Claire Smith
Editor

Encyclopedia of Global Archaeology

SpringerReference

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With 2619 Figures and 106 Tables

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For Jacko

Also dedicated to

James Alexander Smith

Annette Pauline Vera Smith

Charles Thurstan Shaw

Thomas Walter Willis

Preface

Archaeology – the study of human cultures through the analysis and interpretation of artifacts and material remains – continues to captivate and engage people on a local and global level. The significance of such international heritage sites such as the pyramids – both Egyptian and Mayan – the Lascaux caves, Stonehenge, and Petra all provide insights into our ancestors and their actions and motivations. However, there is much more to archaeology than famous sites. When archaeologists are asked to elaborate about their job, they will touch on archaeological theory, chemistry, geology, history, classical studies, museum studies, ethical practice, and survey methods, along with the analysis and interpretation of their sites. Archaeology is a much broader subject than its public image and branches out to many other fields in the social and hard sciences.

The *Encyclopedia of Global Archaeology* provides a comprehensive and systematic coverage of archaeology that is unprecedented. It encompasses the breadth of the subject area along with those aspects that are tapped by other disciplines. In addition, it encompasses all time periods and regions of the world and all stages of human development. The entries range from succinct summaries of specific sites and the scientific aspects of archaeological enquiry, to detailed discussions of archaeological concepts, theories, and practice, the social and political dimensions of archaeology and archaeological ethics. The different forms of archaeology are explored, along with the techniques used for each and the challenges, concerns, and issues that face archaeologists today.

This 11 volume *Encyclopedia of Global Archaeology* is available in both print and eReference versions. The print version has 1,625 contributions from 1,356 authors and over 11,634 cross-references. At the time of publication, another 200 entries have been commissioned for the eReference version. Through constant updating, the eReference version of the *Encyclopedia of Global Archaeology* will continue to access the best scholarship from around the world. Our aim is to ensure that this reference work will be as useful in twenty years as it is in two years.

An Encyclopedia for a Global World

The *Encyclopedia of Global Archaeology* was designed to be a definitive reference work for archaeologists, cultural heritage managers, and the general public. Its major aim is to disseminate global expertise in archaeology.

We have achieved this through four innovations: an unparalleled level of contributions from archaeologists who do not normally publish in English, the conscious inclusion of multiple perspectives on key topics, biographies of major archaeological figures from throughout the world, and the combination of print and continuously up-dated eReference publication.

The first major challenge for this encyclopedia was to access the best scholarship in the world. However, there was a fundamental problem – archaeological experts around the globe do not always write in English. The best scholars from throughout the world write in a variety of languages. For example, the problems of site conservation and preservation can be very different in different parts of the world – and the experts publish in their own languages. Moreover, not all specialist knowledge is published in English. Some of the most advanced thinking on archaeological theory comes from South America, while the French and Spanish have the deepest knowledge of Upper Palaeolithic rock art and the place to learn about large-scale urban excavations or historic reconstructions is Japan. The experts from these countries publish their research in their own language. While some also publish in English, many don't – and even scholars who speak English can be reluctant to publish in English, as they may not have the level of written competency to fully express the complexity of their ideas.

The answer was to allow non-English-language speakers to contribute to the encyclopedia in their own language. This accessed a torrent of hitherto untapped expertise. Around 140 entries and more than 300,000 words in the *Encyclopedia of Global Archaeology* have been translated from French, Italian, Portuguese, Russian and Spanish. In addition, many more entries were submitted by authors whose first language is Chinese, German, Japanese or Turkish. Often, these entries involved significant editing, re-writing, and polishing in order to ensure academic standards and clear communication. This painstaking work was undertaken by the editors of the relevant sections and by myself. The authors and translators often had to review several versions of the text, and they did this without complaint. This cooperative and cosmopolitan approach has brought enormous strengths to the encyclopedia and produced something that is quite different to what has come before.

The second challenge was to maximize the value of the *Encyclopedia of Global Archaeology* as a teaching resource for schools, colleges, and universities. Some of the best learning is achieved through comparison and debate. Accordingly, we have included multiple and regional perspectives on key topics to facilitate comparisons, especially at a global level, and provide rich materials for classroom debates. The ethics of commercial archaeology, for example, has individual entries that provide perspectives from Australia, Brazil, Japan, Nigeria, Southern Africa and the USA. While each entry provides an in-depth discussion of the issues that affect a particular region, taken together, these entries provide the materials required for students to undertake analyses of contrasts and comparisons at a global level.

The third challenge was to honor the work of archaeologists from throughout the world. The biographies in the encyclopedia were selected by section editors on the basis of the contribution of particular archaeologists to specific

disciplinary areas and also through recommendations from archaeologists in underrepresented countries. While we attempted to obtain some form of uniform global coverage in archaeological biographies, this was not possible as archaeology is at different stages of development in different parts of the world. The need to build archaeological capacity is greatest on the African continent. The small number of biographies of African archaeologists reflects the small number of archaeologists in the continent as a whole. While the vast majority of these archaeologists are located in South Africa, there are key nodes in countries such as Kenya and Nigeria. Sometimes these nodes are an outcome of capacity building that occurred as part of colonial processes, as with the life work of Charles Thurstan Shaw. Some biographies honor the work of archaeologists who spent their lives building capacity in a part of the world that is not their home country, as with the work of Betty Meggers in South America. All of the biographies provide insights into the life histories of archaeologists in various periods and in diverse parts of the world. Moreover, cultural attitudes are apparent in the profiles of biographies for each region. For example, while many Portuguese biographies are of mid-career archaeologists who are still alive, the majority of biographies of Japanese archaeologists are of people who established important facets of the profession and have now passed away.

The final challenge was to harness the potential of an online environment not only to ensure global accessibility but also to enrich the encyclopedia's content. From the beginning, the *Encyclopedia of Global Archaeology* was conceived firstly as an online reference work, and then as a print reference. This interactive, online reference uses dynamic content to deepen discussions and to update material published in the print version, and to add information on new finds, or new ways of approaching the material. Hot links and extensive cross-references between keywords and related articles provide topics with greater depth and enable efficient searches in a user-friendly manner. The important innovation here is the continuous updating of entries and the addition of new entries to the eReference version. This will ensure that the encyclopedia maintains ongoing relevance.

15 July, 2013

Professor Claire Smith
Adelaide, Australia

Acknowledgments

My motivation to produce an encyclopedia originated in my childhood, when my mother, Annette Smith, used her hard-won wages to purchase weekly installments of the *Columbia Encyclopedia*, a one-volume encyclopedia produced by Columbia University Press. Each week, my sister, Jo, and I would take pleasure in discussing the newest entries with our mother. It was in these conversations that we both learnt a love of scholarship. Decades later, in 2008, the genesis of the *Encyclopedia of Global Archaeology* arose out of a conversation between Teresa Krauss, a senior editor at Springer, and myself over lunch at a restaurant in Vancouver. This first discussion was followed by workshops and meetings in Atlanta, Dublin, Memphis, Hawaii, and, regularly, New York. It has taken five years to bring this encyclopedia to fruition.

While this encyclopedia is much more than the sum of its parts, each of these parts was essential to the final product. There are many people to thank. I am grateful to the individual authors, who have shared their knowledge and expertise. The vision and architecture of this encyclopedia has been steered by the International Advisory Board, while the untiring efforts of section editors ensured that high quality and polished entries came in on time. In addition, I thank the members of our editing and production team, which includes all of the translators, but especially Lilén Malugani Guillet from Universidad Nacional de Catamarca in Argentina; administrative assistant, Cristina Lanteri; in-house editor, Christine Hausmann; and managing editor, Jo Smith. Each person has provided contributions that are essential to the success of the encyclopedia.

I thank the following people who helped me to proof read the 8,160 pages of the Encyclopedia: Heather Burke, Cherrie de Lieuen, Dianne Riley, Peta Straiton, Bradley Guadagnin, Chelsea Colwell-Pasch and Vanessa Sullivan.

Those who seek insight into the role of the editor should look up the YouTube clipping "C is for Contrafibularity," from the BBC program Blackadder, in which the writer Samuel Johnson celebrates having completed his lifework of a dictionary with every word in the English language – only to be accosted by a host of new words. Like the English language, archaeology is constantly changing and growing. While this is the most globally comprehensive encyclopedia of archaeology produced to date, it is not possible to have an entry on every possible subject. People should use this encyclopedia as a first stop for obtaining information on a topic and as a directory to further

specialist information. Those seeking greater knowledge on a specific topic should use the reading lists provided to identify specialist publications. Readers should be prepared for some of these readings to be in a language other than English.

The translated entries, which are a critical and definitive characteristic of this encyclopedia, have been made possible through support from Springer-Verlag and through two grants from Flinders University in South Australia, one from the Faculty of Education, Humanities and Law and one from the School of Humanity. This support has allowed the encyclopedia to contribute to the democratization of archaeology globally. By accessing the work of the finest scholars, no matter what language they write in, we have replaced English-language networks with *international* networks and produced an encyclopedia that is truly global in scope.

15 July, 2013

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Professor Claire Smith teaches archaeology at Flinders University, Adelaide, Australia. Her primary research interests are the ethics of archaeological practice, rock art, and gender. While she has conducted field research with Aboriginal communities in Australia, Asia, and North America, she mostly works with Aboriginal people from the Barunga region of the Northern Territory, Australia, and with Ngadjuri people in South Australia. Her current research focus is on helping to close the 17-year life expectancy gap that exists between non-Indigenous Australians and Indigenous people living in remote communities by using Indigenous strengths in cultural heritage to lift the educational and employment attainments – and life chances – of Indigenous Australians. In addition to over 120 scholarly articles, reviews and reports, Professor Smith has produced nine books, including *Country, Kin and Culture*, a history of the communities that she works with in the Northern Territory; *The Archaeologist's Handbook* (with Heather Burke); and *Indigenous Archaeologies* (coedited with H. Martin Wobst). Professor Smith is the twice-elected president of the World Archaeological Congress. She served in this position from 2003 to 2014.

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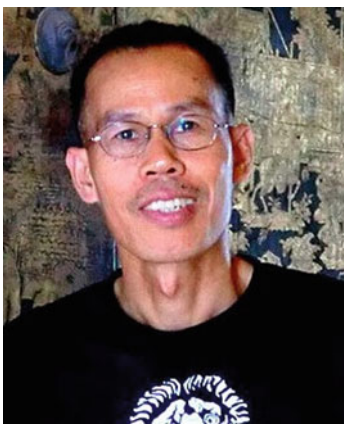

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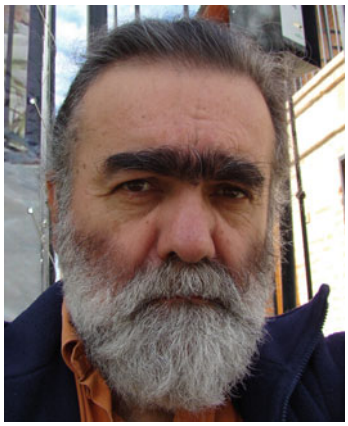

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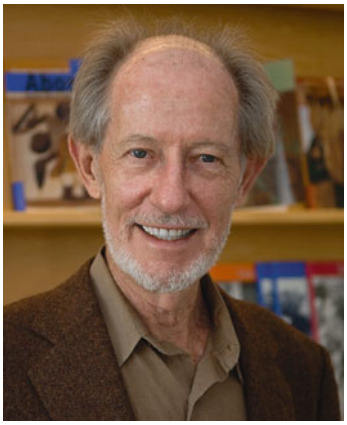

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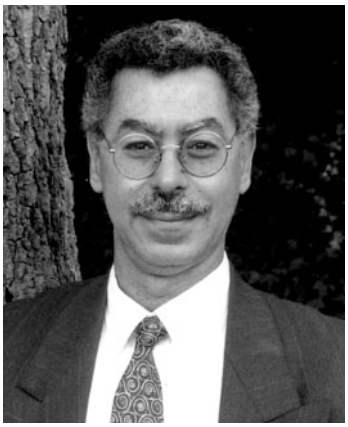

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Abu Hureyra: Agriculture and Domestication

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Introduction

The prehistoric settlement of Abu Hureyra (35° 52′ N, 38° 24′ E) was located on the edge of the valley of the Euphrates River in northern Syria. It was a very large (11.5 ha) mound composed of two superimposed villages, Abu Hureyra 1 (c. 13,400–11,500 CalB.P.) and Abu Hureyra 2 (c. 10,600–7,500 CalB.P.) with an Intermediate episode of occupation (c. 11,500–10,600 CalB.P.) (Moore et al. 2000: Fig. 14.1). The site was thus continuously inhabited for 6,000 years. Culturally, Abu Hureyra 1 had late Epipalaeolithic affinities while the Intermediate Period and Abu Hureyra 2 fell within the Neolithic of Western Asia.

Key Issues

The site was excavated in 1972 and 1973 as part of an international salvage campaign that preceded the completion of a dam across the Euphrates. The site was flooded in 1974. Seven trenches were dug across the site to establish the sequence of occupation. These demonstrated that the initial settlement of Abu Hureyra 1 was confined to the north-west sector of the mound. The bulk of the deposits was derived from the much more extensive settlement of Abu Hureyra 2.

All the soil was dry-sieved to ensure near-total recovery of artifacts and animal bones. Given the potential of the site to yield information about the formative stages of agriculture, the excavators systematically employed flotation to recover large samples of plant remains. The 2 t of animal bones and 500 l of plant remains retrieved by these methods provided important insights on changes in the economy and environment.

The initial settlement at Abu Hureyra in Period 1A consisted of multichambered pit dwellings dug into the subsoil that were covered with a timber framework and roofed with reeds. This settlement was occupied year-round and lasted for 500 years. The form of the settlement changed abruptly in Periods 1B and 1C. The inhabitants built their huts on the surface of the ground with a frame of wooden posts and floors of trodden earth or clay. Finds of human bones suggested that some of the deceased were buried within the settlement.

The most numerous artifacts were made of chipped stone. Microliths, especially large lunates, and also scrapers and notched pieces, were conspicuous. A few fragments of obsidian were imported from Anatolia to the north. The bone artifacts included bipoints used as arrowheads, many awls, and some pins. Many of the other tools were made of basalt, among them grinding dishes, querns, rubbing stones, pestles,

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and mortars. These were used to prepare food and to grind pigments. Notched pebbles were probably used as sinkers for fishing lines and nets.

The inhabitants of Abu Hureyra 1A were hunters and gatherers who consumed a diverse range of foods. They collected over 100 species of edible plants (Moore et al. 2000: 369), of which wild cereal grains, feather grasses, club rush, knotgrass, millets, and chenopods were staples. Persian gazelles were the main source of meat. Herds of these animals were hunted using animal traps as they migrated past the site in the spring (Legge & Rowley-Conwy 2000: 449). The other main game animals were onagers, wild cattle, sheep, and hares.

An abrupt change in economy took place in the transition from Period 1A to 1B, c. 12,900 CalB.P. The sudden onset of the Younger Dryas climatic phase caused a prolonged drop in temperature and increase in aridity that significantly altered the environment (Robinson et al. 2006: 1536). Many of the staple plant foods diminished in abundance. The villagers responded by adopting farming (Moore et al. 2000: 479; Hillman et al. 2001). Among their crops were domestic rye, einkorn, and lentils. Cultivation of crops provided increasing amounts of food thereafter, and the population of the settlement grew as a result. The inhabitants continued to hunt gazelle as before, but they modified their pattern of plant gathering.

During the Intermediate Period and Period 2, the nature of the settlement changed remarkably. The houses in this densely packed village were built of mudbrick, were rectilinear in plan, and contained several rooms. Following the development of farming, the settlement grew very large until in Period 2B its population numbered between 5,000 and 6,000. Its economy was based on an array of cultivated cereals, rye, several wheats and barley, and legumes, including lentils, peas, vetches, and chickpeas. The villagers also raised flocks of sheep and goats, while continuing to hunt gazelle. Then, in the transition from Period 2A to 2B, c. 9,300 CalBP., hunting of gazelle sharply declined because of overexploitation. The inhabitants maintained the meat supply by rapidly expanding their flocks of sheep and goats, and added domestic cattle and pigs to the mix. By this time, hunting and gathering had ceased to contribute much to the diet.

The artifacts in Period 2 were significantly different from those of Period 1. The chipped stone industry was composed of large tools on blades, notably arrowheads, burins, and endscrapers, with a few sickle blades. Many of the artifacts were used to kill and butcher game. Small but regular amounts of obsidian attested to continued long-distance contacts with central and eastern Anatolia. Bone tools, including awls, needles, and spatulae, were used in basketry, leather working, cooking and as ornaments. There were relatively few ground stone tools in Period 2, so most agricultural and food-processing implements were presumably made of wood and other perishable materials.

Conspicuous among the remains from Period 2 were burials of humans. These were usually single inhumations or, occasionally, group burials in shallow graves under the floors of houses (Moore & Molleson 2000: 278). More women than men were buried in these locations, indicating a strong link between women and the home. Skulls were often buried separately from the rest of the corpse. The burials were the final stage in a lengthy series of rituals involving sequestering of the body while the flesh decayed. These elaborate burial rites reveal a rich ideology with reverence for ancestors and belief in an afterlife.

Many of the skeletons were sufficiently well preserved to yield vivid evidence of the lives these people had led. Most exhibited traits that indicated that they had worked extremely hard. The females, in particular, had developed a series of injuries caused by spending many hours of the day grinding grain on a saddle quern for food (Molleson 2000: Fig. 11.8).

Abu Hureyra is significant because it documents the transition from hunting and gathering through a continuous sequence of occupation at

a single site. Year-round sedentary life based on specialized hunting and gathering preceded the transition to farming. The transition itself was precipitated by an abrupt climatic change, the onset of the Younger Dryas. The subsequent development of agriculture was a lengthy step-by-step process that culminated 5,000 years later in a mature mixed farming system. The inception of farming had extraordinary consequences at Abu Hureyra, from the massive growth in the population of the village to its impact on the people themselves.

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Basic Biographical Information

George H. O. Abungu, a Kenyan, is among some of the well-known African archaeologists. He has had a tremendous academic career, establishing himself as one of the leading heritage professionals who have played a pivotal role in the management of Africa's rich past. His illustrious career should be an inspiration to the younger generation of African scholars who take up an interest in the discipline of archaeology and heritage management.

George trained as an archaeologist at the University of Nairobi Kenya between 1980 and 1984 with an Honors degree in archaeology and was subsequently employed as a Research Trainee with the National Museums of Kenya (NMK). A year later, in 1985, he got a scholarship to study at Cambridge University in England, United Kingdom, where he received an M.Phil. (1986) and a Ph.D. (1989) in archaeology. His Ph.D. research was titled *Communities on the River Tana: An Archaeological Study of Relations Between the Delta and River Basin, AD 700–1890*.

Dr. George Abungu went back to Kenya and continued working for the NMK as a Coastal Archaeologist. Between 1984 and 2002, he served in a number of positions beginning as a Research Trainee in 1984; a Senior Research Scientist 1987–1990; Head, Department of Coastal Archaeology 1990–1995; Head, Coastal Museums Programme 1992–1995; Deputy Director, NMK 1996–1997; and a Director, Regional Museums, Sites, and Monuments 1997–1999 and the Director General of the NMK, 1999–2002 when he left NMK.

Besides working for the NMK for almost two decades, Dr. Abungu has had many other professional responsibilities over the years, among them, Founding Chairman of Africa 2009 Program, and Founding Chairman for the Centre for Heritage Development in Africa (CHDA). He was a Research Associate (2001–2009) with the Field Museum of Natural History in Chicago, a Committee Member and African Representative on the ICOMOS International Committee on Underwater Cultural Heritage, and a Kenyan Representative on the UNESCO World Heritage Committee (2005–2009). Other positions of responsibilities he has held include World Archaeological Congress (WAC) Council Member from 1997, Chairman of the International Standing Committee on the Traffic of Illicit Antiquities (since 1999), Global Heritage Fund Advisory Board Member (from 2002), Member of the Executive International Council of Museums 2004–2010, and Vice-President of International Council of Museums (ICOM) from 2010.

In well over two decades, Dr. George Abungu has actively worked to ensure that the preservation of the rich African heritage and training of heritage professionals including heritage managers is not only enhanced but well established. His knowledge has been sought after, and he is often a key note speaker to many international conferences as well as guest lecturer to a number of universities, in Africa and beyond. Dr. Abungu's efforts have not gone unnoticed and most recently became the recipient of the *2012 Association for Research into Crimes Against Art (ARCA) Award for Lifetime Achievement in Defense of Art 2012* as well as the recipient of *Knight in the Order of Arts and Letters of the French Republic*. He is also a recipient of the *Life Prize in Museology* (2007), as well as *Passeur du Patrimone*, of Ecole du Patrimone Africa (2009).

The Kenyan authorities have also honored this high achiever as he is one of the three professionals whose contributions were celebrated by the NMK during its centenary celebration in 2011. In particular, Dr. Abungu was honored for the contribution he made to research and the development of Coastal Archaeology in Kenya.

Besides being a museum professional and training many aspiring heritage professionals, Dr. Abungu has been a scholar of note. He has published extensively and his publications have covered a wide range of subjects, from archaeology, heritage management, heritage legislation, to museology. He is currently undertaking research on one of the most significant challenges in this century, that of the relationship between heritage conservation and development. In the case of an African continent that lags behind in service delivery to its citizens, the conflict between managing Africa's rich past and encouraging development has become a big challenge. Additionally, Dr. Abungu is an Editorial Member for among other publications, *Public Archaeology* and *African Archaeological Review*.

He is a Founding Director of the Okello Abungu Heritage Consultants, a company, through which he offers specialized expertise to a number of heritage institutions in Africa and beyond, particularly in the areas of heritage management and planning, training, and policies relating to the management of World Heritage sites and heritage training programs in the field of world heritage in and out of Africa.

Major Accomplishments

As a trainer, mentor, and advisor, Dr. Abungu has been instrumental in efforts to improve the management of World Heritage and other sites in Africa. He is among the scholars who have pushed the African position at the World Heritage Committee (WHC) and other international forums to ensure that the rich heritage of the continent is adequately represented on the World Heritage List and supported. Among some of his accomplishments in this area has been the writing of Management Plans for Lalibela WHS (Ethiopia), Kilwa Kisiwani and Sogo Mnara WHS (Tanzania), Robben Island (SA), and nomination dossiers for Mijikenda Kaya (Kenya), the Kenya Rift Valley Lakes System (Kenya), and Le Mourne (Mauritius) among others. He is also the Founding Coordinator for the World Heritage Nomination Course in

Africa 2008–2012 and the African Regional Coordinator for the UNESCO African Periodic Reporting 2010–2011. Both of these exercises have not only led to the increase of the number of African heritage sites on the UNESCO World Heritage List but also to the improvement in the conservation of the heritage in Africa.

An advocate against the illicit trade in African heritage, Dr. Abungu was recently recognized for his commitment to this through the 2012 ARCA award. He was instrumental in the return to Kenya of the looted vigango, which are the traditional grave markers. Many of these traditional grave markers were stolen from the Mijikenda Kayas, which are now on the World Heritage List. Their return followed a process of repatriation Dr. Abungu began with his American colleagues many years ago when he worked on Kenya's Coastal Archaeology and as the Director General of the National Museums of Kenya.

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Académie Internationale de la Pipe

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Basic Information

The *Académie Internationale de la Pipe* (Academy for the Study of Tobacco and Tobacco Pipes) is a learned society which, according to its statutes, was established "to advance the education of the public in the economic and social history of tobacco and pipe smoking worldwide." Specifically, it attempts to promote a better awareness of the tobacco pipe as a cultural, artistic, and social phenomenon and to highlight the particular place the pipe holds in the history of peoples and civilizations. It supports and encourages the collecting of both artifacts and documentary information about pipe smoking and encourages serious research on pipes and related subjects.

The Academy came into being in 1984 on the initiative of a Frenchman, André-Paul Bastien. Initially based in Italy, it moved to France in 1992. Membership of the Academy consists of three distinct constituencies: serious collectors of pipes and tobacco related artifacts, curators of national museum and specialist museum collections, and academics involved in the study of the

archaeology and socioeconomic history of tobacco and smoking. Originally, the Academy might be described as elitist in that only two academicians were permitted from any one country and applications were intensively vetted. There was a secondary layer of "corresponding" members as well as institutional and sponsor involvement.

In 2008, the Academy moved its head office to Liverpool where it is housed within the School of Archaeology, Classics and Egyptology at the University, under new charitable articles of association (UK Registered Charity Number 1126166). Its address is: Room B3, 12 Abercromby Square, University of Liverpool, L69 7WZ. Its website can be found at: www.pipeacademy.org. Under its new articles, there is a single category of individual membership which is now open to any *bona fide* researcher and can include any number of people from the same country, including women.

Major Impact

The Academy has always tried to promote knowledge and research about tobacco pipes and their use in every era, in all parts of the world and from every angle, whether cultural, artistic, scientific, sociological, or ethnographic. It does this in three main ways: by organizing conferences at different centers at which members are able to discuss major themes, by the formation and activities of working groups of members, and by a program of publication.

The most recent conferences have been held in Ruhla (Germany, 2006), Metz (France, 2007), Liverpool (UK, 2008), Budapest (Hungary, 2009), Grasse (France, 2010), Novi Sad (Serbia, 2011), and Gdansk (Poland, 2012). The conferences are usually focused on regional pipe collections and are intended to promote research and local appreciation of them. For example, the Budapest conference resulted in a series of papers on the archaeology of the clay pipe in Hungary and eastern Europe which, together, have transformed understanding of the industry in that region (Ridovics & Davey 2010). At Grasse, the meeting focused on the outstanding pipe collection assembled by Baroness Rothschild in the second half of the nineteenth century. On this occasion, members of the Academy were able to advise the local library service not only about the academic significance of items within the collection, but also of the means of improving its conservation and public access. In preparation for the 2011 conference, Novi Sad Museum organized an exhibition of pipe collections from museums throughout Serbia and published a definitive catalog which has advanced knowledge of pipe production and consumption in that country to a considerable degree (Gačič 2011).

Two of the Academy's working groups have recently published wide-ranging papers as a result of their deliberations. The clay pipe group has produced summaries of the state of research in 19 countries which include historical overviews, accounts of the products, bibliographies, and proposals for future research (Davey 2009). The Meerschaum pipe group has published a symposium on iconography that was presented at the Grasse conference (Burla et al. 2011).

Between 1996 and 2008, the Academy regularly published the *Livre de la Pipe* in French, English, and German. It also produced 19 issues of an annual newsletter the *Annales* from 1987 until 2006 and a number of occasional publications such as an account of the first English pipe-smoking merchant to be based in Japan during the first years of the seventeenth century. Since the move to Liverpool in 2008, the Academy has launched a new A4, full-color, peer-reviewed journal – *Journal of the Académie Internationale de la Pipe* – that is now the main public platform for pipe research worldwide.

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Acheulean Industrial Complex

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Introduction

For almost a million years in Africa during the first phase of human cultural development known as the Oldowan industrial complex, there appears to have been little directional change in tool technology. As sophisticated and variable as that technology had been, many archaeologists justifiably consider it a time of relative technological stasis, with differences across assemblages being relatively minor. Although the success of the simple core and flake adaptation was evident in its long endurance, by 1.7 Ma innovations began with the appearance of the Acheulean. An adaptive and technological threshold was crossed with the knapping of large flakes (>10 cm in size) and the shaping of heavy-duty tools (handaxes, cleavers, and picks) for specific tasks. The Acheulean industrial complex, together with the Oldowan, is referred to as the Earlier Stone Age (ESA) and persisted until c. 0.3/0.25 Ma in Africa. Mary Leakey (1971) published the first detailed description of the Early Acheulean, using the EF-HR assemblage from Olduvai Gorge as her descriptive type series. Over the years, research has fleshed out a deeper understanding of the Acheulean complex across the African continent.

Although Leakey preferred the term *biface* to the functionally defined types of cleaver and handaxe, the best generic term today for these diagnostic types is the large cutting tool (LCT). This term is preferable because handaxes are not always bifacial and also because picks (which are sometimes trihedral) were not usually discussed as bifaces. Many LCTs are made on large flakes because such blanks are relatively thinner, with accessible edges, making it easier to shape the piece, but cobbles were also used for handaxes in some assemblages and very occasionally for cleavers. At some sites, there are preferences of particular raw materials for LCTs, such as large lava or quartzite cobbles and boulders, because they yielded large flakes of better size and quality. Overall, the technology of many of the earliest Acheulean assemblages is relatively similar to the classic Oldowan or only slightly more advanced in core working strategies, with large flakes and LCTs largely an added component. However, there are some clear behavioral changes apparent in the size and distribution of sites from 1.7 Ma. A trend toward larger sites and greater densities of stone tools within a site reflect a more habitual dependence on lithics for daily subsistence, and there is a more sustained use of some venues as strategic locations or for seasonal resources. Sites now also occur in a greater variety of environments, including the more consistent use of open habitats. Occasionally, some raw materials are transported further distances than in the preceding Oldowan, reflecting the broader use of landscapes.

The controlled use of fire almost certainly was a further innovation in the Early Acheulean, especially as it provided a means of defense against carnivores in open habitats where hominids competed for game. However, the interpretation of early campfires is controversial due to poor preservation in open-air sites. A few East African sites c. 1.5 Ma contain burnt sediments accepted by many researchers as plausible evidence of campfires, as heat of a certain temperature must be sustained long enough to alter the ground. There is also patterning at some sites in the spatial distribution of lithics and bone around these burnt features, which strengthens the argument for the controlled use of fire in the Early Acheulean. By 1 Ma, there is evidence for bones burnt in campfires and washed into an underground cave deposit at Swartkrans. Also c. 1 Ma, Wonderwerk Cave is argued to show in situ burning of vegetation in an Acheulean layer. While wood charcoal is absent, it may not have survived if burnt to ash (M. Bamford, *pers. comm.*). By 0.8–0.7 Ma, however, the open-air site of Gesher Benot Ya'aqov in Israel has burnt artifacts and charred botanical remains with a patterned distribution that suggests activities associated with hearths.

Key Issues/Current Debates

The Earliest Acheulean

The appearance of a new African hominid, *Homo ergaster* (Fig. 1), is the most plausible explanation for the behavioral and technological changes that appear with the Acheulean. This species has more sapient-like traits than *Homo habilis*, including modern human body proportions which provided an advantage in open habitats. Many researchers group *H. ergaster* with *Homo erectus* or refer to it as African *Homo erectus*, while others restrict the *erectus* species to Asia, which is the classification followed here. The earliest appearance of *H. ergaster* is dated to 1.78 Ma in Kenya (Lepre & Kent 2010) and to >1.7 Ma at Swartkrans in South Africa (Pickering et al. 2012). At Sterkfontein, it is found in direct association with Early Acheulean artifacts (Kuman & Clarke 2000). The species persists until at least 1.4 Ma, and thus there is a good match with Early Acheulean chronology.

Many of the historically important debates concerning the Early Acheulean are today increasingly less relevant. For example, Leakey's 1971 classification system regarded many core-based forms as tools rather than cores, considering the sharp edges created by platform intersections to be working edges. She then used a quantitative analysis of these types (which included the "bifaces") to arrive at her formal definition for the Acheulean industry: an assemblage in which 40 % or more of the "tools" consist of bifaces. Assemblages which did not meet this criterion were designated as Developed Oldowan. However, few researchers today use this term as the technical differences once considered important have other, better explanations. Today the range of variability in the Early Acheulean is clearer, and technological and behavioral traits that reflect the increasing complexity of the adaptation allow researchers to recognize such assemblages even when LCTs are absent due to activity differences or small sample sizes.

Kokiselei (West Lake Turkana, Kenya) is the earliest dated Acheulean site at 1.76 Ma (Lepre et al. 2011). Other dates for East African sites are as follows: 1.7 Ma at Konso, Ethiopia; 1.6–1.4 Ma at Olduvai in Middle and Upper Bed II; and c. 1.5–1.4 Ma at East Lake Turkana, Kenya (see Lepre et al. (2011) and Gibbon et al. (2009) for references). Additional Early Acheulean sites at Gona, Ethiopia, have been announced by Sileshi Semaw but are still unpublished, as are new finds in Algeria presented by Mohamed Sahnouni. In South Africa, equally early Acheulean assemblages are well established in the karst hominid sites of Sterkfontein and Swartkrans (Kuman 2007). Faunal ages for cave breccias with Early Acheulean are c. 1.5 Ma and 1 Ma at Swartkrans and c. 1.6 Ma at Sterkfontein. While there have recently been claims for younger ages at Sterkfontein in a number of deposits, the absolute methods employed have their own problems at

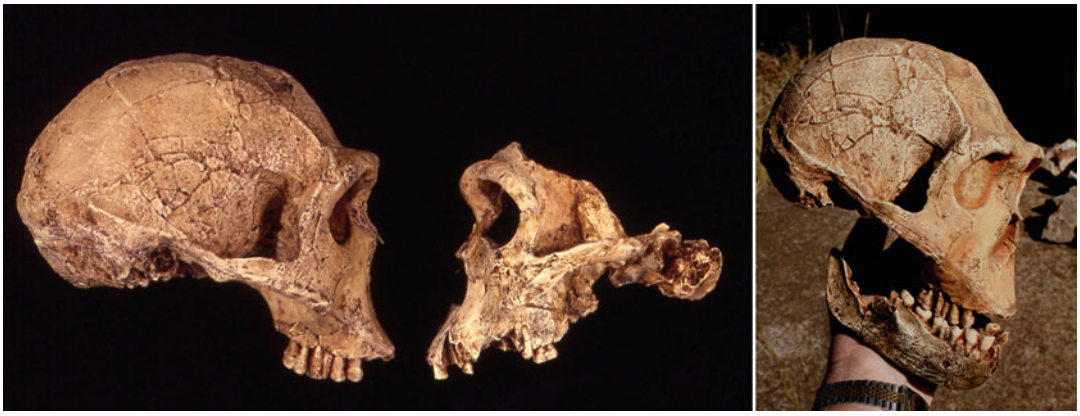

Acheulean Industrial Complex, Fig. 1 The earliest Acheulean is contemporary with a new hominid species, *Homo ergaster*, considered to be responsible for cultural innovations. KNM-ER 3733 from Kenya (*left*) is the most complete cranial specimen and is shown facing SK 847 (*center*) from Swartkrans, which was the first discovery of this species. At right is the type specimen, the KNM-ER 992 mandible from Kenya, shown together with 3733. They are not the same individual (All photos are of casts, courtesy of R. J. Clarke.)

these karst sites. Palaeomagnetic and U-Pb dates for Sterkfontein have been argued based on speleothems, but these have formed postdepositionally after the collapse and settling of breccias created voids that later filled with flowstone. Also problematic are younger electronic spin resonance dates proposed for the Sterkfontein Acheulean. Typologically and technologically, the LCTs are comparable to Early Acheulean examples from East Africa, and at this stage, the relative faunal age is more reliable. Karst cave breccias are particularly prone to the migration of groundwater through deposits, which compromises the closed system needed for ESR dating.

In interior South Africa, Early Acheulean is also now well documented in alluvial deposits of the Vaal River basin (Fig. 2), where cosmogenic nuclide burial dating documents artifact-bearing deposits ranging from 1.9 to 1.3 Ma (Gibbon et al. 2009). Although the error margins of the dates are large, their great age means that the sites still fall within the Early Acheulean. Subtracting the error from the oldest dated deposit results in an age of 1.7 Ma, which is as early as two of the East African sites (Konso at 1.7 Ma and Kokiselei at 1.76 Ma). Due to the limitations of geological preservation and dating, the Early Acheulean industries of East and South Africa currently provide our best evidence for the widespread distribution of this complex by 1.7 Ma. Undated but typologically equivalent artifacts are reported in Mozambique, and evidence will be published for Algeria, but other parts of Africa currently lack exploration or datable sites.

Descriptions of Early Acheulean technology and tool types have largely focused on the shaping of LCTs (Fig. 3), as more effort tends to be invested in such tools. Although published details are not yet available, LCTs from Konso and Kokiselei have been described as large pick-like pieces or "pick-like handaxes." The heavy-duty function of these tools may have been for digging underground foods such as bulbs, roots, and tubers. However, such types do not dominate in all the early assemblages. Handaxes from EF-HR at Olduvai and Peninj in Tanzania have been described as largely unifacial pieces – like massive scrapers with robust convergent tips (De la Torre et al. 2008). The notched edges on some examples from Peninj, EF-HR, and Sterkfontein suggest woodworking was another important function. In some assemblages, pick-like handaxes and unifacial handaxes with robust tips and scraper edges are only a minor component of the LCTs, but early handaxes generally all possess strong distals converging to a more or less flat tip for some hacking or cutting function. The degree of trimming to

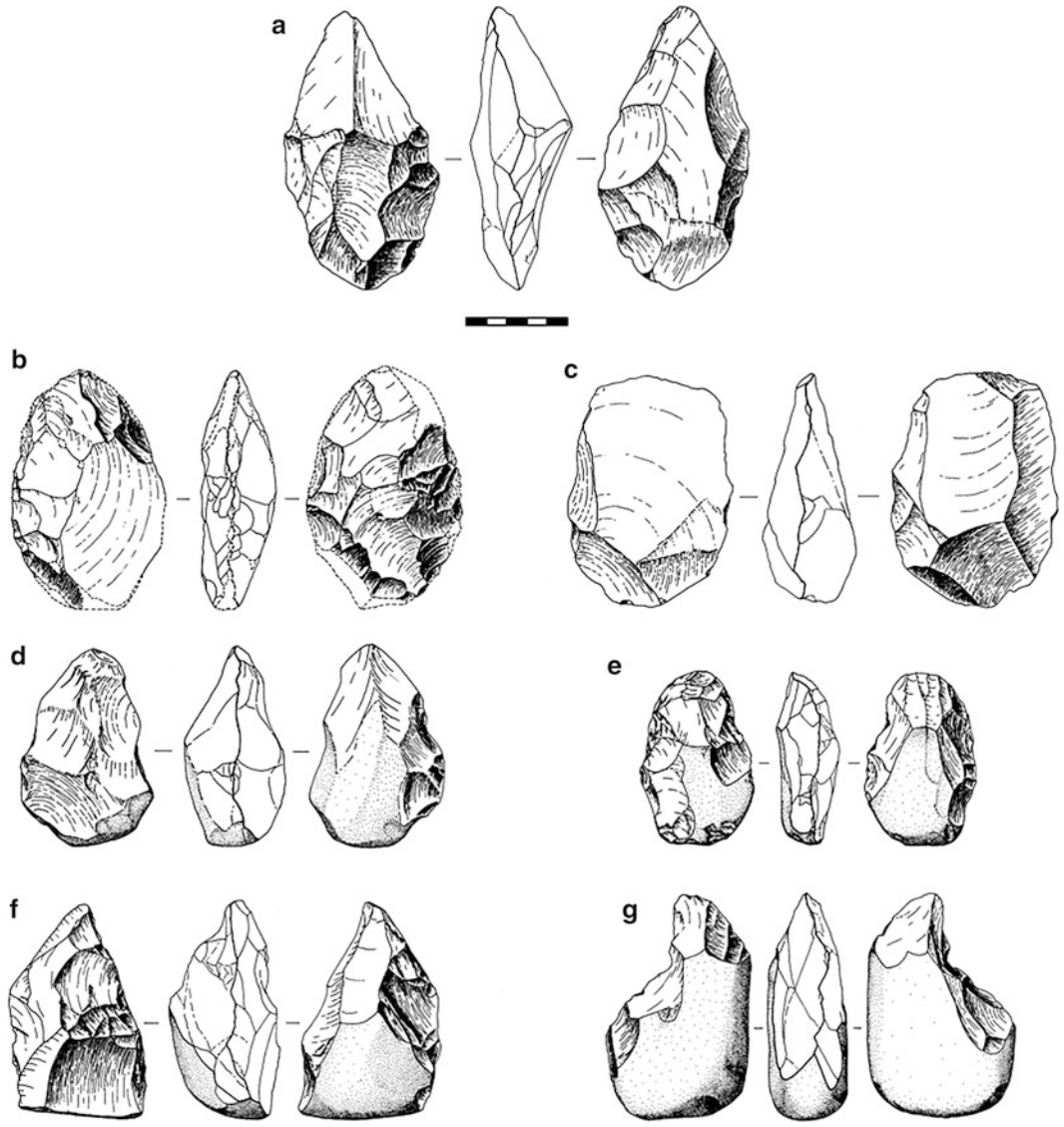

Acheulean Industrial Complex, Fig. 2 Early Acheulean LCTs from Rietputs 15, South Africa, from a trench c. 1.7 Ma. Handaxes (**a**, **b**) and a cleaver (**c**) on flakes; handaxes (**d**, **e**) and picks (**f**, **g**) on cobbles (From Gibbon et al. 2009)

shape a handaxe also ranges from largely unifacial to partly bifacial to fully bifacial. However, many assemblages tend to be dominated by one type of shaping within this range, which is often determined by the degree of re-sharpening. For example, the BK assemblage from Olduvai (Fig. 4) includes some classic bifacial handaxes, along with likely evidence for re-sharpening in the form of distals broken through end-shock during knapping, as well as some very small-sized bifaces. Although some early assemblages are said to be dominated by pick-like handaxes, many researchers are able to distinguish picks as a separate type: an LCT in which the shaping is focused mostly on the distal end, with limited attention given to the body of the piece. Following the Early Acheulean, however, picks and handaxes are easier to separate as discrete types.

Acheulean Industrial Complex, Fig. 3 Early Acheulean LCTs of East and South Africa are comparable. *Right* are from Mary Leakey's type series from EF-HR, Olduvai Gorge; *left* are from Member 5, Sterkfontein

Acheulean Industrial Complex, Fig. 4 Broken handaxes and handaxe tips from BK, Olduvai, most probably resulting from flaking to re-sharpen the pieces

Another very characteristic type in the African Early Acheulean is the cleaver – an LCT made usually on a large flake, with a broad cutting edge at the distal end and/or along one lateral. The cutting edge is referred to as the "bit." It is usually formed by the naturally sharp portion of the large flake blank, but rare examples of bits with large removals do occur in the early assemblages, presumably to regularize the shape of the cutting edge. The making of a cleaver requires some planning for the large flake to be detached in order to produce a sizeable bit. The most classic cleaver type for both the early and younger Acheulean industries is one made on a large side-struck flake – a flake that is wider than it is long, with the bulb at the side of the flake's long axis. The thick platform area is then trimmed with some large removals, and the opposite lateral may also be trimmed (particularly in younger Acheulean assemblages). However, examples of cleavers on corner-struck and end-struck flakes also commonly occur. The sharp cleaver bit implies that the tool was used for a cutting or hacking function requiring a sizeable sharp edge and a tool with weight. Experiments suggest that cleavers make good dismembering tools in butchery, but handaxes and plain flakes can also perform this function. A small number of pieces studied for use-wear traces, micropolish, or phytoliths also suggest that some cleavers may have been used for chopping and scraping wood.

The raw material and the blank's form have a strong influence on the regularity of shape for LCTs, and the Early Acheulean is characterized by both crude and relatively finer examples when made in better raw materials. However, it is essential to remember that LCTs were functional pieces and there was no need for early *Homo* to produce standardized forms, symmetrical handaxes, or elegant shapes. The iconic concept of the classic, symmetrically shaped handaxe or elegant cleaver, when it occurs, is most often found in Later Acheulean assemblages after 0.6 Ma (discussed below). However, it is during the earlier Acheulean that the first handaxe industries appeared beyond the African continent. Ubeidiya in Israel has a sequence of Early Acheulean deposits from 1.4 Ma. Recently, the Early Acheulean has also been recognized in India c. 1.5 Ma with cosmogenic burial dating. The earliest handaxes in China appear by at least 0.8 Ma (at Yunxian in central China and Bose in southwestern China). In Europe, the earliest Acheulean may be as old as 0.9 Ma in Spain, but it only becomes widespread after 0.5 Ma.

From 1–0.6 Ma: Developments Following the Early Acheulean

While sites dated between 1.7 and 1.4 Ma are consistently referred to as Early Acheulean in the literature, there is no consensus on terminology for the following phases of ESA development. This is certainly a result of the limited number of sites and especially dates for the period between 1.3 and 0.78 Ma. Terms such as Early, Middle, and Later Acheulean are also historical labels created at a time when few absolute dates were available. Consequently, some researchers prefer to lump Acheulean sites into only two phases: Lower and Upper Acheulean or Early and Later Acheulean. However, with today's better understanding of Acheulean developments c. 1 Ma, there is perhaps some justification to recognize a Middle Acheulean phase from approximately 1.0–0.6 Ma. East African sites at this time demonstrate improvements in LCT production, as outlined below, and some sites show increased numbers of handaxes. Changes in handaxe flaking are probably the result of more attention paid to creating sharp cutting edges, and picks are now easier to separate into a class of their own.

At Olduvai, the sequence following the Early Acheulean in middle and upper Bed II has been published in some detail (Leakey & Roe 1994). Although the preservation of these younger assemblages is poor relative to the Early Acheulean and dating of these beds is not so precise, Roe was able to characterize changes in technology following the Early Acheulean: the Bed IV handaxes (c. 0.78–0.95 Ma – Peters et al. 2008) show more regularity of shapes and thinner profiles over the Early Acheulean, and cleavers become more frequent and often more elegantly made. These improvements could be considered a Middle Acheulean technology. Following Bed IV are the Masek Beds (c. 0.5–0.78 Ma – Peters et al. 2008), in which handaxe manufacture shows even greater standardization of preferred shapes and a high degree of technological competence. In Kenya, Olorgesailie also has a lengthy sequence dating back to 0.99 Ma. Isaac (1977: 213) classified the site as Upper Acheulean because "reliable chronological distinctions. . . are not possible." However, he commented that the assemblages are not the most refined and that one might be tempted to designate them as Middle Acheulean. Similar improvements over time are also recorded for the long sequence of Acheulean sites in the Middle Awash of Ethiopia (de Heinzelin et al. 2000). Soft-hammer flaking made its first appearance in the Middle Acheulean, with the earliest date for this technique reported from Gesher Benot Ya'aqov, Israel, at c. 0.78 Ma (Sharon & Goren-Inbar 1999). Potential percussors could have been a softer stone (like sandstone), a hardwood billet, or in Eurasia deer antler. The method is useful for detaching thinner flakes that extend further across the surface of an LCT and for finer retouching along the edges. However, the technique is more typically seen used for LCTs in the Later Acheulean.

A handful of hominid fossils is found with industries that could be termed Middle Acheulean. Several specimens from Daka, Ethiopia, are dated to 1 Ma, including a remarkable cranium

described as an evolving form of *Homo ergaster* (deHeinzelin et al. 2000). The illustrated LCTs show better technique and are more regular in form than Early Acheulean examples, but overall they are described as having bold flake scars and are larger and more irregular in plan view and profile than Later Acheulean examples. Also dating to 1 Ma is Buia in Eritrea which yielded a hominid cranium that, like Daka, possesses some progressive features. LCTs show variability across the Buia sites but are comparable in many respects to those of Daka, with bold scars and limited trimming that does not significantly modify the original blank's morphology (Abbate et al. 2004). Olorgesailie in Kenya has also yielded fragments of a hominid cranium at least 0.9 Ma, contemporary with Middle Acheulean elsewhere at the site. For South Africa, little detail is currently available for hominids in this time range as few dates are available for potential sites. An exception is Uitzhoek-Cornelia, but so far this site has only yielded one hominid tooth (Brink et al. 2012).

Most research on Acheulean sites today is focused on documenting the cultural and stratigraphic record of the relevant sites and obtaining reliable dates and palaeoenvironmental information. From a theoretical perspective, however, the "variability selection hypothesis" for hominid and cultural evolution has received widespread acceptance (Potts 1998). It argues that the driving force behind human evolution in the Pleistocene has been climatic change and the periodic fluctuations between moister and wetter environments over hundreds of thousands of years. *Homo* rose to this challenge of variability in climate and subsistence resources and adapted both physically and culturally. Fauna has long been the primary means of reconstructing palaeoenvironments when it is preserved. Isotopic studies (particularly on faunal teeth) are now a major means of analyzing diets, and hence the habitats of hominids and fauna, supplementing data that was previously limited to lists of taxa and their correlation with modern habitats. As the diets of some modern species differed somewhat relative to their past counterparts, isotopic analysis has become a valuable tool to discover those differences. Some researchers also focus on "taxon-free" analysis, studying the details of weight-bearing postcranial bones in relation to habitat substrates, particularly in bovids. And dental microwear analysis has shed further light on subsistence patterns of both fauna and hominids and hence habitat adaptations. Analysis of plant phytoliths and pollen, when preserved, along with stable carbon isotopes from sediments and geomorphological reconstruction, is another means of studying past environments. The varied regional habitats that existed across Africa during the Pleistocene add strength to the Potts hypothesis of fluctuating climates as a driving force in hominid evolution.

Another area of focus in Middle Pleistocene research is the origins of prepared core technology within the Acheulean. The earliest published date for this development is in Israel c. 0.7–0.8 Ma (Goren-Inbar et al. 2011), where there is one prepared core. However, a cosmogenic burial date for the Victoria West industry from Canteen Kopje (South Africa) is older and although the prepared cores are not the most common, they are substantial in number. These two unrelated examples suggest that the ancestor of *Homo sapiens* had relatively sophisticated cognitive abilities which were, so to speak, "hardwired" in the brain. Many researchers believe that the shaping of handaxes gave rise to the concept of core preparation, and the Victoria West industry demonstrates this well (Figs. 5, 6). These almond-shaped cores are flaked initially like a very large handaxe with bold scars. However, the profile is more asymmetrical, with a shallower upper surface and a deeper lower surface. A single large "preferential" flake is struck from the upper surface, perpendicular to the long axis of the core. Such side-struck flakes were particularly suitable blanks for handaxe manufacture. Cleavers may not have been made regularly on these blanks, as the preferential flake scars tend not to have the right shape for a *bit*. Although the Victoria West core is a small component of the overall cores in excavated samples, it clearly shows the conceptual link with handaxe manufacture. "Giant cores" are also present at Gesher Benot Ya'aqov

Acheulean Industrial Complex, Fig. 5 Handaxes from Canteen Kopje's Victoria West prepared core industry, South Africa

(Goren-Inbar et al. 2011). These appear to have been specially targeted for the making of LCT blanks. Hominid size and strength at this time must have enhanced human survival considerably, and this is reflected in the giant cores and the heavy-duty tools.

From 0.6 Ma to 0.3–2 Ma: The Later Acheulean and Final ESA

From 0.6–0.5 Ma, the number of archaeological sites in Africa increases (Clark 2001a), not merely because younger sites are more likely to be preserved but because of the successful adaptation of evolving *Homo sapiens*. A very important influence on this success was undoubtedly the slower rate of maturation of *H. sapiens*, which the increase in site numbers suggests was developing at this time. In contrast, even *Homo ergaster* matured relatively quickly. The specific age of an early *Homo* fossil may be difficult to know for certain, but it is today well documented that the rate at which an early *Homo ergaster* juvenile reached maturity was faster than in modern humans. This fact undoubtedly influenced the character of earlier Acheulean industries. Hominids learned to make tools by observing and learning their group's tradition, but a shorter adolescence would have limited the time for individuals to experiment and innovate. Studies of nonhuman primates show that it is mainly the younger individuals who invent new cultural practices or adopt innovations from others in the group through observation.

While most variability in the Later Acheulean from c. 0.6 to 0.3 Ma can be explained by differences in raw materials and environment (Clark 2001a), there is nevertheless greater skill evident in the flaking of cores, in the acquisition of some better raw materials from distant sources, and in the shaping of the best LCT examples. The most logical explanation for these changes is not the appearance of a dramatically different, more advanced hominid but the increase of more sapient traits and cognitive abilities in the descendants of *H. ergaster*. Some researchers lump the hominids of this phase together as *Homo heidelbergensis*, but most specialists prefer to restrict this species to Europe and refer the fossils to archaic *Homo sapiens*. The relevant fossils are all associated with Later Acheulean and include the Bodo cranium from Ethiopia c. 0.6 Ma, the Elandsfontein skullcap from South Africa c. 0.5 Ma, and the Ndutu cranium from Tanzania c. 0.4 Ma. The Kabwe cranium was retrieved by miners at Broken Hill, Zambia, and is probably at least 0.4 Ma. Middle Stone Age artifacts were also found in the cave deposits but in unknown relationship, while Acheulean and Sangoan assemblages (discussed later) were excavated in situ from open-air deposits not far from the cave.

The earliest cave occupations occur in the Later Acheulean, such as the Cave of Hearths (c. 0.45 Ma), Montagu Cave, and Wonderwerk Cave in South Africa. There are earlier Acheulean levels at Wonderwerk >0.78 Ma, and if the artifacts are in situ, then Wonderwerk

Acheulean Industrial Complex, Fig. 6 Victoria West prepared cores. *Top right* is the prepared upper surface and *bottom right* the deeper undersurface. *Top left* shows a core in profile with an LCT made on a large side-struck flake from such a prepared surface. *Bottom left* are profile views of two cores showing the asymmetry of the two surfaces

would be the earliest cave occupation to date, as the karst cave infills in South Africa are in redeposited contexts that do not represent occupations. The assemblages from these earlier levels at Wonderwerk are small and not well published. It is possible that hominids may have sheltered or slept in the cave rather than lived in it, as some rare baboon and chimpanzee troops have been recorded to do, and this could explain the small tool assemblages.

Open-air sites of the Later Acheulean in Africa are much more numerous, although many remain poorly dated. Exceptions are Kathu Pan in South Africa and Kapthurin in Kenya, both c. 0.5 Ma. Some of the most detailed descriptions of Later Acheulean industries are published for Olduvai, Tanzania (Leakey & Roe 1994), and the Middle Awash Valley of Ethiopia (de Heinzelin et al. 2000). All Later Acheulean assemblages show considerable improvement in skill over earlier phases, even though there is very often a "least effort" approach, with just enough flaking to get the desired edge. The sequence at Kalambo Falls deserves special comment, as it is well described (Clark 2001b) and includes both Later Acheulean and an overlying final ESA industry known as Sangoan. Experienced knappers have commented that the Kalambo LCTs show some of the finest proficiency in the African Acheulean, with refined technique evident in sharp cutting edges around all or most of the perimeter, absence of step fractures, intensive flaking, symmetrical plan forms and cross sections, careful removal of small flakes as a last series of removals to regularize edges, and use of soft-hammer flaking for the finer work. Not all Later Acheulean LCTs are beautifully made, but when effort is invested in a good raw material or the maker is highly experienced, there is great skill evident, demonstrating what Glynn Isaac referred to as the "upper limits" of the abilities manifested in an industry (Fig. 7).

The significance of blades in the Later Acheulean is often noted, as blades require

Acheulean Industrial Complex, Fig. 7 Some of the more finely worked handaxes from the Later Acheulean at Cave of Hearths, South Africa, showing extensive flaking

a purposeful flaking strategy to be made with any consistency. Three of the oldest regional industries with blades date back to 0.5–0.4 Ma (see Wilkins & Chazan 2012 for references). Along with blades, the Fauresmith at Kathu Pan, South Africa (c. 0.5–0.29 Ma), includes some LCTs, points, and prepared cores. Similarly, the Kapthurin industry in Kenya has core preparation and blades from c. 0.55 to 0.285 Ma. In Israel, a third blade technology is the Amudian, c. 0.42–0.32 Ma. These three technologies are unrelated as the techniques differ. In Africa, Acheulean blade tools tend to be associated with more open habitats (Clark 2001a). Another trait noted occasionally in some late assemblages is small-sized LCTs, some of which overlap in length with the larger early Middle Stone Age (MSA) points and unifaces. The most variable and skilled assemblages of the Later Acheulean occur in the late or final phase of the Acheulean, with retouched tools and technology presaging MSA features in some industries (Clark 2001a). Due to such similarities, many researchers recognize regional transitions from ESA to MSA but will label an assemblage Acheulean if it contains LCTs. The Kapthurin and Fauresmith both suggest a slow transition toward Middle Stone Age technology in different parts of Africa.

Clark (2001a) always maintained that the late ESA was the first time that hominids coped with the challenges of more forested environments. The Sangoan was named as a central African industry found in regions that today are tropical. While the original collections were retrieved from disturbed geological contexts, subsequent research has documented it in context, where it always follows the Acheulean in time when both phases are present. The industry is found mainly in central and south central Africa and western Kenya where woodlands were prominent at times. At Kalambo Falls, climates alternated between warmer/moister and colder/drier episodes, indicating that the Sangoan was not specifically a tropical or closed habitat adaptation. Rather it occurred in regions where woodland resources were an important component. Typical tools include small scrapers, picks, and core axes, a type which seems to have functioned as a form of adze for woodworking and cutting toe holds for climbing in trees (Clark 2001b). Acheulean-style handaxes continue to occur in small numbers, and thus some researchers see the Sangoan industry as a variant of the Later Acheulean with the addition of some new types related to the prominence of woodland resources. In Zambia and western Kenya, there are some shared features between Sangoan and early MSA industries, such as the core axes at Kalambo Falls which continue in the early MSA but become increasingly adze-like. In western Kenya, the Sangoan and the Lupemban (an early MSA industry) share so many traits that at least one research combines the terms as the Sangoan-Lupemban Complex. Precise dates are not available for Sangoan industries, but they are at least 0.1–0.2 Ma, and some may be considerably older.

International Perspectives

The most interesting theoretical aspect of Acheulean research is perhaps the "variable sameness" of the industries across time and space in Africa and Eurasia until the Later Acheulean. Even then,

most variability is attributed to raw material differences, and one is still left with an impression that the toolmakers were very clever people indeed, but still relatively archaic in mind and matter when compared to modern humans that appeared by 0.2 Ma with the early MSA. Industries then become considerably more variable, with many regional adaptations that include some stylistic differences, and the pace of change picks up even more during the course of the MSA. Various researchers have debated the meaning of Acheulean variability and the methods used to analyze it both regionally and globally. However, the most informative approach remains a thorough understanding of Acheulean assemblages in the context of experimental flaking with the specific raw materials that influenced their characters. Such hands-on experience always provides valuable insights, often more valuable than detailed morphometric and statistical studies that are popular today, as they help to interpret those factors contributing to the variability. The Acheulean was undoubtedly a highly successful adaptation from 1.7 to 0.3–0.2 Ma ago, with an emphasis on open woodland and grassland subsistence until the appearance of the Sangoan variant. The final ESA, however, is unique, witnessing the transition from more archaic to modern humans by 0.2 Ma. The success of the Early Acheulean and *Homo ergaster* as a species clearly set the stage for these milestones in human development.

Cross-References

- ▶ African Stone Age
- ▶ *Homo ergaster*
- ▶ Human Evolution: Use of Fire
- ▶ Olduvai Gorge Archaeological Site
- ▶ Lithic Technology, Paleolithic

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Basic Biographical Information

Lisa Ackerman is Executive Vice-President and Chief Operating Officer of World Monuments Fund and serves on the boards of Historic House Trust of New York City, New York Preservation Archive Project, and US/ICOMOS. She has previously served as Executive Vice-President of the Samuel H. Kress Foundation.

Major Accomplishments

In 2007 Lisa Ackerman received the Historic District Council's Landmarks Lion Award. In 2008 she was named the first recipient of the US/ICOMOS Ann Webster Smith Award for International Heritage Achievement.

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Activism and Archaeology

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Introduction

For most people, including many archaeologists, archaeology is about the more distant past. Archaeology is more interesting and esoteric than actually being useful. After all, the "archaeo" part of the word means "ancient"! Thus, the past is over and done with, and while it may be intrinsically interesting or provide us with perspective on our lives and cultural changes through time, the past does not seem to be of much use in dealing with contemporary issues. Other archaeologists, however, have called on archaeology to become more action oriented

and for archaeologists to explore more ways to use archaeology to address contemporary problems (Kleindienst & Watson 1956). They want archaeology to matter (Sabloff 2008) arguing that archaeologists "...have responsibilities towards the communities, individuals, and institutions directly implicated by archaeological work into the recent past in helping them come to terms with the obscured and often painful circumstances of contemporary life" (Buchli 2007: 14). To do this, archaeologists must first acknowledge that the past actually includes anything from the briefest moment ago into the depths of time (Patel 2007: 51).

Archaeology is really more about the study of material culture than about the past and can be applied to *any* period of time. Expressed simply, artifacts do not "lie"; they are present or they are not, which in either case may require explanation. Although archaeologists may err in their interpretations, their goal is to recover material remnants of past behaviors and their contexts in order to provide a narrative – a story – about the history of a people, their lifeways, their adaptations to changes in natural and social environment, and what things mean to them. This can be a powerful way of seeing the past, which makes archaeology potentially useful in understanding contemporary concerns. Archaeology's applicability to the present stems from three key elements: studying material culture, building accurate narratives about the past based on what is found, and using the narratives to suggest changes relating to social concerns. To realize this potential, however, requires activism.

Definition

Activism generally is the use of some kind of direct action either in support of or in opposition to a cause or issue. When linked to archaeology, this means that the tools of archaeology are applied in some way to support or oppose an issue in an effort to promote change. Activism requires that archaeologists make choices and then take some sort of political position, usually in collaboration with stakeholders to that issue, in an effort to effect the desired change.

Activism depends heavily on collaboration with non-archaeologists. Projects are sometimes low key exercises in public education about what archaeology does or uses archaeology to address relatively uncomplicated concerns. Several projects, for example, employ archaeology to demonstrate the historical basis and impacts of race in a community, and others use particular archaeological techniques to assist with mass disasters. On the other end of the continuum are projects in which archaeology is only one aspect of studying very complex social problems such as homelessness or global warming. Little and Zimmerman (2010) and Stottman (2010) provide numerous examples spanning the spectrum of activist archaeology projects.

Key Issues/Current Debates/Future Directions/Examples

Two key issues impede activism. The first is that activism requires archaeologists to be political, which many have been loath to do. The second is that even if they are willing to be activists, few archaeologists know how to translate the results of their work in ways useful to the formulation of public policy.

The former stems from archaeology's long struggle to become scientific, and as such, many archaeologists believe that archaeologists and their interpretations must be objective and unbiased. Some altogether reject studies of the contemporary past as even being archaeology, suggesting that they epistemologically reflect postmodernism. As a few activist archaeologists have heard from colleagues, "you do politics, not archaeology!" In spite of the fact that there is disagreement with his assessments, McGuire (2008) has contended, however, that archaeology always has been and still is clearly political.

Accepting archaeology as inherently political, a growing number of archaeologists have moved toward making their research "translational". This means that they "generate

knowledge and utilize evidence to develop meaningful practices that address problems or issues in everyday life and collaborate or form partnerships to successfully translate evidence into meaningful practices" in order to make a difference in people's lives (Zimmerman et al. 2010: 444-45). In other words, by working with others, they find ways to put archaeology to use. Doing so is not always easy and carries risks of alienating collaborators or other powerful stakeholders. Given the limited experience of most archaeologists with activism, most are relying on a case-by-case approach to projects and use a lot of experimentation. To say that the discipline has yet to develop an encompassing epistemology for activism and is nowhere close to a set of "best practices" would be a profound understatement.

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- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation

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Basic Biographical Information

Dr. Alexis Bertrand Agunmaro Adandé is an archaeologist from the Republic of Benin, born April 7, 1949 in Dakar, Senegal. He completed his primary and secondary studies in Dakar (Senegal), and Porto-Novo (Republic of Benin), between 1954 and 1968. After obtaining his Baccalaureat in 1968, he entered the Institute of Higher Education of Benin in Lomé, Togo; in 1970, he left to continue his studies at the University of PARIS I – Panthéon – Sorbonne in France. There, he obtained a license of history in 1971 and a Master of Arts in 1972. He returned to Benin, where he taught history and geography in secondary schools (1972–1979), before returning to France in 1979 for his doctoral studies. At the University of PARIS I – Panthéon – Sorbonne, he successfully defended a Diploma of Advanced Studies in Archaeology in 1980, and a Ph.D. in 1984. Upon his return, he was sent to the National University of Benin, where he was already a lecturer in archaeology at the Department of History and Archaeology (1978–1986). He taught archaeology as Assistant Professor of Archaeology from 1986 to 1993. Since 1993, he has been a senior lecturer in archaeology. He was Deputy

Adandé, Alexis B. A., Fig. 1 During fieldwork

Head of the Department of History and Archaeology of the University of Benin from 1989 to 1995, and Head of the Archaeological Research Team of Benin (ERAB) from 2003 to 2007 (Fig. 1).

During his career, Dr. Adandé participated in several training courses at archaeological sites in Tunisia and France; in particular at the Pincevent school site, under the direction of Professor André Leroi-Gourhan, College of France (16 June–6 July, 1980) and the training school site of Ras ed Drak-Kerkouane (Tunisia) under the auspices of the Institute of Art and Archaeology and under the joint direction of Professors A. Fantar and J. Leglay (September 1983).

He has directed several archaeological excavations in Benin. He was, among other things:

responsible for research and excavations in the region of Allada (1981–1982);

Co-leader of the Mixed team for the Benin–Togo Archaeological Rescue Project of Mono Valley (1990–1993);

Co-director of the Archaeological Project in Ouidah (July–August 1991);

Project Manager of Ouessè Archaeological Research (1992);

Co-leader of Project Beninese—Danish archaeology (BDArch, 2002–2004).

Dr. Adandé is also interested in museums, where he led several exhibitions within the framework of the development of the archaeological results. This includes the first archaeological exhibition in the Republic of Benin during the commemoration of "Ten years of archaeological research in Benin" (campus of Abomey – Calavi and Honmè Museum – Royal Palace Porto Novo, 1988); and the installation of the exhibition "The Earth is also Our History Book," Alexandre Sènou Adande ethnographic museum, Porto-Novo (1994–1995). He was Executive Director of West African Museums Program (WAMP) from 1995 to 2001. Dr. Adandé has also participated in several seminars and scientific conferences and educational workshops on the national and international level (Fig. 2).

Major Accomplishments

Dr. Alexis Bertrand Agumaro Adandé was the first to have defended a doctoral thesis in archaeology in the Republic of Benin. He was the first archaeologist who conducted well-documented archaeological excavations at the site of Togoudo Awutè Allada, southern Republic of Benin (Adandé 1984). His work has contributed to the knowledge

Adandé, Alexis B. A., Fig. 2 Dr Alexis Adandé during an exhibition

of the rich archaeological heritage of Benin and its protection. He has contributed to the creation of the Archaeological Research Team of Benin in 1978 under Father François de Medeiros, then Head of Department. This team developed the first national program of archaeological research, covering the territory of Benin and has enabled a precise inventory of archaeological sites in Benin.

Dr. Adandé has contributed to the opening of a regional perspective in archaeological research through the West African Archaeological Association. For him, the archaeological approach, to be meaningful, has to be global; that is to say, the work cannot be achieved without taking into account research sites located in neighboring countries (Adandé 1993). This methodological perspective of integrating the historiography of various countries within the sub-regional West Africa is fruitful, because it helps build hypotheses that are better reasoned and less narrow.

Dr. Adandé also contributed to the training of several generations of archaeologists in Benin and in the sub-region of West Africa. He has significantly contributed to the development of archaeology in Benin and West Africa.

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- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
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Adaptation in Archaeology

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Introduction

The theory of evolution is inherently attractive for archaeologists, who are concerned with the long-term history of humankind (Dunnell 1980). Changes through time during the long process of hominization are, by definition, adaptive. Adaptation is clearly one basic constituent of evolution. For that reason, the concept of adaptation – including the capacity for a cultural system to adjust to changes – is important in many approaches, particularly in ecologically oriented archaeology and, more recently, in evolutionary archaeology.

Definition

This variety of approaches using the concept of adaptation naturally leads to the existence of slightly different definitions (O'Brien & Holland 1992; Van Pool 2002).

Basically, adaptation refers to "the idea that organisms are fitted for the particular environments in which they live" (Alexander 1962: 826), or more directly to the "conformity between the organism and its environment" (Pianka 1983: 85).

It is accepted that an adaptation refers to both the state of being adapted and the process that produces the adaptation. However, even biologists have found it difficult to recognize adaptations, and the acceptance that natural selection is not the only mechanism behind evolutionary processes was one result of this difficulty (Vrba & Eldredge 1984).

Historical Background

The concept of adaptation used by many archaeologists was based on the work of classic evolutionary anthropologists like Leslie White (1949) and Julian Steward (1955). In these approaches, tools are seen basically as extrasomatic means of adaptation. The assignation of functions to archaeological tools and features is the key concept to understand and discuss adaptations, an activity that falls within the approach known as Cultural Evolution, which is extremely popular. Circularity is the main interpretative problem of this approach. Effectively, the role of adaptation as an ex post facto argument invoked as the cause of both the appearance and the persistence of archaeological traits was and is an impediment in most applications (O'Brien & Holland 1992).

On a slightly different vein, Patrick Kirch wrote about "the continuous modification of . . . behavioral patterns in response to changing environments, by means of selective retention of behavior" (Kirch 1980: 110). He explained that it is this selective retention which serves the adaptation of individuals. In a sense, in this approach, artifacts are the result of adaptations. One famous example provided by Kirch refers to the different types of fishhooks recovered at the different Pacific Islands (Kirch 1980). Using this approach to define tactics and strategies which involve tools and features, it is possible to discuss how large parts of past societies functioned in the past, and Kirch used it – in conjunction with historical linguistics – to explain the process of human colonization of the Pacific Islands (Kirch 2010).

One observation is that many times these approaches assumed that cultural systems were in equilibrium, and adaptations were simply seen as including those behaviors "that seemed a reasonable way to maintain the status quo" (Kelly 1995: 47). In the end, it is true that the concept of adaptation is trapped in circular thinking.

Since the 1980s, adaptation is also a core concept of Darwinian or selectionist archaeology. In this approach, tools are seen as the hard parts of the human phenotype, and they are treated as adaptations resulting from the action of natural selection (O'Brien & Holland 1992). The problem is that showing that any given trait was under natural selection is a difficult task at best. Most published

applications are restricted to highly specific aspects of past societies, like changes in the shape of projectile points or in the wall thickness of pottery (Neff 1992; O'Brien & Holland 1992). These are attractive and useful examples, but wider applications are still difficult to achieve.

Key Issues/Current Debates

In the twenty-first century, different approaches with a focus on the concept of adaptation are disputing their capacity to deal with the archaeological record. Among these approaches, human behavioral ecology (Bird & O'Connell 2006), selectionism (Dunnell 1980), and cultural macroevolution (Prentiss et al. 2009) are among the best known. Behavioral ecology is "the subset of evolutionary ecology that studies the fitness-related behavioral trade-offs that organisms face in particular environments" (Bird & O'Connell 2006: 144) and includes widely used subfields like costly signaling theory. Basic to these approaches is that natural selection provides the flexibility to adapt to a variety of situations. Extensive ethnoarchaeological and experimental research was done in order to understand the costs and benefits of different tools and strategies. These results are in turn used to discuss diverse aspects of the archaeological record that are not focused in adaptations, but result from the process of decision-making allowed by natural selection. Ethnographic data is used not only to develop methodological tools but also to test some of the basic assumptions of behavioral ecology.

Selectionism, on the other hand, tries to explain the archaeological record in terms of the direct action of natural selection (Dunnell 1980; Neff 1992). Adherents to this approach believe that ethnoarchaeology is not useful, since recent societies should be the result of evolutionary forces. For that reason, they should not be adequate to provide good analogs for the past. However, there is a role for experiments, especially those designed to develop engineering principles that can be used to understand the performance of archaeological tools. Many of the most attractive discussions about adaptation produced by selectionists derive from this kind of studies.

Researchers working under the cultural macroevolution brand are concentrating in the study of higher level cultural entities. This is their basis for the construction of an inclusive macroevolutionary approach to archaeology, which is used to study the evolution of whole cultural systems (Prentiss et al. 2009).

Examples of the identification of archaeological and ethnographic adaptations exist, but there are critiques, importantly that most of the so-called adaptations recorded by ethnographic research cannot be the result of natural selection, because they occurred within one human generation. The main example is the use of snowcats by the Cree that replaced snowshoes in a few years (Boone & Smith 1998). It is indeed difficult to implicate natural selection – a benefit in differential survival – to explain a process that occurred in less than one generation. As a result of all these disagreements, nothing close to an operative application of the concept of adaptation for archaeology emerged. Scheinsohn (2011) maintains that the published examples presented as adaptations are many times in fact either aptations or exaptations, that is, "features coopted for a current utility following an origin for a different function (or for no function at all)" (Gould 2002: 1246). In the end, it appears that it is not reproductive, but replicative success that is useful in archaeological studies (Leonard & Jones 1987). Tools can be counted through space and time, and the results can be compared. The assumption is that replicative success derives from the better performance properties of tools, and this is something that we can study in a number of ways. Studies of the resistance of materials, that is, the resistance of ceramics to thermal shock, or the shape of tools, that is, the distribution of cutting edges in lithic tools, can be used to understand the performance potential of different materials. Given the fact that the selective environment is constantly changing, when replication is successful, a number of exaptations are to be expected (Van Pool 2002). For example, most of the morphological

transformations of lithic tools are expected to be exaptive. For that reason, it can be suggested that many lithic tools follow an inexorable trend of exaptive transformation. Functional studies, or residue analysis, are adequate ways to study and understand the scope of these variations.

Also, in order to study replicative success per se, engineering studies are useful. These studies are basic components within both the Darwinian or selectionist and behavioral approaches to archaeology. Behavioral archaeology is an approach based on human-artifact interactions that seek to understand cultural change in the long term. In part, this similarity and the idea that "nothing in Darwinian theory per se nor in modern evolutionary biology precludes framing theory and models in behavioral terms" (Schiffer 1996: 96) led Michael Schiffer to propose the existence of important overlaps between both research programs. The answer from the selectionist camp was that differences were still important, including the nomothetic interest which is manifested in the behavioral approach and the corresponding place for historical contingency in the selectionist approach (O'Brien et al. 1998). Beyond these discrepancies, it can be sustained that an understanding of the forces and tensions to which pottery, lithics, or bones are subjected surely helps in the construction of credible adaptive scenarios. These scenarios, in turn, should be able to capture the whole complexity of the cultural systems that produced them.

The study of human bones should be a basic component of any approach that is trying to tackle adaptations in the archaeological record. However, bioanthropology usually appears only through applications of the results of population genetics and molecular biology. This is particularly true in highly speculative scenarios of human colonization of the different regions of the planet. But human bones rarely appear in archaeological discussions of adaptation (but see O'Brien 1987). This is odd, since humans are the carriers of the supposedly adaptive tools and behaviors that we are studying.

Future Directions

One important conclusion is that tools are just means purposefully designed to perform functions. However, intentions can be considered proximate causes at best, and their main role is to generate variation (O'Brien & Holland 1992). Some of the tools recovered in the archaeological record can be seen as exaptations, cases in which the design is not necessarily related with the function but, instead, in the nomenclature of Gould (2002), with its effects. In other words, tools can be used in many unplanned contexts. In one way or the other, it may be true that exaptations can be seen as basic to the understanding of long-term human processes. More specifically, the explicit search for exaptive examples appears today as an archaeologically relevant task, since functions and effects can be understood and temporal changes can be evaluated (Scheinsohn 2011). In a more sophisticated level, exaptations can be invoked even to explain issues like the origins of social inequality or socioeconomic change (Prentiss et al. 2009).

Finally, it is only with the intensive use of bioanthropological information that archaeological discussions of adaptation will find the much desired depth. There is promise in a study that starts with the study of adaptations of the human individual – functional pathologies, stress indicators, stable isotope information, etc. – and then searches for related changes in the frequency of tools or designs. In doing this, we are dealing with conscious or unconscious modifications of behavior (Van Pool 2002: 16) that respond to changes in the social and natural environment. In other words, behaviors, technologies, and phenotypes can be related in complex and difficult to understand loops. Then, an exploration of exaptations, which may be related or not with previous adaptations, appears to be an attractive and promising way to understand the dynamics of past societies.

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Advertising and the Appropriation of Culture

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Introduction

The growth of cultural tourism and the spread of global information have both contributed to an increase in the commercialization of the past. Ancient cultures are used for marketing everything from vacation destinations to a wide range of products that draw upon stereotypes of the past as mysterious or idyllic. The pervasive use of ancient sites and artifacts by advertisers may simultaneously increase awareness of the past as well as put sites in danger as a result of overvisitation or mismanagement.

Definition

Certain sites such as Stonehenge and Chichen Itza have both iconic status within modern Western marketing and clear brand name recognition. Unfortunately, the field of advertising is largely unaware of the impact upon archaeological sites and descendant communities of a campaign designed around stereotypes of the past.

Key Issues/Current Debates/Future Directions/Examples

Advertising is ubiquitous in our world today. Given the seemingly endless opportunities to

purchase goods and services in modern Western society, it is no wonder that archaeological cultures and sites are frequently used to attract consumer attention. Well-known archaeological sites achieve an iconic status within many cultures and become easy shorthand for specific values advertisers wish to associate with their products. The advertising industry is voracious and constantly on the lookout for new ideas and ways to market products. Archaeologists must be aware of the impact such media campaigns have on popular conceptualizations of cultural heritage and guard against a trivialization of archaeological resources due to overexposure or distortion in the media.

One of the risks of archaeological resources being utilized in advertising campaigns derives from the nature of this particular enterprise. "Advertizing is a rhetoric of persuasion, not a narrative of instruction," and while it is obvious that we do not turn to advertisements for educational purposes, nonetheless the messages conveyed about ancient cultures and archaeological sites via the medium of advertising influence our shared understanding of the past (Talalay 2004: 208). In many cases, an entire civilization is reduced to a single image and concept – when Stonehenge is used to convey a sense of a premodern, nonindustrial, and tribal identity missing from today's hectic world or when a jungle-covered Maya pyramid is used to convey an exotic and dangerous escape from modern routines, advertisers have selectively imagined the past in a way that essentializes the diversity and complexity of ancient cultures in order to connect quickly and easily with the consumer (McCarthy 2002). This reductive process in turn fosters the stereotypes that most Westerners have about the ancient past – that it was a simpler, easier time – and may even constrain how heritage resources are managed. The use of a single icon from ancient Egypt, such as the Sphinx, reinforces the stereotype that ancient Egypt was dominated by isolated monumental constructions that exist in a peopleless and pristine setting (MacDonald & Rice 2003). When such extraordinary and unusual artifacts come to define an ancient culture, we lose the richness of a landscape filled with ancient people performing an enormous range of activities in order to keep desert settlements functioning, and in turn we hamper our ability to preserve the less visible sites where the vast majority of the population lived, worked, and conducted the business of social reproduction.

Popular advertising that utilizes archaeological themes often overemphasizes the artificial boundary erected today between past and present (Talalay 2004). The idea of a "past" that is not in some way tied to our modern lives is a falsehood encouraged by depictions of archaeological cultures as exotic, unchanging, or bizarre. Advertisements for adventure tourism or all-terrain vehicles often utilize this trope by situating the modern consumer within an alien landscape of ruined structures in a harsh environment. The message conveyed is that the past is stuck in the past and we may enter it for entertainment or diversion if we are brave enough. Advertisements for cosmetics and jewelry that draw selectively upon artifacts and iconography of the ancient Mediterranean, for example, are based in a different trope that argues the boundary between past and present is permeable – certain goods have always been valued by elites, and the purchase of a pearl necklace or timepiece will connect the consumer to a privileged set who unabashedly displayed their elite status when such behaviors were better tolerated (Duke 2007). The consumer is invited to share an essential understanding of the unchanging and timeless value of certain important luxuries. In both cases, whether the past is depicted as alien and threatening or as a source of legitimization, the past has an uncontested authority that advertisers use to promote their product. This inherent authority is set in opposition to our ever-changing present, full of diverse choices and ambiguity.

Archaeological tourism is one venue in which advertisers take full advantage of ancient cultures to sell a product. As cultural and heritage tourism have grown over the last 20 years, national tourism agencies have created marketing campaigns centered on the iconic image of archaeology as healthy escapism. Many of the most important archaeological sites around the world are state

owned and state managed, with governmental control over how they are marketed. This arrangement has serious implications for the interpretation of archaeological cultures, as governmental control has often meant a small minority of power holders construct a past that is acceptable, marketable, and profitable. Descendant communities, especially indigenous populations, are very often excluded from this interpretive process and from decisions about how their heritage will be marketed or appropriated for national tourism campaigns (Ardren 2004). This is despite overwhelming evidence of the strong ties many modern indigenous people have to ancient sites or to an identity that rests in part within a historically charged landscape of places and events. In January 2006, indigenous people from all over the world met at the ancient center of Tiwanaku, Bolivia, to witness purification and blessing ceremonies of incoming President Evo Morales. President Morales is the first Bolivian president of indigenous heritage, and he chose Tiwanaku as his inauguration setting deliberately. His comments on that occasion referenced the archaeological site as evidence for the survival of indigenous culture and its successful resistance to colonial empires. Morales reclaimed the site as a reservoir of native art and culture as well as a source of tourism revenue. The distinctive art and architecture of Tiwanaku are frequently used in advertisements, and President Morales argued that the indigenous people of Ecuador should have a role in deciding how such images are commercialized and manipulated. Tiwanaku is by no means a unique example: the three most heavily visited UNESCO World Heritage sites in the New World – Chaco Canyon in New Mexico, Chichen Itza in Mexico, and Machu Picchu in Peru – have no formalized mechanisms for the involvement of the large descendant communities that surround them in decisions about how images from the sites will be commercialized and popularized.

The way archaeological resources are portrayed in the media also affects the public understanding of archaeology as a natural and cultural resource and, thus, site management strategies. If archaeological sites are trivialized, through their depiction as either the settings for escapism or entertainment activities only, the argument for sufficient resources for protection and maintenance becomes much harder for archaeologists and others committed to heritage preservation to make. Likewise, when archaeological sites are depicted as exotic locations full of unusual or mysterious objects, a message is conveyed that archaeological resources are only located in distant places and we are unlikely to encounter them at home. When archaeological cultures are used as a passive backdrop for commercialized advertising, a dangerous impression is given that archaeological resources are unlimited and eternal and that they exist without the need for careful preservation and management (McCarthy 2002).

In sum, the archaeological past is generally appropriated by advertising in a way that furthers common stereotypes and does not encourage responsible use. Improvements are simple and would involve avoidance of these stereotypes, efforts to "people" the past, and consultation with descendent communities when images are being used. The common use of ancient cultures in modern advertising can have a very positive effect upon the public awareness of archaeology and archaeological resources. But there is tremendous room for improvement in how such images are utilized and in trying to understand the effect they have on all of us who consume them.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage Research and Visitor Planning

▶ Heritage Tourism and the Marketplace
▶ Heritage: History and Context
▶ Indigenous Archaeologies
▶ Intangible Cultural Heritage
▶ Marketing Heritage

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Aerial and Satellite Remote Sensing in Archaeology

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Introduction

Aerial and satellite remote sensing technologies offer a noninvasive and nondestructive tool that can be used in many ways for the preservation and conservation of archaeological sites and landscapes. A synoptic, landscape perspective is inherent in the use of these technologies, which enriches the context that is essential to understanding the value of archaeological discoveries. The extent and nature of environmental changes that threaten sites can often be more quickly observed, characterized, and measured by observing the landscape from above, rather than exploring it on the ground. With training, archaeologists can use them to (1) directly detect archaeological sites, (2) model likely site locations, (3) assess the importance of sites based upon spatial relationships among sites themselves as well as relationships among sites and environmental features, (4) detect threats to sites and landscapes arising from natural processes or from development, and (5) monitor such threats as they emerge, increase, or abate.

Recent years have seen enormous advances in sensor technologies and much greater access to a variety of aerial and satellite platforms that carry these sensors. During the same period, computing power measured in numerous ways has roughly doubled every two years ("Moore's Law"), data storage capacity has grown at the same pace and become much less expensive, and software for enhancement, analysis, and integration of images into geographical information systems has become more user friendly. Some of this software is open source or available at a reasonable price. The cost of using open source software is therefore only in acquiring the training necessary to use it. The result of these technological improvements means that little stands in the way of their use by archaeologists and conservationists.

Definition

Remote sensing includes a wide array of technologies that have in common the acquisition of data from platforms that are at a distance from objects, materials, and other phenomena of interest. These technologies use and analyze electromagnetic radiation or, in a few cases, sound waves or gravitational fields. Types of radiation frequently used include many bands of the electromagnetic spectrum, from ultraviolet through visible light to longer electromagnetic waves, such as near infrared, infrared, and radar. Sensors that collect data generated by the use of visible through infrared

bands are termed *multispectral* if they utilize only a few, narrow, discreet bands or *hyperspectral* if they sense bands over a continuous range. Some electromagnetic bands can be transmitted and received in ways that greatly enhance the ability to collect data of particular interest. Light waves, for example, can be made highly coherent and focused. Transmitting and receiving a pinpoint of light created in this way can be used to precisely locate what reflected the light. Using many points of light, a surface can be extrapolated from multiple locations. Radar transmitted from a rapidly moving platform (aircraft or satellite) creates a synthetically large antenna; since resolution of images sensed by radar depends upon the size of the antenna, the faster the platform carrying radar moves, the greater the resolution of resulting images.

Synthetic aperture radar (SAR) waves can also be polarized vertically or horizontally at transmission and reception, providing data that can be used to discern shape and orientation and can be analyzed interferometrically to develop a surface model. Analysis of remotely sensed data is done with use of many different types of software that create and enhance images, and provide built-in algorithms for the analysis of images and a degree of capacity to develop custom algorithms. Images, which are enhanced, analyzed, or otherwise modified, are often further interpreted as a layer in a geographical information system project. Data obtained from sensors and images can also be analyzed with mathematical, statistical, and engineering software.

Key Issues/Current Debates/Future Directions/Examples

An important application of this technology is the detection of archaeological sites. Archaeologists have used aerial photos obtained from aircrafts and before that balloons and kites for more than 100 years (see, for example, Poidebard 1934). Photos obtained from small, private aircrafts are still being used in this way, especially in Europe and the Middle East. From 1960 to 1972, the United States operated the Cold War-era CORONA intelligence satellite program. In 1972, Corona images were declassified and now can be easily obtained by the public (http://earthexplorer.usgs.gov), as can those acquired by a companion satellite, GAMBIT. These black and white photos are of relatively high resolution, but were not georeferenced and contained the normal distortion associated with perspective. They require georeferencing or preferably orthorectification to be transformed into an image with a scale that is constant throughout. They have been of especially great utility in planning archaeological surveys in remote areas and in determining the locations of sites that have been obscured or obliterated by development. Min (2013) has used CORONA photographs in this way to map features on the ancient landscape that have been removed by the recent rapid development in China.

New analytical techniques can render the analysis of images produced with older, strictly optical, technologies more useful. Jesse Casana and Jackson Cothren (2013) of CAST at the University of Arkansas have developed a means to streamline orthorectification of CORONA imagery. They have made more than 1,000 CORONA tiles of the Middle East available for download (http://corona.cast.uark.edu/index) and have described their technique for replication by others. Ur (2012) provides an overview of how CORONA and GAMBIT have been used in the Middle East, describing how tells, roads and tracks, irrigation canals, and fields have been discerned with the eye by attention to shadow, lightness, and darkness. Ur and Menze have refined this approach by developing signatures for soils generated by human occupation (anthrosols) using bands from among the 14 collected by ASTER satellites (Menze & Ur 2013).

Newer sensing technologies expand possibilities for site detection. If archaeological remains are above ground, and exhibit a level of structural integrity, LiDAR can generate remarkably clear images of them. If dense clusters of LiDAR beams are used, the full array of archaeological features on a landscape can be imaged even when covered by forests, shrubs, or grassland. SAR can penetrate materials to a depth determined by

wavelength and moisture content of materials encountered. Maximum penetration is of sand in hyperarid environments. SAR images are less easy to interpret with the naked eye than are images produced by LiDAR, because data to produce them are obtained from oblique angles, and so distortion can be more difficult to correct. SAR images are therefore generally more informative when data contained in them are analyzed by the use of statistical protocols that have been identified or developed for this purpose (Comer & Blom 2007; Chen et al. 2013). Similar statistical protocols can also detect sites using multispectral and hyperspectral imagery under certain conditions with greater or lesser success given the nature of sites to be detected and the environment in which they are located. Statistically based site detection, by definition, admits some degree of uncertainly until site locations are confirmed on the ground. Nonetheless, an inventory based upon statistically valid measures of productivity and reliability provides a valuable starting point for site protection, one that can also be used to more wisely allocate on-ground survey efforts. An alternate approach is the use of archaeological predictive modeling (APM), which identifies areas more or less likely to contain sites. While direct detection of archaeological sites can therefore be termed probabilistic, APMs are *possibilistic*, as discussed by Van Leusen and Kamermans (2005: 30).

Site evaluation is an essential step in the protection of archaeological heritage. Not all sites and landscapes are of equal importance. Given the dearth of resources available for site preservation, setting priorities is essential. The analysis of multispectral and hyperspectral imagery is particularly useful in characterizing the environments in which sites occur. It can therefore illuminate relationships among sites themselves and the environment in which they are found. These relationships have a tremendous bearing on the importance of each individual site. Environments can often be characterized sufficiently using data contained in inexpensive NASA satellite imagery. Landsat satellite images are now available at no cost, and the cost of ASTER imagery is minimal. Comer (2013), for example, has used Landsat imagery to explore the association between the distribution of sites on arable soils and the emergences of settled way of life among the Nabataeans.

NASA satellites also provide information not available from imagery collected by more recently developed, higher-resolution satellites operated by the private sector: they provide a record of environmental change over the past 30 years, since the first Landsat was launched. This records degradation that affects the value of sites, which can be halted or reversed if detected in time. For example, Barlindhaug et al. (2007) has analyzed Landsat imagery to monitor regrowth at archaeological sites allocated in abandoned farms in Norway, which damages or destroys them.

Precise surface models (DSMs, DTMs, and DEMs) can be the key to an even deeper understanding of intra-site and environmental relationships. These are developed from dense point clouds, often obtained using LiDAR and SAR data collected from satellites and many common types of aircraft. As noted previously, data collected by LiDAR, if this is done in certain ways, can model the surface of the earth as it would appear if it were devoid of vegetation (usually termed a digital terrain model or DTM). Standard or custom algorithms can generate least-cost paths from DTMs. These provide the basis for developing and testing hypotheses about polity size, procurement zones, and social and political interactions. White and Surface-Evans (2012) offer many examples of how this has been done; surface models can also provide viewshed analyses, which are pertinent to suggesting similar social parameters (Fisher & Farrelly 1997; Bongers et al. 2011). Harrower (2010, 2011) has generated hydrological models from digital surface models that clarify the development of agriculture and the role of pastoralism in Yemen.

Surface models can also identify areas that would visually intrude upon ancient landscapes were they developed. They can also be used to model hydrological changes that threaten

archaeological sites (Akasheh 2012). Point clouds can be generated by photogrammetric analysis of "stereo pairs" acquired from model airplanes and even kites. This can be done very inexpensively, but will not provide a DTM.

As the cost of such technologies continues to lessen, archaeologists, conservationists, and cultural management officials will increasingly use them to track and maintain cultural heritage throughout the world.

Cross-References

- ▶ Aerial Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Landscape Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

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Aerial Archaeology

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Introduction and Definition

Aerial archaeology (AA) uses photographs, and other kinds of image acquisition, in archaeological field research. It involves taking photographs of the land from above, examining them for pertinent information, interpreting the images seen there and making the resulting data available in a variety of forms to develop archaeological knowledge about past people and the conservation of archaeological sites and landscapes (Bewley & Rączkowski 2002).

Key Issues/Current Debates/Future Directions/Examples

Why Can We See a Variety of Types of Sites?

Since people first learnt to fly, it has been appreciated that traces of early human activity can be observed from the air, recognized from their curved or linear shapes. Humans have always exploited and adapted the environment to their own needs. The surface of the ground has been disturbed and altered by generations of previous occupants, who have dug into it to create foundations, ditches, and pits, and raised structures upon it, in the form of stone buildings or earth ramparts. All this activity has caused "injury" to the land. Much of it has been subsequently covered over or leveled by later exploitation, particularly agriculture. Today, in the majority of such places, there is little sign of this past human activity on the surface, but the "scars" remain beneath and these may show up from the air (Wilson 1982).

Some ancient earth, stone, and timber structures are still just visible above ground level as *earthworks*. Most frequently encountered are the remains of barrows, ramparts, walls, banks, and ditches. These can be photographed by exploiting the contrast of the shadows by a sun low on the horizon. The way snow settles and melts may also reveal the presence of archaeological features, as can widespread flooding (mainly on low-lying ground) for it exposes all the topographic elements which are above water level (Fig. 1). The new technique of LiDAR (see below) now records low-lying earthworks by measuring their topography directly.

The remains of human activity beneath the topsoil determine growth conditions and cause

Aerial Archaeology, Fig. 1 Bonikowo, Wielkopolska Region, Poland. Early Medieval stronghold clearly visible due to flooded bottom of valley (Photo: W. Rączkowski, March 1999)

Aerial Archaeology, Fig. 2 Mutowo, Wielkopolska Region, Poland. Cropmarks show up archaeological remains of a medieval town (thirteenth century) of Szamotuły (Photo: W. Rączkowski, July 2011)

difference in growth, causing *cropmarks* (Fig. 2). Subsurface hollows, foundation trenches, ditches, and pits retain water and nourishment, prompting the plants that grow immediately above them to be taller or greener for longer than others in the immediate vicinity (*positive cropmarks*). Plants growing over stones, bricks, or roads are deprived of moisture, so may be more stunted in growth and more pallid in color (*negative cropmarks*). Cropmarks can also be photographed, thanks to the shadows thrown by taller plants, disclosing the archaeological features beneath. Not all plants are equally "sensitive" to variable soil conditions – some "display" what is beneath the topsoil while others do not react to local conditions. Wheat and barley best show the presence of archaeological remains well, especially late in the growing season, while potatoes, cabbage, or corn are less demonstrative of what lies beneath.

Plowing may disturb the uppermost layer of an archaeological feature and bring it to the surface as a *soilmark*, recognizable by its different color to the topsoil. Soilmarks can be most readily

Aerial Archaeology, Fig. 3 Rębowo, Wielkopolska Region, Poland. Color of soil differentiation shows up the remains of a plowed rampart of an early medieval stronghold (Photo: W. Rączkowski, March 1999)

observed when there is no vegetation growing – from late autumn through to early spring (Fig. 3).

Development of Techniques: History

The first known aerial photographs in archaeology used hot air balloons to take aerial photographs of archaeological sites between 1899 and 1911 (Forum Romanum, Tiber delta, Pompei, Ostia) and in 1906 (Stonehenge). The First World War advanced the development of both aeroplanes and cameras. The number of pioneers using aerial photographs to search, identify, and document archaeological sites increased (T. Wiegand, L. Rey, G. Beazeley, A. Poidebard, C. Schuchhardt). O.G.S. Crawford (1923) made a significant contribution to the methodology and its application in research. In the 1920s and 1930s, photographs were taken of archaeological sites (e.g., hillforts) across Europe, excavation work in progress was documented from aircraft (e.g., Biskupin in Poland), and aerial surveys led to the discovery of new sites (e.g., Woodhenge – UK, Ipf near Bopfingen – Germany). Similar surveys were also successful in the USA (C. A. Lindbergh, N. Judd), Mexico (A. V. Kidder, P. C. Madeira Jr.), and Peru (G. Johnson).

Developments in both technology and the interpretation of aerial photographs (e.g., the Allied Central Interpretation Unit) during the Second World War enhanced the technique and established it after the war as a primary research tool in archaeology. Although political regimes in some European countries severely restricted overflying, it developed without major interference in the UK (J.K. St Joseph, A. Baker, J. Pickering, D. Riley, D. Wilson), France (J. Baradez, R. Agache), West Germany (I. Scollar, R. Christlein, P. Filtzinger, O. Braasch, K. Leidorf), Belgium (C. Leva, J. Semey), and Denmark (H. Stiesdal). The 1994 Klienmachnow conference (in Germany) was a key moment in raising awareness of AA among archaeologists from Central, Eastern, and Southern Europe.

Stereoscopy was a successful technology especially applied during WWII. Nowadays, it is frequently used in AA when working with vertical photographs to give an illusion of depth. A 3D effect can be achieved using two photographs offset by 60 %. The stereoscope shows the left eye one photograph and the right eye the second, the brain then creates a 3D image of the area.

Since the late 1960s, AA has seen dramatic technical advances. In addition to the traditional platforms (e.g., kites, model planes, balloons, aircraft, helicopters), remote sensing now makes use of multispectral imagery captured by

satellites to explore past landscapes and features at a wide range of scales. Satellites (since 1960s) orbiting at 600–1,200 km from the Earth's surface have recorded a wealth of information.

The declassification by the USA in 1995 of an archive of images acquired by the first generation of US photo reconnaissance satellites (CORONA – 1960 and 1972) and the KH-7 GAMBIT and KH-9 mapping camera programs in 2002 was a milestone for archaeologists who quickly recognized the potential of these archives for extensive survey coverage of the Earth, including territories currently lying in no-fly zones (e.g., Turkey, Syria, Armenia) (Ur 2003). The ERTS satellite (later renamed LANDSAT) was launched in 1972 to continually photograph the Earth's surface. Many countries and organizations have sent satellites equipped with cameras and sensors into orbit to acquire information on surface events by using electromagnetic radiation across the spectrum (Parcak 2009).

Use of the wider spectrum of different bands of wavelengths of electromagnetic radiation (daylight, infrared, ultraviolet, thermal radiation) means that AA can be classed as a method of *remote sensing*. Radiation of different wavelengths detects different physical features. The majority of satellite survey work in archaeology has focused on the band of *visible light* to detect archaeological features and past landscapes. However, visual data is only a small proportion of what cameras and other sensors can detect. A multispectral scanner registers a small number of bandwidths. By comparison, a hyperspectral scanner registers 100 or more bandwidths – including those which are beyond the visible spectrum, e.g., radar, ultraviolet, thermal radiation, etc.

For assessing what can be detected, two parameters are especially important – spectral resolution and spatial resolution. *Spectral resolution* denotes the detection that is possibly owed to the chosen wavelength. The range of visible light is from 0.380 to 0.780 μm (panchromatic image). If a sensor registers visible light, then it covers four channels (spectrum bands) – blue (0.45–0.52 μm), green (0.52–0.60 μm), red (0.63–0.69 μm), and infrared (0.76–0.90 μm). The spectral response pattern of soil is generally governed by the properties of the soils: color, texture, structure, mineralogy, organic matter, free carbonates, salinity, moisture, and the oxides/hydroxides of iron and manganese. Thus, analysis of results from parts of the spectrum provides information about the physical-chemical characteristics of any detected features. For example, analysis of green and red bands may give information on the contents of iron (Fe) in soil. *Normalized Difference Vegetation Index* (red and infrared bands) is a method for measuring vegetation vigor which may indirectly infer the presence of archaeological features.

Ground (spatial) resolution measures the minimum size of a feature detectable on the ground. A feature larger than the spatial resolution will be visible on the image, while a feature appearing smaller than a pixel on the image will not be seen. High ground resolution therefore is extremely important. Images of 80 m resolution (Landsat series MSS 1, 2 and 3) or 30 m (Landsat TM 4 and 5) are sufficient to determine geological or geographical aspects but not to detect archaeological features. Current resolutions can be achieved down to 1 m, which enables individual features such as storage pits, barrows, or sunken houses to be identified. The IKONOS satellite's panchromatic imaging (the whole visible spectrum, which means more energy reaches the sensor) provides a surface resolution of 1 m, although multispectral imaging resolution falls to 4 m.

Satellite images are currently used in prospection of archaeological features, study of their environmental contexts, spatial analysis, past landscape studies, 3D modeling, preservation assessments, and protection and management of archaeological heritage.

Airborne Laser Scanning (ALS), developed in the 1990s, uses the LiDAR (**L**ight Detection **a**nd Ranging) system for rapid, high precision survey of the surface of the ground (including forested areas) (Crutchley & Crow 2009). In this method, laser range-finding beams are fired at the ground from an aircraft with exact position measured by GPS, creating clouds of points (with x, y, z coordinates), which are used to

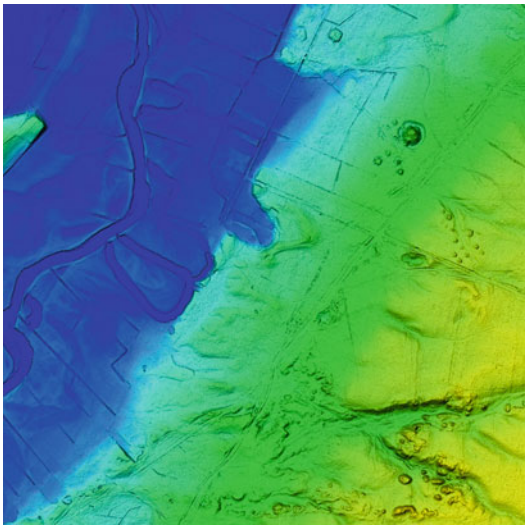

Aerial Archaeology, Fig. 4 Wrześnica, Pomerania Region, Poland. DTM derived from LiDAR of the forested area presenting detailed topography and showing up the presence of geomorphologic structures as well as clusters of early medieval burial mounds (By Ł. Banaszek & MGGP Areo, 2012)

compute a digital terrain model (DTM) and digital elevation model (DEM) (Bewley et al. 2005). Digital graphic processing generates views of the surface in micro-relief. The most spectacular discoveries made using this technique include medieval field systems, road courses, barrows, queries, etc., especially those hidden in forests (Devereux et al. 2005; Doneus & Briese 2011) (Fig. 4).

LiDAR data also provides additional information on the intensity of the reflected light, as the emitted signal is usually in the near-infrared (NIR) spectrum. It is therefore possible to use it to analyze moisture, chlorophyll content, and other factors that characterize cropmarks.

Theoretical Context

AA has been a key branch of *field archaeology* for more than a century. Its initial success was applied to generating *culture history*, featuring interpretations based on *evolution* and *diffusion*. This took the premise that a photograph is neutral and objective in its representation of the world. As image registration is "mechanical" in nature, photographs were seen as recording real anomalies devoid of a subjective human factor. These anomalies added to the world's stock of sites and monuments, from which the narratives of prehistory and history can be written. By the same token, repeat visits to certain landscapes led to the realization that the sites were disappearing. *A Matter of Time* (published in 1960 by the Royal Commission on Historical Monuments of England) established a role for AA in conservation practice in the UK, leading to *The National Mapping Programme* and the development of set standards.

Processual archaeology was a major factor in the technological "revolution" in AA. It emphasized the objectivity of the research process and the consequent importance of the precise measuring of cultural and natural features. This mission was aided by new analytical technologies, particularly computerized *data bases* (including mapping) and *Geographic Information Systems* (GIS). Gaps in the record raised questions about the visibility of sites, and prompted research into *formation processes* as applied to cropmarks and soilmarks. Results obtained from remote sensing influenced the classification and construction of models describing the relation between cultural systems and the natural environment, and the application of technological innovation.

Postprocessual archaeology questioned the "realism" of aerial photographs, and emphasized the role of perception and interpretation in the creation of the record. Interpretation issues are now the subject of intense discussion on the way the cultural context affects aerial survey, the photoreading process, and their role in forming how we imagine the past (Brophy & Cowley 2005).

Interpretation

Understanding that there is an interpretative process by which the information from aerial photograph becomes an archaeological record is crucial. The interpretation of archaeological features and landscapes is a skill built on experience and knowledge, where intuition and subjective judgment are acknowledged as major factors.

The ability of the archaeologist to interpret and depict is as important as the technical processes of rectification and georeferencing.

As archaeological use of digitally recorded data has developed, it has become increasingly clear that it is not an "objective" dataset. Methods of primary data collection and processing parameters have a significant impact on output; the ability to "see" is heavily dependent on software for manipulation and visualization. These factors are a complex mix of objective parameters (e.g., point density) and subjective judgments that are inextricable from the pervasive issue of archaeological interpretation.

Archaeologists decide which platform to use (aerial, satellite, ALS) and which electromagnetic emission to record. Similarly, data-processing, the selection of suitable algorithms, and their mode of visualization are matters decided by researchers. The final image undergoes visual editing and interpretation according to knowledge and interpretation experience and is accepted when a result is deemed to be satisfactory. Thus, like all other forms of archaeological data, the corpus of aerial photographs is the result of reconciling observation and imagination, of matching what we want to know, what has survived, what we currently recognize, and the methods available for their detection and recording. These methods are improving all the time as fresh interpretations raise our expectations and ambitions further.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Landscape Archaeology
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Prospection Methods in Archaeology
- ▶ Site Formation Processes

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Aesthetics in Archaeology

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Introduction and Definition

The term "aesthetics" was coined in the eighteenth century by Alexander Baumgarten, who thought of it as "the science of sensible cognition" (1961[1750-1758]: §1, p. 107). As such, it concerns the study of how to think the sensible appearance (the look/sound/feel) of things when the focus is on their perceptual qualities as such. Immanuel Kant further added

to this conception by proposing that aesthetic judgment involves a claim *not* based on an (objective) *coming to know* of the world but on a particular (subjective) *feeling* produced in the encounter with objects of perception. The feeling in question is produced when the faculties of imagination and understanding are in "free play" while provoked by various objects of perception (Kant 1790 trans. 1987: Pt. 1, Book 1, Section 9).

Accordingly, aesthetics is concerned with the claim that the *particular way* in which things are present in our awareness may lead to a certain kind of object-related but subjective feeling. Concretely, the feeling in question responds to *the particular disposition* of things, be it the composed *ordering* of sounds; the *layout* of material things in space; the choreographed *pattern* of movement of bodies through three-dimensional space; the *design* of two-dimensional surfaces; the meaningful *arrangement* of words; the determinate *sequencing* of the contents of the imagination based on some written, heard, or visual narration; or some other perceivable *structuring* of our perceptual world, including, for example, diverse forms of "skilled and knowledgeable forms of action" (Pollard 2001: 318).

While Baumgarten and Kant intended aesthetics to address itself to a *very wide* range of objects, later theoreticians tended to focus on *artistic* manifestations, as found in the Western world. This orientation has caused concern among archaeologists and anthropologists about the application of the aesthetic gaze to their objects of study, insofar as it would bring about ethnocentric and anachronistic conclusions, especially since many cultures seem not to distinguish between art and other spheres of life. The worry is that by using the categories of Western aesthetics and art in the study of the archaeological record, epistemological, methodological, as well as ethical problems, seem to arise.

Key Issues/Current Debates/Future Directions/Examples

The situation would seem to pose an epistemological problem since due to limited access in archaeological research to the context of the objects studied, it may be questioned whether we can know that the people, who made and used these objects, in fact had the intention of making objects with particular aesthetic qualities such as we recognise in standard Western artworks of the modern period (Soffer & Conkey 1997). Furthermore, there is the problem of how the disposition or structuring of things may have been appreciated by their makers and users if we have reason to believe that their perceived world differed radically from ours. In other words, their different "sensorium" would suggest that their aesthetic appreciation would have been significantly different from ours, and hence, it may be difficult to know what counted as aesthetically valuable and what not.

Methodologically, there is the problem that the focus on aesthetics and art seems to lead down the wrong path because *universal validity* is claimed for aesthetic and art-oriented categories, which actually import perspectives and values of *merely regional and historical validity*, as developed in the artworld of European peoples between the eighteenth and twenty-first centuries (Tomásková 1997; White 2003; Moro Abadía & González-Morales 2008). Ethically, the utilization of these categories entails the problem that insofar as they are value-laden, their application to objects from other cultures may lead to inappropriate value judgments (often expressing ethnocentrism) about other peoples' cultural goods (Heyd 2003, 2007; Heyd & Clegg 2005).

Notably, these epistemological, methodological, and ethical concerns tend to arise through the narrowing down of the object of aesthetics to a very limited, geographically local and historically conditioned, notion of "art." Aesthetic judgments, however, are also issued in a great variety of *nonartistic* contexts, such as regarding human beings, natural landscapes, or even concerning thought constructs such as mathematical formulae. *Anything* may become an object of aesthetic attention when it is considered as the trigger for a certain feeling based on the reflexive appreciation of one's perceptual contents (Ziff 1997). Human beings everywhere

Aesthetics in Archaeology, Fig. 1 *Gwion Gwion*, Kimberleys, Northern Australia (taken by Heyd in 2000)

sing, produce poetry, tell and enact stories, and draw or fashion three-dimensional objects to delight their fellows and children. As such, aesthetic judgments are ubiquitous and, as evolutionary aesthetics argues, probably can be projected back to our species' deep past (Davies 2006: 1-25). This situation, in turn, invites closer consideration of aesthetic values in the archaeological record as a topic of research.

While anthropology may be said to have discussed aesthetics as a research tool at least since the 1990s (Coote & Shelton 1992; Gell 1992, 1998), interest in theorizing its application in archaeology is more recent. Starting from the perspective that the aesthetic values perceived in things have socially relevant effects, it is argued, for example, that tracking the ways in which such effects are produced may open up an understanding of important aspects of the cultural systems under study (Gosden 2001). Here, the plethora of possibilities for structuring particular objects two- and three-dimensionally, and even their arrangement in space, may constitute valuable resources of insight (as demonstrated by Pollard 2001, in his study of depositional practice).

One very general argument for the consideration of the aesthetic perspective is that many cultural goods, even if utilitarian, be they material (such as pots, knives, or shoeing) or more notional (such as accounts of religious ideals or of stratification in society), often seem to exhibit *more structuring than necessary* to realize a specific function or to get a particular message across (Dobres 2001). This information may be "tapped into" by archaeologists by paying close attention to the perceptually accessible structuring of the carriers of information. As an illustration, we may consider humanly made marks on rock, commonly referred to as "rock art" (e.g., see Fig. 1).

Aesthetically relevant choices are evident throughout in what concerns the making of these manifestations. Generally, it is true that particular sites are chosen among many available, only certain surfaces are selected even if others could be used, selected modes of image making (e.g., painting, engraving, stencils or wax application) are utilized when other modes are possible, and motifs perceived may be represented in more or less dynamic, restrained, interactive, or striking ways. The multiple, perceptually significant choices realized in each site suggest empirically testable hypotheses with regard to their significance for their makers and users. For example, large images may be understood as directed toward people at a distance, suggesting that they may have group representational functions, while small images only accessible by, or visible to, single individuals may be meant for more private, potentially spiritual, functions. Dazzling figures may be meant to impress friend, foe, or commercial exchange partner (Gell 1992, on the decoration of Trobriand canoe prows, and Morphy 1992, 2005, on Yolngu *bir'yun* brilliance), while hand stencils may be intended as referential to personal identities (Forge 1991: 40).

Throughout, it is notable that insofar as the making of images requires attention to how the marks created *appear* to onlookers, aesthetic judgments and the application of skill and knowledge would have been *required* on the part of their makers. Moreover, insofar as different aesthetic values are generated through the choice of particular formal qualities, the ability among viewers to "read" aesthetically relevant differences would have to be presupposed. Hence, *not* attending to the aesthetics of such images would be to overlook a potentially important aspect of the forms of life of the human groups studied (also see Heyd 2012).

While concern regarding the importation of values and categories from the cultural context of the researcher into her or his objects of research certainly is relevant and legitimate, this danger is nothing new within the wider anthropological and archaeological context. Appropriate methodology in this respect would argue for the need to recognize cultural biases and the application of empirical techniques that allow specific cultural differences to *emerge* from the archaeological text, instead of forcing the given into the procrustean bed of Western aesthetic categories.

Certainly, recovering a sense of the aesthetic impact of any structuring of items found in the archaeological record on their makers and users will have to remain at the level of an educated guess. As Gosden (2001: 166) suggests, this requires "an unlearning" of our own sensorium to facilitate the appreciation of the sensory environment that may have existed for those who left material traces in former times. In sum, we may conclude that though aesthetic perspectives in archaeology undoubtedly have played a part throughout archaeological research in the past, its theoretical grounding and systematic exploration is still in development and likely will produce significant payoff in future research endeavors.

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► Rock Art, Forms of

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African Diaspora Archaeology

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Introduction and Definition

Archaeological investigations of African diasporas have expanded dramatically in number, diversity of research designs, and geographic scales over the last several decades. The term "diaspora" is typically used to address the dispersion of people to new locations as a result of hostile circumstances in the areas from which they departed or were abducted. Analysts have pursued a diverse array of perspectives in this period of growth for African diaspora archaeology. Projects have explored questions in spatial scales spanning the household, local, regional, interregional, and global.

Historical Background

Researchers undertaking interdisciplinary studies of African diaspora sites and communities will benefit by familiarity with the analyses of scholars in Black studies, such as Frederick Douglass, St. Claire Drake, W. E. B. Du Bois, bell hooks, Zora Neale Hurston, Arturo Schomburg, Booker T. Washington, George Williams, Carter Woodson, and Malcolm X (e.g., Mullins 2008). The work of investigators of African diaspora communities is also aided by digital and internet-based databases. These include *The Trans-Atlantic Slave Trade: A Database on CD-ROM* (Eltis et al. 2000) and the expanded *Trans-Atlantic Slave Voyages* database available online, which provides information on 34,850 slave vessel voyages and the people captured in those operations of bondage (e.g., Eltis & Richardson 2008). The *Digital Archaeological Archive of Comparative Slavery*, funded and maintained by the Thomas Jefferson Foundation (n.d.), presents archaeological data from numerous sites in North America and the Caribbean. Jerome Handler, Michael Tuite, Jr. (2011), and their colleagues maintain a substantial online database of historical images depicting details of the operations of the trans-Atlantic slave trade and its impact on past lives. The African Diaspora Archaeology Network (n.d.) consists of numerous collaborating researchers and publishes a quarterly, online newsletter with articles, announcements, and reviews on new projects and research designs.

Key Issues/Current Debates

A remarkable variety of research questions have been addressed over the past several decades, often engaging with theoretical debates on subjects such as social group identity, agency, racism, power, class structures, ethnicity, and self-determination (Ogundiran 2008 and Fennell 2011 provide overviews). In North America, the vast majority of archaeology projects related to African diaspora sites are conducted by archaeologists working in cultural resource management (CRM) settings. This tendency reflects the higher frequency with which sites of African diaspora heritage are impacted by disturbance due to new construction projects and resultant analysis through CRM procedures (e.g., Joseph 2004). These CRM archaeology projects contributed significantly to the development of African diaspora archaeology in the United States (e.g., Wheaton et al. 1983).

Some researchers advocate the compilation of detailed, contextual studies addressing dynamics at local and regional scales (e.g., Mullins 2006). Researchers also frequently implement investigative plans shaped in part by the interests of descendant communities (e.g., Agbe-Davies 2007 in Ogundiran & Falola 2007). Other analysts recommend a focus on the facets of racial ideologies and capitalist economies on a worldwide scale (e.g., Orser 1994; Mullins 2008).

This variety of research designs includes a focus on the operations of racial ideologies underlying economic structures (e.g., Orser 2007) and African descendants living and working in industrial settings (e.g., Shackel & Larsen 2000 in Delle et al. 2000). Researchers have also explored the ways in which facets of particular African cultures (such as the Asante, BaKongo, Igbo, and Yoruba) were related to continuing developments of cultural beliefs and practices at diaspora sites (e.g., Ferguson 1992). Many sites have yielded evidence of the material expressions of spirituality by African descendant peoples (e.g., Fennell 2003). The contours of ethnic group identities and new social networks (e.g., Wilkie 2000a; Ogundiran & Falola 2007 in Ogundiran & Falola 2007) as well as processes of ethnogenesis, syncretism, and creolization (e.g., Fennell 2007) have been examined in extensive studies.

Our knowledge of African diaspora histories has also been greatly enhanced by studies of mortuary traditions (e.g., McCarthy 2006 in Haviser & MacDonald 2006) and health-care practices (e.g., Cabak et al. 1995). Bioarchaeological investigations similarly provide detailed evidence of past lifeways, individual health conditions, and the impacts of enslavement on the physiologies of Africans and African descendants trapped in bondage (e.g., Mack & Blakey 2004). Diverse studies of diets, culinary practices, and consumer choices provide evidence on multiple time periods and spatial scales (e.g., Wilkie 2000b). Investigators have explored the subject of gender dynamics within African diaspora communities and seek to implement feminist critiques of research designs (e.g., Battle-Baptiste 2011). Extensive studies have examined the degree of impacts of particular African pottery-making and ornament traditions on ceramic production at diaspora sites (e.g., Ferguson 1992; Deetz 1993; Singleton & Bograd 2000 in Delle et al. 2000; Hauser 2007 in Ogundiran & Falola 2007).

Other investigations have concentrated on instances of self-determination, resistance against subjugation, and the creation of "maroon" communities (e.g., Weik 2004; Agorsah 2006 in Haviser & MacDonald 2006). Archaeological studies have focused on such dynamics of communities founded by escaped bonds people called "palenques" in Cuba and "quilombos" in Brazil (e.g., Orser & Funari 2001; La Rosa Corzo 2003). The operations of escape networks combating slavery in North America, often referred to as facets of an "underground railroad," have received increasing attention by archaeologists and landscape analysts as well (e.g., Ginsburg 2007; Delle & Shellenhamer 2008). Studies of spatial distributions and the ways people shaped and perceived the surrounding landscape have traversed scales from the household and yard, to neighboring plantations, to community and region (e.g., Handler & Lange 1978; Delle 1998; Battle-Baptiste 2007 in Ogundiran & Falola 2007; Chan 2007 in Ogundiran & Falola 2007).

International Perspectives

Much of the work in African diaspora archaeology has focused on sites in the Americas and Caribbean. A growing body of work addresses diasporas throughout the Indian Ocean region, Middle East, and portions of Asia (Walz & Brandt 2006 in Haviser & MacDonald 2006; de Jayasuriya Silva & Angenot 2008). In addition, an increasing collection of historical archaeology studies of locations in Africa impacted by the trans-Atlantic slave trade presents excellent potentials for comparative analyses in the future (e.g., Hall 2000; Kelly 2004 in Reid & Lane 2004; Reid & Lane 2004; Schmidt 2006; Ogundiran & Falola 2007).

Future Directions

This brief survey of research questions and methods in African diaspora archaeology illustrates the remarkable breadth and diversity of the field. Future work provides great promise for comparative and synthetic analyses of sites spanning the Americas, Africa, Europe, and Asia. Rapid advances in bioarchaeological methods, DNA studies, and stable isotope analyses have the potential to provide increasing data on direct connections between populations across space and time. Ongoing developments in spatial modeling, remote sensing, accessibility of aerial and satellite data, and complex mapping programs will also enhance landscape and spatial studies. Researchers in African diaspora archaeology pursue these state-of-the-art advances while also maintaining close ties with the interests and questions advanced by members of African descendant communities.

Cross-References

- ▶ African Diaspora Archaeology Network (ADAN)
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Ceramics: Colonoware
- ▶ Deetz, James (Historical Archaeology)
- ▶ East Africa: Historical Archaeology
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historic St. Mary's City
- ▶ Mexico: Historical Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Plantation Archaeology
- ▶ Posnansky, Merrick
- ▶ Southern Africa: Historical Archaeology
- ▶ Trade Beads in Historical Archaeology
- ▶ West and Central Africa: Historical Archaeology

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African Diaspora Archaeology Network (ADAN)

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Basic Information

The African Diaspora Archaeology Network (ADAN) consists of collaborating scholars, researchers, and interested parties with expertise in African diaspora studies, archaeology, material culture analysis, African histories, and studies of the many developments and changes over time in African diaspora communities. The term "diaspora" typically addresses the dispersion of people to new locations as a result of adverse and hostile circumstances in the areas

from which they were abducted or departed. The ADAN (n.d.) describes its mission as connecting "an intellectual community that considers the historical processes of culture, economics, gender, power, and racialization operating within and upon African descendant" populations.

Major Impact

The ADAN publishes a quarterly, open-access newsletter through Internet distribution to thousands of readers worldwide. The network also presents extensive resources for community members and researchers through its Internet site (ADAN n.d.) and convenes an annual forum at the conference of the Society for Historical Archaeology (SHA).

The ADAN and its quarterly newsletter are successors to the African-American Archaeology Network (AAAN) and newsletter. The AAAN was organized by Theresa Singleton in 1990, and its newsletter was edited and produced in succession by Singleton, Thomas Wheaton, and John McCarthy up through 2000. The ADAN was organized in 2005 by Christopher Fennell, McCarthy, Jamie Brandon, and a group of collaborating scholars and adopted a new name to focus on the broader geographic scale of African diaspora communities worldwide.

The field of African diaspora archaeology has witnessed a remarkable expansion in the number of projects, scope of investigations, and variety of research questions pursued over the past several decades. This growth was illustrated in discussions at an ADAN forum entitled "Research Designs for Atlantic Africa and African Diaspora Archaeologies," convened in 2007 at the annual meeting of the SHA. Those forum discussions focused on interpretative frameworks and theoretical constructs utilized in African diaspora archaeology projects. Debates also addressed comparative historical archaeology investigations of sites in Africa impacted by the trans-Atlantic slave trade. The resulting assessments of the state of the field demonstrated that researchers are pursuing a breathtaking variety of research questions. Such analysts address relationships between people, material culture, and historical processes across spatial scales spanning local, regional, interregional, hemispheric, and global frameworks (Fennell 2011).

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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African Stone Age

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Introduction

The African Stone Age spans the first 2.5 Ma of human prehistory, beginning with the world's earliest stone tool production and continuing through the historical period of European colonization. The African Stone Age includes a tremendous diversity in terms of the characteristics of its industries and the life ways engaged in by its makers. Archaeological research on African stone tool industries has had wide-ranging impacts on our understanding of processes of human evolution and the organization of past human societies.

Definition

The African Stone Age is conventionally divided into three phases, including the Early, Middle,

and Later Stone Ages (ESA, MSA, and LSA). The ESA includes the Oldowan, Developed Oldowan, and Acheulean industries. Oldowan industry is thought to have begun with the world's oldest known stone tool technology at the site of Gona, Ethiopia, dating to around 2.5 Ma (Semaw 2000). The Oldowan industry is characterized by the production of flakes using direct hard-hammer percussion, though bipolar flaking is also known (Delagnes & Roche 2005). Common core forms include choppers, discoids, and polyhedrons. Retouched tools mainly include various types of scrapers and denticulates, though flake retouching is not common in most assemblages. The Oldowan gives way to the Acheulean industry between around 1.8 and 1.5 Ma, though this transition appears to have occurred gradually. Numerous securely dated Oldowan sites are known across eastern and southern Africa, and stone tool assemblages with Oldowan characteristics have also been identified in both the eastern and western Sahara (Plummer 2004). It is reasonable to conclude that the Oldowan industry was a pervasive phenomenon across Africa during the Lower Pleistocene.

The earliest known Acheulean assemblages occur at sites dating between around 1.8 and 1.5 Ma in the Konso Formation of Ethiopia (Asfaw et al. 1992), the West Turkana region of Kenya (Roche 2003), and at Olduvai Gorge in Tanzania (Leakey 1971). Acheulean assemblages include the same core and retouched tool forms as the Oldowan but are defined by the production of large bifacial hand axes, which are also referred to as "large cutting tools" (LCTs). Acheulean sites are known from all regions of the African continent. Hand axes at early Acheulean sites were produced through a process of alternate flaking using direct hard-hammer percussion, which resulted in large tools with bifacial edges. Middle Pleistocene Acheulean assemblages show more sophisticated flaking techniques for the purposes of bifacial thinning, including the use of soft-hammer percussion and the preparation of striking platforms (Ambrose 2001). Terminal Acheulean industries, such as the Fauresmith industry of southern Africa, are characterized by the production of much smaller hand axes and the increasing prevalence of other core reduction strategies. The Acheulean industry gives way to the Middle Stone Age between around 300 and 200 ka.

The Developed Oldowan industry is contemporaneous with the early period of the Acheulean industry, ranging in age between 1.8 and 1.0 Ma. It is mainly defined by the absence or scarcity of hand axes, though Developed Oldowan assemblages often include crude bifacial core forms, such as picks (Leakey 1976). Retouched tools also occur in somewhat higher frequencies and with more diversity than in the Oldowan industry. While there is some controversy in the definition and identification of Developed Oldowan sites (Semaw et al. 2009), a number of examples have been documented in eastern and southern Africa as well as in the Sahara.

The earliest known MSA sites are located in the Kapthurin Formation of the Kenyan Rift Valley and date to around 280 ka (Tryon & McBrearty 2002). Elsewhere in eastern and southern Africa, the transition from the Acheulean to the MSA appears to have occurred somewhat later, ending by around 200 ka. The Middle Stone Age is defined by the use of the Levallois technique, in addition to other varieties of centripetal core reduction strategies and the use of striking platform preparation. These core reduction strategies had their origins earlier in the later Acheulean industry, perhaps predating 500 ka (Rolland 1995). In the MSA, however, they comprise a more prevalent element of core reduction strategies and the production of hand axes largely ceases. Thus, the transition from the Acheulean to the MSA may again be described as a relatively gradual shift in the prevalence of various core reduction strategies at the boundary between the Middle and Upper Pleistocene (Tyron et al. 2005: 201).

The MSA is also the first period in which stone points were produced in significant frequencies using both the Levallois technique and through the marginal retouching of flakes. Such points are thought to have served as the tips of hand delivered spears. In addition, the MSA is characterized by low frequencies of other retouched tools, including various types of scrapers, notches, denticulates, and trimmed flakes. The latter MSA,

after around 100 ka, is characterized by increasing regional diversity in terms of stone tool traditions. In southern Africa, the distinctive Still Bay and Howiesons Poort industries, respectively, defined by the production of thinned bifacial points and backed blades, appear between 80 and 55 ka (Henshilwood et al. 2001; McCall 2007). In eastern Africa, the Mumba industry dates between 60 and 50 ka and is also defined by the production of backed blade technologies. In northern Africa, the Aterian industry appears between 80 and 40 ka and is defined by the production of stemmed points and bifacial points (Cremaschi et al. 1998). It is also important to note that these later regional MSA industries are associated with the appearance of the earliest symbolic objects, which have important implications for the origins of modern cognitive, linguistic, and social capabilities (Henshilwood & Marean 2003).

The LSA begins in eastern and southern Africa between 50 and 40 ka and is characterized by the production of small microlithic tools (Wadley 1993; McCall & Thomas 2009). The earliest uncontroversial LSA assemblages are known from the site of Enkapune Ya Muto in Kenya, though putative LSA artifacts predating 40 ka have also been found at the South African site of Border Cave. Elsewhere in southern Africa, MSA traditions have been documented dating to 25 ka or later, demonstrating that the transition from the MSA to the LSA was both a time-transgressive and geographically mosaic phenomenon. While most LSA industries are characterized by microlithic stone tool technologies, this is not universal. For example, the South African Oakhurst industry dates between around 12 and 7 ka and is defined by the production large flakes and the frequent retouching of these into informal scrapers.

In the eastern Sahara, terminal Pleistocene and Holocene microlithic stone tool industries share most formal qualities with the LSA of sub-Saharan Africa but are generally referred to as Neolithic using the Levantine nomenclature system (Wendorf et al. 1976). Across Africa, LSA stone tool industries are associated with origins of pastoralist and eventually allied small-scale agricultural economic systems, occurring first in the Sahara around 9 ka and spreading to sub-Saharan Africa subsequently. The use of stone tools comes to an end with appearance of iron technology, which becomes increasingly prevalent between 2 and 1 ka. In southern Africa, forager and pastoralist populations continued producing stone tools in the Wilton industry of the LSA through the historical period of colonial contact. Isolated cases of stone tools production, such as the manufacture of stone scrapers by hide workers in Ethiopia, have persisted into the twenty-first century.

Historical Background

Early research on the African Stone Age was associated with the expansion of European colonial territories in Africa during the late nineteenth and early twentieth centuries. The three-age Stone Age chronological system was first proposed seriously by the South African archaeologists John Goodwin and Clarence van Riet Lowe (1929), though Goodwin was heavily influenced by his training under Miles Burkitt at Cambridge University. Following from Burkitt (1925), Goodwin and van Riet Lowe (1929) eschewed the three-age system used to classify the European Paleolithic (Lower Paleolithic, Middle Paleolithic, and Upper Paleolithic) in favor of a chronology unique to the African continent. The reason for this revolved around the widely held Eurocentric view that while the African Stone Age sequence showed some similarities with that known from Europe, its industries occurred later in time and were inferior reflections of their European origins. In short, the various stone tool industries found in Africa were thought to have originated earlier in Europe and diffused into Africa, degrading in quality over space and time.

This view was seriously challenged beginning in the late 1950s by the research of Louis and Mary Leakey, who were the first to establish the deep antiquity of Stone Age artifacts in eastern Africa using newly developed isotopic dating methods (Leakey 1971, 1976). Their research showed that Oldowan artifacts dated to at least

1.8 Ma – much older than what had been supposed and also significantly older than any known stone tool technology in Europe. Subsequent research demonstrated that virtually every early stone tool industry known in Europe had its predecessors in Africa, reframing Africa as the location of the origins of both our earliest human ancestors and their technological traditions. Furthermore, the increasingly synthetic reconstructions of African prehistory in the 1960s produced by archaeologists such as Desmond Clark and Glynn Isaac, as well as their students and colleagues, demonstrated that African Stone Age industries were as complex and sophisticated as any known from other regions of the world.

This trend continued with respect to research on the MSA and modern human origins, thanks in part to further advances in dating technology. While the MSA was once seen as static and underdeveloped relative to European Middle and Upper Paleolithic sequences, it is now known that the MSA was the source of many key behavioral changes among early modern human population. It is now widely acknowledged that many features of the so-called Upper Paleolithic Revolution in fact had their origins in African MSA (McBrearty & Brooks 2000; Henshilwood & Marean 2003). Furthermore, it is increasingly recognized that many important technological features of the Mesolithic and Neolithic microlithic industries of Eurasia originated much earlier in the Upper Pleistocene with the appearance of the LSA in Africa. Thus, the African Stone Age has become a major focus of research on a wide range of global Paleolithic phenomena in terms of the evolution of humans and their expansion across the Old and New Worlds.

Key Issues/Current Debates

The African Stone Age continues to be the subject of a wide range of active archaeological research and debate. Such debates involve issues of prehistory as well as archaeological method and theory. They primarily revolve around accurately reconstructing the life ways of past populations and the complexity of associated social structures, cognitive capabilities, and symbolic practices.

Current research on the ESA has focused on assessing the sophistication of knapping activities and putting these in the context of forms of archaeological information concerning economic and social behaviors. Making use of *chaîne opératoire* and allied methods of lithic analysis, this line of research has demonstrated that even the earliest hominin flintknappers associated with Oldowan lithic assemblages had a solid mechanical understanding of platform angles and other aspects of core geometry – something that even the most highly trained and sophisticated chimpanzee knappers lack (Toth & Schick 2009). Similarly, research on Middle Pleistocene Acheulean assemblages has shown that evident processes of bifacial thinning require a high degree of knapping skill, perhaps implying both sophisticated cognitive and social/linguistic structures for teaching (McPherron 2000). These insights stand in contrast with prior views of early hominin behavior and cognition, which have tended to see ESA archaeological assemblages as indicating much more apelike behavioral patterns.

Archaeological research on the MSA has exploded within the last two decades with profound implications for our understanding of modern human origins. New dating technologies and expanded programs of field research have radically overhauled our knowledge of MSA prehistory and the nature of early modern human cultural behavior. Such discoveries include the world's earliest symbolic objects, ground bone tools, blade-based lithic technology, as well as evidence for other complex knapping procedures and the exploitation of labor-intensive subsistence resources. These behavioral features have been used to define the European "Upper Paleolithic Revolution" and the broader concept of "behavioral modernity" (Mellars 1989; Shea 2011). In addition, research on MSA lithic technology has offered increasing clarity concerning the kinds of technologies, subsistence practices, and mobility systems employed by early humans. Combined, modern research on the MSA has

provided important insights concerning the origins of modern humans, their shifting cultural behavior, and their spread to the rest of the world.

By virtue of finer-grained chronological information and historical associations with modern forager groups in the Kalahari and East Africa, research on the LSA has sought to investigate the nature of later prehistoric foraging forms of technology, economic practices, and social systems. Research on rock art, especially in southern Africa, has offered important information concerning the nature of LSA social structures, religious practices, and cosmological constructs (Lewis-Williams 1983). Recent research has also focused on the transition from foraging to small-scale farming and pastoralist economic systems, as well as the complex forms of interaction between later LSA foragers and their agricultural neighbors. Finally, the transition from the MSA to the LSA is now receiving renewed attention in light of new excavations and improved dating techniques.

International Perspectives

The bulk of early archaeological research on the African Stone Age was conducted under the auspices of European colonial (especially British) academics and their associates in various African colonies. For example, John Goodwin, Louis Leakey, J. Desmond Clark, Glynn Isaac, and Brian Fagan all received graduate education in archaeology at Cambridge University in the early to middle twentieth century. Beginning in the 1960s, an initial generation of African professional archaeologists emerged and populated departments of archaeology at local universities, especially in South Africa. While this generation remained committed to the methodological and theoretical directions that originated in Europe, archaeological research on the African Stone Age began to take on a distinctive regional flavor.

The 1960s also saw the movement of many of the most important African Stone Age archaeologists to major research universities in the United States, such as the hiring of J. Desmond Clark and Glynn Isaac and the University of California Berkeley in 1961 and 1966, respectively. This trend had the effect of fostering the increasing involvement of American archaeologists on African Stone Age topics. Beginning in the 1970s, American archaeologists began to make important contributions on topics ranging from dynamics of lithic reduction, patterns of bone modification, site formation processes, ethnoarchaeology, and experimental archaeology. The increasing popularity of African Stone Age research topics also attracted the attention of powerful foreign scholars, such as Lewis Binford. Within the last two decades, archaeologists from other regions, such as various Western European countries and Australia, have made increasingly important contributions. For example, French Paleolithic scholars, such Anne Delagnes, Pierre-Jean Texier, and Jean-Philippe Rigaud, have offered new perspectives in terms of the application of *chaîne opératoire* approaches to lithic echnology in the ESA and MSA.

Perhaps the most important shift in terms of research on the African Stone Age has been the increasing involvement of indigenous scholars and African governments in the examination and preservation of Stone Age cultural resources. While this has been a continent-wide phenomenon associated with the gaining of independence from European colonial powers, it has been particularly salient in the Rift Valley nations of East Africa (especially Ethiopia, Kenya, and Tanzania) and South Africa. Across Africa, the record of human evolution and cultural diversity associated with the Stone Age has become increasingly recognized as a crucial element of cultural patrimony. With that said, indigenous involvement in research on African Stone Age topics remains regrettably rare (Shepard 2002).

Future Directions

Research on the African Stone Age is in the midst of a significant period of reorientation based on the development of new analytical methods and dating techniques as well as the expansion of available data sets through the proliferation of fieldwork projects.

Research on the Oldowan and Acheulean industries has recently focused on the evaluation of early hominin cognitive capabilities and the complexity of social organization. Future research is poised to make use of a wide range of evidence resulting from human and chimpanzee knapping experiments, further archaeological and ethological investigations of chimpanzee tool use and associated activity areas, and more detailed analysis of archaeological assemblages within a technological framework. In addition, various three-dimensional scanning technologies now allow for the documentation of the shape of tools such as hand axes in much greater detail. Finally, the field is once again turning its attention to the examination of early hominin technological organization, mobility patterns, and broader dynamics of ecological adaptation.

Recent research on the MSA has offered a great deal of new knowledge concerning the design and function of tools and weapons as well as implications for subsistence activities and economic organization. Likewise, having established the presence of many precocious forms archaeological remains associated with early modern humans, recent research on the MSA has sought to evaluate the nature of novel forms of social organization and their potential causes. While some current scholarship has questioned the utility of the behavioral modernity concept (Shea 2011), a great deal of work continues to be focused on the nature of MSA early modern human cognitive and cultural sophistication (Wadley 2012). Future research will no doubt continue to add detail concerning the nature of MSA life ways while improving our understanding of the relationship between various regional phenomena and shifts over time. For example, while the later MSA sequences of South Africa are known in great detail, their relationship with contemporaneous industries in adjacent regions is not. Likewise, the MSA of East Africa remains a neglected topic relative to the study of ESA technologies in the interest of addressing debates concerning early hominin evolution.

Future research on the LSA seems poised to address a range of issues. While the technological and operational characteristics of MSA tools and weapons are increasingly known in great detail, such information remains lacking for the LSA in spite of links with modern forager groups in Africa. The application of a similar research program would seem to have much to offer. In addition, the transition between the MSA and LSA remains a poorly understood process, especially considering apparent differences between various African regions. New directions in research on the LSA might also choose to focus on the continued production of tools by historical and modern societies. Understanding changes in lithic technology associated with processes of colonization and modernization could offer valuable new perspectives on these profoundly important historical phenomena. Finally, future research on the LSA will continue to show the ways in which LSA life ways were specialized aspects of global processes of post-Pleistocene adaptation rather than being "timeless" elements of foraging societies as was assumed by earlier ethnographers and archaeologists.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ Out-of-Africa Origins
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ West and Central African Neolithic: Geography and Overview

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African World Heritage Fund (AWHF)

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Introduction

The African World Heritage Fund (AWHF) addresses a dire need to provide greater protection for World Heritage sites in Africa. The mission of the African World Heritage Fund is to support the effective conservation and protection of natural and cultural heritage of outstanding universal value in Africa (Herbert n.d.). The fund was established in 2006 as an intergovernmental organization to support the protection of World Heritage sites by providing financial support for training, national inventories of cultural heritage sites, and the conservation and management of heritage properties in Africa (Patchett 2006). The aim is to target local populations of the African countries who have signed the United Nations Educational, Scientific and Cultural Organization (UNESCO) convention and support them to implement active approaches to protect World Heritage sites (Herbert n.d.). The major initial contribution to the Fund was a donation of 20 million rand, the equivalent of US$3.5 million, from South Africa (Patchett 2006).

Current Debates

The African World Heritage Fund addresses two issues that are critical to world heritage in Africa: the low number of sites in this region that is inscribed on UNESCO's World Heritage List and the high costs of maintaining the sites that are inscribed on the World Heritage List. The impact of the fund can be judged by an increase in the number of sites in Africa that are inscribed on the World Heritage List and in the number of countries from the region that have sites inscribed on the list or nominations in process.

According to Varissou (2010), the most important task of the African World Heritage Fund is to increase the number of African sites on the World Heritage List. There is a need to impress the importance of listing sites on the local population and to train authorities and site managers of heritage sites with knowledge on how to apply for inscription on the list. In the space of a year, from 2009 to 2010, the fund helped finance 30 sites to conform to the criteria needed to progress for enlistment. When the African World Heritage Fund was established in 2006, only 65 of the 812 sites inscribed on the World Heritage List were located in sub-Saharan Africa and only 24 of the 40 sub-Saharan African states that had ratified the World Heritage Convention had sites on the World Heritage List (Patchett 2006). By 2013, the World Heritage List had grown to 962 properties (UNESCO 2013). Notable sites from Africa that were inscribed during this period include the Sangha Trinational National Parks, situated in the northwestern Congo Basin, at the intersection of Cameroon, Central African Republic, and Congo; the Ounianga Lakes in Chad; Rabat in Morocco; and the Bassari, Fula, and Bedik cultural landscapes in Senegal (UNESCO 2013).

The African World Heritage Fund provides critical support for State Parties in their efforts to ensure that their World Heritage sites conform to the 1972 World Heritage Convention criteria. There is a significant financial burden involved in ensuring that sites inscribed on the World Heritage List continue to conform to the 1972 World Heritage Convention criteria. The maintenance of World Heritage sites is the responsibility of State Parties. In low-income countries, such as those in Africa and parts of Asia, the burden of maintaining sites on the World Heritage List is particularly onerous. In 2013, the critical nature of the situation was indicated by 16 of the 38 sites on the List of World Heritage in Danger being located in Africa (UNESCO 2013). While some of these sites are in danger due to conflict in the region, such as with the Democratic Republic of the Congo, other sites are in danger due to a lack of trained personnel to protect sites or financial resources to put protection measures in place.

The African World Heritage Fund provides both forms of support. To achieve these objectives, the fund requires the implementation of a plan to ensure the sustainability and protection of heritage sites.

The capacity building program established by the African World Heritage Fund addressed a critical need for trained local personnel. As Leitão (2012: 5) points out, Asia and North Africa were the last regions to experience capacity building programs as part of the World Heritage Capacity Building Project. A significant event in this process was a workshop for North Africa which took place in 2012, held in partnership with the Arab Regional Centre for World Heritage and the National Institute for Heritage in Tunisia. The International Centre for the Study of the Conservation and Restoration of Culture Property (ICCROM) and International Union for Conservation of Nature (IUCN) conduct specialized training on World Heritage and conduct assessments to deal with issues surrounding the topic (Leitão 2012: 6). The first two assessments were at the University College Dublin, Ireland, and at the Brandenburg University of Technology in Cottbus, Germany.

Though it was established only recently, African World Heritage Fund plays a critical role in protecting World Heritage sites in Africa.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Southern Africa: Cultural Heritage Tourism Development and Management
- ▶ UNESCO (1972) and Malta (1992) Conventions

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Age Estimation

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Introduction

Age is a measure of how long a person or an object has existed. A reliable estimation of the age of an individual requires there to be a well-defined and documented event to which the duration of a known passage of time can be ascribed. The thorny question then arises about "when" a human starts to exist. This temporal moment of definition between existence and nonexistence can be difficult to fix in relation to the human and generally has three distinct options: the time since fertilization, the time since intrauterine implantation, or, most commonly, the time since birth.

Key Issues

Early Years

The clinical disciplines of Medical Embryology and Obstetrics wish to know the date of fertilization to permit them to calculate the age of an embryo or a fetus. However, unless there has been only one sexual event, then this timing is unlikely to be a certainty, and so clinicians opt to calculate the age of the fetus from a more reliable event – the last menstrual period (LMP). The mother is more likely to recall or at least approximate this date but of course this can also be unreliable as she may genuinely not remember or

may choose to falsify the information for personal reasons. Therefore, even in the earliest stages of human development, age estimation can be imprecise; a fact which is often little understood by the expectant mother who, when given a due date for her baby, is disappointed when that date generally proves to be incorrect. Only some 4–5 % of babies arrive on their due date, with approximately 80 % arriving in the 2 weeks to either side of that date.

To assign an age to a fetus in utero is achieved through ultrasound image measurements of the length of the fetus (crown-rump length), biparietal width of the skull, or length of the long bones, especially those in the lower limb. If the fetus has been miscarried or aborted, then additional measures of weight, head circumference, thorax dimensions, and crown-heel length can be measured. If, however, the remains are skeletonized, then age estimation is normally based on either bone lengths or maturation status of several of the skeletal elements (Scheuer & Black 2000). A fetus can be viable from 23 weeks gestation, but chances of survival are greatly enhanced if it is over 25 weeks. In some contexts, legal abortions of a fetus can be undertaken providing the fetus is less than a prescribed number of weeks of gestation (e.g., in the UK it is less than 24 weeks). Thus, there are two very important forensic questions that can be related to the age of the fetus – (a) was it viable and (b) was the termination legal.

Birth is an eminently definable event in relation to both a time and a specific calendar date. It is perhaps the most important human marker of existence and is celebrated by millions of people as an annual event throughout their entire life. In most western countries, birth is formally recorded through authenticated certification so that "proof" of the date does not rely solely on memory but is supported by verifiable documentation. Indeed, this formal record is so important and desirable that it can carry a high black market price and may be acquired through fraudulent means. This therefore brings the authenticity of the documented information into some debate, and an understanding that forgeries exist is vital to the realistic acceptance that even documentation may not be relied upon. Many less-developed countries may not record birth dates and therefore not have any basis upon which to develop a robust certification process. This leads to difficulties when the age of a person is required to be known and there is no formal paperwork to support the believed assumption. Under these circumstances, what is referred to as "chronological age" may be questioned and may require verification. Government departments, banks, employers, law enforcement agencies, and other legislative authorities require confirmation of the age of the individual with whom they interact, and each can, and frequently does, seek legal recourse to resolve disputes over alleged age assignment (Black et al. 2010). Therefore, the estimation of the age of a person is undeniably of forensic relevance (i.e., pertinent to the courts) regardless of whether the person is alive or dead. The methodologies and principles followed in both circumstances are very similar.

In the case of a deceased person, an assignment of the age at death is an important component of the biological profile of the individual which can ultimately assist with the identification of the remains in forensic and archaeological investigations. Investigation of a crime is exceptionally difficult in the absence of the identity of the deceased, and indeed investigation of the death is critical for the prosecution of a crime. The biological identity of the deceased is comprised of four principal characteristics – sex, age at death, ancestry, and stature. The personal identity of the deceased can then be pursued once these primary characteristics have been attributed. Personal traits of identity may include matching for DNA, fingerprints, dental information, and other, what are deemed to be secondary, indicators of identity including facial appearance. The methods used to estimate age vary little, regardless of whether the deceased is of recent origin or of historical provenance. However, a recent report by the UK Law Commission (2011) suggests that methods may only be deemed admissible for the court if certain thresholds of acceptability are met. While this is not a hurdle faced in the analysis of ancient remains, if it is deemed best practice, then thresholds of what is deemed "acceptable" will need to be determined and agreed upon by practitioners.

Age estimation processes are based on the principle that as time passes (i.e., the further one

progresses from the moment of birth), then a number of biological maturational events will occur that can be mapped and related to the known occurrence and timing of such events. Therefore, there has to be a strong relationship and correlation between two age-related continua: chronological and biological age. The closer biological age is to chronological age, then the greater will be the certainty of prediction of one from the other, but the more they diverge, then the more uncertain will be the estimation of chronological age. The methods utilized in this process tend to show a close and strong relationship between the two ages during childhood, and they start to diverge markedly as adulthood approaches and then move even further apart as middle age approaches. Therefore, the techniques available to forensic anthropologists and osteoarchaeologists permit high levels of accuracy at predicting the age of a child (living or dead), and they are reliable in the later teenage years, acceptable in the early adult years, and very poor in the middle to later years of adult life (Bogin 1999).

Biological age has two components, skeletal age and dental age, and each can be established independently. Skeletal age utilizes information on the timing of formation of bones, their growth, and the pattern of their ultimate fusion to form the final adult product. Almost all growth has ceased in the human skeleton by 30 years of age, and the changes thereafter are degenerative. These are less reliable markers of the passage of time as they are heavily influenced by many factors including genetics, environment, health, nutrition, and lifestyle. To visualize the skeleton in the living requires that the person usually be exposed to ionizing radiation for imaging purposes (X-ray or computed tomography (CT) scans) although magnetic resonance imaging (MRI) does not carry the same health risks. In the deceased, exposure to radiation for imaging purposes is not as restrictive, and indeed to gain access to the skeleton, soft tissue can be removed through maceration, although of course this does not pose a problem if the remains are partially or completely skeletonized. Age can be estimated to some degree from almost every part of the human skeleton, but obviously in the living, the areas that can be targeted are restricted. These generally comprise the wrist and, if possible, the medial ends of the clavicle. The radiographic image of the wrist and hand region provides access to at least 29 separate bones, and therefore age estimation can be considered from birth through to middle adolescence with some degree of reliability (Black et al. 2010). Imaging of the medial clavicle permits an indication of age from later teenage years through to early adulthood, but it does carry some health and safety risks in relation to exposure to radiation for imaging purposes. Textbooks exist on how to establish the age of an individual when living (Black et al. 2010), for forensic purposes (Burns 2006) and in the archaeological arena (White & Folkens 2005), but in reality, they all use similar methodologies.

Dental age is predicated on the pattern of known development, eruption, and shedding of teeth that occurs throughout the life of the child. The first tooth to start to develop does so in early embryonic life and the last tooth to reach occlusion does so in early adult life – therefore, accurate age estimation from the teeth is valid from fetal age through to adulthood, but beyond the eruption of the third molars, teeth become less reliable indicators of age (Blenkin 2009). In the living, teeth are the only hard structures of the body that are visible to the naked eye, and their ability to survive trauma makes them an ideal medium for age evaluation. There is also a largely unsubstantiated, but generally accepted, maxim that dental age is more closely related to chronological age than is skeletal age as the teeth tend to be more protected from environmental insult and so retain a closer parallel progression of the two continua. Therefore, combining estimations of age from the skeleton with those from the teeth will most likely result in an acceptably reliable indicator of age both for the living and the deceased.

Future Directions

Our modern society demands confirmation of how long we have existed, and the scientist does their best to oblige, but it is never, and can never be, a precise operation. This is the area of research that is most likely to be prevalent in

future years as our security-conscious world focuses on who we think we are, who we say we are, and how we can prove it.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Dental Anthropology
- ▶ Facial Approximation and Craniofacial Superimposition
- ▶ Imaging Techniques in Bone Analysis
- ▶ Osteology: Definition
- ▶ Sex Assessment

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Agency in Archaeological Theory

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Introduction

Agency is an explicitly humanistic perspective for understanding ancient people and social reproduction. It emphasizes the reciprocal relationship between people's conscious and unintended actions and their social, ideological, and material conditions. Agency is an attempt to bridge three long-standing paradigmatic divides: between theories focused on egocentric individuals "in" society, those concerned with the deterministic nature of normative culture, and theories emphasizing the influence of external (material) conditions on both individuals and society.

After more than three decades of experimentation and critical reflection, there is still little consensus across paradigmatic boundaries as to precisely what agency is (Dobres & Robb 2000, for attempts at a comprehensive definition, see Johnson 1989; Bell 1992; Pauketat 2001; Dornan 2002). Nonetheless, as a conceptual framework and an analytic tool, the utility of agency for making sense of the past is undisputed. And given the heterogeneous interests of twenty-first-century archaeology, perhaps resistance to being pigeonholed by a single set of tenets is part of its wide appeal and its efficacy. For example, recent agency research published across a wide spectrum of archaeological journals, books, dissertations, and edited compendia shows that how agency played out in particular ancient settings varied considerably (e.g., the agentive processes involved in early state formation in Ancient Mexico, Venezuela, and Crete did not unfold in the same manner).

Another aspect of its popularity in archaeology is that the dynamics of agency have shown themselves amenable to empirical investigation. Indeed, practically every kind of archaeological material has been the means to study agency, including post holes, stone tools, trash, monumental stelae, cave art, village layouts, burial mounds, and graves as well as classic material signifiers of technology, economics, prestige, culture contact, and state formation. Methodologically, this is important, because while archaeologists do not "dig up" agency (see below), they can study "it" in any time period, in any place in the world, from practically any paradigmatic standpoint, and using practically any categories of material culture.

The previous three points help explain the appeal of agency across the discipline: (1) lack of definitional consensus allows the concept to be utilized creatively; (2) agency "looks" different in different cultural, historical, and material circumstances; and (3) research on agency is not limited to only certain times, places, processes, or categories of data.

Nonetheless, agency in archaeology has, at times, been employed far too uncritically (e.g., conflating agency with physical actions or all-knowing and self-strategizing individuals). Uncritical use of the concept remains an epistemological, interpretive, and methodological issue that this presentation cannot hope to resolve.

Definition

Agency is notorious for resisting a single clear-cut definition (Dobres & Robb 2000). Not only do archaeologists employ the concept in numerous and sometimes competing ways, but the "thing" itself is a slippery dynamic that plays out different in different settings. While an early and seminal definition of agency (in sociology) defined it as the capacity to make a difference through action (Giddens 1984; see below), this definition is too narrow to capture the many layers of what agency means in contemporary archaeology.

For example, depending on who you read agency in archaeology has been defined in terms of the rational individual, the conscious (or unconscious) negotiation of intersubjective personhood, free will and intentional (self- or group-serving) strategizing, the normative collective and its construction of reality, conscious or (unconscious) resistance to social norms, adept social practice, unintended goofs and their consequences, and the interplay of individuals, structures, events, and history.

At its core, agency in archaeology is concerned to understand the dynamic relationship between the knowledgeable routines of everyday practice and the ability of agents (both individuals and collectives) to act within and upon larger "structures." In this regard, one major tenet agreed upon by most is that although agents are necessarily conditioned by historical, social, and material circumstances, they are not wholly circumscribed by them.

More specifically, agency is about the unfolding and recursive process of social reproduction. It is about individual and collective agents acting in relation (1) to each other; (2) to their cultural norms; (3) to history; (4) to environmental, (5) material, (6) political, and (7) economic conditions; and (8) in relation to a host of local circumstances. Collectively, numbers 2–8 are called "structures." While structures are necessarily of their own making, agents do not fully control them.

In agency theory, the unintended consequences of habitual (largely unconscious) routines loom large in mediating the reciprocity between agents and their structures. For example, while socioeconomic, political, material, and ideological structures are the resources agents use (imperfectly) to make sense of and act in the world, such structures simultaneously shape how agents think and act. Thus, rather like the chicken and the egg dilemma, the question of agency is not about "which came first (agents or structures)?" but about how, in specific settings, they interacted with and shaped one other.

In sum, agency in archaeology is, at one and the same time, a cultural process, a theoretical concept, an interpretive paradigm, and an analytic tool for making sense of the past in terms of an inseparable suite of dynamics. For its advocates, agency is a corrective bridging the inadequacies and limitations of better-established (albeit more narrowly conceived) processual and post-processual approaches to the past. But to others, the acknowledged difficulty with providing a clear-cut definition acceptable to all makes agency a "platitude" more than a "paradigm" (Dobres & Robb 2000: 3).

Historical Background

The initial inspiration for agency in archaeology (and the social sciences more generally) stems from Marx's famous dictum that "men [sic]

make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past" (Marx 1969: 15 [orig. 1869]). The more immediate and palpable influence on archaeology begins in the 1980s, with Anthony Giddens' (1984) work on "structuration" and Pierre Bourdieu's (1977) emphasis on habitus and *praxis* (Ortner 1984). The key points of their ideas, as relevant to archaeology, are summarized below.

Giddens' theory, known as "structuration," seeks to understand how society, social rules, and large-scale structures (specifically, sociopolitical and economic institutions and class ideologies) come to exist outside of the agents who make them possible in the first place. Structuration wants to explain how society's structures are susceptible to change if the agents who create and sustain them have little awareness or control of what's going on. Giddens' "duality of structure," in particular, emphasizes how everyday actions create the normative rules and top-down conditions which recursively act back on their creators in a never-ending "dialectic." Structuration theory takes the question of social change seriously because agents and structures do not exist in a homeostatic feedback loop adapting to each other and the "real" world. Rather, agency and structures are processes of interaction, and their relationship is a dynamic dance in which "external" and objectified conditions (viz., structures) are both the architecture and the resources agents use to live in a world of both social perception and material realties. Importantly, it is in this unstable cauldron of agency and structures that change unfolds.

On the other hand, Bourdieu was particularly concerned to counter structuralist notions that agents are little more than robots unconsciously following deep-seated rules and a cultural logic of which they are unaware and impotent to change. Bourdieu's so-called "theory of practice" highlights habitus, which is defined as tacitly learned social practices and routines of action that serve as the resources with which agents cope with their social, ideological, and material conditions (no matter how imperfectly understood). Habitus and everyday practice (*praxis*) are not only normative strategies to get through the day. As an embodied and meaningful form of knowledge of how to get by in the world, habitus is susceptible to both conscious and unintended alteration. Thus, subtle changes in everyday routines, whether by mistake or by intention, can accumulate to change the structures (i.e., the culture) within which they take place.

Importantly, both Giddens and Bourdieu emphasize that the structures "within which" agency unfolds (i.e., institutions of power, history, social rules, traditional and innovative practices, as well as and knowledge) are neither rigid nor do they exist "out there" and in opposition to agents. But because structures are the means by which agents understand who they are and how the world should work, they are perceived as objective (external) entities.

To summarize, agency theory in the social sciences emphasizes habitus, *praxis*, and structures as different but inseparable aspects of social reproduction. Combined, they not only shape how agency unfolds but also serve as the raw material used to act in the world as agents see fit.

In archaeology, agency is thus premised on the idea that both the structuration process and the habitus of everyday practice are relational and recursive dynamics. Structuration and habitus highlight not only the interplay, or duality, of people and society but also their social, ideological, historical, and material conditions – none of which should be teased apart for heuristic (analytic) ease. In this web of life, past and present, neither structures nor agents can exist without the other, neither wholly determines nor is influenced by the other, and change is built in to the very essence of everyday routinized actions (rather than only through conscious political upheaval, culture contact, or change in the environment).

The question of agency entered archaeological discourse as part of the "post-processual" movement (e.g., Johnson 1989; Bell 1992; Barrett 1994) but is currently investigated by researchers of every paradigmatic stripe (not that they all define agency in the same way; see above). Agency was initially a balm to the impersonal

and deterministic nature of the functionalist and systemic (New Archaeology/Processual) paradigm, which gave more credit to the environment and "needs of the system" than to living breathing people. Thus, the attractiveness of agency was, at first, to "find people" (Robb 2010; but see below for new intellectual trends). A parallel interest in agency can be traced, at much the same time, to frustration with how mainstream paradigms discounted the role of gender, in particular, as (1) a form of everyday practice, (2) as a structure and set of rules shaping actions and perceptions, and (3) as a potential source of wholesale culture change (e.g., Dobres 1995).

For archaeologists, habitus and *praxis* are attractive concepts because we dig up palimpsests of everyday material activities and evidence of culture change at numerous analytic scales (Barrett 2001). Similarly, the structuration process is intuitively familiar because archaeological applications of systems theory have already made familiar the idea that archaeologists can excavate a "system" from the patterning of archaeological remains. But on these two points, there are substantive differences, explicated below (see also Dobres & Robb 2005).

Key Issues/Current Debates

Agency and Projects

While archaeologists dig up the material remains of past activities, those activities are not, conceptually, the same as "projects" (Robb 2010). Projects is a concept better suited to researching the dynamics of the agency/structuration dialectic because agency is about more than just doing something with material culture.

For example, the earliest writing projects were more than just activities. As scribal projects, they wove together the agencies of traders and accountants with scribal communities and elite patrons. Epigraphy on a gravestone or on the walls of a chiefly tomb intimately connected the agencies of dead and the living with the agency of the material being inscribed (see below). Accounting projects concerned not only the herds or cloth being counted and the containers of wine and grain being sealed. Each of these was, in turn, connected with the bone, ivory and clay being used for seals, with the chisels used on stelae, and with the technical recopies for ink and papyrus. Thus, more than activities leaving material traces, early writing projects were overlapping fields of social, symbolic, political, economic, and material agency contextualized within structures too numerous to elaborate here (but see papers in Englehardt 2013).

The Agency of Material Things

Extending the idea of agency beyond the original duality of agents and structures, archaeologists now study the agency of material things (Gosden & Marshall 1999; Gosden 2005). In this formulation the material world is not passive, waiting to be brought to life through the physical activities of people. Rather, the material world of objects and raw materials has its own kind(s) of agency that during the unfolding of agentive projects interacts with and thus in part shapes how agents understand the world and act in it.

But material things are not agentive simply because humans give them meanings, values, and functions. From an agency perspective, things are partners in social life and can contribute to or intervene in the best-laid plans of sentient agents. For example, in crafting and using Ice Age sewing needles, bone and stone (burins) collaborated with, but also occasionally resisted, the wishes, skillful gestures, and know-how of the technicians engaging in those projects. In this sense, the agency of bone and stone not only contributed to the "inalienable" value of bone sewing needles but also helped "make" their makers (Dobres 1995).

Agency and Personhood

As mentioned above, the initial focus on agency in archaeology was to humanize the past through explicit concern with human beings and their meaningful experiences in a material world of sociopolitical, economic, and historical structures. Many archaeologists remain focused on understanding how the mindfully, materially, and socially constituted bodies of agents worked in and through their world to give it meaning and

shape. This research often appeals to phenomenology and its attention to how the corporeal senses of embodied experience become both a locus of meaning making and a medium of agency.

As but one example of the (inter)agency of people, communities, structures, projects, and things, Dobres (2000) has explored how an embodied and corporeal sense of (gendered) personhood was negotiated, tacitly, during the most mundane and habitual projects of artifact manufacture, use, and repair during the Magdalenian (Late Ice Age) in the French Pyrénées. Asking about the agency of Magdalenian personhood led to an empirically grounded exploration of the interrelationship between gestural skill, esoteric and practical knowledge, and normative rules about the right and wrong ways to make and use objects in particular material settings. In turn, this concern with personhood led to an appreciation of the materiality and agency of antler, bone, and ivory as well as the artifacts made from them – as agents in their own right.

Agency and Social Reproduction

Clearly, the resources agents make use to act in the world, and the meanings attached to them come about through the routinized practice and physicality of everyday projects. At the same time, such routines are in a dialectical dance with larger-scale structures (such as tradition and history, politics, and ideologies and of course material conditions). Combined, local practice and large-scale structures constitute the "stuff" of social reproduction. But agents employ an imperfect understanding of their circumstances, and they do so with only partial success and with a host of unintended consequences. Thus, from an agency perspective, social reproduction unfolds through a series of relationships negotiated between (1) the agencies of individuals and communities, (2) the agency of material culture, and (3) between these myriad projects and larger-scale historical traditions and structures.

For example, at Umbro and Penitenzeria (Bova Marina, Calabria), Robb (2007, 2010) has used the lens of agency to consider prosaic projects as social and material forms of agency. Foodways, herding, clay and stone technologies, house construction, burials, and trade – these were overlapping projects (not activities) connecting people to their kin, to their ancestors, and to extrafamilial relationships. But more than the stuff of everyday life and habitus, these projects also reproduced the Italian Neolithic writ large. Robb shows how six items of everyday trash are more than traces of an "economic system." The projects in which they were caught up connected them to social actors, to other objects, to symbolic power, to the social landscape, to fields of memory, as well as and to household rites. Thus, social reproduction during the Italian Neolithic was a partnership interconnecting artifacts, agents, habitus, community, and the social landscape with the *longue durée* of history, memory, economic institutions, space, and the environment.

As well, the question of agency has led to new considerations of power and even the question of wholesale culture change. To generalize, the methodological individualism underwriting "rational actor" models holds that humans have a universal desire for prestige and power and will seize the opportunity, consciously, whenever possible. In stark contrast, from an agency perspective the development of sociopolitical and economic inequality is posed as a historically specific and local question of intersubjectivities and contingencies. While some archaeologists investigate how collective expressions of agency made use of older (normative) socioeconomic and political structures in order to reconfigure them in new and unequal ways, others research how traditional ideologies, habitus, and sociomaterial conditions served as a pool of (imperfectly understood) resources with which communities sometimes resisted and sometimes acquiesced to attempts at altering power relationships.

Agency and Scale

As can be seen above, still another way to think about agency in archaeology is in terms of scale. For some, agency is a way to highlight the local, the historical, and the situatedness of "individuals" or intimate collectivities within larger-scale

structures beyond their ken. But for others, the interest is on those larger-scale structures. Importantly, when one shifts from the question of small ("micro")- to larger ("macro")- scale concerns, it does not mean that localized expressions of agency are no longer relevant. Because in the past agency unfolded at each and every scale one can identify, research focused on any particular scale must be concerned with the overlapping and possibly contested nature of agency at multiple scales.

Thus, the focus on understanding the agency of people and communities in relation to their social, material, and ideological conditions ranges from making sense of the projects and habitual practices of recognizable individuals to the more anthropological concept of "the individual," to communities of agents (who may or may not have been acting in concert), and all the way "up" to the scale of structures far beyond the control of anyone. Similarly, agency can be studied through the remains of a hearth, a single house floor, a village, a trade route, or an empire – because agency unfolded within and through them all.

International Perspectives

In a brief amount of time, agency has become a popular topic in archaeological research across the globe, and increasingly, such work is being pursued by non-Western trained archaeologists. For example, agency has been used to study the origins of writing in Greece, pottery manufacture in Cameroon, culture contact in Hawaii, lithic production in prehistoric Pakistan, identity in Ancient Egypt, and dynastic-period Chinese burials. As a result, expressions of agency are being identified that do not conform to Western notions, such as the agency of the "we" (rather than the "me"). Indeed, across the globe the current state of research on agency in the past may best be characterized as the study of agencies in archaeologies.

Perhaps the most difficult issue facing archaeologists interested in agency is to learn how to "see" and appreciate expressions that were different from those evident in the modern (capitalist) world (e.g., papers in Knappett & Malafouris 2008). It has been far too easy to succumb to the "me, myself, and I" notion of the egocentric individual and describe past expressions of agency in terms of all-knowing individuals (or agenda-driven groups) consciously manipulating the world to suit their fancy. In this regard, international perspectives on agency are a welcome challenge to Western and capitalist descriptions of the past. It is hoped that international perspectives, framed by non-Western theoretical perspectives, will enable us to ask if we can hope to understand, on their own terms, how differently constituted agentive projects unfolded in settings unlike anything known in the present.

These are among the vexing dilemmas research on agency is only beginning to grapple with, and they will be well-served by increasing input from non-Western trained archaeologists and those studying times and settings wholly unlike the present.

Future Directions

What is both vindicating, but at the same time problematic, is that agency has become a ubiquitous part of twenty-first-century archaeological discourse. It is currently employed by Darwinian, evolutionary, and behavioral archaeologists, by processualists and those favoring ecological perspectives, by feminist and Marxist archaeologists, and by post-processualists of every stripe. Nonetheless, there is still much room for analytical, interpretive, methodological, and epistemological introspection and growth. In archaeology, particularly, many issues still need to be explored and elaborated, among them:

- A phenomenological concern with how normative structures become internalized through the situated subjectivity of everyday practice should be leading us to ask: how did non-discursive and tacit forms of agency play out at collective and larger (macro) scales?
- In different times, places, and in cultural settings, archaeologists could be asking: what,

precisely, was the nature of the relationship between embodied and mindful human agents and their externalized social, political, and material conditions?

- For all the focus on the dialectic of agents and structures, archaeologists still tend to take for granted the question of "tradition" and cultural conservatism. Thus, perhaps it is time to ask: how did agency contribute to long-term social stability?
- On the flip side, more work needs to be done on understanding how microscalar forms of agency, played out in local arenas of materiality and meaning making, contributed to wholesale structural change. Among the topics we might explore from this perspective: how did local expressions of agency and habitus contribute to state formation or the development of agriculture?
- Archaeologists with even a passing familiarity with ethnography are well aware that Western notions of agency, "the individual," and personhood depend on a problematic definition inappropriate for much of the past. Though this does help explain why there is growing interest in the agency of material things, we need to keep asking: what other forms of personhood and agency existed in the past?
- More particularly, how can archaeologists conceptualize, much less study, the agency of class, power, gender, ethnicity, or race? Will a one-size-fit-all (Western-centric) theory and methodology work for all these dynamics? Surely not.

Conclusions

While archaeology is all the better for the inclusion of agency in the study of the past, major epistemological, analytical, and interpretive issues remain unresolved (Dobres & Robb 2005). But there is no doubt that as an explicitly humanistic perspective for understanding ancient people and social reproduction in terms of practice, projects, and materiality, agency is a theoretical concept, an interpretive paradigm, and an analytic tool amenable to studying any time, place, and circumstance of interest to archaeologists.

Cross-References

- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Material Culture and Education in Archaeology
- ▶ Phenomenology in Archaeology

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Agnew, Neville

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Basic Biographical Information

Neville Agnew joined the Getty Conservation Institute (GCI) in Los Angeles in January 1988. He came to the Getty from the Queensland Museum, Australia, where he had headed the conservation department, which he was instrumental in establishing when he joined that institution in 1980. Prior to 1980, he had pursued a career in academic and research chemistry in South Africa and Australia. Educated in South Africa, he did graduate research in England and received a doctorate in chemistry in 1967. His conservation work in Australia was mainly on the preservation of outdoor sites, including fossil footprints (the Lark Quarry dinosaur stampede site), a maritime archaeological site (the British warship *Pandora* wrecked in 1791 on the Barrier Reef), and the ruins of a nineteenth-century settlement (the penal colony on the island of St. Helena in Moreton Bay). Among his research activities have been a joint Getty Conservation Institute/New Mexico State Monuments project on adobe preservation, development of techniques for preservation and protection of archaeological sites, and a collaborative project with the U.S. National Park Service at Chaco Canyon, New Mexico.

Dr. Agnew has led and participated in many of the international conservation projects of the institute, notably in China where he has worked continuously since 1989, under the Getty's agreement with China's State Administration of Cultural Heritage, at the Mogao ancient Buddhist grotto site and the Chengde Imperial Summer Resort; and among others, in Egypt on conservation of the wall paintings in Nefertari's tomb and the Great Sphinx at Giza; in Africa on the conservation of the bas-reliefs of the royal Palaces of Abomey and the Laetoli hominid trackway in Tanzania; South America in the Quito historic center; and in the city of Prague on the St. Vitus mosaic project. His long association with heritage conservation in China has resulted in a number of awards: the Friendship Award of the State Council in 2000, the International Scientific and Technological Cooperation Award of the PRC in 2005, and awards from Gansu Province and the Dunhuang Academy. He was instrumental in drawing up national guidelines for the conservation of heritage sites in China. Currently he leads the Getty's collaborative projects in Egypt for the conservation of the Valley of the Queens and

Tutankhamen's tomb and the Southern African Rock Art Project.

Dr. Agnew has authored publications in research chemistry and conservation, including the book: *Cave Temples of Mogao* (with two coauthors), and is a member of several professional associations, including being on the editorial boards of the journals *Conservation and Management of Archaeological Sites* and *Historic Environment*. For 8 years, he was a board member of the National Center for Preservation Technology and Training (a program of the U.S. National Park Service) and served as chair. He has organized major international conferences and edited the proceedings. These include two conferences at the Mogao Grottoes of Dunhuang and the conservation theme at the 5th World Archaeological Congress held in Washington, D.C., in 2003.

Dr. Agnew is currently senior principal project specialist in the Field Projects department of the GCI.

Major Accomplishments

Neville Agnew has successfully sustained significant multiyear international heritage conservation projects in a wide range of cultures and climates. These collaborative projects, as part of the GCI's international outreach, are premised on identifying significant conservation needs or problems and developing partnerships and teams to address the issues. This has required both conceptual understanding and technical knowledge and the ability to lead. Examples of these projects have been the development of the *Principles for the Conservation of Heritage Sites in China* with the State Administration of Cultural Heritage and the Australian Heritage Commission, technical preservation interventions at the Mogao Grottoes, and completion of a decade-long project for conservation of the earth-based wall paintings at this World Heritage Site. Also at the Mogao Grottoes, the *China Principles* were used in drawing up a master plan which in turn led to the development of a systematic methodology for sustainable visitation to the site. In southern Africa, annual workshops have been mounted for conservation and management of rock art. These have been attended by participants from all 12 southern African countries, and linkages are now being forged with traditional owners of rock art sites in Australia.

In Tanzania, the 6-year project for the conservation of the 3.5-million-year-old Laetoli trackway was completed with educational outreach to local and international audiences. Currently in Egypt, in collaboration with the Supreme Council of Antiquities, a comprehensive plan for conservation and management of the Valley of the Queens with its 100 tombs has been completed, while research and study of the tomb of Tutankhamen is well advanced, in preparation for conservation of the wall paintings and presentation and interpretation of the tomb.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Archaeological Stewardship
- ▶ Archaeology and Anthropology
- ▶ Architectural Sites: Monitoring
- ▶ Art, Paleolithic
- ▶ Australia: Maritime Archaeology
- ▶ Australia's Archaeological Heritage
- ▶ Australopithecines
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Chaco Canyon, Archaeology of
- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List

- ▶ China: New Approaches to Heritage Administration
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and Communities
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- ▶ Getty Foundation
- ▶ Kakadu National Park: Rock Art
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- ▶ Lake Mungo, Archaeology of
- ▶ Landscape Archaeology
- ▶ Nonstructural Sites: Monitoring
- ▶ Paleoart Studies: Scientific Methods
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- ▶ Rock Art, Forms of
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art Sites: Management and Conservation
- ▶ Sierra de San Francisco: Great Mural Rock Paintings
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
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- ▶ Site Stewardship Programs
- ▶ South Africa: Heritage Management
- ▶ Stakeholders and Community Participation
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- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
- ▶ Trackways in Archaeological Conservation and Preservation
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- ▶ Urban Landscapes: Environmental Archaeology
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management
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Agora in the Greek World

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Introduction

The word "agora" derives from the ancient Greek term ageirein, meaning "to gather together" and is attested as early as the eighth century BCE. It is commonly translated as "assembly," "assembly place," and "market place." The agora was a crucial component of all Greek villages and towns across the Mediterranean. According to Herodotus (1.153), the Persian king Cyrus II conceived of the agora as the single most defining characteristic of an urban settlement. For Homer (*Od.* 9.112-5), the agora was not only a constituent part of an urban environment but also signified a form of order and civilization, since he characterized a community without one, such as that of the Cyclopes, as lawless (*Od.* 9.106). The emergence of the agora has been linked with the birth of the Greek polis (city-state). Antonaccio (1997: 170-80) regards the agora, alongside other features including monumental temples and the council house, as an indicator for urbanization. Civic requirements – political, social, commercial, religious, and cultural – were fulfilled in this public place. It was also a place for public display, with honorific statues for good citizens and benefactors as well as political monuments that often functioned to define the collective identity of the polis. Some of these activities and functions were so closely linked to this space that they came to describe it as well as the term "agora," including *choros* (dance), *agon* (athletic contest), and *ekklesia* (popular assembly) (Kenzler 1999: 306). It was originally an open place, but it soon became home to buildings of civic and sacred importance, in line with the growing need to permanently reserve specific areas for specific activities. However, there was nothing that one might call an archetypical Greek agora. While most examples are attested in urban centers, there were also areas designated as agoras outside of settlements (Strab. 9.1.10) and temporary agoras outside of cities, especially in wartime (Thuc. 1.62.1).

Definition

The earliest references to the *agora* can be found in the *Iliad* and the *Odyssey*. While the exact date of the composition of the epics of Homer is debated, most scholars seem to agree that they were written down in the later eighth or early seventh centuries. For Homer and his audience, *agora* could refer to an actual gathering (*Il.* 7.345; *Od.* 9.112, see also Alcaeus F 130b.1-4; Campbell 2002) or an assembly place (*Il.* 18.497; *Od.* 7.44). Once the Greek polis and its rules for communal living were fully developed in the Archaic period, it came to denote a public space that served as the civic and commercial heart of the Greek city-state. This area was sacred in a similar manner to other elements of the urban infrastructure (Martin 1951: 164-201). It served as the locus of governmental proceedings, archives, religious rites, athletic and dramatic competitions, military activities, trading and shopping, philosophical discussions and chats, and eating and drinking.

Historical Background

Both textual and archaeological sources provide evidence for the ancient Greek agora. The earliest use of the word is attested in the Homeric epics,

where the word is mostly employed in the sense of a gathering of people and a council assembly (*Il.* 2.143-4; *Od.* 2.26) but also as a topographical term (*Il.* 18.274; *Od.* 2.7). It is occasionally unclear whether Homer refers to the agora as an institution or a location (*Il.* 2.93; *Od.* 10.114). The agora plays a significant role in the world that he created in his poems, but it is much debated to what extent the *Iliad* and the *Odyssey* actually portray Greek society in the eighth century BCE; it is, therefore, better to discuss the Homeric world separately. People in the Homeric world come to the agora to attend court sessions, games, and assemblies and to watch dances and athletic contests (Kenzler 1999: 304-6). The agora might also be associated with craftsmen, if indeed the shipyards beside the Phaeacian agora provided ship maintenance services (*Od.* 6.268-9). Especially in the *Iliad* (2.48-83), it is also a place where military matters are addressed. In Homeric Ithaca, the men congregate every morning at the agora to talk and gossip (*Od.* 17.52-72); political meetings usually seem to require the presence of their leader (*Od.* 2.26-7, but 2.6-7). In wartime, gatherings could take place close to ships or on the battlefield (*Il.* 1.305; 8.489-92). The agora is an open, sacred space with few structures, located at the temple of Poseidon in the harbor area on Scheria (*Od.* 6.263-7), or in the lower city, below the acropolis (Kolb 1981: 2-3); assemblies could also be held at other places, such as in the citadel of Troy (*Il.* 7.345). The single most important installation is the *hieros kyklos* (sacred circle); the circle of honorary seats (*thokoi*) marked this place permanently (Kenzler 1999: 53-9, 243-8). In the trial scene depicted on Achilles' shield (*Il.* 18.497-508), the elder noblemen sat on polished stones within this circle while the other men of the community gather around them in the open space. Heralds gave staves to the elders who wished to give judgment. Other authors had different names for this sacred circle, and it was called the "orchestra" in Athens (Plato *Ap.* 26d-e), implying that it served for theater performances and other religious activities. The Spartans termed it according to Pausanias (3.11.9) "choros" (dance), suggesting that it functioned as a dance floor.

The agora plays a crucial role in communal life both in the Homeric world and in ancient Greece. While community matters were openly debated in the epics of Homer, court sessions were held by a small number of representatives and followed by an audience that participated through verbal assent (Kenzler 1999: 304-5). In this sense, the agora was an important place for the strengthening of a community's sense of unity. This basic function was not restricted to the Homeric world. In fact, this never changed even if access to the agora and the relative roles of the worlds of the living and the dead within it were subject to change. It appears that access to this public place was unrestricted in Homeric society though not everybody seems to have had the right or power to decide matters of controversy. Many historical poleis, by contrast, clearly defined the space of the agora by boundary markers (*horoi*) and lustral basins (*perirrhanteria*) set up at its edges, and some excluded by law individuals accused of pollution, such as murderers (Dem. 20.158). Assemblies were occasionally held at hero tombs within Homeric society (*Il.* 10.414-5, cf. Kenzler 1999: 307). The relationship between the living and the dead became more permanent when the agora was placed next to burial grounds. For the Megarians, this was a conscious decision so that the dead could play an active role in communal affairs (Paus. 1.43.3). Other poleis only granted select individuals the right to be buried in the city center. The founder-leader (*oikistes*) was customarily buried and worshipped in the agora of new foundations, as in the case of Cyrene in North Africa (Malkin 2009: 374). The Athenians buried the remains of their local hero and model ephebe, Theseus, in their civic center; his adventures adorned a temple, the so-called Hephaisteion, that stood next to major civic buildings (Paus. 1.17.6).

The origin of the agora is much debated. Some scholars believe that the agora of the Early Iron Age was influenced by Minoan palace architecture (cf. Kenzler 1999: 323-6). Other scholars (e.g., Mazarakis Ainian 1997: 273) place more emphasis on the spatial configuration of Early Iron Age settlements and suggest that the open

space in front of a ruler's house may have functioned as a "primitive agora." In any case, the earliest-known spatially defined agoras date to the eighth century BCE, a period that is characterized by the formation of cities and states. The earliest archaeologically attested agora was discovered in Megara Hyblaea in eastern Sicily, a settlement that was founded shortly after 750 BCE and covered a territory of about 600,000 m^2 (Mertens 2006: 64-72; cf. Hoepfner 2006: 3-4 for early settlements on Chios and Andros). The territory of the city of Megara Hyblaea was subdivided into five districts, each of which followed a slightly differently oriented grid system. The spatial planning reserved, among other spaces, an agora on the so-called Plateau Nord, an area of about 4,200 m^2 that was located between two habitation districts, hence its unusual trapezoidal form (Fig. 1). This innovative urban planning solution was copied in Selinus, Miletus, and Piraeus, cities that were also laid out in converging grid-patterns. Another feature of urban planning, the main road connecting the agora with the main urban sanctuary, can be found in Megara Hyblaea's daughter colony, Selinus. At first, the agora of Megara Hyblaea consisted of an open, multifunctional space with altars, and it remains unclear whether its primary function was originally civic or sacred (Bergquist 1992: 134-5; de Polignac 1999). Monumental buildings, including temples, stoas, possibly a *bouleuterion* (council house), were constructed at the end of the seventh century BCE, while a heroon and a banquet house were added much later.

It is perhaps not surprising to find one of the earliest agoras in a colonial context, since "the phenomenon of colonization provided the overall rise of the polis with an enormous impetus" (Malkin 2009: 377). Although processes of urbanization were not uniform throughout the Mediterranean (van Dommelen 2005: 44), in most Greek settlements, they seem to have followed similar trends. Among other things, increasing importance was accorded to the community as a whole and to the public (*to koinon*, *to demion*) rather than the individual (*to idion*) or the household (*oikos*). If necessary, preexisting domestic structures and burials were cleared away for the creation of an agora. Designated spaces in the polis were assigned specific functions and later adorned with purpose-built buildings. Once the civic center was established, it was seldom relocated, as can be seen in Argos (Pariente et al. 1998). This may also have been true for the agora of Corinth, which Donati (2010) recently posited beneath the Roman forum.

The evidence from the sixth and fifth centuries BCE is somewhat more plentiful, partly due to the construction of permanent administrative buildings and sanctuaries for polis deities. The agora of Metapontium in South Italy, for instance, not only housed a number of shrines and temples but also an impressive amphitheater-like installation that has been interpreted as an *ekklesiasterion* (building for popular assembly) with space for up to 8,000 people. It is possible that the area was already used as an agora before 600 BCE, if the wooden remains discovered here can be interpreted as a stage (*ikria*) (Mertens 2006: 47). As in Selinus and possibly Syracuse (Mertens 2006: 76), it was an integral part of the planned settlement but it was not the focal point of its layout. The agora of Metapontium only became the heart of the city when the settlement expanded in the fourth century BCE. On the Greek mainland, the agoras tended to be less elaborate. The agora of Argos was adorned with two stoas and a temple for Apollo around the middle of the fifth century BCE.

The most famous agora is the agora of Athens, situated directly beneath the Acropolis in the district called the *Kerameikos*. It is also one of the best-published agoras (Camp 2010). This well-known agora is most likely the successor of an earlier agora. The location of the original agora and the date at which the later agora was monumentalized are much discussed. Papadopoulos (2003: 280-97; cf. Hoepfner 2006: 16, fig. 13) recently suggested that the earlier agora was located east of the Acropolis and relocated after 480 BCE. The chronology of the first major building phase in the western part of the new agora has been pushed back to the end of the sixth century BCE in recent scholarship;

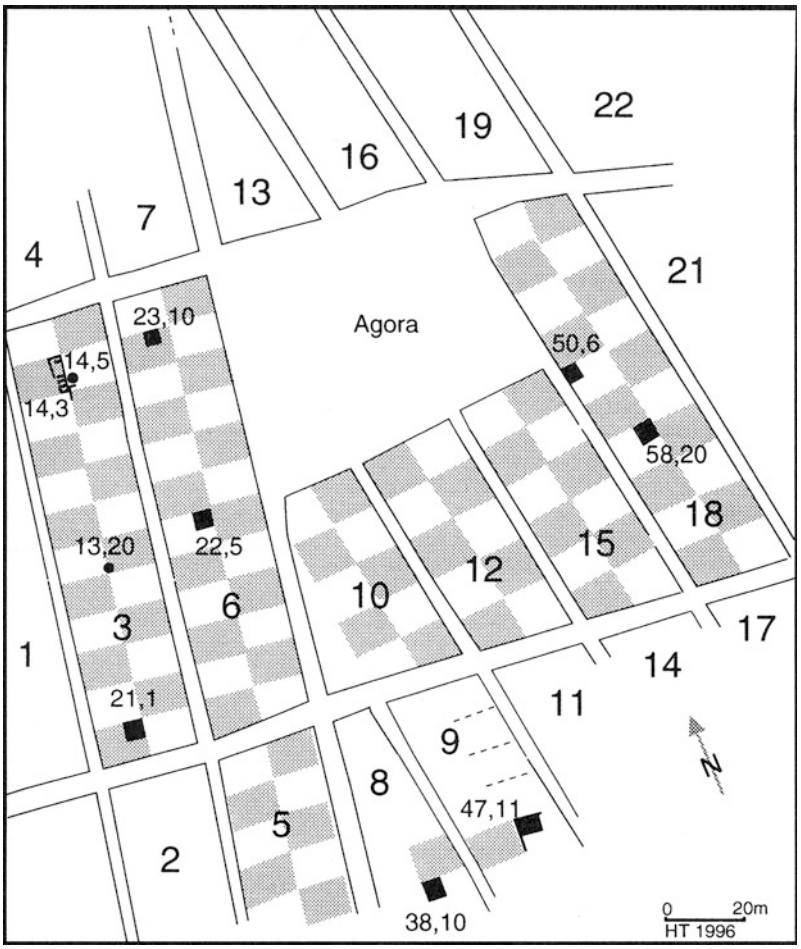

Agora in the Greek World, Fig. 1 Plan of the agora of Megara Hyblaea. (Courtesy: H. Tréziny)

Papadopoulos (2003: 295) does not necessarily contradict this view, since he is mainly interested in determining when this place formally acquired its new function. By then, the principal public building of the Old Bouleuterion (Metroon) and perhaps the Royal Stoa had been erected in the northern part of the agora as well as altars and shrines, including the Altar of the Twelve Gods (Figs. 2, 3). The Athenian agora also had its own fresh water supply; the public fountain house was part of a larger water management project that was celebrated on many black-figure vases. Some civic institutions such as the people's assembly were eventually established in the neighborhood of the agora, on the Pnyx or in the theater (McDonald 1943: 45, 47-51, 57-8). If many major buildings of the agora and the erection of boundary markers are associated with the Cleisthenic reforms in 508/7 BCE which resulted in "a united Attica" that was "a functional reality" (Anderson 2003: 5), it can be argued that this newly formed community, in turn, used the agora to strengthen its sense of community and collective identity. The Athenians measured the distances in Athens from the Altar of the Twelve Gods (Hdt. 2.7; *IG* II^2, 2640); the Panathenaic procession crossed the agora; monuments commemorating important people and milestones in the city's history, such as the end of tyranny and victories in the Graeco-Persian Wars, were erected in the agora. It is noteworthy that in addition to the meeting place in the city center, each Attic deme (small community of a citizen body that shared cults and festivals) had its own

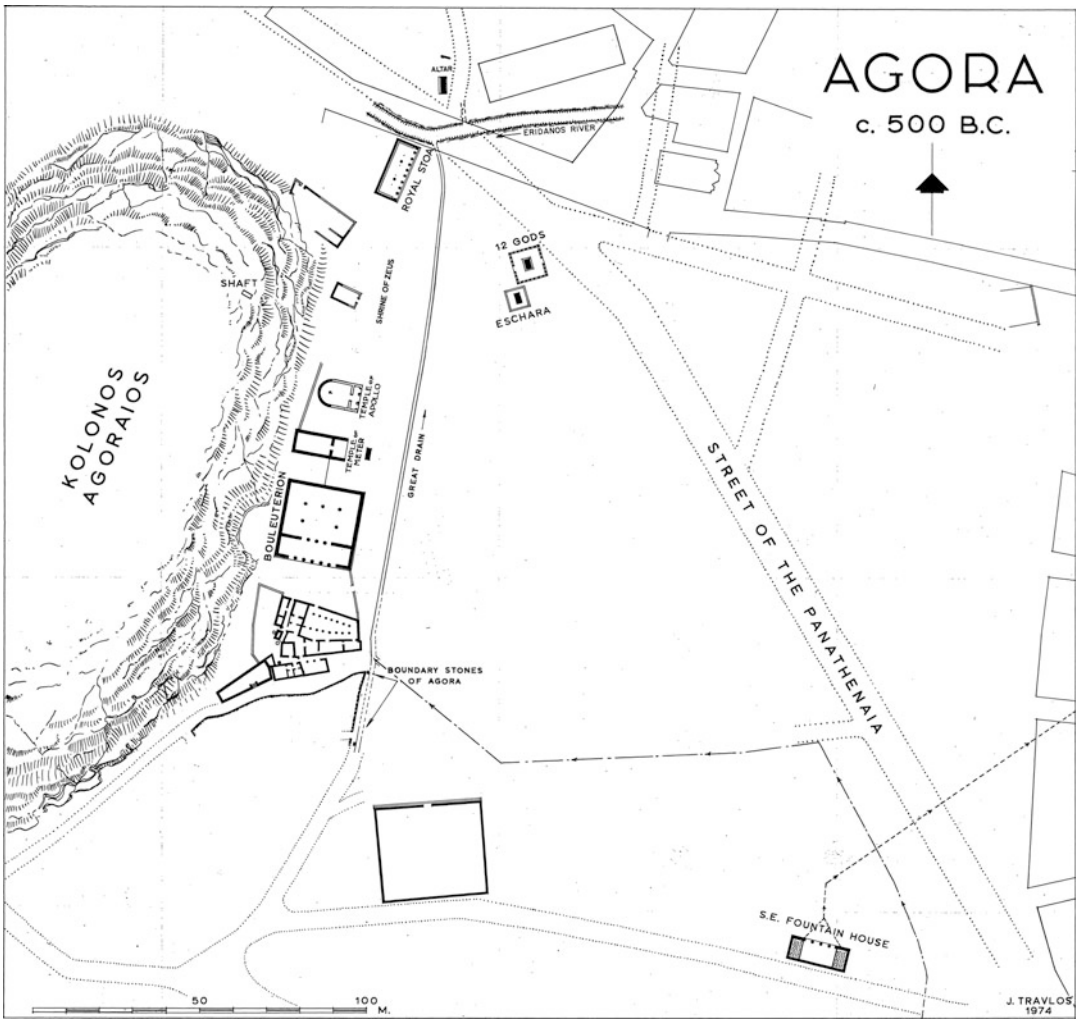

Agora in the Greek World, Fig. 2 Plan of the agora of Athens, c. 500 BCE. (Courtesy: Agora Excavations)

"agora" or "theatron," as they were called in inscriptions, in the fifth and fourth centuries BCE (Kolb 1981: 62-74).

Herodotus (5.101) is one of the first authors to refer to the agora as a marketplace but it soon became the quintessential function of this public place. Some Greek authors such as Herodotus (2.39) and Xenophon (*An.* 1.5.6) even used the term to denote market places in non-Greek societies. Specific products such as vegetables, meat, books, and perfumes were sold in designated spaces in the agora of Athens (e.g., Ar. *Lys.* 557-8), and these spaces were in turn named by the Attic orators after the goods sold there (Poll. 9.47; 10.19). Stoas often had rooms used as shops and workshops that were rented out by the polis authorities. The Attalos stoa on the east side of the agora of Athens consisted of 42 rooms (approximately 5 m by 5 m) on two floors. This additional function made the agora the perfect social meeting place, hence the term *agoraios* for someone who spends much time there (e.g., Hdt. 1.93). For Socrates, the agora was the ideal place to engage passers-by in philosophical discussions. Aristotle (*Pol.* 1331a-b) argued for a separate commercial agora. Two agoras were the norm for most Hellenistic cities. While the market place can be found near the harbor in

Agora in the Greek World, Fig. 3 Model of the agora of Athens, c. 500 BCE. (Courtesy: Agora Excavations)

Ephesus and Miletus, the civic and the commercial centers were placed next to each other in Kamarina and Morgantina. The two agoras of Priene were close to each other but of different sizes.

The agora was still a characteristic feature of Greek cities in the late Classical and Hellenistic periods even though their autonomy was often limited to self-government and depended on the approval of imperial powers, and while new institutions emerged and became characteristic features of Hellenistic cities. This was also true for later writers, including Dio Chrysostomus (*Or*. 48.9) and Pausanias (10.4.1). By the Hellenistic period, the agora was monumentally defined and quite often closed off from the surrounding area by monumental public buildings. Yet it was not standardized. One of the most characteristic building types of this period was the stoa defining the boundaries of a central area and housing commercial establishments, as on Delos, at Magnesia on the Maeander and Miletus. Two adjacent sides of the agorai of Kassope, Kolophon, Orchomenos in Arcadia, and Syracuse were closed off by porticos, while the agora of Morgantina in Sicily and that of Thelpousa in Arcadia were framed on three sides. The agora at Messene is a typical example of a completely closed agora. Other cities placed theaters on the edges of their agoras. In the cases of Akrai, Assos, Elis, Mantineia, Morgantina, and Metapontium, the theater served as an *ekklesiasterion* (Kolb 1981: 88), while the theater of Kassope has been interpreted as a *bouleuterion* (Hoepfner 2006: 23). In addition, wealthy benefactors (*euergetai*) sponsored individual buildings within the agora or completely new building complexes. Famous examples of the former include the Stoa of Attalos at Athens and the colonnades and exedrae of the so-called Agora des Italiens on Delos, the function of which is still debated. The most famous example of the latter is perhaps the Upper Agora of Pergamon on the edge of the acropolis (Figs. 4, 5), which was part of the major building project of the Hellenistic King Eumenes II (197-160/59 BCE). As the administrative and religious center of the newly organized royal metropolis of the Attalids, it was adorned – like most Hellenistic agoras – with statues, dedications, and altars (Radt 2001: 48).

The Upper Agora of Pergamon moreover exemplifies characteristically Ionian features according to Pausanias' typology of agoras, namely, the colonnades that enclose large sections of the agora (but do not obstruct the view to the monumental altar; Fig. 5). Many newly founded, refounded, and even modernized late Classical and Hellenistic cities in Ionia used the

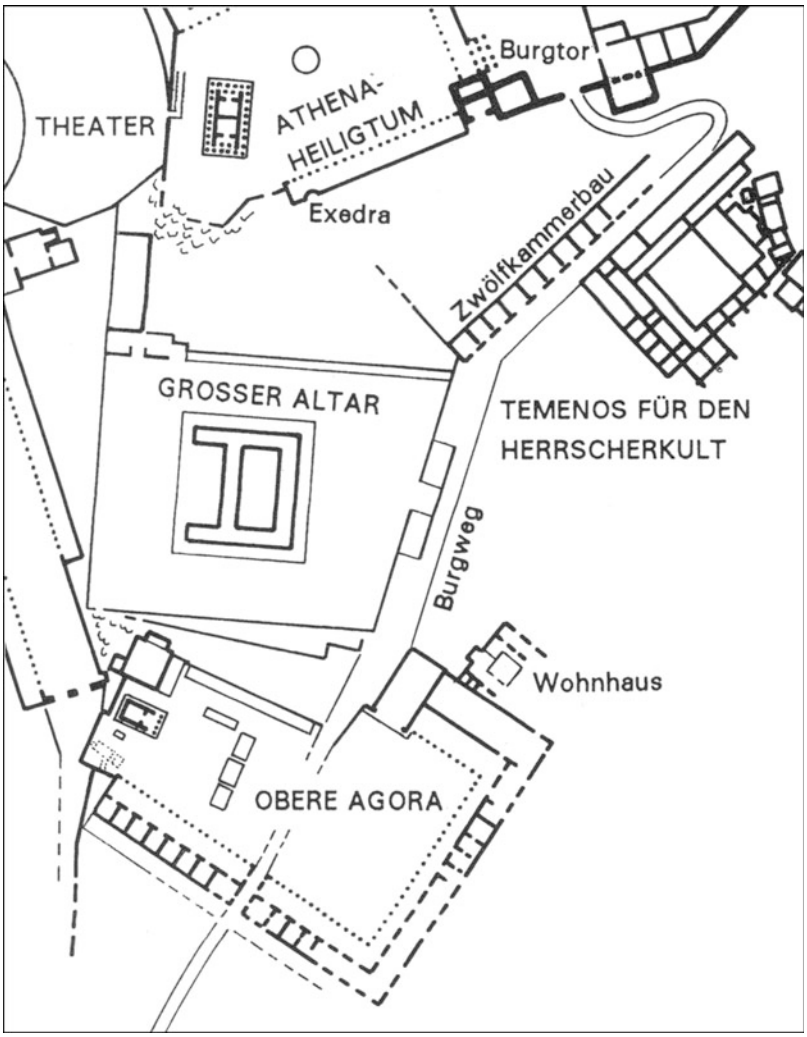

Agora in the Greek World, Fig. 4 Plan of the agora of Pergamon, second century BCE. (Courtesy: K. Rheidt)

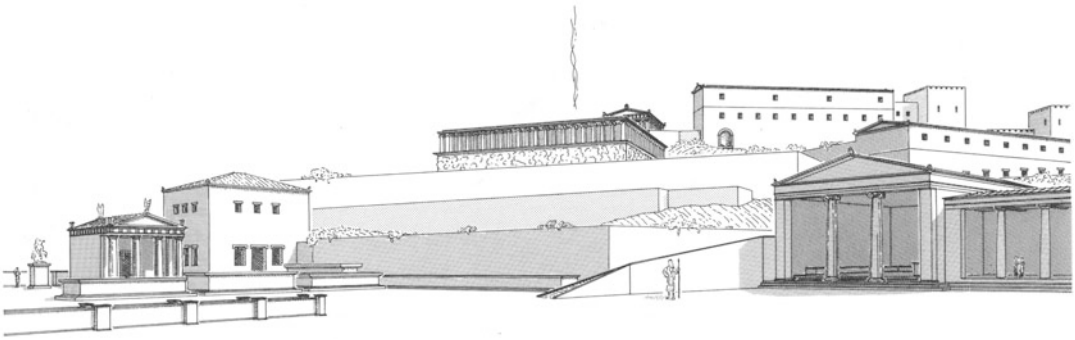

Agora in the Greek World, Fig. 5 Reconstruction of the Upper Agora of Eumenes II. The reconstruction of the north niche in the foreground is hypothetical. (Courtesy: K. Rheidt)

so-called Hippodamian town plan, in which streets are laid out on a rectangular grid around central, often colonnaded public spaces. Another famous example is the agora of Priene, a city that was refounded in the fourth century BCE. When Pausanias, in the second century CE, visited the agora of Elis, he noted that the local agora with "porticoes separated from each other and with streets through them" was rather old-fashioned and stood in sharp contrast to the agoras of the cities of Ionia and of the Greek cities near Ionia (6.24.2; Jones 1933). The closed-off Ionian agora with few formal entrances may be seen as the predecessor of the forum, the open square, or market place of a Roman settlement or town, even if some of its characteristic features such as the podium temple and basilica were developed in Italy, and some aspects of its layout such as the new architectural concept of a grandiose approach to the forum, as found at Ephesus, Pergamon, and Hierapolis, were introduced much later.

Key Issues/Current Debates

The archaeological evidence for the emergence of the agora is scarce. The location and appearance of the early agora is best documented in systematically planned poleis in southern Italy and Sicily. Here, agoras are centrally located, open places that serve the needs of the community. The earliest civic centers of cities which were never planned as a whole, such as Corinth and Athens, are often difficult to locate or can only be traced archaeologically when buildings were placed along their boundaries. Literary references to an earlier agora exist occasionally, as in the case of Athens, but no traces of this old agora that is mentioned in a note of the second century BCE writer Apollodoros (FGrH 244F 113 and preserved by Harpokration) have been discovered. Owing to the poor archaeological documentation of early poleis, the frequent references to the agora as a social institution and as a place of communication in the epics of Homer have received much scholarly attention. However, the Homeric poems cannot be used as a historical source even if the date at which they were written down can be determined. While it is generally accepted that the Homeric world cannot be mapped onto Bronze Age or Iron Age Greece, it is still debated how to best explain inconsistencies within the poems and how to conceptualize the sociopolitical configuration of Homeric society.

Future Directions

The main area for future research is the early agora. The exact relationship between the origin of the agora and the birth of the polis and urbanization processes needs to be explored in more detail. New discoveries will play a major role in this discussion, since many of the excavated sites have long occupation histories that make it difficult to detect open space with little to no architectural features. A further research area concerns the development of the agora in the Black Sea region.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Forum
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (excluding Crete), Archaeology of
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Polis
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Stoa
- ▶ Urban Planning in the Greek World

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Agrarian Landscapes of the Historic Period

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Introduction

Agrarian landscapes of the historic period have an often fragile archaeology. Most are still used to produce food, and the fences, walls, and hedges which form their principal remains, or the earthwork traces of earlier systems of farming and land division which survive within them, are thus vulnerable to destruction. Those living and working within what appear to be everyday, functional landscapes are often unaware of their antiquity or historical significance.

Definition and Historical Background

Across much of medieval Europe peasant communities exploited most uncultivated land in common. Grazed intensively for centuries, and cut for fodder, fuel, and much else, these areas

developed as particular forms of habitat – with their own individual suites of flora and fauna – such as moorland, fens, or heaths. In addition, in many districts the arable land was farmed in "open fields," in which the properties of cultivators lay intermingled in the form of narrow, unenclosed strips (each usually less than 10 m wide and frequently less than 7m), across which various communal routines were imposed. Usually, for example, the same crop was cultivated by all those holding land in a particular section of the fields, and large and often continuous sections of the arable lay "fallow," or uncropped, every second or third year, so that they could be dunged by livestock and recover fertility. Open-field strips were usually slightly sinuous in plan, having been distorted over the years. Many took the form of a shallow "reversed S," caused by the way that the plowman moved to the left as he approached the end of the strip, in order to avoid too tight a turning circle.

Open fields took many forms. In Sweden, parts of Denmark, central England, northeastern France, southern Belgium, and central-southern Germany, extensive and highly communal systems existed. These were farmed from large villages and contained the intermixed holdings of substantial numbers of landholders. But more "irregular" field systems, containing the holdings of fewer farmers and normally associated with dispersed settlement patterns, could be found widely across northern Europe, from Cornwall and Brittany in the west to Hungary in the east. Other variants existed in some Mediterranean countries, including Italy and Spain. Open fields first developed in the early medieval period, in many districts before the tenth century, and possibly as early as the seventh. There has been much debate about their origins. The intermixed properties seem initially to have developed as a consequence of partible inheritance and piecemeal colonization (as new land was divided in an equitable fashion among those who had worked to reclaim it). But the emergence of more complex and corporate forms was probably the result of population pressure, technological change (especially the shared use of a large moldboard plow), and the need for elites to facilitate the extraction of rents and services. Their creation involved a measure of systematic planning and, in some cases, the reorganization of existing patterns of settlement.

Open fields disappeared from most of northern Europe between the fifteenth and the nineteenth centuries, but have left a number of archaeological traces. In some areas unhedged and intermixed parcels, larger than the original strips and no longer subject to communal regulation, still survive, as in parts of the Netherlands and France. Elsewhere their essential layout is preserved, in more simplified form, in the current pattern of walls and hedges. This is because in many districts open fields disappeared through "piecemeal" enclosure: that is, landowners gradually consolidated scattered holdings through purchase and exchange, surrounding groups of strips with walls or hedges which thus perpetuated the sinuous, parallel patterns of the former landscape. In addition, in areas of heavy soil individual strips were often plowed in ridges, to facilitate drainage. Because enclosure was often associated with a shift from arable farming to specialized livestock production or dairying, these can be preserved in grass fields as the earthworks known as "ridge and furrow" (Fig. 1), found in particular in parts of the English Midlands but also sporadically in northern France and Germany.

Key Issues

Not all areas of Europe were dominated by open-field agriculture. In the *bocage* of western and much of central France, for example, and in the "woodland" districts in both south eastern and western England, landscapes of enclosed and often irregularly shaped fields, or ones in which enclosed fields and small patches of open fields coexisted, could be found. Both the relative extents of open fields, and their particular character, were the consequence of the complex interplay of demographic, economic, environmental, and social factors, although archaeologists and historians continue to debate the relative importance that should be attributed to each.

Agrarian Landscapes of the Historic Period, Fig. 1 Well-preserved ridge and furrow in western Northamptonshire (Photo credit: T. Partida)

The agriculture of much of northern and western Europe was transformed in the postmedieval period, with the development of greater regional specialization and major increases in productivity. These developments were the consequence of wider changes and pressures which included rapid population growth (especially from the eighteenth century), the emergence of developed market economies, and industrialization. Agricultural "improvement," to use the fashionable eighteenth-century English term, occurred at differing rates in different areas, depending on the wider character of social and economic relations. By the eighteenth century the agricultural primacy of England and the Netherlands was widely accepted, and the new practices which had been developed there widely emulated. New fodder crops – turnips and other "roots," and grasses like clover – were introduced into field rotations, reducing the need for land to lie fallow, and agropastoral areas and other commons and forests were brought into more intensive cultivation. These changes involved the end of communal forms of exploitation and a shift to more individualistic modes of farming. Many areas of common land were now allocated in hedged or walled parcels to particular owners; properties in open fields were either subject to gradual piecemeal consolidation or were reallocated in a planned fashion as private fields – in England, for example, by parliamentary enclosure and in Denmark through the process of *ensgifte*. Nevertheless, these developments were not universal, and open fields were still being reorganized, in Germany and the Netherlands, as late as the eighteenth century. In parts of central and eastern Europe, they survived into the twentieth century and in some cases up until the present.

The enclosure and "improvement" of marginal land in postmedieval Europe had major effects on biodiversity. This period saw, for example, the destruction of more than three quarters of the heaths in Denmark and even more in Brittany. In part, reclamation of such land was made possible by the substitution of organic materials for coal and iron, as Europe industrialized, for heaths, moors, and other rough ground had originally been cropped for fuel and fodder, just as many wetlands had been regularly dug for peat. Indeed, it was the drainage of wetlands which was one of the most striking features of the postmedieval period. Much coastal marsh had been reclaimed in medieval times, but the period from the sixteenth century saw an increase in drainage activity and its extension to the more problematic wetlands, especially those formed in peat rather than marine clays. The Netherlands had long experience of land drainage, carried out from the fifteenth century with the assistance of windmills, and it was largely Dutch engineers

Agrarian Landscapes of the Historic Period, Fig. 2 The ornamental farm erected in the grounds of Racconigi Castle, Piedmont, in the early nineteenth century by Charles Albert, Prince of Carignano (Photo: T. Williamson)

who directed postmedieval reclamation in the Fenlands of eastern England, in the Marais de Poitou and other French marshes, in Lammefjorden and elsewhere in coastal Denmark, and in Poland and north Germany.

Planned enclosures of commons and open fields were assisted by the development of more sophisticated systems of surveying and land measurement, and fields created from the seventeenth century were frequently straight-sided and geometrically shaped: land freed from communal control was now, more than ever, a commodity to be measured and exchanged. Such landscapes can be found across much of northern Europe, although they have survived modern agricultural developments best in the English Midlands, parts of the Netherlands, and southern Scandinavia. Some schemes of enclosure took particularly abstract geometric forms, such as the grid of roads and drainage ditches created when the wetlands at Beemster in the Netherlands were drained in the seventeenth century – now a World Heritage site. Indeed, the new agrarian landscapes of the post-medieval centuries were not purely practical and agricultural in character. They represented the rational transformation of nature and the triumph of modernity over tradition, and it is noteworthy that in this period, in contrast to the Middle Ages, elites often consciously identified themselves with agricultural activities. This was especially true in England, where major eighteenth- and nineteenth-century landowners like Thomas Coke of Holkham in Norfolk were prominent "improvers," the landscapes of their estates often combining, in complex ways, aesthetic and agricultural elements. Many created "model farms" with buildings which were both practical and ornamental in character, often laid out in some whimsical "Gothic" form. Major landowners in other European countries did the same: notable examples include the Gothic farm complex created at Racconigi in Piedmont by Charles Albert, Prince of Carignano, in the early nineteenth century (Fig. 2).

Enclosed fields thus proliferated in the postmedieval period in Europe, and the ways in which they were bounded exhibited elements of both continuity and change with medieval practice. Boundaries in drained wetlands took, in all periods, the form of water-filled ditches. These served to drain the land but also – in areas where livestock farming was important – functioned as "watery fences" to restrain sheep or cattle and to provide them with drinking water (Fig. 3). Reclaimed wetlands are thus characterized by

Agrarian Landscapes of the Historic Period, Fig. 3 In areas of low-lying wetland, field boundaries took the form of water-filled ditches: Halvergate Marshes, Norfolk (Photo: T. Williamson)

an absence of hedges, fences, or walls. In upland areas dry stone walls were generally employed to enclose land, and in the course of the postmedieval period, these often took increasingly regular forms. In lowland districts hedges were generally used (Fig. 4). In medieval and early postmedieval times these had normally been planted with a range of species, partly because of the difficulties of accessing large quantities of hedging material but also because – as well as functioning as stock-proof barriers – they also served as a source of fuel wood. By the eighteenth century the fashion for planting single-species thorn hedges was becoming established, especially in England, as the increasing availability of coal lessened the importance of hedges as a fuel source. Such hedges served to express the divorce of large, modern landowners from the archaic practices of a peasant economy.

Agrarian Landscapes of the Historic Period, Fig. 4 Hedges were the most common form of medieval and postmedieval field boundary across large areas of Europe (Photo: T. Williamson)

International Perspectives

The range of agricultural landscapes found elsewhere in the world, and which were encountered

by Europeans during the great postmedieval diaspora, are too varied to be considered in detail here, but were again shaped both by practical agrarian considerations and by wider social, economic, and ideological contexts. In archaeological terms, the most striking features include the great systems of terraces which are found across much of the Far and Near East, and in the Americas, from the southwest of the United States as far south as northern Argentina. Terraces fulfilled a range of functions. They provided a level area of cultivatable ground in mountainous regions, helped control soil erosion, and assisted in water management. The latter concern looms large in agricultural systems on a global scale, from an early date: examples include the complex forms of perennial irrigation practiced in various parts of the Middle East and Mesoamerica, with water conducted to crops through complex systems of channels, and the systems of basin irrigation practiced in Egypt, where seasonal floods are constrained within embanked fields. Archaeological remains of irrigation are often, in semiarid areas, one part of more complex agrarian strategies. Across much of central and southern America, and in some parts of the USA, "raised fields" – elevated planting areas separated by canals or ditches, often covering very extensive areas of ground – served both to provide drainage and irrigation, depending on the season. The canals also provided a microclimate, giving some protection from frosts, and served as a source of fertility, for their nutrient-rich mud was dredged and spread on the fields.

When European colonists encountered indigenous peoples, existing agricultural landscapes often continued with little change, especially in contexts of colonial dominance rather than large-scale immigration. The great rice terraces of the Ifugao in the Philippine Cordilleras have thus been continuously used and maintained through more than 2,000 years. Where agrarian landscapes possessed relatively few structural elements or the economy was largely organized around hunting and gathering, in contrast, and where the immigrants were themselves numerous, they were more likely to impose elements of their own ways of organizing a countryside – although sometimes these were inappropriate and short-lived, like the attempts by early settlers in New England to lay out fields modeled on the open fields of their homelands. In the southern coastal states of North America, in particular, elements of the landscape of English eighteenth-century estates were often replicated, although here organized mainly around slave production rather than tenanted farms. The long European experience of reclaiming wetlands was also employed in the New World, to create drained marshes like those of the French Acadian settlement at Grande Pré in Nova Scotia, currently a candidate for World Heritage status. But much about the agrarian landscapes of North America was new. In the original thirteen states, field boundaries were normally fenced, or in parts of New England walled, rather than hedged, largely due to the local abundance of wood. Initially post-and-rail fences were created but in the southern states these were soon replaced by the split rail zigzag fences still characteristic of the area. As the colonists spread west, into the northwestern territories, highly rectangular field patterns were created through the organized subdivision of the great abstract grid imposed on the landscape under Thomas Jefferson's direction as an expression of the rational and egalitarian principals of the young republic. This was further extended into the territories purchased from the French in 1803. Here, in a landscape singularly lacking in wood and timber, the fields created as the grid was subdivided were bounded by various forms of wire fence, and especially by barbed wire (invented in the USA in the 1860s), rather than by fences of wood. Across the interior of Australia, too, parcels of land bounded by wire fences, currently the subject of archaeological research and classification, proliferated in the course of the nineteenth century, rendering redundant the practice of running mobile sheep flocks under the control of shepherds.

Viewed in global terms, agrarian landscapes display an almost limitless variety, born not only of agricultural and economic factors but also of wider social, economic, and ideological influences.

Cross-References

- ▶ Estate Landscapes in Historical Archaeology
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Hedges in Historical Archaeology

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Agrarian Landscapes: Environmental Archaeological Studies

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Introduction and Definition

Environmental archaeology has grown to be a major subdiscipline of archaeology, which utilizes scientific approaches from many different backgrounds of academia, including geography, geology, biology, physics, and chemistry (Butser 1982; Dincauze 2000; Bell & Walker 2004; O'Connor & Evans 2005). We can therefore define environmental archaeology in archaeology as "*the study of the environment and its relationship with people through time*"; this has in turn led to the development of distinctive subdivisions of environmental archaeology called *geoarchaeology*, *zooarchaeology*, *and archaeobotany*. Geoarchaeology is concerned with landscape and stratigraphic formation and modification processes and draws mainly on geological, sedimentological, and soil science analytical techniques. Both zooarchaeology and archaeobotany focus not only on human economies and subsistence (diet, health, and nutrition) of both wild and domesticated animals and plants (*paleoeconomy*) but also on broader environmental reconstruction (*paleoenvironment*), such as vegetation succession (Branch et al. 2005).

The reconstruction of agrarian practices, and their landscape and environmental context, is reliant therefore upon the application of scientific procedures utilized in *geoarchaeology*, *zooarchaeology*, *and archaeobotany*. Geoarchaeological procedures include sediment/soil classification, micromorphology, particle size analysis, magnetic susceptibility, and multielement geochemistry. The relevant archives investigated include not only archaeological features, such as ditches and pits, and ancient soils (paleosols), but also geological archives, such as floodplains (alluvium), slope wash in dry valleys (colluvium), aeolian deposits, volcanic and cave sediments, and organic and mineral sediments in bogs and lakes. In bioarchaeology (both *zooarchaeology and archaeobotany*), the key proxies (subfossils) that are recovered from these archaeological and geological archives include animal bones, terrestrial Mollusca, charred seeds and other plant parts, charcoal and phytoliths, and also pollen, fungal spores, and waterlogged seeds. Precise identification and recording of these proxies, and where applicable the utilization of data from ethnographical, ethnohistorical, and documentary sources, is key to the reconstruction of agrarian practices. Good preservation of charred plant remains on many

West Asian and North African archaeological sites, for example, combined with well-established ethnographic models detailing traditional agricultural practices, has indicated the status of the arable fields (e.g., soil type, moisture content), the system of cultivation (e.g., intensive, extensive), manuring regimes, tillage practices, and sowing, harvesting (e.g., uprooting, plucking, or cutting with a sickle or scythe), and processing methods, especially for free-threshing cereals (durum wheat and naked barley), hulled barley, and glume wheat (emmer, spelt, and einkorn). Studies make frequent use therefore of both qualitative and quantitative approaches to evaluate the potential of proxies to provide robust reconstructions of agrarian practices and their wider environmental context. These approaches include the creation of taphonomic models to differentiate between "local" and "regional" signatures of human activity (e.g., pollen analysis) and to elucidate the role of diagenesis in the creation of the subfossil assemblages (e.g., animal bones, pollen). The application of "modern analogue" studies is especially important here, and this has been ably demonstrated with respect to West and Southeast Asian investigations of the history of wheat/barley and rice cultivation (respectively), which has involved gathering essential information on the environmental variables for their growth within specific agricultural regimes (e.g., dry-farmed, irrigated fields, crop rotation).

The integrated study of these archives, both archaeological and geological, and their proxies permits environmental archaeologists to address a range of research themes that may be specific to a single site (e.g., Neolithic settlement), and an event of short duration (e.g., woodland clearance), or relevant at a regional to global scale, and spanning several millennia. Whatever the spatial and temporal scale, collectively they provide important information on the origins and spread of agricultural practices, the development of agricultural systems through time, the impact of agriculture on the landscape and environment, and the changing nature of human diet, health, and nutrition.

Key Issues/Current Debates

Environmental archaeological studies make a considerable, ongoing contribution therefore to improving understanding of the origins and spread of agriculture and the accompanying landscape and environmental changes. Western Asia (from present day Iran in the east to Turkey in the west), for example, is acknowledged as one of the geographical centers for plant and animal domestication ~12–10,000 years ago. In this area, many of the food staples that remain important today, such as wheat, barley, rye, lentils, peas, sheep, and cattle, were morphologically and genetically altered through the processes of domestication and then subsequently spread across Europe over ~6,000 years (Zeder 2008). In the Jordan Valley, an important region of intensive environmental archaeological research, investigations provide a complex picture of farming and its environmental context (Mithen & Black 2011). Charred plant remains and animal bone assemblages indicate mixed farming, with the cultivation of a broad range of key plant domesticates from the start of the Neolithic (~12–6,500 years ago) that included emmer and einkorn wheat, barley, as well as lentil, pea, chickpea, bitter vetch, and flax. The evidence suggests that significant landscape modification accompanied the transition to farming, with programs of water management to feed agricultural land enclosed within terrace walls, thereby enhancing the probability of a regular crop yield. According to the pollen data, the onset of the Chalcolithic (~6,500 years ago) was marked by the first clear signs of woodland clearance for farming, which became extensive ~2,000 years ago with significant deforestation associated with metallurgical activities. These studies have also suggested that periods of rapid climate change in the East Mediterranean significantly influenced the direction of agricultural activities, with periods of higher precipitation seemly favoring the intensification of cultivation at ~6.5–4,000 and ~2.5–1,300 years ago, with olive, grape, and walnut production at its maximum during the Roman-Byzantine period.

Similarly, in SW Turkey, extensive pollen-based land-use histories have revealed evidence for widespread Bronze Age clearance and farming ~3,200 years ago (Eastwood et al. 1998). These studies indicate that, depending upon elevation and local factors, olive, walnut, chestnut, pistachio, and vine were cultivated, alongside cereals, and managed in the woodland. In E Turkey, lake sediment records indicate pronounced human activities from ~3,800 years ago, which became more intensified in the last ~600 years, with evidence for walnut cultivation and the expansion of pastureland, while in central Turkey, there is outstanding evidence for the imprint of agrarian activities on the landscape from the late Roman period based on pollen analysis (England et al. 2008). The presence of walnut, olive, vine and chestnut, and rye, wheat, and barley cultivation suggests arboriculture, pastoralism, and cereal cultivation. At 670–950 CE, there was a marked decline in agrarian practices during the "Dark Age," which was succeeded at 950 CE by renewed cereal cultivation and pastoralism. The impact of Neolithic agricultural practices on the landscape in this region remains less well understood, however, despite the good archaeological evidence for settlement and farming. Indeed, the pollen evidence indicates a predominantly wooded landscape with seemingly low levels of human interference. An alternative interesting possibility is that this wooded landscape was "managed" by deliberate burning to create suitable grazing land and to enhance conditions for cultivation (Roberts 2002; Wick et al. 2003).

In Southeast Asia, environmental archaeological studies of agrarian practices, and their landscape and environmental context, have arguably been less intensively investigated than in West Asia. Comprehensive studies in the Lower Yangtze region (China), however, have permitted an improved understanding of prehistoric farming and one of the key crops for this region: rice. Studies have shown that rice cultivation commenced here ~6.9–6,600 years ago and certainly as early as ~8,000 years ago in other parts of China. This systematic study using rice grains, phytoliths, and spikelet bases has also provided important evidence for the composition of weed species typically associated with rice cultivation, thereby providing a further important evidential base from which to infer cultivation (Fuller et al. 2009). The landscape context for the cultivation involved both water management and burning.

In Europe, environmental archaeological studies have revealed that the spread of agriculture had far-reaching consequences for the landscape and environment (Kaplan et al. 2009). The evidence from both archaeological and geological archives suggests that although the early stages were a mixture of permanent settlement and residential mobility, both cultivation and animal husbandry of the main domesticates from West Asia required the clearance of woodland, which was often associated with biomass burning ("slash and burn"). Although many records suggest that clearance was temporary ("shifting cultivation"), which permitted the woodland to recover, during prehistory, the evidence indicates progressive deforestation of mature coniferous (e.g., fir) and/or deciduous (e.g., elm, lime, oak) woodland and the introduction of field systems and, in some areas, agricultural terracing. This led to the creation of "plagioclimax communities" that were sustained by human interference, e.g., grasslands, heathlands, and moorlands of Northwest Europe and the scrubland of Mediterranean Europe (although regional climatic and edaphic factors were also important in their formation and maintenance).

Evidence for deforestation due to agricultural practices, namely, cereal cultivation and/or animal husbandry, from the Neolithic period onwards is widespread in upland and lowland parts of Europe. Indeed this key "anthropogenic signature" in subfossil records from lake sediments and bogs, combined with archaeological evidence for mixed farming (e.g., charred plant remains and animal bone), has enabled the development of complex regional models of human-environment interaction. For example, pollen data from Northwest Europe indicate two pronounced events, which have been strongly associated with human activities: Neolithic "elm woodland decline" (Parker et al. 2002) and Bronze Age "lime woodland decline" (Grant et al. 2011). These two trees

formed important components of the natural forest cover. Debate over the cause, or causes, of the "primary" decline in elm woodland has continued for several decades, with evidence from Britain and Ireland indicating a very rapid decline in ~36 years (6,343–6,307 years ago). For this reason, woodland clearance for cultivation and grazing, as well as the harvesting of elm leaves, twigs, and branches for winter fodder and bedding, may be a secondary cause. Instead, the rapid spread of disease (caused by ascomycete fungus *Ophiostoma ulmi*), in conjunction with both human activities and climate change (increased continentality), may collectively have contributed to the decline. Whatever the precise cause, pollen analysis has shown that the decline of elm woodland is often associated with cereal cultivation and possibly animal husbandry (presence of dung beetles), which suggests that human groups, albeit at dispersed, low population levels during the Neolithic, were having some localized impact on elm woodland. This probably formed part of a system of forest farming involving residential mobility, short-term woodland clearance, burning, woodland management (pollarding/coppicing), and cultivation. In Ireland, the discovery of the Neolithic "céide fields" provides an exceptional example of a coordinated approach to landscape modification following the introduction of agriculture that provides unequivocal evidence for a marked reduction in woodland cover (pine, oak, elm, hazel, and birch) and the establishment of grassland and finally heathland.

The lime woodland decline, which commenced in Britain ~5–3,000 years ago (Late Neolithic to Late Bronze Age), has also been strongly linked to clearance of the landscape for farming, as well as the provision of fodder for animals. Although, like elm, alternative explanations have been proposed, the overwhelming evidence for its association with contemporaneous cereal cultivation and settlement activities, together with the diachronous nature of the decline ("different times in different places"), provides strong support for a human cause. For example, in S England, the environmental archaeological evidence suggests widespread use of landscape units (valley bottom and side, and hilltop) with mixed farming of emmer wheat and six-row barley, as well as einkorn, bread, and spelt wheat, and pastoralism involving cattle, sheep, pig, and goat that were probably moved on a seasonal basis ("transhumance"). These practices caused not only a change in natural vegetation cover from the Bronze Age onwards (e.g., widespread heathland formation) but also soil status (e.g., podzol and rendzina formation), including a reduction in nutrient quality and pH (acidification), accelerated erosion (colluviation), and paludification (wetland or bog formation) due to impeded drainage. During later prehistory, and into the historic periods, environmental archaeological evidence for the wider landscape and environmental context of farming practices in NW Europe, especially Britain and Ireland, is less available due to the paucity of intensive studies and availability of suitable sites. Nevertheless, those studies conducted in Britain and Ireland suggest marked intra-regional differentiation in the agricultural landscape, with significant temporal variations in land use, e.g., afforestation, pastoralism, and cereal cultivation (Fyfe et al. 2004). Those studies that have benefitted from the combined use of geological, archaeological, and historical archives have provided valuable information on medieval and later agrarian landscapes. In Ireland, for example, studies have revealed that although cattle farming, and barley and oat cultivation, formed the basis of the medieval economy, a shift towards cereal cultivation occurred from 770 CE as a possible response to wetter climatic conditions, which worsened during the Little Ice Age (1350–1850 CE), and led to major changes in settlement patterns and agrarian practices. Indeed, the role of climate change in determining the direction of agrarian activities in Britain and Ireland, and throughout the world, has been a considerable point of debate. For example, pollen-based studies of later Bronze Age farming in Scotland indicate that ~2,900 years ago, a widespread period of climatic deterioration commenced across NW Europe and resulted in a change in land use, rather than abandonment, with the increased importance of grazing in upland areas, and the expansion of

settlement and agricultural land in the lowlands (Tipping et al. 2008). In this example, the evidence indicates that adaptation, rather than collapse of the agricultural system, caused a change in farming activities, which implies a high degree of resilience to environmental stress caused by climate change by human populations living in "marginal" agricultural areas.

In the Mediterranean region, environmental archaeological studies of landscapes have debated the influences of human activities, especially farming, and climate change for many decades. Although the debate continues, there is now a substantial body of sedimentary evidence linked to the archaeological record for catastrophic erosion due to woodland clearance and land use, especially from the Bronze Age onwards (e.g., Greece) (Klinge & Fall 2010). The subsequent construction of agricultural terraces throughout the Mediterranean may therefore have been an important conservation measure to mitigate the risk of further erosion and to ensure the sustainable supply of food for an expanding population. Indeed, environmental archaeological data suggest that abandonment and/or neglect of the terraces caused renewed erosion, accelerated by unmanaged vegetation growth and grazing animals. Periods of erosion have been associated therefore with phases of expansion and contraction in agricultural activities. The modification of the morphology of the landscape, changes in natural soil quality, and reduced susceptibility to erosion, through the Bronze Age development of terrace agriculture in the Mediterranean, was therefore a major innovation (~3,800 years ago). This provided a means of creating a more sustainable agricultural system and ultimately provided an ideal situation for the widespread management of important cultivars, such as olive.

In addition to terracing, an important aspect of Mediterranean agriculture has been transhumance involving the movement of livestock on a seasonal basis between lowland and upland areas, sometimes over considerable distances (Barker 1985). These practices were probably in place from the Early Neolithic, but the expansion of farming into mountainous regions of the Mediterranean from at least the Late Neolithic led to further development of the transhumance network. In Greece, for example, evidence for sheep/goat, cattle, and pigs provides a valuable insight into early agrarian practices, which included the cultivation of emmer and einkorn wheat, and two-row barley and lentil. These crops were initially cultivated in a forested landscape in localized clearings, but pollen records reveal a progressive reduction in woodland that coincided with the development of a broader subsistence economy. In Italy, a similar dependence on emmer, barley, and legumes, as well as sheep and goats, recorded in lowland open air and cave settlements, seemingly led to limited landscape modification until the Late Neolithic (~6,100 years ago). At this time, pollen records from mountainous areas indicate a gradual reduction in woodland cover (e.g., elm and lime) or the changing dominance of tree taxa (e.g., fir to beech), suggesting the increasing influence of human activities. The history of beech woodland in N Italy, in particular, has received considerable attention because of its ability to invade adventitiously mature woodland due to one or more causes, including disturbance and climate change to favorable conditions. The remarkable correlation at many sites between the expansion of beech woodland, increased biomass burning, evidence for pastoralism (archaeological and pollen stratigraphical), accelerated erosion, and the decline of other tree taxa strongly suggests that agrarian practices may have initiated changes in the conditions necessary for beech growth leading to its dominance in vegetation communities (Branch 2012).

Outside Asia and Europe, environmental archaeological studies have demonstrated the existence of multiple centers of plant and animal domestication around the world, with the timing of the transition to farming varying considerably. To highlight this global phenomenon, the broad timing of plant domestication in key centers is illustrated (all "years before present day"): Australasia (e.g., yam and banana) ~7,000; N Africa (e.g., millet and sorghum) ~4–3,000; N America (e.g., squash and sunflower) ~5,000; Mesoamerica (e.g., squash and maize) ~10–8,000; and

S America (e.g., squash, arrowroot, yam, cotton, sweet potato, beans, peanut, manioc, chilli pepper, potato, and quinoa) ~10–5,000. Although the precise reason or reasons for the initiation and adoption of plant cultivation and animal husbandry in many parts of the world remain unclear, the key factors were undoubtedly geographically variable and included measures to mitigate the risk of failure of annual food supplies, population pressure, and climate change (Stahl 1994).

In S America, evidence for landscape modification based on pollen and phytolith data suggests that cultivation probably commenced at least ~7,000 years ago in northern countries, such as Panama, and involved maize, arrowroot, and economically important trees. Throughout S America, the development of raised field agriculture transformed the landscape and enabled the development of a sustainable system by creating a distinctive microclimate and by improving the soil status and nutrient cycling. Similarly, terracing throughout S America is extensive with an estimated ~1,000,000 ha in Peru alone. The importance of terrace agriculture in many parts of the Andes, like the Mediterranean region, cannot be overstated. Environmental archaeological studies indicate that the construction of terraces transformed the morphology of the landscape while also creating the basis for a highly innovative and sustainable agricultural system that primarily permitted the cultivation of maize and quinoa, an interpretation verified by parallel studies of archaeological and geological archives using pollen and phytolith analyses. Archaeological studies have permitted detailed investigations of the terrace structural organization and development, especially their irrigation and drainage, and the physical properties and composition of the soil infilling the terraces using techniques such as micromorphology and geochemistry. Studies in central and southern Peru, for example, have revealed multiple phases of terrace construction during later prehistory, with evidence for possible soil enrichment through manuring and/or fallow periods, and localized landscape erosion triggered by the construction activities (Branch et al. 2007). Interestingly, there is evidence in several parts of Peru for the abandonment of terraces, such as those of the Wari civilization (500–1000 CE), and their subsequent reconstruction prior to the Colonial Period (1533 CE). While the persistence of terrace agriculture confirms the importance of terraces in the agricultural system, the precise reason for their occasional abandonment remains unclear. Correlation of archaeological and paleoecological studies with paleoclimatic records from ice cores in Peru and Bolivia indicates, however, that periods of rapid climate change, e.g., at ~1000 CE, may have been the cause. The onset of drought therefore may have led to the collapse of Wari irrigated terrace agriculture, an argument supported by the contemporaneous decline of the "Tiwanaku civilization" raised field agriculture on the shores of Lake Titicaca. The development of terrace agriculture and maize cultivation in the intermontane valleys of the Andes has been linked to the formation of complex social and economic systems, e.g., Wari. Maize growth formed part of a broadly defined agricultural model that saw the utilization of a wide range of ecosystems, and included the cultivation of bitter potatoes, and herding of llama and alpaca, above the maximum elevation of maize cultivation (3,700 m above sea level).

In Mesoamerica and N America, the history of maize has also been the primary focus of many environmental archaeological studies. The main sources of evidence have been phytoliths in pottery residues and dental calculus, as well as in soils, lakes and bogs, and macrofossil specimens, and associated archaeological artifacts indicating food production. Evidence has pointed to the conversion of the landscape and environment by shifting cultivation ("swidden"), terrace agriculture, and raised field systems. The collapse of these intensive practices due to nutrient depletion and soil erosion has been strongly associated with the demise of the Mayan civilization (Santley et al. 1986). Alternatively, the evidence for a well-developed system of

environmental and crop management suggests that other external factors may have triggered the collapse. The evidence for extensive deforestation and hydrological changes, together with an overreliance on maize cultivation, suggests, however, that the Maya did not facilitate the development of a long-term sustainable agricultural system.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Rice: Origins and Development

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Agricultural Practice: Transformation Through Time

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Introduction

Agricultural production is a dynamic process that evolves out of interactions between plants, animals, the environment, and the food needs of human communities. Through time, agricultural practices changed as farmers developed new techniques to meet demands presented by both their physical and sociopolitical environments. The diversity of past agricultural practices and how they changed through time are reflected in a range of archaeological datasets, from large-scale landscape modifications such as irrigation and field systems to small-scale shifts in plant and animal ecologies. Archaeologists employ a range of methodologies to document the diversity of past agricultural practices and to understand the reasons for change.

A unifying topic in the archaeological study of transformations in agricultural practices through time is that of intensification. Intensification is the increase of agricultural output per unit of land per unit of time (Brookfield 1972). Two aspects of intensification that archaeologists study are (1) documenting the diverse range of intensification practices that past farmers employed and how they changed through time and (2) understanding the reasons why farmers needed to increase production. Both aspects of agricultural production relate to other important aspects of ancient human societies including population size, the environment, and sociopolitical dynamics.

Definition

Around the world, the adoption of agriculture as the primary means of obtaining food came after the initial domestication of plants and animals. In many places, there was a long period of time in which domesticated plants and animals supplemented foraging activities or "low-level food production" (Smith 2001). For a variety of reasons, ranging from climate change to social demands, most of these societies eventually became reliant upon agriculture and foraging became a supplemental practice.

Being a committed agriculturalist requires a fundamental shift in the relationship people have with their environment. In order to assure that a domesticated plant reproduces successfully and in sufficient quantities each year, farmers must learn to manage the dynamic environments in which the plants live and grow. Aside from the crops themselves, farmers must manage inclement weather (hail, frosts, drought), water, soil quality, and competitors (both plants and animals). Each region of the world presents unique characteristics, which have given rise to the diversity of agricultural strategies developed by people through time and space. Despite this diversity, there are common trends seen across the globe as societies became increasingly dependent on agricultural production.

Agricultural Practices

In his book, *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*, anthropologist Robert Netting (1993) provided a useful framework for categorizing the various practices nonindustrial farmers utilize to maintain productive agricultural systems: (1) soil moving and management, (2) water regulation, (3) restoring/increasing soil fertility, (4) diversification of production, and (5) protection of plants from growth-inhibiting competition. Each category is defined and discussed below with some specific examples and a general commentary of how these practices change through time. The types of archaeological evidence and the methods used to study each category are also described.

Soil Moving and Management

A variety of practices involve moving or manipulating the earth in order to support plant growth

and control erosion. This can range from simple tilling to more permanent landscape modifications, such as terracing, elevating raised fields, and constructing paddy or pond fields.

In most regions, early agriculture occurred in areas with soils that were loose enough to till with simple tools, such as digging sticks or handheld hoes, including alluvial soils along river floodplains and loess deposits. As agriculture expanded, people often had to modify more difficult terrain in order to make it suitable for planting. For example, in mountainous regions with steep slopes such as the Andes, expansive systems of terraces were constructed. Another major innovation with reference to soil manipulation was the ox-drawn plow. While it initially helped farmers in the Near East farm more efficiently in river valleys, its introduction into Europe permitted expansion of farming into areas with deep, firm soils (Sherratt 1981).

Archaeologists have traditionally studied agricultural practices associated with soil moving and management using aerial and pedestrian survey, as well as analysis of stone, wood, and metal artifacts associated with tilling. Topographic maps and aerial photographs have long been used to document regional field systems. New technologies such as remote sensing with satellite photography and, most recently, airborne light detection and ranging (LiDAR) provide more expansive regional coverage, filters to highlight variations in soil and vegetation, filters to digitally remove obstructive features such as dense vegetation, and in some cases, provide higher resolution of features. For example, the use of LiDAR has revealed extensively terraced hillsides around the Classic Maya site of Caracol that had for centuries been obscured by tropical forest (Chase et al. 2011) (Fig. 1).

Soil manipulation can also be detected in geoarchaeological data sources such as soil profiles, sediment cores, and microstratigraphy (Lehmann et al. 2003). Finally, archaeobotanical datasets can reveal increased soil manipulation through the study of plant species associated with clearance such as a decline in forest species and increase in agricultural weeds.

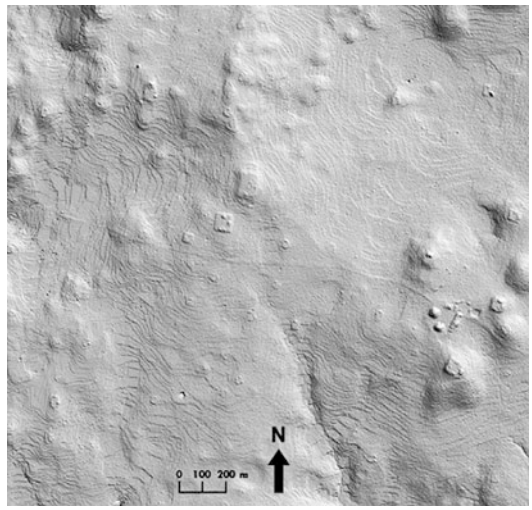

Agricultural Practice: Transformation Through Time, Fig. 1 LiDAR 2-D image of Ceiba Terminus at Caracol, Belize, showing hundreds of constructed terraces (From Chase et al 2011: 394, with permission)

Water Regulation

Farmers utilize a range of strategies to regulate water either to increase its supply or remove it. Water regulation systems that bring and retain water to fields include canal networks, check dams, and pond or paddy fields. Systems that help eliminate water include raised fields or mounded fields.

Early farmers used naturally well-watered areas such as receding floodplains or, in the case of rice, naturally flooded areas. As with soil manipulation, which is in part related to water regulation, when farmers wanted to expand their planting area, they needed to invent ways to transport water from the original source, maintain it, or, in some cases, remove it.

Extensive irrigation systems were developed in arid regions such as Egypt and coastal Peru. Elaborate wet farming systems that involve both canals and water-retaining fields developed throughout East and Southeast Asia and the Pacific. Throughout the Americas, farmers developed raised-field systems in naturally inundated areas.

Archaeologists use the same range of survey and remote-sensing methods as discussed for soil manipulation and management. There are also

innovative uses of archaeobotanical evidence to document the use of irrigation. For example, researchers observed an increase in the size of wheat and barley phytolith skeletons in periods associated with increased irrigation in the Near East and Egypt (Rosen 1994).

Restoring/Increasing Soil Fertility

An important process often associated with intensification is the reduction of the fallow period, or the time in which the field is allowed to rest. The fallow period is crucial for rejuvenating the nutrients in soils; however, if food needs require fields to be more continuously productive, humans can intervene to replenish nutrients and restore soil fertility.

Restoration of soil fertility has been accomplished through a variety of strategies such as crop rotation and adding fertilizer. Rotation involves planting different crops with different soil requirements over successive years. Legume crops are particularly crucial in these systems as they fix nitrogen and can improve soil quality. In Eurasia, legumes are often planted after cereals, and in Central and North America, indigenous farmers planted beans together with maize and squash.

Farmers also add nutrient-rich materials such as animal dung, kitchen or midden ashes, plant litter, and even animal parts to increase fertility. Fertilizing with dung is very common in regions with domesticated animals such as goats, sheep, and cows in Eurasia and camelids in the Andes. Muck from canals and ditches can be excavated and added to the planting field.

In tropical regions, soils tend to be thin and acidic, greatly limiting their natural productivity. These areas are most well known for the use of slash-and-burn or swidden agriculture, where plots of forest vegetation are cut and burned to create ashy, nutrient-rich planting surfaces. Such plots can be used for 4–5 years, but the nutrients are eventually depleted and the area is often overrun with weeds and pests. These plots are abandoned and new ones are cleared. Swidden farming is considered to be an extensive system of production and only able to support relatively small populations.

In the Amazon basin of South America, archaeologists have recently discovered that ancient farmers actually improved soils through a combination of slow burning forests, or creating what is known as a biochar, and possibly adding household waste. This increased the fertility of the soils and these "terra preta do indio" or Amazonian Dark Earths (ADE) are still sought after by modern-day food producers in Brazil. These deposits have been documented and studied by sedimentologists and micromorphologists to understand the practices that formed these unique soils (Lehmann et al. 2003).

When ancient cultivated areas are identified, several geochemical and geoarchaeological methods can help determine if they have been supplemented with fertilizer. There are also several indirect measures that together with other evidence may point to fertilization and soil restoration. These include the presence of manure-producing animals, nitrogen-fixing legumes, or nitrogen-loving (eutrophic) plant species in the archaeological record. Recently, researchers working in the Near East have argued that increased nitrogen levels in human isotopes throughout the Neolithic may reflect fertilization of fields rather than increased meat consumption (Bogaard et al. 2007).

Diversification of Production

Unlike our modern, industrial farming systems that focus on the mass production of a few crops, ancient and subsistence farming systems incorporated a wide range of crops and varieties that were often interplanted and rotated based on local environmental conditions and food needs. They also incorporated domesticated animals and pastoral activities.

The indigenous farming systems that developed and spread throughout the world involved a range of domesticated plant species including seed crops, legumes, tubers, fleshy fruits, and nuts for food and wood, fibers, and resins for industrial uses. For example, in the Andes of South America, ancient farmers grew many varieties of potatoes, as well as other tuber species such as *oca*. They also grew the grain crops quinoa and maize and in some areas

leguminous crops such as tarwi and common bean. In more temperate climates, they managed food and spice-producing tree species such as huarango and molle. Additionally, they raised guinea pigs and two species of camelids, llamas and alpacas.

Through time farmers developed many varieties of individual crops and adopted and exchanged new crops for many purposes. Some varieties were selected for their ability to withstand local climatic variations and others were developed to meet diverse culinary tastes and traditions. While there were local developments of crop species and varieties, the spread of different domesticated plant species into new regions also played an important role in changing agricultural practices. In some cases, these new crops were simply integrated into existing cropping systems, such as maize in the Andes. In other cases, the introduced crops eventually replaced some of the indigenous ones, such as in eastern North America where the indigenous crop complex that included sunflower, maygrass, chenopod, and knotweed was eventually replaced by the Mesoamerican tripartite of maize, beans, and squash.

Archaeobotanical remains provide the primary means for studying the composition of past cropping systems. Carbonized, dessicated, or waterlogged macrobotanical remains have provided a great deal of insight into the role of seed crops, legumes, durable fruits, and woods. Tubers and fleshy fruits have been more difficult to study because they often do not preserve, but advances in microbotanical analyses of phytoliths and starch grains are improving our knowledge of these very important species. Finally, analysis of human isotope levels also contributes to the study of cropping regimes, particularly for the introduction and spread of C4 plants, such as maize in the Americas (Hastorf & DeNiro 1985).

Protection

Finally, all farmers must deal with the unwanted plants, animals, and insects that inhabit the fields and present competition or danger to the crops. Pests often increase as farmers intensify agriculture because some species, for example, members of the sunflower and mustard families and some rodents, are especially adapted to the highly disturbed environments in cultivated plots and fields. Additionally, as certain crops are cultivated more frequently for human consumption, they are more readily available to the insects that prefer them.

Several practices can help reduce the number of unwanted species such as plowing or planting toxic or pungent species that deter animals or birds. To remove unwanted plant species, often referred to as weeds, farmers intermittently enter the growing fields and manually remove them. Intercropping diverse crops and varieties, as well as maintaining a crop rotation system, can also serve to reduce pest populations or at least reduce the risk of complete destruction by them. Certain types of wet farming, such as pond and paddy fields, can help reduce the number of weeds and animals in fields. In his study of wet versus dry farming on Futuna Island in the Pacific, Patrick Kirch (1994) found that wet fields required much less work weeding than the dryland farming fields. Fences and earthen barriers also aid in keeping unwanted animals and even other humans away from the crops.

Detecting these types of practices in the archaeological record can be challenging. Fencerows or physical barriers may be encountered in surveyed or excavated field systems. Weedy species are common in archaeobotanical assemblages, particularly in areas where the dung of grazing animals is burned. These assemblages can provide insights into the types of species present in the fields but not necessarily if or how they were removed (Jones et al. 1999). Archaeobotanical studies of crop processing stages may reveal the removal of weedy species during the grain cleaning process (Hillman 1973). Zooarchaeological studies also provide insight into the animal pests that may have inhabited fields. For example, in the American Southwest, the ubiquity of field and house rodents increased as farming became the primary form of subsistence (Dean 2005). Although farmers do not want these ruderal plant and animal species to destroy their crops,

they are often useful resources in their own right. Some weedy plant species can be eaten as greens or used for medicine, while garden hunting can provide an important source of animal food.

These categories provide a general overview of the various strategies farmers employed, how they may have changed through time, and how archaeologists can document them. While understanding this diversity is important, it is also important to understand *why* such practices changed through time.

Historical Background

Theories of Agricultural Change

Archaeologists have long recognized that transformations in agricultural production were linked to other fundamental changes in human prehistory such as the development of complex societies and the founding of cities. V. Gordon Childe (1950) believed that the "Urban Revolution" could only occur once agricultural production was great enough to support non-farming specialists who could produce prestige goods and engage in trade. Julian Steward (1955) and Karl Wittfogel (1956) both argued that the first states emerged in arid regions that required irrigation to expand and intensify agriculture. They believed that a centralized and hierarchical system of governance was required to organize the construction, maintenance, and distribution of water in expansive irrigation systems.

Another factor that early thinkers associated with agricultural production was population. In 1798, Thomas Malthus (2004 [1798]) argued that agricultural production generally could not keep up with population growth. Unless a new technology could be introduced, overpopulation would be checked by famine or war. He did not consider, however, the political or social factors that may have caused such tragedies. This idea was challenged in 1965 by Danish economist Ester Boserup (1965), who, based on observations of nonindustrialized agriculturalists in Africa and Asia, argued that population growth is not limited by available agricultural technologies but that demographic pressure actually stimulates agricultural change. She found that as populations grew, farmers reduced the amount of time they left their fields in fallow and increased their work in the fields by weeding, fertilizing, and plowing in order to make them more productive. In cases where population size fell or pressure was reduced, they would shift back to more extensive land use.

Key Issues/Current Debates

Recent archaeological inquiries and debates have built upon these previous ideas and have attempted to determine which of these various factors, environment, population, and/or sociopolitical dynamics, may have brought about transformations in agricultural production. The main arguments are summarized below.

Population

Boserup's (1965) theory of population growth as the primary cause for agricultural intensification found much support among anthropologists and archaeologists. Such a pattern was documented among modern-day farmers in Africa and the Americas, and the definition was further refined (e.g., Brookfield 1984; Turner et al. 1993). Archaeologists argued that there was support for population causing agricultural intensification in areas such as Peru (Cohen 1977).

Boserup's theory has also received much critique. One set of critiques focuses on Boserup's unilinear evolutionary scheme of ever-decreasing fallow periods as the primary trajectory of intensification (Table 1). As described in the section on agricultural practices above, however, there are many ways to increase production such as implementing innovative irrigation or cropping systems (Morrison 1994). Another critique focuses on her lack of consideration for the role of environmental or ecological variables. She saw the evolution of ever-decreasing fallow as independent of local environmental conditions, but new research shows this may not be the case. Finally, researchers have found other reasons as to why people may

Agricultural Practice: Transformation Through Time, Table 1 Esther Boserup's (1965: 15-16) intensification scheme of decreasing fallow periods

Types of land use	Fallow period	Vegetation
Forest-fallow cultivation	>10 years	Forest regeneration
Bush-fallow cultivation	5–10 years	Some shrub, tree regeneration
Short-fallow cultivation	1–2 years	Grass regeneration
Annual cropping	Months	Cropped once a year
Mutli-cropping	None	Cropped two or more times a year

intensify agriculture aside from population growth. These ideas are discussed in more detail below.

Environmental Conditions

Boserup challenged environmentally deterministic models but to such an extent that she largely ignored how natural conditions shape the dynamics of agricultural systems. Boserup's scheme of forest fallow to multi-cropping is not applicable to more arid regions. As Wittfogel (1956) and Steward (1995) pointed out early on, the primary means of intensification in particularly arid regions is through irrigation.

In some cases, environmental conditions prohibit the possibility of intensification. In extremely arid regions, where rainfall is highly variable (seasonally and/or annually) and where irrigation is not possible, it is not worth increasing investment in fields that will likely fail due to drought. This seems to have been the case in the Wupatki region of New Mexico in the twelfth century CE (Stone & Downum 1999). Here, a volcanic eruption deposited fertile ash in a valley normally not suitable for agricultural production. Although the population did subsequently increase in the area, rather than intensify the production of individual fields, settlement patterns and territory markers indicate that farmers protected large areas of land in order to maintain a more extensive land-use strategy because intensification would have been too risky in this particularly arid region.

Finally, researchers argue that in some regions where rainfall is unpredictable, intensification practices, such as terracing or irrigation, are not implemented to meet the needs of population pressure but as a risk reduction strategy. For example, maize irrigation in parts of the Basin of Mexico did not increase yields compared to successful dryland farming but secured the production of the crop during years of low rainfall (Nichols 1987).

Social and Political Variables

Another important topic related to explaining agricultural transformations is the role of social and political variables. One theory is that agriculture is often intensified to meet political rather than population demands. For example, in New Guinea and the Pacific Islands, communities overproduce pigs and taro or yams for large feasts that will boost the social status of certain individuals. Although one result is the increased power and prestige of particular individuals, the community members also benefit by taking part in the feasts and ceremonies sponsored by this individual (Brookfield 1972). Shifts in political power can also drastically transform how and what types of food are produced. Expansive states and empires often reorganized food production in their new territories. For example, the Inca empire shifted highland potato farmers into lowland valleys and required them to produce more maize (Hastorf 1993).

The other issue that links social and political power to agricultural transformations is the "hydraulic hypothesis" proposed by Steward (1955) and Wittfogel (1956). They posited that complex irrigation or field systems require a more centralized form of governance. Much like Boserup's intensification model, Steward and Wittfogel's ideas generated much enthusiasm. Archaeologists argued that the irrigated pondfield systems of the Hawaiian Islands were governed by complex chiefdoms (Earle 1980) and that the large-scale raised-field production in the Lake Titicaca Basin of Bolivia was directed by the Tiwanaku state (Kolata 1986). This model has been challenged, however, with ethnographic and archaeological cases showing how

decentralized communities can operate large-scale irrigation and field systems such as on the north coast of Peru (Netherly 1984).

The theories summarized above focus primarily on single causes such as population, environment, or politics that bring about changes in an agricultural system. As archaeologists have learned more about the complexities of past and present agricultural systems, they have realized that no single factor or "prime mover" can explain how they developed and changed (Morrison 1996). For this reason, archaeologists now aim to understand the multivariable processes or courses of agricultural change by considering multiple archaeological datasets, such as those described above.

International Perspectives

From the examples provided above, the study of past agricultural strategies and transformations has been quite international and comparative in nature. Aside from teaching us about past dynamics in agricultural systems, archaeological studies of agricultural transformation have the potential to inform us about modern-day agricultural issues.

Rehabilitation of Ancient Farming Technologies

In some underdeveloped countries and regions, the study of lost, ancient agricultural techniques has led to rehabilitation projects aimed at improving local economies. For example, there have been several raised-field rehabilitation projects in highland and lowland Bolivia and Peru (Fig. 2). Ancient raised fields that were likely in use between 800 and 1200 CE were reconstructed in the Lake Titicaca basin of the Andean highlands (Erickson 1988; Kolata & Ortloff 1996), and the Llanos de Moxos of the Amazon basin (Erickson 1980). Initial experiments showed them to be highly productive. Several development projects aimed at helping these communities use this technology to improve food production were instituted but none of them lasted very long (Swartely 2002). Why these projects were unsuccessful has forced archaeologists to think more carefully about the differences in food production between today and the past and about our models of how these field systems originally functioned. Were raised fields used because they were more productive than dryland fields, or did they simply supplement dryland agriculture? Is the labor and effort

Agricultural Practice: Transformation Through Time, Fig. 2 Ancient raised fields in the Pampa Koani, Bolivia

needed to construct and maintain such field systems too great for small communities? Or has the economic structure of the modern, market and city-oriented labor force made rural, agricultural projects that require large, continuous labor inputs no longer viable or valuable? While such projects have the potential to help modern-day communities, they also help us refine our understanding of the past.

Future Directions

Archaeologists continue to pursue more information on the particular trajectories of agricultural transformation across the globe. The trend towards considering a broader range of reasons for and strategies of agricultural change will lead us to a better understanding of both differences and similarities among different world regions. Early studies of agricultural change tended to focus on landscape modifications such as field and irrigation systems. While we will continue to learn more about such systems with new technologies such as LiDAR, the greatest advancements will be made through analytical techniques in botanical and geochemical analyses that reflect other important agricultural practices such as fertilization, soil management, and pest control.

Cross-References

- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Andes: Origins and Development of Agriculture
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Garden Hunting
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Paddy Soils: Environmental Analyses

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Agricultural Practices: A Case Study from Papua New Guinea

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Introduction and Definition

A useful methodological tool to help unravel the complexities of how early agriculture emerged within a given locale is the concept of "practice" (following Bourdieu 1990; see Denham 2005, 2009, 2011; Denham & Haberle 2008; Bruno 2009; Jussuret 2010). In archaeology, practices represent human actions in the past, including habitual modes of behavior and dispositions, as well as individual idiosyncrasies (Barrett 1994). As such, the concept of practice has been proposed as a useful way to overcome various dualisms, or binary divisions, that permeate the study of human-environment interactions and social relations, whether in the past or present (Fig. 1; Denham & Haberle 2008; Denham 2009).

From one perspective, practices represent the nexus of human-environment relations because they mark the intersection of social life with the biosphere and geosphere (Fig. 1a); practices are structured by the environment, while simultaneously acting upon and changing that environment. Any practice represents the intersection between people and their world. From another perspective, practices are a manifestation of, and represent the nexus of, more abstract structure-agency dichotomies that pervade the social sciences and humanities (Fig. 1b). Practices focus upon what people did rather than upon seeking to

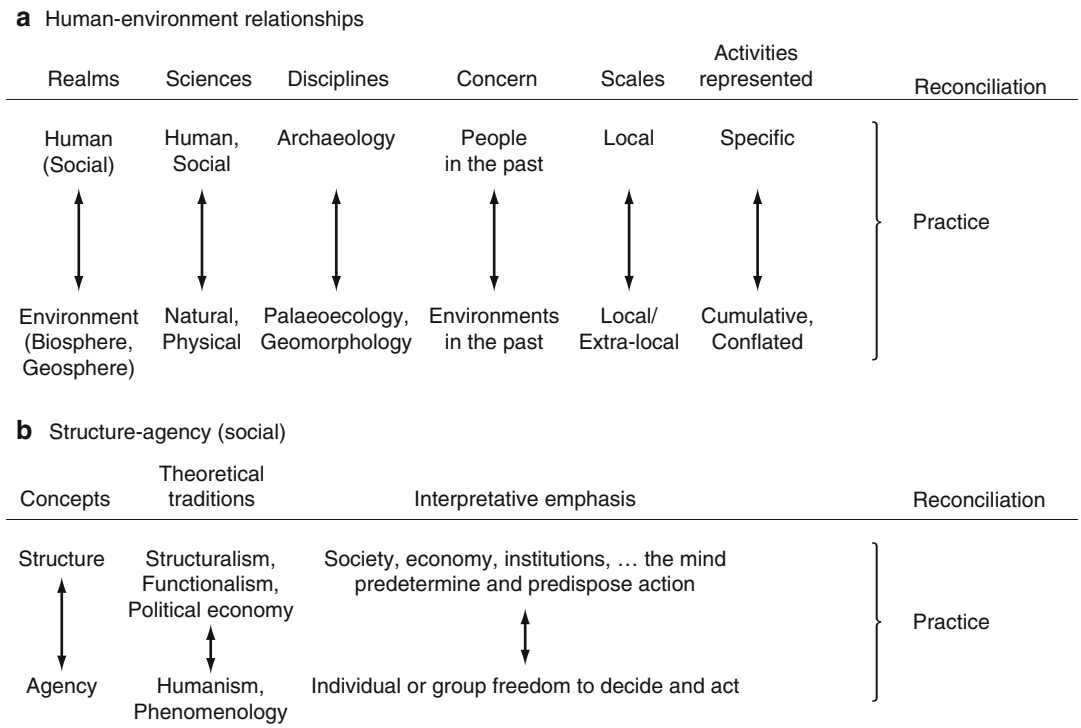

Agricultural Practices: A Case Study from Papua New Guinea, Fig. 1 Schematic diagram showing how the concept of practice reconciles various dichotomies inherent to the understanding of human-environment (*upper*) and human-human (social) relations (*lower*) in the past (Amended version of Denham & Haberle 2008: Fig. 2)

unravel the degrees to which someone's actions are structurally determined (whether by social, economic, or mental structures) or represent their predispositions or are a product of individual improvisation. As such, practices subsume and encapsulate the inherent recursivity of human-environment interactions and social relations, respectively.

The concept of practice, though, does not address questions of ultimate causation, which remain open to variable speculation (Denham & Haberle 2008: 484-485):

> . . . in trying to explain why people did something in the past - whether in terms of what caused something to happen or in terms of what it meant to people in the past - we are continually drawing on our own frames of reference about how people behave and what governs that behaviour, ie, we continually fall back on patterns of thinking derived from our understanding of the world today. Consequently, we populate the past with *Homo economicus* and *H. ecologicus*, such as resource maximisers and optimal foragers . . ., or we try to distinguish conscious or unconscious patterns of behaviour from the evidence of past practices.... In attempting to address questions of 'why?' there is a continual interplay between what happened in the past and how that past is made meaningful in the present.

Having said this, a focus on practice draws our attention away from questions of "why," or from questions of ultimate causality, to the "what" and "how" something happened in the past. As a result, the concept has considerable utility for understanding the emergence of agriculture in a particular locale.

Key Issues

A Practice-Centered Method for Investigating Early Agriculture

A practice-centered approach is useful for archaeologists studying early agriculture because it focuses attention upon the multidisciplinary

evidence of what people did in the past. Specific practices associated with cultivation may potentially include burning, forest clearance, gathering, plot preparation, transplantation, planting of seed, dibbling, staking of plants, tillage, construction of raised beds and mounds, and digging of drains or ditches. Some of these are relatively generic, constituent practices that are common to many forms of plant exploitation, including agriculture. As such, a practice-based framework provides common conceptual ground to understand and compare different forms of plant exploitation, such as agriculture and foraging, and to chart how these were transformed through time and across space (Denham 2008; Denham et al. 2009).

Within this conceptual framework, forms of plant exploitation represent higher-order categories associated with how various constituent practices co-occur, or are "bundled," within particular historico-geographical contexts. This bundling effectively reconstructs how constituent practices articulate and intersect within a locale at different times in order to determine which forms of plant exploitation plausibly occurred in the past and to show how these were transformed through time (following Hägerstrand 1970). This practice-centered method is designed to circumvent some of the laden "semantic" (Harris 1996) debates concerning the definition and attribution of monolithic categories such as "agriculture" or "foraging" to different forms of plant exploitation in the past.

Methodologically, a chronology of practices in the past can be reconstructed relatively directly from archaeological remains and indirectly through the interpretation of paleoenvironmental proxies, such as charcoal, phytoliths, pollen, and sediments. Using the Kuk Swamp evidence from the highlands of Papua New Guinea as an example, archaeological evidence of past plant exploitation and cultivation practices has grounded more equivocal paleoecological evidence of landscape transformation and archaeobotanical evidence for the presence and use of food plants (Denham & Haberle 2008). It is not just that multidisciplinary evidence for different practices co-occurs in time and place, but the archaeological evidence enables the different lines of evidence to be integrated and linked to specific practices, thereby enabling their "bundling" into forms of plant exploitation.

At Kuk Swamp, archaeological excavations documented artificially constructed mounds dating to 7000–6400 cal BP on the wetland margin. One of the fills between these mounds contained anomalously high *Musa* spp. banana phytoliths, while paleoecological evidence from several fills indicated a dramatic transformation of the landscape to grassland at this time (Denham et al. 2003). In the highland New Guinea context, these lines of evidence suggest mounded cultivation of crops, including bananas, as well as the exploitation of tuberous plants on the wetland margin within a landscape denuded and maintained as grassland.

The multidisciplinary evidence, the chronology of practices, and the interpretation of plant exploitation in the past should be reconstructed for a particular landscape or restricted region, rather on broader spatial (or chronological) scales. Today cultivation practices and major crop plants can vary considerably across Papua New Guinea, including from one valley to another (Bourke & Harwood 2009). Similarly, forms of plant exploitation are likely to have varied considerably across the island of New Guinea in the distant past (Denham 2005, 2011). In seeking to reconstruct plant exploitation in the distant past, particularly the emergence of agriculture, the conflation of records from geographically dispersed regions may provide a highly inaccurate portrayal of what actually happened at any given locale – the interpretative sum can be greater than the evidential parts (Denham 2009: 661).

These ideas are illustrated, and have been developed in order to understand, the long-term history of plant exploitation and the emergence and transformation of agriculture in the highlands of New Guinea.

Early Agriculture in the Upper Wahgi Valley, Papua New Guinea

Various lines of multidisciplinary evidence have been used to reconstruct a chronology of practices in the past for the Upper Wahgi Valley, Papua New Guinea (Fig. 2; following Denham & Haberle 2008). The chronology of practices has

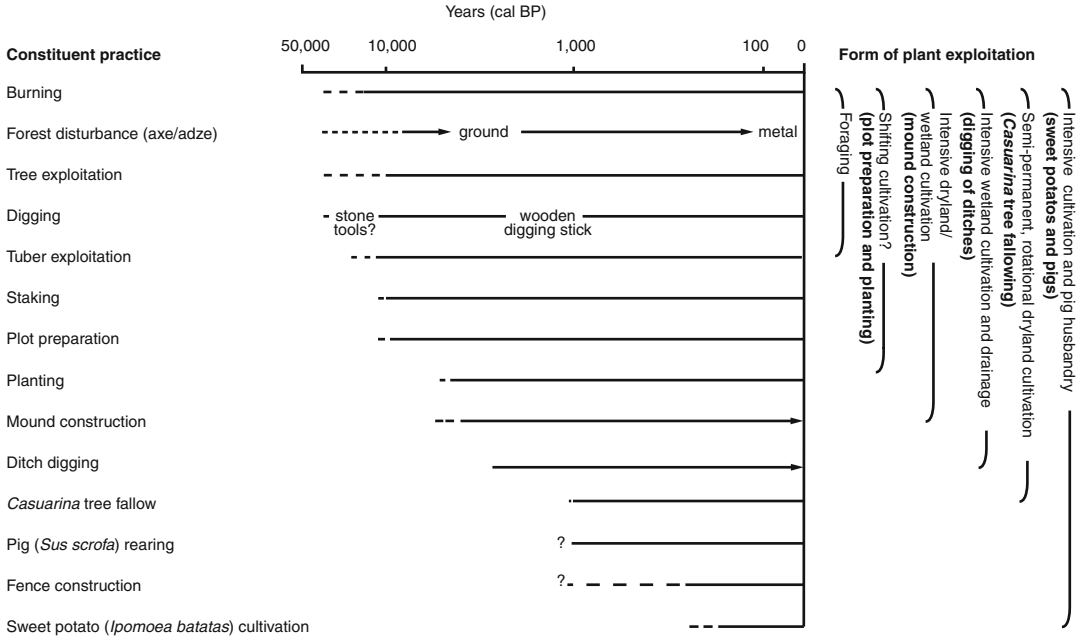

Agricultural Practices: A Case Study from Papua New Guinea, Fig. 2 Chronology of practices and associated forms of plant exploitation reconstructed for the Upper Wahgi Valley using multidisciplinary lines of evidence (Amended version of Denham & Haberle 2008: Fig. 9)

been cross-referenced with, and bundled into, forms of plant exploitation that have been documented ethnographically in the region. The chronology and resultant interpretations are secure because they are derived from archaeological, geomorphological, and paleoecological investigations at multiple sites (including wetlands, rockshelters, and open sites) within a confined region of one valley in the highlands.

The practice-centered method charts the emergence and transformation of agriculture through time in the Upper Wahgi Valley (Fig. 3). Continuities with earlier forms of plant exploitation, such as from foraging to shifting cultivation, are clearly demonstrated. To illustrate, multiple constituent practices are associated with traditional forms of foraging that occurred since the beginning of the Holocene, including burning, forest disturbance, tree exploitation, tuber exploitation, and digging. The additions of plot preparation, staking, and inferential evidence for planting to the practical repertoire are suggestive of some form of shifting cultivation on the floor of the Upper Wahgi Valley during the early Holocene. Additional definitive evidence for planting and mound construction indicates more intensive forms of cultivation on the wetland margin at Kuk Swamp at 7000–6400 cal BP. Subsequent innovations, introductions, and transformations of agriculture occurred following the inception of ditch digging from 4,400 to 4,000 years ago, the adoption of *Casuarina* tree fallowing from c. 1,200 years ago, and intensive pig rearing and sweet potato cultivation within the last few hundred years.

Each transformation, or augmentation of the plant exploitation repertoire, results from the adoption of additional practices, whether of local innovation or extralocal introduction. Significantly, forms of plant exploitation need not

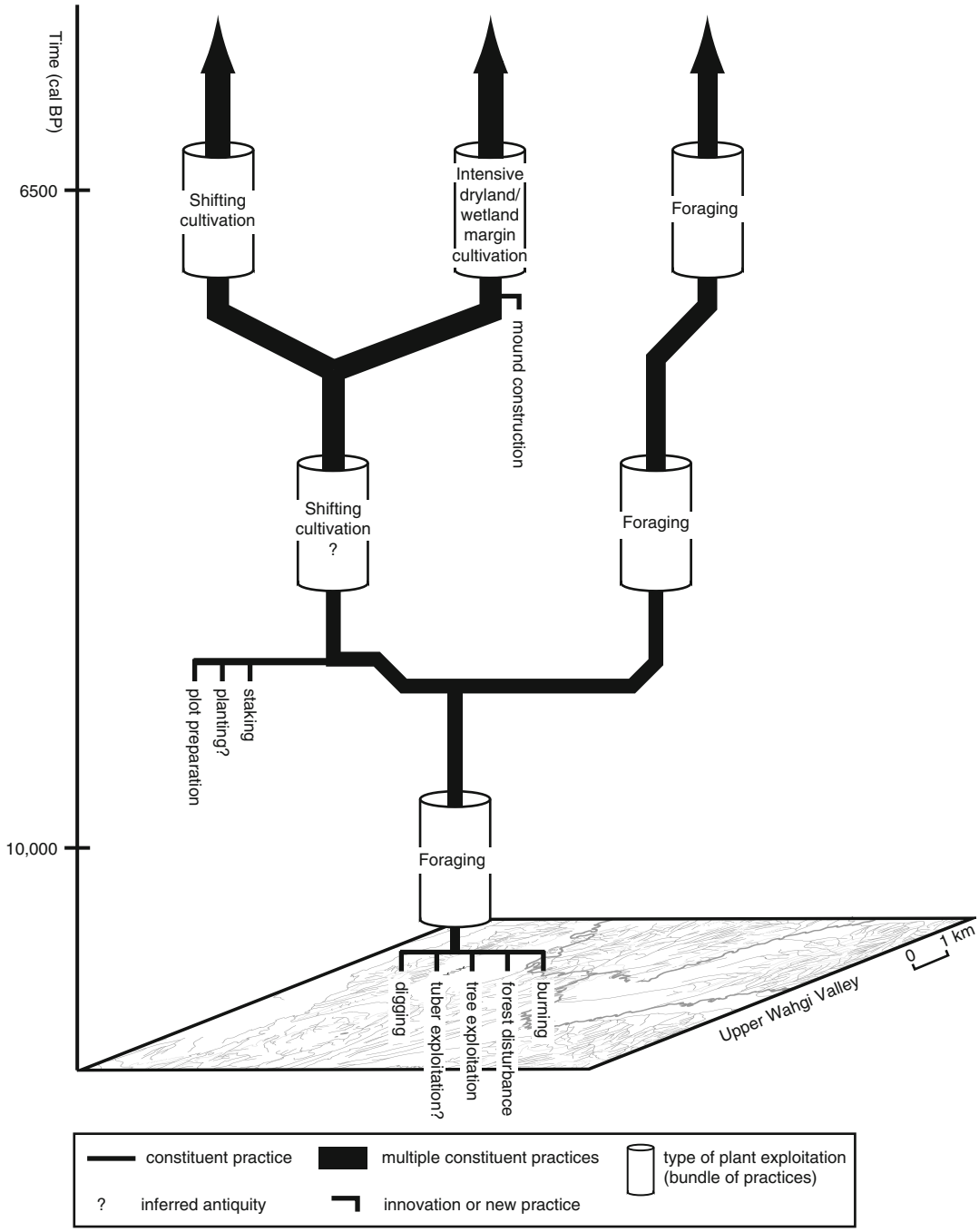

Agricultural Practices: A Case Study from Papua New Guinea, Fig. 3 Schematic representation of the bundling of practices into forms of plant exploitation reconstructed for the Upper Wahgi Valley during the early-to-mid Holocene (Amended version of Denham 2009: Fig. 2)

be supplanted by successive transformations. In the Upper Wahgi Valley context, each reconstructed form of plant exploitation broadens the repertoire that people draw upon simultaneously in different parts of the landscape. Consequently, the long-term history of agriculture is not unilinear; rather it becomes increasingly multilinear and adaptive to different parts of the landscape, as well as to different landscapes, through time. The practice-centered method is designed to highlight the transformative aspects of plant exploitation, rather than viewing each form as a static, monolithic entity (Denham 2009).

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Bananas: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Sugarcane: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Yams: Origins and Development

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Agriculture: Definition and Overview

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State of Knowledge and Current Debates

Introduction

Agriculture is the most comprehensive word used to denote the many ways in which crop plants and domestic animals sustain the global human population by providing food and other products. The English word agriculture derives from the Latin *ager* (field) and *colo* (cultivate) signifying, when combined, the Latin *agricultura*: field or land tillage. But the word has come to subsume a very wide spectrum of activities that are integral to agriculture and have their own descriptive terms, such as cultivation, domestication, horticulture, arboriculture, and vegeculture, as well as forms of livestock management such as mixed crop-livestock farming, pastoralism, and transhumance. Also agriculture is frequently qualified by words such as incipient, proto, shifting,

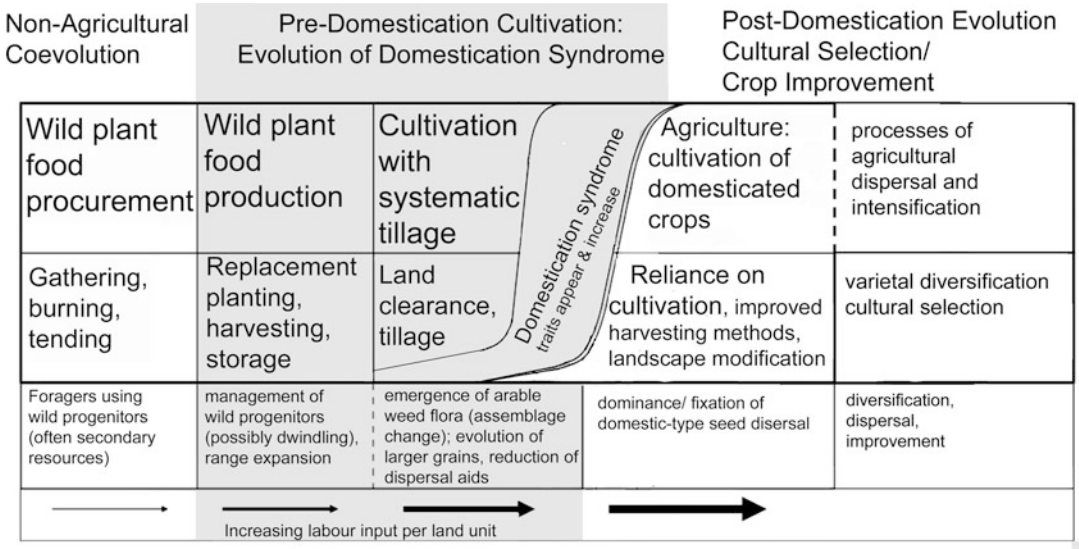

Agriculture: Definition and Overview, Fig. 1 An evolutionary model from foraging to agriculture, in which the transitions to cultivation, domestication, and agriculture are separated and potential archaeological indicators are suggested (Modified from Harris 1989 and Fuller 2007)

extensive, and intensive, the precise meaning of which is not self-evident. Many different attributes are used too to define particular forms of agriculture, such as soil type, frequency of cultivation, and principal crops or animals. The term agriculture is occasionally restricted to crop cultivation excluding the raising of domestic animals, although it usually implies both activities. The Oxford English Dictionary (1971) defines agriculture very broadly as "The science and art of cultivating the soil, including the allied pursuits of gathering in the crops and rearing live stock (*sic*); tillage, husbandry, farming (in the widest sense)." In this entry, we too use the term in its broadest, inclusive sense.

In the published literature on early agriculture, there is a tendency for the word agriculture and many of its subsidiary terms to be used vaguely without precise definition, and sometimes their connotations overlap, for example, proto/incipient and shifting/extensive. There is need to clarify much agricultural terminology to avoid confusion (Harris 2007: 17-26), particularly because the multidisciplinary nature of research on the subject leads to many concepts being used that derive from disparate disciplines; principally archaeology, anthropology, biogeography, genetics, linguistics, and taxonomy. In this entry, we cannot review comprehensively all the typological terms currently used in discussions of the origins and early development of agriculture. Instead we focus on the two most fundamental processes that led to agriculture, cultivation and domestication (of plants and animals), and then comment on some of the terms used to denote particular categories of agricultural production. In conclusion, we return to agriculture itself as a process of landscape-scale food production.

This approach, leading from consideration of cultivation through domestication to agriculture (Fig. 1), proposes that agriculture is a form of land use and economy that resulted from the combination of cultivation (a bundle of human actions focused on preparing soil and planting, tending, and harvesting plants) and domestication (a bundle of genetic and morphological changes that have increased the ability of plants to adapt to cultivation). Cultivation and domestication are related as cause and effect, a change in human strategy with consequences in genetic adaptations of another organism, which increased the interdependencies of both. In the next two sections, we explore the nature of and interaction between cultivation and domestication over time

in light of mainly archaeological evidence together with some genetic data, including exploration of the concept of "pre-domestication cultivation."

Cultivation

Cultivation is an activity through which humans become directly involved in the management of the lives and life cycles of certain plants. In abstract terms, this can be considered a change from a largely extractive approach to subsistence (collecting) towards a highly regulative one (Ellen 1994), with seasonal scheduling of labor for delayed returns and storable product. In practice, cultivation involves manipulation of soil, water, and other components of the plant environment. At its most basic, it involves sowing of seeds on soil which has been cleared of other vegetation. In low-intensity systems, this may come about through burning of vegetation (slash and burn) or by taking advantage of fresh deposits of silt by river floods (e.g., *décrue* agriculture; Harlan & Pasquereau 1969). It usually involves preparation of the soil by tillage. Tillage methods and tools vary from simple handheld devices (digging sticks, spades, hoes) to team-employed tools, such as the Andean "foot-plough," to animal-powered ards and true ploughs (Steensburg 1986). Other important variables include the addition of nutrients to the soil by such means as manuring, multiple cropping with nitrogen-fixing species (usually legumes of the family Fabaceae), or using crop rotations with legumes or fallow periods. This represents an important component of cultivation, i.e., scheduling the seasons of sowing and harvesting and interannual patterns in crop rotation and fallowing.

Water is a key input into any cultivation system, and in some regions it had a central role in the origins of agriculture. For example, control of water levels was essential in the development of early rice cultivation in China (Fuller & Qin 2009). Successful cultivation of the perennial ancestor of *japonica* rice involved extending shallow and wetland-margin habitats by clearing competing vegetation, as use of these slightly less-watered microenvironments would have increased grain production. The earliest preserved field systems for rice cultivation consist of small (1–2 m diameter) fields interconnected to each other and to frequent deep water pits that served to drain water from the growing rice.

Cultivation represents an important change in human strategy as people start to manipulate the soil and the composition of plant communities to enhance yields of particular plants later. This has led many researchers to infer that morphological domestication came about through unconscious selection. In other words, people did not set out to domesticate plants but to manipulate productivity through cultivation. The new environment created by cultivation can cause unintended domestication, as the cultivated species adapts to these new circumstances.

In recent years, archaeobotanical research has aimed to identify the practices of cultivation prior to the emergence of domesticated species. Such evidence for pre-domestication cultivation can be inferred from the presence of arable weed assemblages, which may be demonstrated by the statistical composition of wild-seed assemblages or by the modern ecological characteristics of species that recur archaeologically but have little or no known human uses (Willcox 2012). As is well known from later agricultural periods, archaeobotanical assemblages are made up predominately of crops and weeds, together with some gathered fruits and nuts, and this pattern begins to emerge by the earliest Pre-Pottery Neolithic in Southwest Asia and in the middle Neolithic in parts of China (Fuller & Qin 2010). This approach draws on the well-developed tradition in European archaeobotany of using weed-seed assemblages to infer the cultivation ecology of fields (Jones 1988).

Domestication

Domestication is most clearly defined as a biological phenomenon, that is, by traits in crops that result from adaptation to cultivation and by which they differ from close wild relatives. Several recurrent "domestication syndromes" can be recognized as sets of characters that define domesticated crops and characterize

domestication as a form of convergent evolution under cultivation (Fuller 2007). The domestication syndrome differs for different kinds of crop plants, according primarily to how they are reproduced, by seed or by cuttings, and what plant organ is the target of selection (grain, fruit, tuber).

The best defined domestication syndrome is that for grain crops, including cereals, pulses, and oilseeds. While all of these traits are the product of cycles of harvesting and sowing from such harvests, the actual selection pressures seem to come from two different aspects of cultivation. First are some traits selected for by harvesting and the crops' growing reliance on humans for seed dispersal. Second are traits that relate to soil conditions, as tilled fields are essentially early successional communities on empty soil, which is generally loose and allows deeper burial of seeds. Although there are six essential syndrome traits in seed crops, only the first four have some chance of archaeobotanical preservation in some species.

First (1) is the elimination of natural seed dispersal, such as through non-shattering rachis in cereals and non-dehiscent pod in pulses and oilseeds. This is often regarded as the single most important domestication trait as it makes a species dependent upon the farmer for survival. It also means that human labor must be used to thresh crops and separate seeds, pods, or spikelets instead of natural dispersal occurring at maturity (Fuller et al. 2010). This trait can only evolve under conditions of harvesting, such as uprooting, use of sickles, or harvesting when crops are mature rather than green. This trait is readily identifiable in cereal rachis or spikelet-base remains, and has been studied in rice, wheats, barley, pearl millet, and maize, but is less evident in the preserved remains of many other crops. However, not all harvesting methods necessarily select for this, which means there are conceivable systems of "non-domestication cultivation" (Hillman & Davies 1990), or there may be weak selection leading to very protracted evolution of this trait within populations (Fuller 2007; Allaby 2010). It is worth noting that any individual plant, or archaeological specimen, either has wild-type or domesticated-type dispersal, but domestication is working on populations, and therefore domestication status should be determined for assemblages as representative of past populations. Recent archaeobotanical evidence tends to suggest relatively weak selection for this trait (Fuller et al. 2010).

A second connected trait (2) is reduction in aids to wild seed dispersal. Plants often have a range of structures that aid seed dispersal, including hairs, barbs, awns, and even the general shape of the spikelet in grasses. Thus domesticated wheat spikelets are less hairy, have shorter or no awns, and are plump, whereas in the wild they are heavily haired, barbed, and aerodynamic in shape. Varieties of wild rice are always awned and heavily barbed, while many cultivars are awnless and those with awns have fewer barbs. Rather than being positively selected by harvesting, this comes about by removal of natural selection for wild-type dispersal adaptations, and therefore under domestication, such traits require less metabolic expenditure. This trait may sometimes be visible in archaeobotanical material but is rare and non-diagnostic and does not provide a definitive means of identifying domestication archaeologically. Because this trait shifts gradually and non-diagnostically, it can be regarded as indicating "semidomestication."

Two additional traits of the domestication syndrome may be widespread, but they are not recoverable archaeologically: (3) synchronous tillering and ripening, sometimes including a shift from perennial to annual. Planting at one time and harvesting at one time will favor plants that grow in synchronization. Another trait (4) is a more compact growth habit with apical dominance, such as a reduction in side branching and denser spikes or seed heads. In some species, such as in several pulses, this involved a shift from a climbing habit to self-standing. Harvesting methods, like those that select for non-shattering types, can also favor plants with single and compact parts to be harvested.

Two more important traits are thought to relate primarily to an aspect of soil conditions,

i.e., planting seeds into more deeply tilled soils. These are traits that relate to rapid germination and early growth. On the one hand (5) is the loss of germination inhibition. In the wild, many seeds will only germinate after certain conditions have passed – conditions of day length and temperature – or after the seed coat is physically damaged. In wild legumes, for example, this may mean that 90 % of seeds will fail to germinate. By contrast, crops tend to germinate as soon as they are wet and planted. This is simply selected by planting as those seeds that do not germinate will fail to contribute to the next harvest and subsequent crops planted from it. This is regarded as a key domestication trait, especially in pulses and pseudo-cereals (e.g., *Chenopodium* spp.) This change is often signalled by changes in the seed, such as thinner and less ornamented seed coats. On the other hand it is a trait, widely studied in archaeobotany, that can be regarded as a "semidomestication" trait. Trait 6 is increasing seed/fruit size. This is likely to be selected for by open environments and deep burial in disturbed soils. This has the added advantage of increased seed weight which tends to increase harvest yields from a given number of crop plants. Comparative studies, for example, between related species, show that larger seeds germinate more quickly and effectively than smaller seeds, and thus this should be selected for by tillage and cultivation generally. As seeds readily preserve, archaeological populations of them can be measured to track changes in average sizes and size ranges, to trace this trait over time. In the case of cereals, selection seems to be focused on seed thickness/breadth rather than length (Fuller et al. 2010).

While for seed crops, predominance of the above traits marks domestication, the end of a process of biological evolution, the determination of domestication sequences is much more difficult in vegetatively cultivated plants such as roots and tubers (Hildebrand 2003, and see the section below on Vegeculture). Because harvest of tubers focuses on a starchy storage organ rather than a reproductive organ, harvesting practices by humans are unlikely to pose strong selective pressures on the next generation. In addition, because tuber plants tend to be perennials, the harvested individual will tend to grow back, reducing the potential to select for improvements across generations. In many cases, cultivation practices may induce the useful part of the plant – the starchy organ – to exhibit phenotypic alteration without changes in its genotypic makeup, such as the improved tuber size produced by yams in loosened, prepared soil as opposed to harder unprepared soils (Chikwendu & Okezie 1989). Thus tuber crops can be cultivated for long periods and on an extensive field scale without undergoing morphological domestication. In addition, archaeologically recovered tuber fragments (parenchyma) tend to preserve few morphological attributes relevant to phenotypic or genotypic change. There is some research which suggests that micro-remains such as starch grains have increased in size with tuber domestication (Piperno 2012). As a result of these factors, the study of early vegecultural systems tends to focus on establishing the presence of potential crop species and inferring practices of landscape modification and management, such as soil mounding, ditch digging, and vegetation burning (see, e.g., Denham 2007).

Specialized Types of Livestock Management and Crop Production

In this section, we examine briefly several distinctive types of agriculture that developed over time into specialized systems focused on the production of food and often also secondary products such as hides, hair, wool, building materials, and many other useful items.

Mixed Crop-Livestock Farming

One of the most significant variables in the historical differentiation of agricultural systems is whether domestic livestock were fully integrated with the processes of crop cultivation as beasts of burden and agents of soil fertilization as well as producers of food. Such systems of "mixed farming" or "agropastoralism" developed early in only a few regions. They did so most comprehensively in Southwest Asia (and later in Europe) where domesticated herd animals – cattle, sheep,

goats, and pigs – were raised in close conjunction with wheat, barley, and other cereal and pulse crops as producers of meat, milk, hides, hair, wool, and dung and as traction animals used for ploughing, load-bearing, and other purposes (Harris 2002). A comparable system of mixed farming evolved in East and Southeast Asia where water buffaloes became an integral component of the system of wet-rice (padi) cultivation (Hoffpauir 2000), although this may have been millennia after rice had spread throughout China and much of Southeast Asia (Fuller et al. 2011).

In other regions of early agriculture where domestic herd animals were present, they were not fully integrated with crop cultivation as providers of food, fertilizer, and traction. Thus, in northern tropical Africa, cattle, camels, sheep, and goats, and in the Andean region of South America camelids (llama and alpaca), were not fully incorporated into indigenous systems of cereal, pulse, and root-crop cultivation.

Pastoralism

The full incorporation of domestic herd animals into systems of mixed farming requires permanent facilities such as barns, sheds, stalls, fenced fields, and other enclosures for confining the animals and controlling their movements. This contrasts with pastoral systems that are characterized by more mobile methods of management. The term pastoralism derives from the Latin *pastor*, meaning a herdsman or shepherd, and it applies to mobile systems in which the herd animals, principally sheep, goats, cattle, horses, donkeys, camels, llamas, alpacas, and reindeer, are raised to provide food and other products and as pack and riding animals. The essence of pastoralism is that people move with their animals. The spatial and temporal scales of their movements range from short daily movements of flocks and herds to and from pastures near their owners' settlements (diurnal grazing) to longer seasonal movements by part of the local community with their animals to higher and/or more distant pastures (transhumance), to the most fully mobile system in which families migrate from pasture to pasture with their herds throughout the year and from year to year (nomadic pastoralism). Nomadic pastoralists own and largely depend on their animals, although they have historically obtained some of their food and other supplies by trading with or raiding settled agricultural communities. In fact, all nomadic pastoralists depend to some degree on crop products for their food and often also for supplementary fodder for their animals.

Few if any fully nomadic pastoral groups still exist in the modern world, but in the historical and prehistoric past, this way of life was followed extensively in the deserts of northern and eastern Africa and southwestern and central Asia. The pastoralists' herds consisted mainly of sheep and goats, with the roles of horses and camels varying from region to region, and in the high latitudes of Eurasia a variant form of reindeer pastoralism became established (Ingold 1980).

Horticulture

Horticulture has two contrasted connotations in the literature on traditional agricultural systems and the origins of agriculture. The first relates directly to the origin of the word from the Latin *hortus*, meaning garden (juxtaposed to *ager*, field), and in this literal sense it refers to the cultivation of plots of land adjacent or quite close to the houses of the cultivators. Such gardens are normally smaller than fields, which are usually located farther from their associated settlements. A greater variety of plants, especially perennial shrubs and trees, tend to be cultivated in gardens than in fields, which are commonly devoted to one or only a few types of crop. Also, whereas most fields are cultivated in seasonal cycles, gardens are usually tended continuously, especially in the tropics where long growing periods favor year-round production. Another distinctive feature of house gardens is the presence in them of many adventitious wild and weedy plants. They add to the floristic and structural diversity of the plant community and enhance its ability to provide a great variety of edible, medicinal, and other products such as flowers, fibers, dyes, containers, and construction materials (see, e.g., Coomes & Ban 2004).

The contrasts in size and floristic diversity between gardens and fields are widely recognized

in the literature on early agriculture, for example, in the terms "fixed-plot horticulture" and shifting or "swidden" cultivation and the German *gartenbau* and *ackerbau*. Small, continuously tended plots close to dwellings have been proposed as probable arenas of early plant domestication (Harris 1973: 398-401), but very little archaeobotanical research on past garden cultivation has as yet been undertaken.

Secondly, the terms horticulture and gardening have been used to denote agricultural systems that combine field cultivation of annual root and/or seed crops with growing mainly perennial tree, shrub, and herbaceous plants in gardens – a mixed cropping system that, when trees are a major component, is sometimes alternatively described as agroforestry. This connotation of horticulture has been used particularly in descriptions of traditional, and by implication early, systems of cultivation in Melanesia and the Pacific Islands, but this usage tends to obscure the useful distinction between field and garden cultivation.

Arboriculture

The term arboriculture, from *arbor* the Latin for tree, is used to specify agricultural systems focused exclusively or largely on the cultivation of trees and shrubs for the production of fruits and seeds and, in some species, also for ancillary products such as wood for construction and leaves for thatch, fiber, etc. The term, which is sometimes equated with agroforestry (see above), refers mainly to the specialized cultivation of fruit- and nut-bearing trees and shrubs in single- or mixed-species orchards and plantations. It can refer also to plantations of trees for timber production, although this process is more usually described as forestry.

Arboriculture differs from horticulture in that the plants are grown in less floristically diverse communities on larger landholdings. Traditional systems of arboriculture include oil-palm plantations in tropical West Africa and olive, almond, and walnut orchards in the circum-Mediterranean region. Arboriculture has attracted much less attention in the literature on the beginnings and early development of agriculture than the cultivation of cereal, pulse, and root crops, and fruit- and nut-bearing trees are likely to have been a much more important source of food among many hunter-gatherer groups than among early farmers (Harris 2012: 37-9). It tends to be difficult to differentiate specialized arboriculture from more floristically mixed traditional systems of horticulture, and it is seldom possible to do so on the basis of archaeobotanical data alone (see, e.g., Gosden 1995 and Latinis 2000). At present, most of what can be inferred about arboriculture in premodern times comes from historical and ethnoecological evidence.

Vegeculture

The word vegeculture is used to describe agricultural systems that produce mainly root and tuber crops with underground storage organs consisting of starch-rich roots, root and stem tubers, corms, and rhizomes. The crops are reproduced asexually by planting pieces of a parent plant such as parts of tubers, stem cuttings, or sprouts, rather than being grown from seed. Vegetative reproduction made possible the domestication of tuberous plants by replicating the characteristics of parent clones and then selecting and multiplying useful phenotypic variations that arose in planted stock, such as unusually large or smooth-skinned tubers. The process did not involve directional genotypic change from wild progenitor to domesticate as occurred in seed-crop domestication. Root and tuber domestication has taken place within the limits of phenotypic variation determined by an unaltered genotype, but morphological changes under domestication have nevertheless been substantial, for example, decreased flowering and in tubers changes towards greater size and starch content and reduction in bitterness and in the numbers and length of thorns.

Although root and tuber and seed crops are often cultivated together, vegeculture is the traditional mode of agricultural production in many parts of the humid and seasonally dry tropics. Until recently, little macrobotanical evidence of vegeculture had been found because the soft tissues of root and tuber crops are seldom preserved (except in very dry or waterlogged archaeological

contexts), but advances in microbotanical techniques for identifying remains of tuberous plants in the form of phytoliths (silicified particles of plant tissues), parenchyma (vegetative storage plant tissues), and starch grains preserved in sedimentary deposits are now beginning to illuminate the prehistory of vegeculture in several regions of the tropics (Hather 1994; Fullager et al. 2006; Piperno 2012).

Agriculture as Landscapes of Food Production

The beginnings of food production represent a strategic shift in human behavior, towards the manipulation of the soil environment and through an influence on the composition of plant populations grown in that soil, via preferential seeding and tending of one or a few species. While cultivation may involve a range of practices, and these will tend to select for morphological domestication, at least in seed crops, we can define agriculture in relation to the scale of cultivation, its prominence in local landscapes and in contributing a major component of human diet. In this sense, *agriculture* is the form of land use that represents a *change in the landscape*, as people regularly cultivate, raise, and focus more attention on domestic plants and/or animals. Agriculture creates fields for larger-scale production of crops and livestock. While small-scale cultivation may involve a few plants, agriculture involves the creation of substantial fields of sown vegetation on such a scale that it should, in principle, be recognizable in regional palaeovegetation datasets, recoverable from palaeosols, and a prominent part of the inferred source of archaeological plant remains. How one distinguishes agriculture from small-scale cultivation varies according to the parameters of particular geographical and cultural contexts.

Irrigation systems are one notable and widespread way in which distinctive landscapes of agriculture have been created. Control of water can be focused either on its removal (drainage) or by adding water to otherwise locally dry areas to allow cultivation where rainfall is insufficient to enhance productivity. In riverine agriculture, such as that associated with ancient Mesopotamia and Egypt (Butzer 1976), this took the form of canals and basins that helped to conserve floodwater and distribute it more evenly and widely. In some mountain environments, such as the Andes, canal systems, often closely associated with cultivated terraces, were also developed to bring steep slopes into agricultural production (Donkin 1979). Some irrigation systems incorporated manual water-lifting devices, such as the *shaduf* which was widespread in Egypt and Southwest Asia by c. 1,500 BCE and allowed buckets of water to be raised above the level of canals and fed onto the fields. By the Classical era, cattle-driven water wheels (*saqia*) made lifting water more efficient and increased the extent of arable lands in river valleys. In regions that relied on rainfall for cultivation, deep wells to tap into groundwater, and surface reservoirs (tanks), were developed to store water. In some of the driest margins of cultivation around the Iranian plateau, in Central Asia, Arabia, and the Sahara, systems of underground tunnels or galleries (*qanats*, *karez*, *foggara*) began to be built several thousand years ago to collect subsurface water from piedmont slopes and direct it out to fields and palm groves in the adjacent plains (see, e.g., English 1968; Magee 2005).

Many other types of agricultural landscape, not referred to here, were developed in premodern times as an increasing proportion of the inhabited earth's surface was transformed by agriculture and as the human population became progressively more dependent through the Holocene, for its food and other needs, on a growing number of domesticated plant and animal species.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany

▶ Domestication Syndrome in Plants
▶ Domestication: Definition and Overview
▶ Landscape Domestication and Archaeology
▶ Vegeculture: General Principles
▶ Yams: Origins and Development

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Agroforestry: Environmental Archaeological Approaches

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Introduction

Agroforestry, the deliberate incorporation of trees in farming systems, is a very widespread practice with many variants, some of them presumably ancient. Archaeological investigation of these systems requires multidisciplinary research across disparate temporal and spatial scales, combining archaeobotanical, paleoecological, and ethnobotanical studies and focusing on agroecosystems rather than their individual constituents. The recent increase in such studies is part of a growing awareness of the intricacies of past human impacts on environments and of the diverse and complex histories of farming. Recognition of the biodiversity and variability of management practices in traditional agricultural systems has begun to stimulate revised models of the trajectories of peopled landscapes. New research questions in archaeology are supported by an expanding array of analytical techniques which draw on a wide range of sciences including molecular biology, genetics, chemistry, geophysics, information technology, and ecology.

The characteristics of trees, especially their slow maturation and long life, contrast with those of the annual and short-lived crops most often emphasized in archaeological studies of the origins and development of agriculture. Understanding the incorporation of trees in agroecosystems requires research at scales encompassing whole landscapes and long sequences of environmental change at fine resolution. Revised models of the effects of human manipulations of plant communities are developing as archaeobotanical, paleoecological, and associated research gradually expands the information base.

Definition

The Oxford English Dictionary lists "agroforestry (n.) as agriculture in which there is integrated management of trees or shrubs along with conventional crops or livestock" (http://www.oed.com/view/Entry/4197 [accessed June 26, 2012]) and cites the following earliest usage from Bene et al. (1977: 41): "One of the objectives of *agroforestry is to 'domesticate' and upgrade shifting agriculture to maximize sustained production on less well-endowed land."

Definitions of agroforestry that state similar objectives, and prescribe remediation of damage caused by unsound agricultural practices, are common in literature on rural development. Usage of the term agroforestry has extended to include many forms of polycultural farming in which trees are incorporated, practiced by

independent small-scale farmers worldwide. In this broader usage, agroforestry may be synonymous with or include arboriculture, forest farming, orchard-gardens, silviculture, and similar terms. Clarke and Thaman (1993) distinguished the first, prescriptive definitions as constituting institutional agroforestry and the second broader usage as traditional or indigenous agroforestry. In the second sense, agroforestry is a useful collective name for land-use systems in which woody perennials are deliberately grown on the same piece of land as agricultural crops and/or animals, either in some form of spatial arrangement or in sequence.

Historical Background

The word agroforestry came into common use with the establishment of the International Council for Research in Agroforestry (ICRAF), following the recommendation of Bene et al. (1977). This was a response to the perception that tropical forests were increasingly threatened by agricultural expansion. Agroforestry research became a topic of major interest among agricultural scientists, at first centered on Africa and restricted to a small range of practices aimed at soil improvement. The term agroforestry has gradually been adopted in other disciplines, especially anthropology and geography, to cover the wider range of traditional polycultural systems which include trees. The literature on agroforestry is now enormous.

Deforestation in the tropics was one among a number of environmental concerns that in the last decades of the twentieth century prompted wide-ranging research on causes and rates of environmental change. Cultural, ecological, and historical aspects of human agency have been an important part of this research, which has at times fueled political controversy over issues such as indigenous rights and conflicting claims to resource use.

The expansion of archaeological and related research over the last few decades has made clear that human-environmental interactions are complex and variable across time and space. Simplistic developmental trajectories, based on hypothetical sequences of the practices by which human groups have drawn food and other resources from their environments, have been superseded by more complex local and regional sequences. These are based on a wide range of evidence from many disciplines, derived from a profusion of new, analytically sophisticated research techniques and revised research questions.

Recent research on tropical forests has shown that these are mostly not primeval remnants of an ancient, unpeopled world and that human impacts on them are not restricted to relatively recent degradation, nor are they inevitably destructive (Brookfield 2001; Baghwat et al. 2008). There has been an upsurge of interest in traditional small-scale tropical forest farming systems, many of which can be described as agroforestry, drawing together descriptions in older literature with newly identified variants. Ethnobotanical studies have shown that local systems of plant management often articulate elements that lie outside common analytical conceptions of agroecosystems, thus extending the boundaries of human influence on vegetation across space and over time (influential examples are Yen (1974) for Oceania and Alcorn (1981) for Mexico).

Traditional, subsistence-oriented agroforestry systems encompass fixed, rotational, and shifting fields and may include trees for food, fuel, medicine, forage and other uses, as well as for soil improvement and erosion control. While there is a strong association with tropical rainforest, there are tropical savanna and temperate examples as well.

Among the most familiar agroforestry systems (though not usually so-described) is the archetypical palm-fringed tropical South Pacific island. Its traditional components, apart from coconuts, include iconic ornamentals such as hibiscus and gardenia, breadfruit, and other tree crops, along with root and herbaceous food crops. These Pacific farming systems have often been characterized as arboriculture (Yen 1974), emphasizing the tree crop component, which is certainly distinctive but nevertheless an integral part of the larger system (Clarke & Thaman 1993).

Another classic exemplar of an agroforestry system is the Guatemalan orchard-garden minutely described and mapped by Anderson (1952: 137–40). And in northern Luzon, in the Philippines, Conklin's (1980) detailed research over many years on the monumental rice terraces of the Ifugao showed how they are embedded as one component, albeit overwhelmingly picturesque, of an intricately managed and flexible landscape architecture in which "woodlots" are essential. These carefully managed mini-forests provide food, medicine, firewood, and construction materials but most importantly, anchor the water and soil that maintain the terraces (Conklin 1980; Brookfield 2001: 18–20).

The literature describing traditional systems of tree management in the tropical New World expanded rapidly during the 1980s and in Southeast Asia, especially Indonesia, in the 1990s (summarized in Brookfield 2001: 140–56). Regional surveys of modern agroforestry practices often begin with thumbnail accounts of past practices for which high antiquity is asserted (e.g., for China, Hsiung et al. 1995; and Europe, Eichhorn et al. 2006). Although it is commonly accepted that the widespread and varied traditional forms of agroforestry systems have considerable time depth, evidence of this is often weak. In a few areas, the detailed ethnographic and ethnobotanical descriptions of extant traditional agroforestry systems have attracted the attention of archaeologists and provided the impetus for research on the origins and development of these tree-based agroecosystems, using archaeobotanical and paleoecological evidence. Such research contributes to wider debates among archaeologists and others on Pleistocene to Holocene environmental change, human-environmental interactions in general, and trajectories of plant-based human resource use in particular.

Key Issues/Current Debates

Tropical rainforests, under increasing threat from the encroachments of the modern world, have become the focus of increased attention from many disciplines: ecology, climatology, biogeography, and the politics of resource use prominent among them. Rates of change, at all scales and time periods, are a critical and highly contentious issue, as are the nature and timing of human impacts. The recent upsurge of multidisciplinary interest has largely rewritten tropical rainforest ecology and has opened new debates in archaeology and historical ecology.

Most archaeological research on agroforestry and related systems has so far been concentrated in the tropics, especially the New World, where establishing evidence for plant food production is problematic. Tropical agroecosystems are a poor fit for standard theoretical frameworks concerned with agricultural origins, in which the sharp contrasts of foraging/farming and wild/domestic are supported by relatively well-defined domestication syndromes of annual seed crops (Fairbairn 2005). Systems based on these crops do not furnish comprehensive models of the much greater range of practices which produce foods from plants managed in modified environments. Perennial crops, especially those propagated vegetatively, have been largely overlooked in synthetic models linking domestication processes and landscape management (McKey et al. 2012). Because of their long life spans and slow growth, tree crops are an especially difficult category (Kennedy 2012). Recent research has begun to increase the range of plants examined, as new techniques in archaeobotany are more often applied, and comparative collections expanded.

Understanding the development of crop assemblages and agroecosystems has tended to be sidelined by research, especially recent genetic research, on individual crops. Current archaeological research on local and regional trajectories of prehistoric human resource use ranges in scale from the isotopic signatures of dietary histories of single individuals to cultural and environmental transformations over millennia. The complexity of new data requires very specialized technical skills and more sophisticated models than ever. The challenge to develop interdisciplinary collaborations,

based on shared understanding of complex laboratory methods matched with the flexibilities needed for field research, has never been greater.

International Perspectives

Although agroecosystems that might be described as agroforestry exist virtually throughout the cultivated world, archaeological research on these has been concentrated especially in the tropics. In temperate areas of the Old World, where research on the prehistory of agriculture has concentrated especially on the cereals, other crops, including trees, have tended to be considered species by species, if at all. Their integration as part of agroecosystems has been less of an issue than their incidental presence in cultivated landscapes.

Recent archaeological work in the New World has focused directly on agroforestry. In tropical Central America and Amazonia, there is an emerging consensus of widespread modification and more or less intensive management of forest, including successional fallows (reviewed by Brookfield 2001: 141–6). However, debate continues about the origins of particular crops, the directions and rates of spread of these, and the sequence of practices associated with their management.

Landscape-focused, multidisciplinary research on agroforestry and management of water resources around the Mayan site Tikal has recently been renewed (see Further Reading, below). In western Ecuador, in a valley-wide study, Stahl and Pearson (2012) drew together macrobotanical, phytolith, and faunal data from archaeological contexts to infer that pre-Columbian agroforestry was practiced, producing a managed landscape mosaic in which domesticated annuals were combined with perennial tree crops and useful forest taxa. In the Peruvian Andes, Chepstow-Lusty and Winfield et al. (2000) used historical and ethnographic data along with pollen cores and archaeologically provenanced charcoal from fuel wood, to examine Inca management of trees for firewood, construction, and tool making. Their data imply that this management would also have protected water resources.

In the Pacific, the relatively rich ethnohistorical and ethnobotanical records of traditional agroecosystems of the small, remote islands, especially those of Polynesia, form a particularly striking paradigm of landscape transformation under human management. Most of the plant food resources of these islands are human introductions. Archaeobotanical and paleoecological research on these islands is increasingly directed to resolving local sequences that span both prehuman and human phases of environmental change and to disentangling human action from other causes of environmental change. Human agency here includes construction of agricultural features such as terraces and ponded fields and extensive tree planting as well as erosion and deforestation. Athens et al. (1996) considered development of the traditional agroforestry system of Kosrae, a Micronesian high island, using pollen, sedimentological, and macro- and micro-charcoal evidence derived from cultural and noncultural contexts. They argued that this system, in which the trees and other crops are introduced cultigens, was established rapidly after the first colonization and persisted relatively unchanged for nearly two millennia. In contrast, developmental sequences have been proposed for other remote Pacific islands, starting with shifting cultivation which is then gradually transformed by intensification of land use and management of the introduced tree crops.

Further west, on larger islands of the southwest Pacific, the time span of human settlement extends back to the Pleistocene. The extended trajectories of human resource use are enmeshed with the effects of late Pleistocene climate change and include transition from hunter-gatherer to agricultural economies and domestication of local plants as well as extensive landscape modification. On these large islands, cultivated and wild populations of closely related tree species coexist, often without easily defined boundaries between them.

Ethnobotanical and other descriptions provide incomplete coverage of the very diverse agroecosystems, many of which are tree based (Kennedy 2012). Archaeobotany in these islands confronts the pioneering challenges of poorly specified models and inadequate reference collections (Fairbairn 2005). Archaeobotanical and other evidence for sequences of resource use is scarce, especially in the lowland areas of tropical rainforest. In the densely populated intermontane valleys of highland New Guinea, the striking diversity of extant intensive agricultural systems reflects a long and complex prehistory. Haberle (1998) collated chronological data from 16 archaeological and 23 paleoecological sites across the highlands, showing indirect evidence of changes associated with agriculture over the last 2000 years. These include most notably an increase in pollen of *Casuarina*, likely to represent a nitrogen-fixing species (*C. oligodon*) widely planted today for firewood and construction, and recognized as having sacred/aesthetic value and as a soil improver. There are also changes in palynological and sedimentological data indicative of landscape disturbance. Tephra chronology and sequences of archaeological features articulate with the other records to show an overall picture of dramatic and widespread change. Since these changes are not synchronous across the highlands, Haberle (1998) suggests that they reflect human activities, including adoption of new crops and new management practices such as agroforestry, as well as climatically driven environmental change.

In Southeast Asia, the large literature describing extant systems of agroforestry is mentioned above. This record raises questions for archaeobotanical and paleoecological research that are yet to be addressed in any detail. The region suffers from much the same challenges of pioneering research as the large islands of the southwest Pacific to the east (Fairbairn 2005). In some areas, including the islands of Java and Borneo, it is commonly assumed that systems such as fallow management and household orchards are historically recent developments, but evidence for this is lacking (Brookfield 2001: 146–7).

In Africa, the literature on modern agroforestry systems is enormous, and the remedial interventions that this literature documents were first developed there. There is nevertheless recognition in this literature of the existence of traditional forms of agroforestry, though without much evidence for their antiquity. Archaeological studies have begun to remedy this. For example, Neumann et al. (2012) point out the widespread importance in archaeological sites, all over West and Central Africa from the semiarid Sahel to the humid rainforest, of intensively exploited trees, especially those with oil- and fat-containing seeds and fruit, over at least the last 2,500 years. Archaeobotanical and other records elucidating how and when these trees have come to be integrated with other crops are so far very limited. Some of the trees, notably oil palm (*Elaeis guineensis*), are now important crops on the world market. Genetic research to improve this resource is very likely to provide useful insights relevant to its past. As elsewhere, archaeological evidence for the origins and development of African traditional agroforestry systems needs more research oriented to archaeobotanical and paleoecological questions.

Future Directions

Since the role of human agency in environmental change is currently a subject of great interest, the extended time scale contributed by archaeological studies is likely to be increasingly valuable. Archaeological research based on multidisciplinary collaborations enables the investigation of complex linkages between patterns of human resource use and environmental change, encouraging the development of more sophisticated models than before.

Human use of plant resources is undergoing reassessment, as new techniques allow more direct and detailed data bearing on previously difficult questions, such as the constitution of individual diets, rates of genetic change of plants under human management, and fine-grained environmental fluctuations. As a result, existing models of the ecological relationships that

underpin human subsistence are subject to renewed critique (e.g., Zeder 2012).

Insights from the extensive new research on agroforestry and related practices in the New World are likely to be influential and to stimulate similar work in other areas.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Landscape Domestication and Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology

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Aguigah, Angèle Dola

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Aguigah, Angèle Dola, Fig. 1 Mrs. Angèle Aguigah

Basic Biographical Information

Dr. Angèle Dola Akofa Aguigah (Fig. 1) is the first female archaeologist from Togo. She was born 4 December, 1955, in Lomé, Togo, where she grew up. Dr. Aguigah is the first female archaeologist in Togo and one of the only archaeologists in the region to defend two doctoral theses in archaeology. In 2007, Dr. Aguigah was admitted to the rank of Living Human Treasures of Togo.

Dr. Aguigah undertook her higher studies in France, where she obtained at the University of Paris I, Pantheon-Sorbonne, a License in Archaeology and general History of Art (1978–1979), a MA in African Archaeology (1980–1981), a Diploma of Advanced Studies (1981–1982), and a Ph.D. in African Archaeology (1982–1986) (Aguigah 1986). She also obtained a Certificate in Regional Planning and Urbanism from the National Arts Centre of Paris in 1992. In 1991, Dr. Aguigah started work on a second African Archaeology Ph.D. thesis, successfully defended in 1995 at the University of Paris I, Panthéon-Sorbonne, under the supervision of the late Professor Emeritus Jean Devisse (Aguigah 1995).

Dr. Aguigah is a Senior Lecturer at the Universities of Lomé and Kara (Togo) and also teaches art history at the School of African Architecture and Urbanism. She is the Head of the Archaeological Program of Togo and a consultant in cultural heritage. She has given courses in several universities in West Africa, France, and the United States of America. She has directed several archaeological excavations and her research on Notsé, Tado, Dapaong, Nook (Togo), and Bè sites is the subject of an exhibition at the National Museum of Lomé (Togo).

She has participated in several international conferences and scientific events and is a member of several associations and networks, including the UNESCO-Network Forum at the World Heritage Centre of UNESCO, the Council of African Museums, and the Board of Directors of the West Africa Museums Program. Dr. Aguigah's administrative duties include being Secretary-General of the Association of Heritage Friends, Lomé; Vice-President of Togolese ICOM (International Council of Museums), Lomé; President and

member of the Togolese ICOMOS (International Council on Monuments and Sites), Lomé: and in 1999–2001 President of West African Archaeological Association (WAAA). She is still the current president of this Association (2013–2015). She is also President of the Network of African Women Ministers and Parliamentarians section of Togo.

Dr. Aguigah has received many decorations and awards during her career. Notable among these are the Order of Merit from the University of Lomé (1999); Knight of the French Order of Academic Palms (2002); Officer of the Order of Mono, Togo (2002); Award of Excellence at the University of Lomé (2005); and a Distinguished Personality of the African Jubilee of Independence of Togo (2010).

Major Accomplishments

Dr. Aguigah's fieldwork across the Togolese territory has contributed to knowledge of the rich archaeological heritage of the country and to the protection and management of this heritage. One of her major accomplishments is rehabilitation of the archaeological sites of Notsé, Bassar, and Tcharè (Togo). As a consultant to UNESCO, she undertook an inventory of the intangible cultural heritage in Togo in 2008. She is currently coordinator of the ongoing study of the caves sites of Nook and Mamproug for their registration on World Heritage list of UNESCO.

Dr. Aguigah has occupied high positions in her country. She was Minister Delegate to the Prime Minister's Office in charge of Private Sector of Togo (2000–2003) and Minister of Culture of Togo (2003–2005). This last function enabled her to put her competences as an archaeologist to the service of her country. The concrete actions that she undertook included the presentation of the "Cultural Landscape of Koutammakou" and its registration in the World Heritage list of UNESCO, the first cultural landscape registered in Togo; realization of the first edition of "Heritage Month" in the Togo official launch of the site of Koutammakou; revaluation of endangered culinary heritage through the presentation of dishes in the maritime region, Aného; carrying out a study on the development of cultural industries and identifying opportunities for economic growth in Togo; creation of Regional Directions of Culture in the context of decentralization of culture in Togo; facilitation of an exhibition "Museum and Heritage Woman" at the artisanal center of Lomé for International Women's Day; meeting with tour operators and travel agencies on the socioeconomic management of heritage sites; and coordination of the cultural policy of Togo on an international level in the context of globalization, cultural diversity, and intercultural dialogue.

Dr. Aguigah has contributed to the training of several generations of archaeologists in West Africa. In addition, she has participated in important archaeological fieldwork particularly the excavations of the Loropéni ruins southwest of Burkina Faso, required for the registration of this site on the UNESCO World Heritage list in 2009.

Cross-References

- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ World Heritage List: Criteria, Inscription, and Representation

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'Ain Difla Rockshelter

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Introduction

'Ain Difla (WHS 634) was discovered by Burton MacDonald's Wadi Hasa Survey in 1982 and was partially excavated by Geoffrey Clark in 1984, 1992, and 1993; by Clark and Gary Rollefson in 1986; and by Zeljko Rezek in 2010 and 2011 (Fig. 1). Located at c. 780 m above sea level in the Wadi Ali, a southern tributary of the Wadi Hasa in west-central Jordan, the site consists of a small wedge of sediment preserved under the overhang of a large rockshelter, the contents of which have mostly been emptied by fluctuations in the course of the wadi, now located some 12 m below it. Intact deposits cover about 35 m^2 and extend to a depth of c. 6–7 m in the talus slope in front of the rockshelter (Fig. 2). Preservation within the rockshelter is a function of its location, nestled within a recessed cavity that protected it from lateral erosion and slope retreat.

Definition

Field profiles record approximately 30 thin, moderately sloping (7–15°) to subhorizontal layers or lenses in Tests A and B, which reached a depth of 2.1 m below datum. Excavation proceeded by 10 cm arbitrary levels (spits) because the natural stratigraphy of the extremely dry sediments was very hard to follow clearly. Three primary sediment "packages" comprise (1) surface debris, roof spall, deflated silts, and pockets of calcreted organic residues (0.0–0.6 m); (2) organic silts and oxidized sands associated with weathering and water-laid (possibly seasonal) sedimentation (0.6–1.4 m); and (3) more consolidated flowstones and breccias interstratified with organic lenses that accumulated episodically and were subsequently calcified (>1.4 m).

A geological section, Test C, was excavated to a depth of 7 m below datum to determine the relationship of the rockshelter fill to the high (12–30 m) and middle (3–7 m) terraces of the wadi. It showed that, although scattered artifacts occurred in fragments of both terraces, relatively intact cultural deposits backed up against the shelter wall were confined to the talus slope fronting the site. Six primary depositional units were recognized, variously subdivided. The lowest part of the sequence rests on what appears to be a fragment of the middle terrace and consists of alluvial sands and silts, gravel stringers, and local slope wash (units 6–4A). Unit 3B records an episode of brecciation, and the upper part of the sequence consists of slope collapse, scree, mixed colluvium, rubble, and roof spall (units 1–3A).

Northwest of the rockshelter, three massive blocks of tufa (calcium carbonate precipitates) cover the mid-slopes of the Wadi Wanid, a tributary of the Ali. The base of the highest of these lies at approximately the same elevation as the upper third of the occupation levels in the rockshelter and is thought to be roughly

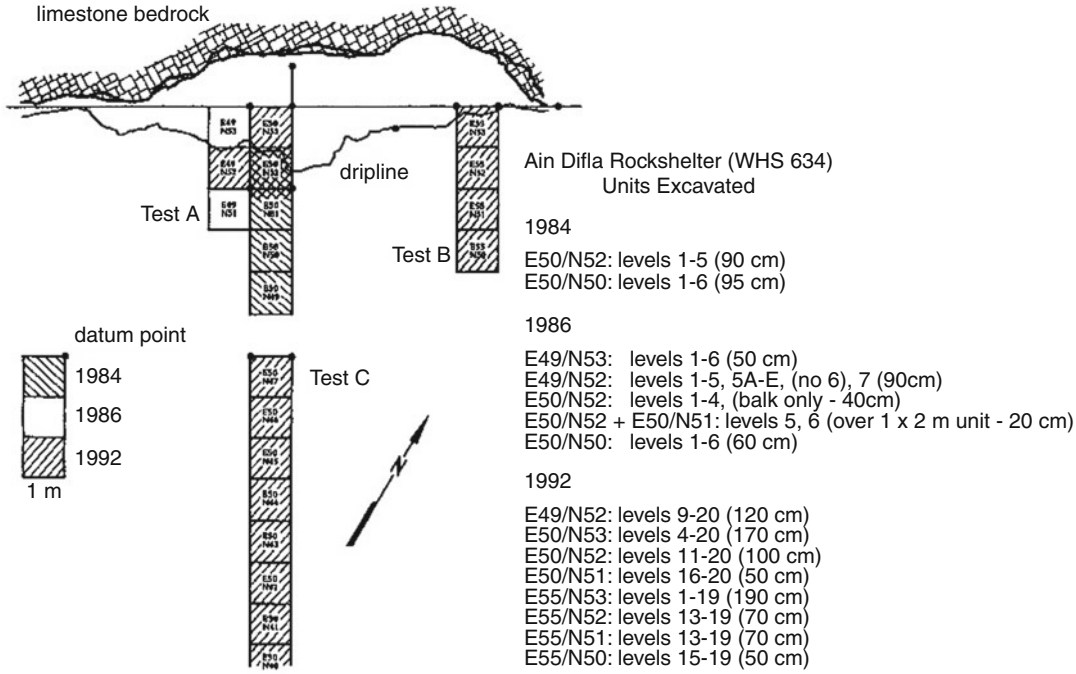

'Ain Difla Rockshelter, Fig. 1 A plan view of the 'Ain Difla rockshelter (WHS 634): units excavated during the 1984, 1986, and 1992 field seasons in Tests A, B, and C (After Clark et al. 1997: 80)

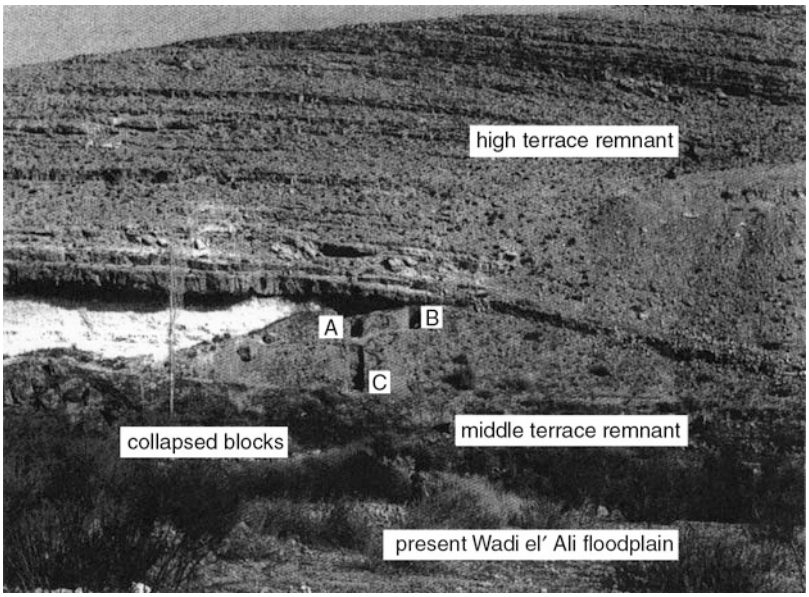

'Ain Difla Rockshelter, Fig. 2 View of 'Ain Difla from the south bank of the Wadi Ali showing the locations of Tests A–C, the high (12–30 m) and middle (3–7 m) terraces, and the present wadi floodplain (foreground). A linear pile of boulders from a major collapse of the shelter overhang can be seen to the left. The position of these rocks indicates that the shelter overhang extended at one time at least 10 m beyond its present location (After Clark et al. 1997: 78)

contemporaneous with it. Dated to 141 ± 20 ka BP, it represents an ancient spring that could have recharged the aquifer that fed the active wadi systems during the Upper Pleistocene prior to the cut and fill sequences registered in the middle and low (0.5–1.5 m) terraces (Fig. 4).

'Ain Difla is a Middle Paleolithic (Mousterian) site dated by 10 thermoluminescence (TL),

thorium/uranium (Th^{230}/U^{234}), and electron spin resonance (ESR) determinations to 180–90 ka BP. The site was assigned to the Middle Paleolithic based on the absence of any later materials in the initial surface collection (1982) and the presence of elongated Levallois points. The excavations produced an assemblage of 19,132 stone artifacts, one of the largest from the region. Statistical descriptions of the lithic assemblage using standard Bordesian indices and ratios, a use-wear study of a sample of the Levallois points, the stratigraphy, sedimentology, landscape geomorphology, paleontology, and palynology, have been published (Lindly & Clark 1987, 2000; Clark et al. 1987a, b, 1997; Schuldenrein & Clark 1994, 2001, 2003; Mustafa & Clark 2007).

Although samples were taken from the entire sequence, pollen was recovered only from Levels 1 and 3. These layers are dominated by non-arboreal taxa indicating steppe vegetation (Chenopodiaceae, Tubuliflorae, Artemisia, Gramineae, Cruciferae), suggesting that the last phase of occupation took place during a cool, dry interval, perhaps MIS 6 (186–127 ka BP): or the early part of MIS 5 (121–27 ka BP). A TL determination from Level 5 (105 ± 10 ka BP) dates the latest possible occupation at 'Ain Difla because the pocket of sediment that constitutes the site extended up to within about 50 cm of the shelter overhang.

Faunal analyses are also consistent with a cool, dry, steppe environment. The sparse assemblage is largely confined to teeth and is dominated by equids (wild ass, horse, or possibly, zebra – *Equus hemionus*/*asinus*; *Equus* sp. indet.) and caprids (goat or ibex – *Capra* spp.) but gazelle (*Gazella* sp. indet.) are also present. Grassland grazers, gazelle and equids (three species) are indicators of steppe or steppe/desert conditions, consistent with the dry conditions indicated by the pollen.

Technological, typological, and metrical analyses of the 'Ain Difla lithics are consistent with previous studies that align 'Ain Difla with the Tabūn D-type Levantine Mousterian. First defined by Dorothy Garrod at Mugharet et-Tabūn, a cave on Mt. Carmel, Tabūn D-type assemblages are typically made on laminar blanks (blades, elongated points) derived from Levallois and non-Levallois unipolar convergent and bipolar cores (Fig. 3). Based on core reconstructions, Meignen (1994) notes a change in the volumetric concept of reduction that differs little from that of Upper Paleolithic blade industries. Tabūn D assemblages often contain a higher frequency of retouched pieces when compared with those assigned to Tabūn C and B. Bifaces are usually absent, and those reported by Garrod at Tabūn layer D could have resulted from mixture with uppermost Layer E, assigned to the Acheulo-Yabrudian (Bar-Yosef 1998). Tabūn D-type assemblages are reported from Tor Abu Sif and Sahba, in the Judean Desert; at Rosh Ein Mor and Nahal Aqev 3, in the central Negev highlands; in the Galilee at Hayonim lower layer E; at Jerf Ajla and Douara Cave

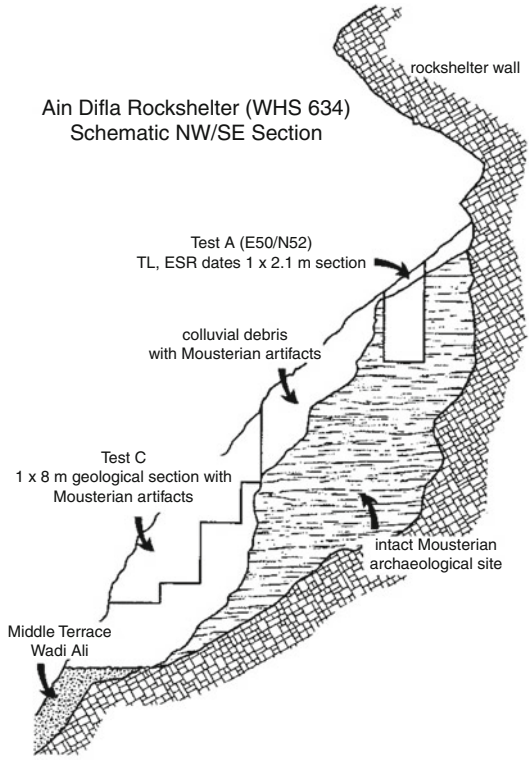

'Ain Difla Rockshelter, Fig. 3 A schematic NW/SE section through the 'Ain Difla rockshelter showing gross stratigraphy in relation to bedrock and to what is probably the middle terrace of the Wadi Ali – not drawn to scale (After Clark et al. 1997: 79)

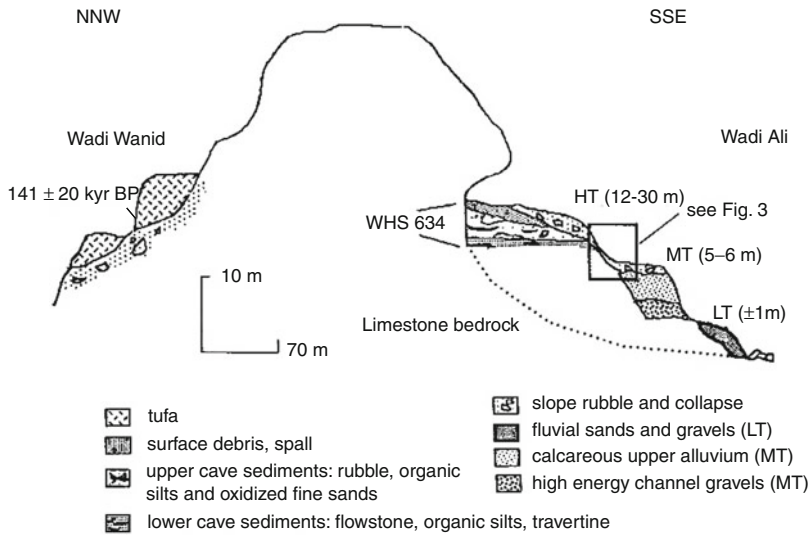

'Ain Difla Rockshelter, Fig. 4 A schematic NNW/SSE section through the cuesta ridge separating the drainages of the Wadi Ali and the Wadi Wanid – vertical scale exaggerated (After Clark et al. 1997: 80)

layer IV, in the Palmyra Basin; the Hummalian sites at El Kowm, in Syria; and at the 'Ain Difla rockshelter, in west-central Jordan. TL and ESR dates from Tabūn and 'Ain Difla indicate temporal spans of 270–170 ka BP (Mercier et al. 1995) and 184–90 ka BP (Clark et al. 1997) respectively, suggesting that human use of the site falls in the latter half of the Levantine type D Mousterian chronology. No human fossils have so far been recovered from any D-type site, so the authors of this Mousterian facies remain unknown. Neanderthals have been found in association with Type B industries at Kebara and Amud and with Type C industries at Tabūn, whereas early modern humans are associated with Type C industries at Qafzeh and Skhūl. Although dated sites are few, there is general agreement that the D-type industries mostly predate the last interglacial (MIS 5, 127–71 ka).

Although Middle Paleolithic sites are fairly common and well-published west of the Jordan Rift (see, e.g., Bar-Yosef 1998), stratified Middle Paleolithic sites in Jordan are confined to 'Ain Difla, and to Tor Sabiha, and Tor Faraj rockshelters in the Wadi Hisma below the Ras en'Naqb escarpment in southern Jordan (Henry 1995, 2003), and the open-air sites of Ar Rasfa on the eastern edge of the Jordan Rift in the northwest part of the country (Ahmad & Shea 2009) and WHS 621, at the eastern end of the Wadi Hasa (Clark et al. 1987).

Except for a very low incidence of retouched pieces (1.1 %), 'Ain Difla is in good agreement with descriptions of the Levantine Type D Mousterian. Typological and technological comparisons with other Levantine Mousterian sites suggest that the evolution of the blade-rich Mousterian can be viewed as a continuum between the early (Tabūn) and late (Boker Tachtit) Mousterian, that (on any index) 'Ain Difla falls somewhere around the middle of that continuum, and that after about 47 ka BP, Mousterian laminar technologies develop more or less continually into the early Upper Paleolithic Ahmarian. It might also be the case that blade-dominated industries long predate the Mousterian itself, extending far back into the Lower Paleolithic (Monigal 2001).

Key Issues

'Ain Difla derives its importance from several aspects of modern human origin (MHO) research in the Levant and from an ongoing debate about the compositional integrity and behavioral implications of the basic analytical units used there, the Mousterian facies defined by Garrod at Tabūn.

MHO research in the Levant is guided by two conceptual frameworks that, in their extreme forms, are almost diametrically opposed to one

another: (1) the multiregional continuity (MRC) model (e.g., Wolpoff et al. 2000) and (2) the recent African origin (RAO) or replacement model (e.g., Stringer 2007). MRC advocates emphasize strong evidence for continuity in adaptation based on fossils and on archaeology and supported by studies of symbolic and mortuary behavior. MRC holds that archaic *Homo sapiens* evolved independently into anatomically modern humans in the Levant and elsewhere, that gene flow through interactions between neighboring groups was sufficient to maintain species integrity over large areas, and that differences between archaic and modern *H. sapiens* are subspecific or populational, rather than specific. RAO emphasizes the results of genetic analyses of human mitochondrial DNA and "spread-and-replace" scenarios drawn from certain construals of pattern in the archaeological record. RAO maintains that anatomical moderns arose as a speciation event in an isolated region of east Africa and that they migrated, radiated, or dispersed from Africa throughout Eurasia after c. 100 ka, eventually replacing all other archaic hominins over the range originally colonized by *Homo erectus*.

'Ain Difla is important in MHO research because evidence from the site supports Jelinek's arguments for local continuity in cultural development at Tabūn (e.g., Jelinek 1981). At neither site are there any indications of obviously intrusive elements, as would be expected under the RAO models proposed by Stringer (e.g., 2007) and others. The core tenet of the RAO model is that if anatomically modern African immigrants were moving into the Levant and replacing indigenous archaic populations there, that process should be evident in the appearance of a distinctive cultural repertoire, with an archaeological "signature" that differs from that of the indigenes and that it should be discernible in differences in adaptation between archaic and modern populations. While changes in technological continuity are not necessarily related to changes in human morphology, continuity in adaptation as monitored by the archaeology tips the balance in favor of multiregional continuity as the hypothesis best supported by the available evidence (Mustafa & Clark 2007).

The 'Ain Difla research is also noteworthy in an epistemological sense because work there has had important implications for pattern in the Levantine Mousterian and what it might mean in terms of human behavior. The large collection from the site has been compared to those from 19 other Levantine sites classified by reference to the 3-facies sequence at Tabūn (Culley et al. in press). Keeping in mind that 'Ain Difla is only a small part of a much larger site, now destroyed, the work showed that human occupations were ephemeral and episodic, of short duration, by small numbers of people and that there was little evidence for prolonged use of the locality. A dozen small circular or oval hearths attest to visits by perhaps three to six individuals, a pattern most consistent with an overnight hunting camp by a small party dispatched for some particular purpose from a larger residential base located elsewhere. There is little evidence for core preparation, primary and secondary reduction, and almost no retouched pieces, indicating the provisioning of mobile individuals with a limited number of tools they could carry with them, rather than the full repertoire of lithic processing activities expected at a long-term residential base.

Work at 'Ain Difla is ongoing, with current efforts directed toward refining the radiometric chronology of the upper sequence using optically stimulated luminescence (OSL) dating of sediments from Levels 1–5.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic

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Aitken, Martin

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Basic Biographical Information

Following a B.A. in physics and a D.Phil. in high energy physics at the University of Oxford, Martin Aitken (1922–) was appointed in 1957 as the Deputy Director of the Oxford Research Laboratory for Archaeology and the History of Art which had been established two years earlier through the combined efforts of Lord Cherwell and Professor Christopher Hawkes under the directorship of Edward (Teddy) Hall. Martin Aitken then continued to work at the Oxford Research Laboratory until his retirement in 1989.

Major Accomplishments

In the early days, his two main research interests were magnetic dating and magnetic prospection,

of which the former remained an ongoing interest throughout his career. Initially, magnetic dating involved the measurement of the past direction of the Earth's magnetic field using large samples extracted from in situ kilns and hearths, but later, the method was extended to the measurement of the past intensity of the magnetic field, an approach that did not require in situ samples but could be applied to pottery sherds. Although as a dating method, the technique never realized its initial expectations; the results have helped toward our understanding of the origin of the Earth's magnetic field and are thus an example of the contribution of archaeology to science rather than vice versa.

In 1958, he undertook the first successful magnetic survey on an archaeological site using a proton magnetometer which had been developed and built in the Oxford Research Laboratory. Originally developed to locate kilns for magnetic dating, it was immediately found that the proton magnetometer could also be used to detect filled-in pits and ditches, as well as stone walls surrounded by topsoil. Thus, the very considerable potential of magnetic prospection for the investigation of archaeological sites prior to excavation was established, and as a result, magnetic prospection, using various types of magnetometer, is now extensively used on archaeological sites throughout the world.

One consequence of his involvement in magnetic prospection was the emergence of the International Symposium on Archaeometry. In 1962, he organized a course for archaeologists who had purchased proton gradiometers from the Oxford Research Laboratory. During subsequent years, regular reunions of these gradiometer users were held in Oxford, and gradually the scope of these reunions expanded to include other aspects of archaeometry until eventually they evolved into the annual (now biennial) International Symposium for Archaeometry, of which the 39th symposium was held in 2012. From their inception, he was Chairman of the Standing Committee responsible for their organization, subsequently, from 1990 to 2008, taking on the role of President.

In 1960, he initiated the first detailed research into the use of thermoluminescence (TL) phenomena for the dating of archaeological ceramics. Subsequently, luminescence dating was his primary research interest through until his retirement and beyond. Thus, he was actively involved in all the wide-ranging developments that occurred from its beginnings as a method for dating and authenticating ceramics, through TL dating of burnt flint and calcite deposits in caves, to the development of optically stimulated luminescence (OSL) dating of sediments. Again, the first Specialist Seminar on Thermoluminescence Dating that he organized in Oxford in 1978 evolved into the current triennial International Conference on Luminescence and Electron Spin Resonance Dating, of which the 13th conference was held in 2011. As a result, he established the Oxford Research Laboratory as an internationally recognized center of excellence for luminescence dating.

In addition to more than 150 scientific papers, he published the first comprehensive textbook on archaeometry, entitled *Physics and Archaeology* (1961, Interscience Publishers, London). Subsequently, as well as a second edition of *Physics and Archaeology* (1984, Clarendon Press, Oxford), he published books entitled *Thermoluminescence Dating* (1985, Academic Press, London), *Science-Based Dating in Archaeology* (1990, Longman, London), and *An Introduction to Optical Dating* (1998, Oxford University Press, Oxford). In addition, until 1989, together with Professor Edward Hall, he edited the journal *Archaeometry* from its humble beginnings as the Bulletin of the Oxford Research Laboratory through to its current status as one of the primary international journals for the subject. He has further contributed to the development of archaeometry through his supervision of a succession of research students, several of whom have continued to work in the field and become authorities in their own right.

Recognition of his contribution to the subject both nationally and internationally came: first, in 1983, with his election as a Fellow of the Royal Society and second, in 1985, when he was given an ad hominem Chair in Archaeometry by the University of Oxford.

Thus, throughout his career, Martin Aitken has been at the forefront of research in archaeometry and has played a major role in ensuring the subject's national and international recognition within both the archaeological and scientific communities. Therefore, he can be truly seen as one of the "fathers" of archaeometry, even though, having confined his research to scientific dating and prospection methods, he has always regarded himself as being primarily a physicist rather than an archaeological scientist.

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- ▶ Research Laboratory for Archaeology and the History of Art (University of Oxford)

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Akrawi, Aysar

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Basic Biographical Information

Aysar Akrawi's educational background is in history and political science, and she has undergone extensive training in senior management. Previous positions have included setting up and managing The Queen Noor College for Civil Aviation and introducing and implementing entrepreneurial projects for women in rural areas of Jordan.

Major Accomplishments

Aysar Akrawi has occupied the position of executive director of the Petra National Trust (PNT) since 1994. In this capacity, her responsibilities are diverse. As it is the aim of the Trust to advocate for the preservation of the cultural and natural heritage as well as the integration of the local communities in the decision-making process of the PAP and the Petra region, she is responsible for the planning, implementation, and supervision of the Trust's projects; the local and international publications; and coordination with governments, other NGO's, international donors, and international preservation organizations and societies. Finally, she is also responsible for the correlation with the media, educational systems, and action groups with the purpose of increasing public awareness of the World Heritage Site of Petra.

One of PNT's major roles throughout Aysar Akrawi's tenure has been advocacy for protection of Petra and its associated Outstanding Universal Values.

PNT has called for maintaining a rational balance between the dictates of the site's fragile environment and the role of tourism in the region's economy. Community involvement in the development and protection of this important heritage remains a high priority for PNT.

A major mechanism for this inclusion is the Petra Junior Ranger Programme, in which youth from the communities surrounding Petra learn about the site and its significance to their heritage. This project raises awareness among future decision makers, arming them with important knowledge and skills. Additionally, PNT has implemented conservation projects with local, national, and international partners that save both monuments and lives. The PNT furthermore pivotally serves as the institutional memory of developments in the state of management and conservation of Petra.

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- ▶ Petra, Archaeology of
- ▶ Petra National Trust and the Challenge of Site Management at Petra
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Aksum: Environmental Archaeology

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Introduction

Rising above the Sudanese lowlands to the north and the Red Sea coastal plains to the east, the highlands of northern Ethiopia and Eritrea have long been recognized as a center of plant domestication and host of some of the earliest complex societies of sub-Saharan Africa. The intensification of contacts with southern Arabia in the first millennium BCE favored the development of complex societies and, later, the emergence of the Kingdom of Aksum (BCE 50–CE 800). Aksum is located on a gentle plain at the heart of the Tigray highlands (Fig. 1) which provided excellent ground for the new kingdom to thrive for almost a 1,000 years by engaging in long-distance trade and commerce, developing literacy and coinage. The adoption of Christianity in the mid-fourth century CE furthered Aksum's importance within and beyond northeast Africa. This historical significance has fostered intensive archaeological research in the region, but the history of its diverse environment has received little scholarly attention until recently. Today, Aksum (UNESCO World Heritage Site, 1981) is one of the most important archaeological sites of Africa and remains the leading religious center for the Ethiopian Orthodox Church. As environmental archaeology in Ethiopia and Eritrea grows, the historical contexts of landscape change are becoming increasingly prominent in current debates about land degradation and sustainable resource uses.

This review begins by outlining the environmental aspects that have been explored by archaeological research at Aksum. The historical background traces the emergence of archaeological research through three main phases: the "discovery" (1900s–1940s), the "consolidation" (1970s–1980s), and the "diversification" of the last two decades. A third section explores the emerging critique of environmental history models in the light of new research findings and changing perspectives. The review ends with a remark on the emphasis on the role of environmental archaeology (and history) to current debates on heritage management, land degradation, and sustainable resource use.

Definition

Environmental archaeology in the northern highlands of Ethiopia has focused on three main

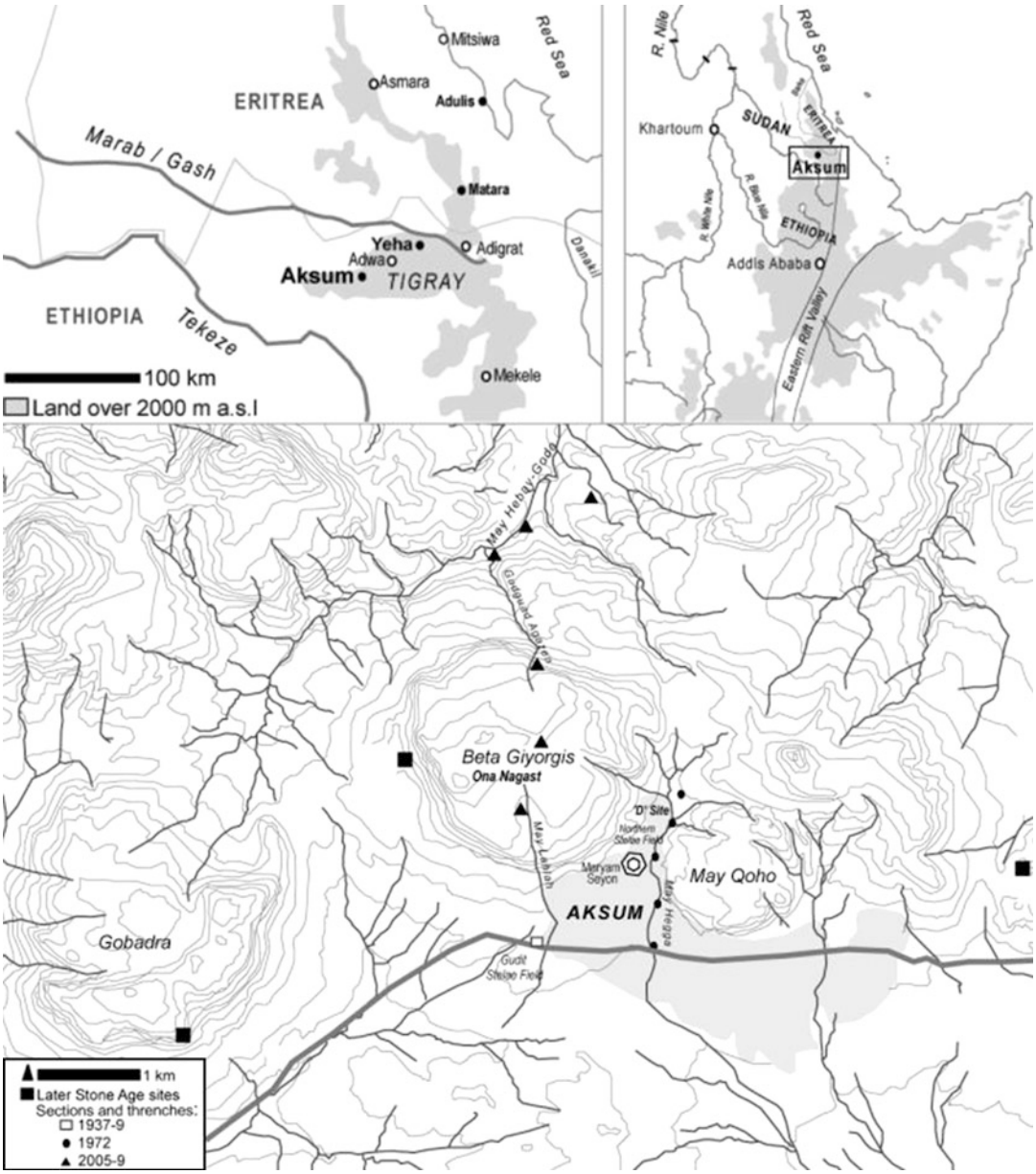

Aksum: Environmental Archaeology, Fig. 1 Map of Aksum: (*top row*) regional map and the location of Tigray; (*bottom row*) the Aksum area (contours are at 20 m interval)

topics: (1) the development of settlement and its impact on the landscape, (2) the availability and management of environmental resources, and (3) the legacy of past land uses into present-day landscapes and societies. The emphasis on these topics is much the result of advances in archaeological methods and the sociopolitical transformations that have shaped modern Ethiopia. Intensive archaeological survey and reconnaissance records have provided data for reconstructing the settlement history of the Aksum plain. However, while the research focus on the development of the kingdom has produced well-defined settlement trajectories for the first

millennium CE, the records for the periods before the emergence of Aksum and following its decline are patchy, and there are important gaps. For example, excavations at rockshelter sites have elucidated aspects of the later prehistoric occupation (c. ninth/eight millennia BCE) in the hills surrounding the Aksum plain (Phillipson 2000), but the landscape that hosted these early groups is poorly understood. In fact, no solid environmental record is available from Aksum for this period, though regional and continental datasets of past climate are available. The regional record of significant climate amelioration at the beginning of the Holocene (c. 10,000 BCE) has been linked to the peopling of the area (though sporadic occurrences of Early Stone Age and Middle Stone Age material point to much earlier frequentation). Substantial environmental records are available only for the Aksumite periods, broadly encompassing the rise of social complexity and the demise of the kingdom (c. 700 BCE–CE 800). Studies of plant and animal remains, and geoarchaeological investigations have contributed to illuminating aspects of the subsistence base of the kingdom and its impact on the landscape. Archaeobotanical and zooarchaeological studies have concentrated on settlement sites and funerary contexts, and geoarchaeological data come mainly from landscape sequences and buried soils (or paleosols). Regional climatic records provide further sources of information, but the physical diversity of the northern Ethiopian-Eritrean highlands together with patchy archaeological records makes it difficult to build solid correlations (see below). The cultural and environmental history following the decline of the Aksumite kingdom (c. 800 CE onwards) is poorly understood, but there is now indication that Aksum's countryside was not abandoned (Fattovich 2008). In addition, buried soil records, palaeobotanical data, and historical sources provide supporting evidence for prolonged settlement and arable land use throughout the second millennium CE.

Over the last decade or so, the implications of environmental reconstructions beyond archaeological research have begun to emerge. Geomorphological and land evaluation studies have often linked past land uses to present environmental degradation (e.g., Nyssen et al. 2004). The links between intensifying agriculture and the decline of the Aksumite kingdom feed into discussions about traditional land uses and their contribution to present environmental conditions. This highly debated topic is unlikely to find consensus until a far more coherent and richer body of data is available. In fact, while Aksum is arguably the place where most archaeological research has taken place, environmental and land evaluation studies have targeted other areas of the Ethiopian-Eritrean highlands and beyond. Thus, correlations between local archaeological evidence and regional environmental proxies rely on questionable geographical, cultural, and temporal uniformities.

Historical Background

Discovery (1900s–1940s)

Archaeological investigation at Aksum begun in the early 1900s with the Deutsche Aksum-Expedition (hereinafter DAE) led by Enno Littmann. The German team comprehensively recorded ancient monuments at Aksum and other sites of Tigray and Eritrea. The detailed analysis of ancient architecture, inscriptions, and material culture was published in four volumes (Littmann et al. 1913) and laid the foundations of Aksumite archaeology. Although this team was not particularly concerned with environmental aspects, the expedition's photographic archive includes several panoramic views of Aksum's landscape in 1906 and, thus, before the occurrence of main reforestation programs, infrastructure building, and urban development, which later transformed significant parts of the Ethiopian highlands. This is a remarkable source of information that remains largely untapped. The DAE publication offered the first detailed description of the local archaeology, which Carlo Conti Rossini (1928) discussed within a coherent historical context and linked to textual and oral sources. This includes, for example, reference to oral traditions linking the "fall" of Aksum to the destruction caused by the external

Aksum: Environmental Archaeology, Fig. 2 View of Aksum's landscape, November 2007: taken from Beta Giyorgis hillside, near "D site," and looking northward (Photo: F. Sulas)

invasions, droughts, and famines. However old some of these local traditions may be, they are preserved in manuscript texts compiled in much later periods than those to which they refer. That said, these sources offer remarkable information on Aksum's landscape, and some have long been referenced in support of archaeological interpretation (see Fattovich 2008).

In the 1930s and 1940s, systematic excavations at Aksum included the recording of landscape stratigraphy. In 1937, while in Aksum for the relocation of a stele to Rome, Ugo Monneret de Villard (1938) conducted a topographic study of the area and investigated the stratigraphic sequence of the plain. He identified two main phases of sediment depositions next to the Cathedral Maryam Seyon (Fig. 2): the earliest phase would have preceded the rise of Aksum, and, in particular, it would have occurred before the erection of the monoliths at the Northern Stele Park; a second phase would have taken place after the decline of the kingdom. Shortly afterward, further sedimentary data were collected by Salvatore Puglisi (1941), who led the *Missione Archeologica Italiana* at Aksum and sought to expand research beyond the then known archaeological area by surveying other sectors of the plain. Puglisi excavated a main residential building and conducted test excavations to the west and northeast of the old town where he recorded a stratigraphic sequence of cultural layers interspersed by alluvial deposits (Fig. 2). In the 1950s and 1960s, the newly established Ethiopian Institute of Archaeology (Addis Ababa, 1952) sponsored further systematic research by French scholars who excavated important monumental structures and sites. The results of these studies provided new evidence for outlining the early cultural sequence of Aksum and its surroundings.

Consolidation (1970s–1980s)

The early 1970s saw the beginning of large-scale excavations and surveys at Aksum and its surroundings by British, Italian, and American archaeologists. The new research programs were designed to examine the environmental factors and cultural processes involved in the development of the Aksumite kingdom (e.g., Munro-Hay 1989; Ricci 1990; Michels 2005). However, these were cut short by widespread sociopolitical unrest that culminated in the demise of the Ethiopian monarchy in 1974 and the establishment of the Derg regime (1974–1991). The new political setting halted field research for nearly two decades, but this interruption provided time for elaborating and publishing the results of the research conducted in the early 1970s. In particular, two main works laid the foundations for subsequent modeling of the environmental and settlement history of Aksum. In 1972,

Butzer (1981) had conducted preliminary geoarchaeological investigations in the Aksum plain, which included the application of soil micromorphology. The results were elaborated into an "archaeo-sedimentary" sequence that, for the first time, provided an integrated framework for linking cultural developments and environmental change. Although the chronological frame available in the 1970s has now been revised, Butzer's sequence remains the main reference point for any environmental reconstruction of the Aksum area. The analysis of several sections in the core archaeological area (Fig. 1) led Butzer to conclude that four aggradation phases had occurred at Aksum. The first aggradation phase (c. BCE 150–CE 150) was associated with a period of increased precipitation and the growth of Aksum as a regional political center. The second aggradation phase was linked to the erosion of degraded agricultural lands upslope as a result of heavier rains and settlement and demographic increase (see below). The last two phases of aggradation occurred several centuries after the decline of the Aksumite kingdom.

Shortly after Butzer's work at Aksum, the American team led by Joseph W. Michels conducted a systematic survey of the region comprised between Aksum and Yeha (Fig. 1). During the 6 months of intense fieldwork, the survey documented over 250 ancient sites, and the resulting database not only included archaeological information but also a new classification of settlement types and records of modern land uses (Michels 2005). The results of Michels' work (2005; an interim report was published in 1984) were fundamental in showing the intensity of ancient settlement over a diversified environment and the links between landscape characteristics and land uses.

Diversification (Since the Early 1990s)

Following the establishment of the Federal Democratic Republic of Ethiopia in the early 1990s, the country regained enough political stability for resuming fieldwork. New research programs began investigating the development of farming and livestock holding, the settlement system and subsistence base of the Aksumite kingdom, and the short- and long-term impact of land use practices on the environment. In 1993, two large-scale archaeological projects started at Aksum: David W. Phillipson (2000) led the British Institute in Eastern Africa's research in the plain, and the Italian-American expedition directed by Rodolfo Fattovich and Kathryn A. Bard resumed research on the adjacent hill of Beta Giyorgis (Fattovich et al. 2000). In addition to sharing a multidisciplinary approach, both projects combined large-scale excavations and systematic surveys for over a decade, and, thus, they ensured an unprecedented continuity of research. The British expedition excavated a number of sites to the north and west of the town. The excavations of rockshelter sites, as mentioned, clarified aspects of later prehistoric occupation. Research on later periods included the excavations at Aksumite sites and, significantly, the first rural settlement known as "D site" (domestic). This low-status satellite farming settlement was located to the north of the old town (Figs. 1 and 2) and yielded evidence for two distinct occupations: an early farming-based settlement (c. 700–400 BCE) and, after a significant hiatus, a lower-status occupation in the sixth century CE. Botanical and faunal assemblages revealed a widening of the resource base from the early phase and included the first appearance of African cereals such as tef (Boardman 1999; Phillipson 2000). The records from "D site" and other sites show that Near Eastern and African crops were grown from at least the mid-first millennium BCE and possibly earlier (Bard et al. 2000; D'Andrea 2008). Near Eastern plants (i.e., barley, emmer wheat, flax) were the most common groups and were most likely associated with dry farming. Since the mid-first millennium CE, there is evidence for an increase in food plants, cereals, pulses, oil, and fiber plants (Boardman 1999). With the exception of few species (grape, sorghum, finger millet), there is a remarkable continuity between the later Aksumite times and today (Phillipson 2000: 420). A similar scenario is illustrated by the results of exploratory pollen analyses on archaeological sediments from Beta Giyorgis hill, which point to the presence of an open grassland vegetation cover with tree patches from the mid-first millennium

Aksum: Environmental Archaeology, Fig. 3 Archaeologists at Aksum, May 2006, from the *left*: Charly French, Marco Madella, and Rodolfo Fattovich (Photo: F. Sulas)

BCE (DiBlasi in Bard et al. 2000). While further palynological studies have yet to be undertaken, research on plant resources and vegetation history has gradually diversified. Recent developments include ethnobotanical approaches to reconstruct crop processing and taphonomic processes (D'Andrea 2008) and analyses of phytoliths and charred wood, from buried soils and sediments to acquire information on the vegetation history (French et al. 2009). As for zooarchaeological studies, the faunal assemblages from settlement sites at Beta Giyorgis and Aksum show a predominance of domesticated mammals (cattle, sheep, and goat), suggesting that animals were kept for meat, by-products, and labor (Bard et al. 2000; Phillipson 2000). These first studies showed the potential of zooarchaeology for investigating environmental and resource use aspects of the Aksumite culture. However, no further research in this direction has been conducted and, in the absence of taphonomic studies, the role and use of animal resources is still poorly understood.

The last decade has witnessed the first local archaeologists working at Aksum (Tekle Hagos 2001) and the opening of the first archaeology department in the country (2006) at the newly established Axum University. New research projects were set up to investigate the local landscape history by combining geoarchaeological, palaeobotanical, and remote sensing techniques (Schmid et al. 2008; French et al. 2009). At the same time, Fattovich and his team (Fattovich 2008) resumed intensive and systematic surveying to complete the archaeological map of the greater Aksum area (Fig. 3). Other recent studies also include geo-pedological research on past soil erosion (Ciampalini et al. 2008). As detailed in the following section, these new developments provide the basis for rethinking a series of aspects concerning the theories and methodologies of environmental archaeology in the region.

Key Issues/Current Debates

Recent research advances call now for a reconsideration of a series of long-established ideas about Aksum's past. First, new archaeological findings from Tigray and Eritrea indicate that a mosaic of cultures and subsistence strategies populated the region during the first millennium BCE (Phillipson 2012). This evidence calls for a rethinking of former cultural sequences emphasizing the importance of a single culture (namely, the Pre-Aksumite culture) and farming. While these were part and parcel of Aksum's development as a kingdom, other cultures and ways of life played important roles in the broader region that was later under the control of the Aksumite kingdom. Second, there are substantial temporal

and spatial discrepancies between the archaeological and landscape data at regional and local scale. A wide range of regional data about past environment and climate come from lake deposits and landscape sequences in areas and regions (see, e.g., Nyssen et al. 2004), for which archaeological evidence is very limited, if not absent altogether. On the other side, the remarkably rich cultural record from Aksum has been associated with limited local landscape data until recently; these were almost exclusively based on Butzer's 'archaeo-sedimentary' sequence, linking the rise and demise of Aksumite cultures to increased rainfall, population growth, and intensified land use. Since the mid-1990s, the study of plant and animal remains and, more recently, geoarchaeological research have provided new local data that suggest a more complex scenario. Studies of plant macro- and microfossils (seeds, charred wood, pollen, and phytoliths) indicate the presence of a woody savannah vegetation cover at Aksum before, during, and after the kingdom was in place, and there is no evidence for the occurrence of woodland and, subsequent, land clearance. This is further illustrated in the sedimentary record from the hilltop of Beta Giyorgis, hillsides, and river valleys north of the town (Fig. 1) that indicates prolonged landscape stability associated with permanent settlement and land uses from the mid-fourth millennium BCE until about 1600 CE (French et al. 2009). On hilltops and uplands, buried thick soil horizons were associated with settlement and farming, while buried soil records from hillside deposits may have been linked to pastures. The botanical remains (phytoliths and charred wood) from the buried soils reflect a substantially stable woody savannah vegetation cover with tree patches nearby watercourses and settlements, of which palm trees were a significant component. However, the impact of the climatic fluctuations on the vegetation is still unclear, but the cyclical alternating of wet and dry pulses, possibly including thunderstorms and aridity peaks, is likely to have had some impact on selected landscape niches. The possibility of localized, intense, and climate-driven events, such as natural fires and the partial removal of vegetation by erratic rainfall, requires careful consideration.

Today, Ethiopia is undergoing major landscape transformations due to urban development and agricultural programs, and these changes are having a significant impact on the "traditional" lifestyles of the rural population. Modern Aksum is situated in a buffer position between international borders, a war-prone zone where rain/crop failure and political instability are actual rather than potential threats. A main theme of current research targets precisely the debate about present-day landscape conditions: are they the results of mismanagement since people permanently settled down, started farming, and ultimately transformed Aksum's landscape? Or have both human and natural forces contributed to change? If so, what lesson can be learned from the past? These questions highlight the need for studies designed to understand the interrelated histories of land use and degradation. As outlined above, archaeological research has long focused on the development of settlement and the emergence of social complexity, and only a limited number of studies have addressed the potential effects of agriculture and other land uses on the landscape.

International Perspectives

Since the early 1980s, the decline of the kingdom in the late first millennium CE has been linked to environmental degradation due to population pressure, arable land use intensification, and increased precipitation. This thesis has then been integrated with large-scale survey data on settlement patterns and applied for modeling a cultural history of Aksum, whereby human-induced factors inhibited landscape readjustments to climatic shifts. However, recent work has begun to question a number of assumptions based on earlier research. First, recent large-scale landscape investigations using a variety of archaeological science techniques are now regularly able to elucidate finer details from buried landscapes that indicate intrinsic linkages between human exploitation of landscapes, soil and vegetation change, and long-term climate change. The development of geoarchaeology

has had a fundamental role in placing human activity in changing landscape settings by deciphering long-term trajectories of landscape change and by identifying the effects of human settlement on the sustainability of landscapes under human pressure. In Ethiopia, human activity as a factor of soil formation and development has rarely, if ever, been considered. Instead, an increasing number of studies, particularly pertinent to tropical environments, are showing how important the perception of local people is for addressing soil issues. In addition, recent archaeological survey has also indicated a greater time depth and gradual intensification of settlement development in the northern Aksum area over at least the last four millennia. As such, archaeology has moved beyond simple equations linking state formation, settlement expansion, agricultural intensification, and consequent deforestation, erosion, and soil degradation. Rather than raising new questions, these considerations refocus perspectives and viewpoints for old issues: was intensification of agriculture a result of decreased land productivity, or environmental/climatic worsening or increased population/market demands, or a combination of all of these?

Future Directions

Throughout the twentieth century, the understanding of the relationship between the development of subsistence systems and environmental changes at Aksum was based on a combination of multi-scale and multidisciplinary data. The interpolation of environmental data, which informs our wider research question of human settlement, was drawn from regional scale and context-specific archaeological records. The Aksumite urban development has long been linked to the idea of an agricultural substratum dependent on irrigation and responsible for land clearance. However, it is now clear that woods were not a common feature of the local landscape either before or during the Aksumite period and that agriculture relied on rainfall. Even if some aspects of ancient resource management have been investigated, site-specific studies and informed research are still very few. Furthermore, important issues such as terracing and field systems have yet to be addressed, albeit clearly priorities within the context of a changing landscape. A greater amount of environmental and archaeological records are needed particularly now that relevant comparable datasets are being acquired from elsewhere in Tigray (e.g., Gebru et al. 2009). The retrieval of landscape information is needed to contextualize non-environmental factors affecting societal decision-making over time. A greater amount of archaeological and historical data on the typology/typologies and distribution of rural settlements is necessary to address urban development and, subsequently, the decline of the Aksumite kingdom. The trajectories of settlement and land use diversification need to be addressed within their environmental and ecological contexts. Indeed, the paucity of buried landscape records implies that any attempt at modeling synchronous histories of forest expansion/clearance or the impact of changing rainfall, to mention just two important topics, has to rely on assumptions of environmental and cultural uniformity across vast regions.

Perhaps, the most compelling task currently facing archaeology and cognate disciplines concerns the development of multiple "applied approaches". In this respect, there are a number of opportunities and challenges for archaeological research at Aksum. The applied nature of archaeology has often been confined to the spheres of heritage creation and conservation, and tourism development. However, archaeology has much to offer to integrated, environmental research and can act as a bridge to link theories and methods from the humanities and earth sciences. Past societal responses to environmental stresses and opportunities were chosen from within a range of cultural and ecological constraints, and the understanding of these responses informs contemporary responses to present and future environmental risks.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Macrobotany

- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Butzer, Karl W.
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Oral Sources and Oral History
- ▶ Phytolith Studies in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Taphonomy: Definition
- ▶ Zooarchaeology

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Basic Biographical Information

Ekrem Akurgal was born on the family farm in the village of Haifa, near Tulkarem, Palestine, in 1911. At the age of two, his family returned to Turkey and he started his education at home. He graduated from Istanbul Males High School in 1932. As a requirement of the period of which the Turkish Republic was recently established, and due to new cultural and historical policies, he was sent to Germany as a scholarship student in 1932 and studied classical archaeology under Gerhart Rodenwaldt until 1940. In 1941 he was promoted to associate professor in Ankara University's Faculty of Languages, History and Geography and in 1949 became professor and professor emeritus in 1957. Akurgal served as the dean of the faculty from 1958 to 1959.

Major Accomplishments

Akurgal founded an archaeology library in the faculty that contains nearly 6,000 books which are mostly published in foreign languages. This provides students and scholars with convenient access to an important reference resource. Akurgal excavated and revealed ancient sites such as Foça (Phokaia), Çandarlı (Pitane), and Çeşme - Ildırı (Erythrai) veBayraklı (old Smyrna). He has written numerous publications on ancient Greek, Hittite – Hatti, and ancient Anatolian civilizations in various languages. He was a member of seven academies in Europe and also an honorary member of many scientific institutions: the University of Bordeaux (1961), the University of Athens (1988), the University of Lecce (1990), and the Anatolian University (1990) where he was awarded the title of honorary doctor.

Ekrem Akurgal received the Order of Merit of the Federal Republic of Germany (1979), Goethe Medal (1979), Republic of Turkey Ministry of Culture Great Award (1981), Italian Commendatore Order (1987), and French Légion d'Honneur Officier (1990). He died in İzmir in 2002. His studies were continued by his wife, Meral Akurgal, who was an archaeologist and the closest assistant of Akurgal when he was alive.

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► Hellenistic and Roman Anatolia, Archaeology of

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Ali Kosh: Agriculture and Domestication

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Introduction

Ali Kosh is a small mound on the Deh Luran plain of western Iran, close to the Iraqi border (32^{0}33′26 18″ N and 47^{0}19′30 11″ E). The site's prominence owes to its having revealed the first substantial evidence from charred plant remains of early stages of domestication in the Near East. Using the (at the time) new method of flotation, archaeologists recovered tens of thousands of seeds from Ali Kosh (Neolithic) and nearby Tepe Sabz (Chalcolithic), whose analysis by Hans Helbaek, a Danish paleobotanist (Helbaek 1969), showed an evolving competence in agriculture.

Key Issues

Excavated in 1961 and 1963 by Frank Hole and Kent Flannery, Ali Kosh is divided into three phases denoted by changes in plant and animal use, building types, burials, grinding stones, chipped lithics, and other artifacts (Hole et al. 1969; Hole 1977). The Bus Mordeh and Ali Kosh Phases are preceramic, while the Mohammad Jaffar Phase has some of the oldest ceramics in Iran. Radiocarbon dates show that the site was founded around 7500 cal. BCE and abandoned by 7000 cal. BCE (Zeder & Hesse 2000; Zeder 2000).

The Deh Luran plain, situated near the base of the Zagros Mountains had rich wild resources for the settlers to exploit and fertile soil in which to plant crops. The site was established near a marshy lake, which provided food resources, such as fish, water fowl, crabs, and turtles, as well as plants such as sea club rush whose seeds are edible. Local-hunted fauna included gazelle, onager, cattle, and pigs. The people also made extensive use of the wild-plant resources, including alfalfa, spiny milk vetch, *Trigonella* (a small plant of the pea family), various grasses, goosefoot, and fruit of the caper. While such plants were edible, because of their small seeds, they required considerable time to process. The people also imported and planted the larger-seeded emmer wheat and two-row hulled barley, neither native to the Deh Luran steppe. This basic picture of an important reliance on wild foods continued throughout the occupation of Ali Kosh, although their use diminished as domesticates increased, and the floral composition of the steppe gradually changed owing to cultivation, grazing by herds of goats and sheep, and gradual burial of the marsh by geological processes.

Bus Mordeh Phase

Using red-clay slabs cut from the edge of the marsh, the first people at Ali Kosh built small rooms whose floors were covered with reed matting (Fig. 1). They planted emmer wheat and two-row hulled barley and kept a small herd of goats, but hunting and fishing provided a major part of their subsistence. It is probable that the people migrated into the mountains during the summers where cooler temperatures and fresh grass would be available for their herds. While they made thousands of small bladelets of flint, their inventory of grinding stones was limited. A small number of pieces of obsidian arrived from a source in Turkey, one indication of wide regional contacts. Although no burials were recovered, a number of beads and pendants made of boar tusk and shell are indications of personal decoration.

Ali Kosh Phase

A change in architecture is one of many differences with the Bus Mordeh Phase. By this time, red clay was no longer accessible, and walls were made of large slabs of clay cut directly from the land surface, and the houses were larger. Two such structures, with a narrow corridor between, lay next to an open courtyard with a brick-lined hearth. The courtyard was littered with stone tools for butchering animals, and the corridor between the buildings was filled with discarded bones (Fig. 2). In addition to using mats on the floor, they also made simple baskets, some of which may have been waterproofed with asphalt, taken from

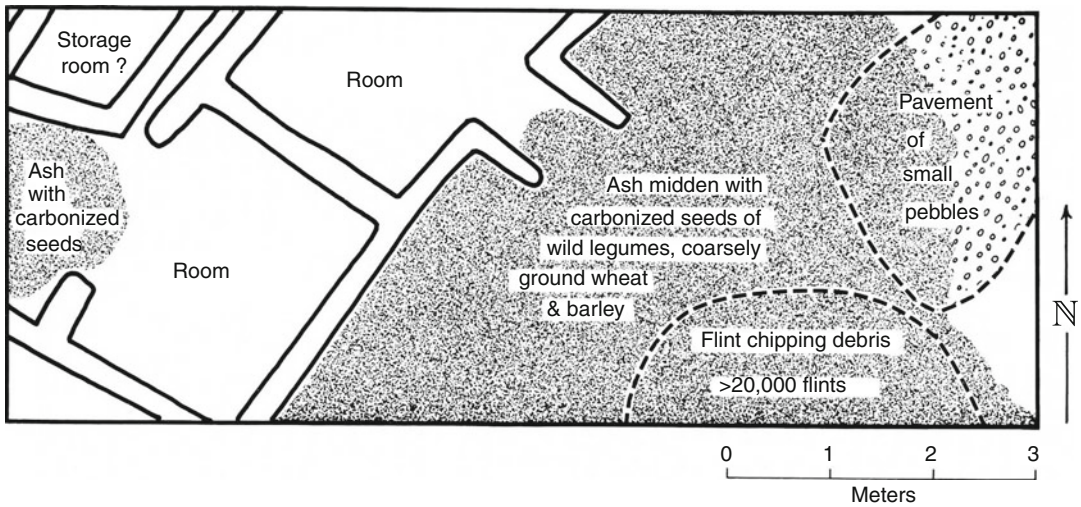

Ali Kosh: Agriculture and Domestication, Fig. 1 Plan of Zone C2 (Bus Mordeh Phase). Small rooms of *red*-clay bricks and lithic workshop covered with the *ash* midden

a seep near the site. Although there was no pottery, there were carefully made stone bowls and shallow trays of limestone, as well as clay figurines, mostly of goats and possibly humans, as well as other enigmatic clay objects. A copper bead hammered from a native source on the Iranian plateau attests to contacts, as does the increased amount of obsidian. This phase sees a proliferation of grinding stones in various new forms, implying a more sophisticated approach to the processing of wild plants and domestic crops.

There are burials beneath the houses, generally in small pits in which the bodies were tightly wrapped in matting and placed in a seated position. The skulls show annular cranial deformation, which elongates the skull. Numerous beads and other ornaments were on the bodies, some of which had been coated with red ochre.

Mohammad Jaffar Phase

The presence of pottery, lightly fired, chaff-tempered wares in three types – plain unpainted bowls, painted vessels, and red burnished bowls – denotes this phase and provides excellent stylistic links with other excavated sites in western Iran and Iraq, such as Sarab, Guran, and Jarmo.

The herds, consisting of both goats and sheep, show the characteristics of full domestication, and they now comprised the majority of faunal remains, although hunting of the large ungulates continued. The steppe vegetation now had *Prosopis*, a woody perennial with edible pods which, with fumaria and goose grass, are indications of grazing and cultivation. The filling of the marsh is attested by the absence of water-loving plants. In other words, human use and geological processes over the centuries had degraded the local environment.

Many of the flint, clay, and stone objects made in the Ali Kosh Phase continued in use, but a further innovation was the combination of shallow-basin grinding slab and mortar.

Together with grinding implements carried over from earlier times, there never had been as varied an array of artifacts to deal with the processing of cereals, which still were not "free-threshing."

Houses in the Mohammad Jaffar Phase showed further evolution. Now the walls had stone bases to control soil moisture, and the walls were of straw-tempered mud bricks (Fig. 3). Outside the houses are a number of burials lying in fetal position on their sides. Gone is cranial deformation, but a new array of ornaments occurs: bell-shaped pendants of marble, as well as labrets (one found in place), and beads of turquoise. Obsidian from eastern Turkey, seashells from the Gulf, specular hematite from Fars (southern Iran), and turquoise

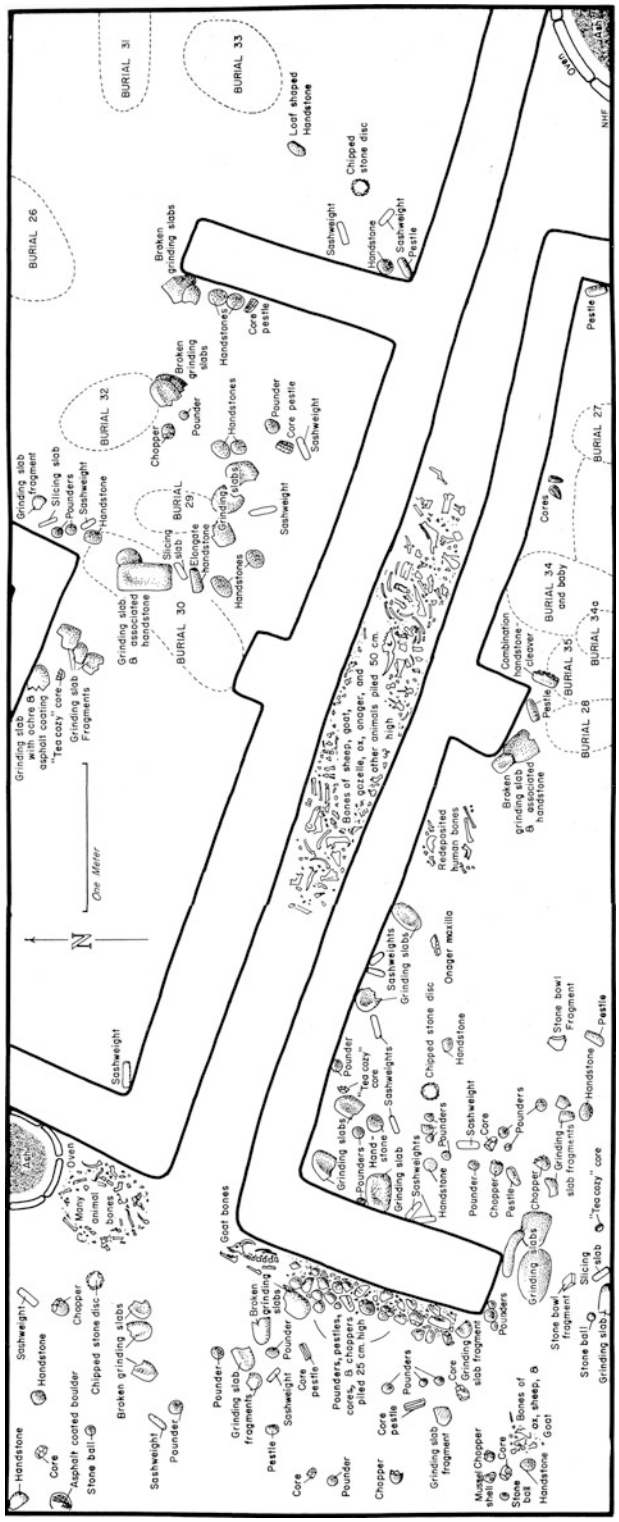

Ali Kosh: Agriculture and Domestication, Fig. 2 Plan of Zone B2 (Ali Kosh Phase). Parts of two houses and courtyard, with lithic and faunal remains in situ

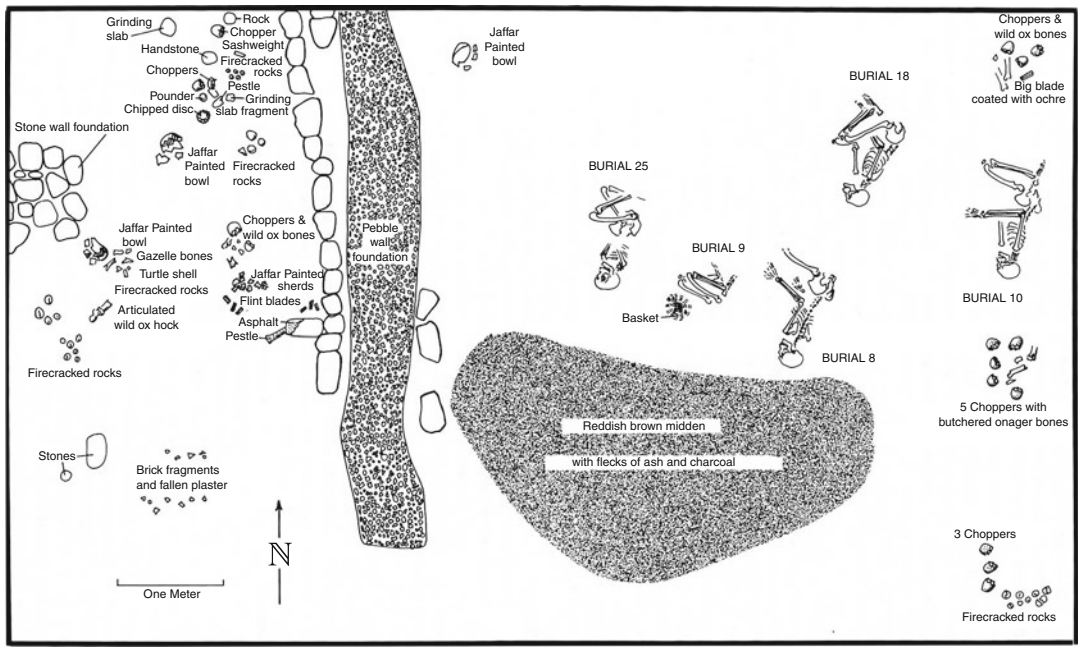

Ali Kosh: Agriculture and Domestication, Fig. 3 Plan of Zone A1 (Mohammad Jaffar Phase). To the *left*, a stone-founded wall of a house with tools and fauna. On the *right* are burials outside the structure

(possibly from northeastern Iran) are all evidence of widespread contacts through some means of exchange or transmission.

Because of its importance in the history of Deh Luran as well as to western Iran generally, the site has been designated as a protected reserve, off-limits to any non-archaeological activity.

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- ▶ Agriculture: Definition and Overview
- ▶ Goat: Domestication
- ▶ Sheep: Domestication
- ▶ Wheats: Origins and Development

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Basic Biographical Information

Frederick James (Jim) Allen was born in Gosford, NSW, Australia, in 1938. Graduating

B.A. (Hons.) from Sydney University in 1965, Allen then undertook research for his doctorate in the Department of Prehistory at the Australian National University, being awarded the degree in 1969. From 1969 to 1972, he was a Lecturer in Prehistoric Archaeology in the Department of Anthropology at the University of Papua New Guinea. Following this, he took up an appointment as Research Fellow and then Fellow in the Department of Prehistory at the Australian University until 1985. During that time (in 1974), he was appointed Commonwealth Fellow, St John's College, Cambridge, UK. In 1985, he left the ANU to become foundation Professor of Archaeology at La Trobe University in Melbourne, Australia, retiring to become an Emeritus Professor in 1999. Allen's La Trobe years saw him take up Visiting Professorships in Auckland (1989) and Utah (1993). From 1993 to 1998, he was an Australian Research Council Senior Research Fellow. In retirement, he has also been a Member, Centre for Archaeological Research, Department of Archaeology and Natural History, Australian National University (1999–present), and a Research Professor, Department of Anthropology, University of Utah (2004–present).

Major Accomplishments

Allen has a unique position in the history of archaeology in Australia. Beginning at the University of Sydney with a training in Classical Archaeology, Allen moved to the Australian National University to undertake Ph.D. research on the historic site of Port Essington (1966–1969), completing the first ever dissertation on historical archaeology in Australia. Allen then moved to the University of Papua New Guinea (1969–1972) where he became a pioneer of prehistoric and protohistoric archaeology in that country.

Allen has contributed to a revolution in scientific knowledge about the prehistory of Melanesia and Tasmania. Returning to the Australian National University (1972–1984), Allen played a pivotal role in founding the field archaeology of island Melanesia, through his leadership of the Lapita Homelands Project. In addition, Allen became involved in the prehistoric archaeology of Tasmania, which increased in intensity with his move to become foundation professor at La Trobe University (1985–1993), where he led the Southern Forests Archaeological Project. These major passages of fieldwork lay the groundwork for significant publications related to the archaeology of greater Australia. They also provided the framework for several major doctoral dissertations and other ancillary research. Allen has played a vital role in training several generations of Australian archaeologists and founded the Department of Archaeology at La Trobe University, Melbourne, in 1985.

Although he retired from academic archaeology in 1998, Allen has continued to conduct foundational research in Australian prehistoric archaeology and to draw together the threads of his diverse experience and knowledge of regional archaeology. Beginning with his work on developing models of prehistoric trade for egalitarian communities along the Papuan coast, which underscored the complexity of trade as a social act; then moving towards an exploration of colonization as a vector for increasing social complexity in Melanesia; and finally resting on a deep consideration of the prehistoric settlement of Australia and its consequences for the subsequent history of Aboriginal societies over the last 50,000 years, Allen continues to be vitally engaged in the research process. The importance of Allen's long connection with regional archaeology and its broader consequences was recognized by his election as Foreign Associate of the US National Academy of Sciences in 2012.

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Basic Biographical Information

Mitch Allen is an archaeologist, publisher, and instructor. He obtained a Bachelor of Arts degree in Anthropology from the University of California, Santa Barbara; a Master's degree in Near East Studies from the University of Michigan; and, in 1997, a Ph.D. in Archaeology from the University of California, Los Angeles. His dissertation was concerned with Philistia, the Neo-Assyrians, and world systems theory (Allen 1997). Allen has taught at several universities in the United States, such as Mills College, the University of Maryland, Santa Clara University, and Diablo Valley College. Allen has taught and published on an eclectic mix of subjects, including the ancient Near East, archaeology, and scholarly publishing. The latter was borne out of 35 years of experience in the publishing industry.

Major Accomplishments

Allen is best known for his career in publishing, during which he has overseen the publication of over 1,000 books, articles, and software products. After working as an executive editor at Sage Publications, a social science publisher, Allen founded AltaMira Press in 1995 and directed its first 10 years. Under his supervision, AltaMira Press became a leading source of texts on cultural resource management, public history, and applied anthropology, among other topics. In 2005, Allen left AltaMira Press to establish Left Coast Press Inc. There, he publishes books and journals in the humanities and social sciences, covering a broad range

of topics such as anthropology, archaeology, sociology, ethnic studies, gender studies, heritage studies, public history, museum practice, qualitative research, and ethics. Allen's goal with both AltaMira Press and Left Coast Press was to create a space in which to produce progressive works (e.g., on indigenous and postcolonial archaeologies) and "find alternatives to traditional publishing" (Allen 2005). The latter can be demonstrated by the variety of unconventional textbooks Allen has published, including those that take the form of comic books and novels. Allen also encouraged the development of materials that would address gaps in scholarship, arguing that "our role is as much to shape scholarly output as to facilitate it" (Allen 2007a: 197). For example, at his urging, a textbook on archaeological ethics was written.

In addition to publishing the work of others, Allen has contributed several of his own publications, many of which are practical guides to navigating professional or academic life. He has advised on topics such as creative teaching methods (Allen 2007b), writing memorable and engaging works (Allen 2002), and the nature of academic publishing (Allen 2003; Allen & Joyce 2010).

In 2013, the World Archaeological Congress (WAC) gave Allen an International Achievement Award in recognition of his contributions to archaeological scholarship and publishing. Allen had collaborated with WAC to produce new publications such as the *WAC Research Handbooks in Archaeology*, the *Archaeology and Indigenous Peoples* series, and the journal *Archaeologies*.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Ethics in Archaeology
- ▶ Indigenous Archaeologies
- ▶ Postcolonial Archaeologies

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Alpaca and Llama: Domestication

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Basic Species Information

Four camelid species inhabit South America today: the vicuña (*Vicugna vicugna*) and its domesticated form alpaca (*Vicugna pacos*), and the guanaco (*Lama guanicoe*) and its domesticated form the llama (*Lama glama*) (Kadwell et al. 2001). Since their initial contact with humans in the late Pleistocene and early

Holocene, camelids have been an important resource for the South American people. Initially camelids were a primary source of food, which ultimately led to their domestication in the mid-Holocene. Over the last several thousand years, domesticated camelids have become important in many aspects of human life, from textiles to religious practices. In the sixteenth century, the Spanish conquest had a devastating impact on camelid populations. Tax records of herd sizes registered a 90 % decrease during the first 100 years of Spanish occupation (Wheeler 2012). Therefore, we do not have a clear understanding of the diversity of alpaca and llama that existed under pre-conquest husbandry practices.

The vicuña is the smaller of the two wild camelids (35–50 kg), with very fine fiber (~12.5 μm) (Wheeler 1995; Mengoni Goñalons 2008). Alpaca closely resemble their wild vicuña ancestor, *V.v. mensalis*, but are slightly larger (adult weight 55–65 kg) with coarser, white to brown, and black fiber (~32 μm). Studies of pre-Spanish, alpaca mummies indicate that intensive selection for phenotype and high quality fiber production was practiced (Wheeler 2012). Two recognizably different varieties exist today, although they do not breed true. Alpacas with the "suri" phenotype have long dreadlock fibers, while those with the "huacaya" phenotype have a crimped fleece. They are also an important source of meat in South America.

Guanaco are larger (85–140 kg) and have coarser fiber (16.5–24 μm). Llamas are very similar in size and morphology to their wild guanaco ancestor, *L. g. cacsilensis*, although fleece color, texture, and fiber diameter have changed as a result of selective breeding (Mengoni Goñalons 2008; Wheeler 2012). Due to their robust nature, llamas have traditionally been used as pack animals, making possible the Inca expansion from southern Columbia to central Chile. However, they were also bred for fine fiber production prior to Incan times. These latter varieties have largely disappeared today, and although llama have several distinct fleece phenotypes, only the woolly (ccara), non-woolly (chaku), and dreadlock (suri) varieties are generally recognized.

Archaeological evidence tracking the timing and location(s) of camelid domestication in South America includes direct evidence (tooth morphology, osteometry, bone, and fiber morphology), indirect evidence (change in abundances and age groups), and contextual evidence (corral structures, art, and other cultural artifacts) (Mengoni Goñalons 2008). Archaeological evidence suggests that alpaca and llama were used by the native people for a variety of purposes, including fiber for textiles, bones for tools, dung for fuel and fertilizer, pack animals for transportation of goods, and in religious ceremonies. Other evidence suggests that the high-elevation, montane Puna (grassland) region, which extends from central Peru, through Bolivia to northern Chile and northwestern Argentina, was the area in which the domestication of both camelids occurred (reviewed in Wheeler 2012 and Mengoni Goñalons 2008).

Alpaca were likely first domesticated in the humid Puna region of Peru during the early to mid-Holocene. Archaeozoological evidence, primarily based on tooth enamel patterns unique to alpaca, from Telarmachay rockshelter suggests that alpaca were domesticated prior to 6,000 years ago. Faunal remains from other sites suggest that alpaca were brought to lower elevation mountain valley areas ~3,800 years ago and into coastal sites in the last 1,000 years (Wheeler 2012). Similar to its ancestor vicuña, alpaca had a more restricted range than guanaco and llama. The historical distribution of alpaca included the Puna of Peru, Bolivia, and northern Chile, as well as the inter-Andean and coastal valleys of Peru (Mengoni Goñalons 2008).

Archaeozoological evidence indicates that llama were likely domesticated ~5,000–3,800 years ago at multiple locations in the Puna of the central Andes (northwest Argentina and northern Chile) and possibly in the high Andes of Peru (Wheeler 2012 and Mengoni Goñalons 2008). Beginning ~1,400 years ago, llama were brought into areas previously uninhabited by their wild ancestors such as Ecuador and southern Columbia. Generally, archaeologists have

considered llama domestication independent, but more research is needed to fully understand the relationship between alpaca and llama domestication.

Both llama and alpaca figured prominently in the economy of the pre-Incan cultures, as well as the Incan empire (1470–1532 CE). At the site of El Yaral in southern Peru, naturally mummified alpacas and llamas from the Chribaya period (850–1470 CE) document both religious sacrifice of these animals and selective breeding for fine fiber production in both domestic forms (Wheeler 1995). Under the Inca, alpaca and llama production was strictly controlled by herding specialists and emphasis was placed on breeding animals for sacrifice to specific deities, for fiber production for the state-controlled textile industry, and as pack llamas for the army.

Although it is possible that the extant varieties (e.g., suri and huacaya alpacas, ccara, chaku, and suri llamas) are in fact relicts of highly selected Inca or pre-Inca varieties, the vast majority of alpacas and llamas reared in the Andes today are not the object of selective breeding practices. Genetic analyses of contemporary llama and alpaca populations have confirmed that extensive bidirectional hybridization has occurred (Stanley et al. 1994; Kadwell et al. 2001), possibly as a result of the breakdown of traditional breeding practices during the chaos of the Spanish conquest. Although guanaco and vicuña can produce fertile offspring when forced, there is no evidence that hybridization occurs in areas where their ranges naturally overlap. Only 6–20 % of alpacas are free of llama ancestry, making the preservation of alpacas an urgent necessity.

Morphological and osteometric studies and DNA analysis have revealed that the domestication of South American camelids played out against a complex recent evolutionary history, potentially involving yet incompletely understood additional camelid taxa. Along with data from stable isotopes, these methods will be key to developing a better understanding of the timing and locations of domestication for both llama and alpaca, as well as the role of hybridization in pre-conquest breeds.

Cross-References

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- ▶ Camels: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Basic Biographical Information

Dr. Nezar AlSayyad is an architect, planner, urban designer and urban historian. He is a Professor of Architecture, Planning, and

Urban History at the University of California at Berkeley where he currently serves as Chair of the University's Center for Middle Eastern Studies (CMES) and the Director of the International and Area Studies Graduate Program. AlSayyad holds a B.S. in Architectural Engineering and Diploma in Town Planning from Cairo University, an M.S. in Architecture from the Massachusetts Institute of Technology and a Ph.D. in Architectural History from UC Berkeley.

Major Accomplishments

He is the recipient of many grants and awards for his research, books, films, and projects. In 1988, AlSayyad co-founded the International Association for the Study of Traditional Environments (IASTE). Today, he still serves as the Association's President and Editor of its highly acclaimed peer-reviewed journal *Traditional Dwellings and Settlements Review*. Professionally, AlSayyad has an active practice in the Middle East and the US and is the Principal in XXA-Office of Xross-Cultural Architecture, an Architecture, Urban Design, and Planning firm with several award-winning credits. AlSayyad is the author, co-author, editor, or co-editor of many books. Additionally, he has written, co-produced and co-directed two NEA – funded public television programs, "Virtual Cairo" and "At Home with Mother Earth."

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► Authenticity and the Manufacture of Heritage
► Heritage Sites: Economic Incentives, Impacts, and Commercialization

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Altai: Paleolithic

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Introduction

The Altai range is located at the cross-roads between Central and Northeast Asia, between 49–52° N latitude and 32–88° E longitude. The Altai plain borders it in the north and the Ob River Basin opens to the west on the Siberian plain. On the northwest border stand the Salair and the Alatau ranges and in the southwest, the western Sayan range. In the south, the Mongolian Altai runs east to the Gobi Desert and joins the Kazakh steppe to the west. In the southwest, the Altai is separated from the Central Tian Shan by the plains of the eastern Balkash, by the Tarbaghatay range, and by the surrounding

Zaisan. The plains reach the Xinjang and the Taklamakan desert via the Turpan-Ami depression and southern and Inner-Mongolia via the western edge of the Gobi desert.

The Altai Mountains are the result of a complex and contrasted history. Several periods of complete flattening (e.g., Early Mesozoic, Late Paleozoic) of the landscape have been recorded and the current setting was initiated during the Late Jurassic (Chlachula 2001). The Siberian Mountains are seen as the continuity of uplifting processes starting from the Baikal region, progressing from east to west and reaching the Altai-Sayan during the late Pliocene.

The Altai alpine ridges, such as the Chuya, Saylugem, Katun, and Kuray, include peaks with a maximum elevation of 4,506 m asl. The high plateaus of more than 2,000 m in elevation (e.g., Ukok, Chulyshman, Ulugan) represent a third of the Altai territory and intermediate mountain landscapes, ranging between 800 and 2,000 m asl, account for about half of it. These are mainly located in the northern and western regions and their relief is shaped by active hydrographic networks and by selective erosion. Intermediate mountain landscapes were formed by the erosion of the peneplains of large plateaus (Shahgedanova 2003). Two main lakes, the Markakol and the Teletskoe, are located respectively at the southern and northern edges of the Altai range. The current climate is continental with contrasting seasonal climatic inversions. The winters are generally cold with mean temperatures ranging from −16° C in the foothills to −36° C in the high mountains (Shahgedanova 2003). The minimum temperature is recorded in the Chuya depression, reaching −60° C. Precipitation is stronger in the northwestern part of the Altai, as the southeast is more arid (Chlachula 2001).

The earliest sedimentary deposits in the Anuy river valley were first attributed to the last interglacial, c. 120–110 ka, when karsts were formed due to the exposure of carboniferous formations (Baryshnikov & Maloletko 1997). Such a chronological attribution is consistent with the tectonic activity recorded at the end of the Middle Pleistocene that would be responsible for a deepening of the valley system by about 100 m the Anuy River and about 200 m in the Katun River. This view, however, has been challenged on the basis of radiothermoluminescence (RTL) measurements providing ages of c. 225 ka for the pebble and gravel layers at the base of the Anuy alluvial plain (Derevianko et al. 2003).

During the first half of the twentieth century, the interest for Paleolithic research in the Altai was stimulated by the collection of surface artifacts at the confluence of the Katun and the Biya rivers and with excavations in the Byisk area. In 1954, S.I. Rudenko reported evidence of Paleolithic occupation at Ust-Kanskaya Cave, along the Charysh River. Rudenko quickly noted some Mousterian typological features on the lithic assemblage, and eventually attributed the human occupation to the Last Glacial based on the fauna recovered. A.P. Okladnikov recognized affinities with the Mousterian from Western Europe and Central Asia and until the discovery of Ulalinka site in 1961, Ust-Kanskaya was considered the most ancient Paleolithic site in the Altai. Okladnikov discovered and excavated important sites in the region, such as Strashnaya Cave, Denisova Cave, and Kara-Bom and remains a major figure in Altai Paleolithic archaeology. His work in Uzbekistan, the Baikal area, Mongolia, and the Far-East led him to consider the existence of a vast Sibero-Mongolian Levallois technocomplex (Fig. 1).

Among his students, A.P. Derevianko appears as the most influential contributor to Paleolithic research in the Altai region. He participated in the discovery of the Anuy I open-air site in 1983 and Okladnikov Cave in 1984. At about the same time, excavations started at Maloyalomanskaya Cave, in the Katun basin. Derevianko discovered the site of Ust-Karakol 1 at the confluence of the Karakol and Anuy Rivers. The latter was first excavated in 1986 (sector 1) and excavations at the nearby site of Anuy II started in 1989. Since the beginning of the 1990s, the sites of Karama, Anuy III, and more recently, the Mousterian site of Chagyrskaya were discovered and his team.

Altai: Paleolithic, Fig. 1 A.P. Okladnikov (*left*) and A.P. Derevianko (*right*) (Photo credits: IHMC RAS St. Petersburg, IAE SBRAS Novosibirsk)

Following Okladnikov's legacy, Derevianko undertook numerous international expeditions (e.g., Montenegro, Uzbekistan, Mongolia, Far-East) and developed many collaborations. This approach generated a rich data set upon which synthetic models of population dynamics could be built (Derevianko 2011) (Fig. 2).

Paleolithic sites are mostly located in the northwestern and in the central part of Gorny-Altai, between the Alpine relief and the northern plain. They lie in intermediate mountain zones, generally between 300 and 1,200 m asl. In the northwest, Strashnaya Cave and Chagirskaya Cave are located in the Charysh Basin. Okladnikov Cave, Isrkra Cave, Karama, Anuy I-III, Denisova Cave, Ust-Karakol, and Kamminaya Cave are located in the Anuy basin and Ust-Kanskaya is located further south along the Charysh, in the Central Altai. Ulalinka was found near the city of Gorno-Altaisk, and the Biyka Cave complex and the site of Kara-Tenesh lie upstream along the Katun River. The Tiumechin complex and the Kara-Bom site are located near the Ursul river, and Maloyalomanskaya Cave can be found along the Mala Yaloman, a small tributary of the Katun. Only a few sites such as Barbughazy, Torgun, and Yustid are found in the southeast, and they are mainly attributed to the final stages of the Paleolithic.

Definition

Based on the Eurasian system of division, three main periods can be recognized during the Paleolithic of the Altai: the Lower, Middle, and Upper Paleolithic. The Lower Paleolithic corresponds to the first human occupation of the Altai that would start c. 800 ka. The Middle Paleolithic would start sometime at the end of the Middle Pleistocene and last until c. 50 ka. The Upper Paleolithic covers a time range from c. 50 ka to the end of the Pleistocene.

Key Issues/Current Debates

The Lower Paleolithic

According to Derevianko (2011), the Altai was first colonized by small populations of *Homo erectus/ergaster* starting from c. 800 ka, that subsequently disappeared from the region c. 500 ka. The site that would best represent this first wave of human occupation is Karama, along the Anuy River (Derevianko & Shunkov 2009). The diversity of the exotic flora is said to fit with a Middle Pleistocene attribution and the RTL dates of 643 ± 130 ka and 542 ± 110 ka have been obtained on the lower portion of the sequence (layers 8–14). Although the identifiable artifacts do not include handaxes, Derevianko

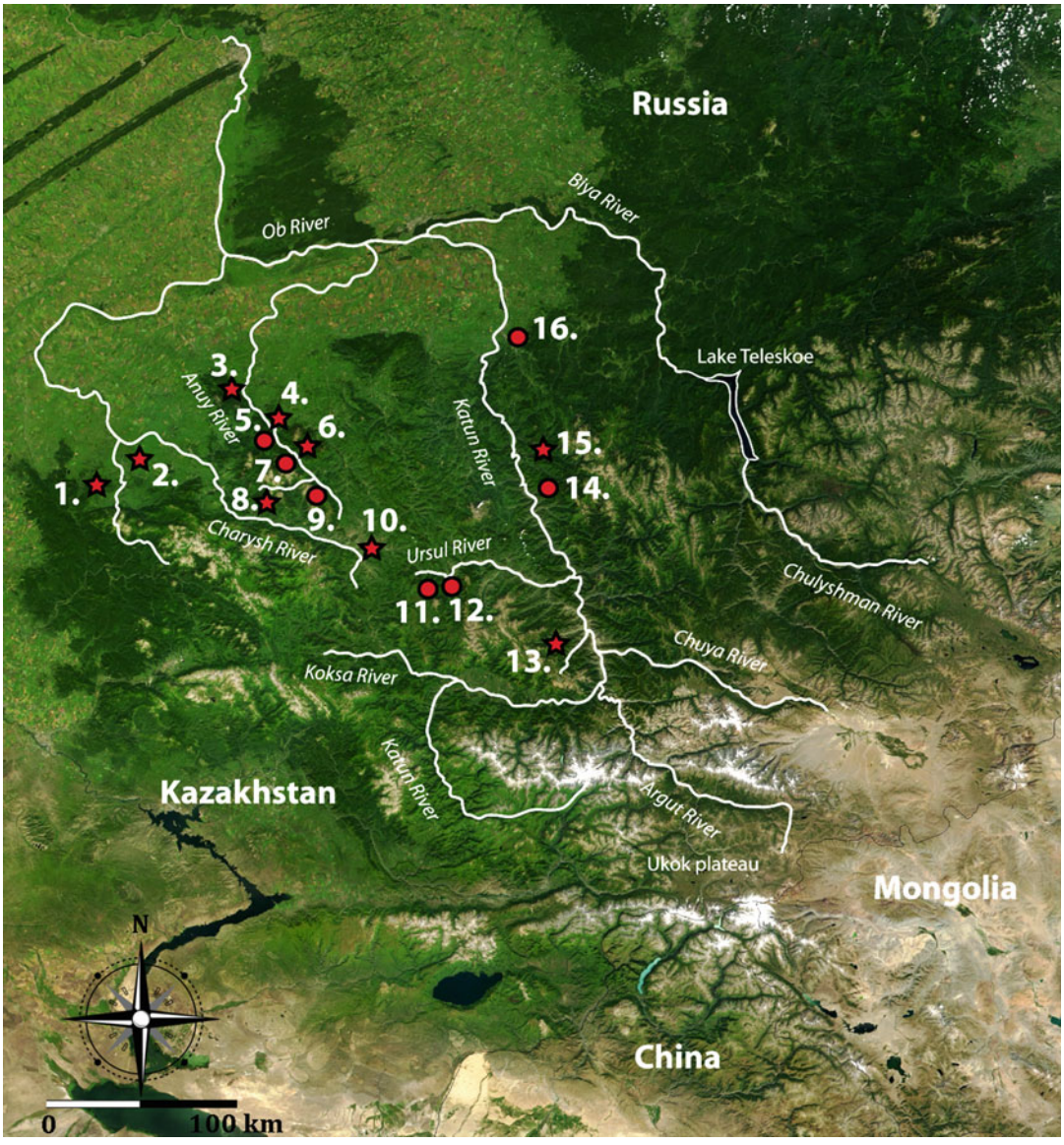

Altai: Paleolithic, Fig. 2 Location of the main Paleolithic cave (*stars*) and open-air (*circles*) sites in the Altai (Adapted from Nasa Visible Earth). *1* Strashnaya Cave – *2* Chagyrskaya Cave – *3* Okladnikov Cave – *4* Iskra Cave – *5* Karama – *6* Anuy I-III – *7* Denisova Cave – *8* Kamminaya Cave – *9* Ust-Karakol 1 – *10* Ust-Kanskaya – *11* Kara-Bom – *12* Tiumechin 1–4 – *13* Maloyalomanskaya Cave – *14* Kara-Tenesh – *15* Biyka Caves – *16* Ulalinka

and Shunkov tend to emphasize elements that would fit with an Acheulean attribution. The technology is described as cores on pebble blanks and flakes with subparallel dorsal pattern. The tool-kit includes various kinds of scrapers (including naturally backed examples), Clactonian notches, and choppers. More surprising is the reported presence of core-like endscrapers with abrupt retouch. Derevianko acknowledged that the first Lower Paleolithic occupation of the Altai is elusive and likely represents a short-term event. Discovered in 1961, the site of Ulalinka was originally presented by Okladnikov as evidence of Lower Paleolithic human occupation.

Altai: Paleolithic, Fig. 3 Denisova Cave (Picture by N. Zwyns)

The chronological attribution beyond the Bruhnes-Matuyama reversal and the authenticity of the lithic artifacts became, however, quickly controversial. The period following the initial peopling of the Altai corresponds to a gap in the archaeological record followed by what is interpreted as a replacement of population (Derevianko 2011). Based on assemblages from the lowermost layers in the Denisova Cave main chamber, Derevianko suggested that a new population settled in the Altai during the Middle Pleistocene, around 300 ka (Fig. 3). These newcomers bring the first evidence of Levallois and blade technology. Although first mentioned as Mousterian, the archaeological material is also seen as derived from a Late Acheuleo-Yabrudian (Derevianko & Postnov 2004).

The attribution of these assemblages to the Lower Paleolithic is mostly based on RTL dates. At one standard deviation, ages between 330 and 130 ka were obtained on the layer 22. Two inversions of magnetic polarity have been recorded and, following the dating of the layer, interpreted as Biwa I (220–176 ka) and Biwa II (330–266 ka). This contradicts estimations based on tectonic, geomorphology, and small mammals that suggest a formation of the karstic system too closer to the last Interglacial. Furthermore, some authors have warned that the RTL method follows different assumptions than the standard TL and that unbleached particles in cave sediments may be problematic for luminescence dating. In front of the cave, the lower part of the sequence is attributed to the last interglacial and the single magnetic inversion recorded is currently assigned to the Blake episode.

The Middle Paleolithic

The Altai Middle Paleolithic is described as belonging to two main variants. Based on Levallois indexes and on frequencies of Mousterian elements, Shunkov (2005) recognizes a Mousterian variant opposed to a Levallois-Mousterian variant. This variability was interpreted as reflecting different settlement patterns of a single MP tradition. Mousterian assemblages, which are only represented in cave sites, would represent long-term occupations. On the contrary, the Levallois-Mousterian seasonal occupations are associated with open-air contexts. A behavioral ecology approach was further developed by P. Wrinn (2010). Based on the occurrence/absence of formal tools or chips that would testify to tool rejuvenation or raw material management, he classifies MP occupations into three main categories: ephemeral/task specific, ephemeral generalized, and intermittent generalized occupation. His analysis of the fauna and of the lithic frequencies suggests a low intensity of human occupation in the region. The Altai is then seen as a refugium for hominins during cold phases.

The *Levallois-Mousterian variant* is mainly represented by the assemblages from the middle part of the section at Denisova Cave (layers 20–12), the lower and middle part of the sequence at Ust-Karakol I sector 1 (layers 19–12), and the lowermost cultural layers at Kara-Bom. In addition, the variant possibly occurs at Ust-Kanskaya and Strashnaya Cave. Kara-Bom and Ust-Karakol assemblages show a technology characterized by

the production of Levallois points from tabular cores. The reduction is mostly unidirectional but also includes bidirectional instances, with occasional removals of debordant blanks to reshape the convexities of the core. The reduction system includes the production of elongated spalls. Although it should be supported by additional chronometric data, the Levallois-Mousterian would appear during the OIS5e, c. 120 ka and eventually disappear from the region at the beginning of OIS3.

The *Mousterian variant* is defined based on the material from Okladnikov and Chagirsakaya Cave. Recently, Derevianko and Markin suggested that these two sites illustrate the existence of a distinct MP facies, relatively late, and intrusive, which they call the Sibiryachikha variant (Derevianko & Markin 2011). It is characterized by a lack of Levallois elements and by a good representation of Mousterian retouched tools, such as various types of sidescrapers and notches. These assemblages seemingly appear at the beginning of OIS3, around 55–50 ka, and last at least until the middle part of OIS3, c. 37 ka. The Sibiryachikha assemblages are said to represent Neandertal populations moving across Central Asia (e.g., Teshik-Tash) and subsequently penetrating in the Altai under the demographic pressure of the spreading Modern Human populations.

In sum, two variants can be distinguished among the MP assemblages from the Altai. The Levallois-Mousterian is better represented in the archaeological record and seems to predate the appearance of a more elusive, and apparently intrusive Mousterian. How much seasonal, functional, or cultural factors are responsible for such variability is not yet clear.

The Upper Paleolithic

The local Levallois-Mousterian is said to have gradually evolved into two main UP variants, the Ust-Karakol and the Kara-Bom variants. Derevianko (2011) sees both UP trends as the result of an incipient evolution from a local Middle Paleolithic background. In his model, the latter process is used to support a scenario of multiregional emergence of modern human anatomical and behavioral features. Other authors have underlined the role of site-formation processes to explain the apparent transitional character of some assemblages or the regional discontinuity of human occupation (Wrinn 2010; Zwyns 2012). Following these views, the Altai data set may support to models in which population movements more consistent with the Out-of-Africa hypothesis.

The Kara-Bom variant (or *Initial Upper Paleolithic*) is defined on the basis of levels OH5 and OH6 from the eponymous site, but is also described at Ust-Karakol 1 (sector 1, OH5.5 and OH5.4), Kara-Tenesh, Maloyalomanskaya Cave, and in the Byike complex. The defining technological features are clearly expressed in the production of laminar blanks (Fig. 4). Asymmetrical blade cores were reduced from two opposed platforms. The main flaking surface is usually located on the broad face of the core and one of the narrow faces is used to reshape lateral convexities. Large and robust blade blanks are produced and retouched whereas thick technical side blades were turned into burin-cores to detach small laminar blanks (Zwyns et al. 2012). This technology is seemingly associated with an early appearance of ornaments, starting from c. 42 ka. The Kara-Bom trend has been considered as an example of local and gradual transformation of the technology observed in the underlying Middle Paleolithic layers (Derevianko 2011).

The *Ust-Karakol variant* (or *Early Upper Paleolithic*) first occurs during the middle phase of OIS3. It is marked by the production of small laminar blanks from narrow-fronted and carinated cores reduced by direct percussion. It is associated with the generalization of bone tools and fully developed forms of ornaments. The defining assemblages are Ust-Karakol 1 (sector 2) layers 11–8, but other assemblages from Anuy I-III, Strashnaya upper levels, Tyumechin-4, and Ushlep 6 are considered analogous. It is said to have evolved from a Levallois background assigned to OIS5e at Ust-Karakol 1, sector 2, (layers 19–18). Originally described as non-Levallois, the central chamber of Denisova Cave was later said to illustrate the same gradual development, between 100 and 30 ka, toward

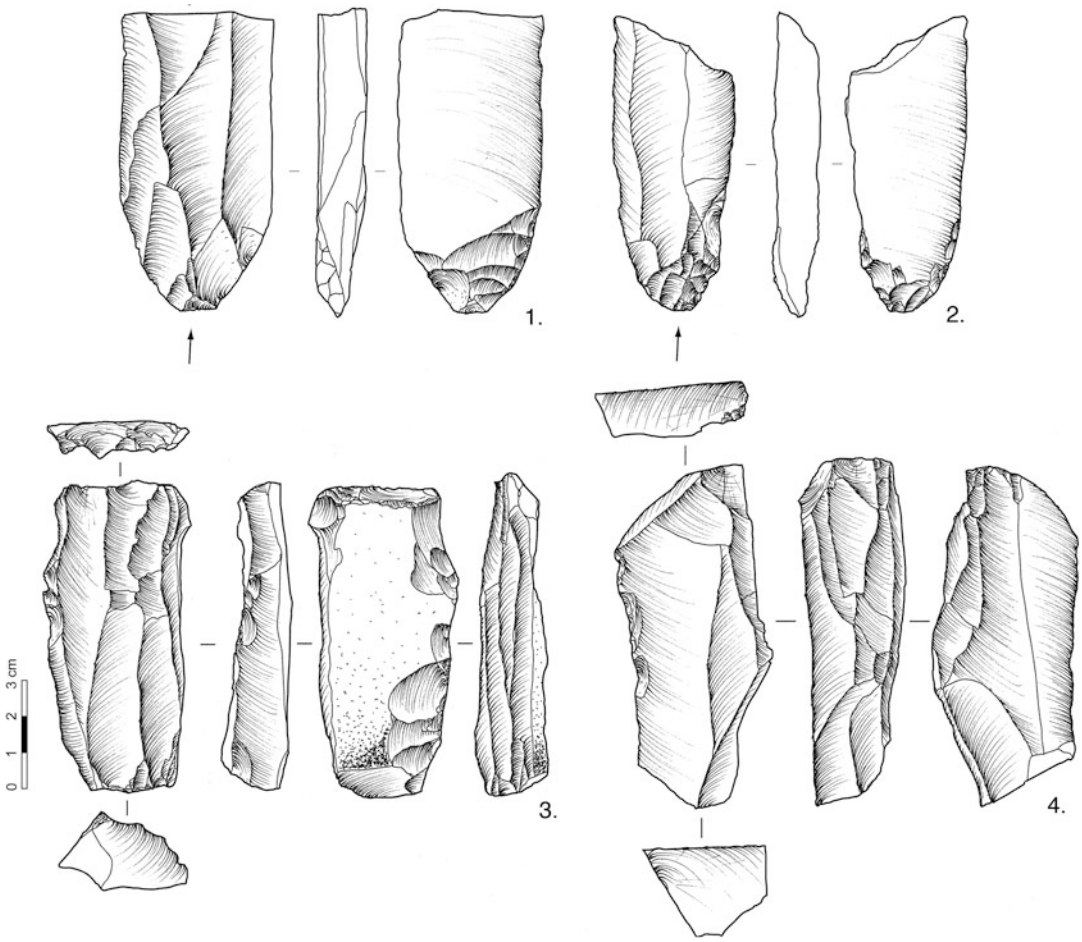

Altai: Paleolithic, Fig. 4 Initial Upper Paleolithic (the Kara-Bom variant) from Ust-Karakol 1 sector 1. 1, 2, blade with inverse proximal retouch; 3, bidirectional blade core; 4, burin-core. (Drawings by N. Zwyns)

genuine UP (layers 11 and 9). Although the Ust-Karakol trend is sometimes listed as a possible source for the spread of microblade technology in Northeast Asia, the early UP assemblages display no clear evidence supporting an early use of pressure flaking.

A recent study based of the laminar technology of Kara-Bom and Ust-Karakol variant supports the existence of two main technical traditions at the beginning of the Upper Paleolithic (Zwyns 2012). By comparison with Europe and the Levant, the Kara-Bom variant is assigned to the Initial Upper Paleolithic (IUP) to describe the presence of derived UP features without necessarily implying a local transition. The IUP definition reinforces analogies proposed by numerous authors (e.g., Derevianko 2011) with sites from the Cis-Baikal (e.g., Makarovo-4), Trans-Baikal (e.g., Tolbaga, Barun-Alan, Khotyk, Kamenka A and C, Varvarina Gora, Podzvonkaya), or Mongolia (Tolbor 4). The IUP is followed by an Early Upper Paleolithic (EUP) phase with a shift toward developed UP features (Ust-Karakol variant). The latter correspond to a series of behavioral changes in terms of economy (emancipation of the bladelet production) knapping techniques (shift to soft hammer), but also probably in terms of weaponry (composite spears). Although they are poorly dated, the two phases appear separated by a significant time span and by climatic events such as Heinrich 4 (Fig. 5).

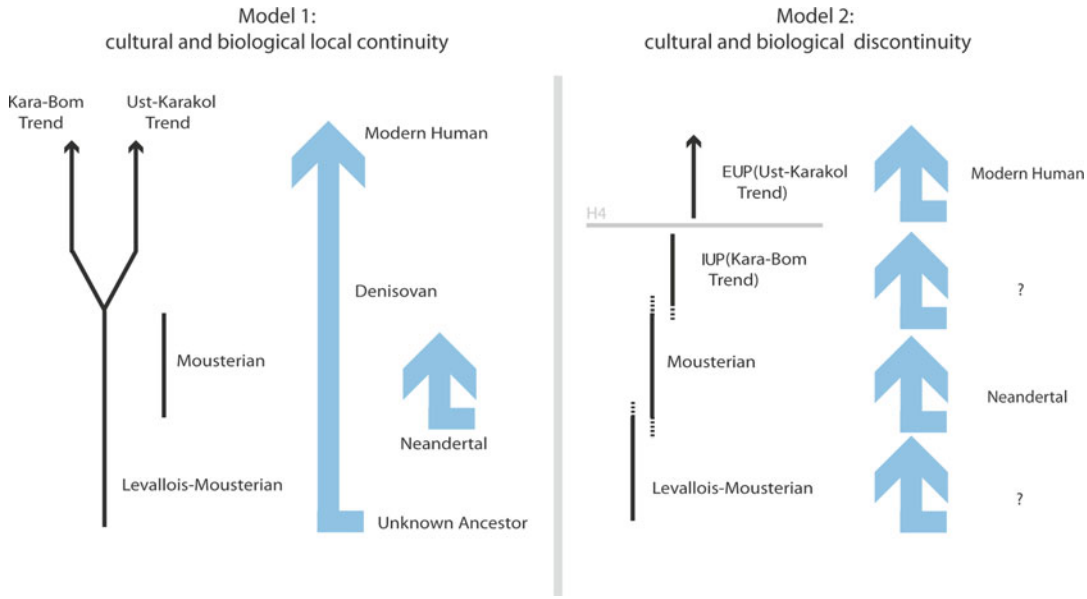

Altai: Paleolithic, Fig. 5 Main models of Upper Paleolithic emergence in the Altai: summary (see text for references)

According to the chronometric data, the Upper layers of Anui 2 document human presence during a time span that covers the end of OIS3 until the Late Glacial Maximum. It is not yet clear if human groups inhabited the lower valley of the Altai during the LGM or if the record illustrates a regional discontinuity in human occupation. It seems, however, that the occupational hiatus is more clearly marked than in the piedmonts. Starting from OIS 2, the blockage of river systems driven by the expansion of mountain glaciers led to the multiplication of lakes. Eventually, periodic drainage events may have caused catastrophic floods that may represent a source of bias in the archaeological record for the period between 26 and 13 ka.

Human Remains

At Okladnikov Cave, dental remains occur in stratum 2 with a left lower molar, but also in stratum 3 with a left lower premolar, a left lower molar, and a right lower molar. Postcranial remains are found in stratum 2 with an adult humerus, and in stratum 3 with a subadult humerus and a hand phalanx. The good preservation of the collagen extracted from the phalanx, from the subadult humerus, the femur, and from the adult humerus has led to the reconstruction of the mtDNA sequence which has been identified as Neandertal (Krause et al. 2007). The archaeological assemblage is Mousterian but the dating of the human occupation is far from clear. Direct dates would indicate that the Neandertal presence in the area lasted until at least 37 ka 14C BP.

At Strashnaya Cave, eight deciduous teeth presumably belonging to a single individual come from an unclear stratigraphic context that can be attributed to the UP. The specimens could not be assigned to a clear taxon. At Maloyalomanskaya Cave, the discovery of a single human tooth has been reported, but no detailed description has been published.

At Denisova Cave, two teeth have been found in the 1984 collection from the central chamber. Denisova 1 is an upper central incisor found in layer 12. Although it has been previously published as a human tooth, Viola et al. (2011) assign it to a worn incisor from a large bovid. Denisova 2 is a deciduous molar (right first lower) found in layer 22.1 that would date to at least OIS 5e. In 2000, layer 11.1 of the south gallery yielded a tooth belonging to a young adult and identified as a third or second

upper molar (Viola et al. 2011). Denisova 3 is the proximal epiphysis of a juvenile manual phalanx uncovered in layer 11.2 of square D2 of the east gallery. The phalanx belongs to a distinct individual with an age evaluated at around 6–7 years old. Both mtDNA and nuclear DNA were extracted from these remains, resulting in the identification of a hitherto unknown archaic hominin (Krause et al. 2010; Reich et al. 2010). The nuclear DNA indicates that these hominins, referred to as "Denisovans," belong to a lineage sharing a common origin with Neandertals that post-dates the split with MH ancestors. Initial morphological descriptions of the tooth noted a set of archaic features not seen in Neandertals or in early modern humans, further suggesting a distinct evolutionary history.

At the recently discovered Chagysrkaya Cave, Viola and colleagues (2011) described human fossils associated with layers 6b and 6c. Chargyrskaya 1 is a worn upper deciduous canine and Chagyrskaya 2 is an atlas fragment. Both fossils are associated with layer 6b. Chagyrskaya 3 is an upper premolar and Chagyrskaya 4 is a lower incisor. Both are worn and small and would fall outside the range of Neandertals. Nevertheless, the mtDNA is under reconstruction; although the results are not fully published, they seem to indicate an attribution to Neandertals (Viola et al. 2011). The rich lithic and fauna assemblage is assigned to the Mousterian and the excavation is still ongoing.

Future Directions

The recent identification of the Denisovans in the Altai opens up new perspectives for understanding the peopling of Asia. Genetic data suggest that, apart from some present-day populations from Melanesia and Australia, Denisovans did not contribute significantly to the genome of Eurasian populations (Reich et al. 2011). The current geographical distribution of the Denisovan genetic input lead to the hypothesis that the Altai might represent the northern edge of their territorial expansion. Where and when they did interbreed with MHs is still unclear and the current data do not rule out other sterile encounters.

The human fossils from Denisova Cave have not been directly dated. New radiocarbon dates were produced on cut-marked bones and bone tools that belong to the same layers as the Denisovan fossils. The results indicate post-depositional admixtures from subsequent and underlying layers (Reich et al. 2010). The chronological and cultural attributions of the Denisova hominins remain, therefore, uncertain. Although it shows the first occurrence of modern behaviors, the IUP assemblages predate the earliest known MH fossil from Siberia. According to the data at hand, the latter appears contemporaneous of the EUP. The Altai Neandertals are, up to now, the only taxon clearly associated with an archaeologically defined unit, namely, the MP of Mousterian variant. The makers of the Levallois-Mousterian variant are still unknown and the identity the IUP populations is yet to be found.

Finally, the apparent complexity of the Altai Paleolithic human occupation likely reflects a lack of reliable and comparable chronological data. Recent steps taken toward the identification of human remains in clear archaeological, taphonomic, environmental, and chronological contexts have already proven to be highly valuable. Further efforts to acquire high-resolution datasets are, nevertheless, essential in order to test current models. There is a few doubt that it will provide new keys for the understanding of the peopling dynamics in a region that stands as a gate between Central and Northeast Asia.

Cross-References

- ▶ Fossil Records of Early Modern Humans
- ▶ Mongolia: Paleolithic
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries

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Altamira and Paleolithic Cave Art of Northern Spain

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Introduction

There are more than 120 caves in the Cantabrian side of Northern Spain that preserve rock art produced during the Paleolithic. In 1985, one of them, Altamira, was declared World Heritage as it represents "a masterpiece of human creative genius" (Criterion I & III: http://whc.unesco.org/en/criteria/). In 2008, this same recognition was extended to another 17 caves in the region.

Some of the archaeological sites with Cantabrian Paleolithic cave art have also produced outstanding portable art pieces on bone, antler, or stone (Corchón 1986; Barandiaran 1989).

Definition

Cave art of Northern Spain extends along a 400-km coastal zone, from the Bidasoa's to the Nalón's river basin, coinciding with the distribution of the karstic lithology of the Cantabrian coast. Especially noteworthy are the concentrations associated with the mouth of the Sella and the Saja-Besaya river basins; the Nalón, the Pas, and the Asón middle basins; or the coastal areas of Llanes and Castro Urdiales (González Echegaray & González Sainz 1994).

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 1 Distribution map of decorated caves on the Cantabrian coast of the Iberian Peninsula (D. Garate)

This area is one of the classic regions of Paleolithic cave art (Balbín Behrmann 2004), together with the Pyrenees and the Dordogne, and other emerging regions such as Andalusia and Ardèche. New sites continue to be discovered, increasing the number of sites and gradually redefining the characteristics of this artistic tradition.

Altamira was not just the first recognized decorated cave, but one of the most outstanding because of its artistic quality and the quantity of motifs preserved. The cave was discovered in 1879 by the daughter of Marcelino Sanz de Sautuola who for years had studied the cave. The discovery generated a huge controversy about the finding's authenticity, which was only resolved in 1902, when the existence of Paleolithic art was accepted by the broader scientific community (Moro Abadía & González Morales 2004). The turn of the century brought the first systematic surveys that resulted in the discovery of other new and spectacular decorated caves (Alcalde del Rio et al. 1911) (Fig. 1).

After one and a half centuries of research, the wide variability and the specific features of each site are now well known (González Sainz 2004). Each of these is unique, and we have identified a number of graphic devices that were continuously reused throughout the Upper Paleolithic with art assemblages involving hundreds of figures such as Peña Candamo, Llonín, Tito Bustillo, Altamira, Castillo, or La Garma. Others, however, were only decorated at specific points in time but, in some cases, also in a very profuse manner (e.g., Ekain or Altxerri). In some cases (such as in Cullalvera), the artists penetrated the farthest depths inside the caves for their activities. But quite often (such as in La Lluera, Chufín, or Venta Laperra), the decorated panels are located near the entrances, even illuminated by natural light.

Most of the others have very modest assemblages with only a few images represented. This suggests that the artistic production was not probably the main activity practiced at these sites (Fig. 2).

Figurative subject matters are dominated by animals. From the beginning are horses, bison, aurochs, and goats, but during later periods, the horse and the bison dominate the iconography as is found in other regions (Pyrenees and Dordogne). The animals appear together with specific geometric signs such as rectangles divided internally, rectilinear forms with central bulges, and simpler shapes such as cupules in rows or clouds of dots. Although there are a few human figures, there are representations of vulvas and hands stencils are abundant.

The techniques used by the artists are basically painting and engraving. The color palette was limited: different hues of black, yellow, and red. The first was obtained from charcoal, burned bones, or manganese oxides, while the others

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 2 Panel of the polychromes of the Altamira cave (P. Saura/ Museum of Altamira)

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 3 Main panel of Tito Bustillo cave (R. de Balbin)

were produced using different sorts of iron oxides. The color was applied directly as a crayon or as a processed paint. The application of the pigment with the fingers to produce dotted animals is a technical peculiarity specific to this region. Engravings made with flint tools or with the fingers on soft surfaces had different depths and were produced by one or repetitive strokes.

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 4 Panel of the hands of the El Castillo cave (P. Saura/Council of Culture, Tourism and Sports, Government of Cantabria)

In this case, multiple striping to indicate animal fur, especially on deer, is also specific to the region (Fig. 3).

Key Issues/Current Debates/Future Directions/Examples

Paleolithic art research presents a number of common problems in the various regions where it appears. It is difficult to interpret its original meaning, and the establishment of chronological sequences has been a priority, given the difficulties of directly dating the art. Even though the message originally transmitted by the Paleolithic images cannot be recovered, through their study we can explore the lifestyle and the way the artists understood the world and, by extension, to the societies that created them (Fig. 4).

Chronological Distribution

The improvement of radiocarbon and other dating techniques has demonstrated that a highly developed art form existed from the beginning of the Upper Paleolithic.

The chronology of art production in caves along the Cantabrian coast requires further research. Radiocarbon dates remain controversial (Fortea Perez 2000–2001), and other techniques such as calcite formations dating, under or superimposed over the figures, provide a lower degree of resolution. Thus, the thermoluminescence dates from Venta Laperra and Pondra caves offer a minimum age for the decoration of these caves, and these are significantly older than expected (González Sainz 1999). Uranium series applied to calcifications at Altamira, Tito Bustillo, and Castillo (Pike et al. 2012) are surprisingly old, and the accuracy of this technique is still being debated.

In any case, it seems that artistic skills were not the result of a progressive learning throughout thousands of years of European Paleolithic art. Advances in dating techniques will allow us to reconstruct in a much more precise way the sequence of this first art of mankind.

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 5 Zaldei panel with polychrome horses in Ekain cave (Basque Government/J. Wesbuer)

Style, Territory, and Identity

The spatial settlement of hunter-gatherer groups in the territory is given by the combination of sedentary behaviors and a range of mobility. Within these parameters, social activities develop. In this sense, art is understood as a graphic code associated with a specific community and is an indispensable tool for the characterization of groups of Paleolithic hunter-gatherers.

In the Cantabrian coast, the graphic traditions of the Early and Upper Paleolithic were significant (Moure Romanillo 1994). This includes the open air rockshelters or sites decorated with deep engravings representing animal forming palimpsests and especially concentrated in the Nalón basin and the deep caves with red animal paintings composed of small digital dots arranged in pairs, whose main focus of which is found on the river Asón. The caves of the central part of the region have fine striated engravings which represent animal fur, which also present on pieces of portable art. In all cases the most common animal is the deer, accompanied by horses, aurochs, and bison. Traditionally these regional styles were interpreted as successive and independent but, in the light of the recent chronological findings, they could have overlapped in time, reflecting the presence in the territory of different human groups (Garate 2010).

By the end of the Upper Paleolithic, the Cantabrian regional particularities are replaced by some artistic interregional linkages encompassing also the Pyrenees and the Dordogne (Fig. 5).

Cross-References

- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Rock Art, Forms of
- ▶ Spain: Archaeological Heritage Management
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Altitude Environments in Archaeology

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Introduction

Since humans have evolved as a low-elevation species, to live and thrive at high elevations, our species had to develop physiological, genetic, and cultural adaptations to this extreme environment. Although it is probable that humans made seasonal forays into high-elevation environments perhaps beginning in the Lower Paleolithic in Africa, the permanent occupation of high-elevation environments occurred relatively late in prehistory. The adoption and spread of plant and animal cultigens, along with acquired genetic adaptations, allowed high-elevation inhabitants, particularly in the world's high plateaus, to create complex polities.

Definition

High-elevation (or altitude) environments are defined as those at and over 2,500 masl (meters

above sea level). It is at this elevation that native lowlanders first experience hypoxia, which is the reduced partial pressure of oxygen. At sea level, for example, arterial blood is 97 % saturated with oxygen; at 3,000 m, it is at 90 %; and at elevations between 4,000 and 5,000 m, saturation decreases by almost 30 % when compared to sea level (Beall 2001: 426-28). Hypoxia begins to affect lowlanders at c. 2,500 m above sea level and has both direct and indirect effects on health status, reproduction and growth, nutritional status, and work capacity. However, these effects on human biology are differentially expressed across time and can be characterized as being of either short- or long-term consequence. Importantly, hypoxia is the stressor that is least amenable to intervention and amelioration via cultural adaptations. Over the long run, then, the establishment of permanent habitation at elevations above 2,500 m depended upon the appearance of acclimatizations (phenotypic plasticity), true adaptation (the appearance of genes capable of overcoming the selective pressures of hypoxia), or some combination of the two.

High-elevation ecology is determined by a complex interaction of climate, altitude, and topography and can be characterized by five primary features (Aldenderfer 1998: 2-4): (1) environmental heterogeneity, (2) extremeness, (3) low predictability, (4) low primary productivity, and (5) high instability and fragility. High-elevation environments tend to be patchy in both space and time, and consequently, there is significant variability in the location, size, and duration of resource patches. At high elevation, two aspects of extremeness are important: temperature and hypoxia. Even in tropical mountains like the Andes, cold is a constant problem. Humans must cope with cold by cultural adaptations that have significant material and energy costs, and thus divert resources from the subsistence quest. Hypoxia affects plant morphology and metabolic processes, which in turn affects primary productivity. The combination of cold, hypoxia, and aridity in high-elevation environments creates a context of low primary productivity. Only the most extreme deserts and polar environments of the planet have lower primary productivity than those at high elevation. Finally, high-elevation environments are highly susceptible to wind and rain erosion and extreme colluvial processes which can modify terrain, change stream courses, and destroy resource patches, thus contributing to the overall patchiness of the high-elevation landscape.

The two primary extremes of high-elevation environments – hypoxia and cold – act as stressors on human biology and affect all facets of life, especially reproduction, growth, health status, morbidity, mortality, nutritional status, and work effort. Although the existing indigenous peoples of modern high-elevation environments have a variety of physiological adaptations based upon selection for alleles identified as promoting improved oxygen transport and that ameliorate the negative effects of hypoxia, these developed over time and would have acted as constraints on the earliest inhabitants of high-elevation environments and their descendants. A consideration of these stressors is necessary because they have had a significant effect on the range of human *cultural* adaptations and historical outcomes of cultural evolution and change at high altitude. Constraints on fertility or exceptionally high neonatal mortality rates, for example, which are known to affect migrants to high elevation, may well have led to lower growth rates of highland populations, especially in the generations immediately following their founding by lowlanders. And since high-elevation peoples tend to have higher basal metabolic rates, they would have required on average more calories than comparable low-elevation peoples. This may in turn have had important effects on cultural strategies when dealing with problems relating to environmental packing, diet choice under restricted mobility, resource intensification, and both short- and long-term changes in resource availability. Mobility strategies themselves may have been substantially affected due to demands imposed by basic caloric requirements as well as the greater work effort required to traverse rugged mountain topography. Although it is important not to cast these stressors in an overly deterministic role, they did have tangible effects on a variety of aspects of human life at high elevation.

Altitude Environments in Archaeology, Fig. 1 Areas of the world at elevations greater than 2,500 m above mean sea level

There are relatively few places on the planet that exceed 2,500 m in elevation (Fig. 1). Most are the peaks and surrounding high terrain of the mountainous regions of North America (the Alaska Range and the Rocky Mountains), Central America (including the Basin of Mexico), South America (the Andean chain), Europe (the Alps and Caucasus), the Middle East (Zagros), the Asian mountain systems (Himalayas, Tien Shan, Kunlun Shan, and Altai ranges), and Africa (peaks in Ethiopia and Kenya). Aside from the Greenland and Antarctic plateaus, which owe their elevation to massive glaciers and icecaps, there are three major plateaus at high elevation: the Ethiopian plateau, the Andean altiplano, and the Tibetan plateau.

Historical Background

The study of high-elevation environments in archaeology has been significantly undertheorized. Although archaeological research has been done in all of the world's high plateaus and surrounding mountainous regions, virtually no serious consideration of how the stressors of hypoxia and cold affected the ways in which these environments were first entered, then permanently occupied. Clive Gamble's *Timewalkers* (1993) recognized high-elevation environments as extreme and noted that they were among the last places on the planet to be occupied permanently. However, there was no discussion of the physiological factors that would have challenged early inhabitants, and instead the ruggedness and difficulty of the terrain and its productivity were emphasized.

Key Issues/Current Debates

There are two major debates and areas of emphasis in modern studies of high-elevation environments: evaluations of the evidence for the initial peopling of the world's high plateaus and mountainous regions and debates involving contrasting explanations for their relatively late permanent occupation.

Evidence for the Peopling of the World's High-Elevation Regions

Although evidence for the occupation of the world's high places is relatively recent in human prehistory, it is possible that some of our hominid ancestors may have used elevation zones above 2,500 m as early as 1.5 mya along the Rift Valley rims near the southern margin of the Ethiopian plateau. Acheulian-style hand axes and Middle Stone age artifacts have been found in surface contexts on the plateau at elevations up to 2,300 m, but no permanent occupation dating before 5,000 years ago has yet been documented upon it (Phillipson 2005). However, sites such as Melka Kunture (2,300–2,400 m), which

contains Olduwan, Acheulian, and Middle Stone Age materials, also include the fragmentary skeletal elements of *Homo ergaster* and *Homo erectus*, and the Gadeb locality (2,400 m), which contains Developed Olduwan and Acheulian materials dated between 1.5 and 0.7 mya, suggests the possibility that higher-elevation regions on the nearby plateau could have been utilized on a seasonal or temporary basis (Aldenderfer 2006).

The antiquity of the occupation of the Andean altiplano is constrained by the antiquity of the human presence in the New World. Aside from a handful of controversial sites as well as a number of potential candidates for an early human presence in the New World in active excavation, the only reliable archaeological data for the earliest site in the Americas is from Monte Verde, located in lowland south-central Chile and which is dated to between 14,220 and 13,980 BP (Dillehay et al. 2008). However, other lines of evidence, including mitochondrial and Y-haplotype DNA, biometric data on skeletal remains, and linguistics push an initial occupation of the New World back substantially further, perhaps between 15,000 and 30,000 years ago (Powell 2005). Even the number of migrations to the Americas is now hotly debated, with one, two, three, and more suggested by different lines of evidence.

Although there is controversial evidence of an early occupation of the Andean highlands at Pikimachay (2,850 m) between 12,000 and 20,000 years ago, this assertion is not widely accepted (Aldenderfer 2006: 362). Currently, the most widely accepted dates for the initial colonization of the altiplano suggest that it was initiated around 11,500 BP by foragers moving from low-elevation sites into the Andean highlands to procure resources such as obsidian and to hunt in newly opened niches (Aldenderfer 2008). A more permanent, longer-term occupation of the highlands appears first in the central Andes at sites like Pachamachay and Telarmachay by 10,000 BP, and 9,500 BP further to the south at Asana and in the highlands of northern Chile and northwestern Argentina (Aldenderfer 2008).

The dating of the earliest occupations of the Tibetan plateau is similarly controversial (Aldenderfer & Zhang 2004; Aldenderfer 2011). Although there has been speculation that the initial occupation of the Tibetan plateau was as early as 50,000 years ago, more recent research suggests that the earliest occupation of the plateau is no earlier than 30,000 years ago and could be much later in time. Xiao Qaidam (3,100 m asl) is found on the extreme northern fringe of the plateau, and the original dating of the geological context at Qaidam indicated that the site dated between 33,000 and 35,000 years ago. A more recent examination of the geological context of the site places it in time between 3,000 and 11,000 years ago, with the latter the most probable date given a reassessment of the cross dating of the stone-tool assemblage (Aldenderfer 2011: 142). Other candidates for an as yet uncertain early occupation include Siling Co (4,600 m) and Chusang (4,200 m). However, the sites with the most reliable dates are found on the northeastern margin of the plateau and include Heimahe 1, Jiangxigou 1, and Locality 93-13. Together, these total to five distinct occupations dating between 15,000 and 13,000 years ago. They are found at elevations between 3,200 and 3,300 m (Madsen et al. 2006). However, the excavators of the sites assert these sites represent short-term, temporary encampments of foragers that were connected to lower-elevation base camps. It is not until c. 5,900–4,145 BP that a permanent occupation of the plateau can be identified. This is Karou, found on the extreme eastern margin of the plateau at an elevation of 3,100 m. The site has substantial semisubterranean structures, a single cultivar – foxtail millet (*Setaria italica*) – and two species of likely domesticated animals – an unidentified bovid and pig (*Sus scrofa*). Other Neolithic sites with different cultivars – "naked" barley (*Hordeum vulgare* L. Varnudum) and domesticated sheep and yak – appear on the plateau slightly later in time and at higher elevations (Aldenderfer 2011: 144-46).

The occupation and utilization of high-mountain environments, as distinct from high plateaus, is similarly late. There is no strong

evidence for the use of high-elevation zones in the Alps, Caucasus, Zagros, and African mountains until well after the advent of the Holocene (c. 10,000–12,000 years ago); however, like the plateaus, it is possible that areas above 2,500 m were used sporadically and for very brief periods during glacial interstadials and other warming periods as early as the Middle Paleolithic. The Himalayas, as well as the mountain systems to the north of the Tibetan plateau, reflects a similar situation, with foothill zones and moderate elevations showing Paleolithic era occupations followed in the Holocene by more significant occupations of foraging peoples in high-valley systems (Dambricourt-Malassé 2008). Finally, the New World mountain systems show no permanent occupations at high elevation at any time. Instead, these mountain systems were used on a seasonal basis by foragers. Of note is the Basin of Mexico, which lies at an average elevation of c. 2,200 m. Early Holocene foraging peoples used the surrounding higher slopes but made no permanent encampments in them until well after the appearance of cultivars.

Debates over the Timing of the Late Permanent Occupation of High-Elevation Regions

Compared to other extreme environments, such as the world's deserts and polar regions, high-elevation environments were occupied relatively late in human prehistory. The New World plateaus could not have been occupied before humans arrived into the hemisphere. In the Old World, however, our hominid ancestors occupied the low-elevation fringes of most major mountains and plateaus throughout much of the Pleistocene, yet did not move into them.

I have argued that three conditions served to promote or constrain the permanent occupation of high-elevation environments by our ancestors: physical accessibility, resource availability, and the capacity for behavioral flexibility for long-term survival in an extreme environment (Aldenderfer 2006: 363-366). In the Old World, both the timing of access and the availability of resources would have been dictated by the pulse of glacial advance and retreat. However, there were multiple times over the past 1 mya in which our ancestors could have moved into and lived on the high plateaus. Behavioral flexibility was by far the most significant constraint on the process. From a cognitive perspective, our ancestors had the ability to create complex foraging systems capable of dealing with strong seasonality and cold stress by the end of the Middle Pleistocene. Further, the controlled use of fire, which would have been essential for life in extreme cold, also has a relatively early origin. However, high-mountain peoples would also have required adequate clothing to mitigate the effects of cold stress, and these did not appear until the advent of the Upper Paleolithic some 50,000 years ago.

But cultural adaptations can only mitigate, not ameliorate, the effects of hypoxia, so in the long run, our ancestors had to acquire genetic adaptations to it. It is well known that the native peoples of the world's high plateaus have different phenotypic responses to hypoxia, and thus it comes as no surprise that there appears to be important variability as well in the genes that promote adaptation to hypoxia (Beall 2013). At present, the antiquity of these genetic adaptations remains to be determined. For example, one prominent study of the timing of genetic divergence between native Tibetans and Han lowlanders for alleles thought to be important in promoting more efficient oxygen transport in less than 3,000 years, a finding that is contradicted by archaeological evidence for the occupation of the plateau that suggests a permanent occupation of at least 6,000 years ago and quite possibly much earlier (Aldenderfer 2011). Similar studies have yet to be conducted for the Ethiopian plateau and Andean altiplano.

Future Directions

As with many research questions in archaeology, more data will be required to begin to resolve many questions regarding the peopling of the world's high places and the timing of permanent occupation upon them. Research strategies that

focus upon accessibility and the timing of possible openings onto plateaus from surrounding lowlands offer some real promise. So-called ice patch archaeology – the examination of areas once covered by permanent snow that have begun to melt as global warming intensifies – is beginning to provide new data into specific routes into mountainous terrain or the locations of possible foraging territories. The discovery of Ötzi, the frozen remains of a person who died in a high alpine setting (3,210 m) around 5,200 BP in what is now the Austrian-Italian border, is a dramatic example of what may be discovered as research intensifies.

Another line of evidence that may provide some insight into high-elevation genetic adaptations is ancient DNA (aDNA). If skeletal remains of sufficient antiquity and conditions of preservation can be located, it may be possible to examine these samples for the presence of genes and alleles thought to promote adaptation to hypoxia.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Andes: High-Altitude Archaeological Sites as Cultural Heritage
- ▶ Glacial Landscapes: Environmental Archaeology
- ▶ Human Evolution: Use of Fire

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Amazonian Dark Earths: Geoarchaeology

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Introduction

Amazonian Dark Earths (hereinafter ADEs) are expanses of anthropogenic soils that formed on generally nutrient-poor upland soils of the Amazon basin during pre-Columbian times. Expanses of ADEs range from <1–80 ha, and overall agricultural aptitude is higher than the vast majority of soils in the region. These soils are much sought after by local farmers who use them to grow specific crops. Most of the documented expanses of ADEs are found on Tertiary-age sediments located in riparian and interfluvial positions of the Amazon basin. However, instances are also

reported on Quaternary alluvial sediments and on human-made earthworks, highlighting that the formation of these soils was an outcome of specific forms of pre-Columbian settlement. The discovery of ADEs alongside the main waterways of the region has been a crucial Rubicon for Amazonian archaeology: these soils record the effects of pre-Columbian indigenous societies' creative manipulation of environmental affordances. Thus, they highlight that human inhabitation of the Amazon basin was, and is, much more than efficient adaptation to environmental limitations. Their ubiquity provides strong evidence for the existence of more sedentary and demographically denser indigenous societies in the Amazon basin before European colonization. Moreover, examined from a strictly archaeological perspective, ADEs are one of the best archaeological signatures of sedentary occupations in a region with limited archaeological preservation potential. ADEs are *sui generis* archaeological artifacts of extraordinary relevance for present-day concerns: soil scientists are currently studying the properties and formation of ADEs in order to develop techniques of soil amelioration that permit recuperation and amendment of degraded and infertile soils.

Definition

ADEs collectively refer to circumscribed expanses of organically enriched mineral soils found mostly within the non-flooding terrain of the Amazon basin. Expanses of these soils vary in size, shape, and location: linear expanses have been reported as patches extending over hundreds to thousands of meters along *terra firme* (non-flooding) bluffs that overlook the major waterways of the basin. However, smaller patches, either oval in shape or draping the horizontal surface of the landform on which they are located, also exist on relict floodplain locations, on *terra firme* areas adjacent to alluvial lakes and flooding forest, on *terra firme* interfluvial terrain away from large rivers, and on alluvial sediments. Moreover, soil horizons with similar characteristics are reported on both shell middens and artificially constructed pre-Columbian mounds found in flooding landscapes of the Amazon basin and beyond.

The topsoil of ADEs (the A horizon) is generally darker (grey, brown, or ink black in color) and deeper (not infrequently reaching down to 60 cm) than the thin A horizons of regional soils. Studies distinguish between *terras pretas* (black earths), i.e., pottery-rich dark soils with a deep A horizon, and *terras mulatas* (brown earths), larger surrounding or adjacent expanses of darkened soils whose surface horizon lacks archaeological artifacts but whose nutrient status is intermediate between *terras pretas* and the broader soilscape (Sombroek 1966). Many scholars consider this contrast to reflect a distinction between sedentary pre-Columbian settlements and associated outfields. The vast majority of studies of ADEs concentrate on settlement-related *terras pretas*. These studies demonstrate that compared to the underlying B horizon or comparable adjacent soils, the A horizon of ADEs shows a higher cation exchange capacity, a more basic pH, and higher concentrations of, among others, organic carbon, calcium, phosphorus, manganese, potassium, barium, copper, manganese, strontium, and zinc. Estimates of black carbon contents using molecular markers, such as benzenepolycarboxylic acids, suggest that the A horizon of settlement-related ADEs occludes up to 70 times more pyrogenic carbon (charred plant matter, i.e., charcoal) than adjacent Oxisols. This observation has been marshalled to suggest that high black carbon concentrations are key to the high organic matter retention of these soils (see Glaser & Birk 2011 for a recent review).

Historical Background

Amazonian Dark Earths were first described in nineteenth-century Brazil as "Terra Preta de Índio" (Indian's Black Earth) or simply as "terras pretas", the reference to "Indians" being a reflection of the fact that abundant pottery shards of evident pre-Columbian age could be seen on the surface. An anthropic origin for

ADEs was advocated in these first descriptions: pioneering geologists like Smith and Hartt unhesitatingly related cultivated ADE patches to villages of former indigenous peoples (Myers et al. 2003). The results of the first soil chemistry analyses conducted on ADEs allowed Katzer (1903) to argue that their high fertility was the result of unusual concentrations of charcoal and decomposed organics in the fine earth fraction, properties which he argued had also made them attractive to farmers in the past. As early as the 1920s, ethnologist and archaeologist Nimuendajú (see Neves 2004) noted that their geographical distribution and associated archaeological remains (including artifacts, earthworks, and roads) suggested they had originated in densely populated, sedentary pre-Columbian settlements.

For the first part of the twentieth century, however, these opinions remained isolated. Nimuendajú's archaeological research went unpublished and, more significantly, was beyond the intellectual web of earth scientists until the mid-1960s. The size of farmed expanses in the Brazilian Amazon, the fact that many local farmers did not recognize their human-made origin, a lack of clear-cut evidence for their contemporary formation, and the scant attention accorded to them by important Amazonian archaeologists (see below) led some researchers to advocate a variety of "geogenic" models for their origins. In broad outline these models argued that ADEs are patches of fertile soils that formed from localized, non-anthropogenic accumulations of organic and/or mineral materials of fossil, volcanic, or peaty origin. However, Klinge (1962) argued that high total and soluble phosphoric acid concentrations of ADEs evidenced an anthropogenic origin. In parallel, Hilbert (1968) whose archaeological research documented the co-occurrence of dark earths and ceramic archaeological remains along the main rivers of the western half of the Brazilian Amazon, observed that ADEs formed on different types of Oxisols (Red and Yellow Latosols in the Brazilian soil classification). Like Nimuendajú, he suggested that ADEs resulted from long-lived settlement.

It was undoubtedly soil scientist Wim Sombroek's (1966) interpretation of the physicochemical characteristics measured in settlement-related ADEs located on the Belterra plateau (near Santarém, Brazil) that convincingly refuted geogenic models for their origin. Sombroek pointed out that the overall topography and drainage of the plateau were incompatible with suggestions that organic material had accumulated in small water bodies. He next noted that instead of the random spatial distribution to be expected from a natural phenomenon, the landscape position of ADE expanses suggested deliberate selection of areas suitable for the invigilation of navigable waterways. He then reported particle size and x-ray diffraction data that evidenced the same overall texture and kaolinitic parent material in *terras pretas* and neighboring soils, effectively overruling a source in volcanic debris. Finally, he enunciated the distinction between *terras pretas* and *terras mulatas*, i.e., between settlement-related anthrosols and settlement-peripheral anthrosols, and presented distributional evidence that expanses of the former were often associated with much larger surrounding or adjacent areas of the latter. It is fair to say that Sombroek settled the matter of anthropogenic *vis-à-vis* geogenic origins in the 1960s.

Although Sombroek's work inaugurated the modern era of studies of ADEs, discussions of Amazonian pre-Columbian history did not initially take stock of their presence or ultimate significance. This lack of attention was not trivial in the face of contrasting understandings of pre-Columbian societies advanced by leading scholars of the day: Betty Meggers (1971) militantly disregarded suggestions that Amazonian upland soils could be made fertile and thus envisioned a low ceiling for sedentism and demographic growth based on the retroduction of ethnographically observed slash-and-burn agriculture. Donald Lathrap (1970) placed his weight behind the suggestion that the crop base of large pre-Columbian populations would have relied on intensive cultivation of rich alluvial sediments. While some argued that the agricultural aptitude of upland soils was not *per se* low nor necessarily unchanging (Carneiro 1983), this lack of attention to Sombroek's findings all but blinded

archaeologists to the possibility of creative manipulation of environmental affordances in the past until the 1980s (Herrera et al. 1980-1; Eden et al. 1984; Andrade 1986; Mora 1991), when pioneering pedo-archaeological investigations in the Colombian Amazon highlighted the part that ADEs could have played in permitting denser populations in pre-Columbian times. On the other hand, Sombroek's research was a crucial intellectual referent for the first systematic survey of ADEs in the Brazilian Amazon, led by geographer Nigel Smith (1980). Significantly, Smith presciently surmised that the dark color of these soils was a result of the deposition of comminuted charcoal and argued they were the correlates of the large settlements that had been sighted by European explorers in the sixteenth century. Recognition of their ubiquity, in turn, permitted links with studies of Amazonian resource management – specifically practices resulting in deliberate environmental alteration (Posey 1984) and/or the presence of biotic legacies in the landscape (Balée 1989). These inferences eventually prompted a reassessment of geographers' arguments about pre-Columbian settlement patterns and population density (Denevan 1992, 1996). It is accurate to say that since the late 1980s and 1990s, ADEs have become an increasingly more important component of archaeological arguments about pre-Columbian Amazonia (Heckenberger et al. 1999; Petersen et al. 2001; Arroyo-Kalin 2010a).

Key Issues

The Makeup of ADEs

Many of the concentrations of edible or useful fruit trees marshalled by Balée (1989) as evidence of anthropogenic disturbance grow on expanses of ADEs (see also Junqueira et al. 2011). Some researchers have considered ADEs as remains of pre-Columbian house gardens produced by the deliberate composting of settlement residues (Andrade 1986; Myers 2004), others perceive them as an outcome of the accumulation, perhaps also management, of waste associated with settlements (see review in Erickson 2003; WinklerPrins 2009; Schmidt 2013, in press), yet others postulate that alluvial inputs make these soils more productive (Herrera et al. 1992; Woods 1995), and still others emphasize the role that pottery production may play in understanding their makeup (Lima et al. 2002; Schaefer et al. 2004; Sergio et al. 2006). It is evident that these opinions do not necessarily exclude each other, especially because a single, Amazon basin-wide account of these soils' formation processes is unlikely to exist. This explains in part the appeal of the "kitchen midden" model (Sombroek et al. 2002), which suggests that a combination between the decomposition of excrements, household garbage, bone, and organic constructions, and the concentration, of ash and charcoal derived from ground-level fires are the most important inputs leading to the formation of settlement-related ADEs. A rise in soil pH associated with organic waste is argued to permit the formation of resistant organo-mineral complexes and thus augment the retention of a more stable pool of organic matter (Sombroek 1966); larger quantities of pyrogenic carbon are considered to provide more ubiquitous sorption sites for metals; a combination of illuviation and faunal mixing of comminuted and/or decomposed constituents is considered responsible for homogenizing these inputs and for the strong melanization that characterizes these soils (Vacher et al. 1998; Kern et al. 2004; Topoliantz & Ponge 2005); both organic and inorganic inclusions are thought to become metabolized by soil microbes and stabilized through humification (Glaser & Birk 2011).

Micromorphological studies have been crucial to ascertain some of these processes as well as the ubiquitous presence of microscopic charcoal, bone, and pottery fragments in ADEs. Soil micromorphological methods were initially deployed by soil scientists (Lima et al. 2002; Schaefer et al. 2004) to compare *terras pretas* and nearby Oxisols. This study permitted linking the aforementioned anthropogenic inclusions and enhanced elemental concentrations. A geoarchaeological study using soil micromorphology (Arroyo-Kalin 2008b; Arroyo-Kalin et al. 2008; Arroyo-Kalin 2010a; Arroyo-Kalin 2012) expanded these results

significantly. By comparing ADEs from within archaeological sites and contrasting observations between clayey- and sandy-textured ADEs from different archaeological sites, it showed that high levels of nutrient enhancement covary with the presence of microscopic inclusions (especially charcoal and bone), highlighted that high densities of microscopic pottery fragments and baked clay are reflected in high magnetic susceptibility values for these sediments, and presented empirical evidence to distinguish between settlement-related *terras pretas* and settlement-peripheral *terras mulatas*. *Terras mulatas* were found to contain a significant volume of microscopic charcoal (lower than *terras pretas*) but, despite high nutrient status, only negligible fragments of microscopic bone, pottery, or burnt clay. Magnetic enhancement of *terras mulatas* has been interpreted as evidence that soil microscopic charcoal did not originate *ex situ* but from repeated near-surface burning associated with past management. Coupled with micromorphological observations suggesting scraping, raking, and/or churning of the soil, this research provides important support for Denevan's (2004) suggestion that *terras mulatas* are the result of spatially concentrated, fire-intensive cultivation practices in pre-Columbian times. It also emphasizes that settlement-related ADEs bear the material signatures of midden material, house floors, and other activity areas.

From a geoarchaeological perspective, important questions arise about the buildup of settlement-related ADEs, which are anthropogenic cumulic soils that in many cases lack a clear source of sediments nearby. Micromorphological analysis accords a role to bulking-up of the sand- and silt-sized fractions by large quantities of microscopic inclusions of anthropic origin, to mixing by soil fauna, and, indirectly, to ash deposition (Arroyo-Kalin et al. 2008). These observations shed light on two conceptual models for ADE horizonation: Vacher et al. (1998) suggest that vegetation clearance associated with the implantation of settlements would lead to destruction of organic litter, after which inhabitation-related production of organic and mineral inputs and the modification of mineral surfaces through trampling, soil removal, and other activities would lead to the formation of a modal O-A-B soil profile with clearly established eluvial and illuvial subhorizons. The upper subhorizon would be directly affected by settlement activities and the lower one would accumulate inputs from the settlement surface. Visible differences between these subhorizons would be obliterated as the lower subhorizon becomes saturated with pigmenting soil constituents, effectively resulting in melanization. At site abandonment, a new mineral surface (A horizon) would be developed through upwards translocation of sediments by soil fauna, obliterating settlement-related sedimentary structures (e.g., compaction) and interring artifacts in the organically enriched sediment matrix. Woods (1995), in contrast, highlights that the accumulation of organic and mineral material would tend to bury the original surface, resulting in rising of habitation surfaces as subsequent occupations takes place. Given a modal O-A-E-B soil profile, he argues that organic inputs would result in an enhancement of the activity of soil fauna as well as strong melanization of the new A horizon, transforming the sediments of the original A-E-B sequence into a transitional AB horizon. Further sedimentation associated with continued habitation would tend to result in repetition of the same process, i.e., buildup at the surface and down mixing as a result of increased activity of soil fauna. While Woods' model is particularly useful to explain the thick A horizons most commonly noticed by soils scientists, there are elements in both models that resonate with empirical observations: ADEs should not be understood exclusively as thick A horizons that have expanded downwards but as an outcome of the accumulation of settlement debris, the effects faunally induced burrowing, mixing, and/or churning of soil material; of the upwards or "conveyor" translocation of sediments from lower in the deposit; and of a higher overall deposition of organic matter (Arroyo-Kalin 2008b).

The Making-Off of ADEs

In his classic review of Amazonian pre-Columbian community patterns, Myers (1973)

argued that the larger and more complex settlement layouts that could be derived from ethnographic and ethnohistorical sources – single-family house communities, multi-family rounded or circular houses, plaza-centered groups of houses (including cases of multiple malocas around a plaza), and linear groups of houses strung alongside rivers and lakes – were all characterized by scrupulous maintenance of the patios, plazas, or circular plazas within, behind, or around which dwellings were located. These maintenance practices resulted in debris accumulating as secondary refuse in either linear middens behind rectilinear rows of houses or in ring-shaped middens around other types of settlements (from single and multi-family house-based settlements to plaza-centered groups of houses). Erickson's (2003) recent survey of the ADE formation literature reexamines Myers's (1973) classic survey and suggests that ADE expanses could result from a combination between specifically shaped refuse accumulations, remobilization of enriched soils once they have formed, and overlapping occupations characterized by different settlement layouts. These suggestions are borne out by the compounded results of different ethnographic studies in Amazonia: Deboer and Lathrap's (1979) ethnoarchaeological study of San Francisco de Yarinacocha, in the Peruvian Amazon, shows that secondary refuse resulting from constant sweeping and raking of household and plazas/patios should, under ideal conditions, accumulate in settlement-peripheral middens and (to judge from the settlement plan they present) specific activity areas such as food preparation and pottery firing areas (see also Siegel & Roe 1986). Zeidler (1983) describes a 3-year-old Achuar dwelling as a thatch-roofed oval area of some 160 m^2 enclosed by walls formed by upstanding peach palm logs. He observes that the position of debris within the house reflects, first, gender-ordained, communal, and personal activity areas and, second, maintenance of clean spaces through sweeping. However, he also notes that the periodicity of sweeping opens up opportunities for artifacts to become interred as a result of trampling, a process that is assisted by sedimentation of ash, charcoal, and burnt soil produced by and accumulated adjacent to combustion features. In the upper Xingú region, research along the southern periphery of the Amazon basin has highlighted circular plaza-centered villages surrounded by rings of dwellings as contexts for the formation of ADEs (Heckenberger 2005; Schmidt 2013, in press). Chemical and physical analyses of a ringlike string of elevated rubbish middens behind house structures as well as house sediments and plaza sediments show the lowest values of pH, organic matter, phosphorus, calcium, potassium, manganese, magnesium, and sodium in the latter areas, intermediate values within abandoned houses, and high values within middens. Middens form distinctive patterns on the landscape consisting of linear mounds along backyard edges and trails. These are used for the cultivation of home garden crops but can also be levelled to place houses on them. Comparable data are presented by Hecht (2003) at the Kayapó settlement of Gorotire, which identifies different types of middens beyond plazas and houses and records comparatively higher concentrations of key elements as a result of planned waste management. Silva's (2003) study of an Asuriní village similarly shows how regular maintenance of public spaces produces large middens behind houses, some being deliberate pilings of large amounts of debris and others more incidental accumulations. In northwest Amazonia, early-twentieth-century ethnographic descriptions show thatch-roofed longhouses enclosing spaces internally divided into communal areas used for meals and transit, compartments for nuclear families, and areas in which manioc processing takes place. Fireplaces of different kinds and purposes were frequently used in different parts of the longhouse, resulting in the production of charcoal and ash. Many accounts suggest that the interiors were swept regularly, sometimes accompanied by wetting of the otherwise dry floors (Koch-Grünberg 1995 (1909)). More recent observations (Arroyo-Kalin, field notes) suggest that floors of thatch-roofed structures are characterized by buildup of sediment in which significant amounts of organic debris, ash, and charcoal accumulate.

Roofed precincts restrict the transportation of airborne sediments permitting, among other things, the accumulation of soot particles on the underside of roof thatching (in new houses, this is encouraged to increase water-proofing). A number of different researchers (Neves et al. 2003; Neves et al. 2004; WinklerPrins 2009) point to various forms of localized "dooryard" burning of organic debris that could result in localized, within-settlement concentrations of charcoal and other debris. Other activity areas of potential interest for the formation of ADEs are smoldering fires under racks used for smoking fish and, perhaps most intriguingly, areas in which pottery tempered with *caraipé* (obtained by ashing the bark of *Licania octandra*) was produced. The *caraipé* link deserves more focused research given that it could permit linking ADE formation to particular ceramic techno-sylistic traditions. All in all, it is clear that a variety of contexts for the formation of ADE must be considered.

ADEs in Space and Time

An up-to-date map of the spatial distribution of reported expanses of ADEs is being developed as a Google Earth map (WinklerPrins & Aldrich 2010). The overall distribution suggests ADEs are ubiquitous in the Amazon basin but, on the whole, less frequent or underreported as one approaches the westernmost lowlands of the Amazon basin. In terms of occupations, the oldest reported ADEs are associated with c. 3rd millennium BCE preceramic occupations of the Massangana phase, Jamari river, in the upper Madeira basin, Brazil (Miller 1992). However, the vast majority of occupations include ceramic remains and charcoal that date from around or after 0 CE and, in many instances, from around 500 CE. Most of these occupations peak around or after 1,000 CE (Arroyo-Kalin 2008a; Moraes & Neves 2012). Some controversy has existed about the extent to which *terra preta* sites reflect continued inhabitation as opposed to overlapping short-lived occupations (Meggers 2001; DeBoer et al. 2001; Heckenberger et al. 2001; Neves et al. 2003; Neves et al. 2004; Neves & Petersen 2006). A comparison between the 14C dates of soil-embedded microscopic charcoal and macroscopic charcoal associated with archaeological remains shows that the pyrogenic carbon pool of *terras pretas* is coherent with the most intense human occupations inferred from archaeological evidence (Arroyo-Kalin 2012). At the Manduquinha site, a relatively small ADE expanse occupied over a period of approximately 300 years prior to European contact, horizontal variability in elemental concentrations of the A horizon is interpreted as evidence for areas of transit, middens, dwellings, and shells heaps, effectively suggesting a relatively stable settlement layout persisted during occupation (Kern et al. 2004). Studies of multicomponent sites (e.g., Heckenberger et al. 1999; Neves 2003; Mora 2003; Moraes 2006) support Woods' contention that ADEs are accreting deposits in which numerous occupations are recorded. Thick A horizons in ADE are generally associated to anthropogenic enrichment of multiple surfaces and subsequent mixing by soil fauna, sometimes appearing as subhorizons to other earth scientists (Arroyo-Kalin 2008b). Evidently this suggests that many of the best-known ADE exemplars are large sites with protracted and intensive occupation histories. However, less-evident, perhaps incipient anthropogenic horizons are found associated with occupations that reach back to the early to mid-Holocene (Arroyo-Kalin 2010a).

Future Directions

While much recent literature has emphasized the unique Amazonian character of these soils (Lehmann et al. 2003; Glaser & Woods 2004), archaeological investigations show that similar anthropogenic modifications are found beyond the Amazon basin, for instance, in the north of Colombia, in the Orinoco basin, in the Guianas, and in subtropical areas south of the Amazon basin proper. This has led some to propose the need to reconsider the distribution of anthropogenic dark soils of pre-Columbian origin within the broader geographical context of the Neotropics (Graham 2006). Even casual perusal of studies from further afield highlights that

anthropogenic soils and sediments have been linked to a very broad variety of situations, i.e., underscores the need to examine ADE formation processes with attention to historical regional specificities. Notwithstanding, the significant appeal of their study in the Amazon basin ultimately resides in a heritage of archaeological interpretations that regards the Amazon basin as hostile to population growth and sedentism. ADEs lay to rest this suggestion and effectively tackle down the received truth that soil fertility was an insurmountable limit for pre-Columbian populations.

Amazonian Dark Earths are prized to this day by farmers because they achieve higher yields of staple lowlands cultivars such as manioc, permit the growth of acid-intolerant crops such as maize, and concentrate a high diversity of edible/useful fruit trees. The overall spatial distribution of ADEs might suggest co-occurrence between these soils and regions where bitter manioc is cultivated (Arroyo-Kalin 2010a; Fraser et al. 2011). However, more intensive archaeological survey is required to ascertain broad patterns of regional distribution as well as to determine any significant temporal gradients in their formation. Detailed consideration of their variability and associated plant and animal fossil assemblages is called for to answer a number of archaeological research questions: given the ubiquity of microscopic bone fragments and the fact that bone apatite is a source of P and Ca, can fertile ADEs be linked to the ability of past populations to tap into abundant faunal resources? If this is the case, then new and interesting questions arise regarding the feedback mechanism between fishing, the main source of protein in Amazonia, and the development of fertile agricultural soils (Arroyo-Kalin 2010b). A further question can be asked: to what extent have we grasped the full variability of the ADE phenomenon? Here it is crucial to take into consideration the little that we know about the variability of intra-settlement and, especially, settlement-peripheral soils (*terras mulatas*), which can be expected to vary according to broad precipitation patterns (Arroyo-Kalin 2012). One might also ask: were some of the well-developed expanses that we see today recycled for crop cultivation in the pre-Columbian past? Did they play a role in permitting the cultivation of certain crops? Were they dump heaps for the domestication of autochthonous Amazonian lowland crops? What does the spatial patterning of known occurrences indicate in terms of pre-Columbian population density and livelihoods (Arroyo-Kalin 2010b; cf. McMichael et al. 2012)? To what extent did increased soil fertility in ADEs lead to specific locales becoming more contested by pre-Columbian populations (Arroyo-Kalin 2008a)? Such questions can only be answered through interdisciplinary research that includes archaeological perspectives: it is otherwise impossible to establish basic spatiotemporal parameters that permit examining ADEs as historical outcomes of multiple processes. In conclusion, it can be stated that ADEs provide a paradigmatic example of a trans-generational and cumulative transformation of the landscape – one with incidental *and* deliberate components – in an environment long regarded as impenetrable. Consequently, the study of ADEs ultimately angles on the increasingly more significant role that human niche construction (Laland et al. 2000) – as a long-term process associated with cultivation, husbandry, and sedentism – is set to play in archaeological thinking in coming decades.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Archaeological Soil Micromorphology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Chemical Survey of Archaeological Sites
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Urban Dark Earth

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American Academy in Rome

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Basic Information

The American Academy in Rome, founded in 1894 and chartered by the United States Congress in 1905 and 1912, is an independent center for the development of United States artists and scholars. Its present institutional form dates to 1914, when the American Academy, newly consolidated with the American School of Classical Studies in Rome (founded 1895 under the auspices of the Archaeological Institute of America), took up a joint campus on the Janiculum Hill, encompassing 11 acres.

The Academy still operates under its 1912 charter as "an institution for the study and practice of the fine arts and for the study and investigation of the archaeology, literature, and history of the Classical and later periods." The Academy appoints its "Rome Prize" Fellows through a juried competition (with now typically four out of an annual total of c. 30 fellowships reserved for ancient studies). In addition to a small staff (which includes a Professor-in-Charge for the humanities), a complement of residents (appointed by the Academy's Director), affiliated fellows, and visiting scholars and artists presently fill out the Academy community each year.

Major Impact

The Academy's most significant contribution to archaeology is the five decades (1947–1999) of excavation it organized at the site of the Latin colony of Cosa in southwestern Tuscany, tracing developments in the town and its territory from the important era of growth in the second century BCE through the early and later imperial and then medieval periods. More generally, the Academy can be credited for the field training of many American archaeologists at Cosa and other more loosely sponsored digs in Rome and Italy, as well as through various summer programs it has offered.

By the time of the physical merger of the American Academy and American School on Rome's Janiculum in 1914, the School had a substantial library, an archaeological museum (principally assembled by Richard Norton, its Director from 1899 to 1907) and cast collection, a $100,000 endowment, and continuing subscriptions from a number of foundations and colleges. It also had admitted women members since the

turn of the century. However, the consolidated American Academy, now organized into two schools ("Fine Arts" and "Classical Studies"), would see women as full Fellows only in the Classics and Archaeology fields until the post-World War II period.

The pivotal year 1914 opened with Albert William Van Buren (American School Fellow in 1906) as Professor of Archaeology and in charge of the library. In that same year, the death of Thomas Spencer Jerome (US Consul on Capri) brought an important endowment jointly to the Academy and University of Michigan for a lecture series on Roman topics that bears his name. A journal, *Memoirs of the American Academy in Rome*, began in 1915, with a *Papers and Monographs* series soon to follow in 1919. In the period between the two Wars, Van Buren closely supervised an archaeologically based course of study for the classical Fellows and shorter-term visiting students that included intensive explorations in Rome and travel in Latium, Campania, and Greece. (Links between the new Rome Academy and the American School of Classical Studies at Athens, which dates to 1881, were close from the start.) A Classical Summer School was founded in 1923 that condensed the curriculum for Rome and environs for the benefit of American teachers of classics.

The disruptions caused by World War II led to the shutting of the Academy from 1940 to 1945. By that time, the institution had firmly established itself as a premier archaeological training ground for future American academics and museum curators. The Academy's impact here can perhaps best be seen in the significant number of both its scholars and artists who played a prominent role in forming and serving in the military Monuments, Fine Arts, and Archives (MFA&A) section that proved highly effective in preserving cultural properties in Europe during and immediately following the Second World War. The Academy also opened its properties in 1945 and 1946 for "leave courses" in archaeology and other subjects to military personnel and members of the US Embassy in Rome.

During the war years, the Academy's Trustees decided that it would henceforth broaden the institution's humanistic fields to encompass medieval and Renaissance studies and (apparently with a view toward reducing overhead) discontinue the system of courses in both the Schools of Fine Arts and Classical Studies. These were significant choices that proved decisive for the Academy's present identity as a center for independent study and advanced research. Other measures included a revitalization of the Jerome Lectures and energetic participation in the new (1946) International Union of the Academies in Rome and International Association of Classical Archaeology (AIAC). The creation of the Fulbright Program in 1946 soon enabled the Academy to introduce two Italian scholars per year into the community, many of them archaeologists. One of the most important dividends of the "internationalization" of the postwar Academy was German photographer Ernest Nash's establishment there in 1957 of the Fototeca Unione archive, which remains a vital center of visual documentation on Roman architecture and topography.

Already in 1944, the Academy's Trustees had started discussions about finding a working excavation site once peace was restored in Italy. In 1947, former Fellow (and Yale University faculty member) Frank E. Brown returned to the freshly reopened Academy as Professor-in-Charge and Director of Excavations. Brown moved quickly to systematize and prune the Academy's museum holdings and to identify Cosa as the most promising site for an institutional dig. Excavations started at Cosa in 1948 and work continued (under Brown for almost three decades, followed by Russell T. Scott and then Elizabeth Fentress) at regular intervals until 1999 with a series of publications that is still ongoing. The Academy also constructed a small museum on the site (1964–1968), which it turned over to the Italian government in 1981 when it was fully furnished. The research methods and results from especially the early years of work at Cosa have done much to stimulate work in Republican urban archaeology elsewhere in Italy, most directly Fregellae, and provided valuable comparanda for other sites, including the situation of Republican Rome itself.

The postwar years saw the Academy make repeated attempts to expand its public acceptance in the United States and to increase revenues for its ambitious programs, including the Cosa excavations. Financial pressures led to the creation of a full-time paid Executive President based in New York starting in 1969. But one of many welcome developments was the decision in 1973 by the Andrew W. Mellon Foundation to endow the position of Professor-in-Charge, with Frank Brown as the first incumbent (1974–1976).

Though the central organization of the sustained work at Cosa as a multiyear institutional project has so far proved unique, the Academy has sponsored numerous other excavations at varying levels. These range from work in Rome by Frank Brown on the Regia (1964–1966, still mostly unpublished), Russell T. Scott in the Area Sacra of Vesta (1987–1996), and Eric Hostetter on the northeast slope of the Palatine hill (1989–1995) to formal patronage of a large-scale University of Michigan excavation at Gabii in Italy conducted by Nicola Terrenato (2008–present). The American Academy also has established two annual summer programs on the analogy of its long-standing Classical Summer School, one devoted to Roman archaeology (first in 1991) and another to Roman pottery (2006). An effort of some 25 years to reorganize and properly catalogue the Academy's museum holdings has resulted in the creation of a new (2008) archaeological repository and seminar room dedicated to Richard Norton and A. W. Van Buren.

Notable past Fellows of the American Academy and its predecessor the American School who have made significant contributions in Mediterranean archaeology include Charles Rufus Morey (completing his Fellowship in 1903), Esther Boise Van Deman (1909), Charles Densmore Curtis (1915), Lily Ross Taylor (1920), Charles Alexander Robinson (1926), Howard Comfort (1929), James Henry Oliver (1930), Frank E. Brown (1933), Lucy Shoe Merritt (1937), Lawrence Richardson, Jr. (1950), Emeline H. Richardson (1952), William L. MacDonald (1956), Michael Jameson (1959), R. Ross Holloway (1960), Maria Teresa Moevs (1964), James Packer (1964), Susan Downey (1965), Russell T. Scott (1966), Malcolm Bell III (1970), Joseph Carter (1971), Eric Hostetter (1983), Ingrid Edlund-Berry (1984), and C. Brian Rose (1992), among many others. Archaeologists have often filled the rotating post of Professor-in-Charge, most recently Elizabeth Fentress (1996–1999) and 2006 Fellow Kimberly Bowes (2012–present).

Cross-References

▶ Archaeological Institute of America (AIA)
▶ Latium Vetus, Latium Adjectum

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American Anthropological Association (AAA) and Ethics

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Introduction

The American Anthropological Association (AAA), established in 1902 and currently with

over 10,000 members, has a long and conflicted history of professional ethics. Originally comprised mainly of academic anthropologists, the organization now features members from a diverse set of educational backgrounds and employment positions. Anthropologists today can be found in the board room examining organizational behavior, in a hospital room observing patients, or in the classroom assessing the significance of archaeology at a construction site. Anthropologists undertake a particularly wide array of research methods, from physical measurements and blood draws by biological anthropologists to ethnographic interviewing and participant observation by cultural anthropologists, to the collection of artifacts and oral histories by archaeologists, and more. As a result, anthropologists encounter wide-ranging instances of ethical dilemmas and debates.

Key Issues

Over the century of its existence, the AAA has arrived at some agreed-upon ideals of what it means to be an ethical anthropologist. In the AAA Code of Ethics (2009), the emphasis is on a "primary ethical obligation" to the "people, species, and materials they study and to the people with whom they work." The AAA Code of Ethics provides guidelines for best practices but rarely provides easy answers. Development of the AAA Code of Ethics has been ongoing and was not an immediate priority for the organization. In fact, the first formal code of ethics passed by an anthropological group was enacted in 1948 by the Society for Applied Anthropology. The concept of applied anthropology itself has engendered its own set of debates. In 1971 the AAA issued the Principles of Professional Responsibility, and in 1998, after much contentious discussion, the first formal AAA Code of Ethics was agreed upon by the membership. This was recently revised in 2009. The 2009 version is more nuanced than earlier versions and purposefully ambiguous on questions of classified research, leaving it up to the individual anthropologist to interpret. The association has been in intense deliberations about the code of ethics for several years – a debate prompted in part by highly publicized programs in which some anthropologists have worked for the US military in Afghanistan and Iraq, while at the same time, there are growing numbers of scholars who have started doing proprietary research for public and private companies and institutions. Central issues for anthropologists engaging in these types of action are those of transparency, conflicting obligations (toward funders, employers, the AAA, etc.), and the dissemination of the research outcomes.

Historically, conversations surrounding ethical issues within the AAA have been reactive rather than proactive, generated by moments of crisis like Vietnam, Cambodia, Project Camelot (the 1964-5 US Army project to assess the sources of insurgency in Latin America using knowledge gained from anthropologists and other social scientists) and the potential destruction of the archaeological record during uprisings in Egypt, Libya, Qatar, Syria, and the Yemen. Changes to the code in the 1990s were intended to address earlier failings, but events in Iraq and Afghanistan in the mid-2000s renewed calls for a more active policy on ethics. Throughout the AAA's debate on ethics, critics have charged that the association has been too slow to respond and that it has been unwilling to develop a process for repudiating actions judged unethical. Former chair of the AAA Committee on Ethics, Janet Levy, has suggested that earlier iterations of the ethical code provided no real guidance or direction for archaeologists and/or biological anthropologists to deal with issues such as the destruction of archaeological resources, the international trade in antiquities, or the bushmeat trade in nonhuman primates. For many years, ethics work by the AAA focused entirely on issues of cultural/linguistic anthropologists; the four-field nature of anthropology was not captured in ethics debates (Levy 1994).

Anthropological archaeologists have duties to systematically excavate, analyze, and report on the archaeological record while collaborating with the local communities and governments

where they work. There are overarching issues of control over the production of archaeological knowledge, custodianship of cultural heritage, the legacy of colonialism, and ongoing requests for the repatriation of artifacts and remains. The Native American Graves Protection and Repatriation Act 1990 (and its recent amendments) was passed to address the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to Native American cultural items, including human remains, funerary objects, sacred objects, and objects of cultural patrimony. This has encouraged both archaeologists and museums to reevaluate their practices in relation to Native American materials.

The relationship of archaeologists with the military also raises difficult issues. In 1919, Franz Boas, one of the founding members of the AAA, was censured by the organization for his critique in *The Nation* of anthropologists (including archaeologists) who acted as informants (spies) during WWI. Recently archaeologists who work with the military to protect archaeological sites in Iraq, Afghanistan, and Syria have faced condemnation by some anthropological colleagues for collusion and for implied support for military intervention. As it currently states, the AAA's Code of Ethics (2009) is merely intended to provide anthropologists with the tools needed to engage in the development and maintenance of an ethical framework. Critics find the wording overly vague and not appropriately prescriptive.

At best ethics and anthropology are situational and often contradictory. Arriving at a code of ethics for the practice of anthropology is a long, negotiated, ongoing process, which is greatly enhanced by education and the recognition that there are complex conversations involving the various scenarios that anthropologists from all areas of the discipline face. Just as there are often no truly right and wrong answers, codes of ethics can in no way be considered the last word on ethical practice by anthropologists. As of November, 2011, the AAA Executive Board has received a draft of a revised code of ethics. All ethical debates are ongoing projects.

Cross-References

- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Forensic Anthropology: Definition
- ▶ Repatriation: Overview
- ▶ Stakeholders and Community Participation

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American Association of Physical Anthropologists (AAPA)

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Basic Information

The American Association of Physical Anthropologists (AAPA) was founded in 1930 after being proposed to and supported by Section H (Anthropology) of the American Association for the Advancement of Science (AAAS) in 1928. Aleš Hrdlička was the principle driving force behind the founding of the AAPA, also having launched the *American Journal of Physical Anthropology* (*AJPA*) in 1918. Hrdlička served as the first editor of the journal (1918-1942) and the first President of the AAPA

(1930-1931). An early history of the AAPA in Spanish can be found in Comas (1969) with an English translation by Alfonso and Little (2005). Today, the AAPA (http://www.physanth.org/) has grown from its charter membership of 83 in 1930 to a membership of nearly 2,000 physical or, as often called, biological anthropologists. The early members were drawn from anatomical, medical, and anthropological professions, whereas contemporary membership is broadly represented by the biological, medical, and social sciences. It is the largest professional society in physical/biological anthropology in the world. Annual meetings often draw 1,000 or more professional, associate, and student members and other attendees.

Major Impact

The professional goals of the Association are to promote and advance the development of research, education, and public outreach within the science of physical (biological) anthropology. Theoretical perspectives and the content of research in biological anthropology are derived from a number of sources. Of primary importance is *human evolution*, including past processes, as represented by human fossil remains and artifacts reflecting past human cultures. Human evolution is also studied as ongoing evolution, that is, the diversification of humans by microevolutionary and hereditary processes. Another theoretical focus is on the uncovering of patterns of *human variation* and its sources – evolutionary, developmental, and historical. A third theoretical focus derives from its anthropological roots: this is the search for *interactive biological and cultural/behavioral processes* that define us as human. Current subfields of biological anthropology include skeletal biology, bioarchaeology, forensic anthropology, human population genetics and molecular anthropology, human population biology, reproduction and child growth, paleoanthropology, and primatology. Each of these subfields is represented by members of the AAPA, and substantial cross-disciplinary research is conducted by these members and others from the biological, health, and anthropological sciences.

The AAPA officers include a President, either Past President or President-Elect, Vice President, and Secretary-Treasurer. The Executive Committee is constituted of these four officers, the two editors of the *AJPA* and the *Yearbook*, and four additional elected members. A new nonvoting member of the Executive Committee is a graduate student liaison. There are a number of specific subcommittees charged with issues of career development, education, history, awards, and the like. A Code of Ethics was prepared in 2003, and "Position Statements" cover a variety of topics that are germane to the profession. Some of these include positions on "Biological Aspects of Race," "Native American Graves Protection and Repatriation Act (NAGPRA)," "Teaching 'Scientific Creationism' in Public Schools," and "Disposition of Culturally Identifiable Human Remains."

There are two publications associated with the AAPA: *American Journal of Physical Anthropology* and the *Yearbook of Anthropology*. The journal, which began as a quarterly, is now published 12 times each year, with an additional issue devoted to the annual meeting program and abstracts. The *Yearbook* was founded in 1946 by Sherwood L. Washburn and Gabriel W. Lasker as an annual that originally published reprints of important articles that were not easily available to North American anthropologists, as well as reports of the Wenner-Gren Foundation summer workshops in the 1940s and early 1950s. During the 1970s, the Yearbook was reorganized to publish solicited and unsolicited reviews of important topics to the profession. The annual meeting, usually held in the spring, and which at its inauguration included 30 papers, now constitutes a program with more than 400 posters and 400 podium presentations. The AAPA annual meeting ordinarily meets for 3 days. However, there are a number of smaller sister societies that meet in conjunction with the AAPA which lengthens the meeting to 5 or 6 days. These societies are American Dermatoglyphics Association, American Association of Anthropological Genetics, Dental Anthropology Association,

Human Biology Association, Paleoanthropology Society, and Paleopathology Association.

Numerous awards and sponsorships are provided by the AAPA for professional members and for student members. The Charles R. Darwin Lifetime Achievement Award (est. 1992) and the Gabriel W. Lasker Service Award (est. 2006) are given annually. There is an Early Career Executive Committee Mentoring Opportunity that carries with it travel funding, and several Professional Development Grants for early-career, nontenured faculty or postdocs. The William S. Pollitzer Student Travel Awards to attend the annual meeting were given to more than 40 students in 2012. Finally, there are cash awards for Student Presentation Prizes given for outstanding poster or podium presentations. Five prizes are named after distinguished past members of the AAPA: Juan Comas, Earnest A. Hooton, Aleš Hrdlička, Mildred Trotter, and Sherwood L. Washburn. These awards and prizes recognize the achievements of senior and junior members of the AAPA, and they support the next generation of biological anthropologists as developing scientists.

The American Association of Physical Anthropologists is an active professional society that has been growing in membership since its beginning in 1930. With the exception of the WW II years, there have been annual meetings each year, and the journal will have its 100th anniversary in less than a decade (2018). Fiftieth anniversary (Boaz & Spencer 1981; Spencer 1982) and 75th anniversary (Little & Kennedy 2010) reviews of physical anthropology and the AAPA provide overviews at these time junctures.

Cross-References

- ▶ Darwin, Charles R.
- ▶ Forensic Anthropology: Definition
- ▶ Hrdlička, Aleš
- ▶ Paleoanthropology Society
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice

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American Institute for Conservation of Historic and Artistic Works (AIC)

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Basic Information

The American Institute for Conservation of Historic and Artistic Works (AIC; http://www.conservation-us.org) is the national membership organization supporting conservation professionals in preserving cultural heritage by:

- Establishing and upholding professional standards
- Promoting research and publications
- Providing educational opportunities

- Fostering the exchange of knowledge among conservators, allied professionals, and the public

Incorporated as a nonprofit organization under article 501(c)(6) of the United States Tax code in 1972, its membership of 3,700 includes archaeological conservators who are active around the world.

AIC holds annual meetings in venues across the United States. General session themes range from the theoretical to the practical, while specialty group sessions focus on topics of particular interest to those practicing in fields ranging from architecture, books and paper, electronic media, paintings, photographic materials, textiles, and objects, including wooden artifacts and archaeological materials.

In addition to supporting the production and dissemination of a variety of online and print conservation publications, AIC publishes a peer-reviewed journal, the Journal of the American Institute for Conservation, which is available as a benefit of membership and on Conservation Online (http://cool.conservation-us.org/), JSTOR (www.jstor.org), and, as of 2013, through Maney Publishing (www.maney.co.uk).

Major Impact

As the national body that represents archaeological conservators in the United States, the AIC provides professional standards and guidelines that directly pertain to the conservation and preservation of historical and archaeological resources. These include legal and ethical considerations for treating artifacts obtained through illegal or unethical excavation, professional conduct and respect towards various cultures and societies, educational and training guidelines for archaeological conservators, and guidelines for the examination and scientific investigation of artifacts which are applied to field excavations, in situ preservation, and conservation treatments used for archaeological materials. The AIC also encourages collaboration with allied professionals to ensure the best possible understanding and outcome in preserving our collective cultural heritage.

Within the AIC, the Archaeology Discussion Group (ADG) is a network of professional conservators who work with, or are interested in, the conservation of archaeological objects, structures, and sites. The ADG is a working group of AIC's Objects Specialty Group. Their members work in many different areas including for museums and other cultural institutions and organizations, in private practice, for archaeological or historical sites, as well as teaching in academic programs. Many ADG members are also affiliated with national and international archaeological, scientific, and cultural heritage organizations. These include the American Association of Museums, the International Council of Museums and the Committee for Conservation, the International Institute for Conservation of Historic and Artistic Works, the Archaeological Institute of America, the Society for Historical Archaeology, the American Schools for Oriental Research, and the Materials Research Society, which help to further promote conservation, and specifically archaeological conservation, worldwide.

One of the central goals of the ADG is to facilitate communication and collaboration between AIC and professional archaeological organizations in the United States. The AIC and individual members promote interdisciplinary relations with various professional archaeological organizations, including the Archaeological Institute of America, the Society of Historical Archaeology, the Society of American Archaeology, and the American Schools for Oriental Research through the presentation of papers and posters at annual meetings, organizing and moderating specific sessions and workshops dedicated to conservation, and through AIC sponsored exhibit booths at these conferences.

The AIC also provides scholarships and grants to aid in the professional development of members through workshops, publications, and

outreach efforts and provides grant funding for specific conservation projects. In addition to these opportunities, the organization promotes safe practices through resources provided by the Health and Safety Committee. Disaster Response and Recovery can also be provided to archaeological sites and collections that have experienced damage through natural or man-made disasters.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Outreach
- ▶ Field Stabilization of Movable Heritage
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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American Pioneers and Traditions

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Introduction

The Americanist tradition of archaeology is defined by comparatively oriented research that draws heavily on an innovative tradition of regional-scale fieldwork (Willey & Sabloff 1980; Willey & Phillips 2001[1958]). Many early pioneers worked in multiple culture areas of the Americas, seeking direct connections between the archaeological record and living or historical indigenous peoples and fostering close ties with anthropology as a result. This brief outline covers seminal developments in stratigraphic excavation, regional survey, and other field methods within their historical and geographic context.

Definition

Stratigraphic excavation in the Americas began nearly two decades after its initial development in Europe, but then quickly became part of standard archaeological practice. The stratigraphy of the Emeryville Shellmound, near San Francisco, was explored by the German archaeologist Max Uhle in 1902 and by the American Nels Nelson in 1906 (Uhle 1907; Nelson 1909). The Mexican archaeologist Manuel Gamio, together with Franz Boas – his graduate advisor at Columbia

American Pioneers and Traditions, Fig. 1 WPA trowelmen at work, Thompson Village Site, Tennessee (Image courtesy of the Frank H. McClung Museum, University of Tennessee (62HY5[B]))

University and generally acknowledged "father" of American Anthropology – initiated a chronological sequence for Central Mexico in 1911 (Gamio et al. 1921). This work involved ceramic collections at six sites surrounding Mexico City and Gamio's excavation of nearly 6 m of superimposed cultural layers at Azcapotzalco. Two years later, Nelson participated in stratigraphic excavations at the Paleolithic cave site Cueva de El Castillo, Spain, and returned to New Mexico convinced of the importance of the methodologies he learned there, which he then applied to Southwestern archaeology through his work in the Galisteo Basin (Nelson 1914). The pace of stratigraphic work in these culture areas accelerated rapidly and spread elsewhere. Direct successors within these two regions include George Vaillant's excavations of nine Central Mexican sites, while a curator at the American Museum of Natural History, and Alfred Kidder's 15 years of investigations at Pecos Pueblo, sponsored by the Peabody Museum of Harvard University and of Phillips Academy (e.g., Kidder 1924; Vaillant 1937). Both projects were critical to establishing cultural sequences and served as benchmarks for future excavations in Mesoamerica and the Southwest.

Part of Franklin D. Roosevelt's New Deal put Americans back to work during the Great Depression by offering jobs as laborers on archaeological survey and excavation crews led by trained professionals (Lyon 1996; Fagette 2008). This boon to US archaeological research resulted in investigations in 36 states and included the widespread adoption of methods such as excavation by horizontal stripping, spraying sediments for better visibility of features and strata, plotting the post molds and pit features of perishable structures (Fig. 1), and the circulation of manuals on field and lab methods. New Deal archaeology also saw the professionalization of historical archaeology in the USA. Whereas earlier excavations had focused primarily on architectural restoration, J. C. Harrington's 1934–1941 investigations at Jamestown, Virginia, included excavations targeted especially at areas lacking architecture, in order to document the ditches and fence lines that defined property boundaries, and the collection of all artifacts with special attention to context (e.g., Harrington 1955).

Gordon Willey (Fig. 2) launched the field of regional archaeology (aka landscape archaeology) with his 1946 survey of Peru's Virú Valley while working for the Smithsonian Institutions' Bureau of American Ethnology (Willey 1953). Willey followed this project with over two decades of settlement research in Central America and Mesoamerica. His work transformed global archaeology by demonstrating that sites cannot be understood in isolation,

American Pioneers and Traditions, Fig. 2 Gordon Willey at Tula, Mexico (Gordon Willey Slide Archive, courtesy of William L. Fash)

nor should archaeologists focus exclusively on large or architecturally conspicuous sites; rather, sites must be viewed holistically, as parts of ecological and cultural landscapes. Field methods in the Virú Valley included the production of site maps from aerial photos, "ground truthing" these maps in the field using a compass and measuring chains, recording details of site setting and architecture, and plotting all sites on a valley map made by the geographer F. W. McBryde. In North America, Willey's long-time collaborator Philip Phillips developed a similar approach during his 1940–1947 survey of the Lower Mississippi Valley, undertaken with James Griffin and James Ford, the latter of whom worked with Willey in Virú (Phillips et al. 1951). The greater use of test pits in the Mississippi Valley reflects the differences in surface cover and visibility between the arid coast of Peru and temperate woodlands of the eastern USA. Full test pits or shovel test pits are much more common in surveys of densely vegetated regions of the Americas such as the Eastern Woodlands, Maya Lowlands, and Amazon Basin, compared to drier regions of western North America, and the highlands of Mesoamerica and the Andes.

The regionally oriented and stratigraphically deep research of Stuart Struever in the Lower Illinois Valley during the 1960s was highly influential for its use of multi-scalar sampling strategies (within sites, ecozones, and regions) and of flotation as a means of recovering small ecofacts and artifacts (e.g., Struever 1968, 1971). Field sampling methods were further developed by projects such as the Chevelon Archaeological Research Project, directed by Fred Plog (1974); the New Survey of the Southwest Archaeological Expedition of the Field Museum (e.g., Hanson & Schiffer 1975); and the Prehistory and Human Ecology in the Valley of Oaxaca Project, directed by Kent Flannery (1976). These projects emphasized the importance of some element of randomness in the placement of test units in order to minimize biases based on initial assumptions of the patterning of subsurface remains and to derive statistically significant samples upon which to build social interpretations. The choice of squares or trenches as sample units might be determined by the depth of deposits – as was done by Flannery and colleagues, who found trenches to be more efficient for deep sites in Oaxaca, thereby avoiding "telephone booth" style pits – or the strategies could be integrated at the same site, as was done by Hanson and Schiffer at the Joint Site Pueblo (Fig. 3).

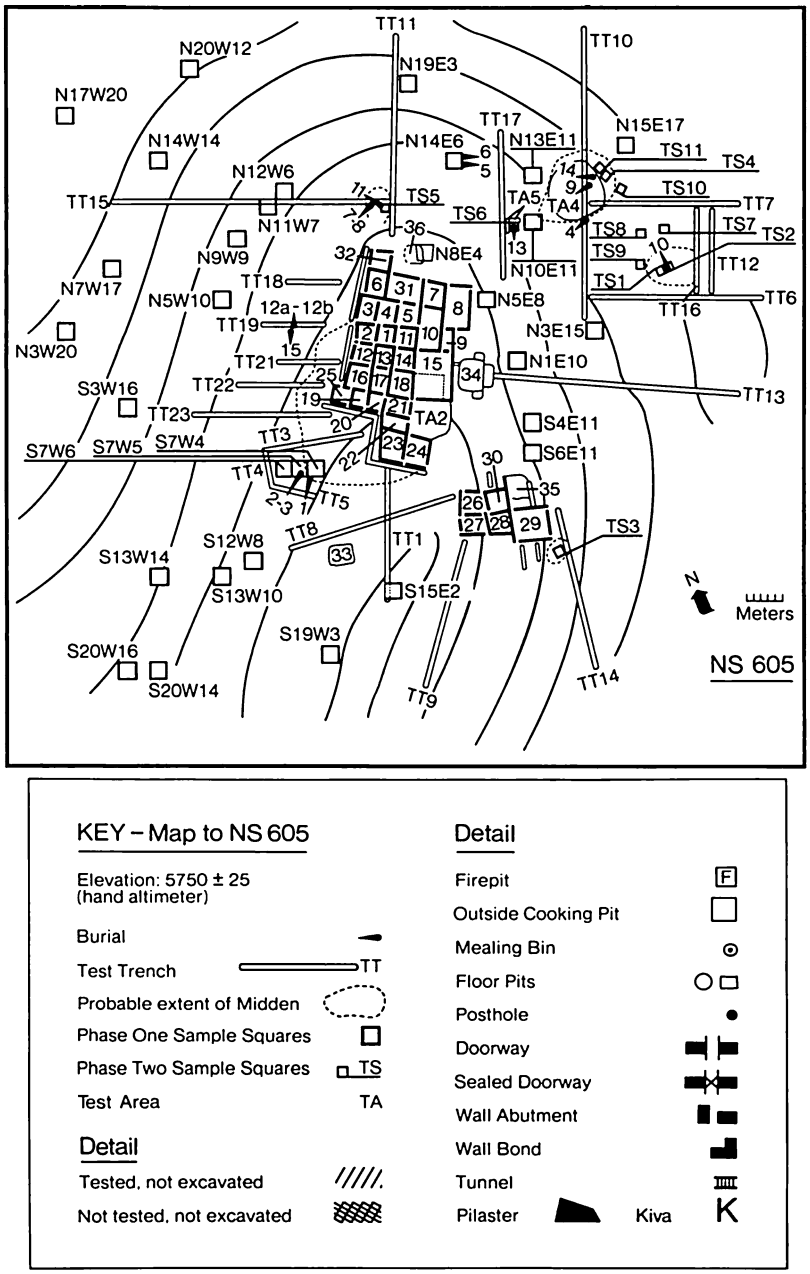

American Pioneers and Traditions, Fig. 3 Site sampling by squares and trenches at the Joint Site Pueblo, Arizona (Hanson & Schiffer 1975: Fig. 5) (Image courtesy of the Field Museum)

Key Issues/Current Debates/Future Directions/Examples

The Americanist tradition of cross-cultural comparison drawing on regional archaeological datasets is exemplified by work such as Flannery's and by Robert McC. Adams's (1966) comparative study of urbanization in Mesopotamia and Mesoamerica. Building on this base of pioneering researchers, methods in American archaeology continue to develop, today increasingly incorporating new spatial technologies and material sciences in the field. This is not only true of archaeology sponsored by universities and museums but also of Cultural Resource Management (CRM), which

is currently the public face of archaeology and largest employer of archaeologists in the USA.

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- ▶ Binford, Lewis R. (Theory)
- ▶ Cultural Heritage Management and Native Americans
- ▶ Early Excavations Around the Globe
- ▶ Excavation Methods in Archaeology
- ▶ Flannery, Kent Vaughn
- ▶ Gamio Martínez, Manuel
- ▶ Historic Jamestowne
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Schiffer, Michael Brian (Theory)
- ▶ Society for American Archaeology (SAA)
- ▶ Surface Survey: Method and Strategies
- ▶ US National Park Service and World Heritage
- ▶ Uhle, Friedrich Max
- ▶ Willey, Gordon Randolph

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American School of Classical Studies at Athens (ASCSA)

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Basic Information

The American School of Classical Studies at Athens (ASCSA) was America's first overseas research center and is still the largest in terms of assets, programs, and constituencies. It is

a nonprofit organization based in the United States; its Trustees were incorporated in 1881 in Massachusetts for the purpose of founding the ASCSA in Greece. ASCSA's website is at http://www.ascsa.edu.gr.

Major Impact

Since then ASCSA has provided American graduate students and scholars a base in Greece for pursuing studies in the history and civilization of the Greek world. ASCSA remains today a teaching institution, providing through its academic programs, opportunities for graduate students, undergraduates, secondary school, and college teachers, as well as other scholars to study at first hand the sites and monuments of Greece. ASCSA is also a major research center for postdoctoral scholars pursuing independent research in a broad range of fields in the humanities, archaeological science, and social sciences from antiquity to modern times.

ASCSA operates two internationally renowned libraries, the Blegen Library with approximately 100,000 volumes dedicated to Greece and related regions and cultures from prehistory to the end of the antiquity and the Gennadius Library with over 120,000 volumes concentrating on the Greek world and Balkans after the end of antiquity to the modern day, two archival repositories, and the Wiener Laboratory for Archaeological Science. ASCSA sponsors two major excavations in Greece and related research centers at Corinth and in the Athenian Agora, administers other American excavations and research activities in Greece, and supports a major publications program, publishing up to ten titles per year and an award-winning, quarterly journal, *Hesperia* (ISSN: 0018-098X; E-ISSN: 1553-5622).

Many scholars of classical antiquity consider the Blegen Library to contain research collections in their field comparable to those at major research universities, while the Gennadius Library holds a diverse collection of books and rare bindings, manuscripts, works of art, and archival collections that pertain to Medieval and modern Greek culture. Important among the collections of the latter are first editions of Homer, rare Bibles, diaries of early travelers to Greece, unique maps of Greece and the Mediterranean, the diaries and letters of Heinrich Schliemann, and the papers of many of Greece's most important political and cultural figures, including Greece's two Nobel Prize-winning poets, George Seferis and Odysseas Elytis. The archives of the Blegen Library contain records of many important archaeological projects, as well as photographs and the personal papers of renowned archaeologists who have conducted work under its auspices. Inaugurated in 1992, the Wiener Laboratory for Archaeological Science is one of the leading laboratories of its kind in Greece, especially in the fields of biological anthropology, zooarchaeology, geoarchaeology, and environmental studies (including the study of organic residues and botanical remains).

ASCSA presents lectures, workshops, and conferences on topics related to Greece and neighboring regions in all periods. Lectures are videotaped and made available on the ASCSA website (http://www.ascsa.edu.gr). In addition, the ASCSA's digital library, also available through the website, offers wide access to archaeological records from the excavations at Corinth and the Athenian Agora and research materials from the libraries and archives.

From its founding, ASCSA has sponsored excavations at major sites in Greece. Its excavations at Corinth began in 1896 and are one of the world's longest continuous projects, as well as serving as a training ground for generations of young ASCSA archaeologists. Located on a hill above the strategic Gulf of Corinth, the ancient site is vast, encompassing over 6 km^2 within its walls; the more than 60 acres of the site that have been explored thus far include the acropolis of Acrocorinth, the city center, and its two ports on the Corinthian and Saronic Gulfs – Lechaion and Kenchreai. Excavations by ASCSA have documented Corinth's history and its territory from the Early Neolithic period (6500–5750 BCE) to the modern day (http://www.ascsa.edu.gr/index.php/excavationcorinth/). Some 40 volumes in ASCSA's Corinth series have been

published, while other monographs and numerous articles in *Hesperia* also record the results of investigations.

The second long-term excavation of ASCSA is in the civic, political, and commercial center of ancient Athens, the Athenian Agora. Since 1931 ASCSA has excavated this large archaeological site in the heart of the city, documenting its 5,000-year history (http://www.ascsa.edu.gr/index.php/excavationagora/). Excavations have yielded finds ranging in date and character from pottery of the late Neolithic period (c. 3000 BCE) to the contents of nineteenth and twentieth century basements. The Agora of the fifth and fourth centuries BCE, however, has been the main focus of attention, and its exploration has revealed primary evidence for the functioning of the ancient Athenian governmental institutions that played a formative role in the foundations of western democracies. There are few ancient sites more important in Greece, and none for which the excavation records are more critical for documenting the unparalleled achievements of Classical Athens. ASCSA has published some 40 volumes in a series on the Athenian Agora, as well as numerous other monographs, booklets and guidebooks for the general public, and scholarly articles in *Hesperia* and elsewhere.

Since its founding ASCSA has overseen numerous other excavations and surface surveys in many parts of Greece, though often with particular focus on the Peloponnese and Crete. Recent projects are at Gournia in eastern Crete, at Gla and Thebes in Boeotia, and in the Sanctuary of Zeus at Nemea. (For a list of and links to other projects affiliated with ASCSA in recent years, see http://www.ascsa.edu.gr/index.php/fieldwork/Affiliated-North-American-Field-Projects).

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- ▶ Agora in the Greek World
- ▶ Bioarchaeology: Definition
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology
- ▶ Crete, Archaeology of
- ▶ Geoarchaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Schliemann, Heinrich
- ▶ Zooarchaeology

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Amheida, Archaeology of

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Introduction

Amheida is a substantial ancient settlement located in the northwest extent of Egypt's Dakhleh Oasis. Amheida is a multiphase site that reached its greatest expanse under Roman rule (first century CE to fourth century CE). Its ancient name was Set-wah ("resting place"), and it was known as Trimithis during the Roman Period. This site is the largest surviving ancient settlement within the oasis.

Definition

Amheida was one of the most important towns in the Dakhleh Oasis during the Roman and Byzantine centuries. Documentary sources indicate that it became a city by the fourth century and was regarded on the same level as other significant cities in the Oasis Magna, which consisted of Dakhleh and the Khargah Oases to the east (Wagner 1987: 191). The diversity and extent of

archaeological remains at Amheida attest to this significance. The substantial aboveground remains and surface pottery scattered across the urban center and cemeteries extend from at least 2.5 km north-south and 2 km east-west. These remains represent dates ranging from Pharaonic to Late Antique periods, and the surrounding environs contain evidence of prehistoric lithic scatters, Old Kingdom ceramics, and several cemeteries. Despite a long occupational history, Late Antique ruins dominate the visible site surface today. The historical trajectory of Amheida complements that of the greater Dakhleh Oasis in that it reached its apex during the Roman Period.

Key Issues/Current Debates/Future Directions/Examples

History of Research and Excavation

Outsiders have known about Amheida since European explorers first ventured to Egypt's Western Desert. Sir Archibald Edmonstone, a British explorer, became the first European to visit the oasis and Amheida in 1819. Renowned explorers, Bernardino Drovetti and Frédéric Cailliaud, visited the oasis shortly thereafter. Since its European discovery, both specialists and nonspecialists visited Amheida (Boozer 2013). The site came into prominence in 1979 when the Dakhleh Oasis Project (DOP) discovered classical wall paintings on the site during its survey of the entire Dakhleh Oasis (Leahy 1980; Mills 1980a, b).

Modern archaeological fieldwork began in 2000, directed by Roger Bagnall. It was first under sponsorship from Columbia University and then by New York University, along with additional partner institutions. Early excavations, begun in 2004, focused primarily on the house containing wall paintings discovered in 1979 (Boozer 2005). These excavations later expanded to include additional domestic structures, temple mound, and conservation of a pyramid and of a monumental mud brick tomb.

Urban Layout

Survey continues to define the extent and form of Amheida's urban fabric, although preliminary conjectures regarding the layout can be made at this time. Amheida manifests a diversity of structure types, as can be expected for a major regional center. The houses seem to be single – or, in some cases, possibly two-story – mud brick structures with mainly barrel-vaulted roofs and some palm reed and mud flat roofs. Industrial areas can be found distributed among the domestic structures but primarily along what we currently understand to be the edges of the city. A temple mound on the west side, around which the Roman settlement curves, and mortuary structures along the southern side are also clearly evident among the surface remains. Agricultural fields occupied the low-lying surrounding landscape. Governmental, administrative, or so-called public buildings have not been identified securely yet. Even so, it seems that the area just east of the temple mound may have been a focal point on the site as surface remains indicate a number of large, elaborate structures that may have served civic functions. Moreover, the houses excavated closest to this area appear to be of particularly high status.

There are two major streets currently identifiable at Amheida. First, a broad east-west-oriented road provided access into the city from the east. It leads from the industrial and domestic area on the northeastern extent of the site toward an area north of the temple mound, but it turns sharply off axis and then stops abruptly before reaching the temple mound itself. It is the widest-identified road at Amheida at nearly 7 m wide. It appears that the road and the structures along its easternmost extent may have been built during a single phase of construction.

The second major street is a north-south-oriented road that extends from the mortuary area in the southeastern portion of the city to the north. This road appears to have had structures built into it over time, which made it less effective as a major conduit across the city. In addition to these major roads, there are some less-fully traced out streets and alleys. One runs roughly parallel to the major north-south road and is located between this road and the temple mound. Some additional east-west-aligned streets also occur. Curiously, the project has not yet identified any streets connecting the eastern

settlement area with the temple mound nor has any trace of the temple dromos been found.

There are several areas that indicate localized planning. For example, the northeastern part of the site appears to have been laid out in a single phase, and the structures in this area share similar plans. An area located in what appears to be the center of the Roman site also contains houses that, from the surface, appear to share similar layouts. Likewise, in an area just south of the temple, a series of roads delineate the eastern boundary of a housing block where at least one significant, decorated house is identifiable on the basis of surface architecture (Boozer 2007: 109–14).

Domestic Structures

Domestic structures have been a key focus of this project since its inception, and this project has made a major contribution to our understanding of Romano-Egyptian domestic life (Boozer 2012).

A fourth-century house (B1) provides us with a wealthy dwelling that contained Greek mythological wall paintings in a central, domed room and wallpaper motif wall paintings in a number of side rooms. These figural scenes are unique within Roman Egypt at this time and also inform us that occupants of the oasis were more au fait with Roman Mediterranean cultural norms than might otherwise be expected. Measuring 15 × 15 m, this house was largely square in plan view and had a clustered plan of access between rooms. Most of the rooms were covered in barrel vaults, although one room contained a dome, potentially with an oculus, and there were flat roofs constructed out of palm reeds and beams with a mud plastering over at least two rooms. Minimal material culture was recovered from this structure. Damp conditions did not preserve soft organic materials as well as at other sites within the oasis, particularly Kellis (Ismant el-Kharab). The other materials that survive include a substantive corpus of ostraka, which provide information about the owners of this structure, dependency relationships within the region, small-scale economic data, and also political information because one of the owners was a city councilor (Serenos) (Bagnall & Ruffini 2004, 2012). Ceramics are of a generally high quality with respect to the local assemblage, and there are other artifacts that point toward higher status occupants. Preliminary analyses suggest that the occupants consumed foods common within the broader Roman Empire and sustained an existence looking more toward the Mediterranean than one might have expected, given the peripheral location of the site (Boozer 2007: 122–90, 2010, 2012).

The vicinity of the house has also been explored. Children appear to have been educated in three rooms along the north end of the house. Red dipinti on the walls indicate that these children were educated in classical Greek traditions and particularly rhetorical verse composition (Cribiore et al. 2008; Davoli & Cribiore 2010). South of the house lies another unexcavated house with an identical overall footprint and a similar layout within. Sondages beneath the excavated house indicate that it is located on top of a Roman bath house that possibly dates to the third century CE and was constructed out of mud and baked brick. Only a fraction of this structure has been excavated thus far, due to the overlying domestic structure. Excavations have recently begun on an additional structure (B6), located northwest of this house. This structure contains approximately ten rooms and a central, columned room. These preliminary results may suggest Roman Mediterranean influences on the architecture, but more excavation is required.

A mid- to late third- to early fourth-century CE house (B2) was also excavated in its entirety. This house is located in the northeastern part of the site in an industrial and domestic quarter. The house measures 121 m^2. Like the larger house, this structure is constructed out of mud brick, demonstrates a clustered plan of access over its square plan, and employed barrel-vaulted roofs. No evidence of roofing was recovered from the central room. Cooking facilities are present both within the house as well as an exterior courtyard, suggesting potential changes in food preparation practices or different facilities used for different types of cookery. The material culture was preserved in great densities and included a small percentage of

organic remains. Objects and texts connect the inhabitants to a range of activities including linen weaving, trade, and low-level water management. This evidence indicates that the inhabitants may have participated in small-scale management of production and transportation activities, which may provide useful avenues of research into mid-level economic relationships. The domestic assemblage as a whole shows a combination of Egyptian, Greek, and Roman influences. This range may indicate that the inhabitants had mixed ethnicities, that social status was linked with ethnic material goods, or that the inhabitants did not have a vested interest in identity politics (Boozer 2007: 191–247, 2011, 2012).

The vicinity around this house has also been explored. A courtyard exterior to the house contained a bread oven with a platform and appeared to have served as a stable for animals such as donkeys. The street adjacent to the house was also excavated, revealing multiple street levels as well as foundation trenches in common between the house and the street (Boozer 2007: 193–5, 237–9). The DOP cleaned and mapped the surface of a structure across the street from this house, revealing a house that was subsequently provided with kilns for small-scale ceramics production (Hope 1980: 307-11).

Temple

Amheida's temple was dedicated to the Egyptian god Thoth, god of writing and wisdom. The temple itself, although looted in antiquity and again in more recent times, has provided substantive information on the occupational history and religious life within the Dakhleh Oasis. Excavations of the numerous Ottoman looter pits that dot the temple mound have indicated that the site was occupied since at least the Old Kingdom, and the material recovered from these excavations suggests that there may have been a settlement located on what became the temple mound in later years. New Kingdom remains include an ostracon with a school exercise (Kaper 2010).

The epigraphic material from the temple has provided a particularly important collection of cartouches with Pharaonic and imperial names that indicate governmental investment in this region. The recovered cartouches provide us with some of the construction history of the temple and associated chapels, although interpretations may change as they are based on a highly fragmentary data set. Minor building took place under the Theban 23rd Dynasty (King Pedubast c. 800 BCE) and the early 26th Dynasty (Nekau II, 610–595 BCE, and Psamtek II, 595–589 BCE). Major construction seems to have started under Amasis/Ahmose II (569–526 BCE) and the Persian ruler Darius I (522–486), both of whom contributed a new chapel with vaulted ceiling. The Roman Emperor Titus (CE 79–81) built a new Roman period temple on the site, and Domitian (CE 81–96) both demolished older structures and contributed a new larger sanctuary, which was extended under later emperors as yet anonymous (Kaper & Davoli 2006; Kaper 2009). The epigraphic material also provides us with some intriguing clues about local oasite traditions. In the Third Intermediate Period, Dakhla was ruled by an egyptianized Libyan tribe, called the Shamain (Kaper & Davoli 2006; Kaper & Demarée 2006; Kaper 2009). This epigraphic material suggests that these late dynasties incorporated the oasis region structure much more thoroughly into their regional ruling than had been attested previously. Moreover, the Persian Period finds have provided some of the most substantial indications of a Persian presence in this distant oasis.

The material culture recovered from the temple mound includes fragmentary glimpses into local cultic practices and the occupational history of Amheida. For example, ceramic coffins containing un-mummified birds were recovered from the temple mound. Such deposits were common from the Late Period through the Roman Period and served as votive offerings. The remains included a range of birds (raptors, ibis) as well as other animal fragments. The ibis was long associated with Thoth, while the raptors should be associated with other gods venerated in the oasis such as Horus or Ra-Horakhty. Offerings to Osiris were also found in the form of 45 bronze statuettes, fragments, and pendants of the god. In addition to these finds, ceramics dating back to the Old Kingdom have been recovered, including large quantities of bread molds.

Future Directions

Topographic survey will continue to expand and fill in detail to the urban and cemetery layout of Amheida, and excavations will continue in the areas previously investigated in order to deepen our understandings of the areas surrounding excavated structures. For example, excavation has commenced in an additional structure (B6) located in the vicinity of the fourth-century house (B1). These excavations will continue to refine our understanding of the distinctions between public and private architecture in this site, since previously excavated domestic structures in Dakhleh are much larger and more opulent than previously suspected. Excavations will continue in the vicinity of the third/fourth-century house (B2) in order to understand neighborhood affiliations, small-scale production, and ethnic affinities in Roman Egypt. Likewise, additional research will take place on the temple mound in order to recover additional information about the construction history of this temple, the occupational history of Amheida, and the history of the oasis in general. Geological and geomorphological surveys will continue in the future to understand the landscape of the city and of its surroundings. The project also intends to begin a mortuary and physical anthropological component in the near future.

Cross-References

- ▶ Domestic Architecture, Roman
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Late Antique Egypt, Archaeology of
- ▶ North Africa, Roman

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Amphitheater

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Introduction

The amphitheater is one of several classes of building that were developed to accommodate a range of entertainments and spectacles in the Roman world. It is one which was an exclusively Roman development, and which was traditionally associated with gladiatorial display. As a building type, it was relatively late in reaching its canonical form and associated facilities. Debates about the origins of both the structures and the types of display have monopolized scholarly attention, although recent research has clarified many points (Futrell 1997; Welch 2007). Partly as a result of senatorial opposition as well as cultural conservatism, permanent amphitheaters were not constructed in the city of Rome until the very late first century BCE, despite the fact that they were being provided earlier for other cities in Italy. In the provinces, most amphitheaters were constructed in the first to early third centuries CE corresponding to the chronology of epigraphic evidence for arena displays, though it should be noted that not every city had one, nor were they always constructed on a monumental scale. In the Eastern Mediterranean, a more complex situation prevailed which involved the limited provision of purpose-built amphitheaters and the much wider modification of preexisting entertainment venues for arena displays.

Definition

The permanent amphitheater is recognizable by its elliptical plan, with an oval arena completely surrounded by seating (Golvin 1988; Welch 2007). This is the literal meaning of the Greek word "*amphitheatron*," which from the time of Augustus gradually came to be used for this structure (Vitruvius, *de Arch* 1.7.1; *Res Gestae* 24; see also Dio 43.22). The earliest, datable permanent amphitheater is at Pompeii (Italy), and in the dedicatory inscription (*CIL* 10.852, 70–65 BCE), it is termed as "*spectacula*," a word usually used for the entertainments themselves, and one clearly employed here because such buildings had yet to acquire a specific terminology.

Gladiatorial displays (*munera*) had their origins in aristocratic funerary rites, and as such played an important role in elite display and competition in the Republic. They were staged in the Forum Romanum, the traditional location for aristocratic funerals, and the temporary spectator facilities required for the displays became increasingly elaborate. These facilities may have provided a model for the ovoid plan of early permanent amphitheaters elsewhere in Italy (Golvin 1988: 56-8; Welch 2007: 30-71). Investigations during the mid-twentieth century under the paving of the Forum Romanum located a central corridor, with four lateral arms bisecting it at regular distances 15 m apart, which excavators dated to the mid-first century BCE. Access up into the open piazza was provided by 12 shaft openings. Traces of installations in these galleries are reminiscent of the system of cages and pulleys for winching performers and animals up into the arena that would later be installed beneath the arena in some developed amphitheaters of the imperial period (Coleman 2000: 227-8). The amphitheater at Pompeii was dedicated by C. Quinctius Valgus and Marcus Porcius, *duoviri* of the new colony established

at Pompeii in 80 BCE; they paid for the structure with their own money and in accordance with their magistracies (Golvin 1988: 33-7; Welch 2007: 74-7). The building was located just within the eastern city walls, and measures 135 by 105 m externally. In common with other early amphitheaters, it was not provided with the extensive vaulted substructures, and the main support for the seating was formed by upcast from digging out the sunken arena. The exterior retaining wall at the upper level was built of *opus caementicium* faced with *opus incertum*, strengthened by buttresses, and with staircases that provided spectator access to the top of the *cavea*. At the north and south ends were broad, sloping corridors leading down into the arena. It was not until 29 BCE that Rome received its first permanent amphitheater, built by T. Statilius Taurus. It stood in the southern Campus Martius, and was financed by the *manubiae* (a general's share of the booty) he received from his successful campaigns in Africa (Dio 51.23.1; Suetonius, *Augustus* 30.8; Golvin 1988: 52-3; Welch 2007). Little is known about it except that it was small and built of stone and wood; Dio referred to it as a "hunting theater" (*theatron kunegetikon*) and probably it was never used as a fully public venue. It was destroyed in the fire of 64 CE.

Key Issues/Current Debates/Future Directions/Examples

Key Example: The Colosseum

The most famous, and most influential, of all amphitheaters in the Roman world was the Flavian Amphitheater in Rome, better known today as the Colosseum (Gabucci 2001; Lancaster 2005; Welch 2007) (Fig. 1). It was begun by Vespasian on the site of the drained lake of Nero's Domus Aurea and dedicated in 80 CE by Titus after his father's death**.** This was a grand and monumental building of four stories, 52-m high, standing on elliptical concrete foundations 12-m deep. It was an astonishing feat of planning and engineering on an unprecedented scale. With outer dimensions of 188 by 156 m and an arena measuring 80 by 54 m, an estimated 100,000 m^3 of travertine was used for the façade with 300 t of iron to clamp the blocks together. A combination of materials was used: concrete, travertine, and tuff, which allowed architects to address the specific structural challenges inherent in its design. The vaulted substructures beneath the *cavea* comprised a series of passages, corridors, and staircases. The three outer arcades formed two outer, annular corridors 7-m high covered by concrete barrel vaults. One further ring corridor

Amphitheater, Fig. 1 Colosseum, view of the arena

closer to the arena was constructed of brick-faced concrete with a veneer of marble; this particularly grand passageway was used by those accessing the ringside seats set aside for the elite. These annular passages were intersected by the radial passages that accommodated staircases, superbly organized for ease and control of access. Although the access system was used in both the theaters of Marcellus and of Pompey in Rome, here it was perfected so that the building perfectly incorporated the functional demands of a segregated society into its fabric (Edmondson 2002).

The design of the façade, broken up by arches, was framed by traditional orders (Tuscan, Ionic, and Corinthian), and helped to relieve the visual heaviness of the building. A similar treatment had already been employed for the exterior of the Theater of Marcellus (ded. 13 BCE). The topmost level of the Colosseum facade, possibly not completed until the reign of Domitian, was a plain wall with windows alternating with Corinthian pilasters. It is at this level that the corbels for the awnings (*vela* or *velaria*) are preserved. Beneath the now lost wooden floor of the arena is an elaborate system of subterranean passages and chambers where animals and gladiators were held in readiness and winched up to the arena level or let up along ramps (Connolly 2003; Lancaster 2005). These had a very simple arrangement in wood at the time of the inauguration, such that scholars have suggested that the arena could have been flooded for full-scale aquatic displays, as implied by the literary sources (Dio 66.25.2-4; Coleman 2000; Gabucci 2001; Connolly 2003; Dodge forthcoming). There is still much debate about the logistics of such an enterprise, made more difficult by the fact that the arena substructures (*hypogeum*) have been much refurbished and rebuilt over time. However, such substructures and their access points can be better appreciated in the amphitheaters at Capua and Pozzuoli in Campania. Here the arena floors of concrete are still in place, and the trap doors for hauling up animal cages can still be clearly seen (Golvin 1988).

Welch has demonstrated that the provision of amphitheaters in Italy and the western provinces during the late republican and early imperial periods was linked to army training, and to veteran settlement and entertainment, as at Pompeii and Capua (Welch 2007: 88-91). These first permanent amphitheaters came to represent an important display of Rome's power and culture in Italy, and late first century BCE colonies also provided the context for the earliest amphitheaters in the provinces, as at Carmona (Spain) and Corinth (Greece) (Golvin 1988: 41-2; Welch 2007: 255-9; Dodge 2009; 2010). In the early imperial period, this colonial association continued within Italy, for example, at Aosta and Verona. Both colonies and provincial capitals provided important contexts for amphitheatrical building projects in the provinces, as at Lyon (France), Mérida (Spain), and Carthage (Tunisia) (Golvin 1988: 82-3, 109-10, 122-3; Bomgardner 2000: 128-41).

Amphitheaters in the Provinces

Amphitheaters survive in large numbers in Italy, North Africa, the Danube region, and the Western provinces, although with much variation in size and design, for example, at Capua (170 m by 139 m), second in size only to the Colosseum; Nîmes and Lyon; Carthage, El Djem (Tunisia); and Lepcis Magna. Extramural amphitheaters were also built and survive at some tribal capitals in Britain, as at Silchester and Cirencester (Wilmott 2008). Legionary bases around the empire were routinely provided with an extramural amphitheater, for example, at Vetera (Germany), Caerleon and Chester (Britain), Carnuntum (Austria), and Lambaesis (Algeria) (Golvin 1988: 80, 88; Futrell 1997: 147-52). All are relatively small, both in overall size and scale of construction.

In the British and Gallic provinces a hybrid structure, built to function as both theater and amphitheater, was often constructed, for example Les Arènes in Paris (France). It is unclear if these "theater-amphitheaters" (also, confusingly, referred to as "semi-amphitheaters" by some modern commentators) were more amphitheater than theater and what kind of performances took place in them (Golvin 1988; Dodge 2009). They were generally not elaborately constructed, utilizing earth banks retained by masonry walls as supports for the seating (*cavea*). Similar theater-amphitheaters were also associated with

Amphitheater, Fig. 2 Pergamum. Amphitheater

rural shrines in Gaul, as at Sanxay, and these perhaps should be interpreted as a continuation of the classical connection between temple and festival games as seen in the Greek sanctuaries at Delphi and Epidauros, and continued in Italy, for example, at Pietrabbondante. The only example of this type of hybrid theater-amphitheater outside the northwestern Provinces is at Lixus in Morocco (Golvin 1988). There may also have been an economic element in this design, maximizing the facilities available in a single building.

By comparison with the West, there are far fewer purpose-built amphitheaters known in the eastern Roman provinces. This has been traditionally explained by the idea that the Greek East was more "civilized" than Italy and the Western Provinces, and therefore would not have indulged in the kind of blood sports these structures accommodated. However, 22 purpose-built amphitheaters have already been identified in the East (Dodge 2009). The earliest example was constructed at Antioch-on-the-Orontes in the later first century BCE (Malalas 216.21-217.4; Libanius *Orations*, 2.219). Malalas referred to it as "a place of single combat" (*monomachikon*). The simple form of this building, partly rock-cut with no arena substructures, was probably similar to other contemporary amphitheaters known in Italy and the West, for example, at Paestum (Italy) and at Carmona. None of the amphitheaters in the Roman East have the monumentality and arena substructures seen in the West, as Nimes, Mérida, or El Djem, except perhaps Pergamum and Cyzicus (Golvin 1988; Dodge 2009) (Fig. 2).

Problems of Definition

There are many venues that do not fit simple modern characterizations, both in terms of ancient terminology and the range of events staged within them. This is particularly true of the eastern empire that had an already existing building stock of theaters and stadia. What has become clear in recent years is the extent to which venues were modified and remodeled to maximize the flexibility for staging a range of entertainments. This was achieved in a number of different ways. In theaters, the most common method was the construction of a wall around the orchestra, often with the removal of the lower rows of seats and the reduction of the stage-building to create an arena-like space, as at Corinth (Dodge 2009); the removal of the seats created a high podium wall providing both protection and better viewing for the spectators. These modifications are mainly second century CE in date, or later, but some occurred as early as the first century CE, as at the Theatre of Dionysus in Athens. Stadia were adapted in a similar way at the curved end of the structure to create a mini-arena, for example, at Perge (Welch 1998, 1999; Dodge 2009).

Very few entertainment buildings have been fully excavated and properly published, making their dating and structural history problematic. Despite the massive scale of construction and public investment, some have been completely lost. Thus, new discoveries in recent decades have been particularly important, advancing knowledge in the provision of these buildings and the engagement of the local populations in typically "Roman" cultural pursuits. For example, an amphitheater was identified and excavated in the late 1980s and 1990s in London, the provincial capital of Britannia (Bateman 2008). The identification in 2006 of an amphitheater at Sofia (Bulgaria) has made another addition to the lengthening list of amphitheaters in the Eastern part of the Empire, further emphasizing that Roman spectacles were enjoyed as much in the Greek East as in the Latin West (Welch 1998, 1999; Dodge 2009; Velichkov 2009).

The most northerly amphitheater occurs in a military context in Scotland associated with the Antonine fort of Inveresk (Wilmott 2008); the most easterly examples have been identified at Palmyra in the Syrian desert and Dura-Europos on the Euphrates (Rostovtzeff et al. 1936: 72-7; Golvin 1988: 139; Hammad 2008; Dodge 2009). Interestingly, the latest amphitheaters were constructed in the third and early fourth centuries CE, for example, at Beth Guvrin (Israel) (Dodge 2009), at a time when the gladiatorial games themselves were becoming far less frequent, and indeed late evidence is nonexistent in the West outside Italy. As combat displays declined, arenas continued to provide a venue for the other types of display with which they had long been associated – animal displays, acrobatics, and dancing. This continuity is very evident in the early sixth century CE writings of Cassiodorus and the contemporary diptychs of Constantinople (Cassiodorus *Variae* 5.42.6-10; Dodge 2009, 2010: 73-6).

Cross-References

- ► Architecture, Roman
- ► Romanization
- ► Urban Planning, Roman

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Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation

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Introduction

Archaeological artifacts which have been lost, abandoned, or deliberately deposited in the ground will become included in the natural cycles of decay and the return to nature. This normally results in the survival of only the more robust materials such as stone, shell, and ceramics and the partial survival of metals, glass, bone, and other inorganic materials. The most abundant materials used by mankind are of organic origin such as wood and plant materials, skins, and other animal products. These will normally all be destroyed through microbial activity and biodeterioration, leaving barely a trace. But occasionally these materials do survive, albeit in a greatly altered state, through becoming included in anaerobic waterlogged deposits. Where such conditions pertain not only do a greater range of artifact materials survive but also environmental macrofossil remains such as small bones, insect parts, plant remains, seeds, and pollen resulting from the interaction between humans and their immediate surroundings. Waterlogged archaeological deposits therefore represent a particularly valuable source of information about past cultures and environments, requiring special management and protection.

Definition

Anaerobic, or anoxic, conditions are formed by the exclusion of air from the burial medium through water saturation. This denies the microorganisms (mainly fungi and bacteria) responsible for biological decay the oxygen which their metabolism requires. These oxygen-free or "reducing" conditions can also provide excellent protection against corrosion for metals such as copper, lead, and iron whose normal corrosion is as a result of oxidation processes (Selwyn 2004).

Artifacts composed of organic materials (wood, leather, and animal and plant fibers) can survive burial in anaerobic deposits for many hundreds or thousands of years, but only if the artifacts become well sealed within anaerobic deposits and with their chemical equilibrium undisturbed and at a depth that does not permit exchange of oxygenated water from the deposit/air interface. Anaerobic waterlogged conditions most commonly exist in the sediments at the bottoms of rivers and lakes; in fenlands, marshes, and peat bogs; and in urban contexts where the natural water table is raised artificially through centuries of deliberate dumping of organic debris.

Key Issues/Current Debates/Future Directions/Examples

Wetlands have always been a focus of human activity and settlement, offering means for defense, transport, and trade or the ready availability of natural resources. Where anaerobic conditions persist into modern times, preserved cultural materials of many different types and sizes may be anticipated. Discoveries are almost always made due to modern exploitation, such as gravel extraction, peat digging, land drainage for agriculture, the dredging of rivers, and construction. Among the largest waterlogged wooden structures discovered in recent years are ships and large boats, normally discovered in silted up river harbors, on river beds, or incorporated into riverbanks. In the UK prehistoric dugout canoes are regularly found during gravel extraction in the flood plains of rivers or in the digging of drainage channels and artificial lakes. The remains of prehistoric settlements and associated trackways, constructed entirely out of wood, are often found accidentally or as a result of rescue excavations on sites threatened with

the dewatering and shrinkage of overlying protective peat layers. Wetlands, especially bogs, can also contain remarkable assemblages of well-preserved artifacts of many material types, taken to be votive or sacrificial deposits. Bogs can also be the last resting places of human sacrifices, as in the case of the Danish bog bodies and Lindow Man (Stead et al. 1986), found during the commercial digging of peat. Culturally rich waterlogged deposits also exist in many ancient cities, such as London and York in the UK and the major ancient towns in Scandinavia. These highly organic contexts, sometimes referred to as "black earth," contain domestic, craft, and industrial waste, timber foundations, and environmental remains – all of which, when properly excavated and researched, can provide a highly detailed picture of the life and activities on that particular site and its surroundings, sometimes over many centuries.

Artifacts of organic origin can often be preserved sufficiently well that the surfaces still bear an extraordinary level of detail. Wood artifacts and structural timbers often bear the clear signs of the tools used in their shaping, allowing the type and size of the cutting tool to be identified. Even the "tool signature," the minute signs of damage and wear to the blade edge, can be recognized, allowing the use of the same tool to be identified over several timbers or within the same structure (Brunning 2010, 16). Non-artifactual wood from prehistoric contexts has occasionally been found still bearing the chew marks of ancient beavers (Coles 2006). The study of wood technology and biology often provides valuable information relating to resource use and procurement, woodland management, and dating through dendrochronology. But despite appearances, waterlogged organics are usually to be found in a highly altered state upon excavation, having become denatured by their long period of burial. The more susceptible portions of the material's structural and chemical makeup will have been removed through processes such as hydrolysis, the breaking down of chemical bonds through the addition of water. This is partly driven by low levels of bacterial activity that is able to tolerate the toxic anaerobic conditions. Wood will lose its cellulose component leaving only the lignin skeleton, but enough of the macrofossil structure will often remain to permit identification (Kenward et al. 2008). Leather survives only because the tanning process has rendered the collagen fibers resistant to hydrolysis. Only textiles of animal fiber origin (hair, wool) are normally found, since keratin is similarly resistant. Other chemical factors in the burial medium may also have an effect on survival. Peat bogs can be strongly acidic, causing some materials, such as bone, to be destroyed. But peat bogs are also extremely tannin-rich meaning that skin products other than pre-tanned leather will become preserved. This accounts for the survival of "bog burials" where the human skin and some internal organs are well preserved, but the skeletal material has all but disappeared (Stead et al. 1986).

Such denatured organic materials are often structurally very weak and their surfaces in particular extremely soft and fragile, their shape only being maintained by the water that they contain. They are therefore very susceptible to drying from the moment of exposure onward, any loss of water content causing irreparable damage to both surface detail and whole objects due to shrinkage and structural collapse. Controlled archaeological excavations of waterlogged sites require special management and resourcing as the working conditions and anticipated results will be so different from a normal dry site. Special techniques and procedures will be required for uncovering waterlogged structures and artifacts, with specialist skills and knowledge available to undertake recording, sampling, and field stabilization and conservation (Brunning 2010). Advance plans need to be made for the safe packaging and temporary storage of recovered materials and arrangements made with suitable laboratories for longer-term storage and treatment. The preservation treatment of waterlogged materials can be costly and complex, especially for larger items, and the decision to excavate and lift waterlogged structures and assemblages can only be presaged on the ability to undertake such

preservation (Hoffman in press). The possibility of reburial or "preservation in situ" has, it seems, only become a viable alternative in exceptional cases (Coles 1987; Spriggs 1987). Current research into these topics is reported to the triennial international meetings of the Waterlogged Organic Archaeological Materials (WOAM) Group of the ICOM Conservation Committee (e.g., Straetkvern & Williams 2012).

The main threat to wetlands and other types of waterlogged deposits is from lowering of the water table, with consequent drying out, wastage, ingress of air, and the rapid onset of the normal processes of biodeterioration. In cities such as York and Bergen, evidence for dewatering can be linked directly to the construction of buildings with underground basement levels which serve as sumps for water from the surrounding cultural levels which start to dry out as a consequence. Rural wetland sites are under continual threat from activities such as sand and gravel quarrying, peat extraction, and field drainage for agriculture. Waterlogged structures are seldom anticipated or detectable in advance of these activities, and major finds are not uncommon and have to be recovered by archaeologists under "rescue" conditions. Efforts at site protection are often most likely to succeed when in concert with other organizations with common interests such as nature conservation bodies and wildlife agencies. Legal protection is sometimes possible where cultural significance can be established, and interest from other stakeholders, such as tourism and education, can also be valuable. But in most cases, some form of physical intervention will also be necessary to maintain or elevate the local water table. Where extensive structures, such as prehistoric trackways and lakeshore villages, are known to exist, various forms of environmental intervention to protect surviving portions have been used by, for example, constructing clay bunds around the area to be protected, which is then backfilled and artificially flooded (Coles 1987). These attempts at protection are usually costly and require continuous monitoring and long-term regular maintenance, if they are to be successful.

Research into new methods and strategies for site protection techniques is reported at regular intervals at the Preservation of Archaeological Remains In Situ (PARIS) International Conferences (e.g., Gregory & Mathieson 2012). Important here is the development of techniques and equipment for inground monitoring to measure the rate of change in waterlogged soils and the effectiveness of remedial action taken (Smit et al. 2006). A number of site-specific projects are ongoing to find ways to slow down the deterioration of important waterlogged archaeological and historic structures and sites, such as at Bryggen, Bergen (Mathieson et al. 2008), and in Amsterdam (Klaassen 2005). These projects have led to an increasing awareness of the potentially catastrophic effects that could be caused by ongoing climate change.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Dating Techniques in Archaeological Science
- ▶ Deep-Water Archaeology
- ▶ Field Stabilization of Immovable Heritage
- ▶ Glass: Conservation and Preservation
- ▶ International Council of Museums (ICOM)
- ▶ Leather, Archaeological: Conservation and Preservation
- ▶ Metals: Preservation and Conservation
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Waterlogged Finds: Conservation
- ▶ Wood: Conservation and Preservation

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Analogy in Archaeological Theory

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Introduction and Definition

An analogy is a cognitive process by which new phenomena are comprehended from known experiences, using the latter heuristically in building explanatory models and in directing future research. Analogies perform an important role in theory building and in suggesting new lines of research. An orthodox position in the philosophy of science posits that analogies are not indispensable in systematic scientific explanations (deductive-nomological model) and thus are not part of the process of theoretical justification (hypothetic-deductive model), that is, analogies are significant in the process of discovery but not when scientific justification is at stake because they function in the inductive confirmation of a given theoretical proposition. However, analogical reasoning can perform a clue role in the justification of hypothesis and theories, especially if we accept that scientific practice ultimately rests on analogical extensions of paradigmatic models. An analogical argument allows setting forth conclusions based on similarities between two or more entities that share relevant structural properties (analogues). Yet, an analogical argument is not exclusively based on similarities and coherences between analogues but on ideas, generalizations, and principles that make the analogical movement feasible and open to epistemic consideration (Shaw & Ashley 1983).

Key Issues/Current Debates

In the history of archaeological thinking, the epistemological role of analogical inferences, in general, and of ethnographic analogies, in particular, has been central in the ontological debate that has taken place in the last decades about the status of archaeological theory in the social sciences field. In epistemological terms, archaeological knowledge has always used analogies drawn from other fields, such as history (analogies about changes over long periods), paleontology (materialist analogies about the classification of evidences), biology (analogies about the interconnectedness of different types of natural phenomena), and, in particular, anthropology (analogies about cultural behavior) (Murray & Walker 1988).

Ethnographic analogies were foundational in prehistoric archaeology since the sixteenth century, when the contact with "contemporary savages" made possible in Europe widening interpretative perspectives about ancient human artifacts, traditionally understood from a mythical or magical standpoint (Wylie 1985). The interpretations of antiquarians were configured as primitive analogies, that is, they were based on simple identifications and projections of certain empirical properties between two or more analogues, without even considering a relevant structural connection (Shaw & Ashley 1983).

The use of ethnographic analogies increased in the nineteenth century as attention was given to theoretical explanations of cultural development. If until the eighteenth century the antiquarian's perspective established a direct equivalence between "prehistoric primitives and moderns," for classical evolutionism contemporary cultures were composed of different degrees of cultural complexity that were projected into the past as stages of a determined course of historical development. This first systematic use of analogies in archaeological interpretation posited that the most primitive contemporary cultures were presumably comparable to most ancient forms of prehistoric savagery. Such an idea took for granted an evolutionary starting point in a developmental sequence of technological, economic, and political stages leading to industrial civilization (Wylie 1985). Ethnographic analogies in classic evolutionary thinking were a direct reading of the past from the present. They were standard analogies in that the identification and projection of certain empirical properties between two or more analogues were constituted from conditions of relevance established by the very principles and theoretical structure that set them forth in the first place (Shaw & Ashley 1983). This kind of analogical inference is based on uniformitarian premises, making it impossible to prove its truth. Besides, they are prone to error and are a part of an ethnocentric, biased vision of the past (Wylie 1985; Trigger 1992).

A first reaction against the abuses of classical evolutionism stemmed from the rejection by culture-historical archaeology of ethnographic analogies as interpretative inferences about past human behavior. At the beginning of the twentieth century, the emphasis on establishing cultural typologies and chronologies championed by culture history led to a renewed appraisal of analogies based on the direct historical approach. In American archaeology, the proximity with anthropology made it possible to trace direct relationships between the prehistoric past and historical events documented in written sources. This was achieved by archaeological investigations in sites with contemporary occupations. As a result, archaeological contexts and styles from a given area were identified with groups that were recognizable in ethnohistorical sources. The analogical argument involved was based on continuous models of interpretation which imply that the sources of analogies presuppose a genetic connection between ascendant and descendant, in clear opposition with the purely functional connections so cherished by evolutionism. The direct historical analogies of the 1930s and 1940s implied archaeological tests that could correct or confirm hypotheses derived from ethnographic or ethnohistorical data. Archaeological tests helped to control analogies, and ethnographic data helped to stimulate and direct archaeological research (Wylie 1985; Trigger 1992; Willey & Sabloff 1996).

Given that most prehistoric phenomena do not have likely evolutionary descendants and that

many documented ethnographic phenomena do not have any obvious archaeological ancestor, in the 1950s American archaeology began to search for new parameters for establishing general analogies based on discontinuous models of interpretation. Comparisons between the present and the past were filtered out by theoretical inferences derived from cultural ecology and multilinear evolutionism. Important in that regard was the notion that functional convergences between past and present cultures are mediated by similar environmental characteristics and similar levels of technological sophistication (Wylie 1985; O'Brien et al. 2005). They were, inferentially speaking, analogies with presumed structure, that is, analogies in which the connection between analogues is established by relevance, linking structure and properties (Shaw & Ashley 1983).

At that time, it was held that the problem with ethnographic analogies was mostly related to the limitations of the sources. In order to overcome such limitations, archaeologists should pursue their own ethnographic projects about continuous cultural change, by which living communities create, use, recycle, and discard the material culture that will eventually form the archaeological record (Wylie 1985). Although there was no methodological consensus about the role of analogies in archaeological interpretations, the term ethnoarchaeology began to be used from then on to define the research procedures of this "new analogy," placing emphasis on the study of subsistence and settlement patterns, production and use of material culture, and formation of the archaeological record. Experimental studies can also be included in this perspective because they were developed to document contemporary patterns of tool manufacture and the effects of natural processes in the formation of the archaeological record (David & Kramer 2001).

In the last three decades, the debate between processualism and postprocessualism regarding the role of analogies in archaeological interpretations reflects a wider epistemological discussion. The New Archaeology of the 1970s adopted a radical posture regarding ethnographic analogies. Such a posture stemmed from its explicit adoption of neopositivism, which rejects analogies as explanatory components of hypothetic-deductive methods. The New Archaeology strove to eliminate the dependence in analogies or any other form of inductive inferences leading to uncertain conclusions in hypotheses testing. They were treated as tautological inferences doomed to the fallacy of affirming the consequent. Such an objection was premised upon the limitations of amplitude and quality attributed to the empirical data used as referents of contemporary analogues, incapable of accounting for the diversity of past human behavior. The idea was that interpretative hypotheses must be deducted from nomothetic propositions based on well-established uniformitarian principles, such as those derived from natural sciences, projecting into the past human behavior regularities, limited to their biological and physical dimensions (Gould 1980; Gould & Watson 1982; Wylie 1985; David & Kramer 2001; O'Brien et al. 2005).

In the 1980s, the critique of the "safe yet limited" interpretations championed by processualism and of the role of analogies in archaeological practice led to the reassessment of the relationship between inductive methodologies and archaeological theory. If analogies are inductive but also ampliative, the conclusions they allow have more information than premises and initial data. The relevance of an analogy is assessed by analyzing the connecting principles between analogues that posit the simple presence or absence of given properties (formal analogies), emphasizing the importance of structural relationships between them (relational analogies). Relational analogies imply that causal mechanisms are behind similarities between analogues, determining the presence and interrelationship between properties. It is from this kind of analogical reasoning that established theories can expand to new analytical realms, given that such a reasoning is explanatory: the projection of new properties not only implies structural connections between the properties of the analogues but also explains their coherence (Hodder 1982; Shaw & Ashley 1983; Wylie 1985; O'Brien et al. 2005).

The analysis of the relational character of analogies between the present and the past in building archaeological theory is linked to the processualist revision of the guiding ontological principles of

the discipline through middle-range theory and behavioral archaeology. Middle-range theory posited relationships between the static and the dynamic through inductive methodologies, while general theories would be devoted, instead, to understanding those processes involved in changes and diversifications of the organizational principles of living systems. For middle-range theory, all interpretative principles about past dynamics cannot be tested in the archaeological record, for it is static and contemporary. Inferences about the past can only be tested in actualistic studies, in which the formation of the archaeological record can be examined experientially and directly. Such an approach is also based on uniformitarian principles: the causes of current events leading to the formation of the static archaeological record are the same obtained in the past. An analogy allows setting forth propositions about the past to be tested in the archaeological record. Consequently, ethnoarchaeology became a source for formulating and testing hypotheses about the relationship between cultural and material phenomena, making it possible to offer models of past societies based on contextual studies of the archaeological record (Binford 1977, 1981). To this analogical equation, behavioral archaeology adds noncultural processes that contribute to the formation of the archaeological record. It is argued that the understanding of the depositional and postdepositional processes responsible for the formation of the archaeological record is a means for refining analogical arguments linking past and present behaviors, as they are reflected in archaeological contexts (Schiffer 1995, 1996).

To the discussion on the limits of a neopositivist approach in archaeology, in the 1980s postprocessual archaeology added a wider openness towards social sciences. The paradigmatic tensions between processual and postprocessual approaches at the end of the twentieth century are a part of a wider debate in human sciences about universalistic and particularistic perspectives, opposing materialist and symbolic visions of cultural phenomena. Postprocessualism, drawing from eclectic theoretical approaches, emphasizes the symbolic nature of material culture and its active role in the relationship among human beings and between them and the environment. It champions the importance of linking social practices to history, and by doing so, it aims to capture the gradual and cumulative processes of cultural maintenance and transformation. While processual analogies between the past and the present would entail external, nonparticipant visions in the study of human behavior (etic perspective), postprocessualism, by positing culture as a fabric of historically constituted meanings, seeks to understand the meanings of material culture by contextualizing it in particular symbolic environments (emic perspective). This led to a renewed discussion about the role of analogies in building continuous and discontinuous interpretative models about the past (Hodder 1986).

Future Directions

In current archaeological theory, these dichotomies have been relativized by understanding that the knowledge about the past is contingent to a network of dialectical relationships between the whole and the parts, the universal and the particular, the structure and the event, and the material and the symbolic. The role of analogies in processual and postprocessual ethnoarchaeological approaches shares the common goal of building, from ethnographic experiences directed by an "archaeological gaze," interpretative models about the relationship between practice and symbolism in the action of human beings upon the material world. Likewise, relational analogical thinking keeps feeding the development of ethnoarchaeological approaches strongly aligned with processualist premises, such as those arising from performance theory, and it also contributes to a dialogue with natural sciences through behavioral ecology and Darwinian archaeology (David & Kramer 2001; O'Brien et al. 2005).

Cross-References

▶ Ethnoarchaeology
▶ Ethnoarchaeology: Building Frames of Reference for Research

▶ Hypothesis Testing in Archaeological Theory
▶ Middle-Range Theory in Archaeology
▶ New Archaeology, Development of
▶ Post-Processualism, Development of
▶ Processualism in Archaeological Theory

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Ancestry Assessment

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Introduction

The assessment of ancestry forms part of the suite of analyses undertaken by forensic anthropologists and bioarchaeologists to develop a biological profile. Regardless of the methods used, it is not an easy task to assess a person's biological ancestry. It is usually not possible to be confident about an assessment unless a person's ancestry lies within one of the four major geographical regions of the Euro-Mediterranean, sub-Saharan Africa, eastern Asia, or Australia/Melanesia. The reason for lack of confidence is that areas between these four regions contain people whose biological properties tend to be blended.

Definition

Ancestry in this context means where a person's ancestors originated before the mass voluntary and forced migrations of peoples that started around the world in the fifteenth century CE.

Key Issues

Why Assess Ancestry?

There are various reasons for wanting to assess ancestry from skeletal remains. These may include answering archaeological questions, such as the identification of persons of African ancestry in Romano British York (Leach et al. 2009). A major question in archaeology is whether the spread of agriculture into Europe was caused by the migration of farming people from Southwest Asia or by the diffusion of cultural practices (Pinhasi & Von Cramon-Taubadel 2009). More remote in time, there are questions such as whether the late Pleistocene Upper Cave skull 110 from Zhoukoudian, in China, is a morphological candidate for being an ancestor of modern people in eastern Asia (Wright 1995).

The process of repatriation raises questions about whether particular skeletal remains are biologically related to the groups to which they are to be repatriated, or whether there has been some confusion of labeling over the decades since they were collected.

In the forensic field, an assessment of an individual's ancestry from analysis of the skeletal remains may help in the search for missing persons. If ancestry has been assessed from skeletal remains, then information about an individual's soft tissue, and the hair color and form, will be more accurate. So assessment of ancestry, when no soft tissue is available, may help in facial reconstruction.

In summary, anthropological evaluation of ancestry offers a quick estimation, which may later be backed up or refuted by analysis of DNA. However, the ability to use DNA cannot be taken for granted. In many non-forensic cases, there are no funds to use DNA to compare results with anthropological assessment of ancestry. There may also be no viable DNA recoverable from archaeological bones. So a need persists for the anthropological analysis of ancestry, using the appearance of the bones themselves.

Assumptions Underlying Assessment of Ancestry

Most assessments of ancestry depend on the skull, because of its high information content available for both observation and measurement. All anthropological methods for determining ancestry are based on the critical assumption that there is systematic geographical patterning of cranial variation (Howells 1989). This assumption of patterning is justified on a worldwide scale (Fig. 1). This scattergram is derived from a metrical analysis of 29 measurements on each of 3,163 skulls in the CRANID database (Wright 2008). Though the provenance of each skull is known, the analytical program that produced the chart contained no information about geographical origin. Analysis considered merely likeness and unlikeness, in size and shape, of the skulls. The results are consolidated for plotting as points on the chart, which represents samples in the space of what are known as the first two canonical variates.

If geographical origins are then superimposed onto the purely craniometric chart, it is possible to see that there is a high correlation between cranial form and world geography. The craniometric results produce an approximate map of the world. Therefore, placing an unknown skull on such a map, using its measurements, helps in an assessment of ancestry. An additional working hypothesis is that this patterning is very much due to inherited variation, though there is likely to be some interference from such environmental factors as diet and climate.

How Is Ancestry Assessed?

Early attempts to determine ancestry were hampered by lack of computers. For many decades anthropologists used the two variables of cranial length and breadth, from which they calculated, by hand, the so-called cranial index. Results for this index ranged from dolichocephalic (long headed) to brachycephalic (short headed).

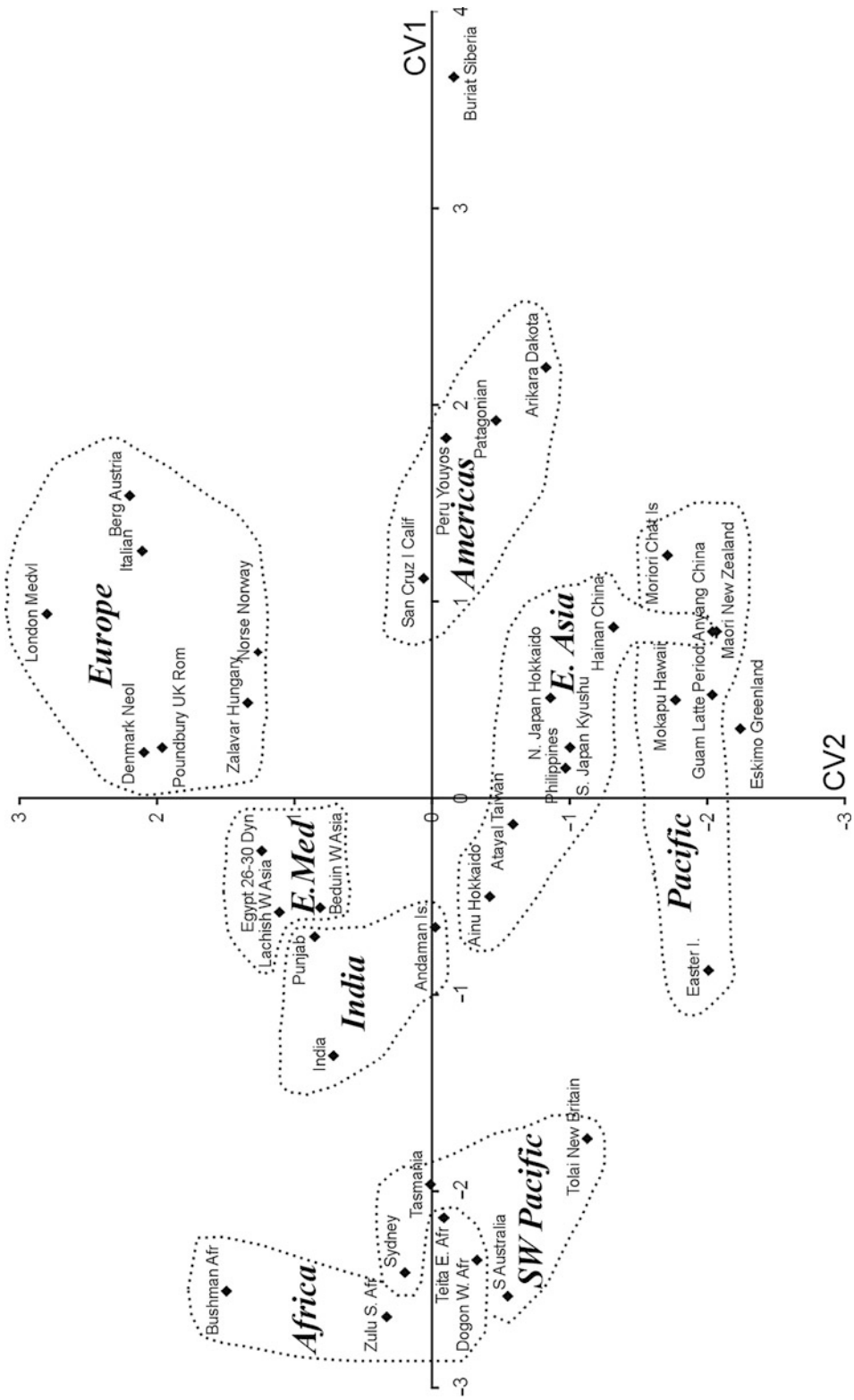

Ancestry Assessment, Fig. 1 Samples of skulls analyzed by CRANID and plotted in the space of the first two canonical variates following multivariate analysis. No geographical information was available to the program, only cranial measurements. Nevertheless, there is a clear geographical patterning of samples, showing that there is good correlation between geography and cranial form. This correlation is the assumption that underlies methods of assessing ancestry

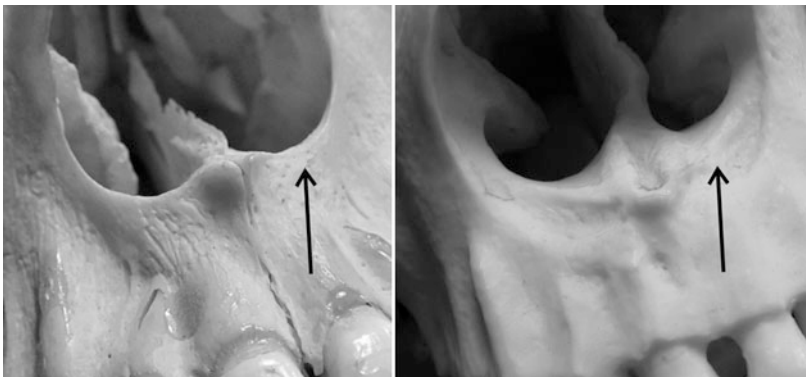

Ancestry Assessment, Fig. 2 Two extreme forms of the anterior margin of the base of the nasal aperture. The sharp sill on the left is characteristic of people with European and east Asian ancestry. The smooth form on the right is characteristic of people with sub-Saharan African and Australian/Melanesian ancestry

Though much effort was published in this field, the results had fundamental flaws when applied worldwide to an understanding of ancestry. For example, in their cranial index medieval Norwegian skulls are more like Tasmanian Aboriginal skulls than they are like medieval skulls from European Austria – an ancestral implication that is negated by all other indications of ancestry and history.

More durable in their usefulness have been various illustrations of skulls that characterize the properties of skulls from various geographical regions. Use of these illustrations depends on the undoubted ability of the human mind to visually evaluate similarities and dissimilarities between images. Widely used illustrations are those of Rhine (1993). These illustrations have been reproduced elsewhere, and are presented with full annotations in Klepinger (2006). While such illustrations are easy to use by workers with no prior knowledge of worldwide cranial variation, they tend to be limited by being caricatures of geographical extremes. In other words, they do not take account of variation within groups and overlap between groups.

Furthermore, it happens that determination of geographical origin is easiest in the case of adult males, who best manifest the extremes seen in the illustrations. The skulls of females and subadults tend toward the undifferentiated general human form of cranial appearance and, because of much overlap in morphology, their ancestry is more difficult to assess by whatever method is used.

One advantage of such illustrations, compared with the craniometric approach, is that they can readily illustrate such simple but important discriminating properties such as the shape of the anterior margin of the base of the nasal aperture (Fig. 2). Although not a universal panacea for assessing ancestry, this tiny area of the face shows a sharp transverse ridge in people of European and eastern Asian ancestry. This ridge is not seen in people of sub-Saharan African or Australian Aboriginal and Melanesian ancestry where the sill appears smooth.

Multivariate Methods

The development of computers led to multivariate methods of assessing ancestry. Most of these efforts have used measurements of crania, though some have applied multivariate methods to the worldwide distribution of epigenetic traits (Hanihara et al. 2003). An early multivariate aid was supplied by Giles & Elliot (1962). Giles used linear discriminant analysis of eight measurements on American Whites, American Blacks, and Indigenous Americans. To take advantage of this work, the user substitutes measurements from an unknown skull into equations and thereby determines which of the three groups the unknown skull is most alike (Wright 1995).

The method of Giles and colleagues was helpful, but restricted in terms of its worldwide coverage. In 1973, the anthropologist W.W. Howells made available the results of his lifetime study of cranial variation in the human species around the world (Howells 1973). This work was followed up by the general release of the actual

measurements on the skulls (Howells 1996). His work is distinguished by a worldwide approach, and the notion of geographical mapping of cranial variation rather than the sterile, and to some provocative, attempt to define the concept of race and races.

The release of Howells's database led to the development of "turnkey" computerized packages for the determination of ancestry, such as Fordisc (Jantz & Ousley 2005) and CRANID (Wright 2008). Both packages use multivariate methods of discriminant analysis. Fordisc has additional forensic samples from America, and CRANID has additional samples from parts of the world not covered by Howells, for example, the Indian subcontinent and Patagonia.

Compared with the simplicity of comparing a skull with illustrations, the multivariate approach means that the user must first get thoroughly competent in taking a series of defined measurements. An advantage of the multivariate approach is that it offers numerical results. These reflect the differing probabilities of an unknown skull coming from particular samples from around the world.

Future Directions

Possible Advances

It seems unlikely that there will be significant advances in multivariate method and theory for use on craniometric data. The algorithms for discriminant analysis were developed in the 1930s. They have advanced little since then, though their use is now widespread with the availability of computer packages. A useful advance, aiming to improve the accuracy of determining ancestry, would undoubtedly come from increasing the worldwide coverage of samples of skulls that can be incorporated into discriminant analysis.

New techniques to take measures have been developed, for example, 3D landmark geometric approaches (Ross et al. 1999) as opposed to measurements by calipers. However, it is difficult to see such methods eclipsing the traditional approaches to worldwide assessment of ancestry, used in Fordisc and CRANID. This doubt exists because there seems little prospect of anybody building up a new worldwide reference collection that matches the comprehensiveness of Fordisc and CRANID. Skeletal collections from many parts of the world are now off limits when it comes to research.

Cross-References

- ▶ Age Estimation
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

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Andah, Bassey Wai

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Basic Biographical Information

An outstanding scholar and teacher, Bassey Wai Andah was born on January 6, 1942. He had his first degree in history at the then University College Ibadan, graduating in 1964. Bassey Andah's keen interest in archaeology was fired by series of open lectures delivered then by Professor Thurstan Shaw. By that time, he was a final-year history student and a member of the audience.

Shortly after graduation, Andah rejected a job offer by the Nigerian Department of Antiquities to take up a postgraduate program at the Institute of Archaeology, London, through a Nigerian Federal Government Scholarship. He completed his M. Phil. degree in July 1967 at the institute and thereafter proceeded to the University of California for a Ph.D. under the renowned Professor Desmond Clark.

Five years after securing his M. Phil. degree, Bassey Wai Andah gained his Ph.D. in 1973 with his thesis on archaeological reconnaissance in Upper Volta, 1970–1972. He became a faculty member at the Department of Archaeology at the University of Ibadan almost immediately after a successful defense of his work.

In 1978, Bassey Andah was promoted to the rank of a professor at the relatively young age of 36 and was also appointed as head of the Department of Archaeology.

Professor Andah who played very active roles in the formation and stabilization of the World Archaeological Congress (WAC) became the first African/third president of the World Archaeological body having been elected in Delhi, India, in 1994. He had earlier served WAC in various capacities including being the senior representative for the West African Region.

Professor Bassey Wai Andah was president of WAC till his last breath on December 22, 1997. Few months before then, precisely March 1997, he was elected as deputy vice-chancellor (Administration), University of Ibadan.

Major Accomplishments

Professor Bassey Wai Eteyen Andah's distinguished career in African archaeology was hinged on a proper channelling of "expert" curiosity, energy, and experience into the effective analysis of West African cultural patterns. Andah believed that many of the early scholars in West Africa were too uncritical especially in the approaches adopted for the story of man's broad cultural history in the region. Consequently, concepts and misconcepts coined from other places were utilized wholesale and indiscriminately in the analysis and interpretation of cultural life patterns in West Africa. He promoted the development of cultural resources management which he regarded as a means of linking the past with the present.

Andah carried out extensive fieldwork in various parts of West Africa and lectured in Ghana, United States, Sweden, and Nigeria.

Professor Andah was prolific as a teacher and a scholar. He wrote over 70 journal articles, authored four books, and coauthored six books on African archaeology. Having succeeded Professor Thurstan Shaw as the editor of *West African Journal of Archaeology* in 1978, Andah edited the journal till his death in 1997. He was a teacher of teachers as over 70 % of the current academics in the Department of Archaeology and

Anthropology, University of Ibadan, were his students. In fact, most of the archaeology teachers in other Nigerian universities were also his students, while many of his former students are today archaeologists, ethnographers, cultural officers, and museum professionals in different parts of Nigeria.

Bassey Andah was the longest serving head of the Department of Archaeology and Anthropology, University of Ibadan, having been head from 1978 to 1985 and from 1989 to 1991. It was at his initiative that courses in cultural anthropology were introduced and the first set of graduates with honors in cultural anthropology graduated during the 1982/1983 academic session. In the 1986/1987 academic session, the name of the department was changed to reflect the introduction of degree courses in anthropology.

The first Nigerian professor of archaeology laid the foundation for the active participation of Nigerians in the activities of the World Archaeological Congress. Today, Nigeria has two of her scholars in the executive of WAC, while the country has the highest number of members on WAC membership list in the West African Region.

During his lifetime, Professor Andah received a plethora of academic awards including the Fulbright Senior Scholars Fellowship award in 1984 and the CODESRIA/Rockefeller Senior Scholars Fellowship Award in 1991/1992. In 1993, he received the Distinguished Historian Award for APEX Museum, Atlanta Georgia, USA, and secured the Australian University's Merit Award in 1995.

In recognition of his academic brilliance and numerous contributions to African archaeology, a memorial lecture was instituted in his honor, while the library of the Department of Archaeology and Anthropology, University of Ibadan, was named after him.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ World Archaeological Congress (WAC)

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Andarayan: Agriculture

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Introduction

The archaeological site of Andarayan is located close to the Cagayan River, in the Cagayan Valley, just east of the modern town of Solana, northern Luzon, Philippines. Richard Shutler Jr. conducted limited test excavations at the site in 1978 (Snow et al. 1986). Within the alluvial deposits, Shutler recovered a large assemblage of red-slipped pottery, clay earrings and spindle whorls, and fragments of ground stone tools. Some of the pottery had been produced using an organic temper of rice chaff and broken stem segments to aid in the bonding of the clay during firing. The general shape of the glume imprints identified in the pottery indicated that the impressions were from rice *Oryza* and intermediate between the common cultigen *O. sativa* and its wild progenitors. A single AMS date of 3400 ± 125 years BP or 4000–3350 cal. BP (no code) confirmed that the pottery was

produced during the early–mid second millennium BCE. From this evidence Snow et al. (1986) argued that this represented the earliest evidence for the cultivation of rice in the Philippines and across most of Island Southeast Asia (The earliest known rice temper in Island Southeast Asia is from the cave site of Gua Sireh, Sarawak, Malaysian Borneo, and is dated to c. 4,200 years ago. Rice has also been identified to the north of the Philippines at late Dabenkeng sites such as Nanguanli in Taiwan dated to c. 4,700–4,200 years ago).

Key Issues

Andarayan is by no means a unique archaeological site for northern Luzon but rather one of many such sites found within the Cagayan River Valley that have produced a similar suite of material culture. These include Magapit, Nagsabaran, Conciso, and Irigayan, and there are sites of a similar date to the north in the Batanes Islands (Mijares 2007). But the lower Cagayan Valley sites are unique in that many of them are very large shell middens, dating from Neolithic and Iron Age times and possibly even pre-Neolithic as well (more research is needed on chronology). The earliest occurrence of many of these Neolithic artifact types and technologies in the Philippines, like pottery and ground stone tools, is at these sites in the Cagayan Valley. Many such artifacts have strong similarities to the types of material culture identified in Taiwanese Neolithic sites dating to a similar period. For example, the red-slipped pottery found in southeastern Taiwan and northeastern Luzon has great affinities in form, surface finish, and decoration. The spindle whorls are very similar in morphology to those found at sites such as Fengpitou in southwestern Taiwan.

Although it has been argued that these Neolithic peoples were sedentary agriculturalists who brought rice agriculture with them, the evidence for intensive cultivation has yet to be identified, and Andarayan remains the only site of this date to have produced any evidence for the presence of rice in the region (Andarayan is unusual in that it is the only site in the Cagayan Valley to have produced red-slipped pottery with an organic temper. The pottery from all other sites in the region has either fine- or coarse-grained inorganic tempers). There is, however, evidence to suggest that, along with new types of material culture, domestic pigs were introduced to the Philippines by c. 4,000 cal. BP.

Collectively, Andarayan and these Cagayan River Valley sites are considered to reflect one of the earliest arrivals of the Austronesian-speaking peoples from Taiwan into Luzon around 4,000 years ago. The settlement of the northern Philippines from Taiwan represented the initial step in a process of migration and colonization by the Austronesian-speaking populations that would eventually encompass two thirds of the globe from Madagascar in the west to New Zealand and Easter Island in the east and is considered the most extensive movement of human populations recorded in prehistory (Bellwood 1997).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Farming-Language Dispersals: A Worldwide Survey
- ▶ Farming-Language Dispersals: Principles
- ▶ Island Southeast Asia: Neolithic
- ▶ Pig: Domestication
- ▶ Rice: Origins and Development

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Andernach-Martinsberg (Magdalenian): Geography and Culture

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Introduction

Andernach-Martinsberg is, together with the site of Gönnersdorf, one of two major Magdalenian settlements in the German Central Rhineland. Burial under Late Glacial ash deposits of the Laacher See volcano protected the site from destruction, making possible detailed insights into many aspects of human life during the Magdalenian. A broad range of analyses informs on technology and subsistence strategies, spatial organization of living space, mobility of people in the landscape, and socio-cultural behavior represented by ornament and artistic expression.

Definition

Much knowledge of certain periods of the Paleolithic is defined by a few exceptional sites, which for reasons of function or duration of occupation, but crucially also due to favorable conditions for their survival, preserve a range of information rarely available in the case of most archaeological sites of this age. In the case of the late Paleolithic, Andernach-Martinsberg is such a rare site.

Key Issues/Current Debates/Future Directions/Examples

Research History

The Andernach Paleolithic site lies on the Martinsberg, a middle Pleistocene lava flow which forms a slope extending toward but not reaching the River Rhine, a few hundred meters to the north. The site is secure from flooding and sheltered by the local topography and close to where the river flows northwestwards from the low-lying Neuwied Basin into the narrow channel of the Rhine Gorge. The comparable Magdalenian site of Gönnersdorf lies only 2 km away, to the north of the Rhine in view of the Martinsberg.

The Martinsberg site was originally discovered in 1883 and excavated and subsequently published by Hermann Schaaffhausen (1888). The anatomist and antiquary from Bonn, an advocate for the presence of "Diluvial Man" in the Rhineland, saw the site as a vindication of his views.

A reanalysis of the 1883 Andernach lithic and faunal assemblages was carried out following the discovery of the neighboring Gönnersdorf Magdalenian site in 1968 (Bosinski & Hahn 1972). The location of the Martinsberg site was then rediscovered during earthmoving in 1978. Excavations between 1979 and 1983 (Veil 1982; Street 1995) and from 1992 to 1994 (Holzkämper 2006) showed the presence not just of the expected Magdalenian horizon but also a younger late Paleolithic horizon assigned to the "Federmessergruppen" (Penknife Point groups).

The excavations from 1979 to 1983 investigated something over 100 m^2, uncovering three distinct concentrations of Magdalenian lithic and faunal material (C 1, C 2, and C 3). The investigation of a similar area from 1994 to 1996 discovered a fourth Magdalenian concentration (C 4) 15 m to the south.

Chronology and Environment

The age of the Magdalenian settlement of the Martinsberg is known quite accurately due to series of radiocarbon dates on the bones of hunted animals, which fall around 13,000 BP, equating to approximately 13,800 calibrated years BCE. This was near the end of a cold and very dry climatic event and some 1,000 years before the onset of the Late Glacial Greenland interstadial (Street et al. 2006). The species hunted during the Magdalenian occupation at Andernach are typical for steppe-tundra conditions – horse, reindeer, arctic fox, and varying hare – whereas woodland species are absent.

Settlement Features

That concentrations C 1 and C 3 had been dug into by the 1883 excavation is shown by conjoined lithic material recovered a century apart, and C 1 is also truncated by the foundations of a house built later. C 4 was also truncated by recent disturbances. After the deposition of the Magdalenian archaeological horizon, some areas of C 2 and C 3 were heavily disturbed by erosion into fissures in the underlying basalt. This clearly took place before burial by Laacher See volcanic ash. Before this happened some material from both the Magdalenian and Federmessergruppen phases was vertically displaced and mixed by frost heaving and/or bioturbation.

Features C 1, C 3, and C 4 are characterized by areas of denser (C 1, C 3) to diffuse (C 4) paving formed of sometimes very large slabs of slate, quartzite, and other types of rock, sometimes stained by red ochre and by concentrations of lithic artifacts, faunal remains, and other items. The concentrations are associated with complexes of pits and are interpreted as stable, enclosed dwelling structures. They clearly represent complex and dynamic settlement activities over an appreciable length of time, perhaps during repeated occupations over several years.

C 2 is defined by a discrete scatter of blanks, tools, and waste of flint and numerous ivory fragments around and within a natural fissure open to a depth of perhaps 2 m at the time of the settlement. The surrounding material was subsequently eroded into the fissure, truncating the higher-lying archaeological horizon and redepositing finds at various depths. Shallow patches of red ochre-stained sediment on the truncated surface suggest that any pits originally present were largely destroyed. Patches of red stained sediment in the fissure fill may represent the fills of these pits or merely sediment blocks transported by erosion. Activities at C 2 included the production and repeated sharpening of flint burins and probably the working of ivory. Refitted artifacts show a connection to C 4, and it is possible that C 2 was a specialized satellite activity area linked to the dwelling structure.

Indications for the use of fire are limited to traces of thermal reddening of slabs and cobbles of schist and quartzite and quantities of fire-cracked quartz cobbles (pot boilers). Bones from the Magdalenian horizon show almost no traces of burning and very few burnt lithic artifacts are present. Rocks with concave surfaces (geodes, conglomerate) are found and would have been suitable for use as lamps fueled with animal fat, which may have provided light and some heat within the dwelling structures. However, since the many fire-reddened slabs and fire-cracked cobbles suggest that fires were lit in contact with the paved surface, it is possible that contents of hearths (ash, charcoal, and burnt objects) were methodically cleared away and possibly dumped outside the excavated area.

Artifacts

Analyses of the lithic artifact assemblage (Floss & Terberger 2002; Holzkämper 2006) include studies of raw materials, technology and typology, conjoining and plotting knapping sequences, and examination of assemblage variability. Samples were also studied for trace wear.

It is difficult to quantify the lithic material from the 1883 excavation, now divided between a number of museums, but almost 1,000 finds can still be located and seem to be representative of the better analyzed samples from the more recent excavations. Between them, C 1–C 3 produced more than 23,000 Magdalenian artifacts of which >5,300 were larger cores, flakes, blades, or bladelets. The most recently recovered Magdalenian assemblage (C 4) yielded almost 20,000 artifacts, over 600 of which were blades and bladelets.

Artifacts recovered from C 1 and C 3 are predominantly made of limnic quartzite and show a balanced mix of tool forms typical of the Magdalenian. C 2 is characterized by the manufacture and re-sharpening of burins associated with waste from ivory working. In C 4 the importance of activities involving burins is shown by 129 of these forms, almost 50 % of the tool inventory, and more than 700 recovered burin spalls.

A wide range of non-cryptocrystalline rocks brought to the site were modified as artifacts in several ways (Eickhoff 1995). Various types of

pebbles obtained from river gravels, some of them quite standardized, were used as hammer stones or retouchers for the manufacture of lithic artifacts, while larger cobbles were probably used for processing a range of other inorganic or organic materials.

Many of the rocks used as constructional material show complex patterns of modification, such as splitting and notching of the edges of blocks and slabs. Some of the notches may have been created to accommodate perishable wooden posts or stakes.

Numerous artifacts of bone, reindeer antler, and mammoth ivory typical for the later Magdalenian include eyed needles of bone, spalls and projectile points of antler and ivory, antler batons percés, and baguettes demi-rondes (Tinnes 1994). Waste debitage shows the manufacture of such items at the site.

Subsistence

The fauna comprises mainly larger and smaller mammal species, with some evidence for birds and fishes (Poplin 1972; Street 1993). In terms of food value, the most important species is the horse. Together C 1, C 2, and C 3 yielded the remains of at least 12 horses, and at least three individuals are present in C 4. Analysis of the age patterning of the animals killed suggests prey selection, with Magdalenian hunters targeting family groups of mares and young animals. Since almost all parts of the horse skeleton are present, albeit in varying proportions, at least some kill sites must have been close enough to the Martinsberg to enable utilization of entire horse carcasses, probably after dismembering into transportable portions. Standardized butchering processes, such as disarticulation and filleting of the carcass, are revealed by regular patterns of cut marks on bones. Intensive fracturing of bones for the extraction of marrow and grease is also well documented.

Other species play a far less significant role in the diet. Reindeer is represented in C 1, C 2, and C 3 by no more than three individuals interpreted as food remains and is also present in C 4 where it was not possible to calculate the number of individuals. By contrast, antler is very common in the form of modified tools or waste from their manufacture and in some cases demonstrably comes from collected shed antlers.

Of the smaller taxa, arctic fox is mainly found in the large paved structure C 1, with appreciably less material from C 2 and C 3. At least five or seven individuals are represented, calculated on the post-cranial skeleton and dentition, respectively. Only a single tooth fragment was recovered from a pit in C 4. Only 24 specimens from the 1979–1983 excavation are identified as varying hare, most of them from C 2, with at least two individuals represented. Several vertebrae from a pit in C 4 probably deposited in articulation may underline the connection between this area and C 2.

Bird species found in C 1 and C 3 include ptarmigan (single bones), swan, and goose. The avifauna from C 2 comprises only ptarmigan and raven, each represented by at least two individuals. Bird wing and foot bones may primarily derive from use of ornamental feathers and claws and not represent food remains. The few fish remains recovered from the paved structures C 1 and C 3 include salmon or sea trout, while C 2 has these species and a single find identified as grayling.

Mammoth is represented only by ivory. C 1 contained three female figurines, some ivory projectile points, and a unique core on a tusk segment, and the small area of C 3 also produced some ivory. C 2 has been mentioned as an area perhaps specialized in ivory working and several figurines were recovered here, while a single female figurine and three ivory fragments are all that was found in C 4.

Season and Duration of Occupation

Seasonal information from the analysis of faunal remains suggests that Andernach was occupied over an extended period of the year.

Tooth eruption data for horse and reindeer suggest an autumn/winter occupation for Andernach C 1 and C 3, and the importance of arctic fox in C 1 can perhaps be interpreted as an indication of winter trapping of animals for pelts (which might also apply to varying hare). The presence of migratory birds (geese and swan) could equally suggest autumn/winter occupation if these species had similar patterns of migration to that of today.

Vertebrae of large adult salmonids (up to 1-m length and more) at Andernach clearly represent anadromous fish and could be from individuals caught in spring/summer when ascending the river to spawn. The majority of specimens are from C 2, but two vertebrae of a very large salmonid were found in a pit of C 1 which also contains horse teeth of a young horse killed in autumn. It is therefore probable that site history is complex, with settlement probably extending over longer periods of time and at different and/or overlapping seasons.

Mobility and Social Networks?

A range of exogenous lithic raw materials were imported to the Central Rhineland by Magdalenian people (Floss 1994). They are seen as proxies for the mobility of groups within the landscape, providing information on their movements over middle- and long-range distances and contacts to other regions. Several varieties of fine-grained Tertiary limnic quartzite available at distances of up to 30 km are generally of very high quality and suitable for the production of large blade blanks.

Lithic resources located much further (> 90 km) from the Central Rhineland include high-quality Cretaceous flint from primary outcrops in chalk formations some 120–130 km to the northwest, in the region of the German-Dutch-Belgian border, which possibly indicates contact or identity with Magdalenian groups at the northern edge of the loess belt. Cretaceous flint was also collected from glacial moraines some 100 km north and northeast of the Central Rhineland. A small number of artifacts made of chalcedony were probably obtained from the lower Main Valley some 80–100 km to the southeast.

The exact relationship between the different regions represented by these raw materials of disparate origin is unknown. Possibly distinct Magdalenian groups exploiting the different regions met at Andernach, which would then have the character of an "aggregation camp." Alternatively, a single larger group occupying the Central Rhineland for much of the year may have dispersed into the different regions during specific seasons.

Other categories of finds at Andernach show the movement of objects and, thus in some manner, of people, over much greater distances. Marine mollusk shells (*Homalopoma sanguineum, Dentalium*) show contact between the Central Rhineland and the southern French Atlantic or even Mediterranean coast, a distance of some 800–1,000 km. Possibly contact was along the axis provided by the Rhine-Rhône river systems; alternatively, movement could have been along the northern edge of the upland zone, traversing the region of origin of some of the Cretaceous flint. A few specimens of *Tympanotonos* and *Pirenella plicata* from C 1 and C 4 identified as fossils from Lower Miocene deposits in the Mainz Basin suggest contact between both these concentrations and the south.

Apart from the modified marine shells, the teeth of several mammal species transformed into ornament were found at Andernach. Reindeer incisor teeth from C 1, C 2, and C 3 were cut as articulated series from the mandible by removal of their roots for use as adornment. They must have come from at least eight individuals; more than are demonstrated by material believed to derive from hunting episodes during the occupation of the site; however, the presence of removed roots shows that some specimens were certainly modified at the site. C 3 yielded three similarly modified incisor teeth of a large bovine, a taxon not otherwise present in the area of the 1979–1983 excavation, although postcranial bones of a large bovine found in C 4 suggest that these animals were sometimes hunted locally. Two perforated canine teeth (*Hirschgrandeln*) of red deer stags from C 1 may not have been produced at the site but imported from elsewhere. By contrast, many or perhaps most of the perforated canine, incisor, and premolar teeth of arctic fox were certainly manufactured at Andernach.

Whether the very long-range transport of some of the marine shell ornament reflects mobility of individual persons/human groups or exchange systems between groups is unknown. Clearer evidence for the mobility of individual persons is provided by a detailed engraving on a slate plaque which shows that the artists were as familiar with these animals as with species hunted in the Central Rhineland. It is unlikely that seals migrated up the

Rhine as far as the Neuwied Basin in view of the far greater distance from the Late Glacial coast to the Central Rhineland since no seal remains are known from the faunal assemblage. It is more probable that the animals were observed at the coast, which implies that at least some people present in the Neuwied Basin must have previously spent time there. Engravings of seals are very uncommon in the Rhineland Magdalenian and the most commonly depicted animal species are horse and mammoth, with several of the other hunted species also represented by engravings (Bosinski 1996). Rare representations of woolly rhinoceros show that both mammoth and rhinoceros were well known to the artists, but, as in the case of seals, they may have encountered or observed these megafaunal species not in the Central Rhineland, but elsewhere.

In contrast to the realistic representations of animals, the many depictions of women are executed in a very schematic fashion (Bosinski 1992; Höck 1995). The figures, without head and feet and with pronounced buttocks, are often arranged as pairs or in groups to form scenes interpreted as dancing. Female figurines, normally carved of ivory, are fashioned in the same style. In addition to the representations of animals and women are many engravings of abstract symbols, and together this rich corpus of art forms an open-site equivalent to body of artistic expression from western European Magdalenian cave sites and reflects the complex social activities which occurred at Andernach.

Conclusions

The site of Andernach must be seen as forming only one location in the extensively oriented land-use occupation strategy of highly mobile Magdalenian people. That they were in a position to occupy specific localities intensively is shown by the large amounts of diverse materials accumulated at favored locations in the landscape. The intensity of settlement probably represents a palimpsest of occupations over an appreciable length of time (several weeks to several months) due to repeated visits separated by periods of absence lasting a season or even longer.

It is possible that northern Magdalenian groups spent the shortest days and coldest part of the year in sheltered locations, such as the Central Rhine valley, with a period centered around winter the time when the "temporary sedentism" seen at Andernach would be the most appropriate survival strategy. Conversely, the probable time of their absence from the site perhaps involving social contact with other groups by traveling to other regions (as suggested by a range of exogenous materials at the site) would have been the warmest season with the longest hours of daylight, the summer. This scenario can be broadly suggested for Andernach and is supported by better seasonal evidence at the neighboring and similar site of Gönnersdorf. An alternative interpretation of the role of Andernach would see distinct groups of people inhabiting different regions traveling to the Central Rhineland, giving the site the character of an "aggregation camp." With no clear indications for the social identity of the people occupying the different Magdalenian concentrations, it may be impossible to decide which model is more plausible.

Cross-References

- ▶ Art, Paleolithic
- ▶ Bone Tools, Paleolithic
- ▶ Gönnersdorf (Magdalenian): Geography and Culture
- ▶ Lithic Technology, Paleolithic

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Basic Biographical Information

Johan Gunnar Andersson (1874–1960) was born in rural Sweden, and as he himself recounts in several riveting autobiographical books (1932, most famously), he became interested in science and nature already as a young boy. He read geology and paleontology at Uppsala University and received a doctoral degree in 1901 for his dissertation on the geology of Bear Island in the North Atlantic. Andersson participated in several other Arctic and Antarctic expeditions. In 1906 he became director of Sweden's Geological Survey and hosted the International Geological Congress in Stockholm in 1910. In 1914 he accepted an invitation to work at China's newly organized National Geological Survey (NGS) as a "mining adviser to the Chinese Government" of the young Republic founded 1911 (Fig. 1).

From 1914 to 1925, Andersson was based in Beijing (Peking). There, he trained geologists, surveyed mining ores, and helped modernize Chinese mining. He also engaged in paleontological investigations across Northern China. Then, beginning in 1920–1921 with his sensational archaeological discoveries of China's previously unknown Neolithic, Andersson shifted decisively to archaeological field research during his last four years in China.

He dedicated the rest of his life to publishing the results of his Chinese research and also to the new Museum of Far Eastern Antiquities, in Stockholm, Sweden, which he opened in 1929 based on the first collections from Chinese Neolithic archaeology, which had been partaged between Sweden and China. He served as the museum's first director and continued his work there after retiring in 1938. He kept writing and publishing into the 1950s, ultimately returning to his native rural home area.

Major Accomplishments

In 1920, following on years of geological and paleontological survey work, Andersson and his Chinese co-workers came across painted ceramics protruding from gulleys at Yangshao, Henan Province. Based on his knowledge of geology and stratigraphy, Andersson confirmed that they were Neolithic. Excavations were carried out the next year, with Yuan Fuli (1893–1987),

Andersson, Johan Gunnar, Fig. 1 Johan Gunnar Andersson in the field in China, 1918 (Andersson's photographic collection, Museum of Far Eastern Antiquities, Stockholm)

another pioneer geologist-turned-archaeologist, and others (Andersson 1923). This was a sensational breakthrough, since Neolithic materials had not previously been systematically studied in a stratigraphic context in China. Yangshao later gave name to an entire period of prehistoric archaeology and sparked debate over the relationship between the previously unknown people who had created these materials and later Chinese civilizations.

Until recently, it was widely believed that the breakthrough was accidental, but recent archival research (Chen & Fiskesjö 2003) has shown that Andersson knew the time was ripe for the archaeological discovery of Chinese prehistory. He had been encouraged to pursue it by the famous archaeologist Oscar Montelius (1843–1921), who argued that China's unknown prehistory was obscured by the burden of known history, just like that of Egypt or Greece had once been.

In light of the then-current theory concerning transcontinental linkages between prehistoric cultures in Eastern and Central or Western Eurasia and bolstered by the apparent similarities of Yangshao to Anau, Tripolje, and other comparable Eurasian sites further West, Andersson developed a major NGS-supported and Swedish-financed campaign of more excavations further West. His closest Chinese colleague and superior, the British-trained geologist, polymath, and politician Ding Wenjiang (1887–1936) who was founder-director of the National Geological Survey, strongly encouraged this research and was as enthusiastic about it as "An Tesheng" (Andersson's Chinese name) himself.

His campaign in the provinces of Gansu and Qinghai was carried out during 1923–1924; the resulting wealth of ceramics and other prehistoric materials found forced Andersson to focus on their recovery and care. Hundreds of painted vessels and other artifacts were shipped on rafts down the Yellow River. In 1925, a Swedish-Chinese partaging agreement was made between the NGS and the China Committee now chaired by Sweden's Crown Prince (later King Gustaf VI Adolf; reigned 1950–1973), himself an archaeologist and scholar. Andersson would ship everything to Sweden, describe it, and return half to China (which he did, in seven shipments, 1927–1936). Andersson was appointed Professor of East Asian archaeology and used the Swedish half to found the Museum of Far Eastern Antiquities, which opened in Stockholm in 1929 (see Fiskesjö & Chen 2004 for a full account).

Because of his museum commitments, as well as the Japanese invasion of China, Andersson could not continue his field research program in China as he had hoped. On his last trip to Asia, in 1936–1938, he conducted surveys and excavations in Sichuan, Western China; Hong Kong; and Vietnam (Andersson 1938, 1939). In retirement, Andersson focused on writing up his research, in large part published in the *Bulletin of the Museum of Far Eastern Antiquities BMFEA*

since 1929 (Andersson 1943; also *BMFEA* volumes 17, 18, 19, and more) and with parts of this work delegated to others (e.g., Palmgren 1934; Sommarström 1956).

Later, the returned Chinese materials were lost, probably in the war (including priceless human ceramic figures that remain unparalleled despite the phenomenal development of Chinese archaeology since Andersson's time)—as were the Peking Man (*Homo erectus*) fossils excavated from 1921 onwards at the Zhoukoudian site, near Beijing, the potential value of which had been pinpointed by Andersson. Strangely, their disappearance has attracted much more attention than the loss of the Neolithic treasures.

Today, the Museum of Far Eastern Antiquities contains vast unstudied materials. While Andersson originally envisioned it as an international center for East Asian archaeology, the prehistoric materials were increasingly marginalized in favor of later-period arts. Even Andersson, who had lamented the destructive effect of looting for artifacts in the wake of his own field research, became increasingly entangled with collectors and dealers (Johansson 2012). The reasons for this shift include China's isolation under Mao and also an absence of disciples to pursue Andersson's path. Most notably, Andersson recommended the talented Folke Bergman (1902–1946) as a field archaeologist to the expeditions of the Swedish geographer and explorer Sven Hedin (1865–1952), but Bergman died prematurely, and Hedin's expeditions were also interrupted by war, and other factors.

Johan Gunnar Andersson's pioneer role in Chinese archaeology was made possible by his insights and skills from geology and paleontology, just as archaeology itself once emerged on this same trajectory. Andersson's genius and main accomplishments were in the spirited and creative application of these insights to the trailblazing discoveries of the prehistory of East Asia, accomplished in collaboration with his Chinese colleagues. Andersson is famous above all as a key pioneer of (Neolithic) Chinese archaeology, as the founder of Sweden's Museum of Far Eastern Antiquities, and also as a prominent geologist, paleontologist, polar explorer, and writer. Less well known is the fact that apart from his numerous scientific papers and books in all these fields, he also, in his last years, published a 1,200-page history of exploration, denouncing the harm done to indigenous peoples through European colonialism and conquest (Andersson 1953).

Cross-References

- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ Peking Man

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Andes: High-Altitude Archaeological Sites as Cultural Heritage

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Introduction

Archaeological remains, predating the Spanish conquest of 1532 CE, have been found on numerous mountain summits in the Andes, including more than 100 sites above 5,200 m, with some ranging as high as 6,700 m. This is only one of the many achievements associated with the culture of the Incas – but it is unique (D'Atroy 2002). In less than a 100 years (c. 1470–1532 CE), they constructed well-built stone structures in mountains over a vast area of the Andes, encompassing the countries of Chile, Argentina, Bolivia, and Peru (Beorchia 1985 and 2001) (Fig. 1). Nowhere else on earth have archaeological remains been found at such altitudes. Indeed, the heights of some structures were not even *reached* again for four centuries, and taken together, this constitutes one of the most awesome accomplishments known to us from ancient times.

The sites generally consist of stone buildings with low walls, artificial raised platforms, and simple structures that served for protection from the elements. At the base of some mountains, fairly large complexes – some with hundreds of structures – have been found that provided storage and housing facilities for participants in ceremonies carried out on the summits. The summit structures are often not impressive in size, and it is the ritual offerings, such as statues, precious textiles, foodstuffs, and in rare cases human sacrifices, which have been found in the structures that make them of such value to us today.

Extraordinarily preserved in the cold environment of the high Andes, the mummified remains of the sacrificial victims and their associated funerary offerings provide invaluable evidence for the study of the ceremonial life of the Inca civilization. They are among the few pieces of material evidence of Inca religion that have survived the Spanish conquest and have been found in their original contexts. Unfortunately, during the last 100 years, many of the mountain-top shrines of the Incas have been destroyed by looters, and the scientific study of these sites only began in the past few decades.

Definition

The term "high altitude" has often been used by archaeologists to refer to sites found above 5,200 m. This has been a convenient way to distinguish them from lower-lying ruins with which they may, nonetheless, share many characteristics. It is also understood that ruins on a mountain only 2,000 m in altitude could still be considered "high" relative to people living over 1,000 m below.

Nonetheless, it is the high altitude of so many ruins that has captured attention, not least of all because of the great amount of energy, organization, and in some cases specialized techniques necessary for constructing and maintaining structures at such heights. Commonly, even people who have lived all their lives at c. 4,000 m (the highest that permanent villages are normally found) have difficulty in reaching, let alone working at, altitudes over 5,200 m.

A mummy can be defined as a human corpse that has had its skin preserved over its skeleton,

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 1 Map of the central Andes with selected Inca high-altitude archaeological sites marked (Courtesy of the National Geographic Society)

either through natural or artificial processes. One of the things that makes Andean frozen mummies unique is their *natural* preservation. Egyptian mummies are renowned and some date back over three millennia before the Incas. However, these are usually desiccated bodies that have had their intestinal organs removed and embalming techniques utilized to help the mummification process. As rare as these ancient mummies may be, those mummies that have been naturally frozen are far more so. Thanks to their better-preserved body tissues and organs, they provide a wealth of human biological information otherwise unobtainable and enable scientists to undertake far more comprehensive studies.

Historical Background

The Spanish chroniclers described Inca offerings to the gods as including statues made of precious metals, finely woven textiles, and ceramics of distinctive Inca style, along with coca leaves, incense, food items, and alcoholic beverages. Although they also noted that offerings could involve human sacrifices, it was not until 1954 that scientists began paying serious attention to such sacrifices having taken place on mountains. That year, looters in Chile discovered the body of an Inca boy on the summit of El Plomo at c. 5,200 m. After it was recovered by archaeologists, the study of the mummy and its associated artifacts led to a collection of articles by specialists from several scientific disciplines (Mostny 1957). In 1964, the frozen body of an adult male was found by mountain climbers at 6,000 m on Mount El Toro, and in 1985, the frozen body of a seven-year-old boy was recovered from an Inca site at 5,300 m on the slopes of Aconcagua in Argentina (Schobinger 1966, 2001). The resulting studies of these mummies laid the foundation for the development of longer-term scientific excavations to be undertaken on the summits themselves during the 1990s, and this resulted in the discovery of four exceptionally preserved Inca mummies on the mountains of Ampato and Llullaillaco in Peru and Argentina, respectively (Reinhard 2005; Reinhard & Ceruti 2010) (Fig. 2).

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 2 An overview of the Inca ceremonial site on Mt. Llullaillaco's summit at 6,700m (Photo: Johan Reinhard)

Key Issues/Current Debates

The Andean mountain-top mummies are unusual even among the world's few "ice mummies." This is because the human sacrificial victims often would have become frozen at the time of their deaths – not after time had passed and the bodies begun undergoing decomposition. Indeed, several chroniclers described many of them as having been buried while they were still alive. On snow-laden mountains, this has allowed for an unprecedented scientific treasure – a body

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 3 An Inca female frozen mummy recovered from the summit of Mt. Llullaillaco (Photo: Johan Reinhard)

could be frozen with little decomposition having occurred even after the passage of five centuries (Fig. 3).

There are several reasons for their excellent preservation, but the main one would have been the continuity of below-freezing temperatures at the high altitudes of Andean peaks. Scientists have noted that some humidity is necessary because the absolute absence of water causes shrinkage and embrittlement of organic materials by water loss. As Cronyn (1990: 24) noted, "the best condition for preservation is that of extreme cold – for here, since all water is turned to ice, it is inactivated without being lost and so both inorganic and organic materials are unaffected."

If volcanic ash surrounds the mummies, such as has occurred in some cases in the Andes, this also helps to inhibit the growth of bacteria, while maintaining moisture. And the rapid burial and freezing of the soil can result in a vapor barrier being created, further impeding decomposition. This unique combination of factors makes the high Andean summits excellent places for the preservation or organic material. Frozen mummies have even been recovered with their DNA perfectly intact.

At present, these high Andean sites cannot be protected and they will – sooner or later – be looted. That is a fact, one underlined by the looting that already has taken place at many of them, not to mention at thousands of tombs throughout the coastal region and highlands of western South America (Atwood 2004). Of the several dozen high-altitude sites I have seen, only a few have not been at least partially looted *already* – in the sense of items having been taken from the surface and holes dug. It is impossible to post guards on the summits or even around the mountains, which are, after all, several miles in circumference. Furthermore, mountains can be climbed from many sides, and, if situated on a border between countries, they are even harder to protect.

Several factors have combined in recent years to increase the likelihood of the sites being looted. Access has become easier as roads have penetrated throughout the Andes,

in large part due to mining. Poverty and the displacement of people has increased, while at the same time the amount of money being paid on the black market for artifacts has multiplied. The number of mountain climbers has increased, gear (and its availability) has improved, and guidebooks now provide descriptions of routes up most of the mountains. It is not a matter of *if* the mountain sites will be looted, but *when*. As for the ease of destroying one of them, a single person with a stick of dynamite could be on and off the summit in less than an hour.

All of this is also taking place within the larger context of climate change. Throughout the Andes, the permanent snowline is receding, exposing ruins previously hidden from sight. This not only makes the organic materials more susceptible to decomposition, it also makes them more likely to be discovered and looted.

International Perspectives and Future Directions

Whether in a museum, in a laboratory, or in the field, research on the ritual offerings made on mountain summits continues to add to scientific knowledge while at the same time helping protect the cultural patrimony of Andean peoples. Mummies and their associated artifacts also serve as means to help the economies of local communities through avenues such as arts and crafts, museum exhibitions, and focusing government attention on their needs.

Mummies provide information that can be used to educate the world about the unique history of a remarkable ancient civilization – and point the way to others. In the imaginations of many children, mummies are second in interest only to dinosaurs, and their educational potential appears to be unlimited. A mummy is a magnet and can be used as a teaching tool on many subjects, including archaeology, geography, human biology, conservation, and the environment.

True time capsules, these frozen bodies allow a view into the past that cannot be obtained through any other means, including that of the best-preserved mummies found in other climates, such as in the deserts of Egypt (Bahn 2003). Due to their excellent preservation, finds made at high altitudes enable unique opportunities for studies ranging from the biological to the archaeological (extremely rare artifacts and among the few remaining Inca ceremonial sites which have offerings in situ). Because of the Incas' practice of making human sacrifices at sites on high mountains, the Andes region is the only one in the world with a good chance of finding frozen mummies – assuming systematic work is conducted before they are destroyed and lost to mankind forever.

In recent years, it has become clear that a frozen mummy is one of the most valuable objects to reach us from the distant past. Such mummies will *never* stop adding to our knowledge, since technology is constantly evolving and they contain information that cuts across a wide variety of scientific disciplines, including ones as diverse as ornithology, pollen analysis, parasitology, DNA analysis, microbiology, paleopathology, odontology, prehistoric diet, and textile and pottery analysis. New information will be obtained years from now and likely to continue to be so for as long as mankind exists. Thanks to extraordinary cell preservation and advances in technology that have resulted in the reanimation of frozen cells, one day frozen mummies may no longer just be like time machines, they may *become* time machines, enabling us to recover living information from the past. It is difficult to imagine anything, however rare, that can compare with the uniqueness, complexity, and the unlimited knowledge provided by a frozen mummy.

The documentation of the mountain-top shrines and the finds made at them has combined with the development of interdisciplinary studies on frozen mummies and other organic materials to add insights into fundamental aspects of Inca ceremonial life. They have therefore not only helped deepen our knowledge of Inca civilization, but contributed to the preservation of an invaluable heritage for future generations.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Andes: Prehistoric Period
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Heritage Museums and the Public
- ▶ Human Remains in Museums
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Inca State and Empire Formation
- ▶ Landscape Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Permafrost Digging
- ▶ Sacred Site Conservation and Preservation

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Andes: Origins and Development of Agriculture

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Introduction

Terminal Pleistocene horticultural societies such as the Natufian complex of the Near East that domesticated wheat at c. 14,000 BCE were not alone in the world at that time. Recent interdisciplinary research show that past tropical Andean societies began to experiment with cultigens approximately 12,000 BCE i.e., somewhat coeval with other pristine cultures around the world.

Two main effects resulted from this early plant manipulation process. The first one was the increscendo guarantee of stocking staples, which ensured quasi-permanent food among ancient Andean societies. The second effect was the resulting decrease in mobility of plant manipulators, who learned to plant seeds near camps and dwelling structures, thus providing food in one place, and therefore the preference of establishing in the same place.

Andean civilizations learned not only to domesticate since the Terminal Pleistocene, but completed domestication prior to the emergence of complex societies in the third millennia BCE; so from that time, only a few "new" plants were incorporated into the Andean diet. Once the principal Andean cultigens were controlled, they were massively produced, not only during the Preceramic but also CE times, even until the Incas, who produced maize in impressive quantities and made this plant the main staple of the Imperium.

Definition

Agriculture in the Andes is a common denominator among all cultural developments throughout this territory, from the Pacific Ocean to the

humid eastern Amazonian boundary. From the earliest times, hunter-gatherers in the Andes learned to adapt to the complex Andean region, not only by hunting, gathering and fishing strategies, but also by experimenting with plants, i.e., horticultural assays. The in-crescendo agriculture techniques during Andean cultural developments led to Andean societies where plant economies were crucial for the sustenance of whole cultures and even to the Imperium of the Incas.

Among the pre-Columbian Andean plants are lowland roots and tubers such as achira (*Canna edulis*), manioc (*Manihot esculenta*), and sweet potato (*Ipomoea batatas*). These provide huge proportions of charbohydrates. Further root and tubers were also domesticated in the Andes, such as for instance, oca (*Oxalis tuberosa*), mashwa (*Tropaelum tuberosum*), and ullucu (*Ullucus tuberosus*), including probably the most popular: potato (*Solanum tuberosum*). These four high altitude plants were domesticated in southern Peru and Bolivia and display exceptionally rich values in proteins. In the Andes, pseudocereals such as quinoa (Chenopodium quinoa) and maize (Zea mays), and also legumes such as peanut (*Arachis hypogaea*), common bean (*Phaseolus vulgaris*), and lima bean (*Phaseolus lunatus*) were domesticated and became important sources of proteins, carbohydrates and vitamins. Additional important native plants were chili-peppers (*Capsicum* sp) and coca (*Erythroxylon coca, E. novogranatense*) (Pearsall 2008).

Ancient Andean agriculture restricts its evidence mostly to macro-remains. These are found in places where organic preservation occurs. For instance, ideal organic preservation conditions on both the Peruvian and Chilean Coast (south of 4ºS) allow for detailed examination of ancient Andean plants, in order to determine both taxonomy and state of specimens (wild or domesticate). Other research avenues such as phytoliths and biochemical traces in bones help to recover data on paleodiet based on plants (Piperno & Pearsall 1998).

The world of pre-Columbian agriculture should also cover derivative evidence, such as the native knowledge of conservation techniques to generate permanent staples and improve biochemical properties (as in the case of dried maize or chuño–dried potatoes), or even the development of artificial irrigation techniques dating to 5600 BCE, such as those irrigation channels found in the valley of Zaña, which could be considered the oldest probable evidence of agricultural irrigation systems (Dillehay 2011).

When they realized that some cultivars yield higher productive resources when planted in combination, this aboriginal knowledge allowed ancient Andean people to profit from agricultural resources. This was the case for maize, common beans and squashes, when these three plants were cultivated together. While maize grows upwards in the middle of the field, common beans profit from the wet and shady environment, and squashes flank both plants as a protection wall. Such combination was already mentioned by Vavilov, and was used in the Andes from the very beginnings of the agriculture. Apparently, there are other combinations with positive effects among other plants, such as high altitude tubers and rhizomes.

The very early peopling of the Andes seems to be almost coeval with the discovery of plant manipulation and horticultural practices that finally led to agriculture in the Andes. Calibrated radiocarbon dates of Ecuadorian phytoliths of both domesticated squashes (*Cucurbita* sp) and gourds (*Lagenaria* sp) push back them to approximately 10,000 BCE (Piperno & Stothert 2003). In Peru, pristine cultivars are found in the cave of El Guitarrero, a site located in the Callejon de Huaylas, an interandean and mesothermic valley at 2,850 masl in the Central Andes. At that site, Tom Lynch (1980) reported a layer containing macro-remains of the already domesticated common bean (*Phaseolus vulgaris*), oca (*Oxalis tuberosum*), and chili pepper (*Capsicum* sp) dating c. 9600 BCE. All of these finds imply that plant manipulation began around 10,000 or even 11,000 BCE, i.e., within the Younger Dryas, virtually the last ice age.

Recent archaeological research conducted by Tom Dillehay on the Northern Coast of Peru (Zaña valley) shed light onto very early agriculture

in the Central Andes. By using interdisciplinary analysis, wild peanut (*Arachis* sp) macro-remains and starch were discovered in situ and dated to approximately 7000 BCE. Sweet potato (*Ipomoea batatas*), also an important tuber among the ancient Andean people, was domesticated around 8000 BCE, but was introduced to the Andes and later became one of the most important food sources. A wild ancestor (*Manihot flavelifolia*) of the sweet potato (*Manihot esculenta*) was likely domesticated in the Cerrado region (Southern Brasil), and then imported into the Andean area (Piperno & Pearsall 1998).

However, two plants are most representative of the Andes: potatoes and maize. The earliest potato remains were found in a site called Huaynuna, located on the Central Coast of Peru and dated to approximately 2800 BCE (Ugent et al 1983). However Don Ugent, the botanist who examined the specimens, was able to find out based on starch analysis that the domestication of potatoes likely began two (or more) millennia before, i.e., around 5000 BCE. According to experts, the domestication centers could have been located principally in Northern Bolivia, Southern Peru and Chile.

Maize was also a key domesticated plant in the Andes. Conversely to what was believed for a long time, maize of the Andes does not come from Mesoamerica or Mexico, but rather from the same Andean region. Indeed, once wild maize seeds landed in the Andes (probably by means of birds migration), people learned to manipulate and then domesticate this plant. Independent lines of evidence support the thesis of an Andean domestication that seems to be approximately coeval with its domestication in Central America (e.g. Oaxaca, Guila Naquitz). In fact, calibrated radiocarbon dates of archaeological sites such as Cerro Julia, Cerro Negro (Casma Valley), Rosamachay (Ayacucho), the (above-mentioned) Guitarrero cave, and the recently excavated Huaca Prieta on the North Coast yield approximately 5600–4000 BCE. In this last mentioned site, Grobman, Dillehay and Bonavia (2012) discovered native maize races than belong exclusively to the Central Andes. In general terms, the existence of three Preceramic races of maize, older dates, the difference among the chromosomal knots, the absence of hybridization with teosinte and the high variety of Andean maize are the basis to affirm that there was a native Andean domesticated maize.

Some high altitude plants, such as quinoa (Chenopodium quinoa), an important crop found at the site of Jiskaurimoko in the southern Andean plateau (Lake Titicaca environment), were already domesticated and dated to c. 2000 BCE. However, wild Chenopodium has been found in excavations in some caves of the Central Andean plateau dating back to approximately 7000 BCE.

Historical Background

The scientific interest in pre-Columbian agriculture in the Andes goes back at least to the end of the nineteenth and beginning of the twentieth century, with the pioneer ethnobotanical research of W. Safford, who was able to examine some botanical remains from the early archaeological field research in Peru. Also, John Harschberger analyzed botanical remains from sites like Pachacamac and proposed, based on both starch and plant morphologies, that the evolution and domestication process took place within the Andean region.

In the first half of the twentieth century, works like those of Eugenio Yacovleff and Fortunato Herrera were veritable efforts in capturing all available data related to plant remains and agriculture from ancient Peru.

Richard MacNeish took another step with his ethnobotanical project in the Ayacucho basin. He intended to record all possible plant remains from Preceramic times, from a series of caves and sites in the central Andes. From that time on, in-crescendo interests in recording this kind of data have been present, and therefore projects usually incorporate this typeof approach in order to document plant occurrences and development of ancient Andean agriculture. Extensive reports, such as that on "Los Gavilanes," a Preceramic site where huge maize storage holes were found by Duccio Bonavia (1982), are clear efforts towards a reconstruction of ancient plant management in the Central Andes.

On the other hand, archaeologists and other researchers discovered some key technologies that contributed to provide stable and regular

food resources to the past Andean societies from the earliest times. From the Middle Holocene to the Inca time, people built, for example, complex systems of irrigation, aqueducts and raised fields, especially in Ecuador, Peru and Bolivia (Farrington 1980; Denevan et al 1987; Donkin 1979; Erickson 2000; Lane 2009). High complex civilizations such as Chimu or Tiahuanaco were able to develop practical and efficient artificial systems to improve water sourcing and management. Puquios (holes to extract water from the underground) even made it possible to live in the desert, as did the Nazca some 1,500 years ago (Schreiber & Lanchom 2006). Recent approaches towards an integral understanding of ancient agriculture in the Andes involve, for instance, genetic analysis (Zeder et al 2006) that uses phyto tracers to track plant origins. This and other approaches promise increasing data, leading to a better understanding of Pre-Columbian Andean agriculture.

Key Issues/Current Debates

Key issues and debates around Andean domestication are quite rich and numerous. There is discussion about the character and particularity of the plant domestication process in the Andes, the link between paleoclimatology and pre-Columbian agriculture, the timing of the Early Holocene gardening, the human manipulation of plants since the very begin of the Holocene, the phytogenetic relations among Andean plants, the biochemical properties of Andean plants, and the characterization of the agriculture technology (including channels, dams, artificial irrigation, raised fields, etc).

International Perspectives

Ancient Andean agriculture is relevant because of its exclusivity. In fact, potatoes, maize, quinoa and other important food plants were domesticated and cultivated in the Andes once early people settled this territory, with no other contacts such as in Eurasia. These plants were therefore exclusive to the Andes, and once this area was conquered, they were exported to the world. Therefore, research is to be conducted on some key topics that will contribute to the study of worldwide parallel plant domestication processes, genetic markers (phytogenetic), and biochemical properties of the principal plants of the Andes.

Also, the precocious character of Andean domestication of plants should be radiometrically updated in order to assess the actual time depth in comparison to other worldwide histories. This implicates not only overseas interests, but also the Andean community, as the Andes are shared by six countries.

Future Directions

There are many number of difficulties regarding the destiny of ancient agriculture in the Andes, especially in moving towards a holistic view and incorporating them into current life. Probably the most important is the role of plant diversity in the Andes as a potential bio-resource, not only for the Andes, but also for the whole world. Ancient Andean people were able to domesticate and profit from the high potential botanical diversity. Hence, it could be a matter of research to learn about opportunities from the past and use them in the present. High protein-content tubers and grains once cultivated in the high Andes are virtually the feed reserve for the future. Another issue for future direction is the recovery of ancient efficient agricultural technologies that were developed in the Andes in the past. There are a number of studies showing the outstanding productivity and harmless effects in applying this native technology to agricultural issues. Finally, plants played a key role from the earliest time in the Central Andes, within the early process of the rise of the Andean civilization in the Middle Holocene some 7 millennia before. Plants were not only food, but also became a crucial part of ancient beliefs, myths, and legends. People of today who taste Andean food should realize that this ample assortment of plants has a very ancient history that belongs to the national identity; this is especially important during this time when gastronomy is experiencing a “boom.” The correct link will fuse both issues, benefitting both the Andean past and current nations.

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- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Beans: Origins and Development
- ▶ Capsicums/Chiles: Origins and Development
- ▶ Paleoethnobotany
- ▶ Phytolith Studies in Archaeology
- ▶ Potato: Origins and Development
- ▶ Quinoa: Origins and Development
- ▶ Squash: Origins and Development
- ▶ Sweet Potato: Origins and Development
- ▶ Waynuna: Agriculture and Domestication

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Andes: Prehistoric Art

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Introduction

Worldviews among Andean people go back to the very first inhabitants that once entered this vast and complex territory. Early on, people figured out a way to capture the inaccessible by means of material representations. From the Andean hunters, i.e., artists representing a dancing

shaman and running camelids in caves, invoking natural powers; to the Inca "tokapus" (textiles containing different signs and colors) exhibited by the elite, sacred art was a link to power and control of human and natural resources.

Early in time, Andean artists were able to find a variety of raw materials to accomplish these handcrafts. Clay, metal, wood, textiles, bones, and even stone were employed and transformed into art. With a few exceptions, almost all objects of nature were represented, both without modification and modified into unreal subjects. Therefore, it is usual to find, for example, plants or animals transformed into humans, and also human beings with bird attributes, etc. From the universal worldview, pre-Columbian ritual art is a common denominator of the Andean region from Colombia to Argentina, and from the early hunter gatherers to the arrival of the Spaniards, and even thereafter.

Definition

The prehistoric art of the Andes could be defined as all artistic expressions made of materials such as stone, clay, metals, textiles, wood, and bones, among others, with the purpose of capturing an image from the outside environment or even from the mind-self of the creator. Hence, there is a transfer of the subject from reality to a "captured" image contained in a space or even in an object. "Captured" or represented images played a number of roles in pre-Columbian times, from the animist goal (no complex societies) to power and propaganda issues (complex and aggregated societies).

Archaeologists usually divided pre-Columbian art objects into two categories, namely: non-portable art and portable art. While the first one involves murals for example, cave paintings and even rock art, the second comprises portable objects made of a number of raw materials, in most cases little (to medium) in size and weighing less than the non-portable art pieces.

Although there are some particularities among pre-Columbian Andean art expressions, especially in regard to the multiple micro-environmental conditions of the whole Andean region, one can perceive some common traits, such as the constant intention of representing animals typical of the Andes (e.g., pumas, condors, snakes, frogs) and also plants (Andean crops and tubers), human beings and even scenes of life, such as the very famous Mochica iconography found in pottery or Colombian metal art.

From a chronological point of view, the wealth of artistic representations of pre-Columbian art in the Andes can be divided into two main groups. The first one was an early art that displayed images that reflect both the elements of the surrounding environments and individual-common internal "imagination". This kind of art usually belonged to the times of the hunter-gatherer-fisher, i.e., "non-complex" societies. However, it does not imply that "realistic" art occurs later in pre-Columbian times. In fact, human beings associated with animals are usually represented in caves and interpreted as hunting scenes. But, in some similar cases, the same image is accompanied by points and symbols that are part of the composition and complicated to interpret. That means non-complex and complex representations are associated from the earliest times.

As time went by, artistic expressions underwent complex transformations in response to their sources and intentions, usually within a state and civic frame as established components and official propaganda. Thus, archaeologists see the birth of complex scenes and symbols that became local and/or regional recurrences throughout the Andes, implying consensus and territorial domains. Indeed, it was the time of the second "later" art in the Andes. Examples for such an art could be the Inca human figurines found in some fertility rites, such as the "capacocha" in the high mountains of the Andes, and also textile flags of banners representing jaguar-snake-human being gods of the Chavin culture some 2,500 years ago.

Once the Europeans landed in the Andes, pre-Columbian art persisted, despite the occidental rules against all native artistic expressions as a part of the conquerors' domination plan. A very interesting example is the continuity in rock art paintings of Lachay (Near Lima, Peru),

where one can see pre-Columbian designs in association with images of Jesus Christ on the same wall cave (Bonavia 1999).

Historical Background

Let us now mention some relevant passages of pre-Columbian art of the Andes. Once they arrived in the Andes, non-complex civilizations began to paint and engrave rocks and caves. In fact, the need to create art goes back to the earliest times, i.e., the Paleoindian period. Parenti (1996), for instance, found two red parallel lines in association with a hearth in Boqueirao da Pedra Furada (Piaui, Brazil) dated to 17 kyr BP. Later, Jean Guffroy (1999), in a synthesis of the Central Andean rock paintings and engravings proposed that indeed this is a particular Andean tradition than belongs to the Central Andean region, including southern Peru and probably northern Chile and NW Argentina.

Early rock art usually displays hunting scenes, but there are also some other "common denominators", such as the "negative hands," a tradition shared by a number of regions as Peru, Argentina, Bolivia and Chile. These are quite similar to those made in Europe by Solutreans some 20 kyr ago. The "negative hands" are prints of hand silhouettes, usually in red or black colors, possibly representing children initiation rituals. Later, rupestrian art was also practiced by cultures as the Cupisnique (100 BCE–1 CE) or even the Recuay (100–700 CE) in Central Peru.

Cave paintings were made throughout the Andes. In Northern Chile, for example, research around this art has been recently updated and summarized by Sepúlveda et al. (2010). They point out that most of the representations in an initial time span, c. 2000 BCE–1 CE, address themes related to hunter-gatherer activities, and in a second time span, caravans of camelids, a typical symbol of the Southern Andes that implies commerce and trade.

As explained above, Andean people such as the Chinchorrro from the Northern Chilean desert manufactured grave goods; shell and bone necklaces and pendants dating back 5,000 years. Among these remains, archaeologist were able to find colored pigments and small vegetable brushes that were probably used to paint their bodies (Arriaza et al. 2008). Grave goods representing ornaments destined to be a companion of the death person are typical, even from the Middle Holocene.

One of the mobile arts typical of the Andean cultures is the decorated pottery. From the very beginning, Andean people learned to paint, engrave and model clay. Very early decorated bowls (c. 3800 BCE) were manufactured by the Valdivia Culture, which was located in the southwest of Ecuador. These vessels were usually finished with a burnished red slip and decorated on their exterior surfaces with incised geometric motifs. The Valdivia potters also made figurines representing male and female individuals for ritualistic purposes (Raymond 2008). In Peru, for example, in some very early archaeological sites such as Caral, Chupacigarro and Áspero, dating from c. 3500 BCE, archaeologists found miniature idols made of clay that are believed to have relationships with rituals.

Metal handcrafts also occurred relatively early in the Andes. At Jiskairumoko on the Southern Altiplano, a necklace composed of gold beads has been found in a context dating to c. 2200 BCE (Aldenderfer 2008). Later in time, gold ornaments, such as from the Kunturwasi, were made exclusively to accompany priests and elite persons. But later cultures, mostly from the beginning of our era, achieved quite impressive metals pieces, not only from Peru, but especially from Colombia, among such cultures as Nariño, Tairona, Muiscas, etc. Pre-Columbian metal workers learned to work mostly gold, silver and copper. They were not able to discover iron.

Textiles and fabrics are also one of the most impressive and finest manifestations of Andean pre-Columbian art. This type of organic remains is almost perfectly preserved along the coastal desert because the dry climatic conditions. Textile handcrafts have their origins in Early Holocene basketry; techniques learned from that time later applied to weaving. For example, on the northern Coast of Peru in a site called Huaca Prieta, a c. 3000 BCE cotton-textile was found.

As with other materials, textiles were conceived not only for practical and dressing purposes, but also for beliefs and religion. Textiles of Huaca Prieta display, for example, a design of a condor and a snake within its belt, two of the most represented animals among the Andean iconography. Because their sophisticated techniques and bright colors, the Paracas have some of the most impressive textile art. Thousand of mantles, dresses and embroideries are wonderfully preserved within the Desert of Ica, immediately south of Lima. These "master pieces" are believed to cover and wrap mummies in a way that bundles and contains these human remains and offerings of various types and raw materials. Archaeologists interpret the "excessive time" invested in their elaboration as the result of ancestor worship in the past.

Another important raw material is stone, so for example, lithic sculptures are also a particularly developed art by Ancient Andean people. From north to south, we can mention some outstanding examples, such as the stellae made by the San Agustin Culture in Colombia (representing priests or shamans and dating CE 1–1200), the Chavin (1000–100 BCE) stone sculptures (representing zoomorphic and phytomorphic beings, including anthropomorphic human beings), the Recuay (100–800 CE) mourning lapidae; the impressive Pucara (1000–100 BCE) and Tiahuanaco (100 BCE–1200 CE) monoliths undoubtedly associated with ancient gods and beliefs. Among these, we can mention the Bennett´s monolith, currently a symbol of the Tiahuanaco Culture. Not considered art, but no less impressive are the sculpted wall stones of Inca buildings, e.g., Sacsayhuaman (Cuzco). The perfect fit of their outlines, used as "block-puzzles" to erect walls, led archaeologists to think Incas were aware of masonry techniques and used sophisticated procedures to transform stone forms to some degree.

Finally, idols and other modelled artistic items of wood and bone were also created by a number of cultures of the Andes. This is the case for the figurines of the Peruvian North Coast cultures, or the beautiful Inca beakers of wood called "Kero," which were decorated with rhombic designs and flowers that were actually Inca patterns, indicating regional domination.

Key Issues/Current Debates

Among the most fascinating debates on pre-Columbian art in the Andes, there is discussion on the exclusively "unique" character of some selected pieces. Indeed, all Andean pieces share common traits, such as modular bodies of anthropomorphic representations or shamanic personages, but in some cases there are distinctive pieces that distinguish themselves from the others. Stone sculptures such as the "Estela Raimondi" (Chavin Culture, c. 400 BCE) or the Bennett monolith (c. 200–500 CE) are unique pre-Columbian legacies to Peru and Bolivia respectively. Hence, pre-Columbian art could also be considered national symbols in Andean countries.

Another key issue in pre-Columbian Andean art is the techniques that were employed. Tiny metal filigrees, helicoidally made wooden sticks, highly elaborated textiles, or stones that seem to have been "smelted" still remain enigmatic from the technical point of view. Archaeologists, aided by other colleagues from a variety of research fields try to reconstruct some *chaine operatoires* that lead to this kind of superb technical-artistic results.

We know that in the Andes, there were no writing systems, and yet there were accounting devices and possible ideograms. So, are we able to recognize one artist or a family/group of them when assessing an artistic work? Chris Donnan proposed that among the Mochica potters, there were actual artists who were painters and exclusively devoted their time to the fine painting of ritual pottery. However, we lack further data and studies of other cultures to test if this was a regular trait of ancient Cultures of the Andes.

Pre-Columbian Andean art of complex civilizations is usually conceived to enhance power and legitimacy of some cultures "above" others. Yet the conceptual relationship of "art-power" in the Andes as an establishment is in some cases

a matter of debate when chemical-physical sciences are applied, so that, for instance, some highly decorated Nasca vessels (CE 1–650) from Ica (south of Lima) were also used for food purposes and not only as grave goods.

But were archaeologists able to find the ancient artistic workshops that were agglomerated by these creative minds? The answer is "unfortunately no." Most research addresses graves, simply because the luxurious contents attract media and people, which helps to maintain and improve research budgets. As seen, archaeologists need to apply a rather holistic approach in order to get a more complete overview from the past art in the Andes.

International Perspectives

Indeed, there is great potential in ancient Andean art, because of its uniqueness, palette-rich expressions, high technical quality, outstanding manufacture and combined colors. Its abstract and lineal modulation, in contrast to other world ancient arts such as the Roman Empire or even Attica, are typical of the Andes. Furthermore, the nature and special combination of structure and colors, for instance gold-cinnabar-turquoise, make such a visual impact, surely in ancient and even in modern times. However, technical and contextual data are still lacking.

Future Directions

A post-processual perspective is needed within this fascinating issue of pre-Columbian Andean art in order to improve our knowledge on this issue. Round tables with interdisciplinary participation would highly benefit our understanding of the how, reasons why, and role of ancient Andean art among not only elite, but also common populations.

Cross-References

▶ Andes: Prehistoric Art
▶ Archaeology of Art: Theoretical Frameworks
▶ Cueva de las Manos, Río Pinturas Cave Art
▶ South American Rock Art

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Andes: Prehistoric Period

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Introduction

After the Last Glacial Maximum (LGM), immigrants from Asia and probably other parts of the world entered the American continent. Once established in this ample territory, some settled in North America, while others peopled the Pacific shore, intra-mountain areas and

Amazonia of South America. Some people remained on the western side of South America, a territory whose common denominator is the Andean Chain. Although it is difficult to say why Ice Age people decided to stay in the Andes, one possible reason is (and was) its extremely diverse and rich ecological environment (Lavallée 1999). From west to east, the tropical warm waters, temperate and microthermal Interandean chain, and the evergreen Amazonia certainly provided a number of resources for food and raw materials, depending on seasonal productivity. Besides, a combination of natural rivers resulted in a cool and extremely rich ocean stream (the Peruvian or Humboldt Stream). Upwelling waters have made a huge number of fishes and mollusks constantly available to humans living along the Peruvian and Chilean Coast, especially from about 5,000 BP. Some archaeologists believe these were the basis of the Andean civilization (Dillehay 2000).

From a global perspective, Andean prehistory seems to have some constants, such as extreme internal cohesion among ethnic groups, strong interchange links, reciprocity, communal labor and sense, authority and vertical power, fixed traditions, deep beliefs, and a special commotion in front of natural events. These are key in assessing material culture in response to ancient Andean behaviors.

Definition

By convention, the prehistory of the Andes lasted from the very early peopling of this region at about 16,000 BP, until the arrival of the Spaniards at the beginning of the sixteenth century. From the start, early human settlers who entered the Andes inhabited a number of ecotones, from the Ocean Pacific shores of South America's western flank to above 4,000 m above sea level (masl), high in the Andes Mountains. Archaeologists believe that by that time, the Amazonian region bordering the Andes was also inhabited.

The development of different cultural complexes within the Andean region occurred under a scenario of changing environmental conditions. The initial population was coeval with the time span after the LGM that is marked by glacial advances and inversions, until the Younger Dryas (YD) event approximately 13,000 BP (León 2007). People were hunters, gatherers, fishers, and scavengers and lived in both camps and caves. From that time, some locations of the Central Andean region experienced a socioeconomic boom due to two key events. The first event was the premature invention of horticulture, especially based on squashes and likely a short time after the YD. Next, among other important plants, chilies (*Capsicum* sp), peanuts (*Arachis hypogaea*), and beans (*P. vulgaris, P. lunatus*) were domesticated from the time of the glacial-Holocene transition at 12,000 BP. The second key event (as a consequence) is that some groups became less mobile after the Early Holocene, and thus the sedentary process that finally led to the rise of Andean civilization was triggered (Bonavia 1991; Lavallée 1999; Dillehay 2000).

Socioeconomic developments within the Andes were not coeval. The rise of complex societies within this broad area seems to have occurred earlier, and originated in the Central region, especially from the coast of Ecuador and Northern–Central Peru.

The whole Central Andean development, founded on very early agriculture, camelid domestication, and quasi-permanent seafood resources, probably lead to internal social aggregation, differentiation and discrete hierarchies at around 6,000 BP. Emergent complex societies generated ritual paraphernalia and a "sacred world" that commanded a series of socioeconomic developments. Therefore, ornaments decorated with a typical Andean iconography were manufactured in response to the different gods that were worshipped.

The reorganization and establishment of the cool sea of the Peruvian stream region resulted in both a quasi-permanent and invariable climate and richness in seafood resources (including fish and mollusks) that complemented the horticulture already being practiced. This time span corresponds to the Maximum Holocene, when climate was warm and wet. Soon after

6,000 BP, people were able to build monuments devoted to ritual activities, probably linked to economic endeavors. Whereas pottery occurred in Peru around 4,600 BP, it dates to 7,000 BP in Ecuador. Monumental architecture experienced a singular emergence after that time. Archaeologists were able to identify at least three architectonical traditions. The first consisted of truncated platforms, stairways and ramps; the second displayed courtyards, rooms and a subterranean ventilation duct for fire offerings; and the last one was composed of a u-shaped building typical for the Central Coast of the Peruvian Andes.

"Periphery" regions to the Central Andes region underwent cultural changes to become complex societies somewhat later. However, the premature techniques discovered in some circumstances appear to be extremely early. For example, this is the case for the mummies of the Chinchorro culture located on the coast of Northern Chile and Southern Peru and dating to approximately 7,000 BP. Even within the Middle Holocene, people of this culture were able to recognize that organic remains were perfectly preserved when exposed to very dry conditions of the Atacama Desert. Non-central Andean societies also contributed with some key food resources, such as the potatoes, sweet potatoes or peanuts, that, once introduced among complex civilizations, became a key factor in their development. These are undoubtedly plants that were domesticated in the Oriental Andes or even in the Amazonian region and then introduced to the Andes.

Central Andean prehistory is one of the most attractive research issues, both to national and international archaeologists. This is not due to the former occurrence of the greatest empire of the southern hemisphere, by the Incas, but to the outstanding preservation of organic remains from the very earliest human presence in this region.

Some 3,500 years ago, the Andean landscape witnessed the rise of the first civilization known as Chavin; this name was chosen from the Chavin de Huantar site in the Central Highland of Peru. Some archaeologists consider this cultural occurrence as the very first Horizon, based on the spread of icons such as jaguars, condors and snakes, always altered and mixed with traits of human beings. This iconography is found from northern to southern Peru, covering more than 500 km, thus implying all regions within this radius were part of the Chavin Culture, i.e. First Horizon of the Central Andes. However, it must be kept in mind that almost all "Chavin traits" are not local, but rather imported. The Archaic or Late Preceramic public buildings addressed above came from both the Coast and Highland and are present in Chavin de Huantar. Also, some Amazonian animals such as caimans are key icons within the Chavin iconography. The probable pilgrimage into the cult center included paraphernalia and even inhalation of hallucinogens by priests. This time was based on religious beliefs in Chavin, and thus archaeologists propose that people were differentiated between the elite, composed of administrators and priests, and common people and servants.

The CE opening time span is coeval with the dissolution of the Chavin Cult and occurrence of a series of regional cultures on both the Coast and Highland regions of the Central Andes. At that time, experts consider that states were established and an "essor" of development of complex societies took place. It was also the time of magnificent development of art in a number of raw materials; from pottery to textiles to metals such as gold, silver and copper. In general terms, ornaments were conceived as representations of the ritualistic worship of the Andean god. Cultures of the Vicus, Mochica, Nasca, Recuay, and Cajamarca are representative of the time from 100 BCE to 600 CE. Sites display a series of forms from simple dwelling structures to ritual temples. One interesting difference is that northern buildings are usually huge and monumental, in contrast with the Southern Coast structures that are smaller.

The next period lasting from CE 600 to 1000 witnessed a new cultural fusion, again by means of a belief in a god. This god seems to be a human being, holding a trophy head in one hand and a (sacrificial) knife in the other. Its representation spread throughout the Central Andean region, similar to the Chavin cult. Archaeologists have labeled this time span as the Middle Horizon, or (by most experts) the Huari Empire. There are discrete differences when comparing the Huari

God with the one of the Tiahuanaco Culture (Bolivia), so there might have been some interaction between these two coeval cultures. The Huari Empire developed a complex road system that covered key places from the highest Andean mountains to the coastal shores facing the Pacific Ocean. These were further improved by the Inca Empire some millennium later. The Huari were also able to plan and construct actual orthogonal "cities," organized by administrative centers, public buildings, fortifications, ceremonial temples and even domestic villages. Lama caravans were also a dynamic means of communication and wares interchange with other populations across the Andes.

The internal atomization of the Huari Empire leads again to a regional independence and the reactivation of local societies, not only where former ones existed, but in a number of other localities. For instance, the Chimu Kingdom ruled over the Northern Coast of Peru and was able to build the Americas' biggest "city" of mud and also the most delicate and wonderful metal handcrafts of the Central Andes. At the same time, the Huanca culture inhabited the highest mountains in Central Peru at over 4,000 masl, dominating Andean resources and the side effects of high altitude living. Other cultures from that time achieved high quality in the manufacture of different wares and arts that in most cases were related to sacred purposes.

Finally, the Incas represent the crown of c. 14,000 Andean prehistoric development. According to historical sources, Imperial Inca development lasted only about 70 years. However, radiocarbon data seems to indicate that the Inca origins date back to at least the fourteenth century CE. Spreading from Cuzco, they reached quite far, from Colombia to Chile and Argentina along the Ocean Pacific shore, wherever the Andean mountain chain was present. The Incas based their culture on principals such as the royal panaca (elite family ties), and a dual system of conceptualizing the world. Their paraphernalia were simply expressions of an impressive power. They conquered a series of cultures inhabiting the Andes not only by means of force, but usually also by reciprocity and a smart system of interrelations. They also profited and improved the already implemented connection web throughout the Andes built by the Huari Empire, and introduced some Inca logos, such as the cross-like shape (Chacana) and the trapezoid window typical of the Inca occurrence.

Periphery history is somewhat dissimilar, but important to include here to complete a broad intercontinental panorama on the archaeologies of the Andes. In Northwest Argentina for example, most cultures are recognized by a dependence on agricultural crops such as maize and other tubers and grains, as well as household residential dwellings where people devoted time to economic activities such as agriculture and at times, ritual ceremonies (Leoni & Acuto 2008). Also, in western Ecuador, permanent settlements were established by 3500–3000 BCE with antecedents being low, mobile people from the Las Vegas Culture from 8500 to 4600 BCE (Raymond 2008). From the same country, phytoliths of squashes are dated to 10,000 BCE and maize to 6000 BCE. These, together with the Peruvian botanical remains, are very early evidence of Early to Middle Holocene plant domestication of the Central Andes. Further north in Colombia, a number of cultures also developed, but they are known in some cases by their stonework (e.g. the San Agustin culture with its lithic stellae), and mostly by their wonderful metal art, as in the Muisca, Calima, Tairona or Tumaco cultures.

The southern Altiplano area around the Titicaca Lake deserves special mention. After approximately 3000 BCE, people settled this high altitude region. Pukara and Kaluyu cultures are representative of the first millennium BCE. Archaeologists recognize the importance of the Tiahanaco culture at the end of that time span; it was actually a former state, based on religious beliefs that centered on a human-looking god who held a trophy head and a ceremonial knife in his hands. The Tiahuanaco people were recognized by their stone art and monuments. The Tiahuanaco center is an impressive center with massive stonework in the form of remarkable pyramids and platforms. Lama caravans for transporting goods are also uniquely typical for this culture. Multiproxy studies show that by that time, pilgrimage and immigration into and out of the center was quite frequent (Silverman & Isbell 2008).

Historical Background

The history of archaeological research in the Andes shares four similar and almost coeval periods (Politis & Alberti 2005). The first period goes back to the time after the Spanish arrival, when priests, administrators and other Spaniards gave accounts of the newly conquered territories and ancient heritage. The second period includes reports of the voyagers of the seventeenth and eighteenth centuries, within the context of both the illustration and romantic years ending with the new rising Andean nations. There is a third period when scientific research begins, approximately by the middle of the nineteenth century. In Colombia, for instance, the German Anthropologist Adolph Bastian made a exhaustive list of Colombian archaeological sites published in 1878; this was continued by Vicente Restrepo in 1898. In Ecuador, pioneers such as Jacinto Jijón, Caamano or Federico Gonzáles and Otto von Buchwald also reported the first archaeological studies at the end of the nineteenth century. In Peru, Mariano Eduardo de Rivero was able to make the first archaeological collection, and thus founded the National Museum. Later, Wilhlem Reiss and Adolph Stuebel conducted the first scientific excavations in Ancón by the late nineteenth century. A fourth and final period started around the start of the twentieth century, with scientific research in both field and labor. In Ecuador, for example, George Dorsell, Marsall Saville and Paul Rivet were remarkable during the first decades. One scholar who made a series of seminal contributions not only in Ecuador, but also in Peru and Chile, was the German Max Uhle. This is why some consider him as the father of Peruvian archaeology. Uhle excavated in the Pachacamac Sanctuary, near Lima, Peru, and proposed the very first archaeological sequence for Peruvian archaeology based on the stratigraphy of this sanctuary. Another relevant scholar was Julio Tello, who excavated a number of archaeological sites throughout Peru, thus providing quite important collections that now comprise the National Museum. Other scientific expeditions, especially from the US, conducted research in Peru, laying the groundwork for the next generations. A pivotal sequence was proposed, based on the team of the famous Viru Project in Northern Peru. The sixties witnessed the emergence of interdisciplinary research that opened a new age, allowing important issues, from botanical to palaeoenvironmental in nature, to be addressed. Up to 2012, there are regular projects that include this type of approach and invite not only Andean, but also international archaeologists to contribute to our knowledge of Andean archaeology.

Key Issues/Current Debates

The Andean archaeology of the twenty-first century especially incorporates international debates on inclusive archaeology, gender anthropology, expedient/complex technologies, paleoenvironmental (i.e. past climate change impact on ancient Andean civilizations), effects of archaeometrical contributions, radiocarbon corrections, Andean household archaeology, *chaine operatoire* approaches, and external problems such as public archaeology. All these topics are debated and included in Andean archaeology to improve our knowledge of this subject.

International Perspectives

Andean archaeology contains issues attractive to international research teams. One such issue is the wonderful and almost perfect conservation of organic remains in the Atacama Desert that make possible high resolution reconstructions in different perspectives. Good tissue preservations are also ideal for mummy conservation. The sea as a food provider for ancient people is also quite an interesting issue, especially because of the richness of its waters.

Future Directions

Research on Andean archaeology is a suitable and promising issue in every nation of the Andes, and national and international archaeologists have conducted it (Lane 2012).

It provides not only a partial portion of the history of almost half of the countries in South America, but also a sense of integration, because of the general homogeneity of ancient cultures of the Andes. A good example is the Inca road that links literally the whole Andes. The Inca road system was conceived and constructed over the whole Andean territory for the purpose of communication and ware transport, and is being seen as the main link among modern Andean countries.

On the other side, governments also see the history of the ancient cultures of the Andes as a common denominator for integration. Andean countries share a similar past, and so have an experience of permanent interchange from the earliest times.

Andean archaeology should also see an opening for applying new theoretical frames by relating, for example, the past roles of women, minorities, domestic activities, and landscape archaeology. Every nation has its challenges in this task.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Caral: The Sacred City
- ▶ Guinea Pig: Domestication
- ▶ Inca State and Empire Formation
- ▶ Machu Picchu: Geography and Culture
- ▶ Maize: Origins and Development
- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
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Andron

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Introduction

Andron (plural, *andrones*) is the name given by modern scholars to rooms excavated at sites from ancient Greece that combine a number of distinctive architectural features. These include a near-square layout with walls approximately 4.5 or 6.5 m in length; an offset doorway; a raised border platform; a central depression floored with plain or colored cement or plaster, or inlaid with pebbles or tiled mosaic; channels or guttering for drainage; and colored plastered walls (Nevett 2010: 47). Archaeological analyses place basic forms of these rooms at sanctuaries during the Archaic period, for example, at Perachora's Heraion and the sanctuary of Apollo Delios on Paros (Bergquist 1990: 38). Later, while continuing to appear at ritual-civic sites, the increasingly elaborate *andron* became commonplace, if not standard, in Classical and Hellenistic houses. Olynthus provides the majority of evidence for the domestic *andron* in the late fifth and fourth centuries BCE, where it has been identified in a third of the excavated houses (see Cahill 2002: 74-146). While the record for smaller domestic units at Delos and in the rural demes of Attica

further emphasizes that the *andron* was non-pervasive and was possibly absent from the majority of households (Trümper 2005: 119; Nevett 2005: 88, 93), the room does appear at Greek settlements across the Mediterranean (Nevett 1999: 80-126, 127, 138, 142, 153). However, sometimes the designation "*andron*" may be debatable. Thus, at the Hellenistic House of the Ptolemaic Coins in New Halos, the raised platform can be indicative of a storage area in the absence of other markers (Haagsma 2003: 68). Then again, distinctive architectural features were dispensable. While a number of houses at Delos contain ornate rooms with mosaic floors and elevated platforms, few of these "*andrones*" are quadrangular and none possess an offset door (Trümper 2007: 330).

Definition

The word *andron* means literally a space belonging to men. Earliest literary attestations from the fifth century BCE make it a generic "men's quarters" and a place for hospitality, including convivial gatherings that display features of the *symposion* (e.g., Aeschylus, *Agamemnon* 244; *Libations Bearers* 712). Of the architecturally distinctive room, the elaborate furnishing, extravagant decoration, and raised platform to accommodate couches, along with the provision of stepped floors and gullies to facilitate cleaning, correspond to this specific usage. However, domestic space was flexible. The *andron*, like other rooms in the Greek house, may have been occupied differently during the day, across seasons, and between owners. Daytime activity is implied, for example, by additional architectural elements. At House II in Eretria (c.400 BCE), upper columns break up an interior *andron* wall. Like external windows, this feature would maximize light and encourage circulation of air (Reber 2007: 284). As drinking was ideally staged in the evening (and those like the younger Alcibiades who reputedly reveled by day were censured for it: Lysias 14.25), this setup would most benefit daytime users engaged in other household occupations. More broadly, the *andron* may have provided a general living area when winter weather made the courtyard uninhabitable, as suggested by Rider (1965: 249) for Hellenistic Delos. Specific finds can also suggest changing usage over time. Thus, the presence of terracotta statues and the selection of tableware in the *andron* of the House of the Comedian at Olynthus leads Cahill (2002: 140-1) to propose that the sympotic room acquired ritual functions during its lifetime, although dual usage is another possibility.

Unfortunately, finds from *andrones* are frequently sparse and inconclusive, with the result that it is often difficult to establish what activities may have taken place on the basis of artifactual evidence. At Olynthus, even sympotic furniture and paraphernalia are rare. However, the best bet for an *andron* in the House of Zoilos did yield a loom weight, an item prevalent in other parts of the house (Cahill 2002: 135). The whole ground floor may have been appropriated for household industry (cf. Nevett, 1999: 71). Then again, in the front room of House AII.6 at Leucas in Acarnania, a large room decorated with painted plaster and boasting a window, a wide range of material was excavated. The presence of cooking ware, storage vessels, and fine pottery suggests that this likely *andron* space was harnessed for the production and storage of food and drink, as well as their consumption. Worktools – chisels, fishhooks, flint instruments, and an axe – were also kept in the room (Fiedler 2005: 107-10). Certainly, to return to hospitality, opportunities for dining beyond the symposion *sensu stricto* might also arise during festivals and on a daily basis. So, when Theban rebels arrive at the home of the governor they plan to assassinate, in Xenophon's *Hellenica* (5.4.7), they find him reclining on a couch with his wife seated by his side after dinner. Presumably, on the basis of this detail, they are in the *andron* (cf. Blazeby 2011: 89 for other convivial occasions involving female family members at home). Wider usage of the *andron* by other members of the household, and not just its menfolk at the symposion, is plausible.

Key Issues and Current Debates

As the place where visitors were accommodated within the house, and as space defined by its male

occupants, the domestic *andron* offers special insights into the relationships between *oikos* and *polis* and between the genders. Nevett's (1999) careful study of the Olynthian record shows that here the *andron* was frequently situated near the entrance to the house, approached through the court, and sometimes through an antechamber (the pattern is replicated at some near-contemporary sites, e.g., at Athens, 1999: 90-1; Thasos, 1999: 93-4; and Halieis, 1999: 98-101). These areas might also be decorated with "coloured plaster walls, terracottas and metal ornaments" (Nevett 1999: 70), effectively marking them as a suite and setting them apart from the remainder of the house. Through their adornment, the *andron* and the areas by which it was accessed made a statement to invited guests of the householder's "social prestige" (Jameson 1990: 189), or such decoration might be a marker of "social distinction" (see Westgate 1997-98: 106). The domestic *andron* may be an indicator of broadening sympotic activity from élite circles to the moderately wealthy, but it still conveys the affluence of the household to visitors. The addition of windows on the exterior walls, however high up, might have carried this message out into the city, at every noise- and scent-filled celebration (Tsakirgis 2010: 576).

If the *andron* communicated ideas about the wealth and prestige of the household to guests, it also provided a separate and enclosed space which kept those visitors focused inwards and away from the rest of the house. For the *symposion*, this enhanced the psychological effects of being together, hot-housing the sensory pleasures of drinking wine, inhaling incense, listening to and making music, conversing and laughing, and sexual desire. For the men who gathered together in the *andron*, relationships might be negotiated through shared endeavor and consolidated via a heightened atmosphere of merriment (*euphrosyne*) and fellow-feeling (*philophrosyne*), the qualities envisaged by sympotic poets Solon of Athens (26 W) and Ion of Chios (27 W) and manifest in parties painted on pottery like the red-figure bell-krater now at Port Sunlight (Lady Lever Art Gallery 5037: see Robertson 1987: 37-8, 96). Produced at Athens in the early fourth century, at the very time *andrones* were becoming visible in the domestic record, this mixing vessel depicts tightly packed, garlanded young men reclining on couches, their heads thrown back in song, as a young boy beats the tympanum and a woman dances (or plays an *aulos*: the instrument is visible below the paint but omitted from the final composition). Presented within the confines of the body of the krater, the scene encapsulates the spirit of camaraderie and shared pleasures encountered within the enclosed space of the *andron*.

Because the men joining in the symposion might be friends or relatives or associates or co-members of a religious organization, the *andron* offers a bridge between the "private" *oikos* and the "public" sphere, as "insiders" and "outsiders" mix within its walls. Furthermore, drinking companions might be fellow citizens or political sympathizers. Connecting the rise in domestic *andrones* in particular to democratic practice and ideology, Ault (2000: 486-8) even suggests that "the domestic *andron* brought the political sphere into the domestic realm and provided a space for small groups of citizens to gather for discussion outside the public assembly, lawcourt, or *agora*" (see also Nevett 2010: 62). For *andrones* outside the domestic record, in civic-ritual sanctuaries from the Archaic period onwards, the dynamic might be reversed, as individuals confirm their social and political relationships and continue their conversations under the rubric of public celebration (Schmitt Pantel 1992). The *andron* thus not only bridges but muddies the relationship between "public" and "private" and in the process sheds light on the dynamics of the Greek city. Social bonds established there between friends might be simultaneously between colleagues in political enterprise, whether symposiasts are citizens dedicated to democratic endeavor or orchestrators of dissent.

While fostering unity among participants in the symposion, the *andron* also articulates a gender divide. This divide was both physical and ideological. Certainly, the room may have been used by different members of the

household for a variety of purposes, possibly including weaving by women in the House of Zoilos (see above). Figured pottery like the Port Sunlight krater also shows women present at the *symposion*. However, such women were hired musicians or dancers, or they were *hetairai*, "female companions" who were sexually available (the two groups need not be mutually exclusive). As the fourth-century lawcourt case involving Neaera shows, a woman attending a drinking party could be branded a *hetaira* and find her status as a wife attacked ([Demosthenes] 59). In Athenian public discourse, female relatives should not be present in the *andron* during the *symposion*. By closing off the space to women in the family at certain moments, their contact with male incomers was controlled and gender relations were prescribed. To Antonaccio (2000: 532), the *gunaikonitis* "was a space where women could retreat when male visitors were present." By default, its male equivalent, the *andron* – or *andronitis* – becomes an exclusively male preserve, a space for men to occupy in the absence of women from the house. This was not a permanent segregation of the sexes, however, but a temporary impermeable division arising from social convention. The *andron* was both a space and an idea.

Cross-References

- ▶ Agora in the Greek World
- ▶ Polis
- ▶ Religion, Greek, Archaeology of
- ▶ Symposion

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Angel, John Lawrence

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Basic Biographical Information

J. Lawrence Angel was born on March 21, 1915, in London, England. His father, John W. Angel, was a British sculptor and his mother, Elizabeth Day Seymour, was an American classicist originating from Connecticut, USA. Angel moved to the United States with his family at the age of 13 and enrolled in the Choate School in Wallingford, Connecticut. In 1932, he entered Harvard where he obtained his A.B. (Artium Baccalaureautus) in 1936 and his Ph.D. in anthropology in 1942. In 1937, Angel married Margaret (Peggy) Seymour Richardson, his wife of 49 years and an invaluable professional as well as personal partner.

His most influential mentors at Harvard were Clyde Kluckhohn (social anthropologist), Carleton S. Coon (physical anthropologist), and Earnest A. Hooton (physical anthropologist). As an undergraduate student, he participated in archaeological fieldwork in New Mexico, Arizona, and Georgia. His first data collection and fieldwork trip to Greece and the Eastern Mediterranean occurred between 1937 and 1939, mainly under the auspices of the American School of Classical Studies at Athens and Harvard University, followed by ten more field trips in the Near East, focusing on Greece, Cyprus, and Turkey (1949, 1954, 1957, 1965, 1967, 1969, 1972, 1975, 1977, 1978).

Angel taught at the University of California at Berkeley (1941–1942), at the University of Minnesota (1942–1943), and at the Daniel Baugh Institute of Anatomy of the Jefferson Medical College in Philadelphia (1943–1962). He was a research associate at the University Museum of the University of Pennsylvania (1946–1962) and a civil consultant in surgical anatomy at the U.S. Naval Hospital in Philadelphia (1957–1962). In 1962, Angel succeeded T. Dale Stewart as the Curator of Physical Anthropology at the Smithsonian Institution, National Museum of Natural History, in Washington D.C., a position he held until his death. Additionally, he was an adjunct professor at George Washington University (1962–1986) and a visiting professor of anatomy at Howard University Medical School (1965–1970).

After joining the Smithsonian, Angel also became actively involved in forensic anthropology and served as a consultant for the Federal Bureau of Investigation (FBI), the US Armed forces, and other law enforcement agencies. He joined the American Academy of Forensic Sciences (AAFS) in 1975; he became a Diplomate of the American Board of Forensic Anthropology in 1978 and served as president (1980–1985). He also taught forensic pathology at John Hopkins School of Public Health (1963–1986).

He served as secretary-treasurer (1952–1956) and as vice president (1959–1960) of the American Association of Physical Anthropologists (AAPA). He was president of the Philadelphia Anthropological Society (1946–1948), the Philadelphia Society of the Archaeological Institute of America (1949–1950), and the Anthropological Society of Washington (1974–1975). He also performed associate editor roles for the *American Anthropologist* (1946–1948), the *American Journal of Physical Anthropology* (1951–1954, 1960–1963), and *Clinical Orthopaedics* (1954–1970).

Angel died at the age of 71 at the George Washington University Hospital on November 3, 1986.

Major Accomplishments

Angel's work shows a remarkable scholarly breadth encompassing human anatomy and osteology, dental anthropology, paleopathology, paleodemography, paleoecology, longevity and biological aging, obesity, stress indicators, behavioral reconstruction, biological distance and genetic mixture, and forensic anthropology. Among these, health and disease as selective micro-evolutionary processes held a central place in his research. His enduring research interest in Greece and the Eastern Mediterranean developed early on in his career, where he literally founded the fields of physical anthropology and paleopathology.

His early work, influenced by Hooton, was typological and emphasized craniometry, as represented in his dissertation aimed at reconstructing the complex interplay of biology, culture, and the environment in the Greek world. In doing so, Angel introduced a highly contextualized approach that he termed *social biology* (Angel 1946). Throughout his career, he promoted problem-oriented, interdisciplinary anthropological research, methodological and theoretical rigor, and new methodologies, thus setting the stage for the more recently developed field of bioarchaeology.

Angel's research on hemolytic anemias and particularly on the history of thalassemia in the Eastern Mediterranean has been a landmark in paleopathology. He coined the term *porotic hyperostosis* (Angel 1966a, 1967), now widely accepted. Angel attributed *porotic* hyperostosis to thalassemia or sicklemia in the Eastern Mediterranean favoring the former due to its endemicity in that part of the world. Based on the classification of these two genetic anemias as balanced polymorphisms maintained by the heterozygote advantage against malaria, he linked the occurrence of porotic hyperostosis in the Eastern Mediterranean to malaria, particularly *falciparum* malaria. In this regard, he developed a thoroughly ecological and regional approach to population health and disease (Angel 1971, 1975), culminated in his monograph on *The People of Lerna*.

Angel was particularly interested in paleodemographic parameters such as longevity, fecundity, and differential fertility. One of his major contributions has been his influential critique of the use of life tables from archaeological skeletal samples, emphasizing the difference between cemetery samples and living populations (Angel 1969). Angel was also a pioneer in the reconstruction of past human behavior and lifestyle through skeletal markers. The identification of the commonly observed elbow osteoarthritis in the Pre-Columbian human remains from Tranquillity (California) with spear-throwing described as "atlatl elbow" was highly influential, especially in linking osteoarthritis to a specific activity (Angel 1966b). His contextualized approach to behavioral reconstruction was further established in his work on the life stresses of slavery for the African American ironworkers at the Catoctin Furnace Cemetery with J. O. Kelley during the last decade of his life.

Angel received the Pomerance Medal of the Archaeological Institute of America (1983), the Physical Anthropology Section award of the AAFS (1984, 1986), and the Distinguished Service Medal of the American Anthropological Association (AAA) (1986). The AAPA organized and published a symposium in his honor (1979). Posthumously (1987), a memorial session was held at the AAA annual meeting, followed by an edited volume (Buikstra 1990). Since 1992, the Wiener Laboratory of the American School of Classical Studies at Athens has regularly awarded the J. Lawrence Angel Fellowship in human skeletal studies.

Cross-References

- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Bone, Trauma in

▶ Dental Anthropology
▶ Osteology: Definition
▶ Pathological Conditions and Anomalies in Archaeological Investigations
▶ Pathological Conditions and Anomalies in Forensic Contexts
▶ Skeletal Biology: Definition

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Animal Domestication and Pastoralism: Socio-Environmental Contexts

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Introduction

The domestication of herding animals and the development of pastoralist societies have played a key role in human economic, ecological, and social history (Dyson-Hudson & Dyson-Hudson 1980). Pastoralism supports substantial human populations in Eurasia, Africa, and South America, and both pastoralists and other farmers still rely predominantly on the few animal species that were domesticated in the early to mid-Holocene. Understanding changing human-animal relations with domestication and the development of pastoralism provides insights into the biodiversity of the animals on which contemporary pastoralists rely, the history of milk-drinking, and the coevolution of humans and domestic animals. Archaeology provides broad perspectives on pastoral societies as complex and flexible social constructs, forms of risk management, and as resilient systems evolved over millennia to help people to cope with aridity, climatic changes, and environmental extremes.

Definition

Conceptual Framework

Collaboration among archaeologists, ecologists, and molecular biologists has resulted in the development of a new conceptual framework for understanding the emergence and multiple dimensions of pastoralism. Pastoralism is defined here as a social and economic system in which people

move domestic animals to pasture and rely on spatial mobility for survival (Dyson-Hudson & Dyson-Hudson 1980; Wendrich & Barnard 2008). Pastoralists also emphasize the social and symbolic role of domestic animals (Marshall & Weissbrod 2011). They thrive in environments where climate and topography constrain agricultural production such as deserts, semiarid plains, mountains, and tundra. Although pastoralists often complement their livestock-based economy with other productive tasks such as cultivation, exchange, trade, fishing, hunting, and gathering, the needs of their herds override other considerations. People's roles as herders and pastoralists are also fundamental to the construction of individual and group identities in pastoral societies. Pastoralism in this sense is more than an economic activity and includes ecological, social, political, and ideological dimensions.

Pastoralists depend on a range of herd animals including sheep (*Ovis aries*), goats (*Capra hircus*), taurine cattle (*Bos taurus*), humped cattle (*Bos indicus*), horses (*Equus caballus*), donkeys (*Equus asinus*), llamas (*Lama glama*), alpacas (*Vicugna pacos*), dromedaries (*Camelus dromedarius*), Bactrian camels (*Camelus bactrianus*), yaks (*Bos grunniens*), or reindeer (*Rangifer tarandus*) that were domesticated between 12,000 and 4,000 years ago. Many of them were domesticated multiple times, and the circumstances in which different taxa were domesticated vary widely. Animal domestication is seen here as a microevolutionary process resulting from long-term coevolutionary relations between people and animals in humanly modified habitats (Zeder 2011). Microevolution in anthropogenic habitats and management of animals lead to selection away from wild genotypes and phenotypes. The degree to which people and animals depended on each other varied greatly. Animal domestication was a slow process, and long-term gene flow often continued between wild and domestic populations.

Animals provide food including meat, milk, blood, and raw materials such as dung, hides, or wool and can also be used for transport and traction. Pastoral families generally employ herding animals with diverse feeding strategies and uses. Pastoral herd sizes range from a few animals to many thousands depending on factors such as wealth, access to labor and land, climate, and disease, as well as political conditions. Herders move animals to grazing, water and salt, guard them from predators and rustlers and monitor their health. Settlements are sited in locations well suited for the needs of domestic stock and revisited over time. Landscape management and cycles of mobility facilitate access to pasture and water, but depend on factors such as seasonality, climate, and local flora, as well as enforcement of institutionalized property rights to pastures. Individuals or whole households move with herds at time scales that range from a few days to seasonal, yearly, decadal, and even centennial intervals, depending on environmental and social factors (Wendrich & Barnard 2008).

Most pastoral societies are characterized by social systems that emphasize rights to diverse terrain, through kin relationships and lineages, clans, or age sets. Families make their own herding decisions, however, and often have considerable autonomy. It has been argued, therefore, that mobility and pastoral subsistence systems lend themselves to the development of complex but relatively egalitarian social systems. However, polygamy is common in pastoral societies in Africa and Asia, and in many regions today, older men wield much of the power. Furthermore, highly stratified pastoral societies have existed in most continents through time. Central Asia is especially well known for ancient pastoral empires (Frachetti 2012), and raiding and warfare have been commonly associated with pastoral societies.

Historical Background

There have been long-term debates in anthropology over the role of mobility in society, domestication, and timing of the development of pastoral societies. One of the big questions has been whether hunter-gatherers domesticated animals or whether pastoral societies developed after settled plant-cultivating communities. In the nineteenth century it was thought that nomadism

preceded settled agricultural villages, but as a result of Darwin's evolutionary research, he and other scholars began to focus on the role of genetic isolation in domestication and to argue that animals were more likely to have been domesticated by settled village-based cultivators than mobile foragers. Despite the long-term success and resilience of pastoralism, western popular culture retains biases against mobile herding ways of life, which can be traced to the difficulty that ancient states faced in controlling mobile peoples, nineteenth-century cultural evolutionism, and historical notions of mobile hunter-gatherers or pastoralists as "primitive." Current anthropological perspectives strongly refute this argument and see the sustainability of pastoral ways of life as one of the long-term success stories of the ancient and modern worlds.

In a different historical twist, scholars studying early cities in Mesopotamia argued that pastoralism developed relatively late as a specialized economic system in response to the establishment of settled urban communities, irrigation systems, and exchange networks in the region. It was proposed that pastoral mobility developed as farmers occupied the best soils and relegated pastoralists to the margins of agricultural areas (Lees & Bates 1974). In the Zagros, however, there has always been an argument for early independent development of pastoral systems (Abdi 2003). The nature of pastoral subsistence has also been much discussed. There are ongoing debates regarding the Secondary Products Revolution or the idea that people's use of animals for milk, hair, and traction was not part of the initial motivation for domestication but led, instead, to elaboration of herding systems and the spread of pastoralists into Europe (Sherratt 1983). There are also discussions regarding independent incidences of animal domestication and development of pastoral ways of life vis-à-vis demic diffusion from discrete points of origin.

Key Issues/Current Debates

Identifying Domestication

Archaeological research on animal domestication relies on information from animal bones discarded at archaeological sites and contextual analyses of faunal remains, spatial organization, architecture, and artifacts found on sites. Size decrease has long been the most widely used marker of animal domestication, but it has become increasingly clear that there is a significant time lag after management before size changes are manifested (Marshall & Weissbrod 2011; Zeder 2011). More sensitive indicators include change in species frequencies, animal age and sex profiles, and pathologies indicating animal use or penning, as well as distribution of animals outside their wild range. Lenses of animal dung resulting from corralling or organic residues indicating milking are also increasingly used to identify early phases of domestication (Outram et al. 2009; Dunne et al. 2012). Genetic studies of extant species and ancient bones are playing a major role in helping to codify the phylogenetic relationships of purported ancestors and domesticates as well helping to ascertain the location, timing, and number of domestication processes involved.

Domestication and Pastoralism: Regional Variability

The histories of domestication reviewed here and incorporation of sheep, goat, and taurine cattle into pastoral societies around the world provide important insights into the development of diverse pastoral trajectories and their relationships with domestication processes.

The Near East

Sheep and Goats Archaeological and genetic data suggest that sheep and goats were domesticated multiple times by hunter-gatherers living in settled village communities in the higher elevation headwaters of the Tigris and Euphrates rivers (Zeder 2011). The wild bezoar (*Capra aegagus*) was the earliest of the herd animals to be domesticated. Goat herds were managed 11,000–10,000 years ago during drier conditions. By 9,500 years they were herded at lower elevations outside of their wild range. Genetic data also document at least six maternal lineages of domestic goats and suggest that herders moved them around the Fertile Crescent. Attempts to manage wild herds of Asiatic mouflon (*Ovis orientalis*) also occurred

11,000 thousand years ago. Culling of young male sheep suggests herd management and domestication in eastern Anatolia and the northwestern Zagros 10,300–9,500 years ago.

Herders relied for a long period on a combination of free-living, managed, and fully domesticated sheep and goats. As a result of long-term gene flow among these populations and variable levels of animal management and herding success, domestication was slow and erratic. Scholars have argued that pastoralism developed out of specialized hunting in mountainous regions (Abdi 2003). However, most excavations have explored settled village sites. The extent to which sheep or goat herding was seasonally specialized or undertaken by pastoral subgroups has not been fully examined. This may be remedied by new isotopic approaches to detecting mobility. The high mountains of Iran and Iraq remain relatively little explored from a pastoral perspective, and smaller open sites that might have been created by early pastoralists have not been systematically investigated. The earliest well-documented evidence for nomadic pastoralism in the Zagros Mountains dates to 9000–4000 BP.

Cattle Domestication of taurine cattle (*Bos taurus*) added a key third animal species to the caprine duo relied on by early herders. Aurochs (*Bos primigenius*) are now extinct, but were domesticated 10,500 to 10,000 years ago by settled farmers in the Middle Euphrates and high Tigris valleys of the Near East (Zeder 2011). Unlike caprines, taurine cattle were domesticated only once. Recent genetic research suggests that relatively few female cattle were ever domesticated and that people from just a few villages might have been involved (Bollongino et al. 2012). Cattle herding spread into western Turkey and southeastern Europe. Lipid residues in ceramic pots date as early as 9,000–6,000 years ago and the genetics of human lactase persistence suggest that milk had an important impact on survival (Gallego Romero et al. 2012).

Development and Spread A mosaic of farming, hunter-gatherer, and pastoral communities lived in the Levant during the PPNB. Pastoral nomadism, it is argued, originated in the Syrian Desert and diffused south (Arikan 2012). In the Negev herders also hunted. In a different pattern, pastoralists living in the increasingly arid environment of Chalcolithic Jordan adopted extensive nomadic pastoral strategies with seasonal cultivation. Land use models suggest this was the most sustainable way to minimize impacts and increase biodiversity in this low rainfall area.

To the west, domesticated cattle, sheep, and goats and annual crops were progressively incorporated into the European Neolithic beginning 8,000 years ago. Mixed farming, herding, and milking are strongly associated with demic diffusion. Specialized pastoralism such as that practiced in the Alps and other mountainous regions of central Europe probably began as recently as 4,000 years ago during the Bronze Age. The specialized management and domestication of reindeer occurred approximately 2,000 years ago and independently in northern Scandinavia and central northern Russia.

South Asia

Cattle, Goats, and Sheep In South Asia there is a different trajectory toward pastoralism than in Western Asia, with domestication of wild South Asian cattle (*Bos namadicus*) in the Indo-Iranian borderlands (Meadow 1996). Just as in Western Asia, little is known about smaller sites, and the bulk of the evidence comes from settled villages. Genetic data suggest that humped zebu cattle (*Bos indicus*) were domesticated in the Indus and perhaps northern India. During the eighth millennium BCE, farmers in Baluchistan cultivated wheat and barley, kept goats, and hunted wild cattle and sheep (Meadow 1996; Fuller 2006). Cattle domestication is documented 7,000 years ago by age profiles and size decreases indicative of management. Herders subsequently spread zebu cattle west across the Iranian plateau. In south India, ash-mound sites document the development of specialized pastoralism between 6,000 and 4,500 years ago and possibly preceding cultivation in the region. Four thousand years ago pastoral systems of the Indian subcontinent incorporated transport animals from other regions

including donkeys, horses, and Bactrian camels to create resilient pastoral systems in arid portions of Southern Asia. Lactase persistence in parts of South Asia attests to the significance of the history of milk-drinking among herding populations (Gallego Romero et al. 2012).

Central Asia

Horses, Bactrian camels, and yaks were domesticated in Central Asia, and these transport and multipurpose animals provided the basis for pastoral systems variously adapted to steppes, deserts, mountains, and high-altitude plateau regions from the Black Sea to China.

Horses Domestication of horses influenced the development of pastoral systems of the Central Asian Bronze Age and transformed scales of mobility and flows of information across Central Asia. Evidence from settlements in northern Kazakhstan, especially the site of Botai, suggests that settled hunters used domestic horses 5,500 years ago to hunt wild horses (*Equus ferus*). Geoarchaeological evidence of corals, bit wear on horse teeth, milk residues, and size decrease, demonstrate domestication (Outram et al. 2009). Initial domestication likely took place elsewhere. Genetic data document multiple maternal horse lineages across Central Asia and suggest gene flow over the long term among wild and domestic populations.

The introduction of domesticates from Western Asia enhanced horse-based pastoralism and triggered later Middle Bronze Age (4,500–3,500 years ago) forms of nomadic pastoralism that incorporated Western Asian cattle and sheep. Horses were used for meat, skins, milk, and transport; associated with the sun god; and used in ritual sacrifice. A recent hypothesis suggests that pastoralism and herding animals could have spread from west to east through the inner-Asian mountain corridor instead of the steppes (Frachetti 2012). Nomadic pastoralists in Mongolia, 2,500 years ago, relied on diverse subsistence strategies including horses, domestic caprines, cattle, hunting, and cultivation (Wright et al. 2009). Furthermore, organized landscapes reflect long-term revisiting of sites best suited for pastoral settlement. In areas such as northern Mongolia, there is also evidence for trade, hierarchy, and semipermanent pastoral habitation.

Bactrian Camels The domestication of two-humped Bactrian camels transformed people's ability to live in the cold deserts of Central Asia and opened up desert trade routes. Bactrian camels are thought to have been first domesticated between China and Mongolia. There is little osteological information, however, on the social context, place, and timing of domestication. Ancient DNA from Iron Age sites and the lack of geographic variability among modern domestic camels from China and Mongolia have led scholars to suggest a single center of domestication. Genetic research has demonstrated, though, that endangered wild Bactrian camel populations are not the ancestor of the domestic two-humped camel. On the basis of early distribution outside their wild range, archaeologists suggest that Bactrian camels were domesticated 6,000–4,000 years ago (Peters & von den Driesch 1997). After domestication the range of domestic Bactrians expanded west to Turkmenistan where clay figures of Bactrian camels pulling carts date to the early third millennium BCE (Meadow 1996). In South Asia two-humped Bactrian camels appear in the late third millennium BC, probably through northern Afghanistan, whereas in northwest China camel bones date to about 3,000 years ago.

Yaks Yaks were domesticated by hunters of the Tibetan borderlands (Rhode et al. 2007). Genetic studies document the presence of two maternal lineages of domestic yaks suggesting two domestication events or gene flow. Yak dung has played an important role as fuel on the Tibetan plateau, and it has been argued that this may have been a motivating factor in domestication. Yaks were used for milk, hair, meat, and as pack animals. They are also spiritually important in the region. Yak-based pastoralism has played an important role in the settlement of the high-altitude regions of Central Asia and the development of trade and interconnections among valleys, plateaus, and

mountain ranges of the region. Yaks were adopted by both herders and mixed farmers from the Himalayas to the Kunlun Mountains and through the Gobi to Mongolia and Siberia.

Arabian Peninsula

Domestication of dromedaries allowed people to survive over the long term as pastoralists and traders in the arid deserts of the Arabian Peninsula and Africa. Recent research indicates that the extinct giant camel *Camelus thomasi* was the wild ancestor of the dromedary or Arabian camel. Large numbers of camel hunting sites on the eastern coast of the Arabian Peninsula suggest that dromedaries were domesticated there 6,000–4,000 years ago (von den Driesch & Obermaier 2007). Pastoralists of this region came to rely heavily on camels for milk and as a result have high frequencies of lactase persistence today. With domestication the ancient range of the dromedary expanded along trade routes to Iran and South Asia. Camels date to 2,000 years ago in Africa and became an increasingly important part of subsistence and trade as deserts expanded. Pastoral societies of the Horn have been shaped by their reliance on camels for milk, meat, and blood. Saharan camel trains are depicted in rock art and associated with the development of specialized gold and salt trade routes. In the Arabian Peninsula and Sahara, camel-based pastoral groups played a role in the development of complex polities.

Africa

Pastoralism was the earliest form of food production on the continent and allowed Africans to cope with the mid-Holocene expansion of the Sahara (Gifford-Gonzalez & Hanotte 2011). Microsatellite and paternal genetic data, and the timing of the appearance of cattle before sheep and goats, suggest that settled hunter-gatherers may have domesticated African cattle in the eastern Sahara (Marshall & Weissbrod 2011). It is also likely that incoming taurine cattle from Asia were interbred with local wild cattle. A thousand years later Near Eastern domestic sheep and goats were integrated into mobile herding, hunting, and gathering systems that spread across Saharan grasslands. These herders also domesticated a desert-adapted animal, the African wild ass (*Equus africanus*). Genetic data documents high diversity in African donkeys and two maternal haplogroups suggesting two African populations played a role in domestication. Cattle, donkeys, sheep, and goat complement each other, increasing resilience by providing herders with animals that have dissimilar lifecycles, feeding habits, and disease susceptibilities. Lipid residues in ancient pots from southern Libya demonstrate that herders were relying on cattle for milk as they moved west from the central Sahara by 7,000 years ago. Milk fats from a range of plants also indicate a seasonal pastoral system in the Acacus, with herders moving between the mountains and the plains (Dunne et al. 2012). As the African humid phase ended, hyperarid conditions developed in the Sahara 6,000 years ago. Herders moved more frequently and relied more on sheep and goats. Monumental cattle burials appear at this time, and abundant pastoral rock art testifies to ritualization of cattle.

Pastoralists ultimately abandoned the Sahara, migrating to the Nile Valley and Sahel. Herders with generalized domestic and wild subsistence bases also moved as far south as East Africa 5,000 years ago. In Southwest Kenya specialized pastoralists relied on domestic stock without hunting abundant large mammals approximately 3,500 years ago. It has been argued that this subsistence choice reflected pastoral identity as people who eat cattle, rather than wild meat (Marshall & Weissbrod 2011). Pearl millet was domesticated 4,000 years ago in West Africa by pastoralists who settled in the Sahel. After this time, seasonal cultivation became part of the repertoire of many pastoralists. Disease threats affected the spread of pastoralism in Africa, but trypanosomiasis-resistant cattle breeds attest to the adaptation of African cattle to the wetter tsetse belt of West Africa (Gifford-Gonzalez & Hanotte 2011).

South America

Pastoralism developed in the Andes between 6,000 and 4,000 years ago with the domestication of llamas and alpacas and the development of

distinctive pastoralist societies (Mengoni-Goñalons 2008). Genetic research has demonstrated that the guanaco (*Lama guanicoe*) is the wild ancestor of the llama and the vicuña (*Vicugna vicugna*) the wild ancestor of the alpaca. Considerable hybridization has also been documented (Wheeler et al. 2006). Recent research suggests that camelid pastoralism developed to buffer against the climatic and environmental unpredictability that characterized the Andean highlands throughout the Holocene. Domestication of Andean camelids now appears a more diverse and dynamic process than previously thought. Growing evidence from southern Peru, northern Chile, northwestern Argentina, and western Bolivia suggests multiple simultaneous instances of domestication outside the Peruvian central highlands. Long archaeological sequences from widespread highland sites document specialized hunting of wild camelids between 10,000 and 6,000 years ago, followed by a period of intensive management and the eventual formation of distinctive herding communities 5,000–3,500 years ago. There is evidence for long-term herding in the highlands and the introduction of domestic camelids to the coast, eastern, and northern Andes as early as 4,500 years ago.

In the Andes, pastoralism was complemented by other subsistence strategies as it developed, and these varied with environmental and social settings. In the Bolivian central Altiplano, Wankarani pastoralists employed camelids in a diverse subsistence strategy that included fishing, cultivating, and use of a range of wild resources. Domestication of llama's secured access to meat, transport, and dung for fuel, but the motivation behind herding alpacas was to produce fine wool with which to make textiles. Pastoralist specialization in some areas resulted in herders depending on specialized wool-producing breeds. Highland farming societies also incorporated domesticated camelids from early on to complement agricultural production. Meat, wool, and pack-based pastoralism allowed denser settlement in high-altitude regions of the Andes and has proven a resilient way of life.

Emerging Patterns

New data and increasing research in Central Asia, Africa, and South America is providing fresh perspectives on domestication and contexts for the development of pastoralism. Two common assertions regarding the timing of the appearance of pastoral systems are that plants were domesticated before animals and that pastoralism developed late and out of settled villages and towns of early states. Thinking about these processes was initially framed in Southwest Asian contexts. Sheep and goat were the earliest herd animals to be domesticated worldwide, and recent syntheses show that they were domesticated in the Fertile Crescent at about the same time as the earliest plants. Similarly, in South America, hunter-gatherers domesticated camelids at the same time as many Andean cultigens. In Africa, however, domestication of donkeys and incorporation of introduced animals and the development of mobile early pastoral societies preceded domestication of African plants by several thousand years. In Central Asia pastoral systems are variable, but there is no indication that cultivation occurred as early as herding. In Baluchistan, however, there are complex patterns of cultivation of introduced wheat and barley prior to the domestication of zebu cattle. However, in South India early cattle pastoralism preceded cultivation. Current data suggest that domestication of South Asian plants occurred after the earliest pastoralism and in regions where pastoralism was never common.

Answers to the related question of whether pastoralism developed late and out of the settled villages and towns of early states are straightforward in some regions and less so in others. There are strong indications that domestication resulted from specialized hunting and widespread modification of the environment starting 12,000 years ago (Zeder 2011). But whether goats and sheep were also incorporated into residentially or seasonally mobile pastoral systems in the Fertile Crescent or whether they were largely integrated into systems of village-based agriculture is unclear. The timing of the earliest pastoralism in Southwest Asia is, therefore, unknown. By contrast, in Africa and the Andes hunter-gatherers or early herders domesticated a range of animals

and pastoral sociopolitical systems developed well prior to the appearance of settled polities. Similarly, the first evidence for reliance on domestic horses is among hunter-gatherers. It is possible, however, that horses were domesticated by people further to the west who kept cattle and cultivated crops. It is clear, however, that the development of pastoralism in Central Asia stimulated the development of complex nomadic societies and states, rather than the other way around. Settled towns and polities played no role in the development of horse pastoralism in Central Asia. Simple statements about the relative timing and spread of farming and pastoral systems obscure complex climatic shifts, and subsistence histories and sociopolitical contacts, that made one system or the other more likely to flourish at any given time. But it is clear that plants were not domesticated earlier than animals as a general rule and that in many cases pastoralism developed before ancient states.

Research carried out during the last 20 years shows that animals were domesticated and pastoralism was developed in widely dispersed areas of Eurasia, Africa, and the Andes. However, there is still tension between the ideas of independent origins and diffusion, and with the exception of relations between Southwest Asia and western Europe, relatively little is known about the nature and timing of regional contacts. Recent research suggests passage of people, animals, and ideas across Iran from the Near East to South Asia. Similarly, it has been argued that horse-based pastoralism spread through long-distance movements from west to east across the Central Asian steppe and the inner-Asian mountain corridor. Current discussions of Central Asia focus less on migrations as mechanisms for social change and more on relatively small-scale pastoral movements, repeated revisiting of the same locales, and extensive interactions among mobile pastoralists during seasonal rounds (Frachetti 2012).

The question of whether herders started to milk animals early or whether milking and use of animals for hair, and traction, was part of later pastoral development and spread is another issue that has been much discussed (Sherratt 1983). Recent research demonstrates, though, that in Turkey milk residues on pots date to as early as 9,000 years ago (Dunne et al. 2012). Pastoralists moving into southeastern Europe 8,000 years ago also relied on milk (Gallego Romero et al. 2012). The same is true of the earliest cattle pastoralists moving west across the central Sahara 7,000 years ago. Horses were also milked in the earliest phases of domestication by herder-hunters in northern Kazakhstan about 6,000–4,500 years ago (Outram et al. 2009). As a result, scholars now suggest that secondary products may have been part of the early motivation for people to manage herd animals. Drinking milk conferred such a survival advantage on pastoralists that different genetic pathways for lactase persistence developed in Europe and Africa. Lactase persistence is a pastoral legacy and geographically concentrated at high frequencies today in northwestern Europe, parts of Africa, Southwest Asia, the Arabian Peninsula, and Mongolia.

Future Directions

Well-known pastoral regions of the world such as the Andes, Africa, and Central Asia have seen far less research than areas that have long been under intensive cultivation such as Western Asia, Western Europe, Eastern China, or North America. Ongoing research is addressing these imbalances. Furthermore, pastoral sites are by definition ephemeral, and there is a need for more highly trained pastoral archaeologists. Global geopolitics as well as applied issues such as the need for sustainable food production and mobile responses to climate change are, however, expanding the scope and relevance of pastoral research. New methods of detection of pastoral sites and early stages of animal management such as micromorphology and soil chemistry, as well as breakthroughs in the study of isotopes and ancient and modern biomolecules, are also making it possible to conduct much more systematic and fine-grained archaeological research on domestication and mobile pastoral societies.

Future research is needed on regional variability in pathways to pastoralism at a range of scales. There is evidence for different pathways to pastoralism in South America, Africa, and Central Asia,

for example. There is much less information, however, on smaller scale variability in patterns of camelid domestication or breed development within regions – such as the Peruvian or Bolivian Andes. Similarly, little is known about differences in the way that Bactrian camels and dromedaries were domesticated. It has also been suggested that there are resemblances between the development of cattle-based pastoralism and late cultivation of crops by early herders in northeast Africa and South India, but multisited research projects have not attempted systematic data collection and comparison between continents.

Ethnohistoric research in Africa and the archaeology of Cyprus also make it clear that small groups of people and their animals suffered periodic reverses with pastoralists becoming hunter-gatherers, animals becoming feral, or local populations of cattle or other livestock being decimated. Research on these and other small-scale processes that are critical to domestication and breed formation will be greatly enhanced by long-term regional archaeological studies that integrate fine-grained research on zooarchaeology, soils, chemistry, genetics, local environments, and human social practice.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Asses/Donkeys: Domestication
- ▶ Camels: Domestication
- ▶ Cattle: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Goat: Domestication
- ▶ Horses: Domestication
- ▶ Sheep: Domestication
- ▶ Yak: Domestication

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Animal Paleopathology

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Introduction

A relationship is a two-way entity. The different partners within it influence each other to a greater or lesser extent. So it is true for the long history of human-animal relationships (Fig. 1): each has affected the individual lives, and also the historical trajectories of whole populations, of the other. It is these stories that animal paleopathology can elucidate. The domestication of animals, for example, changed the course of development of human society and economy and in doing so affected human health and disease. Bringing animals together in larger, denser herds, in close association with human communities, would have changed the ecology of infectious diseases for both parties.

Definition

Animal paleopathology is the study of health, disease, and injury in past animal populations from the analysis of preserved hard and soft tissues. It is concerned primarily with the bones and teeth routinely recovered from archaeological sites, but can also include studies of soft tissues (mummified remains, bog bodies), and articulates with a range of related research areas, such as paleoparasitology, paleodiets, molecular biology, veterinary medicine, and human paleopathology. Through studies of skeletal abnormalities and alterations related to disease and injury, a range of interpretations can be formed and forwarded relating to past economies and societies, environments and living conditions, animal husbandry techniques, and disease ecology.

Key Issues/Current Debates/Future Directions/Examples

The current state of the discipline of animal paleopathology and several of the key issues under debate (in particular those relating to methodology) are perhaps best viewed and understood through a brief retrospective on the discipline.

Methodological Problems and Biases

In considerations of the state of the discipline, parallels are often drawn with its close relative, human paleopathology (O'Connor 2000: 98; Thomas & Mainland 2005). Human paleopathology is a discipline reaching back into the nineteenth century. It is a mature subject, with well-established and consistently applied protocols and methodologies. Animals were included in paleopathological reviews in the earlier twentieth century, but it was only from the 1960s, with the work of such specialists as R.A. Harcourt and D.R. Brothwell, that the foundations of animal paleopathology really began to take off. The publication in 1980 of a general textbook on the subject by Baker and Brothwell (1980) is widely recognized as a seminal moment for animal paleopathology. This volume, a collaborative

Animal Paleopathology, Fig. 1 Example of a human-animal relationship: a man traveling by donkey (modern Greece) (Photo: R. Bendrey)

work between a veterinary pathologist and a zooarchaeologist, reviewed the potentials of the discipline and the abnormalities that might be identifiable within zooarchaeological assemblages. In the subsequent decades, animal paleopathology has developed slowly and rather erratically, and in comparison to human paleopathology, methodologies have unfortunately not been applied consistently to studied material (Thomas & Mainland 2005; Upex & Dobney 2012).

The discipline developed into a situation where common practice was to publish "interesting specimens" (Upex & Dobney 2012). On the one hand, these publications can be useful as they raise the profile of certain recognizable disorders to the wider zooarchaeological community, hopefully encouraging their future recognition; on the other, the absence of proper articulation with their full context, and other forms of archaeological evidence, limit their broader importance. This general approach has been linked with relatively limited publication of prevalence rates (the number of cases of disease or infection in relation to the unit of population in which they occur). It is important to synthesize and compare data to understand geographical and chronological variability. To this end, prevalence rates should be routinely calculated and published. The lack of standardization has led to a situation where studies are not often comparable; even more problematic is the fact that pathology is not always recorded or reported.

This lack of methodological refinement and systematic application has been attributed to several factors (Thomas & Mainland 2005). Most zooarchaeological assemblages consist of disarticulated and fragmented skeletal elements, and complex taphonomic processes (differential destructive processes associated with slaughter, butchery, cooking, consumption, and discard behaviors) further bias the recoverable data (Bartosiewicz 2008). These factors, often resulting in pathological bones being separated from the context of the whole individual, mean that there are often multiple etiologies for a single pathological lesion type. Linked to taphonomy, it is the case that some pathologies are more likely to survive than others.

Full understanding of pathologies is not supported by control studies in modern populations. There are further methodological problems related to the identification, recording, and interpretation of pathologies. One key problem, for instance, is determining what should be considered "normal" (O'Connor 2000: 107).

As the premise of paleopathology rests upon identifying, quantifying, and interpreting abnormal alteration from a healthy state, we need to understand the full range of normal variation that might occur. Modern comparative studies of known life-history populations will help in the assessment of what is "normal" and what is pathological and will be able to improve knowledge on conditions that remain poorly understood (O'Connor 2000; Thomas & Mainland 2005).

The inconsistent application of paleopathological research may perhaps be viewed in the context of the variability in methodologies applied in zooarchaeological research more generally (due to differing research agendas, project aims, personal research interests, publication space, and financial/time constraints). Pathologies tend to be an infrequent occurrence in zooarchaeological assemblages and may not be prioritized for research. Problems may also stem from a lack of familiarity with veterinary medicine research and also with the archaeological relevance of the diversity of pathological lesions. In many senses, the discipline has been a story of unrealized potential to date, and studies have been somewhat sidelined, although they can contribute key information in relation to the human past (discussed below).

The discipline, however, has seen significant advances in the last 15 years or so, in the development and application of methodology, occurring alongside a number of developments promoting animal paleopathological research and publication. Established in 1999, the *Animal Palaeopathology Working Group* of the *International Council for Archaeozoology* was founded to address the problems discussed above, especially the integration of paleopathological data with other forms of evidence, improvement in recording practices and their systematic application, and improvement in the knowledge of the underlying biological processes and consequences of disease and injury. Further, 2011 saw the launch of the *International Journal of Paleopathology*, a journal dedicated to the publication of both human and animal diseases.

The Functioning of Economies and Societies

Animals have been, and are, a central part of human existence: they are part of our economies – providing dietary staples and physical work; we form emotional attachments to them; through our close associations, we share diseases with them. Animal paleopathological research can inform on all of these broad themes.

Until the mechanization of wheeled vehicles, animal power played an essential role in land transport, agricultural production, and warfare. Their use thus had major repercussions on human society and economy with cattle plowing, for example, allowing the intensification of agriculture, and horse riding bringing into human use an animal that revolutionized how people could travel, communicate, and fight each other. Pathological changes occurring in the skeletons of animals used for transport and work can provide evidence of these past uses.

Bone skeletal elements undergo adaptive remodeling in response to increased functional strain – essentially bone deposition is stimulated by extra forces acting on the skeletons (Fig. 1). This can produce joint arthropathies in animals used for work (Fig. 2), although it is the case that such morphological changes also develop as a function of other factors, such as age, sex, body weight, living conditions, and genetic predisposition (Bartosiewicz et al. 1997; O'Connor 2000: 99-101). It is only through the study of collections of modern skeletons with known life history that it will be possible to understand the different influences of the separate factors. Study of such comparative, control populations has contributed to the development of criteria usable to explore the identification of the human use of animals for work in the past, such as the use of cattle for traction (e.g., Bartosiewicz et al. 1997) and the horse for transportation (e.g., Bendrey 2007: Fig. 3). These criteria need to be robustly tested and revisited with reference to new and more diverse control collections to assess their validity, for example, current debates over the reliability of different methods for identifying bitting damage in horses

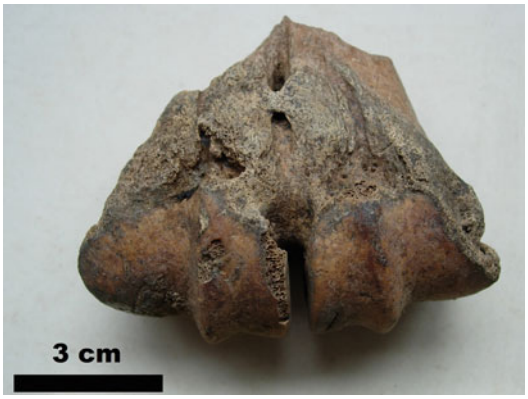

Animal Paleopathology, Fig. 2 Cattle metacarpal from Roman Canterbury (England) displaying degenerative changes to the distal epiphysis, with splayed distal condyles and peripheral exostoses (Photo: R. Bendrey)

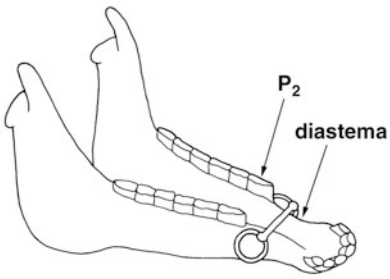

Animal Paleopathology, Fig. 3 Identifying horses used for transport: above – the position of the bit relative to the mandible in the horse's mouth; below – both reactive new bone deposition and bone destruction on left and right mandibular diastemata of a horse from Iron Age Danebury (England) interpreted as a bit-induced pathology (Photo: R. Bendrey)

Animal Paleopathology, Fig. 4 Photograph (*left*) and x-ray (*right*) of a healed double fracture of a Roman right dog radius and ulna from Tiel Passewaaij (the Netherlands) (Photo: Courtesy of Dr. Maaike Groot)

(Bendrey 2007) will hopefully continue as methods are improved and refined.

Again, a further complicating problem with such studies is that as most zooarchaeological material recovered is both disarticulated and fragmentary, it is difficult to assign specific ages or sexes to pathologies in such material, making it harder to assess the separate possible factors influencing individual cases. Complete skeletons can often give more detailed, nuanced assessments.

Cultural attitudes toward animals can also be revealed through the study of pathologies (MacKinnon 2010). Traumatic injuries, for example, can give insights into possible cases of accident, abuse, "occupational" injury, care, and treatment of "pets." Dogs, for example, may be susceptible to both abusive injury by humans and "occupational" injuries received during hunting or herding (Fig. 4). In such studies, recorded fracture prevalence rates will be an underestimate of the true prevalence, and it is also difficult to

distinguish between accidental and deliberate injuries (which is most reliably assessed through cases where traumata distributions are studied in complete skeletons) (Groot 2008). Again, to interpret archaeological data, it would be useful to have modern control data for known populations, such as the prevalence of fracture rates in working populations of dogs (Thomas & Mainland 2005).

Environments and Living Conditions

Knowledge of past animal health and disease articulates with, and informs on, that of broader ecology and environment. This can encompass the broader regional environmental context of the animals (e.g., climate and ecology) and also "local" context (e.g., housing, penning). Diet, a key aspect of animal ecology, directly affects skeletal development.

In recent years, a considerable research focus has been directed at recording and interpreting finds of enamel hypoplasia – an interruption or disturbance in the formation of enamel (Fig. 5). This developmental defect is associated with physiological stress during the growth of the tooth crown. Research has shown that it can be due to a range of factors causing stress on the animal, especially developmental (e.g., weaning), nutritional (e.g., seasonal malnutrition), and disease (e.g., parasite load). In zooarchaeology, most work has been undertaken on the low-crowned teeth of pigs; however, recent work has begun to address the study of enamel hypoplasia on high-crowned species, such as caprines (sheep and goats) (Upex & Dobney 2012). The prevalence of enamel hypoplasia, for example, has been shown to vary according to climatic and ecological factors in a study comparing modern caprine teeth between a semiarid and a (moister) mesic environment in Kenya (Balasse et al. 2010).

Studies of enamel hypoplasia can also inform on animal husbandry. In the study of pig remains covering some two millennia at Neolithic Çayönü Tepesi, in southeast Turkey, Ervynck et al. (2002) identified a gradual increase in enamel hypoplasia through time, along with a trend toward younger animals at death and smaller body size. They interpreted this as a gradual increase in physiological stress in pig populations due to the domestication process and animal husbandry pressures.

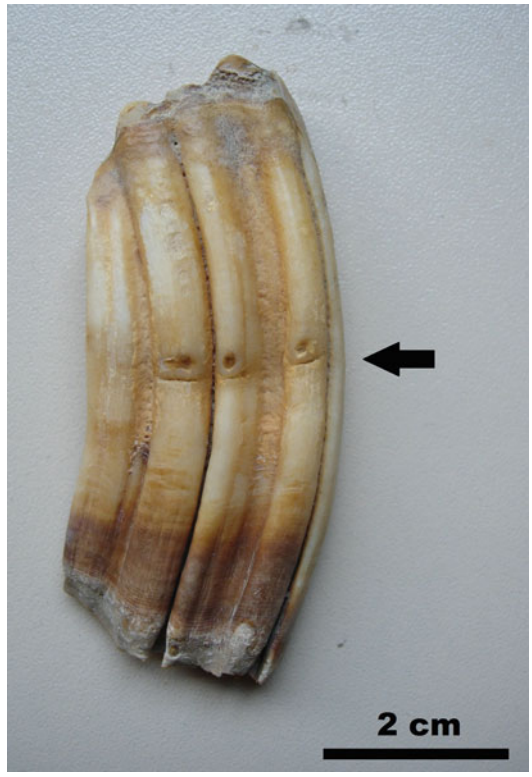

Animal Paleopathology, Fig. 5 Linear and pitlike enamel hypoplasia on an Iron Age horse lower third molar (M_3) from Tsengel Khairkhan (Mongolian Altai) (Photo: R. Bendrey)

Markers indicative of the animals' physical environment may be preserved on the bones. The condition known as "penning elbow" – consisting of new bone (osteophyte) deposition on the lateral side of sheep humero-radial joints – is so called as it is often considered to be a result of trauma to the outside of the joint from husbandry practices such as penning or handling (Baker & Brothwell 1980: 127; Upex & Dobney 2012: 202-3). However, recent work on comparative modern sheep populations from North Ronaldsay (Scotland) indicates that the incidence of these lesions may not be related exclusively to husbandry practices but also to environment, joint morphology, and possibly age (Clark 2009). This study, of sheep

from two contrasting environments on the island, indicated that the lesion may also be related to the environment and that repeated minor shocks, as might be expected from movements over rocky ground, may produce the lesion.

Animal Breeding and Husbandry

Animal management and husbandry techniques lie at the intersection of economic and cultural decisions, domestic animal physiology and behavior, and local (and wider) environmental contexts. Evidence for these practices, as discussed above, can leave various traces in animal skeletons linked to both individual lifetime events (e.g., weaning) and habitual lifestyle and behavior (e.g., grazing terrain). Other conditions may potentially contribute to understanding of the housing and feeding of animals, such as evidence for rickets or malnutrition (Baker & Brothwell 1980: 43-52). At the population level, selective breeding for certain desired traits can have negative effects by the unconscious concomitant selection of other detrimental congenital traits which can be identifiable in skeletal remains (Baker & Brothwell 1980: 40-2; Upex & Dobney 2012: 204-5).

Infectious Diseases and Disease Ecology

Changes in disease ecology and the incidence of infectious diseases affecting humans and animals will have been important consequences of changing human-animal relationships through time. A range of cultural, social, biological, and environmental variables will have impacted upon the epidemiology of infectious diseases in the past. Examples of the significant effects of the transmission of infectious organisms between contiguous animal and human communities are well known, as in the medieval plague epidemics in Europe caused by the bacterium *Yersinia pestis*.

Animals are, and have been, an important vector for the transmission of infectious diseases to humans, and the study of animal paleopathology can therefore inform our understanding of the disease ecology of past human communities. Domestication events can be seen as pivotal moments in these stories, for example, the number of shared diseases between humans and domestic animals increases in relation to the length of time since domestication (Horwitz & Smith 2000). The intensification of human-animal relationships through the domestication processes provided the routes for disease transmissions. The health implications of infectious diseases for past animals may also potentially provide valuable insights into past economies (e.g., losses associated with illness and death among domestic animal populations) and environments and living conditions (e.g., contact among and between various domestic and wild animal species).

Our ability to explore these relationships is limited by what is identifiable from the archaeological record. For example, a case of tuberculosis (caused by infection by one of the members of the mycobacterial tuberculosis complex) may cause bony changes to the skeleton of an animal, whereas one of anthrax (caused by the organism *Bacillus anthracis*) would not. Further, only a small proportion of animals infected by an infectious organism might show evidence of bony changes (when these do occur – as in the case of tuberculosis), suggesting that what is visible in the archaeological record underrepresents the true prevalence rate (Upex & Dobney 2012: 196). As mentioned above, the taphonomic histories of most animal bone assemblages mitigate against the identification of diseases (Bartosiewicz 2008). However, in some cases, we have complete, well-preserved animal skeletons with lesions preserved suggestive of infectious disease. Even then, it is often the case that gross morphological analysis can often only indicate nonspecific infections, as identifying the causative agent based on structural changes within bone alone is problematic given the lack of specificity of these changes for the various pathogens (Bendrey et al. 2008). Beyond this, it may only be with the application of DNA analyses that a specific agent may be positively identified (Spigelman et al. 2012).

Future Directions

Although still a relatively young discipline, animal paleopathology is capable of delivering

valuable and unique insights into a range of past human-animal-environment interactions. Studies are most powerful and effective when linked into the broader archaeological context and integrated with other methods. The foundation for the future of animal paleopathology will be built on a few key practices: an emphasis on the description of lesions (not just diagnoses) in publications, in a quantifiable manner, and the routine calculation of prevalence rates. Ideally, recorded conditions should be analyzed within the background of the normal elements and in relation to the other recognized osteological anomalies in that species in the analyzed assemblage (Clark 2009).

It is the identification of variation in gross morphology of bones and teeth that is the core method in the study of animal paleopathology, but increasingly the application of multiple techniques to specimens, including radiology, microscopy, histology, and genetic analyses, will help to produce robust differential diagnoses. Microscopic study of bone microarchitecture can contribute important perspectives on the nature and timescale of pathological manifestations. Undoubtedly, recent and future advances in ancient DNA research will contribute significant results to the study of ancient diseases and their ecology, although there is continued debate over both methods and results (Spigelman et al. 2012). Further understanding of skeletal abnormalities must be based on the distribution and expression of such conditions in modern control populations (e.g., Bartosiewicz et al. 1997; Bendrey 2007); otherwise, interpretation of lesions in the archaeological record risks being nothing more than speculation. The discipline must continue to test and refine methodologies and assess and compare the expression of abnormalities in different archaeological as well as modern populations.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone, Trauma in
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Social Zooarchaeology
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Zooarchaeology

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Annapolis: Historical Archaeology

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Brief Definition of the Topic

Annapolis, first settled in 1649, is located on the Chesapeake Bay and is the current capital of the state of Maryland. Initially centered on the Chesapeake tobacco economy, Annapolis is known today for its maritime and heritage tourism industries. The city served as the short-lived capital of the United States from 1783 to 1784 and has been the home of the US Naval Academy since 1845. Annapolis has become a tourist destination due to its seventeenth century town plan, and surviving impressive eighteenth century and vernacular nineteenth century buildings. A formal archaeological program, Archaeology in Annapolis, began in 1981 through collaboration with University of Maryland, College Park, Historic Annapolis Foundation, and City of Annapolis. Since that time, Archaeology in Annapolis has excavated sites ranging from elite colonial houses and gardens to early twentieth century houses of middle and working class people from different racial backgrounds. Through archaeological interpretation, the history of enslaved and free African-American life became a more publicly understood part of the City's official histories.

Despite the diversity of the excavations themselves, the project seeks to understand the City as a whole, interpreting its history over time and across space and social locations. Early work focused on the ability of archaeology to understand the development of the culture of capitalism. This work is exemplified by Mark Leone's study of the William Paca Garden, Leone and Paul Shackel's

examination of individuation and standardization of material culture, and Barbara Little's study of the Jonas and Anne Catherine Green Print Shop. As the early goals were to democratize archaeology and challenge a world created by capitalism, through the work of Parker Potter, Archaeology in Annapolis also became an experiment in public archaeology. Using museum exhibits, newspapers, local television, and community education, the project sought to integrate critical theory with the aim of politicizing and making change in the present.

During the early 1990s, the project began to excavate the homes of the City's free African-American community and those of middle and working class residents of European descent. Guided by community-based anthropology, much research was carried out in consultation with minority communities and other constituencies. Working especially with politically or socially disfranchised groups, the hope was to subvert modern ideologies as well as present alternatives to official historic narratives. This work is exemplified by Paul Mullins' and Mark Warner's studies of the 1847 Maynard Burgess house, the home of a middle-class African-American family, where they examined the intersections between racial discourse, labor structure, and class in material consumption. Also illuminating a history of Annapolis not readily apparent today, Christopher Matthews has explored the ways in which the City's current appearance with the construction and reconstruction of landscapes is tied to the nineteenth and twentieth century commodification of the City's history through historic preservation.

Overall, archaeology has sought to understand how material culture is tied to power relations, class formation, and identity construction within the context of a single city. This has included the study of the transition to a capitalist economy, negotiations of racism, and examination of the City's historic preservation industry.

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- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Historic Jamestowne
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Modern World: Historical Archaeology

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Anozie, Fred

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Basic Biographical Information

Information on Prof. Fred A. Anozie is extremely scarce. Prof. Anozie, as he was popularly called, was an astute Nigerian archaeologist whose name rang (still rings) bells within the archaeology space in and outside Nigeria. There is, as yet, virtually no information about his early years. But it is known that as early as 1977, Anozie had published a preliminary report of excavations in Aguleri, a village in Southeastern Nigeria (Nzewunwa 1983).

Between 1978 and the 1980s, Prof. Anozie conducted extension research in Igboland and quickly became recognized as a notable archaeology scholar in Nigeria and West Africa. Most

of his research sites were based in eastern Nigeria with some of the most popular being the Ezi-Ukwu rockshelter near Afikpo, the iron-smelting sites of Umundu and Lejja, and Ugwuele in Uturu Okigwe local government area in Imo State, Nigeria (Nzewunwa 1983).

Major Accomplishments

Like Dr. N. Nzewunwa, the fact that he worked with Prof E.J. Alagoa for many years and coauthored the book: *The early history of the Niger delta* is a testimony of his competence in the field. In addition, he and Prof. Chikwendu V.E. took over the mantle of leadership for the direction of archaeological research in Eastern Nigeria with the exit of Prof. D.D. Hartle who worked extensively in Igboland in the mid-twentieth century.

He was a prominent member of the Archaeological Association of Nigeria (AAN) until his unfortunate death in 2006.

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▶ West and Central Africa: Historical Archaeology

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Anquandah, James

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Basic Biographical Information

Professor James Kwesi Anquandah is one of the earliest and longest serving Ghanaian archaeologists. He was born on April 10, 1938 and obtained a Cambridge School Certificate from the Achimota School in Accra, Ghana, in 1957 and Cambridge Higher School Certificate in 1959. Prior to obtaining a diploma certificate in Archaeology from the University of Ghana, Legon, in 1965, Professor Anquandah had earned a Bachelor of Arts (B.A.) degree in history at the same university in 1963. In 1967, he received a Master of Letters (M.Litt.) from the University of Oxford, UK, and worked as a Research Assistant at the Pitt-Rivers Museum, University of Oxford, between 1966 and 1967.

Before joining the academia, Professor Anquandah had worked at the state-owned Ghana Broadcasting Service (GBC) as Programs Officer (1959–1960) and later as Senior Producer (1972–1973) of programs pertaining to the history, culture, and heritage of Ghana. He began his career at the University of Ghana as a Research Fellow in African Studies and Archaeology (1973–1975), then as Lecturer at the Department of Archaeology (1975–1978). He was promoted to the positions of Senior Lecturer in 1978, Associate Professor in 1988, and Professor in 1994. Professor Anquandah has a wide array of experience in teaching and researching African Archaeology and has about fifty (50) publications. His areas of specialization include Archaeology of Ghana and West Africa, Archaeology of the Nile Valley, Art History of Ghana, and Paleo-Historical Demography.

At the University of Ghana, Professor Anquandah held several positions including Head of the Department of Archaeology (1976–1977; 1981–1993) and Dean, Faculty of Social Studies (1991–1997). He also acted briefly as Pro-Vice Chancellor of the University from January 1996 to February 1996. He served on various boards and committees of the university, including Academic Board, Faculty Board, and Executive Committee. He was the curator of the Museum of Archaeology, University of Ghana, Legon, from 1974 to 1998, and served as member of Ghana Museums and Monuments Board (GMMB) from 1995 to 1999 and 2010–2012.

He was a Visiting Professor at the University of Pisa, Italy, in 2002, and has been a Visiting Professor of Art History at the Ghana Campus of the New York University since 2008. He is currently an External Examiner for Ph.D. theses from the College of Art, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, a position he has held since 2006. Professor James Anquandah is currently lecturing part time at the Department of Archaeology and Heritage Studies, University of Ghana, after serving 10 years (1998–2008) post-retirement contract at the same department.

Major Accomplishments

Professor Anquandah has been instrumental in the training of most of the current generation of Ghanaian archaeologists at the University of Ghana. He has played a vital role in the survival of the Department of Archaeology by resisting attempts by university authorities to scrap the department in the 1990s following restructuring exercises embarked on by the university.

Professor Anquandah became the first Ghanaian to head the Department of Archaeology at the University of Ghana, after working with expatriates such as Peter Shinnie, Oliver Davies, and Merrick Posnansky. His commitment to research and publication aimed at deepening knowledge about the prehistory, historical archaeology, and art history of Ghana remains one of his greatest achievements. His pioneering works (Anquandah 1981, 1987, 1998, 1999, 2003, 2012) are good insider's contribution to Ghanaian Archaeology and African Archaeology at large. He has won the Ghana Book Development Council award in 1983 for the publication of his book (Anquandah 1982) titled *Rediscovering Ghana's Past*. In 1987, he successfully mounted an exhibition on Ghana's Arts at Porte de Versailles in Paris.

Between 1994 and 2001, Professor Anquandah served as the Coordinator of the Management Committee of the Ministry of Education Secretariat Universities of Ghana Research Fund. As the Chairman of the Scientific Committee, National Commission on Culture (2004–2008), he among other things ensured the creation and maintenance of a website for the commission; a good reference point for the understanding of certain aspects of Ghana's culture and cultural institutions.

He has also worked as Chairman of the research unit of Ghana's National Slave Route Project at the Ministry of Tourism from 1999 to date. The unit's efforts culminated in the publication of one of the most comprehensive books (Anquandah et al. 2007) on the Transatlantic Slave Trade in Ghana.

Cross-References

- ▶ West Africa: Islamic Archaeology
- ▶ West Africa: Museums
- ▶ West and Central Africa: Historical Archaeology

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Antarctica: Historical Archaeology

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Introduction

Historical archaeology in Antarctica has been largely driven by the needs of heritage resource management. Polar heritage sites can be defined by, or have their significance enhanced by, archaeological remains, and the archaeological study of aboveground evidence and buried deposits has long been used in researching and conserving such sites in Antarctica.

In Antarctica, archaeological sites are rare commodities. Human presence on the continent and its surrounding islands has been relatively recent, brief, infrequent, and widely scattered. The range of human activities – exploration, sealing, whaling, and scientific research – has been very limited, and sites often relate to a single use at a single point in time. These sites have immense archaeological potential and, at the same time, are unique elements of the world's cultural heritage. They are also very expensive to study, given their isolated location and difficult access, severe climatic conditions, and the difficulties in excavating frozen deposits. These considerations dictate that the benefits of archaeological programs in Antarctica have to be clearly demonstrated in order to gain support, and to date, most funding has been associated with broader heritage conservation or environmental remediation efforts.

Professional historical archaeology has been practiced in Antarctica and the sub-Antarctic islands since the late 1970s. Archaeologists from Argentina, Australia, Brazil, Chile, France, New Zealand, South Africa, the United Kingdom, and the United States of America have participated in archaeological programs of survey, recording, or excavation. The objective of this work has primarily been the identification and conservation of historic sites, and in particular historic buildings, with less emphasis given in the past to academic research-driven projects (for a short history of archaeology in Antarctica see Pearson 2011a).

Definition

"Antarctica" is defined as being the area south of 60° south latitude (the area encompassed by the Antarctic Treaty), and for the purposes of archaeological research, the isolated peri- and sub-Antarctic islands of the Southern Ocean are included. All archaeology on the Antarctica continent and immediate peri-Antarctic islands is historical archaeology, as there is no evidence of any prehistoric contact with the continent. There is, however, recent evidence of prehistoric Polynesian visitation or settlement on the sub-Antarctic Auckland Island, south of New Zealand, and Campbell Island in the same region remains to be investigated (Dingwall et al. 2009).

Key Issues/Current Debates/Future Directions/Examples

The vast bulk of the archaeological work in Antarctica has been undertaken in relation to the removal of ice from inside and around historic huts, and the excavation, often through ice, of accumulated material inside huts and of stores boxes and caches outside huts. Despite being targeted at practical conservation works, this research has produced an accumulated record of the activities and material culture of, particularly, Heroic Era exploration parties (1897–1922).

In the case of sealing and whaling sites on the sub-Antarctic islands and the peri-Antarctic South Shetland Islands, the focus has been on

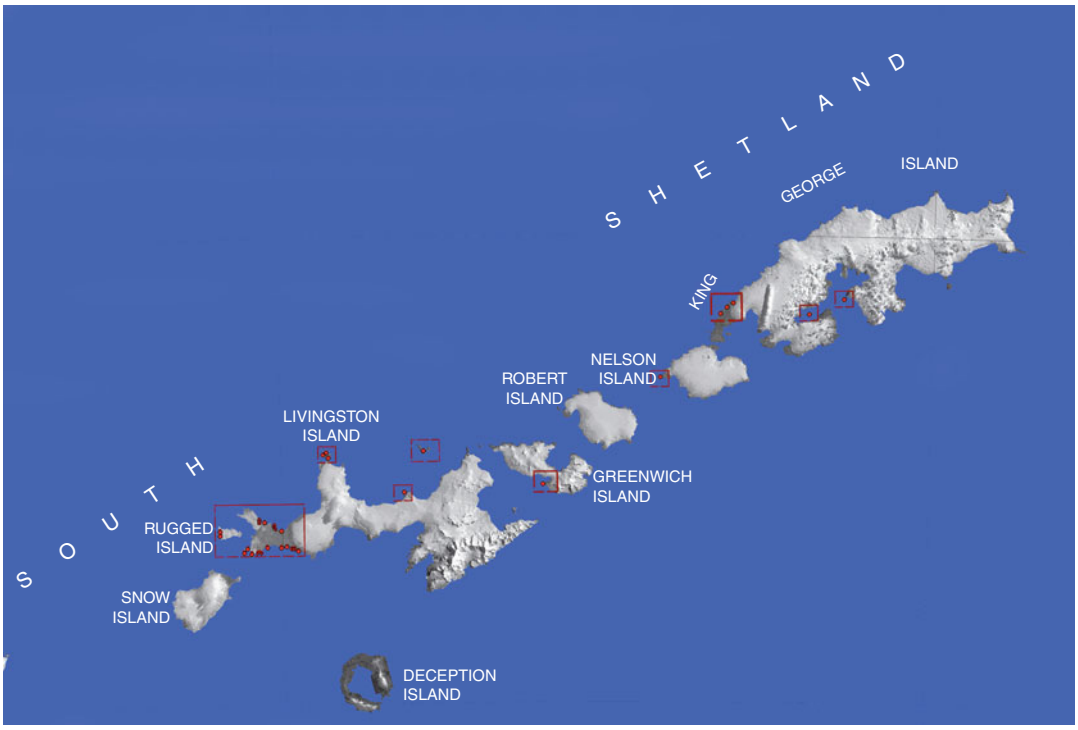

Antarctica: Historical Archaeology, Fig. 1 Map of South Shetland Islands showing the location of archaeological sites of sealers and whalers occupation in the nineteenth century

establishing the presence and form of shelters and work areas, again largely related to the long-term conservation of this heritage resource, but often providing information about sealer's and whaler's domestic subsistence and work activities not available in the usually scant documentary sources (Figs. 1 and 2). The work of Senatore and Zarankin in the South Shetland Islands has moved archaeology into more theory-driven research questions (e.g., Senatore & Zarankin 1999; Zarankin & Senatore 2005, 2007; Zarankin et al. 2007).

The range of conservation-related archaeological work has included:

- The retrieval of artifacts related to known historical parties
- The direct understanding of the construction of buildings and sites, their historical sequencing and use
- The understanding of sites in the context of other, like, sites
- Ascertaining the survival and research value of artifacts in the light of Antarctic risks such as "wallowing" by elephant seals (e.g., Townrow 1989) and erosion caused by penguin rookeries and extreme weather events (Pearson et al. 2008)
- For nonstructural sites, such as sealing sites, better understanding their characteristics so other sites can be identified (e.g., determining if artifact types differ from inside and outside now-collapsed shelters, so former shelter locations can be identified from artifact scatter patterns)
- Isolating the factors influencing the deterioration of archaeological sites over time

Work asking broader research questions has included:

- Determining if the archaeological remains provide substantive evidence of heritage significance not available from other sources (such as the lifestyle and experiences of

Antarctica: Historical Archaeology, Fig. 2 Sealer/whaler archaeological site in Livingston Island, South Shetland

nineteenth-century sealers, e.g., Lazer & McGowan 1990: 15)

- Determining the ethnic origin of sealers (e.g., McGowan 2000: 69)
- Using evidence to see if sites found in different locations originated from the same sealers (e.g., Hughes & Lazer 2000: 73)
- The relationship of sealing to global industrial developments and economic networks (Senatore & Zarankin 1999; Zarankin & Senatore 2005, 2007)

In the Antarctic regions, the documentary evidence of human activities is sometimes far less helpful in understanding the past than it can be in more temperate climates. The Heroic Era exploration sites are usually well supported by journals, diaries, inventories of gear, and even photographs. There are, however, few surviving sealing logs and journals, and there are few detailed inventories of sealer's gear and stores, nor are there many instances where a specific site can be related to a specific historically documented party. The life experience of individual sealers is little recorded. The interpretation of the aboveground sites and excavated finds and data can provide "physical history" to augment a scant documentary history of this important period of human interaction with the continent, quite apart from archaeology's potential to address broader research questions.

Archaeological excavation destroys, at least in part, the sites it studies, and human occupation sites in Antarctica are rare. They are of high research value, of high heritage value, are vulnerable to human (including archaeological) and natural disturbance, and are very difficult and expensive to study. It is therefore imperative that archaeologists understand the multiple values of the sites they wish to study and formulate research strategies that maximize the benefits of their work in the unusual Antarctic context.

Cross-References

▶ Heritage and Archaeology
▶ Polar Exploration Archaeology (South)

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Anthropogenic Environments, Archaeology of

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Introduction

The term "anthropogenic environment" suggests, in its etymology, an environment that is created by humans, but the archaeological study of anthropogenic environments is primarily concerned with the coevolution of human communities and their landscapes, the dialectic between ecology and society.

As the intersection between culture and ecology, anthropogenic environments provide a critical record of past human impacts on the environment, an aspect of archaeology that is critical for contextualizing current environmental problems. From an ecological perspective, human modifications to the environment can be both positive and negative, leading to increases in biodiversity as well as decreases. The archaeology and anthropology of anthropogenic environments have led to the recognition of traditional landscape management practices as important to the development and maintenance of ecological diversity in many regions worldwide. Anthropogenic environments also preserve records of past societies; diet, subsistence practices, labor organization, social organization, settlement patterns, and beliefs are all part of the relationship between people and their environments and therefore leave some archaeological trace on the landscape.

Zooarchaeology, archaeobotany, and geoarchaeology are the methodological subfields most commonly used in the study of anthropogenic environments. These are the fields best suited to the study of human/environmental interactions as seen through the impacts human communities have had on animals, plants, and soils or landforms.

Anthropogenic Environments, Archaeology of, Fig. 1 A terraced agricultural landscape, along the Douro River, Portugal

Definition

Anthropogenic environments are also called culturally modified environments or human-modified landscapes. Modifications of the environment, whether minor or profound, are ubiquitous wherever human communities are found. In the modern world, therefore, essentially all environments are anthropogenic, to the extent that they have been altered by human occupation. In practice, however, archaeologists usually define anthropogenic environments as those that show measurable changes in ecological dimensions, such as plant and animal diversity or soil fertility, that can be attributed to human modifications.

The tendency of Western societies to see the environment and human societies as categorically separate (the nature/culture dichotomy) makes anthropogenic environments difficult to define. The English language and Western philosophy define humans as distinct from their ecological context, but the study of anthropogenic environments demands a recognition of humans as part of the environment, one important component within the ecosystem. Anthropogenic environments are the result of the dialectic between human communities and their context, a physical manifestation of the enveloping web of relationships between humans, their landscape, and other animal and plant species.

The archaeological study of anthropogenic environments focuses on three common types of human interactions with the environment: impacts on plants, impacts on nonhuman animals, and the modification of soils or landforms.

The modification of soils or landforms can take many forms, often (and most spectacularly) related to agriculture, but certainly not limited to agricultural societies (Fig. 1). Terracing, irrigation, soil amelioration (including the creation of dark earth), damming, and other modifications of the landscape are frequently associated with the cultivation of domestic or wild plants but can have a strong effect on the composition and growth of all members of the local plant community, including weedy annuals and tree growth. The creation of roads, paths, fields, houses, burial mounds, or villages can also affect plant and animal species by changing water runoff patterns

and soil compaction and creating edge effects that increase diversity. These deliberate modifications of the landscape have both intentional and unintended effects on species composition. Additionally, use of the landscape can have disastrous effects on soils and productivity, through salinization or erosion.

Human impacts on plant species and communities include domestication, transplantation, the extension of normal range (for either domestic or wild plants), cultivation of wild or semidomesticated plants, clear-cutting of forests, burning of forests or grasslands, and the preferential destruction or encouragement of certain species. Less direct, but often just as significant, are human-caused changes to habitats or growing conditions, whether or not such changes were intended to impact plant species. These include most of the modifications of soil and landforms mentioned above. For example, irrigation, soil amelioration, and terracing have a profound effect on plant growth, as can clearing vegetation for a field or trampling soil for a path. These effects can be wide-reaching and impact not just the specific species that may have been targeted (if any) but also weedy annuals that may take advantage of these anthropogenic niches. Agricultural systems, such as monocropping or multicropping, can also impact the diversity and density of regional plant communities (Fig. 2).

Similarly, human societies and communities impact animal species through domestication, transplantation (of wild or domestic animals), range extension, overhunting, and the targeting of particular age/sex classes of prey. Human impacts on plant species, like those discussed above, can also have a profound effect on animal communities, through changes to habitat and food supply. Burning is commonly used to increase the range and abundance of grazing animals, for example, but irrigation, terracing, and other modifications that lead to denser or more diverse plant cover can also increase the abundance and diversity of animal communities. Clear-cutting of forests, damming of rivers, and wide-scale pollution can also lead to the local extinction of some species. Livestock can also impact landforms and plant communities through over-grazing, a common cause of erosion and changes in seed distribution and plant survivorship.

Anthropogenic Environments, Archaeology of, Fig. 2 Agave growing in rock mulch gathered from the desert floor, Arizona, USA

While anthropogenic environments are, in a sense, human "created," the relationship between people and their environments is more complex and nuanced than this implies. Anthropogenic environments are, in essence, contingent landscapes; landscapes reflect past histories of use and modification, and current uses and modifications are dependent on the choices made in previous generations. A fundamental recognition that all people live in contingent landscapes is fundamental for an understanding of modern environmental problems.

Historical Background

The history of the archaeological study of anthropogenic environments mirrors changes in popular conceptions of the environment and how it relates to human societies and also to the development of theoretical perspectives on the environment in the fields of ecology, anthropology, and geography, which have strongly influenced, and been influenced by, archaeology.

The Western concept of nature/culture dichotomy has roots as deep as ancient Greek philosophy and continues to be enshrined in popular and scholarly culture. The tendency for Western

scientists and philosophers to see non-Western people as part of nature – a tendency fueled by the unwillingness of colonial powers to recognize the accomplishments of indigenous people and the land claims that went with them – initially made it difficult for Western archaeologists to recognize the extent of anthropogenic landscapes around the world.

Early understandings of human/environmental interactions in the social sciences often took the form of extreme determinism. As a backlash against these simplistic views, environmental arguments were avoided during the early development of archaeological theory. A culture's environmental setting was considered little more than an enabler or (more frequently) limiter of human behavior. After World War II, however, popular recognition of the environmental effects of human population growth, pollution, and consumption increased. Archaeologists working with ancient states were some of the first to apply this recognition to the past, with the documentation of human-created environmental disasters that led to abandonment of settlements or collapse of civilizations (e.g., Jacobsen & Adams 1958). While large-scale societies were considered to have significantly depleted their environments, the ecological impact of small-scale societies, whether positive or negative, was not widely studied (but see Day 1953).

The first ecologically inspired theoretical perspective to gain wide purchase within anthropology was Julian Steward's. His 1955 *Theory of Culture Change* was the foundation for the school of Cultural Ecology, which saw social and subsistence organizations as adaptations to the environment. Steward's work focused heavily on subsistence and the technological adaptations adopted to implement a particular subsistence regime within a particular environmental context. Although Steward's approach was far better suited to the study of small-scale societies than earlier approaches to human/environmental interactions, his primary focus was on the impact that the environment had on people, rather than on a recognition of the diversity of impacts people could have on the environment.

Popular and scientific understanding of the environment, and particularly environmental problems, was revolutionized by the 1962 publication of Rachel Carson's classic *Silent Spring*. Carson documented the degree to which the catastrophic effects of human actions could be both widespread and subtle. Overtly destructive actions, such as logging or strip-mining, were not the only environmental threats, nor could protecting national parks and wilderness from development solve the problems of invisible poisons in the air, soil, and water. Carson showed that urban, agricultural, and rural landscapes, as well as our own health, had to be protected from the effects of pollution. Population pressure, and the threat of population growth to the environment, was another important scientific and popular theme of the 1960s, with the publication of Paul Ehrlich's 1968 best seller, *The Population Bomb*.

Although the focus of public discourse was on the destructive impacts of human actions on the environment, within anthropology and archaeology there was increasing recognition of the coevolutionary aspects of human/environment interactions. Anthropologists of the 1960s were strongly influenced by equilibrium models of ecosystems. In these models, disturbance – including positive and negative feedback from cultural or non-cultural sources – was thought to pull the ecosystem away from a "natural" vegetation regime. When disturbance ended or was minimized, the ecosystem would return to this "baseline environment." Under these models, small-scale communities could be seen as inherent environmentalists, living within the equilibrium of their environment. This was an idea supported by the work of Roy Rappaport (1968) who argued that complex cultural adaptations maintained ecological balance. Similarly, while Ehrlich (1968) had warned of the negative consequences of unchecked population growth, within archaeology, the late 1960s saw the emergence of models suggesting that population pressure drove social and technological change in human societies. The shift to Mesolithic/Archaic ways of life, the development of agriculture, and the rise of urbanization were all

attributed, at least in part, to population growth (Boserup 1965; Binford 1968; Flannery 1969; Athens 1977).

Anthropological awareness of human impacts on the environment broadened as the issue gained increased public recognition. Vayda and Rappaport's (1968) seminal paper "Ecology, Cultural and Non-Cultural" became a critical theoretical underpinning of the study of human/environmental interactions and particularly anthropogenic environments. This interest moved beyond a focus on complex societies, as a growing interest in the origins and effects of agriculture and agricultural intensification led to a focus on the impact of small-scale farming societies on ecosystems (e.g., Netting 1968). Foraging societies were also recognized as having a significant impact on their environments at this time, with Martin and Wright's 1967 publication of *Pleistocene Extinctions: The Search for a Cause*, one of the first attempts to systematically explore the possibility that small-scale hunting and gathering societies may have caused wide-scale prey extinctions.

While Cultural Ecology remained the dominant theoretical perspective on human/environmental interactions through the 1970s, the 1970s and 1980s saw the diversification of theoretical approaches, particularly the development of Human Behavioral Ecology, which focuses on the use of optimality models for explaining human behavior (Winterhalder & Smith 2000). Optimality models have their base in ecology, particularly Charnov's (1976) "Optimal Foraging: The Marginal Value Theorem," but are also developed from rational choice models popular in economics. While classic works of Cultural Ecology sought to explain human behaviors as adaptations to maintain ecosystem balance, Human Behavioral Ecologists argued for short-term and self-serving behavior by individuals seeking to maximize individual fitness. Although the behaviors best suited to survival might involve conservation of local landscapes, Human Behavioral Ecology did not assume that such conservation was necessary or desirable to the actors involved. From the perspective of evolutionary theory, Human Behavioral Ecology is more defensible in its focus on individual fitness than Cultural Ecology, since the latter's theoretical approach can rely on an assumption of group selection. Human Behavioral Ecology, however, did not significantly improve archaeological understanding of anthropogenic environments, since the focus on individual actions meant that Human Behavioral Ecologists tended to see human impacts on the environment as inherently negative (or absent) rather than part of a feedback loop (as with Cultural Ecology) or as a dialectic with the local landscape that could be both positive and negative for environmental health.

The 1980s brought a better understanding of the dynamic relationship between human communities and their landscapes, as equilibrium models of ecosystem dynamics were abandoned in favor of non-equilibrium models that rejected the idea of "natural" baseline environment that was maintained through a series of feedback loops. Instead, ecosystems were seen as highly dynamic, influx, and contingent, with disturbance part of the system, rather than inherently negative. Non-equilibrium models challenged the view of humans as either destroying the "natural" vegetation regime or adapting to an existing ecological balance. Rather, people were situated squarely within the ecosystem, as just one more source of dynamic and historical change.

The use of non-equilibrium models is most strongly associated with the development of Historical Ecology, which emerged in the last decade of the twentieth century (Baleé 2006). Historical Ecology's focus on non-equilibrium models, and particularly the recognition of contingent landscape development, makes this the natural theoretical perspective for fully exploring the role that humans have played in shaping environments over millennia. Historical Ecology is particularly suited for the study of small-scale agricultural societies and the many subtle and profound ways that such societies manipulated their environment, creating whole landscapes shaped by human actions. Early works on the landscape management of small-scale agricultural societies, such as Posey's (1985) "Indigenous Management of Tropical Forest Ecosystems: The Case of the Kayapó Indians

of the Brazilian Amazon," were instrumental in recognizing the scope of anthropogenic environments.

Throughout the 1990s, anthropological research continued to refute the idea that the indigenous people of any continent had failed to change their local and even regional landscapes. Influential articles, such as Redford's (1991) "The Ecologically Noble Savage" and Denevan's (1992) "The Pristine Myth," were published just before the UN Conference on the Environment and Development in Rio, which brought to the forefront the environmental problems of traditional and developing nations. The rejection of the view of small-scale societies as inherent conservationists was founded on strong ethnographic and archaeological data. Some of this data, however, had been present since the 1950s or earlier. The increasing acceptance of this perspective had as much to do with changing paradigms as with new data. The growth of postcolonial and indigenous archaeologies helped to refute older theoretical perspectives on small-scale societies that had deep roots in archaeology's colonial past.

Key Issues/Current Debates

The study of anthropogenic environments is tied to the increasing importance of applied archaeology as it relates to modern environmental policy and conservation efforts. An understanding of how people have changed their environments in the past can be used to improve modern environmental policy. This includes the use of archaeological and historical data to guide the reconstruction of damaged ecosystems as well as the use of archaeological knowledge of past technology (e.g., agricultural technology) to improve modern landscape modification practices.

The concept of environmental reconstruction assumes a "baseline environment" that can be reconstructed. As discussed above, however, current theoretical perspectives recognize the inherent dynamism of ecosystems. The focus on anthropogenic landscapes allows for a better understanding of the complexity of environmental reconstruction, a process that does not necessarily involve minimizing disturbance and human impact. If all environments are anthropogenic – and in fact many degraded modern environments are degraded from a healthy diversity that was created through human manipulation – then the purpose of reconstruction must be something other than to return the environment to a pre-manipulation state. Specific goals, such as increasing diversity or decreasing erosion, must be identified, and the recognition made that such goals may be best gained through active cultural manipulation of vegetation and landforms.

The archaeology of anthropogenic environments can provide data on the species of plants and animals present in past environments, the past landscape manipulations that created the environment, and the cultural behaviors that improved environmental health. Archaeologists are also increasingly applying lessons from past societies to help local communities improve quality of human life as well as improve or protect environmental diversity. For example, archaeological studies of Amazonian dark earth (terra preta soils) may help protect the Amazon rainforest by reviving prehistoric soil amelioration practices that allow farmers to use the same plot of land for longer, rather than expanding into nearby forested regions when fields lose fertility (Lehmann et al. 2004).

International Perspectives

The understanding of anthropogenic environments has a peculiar history within the Americas, which makes their importance (politically, economically, and socially) far different from Eurasia or Africa. Concepts of the "ecologically noble savage," which only recognized European-style agriculture, architecture, and landscape modification as "cultural," were the result of blindness to the accomplishments of indigenous people and were also part of the colonial justification for land acquisition. When native land transformations, and the indigenous people

themselves, were seen as "natural," then their land could be considered "unimproved." This was used as justification for European appropriation.

Although there is now a much greater understanding of the impact indigenous people had on the landscapes of the Americas, the colonial history of this topic, as well as the colonial history of archaeology itself in the Americas, continues to impact scientific and popular understanding of environmental transformations. The modern landscapes of the Americas are a part of the cultural patrimony of groups of people who were historically only a peripheral part of archaeological discussions.

Future Directions

Archaeologists interested in anthropogenic environments are increasingly engaged in applied research, both through engagement with environmental policy makers and through the application of archaeological knowledge to change or modify present behaviors that could harm the environment or human health. As the destruction of ecosystems intensifies and greater interest is paid to environmental problems, an understanding of past human/environment interactions will become more critical for understanding how environmental problems can be solved and predicted.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Cultural Ecology in Archaeology
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
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- ▶ Human Impacts on Ancient Marine Ecosystems
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Anthropogenic Sediments and Soils: Geoarchaeology

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Introduction

Archaeology has gradually but consistently increased its interest in the study of soils and sediments over the last decades. As a result of this emphasis, the discipline has not only sought to characterize the terrigenous matrix within which the great majority of archaeological materials are found but, increasingly, to also understand soils and sediments in their double dimension: as archives of archaeological and environmental data and as *sui generis* artifacts (Butzer 1982; Waters 1992; French 2003; Holliday 2004; Goldberg & Macphail 2006; Walkington 2010). This salience notwithstanding, a tendency to conflate the meaning of sediments and soils continues to exist within the discipline. In some cases, this owes much to the nature of archaeological findings and their context; artifacts are found in sediment deposits that have stratigraphy and which, generally speaking, are sufficiently close to the surface to be affected by soil-forming processes. Be that as it may, it is useful to draw a contrast between "anthropogenic sediments" and "anthropogenic soils" (and indeed between sediments and soils) because the distinction highlights different earthly processes that can affect the formation of this type of archaeological evidence. Put another way, both anthropogenic sediments and anthropogenic soils imply terrigenous material with distinctive characteristics resulting from the strong and enduring influence of past human activity. However, each concept emphasizes a different aspect of the life history of the landscape, that demands the separate attention of archaeological research, especially the subdiscipline of geoarchaeology.

Definition

Sediment is non-lithified material made up, most of the time, of mineral particles of different composition, shape, and size. Sediment is subject to alteration through weathering and can be transported by different agents, which can select different particle sizes as a function of overall energy. Sediment is generally studied by archaeology in deposits that have stratigraphy: the composition of particles, their distribution in terms of size classes, and the sedimentary structures at

various scales of observation both inform about the history of a deposit and provide crucial information about preservation factors (Goldberg & Berna 2010). Anthropogenic sediments are those sediments whose distinctive characteristics are a result of the strong and enduring influence of past human activity. Their geoarchaeological study focuses on their composition, history of deposition, and post-deposition alteration, taking into account the significant material effects of human agency. A more intuitive starting point is that most human activity takes place on land surfaces and that land surfaces are subjected to different actions that modify their characteristics over time. Modifications resulting from the activity of people produce a specific range of changes and inputs that lead to detectable differences when preserved: even fairly simple human activities can produce a variety of debris, e.g., charcoal, ash, bones, pottery, plaster, lithics, phytoliths, and slag; one might also consider here other human activities such as excavating, heaping, and winnowing of sediments for different purposes. The archaeological correlates of these inputs and activities are detected through specific material signatures that endure over time and alter the measurable properties of sediments. It is important to underscore that anthropogenic sediments do not only include sediments enriched by anthropic debris or depleted by associated chemical alteration. Unaltered sediments that have been relocated by humans (for instance, those used in platforms, agricultural raised fields, as well as sand or clay mined from quarries and transported to other locales), and sediments that have been modified by humans as raw materials for the manufacture of objects (e.g., clay deposits for making pottery, adobe, and mudbrick), among others, also deserve to be considered as anthropogenic sediments. Human impact on the stability of sedimentary deposits (for instance, through vegetation clearance and burning) are also known to contribute to higher mobility of sediments (e.g., via erosion), but the concept of anthropogenic sediments is probably best reserved for those sediments so mobilized that show the enduring and telltale material signatures of human activity, e.g., re-deposited anthropogenic sediments and soils.

A measure of the importance of distinguishing between anthropogenic sediments and anthropogenic soils is gained by examining what the notion of soil embodies and, consequently, how we can understand the notion of anthropogenic soils. Soil constitutes a complex and open system, a material continuum that drapes the entire planet. It is an assortment of organic and mineral material resulting from the interaction between geomorphological and biotic processes as they affect, and modify the properties of, surface sediments. Collectively, these processes are known as soil-forming or pedogenetic processes and lead to the formation of distinctively patterned layers known as soil horizons (Phillips & Lorz 2008). While key characteristics of soil horizons are determined by the parent material of soil, in other words by the actual composition of the sediments upon which soils have formed, the differences that can be observed between horizons are often the result of the decay, mixing, and depositional action of soil, the mobilization of non-consolidated or dissolved mineral and organic material through the existing pore structure (much of which results from the action of soil biota), and other forms of chemical modification. Horizontal variation in soil characteristics along a land form – a soil catena – subsumes contrasts in parent material as well as variation in slope, drainage, vegetation cover, etc. Anthropogenic soils, in turn, are those whose formation and characteristics have been enduringly influenced by the material effects of human action. Their geoarchaeological study emphasizes an interpretation of the properties of soil horizons as a partial outcome of past human modification. Examples are as varied as they are intriguing: they include soils which were deliberately enhanced through the addition of materials in the past (often to increase fertility, including here compost heaps, home gardens, and agricultural fields) inasmuch as the mineral and even organic components are resistant to degradation; they also include soil horizons formed on human-transported or human-manufactured anthropogenic sediments (e.g., landforms created or altered by humans, including raised fields, soils formed on disturbed materials associated with mining); soils formed

in situ on abandoned habitation areas; and soils whose surface horizon has been modified by topsoil disturbance and/or irrigation associated with different types of agriculture (e.g., slash and burn soils, paddy soils), among others (Limbrey 1975; Woods 2003; Dudal 2005).

Anthropogenic sediments and soils exist at variable spatial and temporal scales, from sand piles, pit fills, and compost heaps ephemerally accumulated in the vicinity of houses to entire landscapes blanketed by sediments dislodged by clearance and modified through millennia of continued agriculture. The foci of geoarchaeological studies of anthropogenic sediments involves, among others, establishing which sediments have been transported by humans deliberately (and wherefrom), which in situ sediments have been modified due to human activity (and how), and which sediments have been chosen to craft particular materials (wherefrom and how). The study of anthropogenic soils, on the other hand, includes how soil horizons' properties record the enduring influences of past populations (and to what extent the soil archive can be used to examine past land use), how these material signatures can be used to infer past human activity, and whether soils formed on old occupation deposits have been subsequently employed for cultivation, among others.

Historical Background and Current Debates

Archaeological research focused on anthropogenic inputs on soils and sediments trace their lineage back to Arrhenius' studies of phosphate enrichment in Sweden (Arrehenius 1929) and include geochemical prospection in a wide array of different contexts. The interpretation of modified properties as evidence of anthropogenic enrichment rests on the conceptual premise that humans concentrate metals and nonmetals, and develop other signatures in the sediment record (for instance, enhanced magnetism as a result of burning, changes in pH, etc.). Ethnographic and actualistic situations, in turn, document enrichment with phosphorus, carbon, calcium, potassium, magnesium, manganese, zinc, copper, and other elements associated with different settlement practices or activity areas (Woods 2003). These studies constitute a powerful tool to infer patterns in the use of space, especially when chemical properties are interpreted with the aid of micromorphological observations (Milek 2012). In this connection, compared to some pioneering research of the 1970s and 1980s (Eidt 1984, 1985), the application of micromorphological observations (Courty et al. 1989) has both greatly expanded the overall scope of this research and illustrated the remarkable heterogeneity that characterizes occupation deposits as archives of past human activity (Brochier 2002; Goldberg & Macphail 2006).

Approaches to the study of anthropogenic soils as archaeological entities owe much to studies of *plaggen* soils, the latter being deliberately enhanced farming soils resulting from applications of manured animal bedding made of heather, grasses, and peat by medieval farmers of the sandy lowlands of North-West Europe (Blume & Leinweber 2004). Examples are studies documenting the impact of *plaggen* cultivation on the landscape and research focused on determining new recipes for *plaggen* production (Simpson et al. 2005). Other examples of anthropogenic soils modified for agricultural purposes include soils modified by liming (Conry 1971) and *terra mulata* soils of the Amazon basin, modified by intensive in-field burning (Arroyo-Kalin 2012). In parallel, studies emphasizing the deliberate "making" of anthropogenic sediments include the construction of ash mounds of South India (Paddayya 2002), the making of Tell mudbrick (Rosen 1985) and New World adobe bricks (Goodman-Elgar 2008). Also important are studies devoted to the construction of mounds from more incidental materials, including earth and shells (Roosevelt 1991; Gaspar 1998; Villagran et al. 2011; Rostain 2012).

Worthy of note are examples of anthropogenic soils developed on abandoned archaeological sites, such as Amazonian Dark Earths (Arroyo-Kalin et al. 2009) and European Urban Dark Earth (Macphail 1983; Cammas 2004). Some of the more sophisticated geoarchaeological studies

of these deposits focus on ascertaining the properties, mode of formation, spatial extent, and variability of anthropogenic soils, with a particular emphasis on how pedogenetic processes have been affected by past human action (Cremasci & Nicosia 2010). Further areas of research include the actual timing of anthropogenic soil formation (Arroyo-Kalin 2012) and the extent to which these soils, enriched with human occupation debris, can be said to have been used for cultivation (Devos et al. 2009). The latter is an important avenue for research in light of ethnoarchaeological and actualistic studies documenting within-settlement soil improvement (Schmidt 2013, in press), as well as sophisticated, experimentally-based, studies of the material signatures of past cultivation (Lewis 2012). A related line of enquiry focuses on the use of refuse and/or manure in broad areas around settlements, which has prompted important discussion in the archaeology of North-West Europe, the Mediterranean region, and Middle East (Wilkinson 1989; Bintliff et al. 1990; Guttmann 2005).

Techniques employed in the study of anthropogenic sediments and soils are, for the most part, those deployed in other environmental archaeology investigations (Rapp & Hill 1998; O'Connor & Evans 1999; Goldberg & Macphail 2006): a combination between quantifying inclusions and fossil remains, measuring physical and chemical properties of terrigenous material, and studying undisturbed samples microscopically – all within an understanding of processes of landscape evolution. A key methodological issue, however, is the need to establish adequate baselines to assess anthropogenic modification. While human activity can be linked to higher phosphorous, calcium carbonate, carbon, as well as changing particle size classes and enhanced magnetism, it is not straightforward to successfully establish the extent of enrichment or depletion of soils and sediments in absolute terms. One approach is to use maps to compare relative abundance of selected parameters. Another is to employ a "background" for comparison. The extent to which this "background" is equivalent to "natural" conditions depends on the particular features of different regions: in some areas of the world agricultural modification of large expanses makes it next to impossible to detect parts of the landscape that are comparable to archaeological situations and which have not seen major impact by humans (Sanders in Turner & Sanders 1992). In other parts of the world, "backgrounds" can and should be sought because their study permits understanding local processes and situating anthropogenic modification in the specific context of local sediment dynamics and soil forming processes (Arroyo-Kalin et al. 2009). In this connection, some crucial considerations are to study "background profiles" rather than simply "background topsoil samples" (in order to compare to the profiles, rather than surface samples, of archaeological interest); ideally, to locate study profiles on the same landform as archaeological exemplars; and, importantly, to take into consideration the position in the soil catena or palaeocatena (French 2003).

Future Directions

The fundamental common ground between the study of anthropogenic sediments and soils is that both bear distinctive characteristics which can be traced back to human action. These characteristics are enduring, such that, on the one hand, they can be studied as material signatures of past human activity and landscape transformation and, on the other, they can affect the properties of anthropogenic sediments or anthropogenic soils, rendering substrates that have become enriched, depleted, polluted, or otherwise transformed as a result of human agency. Given the ubiquity of human modification of the landscape throughout the Holocene – in many cases an integral consequence of the widespread adoption of agricultural livelihoods over millennia – geoarchaeological studies of anthropogenic soils and sediments constitute a developing and ever more important research program. It is increasingly realized that questions such as "What was the human impact on past environment?" can in many contexts oversimplify the issues at stake, namely, that the legacy effects of past human

inhabitation constitute an important source of landscape variability which subsequent inhabitants had to both confront and creatively engage with (Stahl 1996). Put another way, in many cases, and via the enduring effects of manipulating environmental affordances, human populations have played the role of a keystone-species (Balée 2006), both in the flux of ecological interactions and as part of long-term processes of change that have modified the actual properties of the landscape.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Aksum: Environmental Archaeology
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeological Soil Micromorphology
- ▶ Chemical Survey of Archaeological Sites
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Paddy Soils: Environmental Analyses
- ▶ People as Agents of Environmental Change
- ▶ Urban Dark Earth

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Antioch, Apamea, and the Tetrapolis, Archaeology of

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Introduction/Definition

Seleukos Nikator is traditionally referred to as the founder of a constellation of colonies in the Syrian region and in particular of the *Tetrapolis*, a consortium of four sister cities that occupied first millennium BCE settlements: two inland foci (Antioch and Apamea) and two seaports (Laodikeia and Seleukeia in Pieria). Altogether, these foundations were essential in stamping Seleucid hegemony over Syria in light of the overall peaceful settlement with Ptolemy Soter, who in turn seized most of Phoenicia after the fall of Antigonos Monophthalmos. By this rationale, the *Tetrapoleis* created a web of urban foci that firmly secured the Orontes Valley and the coastline in Seleucid hands, thereby curbing expansion ambitions of the Ptolemies. We can safely infer that this ambitious plan of geopolitics was brought to completion in fairly rapid terms during the last years of the fourth century BCE, following the foundation of the new capital at Seleukeia on the Tigris, Seleukos' assumption of kingship,

and Antigonos' defeat at Ipsos. As regards the agencies behind these foundations, the Macedonians, Athenians, Argives, and Syrians who figured so prominent in the ranks of the Seleucid legions in the campaigns between 306 and 300 BCE may have served in the initial construction of the *Tetrapolis* as well as in a series of equally ambitious urban achievements, many of which carried dynastic denominations.

Key Issues/Current Debates

In chronological order, Seleukeia in Pieria (Samandağ, Turkey) deserves primacy. It was the first foundation among the *Tetrapolis*, and what is more, in Seleukos' plans, it was to become the next capital as well as his final resting place. Hence, in the aftermath of his key victory against Antigonos in 301 BCE, he offered sacrifices to Zeus on Mt. Kassios and shortly thereafter founded the city at a site seven miles north of the Orontes' delta, near modern Samandağ. Bearing witness to the ebb and flow between Seleucid and Ptolemaic rule in the region, Seleukeia throve as a hub of commerce, in particular, during the days of Pompey the Great. Later, under the mandate of the Flavian emperors, the city was inserted in the grand scheme of militarization of the Orontes basin. A new harbor was built, and along with it came a vast program of canals and diversion of waters to ease the navigability of the Orontes and prevent the silting of the harbor itself. Furthermore, Seleukeia became home of the *Classis Syriaca* and of detachments from the fleets at Misenum and Ravenna, as attested by a rich corpus of funerary inscriptions. All in all, the eastern campaigns of the second and third centuries CE fully harnessed the resources of Seleukeia's harbor. With the tetrarchic era, however, the harbor's role began to dwindle, a process accelerated by the rise of new hubs at Tyre and Antarados further south along the Syrian coast. That the city's abandonment may have started at this time is a cogent hypothesis. All the same Isaurian raids, the early sixth century's catastrophic earthquakes, and finally the Sasanian king Khusro's invasion brought city life to a halt; aside from the names of its bishops, Seleukeia was heard of no more.

As for the archaeology, very little is known about Seleukeia. Cursory investigations were conducted by a Princeton team in the 1930s but limited to a handful of houses and their mosaic pavements, namely, a Hellenistic peripteral temple, the so-called Market Gate, and finally the late-fifth-century-CE remarkable martyrion near the latter. Yet, it is plain that Seleukeia's city plan negotiated the steep slope through systems of terraces; strewn over an upper and lower city, its configuration is arguably reminiscent of that of Pergamon, albeit on a smaller scale. The city walls are of interest: while stretches of polygonal masonry survive on the eastern flank of the acropolis, the rest of the perimeter uses an isodomic technique that seemingly harks back to the early days of the Seleucid foundation. Measuring approximately five km of length, these walls were punctuated by potent rectangular and semicircular towers. Outside of them, along the road leading to Apamea, are a hippodrome (now covered by maquis and shrubs) and the necropolis at Mağaracık. Seleukeia's main attraction, however, is the so-called Titus Tüneli, the spectacular tunnel that diverted torrential waters and thus avoided the inundation and silting of the bay. Several inscriptions around the harbor, referring to Vespasian and Titus, leave no doubts about the agency involved in these works and underscore the size of this undertaking as without par.

The fortunes and the decline of Seleukeia in Pieria, it seems, cannot be divorced from those of its twin-sister city Antioch on the Orontes (Antakya, Turkey). Poised on the southwesternmost tip of the Amuq Valley, Antioch sits on a highly dynamic ecosystem. Three rivers demarcate this landscape: the Orontes, the Afrin, and the Kara Su. While the former follows its erratic course from south to north, the other two originally emptied their waters in the Amik Gölü, that is, the Lake of Antioch, now dry, after a vast 1960s reclamation plan.

Antakya is Antioch's modern reincarnation. Its features are typical of many modern Turkish towns: large boulevards, squares dedicated to the leaders of the modern Republic, and the chaotic

allure of the bazaar. Antakya's gradual, almost tangible urban sprawling is ridding the city of old and ancient buildings by the day, and the modern cityscape bears no memory of what lies beneath.

Replete with great expectations, the 1930s excavations of Antioch were the first attempt to investigate archaeologically a city that had played a key role in the political landscape of Classical and Late Antiquity and had always attracted innumerable researchers thanks to the mediating powers of the textual sources. Financial cutbacks, strategy shortcomings, and ultimately pressures from the sponsoring institutions, however, greatly impaired the operations of the *Committee for the Excavation of Antioch and Its Vicinity*, thereby hindering the effectiveness of this short-lived enterprise.

The mosaics, frescoes, and sculpture recovered – enthusiastically hailed as markers of Antioch's elites – have reduced the city's complexity to a mere constellation of luxurious suburbs with vistas on springs and idyllic landscapes. What is more, the city's topographical and social configurations remain by and large conjectural. Ironically, what was the Seleucid metropolis, the Roman provincial capital, the seat of the first Christian community, the virtual capital of the Near East in the fourth and fifth centuries CE, and the seat of the Count of the east – to name but a few titles – remains an uncanny, almost abstract entity. Simply put, Antioch and its vicinity are still unknown.

Today, only a handful of heavily battered monuments survive and conjure up the glorious past of the capital: the aqueduct of Trajan, the late antique fortifications, the stadium's piers, a pagan temple, and finally the church of St. Peter. The rich textual sources, however, compensate for the dearth of visible ruins. The texts of Josephus, Libanius, John Chrysostom, and Malalas plus a vast array of early Christian and Byzantine sources are key in tracing the building programs that shaped the capital city time and again. The inconsistencies, discrepancies, and vagaries that these texts present, however, hamper the realization of a more precise picture. For instance, the location of most sacred areas is speculative at best; while we know very little of the several sanctuaries that existed in Antioch and in its suburban extension Daphne, the picture for 31 churches reported by several authors is even more perplexing, as none of them can be situated in space.

Nevertheless, some general narratives of settlement and of building programs can be presented here. Antioch was apparently founded only a month after Seleukeia in Pieria. Honoring the memory of Seleukos' deceased father Antiochos, the city was built on a site where there had been favorable omens. In addition, the entire population of nearby Antigonia was forcibly relocated to Antioch; the former, founded by Antigonos in 306 BCE, may have ceased to exist shortly afterward.

The growth of Antioch began under Antiochos Soter and Antiochos III, when the island on the Orontes and the slopes of Mt. Silpius were incorporated within the urban grid, likely in response to the number of new settlers and veteran soldiers that the city continued to receive. Under Antiochos IV Epiphanes, however, some decisive changes occurred. The quarter of Epiphaneia was added to the city, thus modifying the overall urban layout that, however, would remain basically unchanged for the rest of antiquity. A new square was also added, which might correspond to the "Tetragonal" agora that was later to become the stage for the disorder of 69 CE. Furthermore, an aqueduct was added at this time, providing Antioch a continuous supply of fresh water. On a different note, Antiochos IV also commissioned the construction of the *Charonion* bust, an apotropaic monumental group defending the city from a plague's explosion. Though heavily weathered, it is still visible today and it is Hellenistic Antioch's only visible monument.

This Hellenistic city plan defined Antioch for ages to come; despite the many overhauls that the walls in particular underwent in the following centuries, the layout of the city remained unchanged. A solid grid-regulated space, punctuated as it were by two possible agoras and their correlated sanctuaries, followed the tradition of the great cities of Asia. The gradual addition of new urban quarters and the building of the royal headquarters on the island coalesced with the

armature of the city, which at that point was structured around the main north to south thoroughfare. This road connected the various boroughs and also linked the city to south and northern Syria. Its modern reincarnation, Kurtuluş Caddesi, follows exactly the same trajectory.

More notably, however, this road was the locus for various manifestations of popular mobility: riots, acclamations, food distributions, and funeral parades, among others. Here, on this pivotal axis, Antioch's many historical layers converge. The grand military parade of Antiochos IV Epiphanes in 166 BCE, the mourning of the great general Germanicus' body plausibly poisoned by Piso in the year 19 CE, and the solemn entrance of St. Symeon's coffin in 459 CE bring into focus the centrality of this axis within the constant reshaping of Antioch's urban and social fabrics. A unique commingling of emotions, political anxieties, and religious tensions unfolded along this boulevard, and demarcated some of Antioch's most momentous events.

Punctuated as it were by agoras and sanctuaries, the thoroughfare underwent major overhauls at the time of Herod the Great, when Syria and Antioch were firmly in Roman hands. Half a display of loyalty toward Augustus and half an act of *euergetism* toward a city that tallied a sizable Jewish community, newly designated as cardo, now embellished by porticoes and colonnades, it inspired the appearance of similar colonnaded streets in most cities of the Greek East.

This new addition to the urban matrix, however, was germane to the insertion of buildings and venues that advertised the spirit of the Augustan Peace. The theater of Caesar and a sequence of baths along the slope of Mt. Silpius contributed to redesigning the map of amenities in Antioch while conveying the essence of *Romanitas*. In more practical terms, however, Agrippa and Augustus promoted the wholesale implementation of new quarters at the end of the first century BCE, in a way that reminisced and perhaps deliberately replicated what the Seleucid kings had accomplished in the previous centuries.

Be that as it may, the city at the time of Tiberius may have been girded by new, larger, and more potent walls. Caution is in order on this point, however, as Tiberius of all the Julio-Claudian emperors went down in history for not having promoted major building programs in Rome, let alone in the provinces. Otherwise, as a token to Antioch's splendor, prestige, and remarkable pedigree, the city became the capital of Roman Syria enjoying a series of grants and tax immunities. The largesse with which these gifts were accorded must be questioned. Antioch had many assets; as early as the Julio-Claudian period, the city became instrumental in keeping the recalcitrant South Syria and Judea districts in check. Moreover, from there, the Euphrates region and the Parthian border could be reached with ease thanks to a network of roads that was promptly enhanced by Augustus in the first decades of his mandate. In practical terms, Antioch had to accommodate the governor and his substantial entourage, plus the entire military infrastructure of the east. It retained civic independence, but it came with a price.

In spite of vast building programs that included aqueducts, baths, stadiums, and other amenities, Antioch's armature remained substantially unvaried through the Islamic era. The Theodosian and Justinianic fortifications, though conspicuous, replicated earlier perimeters; new quarters and building programs allowed grandees from Agrippa to the bishop Ephraem in the early sixth century CE to declare their ambition onto the local cityscape. But by early Late Antiquity, Antiochene urbanites must have felt cramped in a city that was getting too crowded and too constructed. Urban chaos, noise, and confusion resonate in Theodoret of Cyrrhus' descriptions of the city. Antioch's built environment and its experience, however, constantly changed. The city never stayed a museum to its own self, far from it. The traditional agora which had marked the center of public space was replaced by the courtyards of great churches, *sermons in stone* as Peter Brown comments. Their wide open plazas became ideal venues for social and religious aggregation as well as proselytism; the daily routines of Paul of Samosata's parading through the agora in 260 CE while reading aloud to his clients from his official correspondence are well known.

By contrast, the thoroughfare became the new heart of the city's economy after having been framed by porticoes and stoas as well as punctuated by shops. Earthquakes, fire, and floods had, however, their own share of responsibility in the reshaping of this community and in forcing continuous rebuilding and maintenance in Antioch.

Further upstream from Antioch lies the city of Apamea (Qalaat al-Moudiq, Syria), the best known among the *Tetrapolis*. According to Strabo, this city served as arsenal for the Seleucid kings as it accommodated thousands of mares and elephants as well as training facilities for the soldiers. Outshined by its neighbor and Syrian capital Antioch in the Roman period, Apamea acquired visibility in the third century when it was base of the Legion II Parthica. It suffered greatly from Sapur's raids in 252 CE and from the sequence of earthquakes that shattered most urban foci in the sixth century. In the census of the year 6/7 CE, Apamea apparently tallied 117,000 citizens.

Thanks to the extensive Belgian excavations, Apamea is now well documented and attracts visitors by throngs. The site's well-preserved ruins, which in the main predate the earthquake of 115 CE, open vistas onto the planning solutions adopted by the Seleucid planners for the *Tetrapolis*.

Framed by a mountain called al-Saheliyeh and dominating the middle course of the Orontes and the Ghab Valley, Apamea was laid out on a conspicuous plateau accessible solely from its north side. A grid consisting of 105 × 53 m blocks created the basic armature, framed as it were by a 7-km-long system of fortifications that date to the third/second centuries BCE – the tumultuous days of the Syrian wars – but underwent numerous overhauls during the Roman and Byzantine periods. Well known are the third-century-CE repairs that employed a cache of funerary stones from nearby necropoleis. Overall, Apamea's built environment encompassed 250 ha of space, seized by domestic and public areas. The backbone is the colonnaded street, by far one of the best preserved in the Greek East. At 1,850 m of length and almost 40 m of width and beautifully embellished by second-century-CE porticoes, it illustrates an architectural feature that was the signature of Greek cities in the east. At Apamea, this avenue linked the southern quarters to the Tycheion, the Agora, and the Great Baths, while also connecting suburbs to the city. Of importance is also the formerly prominent temple of Zeus Bêlos situated west of the colonnaded street, where emperors with the stature of Hadrian and Septimius Severus sought the response of the oracle, and the second-century-CE theater, one of the largest in Syria with its 140-m diameter. Also, it should be borne in mind that numerous houses have been excavated; by and large they date to the fifth and sixth centuries, and many showcase architectural and decorative solutions similar to the houses excavated in the 1930s near Antioch, Daphne, and Seleukeia in Pieria.

Finally, Laodikeia (Latakiyah, Syria) bore the lofty name of Seleukos' mother. Its population may have consisted in the main of Macedonian settlers, as attested by the 175 BCE decree that mentions the city's *peliganes*, a Macedonian term for city councilors. As with Apamea, Laodikeia was greatly affected by the political fluctuations of the Syrian wars, and it acquired independence as late as 83 BCE under Tigranes of Armenia. During the Roman era, it owed its reputation as hub for the shipment of its celebrated wine and to the famous incident that led to the downgrading of Antioch as kome (village) under Laodikeia's jurisdiction (so much for not siding with the just during the civil war of 193 CE). In the sixth century, Laodikeia was not exempt from suffering the blows of earthquakes, just as most of its Syrian counterparts.

Although obscured by the modern city, Laodikeia's urban configuration is fairly well known thanks to an early study by Jean Sauvaget. Built around its harbor, Laodikeia's design mirrors that adopted by the planners at Apamea, thus reinforcing the possibility that the same agencies were behind these foundations. A northern access, a colonnaded street, and *insulae* measuring 112 × 57 m are the features that legitimize this hypothesis. All the same, not much has survived among the temenoi and sanctuaries that allegedly punctuated Laodikeia's

cityscape. A tetrapylon of the Severan period is the sole reminder of Laodikeia's heyday in the Roman era. Finally, it should be noted that Sauvaget's reconstruction of classical Laodikeia was long upheld to illustrate the transition from the classical colonnaded street to the enclosed and covered market, the suq of the Islamic period. As it stands, this model is based on a notion of cultural decline and degeneration from an age of order to one of political chaos; its overall colonial posture is now called into question.

Cross-References

- ▶ Domestic Architecture, Roman
- ▶ Dura-Europos, Archaeology of
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Greater Syria: Islamic Archaeology
- ▶ Late Antique Anatolia, Archaeology of

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Aphrodisias, Archaeology of

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Introduction

Aphrodisias is located on a plain south of the fertile Meander River valley, about 200 km southeast of Izmir in modern Turkey. The city was part of the region of Caria and the capital of the Roman province of Caria-Phrygia starting from the 250s CE. The city was well-known in antiquity for its cult of Aphrodite, sculpture production, and sculptors, who are known to have worked for domestic as well as Italian patrons.

Definition

Previous Excavations

The site was visited by several travelers in the eighteenth and nineteenth centuries such as William Sherard, Charles Texier, Sir Charles Fellows, Philippe Le Bas, and William Waddington, who mostly focused on recording the inscriptions of the site. Excavations were first conducted in 1904 by Paul Gaudin and later in 1937–1938 by Giulio Jacopi. Systematic excavations and research was begun in 1961 by Kenan T. Erim on behalf of New York University, until his death in 1990. After 1991, NYU excavations have continued under the directorship of R.R.R. Smith from Oxford University.

History of the Site

The site, with its buildings and monuments, is exceptionally well preserved, owing to its secluded location. The site's surviving monuments and material culture, which is predominantly in the form of marble sculpture, are mostly from the Roman and late antique periods and provide information on the history of the site from the Republican period to the fifth century CE. Some 2,000 inscriptions preserved on the site, on the other hand, illuminate the social history of the site and life in Roman Asia Minor in general.

According to a legend recorded by Stephanus of Byzantium and to the Greek tradition, the city was founded by Ninos, who was the mythical founder of the Assyro-Babylonian Empire, and the husband of Semiramis. There are substantial remains from the prehistoric and Bronze Age periods of the city, which were excavated from the two prehistoric mounds, the Theater Hill (Acropolis) and the Pekmez mound (Joukowsky 1986). There are fewer remains excavated so far from the archaic and classical periods. From the second century BCE onward, the city grew around the sanctuary of Aphrodite and witnessed major urban development in the first century BCE onward. By this period, as evident from coins, Aphrodisias was in a "sympolity," or close political or religious union, with Plarasa, a nearby city, which may have been the present-day village of Bingeç (Reynolds 1982: Doc. 2, 11-16).

One of the major sources for the history of the site, the north parodos wall of the Theater, the so-called archive wall, provides information about the early urban development of the site. In 39 BCE, after the city's loyalty to Rome against Labienus, who plundered both the sanctuary and private property, the city was granted freedom, nontaxable status, and increased asylum rights in the sanctuary of Aphrodite. The granting of these privileges was without doubt a major influence of Octavian/Augustus.

In the Imperial period, the city kept its "free" status until 250s, CE when it became the capital of the province of Phrygia and Caria. The first and second century CE saw major construction of marble monuments and urban development at the site (Ratté 2000). This construction stopped in the second half of the third century, but the city kept its vital culture under the influence of Roman governors. The rise of Christianity eventually put an end to the cult of Aphrodite. In the fourth century CE, the city had a bishop. In the fifth century, however, it was still home to a leading school of pagan Neoplatonic philosophy. The site was gradually abandoned in the seventh century and was home to a Turkish population beginning in the fourteenth century.

Key Issues/Current Debates

Major Monuments and Urbanism

The North and South Agora

There are two agoras at Aphrodisias, but the older civic center, the North Agora, is the area immediately to the south of the Bouleuterion and to the west of the Hadrianic Baths, (Smith & Ratté 1998). The space was surrounded by colonnades on all four sides. Recent excavations have shown that only the northern and southern colonnades had a double row of colonnades, whereas the eastern and western ones each had a single row (Smith & Ratté 1997). The northern colonnade of the North Agora was dedicated in the first century BCE by C. Julius Zoilos, an Aphrodisian, who was the freedman of Octavian/Augustus. The southern colonnade of the Agora is adjacent to the Portico of Tiberius, a colonnade that carried a mask and garland frieze.

The South Agora covers the area to the south of the North Agora and is bounded on the north side by the Portico of Tiberius. The South Agora seems to have been laid out as a consequence of second century CE urban development, and an earlier possible formulation of the area is ambiguous. In the second century, a columnar two-storey gate was added to the east, as well as a large rectangular pool with rounded ends that occupies the center of the Agora.

The Temple of Aphrodite

The first marble temple of Aphrodite was a prostyle building of the late first century BCE, which was turned into a pseudodipteros in the

first century CE (Smith & Ratté 1995). Two features were added to the sanctuary in the second century: the temenos surrounding it and the monumental gateway of the temenos ("Tetrapylon"). In Late Antiquity, the temple was converted into a Christian church and remained in use until the Middle Byzantine period.

The Sebasteion

The Sebasteion, discovered in 1979, is a large temple and sanctuary complex dedicated to Aphrodite and the Julio-Claudian emperors. The structure was a long and narrow street with a three-storey building on the north and south sides, a propylon on the west end, and the Temple of Aphrodite on the east. The building presents an unusual combination of well-preserved architecture, relief sculpture, and inscriptions. There are about 80 surviving panels of relief sculpture, which are either mythological or allegorical/imperial in content (Smith 1987). The mythological reliefs are unusual in that they provide us with the surviving visual vocabulary of ancient mythology in the Roman period. The allegorical/imperial reliefs, on the other hand, present a glimpse of the reception of Roman emperors in this eastern city. Current excavations have shown that almost nothing beyond the façade remains of the temple, which was replaced in antiquity by domestic structures.

The Theater

The Theater, a semi-circular structure built over the site of the Bronze Age occupation, was built in two major stages. The earliest phase was the construction of the stage building, dedicated in 28 BCE by C. Julius Zoilos, the same freedman who dedicated the north colonnade of the Agora. The second phase was the building of the auditorium out of marble, which was a Julio-Claudian undertaking and was perhaps still under construction in the Flavian period. The seats above the diazoma are lost today. Excavations in the 1960s and 1970s have unearthed the auditorium, the blocks of the stage building, which was restored on the first storey, and the so-called archive wall to the north of the *logeion* that records the communications between the city and Rome. The fourth-century CE colonnaded square to the west of the Theater, called the "Tetrastoon," was also cleared of blocks. Recent efforts have focused on studying the architecture of the Tetrastoon as a whole, together with its inscriptions and statues, and its contribution to the late antique urban plan of the site.

The Hadrianic Baths

The baths were built in the early second century CE and were dedicated to emperor Hadrian. The building, located at the west end of the South Agora, consists of three parts: a series of barrel-vaulted rooms, a forecourt with marble architecture in the east, and a late antique court (the "Tetrastyle" court) with a central pool in the north. Excavations in 1904–1905 and then in the 1960 revealed the walls of the main bathing block, its floors, including the well-preserved hypocaust system, the marble court, and the Tetrastyle court and its sculpture. Recent study efforts have focused on the Baths once again, with the aim of conserving the monument, explaining its architecture and historical phases, and opening it to the visitors.

The Bouleuterion

The building was the seat of the *boulē* and is a small semicircular auditorium on the north edge of the Agora, with a shallow stage building. The marble seating of the lower cavea survives intact, but the section above the diazoma has collapsed. The stage building was a two-storey structure with niches decorated with honorific statues and statues of deities. One of the major questions surrounding the structure is its exact chronology. The main structure dates to the second century CE with distinct Antonine and Severan phases. It remains elusive, however, whether there was an earlier first-century structure on the site (Smith & Ratté 1996). The structure was used through late antiquity. Several changes to the architecture were made to enlarge the orchestra for performances in the fifth century CE, when the cornice molding of the stage front (or *pulpitum*) was incised with an inscription identifying the patron (whose name is missing) of the *palaestra*. The word *palaestra*, originally

meaning wrestling place, could have been used metaphorically to refer to various competitions taking place in the building (Roueché 2004: 79).

The Basilica

The basilica is a long hall extending southward from the South Agora (Stinson 2008). Excavations since 1962 have documented the architecture and relief decoration of the building. The building, with a central hall flanked by two side aisles and a hall in the south opened to the main nave by arches, combined a Roman basilica with a Hellenistic stoa and meeting hall. The two-storeyed structure had an Ionic order on the lower storey and a Corinthian order on the upper one, with engaged half-columns and balustrade-like reliefs at the bottom of the columns. Built in the Flavian period, the building probably had a multi-purpose public function, including banking, money changing, and engaging in scribal activities and legal contracts. The building also served as a site to display important relief sculpture and inscriptions. There were reliefs and niches for statuary along the side walls of the long hall. The South Hall may also have served as an honorific hall for Flavian emperors and other dignitaries. In the fourth century CE, the north façade of the building became a surface to display Diocletian's Price Edict. Recent excavations have revealed the pillar capitals from the South Hall that were decorated with bull and lion protomes.

The Stadium

The 270-m-long building, entirely built of marble, is the best preserved example of its type. It has an unusual double-ended design with the auditorium running in semicircle on both ends. The structure has a seating capacity of 30,000 people, which is above the entire population of the city itself, showing that it was designed to host games for guests. The east end of the structure was converted into a small amphitheater in late antiquity (Welch 1998).

Domestic Architecture

Three major house complexes were excavated beginning in the 1980s and shed light on a portion of the domestic life of the city in late antiquity. One of the most significant domestic complexes on the site is the "Bishop's Palace," which was named so based on its proximity to the cathedral, but is now known as the "Triconch House" after its most prominent architectural feature (Berenfeld 2009). The house conveys the architecture and layout of a late antique house in the city and its relationship with the wider urban environment.

A second major house complex is the "Atrium House," which is adjacent to the back wall of the northern portico of the Sebasteion and consists of two complexes: an atrium complex to the north and an apsidal building to the south. The archaeology of the building and its peculiar sculpture, which includes a series of late Roman philosopher portraits, has been well examined.

A third housing complex of late antique date is the "North Temenos House," which is adjacent to the Temple of Aphrodite (Smith & Ratté 1998). A building with a large apsidal hall, the structure provided a mosaic floor and a series of late antique pilaster capitals with bucolic scenes.

Regional Survey

An archaeological survey of the surrounding areas was conducted between 2005 and 2009. The survey has documented several Hellenistic–Roman or pre-Hellenistic settlements, fortifications, Byzantine churches, aqueducts, marble quarries, tumuli, tombs, and sarcophagi.

Sculpture Studies

Marble workshops and sculptors from the city provided for both domestic and Italian patrons. For example, some sculptures from Hadrian's Villa at Tivoli and the Esquiline statues in Rome are signed by Aphrodisian sculptors. Due to the massive amount of Roman marble sculpture, both free-standing and in relief, sculpture studies have been one of the main focal points of the current excavation project. Several studies have dealt with Roman and late-Roman portrait sculpture, relief sculpture from the Zoilos monument, Sebasteion and the Basilica, the Aphrodite of Aphrodisias, mythological reliefs from the Agora Gate, sarcophagi (Smith & Ratté 2000;

Ratté & Smith 2004), and other pieces of sculpture material.

Epigraphy Studies

The epigraphic documents from the city, which survive in unusual numbers and provide tremendous information on the history of the site, have been studied since the eighteenth century by various scholars including Sir Charles Fellows, William Waddington, William Paton, and Louis Robert. NYU's systematic excavations carried out in the years 1961–1995 had Joyce Reynolds and Charlotte Rouché as epigraphers, who created the invaluable online database project known as "Inscriptions of Aphrodisias" (Roueché 2004; Reynolds et al. 2007). From 1995, the epigraphy of the site has been studied and published by Angelos Chaniotis (Chaniotis 2004).

Future Directions

Current research and planned future research at Aphrodisias can be reviewed under two separate headings: (1) the excavation and conservation of monuments and (2) the publication of major monuments and sculpture. In terms of the excavation of the monuments, the main focus of the current excavations is the main North–South Avenue of the city that connects the monumental gateway of the Temple of Aphrodite to the propylon of the Sebasteion. This avenue, reused in late antiquity, will be excavated and exposed to answer questions regarding the late antique urban layout of the city, and to enhance the visitor's experience of the site. Other excavation efforts will focus on the area to the south of the Theater, where a group of sondages will be dug in order to learn the early history of the site and to expose a major apsidal building, presumably a house complex, which was revealed in the recent geophysical surveys of the area. The excavation of this apsidal complex will be carried out as a collective effort by several experts.

The conservation and restoration of the existing monuments has been a major part of the seasonal activity at Aphrodisias, and the most significant of these efforts is the anastylosis of part of the south building of the Sebasteion. For this project, plaster casts of several reliefs were made and placed on the structure. Further studies will continue with a possible anastylosis of the propylon of the Sebasteion. Another major conservation project focuses on the Hadrianic Baths and includes wall capping and re-bedding of the tile floors. The aim of the project is to protect the rooms of the Baths from further damage from the elements and secure them well enough to open to visitors.

Four monographs have been published. The first two by the excavation director R.R.R. Smith deal with the funerary monument of C. Julius Zoilos (Smith 1993) and the Roman portrait statuary from the site (Smith 2006). The third volume is on the Aphrodite of Aphrodisias (Brody 2007), and the fourth monograph is about the mythological reliefs from the Agora Gate (de Bellefonds 2009). Publication of the monuments and sculpture will continue with monographs on the Basilica, the Bishop's Palace, and the Sculptor's Workshop. While publication projects such as the Sebasteion reliefs and the late antique statues from the site are imminent, other forthcoming publication projects on the sarcophagi and the Atrium House will explore issues of life and death in the ancient city.

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- ▶ Domestic Architecture, Roman
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Epigraphy, Greek
- ▶ Erim, Kenan
- ▶ Hellenistic and Roman Anatolia, Archaeology of
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Apricot: Origins and Development

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Basic Species Information

Apricot, sometimes known as Armenian plum (derived from a mistaken belief of an Armenian origin), is the common name of *Prunus armeniaca* L./*Armeniaca vulgaris* L. The name apricot derives from the Arabic *al-birquq* through Byzantine Greek *berikokkia* from Latin *malum praecoquum* – early ripening fruit. The Latin *Prunus armeniacum* is a reference to an early believed origin in Armenia, which is one of the places where these trees are wild.

Apricot is a deciduous tree up to 10 m with broad ovate leaves, self-fertile white – rarely pink – flowers produced singly or in pairs before the leaves in spring. Some cultivars are self-compatible while are others are self-incompatible. Wild forms are fully interfertile with cultivated populations. Apricots are grown for their large fleshy fruit, a drupe with glabrous or pubescent yellow to orange exocarp and a soft mesocarp. The endocarp is lignified and slightly grainy on the outer surface. There is a pronounced ridge along the ventral suture. The seeds or kernels produce laetrile (cyanide) in wild forms, and some cultivars are bitter to avoid predation (Zohary et al. 2012). In other cultivars, apricot kernels can be eaten in substitution for almonds, especially in China where they are commonly roasted to make them palatable (Simoons 1991). Apricot kernels are also used to flavor Amaretto liqueur and biscuits (van Wyk 2005).

Apricots are cultivated in temperate, subtropical and continental regions. They require cool weather for dormancy, and the trees can survive winter temperatures down to −30 °C, but the buds and flowers are not frost resistant.

The fruit needs dry weather for maturation. Trees usually bear fruit the 4th or 5th year after planting.

Major Domestication Traits

Wild apricots have a disjunct distribution in the Caucasus region and in eastern Asia. These wild forms are characterized by smaller fruits and leaves and spiny branches (Lu & Bartholomew 2003; Gabrielian & Zohary 2004). In China, free-growing and possibly wild populations of a number of varieties are reported from hilly areas around much of northern and western China (Ningxia, Qinghai, Shaanxi, Shanxi, Nei Mongol, Liaoning, Jiangsu, Shandong, and Sichuan). *A. vulgaris* var. *vulgaris* is reported to occur in pure stands in the Illi prefecture of Xinjiang. While in China, these occur between 600 and 3,000 m elevation; in Armenia, they are found at 1,200–2,100 m only. Modern genetic diversity is suggested to have three centers of diversity (Yilmaz & Gurcan 1977; Maghuly et al. 2005), including one focused on the Caucasus, one on northwestern South Asia, Central Asia, and Xinjiang, and one on China. This strongly suggests that wild populations in Xinjiang and Armenia have contributed to cultivar diversity, although the origins of early cultivars may only have taken place in China.

Timing and Tracking Domestication

Archaeobotanically, apricots may be recognized from endocarp remains that differ from related tax (e.g., Fig. 1). Based around the Caucasus center of wild apricots are a number of early finds. These include archaeological evidence from the Eneolithic at Garni and Shengavit in Armenia (Arakelyan 1968), Eneolithic sites in the Ukraine ca 4,000–2,800 cal BCE (Zohary et al. 2012), and sixth and fourth millennia cal BCE sites in the Carpathian-Dniester region (Monah 2007). It is unclear if this indicates a formerly more widespread wild distribution or early translocation of cultivated trees.

Apricot: Origins and Development, Fig. 1 Illustration of endocarps (stones) of apricot (*Armeniaca vulgaris*), *left*, compared to the Japanese apricot (*Armeniaca mume*), *right*

In the East, archaeobotanical evidence points to origins of cultivars in Central China. It is difficult at this stage to separate stone remains of wild versus domesticated apricots in early assemblages. The earliest finds probably represent gathering, such as from Kuahuqao (6,000–5,400 BCE) in the Lower Yangtze region, alongside many wild nuts and fruits, including the related *Armeniaca mume*. Later in the Longshan period (after 2,500 BCE) and Bronze Age (second millennium BCE), there are several sites with apricot from Central China (Hosoya et al. 2010). The early history of apricot in China is intertwined with the mume apricot, or Japanese apricot, *A. mume* Siebold (syn *Prunus mume*), which today goes by the Chinese name *mei* distinct from *xing* used for true apricot. However, it is thought that *mei* might have originally referred to true apricots. *A. mume* is an important cultivar, especially in South China, Japan, Korea, northern Laos, and Vietnam. It is native to the slopes below 3,100 m in western Sichuan and western Yunnan (Lu & Bartholomew 2003). Disjunct wild populations are also reported from northern Taiwan. This species has sour fruits which are normally made

edible through drying, salting, or pickling (Simoons 1991). True apricots may have been used in similar fashion, with sweet forms developing later (or even outside of China). The first finds of apricot beyond its Chinese wild distribution is in Neolithic Kashmir by or shortly after 2,000 BCE (Lone et al. 1993). Much later finds include late First Millennium BCE in Nepal (Knorzer 2000) and in the Sampula Cemetery in Xinjiang (Jiang et al. 2009).

Apricots reached the Mediterranean region late, probably as introductions from Iran and Armenia around the third century BCE. Within a few hundred years apricots were well established in Spain, Turkey, Greece, and Italy (Zohary et al. 2012). They were taken to the Americas by the Spanish in the fifteenth century (Yilmaz & Gurcan 1977).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Peach: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Arabian Peninsula: Islamic Archaeology

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Introduction

As the birthplace of Islam, the Arabian Peninsula holds a special place within the Muslim religion

and culture. Despite this the archaeology of the region has not been investigated to the same extent as many other parts of the Middle East, and there are still major sites and themes which are yet to be explored. The reasons for this situation are largely historical, and currently our understanding of the archaeology of the region is being transformed through new international and national projects throughout most of the Peninsula.

Definition

The Arabian Peninsula is a huge area covering more than one million square miles with a considerable diversity of climate, topography, and culture. It is located between Africa and Asia and with its own tectonic plate may be considered a subcontinent although conventionally it is regarded as part of Asia. Seven countries are located entirely within the Peninsula (Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates (UAE), Oman, and Yemen), while large parts of Jordan and Iraq may also be considered part of the region. Saudi Arabia is overwhelming the largest country in Arabia and shares a common border with all of the other states. The regional significance of Saudi Arabia is further reenforced by the fact that it contains the two holiest sites in Islam, the sacred cities of Mecca and Medina. Despite being home to ancient civilizations, the modern states of Arabia are mostly fairly recent, and with the notable exceptions of Oman and Yemen, all are less than 200 years old.

Historical Background

Prior to the development of European interest in Arabia, inhabitants of the region had shown some interest in the antiquities of their homeland. For example, as early as the seventh century, the authorities in Mecca had investigated the antiquity of the Ka‘ba and the earlier foundations buried beneath. Similarly the early tenth-century author Hasan ibn Ahmad al-Hamdani considered the antiquities of Southern Arabia in his book *Kitab al-Iklil* (Faris 1938). However, systematic investigation of ancient remains recognizable as modern archaeological practice was largely the result of European interests in the region. The archaeological investigation of Arabia began in different areas at different times although the earliest scientific exploration of the Peninsula was carried out by the Danish Expedition of 1761–1767 of which Carsten Niebhur was the only survivor. Although the expedition mostly retrieved information about the coast of Arabia with little information from the interior, it was unique because it was the first attempt to systematically document the region (Niebhur 1792). In the nineteenth century there were many expeditions to Arabia which included documentation of antiquities; the majority of these focused on northwest Arabia though Yemen was also an area of considerable interest. Although many of these early explorations collected information relevant to Islamic archaeology, most were concerned primarily with pre-Islamic remains and in particular the ancient Arabian civilizations. Interest in Islamic civilization was generally restricted to ethnographic studies although there was some interest in Islam as a religion with a fascination for the holy cities of Mecca and Medina. Early explorers who offered descriptions of antiquities include the Swiss explorer Burckhardt famous for rediscovering Petra in 1812. In addition Burckhardt made a trip to Mecca in 1814 where in the guise of a Muslim, he made a detailed study of the holy sites of Mecca including the Ka‘ba (Burckhardt 1829). Nearly forty years later in 1853, Sir Richard Burton disguised himself as an Afghan Muslim and visited Mecca and Medina making detailed notes and measurements of all he saw within the holy cities (Burton 1893).

Against the background of increasing European interest in the antiquities and culture of Arabia, the political configuration of the Peninsula in the nineteenth century was gradually evolving. While the Hejaz (western region), Yemen, and al-Hasa were under Ottoman Turkish control, the interior Najd was the home to a growing fundamentalist Islam which was the

seed of the modern Saudi state. In the Arabian/Persian Gulf on the east coast of Arabia, Oman and a number of tribal territories along the coast were brought under British influence in order to protect the security of the sea route to British India. Despite the British presence in the Gulf, there was little interest in the antiquities of the area although records made by British officials have subsequently become indispensable for the study of archaeology in the area. Following the collapse of the Ottoman Empire in 1918, there was political turmoil in the region, and little archaeological research was carried out until after World War II.

From the 1950s onward there was increasing interest in the archaeology of Arabia partly funded by the quest for oil in the region. Important work was carried out in Bahrain and the Eastern Province of Saudi Arabia (formerly al-Hasa province) revealing a complex early society with links to Mesopotamia and India. Although the focus of this archaeology was on the pre-Islamic period, the presence of Islamic-period remains often overlying those of earlier periods could not be ignored. In general however Islamic archaeology was not regarded as something of interest in its own right. This is reflected in the works of Creswell who was famously dismissive of the Arabian contribution to Islamic architecture (King 1993). Even within the highly religious Kingdom of Saudi Arabia, the interest in antiquities in general and Islamic antiquities in particular was muted, and on occasions there seemed to be a hostility to archaeological research. The suspicion of archaeology was partly a wariness that archaeological sites could become shrines and as such used as a focus for unorthodox worship. There was also a sensitivity to interpretations of archaeological material which might conflict with accepted historical narratives. Examples of studies which have challenged Muslim historiography include Patricia Crone's work which suggested that Mecca was not a major trading center (Crone 1987) and Nevo and Koren's assertion that Muhammad was not fundamental in the establishment of Islam in Arabia (Nevo & Koren 2003). Although both these studies have largely been disproved by archaeological and historical research, they are both sensitive issues for the Saudi religious authorities.

The granting of full independence to the Gulf States and growing urban and industrial infrastructure during the 1970s led to a growing interest in protecting and investigating the antiquities of Arabia. For example, the government of Qatar commissioned the *Qatar Archaeological Report* which was the first detailed archaeological survey of the country and is still an important source of information for the Islamic and pre-Islamic archaeology of the country (De Cardi 1978). Also during this period the Saudi government began a comprehensive survey of archaeological sites throughout the kingdom and initiated a major project recording the Darb Zubayda (Muslim pilgrimage route from Baghdad to Mecca). The 1970s also saw the first publication of the *Proceedings of the Seminar for Arabian Studies* under the initiative of John Dayton. The Seminar provided a forum for the discussion and publication of issues related to the archaeology and culture of Arabia which is still continuing today. This period also saw the first excavations at Qaryat al-Fau by King Saud University under the direction of Abd al-Rahman al-Ansary. This major pre-Islamic settlement in central Arabia (first century BCE and fourth century CE) is important for understanding the Islamic archaeology of Arabia because it indicates the indigenous roots of Arabian civilization (al-Ansary 1982). However, the most important project for Islamic archaeology was the excavation of the early Abbasid site of al-Rabadha by Saad al-Rashid in the late 1970s and early 1980s (al-Rashid 1986). Although the site had been inhabited prior to the eighth century, the construction of the pilgrimage route from Baghdad to Mecca led to the development of the settlement as a major stopping place. The architecture and finds from the site indicate a sophisticated urban settlement with extensive trade connections.

Since 1980 the number of archaeological projects in Arabia has multiplied with both research projects and developer-funded excavations transforming our understanding of the archaeology of the region.

Key Issues

The archaeology of the Islamic period in Arabia is a subject which is developing very quickly, and it is likely that many of the current questions and theories will be modified or replaced as new data becomes available. For the present a number of areas of research dominate our understanding of this period which relate to urbanism, maritime/coastal archaeology, water management and agriculture, and trade and pilgrimage routes.

Urbanism

The birth of Islam in Arabia is intimately associated with urban life in Mecca and Medina, while the spread of Islam outside Arabia is also associated with cities and towns. Before the 1980s archaeologists working further north in Syria, Palestine, and Jordan tended to ignore this Arabian urban heritage looking instead at Islamic cities simply as developments of earlier Roman and Byzantine urban settlements. The discovery of both pre-Islamic and early Islamic cities within Arabia has led to a reassessment of this cultural bias. New research based on excavations at sites such as ʻAqaba in Jordan has suggested that the pattern for Islamic settlement may in fact originate in Arabian forms of urban development (Fig. 1; Whitcomb 1996). In addition to an interest in the contribution of Arabia to early Islamic urbanism, there is also a growing interest in towns of the late Islamic period (Petersen 2009). In part this is connected with an interest in the origins of the modern Gulf cities such as Dubai, Abu Dhabi, Ras al-Khaimah, Doha, and Muscat (Peterson 2007). There is also a growing interest in traditional urban architecture which is seen as environmentally and socially more suitable than modern energy-intensive structures.

Maritime/Coastal Archaeology

Although typical images of Arabia are largely dominated by arid mountains and sand deserts, it also has coasts on three seas (the Red Sea, the Indian Ocean, and the Persian/Arabian Gulf). The majority of settlement in Arabia is located near the coast with traditional occupations including fishing, pearl diving, and maritime trade. A number of port cities have been excavated (e.g., ʻAqaba, Qalhat, Bahrain, Ras al-Khaimah, Sohar, Jumeirah, Ras al-Hadd) with finds which indicate wide-ranging long-distance trade with sub-Saharan Africa (Kenya and Tanzania), the Far East (China, Vietnam, and Philippines), and India (Gujerat). Recently there has been considerable interest in the pearl industry in the Gulf with major excavations at Zubarah and Ruwayda in Qatar revealing much about the organization and material culture of a nineteenth-century pearling center

Arabian Peninsula: Islamic Archaeology, Fig. 1 The Mamluk and Ottoman fortress at ʻAqaba, Jordan, excavated between 2000 and 2003. Originally founded in the thirteenth or fourteenth century, the majority of the standing building dates to the 1500 s and later. The site of early Islamic ʻAqaba excavated by Donald Whitcomb in the 1980s is approximately one kilometer to the west

(Petersen & Grey 2010; Richter et al. 2011). Fishing has also attracted attention with the mapping and excavation of fish traps demonstrating considerable continuity from the pre-Islamic period to the present day.

Water Management and Agriculture

One of the distinguishing features of the Arabian Peninsula is the scarcity of water, and over the centuries the inhabitants have developed sophisticated means of water catchment and retention. Some areas such as Yemen and southern Oman benefit from seasonal monsoon rains and have developed complex irrigation and agricultural systems which maximize the available water. In other areas such as Oman and the UAE, water is brought from the mountains into urban agricultural areas by means of underground water channels (*qanat*s). However, in most of Arabia water is derived from wells or springs and is extremely scarce. Nomadic Bedouin are generally dependant on wells both for their herds and for themselves, and complex arrangements have developed to enable the water to be shared between different tribes. One of the key issues in the study of water management is the origin and the development of the *qanat* system which investigators have traditionally attributed to pre-Islamic Persian occupation. While some *qanat*s certainly predate the advent of Islam, it also appears that many of the *qanat*s in Arabia were built during the Islamic period (Lightfoot 2000).

Trade and Pilgrimage Routes

While Arabia had extensive connections through maritime trade in the Indian Ocean and the Gulf, there were also caravan routes which connected the towns and cities of the coast with the interior and the more settled regions of further north. The most famous caravan route is undoubtedly the incense road which connected south Arabia with Syria via the caravan cities of Medain Saleh and Petra. Although the incense trade seems to have declined before the advent of Islam, the route continued to be of importance during the Islamic period as the Syrian *hajj* route. During the Ottoman period this route became particularly significant as the link between the Constantinople and Mecca increasing the legitimacy of the Sultan's title of Protector of the Two Shrines (al-Rashid 1979, 1980; Petersen 2012). The network of pilgrimage routes which cover Arabia not only provided access to the holy cities of Mecca and Medina but also stimulated trade and the local economies of the towns, villages, and nomadic territories through which they passed. Other important caravan routes linked the settlements on the Gulf coast with those of Oman via the Wadi Jizzi. The advent of Islam increased the traffic on all the existing routes as well as creating new roads such as the Darb Zubayda.

Current Debates

The large number of archaeological investigations in Arabia as well as the increasing interest in the history and culture of the area has raised a number of difficult methodological problems which need to be addressed. These may be summarized as (1) how to incorporate churches and Christianity into the Islamic archaeology of the region; (2) how to deal with the archaeology of Mecca and Medina in the face of rapid development; (3) how to investigate the archaeology of slavery within the region; and (4) how to deal with the archaeology of different religious sects.

Churches and Christianity

Both historical sources and archaeological excavations point to a significant Christian population in Arabia before the advent of Islam. In eastern Arabia excavations have revealed churches and monasteries at a number of sites including Failaka in Kuwait and Sir Bani Yas in the emirate of Abu Dhabi. There is also significant anecdotal evidence of the discovery of churches in Saudi Arabia although these are generally unpublished (see, e.g., Langfeldt 1994). The general assumption is that all the churches are of pre-Islamic date and ceased to function soon after the time of Muhammad; however, it is probable that at least some of these communities continued well into the Islamic period.

The challenges include recognizing the archaeological evidence of continued Christian presence into the Islamic period and incorporating this into "Islamic archaeology" (see also Insoll 2005: 198-9).

Archaeology in Mecca and Medina

Like many religious sites around the world, Mecca and Medina have both a spiritual and an archaeological significance. The spiritual dimension of the cities includes both practical considerations related to the accommodation of ever-increasing numbers of pilgrims and also philosophical questions related to the embodiment of the faith in structures and locations. The archaeological dimension relates to the fabric of buildings as well as stratigraphic deposits and features which may be found within the cities. Massive building works in recent times have meant the destruction of much archaeological material, and it has been estimated that up to 90 % of the historic fabric of the cities has been destroyed. Reconciling the needs for accommodating vast and increasing numbers of pilgrims with the historic remains is undoubtedly a challenge and will involve some difficult decisions; however, archaeological documentation can still be carried out whatever the ultimate fate of particular historic structures.

The Archaeology of Slavery

The archaeology of slavery in the New World, in Africa, Europe, and elsewhere is an area of research which has seen growing interest in recent years. Within the Islamic world there have been a few attempts to investigate slavery through archaeology, but much more needs to be done. In Arabia there is considerable scope for investigating the phenomenon both because it survived much longer than elsewhere and also because there is potential for considerable material to have survived.

The Archaeology of Religious Sects

Although Muslims generally see themselves as part of a single community (*ummah*), there are many different sects and divisions, the most prominent of which is between Shia and Sunni Muslims. Within Arabia the majority of the current population is Sunni (specifically *Wahidun, Salafist,* or *Wahabbi*) although there are also significant numbers of Shia in the Eastern Province of Saudi Arabia, Bahrain, and Yemen. In addition Oman has a sizeable Ibadi population, and there are Sufi orders which although rare in present-day Arabia were a significant feature in Ottoman times. The recognition of these sects within archaeology is important to inform modern perceptions of heritage and to gain a full understanding of the past cultures.

International Perspectives

Archaeology in Arabia has always had international dimensions because of both the religious significance of the region and international strategic and economic interests in the area. For example, Russian archaeological expeditions were carried out in south Yemen during the period when the country was allied to the Soviet Union (1969–1992), while many of the early archaeological discoveries in Saudi Arabia were linked to the work of Americans working for the Aramco oil company. Other countries involved in Arabian archaeology include Denmark (with Danish teams carrying out excavations in Qatar, Bahrain, Kuwait, and the UAE), Japan, and Britain.

Future Directions

The rapid development of much of Arabia combined with a growing appreciation of the value of traditional heritage and culture means that archaeology is of growing importance for the region. Islamic archaeology is particularly significant due to its connection with the modern population of the area and because it is so well represented in the material record. Aspects of archaeology likely to develop our understanding of the Islamic period in Arabia include aerial survey, environmental studies, and heritage development, as well as some theoretical approaches adopted from historical archaeology.

Aerial Survey

The large and often inhospitable interior of Arabia lends itself to aerial survey, which has been used in the region since the early twentieth century. Although security concerns and territorial disputes have restricted the use of aerial survey in archaeology, the development of new techniques has opened up new possibilities. These include the use of declassified and open-source satellite imagery which together with increased accessibility to historical imagery have enabled significant discoveries of archaeological sites (Kennedy & Bishop 2011). In addition the development of unmanned aerial vehicles (UAVs) has given archaeologists the opportunity to selectively survey areas both as a means of site prospection and in order to monitor known archaeological sites.

Environmental Studies

Although environmental studies have long been part of prehistoric archaeology in the Middle East, their application to historic-period sites is infrequent. However, as the number of sites investigated increases, it is likely that it will be possible to investigate long-term patterns of production and consumption throughout the Islamic period. Of particular interest is the range and quantity of agricultural produce used on different sites, with associated implications for cultural adaptation and climate change.

Heritage Development

The growing importance of archaeology and historic buildings in Arabia is reflected in the increased attention being given to the presentation of sites and monuments as well as the development of museums. The Islamic period is particularly well presented in museums, while a number of specifically Islamic sites have been added to the UNESCO World Heritage list; these include the al-Turaif district in Saudi Arabia, Zubarah in Qatar, Zabid and San‘a in Yemen, and Bahla Fort in Oman. In the future it is likely that the number of World Heritage sites in the region will increase, as will local engagement with archaeology and heritage (Figs. 2–4).

Theoretical Approaches

As a branch of archaeology which focuses on a historical period, Islamic archaeology can

Arabian Peninsula: Islamic Archaeology, Fig. 2 Corner tower of al-Jahili Fort in al-Ain, UAE. The fort dates mostly from the nineteenth to twentieth century and is one of nine forts in the al-Ain Buraimi Oasis. It was excavated in 2008 as part of a comprehensive restoration program

Arabian Peninsula: Islamic Archaeology, Fig. 3 Zubarah fort during National Day 2008. The site has national significance and is used as a location for heritage reenactments. To the south of the fort are extensive ruins of the city of Zubarah which are currently being excavated and restored

Arabian Peninsula: Islamic Archaeology, Fig. 4 Julfar ware jar in al-Khaimah museum. Julfar ware was produced from the medieval period until recent times and was widely used in the region of the Gulf

benefit from many of the theoretical and practical perspectives of historical archaeology as it has developed in Europe and the Americas. Particular importance can be attached to issues of globalization in which Arabia, as the bridge between the Mediterranean and the Indian Ocean worlds, was a key component. Also of interest is the diffusion of crops such as coffee from Arabia to the Americas as well as the importation of tobacco (see, e.g., Bouzigard & Saidel 2012). In the future it is likely that these approaches will demonstrate that Arabia was already a major component of world trade systems before the discovery and exploitation of oil.

Cross-References

- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Islamic Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology

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Archaeobotany

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Introduction and Definition

Archaeobotany is a composite discipline, combining botanical knowledge with archaeological materials. Archaeobotany is also known as *palaeoethnobotany* (or *paleoethnobotany*). It focuses on the study of preserved plant evidence from archaeological sites and the reconstruction and interpretation of past human-plant relationships. The term "archaeobotany" emphasizes the archaeological nature of the evidence, with its recognition of site formation processes and sampling issues. The term *paleoethnobotany*, especially prominent in North America, recognizes the importance of modern ethnobotanical studies in contributing to interpretations of the past. This needs to be kept distinct from the term *palaeobotany*, which is the study of past plants, their adaptations, evolutionary relationships, and communities, from the fragmented remains that are preserved in old sediments. While palaeobotany takes in the whole history of plant life on land (approximately 415 Ma), archaeobotany focuses on the plant evidence relating to past human environments of the Pleistocene and Holocene.

Like many other specialist subdisciplines of archaeology, archaeobotany has evolved from a side-line pursuit of scientists outside of archaeology to something that is very much a part of archaeological research (for histories, see Hastorf 1999; Pearsall 2000; Fuller 2008). The origins of this field of research can be traced back to the nineteenth century, especially to a prominent expert on fossil plants, Oswald Heer, who carried out the first studies of archaeological plant remains recovered from waterlogged Swiss Neolithic and Bronze Age lake-side sites. His detailed monograph on these, in 1865, had a major impact on the discipline of archaeology and the early development of evolutionary biology; see by extension, summaries in Charles Darwin's *Variation in Animals and Plants under Domestication* (1868) and John Lubbock's *Prehistoric Times* (1872), which introduced to archaeology the term "Neolithic." For much of the subsequent century, recovered plant remains were sent by archaeologists to botanists for study, for instance, specialists working at natural history museums. However, specialist archaeobotanists taking part in archaeological fieldwork only began to be staples of archaeological research from the 1960s onward. Particularly important for this trend was the advent of improved systematic sampling of plant remains through the flotation method, first carried out in the USA and the Middle East in the 1960s. Flotation, a key method in archaeobotanical research, uses water to separate light organic remains (especially charcoal and carbonized seeds) from heavier archaeological material and the sand component of sediment (details of various systems in Pearsall 2000).

Key Issues /Current Debates

Research Themes

In general terms, archaeobotanical research questions relate to both past food-related practices/foodways, and past landscapes. A central concern of archaeobotany is the recovery of evidence for food plants exploited by past populations, where these plants came from, and how they were processed. In the study of hunter-gatherer societies, there are often challenges of preservation; yet, research on plant subsistence is crucial to examining issues of seasonal

Archaeobotany, Table 1 Archaeobotanical datasets, preservation environments, and typical spatial resolution

Data sets:	Preservation	Spatial resolution (typically)
Macros: remains of seeds and other fruit fragments	Charred	Local, biased by human procurement
	Waterlogged	
	Desiccated	
	Mineralized	
Macros: wood charcoal	Charred	Local, biased by human procurement
	Desiccated	
	Waterlogged	
Macros: parenchyma fragments	Charred	Local, biased by human procurement
	(Potentially desiccated)	
Plant impressions in pottery/ mud-brick	In pottery or hardened clay, therefore all environments where pottery or mud-brick is used	Local or nonlocal (traded), biased by human procurement and tempering preferences
Pollen	Fine sediments, especially acidic (alkaline and oxidizing conditions destroy pollen)	Regional
Phytoliths	Fine sediments, minimal bioturbation (of most pH levels except very high alkalinity (>9) and high temperatures).	Local plant use activities (on-site)
		Regional vegetation (when part of off-site studies, as with pollen)
Starch Grains	Preserved in dental calculus	Components of human/ animal diet
	From artifact surfaces (groundstone, ceramics)	Plant parts and taxa processed on these tools or vessels
Palaeofaeces (i.e., preserved feces or coprolites, and gut contents from mummies or bog bodies)	Mineralized	Local diet, but may contain regional pollen
	Waterlogged	
Diatoms are sometimes examined in archaeobotanical research		Regional aquatic environment

scheduling of activities, intensification of plant use and processing, storage, and niche construction (e.g., Mason & Hather 2002; Wollstonecroft 2011). Another major focus of archaeobotany is the transition to, and spread of, agriculture, including research on cultivation systems, arable weeds, and plant domestication traits (e.g., Fuller 2007; Piperno 2011). In contexts where agriculture existed, archaeobotanical research focuses on issues of diversification and intensification of agricultural systems and the organization of production and consumption of crops in relation to social hierarchy (e.g., Gumerman 1997; Fuller & Stevens 2009). When it comes to landscapes, archaeobotany has contributed to the reconstruction of past environments as well as to studies of environmental change due to climate change and/ or human impact. In this area, wood charcoal, on-site and off-site palynology, and phytolith studies are especially prominent.

Archaeobotanical Datasets and Subfields

Given that the various datasets define subfields of the discipline, few archaeobotanists practice research on all lines of plant evidence. Macro-remains analyses tend to focus on the study of seeds only, whereas wood charcoal and the analyses of phytoliths and starches are specializations in their own right. Still these various datasets are largely complementary and gain strength from integration. The sections below, and Table 1, summarize the main lines of archaeobotanical evidence and their respective potentials. The study of Palaeofaeces, i.e., the analysis of exceptionally preserved human coprolites and gut contents, is another source of archaeobotanical data that may combine several lines of evidence (Hillman 1986).

Macro-Remains: Crops, Chaff, and Weeds

Macro-remains refers to plant remains that are visible to the naked eye (larger than 0.25 mm),

but which still require microscopy to identify. Seeds, which are the most common evidence studied by archaeobotanists, can be preserved by numerous means, including mineralization, waterlogging, metal oxide preservation (sometimes called pseudomorphs), or as impressions in pottery. The most common means of seed preservation encountered, however, are charred seed remains. Generally, charred macro-remains can be identified by examination of their external morphology through a low powered binocular microscope (i.e., 6x–40x). It has now become possible to extract fragmentary ancient genetic information (i.e., aDNA) from ancient seeds, and the prospects of this technique are immense (Palmer et al. 2012).

In general, charred assemblages sample only a very limited range of the floristic diversity of local flora. This came to be recognized in Europe in the 1970s. It was observed that most archaeobotanical samples consisted of a similar range of taxa that are dominated by grain crops (seeds and chaff) and wild species known from modern field studies as weeds of cultivation or weeds of habitats that are disturbed by humans (Jones 1985). However, by far, the best represented remains were those of cereals, in part due to the good preservation of grain and chaff. Thus, aside from the remains of a few wild fruits likely collected for food, most of this fossil evidence can be interpreted as deriving from arable plant communities rather than the environment at large. Therefore, the associations of grains, chaff, and weed seeds can be used to infer aspects of crop-processing (Hillman 1984; Jones 1987; Fuller & Stevens 2009). After crops are harvested, they must be processed in predictable ways, to remove inedible husk (and weeds) and to separate the grain products. Through ethnographic studies, archaeobotanists have developed predictive models about sample composition, which allow the stages of crop-processing represented to be inferred. Most studies have been on the crop-processing of Mediterranean wheat and barley (e.g., Fuller & Stevens 2009), but one can also find studies of millets (e.g., Reddy 1997; D'Andrea & Wadge 2011), rice (Thompson 1996), and some new world crops (e.g. Lopez et al. 2011). These ethnoarchaeological models have made it possible to interpret crop-processing, which can be divided into two basic sets of activities: those that break apart the crop-plant and those that separate out the various freed components. The first activity includes threshing to break apart cereal ears, or separate the pods of some pulses. Another later stage, for hulled crops, is de-husking, which removes the hulls and glumes that are still attached to the grain. In simplified terms, the early stages produce waste that is rich in chaff (especially of free-threshing cereals, like bread wheat and barley) and weed seeds, especially smaller, lighter weed seeds that are removed by winnowing. Later stages will have a higher proportion of grains, fewer weeds that are generally larger and heavier, and will only have chaff from hulled cereals (like the glumes of emmer or einkorn wheat).

Parenchyma, the starchy storage tissue of plants, which predominates in tubers and other underground storage organs, can also be preserved by charring. Such material has not traditionally been searched for in archaeobotanical samples, but studies from a number of regions have found it to be fairly common among seeds and charcoal (Hather 2000), and this line of evidence has the potential for identification of wild or cultivated roots and tubers. This approach should be an important part of research on the origins and development of Vegeculture. Identifications of this material requires the high magnifications and depth of field provided by scanning electron microscopy (SEM).

Macro-Remains: Impressions

Another source of evidence of seeds and chaff is preserved impressions of plants. Plant impressions, often preserved in pottery, are one of the traditional sources of archaeobotanical information. However, today, the study of impressions is often eschewed when charred remains recovered through flotation are available from a site. Impressions can be studied at lower magnifications and often latex casts are prepared from the

molds, which can then be analyzed by SEM. Most cereal parts, such as chaff, are preserved in pottery since these readily available by-products of grain production were often used for tempering pottery. In some cases, this provides early evidence for crop domestication, such as in West Africa (e.g. Manning et al. 2011).

Macro-Remains Wood Charcoal

Wood charcoal is the most abundant component of archaeobotanical flotation samples. Given the centrality of fire in human cultures, wood charcoal is among the most abundant of cultural by-products. In contrast to seed remains, which represent chance/incidental burning, wood is generally considered to be the product of intentional burning. Wood can also be preserved under other circumstances, such as waterlogging. It is identified by looking at anatomical characters in transverse, tangential, and radial sections. This kind of study requires higher magnifications, generally 50x–150x, but sometimes as high as 400x, and beyond, which is aided by SEM. Since most fuel is likely to come from the vicinity of the site, it should provide some reflection of the surrounding vegetation. Numerous studies have utilized changes in the composition of wood taxa to examine changes in the landscape, but fuel choice may also reflect social and political concerns (Asouti & Austin 2005; Marston 2009).

Micro-Remains: Phytoliths, Starch, and Pollen

There are a number of lines of archaeobotanical evidence that are beyond the range of human vision and must be extracted from sediment samples, mounted on slides, and examined under high magnification. These lines of evidence are micro-remains, and include phytoliths, pollen, and starch grains. The most widely studied micro-remains in archaeology are phytoliths (sometimes called "plant opals," silica skeletons, or spodograms), which are the silica casts of plant cells formed by the evaporation of silica-laden water through plant transpiration (Pearsall 2000). Being an inorganic glass, these have a high potential for preservation in many sedimentary environments, although they are likely to be destroyed by mechanical processes. The study of these remains requires magnifications from 200x to 1,000x. Phytoliths are invisible in cross-polarized light. Phytolith identification is complicated by the fact that any given plant produces numerous different forms of phytoliths and similar phytoliths forms may be produced by unrelated species. Nevertheless, some phytolith forms are diagnostic. Because of the high preservation potential of phytoliths, they have proved particularly important for examining plant exploitation prior to agriculture in the Palaeolithic (Madella et al. 2002), and for tracking crops in tropical environments with poor on-site preservation of macro-remains (e.g., Piperno 2011).

A more recently expanding line of research are starch grains; the intracellular storage of starch by plants. The form of starch grains appears to be taxonomically determined, allowing separation of families, and sometimes genera and species (Torrence & Barton 2006). There also seems to be some indication of domestication in some taxa (e.g., Piperno 2011). Most often starch grains are extracted from the surfaces or residues of artifacts, such as groundstone, but they also become trapped in dental calculus and, as such, reflect human diet. Starch grains have been central to the archaeological study of past Chimpanzee archaeology (Mercader et al. 2007). Some traditional archaeobotanists still regard starch grains with suspicion and there is on-going research and debate on issues of taphonomy, preservation, and identification, as there is with other lines of archaeobotanical evidence.

Pollen is usually collected from off-site geological sediments (palynology) for examining palaeoecology, which is often of relevance for archaeological interpretations. Of particular interest are approaches to identifying the introduction or intensification of agriculture through pollen. In addition, pollen is sometimes preserved in archaeological sediments (archaeological palynology), which can help fill-out reconstructions of past vegetation

(e.g., Dimbleby 1985; Pearsall 2000). Pollen is studied at similar high magnifications as phytoliths.

International Perspectives and Future Directions

The growth of archaeobotany has been uneven internationally. As reviewed in Fuller (2008), several regions of the Old World have seen different chronologies for the development of this field. It was earliest in Europe, quite early but small-scale in India, and early in the Near East. Development in Africa has been slow, and the majority of sub-Saharan countries have had no archaeobotanical research. The USA has a long tradition of archaeobotanical research, but for much of the Neotropics, developments have been more recent and are spatially uneven (cf. Piperno 2011). Japan has had a longer tradition of studying waterlogged macro-remains, using flotation, and undertaking phytolith research, whereas such developments are quite recent in China or Korea. Most of Southeast Asia is un-sampled and understudied (Castillo & Fuller 2010). Thus, while archaeobotany has potential application anywhere – all human societies have used and consumed plants – its adoption has been uneven, partly biased toward countries with better funded research institutions and partly focused on regions deemed to be centers of origins of agriculture and civilization (e.g., Mesoamerica or Southwest Asia). Archaeobotany has greatly expanded internationally and across a range of subfields. It is set to continue to do so in the future.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agriculture: Definition and Overview
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Landscape Domestication and Archaeology
- ▶ Maize: Origins and Development
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Phytolith Studies in Archaeology
- ▶ Vegeculture: General Principles

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Archaeobotany of Agricultural Intensification

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Introduction

Although agriculture was introduced into Europe at the beginning of the Neolithic period, archaeological studies often suggest that intensive systems of agricultural production were not practiced until the Bronze Age. In the case of Britain and Ireland, for example, the increased appearance of archaeologically identifiable fields and farmsteads during the Bronze Age is often understood to represent agricultural intensification (see Brück 2000: 275). The intensification of agriculture in Bronze Age Europe is of enormous significance, as it is considered to be a precursor to increasing social stratification, with the creation of a strong agricultural economic base enabling the development of hierarchies that controlled the means of production and distribution of produce. This model of increasing intensity over time will be challenged here through detailed consideration of agricultural terminology and archaeological evidence for intensification, with a focus on archaeobotany and Ireland. It will be shown that intensification represents just one of many agricultural strategies available to prehistoric

farmers in Europe and cautions against an over-focus by archaeologists on this mode of production.

Definition

The definition of intensification used by many archaeologists worldwide is derived from the seminal work of a Danish economist, Ester Boserup, who published a revolutionary study in 1965 entitled *The Conditions of Agricultural Growth*. Boserup's study proposed a model for the development of intensification in nonindustrial farming societies. Since the publication of her work, the validity of Boserup's model has been much debated, mainly among ethnographers, but also in other disciplines such as agronomy, history, and, to some extent, archaeology. It appears, however, that many archaeologists have not followed these subsequent debates, while others are misinterpreting the basic meaning of intensification.

There is a need for more precision in terminology used to describe agricultural systems. In archaeological studies, the term "intensification" is sometimes used to refer to an increase in production or increased detection of remains (Morrison 1994, 1996: 587). The definition of intensification will be taken as follows: intensification is an increase in labor and/or capital inputs to a fixed area of land in order to increase or maintain production (after Brookfield 1972: 31). Intensification aims to achieve not simply an increase in overall production, instead it aims to increase productivity per unit of land.

Land capital remains the same in this process, in that the area of land being farmed does not increase; the increase is in labor and/or capital inputs with the aim of increasing or maintaining production. While labor inputs can be applied at a specific point in time, capital inputs – including the construction of terracing, irrigation, and field systems – may have to be created before they can be used, perhaps over a long period and then enduring for a substantial period of time (Brookfield 1972: 32).

If the goal is to increase productivity through the cultivation of a greater area of land than previously farmed, then this process is known as "extensification" rather than intensification. Extensification can take place when people move out over the landscape – thereby extending the area of land being farmed – rather than increasing inputs into a fixed area. Extensive farming is often characterized by a lower level of input and lower output per unit area, but a higher output per capita (van der Veen 2005: 158).

Historical Background

Boserup's model of agricultural intensification, *The Conditions of Agricultural Growth* (1965), is one of the most influential formulations of this issue from the last century. Based on ethnographic work, Boserup argued that an increase in population density was responsible for an increase in the intensity of cultivation. Boserup proposed that in preindustrial societies, as farmers intensify agricultural production, cultivation systems pass through a universal and linear sequence of evolutionary stages. According to this model, a clear trajectory of agricultural development can therefore be identified.

Boserup suggested that extensive forms of shifting cultivation gradually become more intensive by a reduction of the fallow length. According to this model, shifting cultivation might take place in order to minimize the possibility of soil exhaustion – land is cultivated and then abandoned in order to leave it fallow and allow the soil to regenerate, whereupon the land can be farmed again at a later time. With more intensive strategies, Boserup suggested that communities reduce the length of time that the ground is left fallow. Communities are able to reduce the fallow length by introducing more labor and/or capital until they eventually reach the stage of annual cropping or even multi-cropping. Increased labor will allow more tillage and seedbed preparation, as well as more weeding, all of which can encourage reduced fallow periods. Capital inputs can include the use of superior tools and increased diversity in

crops. Boserup also refers to inputs such as manuring and the enclosing of land in the progression towards intensification.

Many of Boserup's stages can be archaeologically identified, for example, in the form of innovative tools, soil modifications, and field boundaries. It is likely that the ability to identify these stages has influenced the popularity of Boserup's model in archaeological studies. The model appears to be straightforward – people start out by farming extensively with low inputs, progressing towards more intensive farming by adding in more labor, tools, and various other methods to increase or maintain productivity in an area of land. Boserup's assertion that population pressure was a causal factor in encouraging intensity of agricultural production has also found favor among archaeologists, as it has often been suggested that population pressure was a causal factor leading to societal and economic changes in Bronze Age Europe (Sherratt 1981).

Since the publication of *The Conditions of Agricultural Growth*, there have been many criticisms of this model of agricultural intensification and also of its application by archaeologists (Brookfield 1984, 2001; Kirch 1994; Morrison 1994, 1996; Leach 1999; van der Veen 2005). Boserup did, however, provide a very useful framework for highlighting some of the many variables in the process of agricultural change, and this seminal study resulted in much discussion and development of these complex issues as they pertain to different societies and environments throughout the world.

Key Issues/Current Debates

Does Agriculture Evolve from Extensive to Intensive Systems?

One of the main debates in agricultural intensification relates to the concept of unilinear progression, whereby agriculture is considered to start out as extensive and then becomes increasingly intensive as time progresses. Boserup (1965) proposed an evolutionary continuum towards fixed field-intensive agriculture, which argued for a clear trajectory from extensive to intensive farming. Diversity and variability are, however, critical aspects of both the structure of agricultural production and the process of agricultural intensification. Extensive and intensive forms of cultivation are different options, rather than stages of an evolutionary sequence. They represent strategies available to farmers to choose from, depending on local, social, and economic circumstances, and to use alongside other strategies such as innovation, specialization, and diversification (van der Veen 2005: 158). Intensification should therefore be viewed as consisting of one of multiple potential strategies, rather than a single process.

A consequence of this view is that there may be multiple paths or courses towards intensification rather than a single route from shifting to fixed agriculture, from extensive to intensive production, and from long to short fallows (Morrison 1994: 115). The direction, as well as the rate, of change may have varied, depending on economic and cultural circumstances at different times and places, with the possibility of reversals occurring, whereby agriculture became more or less intensive. Boserup's model suggested that early farmers would have made use of shifting agriculture, eventually moving towards fixed plot, more intensive agriculture. This model was applied by archaeologists to Neolithic societies in Europe, where it was assumed that extensive agricultural practice eventually gave way to more intensive systems in the Bronze Age. The archaeobotanical evidence from Neolithic Europe does not, however, support this application of Boserup's model.

Bogaard's (2002) study of early crop husbandry in central Europe investigated management of agricultural plots through analysis of ecological characteristics of potential arable weeds. Ecological characteristics relevant to the permanence of cultivation plots were previously determined during the "Hambach Forest experiment" in Germany, where experimental plots on loess soils, cleared of long-lived deciduous woodland, were cultivated over a six-year period and surveyed immediately prior to harvest time in order to document the weed flora. It emerged that arable weed flora associated with recently cleared

plots managed with little or no tillage and weeding (as in a shifting cultivation regime) are likely to be dominated by perennial taxa, particularly woodland perennials. Dominance by annual taxa is more likely to be indicative of long-established cultivation plots on regularly disturbed soils (representing a more intensive regime). Bogaard's analysis of archaeobotanical weed data from sites in the western loess belt and Alpine foreland demonstrated that many Neolithic cultivation plots in these regions tended to be long-established, rather than temporary, plots, suggesting that shifting agriculture was not taking place. Bogaard, together with Jones, more recently applied this approach to weed assemblages from Neolithic Britain, where they found further evidence for weeds associated with more intensive and long-term cultivation strategies in archaeological deposits associated with the earliest farmers (Bogaard & Jones 2007).

The difficulties in directly applying Boserup's model, which is based upon tropical agricultural systems, to temperate agricultural systems, such as Europe, have been highlighted (e.g., Sherratt 1981: 290). It could be argued that shifting cultivation is an agricultural system adapted to a specific set of ecological circumstances – found primarily in the humid inner tropics – to ensure maintenance of soil fertility. The application of such a system to Europe may be inappropriate, because different soil types and the presence of domestic animals enabled different forms of soil nutrient restoration in this region (Sherratt 1981; van der Veen 2005: 157).

Population Change and Intensification

Potential relationships between agricultural intensification and population change represent another issue that has been much debated. Population pressure has often been regarded as a causal factor leading to societal and economic change in Bronze Age Europe (Sherratt 1981). Boserup (1965) argued that population pressure was the primary causal factor of intensification – more intensive agricultural strategies can support increasing populations, with intensification in turn requiring increased labor per unit of food produced.

Boserup argued that intensification in food production originated as a response to factors beyond human control, in that humans were unable to prevent population increase. Anthropological studies have, however, revealed numerous examples of birth-spacing practices, abortion, and infanticide, suggesting that population increase has been subject to human intervention throughout prehistory (Kirch 1994: 310). More importantly, population growth and resultant land shortages are not in all cases the primary inducements for intensification. Demographic factors can be of variable importance in different cases, and intensification is not the only response to land shortage (Stone 1994: 317; Stone & Downum 1999: 115). Other responses could include migration, conflict, and changes to nonagricultural enterprises, while coercive social relations, such as chiefdoms, may also influence intensification. There is also the issue of which came first – was population increase followed by changes in agricultural practice or could populations have expanded *following* "favorable" circumstances, for example, where there was a stable agricultural base to support more people?

It has been argued that the disadvantages associated with intensive agriculture ensure that such modes of production will be adopted only when necessary, citing disadvantages such as increased labor inputs and declining efficiency of that labor over time (Boserup 1965). Diminishing returns on labor are assumed, which results in declining efficiency as intensification increases. Efficiency considerations can, however, be overridden, and an increase in production does not always correspond to a decline in efficiency (Stone & Downum 1999). Efficiency can vary according to the types of crops grown – e.g., hulled versus naked crops and spring-sown versus autumn-sown crops – and methods of cultivation. As well as technical innovations – such as new tools – social innovations can be hugely significant, including mobilization of labor, increases in productivity of labor, and improvements in the management of resources. Efficiency in time management, for example, rather than basic labor input, can be of

significant importance – there can be major differences in productivity between adjacent farms that are similar in workforce endowment (Brookfield 2001: 184).

It has also been argued that agricultural producers exerted the minimum effort required to meet their needs – the Law of Least Effort (Boserup 1965). In this way, people and societies make rational, informed choices in order to maximize the outcome of agricultural activities in the local landscape. But were agricultural strategies in Bronze Age Europe focused on maximization of production? As well as providing calorific value, crops can also be grown for social returns, being used, for example, in ceremonial and "ritual" activities. Ethnographic evidence indicates that inputs may appear uneconomic when measured against calorific returns yet reasonable when measured against social returns (Brookfield 1972: 38). Intensive production should not, therefore, automatically be assumed to be an objective in Bronze Age Europe.

International Perspectives

Were the Earliest Farmers in Ireland Engaged in Intensive Agriculture?

Arable agriculture was introduced into Ireland in the centuries after 4000 cal BCE, and it has often been suggested that the earliest farming was extensive, with intensive practices becoming more widespread during the Bronze Age (2500–600 cal BCE). This assumption is presumably based on the Boserupian model, which suggests that agricultural production would have started out in an extensive manner, eventually becoming more intensive. The relatively large quantity of cultivated archaeobotanical remains from Bronze Age sites in Ireland, when compared with Neolithic sites, is also likely to have been of influence. This evidence does not, however, necessarily mean that more intensive practices were being undertaken during the later period – increased production does not automatically mean intensification. It has been shown above that the evolutionary model of agricultural production – whereby systems progress from extensive to intensive – is not appropriate in many cases. A better method of assessing the intensity of farming practices in Neolithic Ireland is through ecological analysis of potential arable weeds.

The contribution of arable weed analysis in detecting intensity of agricultural production has already been discussed above, with reference to archaeobotanical studies from central Europe and Britain. Previous studies have established the types of arable weeds characteristic of a shifting cultivation regime versus arable weeds more associated with long-established cultivation, representing a more intensive regime. Analyses of arable weeds from Neolithic sites in central Europe and Britain have indicated that cultivation plots in these regions tended to be long established, rather than temporary, suggesting that shifting agriculture was not taking place (Bogaard 2002; Bogaard & Jones 2007). This approach has recently been applied to archaeobotanical data from Ireland for the first time, and a similar picture is emerging (McClatchie et al. in press). Although the Irish Neolithic dataset is smaller than that from Britain or central Europe, it appears to follow a similar trend, in that disturbed weed taxa are dominant and woodland taxa are rare, while annual species are more commonly recorded than perennial species. In common with Neolithic Britain and central Europe, the evidence from Ireland does not resemble the picture expected for newly cleared plots managed under a shifting cultivation regime. The earliest farmers in Ireland instead appear to be engaged in more intensive practices than previously acknowledged.

Do Prehistoric Field Systems in Ireland Represent Intensification?

It has been noted above that an increased appearance of archaeologically identifiable fields has been interpreted as representing agricultural intensification in prehistoric Europe. The construction of field systems creates both enclosures and boundaries. The enclosing of land can be effective in the prevention of further soil erosion, particularly on sloping ground, because it can help decelerate soil creep and encourage drainage. Boundaries can protect animals and

crops by preventing wind chill and providing shelter. As well as enclosing and bounding areas of land, the construction of field systems is also a form of *landesque* – investing in the land beyond the life of the current crop (Brookfield 1984).

One of the earliest, and indeed largest, examples of field systems from prehistoric Europe can be found at the Céide Fields, County Mayo, on the northwest coast of Ireland. Here, well-defined rectangular field systems, consisting of stone walls, were erected over an area of approximately 12 km^2 around the middle of the fourth millennium BCE and then covered by peat growth, thus enabling their preservation (Caulfield 1978; Figs. 1 and 2). The fields appear to be large in size and are often thought to have enclosed animals, although it should be noted that organic hedge boundaries, which would have left little trace, could also have been used to subdivide fields for arable use. While this early evidence from the Céide Fields is certainly significant, prehistoric field systems in Northwest Europe more often date to the Bronze Age, as is the case in Ireland (O'Sullivan & Downey 2004). Some field systems appear to have an orderly layout – for example, at the Céide Fields – while others tend not to be laid out in a coaxial manner, instead being less regular in their arrangement, perhaps indicating more gradual and incremental growth.

The erection of agricultural walls, dams, irrigation features, and terraces can require a substantial labor input in their construction and maintenance, which is sometimes interpreted as evidence for intensification. Although it is clear that the increase in field systems during the Bronze Age represents a change in the organization of production, this does not necessarily imply any enhancement in productivity. Studies of field systems often focus on morphology of the fields as well as economic and technological aspects of their construction and use. The increased appearance of field systems may also reflect changing social relations between people and the land that they occupy and cannot be explained solely in economic or technological terms (Johnston 2000). Field boundaries can be established for reasons other than increasing productivity of the land (Stone 1994; Brück 2000). Field boundaries can be constructed to mark boundaries – to transmit information – and also to protect boundaries, or control access. Field boundaries will therefore not *necessarily* occur where cultivation is intensive. It is also worth noting that landscapes can be demarcated conceptually and their natural features can convey symbolic meanings, without the land itself being altered in any way by field boundaries, ditches, lines, or posts (Bayliss-Smith & Golson 1999: 209). So while field boundaries may well be part of an intensive system, their presence does not automatically imply intensification. Field boundaries may even be part of an extensive strategy, whereby people are

Archaeobotany of Agricultural Intensification, Fig. 1 Aerial view of a section of the Céide Fields, County Mayo, Ireland – prehistoric stone walls (Courtesy of Photographic Unit, National Monuments Service, Department of Arts, Heritage and the Gaeltacht)

Archaeobotany of Agricultural Intensification, Fig. 2 Section of the Céide Fields, County Mayo, Ireland – prehistoric stone walls

moving out over the landscape. It seems, therefore, that a variety of economic and social strategies might have prompted the increased construction of field systems in Bronze Age Ireland. This may be better understood as a *transformation* in the way that agriculture was being carried out.

An alternative means of determining the intensity or otherwise of agricultural production is through geoarchaeological analysis of the sediments themselves. Manures can be important indicators for the intensification of arable production, because they are an example of applying increased inputs to a fixed area to increase/maintain production. Such soil amendment strategies have been detected at the Bronze Age field system in Belderg Beg, County Mayo, through geoarchaeological analyses (environmental investigations at this location are ongoing; www.ucd.ie/archaeology/research). Another recently developed technique is the investigation of manuring through analysis of stable isotope values in cereal remains (Bogaard et al. 2007). A variety of methods can therefore be employed to explore intensity of cultivation at an individual site.

Future Directions

It is clear that the causes and paths of agricultural change can be complex – variability and diversity are often evident in the archaeological record. Intensification is not caused by any single factor, such as population pressure. It may instead be influenced by a variety of demographic, social, and economic factors. There is not an evolutionary trajectory in all agricultural systems, whereby they go from extensive to intensive farming. Similarly, certain landscape features do not automatically imply any individual agricultural strategy – it has been demonstrated above that the construction of field systems is not always indicative of intensive agricultural production. The term "intensification" and its implications have, unfortunately, been misused and misunderstood in some archaeological studies. Future studies should aim to pay more attention to the use of proper terminology and to be more critical when exploring evidence for agricultural change – in the case of prehistoric Europe, it could be argued that the problem with Boserup's model is not so much the model itself, rather the way it has been applied and oversimplified by others. While the identification of true intensification in the archaeological record can certainly be challenging, a variety of useful environmental analyses are now available, including geoarchaeological and isotope studies. Investigation of archaeobotanical evidence – such as arable weeds – can also provide new insights into the intensity or otherwise of land use. More frequent use of such methods is recommended. Archaeologists should, however, be careful not to overfocus on trying to identify intensification in the archaeological record. Depending on local circumstances, different agricultural strategies may have been deployed at different times and in different places, with the possibility of co-occurrence. It may be more worthwhile to

explore the potential for a variety of different strategies, which may include intensification but also includes other options such as innovation, specialization, and diversification.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agriculture: Definition and Overview
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sherratt, Andrew
- ▶ Southern Africa: Origins and Development of Agriculture

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Archaeobotany of Early Agriculture: Macrobotany

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Introduction

Analysis of archaeological macrobotanical remains continues to be a primary source of direct evidence for the development of agriculture in many parts of the world. Macrobotanical remains are small in size, often fragile, and require special conditions for preservation, making interpretation of archaeobotanical assemblages a complex process. There are multiple ways that macrobotanical remains can be used to explore early agriculture and plant domestication, from techniques examining morphological changes in seeds to statistical analysis of changes in archaeobotanical assemblages. Recently, archaeobotanical evidence in multiple parts of the world has been used to argue for extended periods of "predomestication cultivation" in early agricultural systems.

Definition

Macrobotanical remains are archaeological plant remains that are large enough to be seen with the naked eye. These remains usually range in size from several centimeters (e.g., wood charcoal and tubers) down to 250 μm (e.g., very small seeds). Using stereomicroscopes, archaeobotanists examine these remains for diagnostic features that can be used to identify the plant to the lowest taxonomic level possible (e.g., genus or species). Morphological and morphometric studies are also often carried out on macrobotanical remains from early agricultural sites to examine changes resulting from plant domestication. Although macrobotanical remains can include items such as wood charcoal, herbaceous plant material, and parenchyma, in the context of early agriculture the focus of research is usually on the seeds of cultivated or domesticated plants.

Key Issues

The Nature of Macrobotanical Research in the Context of Early Agriculture

Although microbotanical remains such as silica phytoliths and starch grains have recently demonstrated some of the earliest evidence for agriculture in some parts of the world (e.g., in the New World Neotropics and Southeast Asia), macrobotanical remains continue to be the primary source of evidence for most archaeobotanists who study the development of plant cultivation and agriculture worldwide. Macrobotanical research, though often challenging, is particularly valuable because it allows researchers to directly investigate relationships between people and plants (Pearsall 2010: 247). By using strict methodological controls and statistical measures recording changes in seed

morphology, taxon abundance, and assemblage diversity through time, archaeologists can use macrobotanical remains to detect shifts in plant use practices that are not discernable through the analysis of any other type of archaeological remains.

Unlike mineralized artifacts such as ceramics and bone, macrobotanical remains require special conditions for preservation and special techniques for recovery. Carbonization transforms botanical matter into compounds that cannot be broken down and consumed by living organisms, such as insects and microbes. With the exception of dry, waterlogged (anaerobic), or frozen conditions, carbonization is usually required for botanical preservation at archaeological sites. The majority of botanical evidence for early agriculture comes from such charred macrobotanical remains, with some exceptions. For example, Grobman et al. (2012) recovered numerous partially charred and uncharred remains of maize (*Zea mays*) from a desert site on the north coast of Peru from layers dated c. 6700–5000 BP, and some of the earliest evidence for rice agriculture in central China comes from waterlogged levels at the Hemudu site, dated c. 7000–5800 BP (Zhao 2011).

Although macrobotanical remains can include relatively large materials such as charcoal and tubers, most macrobotanical remains are small and thus unlikely to be recovered through typical dry screening. The development and spread of the flotation recovery method in the 1960s allowed the recovery of representative archaeobotanical assemblages and were responsible in large part for the development of archaeobotany as an archaeological subdiscipline (Pearsall 2010). In flotation, archaeological sediments are disaggretated in a water-filled tank, allowing charred botanical remains to float to the surface of the water for collection in fine mesh sieves.

The requirement of carbonization acts as a preservation filter for macrobotanical remains, with important implications for the interpretation of archaeobotanical assemblages. Plants that are processed, consumed, and discarded in the absence of fire (e.g., many fruits) are unlikely to be preserved in the archaeological record, while those that are exposed to fire are more likely to dominate archaeobotanical assemblages. In the context of early agriculture, this can lead to ambiguities in the interpretation of wild and domesticated plant use, particularly in cases where dung may have been an important source of fuel. For example, Miller (1996) argued that the archaeobotanical assemblage at early Abu Hureyra (c. 11000 BP), which contained a broad range of seed taxa, including seeds which are inedible to humans without processing, was not just the result of crop processing but also of dung fuel use, however, Hillman et al. (1997) suggested that the assemblage of wild plant taxa was instead a reflection of the broad-based seed collection strategy practiced by site inhabitants.

In any agricultural site, the sequence and location of crop processing activities shapes the archaeobotanical assemblage. Heuristic models of pathways to botanical preservation (i.e., formation processes), often based on ethnoarchaeological studies, are required to accurately reconstruct past practices (Fuller & Weber 2005). These models should integrate how and where crops are harvested, threshed, winnowed, stored, ground, cooked, consumed, and discarded, as well as how taphonomic processes affect the distribution and preservation of remains after deposition (Fuller & Weber 2005). Variations in crop processing sequences between sites and time periods preclude simple comparisons of macrobotanical assemblages across time and space. The proportion of agricultural weeds may be much higher at one site than another, but this pattern could result from increased exposure of winnowed botanical materials to fire or the use of dung as fuel rather than co-consumption of arable weeds with agricultural crops.

The process of carbonization also affects the morphology of plant seeds. Seeds with hard testas or fruits with stony endocarps tend to retain their shapes during carbonization, while seeds and fruits lacking hard testas and containing large quantities of starch (e.g., grass caryopses) or oils (e.g., flax seeds) often exhibit dramatic changes in morphology and appearance after carbonization. Märkle & Rösch (2008) documented significant differences in the environmental

requirements (temperature, duration, and oxygen availability) for preservation through carbonization between cereals and oily seeds, showing that oily seeds are much less likely to be preserved than cereals in oxidizing conditions. Thus, interpretation of archaeobotanical assemblages must also take into account the different conditions necessary for preservation. The absence of a taxon in an archaeobotanical assemblage does not necessarily imply that it was not present or in use at a site.

Macrobotanical Remains as Evidence for Cultivation and Domestication

Evidence for early agriculture is drawn from multiple lines of evidence, including the development of novel tilling/harvesting/processing technologies, increased sedentism, changes in isotopic indicators of dietary composition, and many others. However, often the most direct form of evidence for early agriculture has come from the detection of domesticated characteristics in the morphology of plant seeds. Fuller (2007: 904–5) identified six phenotypic traits that comprise the "domestication syndrome" for field crops: elimination of natural seed dispersal, reduction in seed dispersal aids, increasing seed/fruit size, loss of germination inhibition, synchronous tillering and ripening, and more compact growth habits. Of these, the first four can be examined using archaeobotanical remains. One additional characteristic, parthenocarpy (fruit maturity in the absence of seed fertility), may be useful in identifying vegetatively propagated plants.

In addition to morphological attributes of seeds and fruits, characteristics in the composition and structure of archaeobotanical assemblages can also indicate plant cultivation. Examples include botanical remains found outside of their natural ranges, unexpectedly high densities of botanical remains within natural plant ranges, and changes in the maturity of seeds in assemblages.

Elimination of Natural Seed Dispersal/Reduction in Dispersal Aids

In the overwhelming majority of wild cereals, grains are connected to the rachis by a brittle attachment that shatters when the grain is mature. A small proportion of wild cereal plants exhibit nonshattering ears, a genetic mutation in which the attachments between the rachis segments are too strong to naturally dehisce. In these cereals, grains must be separated by threshing, leaving a distinct jagged attachment scar on the rachis or spikelet base (Fuller & Allaby 2009). A large proportion of nonshattering rachis fragments in an archaeobotanical assemblage provides strong evidence for domestication since seed dispersal and germination is dependent on human intervention in these contexts. Domestication also removes selection pressures maintaining plant anatomical structures that aid in seed dispersal (e.g., cereal spikelet hair cells and elongated awns), sometimes reducing or eliminating these structures (Fuller 2007).

Changes in Seed Size and Morphology

The process of domestication often results in enlarged seeds or fruits and sometimes in changes in the overall shape of these. In Near Eastern domesticated cereals, increases in seed size take the form of greater breadth and thickness in caryopses. At the site of Jerf el Ahmar in Syria, Fuller (2007) showed that the maximum breadth and thickness of both barley (*Hordeum vulgare*) and einkorn wheat (*Triticum monococcum*) caryopses increased dramatically between early (c. 11500–10800 BP) and late (c. 10500 BP) occupation levels. Unlike barley and wheat, increase in rice (*Oryza sativa*) caryopsis size in central China took the form of significantly increased *length* and breadth after c. 6000 BP (Fuller 2007). Bruno (2006) argued that seed size is not sufficient to distinguish wild and domesticated forms of quinoa (*Chenopodium* spp.) taxa. Rather, morphological features such as seed coat texture, pericarp patterning, and margin configuration are required to differentiate wild from domesticated forms.

Loss of Germination Inhibition

Many wild plants produce seeds that have physical or chemical characteristics which inhibit immediate germination. Harvesting of crops in

a single age cohort tends to select for seeds which germinate as soon as they are planted, reducing the incidence of germination inhibition in plant populations. This characteristic has been used primarily to identify domesticated quinoa taxa, which tend to have thinner testas than wild varieties. Bruno (2006) found that domesticated quinoa have testas 1.25–7.50 μm in thickness, while the testas of wild varieties are 11–55 μm in thickness. However, Bruno cautioned that the potential overlap between testa thicknesses between some wild and domesticated taxa makes this characteristic nondiagnostic on its own.

Parthenocarpy

Some fruit tree taxa occasionally produce parthenocarpic mutants in which fruits mature without fertile seeds. Parthenocarpic fruits can have larger quantities of sugars and carbohydrates than their fertile counterparts, making them more desirable for human consumption. Kislev et al. (2006) recovered nine apparently parthenocarpic fig fruits from the site of Gilgal I in the Jordan Valley, dated to 11400–11200 BP. While Kislev et al. (2006) interpreted the remains as early evidence for the horticultural propagation of fig trees, Denham (2007) argued that the parthenocarpic figs represented a small sample of specimens that may have been preferentially harvested from wild stands.

Archaeobotanical Evidence for Plants Outside Natural Ranges

The identification of domesticated or nondomesticated food plants outside of natural plant ranges can be evidence for local cultivation or for trade. Multiple lines of evidence, such as from the development of cultivation-related technologies or increased sedentism, can clarify which explanation is most likely. Weiss et al. (2006) suggested that the presence of morphologically wild lentil (*Lens orientalis*) at the site of Netiv Hagdud in the Jordan Valley around 11000 BP indicates that soon after initial loss of seed dormancy, lentil quickly spread southward from its genetic origin in northern Syria or southeastern Turkey.

High Densities of Archaeobotanical Remains Within Natural Plant Ranges

In cases where plants used as food occur in the wild only sporadically, large quantities of the taxon on archaeological sites may indicate cultivation. Weiss et al. (2006) argued that this is the explanation for hundreds of morphologically wild lentil remains at the site of Jerf el Ahmar in Syria, dated 11000 BP. The authors reasoned that wild lentils are unlikely to have been harvested in significant quantities due to their low abundance on the natural landscape and low seed production. They suggested that the lentil remains in the archaeobotanical assemblage represented cultigens that had lost seed dormancy, but had not yet begun to exhibit domestication-related morphological changes.

Changes in Maturity of Crop Seeds

The caryopses of wild grasses often do not mature in synchrony, but rather over a period of days to weeks. Fuller (2007), drawing on expectations of optimal foraging theory and ethnographic data, proposed that early rice harvesters could maximize wild rice (*Oryza* spp.) yields by harvesting several days after the first grains on inflorescences began to mature. At this time, many rice grains would be harvested in an immature state, creating a distinct pattern of high proportions of immature grains in archaeobotanical assemblages. Fuller (2007) argued that this pattern is evident in assemblages of early cultivated rice in central China and proposed that changes in rice morphology toward larger and plumper grains after c. 6000 BP reflect a shift toward harvesting larger proportions of mature grains.

Predomestication Cultivation and Multiple Domestication Origins

A longstanding model of domestication in the Near East proposed that founder crops were domesticated (a) relatively quickly, (b) as a package, and (c) in a single location or "core area" from which they subsequently spread (Fuller et al. 2011). This model has been called into question through recent research. By tracking changes in the proportion of nonshattering ears and in grain sizes at early agricultural sites

in the Near East, Fuller (2007) found that the period of transition from archaeobotanical assemblages comprised of wild wheats (*Triticum* spp.) and barley to those dominated by grains with domesticated characteristics was protracted, lasting up to 2000 years. Cultivation during this period, in which archaeobotanical assemblages contain both morphologically wild cultigens along with arable weeds, is termed "predomestication cultivation" and produces archaeobotanical assemblages with "semidomesticated" characteristics (Fuller 2007). Fuller et al. (2011) compared the archaeobotanical assemblages of early (c. 11000–9000 BP) cultivation sites across the Fertile Crescent. The authors found that the suite of domesticated Near Eastern founder crops was not present at one or a few early sites in a core area. Rather, they describe domestication as occurring in a mosaic or piecemeal fashion across the region, with particular zones focusing on a limited number of early domesticates. They argue that the putative "core area" of domestication is not the origin of the Near Eastern founder crops, but rather the location of later agricultural integration of crops domesticated in multiple locations.

This pattern of multiple origins of domesticates within a region likely applies to other parts of the world as well. Smith & Yarnell (2009) reviewed evidence for the earliest domesticates in eastern North America. At each of three widely separated sites dated from c. 5000–4500 BP, only a single domesticated crop was present; evidence for an incipient "crop complex" of multiple domesticates at a single site does not appear until c. 3700 BP.

Zhao (2011) reports clear independent centers of domestication for rice and millet in central and northern China, respectively. As in the Near East, archaeobotanical data suggests a protracted period of predomestication cultivation for both crops. Zhao (2011) proposed that rice cultivation may have begun around 10000 BP, with morphologically domesticated rice first appearing between 9000 and 7800 BP at the Jiahu site in central China. Zhao suggested that rice cultivation played a supplemental role in subsistence practices for an extended period, with full rice agriculture only beginning c. 6500 BP. Alternatively, Fuller (2011) argued that the evidence for domesticated rice at Jiahu was unclear, as archaeobotanical research at the site did not include spikelet base analysis or present clear evidence of morphological changes. Although Fuller (2011) traced the beginnings of cultivation in China to as early as c. 10000 BP, he proposed that the earliest evidence for morphologically domesticated rice comes from the Baligang site in interior central China, dated to c. 8000 BP.

Although preliminary evidence suggests extended periods of predomestication cultivation in multiple areas of the world, the number of proto-agricultural sites examined archaeobotanically is still relatively low in many regions (with the exception of the Near East). Additional research in the coming years will be needed to clarify this important issue.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Australia and the Origins of Agriculture
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
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Archaeobotany of Early Agriculture: Microbotanical Analysis

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Introduction

Archaeobotanical research is conducted to gain an understanding of the relationships between ancient human populations and their surrounding botanical biosphere. To reach this goal, archaeobotanical researchers recover plant remains from archaeobotanical contexts, identify the botanical taxa present in the samples, and interpret the data within the cultural framework of the peoples who used the plants for various purposes including food, construction, and crafts such as basketry. Microremains are also used as tools to understand human impact on the surrounding landscape. It is the aim of archaeobotanical research both to gain a complete understanding of ancient plant use and to obtain the most solid, reliable evidence possible.

Perhaps the most common area of research is plant use and economy, a broad field of study that includes basic subsistence categories such as diet and construction materials, as well as more specific topics such as medicines or fish poisons. Because plants were often important economically, their remains can also be used to study migration and trade among human populations as seeds and other propagules moved from hand to hand across the landscape.

Another important archaeobotanical research subject is environmental reconstruction, which typically involves the coring of sediments in wetlands and subsequent analysis of the botanical microremains within. These cores and other samples from living and activity areas can also help us understand human adaptation to the environment including the introduction of plants into a new area, as well as their tending, cultivation, and domestication.

Finally, but no less importantly, archaeobotanical remains can be used to understand ancient human cultural activities including ideology and religion. Examples include plants in symbolic contexts; in art, as incense; and as hallucinogens for spirit journeys.

There are two major categories of archaeobotanical remains that are studied: macroremains, or large fragments of plants or their tissues, and microremains, the subject of this discussion, which are much smaller in size and, therefore, typically require more specialized equipment for both extraction and identification. Most microbotanical remains are of such small size that they must be viewed using instruments that allow for both high magnification and resolution. These instruments include the compound light microscope and the scanning electron microscope. Microremains are also, however, more durable than macroremains in harsh environmental contexts as well as at great depths where the heavy, overlying sediments can crush fragile charred specimens. Thus, microremains can be studied by archaeobotanists working in contexts that did not allow for the preservation and recovery of macroremains.

Key Issues/Current Debates/Future Directions/Examples

Microbotanical analysis is the study of ancient fragments or structures of plant tissues that are not visible to the naked eye, with the aim of understanding interrelationships between human populations and the plant world.

The three most commonly studied categories of microbotanical remains are pollen, phytoliths, and starch grains. All three types of microremains form in the tissues of plants and, just like the larger-scale flowers or fruits, differ in morphology between different groups or even species of plants. They are deposited in archaeological contexts via various methods, and archaeobotanists are able to extract them from sediments or artifacts, concentrate the extracts, and examine the assemblages of microfossils via microscopy. Microfossils can often be identified as being derived from specific plant taxa, and, thus, they are important indicators of plant presence and/or use in an archaeological context.

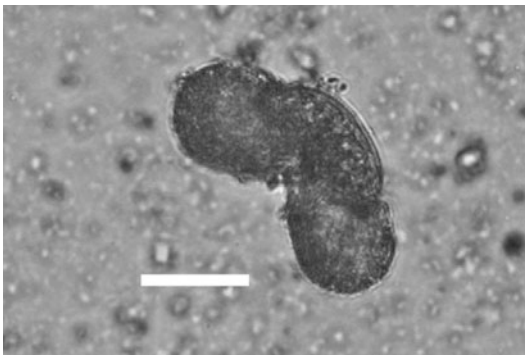

Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 1 A pollen grain from *Pinus* sp. showing the distinctive bisaccate form. Archaeologists sample for ancient pollen using methods that eliminate the possibility of contamination from modern pollen rain. This pollen grain was extracted from a starch sample. The *scale bar* is 20 μm in length

There are many similarities between the types of microfossils and how they are used by archaeobotanists, but there are also some key differences. This entry presents basic summaries of the three types of microfossils and how their analysis is carried out and then used as an interpretive tool in archaeobotany.

Pollen grains (Fig. 1) are microsporangiate reproductive structures that form in the anthers of flowers. If pollen grains are recovered from archaeological contexts, they can be used as markers to identify the remains of plants in archaeobotanical samples.

The extraction of pollen grains from archaeobotanical samples can also recover other microfossils that are made of very durable materials (Traverse 1988). The exine, or outer

envelope of a pollen grain or spore, contains the material sporopollenin, and structures made by protozoa, fungi, or algae can consist of chitin, tectin, or other similar substances (Traverse 1988). These substances are resistant to degradation by the acids that are used by archaeobotanists to extract the microfossils from sediment samples, and, when considered as a group, these types of microscopic structures that occur in an assemblage are called palynomorphs (Traverse 1988).

The study of palynomorphs is called *palynology*. Archaeologists typically use palynology to provide evidence for three main purposes: environmental reconstruction, understanding human environmental impact, and documentation of the economic use of plants.

Environmental reconstruction involves the documentation of the species and diversity of plants that occur or move in and out of a system over time. Knowledge of the specific environmental requirements of each type of plant, such as rainfall, temperature, or soil conditions, then allows for an understanding of changes and/or stability in the studied environment.

The impact of human activities on the immediate environment is typically documented using specific changes in the plant community as well as other markers that may appear in the samples. Loss of timber species and the appearance of weedy taxa, for example, are good indicators that humans are clearing forest, perhaps for agricultural activities. If the landscape is altered, samples can show an increase in sedimentation rates as soil is exposed, and charcoal fragments indicative of burning activities may also occur.

The economic use of plants can be documented using pollen that may occur in specific contexts. Burials, for example, may include the ritual use of flowers that can then be identified. Identification will lead to a seasonal date of the burial due to the restricted time period in which the flowers bloom each year. Pollen can also be extracted from human coprolites. Typically, if the recovered pollen is from an insect-pollinated plant and is quite abundant, it can be interpreted as ingested. In contrast, pollen from wind-pollinated plants could have entered the system as "rain."

Pollen is identified using a one-on-one comparison with modern palynomorphs, and micromorphological features like shape and size as well as surface details such as pores and decorations are taken into consideration (Traverse 1988). Diagnostic forms occur in many plant groups but not in others (Traverse 1988). A three-dimensional viewing of pollen grains is usually required for identification, and taxonomic identification may be to the family, tribe, genus, or species level depending upon many factors including the types of pollen recovered and the quality of preservation.

When analyzing an assemblage of pollen remains, the archaeologist and paleoecologist must take several factors into consideration when making interpretations (Traverse 1988). First, the type of pollination system that the plant used is determined. Wind-pollinated plants make very large numbers of pollen grains that travel over distances. In contrast, insect-pollinated plants produce relatively few grains of pollen, and these grains will be dispersed only as far as the pollinator takes them. Some plants are pollinated by the movements of water, and these pollen grains tend to be very fragile and decay rapidly after deposition, while pollen grains from self-pollinated plants often germinate prior to the opening of the flower. Each type of pollination system will create a different signature, and, with the exception of wind-pollinated plants, most types of pollen are likely to be "underrepresented" in an assemblage or not represented at all.

Taphonomic processes can also affect a pollen assemblage. Degradation can occur due to the mechanical abrasion of sediment particles on pollen grains, the chemical destruction of the structure by alkalinity, and biological activity of decomposers like fungi and bacteria can digest pollen grains.

Pollen samples can be collected in different ways that are dependent upon the questions the investigators wish to address. The main goals are to collect samples so that naturally occurring pollen rain can be distinguished from cultural deposits and to minimize modern pollen rain and cross-contamination within the samples.

Samples for pollen analysis, and for microbotanical studies in general, can include stratigraphic sequences, feature sediments, washes from artifacts, cores from lake beds or other sources, and control and/or comparative samples. Modern comparative collections are typically assembled from locally occurring flora. Pollen grains are stored on slides or in vials for the purposes of one-on-one comparisons with archaeological pollen grains.

Phytoliths (Fig. 2) are silica "bodies" that occur within and between plant cells. Plants produce phytoliths using soluble silica that is absorbed from the soil, and they are believed to occur in plant tissues for various reasons including the structural support of the plant, to aid as a detoxifying agent against damage from heavy metals that occur in soils, and for defense against small herbivores such as insects (Piperno 2006). Unlike pollen and starch grains, phytoliths consist of inorganic silica and, thus, are the most resistant to degradation in sediments. The relative stability of a phytolith in a sediment is dependent upon several factors including the comparative fragility of the phytolith in its native state, concentrations of various substances in sediments like iron and aluminum oxides that protect phytoliths, or extremely alkaline conditions that can degrade them (Piperno 2006).

Phytoliths are extracted from sediments by chemical processing followed by a heavy liquid flotation (Piperno 2006). Notably, the processing techniques that are used to free phytoliths from sediment particles destroy pollen grains, and vice versa. Starch grains, in turn, are destroyed during the processing for both pollen and phytoliths. Thus, enough sediment must be collected from each relevant context if all analyses are to be employed. Phytoliths can also be brushed or washed from artifact surfaces. A sonic cleaner or sonic toothbrush can prove indispensable in extracting microfossils from artifacts, even in the field, and assemblages of phytoliths can reveal the function of the artifact in question.

As is the case with pollen, diagnostic phytoliths occur in some plant groups but not in others (Piperno 2006). Some plants produce commonly occurring or less-distinctive morphologies, while other plant groups do not make phytoliths at all. Two general approaches to the study of systematics within phytoliths are commonly employed within the discipline. The botanical approach studies phytoliths in situ, within the modern plant tissues themselves. The morphological approach studies disarticulated phytoliths that have been extracted from plant tissues. The goal of each approach is the same: to determine the typology for a particular plant or group of plants so that the remains can then be identified in the archaeological record.

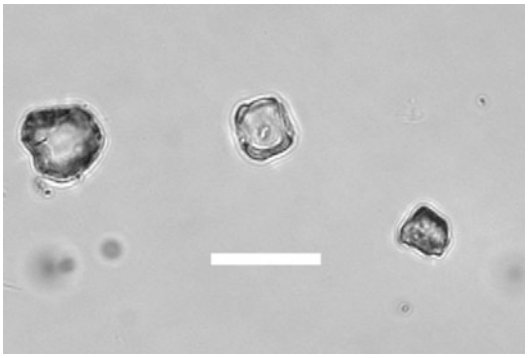

Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 2 A saddle phytolith (*center*) typical of those from grasses in the Chloridoideae. The presence of this type of phytolith in an assemblage is an indicator of the occurrence of chloridoid grasses in the sampled context. The scale bar is 20 μm in length

To successfully identify phytoliths, a one-on-one comparison with modern specimens is used, and the microremains are viewed in three dimensions. The archaeobotanist must understand the local flora, both modern and at the time of interest, and must also have a grasp of which plants in the area may produce similar types of phytoliths. With this approach, the specific characteristics necessary to separate groups can be determined, and secure identifications can be more reliably made. Like in palynology, the study of phytoliths is employed by archaeobotanists who are interested in studying environmental reconstruction, the impact of humans on their environment, and the economic uses of plants by ancient peoples.

Phytoliths are deposited in archaeological contexts via several mechanisms. Plant tissues can decay in situ, leaving behind the durable

silica. Plants can also be burned, and phytoliths can bear the scars of fire with black markings or heat distortion. Digested plant materials, such as coprolites, will also contain intact, indigestible silica phytoliths. Via the careful analysis of context, archaeobotanists can collect phytolith samples from these cultural contexts and use them as tools to reconstruct ancient human activities. Phytoliths are also continuously deposited in non-anthropogenic contexts via the decomposition of plant tissues in "natural" systems.

As with pollen, sampling strategies for phytolith studies are typically dependent upon the research questions of the archaeobotanists. Cultural contexts, both sediments and artifacts, can be sampled, as can "natural" contexts like lake cores. Again, control samples can be key in determining the background "noise" and determining which deposits are culturally derived.

Starch grain (Fig. 3) analysis is the most recently applied method in the analysis of archaeobotanical microremains; however, due to the significance of starch in other fields including botany, food science, and industrial chemistry, it has been very broadly studied, and descriptions of both native and modified starches are common in various literatures (e.g., Reichert 1913; BeMiller & Whistler 2009). Starch grains are the eventual product of photosynthesis in many plants, and they are formed in amyloplasts within the plant cell. Storage starches in particular are studied by archaeobotanists because they are both used for food and are diagnostic in morphology, while other transient starches that occur in plant tissues are not.

Starch analysis has been used to document the origins of agriculture, the domestication of plants, and economic uses of plants. Because starches are much more likely to represent ancient foodstuffs than items such as construction materials and surrounding vegetation, studies of starch grains are typically, though not necessarily, diet focused. Just as is the case with pollen grains and phytoliths, diagnostic starch grains occur in many plant taxa but not in others.

Starch grains are identified very much like pollen grains and phytoliths are, via a one-on-one comparison with modern specimens and a three-dimensional examination of the morphological features of the grain. The archaeobotanist must have a grasp of the local plant communities, both modern and at the time of interest, and must also understand which related taxa in the area may produce similar types of starch grains. With this approach, the specific characteristics necessary to separate groups can be determined, and secure identifications can be more reliably made.

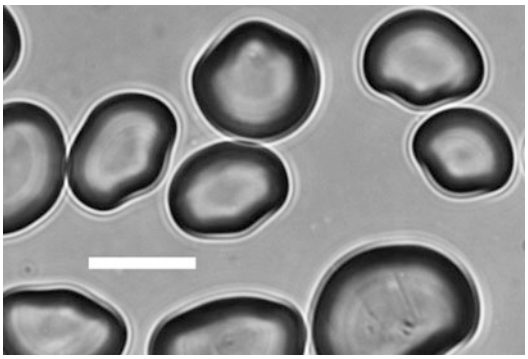

Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 3 Starch grains from a modern comparative specimen of *Nothoscordum bivalve*, or "crow poison." Modern specimens are key in identification of ancient microfossils. The *scale bar* is 20 μm in length

Starch grains can be deposited in archaeological contexts via various processes including the decay of discarded starchy plant tissues and through the processing of plant foods with, for example, cutting or grinding tools or cooking vessels. Thus, as with other microfossils, starch grains can occur both in sediments and on artifacts, and they can be extracted from both contexts. Extraction from sediments involves a chemical deflocculation followed by a heavy liquid flotation, while artifacts can be washed or treated with a sonic cleaner or toothbrush. Starch analysis can be used in the study of dental calculus (Henry et al. 2011), and starch grains have also been extracted from human coprolites (Vinton et al. 2009). Both of these contexts document the actual ingestion of plant food resources.

The processing of starchy foods in laboratory settings allows archaeobotanists to compare damaged starches to those found in archaeological contexts (e.g., Perry & Quigg 2011). Both mechanical

processing and heating, as would be applied in cooking, have been studied and documented archaeologically. These analyses allow for a more detailed understanding of the uses of ancient starchy food plants and a more comprehensive interpretation of ancient food-related activities.

Sampling for starch grains in the field, like in palynology and phytolith analysis, is dependent upon the research questions. Stepwise sampling of artifacts in the laboratory can include a dry brushing of the tool, followed by a wet brushing and a final sonic cleaning. This stepwise analysis can solidify the interpretation that the starch grains are directly associated with the artifact's function (Piperno et al. 2000), although, thus far, there has been no evidence that artifacts can be contaminated by decaying plant tissues in surrounding sediments.

Studies

Pollen studies, combined with phytoliths and particulate charcoal, have documented the sequence of farming practices in the tropical forests of Panama (Piperno et al. 1990) and helped document ancient cultivation of bananas in New Guinea at Kuk Swamp (Denham et al. 2003). Starch grain research has revealed the ancient use of millets in North China (Yang et al. 2012), ancient root crop agriculture in Panama (Piperno et al. 2000), the use of chili peppers throughout the tropics of the Americas (Perry et al. 2007), and the domestication of maize in the Balsas region of Mexico (Piperno et al. 2009). Multiproxy analyses using combinations of microremains are becoming more common. As an example, the integration of both phytoliths and starch grains revealed the early use of maize in highland Peru (Perry et al. 2006).

These are but a few examples of the many studies using microremains as tools for increasing our understanding of ancient agriculture throughout the world. These studies make a larger suite of economically significant ancient plants visible than can be recovered using macrobotanical analysis alone. As more archaeobotanists embrace these methods, ancient relationships between people and plants will be better understood.

Cross-References

- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Phytolith Studies in Archaeology
- ▶ Phytoliths in Islamic Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

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Archaeological Archives

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Introduction

Archaeologists seek to reconstruct the past through the material record. In doing so, they produce a body of data of their own – the archaeological archive. Without these associated materials that document the fine details of an excavation, the artifacts themselves, however impressive, run the risk of losing much of their intrinsic value as tools for understanding past human experience.

Definition

Archaeologists document an excavation thoroughly, beginning well before the ground is broken with background research and development of a research design. During fieldwork, excavators create detailed maps and drawings, take photographs, and make extensive and detailed field notes. Once the excavation is complete, artifacts and specimens may be conserved and analyzed and the archaeological site interpreted in the form of a final report, scholarly work, or publication. Together, these supporting components make up archaeological archives.

Key Issues/Current Debates/Future Directions/Examples

Archaeology is by its very nature an act of destruction. As cultural features and artifacts are removed from their original physical contexts, embodied information risks being lost without careful attention to documentation at each step of the way. Maintaining this documentation is an ethical obligation for archaeologists and institutions that house archaeological collections and records. Stewardship of archaeological records is a component of the statements of ethics for the Society for American Archaeology, the Society for Historical Archaeology, and other professional organizations (Society for American Archaeology 1996; Society for Historical Archaeology 2003).

Archaeological record curation facilities are as varying as the sites themselves. Some record repositories are unique to one site or area. Others are affiliated with universities or cultural institutions, and yet more are divisions of government agencies. In some instances, collections of artifacts are stored alongside related documentation, and in others, different types of archaeological materials and records are housed in separate facilities determined by medium. Many artifact curation facilities have collection policies that specifically spell out requirements for non-artifact records associated with an archaeological collection in order to ensure that they are housed in a safe manner and that they may be useful tools for future research (Parks Canada 2009).

Good archaeological supporting documentation begins in the field. It is imperative that field notes are written legibly and all paperwork properly labeled and organized before being sent off to a permanent repository for curation. The variety of media present within archaeological records can create a challenge for long-term preservation and storage. Large-format maps and field drawings, delicate photographs, scribbled and dirty field notes, computerized artifact catalogs, and other materials each require different accommodations and handling to ensure their survival over the decades and centuries. Environmental factors such as temperature, humidity,

vulnerability to insects and other pest, and threats of damage by flood, fire, or intentional human effects like theft and destruction must all be considered when developing strategies and policies for managing collections of archaeological records.

The loss of provenience data is another major risk for archaeological archives (as well as recovered artifacts and specimens). Great care should be taken to clearly mark each document with appropriate reference numbers and dates in case individual pieces of documentation become separated from a larger collection. An important photograph of an archaeological feature or excavation unit may appear unremarkable and indistinguishable from any other when viewed out of context. Field records written on or with archivally unstable materials (Kraft paper bags, napkins, water-soluble ink, etc.) may be photocopied onto acid-free archival paper to ensure long-term survival. Photographs should be printed to archival standards in order to ensure that the chemistry is stable over time.

Many record curation facilities employ the use of relational databases to serve as an index to these diverse materials, often organized by site and/or provenance. This level of organization is key to maintaining the usability of all the collected information. A fundamental value of archaeological archives lies in their ability to make existing collections valuable tools for current research. When supporting documents become lost or damaged, the research value of the collection as a whole is greatly diminished. In order for archaeological collections to be a vital source of data for scholarly research, the associated records must be diligently maintained. A well-documented excavation and collection can produce data repeatedly, data that can be analyzed in a myriad of ways beyond what may have been envisioned by the original researcher without any additional destruction to the archaeological site (Nelson & Shears 1996).

The digitization of archaeological archives has had a major impact on data from a global perspective. As more and more countries move into the digital era, it is becoming possible to easily relate data between sites located across the globe. With an eye on interoperability of archaeological records and databases, researchers have developed projects like the Archaeological Records of Europe – Networked Access (ADS 2012), the Digital Archaeological Record (Digital Antiquity 2012), and the Digital Archaeological Archive of Comparative Slavery (Thomas Jefferson Foundation 2012). Although standards for data collection may vary from site to site depending on the excavator, government requirements, site type, and other factors, modern relational databases allow for information to be parsed in a way that enables broader inter-site analysis.

The nature of archaeological archives has changed at an astonishing rate over past decades with the increased ubiquity of digital data for information capture and storage. Instead of 35-mm film, many archaeologists only take digital photographs. Site mapping may be done entirely in Geographic Information System (GIS) or Computer-Aided Design (CAD) software, using GPS coordinates obtained from sophisticated units in the field (or even mobile phones). Artifact catalogs may be part of large databases, and final reports may exist in the form of interactive websites or as a single digital file. While these technologies introduce endless new opportunities for ways to process and disseminate archaeological data, they also prove to be a challenge for managers of archaeological archives. Technology is not always sustainable. If a digital record is created using a technology that becomes obsolete, the data may be lost forever.

Sophisticated analytical methods such as geospatial modeling and 3-D scanning may produce large volumes of digital data. Many contemporary facilities holding digital materials as part of archaeological archives are currently struggling with ways to manage an ever-increasing volume of bits and bytes while

keeping the data accessible. A disorganized box of paper site records is just as difficult to use as digital data that is not well maintained and indexed. Without a way to connect the information to the excavation and artifacts, knowledge is lost.

Because of the fragile and irreplaceable nature of many archaeological sites, access to information held as part of archaeological archives is often restricted to professional archaeologists and other approved researchers. In the United States, the Archaeological Resources Protection Act of 1979 allows government agencies to withhold any information from public access that may make the site vulnerable to looting or destruction. Great care should be taken to protect the physical location of archaeological sites while still allowing for an open flow of information.

Cross-References

- ▶ Archaeological Record
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Paper: Preservation and Conservation
- ▶ Recording in Archaeology

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Archaeological Chemistry: Definition

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Brief Definition of the Topic

Archaeological chemistry, a subfield of archaeometry, is the application of techniques and approaches from chemistry and the chemical sciences to the analysis of the material record of past societies. Research in this field of study examines a wide range of human behaviors and formation processes including dating, provenance, technology, organic and inorganic residues, diet, migration, and human-environmental interactions, among other topics. Early approaches are reviewed by Caley (1948, 1951, 1967) and more recently by Pollard and Heron (2008), who describe the most common applications today: obsidian characterization, clay and ceramic provenance, chemistry of archaeological glass and metals, composition of resinous substances, amino acid stereochemistry, lead isotope geochemistry, human bone (diet, nutrition, health, mobility), and biomolecules (e.g., DNA, dairy products). A number of important textbooks have emerged recently, including those by Pollard and colleagues (2007) and by

Price and Burton (2012). These and related works emphasize the use of physicochemical instrumentation in solving archaeological problems, including (but not limited to) optical emission spectroscopy, atomic absorption spectrometry, inductively coupled plasma emission spectrometry, mass spectroscopy, X-ray fluorescence spectrometry, analytical electron microscopy, proton-induced X-ray emission spectroscopy, neutron activation analysis, infrared and Raman spectroscopy, and various chromatographic techniques.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Bone Chemistry and Ancient Diet
- ▶ Isotope Geochemistry in Archaeology
- ▶ Laboratory for Archaeological Chemistry (University of Wisconsin)

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Archaeological Informatics

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Brief Definition of the Topic

Archaeological Informatics is the practice of analyzing, managing, and preserving archaeological information. This can include information relating to tangible and intangible heritage, and the term generally adheres to both information and data, created or held in digital formats. Such data might be held in databases, geographical information systems, as digital documents (such as text, spreadsheets, images, audio, video), as well as more complex digital objects such as CAD, remote sensing formats, and 3D datasets. It also refers to both the dissemination and the collection of information via digital media, such as the World Wide Web.

Just as digital technology has had an incalculable impact on multiple spheres of human experience, Archaeological Informatics has revolutionized archaeological practice in a number of ways, most noticeably in the near universal use of databases to store, manipulate, analyze, and ultimately disseminate archaeological information. It has also challenged traditional models of paper-based archaeological publication, particularly through broadening access to underlying datasets and to other traditionally unpublished material, such as gray literature, via the Internet. It is also true that Archaeological Informatics does not fundamentally remedy issues of representation, partiality, categorization, and interpretation that are inherent in the data themselves irrespective of the media in which they are held. The potency of digital media itself, particularly in terms of its association with modernity, precision, accuracy, and scientific approaches, may even add additional complexity to the task of critically assessing

data for interpretative purposes. This is especially true where data are being consumed by nonexpert audiences where, for example, data presented as a three-dimensional model might appear inherently more trustworthy than the same data presented as a hand-drawn image.

Breaking down barriers between isolated archaeological datasets remains a constant challenge in Archaeological Informatics because the adoption of archaeological information systems and digital recording techniques has generally taken place in advance of formats and systems that allow sharing of the data out with the project or organization in which it was created. Recent developments have begun with regard to data standards, that is, shared categories, definitions, and data schema, which facilitate meaningful comparison between cultural heritage records and the aggregation of these records nationally and internationally. This will have a significant impact on both how the heritage is curated and how it is presented to the public. The most obvious benefit to curation has been that digital sources, such as national and local monument inventories and digital repositories containing significant resources, need no longer be hermetic entities relating to a specific geographical period or subject boundaries but can make their content available as part of a larger aggregated dataset. Thus, researchers and cultural heritage managers are much more likely to be able to retrieve data on their area of interest from a single point of access without being constrained by arbitrary, technical, political, or regional boundaries.

Two important points which arise with regard to data standards are, firstly, they should be reactive to how data is gathered rather than proscriptive and the role of arbitrary classification should be balanced against the creative process of interpretation. Secondly, the level of their adoption is far from universal even in countries where such standards exist, recasting legacy datasets as compliant to data standards can be time-consuming and costly even using data-mining and natural language processing techniques. As well as local or national standards, the CIDOC Conceptual Reference Model provides an international standard with definitions and formal structures for describing the implicit and explicit concepts and relationships used in cultural heritage documentation. A number of countries also have national and or regional policies explicitly intended to create cultural heritage data infrastructures and/or aggregation services for cultural heritage resources or participate in projects with this aim, such as the NSF "Cyberinfrastructure" program in the USA, the EU-funded Europeana project, and the multi-European-government-funded Digital Research Infrastructure for the Arts and Humanities (DARIAH).

At the same time as standards development extends the interconnectedness and utility of archaeological datasets, a broader shift in Internet technology toward the "Semantic Web" has prompted a change in the publication of datasets online to linked data format (i.e., expressed as a series of dereferencable URIs linked together in subject-predicate-object triples). This acts to extend the linkages between archaeological and cultural heritage datasets to any other appropriate dataset, or data point expressed as linked data. In some countries, the driver for the adoption of this approach to structuring data is being explicitly driven by government policy (e.g., the UK data.gov.uk program). The impact that this change will have over time in widening access to cultural heritage information and embedding it in a broader "semantic Web" could potentially be on a scale of significance similar to that of the original World Wide Web.

A further significant focus for Archaeological Informatics is the representation of uncertainty. This is still considered a challenge more generally in informatics, but has particular implications for systems holding cultural heritage information. Many aspects of cultural heritage defy precise definition, geographically, temporally, and culturally, and even where the subject matter is amenable to some form of precise definition, there is often a lack of certainty due to incomplete evidence or competing interpretations. For example, for in-building or

development control purposes, precise boundaries for archaeology may be desirable, but some indication or representation of the "fuzzy" or contested nature of the data from which the boundary is derived is necessary to make the boundary actually meaningful when making decisions.

Perhaps the most significant issue facing archaeological informatics is the growing realization that digital data is extremely prone to corruption, loss, and software and hardware obsolescence. This is a particularly important point as virtually all archaeological data, from primary data to synthetic analysis, is now "born-digital," that is, it is originally created in digital form whether that be a simple word processing document or a three-dimensional laser scan. Much of this data, if lost, cannot be recreated. The need for all sectors of archaeology to have access to reliable and (preferably publically) accessible repositories with expertise in digital preservation and cultural heritage content remains a key concern in Archaeological Informatics. There are still few organizations able to offer viable preservation and access services specifically focused on the cultural heritage domain although good examples are the Archaeology Data Service in the UK (ADS), Data Archiving and Networked Services (DANS) in the Netherlands, and Digital Antiquity's data archive (tDAR) in the USA.

In tandem with the challenges relating to digital preservation, there has been a rapid expansion of opportunities for public dissemination and engagement provided by new media, particularly Web-based technologies such as social networking, public participatory GIS, (PPGIS), and other forms of user-generated content. These have to a certain extent blurred traditional boundaries between "expert" and "mediated" material and content, including interpretation, memories, opinions, and records of the cultural heritage generated by the broader community. This process can raise challenges for cultural heritage managers, such as understanding conflicting or contradictory viewpoints, as well as significant opportunities such as expanding the knowledge base and tapping into the many alternative perceptions of what actually constitutes the heritage.

Cross-References

- ▶ Archaeology Data Service (ADS)
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage

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Archaeological Institute of America (AIA)

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Basic Information

The Archaeological Institute of America (AIA), located at Boston University, 656 Beacon Street, 6th Floor, Boston, Massachusetts, 02215 USA, http://www.archaeological.org, is the oldest learned society in North America devoted to archaeology. It is also the largest with over 200,000 members. The AIA was founded in Boston, Massachusetts, in 1879 under the leadership of Charles Eliot Norton of Harvard University (Sheftel 1979: 3). It has a unique structure based on local societies, now numbering over 100 across the United States of America, Canada, and overseas. The AIA counts among its members professional archaeologists, most of whom work in the Old World, and members of the general public with a deep interest in archaeology. The coexistence of these two groups has shaped the AIA throughout its history and continues to be a fundamental element of its character.

The AIA promotes archaeological research and disseminates its findings, notably in a scholarly journal, the *American Journal of Archaeology* (ISSN 0002-9114); in a popular magazine, *Archaeology*; and in professional monographs. It holds an annual meeting at which archaeologists present their latest results to colleagues and interested members. Through its local societies, the AIA supports a nationwide program of public lectures and other programs designed to inform the wider public about archaeology and significant recent discoveries. It has also developed educational programs for children. News about archaeology and the activities of the institute is communicated to members and the public through a newsletter and, increasingly, the worldwide web. The AIA provides a fellowship program for its younger academic members and also funds students who wish to gain some experience of fieldwork. Several awards recognize archaeologists and others who have made outstanding contributions to the field and to heritage preservation. The most significant of these is the Gold Medal for Distinguished Archaeological Achievement. This has been given to such distinguished archaeologists as George Bass, Robert Braidwood, Hetty Goldman, and Gordon Willey. Additional awards honor scientific contributions, books of special note, and excellence in undergraduate teaching. The AIA has long campaigned to end the international traffic in antiquities, arguing that this destroys part of our common heritage from the past. Recently, it initiated a program to preserve prominent archaeological sites worldwide and to promote best practices in site conservation.

At first the members of the institute were mostly Harvard University faculty and leading figures in the Boston business and social communities. Within a decade of its founding, the AIA could claim to be national in scope as local societies were founded in New York, Baltimore, and across the Midwest (Allen 2002: 12). Early in the twentieth century, the number of societies grew still farther across the western states, including California. In 1906 the United States Congress approved a charter for the AIA (Sheftel 1979: 14), an indication of the organization's growing national prominence. That document sets out a mission for the institute that continues to inspire its activities today. The charter states that the AIA was founded

> . . .for the purpose of promoting archaeological studies by investigation and research in the United States and foreign countries by sending out expeditions. . ., by aiding the efforts of the independent explorers, by publication of archaeological papers, and reports of the results of the expeditions which the Institute may undertake or promote. . ..

In its early years, the AIA sponsored excavations at the Pecos Pueblos in New Mexico; at Assos in Turkey; in Crete; at Cyrene in Libya and also in Guatemala, Mexico; and at Nippur in Iraq. The institute considerably expanded its reach through the establishment of schools of archaeology around the Mediterranean and in the Southwestern United States (Sheftel 1979). Among the most prominent were the American School of Classical Studies at

Athens, the American School of Classical Studies in Rome (now the American Academy in Rome – School of Classical Studies), the American School for Oriental Study and Research in Jerusalem (now the American Schools of Oriental Research), and the School of American Archaeology in Santa Fe, New Mexico (now the School for Advanced Research on the Human Experience). Later, schools of archaeology in Baghdad, Cairo, and Tehran were added to this list.

From the beginning, the institute developed a special interest in the archaeology of the ancient civilizations of Greece and Rome, together with the high cultures of the ancient Near East. This continues to be the focus of many of its professional members today and is reflected in the contents of the *American Journal of Archaeology*. Thus, for some of its members, the archaeology of the lands surrounding the Mediterranean has been of primary importance (Renfrew 1980). Others associated with the institute, however, have had more diverse interests within archaeology, extending widely across the Old World and into the New World also. Indeed, this dichotomy has been part of the institute's character from its founding as its early exploration of sites in the Southwestern United States demonstrates. Currently, that wider array of interests finds expression in the pages of the magazine *Archaeology* and in the lecture program, both of which embrace the exploration of the entire human past across the globe. Through these means, and also in the site preservation program, another global initiative, the institute has a worldwide reach.

Major Impact

Today the Archaeological Institute of America can claim to be the leading organization devoted to international archaeology in North America. It continues to provide significant support for professional archaeologists while expanding its outreach to members of the public, including children. The AIA has recently become one of the leaders in the heritage preservation movement internationally. Its rich array of activities is captured concisely in a motto "excavate, educate, advocate."

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Archaeological Licenses

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Introduction

The licensing of archaeologists is one part of a system of quality control of archaeological heritage management (AHM), sometimes known as archaeological resource management (ARM), cultural resource management (CRM), contract archaeology, rescue archaeology, and preventive archaeology. The other two parts of quality control are: oversight of an ongoing project by the appropriate government agencies; and review and approval of the final product or report by the proper authorities. Licensing often involves requiring registration of qualified archaeologists at the national or provincial or even local level, and it can also involve review of a candidate's qualifications on a project-by-project basis. Such a review can include personal interviews and submission of prior work upon which to base a certification of the archaeologist's ability to complete a project in an acceptable manner.

Definition

While quality control in archaeology has always been an issue, it did not really come to the forefront of consideration until in the mid-twentieth century; archaeology moved out of the academy and government and into the private or

contracting sector. Prior to that time, only archaeologists knew or cared enough about the quality of archaeology to make it an issue, and the quality of archaeologists and the work they did was thus generally controlled by peer pressure and academic ethics and organizations. As the public and non-archaeologists became more involved in archaeology through taxpayer and polluter-paid funding and by projects that were of more immediate local public concern, there arose a need for non-archaeologists to judge the qualifications of archaeologists, about which the average citizen, politician, and government bureaucrat knew virtually nothing.

Taxpayers and clients hiring archaeologists needed to know that their money was being spent in the most efficient and effective manner possible to protect the public's common archaeological heritage and to get approval and permits for development projects. The inherent conflict of interest involved in academic archaeologists or government agencies accrediting their own work also argues for the application of some kind of independent certification or licensing of such archaeologists so to protect the public's interests when public funding is involved. Despite this, however, licensing is generally only accepted by, and applied to, private-sector or contract archaeologists.

Qualifying archaeologists prior to commencement of a project, or in other words licensing, can be thought of as a "front-end" approach to quality control, and in some countries this is the full extent of attempts to control the quality of the work done. If you pick a well-qualified archaeologist, the thinking goes, the work done and the final product must be acceptable. This is a common system in countries with legal systems based on the Napoleonic code and in the Latin tradition.

Peer review of the final report of a project attempts to control quality by reviewing what the archaeologist has done to see if the completed work meets certain standards. This is usually accompanied by inspection of the project in progress and can be considered the "back-end" approach to quality control. This is a common system in countries based on Saxon or British common law.

Both the "front-end" and the "back-end" approaches have their advantages and disadvantages, and in most countries both approaches are used, with one or the other receiving most of the emphasis. Even in "back-end" countries like the United States, the United Kingdom, and Australia, where the government is not involved in prequalifying or certifying archaeologists beforehand, the qualifications of archaeologists are taken into consideration before awarding a contract. And conversely, in "front-end" countries such as Namibia, Portugal, and Ireland, there is some review of the final product at the completion of the project. In countries, such as France and Mexico, where there is no licensing, since archaeology is a monopoly of the state, the final product is subjected to at least a cursory review, and it is assumed that the archaeologists hired by the state are qualified at some level. In some countries, for example, the Netherlands where there is a recently instituted private sector, AHM is controlled by a complete system of "front-end" licensing, in progress inspection, and "back-end" review. But such a complete system of quality control, if not unique, is unusual at the beginning of the twenty-first century.

Key Issues

What is considered adequate work depends on the country and the laws and customs where the work is conducted. Neither the "front-end" nor the "back-end" approach by itself is sufficient to ensure that the work conducted is adequate in any country. The major drawbacks for the "front-end" approach are that the work may be poorly executed and a final report never submitted, which has often been a major problem of academic archaeology. For the "back-end" approach, the work conducted may turn out to have been inadequate, but once an excavation is completed the site and data it contained have been destroyed, cannot be replicated, and are irretrievably lost. Clearly, both approaches accompanied by ongoing project review, as in the Netherlands, are necessary to assure that the public's money has been spent wisely and that the

archaeological data has been collected to protect the public's common heritage.

It was mentioned above that even in "back-end" countries, where the government does not require a formally recognized register of qualified archaeologists, there are often informal qualifications standards, if for no other reason than that the client, such as a local government requiring national government review or a private developer needing an adequate level of investigation to obtain a building permit, must be assured that the work that will be done is sufficient to pass review prior to spending their money. In many of the "back-end" countries, NGOs have been instituted whose main purpose is to certify the qualifications of archaeologists and archaeological contracting companies. Two prime examples are the Register of Professional Archaeologists (RPA) in the United States and the Institute for Archaeologists (IFA) in the United Kingdom.

In the USA, there is no licensing at the federal, state, or local level, although federal agencies who oversee the implementation of the major AHM legislation suggest and sometimes require that archaeologists have a minimum level of education and experience. However, there is a private, nonprofit NGO, the Register of Professional Archaeologists (RPA), which certifies the educational and experiential qualifications of its members who join the organization voluntarily. RPA members who break the rules can be, and have been, expelled from the organization. Hiring an RPA member provides some assurance to the client that the work will be adequate and will pass review, but there is no requirement at any level of government in the USA that archaeologists be RPA certified, and few clients even know of the existence of the RPA. In the UK, the Institute for Archaeologists (IFA) has improved on the RPA by certifying not only individual archaeologists but archaeological contracting companies, including periodic inspections by the IFA of a company's financial and personnel records. The British government does not require that contractors be IFA certified, but clients hiring IFA-certified companies are assured that the individuals in the companies and the companies themselves are qualified. In addition, British clients are learning of the IFA and are increasingly requiring IFA certification of their contractors.

One of the major benefits of certifying companies rather than individual archaeologists is that companies, because of their varied work force, have expertise in various subspecialties that an individual archaeologist could not have, including such things as business management and meeting contract requirements, bio-archaeology, regional and temporal specialties, rock art, physical anthropology, and other specialties often necessary for the successful completion of a project. Even in countries that have no private sector, it is often the case that a government agency might have a particular type of expert, but scheduling may prevent that expert from being available in a timely manner to complete a project. Thus, the private-sector contracting system is often more flexible and able to address a variety of situations than single-source, centralized, governmental agencies. If one company is not available, another qualified company usually is.

Perhaps the main reason for the development and thus licensing of a private sector is the lack of sufficient personnel in government agencies and academia. This is often for a lack of financial resources even in developed countries. As an example, in the United States the main AHM legislation was passed in 1966. Over the next few years, clients doing work for or requiring permits from the federal government began looking for archaeologists to meet the new requirements. There were few if any governmental archaeologists available to do the work so developers seeking archaeologists looked toward the universities. At first, the universities met the need by using student labor, often managed by university graduate students. This was inexpensive and provided experience to students, but the quality and timeliness of the work varied greatly. By the mid-1970s, the demand outstripped the ability of universities to respond appropriately and within limited time frames. Some universities tried to set up separate contracting arms within the university, but these were generally poorly managed, underfunded, and unable to meet

schedules and budgets. As a result, the private sector was instituted, often with a graduate student or professor setting up a company on his/her own. By the early 1980s, there were so many of these extra-academic archaeologists and companies that developer clients could not determine if their contractors were qualified, since they were not clearly associated with a recognized university program. A need for some kind of certification was born, but, in the USA at least, it was not adequately met. The RPA which had been started in the early 1970s has never really caught on as a certification group by clients or government agencies, and as a result, the USA is still today without a system generally recognized by clients and government review agencies. Thus, the USA still has primarily a "back-end" system.

Examples

A perusal of the IFA, RPA, and the Dutch Archaeology Quality Standards gives a set of standards that could serve as a framework for certification in countries presently operating without such standards and who wish to develop a more well-rounded quality control system to meet the needs of their taxpaying publics, of developers requiring such work, and of their archaeological resources. Such standards might also be worth reviewing by those countries who already have a "front-end" system and even for those with a closed governmental monopoly.

Some of the major points in these standards state that a professional archaeologist should:

- Insure that any work conducted is replicable, management and results are open and transparent, and that methods are clearly stated and adequate to the job
- Provide for publishing the data in a timely manner and as completely as possible for use by other archaeologists and the public, and that the data is preserved for the future whether the work is paid for by the government or by the polluter-pays principal
- Abstain from dishonesty, fraud, and misrepresentation in dealings with others
- Deal fairly, responsibly, and ethically with colleagues, employees, and clients
- Cooperate with other archaeologists and the public and descendant groups
- Insure that the archaeologist has the necessary expertise to do a competent job
- Abide by laws protecting the resource and employees
- Protect client's privacy and interests if not in conflict with archaeological ethics
- Assure the timely completion of an adequate project
- Be aware of safety for employees and the public
- Avoid conflicts of interest
- Support and promote conservation of the resource base and the interests of descendant communities
- Not knowingly recover artifacts for commercial exploitation
- Give credit where credit is due
- Keep up with developments in the field
- Not commit plagiarism or falsely attack the reputation of another archaeologist
- Not take bribes
- Ensure that the research results will justify the destruction of the resource
- Avoid exaggerated and sensationalist statements about archaeological remains
- Be informed about the research at hand and before dealing with the public or giving legal testimony
- Report violations of the code of conduct to the proper authorities in a timely manner
- Insure that archaeologists and agencies put the archaeological resource first, and not their political agenda

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Project Management

▶ Cultural Heritage Management Quality Control and Assurance
▶ Ethics in Archaeology
▶ Heritage and Public Policy
▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
▶ Institute for Archaeologists (IfA)
▶ Netherlands: Cultural Heritage Management
▶ Stakeholders and Community Participation
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Archaeological Prospection Laboratory (National Autonomous University of Mexico)

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Basic Information

In the same way that the development of medical technology has contributed to make surgical interventions less intrusive, by using images generated by X-rays, ultrasounds, and nuclear magnetic resonances and complementing them with biopsies, clinical analyses, etc., so, in the last few years, archaeological prospection has made available a variety of images from the subsoil that contribute to optimizing excavation strategies and accurately defining the areas and depths at which one can recover the information that is relevant to the objectives of an archaeological project.

Unfortunately, exploratory studies prior to excavation are well behind and a long way from being a generalized archaeological practice, unlike medicine, where you would not conceive of carrying out any surgery without applying all of those tests. Nonetheless, the international trend is, more and more, to make use of the information provided by techniques that can give details about the conditions of the subsoil, and so reduce to a minimum any disturbance of the archaeological context caused by excavating, and at the same time recovering as much information as possible. This is where the activities of the Archaeological Prospection Laboratory come in, which, during the last 30 years, has developed procedures, technologies, and tools for the study of archaeological sites in Mesoamerica.

Background of the Laboratory

The Archaeological Prospection Laboratory was created in early 1983, with a proposal to

incorporate, develop, and adapt instruments, techniques, and methods that permit to obtain data and interpret archaeological sites from the ground surface.

After training at the Lerici Foundation in Italy in 1981, Luis Barba outlined a plan to gradually incorporate various techniques into the laboratory, in the same coordinated way that the Italians have come to use so successfully. After further training at the University of Georgia getting his Masters Degree, Barba returned in 1983 to establish the laboratory. In that year, a mobile laboratory was designed and built to facilitate the acquisition of geophysical data and perform chemical analysis in the field. With this infrastructure, the laboratory began to take part in archaeological projects, with the purpose of carrying out exploration studies prior to any excavation work.

In 1985, Barba defended a Master's thesis at the University of Georgia that proposed a methodology for the surface study of archaeological sites that is still being applied by the laboratory. In this way, the Prospection Laboratory established a process that includes the application of remote sensing, geophysics, geochemistry, and archaeological techniques. This has been called the methodology for studying sites from the ground surface, and it provides information about the characteristics of the context and the buried structures, which permits decision-making about whether to excavate or not, and then where to excavate, based on scientific data.

In favorable conditions, it has been possible to obtain data about the function of a site before its excavation. This presents unquestionable advantages in the quantity and quality of the information that can be retrieved as well as the time and cost that the archaeological investigation will require.

The methodology mentioned incorporates a variety of archaeological exploratory techniques, organized in such a way that their application is as efficient as possible. Essentially, it makes use of a wide range of techniques such as satellite imagery and aerial photography to locate and delimit the sites. It records the conditions of the surface using the topography and the distribution of scattered material. The geophysical techniques are located at an intermediate level as regards the area of land that they cover, which shows the limits of the sites and the localization of the structures that form it.

At the last stage of this procedure, the samples taken from the site are chemically analyzed. In this way, at each stage of the process, the data obtained in the previous stage is detailed and verified. In every case, the variations detected for each indicator are represented by way of computer-generated maps and immediately after the acquisition of data to provide a constant feedback (Barba 1994).

In this way, it is possible to cover several hectares in a few weeks of work, but at the same time, the results offer a sufficient level of detail in the areas of interest to guide subsequent excavation work. Recently, the quality of surface data has allowed us to visualize and understand complete archaeological sites without the need for any excavation.

Prospection Techniques

The laboratory has experimented with a variety of tools. One of the most successful has been the use of balloons to lift photographic cameras, triggered by remote control, to acquire aerial images for archaeology. That, complemented by the processing of images to produce digital mosaics of the site and combined with topographic surveys, has permitted a comprehensive recording of the surface using digital terrain models (DTM).

As one part of the technology used in archaeological exploration, geophysical techniques are utilized to identify what is below the surface and, by way of indirect observation, what materials have different physical properties. The most common techniques include measuring magnetic properties, currents and electric potentials, and the reflection of electromagnetic waves in the terrain that is being studied.

In archaeology, the techniques of geophysical prospection offer the advantage of being able to investigate areas in less time and with less cost than the use of traditional methods. As with other research techniques, they also have their

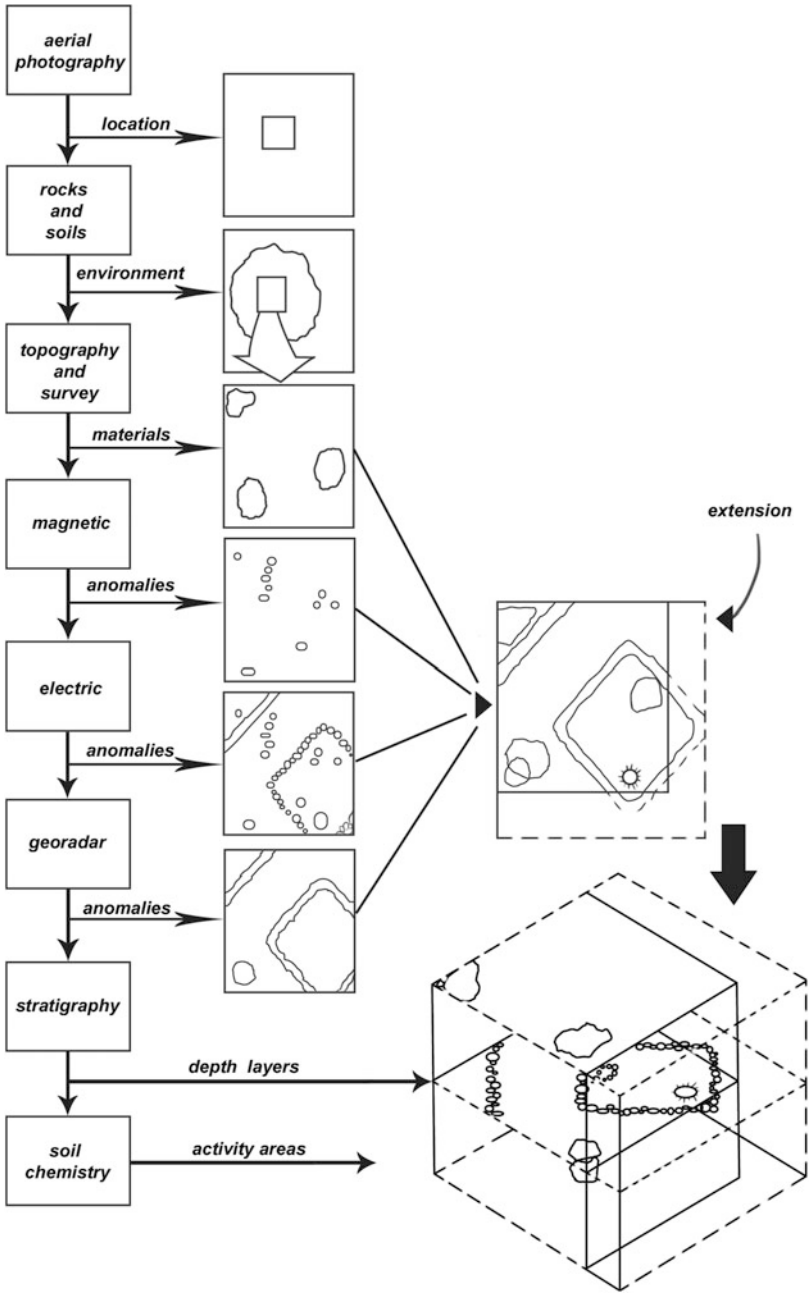

Archaeological Prospection Laboratory (National Autonomous University of Mexico), Fig. 1 Diagram showing the application sequence of analytical techniques used in the Archaeological Prospection Laboratory (After Barba 1994)

limitations, as there always exists some uncertainty in the interpretation of the data. Generally, one has to decide between the penetration (depth of investigation), the required resolution, and the speed of accomplishing the fieldwork. It is very difficult to achieve rapid and inexpensive measurements that will reveal in detail the deep structures, by using only one technique; because of

that, our work includes many of the currently available techniques, applied in a systematic and coordinated manner. Despite the undoubted contribution of geophysical techniques, our laboratory has never abandoned the use of chemical techniques, and the expected arrival of new elemental analytical techniques with portable XRF promises to revitalize the role of chemical techniques in archaeological prospection.

Major Impact

Main Contributions of the Laboratory to Archaeological Investigation

Throughout the 30 years of its operation, the laboratory has developed many analytical techniques and applied them in over 100 archaeological sites in which it has worked in various parts of the world. One of the most significant achievements is the establishment of the integrated methodology that has permitted, through the application of remote sensing, geophysical exploration techniques, and chemical techniques, enormous detail in the study of archaeological sites before initiating excavation. As is shown in Fig. 1, each technique collects data that are converted into images, producing layers of information, each time more accurate, of the archaeological site that is still buried.

As a consequence of applying chemistry to prospection, another significant contribution was made to the study of occupation surfaces: it was in this laboratory that, at the end of the 1970s, a research project was designed to reconstruct human activities by analyzing the chemical residues on floors of the excavated sites. In the early 1980s, the laboratory gradually incorporated geophysical tools in its fieldwork, at the same time reducing the role of chemistry in prospection but promoting the study of chemical residues, first on floors of occupied houses(Barba & Bello 1978), later on floors of archaeological houses, and finally on ceramic vessels.

The chemical study of floors has provided evidence of the activities carried out on them, allowing us to understand the use to which the spaces were destined. Such is the case in the identification of areas for food preparation, consumption of food, ritual zones, transit zones, storage, etc. Recently, the efforts of several laboratories have made ICP, XRF, GC-MS, and other analytical techniques available to detect those residues on floors (Middleton et al. 2010).

It has been also incorporated the study of residues impregnated in the pores of ceramic vessels in order to infer what liquid substances they once contained. The analyses applied as much to the floors as to the ceramic vessels include tests for phosphates, carbonates, pH, protein residues, fatty acids, carbohydrates, and sometimes the determination of color (Barba 2007). On occasion, additional tests to detect iron, nitrates, chlorides, and calcium have been applied to resolve specific problems. Nowadays, XRF has been incorporated to also identify some elements with cultural importance.

Cross-References

- ▶ Archaeological Soil Micromorphology
- ▶ Chemical Survey of Archaeological Sites
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Archaeological Record

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Introduction

Read history if you wish to learn the past? Well, yes and no. Read history, by all means. But the human past – hundreds of thousands to millions of years – vastly exceeds the 5,000 years of written records which, in any event, are highly uneven in time-space coverage even during that comparatively brief span. For most of the human past in most corners of the world, the archaeological record is our sole or chief source of evidence. The historical record is texts of various kinds. But what exactly is the archaeological record?

Definition

Everyone knows, or at least think they do, that the archaeological record consists of the material remains left behind by past societies. In the narrowest sense, this much certainly is true. An ancient hunter discarding a butchered animal bone, an ancient cook discarding the broken shards of a pot, and an ancient despot raising a monument to his or her glory that, like the statue of Ozymandias, at length falls to abandonment and disrepair all contributed to the archaeological record. The record, therefore, consists of all things that ancient people made, used, or otherwise transformed from their natural state and place. It is indeed material things that range in size and makeup from old bones and stones, dusty bricks, and shards of pottery vessels to palaces and pyramids. But archaeologists and even students in their introductory classes know that the record is not just material things but also abstract or intangible *context*. It is not just the old bones or broken shards, etc., but where they are found, associated with what else, and in what depositional matrix. The archaeological record is old things and contextual information about them.

Artifacts and other material things in the record possess intrinsic properties like their composition, size, and form, which characterize them whatever the nature of the record. Extrinsic properties include objects' abundance or number, their distribution, and their patterns of association. Extrinsic properties of things in turn comprise intrinsic properties of the archaeological record. The theory that explains how the record formed says nothing directly about objects' intrinsic properties but a great deal about their extrinsic ones, in the sense of what and how much is deposited, where, and with what.

Whatever its nature, the archaeological record is not entirely a thing of the past. It may have originated in "Thens" beyond number, but it is accessed in painfully finite "Nows". Archaeologists often emphasize the record's status as a contemporaneous thing to distinguish what we do from ethnography, the study of contemporaneous cultures by direct observation, not indirect inference from material remains in context. But the record is contemporaneous in another sense because "Nows" of different times involve different methods by which to recover the record. Forty years ago, for instance, tiny and nearly invisible fragments of plants and animals that ancient people ate were overlooked in archaeological deposits, too small to detect and systematically to collect. With the development of flotation methods, representative samples of those abundant and important parts of the record became commonplace, in the process altering our understanding of the past. Physical science methods allow us to identify trace elements in archaeological materials from pottery to stone and beyond in ways that earlier generations of archaeologists could not imagine. What parts of the archaeological record are accessible, and how, are themselves historical artifacts. Whatever he had in mind, so far as it concerned the archaeological record Faulkner was righter than he knew in saying "The past is. . .not even past."

Historical Background

For most of archaeology's own past, however, there was precious little self-conscious reflection about what the archaeological record was. It was there, and it clearly was meant to be dug and documented. Archaeologists simply got on with the task.

At a particularly influential moment in its history, though, a prominent archaeologist argued that the material record and context "present a systematic and understandable picture of *the total extinct* cultural system" (Binford 1962: 220; original emphasis). Salutary against the then-prevailing belief that the record revealed comparatively little about the past (e.g., Hawkes 1954), this optimistic view excited enthusiasm for ambitious attempts not just to learn the chronological order of things or to engage in sterile exercises in object classification but to determine how the record registered, if obliquely, the structure and organization of the past cultures that left it behind. Initial enthusiasm may have overreached, less so than some believe today, but had the virtue of rescuing archaeology from its traditional preoccupations with time order and taxonomy. In the process, archaeologists were prompted not only to think about what the record revealed of the past but also to appreciate that learning how the record formed was essential to revealing that meaning.

Besides its promise, this appreciation naturally led archaeologists to contemplate limitations of the record. Obviously, limitations include the natural processes like organic decomposition that reduce or alter the record after its deposition and those like disturbance by animals – "bioturbation" – that alter its context. Perhaps less obviously until archaeologists began to think about it, another limitation is that the record as deposited is neither time capsule nor preserved Pompeii. Instead, it is a confusing scramble of things used in different ways at different times for different purposes, all thrown together at the point of abandonment or discard with (as it seems to some of us at weaker moments) no regard whatsoever for the inferential challenges confronting future archaeologists. (Schiffer [1976] termed these "natural-" and "cultural-formation processes," respectively.) Confusing this scramble of things may be, but arbitrary it is not. Yet until the systematic properties of the scrambling process are, well, unscrambled, archaeologists cannot understand the record or, by extension, the past that it reveals. Failing to understand the complex, secondary patterns of association that dominate the archaeological record, for instance, anyone troubling to examine a family's trash when it contains food scraps, rosary beads, broken tools, and fragments of shingles, might mistakenly conclude that it dined on the roof using screwdrivers while adorned in curious jewelry.

Thus arose formation theory which, broadly speaking explains how the record formed and why it formed as it did (Schiffer 1976, 1987; Binford 1981; Shott 2006). It is one thing to know that how the record formed is critical to its grounded interpretation. It is quite another thing to accomplish this task in practice. Doing so requires knowing the record both for its promise and the limitations only briefly noted above. If, as David Clarke (1973: 17) once said, the archaeological record was "indirect traces in bad samples" of what ancient people did and how their societies were organized to do it, this rueful characterization merely underscores the challenge confronting archaeologists who wish to learn from the past from its material remains. No one promised that it would be easy; fortunately, some have thought seriously about the problem in ways that might help us meet the challenge.

For instance, Cowgill (1970) described the archaeological record as the transformed, progressively diminished remnant first of what was deposited, then of what preserved among the deposits, then of what could be found and recovered of those deposits. However mundane the argument may seem to outsiders, it focused archaeologists' minds on the steps in the process that separate living cultures of the past from the material record that we study now, and led eventually to serious theorizing about how the record formed and the systematic transformation that structure it at each stage. Archaeologists

called this "middle-range theory," "formation processes," "accumulations research," or "formation theory" (Shott 2006). In the 1970s, prominent American archaeologists debated what the record was. If to Schiffer (e.g., 1976) it was transformed ethnographic tableaux, Binford (e.g., 1981) saw all records as fundamentally different categories of evidence to ethnography's. To Schiffer, if we systematically account for transformations between ethnographic and archaeological contexts and more finely resolve past time, then we approximate the ethnographic record. Binford argued instead that not merely transformation and timescale separate the two records and that how they formed and what they revealed differed immensely. Like many debates this one gave off light but also much heat that sometimes obscured the good points that antagonists made. But at least it served to contrast archaeological and ethnographic data, a difference that, even now, archaeologists have assimilated imperfectly. In the process, it gave renewed emphasis to ethnoarchaeology, the study of living peoples and cultures for how they form their archaeological records. As a result, Binford but also many others documented how cultures of many places and characters generated their own archaeological records.

Briefly around 1980, ethnoarchaeology was popular, and it has continued since as a secondary but vital branch of archaeological theory and method (David & Kramer 2001). Just as ethnoarchaeology and formation theory began to gain traction in the 1970s and 1980s, however, their development was complicated by other intellectual trends. For reasons that had as much to do with contemporary sociopolitics and European, particularly British, intellectual reactions to American thought (Shott 2005) as with the past, a strain of post-modernism gripped archaeology in the 1980s. Somewhat subsided today, it nevertheless questioned legitimate archaeological concerns. For instance, postmodernists cited by David and Kramer (2001: 419) airily dismissed ethnoarchaeology as an immoral effort to deny peoples' or cultures' splendid isolation by subjugating them beneath general principles residing within bodies of thought like formation theory. In this view, there are different cultures, but no general patterns or causes of the undeniably immense variation among them. Instead, each culture must be contemplated only in its irreducible uniqueness. This is academic nihilism unworthy of serious regard and a brief for archaeology as glorified butterfly collecting.

Postmodernism also created the trope of record as text to be read to reveal its many voices and messages. In the process, many nouns became verbs and words like "multi-vocality" grew popular among archaeologists who regarded the effort to learn about and from the past as a futile bourgeois pastime. In its place, reading the record reduced to exercises in cleverness or inscribing a blank canvas with one's intellectual predilections. In this climate, how the record formed either was irrelevant, or its systematic characterization was hopelessly confounded by ineffable systems of meaning accessible only to the living mind and therefore beyond the reach of any theory of a material record whose producers do not survive to explain it (Hodder 1982). The latter is, at best, a clever counsel of despair.

Record as text identifies archaeology's material record with written texts. In the process, it rests on a conflation of very different purposes and origins. All writers write for an audience; even diarists write for themselves. In contrast, only vanishingly small fragments of the archaeological record were deposited with the self-conscious purpose of interpretation by those expected to encounter them later. Whatever the sources and origin of historical data, archaeology's is a record chiefly of what ancient people lost, abandoned, or discarded. The archaeological record, then, was not written for audiences; it accumulated as the by-product of actions, ordinary and extraordinary, and with no future readers in mind. As our only source of grounded knowledge about the remote past, archaeologists must properly recognize the material record as it is, not as their conceits may wish it to be: unintended consequence, not constructed text.

Key Issues

Despite such distractions, formation theory as a way to explain the record has made modest progress. One example of its contribution to understanding the archaeological record is formation theory's explanation of "discard behavior," where trash was placed, how, and with what other trash. This could be regarded either as trivial or impossible to know, but instead it was shown to pattern systematically with culture type, land use, and other factors (e.g., Murray 1980), whatever unethical subjugating of ineffable uniqueness entailed. And, far from being trivial, it matters a great deal to how we interpret the record in ways that range from the existence of "toolkits" (tools thought to be used together in performance of certain tasks and therefore to reveal the nature and frequency of ancient peoples' actions) to parsing the occupational history of complex sites (e.g., Varien & Ortman 2005; Chapman & Gaydarska 2007) with all its implications for population trends, political organization, and social process.

Another example concerns how we understand the abundance of things in the archaeological record. In an innocent past, the more abundant an artifact type was in the record, the more important was its role or frequent was its use in the past. Following such logic, future archaeologists might conclude that people today smoke cigarettes much more often than we wear expensive jewelry because butts are far more abundant than are diamond rings in the material record that we are accumulating. Correcting such misapprehensions draws our attention to an intervening factor – how long different things last in use, or "use life" (Schiffer 1976: 60) – and to systematic variation in this factor that must be understood as we interpret the record.

Current Debates and Future Directions

Would that there were many more examples and that formation theory and systematic study of the archaeological record *qua* evidence were actively debated today. Instead, in an archaeology that continues to lurch from fad to intellectual fad in its immature disciplinary state, formation theory and its critical role in explaining the record were left to languish somewhere between indifference and oblivion. Case studies cited above and others show that some archaeologists continue to study it seriously, but it no longer is a central concern of the field. One of our most urgent tasks is to establish the serious study of formation theory at what it pleases British academics to call the "high table." That is, archaeologists must regard formation theory not as an esoteric infatuation of the few but as an essential tool in every archaeologist's quest to learn about the past. If formation theory were vigorously debated today, topics might include the connection, if any, it implies between archaeology and anthropology and the relevance of the record and formation theory to the full range of general theories.

In North America, archaeology is subsumed beneath anthropology in ways not duplicated elsewhere. Whatever purpose its encapsulated status may have served historically, today archaeology is poorly placed within an anthropology whose chief preoccupations are vastly different from ours. Formation theory and the nature of the archaeological record sharply distinguish archaeology from an anthropology that requires neither. Archaeology also applies a range of general theory that differs in character and epistemological status from the interpretive traditions that most anthropologists practice. Perhaps if and when archaeology achieves in North America the disciplinary independence that it has deserved for at least decades, formation theory will rise in importance and stature.

Whatever the complexities of its formation and the obliqueness of the prehistoric action that it registers, the archaeological record is our sole evidence of the cultural past. Of course how we interpret the record depends crucially upon how we understand its formation. But how we understand the past depends also on how we explain the action, structure, and process that the record preserves; formation theory and general theory are equally essential to archaeological research (Shott 2006). Accordingly, the understanding of

how the record formed is not confined to theoretical traditions like materialism in its various guises. Rather, formation theory is equally vital to all theoretical traditions, including those that favor agency, symbol, or structure over material conditions. In its most radical programmatic statements, the post-modernism noted above denied the possibility of knowing the past and, by extension, the need to ground inference in evidence. Such views neatly reduce archaeology to the "irresponsible art form" that Clarke (1973: 16) feared it might become. But the excesses of post-modernism at least inspired the belief that the past might be understood in structural and symbolic terms, not just in the material terms of what people ate or did. At length post-modernism yielded to more constructive cultural and structural theories that, despite sometimes overwrought rhetoric, provide balance to the materialism that undeniably dominated archaeological, particularly American, thought in processualism's heyday.

Today, nonmaterial theory is both more diverse and, in significant degree, committed to grounded inference (e.g., Chapman & Gaydarska 2007). Warts and all, such theory considers not just material conditions and individuals or groups as strategizing agents but also intrinsic cultural context which, admitting only the possibility of systematic properties to cultural variation, therefore is accessible to both general and formation theory. To date, however, there has been more development of general cultural theory than the "middle-range (i.e., formation) theory of mind" (Cowgill 1993), of structure, and of organization that is as conceivable and essential as it currently is neglected. Sources like Hill (1995) and Chapman and Gaydarska (2007) are exceptions that prove the rule; cultural theory awaits the formation theory that can make its inferences reasoned, not a priori.

A start has been made using ethnoarchaeological study to illuminate social, political, and symbolic dimensions of cultures. The Colombian Nukak, for instance, deliberately break artifacts during dispute resolution (Politis 2000). Awá men of the Brazilian Amazon make arrows out of proportion to their utilitarian value; details of fletching, construction, and use are signifiers of maleness, not mere functional attributes, and "use" sometimes amounts to little more than carrying arrows (González-Ruibal et al. 2011). Applied mechanically to archaeological interpretation, these observations are mere cautionary tales (e.g., that the abundance of arrows in material records may not directly measure the frequency or importance of hunting) that underscore the often particular cultural contextualization of the record's formation. But compiled into a larger body of evidence itself synthesized as Cowgill's "middle-range theory of mind," they can reveal symbolic dimensions in the use of material objects and their discard into the record. In this way, formation theory is not narrowly material or utilitarian but broadly cultural in its scope.

Yet concerning formation theory, there is room for improvement in all varieties of archaeology's general theory. We have no shortage of general theoretical stances and predilections, most of which are inadequately grounded in evidence by a sincere effort to develop necessary formation theory. Varieties of evolutionary theory, for instance, have resurged since the 1990s (e.g., O'Brien & Lyman 2000). Context in the record does not figure prominently in their usage; also, they sometimes dismiss formation theory as an effort to reconstruct ancient behavior, which they reject on principle as unobservable. Yet every evolutionary invocation of transmission, style, drift, and function invokes behavior, at least implicitly; more broadly, formation theory and the understanding of the record's meaning that it provides are as essential to evolutionism as to any other general theory in archaeology. Similarly, intellectual traditions in classical and prehistoric archaeology are quite distinct, yet formation theory was central to Peña's (2007) study of Roman pottery.

Conclusions

Even in archaeology's present underdeveloped state of intellectual development, it is futile to debate what the record is; at least broadly, we agree on that score. Nor should we wonder if it preserves all relevant detail and content of all past

cultures. Of course it does not. Yet it is equally futile to suppose that the record is so limited and biased as to deny the possibility of systematic, fairly far-reaching inference to those past cultures or to free archaeological thought from any grounding in relevant evidence. The archaeological record is neither our best friend nor worst enemy. The archaeological record simply is. It is for us to determine what can be made of it.

Case Studies

Despite halting advances and sometimes bitter debate, archaeologists of various theoretical casts have used formation theory intelligently to improve their inferences from general theory and their understanding of the past generally, encouraging signs that serious study of how the record formed is regaining traction. Hill (1995) interpreted patterns and sequences of discard at British Iron Age settlements in symbolic terms, as ritual or "structured deposition" that revealed elements of world view. Careful analysis of deposits and building sequences at a Cypriot Bronze-Age village allowed Frankel and Webb (2001) to estimate population size and occupation span and gave insight into household size and structure and social reproduction otherwise obscured from view. Gallivan (2002) examined joint variation in population and sociopolitical complexity in the late prehistory of the American Mid-Atlantic coast. Varien and Ortman (2005) used formation theory to determine occupation span and sequence of Puebloan villages in the American Southwest, which they then linked to land tenure, economic intensification, and sociopolitical trends. Lamenting neglect of "how and when different kinds of pottery came to be incorporated in different amounts and in different conditions into different kinds of archaeological deposits" (2007: 1), Peña demonstrated the relevance of formation theory in Roman archaeology. Using mostly Balkan evidence, Chapman and Gaydarska (2007) argued that fragments of pottery and other prehistoric goods, whether broken deliberately or not, frequently were reconstituted for various symbolic and social purposes. In the service of this original if perhaps overstated symbolic thesis, they employed the very formation theory that postmodernists eschewed on principle. Surovell (2009) both integrated formation theory with a general theory, behavioral ecology, and applied it systematically to stone tools and debris, among archaeology's most abundant and widely distributed materials.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Middle-Range Theory in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes

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Archaeological Resource Management: The Changing Role of the State

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Introduction

In the United Kingdom (as in many other countries) the state, from the end of the Second World War onwards, played a dominant role in investigating, protecting, and presenting the nation's archaeological heritage. Now, in very many areas of life, the role of the state, and the relationship between citizen and state, is changing. Archaeology, and also heritage protection more generally, are affected by this in a variety of ways. The way in which state archaeological organizations operate in the future may be rather different than it has been in the past.

Key Issues/Current Debates/Future Directions/Examples

In 1945, immediately following the end of the Second World War, the Labour Party came into government in the United Kingdom, following a "landslide" victory in a general election. This marked the beginning of a phase of history in which, under the so-called "welfare state" philosophy, central government played an increasingly dominant role in many different areas of the life of the nation. The same trend was seen, in varying degrees, in many other liberal democracies in western Europe and beyond.

The investigation and protection of the archaeological heritage, and the presentation of this heritage to the public, was just one among many areas of activity in which the role of the United Kingdom state expanded greatly in the decades after 1945. Central government and its agencies undertook extensive archaeological surveys; new legislation was introduced to provide better protection for archaeological sites and monuments; officials selected more sites for such protection; greatly increased finance was made available for excavating sites threatened with destruction by development; important monuments were excavated, conserved, and displayed for the benefit of the members of the general public who wished to visit them; and guide books, produced and sold by the state at the monuments, gave authoritative accounts of the remains and their interpretation. One result of all this activity and expenditure was the development of a substantial archaeological profession. Another was the establishment of a particular kind of relationship, in the area of archaeology and archaeological protection, between the state and the archaeological profession on the one hand and interested members of the public on the other. The state was a major provider of interpretation and narrative (in a broad sense, and not least in the kinds of monuments and remains which it chose to investigate and protect), and the public was cast largely in the role of passive consumer of messages devised by officials of the state and archaeological professionals dependent on the state (Thomas 2004: 192-3).

Today, the situation is very different. The role of the state has changed quite significantly in recent years and is continuing to change. There is every indication that the rate of such change may, if anything, accelerate in the coming years. There are many reasons for this. Globalization, the Internet, and the emphasis on "consumer choice" have made people much less ready to accept single, "official" versions of the nation's past. Increased leisure and mobility (for some, at least) have prompted people to find new ways to spend time. The digital social media are leading people to expect to contribute their own views (and to have these listened to) rather than simply being passive consumers of information and decisions emanating from the state and other large corporate bodies (Thomas 2004: 193-5). Most recently, the economic crisis which has engulfed large parts of Europe since about 2008 has left many governments struggling financially. Many states are cutting their expenditure drastically; in the future, they will not be able to provide all the things which they have been providing in the recent past.

This, then, is the broad background to this entry. Two main forces for change can be identified. First, people are much less ready and willing today to simply accept the authority of the state without question; people wish to decide for themselves what they believe, and they also want their voices to be heard by authority. Second, the state is less able to provide services (of many different kinds) than it was previously. The archaeological functions of the state are no exception to this; indeed, they may be among the more vulnerable because these functions can easily be seen as less necessary than, say, health or education. It is easy to see how these two trends can reinforce each other.

How, then, are these trends being manifested in archaeology and heritage protection in the United Kingdom today? And how are state archaeological organizations and their officials reacting to them?

The rejection of "official" views of the archaeological past can perhaps be seen most clearly in the way in which prehistoric archaeology and prehistoric monuments have been taken up by "New Age" and "pagan" believers. The conflicts over access to Stonehenge are well known (e.g., Bender 1998), but there are other examples of contest over the rights to, and interpretations of, prehistoric monuments. A particularly telling episode occurred when a prehistoric timber circle was exposed by storms on a beach in Norfolk in the east of England. The monument was quickly labeled "Seahenge." English Heritage (the principal state agency for archaeology and heritage in England) believed the monument to be at risk of destruction. It decided that the best course of action would be to investigate the monument scientifically (in the course of which some physical damage would be caused) and to remove the timbers from their context in the hope of preserving them elsewhere. The state was seeing the monument primarily as a resource for scientific inquiry by dissection. Other groups, however, had different ideas. Pagans of various kinds believed that the monument was a sacred place and should be left in peace. The conflict was acute and generated a huge amount of media coverage (Champion 2000).

Seahenge was an example in which the beliefs and perspective of a particular group clashed with those of the state. In other cases, a group may simply develop its engagement to the past with little or no reference to what the state thinks (if anything) of that group's perspective. "Pagan" or "alternative" uses and interpretations of ancient monuments (particularly prehistoric ones) are an example of this (Cope 1998).

Thus, in some instances the authority of the state may be challenged; in others the state is simply ignored because it is not seen as relevant.

Shifting power relations can be seen very clearly in the relationship between the media and the state. The television archaeology series "Time Team" has been immensely popular in England (and more widely) (Taylor 1998). It portrays archaeological investigation as a rather breathless pursuit, carried out by people who some might regard as slightly eccentric. In some cases, Time Team has wished to work on protected monuments, meaning that English Heritage's agreement has been needed. The relationship has not always been an easy one. Sometimes English Heritage has had reservations about what was proposed and has ended up being made to

look slightly officious in the broadcast program. However, the public popularity of Time Team and its impressive viewing figures (routinely in the millions) have meant that English Heritage has not wished to be uncooperative towards the program and its makers.

Overall, certain wider social trends – a readiness to reject "official" versions of the past in favor of alternative ones, to challenge state authority, and to pursue different agendas from those advocated by the state – are reflected in the public's approach to archaeology and heritage. There is no doubt that responding to these trends poses considerable challenges for state archaeological and heritage organizations, accustomed as they are to "top-down" ways of seeing the world and of operating. How have such organizations tried to respond?

"Designation" (protecting buildings, monuments, and areas by giving them specific legal protection) has long been a key state function. Traditionally, decisions about which monuments to select for designation were made by officials, using criteria which reflected a particular outlook and set of priorities (Thomas 2004: 192-3). In recent years, a number of things have happened. First, English Heritage has encouraged members of the public to propose sites for designation and has provided a means of doing this online. Second, the idea of "local listing" – that is, designation at a local level, by local authorities, using locally developed criteria – has been promoted. This is seen as a more locally responsive system than one operated entirely by central agencies. In theory, "local lists" are meant to supplement national designation, allowing things which would not meet the stringent national selection criteria to be given some formal recognition, but it is possible that some locally listed items will be ones which are of national importance, but which central government has not yet had the resources to designate at national level. Third, English Heritage has undertaken a number of programs to assess the material legacies of "underrepresented" groups in England (English Heritage n.d. a, b, c).

Another interesting development has been the Portable Antiquities Scheme, in which public funding supports professional archaeological staff who record objects found by metal-detector users and other members of the public (Portable Antiquities Scheme n.d.). In England, there is no obligation on finders to report archaeological discoveries (other than those which fall into the restricted category of objects which are legally defined as "treasure"), so the scheme is very much about professional archaeologists reaching out to the public and working with them. Relations between professional archaeologists and metal detectorists have sometimes been uneasy in the past. When metal detecting first became widespread, some archaeologists wished to see it made illegal. That was never likely to happen (and certainly will not happen now), so engaging with metal detectorists has been the only viable option. In fact, many detectorists are deeply interested in the past and have a strong desire to be involved in its discovery but have chosen metal detecting, rather than (say) going on organized excavations, as their way of doing this.

Another recent growth area has been community archaeology (Council for British Archaeology n.d.). This is a large topic, but the broad thrust is clear – it is about nonprofessionals engaging actively in archaeology themselves and about some professionals acting as trainers and enablers, helping nonprofessionals to carry out archaeological projects which are of direct interest to them. One of the sources of funding for community archaeology is the Heritage Lottery Fund (which distributes fund raised by the National Lottery, established by the state in 1994). Of particular interest is the Community Archaeology Bursaries Scheme, under which the Heritage Lottery Fund and the state archaeological bodies for England, Wales, and Scotland support training placements "to equip would-be community archaeologists with the skills, experience and confidence to work with voluntary groups and communities." The message is clear – rather than the state doing archaeology on behalf of the citizen, it is helping the citizen to do archaeology on behalf of himself or herself.

All of the forms of activity described above are reflections of a changing relationship between state and citizen in the area of archaeology

and of changes in the way the state operates, made in response to this changing relationship. Citizens are no longer so willing to be the passive consumers of messages generated by state-employed professionals, and the Internet and social media provide new and larger opportunities for the citizen to make his or her voice heard and to exchange views and information directly with other citizens. At the same time, the state's ability to do everything itself is declining, which makes it difficult for professionals to argue (even if they wanted to) that archaeology is best left to the state and the professional to do.

In many ways, what is happening in archaeology in the United Kingdom today is a microcosm of what is happening in society more widely: a public which expects to have its views listened to by the state, a state which cannot afford to do everything which it might like to do or which it used to do, and a voluntary sector which is starting to show signs of filling some of the gaps left by the state. The activities described above are all examples of new kinds of relationships being negotiated between the state and the citizen, in a world which is changing rapidly and which is already markedly different from that of the "welfare state" which emerged after 1945.

There is no doubt, of course, that the state will continue to play a very important role in archaeology in the future. Not least, the imposition of legal controls on private property is something which can only be done by, or with the full backing of, the state. Nonetheless, it is clear that the role of the state in archaeology, and the relationship between citizen and state in this area, has changed substantially over the past 20 or so years. It seems beyond doubt that it will continue to do so in the years and decades ahead.

Cross-References

- ▶ Community Archaeology
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Metal Detecting in Archaeology

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Archaeological Review from Cambridge

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Brief Definition of the Topic

The Archaeological Review from Cambridge (ARC), first published in July 1981, is a biannual academic journal of archaeology, with calls for papers released approximately 18 months before its two publication dates (April and November) (Fig. 1). It is run on a nonprofit, voluntary basis by postgraduate students at the University of Cambridge. The present Committee is comprised of members working on such diverse research projects as Croatian Epigravettian subsistence strategies and Etruscan identities.

Rooted primarily in archaeological theory and practice, publication in ARC is open to all,

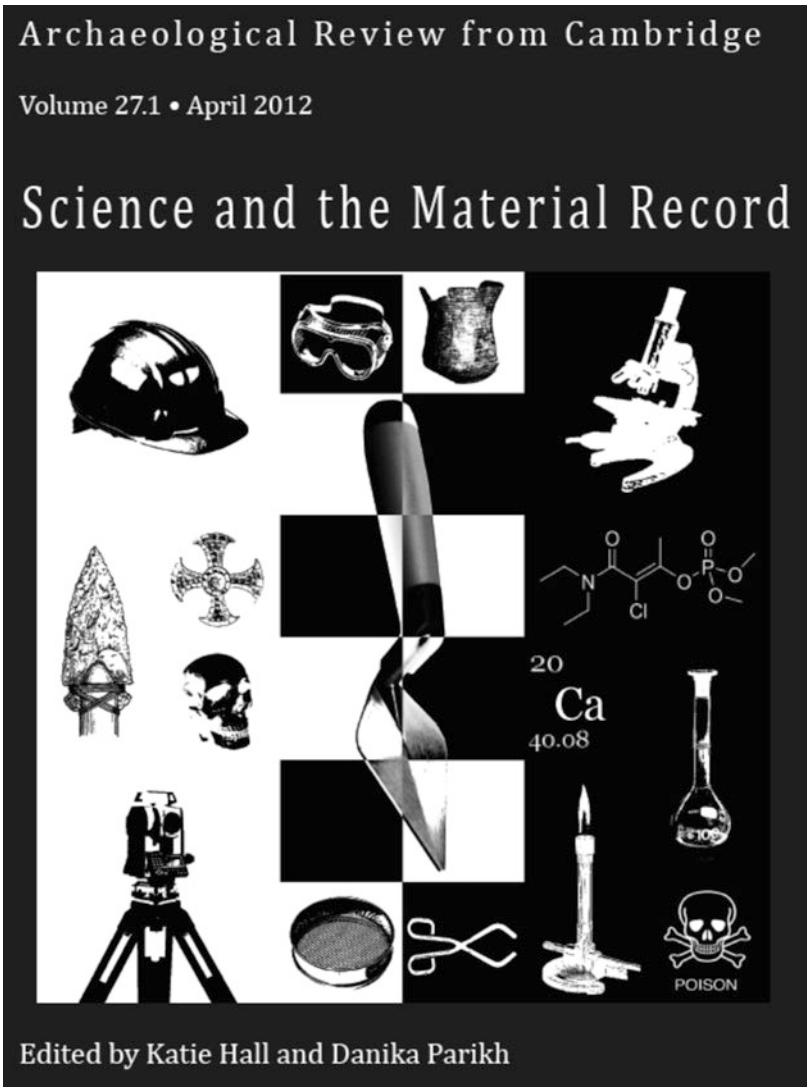

Archaeological Review from Cambridge, Fig. 1 Cover of the April 2012 issue of the Archaeological Review from Cambridge

and it increasingly invites a wider range of perspectives with the aim of establishing a strong, interdisciplinary journal which will be of interest in a range of fields. Recent issues have focused on such topics as violence in the material record, boundaries and archaeology, and economic crises:

Volume 26.1 (April 2011): *Archaeology and Economic Crises*. Edited by Suzanee E. Pilaar Birch and Rosalind Wallduck

Volume 25.2 (Nov. 2010): *Boundaries and Archaeology*. Edited by Mark Sapwell and Victoria Pía Spry-Marqués

Volume 25.1 (April 2010): *Violence and Conflict in the Material Record*. Edited by Skylar Neil and Belinda Crerar

Current issues under production include Katie Hall and Danika Parikh's (eds) *Science in the Material Record* (27.1 – April 2012), which looks at how advances in archaeological science have opened up new vistas when it comes to the interrogation of archaeological material in the twenty-first century, and Dominic Walker's (ed.) volume on *Collaborative Archaeology*, due to be published in November 2011 (issue 26.2).

Cross-References

- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Landscape Archaeology
- ▶ Modern Material Culture Studies
- ▶ Zoning: Boundary Areas and Buffer Zones

Further Reading

Archaeological Review from Cambridge. n.d. Available at: http://www.societies.cam.ac.uk/arc/.

Archaeological Soil Micromorphology

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Introduction

Archaeological soil micromorphology, which has become increasingly developed as a technique over the last 60 years, is now a major component of geoarchaeological investigations, especially in Europe. This is because it not only provides information for landscape studies but is best able to identify site formation processes, land use, and use of space within houses and settlements. Key to this is the recognition that soils and sediments are worthy of contextual study.

Definition

Archaeological soil micromorphology is adapted from soil science and geology using thin sections and the polarizing microscope, where undisturbed soils and sediment samples are stabilized by resin impregnation before thin sectioning. This method has now become developed specifically in order to investigate soils and sediments affected or produced by humans; the latter includes a wide variety of archaeological materials. The technique employs the use of standard optical (plane-polarized light [PPL], crossed-polarized light [XPL], and oblique incident light [OIL]) and fluorescence (e.g., ultraviolet light [UVL], blue light [BL]) microscopy, as well as instrumental studies on thin sections, such as Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray Spectrometry (EDS), and Microprobe and Fourier Transform Infrared Spectroscopy (FTIR). Methods and applications have developed especially over the last 25 years with standardized descriptive and various numerical methods and the employment of such geological concepts as "microfacies" (Bullock et al. 1985; Courty et al. 1989; Courty 2001; Goldberg & Macphail 2006; Stoops et al. 2010).

Historical Background

Ian Cornwall, Institute of Archaeology, University College London, UK, was the first person to apply the new technique of soil micromorphology as developed by Kubiena (1938) when working with Frederick Zeuner, the first ever professor of Environmental Archaeology. Cornwall contributed numerous analytical reports on British and foreign archaeological sites during the 1950s and 1960s (11 are cited in a review of soil science in English archaeology; Macphail 1987). For example, Cornwall provided a barrow-buried thin section study on the classic Neolithic cultivated site of Kilham, North Yorkshire, when working with major environmentalist archaeologists (Dimbleby & Evans 1974). These first investigations were followed up by the Scottish soil scientists Romans and Robertson (Macaulay Institute, Aberdeen), who when providing analytical data on Scottish soils managed to investigate a number of monument-buried soils dating to the Neolithic and Roman periods, with special focus on environmental change and ancient cultivation (Romans & Robertson 1983). The next major advance came

in an international collaboration, which considered that the current understanding of soil science and geology could be applied to the soil micromorphological study of archaeological soils worldwide; this was done through a series of thematic chapters and case studies in "Soils and Micromorphology in Archaeology" (Courty et al. 1989). The authors had the great benefit of the advice of internationally famous soil scientist Nicholas Fedoroff (Institut National de la Recherche Agronomique – INRA; Paris-Grignon, France). Subsequently this methodology has continued to advance through experiments, the increased employment of associated instrumentation, and closer collaborations with other scientists (e.g., soil chemistry, macro-, and microfossils) studying the same soils and sediments (Viklund et al. Forthcoming/2013). As archaeology has now often come to rely on the data that thin section studies can provide, the number of workers in this field has expanded exponentially, while numbers of soil micromorphologists working in agronomy have shrunk dramatically. High standards have in part been encouraged by the establishment of the Working Group on Archaeological Soil Micromorphology in the early 1990s. Important advances have also been made by taking part in long-term archaeological experiments such as the Experimental Earthworks Project and Butser Ancient Farm in the UK and at Umeå University, North Sweden, and by extemporizing experiments and employing ethnographic analogue sites to examine specific questions across Europe and Africa (see Goldberg & Macphail 2006; Mallol et al. 2007; Shahack-Gross 2010; Lewis 2012).

Key Issues

Current Themes of Study

The number of ways that soil micromorphology contributes to archaeological investigations is ever-increasing. In the first instance, these relate to attempts to match pedological and/or sedimentological formation processes with human occupation, whether in open-air sites or in caves, for example. In many cases, these formation processes are simply contemporary and not influenced by human activity. Such studies can only be carried out if there is a very clear understanding of the processes that effect *buried soils and sediments*. It also has to be remembered that during the Pleistocene and at sites affected by human-induced colluviation, surfaces may be ephemeral and pedological development is likely to be very weak. Here, we are dealing with *soil-sediments*. In some cases, sites have been preserved by sediments associated with alluviation and/or marine inundation, and here not only are these events required to be recognized but also their effects on buried surfaces need to be understood. Thus, *inundated sites* necessitate comprehension if microfeatures now present in buried landscapes are to be interpreted properly. Another key area is the study of *archaeological materials*, and these include everything from human latrine waste and animal coprolites to constructional and industrial materials. In terms of major human impact on the landscape, *clearance and cultivation* are often of primary importance and require accurate identification. Closer analysis of complex societies however also warrants a clear idea of how *occupation surfaces* reflect use of space by humans and stock, but this is only one part of how *settlement morphology* can be elucidated. There will also be water holes and wells, graveyards, and middening areas, for example. Lastly, *site transformation* studies show how once recognizable occupation layers and farmed soils, for instance, became reworked after abandonment or through a land use change. This is a key aspect of investigation on any archaeological site. In fact, there has been a major focus on these kinds of studies on some of the most challenging archaeological deposits worldwide, such as European Dark Earth and Amazonian Dark Earths (e.g., *terra preta*). These eight themes, which are presented in detail elsewhere (Macphail & Goldberg Forthcoming/2013), are now briefly discussed.

Issues concerning how *buried soils and sediments* could be accurately interpreted was first addressed by soil micromorphological components in the Experimental Earthworks Project, UK, both on base-rich chalk soils

(Overton Down, Wiltshire) and on acid soils (Wareham, Hampshire). The chief result was the recognition that changes and compaction occurred rapidly after burial, especially at Overton Down, where an open, rooted, and earthworm-worked Mull horizon was transformed into a compact soil. In places, earthworms had migrated upwards blurring the buried soil boundary. Compaction was in part due to a loss of organic matter (roots had disappeared or been finely fragmented) – as also shown by soil chemistry (Goldberg & Macphail 2006: 248-54). The nature of soil burial is thus very important, and conditions of burial vary according to pH, degree, or absence of waterlogging and/or periodic anaerobism, extant soil fauna, weight of overburden, migrating solutions, etc. The chalky soil dump which formed the Neolithic bank barrow at Maiden Castle, Dorset, encouraged earthworms to burrow downwards into the buried soil; chalky soil burrow fills were in stark contrast to the original decalcified buried soil. In the case of the Gokstad Ship burial mound, Vestfold, Norway, the anaerobic conditions which preserved the wooden long ship also encouraged the migration of phosphate within the turf mound. Vivianite became concentrated along some plant litter layers within the turf stack (Figs. 1 and 2).

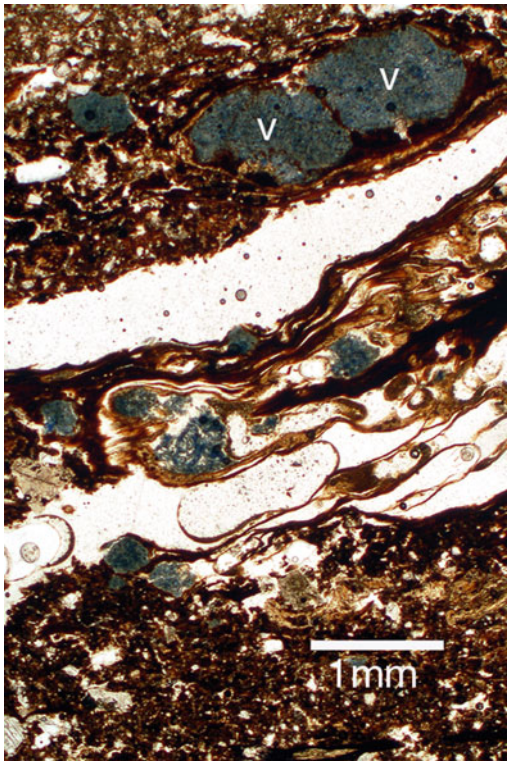

Archaeological Soil Micromorphology, Fig. 1 Viking Gokstad Ship Burial Mound, Vestfold, Norway; photomicrograph of turf layers ("laminated Mull humus"), with vivianite (crystalline iron phosphate [e.g., $Fe_3(PO_4)_2\ H_2O$] formed under reduced conditions) associated with humified plant litter layers, and recording migration of phosphate from pasture soil turf within the mound. PPL (Macphail & Goldberg Forthcoming 2013)

Although an aspect of European prehistoric and historic colluvia is an outcome of clearance and/or cultivation, *soil-sediments* are more often encountered in Pleistocene sequences, where these deposits can bury palaeosols or form palaeosols. Investigations of palaeosols with associated artifacts should always pay attention to the provenance of bones and stone tools, as concentrations of such materials can simply be the result of geological processes rather than cultural activity. Accurate interpretation is even more crucial at early hominid sites. The micromorphology of soil-sediments and associated palaeosol formation, in relationship to the erosion of unstable soils for example, has been investigated for a long time (Fedoroff et al. 2010). Climatic conditions, especially those involving cycles of freezing and thawing, have come under special scrutiny, especially in North West Europe and North America. Cave sedimentology has also improved our understanding of natural geological and faunal processes and its ability to differentiate sedimentary layers that are strongly influenced by human activity. For example, mud flows occur beneath sink holes in caves, while bird and bat guano have a strong effect on phosphatization, while large animal scavengers might burrow into "middens" and deposit coprolites. Diffuse hearth deposits are often termed combustion zones because of fragmentation by wind, water, and human and animal activity (Mallol et al. 2007). Soil micromorphology and associated techniques have also helped identify fire-use in early archaeological contexts, such as the ~1.0 Ma

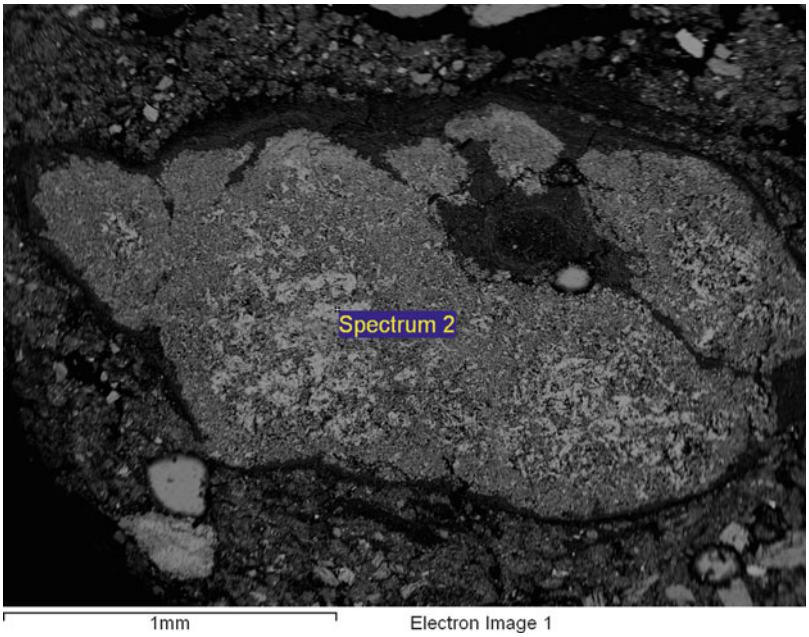

Archaeological Soil Micromorphology, Fig. 2 As Fig. 4, SEM/EDS X-Ray backscatter image of vivianite within laminated mull horizon characterized by layered plant litter and amorphous (humified) organic matter. EDS Spectrum found 45.6 % Fe (58.7 % FeO) and 16.7 % P (38.2 % P_2O_5). Scale = 1 mm (Macphail & Goldberg Forthcoming 2013)

old Acheulian levels at Wonderwerk Cave, Northern Cape province, South Africa (Berna et al. 2012).

Open-air occupations are much more prone to reworking compared to caves, but there are some exceptions, for example, and *inundated sites* can show good preservation, although these have to be interpreted with caution. Soil micromorphology has shown that some low-lying terrestrial areas, which were a focus of occupation by hunters and gatherers for example, were affected by rises in sea level and/or freshwater inundation caused by a similar rise in base level. Together with faunal and artifact refitting analyses, sediment micromorphology showed that butchery and Acheulian hand axe manufacture occurred on mudflats within the intertidal zone at Boxgrove, West Sussex, UK, where a chipping floor was studied within marine alluvium (Macphail 1999).

In the case of complex societies, there is the ever-increasing need to identify *archaeological materials*, whether these are of simple constructional origin, such as earth-based daub/adobe or sophisticated manufactures – for example, lime-based plaster, iron slag, nonferrous metals, and alloys. Artisan activity such as soldering lead pipes in Roman and medieval constructions can lead to lead droplets being preserved in occupation sediments (Figs. 3 and 4). In addition, there are other background deposits in the form of fuel and kitchen wastes (charcoal, charred peat, calcitic ashes, bone, burned bone, eggshell) and animal dung and various forms of latrine deposits (Macphail & Goldberg 2010). Moreover, the interpretation of *occupation surfaces* within archaeological deposits has been crucial in determining use of space within structures (Gé et al. 1993); this has been further elucidated by experiments (Goldberg & Macphail 2006: 258-63). Such studies have also included ethnoarchaeological investigations as a way of understanding *settlement morphology* better. One example is the multi-method geoarchaeological investigation of dung, which included its preservation and spatial distribution associated with cattle management in abandoned Maasai settlements in East Africa (Shahack-Gross 2010). Some Neolithic cave deposits might be totally anthropogenic in origin, as many meter-thick ashed dung and stabling remains were formed by the overwintering of stabled ovi-caprids in the Mediterranean region. In the study of settlements and local land use, paths, trackways, cess pits,

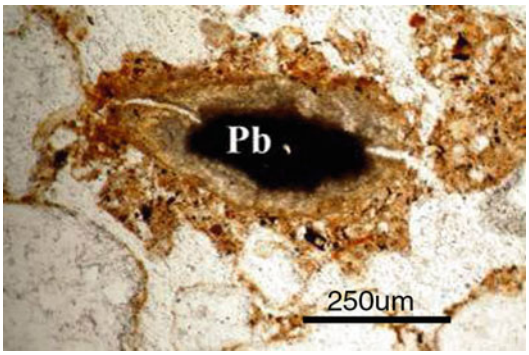

Archaeological Soil Micromorphology, Fig. 3 Late Roman Leicester, UK (Freeschool Lane, dark earth deposits); photomicrograph of lead (Pb) droplet embedded in calcitic ash, recording an earlier period of artisan activity – perhaps lead pipe soldering. This Context 6450 is generally strongly enriched in lead (2,560 μg g^{-1}), a common metal on Roman sites (analysis by John Crowther, University of Wales Trinity St David) (Macphail & Goldberg Forthcoming 2013). Plane-polarized light (PPL)

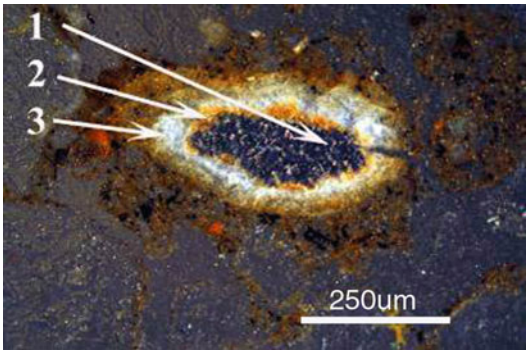

Archaeological Soil Micromorphology, Fig. 4 As Fig. 1, under oblique incident light (OIL). Thilo Rehren, University College London (employing a metallurgical microscope), tentatively identified pure lead (1), with corrosion haloes of red lead oxide (2) and lead carbonate (3) within this ashy aggregate. SEM/EDS analysis on this and other examples confirmed this: red lead oxide: 92.8 % Pb (100 % PbO); lead carbonate: 86.3 % Pb, 5.67 % Ca, 7.23 % P; surrounding ashes: 43.0 % Pb, 10.6 % Ca, 7.83 % P (Macphail & Goldberg Forthcoming 2013)

waterholes and wells, and even cremation, excarnation, and inhumation features require investigation alongside ubiquitous waste disposal midden deposits. For example, at a truncated Viking grave mound at Hesby, Vestfold, Norway, body stains, tentatively identified in the field and subsequently mapped by phosphate analysis (Figs. 5 and 6), were found to be amorphous iron-phosphorus-calcium compounds. Here, standard excavation, geochemical mapping, and soil micromorphology, complemented by EDS, fully characterized this Viking grave mound (Viklund et al. Forthcoming/2013).

Settlements are often associated with farming communities, and local areas would likely have undergone *clearance and cultivation*. One of the earliest contributions of soil micromorphology was its ability to identify cultivation. The microfeatures found in arable soils by Dutch soil scientists allowed workers to tentatively suggest that similar features in disturbed surface soils found under monuments, for example, could record a cultivation history (Romans & Robertson 1983). This suggestion was followed up by experiments in the use of cultivation tools, including replica ards, in France, Germany, and the UK, and the subsequent analysis of the resulting soil microfabrics (see reviews in Lewis 2012). It is has always been important, however, to be able to broadly differentiate between the soil disturbance and resulting colluviation caused by cultivation and that caused by woodland clearance (Goldberg & Macphail 2006: 193-210). While cultivation tends to homogenize soil, clearance soils in contrast might display heterogeneity, with fragments of mixed soil horizon materials being represented. Burned soil might also be present, if fire was involved. Arable soils which are not manured may lose structure and suffer reduced fertility, and so manuring practices developed. Soil chemistry and field walking may indicate manuring with animal dung and settlement waste. In thin section, the residues from manuring may also be evident. These can be in the form of pottery fragments and burned flint and daub, while coprolitic bone and amorphous phosphate – sometimes embedding calcitic ash – from night soiling, i.e., the use of household latrine waste, may additionally be found. "Mixed farming" involved both cultivation and animal management, and in some circumstances dung traces can be recognized in ancient arable soils, which are high in organic phosphate of dung origin. In the settlements

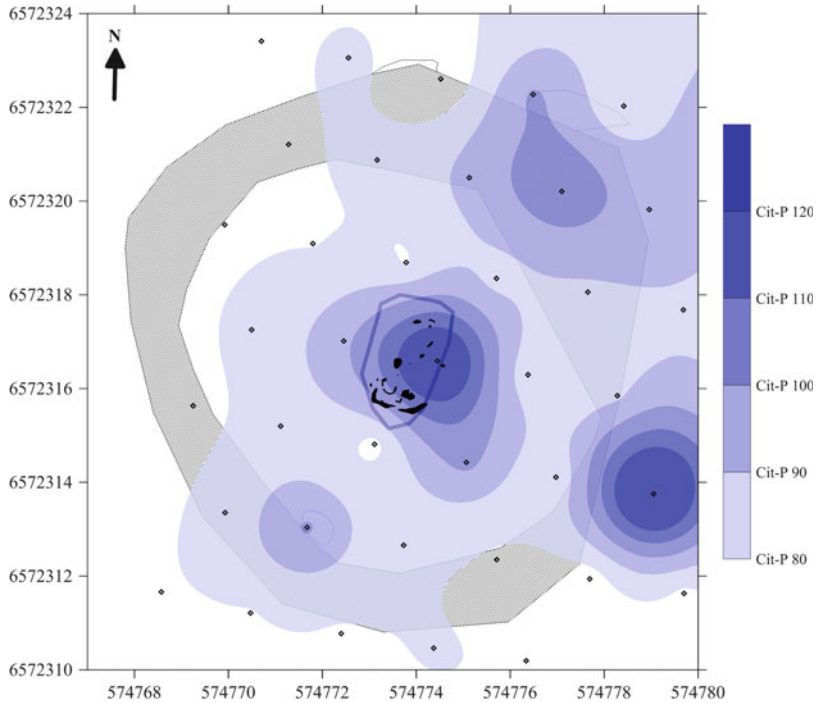

Archaeological Soil Micromorphology, Fig. 5 Map of truncated Viking grave mound (Hesby, Vestfold, Norway); map shows phosphate distribution (*dark blue* equals highest concentrations – see Fig. 6) (analysis by Johan Linderholm, MAL, University of Umeå, Sweden) (Viklund et al. Forthcoming/2013)

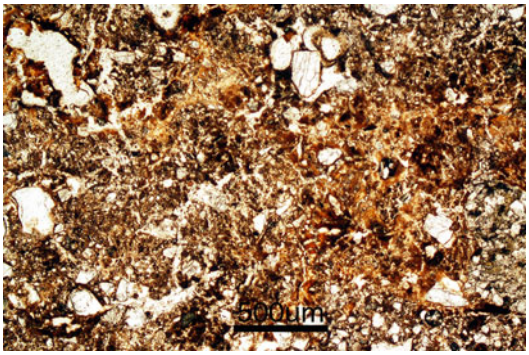

Archaeological Soil Micromorphology, Fig. 6 As Fig. 5, photomicrograph of phosphate-rich area; "body stain" fine silty clay fill inside grave, composed of very abundant iron staining and void hypocoating. Note fibrous secondary iron in voids. Iron also impregnates a relict organic content. EDS found mean 33.8 % Fe, max 48.1 % Fe; mean 9.34 % P, max 14.4 % P; mean 2.26 % Ca, max 3.77 % Ca, as mineralized human body residues. PPL (Viklund et al. Forthcoming/2013)

themselves, the use of space investigations can show areas of a long house or a specific roundhouse, for example, which was used to stable animals. In more urban environments, not all animal waste could be used on the fields and was often dumped by roadsides and in open area middens. Interdisciplinary analysis of layered, humified plant-rich stabling waste, employing soil micromorphology, microprobe, macrofossil, and pollen analysis (for example, at Butser Ancient Farm, Hampshire, UK), has found them to have specific characteristics (Figs. 7 and 8) compared to generally more minerogenic earth floors formed in domestic space. The latter is likely to include much more kitchen and burned waste and as a consequence often has an enhanced magnetic susceptibility.

Lastly, soil micromorphology has the ability to understand *site transformation*, when post-depositional processes (Courty et al. 1989: 138-89; Stoops et al. 2010) affect what may once have been recognizable as archaeological stratigraphy. These processes include mechanical working by plants and animals, as well pedological ones, such as leaching and horizonation. The effect of marine inundation on ancient land surfaces, as noted above, is one example where information on past land use may still be relatively easy to discern. There are other more extreme examples of the transformation of archaeological layers, and

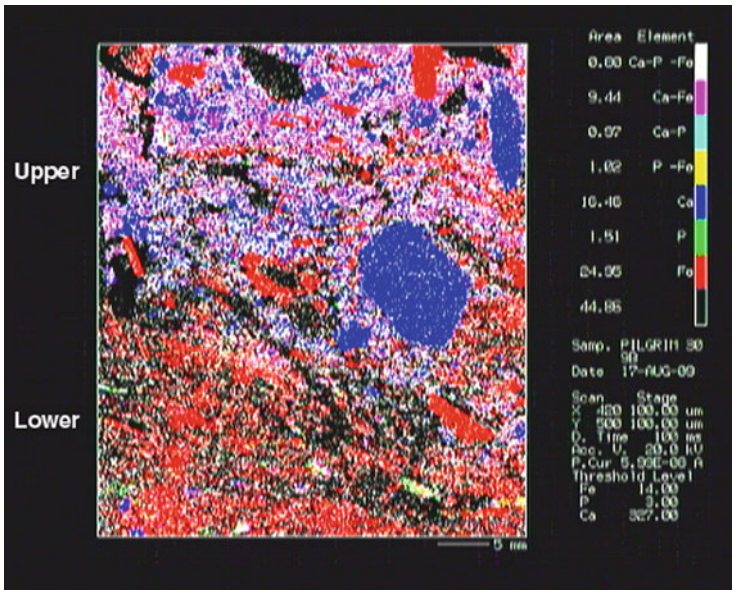

Archaeological Soil Micromorphology, Fig. 7 Fourteenth century dumped occupation floor deposits (Pilgrims School, by Winchester Cathedral, Winchester, UK); microprobe map of Context 309B; 309B upper is composed of mixed calcareous (ashy) floor and kitchen waste (Pb [0.06 %] enriched); 309B lower is an Fe-stained layered stabling waste dump – which also shows some P enrichment; 1.12 % mean Fe, max. 7.12 Fe; 0.162 % mean P, max. 1.39 % P; 0.394 % mean S, max. 1.20 % S (see Fig. 8) (Microprobe map of Ca-P-Fe; scale = 5 mm) (Macphail & Goldberg Forthcoming 2013)

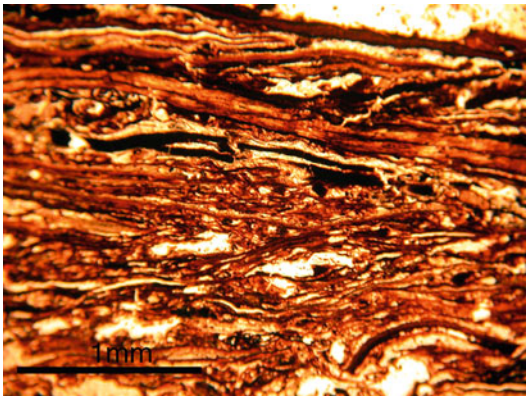

Archaeological Soil Micromorphology, Fig. 8 As Fig. 7; stabling waste in Context 309B lower: Overall Context 309 bulk analysis: 34.4 % LOI, 3.92 mg g^{-1} phosphate-P, 10.5 × 10^{-8} SI χ, 4.13 % χ_{conv}, 736 μg g^{-1}Pb, 84.5 μg g^{-1} Zn, 47.4 μg g^{-1} Cu; pollen from 309B lower: cereal types (19 %) and grasses (57 %) and range of herbaceous taxa (21 %) are consistent with presence of dung/stabling waste composed of straw/chaff and grass hay; long, horizontally oriented humified monocotyledonous plant fragments, with long articulated phytoliths and intercalated silt. PPL (Chemical analysis by John Crowther, University of Wales Trinity St David; pollen data from G. M. Cruise, freelance) (Macphail & Goldberg Forthcoming 2013)

these are the Urban Dark Earth of Europe and Amazonian Dark Earths (Arroyo-Kalin et al. 2008). In the case of northwest Europe, there has been a focus on seeking information on urban land use from dark earth that dates to the late Roman (late Antique) to medieval periods, where homogeneous deposits occur between stratified Roman and Medieval layers. Work in England, France, Belgium, and Italy has shown that soil micromorphology is one of the best tools for this kind of investigation, especially when backed up by associated and carefully analyzed small artifact and bulk soil studies that include macro- and microfossil identifications (e.g., pollen and phytoliths). Firstly, the decay of earth-based buildings and weathering of lime plasters and mortar, dating to a supposed decrease in urban populations, provides much of the "soil" in dark earth. Secondly abandoned and robbed-out house plots often became favored areas for ash middening by the remaining town dwellers. Latrine and butchery residue dumping and inhumations in newly formed waste ground within some Roman cities

likely reflect a breakdown in municipal regulations. These deposits became almost totally homogenized and weathered into brown soils, for example, during the second and third centuries CE. Other dark earth layers, on the other hand, can record a renewed and different use of "urban" space in the late Roman and early medieval periods. Middening and animal dung-rich deposits indicate stock management in a form of rural suburban lifestyle. There is compelling soil evidence that urban space was never totally abandoned in general and that early medieval urban life, recorded by dark earth and the micro-artifacts it contains, was possibly enjoyed by larger populations than during Roman times in some European cities.

International Perspectives

It is remarkable to note that the technique of soil micromorphology, first employed across North America and Europe to study questions concerning agronomy and palaeosols, has become a mainly "European" technique when applied to archaeology. Research and teaching in archaeological soil micromorphology in North America has been almost exclusively carried out by Paul Goldberg at Boston University and his past students. It is surprising that this application has yet to properly catch on in the USA. In Europe, in stark contrast, the subject has gone from strength to strength with major centers of expertise in the UK (Cambridge, London, Reading, Stirling, York), Belgium (e.g., Brussels), France (e.g., INRAP), Italy (e.g., Milan and Pisa), Spain (e.g., Barcelona), and Switzerland (e.g., Basel), with other key workers in Czech Republic, Germany, Greece, Holland, Romania, etc. Encouragingly, new students of the subject are now emerging from Asia, and North and South America.

Future Directions

Since the 1980s archaeological soil micromorphology has been an integral part of workshops and conferences, within organizations such as the International Union of Soil Science International Working Meetings in Soil Micromorphology (e.g., London 1981; Paris 1985; Austin; USA 1988; Ghent, 2001; Lleida, Spain, 2012; Mexico City, 2016). In addition, since the 1990s specific archaeological soil micromorphology workshops have been held annually/biannually, to aid training and promulgation of the discipline. Also, in recent years workshops have also been organized as part of Developing International Geoarchaeology (DIG) meetings, and since 2008 an annual week-long intensive training course in archaeological soil micromorphology has been organized at the Institute of Archaeology, University College London, where it had all started some six decades previously.

Cross-References

- ▶ Aksum: Environmental Archaeology
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Chemical Survey of Archaeological Sites
- ▶ Geoarchaeology
- ▶ Paddy Soils: Environmental Analyses
- ▶ Urban Dark Earth

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Archaeological Soil Micromorphology Working Group

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Basic Information

This working group was initiated in 1990 by Richard Macphail at the Institute of Archaeology, University College (UCL), and with the encouragement of co-workers Marie-Agnès Courty (CNRS, France) and Paul Goldberg (Hebrew University of Jerusalem, Israel; now at Boston University, USA) (Courty et al. 1989). The first full workshop was organized at Birmingham University (with Susan Limbrey). A pattern developed comprising approximately alternating UK and European venues and organized at Cambridge (C. French, x2), Sheffield (C. de Rouffignac), Stirling (D. Davidson), and UCL (R. Macphail, x3), for example, along with Basel, Switzerland (P. Rentzel, x2); Brno, Czech Republic (L. Lisa); Dijon (D. Sordoillet) and Rennes (A. Gebhardt), France; Frankfurt, Germany (H. Thiemeyer); and Poviglio (C. Nicosia and M. Cremaschi), Pisa (G. Boschian, x3), and Milan (L. Trombino), Italy, for instance, e.g., Pisa 1998 (Arpin et al. 1998). Only one meeting took place in the USA and was held at the Boston University field school in New Hampshire (P. Goldberg).

Major Impact

The meetings are designed specifically to aid students in archaeological soil micromorphology; hence, prices are kept low and the emphasis is on practical help and study. Short presentations are mainly given to introduce material for the workshop and sometimes to improve a study ahead of publication, by getting feedback. In a number of cases, however, workshops have produced publications (electronic Bulletin 1, 1995–1997, Greenwich University web publication edited by Acott, T. and Macphail, R. I.) or have been associated with conference publications, e.g., Soils and Archaeology (Boschian 2007) and DIG (Developing International Geoarchaeology – Cambridge, 2007; French 2009). There has also been a close relationship with the International Union of Soil Sciences Commission 1.1 "Soil Morphology and Micromorphology." A joint workshop and conference was held, for instance, at Ghent, Belgium in 2001 (J. Mikkelsen) (Stoops 2003). Most recently (2012), a workshop was held in Spain at Barcelona University (R. Macphail and M. Bergada) in association with the IUSS Soil Micromorphology conference held at Lleida, which was the venue for posters and presentations by attendees of the workshop, to be published in *Quaternary International*.

It can also be noted that there have been themed workshops, for example, the link between soil micromorphology and (1) soil chemistry (e.g., phosphate and magnetic susceptibility; London 1997), (2) the field (the early human cave site of Tautavel, France 2006; M-A Courty and C. Perrenoud), and (3) phytolith studies in general. As training has always been the chief aim of the working group, a short intensive course in Archaeological Soil Micromorphology has also been developed for this need at UCL since 2005.

Acknowledgements The author thanks members of the Working Group who have organized workshops for their comments.

Cross-References

► Archaeological Soil Micromorphology

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Archaeological Stewardship

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Introduction

Stewardship is a term and concept often invoked in some archaeological circles and entirely absent from others. Archaeologists, anthropologists, museum curators, collectors, government officials, and members of descendent populations have all been considered stewards. Exploring questions about stewardship "for whom?" "of what?" and "to what ends?" reveals that the meanings and applications of archaeological stewardship, though entrenched and bureaucratized in some contexts, are neither universal nor unchanging. In fact, conceptions of stewardship seem to be shifting away from standardized interpretations of management, preservation, and conservation toward more collaborative, inclusive discourses and practices that recognize the special relationships many people have with the past. Collaborative approaches to stewardship sometimes result in restrictions on the activities of archaeologists as they begin to share "the past" on terms other than just their own.

Definition

"Stewardship," as defined by the Oxford English Dictionary (OED Online), refers to the office or duties of a steward (from the Old English, for "house" and "keeper"), which may include caretaking, administration, planning, control, or use of property or resources owned by another. Stewardship is also defined as an ethic, exemplified by responsible planning and management of resources.

In archaeology, stewardship has been closely associated with conservation, curation, anti-looting sentiments, resource management, and the nonrenewable nature of archaeological resources. In *Teaching Archaeology in the 21st Century*, Bender and Smith (2000: 34) present a narrow definition of stewardship as "the wise use of resources [that] can include stabilizing an archaeological site, preserving it in place, excavation, or promoting public understanding of the information content of the resources through site development and interpretation." More generally, and particularly in the context of North American archaeology, the term has come to mean the act of conserving and preserving the nonrenewable archaeological record for future generations, with the aim of promoting knowledge about the past.

Implicit in all of these definitions are assumptions that stewardship is a relationship that denotes responsibility for taking care of something for someone else. Stewardship implies choosing service over self-interest and, instead, acting in the interest of another. Thus, underlying the discourse of stewardship are various legal, cultural, economic, moral, and political interests, all of which raise fundamental questions of privilege and legitimacy. Who claims to be a steward? For whom? Whose interests does the steward actually serve?

For whom do archaeologists serve as stewards? The concept is fuzzy in this regard. Is it for a universal "everyone" – all of humanity, "the public"– or for "no one" because the archaeological record cannot be "owned?" Or do archaeologists serve the nation-state, which, in many cases, claims legal ownership of archaeological sites and objects? In arguing that archaeological stewardship is performed for "the public," archaeologists remove themselves from the problematic arenas of ownership or culture-based rights and instead purport to act as stewards of, and advocates for, cultural heritage that belongs either to no one, to everyone, or to the state (see Warren 1999).

Historical Background

Historically, at least in western contexts, "stewardship" has never been necessarily egalitarian or altruistic; in fact, the term has often carried an exclusive and elitist connotation. Originally, the term was primarily found in relation to the governance and management of elite wealth and property or as a title for an officer of the state, such as the "Great Steward of England." Later, stewardship was used in commerce to indicate a manager and also as a synonym for servant or aide. The term has long been employed in ecclesiastical contexts, both to refer to the manager of a church's property and the duty to use God's teachings and gifts wisely.

But the concept of stewardship has a much deeper history than the term itself or its co-option by state-based governance systems would suggest. It is deeply rooted in the ethics and practices of land-based peoples throughout time and place. For example, in New Zealand/Aotearoa, the Maori concept of "kaitiakitanga" is closely analogous to "stewardship" but translates more specifically as "guardianship" that is undertaken on behalf of a particular community or *whenua* (J. Coster, e-mail, 23 August 2012).

In recent decades, stewardship has often appeared in reference to the environment and natural resource use. "Earth stewardship" has come to connote one's duties not on behalf of an entity such as god, king, or nation-state but on behalf of the earth and its resilience (see Chapin et al. 2011). Indeed, archaeology should have a great deal to contribute to these discussions (see Hudson et al. 2012).

According to Shawn Malley (2012: 23), the concept of archaeological stewardship emerged

in conjunction with excavations of Near Eastern sites by British archaeologists in the mid-1800s, along with the rabid collecting of ancient material culture by western museums. Malley (2008: 623) notes that "the paternalistic ideology of Western stewardship" that pervaded British archaeology at the time served to rationalize less benevolent, imperialistic interests. By the late 1880s, western museums promoted themselves as stewards of the past for the public, responsible for educating the masses and promoting national identity. These deliberate policies reinforced particular ideologies and public imaginings about archaeology that later coalesced under the heading of "stewardship" (see Smith 2004: 85).

In the early 1900s in the United States, just as natural resource conservation movements were on the rise and the discipline of archaeology was beginning to embrace more systematic methods of research and training, massive commercial excavations of noteworthy sites by private entities prompted government action. The 1906 Antiquities Act essentially appointed archaeologists as protectors and stewards of sites on public lands, acting in the national interest. In the decades that followed, the US government funded many large excavations – whether to salvage the remains of earlier cultures, to investigate the "Mound builder" myth, or to bolster the American economy. Other nations also recognized the power of archaeology to reinforce nationalist narratives and developed similar programs. This use of government funds for archaeology endowed the notion of stewardship with a sense of public accountability that remains prominent today.

Laurajane Smith (2004: 84-92) associates the development of the concept of archaeological stewardship with the growth of liberalism – the idea that governments think they know what is best for others. She points out that long before the term actually came into use, archaeologists had assumed stewardship of the histories and prehistories of others. This presumption was nurtured by early twentieth century ideas that cultural objects embodied past identities in ways that revealed themselves through scholarly study. Subsequent ideological positions within archaeology, including the claim of processual archaeology to be a science of human behavior, the development of heritage as a public education issue, the establishment of CRM archaeology as a profession accountable to public and private interests, and the articulation of a "conservation ethic," all lent support to a notion of archaeological stewardship.

In the 1960s and 1970s, the United States, Great Britain, and Australia were among nations that enacted archaeological resource management legislation. This was in part a reaction to increased development, land use changes, and other threats to archaeological sites. Many of these acts defined the proper care and management of heritage objects and sites in terms of "preservation" or "stewardship." In many instances, sacred sites or other places of heritage value and their contents were reinscribed as "archaeological resources," in need of protection by trained professionals. The implementation of these top-down policies quickly fell to university-trained archaeologists, creating a cadre of professional managers that assumed both a legal right and a moral responsibility to serve as guardians of sites and objects.

By the mid-1990s, "stewardship" had been adopted as the primary principle of ethics by the Society for American Archaeology (SAA) (Lynott & Wylie 1995). This signaled an expanded responsibility for archaeologists, far beyond merely doing "good science." The concept of stewardship spoke to many pressing issues of the time, such as the growing reluctance to excavate except at threatened sites, the "curation crisis," threats posed by looting and the antiquities market, the need to preserve archaeological records, and a mandate for public outreach. Most of the other Principles of Archaeological Ethics set forth by the SAA evolved to address what stewardship meant in various contexts. Clearly, stewarding the archaeological record "in the public trust" entailed serving many different – and sometimes conflicting – interests.

During the 1980s and 1990s, archaeologists faced ardent criticism from Aboriginal peoples, especially in regard to assumptions about the right

to study Aboriginal pasts and claims of ownership by nation-states over heritage sites and objects. Reframing these potentially messy issues in terms of stewardship, instead of rights or ownership, could be called a strategic move on the part of state-based agencies, since it "require[d] all sides to accept their responsibilities as stewards and to put aside professional and political interests in order to act in the best interest of the property and the cultural heritage that property represents" (Hanna 1993).

But is it possible to put aside professional and political interests? What does it mean to act in the best interest of the archaeological record or the heritage it represents? Could the use of the term stewardship in such contexts – intentionally or unintentionally – serve to depoliticize archaeology and neatly smooth over or mask more contentious issues of rights and sovereignty? (see Smith 2004: Chapter 5).

Current Contexts

How is the term "stewardship" being used in various heritage- and archaeology-related contexts today? The brief discussion below incorporates responses to a query posted on the World Archaeological Congress listserv.

Government

The normative force of the concept of stewardship is clear from how pervasive and embedded the term has become in "official" discourses, where it puts a benevolent spin on who has the authority and expert knowledge to make decisions about how to manage, for whom, and to what ends. Federal programs typically follow standardized legal definitions that equate archaeological stewardship with cultural resource protection, preservation, management, and public outreach, performed under the direction of trained professionals. In many government contexts, "heritage stewardship" has become synonymous with "heritage management." Stewardship is also a central tenet of numerous government-sponsored public education programs, which impart particular values to citizens through participatory archaeology projects and "site steward" programs.

Sometimes codified definitions of stewardship embedded in agency policies and regulations conflict with ideas about good stewardship in practice. For example, US regulations legally mandate indefinite or perpetual curation of federally accessioned archaeological collections (see 36 CFR 79). This severely limits what actions can be taken, even when repatriation, reburial, or disposal is more appropriate.

Private Sector

Today the majority of archaeological work is conducted by private sector cultural resource management firms (CRM; also known as archaeological heritage management or AHM). In this context, stewardship typically refers to practices and decisions that protect or increase the significance and value of heritage resources. Here, preservation and conservation often compete with economic development, and stewardship may involve calculated destruction or mitigation that attempts to balance economic, private, and state interests. Some heritage management companies invoke "stewardship" as an advertising strategy, to express their moral superiority in contrast to other firms that practice "mere compliance."

The recent growth of private sector involvement in historic preservation has spawned a drove of "heritage stewardship" consultants who seek to bridge private interests and government mandates. Many of these consultants talk about heritage as an asset or form of capital and good stewardship as the means of protecting and growing these investments.

Professional Contexts

"Stewardship" appears in the codes of ethics and professional statements of many archaeological societies and not at all in others. For example, the Archaeological Institute of America's Code of Professional Standards describes archaeologists as "primary stewards of the archaeological record," while the professional statements of the Council for British Archaeology mention stewardship only briefly, in connection with local sites, and the Australian Archaeological Association makes no reference to "stewardship." The SAA Principles of Archaeological Ethics, which

declare "stewardship" as the primary principle, are widely cited in archaeological literature and training and have been adapted or adopted by a number of other national archaeological organizations, including the Society of Philippine Archaeologists and New Zealand Archaeological Association.

A refreshing approach is found in the Canadian Archaeological Association's (CAA) Principles of Ethical Conduct, ratified in 1996. As in the USA and New Zealand, the CAA lists "stewardship" as its primary principle but defines it as "respect for archaeological remains and for those who share an interest in these irreplaceable and nonrenewable resources now and in the future." This is notable for its openly stated inclusion of other interested persons. The CAA also has a Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples, which essentially recognizes Aboriginal stewardship as a right.

Using examples of high-profile repatriations in the USA (Kennewick Man) and Australia (Lady Mungo), Claire Smith and Heather Burke (2003) have illustrated how differing interpretations of stewardship deeply affect the professional practices and outcomes of archaeology. They point out that a code of ethics which cites stewardship of the archaeological record as its primary ethical principle invokes a very different epistemological standpoint and set of practices compared to a code that foregrounds people and relationships (as do the CAA and the World Archaeological Congress).

Museums also take their professional role as stewards very seriously. During the twentieth century, most museum professionals came to see themselves as stewards not simply for the nation-state but with a mandate to serve the public. In yet another transformation of their stewardship role, a growing number of museums today act as caretakers of objects for particular descendant and source communities. This has opened up the concept of archaeological stewardship to new relationships and practices. It can also mean that archaeologists and other researchers may encounter restrictions on access to particular objects or cultural information, unless appropriate permissions are obtained.

University Contexts

The term "stewardship" is noticeably absent from most introductory archaeology texts. When it does appear, it generally occurs within discussions of CRM or Public Archaeology. As Sonya Atalay advocates (2008: 139), archaeology courses should be studying the social, political, and historical conditions that have led archaeologists to claim to be stewards of the archaeological record in the first place. University-level archaeology programs with a focus on stewardship have tended to be located in North America, and they are typically geared toward training in heritage management. This is changing, however gradually (see "Future Directions" below).

Indigenous Uses of Stewardship

When Indigenous peoples – who have their own potent relationships, values, and forms of knowledge associated with ancestral sites and objects – talk about stewardship, it can mean something quite different from what most archaeologists take the term to mean. According to Navajo archaeologist Rena Martin (1997), all members of the Navajo community consider themselves stewards of the land and what it offers, and archaeologists are often viewed as interlopers who disturb the dead and their belongings.

Many descendant or source communities recognize stewardship as describing the relationship that Indigenous populations had with their lands and cultural resources prior to European colonization, a relationship that many are seeking to recover (Atalay 2008: 123). They are concerned that their heritage continues to be appropriated without their involvement or consent, and they see this as a serious violation of their own principles and responsibilities as stewards.

Some First Nations and other Indigenous peoples utilize the term in governance to express their rights and responsibilities to protect and nurture cultural resources. For example, in 1988 the Navajo Nation passed a Cultural Resources Protection Act (CMY 19–88, 1988) based on the concept of stewardship. The Act suggests the same end goal described by archaeologists (to benefit present and future generations) but goes

further in advocating collaboration among all parties who play a part in administering Navajo cultural resources. As a result of amendments to the US National Historic Preservation Act in 1992, over 100 federally recognized tribes have established Historic Preservation Offices to administer duties that would otherwise fall under state supervision. Meanwhile, Indigenous archaeology, which integrates tribal-based teachings with principles of "cultural heritage stewardship," has become a vibrant subfield within archaeology (see the entry on "▶ Indigenous Archaeologies in Archaeological Theory" by George Nicholas and Joe Watkins).

Key Issues

In many ways, the concept of stewardship has acted to promote the idea that archaeologists have a special, or even primary, relationship to "the past," one that overrides the interests and relationships of others. What rationales have been used to justify this presumption of privilege?

- The training archaeologists receive does indeed give them a special relationship to "the archaeological record" (a term that claims the past as the domain of archaeologists) and implies that this domain is best cared for or managed by trained professionals (see Hamilakis 2003).
- Government-mandated policies that designate archaeologists as managers and protectors of heritage resources.
- The discourse of professionalism and expertise, which distances archaeologists from the public and at the same time creates a sense that experts are needed to help people understand and care for the past (see Zimmerman 2000).
- The "implicit presumption of scientific privilege," justified by intellectual and scientific authority (see Wylie 1996).
- The "fiction of universalism" that supposes a transcendent, panhuman interest in scientific knowledge about the past (Wylie 2005: 61-2).
- Related to this, the notion that archaeologists, in their role as stewards, are acting as "impartial caretakers of a common heritage" (Bendremer & Thomas 2008: 62).

Over the past 30 years, each of these presumptions has been deeply criticized and challenged by archaeologists, Native peoples, and others (see McGuire 1992; Wylie 1996, 2005; Zimmerman 2000; Groarcke & Warrick 2006; Bendremer & Thomas 2008).

At the turn of the century, David Lowenthal (2000: 19) declared that heritage stewardship had become an "enterprise of technical expertise, while the general public, devoid of professional competence, stands aside." He repeatedly warned against this kind of exclusivity, insisting that effective stewardship requires engagement with the complications of everyday life. Alison Wylie (1996, 2005) has long argued that archaeological expertise should not override other interests or ways of connecting with the past. Leo Groarcke and Gary Warrick (2006) find the claim that archaeologists are acting for "all of humanity" problematic and impossible in practice, as if "the public" were a homogenous entity with interests synonymous with those of the state. Cornelius Holtorf has pointed out that, insofar as stewardship claims to preserve or protect on behalf of future generations, there has been no substantive discussion about what future that should be or why we should assume that the heritage being preserved now will be valued then.

John Carman (2005: 75-6) has gone so far as to call the concept of stewardship a justification employed to legitimate state claims of cultural property ownership. Laurajane Smith (2004) has exposed stewardship as a strategy for government control and authority that positions archaeology to mediate between the record of humanity's past and interest groups in the present. She argues that archaeological stewardship is often an appropriation of someone else's history in disguise, used to justify "pastoral care" and legitimate archaeological intervention (Smith 2004: 100). Nick Shepherd and Alejandro Haber (2011: 13) have discussed how the concept of archaeological stewardship acts to devalue and transform local knowledge and ways of interacting with sites and objects into a global, professionalized discourse of "heritage" and "resources" in ways that enable

nationalistic interventions or re-inscriptions of local histories.

In spite of their robust nature, these and other critiques have not led to a reenvisioning of stewardship among the majority of practicing archaeologists. Nevertheless, there are archaeologists and Indigenous community members alike who are giving serious thought to what it means to be a good, active steward and to identifying qualities that characterize leadership in heritage stewardship (see, e.g., Welch et al. 2011). All in all, although some people advocate doing away with the term altogether, there are also important ways that the concept of archaeological stewardship is being redefined, expanded upon, and recast.

International Perspectives

The term "stewardship" may be an entrenched part of the discourse of heritage in North America, but in global heritage contexts and in many places around the world, its use is much more uneven, though the underlying rhetoric of preservation, protection, or conservation "in the public trust" is usually present. With a few exceptions, stewardship is noticeably absent from international discourses on heritage. UNESCO's mandate includes "promot[ing] the stewardship of the world's cultural resources, including the built heritage, which constitutes our collective cultural memory," but with no discussion of what this means. The International Council of Museums (ICOM) defines stewardship in its code of ethics in relation to a museum's duty to hold collections "in the public trust":

> Collections are a significant public inheritance. . .inherent in this public trust is the notion of stewardship that includes rightful ownership, permanence, documentation, accessibility, and responsible disposal (ICOM 2004).

Responses to a query posted on the World Archaeological Congress listserv indicate that stewardship is not a term commonly employed in archaeology outside of North America. In fact, many felt that it had negative connotations, related to an imbalance of power over decisions about the care and management of heritage, in favor of national governments and archaeologists.

In South America, the term "stewardship" is also not commonly used. A word that sometimes takes its place is "fideicomiso," which refers to holding property in trust but also connotes a process of appropriation and disenfranchisement that is tacitly normalized by the state (Herrera, in press).

A notable exception is the ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value, which recognizes the Maori concept of "kaitiakitanga" as an obligation that extends beyond legal ownership (ICOMOS New Zealand 2010: §3). Although the text of the Charter does not mention stewardship, the glossary defines "kaitiakitanga" as ". . .the duty of customary trusteeship, *stewardship*, guardianship, and protection of land, resources, or taonga [cultural treasures]."

A few international colleagues saw value in using the term – not, however, to define an archaeologist's rights or responsibilities but rather when characterizing a community's right to manage resources on local terms. Several respondents noted that, in many international and intercultural contexts, and outside of North American governance circles, stewardship was more commonly associated with land and landscapes instead of sites and objects, and as an alternative to ownership. In this sense, the responsibilities of archaeologists may actually fall under the broader duties of land stewardship.

Future Directions

A number of significant changes in archaeology in recent years have challenged normative conceptions of stewardship and have brought about shifts in its meaning and uses. These include:

- Acknowledgment that living people(s) have potent interests in and intimate relationships with the past and may be strongly affected by the actions and interpretations of archaeologists

- Shifts in authority – in who is working for whom and who sets the agenda
- Respect for alternative, culturally appropriate ways of conserving, curating, and caring for sites, objects, and cultural knowledge
- Realization that the imagined divide between cultural knowledge and "science" is false as well as disrespectful of the diverse ways that people value the past
- Greater degrees of collaboration among those who have special relationships with "the archaeological record" or who are otherwise affected by archaeology
- In particular, the inclusion of non-archaeological voices and values in planning, interpretation, and decision-making

These changes have helped generate new conceptions of "stewardship" that begin to move beyond privileging archaeological knowledge or expertise.

Below are some examples of how "stewardship" is taking on new meaning in archaeology and heritage-related research and practice.

Shared Stewardship

Shared stewardship has become an important concept in international negotiations regarding ownership of antiquities and cultural property, where questions of valid title are so difficult to resolve (see Lyons 2002: 133). In another context, the US National Park Service now references "shared stewardship" as one of its "core values," purportedly as a way to signal a commitment to collaborating with members of the global preservation community. Shared stewardship is also occurring with greater frequency on small, local scales, where it means sharing control, authority, management, and/or decision-making. Examples include repatriations to source communities, the co-management of heritage sites, development of memoranda of understanding between museums and cultural descendants, and the use of culturally appropriate curation practices.

Collaborative Stewardship

Collaborative stewardship moves even further toward inclusiveness, honoring and supporting the obligations, values, and alternative approaches of others, and thus directly challenging archaeological privilege. For many archaeologists, incorporating alternative conceptions of stewardship, worked out in collaboration with others, is an important way to decolonize archaeology (see Nicholas 2005; Atalay 2008, 2010).

Community-Based Stewardship

Community-based stewardship – which is essentially collaborative stewardship guided by community-identified needs – is becoming an important aspect of twenty-first century archaeological practice. In community-based projects, archaeologists may act as facilitators, promoters, educators, or benefactors, while local people are full partners and beneficiaries. Frequently the role of steward, over time, is "devolved" from archaeologists or the state to those living and working in the area. The museum at Agua Blanca, Ecuador, is one example where, after years of collaborating with archaeologists, the stewardship of local sites and management of the local cultural center/museum is today in the hands of local townspeople (see McEwan et al. 2006).

Community-based stewardship presents archaeologists with considerable challenges, since community needs may have more to do with securing economic opportunities, jobs, or funding for local projects than with conventional archaeological goals. Swedish archaeologist Eva Svensson (e-mail, 28 October 2011) suggests that since heritage has become such an important asset for development, a community-based conception of stewardship could lend weight to citizen and community voices and thus help balance development decisions (often made by outsiders) with ideas about heritage and its significance held by local people.

Knowledge Stewardship

For archaeologists, knowledge stewardship has long been an important aspect of their own professional practice, but today it also refers to respect for how others have their own, sometimes very different, methods of caring for, nurturing, and sharing knowledge and other intangible aspects of culture. Atalay (2010: 65) notes that "[i]n many cases, caring for knowledge and place

simultaneously was often interwoven in traditional forms of stewardship." For example, the Ojibwe concept of *gikinawaabi* encompasses the responsibility of elders to protect and pass on knowledge. In this and many other instances, archaeologists are also learning that good stewardship sometimes means respecting restrictions on access to or circulation of cultural information or knowledge.

Indigenous Heritage Stewardship

Indigenous heritage stewardship is a term being used to describe approaches developed by, for, and with Indigenous communities, which place archaeology in the service of Indigenous goals and principles and have social justice as an underlying core value.

For example, for the White Mountain Apache, archaeology and heritage stewardship are playing an important role in ongoing efforts to strengthen tribal sovereignty (Welch et al. 2006). The tribe has created heritage policies founded on Apache principles of stewardship, which extend to caring for sites and objects that, due to historical circumstances, lie outside current tribal boundaries and ownership. These policies in turn inform tribal law, governance, and economic development decisions. Similarly, the Hul'qumi'num Treaty Group of Vancouver Island (Canada) has articulated protocols based on their own conceptions of heritage law to guide decisions about land and resource development (see McLay et al. 2008).

Today, several universities, including Northern Arizona University (USA) and University of Victoria (BC) Canada, offer programs in Indigenous Heritage Management (see Hunter 2008). John Welch, who teaches Indigenous Heritage Stewardship at Simon Fraser University in British Columbia, believes that this is the direction that the concept of stewardship is heading within archaeology.

Deliberative Democracy

When the participants of a 2008 conference session on "The Ethics of Archaeological Stewardship" shared their experiences, they discovered that "stewardship" had a different meaning in each and every situation (Shoup & Monteiro 2008). What seemed to matter most was the attitude of the archaeologist – in particular, an attitude of respect, the ability to listen, and a willingness to integrate local needs and interests into the research agenda. The concept of "deliberative democracy" emerged as a term that encompassed the kinds of practices that archaeological stewardship should nurture, both in daily interactions, dialogues, and decisions with local people and in broader heritage contexts (Shoup & Monteiro 2008: 331).

These are just a few examples of ways the concept of stewardship is being revisioned in archaeology.

Conclusions

The idea that stewardship is the purview and privilege of archaeologists and other heritage specialists is still very entrenched – especially in government agencies, international bodies, and private sector heritage industry. In some places, use of the term in relation to archaeology is virtually nonexistent. In others, it marks deliberate movements toward self-determination and more equitable practice, signaling empowerment of local people and descendant communities to manage, protect, and make decisions about heritage and its uses.

In general, the meaning of stewardship in archaeology has shifted over the past generation from being almost exclusively object-centered to becoming more relationship-centered and from being defined by state-based policies or universalisms to recognizing pluralisms and particularisms that embrace more collaborative and inclusive approaches. Archaeologists may find that these new approaches and relationships mean additional restrictions on current disciplinary practices as they find ways to share their sense of duty to the archaeological record with others. Whatever the case, as part of understanding and confronting the foundation of their discipline and its practices, archaeologists must continue to revisit the questions: stewardship – of what? for whom? on what terms? and to what ends?

Cross-References

► Archaeological Record
► Community Archaeology

▶ Conservation and Management of Archaeological Sites
▶ Cultural Heritage and Communities
▶ Ethics in Archaeology
▶ Repatriation: Overview
▶ Sacred Sites in Indigenous Archaeology

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Archaeological Theory: Paradigm Shift

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Introduction

The human and social sciences have undergone major changes in the past decade, thanks in part to (1) the critique of humanism, anthropocentrism and Eurocentrism; (2) the development of new connections between the humanities and the sciences, especially biology and the natural sciences; (3) the conventionalization of the interpretivist-constructivist paradigm which has prevailed in the humanities since the 1970s; and (4) the emergence of various, often conflicting trends related to new materialism and new empiricism, which share a turn away from the text and a return to materiality that is present and accessible "here and now." This shift is prefigured by the development of global capitalism, migration, the ecological crisis, natural disasters and new genocides and terrorism, and biotechnological progress, phenomena which the human and social sciences have attempted to describe and comprehend. The alternative trends proposed by scholars who represent cutting-edge research perspectives and lead the way in disciplinary debates suggest the need for a thorough rethinking of our notions of life, human nature, the relations between the human and the nonhuman, and for breaking away from the Western tradition of anthropocentrism with its reductionist concept of matter as empty, lifeless, and lacking agency.

Key Issues/Current Debates/Future Directions/Examples

While the variety of research tendencies and approaches constituting the contemporary

human and social sciences cannot be subsumed under homogeneous paradigms (understood here after Thomas Kuhn as research models or as a disciplinary matrix), in order to present a simplified model of paradigm shift which has arisen in the human and social sciences in recent years, two dominant models might be identified: the interpretivist-constructivist (postmodernist) and the posthumanist. This shift can be observed (among others) in the recent interest in animals, plants, and things. However, quite often while they are treated as interesting research topics and examined by means of known theories, researchers hesitate to address the relationship between humans and nonhumans in the context of the radical avant-garde of critical posthumanism, even though it is the latter that anticipates the appearance of new facts (e.g., Rosi Braidotti, Donna Haraway, N. Katherine Hayles, Bruno Latour, Cary Wolfe, as well as artists like Eduardo Kac or Stelarc). Scholars are increasingly interested in "disobedient" subjects, which often require complementary approaches combining the human, social, and natural sciences, such as environmental studies, animal studies, plant studies, and BioArt. The theories used in the human and social sciences today struggle with the problem of incommensurability: the results of their research are incommensurable with the changing reality and social expectations. That is to say, although scholars observe the ongoing changes, write about them, and create new research areas, they lack adequate tools to conceptualize them. This lack constitutes a major problem in today's human and social sciences.

The interpretivist-constructivist paradigm was not a homogeneous whole but a set of various research approaches and perspectives which have evolved in time and space. This paradigm might be regarded as characteristic of the so-called new humanities, which includes a variety of interdisciplinary trends such as gender and queer studies, postcolonial studies, ethnic studies, and disability studies (Fuery & Mansfield 1997). The interpretivist-constructivist paradigm has played an interventionist, emancipatory, and even insurrectionary role, actively participating in social change. During its domination in the humanities, scholarship has become a form of political activism and concentrates its interest around such key concepts as identity, power, and the other. The characteristics of this paradigm include a pragmatic approach to research, its politicization, emphasis on the relations between knowledge and power, ideological engagement of the researcher who wants to participate in social change and the struggle for justice, unmasking the practices of power, belief in the construction of social reality, and focus on reclaiming forgotten and/or excluded pasts. In terms of epistemology, the interpretivist-constructivist paradigm has promoted interdisciplinary approaches and epistemological relativism, the theory of the situated subject of knowledge (i.e., its subjectivity), and reflexivity and has emphasized the pertinency of interpretation over an interest in truth.

After the long dominance of postmodern "weak science," its politicization and ideologization, scholarship which is experiencing a paradigm shift, begins to look for ways to reestablish its authority, for new goals and standards, and for solid knowledge based on evidence and affording a sense of security in the world. It begins to readdress such classic worldly issues as good and evil, truth, values and virtues, universals, human nature, religion, and the sacred and looks for practical wisdom that would help answer the question of what to do and how to live a morally responsible life in a world where everyone has the right to their own truth.

The limitations of the interpretivist-constructivist paradigm are evident in relation to the process that sociologist of science Andrew Pickering described as "posthumanist displacement of our interpretative frameworks" (Pickering 1999: 561). One manifestation of this process is the emergence of the posthumanities (Badmington 2007; Wolfe 2010). The posthumanities can be defined as

a set of tendencies and research trends related to the intellectual movement and ethical stance known as posthumanism. They construct a knowledge that critiques and/or rejects the human's central position in the world, hence their preference for non- or anti-anthropocentric approaches. In a sense, the posthumanities can be thought of as non-anthropocentric humanities, although this definition is too paradoxical to be embraced without reservations. Ideas of a non-anthropocentric paradigm appeared as early as the 1990s. The primary research interests of the posthumanities include the boundaries of species identity, relations between the human and the nonhuman (the human's relations with technology, the environment, animals, things) and questions of biopower, biopolitics, and biotechnology. The point is not to exclude the human from scholarship but to critique the view of the human as the master and center of the universe.

Environmental history scholars have long criticized cultural and social determinism and the Euro- and anthropocentric character of knowledge. Richard C. Foltz emphasized the need to depart from fragmented knowledge and replace it with integrated visions of the relations between humans and nonhumans and to reframe the concept of agency as the historical (non-intentional) agency of nonhuman actors. He observes that "the environmental crisis is the playing field on which all other issues meet," while a "climate change may well turn out to be the historical event of our times, which future historians may see as the matrix within which all other historical events of our era unfold" (Foltz 2003: 20).

The changes described above provide a context for the growing "thing studies" (part of the so-called new material culture) associated also with an interest in the new materialism that manifests a departure from the traditional (Cartesian) concept of matter as passive and lifeless (Cole & Frost 2010). Characterized by focus on technological progress and humans' growing dependence on things, validation of autochthonous cultures' view of the relations between humans and things, and reliance on quantum physics, new materialism proposes a thorough rethinking of the concepts of matter, vitalism, and animism in the completely new context of today's world (Lury et al. 2006; Harvey 2006). Matter and things become active, unpredictable forms of constant becoming non-intentional agency.

While observing a growing interest in thing studies as well as in animal studies and plant studies, it seems that the reference point for human and social sciences is increasingly shifting from the human being and the humanist, anthropocentric view of its dominant position in the world to the human being as a species, considered in the context of the so-called deep or big history of life on earth (Christian 2004; Smail 2008) and understood as one of the forms of this life. Paradoxically, in the current geological epoch referred to as the Anthropocene (Steffen et al. 2011; Solli 2011) and characterized by a massive global impact of human activities on the environment and the climate, today's human and social sciences are defined by debates about the critique of anthropocentrism, posthumanism, species identity, and interspecies relations.

This kind of thinking has inspired the ideas popularized by Fritjof Capra in the late 1990s. Capra argued that we were witnessing a paradigm turn in science, a turn away from physics and to natural science accompanied by a change of values as researchers embraced the principles of ecological thinking (Capra 1997). During the last ten years a shift from the interpretivist-constructivist paradigm to the posthumanist paradigm (working label) can be observed that includes various pro-environmental approaches. Richard McNeil Douglas argues that "Environmentalism itself is not the paradigm, rather its antithesis, erupting from the growing contradiction between progress and reality, which tells us that a new paradigm is needed" (Douglas 2010: 214). However, posthumanities and ecological humanities, with their non-anthropocentric approach (seeing the world in terms of

collectives of humans and nonhumans, companion species, and kincentricity with the natural world) and interest in traditional ecological knowledges, already announce a growing fundamental change in scholars' consciousness. A process of "indigenizing the academy" – as Devon Milhesuah and Angela Wilson have called it (Milhesuah & Wilson 2004) – is worth mentioning here; they argue – as do postcolonial scholars – that the academy needs an alternative to the European tradition of thinking since this tradition does not offer a worldview that will be a successful survival tool. In a sense, a paradigm shift marks a return to the evolutionary understanding of scholarship as adjusting to a changing reality and a resumption of the debates about whether scholarship (the human and social sciences) has any survival value for the human species and for life in general. This shift is interesting and important because it adopts new points of reference and new goals for the production of knowledge. One of its reference points is life itself or *zoe*.

One sign of the major reconfigurations in the theory of the human and social sciences is a change of research perspective, from the vertical to the horizontal. Generally speaking, the vertical model of knowledge is being replaced by the horizontal model as the so-called flat alternatives and/or relational approaches grow in importance. Indeed, it is legitimate to say that contemporary human and social sciences are all about relations and interconnectedness. Among the many factors that stimulate this shift are quantum physics as well as traditional ecological knowledge that share a conviction that all things are connected. However, as mentioned above, Raymond Pierotti and Daniel Wildcat indicate connectivity "is not simply a homily and a romanticized cliche, but instead is a realization that no single organism can exist without the web of other life forms that surround it and make its existence possible" (Pierotti & Wildcat 2000: 1336). Pyramidal metaphor of viewing reality has given way to the metaphor of entangled relations, a web, net, and network but also assemblages, collectives, kinships, companions, and communities.

Thus, this shift has been caused, first, by ecological thinking, which endorses an ontology of connectivity between humans and nonhumans and humans and the environment, and second, by science and technology studies, which examine the relations between humans and things. It has resulted in a widespread use of flat alternatives and relational approaches. Flat alternatives operate in terms of horizontal relations, associations, assemblages, symbiotic communities, emergence, and entanglement. Examples of such flat ontologies are Bruno Latour's actor-network theory (Latour 2005), Manuel DeLanda's assemblage theory (DeLanda 2006), and more recently, Ian Hodder's project of relational archaeology (Hodder 2010). They share a critical approach to traditional social constructivism, whose idea of society as socially constructed establishes a certain social determinism (sociocentrism) focused on human subjects. Many scholars agree with Latour, who argues that society is not constructed exclusively by humans but emerges as a result of human-nonhuman interactions (Latour 1999: 199, 209). In this context the idea of hierarchy is being replaced by that of symmetry.

The idea of symmetry has become so widespread in the human and social sciences that avant-garde archaeologists, following in Latour's footsteps, have formulated the project of "symmetrical archaeology" (Witmore 2007). In his *In Defense of Things*, Bjørnar Olsen declares an egalitarian approach and a more symmetrical view of reality. He assumes that things, and material culture in general, are beings that coexist with other beings like humans, animals, or plants. They all have material properties and share the world they inhabit. Symmetry in this context does not mean that all these beings are equal or the same; they are seen as different and diversified forms of being, but

the differences among them should not be framed as ontological dualisms or negations. Rather, they are nonoppositional, relative differences that foster collaboration, transmission, and exchange (Olsen 2010).

The future of the human and social sciences is inseparably connected with reflection on the future of the human species, transspeciation, and of life itself. Knowledge about the past becomes a future-oriented knowledge that facilitates adaptation and is relevant insofar as it supports the survival of various species. Thus, knowledge about the past becomes part of the planetary project of sustainable development. Science, technology, and art open the way for the human and social sciences to think about the multispecies world of future communities.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeobotany
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Environmental Archaeology and Conservation
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Hodder, Ian (Theory)
- ▶ Material Culture and Education in Archaeology
- ▶ Materiality in Archaeological Theory
- ▶ Zooarchaeology

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Archaeology and Anthropology

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Introduction and Definition

This entry addresses the practice of modern world archaeology in relationship to its sister discipline of anthropology. My discussion explores two particular issues. First, I briefly describe a history of some of the shared interests that establish the relationship between archaeology and anthropology. Based in the analysis of material culture and spatial relations, archaeology has long drawn insight and inspiration from the anthropological study of cultural interactions, processes, and systems. I also consider the application of anthropology in the actual practice of modern world archaeology. This work is presented in two frames. The first is the use of anthropological data and approaches in the recovery and interpretation of past people and ways of life through surviving material remains. I focus specifically on cross-cultural studies, whose anthropological perspectives enhance the capacity of archaeology to contribute to the study of colonialism. A second frame is the use of anthropology as method for developing a reflexive critique of archaeological practice. In recent years especially, a great deal of work has aimed to better understand archaeology as a distinctly modern practice. In one guise, this work looks explicitly to connect archaeology with modern interests in heritage and cultural identity and establishing a record that recognizes diversity within modernity. Another expression is found in work that employs an anthropological perspective to establish archaeology itself as a worthy subject of study. In this work, archaeologists and others examine archaeologists and archaeological projects as cultural practices. The use of anthropology here is a realization of one of the discipline's most basic goals: to critique the "home" cultures and communities that conceived of anthropology and archaeology in the first place and to enhance the capacity of this work to cultivate greater understanding and democratic participation in modern life.

Historical Background

A logical place to start is Lewis Binford's classic and controversial 1963 *American Antiquity* article, "Archaeology as Anthropology." This essay is regarded as a seminal work for "new" or "processual" archaeologists, especially in the United States. While the essay has been critiqued, it still represents one prominent perspective on the practice of archaeology as a branch of anthropology. Binford (1963: 217) states his understanding of anthropology in this way:

> Initially, it must be asked, "What are the aims of anthropology?" Most will agree that the integrated field is striving to *explicate* and *explain* the total range of physical and cultural similarities and differences characteristic of the entire spatial-temporal span of man's existence . . . Archaeology has certainly made major contributions as far as *explication* is concerned. Our current knowledge of the diversity which characterizes the range of extinct cultural systems is far superior to the limited knowledge available fifty years ago. Although this contribution is "admirable" and necessary, it has been noted that archaeology has made essentially no contribution in the realm of explanation.

For Binford, the purpose of anthropology is to explain "cultural systems," and, as anthropologists, archaeologists should aspire to not only recover, describe, and classify material culture but to employ it as evidence to explain the causes of past activities. Binford sought to reinvent archaeology as a more rigourous scientific pursuit that produced causal explanations based on hypotheses tested against the archaeological record itself. Binford's career as well as that of many of his American peers and acolytes was defined by a scientific struggle to connect the archaeological record to the activities that produced it so that what happened in the past could be known, tested, and ultimately predicted (Schiffer 1976).

Processual archaeologists largely deployed cultural ecology as "anthropology" so that people

and their social and cultural contexts were defined by the resources and limitations of their environment. Cultural ecology also places great value on (eco)systemic stability and the importance of adaptation to explanations of human activity. An excessive focus on human-environmental relationships and the concurrent dehumanization of archaeology's subjects fostered a number of powerful critiques of cultural ecology (e.g., Shanks & Tilley 1987; Trigger 1989; Gero & Conkey 1991; Hodder & Hutson 2004). Nevertheless, a kernel of Binford's hope for an anthropological archaeology remains in general circulation. This is the idea that archaeology shares a basic common goal with anthropology: that expressions of humanity, including in and through material objects, are patterned and can be read to reveal influential practices and perhaps underlying rules that produced and reproduced meaning and action. While the cultural ecological approach of processual archaeology situated meaning in the adaptation of societies to their surroundings, the diverse post-processual archaeologies that followed it engendered a more broadly conceived approach to meaning-making in archaeology.

Couched in Marxism, feminism, hermeneutics, and other frameworks, post-processual archaeologies embrace a general notion that understanding agency and subjectivity is essential to the making and interpretation of the archaeological record. In fact, most post-processualists embrace subjectivity, arguing that the intersubjective spaces and activities people work through every day form the basis of active meaning-making in social and cultural life. Post-processual archaeology draws on the anthropological framework that succeeded cultural ecology. This approach has come to be termed "interpretive anthropology," a framework described famously by Clifford Geertz (1973: 5) in this way: "Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning." Interpretive anthropology moves from explanation toward understanding such that even as we live now in our own situated and culturally structured worlds, we may still acquire a perspective on others, both past and present, in which they may be appreciated and understood on their own terms. The focus of interpretative anthropology is less the struggle for resources than the struggles for identity, power, change, and significance.

As interpretive anthropology matured, a significant interest emerged in the situated standpoint of all persons and institutions, including those of the disciplines and researchers working to document and represent diverse cultural worlds. Eventually a reflexive anthropology formed, especially following a set of powerful critiques of the discipline during the 1970s and 1980s. One critique showed the complicity of anthropology within the oppressive and racist colonial regimes where anthropological fieldwork traditionally took place (Asad 1973). A second critique, initially voiced by feminist anthropologists, rejected the capacity for anthropology to produce objective knowledge, insisting that all knowledge is situated and partial, especially knowledge constructed cross-culturally (Moore 1989). A third critique focused on the translation of experience into text and argued for the radical deconstruction of the research position as not only socially situated but also the result of distinct and under-theorized actions of writing and representation in and about the world (Clifford & Marcus 1986).

Reflexive anthropology fostered new approaches to writing and to the representation of cultural subjects. It also established that the practice of anthropology is itself more than description and interpretation but also is an active way to create meaning in and about the modern world. However, the most powerful transformation to anthropology achieved by reflexive approaches was an acceptance that not only are interpreters (i.e., anthropologists) viable anthropological subjects but subject persons and groups themselves are necessarily valid interpreters of anthropology. Seeking broader inclusion in the discipline and a deeper dialogue about the meaning of anthropology in the modern world, indigenous anthropologies illustrate some of

the most basic goals of reflexive research (Smith 1999; Kirch 2006).

In large part modern world archaeology is a post-processual, interpretive, and reflexive field. With access to historical and cultural documents, the textual silence associated with the creators of the prehistoric archaeological record disappears and in fact defines a new rationale for archaeology that aligns it with interpretive anthropology. Given the presence and authority of documents and oral testimony in modern life, archaeology and material culture provide complimentary data that reveal significant contradictions and uncertainties that lie in the spaces between the written and wrought and between the consciously recorded and the simply done (Potter & Leone 1988). Very much informed by interpretive anthropology, modern subjects are considered active social beings whose lives are marked by a rich negotiation with competing regimes of power and identity, such as nation, race, class, capitalism, and modernity. Moreover, with a complex array of documentary and material data at hand, the reconstruction of the interpreting subject is well within the reach of modern world archaeologists. At its best, modern world archaeology brings the world as subjectively conceived by it subjects into view and then deepens it as the statements recorded in documents are articulated with the practical consciousness of actions and artifacts.

Modern world archaeologists are also quite aware that they study the origins of the world as most people know and experience it today. Modern world archaeology thus contains a number of studies cast in the mold of reflexive anthropology. Some of these studies work to bring awareness and significance to what may be termed "minority histories." This sort of research takes as a starting point the fact that the making of modern world has involved the creation of the white western heterosexual male standpoint as the "normal" historical subjectivity. The perspectives and experiences of the modern world of women and nonwhites, as people without history, must therefore be excavated from the spaces where they were confined as secondary and abject and reintroduced as fully participating characters in the narratives of modern life.

A second branch of reflexivity in modern world archaeology researches what may be called "subaltern pasts" (these terms derive from Chakrabarty 2000). In these instances, a reflexive critique of archaeology works to challenge not only the absence of a historical presence for the majority of actors but the inherent biases that lie latent in the archaeological methods and practices we deploy to recover them. As with reflexive anthropology, an indigenous archaeology movement was forged alongside a great deal of productive research and analysis in the field of critical, community, and public archaeology. The remainder of this essay explores varied examples of the use of interpretive and reflexive anthropology in modern world archaeology.

Key Issues/Current Debates

Archaeologies of Colonialism

In most conceptions, anthropology is the study of cross-cultural interactions and subjectivities to provide a relativistic understanding of cultural experiences in different cultural milieus. Anthropology in this vein introduces an important layer of meaning and interpretation that transforms behaviors that may appear quite strange to outsiders into appropriate, culturally situated responses and actions. For example, Marshall Sahlins' (1985) study of the killing of Capt. James Cook by native Hawaiians in 1779 explains that the event, which lived up to the western conception of indigenous people as dangerous and wild, was rather a playing out of a native Hawaiian conceptual scheme that constructed Cook and his crew as representation of the deity Lono. Similarly, Michael Taussig's (1983) study of Columbian and Bolivian peasants shows that irrational practices like making deals with the devil and baptizing money are rather astute interpretative critiques of the transformations wrought by the capitalist planting and mining industries that came to dominate their communities. Many modern world

archaeologists work in comparable cross-cultural contexts that help reveal the contours and constructions of the modern world. While this sort of work may be found in varied contexts, I highlight here studies that examine the emergence and entanglement of cultures in colonial settings.

One of the most prevalent markers of the modern world are the thousands of intercultural relations that developed with European expansion and colonialism. Most research in this area begins with a conception of colonialism as the interaction of two or more distinct cultural worlds. The result has been an overwhelming majority of studies documenting the impact of colonialism on presumably stable "preexisting" indigenous cultures that underwent substantial change as they became modern. This sense of colonial cultures has undergone serious critique. In a nutshell, this critique illustrates Eric Wolf's (1982) concern with "people without history" such that before contact the worlds of the colonizer and especially the colonized followed secure and essentially timeless traditions that changed only after impact. It is misguided and self-important to think that colonialism instituted changes so substantial that colonized people were irreparably changed by their encounter with Europeans. For one, anthropology explains that all groups face changes and are culturally poised to respond, understand, and control their circumstances. This is the basis of Sahlins' interpretation of culture contact in Hawaii. Second, anthropology also shows that culture does not function outside of the social and historical circumstances in people's lives but is simultaneous and integral to the way history is made. This is what we learn from Taussig's research in South America. As such, we need to take care to recognize that colonialism is more than a context or a set of relations that situates people and groups in certain conceptual cultural worlds; colonialism is also a means of actual cultural production that creates and is created by the specific conditions that enable and control actions and social power through time.

An excellent approach to understanding the dynamics of colonial culture is Kurt Jordan's (2008) study of *The Seneca Restoration* in the early 1700s in New York State. Jordan urges the adoption of two critical standpoints. The first is a rejection of the dominant trope of "cultural decline" attached to the study of indigenous communities in the colonial era. In most instances, researchers posit a "precontact" indigenous people defined by the modern dream of the noble savage, a dream eviscerated as the unprepared native succumbs to modern desires, falters, and ends up destitute if not eliminated altogether. Regarding his study of the Seneca Iroquois, Jordan (2008: 18) points out the principal implication of the trope: "it declares that the only way for the Iroquois to remain Indians was to stay the same." In contrast, Jordan contends that the fact that we call people Iroquois (or another identifier) does not necessarily mean that they need to act in any particularly "Iroquois" way to leave behind important stories about the Iroquois people. Rather, how they struggled to remain a relatively autonomous and empowered community of Iroquois people is what we need to understand.

Jordan also calls for researchers to consider the "local political economy" in the interpretation of colonial lives. Referring to the places and relationships that make up the contexts of their daily activities, such as acquiring, cooking, and preserving food and tools and the maintenance of external relationships (through trade and conflict), he argues that understanding and operating in local contexts made up most of the consciousness of colonial subjects. A focus on local political economy does not replace a concern for broader-reaching contexts of colonialism or capitalism that are the general interest of modern world archaeologists. Rather, inasmuch as these broader concerns can be understood culturally, it will be in how they emerge in the actual daily practice in localities.

Jordan's study of the Seneca Iroquois in west-central New York State illustrates these standpoints masterfully. Most research argues that the Iroquois' encounter with British and French colonials is a story of decline defined by their participation in the international fur trade interspersed with periodic warfare, which left them decimated by disease and death and unable to reproduce vital cultural practices and remain

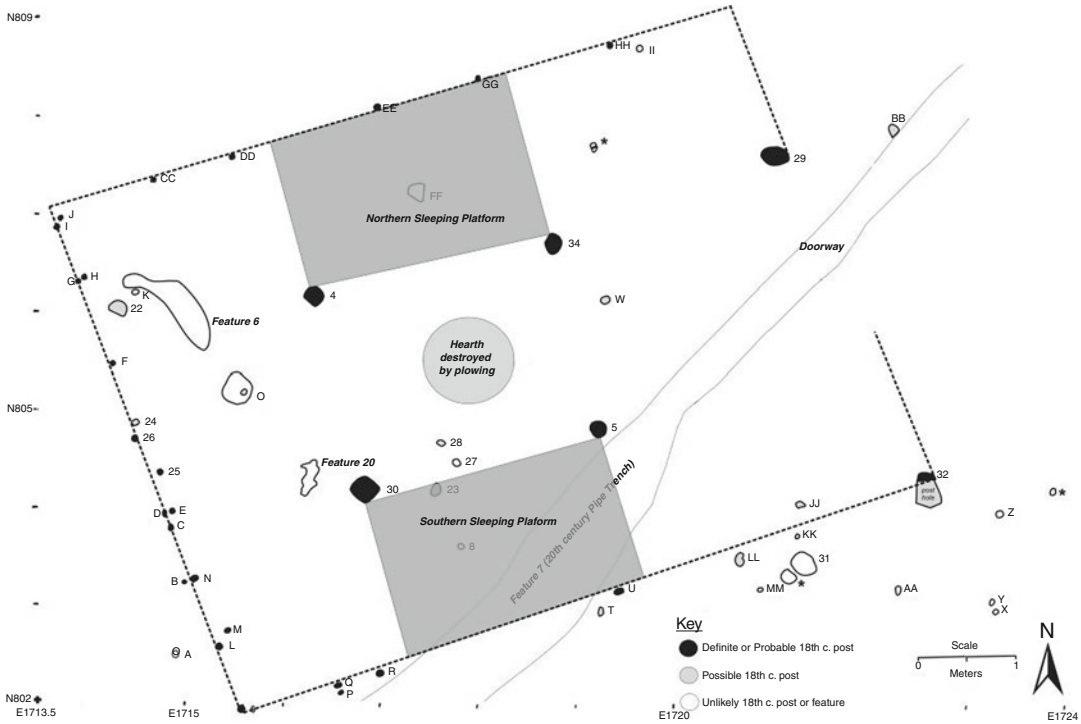

Archaeology and Anthropology, Fig. 1 Plan view of a Seneca short longhouse, Structure 1, DRC 1, Area D, Townley-Read site (Courtesy: Kurt A. Jordan)

Iroquois. The consensus is that by the early 1700s, the Iroquois were fully colonized and in this eroded state adopted what they could of European ways of life to survive. By the time they were subject to one of the earliest modern anthropological studies in the 1840s, Lewis Henry Morgan concluded they had become passive and lost the capacity for innovation, i.e., they were no longer Iroquois. Among the most visible effects of Iroquois acculturation was a change in housing and settlement patterns. Precontact Iroquois sites are associated with a matrilineal, multi-family house structure known as the "longhouse," built in clustered and often palisaded villages. By the 1700s clustered longhouse villages were replaced with dispersed settlements made up of smaller, sometimes nuclear-family, houses built with European materials. So, when "the people of the longhouse" (Jordan 2008: 13) stopped building longhouses, scholars took this as evidence of their decline.

Jordan counters this interpretation explaining that "many factors previously taken as evidence for acculturation or social disintegration in fact were innovations *beneficial* to Iroquois people" (2008: 23). His focus is the Townley-Read site, a component of the dispersed New Ganechstage Complex, located near the western shore of Seneca Lake. The site was established around 1715 in the years after a formal declaration of peace between Britain and France and occupied until the start of new international hostilities in 1754. Over several previous generations, international conflicts created a "landscape of fear" forcing Senecas to negotiate alliances with their Indian neighbors and colonial settlers and armies and, with a constant threat of war, be prepared to protect and/or uproot their settlements. However, after a peace treaty in 1713, palisaded villages were abandoned, and the Seneca moved to the dispersed New Ganechstage Complex consisting mostly of smaller "short longhouses" (Fig. 1).

Jordan argues that the 1713 peace treaty brought about the best conditions the Iroquois had experienced in decades. The shift to

a dispersed settlement therefore was a strategic development that allowed established Iroquois cultural practices to be put to use given the current conditions. Dispersed settlements supported greater household autonomy and better integration into the regional political economy. Households avoided a pattern of overusing key resources like firewood and cropland. Seneca women were also closer to water sources and their fields, giving them more time to devote to other productive activities. For example, the archaeological record suggests a greater emphasis on local deer hunting in this era. Deer meat was useful, but given more free time, women also extracted the maximum amount of value from a given animal. Marrow from long bones was collected for storable bone grease. Deerskins were also useful both in the household and as a valuable good in the international fur trade that still operated in the region.

Participation in the deerskin trade is paired with a documented shift in the source of beaver pelts to the Ohio territory and points west. Many scholars assert that this factor also evidences Iroquois decline. Jordan (2008: 341) shows that the western fur trade instead established a very useful "geographic middleman position" for the Seneca, in which good relations with the Iroquois were required for safe passage through their territory to the European trading forts. Iroquois are documented to have encouraged western groups to trade with Europeans in their region, most likely because this would have preserved and enhanced their role in the evolving trade network. Archaeologically this process is visible in a marked increase in the number of red pipestone artifacts which originate from the upper Midwest. More than exotic goods, these artifacts were part of an assemblage that also included glass beads and beaver pelts paid to the Seneca for safe passage through their territory. Notably, red pipestone was not valuable to Europeans at the trading forts so its value was restricted to Native American relations. Moreover, a 1730 document shows that western Indians went out of their way to visit Seneca villages, a record suggesting this was part of an established process of securing an alliance.

In sum, Jordan shows in these data and many others that the early eighteenth-century Senecas were not in decline but strategically situated to take advantage of the opportunities and limitations presented in their cultural world. Their selection of a dispersed settlement pattern suited the conditions of the era and allowed them to employ and adjust key "Iroquois" cultural practices in household management and trade relations. In effect, the evidence of being Iroquois in this case indicates the process of Iroquois people continuously transitioning to become modern within and against colonialism.

A second compelling archaeological study of modern colonialism is Akinwumi Ogundiran's (2002) study of trade beads and cowrie shells in Nigeria and Benin during the era of the African slave trade. Ogundiran works with multiple data sets including myths and legends as well as archaeological material culture to weave a brilliant interpretation of the uses and meanings of cowrie shells. Ogundiran (2002: 431) argues that "material culture, myth, and legends constitute a 'cognitive constellation' that shapes the perception of reality and provides insights about the world and about new experiences. In this regard, objects (whether locally or externally derived) are critical to generating, transforming, and transmitting ideas and values into physical reality. The conversion of ideas into objects and of objects into ideas, however, is a two-way process by which culture is created, codified, and contained." In this approach cultural expressions (both material and ideal) are practical statements seeking to provide stability to the dynamic and unsettled meanings that can emerge in colonial settings.

This study begins with the fact the Bight of Benin/Slave Coast region consumed almost half of the cowrie shells (more than 10 billion) imported through all West African entrepôts. Cowries are an Indian Ocean shellfish species first imported by Portuguese traders to serve as a trade item in Africa. Soon after their introduction, cowries were adopted as a form of currency and thus elevated from a bauble to a foundation of local economies. Ogundiran contrasts the use of cowries with that of glass trade beads that had

long served as sumptuary goods deployed by elites to display prestige, cement alliances, and fund attached specialists. Moreover, beads came to stand for preciousness, auspiciousness, good fortune, and spiritual health. Ogundiran offers the following translation of a Yoruba panegyric to illustrate:

> Child of one who wakes to thread, one who threads *segi* beads
> My father, one who rises at the crack of dawn to thread "groundnut" coral
> Child of Owara Aremu, who scatters *segi* beads in the forest
> He said it's because of the pluckers of leaves (leaf sellers)
> He said it's because of the breakers of sticks (firewoods sellers)
> He said it's because of the destitute who traverse the bush far and wide

Beads were the result of hard work and the use of one's wealth to care for those at the margins of society. While self-aggrandizing, elites were praised for their charity and support of the whole community.

The introduction of cowries and their use as currency supported an intensification of commercial activities among an ever-larger proportion of the population that ultimately undermined such reciprocal cross-class relations. Cowries were used for most payments including tribute and bride-price as well as accepted as payments for captives sent to the slave trade. It was the connection between cowries and captive people more than anything else that fractured earlier social relations. One key social factor of cowrie currency was their tie to the emergence of more centralized state power largely supported by elite control of the slave trade. With centralization, the value of cowries stabilized, and their use more became widespread such that while most African commoners rarely owned other Atlantic trade goods by the 1700s, almost everyone in Yorubaland had cowries.

Notably, cowries also became an "embodiment of transformative/ritual potency" (Ogundiran 2002: 440). One story tells of the origins of cowrie money as the result of the peace made between a Benin king, Oba Eresoyen, and the great deity of the seas, Olokun, who "as a reward . . . heaped up cowries to the sky for Eresoyen and they were packed to the palace" (Ogundiran 2002: 441). This myth worked because the connection between the use of cowries and the transshipment of captives represented the basis of a new way of life for people tied to the generation of wealth and power from the ocean. Commoners also told stories that connected enslavement, cowries, and the sea:

> In the beginning of the world we had the forge and we forged things, we had weaving-looms and we wove our clothes.... we had boats from which we caught fish. We had no guns. We had no cowrie-money (akwa). If you went to the market you took beans in order to exchange them for sweet potatoes. You exchanged something for something else. Then the king brought the cowrie-money. What did the king do in order to bring the cowrie-money? He caught people and broke their legs and their arms. Then he built a hut in a banana plantation, put the people in it, and fed them bananas until they became big and fat. The king killed the people and he gave orders to his servants to attach strings to their bodies and to throw them into the sea where the cowrie-shells (akwa) lived. When the cowrie-shells started to eat the corpses, they pulled them in, collected the shells, and put the live cowries in hot water to kill them. That is how cowrie-money came to exist (Ogundiran 2002: 443).

Here we see how common people, those most vulnerable to capture, construed a direct human-cowrie conversion. Yet, this myth also captures the rising significance of commercial activity in coastal West African society during this era. With cowries, as with all money, the value of goods shifted from their use in barter to their use in the creation of wealth at the expense of those traded away.

Slave Coast West Africans also found ways to rationalize the transformation of their society toward the global system and an associated shift in the meaning of humanity from lineage and region to the commercial value of persons, enslaved or free, in the market. Ogundiran explains this change through the use of cowries in rituals of self-realization. Just as "Oba Eresoyen is remembered in the oral traditions of Benin as the king who 'built a house of money' because he 'decorated the walls and palace of his palace with cowries'" (2002: 445), so did others,

Archaeology and Anthropology, Fig. 2 House of the Head Shrine (Ile-Ori), dimensions: H. 13 3/4 × diam. 10 in. (35 × 25.4 cm) (The Michael C. Rockefeller Memorial Collection, Gift of the William W. Brill Foundation, 1962. Accession number: 1978.412.459a-c)

including both noble and common people. A significant expression is the proliferation of *Ibori* shrines and *Ile-Orí*, or individualized deities constructed with cowries as the main decoration (Fig. 2). The *Ile-Orí* were "the house of the inner head" used to protect individuals from harm by nature or the evil eye, secure their privacy, and ensure their self-respect. The key reference is how cowries supported the individual as the basis of social life and the distinctions between individuals as the result of their autonomous actions: "The centrality of cowries to the making of *Ibori* and its *Ile-Orí* is evidence that cowries became the value register for harnessing the spiritual and temporal powers of successful men and women after the sixteenth century" (Ogundiran 2002: 448). Cowries helped West Africans to conceptualize and enable the transformations wrought to their society by the impact of the slave trade both in the taking of persons and in the commercialization and individualization of everyday experience.

Minority Histories: Archaeology, Heritage, and Identity

A very active interest in modern world archaeology lies at the intersection of archaeological research and heritage interests. Heritage is a shared interest among anthropology and archaeology, especially in the field of applied anthropology (Shackel & Chambers 2004). Based on the promise that archaeology can recover new data and build interpretations that compliment as well as challenge dominant narratives of modern history, many archaeologists see their work being about the meaning of past actions to people living now. As applied anthropology, archaeology is used to provide tangible histories and material touchstones in support of the creation and recognition of minority identities in modern life and the construction of paths to the recognition of diverse heritages. Some archaeologists see their work as a form of civic engagement and adopt a distinctly political edge. These approaches deploy archaeological resources to work with minority communities in order to capture their interests in the past and to present their findings to the broader public with the aim of fostering recognition and social change.

Very good examples of this work come from research connected to the struggle to preserve "unrecognized" indigenous identities in postcolonial modern life. In United States as well as other modern settler nations, the legitimacy of indigeneity is a serious discourse that crosscuts questions about national and tribal identities, race, as well as propertied interests and claims. The basis of recognition in the eastern United States is especially difficult since federal recognition of tribal status demands a continuous and documented official tribal record over four centuries. Being poor, racially outcast, and largely dispossessed of their material and cultural property and heritage, many eastern tribal communities cannot produce the records required for official recognition. Archaeological research on the history of these communities in the modern world, therefore, enters a dialogue on heritage and identity with powerful meanings and results.

The Werowocomoco project (Gallivan et al. 2011) in tidewater Virginia provides a good

illustration of this sort of work. Werowocomoco was the capital of the Powhatan confederacy when the English settlement at Jamestown was constructed in 1607. Werowocomoco was also the likely site where Pocahontas saved the life of John Smith, establishing a key origin story about colonial intercultural encounters that most Americans know and embrace. The archaeological discovery of the site in recent years, especially as it was concurrent with the 400th anniversary of the Jamestown settlement, positioned Werowocomoco as a potent symbol to a wide number of groups, including both Native American descendants and non-Indian American patriots.

Gallivan et al. (2011) point to a contradiction that surfaced around the Werowocomoco project between the expectations of indigenous historical and cultural continuity and current trends in anthropological scholarship that challenge essentialist cultural claims. Anthropology in this vein draws attention to the fluid social networks and strategic adaptations groups adopt to preserve autonomy and power during stressful times. The problem for unrecognized tribes such as the Pamunkey and the Mattaponi is that, while this sort of research may produce a more accurate, decolonized depiction of their history as people who equally contributed to the making of the modern world, it undermines the requirements for recognition that they exist still as "fixed, bounded and historically continuous entities" (Gallivan et al. 2011: 12). As such, Native American collaborators in the Werowocomoco project "publically represented themselves and their communities in terms of tightly bounded, internally homogenous tribal identities" (Gallivan et al. 2011: 12).

Despite this context, the research team still found useful insights and approaches that helped to construct a novel understanding of an indigenous life during the early colonial era. Challenging preconceptions that the Powhatan confederacy was a regionally organized, hierarchical chiefdom, archaeologists now believe that the network of Indian communities was framed in more local terms with groups forming alliances and other "foreign relations" without the overarching authority of a centralized chief. With this perspective in mind, Gallivan et al. (2011: 19) consider the community at Werowocomoco and their descendants have long practiced "creatively incorporating cultural elements including colonists, Christianity, and (most recently) archaeology, while retaining meaningful connections to place as well as kinship ties that stretch across diverse communities." While the results of this project and the collaborations and political actions with which it is engaged are not yet fully realized, a view of how modern world archaeology intersects with the complexities of intersecting and diverse heritages is very evident.

A second approach to heritage-driven research in modern world archaeology draws from a more explicit and political engagement with the process of building community collaborations as social action. Through the negotiation of a shared authority over research and presentation, collaborations with descendant and local communities often serve to empower not only their recognition but novel forms of knowledge useful to understanding modern lives both past and present. The Hampden Community Archaeology Project (HCAP) in Baltimore, Maryland, is a wonderful example of this work in the context of industrial working-class heritage (Gadsby & Chidester 2011). The Hampden section of Baltimore is a former industrial zone and working-class district that thrived in the late nineteenth and early twentieth centuries. After the 1920s most factories closed and residents had to look elsewhere for work. By the late twentieth century, Hampden's industrial history became noteworthy, though this was based in stories of the district's industrial and technological achievements and not stories about its working-class residents. As is common in postindustrial districts, this history was closely tied to the renovation of mill buildings into high-end studios and offices and the opening of new restaurants and trendy shops as Hampden was gentrified for use by the middle class. While the working-class history of the neighborhood is largely neglected, it does make an appearance at "HonFest" an annual event that "lampoons an imaginary

Archaeology and Anthropology, Fig. 3 HonFest 2004. Hamden, Baltimore (Photograph courtesy David A. Gadsby)

blue-collar experience by disseminating inaccurate and cartoonlike images of working class men and women" (Gadsby & Chidester 2011: 106) (Fig. 3). The HCAP seeks to redress this slighting of the heritage of the working-class residents, who have always formed the core of the Hampden community.

Gadsby and Chidester (2011: 107) distinguish between public heritage, that which is marketable and often the focus of heritage and urban development professionals, and private heritage "in which the past is dynamically linked to the present, with heritage values interpreted and identified by community members rather than outsiders." Focused on landscapes, housing, and fixed historical associations, public heritage encourages forgetting as it separates people and places. Private heritage, however, promotes remembering as it is based on the people and relations that connect past and present and thus give historical contexts to places as they are actually lived.

In addition to excavations at sites associated with the historic working class of Hampden, the HCAP also developed a number of noteworthy outreach programs to illustrate and promote an appreciation of the private heritage in Hampden. These included a series of public history workshops, a project blog, an oral history project run with high school students, and a program that paid city youth to work on the project. These resources provided community members with a chance to participate, publicly share their interest in Hampden's working-class heritage, and criticize how this heritage is ignored by outsiders. These useful critiques enhance the capacity of the archaeological project to engage in informed social action. One example of this was the creation of an exhibit on working-class women's history in Hampden to be mounted during HonFest, which provided a counter-narrative to the disparaging public heritage otherwise represented at this event.

Subaltern Pasts: Diverse Meanings of Archaeology in the Modern World

There is one additional anthropological method used to engage the cultural complexity of the modern world in archaeology. This involves understanding the contemporary landscape of knowledge production that enmeshes archaeology in modernity (Thomas 2004). Taking a cue from reflexive approaches in anthropology, some modern world archaeologists have conceived projects that consider archaeology itself as a subject of study. While some have engaged in

ethnographic research of archaeologists at work (Edgeworth 2006), others pursue ethnographic research on the contexts that construct archaeology as a discipline and practice as well as the activity of specific persons in the modern world. From the latter especially, important insights on the intersection of archaeology and modern life have emerged that very well may change the discipline's future.

This line of research may be couched under Lynn Meskell's (2005) term "archaeological ethnography." For Meskell, there are two critical elements that define this approach. The first is an interrogation of the relations between archaeology and "the locals." Long associated with archaeology as laborers, constituencies, sources of "traditional" knowledge, descendants, and stakeholders, archaeological ethnography seeks to broaden the scope of "local" relations as they are defined by the global and local scales of the modern world. At the global scale, "locals" are defined by diverse and specific geopolitical positions that situate them in ethnic, racial, and class histories of place and locality. According to Meskell (2005: 82), "locals" are not passively engaged with their conditions but "directly enmeshed in their own critical reformulations, political negotiations, and constitutions of theory and interpretation." In addition, local communities engaged with archaeology are typically internally diverse, crosscut by gender, age, and class dynamics that will necessarily affect relations with archaeologists and other outsiders. Archaeological ethnography works through these dynamics to establish the proper cultural fields in which archaeology participates.

One result of this approach for Meskell was the clear pictures of archaeology that "locals" had in mind when she approached them about her project at Kruger National Park in South Africa. Meskell's interest was in developing a proper picture of the cultural meanings and interests that neighboring communities, many of whom had been displaced by the colonial and apartheid regimes to create the park, held for archaeological sites within the park. Intending to discuss this project with residents of a Malatji village, she was directed to a courtyard where women were preparing a plaster courtyard floor. Meskell realized they were showing her traditional Malatji construction techniques or what they thought an archaeologist would be interested in seeing in their village. A similar example of cross-cultural confusion arose when her team reached an impasse while interviewing Malatji elders. The new chief expressed reservations about sharing the elders' stories because of a history of their cultural knowledge being used against them, especially in regard to land claims. Meskell (2005: 92) puts it this way: "in most contexts the taxonomy of 'homeland' would be a positive one inflected with concepts of tradition, ancestry, and indigeneity, whereas in South Africa it is steeped in a dystopian history of dislocation and disenfranchisement."

A second critical element for Meskell is the interrogation of the discursive field archaeology occupies. In archaeological ethnography, researchers shift their attention from an interest in past dynamics to the notions and uses of "archaeology" and "the past" in contemporary culture. While the past is a vital resource for building heritage in the present, the structure of the past and even what constitutes being "past" are regularly debated. The structure of the past is defined in the conflicts between unified and fractured tellings of history: whose history is privileged? How and why are others left out? Does the acceptance of diversity in history require multiple histories or can a broader inclusive history be built? The question of what is actually past versus what is still present is one with especially great relevance in modern world archaeology. In fact, a defining characteristic of modern world archaeology is that the issues and topics driving research have direct relevance to the present. Topics such as capitalism, colonialism, industrialization, racism, gender and sexual bias, class formation, and oppression can all be situated in both past and present, often with clear ties between what happened before and why and how things are the way they are now (Hamilakis & Duke 2007; Matthews 2010; Voss & Casella 2012).

More pointed than expressions of cultural continuities, the question of what makes the

past is especially significant when the problem is whether a people still exist and therefore whether the claims of those living now need to be addressed. Similar to the question of recognition in the Werowocomoco project discussed above, Meskell found a sharp divide between natural and cultural history in Kruger National Park that removed responsibility from park managers for the maintenance of archaeological sites or from having a working understanding of the relevance of archaeological sites to nearby local communities. The additional complexity here comes from basic questions that emerge about what counts as archaeology and who is responsible (and how) for establishing its relevance in the contemporary world.

My own work with the descendant mixed-heritage Native and African American community in Setauket, New York, explores some dimensions of archaeology as a public discourse alongside its role as a method for recovering histories lost to modernity (Matthews 2011). This project began as a collaboration between a community-based historic preservation group, Higher Ground Intercultural and Heritage Association, Inc., and the Center for Public Archaeology at Hofstra University (the collaboration is now with the Center for Heritage and Archaeological Studies at Montclair State University). From the start the project was community-driven, in that Higher Ground sought to create an independent story of their community that captured what its leaders felt was a disappearing resource. Since the 1960s, the mixed-heritage minority community in Setauket has seen a great deal of change as their population dropped from more than 40 families to fewer than 15. The problem is that during this time the Setauket area became suburbanized, a process that introduced more people and commercial development in the local area. New people and resources in turn led to an increased demand for housing and municipal services that in turn drove up property taxes. The Native and African American community were not prepared for these changes, and many have since left the area for less expensive places to live. While the process of gentrification is common on the American landscape; in this case, the community being removed is one that has distinctly deep local roots, having been present in the area since colonial settlement in the 1660s, if not long before, given their Native American ancestry.

This community's story is also connected to another local effort to control suburbanization: the creation of a series of historic districts in the area that have protected historic sections of Setauket from demolition. These districts have preserved a wide range of structures dating to the colonial and postcolonial eras of the area that help to give Setauket an aura of the past that it uses to distinguish itself within the larger region. It notable that the sections excluded from these historic districts were those areas where the minority community, who have always been there, lived. In one case the neighborhood was already torn down and replaced with a strip mall; in another case, the community was already removed in order to create an all-white elite enclave, and in the third, the area known as east Christian Avenue, where those who remain still live, was excluded because its lack of properly "historic" structures. In the end, the historic minority community was surrounded on all sides by an official historical landscape that made virtually no mention of them.

In response, Higher Ground petitioned for the creation of the Bethel-Christian Avenue-Laurel Hill historic district in 2005 so that the last stronghold of the historic Native and African American community could be preserved. This act not only added a minority component to the local historical landscape, it created a social context for creating and telling a separate story about the past in Setauket. This is how the collaboration between Higher Ground and Hofstra University came about. Higher Ground deliberately sought an outside institutional partner with which to create an independent and critical story of Setauket as a historical place. The partnership therefore was formed not only to recover archaeological and historic data but to create a new perspective on minority history within a space where the official history is routinely and genuinely celebrated by the majority community. Moreover, the purpose of our project does more

than challenge the mainstream story about the past in Setauket but also makes plain that neglecting the minority community in local history is akin to neglecting their well-being and survival in the present.

In words of Mr. Robert Lewis, President of Higher Ground, archaeology provides an opportunity to do something "unconventional." For his whole life, Mr. Lewis lived in a Setauket that relied on a simple historical thread tied to its colonial and rural history, its association with actions during the American Revolution, and a long process of slow capitalist development that had always found a place for his people, although at the bottom end of the socioeconomic scale. When he heard this same story from white preservationists as he sought their help, he realized that the story itself was very much part of the problem because it was not the same resource in his community than it was for his white neighbors. He needed a story of his own that could excite his community and inspire them to protect their heritage despite the obvious challenges.

Regarding archaeology Mr. Lewis said, "because it is unconventional opportunities for exciting discoveries exist" (Matthews 2011: 50). So, in this project we not only share our findings and include community members in the process of creating knowledge about the past but seek explicitly to engage them in the association between archaeology and discovery that Mr. Lewis keyed into. Archaeology emerges through a different process and from a different archive than the traditional stories circulating in Setauket, and the sites and artifacts we discover are directly connected to members of their community. These sources and connections support a place for an indigenous knowledge not predicated on the survival of ancient traditions alone. Rather, it is based on the same process of discovery that has fueled mainstream knowledge and fascinations with the past but practiced in this case by subalterns who have traditionally been excluded from making discoveries and contributing to the making of modern places of heritage. Thus, in this case, archaeology is both discursively and practically in the hands of the community and therefore provides them with a tool to do more than represent diversity but also to create it.

Future Directions

This entry has considered the relationship between anthropology and modern world archaeology, and the studies reviewed were selected to provide a view on where the use of anthropology by modern world archaeologists is heading. The several examples show how the use of the interpretative and reflexive anthropological approaches creates potent frameworks for creating knowledge about and understanding of modern lives. One specific use of anthropology is in the cross-cultural analysis of modern colonialism where archaeology provides insight on local political economies and reveals strategic indigenous cultural practices that complicate master colonial narratives of decline and acculturation. A second anthropological approach lies in the development of heritage diversity in modern life. Considering examples of Native American and working-class struggles for proper cultural recognition, archaeology is shown to function as a tool for both research and social action and to provide a useful means for supporting cultural claims that complicate the histories of minorities that dominate modern life. Also discussed was the possibility of modern world archaeology to address the cultural realities that situate archaeology and archaeologists. These realities include miscommunications of the role of archaeology in the new South Africa and the capacity of subaltern people in New York to appropriate the idea of "archaeological discovery" to create an independent and politically useful indigenous history.

Anthropology serves modern world archaeology by providing frameworks that situate modern people, practices, disciplines, objects, and ideas in specific and productive material and cultural relations. In turn, archaeology activates a new archive of data that brings into view actual and possible counter-narratives that complicate our understanding of the experiences of modern life and the ability of

archaeologists to act as modern people coeval with the people and pasts that constitute their research and lives.

Cross-References

- ▶ Activism and Archaeology
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Colonial Encounters, Archaeology of
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Cultural Heritage and the Public
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Heritage and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Labor Archaeology
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ South Africa: Heritage Management

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Archaeology and Politics

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Introduction

This entry considers the institutionalization of the archaeological discipline in the context of modern Western science and puts forward the idea of "archaeology as politics." The analysis takes place from a South American perspective and takes a different stance from the widespread treatment on the subject which is based on the presumption of a division between science and politics as exclusive domains (although recognizing some influence of the latter). That is, it is not the intention of this entry to differentiate between archaeology and politics as separate spheres, which would imply the acceptance of the possibility of being able to "manage" at will the political side of archaeological practice in time and space. On the contrary, it is considered that archaeology is politics and its disciplinary practice inscribes power-knowledge relations both at the micro- and macro-political levels.

The dual anchorage of archaeology in modernity and in the unfinished transmodern reconfigurations predefines the political origin of absolutely all actions and choices involved with the production process, reproduction, and management of scientific knowledge. This is related to the geopolitical conditions implicated in the generation of knowledge and which preestablishes the preeminence of science over other forms of knowing. Geopolitical contexts refer not only to the physical space but also to the sociopolitical, historical, epistemological, academic, and editorial (among others) scenarios, through which certain forms of knowledge are generated and installed over others (Walsh 2007). To account for this, some historical trends will be discussed that have occurred in South America in general and in Argentina in particular, regarding the interrelationships between archaeological practices, theoretical frameworks, and political contexts. The geopolitics of knowledge impact not only the forms and conditions of producing and reproducing knowledge (i.e., science, academia, publishing companies) but also the definition and management of places of interest (e.g., historic sites, protected areas) and materiality (e.g., memorials, monuments, heritage, artifacts, museums) promoted by different sectors and actors with commemorative, recreational, educational, and cultural purposes. In this context, archaeology as discipline provides discourses, narratives, lifestyles, places, and objects located in time and space, thereby becoming a contemporary device in the classification of stories, landscapes, people, and their relationships from an Anglo-Saxon, colonial, and modern knowledge perspective.

Historical Background

Archaeology from a Political Perspective

Anthropology and archaeology as disciplines have a modern origin and are associated with the centers of political and economic power of liberal industrial countries (e.g., England, France, Germany, and the United States). Since its beginnings in the mid-nineteenth century, social sciences in general and archaeology in particular developed in relation to these power centers and became institutionalized as a knowledge-producing enterprise. In this historical constitution of disciplines in Western thought, there are two foundational assumptions that characterize modern social sciences (Lander 2003). On one hand, the existence of a universal metanarrative from which all peoples and world experiences are classified and ranked, with European industrial society considered the most advanced expression of this development. In this context, the first "articulations of cultural differences in chronological hierarchies" appear, activating classifications of premodern, traditional, and/or primitive. From this perspective the forms of knowledge that were developed to understand the "other" societies came to be the only valid, objective, and universal ways of understanding the world. Through this Eurocentric view which organizes time and space, a mechanism of colonial and

imperial knowledge was installed and naturalized that preestablished the superiority of the product of science over other forms of knowing (Restrepo 2007). The ideal of knowledge in modernity, besides being characterized by its objectivity and universality, is predefined as disembodied and ahistorical, that is, by its possibilities of transcending and disregarding persons, times, and places. This is connected with the ontological rupture between body and mind, an initial separation in the modern Western tradition, which places human beings in an external position and instrumental to their environment (Lander 2003). This reinforces abstraction and distancing as main heuristic elements in the construction of knowledge.

According to the Porto Rican philosopher Maldonado-Torres, if scientific knowledge is recognized as the only valid way of knowledge, cognitive faculties in racialized subjects (the "other" colonized) are denied, which provides the basis for the ontological denial and epistemic disqualification of the latter (Maldonado-Torres 2007). Descartes' cogito ergo sum gives primordial importance to the epistemological and expresses the sense of coloniality of knowledge, "others do not think, thus they are not." So, "not thinking becomes a not being signal in modernity" (Maldonado-Torres 2007: 145), and thereby exclusion, subalternation, and/or denial mechanisms are generated for all that is different from the way of thinking of the modern, Western, and white "us." The epistemic disqualification referred to by Maldonado-Torres can be linked to the concept of "epistemicide" proposed by Santos (2006), to refer to the death of alternative knowledge caused by the installation of the idea of scientific knowledge as the only valid and rigorous way of understanding the world. Consequently, this monoculture of knowledge, as it discredits and disqualifies "others," shrinks and reduces the present by eliminating different contemporary conceptions that do not fit within modern canons and scientific principles (Santos 2006).

Moreover, there is no doubt that the relationship between politics and archaeological practice has begun with the emergence and development of the discipline in the nineteenth century (Trigger 1989). However, discussions about the political implications of archaeology or on the uses and abuses of the past emerged only in the last decades of the twentieth century. Archaeologists' late treatment of these discussions can be seen as a result of disciplinary institutionalization which sought to cover archaeology with scientific status guaranteeing objectivity and neutrality. Simultaneously, the development of the firm belief that archaeology is synonymous with the past helps to install the view of the professional's role as being free from the vicissitudes and particularities of its own time. In that sense, the practice of archaeology, under the precepts of modern scientific thought, is inscribed and mediated by the denial of its contemporaneity reflected mostly in political, Eurocentric, and racist terms. Some academic theories, such as diffusionism and evolutionism, were the conceptual frameworks for the construction of national identities in different countries of South America and which white Europeans used to legitimate their treatment of indigenous peoples. At the same time, different archaeological investigations sought to demonstrate the historical discontinuities between high pre-Hispanic cultures and contemporary native groups. The cultural historical synthesis of large regions and areas was one of the main objectives of the South American archaeology in the early decades of the twentieth century. In this context, diffusionism and racial studies were one of the main mechanisms to explain the migration patterns of human groups through space and time (Politis 1995).

It was not until the 1970s and 1980s that scientists began to reflect deeply on the close relationship between the archaeological work and nationalist practices, as well as the sociopolitical contexts in general. The emergence of Latin-American social archaeology in Mexico and Peru, with its theoretical orientations in historical materialism and neopositivism, saw attempts to explain social phenomena scientifically. This movement sought to link the past to the present and aimed to be a weapon of liberation for the people. Issues relating to their origin and status as exploited or the transience of social

classes, institutions, and behavioral patterns were explored (Lumbreras 1974). Latin-American social archaeology was therefore characterized by the development of an original theoretical approach which sought to provide the basis for generating emancipatory political positions rather than academic positions. The most significant contributions were made in Mexico, Peru, Venezuela, Dominican Republic, and Cuba; however, the influences of this approach were restricted to those countries during the 1970s and early 1980s. In this regard, it has been suggested that social archaeology was associated with temporal contexts where the political model of the nation state tended towards a Marxist ideology (Oyuela-Caycedo et al. 1997).

Moreover, not all Marxist archaeologists ascribed to the tenets of the Latin-American social archaeology. Among them, some American archaeologists close to Marxism began to explore the political implications of the discipline and archaeological praxis and to discuss issues relating to the procedures and uses of the past such as ownership of archaeological materials, authenticity, ethnicity, restitution, and cultural resource management (Trigger 1989; Kohl & Fawcett 1995; McGuire et al. 2005). The emergence of post-processual archaeology in the Anglo-Saxon context also contributed to a deeper analysis of the relationship between archaeology and politics and broadened the discussion about the implications of professional practice and the role of the archaeologist (Shanks & Tilley 1987). The organization of the first World Archaeological Congress (WAC) in 1986 promoted the analysis and discussion of politics in archaeology and especially its inclusion in the research agenda (Ucko 1987). The founding objectives of the WAC, which among other things sought to promote indigenous peoples and defend their rights, were to activate relationships with and the participation of archaeologists from peripheral countries and engage in their sociopolitical issues. These were novel proposals that challenged the idea of a neutral archaeology and promoted other ways of considering professional practice.

In the 1990s, the vision that archaeology had consolidated, due to its origin, an inescapable political dimension and that nationalism is just one of many possible manifestations of this nature can be expressed both in its political and scientific activities (Silberman 1995). Some observations may be made in relation to this idea of archaeology and also in reference to the excision of political and scientific domains. Regarding the former, this assumption is still accepted without much discussion, and it appears that the political domain in archaeology is *one* dimension (Kohl & Fawcett 1995). This idea implies that the discipline must inevitably have other dimensions that are not political and that there is some possibility of disaggregating its components. Moreover, considering scientific and political activities as independent areas, besides representing the possibilities of disaggregation of archaeological dimensions, is part of the neoliberal agenda which is sustained by ideas of neutrality, detachment, and objectivism. As mentioned at the beginning of this entry, by its origin, scope, implications, overt and hidden actions, and omissions, archaeological practice is always inherently political. In this decade, and in some South American countries, constitutional reforms have recognized the preexistence of indigenous peoples and have consecrated certain fundamental rights such as the communal ownership of land as well as rights to health care, to education, and to practice their culture. These rights, established by the nation state, will become in the future significantly relevant for the indigenous peoples in their relationship with archaeologists.

The beginning of the twenty-first century heralded the deepening and multiplicity of voices associated with the politics of knowledge in archaeology. This development gave rise to changes in the ways archaeologists began to consider archaeological practice through an understanding of the plurality of agents involved. In recent years there have been, in different contexts of world archaeology, diverse theoretical and methodological approaches in the light of decolonizing thought that have tried to account for the involvement, participation, and coproduction in archaeological research projects of actors and historically

marginalized sectors (McNiven & Russell 2005; Smith & Wobst 2005; Gnecco & Ayala 2010).

In its disciplinary history, much of South American archaeology has developed behind closed doors privileging knowledge construction from a Western and white perspective. One could argue that this way of looking at archaeological practice in much of South America is a result of the theoretical and methodological influences from the historical cultural school and the processual archaeology that predominated and still influences this part of the Americas. Moreover, in Argentina in particular as well as in some other South American countries, democratic governments have alternated with coups d'état and military governments that have significantly influenced the development of archaeology in these regions through the promotion of national archaeologies (Politis 1995). In general and in brief, it can be said that in Argentina during democratic times, science advanced and academic activity progressed in many directions. During these moments, archaeological research consolidated, systematic financing research projects began, important national and international scientific events occurred, and new undergraduate and graduate careers were created. Conversely, during military periods, there were setbacks in research, some universities and anthropology careers were closed, and there was ideological persecution and discrimination (Politis & Curtoni 2011).

In recent years, especially since 2003, the Argentine government of President Néstor Kirchner promoted a progressive national and popular model, with a clearly defined foreign policy and South American connection, which meant a change in style and conception of international integration of the country. In the twenty-first century, this has been favored by the surging conditions in the South American scenario, generally characterized by a neoliberal exhaustion – through policies of market liberation; the emergence of social and political movements that put forward alternatives of production and management; the revaluation of the State versus the market, shown in the regulation and promotion of social equality; debt reduction and the proposal of autonomous relations with the United States; and, finally, the search and strengthening of processes of regional integration represented by the Mercosur and Unasur (Ayerbe 2011). This economic, political, social, and cultural repositioning, which has occurred in several countries in South America, has affected and still are affecting, to varying degrees and depth depending on national contexts, the ways to consider archaeological practice as well as its own theoretical elaboration. In Argentina, in recent years, discussions about the ethical dimensions of archaeological work and heritage management have been activated, and the participation and involvement of indigenous peoples in archaeological research projects has seen the emergence of new issues and problems of inquiry. For example, issues relating to local situations have been considered and claims and disputes raised by local groups (e.g., indigenous peoples, peasants) have been addressed in archaeological congresses (e.g., relating to territorial dispossessions, the destruction of sacred places, repatriation of human remains and associated materiales, and the destruction of sites).

Key Issues

Archaeology, Knowledge, Politics, Power

Since its conception, production, reproduction, distribution, and consumption, knowledges generated within academic institutional frameworks bear their geopolitical, geo-historical, and geo-cultural imprints ("knowledge" is used in plural in this entry with the intention of presenting the idea that knowledge in singular refers to the Eurocentric view while the plural makes reference to the Latin-American conception of the possibility of multiple knowledges). Referred to as the body politics of knowledge (Castro Gomez & Grosfoguel 2007), knowledges possess a place, context, body, color, and gender in their origin (Castro Gomez & Grosfoguel 2007). Thus, they are contingent, situated, and traversed by relations of space and power. These conditions may also express the senses of coloniality of power, knowledge, and being, which characterized ways of

knowing developed and imposed in colonial modernity (Lander 2003). The concept of the coloniality of power refers to strategies of modern exploitation and domination that had their origins in the naturalization of racial hierarchies and the ordering and classification of "otherness." The coloniality of knowledge is related to the central role of epistemology in the process of elaborating knowledge, which can allow reproducing colonial schemes of thinking and controlling all forms of subjectivity, of culture, and of production and reproduction of knowledges (Quijano 2003). Finally, the coloniality of being refers to the colonized subjects' lived experiences and histories and their impact on language forms (Maldonado-Torres 2007). Under these conditions, Western science's epistemic colonialism is imposed from the definition of the "zero" point as the main model of knowledge through which the world can be observed from a neutral, objective, and absolute locus (Castro Gomez & Grosfoguel 2007).

In Argentina, the thinker Arturo Jauretche reflected on the reality of the country in the 1950s in terms similar to those involved in the concept of the coloniality of power, by considering the geopolitical and chronopolitical dimensions of knowledge. In his essay on "pedagogical colonization," he said that under the appearance of universal values, "only relative values corresponding to a certain time or geographical location, whose appearance of universality arises solely from the power of universal expansion given by the centers that originate them" are still being introduced (Jauretche [1957] 2004: 99). Also, through national projects, the intellectual elites or "intelligentsia," according to Jauretche ([1957] 2004), identified the universal values of "culture" enshrined by the centers of power, thereby excluding all preexisting understandings. The ideal promoted by the "intelligentsia" was to create Europe in America through the destruction of indigenous peoples who were seen to be an obstacle and through the denial of all local values and possibilities of regional creations. Thus, the process of "Europeanization that was practiced did not consist in the incorporation of European values to the existing culture, but in its outright derogation" (Jauretche [1957] 2004: 102).

Hegemonic narratives are furthermore added that imposed some axiomatic formulations, discursively constructed, posing the lack of continuity between the pre-Hispanic past and contemporary indigenous peoples. In his book, *The Prophets of Hate and Yapa* (*Yapa* is Quechua word meaning gift that the seller gives to the buyer), Jauretche ([1957] 2004: 102) expressed, "The misunderstanding of our pre-existing as a cultural, or rather, understand it as anti-cultural, contributed to the fact that the pre-existing were deprived of all means of expression. It was not enough with the massive replacement of the native population by immigration flow. Intelligence became 'intelligentsia' and assuming that culture was exclusively imported it became one of the most effective tools to uproot the local elements of pre-existing culture." The idea of progress in America could materialize if both the past and the present were denied, "hence the insistence of American denial and anxiety about being European. This historical pattern caused a method that later became norm. Reality was replaced by abstraction" (Jauretche [1968] 2002: 30).

The effects of the coloniality of power and relationships with knowledge management have been criticized and denounced by various Argentine thinkers such as Ortiz Pereira, Manuel Ugarte, Scalabrini Ortiz, Jauretche, and Fermín Chávez, who sought to think of reality both from their own and from concrete needs. It was a way of seeing things "from here" because "the inability to see the world from ourselves has been systematically cultivated in our country" (Jauretche [1957] 2004: 108). Pre-Hispanic past denial and the denial of contemporary indigenous peoples became part of the essence of the modern cosmovision and modus operandi established from colonial order. For example, in the search for defining the identity of the pampas promoted by state authorities and based in the multicultural synthesis, "the indigenous" fluctuates in a complex way, being at times present as a figure of recognition and reparation and at other times absent ignoring their current claims and concessions. This is a consequence of the action of two simultaneous processes called the

"specific invisibility" and "generic visibility" (Curtoni & Chaparro 2008). Specific invisibility refers to the strategies of concealing, silencing, and denying that operate on the "indigenous being," on the concrete needs of the communities, their rights, and claims, as well as on political activism and its representatives. Different narratives have been attempting both to enunciate the absence of indigenous people in the region and to challenge the legitimacy of existing identities. In parallel, generic visibility mechanisms are generated, generally staged by state power, and associated with reparation, recovery, and revaluation of "the indigenous" actions. The preferred forms of expression of this process are the materialization or the monumentalization of "something" referred to as the indigenous world, without any discussion and consensus with local communities about what and how and with the intention of visibilizing actions and demonstrating political awareness. These constructions objectify indigenous agency and relationships. The official authorities' discourses are also activated which promote multicultural integration as a way of overcoming historical controversies (such as indigenous and white Creoles). In this search for Pampa identity, the "indigenous" fluctuates unanchored in different forms, being at times synonymous with the past, in the best case, in miscegenation, and in others and expressed as patrimonialized and/or monumentalized figures (Curtoni & Chaparro 2008).

These strategies, together with racist and ethnocentric elaborations, formed the basis of nation-constitution projects in different countries of South America in general and Argentina in particular (Politis & Curtoni 2011). Social science and archaeological practice taking place in these spaces of power were not free of ideological-political influences promoted by the colonial modern imaginary. Thus, the criticism of the colonial construction of knowledges requires an epistemological-political positioning that attempts to "decolonize" disciplinary foundations. This dual dimension is expressed in terms of methodology with the statement that there are no definitive and unique rules which guide research (see Haber 2011), together with the acceptance of other views and extra-academic elements in the construction of knowledges and at the political level with the critique of science's hegemonic, globalizing, and exclusive stance. The premise of the decolonization of knowledge is to make clear the place and relationships from which knowledges are produced and to analyze the institutions that produce and/or are managers of it and point out its power effects. It also entails transcending the senses involved in the "zero point" challenging detachment and neutrality and recognizing contamination and agreement in the generation of knowledge (Castro Gomez & Grosfoguel 2007).

Future Directions

In this sense, what is necessary is not just alternative knowledge, but new ways of producing and reproducing them (Santos 2006). These could rise from an intertopic criticism about the global imposition of knowledge, leading to the promotion of different and multiple places of enunciation though interrelated, coproduced, and pluriversal. The practice of archaeology "from here" (Jauretche's) results in a rupture with the academic-scientific privilege and status as the legitimate producer of universal knowledge construction, and on the other hand, it activates decolonizing procedures of instituted knowledge (pedagogical decolonization), thereby promoting new ways of knowing. What is sought with these statements is that the construction of knowledge is historically situated, i.e., not Eurocentric or based on the scientific rationalism of liberal modernity. Overcoming Eurocentrism implies, among other things, an anchorage of space in terms of the spatial, social, bodily, linguistic, epistemic, and political sense so as to activate our incorporation in concrete spheres of pluriversality where other bodies, languages, concepts, other knowledges, and epistemologies coexist. These "other spaces," where different knowledges are organized together with other epistemologies, cosmovisions, and rationalities, are prior to the interests and motivations of the academic field.

Therefore, neither do peoples and groups forming these spaces and knowledges, as well as the places themselves, need to be empowered (paternalist attitude quite common in some postcolonial and postmodern discourses) nor do they need the academic concourse or the "expert" wink to manage a position of credibility, legitimacy, and existence. On the contrary, it is essential to establish decolonizing processes at the subject's level in terms of its "pedagogical colonization," its scientific language and disciplinary practices, and its disincorporation, in order to overcome academic arrogance and the exclusion caused by epistemic hierarchies of the global coloniality and its incorporation – in the sense of embodiment – to local situations.

Throughout history and even in some current contexts, archaeology has developed and been installed as a hegemonic biopolitical device whose narratives construct and control stories, places, subjects, and their relations from a Anglo-Western, scientific, modern, and colonial production standpoint. Thus, archaeological practice is always inherently political, and it reflects in different ways and intensities the complex and dynamic interrelationships between interest groups, archaeologists, and sociopolitical contexts. The analysis of the relationship between archaeology and policy exhibits complicity between modernity and coloniality and the generation of knowledge as an ideological/political product. The subversion of this mode of production, which has been institutionalized and naturalized, involves at least the effort to place the constructions of knowledges together with and from local pluriversality and from geo-chrono-political stances so as to invert the relationship and thus retrace the itineraries of the archaeological politics in the light of other interests and other ways of knowledge production.

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Cross-References

▶ Decolonization in Archaeological Theory
▶ Indigenous Archaeologies
▶ Local Communities and Archaeology: A Caribbean Perspective
▶ Social Archaeology
▶ South American Archaeology: Postcolonial Perspectives

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Archaeology and the Emergence of Fields: Environmental

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Introduction

Environmental archaeology is both an extension of general archaeological principles and an area of study in its own right. Formally acknowledged in the 1950s, it has grown significantly since then – so much so as to give rise to the fear of ever-increasing "silos" in the discipline of archaeology. Environmental archaeology uses proxies to investigate site context and forensically pursues artifacts and ecofacts to elicit data. Rigorous taphonomic investigations are intrinsic to methods used in environmental archaeology.

Definition

Environmental archaeology investigates the site environment at the time of human activity. The principal aim is to determine the link between changing patterns of human activity and local, regional, or even global environmental change. In this way, the environmental record can be used to make causal inferences about changes in the archaeological record.

Humans continually respond to their environment and any change to their familiar surroundings invokes changes in their response. This change is discovered in the archaeological evidence through the use of a number of subdisciplines. For example, paleoethnobotany (study of fossil plant remains), zooarchaeology (the study of vertebrate remains), geomorphology (study of landscape formation), palynology (study of past pollen regimes), geophysics (study of dynamic landscapes), landscape archaeology (the cultural landscape of the site), human biology (human remains), and human ecology (living in the landscape) are some of the subdisciplines in

environmental archaeology. Each subdiscipline offers a particular analytical methodology to investigate the past environment and its record over time. Change is scalar and can be anywhere from micro to macro. Smaller changes are generally harder to recognize in the archaeological record. Through the use of subdisciplines, a greater level of sensitivity can be applied, thus increasing the chance of successfully recognizing local, small-scale change. Identifying change on any level enables inter- and intrasite comparison and comparative archaeological analysis is the core of most archaeological research.

Historical Background

Environmental archaeology has been recognized as a serious component of archaeological investigation since the 1950s. The appointment of Frederich Zeuner as Professor of Environmental Archaeology at the Institute of Archaeology in London in 1952 allowed formal recognition of environmental archaeology as a substantial and significant subdiscipline of archaeology. Initially, the place of the natural sciences in archaeology was almost exclusively through the application of stratigraphy. Stratigraphy emerged through the efforts of geology to provide time lines for fossil finds and in so doing allowed a means of chronology to be applied to human occupation. Stratigraphy was also able to identify catastrophic environmental events such as sudden onset of aridity, floods, or lava flows. Such singular and dramatic, large-scale environmental events were readily recognized and their subsequent impact on humans could be investigated as an individual focus in archaeological investigations. Matching stratigraphic change to a chronological phase has allowed changes in human response to be recognized and environmental interpretations to emerge. However, the nineteenth century saw archaeological endeavor subsumed to some extent by evolutionary theory and it was not until the early twentieth century that a broadening of the discipline really came about.

A key turning point in the approach to archaeology had already begun with Eric Higgs paleoeconomics and an equivalent impact was delivered by Graham Clarke through his work at Starr Carr. Starr Carr is a Mesolithic site located in Yorkshire, England, and is arguably one of the most significant sites studied in the mid-twentieth century. This site is considered to have truly set environmental archaeology on its path by providing a momentous leap from simply looking at stone tools in isolation to applying other lines of scientific investigation. Indeed, Clarke was able to inter-relate human behavior and their artifacts with the environment. In this way, changes in the artifacts became signatures of changes in human behavior over time. From here on, archaeologists were able to seek the causal effects of changing environments on human behavior over time. It also allowed the reverse to be investigated – human environmental impact causing landscape, ecological, and even meteorological change over time.

Key Issues/Current Debates

Two schools of thought have arisen in environmental archaeology which can be simplified into a regional versus single site approach (Evans 2003). Some archaeologists concentrate on single sites while others adopt a regional approach by investigating a series of sites usually linked chronologically and/or culturally. A region is generally geologically defined such as a valley or mountain range. It is possible to consider sites as a single entity within a broader cultural landscape and both schools of thought offer advantages and disadvantages. Regional approaches allow greater scope for identifying large-scale environmental change and its impact on a region. Regional approaches also enable intersite comparison and broaden the investigation by including, for example, exchange and transport routes. However, the disadvantage can be the lack of intense investigation at any one site, as offered in the single site approach. Perhaps a combination of both is ideal if not always practical.

The rise of environmental archaeology has also been expressed differently on different

continents. O'Connor (1998) identifies a key difference existing in the 1980s between the United States of America and Britain. According to O'Connor, Britain was primarily focused on the "organic" content of a site while North Americans were primarily geologically focused. This could be an inevitable outcome considering the marked differences between these two continents in not only dimension, but also in geology, culture, and chronology.

Environmental archaeology does allow a site investigation to be reduced into many fields of enquiry. This fact has caused some concern, as expressed initially by Thomas (1990) and then considered by others (Wilkinson & Stevens 2003) in that environmental archaeologists operate outside of the mainstream of archaeology. Fear lies in the sublimation, or worse elimination, of archaeological aims and methods in the pursuit of identifying environmental change. The fact that environmental archaeology is independent of routine archaeological methods has been viewed as problematic and even threatening. For this reason, it is reliant on the archaeologist to synthesize the many streams of enquiry into a coherent interpretation that acknowledges the discipline for which it is written.

Others feel that the term "environmental archaeology" is redundant and all scientific pursuits relevant to archaeology are either bioarchaeological (zoology and biology) or geoarchaeological (sedimentology and pedology). This allows the archaeologist to maintain a clearer approach; however, if both are selected, then the whole reverts back to environmental archaeology! In the end, archaeology must remain focused on human response to localized change.

Environmental archaeology is investigated via key areas of exploration – geology (earth systems), zoology (animal systems), sedimentology (layering of soils and rocks), biology (ecosystems), botany (plants and floral systems), pedology (origin and change of soils), and taphonomy (site formation processes). These subdivisions fall into one of two key areas of investigation: via the organic or the physical. Bioarchaeology covers the former and geoarchaeology covers the latter.

Archaeological artifacts are composed of raw materials. These raw materials are termed proxies and it these proxies that are available for specific analysis. Proxies are more sensitive as environmental indicators compared to their "whole body" counterparts. A modern Australian kangaroo, for example, is a poor environmental indicator as its geographic distribution is continent wide and it has been on the same continent for many thousands of years. By comparison, pollen is a more sensitive indicator of the local environment. Preferred proxies are those with narrower geographic distributions or habitats and are themselves very sensitive to localized environmental change.

Proxies exist on macro- or microscales. Bioarchaeological macroproxies are mostly floral and faunal remains such as seeds, shells, bones, teeth, and insect carapaces and casings. Geoarchaeological macroproxies include sediments, soils, and rocks. Microscopic bioarchaeological remains include pollen, phytoliths (silica skeletons), diatoms (single celled algae), ostracods (bivalve crustaceans), and foraminifera (singled celled shelled animal). Microscopic geoarchaeology proxies include the chemical elements that make up soil and rocks. Most proxies are "ecofacts" as unlike artifacts, they are not directly attributable to human endeavor such as a wooden or stone implement. Ecofacts are not fashioned or manufactured for human purpose but provide an important opportunity for investigating the paleoenvironment. For example, meal discards such as shells found in Aboriginal middens are ecofacts. Midden shell is used extensively in archaeology to identify environmental change (through spectrum analysis, for example) and cultural change (through radiometric analysis).

Some proxies can be even further reduced into smaller elements and characterized to extract a finer level of information. However, all environmental archaeology effort is constrained and challenged by the degree of preservation operating across a site or region and the method employed. Sampling for microproxies relies on a high degree of structural preservation. Taphonomy investigates site formation processes and

offers a means of determining and assessing degrees of site and artifact or ecofact disturbance and preservation. In using proxies, it is critical to be able to identify when a proxy is an unreliable agent due to significant bioturbation or other impact on the site.

Charles (1998), for example, investigated the use of dung-derived plant material in archaeological sites in Northern Iraq. In areas where animal dung is used as a fuel source, dung cakes offer a means of identifying local plants by identifying seeds passed out in the dung. As Charles (1998) points out, critical taphonomic issues are that the plants can be a mix of grazed, crop residue or wild plant fodder sources. Dung is also likely to be sourced from a range of animals and the variable impact of digestion on seeds needs to be understood. A further key point is that dung cakes are burned and only those that partially or completely survive this process are useful for analysis. Some of the dung cakes also contained dung pellets, offering a means of identifying which animals produced the dung. Dung pellets may also contain seeds or pollen. Charles (1998) was able to consider the taphonomic aspects effecting plant remains in dung cakes and then compare the interpretative data from the dung cakes and pellets with ethnographic information on animal husbandry and seasonal cycles of cereal cultivation. Importantly, these two interpretative frameworks were not in unison and Charles (1998) suggests that critical changes within husbandry at these sites can be linked to local environmental change.

By way of another example, Church et al. (2005) have provided results from the first archaeological investigation of Norse settlement on the Faroe Islands. This archaeological investigation makes use of the results of prior paleoenvironmental investigations to assess the impact of early human economic practices. The archaeology explored reliance on and timing of animal husbandry, cereal production, integration of wild species, and sourcing different fuel supplies. Church et al. (2005) utilized animal and plant remains as vital proxies, integrated against the multiproxy approach employed previously in the paleoenvironmental investigations. By examining the animal bones in the excavations, it was recognized that Norse settlers commenced with a heavy reliance on puffins as a vital food source and the collection of driftwood, peat, and turf as fuel sources. This reliance on both food and fuel that was gathered from the natural environment altered the understanding of the beginnings of human settlement in this region. The eventual shift to the production of crops, husbandry, and managed fuel sources was matched against the environmental data to provide the contextual framework of Norse settlement on the Faroe Islands.

With multiple lines of investigation, the archaeologist is more likely to find at least one proxy from primary (humans bringing in materials), secondary (by-products of the processing), or tertiary (dumped rubbish) agents. Locating proxies also requires the application of purposeful sampling methods and it is here that the environmental archaeologist may seek the expertise of non-archaeological specialists.

Spectral analysis is a field of investigation used across the physical sciences. It offers significant potential for archaeology by identifying the elemental composition of proxies, a process known as "characterization." Characterization allocates the raw material of a proxy a unique signature or "fingerprint." The characterization of raw geological materials such as sedimentary rock (e.g., dolomite, basalt, and flint), sand or hematite or goetite rich clay pigments (e.g., ocher) is a key focus for geochemical investigation. Rock or clay from a quarry will have a different signature or "fingerprint" to rock or clay from another quarry. This uniqueness enables the distribution of objects to be mapped away from their quarry source. In turn, distribution routes of the raw material can be spatially located, thus connecting humans across different cultural and geographic landscapes. Characterizing ocher to its own quarry source is proving both successful and challenging as ocher is found to differ geochemically within as well as between sources (Popelka-Filcoff et al. 2008). Exchanged objects have also benefited such as ground edge axes manufactured from dolomite rock in southeastern Australia. Dolomite was sourced from

very few quarries and traded out from those centers. By characterizing the dolomite, exchange routes across southeastern Australia have been established (McBryde 1984).

Trade and exchange routes originally identified through more traditional archaeological methods are now able to be refined by use of highly sensitive analytical instruments that rely on infrared spectroscopy. Finds, such as the 100,000 years old ocher grinding tools from Blombos Cave in South Africa, provide a range of samples capable of providing detailed environmental data. These tools include abalone shell, ocher, bone, and stone which are all significant for geochemical investigation.

Environmental archaeology commenced with an awareness of the value of data gathered directly from the site context. Looking back, the gathering of environmental data was comparatively coarse, relying largely on macroproxies and rarely on microproxies. The introduction of highly sensitive instruments offering a range of spectrum analysis has shifted the balance to microproxies. It has also, as a result of that shift, placed increasing emphasis on ecofacts whereby artifacts and ecofacts can hold similar weight in interpreting the site. Environmental archaeology has fine-tuned its approach in response to the increasing availability of highly sensitive analytical instruments as a valuable methodological tool.

Other preferred proxies are those that are keyed to a single level of water quality – fresh or saline. Proxies that can withstand brackish environments are poorer indicators than those that are associated only with either fresh or saline hydrological regimes. Declining levels of fresh water are often identified in archaeological landscapes as the primary cause of a shift in technology, economy, and even geographic with groups moving elsewhere. In this case, diatoms, foraminifera, or ostracods are sought out in aquatic sediments, particularly lakes. These proxies are highly sensitive indicators of fresh or saline regimes and have proved successful in detecting varying water quality over long time scales (e.g., Gell et al. 2005).

The investigation of dune-fields is another key focus area for environmental archaeology. The occurrence and abeyance of dune-fields has long preoccupied human groups. Dune-fields are a natural feature but can be mobilized by deforestation. A major trigger for deforestation has resulted globally from humans seeking fuel and also fodder for domestic animals. Numerous settlements over time have been swallowed up by mobile dune-fields and the timing and consequences of this on human activity can be investigated through the characterization and aging of dune-fields (Hesp 2001).

Environmental archaeology through its reliance on proxies also requires a range or reliable datasets and reference materials. Diagnosis of animal and plant remains relies entirely on a comparative reference set. As found by numerous archaeologists, establishing such sets can be extremely problematic as it is also necessary to include as much demographic or seasonal variation as possible. Ideally each animal will be represented by male and female examples of juveniles, subadults, and adults. Such a plea was made by LeFebre (2007) during an investigation of the maritime economy on the coral reefs of the West Indies. Inevitably LeFebre was confronted with numerous fish bones and limited reference material. This is hardly an unusual situation and one that will continue to confront emerging environmental archaeologists. Fish are particularly sensitive environmental indicators. The need to identify to species level is critical if a robust environmental framework is to be established. Fish otoliths (earbones of fish) are an even more sensitive proxy than the fish itself, are species specific, and also offer data on the size and age of fish at death. Otoliths are structurally robust and preserve better than fragile fish bones, offering an almost perfect archaeological proxy. However, establishing adequate banks of otolith reference material requires high resource commitment and a skilled researcher to match archaeologically derived otoliths.

International Perspectives

The pursuit of environmental archaeology in Australia has progressed similarly to other

continents after having commenced in a recognizable format since the 1960s. Australian archaeologists at that time were particularly aware of Higg's paleoeconomic models and Clarke's paleoenvironmental approach at Starr Carr. Australian archaeology has also demonstrated a bold approach to integrating science into the discipline. In the 1930s, for example, Norman B. Tindale was collecting raw sediment samples, charcoal, and ocher in the belief that future technology could provide analytical tools for dating and deciphering the elements there in. Over the last 20 years, there has been considerable effort made to find an increasingly diverse array of proxies analyzed by increasingly more sensitive and sophisticated instruments. As a result, proxies become ever smaller and more diverse, offering multiple possibilities for highly sensitive signatures of environmental change. Australia's greatest challenge is the size of its land mass and the relatively few well-described sites and even fewer fully analyzed excavation assemblages. The ratio of open to deep deposit (rockshelter/cave) sites is also significantly in favor of open sites. Preservation of bioarchaeological proxies in particular is poor for open sites, leaving the vast majority of sites reliant on geoarchaeological proxies for determining environmental change. The limitations incurred under such conditions can be alleviated to some extent by a regional approach in the hope that at least some rockshelter/cave sites will be recorded along with the numerous open sites. However, this in turn can be problematic in view of the size of the continent and the scarcity of well-described sites. This can lead to valiant but statistically challenged attempts to identify regional and chronological trends drawn from a few sites spread over vast distances. Aboriginal occupation of Australia is well over 45,000 years and this only compounds the problem of too few well-described sites.

Although Australian archaeology has been unhesitating in its incorporation of scientific principles into the discipline, it too is hampered by minimal comparative reference sets of proxies and datasets. A hiatus in the 1980s saw numerous small research projects devoted to establishing proxy collections, but the more recent trend away from such core research has created a significant gap in valid reference material. A similar history exists with taphonomic reference material due to the demise of actualistic studies. Understanding growth rates and species diversity is also an under researched area and yet it is vital to making interpretations from elements such as bone and shell. Australia's unique environment with its consequent unique range of environmental agents needs to establish its own comprehensive data set rather than assume that data derived from other continental contexts is comparable. Happily, however, it is precisely Australia's unique situation with such a long era of hunter-gatherer occupation followed by the current and very brief era of colonial and pastoral settlement that offers enormous potential for environmental archaeology. Australia's way of life leads us to automatically look to the natural landscape to explain patterns of human occupation. The contribution from contemporary Aboriginal people has also enabled an inspiring approach in interpreting the relationship between humans and their environment.

A key difference between the Australian continent and other land masses is its hydrology. It is the driest continent on earth but capable of dramatic, short-lived floods and has very slow rates of soil deposition. All of this has great bearing on the preservation of archaeological deposits and proxies which in turn makes environmental archaeology in Australia unique. It also points out the urgency in generating our own data sets from a range of comprehensive biological, geological, and hydrological studies.

Future Directions

O'Connor (1998) and others (e.g., Evans 2003; Wilkinson & Stevens 2003) have pointed out that environmental archaeology is capable of reducing itself into innumerable pockets of research (soil, coins, trees, phytoliths, etc.). Although there is the potential for a "silo" effect as it is often known, it is rare that any one site offers an overwhelming range of proxies suitable for

intense analysis. Most sites offer only a few well-preserved proxies. In addition, it is reliant on the archaeological team to ensure that clearly stated archaeological aims are established and the driving and unifying force for the environmental investigations. The strength of environmental archaeology lies in offering a holistic view of the relationship between past ecosystems and changing human response. Data collection and building reference collections needs to be more robust, geographically wider, diverse in species and genus, and longitudinal. There has been a step away from experimental (simulation) archaeology, due to recognized inherent problems of replicating human and/or animal behavior in controlled conditions. Environmental archaeology is only as valid and robust as its datasets and reference material. Fine scale data, such as growth rates (e.g., Langlet et al. 2006) and species identification, is demanded globally. There is also an urgent need for complex and longitudinal taphonomic studies. The vagaries of site preservation have been long accepted but the understanding of factors affecting the preservation of a site and its objects is still poorly understood in most instances. If proxies are to be selected for specialist analysis, archaeology needs to ensure that they are relevant to the site and that they have structural integrity. To make environmental archaeology more rigorous, taphonomic investigations also need to offer more concise identifications of the numerous agents of change operating across a site and identify the implications of this for the use of proxies.

The opposing side of field work is the pressing issue of making archaeological collections sustainable. Archaeological collections are notorious in collecting institutions for their high-end need for space compared to other collections. Spectrum analysis is able to investigate the matrix of any element, thus urging archaeology to retain almost the entire site rather than just the objects and modest samples of excavation sediment. The need for space will escalate exponentially if collecting institutions allow archaeology to retain bulk samples and increasing amounts of ecofacts. This renewed interest in existing collections is extremely beneficial for research outcomes and for securing existing collections into the future; however, it is hoped that this is not at the cost of housing new collections.

The final challenge for environmental archaeology (as it is for archaeology generally) is to publish results more often and more widely. Too often it is only the environmental results that make it into the public domain rather than a broader and comprehensive contribution to the discipline of archaeology. Field activities such as excavation and surface collection continue to far outweigh the more laborious and in-house task of producing professional reports and peer-reviewed papers. It is vital that archaeologists offer the latter as some recompense for disturbing, or even destroying, cultural heritage sites.

Cross-References

- ▶ Aksum: Environmental Archaeology
- ▶ Biometry in Zooarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Cultural Ecology in Archaeology
- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Submerged Prehistoric Landscapes
- ▶ Urban Landscapes: Environmental Archaeology

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Archaeology and the Emergence of Fields: Historical and Classical

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Introduction

In this entry two closely linked archaeological fields are discussed: classical archaeology and historical archaeology. We share Thomas Patterson's (2001) externalist approach to the history of science, considering the discipline not only through changes in ideas and concepts but also as a result of intellectual moves linked to social changes. This theoretical stand pays attention to social and cultural issues affecting scholarly production in general and particularly archaeology.

Historical Background

The relationship between classical and historical archaeology is not a given fact but a chosen way of understanding the archaeology of societies with written records and concerned with Western tradition. It is thus a theoretical stand, informed by a redefinition of the field from the 1990s (Funari et al. 1999). Classical archaeology arose very early, at the beginning of the nineteenth century, as part of the imperial project of Western powers, being military in character, a conservative and male endeavor (Funari 2002). It started as an ancillary to history and classics, mostly as art history illustrating classical references to peoples and places. In epistemological terms, classical archaeology was established as a philological discipline, concerned with cataloguing and typology,

and dependent on the mastering of Greek and Latin. First and foremost, a classical archaeologist was a military male with a good command of classical languages and literature as well as an historian. Until last quarter of the twentieth century, the field continued a conservative course, but since then classical archaeology gained a lot of traction from social theory and theoretical discussion in general, even if continuing in line with traditions of the field, such as having a good command of classical languages (Shanks 1996).

Historical archaeology developed in a completely different historical and intellectual context. It started in the United States in the 1960s, as an anthropological field interested in the material culture of Anglo-Americans. Although it departed from a completely different place in comparison to classical archaeology, the American discipline was also reactionary, focusing on the study of the White Protestant Anglo-Saxons (WASP) and praising the founding fathers (Orser 2001).

In the following decade, as a result of substantial social and academic changes in the United States, in the wake of the civil rights, antiwar, and feminist movements, new issues were included in historical archaeology, such as the study of subordinate groups, African-Americans, the Irish, and women. Years later, new concerns from outside the USA led to the inclusion of global issues, and the discipline started to discuss all historical periods with written documents, much beyond the original fifteenth century onwards thrust as was prevalent in the USA (Funari et al. 1999). From the late 1990s, there have been a growing number of people putting together the archaeology of Greece and Rome (classical archaeology) and the archaeology of other historical periods, including the historical archaeology of the modern period.

Key Issues/Current Debates

Historical Archaeology

Historical archaeology as the study of societies with written records comprises such diverse subjects as ancient Egypt, Greece, and Rome, medieval societies, and modern settlements but also sites in China and Vietnam, thus including all the continents. This broad perspective is now widely accepted, even if historical archaeology is still mostly a term used to refer to late medieval and modern material culture as attests a leading journal in the field, *International Journal of Historical Archaeology*.

Disciplinary boundaries are always a thorny issue (Burke 2006: 13-4), as it concerns not only an epistemological question (what is and what is not within the field) but an administrative one, related to power in academia and society at large, as stressed by Pierre Bourdieu (1988). Any study of the discipline is thus embedded in power relations and politics (Meskell 1998), and our own stand here is to contextualize the field and our own stand, as we are archaeologists from the periphery. We thus reject any essentialist standpoint, as if a specific definition should be correct, for we acknowledge the diversity of the field and different approaches. In this entry we will deal with two different traditions in the field: European and North American historical archaeology.

European and North American Traditions

The epistemological differences between European and North American traditions are rooted in the different historical and academic contexts. Archaeology started in Europe in the nineteenth century as a counterpoint to classical philology and history. Archaeology was the material study of ancient civilizations considered as the intellectual ancestors of the Western powers, Egypt, Greece, Rome, and later on Mesopotamia and Palestine. Different civilizations flourished in those areas in ancient times due to the mastering of writing, a key feature of civilized life. History itself was thus defined by writing, and due to an evolutionary approach, there was a perception that there was ever-growing progress from the most ancient civilizations to the apex of industrial capitalism (Nitecki & Nitecki 1992).

Archaeology was thus historical archaeology, in so far as it dealt with civilizations using writing to store knowledge. Prehistory and prehistoric archaeology developed later to study material

remains from much earlier people who lived before writing was invented.

Until the 1930s at least, archaeologists working in Europe were using philological and historical tenets in archaeological interpretations, particularly in historical or protohistorical contexts, such as Flinders Petrie, Gustaf Kossinna, and Gordon Childe. However, the role of writing has been challenged from different quarters, from the early twentieth century. First and foremost, the influx of social theory revealed the relevance of other sources of knowledge and questioned the well-established pivotal role of writing (Burke 2006).

This move affected archaeology by emphasizing identity issues (Kristiansen 2009). Archaeology has moved to pay attention not only to distant civilizations but turned also to more direct national roots, turning to the Anglo-Saxon in Britain, to Germans in Germany, to Vikings in Scandinavia, or to the Celts and Iberians in Spain. It is thus possible to conclude that in the European tradition historical archaeology emerged from a number of epistemological and political issues: the pivotal role of writing and the role of a historical framework in interpretation. In this tradition, historical archaeology studies us, the civilized people, producers of learned culture as expressed in writing, and it is thus linked to nationalist and imperialist contemporary interests and concerns. The conflict of different nation states in Europe led also to interpretive conflicts, such as the different identification and interpretation of Celtic, Germanic, and Slavic remains. Historical archaeology in the European tradition has been rooted in modern identity issues and to national pride and prejudice.

Historical Archaeology in the American Tradition

In the United States, archaeology started in two different ways. First, as in Europe, it was established as the study of civilization. The American Archaeological Institute was set up in 1879, and soon afterwards America was digging in the Old World, as attests the American School at Athens (1880) and the American School in Rome (1895) and in Jerusalem (1899). Classical and oriental archaeology were thus in the same European style and it still is a most active tradition in the USA. It was and in a way still is concerned with studying the Western tradition, rooted in the both the Middle East through Judaism and Christianity and in the Greek and Roman classical heritage.

Prehistoric archaeology though was from the start concerned with the other (Hartog 1988), native inhabitants of the continent, taken as completely foreign to the civilized American cultural milieu. It was thus only too natural that archaeology in this vein was taken as part of the discipline concerned with the other, anthropology. While linguistics studied Indian languages, biological anthropology studied bodies, social anthropology studied living Indians, and archaeology was to explore dead Indians through their remains. The American Anthropological Association was established in 1902.

It is thus clear that the archaeological study of colonial and national sites in the USA developed only lately. It started as the archaeology of historical sites still very much concerned with some national iconic sites. It was only in the 1960s, thanks not least to the influx of Roman archaeology as practiced in Britain, that historical archaeology took root in the country, searching for the equivalent of Romans, that is, the first introducers of writing and civilization to the land: the early Anglo-Saxon settlers of America. The Society for Historical Archaeology was established in 1967 and in 1989 the AIA, the American Schools of Oriental Research, and the Society for Historical Archaeology held the first Joint Archaeological Congress, further strengthening the link of historical archaeology concerned with modern roots and the other archaeological institutions equally in search of American and Western civilizations.

Changes in European and American Historical Archaeology (1970s Onwards)

Since the 1970s, historical archaeology in the USA gained traction and increasingly broadened its scope, as attests the seminal publication of James Deetz (1977). The original focus on WASP material culture shifted gradually to include other groups, such as African-Americans

(Orser 1988), and then a plethora of excluded subjects, including women, Chinese, and more. The publication of Eric Wolf's classic in 1982 signaled this trend towards the excluded and beyond the traditional emphasis on written evidence for interpreting material culture. Colonialism has thus also been put at the heart of the discipline (Hicks & Beaudry 2006; Kristiansen 2009).

Historical Archaeology and Capitalism

According to Hicks and Beaudry (2006), Charles E. Orser, and Mark Leone, among other pioneering Marxist historical archaeologists, such as Randall McGuire, managed to define historical archaeology as the study of capitalism and the resulting modernity and globalization. The Annapolis Project (1981) is a clear case of successful interpretation of material evidence as part of the capitalist order of things. The project was also responsible for the study of the subaltern, as with the case of the remains of African slaves, workers, and exploited people.

Orser (1996) produced a most convincing argument for historical archaeology as the study of capitalism, spreading from Europe and uniting the whole globe. Capitalism was not only the economic driving force, but it redefined the whole set of social relations (Leone 1999). Power relations, domination and resistance, and identity processes were among the subjects dealt with through the identification of historical archaeology and the study of capitalism. In recent decades, under the influx of other interpretive frameworks, most notably those criticizing normative schemes, several scholars have refined or even contradicted the overwhelming and totalizing power of capitalism. Some stressed symbolic issues (Hodder 1995), class conflict (McGuire 2008), and the role of writing (Little & Shackel 2007; Johnson 2010). However, it should be noted that some of those scholars were not American and this leads us to the role of peripheral outlooks.

Historical Archaeology in Latin America

Archaeology in Latin America started very early as it did in the United States, first as a search for Old World roots in the nineteenth century (Ferreira 2010) and then prehistoric archaeology developed for nationalist purposes in countries such as Mexico and Peru, but also in countries with less impressive prehistoric monuments. This was the case in Argentina with its quest for the earliest human remains worldwide. The study of Iberian settlements though developed late, as this was mostly as a result of the influence of the United States newly established field of historical archaeology. However, while the USA was always a democratic country with a wide variety of social movements, Latin America faced the contradictions of the Cold War (1947–1989), including dictatorships. Historical archaeology developed late and at first as an empirical endeavor, in tune with the times. The waning of authoritarian rule led to a freer and more diversified study of historical archaeology. The inclusion of the subaltern, such as maroons, slaves, and women, led to a growing social commitment of the discipline, culminating in the study of repression and the struggle for freedom (Funari 2001; Funari et al. 2009). Two different theoretical trends developed. Under the influence of the USA, historical archaeology has mostly been interpreted as the study of capitalism after the arrival of the Europeans in the Americas. Others though were keen to explore how the historical experience in Latin American has been also patriarchal, hierarchical, and prone to personal and patronage relations, as such the importation of the concept of historical archaeology as the study of capitalism was not always useful. On the contrary, the specificities of noncapitalist features in Latin America necessitated the study of material culture through different, local lenses (Funari et al. 1999). The diversity of approaches has fostered the interest of people outside to understand it, discussing such theoretical concepts as transculturation, patronage, and métissage among others.

Classical Archaeology

Classical archaeology was only recently affected by theoretical discussions in the discipline. At the conference celebrating the centenary of the Archaeological Institute of America, the leading

classical archaeologist Colin Renfrew (1980) pondered the three the most relevant achievements of the institute: the extension of the field of American archaeology in other areas and seasons, including the "ancient world"; the promotion of academic criteria for the discipline through its publications; and the creation of a discussion forum in this institutional space.

Renfrew interpreted classical archaeology as part of the so-called great tradition of the Western canon: the reading of classical literature in the original and a philological approach to the world. We can add that this tradition was grounded on repetition, memorization, and description. The past was always better than the present, as in other traditional cultures stressing past models rather than aiming for innovation, such as is also the case with the traditional Chinese worldview. This led to classical archaeology being from the start mostly descriptive and lacking interest in theoretical issues. It was only through the push of Anglo-Saxon anthropological moves, first new archaeology in the 1960s and 1970s and then post-processual archaeology, from the 1980s, that it reacted in a creative way. Let us turn to the main traditions of classical archaeology.

Traditions of Classical Archaeology

Over the last few decades, classical archaeologists from various parts of the world reacted to the challenge, rethinking their epistemological frames. We will study four main perspectives here: the German, English, Italian, and French. We start with the German, for it is the earliest and in a way the most traditional and probably also the most impervious to social theory issues, as the term is interpreted in the Anglo-Saxon world.

German Tradition

German classical archaeology predates the country and refers not to Germany but to German-speaking people. This is a key aspect of classics and classical archaeology in the German style: it is a culture area (*Kulturkreis*). Classics played a unique role in German-speaking areas such as Prussia but also elsewhere. It was a romantic way of fostering nationalism and identity in different contexts. The *Gymnasium* (grammar school) was the basket of the intelligentsia. Classical archaeology started as a search for material evidence relating to classical literature in the German-speaking principalities, municipalities, and even empires (such as the Austro-Hungarian), Greece and Italy, geographical concepts in search of a nationality. It is no coincidence that the 21st of April (date of the foundation of ancient Rome) 1829, a number of scholars, artists, and diplomats founded in Rome the *Istituto di Corrispondenza Archeologica*, aiming at studying monuments of ancient art, inscriptions, topography, and beyond. It was transferred to Berlin, in Prussia, in 1832, becoming imperial after the unification of Germany in 1874. Several branches were established and classical excavations spread throughout the Mediterranean.

German classical archaeology followed strict procedures in terms of publications paying attention first and foremost to complete catalogues with the largest possible cross-references. It was also subjected to nationalist and racist trends from society and academia, such as the search for superior Aryans and Indo-Germans: racist interpretations were widespread everywhere as attested to, for example, in books by Vere Gordon Childe, not to mention more imperialist archaeologists such as Mortimer Wheeler, both founders of the Institute of Archaeology, University College London. In recent decades, classical archaeology in German-speaking countries, even if still keeping most of the array of learned descriptions of sites and artifacts, is ever more open to social theory, German style, meaning the consideration of theories relating to religion, to economics, to iconography, and so on. This acceptance of a specialized theoretical discussion is thus usually concerned not with social theory in epistemological terms but with specific interpretive tools considered as useful for understanding specific sets of material culture.

The English Tradition

Classical archaeology started early in Britain, and as with classics in general, it was mostly influenced by German scholarship. It was,

however, from the start less obsessed with cross-referencing *ad nauseam* and was open to social theory, as attested to by two of the leading icons of the discipline of archaeology, Gordon Childe and Roger Collinwood. From those early-twentieth-century days dates also the preoccupation with interpreting material culture per se, not as mere parts of a narrative established by ancient literature. This led to a late-twentieth-century emphasis on the interpretation of material culture outside the framework of classical literature (Snodgrass 1987) and expanded the interpretation of periods before the use of writing, such as the Iron Age in several parts of Europe. Later on, issues such as colonialism, imperialism, and nationalism were used to study different classical subjects, such as obscure periods of Greek history (Morris 2000), so much so that for Morris (2000: 3) "archaeology is cultural history or it is nothing." The entangled relationship between past and present and reception and interpretation has also been stressed by such classical archaeologists as Richard Hingley and David Mattingly, using medium range theory, German style, and epistemological discussions about the discipline.

The Italian Tradition

Italian classical archaeology has been similar to the German tradition, since the early-nineteenth-century days. Filippo Coarelli (1994) explored the subject and concluded that historical problems and narratives guided classical archaeology on the one hand and on the other stressed cross-referencing and description. Even Marxist-inspired classical archaeology (e.g., Ranuccio Bianchi Bandinelli, Mario Torelli, Andrea Carandini, and Daniele Manacorda) upheld both tenets. Today, classical archaeology in Italy has been subjected to social theory via Anglo-Saxon influences, but mostly it is the German style of medium range theory of religion studies, economics, or even law studies which are most relevant.

The French Tradition

Classical archaeology in France was established in the nineteenth century as a reaction to German movements. The French established archaeological schools in the Mediterranean in the wake of the German ones, and the main German tenets were also adopted, but the French style came with a reversion of roles. While the Germans searched for Aryans, the French looked for colonizers and civilizers, as if the ancient Greeks were the only early bearers of civilization standards (*la mission civilisatrice*).

Renewal came from the 1960s due to several reasons, most notably French colonial setbacks. The discipline was also concerned with the importation of field techniques, such as the Wheeler grid. Most relevant has been the recent redefinition of the discipline as historical archaeology, as proposed by Étienne, Müller, and Prost (1990). The use of middle range theories from semiotics, religion studies, economics, and others is now much more common, and anthropological issues are also apparent. Again, this move is close to what happened in German-speaking countries and Italy, while a social theory of wider scope is still usually sidelined.

Future Directions

Historical archaeology and classical archaeology developed in completely autonomous, independent, and even contradictory ways. However, they share some major concerns with the role of writing and literary narratives in shaping the understanding of material culture. They also share issues relating to roots, identity, national, and imperial power, as well as how to deal with the other, opposing civilization and barbarism. In recent decades, several scholars have been stressing the usefulness of a closer relationship between all the archaeologies in general and particularly those studying societies using writing, from the Mayas to Egypt, China, and the contemporary USA (Gosden 2004).Even more related are historical and classical archaeologies, for they share a common classical canon but also the criticism of this canon in recent decades. The cross-fertilization of both fields has been going on for a while and promises to grow in the future for the benefit of an informed archaeological approach to ancient and modern societies.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Capitalism: Historical Archaeology
- ▶ Classical (Greek) Archaeology
- ▶ Historical Archaeology

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Archaeology and the Emergence of Fields: Maritime

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Introduction and Definition

Maritime archaeology in its most basic form is the study of material culture related to human

interaction with the sea. It involves the study of ships and shipwrecks, maritime infrastructure, maritime exploitation, maritime identities and landscapes, seascapes, and other types of heritage, tangible or intangible, associated with the sea. Related to maritime archaeology is the study of nautical archaeology which primarily focuses on "the ship" and all technical and social aspects of the ship, whether it is on land, underwater, or extant in a museum. Also related to maritime archaeology is underwater archaeology, which is concerned with the archaeology of sites located underwater, regardless of their connection to the sea; it includes not only shipwreck sites but also aircraft wrecks, sunken cities, submerged indigenous habitation sites and refuse sites. Thus, maritime archaeology differs from underwater archaeology in that its focus can be on wet or dry sites including shipwrecks, ship burials, shipwrecks buried in reclaimed land, maritime infrastructure sites (such as jetties and lighthouses), or shipwreck survivor camps. To further complicate matters, there are more related and overlapping study areas including lacustrine archaeology (archaeology in and of lakes), riverine archaeology (archaeology in and of rivers), marine archaeology (archaeology that occurs in the marine environment), and the list goes on. The development of maritime archaeology is intimately connected with each of these associated study areas through overlapping subjects, methodologies, and theoretical developments and can be difficult to separate when reviewing its history. Nevertheless, this entry will only cover the development of maritime archaeology as a subdiscipline, and as such, sites and studies not related to human use of the sea will be omitted.

Historical Background

The emergence of maritime, underwater, or nautical archaeology as a field or subdiscipline within archaeology has been primarily linked to the works of George Bass in the Mediterranean in the late 1960s (Bass 1967). His research project was the first underwater excavation of a shipwreck directed by a diving archaeologist. Nevertheless, as stated in the above definition, maritime archaeology is not strictly conducted on sites underwater. Lesser known, or less associated, are the earlier works and publications of a number of individuals and projects that set the pace for conducting maritime archaeology, albeit on land. Beginning in the late nineteenth and twentieth centuries, discoveries of watercraft in tombs and on dry land were investigated by antiquarians and archaeologists alike. Examples of such work include Jean-Jacques de Morgan's (1895) discovery and excavation of Egyptian boats in tombs at Dahshur and Basil Brown and Charles Phillips' team excavation of the Anglo-Saxon ship burial at Sutton Hoo in 1938–1939. While these research projects were not conducted underwater, the site types and subject matter can be considered well within the purview of maritime archaeological studies. The individuals who undertook this early work held university degrees and were trained in archaeological excavation techniques. Further, the archaeological questions asked were consistent with contemporary thought and revolved around the assembly of culture types and culture-histories.

Underwater efforts to recover objects and investigate sites by amateur archaeologists and salvors were also attempted through breath-hold diving, surface-supplied air sources, and diving bells. While these projects are interesting from a historical diving perspective, they contributed little to the development of the discipline other than fine-tuning some of the underwater exploration and recovery techniques which eventually would be used by archaeologists. In contrast, a project that is considered to be the earliest and first state-sponsored underwater archaeological survey took place in Greece at the naval warfare site of the Battle of Salamis by the Archaeological Society of Athens in 1885 (Lolos 2003; Catsambis 2006). Although trained archaeologists directed divers from the surface, this project represents perhaps the very first maritime archaeological survey underwater. The field reports of this survey were only recently found and translated, which leads one to believe that there could be several more of these surprising examples waiting to be discovered.

The development in the 1940s of the Aqua-Lung, a self-contained underwater breathing apparatus (SCUBA), allowed humans to reliably explore the underwater environment. SCUBA provided a vehicle for explorers, antiquarians, and, indeed, later archaeologists to begin freely examining material culture located underwater. For example, in the 1950s and 1960s, French and Italian SCUBA divers worked under the direction of archaeologists on wrecks at Grande Congloué, Cape Dramont, Île du Levant, Mahdia, Spargi, and Albenga (Atti del II Congresso 1961; du Plat Taylor 1965; Roghi 1965; Bass 2011). These surveys may not have included full-scale archaeological excavation or even diving archaeologists, but they certainly fulfill the criteria considered appropriate for conducting modern "deepwater archaeology" projects in which archaeologists on the surface direct activities underwater.

Arguably, one of the largest recovery projects to take place in the history of maritime archaeology was the raising of the Swedish warship *Vasa* in 1959 (Cederlund & Hocker 2006). This project set the pace for large-scale excavation and recovery projects, and for the next few decades, a number of large shipwrecks were recovered such as the warship *Mary Rose* in England and Dutch East India Company vessel *Batavia* in Australia. Alongside these projects being conducted underwater, equally significant maritime archaeological work was being undertaken in Scandinavia. By employing a cofferdam to allow submerged shipwrecks to be excavated as terrestrial sites, the Skudelev project involved the excavation of six Viking ships by Ole Crumlin-Pedersen and Olaf Olsen in 1962 (Crumlin-Pedersen & Olsen 1978).

What began with the untethered exploration of the underwater environment using SCUBA quickly developed into full-scale treasure hunting. Sites around the world were being destroyed in search of elusive treasure contained within shipwrecks. By the 1960s, legislation to protect underwater cultural heritage was being developed to prevent looters from destroying early shipwrecks. In fact, the Western Australian Government passed one of the earliest pieces of heritage legislation in the world in 1964 (Nash 2007: 3), which would ultimately become the model for Australia's *Historic Shipwrecks Act 1976*. By the late 1960s and early 1970s, several large-scale maritime archaeological projects were under way including excavations of the seventeenth- and eighteenth-century Dutch East Indiamen wrecked off of Western Australia, the fourth-century BCE Kyrenia ship in the Mediterranean, sixteenth-century Basque whaleships in Red Bay (Canada), and Spanish Armada wrecks in the USA and Caribbean. However, by this time, fewer were being directed from the surface as more archaeologists were conducting their own research on the seabed. John Goggin (1959–1960: 350), considered a pioneer in underwater archaeology for his work in freshwater springs in Florida (USA), was never more true when he stated, "it is far easier to teach diving to an archaeologist than archaeology to a diver!"

Another major step forward was the 1972 introduction of the *Journal of Nautical Archaeology and Underwater Exploration*, the first journal specifically devoted to the subdiscipline. Soon after, academic departments at universities in various parts of the world established programs dedicated to maritime archaeology; some of the early examples include those at Texas A&M University, University of Haifa, St. Andrews University, and East Carolina University. This was the beginning of what would become a proliferation of specialty degrees and would produce most of the first round of heritage managers and academics focusing on the subject.

Once maritime archaeology was a named degree or specialization within university archaeology and anthropology departments, it earned the status of a subdiscipline. While some speculate that this was a potential negative impact in the development of the discipline as a whole and that maritime archaeology should be taught alongside and in conjunction with the broader field of archaeology (Flatman 2008), others reveled in its acceptance and even benefitted from the newly developed specialty programs. As of 2011, there are no fewer than 15 academic departments around the world that teach maritime archaeology, and in nearly every country

that borders on water, there is a maritime archaeologist working. Indicators of the success of the subdiscipline include the 2006 introduction of a second journal dedicated to the field of maritime archaeology (*Journal of Maritime Archaeology*) and a steady increase in the number of jobs in maritime archaeology.

Today, the field is so broadly focused and diverse, if it were not for the definition of "human and sea," it would be difficult to describe it adequately. No longer is it necessary to be a diver to specialize in maritime archaeology because there are an equal amount of maritime-related sites being investigated on land as there are underwater. From lighthouses to shipwreck survivor camps, maritime archaeology is just as at home on the dry edges of the sea as it once was underwater.

Key Issues/Current Debates

Perhaps one of the most pervasive issues within the field of maritime archaeology is the need to protect underwater cultural heritage from those who wish to profit by selling, bartering, or trading associated material culture. Treasure hunting and looting of all forms is an offense maritime archaeology has battled from its inception. Even with the 2009 ratification of the UNESCO Convention on the Protection of the Underwater Cultural Heritage, the security of underwater heritage remains unstable in many countries around the world, and permits are issued regularly for treasure hunting endeavors. Public education and pressure to change laws at the State party and international levels are two areas where maritime archaeologists may contribute to correcting this problem. As Bass has so rightly pointed out, "[t]he distinction between archaeology and treasure hunting is misunderstood by far too large a part of the population" (Bass 2011: 14). Thus, education and engagement of the general public in maritime archaeology is critical. The media, from magazines to newspapers and television, is a powerful tool that has yet to be capitalized fully by maritime archaeologists and is a substantial key to educating the public about the difference. Treasure hunting is not profitable based on its "finds"; rather, it profits from selling a dream to unsuspecting investors. If there are no investors, there is no treasure hunting. Further, pressure to enact or change laws from individual and collective groups of maritime archaeologists, such as the Advisory Council on Underwater Archaeology and the Australasian Institute for Maritime Archaeology, can also provide protection to underwater cultural heritage. Through writing letters, lobbying governments, and providing technical assistance to developing countries that are often preyed upon by treasure hunting ventures, such groups are winning small battles. The enforcement of the UNESCO Convention on the Protection of the Underwater Cultural Heritage will be a huge leap forward in terms of managing and protecting underwater cultural heritage, but there is still much work to do on the local front.

Another related and key issue within the field is that of managing underwater cultural heritage. As more threats arise and budgets are restricted, maritime heritage managers are forced to find new ways of managing and protecting sites through survey (to locate sites), investigation (to identify sites and threats to them), and long-term monitoring (to ensure they are protected and to record changes over time). Over the last 10 years, large-scale excavation and recovery projects have waned. These projects are being replaced by in situ surveys, investigations, and monitoring, which involve leaving sites as they are rather than disturbing or recovering material culture. The current buzz word in the field is in situ preservation and conservation, and while most authors have pointed out that UNESCO defines in situ as a "preferred" method of management rather than the "only" method, it still weighs heavy on the minds of maritime archaeologists. Part of the issue with the concept in situ revolves around a lack of definition and principles for conducting in situ conservation and preservation. Because the field of in situ research is largely driven by conservation scientists and the results disseminated in conservation journals and conferences, there appears to be a lack of communication between the researchers (conservation scientists) and end users (maritime archaeologists and

managers). A study conducted in 2009 of practitioners revealed that many were unaware of what constitutes in situ preservation and conservation techniques and were therefore unwilling to consider in situ as part of their management practices (Ortmann et al. 2010). Thus, an area of research and discussion for the future of maritime archaeology will undoubtedly be focused in the coming years on in situ methods and their use. Closer collaboration, scientific investigation, and on-site application, as well as wider dissemination of results, may contribute to a better understanding of in situ practices.

The management and investigation of archaeological sites beyond the reach of divers, such as deepwater or remote shipwrecks, is an area of growing interest. Advances in technology are facilitating access for not only the archaeologist but also the novice and in some cases the treasure hunter. Deepwater sites often fall under the jurisdiction of State bodies, and practitioners are charged with managing sites that they cannot in fact view or visit. Additionally, deepwater wrecks require sophisticated and expensive equipment, large platforms for operating that equipment, and in some cases lengthy cruises to access the sites. Finally, because these sites are further out to sea, they are not protected under State legislation. Thus, they are unprotected from disturbance and treasure hunting. So how are these issues negotiated? The answers to accessing and investigating these sites may lie in the cooperation with large organizations, such as marine institutes that conduct geophysical, biological, or oceanographic research. However, partnering with groups who possess the technology and ability to access such sites will only allow the archaeologist to arrive at the site; the next issue is how to conduct archaeological investigations on deepwater sites. The same concern that others raised about archaeologists conducting archaeology from the surface in the 1960s, again, rears its head. Can proper archaeological work be conducted on sites that can only be accessed remotely? And perhaps more importantly, what types of research questions can be adequately addressed? Can questions that count be asked of sites where little ability exists other than to collect samples for identification of site type, function, and possibly cultural affiliation? Are basic archaeological site plans reconstructed though remote photography and video contributing to our knowledge about the people and culture behind the sites? Answers to these questions are currently being debated among academics and practitioners (Adams 2007). There are no easy answers to these questions; however, the issue exists and is not one that will disappear or even decrease in complexity.

A final key issue that has rippled beneath the surface and is occasionally communicated relates to interaction of indigenous peoples with the sea and the investigation of archaeological sites closely associated with these activities. Until relatively recent times, maritime archaeology has primarily focused on classical and historic period sites. Ships, lighthouses, boatyards, jetties, and harbors were typically constructed by historic culture groups. Thus, maritime archaeologists have given relatively little attention to sites and regions of the world where an indigenous population had/has an intimate connection with and use of the sea. These sites are overlooked primarily because they fall within the realm of terrestrial archaeologists who focus on indigenous sites. However, maritime archaeologists can contribute greatly to this area; the key lies in collaboration. Maritime archaeologists are trained to look at the specific "maritimity" of a site or object (Tuddenham 2010). When viewing coastal and inland sites, our first questions involve the location of the nearest port or how far inland a river is navigable. Answers to questions about access to goods and trade networks often involve waterborne travel rather than overland travel. Maritime archaeologists understand seasonality, maritime subsistence, and boat-building technologies. Some researchers have begun to collaborate on projects related to indigenous knowledge and use of the marine environment and the importance of watercraft in migration, but the work is slow to develop. This area of research could contribute not only information about past and present use of the sea but also indigenous claims

of tenure and sea rights. Maritime archaeologists and their research have the potential to contribute to relevant modern social issues in the areas of indigenous maritime tenure in the coming years.

Future Directions

From its inception, an overwhelming obsession with shipwrecks, method, and technology has left the subdiscipline of maritime archaeology unbalanced. Just as developing methods for finding and recording shipwreck sites underwater were a necessity for the field to grow, so was the need to align research with current intellectual and theoretical discourse within the broader field of archaeology and anthropology. Unfortunately, the field's practitioners failed to accomplish this second phase, and a period dominated by historical particularism characterizes most of the early work. However, all is not lost; in recent years, the battle to overcome the historical-particularist approach is well under way. A perusal through journal articles, books, and websites demonstrates that maritime archaeologists are actively engaging in greater intellectual and theoretical debates with the disciplines of archaeology and anthropology. The investigation of more terrestrial maritime sites including landscape and seascape studies and shipboard material culture are areas in which theoretical discussions are occurring.

Another future direction that is vital to the field of maritime archaeology is that of public engagement. This has never been more important than now when the world's economy is flailing and budget cuts are severely impacting State bodies, granting organizations, and education funding. The public write letters to those who make the laws, vote for the laws, and, ultimately, are for whom maritime archaeology is practiced. Engaging people in all levels through consultation, volunteerism, and eventually to the final product of publication and dissemination of results is an area in which maritime archaeology can expand. And it appears to be making progress; with successful organizations and programs such as the Nautical Archaeology Society in the UK, the Florida Public Archaeology Network in the USA, and the Museum of Underwater Archaeology online, the public is being brought into the fold. There remains, however, room for improvement such as involving and interpreting sites for the non-diver and producing stimulating media products to rival exploration and treasure hunting ventures. In an age of video games, simulation technology, and mobile applications, maritime archaeology offers a veritable and endless source of public entertainment and education.

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Archaeology as Anthropology

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Introduction and Definition

Archaeology, it has been said, is one of the four subdisciplines of a larger discipline – anthropology – the other three being bioanthropology (formerly known as physical anthropology), linguistics, and social/cultural anthropology (a double adjective that honors both the British and American traditions). This account, however, largely only reflects the American context. In most other parts of the world – notably in Europe, where the "disciplines (or subdisciplines)" were born – the two have been separated thematically, pedagogically, and administratively. But even in the Americas, where the linking of archaeology to anthropology is rarely disputed, their explicit relationship is strained, and it could be argued that the stated relationship does not really exist; further, it has been utterly distant for the most part, so much so that in spite of an avowed nearness and their contributions to the same thematic field, they successfully ignore each other. Their closeness or distance is a direct function of their relationships, separated or in tandem, with colonialism, nation-building, and, nowadays, with post-national multiculturalism. Yet, what anthropology means to archaeology and vice versa is important to their destinies in postmodern times.

In considering the relationship between archaeology and anthropology, however, more commentary is required to clarify the discussion that follows. Archaeological interpretations have *always* used cultural data – especially as professionally produced by anthropologists – in order to give meaning (functional and symbolical, for the most part) to "things" and "sites" through cross-cultural analogies; although the latter were used intuitively and in a very relaxed way for decades, archaeologists have spent much effort to refine and control their use. In this regard, the intimate, unidirectional relationship of archaeology with anthropology is quite evident and needs no further development. Other stories can be told in terms of their mutual or separate articulation to wider agendas and purposes, political and otherwise; the following is the story I chose to tell.

Historical Background

The origin of anthropology is tied to the European colonial expansion of the nineteenth century. Baffled by the weird behavior of the very peoples they sought to colonize and exploit,

colonial governments rapidly understood that the best way to an efficient government was the understanding of the locals. The anthropological understanding of the "savages" thus emerged as a condition for better governments. Archaeology is older. It was born in the eighteenth century to feed the historical imagination of a recently created modern entity: the national society. Anthropology appeared to normalize the "other" of modernity (the "savages" located in an ontological exteriority), while archaeology tamed an undisciplined time vector built upon objectification, universality, and progressive temporality – modern time, that is. Their common European birth was thus not coterminous and arose in different contexts: while the latter provided the teleological and monoethnic temporality the recent nation-states needed, the former was geared to the administration of colonized peoples in Asia and Africa. Although canonical definitions have it that both were meant to deal with "men" as a cultural being (one in the past, the other in the present), in Europe and elsewhere they performed quite disparate functions. The story is different in the Americas, where archaeology was part and parcel of a larger field called anthropology.

The relationship between the two varies with place and time. In Europe and most of the world, it hardly exists or is merely formal. In the Americas – and, to a lesser extent, also in Australia and New Zealand (Harry Allen, *pers. comm.*) – it may be argued that they share a common genealogy. While archaeology in Europe wrote about the "savages" as proto-selves – in evolutionary terms, the primitive that eventually evolved into the civilized Westerner – in the Americas and elsewhere "savages" were written about as the "other" external to modernity. In European countries, the denegation of coevalness to their own pre-civilized "savages" was a function of teleology: they were not part of modernity because they truly belonged to past times; their rhetorical existence (their presence in archaeological narratives built upon "true" relics) and their eventuating into modern selves (their presence in national histories) were proofs of the elapsing of progressive time. In the Americas the "savages" as "other" (the paradigmatic Indians) were not part of that story: they did not evolve into the civilized self. As if that were not enough, in Latin America the appropriation of some indigenous achievements – carefully selected as to mimic European civilization (gold work, domestication of crops, monumental architecture, religious life, centralized governments, even writing-like systems) – by national storytellers, all members of elites that despised the Indians and considered themselves "white," was a brutal paradox. Archaeology became the notary public of the passing of pre-European societies; it legitimized the disappearance of the Indians (something of the past), and it paved the road to *mestizo* national ideologies.

Such was the basic difference between the colonial centers of power and the colonized areas in terms of storytelling. Indeed, in Europe, anthropologists were producing information from and about the "savages" while archaeologists were mere citizens proudly elevating their own heritage; in their colonies of Africa and Asia, European archaeologists were delving in the pleasures of antique hunting. In the Americas, Australia, and New Zealand, archaeologists and anthropologists worked toward a similar goal, nation-building. For these reasons, archaeology in Europe and its colonies was not part of anthropology. In contrast, archaeology played a different role in the Americas where it took part in the normalization of contemporary "savagery." Archaeology and anthropology in the Americas were one and the same; their relationship was a pure brand of the apparently odd complicity between modernity and colonialism. While anthropology set to normalize the "savages" through indigenism, archaeology normalized them by imposing a new temporality (that of civilization) and by using their chosen civilized traits as national symbols – the latter was especially true in Latin America. In short, both were modern disciplines designed to modernize "savagery" through the production of national imaginations.

While in most parts of the world archaeology and anthropology have silently traveled along different paths, it is not surprising that in the Americas their relationship has preoccupied archaeologists – anthropologists, aware of their

theoretical sophistication and the nuances of ethnographic renderings, have despised the rude empiricism of their disciplinary colleagues to whom they pay little attention. Archaeologists felt – and, to a large extent, still feel – that their subdiscipline was there to serve a higher anthropological purpose, the holistic understanding of humankind, through a painstaking spatial and temporal ordering of ancient things left in the ground. They did so, basically, by providing the long-term data that evolutionary typologies about society needed to fill temporal gaps. Yet, afraid that the relationship was drifting toward a mere departmental cohabitation with no epistemological articulations and seeing in anthropology a model to be followed, Philip Phillips (1955: 247) wrote what became a famous dictum, with lasting consequences: "American archaeology is anthropology or it is nothing." The anthropology Phillips was referring to was one of a kind – objective and disciplined by scientific protocols. The mirror archaeologists were looking at was that of a nomothetic and universalist science. Later on, Lewis Binford (1962) outlined even clearer relations through the use of the key term *explanation* ("the demonstration of a constant articulation of variables within a system"), the hinge that would articulate the disciplines dealing with "men" as cultural beings amenable to scientific scrutiny.

Anthropology was chosen as a model for archaeology due to an unreflective legacy that stressed a common origin, but it soon became a burden. A subservient dependence of archaeology to anthropology was resented by many, especially in terms of theory, so much so that a strong appeal grew for archaeology to develop its own conceptual machinery. The scientific program widely adopted since the end of the 1960s found necessary to maintain genealogical ties with the mother discipline but building its own theoretical and methodological apparatus (understanding that the technical attire was already at hand) as a way to elevate archaeology to full maturity. An iconic paper in this regard was written by David Clarke (1973) – a British scholar, to be sure – celebrating the loss of innocence of archaeology at the expense of almost ignoring anthropology. Confident that even its own "general theory" was reachable, archaeology decided to follow its own path. The decision was not surprising; although heralded by British scholars who came from a non-relational tradition, it rapidly took roots and sealed the abandonment of the last traces of its functional relationship with the nation – and of its relationship with anthropology! Archaeology locked itself in a scientific, meta-real world, away from contemporary preoccupations such as collective history and identity – the very stuff anthropologists were dealing with. For scientific archaeologists, the field that still linked them to anthropology, although by sheer instrumentality, was ethnoarchaeology, widely promoted as a contact with *living peoples* but which was simply devoted to producing information for the translation of statics (the archaeological record) into dynamics (the operation of cultures).

The wave of reflection and criticism that beset anthropology after the 1970s (which occurred due to the mounting accusations of its complicity with colonialism) eventually impacted archaeology. Although never as agonizing as in anthropology, the critical move took the form of metadisciplinary inquiries: the complex relationships with imperialism, nation-building, "othering," and capitalism came to the fore, in many cases, for the first time. The disentanglement of such relationships brought archaeology close to anthropology because it touched the nerves of the contemporary world. It also showed that archaeological products were constructed in social milieus and were thus social facts, inherently political. Politics are thus a recent archaeological preoccupation that has been engaged in several ways. Most archaeologists practice politics the multicultural way: politically correct while going public, they celebrate their proximity to "otherness" (still an academic object) but are careful not to mingle excessively and to safeguard their epistemic privileges – repatriation being the best example because it does not compromise the integrity of the discipline but allows archaeologists to get closer to the "other." A growing minority genuinely strives to reconcile knowledge and power, surgically separated since the end of the nineteenth century by

positivism, and has made archaeological interventions politically conscious at all levels; in doing so, it follows anthropology's estrangement from colonialism by siding with and giving voice to the very people it used to study for governmental purposes; it became anticolonial and even antimodern. Discontent with a discipline that was a favorite proxy of modernity *qua* colonialism, a sector of anthropology started to think and act critically and independently, so did many archaeologists who refused to be functional to the rhetoric of multiculturalism.

Yet, most anthropologists work within the current social and political order, providing the epistemic means through which "otherness" is administered by the rhetoric of diversity, not least through the ongoing promotion of development. A more academic approach has seen the adoption of a constructivist agenda that portrays culture (and its weaving of the social fabric through identity) as situational, fluid, conjunctural, and strategic, thus castigating cultural primordialisms, especially ethnic. Alternative anthropologies have emerged, though, building upon previous political commitments. They stress collaboration in research (establishing research priorities from the local up) and account for non-Western cosmologies; the latter are not any longer seen as exotics awaiting cultural translation but as meaningful renderings of life on their own. Further, the widespread academic anti-essentialism is countered by a critical, at times sympathetic, understanding of the politics of identity. Archaeology is also plural in contemporary contexts. Two or three decades of multiculturalism have altered its face. If archaeology had a clear relation with nationalism during its modern phase, in its house now reign disorder and confusion; if it formerly administered discourses partly designed to deal with others located outside of modernity, it now ignores what kind of discourses it administers when those others are no longer the exteriority of modernity but a constitutive interiority of multicultural societies. Many archaeologists, especially those in countries suffering aggressive capitalist expansions, satisfy market needs through cultural resource management (CRM) or cultural heritage management (CHM), becoming commodities themselves and undertaking their work according to a legalistic and vertical conception of heritage. Scientific archaeologists often fustigate CRM/CHM practitioners, arguing that their scholarly standards are piecemeal, if not unaccounted for; committed to an increasingly cumbersome liaison with science, they are unlikely birds in multicultural lands – decontextualized fellows who insist on courting a narrative monopoly already lost to other interested parties. Before that fact, a growing number of archaeologists have forged a curious approach that mixes a bit of old positivism with a pinch of new constructivism; they label it *public archaeology*, a fine multicultural product that accommodates the old tenets of archaeological practice to the changing multicultural contexts. Still others have embarked on different paths, seeking to forge alternative archaeologies – this is the case for disciplinary practitioners working through collaborative research agendas with local constituencies and/or via indigenous activism. Alternative archaeologies, though, still retain a metaphysical and ontological disciplinary core. For that reason, alternatives to archaeology are being casted world round with the aim of engaging non-Western conceptions of time, space, matter, and relations.

Key Issues/Current Debates

Several books (Gosden 1999; Gillespie & Nichols 2003; Garrow & Yarrow 2010; Shankland 2012) and a wave of professional symposia over the last few years show that the relationship between anthropology and archaeology is a matter of renewed interest. The main meeting points, sometimes intertwined, are ethnography and materiality; Ingold (1993) would add time and landscape to the list, but I will not explore them here given that they have received much less attention. Nor will I discuss the still widely held idea that archaeology is uniquely positioned to provide long-term data for the anthropological understanding of cultural practices or, as in the

case of *applied archaeology*, for the implementation of successful past technologies in current contexts – such as pre-Hispanic raised field agriculture in tropical places in South America. The archaeological access to the long-term (also called the *distant past*) would account for variations and changes (but also continuities) not available to the theoretical and methodological machinery of other social disciplines. The understanding of adaptations and extinctions (their causes, consequences, and advantages) has been usually mentioned as the basic field to which the privileged archaeological gaze can contribute. However, such a contribution is hampered by a widespread rejection of uniformitarianism and by a simple tautology: archaeological models based in anthropological data are used to inform anthropological interpretations.

Ethnography

The theoretical, metadisciplinary lookouts that archaeologists build to have a better view of their own work (and, many times, to elude their responsibility) are usually removed from practice, as if their reflection about general, past concerns protect and isolate them from the very processes to which they contribute, intentionally or not. The genealogies of particular archaeological trajectories – such as the relationship between the discipline and nation-building – have proven their utility to uncover its social/contextual character. Yet, they lack an essential ingredient: the ethnographic present in which we are all trapped and which forces us to confront our work in real time more than as the unavoidable legacy of faraway forebears. Such a limitation appears to be being overcome in recent times. Ethnography now appears as a common ground for archaeology and anthropology, so much so that a recent review paper (Hamilakis 2011) calls it "a multitemporal meeting ground" for them both.

New relational approaches, variously called "ethnographies of archaeology" (Edgeworth 2010), "archaeological ethnographies" (Hamilakis 2011), or "ethnographic archaeology" (Castañeda & Matthews 2008), "use ethnographic methods to try to understand the *cultural practices of archaeology* itself" (Edgeworth 2010: 54); their philosophical core is constituted by relations and meanings between beings, not things. They share a concern with the effects of archaeological activities (excavation, exhibition, curation, dissemination) upon local publics and, conversely, with how local publics engage archaeology and its diverse discursive objects. To use a time-honored archaeological expression, they document their own activities in situ: the archaeological *site* is thus elevated to a constructed place where the very materiality of the social and the political unfolds (the long-lasting effects of archaeological discourses – their articulation with national, regional, or subaltern agendas, for instance – are not the focus of their inquiry). Through reflexivity and self-criticism, they seek to understand (a) how archaeologists produce knowledge as situated and positional subjects, (b) how different publics relate to it (ironically, selectively, opposingly), and (c) how archaeological representations are deployed (and many times countered).

Archaeology may find in the ethnographic gaze a bountiful source of reflexivity about the observer/observed dichotomy. For decades, archaeologists disdained ethnography (that weird activity performed by anthropologists, uncomfortable bed partners to whom they didn't talk, with whom they didn't share) only to consider it now a novel way to connect past and present. Archaeological ethnographies are not akin to the ethnoarchaeological activities scientific archaeologists were so accustomed to. In spite of optimistic and condescending appraisals that posit it as a forebear of archaeological ethnographies, more often than not ethnoarchaeology reinforces the logocentric gaze, avoids intersubjectivity, and subdues multiplicity; its almost exclusive purpose is to produce dynamic cultural data for interpreting static archaeological information, bypassing or ignoring the lives of the peoples they judiciously study, those *mobile objects* whose sole role is providing information useful for archaeological interpretations; the people thus studied are just unveiled objects, measured, disciplined. But away from

ethnoarchaeology, archaeologists and local communities can engage in new kinds of relations, meaningfully built around interactions of lives and beings and intersubjective understanding – the very meaning of ethnography, anthropologists notwithstanding (Fabian 1990).

Materiality

A widespread and shared idea is that archaeology's specificity, more than anything else, lies in its expertise about artifacts, especially if they are ancient. For most of archaeology's history, artifacts were inert, exterior, and silent things geared to mediate between culture and nature; although resulting from human interaction, they were utterly reified. Yet, due to the holistic approach to culture championed by the scientific program, artifacts began to be considered more widely and interactively as an important part of *material culture*; the use of *material* as an adjective of *culture* (but not vice versa) signaled an important change whereby social relations entered the otherwise sealed and autonomous realm of artifacts. An important consequence of this move was that archaeology engaged in related discussions with other fields (philosophy, economy, history) and pitched its tent in time slices and topics formerly banished; such is the origin, for instance, of historical archaeology and its more recent offspring, archaeology of the recent past. Joining forces around material culture with other disciplines, archaeology began to speak about commodities, consumerism, and the constitution of social personas. Such an interdisciplinary endeavor is behind the creation of material culture studies (e.g., Buchli 2002). Part of the same move, the so-called anthropology of technology (Lemonnier 1992) brings archaeology and anthropology together by deploying ethnographic observations upon cultural practices around *techné*. Those observations downplay economic reductionism as a means to understand human choices regarding technical and technological options; instead, they show that such choices are often dictated by powerful drives that cannot be explained by functional criteria. The ethnographic, non-reductionist approach adopted by the anthropology of technology has humanized the mechanism inherent in studies designed to understand technological organizations, the Anglo rendering of the French *chaîne opératoire*. A related field of inquiry, from which archaeologists have largely profited, aims to reconstruct the social life of material objects (Appadurai 1988), mostly through the lens of political economy – the very reason that explains why things are thus considered in their mercantile phase as commodities. Another notable area of research along these lines put museums in the forefront because they are the iconic places for direct, bodily interactions between the public and archaeologically produced objects.

Not long ago, archaeologists brought theories of agency to bear on material culture, thus showing how humans position themselves actively toward "things" and how the latter participate in the production and reproduction of social life; the participation of things, however, does not occur as beings (as relational accounts would have it) but still as fetishicized and reified objects. Agency is accorded to humans, not to things. This fact underscores that most material culture studies are undergirded by modern ontological precepts whereby "things" and humans remain rigorously separated as much as mind and matter. For that reason, the term *materiality* is now preferred by those who favor processes and events and, perhaps more importantly, who think that objects can be disentangled from their modern ontological cradle. An exciting alternative has thus emerged, one that engages other ontologies in which life and the world are conceived and acted upon relationally, understanding materiality through its embeddedness in a web of living entities (Haber 2009). It is linked to the work of several individuals and traditions, basically in the social studies of science (e.g., Isabelle Stengers' *cosmopolitics* and Bruno Latour's *symmetrical anthropology*) and anthropology (e.g., Marisol de la Cadena's *multiontologies* and Eduardo Viveiros de Castro's *multinaturalism* and *perspectivism*).

Future Directions

Optimism is mounting among many archaeologists about the rapprochement with anthropology through ethnography, so much so that the editors of a recent volume devoted to the issue stated that "we foresee a time when ethnographies of archaeology such as these (which describe the social context, local reverberations, or political economies of archaeological ideas or objects) are considered just as significant to the field of archaeology as is excavation or artifact analysis" (Hollowell & Mortensen 2009: 8). However, there are powerful reasons why we should not celebrate so soon. Two contemporary conditions further the cleavage between archaeology and anthropology by solidifying the self-isolation of the former and by hampering its political edge: (a) its accommodated relationship with multicultural policies, especially those dictating political correctness and the commoditization of otherness, and (b) by embracing CRM/CHM projects, whereby disciplinary practice is geared to the needs of development.

The multicultural face of archaeology is pitiful. A "reformed" establishment is happy to share what it cherishes most with previously marginalized parties: disciplinary epistemic coherence. The gains are numerous: it keeps practicing archaeology as it was laid out by modern standards (it changes nothing of its metaphysical fabric); it does so in public (generously); it feels more democratic (by sharing); it gets closer to what it used to call the "savage," appeasing her/his demands while convincing itself that disciplinary nearness is tantamount to spatial, temporal, and cultural coalescence. All in all, however, archaeology keeps spreading the fruits of enlightenment and gets other (local) actors to participate in institutional spaces created to control the definition and management of disciplinary principles.

The intimate relationship of archaeology with capitalism – as expressed in its provision of empirical data for supporting progressive temporality – has been augmented by the expansion of CRM/CHM worldwide. Its impact is so pervasive that a significant number of archaeologists work for that growing market – in Brazil, for instance, where the situation is distressing, that number may be as large as 90 %. In doing so, they have abandoned any possible intervention in contemporary issues in order to dance to the rhythm of money. CRM/CHM is even producing profound curricular transformations (something achieved by no other event in the history of the discipline): new undergraduate programs – characterized by their short length (normally no more than 3 years) and their technical emphasis – are being created to mass-produce archaeologists to fulfill the contractual needs arising from aggressive capitalist expansions (transport infrastructure and mining are the most salient). In the process, the already weak ties with anthropology have been severed. The result is an utmost estrangement of archaeology from anthropology by severely abating the struggle for social justice, including engaging alternative social/historical cosmologies, and curtailing a critical stance toward the global order; by fueling the conversion of heritage and the past into commodities, long ago denounced; and by an overt complicity with market mandates, effectively diminishing the possibility for the discipline to rebuild its metaphysical and ontological apparatus, already clearly hierarchical and neocolonial. What archaeologists dreamed for decades (their independence from anthropology) seems to have been finally achieved by the most gruesome of means: their ultimate surrender to capitalism and the multicultural order. Although this complex stage would demand an attentive introspection, it seems that just the opposite is happening: most archaeologists are now more impervious to critique and self-reflection than ever before. They feel fine with their multicultural concessions; besides, the CRM/CHM money that flows through the inner circuits of the discipline is of such magnitude that they don't want anything or anyone disturbing their comfort. For these two main reasons (multiculturalism and CRM/CHM), most archaeologists are happy to preserve their privileges – cognitive and otherwise. This perverse situation has produced complacency and silence.

The future relationship between archaeology and anthropology is thus subjected to different forces. One is centrifugal and pulls them apart: it does so by accommodating to multicultural and

capitalist needs. Another force is centripetal and brings them closer, sharing concerns in a convergent, alternative platform where modern metaphysics and ontology are at stake. In this regard, archaeological ethnographies can produce the collapse of disciplinary self-referentiality, the demise of its closure. They can also offer intersubjective experiences as the loci of knowing, which cease to be a function of a methodological prescription, as the canon of modernity established, to be the result of relationships between subjects who strive to bring closer different worlds; such proximity can open up alternatives of life and action that truly are alternatives to a Western cosmology. The intersubjective space facilitated by the ethnographic encounter entails the dismissal of objectivism in archaeological and anthropological discourses. In the ethnographic encounter, but also in the establishment of horizontal and participative relationships that seek to eliminate distance (between observer and observed, researcher and object of study, the West and the rest), archaeology meets anthropology anew. This encounter, not accidental or bureaucratic any longer but deliberate and militant, is the stage for a new morality that cannot be found solely within disciplinary borders (stubbornly patrolled to preserve epistemic privileges) but which will more likely arise from an engagement, simple and non-hierarchical, with lives built and being built outside Western mandates.

Archaeologists are keen to talk about the past – well, that is what they basically do. They are not so keen to talk about the future, a temporal horizon far removed from their trade. It is not surprising, then, that it has been precisely an anthropologist who has ventured into the shifting grounds of prediction to imagine what archaeology and anthropology are going to look like four decades from now. For Tim Ingold, a concern with relatedness (instead of anthropocentrism) and the persistence of life (instead of preservation) will define a common agenda:

> Between Archaeology and Social Anthropology, then, there is no longer any difference of principle. They have, in effect, converged upon a science of life whose overriding concern is to *follow what is going on*, within dynamic fields of relationships wherein the forms of beings and things are generated and held in place… [Thus] the *archaeo-* of archaeology and the *anthropo-* of anthropology have lost their former appeal… [and archaeology] has become an anachronism for the subject that still goes by that name has long since lost its association with antiquity. It is not that archaeologists have ceased to dig down for evidence of past lives, any more than ethnographers have ceased to participate in the lives that are going on around them, in what we call the present. But they have dropped the pretense that what is past is any older, or more ancient, than the present, recognizing that the occurrences of the past are not deposited at successive moments while time moves on, but are themselves constitutive of that very moment (Ingold 2010: 160).

Cross-References

- ▶ Ethnoarchaeology
- ▶ Interpretation in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology
- ▶ Nationalism and Archaeology: Overview
- ▶ Supermodernity and Archaeology

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Archaeology Data Service (ADS)

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Basic Information

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The Archaeology Data Service (ADS) was established on October 1, 1996, with the mission to preserve, catalog, and describe digital data generated in the course of archaeological research and to facilitate its reuse (Richards 1997; Richards et al. 1999; Wise & Richards 1999). These activities are mutually supportive as unless digital data are actively curated, they will not be available to future scholars, and unless researchers are going to reuse data, there is little point in expending effort attempting to preserve them. Preservation is therefore inseparable from dissemination and publication (Fig. 1).

The ADS was set up as one of five disciplinary-defined services within the Arts and Humanities Data Service (AHDS) (Burnard & Short 1994). It developed from a successful proposal from a consortium of university departments of archaeology and the Council for British Archaeology, led by the University of York where it is hosted within the Department of Archaeology. Initial funding came from the Joint Information Systems Committee (JISC) and the Arts and Humanities Research Council (AHRC). From an early stage, the ADS also began to receive external funding from a variety of other UK organizations, such as English Heritage, reflecting the diverse nature of the archaeological sector. Despite the AHRC and JISC ceasing their funding for the AHDS, the ADS provides ongoing support for digital preservation and reuse, for research, learning, and teaching for archaeology and the historic environment sector. Depositors are required to pay a one-off fee, at the point of deposition, based upon the ADS charging policy (Richards et al. 2010). Access to data, however, is free to all. The source of the data must be acknowledged, and copyright is maintained by the data depositor. The ADS takes a nonexclusive right to distribute the data and to take steps to preserve it. The ADS is a member of the Digital Preservation Coalition (http://www.dpconline.org/) and follows the Open Archival Information System (OAIS) model for the preservation of digital data (ISO 14721: 2003). In 2010 it was awarded the Data Seal of Approval (http://www.datasealofapproval.org/). All data archives are given a permanent digital object identifier (DOI) under the auspices of DataCite (http://datacite.org/).

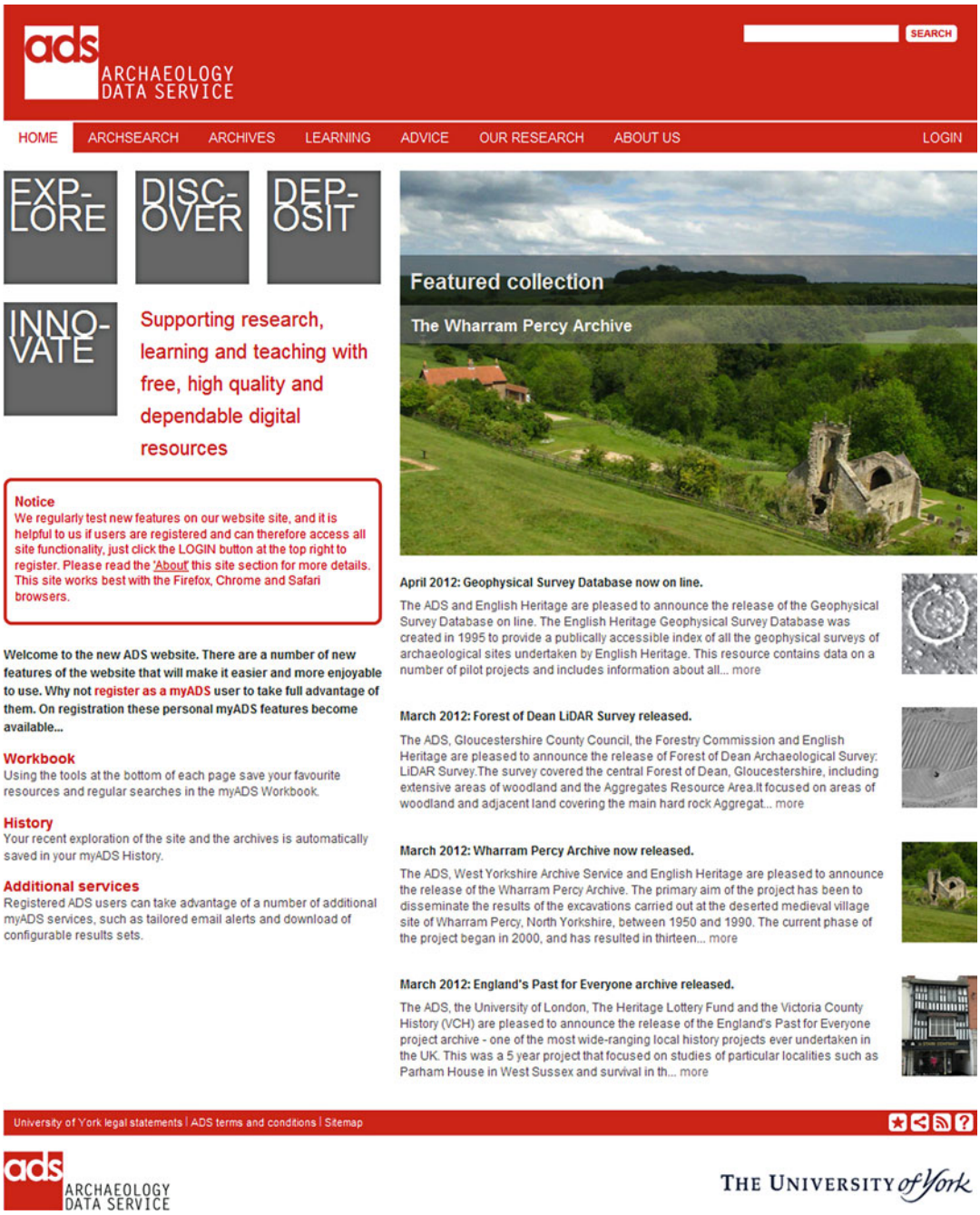

Archaeology Data Service (ADS), Fig. 1 The Archaeology Data Service homepage, April 2012

Major Impact

Archaeology and the historic environment sector are in a special position in that much data creation results from the destruction of primary evidence, making access to data all the more critical in order to test, assess, and subsequently reanalyze and reinterpret both data and the hypotheses arising from them. Over the years, archaeologists have amassed a vast collection of fieldwork

data archives, a significant proportion of which remain unpublished. Access to data, even those which are published, is often difficult or inconvenient at best. The ADS works with national and local archaeological agencies and those research councils involved in the funding of archaeological research to negotiate deposition of project data. This includes data derived from fieldwork as well as desk-based studies. The types of data involved include text reports, databases (e.g., related to excavated contexts or artifacts), images (including aerial photographs, remote sensing imagery, photographs of sites, features, and artifacts), digitized maps and plans, numerical datasets related to topographical and subsurface surveys and other locational data, as well as reconstruction drawings. By 2012, the ADS provides access to over 1 million metadata records for the archaeology of the British Isles, over 20,000 unpublished fieldwork reports (the so-called gray literature), and over 500 individual project archives. These include a wide range of environmental data, including ABMAP (the Animal Bone Metrical Archive Project), the Environmental Archaeology Bibliography (EAB), and the Environmental Archaeology Unit digital archive. The ADS is also working with European and other international bodies to develop a worldwide infrastructure for archaeological research.

Cross-References

- ▶ Archaeological Informatics
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)

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Archaeology in the Enlightenment

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Introduction

Virtually no archaeological research, in the sense we understand archaeology today, was conducted during the period (1690 to 1789) that was embroiled in the intellectual ferment known as the Enlightenment. Yet three key concepts of the Enlightenment frame debate about archaeological theory in the present. The learned of Europe and the English colonies earned liberation from a servile obeisance to the established political and clerical order by the universalizing canons of science – empiricism, trust in sense perception, and the freeing of human consciousness from ignorance and received doctrine. History was conceived as a predictive science that was fully an equal to the natural sciences because of an abiding faith that all humanity was borne of a common ancestor, with implications for present prehistorians who ask by what methods and authority we can comprehend unrecorded motivations in the past. Lastly, the Enlightenment's signature publication, the *Encyclopédie*, elevated the humblest tool to a probe for comprehending the intellectual status of its craftsman maker, however remote in the past. One of the enduring legacies of the Enlightenment is the general acceptance that archaeology is the study of the remains of past people's actions upon a world as socially constructed and perceived – understanding of which can be empirically derived and is not obscured to the outsider by an inner logic (manual of translation for the meaning of behavior) forever hidden.

Definition

The Enlightenment celebrated scientific society as the highest moral end of history, with the promise that the historical sciences (eventually including archaeology) could reveal moral laws and practical means to increase human happiness.

Key Issues

There is some irony in writing about archaeology in the Enlightenment. Arguably, there was none (with one informative exception). Yet, it is also fair to say that three currents of Enlightenment thought converged to give us the fundamental questions we ask of all prehistoric data. It is a common place to say that all archaeologists can do is use fragmentary and ambiguous material evidence to make statements about how peoples in the past acted upon the world as they perceived it. Put another way, the intellectual history of archaeology has been the search to comprehend unrecorded motivations. Were the actors upon the ancient stage much like us, such that we can recreate their motivations in our mind? Or were they playing to a script that is untranslatable to an audience from another time and another society?

These questions would have had no meaning to those who thought about past peoples during the previous Speculative Period (post-Medieval, early Modern). Post-Enlightenment, these same questions became core to archaeologists' understanding of the world (and continue to split philosophers of the social sciences into partisan camps).

In order for archaeology to be something other than an academic vanity, there must be a basis for cross-cultural and deep temporal understanding. How that cross-cultural understanding is derived may be a matter of strident dissent (witness the ongoing debates between Processualists and post-Processualists, for example). The fact is that this question – how can we, at a remove in time and often of an alien culture, comprehend unrecorded motivations in the past? – is central to the archaeologist's enterprise and means that we are all children of the Enlightenment. But here we have to separate the intellectual task of archaeology from the data retrieval and processing task.

To the vast majority of those who dug into ancient monuments and remains during the roughly 100 years of the Enlightenment, little knowledge was gained. So let us deal with this issue first.

Thomas Jefferson's 1784 excavations of Virginia burial mounds (arguably the only systematic, if "unintended" archaeological excavation conducted as part of the Enlightenment project) was undertaken to gather data to counter the argument of degeneration of North American animals, indigenous peoples, and their institutions. The nitty-gritty of the excavation techniques could hardly be called up to standard; however, the description and recording of what was found and in which stratigraphic context was surprisingly good. If we can agree that modern systematic data collection starts with a question, a question that generates implications about patterning of the material remains, patterns that are, in turn, observable or non-verifiable in the field (falsifiability), and that the observation protocol (excavation, survey, etc.) must be fully described along with the ultimate conclusions so they can be assessed independently by others – then Jefferson did it all. His data recovery was in response to a European questionnaire that had at its heart an assumption (the question) that animals and humans removed from the old world to the new would inevitably degenerate (becoming smaller and less complex) because of some presumed environmental deficit. Jefferson reasoned that Native American remains stratigraphically below others in burial mounds would be older than those above; hence (according to the questionnaire's assumptions), the artifacts in those lower strata should be more developed (and the makers physically larger). Dug stratigraphically and compared layer by layer, the material remains did not show any differences – Jefferson uses the new Enlightenment canon of sense perception, empirical knowledge derived from experience to falsify the initial "hypothesis."

There has been some effort recently to rehabilitate the reputation of Rocque Joaquin de Alcubierre, the Spanish military engineer in the employ of Charles of Bourbon, king of Naples, and to name him the father of classical archaeology for his 1738 excavation of Herculaneum. Usually, vilified as a plunderer and foe of his more systematic successor, Karl Weber (excavated from 1749), he is now acknowledged for at least making lists of the antiquities coming up from his shafts into the Vesuvian detritus and some note of where these treasures were found. His research question (or hypothesis)? His plan of attack (or protocol)? – there were none of these. The same can be said for scores of other plunderers and curiosity seekers devastating the countless barrows, mounds, ruined cities and tells of Europe, and, increasingly, the new territories of European expansion during the years of the Enlightenment.

Post-Enlightenment it is difficult to comprehend just how liberatingly radical (and recent, only with Locke's 1690 *Essay Concerning Human Understanding*) and dangerous to the established order was this experiment with how we comprehend the world from the material evidence around us. If, however, Jefferson can be called the sole "accidental" archaeologist of the Enlightenment, he was nonetheless attacking his problem in a quite current archaeological manner. By the Enlightenment period's close, the problem of comprehending the motivations of peoples distant in customs or in time was turned on its head compared to how pre-Enlightenment scholars would have proceeded: They may be us as we once were, but they are us, nonetheless.

Intellectual Liberation: The Enlightenment

Europe's world expansion would not have sufficed to challenge medieval ecclesiastical doctrine that all but the Christian chosen were lesser approximations of God's image. There was far too much need for justification of conquest and genocide, such as Fray Ginés de Sepúlveda's (c.1560) assertion that the "savages" of the Americas were not even human. All that began to change with the realization that the rude stones and bones being unearthed in increasing numbers from the ancestral soil of Europe looked undeniably like those made by barbarous tribes far away. The best Enlightenment minds asked the archetypal archaeological question that rests

the basis for all current assertions of universal human rights: are they what we were once – or are now still? Beginning mid-seventeenth century, new inquiring minds of Europe began to invent a new authority to interpret distant savages and their own distant ancestors. The *philosophes* looked upon the face of modern savages and ancient brutes and saw there none of the revealed certainties of the senescent medieval order.

Intellectually, that medieval order, God's order was starting to crumble. The Enlightenment was not conceived in a vacuum. Since the sixteenth century, curios from voyages of discovery and amateur diggings, together with natural science samples, found their way into *Wunderkammern* or cabinets of curiosities. These were far more than proto-museums. They were the mirror of the universe, where Divine purpose was exposed to scrutiny of reason. Scholars scrutinized their *Wunderkammern* for universal, mechanical laws championed by Descarte, Kant, Buffon, and Newton. Dangerously, humans, too, were forged into God's Great Chain of Being and so belonged with all things measurable – animate and inanimate, present and ancient. Now, if God made the Great Chain, then He must have made it according to immutable principles. It was a given of the established order that authoritarian cabal of clerics, princes, and pre-Enlightenment scholars that each link in the Great Chain was a unique, well-differentiated "natural species." Each link was present since the creation, each unchanging – each so different from its neighbors on the Chain that one could talk of an organic barrier to the understanding of the mental processes of one from the next just as unassailable as the genetic barrier between species. This was particularly the case in the matter of the "micro-"Great Chain of Being on which each peoples of the globe stood arrayed, a reflection in small of the "macro-"Great Chain of all organic life forged by God.

Linnaeus was ranking species, not just classifying them, when he invented, *Homo troglodytes*, the link to the great apes immediately below the rudest of living primitives. So too, as late as 1790, Soame Jenyns produced a seriation of humanity from the "brutal Hottentot" to Newton. However, as early as 1636, Peter Heylyns's *Microcosmos* makes a direct comparison of North American aboriginals to Europeans 300 years after Noah's flood. While the members of the Scottish Enlightenment (Ferguson, Stewart, Adam Smith, Millar) and their French counterparts (Turgot, de Condorcet, Buffon, Montesquieu, Voltaire) were to make God an irrelevancy to the discovery of the principles of causation, they transformed how one uses the evidence of ancient times to know the workings of the minds of people very different than themselves. First, they championed the abandonment of the idea of a radical divide between the European and the rest of humanity. Secondly, there evolved an equation of ethnographic distance from Europe with the historical distance ancestors. This, in and of itself, was not particularly revolutionary. Certainly, it would not have been considered a remarkable insight when, in 1750, Turgot stated that all stages of development leading to the European nations were represented somewhere in the world. What was pioneering were the methods of analysis and the initial presumption of a transcendent, constant human nature.

If we take 1690 (publication of Locke's radical exposition of empiricism and the implicit challenge to the established order by denying the monopoly of a god-given warrant of truth and authority) as the beginning of the Enlightenment (and the 1789 beginning of the French Revolution as a somewhat arbitrary end), then what were the particular threads of thought in the multicolored weave of Enlightenment thought that made a modern archaeology possible?

Paired with the persistent anticlericalism of the period was a faith in Science. Science not in the sense of a protocol of skeptical testing and analysis that it has recently come popularly to mean but as a liberation of the mind and of human consciousness from ignorance and immature (read: received) doctrine. Each an authority unto himself or herself, each demanded by Locke to understand the world by the testimony of her or

his own sense perceptions, each person had within the soul of a scientist and student of natural laws of the universe and of humanity. In the case of moral (human) laws, the goal of these studies was to isolate causation of human history by pragmatic observation, classification, and experiment. The laws thus revealed were to possess the same structure as natural science laws and, because they were lessons to reduce humanity's pain, were of even higher moral status. The means were open-mindedness and unfettered empirical inquiry; the results would be democracy, equality, and progress! Laws were predictive. Infinite perfectibility was the law of nature. Societies develop along universal, linear stages, each developing out of the preceding. Scientific society was the highest moral end of history. As Kant wrote in his 1784 *Was ist Aufklärung?* "Enlightenment is man's release from his self-inflicted immaturity. Immaturity here means man's inability to make use of his intelligence without direction from another."

History could only be treated as an equal to natural science because of an abiding faith that all humanity was borne of a common ancestor. This (monogenist) faith in global innate equality of intelligence, articulated by Buffon (1749) and Ferguson (1767), is passed on to the next generation by Prichard (1813, 1841) as the "psychic unity" of the social evolutionists. However, the idea of progress (that Science or a society directed by a committee of Scientists would inevitably lead to a higher quotient of happiness or lessening of pain, or of enlightenment in the world) was not so highly regarded by all *philosophes*. Rousseau, with his 1755 *Discourse on the Origins of Inequality*, challenged the abiding faith of luminaries, from Voltaire to Adam Smith, that the (empirical) discovery of laws of human history would ineluctably lead to a better humanity. Rousseau's prescription was that the material gain that was science's harvest, especially private property and luxury, would rather lead to greater inequality, to the degeneration of society. Lost, perhaps, in most discussion of Rousseau is the shared assumption, his and his adversaries, that all humanity, all races, and all social classes partake of a universal psyche. By the mid-eighteenth century, at least in the rarified world of Enlightenment discourse, the revolutionary idea of a common human mind was unremarkable.

Eventually, the expression of this idea of a global innate equality of intelligence with greatest impact (albeit indirect) on archaeology was by the tragic Marquis de Condorcet, in his ten-stage, unilinear history *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain* (1793). This is the most revolutionary thesis of the Enlightenment in his use of antiquity to develop, empirically, not just a history of civilization but a "law" of the role of science in the grand schema of moral progress, justice, and human rights. Importantly, modern hunters and gatherers are survivals from the original human condition. They may still be steeped in ignorance because of environment or historical accident, but not because of biological (racial) barriers to progress or because they degenerated from an earlier condition. Stage by stage, the now familiar Enlightenment concepts of a comprehendible, universal, and law-driven humanity are expressed. Progress comes as ignorance is stripped away and as science increasingly drives rational society. Progress in the natural sciences will be followed by that of the moral or philosophical sciences, the latter with equal or more import for humanity. Expanding knowledge in all sciences leads inevitably to individual freedom and to more justice. And (as a methodology), study of the past reveals a causal order (laws, if you will) that can be rationally understood and that apply to all of humanity. Thus, the problem of comprehending the motivations of peoples distant in customs or in time was really a nonproblem: They may be us as we once were, but they are us, nonetheless.

The third Enlightenment "big idea," no less foundational to archaeology than liberating science and global innate equality of intelligence, is one that rarely gets mention. Denis Diderot and Jean le Rond d'Alembert edited the Enlightenment's signature publication, the 28-volume *Encyclopédie* from 1751 to 1771. The spiritual importance to archaeology is in its full title, *Encyclopedia*, or *Analytical Dictionary of the*

Sciences, Arts, and Crafts. Radical! In the last word of the title, *Crafts* or better in the French, *Métier*, the once despised (or at least neglected) "mechanical" techniques and tools of everyday craftsmen were elevated to equal significance with the more cerebral sciences and (fine) arts. Hundreds of articles on the everyday craft of working with material things and hundreds of pages of engravings of tools, all for the purpose of showing how human experience and understanding is embedded in the mastery of mechanical things. If all that archaeologists can and have every done is to read in the fragmentary material evidence the story of how peoples in the past acted upon the world as they perceived it, how better to try to comprehend the intentions and motivations of those peoples than through examination of the tools by which they acted upon the world? Ancient tools are not, of course, the be all and end all of archaeology. But arguably Diderot (himself the son of a master cutler) sped us on the way from an exclusive celebration of fine arts (as in Johannes Winckelmann) to the omnivorous purview of archaeology today. (Junior archaeologists forced to create their first lithic or ceramic typology curse Diderot still!).

Reactions to the Enlightenment

The Enlightenment remained in its armchair. Real, systematic excavation as we recognize it today would have to wait until the late nineteenth century (with Pitt Rivers at Cranborne Chase, 1887–1898) and, as a profession, much later. More troubling as the nineteenth-century reaction against revolutionary ideas of universalism and egalité and against the horrors of the French Revolution and as the Napoleonic betrayal set in, speculation about the past fell increasingly into the hands of nationalists and mystical Romantics. There were Enlightenment-like carry-overs, to be sure. Saint Simon (1813–1825) and, especially, August Comte greedily consumed classical antiquity and comparative prehistory as they carried the sputtering torch of progress and unity of method with the natural sciences. In his *Système de Politique Positive* (1824) and *Cours de Philosophie Positive* (1830–1842), Comte articulates a grand hierarchy of all the sciences. Social physics (history) will be the last to mature but will boast the profoundest laws. In the end, however, Comte's grandiose plans for history simply became irrelevant to the growing numbers of advocational field archaeologists. For them, the living prehistory represented by the diverse peoples of the new colonies overseas served as a quite adequate and uncomplicated illustration of how ancient peoples lived. The larger Enlightenment project of divining laws of moral progress by which all of humanity could be lifted up was largely abandoned. If those savages had had a history, it was irrelevant. The hand axes of Australian aboriginals were just hand axes, with no innate lesson to teach about causation of history or about progress. These nationalists and mystics held that each people had their own particularistic history, determined by geographical accident or race. Nationalism melded with the conceit that natural selection produced some races superior in intelligence and capacity for complex social institutions, while others – argued Lubbock in his *Prehistoric Times* (1865) – were destined only for cultural stasis.

Still, Enlightenment concepts lived on. Social evolutionists held as unremarkable the belief that variability in the ethnographic record mirrors humanity's past – so argued Lubbock in 1865. So Sollas still maintained in his 1911 *Ancient Hunters*, where he equates Tasmanians with the European Lower Paleolithic society, the Middle Paleolithic with Australian Aboriginals, and the Upper Paleolithic with the Eskimo and Kalahari San. The social evolutionists reinvented bastardized versions of "psychic unity"; Within the same stage, ethnographic and archaeological peoples share the same emotions and same intellectual capacities. Hence, Sir James George Frazer (1890, 1906–1915) believe in cross-cultural survivals of primitive totems and religion (eventually to give way to scientific thought).

One would be forgiven for seeing in more recent theoretical "stances" of archaeology (as anthropological archaeology) a pendulum swing toward and against fundamental Enlightenment contributions. We see a swing against in Boas'

rejection of cross-cultural unilinealism and his and his immediate archaeologist students' writings against all forms of speculative, comparative laws of evolution, race, or progress. The field swings toward Enlightenment ideas with those optimisms of the new archaeology's first flush that archaeology become a science would transform the discipline into a true anthropology of the past. More recently, we have witnessed the Post-Processual recoil against renouncing all attempts to make archaeology into an anthropology aping the natural sciences. In these theoretical swings and debates and even in the language in which those debates, we see revealed the Enlightenment's deep legacy.

From mid-twentieth-century European and North American skepticism that the motivations of the long dead could ever be known and W.W. Taylor's argument that the archaeologist can never be a part of the past, so it is impossible for him or her to reconstruct a civilization, to Lewis Binford's late career repudiation of an earlier position on the question of whether ancient beliefs and intentions could ever be reconstructed, and then the post-Processualists' astonishing reinvention of an empathetic source of real knowledge of the past (Hegel and Herder would have been proud), the Enlightenment belief that the mind (intentions and motivations) of past peoples might be comprehended by the living is alive and well (and hotly debated).

At the end of the day, one of the enduring legacies of the Enlightenment (and of debates post-Enlightenment) is the general acceptance that archaeology is the study of the remains of past people's actions upon a world as socially constructed and perceived. Few archaeologists would go so far as to say that the process of social construction is mystical and, hence, utterly unknowable empirically. Behavior does not depend upon an inner logic (manual of translation) that is forever hidden from outsiders to the community. There is an emerging optimism that past motivations can be at least partially revealed through the investigation of how symbols and objects function as devices or insignia communicating peoples' view of themselves. That would be a novel way of putting the issue, one that would make the *philosophes* scratch their chins (scratch beneath their wigs?). But it is a concept that would not be completely alien.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Nationalism and Archaeology
- ▶ Social Archaeology
- ▶ Winckelmann, Johann Joachim

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Archaeology of Art: Theoretical Frameworks

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Introduction and Definition

This entry provides an overview of the main *theoretical frameworks* used in the *archaeology of art* and outlines their main contributions and limitations. These frameworks can be defined as sets of *concepts* used by researchers to approach the

analysis and interpretation of *visual imagery* in the *archaeological record*, which includes *materials* such as rock art (petroglyphs, paintings, and geoglyphs), portable art (decorated tools and artifacts with no practical-mechanical function), sculptures, friezes, body ornaments (beads, pendants, etc.), and pottery decoration. These theoretical frameworks have varied along the history of archaeology according to factors such as the following: (a) *ontology*, the way "art" is defined and conceived from each specific theoretical perspective; (b) *epistemology*, the way art analysis and/or interpretation is carried out, that is, whether it uses induction and/or deduction, whether it focuses on qualitative descriptions and/or searches for quantitative patterns, and whether it uses one or more lines of independent evidence (e.g., image data, technical data, spatial data, archaeofaunal data, and ethnographic data); (c) the *topics* which are central to each framework and which are reflected by the *questions* asked about the materials under study and by the *concepts* used to describe, explain, and interpret them; and (d) *methodology*, the practical ways in which *data* are collected and *variables* are measured in the field, analyzed in the laboratory, and presented within the academic community (theoretical frameworks have also varied according to their historical and sociocultural contexts, but these will not be addressed here due to space limitations).

Some theoretical approaches to art stem from wider archaeological theoretical frameworks (e.g., culture-history, processual, post-processual, and evolutionary-ecological; see below), and thus, their concepts are mainly applications of their particular conceptions about past human cultures to the analysis and interpretation of artistic materials in the archaeological record. Other approaches derive from the application of theoretical frameworks generated in other disciplines than archaeology, such as anthropology, linguistics, or sociology (e.g., structuralism, semiotics, and historical materialism; see below). Finally, others focus particularly on the development of hypotheses about art's functions (e.g., shamanism and art as landmarks along caravan routes; see below) which have been developed to tackle specific cases-studies (Fig. 1).

Historical Background

Foundational Approaches: The Pioneer Interpretations

In the late nineteenth century, researchers followed evolutionist ideas that viewed prehistoric hunter-gatherers as "savages" with a minimal cultural development; hence, they did not conceive that they could have the creativity potential to produce art. This was reversed by series of archaeological discoveries, firstly of portable art in Paleolithic contexts (e.g., Lartet & Christy 1865 in Ucko & Rosenfeld 1967; Bahn & Vertut 1988; White 2003) and later of rock art of Paleolithic origin (see De Sautuola-Carthailhac debate in idem). Interestingly, by that time similar findings and inferences about art's antiquity were also being made in other continents: in South America, some of the first rock art discoveries were made as early as 1876 in Patagonia (Argentina; Moreno 1876) and in 1877 in Northwest Argentina (Liberani & Hernandez 1950), and in both cases, they were attributed to native peoples of pre-Hispanic times (which are obviously not comparable to Paleolithic antiquity but are conceptually comparable insofar as they are both prehistoric contexts).

As part of the realization that art had prehistoric origins, the first interpretations about its origins and purposes were proposed. Given that by that time archaeology was still not a formal academic discipline, these hypotheses were not developed within an explicit archaeological theoretical framework but rather were ideas that stemmed from the contemporary conceptions about Paleolithic life, about Western art, as well as from ethnographic analogies with hunter-gatherer societies living in several territories colonized by European countries.

An early interpretation, known as "*art for art's sake*," proposed that *portable art* had *no meaning*, pursued only an *ornamental* purpose, and was produced due to plentiful Paleolithic environmental conditions which enabled hunter-gatherers to dedicate to these activities during their spare time (Lartet & Christy 1864 in Ucko & Rosenfeld). Interestingly, this idea is detectable in contemporary authors of South America:

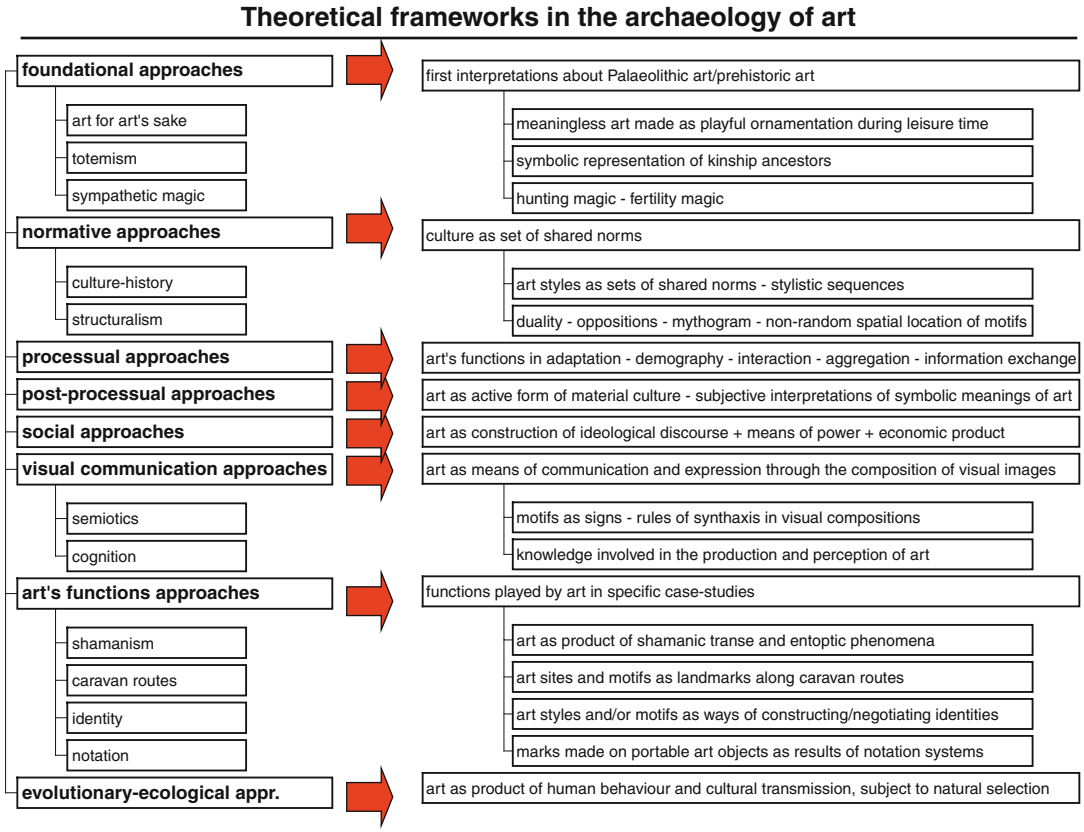

Archaeology of Art: Theoretical Frameworks, Fig. 1 Theoretical frameworks in the archaeology of art

for example, when referring to rock art from Patagonia (Argentina), Burmeister (1892) inferred that these images had been made by the native inhabitants during "leisure times." This hypothesis is difficult to test insofar as meaning is the most evasive aspect of prehistoric art. However, the fact that visual patterns are sometimes repeated within individual items and among assemblages indicates an intentional reproduction of certain decorative motifs which can be interpreted as socially significant, that is, responding to cultural norms of material culture design, presentation, and use, regardless of their potential symbolic meaning. Moreover, it is also interesting to note that the *emphasis* placed by Lartet and Christy on *environmental conditions* entails that already this early hypothesis was taking into account a *production context*, which, in turn, was positively valued in spite of the dominant negative ideas about hunter-gatherer life.

A second pioneering interpretation was that of *totemism*, which originated in *ethnographic analogies* and asserted that some Paleolithic *rock art motifs* could be conceived as *symbolic representations* of *kinship ancestors* (Reinach 1903). Such hypothesis, which had relatively little academic impact, only took into account few animal representations and disregarded other motifs and was clearly very hard to test. However, it did bring into attention the fact that prehistoric art could have had a social function, in this case related to identity and ritual use.

A third interpretation was that Paleolithic art had been produced as part of *sympathetic magic* rituals carried out in order to increase success in *hunting prey* and/or in its *fertility* and thus in its availability for further hunting (Reinach 1903; Breuil 1952; see details in Ucko & Rosenfeld 1967; Bahn & Vertut 1988; White 2003). This interpretation was based on the fact that *species*

represented in rock art were also *consumed* by Paleolithic people, as well as the fact that the images' *location* was often hidden in *dark panels* of caves, a context that was assumed as likely for *ritual practices* and not general domestic use. Superimposed motifs were interpreted as ritual reiterations, while marks made on rock art and clay-modeled animal representations were interpreted as symbolic wounds. In turn, rock art depictions of animals with swollen abdomens were seen as pregnant individuals, while the portable "Venus" figurines were considered as fertility symbols given the exaggeration of the reproductive portions of the human female body in some of these figurines.

The number of images interpreted via this approach was later expanded by Breuil (1952) to account for other motifs: for example, predators which were not part of the diet were depicted to control them symbolically; geometric signs were representations of traps or weapons; incomplete animals were represented as deprived of their senses or body parts in order to symbolically prevent them from escaping; human hands superimposed or near to animal figures represented their appropriation.

Criticisms to the sympathetic magic hypothesis have been many, including the following: (a) hunting scenes are infrequent, (b) some animals with swollen abdomens are male, (c) most represented animals are not "wounded," and (d) there are discrepancies between the represented taxa in the archaeofaunal and artistic records (a point that would later be approached by other frameworks; see below). Moreover, the exclusively inductive epistemology underlying these interpretations also weakens their explanatory power. However, one of its core contributions is the combination of an idealist ontology with some materialist underpinnings: the symbolic aspects of art are combined with its core practical functions in a hunter-gatherer world where prey availability seems crucial. Furthermore, both Reinach and Begouen (in Ucko & Rosenfeld 1967) stressed the fact that the *act of making* these images was essential to the *performance* of the sympathetic magic rites, a detail which points to an early – though implicit – interest in what later would be the concepts of praxis and engagement through art production.

Normative Approaches: Culture-History and Structuralism

Normative approaches to the study of art in archaeology share in common the fact that they consider *culture* as a *set of shared norms*; hence, art materials would reflect such norms in their design and technique.

Culture-history was the first formal theoretical framework developed in academic archaeology by authors such as Willey and Phillips. It operated within a normative conception of culture, and its main aim was to identify "*archaeological cultures*" or "*industries*" defined by spatial-temporal distributions of artifact *types*. Each type was defined by one or more trait/s that allowed the *typological classification* of artifacts found in the archaeological record. In turn, archaeological cultures involved specific artistic *styles*, defined by similarities in the types of motifs (their form, color, etc.), their layout on the artifacts, the themes represented in the figurative images, the techniques with which they were created, etc. Culture-history analyses tended to create *periods* which organized the archaeological cultures in a diachronic succession: thus, when approaching art, this theoretical framework created *stylistic sequences*. With portable art, these were mainly based on the stratigraphic position of decorated artifacts in successive layers of sites. In rock art these were based on (a) the superimposition of images, which were used as indicators of their relative dates, and (b) the indirect association of rock art images located in the walls of a site with pigment residues in sequential archaeological layers, dated sediments sealing the walls, or fallen wall fragments with imagery buried by the sediments.

These stylistic sequences were related by the authors to the periods not only as a way of providing a context to the former but also as a way of defining the latter. Yet it is interesting to note that in several cases there was no univocal correspondence between one style and one archaeological culture, implying that despite of the "shared cultural norms" premise, archaeologists did not

assume that industries and artistic styles changed necessarily in a coordinated manner. For example, in Western European Paleolithic art, Breuil (1952) defined two "cycles," Aurignacian-Perigordian and Solutrean-Magdalenian, while similar – though more complex – stylistic sequences were proposed by Laming-Emperaire and Leroi-Gourhan. This kind of stylistic scheme was applied to the study of portable art and rock art in many other regions of the planet (e.g., Gradin et al. 1979 in Patagonia, Argentina).

Due to its emphasis on culture as a set of shared norms, this framework focused mostly on the types of artifacts and of motifs which could be used as "fossil guides" due to their high frequencies and/or visual distinctiveness, to construct cultural periods and stylistic sequences, thus disregarding cultural variability. Its idealist ontology – entailed by the notion that culture was a "projection" from mind to practice – and its highly inductive epistemology also limited its explanatory power insofar as little room was left to move beyond descriptive and empiricist accounts of the past. However, the creation of art periods and stylistic sequences is still used by most archaeologists as a means of organizing archaeological data, although it has now become clear that this is only a means, and not an end, in the archaeology of art.

A second and entirely different normative approach to art was *structuralism*. In accordance with the core ideas of Levi Strauss about culture being structured by associations and oppositions as a reflection of the human mental structure, and following early suggestions by Raphael in 1946 about the fact that in European Paleolithic rock art animal representations were spatially displayed with a nonrandom structure, Leroi-Gourhan (1964) and Laming-Emperaire developed systematic analyses in search for spatial patterning of motifs in European cave art. Such analyses were carried out by (a) *classifying motifs* in *groups* (e.g., A = horses, B = bovines, P = fish, a = lines and dots signs, b = ovals and triangles), (b) partitioning the *topographic zones* of the caves (e.g., entrance; central zone; passageway; etc.), and (c) *quantifying* the motif groups in order to search for their *combination patterns* and their *links* to the *topographic zones* (Leroi-Gourhan 1964). The emerging patterns were then interpreted as *mythograms*, that is, the graphic symbolization of shared myths whose structure was projected from the mind to the cave walls. Such structure emerged from *dual associations and oppositions* such as light-darkness and life-death. Also, certain *animal motif types* were also associated to certain *geometric signs* and attributed a *sexual meaning*.

Although these authors also developed stylistic sequences in the normative fashion with an essentialist and idealist ontology, the differences of structuralism compared with the former framework are profound: (a) its emphasis on a synchronic view of art, (b) its partially inductive and partially deductive epistemology, (c) its use of quantitative data, and (d) its highly interpretive approach to the emerging patterns. Criticism did focus precisely on these issues: for example, the synchronic view collapsed images made centuries apart into one single data corpus and the mythogram interpretations were untestable. However, this framework did develop for the first time the systematic recording and quantification of art data (motif types, their combinations, and their spatial location) and proposed a testable hypothesis regarding the nonrandom layout of images, which are still of relevance in the archaeology of art.

Processual Approaches: Variability, Adaptation, and Information Exchange

A revolutionary breakthrough from normative theories was achieved by a group of archaeologists in the 1960s (e.g., Binford, Flannery, Schiffer, Redman, Renfrew, Watson, Wobst, etc.) who, following ecological concepts applied to the study of human behavior, proposed a definition of *culture* as an *extrasomatic means of adaptation* of *people* to the *environment*. This meant that culture could be seen as a *system* integrated by several *subsystems* (subsistence, technology, etc.), each of which complied with a specific *function* in the adaptation of a human group via the deployment of *adaptive strategies*. Thus, breaking away from finding cultural norms and creating periods which focused on the

average items of the archaeological record, these "new archaeologists" focused instead on the study of cultural *variability* and on the circulation of *materials*, *energy, and information* along wide spatial scales. This materialist ontology was combined with a hypothetico-deductive epistemology: both were foundational in one of the most innovative and pervasive archaeological frameworks (though with obvious shortcomings; see below).

Although its main concern was with subsistence and technology, this theoretical framework had a clear impact on art analyses. Archaeologists following this perspective stressed the need to (a) study variability *within* broad periods such as "Paleolithic art" which covered thousands of years and often masked actual variations in human behavior, (b) consider that terms such as "parietal art" or "portable art" were also labels that often masked variability in spite of their usefulness in academic communication, (c) go beyond inductive typological descriptions of periods and stylistic sequences and offer explanations proposed by explicit hypotheses tested against systematically analyzed data, and (d) focus not just on the potential symbolic meanings of art (which are often unattainable) but also on art's functions within the human groups that produced it (e.g., Conkey 1985).

These ideas were applied to several Paleolithic case studies, in which authors – following Wobst's demographic simulations and analyses about hunter-gatherer populations – focused on portable art and/or rock art similarities to identify inter-site links viewed as evidence of regional interaction. Art was a key evidence through which networks, alliances, and aggregation sites were identified by (a) qualitative comparisons between *designs* (Bahn 1982; Gamble 1982), (b) inter-site comparisons of relative *frequencies* of *decorated artifacts* (Conkey 1980; Bahn 1982; White 1992), (c) detailed analyses of *element repertoire* and *structural principles frequencies and diversity* (Conkey 1980), and (d) *number* of rock art *sites versus* stylistic *regionalization or homogeneity* (Jochim 1983). These data were contextualized by their environmental setting (e.g., paleotemperature, sites' geographic location, vegetation distribution, faunal diversity, carrying capacity, exploitation and intensification strategies, and their relation to the relative population densities they could afford) to characterize the natural and social context in which these "adaptive strategies" were operating.

In accordance with the processual agenda, these studies tended to see art production and use as a means of overcoming environmental stress and potential competition for resources triggered by environmental changes and/or demographic pressure by creating and reinforcing social bonds. This functionalist view of the adaptive purposes of art has been subsequently criticized by several authors (including self-criticism by some pioneers of this framework; e.g., Conkey 1984) for its environmental reductionism and for its teleological reasoning. While taphonomy/conservation, sampling, identification, and publication were explicitly considered as biasing factors of the artistic materials within the archaeological record (e.g., Bahn 1982; Conkey 1985), these analyses have been criticized because of their sampling strategies and statistical methods, which have subsequently been refined.

Following the adaptive approaches to culture, *style* and *function* were dichotomically conceived by some authors, the latter being considered as adaptive while the former being considered as nonadaptive (e.g., Dunnell). However, other authors argued that style did have specific adaptive functions as *systems of information exchange* (e.g., Wobst). This, in turn, led to a whole debate on the active and passive functions of style which are applicable to art analyses (see the entry on ► Style: Its Role in the Archaeology of Art in this encyclopedia).

Another crucial development within this framework was the flow model presented by Schiffer in 1972 "to view the "life history" or processes of *systemic context* of any material element" which included "procurement, manufacture, use, maintenance, and discard," in order to account "for the production of a substantial portion of the *archaeological record*." This model, similar to the *chaîne opératoire* concept, was adapted to the analysis of rock art production

by Aschero (1988) and applied to the study of production sequences of portable art by White (1992); clearly, both models supercede the processual agenda and are useful for the study of art materials from other theoretical perspectives.

The main criticisms to this theoretical framework were (a) its ecological reductionism and determinism, which often is not enough to explain art's creation, uses, and changes; (b) its teleological conception of culture, and art within it, as exclusively a means of adaptation, which leaves aside other potentially "nonadaptive" uses of art; and (c) its functionalist view of culture, and art within it, as a homeostatic system which paid little attention to its potential internal contradictions, which are often core factors leading to change. Although the search for variability was a key contribution of processualism, which is part of the research agenda nowadays, paradoxically its deterministic view sometimes gave little room to the study of the diversity of human actions, that is, human agency, social divisions, and inequalities. Other theoretical frameworks took up these challenges.

Post-Processual Approaches: Symbolism and Interpretation

One of the strongest reactions to the processual framework in the 1980s can be found in publications by, among others, Bender, Conkey, Hodder, Shanks, and Tilley who criticized it as positivist, reductionist, functionalist, and deterministic. Following postmodern concepts, they proposed instead that archaeologists cannot reach an objective truth about the past because the *past* is a *construct* made from the *present*, and as such it is a *situated* and *subjective* construction – that is, biased by the socioeconomic status of the researcher, his/her cultural and ideological background, and his/her gender, values, intentions, etc. Thus, the key means to approaching the archaeological record was via its *interpretation*, metaphorically reading it as a text, and offering as a result not necessarily just one but several subjective and *multivocal* insights to the past. Against the processual view of human behavior as a passive response to environmental conditions, post-processual archaeologists saw *human agency* as an active construction of *subjective relationships* between *persons*, *objects*, and *landscapes*. Thus, *material culture*, including art, was conceived both as *active* (bearing traces of its producers' actions but in turn having further effects on its users' actions) and *meaningful* (bearing multiple – sometimes ambiguous – senses and intentions). This was partly derived from ethnoarchaeological observations such as those made by Hodder, who studied the *decoration* of calabashes in the Ilchamus society of Kenya and inferred that, in this male-dominated society, these objects were decorated by women with designs that had several meanings, some of which were *gender*-related and *symbolized* female resistance.

A foundational example of the application of this framework to rock art interpretation is that of Tilley (1991), whom in his study of the engraved "*de*signs" of Nämforsen (Sweden) developed the following themes:

(a) An initial *question* about "*What is their meaning, significance, and value* ***today****? . . . Or can we hope to mediate them productively, reinscribe them into the present, and open out the carvings to subjective experience once more*?" (Tilley 1991: 8).

(b) Several *interpretations* of the carvings' meanings, including the use of the petroglyphs as totemic symbols (expressed through nature/culture dual oppositions), as ideological reinforcements of social control between the hunter-fisher-gatherer groups and as intragroup symbols operating in terms of age and gender distinctions (idem: 99, 167, etc.).

(c) An open *dialogue with the reader* in which he portrays the critical questions he thinks the reader will ask of his book, for example, that the discourse includes an open-ended array of possibilities, that the author has evaded his responsibility to tell the reader what the carvings in fact mean, and that the author's relativism destroys any productive links between past and present. To this, he replies that a "totalizing framework" or "totalitarian

solution" that tries to box in many interpretations will anyway leave a surplus of meaning/s that cannot be captured in one single discourse (Tilley 1991: 173). Through such final deconstruction of his own work, the author actively engages the reader in the realization that unique conclusions are neither feasible nor desirable in the human sciences.

Other post-processual conceptions and analyses of art have been less relativist and skeptical and have focused on applying concepts related to art's spatial distribution, such as the notion of social geometry, with lattices of people and objects deployed in space to *construct socially meaningful landscapes* (Conkey 1984). This includes the knowledge to navigate in these landscapes, which is not just verbal but also expressed through material culture (e.g., movable, as in portable art, and fixed in space, as in rock art). Thus, following Bourdieu's notion of habitus, Conkey proposed that human practices and knowledges structure space and in turn such structured space structures humans: the reproduction of such trends can be identified in the archaeological record (idem). This kind of approach to the ways in which people have engaged themselves in the construction of a visually marked landscape via rock art placement at significant locations has been fruitful and is still used nowadays (Bradley et al. 1994).

Finally, the interpretation of art from the *aesthetics* point of view – defined as the particular way in which a person experiences an object and through such process generates a subjective feeling – can also be included within the broad spectrum of post-processual approaches to past visual imagery (see the entry on ▶ Aesthetics in Archaeology in this encyclopedia).

This framework has pinpointed a crucial issue in terms of the *self-awareness* and *self-criticism* that archaeologists need to develop by acknowledging the *biases* of their *situated knowledge-construction process*. However, in spite of such contextual approach, the idealist ontology and the hermeneutical epistemology of post-processual framework can be criticized for their extreme relativism, which leads to the notion that any interpretation is valid. Moreover, post-processual discourse can end up being more self-referential (about the researcher) than analytical and informative about the persons who lived in the past: if multi-vocality is truly advocated, then those *past voices* and *agencies*, which are inscribed in the *materiality* of archaeological *artefacts-images*, should also be listened to, without of course claiming that they can be accessed objectively. Thus, it is useful to draw a distinction between the *past events* and the *knowledge about the past*: present researchers have had no intervention in the creation of the former but do have total intervention – and responsibility – in the construction of the latter.

Social Approaches: Ideology, Power, and Economy

Partly independently and partly as a response to processualism, a relatively small group of archaeologists started applying *materialist* and *neo-Marxist* concepts to archaeological analysis (e.g., see publications by Bate, Earle, Gándara, Lumbreras, McGuire, Patterson, Vargas Arenas, etc., which in some cases follow the much earlier and foundational work of Childe). Challenging processualism, this framework pointed out the fact that culture is not always a means of adaptation due to several reasons, including that *societies* are often *not homogenous*, hence not all members of a group have the same chances of accessing *resources* and *information* vital for their social reproduction: culture can adapt some people at the expense of not adapting others. From this point of view, the basis of a society is its *economic structure* (briefly defined as the division of labor entailed in the process of extraction-production-circulation-consumption of raw materials, finished goods and services, the property of production means and of their profits). This determines the existence of a *political and ideological superstructure* developed to sustain and *reproduce* such structure, particularly when it entails situations of *social inequality* and *labor exploitation*. Within this framework, *art* has mainly been considered as part of *political strategies* manipulated to maintain control and enforce *power*, as well as part

of *ideological discourses* to *mask* and/or *justify inequalities* (Earle 1989, Lumbreras 1998, Perez Gollán 2000).

Such *political functions* to create and reproduce intragroup differences can be identified by studying art styles and luxury items, which are a means of conferring and sustaining *status* and *power* due to the fact that they operate visually, catching people's attentions and generating aesthetic reactions – which are sometimes difficult to manage rationally, hence their high effectiveness (Earle 1989). Moreover, the power emanating from durable objects tends to feel more permanent, hence unquestionable, thus conferring solidity also to the social position of their owners (Earle 1989). In turn, *ideological functions* of art have been often studied by analyzing the images' motifs/topics and the ways in which these are represented: for example, in the case of Aguada style (found in the pottery, metal objects, wooden artifacts and textiles from Northwest Argentina), the images of a sacrificer holding a human head and, particularly, of a feline are pervasive throughout these materials and have been interpreted as a means of *legitimizing* power and hereditary social inequality, by linking the governants with sacred beings and, through such iconographic manipulation, represent the elites with divine attributes (Perez Gollan 2000).

These analyses of the political and ideological functions of art have focused heavily on art's capacity to express ideas and thus on the *mental dimension* underlying its creation and use, while the *material conditions* in which it was produced and displayed have mainly been considered as an *external context* which determined art creation, but have often not been thoroughly analyzed as an *internal component of art's production*. However, some authors have indeed noted that art can also be conceived not just as a *representation* but as a *presentation* of a material object and, as such, as a "*productive work*" (Lumbreras 1998). Thus, the artistic *work process* can be reconstructed via the analysis of the *production sequence* (Aschero 1988; White 1992). Also, conceiving *art* as an *economic product* entails that it is a material artifact made through the combination of *productive forces* (raw materials, tools, techniques, human labor) and *social relations of production* (the engagement of persons and materials and knowledge in such work process) in order to create an image-artifact. In turn, art production entails a certain *labor investment*, which can be assessed via multiple variables, for example, (a) media on which to produce the images, their abundance/scarcity, accessibility/inaccessibility, hardness, and texture; (b) raw material availability to make tools and prepare paint; (c) expedient/curated nature of engraving and painting tools; and (d) simplicity/complexity of image-making techniques and of visual designs produced with them. The study of such variables allows one to transcend a descriptive approach to the *materiality of art* and is relevant to characterizing the amount and quality of labor invested in its production, thus revealing economic aspects underlying its creation, which in turn shed light on some of the ways people *engaged* themselves – through practical manipulation and visual perception – with the *material features* of these images.

The orthodoxy of these approaches has been rightly criticized for its reductionist economic determinism and for its mechanistic and teleological approaches to art's functions as mere reproductive reflections of the economic structure. Moreover, on many occasions, the potential political and/or ideological functions of art are not well grounded, hence reducing the explanatory power of these concepts. For this reason, materialist and neo-Marxist approaches need to not just assert but demonstrate in each case why and how a certain art form has complied (or not) with such functions. Yet, breaking away from the Cartesian mind-body split, which originally led to art being associated with ideology and not with economy, and recognizing that art is *intrinsically* and *simultaneously* ideological-political-economic, strengthens the viewpoints proposed by this framework. Moreover, its materialist ontology – which allows to focus on contextual *and* internal material aspects of art production and display – and its dialectical epistemology, combining deduction and induction, have great potential within the archaeology of art.

Approaches to Art as Visual Communication: Semiotics, Cognition, and Expressive Symbolism

Most frameworks do involve the notion that art has a communicative aspect, but two frameworks have focused on this feature as their core concept. On the one hand, following the work of linguists and semioticians such as Saussure, Peirce, and Barthes and also having clear influences from the structuralist framework presented above, the *semiotics* approach has put forward the notion that visual art is the product of an act of *communication*, which includes a *source* who produces a *message* containing information, a *code* in which it is formulated, a *channel* through which it is transmitted, and *receiver*(s) who decodes it (if they share a common code with the source) and who may respond or *feedback* to it. Three sets of rules function in the code in order for the information contained in the message to be transmitted: *syntactic*, *pragmatic*, and *semantic*. The first two have clearly a greater chance of archaeological visibility in art designs, since the *types* of motifs and their *spatial relations* in terms of association, juxtaposition, direction, distribution, etc. (e.g., Llamazares 1992) can help identify aspects of the rules underlying the syntactic composition and pragmatic use of the images.

Also having developed partly from structuralism, approaches oriented to the study of *cognition* in the archaeology of art have focused on analyzing the steps taken by past artists in the creation of images with specific features (symmetry, size, etc.) and how their *visual perception* has participated in such process. To do so, special attention has been given to how *forms* (a) are *selected* and filtered among a wider array of possibilities, through the emphasis of some details and the omission of others, in order to facilitate and *economize* their visual perception and interpretation; (b) are *categorized* within each cultural context; and (c) are contained within a *cultural memory* which allows the *organization* of image perception, makes images *recognizable* and *significative*, and influences the *elaboration of future forms* (Washburn 1983). Finally, following Parsons' work, the *expressive symbolism* approach has proposed that an art object functions as an expressive symbol when it operates as a token of the *feelings* or the *attitude* of an "ego" toward an "alter," thus mediating the *affective component* in such *interaction* (Tanner 1992).

The complete application of these approaches seems to require other sources of information rather than just the archaeological materials, thus being more fully applicable to historic than to prehistoric cases. Yet many approaches developed by these frameworks can be found in diverse case studies.

Approaches to Art's Functions: Case-Oriented Hypotheses

A number of art analyses are based not on wide theoretical frameworks but rather on specific hypotheses which are oriented and applicable to specific case studies. Such is the case with *Shamanism*, which proposes that many rock art motifs are representations of images seen during *altered states of consciousness*, induced through *trance* and/or through the consumption of *hallucinogenic substances* which generate *entopic phenomena* (Lewis Williams & Dowson 1988). The application of this hypothesis, originally developed for South African cases, requires the use of ethnographic information as an independent source of data to corroborate it when applying it to other case studies in order to avoid equifinality problems: otherwise, similar motifs could be ascribed to shamanism when in fact they may well be the product of rather different causes.

Another function attributed to rock art is that of marking significant points and roads along *caravan routes*. This hypothesis has been tested by plotting the distribution of rock art sites and motifs depicting llama herds along wide spatial ranges in Northern Chile and checking their correspondence with trails followed by llama shepherds on their travels across long-scale distances and with sites containing evidence of these faunal resources (Nuñez Atencio 1976).

Rock art has also been related to *identity* in two different and complementary manners: (a) as an *archaeological indicator* of social groups and their boundaries and (b) as an *intentional*

construction of *self-expression* of social identity (Domingo et al. 2008). What they share in common is that identity is a twofold phenomenon, which requires simultaneously the construction of *similarities* to produce a *sense of belonging* to a group and of *differences* to *distance* such group from other surrounding groups. Thus, identity may have archaeological visibility, although it is sometimes difficult to distinguish whether such identity is mainly a construction by the archaeologist derived from a set of visual designs attached to material culture or whether such designs were intentionally produced as an identity expression. In turn, this notion is very much related to that of style (see above and also the entry on ▶ Style: Its Role in the Archaeology of Art in this encyclopedia).

Finally, the sets of marks such as dots and notches found on the surface of many Paleolithic portable art items have been interpreted as *notation systems* (e.g., lunar calendars and event tallies). This hypothesis was originally proposed by Marshack (1972) who used *microscopic observations* of *archaeological materials* to provide evidence to support it. However, such interpretations and methods were challenged by D'Errico (1995) who pinpointed the need to use *independent criteria* derived from microscopic observations of *experimental marks* as *parameters* to assess the observations of the archaeological materials and to recognize whether the sets of marks had been made with a single tool or with several tools and in turn whether it had been made in a single event or along different events (D'Errico 1995; see also White 1992). Heated debate led to the refinement of these methods and to the conclusion that indeed several Paleolithic materials functioned as notation systems, but not all marked artifacts can be interpreted as such.

Evolutionary-Ecological Approaches: Human Behavior, Cultural Transmission, and Natural Selection

Following neoevolutionary concepts but breaking away from the processualist teleological and functionalist explanations about culture, the *evolutionary-ecological* approaches in archaeology led by authors such as Dunnell, Gamble, Lyman, Mithen, O'Brien, Shennan, etc., focused not just on adaptation but on the broader process of how *human behavior* is developed and reproduced within an *ecological context*, thus including *mechanisms* of *variability production*, *cultural transmission*, and their *natural selection* under specific *environmental conditions*. Its materialist ontology and positivist epistemology are also shared with processualism, but the evolutionary framework has entailed a broader spectrum of behavioral possibilities that range from *adaptive* to *nonadaptive* outcomes, thus allowing for a conception of *culture* which is *not always homeostatic*.

Although the core lines of research followed by this theoretical framework do not include art, when applied to the study of such materials, this approach has proposed, for example, that *Paleolithic art* has been regarded as "an emergent property of the interactions between individuals as they pursue their own social and economic strategies" (Mithen 1991: 105) and thus as a method of *information storage and retrieval* which would help hunter-gatherers to take *decisions* that would help "increase their *chances* of *survival* and *reproduction*" (Mithen 1991: 105). Thus, patterns in faunal assemblages have been related to patterns in art representations: the risk and uncertainty generated by changing ecological conditions that affected species availability would have been partially coped with via the information gathered through their visual depiction. This would also account for the discrepancies between archaeofaunal and artistic taxa representations insofar as the latter included informative cues for two different strategies – mass-hunting and stalking of individual animals – which would leave different quantitative traces in the archaeofaunal assemblages (Mithen 1991: 105).

Within this framework, the *diachronic frequency distributions* of *decorated pottery* from early Neolithic Central Europe have been quantitatively analyzed in order to find out whether their *variations* responded to a "*neutral model*," in which variation is regarded as the result of *random drift* of stylistic traits, or to a "*selection model*," in which variation is regarded as the

result of *biased selection* of functional traits (Shennan & Wilkinson 2001). The authors conclude that the case-study data coincide with the model involving selection, that is, bias in favor of novelty toward the recent phases of the analyzed period, and stress that "this does *not mean* that there is a *radical separation* in the real world between "*style*," in the sense of neutral variation, and *function*, in the sense of variation under selection. In the present study it is clear that *both drift and selection are operating*" (Shennan & Wilkinson 2001). Also, analysis of the *tempos* in portable art production can show the *pace* at which *variability* increases or decreases diachronically and thus unveil the *rates of change* of a decorative repertoire and their links to underlying social, technical, and/or economic factors (Fiore 2011).

Another approach based on ecological-evolutionary ideas is the *ethological* conception of art, which focuses on the *behavioral* aspects of making art, or "*artifying*," and their adaptive underpinnings: for example, their capacity as *pleasure sources* and their occurrence under *crucial life concerns* are seen as reasons for the reproductive success of this behavior within the human species and of the human species along its evolution history (Dissanayake 2008).

Some of these concepts have been criticized for their naturalization of human actions, which entails a passive conception of people as entities behaving only according to biological conditions. However, people not only create cultural variability but also have a certain influence in the selection conditions of such variability: this conception allows for researching human agency underneath art production, continuity and change, at long-time scales characteristic of the evolutionary framework.

Key Issues/Current Debates

Several debates are currently developing within the archaeology of art arena, of which three are outlined here. One regards the reasons *why* such production occurred, which have mostly been related to human *cognitive capabilities* (including rational, perceptual, emotional, manual-skill, mnemonic, and neurological factors) and to the *potential symbolic functions* of visual images and their *adaptive and social implications* (Davis 1986; Chase & Dibble 1987; Davidson & Noble 1989; Mithen 1996; Conkey et al. 1997; Bednarik 2003; Hogdson 2006). Another revolves around whether art has been created exclusively by *Homo sapiens sapiens* (Mellars 2005) or whether it has also been created by *Homo sapiens neanderthalensis* (D'Errico et al. 1998), the latter possibility being slowly strengthened by early finds not attributable to the former species.

Finally, due to their strong aesthetic appeal and social implications, art materials often tend to be considered as valuable *cultural heritage* by *researchers, local communities*, and the *general public* (Loubser 2001). This situation sometimes entails conflicts of interest but also bears the potential of enriching the conservation, uses, and knowledge of this heritage if proper and mutually respectful dialogues among all the concerned agents are developed.

International Perspectives and Future Directions

The current theoretical panorama in the archaeology of art is quite heterogeneous, given that several of the above-mentioned frameworks are currently being used by researchers. It is clear that some of these frameworks have similar ontological and epistemological roots, making them complementary, while others are incompatible due to the fact that their perspectives contradict each other in the way they define and conceive art and/or in the way they have devised its analysis and interpretation. Moreover, different perspectives do sometimes approach the same topic from different points of view – for example, information transmission through art has been tackled from processual, post-processual, social, semiotic, and evolutionary-ecological approaches – and these approaches to such topic may or may not be complementary according to the ontological

and epistemological similarities or differences discussed above. A combination of different frameworks can often be viable and relevant where they are not mutually contradictory in their core concepts and methods. Through this critical panorama, the reader can follow those approaches of his/her interest and explore, pursue, and link their paths in order to shed new light on ancient art.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Art Studies: Normative Approaches
- ▶ Mobiliary Art, Paleolithic
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Statues and Monumental Art in Archaeology
- ▶ Style: Its Role in the Archaeology of Art

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Archaeology: Definition

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Brief Definition of the Topic

Archaeology comes from the Greek term *arkhaiologia*, meaning "the study of ancient things," and is defined as the study of past peoples and culture. Archaeologists develop interpretations about the past through the recovery and analysis of material culture (which may include graves, monuments, buildings, inscriptions, tools, pottery, etc.) and associated evidence such as pollen, charcoal, residues, skeletal remains, etc. In order to provide interpretations about the past, archaeologists must accurately recover and record all aspects of a site.

Archaeologists may study the recent (historical) or distant past and are interested in a diverse range of questions: living conditions, how humans organized their social groupings, a interacted with and/or exploited the environment, diet, health status, trade patterns, burial choices to name a few. For this reason archaeologists may have specific areas of expertise which could include the analysis of specific material culture (e.g., pottery), environmental samples, human and/or non-human skeletal remains, dating techniques and so on.

Cross-References

▶ Bone Chemistry and Ancient Diet
▶ Buildings Archaeology
▶ Ceramics: Scientific Analysis
▶ Field Method in Archaeology: Overview
▶ Forensic and Archaeological Analyses: Similarities and Differences
▶ Plant Domestication and Cultivation in Archaeology
▶ Skeletal Biology: Definition

Archaeology: The World at 1800–1850

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State of Knowledge and Current Debates

Introduction

Archaeology as a social science is no stranger to the time in which it develops; therefore, it is constantly changing in its objectives and procedures. Similarly, it is not uniform, its development and practice are the function of its practitioners, and it relates to political and economic powers of every age and their interests. This eventually ends up forming dominant or official groups within the discipline that do not always coincide with the best of science or with what archaeology can do as a social science.

So although archaeology as a discipline starts emerging in Europe in the nineteenth century, the archaeology of the nineteenth century (the archaeology of capitalism or colonialism) starts at the end of the twentieth century. Industrial archaeology is one of the newest branches of archaeology, which is dedicated to the study of sites, methods, and machinery used in production processes introduced with the Industrial Revolution and the forms of social behavior and habitat resulting from such change. The term "industrial archaeology" arose in England and goes together with the concept of industrial heritage (Vincenti 2007). The overall aim is to go beyond written documents and graphics, but with diverse interests and approaches: for example, not with history as auxiliary but contrasting with what is believed to be known according to historiography, contributing to the explanation of the process of globalization that starts at this historic time. This archaeology has been practiced as an alternative to the study of documents of the Industrial Age, which have revealed biased in favor of the ruling classes and insufficient at allowing reliable research on the life of the subordinate classes, the peasantry, marginalized minorities (the end of African American slavery, aborigines from different parts of the world, communities or religious or political minorities). The starting point assumes that archaeological data not only allows the opportunity to balance the information but also to verify the truth or falsity of what the documents say and identify the discrepancies between them. It has therefore been the archaeology of capitalism, gender, "the border" – that is, the contact of the indigenous with settlers (with different approaches: the duality of domination-resistance and creolization or mestizaje).

Even the nineteenth century is investigated from archaeology with the aim of restating scientific methodology itself and revealing its biases (from feminism, for example) or searching for (pre)supposed incapacities and limits of archaeological methodology. Finally, it is being considering an archaeology of the modern era with profitable interest into what will be called industrial landscapes/industrial heritage, with industrial tourism routes included, especially in Europe, or to reclaim the recent history of other continents (from a vision of Native peoples not as a distant past, or as "acculturated passive" indigenous).

Although this nineteenth century archaeology began in Europe, in the same way as prehistoric archaeology, it rapidly spread to the USA and to areas that were colonized or industrialized in the nineteenth century: Australia, Central and South America, the Caribbean, Africa, and Asia. There are at present international journals, as well as Industrial or Historical Archaeology societies in different countries that publish journals and monographs where a large amount of information can be found. Its variety of approaches, objectives, and praxis are causing the various denominations within this Archaeology: historical, of capitalism, industrial, urban, ethnoarchaeology, colonial archaeology.

Global Perspective

Tierra Del Fuego Hunter-Gatherer-Fisher Societies

In this context, in 1988, a Catalan research team with Argentine collaboration began an ambitious

Archaeology: The World at 1800–1850, Fig. 1 Lanashuaia archaeological site in Tierra del Fuego (Argentina)

ethnoarchaeological program in Isla Grande, Tierra del Fuego. The shores of the Beagle Channel had been until the late nineteenth century an important part of the territory of aboriginal groups considered canoeists, namely, the group that the Austrian ethnographer Martin Gusinde had called *Yámana*.The aim of the project was basically methodological and ethnoarchaeological:to test the possibilities of modern archaeological methods to elucidate the nature of social relations that organize a hunter-gatherer society. In order to do this, excavations were carried out on sites that were last occupied by those societies, when they had already had contact with Europeans and were well documented and described. That is, eighteenth and nineteenth century Aboriginal settlements located on the coast of the Beagle Channel were excavated, and as an element of comparison, the northernmost settlements in the interior of the island corresponding to other native groups, called selknam by ethnographers, were also excavated. These were the yamana sites of Tunel VII: a settlement/hut with ten successive occupations; Lanasuhaia: settlement with a prolonged occupation of several months (Fig. 1); Alasawaia with the excavation of consumption remains of the last occupation of a settlement; Harberton, a midden shell burial of an adult (male); Mischiuen III a burial of an adult female in a rockshelter (reused as a burial area) and Cabaña Remolino, a site which hosted one of the last yámana ceremonies according to Gusinde, and in the heart of the island, the selknam sites of Ewan I a ceremonial hut and Ewan II, a hut with an occupation related to the one mentioned before.

The results of the above work allowed the archaeological documentation of the last moments of these societies and the causes of their disappearance (Estévez & Vila 2007).

These canoeist Aboriginal groups, whose history in the area dates back to 7,000 years ago, lived in the nineteenth century (first half) basically exploiting coastal and marine resources (fisher-gatherer-hunters).They had a technology that today is described as simple with rigid social norms that maintained structural inequality between women and men at all levels. Previous archaeological work had shown that after a long historical process, a social organization had been achieved, which held control over food and consumer goods production as well as over biological reproduction.

With the archaeological evidence of the studied sites, the first indirect contacts with Europeans/whites were found. Shortly after the first European expedition passage through the Strait of Magellan in the sixteenth century, European raw materials had reached the area of the Beagle Channel (a fragment of glass in Recent Component Lancha Pakewaia site, 250 years BP at least). This means that the first indirect European

Archaeology: The World at 1800–1850, Fig. 2 Fueguian knives: the two to the *left*, traditional making with mollusk valve blade, the three at the *right* using European iron blades hafted in the traditional way

influence came 200 years before the first official expedition, the HMS Beagle.

In the nineteenth century sites, European materials are already present, although in small quantities (glass fragments) or have indirectly been documented through cutting marks left by metal instruments in some large animal bones. This European presence only involved changes in the raw materials used in their technological system, improving efficiency level: For example, glass or iron found on beaches from ships or shipwrecks was used to replace the mussel shells as knife blades or arrow stone heads and fragile bird bone awls. Initially, these new materials were worked with the same methods used for local raw materials (percussion, abrasion, polishing) and they were even given shapes that imitated traditional forms (awls are European metal nails shafted in bird long bones such as the traditional awls, the European iron blades are hafted transversally like the aboriginal mollusks-blade knives.) (Fig. 2).

Perhaps due to the fact that the archaeological sites are not yet fully documented at an extensive level, substantive changes either at settlement or social organization levels have not been observed as yet. Big changes are only confirmed later (in the second half of the nineteenth century), when there is written information of missionaries who settled in the area. Hut remains of the contact time do not differ from those of previous ages, although it is possible that at the time of the proto-contact and first contact, there were hut settlements formed by larger groupings of those described from the second half of the nineteenth century. This could be the case at the Lanashuaia site, and also of the camp sites that can be observed in the engravings of the first expedition to Cape Horn.

European Diseases

Although the first impact of diseases is not known, it is likely that new diseases and new outbreaks of existing ones, and which are archaeologically verifiable in human remains, drastically diminished the number of people. On the issue of diseases, we do not know the impact of those that could be transmitted at a distance, before the actual arrival of Europeans. However, there are documented infections that occurred from direct contact, although there are no written records until later when the missionaries had settled, who described episodes of mass mortalities. It is therefore possible that the ethnographic image constructed from the second half of the nineteenth century offers a different humanscape that could have originally existed in the time prior to European contact.

However, not enough human remains of those times have been analyzed yet, even though there are already enough excavated: a burial in a midden of an adult with two glass scrapers in

Harberton, a young woman in the rockshelter Mishiwen III, near one of the first settler-missionary settlements, or a burial in Acatushún midden, with an adult and six buttons associated.

However, it is known that there were direct contacts with crews of whaling ships and fur-sealers, crews with scientific and political expeditions, and later missionaries who actually not only introduced new diseases but favored certain everyday practices that negatively affected the health of the indigenous population.

At this time, the practice of abduction and translocation of indigenous people also began, which continued into the twentieth century. By 1829, during the first trip for scientific exploration of the South American coast, Lt. British Royal Navy Robert FitzRoy took three native young men and a girl from the coasts of the channel to Britain in the brigantine Beagle (Fueguia Basket, Jimmy Button, York Minster, Boat Memory). And in 1831–1836, the same FitzRoy now Commander on the second voyage of the Beagle (which is famous for the travel journal published by Charles Darwin) brought back the three surviving Fuegians: Fueguia Basket, Jimmy Button, and York Minster.

Christian Missions

It was on this 1836 journey, that the first failed missionary attempt occurred: Richards Matthews, appointed by the Church Missionary Society to remain among the Fuegians, stayed a few days at Wulaia Bay (now Chile) but resigned and returned to the ship. Later, in 1848, the second missionary attempt would take place, by Allan Gardiner in Picton Island (the mission failed and afterward the human remains of the first missionaries who died of scurvy and hunger were rescued). It was not until 1871 that the Anglican mission of Thomas Bridges and his family (Mary Ann Varder and her daughter) was definitively established in the channel. This first stable mission, a small village with farm gardens would become the modern city of Ushuaia which has not been excavated, nor have subsequent missionary settlements in the area.

Predation and Overexploitation of Native Resources by Europeans

One of the phenomena that excavations in Tierra del Fuego have shown is the relative and significant increase of fish remains together with the decrease in the proportion of sea lion consumption in these eighteenth and nineteenth century settlements (Tunel VII, Lanashuaia, Alasawaia) compared with their presence at sites of previous eras. It was interpreted as evidence of an frustrated attempt to change the strategies of subsistence. The pinnipeds resource had been one of the keys to maintaining the livelihood of these peoples, since the last breeding areas of these animals were in the outer islands and the Antarctic Ocean, away from the technological range of the indigenous population. So the intensification of fishing could be an attempt to develop an alternative resource against a continually descending abundance of pinnipeds. However, it is very likely that the rigidity of social norms, the catastrophic effect of diseases, and the scattering of the population, together with the subsequent missionary activity, did not allow a possible slow structural change, but precipitated the disintegration and dissolution of the native society.

It has been shown that even though the paleoclimatic record found at archaeological sites shows slight variations throughout the Holocene, there was not a natural biotic or abiotic cause to explain this final disturbance.

In the early nineteenth century, Euro-American seal and whale exploitation began in the Antarctic, although there are not yet too many historical details about its magnitude, temporality, dynamics, and intensity. However, in the 1990s of the twentieth century, archaeological projects were initiated in the Antarctic confirming the assumptions made about the causes that affected the issues mentioned before. Indeed, the whaling settlement excavations confirmed documentary sources pointing to a constant presence of sealers and whalers fishing boats directly slaughtering in the breeding zones with technologies much more lethal than the ones of the natives. This caused the catastrophic decline of marine mammals, a fundamental element in the diet of the canoeing people of the Fuegian archipelagos.

Archaeological excavations of camps and sealer shelters in Desolation Island and Cape Shirreff (South Shetland Islands) provided the first physical evidence of the coexistence of foreign and indigenous hunters, demonstrating that these boats used male natives as workforce/sailors/pilots and women as sex objects. All of these contributed to the disintegration of native social organization. In the archaeological sites, indigenous artifact remains were found in direct association with remains of wood, ceramics, earthenware, iron, glass, and seeds from English or American origin of the nineteenth century. In Yamana Beach, close to two rockshelters that were used by sealers, a complete skull of a young mestizo adult woman and two femurs, apparently from the same person, were found.

It was also found in other beaches a marked architectural difference between settlements and, in some cases, constructive differences which are attributed by researchers to persons of different status within groups.

Since there is no radiometric method that could be applied to these archaeological findings reliably, the exact chronology is a problem. Consequently, due to the high homogeneity exhibiting archaeological materials and knowing that the first stage of hunting, between 1819 and 1825, was the most intense of all and which brought the largest number of hunters, there is a tendency to ascribe the findings to this moment. Furthermore, the type of pipes present in these sites strongly reinforces this assumption, since the pipes found in the sites are from the 1780–1820 period (Stehberg 2003: 177).

Another interesting archaeological project in this regard is the Spanish-Chilean project that sought the location of the Spanish ship San Telmo, considered as being lost in South Atlantic waters of Cape Horn in the spring of 1819 when it was sailing from Cadiz to El Callao, in the American coast of the Pacific Ocean (Stehberg 2003). It was sent together with three other ships and troops to try to help the Spanish royalists in the rebellious colonies in South America.

The archaeological study included not only the search and identification of the ship remains but also all evidences left by successive visitors to the area. In a large bay enclosed to the west by some islets called Telmo Island on old maps, a kind of shelter on a cliff was found that may have been artificially prepared. Throughout the area and in other large bay, the Media Luna, there was scattered wood debris, seal and sea lion remains, and some whale bones.

In a superficial survey, a skull was found which, according to an anthropological examination conducted at Santiago de Chile University, may correspond to an indigenous woman carried by sea lion hunters as servant in a boat.

Finally, five sites were located with scarce remains of estructures and disseminted materials corresponding to small temporary camps. Excavations in four of them provide the first evidence for the area that matches with similar settlements found in Byers Peninsula, King George Island, and elsewhere in the archipelagos of the South Shetland and Orkney.

The verification of the final process of aboriginal societies of Tierra del Fuego brings up the question of whether it was an isolated case because they were socially and technologically simple societies, or if it was a repeated and general process affecting small scale societies, whose subsistence was centered on hunting, fishing, and gathering.

To check this issue, the processes experienced by other native societies based on fishing-hunting-gathering should be analyzed.

Societies of the Northwest Coast of America

The recurrently considered more complex hunter-gatherer societies inhabited the land at the other end of the American Pacific coast. In the societies on the central coast of North America Northwest, archaeological research show that ethnographic descriptions have important anachronisms, errors, and gaps. Information contrasted archaeologically shows a similar process to Tierra del Fuego: The trigger for the contact was the exploration and fur demand since 1742. Firstly sea otter and then when they were rarefied from 1815, hunters turned to the inland fur trade (mostly for beaver).

Two archaeologists (A. Martindale and P. Prince) both point out a first

protohistoric/proto-contact period previous to the nineteenth century in which European influences come indirectly, followed by a second period of exploration and fur trade in the early decades of the nineteenth century. During this time, the indigenous maintain their economic autonomy and their production relations. After the first settlement of trading posts (Fort Simpson in the Tsimshian area and Fort McLoughlin, further south in the area Bella Colla), there would have been a post-contact phase in which trade and exchange increased until finally shopkeepers, settlers (in 1834, Fort Simpson is founded and in 1849, Fort Rupert), gold seekers (1858), European canneries and sawmills began to settle in the territory and from the second half of the century, eventually swallow the indigenous population in the market society.

Throughout this period, there is a change in relations between Europeans and Indigenous parallel to the process of change experienced by the European society itself (moving from business contact to colonization).

In the coastal Tsimshian area, the first direct contact occurred in 1787. But there is what we call proto-contact period in which, as in Tierra del Fuego, the natives are exposed to indirect influences of Europeans (diseases and European objects like coins and metallic elements, which have been found throughout the Skeena River course). This first European trade's indirect influence is archaeologically perceived besides the presence of some industrial objects, by the increasing number of fur animal remains in the settlements and especially changes in the settlement pattern itself. In the lower Skeena, permanent occupations change to seasonal occupations and new settlements are located, as Metlalka in natural harbors. Inside the lower course of the river, there is a shift to a hierarchy of settlements and larger villages appear along the Skeena and the confluences with tributaries (Exchamsiks and Kitsumkalum).

Another thing was happening in the middle course of the Skeena, in the Gitksan area, where fortified settlements were placed (e.g., sites of Kitwanga-GgTa1-in-Gitlaxdzawk Kitsumkalum Canyon and GdTc1-in Kitselas Canyon) with permanent occupations on the river to participate in the fur trade traffic between the interior and the coast, where European boats arrived. Settlements became more sedentary and large (up to 17 houses), but the houses got smaller and started having European elements.

In brief, there was an increase in the participation of the commercial economy (the subsistence economy losing importance) and a reduction in houses (social segmentation, which could be explained by the effect of diseases but also by the effects of internal segmentation).

The presence of exotic European assets empowers already existing tendencies as e.g., surplus accumulation, violent conflict (the towns became fortified), social inequalities, and the slave trade. The first two are very well documented in the town of Kitwanga Hill Fort dating from the period 1750 to 1859. There, European items are distributed homogeneously in the houses, but at the end of the period, they are more concentrated in certain areas of a central house (Prince 2001). There, fur animal remains are concentrated and exotic goods accumulation is documented as well as a much more varied diet than in the homes of the periphery which are more modest in their construction.

Despite these changes, social reproduction structure remains essentially unchanged in this proto-contact moment. While the size and number of houses in villages are different, the internal structure of the houses will not change substantially until late nineteenth century. Martindale attributes this resistance to change, among other things, to the fact that until the complete settlement of the European colony in Fort Simpson and especially to the final installation of the missionaries, the natives depend on the strategies and traditional subsistence-production relations.

This was documented in the Psacelay site (GbTh-4). In this town, the pre-contact houses are as described ethnographically as large (up to 11 * 18 mm), multifamily, with internal divisions, with an uneven distribution of consumer goods and accumulation of surplus in the "noble" (the innermost) part of the house. In this site, one of the two pre-contact houses is abandoned

Archaeology: The World at 1800–1850, Fig. 3 Historical site Fort Langley. The original was built by the Hudson Bay Company in this place in 1839. Here, in 1858, the colony of British Columbia was proclaimed. The reproduction was built for the touristic visit

coinciding with the presence of post-contact European elements in the other house (Martindale 2006); however, the internal structure remains the same. The same happens in the town of Ginakangeek (GbTh-2) where crafted glass, dishes with blue decoration, trapper tools, lead fishing weights, and rifle caskets were found in one of the houses.

Trade of European goods (iron, iron tools, muskets, copper plates, fabrics, paint, sugar, biscuits, molasses, rum, tobacco) was superimposed, taking advantage of preexisting sharing networks (dentaliums, slaves, eulachon oil, dried berries, canoes, etc.) and was used to enhance prestige, with natives as intermediaries and with European ships acting as intermediaries among the natives.

With the installation of Fort Simpson (Port Simpson, British Columbia), from 1834, the natives began to cluster around European settlements, increasingly abandoning their winter settlements. Although hunting and fur preparation was mainly carried out by autonomous indigenous peoples, here, as in Tierra del Fuego, written documents speak about hiring Indigenous labor: first Aleuts by the Russians (1810) and then Indians by the British of Fort Simpson. Furthermore, since 1840, we find the natives integrated to European settlements. From 1870, they become employees in sawmills, packaging plants and they even migrate to the city of Victoria (the settlement of Fort Victoria was installed in 1843).

From the European forts, diseases spread, with one in 1836, killing one third of the native population (Fig. 3).

Similarly in the area of Bella Colla, analysis of all materials at Kimsquit settlements demonstrates a gradual incorporation and modification of European goods which are incorporated into native life, which retains indeed most of its own elements. It is not until the second half of the nineteenth century that the use of these foreign items becomes widespread, albeit sometimes with native functions and uses. That is, European materials were selectively adopted. In some cases, they worked with these materials with traditional techniques, giving them new and original forms different than the ones they had before. However, sometimes, it was not just about replacing traditional items, but that using imported objects acquired added value or that these objects were used as prestige goods (firearms, buttons, uniform, transparent glasses, and keys).

The fur companies that entered from the east of the continent advanced by 1806 to establish forts (Fort St. James, Fort Kilmaurs, and Fort Connelly) in the headwaters of the Pacific.

The missionaries of the Church Missionary Society arrived later and settled in 1822 in Red River (Rupert's Land), but in the Pacific Northwest, the first missionary (William Duncan member of the same Church Missionary Society) was installed in Port Simpson much later (in 1857), as in Tierra del Fuego. The objectives and strategies of these missionaries were the same at both ends of the American continent.

Australasia

Although there are different elements, the process that took place in the eastern Pacific had many similarities to the other end of the South Pacific. Archaeology has helped to restore a more complete picture of the early days of European settlement, particularly through the Australian Society for Historical Archaeology founded in 1970 by Judy Birmingham that published a newsletter from 1973. Later, in 1983, this publication became the Australian Journal of Historical Archaeology. This Society from 1991 was extended in Australasian Society for Historical Archaeology that publishes the ASHA Newsletter and Australasian Historical Archaeology Journal, as well as a series of occasional papers and monographs since 1984.

Archaeological works, many published by the Australasian Institute for Maritime Archaeology, have analyzed sunken and stranded shipwrecks and trade of materials transported. Whaling settlements, consumer goods factories (saltworks) and mines, farms, sheep farming, forts, war scenarios, military installations (e.g., the 1840 military settlement of Port Essington or Fort Ligar), prisons, missions, and urban development of cities such as Sydney, Wellington, and Auckland have also been studied. Indigenous life and activities of the subordinate population: Women, and female convicts and aboriginals have been taken into account.

The inrush of the Europeans occurs in an analogous manner: There were some initial Iberian and Dutch seafarers exploratory trips (the archives on the Peninsula are scarcely known and studied by Anglophones scholars), but it was the famous Cook's travels that, in an expansive social context of the metropolis, triggered the scalar increase of the contact. Shortly after his travels, fur seal and sea lion hunting boats started coming to the south coast and southeast, and in 1788, the European settlement in Australia with convicts started in Port Jackson (now part of Sydney). This settlement would be followed by the arrival of the missionaries and little by little, during the first half of the nineteenth century, the interior of the Australian continent was explored.

Although the first to establish seasonal jobs in Van Diemen's Land, present Tasmania, were sealers, the settlement, with soldiers, convicts, and free people, was officially founded in 1803 by a British expedition sent from Sydney to prevent the landing of the French. Colonization was very fast and fatal as evidenced in a punitive expedition of 1815 against the indigenous for killing as many as 930 sheep. The colony quickly became a sheep and livestock colony with hundreds of thousands of cattle, for which they had to take native territories.

The estimated colonial registered population grew from 7185 in 1821 to 24,279 in 1830.

The archaeology in New Zealand, as it is an island and it has similar social and environmental conditions, illustrates the parallels with Tierra del Fuego and the Northwest Coast.

In all of these sites, it can be seen that there was a proto-contact phase (with sailors of various nationalities around their shores) documented by some European items in indigenous contexts: nails, axes, glass, and collar beads. A period of more intense initial contact with seasonal whalers and sealers settlements would follow, which is seen in the increase of these materials in New Zealand (Smith 2005) and the installation of the first penal colonies on the continent. Archaeological research clearly illustrates this contact process in which Aborigines initially tried to take advantage of the presence of Europeans and the introduction of new items incorporating these enclaves within their own networks, which probably like occurred in Tierra del Fuego and in the Northwest Cost, also stimulated significant and stable clusters of people around settlements and European trading points. The settlement of men on the coast generated a certain symbiosis and

also problems of isolation and survival of new settlers, transference from the aborigines to the settlers and mixed settlements.

In New Zealand, the first Europeans to settle seasonally were sealers (mostly in the western part of the South Island), in some settlements where, since 1792, they lived with Aboriginal women and their mestizo offsprings. The first official settlement was that of the missionaries of the Church Missionary Society in 1814 in Oihi, Bay of Islands (Middleton 2006).

Colonization was conducted shortly after the system of privileged companies that violated treaties (such as that of Waitangi in 1840) installed more than 20,000 settlers in just 10 years. From 1803 to 1854, there were over 74,000 convicts transported from the British Isles, including some 12,000 women. This expansion policy confined the indigenous, reduced to a quarter, to the most bad lands.

As in the Pacific Northwest (and later in Tierra del Fuego), in the 1850s, the gold rush attracted more settlers to the Australian continent.

Violence and Disease

From the first contact in 1769 between Cook and the Maori in New Zealand, there began the confrontation between Aboriginal and newcomers. In Australia just 4 months after the first settlement in 1788, there was a confrontation. In December 1790, there was the first recognized massacre of indigenous people. On the mainland, the killings continued unpunished until 1838, by military officers, settlers, and ranchers. But it would be extended along the entire nineteenth century (until 1932) as the frontier advanced, and the conflicts would be reproduced between newcomers: between free settlers and deported, and between squatters, ranchers, and farmers.

In Tasmania, although it is assumed that there must have been some previous encounters between Aboriginal peoples and sealers, the first known violent episode occurred the year after the European settlement in 1804. Violence against Aboriginal people did not cease until its peak (the so-called Black War) between 1823 and 1834. After a major "cleansing" operation in the districts already colonized, it culminated in the deportation of all survivors (about 220 people from different groups of Tasmanian) to Wyllbaenna settlement on Flinders Island in Bass Strait. Most would die during capture and confinement: 14 years after their confinement, in 1847, there were only 47 survivors (Birmingham 1992).

This process is quite similar to that which would occur later, with the advance of the sheep border, in Isla Grande of Tierra del Fuego on the Selknam population, which saw them imprisoned in missions, segregated, deported, and confined on Dawson Island.

In New Zealand (after Cook), hostilities were reproduced, this time between sealers and Maori, with the war called the Red Shirt War which lasted from 1809 until the 1820s. As in the Pacific Northwest, with the well-known case of John R. Jewitt from 1802 to 1807 (Jewitt & Stewart 1987), there were Europeans who trespassed over the border to become "Pakeha" Maori. Their knowledge of the habits, ways of acting, production processes, and access to European goods (such as muskets) made them highly appreciated by the natives. This would lead to the creation of a mestizo population segment as the one that had been formed, by 1821, on the islands of Bass Strait in Tasmania.

As in the North American coast, European interference stimulated some preexisting trends in native society. The cultivation of potatoes, as in the Tsimshian area, was quickly adopted and used as an exchange good by the indigenous, allowing them to enjoy lower dependence on subsistence seasonality and increase production and at the same time increase the workforce. This, together with the possibility of acquiring European guns, stimulated and increased preceding tensions, the war and slavery between groups and Maori peoples (as happened also in known cases of the east coast of Vancouver Island). Thus, bloody episodes occurred as in the so-called muskets war among Maori between 1807 and 1842.

The Treaty of Waitangi between the British and Maori, which was signed in 1840, served to turn the archipelago into a colony out of fear of French influence. The Treaty was not respected

by the settlers, which resulted in the Maori wars between 1845 and 1872 wars that would definitely change the balance of forces in favor of the newcomers.

As it had occurred in Tierra del Fuego, in regard to armed violence, the kidnapping of natives and their removal to Europe soon followed. In 1790, two Aborigines were taken to show them to the king of England. Women and children abduction was also common in Tasmania occupation (especially between 1816 and 1818).

The first settlements of sealers resulted in the sexual predation on indigenous women for using them as company for their campaigns between November and May each year. Europeans got them from the natives themselves in Tasmania and New Zealand in exchange for European objects, sealion furs and dogs. Some missionaries were engaged in kidnapping children (especially girls) and they kept them segregated in special enclosures, with the excuse of saving them from venereal disease. As in all the Americas, diseases reduced indigenous populations to a third. The first recorded epidemic occurred around the European settlement in April of the year following their establishment. Epidemics were reproducing regularly in 1792, 1822, 1831, etc. In their explorations, the Europeans continued finding people marked by smallpox, contributing to the suggestion that the diseases were introduced by Asian fishermen from the North before European arrival.

Sexually transmitted diseases, alcoholism, and segregation policy (implemented first by the missionaries and then by the colonial government itself) helped to dismantle the Aboriginal population's reproduction mode, it would take over a century to begin to recover and reorganize it.

Resource Predation

The early days of pinniped exploitation are poorly documented. Records begin in 1791. At the beginning, the aim were the skins (more than 45,000 skins were gathered per year) to be exchanged, first in China for handicrafts, spices, tea, and silks and then in London where oil, fat, and skins were selling well, and where industrial processes of preparation and preservation developed. It affected the regions from the southern shores of Australia to the southern islands of the Antarctic. In the southern coasts of New Zealand, it lasted until mid-1810, but in just 4 years from 1798 to 1802, pinnipeds were overexploited in all the region of the Strait of Tasmania, and the sealer boats had to move increasingly to the South. Business decreased due to hostilities with Maori in the south, with a slight recovery in 1823 after temporary cessation of fighting and the installation of small sedentary settlements. But animal populations in Australia and New Zealand were overkilled in 1830 and the potential for massive exploitations nearly depleted. The exploitation of pinnipeds for their fur and their fat was supplemented in South Australia, Tasmania, and New Zealand and southern islands with intensive exploitation of whales (for their fat, bones, and whalebones) well before 1803. This hunt was conducted from factories located in coves and bays. Depletion of animals near the coast and the competition of the kerosene as fuel by 1850 changed the type of exploitation, directing it to open sea.

In the productive activities of these exploitations, Aboriginal women and some men were incorporated. Aboriginal New Zealanders also participated in this marine exploitation working at the factories situated in the south of the archipelago. Small settlements were formed with a varying mix of natives and Europeans.

Social Dislocation and European Settlement

Missionaries' permanent installation in New Zealand in 1814, the coastal bases of whaling operations, New Zealand forest and linen exploitation, and agropastoral expansion increased these contact and the transferred materials. The rapid colonization of white people led to an advance of the frontiers, increase of armed fighting, and missionary activity. Survivors were relocated and reservations were established, missionaries tried to attract the natives to Christianity, to the European way of life, to resource exploitation of commercial interest and wage labor.

Excavations in the afore mentioned Wybalenna mission in Bass Strait, where

Tasmanian natives were relocated between 1833 and 1847, may provide additional light on how Tasmanian Aboriginal society came to disappear. Archaeological work confirms the historians' views, which suggests that the Wybalenna settlement was not viable: Living conditions were the poorest and food was scarce; thus, some Aborigines died from malnutrition and disease. They spent time on hunting local native wildlife to supplement their diet: There is a mixture of bones of small marsupials, molluscs, and European domestic fauna (which will increase its proportion over time). They have also shown that not all residents alike accepted the conditions imposed: There are knapped glass instruments and different proportions of local and imported animals in the different rooms. It is clear that there was an attempt to reeducate them in the habits (e.g., sweeping the rooms, ceramic tableware) and with the European system (pencils, ink). Other European items, such as buttons, beads, necklace beads, tobacco, and ceramic pipes, should be bought with coins, and thus, the incorporation of natives to the wage labor and market economy is demonstrated. The official establishment of the colonies and the transformation of the settlements into real urban administrative centers since 1840, as well as the establishment of cities such as Sydney (1852), Perth (1856), Melbourne (1847) by Queen Victoria, marks the end of this period of colonial settlement.

The End of Contacted Societies

In all these areas, were native societies subsisted on fishing or hunting, the same process is archaeologically documented, even though it differs qualitatively or is not completely synchronous at a local basis:

1. A proto-contact (indirect or isolated and littoral) whose effects are documented archaeologically by European materials (raw materials and other utensils reformatted with their own techniques and adapted to their own use) found in Aboriginal sites. There was first the impact of European diseases and the gradual adaptation of European technology in a context of social relationships and native subsistence systems. At the same time, a change in settlement patterns to position themselves in relation to this new foreign input, but still within the traditional relations systems, was experienced. Certain existing trends, such as aggregation, women subordination, social inequality, and, in their case, intergroup violence, were stimulated.
2. Direct contact and European settlement (travelers, traders, missionaries, miners, and settlers), which involved new episodes of catastrophic epidemics and sometimes fights/slaughters. These Europeans, after the first contacts that involved more or less violence, tried to kidnap or capture some native people to serve them later as translators or introducers in their society. European settlements that were installed by the mid-century acted as attractors of the indigenous population while spreading diseases, alcoholism and as bridgeheads for waged (independent) labor and bases for exploitation and competition for resources and territory.
3. The integration of natives as a laboring force (guides, trappers, hunters, food suppliers, translators, trade intermediaries) for both men and women, the latter always with the addition of sex, was produced.

Throughout this century, these groups were completely socially unstructured, and even physically almost gone by the first half of the nineteenth century, like the Tasmanians or Beotucos of Newfoundland. The survivors would be integrated into the market economy and even became dependent on it for their livelihood, forming part of the lower salaried classes of the new society.

The long history of these native societies came to a sudden end in the nineteenth century. They could not control the de-structuring effect on their social networks. Although perhaps it provided initially a series of specific daily improvements for a part of these native societies, it was eventually lethal to the survival of their organizational structures. Aboriginal societies would only be "resurrected" or reconstructed as entities, from World War II and for political reasons and following a political struggle.

In this intermission between the first contacts and the disappearances is when religious missions,

industrial companies, gold seekers or adventurers, or sailors of marine resource exploitation companies and the different governments that were formed in the new countries that emerged from colonization, played an important role.

Global Causes

So far the description of processes that affected societies at the end of European colonial expansion has been explored. Since the verification of the existence of this phenomenon and recurring global processes, the evidence reporting the global causes of the end of some social systems that had survived many crises over thousands of years should be analyzed. Allochthonous objects (metal, porcelain, glass, etc.) found in archaeological sites in settlements at the ends of America and Oceania from early nineteenth century came from maritime routes. These items relate to the newly emerging Europe in this century, the nation-state, colonial-expansionist-scientific-industrial-educated Europe.

In the first half of the nineteenth century, Europe was undergoing major changes. European capitalism of the emerging industrial revolution developed and consolidated new sources of energy (steam power machine). Transport systems (such as the train), with coal as fuel and iron as the backbone, widened markedly and there were large movements of people (from the countryside to the cities). All this led to, and was caused by, an increase in the demand for a means of production of increasingly sophisticated, luxury goods for the new upper class/bourgeois society and consumer products for the metropolitan working classes and the new colonial population in expansion. It was about a basically legitimist, clerical, and reactionary Europe, where nationalism and liberalism prevailed. Nationalism was an important political factor and the mercantilist theory provided a stimulus for the development of a new type of colony; the colony was established by Europeans as a social and economic expansion of the metropolis. This system, which required major sources of raw materials and new markets to sell their products, now also started its own colonial expansion. The exploration of last boundaries for evaluating potential resources briefly preceded colonial penetration, which was often justified by cultural and ideological-religious arguments: as a civilizing and/or evangelizing mission.

Therefore, the causes of the disappearance of those native life systems successfully achieved and experienced for so long, with local characteristics and specific crises themselves, were not internal. Commercial competition between nations led to the establishment of new colonies in the new lands, the processes that occurred in the contacts and meetings with the societies called "primitive"/ethnographic led quickly to their end. So their disappearance was caused by a confrontation with a growing external socioeconomic system whose intrinsic emerging characteristics made it prevail, destroying those it contacted.

History, after the first contacts, is the history of European colonization.

Transformations in the Colonies

The greed and force of this new system are evident, not only in the new lands that the European metropolis occupied in this century, but in the former colonies established centuries before. The consequences of this struggle between European nations, between the metropolis and its former colonies, or between the new settlers and the Indigenous can be detected archaeologically, along all coasts through archaeological remains of the land and naval battles like the underwater remains of the iconic Trafalgar confrontation.

Rivalries between the major European powers for the appropriation and exploitation of the territories "discovered/conquered" were the first stimulus to scientific-political travels (with adventurers, pillaging, and kidnapping). The voyage of the HMS Beagle is the best-known example of the first half of the nineteenth century (Fig. 4). These trips were aimed at finding and evaluating new resources, exploring possibilities for their exploitation (sealers-whalers-gold-fur-trappers) and establishing new commercial circuits. Goods and circuits are known by archaeological analyses of wrecks and the distribution of allochthonous goods that have been found. From the records of the ships, the circulation of

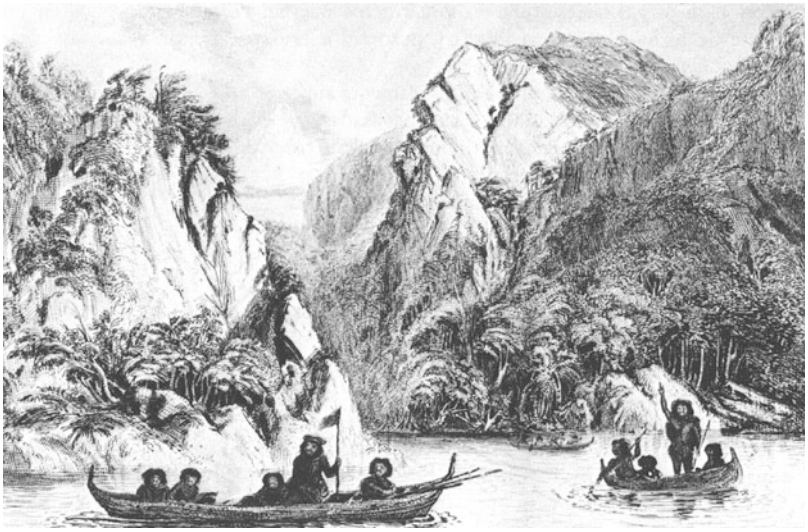

Archaeology: The World at 1800–1850, Fig. 4 Drawing of Fueguian canoeists made by T. Lanseer and reproduced as engraving in King 1839

some goods can be followed. Goods that included: porcelain, spices, silk, and tea from China that were exchanged for fine furs of North America or from the Subarctic first, and later opium (in the first Opium War, England imposed its use in 1842); fuel, minerals, wool, cotton, tobacco, groceries, coffee, and sugar in the already established colonies in exchange for value-added products or industrial products (textiles, Staffordshire porcelain, alcoholic beverages, and consumer luxury goods for the ruling classes and the emerging middle classes), and of course work force (slave, forced or free, African, European, or Asian).

Under these economic conflicts between European nations, changes of "ownership" of some colonies occurred, for example, the purchase of Florida and Louisiana. Enrichment desires of the new Creole elites – both large producers and urban intermediaries – will lead to the independence of the countries in the early decades of the nineteenth century, processes that were not foreign to the interests of the metropolitan rival powers to get these new markets (such foreign interference had occurred since the first independence, that of the USA). The archaeology of Spanish and French Caribbean colonial fortifications perfectly indicates where the problem came from in the first place.

The idiosyncrasies of the different colonizations are reflected in the particularities of the archaeological evidence and settlement patterns, for example, among the Spanish, French or English Caribbean. The displacements and relocations of settlers also have their archaeological expression when compared archaeologically: for example, the housing structure of the Arcadians compared to the houses of the preinstalled settlers in the south of the United States of America.

The strength of the commercial circuits that were stimulated by the desire of exotic goods and imported products prompted the intensification of production in these ex-colonies, both imported products (coffee) as well as their own products such as rubber, guano, or tobacco. Thus, a new class of landowners, stockholders, and businessmen emerged, who often built a residence in the cities in addition to their large properties and homes in the countryside. As a reflection of what was happening in the metropolis, these emerging new classes in the new countries tried to follow European fashions, imitated behavior styles, architecture, luxury objects, furniture, fashion in clothing, etc. In order to fulfill their needs, they directly imported many luxury items.

The presence of European luxury goods and evidence of new production means is archaeologically confirmed: For example, there was a move from the small artisan press to the sugar mill with the early introduction of the steam engine and the railroad. The set of buildings for sugarcane

processing, the sugar mills, have been archaeologically well studied in Cuba, Dominican Republic, Venezuela, and Argentina. In Cuba, for example, at the beginning of the century, sugar mills multiplied, numbering more than a thousand in the 1830s. They produced not only sugar but also began to produce rum. Coffee haciendas in Venezuela, Guatemala, and Cuba have also been archaeologically studied.

Tobacco and cotton were other colonial star products that began to rise in this period. In the USA, large landowner exploitations in the South to small farms in the North have been archaeologically studied. Agricultural intensification explains the flourishing of guano exploitation. In 1845, Peru began exporting this famous fertilizer due to high demand in North America and Europe to increase their agricultural production to cope with population growth.

The same happened with other products to meet industrial demands. For example, the rubber extracted in the subtropical forest was an essential commodity for British industry. There have also been archaeological studies documenting such exploitations.

The same intensification pressed the largest colonies into hinterland occupation where indigenous people survived. They had developed new political, social, and economic organizational strategies, taking advantage of new elements (horses, livestock, crops, weapons).

European expansion, occupation, and the final removal of indigenous people, that have an archaeological reflection at battlefields and military buildings, will start in the first half of the nineteenth century but will intensify and consummate in the second half, from the 1840s.

The most relevant examples of which we have archaeological traces are, in addition to "Maori war," the advance of the whites in South Africa, the "conquest" of the West in the USA, and the so called "war of the desert" in Argentine Patagonia. In Argentina, there was a sustained situation of an unstable border that had generated a native and mixed population which had developed new social and economic strategies: regrouping, mixing, working with cattle and horses, or the exploitation of salt to meet consumption and military demands of the European population, and even participating in the colonial and internal disputes. There is archaeological evidence for the transformation of the natives (e.g., watering hole structures) and Argentine and Spanish ancient forts. The effort to disintegrate the indigenous structure and absorb "undomesticated" – indigenous and gaucho – labor force will be completed with the intensification of the war, and archaeologically well reflected in the forts and border forts and in the means of production and consumer goods recovered at these sites.

The emergence of an urban class of intermediary traders contributed to the remodeling of existing colonial cities and their growth as a service center and as locations for primary processing industries. The case of Buenos Aires is quite illustrative, with a planification that had begun to regulate even before independence in Charles III's regulations (Schávelzon 2002). With the independences, their creole industries, local factories (e.g., china), and at the same time some old ways of organizing work of religious inspiration, such as the Capuchin monks in Venezuela, are terminated (Sanoja 1998).

The same powers (especially Britain), that favored the independence that allowed them to penetrate these markets, stimulated rivalries and interests or divergent plans that emerged between different local elites. Immediately after independence, there followed civil wars and wars between neighbors that tried to prevent the installation of large countries that could threaten the hegemony of the maximum emerging power.

The case of the best-known rivalry and also archaeologically best known was between the USA and Mexico. The expansion of the future new power was oriented not only to the north and west but also southwest, conflicting with Mexico with which they went to war, and they finally snatched 55 % of Mexico's former territory.

Economic and Ideological Changes in the Metropolis

Large commercial transatlantic circuits generated a demand for raw materials and at the same time value-added products, which led to the development of mass production that installed a second

phase of the industrial revolution, the mechanized factories. This process has been well studied by Industrial Archaeology in central and northern Europe.

The development of urbanization and industrialization on the continent, which had begun in the last third of the previous century, has continued into the first half of the nineteenth century. The demand for labor will attract people from the countryside to the cities and industrial areas. Industrialization and mass production systems were developed: Fine porcelain production and transfer systems designs are an excellent example well-studied archaeologically. The chain of production processes accelerated the feedback of all these cycles: Textile mills, for example, required the development of new machinery which in turn stimulated metallurgy, the demand for metals and fuels, mining.

This development required a fundamental transformation in production relations. The change meant the end of slavery and the residues of feudal production relations, which were not carried out without resistance. Archaeology has studied the moment of the end of slavery, from the analysis of the remains of sunken slave ships in the Caribbean to the mills and large slave plantations or runaway slave shelters (e.g., in Cuba).

The capitalist mode of production would be based on non-slave wage labor, for which they had to reeducate the workforce. These new production relations had to be imposed by force against the resistance of certain classes of large agricultural producers, but were especially advantageous in industrial environments. Indeed, they had the advantage of reducing fixed costs, labor market flexibility to adapt to the increasing mechanization and massification and generating new cycles of consumption and profit (rental housing, consumer sales that are materialized in industrial colonies whose architectural and archaeological traces are found throughout Europe).

The restructuring of the labor force and economic growth will lead to large population translocations: mass migration of central and northern Europeans toward the colonies, and the displacement of people from India to South Africa. By mid-century, China also began to move toward the Americas. The loss of male labor in the wars between the metropolitan powers in the colonial liberation, in the emigration to the colonies, etc., needed to be replaced: It was therefore about placing women as reproducers (of the labor force and ideology) and also as a reserve labor force.

The political, legal, and economic status of women did not change significantly with the industrial society and liberalism. They continued to be the victims of discrimination. Female labor in factories and mines did become widespread, but in conditions of extreme exploitation and wage discrimination against their male coworkers. Moreover, women were banned from professional areas of greater responsibility and higher education.

Ideological Changes

The existence of labor force and free consumers demanded restructuring relations of social reproduction: the construction of an ideology for alienation and ideological domination on the one hand, and to stimulate the reproduction of the same workforce on the other hand. An ideological shift was essential to achieve a revolution in the reproductive sphere. Linking morals with reproduction has its paradigmatic theorizing in Malthus's work, which, among other things, would serve as a basis for the development of the theory of Evolution and, therefore, the foundation of biology. Parallel changes occurred in political ideology. Nationalism encouraged the identification of consumers with producers unifying and thus favoring domestic consumption in central nations and metropolitan product in the colonies. Colonial elites not only imported luxury items imposing European fashions but a good dose of liberal ideology and a new lifestyle in the image and likeness of the European bourgeoisie.

The cultural demand of these elites is linked to Neoclassicism and Romanticism, which ensures Archaeology of this period is reunited with its own origin. We are in front of the birth of archaeology as a discipline, in parallel to other sciences

(such as geology or biology). Nationalism also brought an interest in the past and the role it could play in the construction and legitimation of the present. The remote past – prehistory, and in particular Greco-Roman civilization – becomes the focus of interest and is investigated/excavated. Romanticism, in turn, intensifies the interest for lost civilizations: Near East, Egyptian, Mayan and for a dark common past: Celts and megaliths.

The development of archaeology is linked to the demand for exotic and cultural consumer goods: It is expressed in the architecture (neo-Gothic, neoclassical) that is documented in the excavations of mansions and gardens that speak for these interests of the bourgeoisie. In the early nineteenth century, the demand for antiques by states and collectors becomes so great that the great museums in Europe and the USA are created to preserve and exhibit relics of the past. Thus, the nineteenth century is the century of the museums, the pillaging of antiquities in Egypt, in Greece (Parthenon friezes are purchased), and exhibition of exotic people – "other peoples" – that reinforce the European system, civilization, and the status quo.

Resistances

However, the enforcement action of this capitalist system immediately provoked significant reactions and social crises. One can speak of the "Europe of revolutions": the bourgeois revolutions and independence revolutions of the colonies which are followed by other crises, revolts, and working class resistances. Unions and social movements emerged as Luddism, opposed mechanization and was severely repressed, Owen's utopian socialism (1839) that inspired the founding of utopian colonies. These culminated in the mid-nineteenth century with the publication of the Communist Manifesto (origin of scientific socialism), the publication of Proudhon's works (origin of anarchism), and the European revolutions of 1848.

In that same year 1848, the first American feminist collective document, the so-called Seneca Falls Declaration, which was approved on 19 July in a Methodist chapel of that locality in the state of New York, became public. This document first expressed what might be called a "feminist philosophy of history." A philosophy which denounces the abuses women had suffered throughout history.

Conclusion

The causes of the disappearance of native social systems based on controlled production and reproduction were structurally and contextually external and violent. Their origin must be sought in Europe and attributed to its initial capitalist system that begins to expand and consolidate in the first half of the nineteenth century. This required a globalization where colonies fructified, soon converted into independent countries, and for its resource and territory voracity implied delimitation of marginalities incompatible with the new system.

Archaeology allows complete our understanding of the global system expansion illuminating the dark side of the story: those elements that were considered not worthy but removable or to be ignored.

Cross-References

► Histories of the Archaeological Discipline: Issues to Consider

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Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)

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Basic Information

The Archaeometry Laboratory at the University of Missouri Research Reactor (MURR) supports collaborative research on archaeological materials to answer questions about past human behavior (http://archaeometry.missouri.edu). Using information from trace-element and/or isotopic characterization of artifacts, raw materials, and human remains, the Archaeometry Lab at MURR works with archaeologists to investigate resource utilization, trade and exchange, human migration, and environmental adaptation. The laboratory was established in 1988 with support from the National Science Foundation and the University of Missouri (Glascock et al. 2007).

Major Impact

The well-equipped Archaeometry Lab is one of the few laboratories in the world dedicated to performing this type of research and is unique for having these powerful analytical methods under one roof. The main analytical capabilities available in the Archaeometry Lab at MURR include:

- Neutron activation analysis (NAA) – The 10 MW Research Reactor is the largest university-owned research reactor in the world. MURR has the highest possible sensitivities for NAA, especially useful for bulk analysis of pottery, obsidian and other artifact types requiring minimal sample preparation.
- X-ray fluorescence (XRF) – Table top and portable XRF spectrometers enable nondestructive surface analysis of materials such as obsidian, metals, glazes, and paints.
- Inductively coupled plasma-mass spectrometry (ICP-MS) – Three spectrometers (i.e., quadrupole, high-resolution, and multi-collector) and associated equipment (i.e., laser ablation and microwave) provide the highest possible sensitivities by ICP-MS for trace elements and isotope ratios in a wide variety of artifact types.
- Petrography – A petrographic microscope enables the identification of minerals present in thin-sections of ceramic materials.

Laboratory personnel are highly trained and have several years of experience in collaborating on compositional analysis with the archaeological community. Laboratory personnel include the following professional scientists:

- Dr. Michael D. Glascock (Ph.D., 1975, Iowa State University) is a Research Professor and the Group Leader of the Archaeometry Lab with more than 35 years of experience with NAA and gamma-ray spectroscopy as applied to archaeology, geochemistry and environmental science. His research focus is on obsidian source and artifact characterization in Mesoamerica, South America, and the Russian Far East.
- Dr. Jeffery R. Ferguson (Ph.D., 2007, University of Colorado) is a Research Assistant Professor in the Archaeometry Lab. His research

focus is on the archaeology of western and southwestern North America.

- Mr. Matthew T. Boulanger (M.A., 2009, University of Missouri; current Ph.D. candidate) is a Research Specialist in the Archaeometry Lab. His research focus is on the archaeology of eastern North America, landscape ecology, and geographic information systems applied to archaeology.

The Archaeometry Lab's scientists are supported by several skilled technicians most of whom are undergraduates at the University of Missouri. The student technicians perform sample preparation, collect analytical data, and archival of artifacts. They are also frequently involved in various aspects of data interpretation and report writing as part of their educational and research experience. The experiences gained by the undergraduate students who work for the Archaeometry Lab make them well prepared to perform graduate research in archaeology in the future.

The laboratory encourages short-term visits by graduate students and faculty from other universities who are collaborating with the Archaeometry Lab. The laboratory provides training in the preparation of artifacts for chemical analysis, offers recommendations regarding the selection of appropriate samples, gives guidance in selecting the appropriate trace-element and isotopic methods, and provides instruction in the application of multivariate statistical methods for data interpretation.

Customized software developed by the Archaeometry Lab for interpretation of compositional data on artifacts and source materials is available. The Archaeometry Lab software performs many of the multivariate statistical operations commonly employed to interpret large multivariate datasets, including principal components analysis, canonical discriminant analysis, cluster analysis, Euclidean distance calculations, Mahalanobis distance calculations, missing value replacement, bivariate and trivariate plotting, and compositional profile plots. The software is distributed from the Archaeometry Lab webpages at no cost to the user.

Since 1988, the Archaeometry Laboratory at MURR has collaborated on hundreds of research projects ranging in size from one sample to 2,000 samples. The total database of analyzed archaeological samples numbers more than 110,000 specimens. Approximately 70 % of the samples are ceramics and clays; 25 % are obsidian artifacts and source specimens; and the remaining 5 % are chert, basalt, limestone, metals, etc. The database enables many collections of artifacts, both small and large, to be traced to specific locations around the world. In recent years, more than compositional data 6,000 samples per year have been added to the compositional database. These data are continually added to our website and are available for download after publication by the principal investigator.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Archaeometry: Definition

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Brief Definition of the Topic

Archaeometry (*syn*. archaeological science) is a formal field of study whose practitioners apply

techniques and approaches from the physical, chemical, biological, and earth sciences and engineering to address archaeological questions and problems. Together, the sciences provide archaeology with empirical and systematic ways of collecting, analyzing, synthesizing, and interpreting data related to the inorganic and organic material record of human history. Investigations involve both instrumental and noninstrumental approaches and target materials research (e.g., properties of substances and their constituents) as well as chemical and biological substances and residues from the molecular scale all the way up to macroscopically observable artifacts and ecofacts. Applications of archaeometry take place in field, lab, and museum settings and include a wide array of topics, such as radiocarbon dating, provenance of ceramics, stone tool production and use, properties of metals, diet and health in ancient populations, geophysical prospection, soil chemical residues, computer and statistical modeling, and the conservation of archaeological objects and historical monuments. Archaeometric techniques are fundamentally important to archaeological research because they reveal the varied ways in which humans engage the material world and the range of earth processes that are involved in this relationship – from the production, use, and modification of natural and synthetic materials to their ultimate deposition in the archaeological record, the cultural and natural processes that impact them until they are recovered by archaeologists, and their long-term care and conservation.

In the early 1950s, Christopher Hawkes at Oxford coined the term *archaeometry* to characterize the growing emphasis of absolute dating, physicochemical analysis, and quantification in archaeology. By the late 1950s, an international journal, *Archaeometry*, was established, followed in 1961 by the first annual scientific meetings of the International Symposium on Archaeometry. That same year, Martin Aiken (1961) and Karl Butzer (1964) produced some of the first textbooks on the subject. In the 1970s, archaeometric research accelerated around the world, with an important textbook by Michael Tite (1972), a new international journal in 1974, *Journal of Archaeological Science*, and the creation of the Society for Archaeological Sciences in 1977. Today, the field is as vibrant as ever, with occasional edited volumes in the long-standing *Archaeological Chemistry* series from the American Chemical Society (since 1974) and the *Materials Issues in Art and Archaeology* series from the Materials Research Society (since 1988), new textbooks (e.g., Stuart 2007; Pollard & Heron 2008; Price & Burton 2012), and another key journal, *Archaeological and Anthropological Sciences*.

Cross-References

- ▶ Aitken, Martin
- ▶ Archaeological Chemistry: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Butzer, Karl W.
- ▶ International Symposium on Archaeometry
- ▶ Society for Archaeological Sciences (SAS)

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Archaic *Homo sapiens*

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Introduction

In Asia and Africa, many human fossils of Middle and early Late Pleistocene age cannot be allocated to *Homo erectus* (sensu lato), premodern and anatomically modern *Homo sapiens*. They are generally allocated in a taxon, referred to as early or archaic *Homo sapiens*. But recently, a growing number of paleoanthropologists prefer to attribute some of them to other taxons such as *Homo heidelbergensis* or *Homo rhodesiensis*. Specimens of this kind, such as that from Kabwe and Bodo, will not be included in this entry. In the following section, fossils that are usually included in the taxon archaic *Homo sapiens* from Asia and Africa will be described.

Key Issues/Current Debates/Future Directions/Examples

Dali

The site is situated at a loess terrace in Dali County, northwestern China. The human fossil is a rather complete cranium, but the lower part of the face was deformed by the upward depression of the alveolar process. It is associated with Mode I lithics and mammalian fossils of late Middle Pleistocene age. U-series (^{231}Pa/^{230}Th) dating of an ox tooth, associated with the human cranium, gave an age of 209 ± 23 ka. The stratum of human skull is 13 m below a layer of paleosol which is estimated as around 247 ka with IRSL analysis, so the human fossil is earlier than this age; ^{230}Th analysis of the enamel and dentine of an associated rhinoceros gave ages of 258 +34/−26 ka and 349 + 53/−38 ka, respectively; ESR analysis of the associated Lamprotula resulted in an age range of 297 to ~210 ka. All of these suggest a date of between 300 and 260 ka. The ESR/U-series date for animal teeth is around 281 ka.

The human cranium is rather robust and has many metrical features intermediate between *Homo erectus* and modern humans and shows a morphological mosaic between these categories. Some measurements and indices of Dali fall within the range of modern humans, whereas some features seem to be in the status intermediate between Middle Pleistocene hominins of eastern and western Eurasia. The cranial wall and brow ridges are as thick as that of the hominin from Locality 1 of Zhoukoudian. The brow ridge is thickest at its middle part. The most protruding point of the median sagittal profile of the frontal bone is located at its lower half. The cranial capacity is 1,120 cc. There is no supraorbital notch, foramen, and tubercle. In addition, it has many features similar to that of Jinniushan cranium. These are as follows: a median sagittal ridge at the lower part of the frontal squama; the fronto-nasal and fronto-maxillary sutures form a curve which is nearly horizontal but slightly convex upward; an angular torus; the superior border of the temporal squama is slightly curved; the notch between the squamosal and mastoid portions of the temporal is rather deep; the mastoid process is small; between occipital and nuchal planes there is an angular turn marked by a weak occipital torus which extends along the middle two-thirds of the occipital squama; the zygomatic arch is thin, and its upper border

is slightly lower than the Frankfurt horizontal; the nasal profile is nearly vertical; the inferolateral orbital margin is blunt and forms a nearly right angle; the anterolateral surface of the fronto-sphenoidal process of zygomatic bone faces more forward and the lower margin of the zygomatic process of the maxilla is curved.

Jinniushan

The site is a cave located on Jinniushan Hill, Yingkou Municipality, northeastern China. Human fossils include a nearly complete, but broken, human cranium, 6 vertebrae, 2 ribs, 1 left ulna, 9 carpal bones, 2 metacarpals, 7 digits of a hand, 1 left innominate, 1 patella, 11 tarsals, 2 metatarsals, and 13 digital bones of the foot. They are associated with Mode I lithics and a lot of mammalian fossils of Middle Pleistocene age. A U-series date on associated animal teeth is around 280 ka. The cranial capacity is 1,390 cc. The cranial wall is close to that of modern humans in thickness. Brow ridge is not thick, and its thickest point is at the medial part, while the thinnest is in the middle. The postorbital constriction is obvious. There is a supraorbital notch, and the supraorbital process is distinct. The nasal bones are wide. The upper incisors are shovel-shaped. The coronoid process of the ulna resembles that of modern humans in shape. The position of iliac buttress is more anterior than that in modern humans. This structure and the ischial tuberosity are gracile.

Xujiayao

The site is located on the west bank of the Liyigou River, 1 km southwest of Xujiayao Village, Yanggao County, North China. Human fossils include 12 parietal fragments, 2 fragments of occipital, a nearly complete temporal bone, lower part of a child maxilla with teeth, a mandibular fragment, and several teeth. The fossils were embedded in lacustrine deposits also associated with Mode I lithics and mammalian fossils of early Late Pleistocene age. U-series dates on associated rhinoceros range between 125 and 104 ka.

Parietal No. 6 is rather complete, with distinct parietal tuberosity. It is slightly smaller and much thinner than Parietal No. 10 which is intact except for its anterior part. The branches of the middle meningeal artery are thinner than that in *Homo erectus* from Zhoukoudian but thicker and less ramified than that in modern humans. The supero-posterior corner of both parietals is naturally lacking, hinting at the possible existence of an Inca bone. Other parietal fragments are small. The Parietals Nos. 3 and 4 are similar to No. 6 in the presence of straight grooves on the outer surface. These grooves radiate forward, upward, and backward from the parietal tuberosity and seem to represent traces of scraping before death. The bregmatic region of Parietal No. 5 is full of dense small foramina that are probably due to osteoporosis or represent cribra cranii externa. No. 10 is a pair of partial posteromedial parietal bones from an adult. It exhibits a congenital defect, an enlarged parietal foramen. The posterior part of Parietal No. 14 has a small hole that seems to represent a healed wound. The thickness of most parts of the parietals is within the range of variation of *Homo erectus* from Zhoukoudian. Both occipital fragments (Nos. 7 and 15) are very thick. The cerebral fossa is larger and deeper than the cerebellar fossa in Occipital No. 7. A shallow supratoral sulcus exists on Occipital No. 15 but not on No. 7. The temporal bone is of left side. The mastoid process is small and the muscular markings on the surface of the temporal squama are strong. The thickness at the parietomastoid suture behind the parietal notch and at the occipitomastoid suture medial to the mastoid process is very close to the range of that in *Homo erectus* from Zhoukoudian. The length-height index of the temporal squama is 64.5. The tympanic plate is more medially located than that in *Homo erectus* from Zhoukoudian and Hexian. The thickness of the tympanic plate is intermediate between *Homo erectus* from Zhoukoudian and modern humans. The styloid process and stylomastoid foramen align with the mastoid notch. The transverse section of the pyramid is closer to *Homo erectus* from Zhoukoudian than to modern humans, but the upper border of the pyramid is as sharp as that in modern humans. The anterior nasal spine is distinct but not prominent.

Five teeth are attached to the left maxilla. A newly erupted median incisor is shovel-shaped. The canine and molar have strong cingulum but the isolated left upper molar has no cingulum. All teeth are larger than that of female *Homo erectus* from Zhoukoudian, some measurements are even larger than the male from the latter.

Maba

The site is said to be situated in a cave on Shizishan Hill, 1.5 km southwest of Maba Village, Shaoguan Municipality, southern China. The human fossil is a skull-cap which was unearthed by local farmers. The mammalian fauna from the same cave provides a U-series date of between 135 and 128 ka. No stone artifacts were found.

A short median ridge exists on the frontal squama above the supraorbital groove, which is rather deep except for its median part. The frontal tubercle is weakly developed. The middle and lateral segments of the brow ridge are 11 and 12 mm thick, respectively. A top view of the skull shows the medial end of the brow ridge is located more anteriorly than the lateral end. There is a trace of the fusion of the metopic suture on the anterior surface of the glabellar region. The postorbital constriction is as exaggerated as that of *Homo erectus* from Zhoukoudian. The frontal sinus is rather large. A semilunar scar 14 mm long exists on the outer surface postero-lateral to the right frontal tubercle. On the inner cranial surface at the place roughly corresponding to this scar, there is a bulging about the same size. The parietal is 7.0 mm thick at both the bregmatic region and parietal tuberosity. The fronto-nasal and fronto-maxillary sutures form a more or less horizontal curve. The naso-malar angle is 146 °. A median longitudinal narrow ridge exists on the nasal bones, the profile of which is close to a right angle. Most of the right orbit is preserved and is more or less spherical. Its infero-lateral margin is sharp instead of blunt. The orbital index is 88.0. There is no supraorbital notch, foramen, and tubercle. The anterolateral surface of the right fronto-sphenoidal process of the zygomatic bone faces more forward.

Chaoxian

The site is situated at Yinshan Hill, Chaoxian County, eastern China. Fragments of occipital and maxilla, as well as three isolated teeth, were found from deposit of a limestone fissure, associated with mammalian fauna of Middle Pleistocene age. No artifacts were found. U-series date of associated animal teeth is between 200 and 160 ka.

The occipital torus consists of two curved eminences that are short and only slightly prominent. The transition between the occipital and nuchal planes is rounded. No external protuberance exists. The supratoral sulcus is indistinct, except for a small fovea seemingly corresponding to the suprainiac fossa. Distance between inion and endinion is 22.0 mm, and the thickness at the center of the occipital torus is 7.0 mm. The pyriform orifice is probably rather wide. The incisive canal extends more or less vertically. The massiveness of the teeth is within the range of *Homo erectus* of China. Attrition of anterior teeth (only the lateral incisors are preserved) is much greater than that of the molars. It has been suggested that this difference may imply that the anterior teeth functioned as tools for chewing hard and tough food.

Changyang

The site is in Longdong Cave, Changyang County, Central China. The lower part of a maxilla was found by local farmers, and an isolated left lower second premolar was found by Lanpo Jia from the same cave. No artifacts were found. U-series date of presumably associated mammalian teeth is around 195 ka. The straight line connecting the nasospinale and prosthion forms a 60 ° angle with a plane deduced from the occlusal surface of the first premolar and first molar attached on the maxilla. The massiveness of the premolar and molar is close to the lower limit and median value of *Homo erectus* of China, respectively.

Dingcun

The site is at the gravel on the third terrace along the east bank of the Fenhe River near Dingcun Village, Xiangfen County, North China. Human

fossils include three teeth of a child and a fragment of infantile parietal bone. They are associated with Mode I lithics and mammalian fauna of Late Pleistocene age. U-series date of associated mammalian teeth is between 210 and 160 ka. Lamprotula fossils yielded a U-series date of 150–83 ka. Both upper median and lateral incisors are shovel-shaped with weak basal tubercles and fewer finger-like processes. All of these teeth are much smaller than the corresponding teeth of *Homo erectus*. The shape of the supero-posterior corner of the parietal indicates the possibility of the presence of an Inca bone.

Miaohoushan

The site is at a limestone quarry at Miaohoushan Hill, in Benxi Municipality, northeastern China. Two human teeth and a fragment of femur were found in association with mammalian fauna, with a U-series date of between 240 and 140 ka. The human upper canine is much smaller than that of *Homo erectus* from Zhoukoudian, and the lower molar is close to the lower limit of the latter.

Tongzi

The site is at Yanhuidong Cave, Tongzi County, southwestern China. Human fossils include five teeth. They are associated with Mode I lithics and mammalian fossils of Late Pleistocene age. U-series dated to between 180 and 110 ka. The upper median incisor is shovel-shaped, with three finger-like processes. The canine has a basal tubercle and cingulum. The left premolar has traces of cingulum. Cingulum is obvious and very weak in the left and right molars, respectively. The size of most of the teeth is within the range of *Homo erectus* from Zhoukoudian, except the canine and the left molar, the breadths of which are slightly shorter.

Dadong

The site is at Dadong Cave, Panxian County, southwestern China. Human fossils include two teeth. They are associated with Mode I lithics and mammalian fossils of Late Middle Pleistocene age. The upper median incisor is shovel-shaped. The canine has a cingulum. The root of the canine shrinks suddenly near its tip. These teeth are slightly smaller than that of *Homo erectus* from Zhoukoudian.

Locality 4 of Zhoukoudian

An upper first premolar was found in association with mammalian fauna of Middle Pleistocene age and Mode I stone artifacts. Thermoluminescence dates for the associated ash layer is 257 ka. The size of this human premolar is within the range of *Homo erectus* but without cingulum.

Narmada

The right half of a human skull was found on the surface of an alluvial terrace along the Narmada River, 200 m west of Hathnora Village, central India. Stone artifacts and vertebrate fossils have been found from the sandy/silty boulder conglomerate in the area where the Narmada cranium was found. Based on the mammalian fossils, the Narmada cranium is inferred to be of late Middle Pleistocene age. The Narmada cranium is moderately large and long. Cranial capacity is estimated as 1,200 ml. The frontal is not very receding, and the vault is high and narrow. Its broadest part is across the enlarged mound-like supramastoid ridge. The temporal squama is very long but not very high. The parietal notch is vertical and bears an ossicle. The postorbital constriction is moderately shallow. The supraorbital torus is strongly arched and uniformly thick across. The orbital roof is moderately concave.

Zuttiyeh (Galilee)

The frontal bone with part of a left zygomatic was found in a cave on the edge of the Wadi Amud, below the Amud site, and about 3.5 km from the Sea of Galilee. The associated lithics are generally considered as pre-Mousterian from the Acheulean-Yabrudian industry, and an age of well over 200 ka has been suggested. The arched supraorbital torus of both sides connects across the glabella. The lateral portion of the torus is thinner. The forehead rises quite sharply behind a narrow supratoral groove. Five or six lesions are shown on the frontal. The interorbital region is wide. The anterior part of the zygomatic arch

sweeps back, curving laterally very rapidly. Demarcation between the temporal and infratemporal fossae is very clear.

Jebel Irhoud

The human remains include a broken, but fairly complete, cranium, a skull-cap, a broken juvenile mandible, and a juvenile humerus. They were apparently unearthed near the bottom of a fissure in limestone near Chemaia, about 60 km east of Safi, Morocco. A precise provenance is recorded only for the humerus. Fauna from the deposit suggests an early Late Pleistocene age. ESR date estimates on three teeth found just above the humerus range from 90 to 125 ka. The site has yielded a Levalloiso-Mousterian lithic industry. The human crania are inferred to date to between 130 and 190 ka. These human fossils have been suggested to have Neanderthal affinities and are described as morphologically archaic, although foreshadowing modern humans. Cranial capacity of Jebel Irhoud I is 1,305 ml.

Salé

The base and rear of a braincase plus a partial left maxilla and a natural endocranial cast were found by quarry workers from dune deposits ~1.5 km from the coast at el-Hamra, Douar Caid bel Aroussi, Morocco. A 400 ka date seems plausible based on the local geological context. There are no associated archaeological deposits. The human skull is fairly small and tall with a capacity of 880 ml. It is broadest across the supramastoid regions which are slightly swollen. The temporal line is quite high and arches up slightly. The temporal squama is very short, but for its length it is quite high. The styloid process is thin. A rather large stylomastoid foramen lies between the styloid process and the base of the mastoid process. A hind view shows the cranial wall to be short and quite vertical. The transition from occipital to nuchal plane is rounded. The cranial bone is thick. Pathological thickening of the midsection of the frontal extends back over the bregma. The first and second upper molars apparently have thick post-cingulum running down the side of the metacone to the small hypocone region.

Singa

The calvaria were found in calcrete deposits exposed on the west bank of the Blue Nile, some 46 km downstream from Singa, and ~320 km south of Khartoum, eastern Sudan. An early Late Pleistocene date was inferred based on the fauna recovered at Singa. U-Th dating of the calcrete adherent to the cranium gave a result indicating the minimum date for the fossil to be 133 ± 2 ka. The human calvaria might even have been associated with the final Acheulean. The human skull is relatively long and moderately high, with a short frontal rise that is fairly steep. The broadest part of the skull is across the parietal eminences. The temporal squama is relatively long and not very high. The parietomastoid suture is long and horizontal, and the parietal notch is very shallow and open. The mastoid process is very small, thin, and short. The supramastoid crest is distinct. The wall of the left auditory meatus is pathologically thickened. The temporal fossa is undifferentiated from the infratemporal fossa. A top view shows the supraorbital margin to be relatively straight, retreating moderately from the glabellar region; postorbital constriction is fairly strong. In general, the cranial bone is thin, except for thickening in the region of the externally, quite swollen, parietal tuberosities. Cranial capacity is estimated at 1,550–1,600 ml. The supraorbital tori are not very thick. The orbital roof is shallow.

Ndutu

The partial adult cranium was found from the lake margin sediments along western side of Lake Ndutu, at western end of Olduvai Gorge, northern Tanzania. The date is probably in the order of 400 ka or about 200 ka based on correlation with different volcanic tuffs in the region. Handaxes have been found at the site that were almost certainly from the same horizon as the human cranium. Reconstruction shows the braincase is small, short, broad, and quite low. Cranial capacity is 1,100 ml. The transition from occipital to nuchal planes is rounded. A hind view of the vault is almost square in outline. The broadest point would have been across the supramastoid crest. Diploe is thick, inner and

outer tables are quite thin. The preserved left supraorbital torus is moderately thick. The posttoral surface is slightly depressed. The temporal squama is relatively long, probably arched and high. The mastoid processes are very stout. The supramastoid crests are moderate. The parietomastoid suture is relatively long and horizontal. There is a large wormian bone at the lambda region. Cerebellar fossae are larger and shallower than the cerebral fossae. The interorbital region would have been quite broad. On the left side, the anterior root of the zygomatic arch originates rather low, not too far above the alveolar margin. It appears that the anterior extent of the zygomatic arch faces more or less forward. Both left premolars have two distinct roots that probably bifurcated close to the neck.

Florisbad

The human fossils were found from spring deposit about 45 km northwest of Bloemfontein, South Africa. The sedimentary sequence consists of "peat" layers. Human and animal fossils were found at the level of lowest peat layer, Peat 1, for which U-series date is over 100 ka. In all levels below Peat 3, general Middle Stone Age artifacts have been reported. The partial calvaria are high and rounded. The frontal recedes somewhat directly from the supraorbital margin, with only a hint of a supratoral plane. The temporal line is low. A top view shows the glabellar region protrudes forward. The supraorbital margin is quite thick in the medial portion and thinner in the lateral portion. There is something of a break centrally between the medial and lateral portions of the torus. The orbital roof is very shallow and concave. The infero-lateral corner of the orbit is not sharply defined. The interorbital region is moderately wide. The cranial bone is thick with very thick diploe and extensive porotic hyperostosis, as well as large number of healed lesions, including pathological drainage or vascular tracts. A couple of large puncture marks and some scratch-like marks may reflect carnivore activity. The partial facial bone shows that the inferior margin of the anterior root of the zygomatic arch oriented forward and directly out sideways. The third cranial fragment also has thick inner and outer tables and diploe.

Guomde

The cranial fragments were found on the surface of the Guomde Formation southeast of Ileret, on the northern sector of the east shore of Lake Turkana, northern Kenya. No archaeological findings have been reported for this site. The specimen KNM-ER 3884 represents the rear of a skull reconstructed from many individual pieces, plus a reconstructed maxilla with all the teeth, and the anterior part of a frontal. The cranial capacity is estimated to be 1,400 ml. The supraorbital tori are double arched and uniformly thick from side to side. There is no distinct supratoral sulcus or plane. Postorbital constriction is minimal. Stylomastoid foramen lies close to the base of a thin styloid process on the left side but far lateral to it on right side. The mastoid process is relatively thin. Canine fossa is not identifiable.

Eliye Springs (West Turkana)

The human cranium is a surface found near the freshwater Eliye Springs, on the southwestern shore of Lake Turkana, Kenya. No artifacts have been found. The neurocranium is large and high, with a cranial volume of more than 1,300 cc. In side view, the frontal rises fairly steep, the transition between the occipital and nuchal planes is somewhat angular. The temporal line is an obviously high curve. The temporal squama is rather long and very high. The demarcation between the temporal and infratemporal fossae is quite clear. The parietal notch is fairly deep and narrow. Postorbital constriction is weak. The frontal sinus is very large. The interorbital region is extremely wide. The nasal bones are broad. The left orbital roof is shallow. The nasal cavity is relatively small.

Ngaloba

The human fossils consist of a fairly complete calvaria with a maxilla and part of the nasal region. They were found on the surface of the Serengeti Plains of northern Tanzania, about 40 km south of Olduvai Gorge. U-series analyses on bone indicate the age ranging between 129 and 108 ka. A Middle Stone Age assemblage has been found from the Ngaloba Beds,

both in situ and on the surface. The vault is narrow, with a long frontal. The supraorbital tori are thick, without a posttoral groove. The postorbital constriction is very weak. The transition from the occipital to the nuchal planes is rounded. The occipital plane appears "bunned" because the nuchal plane undercuts it strongly. There is neither a clearly defined occipital torus nor a well-defined external occipital protuberance. A posterior view shows the braincase forms a smoothly rounded curve. A small circular depression on the left parietal near the lambdoid suture is probably of pathological origin. The temporal squama is quite high, and the upper border is quite arched. The temporal and infratemporal fossae are separated by an angle in the alisphenoid. The tympanic plate is very thick. There is a supramastoid swelling instead of a crest. The mastoid process is medial-laterally narrow and not very projecting. The styloid process is relatively thick and is situated medially and in front of the large stylomastoid foramen. The cranial capacity was estimated to be 1,367 cc. The vault bone is quite thick, especially around the midline and in the occipital region. The interorbital region is quite broad. The naso-alveolar clivus is straight, moderate in length and angles slightly out and down. The junction between the maxillary body and the zygomatic process of the maxilla is fairly high above the alveolar margin. The lower border of the zygomatic process forms a sharp angle with the maxillary body. The right P1-M1 and left M1-M3 are preserved, none were very large.

Lake Eyasi

A partial cranium and other cranial fragments were found on the surface at an open-air site on the northeastern shore of Lake Eyasi, near Mumba Hill, northern Tanzania. They are believed to be of late Middle Pleistocene or early Late Pleistocene age. The archaeological context is uncertain. It may be of a terminal Middle Stone Age, or earliest Middle Stone Age. The skull is long and low with large brow ridges. The occipital is very thick, angle between nuchal and occipital planes is quite obtuse. The angle between the occipital and nuchal planes is quite obtuse. The left cerebral fossa is large and deep, whereas the left cerebellar fossa is not as deep as the cerebral fossa. A larger mandibular fragment has a moderately deep symphyseal profile, in which the anterior surface angles back to the inferior margin, producing a low bulge. There are traces of a low keel above the bulge. A slight depression exists under the root of the lateral incisor. The thickest part of the symphysis is quite far above the inferior margin. The genial pit is shallow and broad. Small mental foramen lies quite high up below septum between two premolars. A much smaller mandibular fragment is confined to the symphyseal region. A low broad keel descends from the region below two median incisors, quickly broadens into a very wide triangular elevation, that becomes very salient closer to the inferior margin. Shallow depressions lie on either side of the keel. The postincisal plane is vertical. The thickest part of the symphysis is close to the inferior margin. Digastric fossae are very small.

Saldanha

The calvaria and fragment of mandibular ramus were found on the surface some 24 km east of Saldana Bay, Northern Cape, South Africa. The fauna from the same general area is said to be of early Middle Pleistocene age. Stone artifacts said to be of Late Acheulean have been found from the same general area. The braincase is large, long, and low. The widest part is in the supramastoid region. The cranial capacity is 1,225 ml. The squamosal suture may have been shallowly curved for most of its length. The occipital and nuchal planes form an angle. Along the junction of these planes, the bone bulges in a distinct horizontal torus with a small groove above and undercutting below. The cranial bone is moderately thick. The postorbital constriction is distinct but not exaggerated. The brow ridges curve strongly and smoothly back from the midline. The ridge is very thick especially at the middle of the orbits. The orbital roof is shallowly concave. The interorbital region is quite broad.

Despite the fact that archaic *Homo sapiens* has been considered a meaningless taxon by some paleoanthropologists, it has been a useful one in dealing with human evolution. As shown in the above descriptions, it has a rather broad diversity in morphology which exhibits a mosaic of archaic and more advanced traits. A few of these fossils have even been considered as belonging to *Homo erectus* or *Homo heidelbergensis*. Some of the morphological features of some specimens might reflect the transition between earlier populations (the paleospecies, *Homo erectus* and *Homo heidelbergensis*) and anatomically modern *Homo sapiens* or probably resulted from interbreeding between the paleospecies, *Homo erectus*, *Homo heidelbergensis*, *and Homo rhodesiensis*. Generally speaking, the lithics associated with archaic *Homo sapiens* of China are of Mode I technique, while the stone artifacts associated with the African archaic *Homo sapiens* are Acheulean, Levalloiso-Mousterian, or Middle Stone Age.

Cross-References

- ▶ Dali, Archaeology of
- ▶ *Homo erectus*
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Multiregional Origins
- ▶ Lithic Technology, Paleolithic
- ▶ Zhoukoudian, Archaeology of

Further Reading

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Architectural Sites: Monitoring

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Introduction

Monitoring is a crucial component of integrated site management planning, whereby, along with maintenance, it comprises one of the main policies that follow the stage of assessment and analysis of a site (Demas 2002: 45; Walton 2003: 6). The monitoring of architectural structures is not an end by itself, but is an important step in diagnosing the problems facing a structure, which would help in setting up appropriate interventions to remedy the situation. Hence, depending on the specificities of a site, the approach for monitoring its condition is established accordingly.

Definition

Architectural sites are those that comprise architectural elements or structures, which are typically referred to as archaeological sites and could date back to ancient times. Monitoring of these sites includes gathering data related to its condition over a period of time in order to understand the changes that occur on it as well as the factors that impact its condition. Issues related to the sites conservation, exposure, and visitor accessibility are factors that impact its long-term condition. Assessment of these issues helps to establish actions that are necessary for ensuring a site's conservation.

Key Issues/Current Debates/Future Directions/Examples

Monitoring is considered a significant step within a comprehensive process that aims at ensuring the sustainable conservation of a site. It follows assessing its existing physical condition and, often, should precede planning for designing

and executing the appropriate interventions. Condition assessment is critical to establishing the baseline data that is necessary to monitor future changes to a site (Demas 2002: 39).

Monitoring programs can impact the way a site is managed. They help identify threats and risks at a particular site and hence provide the necessary criteria for designing priority actions in terms of mitigation and intervention measures. Additionally, such programs may potentially impact visitation at a site, in terms of numbers of visitors allowed at a certain hour, the paths that the visitors take, and, sometimes, even taking the decision to close off a site from visitation. Therefore, on the basis of a site's condition, the decision for the need and type of monitoring program would be considered and may precede any intervention measures. All of these factors should be considered when planning the management of a site, which also includes the tourism management aspect.

The Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO World Heritage Center 2012) stresses the necessity of having a set of "key indicators" to be used in monitoring the state of conservation of properties. These indicators would be used to provide updated information on the condition of sites and are numerical when possible. The choice of indicators would depend on the nature of the site. Examples could be the percentage of buildings requiring urgent intervention, the degree of movement in a building, or the rate of increase or decrease of an encroachment at a particular site (UNESCO World Heritage Center 2012: 111). Moreover, the ICOMOS Charter on "Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage" (ICOMOS 2003) states that the quantitative approach to diagnosis is carried out on the basis of monitoring, in addition to testing and analysis. Hence, monitoring can be considered as being critical to ensuring appropriate site management planning.

Prior to initiating a site's monitoring activity, a specific methodology should be devised based on the specifics of the site and its condition status. Walton (2003: 9-16) mentions a number of methods used for monitoring the condition of archaeological sites in New Zealand. These comprise a review of existing previous records that can be used to compare a site's previous situation with the current one; the preparation of forms that can be used as a checklist to assess the current condition and the causes of damages that occur; mapping, which is crucial to assess and monitor condition; and photographic recording.

Monitoring of architectural sites implies the monitoring of its built features, which can include its standing structure of walls and roofs, its foundations, and its finishing materials or decorative surfaces that it comprises. Finishing materials and decorative surfaces would include constituents such as tile cladding, stucco, and wall paintings.

The methodology for monitoring architectural sites may include visual inspection, survey and documentation, and the quantitative recording of specific data. However, prior to the collection of monitoring data, it would be pertinent to acquire the baseline information (Walton 2003: 8), upon which the future periodic monitoring would depend. The baseline data provides the necessary information on the existing condition of the structure and its features and helps to establish the main features to be monitored. It also establishes the criteria and methodology for monitoring. Sometimes, existing available records help to assess the state of conservation of structures by analyzing the rate of its deterioration, if any, and could lead to understanding the causes that might have led to that state. Accordingly, the methodology for monitoring can be devised, which would help in determining the future actions to be undertaken in order ensure its future conservation (Demas 2002: 39). However, in order to ensure a certain level of consistency in the collection of monitoring data, forms are often used, which include an outline structure for the registration of specific information.

The decision concerning what should be monitored depends on the condition assessment carried out and the causes of damages identified. For example, at the World Heritage Site of Petra, the impact of visitors was noted as one of the possible factors for the erosion of sandstone

monuments. Hence, two areas in Petra were monitored over a period of 10 years by Tom Paradise, who found that a factor of erosion can be due to human contact (Responsible Tourism n.d.). Such assessments have now been developed by linking them within a geographic information system (GIS) that can be used as a monitoring tool, whereby information was obtained and mapped out with tourist numbers and movement at the site, in order to assess and understand their impact along the paths they took (Paradise 2012).

In fact, GIS systems are increasingly being used as a tool for the management of sites, including their monitoring. GIS applications allow the collection and referencing of information and ensure the regular monitoring of monuments (Tantillo 2007).

In recent years, a number of modern techniques have been developed to acquire quantitative data for accurately monitoring the changes occurring on the condition of architectural elements. For example, the monitoring of monuments and decorative surfaces through an active stereo vision system that provides the possibility for acquiring accurate chromatic measurement of 3-D surfaces of a feature has been developed (Grattoni et al. 2002: 383-90).

Particularly, with regard to architectural sites, cracks can be an important indicator of the condition of a structure, and hence the monitoring of crack movement would help in determining a building's stability. For monitoring the movement of cracks, telltales and sensors can be used, which are sometimes connected to automated data loggers. Based on the results acquired, the information is analyzed and diagnosis is thus carried out. This is a necessary step prior to designing any remedial interventions.

Other methodologies for the monitoring of decay on architectural surfaces may include regular sampling and testing, as, for example, in a procedure for measuring gypsum efflorescence on surfaces undergoing capillary rise to monitor decay resulting from salt crystallization on wall paintings (Zehnder 1996: 1669-78), which allows to determine the extent and rate of deterioration, and can define whether a decay activity had ceased following specific treatments and interventions.

Monitoring helps not only to detect the changes which occur on architectural features and buildings but also to identify the potential threats that could be of an intrinsic nature, that is, within the structure itself or those which are considered as external. All such information would help to establish a set of conservation interventions that would help in remedying the situation and arresting potential threats. Nevertheless, the process of monitoring does not end at that stage. Quite often, and while the execution of interventions is carried out, monitoring might be necessary, especially when interventions are related to structural issues. Also, following the execution of conservation work, the monitoring methodology should be revised on the basis of the changes that have occurred and the new condition status. Hence, monitoring should be perceived as an ongoing process that is carried out according to an established methodology and is continuously revised in accordance with a site's condition and current needs.

Cross-References

- ▶ Aerial Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Nonstructural Sites: Monitoring

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Architecture, Roman

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Introduction

One of the most tangible remains of the Roman Empire is its distinct architecture: with complete buildings still standing in every corner of the empire, the Romans have quite rightly received fame as master builders and engineers. They revolutionized the art of building through experimentation and innovation, two talents Pliny the Elder already describes as innate to their culture (Pliny, *HN* 36.101; Boethius & Ward-Perkins 1970: 3). This entry will not focus on enumerating building types, which recently have been majestically treated by Pierre Gros (1996 and 2001), or building materials and construction techniques, of which the standard publication is still that of Jean-Pierre Adam (1984). Instead, it considers a handful of specific developments and processes that created the architectural style that we now interpret as properly Roman.

Definition

A subject as large as "Roman architecture" has had many interpretations in the past and can be difficult to define with precision. In the broadest terms, it could pertain to any structure that was built in the city of Rome or by the Romans, and in such a case the account would have to start in the tenth century BCE, when the first Iron Age huts appear on the Palatine Hill. Furthermore, the first monumental architecture in the city, in the sixth century BCE, is entirely Etruscan in style. It was, however, submitted to Greek and Hellenistic influences during the fourth and third centuries BCE and further innovation under Augustus to finally find its own unique form. The identification of "Roman architecture" adopted in this entry is that specific style that has its origins in and around Rome in the third century BCE, with roots in foreign architectural practices, but which through experimentation and innovation developed into a style that can be considered truly Roman.

Historical Background

The further Hellenization of the Etrusco-Italic architecture in central Italy during the second and first centuries BCE and its resulting hybrid styles were eventually known as "*consuetudo Italica*," a term used by Vitruvius (V.11.1), the most famous of Roman architects. It is in this

architectural tradition that he composed his treatise *De Architectura Libri Decem* (Ten Books on Architecture), the only surviving architecture manual from antiquity and, as far as we know, the first to consider architecture in general. Previous works, only known through citations in his text, were all Greek and related only to specific orders or buildings. Vitruvius himself, on the other hand, wrote a wide-ranging architectural manual, which not only enumerates building types and rules of thumb for their construction but also provides information on the ideal education and talents of architects, their duties and responsibilities, and their social status. As such, his treatise can be seen as the first to provide a historical narrative regarding the art of architecture.

Writing during the reign of Augustus (27 BCE to CE 14), he dedicated his book in the later years of the first century BCE, when new forms of architecture started to take shape following the application of new building materials, the growing confidence in architectural know-how, and the development of a new ideology (see below). As said, his work displays a thorough knowledge of Greek building practices and a certain partiality to conservative Republican traditions: he frequently refers to the writings of Greek architects, and his chapter on temple design is almost entirely embedded in Greek tradition. He furthermore ignores marble as a building material or the use of the Corinthian order in its developed Augustan form, both of which novelties were becoming standard practices in Rome by the time of his writing. Elsewhere, however, he clearly distinguishes between Roman and Greek architectural forms, for example, for theaters and domestic architecture. Such seeming contradictions between his writing and contemporary practice have made some scholars question Vitruvius' applicability to the field of Roman architecture, but in other's eyes, this trait has made him all the more valuable, as his work perfectly describes the crossroads that architectural practice found itself in at the close of the first century BCE (Anderson 1997: 3–15, esp. 5; Rowland & Howe 1999: 8–18).

Key Issues

It would be quite impossible here to give a complete overview of what Roman architecture was and encompassed, and for a thorough overview, one should still consult the unsurpassed *Etruscan and Roman architecture* (Boethius & Ward-Perkins 1970). Rather, in this section, I will focus on the different mechanisms at play before and after Vitruvius, explaining why architecture developed as it did and why we still recognize buildings as "Roman" while they are thousands of miles apart:

(a) Experimentation and innovation: building materials and techniques
(b) Organization and specialization: the "mechanization" of the trade
(c) The Augustan Revolution
(d) Imitation and emulation: Roman architecture in the provinces

Experimentation and Innovation: Building Materials and Techniques

After the Punic wars in Italy, the moralist rejections of the Greek influence of the late third and second centuries BCE could not prevent the luxuries that Romans encountered in the Hellenistic kingdoms from permeating into every aspect of daily life. Rome embraced a significant influx of architects from the East – a move noticeable for centuries as many architects still had Greek names – but did not fail to produce skilled architects itself: in 174 BCE, the Seleucid king Antiochus IV commissioned Decimus Cossutius, an architect from Rome, to complete the long-unfinished Olympieion at Athens (Gros 1983: 434; Anderson 1997: 22). The Roman drive for innovation was immediately visible as Cossutius changed the temple's style from Doric to Corinthian and the building material from local limestone to Pentelic marble. As Cossutius came from an influential family of architects, it is not unthinkable that he and this project in turn influenced architecture at Rome itself: there, the very first marble Corinthian temple, the Temple of Jupiter Stator in the Circus Flaminius, known from literary sources, was built only shortly afterwards, in 146 BCE, by the Greek architect

Hermodorus of Salamis for Caecilius Metellus Macedonicus. It was followed at the end of the century by the earliest surviving marble Corinthian temple in Rome, the round temple by the Tiber.

This constant exchange of people and ideas between the Greek and Roman spheres led to further experimentation with arch and vault, two concepts never fully explored by previous cultures. Sometime during the latter half of the second century BCE, a completely new type of arch was successfully built within the new city walls of Falerii Novi that would then be commonly used until the early Empire (Boethius & Ward-Perkins 1970: 101–2). It is but an example of this bold experimentation that caused the Romans to achieve supremacy in building. While they probably learned the arch from the Etruscans, its potential was only realized under Hellenistic influence, and the increasing pressure for new building types (most of which originate from or start being built in this period, such as theaters, basilicas, baths, and warehouses), as well as important innovations in the composition of mortar, made them eventual experts of vaulting techniques. Mortar was used for walls as early as the third century BCE, but the real innovation lay in the addition of a new type of volcanic sand, pozzolana – its name revealing its origins near Puteoli in the Bay of Naples – to create a type of concrete which was not only stronger than the previous mortar but also waterproof and could cure underwater (MacDonald 1965: 3–5).

As confidence in this new substance grew, the Romans started to use it for the natural expansion of the arch, the barrel vault, and subsequently many other types of vaulting. Early surviving examples of the new technique show its success (the second century BCE vaults of the Stabian Baths in Pompeii are a good example), but perhaps the most important step in the barrel vault's development occurred when the new techniques were used for the substructures and buttresses of a specific group of sanctuaries in Latium: the Sanctuary of Fortuna Primigenia at Palestrina (Fig. 1), of Hercules Victor at Tibur, of Juno at Gabii, of Jupiter Anxur at Terracina, and the Tabularium, recently identified as the terrace for such a sanctuary in Rome. All date from the late second century BCE to the early first century BCE (Coarelli 1987, 2010: 129; Lancaster 2005: 5). Unmistakably based on the Hellenistic sanctuaries in the East, for instance those of Asklepios at Kos or of Athena at Lindos (Rhodes), they are very distinctly Roman in character, not only through this novel use of materials and vaulting techniques but also by the way in which they altered the landscape.

While their Greek precedents were built on terraces on natural substructures in dugout hillsides, using the curves of that landscape, as at Kos and Lindos, Romans used concrete, arches, and vaults to artificially alter – and ultimately, in their eyes, enhance – the landscape, implementing strict axes and symmetries and building upwards (Boethius & Ward-Perkins 1970: 122). The technological possibilities that architects acquired from these Latial sanctuaries made it possible for the Romans to build, in 55 BCE, the Theater of Pompey, the first completely freestanding stone theater in Rome, which used the same arching and vaulting techniques, though with updated materials. Further studies lent a profound understanding of building materials and paved the way for bold projects like the Domus Aurea, the Markets of Trajan, and the sophisticated design of the dome of the Pantheon. The deliberate choice to use different types of aggregate in the concrete of the building and dome, so the weight decreases as the height increases, was experimented on in the earlier Baths of Trajan, but perfected in the Pantheon (Fig. 2), ultimately contributing to the fact that the building is still standing today. It was subsequently used for the largest vaults and domes, as at the Baths of Caracalla, the Baths of Diocletian, and the Temple of Minerva Medica (Lancaster 2005: 158–61).

Organization and Specialization: The "Mechanization" of the Trade

Key to the development of new techniques and building types is not only the drive for experimentation and a thorough understanding of the capacities of one's building materials but also the availability of resources, their potential for easy

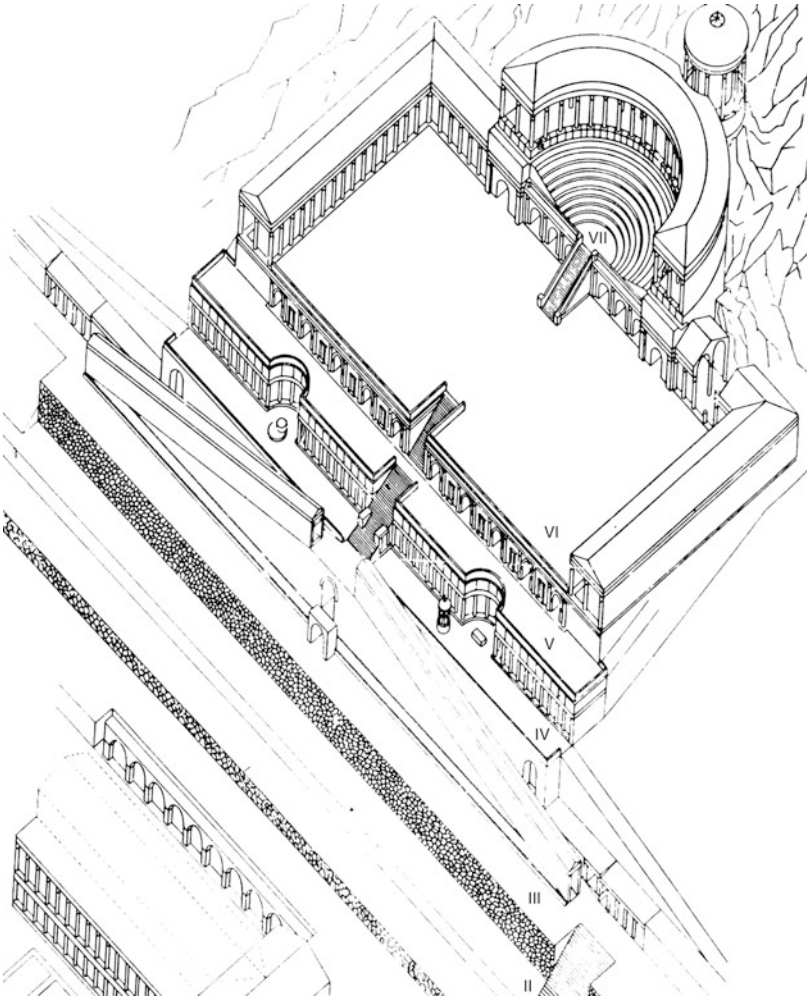

Architecture, Roman, Fig. 1 The Sanctuary of Fortuna Primigenia at Palestrina (Boethius & Ward-Perkins 1970: 142, Fig. 78)

handling on-site, and most of all, an established and well-organized framework in which to operate. Unfortunately, there is a distinct lack of ancient sources on the actual on-site duties of the architect, contractor, or other master builder in the Roman period, even with the survival of Vitruvius' handbook. We are better informed about the Greek Classical Period, when architects were mentioned in the publicly displayed building contracts for major temples. For a long time, the *architekton* was an occasional occupation, only required for large projects such as temples and stoas, which were only commissioned once every generation (Coulton 1995: 27–9). In the Hellenistic Period, the emergence of the new monumental building types and the wealth of individual patrons and new kingdoms, rather than the *polis* as commissioner, gave rise to architect becoming a proper full-time profession, sometimes under permanent patronage. Ironically, such craft specialization also brought with it the anonymity of the architect (but not yet a loss of prestige), as from then on and continuing into the Roman period, the most important name to remain attached to a building was that of the patron. Good examples are the Attalid kings at Pergamon, Pompey and his Theater, Agrippa and his Pantheon, or Maxentius and his basilica. And thus, to identify Roman architects of the late Republic, we depend mainly on evidence from tombstones and other inscriptions or passing references in Cicero, Vitruvius, and other

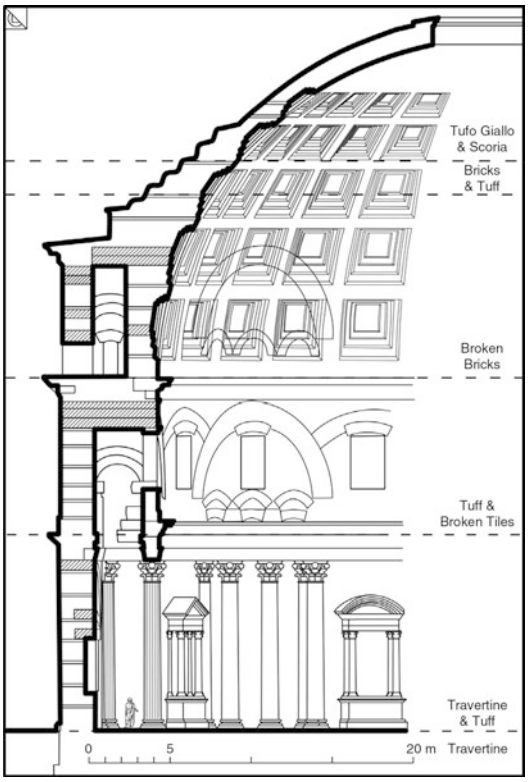

Architecture, Roman, Fig. 2 A section of the Pantheon (Lancaster 2005: 62, Fig. 46)

contemporary writers. Generally, it appears that, especially but not exclusively for small construction projects, architects were at the same time designer, master builder, contractor, and on-site supervisor site (Gros 1983: 431, 452).

With the specialization of the job also came a specialization of the trade. Construction sites became much better organized, with both unskilled labor and highly skilled workmen (*fabri*) contracted for specific tasks. Among these, one would find the *mensores* or surveyors to set out the site, *fabritignuarii* to build the walls, the *tectores* as plasterers, and the *redemptor* – the contractor – to supervise. The Roman building trade was organized with military precision: the guild of builders (the *collegium* of the *fabritignuarii*) at Ostia had reached 350 members by the end of the second century CE; in Rome it had around 1,350 members at the same time. Ordinary members were called the "body of booted soldiers" and were divided into 16 cohorts in Ostia, 60 in Rome, each headed by a *decurio*, while the patron of the *collegium* was a *praefectus*. What is most surprising, however, is that the 350 members of the guild in CE 198 were men of high status: patrons themselves or at least contractors, architects, and heads of "firms" who could afford to pay the entrance fee. This shows that the entire body of builders must have been significantly larger, even at a relatively small town like Ostia. There can be no doubt that by the end of the second century CE, building must have been a very lucrative business with a possible 20,000 people active at any one time in Rome alone (DeLaine 1997: 197–201, 2000: 121, 132), which must have been a continuous building site for the majority of two centuries.

Advantages of such a military organization are obvious: ultimately, it would lead to more uniform construction techniques as well as a quick output rate. Another important change that led to these developments took place with the invention of Roman concrete, as set out above: concrete walls needed an outer facing, and a standardization of the process would mean faster and stronger building. Vitruvius (II.8.1–4) tells us about two facing techniques of his time: the old-fashioned *opus incertum*, in which tufa blocks of irregular size were fitted into an irregular pattern, and the then new *opus reticulatum*, where square-faced tufa blocks were placed in diagonal lines (Fig. 3). The Latial sanctuaries still show *opus incertum* in their walls, but reticulate took over soon afterwards and it is fair to say that it created a shift in Roman building practice: for the first time in the building trade, it is possible to speak of mass production. Since all reticulate blocks were the same shape and size, they could be mass-produced by organized teams of stone cutters, possibly even slaves. This had several consequences: specific skill was needed at the quarry to cut the reticulate blocks, as opposed to the irregular-sized *incertum* blocks, and the mason's time to place the blocks while building walls was reduced significantly. This complete mechanization of the construction site led to the decline in the little prestige that the *architectus* had enjoyed during the late Republic, and in the early Empire his job was basically

Architecture, Roman, Fig. 3 Examples of *opus incertum* in the Sanctuary of Jupiter Anxur in Terracina, of early *opus reticulatum* in the Theater of Pompey in Rome, and of developed *opus reticulatum* in the Baths of the Trinacria in Ostia, Italy (photos by author)

reduced to that of the *redemptor* or contractor (Torelli 1995: 227–230). The only exceptions are, unsurprisingly perhaps, architects that can be linked to specific emperors and designing, rather than executing, grand imperial projects in the first two centuries CE: Celer and Severus for Nero, Rabirius for Domitian, Apollodorus of Damascus for Trajan, and Hadrian himself (for their careers, see Anderson 1997: 52–67).

As the standardization and mechanization continued, we notice the appearance of specialized "ateliers," where building materials could be ordered and bought prefabricated, as opposed to custom commissioned per new project. Nowhere is this more visible than in the use of fired brick and marble. Fired bricks were first used in the early first century BCE and retained the standard sizes given to them then, hence the uniformity one can detect in Roman brick buildings that are still standing. But not only were their size and triangular shape standardized; occasionally also signs of a mechanized production process are visible from stamps that carry the name of either the owner (of the brickyards or *figlinae*) or the maker. In the late first century CE and firmly from CE110 onwards, bricks were more regularly stamped with date and names of the owner, of the brickyard, and sometimes even of the slave that made them. These owners were part of the elite, but over time (and definitely by the beginning of the second century CE), most brickyards became the property of the imperial family, causing further uniformity in production and acquisition processes (DeLaine 2000: 134).

Around this time, the same thing happened to the marble trade. The Romans' first acquaintance with the stone occurred via the marble statues and architectural elements that were looted as war booty from Greece and the East in the second century BCE. Its popularity grew quickly, and already Caesar, under whom the quarries for white Carrara marble were opened up, started taxing marble as a luxury good. Unlike the Greeks, however, Romans especially favored colored marbles for decorative purposes, almost all of which were quarried outside of Italy (Fig. 4). Triggered by the annexation of Egypt as Augustus' personal property, including its quarries of red porphyry and gray and pink granite, the potential economic benefits were soon realized and by the middle of the second century, almost all the major quarries in the provinces entered the hands of the imperial family. With this monopoly came a first significant reorganization of the marble trade, now overseen by imperial officials, and the processes of extraction, transportation, and sale were rigorously controlled and inspected. At a later stage, production (and accompanying revenue) was even further increased by the focus on mass production of half-finished products (e.g., sarcophagi) and on the creation of stocks, rather than on individual orders and individual building projects. Exploitation of the quarries reached new heights because

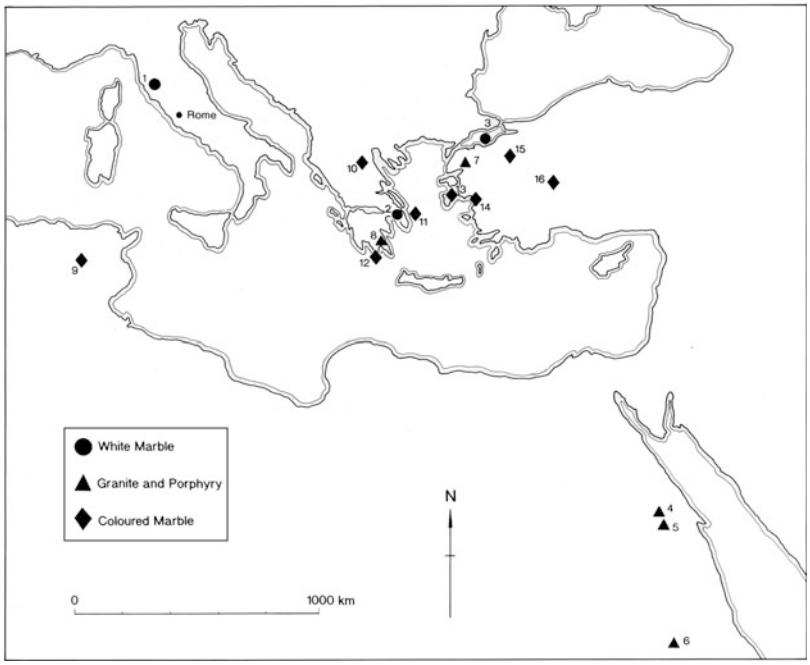

Architecture, Roman, Fig. 4 Map of the main marble quarries in the Roman Empire (DeLaine 1997: 95, Fig. 54): *1*. Luna, *2*. Pentelic, *3*. Proconnesian, *4*. red porphyry, *5*. Mons Claudianus granite, *6*. Aswan granite, *7*. Troad granite, *8*. green porphyry (*serpentino*), *9*. Numidian (*giallo antico*), *10*. Thessalian (*verde antico*), *11*. Carystian (*cipollino*), *12*. *rosso antico*, *13*. Chian (*portasanta*), *14*. *Africano*, *15*. *breccia corallina*, *16*. Dokimeion (*pavonazzetto*)

of these changes: it is estimated that between 100 and 160 CE, the quarries at Dokimeion, Turkey, produced over 500,000 m^3 of marble (Waelkens 1990: 61–72). Long-distance trade in decorative stones on this scale remained unique prior to the modern period.

The Augustan Revolution

After two centuries of building in the newly created Hellenistic-Italic way, the reign of Augustus gave rise to the development of a new decorative program in Rome, which from there spread throughout the Roman world and ultimately defined what we still recognize today as "Roman." This was not a total break with what went on before: the same building types continued to be built, while building techniques continued to develop along the lines explored above. But it is obvious from Augustus' testament, the *Res Gestae Divi Augusti*, that he invested heavily in architecture, cleverly using it as another – successful – propagandistic tool and part of the implementation of an official visual language in his reorganization of Roman society, which he applied to every aspect of daily life, from coins to wall paintings to silver drinking cups (Zanker 1987). In order to legitimize his rule, Augustus needed to exhibit certain continuity between the old Republic and the new order and particularly achieved this through architecture: by evoking a partly Greek classical past in a new jacket, Augustus confirmed that Rome culturally equaled, if not surpassed, Greece.

This architectural innovation deliberately focused on specific building types, most notably temples and theaters. Early instances of the new style can be found at the Temple of Apollo Palatinus (36–28 BCE) and the Temple of Apollo Sosianus (almost contemporary and identical in execution), but already immediately after, it found its characteristic incarnation in the Temple of Mars Ultor (started in the 30s BCE) in the Forum of Augustus, dedicated in 2 BCE (Fig. 5). Many characteristics of its design and decoration became the norm and embodiment of the new Augustan architecture: it was completely built from Carrara marble (not just marble-clad); it incorporated the Romans' predilection for frontal views (as opposed to the Greek viewability from all sides), in this case by a *peripteros sine postico* plan (i.e., with columns only on three sides); it rose on a high podium (an incorporated

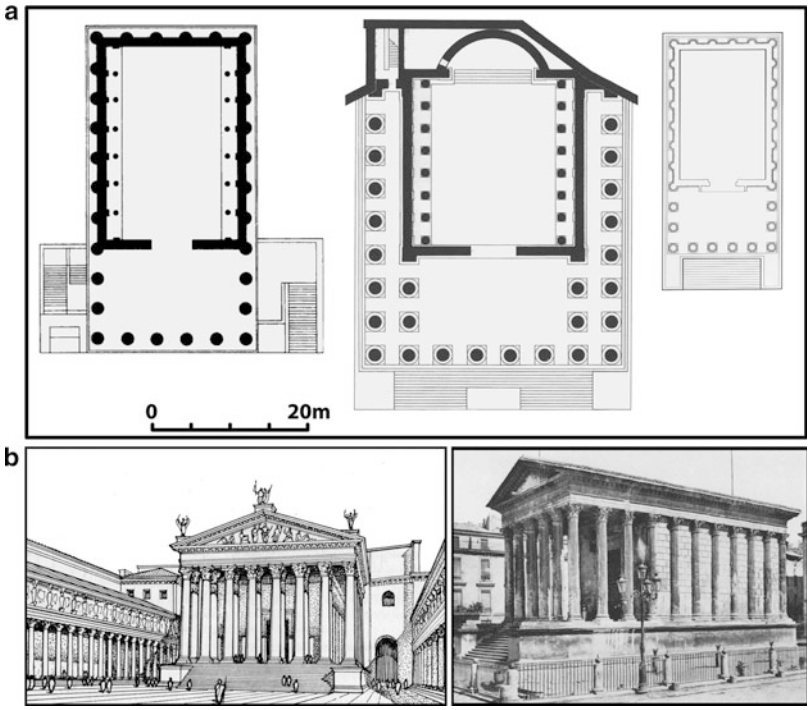

Architecture, Roman, Fig. 5 (**a**) Comparative plans of the Temple of Apollo Sosianus, Temple of Mars Ultor, and the Maison Carrée (Stamper 2005: 120, Figs. 89, and 133, Fig. 97); (**b**) reconstruction of the Temple of Mars Ultor (Boethius & Ward-Perkins 1970: 190, Fig. 85) and a photo of the Maison Carrée (Zanker 1987: 256, Fig. 201)

Italic custom); and above all, its Corinthian order had been transformed into the developed Roman Corinthian, which among other minutiae included a heavy focus on acanthus leaves (which became omnipresent in Augustan art) and a new type of cornice enriched with modillions and coffering, finally giving the Corinthian order its own cornice, which it never had in Greece (Gros 1996: 145–47; Wilson Jones 2000: 139–42). Furthermore, whereas before the outside appearance of a temple needed visually to be the most impressive (following Greek and Hellenistic customs, as one still sees at the sanctuary of Fortuna at Palestrina), now the interior grew in importance and was decorated accordingly, with different types of lavish colored marbles for both flooring and the multistoried columnar displays along the walls. It is likely that in the new visual imagery, the different marble types were representations of the different geographical regions they came from, by then all Roman provinces. In short, the use of multicolored marbles stood symbol for the wealth, breadth, and power of the Roman Empire under Augustus or, even, the *Pax Augusta*.

Apart from temples, theaters also became the carriers of the new Augustan ideology. The Senate had only recently allowed the construction of permanent theaters in Rome, and thus they had a lot of potential to allow for innovation and manipulation. In the Campus Martius, Augustus constructed no less than three theaters (of Marcellus, of Balbus, and a thorough restoration of that of Pompey), together with other places for entertainment, the Saepta Julia and the amphitheater of Marcus Scaurus, in all of which he frequently mixed with the people (Zanker 1987: 151–57). Although this was a less subtle display of propaganda, it obviously pleased the people and the success of the theater was exported to every outpost of the empire; together with temples, they proved to be perfect vehicles for the dissemination of the Augustan ideology, and in one of those instances where Vitruvius (V, 3–9) seems to have been favorable of contemporary

developments in architecture, he devotes a disproportionate amount of text on the Roman theater.

Imitation and Emulation: Roman Architecture in the Provinces

It is therefore not surprising to see the same architectural developments arise outside of Italy during the principate of Augustus. Before this time, Rome had only marginally, if at all, been involved in the architecture of the provinces. In the East (Greece, Asia Minor, the eastern Balkans, and Cyrenaica), a sophisticated, Hellenistic architectural tradition had existed for centuries, while in the West (Spain, Gaul, western Germany, Britain, and western North Africa), architectural traditions were poor and one could argue that any sign of monumentality was lacking. It is only to be expected that local influences and traditions continued to reverberate through the Roman occupation, but it is quite an achievement that today, we would instantly recognize cities or buildings as Roman from their architectural remains, even if they were located thousands of miles apart and had significantly different cultural backgrounds.

Both Spain and the south of France (*Gallia Narbonensis*), although part of the Roman Empire since 206 and 121 BCE, respectively, only received a distinctive monumentalization in their architecture from Augustus onwards, and it is noteworthy that the early examples seem to have been directly inspired by what went on in Rome: the Maison Carrée at Nîmes (Fig. 5), the temple to Augustus and Livia at Vienne, and the temple to Rome and Augustus at Barcelona were all based directly on the Temple of Mars Ultor. At Nîmes, the decoration is even so similar to that of the Ara Pacis, the other Augustan propaganda monument in the Campus Martius in Rome, that the same architect and/or workmen are believed to have worked on it. This influence from Rome continued: in Italica (Spain), birthplace of Trajan and Hadrian, Hadrian built the Traianeum, modeled on the same temple, while at Avenches (Switzerland), an almost exact copy to the Forum of Peace of Vespasian was built in Flavian times (Gros 1996: 151–59, 170, 184).

That there was much room for regional experimentation and other cultural influences, however, is clear from case studies on the so-called forum-basilica complex. This building type, in which the forum was lined with a basilica on one side and the main temple axially laid out lengthwise, could first be found at Silchester (United Kingdom), Lugdunum Convenarum (Saint-Bertrand-de-Comminges, France), and Baelo Claudia (Spain) in the first century CE, not just imitating but also improving and standardizing the model of the Italian forum. After the transformation, it was exported back into Rome to find its ultimate translation into the Forum of Trajan, only to be copied again in the provinces, as at Augusta Raurica (Augst, Switzerland) (Gros 1996: 220–3; Fig. 6).

In North Africa, where a limited monumental architectural tradition had existed before, a much more hybrid style emerged, as not two but three cultural spheres came together: Roman, Berber, and Punic. Here, Roman-style temples could be dedicated to indigenous deities and vice versa, but decorative details often remained Punic in style. A representative example can be found at Lepcis Magna, when between CE14 and 19, a temple to Rome and Augustus was built. Its Ionic order, heart-shaped angle piers, and wooden architraves were all remnants of an indigenous Punic tradition, but at the same time, the temple was peripteral *sine postico*, approachable from the front only, and rested on a tall, vaulted podium with flanking stairs (Boethius & Ward-Perkins 1970: 466–67).

Asia Minor, the wealthiest of the Eastern provinces, tells a different picture altogether. The province of Asia, though already an early "conquest" (it was given to Rome by the last king of Pergamon in 133 BCE), kept its architecture quite comfortably rooted in the Hellenistic tradition for more than another 200 years. Roman influences only started to trickle down slowly and in a piecemeal manner in the Augustan era. The Temple of Augustus and Rome at Ancyra was so rooted in Hellenistic fashion that it was once considered to have been built in the second century BCE (Fig. 7), while the contemporary Temple of Augustus and Men at Pisidian Antioch

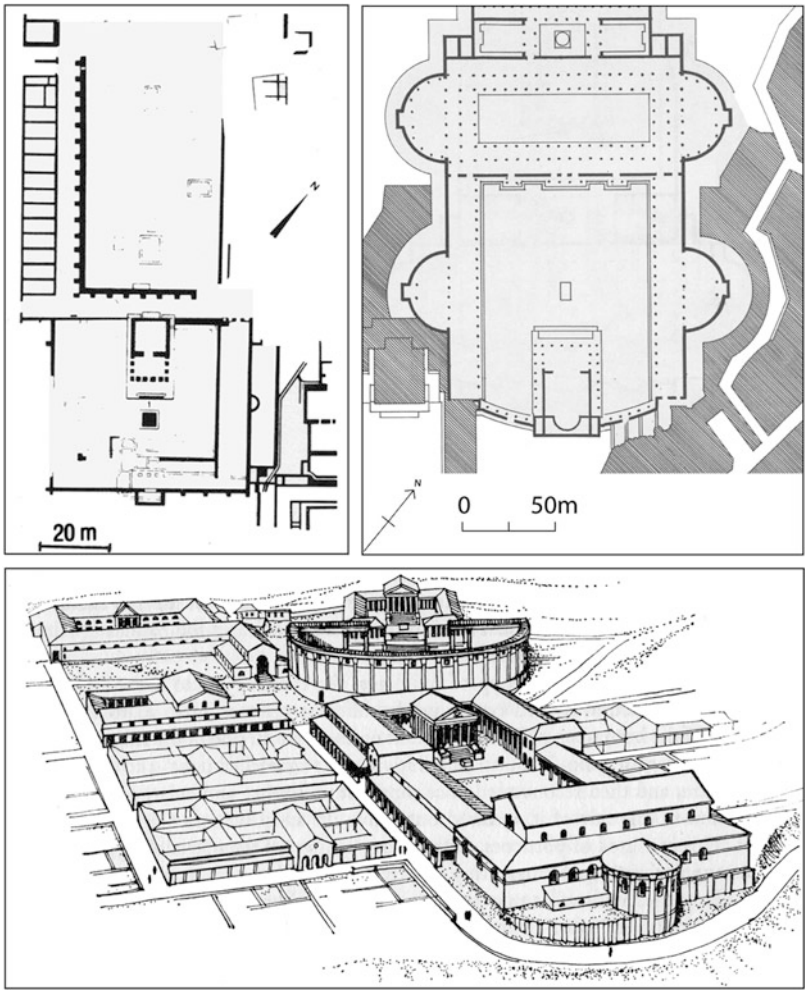

Architecture, Roman, Fig. 6 Plans of the forum-basilica complex at Lugdunum Convenarum (Bedon et al. 1988: 218) and of Trajan's Forum in Rome according to R. Meneghini (after Stamper 2005: 177, Fig. 133) and reconstruction of the complex at Augusta Raurica (Boethius & Ward-Perkins 1970: 343, Fig. 131)

(but not the surrounding portico) followed the styles laid out at Rome, down to the details of the acanthus leaves. From Flavian times onwards, more hybrid structures with heavy influences from both backgrounds emerged. The Temple of Domitian at Ephesus and the Antonine Sanctuary of Zeus at Aizanoi are Ionic pseudodipteral temples (which pretend to have two rows of surrounding columns, but only have one), similar in style to the temple at Ancyra, but both were raised on a high podium (Boethius & Ward-Perkins 1970: 389–92; Lyttelton 1987). When pure Roman buildings arose, they are often directly linked to imperial involvement: an example is the Sanctuary of Asklepios Soter in Pergamon, the patron of which, Lucius Cuspius Pactumeius Rufinus, Hadrian met and befriended on his first visit to the city in CE124. It is likely that the sanctuary was dedicated in CE 129, on Hadrian's second visit, by which time it also included an exact half-scale copy of the Pantheon in Rome (Gros 1996: 182–183). By CE 142, Rufinus had achieved his goal of becoming consul in Rome.

This reluctance to take over Roman architecture wholesale probably lay at the base of the emergence of a specific type of architecture now commonly referred to as "marble style." The abundant availability of marble in the provinces of Greece, Asia Minor, and North Africa; the

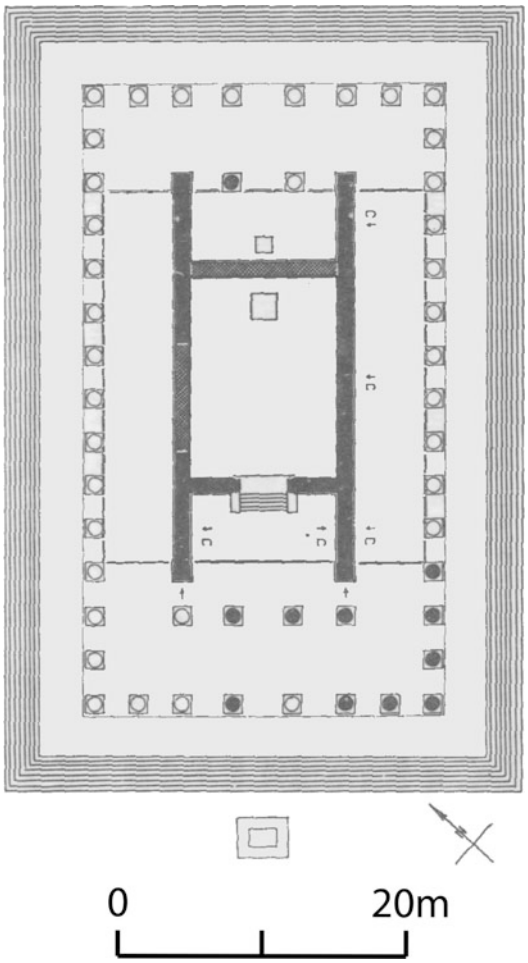

Architecture, Roman, Fig. 7 Plan of the Temple of Augustus and Rome at Ankara (Akurgal 1973: 285, Fig. 118)

emergence of a rich elite in late Flavian and early Trajanic times; and the desire to compete not only between cities but also for political positions in Rome gave rise to a construction frenzy of monumental buildings for public use. While Rome was still turned to for inspiration, the style is very much a provincial emulation of what was contemporary custom in Italy. Based on the stage buildings of theaters in Rome (especially those of Scaurus [Pliny *HN* 34.36] and of Pompey), spectacular columnar facades of multiple orders and multiple marble types now started to appear in other buildings: monumental fountains or *nymphaea* (e.g., Olympia, Miletus [Fig. 8], Ephesus, Perge, Lepcis Magna), honorific arches (e.g., Lepcis Magna, Perge, the Arch of Hadrian at Athens), bath buildings (where a central room with this feature is now often called "Marmorsaal," e.g., Sardis and the Harbour Baths at Ephesus), and other public buildings (e.g., the Library of Celsus at Ephesus). It was only exported into Rome at a later stage, perhaps not coincidentally when under Septimius Severus (CE 193–211), the emperor from Lepcis Magna, a monumental fountain at the foot of the Palatine, called the Septizonium, was constructed in this style (Boethius & Ward-Perkins 1970: 403–6).

Conclusion

It is clear that these four "drivers" can explain most of the development in the architecture in the Roman Empire. While stronger local influences survived in some places and unique variations exist everywhere, overall this consistent style of forms was established which today allows us to recognize structures all over Europe, North Africa, and the Middle East as part of the same architectural tradition.

Future Directions

Still acutely lacking in architectural studies is a thorough examination of the non-Etruscan, local Italic traditions in Italy at the advent of and during the Hellenization of the architecture. This transition has never been fully documented and the standard work on Hellenistic buildings of Italy is now over a century old (Delbruck 1907). More positively, recent decades (1990s and 2000s) have seen a still continuing shift of focus from the 1960s and 1970s increase in books on urbanism and building types to the neglected field of the constructional aspects of Roman architecture, including detailed studies on the way building sites were organized and on identifying individual groups of builders in the same building or town (e.g., DeLaine 1997; Lancaster 2005). New excavations, as well as never-executed detailed studies of even the most famous monuments, will contribute heavily to this research in the coming years.

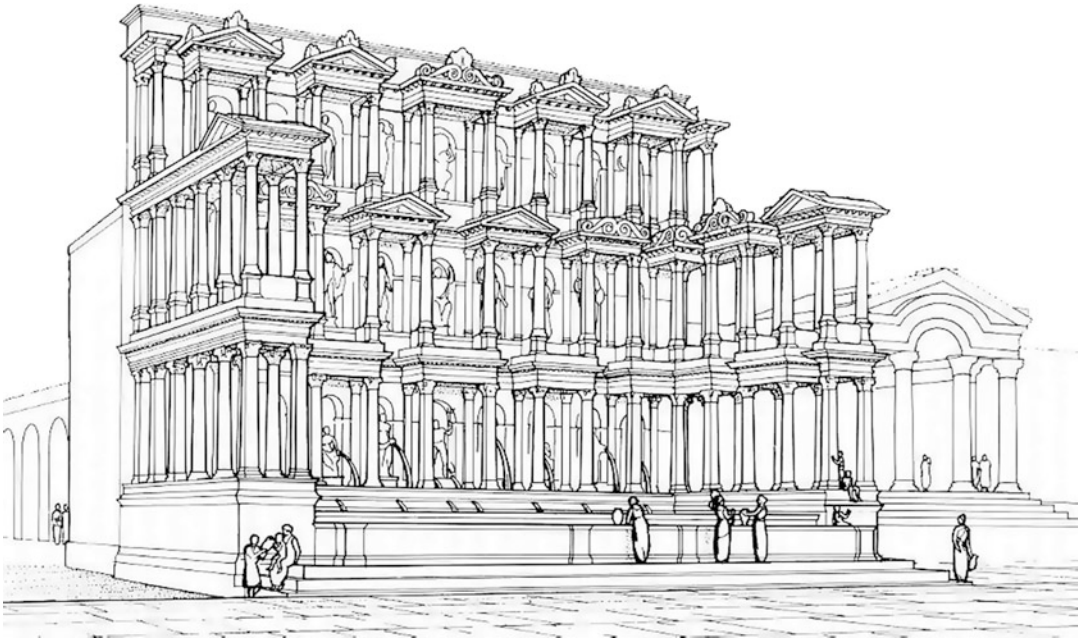

Architecture, Roman, Fig. 8 Reconstruction drawing of the *nymphaeum* at Miletus (Boethius &Ward-Perkins 1970: 404, Fig. 153)

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- ▶ Fortifications, Archaeology of
- ▶ Topography of Rome
- ▶ Urban Planning, Roman
- ▶ Western Roman Provinces, Archaeology of the

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Archival Research and Historical Archaeology

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Introduction

> Historical archaeology is a multi-disciplinary field that shares a special relationship with the formal disciplines of anthropology and history, focuses its attention on the post-prehistoric past, and seeks to understand the global nature of modern life (Orser 2004: 19).

Few archaeologists would have self-identified as a "historical archaeologist" before 1960 (Harrington 1952, 1955). In that year Stanley South started the Conference on Historic Sites Archaeology in conjunction with the Southeast Archaeological Conference. Later, in 1967, the Society for Historical Archaeology was founded. Yet, by that date, there had already been more than a century of what has been termed "text-aided archaeology" (Little 1992) in the Old World on Biblical, Chinese, Egyptian, Greek, Roman, and more recent medieval and postmedieval sites, and in the New World on ancient Mayan and early modern colonial sites in both terrestrial and underwater contexts. Most of these early endeavors were conducted with an eye toward sites associated with elites and were focused on historic preservation and site interpretation, that is, to provide artifacts for display and evidence for reconstruction. Over time these evolved into numerous subfields (e.g., classical, medieval, maritime) while retaining their focus was on the post-prehistoric or historic, literate societies (Fontana 1965; Schuyler 1970). In the United States the historic preservation movement created an interest in sites of the historic period starting at such renowned sites as Williamsburg and Jamestown in Virginia and Fort Necessity in Pennsylvania.

In English-speaking North America the focus on the birth of the early modern global economy steadily began. Methodologically, "historical" archaeologists draw equally on both archaeological and documentary records to consider the processes associated with cultural continuity and change in the face of modernization and in giving a voice to those who were largely mute in the documentary record – women, people of color, children, and the poor. In 1977, the publication of South's method and theory book brought historical archaeology into a reliance on empirical patterns and systematic analysis of archaeological materials. Today historical archaeologists use the methods of history, anthropology, and archaeology to study the past. That is, to paraphrase Schuyler (1977), they use the written word, spoken word, observed behavior, and preserved behavior in their research.

Definition

Archives, simply put, are repositories in which public records or other primary historical records are stored. This may range from the great national archives such as the National Archives in the UK (http://www.nationalarchives.gov.uk/), formerly known as the Public Records Office located in Kew outside of London; the US National Archives and Records Administration (http://www.archives.gov/) located adjacent to the Capitol building in Washington, DC; the French Archives nationales, especially the overseas territories division

(*Archives nationales d'outre mer*) (http://www.archivesnationales.culture.gouv.fr/); or the Archivo General de Indias in Seville (http://www.mcu.es/archivos/MC/AGI/index.html) where documents pertaining to four centuries of Spanish exploration and colonial administration are housed. Smaller repositories may focus on businesses (e.g., Hudson Bay Company Archives in Winnipeg), labor (e.g., George Meany Memorial Archives in Silver Spring, Maryland), the lives of specific individuals (e.g., Ludwig Beethoven at the Ira F. Brilliant Center for Beethoven Studies at San Jose State University in California), or places (e.g., the Louisbourg Institute of Cape Breton University; Santa Barbara Mission Archive-Library). In several European countries, there can be regionally run archives – in the England, for instance, each county has its own records office which holds archives especially pertaining to county matters, although not exclusively so. Regional and even local libraries may also have archival holdings. Sometimes primary documents are published such as those relating to French seventeenth-century trade items in the Illinois country (Pease & Werner 1934) or invoices for the Presidio of Santa Barbara (Perissinotto 1998). These provide researchers and students with real-world "touchstones" for the material culture of the fur trade or the Spanish colonial frontier, respectively.

The "written word" can include contemporary plans and insurance maps; newspapers; vital records concerning such matters as deaths, burials, marriages, and baptisms; deeds; probate inventories; census data; ethnohistorical and geographical accounts; and quantifiable documentary evidence including those relating to the value of exports, port activity, custom's duties, and expenditures for defense. All are especially useful for situating people and their associated settlements within the larger culture and world economy. For example, invoices, ledger books, reports, and eyewitness accounts have been used to identify artifacts and features found at Spanish California mission and presidio sites (Skowronek & Thompson 2006) and have been used to create ethnohistories of Native Peoples in the region (e.g., Hoover 1977).

Other forms of useful documentary evidence include contemporary letters and bureaucratic reports. From piracy and related economic concerns to diet and disease, documents have enormous descriptive value for the picture they paint of a community and the concerns of portions of the populace. Additionally, these reports and letters may contain information on the construction and condition of buildings and vessels. This information might be used to chronicle building phases of a structure or to identify a shipwreck on the basis of the presence or absence of certain aspects of material culture. HMS *Fowey*, lost off the Cape of Florida in 1748, was identified using a combination of court martial proceedings and other primary documents using this technique (Skowronek & Fischer 2009). While documentary evidence can provide a revealing look at the options and choices available to past peoples, they do have limitations which often can be addressed by an analysis of the presence or absence of material evidence. For example, in the sixteenth-century letters from Santa Elena and St. Augustine in the Florida colony, there were complaints that when it came to diet only "vermin and scum" were available to sustain the communities. In fact, study of faunal and floral evidence demonstrates that a wide variety of both domesticated and wild comestibles were available to the settlers (Reitz & Scarry 1985). Other sixteenth-century Spanish communities vociferously complained of seemingly endless attacks by pirates or a continuing problem of smuggling. Study of the material culture from these sites demonstrates that role of piracy and smuggling was overblown in these documents and by subsequent researchers. In fact, the presumed contraband formed a rather insignificant part of the material record, and the vast majority of what was found may well have arrived through fully legal avenues of trade (Skowronek 1992).

Oral history, once a mainstay of history, fell out of favor at the end of the nineteenth century among those studying the West and its colonies. By that time the written word was considered to be the absolute and definitive primary source of information on the past. With a growing number of archives and publishing outlets, historians and political leaders of the era saw any form of non-written material as a lesser and weaker form of evidence associated with preliterate societies and

illiterate peoples. As a result oral history passed into the realm of anthropologists and folklorists. By the last third of the twentieth century, social historians began to turn back to oral histories and the evidence provided by other social scientists to study the past. Oral history can fill in the gaps on particular subjects about which there is little or no information. Oral history can complement both the documentary and archaeological records with human experience and perception (Newland 1997). One of the early landmark projects in the USA which demonstrated the strength of the various avenues of inquiry was conducted at the Mott Farm in Rhode Island (Brown 1978). This study combined documentary history, oral history, and archaeology to more clearly illuminate a 300-year-long picture of human-land interactions. The farm, dating from the seventeenth century, was owned by the Mott family to just before the turn of the twentieth century. For the next century, another family lived on the property renting a portion of the home to a series of families. Brown's study included the traditional study of primary documents associated with the Mott family which provided information on how that family economically fared in their 200 years on the property. This included study of tax records, probates, and personal records. While similar documents were available for the twentieth-century occupants, these were supplemented with oral histories conducted with surviving members of those families. From these, information on trash disposal, outhouse location, and other usually forgotten aspects of life were recorded and later confirmed in the archaeological record.

Key Issues

Scholars continue to struggle over the primacy of the material, written, and spoken records. Documents may be overvalued in the face of contradictory material evidence. Documents may be unsystematically and uncritically used. Oral histories and ethnographic and ethnohistorical accounts associated with the direct historic approach to studying the past may be taken as unchanging traditions. Finally, there are continuing misperceptions regarding the nature of "science" and "history" as being separate and not comparable (Feinman 1997). What this means in the study of the past is that documents should neither be used uncritically nor given precedence over material culture. Rather, historical analysis should be conducted in a systematic and scientific manner which contextualizes the documentary and material records against both the regional and larger global communities in which they were created. Both are likely to have what Michel-Rolph Trouillot (1995) has termed "mentions" and "silences," and what is left out of a written or material record is often as informative as what has been included.

Some 50 years have passed since the use of documentary evidence in archaeology was formalized under the umbrella of historical archaeology. The founders of the field were trained as prehistorians in anthropology programs. Their first forays, and those of many of their students, into this endeavor were poorly received by their colleagues and historians as being neither history nor science. Now, a new generation of historical archaeologists has taken to the field versed in the social sciences and humanities and questioning the ideas promoted in the culture history, processual, and post-processual approaches. Today the archaeological, ethnographic, documentary, and spoken records are powerful methodologies for the examination of history through the lens of historical archaeology (Little 2007). By using these complementary and nonexclusive data sets a more accurate and unbiased view of past peoples, and their associated cultures may be discerned by those willing to undertake an interdisciplinary open-minded approach to understanding the past.

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Arctic Ocean and Bering Sea: Maritime Archaeology

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Introduction and Definition

Physical Geography, Oceanography, and Climate

The Arctic Ocean is a unique place, with no analogue elsewhere on the planet. As the world's largest confined ocean, its permanent sea-ice

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 1 Map of the Arctic Ocean and Bering Sea (Image courtesy of Arctic Biodiversity Data Center)

cover creates a hostile and difficult environment for human research and occupation, but is a crucial component of global climate and the ecology of the world ocean. The region's oceanographic characteristics, climate regime, and human adaptations are not matched by any other, and these factors have been emphasized in recent years as indicators of global warming bring dramatic changes to the Arctic.

Oceanographers consider the Arctic Ocean and its bordering seas to be the body of water surrounding the North Pole and bordered by Europe, Siberia, Alaska, Canada, and Greenland, occupying an area of approximately 14 million km^2 (Fig. 1). Major island groups are found off the European and Siberian coasts (Svalbard, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, and the New Siberian Islands) and throughout Canada's Arctic archipelago. Bordering seas are the Barents, Kara, Laptev, East Siberian, Chukchi, Beaufort, Greenland, and Norwegian Seas. Broad and shallow continental shelves extend from the European and Siberian coasts and beneath the Chukchi Sea, but are narrower and deeper off

Greenland and North America (approximately 30 % of the surface area of the Arctic Ocean is underlain by continental shelves). Maximum depths are attained in the two main subbasins of the Arctic Basin (the Eurasian and Canadian, with depths of c. 4,200 and 3,800 m, respectively). The Arctic Ocean is connected to the North Atlantic Ocean through Baffin Bay and the Greenland and Norwegian Seas and to the Bering Sea and North Pacific Ocean through Bering Strait. The largest rivers flowing into the Arctic Ocean are the Ob, Yenisei, Lena (Siberia), and the Mackenzie (Canada).

The Bering Sea is bounded by Siberia on the west, Alaska to the east, and the Aleutian Islands chain to the south. The Bering Sea has its own special oceanographic characteristics, being neither Arctic nor temperate, with a fairly free exchange of water through the Aleutian arc with the North Pacific and a quite restricted exchange with the Arctic Ocean through the narrow and shallow Bering Strait (c. 85 km wide and 45 m deep). In a typical winter sea ice extends south to the Pribilof Islands, but retreats north past Bering Strait during the summer. The Bering Sea is one of the most productive marine ecosystems on earth, especially along its extensive continental shelves.

The Arctic climate zone can be defined in a number of different ways. Two of the most prevalent are by latitude (above 66.56° N, the "Arctic Circle") and by temperature (the region bounded by the 10° C summer isotherm) (both shown in Fig. 1). The climate of the Arctic is characterized by strong seasonality: long, cold, and dark winters and short summers with long daylight hours (Nuttall & Callaghan 2000). The climate of the ocean itself is shaped by the year-round presence of the Arctic pack ice and by the physical processes of freezing and thawing of river, lake, and sea ice. The presence of ice cover has major influences on physical and biological processes within the ocean and atmosphere, as well as implications for human use and occupation. The Arctic Ocean is almost entirely ice-covered during the winter, while minimum ice extent is attained in late summer. However, Arctic sea-ice cover has undergone significant changes in the past two decades, with five record minima attained between 2001 and 2007 and a small expansion in 2008–2011, but with the lowest value ever recorded in September 2012. The trend is towards shorter ice-cover seasons and thinner ice cover in general. These data have raised speculation that the Arctic Ocean may see entirely ice-free summers as soon as 2030 (Stroeve et al. 2012). Rapidly changing climate conditions in the Arctic have important ramifications for human presence and research, as well as the archaeological record of the region.

Historical Background

Exploration and settlement of the Arctic is a very recent endeavor in terms of overall human history, coming essentially at the tail end of over a million years of human dispersal from Africa. In the later Pleistocene, between approximately 45,000 and 25,000 years ago, modern humans expanded north and east across Eurasia into new regions. These previously unexplored habitats included Siberia up to approximately 60° N (and potentially further on a seasonal basis). These areas were, however, largely abandoned during the peak of the Last Glacial Maximum (LGM, c. 20,000–18,000 years ago) (Hoffecker 2005). In Western Europe, the Fenno-Scandinavian glaciers began to retreat around 12,000 BCE, and the earliest occupations of northern Norway are dated to c. 10,000 BP. Many of the regional cultures arising in Scandinavia during the Mesolithic show a clear orientation towards maritime subsistence. The vast expanse of Northern Eurasia was also reoccupied during the climatic amelioration following LGM, with a variety of Late Pleistocene and Early Holocene cultures arising across most of Siberia.

The growth of polar ice caps and continental glaciations during the Pleistocene resulted in sea levels lowered as much as 120 m below those of the modern era. During much of the Middle and Late Pleistocene, the shallow continental shelf between Siberia and Alaska was thus exposed as dry land. The exposed land connection is often referred to as the "Bering Land Bridge," and the

region from eastern Siberia to the Yukon Territory, encompassing the now-submerged Bering Land Bridge, is called "Beringia" (Hadleigh West 1996).

The existence of a land bridge between Asia and North America (and adjacent areas of exposed continental shelf) is of paramount importance for understanding theories of human colonization of the Americas. Although the possibility of a maritime migration has been proposed (Dixon 1999), prevailing theories favor an overland route for the first humans in North America. The oldest archaeological sites in Alaska date to c. 15,000 BP, and by c. 4,500 BP Paleo-Eskimo peoples had settled in north Greenland.

Successful settlement of the Arctic was dependent on a number of specialized technologies and adaptations, especially those designed and used for maritime subsistence (such as skin boats and toggling harpoons). Tools such as the needle (for use in tailored clothing and sewing skin boat covers) were prerequisites for survival in the Arctic. Equally important was a deep and intense knowledge of the Arctic marine environment, especially sea ice. A succession of cultures can be seen across the North American Arctic, from Paleo-Eskimo to Dorset and finally Thule peoples. The Thule migration from Alaska across the Canadian Arctic to Greenland around 1300 CE is remarkable for its speed and distance – nearly 4,000 km from Bering Strait to Greenland, occurring over a single generation, and possibly over just a few seasons! One possible impetus for this "dash across the top of the world" may have been trade in metals and other goods with Norse inhabitants of Greenland. Archaeological investigations of sites in Canada and Greenland show undoubted contact between Norse and indigenous inhabitants of the Arctic. The cultural affiliation of the people who encountered the Norse in Newfoundland and Labrador is not certain, but in the northern areas they were met by Thule Eskimos – the ancestors of modern Inuit peoples. The nature of these interactions is a fascinating topic, explored by archaeologists in Canada and Greenland (see Fitzhugh & Ward 2000; Maschner et al. 2009).

The oldest maritime sites in the Arctic are camps and settlements of prehistoric maritime cultures. The faunal remains discovered in these sites suggest use of a wide variety of maritime resources: from intertidal mollusks and fish to seals, walrus, and whales. Construction of reliable watercraft was both a necessity and a challenge in the treeless circumpolar environment. Most indigenous peoples in the coastal Arctic used skin boats: open (umiaks) and decked (kayaks). The frames of both umiaks and kayaks were constructed of driftwood and covered, as a rule, with marine mammal skins. Ivory, bone, or antler frame members were also occasionally used, and in some cultures the cover was made of caribou and even polar bear skins. The frames were lashed with baleen and sinew.

The overall chronology of skin boat development in circumpolar regions remains uncertain. As a key element of subsistence, skin boat technology has arguably been used since the very beginning of human population in the region. Recent maritime migration theories suggest that skin boats might have been a vehicle of human expansion across Beringia c. 20,000–10,000 BP (Dixon 1999). The oldest archaeological evidence for skin boats is a wooden rib from a kayak-like vessel excavated at the 4,000-year-old Saqqaq site, West Greenland. Two-thousand-year-old ivory models from the Ekven cemetery near East Cape, Siberia, represent both umiaks and kayaks. Birch bark miniatures of umiaks and kayaks as well as fragments of skin boat frames from the Miyowagh and Hillside sites on St. Lawrence Island in the Bering Strait are within the same date range. Skin boat parts were recorded at the Birnirk site in the vicinity of Point Barrow (500–1300 CE), at the Deering site in Kotzebue Sound (821–1200 CE), at the Qilalukan site on Baffin Island, and in cave sites on Kagamil and Kanaga Islands in the Aleutian chain (890–1667 CE). On Labrador, remains of kayak frames and paddles have been discovered in late prehistoric/early contact period graves at various sites. Skin boat frame finds have also been recorded in archaeological sites of both west and east Greenland (Gulløv 1997). All archaeological skin boat components have been

found in terrestrial sites; no underwater remains have been discovered to date. The presence of boat fragments in house remains and middens indicates reuse of wooden components and suggests a ritualistic significance of skin watercraft. Ethnographic data show that fragments of both kayaks and umiaks were kept as amulets ensuring prosperity and long life. In Greenland, ivory line holders from old kayaks were worn as protective charms on amulet belts. Stem and stern posts were often taken from older, dilapidated vessels and used in the construction of new boats, thus transferring the expertise of the previous generation in both physical and metaphysical senses. Boat elements among grave finds may also indicate that skin boats were considered necessary in the afterlife of the deceased.

Although important, all these finds provide only fragmentary information about the constructional details of circumpolar skin boats. Intact skin boat assemblages are rare in the circumpolar archaeological record. About one third of a kayak frame with associated implements was discovered in 1921 in Washington Land, north Greenland. Found on a hill slope, 40 m. above the sea, the kayak had been put there for future use sometime in the sixteenth or seventeenth century. The Pearyland umiak, the oldest complete circumpolar skin boat known today from the archaeological record, was deposited in similar circumstances (Fig. 2). Discovered by a Danish expedition to Pearyland, northeast Greenland, in 1949, it dates to the fifteenth century CE (Petersen 1986). Iron fasteners and an oak timber indicate that the makers of Pearyland umiak were in contact with the Norse. Contact with nonnative explorers, settlers, and whalers in the Arctic had significant impacts on many aspects of indigenous life, including watercraft. Shifts in technology and subsistence resulting from newly introduced materials and trading opportunities, as well as from the decline of human and whale populations, changed skin boat construction and use. Today only a handful of native communities in the circumpolar north maintain traditional skin boat building.

The historical exploration of the Arctic is a topic that has fascinated the public (especially the race for "firsts" in polar exploration and achievement). The history of Arctic exploration by European nations has its roots in the sixteenth-century push for easier and more direct routes between Europe and Asia. Three routes were considered or attempted at various times: a route directly across the Arctic Ocean, the "Northwest Passage" through the Davis Strait and the Canadian Arctic Archipelago, and the "Northeast Passage" along the northern coasts of Scandinavia and Eurasia. Numerous expeditions, including those of Martin Frobisher (1576–1578), John Davis (1585), and William Baffin (1616), ventured into the eastern Arctic in search of routes across the top of North America (Delgado 1999). The Northeast Passage was also tried, for example, by Willem Barentsz in 1596. Others attempted to find the western terminus of the Northwest Passage by sailing through Bering Strait (i.e., James Cook, in 1778). Various traces of these expeditions, including remains of vessels, camps, and gravesites, have been investigated by archaeologists in the high Arctic.

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 2 Pearyland umiak (Photo by Justin Hays)

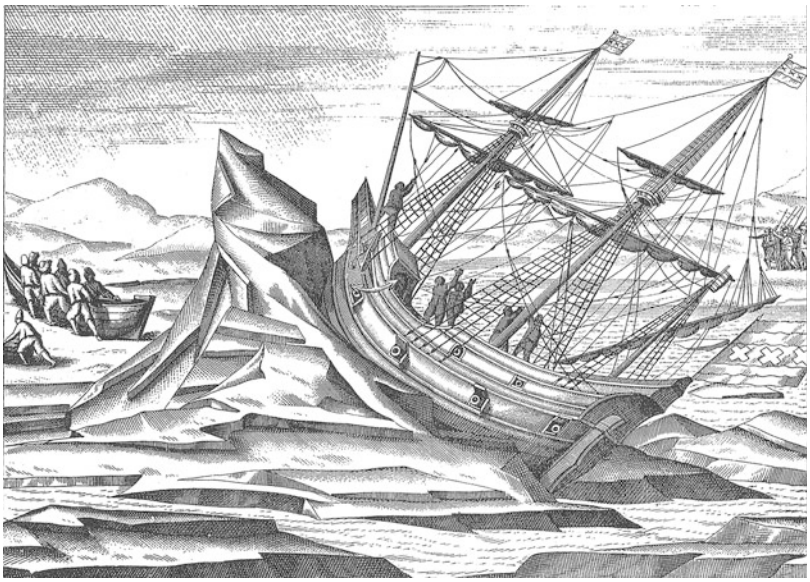

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 3 Image by Gerrit de Veer illustrating the wrecking of Willem Barentsz's vessel on Novaya Zemlya in 1596

The first attempt to find a sea route from Europe to Asia via the Northwest Passage was undertaken by Martin Frobisher in 1576–1578. Frobisher reached Baffin Bay and established a camp on Baffin Island, where the expedition prospected for gold. Frobisher's account is among the earliest written records of European-Inuit interaction. The Frobisher camp on Baffin Island has been excavated by joint Smithsonian Institution/Canadian Museum of Civilization project (the "Meta Incognita" project). The project also collected Inuit oral traditions relating to the Frobisher expedition (McGhee 2001).

Among the earliest attempts to sail the Northeast Passage was the voyage undertaken by Dutchman Willem Barentsz in 1596. Barentsz and his crew were forced to spend a winter on the northeastern tip of the island of Novaya Zemlya after their ship was crushed by ice in the Kara Sea (Fig. 3). Barentsz himself died during the trip, and the survivors among his crew returned to Amsterdam via Russia. The site of Barentsz's camp on Novaya Zemlya was apparently untouched for over 200 years, but has been visited several times since then – initially by other mariners and finally by collectors and enthusiasts. A number of artifacts thus found their way into museum collections, mostly the Rijksmuseum in Amsterdam and the Arctic and Antarctic Museum in St. Petersburg. Most of the recovered objects pertain to shipboard life of the late sixteenth century, well preserved by the cold climate. An archaeological survey of the site, undertaken in 1992 by a joint Dutch-Russian team, found little but wooden foundations of a house built of driftwood and ship's timbers by Barentsz and his crew (Hacquebord 1995).

Despite high costs and complicated logistics, underwater investigations have also been carried out in the Arctic. The first substantive underwater archaeology in the Arctic was a survey of the vessel *Maud*, a three-masted wooden schooner built in Asker, Norway, in 1917 for polar explorer Roald Amundsen. Amundsen, who had been the first person to pass through the Northwest Passage in the sloop *Gjoa*, intended to reach the North Pole by freezing the ship in sea ice and drifting north. *Maud* was custom-built for his proposed Arctic research. Amundsen sailed from Norway in July of 1918, headed for the Northeast Passage. By mid-September of 1918, *Maud* was frozen in the ice in the Laptev Sea. When *Maud* finally broke free in late summer of 1919, Amundsen was able to sail for only 11 days before freezing in again for the winter, this time near the mouth of the Kolyma River. After breaking free in the summer of 1920, Amundsen and his crew were able to pass through Bering Strait

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 4 The remains of *Maud*, Cambridge Bay, Canada (Photo courtesy of Parks Canada)

and put into Nome, Alaska. *Maud* was thus the second vessel to navigate the Northeast Passage (after N.A. Nordenskjold's *Vega*), and Amundsen became the first to pass through both the Northeast and Northwest Passages. Amundsen made two more attempts to freeze *Maud* in pack ice and drift to the pole, but was thwarted each time, and the project eventually ran out of funds. *Maud* was seized by creditors in Seattle in 1922 and sold at auction to the Hudson's Bay Company. The new owners renamed the vessel *Baymaud* and sent it to resupply company outposts in the Western Arctic.

In late 1927 the vessel froze in the ice at Cambridge Bay (Victoria Island). Shortly thereafter a leak developed that required repair facilities not available in the Arctic, and the vessel sank at its moorings in 1930. An underwater site inspection undertaken in 1996 determined that while the lower hull is substantially sound, much of the upper structure has degraded, largely due to ice action. The weather deck, except at the bow, is nearly completely destroyed, and the upper hull sides have been significantly broken down (Delgado 1997) (Fig. 4). *Maud* is officially owned by the Norwegian town of Asker, which bought the wreck from the Hudson's Bay Company in 1990. Representatives from Asker have proposed refloating the vessel for transport to Norway, there to be restored and opened as a museum. Although an export license was granted by Canadian authorities in early 2012, questions of both funding and hull integrity remain to be solved.

Among the most sought-after underwater targets in the Arctic are those connected with the voyage and attempted rescue of the Franklin Expedition. In May of 1845, British Royal Navy ships HMS *Erebus* and HMS *Terror*, under the command of Sir John Franklin, departed England on a much-publicized expedition in search of a viable Northwest Passage route from Europe to Asia. Both vessels were reinforced for operation in the ice, and both had already seen service in previous Arctic voyages. Provisions were taken for a voyage of up to 3 years duration, as the expedition expected to overwinter on their passage. Both ships became trapped in ice in late 1846 in the Canadian archipelago. Franklin himself died in 1847, along with at least 23 crew members. The remainder of the crew abandoned the vessels and attempted an overland escape. None survived, and the vessels were lost to the ice.

After several years with no word or sign of Franklin, rescue operations were mounted. In 1850 the Royal Navy dispatched Captain Robert McClure with 66 men in HMS *Investigator*. McClure's orders were to round South America, pass through Bering Strait, and search for Franklin at the western end of the supposed

Northwest Passage. Once in the Western Arctic, McClure recognized Melville Island and realized that he had connected with parts of the archipelago previously reached from the east. After freezing in at Mercy Bay on Banks Island, the crew endured two harrowing winters before abandoning the ship and sledging east. McClure and his crew were eventually rescued by other Royal Navy ships and on their return to England were credited with the official discovery of the Northwest Passage.

The remains of HMS *Investigator* as well as the graves of three crew members were located in 2010 by a Parks Canada expedition. The wreck and associated debris field, initially located using side-scan sonar, rest in shallow water with the hull bottom buried in sediment. The hull appears to be substantially intact, although masts, rigging, and bulwarks have collapsed (likely as a consequence of damage from winter sea ice). Divers documented the vessel and recovered diagnostic artifacts and samples during a follow-up expedition in the summer of 2011 (Fig. 5). Franklin's vessels (*Erebus* and *Terror*) have never been located, although remains and well-preserved graves of numerous crew members have been identified on Beechey Island and elsewhere in the central Canadian Arctic. *Erebus* and *Terror* have been designated a Canadian National Historic Site (the only such "undiscovered" national historic site) due to the significance of Franklin's voyage and the importance of the two ships in the history of Arctic exploration and navigation (Parks Canada n.d.). Several other wrecks have been identified in Canadian Arctic waters (notably *Albany* and *Discovery* (1720) in Hudson's Bay and *Breadalbane* (1853) in Lancaster Sound). All three are in excellent condition, owing to depth or landforms which have protected them from serious damage from sea ice.

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 5 Parks Canada archaeologists document HMS *Investigator* (Photo courtesy of Parks Canada)

The whaling industry followed close on the heels of the polar explorers and also left remains for archaeology. Whalers were active in the Greenland and Barents Seas by the early seventeenth century, although commercial whaling in the Western Arctic began only in 1848. Over the next century, more than 2,700 whaling voyages were made into Arctic waters at the cost of more than 150 ships lost and the near extinction of the bowhead whale (Bockstoce 1986). Occasionally entire whaling fleets would be lost. In 1871, for example, almost the entire Yankee whaling fleet was trapped in the ice in the Chukchi Sea. Thirty-one ships were crushed and destroyed in this single incident. A project focusing on the wrecks of 1871 fleet, undertaken in 2005–2008, documented extensive wreckage and artifacts washed up along the shore of northwestern Alaska (Fig. 6). However, diver surveys of side-scan sonar targets were unable to identify in situ remains.

Underwater investigations are somewhat rarer along the Russian coast of the Arctic Ocean, although numerous wrecks are known historically. One significant wreck, the steam vessel *Chelyuskin*, was located in 2006 in the Chukchi Sea and declared an archaeological site. The *Chelyuskin*, a freighter that sailed eastbound from Murmansk in 1933 to prove the viability of transiting the

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 6 1871 Whaling fleet wreckage near Wainwright, Alaska (Photo by Pete McConnell)

Northeast Passage, was caught in sea ice, crushed, and sank off the northern coast of the Chukotka Peninsula. The vessel was located with sonar in 2006 and subsequently visited by divers; the ship's identity was confirmed by recovered pieces sent to the shipbuilder for authentication.

Whaling stations and other early "Arctic frontier resource" settlements on Svalbard have also been subjects of investigation, primarily by Dutch and Norwegian researchers. Svalbard (Spitsbergen) was discovered by Willem Barentsz in 1596, while searching for a Northeast Passage route to Asia. The Englishman Henry Hudson, while serving in the Dutch East India Company, reported many whales in the area, and commercial whaling started in 1611. Shore stations were established by English and Dutch whaling enterprises throughout the Svalbard archipelago as well as on Jan Mayen Island. Large furnaces were built to render whale blubber and wooden houses to lodge personnel. Although most whaling stations were abandoned by the early eighteenth century, mineral prospecting and mining camps soon took their place. Archaeological investigations of early camps and stations on Svalbard reflect not only the resource exploitation that followed the "Heroic Age of Polar Exploration" but also the subsequent geopolitical motives for establishing and maintaining settlements in the Arctic (Hacquebord & Avango 2009).

In contrast to the Arctic Ocean, maritime and underwater archaeology in the Bering Sea is in a state of complete infancy. Very few investigations have been attempted, despite the potential for significant cultural resources. One of the most significant projects to date is the joint Russian-Danish excavation of the campsite of Vitus Bering, on Bering Island. Bering and his crew shipwrecked on the island, at the western end of the Aleutian chain, in 1741 when returning from Alaska to Siberia. The investigation found ship's guns and timbers and identified the grave of Bering himself, who died and was buried during the sojourn on the island (Len'kov et al. 1992).

The only substantive underwater project undertaken so far in the Bering Sea is the investigation of a side-wheel steamship, *Eliza Anderson*, which wrecked at Dutch Harbor (Unalaska Island), in 1899. The vessel, in a worn and decrepit state, had been hastily outfitted to bring prospectors north from Seattle during the Klondike Gold Rush. The wreck was identified and surveyed in 2006 (Fig. 7).

Key Issues/Current Debates

There is currently no articulated comprehensive theory of Arctic maritime archaeology – partly due to gaps in scientific knowledge of the Arctic

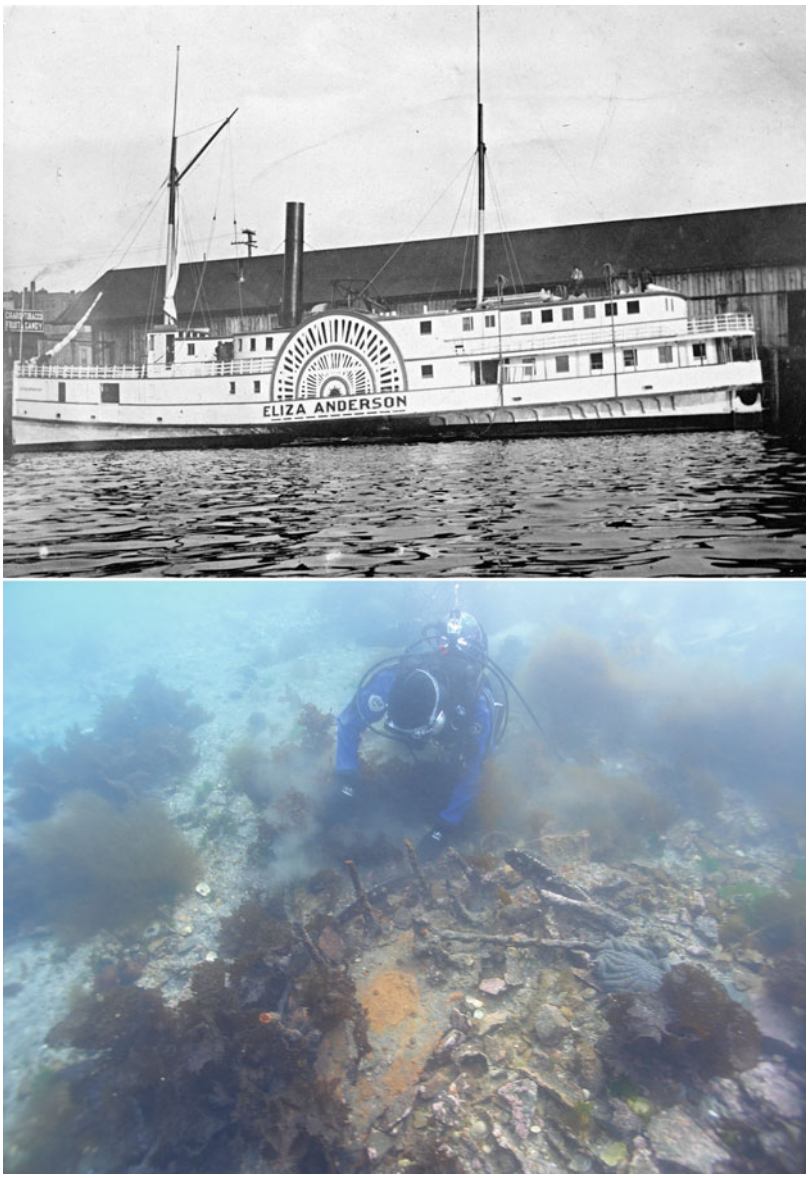

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 7 Above: The steamer *Eliza Anderson*; Below: Remains of the *Eliza Anderson* at Dutch Harbor, Alaska (Photo by David McMahan)

in general. Despite years of study by dedicated scientists, many basic questions remain to be answered. For example, we still do not have a definitive sea-level history for the Bering Strait or Arctic continental shelves, and bathymetry is patchy at best. The development of theoretical approaches to terrestrial archaeology in the Arctic has moved at a faster pace (i.e., Blankholm 2009; Westerdahl 2010), with several specialist journals dedicated to anthropological questions of the region. Regional maritime adaptations are regularly mentioned, although seldom analyzed in a circumpolar context. One reason for the lack of a more comprehensive theoretical approach may be due to a deficiency of truly multidisciplinary investigations; an accurate understanding of the full range of Arctic sites and formation processes requires the participation of not only a range of archaeological specialists but also marine and sedimentary geologists, oceanographers, cold-climate ecology scientists, and native tradition bearers.

Underwater site formation processes specifically may require a much broader assimilation of geophysical knowledge than heretofore assembled. For example, coastal erosion dynamics, vegetation regimes, and other ecological parameters are unlike those of any other region on earth and require investigation and definition. However, the most complex element of the Arctic maritime environment (and potentially most significant for the preservation of submerged cultural remains) is the cyclical growth and movement of sea ice.

Ice formation and extent along Arctic coasts is seasonally variable. Ice formation generally begins in October and reaches an annual maximum in February or March; melting begins in May or June and pack ice retreats during July and August. Most of the Arctic continental shelf is therefore under ice cover for 7–10 months each year. Pack ice is subject to immense wind fields, generated over a large area. The convergence of fields of moving pack ice (or pack ice impacting with shorefast ice) results in linear deformation features called pressure ridges. The intense pressures eventually build up ice masses both above the water's surface (ice sails) and below (ice keels). Ice gouging occurs where ice keels are driven into the seabed and are moved by the accumulated energies of the encompassing pack ice structure. The resulting furrows or tracks in the seafloor are called ice gouges or ice scour (Wadhams 2000). Ice grounding and gouging is common in all Arctic coastal waters, from the sea's edge to considerable depths. Deep gouges tend to produce high flanking ridges to either side, creating combined vertical relief of up to 8 m. The highest gouge densities are in water between 20 and 40 m deep, as are maximum gouge depths. Gouges in water deeper than about 55 m are assumed by some researchers to be relict from periods of lower sea level, as modern ice features do not generally have keels extending beyond 60 m deep.

No comprehensive study has been undertaken regarding the potential effects of ice gouging on submerged archaeological sites and the consequent ramifications for site formation processes. Regarding the Chukchi Sea, the US Minerals Management Service has concluded that "shipwrecks are likely to have survived in the area, especially those that may be at a depth beyond intensive ice gouging" (MMS 2007). Archaeological investigations of historic period shipwrecks near Wainwright on the Alaskan Chukchi coast found considerable amounts of nineteenth-century wreckage in the beach and intertidal zones, presumably gouged from the seafloor and washed ashore. Investigations of shipwrecks in the Canadian Arctic have similarly concluded that wrecks would survive only if protected from pack ice. When considering the potential for archaeological resources along the Arctic Ocean margins, the effects of the ocean's dynamic and complex environmental processes must be taken into account (Fig. 8).

International Perspectives

Since the earliest European attempts to find northern sea routes to Asia and claim Arctic lands, the region has been a focus of geopolitical maneuvering and intrigue. The situation has only intensified as climate change opens Arctic waters and resource exploration increases. While there is a regular high-level intergovernmental forum of Arctic nations (the Arctic Council), many issues remain to be resolved. Maritime borders are unsettled or in dispute. As of 2011 not a single Arctic nation had ratified the United Nations Convention on the Protection of the Underwater Cultural Heritage (and several were actively opposed to the convention). International collaboration on scientific projects is common in the Arctic, but it remains to be seen whether such cooperation will be extended in the future to underwater archaeological investigations.

Future Directions

Archaeology in the Arctic Ocean faces two major interrelated sets of challenges in the near future: climate change and human impacts. As described in a recent article by Hans Peter Blankholm (2009), much recent concern and attention has been focused on environmental and ecological

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 8 Sunset over sea ice near Qaanaaq, Greenland (Photo courtesy of Andy Mahoney and the US National Snow and Ice Data Center)

implications of climate change, while culture-historical issues have been relatively neglected. However, archaeological resources, both terrestrial and submerged, will undoubtedly be affected by changes now occurring in the Arctic.

The warming climate is resulting in pronounced reductions in sea ice, seasonal snow, permafrost, and glacial features, with a corresponding shift in landscape processes. What does this mean for archaeological resources in the affected areas? Continuing widespread loss of discontinuous permafrost and increase in the active layer of remaining permafrost will trigger erosion and subsidence of ice-rich landscapes and change local and regional hydrologic processes. Coastlines are increasingly exposed to wave action and storm surge. Direct impacts from coastal erosion as well as the loss of stable preservation (frozen site matrices) will be varying degrees of resource exposure, degradation, and destruction of buried/frozen cultural material. The effects on submerged archaeological sites are less clear, although reduced sea ice may result in reduced potential for damage from ice scour.

The other major factor likely to impact Arctic archaeological resources (especially in a submerged environment) is a dramatically increased human presence in the region. Approximately four million people currently live in the Arctic. Increased accessibility and intensified resource exploitation will likely bring a larger number of people into the far north. Oil and gas drilling on Arctic continental shelves is already intensifying in Alaska's Chukchi and Beaufort Seas, Norway's Barents Sea, and elsewhere. Impact to submerged archaeological sites is possible from extraction and transportation facilities, pipelines, and related infrastructure. Reduced sea ice will create opportunities for increased open-water transportation (especially cargo shipping but also cruise tourism) (Nuttall & Callaghan 2000). As the Arctic enters this uncertain phase, protection and responsible investigation of the region's cultural heritage is a key concern.

Cross-References

- ▶ Greenland: Approaches to Historical Norse Archaeology
- ▶ Indigenous Archaeologies
- ▶ Indigenous Peoples, Working with and for
- ▶ Maritime Landscapes
- ▶ Maritime History
- ▶ Parks Canada: Historical Archaeology
- ▶ Peopling of the Americas
- ▶ Polar Exploration Archaeology (North)
- ▶ Submerged Prehistoric Landscapes
- ▶ Underwater Archaeology

▶ Underwater Cultural Heritage: International Law Regime
▶ Underwater Sites in Archaeological Conservation and Preservation

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Argentina: Maritime Archaeology

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Introduction

Despite its long-standing tradition in archaeology and its vast maritime littoral and other waterways, the study of the relationship between humans and water through material remains has not had much development in Argentina.

The traditional focus has been in pre-Hispanic societies, either nomadic or sedentary, and almost exclusively from a land perspective. The few cases when water was considered within the cultural system under study was usually triggered by the presence of artifacts (like harpoons or other fishing devices) or ecofacts (such as fish, shellfish, or sea mammals remains) in the archaeological record. Until recently topics such as navigation and watercrafts per se, whether prehistoric or more recent, have been almost absent in the Argentinean archaeological research projects. Let alone venturing into the water to study submerged archaeological remains of any sort.

Since the mid-1990s, however, the fields of maritime and underwater archaeology have been steadily growing, leading to a number of research projects and various other activities dealing with the country's underwater cultural heritage.

Definition

As the discipline of maritime archaeology continues to develop, so does its definition and the debate on the various topics of study it can comprise (Catsambis et al. 2011). In general terms, however, it could be defined as the study, through material remains, of past human cultures in their relation with the sea and occasionally with inland waters. Typical examples of the latter have to do with seafaring, given that oceans, rivers, and lakes are frequently connected and are navigated without distinction.

It is in that broad sense that the concept of maritime archaeology is used in this entry. Besides, although ships are not the only subjects of study, they were chosen to be the focus here not only because of their direct association with water but also because they are good representatives of maritime archaeology in Argentina.

Historical Background

Prior to the development of maritime and underwater archaeology with scientific standards, there had been various instances in which submerged archaeological remains were dealt with (see Elkin 2002; Ciarlo 2008). In the first decades of the twentieth century, they mostly had to do with isolated finds of shipwreck elements which ended up in museum or private collections, in most cases lacking contextual information.

By the 1970s archaeologist Jorge Fernández became involved in the extraction of a wooden canoe from a lake in Patagonia by guiding from the surface the work performed by professional divers and by later describing and interpreting the find (Fernández 1978).

The 1980s was characterized by several activities conducted by an ICOMOS-Argentina working group, mainly comprised by architects-divers, who had the initiative of building capacity

in underwater archaeology techniques (see Elkin 2002). The main project in which this group became involved was the survey of the British sloop of war HMS *Swift*, sank in Puerto Deseado – currently Santa Cruz Province – in 1770, and which had been discovered by local divers in the early 1980s. The work was focused on the in situ recording of the hull structure as well as the excavation of some artifacts (Murray 1993; García Cano 1998).

In the early 1990s a nonprofit organization called Fundación Albenga, directed by Architect J. García Cano, continued to work at the *Swift* site undertaking nonintrusive surveys (García Cano 1996).

The mid-1990s represents a major turning point in the discipline, with the simultaneous birth of two research teams in which archaeologists-divers played a leading role. One of the teams, known as PROAS for the acronym of *Programa de Arqueología Subacuática*, is based at the National Institute of Anthropology in Buenos Aires, under the direction of this author. The other one is based at the National University of Rosario (Santa Fe Province), under the direction of Mónica Valentini. Both groups have been very active since then – sometimes working in partnership with other institutions – and they usually involve specialists from other fields who contribute to the interdisciplinary aspects of the projects. Additionally, both teams have not only been conducting archaeological research but also implementing many initiatives related to raising awareness on the protection of underwater cultural heritage and contributing to capacity building at different levels (Elkin 2003; Valentini 2003).

Key Issues

This section presents the main ongoing or recent archaeological projects in maritime archaeology for which published data is already available. Figure 1 shows the geographic location of each of the case studies.

Studies on Navigation in Patagonian Lakes

The ethnographic and historical record of the Patagonian lakes, rivers, and maritime shorelines (on both sides of the Andes) provides descriptions on three main types of canoes made of local tree species which were used at the time of contact with European explorers, missionaries, and settlers. One was the *dalca*, made of sawn wooden planks and which could be dismantled to be transported on land. Another type was made of sawn bark planks and was mostly used by the Yamanas and Alakaluf in the southermost tip of the continent; these groups mainly travelled along maritime waterways connecting the numerous islands and fjords around Tierra del Fuego. The third type of canoe, called *huampo* or *huampu* in some regions, was dug out from a single tree trunk with the aid of fire and initially using lithic and occasionally shell-made tools, later replaced by metal ones.

As stated earlier, back in the 1970s archaeologist Jorge Fernandez was the first one to address the study of a wooden canoe. It was dug out from a single trunk of a beech tree and was recovered from the Nahuel Huapi Lake close to the city of Bariloche. Since, aside from the use of fire, there was evidence of the use of metal tools in its manufacture and traces of metal corrosion, it was chronologically attributed to a period between the mid-seventeenth and late nineteenth century (Fernandez 1978).

Fernández continued to study and compare various other canoes of this type found by different people in the Andean lakes of Northwest Patagonia, also taking into account historical, ethnographic, and geographic information in his research. On that basis, combined with early archaeological evidence in an island in the Nahuel Huapi Lake which cannot be reached without some watercraft device, he concludes that the seafaring tradition in the region (including the rivers and lakes on the western side of the Andes) must date from prehistoric times (Fernandez 1997).

The topic of the Patagonian lake district seafaring has been addressed more recently by other researchers, in Argentina especially by Romina Braicovich (Braicovich 2006; Braicovich & Caracotche 2008). She studied a number of dugout canoes found in the Nahuel Huapi Lake, including some of the ones previously studied by Fernández (Fig. 2). She concludes that all of them

Argentina: Maritime Archaeology, Fig. 1 Map of Argentina with the location of the areas, sites, and projects mentioned in this entry. *a* Nahuel Huapi Lake, *b* Zencity wrecksite, *c* Reta wrecksite, *d* Valdés Peninsula, *e* HMS *Swift* wrecksite, *f* *Hoorn* wrecksite, *g* Monte León National Park, and *h* Atlantic coast of Tierra del Fuego

Argentina: Maritime Archaeology, Fig. 2 Dugout canoe known as *Canoa Correntoso* extracted in 1968 from the Nahuel Huapi Lake, close to the town of Villa La Angostura (Photograph from the Historical Museum Archive, Villa La Angostura, Neuquén)

probably belonged to local people who lived in the area between the late 1800 and the early decades of 1900 (Braicovich 2004 in Braicovich 2006: 62-3). However, like Fernandez and like Hajduk (Hajduk 1997 in Hajduk & Valentini 2002), she also points out the existence of rock paintings and radiocarbon datings of c. 2000 BP in Victoria Island in the Nahuel Huapi Lake, which suggest that the local aboriginal groups had been navigating in that area since much earlier times (Braicovich 2006: 55-6).

Far away from the Patagonian lake district, similar indirect evidence of seafaring comes from Isla de los Estados (Staten Island), east of Tierra del Fuego in the South Atlantic Ocean. The island has an archaeological record which goes back to 2700 BP, although no boat remains from those times were found yet (Borrero 2001).

Studies on Shipwreck Sites in the Río de la Plata and the Atlantic Ocean Coast

The Zencity Shipwreck

This site consists of a wooden ship found in 2008 in the city of Buenos Aires, in the riverfront district of Puerto Madero, a place where many landfills have taken place particularly after a harbor was built in the late nineteenth century.

The find took place during the excavations for an urban development construction complex called Zencity. The recording and excavation of the site was therefore conducted as rescue archaeology within a period of 90 days, as a Project of the Dirección de Patrimonio e Instituto Histórico of the Ministry of Culture of the City of Buenos Aires. A recent publication by M. Valentini and J. García Cano (Valentini & García Cano 2011) provides a summary of the main results achieved so far in the archaeological research of this site.

The Zencity wreck was a medium-sized (no more than 30 m of deck length) vessel, with a complete hold from bow to stern, and a design which optimized the use of stowage space. The in situ recording of hull and artifacts was done with the aid of the computer software PhotoModeler, which allows a 2D and 3D digital reconstruction.

The combination of the constructive characteristics of the ship and the analysis of the archaeological remains indicate it was a Spanish merchant ship which arrived to the city of Buenos Aires in the second half of the eighteenth century. Preliminary dendrochronological dating of various oak timbers places the ship's construction in the mid-eighteenth century.

The hull was made of European oak, which suggests the vessel was built in the northern region of Spain, where oak forests were available. This northern Spain shipbuilding tradition, known as Cantabrian tradition, made an intensive use of oak trees and produced vessels which were highly sought after due to their resistance, durability, and strength.

Regarding the artifact collection, the most abundant items are ceramic containers known as *botijas* (olive jars), which were found in the stowage sectors of the ship's hold (Fig. 3). Over 200 *botijas* of different sizes were found, both

Argentina: Maritime Archaeology, Fig. 3 Some of the botijas found in the Zencity wreck (Photograph courtesy of Mónica P. Valentini and Javier García Cano)

complete and fragmented. They all have a cone-shaped base and lack handles, a practical shape for sea transportation. There is evidence of wheel throwing for the manufacture of the body, while the neck could be finished by hand. Some of these *botijas* were found sealed with a stopper in place and with olive seeds inside.

The *botijas* from the Zencity wreck represent one of the largest collections in Argentina of this type of container. It was used in the oceanic trade between Spain and the port of Buenos Aires in colonial times and played an essential role in the transportation and storage of products for this remote region of the Spanish empire.

Other type of artifacts found in the site includes metal fittings such as wrought iron tacks, nails, and bolts, all of them consistent with the Spanish manufacture techniques reported for the period, as well as different types of smoking clay pipes, most of them fragmented. The rest of the collection comprises various metal, wood, and ceramic artifacts, as well as animal bone remains.

The hull structure of the ship was reburied in a nearby location that provides similar environmental conditions to the ones which had preserved the ship for so long. It was then covered with various layers of geotextiles and other materials which contribute to its preservation. The reburial site is monitored by constant soundings in precise locations which allow the control of variables such as humidity, salts, oxygen, and acidity.

As it is the case with other former European maritime powers, the study of merchant ships has been often neglected in comparison with warships built by or for the state, and the Zencity wreck presents an excellent opportunity to shed light on the topic.

The Reta Shipwreck

Reta is a seaside resort located nearly 600 km south of the city of Buenos Aires. Due to the presence of an unidentified wooden wreck located on the beach above the intertidal zone, in 2002 a joint team from the University of Rosario and the *Fundación Albenga* conducted a survey and excavation of the site (Fig. 4) that revealed a nearly 30-m-long structure. Subsequent metallographic and chemical studies made on samples of plates and tacks from the metal sheathing showed that the first consisted of a copper-zinc alloy (60 % and 40 %, respectively), which was patented by Muntz in 1832 and soon became of general use (Lorusso et al. 2003). On the basis of the survey and research, the authors have concluded that the ship very probably dates from the late nineteenth century (Valentini 2003).

Argentina: Maritime Archaeology, Fig. 4 Survey of the Reta wrecksite (Photograph courtesy of Mónica P. Valentini and Javier García Cano)

The Peninsula Valdés Project

The Valdés Peninsula in Chubut Province is a UNESCO World Natural Heritage site, featuring a spectacular marine wildlife. The nearby city of Puerto Madryn, gateway to the peninsula, is also the main scuba-diving destination in Argentina, offering a number of activities including shipwreck diving.

The context summarized above seemed to provide a good platform for developing public awareness and public outreach initiatives. With that general goal in mind, the PROAS team started a pilot project in the Madryn-Valdés area which comprised a preliminary survey of existing shipwrecks (both historic and modern), followed by a more detailed in situ recording and investigation of selected sites. In the long term, the Madryn-Valdés Project is expected to contribute to the development of cultural tourism in the area.

The first field seasons and archival research conducted in the initial stages of the project revealed the presence of some 30 shipwrecks and ship-related sites in the area, six of which were selected on the basis of their historical, archaeological, and/or touristic significance (Elkin & Murray 2008). The site that has been studied more thoroughly to date will be described below.

Bahía Galenses 2 (BG2) consists of the remains of an unidentified wooden vessel located in one of the Southern beaches of Puerto Madryn city. Lying in the intertidal zone, it consists of a 28-m-long section of a hull that was becoming increasingly exposed to the elements. A preliminary nonintrusive survey suggested that the original vessel may have been built in the eighteenth or nineteenth century.

With the goal of conducting a more specific assessment of the cultural and chronological affiliation of this wreck, two archaeological field seasons were carried out in 2006 (Fig. 5). The work consisted of the following (Murray et al. 2009):

- Completing a site plan of the exposed structure
- Digging several test pits around the perimeter in order to better understand the nature and position of the structure
- Excavating three cross section trenches in the middle and end sectors of the site (considered potentially diagnostic)
- Surveying diagnostic features of the structure
- Taking samples of the wooden structure, metal fittings, and any other material that could contribute to its understanding

The archaeological research revealed that the structure is part of a wooden-sailing ship,

Argentina: Maritime Archaeology, Fig. 5 Recording of structural components of BG2 site

probably a merchant or fishing vessel of 300–500 t burden, which could have sank due to a fire possibly around the mid-nineteenth century. Botanical taxonomic analysis indicated that European and American wood were used in the construction. Interestingly, the archaeological evidence seems to coincide with historical documentation that indicates the presence of a shipwreck in the area by the time the first Welsh settlers arrived, as well as with the reported salvage of wood from such wreck by the Welsh (Coronato 1997). This inference is based on the fact that some of the buried timbers show evidence of non-recent cutting with an axe or a similar sharp-edge tool. Further botanical and chemical analyses will be conducted for BG-2 seeking a better understanding of this wrecksite.

The HMS Swift

HMS *Swift* was a British sloop of war lost in 1770 after striking a sunken rock in the Deseado estuary, Santa Cruz Province, Southern Argentina.

The site was discovered in 1982 by local divers from Puerto Deseado at a depth of 18 m within what is nowadays the commercial harbor area. After several interventions in the site during the 1980s and early 1990s – mainly by the aforementioned ICOMOS-Argentina working group – since 1998 the archaeological research has been conducted by the underwater archaeology team of the National Institute of Anthropology.

The *Swift* is characterized by its outstanding preservation, constituting one of the most complete archaeological examples of an eighteenth-century Royal Navy sloop worldwide. This is mainly due to the anaerobic conditions created by the fine-grained sediment that covers the archaeological remains. It is estimated that about 60 % of the original wooden hull structure is preserved and the archaeological assemblage comprises a great variety of artifacts made of ceramic, metal, glass, wood, stone, and bone. Other organic remains have been found too, mostly associated with clothing, food, and rigging. During a field season conducted in 2005–2006, a complete human skeleton was unexpectedly discovered.

The general goal of the project was to record in situ as much of the hull structure as possible and to excavate selected sectors of the ship in order to address the main research themes under study: ship construction, contemporary technologies, relationship between material culture and status, diet, site formation processes, and, due to the finding of human remains, health and other bioanthropological topics. Along 15 field seasons conducted to date, significant progress has been accomplished (Elkin et al. 2007, 2011).

Regarding the study of the ship construction, the main results indicate that significant alterations have taken place in the rigging and the decks layout, probably with the purpose of adapting the vessel to transoceanic sailing and other aspects of its service.

The technological characteristics of the ship itself and the artifact collection is, in general terms, consistent with what was standard for the cultural and chronological period under study.

As for the relationship between material culture and status, despite the presence of Chinese export porcelain and other high-quality and elaborate artifacts associated with the officers, some other items they used, including furniture and personal belongings, were made quite coarsely or lacking decorative traits. It is worth noting, nonetheless, that some of the furniture was provided by the British Admiralty and would not necessarily reflect the officers' choice. Regarding the ordinary seamen, to date only a few artifacts can be associated to them. These mainly consist of leather shoes, wooden bowls or parts of them, and glass beer-type bottles.

The food remains found in the site allowed concluding that the diet was quite varied, including fruit and vegetables – although not necessarily fresh – and complemented with local resources such as penguin eggs.

The study of site formation processes revealed a significant attack of marine borers both in some sectors of the main deck of the ship and in some of the artifacts, the latter located at different depths within the sediment matrix. The characteristics of the tunnels correspond to those made by molluscs, although no living or dead specimens which could allow their precise taxonomic identification were found.

The discovery of human remains in the site opened a new line of research within the project, initially based on the hypothesis that they corresponded to one of the three men reported as dead after the sinking, two of which were private marines.

The bones correspond to a male individual, around 25 years of age (range 17–34), measuring 1.67 m of height, probably right handed, and with an overall good health. In turn, the analyses of several elements which were found in association with the skeleton such as buttons, buckles, and fragments of leather corresponding to spatterdashes indicated that the person found in the site must have been wearing a uniform of some sort. Additionally, chemical studies conducted on traces of cloth attached to the upper body revealed it was red wool like the jackets which were worn only by the marines.

On a parallel research strand, DNA was extracted from selected bone samples taken from the archaeological skeleton. However, the fact that it is mitochondrial DNA – only transmitted by females – poses considerable challenges in the tracking down of relatives. Nonetheless, genealogical studies will be conducted in an attempt to identify the skeleton found in the *Swift* site at an individual level.

The 2010 field season at the *Swift* allowed investigating the topic of health on board by means of excavating a compartmented wooden chest full of what seemed to be medicinal items. Most of the containers correspond to pharmaceutical vials of the time, an interpretation which is already being supported by the analyses of some of the contents (Edwards & Maier 2011 in Elkin et al. 2011). These include substances such as pure mercury – believed to cure syphilis – and extracts of natural substances which could have been used for treating various ailments.

The Hoorn

In the early seventeenth century, Dutch merchants Jacob Le Maire and Willem C. Schouten engaged in a major sea voyage in search of a new passage to the Spice Islands. Shortly after crossing the Atlantic Ocean, the two vessels of the expedition entered into the Deseado estuary, and one of them, the *Hoorn*, accidentally caught fire and was lost while being careened on the shore in 1615.

A bilateral research project conducted by Argentinean and Dutch archaeologists (Damián Vainstub and Cristian Murray, from PROAS-Argentina and Martijn Manders, from the National Service for Archaeological Heritage (ROB) of Holland) began in 2003 with the goal of locating and studying the remains of the vessel. The combination of a thorough review of various historical sources, an analysis of the coastal geomorphology, and some surveys along selected coastal zones allowed to locate the wrecksite. A few elements from the *Hoorn* were found on an intertidal pebble beach, although no structural remains of the ship could be seen. The main archaeological evidence comprised allochthonous rocks interpreted as ballast materials, various ceramic shards from the

chronological and cultural context under study, and melted metallic fragments made of pewter and brass alloys, silver, and lead (some of which contained carbon fragments and seeds inside), which surely resulted from the fire on board (Murray et al. 2007).

Subsequent side-scan sonar and magnetometer (Fig. 6) surveys, combined with selected scuba diving, focused on the adjacent seabed. This allowed the location of ferrous concretions which were later X-rayed, revealing the impressions of corroded iron artifacts such as nails, fittings, and bolts (Murray et al. 2007, 2008).

No hull remains were found underwater or on land, probably due to the combination of the dynamic environment of the location and to salvage activities that must have taken place along several centuries.

Despite the relatively few archaeological remains from the *Hoorn* that have survived, it is the earliest identified shipwreck site in Argentina to date.

Argentina: Maritime Archaeology, Fig. 6 Analyzing the images of the side-scan sonar survey in the Hoorn project

The Monte León Project

Monte León is a national park located in Santa Cruz Province, being the first one in the country's national parks system to include an ocean coastline and which stretches along some 40 km.

Although the entire Patagonian coast has been intensively explored – and eventually colonized – from the sixteenth century onwards, from the maritime history point of view, the central coast of Santa Cruz Province, where the Park is located, has an additional appeal: one of the vessels of Hernando de Magallanes, the Nao *Santiago*, was lost in the area in 1520, in the context of the renowned voyage around the world carried out between CE 1519 and 1522.

Partly due to this situation, which causes periodical amateur expeditions in seek of the famous wreck, but also with the more general goal of assessing the maritime heritage of the park, the PROAS team was requested to conduct a coastal field survey.

After an initial compilation of various sources which could shed light on the potential nature and location of archaeological remains related to seafaring in the region (including, of course, historical documents related to Magellan's expedition), two seasons were carried out in the park in 2006 and 2007, respectively.

The archaeological surveys were conducted along the intertidal zone, which not only was the most reasonable one for a baseline study but also because it was the one in which the various documents analyzed in relation to Magellan's expedition suggested that the *Santiago* was lost.

During both field trips, interviews with local people were conducted and the recording of materials previously extracted from the area took place.

Although no remains were found of the *Santiago* (nor any vessel from the period), the archaeological survey of the coast of the Monte León National Park revealed the presence of at least two wooden shipwrecks. Both of these probably date from the second half of the nineteenth century, both are between 300 and 500 t burden, and one of them was built with European woods (Elkin 2011). It is expected that future research will allow testing some hypotheses regarding which specific vessels the archaeological remains belong to.

The Atlantic Coast of Tierra del Fuego Project

The archipelago of Tierra del Fuego and surrounding islands is located at the southermost part of the Americas, and it is characterized by

quite challenging navigation conditions. Prior to the opening of the Panama Canal in 1914, seafaring between the Atlantic and Pacific oceans required facing the rough waters of the region, leaving behind a large number of shipwrecks which are reported in various historical accounts.

In 2010 the *Museo del Fin del Mundo*, based in the city of Ushuaia, set forth an archaeological project which includes the goal of locating remains of historical shipwrecks along the Atlantic coast of Tierra del Fuego island and conducting preliminary surveys on them. The first field season allowed to locate around 20 sites consisting of various types of shipwreck remains (Vázquez et al. 2010).

Future Directions

Along a decade and a half of development, and thanks to the aid of more experienced countries that have provided theoretical and practical training in maritime and underwater archaeology, Argentina is now quite well positioned in the field. Little by little the specialty is also attracting younger generations of students and graduates who engage in various activities such as courses, underwater and coastal work, and even in the production of university-level dissertations despite the fact that to date there are no regular academic courses run in maritime or underwater archaeology.

The awareness regarding the importance and fragility of the underwater cultural heritage is also increasing within the sport diving community and the general public. The Argentinean professionals who work in maritime archaeology periodically carry out courses, lectures, mass media interviews, and other activities that contribute to that goal.

Regrettably, however, the human and financial resources not only in Argentina but in the whole South American region are still too scarce to implement anything but small-scale projects, even without excavation. Additionally, the field of conservation of waterlogged materials is almost inexistent.

As for management, the national legislation provides a blanket protection for all underwater archaeological sites of at least 100 years of age, but due to the aforementioned scarcity of resources, the effective protection and management of such heritage is still far from becoming a reality. In the meantime, a central goal at the national government level is the development of a register of underwater cultural heritage sites, which will eventually be integrated into an archaeological register hosted at the National Institute of Anthropology. So far the data – obtained in the vast majority from written and oral sources – has been compiled either in the form of simple spreadsheets or in a database in access format. The next step will consist of starting to use GIS tools that can provide cross-references between the data and specific geographical locations. In turn, this will allow defining areas with greater or lesser potential for underwater cultural heritage and optimizing the planning and implementation of archaeological surveys. The use of remote sensing techniques, still very seldom used in the country, would certainly contribute to achieve such goal.

Last but not least, in 2010 Argentina ratified the UNESCO Convention on Underwater Cultural Heritage. Such a significant political step, combined with the existing basis of professionals and avocationals engaged in maritime and underwater archaeology, led to believe that the field will continue to grow and so will the knowledge of the maritime past of the nation.

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Cross-References

► Convention on the Protection of the Underwater Cultural Heritage (2001)
► Underwater Archaeology

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Arnold, Bettina

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Basic Biographical Information

Bettina Arnold obtained her B.A. in Archaeology from Yale University in 1983 and her M.A. and Ph.D. degrees in Anthropology from Harvard University in 1986 and 1991, respectively. She is Professor of Anthropology at the University of Wisconsin-Milwaukee, where she was the Co-Director of the Center for Celtic Studies from 2000 to 2009 as well as the Coordinator of the Museum Studies Graduate Program from 1996 to 2012. Her area of expertise is the pre-Roman European Iron Age, but in the course of her career she has participated in archaeological projects ranging from the Middle Bronze Age through the early medieval period in western Europe.

Major Accomplishments

Since 1999 she has co-directed an excavation project in southwest-Germany focused on the burial record of the early Iron Age Heuneburg hillfort and its environs; two burial mounds associated with this site were excavated by the Landscape of Ancestors project between 1999 and 2002. Finds from those excavations were featured in *Die Welt der Kelten: Zentren der Macht - Kostbarkeiten der Kunst*, a major exhibition in Stuttgart in 2012–2013. Her work has been directed toward the following specific research topics: the archaeological interpretation and analysis of complex societies, particularly as reflected in mortuary contexts; material culture as a symbolic system and a means of communicating social relationships; the archaeological interpretation of prehistoric gender configurations in burial contexts; and the socio-political history of archaeology and museum collecting, especially their involvement in identity construction in nineteenth and twentieth century nationalist and ethnic movements in Europe and the United States. She published a groundbreaking article on the use and abuse of archaeology for political purposes in Nazi Germany in *Antiquity* in 1990 that has been reprinted repeatedly since first appearing. In addition to founding and acting as Editor of the on-line peer-reviewed journal *e-Keltoi*, she is a member of numerous editorial boards, including the History of Archaeology series for Oxford University Press and the History of Archaeology Commission of the UISPP.

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▶ Engendered Archaeologies
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▶ Museums and Memory Experiences
▶ Nationalism and Archaeology
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Arqueologia Industrial

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Basic Information

Arqueologia Industrial is a biannual peer-reviewed academic journal published by the Portuguese Society for Industrial Heritage (Associação Portuguesa para o Património Industrial), which is the Portuguese National Representative of The International Committee for the Conservation of the Industrial Heritage (TICCIH), with the support of the River Ave Valley Textile Industry Museum, edited by José Manuel Lopes Cordeiro (Minho University, Braga, Portugal). *Arqueologia Industrial* publishes scholarly research, essays, and reviews of books published in the field of industrial archaeology and its museology.

Recent issues published articles on archaeological works in a lime kiln at Madeira Island, the social and urban space of Vista Alegre Porcelain Factory, or the archaeology of a Brazilian iron mill (seventeenth-eighteenth centuries). The debate on the creation of an international heritage charter on industrial heritage by ICOMOS with the cooperation of TICCIH was also discussed in current issues. Future directions will seek to address issues of industrial landscapes, reuse of industrial heritage, and the use of industrial heritage for tourism purposes.

Official website: http://www.museudaindustriatextil.org.

Major Impact

The first issue of *Arqueologia Industrial* was published in 1987, as a newsletter of the Industrial Archaeology Program of the University of Minho Archaeology Unit. Two numbers were published in 1987 and 1988. The aim was to create a periodical that would meet the interest on industrial archaeology which then began to assert themselves in Portugal. The success of this initiative led to transform the newsletter into a scientific journal, allowing a deeper approach of their subject. After finding a sponsor, the journal restarted its publication in 1993 with its second series, under the project of the River Ave Valley Textile Industry Museum, being published jointly by the Industrial Archaeology Program and the Vila Nova de Famalicão County Council, on a biannual publication frequency, but corresponding to a double issue. Unfortunately, due to several difficulties, the journal was forced to stop its publication, returning with its third series in 1997, under the project of the Oporto Museum of Science and Industry, and published two numbers, also on a biannual frequency. Due to the extinction of the Museum project, it was necessary to find another

editor, to allow its continuity. The solution was found in 2005, and the fourth series has been published jointly by the Portuguese Society for Industrial Heritage (TICCIH Portugal) and the River Ave Valley Textile Industry Museum, again with the sponsorship of the Vila Nova de Famalicão County Council. It has been published regularly ever since, maintaining the biannual frequency (a double issue), extending its contents also to research on Brazil's industrial archaeology.

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Basic Biographical Information

Güven Arsebük was born in Istanbul in 1936. He graduated from Robert's College and, inspired by his high school literature teacher, decided to study archaeology. At this time there were two different certificate programs: in prehistory and classical archaeology in the Archaeology Department of Istanbul University. Arsebük graduated from the prehistory program in 1962.

In 1963 and 1964, during his military service, he translated L.S.B. Leakey's *Adam's Ancestors: The Evolution of Man and His Culture* into Turkish. Following his military duty, he went to the University of Tubingen to study anthropology, genetics, Paleolithic, prehistory, and ethnology education for a year under the Thyssen scholarship. On return to Turkey he was assigned to Istanbul University as professorial assistant in 1966.

With a Fulbright scholarship he took lectures at the University of Chicago including human evolution from F. Clark Howell, science of Paleolithic ages from L. Freeman, Pleistocene geography from K. Butzer, and prehistory from Robert J. Braidwood. He received his M.A. in 1964.

Arsebük was promoted to associate professor in 1981, becoming a professor in 1990 following the publication of his book *Human and Evolution*.

Major Accomplishments

Arsebük is considered one of the pioneering archaeologists who developed anthropological and archaeological methods on the "human"-based approach. He, for the first time in Turkish archaeological tradition, examined an archaeological subject using an anthropological method in his Ph.D. dissertation titled "The Relations Problematic Between Karas Type and Dark Burnished Ware Pottery in Altınova."

After his undergraduate study he participated in many excavations and projects such as the 1958 Side excavations led by Arif Müfid Mansel, following on from 1959 to 1961 Hattuşa directed by Kurt Bittel. Arsebük also participated in the salvage and conservation project for ancient monuments of Lower Euphrates and Keban. As well, with Ufuk Esin, he worked on the Tepecik, Tülintepe, and Değirmentepe excavations.

Güven Arsebük led an international team in excavations between 1988 and 1990, revealing the oldest Paleolithic settlement in Turkey to date. The Yarımburgaz Cave, located in the Küçükçekmece district in İstanbul, was dated from 400,000 to 150,000 BP.

Güven Arsebük served as a representative of Istanbul University's Faculty of Literature for UNESCO from 1990 to 1993. He is a board member of the American Research Institute in Turkey, a member of the American Association of Physical Anthropology in New York, a founder and member of the Turkish Institute of Archaeology, a member of the Germen Institute of Archaeology, and a member of New York Academy of Sciences and of the Turkish Academy of Sciences.

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Art Studies: Normative Approaches

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Introduction and Definition

The theoretical proposals that search for regularities, or "norms," in different materials of the archaeological record have been very important since the beginnings of archaeology and are still foundations for current scientific research. Nevertheless, their success, failure, or relative advantages have been marked by the different interpretations that each theoretical approach has applied to the regularities found in the archaeological record.

For the archaeology of art, throughout the history of the discipline, various normative approaches have been developed, some with applications for portable art and others for rock art. These have varied according to particular situations in different academic contexts.

In the USA the normative approaches have been more linked to the general concepts of the "Culture-History School," which in its North American trend adopted particular features which differentiated it from similar approaches in other parts of the world. In this case, it was intimately linked to "normative theory" (sensu Binford 1965), which has applied fundamentally to portable art research, particularly in the study of pottery designs, looking for recurrent features that would allow the definition of "ceramic styles."

On the other hand, in Europe, the search for regularities in terms of shared norms has been

more related to postulates based on Structuralism, Semiotics and Cognition, and has been specifically applied to Paleolithic parietal art research.

Historical Background

Normativism Inspired in the "Culture-History School"

In spite of the fact that the "Culture-History School" has had great influence in the development of archaeology, both in Europe and America, in its specific relation to the archaeology of art, the North American branch of this school has been more prominent, particularly in respect to portable art and monumental art.

In North America the Culture-History School is best represented by the work of Whilley and Phillips (1958), in which "cultural areas" were defined for the American continent and "chronological-cultural periods" were proposed to tackle the pre-Hispanic occupation of the continent. The characterization of the areas and the periods was carried out from an inductive epistemology which held the notion that "culture" was a "mental norm" shared by the members of a society.

Such a notion starts from a passive vision of material culture, considering it as an expression of such mental norms. The temporal-spatial distribution of material culture with specific features was taken as an indicator of presence-absence of the "bearers of such norms," and these were understood as "archaeological cultures."

Art did not escape such conception, being interpreted as the materialization of ideas, and stylistic standardization as the graphic and concrete expression of cultural norms based on such ideas. Thus conceived, art in all its forms was taken as an indicator relevant to identify archaeological cultures, which helped in the characterization of periods and cultural areas.

The definition of "artistic styles" was carried out through the detailed description of designs and techniques of portable art and pottery (rock art was practically omitted from this and other theoretical frameworks of the American trend). After that, and following the identification of recurrent features, "styles" were defined, which were in turn associated, via induction, to a "culture" and to a "people."

Such "artistic styles" were considered as reflexes of cultural and symbolic norms of such people, whose members were seen as their "passive bearers." In sum, art was conceived as a passive means of expression of ideas, understood as "mental cultural norms."

These conceptions have had a great influence in the development of archaeology and a great part of the systematization of knowledge about American archaeology managed today has been established on its grounds.

In spite of these contributions, later theoretical proposals such as the New Archaeology have strongly criticized these conceptions and their results. In effect, Binford (1965, 2001) wrote a history of the development of "normativism" in North American archaeology, pointing out its important limitations and emphasizing that one of its more important flaws is to hinder the analysis of variability in the archaeological record.

In spite of the theoretical clash between the "normative theory" (sensu Binford) and Processualism-New Archaeology, there has been a great influence of the former over the latter. In effect, Lyman and O'Brien (2004) consider that as an alternative, many of the normative propositions are crystallized when they are explicitly used in the interpretations of the data generated by the New Archaeology followers. Thus, in relation to the archaeology of art, authors such as Deetz, Hill, Longacre, and Whallon (among other New Archaeology followers) developed studies of ceramic designs, and, when analyzing them statistically, they identified design groups which they interpreted as elements which were culturally and normatively significant (Lyman & O'Brien 2004).

Proposals Based on Structuralism, Semiotics, and Cognition

While in North American archaeology the "normative theory" was being developed, it was confronted with the "New Archaeology," and both were being applied in the archaeology of

art, particularly in portable art analyses. Simultaneously, in Europe other theoretical lines were being applied, particularly to analyze rock art.

In effect, postulates based on Structuralism, Semiotics, and Cognition started to be used towards the early 1960s, in order to face the study of European Paleolithic parietal art.

Such tenets, influenced by rationalist French thought, were applied mainly by Laming Emperaire (1962) and Leroi Gourhan (1965) to the study and interpretation of Paleolithic parietal art, considering that:

(a) It was the product of the projection of mental structures, crystallized in artistic creation.
(b) Such mental structures were organized through binary oppositions (proposed by Saussure's linguistics and Levi Strauss's structuralism).
(c) This was recognizable in rock art through the spatial distribution of specific motifs, which was not random but rather structured via determined oppositions and associations.

Taking these considerations into account, recurrences in motifs and their associations in specific places of the sites were searched for, interpreting them as symbolic expressions of myths, expressed via graphic forms, and which were spatially structured through dual associations (*mythograms*).

Specific combinations between motifs and with the bedrock topography entailed a specific meaning, whose analysis should be tackled considering them as the significant symbol associations and not as anecdotal tales of real or imaginary events. Such different combinations would have different meanings according to their topographic-iconographic structuration.

The analysis of these different topo-iconographical combinations should be carried out as if they were "grammatical structures," trying to access the underlying "syntax" or "grammatical code." Such analysis tended to access the knowledge of the "composition rules" which were implicit to the distribution of specific rock art motifs in specific bedrock locations, avoiding a literal interpretation or an exclusively symbolic interpretation, given that their deep meaning was actually lost.

Once the "composition rules" were identified, each of the two aforementioned authors carried out different structuralist analyses, focusing their attention on specific associations observed between animal figures and abstract designs of supposed sexual content. Each one constructed stylistic schemes using, also, elements of other theoretical approaches: such as diachronic cultural evolutionism and culture-history normativism, interpreting differently the nature of such recurrent combinations.

Such free interpretation within the same theoretical position, together with the identification of patterns which could not just be ascribed to a single "visual grammar," or to a specific "mythogram," is some of the main problems faced by this theoretical proposal.

Today, this proposal has been entirely discarded in terms of its interpretive aspects, but some of its contributions still persist and are mainly referred to methodological lines which provide relevant information, such as:

1. The search for chronological indicators in the combination of stratigraphic information with the assessment of superimpositions in art, the analysis of variations in techniques, and in stylistic conventions through time
2. The identification of the persistence of more than one "artistic style or stage" in relation to the duration of determined "lithic industry" found in an excavation
3. The interest for the study of the socioeconomic aspects of rock art production, as much as its social uses in the past, postulating that such aspects could only be accessible through the identification of recurrent patterns which are verifiable in the archaeological record

Problems, Contributions, and Perspectives from Normative Approaches

The proposals and applications of these normative theoretical frameworks need to be analyzed in the particular historical-academic contexts in which they were created and used. Only then can they be properly assessed in terms of their problems and contributions to current research.

Firstly, in the two mentioned cases, a great interest in *developing methodological tools* is observed: these are particularly oriented towards ways of tackling time and space in the analysis of different types of material culture related to portable art and rock art production. To this end, "periods" and "cultural areas" were established within American normative approaches, and "stages" and/or "styles" were defined within the French structuralism with cognitive-semiotic roots. This is understandable in these moments of history of archaeological research, in which absolute dating methods were lacking to date materials in the archaeological record (C14 dating was only available from 1955 onwards); thus, the priority was to have chronological referent for art's relative chronology and for its spatial distribution.

With the development of radiocarbon dating technique, and with the ample possibility of its use in excavated archaeological materials, around 1960 the urgent need to establish chronologies via relative methods diminished, although its importance did not (and does not) disappear, both for excavated materials and also, mainly, for most of rock art research.

In turn, the attempts to develop interpretive tools for regularities observed in the archaeological record were also product of particular situations of the trajectories of each of these theoretical proposals. Thus, *American normativism* was inclined to develop typological analyses, in order to observe similarities and differences in artifact types and complexes, with the end of identifying "archaeological cultures" and to determine limits among them. Established in this manner, each formal variation detected in the artifacts was interpreted as a chronological indicator. Such proposal was considered from the 1970s as a theory about "cultural transmission" in time and space. For this reason it was criticized, claiming that it ignored the great variability of the archaeological record, which was the product of intra- and intergroup differences in "cultural systems." Such criticism emphasized that the main wrong belief of normativism was to assume that archaeological societies were internally homogenous, in their organizational aspects and in their actions, leaving open and unexplained a possible explanation of the great internal variability documented for past and present societies (Binford 2001: 12).

The theoretical approaches based on *French Structuralism*, *Semiotics*, *and Cognition* frameworks, in spite of also having relative chronology as one of their main aims, they attempted a deeper kind of interpretation, trying not only to access the abovementioned "rules of grammatical visual composition" understood as a code of communication represented in parietal art but also proposed a complex explanation of symbolic character. Such explanation considered that the conceptual scheme of thought of prehistoric societies was based on dichotomies manifested in the recurrent associations of motifs which represented opposed principles of sexual nature, which identified a specific animal (horse or bison) with a specific abstract motif (lineal or figure) with a male or female principle, and which, associated to another animal, characterized with the opposed sexual character, formed a composition scheme. From this assumption they drew the conclusion of the existence of a male–female dualism in the representations, forming inextricable associations between topic and symbolism, which organized the ideological world of the Paleolithic societies. Such explanation was extremely criticized a posteriori, and due to this the interpretation about animal-sign sexual dichotomy was abandoned. Afterwards some of the most interesting ideas of this framework were pinpointed as useful, such as the importance given to context, the introduction of questions about the social organization of the art producers, and the interpretation of motifs as possible ethnic markers.

Key Issues/Current Debates

The search for recurrent regularities in the archaeological record, be it of artifacts, of designs, and/or structure features, remains the basis of archaeological research. On the grounds of such regularities, "categories," "types," "styles," "classes," and many other categories

used to "order" the apparent "chaos" in the past material record have been developed and used. In fact, as Gnecco and Langebaek (2006) state, such a kind of "organizing" thought, which they term "typological thought," is our guide, a lense through which we categorize the world around us (plants, peers, emotions, etc.), but although we cannot live without "typological thought," we can in fact escape from its tyranny. These authors (Gnecco & Langebaek 2006) understand "tyranny" as the inherent limitation to reduce the great world variability to manageable and narrow proportions, and they propose that to escape from such tyranny, it is necessary to:

(a) Accept that the already constructed typologies order the world does not mean that the world only fits in them and that we cannot invent new categories, new ways of interpretation, new analytical avenues.
(b) Remember that typologies have an unnecessary tendency towards universalization, which the scientific abuse of typologies gave them a universal character which is not part of their definition, given that typologies are only universal if the theory that builds them needs them to be.
(c) Understand that the typological tyranny essentializes and is ahistoric because it empties all categories of time and space.
(d) Recognize that typologies, as any other social product, do not escape from ideological struggle, and, for this reason, they are not neutral constructions but power mechanisms. In this sense, typological reasoning is, also, a political theory.

In respect of this latter point, the example proposed by Gnecco and Langebaek (2006) is very clear, since they stress that the bases for evolutionism were established on social typologies (savagery, barbarism, civilization) which translate cultural differences into temporal hierarchies, while such hierarchies supported the ideology on which the European colonial expansion was based during the nineteenth century. Hence, such process converted social typologies not in disciplinary findings but in mechanisms of colonial domination whose typological tyranny is hidden with arguments of objective neutrality.

These authors also assert that, in fact, the generalization of typological thought appears almost next to the formal origin of archaeology as a discipline and coincides historically with the formation of the nation-states and the nineteenth-century colonial expansion, which fostered ideologically the classical evolutionism which held the existence of cultural hierarchies. Later, following the same perspective, towards the 1960s, archaeological theory adopted neo-evolutionist typologies about society, which have had a great importance in the interpretations of the human social past. In fact, these have been used in a prescriptive manner, leading the archaeologists to be more interested in "confirming" the existence of types from a few cultural traces than to try to develop imaginative interpretations, sensitive to local contexts, inquiring into different dimensions of social life. Thus the tyranny of typological thought has reduced the interpretive spectrum in a dramatic manner (Gnecco & Langebaek 2006: ix-x).

For these reasons, the cited authors propose that, although typologies are inevitable (since they create nets of meaning in which symbols make sense), their "tyranny" can be faced in archaeological practice if they are used from a *critical*, *heuristic* perspective (as means to reach alternative and suggestive interpretations and not as ultimate and definitive ends) and not in a *prescriptive* manner (instead of using them as threads that need to be followed, they have to be used as constitutive parts of complex and connective weaves) (Gnecco & Langebaek 2006: ix-x).

International Perspectives and Future Directions

Following the considerations done by the previously cited authors, it can be said that it is important to (a) discern *recurrent patterns* in the archaeological record and (b) be *cautious* and have *ample criteria* when proposing interpretations about them.

In fact, the existence of regularities in the archaeological record, be they defined as "artifact types," "patterns of element associations,"

"recurrent features," etc., are the tip of the iceberg to make complex questions about past societies. The way in which these questions are asked and the ways designed to answer them will be the key to their success or failure when applying them as a significant research method.

With the archaeology of art, this is particularly important given that graphic designs offer a wide range of interpretive possibilities. In fact, beyond the abuses committed in terms of establishing "styles" in the traditional manner when studying portable art or rock art in different parts of the world, a wider approach to the analysis of these very same items can allow to ask more complex and varied questions about the societies that produced them.

To do so, it is important to open lines of inquiry that take into account "variability" at the time to interpret regularities observed in the archaeological record and its changes, searching for causal factors among them. In this sense the analysis of variability must always have three basic instances: (a) temporal variation (different chronology), (b) spatial variation (different society), and (c) intra-society variation (different function/s). This is applicable both to portable art and rock art, but they do require different approaches.

In effect, portable art has the same features than any other artifact, with the addition of bearing graphic representations. Therefore it can be analyzed with the same methods applied to study the archaeological record in general, adding some specific strategies to analyze its designs.

Rock art, instead, is different because the plastic representations have been made on top of natural media, without any "object" or artifact to bear them. This situation has led rock art to be left aside from archaeological research (mainly in the North American school), particularly because given it is not embedded in a sedimentary matrix, its relative chronological ascription was very difficult, and, until recently, its absolute dating was impossible; otherwise, it was studied from non-archaeological approaches but recurring to other disciplines (fundamentally in Europe, such as in France and Spain).

However, in other countries, interesting archaeological approaches to rock art have been developed. It is interesting to mention here that such countries are not central places in terms of archaeological theory and/or method development, and among them it is worth mentioning the cases of Australia and Argentina. Australia has greatly contributed to the development of "informed methods" (sensu Chippindale & Nash 2004), following the great number of works carried out in areas where Aboriginal communities still have direct links to the production – use – meaning of rock art. Argentina, in turn, has developed more in relation to the "formal methods" (sensu Chippindale & Nash 2004).

In effect, Gradin (1978) proposed an integral method for rock art analysis that attempts to differentiate rock art production in particular regions (space), through an archaeological sequence (time) and in correlation with different human groups (culture). Such an approach considers that rock art has to be studied at regional scale, articulating information from excavated sites and from rock art sites. He proposes the consideration of three fundamental aspects in rock art analysis:

(a) Topography: *spatial* location (position, accessibility, visibility, specific rock surfaces selection, etc.)
(b) Representation: rock art production processes as *material culture* (topic selection, graphic mode in which it is produced, techniques, etc.)
(c) Chronology: its position in the regional archaeological sequence (superimpositions, fallen rocks with rock art contained in datable sediments, etc.) to assess their consecutive production through time

With these criteria he developed analytical units (motifs, stylistic groups, stylistic modalities, etc.), and their presence-absence observation, spatial or temporal recurrence, etc., allowed him to establish rock art sequences in Argentinean Patagonia. His model was applied by other authors to specific areas of Northwest Argentina.

In spite of the fact that this methodology, which is very useful to establish regional

sequences, focuses mainly on temporal variability (a common situation in most part of archaeological typologies), its usefulness can be significantly widened if it is complemented by other approaches.

Rock art taphonomy (sensu Chippindale & Nash 2004) points out that "differential survival" of rock art images is a critical issue. This variable, however, presents serious difficulties when trying to estimate "comparative arts of survival" required to estimate the postdepositional processes – via natural or human agents – which could affect rock art at the scale of motif, site, area, or region. For this reason, it is important to take into account:

A. When analyzing the incidence of *natural processes*, assess:
   (a) The possibility of complete destruction of sites due to causes such as mass erosion or redeposition, typical of specific geological processes
   (b) The state of conservation of sites with current archaeological visibility, considering:
      1. Bedrock composition, surface processes (exfoliation, biotic growth, accretions, etc.)
      2. Degree of exposure to natural mechanical weathering agents (solar, wind, rain erosion, etc.)
      3. Features of the bedrock protection (e.g., drip line)
      4. Cardinal orientation of the site
      5. Natural agents acting locally and extension of their potential or real damage, among many other factors
B. When analyzing the incidence of human agents, conceived as the actions carried out after the production of rock art representations at a given moment of the sequence, it is important to assess:
   1. The production of new motifs superimposed to others previously made
   2. Events of repainting or reengraving
   3. Use of part of previous motifs to create new ones
   4. Premeditated total or partial destruction
   5. Total or partial cover with sediment or constructions product of later uses of the site

Rock art functions entail that the causal factors due to which rock art representations were created are fundamental variables to be assessed during research.

A-As noted above, the focus placed in the chronological appreciation of rock art resulted, in most cases, in the consideration that observed variation in a specific attribute ("type") assemblage was considered to have been caused by changes through time. This has been detrimental to the assessment of functional variation in rock art production.

B-Functional variation is understood as the diversity of representations that may have been made by the same society in a single moment of the sequence, due to different factors and for different purposes (sacred sites vs. domestic sites; male sites vs. female sites; territorial marks vs. aggregation sites, among many other possibilities). To assess the possible function that specific rock art representations may have had is critical at the moment of proposing interpretive approaches to it.

Both the considerations about *taphonomy* and about *function* are intimately connected with the considerations about *chronology*. In fact, to attempt the inference of a relative production sequence of rock art in a specific region, it is essential to assess both the possible differential occurrence of rock art due to postdepositional variables, as much as the existence of diverse types of rock art representations due to functional variables in specific chronological segments. Such interconnection is so vital that an erroneous assessment of any of these variables can lead to an erroneous estimation of the others.

Taking this into account, the construction of regional relative sequences becomes more complex since it not only requires the consideration of more variables but also of more research questions. Nevertheless, their construction is still a fundamental tool for rock art studies since it is a key to frame rock art in time and space, in order to articulate them with the general regional archaeological sequence.

Nowadays, even counting in some cases with the possibility of obtaining absolute dates with AMS, it is crucial to count first with a

well-established relative sequence, given that this sequence is the guide to the sampling process to date specific relevant motifs within such sequence. This procedure reduces the number of samples to date (avoiding unnecessary destruction), increases the strategy efficiency (covering the whole sequence and/or functional variables), and saves time and economic and professional resources.

Thus, the importance given the development of *regional rock art sequences*, taking into account all the mentioned variables, makes it possible to answer more complex research questions, thus putting the evidence provided by the archaeology of art in a privileged place within the regional studies of past societies.

Cross-References

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- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Binford, Lewis R. (Theory)
- ▶ Laming-Emperaire, Annette
- ▶ Leroi-Gourhan, André
- ▶ South American Rock Art
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Willey, Gordon Randolph

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Art, Paleolithic

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Introduction

Around 100,000 BP (before present), a new class of artifacts began to appear at archaeological sites in Africa and the Middle East. These items included pierced marine shells probably worn as personal adornment (e.g., Qafzeh, Israel; Oued Djebbana, Algeria) as well as pieces of bone and ochre that display deliberate nonfigurative markings (e.g., Klasies, South Africa; Pinnacle Point, South Africa; Blombos, South Africa). Additionally, the presence of red ochre and related materials to prepare this pigment (e.g., Blombos, South Africa) is present in Africa and the Middle East. These artifacts are often cited as the earliest evidence for the "creative explosion" associated with the *Homo sapiens* species, but until 40,000 BP, these potential examples of symbolic behavior remain infrequent and confined to portable objects. Around 40,000–60,000 BP, the frequency of symbolic artifacts increases. This is correlated with the spread of modern humans across the Old World. Around this time, rock art and sculptural art emerged. Paleolithic art is generally divided into three main categories:

1. Parietal art: Also known as rock art, this category includes all paintings, engravings, drawings, and stencils (Davidson 1997: 125) found on immovable surfaces such as the

walls, floors, and ceilings of rockshelters and caves. There is also some evidence in Europe of parietal art having been created in open-air settings (e.g., the engravings at Fornols-Haut in France and the Coa River Valley in Portugal). Due to taphonomic processes such as wind and rain, these outdoor decorated locations have generally not survived.

The majority of the paintings were done with either red or black paint, most commonly produced using red ochre and charcoal, respectively. However, there are also some sites where the mineral manganese oxide was used to create the black color. Other less common colors include yellow and brown (also derived from ochre) and in rare instances white paintings made using kaolin clay have been identified. Preparation was required to produce the paints, including the grinding of the pigments and the use of formulas created by mixing the color component with binders (e.g., water, urine, animal fat) and extenders (e.g., feldspar, biotite, talc, clay). Engravings were done using either a tool to mark the stone, or in cases where the surface included softer materials such as clay, a finger was sometimes used to create the image. The creation of drawings involves the use of dry material in the form of ochre crayons or charcoal sticks as opposed to the use of liquid paint formulas. Stencils refer primarily to the creation of negative hands, which were produced by a method known as spit painting, where the paint or raw pigments were blown over a hand placed against the surface in order to leave an outline.

2. Portable art: This subcategory includes all portable artifacts found at Paleolithic sites that incorporate a symbolic or artistic element. This includes everything from weapons or tools that have been embellished or decorated (e.g., atlatls) to plaques or pebbles that have been painted or engraved as well as the large number of figurines that have been found at sites across Europasia. The materials used to make these portable objects include but are not limited to stone, bone, antler, ivory, and clay.
3. Personal adornment: Most of these pieces are found in elaborated burials and appear to have been worn as jewelry. These artifacts are differentiated from the portable art by being items specifically produced to adorn the human body in some manner. The most common materials used to make these ornaments are pierced teeth, marine shells, ivory, and bone. Large numbers of ivory beads have also been recovered, many of which bear evidence of having been sewn onto clothing and headwear (e.g., the three elaborate burials from an Upper Paleolithic site in Sungir, Russia).

Paleolithic art can be divided into two categories: figurative imagery, which is defined as identifiable art and most often refers to animal and human depictions, and nonfigurative imagery, which includes all abstract or geometric images not easily identifiable as being real-world objects or entities. One type of imagery that appears to be absent at nearly all rock art sites older than 10,000 BP is landscape (e.g., trees, mountains, or rivers) as well as images of everyday life including structures such as housing. Even though the art found in different global regions is varied, there are several overarching themes that are identifiable at sites worldwide:

1. Animal imagery: While the specific subject matter might be determined by the environment in which the art is being produced (e.g., mammoths in Europe, kangaroos in Australia, eland in South Africa), the inclusion of animal imagery at rock art sites and on portable objects is almost universal. At Paleolithic rock art sites across Europe, animal imagery is usually the dominant theme (e.g., horse, bison, mammoth, ibex, deer), and many of the portable art pieces also include animals in their decoration.
2. Human imagery: Images of humans whether they are accurate representations or more stylized descriptions are also found at rock art sites globally. In some cases, these representations have been categorized as being therianthropic, appearing to portray a human-animal hybrid (e.g., the sorcerer at Les Trois-Freres, France). They are also found occasionally on portable

Art, Paleolithic, Fig. 1 Megaloceros, ibex, and human with protruding spears – Cougnac, France (Photo by J. Clottes)

objects. In Europe in particular, there is an entire collection of human figurines from the Paleolithic period (see discussion about these figurines in the "How Old is the Art?" section below). The inclusion of human images at rock art sites varies widely between regions, with them being fairly unusual at European sites but more common at contemporaneous sites in Australia.

3. Abstract imagery: Also known as geometric signs, these images include everything from simple dots and lines to more complex geometric shapes such as tectiforms or scalariforms (see Fig. 1). Geometric signs are found at rock art sites around the world, and in regions such as Europe, these abstract images outnumber the figurative representations at most Paleolithic sites (Bahn & Vertut 1997: 166). These markings are also found on many portable art objects, including items of personal adornment. While this category is often defined as including all images that are not recognizable as items from the mundane world, it has been argued that some of these markings could in fact represent weapons, tools, or other physical manifestations of human behavior (Figs. 2–4).

Art, Paleolithic, Fig. 2 "The sorcerer" – therianthropic figure – Gabillou, France (Photo by J. Clottes)

Art, Paleolithic, Fig. 3 Panel of geometric signs – Niaux, France (Photo by J. Clottes)

Art, Paleolithic, Fig. 4 Panel of hand stencils – Gargas, France (Photo by J. Clottes)

4. Hand imagery: This is ubiquitous in rock art and includes negative hand stencils, positive handprints, and stylized hands. Negative hand stencils are created when a hand is placed against a flat surface such as a cave wall and pigment is blown around it. When the hand is removed, a negative outline of the hand remains. Positive handprints are created when pigment is applied directly to the palm and the fingers of the hand, and the hand is then placed against a flat surface. Stylized hands are freehand drawings which often include abstract images. Hand imagery is subdivided into its own category as it cannot be presupposed that the intention of the Paleolithic artist was to reduce the representation of a human to a handprint or that a handprint could represent an entire human.

Definition

In its broadest sense, the term Paleolithic art encompasses all deliberately modified surfaces and artifacts created prior to 10,000 BP that were thought to have been produced with symbolic

intent. Traditionally Paleolithic art has been identified with symbolic artifacts and images found at archaeological sites from the Upper Paleolithic period in Europe, dating roughly between 10,000 and 40,000 BP. However, this expression is also sometimes used as a blanket term to refer to all parietal art, portable art, and personal adornment found globally and dated before the end of the Pleistocene period (before 10,000 BP). This art is generally associated with modern humans, though there are several artifacts from Europe that have been identified as being produced by Neanderthals (e.g., a necklace from the French site of Arcy-sur-Cure). There has even been recent speculation that some of the oldest art may have been created by Neanderthals, though this remains to be proven.

Historical Background

The discovery and acceptance of Paleolithic art was a gradual process that took place over the course of the nineteenth century. Beginning in the 1820s, portable art objects started being excavated at sites across Europe. Some of the earliest discoveries were in France, where they were believed to be of Celtic origin. It was not until the 1860s that the notion of these artifacts being from the Ice Age was proposed. This was partially due to a greater acceptance of geological chronologies of the earth, as well as discoveries of these objects in archaeological layers with ancient tools and extinct animal species (Bahn & Vertut 1997: 14).

While the recognition and incorporation of portable artifacts and items of personal adornment into the archaeological literature was fairly straightforward, the same cannot be said for the parietal art. The idea that art of this caliber could have been made by such "primitive savages" was hard for many of the Paleolithic archaeologists of the nineteenth century to accept, and it was not until the very end of the 1800s that parietal art was officially incorporated into the category of Paleolithic art (Bahn & Vertut 1997: 20). For example, in 1878 some wall engravings covered in calcite were noted at the site of Chabot in France along with the discovery of Paleolithic tools. While these were thought to be prehistoric in origin, the concept of this behavior being a regular occurrence took much longer to be accepted and was for the meantime ignored. At that time, Paleolithic archaeologists refused to believe that the bison paintings on the ceiling of Altamira in Spain, first discovered in 1879, could have been made by ancient humans due to their level of sophistication. However, as more and more parietal art was discovered, including sites where the images on portable art objects matched those on the walls, scholars finally came to accept the age of the art. By the early 1900s, many studies had been initiated to investigate this phenomenon further.

Key Issues/Current Debates

How Old Is the Art?

As previously mentioned, deciding which objects should be incorporated into the category of Paleolithic art was problematic in the past and is still a source of contention today. In fact, the term "Paleolithic" refers to tool industries found only in Europe, not those of Africa, Asia, or Australia. For this reason, many archaeologists prefer to use the term Pleistocene art. Instead of referring to archaeological materials from a particular region, the Pleistocene is a worldwide geological epoch that coincides with the last Ice Age and is thus a more inclusive term. The Pleistocene begins around 1.75 million years ago and ends around 10,000 years before the present. The emergence of art varies across the globe, but becomes abundant in the Old World around 35,000 years ago.

Africa: The earliest images from Africa come from the cape of South Africa in the form of abstract markings on different mediums. Engraved bones are present at Blombos Cave and Klasies River Caves. Engraved ochre is also present at Blombos Cave. The previously mentioned objects all date to around 70,000 years old. Around 60,000 years ago, inscribed ostrich shells are present at

sites such as Diepkloof Rockshelter. These objects were created during a period known as the Middle Stone Age (MSA). The MSA is preceded by the Early Stone Age and is followed by the Late Stone Age. Objects from the Middle Stone Age have been notoriously difficult to date as radiocarbon dating only extends to 40,000 years, and potassium/argon dating cannot be used on materials younger than 500,000 years old (McBrearty & Brooks 2000). Therefore, depending on the context, detailed stratigraphic knowledge must be combined with other dating methods such as argon/argon, infrared-stimulated luminescence, thermoluminescence, or optically stimulated luminescence. Figurative images are present on ochre slabs at Apollo 11, in Namibia and Nswatugi, Zimbabwe, and date to the late MSA, around 27,000–25,000 years ago. Figurative imagery may have an earlier origin, as ochre "pencils" were discovered at Klasies River dating to over 100,000 years and at Howiesons Poort to 65–80ka. Hematite "pencils" have been dated to 100,000+ years at Border Cave, South Africa. Additionally, unlike Europe, Africa lacks large limestone caves that have favorable conditions for preserving rock art (McBrearty & Brooks 2000).

Australia: Pleistocene art in Australia is difficult to date as much of the imagery was created in open-air settings and charcoal was not used. At present, archaeologists are only able to date charcoal and cannot directly date ochre. It is also challenging to numerically date engravings on a rock in contrast to objects that have been buried. Images in Australian art are diverse and include geometric signs, animals, humans, finger fluting, handprints, and chimeras. The oldest "art" in Australia comes in the form of cupules, circular depressions that are created on a rock surface. Cupules at Pilbara Northern Queensland, Turtle Rock, and Sandy Creek are thought to be at least 30,000 years old (Bednarik 2010). In terms of geometric forms, circular shapes on a bolder in Spear Hill/Abydos are dated to 20,000–27,000 thousand years ago with older symbols found in the surrounding vicinity (Bednarik 2010). Finger fluting at the Gallus site dates to at least 20,000 years. While much of the parietal art is difficult to date, relative chronologies have placed the artwork in a late Pleistocene/early Holocene time frame.

Asia: Although Pleistocene art is present in Asia, it has received little attention by archaeologists outside of Asia. As in Australia, cupules are arguably the oldest "art" found in Asia. In India, at Auditorium Cave a cupule with a line running along part of the edge was dated to the Acheulian (Bednarik 1994). As in other regions, statuettes and two-dimensional images were also created. An ostrich eggshell with engravings was found at Patna, India, and dated to 25,000 years before present. At Longgu Cave in China, an antler with geometric engravings was filled with red pigment and dated to approximately 13,000 years old. Recently multiple petroglyphs have been discovered in the South of India in the Kurnool and include naturalistic images of humans and animals. These images are dated to at least 10,000 BP. However, the objects that have received the most attention are the anthropomorphic and animal figurines from Mal'ta and Buret', Siberia. These ivory figurines date to around 23,000 years old.

Europe: The Paleolithic period of Europe can be divided into three major subdivisions: lower, middle, and upper. Each major subdivision can then be further divided. Both parietal and portable art emerge in Europe during the Upper Paleolithic. Specifically, the oldest rock art and figurines date to the Aurignacian industry, which begins in Europe approximately 40,000 years ago. Imagery continues to be created during the Gravettian industry (approximately 28,000–22,000 years ago). Common subjects include negative hands, geometric signs, and animals. Depictions of humans in European rock art are relatively rare, and animals such as horses, bison, and mammoths dominate cave walls. Although personal adornments are widespread by the Aurignacian, some archaeologists have argued that the ornaments from Grotte du Renne were created by Neanderthals in the Chatelperronian (for a critical view on this topic, see Higham et al. 2010). In regard to portable art, with the exception of the "Venus" of Hohle Fels and the "Venus" of Galgenberg, all of the

Aurignacian figurines are of animals. Starting with the Gravettian, an abundance of predominately female anthropomorphic figurines become widespread across Europe. Male figurines and those that lack secondary sexual characteristics can be found in collections at the following sites: Mal'ta, Kostenki I, and Dolní Věstonice. The anthropomorphic statuettes vary in size, material used, body position, stylistic features, and contextual details. The female figurines are commonly referred to as "mother goddesses" or "earth mothers," although evidence of a shared belief system has not been corroborated. Animal figurines were still created during the Gravettian and are found in abundance at Dolní Věstonice, Pavlov, Predmostí, Petrkovice, and Kostenki I, often in conjunction with female figurines (Bahn & Vertut 1997). Both animal and anthropomorphic statuettes continue to be created in the Magdalenian but become less realistic and instead are more stylized.

Who Made the Art?

The early interpretations of Paleolithic art reflected an androcentric bias in archaeology. It was commonplace to assume that the art had been made by men and small boys. One of the most prevalent of these interpretations focused on a male shaman producing rock art while in a trance. According to Bednarik (2008: 173), the shamanistic or totemistic interpretation of the rock art has remained popular theoretically because such interpretations add a greater "perceived value" or "worth" to the artwork. However, neither of these theoretical interpretations are scientifically testable, and the perpetuation of these androcentric interpretations further promotes an unsubstantiated bias in archaeology today (Sharpe & Van Gelder 2009: 324). A more current interpretation acknowledges that Paleolithic art was created by both males and females of varying ages. Preliminary studies employing the 2D:4D ratio (second to fourth digit) to determine sex from hand stencils have done so with a reasonable degree of probability. In addition, the presence of small handprints and footprints in caves such as Chauvet and Cosquer in France make it apparent that children were present and active within the caves as well. Regardless of age or sex, all of these interpretations have assumed that Paleolithic art was the product of anatomically modern humans alone. However, new uranium-series disequilibrium dates taken from calcite deposits overlying or underlying art found at a series of Spanish caves, most notably El Castillo, have turned this assumption on its head. With dates of up to 40,000 years, these finds suggest that Neanderthals could have also engaged in cave painting, but with modern humans already being in Europe by this time, it is hard to know who may have been the first parietal artists (Pike et al. 2012).

However, multiple personal adornments, colorants, and decorated bone tools were discovered in Châtelperronian levels at Grotte du Renne, Arcy-sur-Cure, France. This suggests that even if Neanderthals were not making cave art or mobile art, they were engaging in different artistic behaviors.

Why Did They Do the Art?

Since the discovery of the first portable and parietal art in Europe in the late 1800s, researchers have tried to understand why Paleolithic artists engaged in this behavior. "Art for art's sake" was a prominent theory of the nineteenth century referring to the belief that Paleolithic art had been created for decorative and aesthetic purposes only, but this theory has now largely been abandoned. Early functionalist theory relied heavily on ethnographies of "primitive" societies and correlating the need for food back to the images on the cave walls. The functionalist approach includes:

1. Hunting magic: This hypothesis was derived from ethnographies of modern hunter/gatherers who hunted with stone tools and produced rock art in order to enhance the success of their hunt. Animal imagery which includes "missiles," blood, and/or wounds has been used to support this theory. Other nonfigurative images have been interpreted as tracks and droppings to corroborate the theory that animal imagery was produced as a means of transmitting hunting knowledge.

2. Sympathetic magic: Like a "voodoo" doll, this theory relies on the concept that animals depicted in rock art influence animals in reality.
3. Fertility magic: This hypothesis was based on the discovery of pregnant and/or copulating imagery including the "precopulatory bison" of Tuc d'Audoubert, France, and the numerous "Venus" figurines.
4. Trophyism: This asserts that hunting was done as much out of necessity as it was to impress females. Animal imagery was produced by a male to impress a female with his hunting abilities and to ultimately increase his reproductive success.
5. Shamanism: This relies on the concept of a male shaman producing rock art while in a trance. Purported examples of shamanism in rock art include the "leaping cow" from Lascaux, France, the "sorcerer" from Les Trois-Freres, France, and the mammoth ivory half-man, half-lion figurine from Hohlenstein-Stadel, Germany.

Along with the above theories of meaning, there are also several major theoretical approaches that have been employed in the study of Paleolithic art; these include:

1. The *structuralist* movement was inspired by the linguistic works of Ferdinand de Saussure and first brought to popularity by the French anthropologist Claude Levi-Strauss. This approach rejected the "straight-line" development of art from simple to complex and from abstract to naturalistic. The creation of images were not unique artistic events, images were intentionally selected for by species type or abstract design, and they were created in specific locations within a particular site, in deliberate association to other images. Two of the main proponents of this approach within the field of Paleolithic art were Andre Leroi-Gourhan and Annette Laming-Emperaire.
2. Settlement archaeology developed out of the *processualist* movement and involved the study of the spatial distribution of human activities and particular occupations within a single room, house, overall site, or region where landscapes were passive backdrops. The focus was on demography, technology, how people used the land, and how the land constrained the people.
3. The *post-processualist* movement involves examining the social aspects, such as the material connection to the land and the human interaction with the land. Within this theoretical framework, there are three main ways that researchers have chosen to approach the art:
   1. Archaeology of place: Landscape was active and complex and recognized that cultural heritage was shaped through tradition and memory. People, places, and features are considered integral, and landscape is seen as shaping and being shaped by human experience.
   2. Social geography: This relies on the idea that Paleolithic peoples moved in and through the landscape and that a regional scale of analysis was required. While "meaning" may be culturally specific, the phenomenological approach or the conscious human experience of everyday life allows scholars to approach landscape and built locations, such as painted caves, as they were perceived, represented, and experienced by Paleolithic peoples.
   3. Pleistocene visual culture (Soffer & Conkey 1997) This relies on the argument that Paleolithic imagery is about materiality, meaning making and recognizing that Paleolithic peoples were active, social agents in constructing their world (Conkey 2009). The images they produced, in terms of materials, colors, shapes, placement, and association, are all part of creating meaning and are therefore integral to the larger picture.

Prehistoric Pornography?

As has been previously mentioned, the idea that adolescent boys created Paleolithic imagery may have influenced Guthrie's (2006) idea that the female statuettes and bas-reliefs were a form of prehistoric pornography. He argued that the mostly "naked" statuettes shared similar body proportions having small waists and broad hips; this is referred to as having a low waist-to-hip ratio. This body type is considered beautiful

cross-culturally and is also linked with fertility and overall health in females (Zaadstra et al. 1993; Singh & Singh 2006). However, upon analysis of the actual statuettes, Tripp and Schmidt (in press) found that the figurines actually share a high-average waist-to-hip ratio. This body type is not seen as attractive in modern populations and is linked to infertility and several mental and physical health conditions. Overall, the amount of diversity among the figurines in terms of style, contextual details, and materials makes it difficult to find a single explanation that can explain the earliest anthropomorphic art.

International Perspectives

At present, there is no one international means of rock art tourism and conservation, but rather, such decisions are made at each country's discretion. As a result, there is differential preservation of rock art around the world. In 1970, UNESCO created a set of guidelines for cultural tourism management and the preservation of World Heritage Sites with the intent to balance conservation efforts with providing cultural tourists with a meaningful experience through public education. South Africa's rock art sites receive around 240 million "cultural tourists" a year, and in consequence, the rock art is caught between the competing interests of impact assessors, who are concerned with the conservation, ethics, and ownership of the art, and those involved in the commodification, pricing, and promotion of the rock art as tourist attractions (Deacon 2006). The Dampier Archipelago of Australia contains the largest concentration of rock art in the world with an estimated million petroglyphs associated with other archaeological materials, such as shell middens and quarries. However, the archipelago has been threatened by years of development and industrialization, and it has led to the slow degradation of the rock art and the destruction of the cultural heritage over time (Mulvaney 2011). In 2007, the rock art paintings of the Sierra de San Francisco canyons of Baja California Sur, Mexico, were threatened despite the fact that they were on the UNESCO World Heritage List. Development of the land, in particular the plan to build roads through the canyons to create ease of access, threatened the art that had long been protected by its remoteness, the need for mules, and local guidance (Clottes 2008). In France, Lascaux Cave has long been endangered through the proliferation of a fungus initially brought on by the influx of tourists after the cave was first discovered. To save the art at Lascaux and Altamira in Spain, replicas of the caves were built which are open to the public. At other caves, controlled visitations, digital recordings, photographic archiving, and the production of virtual cave tours have all contributed to the preservation of the art. In all instances of rock art conservation, however, it is critical that we bear in mind that the greatest threat to the art is human in origin and that it is predominantly due to ignorance and a lack of interest (Clottes 2008).

Future Directions

Future directions in the study of Paleolithic art include incorporating theoretical background with innovative scientific techniques. Tosello and Fritz (2007), for example, experimented with a 3D scanner to record the imagery found on cave walls. This technology allows researchers the ability to record images in more precise detail. Investigators, for example, are able to scan images and screen out modern graffiti, darken lines that are deteriorating, and prevent the flattening of 3D images. They were also able to use this technology to analyze individual brushstrokes of two rhinoceros on the panel of horses in Chauvet Cave. Their results allowed them to make inferences about the intention, skill levels, and cognitive processes of the artist.

Since the antiquity of rock art was first proposed in Europe during the late 1800s, this continent, and in particular its western region, has held a preeminent place in the discipline. Europe has often been the benchmark against which other rock art is compared both in terms of stylistic analysis and temporal sequencing due

to the existing chronology of direct and indirect dates that have been collected from rock art sites. As interest and funding are directed towards the parietal art found in other parts of the world, it will be interesting to see how this affects the current assumption that the oldest art in the world is from W. Europe. Additionally, as dating methods improve, this will be able to ask more precise questions. As the many examples cited in this entry show, there are in fact sites from the Paleolithic period around the globe, and as new dating techniques are applied at these locations, we may find that the time line for the origins and dispersal of this behavior will need to be completely rewritten.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Australian Paleoart
- ▶ Bone Tools, Paleolithic
- ▶ Côa Valley Rock Art Sites
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Conkey, Margaret Wright
- ▶ Crimean Upper Paleolithic
- ▶ Cueva de las Manos, Río Pinturas Cave Art
- ▶ Davidson, Iain
- ▶ East Asia: Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Paleolithic Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ *Homo sapiens*
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Kostenki: Geography and Culture
- ▶ La Riera Cave: Geography and Culture
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ Paleoart Studies: Scientific Methods
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Siega Verde Rock Art Sites
- ▶ Valcamonica Rock Art

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Ash: Geoarchaeology

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Introduction

Ash plays a significant role in archaeology both as a building block of stratigraphic accumulation and also as an alkaline source in taphonomic pathways. It is found all over the world and can be of considerable value in understanding cultural activity. Ash is a major component of many cave stratigraphies (e.g., Brochier 1983; Berna et al. 2012; Shahack Gross & Ayalon 2012), where leaching is minimal and occupation or animal stabling has occurred regularly throughout history. Ash also occurs at open-air sites under arid climatic regimes (Cremaschi & Trombino 1999), in pit fills where the shape and bulk of the deposit discourages dissolution, and in layers where the surrounding sediments are sufficiently alkaline (e.g., Canti 2007).

Definition

The word "ash" covers the remains of any burnt material and appears commonly in nineteenth- and early twentieth-century chemical analysis meaning "the component that cannot be oxidised." In practical parlance, however, it refers to the material left over from solid fuel fires. Archaeological ash can occasionally be the result of coal burning, particularly with the growth of industrial archaeology; however, in most cases, ash found in excavations results from the burning either of plant material or dung derived from herbivores. This entry will deal only with ash from plants and dung.

Historical Background

Although ash was reported from excavations throughout the twentieth century, it has only been studied analytically during the last 50 years or so. As with other aspects of archaeological science, early analytical studies did not approach the subject systematically, so an understanding was only built up slowly from individual pieces of work, such as the elemental analyses of ash mounds in central southern India (Zeuner 1959).

Folk (1973) was the first to indicate the true botanical origin of the calcium carbonate which forms a large part of many ash bodies, but this material and its relationship to the more siliceous ashes derived from grasses and herbivore dung (see below) was not fully understood until the work of Brochier (1983; 1996) and Brochier et al. (1992).

Subsequently, the major focus for published work on ash has been the diagenetic pathways in the Mediterranean and Middle Eastern caves. In these environments, ash, guano, and bone provide uniquely reactive contextual chemistry involving transformation pathways of numerous different phosphatic minerals, which enable valuable interpretations to be made both of the original inputs and the preservation of the environmental remains (Karkanas et al. 2000; Stiner et al. 2001).

Key Issues and Current Debates

What Is Ash?

Various parts of plants have been burnt throughout history by all cultures to produce heat.

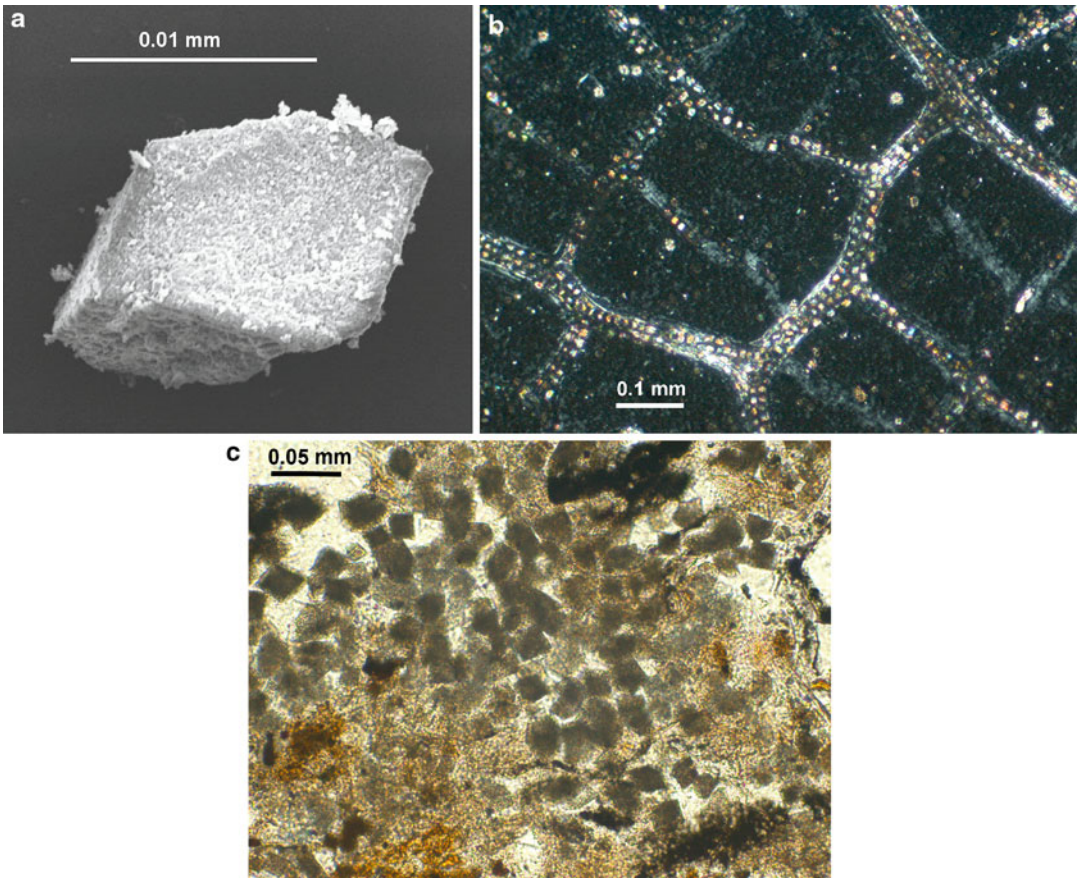

Ash: Geoarchaeology, Fig. 1 (**a**) Prismatic calcium oxalate crystal from *Laurus nobilis* (SEM photo), (**b**) prismatic crystals in leaf veins of *Quercus robur* (bleached whole leaf in crossed polarized light), (**c**) prismatic crystals converted to calcium carbonate in modern bonfire ash from mixed sources (plane polarized light)

The materials used can range from fine grasses to woody stems with leaves or logs from large trees. All these plant products are predominantly made of carbon-rich compound such as cellulose and lignin which burn away. However, they also contain a significant mix of mineral components that are left behind (either intact or modified) to become the ash layers found in archaeological excavations. The major mineral components are calcium carbonate (derived by burning from calcium oxalate crystals in the original plant) and silica which mostly comes through unchanged from phytoliths in or around plant cells.

The calcium oxalate crystals come in two major forms, both of which are preserved in the final ash body. The first of these is prismatic crystals, which form various rhomboidal shapes and commonly line the veins in leaves of numerous plant species (Fig. 1). The second is druses, which are aggregates of radially deployed crystals typically found lining veins or in the parenchymatous tissue (Fig. 2).

The shapes of the opaline silica remains are highly variable. Some form discrete bodies known as phytoliths, while others result from encrustation of the cells and retain a cellular shape after the organic remains have burned away (Fig. 3).

These compounds represent two major trends in plant mineralization. Some form of silica is present in most plant species but especially rich

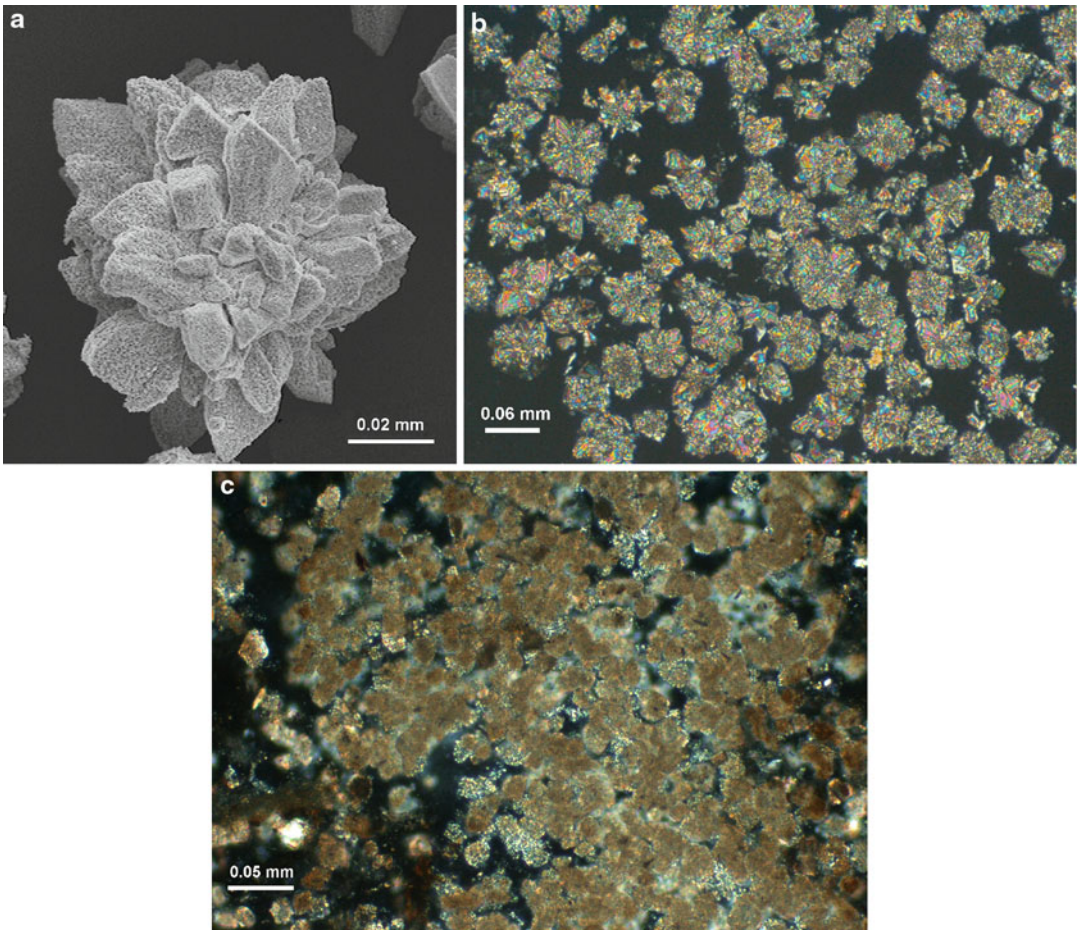

Ash: Geoarchaeology, Fig. 2 (**a**) Druse crystal from *Rheum raponticum* burnt at 700 °C (SEM photo), (**b**) druse calcium oxalate crystals from *Rheum raponticum* (crossed polarised light), (**c**) druse crystals converted to calcium carbonate in modern bonfire ash from mixed sources (plane polarized light)

in the grasses; calcium oxalate is widespread in herbaceous plants and trees but is absent from the grasses. There are other mineral components in ash, and there are further complexities in the physiological and botanical relationships. A more complete discussion can be found in Canti (2003).

An additional modified form of ash occurs when some of these components become fused together. This happens when the ash contains a significant proportion of fluxing agents such as sodium and potassium which lower the melting point when mixed with silica (Robinson & Straker 1991). The results can vary from delicate crisp frameworks of the original plant silica through to lumps of glassy clinker-like material, sometimes vesicular (Fig. 4) due to gas bubbles developing in a liquid melt (Folk & Hoops 1982; Canti 2007).

Once ash has been fully mineralized, the resulting chemical mix has considerable value to people without access to modern chemicals. Careful species selection can make for worthwhile differences in the salts obtainable from ash – a fact still exploited by non-Western peoples today (see Lemonnier 1984). The chemical makeup is variable but is frequently of such a composition that it can be used to glaze ceramics, usually with small additions of clays or other oxides (Rogers 1991). A long tradition of

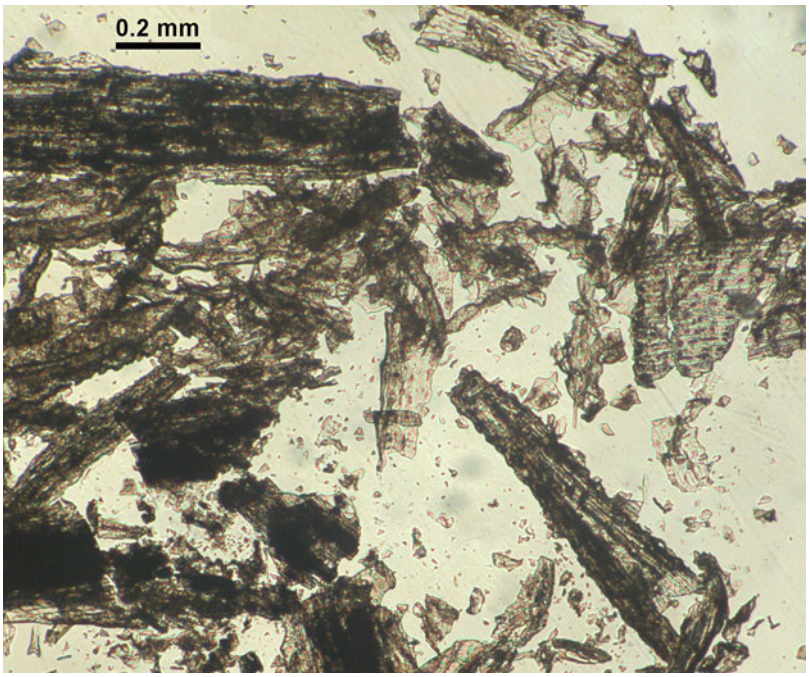

Ash: Geoarchaeology, Fig. 3 Silica remains of burnt *Equisetum* sp. (plane polarized light)

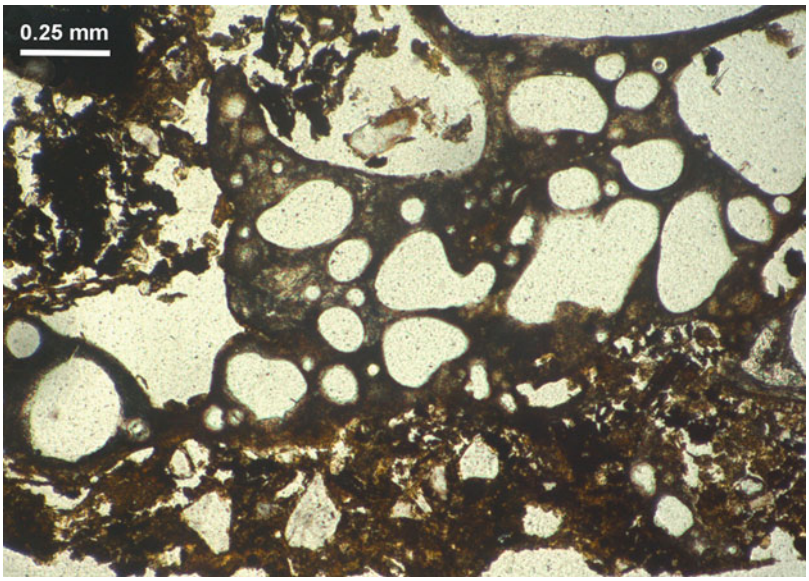

Ash: Geoarchaeology, Fig. 4 Vesicular ash melt from excavations in Woolmonger St., Northampton, UK (plane polarized light)

ash glazing built up in Asia over the last 1,000 years, producing some of the most exquisite ceramics (see Leach 1940). The melting characteristics of ash also made it one of the first major ingredients used in glass manufacturing (Turner 1956).

The predominant geographical location of ash research has been cave studies in calcareous Mediterranean rocks. In conjunction with the use of polarized light microscopy as a major analytical method, this has led to a particular emphasis being placed upon distinguishing geological

and pyrogenic calcium carbonate. The stratigraphy in these locations commonly contains both forms of calcium carbonate, and they are often difficult to tell apart under the microscope. Although the modified calcium oxalate crystals are easy to recognize intact, they can disintegrate or become compressed and sometimes recrystallized in such a way as to obscure the differences in origin.

Two approaches have been employed to try and achieve the desired distinction. Firstly, comparison of the different calcite peaks produced by infrared analysis can distinguish the main forms of calcite in sediments where recrystallization has not occurred (Regev et al. 2010). Secondly, examination of C and O isotopes distinguishes the sources because of the differences in the original isotopic composition of the plant matter, air, and limestone which form the inputs.

As well as successfully separating the ash from the rock, the isotopic approach has raised further questions by showing that the ash itself has different isotopic compositions (Shahack-Gross et al. 2008). These differences arise primarily from the fact that there are two distinct pathways to the formation of calcium carbonate from calcium oxalate. The first is a low-temperature (400–500 °C) transformation in which $CaCO_3$ forms directly by loss of CO, i.e., simply re-deploying the carbon already in the crystal (Dollimore 1987; Frost & Weier 2003, 2004). The carbon in the plant oxalate will be isotopically consistent with the fuel plant's photosynthetic pathway and will thus tend to fall into one of the well-known C3- or C4-type plant carbon groupings.

The second is the high-temperature transformation which goes through modification stages similar to traditional lime burning for mortar and plaster. At around 600–700 °C, carbon dioxide (CO_2) is given off leaving quicklime (CaO) which then hydrates to form calcium hydroxide $Ca(OH)_2$. Over time, this hydroxide absorbs atmospheric CO_2 to reform calcium carbonate ($CaCO_3$) again. A combination of these two pathways inevitably occurs in real fires, and the isotopic compositions of archaeological ash can thus be shown to reflect mixing lines involving the original plant matter, as well as atmospheric and geological inputs (Shahack-Gross & Ayalon 2012).

Folk (1973) pointed out the potential value of calcitic ash for radiocarbon dating based on the chemistry of this high-temperature transformation in which the carbonate from atmospheric sources would have a radiocarbon date the same as the atmosphere at the time of the fire. However, he did not allow for the low-temperature form of transformation in which calcium oxalate changes to calcium carbonate without atmospheric inputs. This type of transformation would lead to a radiocarbon date similar to the carbon in the original oxalate crystals, and thus be analogous to the "old wood effect" where charcoal used for dating a layer is found to be older than the formation of that layer.

In an effort to clarify the potential of plant ash for radiocarbon dating, Regev et al. (2011) burnt different plant materials of known radiocarbon characteristics at different temperatures and compared the results from the ash with the results from the original material. They found that, when burnt at low temperature (500 °C), the ash largely retained the original calcium oxalate radiocarbon concentration but with a slight shift towards atmospheric concentrations. As would be expected, all the material burnt at high temperature (900 °C) showed complete CO_2 exchange with the atmosphere. The mechanism for the low-temperature shift remains unknown.

International Perspectives

The high percentage of calcium carbonate that characterizes most ash means that its archaeological occurrence at outdoor sites is inevitably negatively correlated with rainfall and, apart from the wet tropics, tends towards a similar relationship with latitude as well. In more northerly climates, the calcareous component of ash is commonly leached away, and only the charcoal is left behind, attesting to its former presence. Sites on calcareous geology will retain ash where it gets sufficiently buried to be protected against leaching. These cases are sometimes deep pit fill deposits associated with domestic waste disposal or industrial installations

such as the corn drying ovens at Grateley, Hants, UK (Cunliffe & Poole 2008). Rare occurrences are sometimes found elsewhere, if enough alkaline material is present. At Flixborough, Humberside, UK, blown siliceous sand with only a minor calcareous component was deep enough to preserve ash in significant quantities, influencing the taphonomy at the site and retaining Anglo-Saxon bone layers in very good condition (Canti 2007).

Further south, ash deposits are more commonly found, and the analytical value can be high in situations where the burning of plant matter is accompanied by other lines of evidence. In particular, information from the more detailed botanical attribution of plant silica remains, and the concentrations of fecal spherulites (calcium carbonate remains from dung) can together stimulate deductions about industrial or agricultural activity. The Numidian layers at Althiburos in northern Tunisia, for example, were composed of ashy sediments that provided excavators with insights into the detail of animal keeping and domestic life (Portillo & Albert 2011). Concentrations of inflorescence or whole plant phytoliths, in association with fecal spherulites, provided information on feeding style and seasonality, while spherulites in oven ash showed the use of dung as fuel. At Atar Haroa, an Iron Age site in the Negev Highlands of Israel, Shahack-Gross and Finkelstein (2008) were similarly able to distinguish indoor ash deposits derived through dung and wood burning from external dung-only deposits by utilizing phytoliths and spherulite analysis.

Dung burning appears to be the central reason for the huge ash spreads that occur in parts of central Africa and southern India. These are mounds many meters high in some cases or covering hundreds of square meters in others. They contain elements of ordinary soil, ash, and fused ash – the latter being the reason for much analytical discussion (Zeuner 1959; Allchin 1963; Thy et al. 1995). Cattle dung was piled up at various times in history and prehistory and then deliberately or accidentally burned producing enough heat to cause fusion (see above).

Future Directions

If the shift towards atmospheric carbon shown by Regev et al. (2011) could be understood, it might open the way to using ash for radiocarbon dating. In practical application, there would still be the problem of diagenetic alteration, as ash in the presence of water can undergo calcium carbonate precipitation at any time between deposition and excavation, and that would be likely to introduce carbon from other sources. However, it could be possible to overcome this through careful sample selection, perhaps using microscopy or isotopic separation.

The greater detail recently made possible in the isotopic distinctions of ash types and their formation pathways clearly gives a new direction in the study of this remarkable material. As ever with archaeological science, the challenge remains in taking the laboratory understanding out to the field and using it to produce real interpretations among the indistinct or mixed contexts of real-life archaeological sites.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Charcoal: Preservation and Conservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Site Formation Processes
- ▶ Taphonomy in Human Evolution

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Ashby, Thomas

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Basic Biographical Information

Thomas Ashby (1874–1931) was an archaeologist who specialized in the study of the topography of ancient Rome and its hinterland, the campagna romana. Born on October 14, 1874, he was the only child of Thomas and Rose Ashby, Quakers who owned a brewery in Staines, Middlesex. After Winchester College, Ashby won a scholarship to Christ Church, Oxford, studying ancient history, classics, and archaeology with Francis John Haverfield and J.L. Myres. He pursued a doctorate on Roman antiquities, exploring the hinterland of Rome in the company of the British and American Archaeological Society of Rome which included his father as well as the distinguished Italian archaeologist, Rodolfo Lanciani (1845–1929). He died while on a visit to London on May 15, 1931.

Major Accomplishments

In 1902, he became the first student of the British School at Rome, continuing this institutional association when he became the school's assistant director (1903–1906) and then its third and most distinguished director from 1906 to 1925. During his directorship, with Eugénie Strong as his assistant director from 1909 to 1925, he established the school as an academic force in Italy, overseeing the move to the present location in the Valle Giulia and winning critical operational support from the British government's newly founded British Academy in 1919. In 1924, the school's executive committee decided not to renew either Ashby or Strong after 1925 to the dismay of the academic community in Rome. Thereafter, Ashby, who had married May Price-Williams in 1922, moved to a small apartment in Rome, where he lived until his death in 1931.

Ashby was primarily a topographer of Rome and its hinterland during the Roman period. As an avid photographer and walker, he followed the Roman roads and aqueducts out of the ancient metropolis, mapping them as he did. He was also a serious bibliophile, assembling a significant library of post-Renaissance books about Rome and its hinterland. The most important of a prodigious number of publications included many essays and reports on the monuments in the campagna romana, which later formed the nucleus of his popular book, *The Roman Campagna in Classical Times* (Ashby 1927), and his encyclopedic, posthumous masterpiece, *The Aqueducts of Ancient Rome* (Ashby 1935). He also published important studies of metropolitan Rome such as a revision of Samuel B. Platner's *A Topographical Dictionary of Rome* (Platner & Ashby 1929) and *Turner's Visions of Rome* (Ashby 1925).

Ashby's interests were not confined to antiquity. This energetic scholar also studied Sardinian nuraghi and the prehistoric megalithic tombs of Malta and Gozo and wrote an ethnographic study on Italian life and folklore: *Some Italian Scenes and Festivals* (Ashby 1929). His collection of photographs, besides his archive of notes, remains an important source for the study of Italy before mechanized agriculture and of Rome as it was being made into a capital city. Deeply respected by his Italian contemporaries, this shy and serious scholar established a benchmark for topographic fieldwork in Italy that was not surpassed until the 1960s.

Cross-References

► Infrastructure in the Roman World: Roads and Aqueducts
► Topography of Rome

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Ashmore, Wendy

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Ashmore, Wendy, Fig. 1 Wendy Ashmore (Photo by Amy Goldenberg)

Basic Biographical Information

Archaeologist, anthropologist, and mentor, Wendy Ashmore was born on June 26, 1948 in Los Angeles, California. In the 1950s, at the height of McCarthyism, her family moved to Mexico City for a year. The experience fueled her interest in Mesoamerican studies. Educated at the University of California, Los Angeles (B.A. in Anthropology, 1969), and University of Pennsylvania (Ph.D. in Anthropology, 1981), she taught at Rutgers (1981–1992) and the University of Pennsylvania (1992–2000) before joining the faculty at the University of California, Riverside. She has carried out archaeological investigations of ancient Maya and neighboring Mesoamerican peoples in Guatemala (Quiriguá), Honduras (Gualjoquito, Copan), and Belize (Xunantunich). Notable in its appreciation for the significance of empirical data and their relationship with theory and practice, Ashmore's research led successively over the years to new ways of thinking about settlement patterns, the significance of households, civic planning, and their linkages with landscapes, cosmology, and gender. Paramount across all of these is the social use and understanding of space. By exposing the social contours of archaeological spaces, Ashmore's work led the way for nuanced studies of the diverse peoples that make up any past society (Fig. 1).

Major Accomplishments

Ashmore's initial research at Quiriguá (1975–1979) and Gualjoquito (1983–1986), the later codirected with Edward Schortman and Patricia Urban, were among the first studies of prehistoric settlements and households. Examining a 96 km^2 area adjoining and in the periphery of the Maya center of Quiriguá, Ashmore (1979, 2007) identified the varied lives of Quiriguá residents and how these resonated with broader social and political dynamics.

Ashmore's pioneering research in settlement and household archaeology in the 1970s and 1980s helped elevate these studies to their now central position in archaeology. In two seminal volumes, *Lowland Maya Settlement Patterns* (1981) and *Household and Community in the Mesoamerican Past* (1988, coedited with Richard Wilk), she and her colleagues synthesized past

research, defined relevant social constructs and their archaeological correlates, and suggested fruitful avenues for future scholarship. These volumes remain defining statements; they set the stage for the post-1980s explosion of settlement and household studies in Mesoamerica and beyond that allowed archaeologists to expose the lives of the full range of people in ancient societies.

Archaeological theory in the 1990s was framed by a strong dichotomy. In broad brushstrokes, American processual archaeology, espousing a scientific epistemology grounded in cultural materialism, neoevolutionism, and cultural ecology, was contrasted with European postprocessual archaeology, which favored historical explanations, employing hermeneutic and critical epistemologies to understand symbolic and ideological aspects of past societies. Ashmore's research played an important role in bridging these two poles. By critically thinking through the concept of social process – a concept with roots in processual archaeology – Ashmore was able to show how the archaeological record was simultaneously material and conceptual and part of an ongoing construction of its inhabitants in a manner that was convincing to processualists and postprocessualists.

Ashmore's Copan North Group Project (1988–1989) was pivotal in crystallizing such an approach. Through detailed excavation and analysis of architecture, iconography, artifacts, and burials at Copan's North Group, she demonstrated that the Classic Maya expressed ideational beliefs through material and spatial forms that were accessible to archaeologists. In her groundbreaking article "Site Planning Principles and Concepts of Directionality among the Ancient Maya" (1991) and in many subsequent articles and book chapters in English and Spanish, Ashmore's work in spatial archaeology has shown that how people organize and conceptualize space, shapes and is shaped by society and social action (e.g., Ashmore 1998; Ashmore & Sabloff 2002).

This larger project led to another field defining work: *Archaeologies of Landscape* (1999, coedited with Bernard Knapp), a volume in which themes that Ashmore previously developed within Mesoamerican archaeology were applied to studies from around the world. Later, Ashmore (2006) brought landscape archaeology into productive concert with gender studies by illustrating how gender and landscapes can be co-constituting.

Bringing together previous interests, as the Archaeology Division of the American Anthropological Association's Distinguished Lecturer in 2000, she developed an approach to socializing the spaces of the archaeological record demonstrating how spaces, places, and landscapes are cultural domains that are lived and experienced differently by people across their lives. This lecture "'Decisions and Dispositions': Socializing Spatial Archaeology" later published in *American Anthropologist* (2002) illustrated that by socializing spatial analysis, archaeologists could reveal people's materialized "decisions and dispositions" throughout the life histories of the places they study.

Her long-standing interest in invigorating, rather than silencing, the varied voices in archaeological thought came together in an edited volume *Voices in American Archaeology* (2010, coedited with Dorothy Lippert and Barbara Mills). This volume brought into dialogue diverse voices of the discipline to consider the political and professional implications of archaeology and its future.

For Ashmore, research and scholarship always entailed pedagogy and mentorship. Prominently seen in the Xunantunich Archaeological Project (1991–1997), codirected with Richard Leventhal, she developed research as a vehicle for her students. Through regional settlement, household, and community survey and excavation in the environs of the polity capital of Xunantunich, Ashmore and her students explored the social, political, and ideational underpinnings of life in the region as Xunantunich rose and fell (e.g., Ashmore 2010).

Respected as a teacher and colleague, Ashmore has received numerous teaching and service awards. Her role as a mentor extends beyond her students and colleagues to

a broader arena through two textbooks – *Discovering our Past* and *Archaeology* – used in classrooms national and internationally (Sharer & Ashmore 2003; Ashmore & Sharer 2010). The former has been translated into Chinese and Polish.

Since the 1970s, Ashmore has employed theoretically sophisticated methodologies and problem formulations to provide increasingly textured interpretations and understandings of the evidence, the society, and even the methodology itself. Throughout her career, she has defined significant new fields of archaeology from settlement and household to landscape studies and reformulated fieldwork to expose the peripheries of sites and explore ideational domains. These contributions have been accompanied by increasingly nuanced interpretations and understandings of the diverse and changing social structures of Mesoamerican societies. Her work influenced even her critics due to its considerable attention to empirical evidence.

Cross-References

- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Landscape Archaeology
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Complex Society Development

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Asian Paleolithic Association (APA)

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Basic Information

The Asian Paleolithic Association (APA) is an international organization which aims at

promoting and enhancing the academic communication of Paleolithic Archaeological and Paleoanthropological research in Asia. In 2007, an agreement was made by the representatives from Russia, China, Japan, and Korea, which addressed the establishment of an association on Paleolithic research in Asia and the adjacent area. The title *Asian Paleolithic Association* was for the first time proposed in this agreement. In June of 2008, during the *International Symposium Commemorating the Centennial Anniversary of Academician A.P. Okladnikov – The Current Issues of Paleolithic Studies in Asia and Contiguous Regions*, held in Novosibirsk of Russia, scholars from Russia, China, Japan, Korea, North America, and European countries reached an agreement of officially setting up this organization. This meeting was thus proposed as the inaugural conference and the first annual meeting of APA.

Each member country of the APA, referring to Russia, China, Japan, and Korea, keeps an independent, equal, and reciprocal relationship. The annual meeting is held in these four countries, in turn, each year or 2 years. There is no independent secretariat system; however, each country will serve two representatives who would be in charge of the task force for the preparation process for the annual meeting.

In October 19–23, 2009, the second annual meeting *International Symposium on Paleoanthropology in Commemoration of the 80th Anniversary of the Discovery of the First Skull of Peking Man* was held in Beijing, China. In October 10–15, 2010, the third annual meeting was held in Gongju, Korea. In November 25–30, 2011, the fourth annual meeting *Symposium on the Emergence and Diversity of Modern Human Behavior in Palaeolithic Asia* was held in Tokyo, Japan. And in 2012, the fifth annual meeting was held in Russia.

Major Impact

This organization is young but flourishing. Since its naissance, the research and the academic communication of Paleolithic archaeology in Asia has been strongly activated. During the past four annual meetings, representatives have presented various topics including the origin of early *Homo*, the origin of modern humans, the migration of early *Homo* and early modern humans, and the varieties and communication of different Paleolithic complexes, lithic analyses, taphonomy and zooarchaeology in prehistoric contexts, paleoanthropology, paleoenvironmental archaeology, and so forth. More technologies and scientific methods have been applied in these fields and brought more clues and evidence for archaeology in Asia. APA would behave as the driving and cohesive force and continue to promote and enhance these research fields in the future.

Cross-References

- ▶ East Asia: Paleolithic
- ▶ Human Evolution: Theory and Progress
- ▶ Lithic Technology, Paleolithic
- ▶ South Asia: Paleolithic

Askarov, Akhmadali A.

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Basic Biographical Information

Askarov Akhmadali Askarovich (born in 1935) (Fig. 1) is an academic with the Academy of Science of Uzbekistan, a doctor of historical sciences, and professor in ancient history of Central Asia. He is an organizer of archaeological science in Uzbekistan.

Askarov, Akhmadali A., Fig. 1 A.A. Askarov

After graduating from the historical faculty at the State Pedagogical Institute in Tashkent in 1957, A.A. Askarov worked as a teacher in the middle school. From 1958 to 1961 he studied at the postgraduate school in Leningrad's Department of the Institute of Archaeology, under the scientific supervisor of Professor M.P. Gryaznov. In 1963 he defended a thesis on the theme "Lower Reaches of Zeravshan River in Bronze Age." In 1977 he was awarded the degree of doctor of historical sciences for the thesis "Bronze Age of Southern Uzbekistan: to the Problem of Development of Local Centres of Ancient-Eastern Civilizations."

A.A. Askarov has been a scientific fellow since 1961. Since 1966 he has been deputy of director of Institute of History and Archaeology of Uzbekistan USSR and since 1970 director of the Institute of Archaeology of Uzbekistan.

Major Accomplishments

The scientific interests of A.A. Askarov have focused on prehistorical archaeology – the histories of ancient tribes of Bronze and Early Iron times. Askarov has participated actively in works of significant large expeditions (Baikal, Krasnoyarsk, Makhandarian, Sud-Turkmenistan), led by such famous Russian scientists as M.P. Gryaznov, Y.G. Gulyamov, and V.M. Masson. A.A. Askarov has led the Surkhandarya Complex Expedition since 1970.

A.A. Askarov has made an enormous contribution to research into the history and spiritual culture of the ancient steppe tribes of Southern Asia. He has elaborated an archaeological periodization for development of the steppe tribes's cultures of Bronze and Early Iron times for Lower Reaches of Zeravshan River. In addition, he has reconstructed the whole history of tribes and settlements for this region in the second millennium BCE.

A.A. Askarov has been conducting significant researches in Uzbekistan for about 40 years. His achievements are well recognized in the study of proto-urban civilization, the genesis of urbanization, the transformation of primitive-communal cultures, and the formation of an early-class society through the archaeological materials. He has prepared and published more than 300 works, including 12 monographs and two tutorial books. A number of these works were published abroad. One of the monographs is dedicated to the ancient agricultural civilization of Southern Uzbekistan "Kuchuk-Tepe" and was presented to the world by the publishing house of Institute of Archaeology in Berlin. Askarov is one of the authors of the six-volume *History of Civilization of Central Asia*, produced by UNESCO. Under his editing, 13 volumes of the series *History of Material Culture of Uzbekistan*, ten monographs, and numerous of booklets in Uzbek language were published.

For many years, A.A. Askarov conducted stationary excavations and planigraphical investigations of monuments of antiquity in Uzbekistan. Thanks to his field studies and discoveries, the existence of an earlier unknown South Uzbekistan center of Ancient Bactrian Civilization was proved. The Ancient Bactrian Centre was uncovered and comprehensively characterized by Askarov. Based on his scrutiny of the Sapalli Culture sites (Sapallitepa and Djarkutan sites), he defined a historical place of these objects in the cultural system of Ancient East and in wide context of intercultural relations of neighboring cultures and civilizations.

Askarov's unique discoveries have important historical meaning, including him finding of silk, bast, and cotton tissues in burials of Sepallitepa. This contributed to proving that the production of natural cotton and silk in Uzbekistan was started in the Bronze Age. He was one of the first who raised the question that the territory of Uzbekistan may have been one of the homelands of silk weaving and cotton weaving.

Askarov's discovery of the cult center – the Temple of Fire in Djarkutan – provided important evidence on the genesis of a Zoroastrian ideology during the late Bronze Age. Research into this unique complex provided an opportunity to track sources of Zoroastrian doctrine and to obtain new dates (second half of second millennium BCE) for the appearance of the cult of fire in the history of Zoroastrianism.

The history of irrigated agriculture in Uzbekistan has become more ancient by a thousand years due to the rich archaeological material uncovered in long-term field investigations by A.A. Askarov. The great merit of Askarov's investigations lies with his research into the culture of late molding painted pottery. His study demonstrated that the carriers of this tradition were local tribes of the end of the second and beginning of the first millennium BCE. These tribes were transitioning to agriculture under the influence of more developed ancient urbanistic and agricultural communities of the south.

The numerous archaeological discoveries were done thanks to Askarov; his publications have been recognized with world scientific community as significant contributions in study of early history of Central Asian Civilizations. The results of these researches are widely used not only as theoretical works but have entered into the scientific and pedagogical programs of universities.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Gryaznov, Mikhail P.
- ▶ Masson, Vadim M.
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Asses/Donkeys: Domestication

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Basic Species Information

Ancient African wild asses (*Equus africanus* Fitzinger, 1857) are the wild ancestors of

donkeys (Beja-Pereira et al. 2004; Kimura et al. 2011). There are two living subspecies of African wild asses, Somali wild asses (*Equus africanus somaliensis* Noack, 1884; Synonym: *E. a. somalicus* Sclater, 1884) and Nubian wild asses (*Equus africanus africanus* von Heuglin and Fitzinger, 1866). Somali wild asses or Dibokali are critically endangered (Moehlman et al. 2008). Nubian wild asses of Sudan and the Eritrean Red Sea Hills may now be extinct (Kimura et al. 2011; Moehlman et al. 2008). Atlas wild asses (taxonomy unclear so-called *Equus africanus atlanticus*) were distributed in northwestern Africa until Roman times.

Somali wild asses have shiny grayish coats; white muzzles, belly, and legs; and dark stripes on their lower legs. They do not have dark shoulder-crosses (Moehlman et al. 2008). In contrast, Nubian wild asses have variable shoulder-crosses and no leg-stripes. African rock art and Roman mosaics suggest that Atlas wild asses had both leg-stripes and shoulder-crosses (Marshall 2007). African wild asses are desert adapted, and in keeping with this, domestic donkeys have labile metabolic rates and water sparing mechanisms. Domestic donkeys are predominantly gray with a bold shoulder-cross and no leg-stripes. Although considerable regional variability exists, donkey coat colors are not greatly varied and breed diversity is minimal.

Genetic research has shown that there are two mitochondrial haplogroups of domestic donkeys worldwide, referred to as Clade I and Clade II, and that variability is greatest in northeastern Africa (Beja-Pereira et al. 2004). On the basis of these data, the distribution of ancient cattle herders across northeast Africa and linguistic evidence from northeast Africa, scholars have argued that Saharan pastoralists domesticated donkeys – perhaps more than once (Blench 2000; Beja-Pereira et al. 2004; Marshall 2007). Similarities in mitochondrial haplotypes demonstrate that the ancient Nubian wild ass is the ancestor of Clade I donkeys. Indeed, some of the haplotypes of historic Nubian wild asses sampled from the Sahara and Sudan are identical to those of modern donkeys of Clade I, suggesting that they may be related to the ancestral populations from which the wild ass was domesticated (Kimura et al. 2011). It is yet unclear, however, which historical population of African wild ass was the maternal ancestor of Clade II donkeys. Analysis of 440 bases of the mitochondrial control region showed that Somali wild asses are separated from Clade II donkeys by at least 12 mutations, and to date, ancient DNA has not been recovered from Atlas wild asses (Kimura et al. 2011). Coalescence analysis suggests, however, that the divergence among ancient Nubian wild asses, Somali wild asses, and the ancestor of Clade II donkeys goes back ~100,000 years and that maternal domestication processes were operating on at least two ancient populations or subspecies.

Domestic donkeys occur in archaeological sites as early as >5,000 years ago in Southwestern Asia, and as a result, this has also been suggested as a region of domestication (Vila 2006). To date, however, there is no clear evidence that the African wild ass existed in southwestern Asia prior to the Holocene (Marshall 2007; Kimura et al. 2011). Nevertheless, Asia was an important center for ceremonial and trade-based use of donkeys (Vila 2006). Genetic data demonstrate that the wild ass of the region, the onager (*Equus hemionus*), was not an ancestor of the donkey (Beja-Pereira et al. 2004). Ancient texts and osteological analyses indicate, however, that Sumerians bred their donkeys with wild onagers and that these hybrids were used to pull chariots (Vila 2006; Weber 2008). Subsequently, female horses were bred with male donkeys to produce another hybrid – the mule. Mules are stronger than donkeys and still used today, but they are not fertile and do not produce offspring.

Domestication of the donkey was slow and complex. This process was influenced by the behavior of African wild asses and by use of donkeys for transport rather than for meat (Marshall & Weissbrod 2011). African wild asses do not fit traditional profiles for

domestication; they have a fission-fusion social system with long-term bonds only between females and their foals (Moehlman et al. 2008; Marshall & Weissbrod 2011). Dibokali breed well in captivity but, in keeping with their social organization, display fewer affiliative behaviors than more social equids such as horses. As a result of behavior and management patterns, donkeys in Africa and Asia are seldom intentionally bred (Marshall & Weissbrod 2011) and have many characteristics of their wild ancestors. Nevertheless, donkeys are more social than wild asses and breed younger. Like other domestic animals, donkeys are also smaller and have proportionally smaller brains than their wild ancestors. Donkeys did not decline in size, however, until late in the domestication process (Rossel et al. 2008).

Archaeology suggests that donkeys were domesticated by 6,000–5,000 years ago. Egyptian sites of Maadi and El Omari date to ~4500 BCE and Abydos to 3000 BCE. Domestic donkeys were present in southwest Asia by >3000 BCE (Vila 2006). At Abydos, animals buried in a royal mortuary complex were skeletally indistinguishable from African wild ass, but vertebral and limb pathologies demonstrated that they were used for transport (Rossel et al. 2008). Research on modern pastoralist donkey management has helped to explain selection during donkey domestication by showing that herders value donkeys with the size, strength, and hardiness of their wild ancestor (Marshall & Weissbrod 2011). There is little impetus for controlled breeding and reasons to counteract the effects of selection in anthropogenic environments and genetic drift by breeding domestic donkeys with wild asses. As transport animals, early donkeys played a major role in the creation of ancient trade routes in northeast Africa and Asia, were ritually and politically significant, and played an important role in the development of mobile African herding societies. Donkeys are widely relied on today for household transport and trade in arid and poorer regions of the world (Rossel et al. 2008).

Cross-References

- ▶ African Stone Age
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Animal Paleopathology
- ▶ Domestication: Definition and Overview
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Horses: Domestication
- ▶ Zooarchaeology

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Association for Environmental Archaeology (AEA)

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Basic Information

The Association for Environmental Archaeology (AEA) (www.envarch.net) (Fig. 1) is an international organization that promotes the study of human interactions with environments through archaeology and related disciplines. The AEA was originally established in 1979 to encourage communication between workers in environmental archaeology in the UK but has since become more international in its outlook – around one-quarter of its approximately 400 members currently live outside the UK, mostly in Europe, but also in the USA, Canada, Asia, and Australia. Members' interests are wide ranging, including archaeobotany, zooarchaeology (both vertebrate and invertebrate), geoarchaeology, paleoecology, and biological anthropology, as well as related fields, such as ancient economies. Membership is open to all, including university, museum, government, and commercially based workers, as well as research students and nonprofessionals with an interest in environmental archaeology. In addition to individual membership, institutional membership is also available. Honorary members are appointed on occasion to recognize persons who have made a major contribution towards the aims of the Association.

Association for Environmental Archaeology (AEA), Fig. 1 Logo of the Association for Environmental Archaeology

Major Impact

The AEA is the one of the largest organizations of environmental archaeologists in the world. A major output is its international peer-reviewed journal, *Environmental Archaeology: The Journal of Human Palaeoecology*, which is currently published triannually and sent to all members (www.maney.co.uk/index.php/journals/env). The journal contains papers on a variety of aspects of environmental archaeology, including methodology, synthesis, and theory. The journal publishes substantial research papers as well as shorter reports that focus upon new techniques, philosophical discussions, current controversies, and suggestions for promising directions of research. Critical reviews of recent academic publications are also published in a book reviews section. Maney Publishing took over publication of the journal in 2006; prior to this, the journal was published by Oxbow Books. The current AEA journal, *Environmental Archaeology*, was launched in 1997. The previous journal of the AEA was *Circaea*, of which 12 volumes were published between 1983 and 1996. All volumes of *Environmental Archaeology* and *Circaea* are currently available online to AEA members.

Two AEA meetings are held annually, which are open to all: a 1-day meeting and a major conference. These meetings are designed to keep members up to date with recent advances and new approaches in environmental archaeology. Meeting locations in recent years include Britain, the Netherlands, Denmark,

Poland, Ireland, Germany, and Japan. The 1-day meeting often includes short papers on work in progress and provides an opportunity for research students to present data. Papers presented at the annual conference are often more substantial and focused on a particular theme. In the past, conference proceedings have been published in monograph form, including volumes on the environmental archaeology of industry (Murphy & Wiltshire 2002), human settlement and marginality (Coles & Mills 1998), taphonomy (Huntley & Stallibrass 2000), and economies and environments in the North Atlantic region (Housley & Coles 2004). Collections of papers from conferences have also appeared as special issues of the journal, for example, *Worlds Apart? Human Settlement and Biota of Islands* (*Environmental Archaeology* 9(2)). In recent years, the AEA established a seminar series, which sponsors and publicizes individual seminars at different institutions throughout the UK on any aspect of environmental archaeology. The AEA also administers the "John Evans prize", an annual competition for the best undergraduate and postgraduate dissertations on any aspect of environmental archaeology, which is open to students across the world.

The AEA newsletter is published quarterly each year, and together with the website, they keep members informed about relevant meetings and conferences, recent publications in environmental archaeology, job opportunities, and external websites and organizations. An AEA Discussion List entitled ENV-ARCH has been established via JISCmail to encourage members from a variety of backgrounds to pose questions and discuss their work in a wider forum. The AEA has also published working papers on the teaching of environmental archaeology in UK higher education and on environmental archaeology and archaeological evaluations in England, which are available from the AEA website.

The affairs of the AEA are governed by its constitution and handled by a Management Committee, which consists of an elected chair, secretary, and treasurer, 12 ordinary elected members, and two student representative elected members. The Managing Committee may also co-opt members to serve as membership secretary, representative of the journal editorship, representative of the newsletter editor, and manager of the JISCmail list.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Environmental Archaeology and Conservation
- ▶ Geometric Morphometrics and Environmental Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)
- ▶ Zooarchaeology

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Association for Industrial Archaeology (AIA)

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Basic Information

The Association for Industrial Archaeology (AIA) grew out of a number of conferences organized at the University of Bath in the UK in the early 1970s. Since its first formal meeting in 1973, AIA has since grown to become the foremost national organization for people who share an interest in the UK's industrial archaeology and industrial heritage. From the beginning, it has been an organization in which the amateur and the professional meet. Although the discipline of industrial archaeology was first championed by the Council for British Archaeology (CBA) and supported by many professional archaeologists, the early recording work on industrial sites was carried out by volunteers and they still form the main body of the association. Much of the recording was carried out by groups of people in the individual counties, and the AIA, early in its existence, decided to introduce a category of membership for affiliated societies, and so the AIA represents a far larger number of people than its individual membership, amounting to several thousand. The AIA holds an annual meeting for members of its affiliated societies as well as inviting them to its annual conference.

The AIA recognizes high standards of survey, interpretation, and publication by a number of awards to both professional and amateurs each year, as well as making grants for the restoration of industrial sites by volunteers. An international refereed journal, *Industrial Archaeology Review,* has been produced twice a year since 1977. Members receive an illustrated newsletter four times a year as well as a gazetteer of industrial sites in whichever region the annual conference is held: now numbering over 30, these provide a useful list of sites of industrial interest in the UK. Further details concerning these and other activities can be found on the association's website: http://industrial-archaeology.org/. The AIA's liaison office is based at the Ironbridge Institute, Ironbridge Gorge Museum, Coalbrookdale, UK. The association has a governing council elected on an annual basis. At the time of writing, the association's chairman is Mark Sissons, the secretary is David de Haan, and treasurer is John Jones. The current honorary president is Professor Marilyn Palmer, and former incumbents include Tom Rolt, Professor Angus Buchanan, and Sir Neil Cossons, several of whom now serve as honorary vice-presidents.

Major Impact

The AIA has always tried to champion the cause of industrial archaeology and the industrial heritage at the national level and has worked closely both with the CBA and with national organizations such as English Heritage, Historic Scotland, and Cadw. In 1991, the AIA launched a pamphlet, *Industrial Archaeology: Working for the Future*, which was essentially an examination of the scope of industrial archaeology and a set of research priorities, with recommendations for urgent action. These found their way unto various strategy documents produced by English Heritage. This was supplemented in 1993 by a research project, the Index Record of Industrial Sites, aimed at the creation of a national database of industrial sites, which *inter alia* produced a set of terms for the components of such sites. These were incorporated into the national Thesaurus of Monument Types as well as being used locally to record industrial sites into county sites and monument records. Further efforts were made to influence national strategies in industrial archaeology in several ways, especially by a conference resulting in the publication of a research strategy in 2005, *Understanding the Workplace: a Research Framework for Industrial Archaeology in Britain.* The AIA has also, for many years, run a seminar for professional

archaeologists on current research and thinking in industrial archaeology prior to its annual conference. Specific topics for this seminar have included the defense heritage, urban regeneration and the adaptive reuse of industrial buildings, and the recording and excavation of twentieth-century sites. Between 2008 and 2011, the AIA, in conjunction with the CBA, ran 11 training schools in each of the English Heritage regions in an effort to train those who had responsibility for local planning to understand the significant features of industrial sites and structures so that these could be retained in the process of adaptive re-use. This resulted in a further publication, *Industrial Archaeology: A Handbook* (Palmer et al. 2012).

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Historical Metallurgy Society Ltd.
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute
- ▶ Museo Nacional de los Ferrocarriles Mexicanos
- ▶ Palmer, Marilyn
- ▶ Society for Industrial Archeology (SIA)

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Association Internationale pour l'Histoire du Verre (AIHV)

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Basic Information

The Association Internationale pour l'Histoire du Verre (AIHV) was founded by Joseph Philippe in 1956 as the Journées Internationales d'Histoire du Verre. He was then the Director of the Musée Curtius in Liège, Belgium, and he organized the first congress of the AIHV, which was held in that city in 1958. Seventeen congresses have been held, at about 3-year intervals, since that time, in Leyden, Damascus, Ravenna–Venice, Prague, Cologne, Berlin–Leipzig, London–Liverpool, Nancy, Madrid–Segovia, Basel, Vienna, Amsterdam, Venice–Milan, New York City–Corning, London, Antwerp, and Thessaloniki. The 19th congress took place September 17–21 in Piran, Slovenia, followed by a post-congress tour September 22–23 to Croatia.

Major Impact

In addition to hearing about new research in glass, congress participants can view special exhibitions and visit museums, galleries, and private collections. The congresses also provide AIHV members an opportunity to meet their colleagues from other countries. Those members include several hundred archaeologists, art historians, artists, collectors, museum curators, *graduate students, scientists, and researchers from more than 30 countries*. Papers presented at AIHV congresses are published in the organization's *Annales*. From 1958 to 1983, the association also published bulletins that included information about glass collections in various countries, usually where the congresses were located.

The AIHV was reorganized in 1983, when it adopted its current name. It is now governed by

statutes under Dutch law as it was headquartered in the Netherlands at that time. The president and the board of directors are elected for 3-year terms. The general secretary is appointed by the board and serves as long as he or she is willing. The official languages are English, German, and French, and papers may be presented in any of these languages at the congresses. For other communications to members, only French and English are employed.

Membership in the AIHV is open to all. Students are admitted free of charge. For all others, the annual subscription fee includes a copy of the *Annales*.

Cross-References

▶ Corning Museum of Glass
▶ Glass: Conservation and Preservation

Further Reading

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Atalay, Sonya

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Basic Biographical Information

Dr. Sonya Atalay is a Native American (Anishinabe-Ojibwe) anthropologist and archaeologist and a prominent advocate for community-based and participatory research (CBPR). Dr. Atalay is one of the first of her people to undertake tertiary studies in archaeology.

Atalay grew up in Michigan. She completed her B.A. in Anthropology and Classical Archaeology at the University of Michigan, Ann Arbor, in 1991. In 1997 Atalay first undertook field excavations at the site of Çatalhöyük in Turkey, analyzing clay and ceramics to investigate prehistoric cooking practices. She completed her M.A. in Anthropology at the University of California, Berkeley, in 1998.

In 2003, Atalay obtained her Ph.D. in Anthropology at UC Berkeley. Subsequently, she has been awarded the positions of UC Berkeley President's Postdoctoral Fellow (2003–2005) and Stanford University's NSF Postdoctoral Scholar (2005–2007). From 2007 to 2012, Dr. Atalay held the role of Assistant Professor in the Department of Anthropology at Indiana University as well as Adjunct Assistant Professor in American Studies, Near Eastern Languages and Cultures, and Central and Eurasian Studies. She is currently Assistant Professor at the University of Massachusetts, Amherst, in Anthropology and the Commonwealth Honors College.

Dr. Atalay is a member of the Society for American Archaeology, the American Anthropological Association, the World Archaeological Congress and the Native American and Indigenous Studies Association. She has served as Chair of the Society for American Archaeology Committee on Native American Relations, as well as the Society for American Archaeology Indigenous Populations Interest Group. She was one of the founding board members of the Coalition for Indigenous Archaeology. Dr. Atalay is also a first degree Midewiwin of the Three Fires Midewiwin Society, concerned with maintaining traditional knowledge and spiritual teachings of the Anishinabe people.

Major Accomplishments

Dr. Sonya Atalay has made important and inventive contributions to the field of community archaeology. She began working at Çatalhöyük analyzing clay materials (Atalay 2005) but became increasingly interested in broadening the local community's involvement on-site. In 2005, Dr. Atalay launched the Çatalhöyük community-based participatory research (CBPR) program (Atalay 2012). Instead of only employing local residents as excavation labor and ethnographic informers, Atalay's new project sought to engage locals on an equal level to the archaeologists, as collaborators and research partners.

With local communities consulted about the sorts of participation they desire, the Çatalhöyük CBPR project has grown to include an annual festival, a theater group, production of comic books and newsletters, and archaeological lab-guide training for local children and teens. Particular effort has been put into increasing archaeological and scientific literacy among local communities, which has led to opportunities for internship positions and joint authorship for locals. Dr. Atalay characterizes her approach to community archaeology as being "by and with" local communities, instead of "on and for" (Atalay 2010).

Dr. Atalay seeks to demonstrate that community archaeology methods are applicable worldwide. To this end she has worked in collaboration with a number of Native American communities in Michigan and Indiana. Dr. Atalay has worked with the Sullivan County American Indian Council to produce geographical and oral history surveys of the Waapaahsiki Siipiiwi Mound in Fairbanks, Indiana. This project includes the development of an interpretive walking trail around the mound to help protect the site and educate visitors. Since 2009, Dr. Atalay has assisted an initiative by the Ziibiwing Center of the Saginaw Chippewa Indian Tribe of Michigan to protect the Sanilac petroglyphs site. This involves seeking protection not only for the fragile petroglyphs themselves but also for the indigenous intellectual property they represent. The project has been funded as a case study by the Intellectual Property Issues in Cultural Heritage project (IPinCH). Dr. Atalay is assisting with the implementation of a tribal management plan to ensure that traditional owners decide how investigations of the site are conducted, as well as how widely documentation of this sacred knowledge may be shared.

A significant focus of Dr. Atalay's work has been on the decolonization of archaeology. Invited to guest-edit an issue of *American Indian Quarterly*, Dr. Atalay featured articles on the subject of decolonization and offered her own critique of the National Museum of the American Indian and its approach to presentation (Atalay 2006). Since 2004, Dr. Atalay has researched issues of cultural preservation and repatriation surrounding the Native American Graves Protection and Repatriation Act (NAGPRA). This includes investigation of human remains classified as "culturally unidentifiable" as well as Dr. Atalay's role as Coprincipal Investigator for the Stone Street Recovery and Mitigation Project. She has worked with the Saginaw Chippewa Indian Tribe towards documenting ancestral remains held by the University of Michigan, with the ultimate aim of repatriation due to begin in late 2012. Dr. Atalay was appointed to NAGPRA's review committee in 2009.

From 2007 to the present, Dr. Atalay has taught undergraduate and graduate classes in Anthropology at Indiana University, topics ranging from food archaeology to NAGPRA and CBPR methods. In keeping with her commitment to making academic work more widely accessible, she has also made many presentations on public archaeology for school-aged children.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA

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Atlantic Ocean: Maritime Archaeology

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Introduction

Maritime archaeologists have never conceived of the Atlantic as a unified subject for study in the same way that Atlantic world historians have. While much maritime archaeological work has been done beneath the surface of the Atlantic Ocean, those doing the projects have typically pursued them in reference to their own particular research interests and questions rather than seeing such research as part of a unified approach to understanding the maritime development of the Atlantic world. Consequently, the maritime archaeology conducted in the Atlantic consists of a mix of scholarship focusing on many diverse geographical and temporal areas. This is no doubt influenced by the vast size that the Atlantic covers. Its waters flow across two hemispheres and connect four continents; from prehistory to the present, many cultures have utilized Atlantic waters for subsistence, transportation, trade, and warfare. Despite the lack of a unified approach, however, the maritime archaeology of the Atlantic can be seen as contributing to scholarly understanding of several significant research areas. Key research themes that maritime archaeologists have addressed using Atlantic sites include the study of ships of exploration, the impact of global commerce and warfare during the past 500 years, and the protection of underwater cultural heritage from treasure hunting. In recent years, Atlantic sites have also been used to examine significant emerging perspectives such as deepwater archaeology, prehistoric underwater archaeology, and maritime cultural landscapes.

Key Issues and Current Debates

Shipwrecks from the Age of Exploration

The Spanish and Portuguese were leaders in the field of global exploration, and shipwrecks from the Atlantic have contributed greatly to the understanding of early Iberian global seafaring. The earliest known European shipwreck site in the New World is the Molasses Reef wreck from the Turks & Caicos Islands, which sank in the early 1500s. This wreck and the slightly later Highborn Cay shipwreck from the Bahamas are typically included in discussions of Caribbean sites, but both actually lie in the Atlantic Basin. Because of their early dates, the Molasses Reef and Highborn Cay shipwrecks are significant finds, but in both cases, archaeologists did not arrive on the scene until after the sites had been damaged by treasure hunters (a pervasive problem in Atlantic maritime archaeology that will be discussed in greater detail later in this entry). Formal archaeological work at the Molasses Reef site began in 1982 under an Institute of Nautical Archaeology (INA) team led by Donald Keith (Keith et al. 1984). Excavations conducted from 1982 to 1986 revealed that the vessel was armed with at least 18 swivel guns and personal weapons such as crossbows, *arquebuses* (shoulder-fired guns), *harquebuts* (hand cannons), and cast iron grenades. A pair of

bombardetas were aboard, but were not fitted for use at the time of sinking (Keith 1988: 60-63). Additional artillery included one *cerbatana*, a carriage-mounted gun. Items of ship's equipment from the site include one anchor, an axe head, a lead-sounding weight, and a possible pump valve. Ceramic sherds from olive jars, storage pots, bowls, and basins were also present. As a whole, the ordnance and artifact assemblage suggests a Spanish origin for the vessel. Alternatively, analysis has shown that much of the ballast came from Lisbon, Portugal, so the ship may have been Portuguese instead (Lamb 1988). Unfortunately, only about 2 % of the ship's hull remained; extant timbers suggest a vessel about 20 m long and 5–6 m in beam (Oertling 1989a).

The Highborn Cay wreck (Keith 1988: 59-60; Oertling 1989b; Smith et al. 1985) was discovered by divers in 1965 and subjected to salvage in the late 1960s. Archaeologists became interested in the site in the 1980s, after noting similarities between the artifacts from this site and those from the Molasses Reef wreck. Excavations were begun in 1986 and soon revealed a vessel similar in size to the Molasses Reef vessel, but with much better hull preservation. Fragments of the ship's backbone, including the keel, stem, and keelson, which included a mast step, were preserved. Other surviving timbers included frames, outer hull planking, ceiling (interior) planking, and footwales (longitudinal timbers on the interior that provide strength at the turn of the bilge). The ship was armed with at least 2 *bombardetas* and 13 swivel guns. Few ceramics were found; these include sherds from a bowl and a small pitcher. Likewise, only one personal artifact, a knife handle, was discovered. The paucity of personal artifacts and the fact that two of the three anchors discovered at the site seem to have been deployed at the time of sinking have led to the interpretation that the ship sank at anchor and that the crew had sufficient time to take their possessions with them when they abandoned the vessel. It seems possible, however, that some personal possessions may have been removed by salvors before archaeological excavations began.

The site of Red Bay, Labrador, Canada, provides some of the best evidence for early Iberian contact with the New World (Grenier et al. 2007). In the sixteenth century, Red Bay was utilized by Basque seafarers pursuing whales. The Basque had a whaling tradition that dates back to at least the twelfth century, but by the early modern period, stocks of whales off the European coast had been heavily depleted. With the discovery of the New World, intrepid Basque sailors soon began exploiting whales on the far shore of the Atlantic. From July through October, pods of right whales migrate through the Straits of Belle Isle. Red Bay, located close by, provided an ideal anchorage for fleets hunting these whales. Archaeological excavations on the shores of Red Bay in 1977 first provided evidence for tryworks used to render whale oil, while archival research in Spain revealed that several whaling vessels had been lost in the bay. Following the clues provided by the archives, in 1978 archaeologists discovered the remains of one such vessel, believed to be the galleon *San Juan*, which sank in 1565. Subsequent archaeological fieldwork has revealed three other galleons, along with the remnants of whaleboats. The Red Bay site complex is particularly significant for the details that it provides about life aboard whaling ships and rendering operations ashore, as well as for the information provided about Iberian ship construction, as the cold waters preserved the hulls to a greater extent than is commonly found on wrecks from lower latitudes. The Red Bay archaeological project is also noteworthy for its methodology. The hull of *San Juan* was excavated, dismantled, brought ashore, and recorded in great detail, then reburied on the bottom. Returning the timbers to the seabed obviated the need for costly, long-term conservation of the hull remains yet provided for their protection.

Another significant early Iberian vessel is the Western Ledge Reef wreck from Bermuda (Watts 1993). This shipwreck, which dates to about 1600, was discovered in 1964 and salvaged periodically until the late 1980s. From 1988 to 1991, East Carolina University and the Bermuda Maritime Museum recorded and excavated

the site. Artifacts include cannon, versos, a bronze bell, navigational dividers, and sherds from olive jars, pitchers, and colono ware. The latter, along with bones from a white-tailed deer, indicate that the Western Ledge vessel had probably been to North America and was likely returning to Europe when it struck Bermuda's reef. The artifacts indicate that the ship was probably Spanish. A significant portion of the hull, including parts of the keel, keelson with mast step, sternpost, stern knee, frames, outer hull planking, ceiling planking, and transom planking, was preserved. The hull remains were deemed significant enough to raise and conserve; at the time of this writing, the hull timbers are undergoing analysis and reconstruction.

The Azores Islands served as a critical waymark for Iberian vessels returning to Europe from both the New World and the East Indies. In the 1990s, archaeologists began a program to document and preserve the Azores' maritime heritage. A key focus of this program has been Iberian ships from the Age of Exploration. Investigations at Angra Bay, Terceira Island, revealed several shipwrecks. One of these, designated Angra D, represents the substantially preserved hull of a large Iberian vessel from about 1600 (Garcia & Monteiro 2001). The ship was probably close to 40 m in length, with a beam of about 8 m, and displaced approximately 700–800 t. Surviving timbers include the entire keel and keelson, the sternpost assembly, the main mast step, nine riders, numerous frames, outer hull planking, footwales, ceiling planking, and stanchions. The vessel lay on one side, with the result that parts of deck beams, which are often not preserved, were buried by overburden and thus survived. Rope and a double block provide evidence for the rigging; other artifacts provide abundant testimony to shipboard life. These include wicker baskets and barrel staves, combs, a religious figurine, a thimble, and pins. Chinese porcelain compliments the ubiquitous olive jars in the ship's ceramic assemblage. Bones from cow, chicken, and fish, along with almonds, raisins, and corn, testify to the crew's diet.

Although extent of hull preservation varies widely among the Iberian wrecks from the Atlantic Ocean, these, taken in concert with other Iberian vessel finds from the Caribbean, Gulf of Mexico, Great Britain, and continental Europe, have revealed enough about construction details to allow Oertling (2005) to postulate an "Atlantic tradition" vessel type. This consists of a package of 11 constructional features that seem common to fifteenth- and sixteenth-century Iberian vessels. Significant among these are the use of dovetailed mortise and tenon joints at the intersection of floors and first futtocks, a feature that provides the most readily identifiable indication that a wreck is Iberian. Another feature that can be used to readily identify Iberian vessels is a mast step formed from an enlarged section of the keelson and supported by lateral buttresses on either side. Iberian-Atlantic tradition vessels also feature preassembled central frames (the number varies based on the size of the ship) that indicate that Iberian naval architects were able to plan the shape of the central part of the hull before construction (Castro 2007), a significant advance over earlier European shipbuilding methods. Other significant features of this tradition include Y-shaped frames at the stern and keelsons notched to fit over the tops of the floor timbers.

A significant question concerning Iberian shipbuilding is whether or not archaeological sites can be used to identify particular types of vessels known from historical records. Atlantic sites such as Red Bay have proved critical in identifying galleons, as there is a good deal of certainty that the wrecks discovered there are those of historically known vessels such as the *San Juan*. Other types remain elusive. The caravel was one of the most important Age of Exploration ships; these small vessels were ideal for exploring unknown waters. Two of Columbus' vessels, *Nina* and *Pinta*, were caravels, and Vasco de Gama also employed them in his successful voyage to India. The evidence indicates that Iberian vessels shared the majority of their constructional details in common, despite size, so it does not seem possible to identify caravels on the basis of construction. Based on size, however, three of the Atlantic wrecks, the Molasses Reef, Highborn Cay, and Western Ledge Reef shipwrecks, offer

tantalizing candidates for caravels. Future research may be able to solve this puzzle.

While Iberian vessels dominate the Age of Exploration shipwrecks investigated in the Atlantic, one significant early English site has also been excavated. This is the remains of the *Sea Venture*, which wrecked in Bermuda in the summer of 1609 while en route to the Jamestown colony (Wingood 1982; Adams 1985). Very little is known about early seventeenth-century English ship construction, and *Sea Venture*'s hull provides much needed archaeological evidence. About 15.5 m of the keel survived, with additional evidence to indicate that it was originally approximately 22 m long. At its forward end, part of the keel to stem scarf remains. The size of keel indicates that *Sea Venture* was probably originally around 30 m long on deck, which agrees well with historical records that state that the ship was of 100 t. Fragments of eighteen frames, including floor timbers and futtocks, survive. Remains of deadwood, outer hull planking, ceiling planking, and sleepers (like footwales, these were longitudinal timbers that provided support at the turn of the bilge) were also recorded. In addition to the information it provides about seventeenth-century English ship construction, the *Sea Venture* excavation is also notable for the careful attention to stratigraphy (Adams 1985: 279-284), something not seen on many underwater excavations.

Global Commerce and Warfare

The Age of Exploration laid the groundwork for European expansion. Over the past five centuries, European colonization and commerce, along with their attendant warfare, shaped the world in which we live today. It is no exaggeration to say that today's globalization is merely the most recent aspect of a phenomenon that began 500 years ago. During that time, the Atlantic Ocean has served as a key highway for European expansion, and maritime archaeologists have investigated numerous sites that provide evidence for this.

The Spanish and Portuguese were leaders in the Age of Exploration, a key goal of which was the growth of commerce. In the seventeenth century, Portuguese merchant vessels transited the Atlantic on their way to bring back the wealth of the East Indies. The wreck of one such vessel has been investigated in detail by archaeologists. This vessel, the nau *Nossa Senhora dos Mártires*, sank at the mouth of the Tagus River, Portugal, in September 1606 on its return voyage from India (Castro 2003, 2005). The ship was carrying a cargo of peppercorns, many of which were salvaged soon after it sank, along with much of the ship's armament, fittings, and stores. The site was subjected to further damage in the 1980s, when sport divers looted the wreck. Archaeological excavations from 1996 to 1997, however, revealed that much valuable information remained. The presence of a large quantity of peppercorns provided evidence for the wreck's identity and its cargo. The ship's equipment, including three astrolabes, dividers, and sounding leads, were also recovered. Asian pottery in the form of Chinese, Burmese, and Japanese ceramics hints at the details on cross-cultural contacts that shipwrecks such as this can offer. The Pepper Wreck is also valuable for the data that it provides about seventeenth-century Portuguese ship construction and design. Analysis of the surviving hull structure, which includes a portion of the bottom forward of amidships, combined with historical shipbuilding treatises and iconography, allowed Castro to create a reconstruction of the ship's original shape and dimensions. Further research will include the construction of models to test hull strength and hydrodynamic properties (Castro & Fonseca 2006). Recently, another possible Portuguese East Indiaman has been investigated at Oranjemund, Namibia. This site is located in a high-energy environment just offshore. Investigations in 2008 revealed portions of the ship's hull and tin, lead, and copper ingots. Numerous personal artifacts were also found. Coins from the wreck suggest that the ship sank shortly after 1525; based on this, the vessel has been tentatively identified as the Indiaman *Bom Jesus*, lost on its outbound voyage in 1533 (Werz 2010). Additional research is planned for the near future.

The Oranjemund Shipwreck highlights the potential that the southern Atlantic coast of Africa holds for examining European merchant vessels lost while voyaging to or returning from Asia. In addition to Portuguese vessels, Dutch East Indiamen regularly followed a similar route around the Cape of Good Hope. One of the first VOC ships to be investigated in South African waters was the *Meresteyn*, lost in 1702 at Saldanha Bay, north of Cape Town. Unfortunately for archaeology, the site was looted following its discovery in 1971. Archaeologists did, however, have the opportunity to record some artifacts before they were auctioned (Marsden 1976). These consist primarily of small arms equipment and personal possessions which, lacking context, provide little in the way of data regarding life aboard the ship. Cases such as the looting of the *Meresteyn* helped increase public awareness of the need to protect historic shipwrecks in South Africa. When sport divers discovered two other VOC shipwrecks, those of the *Oosterland* and *Waddinxveen*, at Table Bay in the 1980s, they reported them to the appropriate authorities. As a result, archaeologists had the opportunity to examine these ships, which were sunk in a storm in May 1697 while on their return voyage to Europe. To date, scholarly research has included interdisciplinary investigations by archaeologists, oceanographers, geologists, botanists, and other specialists (Werz 2009).

One of the best VOC shipwreck sites in Atlantic waters is that of the *Mauritius*, which sank in the Gulf of Guinea on its return voyage in 1609 (L'Hour et al. 1990). The wreck was discovered in 1985 and excavated in 1986. Excavations revealed that a section of the hull, approximately 15 m × 6 m, survived. Extant structure includes portions of the keel, 24 floors, 22 first futtocks, outer hull planking, ceiling planking, and pine sheathing that once protected the outer hull. Evidence for timbers that have now vanished is preserved as well; for example, bolts protruding into the interior at the floor – first futtock overlap – show that the ship originally had footwales to provide extra strength at the turn of the bilge. *Mauritius*' hull is significant because it provides an example of a double-planked East Indiaman. The inner layer of hull planking was treenailed to the frames, while the outer layer was fastened to the inner with nails. Lead sheathing was sandwiched between the two layers of planking. About 122 t of zinc ingots, peppercorns, and Chinese porcelain provide evidence for the types of cargo transported back to Europe aboard a returning Indiaman.

At least seven VOC wrecks have been identified in British waters; of these, five can be considered to be Atlantic sites. The Dutch East Indiamen *Lastdrager* (1653), *Kennemerland* (1664), and *De Liefde* (1711) were all lost in the Shetland Islands. The bow section of *Lastdrager* was salvaged in the 1970s and some 3,000 artifacts recovered (Stenuit 1974), but unfortunately, these were sold at auction and so lost to scholarly examination. The *Kennemerland* site was the subject of a long-term study by the noted British maritime archaeologist Keith Muckelroy (Muckelroy 1978). Muckelroy's analyses focused on determining the types of information that could be contained within highly scattered wreck sites, along with developing methodologies for the best ways to study such sites. Muckelroy also utilized the *Kennemerland* site in a seminal examination of formation processes at underwater sites. Like *Kennemerland*, *De Liefde* represents a scattered wreck site. Excavations in the 1960s, however, revealed a highly varied collection of artifacts, including gold, silver, and copper coins, small arms, ceramics, utensils, and personal items (Bax & Martin 1974). The wreck of the VOC ship *Adelaar*, which sank in the Outer Hebrides Islands in 1728, has also been investigated (Martin 2005). Like the wrecks in the Shetlands, the *Adelaar* site was highly scattered due to the dynamic nature of the wreck site. As at the *Kennemerland* site, however, investigations revealed that meaningful archaeological patterns were still present. These sites have helped to counter the argument advanced by treasure hunters that shipwrecks located in dynamic environments cannot provide useful archaeological data and thus should be allowed to be salvaged. A final VOC shipwreck in British Atlantic waters, the *Hollandia*, wrecked in the Isles of Scilly

in 1743. The site was located in 1971 and subsequent excavations undertaken (Cowan et al. 1975). *Hollandia* was outward bound when it went down, and the finds from the wreck include over 35,000 silver coins. Marsden (1978) has discussed the significance of the finds of coinage from outward-bound VOC ships such as *Hollandia*, *De Liefde*, and *Amsterdam* (which wrecked near Hastings in 1749). Far from being merely treasure, the coins from the sites such as these provide evidence for a key economic system in eighteenth-century Europe. The Dutch East India Company paid for Asian goods with coinage that they had to secure in turn primarily from Spanish sources in the New World. Marsden shows that further study of VOC shipwrecks is needed in order to illuminate the complex economic interactions that enabled this system to work. Marsden's study offers strong evidence for the need to examine coinage from shipwreck sites archaeologically rather than viewing it simply for its monetary value.

Atlantic global commerce included not only goods but also the unfortunate transportation of human cargoes. It is estimated that more than ten million Africans were forcibly transported across the Atlantic and sold into slavery in the New World. Maritime archaeologists have yet to investigate this trade to the same degree as historians. One site that is currently undergoing study is the slave ship *Trouvadore*, which wrecked in 1841 off East Caicos in the Turks and Caicos Islands (Leshikar-Denton 2010a: 638). When it sank, *Trouvadore* was carrying nearly 200 African slaves; the majority of these landed safely on the Turks and Caicos Islands, where many descendants live to this day. The *Trouvadore* site was discovered in 2004 and has been investigated by Ships of Discovery and the Turks & Caicos National Museum. Site interpretation involves working with the local islanders to investigate, interpret, and present a site that may provide key for shedding light on a dark chapter in maritime history.

European expansion was accompanied by naval warfare, as nations sought to build empires, protect trade, and threaten the commerce of rivals. Maritime scholars have examined the archaeology of Atlantic naval warfare at numerous sites. Wrecks from the 1588 Spanish Armada (Martin & Parker 1999) have revealed how the Spanish fleet suffered from a variety of problems, such as inferior cannon that were not well-suited to warfare at sea. Other significant Atlantic naval sites investigated through maritime archaeology include the British frigate *Dartmouth* (Adams 1974), HMS *Maidstone* (de Maisoneuve 1992), and the CSS *Alabama* (Watts 2007). To date, most studies of warships have been site specific and concerned largely with examining famous vessels. Sites such as the Spanish vessel *Salvador*, however, which was lost off the coast of Uruguay in 1812 while transporting troops to quell a revolt (Nasti 2001), highlight the potential that maritime archaeology has for addressing issues such as colonialism, which has significance to the wider field of archaeology.

Treasure Hunting and Heritage Protection

While looting of archaeological sites on land remains a problem throughout the world, nowhere is this problem more apparent than on underwater sites. Since the beginning of the field, maritime archaeologists have waged a constant struggle with treasure hunters who seek to exploit underwater sites for commercial gain, on the one hand, and a public that often does not understand the distinction between legitimate archaeology and treasure salvage or the need to protect underwater archaeological sites on the other hand. While destruction of underwater sites by treasure hunting is a worldwide problem, some of the key battles, and some of the most recent developments concerning the protection of underwater cultural resources, have occurred in the Atlantic. Many of the wrecks discussed above were looted before archaeologists arrived on the scene. In other cases, treasure salvors have been granted legal access to shipwrecks, and thus the exploitation and dispersal of these sites has occurred perfectly legally. One such case from the Atlantic Ocean is the pirate vessel *Whydah*, which sank off Cape Cod, Massachusetts, in 1717. Despite the attempts of authorities to provide for proper archaeological procedures, the *Whydah* episode resulted in a debacle,

as archaeologists were not able to perform their duties to satisfactory standards (Elia 1992).

The problem of treasure hunting has been complicated by the difficulty in finding a legal framework to protect underwater archaeological sites. The 1982 Law of the Sea Convention specifies that coastal states have control over cultural resources located in their Territorial Seas (up to 12 nautical miles from the coast) and Contiguous Zones (up to 24 nautical miles). Beyond this, coastal states may claim rights to an Exclusive Economic Zone that extends out to 200 nautical miles; some nations have also claimed rights out to the limits of the continental shelf. In these areas, however, the Law of the Sea provides no explicit protection for cultural resources. Thus, any archaeological sites beyond 24 nm have no legal protection under the Law of the Sea and can be exploited by anyone with the capability to do so. Technological developments in deep sea exploration have made these deepwater sites ever more accessible to treasure hunters. In 1987, for example, the Columbus-America Discovery Group led by Tommy Thompson discovered the wreck of the steamship *Central America*, which lay some 200 miles off the coast of South Carolina in approximately 2,400 m (8,000 ft) of water (Kinder 2009). ROVs were used to locate and subsequently salvage the wreck, which went down in a storm in 1857 while carrying 21 t of gold. Salvage efforts recovered an estimated $100–150 million in gold, along with myriad other artifacts. Although the salvagers specifically stated that scientific knowledge was one of the goals of the project, this has yet to materialize; instead, the recovered gold is offered for sale. A similar story comes from another Atlantic shipwreck, the steamer *Republic*, which sank about 100 miles off the coast of Georgia in 1865 with a cargo of gold and silver coins (Vesilind 2005). The wreck was discovered in 2003 by US-based Odyssey Marine Exploration, Inc., who salvaged an estimated $75 million in coinage from the site. Like the *Central America* salvors, Odyssey claims to be conducting archaeological research, but it is clear that commercial exploitation remains the company's chief goal; Odyssey offers *Republic* artifacts, including coins, bottles, and chunks of coal, for sale on its website. Whether or not such groups record and publish sites to archaeological standards, the commercial nature of these enterprises contradicts the ethical principles of archaeological bodies such as the Society for Historical Archaeology (SHA) and Society for American Archaeology (SAA).

Projects such as the *Central America* and *Republic* have been allowed to occur because, until recently, there was no legal framework for preventing the exploitation of underwater sites located beneath the high seas. This bleak picture for the future of Atlantic maritime archaeology, however, has been lessened somewhat in recent years by the adoption of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage (Leshikar-Denton 2010b). The Convention entered into force in January 2009, when 20 nations had signed it. To date, 40 nations, including 16 that border the Atlantic, have signed the Convention. The 2001 Convention provides standards for the protection of underwater cultural heritage, defined as "all traces of human existence having a cultural, historical, or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years." Unlike the Law of the Sea Convention, the 2001 UNESCO Convention thus embraces the protection of all underwater sites, regardless of geographical location. It remains to be seen how well the Convention can be enforced on the high seas, but the agreement is a definite step forward in cooperation between nations to protect submerged cultural resources. The Convention also contains standards for the proper study of underwater resources; these include properly trained maritime archaeologists, a preference for in situ preservation and noninvasive methodologies, and a prohibition against exploiting underwater sites for commercial gain. Some notable maritime nations, such as the United States and the United Kingdom, are not signatories, but in the case of the former, government cultural resources managers are finding ways to implement the Convention's rules into their policies (Varmer et al. 2010).

Another way to protect underwater cultural heritage is by designating special geographical areas as protected zones. The United States' National Marine Sanctuaries Act provides a model for such legislation. The NMSA provides for the protection of natural and cultural resources in certain designated areas. At each sanctuary, officials are responsible for inventorying and managing shipwrecks and other submerged cultural resources located within the bounds of each sanctuary. The first sanctuary officially designated under the NMSA was the USS *Monitor* National Marine Sanctuary, designated to protect the site of that Civil War ironclad shipwreck off the coast of North Carolina in 1975. Two others, Gray's Reef National Marine Sanctuary (1981) and Stellwagen Bank National Marine Sanctuary (1992), have been created off the US Atlantic seaboard. The NMS program represents a highly effective strategy for preserving maritime heritage for future generations.

Future Directions

Maritime archaeological work in the Atlantic Ocean to date has been primarily focused on the topics discussed above, but as the field of maritime archaeology evolves, new perspectives continually emerge.

Deepwater Archaeology

Given the amount of maritime traffic throughout history, deepwater fieldwork will no doubt become an important part of future maritime archaeological work in the Atlantic. The discovery of the world's most famous shipwreck, the RMS *Titanic*, in 1985 at a depth of 3,800 m (c. 12,500 ft) sparked worldwide interest but has resulted in little archaeological work to date. As the wreck lies in international waters, rights to the wreck were granted to RMS Titanic Inc., which has subsequently conducted salvage operations at the site. According to the company's website (rmstitanic.net), more than 5,000 artifacts have been raised. This work, along with that of other salvage companies, has resulted in damage to parts of the site and the removal of artifacts without proper archaeological recording and with little regard for site preservation issues. Pleas by archaeologists finally resulted in collaboration between RMS Titanic, the Institute of Nautical Archaeology (INA), the National Oceanic and Atmospheric Administration office of National Marine Sanctuaries, the National Park Service's Submerged Resources Center, Woods Hole Oceanographic Institute, and other groups (Delgado 2010). Under the archaeological direction of maritime archaeologist James Delgado, RMS Titanic mounted an expedition in 2010 to map the *Titanic* site using sonar and 3D optical imagery. This information will be used to develop the first archaeological plan of the entire wreck site.

Issues raised by the *Titanic* experience – site access, resource sustainability, and site management – will apply to other deepwater archaeology projects in the Atlantic for years to come. Already, other famous shipwreck sites, such as the World War II German battleship *Bismarck* and HMS *Hood*, have been located, and more discoveries are sure to follow. Maritime archaeologists have not yet reached a consensus regarding how best to conduct deepwater research. Treasure salvors argue that such research cannot be performed by archaeologists because of the skills, expenses, and equipment involved and have thus pushed for collaboration between commercial salvage companies and archaeologists. These claims have been elegantly countered, however, by maritime archaeologist Jonathan Adams (2007), who notes that cooperation is incompatible because archaeologists are bound by ethical standards not to exploit artifacts for commercial gain and because archaeologists do indeed have the potential to carry out deepwater projects. Adams cites successful deepwater archaeological work in the Mediterranean and Black Seas in support of his arguments and urges archaeologists to integrate future deepwater research into the types of international research and management plans advocated by the 2001 UNESCO Convention. This seems the most sensible course. A key goal for deepwater

research in the Atlantic is for maritime archaeologists to convince the public, who often do not understand the differences between treasure hunters and archaeologists, that deepwater shipwrecks represent finite resources that should be managed for the benefit of all rather than being exploited for the profit of a few.

Prehistoric Underwater Archaeology

In recent decades archaeologists have come to realize that much valuable data concerning prehistoric habitation sites and the spread of humans around the globe lies under water. Eustatic sea level rise at the end of the Pleistocene resulted in the inundation of many prehistoric coastal sites, which now lie submerged on the continental shelves. Until recently, most interest in submerged prehistoric sites has come from prehistoric terrestrial archaeologists. Maritime archaeologists, with their specialized knowledge in underwater archaeological methodology and access to high-tech underwater surveying equipment, however, have the potential to make significant contributions to the study of submerged prehistoric settlements and coastal migration routes. To date, most such research in the Atlantic has been conducted off the coasts of North America and Europe (Benjamin et al. 2011; Gusick & Faught 2011). Such research typically has two main thrusts: (1) the reconstruction of submerged paleolandscapes and (2) the identification of paleoshorelines. A primary goal is to develop predictive models for locating submerged prehistoric sites, which can then be studied using underwater archaeological techniques. Because of the nature of this work, research into submerged prehistoric landscapes typically involves interdisciplinary collaboration between maritime archaeologists and other specialists such as geoarchaeologists, marine scientists, and geologists. In the coming years, research into this area should help refine scholarly understanding of issues such as the peopling of the Americas.

Maritime Cultural Landscapes

The last two decades of maritime archaeology have witnessed a surge of interest in the "maritime cultural landscape" approach, an idea promulgated by Swedish maritime archaeologist Christer Westerdahl (1992). The maritime cultural landscape approach advocates studying shipwrecks as part of the cultural systems that produced them rather than as isolated sites. Such an approach is well-suited to future work in the Atlantic basin, which consists of a mosaic of diverse, overlapping, interconnected systems. Several recent projects in the Atlantic serve as guideposts for future work in looking beyond shipwrecks to wider cultural processes. One innovative study utilized data from the sloop of war HMS *Swift*, lost off the coast of Patagonia, Argentina, in 1770, to examine British actions in a colonial context (Dellino-Musgrave 2006). The study used artifacts excavated from the wreck site, primarily pottery, to illuminate the ways that material culture was used to express status relations and maintain a sense of "Britishness" in a colonial setting. Archaeologist Richard Gould, long a proponent of using shipwrecks to examine cultural processes, has interpreted the wreck of the nineteenth-century barque *North Carolina* as a possible crime scene (Gould 2005). *North Carolina* went aground on Bermuda under suspicious circumstances on January 1, 1880. Archaeological fieldwork revealed discrepancies between the material culture evidence and historical accounts of the sinking. Gould concludes that these may represent evidence that the vessel was deliberately wrecked, possibly with the intent to collect insurance money. A final recent project that takes maritime archaeological interpretation beyond the site is the study of the *H.L. Hunley* and USS *Housatonic* naval battlefield (Conlin & Russell 2006). In 1864, *Hunley* sank *Housatonic* in the Atlantic Ocean just off Charleston, South Carolina, becoming the first submarine to sink an enemy vessel in combat. Unfortunately for the crew of the *Hunley*, the submarine sank soon after fatally damaging the union warship. Following its discovery in 1995, the *Hunley* was raised; as part of the overall research project, the *Housatonic* and surrounding area have been examined as well. Maritime archaeologists utilized methodology adapted from that pioneered by historical archaeologists on

battlefield sites such as the Little Bighorn. This approach views the entire site as a landscape, the features and artifacts of which can reveal information regarding the progress of the battle. In this case, the battlefield survey helped provide a greater understanding of the engagement between *Hunley* and *Housatonic* than that provided solely by historical accounts.

Cross-References

- ▶ Caribbean Maritime Archaeology
- ▶ Maritime Landscapes
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Society of the Ship
- ▶ Submerged Prehistoric Landscapes

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Atlantic World: Historical Archaeology

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Introduction

Archaeologists have only recently begun to identify their research as part of Atlantic studies (see Kelso 2010) despite the Atlantic World being a central focus of the subfield of historical archaeology since its inception. This being the case, the research carried out by archaeologists of the Atlantic World has been, and continues to be categorized under a number of studies falling within several discrete subfields, such as colonial, indigenous, contact era, African Diaspora, New World, and a host of other "archaeologies," within the larger field of historical archaeology in the Americas, parts of Western Europe, and West and Southern Africa. Because a specific "Archaeology of the Atlantic World" was a distinct research focus in the early years of historical archaeology, defining it now requires an examination of a number of disparate research agendas.

These early explorations were conducted at sites such as Jamestown and Williamsburg, known and memorialized for their strong associations with the founding of the United States as well as European expansion and settlement in the New World. Those archaeologists that did use the term "Atlantic World" sought to designate a specific time frame within the larger field of historical archaeology, rather than a particular

subject matter or research agenda. As the field of historical archaeology was developing, emphasis was placed on defining this historical period, characterized by both European contact and settlement of the Americas, beginning at the end of the fifteenth century, with the voyages of Columbus, and extending into the present. It can be argued that much of Historical Archaeology was, and remains largely Atlantic World archaeology and this is primarily due to the subject's early thematic focus and its strong emphasis on trans-Atlantic interactions. This is not only seen in both early and current research at Jamestown and Williamsburg, but in some of the earliest investigations in the Caribbean as well (see Deagan in Kelso 2010). Just as the discipline of historical archaeology had trouble defining its subject in the early days, those explicitly studying the Atlantic World have had similar difficulties including the denotation of discrete regional and temporal boundaries, although these debates have largely been the domain of historians (Bailyn 2005).

Definition

An immediate predecessor of the industrial age, the Atlantic World era is concurrently referred to as the "post-medieval," "early modern," and "capitalist world" by historical archaeologists depending on their own national background and training. A single, explicit definition of what the Atlantic World was is not possible, largely as a result of the number of areas and powers involved in trans-Atlantic commerce over the course of roughly four centuries. While there is no single, all-encompassing definition of the scope, size, and period of the Atlantic World, those studies attempting to define a general framework have largely fallen under the purview of historians (Bailyn 2005). Most historians of Atlantic history agree that "during a significant chunk of time, extending at least from 1500 through 1800, the Atlantic World—which is to say, Western Europe, the Americas, and West Africa—was sufficiently integrated…" (Coclanis 2007: 113), thus requiring an integrative research agenda that highlights the connections, responses, and consequences of this integration in a unitary fashion. Following this definition, in the broadest sense, the period of the Atlantic World begins the mid-fifteenth century with European exploration in West Africa and ends sometime in the mid- to late nineteenth century with the advent of the industrial age in Europe, in addition to the period of abolition of slavery in the Americas. As a historical concept, the term "Atlantic World," therefore, refers to those regions with a shore on the Atlantic Ocean and their historical interconnectedness or integration, through maritime exchange that brought about cultural encounters and in turn the mass movement of peoples between these areas. The latter was spearheaded by European efforts at commerce and colonization, initially in Africa and later in the Americas, including the early period of indentured servitude in the Caribbean and Chesapeake for example, followed by the era of the trans-Atlantic slave trade throughout the Atlantic sphere.

In the most basic geographical sense, the Atlantic World comprises all coastal regions of Europe, Africa, and the Americas physically connected by the Atlantic Ocean. Additionally, the areas of the Americas and Africa that are often included in studies of the Atlantic World by researchers may include associated interior regions, but are limited by historical incorporation into various European colonial ventures. Attempts to restrict the geographical and temporal boundaries of this period are further complicated by the various stages of Atlantic development tied to the dominance of successive European powers throughout its existence. The initial period begins with Portuguese ventures in West Africa culminating with their rivalry with the Spanish in South America. Immediately on their heels were the Dutch, English, and French as well as an array of smaller players, such as the Danes, all seeking their own territories in Africa and the Caribbean, as well as in continental North and South America. Thus, within the Atlantic World researchers have highlighted a series of smaller "Atlantics" tied to European nationalistic ventures culminating

in colonial boundaries. This is most aggressively seen in the English-French rivalry in the Caribbean and West Africa.

Historical Background

Historical archaeology of the Atlantic World began with historic sites archaeology in the United States in the mid-twentieth century. Drawing on the earlier definitions of J. C. Harrington and Bernard Fontana, who were among the pioneers in this field, Robert Schuyler (1970: 84) later defined the field's focus as "the expansion of European culture into the non-European world starting in the fifteenth century and ending with either, industrialization or the present, depending on local conditions." Some of the first historical sites investigated in the United States were in Virginia, for example Jamestown, and represented some of the earliest moments of English commercial expansion. Even though Schuyler (1970: 85) states that the field's subject matter may begin as early as 1415, with the "Portuguese penetration of Africa," he addresses the fluid nature of this period noting that the regions subject to European expansion geographically "fluctuated from decade to decade," and the fact that the bulk of the initial studies classified as historic sites archaeology were carried out in the United States, and more particularly the southeast (e.g., the work of Ivor Noël Hume in Virginia). Hence, as a field, historical archaeology began with an emphasis on European exploration in the New World demonstrating a distinctly Americanist perspective (Gilchrist 2005). These early projects highlighted the United States' beginnings and the experience of settlers and colonists in a foreign land, yet specifically addressing their successes, failures, and resourcefulness in creating the larger Atlantic World.

This early perspective led to an emphasis on the English Atlantic sphere, while little attention was given to other European groups or indigenous communities (Deagan 1982: 161-2).

Another definition addressing historical archaeology's focus in the Atlantic World era was presented by James Deetz. While Americanist in perspective, this definition is slightly less eurocentric in nature. In it the author describes the field as "the archaeology of the spread of European cultures throughout the world since the fifteenth century, and its impact on the indigenous people" (Deetz 1977: 5).

In the revised text, Deetz (1996: 5 emphasis added) altered the latter half of this statement to read "and *their* impact on *and interaction with the cultures of indigenous peoples*." This amended statement recognizes that both "European" and "indigenous" people are not monolithic entities, and as such, there were multiple experiences of contact and interaction throughout the Atlantic era. Additionally, it reflects a growing trend within historical archaeology to define a more global subject matter thus opening a dialogue between archaeologists in the Americas, Europe, and parts of Africa (e.g., Falk 1991).

The emergence of historical archaeology in Europe postdates studies in the United States, even though the subject matter roughly corresponds with the era of the Atlantic trade, including its regional focus in the United Kingdom. Its designation as "Post Medieval" has had a tendency to marginalize its practitioners from the larger debates within global historical archaeology (Gilchrist 2005: 330), resulting in the gradual integration of the two perspectives. Attempts have been made to unite the field around investigations that largely fall within Atlantic studies (e.g., Egan & Michael 1999). Here again, the experience of the European has been the primary focus of study, as well as the impact and introduction of new commodities from the Americas and West Africa on European society.

Key Issues and Current Debates

Research within historical archaeology has moved from the sites of major events and influential men, like the homes of Thomas Jefferson, George Washington, and James Madison, to include the local or everyday lives of the invisible masses residing on these properties, as well as within urban spaces, examining topics of race, ethnicity, gender, and

economic marginalization through multi-scalar perspectives. In fact, many of the debates that permeate historical archaeology as a whole are magnified within those focusing on the Atlantic era, notably those surrounding race or racialization (e.g., Orser 1996). This is also reflected in current research being carried out within Atlantic World studies as a whole. More specifically, there is an emphasis on indigenous experiences and successes within the Atlantic. This is seen in studies of Native American communities when approached from an indigenous rather than a settler's perspective (Blanton & King 2004) and in investigations of indigenous trading communities in West Africa (DeCorse 2001).

Archaeologists have also followed the lead of Atlantic historians in defining the various "Atlantics" that coexisted. These are defined by a group of people sharing ethnic or national origins, a region, or a nation and its colonial or mercantile empire. Likewise, the indigenous spheres of interaction are also receiving greater attention. The most explicit example of this is the recent attempt to construct a dialogue between historical archaeologists working on Atlantic period sites in Africa and contemporary African Diaspora sites in the Americas (Ogundiran & Falola 2007). Most importantly, archaeological investigations of Atlantic era sites in West Africa have significantly increased since the 1990s (e.g., DeCorse 2001; Monroe & Ogundiran 2012). Other attempts at defining various Atlantics along nationalistic or imperial lines are less overt, but nonetheless can be found in studies of the Irish (Orser 1996: 89-105; Horning in Kelso 2010), for example. Regional approaches that examine multiple peoples include those focusing on North America and South America, with a particular emphasis on Brazil as part of an Iberian Atlantic (e.g., Funari 2006; Deagan in Kelso 2010), or the Caribbean and its British and French regions (e.g., Kelly & Hardy 2011). In addition to terrestrial investigations, maritime archaeologists working within historical archaeology have investigated a number of Atlantic era sites in the United States (the *Le Belle* by Texas A&M), the Caribbean (most famously Port Royal Jamaica), and more recently in Africa including Ghana (The *Elmina* wreck by Syracuse University) and South Africa (George Washington University's collaborative Southern African Slave Wrecks Project).

Beyond attempts to investigate regions or types of Atlantics, the approach taken by archaeologists considers a range of analytical models primarily aimed at understanding identity within specific socioeconomic spheres of interaction. This includes the work by Stephan Silliman on the northeastern Pequot in the United States, which presents a new perspective on the colonial experience. This and other works investigate what it means to be "indigenous" and how this changes through the course of the Atlantic World era. These issues are addressed utilizing theories of memory and highlighting the lived experience of everyday life by drawing on practice and agency theories.

International Perspectives

The large geographical expanse, involvement of multiple communities, and emphasized relationships between native and European communities have prompted historians and historical archaeologists to approach the Atlantic World in a variety of ways. Though drawing primarily on geographical positioning, the connections formed between these regions through maritime travel, colonialism, and immigration manifested in strong political and cultural ties formed through commerce and exploration. The earliest archaeological excavations carried out within the historical archaeology context, or historic sites archaeology as it was originally named, were conducted at sites tied to discovery and early settlement by Europeans in the United States like Plymouth, Massachusetts and Williamsburg, Virginia. In general, historical archaeology has been defined by its practitioners by its subject matter – namely, sites of European contact in the New World. While the former view of the Atlantic is consequently created from a New World perspective tied to mercantile conquest, in British archaeology this period falls under the umbrella of post-medieval studies including the development of the plantation system in Ireland in the seventeenth century (see Horning in Kelso 2010).

In reaction to the restrictive nature of the Americanist-driven definition of the field, archaeologists have identified this period as a subject for historical archaeologists who employ concepts that are much more global in nature, such as the notions of the "Modern" (Johnson 1995) or "Capitalist" (Orser 1996) World. Both conceptions incorporate the period of the Atlantic World, though each extends the subject matter of the field into the late nineteenth and twentieth century. The emphasis on the spread of capitalism put forth in Matthew Johnson's (1995) and Charles Orser's (1996) formulations is in line with the idea of a modern world-system, originally formulated by Immanuel Wallerstein (1974), that emerged as a result of European trans-Atlantic commerce. All of these research agendas have been criticized for their Eurocentric bias and particularly the emphasis they place on European experiences in, and their conquering of, the New World and parts of western and southern Africa. This includes the expansion of capitalism – deemed a European invention – and the decline of local polities in the Americas and in Africa. The recognition that maritime exploration did create the Atlantic, many argue, should not overshadow the experiences of local communities throughout the Americas and Africa in creating the Atlantic World. It is this point that historical archaeologists have been grappling with since they began to define the focus of their field.

To some extent, studies of culture contact and colonial encounters in the United States represent a move away from a focus on European settlement toward an understanding of the impact of this on indigenous populations. As Deetz indicates, this was a key topic of inquiry in historical archaeology and many of the early studies argued for a loss of native culture. More recently, emphasis has shifted to include consideration of indigenous responses and reactions within colonial encounters in more active terms, through acts of resistance, cultural resilience, and hybridity. Furthermore, archaeologists from Europe, parts of Africa, the Caribbean, and Brazil in addition to the United States have begun to examine local interpretations of the capitalist system driving the Atlantic World. A prominent example of the shift away from the "European experience" within the United States is the subfield of African Diaspora archaeology which focuses on sites associated with populations of African descent in the Americas (and even some in Africa). African Diaspora archaeology's subject matter begins with the trans-Atlantic slave trade and continues into the twentieth century, yet the period that falls under the purview of the Atlantic World is usually considered to begin with the initial arrival of Africans in Maryland and Virginia in the seventeenth century and ends with the abolition of slavery in different areas of the Americas (see Fennell, Chan, Weik, Hauser, and Schávelzon in Ogundiran & Falola 2007). Outside of the United States, various Caribbean Islands have received equal attention with a particular emphasis on plantations and maroon sites (see Haviser 1999) as well as spheres of African-European interaction in West and South Africa (see Monroe, Stahl, and Ogundiran in Ogundiran & Falola 2007; see Schrire in Falk 1991; DeCorse 2001).

Future Directions

Currently, Atlantic World archaeology is coming into its own. This is evidenced by the increase in sessions at the *Society for Historical Archaeology* annual meetings explicitly addressing the topic, such as the 2009 session "The French Fishery in Newfoundland: The Trans-atlantic Landscape of an Atlantic Borderland," or the 2010 session "The Chesapeake in the Atlantic World." Most recently, the 2012 meeting included sessions entitled "African Diaspora in Global Context," "Atlantic Connections and New Dimensions of Archaeology at Maryland's Birthplace," and "Conflict and Violence in the Making of the Atlantic World." These examples represent a shift from identifying the Atlantic as a temporal period, to a more nuanced approach of connections and relationships between spaces and people. While the Atlantic World has been a topic of interest since the early days of historical archaeology, attempts to develop a pragmatic research agenda and gathering interested researchers for debate and discussion are still in

the formative stages (e.g., Kelso 2010 drawing on the 2007 Society for Historical Archaeology Plenary session "Old World, New World, Culture in Transformation").

As seen in the titles listed above, archaeologists are focusing on the connections between regions, and how these shaped local experiences in the Atlantic World. What remains to be seen is if a single Atlantic World archaeology will emerge from these inquiries, or if the field will remain dissipated within historical archaeology as a whole. What is clear, however, is that the growing interest in historical archaeology in the United Kingdom coupled with the increase of researchers focusing on Atlantic era sites in West Africa is driving the current rise in such investigations.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Funari, Pedro Paulo A. (Indigenous Archaeology)
- ▶ Historic Jamestowne
- ▶ Modern World: Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Schuyler, Robert L.
- ▶ Southern Africa: Historical Archaeology
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Basic Biographical Information

Valerie Jane Attenbrow, also known as Val Attenbrow, is an Australian Archaeologist and Museum Research Scientist at the Australian Museum. Her interests lie predominately in Australian Indigenous Archaeology related to variations in territorial occupation. She graduated in 1976 with an honors degree from the Department of Anthropology at Sydney University. Her Honors thesis examined the Aboriginal occupation of the far south coast of New South Wales, focusing specifically on the subsistence patterns of the Holocene period.

Once graduating, Attenbrow began working as a consultant archaeologist in the Cultural Resources Division of the New South Wales National Parks and Wildlife Service. During this period, and in conjunction with the salvage excavation program for the Mangrove Creek Dam, she began work on the Upper Mangrove Creek catchment area. The results of her excavations provided the necessary momentum for more research and fieldwork in the vicinity, which Attenbrow undertook as part of her Ph.D. at the University of Sydney.

Attenbrow also examined the Aboriginal occupation of Port Jackson and the surrounding Sydney region in 1987–1988 as part of a -grant-sponsored project initiated by Hunters Hill Municipal Council. It involved the review of historical documents from the late eighteenth and early nineteenth centuries pertaining to the descriptions of Aboriginal life (albeit not comprehensively) in and around Port Jackson and Botany Bay. Attenbrow began the Port Jackson Project in 1989, which she envisaged would correct the variation present in British records concerning the life and culture of the Aboriginal people in the area. The archaeological evidence she procured through excavations resulted in the development of far more reliable timeframes than the documented evidence, alone, could achieve.

Concurrently, Attenbrow began working for the Australian Museum in its Anthropology Division. Her research since then, which is based at the museum, has seen the completion of several large-scale and successful projects, including the Port Jackson Project and the publication of *Sydney's Aboriginal Past* (Attenbrow 2002). She is now a Principle Research Scientist in the Anthropology Unit, Research Branch of the museum. While at the museum, Attenbrow has continued to analyze excavated assemblages from Upper Mangrove Creek, Port Jackson, and those belonging to other museum collections.

Major Accomplishments

Val Attenbrow's career in archaeology has spanned over three decades and, despite being primarily focused on regional New South Wales, includes other notable contributions to the field of archaeology and a considerable number of published works in the form of books, journal articles, papers, and reviews. In fact, as of early 2011, Attenbrow had a total of 73 published works to her name, both as sole author and coauthor.

Sydney's Aboriginal Past (Attenbrow 2002) is considered to be Attenbrow's magnum opus and represents the culmination of much of her life's work. The book examines three time periods: pre-colonial (pre-1788), British colonization (at 1788), and early colonial (1788–1820), while the documents she examined in 1987–1988 pertaining to Port Jackson and Botany Bay provide the work's foundation. Within those three time periods, she examines, discusses, and clarifies various issues, including the variation present in British records of Aboriginal life, the array of Aboriginal languages and the barrier this created

between the indigenous population and the colonists, and the complex social structures of Aboriginal society. Attenbrow also used, her work in this area, to explore aspects of indigenous life ranging from how food and tools were obtained to the belief systems used in the area and how this affected personal adornment to the use of images and rock art, providing a thorough overview of Aboriginal life in the Port Jackson region.

Some of Attenbrow's other prominent works include *Upper Mangrove Creek catchment* (1988) and *Reduction Continuum and Tool Use* (2005) (coauthored with Peter Hiscock). Her latest publications include a chapter in "Trekking Shore: Changing Coastlines and the Antiquity of Coastal Settlement" entitled *The Role of Marine Resources in the Diet of Pre-Colonial Aboriginal People and Land Use Patters Around Port Jackson, Sydney, New South Wales* (2011). Attenbrow has also been the coeditor of "Australian Archaeology" with Betty Meehan (for volumes 30–35, published from 1989 to 1992) and the editor of "AA Short Reports" (for volumes 42–49, published from 1996 to 1999).

Attenbrow has received a Life Membership Award from the Australian Archaeological Association (AAA) in 2002 and was awarded the Mulvaney Book Award in 2004 by the AAA for her book *Sydney's Aboriginal Past* (2002). Consequently, Attenbrow has not only established herself as an insightful interpreter of Sydney's regional archaeological past but as one who has also contributed substantially to the broader understanding of Australia's Aboriginal past (White 2006).

Cross-References

- ► Australian Archaeological Association Inc. (AAA)
- ► Colonial Encounters, Archaeology of
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Australasian Historical Archaeology

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Introduction

Australasian historical archaeology is a diverse field of archaeological techniques and knowledge focused around the settler societies of Australia and New Zealand. This appellation not only echoes a shared colonial past between the two countries but also demarcates a common disciplinary milieu, a milieu which has seen increased collaboration in recent decades. In the practice of Australasian archaeology, the subfield of historical archaeology commonly relates to the study of a period beginning with the arrival of the first Europeans who arrived with the intent of colonizing Australasia. However, the boundaries of the subfield are not always clear or uncontested and are subject to redefinition as new techniques are adopted and new understandings deployed. Maritime history constitutes an important part of the colonial story in Australasia, and maritime archaeology overlaps with historical archaeology owing to shared research methods and a similar

time frame (Burke & Smith 2007: 215). Therefore, any general consideration of Australasian historical archaeology must be undertaken alongside a consideration of Australasian maritime archaeology (Lawrence & Davies 2009: 629).

The colonial pasts of New Zealand and Australia stem from similar origins within the British diaspora, and these pasts are considerably intermingled, although the initial colonies can be readily understood to have differing populations, since Australia was a penal colony and New Zealand began as a settlement with free settlers. The first flow of population to the east coast of Australia in 1788 over 40 years before New Zealand was vigorously colonized also means a difference in the length of colonial development. Furthermore, each society and region in Australasia was radically altered by the response of Indigenous peoples to colonization. The range of Indigenous responses has resulted in widespread variation, not only between the two countries but also within them. It should also be understood that strong ties still exist between the history and current societies of the two countries. Most of New Zealand was part of the colony of New South Wales until 1825, and the flow of free settlers increased in Australia at around the same time that substantial levels of immigration began in New Zealand. Each country also pursued similar strategies of domination in an attempt to control and subjugate the Indigenous inhabitants of Australasia. The countries were drawn together more tightly through the nineteenth and twentieth centuries and their shared heritage, and geographical proximity has led to strong cultural similarities. Importantly, the diverse background of immigrants to Australasia from all over the world means that it has a broad multicultural composition.

Although there are a number of succinct and instructive descriptions of Australasian historical archaeology as a discrete entity (e.g., Lawrence & Karskens 2003; Lawrence & Davies 2009; Paterson & Heath 2009), the historical archaeology of Australia and New Zealand has not been subjected to a unified exhaustive analysis. This is as much a result of the distinctive development of the discipline within each country as it is of different frames of reference currently at work. A noticeable lack of a shared comprehensive self-reflection underscores a current effort within Australasian historical archaeology to implement studies of a broader geographical scope as a starting point for wider discussions. This effort is a sign of a growing regional "Australasian" consciousness fostered in part by the Australasian Society for Historical Archaeology (ASHA) and the Australasian Institute for Maritime Archaeology (AIMA).

Despite a group of studies undertaken in the early twentieth century in New Zealand by the anthropologist Elsdon Best, the discipline principally flourished throughout Australasia from the start of the 1960s. This began with an awakened understanding on behalf of scholars that the material culture of the historical period was useful in answering research questions, even if these questions were only a subordinate interest to their concerns about the ancient past. This academic awakening was soon spurred by changes occurring within wider society. In both countries, the burgeoning public interest in national history led to historical heritage receiving legislative protection from national and regional governments. This legislation encouraged the growth of professional historical archaeologists who were capable of meeting the new legal requirements for both government and private organizations. The growth of archaeological consultants within historical archaeology, and consequently the increase of reports intended for private consumption rather than publication, has led to the expansion of a considerable body of difficult to locate literature. Although there are some studies that have moved to change this, such as the work of the Archaeology of Sydney Research Group that promotes research and publications from consultant archaeologists as well as academics.

Statutory bodies in both Australia and New Zealand are responsible for the protection of historical archaeological heritage and of ensuring adequate standards in historical archaeological practice. This position is chiefly occupied in New Zealand by the New Zealand Historic Places Trust and in Australia by the Australian Heritage Council and smaller state bodies. Legislation

such as the *Resource Management Act 1991* and the *Historic Places Amendment Act 1975* in New Zealand and the *Environment Protection and Biodiversity Conservation Act 1999* and a variety of state acts in Australia provide statutory frameworks for the protection of historical heritage. There are also a number of non-statutory bodies like the National Trust, Australasian Society for Historical Archaeology (ASHA), Australian Institute for Maritime Archaeology (AIMA), Australian Archaeological Association, and the New Zealand Archaeological Association that promote the protection of historical archaeological heritage. Various local and community groups throughout Australasia also take an interest in protecting the historical archaeological heritage that they are most connected with.

Definition

Australasian historical archaeology is the study of the colonial past of Australia and New Zealand through the investigation of material culture. The time frame that is studied commonly extends from 1788 to the present day, and it can be seen that historical archaeology in Australasia is largely based on an event, the annexing of land by European colonists, rather than any nebulous criteria concerned with an arbitrary "documentary" threshold of historicity in society. The legislative and practical framework constructed around Australian and New Zealand territory means that the vast majority of Australasian historical archaeology is physically placed in Australasia.

The temporal focus of historical archaeology in Australasia is primarily from the beginning of serious colonization onward, although periods of exploration of the region by Europeans and interactions with Indonesian peoples occurring as far back as the beginning of the seventeenth century are often included. The Makassar seasonally visited the north coast of Australia in search of the *trepang* (sea cucumber) since at least the eighteenth century and the Dutch explorers left their material culture, often in the form of shipwrecks, along the west and north coasts of Australia since the seventeenth century. The sometimes implicit emphasis on the arrival of the colonizers often means that in practice, there is a sharp distinction drawn between Australasian historical and prehistoric archaeology, a distinction reinforced by legislation and cultural heritage management frameworks. This division is particularly the case in Australia but less so in New Zealand where historical period Māori sites were first investigated in order to better understand the precolonial past (Smith 1991: 8). This interest in Indigenous cultural continuity across the barrier of European colonization has been sustained throughout the history of New Zealand historical archaeology. Contrarily, only recently has there been an attempt to return an understanding of Indigenous Australian people to the historical landscape in Australia. This attempt has arisen largely from assertions by Indigenous Australians that their histories did not cease with the arrival of the colonists, rather than from a sudden outpouring of theoretical sophistication by archaeologists. This means that the temporal boundary between "prehistoric" and historical Australasia is far from fixed, even less so than the temporal boundary between precolonial and colonial Australasia, despite what has often been believed.

The spatial scope of Australasian historical archaeology is directed primarily to the mainland of Australia, Tasmania, the North and South Island of New Zealand, and a number of other islands scattered throughout the Pacific. Australia and New Zealand also lay claim to portions of the Antarctic and the material remnants of scientific exploration receives archaeological attention from both countries. The Australasian geopolitical area is critical to the practice of historical archaeology, and much research relies on government funding or government-backed regulators. Important archaeological sites spread throughout the world are associated with the history of the ANZACs, Australian and New Zealand soldiers who fought alongside one another in the First World War. The story of the ANZACs constitutes a history that is critical to centralizing and unifying national identities in

both countries, although many archaeological sites are located outside of Australasia. While the geopolitical boundaries of the Australasian region are important in maintaining and fostering the subfield, the global dispersal of Australasian historical archaeological sites means that the scope of Australasian historical archaeology is global.

Broad concepts like capitalism and immigration provide the bedrock of analysis in Australasian historical archaeology, yet it also makes use of a wide variety of more specific themes and categories to control and understand its data. These are somewhat arbitrary, and entirely open to question, these concepts help structure the investigation and provide a measure of comparison that is becoming more and more critical to the subfield. There are as many different categories of site "as there are different types of human behavior in the past" (Burke & Smith 2007: 196), yet a broad enumeration will give an idea of what comprises the regular subject of historical archaeological discourse in Australasia.

An important first step in the use of categories in Australasia is usually the sketching of cultural boundaries interior to Australasian society. This is largely to do with the broader area of knowledge that the site can then be placed in and the resultant ease of comparison that the framework of knowledge then provides (Smith 2004: 260). The rich multicultural background of Australasia means that the cultural groupings are many and varied, yet some examples of cultural groupings often deployed are Indigenous Australian, British, Chinese, Irish, Dutch, German, and Māori. An example of the multiplicity that is encountered once the above broad categories are investigated more closely is seen through the use of the concept of Indigenous Australian cultural identity in the analysis of the historical period. With hundreds of Aboriginal nations, each cultural group is distinct and possesses its own language or dialect and its own worldview. Further evidence of the mutability of these categories can be seen in work relating to Chinese immigrants in the Australasian goldfields in the nineteenth century. These immigrants tended to come from southern China's Guangdong province and their language was Cantonese rather than Mandarin. Selecting the right cultural framework with which to interpret results is often a matter of accurate historical research and the correct scale of analysis. Cultural categories such as these are often employed simultaneously with a variety of site types.

These site types cut across the broader category and tend to reflect the masculine occupations of the past to the exclusion of historical actors who were not adult males (Burke & Smith 2007: 208). Although this is true, when this typing is considered in the broadest possible fashion, a consideration of these types helps to flesh out any definition of Australasian historical archaeology, even if only to characterize the content of how the past is constructed by historical archaeologists in Australasia. A framework produced by Ilka Schacht (2010) for a thematic research framework in Australian archaeology provides a good starting place for this understanding, and Table 1 is a small selection of subjects and themes drawn from this work with the addition of some New Zealand examples.

The practice of historical archaeology in Australasia is typical of global historical archaeology, survey, excavation, and heritage management being chief activities undertaken by practitioners (Fig. 1). Research is conducted through the investigation of documentary evidence at the same time as archaeological evidence which includes standing structures alongside subsurface features and deposits. The majority of documentary evidence is usually available freely from government organizations throughout Australasia and can often be accessed through the Internet. Government requirements within each of the states of Australia and within New Zealand have different requirements for archaeologists and definitions of correct archaeological practices.

Historical Background

An incipient investigation of historical sites was evident in Australasia as early as 1921, yet it was only in the 1960s that systematic historical

Australasian Historical Archaeology, Table 1 A selection of subjects, themes, topics, and site types in Australasian historical archaeology, slightly modified and heavily abbreviated from Schacht (2010)

Examples of subjects	Examples of themes	Examples of sites
Settlement	Cross cultural encounters	Trading station, mission station, rockshelter, camp site, and rural estate
	Convicts and incarceration	Convict households, squatters' estates, prisons, female convict factories, and convict ships
Development	Defense	Battlefields, hangars, airfield bomb shelters, *Pa*, and searchlight bunkers
	Infrastructure and transport	Wreck site, shipyard, dry dock, road verge, tramway, and rail bridge
People and society	Status and class	Schools, churches, urban houses company offices, and cemeteries
	Ideology, cult, and religion	Churches, mosques, temples, Bora rings, cricket pitch, shrine, and town halls
Economy	Primary industries	Quarry, mine, farm, sealers camp, logging camp, and tryworks
	Consumption	Corner shop, urban house site, warehouse, wreck site, quay, and farmhouse

archaeological work began to be undertaken by academic and museological institutions. The first studies contained significant elements of post-contact, industrial, military, and, in Australia, maritime archaeology. Owing to a growing historical consciousness in Australasia, there was a broad enactment of legislation protecting historical heritage from the 1970s. This legislation spurred an increase in archaeological activity in Australia and New Zealand through the 1970s and 1980s, with the former country emphasizing the role of private consultants and the latter that of government-employed archaeologists (Smith 1991: 8; Lawrence & Davies 2011: 12). From the early 1990s, formal steps were taken to solidify the links between Australia and New Zealand, and studies with a wider regional focus were completed. The varied development of historical archaeology in Australasia has shaped the current debates and areas of concern within the discipline today.

The earliest form of historical archaeological thinking in Australasia was the investigation of colonial era Māori *Pa* and British military fortifications by the anthropologist Elsdon Best in New Zealand in the 1920s (Smith 1991: 6). Although relying heavily on historical sources and producing work of a primarily descriptive nature, Best dealt with sites from the colonial period and explained structural changes in Māori military fortifications (Smith 1991: 6).

In 1959, archaeologists in New Zealand excavated a series of deposits dating from the nineteenth century Māori site at Orongo Bay, Gisborne, deposits that were superposed over earlier prehistoric deposits (Smith 1991: 7). Later in 1959 and 1960, excavations were undertaken at the site of the British military's Paremata Barracks near Wellington (Smith 1991: 7). In New Zealand in the 1960s, investigation was focused mainly on post-contact Māori sites, and most of those conducting historical archaeology had received their training in prehistoric archaeology (Smith 1991: 8). During this decade, the New Zealand Archaeological Association began to include historical sites within its site recording scheme (Smith 1991: 8), marking an acknowledgement of the applicability of archaeological techniques to the colonial past. A project in New Zealand that was representative of the emphasis on the study of Māori sites in this decade was the Tongariro Power Development Project (Smith 1991: 8).

The predominance of a prehistoric and anthropological background for the emerging discipline of historical archaeology in New Zealand was not mirrored in Australia, where scholars were also drawn from diverse subject areas such as classical archaeology, history, and geography (Lawrence & Davies 2009: 629). As in New Zealand, a small number of small-scale early studies, primarily driven by historical research but that included elements of archaeological understanding, were undertaken from 1933 up until the 1960s (Paterson & Heath 2009: 113-14). The first substantial, and substantially excavation based, historical

Australasian Historical Archaeology, Fig. 1 Extensive excavations in Hobart at 15 Hunter Street, Sullivans Cove, showing the areas of excavation, interpretive signage, and nearby inn "The Drunken Admiral" that is of the same era as the excavated site. Historical standing structures, public interpretation and urban excavation are three key features of Australasian Historical Archaeology (Photograph taken by Anthony Jenner and courtesy and copyright of Austral Archaeology Pty Ltd.)

archaeological work in Australia was aimed at training postgraduate students in the University of Sydney, the University of Melbourne, and the Australian National University (Lawrence & Davies 2011: 12). Sites excavated as part of this original phase included Port Essington in the Northern Territory and the Irrawang Pottery in New South Wales (Paterson & Heath 2009: 114). The investigations at Irrawang Pottery in the second half of 1969 directed by Judy Birmingham formed a cornerstone of Australian historical archaeology, and industrial archaeology has since been a core focus of Australian historical archaeology (Fig. 2).

The 1970s saw a strengthening of the position of historical archaeology in Australasia, primarily though the passing of legislation protecting historical heritage and the growth of awareness of the importance of historical heritage among the Australasian public. In Australia, the decade opened with the founding of the Australian Society for Historical Archaeology in 1970 (Lawrence & Davies 2011: 14). Following this, the Hope Inquiry was appointed by the Federal Government in 1972 and 1974 to investigate historical heritage in Australia. It included two archaeologists in its appointments and led to the inclusion of historical archaeological places in the Register of the National Estate (Lawrence & Davies 2011: 13). The Register of the National Estate provided statutory protection for sites throughout Australia, and the inclusion of this marked the beginning of a series of localized legislative acts across the country aimed at protecting historical heritage. Undergraduate courses in historical archaeology were offered for the first time by Judy Birmingham at Sydney University in 1974. At around this time, the publication of historical archaeology regarding Australian sites widened in scope and increased in quantity. The publications included books, monographs, and articles dealing with site and artifact studies as well as maritime archaeology and heritage management (Paterson & Wilson 2000: 83). In 1977, the first archaeological excavation took place at Port Arthur, an early convict settlement of some size in Tasmania, and this place was to become a testing and training ground for Australian historical archaeology until the present day.

In New Zealand, there was the implementation of the *Historic Places Amendment Act* in 1975, guaranteeing the protection of sites over 100 years old, and the 1976 seminar by the New Zealand Archaeological Association that set out a conscious plan for promoting historical

Australasian Historical Archaeology, Fig. 2 Excavation at the Phoenix Foundry in South Australia unexpectedly revealed intact molding floors and large, elaborate casting molds. The footings for cranes that were used to move the molds into place can be seen as the white objects at the *top* and *bottom* of photograph (Photograph taken by Justin McCarthy and courtesy of and copyright of Austral Archaeology Pty Ltd.)

archaeology. Important archaeological studies were also undertaken during this time by Neville Ritchie in the Clutha Valley and Nigel Prickett at Taranaki (Smith 1991: 8). The Clutha Valley project produced the then largest and most detailed historical archaeological study undertaken in New Zealand, and it specifically focused on the archaeological remnants of the Chinese gold miners associated with the industrial history of the area. This survey marked the first substantial interest in the archaeology of the overseas Chinese in Australia Around the same time, Prickett had been investigating the fortifications remaining from the Taranaki wars of the 1860s and 1870s, the first extensive investigation that involved significant amounts of European heritage in New Zealand (Smith 1991: 8). These projects provided important training to the following generation of New Zealand historical archaeologists.

Although the awareness of the value of maritime sites in Australia was growing as a result of activities by amateur divers through the end of the 1960s, it was in the beginning of the 1970s that the first steps toward maritime archaeology were taken in the west of Australia. The practice of maritime archaeology in Australasia arose from the need to successfully manage a number of early Dutch wreck sites along the coast of Western Australia that had become subject to looting and harm (Gibbs 2004: 37). The Western Australian Maritime Museum led the early maritime investigations of the Dutch wrecks, carefully excavating four of them between 1973 and 1976 and displaying cannon, elements of the hull, and cargo from the ship *Batavia* (Lawrence & Davies 2009: 632). The excitement of the history associated with the wreck and the splendor of the cargo significantly raised the public profile of maritime archaeology in Australia. Over the coming decades, while the majority of academics showed considerable apathy in promoting the interests of maritime archaeology, the Western Australian Maritime Museum, in association with James Curtin University, trained the current generation of maritime archaeologists in Australia (Gibbs 2004: 37).

The 1980s saw the growth of consultants working in the private sector practicing historical archaeology in Australia, while in New Zealand, routine funding by government meant that a considerable number of historical archaeological publications appeared. As an indication of this, over 70 % of historical archaeological surveys were conducted for two government

Australasian Historical Archaeology, Fig. 3 Precise excavation and recording in progress at Oihi Bay, New Zealand. With a Māori *Pa* and an early mission station Oihi Bay, it represents a significant contact site (Photograph courtesy of and copyright of Andrew Blanshard, Department of Conservation, New Zealand)

bodies: the Forest Survey and Lands and Survey (Smith 1991: 9). The bulk of sites dealt with during this time in New Zealand were industrial, primarily mining, but by the end of the decade, an increase in urban excavation meant that many more domestic sites were also being investigated. The investigation of Māori sites continued to be a staple of New Zealand archaeology through this period, while there was an increase in the investigation of maritime archaeology, beginning in the 1980s (Smith 1991: 9) (Fig. 3).

The situation in Australia was slightly different, as private consultants conducted a large share of the historical archaeological investigations and the foundations for historical archaeology established in academia in the 1970s were consolidated. Graham Connah began teaching historical archaeology at the University of New England in Armidale and Tim Murray at La Trobe occupied the nation's first position dedicated to historical archaeology (Lawrence & Davies 2011: 14). The "Little Lon" excavation in Melbourne, the Queens Theatre excavation in Adelaide, and the beginning of excavations in the Rocks in Sydney are examples of extensive urban excavations that began to occur throughout the cities of Australia as the legislation of the previous decade was enforced (Lawrence & Davies 2011: 14). Reports published during this time increased in sophistication and attention to detail, especially regarding the artifactual assemblages retrieved as part of the excavation.

The 1990s saw the coalescence of an Australasian historical archaeological consciousness and the formalization of the partnership between Australian and New Zealand archaeologists. This connection across the Tasman Sea had been building for some years since the growth of archaeology in each country. In 1990, the Australian Society for Historical Archaeology held a conference in New Zealand and two years later formally changed its name to the Australasian Society for Historical Archaeology, the name of its journal undergoing a similar change. Soon after in 1995, a joint conference was held with the Australian Institute of Maritime Archaeology, which, in 2001, also changed their title to incorporate Australasian. During this time, more appointments were made in Australian universities for positions relating to historical archaeology, and maritime archaeology began to be accepted in the academic establishment. Australia followed New Zealand in investigating Chinese heritage in this decade with a nationwide study (Ritchie 2003: 4). Maritime archaeology also began to lead the way in terms of creating studies with a broad geographical scope, such as the Archaeology of Whaling in Southern Australia and New Zealand project.

The first decade of the twentieth century saw for the first time cohesive trends across Australasia: the continued rise of consultant historical archaeologists in Australasia and a growth of regional projects undertaken by archaeologists in both countries. Alongside was a marked increase in the amount of historical excavation in New Zealand (Smith 2004: 257) and a practical concern with the absence of a thorough investigation of the Indigenous Australian colonial past (Harrison 2010: 90). This congruity between historical archaeological practitioners in the two countries has led to a tentative collaboration on practical projects and an even more tentative approach to theoretical issues.

Key Issues and Current Debates

Current debates in Australasian historical archaeology cover a wide range of areas, from the manner that archaeological findings might be communicated to society to ways of understanding and drawing out insight into the working of ethnicity, class, and gender from the archaeological record. Despite the recurrence of the same issues throughout Australasia and a forum for regional discussion, debates still tend to be localized in either Australia or New Zealand with the problems directed toward a national rather than Australasian basis. This mild form of parochialism arises from the value invested in historical archaeology as a tool of nation building as much as it does from the difference in the trajectories of disciplinary development between the countries.

A number of key issues in Australasian historical archaeology are shared between New Zealand and Australia, namely, concerns over a growth of a large body of unpublished archaeological research, questions about the appropriate scale to conduct studies, possibilities of establishing comparability between sites, and doubts about historical archaeology's role within wider society. Given the difference in the course of development of historical archaeology in the two countries, several critical issues are localized in each country but are still central to current understanding. An example of this is the role of post-contact archaeology in Australia, while in New Zealand, there is a distinct lack of development in the understanding of maritime historical archaeological sites (Carter & Dodd n.d.). The key issue of the appropriate scale that investigations may be conducted at is a core issue in understanding historical archaeology as it relates to the unity of Australasian historical archaeology as a whole.

A consistent issue across Australasia is the increasing creation of the reports of private consultants that are never offered for publication and therefore are not available to the public or to other archaeologists (Smith 2004; Connah 2007). In both Australia and New Zealand, this growth of unpublished, or gray, literature is often linked with the inability of historical archaeology to communicate its findings to the public. Therefore, this fuels concerns over the place of historical archaeology in wider society. In some ways, it is also seen to hamper the establishment of studies of appropriate scale in Australasia, as essential research that might otherwise be available has been withheld from the grasp of researchers (Connah 2007: 106). This is not always the case as the New Zealand Historic Places Trust maintains a library of thousands of online historical archaeological reports produced by consultants and government departments across Australia make reports available on request. Obversely, the monetary cost of subscription to quality historical archaeological journals or online databases often means that access is prohibited to consultants who are not affiliated with an academic institution.

The lack of explicit theory has often been commented on in Australasian historical archaeology (e.g., Murray 2002) and is often linked to the tension between consultant and academic practices noted above. The most serious attempt to systematically produce and apply a novel theory with a substantial data set thus far has been by Burke (1999) where an analysis of the structural relationship between capitalist ideology and historical architecture is undertaken on a regional basis. A concern with the theory and utility of artifact studies has also been an increasing issue in Australasian historical archaeology, and several papers over the last decade have begun

to address the difference between artifact cataloging and artifact analysis (e.g., Crook, Lawrence & Gibbs 2002), or the role of functional categories in analysis itself (Brooks 2005). These artifact studies represent a departure from North American artifactual models and a fast developing independent strand of archaeological theory and method.

The emphasis on post-contact Māori heritage in New Zealand historical archaeology has been continuous, while in Australia, the study of colonial British society eclipsed that of post-contact indigenous sites in the latter decades of the twentieth century. The recent attention paid to the Indigenous Australian experience of the colonial past, first by Indigenous Australians themselves and more recently by archaeologists, is "transforming the discipline from within" (Harrison 2010: 90). A number of studies have recently been published that reflect a departure from the typical subject matter of Australian historical archaeology and innovations in methods for the archaeological approach to the recent past (e.g., Byrne et al. 2001; Lydon 2009).

Although all these issues touch upon one another, a central problematic that binds most of these issues together is the struggle to introduce a broader scale to the analysis of projects. The comparison of artifact assemblages between sites needs proper frames of reference and coherent analysis, not just cataloging. Critically, as seen in the landmark works of Byrne et al. (2001), Lydon (2009), and Middleton (2008), studies of Australasian contact history benefit enormously from wider contextual studies. The idea of a cultural landscape has severe implications regarding scope and methodological procedure, the issues of which are yet to be completely drawn out. The problems presented by an increasing amount of gray literature leave gaps in the data accessible to larger-scale studies.

Future Directions

The key issues that are of concern to historical archaeologists in Australia and New Zealand have given rise to a number of clear future directions. The broadening of scope of historical archaeological studies to include broader regional spatial and temporal boundaries is one likely future direction. Developments in the understanding of historical assemblages will introduce more nuanced understandings of the meaning that is derived from particular sites. These directions call for new methodologies and theories to support the expansion in scale and sharpening of precision. Broad research frameworks, wide ranging but not exclusive themes, and more flexible artifact categories are all future possibilities.

The improvement of the manner in which historical archaeologists communicate with each other and the public is a necessary direction that must be taken in order to overcome a proliferation of wasted literature. The directions that this is likely to take are twofold: an increased community involvement in archaeological projects themselves and a clearer theoretical understanding of what is of importance to the people that archaeologists engage with. Lessons from contact archaeology will be of particular importance in this regard, for it has introduced a more nuanced and responsive positioning of archaeologists and communities than has previously existed. Therefore, of critical importance to the future of Australasian historical archaeology is openness; engagement with the requirements of regional, national, or local communities; and a growth in the awareness of archaeologists about their current and possible roles in creating the historical past.

Cross-References

- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Australia: Maritime Archaeology
- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Buildings Archaeology

- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Capitalism in Archaeological Theory
- ▶ Community Archaeology
- ▶ Connah, Graham
- ▶ Critical Historical Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Industrial Archaeology
- ▶ Interpretation in Archaeological Theory
- ▶ Labor Archaeology
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Multicultural Archaeology
- ▶ Overseas Chinese Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Stakeholders and Community Participation

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Australasian Institute for Maritime Archaeology Inc. (AIMA)

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Basic Information

The Australasian Institute for Maritime Archaeology (AIMA) is an incorporated, not-for-profit organization, dedicated to the preservation of underwater cultural heritage. Based in Australia, it has sponsored work throughout Australia, Asia, and the Indian and the Pacific Ocean. AIMA's objectives are to support and undertake scientific research within the field of maritime archaeology and to publish the results of this work. AIMA is an incorporated body with a Constitution. All members must agree to abide by the Constitution and its accompanying Code of Ethics upon joining or renewing their membership. AIMA works closely with, and provides advice to, State, Territory, and Australian Federal Government on policy pertaining to underwater cultural heritage, such as the *Historic Shipwrecks Act 1976* and the *UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001*. The URL for AIMA is: http://www.aima-underwater.org.au.

Major Impact

In Australia, AIMA has supported important archaeological investigations on shipwreck sites, including *Batavia* (1629) in Western Australia; HMS *Sirius* wrecked at Norfolk Island; HMS *Pandora* (1791) off far north Queensland; *Sydney Cove* (1797) wrecked in Bass Strait, Tasmania; *Zanoni* (1867) in South Australia; and *City of Launceston* in Victoria (1865). AIMA plays an important role in the dissemination of maritime archaeological research. It has an active publications program, including a quarterly newsletter and an annual journal, the AIMA Bulletin, as well as special publication reports. AIMA also organizes an annual conference and provides scholarship money for members to conduct fieldwork and research.

AIMA plays an active role in international maritime archaeology. The organization strongly supports the *UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001* and is formally accredited by UNESCO as a nongovernment organization member of the Scientific and Technical Advisory Body to the State Parties to the Convention. AIMA also supports the work of the International Committee for Underwater Cultural

Heritage (ICUCH) with several of our members represented on the committee and holds an associate membership to the Advisory Council for Underwater Archaeology (ACUA). AIMA members have been involved in training programs in China, Thailand, Taiwan, and Sri Lanka. Joint cooperative projects to assist and support existing or developing maritime archaeological programs have been undertaken in Kenya, Oman, Sri Lanka, Malaysia, Indonesia, Thailand, the Philippines, the Solomon Islands, Korea, and Japan.

AIMA, in conjunction with the Nautical Archaeology Society (NAS – United Kingdom), teaches a four-part course on maritime archaeology. This internationally recognized course is currently run in the United Kingdom, South Africa, Canada, Micronesia, and the USA, among other places. The aim of this course is to introduce the methods and procedures used in maritime archaeology and to generate awareness of underwater cultural heritage preservation in Australia. On completion of each of the courses, students are awarded an AIMA/NAS certificate, which is internationally recognized.

AIMA often lobbies on issues of interest to its membership, such as amendments to underwater cultural heritage legislation in Australia and the region. It has formal ties with other archaeological organizations including the Australasian Society for Historical Archaeology and the Australian Archaeological Association with which it occasionally holds joint conferences.

Cross-References

► Australia's Archaeological Heritage
► Maritime Archaeological Organizations
► Underwater Archaeology

Further Reading

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Australasian Society for Historical Archaeology (ASHA)

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Basic Information

The Australasian Society for Historical Archaeology (ASHA) is an organization that represents historical archaeologists from Australia and New Zealand. It is primarily a society for the interchange of ideas and information related to specific sites, regional analyses, and global perspectives of historical archaeology within the archaeological community, the general public, the cultural heritage industry, and the different tiers of government in both countries. ASHA was founded in 1970 as the Australian Society for Historical Archaeology primarily by Sydney-based archaeologists, and it developed out of initiatives by the New South Wales National Trust and the University of Sydney. One of the leaders of this was Judy Birmingham of the University of Sydney (Lawrence 2006: 5) who was the first secretary and later President of ASHA. It held the first of its now annual conferences in Sydney in 1980. Since then, conferences have been held in all parts of Australia and New Zealand, including half way between the two on Norfolk Island. Joint conferences are often held with the Australasian Institute for Maritime Archaeology and occasionally with the Australian Archaeological Association. The ASHA website is at www.asha.org.au.

Major Impact

ASHA has always had an active publication record and has produced a members' newsletter since the beginning of the Association and started producing its journal, *The Australian Journal of Historical Archaeology*, in 1983, under the editorship of Graham Connah. The 1990 conference held in

Auckland acted to strengthen the ties between Australian and New Zealand historical archaeologists, leading to the change in the association's name to the Australasian Society for Historical Archaeology. This move was mirrored in a change in the journal's name with the publication of Volume 10 in 1992 as *Australasian Historical Archaeology*. ASHA also publishes monographs and landmark doctoral theses in separate publication series.

The ties between historical archaeologists of New Zealand and Australia are more than institutional as both countries share a similar history of British colonization and, for example, an early reliance on mining and pastoral industries, and dependence on the sea for transport, defense, and resources (such as whaling and sealing). Consequently, the research interests of ASHA members from both sides of the Tasman Sea often align. Most of the professional work of ASHA members though does not lie in academe or in museums; most work either in the cultural heritage industry or for the government bodies that regulate that industry. As such, it has always been ASHA's mission to make the results of this consultancy work available to the wider archaeological community and the general public. ASHA also promotes excellence in historical archaeology with an awards program that consists of the annual R. Ian Jack Award for Best Honours Thesis, Judy Birmingham Award for Best Historical Archaeology Consulting Report, Martin Davies Award for Best Public Archaeology Initiative, the biannual Maureen Byrne Award for Best Postgraduate Thesis, the quin-annual Graham Connah Award for Best Publication, and the occasional Ilma Powell Honorary Life Membership Award for Distinguished Service.

Cross-References

► Australasian Historical Archaeology
► Connah, Graham

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Australia and the Origins of Agriculture

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National Library of Australia, Canberra, ACT, Australia

Introduction

The advent of agriculture as a particular form of food production, along with animal domestication, marks the beginning of an unparalleled transformation in human affairs. The transition that took place, from hunter-gatherers to agriculturalists, underpinned the evolution of a number of great civilizations. Usually the development of agriculture based on rye, wheat, and barley in western Asia, and rice and millet in China, is identified as the archetype for the development of the first pristine agriculturally based societies in human history. Over time extensive investigations in a range of disciplines have been conducted in an endeavor to understand the phenomenon, investigations which have attempted to answer such basic questions as when, where, and how did it happen, and perhaps most importantly, why did it happen at all? More recently, it has been realized that developments in hunter-gather societies were more varied and complex than originally portrayed, and that different pathways and forms of "food production" were conceivable. Accordingly, other patterns of development have come to be recognized, one in particular involving the formation of distinctive, complex, socioeconomic, and sociopolitical structures. Societies exhibiting such characteristics are often labeled as "Complex Hunter-Gatherers" or "Affluent Foragers." However, this phenomenon has made the whole question of the origins of agriculture more complex.

Research into the location and timing of the "agricultural revolution" over the last 100 years or so has resulted in the determination, at least in proximate terms, of when and where such developments took place. In the process, it has become apparent that it was not a discrete event but

a circumstance that occurred independently in a number of different places at different times. However, some degree of consensus appears to have been reached in characterizing what happened – that certain groups managed to accomplish, unaided, the transition from hunting and gathering to farming (pristine development), apparently in the space of only a few centuries. The characterization of that transition does depend, however, on the paradigmatic viewpoint. Usually such explanations are framed in anthropological or economic terms, but the process has been described within a biological evolutionary framework.

Agriculture arose independently, or was adopted, at least once on all the inhabited continents, with the reputed exception of Australia. A variety of reasons have been put forward for this apparent anomaly, although it has recently been argued that agriculture was in fact practiced by a limited number of groups in two parts of Australia at the time that British colonization began (Gerritsen 2008). The evidence for relies principally on ethnohistorical and ethnographic information at the moment, rather than archaeology.

Definition

Australia is defined here as the modern political unit, which includes mainland or continental Australia, Tasmania and all offshore islands, and all the islands in Torres Strait, to within a few kilometers of the coast of mainland Papua New Guinea.

The Indigenous population of Australia is usually referred to generically as Indigenous Australians, and this embraces Torres Strait Islanders between the tip of Cape York and the south coast of Papua New Guinea, Aboriginal people of continental Australia, and the Tasmanians. Where Indigenous societies are discussed here, it is in the sense of "traditional" societies, their form at the time when initial contact with Europeans and other outsiders commenced, or began to have a significant influence.

A great variety of definitions of agriculture have been proposed. While it would appear from this that there is little definitional consensus, in behavioral terms, the principal elements appear to be propagation (sowing, planting, usually of "domesticates"), husbandry (soil preparation, maintenance of moisture and fertility, exclusion of competitors, protection from predators), harvesting, and finally storage. The scale or areal extent of these activities would also appear to be a significant factor, though not always explicitly stated.

Whatever definition of agriculture is considered, all consider deliberate planting as a central activity. One attribute that has been included in definitions of agriculture is the requirement that the crops being grown and harvested are "domesticated." However, this requirement has been widely challenged in recent times (Gerritsen 2008: 29-31). Many, but not all, cultivated food plants appear to undergo morphological [phenotypic] changes and/or speciation, some quite quickly, once they are systematically planted, and in so doing may become human-dependent. But intensive harvesting, without planting, may also produce some of those changes, while plants that are systematically harvested may not undergo genetic changes, which depends on the harvesting method as well as the plant's genetic responsiveness (Gerritsen 2008: 29-31, 38-41, 83-4). Moreover, it is becoming evident that in early agriculture, the crops being grown were wild, "undomesticated," crops. In southwest Asia, current evidence indicates wild, undomesticated or only partially domesticated cereals were being grown well into the Neolithic, the period when it is usually accepted agriculture was becoming, or had become, established (Gerritsen 2008: 31, 41, 74). Rice (*Oryza sativa*) is another case in point. It had been cultivated for at least 3000 years as "ancient cultivated rice," only becoming "domesticated" at the end of the Chinese Middle Neolithic (Gerritsen 2008: 31, 75, 83-4). Some have endeavored to distinguish this period as "pre-domestic agriculture" or "pre-domestic cultivation" (Gerritsen 2008: 30-1). The evidence indicates that initially agriculture took some time to become established as the predominant means of food production and even in the

latter part of the Pre-Pottery Neolithic B, from around 9800 cal. BP, hunting, fishing, and wild food procurement (such as nuts and lentils) still provided a substantial proportion of the food supply (Gerritsen 2008: 41).

Although not always explicitly stated, storage or conservation of the yield from crops that are grown is also a central feature of agricultural systems. While physical storage is usually seen in the case of seed, nut, and some tuber crops, it is a frequent practice with vegetatively reproduced staples, such as taro, sweet potatoes, and yams, for the tubers to be left in situ and harvested as needed.

In much of the writings and publications on the origins of agriculture, the term "Neolithic" is treated as almost being synonymous. Broadly speaking, as agriculture, or a mixed economy, such as animal husbandry and agriculture, starts to become the predominant mode of subsistence, permanent habitations, small permanent settlements, much higher levels of sedentism and systematic storage are evident. Although these characteristics emerge from the antecedent period, the Natufian in southwest Asia for example, they are strongly associated with all Neolithic cultures.

Often activities such as clearing, tilling, weeding, fertilizing, watering, and protection of crops are also included in the definition of agriculture. However, there are no systematic studies to support those generalizations and current evidence indicates that at least some may well be much later developments, refinements, or optimization behaviors adopted when agriculture had already become the dominant means of food production.

In summary, agriculture, particular early agriculture, must involve at least propagation (sowing and planting), some husbandry (soil preparation, maintenance of moisture and fertility, exclusion of competitors, protection from predators), harvesting, and finally storage on a significant scale.

Historical Background

The first documented contact Australia had with the outside world took place in March 1606, when a Dutch ship, the *Duyfken*, sailed down and charted 300 km of the western side of Cape York in Queensland, having contact with some of the Indigenous population, probably the Anggamudi or Wik peoples, as they did. In the following 164 years, most of Australia's coasts were unveiled to the outside world and in 1788, the British established a colony at Port Jackson (Sydney) on the east coast. In the succeeding decades, British colonies were established in many parts of Australia. Where these settlements took hold and expanded the Indigenous population was decimated by massacres, epidemics, loss of land, sources of traditional sustenance, and neglect. One of the justifications used for the expropriation of the continent and the dispossession of the Indigenous inhabitants was the claim that they did not till the land and therefore did not use it productively.

Since that time, evidence has come to light from a variety of sources that Indigenous Australians did plant and sow in traditional circumstances. This includes species of yam (*Dioscorea* spp.) in the Cape York region in Queensland – on east Cape York among the Umpila at Lockhart River and islands offshore, and among the Walmbaria and Mutumi of Flinders Island and the adjacent mainland – and west Cape York among the Wik-Mungkan and possibly the Tjungundji. Planting of yams has also been noted at Kalumburu in the very north of Western Australia. Hynes and Chase reported the Pama Malnkana of northern Queensland planted coconuts (*Cocos nucifera*), while the Uradhi of northern Cape York cultivated the sweet potato (*Ipomoea batatas*) prior to contact with Europeans. Noted Australian poet Dame Mary Gilmore claimed in the 1930s that she had participated in traditional planting of grass seeds, and native fruits such as *quandong* (*Santalum acuminatum*), with Wiradjuri companions as a young girl in central New South Wales in the early 1870s.

A number of other examples have come to light in recent times, often observed by anthropologists and ethnobotanists. The seeds of a perennial herb, *kurumi*, tentatively identified as *Tecticornia arborea*, were carefully scattered

in the cracks of the clay pan in the Western Desert of central Western Australia. In 1976, Kimber reported having observed planting in Central Australia of four different species, including two foods – "native fig" (*Ficus* sp.) and *yella* ("bush potato," *Ipomoea costata*). The practice of planting *Ipomoea* spp. has been reported elsewhere in Australia. Ethnobotanist Fiona Walsh also recorded that the Mardu, of the central north of the Western Desert, traditionally broadcast the seeds of "bush tomatoes" (*yalijarra – Solanum diversiflorum*), over burnt ground near their camp prior to rains. In all 19 species have been identified as having been planted by 21 different groups, many as a traditional practice (Gerritsen 2008: 19-23, 58-9) (Fig. 1).

Perhaps the earliest evidence that some Indigenous groups did sow and plant originated with Augustus Gregory, a noted explorer and Surveyor-General of Queensland, who had worked as a young surveyor in Western Australia. He reported in 1886 that in the 1850s, he had observed that the Nhanda of the Victoria District on the central west coast of Western Australia:

> never dug a yam without planting the crown in the same hole so that no diminution of food supply should result (Gregory 1886: 23).

Earlier, the first British explorers, led by Lt. (later Sir) George Grey, to pass through the Victoria District, in April 1839, had come across what appeared to be large yam grounds in the northern part of the Victoria District:

> April 4 1839: And as we wound along the native path my wonder augmented; the path increased in breadth and its beaten appearance, whilst along the side of it we found frequent wells, some of which were ten and twelve feet [3-4 m] deep, and were altogether executed in a superior manner. We now crossed the dry bed of a stream, and from that emerged upon a tract of light fertile soil quite overrun with warran [original emphasis] plants [the yam plant - Dioscorea hastifolia], the root of which is a favourite article of food with the natives. This was the first time we had seen this plant on our journey, and now for three and a half consecutive miles [5.6 kms] traversed a piece of land, literally perforated with holes the natives made to dig this root; indeed we could with difficulty walk across it on that account whilst the tract extended east and west as far as we could see (Grey 1841: 12).

The next day Grey's part encountered what appeared to be permanent settlements of considerable size on the banks of Hutt River:

> Being unable to ford the river here, we followed it in a SE direction for two miles [3.2 kms], and in this distance passed two native villages, or, as the men termed them, towns - the huts of which they were composed differed from those in the southern districts, in being built, and very nicely plastered over the outside with clay, and clods of turf, so that although now uninhabited they were evidently intended for fixed places of residence (Grey 1841: 19).

As Grey proceeded, he came across other settlements. It would appear that yams were grown in the alluvial river valleys of a series of small rivers running through the Victoria District, such as the Arrowsmith River. Grey noted that "the whole of this valley is an extensive warran ground" (Grey 1841: 54).

The domiciles mentioned by Grey were described in greater detail by other explorers, and appear to have been dome-shaped, constructed with timbers about 15 cm in thickness, 1.8-m high, coated in clay, and capable of easily accommodating 10 or more people. Subsequent research indicated that there were at least four substantial, permanent, settlements in the Victoria District, the largest having had an estimated population of nearly 300, with the occupants evincing a high degree of sedentism (Gerritsen 2000; 2008: 34, 37-8, 77) (Fig. 2).

Based on the definition of agriculture – propagation, husbandry (watering from wells, Gerritsen 2008: 34-5), harvesting and storage (in-ground), of a significant extent – the Nhanda and their southern neighbors, the Amangu, were engaging in agriculture, as well as exhibiting many of the characteristics of a Neolithic society.

The second part of Australia where early agriculture was evolving at the time of contact is termed the "Corners Region," where the corners of New South Wales, South Australia, Queensland, and the Northern Territory meet. This does not appear to have been a unitary phenomenon as the area is generally quite arid. The pattern of development is linked to wide alluvial rivers and lakes, but as the region is drought-prone it was characterized by a "pulsation"

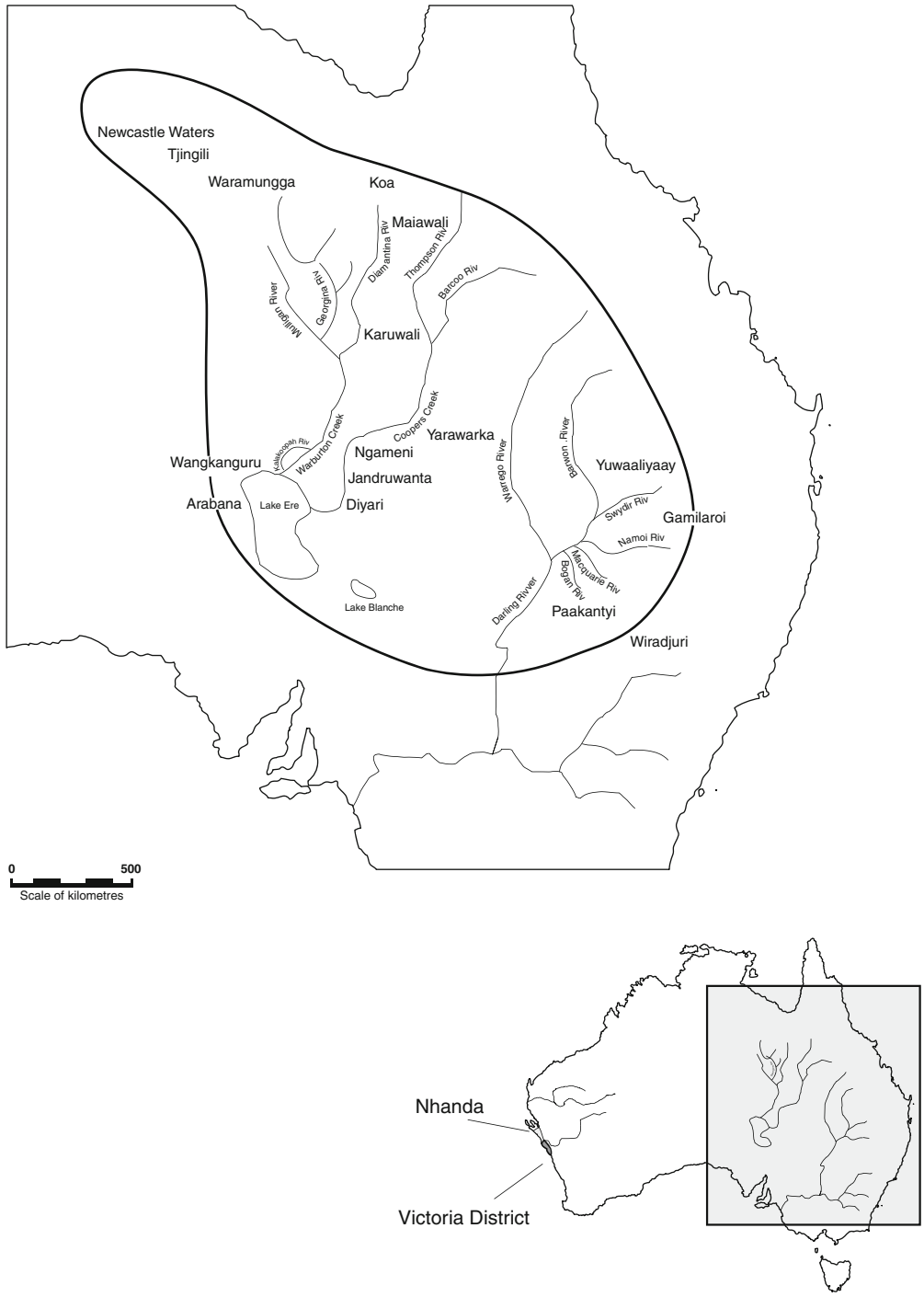

Australia and the Origins of Agriculture, Fig. 1 Map of the Corners Region, and the location of the Nhanda and Victoria District

Australia and the Origins of Agriculture, Fig. 2 Site of former village: Hutt River (Gerritsen 2002: 6)

pattern of exploitation. Many groups would live, often in settlements with permanent shelters, tethered to permanent watercourses, lagoons, or other water sources until rains fell, or a flood occurred. They would then rapidly disperse to take advantage of the bounty produced as the arid countryside sprang to life, only to retreat again to the more secure supplies of food and water as the country dried out.

Early explorers noted extensive stands of millet or distributions of ngardu in clay pans in numerous parts of the Corners Region. For example, explorer and Survey-General of New South Wales, Major Thomas Livingstone Mitchell, first noted on the lower-central Darling River in 1835 that,

> In the neighbourhood of our camp the grass had been pulled, to a great extent and piled in hay-ricks, so that the aspect of the desert was softened into the agreeable semblance of a hay field . . . we found the ricks or hay cocks extended for miles.... All the grass was of one kind, a new species of 'Panicum' related to 'P. effusum' . . . not a spike of it was left in the ground (Mitchell 1839: 237-8).

Similarly, on upper Coopers Creek in south west Queensland, Augustus Gregory had observed in 1864 that the Maiawali or Koa people,

> reap a Panicum grass. Fields of 1,000 acres [400 hectares] are there met with growing this cereal. The natives cut it down by means of stone knives, cutting down the stalk half way, beat out the seed leaving the straw which is often met with in large heaps; they winnow by tossing seed and husk in the air, the wind carrying away the husks (Gregory 1887: 132).

A number of lines of evidence point to the sowing of this grass, *Panicum decompositum*, or its close relatives, known by a variety of Aboriginal names such as *tindil*, *cooly*, and *katoora*. This includes an account of a *katoora* planting ceremony by the Karuwali of southwest Queensland, numerous references in the *Markanjankula* myths of the Wongkanguru to clearing, tilling, and planting of grass seeds and ngardu, and an oral tradition about broadcast seeding of these in the region by an informant of Arabana descent (Gerritsen 2008: 60-1). In this account, a variety of groups in the Corners Region named would:

> chuck a bit there. Not much, you know. Wouldn't be a handful . . . a little bit, spread it you see - one seed there, one seed there, . . . chuck a little bit of dirt on, not too much though. And soon as the first rain comes . . . it will grow then (Kimber 1984: 16).

It would seem that there was a trade in these seeds, carried in specially made bags called *apwa*, weighing up to 23 kg (Gerritsen 2008: 60).

As soon as the British intruded into this region, they noted villages and large population concentrations. For example, on the upper-central

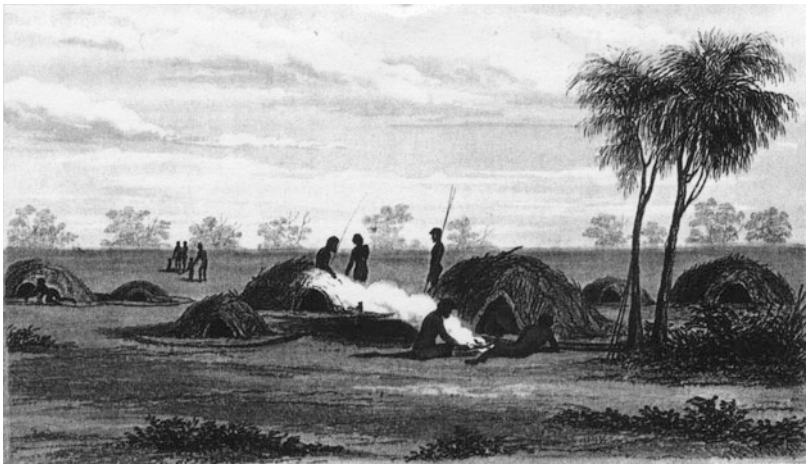

Australia and the Origins of Agriculture, Fig. 3 "Native Village in the Northern Interior" (Sturt 1849: 254)

Darling River early in February 1829, explorer Captain Charles Sturt reported:

> Early in the day we passed a group of seventy huts, capable of holding twelve to fifteen men each. They appeared to be permanent habitations, and all of them fronted the same point of the compass (Sturt 1833: 89).

Some 16 years later, close to the New South Wales/South Australian border, Sturt again struck upon another village. Composed of boughs and clay, each dwelling had a smaller one attached, as can be seen in a contemporary drawing (Fig. 3).

Some quite large structures were also observed by a number of explorers, some up to 27 m in circumference and capable of accommodating 30–40 people (Gerritsen 2008: 48). In addition, there were frequent references by explorers, surveyors, pioneers, and amateur ethnographers entering the region to "villages" and clusters of dwellings, as being "permanent," "well-built," "substantial," "clay-covered," or "multiroom" (Gerritsen 2008: 47-9, 66-7).

Population concentrations mentioned by those explorers and the like often reported encounters with groups of many hundreds, sometimes thousands, assembling, congregating, or residing in particular locations (Gerritsen 2008: 50-1). Alas there have been no specific archaeological studies of settlements in the region, although recent archaeological surveys report such things as "flaked stone" covering an area of three square kilometers on the banks of a large waterhole, Lake Idamea, in southwest Queensland and "vast numbers" of surface sites, some with "millions" of artifacts, in the Lake Eyre South region (Gerritsen 2008: 49, 67n327). These higher populations were supported not only by extensive cultivation of *Panic* grasses, ngardu, and "bush onions" (*Cyperus bulbosus*; Gerritsen 2008: 60) and collecting plant-derived foods and hunting, but surprisingly by fish traps, net fishing, and shellfish, as well as net hunting (Gerritsen 2008: 43-6). Analysis, in terms of matching observational and limited archaeological evidence with the known correlates of sedentism, also indicates the people in this region were clearly exhibiting higher levels of sedentism (Gerritsen 2008: 51-5, 63-9, 77-9).

"Direct" or "Proper" storage, as distinct from caching and stockpiling, was also a feature of the Corners Region, many examples have been identified (Gerritsen 2008: 55-8). Stores of grass and other seeds were often observed, packed in 45–50-kg skin bags and clay casings. Edible gum, in "vast quantities" (Sturt 1833: 118-9), fish meal, dried fruits, and many other consumables were also seemingly preserved and stored. The Diyari utilized seed grain pits (Gerritsen 2008: 56), and a drover, Ashwin, came across a Tjingili settlement in 1871, in the north of the Corners Region, with a larger structure in the center where it is estimated about 1 t of

grass seeds was stored (Gerritsen 2008: 57). The most likely explanation for the smaller structures associated with the dwellings depicted in Sturt's illustration of a "Native Village" is that these were storage structures (Gerritsen 2008: 57-8).

One of the fundamental changes which appears to take place when a society shifts from hunting and gathering to agriculture is a shift in the division of labor. While archaeological evidence of the division of labor in prehistory is limited, it is consistent with that ethnographically observed in hunter-gatherers, whereby men typically hunt while women collect plant foods and catch small game (Gerritsen 2008: 85-7). In both the Victoria District and the Corners Region, there is evidence of a shift in the division of labor, with men systematically engaging in planting, harvesting, parching, threshing, storing, and even preparing plant foods (Gerritsen 2008: 43, 88-90)

Key Issues/Current Debates

It had been the long-standing consensus that Australian and Tasmanian Aboriginal populations were nomadic hunter-gatherers. Consequently, the issue of why agriculture had not developed or been adopted in continental Australia and Tasmania was the subject of much theorizing and speculation. However, the growing realization that in traditional circumstances Indigenous Australians manipulated the environment in significant ways to enhance its productivity, particular through the use of fire, termed "firestick farming" (Jones 1969), and other forms of intervention, leading to the concept of "domiculture" (Hynes & Chase 1982) began to challenge these preconceptions. In concert with this, a growing body of archaeological evidence has been emerging that "intensification" had been in progress in Australia over the last 5,000 years (Lourandos 1997; Gerritsen 2008: 5-15). Evidence of an aquacultural economy, permanent dwellings and settlements, and a higher degree of sedentism in western Victoria also began to emerge in the 1970s. The traditional Aboriginal population here have accordingly been identified as Complex Hunter-Gatherers (Williams 1988), and the region is still under active investigation (Builth 2006; Richards 2011).

Most recently, the proposition that some groups actually practiced agriculture (Gerritsen 2008), and the extent of intervention in the environment, conceptualized as "farms without fences" (Gammage 2011: 281-304), has raised significant conceptual and definitional issues. These have brought to the fore questions concerning the characterization of agriculture, and the distinction between agricultural systems and the procurement practices of Complex Hunter-Gatherers/Affluent Foragers. Hallam (2011: 125) thus questions whether it is actually "meaningful to separate 'agriculture' as one unitary category throughout space and time?"

The interrelationship between agriculture and sedentism has also brought the issue of sedentism in traditional Indigenous Australian communities into sharp relief. Accounts of seemingly permanent dwellings and settlements, some reportedly quite large, had in the past simply been dismissed or treated as anomalies. The first systematic study of traditional Indigenous architecture by Memmot (2007) has provided a broader perspective, with some discussion on the interpretation of the observational evidence now occurring (e.g., Memmot 2007: xviii, 327, 331; Gerritsen 2011: 36-41).

Undoubtedly the question of agriculture in Australia, and attendant evidence of sedentism, will be a matter of ongoing debate. The debate is, however, likely to be as much about paradigms as about evidence. As can be seen, there has been already been a shift away from the universal characterization of traditional Indigenous culture as simple hunter-gatherers, but what are the alternatives, and can traditional Indigenous societies be described in unitary, generic, terms anyway?

International Perspectives

Since World War II, as information and evidence began to accumulate, a variety of theories

on the origins of agriculture were formulated. Braidwood's "hilly flanks" theory focused on population concentrating in the lower Zagros Mountains in the northern Fertile Crescent. Flannery's "edge theory," and Binford's "marginality theory," also saw population concentration as critical, driven by climate change. Explanations based on "population pressure" began with Boserup in 1965 and culminated with Cohen's *The Food Crisis in Prehistory* in 1977. Since that time, many variants of these theories have arisen. Shortly after Cohen published his work, Barbara Bender pioneered the innovative "social competition" class of explanations, an idea taken up by many researchers, particularly by Brian Hayden with his "competitive feasting" model. In the 1980s Ofer Bar-Yosef and his collaborators developed a cultural ecology explanation, the "Levantine Primacy Model," based on the idea that some areas were better favored with domesticable plants and animals than others. An idea first proposed by Darwin in 1868, "weed theories" have been frequently been espoused in the latter half of twentieth century, such as the "dump heap hypothesis" and Smith's "floodplain weed theory." These suggest that humans had inadvertently created habitats for weedy food plants which were then taken into cultivation. Most recently, Gerritsen (2008) has considered the question, with particular reference to Australia, in terms of economic development. This treats agriculture as a form of specialization arising from two factors – higher population densities and innovation rates in areas of higher net natural productivity, and long-term advantageous information acquisition at nodal points in communication, viewed as long-range scale-free networks.

Over the last 11,500 years, agriculture was independently developed in as many as 11 areas outside of Australia (Gerritsen 2008: 141-2). In endeavoring to provide an explanation for the origins of agriculture, the theoretical frameworks or models that have been proposed ought to be able to account for the all the occurrences of agriculture in terms of location and timing, to establish their validity. If the case for agriculture in Australia is supported, then it would provide an excellent opportunity to test those frameworks and models.

Future Directions

As yet there have been no archaeological investigations to directly test the hypothesis that the nominated groups in Australia were indeed engaging in agriculture. The evidence put forward by Gammage also points to the necessity for such studies to more broadly conceive and embrace landscape archaeology more fully. In concert with this, settlement archaeology could be a fruitful field of enquiry. Despite numerous historical accounts of Indigenous Australians living in permanent structures and settlements, outside of western Victoria (Williams 1988; Gerritsen 2000; Builth 2006), there have been no attempts to investigate such sites. Nevertheless, some recent efforts have focused on field work to at least identify the specific location of some reported settlement sites (Gerritsen 2000, 2002). While such issues could command some attention, given the constraints of limited archaeological resources, in a nation that covers a whole continent, with a range of other important priorities, progress may well be slow.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Complex Hunter-Gatherers

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Australia, New Zealand, and Papua New Guinea: Museums

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Introduction

Museums across Australia, Aotearoa New Zealand, and Papua New Guinea are diverse and exist in a variety of settings. These countries share ancient geographic links and recent histories, yet each has differing cultures and landscapes. The museums of these nations also share a common colonial heritage, but each has different trajectories of development. They range from those which are federally, state, or territory funded, and operate in large cities, to those in small towns, universities, and not-for-profit and volunteer-managed organizations. The nature of their archaeological collections are equally as diverse, but reflect the three principal fields of archaeology undertaken in this region, Indigenous, historic, and maritime. However, the majority of objects held in collections are described as "ethnographic" and are chiefly materials from Indigenous nations across Oceania and Australia, mostly procured in the nineteenth century. There are also collections of archaeological assemblages derived from known contexts, such as excavated material and surface collections.

Undoubtedly, for many archaeologists, museums play the role of a repository for artifacts, kept for future post-excavation exhibition or analysis. To others, museum collections are centers of vast research potential. But more than this, museums are a visible means through which many societies affirm a role for themselves and their relationship to other cultures, to the past and the natural environment. This is not just in the sense of a physical building, but as a metaphor for the construction of a consensus notion of identity and behavior, and a collective memory. Museums in Australia, New Zealand,

and Papua New Guinea, like elsewhere, are, however, western constructions and as such can only reflect their societies and the Indigenous cultures within the boundaries from which they have emerged. As such, they are sites of continuing reappraisal and negotiation. They are also sites where archaeological material collected has been used and re-contextualized for purposes of nationalism, to illustrate social history and underscore political narratives, and even reconciliation. They are centers for debate over repatriation, and have moved from the role of collector and classifier to that of advocate and community center.

Definition

The focus of this entry is on museums in Australia, Aotearoa New Zealand, and Papua New Guinea that are engaged in the conservation and exhibition of heritage objects and artifacts, and hold collections of archaeological significance. At the core, they are defined by the frequently cited International Council of Museums (ICOM) definition (2007) as non-profit, permanent institutions that primarily function to preserve, research, teach, and make objects and information accessible to the public. However, this entry also recognizes that there is a growing shift at the boundaries of what defines museums in this region. For example, a museum may be a keeping place, site, community space, or even a website. This is in part because museums in recent years across Australia, New Zealand, and Papua New Guinea have moved to develop more appropriate relationships with Indigenous communities, and recognize the right of Indigenous authority and control. This has affected the ways in which material is displayed, collected, and repatriated and how new spaces are created. Museums also reflect social change, and are increasingly reliant on new technologies. As such, the definition of a museum is moving from that of a repository to places of knowledge and custodianship, where there need not be any physical evidence of collections at all.

Historical Background

The development of museums in Australia, New Zealand, and Papua New Guinea is inextricably linked to their colonial pasts. At the heart of their foundations lie the philosophies of science, collecting, exploration, exhibition and Empire; hegemonies of primitive, of otherness. They were colonial museums, established by British, white, bourgeois professionals to assert their gentility, and, as MacKenzie (2009: 120) notes, to establish networking opportunities, clubs for like-minded scientific gentlemen and their interests in natural history. The first in Australia, founded in Sydney in 1845, was originally known as the Colonial Museum (now the Australian Museum) and was followed by the establishment of a plethora of others in the nineteenth century, including the Tasmanian Museum and Art Gallery (1852); the now Museum of Victoria (1854); the South Australian Museum (1861); the Queensland Museum (1862); and the Western Australian Museum (1891). Each colony, and then state, had its own government and its own museum.

The South Australian Museum exemplifies the deliberate exporting of museum as a symbol of a middle class "civilized" society and many of the characteristics of other Australian museums. Adelaide, which is a planned city (as opposed to penal colony), had its museum conceived as part of its original vision. When it was established in 1861, it needed to be filled, and in addition, the bourgeois of Adelaide needed to be on the world map. The exhibitions of "curiosities" were from the many Pacific and other "exotic" cultures. Such "relics" from other cultures became status symbols as discoveries were made on colonial frontiers. Across Australia, collectors were much more interested in obtaining artifacts from the Pacific Islands than Australia, and local Indigenous cultures were undervalued or seen as uninteresting. This legacy is reflected in the collection of most institutions, for example, the Australian Museum collection includes 60,000 artifacts from the South Pacific and 40,000 from Indigenous Australians (see http://australianmuseum.net.au). At the South

Australian Museum, displays about Indigenous Australian cultures did not take primacy until as late as the 1990s. In the nineteenth century, such emergent nations saw museums as places to display their identity, history, and conquests; subordinate classes and minorities were excluded by definition. Consequently, to visit a museum was to witness the power of the ruling culture.

In the 1880s, there was a shift to collect the "ethnography" of Aboriginal people, as well as the continued lust for Pacific material. This was in part a reflection of influential individuals and their interests, such as Edward C. Stirling at the South Australian Museum, George French-Angas and Pierson Ramsay at the Australian Museum, and Walter Baldwin-Spencer at the National Museum of Victoria (see MacKenzie 2009). At this time, there was a prevalent belief that Aboriginal people were a "dying race." The focus was on collection, rather than display, before these cultures became "extinct." This led to almost frenzied amassing of cultural material, stolen, looted, and traded from Indigenous communities, much of which was initially exported to the United Kingdom; "For at least the first 60 years of settlement, Australian scientists cheerfully and uncritically dispatched the most interesting specimens to the country most of them still called home" (Anderson & Reeves 1994: 83). In Adelaide, there were many Indigenous people living in the immediate area of the museum, these communities were plundered and then as exploration, rail and missionaries proceeded across the state into what now is the Northern Territory, this collecting continued at rapid pace. The South Australian Museum (like all other state museums) also has a significant collection of human remains (for a discussion see Fforde 2004). In 1956 their then curator boasted that their collection of skulls numbered over 1,000 (MacKenzie 2009: 169). Burial grounds such as that at Swanport, South Australia, were also looted.

The imbalance in power relations between colonizer and colonized is exemplified by this scurry for Indigenous artifacts and human remains and their subsequent trade and commodification. The collecting of Indigenous lithics across Australia commenced in around 1900 in a non-systematic fashion. Collecting tended to focus on highly recognizable stone artifact types, such as axes, grindstones, hammer stones, and on secret/sacred objects such as cylcons and tcheringas. The assemblage from the first formal Australian archaeological excavation undertaken at Ngaut Ngaut in 1927 is located at the South Australian Museum. Museums in Australia, however, failed to recognize the diversity and validity of different Indigenous nations with distinctive cultures and also the antiquity and sacredness of the artifacts they had amassed. This positioned museums as "agent" of the dominant white population and some museums still continue to hold on to cultural material, including that of a secret and sacred nature.

The origins of museums in Aotearoa New Zealand are not unlike that of Australia. The British Empire unfolded a network of colonial museums across the globe, and associations of scholarly and middle class scientific gentlemen similarly acquired and collected tokens from the "primitive" and the "dying" Maori. Many Maori sites were looted, including burials and sacred places, including marae (Hakiwai 2005). With the Treaty of Waitangi in 1840, there is a defined start date for British rule and the importation of culture. A small museum was first established in Auckland in 1850, then the Colonial Museum was founded in 1865 in Wellington (the first predecessor of the Te Papa Museum); subsequently, the Otago museum in 1868, and Christchurch in 1870 was established (see McCarthy 2011). Ethnographic collecting commenced immediately, in places such as Auckland where Maori populations were dense, and with the New Zealand wars in progress, obtaining cultural items was opportunistic and swift. The myth that the white settlement of New Zealand was more peaceful and civil than other colonies because of the Treaty of Waitangi can be contested by examining its colonial museums. Like Australia, land and cultural appropriation, acquisitions of human remains, and legacies of war and disease are evidenced in museum

collections. Observers such as McCarthy (2011) and MacKenzie (2009) both accept the collaboration of some British allied Maori groups in the acquisition of cultural material, even taonga (sacred material) and marae (sacred meeting houses) and their contents. The exhibition "Te Maori" (beginning in 1986) was a watershed for New Zealand museum practice and politics and has been characterized as the beginning of Maori decolonization, "Maori people were taking back control over the representation of their culture" (McCarthy 2011: 54). As a direct result of the "Te Maori" exhibition, Maori communities have subsequently been recognized in cultural protocols and guardianship, and involved in collaboration, consultation, and governance.

Most museums around the world contain at least one mask or other artifact from Papua New Guinea. Enormous numbers of Indigenous artifacts were collected by western scientists, missionaries, traders, and explorers visiting Papua New Guinea during the 1870s and 1880s. In this sense, the history of museums in Papua New Guinea differs – it was a center for material that were taken outside of the country, collected opportunistically and at a frenetic pace to fill museum display cases overseas (particularly Germany) up until World War Two. It was a destination for countless scientific expeditions (Gosden & Knowles 2001) but less for settlement and economic investment. The desire to establish a national museum in this country was comparably late. This may be because there was not a suitable or large enough permanent, middle class, white population to warrant the establishment of such an institution, as local Indigenous populations were not the target audience. Support was initiated by two governors, McGregor and Murray, and resulted in the enactment of the Antiquities Ordinance Act in 1913. Although this legislation showed clear intention to protect Papua New Guinea's cultural heritage for future generations, it was only in 1954 that an Act was passed to provide for the foundation of a public museum. The first National Museum was subsequently established in Port Moresby in 1959. In 1966, the J.K. McCarthy Museum, a branch of the National Museum, was established at Goroka in the Eastern Highlands Province. In 1969, the first Papua New Guinean, Lepani Watson, was appointed to serve on the Board of Trustees. Michael Somare was elected President of the National Museum's Board of Trustees in 1971. Four years later, G.N. Mosuwadoga became the first Papua New Guinean appointed as Director. In 1979, the Museum became officially known as the National Museum and Art Gallery of Papua New Guinea and houses and supports substantive anthropological and archaeological collections and research, "reinforcing an awareness that the culture and lifestyle of Papua New Guinea are as rich as those of any other country" (Wari 1980).

In Australia, the twentieth century also saw the slow rise of a national consciousness and identity. Arguably there is a still a broad lack of interest or knowledge of Australian history and particularly archaeology, pre- and post-European colonization. However, it was in the latter part of the twentieth century that a second wave of growth in museums occurred and stirred an interest in an Australian heritage. During these decades, new institutions were established, new buildings constructed, and collections increased. The 1960s saw a rapid growth in historical museums, predominately in the regional areas of Australia (Szerekes 2011). However, the dominant narrative presented was of pioneers and settlers, to the exclusion of both "ethnic" and Indigenous people. Change began to occur with the establishment of small museums by groups of post-World War two migrants in an attempt to continue and preserve their own cultural heritage and traditions. For example, the Ukrainian Museum opened in Adelaide in the late 1970s, run by the Ukrainian Women's Association to house their artifacts and archives. Likewise the Polish museum at Polish Hill River in the Clare Valley, where Poles had settled as early as 1838, was opened. These small institutions signify major shifts. The first, particularly among communities of non-Anglo backgrounds, declared that Australia was, in fact, a multicultural nation. It prompted non-Anglo-Australians to want to see themselves and their heritage being represented. Jewish people arrived in Australia along with the

British in 1788 on the First Fleet, but where was their story and material culture? It was not until 1982 that the Jewish Museum of Australia opened, followed 2 years later by the opening of the Holocaust Museum in Melbourne. Such a recent establishment is surprising, for Melbourne has the largest number of Jewish Holocaust survivors outside of Israel and the USA. In the same way, Chinese people have a long history of largely unacknowledged settlement in Australia but did not open a museum to tell their stories until 1985.

A second shift to occur in the 1970s was a questioning of gender hierarchies of representation in all aspects of Australian cultural life, including museums. At this time, the androcentric nature of Australian museum culture and displays was also challenged, for until then, the representation of women of all backgrounds and time periods was simply nonexistent (see Anderson 1990; Goodall 1990). A turning point for Australian museums was also the 1975 Piggot Report. This is primarily known for its support and recommendations for a new national museum to be constructed in Canberra, focusing on three themes or galleries: "Aboriginal man in Australia"; "European man in Australia"; and "the Australian environment and its interaction with the two named themes" (Piggot 1975: 71). The Report was also important in putting forward the case to display Aboriginal history across all major museums. Subsequently, the National Museum of Australia Act 1980 was developed and the National Museum of Australia was opened in 2001. The Council of Australian Museum Associations (CAMA) meanwhile developed a policy for museums and Indigenous communities. Previous Possessions, New Obligations (PPNO) was released in 1993, addressed all aspects of museum practice and acknowledged that Indigenous people had primary rights in respect of control and interpretation of their culture (and revised in 2005 as the Continuous Cultures, Ongoing Responsibilities policy document). By the late 1990s, every major museum in Australia had redeveloped its exhibitions of Indigenous cultural material, often in consultation with the communities they sought to represent. Similarly, museum philosophies significantly changed in New Zealand in the 1990s with the adoption of the principal of biculturalism in museums (see Smith 2006; McCarthy 2011). The Museum of New Zealand Te Papa Tongarewa in Wellington was developed on the premise of biculturalism in its construction, management, and organization in an attempt to reconcile its Maori collections with colonial legacies. Since it opened in 1998, "Te Papa" has been popularly supported for its innovativeness in the areas of public access, bicultural history, and Maori authorship. Despite this, Te Papa perhaps still perpetuates an old museum paradigm – Maori cultural material attributed a sense of reverent, static history, while Pakeha (white people) are represented through sometimes superficial blockbuster displays.

Key Issues and Current Debates

It is evident that in museums across Australia, Papua New Guinea, and New Zealand, there have been important improvements made in the portrayal of cultural diversity. Although it is impossible to adjust modern moralities to the past, the message of museums has changed to one that tells the story of the fundamental place of Indigenous nations. Museums are for many, and particularly for tourists, they function as a site of first "contact" with an Indigenous culture. The increased emphasis on engaging and reconciling with Indigenous people has seen, for example, the repatriation of Indigenous human remains and cultural material. But a key issue remains – who are these museums for? Tourism Research Australia's 2009 survey of Cultural and Heritage Tourism in Australia found that international cultural and heritage visitors made up more than half (51 %) of all international visitors to Australia in 2009 and, of these, 57 % visited a museum. The most recent report by the Australian Bureau of Statistics (2009) estimated that there were 30.7 million annual museum admissions. What is missing from these reports is the percentage of visitors that were, for example, Indigenous Australians,

or Vietnamese Australians or Sudanese Australians. The percentage is likely to be small. In museum studies, there have been discourses on global, multicultural, post-colonial, post-modern, and reflexive representation (see Corsane 2005) but in a nutshell, museums *are* western institutions still largely *for* western educated visitors.

The issue of museum visitation is linked to the concept of what is "heritage" in Australia and New Zealand. Although a personally defined concept (see studies by Deakin University 2010 and Aplin 2002), consistently problematic in debates on heritage is that British colonial is what is commonly understood to be meant by the term. Through studying the attitudes of Asian Australians, Clark (2007) found that transnational migrants feel a strong attachment to local and global identities, but a weak attachment to the national identity. Her research found that pride was felt least in Australia's "history" compared to all other achievements and national symbols, such as sport or politics. This may be related to the fact that there were prevalent and legally entrenched racist attitudes toward Asians in Australian up until 1970, but this is not a scenario confined only to Asian Australians. The endorsement of particular cultural symbols by museums, and the larger social and political need to foster a sense of loyalty among migrants from culturally diverse backgrounds through a consensus notion of heritage (see Kofman 2005), which is British, are perhaps more subtle reasons. Szerekes (2011) observed of the National Museum of Australia that its "migration section" was "small, constrained and sometimes misleading and inaccurate." This is not to say that exhibitions should include such a multiplicity of interests as to incorrectly portray historical realities, but simply ones more precisely contextualized.

In Australia, there was also a heritage "movement" in the 1970s, largely focused on the conservation of historic buildings. As a consequence, federal and state legislation that followed saw the beginnings of Cultural Heritage Management and rescue archaeology. Since the 1970s, there has been a large growth in the excavation of archaeological sites across Australia, Papua New Guinea, and New Zealand. As a consequence, there are also a rapidly increasing number of artifacts and collections to be stored and conserved. The curation of the material retrieved from archaeological excavations is most often problematic and a major issue for museums and archaeologists themselves. Schacht (2008) identifies a "curation crisis" in the "inadequate recovery, documentation, and legislative protection of artefacts and in the insufficient resources for their storage, conservation, and management. This has resulted in threats to both the physical condition of excavated collections and their accessibility for research, thus impacting on their research significance." Artifacts recovered mostly make their way to museums, local governments, university laboratories, some with archaeologists themselves. They are a burden on storage and administration, and as pointed out by Robins as early as 1988 (Robins 1988), many archaeologists themselves also contribute to the chaos of museum collections due to an inadequate understanding of the role and function of a museum, which is not an infinite repository. Excavated material is often of archaeological merit, but of little monetary or aesthetic value. There is little incentive for museums to display such material – mundane, broken, and unremarkable. Most artifacts, once the excavation process is finalized, are not reused or displayed, but lie in boxes separated from context often with dubious documentation and conservation, perhaps with some cataloging. In Australian archaeology, there is greater emphasis on and interest in the process of fieldwork over theory, systems, and landscape over artifacts. There is a low level of training of archaeologists in terms of conservation in the responsibilities toward the collections they create "little recognition of the fact that the organisation, documentation and deposition of collections with a museum is an extension of the process of site management" (Robins 1988: 116).

The only guidelines in Australia to deal with the significance of artifacts are by the Heritage Collections Council of Australia (2001) which provides a framework for the assessment of individual objects, and identifies as primary criteria,

historical, aesthetic, and social or spiritual significance but not specifically characteristics of archaeological collections. Schacht (2008) argues that the debate in the archaeological literature has stressed the subjective nature of significance; however, this approach has led to archaeologists rarely identifying any significance of the artifact collections they excavate and manage, and has resulted in the underutilization of the collections in research. An additional issue is the gendered division of labor in this sector. According to data released by the Australian Bureau of Statistics (2009) for the same category of work, women are earning only 63 % as much as men. The museum sector also employs a greater number of women than men, and most artifact-based archaeology is undertaken by more women than men.

Across many museums artifacts are often left to speak for themselves in post-modern methods of display and can be ineffective in communicating the more nuanced and complex readings of history and cultural material. This is particularly problematic with artifacts from Indigenous archaeological sites with still hang in an uneasy space in traditional museums. To be able to understand the significance of an archaeologically recovered artifact, the museum visitor needs to have a shift in their understanding and ideas about the past, or a particular culture, and engage with those ideas. This may be easier for most museum visitors attending an exhibition of archaeology from Egypt or Europe – understanding the significance and meaning of a 2,000-year-old sword or necklace is easy and familiar. Viewing and understanding the significance of a 15,000-year-old grindstone or piece of ochre or Indigenous cultural material that is often presented as a bundle of curious, beautiful, unfamiliar objects from an unexplainable, distant past is difficult, unfamiliar, and intangible. Artifacts are often left mute, and for a non-archaeologist, their use or significance (apart from basic observations about function or style, such as in the case of, for example, a boomerang, or a series of 100 boomerangs) is simply elusive. Nor should the contexts be espoused with overt certitude by archaeologists. As pointed out by Stone (2005), archaeologists and curators still have problems in interpreting and displaying material to Indigenous people, but there are also issues in providing meaning to a broad public, a matter that can only be addressed by broader changes in terms of education and perceptions of the significance of the archaeology of Australia, as well as Papua New Guinea and New Zealand.

International Perspectives

The most significant and contested issue for museums in Australia, New Zealand, and Papua New Guinea, which has the greatest impacts on institutions internationally, is undoubtedly repatriation. The past 30 years has seen the emergence and growth of this issue, for the reason that there are likely to be thousands of human remains and sacred items scattered across museums from the United Kingdom and Germany to France and the United States of America. Human and cultural material was procured, acquired, looted, or stolen up until the 1930s (see Fforde 2004). The issue is driven by Indigenous communities and is largely dependent on the development of goodwill between the traditional owners, governments, and museums. In most cases, it involves lobbying overseas governments and institutions on the cultural significance of repatriation, and is supported by federal governments in Australia, New Zealand, and Papua New Guinea. Although most overseas institutions would argue that there is scientific value in continuing to research human remains, what little research has been undertaken was done without the permission of descendent communities. The retention of human remains by museums in Europe and North America against the wishes of claimants is perceived as a continuance of colonial oppression (Hubert & Fforde 2005: 111). Many institutions perpetuate a discourse of ownership, a perceived duty to retain an inheritance from the past for a research future, which is effectively a denial or devaluing of alternative cultural meaning.

In terms of Australian museums, repatriation is managed by eight collecting institutions and assistance is provided where necessary by the

National Museum of Australia and/or the relevant major state or territory museums to the federal Indigenous Repatriation Program, including research to establish the provenance of ancestral remains and the identification of overseas collections of ancestral remains and the holding of remains in temporary "keeping places." There have been over 1,000 repatriations to communities in Australia since 2000. Since 2003, New Zealand authorities have followed a policy of facilitating the repatriation of Māori ancestral remains from museums around the world (see Hole 2007). To date, Te Papa and its predecessor, the National Museum, has repatriated ancestral remains from twelve countries bringing home close to 322 skeletal remains and estimates that there are over 500 still awaiting return.

Future Directions

The presentation and recognition of the archaeology of Australia, New Zealand, and Papua New Guinea and the contribution that museums can make to this process is yet to be fully realized. The attitude and perhaps ignorance to the archaeology that occurs daily is probably best summed up by a question asked by an ABC journalist of TV host Tony Robinson of "Time Team" fame in when on a recent visit to Australia to promote his book on Australian history:

> In the Time Team series you're unearthing stuff that dates back as far as the Iron Age. Of course, Australia is a much younger country, and I wonder whether lack of brevity of history doesn't make for boredom to a certain extent? (Ali Moore, Lateline 21/11/2011).

Of course, the answer given was that Australia has some of the world's oldest archaeology, some more than 50,000 years old. The fault lies here with archaeologists, museum professionals, and education sectors in the failure to communicate broadly the meaning and nature of archaeology of this region, and that our own archaeology is not taught in schools. Museums have tended to focus on collections and exhibitions rather than on other aspects of museums' policies and programs such as education, community engagement, and public programs, as well as engagement with archaeologists. This is also linked to the fact that museum education programs have traditionally been oriented to supporting school curricula, and archaeology as part of the school curricula is yet to be realized. Perhaps future generations, educated with an understanding of their own regional archaeologies, will be able to comprehend the significance of a flake and a core just as well as a coin or hatchet.

Online access to collections complements such a change to both education and public programs. Many museum objects can be already be viewed online, for example, the Collections Australia Network is part of the Federated Open Search Project where it is possible to search the online collections of the Powerhouse Museum, Museum Victoria, National Museum of Australia, Picture Australia, NSW State Records and Libraries Australia via their website. There were 51.5 million unique online visits to Australian museums with a total of 127.3 million web pages viewed in 2007–08 (ABS). With increased access to the internet, better and continuously evolving technologies, online collections are certainly the future for museums. Changes in architecture have already taken place as a response to the changing role of the museum as a cultural center, rather than a repository for objects, such as Bunjilaka at the Melbourne Museum. Indeed, objects and collections may not be an essential focus of museums of the future.

Museums have traditionally conserved and classified, interpreted, and exhibited. The shift has already begun from the role of a classifier to one of advocate – in terms of social critique and the repatriation process. There is a shift in the role as custodian to one of stewardship, from preservation to one of cultural maintenance. Authority and authorial voices remain very important in this debate, especially in the context of collections that are archaeological or ethnographic in nature. Perhaps museums of the future may not be staffed with primarily white, tertiary educated professionals, but a workforce that is more reflective of the collections they hold and audiences they engage with. Positive change and development can also occur with proactive

and genuine community collaboration and interaction, be it with Indigenous communities or archaeologists that may result in enduring, valued, and meaningful museums.

Cross-References

▶ Museums and Memory Experiences
▶ Royal Exhibition Building

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Australia: Cultural Heritage Management Education

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Introduction

Cultural heritage management (CHM) education is a vital component in managing cultural heritage resources, since it produces each new generation of professionals who work across its many allied fields. CHM education takes place at many levels and across many such fields in Australia, reflecting the breadth of the heritage industry as it is currently practiced. In Australia, as in other countries, CHM encompasses a wide range of specialist subfields, from built heritage (conservation or landscape architecture), materials conservation, and heritage planning, to museum studies, Indigenous heritage, archaeology, and professional history. This mosaic has created a complex system of educational opportunities for those seeking professional qualifications to practice and has also created its own particular suite of problems.

While such breadth is partly a strength, in that there are many formal and informal options for education across all sectors of the population, it is also a weakness, in that the field is highly fragmented, with few opportunities for coordination or collaboration, and a clear need for benchmarking, quality standards, and a national outlook on educational and skills needs. One recent study identified this fragmentation as the key problem preventing the sector from responding effectively to regional skills shortages, emerging priorities for skill development, or contributing to nationally significant research agendas and cultural and environmental challenges (Ireland et al. in press). No professional standards or accreditation relating to heritage education and training currently exist in Australia.

Key Issues

Current routes for CHM education in Australia follow a variety of formal and informal pathways. Formal paths are the various degrees, diplomas, or certificates offered through universities or Colleges of Technical and Further Education (TAFEs). Informal mechanisms are usually offered through various not-for-profit cultural heritage organizations (such as museums, the National Trust, or Conservation Volunteers Australia) or nongovernment statutory bodies, such as the Historic Houses Trust of NSW, or the Port Arthur Historic Site Management Authority. Informal training mechanisms usually aim to encourage a more general "culture of care" around heritage through *educating* the public in the conservation of heritage places, creating greater knowledge of heritage management issues or changing visitor behavior at heritage sites.

Formal Cultural Heritage Management Education in Australia

Australian higher education has traditionally been split across the university and TAFE sectors, with TAFEs being viewed as vocational (the government language for the training they offer is known as Vocational Education and Training, or VET), rather than academic. The gap between the two sectors is perhaps most clearly measured by the forms that heritage education within each typically takes. Heritage as offered through a TAFE College is typically only available as a module within a larger course on tourism, Aboriginal languages, guiding, or land management and conservation. The exceptions to this are more tailored courses in Indigenous heritage management designed by some universities and offered in conjunction with state government partners, usually in response to legislative changes that require particular skills. Heritage trades (i.e., stone masonry, thatching, traditional joinery or carpentry, and other craft-based skills) are also only available through TAFE, or through a traditional apprenticeship system (although only 2 % of apprentices learn heritage skills in this way,

Godden et al. 2010: 16). Current literature, however, points to such trades being in chronic shortage, due to the disappearing knowledge of heritage crafts, the advancing age of knowledgeable tradesmen and the lack of incentives for them to take on new apprentices. There are thus very few opportunities to pass on existing heritage trade knowledge and skills (Godden et al. 2010: 15-16).

At universities the traditional path remains a 3 year undergraduate plus 1 year Honors degree (usually a combination of coursework and thesis), although this, too, has been challenged in recent times. Major changes to the Australian education sector in the 1980s and overall increases in the proportion of the population seeking a higher degree qualification resulted in more students studying at tertiary institutions, and created broader scope for vocational courses in heritage to be introduced (Beck & Balme 2005: 32). Through the 1990s, changes happening outside the academy became relevant in driving a demand for CHM employment, creating increased demand for more and better skilled graduates and transforming the CHM education landscape in the process. The growing importance of Native Title-related work with the introduction of the Native Title Act 1993 (see also the entry on ▶ Cultural Heritage Management and the Colonial Culture in this encyclopedia), urban expansion in southeastern Australia and the mining boom in Western Australia have seen the numbers employed in the heritage sector grow substantially over the past 10 years, leading some universities to begin to address the former divergence between the training offered in a degree, the vocational training offered by TAFE, and apprenticeship-style opportunities to learn "on the job."

This is most obvious in the recent developments around graduate coursework programs. In 2005, a national survey of archaeologists identified a need for a vocationally oriented fourth year option (i.e., a graduate diploma) that was different to the traditional research-oriented Honors year. While isolated attempts to create graduate diploma degrees in heritage date back to the 1980s, several universities have responded more successfully to recent needs by developing vocationally oriented options that mix formal, informal, and "on the job" aspects of training. Recently, several universities have also become dual-sector institutions (i.e., both universities and TAFEs), allowing them to offer both degrees and VET training.

Informal Cultural Heritage Management Education in Australia

Raising public awareness of heritage as an important issue in Australian society is also an important heritage education goal. Public interest in heritage generally, and in some of the particular disciplines that study heritage, such as archaeology, is directly related to the social basis for cultural heritage management, since the key to successful management lies in collaborative work with communities, Traditional Owners, and other stakeholders. The two are combined most often through interpretive works on or about a site, or through public archaeology programs ("education through experience") built into the process or outcomes of cultural heritage management work. This can include open days, public site visits, and tours (see also the entries on ▶ Cultural Heritage Outreach and ▶ Cultural Heritage and Communities in this encyclopedia).

Large urban excavations in the 1990s at The Rocks in Sydney and Little Lonsdale Street in Melbourne, for example, both engaged hundreds of volunteers in public archaeological activities and education as part of the development work at these sites. The best long-term outcome of such projects is probably The Big Dig Archaeology Education Centre in The Rocks, which was purpose-built to provide an ongoing range of educational experiences in archaeology and the heritage of Sydney. Many other projects lead to smaller, more site specific, but no less valuable, informal educational outcomes, such as options for interpretation of particular sites.

In NSW, the public basis for CHM and resulting tools for public outreach have been codified more strongly through historic site legislation that often requires the incorporation of public education facets into cultural

heritage management plans, especially for state-significant historical archaeological sites. The work of the Heritage Branch of NSW has been devoted to promoting public awareness by building in various promotional mechanisms to standard archaeological and other consultancies.

The variety of, need for, and sustained interest in, cultural heritage management educational opportunities across Australia holds great potential for the future of managing our cultural heritage resources. Creating better links between universities, TAFEs, community organizations, and volunteer and vocational sectors will bring the disparate facets of CHM education closer together and mend some of the rifts that currently fragment it.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Outreach

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Australia: Domestic Archaeological and Heritage Management Law

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Introduction

Heritage law in Australia is dynamic and challenging. It is closely connected to the broader framework of environmental planning, protection, and regulation. Australia's first heritage management legislation dates from the 1970s. It was enacted in response to the widespread public concern regarding the destruction and loss of many important natural and cultural places as the Australian urban landscape rapidly modernized during the 1960s and 1970s. Since that time, the theory, practice, and public interest in natural and cultural heritage conservation has changed considerably. It has evolved from an ad hoc community-driven movement focused on saving natural environments, historic places, and buildings through activism and protest to an increasingly complex multilevel system of heritage laws and procedures.

Australia has a federal system of governance. It is comprised of the Commonwealth, six states, and two mainland territories, each of which has its own statutes for heritage management. Urban planning, development, and heritage conservation are considered matters of interest to the states (Logan 2007). Yet, the demarcation of roles and responsibilities between the Commonwealth and the states and territories has been the subject of ongoing debate and review in many areas, including heritage management (Aplin 2002). The Council of the Australian Government Heads of Agreement for the Commonwealth and State Roles and Responsibilities for the Environment established a three-tier system for the management of heritage in Australia in 1997. As part of that Agreement, responsibility for listing, conserving, and managing heritage of national, state, and local significance is delegated to the

Commonwealth, the states and territories, and local governments, respectively (Productivity Commission 2006).

The multilevel system of heritage law is administered by various agencies and authorities and requires adherence to heritage conventions, charters, codes, manuals, and standards of practice that are primarily executed and evaluated by tertiary-educated heritage professionals and specialists. Reflecting the unique qualities and diversity of Australia's heritage, the legislative framework protects natural heritage, Aboriginal and Torres Strait Islander heritage (Indigenous), historic places, archaeology, historic shipwrecks, and industrial and movable heritage.

Definition

In recent years, understandings of what constitutes heritage in Australia have been influenced by increasing ethnic and cultural diversity, shifting public attitudes and broader trends in the field. As such, defining heritage and what it comprises is the subject of ongoing debate and refinement (Conroy 2007). Implementing new legislation is a significant practical undertaking and given the dynamic context, it is often difficult to ensure that heritage law reflects current definitions and community values.

Notwithstanding the energetic efforts of the National Trusts in the postwar period, in Australia, heritage came to political prominence through the concept of the National Estate. The "National Estate" was first coined in Australia by Prime Minister Gough Whitlam in 1972, following the example of the American President, John F. Kennedy (Veale et al. 2012). Initially, there was some imprecision in the use of the term, but by 1974 and the release of the *Report of National Estate*, it was defined as comprising the *natural and cultural environment, archaeological and scientific areas and cultural property which are of outstanding significance to the World, to the Nation or of aesthetic, historical, scientific, social, cultural, ecological or other special value to any part of the nation, including a region or locality that should be conserved, managed and presented for the benefit of the community* (Hope 1974).

In 1979, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (the Burra Charter) was adopted. The Burra Charter established a series of best-practice conservation principles and processes that are underpinned by the central concept of cultural significance. Reflecting the definition of the National Estate, under Article 1.2 of the Burra Charter, cultural significance is defined as aesthetic, historic, scientific, social, or spiritual value for past, present, or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places, and related objects which may have a range of meanings for individuals and groups (Australia ICOMOS 1999). While the Charter has not been officially adopted in legislation, its principles and processes are evident in heritage management law throughout Australia.

Notwithstanding the influence of the Commonwealth and the Burra Charter, variation in the definitions used in Australian heritage law persists. These variations provide an indication as to what defines heritage in each jurisdiction. In most instances, legislation defines and protects Indigenous and non-Aboriginal (historic) places and objects separately. Typically, "heritage" is not specifically defined in the legislation; rather, a series of criteria are used to assess whether a place or item has sufficient cultural value or significance to be protected at local, state and territory, Commonwealth, or national levels. For example, the Heritage Acts in South Australia (SA), Victoria (Vic), Queensland (Qld), Tasmania, and Western Australia (WA) specify a place is of heritage significance if it can be demonstrated to satisfy one or more heritage criteria. Under the New South Wales (NSW) *Heritage Act 1977*, items of environmental heritage are protected. This definition includes natural places, as does the Australian Capital Territory's (ACT) *Heritage Act 2004*, which protects places of natural or cultural significance (Boer & Wiffen 2006). The *Heritage Conservation Act 1991* (Northern Territory NT) includes places and objects of social, aesthetic, or scientific value

and may include geology, fossils, archaeology, objects, buildings, precincts, works, relics, gardens, coastlines, landscapes, and ruins the *Heritage Act 1993* (SA) conserves places of cultural value, including places of geological and palaeontological significance.

Generally in Australian heritage law, a distinction is made between heritage places and archaelogical objects and relics. Specific provisions to protect objects and relics are included in most heritage acts in Australia. Historic shipwrecks are defined as a special type of object which are protected by State and Territory legislation in conjunction with the Commonwealth *Historic Shipwrecks Act 1976* which protects wrecks and associated relics that are 75 years or older.

The *Victorian Heritage Act 1995* protects places and objects of significance to the State (excluding Aboriginal heritage). Under that Act, an archaeological relic is defined as any archaeological deposit; artifact, remains, or material evidence related to non-Aboriginal occupation that is 50 or more years old (*Victorian Heritage Act 1995* Section 3). Similarly, in NSW, under the *Heritage Act 1977* (NSW), a relic is any deposit, artifact, object, or material evidence that relates to the settlement of NSW not being Aboriginal settlement and is of State or local heritage significance (*Heritage Act 1977*). Until amended in 2001, the *National Parks and Wildlife Act 1974* also included provisions for the protection of relics, however, in that statute relics related to Aboriginal occupation. Unlike Victoria and NSW, in WA, under the *Heritage of Western Australia Act 1990* and the SA *Heritage Act 1993*, archaeological relics are not referred to, though in WA regard may be given to archaeological value when a place is being considered for entry onto the Register. In SA, a place of archaeological significance may be registered, and a permit is required to remove cultural artifacts from such places.

Across Australia, Indigenous heritage is variously defined. The definitions tend to reflect the different approaches that emerged when Indigenous heritage law was initially passed in the 1970s. In Northern Australia emphasis is placed on the protection of sacred sites and includes any land that is sacred to Aboriginal people or of significance according to Aboriginal tradition. Conversely, across Southern Australia, Indigenous heritage legislation was defined by reference to material evidence (relics or objects) related to Aboriginal occupation such stone artifacts, campsites, and hearths. For example, under the *Aboriginal Relics Act 1975*, Tasmania, a relic is defined as the physical remains of past Aboriginal occupation prior to 1876 and can include middens, stone arrangements, engravings, and rock art. Most definitions for relics and objects exclude those made for the purpose of sale. The assessment and protection of these types of evidence was and is still largely managed by archaeologists, whereas assessments in Northern Australia are predominately undertaken by anthropologists (Office of Environment and Heritage 2012). In NSW, under the *National Parks and Wildlife Act 1974*, Aboriginal objects and Aboriginal places of significance to Aboriginal people are protected. An Aboriginal place is defined in the Act as being a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture (Section 84 NPW Act 1974 (NSW)) *National Parks and Wildlife Act 1974*.

Historical Background

In Australia, heritage management law has had a relatively short history when compared to countries overseas. Despite this, heritage law and the periodic reforms demonstrate how the theory and practice of conservation has evolved and how major trends, public and private attitudes, interests, and pressures have been interpreted and applied to the legal framework for the identification, management, and protection of significant heritage places, objects and relics.

Heritage Legislation: Australian States and Territories

One of the earliest pieces of heritage legislation, the *Native and Historic Objects Heritage Protection Ordinance* was passed in 1955 in the NT

(North 2006). Elsewhere, in NSW, the *Crown Lands Consolidation Act 1913* included provisions for the establishment of reserves to protect Aboriginal art sites. Some years later, amendments to the *Local Government Act* in 1945 included provision for places or objects of historical or scientific interest to be preserved (NSW Heritage Office 2000). Yet across Australia, most heritage law dates from the 1970s and reflects the political response to the community's growing concerns about the destruction and loss of the historic and natural environment. The table below lists the main federal and state and territory heritage and related statutes in force at the time of writing (Table 1).

In 1974, Victoria led the other states and territories when the *Historic Buildings Preservation Act 1974*, which focused on protecting buildings of historic or architectural significance, was enacted. NSW had passed the *National Parks and Wildlife Act* (NPW Act) in 1967, the same year that the *Aboriginal and Historic Relics Preservation Act 1965 (SA)* came into force. Reflecting the American legislative model, the *NPW Act 1967* established the National Parks Service and a formal mechanism for the reservation of National Parks, State Parks, and Historic Sites; which were areas comprising buildings, objects, monuments, or events of national significance. In 1969, significant amendments were made to the *NPW Act*, and the objectives for cultural heritage broadened to include the conservation of objects, places, or features (including biological diversity) of cultural value within the landscape, including places, relics, and features of significance to Aboriginal people, and places of social value to the people of NSW, and places of historic, architectural, or scientific significance. Amendments to the *NPW Act* in 1974 created provisions for the gazettal of Aboriginal places which affords protection to places of cultural significance regardless of whether objects are present.

In NSW, with the passing of the *Heritage Act 1977* (NSW) and the *Environmental Planning and Assessment Act 1979 (NSW)*, heritage protection became part of an integrated system of

Australia: Domestic Archaeological and Heritage Management Law, Table 1 Commonwealth, state and territory heritage and planning legislation

Australian state or territory	Current heritage legislation
New South Wales	*National Parks and Wildlife Act 1974*
	Heritage Act 1977
	Environmental Planning and Assessment Act 1979
	Historic Houses Trust Act 1980
Queensland	*Newstead House Trust Act 1939*
	Queensland Heritage Act 1992
	Aboriginal Cultural Heritage Act 2003
	Torres Strait Islander Cultural Heritage Act 2003
	Cape York Peninsula Heritage Act 2007
	Sustainable Planning Act 2009
Victoria	*National Parks Act 1975*
	Planning and Environment Act 1987
	Victorian Heritage Act 1995
	Aboriginal Heritage Act 2006
Tasmania	*Aboriginal Relics Act 1975*
	Land Use Planning and Approvals Act 1993
	Historic Cultural Heritage Act 1995
Western Australia	*Aboriginal Heritage Act 1972*
	Maritime Archaeology Act 1973
	Heritage of Western Australia Act 1990
	Planning and Development Act 2005
Northern Territory	*Northern Territory Aboriginal Sacred Sites Act 2006*
	Heritage Conservation Act 1991
	Planning Act 2009
South Australia	*Historic Shipwrecks Act 1981*
	Aboriginal Heritage Act 1988
	Heritage Act 1993
	Development Act 1993
	Planning and Land Management Act 1988
Australian Capital Territory	*Heritage Act 2004*
	Planning and Development Act 2007
Commonwealth	*Historic Shipwrecks Act 1976*
	Aboriginal and Torres Strait Islander Protection Act 1984
	Protection of Movable Cultural Heritage Act 1986
	Environment Protection and Biodiversity Conservation Act 1999

planning and environmental management. Some states took considerably longer to legislate for heritage protection, most notably Qld and WA. Both states passed legislation almost a decade later than NSW due to the lack of political will and the economic power of the mining industry (Spearitt 2012). Tasmania, with its tangible convict heritage, was without formal heritage protection until 1995, yet with negligible urban development and growth, there was no imminent threat to heritage places. The first wave of legislation passed during the 1970s tended to focus on historic heritage, natural heritage was generally protected through national parks and reserves, Aboriginal heritage was afforded blanket protection, and consideration of movable heritage objects was typically overlooked (Marshall 2010).

The legislative mechanisms and regulations for heritage management in Australia play a crucial and central role in the management of Australia's heritage at local, state and territory, and national levels. In all jurisdictions, similar legislative and administrative systems have been established. While the extent to which heritage is managed and regulated under each act varies, essentially four main types of legislation are apparent (Pearson & Sullivan 1995). Firstly, there are acts that separately protect Indigenous and historic sites including cultural places, heritage, sites, and relics. Secondly, a number of acts manage heritage through land or site management. Examples include forestry, national parks, or historic houses legislation that typically includes provision for the conservation of heritage within the estate they manage. The *Historic Houses Act 1980* (NSW) provides for the care, control, and management of historic houses, and other buildings of historic importance is an example. One of the oldest acts of this type still in force is the *Newstead House Trust Act 1939* (Qld), which establishes a board of trustees for the Newstead House and for the conservation, education, enjoyment, and public access to Brisbane's oldest residence. Thirdly, land use planning legislation in most states and territories includes specific provisions that regulate development with regard to places of environmental heritage value. Finally, some acts such as the National Trust Acts establish the Trusts in each state and territory and provide for the preservation, maintenance of places of historical, artistic, and scientific interest and the compilation of registers of heritage places.

With regard to historic heritage legislation such as the *Heritage Act 1977* (NSW), *Heritage of Western Australia Act 1990* (WA), *Heritage Conservation Act 1991* (Northern Territory NT), *Queensland Heritage Act 1992* (Qld), *Heritage Act 1993* (SA), *Heritage Act 1995* (Vic), the *Historic Cultural Heritage Act 1995* (Tas), and the *Heritage Act 2004* (ACT), the objectives typically comprise maintaining and managing a heritage register, the establishment of a heritage council to provide advice to government, manage statutory listings, and review proposed changes to listed items; regulation and control over development affecting listed places, the preparation of guidelines, and standards for heritage practice; assistance with the provision of heritage advisory services to local councils; and funding to assist individuals and communities with the costs of conserving heritage.

It is in the area of Aboriginal and Torres Strait Islander heritage law that there is considerable variation between jurisdictions. NSW was the second government in Australia to enact legislation to protect Aboriginal heritage. Under the *NPW Act 1974* (NSW), it is an offence to harm an Aboriginal object or Aboriginal place. When the Act was passed, there was no requirement for Aboriginal people to be involved in determining or protecting their heritage. Recent changes such as the guidelines for Aboriginal consultation and the approaches mooted as part of the Aboriginal heritage law reform place much greater emphasis on Aboriginal involvement. This shift is apparent in other states and territories and reflects a heightened awareness of Australia's obligations under the 2007 United Nations Declaration of the Rights of Indigenous People, combined with the ongoing determination and advocacy of Aboriginal people to identify and conserve their heritage.

In South Australia, the *Aboriginal Heritage Act 1988* is the third such act in as many decades. It provides for the conservation of Aboriginal heritage through blanket protection for Aboriginal sites, objects, and remains. The Act provides for an Aboriginal Advisory Committee which goes some way toward recognizing the rights and role of Aboriginal people in heritage protection. The Act is currently under review, its effectiveness having been undermined by unsuitable administrative policies and procedures, alongside political and public apathy (Whiltshire & Wallis 2008). Principles that are part of the legislative review in SA, including the recognition of Aboriginal custodianship and enabling Aboriginal people to negotiate heritage agreements, indicate the current provisions related to Aboriginal involvement are outdated, particularly given the influence of the *Native Title Act 1992* (Cwlth) on heritage protection. In WA, the *Aboriginal Heritage Act 1972* is the primary statute protecting Aboriginal cultural heritage. It provides blanket protection for places and objects customarily used by or traditional to the original inhabitants of Australia or their descendants. The Act is currently under review and is widely regarded as having proved ineffective in protecting Aboriginal heritage. By contrast, in Victoria, the *Aboriginal Heritage Act 2006* has generally enhanced the protection of Aboriginal cultural heritage, provided greater certainty in the context of development and improved Aboriginal engagement in the process. The "efficacy and efficiency" of this Act is currently under review focused on a number of operational and substantive issues including the integration of cultural heritage management with land use planning, according respect and status to Aboriginal people, and penalties and enforcement (Department of Planning and Community Development 2012).

Federal Heritage Legislation

In 1973, Australia ratified the UNESCO World Heritage Convention, only the sixth nation to do so. This initiative, combined with the policy objective of the Whitlam Federal Labor Government from 1972 to 1975 to preserve and enhance the quality of the National Estate, established the fundamentals of the Australian heritage system. The 1974 Committee of Inquiry into National Estate, chaired by R. M. Hope (Hope Inquiry), helped define the concept of the National Estate which was eloquently summarized by the Tasmanian Premier, as the "the things we want to keep" (Australian Government Publishing Service 1974). The *Australian Heritage Commission Act 1975* was a key recommendation of the Hope Inquiry and the first Act of Parliament to protect heritage at Commonwealth level. The Act created the Australian Heritage Commission with responsibility for the identification, promotion, and conservation of Australia's National Estate and established the Register of the National Estate (RNE) an inventory of Australia's natural, historic, Aboriginal and Torres Strait Islander heritage which has special value for present and future generations. Aside from the lists of heritage places assembled by the various chapters of the National Trust, the RNE was Australia's first national heritage list included natural, Indigenous, and historic places. Any person was able to nominate a place for the Register. It reflected the community-driven, inclusive view of heritage that was a feature of the progressive new nationalism of the Labor Party under Gough Whitlam (Davison & McConville 1991).

Characterized by an ambitious political and social agenda, this period was arguably the highpoint for Australian heritage conservation. Similarly, the focus on Indigenous affairs intensified during this time, resulting in significant changes to legislation and policy at both federal and state levels. The *Commonwealth Aboriginal Land Rights (Northern Territory) Act 1976*, the *Aboriginal Heritage Protection Act 1972* (WA), and the *Northern Territory Aboriginal Sacred Sites Ordinance 1978* were passed. And while the Australian Heritage Commission's work on the Aboriginal National Estate was "tentative and slow," the understanding and appreciation of Indigenous cultural heritage burgeoned (Commonwealth of Australia 1985). The *Indigenous and Torres Strait Islander Act 1984* (Commonwealth) passed a decade later

reflected just how far the understanding of Aboriginal issues had come, particularly, how past dispossession and dispersal of the Aboriginal and Torres Strait Islander peoples and their present disadvantaged position in Australian society had impacted on Indigenous people. Under the Act, Indigenous people may apply to the Federal Minister for Environment to make a protective order over areas of significance where those areas are under threat of damage or destruction.

Since 1996, much of the political largess of the Whitlam Labor years has been eroded at federal level despite significant legislative and administrative reforms. The *Environment Protection Biodiversity and Conservation Act 1999* (EPBC Act) which repealed the AHC Act and the *World Heritage Places Conservation Act 1983* is the Commonwealth's principle heritage law. The EPBC Act (s. 528) defines "heritage value" as the place's natural and cultural environment having aesthetic, historic, or social significance, or other significance, for current and future generations of Australians. Included in the Act's objectives are the promotion and conservation of biodiversity, the protection and conservation of heritage, and assisting with the implementation of Australia's international environmental responsibilities such as those under the World Heritage Convention. Under the EPBC Act, Commonwealth environmental assessment processes are triggered by matters of national environmental significance. Such matters include the likely significant impact on world heritage values or any significant impact on the national heritage values of a place on the National Heritage List (NHL). Amendments to the EPBC Act in 2003 created the NHL and the Commonwealth Heritage List (CHL) and in so doing clarified that the role of the Commonwealth is to protect places of outstanding significance to the nation and places on Commonwealth-owned and administered land that are of significance. Following these changes to the EPBC Act, the Australian Heritage Council was established under the *Australian Heritage Council Act 2003*. This Council replaced the Australian Heritage Commission.

While strengthening the protective mechanisms for National and Commonwealth heritage, the EPBC Act simultaneously narrowed it. Under the concept of the National Estate, heritage was broad, community driven, and inclusive. At its height, the Register of the National Estate (RNE) included 13,000 places. Since the amendments creating the NHL and CHL were passed in 2003, fewer than 500 places have been listed on the NHL and CHL, a fraction of total number of places listed on the RNE. Led by the federal government, reform of Australia's national environmental law is underway. Reforms and reviews to other heritage statues, especially in the area of Indigenous heritage law are currently in progress in NSW, Western Australia, Victoria, and South Australia.

In the wake of funding cuts, sweeping public sector realignments and the prevalent view that heritage is a cost burden for owners and developers requiring complex assessment and approvals processes, the future of heritage protection law in Australia is uncertain.

Key Issues/Current Debates

Presently, there are a series of challenging issues and debates influencing heritage law and conservation practice in Australia. Climate change, environmental sustainability, urban development, mining, and economic growth in the context of global economic uncertainty and a lack of bipartisan government leadership on heritage have had an impact on heritage management and protection.

Current reforms to both Indigenous and historic heritage management frameworks and regulation provide evidence of the continuing process of change and refinement necessary to ensure approaches reflect community will and achieve conservation outcomes. Despite this, a growing sense of dissatisfaction with the government regarding its failure to provide strong leadership and direction for heritage management is evident. On the one hand, there is concern voiced by Indigenous people and others that current statutory mechanisms lack credibility

and effectiveness and are not sufficient to conserve our irreplaceable cultural heritage. On the other hand, some heritage owners (public and private) contend current heritage laws impose onerous cost burdens, restrict development, and provide little certainty in the statutory approval process.

With regard to Indigenous cultural heritage protection, there appears to be discontent and a heightened consciousness about the level of destruction and the lack of systematic and robust data. This is occurring at the same time that Indigenous people are demanding genuine engagement in decision-making about the management and conservation of their heritage. Moreover, the statutory focus and "blanket protection" of Indigenous archaeology within a system that is perceived to regulate destruction rather than protect culture and heritage has been challenged. The authority and validity of the scientific paradigms applied to Indigenous archaeology have also been questioned in a context where communities are endeavoring to achieve recognition and the conservation of deeper intangible values such as knowledge, song, and dance. Some legislative reforms have provided for the integrated assessment and protection of values, including intangible values and an increased level of community involvement. Yet, overwhelming heritage regulation and protection is still biased toward physical evidence and much archaeology continues to be practiced as an objective science based on the modernist processual model, in vogue when much of Australia's heritage legislation was enacted (Colley 2002). It could be argued, however, that the failure to deliver the protection of Aboriginal heritage is not entirely the result of flawed legislation but may be more due to the lack of political will and beleaguered public administration.

Reflecting broader influences in the field, the protection of cultural landscapes and intangible values has received considerable attention, and the scope of heritage continues to broaden. The widening definition of heritage and the increasing emphasis on intangibles such as language, story, and cultural practices raises challenges for Australian governments in developing appropriate legislative and protective management systems. This trend toward inclusivity is at odds with that of government, particularly at federal level, whereby the philosophy underlying the concept of the National Estate as a representation of our "full environmental and cultural history" has been rejected in favor of a system which protects a "few national jewels" (Yencken 2008).

International Perspectives

Australia is a signatory to many international charters and conventions and continues to play a prominent role in heritage internationally through the activities of ICOMOS.

Founded in 1976, Australia ICOMOS is a national chapter of ICOMOS International. In 1977, ICOMOS members met in the historic mining township of Burra, South Australia, and focused on preparing a version of the *International Charter for the Conservation and Restoration of Monuments and Sites* (the Venice Charter) which would be suitable for conservation practice in Australia. The *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (the Burra Charter) was adopted in 1979. The Burra Charter accepted the principles and philosophy of the Venice Charter but placed greater emphasis on the conservation of culturally significant heritage places rather than ancient monuments and buildings.

Members of Australia ICOMOS attend the triennial ICOMOS International General Assembly, and many Australian members have positions on ICOMOS International Scientific Committees including twentieth-century heritage, cultural landscape, archaeological heritage management, polar heritage, and interpretation and presentation to name a few. Presently, Australia has an elected member of the Executive Committee of ICOMOS International.

Future Directions

Australia's governance, combined with the framework of statues, land use planning and

management regimes, inventories, and registers, has resulted in cumbersome heritage management system. Generally, separate Acts still protect natural, Indigenous, and historic heritage. This frequently results in fragmented heritage assessments and inadequate protection that fails to acknowledge the complex and significant interrelationships that exist between nature, history, places, objects, values, and people.

In Indigenous heritage, trends include a greater emphasis on Indigenous engagement (especially native title owners and claimants) and a shift toward values-based assessment methodology, combined with steps toward proactive rather than a reactive system for heritage protection.

With regard to historic heritage, governments appear to be less willing to list heritage places where objections are raised. This approach follows the findings of the Productivity Commission 2006 report. Unless alternatives are explored such as tax incentives or advisory services, heritage is likely to continue to be perceived by some as an economic burden.

What has emerged as a key issue since the Council of Australian Governments clarified the role and responsibility for governments at federal, state, and local levels is just how vulnerable our heritage is particularly when government funding has declined appreciably and population growth, urban development, economic growth, and climate change continue apace (State of the Environment Committee 2011). In response to these ongoing and emerging threats, the future direction for heritage is dependent on political will and continuing community regard based on a shared understanding that heritage is our inheritance from the past and constitutes an important part of our cultural identity which is worth passing on to future generations.

In the 2011 State of the Environment Report, two key issues are identified that are determined to have the most significant impact on the integrity and future condition of Australia's heritage. Firstly, government will need to play a part in the preparation of heritage assessments that provide representative and adequate areas of protected land and comprehensive heritage listings. Secondly, and perhaps most importantly, governments, heritage places owners, and communities will have to manage places in response to the known and emerging threats and in the face of diminishing resources by adopting an approach that is based on the integration of and respect for different forms of knowledge (State of the Environment Committee 2011).

Perhaps the release of the Australian Heritage Strategy Public Consultation Paper in April 2012, with its accompanying series of essays, is evidence that the federal government may be committed to once again assuming a leadership, whether this is the case remains to be seen.

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- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Australia's Archaeological Heritage
- ▶ Australia: Maritime Archaeology
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
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Australia: Indigenous Cultural Property Return

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Introduction

Although there are some earlier exceptions, the return of Aboriginal and Torres Strait Islander cultural property from museums in Australia has been a point of significant debate since the 1970s. Driven by the voice of Indigenous Australians and undertaken in often tense dialogue with museum professionals, anthropologists, and archaeologists (and these groups are not necessarily all mutually exclusive), the debate has led to significant development in museum ethics, policy, and practice in Australia, a change in the way that "ownership" of such items (and thus decision making about, or influence over, them) is viewed, and has consequently resulted in the return of some types of cultural property to Indigenous groups in this country (Turnbull & Pickering 2010; Pickering 2011). The Australian history of the return of Indigenous cultural property is an informative case study, as similar changes within the same time frame occurred in other countries with indigenous populations, such as New Zealand, the United States, and Canada, and because Aboriginal people were prominent in bringing the repatriation issue to international attention,

influencing policy change and instigating debate in a number of countries overseas (Fforde & Ormond Parker 2001; Simpson 2002).

Definition

Although there are particular legal definitions used in international conventions and national legislation, in its broadest meaning, the term "cultural property" encompasses any item which has been produced by a group or culture. The terms cultural "property," "heritage," "material," and "objects" are often interchangeable in common parlance, although the term "property" often implies concepts of ownership more than the others, and while intangible heritage is widely accepted as part of cultural "heritage," it is less frequently incorporated into definitions of cultural "property." However, definitions will vary depending upon cultural context and may differ particularly depending upon their use in legal instruments.

In the repatriation context in Australia, the particular emphasis in the return of cultural property has been upon human remains and objects of special significance (usually secret/sacred, ceremonial, and sometimes funerary objects). What is defined as "human remains" has also been a point of discussion and again can vary depending upon cultural context and museum policy. In particular, it has been debated whether remains which have been made into (or incorporated into) objects should, or should not, be considered as "the deceased" and thus be covered by relevant repatriation policy. What an institution may consider to be "human remains" may not necessarily accord with what a claimant community considers to be within this category. In addition, although the identification of the supply of copies (digital or otherwise) of images and sound recordings as "repatriation" by some institutions is arguably not strictly correct (as originals are not provided or, in cases such as sound recordings, were not removed), the program of holding establishments and community organizations to provide/acquire such items is also frequently considered to fall within the "return of cultural property" rubric and ethos and is (and has been) a significant movement in itself.

The majority of Indigenous cultural property in Australian museums has been acquired over the past 150 years. Before this time, such items were generally sent overseas. They were acquired by Australian state and regional museums and also by university departments, learned societies, and private collectors. Up until the Second World War, human remains were obtained largely for the purposes of studying racial difference and were taken from wherever the dead could be found. Collections include skeletal material in the great majority, most commonly crania, but soft tissue remains were also acquired. With the demise of race-based science in the postwar period, remains were increasingly placed in collecting institutions via archaeological excavation, with scientific interest increasingly focused on areas such as paleodemography and paleopathology. In Australia and North America, it was common for Indigenous human remains found by chance, say in the course of construction, to be placed in collecting institutions (often via the police or coroner) rather than to be reburied as European remains would have been if discovered in similar circumstances. It was an example of this type of differential treatment that led to the beginning of the reburial movement in the USA (Zimmerman 1989: 60-61).

Until at least the 1970s, the evidence that the acquisition of human remains by whatever means had been undertaken with the permission of kin or source communities (or even with their knowledge) is limited, if not completely absent. Indeed in the nineteenth century, there is enough evidence within the historical literature to show that collectors were aware that their activities were not supported by Aboriginal or Torres Strait Islander people, with clear instances of concern and opposition documented, as well as some examples of requests for return (Turnbull 1994). From the 1970s onwards, legislation has been adopted at State, Territory, and Federal level that is designed to protect Indigenous sites and significant cultural property from the type of acquisition and export practices that were so

common previously. Such legislation provides legal requirements for action, for example (which includes consultation with source communities), should human remains be discovered or objects be at threat of international export. Key pieces of Australian legislation are summarized in Table 1.

The development of policy and practice relating to the return of Aboriginal and Torres Strait Islander human remains and significant cultural material occurs to a degree in tandem, and their history is interlinked. However, there are significant differences, and for this reason, a brief, separate, history of each is provided here.

Australia: Indigenous Cultural Property Return, Table 1 Summary of Australian State, Territory, and Federal legislation providing protection for Aboriginal and Torres Strait Islander heritage, including sites, human remains, and objects (From www.environment.gov.au/heritage/laws/indigenous/index.html. Accessed 7 June 2012)

Jurisdiction	Principal Indigenous heritage legislation
Australian Capital Territory	*Heritage Act 2004*
	Heritage Objects Act 1991
New South Wales	*Heritage Act 1977*
	National Parks and Wildlife Amendment (Aboriginal Ownership) Act 1996
Northern Territory	*Aboriginal Sacred Sites Act 1989*
	Heritage Conservation Act 1991
Queensland	*Aboriginal Cultural Heritage Act 2003*
	Torres Strait Islander Cultural Heritage Act 2003
South Australia	*Aboriginal Heritage Act 1988*
Tasmania	*Aboriginal Relics Act 1975*
Victoria	*Aboriginal Heritage Act 2006*
	Heritage Act 1994
Western Australia	*Aboriginal Heritage Act 1972*
Federal	*The Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
Federal	*Protection of Movable Cultural Heritage Act 1986*
Federal	*The Environment Protection and Biodiversity Conservation Act 1999*

Human Remains

With the exception of some early examples of requests for the return of remains that have been documented in the nineteenth and early twentieth centuries, in Australia, the start of the campaign for the return of human remains in collecting institutions and those newly discovered through construction can be traced to the late 1960s. Aboriginal law and that of Torres Strait Islander people holds that the deceased must be interred with appropriate ceremony on their traditional country and people have a responsibility to ensure that this occurs, with the potential for serious consequences if it does not. Circumstances of the removal and scientific use of remains have also been voiced as a matter of deep concern, particularly in relation to the role that racial science has played in the colonial process (Hubert 1989). Respect for the wishes of the dead was a primary consideration voiced by those at the forefront of the campaign for the return of Aboriginal remains, such as the Foundation for Aboriginal and Islander Research Action (FAIRA) and the Tasmanian Aboriginal Centre (TAC) (e.g., Weatherall 1989; Mansell 1990; TAC 2001). Those who argued in support of the retention of remains did so on the basis of scientific importance and the loss of knowledge that would result if they were reburied (e.g., Mulvaney 1991). However, the history of the reburial movement traces an increasing shift in museum and disciplinary ethics, policy, and practice away from this stance to one that continued to recognize the scientific importance of remains but recognized also the preeminent right of Indigenous Australians to determine the future of their ancestral remains whether housed in museum collections or newly discovered (Webb 1987; Fforde & Hubert 2006; Pickering 2011).

By the early 1970s, some Australian museums were beginning to change their policies regarding the accession and curation of human remains, including resolution to no longer accept newly discovered Aboriginal remains without express permission from the source community, and to remove remains from display. This decade also

witnessed the first examples of the return of remains to communities, such as that in 1976 by the Australian Institute for Aboriginal Studies (AIAS – now the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS)) of skeletal remains discovered in a Melbourne garage, to the appropriate community on Groote Eylandt. However, the most significant event to occur during this period was the return of Truganini's remains to the Tasmanian Aboriginal community in 1974 following decades of campaigning by this community and their supporters. Truganini is a famous Tasmanian Aboriginal woman in history whose stated wish for her bones not to become part of a museum collection was recorded by the Reverend H.D. Atkinson in 1869. Despite this, her remains were dug up shortly after her funeral and were later placed on display in the Tasmanian Museum (now the Tasmanian Museum and Art Gallery). A history of the eventually successful attempts to have Truganini's remains returned to the Tasmanian Aboriginal community and her wishes respected can be found in Ryan (1981).

In the 1980s, Aboriginal campaigns for the return of remains from institutions in Australia achieved notable successes, including government support and the amendment of legislation that might restrict museums from deaccessioning such items. During this decade, groups received remains from, for example, the Tasmanian Museum and Art Gallery and the Queen Victoria Museum in 1984, from the National Museum of Australia in 1986, from the University of Queensland in 1988, and from the Museum of Victoria in 1989. Nearly all of these returns had only been achieved after lengthy campaigning by relevant Aboriginal groups and had met significant opposition from the scientific and museum community. However, by the late 1980s, most Australian museums had adopted policies which responded positively to Aboriginal requests for the return of the remains of named or known individuals, those who had died post-contact, those whose line of descent to a modern community could be demonstrated, or those which had been obtained in "unethical" circumstances (Fforde 2004: 112). By the end of the 1990s, these categories were no longer viable, and with the successful campaign for the return of fossil remains excavated at Kow Swamp in 1991 and the unconditional return of the ancient cremated remains of "Mungo Woman" to the people of the Willandra Lakes region in 1992, broader policies encompassing all human remains regardless of age, provenance, or circumstances of acquisition became the norm.

Museums Australia is the national organization for museums in this country, and its document *Continuous Culture, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* (2005) well articulates the new approach to Indigenous collections. And while Australia has no legislation regarding the return of human remains to compare with that of the *Native American Graves and Repatriation Act* (1990) in the USA, through State legislation and museum policy (both individual and via representative bodies), it is now the case that Aboriginal and Torres Strait Islander people may successfully claim the human remains of their ancestors housed in Australian museums and collecting institutions.

Significant Cultural Material

In the repatriation context in Australia, significant cultural material is generally considered to be those items classified as secret/sacred objects, a large number of which were acquired by museums and private collectors. As defined by Museums Australia (2005: 19), "Secret/sacred materials are items of special religious and spiritual significance to Aboriginal and Torres Strait Islander peoples. They have an associated tradition of restricted access and have never been accessible to all members of a community. Such items are usually associated with men's and women's private ceremonies which are not open to outsiders or to certain people within their society of origin." Cultural context is important in the definition of objects as secret/sacred and their degree of restriction; thus Museums Australia recognizes and acknowledges that it is "the

community of origin who ascribe the special status of cultural material and knowledge" (2005: 19).

Responding to Aboriginal concerns, in the early 1970s, some Australian museums began to remove secret/sacred objects from display and to place them in storage areas inaccessible to the public. This decade also witnessed the first return of such items to keeping places established in some remote communities. The South Australian Museum (SAM) in Adelaide, which had acquired significant numbers of secret/sacred objects particularly from Central Australia, played a prominent early role in developing dialogue with communities about the future of these items in its collections. When reflecting on this history, the Senior Curator and Director later noted, "Since their removal from the public gaze, sacred objects have become a difficult issue for museum curators. If such objects cannot be displayed, then it was clear that as objects of research and publication they were not an easy category with which to deal" (Clarke & Anderson 1997: 172). Indeed, removal from display and placement in museum storage did little, if anything, to increase the chances of access to these objects by their traditional owners or even to increase the chances of their knowing what was held in collections.

Serious discussions at the SAM were prompted in the early 1980s by a fortuitous visit from a group of senior Aboriginal men who were in Adelaide to try to stop the sale of secret/sacred objects collected by Professor T.G.H. Strehlow which were then in private hands (Clarke & Anderson 1997: 173). They were shocked to discover large collections at the SAM of which they had no prior knowledge, and the Museum in response undertook to "get its house in order" (Clarke & Anderson 1997: 173). Increasing realization of the extent of museum holdings then led to requests being sent to all museums in Australia requesting the return of secret/sacred objects. From the mid-1980s onwards, the SAM conducted extensive consultation with senior Aboriginal custodians in Central Australia to discuss the future of the secret/sacred objects in its collections, which resulted in the return of some objects and the decision by many communities to leave some or all of their objects in the museum for safekeeping, as well as visits by appropriate community members to the museum's newly built restricted access store.

In the same decade, other museums across Australia began to research their collections of secret/sacred objects and to open dialogue with traditional custodians about their future. While the SAM Board would only consider the return of secret/sacred objects, and particularly those which were still required for ceremonial function, other museums broadened their definition of what type of object was considered "returnable." Other avenues were also pursued, including the long-term loan of secular objects, commonly to community-led cultural centers. Repatriation policies such as those followed by the SAM, combined with the prevalence in collections of secret/sacred objects originating from remote areas, meant that unlike human remains, the return of secret/sacred objects has generally been more geographically confined to Central and Northern Australia.

Research undertaken by museums, Aboriginal groups, and their representatives to locate restricted material in institutional and private collections increased the amount of information available. The work of Museums Australia and its precursor, the Australian Council of Museums, to develop ethical guidelines for the management (including return) of significant cultural material demonstrates the change in the museum profession that has occurred in response to long-running Aboriginal concerns and campaigns. Thus, *Continuing Cultures, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* adopted by Museums Australia in 2005 clearly sets out instructions for the acquisition, return/repatriation, custodianship and access, and display of secret/sacred material, which at all times recognizes the high significance of these items and the right of appropriate Aboriginal and Torres Strait Islander people in source communities to determine their future and management.

Key Issues and Future Directions

In the case of both human remains and secret/sacred objects, it is common for these items to have been separated from any associated provenance information (if this existed). This factor, combined with their frequent placement, a consequent (often unorganized), in storage, and loss of institutional memory, has meant that considerable research is often required to determine as far as possible how and where they were acquired. This type of information is crucial for repatriation, not only to identify the appropriate source community with whom to consult but also because communities do not wish to receive objects or the deceased who are not from their traditional country. The question of what to do with unprovenanced human remains and secret/sacred objects is a significant issue.

Some communities have established keeping places to hold secret/sacred objects – whether returned to them from museums or placed there by their custodians as other locations have become unsafe or inappropriate. As noted by Wallace and Akerman (2008), where and how best to store secret/sacred objects raises a number of questions for communities which require a variety of different solutions. A range of different types of keeping places have been established since the 1960s, and communities face practical and financial challenges in maintaining structures against often harsh climatic conditions, and sometimes vandalism and theft. Human remains are rarely planned to be held permanently in keeping places, although this may occur for a period prior to re-interment.

Funding has been a significant issue in the return of Indigenous cultural property in Australia, which can often be a lengthy and costly process for both museums and communities. Funded by Commonwealth, State, and Territory governments, the *Return of Cultural Property* (RCP) program (1993–1997) followed by the *Return of Indigenous Cultural Property* (RICP) program (1999–present) has provided funds to both museums and communities towards four specific objectives: "identify the origins of all ancestral remains and secret/sacred objects held in the museums where possible; notify all communities who have ancestral remains and secret/sacred objects held in the museums; appropriately store ancestral remains and secret/sacred objects held in the museums at the request of the relevant community; arrange for repatriation where and when it is requested" (Truscott 2006: 2). The National Principles developed by the RICP program strongly align with those of Museums Australia (2005). Nonetheless, the substantial and long-term costs for community organizations, which are associated, for example, with employment of repatriation officers, information management, community consultation, museum visits, acquiring and maintaining keeping places, and conducting funerals, are considerable and remain perhaps the most significant practical issue for communities in the repatriation process. The sheer scale of the number of human remains and secret/sacred objects acquired by collectors in Australia and overseas in the nineteenth and early twentieth centuries means that this issue will be faced by Aboriginal and Torres Strait Islander communities for many years to come.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Human Remains in Museums
- ▶ Indigenous Peoples, Working with and for
- ▶ Kennewick Man Case: Scientific Studies and Legal Issues
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)

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Australia: Maritime Archaeology

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Introduction

Indigenous sites underwater, historic shipwrecks, abandoned vessels, survivor camps, jetties, and aircraft underwater, together with the archaeological evidence associated with maritime industries such as whaling or shipbuilding, comprise the maritime archaeological heritage of Australia and its surrounding waters (Gibbs 2006; Nutley 2006). Indigenous people have been present in Australia for at least 50,000 years, and they arrived by voyaging in some form of watercraft making them among the earliest "maritime" people that we know of. While it is considered unlikely that we will ever find physical or archaeological evidence of early Indigenous watercraft, interesting experimental maritime archaeology can still be attempted. Furthermore, as a result of rising sea levels since the Last Glacial Maximum (LGM), some of the earliest terrestrial archaeological sites associated with Australia's Indigenous peoples have been inundated and now lie beneath the sea (Nutley 2006: 84-88). As a result part of the maritime archaeological record in Australian waters potentially goes back at least 50,000 years.

We know that the Dutch, both deliberately and accidentally, came into contact with Australia after 1600 CE. Soon afterwards Dutch, British, and other vessels began to be wrecked around Australia with the first, that we know of, being the English East India Company ship *Trial* lost in 1622 (Green 1977). Over the next 400 years, thousands of vessels were lost in the waters around Australia, and since the early 1970s, maritime archaeologists have conducted a number of significant excavations of historic shipwrecks in Australia (Nash 2006: 55-68). In addition, while there has been a focus in Australian maritime archaeology on "historic shipwrecks," there has also been important research on abandoned vessels, jetties, aircraft underwater, and other kinds of maritime archaeological sites (Gibbs 2006; Nutley 2006).

Definition

Maritime archaeology in Australia has included the archaeological investigation of the remains of ships (shipwrecks), boats (boat finds), other watercraft or vessels, and aircraft underwater as well as cultural material that was accidentally dropped, lost overboard, or deliberately deposited into the water body. Maritime archaeological evidence can include the remains of structures that were originally built wholly or partly underwater (such as fish traps, bridges, piers, jetties, and wharves). In addition archaeology may examine the remains of human activity that originally took place on dry or marshy land that have subsequently been inundated (or submerged), either by rising water levels or by marine (or fluvial) erosion. Maritime archaeology is a subdiscipline of archaeology associated with the sea, seafaring, and human interactions with the sea. Maritime archaeology can also include sites and artifacts that are not underwater but that are related to maritime activities such as lighthouses, harbor constructions, or shore-based maritime industries such as shipbuilding, whaling, or sealing.

Historical Background

It was the finding of two seventeenth-century Dutch East India Company (VOC) ships during the early 1960s (*Batavia* lost in 1629 and *Vergulde Draeck* sunk in 1656) that first prompted the Western Australian Government to enact legislation designed to protect shipwrecks through the *Museum Act Amendment Act* of 1964 (Jeffery 2006: 124). While this provided a legislative basis for the protection of historic shipwrecks, such as the VOC shipwrecks, there were still no trained, experienced, or qualified maritime archaeologists working in Australia in the late 1960s. This changed in 1971 when the Western Australian Museum employed Jeremy Green who had worked on shipwrecks in the UK with Colin Martin and in the Mediterranean with people like George F. Bass and Michael Katsev (McCarthy 2006: 2). Green brought others to Western Australia from overseas including Myra Stanbury and Patrick Baker who would go on to become long-serving staff members of the Maritime Archaeology Department. Also in the 1970s, other key staff including Graeme Henderson and Michael McCarthy joined the Department, and at the same time, the Materials Conservation Department was gearing up to conserve the artifacts generated by large-scale underwater archaeological excavations.

Starting in the 1970s, the WA Museum conducted a number of terrestrial and underwater excavations of VOC shipwrecks such as *Batavia* (1629), *Vergulde Draeck* (1656), and *Zeewijk* (1727) as part of what was known as the Dutch Shipwrecks Program (Green 1989). Excavations of later period sites like the ex-slaver *James Matthews* (1841), the merchant vessel *Eglinton* (1852), and SS *Xantho* were conducted under the Colonial Shipwrecks Program (McCarthy 2000; Stanbury 2003; Henderson 2009). The excavated assemblages are held by the Maritime Archaeology Department and some material is now on display in the Western Australian Maritime Museum Shipwreck Galleries in Fremantle (Hosty 2006: 155-57; Fig. 1).

In 1976 the Australian Federal Government (the Commonwealth of Australia) enacted

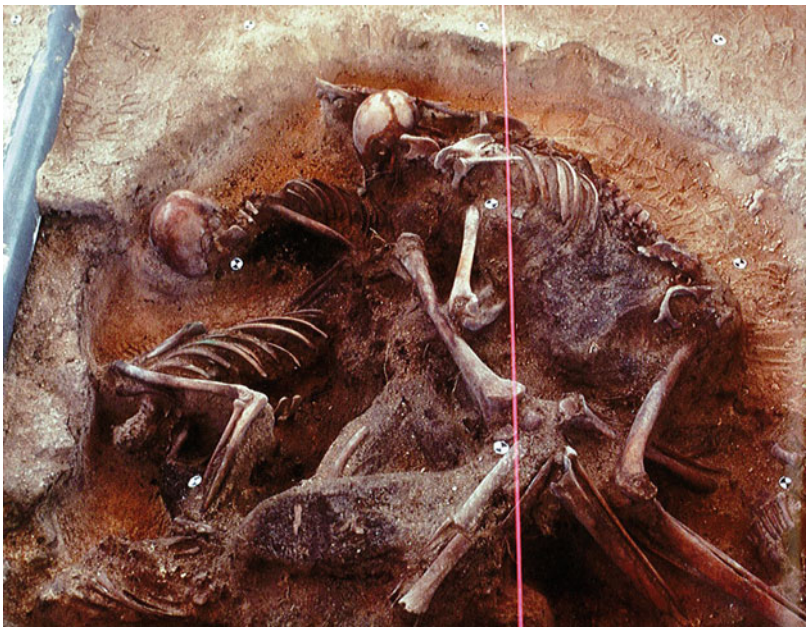

Australia: Maritime Archaeology, Fig. 1 Excavation of a mass grave from *Batavia* shipwreck on Beacon Island (Western Australian Museum)

the *Historic Shipwrecks Act* (*HSA*) 1976 which fundamentally changed the basis for legislative protection and management of historic shipwrecks in Australia. By 1988 all states and territories had enacted state legislation for the protection of historic shipwrecks and/or requested that the Federal government apply the *HSA* to waters off their coastlines. As a result of amendments to the legislation in the early 1990s, the *Historic Shipwrecks Act* 1976 now provides legislative protection to all shipwrecks (but not other kinds of underwater cultural heritage such as aircraft) which sank more than 75 years ago (a rolling date) and that are located in the territorial seas, contiguous zone, and Exclusive Economic Zone (EEZ) from the High Water Mark out to 200 nautical miles offshore (Jeffery 2006: 123-36).

Key Issues

Education is identified as the first key issue as maritime archaeology is a multifaceted discipline that requires both theoretical learning and practical skills training. Fortunately Australia has been one of the few countries in the world that has a long and sustained tradition over more than 30 years of running tertiary education courses in maritime archaeology. The need for tertiary level teaching in maritime archaeology in Australia was first acknowledged in the mid-1970s when the Western Australian Museum canvassed several options for university teaching in maritime archaeology including a 3-year Bachelor's degree course and a Graduate Diploma. In 1980, a 12-month Graduate Diploma in Maritime Archaeology (GDMA) was introduced by the WA Institute of Technology (later renamed Curtin University) and was taught in association with the Department of Maritime Archaeology at the WA Maritime Museum. The GDMA was offered on five occasions between 1980 and 1995 (in 1980/81, 1981/82, 1986, 1990, & 1995/96). At different times since 1990, universities in Western Australia (Curtin University and the University of Western Australia), Queensland (James Cook University), and South Australia (Flinders University) have all offered undergraduate and/or postgraduate courses as well as research higher degree (Ph.D.) supervision (Staniforth 2009). Currently Flinders University has the largest and

Australia: Maritime Archaeology, Fig. 2 Flinders University Intensive Program in Underwater Cultural Heritage, 2009 (Maritime Archaeology Program, Flinders University)

most active teaching and research programs at an Australian university (Fig. 2).

The second key issue revolves around the activities of the Australasian (formerly Australian) Institute for Maritime Archaeology (AIMA) and volunteer involvement in Australian maritime archaeology. One of the great strengths of Australian maritime archaeology over the years has been the activities of AIMA, which was formed in Adelaide in 1981. Membership of AIMA includes not only trained, professional maritime archaeologists (which would be a very small and exclusive club indeed) but many other interested people including volunteers. One important contribution made by AIMA has been the regular publication of *The Bulletin of the Australian Institute for Maritime Archaeology* initially twice a year but in recent years only once a year as well as a quarterly newsletter that is available on the AIMA website. Another has been the regular annual conferences that have been run by AIMA for nearly 30 years, usually in September which not only bring together most Australian maritime archaeologists and underwater cultural heritage managers each year to talk about their work, exchange ideas, and hold various meetings but have also provided the opportunity for many others to come to Australia from all over the world. For a decade now the annual AIMA conference has usually been held jointly with the annual conference of one or more of the other related organizations in Australia (and New Zealand) including the Australasian Society for Historical Archaeology (ASHA), the Australian Association for Maritime History (AAMH), and the Australian Archaeological Association (AAA). In the late 1990s AIMA purchased a license to run the internationally recognized Nautical Archaeology Society (NAS) training program, which was then tailored to suit the Australian situation as the AIMA/NAS training program which has proved of enormous benefit by providing a flow of new membership, fulfilling important public education and awareness needs, as well as being used by universities for training students. AIMA also provides a national umbrella body for the avocational (amateur) organizations that exist in some, but not all, Australian states including the Maritime Archaeology Association of Western Australia (MAAWA), the Society for Underwater Historical Research (SUHR), and the Maritime Archaeology Association of Victoria (MAAV).

Research is the final key issue but has always had a relatively strong track record in Australian maritime archaeology, which has contributed to the development of the methods used in maritime archaeology worldwide (Green 1990) as well as to our understandings of specific aspects of shipbuilding and large-scale historical processes

Australia: Maritime Archaeology, Fig. 3 View from seaward with dive boat and surf breaking over *Sirius* wreck site (Western Australian Museum)

including colonialism, consumerism, and capitalism (Staniforth 2003). This chapter will examine three case studies of historic shipwreck excavations of vessels that date from the last decade of the eighteenth century: HMS *Sirius*, HMS *Pandora*, and *Sydney Cove* in order to consider some of the key issues in maritime archaeology in Australia that have arisen over the last three decades.

HMS Sirius (1790)

HMS *Sirius* was the flagship, and largest, Royal Navy vessel to accompany the First Fleet to Australia in 1788. In 1790 under the command of Captain John Hunter, and together with HMS *Supply*, the vessel made a voyage to Norfolk Island to transport convicts and Royal Marines to that island in order to establish a colony there. For HMS *Sirius*, the voyage ended in disaster on 13 March 1790 when the ship was driven backwards onto the reef near the new settlement of Kingston (Nash 2006: 56-58; Stanbury 2007: 25-26). The wreck of HMS *Sirius* was a highly significant event in Australian history generally and specifically in the history of Norfolk Island. The connections to the events of the First Fleet and British convict settlement of Australia make the site of great significance to Australians.

Three seasons of fieldwork were conducted in 1985, 1987, and 1988, with funding from the Australian Bicentennial Authority (ABA), sponsorship from private companies, and support from a number of museums and government agencies. These archaeological expeditions were led by maritime archaeologist Graeme Henderson from the WA Museum and included a team of about 12 experienced professional maritime archaeologists and avocational volunteers (Henderson & Stanbury 1988, Stanbury 2007). A fourth expedition funded by the Australian Federal Government's Historic Shipwrecks Program took place in 2002 (Fig. 3).

The site is located in very shallow water of two to three meters depth that is regularly subjected to very heavy wave action. Experience gained on shallow water "surf-zone" sites in Western Australia, such as *Batavia*, had demonstrated that valuable information could still be obtained from such sites. The survey and recording work was carried out using SCUBA equipment and conducted from an inflatable dive boat anchored on the seaward side of the surf zone. Apart from a substantial ballast pile consisting of cast-iron ballast pigs (or ingots) known as "kentledge," most of the artifacts were located in gullies and holes in the limestone reef flat. The four

expeditions, and a program of artifact conservation and cataloguing carried out over the last 20 years and largely funded with grants from the Federal Government's Historic Shipwrecks Program, have provided accurate survey data as well as raising and conserving hundreds of small artifacts. The archaeological assemblage contained a wide variety of material from a copper coin to large anchors, but most consists of material primarily associated with the structure of the ship, its fastenings and fittings, and a smaller amount of equipment and personal belongings relating to the crew and passengers.

A number of specialist reports have been written and articles published in respected international journals such as the *International Journal of Nautical Archaeology* (IJNA) as well as a popular paperback book called *Sirius – Past and Present* (Henderson & Stanbury 1988; Stanbury 2007). Artifacts from *Sirius* are now on display both in the lower floor of the Norfolk Island Museum (Pier Store) on Norfolk Island and some loan material has been on display at the Australian National Maritime Museum (ANMM) in Sydney. In addition some material from HMS *Sirius* was incorporated into a major exhibition that toured Australia during 1988 and 1989 titled *Shipwreck – Discoveries from our Earliest Shipwrecks 1622–1797*. (Hosty 2006: 160-61).

HMS Pandora (1791)

As a consequence of the famous and well-documented mutiny on HMS *Bounty* on 26 April 1789, the Royal Navy dispatched the 24-gun frigate HMS *Pandora* under the command of Captain Edward Edwards to the South Pacific in 1790. After capturing some of the mutineers, HMS *Pandora* ran onto a reef-top during the night of 29 August 1791 and the next day sank into deeper water (Gesner 1991, 2007; Nash 2006: 58-62).

In November 1977 the site of HMS *Pandora* was relocated by two rival groups of divers with the assistance of an airborne magnetometer carried aboard an RAAF (Royal Australian Air Force) maritime reconnaissance aircraft. The wreck was reported to the Australian Federal Government and initially inspected in April 1979 by a team led by maritime archaeologist Graeme Henderson, and including Patrick Baker, from the WA Museum. The site is in an extremely remote location, some 50 nautical miles offshore, which would normally fall outside the claimed offshore jurisdiction of many countries, certainly during the 1970s. Nevertheless, Australia had recently passed the *Historic Shipwrecks Act* 1976 which claimed a 200 nautical mile jurisdiction and so HMS *Pandora* was declared as a historic shipwreck in November 1979. The Queensland Museum was made responsible for managing historic shipwrecks in Queensland including HMS *Pandora* and in 1981 the Museum appointed Ron Coleman as curator of maritime archaeology. Also in 1981 HMS *Pandora* was given protected zone status that requires a permit to enter a zone extending for a radius of 500 m from the wreck. The site is still a protected zone, which probably makes it one of the longest periods (now 27 years) of direct, and effective, government control over access to a historic shipwreck anywhere in the world.

Between 1983 and 1989 the Queensland Museum undertook several expeditions to survey and partially excavate the site. Initial funding came from the Australian Federal Government, and with support from maritime archaeologists in a variety of interstate organizations, as well as volunteers, some test excavations were completed and a permanent grid structure was established on site. It was found that a substantial section of the ship's lower timbers had survived on the starboard side including relatively intact areas of the lower hull as well as the collapsed remains of upper works and cabins with their contents (Gesner 1991, 2007).

The remains of HMS *Pandora* lie in approximately 30–34 m of water which, together with the remote location more than 600 km from the nearest major port (Cairns), makes any archaeological investigation both person-intensive and expensive. By about 1990 the problems of the short dive times allowable with SCUBA diving and having to hire "live-aboard" vessels for large teams had led to the conclusion that without large-scale funding, the excavations should

Australia: Maritime Archaeology, Fig. 4 Diver next to one of *Pandora*'s main anchors (Western Australian Museum)

probably cease. Expeditions in 1993 and 1995 concentrated on sediment and core sampling with only limited excavation but, importantly in light of subsequent developments, trialled the use of Surface-Supplied Breathing Apparatus (SSBA) that increased dive times and improved communications (Gesner 2007; Fig. 4).

The situation changed in the mid-1990s when the Queensland state government offered the Queensland Museum $1,000,000 for the project, subject to matching funds being raised from the private sector. The nonprofit *Pandora* Foundation was established in Townsville in 1996 and raised a further $2,500,000 from local businesses and donations, which placed the *Pandora* project back on track to continue excavations. The Queensland government subsequently also announced that it would provide more than $17,500,000 for a major museum development (the Museum of Tropical Queensland) in Townsville which would house and exhibit the *Pandora* material in one of the new museum's major galleries (Hosty 2006: 158).

A series of five expeditions between 1995 and 1999 raised several thousand artifacts including ship's equipment, human skeletal remains, crew items, and "collected" artifacts from the Pacific islands (Gesner 2000, 2007). Over the years a number of research reports, catalogues, and commentaries based on the material culture assemblages from HMS *Pandora* have been completed (Gesner 1991, 2007). The "collected" artifacts or "artificial curiosities" are of considerable interest for what they tell us about the cultural interactions between the "West" and the "Other." British exploration vessels and their crews would collect the material culture of the Indigenous inhabitants of Australasia and the Pacific. The collected artifacts from HMS *Pandora* are of particular importance as they represent collecting by all social strata among the *Pandora* officers and crew, rather than just the "official" or elite collections that made their way into collections of the British Museum, Museum of Natural History, and the like. After the 1999 expedition the project focussed on the opening of the new Museum of Tropical Queensland in April 2000 and, despite plans to continue excavation work, no further expeditions have taken place to date (Nash 2006: 62). There is considerable maritime archaeological potential remaining on the HMS *Pandora* site, particularly in the bow area, which has not been excavated to date. In addition, the existing archaeological assemblages provide excellent comparative collections for other investigations of late eighteenth-century Royal Navy vessels in other parts of the world.

Sydney Cove (1797)

Sydney Cove was wrecked on 9 February 1797 during a voyage from Calcutta in India to the

newly established, penal colony at Port Jackson (Sydney). The merchant vessel had been consigned by Campbell and Clark, a small trading enterprise involved in trading European, Indian, and Chinese goods, primarily around the coasts of the Indian subcontinent, and for whom trading to Australia would be a new venture (Staniforth 2003: 65-99; Nash 2009). It was carrying a speculative, mixed cargo including bags of rice, sugar, tobacco, salted meats, tar, vinegar, soap, candles, leatherware, Indian textiles, livestock, Chinese porcelain, as well as 7,000 gal (31,500 l) of rum (Nash 2009: 32-53).

The site of *Sydney Cove* was relocated by sports divers in January 1977 in only 4–6 m of water, approximately 400 m off Preservation Island in Bass Strait. Despite the recent enactment of the Commonwealth *Historic Shipwrecks Act* (1976), the Tasmanian government proclaimed the underwater site itself, and the associated land sites where a part of the salvaged cargo had been stored and the survivors' camp was located, as a Historic Site on 29 March 1977 under the Tasmanian *National Parks and Wildlife Act* 1970. Survey work and test excavations were undertaken in the late 1970s and further work was carried out in the 1980s to install permanent survey controls around the wreckage. Some artifacts including the partially intact rudder and two cannon were raised during this early work (Nash 2009: 94-99).

An extensive program of archaeological excavation on the underwater site was carried out between 1991 and 1994 under the direction of Mike Nash of the Tasmanian Parks and Wildlife Service, with funding from the Federal Government Historic Shipwrecks Program and conservation assistance from the Queen Victoria Museum in Launceston. Support also came in the form of personnel and equipment from federal and interstate government agencies backed up by numerous volunteers. Diving operations were conducted using surface-supplied air from an 11-m charter vessel *Strait Lady* and SCUBA tanks were only used for some photographic and video recording. A total of 216 m^2 of the site was excavated using water dredges and underwater recording was carried out with a rigid grid frame system. Among the artifact assemblages were more than 200 kg of mostly broken polychrome overglaze and blue underglaze Chinese Export Porcelain, which was commonly imported into the Australian colonies before 1830 which, in addition to its functional utility, tells us about some of the meanings attached to ceramics in the early colony (Staniforth & Nash 1998; Staniforth 2003: 86-99). The excavation also revealed interesting features about the construction of *Sydney Cove* such as the use of traditional Indian methods of protecting the hull including the use of waterproof resins and a thin layer of sacrificial planking, over which the latest imported technology of copper sheathing, over a backing of woollen felt, was laid. The final expedition in March 1994 recovered the entire site using more than 500 polypropylene sandbags, and periodic monitoring has demonstrated this to be a cheap but effective means of stabilizing the site after excavation (Nash 2009: 111, 131-4; Fig. 5).

To commemorate the bicentenary of the loss of *Sydney Cove*, an exhibition was developed which opened at the Queen Victoria Museum in Launceston in February 1997. This exhibition travelled around Australia for 2 years funded by the Federal Government's *Visions* exhibition touring program before returning to Launceston where the archaeological assemblage is now held. In 2002 and 2004 two further terrestrial expeditions were conducted to locate and excavate part of the survivor camp, which included at least one dwelling, at the south end of Preservation Island (Nash 2009: 190-209).

International Perspectives

Australian maritime archaeology is widely respected internationally and Australian maritime archaeologists often individually, but sometimes with institutional support and backing, have taken leading roles in a variety of regional Asia-Pacific and international activities. For more than three decades, Jeremy Green of the WA Maritime Museum, for example, has taken a leading role in research and teaching maritime archaeology in Thailand, China, and Sri Lanka

Australia: Maritime Archaeology, Fig. 5 Divers recording an excavated section of *Sydney Cove's* hull (Parks and Wildlife Service, Tasmania)

through programs like SPAFA as well as conducting research on Dutch East India Company (VOC) ships in Malaysia and Asian-built vessels throughout the Asia-Pacific region. Furthermore, AIMA, and individual maritime archaeologists such as Jeremy Green, support for maritime archaeology projects and programs in the Asia-Pacific region has been an important contribution to the development of the subdiscipline in the region.

Graeme Henderson, also from Western Australia, was the first head of ICUCH – International Committee on the Underwater Cultural Heritage – and he took a leading role in the drafting of both the ICOMOS Charter on the Protection of Underwater Cultural Heritage 1996 and the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001. David Nutley has been the Secretary and is now Vice-President of ICUCH and Mark Staniforth is currently a member of ICUCH. Staniforth also served for two terms on the ACUA – Advisory Council on Underwater Archaeology (2000–2008) including 3 years as deputy Chair (2001–2003) and 3 years as Chair (2004–2007) as well as 3 years on the board of the Society for Historical Archaeology (SHA) in his capacity as ACUA Chair. Wendy Van Duivenvoorde currently serves on the ACUA Board.

Future Directions

Clearly one part of the future directions for maritime archaeology in Australia lies with the tertiary education system, which has expanded in recent years partly as a result of the establishment of the Maritime Archaeology Program (MAP) at Flinders University (Staniforth 2009). Flinders University is currently the only university in Australia to develop and sustainably undertake a fully integrated program of teaching in maritime archaeology from undergraduate to research higher degree level in the form of the Maritime Archaeology Program in the Department of Archaeology. In addition to the ongoing teaching of maritime archaeology at Flinders University, it is considered likely that other Australian universities are likely to take up the teaching of maritime and underwater archaeology at various levels during the next decade. Collaborative research projects involving universities can also be expected to undergo expansion with some signs that this is starting to happen with the Australian Historic Shipwreck Protection Project (AHSPP) receiving a large ARC Linkage grant in 2011 as well as the appointment of the first postdoctoral fellow in maritime archaeology in Australia (Jun Kimura) at Murdoch University in 2012.

Australian maritime archaeology has a long history of "holistic" approaches to the integration of related underwater and terrestrial archaeological sites going back to the 1970s *Zeewijk* excavations, but recent decades have also seen the broadening of maritime archaeology activity to include the study of Indigenous sites underwater, abandoned vessels, jetties, aircraft underwater, survivor camps, and shipyards (Gibbs 2006; Nutley 2006). This kind of holistic approach is another likely future direction for Australian maritime archaeology and, together with the (eventual) ratification of the UNESCO *Convention for the Protection of the Underwater Cultural Heritage* (2001) by the Australian government, is likely to provide the basis for increased activity in these areas of maritime archaeology.

On the other hand state and Federal Government funding cuts, the lack of updated legislation and the loss of positions within government heritage agencies and museums have been ongoing problems for more than a decade (Staniforth 2000) and show signs of continuing well into the future. Unfortunately the comment made in 2000 that "the legislation is seriously dated and in need of a complete rewrite" remains as true today as it was more than a decade ago (Staniforth 2000: 91). The same paper also suggested that "not-for-profit" and community-based organizations provided opportunities for the expansion of activity in maritime archaeology (Staniforth 2000: 91-2). While the opportunities in the "not-for-profit" sector have seen limited progress over the last decade, there remains one area where future expansion is still possible.

Cross-References

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- ▶ Australia's Archaeological Heritage
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Green, Jeremy N.
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Shipyard Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Southern Ocean and Antarctic Maritime Archaeology
- ▶ Underwater Archaeology

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Australia: Repatriation Acts

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Introduction

There are estimated to be thousands of Indigenous Australian human remains in the collections of Australian and international institutions and, in addition, hundreds of thousands of culturally meaningful artifacts (see Fforde 2004; Cubillo 2010). As such, repatriation is a significant issue in Australia for Indigenous communities and also for archaeologists and those working in museums and cultural heritage. Repatriation is also significant as part of a wider assertion of the rights of Indigenous Australians to control their own cultural material, archaeological sites, sacred landscapes, and heritage. Thus, the collections of Indigenous human remains and sacred objects on a deeper level both represent and continue the colonial process. Watson (2003) noted the importance of acts of repatriation when combined with an understanding of other legacies of British colonization, such as the entrenched social and economic disadvantages still suffered by Indigenous people, and how and why these remains have come to be in such collections. In recent years a philosophy of repatriation has been established in Australia and principles have been endorsed by federal, state, and territory ministers and governments, as well as museums. There is no overarching legislation equivalent to the NAGPRA in the United States, but since 2000, individual acts of repatriation have been undertaken as a matter of policy by successive federal governments. In practice this is done through the administration of the Indigenous Repatriation Unit, which negotiates with both overseas and domestic institutions, but efforts to put forward claims are primarily driven by Indigenous communities. The code of ethics of the

Australian Archaeological Association (AAA), one of the largest archaeological organizations in Australia, requires that members acknowledge the importance to Indigenous peoples of ancestral remains, objects, and sites.

Definition

In Australia, repatriation has been referred to as the "repatriation debate" and the "reburial issue" (Fforde 2004; Wilson 2006). It concerns the return of human remains, grave goods, sacred objects, or objects of cultural significance to the individuals, groups, or nations that represent the original owners. Reburial refers more specifically to the reinterment of human remains that were archaeologically excavated. Repatriation is part of a general reassertion of Indigenous control over cultural heritage and of human rights. Following Wilson (2006), repatriation can be defined as more than the return of "something" or "someone" and extends to include the return of authority, power, and control to Indigenous peoples. It thus allows for any important object to be returned and which signifies an important shift in power relations.

Historical Background

Museums in the eighteenth and nineteenth centuries were an expression of the western conviction in concepts of progress, classification, and empire. They displayed the trophies and curiosities of colonial expansion – the specimens, artifacts and human remains, and classification that contributed to the study of race. Theoretical platforms such as monogenism, polygenism, phrenology, eugenics, and social Darwinism reduced Indigenous people to museum curiosities and likened them to fossils for comparative anatomical analysis. When Australia was colonized by the British in 1788, Indigenous peoples collided with perceptions built on such racial theories. Consequently, Indigenous Australian human remains were procured to expand the discourse on Caucasian superiority. From colonization to the 1950s, Indigenous remains were removed, without permission, from burial grounds, hospitals, and morgues, and sent, sold, or traded to museums, universities, and private collections in Australia and overseas (see Fforde 2004). Remains are known to be held in more than 180 museums and in 26 countries (Simpson 2001: 239). A multitude of false premises were put forward about the nature and origins of Indigenous Australians, with one of the most prevalent and pervasive representing them as degenerate, or "primitive," as lowest on the hierarchy of human civilization (Turner Strong 1986; McGregor 1997). A discourse of extinction emerged from the 1860s of a "dying race" and ultimately led to a culture of protectionism and the enactment of legislation such as the *Half Caste Act of 1885* (Victoria) that forced the removal of mixed race children from their parents. The forced removals of Indigenous children occurred across Australia and are now known as the "stolen generations." As argued by Watson (2003: 38–9), "by reducing Aboriginal people to wretched and doomed creatures, science wiped the European slate clean of culpability for genocide, and justified invasion."

From the mid-1960s, Indigenous organizations such as the Tasmanian Aboriginal Centre (TAC) and the Foundation for Aboriginal and Islander Research Action (FAIRA) began campaigning for the return of their "Old People" and cultural property from institutions in Australia and overseas. In 1976, the Tasmanian Museum and Art Gallery was the first museum in Australia to repatriate Aboriginal remains to community. It was also at this time that there was increased interest in Australian archaeologists studying their own continent and undertaken at Australian sites. Excavations of skeletal remains such as at Kow Swamp and Lake Mungo changed the discourse of Australian archaeology and reassessed the age and nature of colonization of the continent. This work provided evidence of the antiquity of

Indigenous occupation, and the nature and timing of the colonization of Australia, as well as the origins of Indigenous Australians, are still principal research areas.

In 1984 the *Aboriginal and Torres Strait Islander Heritage Protection Act* (APA) was adopted. The *APA* (*1984*) was successful in establishing dialogues between museums and Indigenous communities on the repatriation process. However, in the same year the Australian Archaeological Association (AAA) gave only conditional support to the return of human remains to Indigenous communities and to what it saw as the *destruction* of remains, (such as those discovered at Kow Swamp and at Lake Mungo), arguing that this constituted a loss of artifacts which could impact the understanding of human cultural development or biological evolution (Meehan 1984). John Mulvaney, a leading Australian archaeologist, was cynical about the fate of human remains being wholly decided by the appropriate Indigenous community, publicly stating that these remains hold "potential clues to many issues common to all races" and that study is "significant for Aboriginal self-knowledge of their origins and cultural development." (Mulvaney 1989, 1991). Repatriation in the 1980s can thus be characterized as a debate between "science" and Indigenous "politics" (later, after requests and lobbying by communities, the Kow Swamp remains were significantly repatriated in 1990, followed in 1992 by those from Lake Mungo).

The Australian government began funding the repatriation of Indigenous Australian remains from overseas in the 1990s. This funding was first provided through the Aboriginal and Torres Strait Islander Commission (ATSIC), followed by a succession of other federal government departments. As distinct from the USA, Australia has no federal repatriation legislation, only policy. The broad responsibilities for identifying and protecting Indigenous heritage including archaeological sites lie with Australia's state and territory governments. State legislation and how it is interpreted and enforced differs. In some states, such legislation is little more than tokenistic. Indigenous heritage can be protected to varying degrees and developers can apply for a permit or certificate to allow them to proceed with activities that might affect Indigenous heritage. Watson (2003) noted that under Australian common law, there is no provision for ownership of human remains. However, institutions in Australian (and primarily in the United Kingdom) have not relinquished collections of human remains but have worked around this by classifying them as objects. The only Commonwealth Act that may support a repatriation claim is the aforementioned *APA* (*1984*). It is also unlikely that Indigenous people could claim the right to human remains under Native Title legislation, as it is confined to rights and interests in lands and waters. Watson (2003: 40) observed that Native Title rights might exist over burial grounds and in appropriate cases may be available to restrain excavations, but this has not been tested to date.

In 1998 the Australian Cultural Ministers Council endorsed a strategic plan to return human remains and secret sacred objects held in the eight major Australian museums back to their communities of origin. The resulting Return of Indigenous Cultural Property Program (RICP) was administered by the then Federal Department of Environment, Water, Heritage and the Arts (DEWHA). In 2009, the Australian government formally announced support for the Declaration on the Rights of Indigenous Peoples; of relevance is Article 12 which states that:

"Indigenous peoples have the right to the repatriation of their human remains." In August 2011 the government consolidated the international and domestic repatriation programs into one program, the Indigenous Repatriation Program, to seek the unconditional return of Indigenous ancestral remains from overseas institutions and the return of secret sacred objects from Australian major museums to their communities of origin. Australian legal recognition has effectively adhered to its obligations under the *UN Declaration* and which, in a sense, allows it to be more progressive and adapted and implemented more rapidly. For example, the federal policy states that study on Indigenous human remains must be undertaken with consultation and with the informed consent of traditional owners or their

identified representatives and that invasive physical research, such as the sampling of teeth, should not be undertaken.

In terms of Australian museums, repatriation is managed by eight collecting institutions: the Australian Museum, the Museum and Art Gallery of the Northern Territory, Museum Victoria, the National Museum of Australia, the Queensland Museum, the South Australian Museum, the Tasmanian Museum and Art Gallery, and the Western Australian Museum. The "Previous Possessions, New Obligations" policy (PPNO) was instigated in 1993 by Museums Australia. The PPNO was important in that it attempted to build relationships with Indigenous communities by way of Indigenous employment, by gaining their input into policy formulation and by increasing their representation on museum boards. Assistance is still provided where necessary by the National Museum of Australia and/or the relevant major state or territory museums to the federal Indigenous Repatriation Program, including research to establish the provenance of ancestral remains and the identification of overseas collections of ancestral remains and the holding of remains in temporary "keeping places."

There have been over 1,000 repatriations to communities in Australia since 2000. Notable among these are the 2003 return of the remains of over 300 ancestors of the Ngarrindjeri nation from the University of Edinburgh in collaboration with the National Museum of Australia Repatriation Unit and, in the following year, another 74 from Museum Victoria under the RICP, as well as the Oxford Museum. In 2011 the Natural History Museum in London returned 138 ancestral remains to the Torres Strait Islands in the largest single return to Australia to date. Also in 2011, an important precedent was set with the Smithsonian Institution's National Museum of Natural History's first international repatriation when it returned ancestors to the community of Gunbalanya in West Arnhem Land. This is also an example of positive collaboration – here between the community and archaeologist Sally May. In this situation, it was May's research for her dissertation and subsequent publication (May 2010) that acted as the catalyst for the repatriation process.

Key Issues, Current Debates, and Future Directions

Following the ratification of The Vermillion Accord in 1989 by the World Archaeological Congress (WAC), the Australian Archaeological Association (AAA) identified a need for a code of ethics endorsing Indigenous control of their cultural heritage. The code of ethics was adopted in 1992 and amended in 2004; it makes clear that the primacy of ownership, curation, and protection of skeletal remains must ultimately reside with Indigenous Australians. It must be noted that the majority of Australian archaeologists do work with Indigenous cultural heritage and some do carry out research on skeletal remains. This, however, must be undertaken in collaborative arrangements with the permission of traditional owners and by way of negotiation. As pointed out by Smith and Burke (2003), it is difficult to measure the impact of codes of ethics of the AAA and of the Australian Association of Consulting Archaeologists Incorporated (AACAI) in terms of implementation and behavior, apart from any explicit violations of the code. However, it can be said that the vast majority of Australian archaeologists accept, support, and expect a level of Indigenous control and approval if working on Indigenous sites (see Smith & Burke 2007). This is a distinguishing aspect of Australian archaeology.

Undoubtedly, some Australian archaeologists believe that Indigenous remains are of greater value to science than to descendant communities, particularly those working with collections of human remains in museums. This position may be more difficult to defend without strong evidence of ongoing, relevant, and ethical research outcomes (such as publications). Archaeologists do not stand alone from the moral compass of the broader community; there is a need to demonstrate responsiveness to the needs and aspirations of both Indigenous and non-Indigenous communities. Working ethically also requires a consideration of changing social attitudes (such as the reconciliation movement in Australia) and of whether it is acceptable to treat the human remains of Indigenous and non-Indigenous people differently.

Simpson has argued "if museums are to demonstrate they have shaken off the colonial mantle they must address fully the issue of repatriation. To have a blanket 'no returns' policy reflects a failure to recognise or acknowledge the relevance of the concepts of spiritual ownership, cultural patrimony and the cultural importance of certain objects to cultures that did not die out in the nineteenth century, as was expected." (Simpson 2001: 246). Of course, all Indigenous cultures survive and continue today, and the repatriation process allows a handing back of some degree power and control. Positive outcomes can arise from the repatriation process and have demonstrably enabled archaeologists and museums to grow and maintain relevance, not only with Indigenous peoples but also with the broader Australian community. The point must also be made that not all Indigenous communities are antiscience nor necessarily work in opposition to non-Indigenous archaeologists (see Atalay 2008). Through the repatriation process, it may be possible to foster a greater sense of collaboration, dialogue, and capacity to gain a deeper understanding of cultural material and alternate world views.

To progress the debate, it is imperative that potential cultural material, in addition to human remains and grave goods (often termed secular objects), be repatriated. Museums frequently display these objects, such as boomerangs, spears, shields, and clap sticks, to present a story on traditional life. These have not been included in repatriations to date, primarily as collecting institutions do not categorize them as holding the same cultural significance as human remains and known secret sacred material. This is a failure to recognize that such objects, obtained mostly without permission, may also be of significance to Indigenous peoples or that some Indigenous peoples have a spiritual connection to their cultural property regardless of its nature or age. It also fails to recognize that those outside the relevant community may not possess a complete understanding of the role and knowledge of certain artifacts nor the right to be privy to this information which should be based on social position, age, and gender.

An acute aspect of the repatriation debate in Australia concerns the support provided once human remains are returned to a community. Though Indigenous communities are in no way responsible for the removal of their ancestors and cultural material, they are required to carry the burden of the repatriation process. This involves enormous responsibility in terms of time, finances, and cultural resources, as well as an emotional burden, particularly for elders (see Wilson 2006). There is the responsibility that remains are returned in a dignified and culturally appropriate manner, with resources and land for reburial. The April 2010 Discussion Paper on the review of the International Repatriation Program by the Federal International Repatriation Advisory Committee identified a lack of appropriate land as a major problem for a number of communities, particularly if there must be a large number of reburials. This entails negotiating with federal, state/territory, local governments, and private landowners and finding relevant and appropriate sites that now, for example, are housing estates. Further to this there are also issues surrounding access and site protection. Current federal funding does not have the provisions for keeping places (either their establishment, or maintenance, or for holding remains where the specific cultural group is not able to be identified), for the purchase of land, or ongoing site management and protection. The issue of compensation has also been touched on by Hemming and Wilson (2010) and would assist with such issues. However, the issue of Native Title compensation has generated division in Australia. This raises complexities around who is entitled to compensation and on what basis, what might constitute just terms for that compensation, and who is to pay. In reality this may risk further isolating some institutions (particularly outside Australia) who are already resistant to the repatriation process.

Archaeologists have played a role in the disempowerment of Indigenous Australian communities through the appropriation and dispersal of their cultural material. Yet archaeologists do have the potential to be positive agents of change in partnership with Indigenous communities by way of acts of repatriation such as that that has

occurred in Gunbalanya. Through collaboration, rigorous archaeological research can be undertaken that also has real impact, now.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Repatriation and Race in Indigenous Archaeology

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Australia's Archaeological Heritage

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Introduction

Archaeology in Australia covers a time from around 60,000 years ago to the present day. Many of Australia's World Heritage properties consist of large protected area landscapes, and archaeological sites from all historic and prehistoric periods are likely to be contained within them. However, for the most part, the archaeological values within these landscapes have played a minor role in the presentation of the country's suite of World Heritage Areas. Exceptions to this are the Willandra, Kakadu, and Tasmanian Wilderness WHAs, which are mixed natural and cultural sites where archaeological evidence was fundamental to establishing Outstanding Universal Value (OUV). Archaeological excavation programs have also contributed to our understanding of many of the individual sites in the Australian Convict Sites WHA.

For many years following the advent of radiometric dating techniques, the quest to find the oldest site and have the final word on the first human settlement of the continent dominated archaeological debate in Australia. This quest led to many important discoveries but also

limited the range of archaeological inquiry. While there is still great interest in Pleistocene sites, the post-processual movement has provided a sense of legitimacy to a range of different inquiries. New dating techniques measuring modern carbon and optically stimulated luminescence (OSL) have coincided with a rise in archaeological interest in the recent past.

The practice of so-called historical archaeology began as a way of exploring settler history. Problematically, it developed as a strand that was seen to be non-Indigenous and often involved practitioners that had no undergraduate training in Indigenous archaeology, anthropology, or history. However, a strong emergence of interest in the contact period in the 1990s led to a spate of projects that focussed on the Aboriginal settler contact and post-contact relationships.

Historical Background

Australia became a signatory to the World Heritage Convention on August 22, 1974, and has since served four terms on the World Heritage Committee. In the 38 years since becoming a signatory, 19 Australian sites have been inscribed on the World Heritage List. Of these only three sites, the Australian Convict Sites, the Royal Exhibition Building in Melbourne, and the Sydney Opera House, have been listed for cultural values alone, and four others are mixed natural and cultural sites: Kakadu, Uluru-Kata Tjuta, Tasmanian Wilderness, and Willandra Lakes (see Table 1). To some extent, this range of sites can be understood in the context of the nation's changing understanding of "Australian" identity, advances in archaeology, and the emergence of cultural heritage as an important interdisciplinary field which has been pioneered by archaeologists.

Archaeology was not seriously practiced as a discipline until 1929 with the first systematic excavation at Devon Downs Rockshelter on the lower Murray River (see Mulvaney & Kaminga 1999). The growth of archaeology in Australia reflected a growing interest in the origin of Australia's Indigenous peoples, led largely by the South Australian Museum where Norman B. Tindale worked and the Australian Museum where F. D. McCarthy was the curator. It was not until the 1960s that archaeological positions were established at Australian universities and filled by qualified personnel. A growing interest in archaeology in the 1960s and 1970s led to discoveries that radically changed both our academic knowledge and the public's perception of Aboriginal society and its antiquity.

The discovery of Aboriginal occupation sites dating to the Pleistocene altered the perception of Aboriginal people and their culture, laying to rest the idea that the continent had only recently been settled. In the Pleistocene, sea levels were much lower and the landmass now called Australia was part of a larger area scientists refer to as Sahul. Many of the earliest sites in Australia are presumed to be now submerged below current sea levels. The antiquity and geographic distribution of Pleistocene sites in Australia are important in demonstrating how humans occupied most of the continent in the Pleistocene despite climatic extremes.

While archaeological practice in Australia has been critiqued by its Indigenous people as a fundamentally colonial exercise, by demonstrating and empirically proving the antiquity of Aboriginal occupation of Australia archaeology has also undoubtedly contributed to major political shifts in the recognition of Aboriginal rights. Archaeological discoveries dramatically revised the dates for Aboriginal colonization of the continent and provided the ammunition for Aboriginal people to engage with land managers and environmentalists, pointing out that in the millennia of Aboriginal occupation, they had shaped Australia's so-called "natural" landscapes.

Key Issues/Current Debates

Pleistocene Sites and World Heritage

Australia's earliest WH sites focussed on the country's Pleistocene archaeological heritage, reflecting the impact of these discoveries.

Australia's Archaeological Heritage, Table 1 Table of Australian World Heritage Sites inscribed for cultural value (Criteria numbers have been converted to the current numbering convention)

Number	Site name	Inscription date	Cultural Criteria	Natural Criteria	Archaeology period	Archaeology	Area Originally listed	Currently listed (ha)	Notes
185	Willandra Lakes	1981	iii	Viii	Pleistocene (indigenous)	Crucial to both natural and cultural OUV	Difficult to ascertain easily as not specified in the nomination dossier. Dossier says the Willandra lakes Region=6000 km2 (600,000 ha)	240,000	Area reduced (19Comm Decision 1995)
147	Kakadu National Park	1981	I,v	Vii, ix, x	Pleistocene to current day (indigenous)	Archaeology important but Rock Art the most central to the cultural OUV	6,144 km2 (614,400 ha)	1,979,766	Extension 1987, 1992
447	Uluru-Kata-Tjuta	1987 inscribed for natural values. 1994 re-inscription (as cultural landscape)	V, vi	Vii, viii	Primarily Holocene	Evidence for criterion 5	132,566 ha	132,566	Again humans and environment-intensification at 5,000BP and increase in ritual intensity.
181	Tasmanian Wilderness	1983, extension plus cultural listing in 1989 (cultural)	I ii, iv, vi	Vii, viii, ix, x	Pleistocene	Yes	769,355 ha	1,407,513	+ a buffer zone of 3,747 ha
1306	Australian Convict sites	2010	Iv, vi	No	Colonial 1788–1877	Supplementary although key source of information in some of the sites	1502.51 ha	1502.51	+3883.42 buffer
166	Sydney Opera House	2007	i	No	20th Century	No	5.8 ha	5.8	+buffer 438
1131	Royal Exhibition Building & Carlton Gardens	2004	ii	No	19th Century	No	26 ha	26	+buffer 55

Australia's Archaeological Heritage, Fig. 1 Willandra Lakes World Heritage Area (Copyright Mark Mohell & DSEWPaC, used with permission)

Willandra Lakes WHA is a semiarid landscape of dried lake beds located in far southwestern New South Wales (Fig. 1). It was inscribed on the World Heritage List in 1981 for outstanding cultural and natural universal values under criteria iii and viii. Here more than any other WHA in Australia the archaeological and geomorphological evidence played a crucial role in establishing the Outstanding Universal Value of the area (see Fig. 2).

The most well-known archaeological site in Australia is the Lake Mungo Lunette in the Willandra Lakes WHA. A hearth radiocarbon dated to 31,000 years BP is underlain by another half meter of cultural deposit, suggesting that the basal date for the cultural deposit is in fact much older about 40,000 years BP; some speculate even earlier at 60,000 years ago. Mungo provides early evidence of human ritual and all it implies about the complexity of the society and cosmological beliefs of the people who left these traces. This evidence includes a 26,000-year-old burial, which is the world oldest known cremation, and a 30,000-year-old ochre burial.

In addition to addressing the timing of colonization, this WHA illustrates one of the enduring themes of archaeological research in Australia – that of human relationships with the environment through time. Other evidence from archaeological sites within the WHA includes the remains of giant marsupials and seed-grinding stones from 18,000 years BP. Recently, the area has revealed poignant evidence of Australia's earliest inhabitants in the form of footprints of ancient family groups preserved in clay.

The Tasmanian Wilderness WHA was inscribed on the World Heritage List in 1982 for its natural values and extended in 1989 for both its outstanding natural and cultural universal values. It is listed under seven of the ten criteria (criteria iii, iv, vi, vii, viii, ix, x) and is one of the largest conservation reserves in Australia. Climatic changes in the ancient past influenced landscape development. Rising sea levels formed

As a cultural property the region is of outstanding universal value because:

- the remains of Homo sapiens sapiens in the Lake Mungo lunette establish that modern man had dispersed as far as southeastern Australia before 30,000 years ago
- complex ritual and symbolic systems are indicated by the 30,000 years old ochred burial and by the 26,000 year old cremati (the oldest cremation site in the world)
- these skeletal remains provide amongst the earliest evidence of Homo sapiens sapiens anywhere in the world and establish the great antiquity of Australian Aborigines
- some of the world's earliest substantial evidence for the exploitation of freshwater resources occurs here in quantity
- the evidence enables a reconstruction of the economic life of Homo sapiens sapiens, showing a remarkable adaptation to local resources and the interaction between culture and the changing natural environment
- grindstones to produce flour from wild grass seeds were used here in the late Pleistocene, at much the same time as their use in the Middle East.
- pigments were transported to these lakeshores before 32,000 BP
- the typology of early Australian stone tools was defined as a result of research in this region

An aesthetic sense, ritual, and concern for deceased kin are surely the hallmarks of mankind. The Willandra discoveries have established the great antiquity and richness of Aboriginal culture and have caused a significant reassessment of Aboriginal prehistory and its place in the history of modern man. The discoveries have linked the origins of modern society in the Old World with one across Wallace's Line in Australia.

Australia's Archaeological Heritage, Fig. 2 Extract from the nomination dossier – Willandra Lakes WHA

Bass Strait and the Australian mainland became inaccessible; the resulting isolation experienced by Tasmanian Aboriginal people and the cultural effects of this isolation captured the interest of archaeologists.

Kutikina Cave is one of about 40 Pleistocene sites so far discovered in the Tasmanian Wilderness WHA. However, at the time of the original nomination in 1982, there had been no systematic survey for Aboriginal sites, and Kutikina (Fraser Cave) in the Lower Franklin River was the only specific site mentioned in the nomination dossier. It was described as:

> one of the six archaeologically richest limestone caves sites in the western Pacific. A radiocarbon date from the base of part of the cave deposit indicates human occupation in the area about 21,000 years ago....further research is

> proposed. . .It may be claimed already that an antiquity of 21,000 years establishes southern Tasmania as the most southerly known penetration of the earth's land surface during ice age times' (Nomination Dossier 1982: 13).

These sites are of great significance and their discovery contributed greatly to the campaign to protect the area from logging and from proposed dam construction. However, the original justification for listing on cultural values was only four paragraphs, while the natural values justification was nine pages long, which provides some indication of how the archaeology, although significant, was something of an afterthought in the assessment process. By the time the 1989 extensions were proposed, about 37 Pleistocene archaeological sites were known. The justification for inscription under criteria ii, v, and vi is more clearly articulated on the basis of its information about past Aboriginal settlement.

Rock Art and World Heritage in Australia

"Rock art is the most widespread cultural manifestation of humankind. . . it is a manifestation of human conceptual thought and of the beliefs that are at the heart of traditional societies" (ICOMOS 2010: 1). Aboriginal paintings, drawings, and engravings occur in many parts of Australia. There has been a wealth of research into subjects as diverse as the contemporary meaning to Australia's Indigenous people, what the depictions reveal about environmental change and extinct species, and development of techniques for dating and recording the art itself. Significant rock art sites occur in many of the country's protected area reserves outside of current WHAs. Some highly significant sites such as those in the Burrup Peninsula, Western Australia, and in Laura in North Queensland are still at risk from development pressures. Rock art sites also exist in WHAs listed for their natural criteria alone such as the Blue Mountains WHA. However, the only WHA to date where rock art has directly contributed to the case for establishment of the OUV of the landscape is Kakadu National Park.

Kakadu National Park was inscribed on the World Heritage List in three stages over 11 years, commencing in 1981 for both outstanding cultural and natural universal values. It was listed under criteria i, vi, vii, ix, and x. The site description notes that:

> This unique archaeological and ethnological reserve has been inhabited continuously for more than 40,000 years. The cave paintings, rock carvings and archaeological sites record the skills and way of life of the region's inhabitants, from the hunter-gatherers of prehistoric times to the Aboriginal people still living there. It is a unique example of a complex of ecosystems, including tidal flats, floodplains, lowlands and plateaux, and provides a habitat for a wide range of rare or endemic plant and animal species (see http://whc.unesco.org/en/list/147).

Kakadu is a landscape of dramatic vistas, renowned for its beautiful freshwater wetlands and rock art sites. The paintings cover a long chronological span, the oldest date back nearly 20,000 years and the most recent are from contemporary times. Prior to its inscription, there had been a long push to ensure that this area was conserved and protected from mining, and in fact the gazettal of a national park over part of this area arose from recommendations made in the Ranger Uranium Inquiry. While the presence of Indigenous inhabitants was noted in the original nomination dossier, the emphasis was on the archaeological evidence of the Indigenous past, rather than the contemporary Aboriginal community. It was not until the third extension nominated in 1992 (Australian Government 1992: 87-88) that the focus of the nomination dossier changed to more comprehensively incorporate the living traditions of the Traditional Owners and cultural continuity:

> The cave paintings, rock carvings and archaeological sites present a record of the skills and lifeways of the region's inhabitants, from the hunters and gatherers of prehistoric times to the Aboriginal people still living there (Australian Government 1992).

This was an important shift in thinking about heritage and not just in Australia. It was around this time in 1992 that the World Heritage Committee convened a meeting of specialists to redraft the Operational Guidelines to include the concept of associative cultural landscapes more

explicitly in a way that allowed for the recognition of Indigenous cultural values.

While it is the Aboriginal rock art that was the key evidence to support the inscription of this cultural property on the World Heritage List in 1981, there are also a number of Pleistocene archaeological sites in the WHA. The original nomination dossier provides a glimpse of the contemporary debates about the dates and process of Indigenous colonization of the continent (White 1971; Jones 1973). At the time of the nomination, the emerging results from Lake Mungo were challenging some of the assumptions derived from the archaeological work in the Kakadu area in the late 1960s (e.g., White 1967).

Cultural Landscape, World Heritage, and Archaeology in Australia

The changes to the Operational Guidelines adopted in 1992 defined three categories of cultural landscapes including (1) a landscape designed and created intentionally by man, (2) an organically evolved landscape, and (3) an associative cultural landscape.

Australia has actively engaged with the development of cultural landscape concepts within the Convention and quickly moved to renominate Uluru-Kata Tjuta following the successful nomination by New Zealand of Tongariro – the first cultural landscape to be listed. Uluru-Kata Tjuta WHA remains the only cultural landscape listed in Australia. This reserve is in the arid inland and comprises extensive sand plains, dunes, and alluvial desert, dominated by the Uluru monolith and Kata Tjuta. The focus of the park has always been on the monolith Uluru (formerly known as Ayers Rock) which has drawn curious tourists since the 1940s. This interest, while a catalyst, for conservation from tourists gave rise to the long-term struggle of Anangu to retain their traditional way of life and control of their spiritual sites (Layton 1986). This WHA was first inscribed in 1987 for its natural values and it was not until 1994 that it was reinscribed for its cultural values under categories v and vi. The ICOMOS evaluation (p. 100) notes:

> To write that the landscape is *associated with* the narratives, songs, and art of the *tjukurpa*, while accurate from a western perspective, does not do full justice to Anangu ontology and is a poor translation of Anangu concepts. For the Anangu this landscape is the product of heroic ancestors' actions and can be read as a text specifying the relationship between the land and its indigenous inhabitants laid down by the *tjukurpa*. The very rock of Uluru and Kata Tjuta is proof of the heroes' actions and being [criterion vi].

Archaeological evidence of Aboriginal adaptation and change includes the introduction of new tool types and the creation of new forms of rock art as well as changes to camping patterns and social organization over the past 5,000 years. However, the recommendation of ICOMOS (1994) supporting the re-inscription illustrates that though this evidence may have been useful to authenticate the time depth and adaptive nature of Anangu society, it is their relationship and interaction with their landscape and the way it embodies their spiritual beliefs that is the core of the Outstanding Universal Value.

The Archaeology of the Recent Past and World Heritage in Australia

The Australian Convict Sites WHA (Fig. 3) is one of the nation's most recent additions to the WH List. It comprises 11 properties spread across Tasmania, Norfolk Island, NSW, and Western Australia. It was inscribed in 2010 under criteria iv and vi. It incorporates Australia's first ever WH site in private ownership. Each of these places include substantial archaeological values and several, e.g., the Female Factory, Port Arthur, the Hyde Park Barracks, and Parramatta Park, have had extensive archaeological programs associated with them; however, there is little overt acknowledgment of the archaeological values of these places in the nomination dossier.

In the case of the remaining cultural sites, i.e., the Royal Exhibition Building and Carlton Gardens in Melbourne (inscribed 2004) and the Sydney Opera House (inscribed 2007), a consideration of archaeological evidence played no role in their nomination. Interestingly, the Draft Conservation Plan for the Royal Exhibition Building included with the nomination

Australia's Archaeological Heritage, Fig. 3 Student volunteers excavate the site of convict sawpits and tan pits at Port Arthur Historic Site, part of the Australian Convict Sites WHA (Image courtesy of Port Arthur Historic Site Management Authority)

dossier did not address the issue of any associated archaeological deposits and how they would be managed. This reflects a problem with architecturally focussed heritage planning, in that it does not always include multidisciplinary input from archaeologists.

As we have seen, Australia's first cultural nominations can be understood in a national context of the dramatic discoveries of Australia's Indigenous Pleistocene past in the late 1960s and 1970s. Aboriginal activism was re-energized through the scientific discoveries of the antiquity of Aboriginal settlement, the heated environmental battles over the so-called wilderness, and large-scale development proposed in "natural" areas (e.g., Ranger Uranium Mine Inquiry, the proposed Jabiluka mine near Kakadu, and the Tasmanian hydroelectric scheme dam proposal) in the 1970s and 1980s, and the expansion of Australia's protected area reserves. Since that time, government resourcing for the assessment of new areas has dwindled, as too has resourcing for the heritage sector generally.

Heritage bodies have repeatedly lobbied the Australian government to populate its Tentative List through strategic and thematic studies to no avail. There are substantial community-driven campaigns not yet supported by government advocating consideration of a number of cultural properties including the Goldfields, Canberra, Adelaide Park Lands, Cornish mining sites Budj Bim, and the rock art of the Dampier Archipelago. Currently, the assessment of Cape York Peninsula provides opportunities for Indigenous landowners in the region to contribute to any future nomination and develop new models for cultural landscapes shaped by continuing traditions. Ongoing concern over the issues such as costs of managing World Heritage Sites, the globalization of "culture" through international processes such as the World Heritage Convention, the commercialization of significant cultural places through the conflation of world heritage as tourism, and the rights and interests of local communities is debated as hotly within Australia as elsewhere. There are conflicting political positions adopted within Australian society on the impacts of World Heritage listing on Indigenous rights which continue to hamper the development of new models driven by Indigenous Traditional Owners.

Archaeological research is nationally under-resourced compared with other areas of research. While a number of persistent archaeologists continue to carry out field research, the main forms of archaeology now practiced in Australia are consulting and salvage archaeology which are not likely to give rise to dramatic archaeological evidence, and if they do, it is often too late to save it.

International Perspectives

The human species did not evolve on the Australian continent but arrived here somehow

from elsewhere. Evidence to date suggests that these first colonists were modern humans (*Homo sapien sapiens*). Just how, when, and why they arrived is still under debate. International discoveries, such as *Homo floresiensis* in 2003 not far away on the Indonesian island of Flores (Morwood et al. 2004) and a geochronologically dated site in Malaysia at 1.8 million years ago (Majid 2003), are still being made that may potentially change theories about colonization of the region. Such discoveries in turn spark new research questions for Australian archaeologists and may have implications for future transnational serial nominations.

More broadly, the relationship between humans and their environment and responses to environmental change are enduring themes in archaeological research in Australia. The specter of Global Climate Change that now confronts the world has re-energized this area of study with many researchers looking to the consequences of past change and human responses.

Australia's contribution to the articulation of the cultural landscape concept along with the listing of Uluru-Kata Tjuta WHA as a cultural landscape so quickly after the 1994 changes to the Operational Guidelines is significant within the history of the convention (Rossler 2006), and Australian archaeologists remain active in developing new approaches and methodologies relating to the identification of cultural landscapes and in particular articulating the links between tangible and intangible heritage.

Future Directions

The future for World Heritage in Australia is unclear, along with the role that archaeology might play in any future nomination. There have been repeated calls for a serial rock art nomination incorporating the most significant art sites across the nation. The oldest dated rock art site in Australia (>24,600 years BP) is found in the Laura region of Cape York Peninsula (Cole & Watchman 2005), renowned for its distinctive rock art style which is a major tourist attraction in the region. Unfortunately, management of this area is under-resourced and the Traditional Owners struggle to manage tourism impacts on these sites. Investment in management of these sites has been at best sporadic.

Cape York Peninsula is currently being considered as a cultural landscape created and maintained through the continuing association of the Indigenous Traditional Owners. Similarly, there are Indigenous community calls to renominate the Gondwana Rainforests WHA as cultural landscape. There continues to be an opportunity to develop new models and methodologies to assess, describe, and manage associative cultural landscapes.

It is unlikely that there will be standalone nominations relating to Australia's recent past. In many cases, comparative analysis will show that many such sites are similar to those of other colonial nations. This does not diminish the importance of such sites to the Australian people. They can be effectively protected through local, state, and national mechanisms in most cases. However, it is possible that transnational serial nominations of some of these places would be successful (assuming a future government commitment to support them). One example is the proposal for a transnational nomination of the Cornish mining sites.

The Torres Straits is a region that is not represented in Australia's suite of WH places, and Torres Strait Islander cultural heritage is underrepresented on relevant national and state heritage registers. This is a vibrant cultural landscape which was and continues to be a cultural nexus between Melanesian Papua New Guinea (PNG) and mainland Australia and has deep historic connections through their shared Sahul prehistory.

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Cross-References

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▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)

▶ Chile's World Archaeological Heritage and Its Management
▶ China: Cultural Heritage Preservation and World Heritage
▶ Global Archaeology
▶ Heritage and Archaeology
▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
▶ Kakadu National Park: Rock Art
▶ Lake Mungo, Archaeology of
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Basic Information

Formally established in 1972, the Australian Archaeological Association Inc. (AAA) has grown to become the largest archaeological organization in Australia (http://www.australianarchaeology.com/). Aimed at encompassing all subfields within the discipline, including Indigenous archaeology, historical and industrial archaeology, ethnoarchaeology, and maritime archaeology, the association now represents a diverse membership of professionals from the private, government, tertiary, and museum sectors, students, and others with an interest in archaeology. The association's membership encompasses archaeologists and cultural heritage practitioners (including many Indigenous archaeologists and cultural heritage practitioners) from across Australia and the world and as of 2012 comprises approximately 1,000 people.

The AAA holds a conference each year, this being the major national annual meeting of archaeologists, attracting delegates from across Australia and internationally. This conference is hosted by a different institution each year in varying locations across the country to encourage attendance from a broad-cross section of the archaeological community. *Australian Archaeology*, a refereed journal published twice a year since 1974, is the

official publication of AAA. In line with the aims of the association, this journal accepts original articles in all fields of archaeology and other subjects relevant to archaeological research and practice in Australia and nearby areas. This includes subject matter covering research and cultural heritage management focused on prehistoric, historic, and contemporary periods.

Through the annual conference, publication of the journal, and the use of various social media platforms, the aims of AAA are to promote the advancement of archaeology, to provide an organization or forum for the discussion and dissemination of archaeological information and ideas, to publicize the need for the study and conservation of archaeological sites and collections, and to increase public awareness of the aims of archaeology in Australia.

Major Impact

Since its inception, AAA has lobbied the Australian federal and state governments, and private industry on behalf of its members, and has prepared submissions on a range of archaeological and cultural heritage-related issues. These include heritage legislation reform, research funding, and best practice in consulting archaeology (several instances in collaboration with the Australian Association of Consulting Archaeologists Inc. and the Australasian Society for Historical Archaeology).

The AAA actively promotes and supports Indigenous and student engagement with archaeology through the annual conference (often via the provision of funding support for attendance and participation) and promotes the importance of Australia's archaeological heritage as a major sponsor of annual National Archaeology Week events run across the country every year in May. Additionally, the AAA supports and promotes teaching and learning in archaeology across schools and higher education through the Australian National Committee for Archaeology Teaching and Learning (ANCATL).

The association's flagship journal, *Australian Archaeology*, is internationally recognized as a high-quality peer-reviewed forum for the publication of archaeological research from across Australasia. The journal is indexed in the Arts and Humanities Citation Index of the Web of Knowledge, SCOPUS, Australian Public Affairs Information Service (APAIS), and Anthropological Literature and Anthropological Index Online and has been ranked as a tier A journal by the European Reference Index for the Humanities and French Agence d'Evaluation de la Recherche et de l'Enseignement Supérieur.

Cross-References

- ▶ Australian Association of Consulting Archaeologists Inc. (AACAI)
- ▶ Australasian Institute for Maritime Archaeology Inc. (AIMA)
- ▶ Australasian Society for Historical Archaeology (ASHA)

Further Reading

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Australian Archaeology: Pioneers and Traditions

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Introduction

Australia's first archaeological observations were made by early explorers and colonists or noted by observers primarily working in other disciplines (Smith & Burke 2007: 1). The first excavation in Australia was undertaken by the governors of the Colony of New South Wales with a focus on human burials (Horton 1991: 3-5), while the first to employ the method of stratigraphic analysis were anthropologists Herbert Hale and Norman Tindale, who undertook archaeological

excavations at Devon Downs in 1929 (Hale & Tindale 1930).

Formal archaeological work in Australia began in the 1950s when John Mulvaney returned from courses at Cambridge University and introduced archaeological study into the Australian curriculum (Mulvaney 2011). Mulvaney began work on a number of archaeological excavations around Australia and instructed and mentored a number of students who would become leaders in the field, including Isabel McBryde, Jim Allen, and Ian Glover.

In the 1970s, a series of political circumstances spurred by a confluence between the Aboriginal land rights movement and public environmental concerns led to the creation of state heritage legislation, After this, the amount of archaeological work conducted in Australia dramatically increased, both with development of heritage surveys required by legislation and in academic circles, with several universities opening archaeology departments.

While Australia's first department of archaeology had been instituted at the University of Sydney in 1948, the focus was not specific to Australian archaeology. Later, archaeologists with an Australian focus arrived at the university, with Vincent Megaw and Richard Wright arriving in 1961 and Rhys Jones in 1963. John Mulvaney was appointed to the History Department University of Melbourne in 1953, later moving to ANU. Isabel McBryde took up the first titled position in Prehistory and Ancient History at the University of New England, Armidale, in 1960, while Jack Golson was appointed to the Anthropology Department at Australian National University in 1961, which was then just moving into the field of archaeology.

Key Issues

Since this time, Australia has grown a thriving discipline covering a range of research topics. The nature and timing of human settlement in the continent has been a long standing topic of interest in Australian archaeology, with the first estimate being made in 1884 by Reverend Peter MacPherson, who postulated an age of 400 years BP for human arrival on the basis of his excavations in Victoria (Horton 1991: 34-43). This date was quickly superseded with the commonly accepted date of human arrival in Australia now being an estimated 50,000 years BP (see Hiscock 2008: 1). The archaeology of the periods of European contact and industrialization has developed into a major field.

The first Australian book dedicated to an overview of archaeological field methods was written in 1983 by Graham Connah (see Connah 1983), which was followed by a more detailed treatment of field methods and related topics by Heather Burke and Claire Smith (see Burke & Smith 2004). The method of ethnographic analogy has often been employed in Australian archaeology and in many cases has served to inform our interpretation of the past (Hiscock 2008: 268-85).

One of Australia's strengths in archaeology has been its analysis of sociopolitical issues, particularly the reflexive analysis of its relationship as a discipline with Aboriginal people (see Burke et al. 1994). This has evolved from simple consultation in the early days to numerous community-based research projects, informed, and sometimes initiated by Indigenous people (Greer et al. 2002). This has begun to transform archaeology in Australia from a field that studied the history of indigenous people to one that cannot only learn more about the past but also benefit contemporary peoples. Employment in cultural heritage management increased dramatically in the early twenty-first century, in response to the legislative requirements of a mining boom in Australia. In 2012, there were over 1,000 members of the Australian Archaeological Association.

Cross-References

- ▶ Allen, Jim
- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Burke, Heather
- ▶ Field Method in Archaeology: Overview
- ▶ Golson, Jack
- ▶ Jones, Rhys Maengwyn
- ▶ McBryde, Isabel
- ▶ Mulvaney, John
- ▶ Smith, Claire

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Australian Association of Consulting Archaeologists Inc. (AACAI)

Fiona Hook
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Basic Information

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The Australian Association of Consulting Archaeologists Inc. (AACAI) was established in the 1970s as an organization for professionals working in all fields of contract and public archaeology. AACAI aims to uphold and promote the discipline of archaeology and to advance the welfare of members. AACAI has a Constitution, a Code of Ethics, and a Consulting with Aboriginal Communities Policy Document. It is affiliated with the Australian Archaeological Association Inc and is a Foundation Member of the Council for the Humanities, Arts and Social Sciences.

Major Impact

The Australian Association of Consulting Archaeologists Inc. is a national organization with local chapters in Queensland, New South Wales, Victoria, South Australia, and Western Australia. The National Executive Committee (NEC) deals with national issues, including membership applications, AACAI policy, and general administration, while State Chapters deal with local matters. AACAI may also provide technical and professional advice, and dispute resolution. It runs an occasional Professional Development Workshop Series. It also publishes a newsletter, a recommended minimum fee scale, and is preparing an Australian Archaeology Consultancy Monograph Series.

The National Executive Committee of AACAI oversees issues of wide-ranging importance for consultants, clients, and the community. The Membership and Publications Committees answer to the NEC. State Chapters of AACAI deal with specific issues relating to practice in different parts of Australia with different jurisdictions and heritage organizational structures. The Chapters hold specialist workshops, seminar series, and act as the first contact point for consultants. Workshops are organized on specialized topics that assist in the professional development of consultants and which help to inform them on issues that affect their work, such as changes to legislation. Recent workshops include the analysis and management of spatial data (GIS applications) and the implications of the GST on business practice and accountability.

AACAI produces a newsletter, which keeps the members and subscribers up to date with a cross section of archaeological issues in Australia and overseas. Each Newsletter includes updates on workshops and lectures of interest to consultants.

AACAI's Register of Consultants lists all Members. For Full Members, the Register lists contact details, academic qualifications, general fields of work (as ratified by the Membership

Committee), special fields of expertise, specialist studies, and consulting experience. The Register provides summary contact details, expertise, and availability of Associate Members and lists all Affiliate Members. The AACAI website lists all financial Full Members' details as well as all policy documents. AACAI can serve to lobby collectively on issues deemed to be of interest to its professional membership, such as amendments to heritage legislation. It has formal ties with other archaeological organizations, including the Australian Archaeological Association.

Cross-References

- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Ethics in Archaeology
- ▶ Heritage and Archaeology

Further Reading

Australian Association of Consulting Archaeologists Inc. (AACAI). n.d. Available at: www.aacai.com.au.

Australian Deserts: Extreme Environments in Archaeology

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State of Knowledge and Current Debates

Introduction

The first Australians passed through biogeographic filters of the increasingly depauperate islands of Wallacea to enter the most arid continent ever occupied by preindustrial era humans. But were Australia's deserts marginal, extreme, and risky environments for these hyper-adaptive modern humans? We must recall that they were part of a "fast track" southern diaspora of modern humans from Africa to Australia who had already shown extraordinarily adaptive abilities. Given that the Last Glacial Maximum expanded Australia's deserts even further and made for some truly extreme environments, what does archaeology tell us of how Ice Age Australians dealt with the most common environments in Sahul? By the time Europeans arrived in Australia, the deserts were more densely packed with people than ever before, a process that had escalated in the late Holocene to create the renowned desert societies known to ethnographers. Even then, these were some of the lowest density populations ever observed (in some instances one person per 100–200 km^2) (Hiscock 2008). Australian deserts, and desert peoples, have now moved close to the center of Australian society for the first time, providing a vital pump for art and ideas from the desert outward. Here we review Australia's deserts from an archaeological perspective.

Modern humans left Africa between approximately 70,000 years ago (cal BP (years before 1950) is used here to denote calendar years; years BP and BP are used to denote radiocarbon years; ka is used to denote thousands of years ago and generally relates to OSL ages. The Pleistocene period extends from 2 million to c. 10, 000 years ago, and then the Holocene epoch begins) and reached Sahul at the eastern end of this diaspora before 50,000 years ago (Smith 2013). This was an impressive accomplishment, since it entailed crossing through Wallacea, which encompasses the islands of the Lesser Sundas including Flores and Timor, and would have required a series of substantial water crossings out of sight of land (Fig. 1). With the exception of Flores, the archaeological evidence left by the early colonists is indisputably the product of modern human behavior (Balme et al. 2009).

Currently the oldest sites are found in Arnhem Land in the north of the continent. These sites are

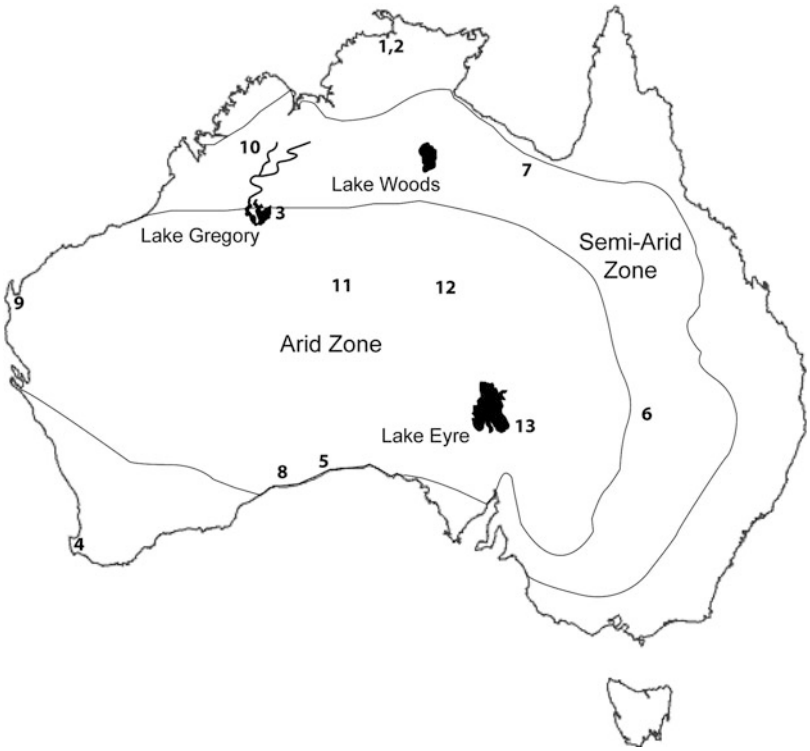

Australian Deserts: Extreme Environments in Archaeology, Fig. 1 Map of archaeological sites discussed in text: (1) Malakunanja rockshelter, (2) Nauwalabila rockshelter, (3) Parnkupirti, (4) Devil's Lair rockshelter, (5) Allen's Cave, (6) Cuddie Springs, (7) GRE 8 rockshelter, (8) Madura Cave, (9) Mandu Mandu rockshelter, (10) Riwi rockshelter, (11) Puritjarra rockshelter, (12) Arltunga, and (13) Killalpaninna mission

not far from the coast today but would have been a significant distance inland at the time of first occupation. Dates of between 65,000 and 50,000 BP have been obtained for sediments in association with the lowest stone artifacts recovered at rockshelter sites Malakunanja and Nauwalabila 1 based on the optically stimulated luminescence (OSL) method (Fig. 1). Sites in the inland arid zone such as at Lake Gregory (*Parnkupirti*) have been dated to between 50,000 and 45,000 (Veth et al. 2009). Using the radiocarbon technique that dates charcoal and other organic remains, dates in the order of 50,000–45,000 cal BP have been obtained for sites in both northern and southern Australia (Balme et al. 2009). A spectacular limestone cave in the extreme southwest of Western Australia, Devil's Lair, currently has the oldest radiocarbon date for occupation approximately 48,000 BP (Turney et al. 2001) – to get here would have required passing by, or through, the arid regions of the northwestern reaches of the continent. Thus, while once thought to have been barriers to human occupation until the Holocene, with many analogues to the Great Basin of the USA, desert sites from Australia in the order of 40,000 BP predating glacial aridity are now well established (Hiscock & Wallis 2005; Smith 2013).

Australian deserts are not uniform, and the impact of environmental transformations over time was variable. The deserts exist across a massive belt of semiarid and arid Australia. In the east arid, regions around Lake Eyre contrasted with the large occasionally active river systems such as Cooper Creek. While people such as *Diyari* benefited from rivers, others were suited to more extreme deserts, such as Wangkangurru dwelling in the dune fields of the Simpson Desert. Moving westward, Central Australia is broken by sets of ranges occupied by *Arrandic* speakers, which had long provided a highly elevated refuge at the continent's heart. Further west, the massive Western Desert combines several separate deserts, both sandy and gravel in form. For humans in these

environments, such as *Martu* and *Pintupi* peoples, life in the sand-dune country required the use of ephemeral waters and more reliable water in rock holes found in small ranges like the Cleland Hills. Reaching the Western Australian coast, the Pilbara is a vast set of ranges extending from the Western Desert to the arid Indian Ocean coast, now clearly never abandoned at any stage in Australia's past. In the south, the Nullarbor Plain also borders an ocean, the Southern Ocean, abutted by a vast flat, often un-vegetated plain, with little surface water.

The Climate of the Arid Zone

The climatic history of Australia's desert provides a critical frame through which to understand human uses of the arid regions which have witnessed some of the most dynamic human-landscape transformations anywhere (Veth 2005).

The climate of arid Australia is characterized by several drivers, notably the northern summer monsoons, cyclones, and pseudo-monsoons in the north and winter westerlies and frontal systems in the south (Sturman & Tapper 1996). The major river systems that bring rain from the monsoon belt into the arid interior and fill water bodies such as Lake Gregory, Lake Woods, Lake Eyre, and Lake Frome also play a significant role in the availability of water and thereby accessibility of the desert (Williams et al. 2010). Changes in the strength and location of these systems, therefore, have large influence over the effective precipitation in the arid interior and indirectly affect other hunter-gatherer requirements, including food resources, vegetation, fire regimes, and water availability.

At the time of human arrival, the arid zone was cool but humid, with several of the large lakes (including Lake Frome, Lake Gregory, and Lake Eyre) containing water from intensified summer monsoons and/or an equatorward displacement of the winter westerlies (Fitzsimmons et al. 2012). These conditions, which would have allowed the exploration of much of the arid interior, persisted until the onset of the Last Glacial Maximum (LGM) beginning at ~30,000 years BP and peaking at ~23,000–18,000 years BP.

The LGM in Australia was a period of significant cooling and increased aridity (Fig. 2) and saw a decline in annual temperatures by as much as 10 °C compared with present day; glaciation of uplands in the Snowy Mountains and Tasmania; reduction in rainfall by 60 % or more, especially in the interior through the weakening of the summer monsoons and poleward displacement of winter westerlies; changes in vegetation structure to generally more steppe-like and grassland-dominated environments; lower lake levels; increasing dune activity and dust transport; and an expansion of the arid zone into semiarid and mesic environments (Williams et al. 2009; Petherick et al. 2011; Fitzsimmons et al. 2012). Sea levels were also at their lowest through this period, at ~120 m below modern day levels, and led to increased continentality across the interior. In the arid zone, only the Murray-Darling Basin system showed evidence of continuing resources, being fed by water from the ice fields covering the Snowy Mountains during this period. Fluvial activity at the headwaters of the Cooper River and high lake levels at Lake Lewis, however, suggest episodic wet events occurred within, or on the margins of, the arid zone throughout the LGM.

Following the LGM, the Terminal Pleistocene/Holocene transition saw rapid environmental change. Increasing temperatures initially outpaced precipitation and, at least for prehistoric people, probably led to some of the driest conditions in the last 50,000 years (Markgraf et al. 1992). Sea levels rose rapidly and by 12,000 years BP had reached present-day levels, inundating the continental shelf and likely displacing significant populations in the (now) Timor and Arafura Seas. Lake Carpentaria would similarly be inundated by ~8,000 years BP. Recent studies show this period to be one of increasing complexity, with the southern parts of the continent having a brief humid phase between ~17,000–15,000 years BP before increasing aridity at ~14,000–10,000 years BP, while in the north the lapsed monsoon saw dry conditions until after 14,000 years BP after which it got progressively wetter (Fitzsimmons et al. 2012). In the center of Australia, the Todd River reveals

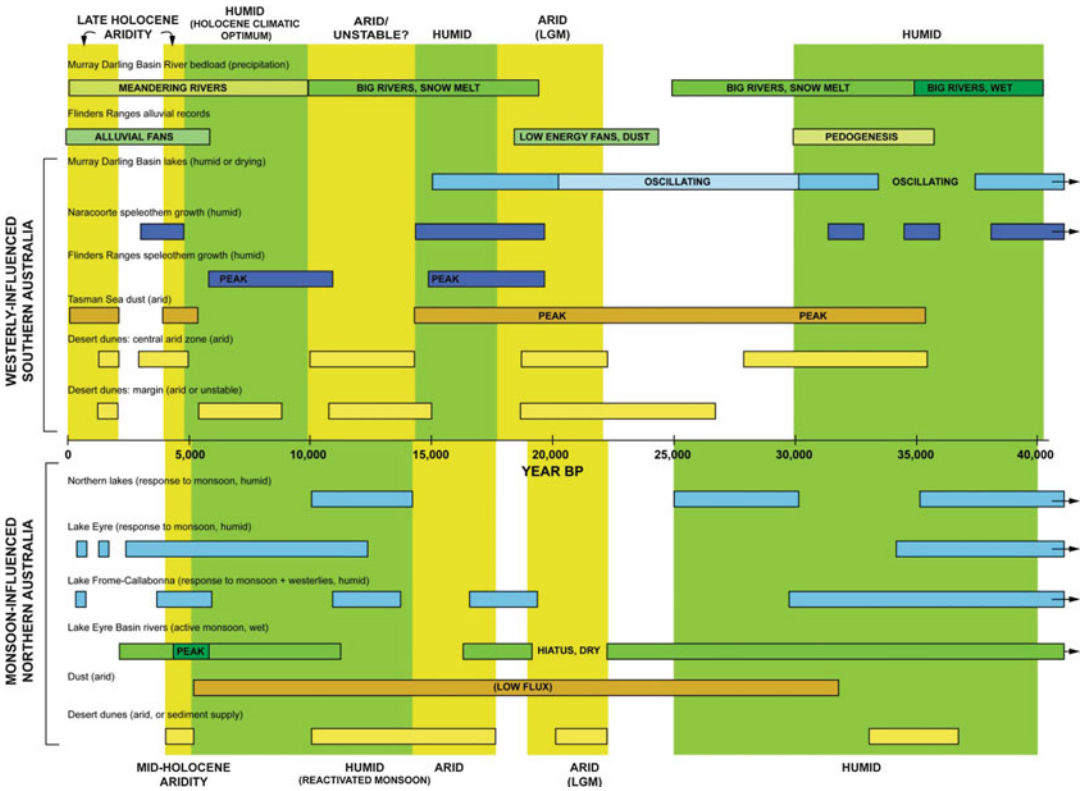

Australian Deserts: Extreme Environments in Archaeology, Fig. 2 A summary of paleoclimatic proxies from northern and southern Australia (Fitzsimmons et al. 2012)

evidence of paleo-floods initiating from 14,000 years BP and continuing into the early Holocene (Smith & Ross 2008).

In the early Holocene, ameliorating climate would have allowed far greater access into the arid interior. An area that had generally been fairly inhospitable to long-term occupation now had increasing resources due to an intensification of the monsoon system brought about by the inundation of the Sahul Shelf (Smith 2013). Rainfall from the increased monsoons fed the major rivers systems running into the center of the continent, and Lake Eyre, Lake Frome, and Lake Gregory were, again, all full (Smith et al. 2008).

From approximately 5,000 years BP, the current El Niño-Southern Oscillation (ENSO) cycle was initiated (Shulmeister 1999). Beginning as a period of increased effective precipitation and enhancement of the monsoons across Australia, the climate quickly turned to prolonged drying and increased variability. Intensification of ENSO would have caused the movement of the Intertropical Convergence Zone northward, increased the anticyclonic conditions overlying the region, and thereby reduced the likelihood of monsoon or rain-laden low-pressure systems into the Australian interior. Between ~3,700 and 2,000 BP, this intensification of ENSO caused significantly drier conditions in Australia and increasing climatic variability in the arid interior. A number of different datasets all demonstrate that ENSO, and specifically El Niño events, was consistently stronger and more frequent during this period. However, while the overall effect of ENSO was to reduce rainfall in this period, increasing variability would have seen significant rainfall in the interior occasionally.

The intensification of El Niño events continued and may have increased until approximately

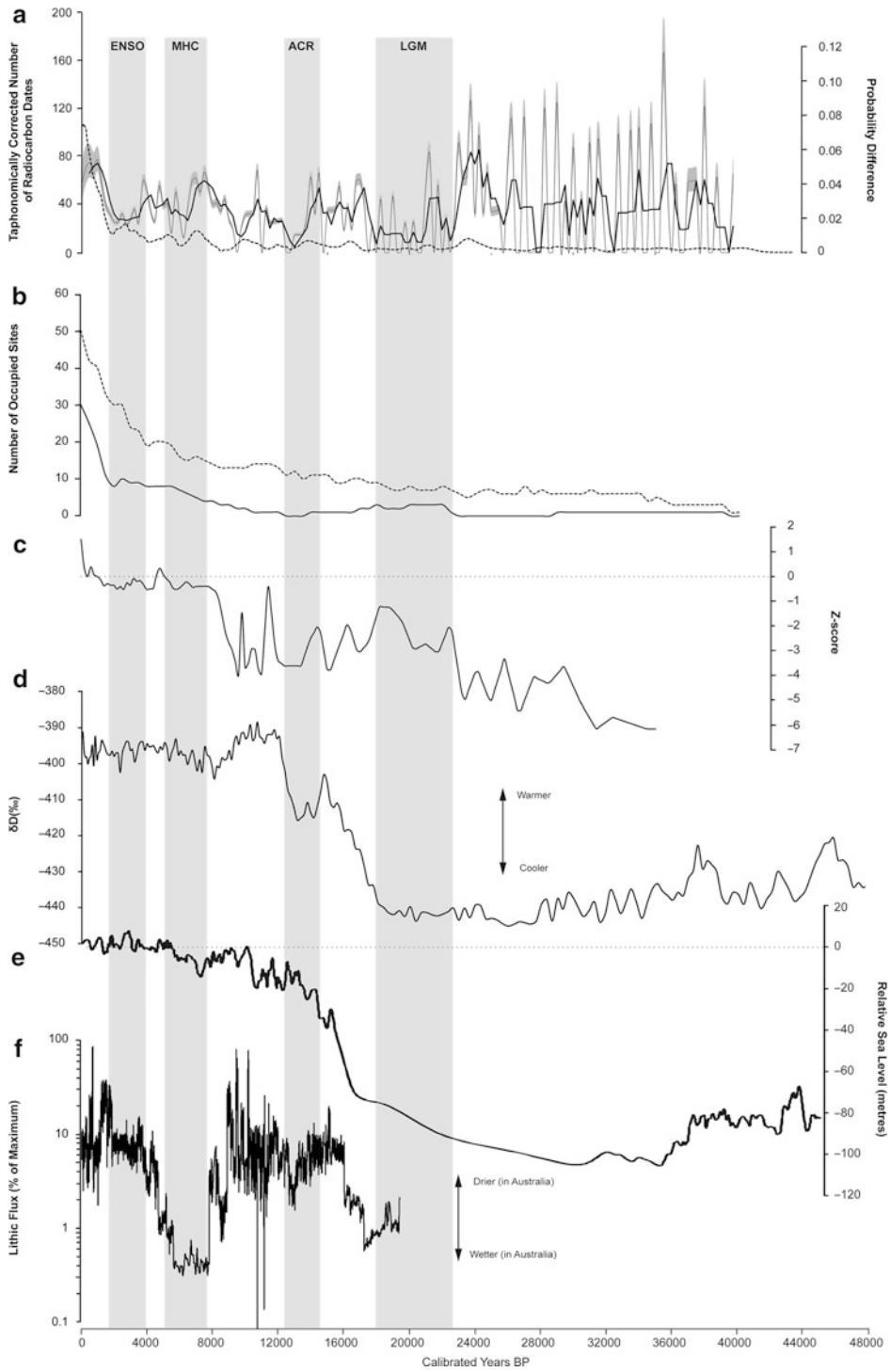

Australian Deserts: Extreme Environments in Archaeology, Fig. 3 A graph showing proxies for population and/or human activity compared with paleoclimatic records. (**a**) Summed probability distribution (*dashed*) of radiocarbon dates from archaeological sites in the arid zone. Taphonomic correction of the radiocarbon data is also presented (*dark gray line* provides the corrected values with associated 95 % confidence

1,500 years BP. Several Australian paleoclimatic datasets suggest amelioration from 2,000 to 1,700 years BP or later. Consequently, the climate of the last 2,000 years was considerably more stable than the mid-Holocene, although there were the well-known climate shifts of the wetter Medieval Climatic Anomaly at 1,200–800 years BP and the cooler Little Ice Age at 600–200 years BP (Williams et al. 2010).

Regional Trends: Time-Series Analysis

Recent approaches in the use of time-series analysis provide a good opportunity to explore the first-order response of prehistoric people to the climatic changes outlined above. Techniques to explore regional response fall into three main categories: (1) the use of summed probability approaches – involving the compilation of radiocarbon data from archaeological sites as an indicator for population size and/or mobility (Fig. 3a); (2) the interpretation and compilation of individual site records to give an inference of peak occupation periods (Fig. 3b); and (3) artifact z-scores, a standardization approach taken from recent paleo-fire studies that allows integration of a wide range of spatial and temporal records into one regional curve (Fig. 3c) (Williams 2012).

As Fig. 3 demonstrates, occupation of the arid zone began soon after colonization. There are now eight sites that would have been located within the expanded arid core of Australia before and during the Last Glacial Maximum. The oldest is *Parnkupirti*, located on a tributary of the once mega-lake of Lake Gregory in the southeastern Kimberley dated from 50 to 45 ka. Lake Gregory itself would have once been a very large freshwater lake fed by the Kimberley ranges to the north and containing shellfish, fish, water fowl, and myriad of fauna such as emu and macropods. Other sites in the Kimberly are dated to 45 ka, while at the western edge of the Central Australian ranges, Puritjarra rockshelter shows evidence for occupation between 40 and 35 ka BP. On the Nullarbor Plain to the south, Allen's Cave has an OSL date of 40 ka, while the earliest occupations at Lake Mungo to the east are estimated by OSL to lie in the range of 50–46 ka. To the northeast, Cuddie Springs dates to 38,500 years ago, while a shelter near Lawn Hill in Queensland (GRE 8) has a radiocarbon determination of 41,500 cal BP (Hiscock 2008; Smith 2013).

Following colonization, human activity and/or prehistoric populations grew slowly until the LGM, when several of the indices show a decline in data. This corresponds with well-documented abandonment of large tracts of the arid interior, population decline, and the falling back of surviving populations into refugia, including the Pilbara, Central Australian ranges, and Murray-Darling Basin (Veth 1989, 2005) (Fig. 4). (It should be noted that the z-score results here are heavily influenced by the Puritjarra rockshelter record, which formed a refugia during this event, and explain the increase in artifact discard during this time.) After a brief recovery, a similar decline in activity is evident during the ACR. Not previously considered in archaeological literature, the ACR probably saw a similar human response as the LGM. With the exception of the LGM

Australian Deserts: Extreme Environments in Archaeology, Fig. 3 (continued) intervals (*pale gray shading*); *black line* presents a 3-point (equivalent to 750-year) moving average. No smoothing or zero trimming was attempted); (**b**) using data from 58 archaeological sites in the arid zone, a graph showing number of occupied archaeological sites by 500-year time intervals (*dashed lined* shows number of sites; *solid line* shows periods of increased artifact discard or other archaeological indices), (**c**) mean z-scores of artifact discard rates (effectively a regional signal) of nine Central Australian rockshelters: Wanmarra, Wanga East (WO4), Ilarari 17, Rrewurlpmurlpme Kweke, Intirekwerle, Urre, Kweyunpe 6, Therreyererte, and Puritjarra. (**d**) EPICA Dome C ice core deuterium/hydrogen ratios – a proxy for temperature, (**e**) sea-level change from sediments in the Red Sea, (**f**) a record of El Niño-Southern Oscillation from an ocean core, SO147-106KL, off the coast of Peru – a proxy for rainfall. Climatic periods are shown, including the Last Glacial Maximum (*LGM*), Antarctic Cold Reversal (*ACR*), mid-Holocene climatic optimum (*MHC*), and intensification of El Niño-Southern Oscillation (*ENSO*). See Williams (2012) for further information and methods presented in this figure

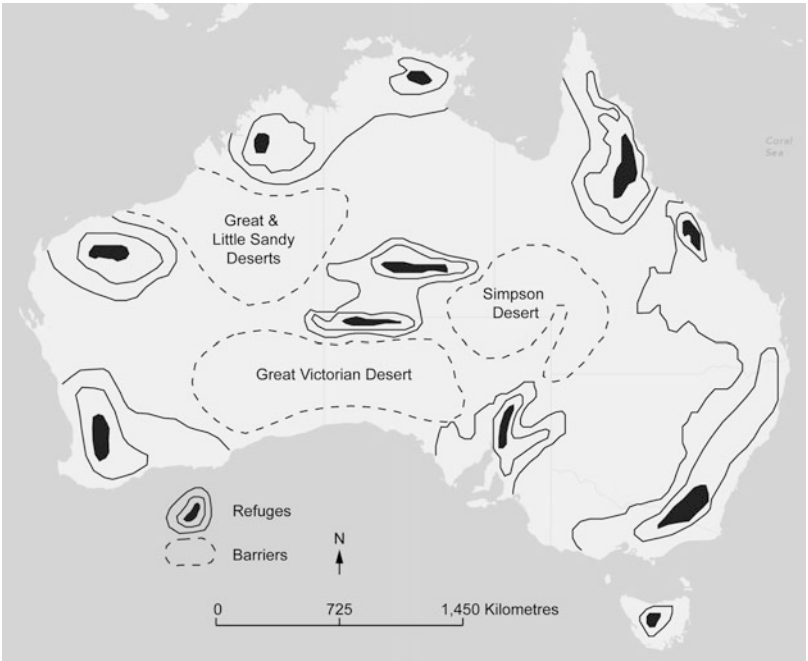

Australian Deserts: Extreme Environments in Archaeology, Fig. 4 Conceptual map of barriers (sand sheets), refuges (uplands), and corridors (interstitial lowlands) used by Aboriginal people during climate perturbations from earliest pluvial phase, expansion of the arid interior during the Last Glacial Maximum, and then subsequent amelioration and climatic fluctuations of the Holocene. Developed by Veth (1989) as a heuristic model to provide a framework for understanding some of the dynamism in the timing, settlement, and mobility of desert societies, this has been supported in large by 25 years of desert studies (cf. Hiscock 2008). The new cryptic refuge model of Smith (2013) sees smaller satellite refugia outside of the major uplands – as deduced from studies of faunal biogeography – especially for persistence of populations during the LGM

and ACR, the data suggests that the Terminal Pleistocene was generally a period of decline or period abandonment in the arid interior.

After the ACR and in tandem with ameliorating climate, significant increases in populations/human activity can be observed in the Terminal Pleistocene/early Holocene between ~12,000 and 8,000 years BP (Smith 2013). A significant increase in both radiocarbon data and artifact rates can be observed during this period, and several sites were occupied for the first time (e.g., Puntutjarpa rockshelter in the Musgrave Ranges, Norina Cave and Madura Cave on the Nullarbor Plain, and Marillana A rockshelter in the Pilbara uplands) or contain evidence of intensified occupation (e.g. Allen's Cave on the Nullarbor Plain and Puritjarra rockshelter in the Cleland Hills).

The initiation of ENSO during the late Holocene led to a series of changes in the configuration of Aboriginal populations, between ~4,000 and 2,000 years BP, including responses inferred as regional abandonment and population decline. During this period, the use of hafting technology, the appearance/proliferation of microlithic tools (e.g., tula adzes and backed blades), and the standardization of stone tools, intensifying long-distance trade and ritual networks, all occur for the first time (Smith 2013).

After 2,000 years BP, hunter-gatherer populations may have increased exponentially, a fact identified by several authors but yet to be adequately explained (Smith & Ross 2008). Importantly, this increase is still prominent in the taphonomically corrected data, indicating it is not an artifact of site loss through time (Williams 2012). This period also saw a series of new adaptive responses to climatic variability, including

marked increase in use of marginal and outlying sites, the extended use of existing sites, increased territoriality expressed through greater differentiation of rock art, and more intensive use of lower calorific food resources, such as *Acacia* and grass seed processing. Recent work has shown this period to be increasing complex with human responses to events such as the Medieval Climatic Anomaly (Williams et al. 2010).

Human Response to Extreme Environments

Conditions were generally more favorable when groups entered Sahul c. 50,000 years ago, meaning that people were not entering the daunting and ostensibly "dangerous" landscapes lamented by early European explorers – although this can be in part explained by European lack of familiarity with these environments. These favorable conditions then became more diverse and in many cases challenging by 30,000 BP. This has been labeled the "desert transformation model." In this scenario, groups first adapted to more benign climates and then made changes in their settlement behavior, technology, economy, dietary suites, and material culture to accommodate significant changes in the landscape.

Environmental reconstructions suggest that while conditions would have been colder than today, other factors may have promoted early movement inland. Hiscock and Wallis (2005) make the case that:

> In many regions it is likely that up until 45,000 years ago – and perhaps to 30,000 years ago in some locations – the availability of fresh surface water would have been at least as good, if not better, than during the Holocene…The greater relative availability and predictability of resources…would have facilitated exploration and exploitation of these unique interior landscapes.

These recent environmental reconstructions, coupled with the patterning of radiocarbon dates and economic evidence from numerous archaeological sites, support a very early movement of people into well-watered inland regions, and here we would argue the "extreme" deserts of Australia.

Groups not only occupied radically different environments in a relatively short period of time; they also began to develop signature regional traits. Interestingly many of these are sources from the then expanded arid zone of Australia. These are inferred from differences in tool production, long-distance exchange networks (witnessed in movement of ochre specimens), complex funerary practices (such as at Lake Mungo at the Willandra Lakes), and very different group-identifying behaviors that have been interpreted from different art styles thought to date to the Pleistocene period (such as the engraved Archaic Faces found from the Pilbara and then in a vast swathe across the western, central, and arid lands on the eastern border).

Lumps of faceted ochre, grindstones on which ochre has been ground, and slabs smeared with ochrous pigment date back to c. 42,000 years ago, from sites in the southwest Kimberley and from a burial site in Lake Mungo, from excavations in Arnhem Land, and from excavations dated to >32,000 BP from Central Australia (Hiscock 2008). It is assumed that ochres were used in the earliest pigment art and that it was likely part of the repertoire of Indigenous Australians (Veth et al. 2011).

Shell beads were important signals of modern behavior in Africa and the Levantine. Representing items of personal adornment and identity, they have now been recovered from Australasia as well. The two key sites of Mandu Mandu Creek rockshelter and Riwi lie on the edge of the deserts of northwest Australia and have yielded "strands" of 22 cone shells older than 32,000 BP and 10 tusk shells dated to approximately 30,000 BP, respectively (Balme & Morse 2006). Such regionally distinct personal wear is seen to have helped in mediating interactions within and between groups.

Long-distance exchange can be inferred from artifacts that lie well outside their supply zone and can be sourced accurately. The oldest comes from a burial site in the Willandra Lakes, more than 40,000 years old, where the closest source for ochre is the Barrier Range some 250 km distant. Ochre as old as 32,000 BP was transported 125 km to the Central Australian site of Puritjarra, while ochres from Mandu Mandu Creek rockshelter in northwestern Australia were transported over 300 km as early as 25,000 BP. Pearl, baler, and tusk shell were moved up to 500 km from as early as 30,000 BP.

During the period of intensified aridity in the Last Glacial Maximum, the ways that humans used the arid zones have been debated. Most agree that certain regions such as inland ranges acted as potential refuges, with other less watered environments being abandoned. This thesis is presented in Peter Veth's (1989) *Islands in the Interior*, where people retreated to ranges in the Pilbara, Flinders, Kimberly, and Central Australia, with the remainder of the arid regions being used in more sustained ways in post-LGM climatic regimes. The main dune fields representing some of the more extreme and challenging environments were thought to remain largely unoccupied prior to 5,000 years BP, although some use of sandhill country occurred during the Pleistocene (Smith 1993). The significance of refugia is clear, particularly in the Pleistocene. In building on Veth's paradigm, Smith has recently proposed a model for "cryptic refugia" borrowing from biological studies that suggest that some areas outside of uplands acted as refugia for scattered populations of various species and that a similar model for scattered human groups may be appropriate. If so, populations would need to survive in smaller numbers spread over a former range, relying on pockets of microhabitats (Smith 2013).

European Contact

Following rare, accidental, and deliberate coastal landfalls in the seventeenth and eighteenth centuries, the arrival of European colonists in Australia in the late eighteenth century heralded a dramatic change from a continent of Indigenous hunter-foraging societies with deep-time attachments to local environments (as they were at the time of contact) to a settler nation wherein migrants vastly outnumbered Indigenous peoples. In terms of world history, Australia is colonized "late," with various colonies (mainly penal in nature) around Australia only after 1788 CE.

Unsurprisingly, Australia's massive interior desert regions remained outside the colonization "frontier" until the mid-nineteenth century. Explorers entered (but did not necessarily survive) the arid lands and encountered the peoples already resident there, although many only saw signs of occupation as they passed by camps and sites. Knowledge was a critical barrier to exploration. Some explorers such as Eyre traveled with Aboriginals, while others such as Canning at times forced Aboriginal people to blaze trails. By the 1860s, explorers had provided knowledge essential for the establishment of isolated outposts strung across Australia's central deserts. These in turn allowed trans-global communication in the form of the Overland Telegraph connecting southeastern Australian colonies to Darwin, then by submarine cable to Singapore and the British Imperial realms. Another very different communication occurred in and around the telegraph repeater stations for each was established in the traditional country of desert communities – this settings provided the location for significant "early historical" observations about Australian Aboriginal society best reflected in the ethnographic observations of Baldwin Spencer and F. J. Gillen. These and other later observations form the foundation from which ethnographic knowledge of desert societies is constructed (see Keen 2003 for further discussion).

From this time onward, Australia's deserts become the setting for increasingly diverse encounters between Indigenous Australians and outsiders (mainly British, but including other ethnicities to create diverse desert societies located well beyond the colonial "frontier"). Nineteenth- and twentieth-century explorations were fuelled by the desire to access land for stock and suitable droving routes (the Canning Stock Route, e.g., cuts across the Western Desert), imaginary interior water sources (the various permutations of "inland seas"), mineral prospectors (such as the announcement by Harold Lassiter in the 1920s of a centralian goldfield), scientific knowledge, and a place beyond the gaze of colonial authority. Exploration led to the establishment of stock-droving routes that crossed the deserts, linked by water and infrastructure, and to various mineral industries, such as Arltunga in the White Range – Central Australia's first official town following gold discovery in 1887 (Holmes 1989).

The early historical period of Australia's desert, from a European perspective, occurred almost

a century after British colonization/invasion. We expect environmental and demographic changes resulting from introduced species to have moved well in advance of colonists (and thus European historical observers). When Europeans arrived, there were few large native fauna and European-introduced species – particularly camels, horses, cows, sheep, goats, dogs, cats, rabbits, and foxes – that had changed the Australian environment dramatically after 1788, resulting in the decline and extinction of many endemic mammalian fauna (Rolls 1984). The ancient Australian soils had never been exposed to hooves, and these animals created havoc (and still continue to) around natural water resources. New plants crowded out native grasses and other plants, at a time when any forms of Indigenous land management – such as the use of fire – were in a state of flux. Few pastoralists looked kindly on the use of fire, seeing it as a threat to stock and the newly installed pastoral infrastructure.

Equally diseases need to be understood – what effect did they have in the early period? Did desert populations plummet, as has been argued by some? The archaeological record is rarely sensitive enough to rigorously measure fluctuations in population in these critical years, given that it is largely a surface record (Campbell 2002). Certainly, the maintenance of long-distance trade networks as observed in Central Australia, for ochre, *pituri* (native tobacco), grindstones, and ceremonies, suggests some robustness in these desert societies following the disruptive arrival of colonists.

We need to distinguish within the various arid and semiarid environments across the continent whether they were colonized by Europeans and other non-Indigenous peoples or not. Many regions were suitable for sheep and cattle pastoralism – other massive desert regions were simply unviable. A gradient of arability emerged from the margins of semiarid regions where stock could be raised, through to those that could not – a situation exacerbated by environmental degradation and fine climatic variation in the more "extreme" or marginal arid environments.

Another significant element of historical period deserts was the introduction of camels and handlers from various origins in West and South Asia – although widely termed "Afghan" or "Ghan" – a name commemorated in the Alice Springs to Darwin transcontinental railway (Stevens 1989). Little archaeology has yet been done of their camps, places of worship, and work. Equally the arrival of missionaries is a significant archaeological topic, only addressed at a handful of sites such as the Killalpaninna Lutheran Mission on the Birdsville Track (Birmingham & Wilson 2010).

The largest corpus of post-contact archaeological work has been carried out on pastoral sites, some simply interested in pastoralism and others interested in pastoral settings as part of a broader regional process of culture contact. In Lake Eyre, for instance, the archaeological record reveals that Aboriginal people continued to live in and around their estates on vast sheep stations – providing labor, knowledge, and economic security through their seasonal availability. However, only some remained "inside" the pastoral domains, and others remained "outside" as "wild strangers" – at least in the perception of Europeans. Conversely in the northern realms, the demands for work married better with seasonal work demands, with the wet season being a time for the fulfillment of cultural responsibilities (Paterson 2008).

For many today the cultural heritage of deserts reflects pastoralism, remote communities, or survival – or not. Bean (1910) reflected: "There, around Lake Eyre, and over some part of Central Australia you may see them today – deserted homesteads standing out from the desert with the marks of old settlement around them. That is what sheep mean to Australia." The other record of heritage often overlooked is an Indigenous record, which too has historical components.

To summarize, the archaeological study of post-contact deserts can be divided into (1) rural and regional heritage studies interested in buildings, mine, and infrastructure (Gill & Paterson 2007); (2) culture contact between Aboriginal people and various outsiders (Veth et al. 2008), particularly pastoralists; (3) Indigenous responses to historical contingencies, as reflected in subsistence, settlement, depictive traditions

(especially rock art) (Taçon et al. 2012), and colonial/government authority and labor demands (Paterson 2008); and (4) "longue duree" approaches that articulate historical events into longer time scales, such as Smith's study of the Cleland Hills (Smith 2005).

In extraordinary events of global relevance, played out locally on patches in the Western Deserts, as late as the 1960s, Aboriginal people who had never seen white people "came out" of the desert and "came into contact" with white Australians for the first time. These events represented the last extreme environments of earth to come into the fold of the wider global community.

Cross-References

- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Australian Paleoart
- ▶ Complex Hunter-Gatherers
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ First Australians: Origins
- ▶ Indigenous Archaeologies: Australian Perspective

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Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology

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Introduction and Definition

The statutory authority of the Australian Commonwealth (federal) government known as the "Australian Institute of Aboriginal Studies" from 1964 to 1989 and "The Australian Institute of Aboriginal and Torres Strait Islander Studies" (1989 to present) has as its primary function support of research into Indigenous Australia (Anon. 1964, 1989). Archaeology was a central focus of the Institute from its inception. The 1961 "Conference on Aboriginal Studies" held under the auspices of the Social Science Research Council that led to the founding of the Institute heard presentations by representatives of each of the disciplines comprising the then fields of Australian Aboriginal Studies: anthropology, human biology, linguistics, prehistory and material culture, and strong arguments for a national research center (Stanner & Sheils 1963; Mulvaney 1963: 33-51; Horton 1986: 83). The Institute's first two principals (chief executive officers), Fred McCarthy (Fig. 1) and Peter Ucko (Figs. 2 and 3), were archaeologists, and chairs of the Institute's Council were involved in prehistoric archaeology Professor Neil W.G. Macintosh (1906–1977), Professor of Anatomy at the University of Sydney and a foundation member of AIAS, between 1966 and 1974; and Professor D. John Mulvaney AO CMG (1925–), known as the "father of Australian archaeology," during the years 1982 and 1984 (Figs. 4 and 5). Most of the first generation of Australian academic archaeologists was involved with the Institute in at least its first decade, guiding not only its activities but also the development in Australia of the discipline itself.

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 1 Dr. Frederick D. McCarthy (1905–1997), first principal (second from L) with Professor D. John Mulvaney AO CMG, Professor W.E.H. Stanner CMG (1905–1981), one of the founders of the Institute, and Dr. Norman Tindale AO (1900–1993), at The Australian National University, Canberra, May 1980, on the occasion of granting honorary doctorates to McCarthy and Tindale (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 2 Dr. Peter J. Ucko (1938–2007), second principal, contemplating an archaeological manifestation/Aboriginal cultural heritage place near Gove, on a visit to the Northern Territory in 1976 (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 3 Professor Peter Ucko at University College London signing copies of his festschrift 7 January 2006, a day of seminars and celebration of him, his work, and his collegiality ("Peter's Day") (Photograph: Lydia Maher, courtesy of Jane Hubert)

Historical Background

Australian Archaeology Before the Institute

In his address to the 1961 conference, John Mulvaney (1963: 34, 44–5) reviewed the state of Australian archaeology, speaking of the

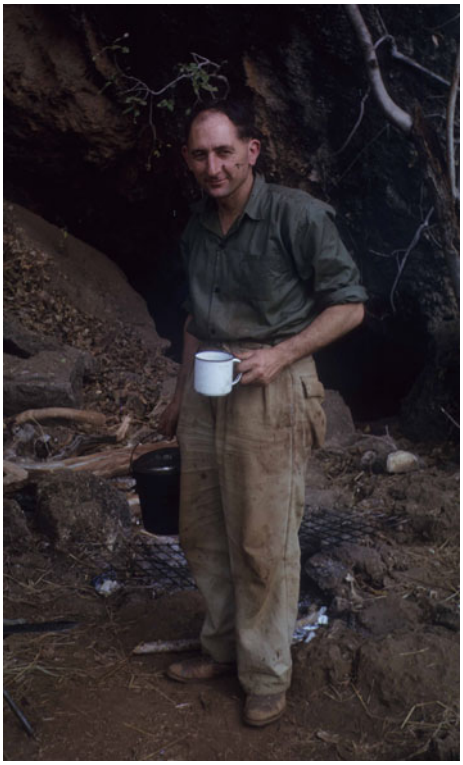

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 4 Professor D. John Mulvaney AO CMG (1925–), Chair of Institute Council, at Kintore, Northern Territory, 1963 (Photograph courtesy of D.J. Mulvaney)

necessity for "typological exactitude," obtaining "more than one age estimation from each site," and of the difficulty of covering the costs of field research. On the same occasion, McCarthy (1963: 53-5) recorded what he saw as the "urgent needs" of Australian archaeology and spoke of the "neglect" of the discipline: there were no university courses in archaeology, no support for research from funding bodies, and neither a specialist journal nor a professional association to organize regular meetings. There were extremely limited employment opportunities; the few persons active were based in museums. Opportunities for publication were similarly limited; while there had been short articles on archaeology in Australian anthropological journals and in museum proceedings, Mulvaney's (1961) major review of Australian prehistory had been published in Britain. The only opportunity for disciplinary meetings was at congresses of the Australia and New Zealand Association for the Advancement of Science. There was no legislation in most jurisdictions to protect archaeological sites or to control field research. Australian archaeology was neither professional nor self-sufficient.

The Institute Established: 1961–1964

In December 1961, an Interim Council was appointed to make recommendations toward "the permanent establishment of a national research organisation" (Stanner & Shiels 1963: xiv). In 1964, following the passage of the *Australian Institute of Aboriginal Studies Act* confirming a 22-member Council and a foundation membership of 100, the first principal was appointed. McCarthy (1905–1997) was ethnologist and curator at the Australian Museum in Sydney; while his scholarly pursuits were broad, archaeology and cultural materials studies were central to his interests. He was one of the few archaeologists active in Australia in the previous three decades, known for his systematic excavations of rockshelters in the Sydney area (Attenbrow & Khan 1994), and for a book on stone tools, for many years the main scholarly work on Australian lithic assemblages (McCarthy 1967/1976). McCarthy, with the assistance of staff initially comprising a secretary, technical officers, and a librarian, commenced building the Institute and establishing its role vis-a-vis other institutions concerned with Australian Aboriginal studies.

Key Issues/Current Debates

Institute Research Grants

The Institute's Interim Council was empowered to provide grants for research, and some of the first went to support archaeological endeavors. The initiative was welcomed; Megaw (1963: 298), acknowledging a fundamental change, noted that "... from the point of view of archaeology in Australia the momentous decision is that of the principle of Government sponsorship for research

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 5 John Mulvaney with (L) Dr. Rhys Jones (1941–2001) and Don Ranson at Kutikina Cave, Tasmania, in 1983. John was involved in the successful national heritage listing of the site. Rhys was an early grantee, long-term Member of the Institute and served on its Prehistory Advisory Committee as member and chair for many years as a sometime member of the Institute Council (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Table 1 Institute grants for archaeology from 1961 to 1970

Topic	Excavation	Survey and excavation	Survey	Ethnoarchaeology	Radiocarbon age determination	Other project types
Number	13	7	5	3	31 (201 analyses)	6

projects …". Listing of successful grants in the Institute *Newsletter* effectively publicized the grants process and encouraged further applications at a time when new researchers were being trained in universities.

Twelve of the 63 initial grants in 11 disciplinary categories went to archaeology. By 1968, when McCarthy (*Newsletter* 2(3): 34-6, 38-41) reported assistance for archaeological research, that support was being manifested across the continent, and it was probable that most of the research in Australian prehistoric archaeology was being funded by the Institute and involved not only Australian-based researchers but also archaeologists from Great Britain and the United States. Toward the end of his term as principal, McCarthy (*Newsletter* 3 (1): 1-101), summarizing research support during the Institute's first decade, showed that archaeology represented more than one fifth of the total grants for all disciplines and the range of research covered (Table 1).

Major projects supported included excavations at Mount Cameron West, Kow Swamp, and Koonalda Cave; there were also 21 projects to record and research rock art. Funds were provided for films on stone tool manufacture and the Kow Swamp excavations. In the 1970s, with the development of various university departments and State agencies, while archaeology became less dependent upon the Institute, AIAS was still a major source of funding for archaeological research. Toward the end of the next decade, the deputy principal was able to report that a similar proportion of grants had been allocated to archaeology and related fields as had been the case in the 1960s (*Newsletter* n.s.13: 6-21).

Throughout the 1990s, Institute annual reports record that archaeology and related disciplines were substantial recipients of research grant

funding. Fifty years after its establishment, despite many changes of emphasis, about one quarter of the Institute's support for external projects in the 2011 grant round was applied to archaeological projects. When the Institute's Grants Program was suspended indefinitely in 2011, the Australian Archaeological Association protested on behalf of its membership.

Support for Publication

An early initiative of the Institute was to provide for the publication of the results of research and related activities. Aside from publishing short archaeological reports in its *Newsletter*, the Institute provided substantial financial contributions toward publication of articles, monographs, books, and technical manuals. The first scholarly article in the *Newsletter* was by archaeologists Megaw and Glover (*Newsletter* 2(3): 4-15); it was accompanied by another on comparison of skeletal materials and a first listing of radiocarbon age determinations. The second principalship, that of Peter Ucko (1938–2007) who took up his appointment in 1972 from a lectureship in archaeology at University College London where he had been responsible for influential books on European rock art, domestication, and urbanism, coincided with the term of a reforming Australian government, an extension of the Institute's role and fundamental changes in its governance and emphases. In January 1974, Ucko initiated a new series of the *Newsletter*, which subsequently carried an increasing proportion of reports and scholarly articles. The Institute's journal, *Australian Aboriginal Studies*, which replaced the *Newsletter*, was started in 1983 and continues today, albeit in a reduced format less suitable for presentation of archaeological material.

In the 1960s, the institute made contributions to the cost of publication of papers in the existing Australian anthropological journals and various museum series. Publication subsidies were provided also for books, including covering the cost of illustrations for a new edition of McCarthy's *Australian Aboriginal Stone Implements* (1976) and assisting with the publication of McBryde's (1974) New England survey (*Newsletter* 3(1): 38-9). By 1970, however, the Institute had its own publication section responsible for the production of books and audiotapes, as well as the *Newsletter* and annual reports. Various publication series were initiated including manuals and monographs on archaeology and "material culture." The first was the radiocarbon dating manual prepared by Henry Polach and Jack Golson, *Collection of Specimens for Radiocarbon Dating and Interpretation of Results* (1966).

This was followed, over the next decade, by *A Guide to Field Methods and Laboratory Techniques* (Mulvaney 1968); *Aboriginal Antiquities in Australia: Their Nature and Preservation* (edited by McCarthy, Isabel McBryde and Mulvaney 1970); *The Preservation of Australia's Aboriginal Heritage: Report of National Seminar on Aboriginal Antiquities in Australia, May 1972* (edited by Edwards 1975); *Stone Tools as Cultural Markers: Change, Evolution, and Complexity* (edited by Richard Wright 1977); and *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe* (edited by Ucko 1977). These works were central to the development of the discipline. From the 1980s, the emphasis of Institute publication changed, notable archaeological exceptions being *A Record in Stone: The Study of Australia's Flaked Stone Artefacts* (Holdaway & Stern 2004) and *The Social Archaeology of Australian Indigenous Societies* (edited by Bruno David, Bryce Barker and Ian J. McNiven 2006).

Support for Positions in Archaeology and Related Disciplines

A major contribution to the discipline was the Institute's funding of positions within museums, universities, and the research program of the Institute itself. In an early example, the Institute sought to provide greater access to radiocarbon analysis and to strengthen the provision of new radiocarbon facilities by paying the salary of an analyst at The Australian National University (ANU). A total of seven professional positions were funded in the 1960s, along with research assistants (eight), technical assistants (two), and State-based research officers (*Newsletter* 3(1): 36-7).

This initiative continued during Ucko's principalship, when the Institute funded the establishment of university chairs of archaeology and "material culture," as well as providing for lectureships, usually on the basis of an agreement that the university would continue funding the position at the end of the period of assistance.

In the mid-1970s, Ucko obtained a significant expansion of Federal government funding; he established several research positions based at the Institute. There were to be five research consultants (five-year appointments) and 14 (three-year) research fellowships. Two of the former and two of the latter research positions were in archaeology or related disciplines (*Newsletter* 3: 4-5). An important addition was the appointment in 1974 of a paleoecologist, David Horton, who worked with archaeologists on faunal assemblages (*AIAS Annual Report* 1975 to 1976).

A significant proportion of the Institute's research funding has supported postgraduate positions. Two of the postdoctoral fellows in archaeology in the 1980s, John Beaton and Colin Pardoe, were based at the Institute; the former adapted the extensive kitchen facilities of the old hostel that housed the Institute to his archaeological laboratory.

Support for Conferences and Specialist Meetings

The 1961 conference provided valuable reviews at that time of the various disciplines of "Aboriginal Studies" (Stanner & Sheils 1963; Horton 1986). It set a useful precedent, encouraging discussions of a wide range of research concerns, and it was followed by other national subject-focused meetings, encouraged and sponsored by the Institute's Council. Institute-supported meetings and conferences were important not only for establishing a collective sense of the discipline of archaeology but also for widening appreciation and agreement on particular matters and sometimes prompting action outside the Institute. In 1963, a "Conference on Nomenclature of Implements and Cultures" was held at the Australian Museum in Sydney (McCarthy 1965). Mulvaney (1986a) wrote that it was the first specialist meeting in Australia of the discipline, Megaw (1963) reported favorably to a wider readership, a subcommittee was established so that the problems raised about typology could be pursued further (*Newsletter* 3(1): 38), and the discussions contributed to the new edition of McCarthy's (1967) manual on the subject, which, decades later, Holdaway and Stern (2004: xiv) could describe as still the ". . .classic typology of Australian stone tools."

Issues of significance to particular disciplines were discussed by members at subsequent biennial General Meetings. In 1964, McCarthy (*Newsletter* 2(1): 3) outlined to the Prehistory Panel his program for encouraging archaeological research toward Australia-wide studies of surface campsites to allow the study of stone tool types in a broader context. At the 1966 General Meeting, discrete disciplinary conferences covered covered human biology, and prehistory and "material culture"; the latter Panel, convened by Mulvaney, explored the need to standardize methods and procedures for recording sites (*Newsletter* 2(4): 49); Mulvaney subsequently edited *Australian Archaeology: A Guide to Field Techniques* (1968; revised 1972; third edition by Connah in 1983).

In 1968, archaeologists combined with ethnographers for a four-day conference on "Monuments and Antiquities: Their Control and Preservation" convened by McCarthy, Robert Edwards, and Mulvaney. McCarthy (1970) described its goal as to place pressure on State and Territory jurisdictions to introduce legislation to protect "Aboriginal antiquities" and to provide for their conservation; the conference proceedings were available several months later (published 1970). At the 1972 General Meeting, a "National Seminar on Aboriginal Antiquities" was convened by Edwards (published 1975) and another by Alan Thorne on "The Settlement of Aboriginal Australia" (*Newsletter* 3(5): 24-5).

The major conference held in conjunction with the 1974 General Meeting was notable for its broad scope, the participation of distinguished international scholars, and some controversy over lack of involvement of Indigenous Australians. The prehistory symposium, "Stone Tools as

Cultural Markers: Change, Evolution and Complexity" was published in Canberra and internationally (edited by Wright 1977), as was the symposium on "Form in Indigenous Art" (edited by Ucko 1977). In February 1975, the Institute organized a meeting to discuss computerization of records of collections of Aboriginal artifacts held in State and Territory collections. This was followed by another to discuss problems associated with the export of Aboriginal artifacts; it recommended several actions to control the trade, and the Material Culture Advisory Committee recommended that the Institute help Australian museums purchase objects of national significance that had been refused an export permit (*Newsletter* 5: 15-6). Other biennial conferences followed – the archaeology focus in 1976 was on "Aboriginal artifacts" – but none were on a similar scale and with a comparable commitment to publication of the presentations and resulting discussions as for the 1974 conference.

Seminars have been another important opportunity for Institute researchers and grantees to present the results of their researches. Regular seminars were started by Ucko soon after he became principal, involving, particularly, Institute-funded grantees who were visiting the Institute, and there were several presentations in the initial series of seminars by archaeological researchers.

Currently, the Institute coordinates two semesters of seminars that occasionally include presentations on archaeology and related topics. Specialist meetings were an integral part of the 1970s Sites of Significance Program, and the Rock Art Protection Program supported conference attendance, especially by Indigenous participants.

Some 32 years after McCarthy's 1963 "Conference on Nomenclature…," another meeting, a workshop organized by the Institute and La Trobe University staff members, was held at the Australian Museum (February 1995) with the intention of reviewing McCarthy's typology; a new and comprehensive work on "Australia's Flaked Stone Artefacts" resulted (edited by Holdaway & Stern 2004). Over the last decade, however, specialist meetings have been few and usually held in association with the Institute's major conferences.

The Influence of Institute Committees

In the early 1960s, the Institute used panels of experts for advice on, particularly, the allocation of grant funds; these committees set high standards in the allocation of grants and also guided the development and direction of each of the disciplines. On taking up his appointment as principal in 1972, Ucko developed this concept, enhancing the roles of the disciplinary advisory committees that had previously conducted their business by correspondence. Committee members now meet in Canberra twice each year, not only to advise the Council on grant applications, fellowships, and related matters but also to debate the direction of the development of each discipline and, where necessary, to commission urgent research. Ucko (*Newsletter* 1: 5) emphasized that the task of committees was to formulate research priorities. In 1973, there were 14 committees with up to 12 members each (*Newsletter* 1: 1-4,7). Of relevance here are the Prehistory, and Material culture, Advisory Committees, and the "Committee on Sites of Significance," established under the chairmanship of the deputy principal to oversee the activities of the National Site Recording Program. A few years later, all Institue committees had an additional member in the person of an Indigenous Australian who was working in or who had a particular interest in the relevant field of study. Institute research staff served as "executive officers" for each committee.

The value of the activities of these committees in developing the direction and practice of archaeology in Australia cannot be overemphasized; over the years that the committees were in operation, many senior practitioners were involved in the discussions and deliberations, and the Institute committees were seminal in the development and professionalization of archaeology in Australia. Much earlier, McCarthy had written how the involvement of the principal and members of the Council in making decisions about the allocation of grants gave the Institute a strong role in deciding

archaeological research priorities and enhancing professionalism in various disciplines; he claimed (1965: 307) that the Institute was "... not only a source of funds for research, but a co-coordinating and advisory body, building up slowly a corpus of information available nowhere else." This process was enhanced by the committee system and may be seen as a major contribution to archaeology and other disciplines of "Aboriginal Studies."

A period of "financial austerity" curtailed the activities of the Institute's committees in the early 1980s (*Newsletter* 17: 4-6), and in 1989, following the passing of the Institute's new Act, most were terminated. A "Research Advisory Committee" including eight elected disciplinary representatives deliberated on grants applications. Some of the wider functions of the Institute's Sites of Significance Committee – which had advised on the allocation of grants under external funding (below) – was superseded by annual meetings of a "National Aboriginal Sites Authorities Committee" hosted in turn by the various State and Territory heritage agencies, involving professional, technical, and Indigenous staff.

Sites of Significance and Rock Art Protection: Externally Funded Programs

The Institute has, on two occasions of significance to Australian archaeology, accepted major external funding to conduct and promote research programs.

Early in his term in office, McCarthy had established a "Catalogue of Aboriginal Relics" to deal with the volume of records being provided by researchers, culled from the literature, and from the voluminous correspondence that he maintained with amateur fieldworkers; copies of the cards were sent to museums and provided the basis of some State site record systems; there was a concern for standardization of terms and recording procedure (*Newsletter* 2(2): 20; 3(5): 26-7). Following the meeting on the need for archaeological legislation at the Institute's 1968 conference, and another on "A National Register of Aboriginal Sites" in 1972, a committee had made recommendations to the Commonwealth government concerning a scheme "to protect and salvage prehistoric monuments and antiquities in Australia." In 1973 – in a period of rapid resource development – funds were provided by the Commonwealth to the Institute for the implementation of a National Site Recording Program (*Newsletter* 3(6): 13): the Institute "... has been vested with responsibility of all sites of either traditional or historic importance to the aboriginal people"; a committee, chaired by the deputy principal, was established with representatives of State and Territory authorities, "one fully initiated Aboriginal man," and others. (In Australia, where responsibility for land tenure rests with the States and Territories, such sensitivities could be mediated by such inclusive membership, but it is not clear how one Indigenous Australian could speak for the many and no doubt various Indigenous interests).

The committee was to meet at least twice each year; it was to formulate a coordinated program and allocate funds to record sites, and a National Register of Sites was to be maintained (*Newsletter* 3(6): 14). Two years later, 22 positions in the various jurisdictions had been filled (*Newsletter* n.s. 3: 11); there were regular meetings of site recorders to discuss processes and other matters of professional interest, a major example being the 1979 site recorders meeting at Kioloa that "...provided an opportunity for site recorders and others, but Aborigines in particular, to meet people currently engaged in research into Australian prehistory" (Dix 1980: 8). There was much to be done, and the expectation that all places of significant heritage value could be recorded was unrealistic.

The Institute continued to provide funding for site recording for several years. By the early 1980s, all Australian States and Territories had archaeological legislation in place and had established their own programs to record and protect Indigenous heritage places with professionally qualified personnel and programs to train and employ Indigenous site recorders. The Sites of Significance Program provided further opportunities for employment of archaeologically trained fieldworkers and thus the development of the field of public or consulting

archaeology in Australia, an area in which a substantial proportion of graduates find work. The Australian Association of Consulting Archaeologists, a professional body established in 1979, has 50 full members and more associates and affiliates.

The national Rock Art Protection Program (RAPP) was established at the request of the then Minister for Aboriginal Affairs to provide for the protection of Indigenous Australian rock art. The RAPP was funded by the Commonwealth government for 12 years from 1986, after which time the Institute continued to provide for a similar range of projects for the next decade. The scope of the RAPP ranged from the physical preservation and management of endangered sites, including those threatened by natural elements and by interference from humans and animals, to the support of new research and applied projects including the development of new dating techniques. As with the Sites of Significance Program, it required the cooperation of State and Territory authorities and that of Indigenous knowledge-holders and custodians of the cultural places involved. It has been argued that the program made a significant contribution to the development of systematic studies of Australian rock and influenced research and practice in these fields elsewhere in the world (Ward 2011).

Indigenous Australian Influences on the Institute and on Australian Archaeology

No Indigenous Australians were present at the 1961 conference; there were, however, many present who had worked in depth with Indigenous communities and would have had their interests in mind (*Newsletter* 1(1): 9-10). In the first decade of the Institute's research activities, there are many instances of the involvement of Aboriginal persons, mainly in association with various grantees, for instance, in bringing traditional knowledge-holders to the Institute to work with researchers. The difficulty that some archaeologists had experienced in obtaining access to sites to conduct their fieldwork was the subject of an Institute meeting in 1971 (Mulvaney 1986b: 105). After the attention brought by the "Eaglehawk and Crow Letter" (signed by Widders and another five activists) on the rationale for the 1974 Biennial Conference and the orientation of the Institute's research program in general, the process of change within the Institute was hastened; along with the opportunities to serve Indigenous interests presented by the *Aboriginal Land Rights (Northern Territory) Act of 1976*, it has been seen as marking "... more or less the start of negotiated anthropology within Australia" (Peterson 1990: 17 fn).

Organizationally, Ucko and the Council encouraged a positive program of "Aboriginalisation" (Ucko 1983; Moser 1995). Indigenous knowledge-holders and community leaders became Members, and, from 1975, an Aboriginal Advisory Committee provided a firmer Aboriginal voice on other committees and in the activities of the Institute in general (*Newsletter* 3: 6). From 1976 a "social issues adviser" participated in the discussions of each advisory committee, so that Indigenous interests could be considered in the various research programs (*Newsletter* 7: 10-1). More Indigenous staff were employed at the Institute, and Indigenous Australians were offered training in research (*Newsletter* 5: 7, 10: 28-9); Indigenous-requested research and training projects were emphasized alongside lists of grants awarded (e.g., *Newsletter* 7: 25). These initiatives were confirmed by a resolution at the 1976 biennial meeting (Newsletter 7: 7). In 1981, outside the Sites of Significance Program, there were ten Indigenous trainees based at the Institute (*Newsletter* 15: 8).

The arrangements for Indigenous participation on the Council and its advisory committees were described as "... the most significant development of all in the 1970s" (*Newsletter* 15: 8). The new direction was formalized by the Institute's revised governing statute (Anon. 1989); this provided for an Aboriginal-controlled Council with a minority elected component and a disciplinary-based Research Advisory Committee – it was a structure that may been seen as a culmination of the undertakings begun in 1974 toward collaborative governance and research endeavor.

In 1976, there was initiated a category of Aboriginal-requested grants, particularly for the

mapping of sites of significance. Concurrently, the Institute continued to provide support through the grants process for the training of Indigenous fieldworkers in site survey and management, despites significant cuts to its budget (*Newsletter* 5: 1-4, 12-3). The new Prehistory Committee decided that its scope should include the ecological studies of living Aboriginal groups (*Newsletter* 1: 7); it reiterated its interest in the investigation of ecological relationships of contemporary Indigenous communities as well as with other archaeological research foci; it discussed ways in which Indigenous Australians might be supported to gain formal qualifications in archaeology (*Newsletter* 11: 11).

Also in the late 1970s, the Sites of Significance Program broadened its scope from archaeological and historic places to include ethnographic places and areas of significance to Indigenous communities – a reflection of the increasing participation in the program of Indigenous fieldworkers. Ucko (*Newsletter* 1: 13) wrote that the program not only reinforced the involvement of the Institute in field research but also that it provided employment opportunities for Indigenous researchers. This had been accomplished through the provision of funds to State and Territory authorities for Indigenous training programs. The site recorders' meetings had a strong Indigenous involvement.

The archaeology and sites programs, in particular, participated in major changes in direction and emphasis of the Institute's research. When the initial conference and the leadership of Interim Council, then that of McCarthy and his executive and committees, firmly located archaeology within "Aboriginal Studies" it also forged relationships between archaeologists and Indigenous Australians that either had not existed or were at best tentative. These were developed during Ucko's tenure, in conferences, specialist meetings, and in the regular meetings of the disciplinary committees and workshops that they organized. For the year that he left the Institute, Ucko (*Newsletter* 11: 6) emphasized the significant changes in the degree of Indigenous participation in the functions of the Institute.

In the research grants process, applicants were required to demonstrate not only appropriate Indigenous participation but also, through an evaluation by the Research Ethics Committee, appropriate dealing with Indigenous community interests, including cultural and intellectual property rights, and defining procedures for the communication of research results to the communities involved. Jointly initiated applications for projects, those combining Indigenous agendas with technical expertise, tended to have greater chance of success in what had become a highly competitive grants program.

All of this resulted in a growing appreciation both of the depth of Indigenous culture and its legitimacy, on the one hand, and, on the other, of the professional and technical heritage of the discipline and its potential to serve Indigenous aspirations (e.g. McBryde 1985). Archaeologists had to consider Indigenous interpretations of sites and their roles in a wider cultural landscape; concurrently, archaeological results – particularly dating that emphasized the longevity of Indigenous occupation of the continent – quickly became incorporated into Indigenous discourses. As Australian archaeology developed academically and professionally, and beyond the direct involvement with the Institute, it was able to move more readily to an appreciation of broader societal and ethical responsibilities. Places were made for Indigenous students in archaeology; several ANU graduates, for example, work or have worked as consultant archaeologists or in museum research. Not only has research regularly and systematically involved consideration of Indigenous interest and participation but spaces have been made for research initiated and conducted by Indigenous scholars (e.g., Johnston 2009). This process of legitimating and privileging Indigenous voices in archaeology may be seen to have begun in the 1970s at meetings in Canberra.

Future Directions

The Institute was established more than 50 years ago by academics and politicians concerned that much knowledge of the Indigenous cultures

of Australia was being lost. Archaeology, one of the founding disciplines, was described as a neglected area of study. Through various avenues, including Institute sponsorship of meetings and conferences, support for specialist committees, for research grants, and for lectureships and chairs, support for publication of research monographs, by encouraging the development of legislation to protect Indigenous cultural heritage places, and insisting on the collaboration with Indigenous communities, the Institute became closely involved in the development and professionalization of archaeology in Australia.

By the turn of the millennium, the role of the Institute in the development of prehistoric archaeology in Australia was muted. The discipline had become a popular university teaching subject with associated research strengths and with its own specialist journals, and with access to various sources of funding; it had its own national association organizing conferences and specialist meetings, encouraging the participation of students in fieldwork and conference activities, and lobbying governments. It constituted a professional discipline with its own institutional base, one largely independent of the Institute. As well, the focus of the Institute itself had changed. It was widely accepted that the traditional disciplines, such as social anthropology, linguistics, and prehistory, were not necessarily the main sources of knowledge about Indigenous Australian cultures. During his principalship, supported both by the new involvement of Indigenous interests and the acceptance of the research community, Ucko saw the direction of the Institute had fundamentally changed from one of recording knowledge about a past culture to exploring aspects of contemporary peoples. The Institute's governance formally recognized Indigenous interests as did its research agenda; there was a strong emphasis upon collaborative research. Although its grant program continued to be accessed by younger archaeologists, archaeological research was no longer central to the Institute's research and other activities. Archaeology, however, would not have become an independent discipline in the way that it did without the early and continued support of the Institute.

The future is less clear; the continuing reorientation of the Institute's research interests has taken it far from its foundation disciplines including archaeology. The ideal expressed by previous administrations of having staff expertise to maintain a purview of research across the range of Australian Indigenous Studies largely has been forgotten. In parts of the southeast, some community members have revived an understanding of their cultural heritages by drawing upon archaeological research results, but it may well be another generation before there are enough Indigenous Australians who value such research for their own ends for archaeology again to be a central focus of the Institute.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Rock Art
- ▶ Conservation and Management of Archaeological Sites
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Kow Swamp
- ▶ McCarthy, Frederick D.
- ▶ Rock Art Sites: Management and Conservation
- ▶ Ucko, Peter (Indigenous Archaeology)

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Australian Paleoart

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Introduction

Australia, almost the size of Europe but with a population only a third of that of France or Britain, boasts not only the greatest concentration of rock art in the world but also the highest number of rock art researchers relative to population size. The perhaps most interesting aspect of Australian rock art research is that the country's rock art scholars are significantly less inclined to attempt interpretation of rock art than those of any other world region. Bearing in mind that Australia is universally agreed to have the strongest ethnographic evidence for the original meanings of rock art (Fig. 1), this presents a paradox.

It is the awareness of the uncertainties of etic interpretations that has prompted Australian researchers to opt for scientific investigation in lieu of the creation of a modern mythology about rock art and its meanings. They have therefore been particularly active in such fields as physical rock art analysis, age estimation, survey work, preservation techniques, and methods of site management, while interpretation is largely limited to what has been obtained by ethnographic means.

Definition and Historical Background

Paleoart comprises rock art and portable art-like material of preliterate societies. Rock art is basically divided into petroglyphs (made by a *reductive* process, such as pounding, hammering, pecking, engraving, scratching, or finger marking of soft cave deposits) and pictograms (made by an *additive* process, such as painting, drawing, stenciling, or application of beeswax). In contrast to the prehistoric mobiliary art of other continents, that of Australia is limited to just a few types and these remain largely undated.

Similarities between the earliest types of rock art in Australia and southern Asia have suggested that the first colonizers, Middle Paleolithic seafarers from Indonesian islands, brought with them a tradition of creating rock art when they arrived, possibly in the order of 60,000 years ago.

Australian Paleoart, Fig. 1 Traditional Custodian at Wandjina site he is responsible for, in the Kimberley, NW Australia

A significant part of the surviving Australian rock art, estimated to be in the order of 10 % of the total corpus, is thought to be of the Pleistocene. Such age appears to be mostly confined to petroglyphs, as is the case in most parts of the world. Although the presence of Pleistocene rock art has been suggested since the early twentieth century, such antiquity has only been demonstrated since the 1980s. It applies to much of the cave petroglyphs in the southern coastal region and to particularly erosion-resistant rock facies of open-air sites in various parts of the continent.

Australian paleoart has been studied in one way or another since the early nineteenth century, but until the 1980s, its scientific contemplation was sporadic and intermittent. The establishment of the Australian Rock Art Research Association in 1983 led to a significant intensification of research and publishing efforts, and the first world congress in the field, held in Darwin in 1988, prompted the establishment of the International Federation of Rock Art Organizations.

Australian Rock Art

With such a large national corpus of rock art, the creation of inventories is a long-term process involving many individuals and research teams. Because the greatest concentrations of rock art tend to be in the north of the country, this is where much of the survey work has been focused (Fig. 2). The major concentrations are the petroglyphs of the Pilbara, the paintings of the Kimberley and Arnhem Land, and the mixed corpora of the Victoria River region and the far north of Queensland (Cape York Peninsula). Noteworthy is also the stencil art centered on the Carnarvon Ranges in Queensland and concentrations in central Australia and eastern South Australia (Flood 1997).

While the sites in the north have attracted the greater interest, comprehensive inventories have been attempted in some southern regions, such as Gariwerd (Grampians mountains) in Victoria, the Olary and Flinders Ranges region of South Australia, in western and coastal New South Wales, and a small selection of petroglyph sites in Tasmania (Sims 1977). It is impossible at this stage to provide reliable quantitative estimates of Australian rock art, and in view of the size of the national recording task, this will remain so for many more years. However, in assembling the best estimates from leading specialists working in the main regions, one would expect that there should be between 100,000 and 200,000 rock art sites in Australia. The largest of them comprise several tens of thousands of motifs, but as a very rough estimate of average numbers, a figure in the order of perhaps 500 motifs per site seems reasonable. Hence, the total number of rock art images is certainly in the tens of millions, roughly half of which are petroglyphs. Pleistocene rock art comprises mostly petroglyphs and consists exclusively of nonfigurative motifs. For the past 100 years, there have been sporadic claims that extinct Pleistocene species or their tracks have been depicted in Australian rock art, but none of these are scientifically credible.

A number of taxonomies endeavoring to identify stylistic traditions have been proposed, but unless they were very narrowly based, spatially or temporally, they tend to be contradicted by evidence in too many cases. Therefore, no accepted continent-wide stylistic sequence is available, and most traditions, genres, or styles tend to be too heterogeneous for simplistic categorization. Nevertheless, several genres are widely recognized as valid traditions, especially the Wandjina and Gwion Gwion (formerly "Bradshaw"; Fig. 3) painting styles in the Kimberley region, the Woodstock anthropomorphs of the Pilbara, the x-ray paintings of Arnhem Land (Chaloupka 1993) (Fig. 4), the Quinkan figures of Cape York Peninsula (Fig. 5), the stencil traditions of central Queensland, the widely distributed track and circle petroglyphs of the arid zones, and the early petroglyphs and finger flutings of the limestone caves (Fig. 6). Each of these broadly identified genres features a variety of motifs co-occurring with the characteristic leitmotifs, some of which are thought to be chronologically diagnostic.

Currently the occurrence of authentic cave art has been confirmed in 49 Australian limestone caves, distributed over four regions across the southernmost parts of the mainland and in Tasmania (Bednarik 1990). Most Australian cave art

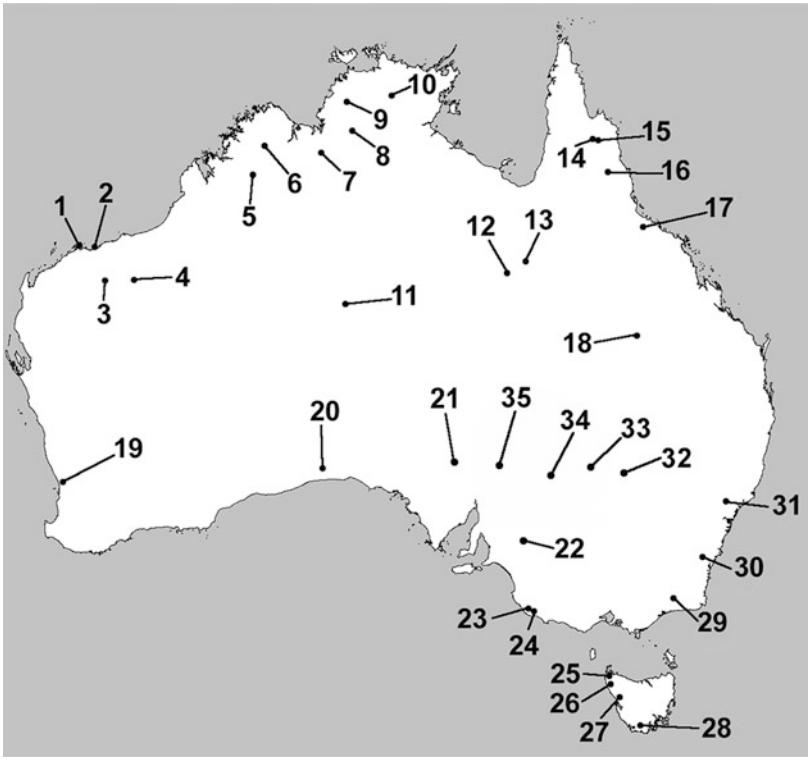

Australian Paleoart, Fig. 2 Some important rock art sites and site complexes in Australia: *1* – Murujuga/Dampier, *2* – Depuch Island, *3* – Pilbara, *4* – Spear Hill-Abydos complex, *5* – Tangalma/Carpenters Gap Shelter, *6* – Kimberley complex, *7* – Jinmium, *8* – Ingaladdi, *9* – Laurie Creek, *10* – Kakadu complex, *11* – Puritjarra and Wanga East, *12* – Carbine Creek, *13* – Saxby Waterhole, *14* – Sandy Creek Shelter, *15* – Early Man Shelter, *16* – Walkunder Arch Cave, *17* – Turtle Rock, *18* – Ken's Cave, *19* – Orchestra Shell Cave, *20* – Koonalda Cave, *21* – Pimba, *22* – Devon Downs, *23* – Karliengoinpool, Karake, Prung-kart, Malangine, and Koongine Caves, *24* – Paroong and Yaranda Caves, *25* – Preminghana, *26* – Sundown Point, *27* – Trial Harbour, *28* – Judds Cavern, *29* – New Guinea 2, Cave, *30* – Gnatalia Creek and Waterfall Cave, *31* – Mt. Yengo Rockshelter, *32* – Cobar, *33* – Mutawinji, Sturts Meadows, *34* – Olary-Yunta site complexes, *35* – Flinders Ranges sites

Australian Paleoart, Fig. 3 Gwion Gwion art (inappropriately called "Bradshaw figures"), Kimberley

Australian Paleoart, Fig. 4 Arnhem Land rock art at Nourlangie, painted in 1964

Australian Paleoart, Fig. 5 Quinkan rock art, Laura, Cape York Peninsula

consists of petroglyphs and a significant portion of it is of the Pleistocene, although several genres or styles have been recognized. Six of the Australian caves containing rock art have also yielded evidence of underground chert mining, most of which also seems to date from the Pleistocene.

Analytical Studies

Scientific analytical work began in Australia with the introduction of direct dating and nanostratigraphy during the 1970s (see Ward & Tuniz 2000 for review). The tradition of rock art dating developed by Australian researchers since then has been instrumental in developing scientific research globally. Nearly all analytical rock art dating methods currently in use were initially developed or introduced in Australia: carbon nuclide and uranium series analysis of carbonates, radiocarbon analysis of oxalates and inclusions in accretive mineral crusts, carbon isotope dating of organic materials in paint residues, luminescence analysis of sand grains in wasp nests, microerosion and other weathering indices analyses of petroglyphs, colorimetric analysis of pictograms and patinae, and carbon dating of beeswax figures. Methods introduced elsewhere, such as the determination of cation ratios in rock varnishes or of cosmogenic radiation products, had to be subsequently rejected as

Australian Paleoart, Fig. 6 Karake-style petroglyphs on the ceiling of Malangine Cave, Mt. Gambier, which have been minimum dated through uranium-thorium analysis of a concealing reprecipitated calcite skin (speleothem) deposited 28,000 ± 2,000 years BP

unsuitable. Nanostratigraphy, first introduced in the 1970s (Bednarik 1979), has during the 1990s been developed into a stunningly sophisticated technique (Watchman 2000). In one case, ten radiocarbon dates spanning 26,000 years were obtained from a sequence of mineral layers only 2.11 mm thick. This kind of work has been made possible by the introduction of innovative techniques such as focused laser extraction of carbon-bearing substances (Watchman 1993), replacing manual excavation of microscopic stratigraphies.

Analytical work with rock art is not limited to dating attempts, however. For instance, Cole and Watchman (1992) have examined paint residues to locate evidence of binder substances as well as incidental inclusions, such as brush fibers, vegetable remains, pollen, and airborne matter, all of which can provide useful information about the circumstances of the painting event. Other applications of analytical methods developed in Australia include investigations of paint recipes (e.g., Clarke & North 1991; Ridges et al. 2000), "internal analysis" of engravings in deep limestone caves, the differentiation between natural and human rock markings (Bednarik 1994), and the study of petroglyph technology (Bednarik 1998), which includes the analysis of the tools that were used in creating petroglyphs.

The Ethnography of Australian Rock Art

Ethnographic studies of rock art have been conducted by many scholars, providing the world's most comprehensive record of this dimension (Layton 1992). The key message from Australian rock art studies is that unless one is a participant in the culture in question, one has no scientific access to what the rock art means or depicts. Much of rock art "research" outside of Australia comprises such practices and Australian ethnographic rock art research has shown that it has to be rejected. This is the result of observations of the production and use of rock art having been made throughout the twentieth century in some parts of the country and the continuation of the importance of this cultural element within an existing, functioning society. Such research has always shown that the valid interpretations of rock art are vastly more complex than an outside observer would be able to deduce: interpretations concocted by uninitiated outsiders are almost universally false (Macintosh 1977). We know from various contemporary traditional peoples that their perception of the world can differ significantly from that of, for example, modern Europeans, so it would be hasty to assume that people of the distant past perceived the world as any modern group does. Hence it is to be expected that the

intricate iconographic meanings of paleoart are not effectively accessible to us.

It is precisely *because* of Australia's superb access to Indigenous ontologies and cosmologies that the continent's rock art researchers have learned to exercise restraint in the invention of interpretative mythologies. Elsewhere in the world the researchers of entirely alien cultures have simply assumed what motifs depict, by projecting their own iconographic perception and contemporary beliefs and mores onto the mute and usually undated rock art. The most important message from Australia is therefore that it is inappropriate to call the simplistic application of alien belief systems to an iconography "research"; it is simply autosuggestion.

Moreover, collaboration between Australian researchers and traditional custodians of rock art sites has shown that other Aboriginal perspectives of rock art can also differ significantly from those of researchers. Archaeology, in particular, has effectively disempowered Aborigines and denied them their identity (Piotrowski & Ross 2011: 38), essentially by posing as the state's interpreter of their past and the gatekeeper of their cultural heritage.

Management and Protection

Australian rock art preservation and site management practices owe much to the efforts of a small number of researchers who have been instrumental in establishing an Australian tradition of site care (Rosenfeld 1985). The underlying strategy is that by selecting well-known and easily accessible sites for public viewing, attention is drawn to these localities, while the locations of others can and do remain confidential. Vast numbers of sites are on privately owned land, and as many landowners are quite conservation minded, this offers considerable protection, particularly in remote regions. Sites selected for public visitation are usually intensively developed, often with marked access paths, raised walkways and viewing platforms, "psychological barriers" as well as physical barriers of various types, interpretation material, and visitor books. Vandalism by visitors of Australian sites has decreased sharply over recent decades as a result of subtle public education measures (Gale & Jacobs 1986), especially through the mass media. Active conservation measures include graffiti removal, stabilization of deteriorating rock, the installation of artificial drip lines and other changes to hydrology, modification of microclimate, removal of fire hazards, dust suppression, and installation of protective barriers.

Public attitude is itself an important safeguard in rock art protection: it can be more effective than laws, fences, or signs. The change in the public perception of rock art, from one of almost complete indifference and ignorance just a few decades ago to a largely positive attitude, coincides with the establishment and progress of the Australian Rock Art Research Association. AURA has since the mid-1980s successfully lobbied the media and public agencies to promote site protection. Not only have these changes had profound effects on the prospects of Australian rock art to survive, they have had equally significant effects on the public's perception of Aboriginality as such, that is, of the value and relevance of traditional Australian culture.

This shows how far-reaching the results of campaigns to raise the cultural status of rock art can be in some circumstances. In the Australian experience, the public funds made available to conservation programs are in fact quite modest, compared to, for example, those expanded in France. This seems to indicate that the actual level of funding is not necessarily the decisive factor in the success of protection measures for rock art. The most important factor is that such endeavors need to be supported by an altruistic, nongovernmental body such as a scholarly society. State bureaucracies and the mass media can both be usefully enlisted in such efforts, but the impetus must come from dedicated and genuinely motivated individuals with a long-term commitment. Indeed, Australian protective legislation for rock art and other Indigenous heritage resources is both inadequate and can be easily circumvented with the help of compliant archaeological consultants.

This is best illustrated with the most comprehensive Australian campaign to preserve a body of rock art, the campaign to save the one million or so

Australian Paleoart, Fig. 7 This flame tower of a natural gas processing plant emits 14,000 t of nitrogen oxide per year, which forms nitric acid in the atmosphere. Note the petroglyph panel on the *left*, 400 m from the plant

petroglyphs of the Dampier Archipelago, northwestern Australia. They have long been under threat of destruction, both physical and by acidic emissions (Fig. 7), and by 2001 a significant portion of the corpus had been destroyed. The international campaign to save the Dampier rock art has diverted dozens of billions of dollars of industrial development from the threatened sites and secured their listing for National Heritage protection. The International Federation of Rock Art Organizations accomplished this with public support but against sustained opposition from the responsible state agencies, the corporations destroying rock art, and the consulting archaeologists.

Portable Paleoart

In contrast to Australia's rich endowment of rock art, the portable component of the continent's paleoart is surprisingly light. It comprises essentially two forms: cylcons and tjuringa. The first of these, cylindrical-conical objects usually made of sandstone, slate, basalt, or limestone, occur in parts of Queensland and New South Wales. They range in length from 15 cm to over 1 m and in the order of half of them bear some engraved marks. Their purpose is not securely established but among the hypotheses suggested that of a phallic significance is perhaps the most likely.

Although the ethnographic tjuringa (also churinga, atywerrenge, tywerrenge, etc.) are generally made of wood, in the past they were also fashioned from schist or sandstone. Such stone objects were decorated much in the manner of the wooden versions, and they are highly sacred. Access to them is restricted to initiated men, and therefore few researchers who have studied them have published about them. Stone tjuringa are thought to have been made by the Dreamtime ancestors themselves, whereas wooden ones are surrogate replicas of them. It is incorrectly assumed that stone tjuringa, and the complex rituals they engendered, were limited to the Arrernte tribe of central Australia.

A series of Pleistocene limestone plaques found in two caves (Devils Lair and Koonalda Cave) have been described as engraved but in all cases were demonstrated to bear only taphonomic markings. Other materials, such as woodcarvings or paintings, have not survived from early periods and are not considered here.

Current Debates

There have been many proposals over the past 100 years that zoomorphs or animal tracks in

Australian rock art are attributable to extinct Pleistocene fauna. Perhaps they were subconsciously inspired by the cave art of southwestern Europe. However, with the exception of the numerous probable depictions of thylacines, both in the form of petroglyphs and paintings, none of these claims have much credibility. The thylacine or Tasmanian wolf only became extinct on the mainland during the late Holocene and in Tasmania in the 1930s. All other animals supposedly represented in Australian rock art are thought to have expired several tens of thousands of years ago. Most of these proposals refer to poorly protected paintings on rapidly eroding sandstone that should not be expected to be more than a very few millennia old. Moreover, the only justification of these claims is that the supposedly diagnostic features of the images suggest the extinct fauna, even though no zoomorphs in Australian rock art are naturalistic, in the sense of resembling textbook images of the species in question. The proponents of these "interpretations" effectively claim that they somehow know which aspects are diagnostic and which are not. For instance, in a recent example, a goose-like image was interpreted as a depiction of Genyornis on the basis of its head shape, and yet only squashed specimens of the species' skull have been recovered. The image was found well outside the known geographical distribution of the species, it had been subjected to rainwater damage, and Genyornis is thought to have died out well over 40,000 years ago. All other claims of this nature are similarly flawed, and there is currently no figurative rock art known in Australia that can be safely attributed to the Pleistocene.

Another issue currently debated in Australia is the relationship of archaeological consultants with their often very powerful corporate clients, particularly when it concerns rock art. The two parties in this debate are people who believe that it is the role of the consultants to facilitate the needs of resource companies at all costs, and those who feel that consultants should be impartial but facilitate the preservation of the cultural heritage resources they investigate. This debate is not endemic to Australia; it can be found in various forms in many countries, but in Australia it tends to be interpreted as a contest of national economic interest or greater good of the nation versus Indigenous heritage, instead of being seen as a confrontation between economic and cultural values. This is because Australia has yet to attain the maturity of a nation that regards its entire cultural heritage as the patrimony of *all* of its inhabitants. In other words, vestiges of cultural apartheid have yet to be overcome in Australia.

International Perspectives

Australian rock art is of interest from an international perspective for several reasons. The amount of sound ethnographic knowledge about its meaning, purpose, production, and cultural roles is significantly greater than anywhere else (Fig. 8). Indeed, in most world regions, there is no such information at all available, and particularly in the endeavors of explaining European paleoart, Australian ethnography has long been recruited for positing bridging analogies. This is ironic because it is precisely the reluctance of Australian rock art scientists to interpret rock art, based on their recognition that etic interpretation is futile in the absence of emic understanding, which distinguishes Australian researchers most from those of the rest of the world.

Another reason to be of special interest is the sheer size of the Australian corpus of rock art, which is to some extent attributable to excellent preservation conditions in a predominantly semi-arid environment. Also, Australia has not experienced any significant iconoclasm, which has had much effect in many parts of the world, and much of this rock art is in exceedingly remote parts of the country. The efforts of recent decades to preserve and manage this rock art have contributed as well, and these have also attracted international attention. These practices have been widely replicated in other continents.

Finally, the quality of rock art research being conducted in Australia or by Australian scholars abroad has established scientific standards in recent decades that have international

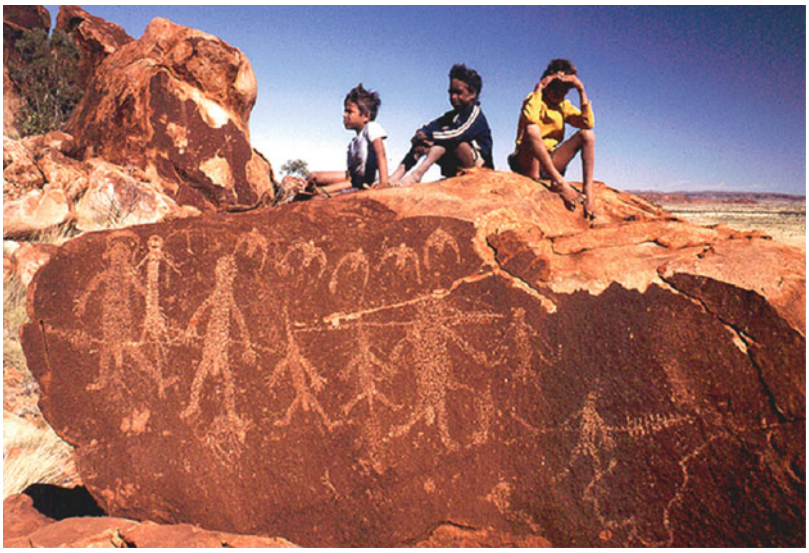

Australian Paleoart, Fig. 8 Petroglyphs at the Spear Hill Complex, eastern Pilbara, with young Aboriginal initiates

recognition. In recent years, Australian rock art scientists have undertaken work in literally dozens of countries and in all continents. The discipline's preeminent journal, international conference, and organizational structure are all based in this country, and Australian rock art scientists are frequently consulted internationally.

Future Directions

Protection and management issues encountered with Australian rock art have shown the need to expand the inventory of this vast resource and to attempt creating a comprehensive national register of it. Development projects of various types, especially in the mining and energy industries, are expanding relentlessly into the most remote parts of the country. The safety of the majority of sites, relatively secure until fairly recently, is being increasingly compromised because legislative protection either is inadequate or is being circumvented by exploiting flawed legislation. The most effective remedy to this is to win broad public support for the preservation of Indigenous cultural heritage. This strategy has already been shown to be the most expedient, and it needs to be developed further. In particular, a deliberate effort is required to change the widely held public perception that Aboriginal rock art is the cultural inheritance *only* of the Indigenes. In this sense the rock art can play a significant role in national reconciliation and in facilitating the development of an inclusive attitude to national heritage.

The establishment of a national inventory of rock art is not only required for the purpose of protection and cultural heritage management; it is also of significance to its scientific study. Despite the great efforts that have been made in this direction, the size of the task will involve many more years of recording work. Considering that rock art is being degraded not only though human intervention but also through natural deterioration, this is a task of some urgency and should have precedence over other archaeological work. Future directions therefore demand that greater efforts be focused on endangered rock art, and this would initially involve a change of emphasis in university teaching priorities. This development has already become evident with the recent establishment of facilities at three Australian universities to specialize in rock art studies.

Cross-References

► Dampier Archipelago Petroglyphs
► Gwion Gwion

▶ Indigenous Archaeologies: Australian Perspective
▶ Kakadu National Park: Rock Art
▶ Rock Art, Forms of

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Australian Rock Art

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Introduction and Definition

The earliest evidence of human occupation on the Australian continent is a piece of faceted red ochre dated to 50–60 ka, recovered from an excavation at Malakunanja II, in the Arnhem Land Region of the tropical north (Fig. 1). While not conclusive evidence for the production of rock art, this and other similar finds indicate that Australia's earliest inhabitants were at the very least processing pigment. Hampered by difficulties in dating rock art assemblages and the limited potential for the preservation of rock art of such great antiquity, identification of the earliest rock art remains a challenging goal for Australian researchers.

Australia is the world's smallest and driest, permanently inhabited continent with an area of about 7.6 million square kilometers. The geographic location of the continent and its size mean that it encompasses a wide range of climate zones. The climate along the southeastern margins of the mainland and island Tasmania is classified as temperate. In the north, tropical climates are marked by hot summers and heavy monsoonal rains, while the climate of the vast

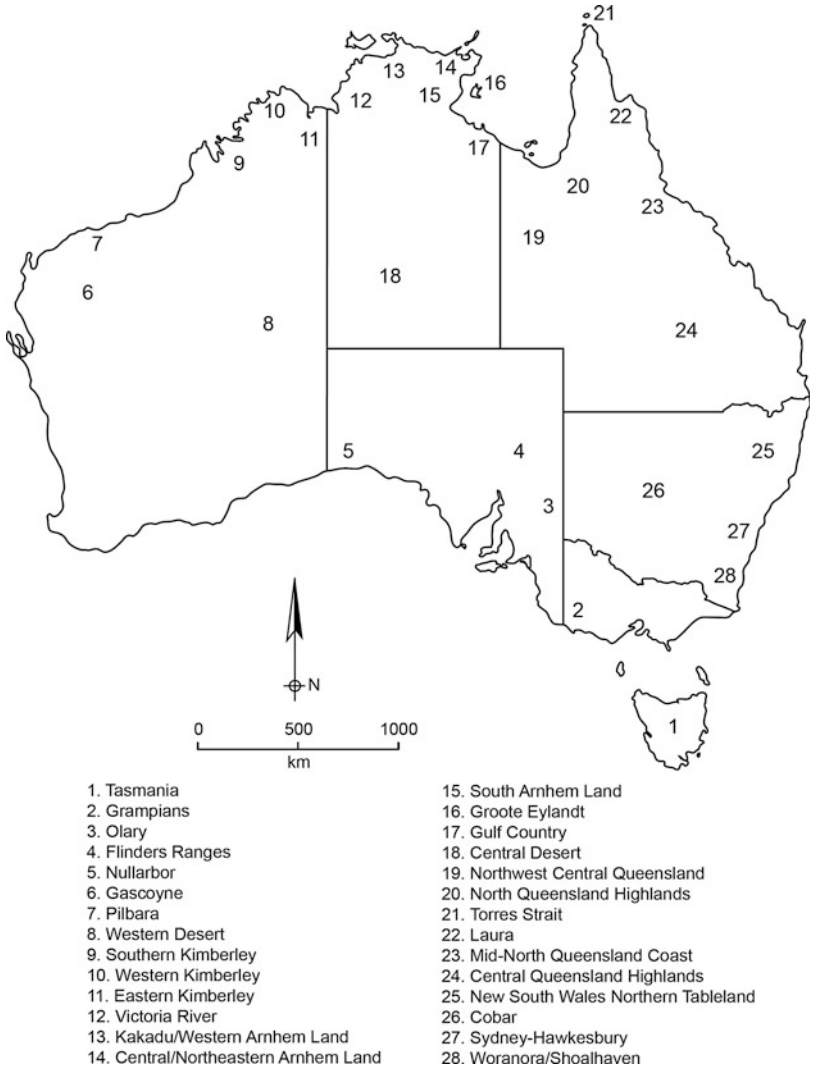

Australian Rock Art, Fig. 1 Australian rock art provinces (Modified from Layton 1992)

interior covering almost two thirds of the continent is arid or semiarid and is characterized by low and unpredictable rainfall. Rock art is found in all climatic zones from the highest snow-covered mountain ranges in the southeast to the vast sand-ridge deserts of the center and the rugged and remote gorges and coastal islands of the north and northwest (Fig. 1).

In northern, central, and western regions of Australia, rock art remains an integral part of Aboriginal culture and belief systems. Although varying in form and detail across the country, the concept of "the Dreaming" is a universally held philosophy that spells out the relationship between Ancestral Beings who created the land, Aboriginal people, and nature (Berndt & Berndt 1988). Aspects of the Dreaming are manifested in rock art throughout Australia, and the origin of many paintings and engravings is attributed to the creation period or Dreamtime. While new assemblages are rarely created today, remarking or other practices that involve traditional maintenance of the potency of rock art sites continue where sites are accessible to communities, now often located in distant towns. In other regions where European colonization has resulted in dislocation of people from traditional lands, specific knowledge of the meaning and function of rock

art assemblages has been lost, although the significance of the rock art remains integral to today's custodians.

The richness of Aboriginal life and the variability of cultural practices across the country have been captured in numerous ethnographic records collected in the nineteenth and early twentieth centuries by researchers such as R. H. Mathews, B. Spencer and F. Gillen, W. Roth, H. Basedow, J. R. B. Love, D. S. Davidson, A. P. Elkin, and T. G. H. Strehlow and more recently by C. and R. Berndt, C. Mountford and R.A. Gould, N. Munn, H. Morphy, R. Layton, I. Crawford, and V. Blundell. The complexity of rock art as a symbolic system, alongside the multivalent meanings attributed to single motifs recorded in these ethnographies, has warned rock art researchers of the futility of relying on literal interpretations of individual motifs alone, a point made strongly by academics, John Clegg (1991) and Iain Davidson (1997). Similarly, the use of simple ethnographic analogy to explain the content or composition of assemblages across regions is acknowledged as problematic. In addition, running contrary to earlier cultural evolutionary ideas that saw Aboriginal people living a substantially unchanged life over thousands of years, the archaeological record attests to the dynamic nature of Aboriginal society especially through the Holocene. To a large degree, these factors have directed Australian rock art research away from speculative interpretation of the meaning of motifs towards research questions that seek to develop an understanding of the role that rock art played in social organization, economies, and ideologies through time.

There are more than 100,000 recorded rock art sites in Australia with many more being added to databases held by universities and state government agencies each year. Rock art is typically found in rockshelters, along cliff lines, on open rock platforms, in gorges, or on angular boulders forming low hills rather than in deep caves. In arid regions where water is scarce, rock art sites are associated with water supplies however meagre. Most techniques including petroglyphs (produced by pecking, abrading, incising, or pounding) and pigment art (pictographs: incorporating painting, stencilling, printing, and drawing) are found in all major art provinces in varying proportions. Motifs created with beeswax pellets have a limited distribution in the north. Studies show that geological substrates alone do not govern the selection of technique used to create rock art assemblages but rather choice of technique can be attributed to regional, temporal conventions. For example, engravings have been produced on the relatively soft Hermannsburg sandstones of Central Australia but are also found on the extremely hard and dense gabbros and granophyres of the Pilbara in the west. Extensive panels of engraved art produced on open rock surfaces dominate the assemblage recorded throughout the central and southern arid zones, while in the northern regions of Cape York, Arnhem Land, Victoria River District, and the Kimberley, rock art painted on shelter walls is most common. On friable white sandstone in the Central Queensland Highlands, stencilling is the most commonly documented technique, whereas on the Woronora Plateau south of Sydney, drawings predominate on similarly light-colored sandstones. In most art provinces, a variety of techniques occur together although specific techniques may dominate during different time periods: the Sydney region stands out as one where two different art media were practiced contemporaneously (McDonald 2008). At the Kuyunba rock art complex in Central Australia, more recent assemblages of drawing, printing, pounding, abrading, and scratching have been recorded in addition to production methods used to create earlier assemblages, i.e., engraving, painting, and stencilling.

Space precludes a comprehensive overview and detailed descriptions of the rock art from each style province and the changes that took place through time. Very briefly, the rock art of the Central Desert region is dominated by engraved assemblages with a limited graphic vocabulary dominated by circle variants, animal tracks especially bird and kangaroo tracks, lines, arcs, mazes, dots, and pits (Fig. 2). Believed to have its origin in the Pleistocene, the same suite of motifs continued to be produced in the more recent painted assemblage and is retained today

Australian Rock Art, Fig. 2 Typical Central Australian engravings (Photo by June Ross)

Australian Rock Art, Fig. 3 Macropod engraving from the Dampier Archipelago (Photo by Ken Mulvaney)

in Western Desert acrylic paintings produced for a national and international art market. In contrast, engraved rock art from the Western Desert and Pilbara regions, some of which is also thought to be of great antiquity, is dominated by depictions of animals especially kangaroos (Fig. 3), birds, and marine species such as fish, turtle, and anthropomorphic figures. Most striking are a series of intaglio faces now labelled archaic faces that are found throughout arid regions across the continent (McDonald 2005).

The rock art of Arnhem Land and the Kimberley regions is dominated by painted assemblages with marked stylistic changes through time. Across both regions, pecked cupules, grass prints, large naturalistic figures, and hand stencils were replaced by elegant, monochrome anthropomorphic figures decorated with an array of tassels, aprons, headdresses, and other accoutrements: known as dynamic figures in Arnhem Land and Gwion figures across the Kimberley where they appear in a highly decorated form (Fig. 4).

Australian Rock Art, Fig. 4 Gwion figures, Kimberley (Photo by June Ross)

Assemblages in both regions also have accurate depictions of animals from their respective regions. Differences between the arts of the two regions become marked in the more recent art assemblages. In Arnhem Land, polychrome X-ray figures display not only the profile of the animal or anthropomorphic figure but also the internal organs and/or skeleton. Over the last 3,000 years in the Kimberley, large spirit figures called Wanjinas were painted on rockshelter walls. Wanjinas are known by individual names and stories of their exploits in the Dreamtime continue to be passed on to younger generations. Often many meters long, these are painted in red, black, and sometimes yellow on a prepared white background and feature two large black eyes, a halo-type headdress, but no mouth.

Historical Background

Prior to the 1970s, Australian rock art studies generally involved description and quantification of assemblages. This resulted in detailed documentation of sites such as those recorded by Fred McCarthy on Groote Eylandt, Dupuch Island, Port Hedland, and the Cobar Pediplain; Ian Crawford in the Kimberley; Robert Edwards in the Olary and Central Desert regions; and B. S. Wright in the Pilbara. Based on these early descriptions, several researchers (D.S. Davidson, F. McCarthy, C. P. Mountford) proposed pan-Australian rock art sequences constructed around motif classification and geographic distribution. However, it was the evolutionary stylistic sequence proposed by Lesley Maynard (1979) – and her archaeological approach to art assemblages – that influenced much of the later thinking related to regional styles and stylistic distribution.

The 1970s saw a dramatic increase in Australian rock art studies driven by the arrival of a number of overseas researchers with international reputations (e.g., Peter Ucko, Andrée Rosenfeld, and Patricia Vinnicombe). For the first time, Australian universities offered specialist units in rock art studies within archaeology degrees at ANU (Andrée Rosenfeld and Howard Morphy) and Sydney University (John Clegg) and later at UNE (Mike Morwood and Iain Davidson). This stimulated a proliferation of regional studies in the following decades, for example, Bruno David in the North Queensland Highlands and with Josephine Flood in the Victoria River District; Paul Taçon and Darrell Lewis in Arnhem Land; Andrée Rosenfeld in Central Australia and Cape York where Mike Morwood and Noelene Cole also worked; Pat Vinnicombe in the Sydney Basin, Kimberley, and Pilbara; Michel Lorblanchet at Skew Valley; Claire Smith in Jawoyn country in southern Arnhem Land; Iain Davidson and June Ross in northwest central Queensland; and Jo McDonald and John Clegg in both the Sydney Basin and western New South Wales. More recent regional studies have been undertaken by Ken Mulvaney in the Dampier Archipelago, ben Gunn and June Ross in the Central Desert; Jo McDonald and Peter Veth in the Dampier Archipelago and Western and Great Sandy Deserts; Paul Taçon in the Wollemi and Kakadu National Park; Sally May,

Chris Chippindale, Bruno David, Bryce Barker, Daryl Wesley, and ben Gunn in Arnhem Land; Liam Brady and Bruno David in the Torres Strait; Julie Dibden and Jillian Huntley in the Woronora Plateau; Al Paterson in the Pilbara; and Mike Morwood and June Ross in the Kimberley.

Running parallel to these studies, important groundwork was laid by dedicated individual researchers such as Percy Trezise in Cape York, Eric Brandl and George Chaloupka (1993) in Arnhem Land, and Grahame Walsh and David Welch in the Kimberley. Relative stylistic chronologies in each of these regions are underpinned by the extensive fieldwork, careful documentation, and analysis of rock art over many decades by these committed enthusiasts.

The dynamics of the 1980s can be attributed to two significant influences. First, the archaeological milieu in which rock art was taught encouraged students to think of rock art as an archaeological dataset to be studied by formal methods. From this time, most major rock art projects were undertaken as part of collaborative research projects involving excavation as well as disciplines such as paleofaunal and paleobotanical studies, which provided social and environmental contexts against which to set an understanding of art assemblages. Datasets were routinely analyzed using statistical analyses including cluster analysis and principal component analysis.

However, by far the most influential changes to the way rock art was perceived resulted from the introduction of new international theoretic approaches that complemented archaeological methods being fostered in Australia. Interest shifted from the concept of art as an object in its own right to a focus on rock art created by the intentional actions of humans in the past. The particular way of producing the art, the "style" was viewed as a means of communication. As Martin Wobst argued, art assemblages can encode a range of social, economic, and ritual information. Conceived in this way, the form and structure of assemblages could thus be seen to express group interaction or differentiation, social boundaries or social organization.

This notion was extended by Clive Gamble, based on ethnographic information from Australia's deserts. He saw a corresponding relationship between the form of art assemblages, the type of social networks people utilized in the past, and availability of resources. Areas with poor resources would have homogeneous art assemblages over vast areas indicating open social networks, while conversely, resource-rich areas would have heterogeneous art styles, each distinctly different from its neighbors, corresponding with closed social networks and territoriality. Open social networks are seen as a means to allow flexibility and mobility in areas subject to unpredictable climates. The theory of information exchange has been widely adopted as an explanatory tool for diachronic changes in the content and composition of rock art assemblages found across the Australian continent. For example, Mike Morwood identified tightening of social networks and a corresponding change in the composition of the rock art assemblages across the Central Queensland Highlands around 3,000 years ago (2002).

The theory that Polly Weissner popularized, "identification via comparison," where each individual or group understands their place in the world by comparing aspects of their material culture with others has been similarly influential in Australia. In the case of rock art, people could choose to produce art that was stylistically similar to others to cement their group status, or conversely, they could choose to differentiate themselves by producing singular art assemblages. Using rock art or material culture in this way, people in the past could mediate their interactions with others. As Australian Aborigines were hunter-gatherers, regularly moving across the landscape, rock art provided an ideal tool to flag identity and mediate predictable interaction in their absence. Ross et al. (2008) have argued that the production of distinctive anthropomorphic figures within a bounded area in northwest central Queensland provided a mechanism that bonded local inhabitants while at the same time flagging to outsiders coming into the area to trade that they needed to mediate their behavior in some way (Fig. 5).

Ceremonial gatherings involving large aggregations of people from distant locations

Australian Rock Art, Fig. 5 Anthropomorphic motif, Northwest Central Queensland (Photo by June Ross)

are well documented in Australian ethnographies. Meg Conkey identified the structure of graphic elements on bone artifacts, which she contended enabled her to trace the history of aggregation at sites in Northern Spain. Identification of similar structural criteria, particularly richness and diversity in the rock art assemblage at sites within the Australian arid zone, has provided a means to distinguish aggregation sites in the absence of ethnographic evidence. Jo McDonald and Peter Veth (2012) attributed the stylistic diversity in rock art assemblages in the Western Desert to the aggregation of people from different groups across the region. Brett Galt-Smith tested the identification of aggregation sites based on Conkey's criteria against assemblages from sites known to have been the focus of large ceremonial gatherings during the late nineteenth century in Central Australia. He found that Conkey's criteria were useful markers of large aggregation but were less successful in identifying more localized aggregations.

There has been resistance in Australia to one international interpretive framework. Shamanism and the associated altered states of consciousness espoused by David Lewis-Williams as an explanation for the production and form of rock art assemblages in South Africa, Europe, and other parts of the world have not been widely adopted by researchers in Australia, largely because there is no ethnographic evidence for shamanism within Australia. Although ethnographies recount some instances where altered states of consciousness might have been achieved – when performers accompanied ceremonial activities with long periods of rhythmic beating using clapsticks or when young men endured periods of fasting during initiation – none records any association between these activities and the production or content of rock art.

The establishment of an Australian rock art organization and the passing of heritage and environmental legislation have also contributed to the direction and growth of rock art studies in Australia. In 1984, the Australian Rock Art Association (AURA) was launched by Robert Bednarik. Conferences organized under the auspices of AURA have drawn international researchers to Australia, and the publication of its biannual journal provides a forum for dissemination and discussion of the results of both national and international rock art studies.

Political change and the promotion of ethical considerations and recognition of Indigenous ownership and intellectual property have also influenced the path of rock art studies in Australia. Today, most rock art projects are run in collaboration with Aboriginal or Torres Strait Islander owners who now participate in research as active partners with their own agendas and priorities. Many work as rangers managing rock art or other cultural heritage sites on their country, while others have developed tourist programs aimed at educating visitors about the Indigenous significance of sites.

Key Issues and Current Debates

Reliable chronometric dating of assemblages remains central to the research efforts in

Australian rock art. The longevity of rock art production across the continent is signalled not only by the extreme weathering of some engraved assemblages but also by the marked stylistic changes identified in many regional rock art provinces as well as the presence of ochre crayons in excavated sediments dating back from the recent past to the time when the original occupants arrived on the continent. Despite concentrated efforts, attempts to date rock art have met with limited success.

David et al. (2013) have reviewed the evidence for establishing the age of ancient pictographs in Australia and note that few proposed dates involve direct and reliable dating of identifiable rock art motifs. Rather, early dated examples include pigments only seen in cross section sandwiched between gypsum-oxalate crusts, the problem being that the very mineral skins that provide a substance to date also obscure the art. The use of radiocarbon dating on other organic materials as a means to date pictographs has met with mixed results. It has been used to successfully date wax motifs, the earliest of these from a turtle motif in Arnhem Land and dated to around 4,500 BP. Samples from a single charcoal drawing located in the Sydney Basin provided two vastly different ages, a problem likely to have resulted from substrate contamination. The radiocarbon dating of charcoal ash adhered to the bottom of a stone slab painted with a partial black motif provides the oldest date (28,000 BP) for Australian rock art although the motif is unclear. More contentious has been the minimum date of approximately 17,500 BP proposed for a Northern Kimberley Gwion figure and hand stencil obtained by Bert Roberts from an overlying mud wasp nest using optically stimulated luminescence. Criticism has been directed towards the technique, but most disquiet results from concerns about the relationship of the section of the nest being dated to the underlying figures (Aubert 2012). Additional concerns were raised when dating of oxalate skins by Alan Watchman indicated a mid-Holocene date for the same stylistic period.

Continued improvements in the preparation and extraction processes for radiocarbon sampling such as plasma oxidation and accelerator mass spectrometry have been used to date charcoal drawings and organics within pigment. Results have provided a range of dates for late Holocene assemblages in the Western Desert, Arnhem Land, and the Kimberley enabling researchers to build temporal frameworks for the dynamic changes that occurred in the last few thousand years. Uranium series, a dating technique used successfully by Maxime Aubert in China and East Timor, is now being trialled in the Kimberley at locations where art is beneath a covering of precipitated flowstone. Even with ongoing improvements to dating techniques, Rosenfeld and Smith (1997) argue for the continued importance of developing a fine-grained understanding of relative stylistic sequences to complement and inform dating projects. Chippindale and Taçon (1998) provide a comprehensive summary of methods that can be adopted to develop such sequences in Australia.

Researchers seeking to date engravings in the past had to rely on recovering examples from stratified deposits. Andrée Rosenfeld dated deposits associated with engravings excavated from the Early Man Shelter in Cape York to about 14,000 BP. Today, dating techniques focus on establishing ages for mineral coatings covering engravings such as silica skins, calcium oxalate crusts, rock varnish, and localized calcium carbonate deposits, thus providing a minimum date for the underlying art. After a promising start, cation-ratio dating of rock varnish has proved unreliable, and likewise, the dating of carbonate deposits has met with little success. Outcomes from Alan Watchman's radiocarbon dating of oxalate crusts have provided more convincing results. Crusts overlying pecked cupules in the East Kimberley provided age estimates up to 5,840 years old, while the dating of crusts overlying similar suites of rock art at two different sites in Central Australia returned to mid-Holocene dates (Smith et al. 2009). The latter example provided a means of validating Watchman's results. The rock art had been engraved on slabs of roof-fall lying on shelter deposits. Radiocarbon dates were obtained from

deposits immediately under the slabs of roof-fall providing a maximum age for the engravings thus bracketing the age of the art between maximum and minimum ages obtained using two different techniques.

Dating studies are now being augmented by analyses of the chemical and mineral composition of pigments and ochres to provide information on the composition of paints and the origin of pigments. Further, a detailed understanding of the composition of pigments provides data that can inform management decisions relating to conservation of art for future generations. The chemical fingerprint of paint samples can be established in the field in situ using portable X-ray fluorescence without damage to the art although Jillian Huntley's research flags some limitations to this technique (Huntley 2012). Alternatively, samples are removed and then processed and analyzed under laboratory conditions.

Interest in gestural marks or associated rock art traditions has continued to grow in Australia as the role and significance of these marks become more apparent. The process of interacting with rock surface continues to retain its significance for traditional owners in some regions although rubbing with a hand frequently replaces earlier practices. While assemblages of pecked cupules and abraded grooves have been regularly recorded in the past, few have been quantified or subjected to rigorous analysis. The recording of abraded areas, battered and flaked edges and random pecking on, or associated with art panels has largely been neglected. Studies on flaked edges at rock art sites in the Northern Kimberley are currently underway in an effort to establish if this practice had a ritual or economic function.

A range of other key issues are currently under debate. Speculations dating to the late nineteenth century that extinct megafauna or their tracks had been depicted in Australian rock art have been revived, although these assertions are not universally accepted. Over recent years, claims have been made for a range of painted motifs judged to be iconic depictions of *Genyornis, Zaglossus, Palorchestes*, *Diprotodon* and *Thylacoleo*, taxa deemed to have become extinct on the Australian continent around 40,000 years ago. Identifications rely either on the likeness of the motifs to hypothetical reconstructions of extinct fauna or on the comparative size of the depictions considered to be larger than any related taxa present today. Further, the presence of depictions of megafauna has been used by some researchers as a temporal proxy to extend their chronological framework and underpin relative sequences.

Bruno David (2002) has argued that both Aborigines and other Australians see the Dreaming as atemporal. Yet when he examined the archaeological manifestations of the Dreaming as we know it from ethnographic times, he concluded that the evidence from multiple sites across Australia reveals a dynamic and emergent culture rather than an unchanging one or even one of great antiquity. This has implications for the understanding of the decline or cessation of earlier art styles and the rise of distinctive regional rock art assemblages that appeared during the late Holocene.

By the time of European contact, Australia was a continent of Aboriginal nations, each with its own language, ceremonial practices, and rock art style. Earlier more homogeneous rock art styles produced over vast areas were replaced with differing regional styles. Identification of the forces responsible for driving changes in rock art assemblages has been the focus of rock art studies in many regions, with available datasets or theoretical perspectives influencing conclusions. In the late 1960s, researchers hypothesized that the demise of the production of elegant monochrome Gwion figures (formerly known as Bradshaw figures) and the later emergence of polychrome Wanjina-style figures over the past few thousand years resulted from the diffusion of ideas from a new wave of immigrants from Southeast Asia. In Arnhem Land, researchers identified dramatic changes in the topography of the region resulting from fluctuating sea levels and an increase in population density supported by resources from the rich alluvial plains that formed (Taçon 1989). Estuarine species depicted in earlier rock art such as mullet and saltwater crocodiles were replaced by

paintings of freshwater species such as magpie geese and water lilies. In Central Australia, the change from a relatively homogeneous engraved assemblage to dramatic site-specific motifs produced during the last 1500 years was attributed to changes in social organization necessitated by pressures from increased population resulting from the onset of more productive but unpredictable climates.

Contact rock art is now regarded as an important Indigenous archive. Clarke and Frederick (2006) demonstrate in their detailed study of recent rock art on Groote Eylandt that analysis of the content and form of the motifs as well as the social, geographic, and historical contexts of contact rock art can be used to examine the complexity of relationships, meanings, representations, and exchanges that resulted from cross-cultural interaction between Aboriginal people and newcomers. This view is supported by the findings of Paul Taçon and Sally May (Arnhem Land), June Ross and Ursula Frederick (Central Australia), Alastair Paterson (Pilbara), Jo McDonald (Sydney Basin), Noelene Cole (Cape York), and Liam Brady (Torres Strait) in their analyses of contact rock art. The history of contact and cross-cultural exchange varied across regions between rural, town, and mining settlements, but analysis of contact rock art assemblages demonstrates that Aboriginal people should more accurately be viewed as keen observers and active participants in past cross-cultural exchange rather than simply as passive victims.

While the threat to rock art assemblages posed by the mining boom of the last decade has led to an increased awareness of conservation and management issues associated with the preservation of sites, direct government financial support for specific rock art management programs and heritage agencies has been reduced. However, the proportion of government funds channelled through the Australian Research Council has seen a far greater proportion of available grant money being awarded to archaeological projects with strong rock art components. In threatened areas, rock art recording and management strategies are generally completed as consultancies commissioned by resource companies or as negotiated offset arrangements where resource companies fund research to better understand the resource generally.

There is a marked trend today, for rock art to be included as a major component in large regional archaeological projects in Australia. Neither is it unusual for projects to incorporate multiple proxies from varied scientific disciplines in order to formulate the clearest picture of the past. The range of disciplines associated with projects such as *Lifeways of the First Australians* in the Southern Kimberley, *Change and Continuity* in the Northwest Kimberley, the *Canning Stock Route: Rock Art and Jukurrpa Project* in the Western Desert, or *Connecting Country: The Jawoyn Homeland Project* in Southern Arnhem Land is more diverse than ever before. Rock art researchers now work side by side with geomorphologists; geochronologists; physical geographers; anthropologists; historians; geologists; palynologists; ecologists; faunal, botanical, ochre, and shell experts; GIS specialists; photographers with specialist technical skills; and filmmakers, each providing ever more specialized knowledge.

Future Directions

In the past decade, three university rock art centers have been established: the Australian National University's Rock Art Research Centre in Canberra founded under the guidance of Howard Morphy, Griffith University's Place, Evolution and Rock Art Heritage Unit led by Director Paul Taçon and situated on the Queensland Gold Coast, and the University of Western Australia's Perth Centre for Rock Art Research + Management with Jo McDonald as Director. Initiatives instigated by these fledgling bodies include raising the awareness of heritage and rock art management issues amongst government agencies and the general population, facilitating and broadening the scope and relevance of rock art research, funding of visiting international scholars, organizing professional workshops,

providing worldwide access to remote rock art sites via internet forums such as Google, and dramatically increasing the number of students studying rock art at tertiary level across Australia. The amount of industry and institutional funds committed to these centers attests to the significance of role that rock art is seen to play in Australians' past, present, and future.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Chaloupka, George
- ▶ Clegg, John K.
- ▶ Dampier Archipelago Petroglyphs
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Kakadu National Park: Rock Art
- ▶ Morwood, Michael
- ▶ Rosenfeld, Andrée
- ▶ Wobst, H. Martin

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Australopithecines

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Introduction

The term "Australopithecines" derives from the subfamily name Australopithecinae that was first used by W.K. Gregory and M. Hellman (1938). It differentiated the ape-men *Australopithecus* and *Paranthropus* from the subfamily homininae or humans that included the genera *Homo* and *Pithecanthropus* and which is abbreviated to "hominines."

Australopithecines are known from Plio-Pleistocene sites in South and East Africa and in Chad. Claims for their presence at sites outside of Africa have not been confirmed. Australopithecines have over the years been variously referred to as ape-men, man-apes, near-men, or Dartians after Raymond Dart who named *Australopithecus* in 1925. These names reflect the characteristics of the Australopithecines as being manlike primates with apelike features.

Key Issues/Current Debates/Future Directions/Examples

The first known Australopithecine was blasted out of a limestone tufa cliff at Buxton Limeworks near Taung, South Africa, in 1924.

Australopithecines, Fig. 1 The Taung child

A natural endocranial cast and a block of calcified matrix displaying sections of cranium and mandible were, with other fossils, saved by miner M. de Bruyn and taken to the mine manager's office. Later, they were sent by geologist R. B. Young to Professor Raymond Dart who had asked Young to look out for monkey fossils. Dart found that the natural brain cast fit into some exposed bone in the matrix block. After he had cleaned away the hard matrix, he realized that he had the face and brain cast of a primate that he considered an ape on the way to becoming man. It was the skull of a child of about 4 years and Dart noted that the molar teeth, though large, were humanlike, that the deciduous canine was much smaller than that of an ape, and that the position of the foramen magnum indicated that it would have walked upright. The brain size was however apelike, and other ape features were the projecting muzzle, flat nose, and facial premaxillary suture (Fig. 1).

Dart (1925) named the fossil *Australopithecus africanus* or Southern ape of Africa. Many of his colleagues were skeptical of his claims that it was a human ancestor but the Scots doctor and paleontologist Robert Broom supported Dart's interpretation and determined to prove it with an adult skull. This he did in 1936 when he recovered a crushed adult cranium with good brain cast that had been blasted out

during limestone quarrying at the Sterkfontein Caves, South Africa. Broom at first named it *Australopithecus transvaalensis* but after discovery of a child mandibular symphysis 2 years later, he created a new genus *Plesianthropus* for the Sterkfontein fossils (Broom & Schepers 1946). Broom, later aided by his young zoologist assistant John Robinson, recovered many Australopithecine fossils (Fig. 2) from the Sterkfontein Caves including, in 1947, part of a skeleton with a pelvis that proved conclusively that they walked upright (Broom et al. 1950).

Australopithecines, Fig. 2 Lower face of Sts 52, a male *Australopithecus africanus*

From 1966 onward, Phillip Tobias and Alun Hughes and later Ron Clarke conducted systematic excavations at the caves and added considerably to the inventory of fossils. Most publications in recent years have considered there to be only one species, *Australopithecus africanus*, in South Africa but R. J. Clarke (2013) has demonstrated that many of the fossils belong to a second larger-toothed, bulbous-cusped, flat-faced species now well represented by a virtually complete skeleton (StW 573, Fig. 3) that he and his assistants Stephen Motsumi and Nkwane Molefe discovered in a lower deposit within the caves (Clarke 1998). Clarke found this second species to be the same as some Australopithecine fossils that Dart's team of the Kitching brothers and Alun Hughes had found at the Makapansgat Limeworks Cave beginning in 1947. Dart (1948) named this species *Australopithecus prometheus* (Fig. 4). These date to around three million years ago and are contemporary with *Australopithecus africanus* at both Makapansgat and Sterkfontein. At this latter site, they are also found in a deposit (member 4 of the Sterkfontein formation) dating to between 2.1 and 2.5 Ma. Males and females of each species can be determined. For example, within *Australopithecus*

Australopithecines, Fig. 3 StW 573 skull of *Australopithecus prometheus*

Australopithecines, Fig. 4 MLD 2, mandible of *Australopithecus prometheus*

Australopithecines, Fig. 5 StW 252 cranium of *Australopithecus prometheus*

africanus, StW 53 is a male and Sts 5 is a female. Within *Australopithecus prometheus*, StW 252 (Fig. 5) is a male and Sts 71 is a female (Clarke 2013). A third South African species has been named *Australopithecus sediba* by L. Berger et al. (2010) on two partial skeletons discovered by his team at Malapa in a 1.9 million-year-old deposit.

Australopithecines, Fig. 6 Laetoli Hominid 4, the type mandible of *Australopithecus afarensis*

The first discovery in East Africa of what eventually proved to be an early species of *Australopithecine* occurred in 1939 when L. Kohl-Larsen found a maxillary fragment at Garusi (now Laetoli) near Olduvai, Tanzania. The deposits in which it was found are now known to date to about 3.6 Ma. Survey work done by Mary Leakey and her team in the 1970s (Leakey et al. 1976) uncovered many more such fossils, including a mandible (Laetoli hominid 4, Fig. 6) which became the type specimen of a new species *Australopithecus afarensis* (Johanson et al. 1978). They grouped the Laetoli *Australopithecus* with similar fossils they had discovered at Hadar in the Afar region of Ethiopia. These fossils included the partial skeleton, known as Lucy, and they possessed features, in particular the lower third premolar, which are more apelike than those of the South African *Australopithecus*. Some other very significant fossils of this species are the reconstructed male skull AL 444–2 (Kimbel et al. 2004), an infant skeleton with a skull (Alemseged et al. 2006), and the trail of Laetoli footprints.

This trail (Fig. 7), representing two individuals side by side, was discovered by Paul Abell in 1978. He noticed what appeared to be a humanlike heel impression in an outcrop of volcanic tuff. Subsequent excavation revealed a 41-m-long trail made by one large and one

Australopithecines, Fig. 7 Laetoli footprints of *Australopithecus afarensis*

small individual. Although the footprints are those of a bipedal walker, they demonstrate some apelike features, including a slightly divergent big toe and a medial expansion of the abductor muscle of the big toe. Such features are consistent with the foot anatomy of the StW 573 skeleton from Sterkfontein. That fossil also has a slightly divergent and mobile big toe that would have been useful for tree climbing.

A canine tooth found at Laetoli in 1935 was so large that Louis Leakey thought it was a monkey. It was only in 1981, with the hindsight of many similar discoveries of large canines, that Tim White recognized this canine in the British Museum as that of an *Australopithecus afarensis* discovered 1 year before Broom's first adult *Australopithecus* from Sterkfontein. An anterior portion of mandible from Chad dating to 3.5 Ma has similarities to *Australopithecus afarensis*, but was named as a new species, *Australopithecus bahrelghazali*, by Brunet (1996).

Jaws of an even earlier and more primitive species of *Australopithecus*, dating to 4.2 Ma ago, were discovered by Meave Leakey's team at Kanapoi in Kenya and named *Australopithecus anamensis* (Leakey et al. 1995). This followed the recovery from that area of a hominid distal humerus by Bryan Patterson's Harvard expedition in 1965. Two years later, Patterson's team recovered part of a hominid right mandibular ramus with a heavily worn first molar at the site of Lothagam near the shore of Lake Turkana, Kenya. This fossil site, rich in Miocene fauna, had been found by Larry Robbins, a University of California, Berkeley, student, and it is possible that the hominid mandible is a representative of *Australopithecus anamensis*.

Another *Australopithecus* species dating to 2.5 Ma ago was recovered from Bouri, Middle Awash, Ethiopia, and named as *Australopithecus garhi* by Asfaw et al. (1999). A partial cranium has very large cheek teeth, combined with a large, prognathic anterior dentition.

From much younger deposits in Olduvai Gorge, Tanzania, and from East Lake Turkana, there are some hominid fossils that have generally been accepted as representing *Homo habilis*, but which have close resemblances, including small brain size, to the South African *Australopithecus africanus*. These fossils dating to under 2 Ma are OH 24, OH 62, OH 13, and KNM ER 1813. They occur in the same areas and same age deposits as much larger brained fossils of *Homo habilis*. Thus, they seem to represent late surviving *Australopithecus africanus* or a closely related form.

Although the earliest stone tools date back to at least 2.6 Ma ago, none has ever been found with the earliest Australopithecines and at later sites, it seems more probable that early *Homo* was responsible for the tools. In the 1950s, Raymond Dart published many articles, as well as a book, claiming that *Australopithecus* had a bone tool culture that he named Osteodontokeratic. Subsequent investigations have shown that there is no justification for such claims and that the accumulations of damaged skulls and broken bones were the natural result of carnivore predation, porcupine collecting, and rock fall and pressure within the cave deposits.

Another form of Australopithecine in addition to *Australopithecus* is the flat-faced, large-toothed ape-man called *Paranthropus*. This was first discovered by a schoolboy, Gert Terblanche, at Kromdraai, near Sterkfontein, South Africa, in 1938 and named *Paranthropus robustus* by Robert Broom. Details on this form of ape-man are given under the entry *Paranthropus* in this encyclopedia.

The several species of Australopithecine are represented over a large part of Africa and although there have in the past been suggestions that isolated teeth and jaw fragments from China and Java are Australopithecine, there has been no indisputable support for this. It seems probable that the fossils in question are those of *Homo habilis* that had spread from Africa to Asia.

Palaeoenvironmental information suggests that many of the Australopithecines were associated with woodland or tropical forest close to lakes and rivers. Their diet, as suggested by their dentition, varied from omnivorous to more vegetarian for *Paranthropus*. All Australopithecines were bipedal with humanlike hand proportions, humanlike (but large) cheek teeth, and small brain size ranging from about 430 ccs in some *Australopithecus* to 530 ccs in some *Paranthropus*.

These apelike brain sizes, and many other apelike features in the skull and skeleton, coupled with the humanlike bipedality, hands, and teeth, mark them as transitional between Miocene ape and Pleistocene human. There is, however, no clarity on which, if any, of the several known Australopithecine species was ancestral to *Homo*, which was a contemporary of both *Paranthropus* and late forms of *Australopithecus*, e.g., at Olduvai Gorge Bed I.

Cross-References

- ▶ Dart, Raymond Arthur
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Tobias, Phillip V.

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Authentication and Conservation in Archaeological Science

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Introduction

Authenticity is one of the most influential factors for determining the course of action of heritage in need of conservation. Determining exactly what constitutes a site or objects' authentic state can be problematic and challenging because there is not one history rather a series of histories and stakeholders to consider. Authenticity in conservation is guided by the ethics behind how a place or object should be perceived and protected.

Since the late seventeenth to early nineteenth century, when archaeology as a science developed in the "age of enlightenment," authenticity has referred to the material condition of something original and unique. For this period of Western cultural history, authenticity denoted a relation to genuine identity. The physicality (tangibility) of archaeology and the concept of successive strata served primarily (process) for dating and proof of authenticity. Archaeological objects unearthed within specific layers became recovered symbols of that historical occupancy. Collectors were known to refer to archaeological objects as ranging from genuine antiquities to imitations of high artistic merit and forgeries of little value. Conservation treatments sought to retrieve the past through restoration or to bring an artifact back to an original condition. The degree of discernable restoration treatment could move an artifact up or down within this authenticity scale based on visual determinations and skill of the observer.

In the second half of the twentieth century, new technologies enabled tests (laboratory results) for determining authenticity through provenance and dating to accompany the previous role of strata or archaeological typology (documentation). Technical studies replaced the role of assessing aged decay and patina for assigning authenticity. Within Western conservation by the end of the twentieth century, interventions to "improve" were considered inauthentic.

Today, at its simplest, authenticity refers to the presence of original material. But authenticity is much more. A practical approach for assessing physical authenticity in conservation treatments may include four authenticities: materials, workmanship, design, and setting. Jokilehto (1993: 59-75) elaborates that treatment must maintain authenticity by maximizing retention of historical material and ensuring harmony with original design and workmanship and not allowing new additions to dominate over the original fabric but respecting the archaeological potential.

If authenticity is the ability to convey significance, then in archaeology, it is also context dependent because sites and their objects can have different meanings at different times, in different places and to different people. Lowenthal (1999) clarifies that this should include origin and evolution and the recognition of multiple histories and stakeholders.

In addition, social value authenticity helps to clarify aspects of (value) spirituality or possibly sentimentality. Economic authenticity helps to clarify sustainability and development (tourism, trade, insurance, or market value).

Beyond these refinements, one sometimes hears reference to *an aura of authenticity* about

a place or object. However, there are many examples that illustrate that rather than being an attribute, both aura and authenticity can be created. This conundrum is what makes the discussion of authenticity and conservation an interesting challenge for all concerned with the preservation and protection of sites, monuments, and objects of cultural heritage.

Definition

Cultural sites and objects are particularly vulnerable to deterioration due to their past utilitarian roles, post-excavation lack of maintenance, and continuous exposure to agents of decay. Unfortunately, warning signs that conservation is needed become visible after deterioration has already taken place. Some of the resulting terms of condition that reflect a loss of accuracy include:

- Dilapidation or structural deterioration: a state of disrepair or nonfunction by misuse, neglect, or abandonment often resulting in loss of validity
- Dismemberment or fragmentation: a state of being divided, cut, torn, broken into parts, and resulting in loss of integrity
- Disfigurement or surface insecurity: a state of instability or vandalism, potentially resulting in loss of legitimacy
- Recreation or use of replacement parts: nonoriginal components added to augment the structure using nonindigenous technologies and materials, potentially leading to loss of accuracy
- Disenfranchisement: heritage that is deprived of the traditions of community use and loss of accuracy or relevance

In practice, authenticity has a significant effect on our choices of conservation interventions (Jerome 2008: 4). Unfortunately, the word conservation has slightly different meanings for professionals working in the environment of built immovable heritage (sites, monuments, and structures) and professionals working with moveable object collections (in museums). More conventional uses of the terms related to conservation are included in Table 1.

The comparison of basic definitions of conservation, preservation, and restoration for immovable and movable heritage shows that the fields are not in sync. For heritage professionals dealing with sites and buildings, conservation is the umbrella term for the overall goal of the profession, while object conservators use the term preservation for this purpose. It is useful to note that in the United States, conservation does not typically apply to buildings, but to other cultural objects. Preservation for buildings and sites refers to the steps taken to achieve overall conservation, while objects conservators refer to the conservation methods needed to achieve overall preservation of artifacts, hence in the USA the difference in titles: preservationists (sites and buildings) and conservators (objects).

Though the working definitions for conservation and preservation differ between the fields, both definitions fall under the relatively new term heritage science which involves managing change and risk and maximizing social, cultural, and economic benefit not just today but in such a way that we can pass on to future generations that which we have inherited. Scientists carrying out heritage science research range across a number of physical and natural science disciplines and their applications, including archaeological science, building science, engineering and technology, computer science, conservation, environmental science, physics, chemistry, biology, engineering, and environment (House of Lords 2006: 2.21 and 3.17). Olsen (2001: 213) warns that at times heritage scientists assume that knowledge is open and available to all, but in reality it is the powerful nations that are the subjects of knowledge and the rest of the world is rendered as object.

Historical Background

"Each generation views authenticity in a new guise, reflecting its new needs for truth, new standards of evidence, and new faiths in the uses of heritage" (Lowenthal 1999). A coherent philosophy for conservation began to emerge in the last quarter of the nineteenth century. At this

Authentication and Conservation in Archaeological Science, Table 1 Terminology

Immovable (Sites and built environment)	Moveable (Objects)
Conservation: all efforts designed **to understand** cultural heritage (monuments, groups of buildings, and sites of cultural value); know its history and meaning; and ensure its material safeguard and, as required, its presentation, restoration, and enhancement (World Heritage Convention. Article I)	*Conservation:* all **measures and actions** aimed at safeguarding tangible cultural heritage while ensuring its accessibility to present and future generations. Conservation embraces preventive conservation, remedial conservation, and restoration. All measures and actions should respect the significance and the physical properties of the cultural heritage item (International Committee on Museums-Conservation Committee)
Preservation: methods of maintaining the historical integrity of a building with limited alterations or additions; methods of stabilizing and preventing further decay (National Trust for Historic Preservation). This term is considered more specific than conservation	*Preservation:* the **protection** of cultural property through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content (American Institute for Conservation). This term is considered to be broader than conservation
Restoration: methods used in rebuilding buildings and structures with **historically accurate materials** to achieve historical authenticity in keeping with a particular time period or event. There is a focus on maintenance of intact historic features, replacement of lost features, and removal of inappropriate features (US Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995)	*Restoration:* all actions directly applied to a single and stable item aimed at facilitating its appreciation, understanding, and use. These actions are only carried out when the item has lost part of its significance or function through past alteration or deterioration. They are based on respect for the original material. Most often such actions modify the appearance of the item. Examples of this restoration are retouching a painting, reassembling a broken sculpture, reshaping a basket, filling losses on a glass vessel (International Committee on Museums-Conservation Committee). In the United States, it refers more specifically to the treatment procedures intended to return cultural objects to a known or assumed state, often through the **addition of non-original material** (American Institute for Conservation)
Reconstruction: is the process of depicting, by means of **new construction**, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location (US Secretary of the Interior's Standards for the Treatment of Historic Properties)	*Reconstruction:* is less commonly used with objects but may refer to an aspect of the conservation or restoration process where new materials are used to create a replacement part of the structure (i.e., a missing chair leg) or if collapsed parts are reassembled
Rehabilitation: actions that emphasize the **retention and repair** of historic materials on deteriorated property with a focus on those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character (US Secretary of the Interior's Standards for the Treatment of Historic Properties)	Term not commonly used
Anastylosis: reconstruction or reassembly of collapsed or fallen parts into their original place and when necessary, incorporating new materials (World Heritage Sites)	Term not commonly used

time, manuals for the conservation of ancient buildings were developed, and authenticity was identified as a concern. By the 1920s, Marshall (1923: 10) wrote: "Although there are many ancient buildings whose state of disrepair suggests at first sight a renewal, it should never be forgotten that their *historical value is gone when their authenticity is destroyed*, and that our first duty is not to renew them but to preserve them."

Philosophies, treaties, various heritage charters, and conventions were organized and laid the foundation for the advancement of doctrine,

practice, and dialogue in conservation. Lowenthal (1999) summarizes that the focus has moved from possession of authenticity to an "authenticity of materials and form, of structure and process, and of aim and intent, moving from exclusive concerns with buildings and artifacts to broader considerations of landscape and nature, folklife and folklore, ideas and beliefs."

Highlights from some of the important international gatherings that have defined conservation for archaeological sites and monuments are outlined below.

The Athens Charter for Restoration of Historic Monuments, organized by the International Museums Office in 1931, established basic principles for an international code of practice for conservation. It recognized a common responsibility to safeguard monuments for future generations as our duty to hand them on in the full richness of their authenticity. Reference is made that "the work of consolidation [use of modern materials such as reinforced concrete] should whenever possible be concealed in order that the aspect and character of the restored monument may be preserved" (Article 4) and that "the architects and curators of monuments should collaborate with specialists in the physical, chemical, and natural sciences with a view to determining the methods to be adopted in specific cases" (Article 5.1).

The Venice Charter for the conservation and restoration of monuments and sites, organized by the International Congress of Architects and Technicians of Historic Monuments in 1964, established that "it is our duty to hand them [ancient monuments] on in the full richness of their authenticity" (Preamble) and that "ruins must be maintained and measures necessary for the permanent conservation and protection of architectural features and objects discovered must be taken" (Article 15). This Charter also identified conservation judgments as necessarily relative and contextual as opposed to a belief in international absolutes.

The guidelines developed in Venice in the 1960s became problematic when authenticity in heritage went beyond the stone remains of past structures and had to consider rebuilding techniques that would preserve the traditional techniques and forms of living cultures or those created from more ephemeral (i.e., organic) materials.

The Burra Charter was first adopted in 1979 and has been revised several times. In 1999, it became known as Burra: The Australia ICOMOS Charter for Places of Cultural Significance. It established that "places of cultural significance must be conserved for present and future generations" (Preamble). "Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups" (Article 1).

The Nara Document on Authenticity, organized by the World Heritage Committee in 1994, opened the world to discussions involving the essential role of understanding of authenticity during the scientific study of cultural heritage. It expanded the range of values for authenticity to accommodate the mainstream Japanese conservation practices of dismantling, repair, and reassembly. The broader framework for authenticity analysis developed at Nara inspired regional meetings that were held in Africa, Europe, the Americas, Australia, and China. The Nara Document establishes that "the conservation of authenticity contributes essentially to the clarification and illumination of the collective memory of humanity" (Article 4) and "judgments of values and authenticity must be considered and judged within the cultural contexts to which they belong" (Article 11).

The Declaration of San Antonio, organized by ICOMOS in 1996, suggested expanding proofs of authenticity to include reflection of true value, integrity, context, identity, use, and function. It states that "the authenticity of our cultural resources lies in the identification, evaluation, and interpretation of their true values as perceived by our ancestors in the past and by ourselves now as an evolving and diverse community" (that coexist but often assign different values to them) (Article 1) and "when an

archaeological site is no longer used by the descendants of [its] builders, the material evidence of the site provides the most direct link to the past which makes it possible for the present inhabitants to perceive and interpret the sites meaning and value" (Article 5).

The Zimbabwe Meeting Recommendations in 1999 state: "In the context of the World Heritage Convention, the notions of authenticity and integrity cannot be expressed in isolation.... The meaning of the heritage is usually a combination of values created by people. These values include norms and belief systems, as well as material and technological aspects. In most instances culture and nature are inseparable." Basically, it suggests that language, indigenous knowledge, skills, and technology should participate and be documented in preservation and management of heritage. Munjeri has clarified that "in traditional African societies, it [authenticity] is not based on the cult of physical objects 'the tangible' and certainly not on condition and aesthetic values.... The solution lies in recognizing that indigenous communities are at heart, 'ecosystem people' integrally linked to the ecosystem they inhabit. They are part of the integrity equation" (Munjeri 2001: 18-9). This truly complicates the equation by expanding the boundaries of authenticity into the slippery slopes of landscape and identity.

The World Heritage Operational Guidelines (2005, Article 81) provides insight into authenticity and includes a list of information resources: form and design, materials and substance, use and function, traditions and techniques, location and setting, spirit and feelings, and other internal and external factors such as management systems, language, and other forms of intangible heritage. It addresses the reconstruction of archaeological remains or historic buildings or districts as acceptable only on the basis of complete and detailed documentation and recognizes the role to some extent on conjecture (Article 24).

The conservation of objects is a smaller aspect of archaeology than buildings, sites, and monuments, and there are no doctrines, charters, and declarations to illustrate historical perspective. By the end of the nineteenth century, there was an increasing recognition of the importance of preservation for antiquities and a justification for the creation of conservation handbooks. Most provide explanation for deterioration and treatment processes, and the use of before and after photographic documentation is identified in some. By the mid-twentieth century, handbooks for collectors, archaeologists, and museum curators were developed because appreciation and study mandated that objects be cleaned, restored, and repaired. By the last quarter of the twentieth century, an intensification of laboratory training was recommended for the conservation of objects.

The conservation of moveable historic and artistic objects is guided by various codes of ethics developed by professional conservators in numerous countries. These codes are statements of values, standards, and aims that guide the conservator through a complex range of issues. Beginning in the mid-twentieth century, professional organizations for the conservation of historic and artistic works were formed to break with the tradition of the craftsman-restorer. The codes provided generalized and idealized standards of behavior for the new professionals of the later twentieth century who owe their professional training to formal graduate studies devoted specifically to the field of conservation.

Most codes of ethics continue to focus on physical or tangible cultural heritage. For example, the American Institute for Conservation code requires that "statements about age, origin, or authenticity should be based on the physical evidence derived from an object, rather than on opinions, and should include an explanation that scientific data alone cannot provide definite attributions."

Conservators are governed by a respect for the integrity of the object or its unmarred, unimpaired, or uncorrupted condition. Some codes specifically clarify that integrity may include physical, historic, and aesthetic integrity, while others have added a reference to conceptual integrity. The American Institute for Conservation's code calls for "an informed respect for cultural property, its unique character and significance, and the people or person who created it."

An important aspect of the Canadian Association of Conservation code is an emphasis placed on "full documentation without fraudulent intent. . .the presence and extent of any restoration or reconstruction must be detectable, though they need not be conspicuous." The historian Cesare Brandi is often credited with introducing modern principles for the conservation of art that led to a rejection of imitative restoration and heightened respect for the traces of time and concepts of authenticity in 1963. This concept respects the original and present contexts in the reintegration while making the intervention discernable at close range.

In addition to the unwritten "six foot, six inch" rule, meaning a restoration should be discernable at six inches but not at six feet, there is the principle of reversibility that has been a long-standing focus of the conservation codes of ethics. It refers to the capacity of a treatment to be undone or reversed, at a later date, without resulting in damage or change to the object. This is inclusive of any materials such as adhesives or restorations that may be added. Despite numerous commonalities in theoretical approach and practice, the needs of different materials have led many specialist conservators to develop different attitudes and approaches to treatment. Conservators of moveable objects tend to specialize by divisions based on material composition (ceramics, wood, glass, metal, painting, paper, and stone). Other times, the specialties represent types of objects (paintings, books, textiles, sculpture, architecture), or they may refer to the academic discipline that objects broadly belong (archaeological, ethnographic, decorative arts, historical, fine arts) or to a type of material function (furniture, costume, and musical instruments).

At the end of the twentieth century, contexts of value began to influence the conservation of moveable objects. Important examples of change include (1) the concept of a single standard toward conservation treatment (the highest and most exacting standard of treatment for each work) was determined to be impractical, (2) the role of cultural sensitivity that allows acknowledgment of indigenous feelings and the connectedness of different values and priorities toward conservation became significant, and (3) a caution about the removal of dirt and residues because analysis may identify past uses, signature a provenance, or provide a date or place of origin.

Also, it is important to point out where discussions of authenticity do not appear. For instance, it is not mentioned in the 1990 Federal Regulation 36 CFR 79: Curation of Federally Owned and Administered Archaeological Collections, which was promulgated to provide minimum standards for the long-term management and care of archaeological collections, including associated records and reports. Notably, the regulations consider actions that need to be taken for both new and existing collections. Likewise, the Salzburg Declaration of 2009 on the Conservation and Preservation of Cultural Heritage established a new collaborative platform to more effectively preserve the world's cultural heritage, but it does not specifically discuss authenticity. Perhaps the assumption that modifying an object should be done for the sake of authenticity is problematic because all conditions are equally authentic (Muñoz-Viñas 2005: 91-113).

Key Issues/Current Debates

Conservation, as the overall goal for heritage science, has evolved from how to conserve to why conserve to for whom we should conserve. Archaeological sites, monuments, and objects may hold values that conflict with one another. Authenticity is critical to consider in conservation, but it is relative, and as a term it has different meanings in different contexts.

Conservation has focused on the material qualities of archaeological remains to meet the test of authenticity and to implement treatments that arrest and stabilize the process of decay. What was seen as objective criteria, relating to design, material, and workmanship, was used to establish the authentic character for treatment. This works well when cultural heritage monuments and objects belong to

a society that has ceased to exist, because faithfulness to original objects, materials, contexts, and aims become a shared common denominator (Lowenthal 1999).

Considering authenticity to be a condition in relation to context means that the revealing of relevant values is also a basis for treatment. But basing authenticity on judgments of intangible value is subjective. Also, values are subject to cultural and educational processes that may change over time. Attempts to conserve cultural contexts and aims over time become more relative and subject to interpretation and negotiation, especially when multiple stakeholders are involved.

Thus, two of the important issues that have emerged regarding authenticity and conservation involve (1) concerns that over-restoration or reconstruction of the tangible original should not destroy value and integrity as in the Venice Charter and (2) concerns that link to intangible cultural values of heritage, that have been maintained over time, should be a primary consideration for meaning and validity as in the Nara Document.

Conservation can claim to provide authenticity through analysis and technical study, but it can also inadvertently remove material authenticity by cleaning away critical evidence. In fact, scientific analysis in the course of conservation is better at producing evidence than it is at proving authenticity. Examples include dating techniques applied to a composition material or elemental analysis of materials known for being indicative of a particular group (based on a body of reference material) or that the wear patterns on an object surface are human made. Continuous developments in science and changes in conservation treatments can complicate investigations into authenticity for ancient sites, monuments, or finds. For instance, Myrberg (2004) summarizes the role of authenticity in ancient monument preservation and provides a problematic example involving a labyrinth on the Swedish archipelago. He asks: "What is a true monument of the past? Many monuments have been reused over the centuries, rebuilt, added to or copied – processes that continue into the present. . . should their use or even their construction in the present be considered less meaningful than their use or construction in, say, the eighteenth century or the Neolithic?"

An authentic value of inspiration may also be important to conservation particularly when it is linked to artistic, historic values. Brajer (2009) illustrates a confusing history of many re-restorations for wall paintings in a Danish church beginning in the nineteenth century due, in part, to the use of medieval techniques and materials and innovative tricks to achieve the appearance of original wear and tear. The resulting condition was a hotchpotch of overlapping repairs, reconstructions, and overpaintings, presenting a picture of repeated disintegration and partial recreation. A growing consciousness regarding the meaning behind the previous restoration efforts helped the conservators establish a link between value (the source of meaning) in treated objects and the authenticity manifested in them (integrity of meaning).

As conservators learn to look beyond the context of original materials to cultural dialogues and engagements or dialectics, they are better able to deal with interpretative issues that involve complex arrays of contexts, sets of data, or multiple stakeholders. Conflicts such as treatments that conserve the research interests of archaeology with tourism or public values can be negotiated. For example, when the Lucy hominid remains were selected for a traveling exhibition, research scientists were concerned about object safety and their loss of research access. Despite the fact that public visitors to the National Museum of Ethiopia had for years been inspired by a display of a cast, that they thought was original, organizers for the traveling exhibit were convinced that only the real Lucy fossil would be adequate to generate tourism dollars. Conservation compromises allowed the Lucy remains to travel safely, to be handled only by her keeper, to be available to both researchers and museum visitors, and to bring home financial reward.

International Perspectives

International perspectives on authenticity and conservation focus a great deal on notions of tangible and intangible aspects, global and local expertise, and universal and particular principles. The founding of the International Council of Monuments and Sites (ICOMOS) in 1965 by UNESCO initiated a global network of professionals devoted to heritage conservation. The World Heritage Convention of 1972 pledged to safeguard heritage resources deemed to be of *universal* value to all of humanity. Various philosophies, treaties, heritage charters, and conventions have laid the foundation for conservation practice and dialogue. "Imbalances between [in] different regions and types of heritage have led to different approaches to conservation, fueling tensions and undermining exchanges of ideas and experiences" (Luxen 2004). Today, the relevance of these documents, which have moral rather than legal authority, is sometimes contested, but they serve to remind and challenge us.

Throughout the world, heritage conservation with value based on original fabric is very different from heritage with living or great spiritual value. Dialogue between professionals from different cultures around the world continues to improve the understanding and practice of conservation. Various international meetings in Africa have identified the importance of culture and nature, while in the Far East, the importance of traditional crafts skills as cultural heritage conservation has been acknowledged with the concept of "living cultural treasure." In the Americas, a common indigenous concept of authenticity suggests that "any object or structure reproduced, replicated, repaired, stabilized or restored by descendants of the original craft persons or members of the same ethnic party loses no integrity" (Ladd 1999: 22). In other words, "A structure can be authentic if it closely resembles an ancient structure in form and design or if its spirit and feeling is that of an ancient building" (Holtorf & Schadla-Hall 1999: 235).

Conservators working with archaeological objects in museum collections often find decisions regarding appropriate conservation treatment to be difficult. If values can be aesthetic, historic, scientific, social, or spiritual and may reflect past, present, or future generations, then objects of similar type including ancient originals, historic or honest copies, recent replicas, forgeries, or deceptive replicas created with some original parts married from different objects may all be authentic. Examination and analysis can detect materials of construction; methods of technological construction; natural corrosion, residue, salt, or other accretion products versus chemical finishing, false patina, or modern adhesive and paint products; and typical wear marks versus machine tool marks. Based on conservation studies, objects may retain a value but have their authenticity, and cultural significance reassigned. Just as a fragmentary object condition may be an argument for authenticity, replicas can be born out of demand for continuing tradition (sometimes referred to as heritage craft), a lack of the original, or the need to fulfill market demand. Restoration techniques that include repainting may come to represent an important history for a piece.

Conservation is still challenged in how to include and evaluate the role of authenticity in treatment decision making, how to reconcile the difference between scientific conservation and the revival of heritage craft, and how to minimize the conservation of spectacular monuments and objects at the expense of less spectacular ones. Several authors (Layton et al. 2001; Muñoz-Viñas 2005; Stanley-Price & King 2009) have offered thoughtful discussion on these subjects. Justifications for reconstruction (returning a place to a known earlier state by the introduction of new material into the fabric) would rarely meet the requirements of the Charters that they are based on but can and do satisfy a variety of stakeholders nonetheless.

Future Directions

Local knowledge and public participation have become recognized components in site preservation efforts. Avrami (2009) explains that social theorists offered their application to planning,

which resulted in "broader participation of stakeholders, challenged top-down expert-driven models, and helped to transform planning into a more social and contextually-responsive endeavor."

The stewardship of sites and monuments is very tied to subjective relationships between people and places. The repainting treatment project of the Kamehameha statue in Hawaii is an example of how a conservation project could be directed with community-centered goals. The first goal included standard conservation procedures, except they were based on the community's decision about whether to paint or gild the statue and how to train local community members to effectively maintain the sculpture into the future. The second goal was to establish a link to future regional development with traditional arts, heritage preservation, and community identity. The use of participatory conservation offers a model for bringing this knowledge into play (making) the conservation process a vehicle for public engagement and as a tool for critical discourse about how conservation represents the past (Wharton 2002). Measures of monitoring treatment relevance, improving management frameworks, and humanizing documentation may also benefit from the inclusion of various stakeholders.

Finally, repatriation rights for sites and objects for indigenous groups are but one example of how decisions of conservation can vary for different people at different times. A critical aspect of the repatriation process in the United States is the role of consultations in determining control, treatment, and disposition of human remains and sacred objects and is outlined in 43 CFR 10.5, 10.8 (a), and 10.9 (b). The repatriation process can be subjective and political, and it can actually be an appropriate reverse of conservation when objects and human remains excavated from a burial are reinterred together or when sacred objects are left to naturally deteriorate as intended.

Sullivan (1998: 8) aptly identifies two important issues that are relevant for all future discussions: "(1) that over-restoration or reconstructions not destroy the value for which the site is listed as a World Heritage Site and (2) that the idea of authenticity is indissolubly linked to cultural value and only has meaning and validity in this context. Thus an appropriate treatment to conserve authenticity will vary depending on the primary cultural values of the place."

Authenticity in conservation has come to require a sense of respect for the place, the indigenous people, and the local history and implies a means of linking to the future as part of a flow of time. Stressing an understanding of knowledge rather than collecting, testing, and presenting facts is important for the integrative stewardship of sites or the preventive conservation and management of collections. National symbolism, continuing function or reuse, education and research, tourism promotion, and site preservation are all linked to sustainability of cultural heritage. Debate over how best to conserve material culture will continue. Some will argue for minimal intervention, while others will argue for extensive restoration and active use of cultural heritage. The recognition of cultural relativism and contested meanings embedded in material objects has formally entered conservation literature (Odegaard 1995; Clavir 2002).

Significant Charters and Declarations for Conservation

Athens Charter for Restoration of Historic Monuments, 1931. http://www.icomos.org/docs/athens_charter.html

Venice Charter for the Conservation and Restoration of Monuments and Sites, 1964. http://www.international.icomos.org/charters/venice_e.htm

36CFR60.4 US National Park Service Regulations for National Register of Historic Places (National Historic Preservation Act of 1966) last revised 2010. http://www.nps.gov/nr/publications/bulletins/nrb38/nrb%2038%20page%204.htm

Burra Charter; the Australia ICOMOS Charter of Places of Cultural Significance, 1979. http://www.icomos.org/burra_charter.html

Nara Document on Authenticity, 1994. http://www.international.icomos.org/naradoc_eng.htm

The Declaration of San Antonio, 1996. http://www.icomos.org/docs/san_antonio.html

The Zimbabwe Meeting Recommendations, 1999. http://www.africa2009.net/common/reports/r-zimb00.pdf

World Heritage Operational Guidelines, 2005. http://whc.unesco.org/archive/opguide05-en.pdf

Salzburg Declaration on the Conservation and Preservation of Cultural Heritage, 2009. http://www.imls.gov/pdf/SalzburgDeclaration%20.pdf

Cross-References

▶ Authenticity and Pastness in Cultural Heritage Management
▶ Authenticity and the Manufacture of Heritage
▶ Authenticity in Archaeological Conservation and Preservation

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Authenticity and Pastness in Cultural Heritage Management

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Brief Definition of the Topic

Seemingly cultural heritage in modern Western societies can successfully evoke the past because it encompasses authentic remains from the past. The discernible basis of authenticity and thus cultural heritage rests in this context largely on an immanent, usually material substance and its inherent qualities. On closer inspection, however,

the significance of cultural heritage is not dependent on the immanent authenticity and age of its objects. Authenticity turns out to be variable, negotiable, and relative to a specific social and cultural context; it is in the eye of the beholder. For something to evoke the past, for example, in popular culture, it does not have to be of great age and can in fact be rather new. Yet materiality often remains crucially important – not insofar as it embodies an inherent quality but insofar as it affects the beholder. This insight affects heritage management in a profound way.

Instead of focusing on age, we ought to focus on the quality of being of the past, as it is this quality that actually matters about age. A useful term denoting that quality of being of the past is pastness (Holtorf 2010, 2013). Pastness is the result of a particular perception or experience, and thus not immanent in any material object. Although pastness may result from a credible determination of the age of a given item of heritage, it may also derive from other perceptions or experiences linked to the item's materiality or context. For example, a ruin may possess pastness because its walls are in an obvious state of decay, irrespective of when it was built. Similarly, an object on display in a glass case may be considered of the past because a label or guide is saying so. If we want to understand and manage cultural heritage with regard to the important role it fulfills in contemporary society, including popular culture, we thus need to investigate under which conditions human beings experience "pastness" in relation to a given object and precisely what that means. In this way, studying pastness extends the scope of both cultural heritage studies and heritage management considerably.

In a second step, it turns out that for an object to evoke the past it does not even have to possess pastness and may thus lack the quality of being of the past. Arguably, cultural heritage is best defined not as being made up of survivals from the past or simulated replacements that in certain circumstances can fool audiences about their actual age, but as the accumulated body of everything that reminds contemporary society of the past. Both definitions overlap but they are not identical. Even historically themed hotel/casinos in Las Vegas like the Luxor or Caesars Palace remind us of an ancient past – far earlier than the twentieth century when they were built and quite obviously without surviving from that time. A similar emphasis on remembrance has been brought to bear on heritage by the French intellectual Pierre Nora. His highly influential book series presenting "Les lieux de mémoire" (1984–92) explored all those realms of memory in France "where memory crystallizes and secretes itself" (Nora 1989: 7). These include not only historic sites but also memorials, commemorative rituals, and imaginary representations of the past in popular culture, all of which evoke the past (rightly or wrongly but that is not the point). All of Nora's realms of memory evoke the past in the present, just like an ancient monument that has survived until our day.

Cultural heritage in modern societies thus consists of those elements of our life-worlds, including popular culture, that either possess the quality of being of the past (pastness) or that remind us of the past in some other way. Heritage management ought to deal with all those elements and address, among other issues, how the quality of pastness and the power of remembrance relate to tangible and intangible remains of the past.

Cross-References

- ▶ Age Estimation
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: Public Perceptions

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Authenticity and the Manufacture of Heritage

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Introduction

The desire for authenticity pervades all facets of modern life. Authenticity, accordingly, constitutes an important site on which tradition and modernity have been debated and reformulated. The recovery of tradition – the cataloguing of the past through material, social, and cultural forms – has allowed narratives of modernity as a future-oriented enterprise imaginable. As illuminated in writings on the interlocking pair of tradition and modernity (e.g., Mitchell 1991; Wright 1991), tradition came into being only when it was imagined as a defining complement of modernity not only temporally – with tradition linked to the past and modernity with the future – but also spatially through the built environment (see Roy 2004).

If authenticity is an important discursive site of tradition and modernity, the built environment serves as an actual terrain on which the recovery of tradition, on one hand, and the elaboration of modernity, on the other, have been displayed. Nowhere is the recovery of tradition more apparent than in defining the meaning of heritage. Like tradition, heritage implies continuity not only with the past, but a past determined to be historically suitable. Yet as Eric Hobsbawm and Terence Ranger (1983: 1) have stressed, "traditions" that "appear or claim to be old are often quite recent in origin and sometimes invented" as is captured in their concept, "invented traditions." The notion of invented traditions suggests that the distinction between tradition and modernity is itself constructed and that authenticity as a proxy for originality or as a marker of differentiation must be questioned.

Extending the concept of invented traditions to the built environment, this entry examines how heritage sites that may appear authentic are oftentimes manufactured in the service of the tourism economy. Specifically, it looks at how heritage itself has become a commodity that is valued through circuits of travel and consumption. Tradition and heritage, recovered and restored as well as invented and manufactured, have been central to the making of the nation-state and in constructing nostalgia-based notions of identity. From an economic standpoint, heritage sites have become invaluable sources for communities, cities, and nations through which to cultivate symbolic capital and accumulate profits. As heritage sites become increasingly commodified and commercialized under late capitalism, the authenticity of heritage has become a taken-for-granted concept whose meanings are assumed but not specified.

The built environment, or "space" broadly conceived, has been identified as part of the web of social experience crucial to forging cultural consciousness (Harvey 1990). When viewed at the intersection of tradition and built form, the built environment has been understood as a "system of settings" or a "cultural landscape" (Rapoport 1989). These conceptualizations highlight the built environment's crucial role as a mediator of values, symbols, power relations, and culture. Rooted in the interdisciplinary perspectives of architectural history and urban studies, this entry focuses on the meaning of authenticity and the manufacturing of heritage evident in the proliferation of place-making practices and the revalidation of locality as it relates to two shifts. The first shift is economic with tourism, a central vehicle for the acquisition of culture and the experience of authenticity. Tourism generates economic and symbolic

values for localities vying for positions in a global order of places. Capitalism, with its infinite ability to commodify everything, has engendered new regimes of production and consumption where commodities are no longer manufactured goods but cultural landscapes, among them heritage environments. The second shift is discursive. Tourism both advances and depends on the trope of authenticity. As evidenced in former colonial cities that are refashioned for global tourism, for example, the marketing of such sites draws upon and extends older myths on the authenticity of "the Orient" or "Africa." The production of these landscapes, cultural commodities under contemporary capitalism, has transformed space and history and made them spectacular. Heritage, by extension, can be understood as a spectacle on display where the phantasmagoria of authenticity is also the source of its profitability (AlSayyad 2001).

Definition and Historical Background

Genealogies of a Concept

Built environments unite capitalism and culture as exemplified in landscapes that are packaged for consumption in the global economy of tourism. In such regimes of tourism, heritage is manufactured for consumption. Manufactured heritage has become a new norm in tourism development with entire built environments constructed to cater to and order difference. Paradoxically, the advance of mass tourism has led to the dismantling of actually existing traditional places and historic sites. Because the built environment is both spatial and visual, the trope of authenticity has been central to a system of classification and representation of place in these cultural landscapes. Authenticity conditions knowledge of a place and underwrites the values that are brought to bear upon this knowledge. That heritage is manufactured to suggest that heritage, culture, and tradition are part of the modes of production not of the industrial economy, but of the cultural economy. Rather than goods that are produced to be consumed, heritage along with the signs and representations of culture is manufactured for consumption. Heritage as a commodity aligns with its root definition as property that is owned.

The purpose of this evaluation of the manufacture of heritage is not to expose an assumed artificiality or constructedness of heritage per se. Rather, the proliferation of manufactured heritage necessitates a look at how heritage is fashioned. Part of this fashioning is the language of authenticity, whether for its symbolic power or in the ways authenticity as an idea imparts value to the traveling experience. Etymologically, authenticity is from the Greek word *authentikos* or genuine. It denotes a state of being in accordance with fact or reality, truth in substance, or in origins and authorship. In social life, however, authenticity functions as a keyword. According to Raymond Williams (1976), keywords used to describe social life are active forces in shaping it. By underscoring the performative, as opposed to the representational, dimension of language, Williams shows how keywords are sites through which social experience is mediated and defined. Earlier, Theodor Adorno (2003 [1964]) cautioned against the allure of semantic games that compromise the task of critical thought. The "fact that the words of the jargon sound as if they said something higher than what they mean. . .the terms of the jargon of authenticity are. . .words that are sacred without sacred content" (Adorno 2003 [1964]: 6). Directed at existentialist philosophers who relied on authenticity as a key trope to critique society's values, Adorno stressed the ideology of language in what he called the "jargon of authenticity." For Adorno, jargon was like an "aura." Following Walter Benjamin, an aura refers to a "strange weave of space and time: the unique appearance or semblance of distance, no matter how close it may be" (Benjamin 2005 [1931]: 518) and provides a means to understand the possibilities of authenticity yielded by new cultural forms.

In the study of the built environment, authenticity is both performative in the sense elaborated by Williams and ideological in the way stressed by Adorno. As a keyword, authenticity has held a dialectical hold over the field of heritage studies in its ability to shape the discourse as well as

name one of its key premises. As a jargon, authenticity is used extensively in heritage debates though with limited analytical utility. Authenticity is often treated as a state of being or as a fundamental characteristic inhered in the built environment. Authenticity ascribes value to heritage or those buildings, landscapes, and monuments historically validated and contextually valued through their transmission across generations. Conversely, built heritage is assumed to be authentic as a space that instantiates history or heritage that displays the past from the position of the present. Indeed, authenticity occupies a paradoxical position in that odd coupling, "authentic heritage." The yoking of these two terms – authenticity and heritage – renders "authentic" an empty signifier or exposes its redundancy specifically when the term "heritage" is unpacked.

Heritage, which derives from the Old French meaning to inherit, denotes property that is valued and transmitted across generations. This ascription of value is crucial. Heritage, whether in the form of objects, traditions, or material culture, acquires its value from a history established through documentary evidence as well as through a set of authorized narratives. For travelers, the authenticity of tourism imparts "distinction" in the sense outlined by Pierre Bourdieu (1984) to those who "consume" heritage sites, exotic locales, and faraway destinations. Bourdieu's focus on the political dimension of consumption suggests that tourism is one of many strategies used by social groups to maintain and reproduce class power and privilege.

The "interpretative turn" (Rabinow & Sullivan 1987 [1979]) in the social sciences was an epistemological as well as methodological shift away from positive science to a hermeneutic approach in the analysis of human practices, discursive strategies, and systems of knowledge. Decades later in 2003, a similar turn took place when UNESCO (the United Nations Educational, Scientific and Cultural Organization) set out to include "intangible heritage" in its definition of cultural heritage. UNESCO has long ignored the political dimension of culture appealing to culture's universality. In expanding the meaning of heritage, the UN agency expanded its original mandate as a steward of culture. Following its reclassification, intangible heritage – those immaterial practices such as oral traditions and performing arts – were deemed to have equal claim to heritage status as much as tangible heritage or buildings, monuments, and objects that have long served as the core of heritage.

The distinction between intangible and tangible heritage relies in part on the trope of authenticity as well as the difference of materiality. But what is equally at play in this expanding category of heritage is the nexus of power and knowledge – experts in planning, preservation, and architecture as well as in history and anthropology who are able recover places, norms, and customs and categorize them. Such categorization suggests that authenticity is not an essence or a thing, but rather contextually driven if not malleable. Places and objects are not inherently authentic. Rather, heritage and authenticity are interpretative categories with certain icons of visibility – the monument or the landscape – that are part of multiple systems of significance, practice, and meaning.

Before going into greater discussion of the manufacture of heritage, it is important to situate the emergence of heritage as part of an emergent cultural consciousness. This desire for knowledge and culture was institutionalized through specific mediums that are central to heritage preservation today – mediums based on specific formalized apparatuses of intelligibility. Among these institutions of intelligibility, codified through colonialism, have been the museum and the world exhibition. These two institutions reflect a nexus of power and knowledge over place that in turn legitimated the colonial enterprise. The museum was part of the classificatory system of the colonial state that functioned as a "pictorial census" (Anderson 1991 [1983]) or a means of governing through categories of identity that allowed for culture to be fixed to a delimited locale or territory. The world exhibition was another institution through which culture – through its visibility – was given object status. These apparatuses continue to be relevant today.

Key Issues

From Colonialism to Global Capitalism

As outlined in AlSayyad (2001), heritage can be contextualized within three historical moments. The first corresponds to late colonialism during which interest in indigenous heritage became initially catalogued and classified. The second period followed decolonization in the period of postcolonial nationalism during which newly emerging nation-states used heritage and authenticity as markers, paradoxically enough, to assert a modern identity. The last is this era of twenty-first century global capitalism where heritage production has become a new frontier of accumulation, placemaking, and positioning. The periodization below serves to illuminate relevant debates rather than indicate strict historical brackets. In what follows, this entry examines the intersection of authenticity and heritage through the lens of the built environment. The manufacture of heritage can be considered the aesthetic organization of space-history under the demands of modernity. All heritage is manufactured in the way that all traditions are invented. Heritage must also be seen as the articulation and management of difference and as a preoccupation with defining a position and place in a globalizing world. The concern here is with the ways in which historical knowledge is not only mediated through something called heritage but how it is mediated through space, that is, in built form. This requires a move away from a normative reading of heritage as a set of truths and essences but rather as socially constructions and systems of representation that make claims to truth, to identity, and to history.

Authenticity as Recovery: The Colonial Ordering of the World

Modernity has been a central platform of engagement with the meanings, discourses, and representations of heritage and tradition. In his treatise on experiences of modernity, Marshall Berman (1988 [1982]) juxtaposes the inauthentic modernity of St. Petersburg, what he calls the "modernism of underdevelopment" with the authentic modernity of Paris associated with progress, reason, and the future. While modernities of the global South have been riddled with questions surrounding the authenticity of the copy or modernity as mimicry, traditions are assumed to be locatable in and native to the Third World. Authenticity and tradition have been treated as stable and positive configurations, associated with the weight of the past deemed to contrast to the dynamism and change of modernity. Yet as noted below, heritage and tradition were representations of culture and power that were erected into reality.

The first systematically visual display of heritage emerged through the world exhibition and the museum. Museums and exhibitions became the staging grounds on which colonial heritage could be rationalized and represented for the consumption of metropolitan viewers. In the colonial order of things, tradition and modernity could be mapped according to the separation of the world between the West and the non-West or in more recent parlance between the global north and global south. Authenticity was reconstituted under colonial rule as the grounds from which to recover tradition and heritage. Thus, tradition was located in non-Western societies and modernity in the West. However, the colonies were also important sites to experiment with modernity and to work through what would become policies of public health, education, sanitation, and urban planning. The colonial encounter was thus crucial in sustaining if not consolidating structural dualisms that have framed much of Western social thought – modernity versus tradition, use-value versus exchange value, and core versus periphery. The museum along with the exhibition transformed objects into historical evidence and valorized landscapes as heritage. The colonial imagination, through such instruments as the exhibition and the museum, was made into reality as colonial administrators and scholars categorized heritage environments and displayed them for public consumption.

Scholars of postcolonial theory and cultural studies have pointed to the multiple temporalities and reconstructions of history associated with the emergence of colonial nostalgia as a cultural phenomenon, nostalgia that positions the past as

critique of present or as a cultural practice connected to revisionist history and politics. Edward Said (1978) has identified this process as the "citationary structure" of Orientalism where the repetition and the circulation of the same notions become sedimented and legitimized as assertions of authenticity and truth.

An example of authenticity as recovery can be found in the Cairo Street or Rue de Caire that was built as part of the Paris Exposition of 1889. As detailed by Zeynep Çelik (1992), Cairo Street was willingly financed and authored by Delort de Gleon, a wealthy Frenchmen who had lived in Egypt for a quarter of a century. His concern for authenticity was so deep that he imported dirt and donkeys directly from Egypt as well as actually existing historic structures including a Quranic school and a water fountain that were disassembled, shipped to Paris, and finally installed at the exposition site. Gleon argued that the Rue de Caire was in fact more authentic than the streets of Cairo based on the reasoning that it was impossible to find an untouched, and thus authentic, street in Cairo.

Authenticity and Postcolonial Nationalism

Benedict Anderson (1991 [1983]) argues that nationalism was made possible and new communities imaginable through the interplay between technology and the relations of capitalist production. In order for a nation to be modern, it had to produce a past. Time, made continuous and linear, became central to the construction of an appropriate history and identity that would be coextensive with territory of the imagined community of the nation. Chronological time, measured by the clock and calendar, coupled with the technologies of capitalism made it possible to represent the nation. Such forms of representation – whether print commodities like the newspaper – made new communities imaginable.

Landscapes were brought into the horizons of intelligibility and knowledge through other forms of representation as well, among them the map and the census, allowing the contours of any community (including the nation) knowable and visible. As writings by Hobsbawm and Ranger (1983), Anderson (1991 [1983]), and Shils (1981) have illuminated, establishing continuity with the past has been essential to the process of making a particular assemblage of people, practices, and histories into a coherent body. In a similar vein, to produce continuity with a past – that is, to produce a history – also entailed the production of place. Together these systems of representation have come together to produce the heritage of place, that is, through practices that establish social cohesion or symbolize belonging for real and artificial communities.

Nation-states, newly formed with the end of decolonization, were active in making national identities that would be projected on an international stage. Following World War II, postcolonial nations engaged in cultivating national identity in the architecture of capitol buildings (Vale 1992). Vernacular architecture has also provided another stage to cultivate national identity. Returning to Egypt, the work of the architect Hassan Fathy provides a case of heritage that was manufactured at the behest of the government. Fathy continues to be a key interlocutor of Egyptian national identity and one of its most well-cited authors of heritage. What is now deemed authentic vernacular architecture, based on traditional mud construction and the housing layouts of medieval Cairo, was indeed Fathy's interpretation and construction of those forms. In the 1940s, the Egyptian Department of Antiquities commissioned Fathy to build a model village for the inhabitants of the village of Gurna located on the west bank of the river Nile near the necropolis of Luxor. The model village of New Gurna would be a relocation site for these inhabitants. Though the village remained unfinished and the project abandoned by Fathy, New Gurna became internationally admired for its usage of local materials and Fathy for his appropriation of forms. His work continues to help define national heritage and postcolonial authenticity. In a recent twist, UNESCO set out to "safeguard" New Gurna beginning in 2011 through the restoration and preservation of the village further cementing the authenticity of what was a manufactured heritage.

Authenticity in an Era of Global Capitalism

In the realm of architecture and urban design, the critique of high modernism coupled with the reconfiguration of capitalism and society together has renewed debates on heritage and authenticity. Heterogeneity, difference, and distance have become the hallmarks of a cultural industry that must deal with the time-space compression of global capitalism. What began as an interrogation of culture in the 1980s and 1990s in the social sciences and humanities has lent to an emphasis on the politics of difference, a turn that has entailed a rejection of totalizing and abstract narratives in favor of the contingent and variable identities and spaces. Coupled with this epistemic shift has been a recalibrated role of culture in the political economy – what David Harvey (1990) has referred to as culture in the embrace of capitalism – evident in tailored projects in architecture, heritage, and urban design. If the built environment constitutes one dimension of the complex of experience crucial to forging new cultural sensitivities, the expanding importance of heritage sites as regimes of accumulation and difference making can be seen as its dialectical twin.

In looking at the question of mediation of authenticity through space, AlSayyad (2001) has noted increasing demand for built environments that promise unique cultural experiences. A countervailing weight to the intensifying flows of the global has been the revalidation of place and local difference. The manufacture of heritage supports the Marxist view on the infinite capacity of capitalism to commodify everything. Among these commodities are cultural landscapes. Amidst the fragmentation generated by flexible accumulation and the condition of postmodernity, the identities of built environments have become new frontiers of cultivation and manipulation.

Following AlSayyad (2001), practices of manufacturing can be categorized as such: an emphasis on iconography where iconography becomes culture, the memorialization of history established through visuality, and an emphasis on the profitability rather than facticity of history. Tourism exposes the paradoxes of authenticity as an ideal and as a pursuit. On one hand, tourism is predicated on the desire for an authentic experience, to see life as it is really lived. Yet tourism, as part of the visual economy of consumption, has also been associated with the superficiality of engagement with the figure of the tourist content with inauthentic experiences. What is taken to be authentic may in fact be a performance of authenticity or indigeneity, with culture and place circumscribed, rationalized, ordered, and exploited. Representations of place – peoples, geographies, culture, and nature – are central elements to a visual economy that links the political economy of capitalism to the aestheticization of space and the appropriation of culture and history.

The city of Las Vegas represents the most explicit site of manufactured heritage where any pretense of authenticity or reality is dispensed with altogether. Here the sophisticated themed casino complexes proffer "authentic fakery" (AlSayyad 2001). Vegas boasts a fake Sphinx and miniature Pyramid at Luxor, the self-contained Venice canals, and a scaled down Arc de Triomphe and Eiffel Tower based on the mimicry of authentic places. The Brooklyn Bridge runs parallel to the Strip, and the Statue of Liberty sits on the corner of Las Vegas Boulevard and Tropicana Avenue. The 20-acre New York-New York Hotel and Casino aims to evoke the glamor of New York without the city's grit or density. As "spectacle" organizes both economy and society in the US general and Vegas in particular, Vegas has been able to capitalize on its ability to adapt to the demands and needs, particularly of the middle class. Specific to Vegas is its characteristic malleability, its ability to brand itself anew, pointing to the absence of a fixed identity for the city. It is a place where "nothing is real" which is understood as its selling point that has ensured its viability throughout its history.

Future Directions

The authentic fakery of Las Vegas is best understood in relation to the "fake authenticity"

(AlSayyad 2001) of Santa Fe, New Mexico. Santa Fe's pueblo adobe forms, though rooted in the history of the area, are in fact constructions of cement and wood disguised as adobe. The unity of appearance of Santa Fe afforded by the Santa Fe style of architecture became codified through a series of urban planning efforts in the early twentieth century. And, what is now known as the "Santa Fe style" was defined by the Museum of New Mexico in the 1910s. The city is, according to Wilson (1997: 4), "an unusually successful illusion of authenticity." The fabrication of its identity and the manufacture of Santa Fe's heritage were designed to revive the cal economy through tourism.

The power of the manufacture of heritage is beautifully captured by Andreas Huyssen:

> One of modernity's permanent laments concerns the loss of a better past, the memory of living in a securely circumscribed place, with a sense of stable boundaries and a place-bound culture with its regular flow of time and a core of permanent relations. Perhaps such days have always been a dream rather than a reality, a phantasmagoria of loss generated by modernity itself rather than its prehistory. But the dream does have staying power (2000: 34).

Authenticity continues to be a resilient trope through which locality and identity are cultivated. As the preceding discussion has shown, what determines authenticity is the frame of reference. Disneyland, that quintessentially American landscape is a case in point. Disneyland's Main Street evokes the nostalgia for small town America. The street's design was inspired by two towns in particular, Marceline, Missouri, and Fort Collins, Colorado. Marceline was Walt Disney's boyhood home and Fort Collins the birthplace of Disneyland's first director, Harper Goff. Facing economic decline in the late 1990s, Marceline sought to further cement its fate to Disneyland and transform itself into its official hometown. In a move that shows the circular movement of authenticity, the town renamed its Kansas Avenue to "Main Street USA" after the gateway to Disneyland Park. Many of the architectural flourishes of Disney's Main Street come directly from Fort Collins. Disneyland's City Hall is a replica of the courthouse in Fort Collins, drawn at three-quarters scale. As Fort Collins grows and attempts to preserve its heritage, it also has resorted to a process that some have called Disneyfication (Iovine 1998). Here lies the greatest dilemma for authenticity. The authentic object has to rely on its own replica to maintain its survival rendering the authentic and the replica a reciprocal couplet in a never-ending dynamic.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Cultural Heritage and the Public

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Authenticity in Archaeological Conservation and Preservation

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Introduction

The Pioneers

"Authentic" is defined in the *Merriam-Webster Dictionary* as "*a*: worthy of acceptance or belief as conforming to or based on fact, *b*: conforming to an original so as to reproduce essential features, and *c*: made or done the same way as an original." This adjective derives from the ancient Greek *authentēs*, meaning "perpetrator or master." The entry for "authenticity" in the *Shorter Oxford Dictionary* (2nd edition, 1936) defines it as "the quality of being authentic," dating from as early as 1657, with four examples of specific applications: (1) as being authoritative or duly authorized, (2) as being true in substance (1762), (3) as being genuine (1760), and (4) as being real, actual (1851).

Concern for authenticity, however defined, in the approach to the restoration and conservation of historic buildings and monuments did not begin to manifest itself fully until the nineteenth century. However, the role of the painter Raphael (Raffaele Santi) in the early sixteenth century played a significant role in the conservation of the earliest surviving monuments of Rome. It was, however, the work of such pioneers as Karl Friedrich Schinkel (1781–1841) and Eugène Emmanuel Viollet-de-Duc (1814–1879) that created an awareness of the need for a systematic approach toward the restoration and conservation of ancient and historic buildings.

The early twentieth century saw the development of a more analytical approach toward the conservation and restoration of the historic heritage. Two names stand out in this theoretical field, those of the Austrian Alois Riegl (1857–1905) and the Italian Cesare Brandi (1906–1988). Following a detailed analysis of the requirements of a state monuments service, Riegl published *Der modern Denkmalcultus, sein Wesen, seine Entstehung* (The modern cult of monuments: its character and its origin) in 1903. In this he identified two main groups of values:

Memorial values (age value, historical value, and intended memorial value)

Present-day values (use value, art value, newness value, and relative art value)

This penetrating classification retains its fundamental validity up to the present day.

Brandi's work dovetails in with that of Riegl, whose classification he expanded slightly into the aesthetic and the historical. He set out three essential elements in any interventions relating to the conservation and restoration element of heritage preservation:

Any reintegration should be easily recognizable at close hand, but at the same time it should not adversely impact the unity that is being restored.

The role of material that directly results in the images is irreplaceable in so far as it forms the aspect and not the structure.

Any restoration should be made in such a way that it will not be an obstacle to subsequent future interventions – indeed, these should be facilitated.

Key Issues/Current Debates/Future Directions/Examples

The Venice Charter

Brandi's holistic approach to conservation and restoration has not always been accepted uncritically, but by and large it still constitutes the contemporary approach to the subject. He did not make use of the term "authenticity" in any of his many publications, but it is implicit in everything he wrote. The first significant use of the word seems to have been in the 1964 International Rescue Convention, produced by the Second International Congress of Architects and Specialists of Historic Buildings and best known as the Venice Charter (to commemorate the historic city in which the conference took place).

The Charter is a remarkable document, providing as it does a detailed ethical and practical framework for the conservation and restoration of the built heritage. It is interesting that the word "authenticity" occurs only once in the Charter: its preamble states that "The common responsibility to safeguard [*historic monuments*] for future generations is recognized. It is our duty to hand them on in the full richness of their authenticity." Article 9 contains the single use of the adjective "authentic": the object of restoration is defined as "to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents." The fact that there is no definition or explanation of this term, however, suggests that the concept was in general use by the 1960s.

The 1964 Venice conference had been convened at the prompting of UNESCO, which was moving toward the drafting of a convention on the protection of the world cultural and natural heritage. It also resulted in the creation in the following year of the International Council on Monuments and Sites (ICOMOS) with the express responsibility of applying the conservation philosophy and recommendations of the Venice Charter. With the signing of the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (better known as the World Heritage Convention) in 1972, ICOMOS was designated an advisory body to the UNESCO World Heritage Committee, responsible for the cultural heritage.

Authenticity and the World Heritage Convention

The practical implementation of the Convention is set out in the *Operational Guidelines for the Implementation of the World Heritage Convention*, which has been subjected to considerable modification and emendation since its first edition in 1977. That text requires that properties inscribed on the World Heritage List should "meet the test of authenticity in design, materials, workmanship, and setting." It goes on to specify that "authenticity does not limit considerations to original form and function, but includes all subsequent modifications and additions, which in themselves possess artistic or historical values." The attributes deemed to be appropriate in evaluating authenticity underwent minor changes over the following years: in 1980, for example, this included the statement that "the [World Heritage] Committee stressed that reconstruction is only acceptable if it is carried out on the basis of complete and detailed documentation on the original and to no extent on conjecture." With the recognition by the Committee in 1992 of cultural landscapes as constituting a distinct category of cultural heritage, evaluation of their distinctive character and components was added to the existing four qualities.

The current (2011) text of the *Operational Guidelines* is more detailed and more comprehensive, as the following excerpts show:

> Depending on the type of cultural heritage, and its cultural context, properties may be understood to meet the conditions of authenticity if their cultural values are credibly expressed through a variety of attributes including form and design, materials and substance, use and function, traditions, techniques, and management systems, location and setting, language and other forms of intangible heritage, spirit and feeling, and other internal and external factors.
>
> Attributes such as spirit and feeling do not lend themselves easily to practical applications of the conditions of authenticity, but nevertheless are important indicators of character and sense of

place, for example, in communities maintaining tradition and cultural continuity.

In relation to authenticity, the reconstruction of archaeological remains or historic buildings or districts is justifiable only in exceptional circumstances. Reconstruction is acceptable only on the basis of complete and detailed documentation and to no extent on conjecture.

This amplification of the concept of authenticity in the World Heritage context (and thereby in the understanding of the international cultural heritage community) is due primarily to a series of debates and discussions that resulted indirectly from the ratification of the Convention in 1992 by the Government of Japan. Japanese heritage experts and government officials had been aware for some time of the prevalent view outside Asia that the approach to conservation, and more particularly reconstruction, in some non-European cultures was radically different to that elsewhere, notably in Europe and North America. This perception was seen as posing a fundamental problem in the nomination and inscription of many important Asian heritage monuments.

The Nara Document

The World Heritage Committee at its 16th Meeting in Santa Fe (USA) in December 1992 identified an urgent need for a critical evaluation of "the criteria governing . . . authenticity and integrity" and called upon ICOMOS to organize a meeting of experts to that end. A 3-day Preparatory Workshop was held in Bergen (Norway) on 31 January to 2 February 1994, funded by the Norwegian and Canadian Governments. On the recommendation of ICOMOS, the Japanese Government agreed to fund a major international conference on authenticity, which took place in Nara in 1–6 November 1994.

The Nara Conference brought together 45 leading experts in the field of preservation of cultural heritage: they represented international organizations and 26 countries from round the world. Following a number of statements from representatives of international bodies, the Chairman of the conference called upon delegates in turn to define their understanding of the meaning of authenticity and its application by their organizations or countries. This revealed a startling variability between regions and latter-day cultures, which demonstrated the truth of a statement by one distinguished expert: "Authenticity is in practice never absolute, always relative" (David Lowenthal in Larsen 1995). It also underlined the need for a more specific definition of what constitute the fundamental principles of authenticity based upon the international perceptions that emerged during three days of papers and intensive discussions. The result of this timely and revealing meeting was the Nara Document on Authenticity, which has become the touchstone for assessing authenticity.

The main points of the Document may be summarized as follows:

Cultural heritage diversity exists in time and space, and demands respect for other cultures and their belief systems. Where cultural values appear to be in conflict, respect for cultural diversity demands acknowledgment of the legitimacy of the cultural values of all parties.

Conservation of all cultural heritages is rooted in the values attributed to it, understanding of which depends, in part, on the degree to which information sources about these values may be understood as credible or truthful.

Knowledge and understanding of these sources of information, in relation to original and subsequent characteristics of the cultural heritage and their meaning, is a requisite basis for assessing all aspects of authenticity.

Authenticity is thus the essential qualifying factor concerning values, understanding of which plays a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning, as well as within the inscription procedures used for the World Heritage Convention and other cultural heritage inventories.

All judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture. It is thus not possible to base judgements of values and authenticity within fixed criteria. On the contrary, the respect due to all cultures requires that heritage properties must be considered and judged within the cultural contexts to which they belong.

Therefore, it is of the highest importance and urgency that, within each culture, recognition be accorded to the specific nature of its heritage values and the credibility and truthfulness of related information sources.

Depending on the nature of the heritage, its cultural context, and its evolution through time,

authenticity judgements may be linked to the worth of a great variety of information sources. Aspects of the sources may include form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, along with other internal and external factors. The use of these sources permits elaboration of the specific artistic, historic, social, and scientific dimensions of the cultural heritage being examined.

The ICOMOS Ename Charter for the Presentation of Cultural Heritage

The Charter for the Interpretation and Presentation of Cultural Heritage Sites (known across the world as the Ename Charter) was approved by ICOMOS at its 16th General Assembly in Québec (Canada) in 2008. This charter deals with an aspect of authenticity that is not covered elsewhere. Its stated objective is to establish seven cardinal principles upon which interpretation and presentation, in whatever form or medium is deemed appropriate in specific circumstances, should be based. Principle 4 is directly relevant to this survey:

Preservation of Authenticity The interpretation and presentation of cultural heritage sites must respect the basic tenets of authenticity in the spirit of the Nara Document (1994).

4.1 Authenticity is a concern relevant to human communities as well as material remains. The design of a heritage interpretation programme should respect the traditional social functions of the site and the cultural practices and dignity of local residents and associated communities.

4.2 Interpretation and presentation should contribute to the conservation of the authenticity of a cultural heritage site by communicating its significance without adversely impacting its cultural values or irreversibly altering its fabric.

4.3 All visible interpretive infrastructure (such as kiosks, walking paths, and information panels), when deemed appropriate and necessary must be sensitive to the character, setting and the cultural and natural significance of the site, while remaining easily identifiable.

4.4 On-site concerts, dramatic performances, and other interpretive activities — when deemed appropriate and sensitive to the character of the site — must be carefully planned to minimise disturbance to the local residents and to the physical surroundings of the site.

It remains to be seen to what extent this admirable charter will influence the interpretation and presentation of the cultural heritage in the years to come.

The Riga Charter

The Riga Charter on Authenticity and Historical Reconstruction in Relationship to Cultural Heritage, known as the Riga Charter, is an international statement of the scope, objectives, and participants in cultural heritage projects. The charter was adopted at Riga (Latvia) on 23 and 24 October 2000 at the Regional Conference on Authenticity and Historical Reconstruction in Relationship to Cultural Heritage, initiated by ICCROM.

It focuses on reconstruction and supplies additional comments on the existing provisions in this field of the Venice Charter and other doctrinal texts including the Nara Document. These as well as the UNESCO World Heritage Convention establish a presumption against reconstruction of the cultural heritage, except in circumstances where reconstruction is necessary for the survival of the property, where a property is incomplete through damage or alteration, where it reconfirms the cultural significance of a property, or in response to loss through disasters, whether of natural or human origin. Reconstruction must, however, be carried out without conjecture or compromising existing in situ remains and must be legible, reversible, and the minimum necessary for conservation and presentation. It takes note of the fact that issues of reconstruction and authenticity have become of particular concern, particularly in countries that have recently regained their independence.

The Charter contains the following definition of authenticity (Article 4):

Authenticity is a measure of the degree to which the attributes of cultural heritage (including form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, and other factors) credibly and accurately bear witness to their significance, believe that replication of cultural heritage is in general a misrepresentation of evidence of the past, and that each architectural work should reflect the time of its own creation, in the belief that sympathetic new buildings can maintain the environmental context, but that *in exceptional circumstances*, reconstruction of cultural heritage, lost through disaster, whether of natural or human

origin, may be acceptable, *when* the monument concerned has outstanding artistic, symbolic or environmental (whether urban or rural) significance for regional history and cultures; provided that appropriate survey and historical documentation is available (including iconographic, archival or material evidence); the reconstruction does not falsify the overall urban or landscape context; and existing significant historic fabric will not be damaged; and providing always that the need for reconstruction has been established through full and open consultations among national and local authorities and the community concerned.

Authenticity and Archaeological Sites and Monuments

Most debate about authenticity has tended in the past to concentrate on historic buildings. On the whole ancient structures and archaeological sites have been given considerably less attention by heritage conservators and managers. As a result there are some archaeological monuments on the World Heritage List where reconstruction has gone well beyond the strict application of the concept of *anastylosis*, and the level now considered to be "acceptable only on the basis of complete and detailed documentation and to no extent on conjecture." The creation of structures on major archaeological sites for the form of which there is little, if any, justification either in the remains themselves or in the available contemporary literature is to be found most frequently associated with so-called theme parks or similar enterprises. The number of these is happily declining, but archaeologists and heritage organizations must constantly watch out, since this can be a profitable business in the wrong hands.

In this context, ICOMOS is to be commended for its initiative in approving the Ename Charter, which, it is to be hoped, will be widely approved and adopted by the heritage community.

Cross-References

► Authenticity and Pastness in Cultural Heritage Management
► Charter for the Protection and Management of the Archaeological Heritage (1990)

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Authenticity in Archaeological Writing and Representation

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Introduction

Calling fictional writing "authentic" immediately raises both eyebrows and hackles among linguists, authors, and scientists, along with any person with a passing knowledge of elementary school curricula. The etymologist might protest by citing the origins of the term "fiction," tracing the word to the Old French ficcion, meaning "something invented," and beyond that to the Latin fictio, meaning "a fashioning or feigning." These lingering meanings of pretense, construction, and invention contrast strongly with the

concept of authenticity – that which is genuine, real, or original. Novelists might raise a similar objection, stressing the degree of imagination and creativity required to conceive a work of fiction – while the most loudly voiced and popular confusion would likely find its grounding in the vernacular understanding that fiction is by definition "made up." How, then, can it be considered "authentic?"

Definition

There is an apparent problem in these various disjointed reactions to precisely why authenticity and fictionality are opposed to one another; the arguments are founded on impossibly disparate definitions of what fiction is. To commit wholly to the morphological path would imply, in fact, that all writing is fictive, since any piece of writing is the clearly constructed work of its author (Clifford & Marcus 1986: 9; Lamarque 1990: 137). However, once "fiction" can be used to label all writing, it is thus rendered a meaningless category. Still, bounding the term by using it only to describe work that is entirely "make-believe" threatens to implicitly challenge the practical applicability and value of literature as a medium for teaching and interpreting the external world (Lamarque 1990: 137). It is essential to disentangle a commitment to reality from the definition of fiction, instead viewing it as discrete from nonfiction based on the existence of three integral characteristics: first, the possibility of creating a narrative voice that diverges from the author's real perspective (Lamarque 1990: 148; Joyce 2002: 12). The role of the narrative voice as the creator of an overarching, emplotted framework exemplifies the imaginative effort required to construct narrative in a way that resonates with ideas of fiction as an artistically creative endeavor. Second, fiction implies an invitation to thematic interpretation and to a critical examination of the conditions impacting the construction of a narrative (Deetz 1988: 16; Lamarque 1990: 148; Pluciennik 1999: 656). Finally, fiction entails an engagement with readers that transcends direct and straightforward communication, relying additionally on evoking emotive and visceral reactions (White 1987: 180; Lamarque 1990: 148). With this definition of fiction in mind – one rooted directly in discussions of archaeological epistemology – it becomes apparent that fiction is a particularly "authentic" approach to writing archaeology with regard to how uniquely well suited it is for rendering the interpretive endeavor of archaeology transparent and understandable to diverse audiences.

Key Issues/Current Debates/Future Directions/Examples

The idea that anyone studying the material past naturally crafts narratives to comprehend the historical world is a longstanding argument in the philosophy of social science (White 1987; Hodder 2003). Hayden White (1987: 60), for example, views narrative not only as "the mode of discourse in which a successful understanding of matters historical is represented," but also as "the way in which a historical interpretation is achieved." This concept of the role of fictive writing – not only as a product but furthermore as a hermeneutic process – has been applied and explored explicitly by archaeologists such as Ian Hodder (1999; 2003), Rosemary Joyce (2002), and Janet Spector (1993).

Both Spector (1993) and Joyce (2002) have examined the integrality of informal in-trenched imaginings – those moments in the field when excavators excitedly extrapolate upon each other's speculations of the events, people, and processes that could have created the archaeological record. Janet Spector's What This Awl Means (1993) is primarily noted for its sections of hypothesized biography detailing the experiences of Mazaokiyewin, an imaginary nineteenth-century Dakota girl. Yet Spector's work is also remarkable for the way she explains the circumstances surrounding the creation of these fictional narrative sections – namely, the casual conversations had in the field between excavation crew members crafting vivid stories to explain their findings. Dialogue, after all, is crucial for the

production of knowledge in all science but especially in archaeology, given the field's inherent dependence on teamwork and communality (White 1987; Landau 1991; Hodder 1999; Leonard 2001). It is through contesting each other's assertions and locating convergences in analyses that the interpretative archaeological product is forged.

Yet archaeologists face an especially daunting challenge in attempting to identify resonances across analyses given the variety of vocabularies employed by archaeologists working in different temporal and regional contexts, as well as the divergent research questions they have in mind. The overwhelming array of languages and methodologies subsumed within archaeology creates archaeological records so diverse in their format and intended function that cross-contextual comparison can appear nearly impossible (Landau 1991; Tringham 1991; Hodder 1999; Joyce 2002). Ignoring this dilemma implies an unjustifiable assumption that authors are using evidence and terminology in universal and objective ways. Instead, examining how archaeological authors utilize characters and archetypal plot devices in their writing can offer a more appropriate method of working with the products of archaeological hermeneutics – and a more authentic one as well, since reading archaeological analysis as fictions sheds the problematic pretenses of positivism (Landau 1991).

Archaeological fictional narrative therefore enables an authentic experience for the audiences of these narratives and grants an opportunity for generating further conclusions founded on transcendent and recognizable literary hermeneutics, avoiding much of the crisis created by mismatched typologies and terminologies professing to be universally and scientifically applicable. The fictive act of writing a plot is also characterized by a great potential for authenticity, allowing as it does for alternative ways of discussing the diverse lines of evidence involved in archaeological hermeneutics. Fieldwork, for example, involves many various activities, which co-occur, coalesce, and impact each other in a multiplicity of ways (Hodder 1999; Joyce 2002; Hodder 2003). An archaeologist-author finds that the temporalities and purposes of these activities need to be viewed and explained in different ways for specific reasons; the flexibility and fullness possible with a creative, fictional narrative enables the simultaneous pursuit of many of these purposes within a single text (Clifford & Marcus 1986).

Fictional narrative additionally allows discussion of the first-person experience which is contradictorily both crucial to and remarkably absent from the majority of archaeological literature. The authority engendered by the atmosphere of the authentic which first-person creative narrative produces has been discussed extensively with regard to ethnography, most notably by James Clifford (Clifford & Marcus 1986). By comparison, archaeological reporting tends to draw its authority from a distanced, scientific voice which feigns inarguable accuracy – rather than the convincing, vivid, fictive voice telling the story of having been at an excavation and having seen the transformation of the site. Fictional narrative allows for communication of the full body of evidence that motivates an archaeologist's decision-making and hermeneutic procedures. Writing archaeological fiction is therefore epistemologically authentic, relying as does archaeology itself on a wide range of internal, emotional, and sensory experience.

Furthermore, presenting archaeological analysis through any medium involves a necessary blurring between evidence and conclusions, since what authors choose to leave out, what they choose to include, and how they choose to address the information therein are all choices shaped by the arguments furthered later in the text (Hodder 1999). In fact, it is clear that analysis and data collection proceed simultaneously and continuously from the identification of a site to publication (Spector 1993; Hodder 1999, 2003; Joyce 2002). Archaeological methodology, data, and interpretation are intertwined, and it is possible for archaeological writing to more closely approximate the complicated chronology of this process, by taking advantage of fiction and narrative's manipulable timelines. *What This Awl Means* (1993) offers an example of this, when

Spector leads her reader through her interpretive approach, discussing how her analysis and findings informed each other as her research progressed. She lays bare the succession of problems she considered over the course of the project. The result is that her presentation of the data and her understanding of it appear together. The context provided by the larger fiction, in this publication and others like it, eliminates the possibility that evidence may be presented and described – deceptively – as if it is scientific data impartially written without regard to the later analysis in which they are implicated.

Archaeological writing which implies that archaeological conclusions rest on inarguable, natural, and scientific authority is an untenable situation when one considers that the appeal of archaeology (or any research in general) to both scholarly and public audiences resides primarily in understanding more than well-supported factoids but, more importantly, the journey by which the researchers involved have come to their current interpretations (Holtorf 2007). The unavoidable storymaking that occurs as archaeologists attempt to make sense of their findings can then be made useful when archaeologist authors choose to write fictional narrative. They are thereby able to invoke a multitude of perspectives and lines of evidence, both of which are integral characteristics of generating archaeological understandings of the past. Moreover, the fictive effort of vividly relating one's firsthand experience conducting fieldwork frees archaeological writing from deriving its authority solely from the neutrality of science, additionally invoking the authority of the ethnographer's perspective, as well as the genuine, broader sensory matrix in which archaeology is conducted. The liberated sense of time and space available to an author creating an emplotted narrative also allows the archaeologist to more closely approximate the authentic temporality impacting his or her hermeneutic endeavor – which has the ability to produce a clearer and even more persuasive text. This means that fictional narrative not only offers benefits entirely pragmatic in the way of staging a convincing argument but also that it offers an avenue to more effectively accessing the authenticity of archaeological interpretation and epistemology in the published products of these endeavors.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Narrative and Storytelling for Archaeological Education

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Authority and Legitimacy in Political and Social Archaeology

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Introduction and Definition

Authority is, according to the dictionary included in Mac computers: "the power or right to give orders, make decisions, and enforce obedience." It is also "the power to influence others, esp. because of one's commanding manner or one's recognized knowledge about something," as well as "the confidence resulting from personal expertise." There is yet another meaning of this word: "a person with extensive specialized knowledge about a subject; an expert."

Whereas somebody is legitimate when he or she is "conforming to the law and to rules," archaeology is legitimate when it operates according to the legal system that regulates social life in a State and when it follows the rules it defines, as a discipline, for the practice of the profession. Despite the differences between these concepts, it is evident that they are closely related: archaeology's authority emanates from, among others, its own legitimacy. However, there are other, more important and more ancient sources for its authority.

Key Issues/Current Debates/Future Directions/Examples

Archaeology has the authority to talk about humankind's past through the study of the material culture of societies of yesteryear. It is the voice of the experts (those mentioned by the dictionary) on that matter, and in order to be able to be considered one, the individual needs to have obtained a formal education (with degree and all) in a University. As a discipline, then, it seeks to produce knowledge founded upon rules and protocols that underlay its academic practices, and in order to learn to do that well, it is necessary to get a formal education. In Randall McGuire's opinion, archaeology is above all a craft, which means that its practitioners need to acquire not only the aforementioned knowledge imparted by institutions of higher education, but also a series of motor skills that allow them to actually put that knowledge into practice (McGuire 2008: 85).

This situation of privilege is in manifest conflict with the worldview and opinions of other social groups, especially in those countries where different ethnic populations co-exist. This scenario becomes really tense when archaeologists show little interest or respect for the opinions offered by indigenous groups. As a matter of fact, archaeologists have total control over their investigations and they can unilaterally pick and design their research agendas – which in general benefit the scholar's career and very rarely favor indigenous demands or needs. This, according to Jeffrey C. Bendremer and Elaine L. Thomas, can be described as a colonial situation (Bendremer & Thomas 2008: 60). Whether this is an appropriate classification or not for postcolonial societies, the truth is that this kind of situation comes from a power differential similar to the one described by Edward Said in his study about Orientalism: it is an asymmetric

distribution of power that makes it possible for a group to elaborate a dominant and authoritative discourse about another group, and not the other way around (Said 1978).

Although it can be argued (successfully, I suspect) that, in the framework of postcolonial societies formerly dominated by colonial powers, it is not quite right to qualify the situations of oppression as colonial or colonialist; it is true, though, that in the past they were so. That is, the present-day situations of oppression are the product or the consequence of colonial legacies: the legacies left by the different colonial situations of the past, and also the epistemological frameworks from which scientific authority emanates developed, as Walter Mignolo has convincingly demonstrated in *The Darker Side of the Renaissance*, in an era that is normally characterized as early modernity or the Renaissance, but which we forget is also a colonial one (Mignolo 1995). According to this author, the traits of Modernity that are usually celebrated (scientific progress, emancipatory drive, and a long etcetera), are just the reverse (the dark side) of the colonial endeavors that took place during the first stage of European expansion. It is probably not an exaggeration nor an imprecision to suggest that the authority archaeology enjoys in the present has its origin in the prestige that surrounded science and knowledge production in the societies that emerged from the European expansion of the sixteenth century. The societies that together are known as the West are the dominant ones, as is well known, in the realm of knowledge production – the protocols, rules, and practices that characterize modern science originated and developed in them. This is a group of societies that expanded throughout the whole planet, carrying with them not only the seeds of capitalism but also a worldview based on a scientific and philosophical approach that finds its foundation in Cartesian assumptions about subject and object, mind and res extensa, and other equally foundational dichotomies (Londoño 2010: 382). From that matrix emerges not only the paradigm of modern science, in general, but also the archaeological paradigm known as New Archaeology or processual archaeology, in particular. As is well known, this new way of doing archaeology presented itself as truly scientific. Therefore, its myth of origin, according to Gavin Lucas, was to imagine itself as a conscious and scientific practice (Lucas 1995: 37). Some of archaeology's prestige and authority stems from its claim about having objectivity, universality, and exteriority as its foundation (Gnecco 2006: 82). This is why one of the most important sources of authority for the discipline is, as mentioned above, Western education and its institutions (Gnecco & Ayala 2010: 32). And it is so, among other reasons, because scientific discourse was very useful for the administration and control of populations in the periphery (Funari 2006: 74).

The authority of the discipline comes, also, from its role in the task of building national narratives, both in the countries that endeavored the colonial enterprise and in those that emerged after being colonies of the former. According to Ian Hodder, the "scientific" archaeology (my quotation marks) that develops in the nineteenth century was made possible thanks to the State's interest in finding ways to control historical heritage (Hodder 1999: 170). In the same vein, Wilhelm Londoño avers that archaeology was (and is) a very useful dispositif that confirmed the success of the modern project; that is to say, it confirmed the dissolution of indigenous peoples' communal ties and the discontinuity between the indigenous peoples of the present and their precontact ancestors (Londoño 2010: 392). This kind of statement proffered by the discipline explains why it played such a fundamental role in the dispossession of indigenous lands: because archaeology declared them dead or vanished, it made it possible for those lands to be left at the disposal of the State and private interests (Haber 2010: 56).

In the countries of what today comprise central capitalism, such as the United States and those of Europe, archaeology is strongly related to a social class, in spite of the claims about being an objective science that characterize the discipline's spokespersons since the advent of the New Archaeology. As a matter of fact, the birth of the modern Nation-State is specifically tied to a social class,

the bourgeoisie, that needed the help of archaeology and other disciplines to both legitimate that experiment in State organization and to rewrite the past of human occupations of the territory (Trigger 1989). It should be also pointed out that, as McGuire suggests, in the countries where settler colonialism developed, archaeology has become a neo-colonial endeavor, because it has dedicated itself to write the history of the ancestors of present-day indigenous peoples by the descendants of the settlers (McGuire 2008: 77–78), while in more recent times it has become a strong ally of the segment of society known as the middle class in both Europe and the United States (McGuire 2008: 88) – and it can be argued that this has happened in other parts of the world as well.

From the 1980s, however, archaeology has had to face a series of challenges undertaken by individuals coming from social groups that do not feel represented by the rules, epistemological assumptions, protocols, practices, and the knowledge produced by the discipline. The bourgeois, Europeanized, and masculine nature of archaeological practice could not continue to pretend to be an objective view of humankind's material past. Its practices, which were dedicated, from its beginnings as a discipline, to favor the interests of the dominant segments of society, began to be rejected from several fronts. Those criticisms were grouped in an umbrella concept known as postprocessualism, which as a multi-headed Hydra attacked, from different angles, the fundamental tenets of processual archaeology. Among the different, new ways of doing archaeology, one, indigenous archaeology, deserves special mention. It is a practice that proposes to take into account the interests, desires, and opinions of indigenous societies of the present.

It is probably in this new way of understanding and doing archaeology that the most effective and long-lasting attack on both the discipline's claim to authority as a group (as McGuire correctly points out, the structure of the profession follows the guild model), and the legitimacy of its aspiration to be the only authorized agent to study and make sense of the past, can be found. As a matter of fact, one of the things indigenous peoples demand from the discipline is to stop having the monopoly of decision-making throughout the archaeological process. In this type of situation, the conflicts are played out and negotiated in different fields of action, and the arguments used by the parties involved cover a wide range that goes from the cultural to the political (and the economic). Yet, without a doubt, the most important, the most decisive sphere were the conflict is discussed, is the legal system. This is why it can be argued that the approval of a series of laws throughout the world, from the 1990s on, about repatriation and restitution of human remains and associated materials (of which the one known as NAGPRA, approved in 1990 in the United States, is paradigmatic), has had unique repercussions in the way in which the discipline is imagined and practiced, because it forces archaeologists to communicate, consult, and collaborate with indigenous living peoples.

As Joe Watkins has rightly pointed out, it is a pity that archaeologists had not themselves promoted this kind of democratic practice before the law forced them to do it, because it precluded the possibility that consultation and collaboration with indigenous subjects could be the product of a conscious ethical decision on their part (Watkins 2000: xii). The fact is that thanks to this kind of legislation, archaeologists are not (in several countries), today, the only legitimate actors for the task of interpreting the past – that is, they are not the only agents that can decide on matters related to indigenous pasts. Nowadays, indigenous groups have the opportunity to be part of those processes of decision-making, which relativizes and undermines archaeologists' previously exclusive authority.

These indigenous struggles for obtaining the chance to be part of the interpretation, preservation, and study of their own past, are attempts at restituting some equilibrium in the face of the above mentioned differential of power that Sonya Atalay calls power imbalance, that kept indigenous peoples outside the processes that led to decisions regarding their own cultural heritage (Atalay 2011: 48). According to this author, those struggles against the existent

power imbalance may end up benefitting other oppressed communities at a global scale (Atalay 2011: 48). The efforts made in that direction have taken diverse forms, one of which is the development of archaeological programs by some indigenous communities (for example, the Navajo, discussed in Watkins 2000: 93-103) who endeavor to study their own past without the help or intrusion of intermediaries. This is not the most common case, because the number of indigenous groups that do not have an archaeology program is much higher than the one of those who have one. More frequent is the case of individuals belonging to indigenous communities who decide to dedicate themselves to the profession in order to change it from within, so to speak (see a rather complete panorama of this growing group of people in the book edited by Nicholas). Last but not least, a modality that becomes more common with time: programs of collaborative archaeology in which individuals of different ethnic backgrounds undertake archaeological investigations in which indigenous values that were absent in mainstream practices are now present. The presence and importance of said values depend, in good part, on two undertakings: consultation and collaboration among different groups.

Some authors, like Nina Versaggi, opine that the kind of consultation required by the law, which is a one-time thing or an event, is not enough to reestablish some equilibrium in the distribution of power among the actors. On the contrary, in her view, consultation must be both continuous and meaningful; it must be a process instead of an event (Versaggi 2006: 30). For other authors, consultation, although a vital element in the whole process, is not enough because only collaboration leads to "praxis" – that is, to a series of conscious actions that intend to change the world (McGuire 2008: 8). For another author, Cara Lee Blume, the collaboration process differs from consultation in that the former means "to work together" (Blume 2006: 210). And according to the same author, the only way collaboration can happen is through the participation of indigenous communities in all the stages of the research process, which implies, for archaeologists, to share power, so that indigenous participants can be part of the instances when decisions are made (Blume 2006: 198). In this way, the new scenario contributes to fight the power imbalance that Atalay talks about and the power differential, if your prefer Said's parlance.

In sum, for at least a couple of decades, archaeologists' authority as the only legitimate agents for the interpretation of the past of the diverse communities that inhabited the planet, has been systematically questioned.

Although this is a situation that puts them in a less privileged position than in the past, it is arguably an opportunity to produce a better science, and a less biased, more democratic knowledge. This is why special attention should be paid to what Cristóbal Gnecco proposes as possible ways in which archaeology could recover some legitimacy in these times when the discipline is undergoing a certain degree of decolonization: to help in the processes of recovery of the local traditions and histories that it contributed to silence and erase in the (sometimes much too recent) past; to become public; to question its long association with the national narratives; and to abandon the academic ghetto to embrace and reach, at last, a wider variety of social sectors than it used to (Gnecco 2008: 30-1). What can be done, then, is to use the expert knowledges that have traditionally been at the service of the exclusion and subalternization of the West's others, to favor the causes and projects defended and undertaken by the latter (Verdesio 2005: 142). This is in tune with what Funari says about the World Archaeological Congress (WAC): its objective is to promote an archaeology that seeks to liberate, instead of to exploit, the world (Funari 2006: 74).

Cross-References

- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Professionalization: Archaeology as an "Expert" Knowledge

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Avocational Archaeology

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Introduction and Definition

Finding a suitable term to describe people who do archaeology without being paid a salary, who do it mostly as a leisure pursuit, is not easy. Many terms have acquired emotional baggage through misuse over the years or have inadequate definition to be accurately used. Avocational is often used as the opposite of professional but is a term seldom used in the UK. We usually talk about the voluntary sector and of volunteers, although this can apply more widely to work placement students as well as people doing archaeology outside the professional sector. An older term is amateur archaeologists, although this has been used as a dismissive term by professionals as though being amateur were somehow less worthy or of lesser standard. It is often seen therefore as a politically incorrect term, the use of which involves an attitude of condemnation towards nonprofessional and therefore slipshod standards. The proper use of the word amateur simply means working for pleasure rather than financial gain. It is therefore entirely appropriate to use as a way

of describing people who do archaeology without being paid a salary. Avocational is also a term that begs questions about assumptions and definitions. I will use all three terms interchangeably since the use of one term alone will become tedious through sheer repetition and some variation is needed for stylistic aesthetics.

Avocational archaeologists are people with a passion for the past as experienced through archaeology but have not chosen to follow a professional career in the subject. They are volunteers in their archaeology. Moreover, they are not content to watch archaeology from the sidelines. They are not mere spectators. People who watch archaeology programs on television are not avocational archaeologists. Nor are people who visit heritage sites or stand behind barriers watching excavations in progress. Nor are people who attend lectures in archaeology. Avocational archaeologists are those who practice archaeology in whatever form during their spare time without personal income or profit.

One question immediately springs to mind as to how comparable these volunteer archaeologists are to professionals in their level of skills and contribution to the study and protection of the past. The role of education is to make sure that volunteers work to the same level as professionals and put into practice the appropriate disciplinary standards.

Where volunteers work within the context of professional organizations, perhaps on work placements as students or as volunteers carrying out agreed special tasks, then they will be trained and fully incorporated into professional levels of practice by their host organization. Where they work on their own as individuals or as part of local groups and societies, the issue of training and education becomes more important.

Historical Background

Archaeology began as an amateur pursuit. In the United Kingdom, most of the early archaeologists of the seventeenth, eighteenth, and nineteenth centuries were volunteers. Some of the great names in the history of archaeology had no employment as an archaeologist. Sir John Evans (1823–1908) was a paper manufacturer, while Sir John Lubbock, Lord Avebury (1834–1913), was a banker. It was in the nineteenth century from the 1840s to the 1870s that most of the county archaeological societies were created. The members of these societies were mostly middle-class professionals with the income and time to devote to archaeological study, such as doctors, clergymen, and lawyers. They carried out archaeological fieldwork and published the results of excavations and surveys. Some early volunteer archaeologists were active over long careers. John Mortimer, a corn merchant, excavated more than 300 barrows in Yorkshire from 1863 to 1900 to what was a very high standard for the nineteenth century.

Newer, more local archaeological societies were founded throughout the twentieth century, especially from the 1950s to the 1980s. The social makeup of their members was wider than in the nineteenth century but was still mostly educated middle class. However, the context of their activities was changing. The 1970s saw a great expansion in professional archaeology, in both universities and field units. The profession grew from around 200 people in 1960 to around 4,500 in 2000 and around 6,500 in 2010. With greater domination by professional archaeologists, the discipline began to systematize its practices and develop an idea of appropriate professional standards. A set of National Occupational Standards was drawn up by the then Institute of Field Archaeologists (founded in 1982 and now the Institute for Archaeologists) in 2002. Nevertheless, the professional sector is small in numbers compared with the amateur sector. A report by the Council for British Archaeology identified more than 200,000 people belonging to local voluntary societies and groups with an active interest in the historic environment (Thomas 2010).

The way that archaeology developed in the United Kingdom as an amateur discipline has meant that there is no legal sanction against anyone carrying out archaeological work, including excavation. There is no system of licensing of practicing archaeologists within England,

Scotland, or Wales (although there is in Northern Ireland). Avocational archaeologists can therefore carry out archaeological investigations. The UK also has a vibrant metal-detecting sector who can also legally detect for finds and may be considered by some as part of the avocational sector (although views among archaeologists on this inclusion of detectorists as part of "the family" are sharply divided).

The avocational sector of archaeology has a long tradition of fieldwork and publication and can research parts of archaeology the modern professional sector seldom has time or resources for. Amateur archaeologists are not limited to working in opportunities provided by the planning system, and are especially strong in being able to carry out research in rural areas, and have often pioneered new areas of research, such as the archaeology of industry, transport, or twentieth-century defenses.

Key Issues

Given that avocational archaeologists in Britain carry out fieldwork, one of the key issues is how to maintain adequate standards in archaeological fieldwork. Some archaeologists may have an instinctive distrust of amateurs. They are "not one of us" and have not been through the same education and training. However, many amateur archaeologists have been active in the field for decades and have levels of experience rarely matched in the professional sector. Some will also have university archaeology degrees, having not chosen to pursue a career in a poorly paid profession and found more lucrative jobs instead while keeping their interest alive as a leisure time pursuit.

What the voluntary sector needs is training in knowledge of archaeological artifacts and sites, the acquisition of methodological or technical archaeological skills. In part this can come from the previous generation of volunteers within their local societies. However, the main source of knowledge and skills has traditionally been university teaching through part-time courses aimed at the general public. The terms used to cover these courses have changed over the years from extramural provision to continuing education to lifelong learning. Whatever the term used, they involve university staff, postgraduates, or highly qualified professionals delivering evening and weekend courses through lectures and seminars and summer field schools based around excavation or field survey. Some of these field schools were long-term research projects such as that at Wharram Percy run by Maurice Beresford from 1950 to 1990 and the Shapwick project run by Professor Mick Aston from 1989 to 1999. One advantage of such courses was that the adult students could be taught by postgraduates at the cutting edge of academic research, and the postgraduates gained early experience at teaching which would be useful for an academic career.

Gradually, funding for these kinds of university courses came under increasing pressure. While some universities still manage to run a program of archaeology lifelong learning courses, many no longer do so. The pressures on these courses stem from an instrumentalist vision of education held by government which demands that in return for state funding, higher education must deliver tangible benefits for society. Such benefits are usually seen as financial and economic. Do courses help people find work? Do courses benefit the local or national economy? Archaeology belonged firmly within a tradition of liberal adult education: education as worthwhile for its own sake as humanizing the individual. It was clearly out of step with instrumentalist views about education. Government funding for adult education became diverted towards vocational training courses, and archaeology found itself left out in the cold. Only where there is strong managerial support for traditional education have liberal adult education courses survived, and such courses are expected to be as self-funding as possible.

Participation in such courses by mainstream academic staff and postgraduates was also under pressure due to the relentless drive for research excellence as almost the only measure of academic worth and funding in higher education. Excellence in teaching has long played second fiddle to research, and courses no longer compete

on the academic CV at the same level as the peer-reviewed research paper in a prestigious journal. Now that the UK government has accepted that a measure of universities' impact outside academia on wider society should be a measure to take into account for receipt of funding, it may be that attitudes will change.

Since 1994, there has been funding for community-led heritage projects through the Heritage Lottery Fund, augmented by a separate Local Heritage Initiative funding from 2000 to 2006. As a result, there has been a renewed expansion of local heritage groups, many of which engage in archaeology. The funding has supported not only existing groups but also the founding of new ones, often on an intensely local geographical base. This has meant an increasing demand for education and training in archaeology. In order to meet this demand, the profession has begun to employ people with the necessary skills in community outreach. In many cases, these new posts have been project funded, only rarely treated as part of the core function of the organization. What these community archaeologists can do is both train local people in archaeological skills and arrange access to professional equipment and specialist help. The old model of university-based support for amateur archaeology is being augmented, and in many areas replaced, by a partnership between professional archaeological organizations and local amateur societies.

International Perspectives

Great Britain (that is the United Kingdom less Northern Ireland) is somewhat out of step with the rest of Europe. Most other European countries operate a system of licensing, where only licensed (in practice only professional) archaeologists can carry out or supervise archaeological excavation. This is not the case in Great Britain. The continental position has been given prominence in the European Convention on the protection of the archaeological heritage (revised) as passed by the Council for Europe at Valletta in 1992 (known simply as the Valletta Convention), in which Article 3 (ii) states that each signatory will undertake:

> To ensure that excavations and other potentially destructive techniques are carried out only by qualified, specially authorised persons.

The signing of the convention by the UK government caused considerable alarm in sectors of British amateur archaeology. In practice, the interpretation of the convention is left to individual states, and the responsible bodies in the UK have no intention of enforcing a system of licensing or in restricting voluntary sector archaeology. Systems of protection through the scheduling of important sites, the role of archaeologists within the planning system, and the usually good relationships between local societies and professional organizations, along with the long record of high-quality fieldwork by many societies, are deemed enough to ensure that the archaeological resource is protected from inexperienced destruction.

Future Directions

Avocational archaeology in the United Kingdom seems to be in a secure position. Provision of education and training for amateur archaeologists is recognized as needed within the profession. Future trends in that provision may be towards a more systematized and nationally recognized framework instead of the varied and local responses currently in place.

Moves by the Institute for Archaeologists towards gaining the status of a chartered body, and therefore towards improving the status of archaeologists as chartered professionals in the same way as being doctors or engineers, could be seen as potentially closing off the discipline into chartered and unchartered sectors. It is important therefore that the IfA has within it a voluntary and community archaeology special interest group and that the IfA continues to be open to membership from both professional and amateur archaeologists. The IfA's annual conference is a major meeting point for the discipline where training in archaeology can occur. Importantly, the IfA also oversees the vocational Qualification in Archaeological Practice, based on the National Occupational

Standards. This is an important avenue of training and education for the voluntary sector. Some have already taken advantage of this, although the costs of taking the qualification may be a deterrent for others. The qualification is based on best practice in archaeology, defined by the Institute for Archaeologists through their standards and guidance. The Council for British Archaeology, funded by English Heritage, has been leading a project, the Introduction to Standards and Guidance in Archaeological Practice (ISGAP), to translate these into a form that is more user friendly and suitable for the voluntary sector across the whole United Kingdom. The introduction highlights best practice for voluntary groups and outlines standard procedures for carrying out archaeological research and investigation. The project's documents have recently been made available at http//:www.isgap.org.uk.

The Council for British Archaeology has been successful in attracting sponsorship to organize funded placements for community outreach officers to help train a new generation of archaeologists with the skills needed for supporting the voluntary sector. There are also a few postgraduate courses in archaeology in public engagement in archaeology helping to provide a future generation of professional archaeologists who are enthusiastic about supporting the voluntary sector.

While many people would not think of metal detectorists as avocational archaeologists, there is no doubt that they are part of the community of interest in the remains of the past and can be seen as part of the wider family that has archaeologists at its center. They produce data which adds to our archaeological knowledge. The Portable Antiquities Scheme in England and Wales does much to educate and train detectorists through its network of Community Liaison Officers. Detectorists also commonly enroll on traditional lifelong learning courses to increase their own knowledge of archaeology.

The future for avocational archaeology in Britain seems secure, so long as the funding is in place to make sure that amateur archaeologists of all kinds have access to the support they need for knowledge and skills from the professional sector. Archaeology in Great Britain is a partnership between professionals and amateurs, in which both are stronger that they would be alone.

Case Studies

The biennial British Archaeological Awards recognize excellence in various aspects of archaeology. One of the awards is the Pitt-Rivers Award for the best project by volunteers. There were two joint winners in 2012: the Norfolk Historic Buildings Group and the Washingborough Archaeology Group.

The Norfolk Historic Buildings Group produced a report on buildings within the village of Buckenham. They had a 5-year plan to survey the buildings, and as some of the members had previous experience of building recording, they were able to train the others on the necessary techniques. Heritage Lottery Funding allowed them to get dendrochronology dates for some of the houses and to publish their results. They produced the largest collection of vernacular houses to have been dated by dendrochronology in the county of Norfolk.

The Washingborough Archaeology Group was a founder member in 2001 of the Witham Valley Archaeological Research Committee. The group concentrated on intensive field walking and auger surveying under the rapidly eroding peat soils of the valley. This identified many archaeological sites and provided an accurate topographical map of the valley. The work was funded by other organizations which also provided surveying equipment in return for access to the results of their work. Specialist reports were produced by the group with some professional support.

The prestigious special award of the Graham Webster Laurels went to the Upper Nene Archaeological Society which has been excavating at Piddington Roman Villa for 27 years. Along the way, they have trained their own members and encouraged them to become specialists in various archaeological disciplines. The society raised their own funds to buy a redundant chapel and turn it into to a modern museum with

a viewing area and rooms where students and local school children are given training.

The British Archaeological Awards also have another category, the IfA Award, for the best professional or professional/voluntary archaeological project that demonstrates a commitment to professional standards and ethics in archaeology. In 2012, this went to the Whiteleaf Hill Local Nature Reserve Project. This was a project initiated by community representatives with the help of Buckinghamshire County Council and Oxford Archaeology. The local community excavated, conserved, and interpreted the remains on Whiteleaf Hill for future generations. The sites included a Neolithic barrow, a Bronze Age dyke and two supposed round barrows, First World War practice trenches, sunken trackways, and ancient and modern woodland. The project involved an emphasis on research and conservation but also integration of the historic and natural environment and an education program for local schools, all under strong community leadership.

A separate award, the Marsh Award for Community Archaeology, was held in 2011. The winner of this award was the Dartmoor Cairn Survey and Repair Project that started in 2005. This recognized the work of the Dartmoor Preservation Association (DPA) Conservation Team, Dartmoor National Park Authority (DNPA), and English Heritage in providing opportunities for volunteers to become involved in a professionally led project. Cairns that marked Bronze Age burials or territories were slowly being altered by people adding or removing stones. The project created opportunities for different groups such as scouts and other youth groups, businesses seeking team-building projects, and students requiring work experience to get involved. The quality of the work done was exceptionally high and depended on the close working partnership between the volunteers and the organizations involved.

Summary

Avocational archaeology, also described as voluntary or amateur archaeology, is a thriving part of the discipline in the Great Britain. Avocational archaeologists work without being paid and receive no personal financial benefit for their work. It has a long history of research and publication and continues to contribute to our understanding of the archaeological remains of all periods from prehistory to the modern world. Many amateur archaeologists have a great deal of field experience and high levels of archaeological skills. A key part of the voluntary sector's success lies in the education and training that amateurs receive from professional archaeologists based in universities, archaeological agencies, and field units. This support has traditionally been through university continuing education courses, although less so than previously due to changes in government funding. More recently, support is becoming more widely available through the new field of community archaeology where professional archaeologists support local societies and groups directly in the field. Much amateur activity is supported by funding from the Heritage Lottery Fund, which helps local groups buy in the professional expertise they may need for specialist tasks and helps with costs of publication of their findings. The profession is beginning to realize that the study of the past is too big a task for a small number of financially hard-pressed professionals. Together, professional and avocational archaeologists make a formidable research team.

Cross-References

- ▶ Archaeological Licenses
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage Outreach

▶ Local Communities and Archaeology: A Caribbean Perspective
▶ Professionalization: Archaeology as an "Expert" Knowledge
▶ Public Education and Archaeology: Disciplining Through Education
▶ Public Involvement in the Preservation and Conservation of Archaeology
▶ Stakeholders and Community Participation
▶ Volunteers in Archaeology

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Basic Biographical Information

Nur Balkan-Atlı was born in 1953 in Aydın, Turkey After graduating from Robert College, she went to Paris and studied prehistory, anthropology, and ethnology at Sorbonne University. She received her M.A. and Ph.D. with a dissertation titled *The Neolithization of Anatolia* from the Sorbonne University in 1985. Atlı was assigned as a specialist to the Prehistory Department of İstanbul University in 1987 and was promoted to Assistant Professor in 1995 and then Professor in 2000.

Major Accomplishments

Nur Balkan Atlı's major field of study is the Paleolithic period of prehistoric archaeology and lithic technologies. Since 1995, she has mostly focused on the obsidian beds and working areas in the Cappadocia region in Turkey. After working in El Kown, Qdeir (Suriye), Cafer Höyük (Malatya), and Aşıklı Höyük (Aksaray) on excavations, she started an ongoing study through the Cappadocia Obsidian Research Project. She is connected to the French Institute of Anatolian Studies and is a researcher and a member of the monitoring committee.

Nur Balkan Atlı is also a foreign member of the French CNRS Archiorient Group, a local consultant of the European Commission INCO-MED Programme, and a member of the American Research Institute of Turkey and similar scientific institutions. She currently serves on the editorial board of journals including "Anatolia Antiqua" and "Paliorién t." She has published the book *La Niolithisation de l'Anatolie* and numerous scientific articles.

Cross-References

► Art, Paleolithic
► Lithic Technology, Paleolithic

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Balme, Jane

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Basic Biographical Information

Prof. Jane Balme is an Australian archaeologist and leading researcher in the archaeology of Indigenous Australia.

She grew up mainly in Western Australia and following high school went to the University of Western Australia where she obtained her undergraduate degree in anthropology (1979). After working at the Western Australian Museum as a graduate assistant in archaeology, she enrolled in a Ph.D. at the Australian National University (ANU). Her Ph.D. research on Pleistocene fishery on the Darling River in western New South Wales was awarded in 1990.

Prof. Balme has also worked as a consultant to the National Parks and Wildlife Service of New South Wales and as a lecturer in the Archaeology and Palaeoanthropology Department at the University of New England. She is currently Professor in Archaeology and Associate Dean (Research) in the Faculty of Arts at the University of Western Australia.

Prof. Balme has worked on projects with Indigenous groups in north and western New South Wales, southern Arnhem Land, the Kimberley region of northwest Australia, and southwest Australia. Most of her work has been on the archaeology of Indigenous Australia, and she has a particular interest in the Pleistocene period, the symbolic evidence of early art and adornment, and the role that symbolic differentiation between populations may have played in the colonization of the continent. She has also published on gender organization in hunter-gatherer societies, archaeology education, and public perceptions of archaeology.

Major Accomplishments

Prof. Balme's research to date has been in three principal areas:

- Social behavior and organization in early Australian Indigenous groups (e.g., Balme & Beck 2002; Balme et al. 2009), including Pleistocene Australia (e.g., Balme 2000; Balme & Morse 2006)
- The development of gendered social organization, particularly in hunter-gatherer societies (e.g., Balme & Bowdler 2006; Balme & Bulbeck 2008; Bowdler & Balme 2010)
- Archaeology as a discipline (e.g., Beck & Balme 2005)

She has held major research grants, usually in collaboration with other researchers. In 2010, she received a major Australian Research Council Linkage Project grant, with Prof. Susan O'Connor, for the study into Lifeways of the First Australians in the Kimberley region. This

project, working in collaboration with Traditional Owners, is using archaeological evidence to investigate the complexity of life in that area.

Prof. Balme has also contributed greatly to the Australian Archaeological Association (AAA), the professional body for Australian archaeologists. She has held several positions in AAA over the years, including secretary, and chair of the Australian National Committee for Archaeology Teaching and Learning.

Cross-References

- ▶ Beck, Wendy E.
- ▶ Bowdler, Sandra E.
- ▶ First Australians: Origins
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: Australian Perspective

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Bam: Archaeological and Social Investigations after the Earthquake

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Introduction

Bam is a desert city engaged in citrus and palm cultivation, whose residents dwelt in handmade mud-brick houses around an ancient citadel, which is a World Heritage Site (UNESCO 2005). It is located in the southern border of the Lut desert, in southeastern Iran. Despite this fringe location, it has traditionally served as a center for local trade. On the 26 December 2003, the city was reduced to ruins by an earthquake in only 12 seconds. Approximately 40,000 people died, 30,000 were injured (Tahmasebi et al. 2005), and 100,000 people made homeless (Mann 2005: 3). *Disaster ethnoarchaeology: Bam after the earthquake* was an ethnoarchaeological project aimed at recording this dramatic change (Dezhamkhooy & Papoli 2010; Papoli 2010; Papoli et al. 2011) (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

The project, which took place in five seasons from 2004 to 2007, was conducted by 40 archaeologists, 24 women and 16 men, Ph.D. candidates, and M.A. and B.A. students, all familiar with the local and cultural context and supported by the previous directors of the *Bam research foundation*. In the first four seasons, data gathering was based on an *ethnoarchaeological approach*. In the last season (2007), six ruined houses of different status and district were

Bam: Archaeological and Social Investigations after the Earthquake, Fig. 1 Bam citadel after earthquake

investigated by archaeological excavation. The main mission of the project was to discover the impact of the catastrophe on the intimate lives of the residents. In addition, the project also sought to understand from the strata how the settlement had previously been affected by Bam's inhospitable and unstable environment – drought, winds, and frequent earthquakes (see Mahalati 1988).

The lifeways of Bam and its immediate environment were surveyed in five categories: mortuary practices, material culture, population mobility, trade and market patterns, and domestic architecture. Data were gathered through observation and by questionnaires designed to record patterns of life before the earthquake. The recorded changes to everyday life were studied over the short, medium, and long term. Also recorded were accounts of the gradual return to normal conditions.

Recording damaged buildings was a key part of the archaeological inquiry. Bam's domestic architecture was first divided into three general architectural styles: modern (structures built on metal frames), semi-modern (plaster and clay mortar on metal frames), and traditional (made of mud brick). 673 houses and 383 destroyed shops (Fig. 2) were evaluated during the first three seasons. These buildings were classified by their degree of damage: destruction of decorations, destruction of walls and roofs, or total destruction. The state of the buildings was compared with the socioeconomic status of the occupants, by district. For example, it was shown that most casualties occurred in the traditional type of housing, most vulnerable to earthquake and occupied by the least wealthy.

The excavations of the six houses (Fig. 3) showed that most of them had already been searched to discover the remains of the dead and to remove valuable materials. Most of the furniture remained. Divisions recorded within the houses led to information about the use of space and the implied spatial imperatives of gender, class, and wealth. People of higher status had more private spaces such as bedrooms or divided spaces based on gender and age, while the less wealthy had more common spaces, such as one bedroom for all the family. Differences in status were evident in other material culture too. The last moments of the six families were reconstructed from the disposition of the surviving cultural material.

There were interesting differences between the archaeological findings and the statements made on the questionnaires, no doubt through a reluctance to admit to activities of which authorities may have disapproved – such as

Bam: Archaeological and Social Investigations after the Earthquake, Fig. 2 Buildings for recording (shops)

Bam: Archaeological and Social Investigations after the Earthquake, Fig. 3 A store room of the Hafezabadi House under excavation Trench 1

sexual practices, drinking, or even watching some satellite channels. The earthquake and the subsequent archaeological excavations opened up private spaces such as bedrooms, revealing intimacies of everyday life, love letters, and personal entertainment tools.

Since the investigators were themselves indigenous, their relations with Bam residents developed naturally. But the feelings of the archaeologists were nevertheless strongly affected by the roles they were obliged to adopt. International and national aid initiatives rapidly altered the circumstances, the attitudes, and the decisions of residents. In addition, the changing policies of the Iranian government were determinant, eventually bringing the project to an end.

Cross-References

► Cultural Heritage Site Damage Assessment
► Disaster Response Planning: Earthquakes

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Bamiyan Buddhas

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Introduction

The Bamiyan Buddhas were situated in the Hindu Kush mountains, in the central highlands of Afghanistan. They were the largest standing Buddhas in the world (Grun et al. 2004). The two main statues were built in 554 CE and 507 CE (Janowski 2011: 47) and were known in modern times as the West Grand Buddha and the East Grand Buddha. They were, respectively, 53 m and 38 m high (Grun et al. 2004: 178). The statues were carved into niches in the valley of Bamiyan, a center of Buddhist culture from the second century CE until the eighth century, and were part of a large complex of Buddhist temples, many of which still survive. The valley and the remains of the Buddhas are now a world heritage site (UNESCO 2003).

In March 2001, Afghanistan's effective government, the Taliban, destroyed the Bamiyan Buddhas in the face of huge international opposition and in defiance of international law (Francioni & Lenzerini 2003). Later discussion of the Buddhas centered on the stabilization of the larger site of Bamiyan and the possible reconstruction or restoration of the destroyed statues.

Definition

These two statues of the standing Buddha were located in the Bamiyan Valley, 200 kms northwest of Kabul, in the Hindu Kush mountain ranges, 2,500 m above sea level. The statues were carved directly into the cliff face. The geology of the cliffs consists of conglomerate and siltstone layers, with the siltstone being particularly vulnerable to the actions of water (Margottini 2004). The region experiences hot summers and very cold winters, and the freeze thaw cycle puts further pressure on the cliffs and the remains of the Buddhas.

The Western statue was the larger of the two. Before its destruction it was the largest standing Buddha in the world. It stood at 53 m high and was constructed in 554 CE. The Eastern statue was slightly smaller at 38 m and was built in 507 CE (Grun et al. 2004; Janowski 2011). A smaller statue of a seated Buddha was located between the Eastern and Western Great Buddhas, and it was destroyed as well.

In modern times the statues appeared to be without faces or arms. The lower legs of the larger Buddha were badly damaged in the seventeenth and eighteenth centuries by the moguls Shah Aurangzeb and Nadir Shah (Grun et al. 2004). The clearest ancient description of the statues is by Hsuan-Tsang, a Chinese monk who visited the site in 630 CE. He described the Buddhas as being gilded and decorated with precious stones. They also wore masks, and while the lack of facial features in modern times is often attributed to vandalism, it is possible that this was an original feature designed to accommodate the wooden masks (Cotter 2001). The statues were originally constructed by carving their rough

shape into the cliffs. The intricate gowns of the Buddhas were shaped by applying stucco to the rough carving, and the lower arms were made of wood (Knobloch 2002).

The statues were sculpted in the Gandharan style that blends Greco-Roman artistic traditions with Indian and Buddhist religious art (Grun et al. 2004). This suggests that the building of the statues was initiated at an earlier time than radiocarbon dates given above would suggest. Grun et al. (2004) states that the building of the Buddhas was instigated by the Kushan Dynasty, who ruled the area from the first to the third century CE. The Western, larger statue represents Vairocana, the "Light Shining throughout the Universe" Buddha, and the Eastern, smaller statue Shakyamuni, "The Awakened One of the Shakya Clan" (AIIS 2004). The artistic style represented here is believed to have inspired other sites in China such as Dunhuang.

The Buddhas were first recorded in Western literature by Alexander Burnes in 1832 (Grun et al. 2004). The first archaeological work at the site was undertaken by the Delegation Arche´ologique Francaise en Afghanistan in the 1920s and 1930s. The French recorded the site, began preservation work on some of the murals, and produced the first guide book to the Bamiyan Valley (Grun et al. 2004). A number of Japanese and American researchers continued working at Bamiyan in the late twentieth century, recording details, completing a photographic survey, and preserving the great statues. Most research at the site was put to a halt with the Soviet invasion in 1979.

Key Issues/Current Debates/Future Directions/Examples

In March 2001 the Taliban regime of Afghanistan, which controlled Bamiyan at the time, destroyed the Buddhas. The destruction of the Buddhas was part of a systematic destruction of all images in Afghanistan that were considered to be idolatrous. While the Buddhas were not the only victims of this wave of destruction, they were the most visible, and their destruction has come to symbolize the violence of the Taliban regime (Centlivres 2008; Janowski 2011).

It is possible that the Taliban's actions were more politically than religiously motivated. In 2001 Afghanistan had been at war for more than 20 years, and the Taliban had begun pushing for full control of the nation. In 1999 the Taliban made a commitment to protect Afghanistan's cultural heritage (ICOMOS 2001) but by 2001 the United Nations had imposed a number of sanctions on the country and had refused to acknowledge the Taliban as the government of Afghanistan, despite their effective control of the country. In this volatile political environment, the destruction of the Buddhas can be interpreted as an assertion of power on the part of the Taliban, rather than an action that was motivated solely by religious beliefs (Francioni & Lenzerini 2003).

The destruction of the Bamiyan Buddhas by the Taliban led to a reconsideration of the nature of war crimes and crimes against humanity. Francioni and Lenzerini (2003) found that the destruction of the Buddhas differs from the usual destruction of cultural heritage during wars because of the careful documentation of the destruction and the lack of a clear military objective. Instead, it can be viewed as act of defiance of the United Nations and of the international community (Francioni & Lenzerini 2003: 620). From this viewpoint, the destruction of the Bamiyan Buddhas can be viewed as a planned action in a symbolic war between the Taliban and others.

In 2003 the United Nations inscribed the cultural landscape and archaeological remains of the Bamiyan Valley onto the World Heritage List (UNESCO 2003) under criteria i, ii, iii, iv, and vi. This area is currently listed as World Heritage in Danger. The inscription specifies the niches in which the Buddhas once stood, the sacred cave system, the remaining Buddhist art, and several other elements of the surrounding landscape as the main elements of the site (UNESCO 2003). Since the fall of the Taliban regime, the new Afghani government has attempted to preserve what remains of the Bamiyan Buddhas and their surrounds. The government has been working with UNESCO to

stabilize the site, which is at risk due to natural process and the effects of the blasting that was done to destroy the Buddhas (Margottini 2004; Manhart 2004). Archaeological work has resumed at the site (Hammer 2010) and a systematic recording of the niches that remain has been undertaken, including computer and 3D modelling of the site (Grun et al. 2004).

When archaeologists visited the site in 2002, they discovered that the Buddhas had not been completely pulverized and that the remains were substantial and that reconstruction of the Buddhas was technically possible (Lawler 2002). Since this time there has been debate over what should happen at the site. UNESCO does not support reconstruction, campaigning for a stabilization of the remaining aspects of the site and the preservation and display of the pieces of the Buddhas in a museum context. Many local people and members of the Afghani government support full reconstruction on economic grounds; they believe the reconstruction of the Buddhas will promote tourism and give the country a much needed economic boost (Gall 2003). The discussion over what to do with the remains of the Buddhas has led to a reassessment of the ethics of restoration and reconstruction in the academic literature (Gall 2003; Manhart 2004; Centlivres 2008; Janowski 2011). The UNESCO 10th expert working group released its recommendation for the Bamiyan site in 2011. They found that "in view of the available scientific data and estimated financial requirement, a total reconstruction of either of the Buddha sculptures cannot be considered at the present time" (UNESCO 2011). However, this does not rule out reconstruction at some point in the future. The remains of the Buddhas are currently still in situ, at the foot of the niches in which they once stood.

Cross-References

- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ UNESCO's World Heritage List Process
- ▶ Vandalism and Looting (Ethics)
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

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Ban Chiang: Agriculture and Domestication

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Basic Site Overview

Ban Chiang is a prehistoric settlement located in the northeastern part of the Khorat Plateau in Thailand. It came to prominence in the 1960s when elaborately decorated pottery vessels were found there. Excavations by Thai archaeologists then identified similar vessels in a cultural sequence that spanned the early Neolithic to the end of the Iron Age. The painted vessels were restricted to late Iron Age burials. These excavations coincided with claims based on the nearby site of Non Nok Tha that copper-based technology dated to the fourth millennium BCE which, if validated, would of necessity make Southeast Asia an independent center for the discovery of bronze casting.

Ban Chiang was soon to be almost entirely ransacked by looters, initially fed by visitors from a large, nearby American airbase. Appreciating the potential significance of this site, the University Museum of Pennsylvania and the Thai Fine Arts Department appointed Chester Gorman and Pisit Charoenwongsa to direct rescue excavations. Two small areas were identified where looters had not yet penetrated, and fieldwork took place in 1974 and 1975. The cultural sequence of both areas, when combined, began with burials containing ceramic vessels decorated with incised and impressed patterns that typify the Southeast Asian early Neolithic. These lay under further human graves assigned to the Bronze Age, although copper-based mortuary offerings were very rare indeed. With the Iron Age, grave goods included bimetallic spears with an iron blade and socketed bronze haft, glass beads, deeply incised clay cylindrical rollers, and bones from domestic pigs and dogs.

Evidence of Early Agriculture

Radiocarbon determinations were initially derived from charcoal which came from two principal sources. The majority of samples were accumulated from fragments of charcoal recovered from grave fill, while a few came from in situ hearths. Gorman and Charoenwongsa (1976) reported that these confirmed the startlingly early date for the initial Bronze Age at 3600 BCE and further claimed that iron forging was under way between 1600 and 1200 BCE. This divided scholarly opinion down the middle, and Ban Chiang became a *cause célèbre*.

The untimely death of Chester Gorman in 1981 led to the appointment of Joyce White to analyze and publish the results of the 1974–1975 excavations. Appreciating the internal contradictions in the charcoal-based chronology, she began first to reinterpret the results and then, with the advent of AMS dating of very small organic samples, turned to a new dating program that involved extracting and dating the rice chaff that had been used in prehistory to temper mortuary pots.

This experimentally involved three different pretreatments. The two most relevant involved dating either the actual fragments of rice teased out of the pot matrix or the organic fraction of the entire crushed potsherd. A problem arose when dates obtained from both pretreatments from the same pot or burial presented offsets of centuries or even millennia. In the event, White has proposed a new chronology for Ban Chiang derived from six crushed potsherd determinations and one from rice phytoliths. These, she has

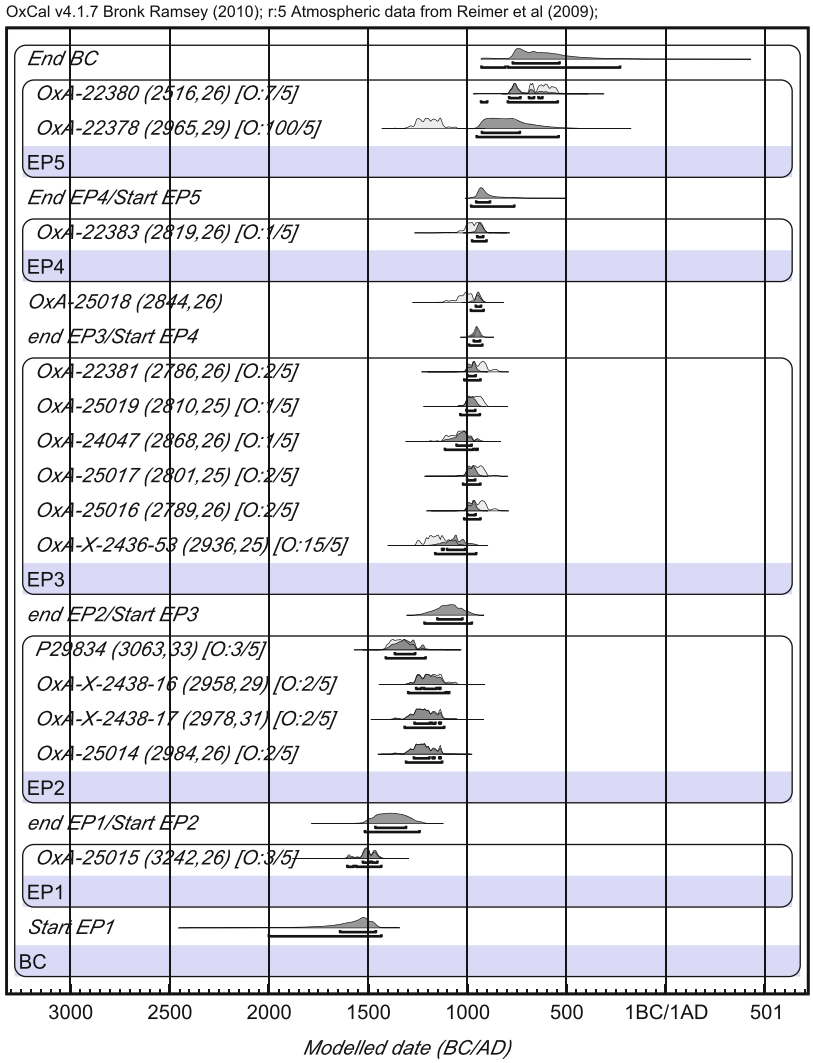

Ban Chiang: Agriculture and Domestication, Fig. 1 The radiocarbon dates of human and pig bones from Ban Chiang. *EP1* early Neolithic, *EP2* later Neolithic, *EP3* early Bronze Age, *EP4–5* later Bronze Age

suggested, indicate initial settlement of the site by Neolithic rice farmers in the 3rd millennium BCE and the transition into the Bronze Age in 2000–1800 BCE (White 2008). This would mean that the inhabitants of Ban Chiang either themselves developed metallurgical capabilities or derived their knowledge from a source other than early Chinese states.

White and Hamilton (2009) have subsequently composed a model which identifies the source of the bronze casting tradition at Ban Chiang in the Seima-Turbino transcultural phenomenon of the Urals. Their proposed route for the passage of the necessary specialists covers at least 2,500 km of Western China.

There are problems with this proposal. The first is the reliability of their radiocarbon chronology based on ceramic tempers. Although prima facie, this seems a valid technique, since the rice chaff is most unlikely to have inbuilt age, it is now recognized that clay itself can contain up to 15 % of carbon, and this provides a spuriously early result. However, new methods for pretreating and dating bone, and then interpreting the results, provide a means of testing and refining their chronological framework. This has now been undertaken on the basis of the bones of those who lived at Ban Chiang and of the animals they interred with the dead (Higham et al. 2011a, b). The results harmonize with the chronologies

Ban Chiang: Agriculture and Domestication, Fig. 2 Bronze mortuary offerings like these bangles were very rare at Ban Chiang

Ban Chiang: Agriculture and Domestication, Fig. 3 One of the few Iron Age painted pots recovered during the 1975 excavation at Ban Chian

obtained at other sites in Southeast Asia. The initial settlement of the site by Neolithic rice farmers took place in the 16th century BCE and the transition to the Bronze Age occurred in the late 11th century BCE (Fig. 1). As with other sites, iron forging began in the 5th century BCE.

With the expansion of fieldwork throughout mainland Southeast Asia in the last two decades, it is now possible to place Ban Chiang in its proper cultural perspective. It was one of many sites which was initially settled by rice farmers whose ultimate origin was the valley of the Yangtze River. This thrust south took place in the first few centuries of the second millennium and saw the incomers adapting and integrating with the indigenous hunter-gatherers. The new Neolithic communities maintained exchange contacts with the rapidly developing states of the Yangtze, which brought jades and bronzes into Lingnan and northern Vietnam, in exchange for cowries, turtle shell, and probably other desirable items such as kingfisher feathers. This exchange network probably involved the movement of specialist bronze casters south, for by the eleventh century, copper-based axes, chisels, bells, awls, bangles, socketed spears, and anklets formed the base repertoire of the Southeast Asian Bronze Age (Fig. 2). At some highly strategic sites, such as Ban Non Wat, this stimulated the rapid growth of aggrandizer groups interred with great wealth in princely graves. But at more remote locations such as Ban Chiang, the Bronze Age graves were poor. Iron was probably introduced into Southeast Asia through the development of a major maritime trade artery linking the region with both India and China. Again, some Iron Age sites, such as Prohear in Cambodia, were exceptionally wealthy in terms of exotic bronze drums and golden ornaments. Ban Chiang, however, being remote from the main trade links, was still poor save for its remarkable red on buff painted pottery vessels (Fig. 3).

Cross-References

▶ Agriculture: Definition and Overview
▶ Rice: Origins and Development

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Ban Non Wat, Archaeology of

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Introduction

Ban Non Wat is one of the many moated prehistoric sites that concentrate in the basin of the Mun River in Northeast Thailand (Higham & Kijngam 2009, 2011, 2012a & b; Higham 2011a & b; Higham et al. 2011). It is a key site for understanding the later prehistory of Southeast Asia for three principal reasons. A large area has been excavated over ten seasons. It has revealed a long and continuous sequence of occupation, and it has been dated on the basis of 76 radiocarbon determinations that have been subjected to Bayesian analysis.

Definition

This site is unique in Southeast Asia for the clarity and length of its prehistoric cultural sequence and the size of the analyzed material. There are 12 phases that begin with hunter-gatherers, followed by 2 Neolithic, 6 Bronze Age, and 3 stages of Iron Age occupation, each associated with human burials.

Key Issues

There are two key issues that dominate the interpretation and wider relevance of Ban Non Wat. The first is the application of AMS radiocarbon dating and Bayesian statistics to provide a valid chronological framework, and the second is to illuminate social change over 2,000 years of continuous occupation that led ultimately to the formation of early states.

Current Debates

This site has contributed new and relevant information that tests alternative models on prehistoric cultural developments in Southeast Asia: the relationships between intrusive Neolithic rice farmers, the timing of the initial Bronze Age, the impact of copper-base metallurgy on social organization, and the social changes that took place with the adoption of iron technology.

The area excavated concentrates in the middle of this circular site, which has a maximum diameter of 320 m, with ten smaller excavation squares distributed in a linear fashion between the moats. The moats and banks that ring Ban Non Wat have also been excavated and dated.

One of the problems that has hampered our interpretation of Southeast Asian prehistory has been the small areas excavated relative to the size of individual sites. By opening a large area, we have identified spatial patterns of activity on an unprecedented scale.

The sequence begins with occupation by hunter-gatherers, one radiocarbon determination on a shell midden falling in the sixteenth millennium BCE. However, the first of 12 fully documented cultural phases began in the early second millennium BCE, when the site was employed as a cemetery for a series of flexed burials that in all probability represent hunters and gatherers. These would have found a richly endowed habitat, offering plentiful resources including fish, shellfish, and a wide variety of animals that included at least four species of deer, pigs, and wild cattle.

This phase partially overlaps the initial settlement by rice farmers, whose ultimate origin lies in the Yangtze Valley. They are represented at Ban Non Wat by their occupation middens and a cemetery, the radiocarbon determinations showing that they arrived in the seventeenth century BCE. The dead were interred with elaborate mortuary rituals. A man and a woman were found in a seated position within large, lidded pottery vessels notable for their elaborate incised, impressed, and painted designs. Two individuals were buried with cowrie shell ornaments, indicating long-distance exchange with coastal groups. Other offerings included pig bones, shellfish, and bivalve shells thought to have had ritual significance. Infants were interred in lidded pots identical in form to those used for adults but naturally smaller.

This first Neolithic phase was followed by a second, dated between about 1250 and 1050 BCE. There was a decline in the quality of the now virtually undecorated pottery vessels placed with the dead and generally a poverty of other mortuary offerings. However, this was prelude to a dramatic change in the mid-eleventh century BCE, when the initial Bronze Age phase at the site saw the dead interred in deep graves, within wooden coffins associated not only with copper-base socketed axes but also up to 15 finely fashioned pottery vessels and a rich array of shell jewelry. Bronze Age 1 occupation gave way in the tenth century to arguably the most significant of all phases of occupation, for Bronze Age 2 witnessed a veritable starburst of social display in what can legitimately be described as princely burials (Fig. 1). This degree of wealth, unprecedented in the Bronze Age of Southeast Asia, saw men, women, and infants interred in very large graves, associated with up to 80 superbly painted mortuary vessels in many forms. Again, copper-base axes were placed with the dead, including some infants, as well as awls, chisels, anklets, and bells. There was a profusion of exotic marine shell jewelry including beads, earrings, and bangles, as well as marble bangles and earrings. The dead were also interred with fish and pig remains that strongly suggest that mortuary feasting took place at the time of burial.

Ban Non Wat, Archaeology of, Fig. 1 Bronze Age burials

Such feasting is a means whereby social aggrandizers can leverage their status through public demonstrations of hospitality and wealth. For at least eight generations, according to the

radiocarbon chronology, this wealthy lineage retained its high status, while contemporary graves elsewhere on the site, and in a nearby settlement, were markedly poorer.

Part way through the third phase of the Bronze Age, in the ninth century BCE, this degree of wealth sharply declined. Although some individuals were still buried with multiple exotic ornaments, the majority were markedly poorer, with only a handful of pottery vessels and a few shell ornaments being associated. Now the dead were buried in cemeteries laid out in row, with many graves disposed head to toe in columns. One grave stands out. It was the burial of a young man accompanied by 29 clay molds for casting bronze socketed axes and bangles. The latter were cast in a manner not hitherto documented in Southeast Asia. A series of molds were set in place like books on a shelf, and the molten metal was then cast into them simultaneously. This is a form of mass production, but curiously, no bangles were found in any of the contemporary graves.

The sixth and final Bronze Age phase is dated from the seventh to the early fifth centuries BCE and saw some modifications to the ceramic forms while retaining the basic repertoire for decoration. Again, the dead were interred with modest offerings when compared with the initial phases of the Bronze Age. Now, however, many were accompanied by spindle whorls and lumps of clay. The former were used to manufacture the filaments prior to weaving, and the latter may be used as a dye or a mordant. It seems that the community in question was beginning to specialize in fabric production.

This continued seamlessly into the early Iron Age. Four Iron Age phases have been identified in the upper Mun Valley, and at Ban Non Wat, we can trace a seamless transition from the late Bronze Age to the earliest Iron Age as the cemetery expanded over time in an easterly direction. Thus, we can identify the point in this sequence where the first iron artifacts were placed with the dead and date it to the second half of the fifth century BCE. This is the first time that this has been done in Southeast Asia. It is most significant that very rare beads and other ornaments of agate, carnelian, and glass were also found with the first people buried with iron. These forms of ornamentation are known to have been stimulated by exchange contact across the Bay of Bengal into India, and their conjunction at Ban Non Wat suggests that they came together, as a package, into the interior of Southeast Asia.

The first items to be forged from iron include large socketed spears, hoes, points, and bangles. There are also kits of small tools, such as knives and awls. The early Iron Age also saw a notable increase in the number of bronzes found, these taking the form of anklets, rings, and bangles on occasion cast using the lost wax method. Lead and tin items were also found, albeit rarely. During this earliest of the four Iron Age phases, many pots were placed with the dead, and these often contained complete fish skeletons. Pigs, cattle, and water buffalo limbs were also found in human graves, suggesting that feasting was a feature of this period.

A vital feature of Ban Non Wat, and many other Mun Valley Iron Age settlements, is that they were surrounded by multiple banks and moats. These are considerable engineering works that have for long been enigmatic. However, we excavated long trenches across them at several sites and identified not only the profile of the moats but the date of the encircling banks. It seems that the moats had a flat base, the banks being formed by heaping up the accumulated surface soil. The relevant radiocarbon determinations indicate construction in the third and fourth phases of the Iron Age, dating from about CE 200 to 600. The moats were fed by the rivers that then flowed past each settlement and could have been controlled to maintain a constant supply of water. Their actual purpose is not known, but they were probably multifunctional. Defense is one probability; we know that conflict was by now prevalent. The food offerings in Iron Age graves also remind us that wherever there is water in this region, there are also fish. There is also the possibility that the moats were an expression of the social standing of those who conceived them, for the later Iron Age was a period when immensely rich individuals were interred at the site of Noen U-Loke, only 1.8 km from Ban Non Wat.

The terminal Iron Age in the upper Mun Valley overlaps the period known in Southeast Asia as Chenla, when the first inscriptions were composed. From these, we can read of chiefs, known as *pon*, who exercised authority over water reservoirs and whose communities included weavers, rice farmers, and herdsmen. It was from this social matrix that the civilization of Angkor was generated. Thus, at Ban Non Wat, we can trace the entire course of prehistory from hunter-gatherers through the Neolithic, Bronze, and Iron Age to the origins of civilization.

Future Directions

The next stage in archaeological research in the Mun Valley of Northeast Thailand is to excavate further moated sites to provide comparative information on the course of prehistoric social change. This needs to identify further evidence for the presence of hunter-gatherers and their interactions with early rice farmers. The presence of a rich Bronze Age elite at Ban Non Wat will come into sharper focus if similar groups can be found at other sites in the region. An elite can only be properly defined if contemporary poor lineages can be identified. These Iron Age sites are so large that their internal structure needs to be investigated. Thus, excavations at Non Ban Jak, a moated mound near Ban Non Wat, have revealed a residential quarter for the first time, with a lane separating rooms belonging to two different houses.

Cross-References

► Dating Techniques in Archaeological Science
► South and Southeast Asia: Historical Archaeology

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Ban Non Wat: Agriculture and Domestication

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Basic Site Overview

Ban Non Wat is a large prehistoric site located in the upper Mun Valley of Northeast Thailand surrounded by a double set of moats and banks. Like the concentration of similar sites in this region, it sits upon a major route linking Central Thailand with the Khorat Plateau and beyond to the Mekong River and has immediate access to a vital resource, salt. Excavations began in 2003 and have continued uninterrupted to the present. An unprecedentedly large area has been uncovered, and few sites if any in Southeast Asia are as well documented.

Evidence of Early Agriculture

The cultural sequence is divided into 12 phases. These began with occupation by hunter-gatherers, who interred the dead in a tightly flexed position. A probable shell midden has provided a radiocarbon determination in the

16th millennium BCE, but the burials belong to the second millennium BCE. This was followed by two phases of Neolithic burials, six Bronze Age, and three Iron Age phases, all represented by human burials. This sequence has been dated on the basis of 75 determinations, some taken from in situ charcoal from hearths and others from the freshwater shellfish regularly placed as mortuary offerings with the dead. The Bayesian analysis of these dates shows that the initial Neolithic settlement began in the mid seventeenth century BCE. The transition from the late Neolithic to the Bronze Age took place in the late eleventh century BCE, while the Iron Age began in the second half of the fifth century BCE (Higham & Higham 2009).

For the first time in Southeast Asia, it has therefore been possible to assess the nature and pace of cultural change over a period of over two millennia in the context of a secure chronological framework. The initial settlement by Neolithic farmers saw that the inhabitants share the cemetery with those who chose to inter the dead in a flexed position. Such interaction between intrusive rice farmers and indigenous hunter-gatherers has become increasingly recognized in other Southeast Asian sites. Evidence for agriculture comes from the remains of rice in middens and a burial, while the dog, pig, and cattle bones come from domestic stock. The Neolithic inhabitants interred their dead either in an extended and supine position or within lidded mortuary vessels. The latter involved both adults and infants (Fig. 1). Pottery vessels were elaborately decorated with incised, impressed, and painted designs of considerable sophistication that are paralleled in other Neolithic sites from Central Thailand to Vietnam and north into China. Other grave goods include exotic cowrie shells, shell beads, bivalve shells, and pig bones (Higham & Kijngam 2011). The middens contain a wide variety of bones from hunted animals, fish, and shellfish. It was clearly an environment that provided an abundance of food.

The transition into the Bronze Age is documented on the basis of seven graves that contain adults, infants, and children

Ban Non Wat: Agriculture and Domestication, Fig. 1 Some of the mortuary vessels placed with the dead at Ban Non Wat were decorated with fine-painted designs (Reconstructed illustrations by Dr. Warrachai Wiriyaromp)

(Higham 2011a; Higham & Kijngam 2012). All reveal a sharp increase in the elaboration of mortuary rituals and the quantity of offerings placed with the deceased. Thus, where a couple of pots might be found with late Neolithic individuals, with Bronze Age 1, this rose to as many as 17. Copper socketed axes were a regular finding in these burials, as were shell bead and pig bones. This initial Bronze Age phase lasted perhaps no more than two generations before Bronze Age 2, when mortuary wealth rose to such a degree of wealth that we can describe the burials as princely (Fig. 2). Again, copper-based axes were regularly encountered, even with infants, as well as chisels, awls, and bells. The dead wore unparalleled quantities of exotic shell and marble ornaments, particularly bangles, beads, and earrings. Over 80 fine ceramic vessels were found, in many and varied forms, some bearing sophisticated painted designs (Fig. 3). A singular feature of these burials is that some men and women were partially exhumed and then the bones were replaced in a carefully placed heap within the grave. This might have been undertaken so that distinguished ancestors were incorporated within social rituals. There is little doubt that during this phase, Ban Non Wat harbored an elite social

Ban Non Wat: Agriculture and Domestication, Fig. 2 Burial 28 dates to the early Neolithic at Ban Non Wat and contained a man in a seated position within a large, lidded ceramic vessel decorated with incised and impressed patterns and painted designs

group that had secured preferential, perhaps restricted, access to exotic valuables that included copper, shell, and marble. The phase lasted from about 1000–850 BCE.

The ensuing phase saw a continuation of very wealthy graves, incorporating tens of thousands of shell beads, multiple shell bangles, and several bronzes. However, with phase 3B, the mortuary wealth fell sharply although the basic protocols associated with interring the dead continued: the same orientation, placement of pottery vessels, and creation of rows of graves. This relative poverty continued into Bronze Age 4, when graves covered the excavated area and were placed not only in rows but also head to toe. Bronzes were now very rare indeed, although one burial contained a bronze founder, a man accompanied by multiple molds for casting bangles and two bivalve molds for axes. The final Bronze Age witnessed new forms of ceramic vessel, several containing complete fish skeletons as food offerings, as well as spindle whorls and clay that may well have been used to dye cloth.

Iron Age burials formed a seamless continuation from the late Bronze Age with virtually identical pottery vessels but also the first iron in the form of spears, knives, tool kits, and bangles.

Ban Non Wat: Agriculture and Domestication, Fig. 3 Burial 197 was one of the richest graves of the early Bronze Age at Ban Non Wat. The man was interred with several copper implements, richly decorated pots, and exotic shell bangles

Three spears had iron blades and cast on bronze hilts. The first glass, carnelian, and agate ornaments were also found (Higham 2011b).

The excavation of a series of squares lineally across the site has shown how the settlement area progressively expanded over time. During the Iron Age, the floor of an area that had been used to impound domestic cattle and water buffalo was identified on the western edge of the site, and complex water control features on the eastern edge were in place as, towards the end of the Iron Age, the moats and banks round the site were constructed. In late Iron Age burials, there was a proliferation of glass ornaments in graves, along with more carnelian, agate, gold, and bronzes that reflect social change heralding the imminent development in the region of early states from the fifth and sixth centuries CE.

Cross-References

► Agriculture: Definition and Overview
► Rice: Origins and Development

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Bananas: Origins and Development

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Basic Species Information

A Multipurpose Crop

Bananas (*Musa spp.*) are a key domesticate of subsistence farmers across the wet tropics and subtropics. Although they are one of the most important commercial crops in the world, about 85 % of banana production is for local food consumption.

The wild banana plant, which does not produce edible fruit, is still used for many other purposes within the primary center of banana diversity or natural range. Among remote societies of South and Southeast Asia, these uses include leaves for roof thatching, flower bracts as legume, leaf sheaths for fibers, and several parts of the plant for medicinal purposes (Kennedy 2009). These practices are likely to have a very long history and would have been crucial to the generation of cultivated banana varieties (cultivars).

Recent genetic, archaeological, and linguistic findings have substantiated this assumption (Perrier et al. 2011). These multidisciplinary studies have enabled the first reconstruction of the entire history of banana domestication and dispersal, from wild species to the current vast array of edible banana varieties.

The Key Role of Human Intervention

Banana plants are among the largest herbs in the world, and some specimens can reach 10 m height. As herbs, they propagate by means of seeds and side-shoots, called suckers. The cultivars are mostly sterile, with seedless fruits and very limited pollen production. Artificial propagation is vegetative (clonal) whereby suckers are collected and replanted. As a consequence, the presence of banana plants

beyond the primary diversity center can only be due to human intervention, usually cultivation.

The planted suckers need about 1 year for fruiting and bunch harvest. Repeated vegetative propagation yields many cultivars with similar genetic composition. Thus, the plants are genetic markers of the people that introduced them originally to a region.

Botanical Background: Groups and Subgroups

The monocotyledon Musaceae family includes the Asian and African genus *Ensete*, the genetically proximal Asian *Musella* genus, and the East Asian genus *Musa*, which is divided into sections with 22 (Eumusa, Rhodochlamys) and 20 chromosomes (Australimusa, Callimusa). Almost all the cultivars belong to the Eumusa section and are diploid or triploid hybrids from *Musa acuminata* (A-genome) alone or from hybridization with *Musa balbisiana* (B-genome) (De Langhe & de Maret 1999). Wild AA grow naturally within the humid-warm tropics part of the diversity center – from India to New Guinea – while wild BB are mostly confined to the drier periphery to the north, from NE India, over monsoonal Southeast Asia, to the Philippines.

Current cultivars are classified into groups according to the respective genome origins: edAA (for edible AA compared to the wild AA), AAA, AB, AAB, and ABB. In this classification, A and B indicate the genomes of the parental wild species. The existence of edBB and of BBB has still not been firmly established.

A cultivar group of minor significance, including Fe'i bananas, is confined to the Pacific region and is derived from Australimusa species (Kennedy 2008). It is not discussed further in this entry.

Only a modest minority of the about 600 cultivars have been strictly reproduced clonally. Many cultivars are the product of somatic mutations, slight genetic and/or epigenetic changes causing modest differentiation in features such as size, plant color, fruit form, and bunch structure. Within each group, the resulting sets of cultivars are called subgroups. They are quite distinct from each other. It is estimated that some subgroups, such as the AAB Plantains in Africa or the AAB Plantains in the Pacific, may contain up to 100 cultivars, all of them probably being mutants from one or a few original clones. Since somatic mutation is a relatively rare process, these considerable subgroups would suggest vegetative propagation over many centuries or millennia since the time of introduction to the respective regions.

Timing and Tracking Domestication

Stepwise Domestication of the Banana

Genetic research has shown that edAA were the original cultivars, from which all the triploid varieties and a few AB cultivars derived by various crossings. The evolution from wild to edible AA involved seed suppression and progressive parthenocarpy development. It is assumed, but not yet firmly demonstrated, that the latter evolution has been caused by century-long cloning. The development of partial to complete sterility, however, calls for the classical explanation that these edAA are in fact hybrids between wildAA parents of significantly different genetic composition, as is the common case with interspecific hybrids. Indeed, the species *M. acuminata* displays a quite pronounced morphological variation all over the *Musa* primary diversity center, with the variants confined to restricted areas. They have therefore been called "subspecies," and at least eight wild AA ssp. are recognized. Research with mtDNA and cpDNA markers has eventually demonstrated that edAA are inter-subspecific hybrids in various combinations, which explains the diversity in current AA cultivars (Perrier et al. 2011).

The pattern of banana domestication implies that plants from region-specific wildAA subspecies were moved between regions by human populations, for the natural hybridizations to become possible. Archaeological and linguistic investigation has revealed that such movements would have happened in the area of New Guinea and Eastern Indonesia even before

the arrival of Austronesian-speaking peoples, perhaps around 4,000–3,500 years ago (Donohue & Denham 2009).

Triploidy Formation

Partially sterile AA cultivars can produce viable diploid gametes. If these are fertilized by haploid pollen, triploid bananas can be formed. Human interaction would have brought different cultivars into contact with other edAA as well as with wild AA subspecies and even the BB species. The addition of A or B genomes to these AA cultivars produced the large range in AAA, AAB, and ABB subgroups.

Because triploid bananas are more vigorous and robust than diploid ones, they largely dominate in all regions where the crop has been introduced. The ABB are typical for the drier tropics, while AAA, AAB, and the few AB thrive best in the humid tropics.

The current distribution of traditionally grown cultivars is rather complex, with more or less characteristic sets in different regions of the tropics. For example, the AAB African Plantains are the only subgroup found in the lowlands of West and Central Africa, while an altitude-preferring AAA subgroup is typical for East Africa. The two subgroups probably have different histories, with different people responsible for their introductions at different times. On the other hand, the AAB Pacific Plantains are the only Eumusa traditionally grown in the Pacific islands to Hawa ii, which strongly indicates that their distribution is linked to the colonization of the Pacific by Austronesian-speaking ancestors.

The Need for Multidisciplinary Research

Banana plants do not contain wood, and the lack of seeds and pollen in the cultivars leaves phytoliths and starch grains as the most common vestiges of their existence in the past, which explains the difficulty in tracking their archaeological visibility (see Denham et al. 2009). The center of diversity poses the additional problem of distinguishing the phytoliths of wild bananas from those of cultivars, except for the metric distinction between edAA and AAA (Vrydaghs et al. 2009).

Circumstantial archaeobotanic evidence of domestication has only been found thus far. It has been demonstrated that *Musa* phytoliths found during the excavations in Kuk (New Guinea), dating to 7,000–6,400 cal BP, belonged to plants that were managed by humans (Denham et al. 2003). On the other hand, phytoliths found in West Africa in pits radiocarbon-dated to c. 2,500 cal BP do not belong to wild *Musa*, since they are beyond the natural range of *Musa* spp.; they, therefore, indicate introduction of the AAB Plantain under cultivation by that time (Mbida et al. 2001).

The above-explained example of AAB African and Pacific Plantains and altitude-preferring AAA shows how the complex geographical distribution pattern of subgroup presence can be a helpful historical marker of different human populations (see Perrier et al. 2011). Within this historical framework, linguistic research proves to be remarkably productive. Traditional generic names for crops are highly conservative within a language family, and analysis of their reflexes can provide the tracks for the presence of the corresponding people. A striking example is the evolution of the generic term *qaRutay, still used among the Aeta people in the Philippines, but of which an elucidated sequence of reflexes over Indonesia and Asia seems to mirror the movement of cultivated bananas from Eastern Indonesia to India (Donohue & Denham 2009). It is tempting to suppose that analogous sequences of subgroup generic names and their reflexes could shed light on many details of this human intervention.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis

▶ Domestication Syndrome in Plants
▶ Domestication: Definition and Overview
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Kuk Swamp: Agriculture and Domestication
▶ Nkang: Early Evidence for Banana Cultivation on the African Continent
▶ Plant Domestication and Cultivation in Archaeology
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Banpocun, Archaeology of

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Introduction

Banpocun (Pan-p'o-ts'un) or Banpo is a site of the Neolithic Yangshao culture, located near Banpo village on the eastern bank of the Chan River, east of Xi'an, Shaanxi province, China. The entire site is estimated to be c. 5 ha in size, of which an area of 1 ha was uncovered during five seasons of excavation carried out from 1954 to 1957, led by Shi Xingbang of the Institute of Archaeology at the Chinese Academy of Sciences (Fig. 1). Archaeological deposits were divided into two phases. The early phase contained very rich material remains and was named the Banpo variant (*leixing*), dating to c. 4800–4300 BCE. Fewer ruminants were found from the late phase, named the Xiwangcun variant or Late Banpo variant, generally dating to c. 3500–3000 BCE (Institute of Archaeology, Chinese Academy of Sciences 1963). The entire excavated area of the Banpo site has been preserved as China's first on-site museum, the Xi'an Banpo Museum, which was first constructed in 1958 and rebuilt in 2006. Banpo has been further excavated in recent years, but a new excavation report has not yet been published.

Definition

Banpo is the first Yangshao culture site excavated on a large scale, providing rich data for understanding the economy, culture, and social organization of a Neolithic settlement. It is the type site of the Banpo phase, and many contemporary sites sharing similar settlement layout and material assemblages later have been found over a large region in the middle Yellow River valley.

Banpocun, Archaeology of, Fig. 1 Excavation of the Banpo site

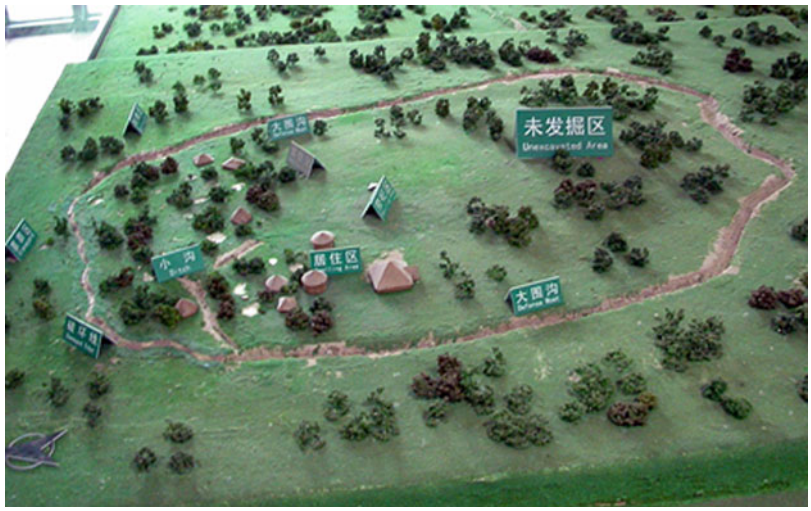

Banpocun, Archaeology of, Fig. 2 Model of the Banpo settlement

Key Issues/Current Debates/Future Directions/Examples

Settlement Layout

The residential area of the Banpo settlement is located in the center of the site, about 3 ha in area, including 46 buildings, more than 200 ash pits (mostly used as storage before abandonment), 2 livestock pens, and nearly 70 children's burial urns. Dwellings appear to have been divided into two clusters, separated by a shallow ditch, 1.5 m deep and 2 m wide. Each dwelling cluster consisted of one large building, up to 160 m^2 in size, surrounded by a number of medium and small structures, measuring 30–40 m^2 and 12–20 m^2 in size, respectively. The residential area was fortified by a moat, 5–6 m deep and 6–8 m wide. To the north of the ditch was a cemetery, and to the east were pottery kilns (Fig. 2).

The dwellings of the Banpo phase were either semisubterranean or at ground level. Each house had a hearth at the center and a doorway opening to outside. All the structures were built with wattle-and-daub walls and foundations, and the upper walls and roofs were supported by wooden posts. These houses were mostly

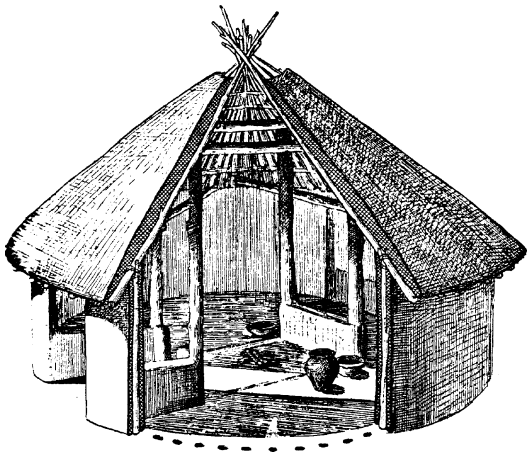

Banpocun, Archaeology of, Fig. 3 Reconstruction of a Banpo house

Banpocun, Archaeology of, Fig. 4 Painted pottery vessel from Banpo

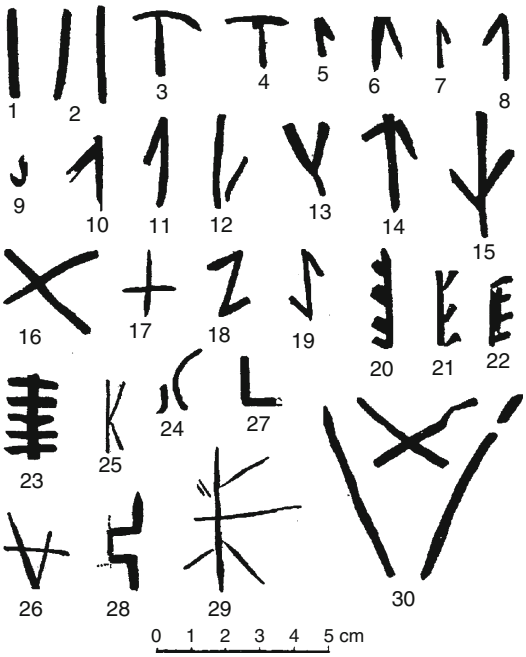

Banpocun, Archaeology of, Fig. 5 Banpo pottery marks

circular structures, but a few were square or rectangular in shape (Fig. 3).

A population level of 5–600 for the entire village has been estimated by the excavator mainly on the basis of the extent of the settlement and the sizes and layout of the houses. The actual population size, however, is difficult to assess, because a large part of the settlement has not been excavated.

Material Remains

Ceramics (more than 500,000 potsherds) are the most numerous material remains excavated, accounting for 80 % of the artifactual assemblage at Banpo. Pottery was probably made on site, suggested by the presence of six kilns. Nearly 1,000 vessels have been restored and are classified into four categories, including serving receptacles, water containers, cooking utensils, and storage vessels. Ceramics are mainly reddish or orange in color, some painted with human, animal, plant, or geometric designs (Fig. 4).

Twenty-two incised symbols have been found on the black band near the rim of pottery *bo* bowls (Fig. 5). They occurred singly, perhaps identifying the makers of the pottery or possibly the owners. Such pottery marks have been found at several Yangshao culture sites, and some of these forms appear to resemble certain numerals in the oracle-bone inscriptions of the Shang dynasty dating to the late second millennium BCE. It is possible that the Yangshao pottery signs were one of the sources of the Shang writing, but these pottery marks have not normally been regarded by archaeologists as indicating the contemporary existence of a writing system.

More than 5,000 tools were excavated from the site, variously made of stone, bone, deer antler, and pottery. The tool types include axe, adze, spade, knife, grinding stones (slab and hand stone),

arrowhead, spearhead, harpoon, net-sinker, and fishhook. They have been classified into three categories, based on their presumed functions, as agricultural, hunting-fishing, and craft-manufacturing implements.

Agriculture appears to have played an important role in the subsistence economy. Carbonized remains of foxtail millet (*Setaria italic*) were found at the site in significant quantities; cabbage seeds (*Brassica* sp.), hazel nuts, chestnuts, hackberry seeds, and pine nuts were also present. Other types of plants may also have been used by the Banpo people; but due to the absence of flotation method at the time of excavation, floral remains were not systematically uncovered.

Matting, basketry, and weaving were part of the craft production, evidenced by impressions of baskets, mats, and textiles on the bottoms of pottery vessels. A large number of spindle whorls, a type of weaving tool, have also been found at the site. It is unclear exactly what materials were used for making textiles at Banpo, but traditionally hemp and kudzu were among the indigenous plants used for weaving in China, as mentioned in ancient texts, such as *The Book of Odes*.

Many animal bones have been found at the site, identifiable as mammals, birds, and fish. Pig (*Sus domestica* L.) and dog (*Canis familiaris* L.) were clearly domesticated. Bones from many species of wild animals were present, including two types of deer (*Pseudaxis hortulorum* Sw. and *Hydropotes inermis* Sw.), sheep (*Ovis* sp.), bovine (Bovidae indet.), horse (*Equus* sp.), fox (*Vulpes* sp.), rabbit (*Lepus* sp.), gazella (*Gazella* sp.), chicken (*Gallus* sp.), and carp (Cyprinidae indet.). Pig bones were the most numerous in the faunal assemblage, followed by Chinese river deer (*Hydropotes inermis* Sw.). Hunting and fishing were important subsistence activities as evidenced by a great variety of wild animal remains and numerous arrowheads, harpoons, net-sinkers, and fishhooks.

Burials

A total of 174 adult burials and 73 children's urn burials have been excavated. Adult burials were found in pit graves, mostly located in the cemetery. Among 118 nondisturbed burials, 71 contained grave goods. Except for two cases in which two males and four females, respectively, were interred, each burial usually contained one skeleton in an extended position with the head pointing to the west or northwest. Grave goods consist mostly of pottery, ranging between one and 17 items, with an average of 5–6 pieces in each burial.

Children's urn burials have been found mainly near houses. They were associated with no funerary items, except one case which contained a small pot. It is noteworthy, however, that a burial belonging to a child of about 3–4 years old was furnished with an oblong wooden coffin and contained six ceramic vessels, three stone pellets, an earring, and a set of 76 bone beads girdled around the waist. This burial, dating to the late Banpo phase, was unique in terms of its rich furnishing, suggesting that social stratification may have emerged during the late phase of the settlement's occupation.

Social Organization

Banpo society was evidently egalitarian in nature during its early phase. There is no indication of social hierarchy present in the burial or residential remains. This site, however, has been routinely described by archaeologists in China as a typical Neolithic matriarchal or matrilineal settlement (see the Xi'an Banpo Museum website: http://www.bpmuseum.com/en/), as opposed to the patriarchal or patrilineal society that presumably developed in the late Neolithic period. The concept of matriarchal society, primarily based on the nineteenth–century evolutionary theory proposed by Henry Lewis Morgan (1877, *Ancient Society*) and Friedrich Engels (1884, *The Origin of the Family, Private Property and the State*), was systematically introduced to China by Guo Moruo (1930) in the 1930s. Banpo was the first archaeological case in which Chinese scholars attempted to employ such a theoretical framework to interpret Neolithic social organization, in support of Marxist doctrine.

The Banpo excavator argued that matrilineal rules of descent are reflected in the two collective burials at the site, one each exclusively of females or males, and that this pattern contrasts with the

single-male or single-female burial pattern characteristic of the monogamous family in patrilineal society. The rich child burial was interpreted as belonging to a girl, indicating that females enjoyed a high social status then. The settlement pattern was also described as arranged in a way suitable for the pairing marriage, believed to have been practiced in a matrilineal society (Institute of Archaeology, Chinese Academy of Sciences 1963: 226-33). The statement that the Yangshao culture was a matriarchal society soon became a standard phrase adopted in many archaeological publications, although evidentiary support is lacking in the archaeological record of some cases (Yan 1989). The reported evidence for matriarchal practice at Banpo is clearly less than convincing. For example, the rich child burial said to be of a girl is problematic, as the sex of a skeleton 3–4 years old cannot be determined. Although some criticisms were made, demonstrating faults in both theory (Pearson 1988; Tong 1998: 262-72) and applications (Wang 1983, 1987), the classical evolutionary model was commonly accepted among Chinese archaeologists then and has continued to be influential, but to a lesser extent, today (e.g., Institute of Archaeology, Chinese Academy of Social Sciences 2010: 204, 413, 652-3).

Cross-References

► China: Museums
► Chinese Field Methods

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Barley: Origins and Development

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Basic Species Information

Barley (*Hordeum vulgare* L.) Poaceae derives from the Old English *baere* related in origin to the Latin *farina* or flour (Ayto 1990) and is known variously as *da mai* (China), *orge* (French), *gerste* (German), *orzo* (Italian), and *cebada* (Spanish) (van Wyk 2005). Barley is a major crop in global agriculture. Modern statistics (e.g., from faostat.fao.org) indicate that barley production globally follows only wheat, rice, and maize. Barley can be turned into breads and porridges, as well as beers and whiskies.

Barley was one of the founder crops of early agriculture in Southwest Asia and parts of the earliest farming systems that spread across Neolithic Europe, North Africa, and the Indus Valley. Its wild progenitor is *Hordeum spontaneum* K. Koch, which occurs widely in the eastern Mediterranean eastwards to Central Asia in the open woodland steppe through to the taller grass steppe zone (Hillman 2000; Harris 2010). Wild populations further west, such as in the Maghreb region of North Africa as well as some of those on its eastern margins, may or may not be aboriginally wild but could be feral populations. Barley is a generally more tolerant cereal than

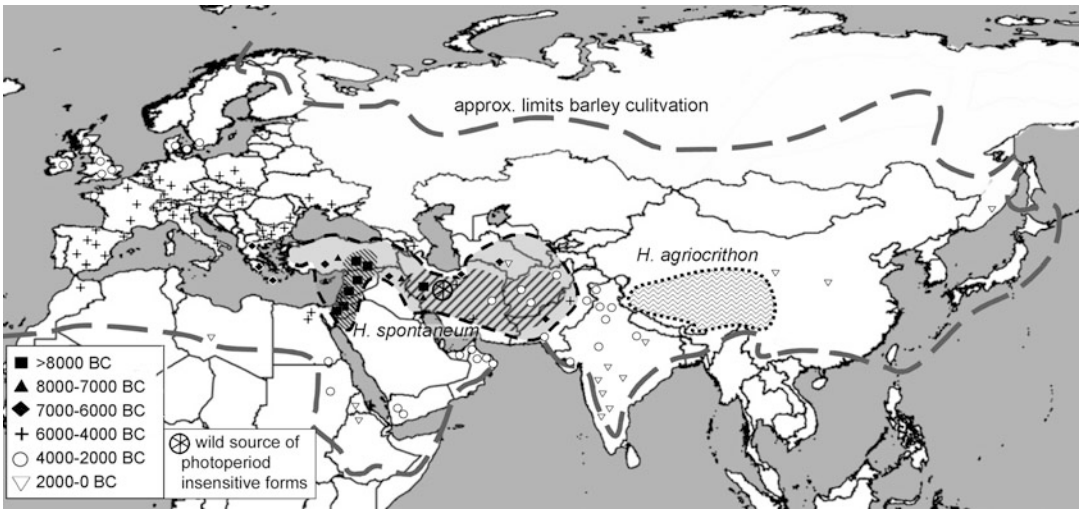

Barley: Origins and Development, Fig. 1 Map showing the approximate maximum limits of traditional barley cultivation (*thick dashed line*) in relation to its wild range (*gray zone*). The map differentiates likely eastern and western subzones within the wild range that had separate domestications, as well as the locations for the development of original photoperiod-insensitive barley in Iran. The *symbols* show representative archaeobotanical finds that chart the earliest spread of barley

wheat, with which it is often found. Barley can be grown on more saline soils and with lower rainfall. It can also tolerate colder conditions than wheat. Thus, barley has reached to higher altitudes and higher latitudes than wheat (see Fig. 1).

Major Domestication Traits

Genetics and archaeology combine to imply that barley was domesticated more than once across the greater Near East, with three origins a likely minimum (Fuller et al. 2012). All are located across Southwestern to Central Asia (Fig. 1). Such evidence includes two genetic variants that make non-brittle domestic-type ears, and several other gene frequencies have geographic structure suggesting differences between east and west (Morrell & Clegg 2007). Genetic differentiation suggests a western Levantine domestication area and an eastern domestication, perhaps in the greater Iranian plateau region. While most wild and cultivated barleys are grown over the winter and flower in the spring, controlled by day length, other varieties have lost the linkage of day length to flowering and are well suited to spring/summer cultivation at higher latitudes or altitudes. These photoperiod-insensitive (summer) barleys derive from domestication of a separate wild population in the mountains of Iran (Jones et al. 2008).

Timing and Tracking Domestication

Archaeobotanical evidence tracks both the evolution of domesticated barley, at least with regard to its western Levantine origin. Sites in several parts of the Levant have reported evidence for pre-domestication cultivation, most often involving apparent arable weed flora associated with morphologically wild barley remains (Fuller et al. 2012). Such evidence goes back to the PPNA period (9700–8800 BCE). Subsequently there is evidence for gradual morphological change including the steady increase in the percentage of non-shattering barley rachis remains and in average grain size (width and thickness) of grain samples over time. Both lines of evidence point towards

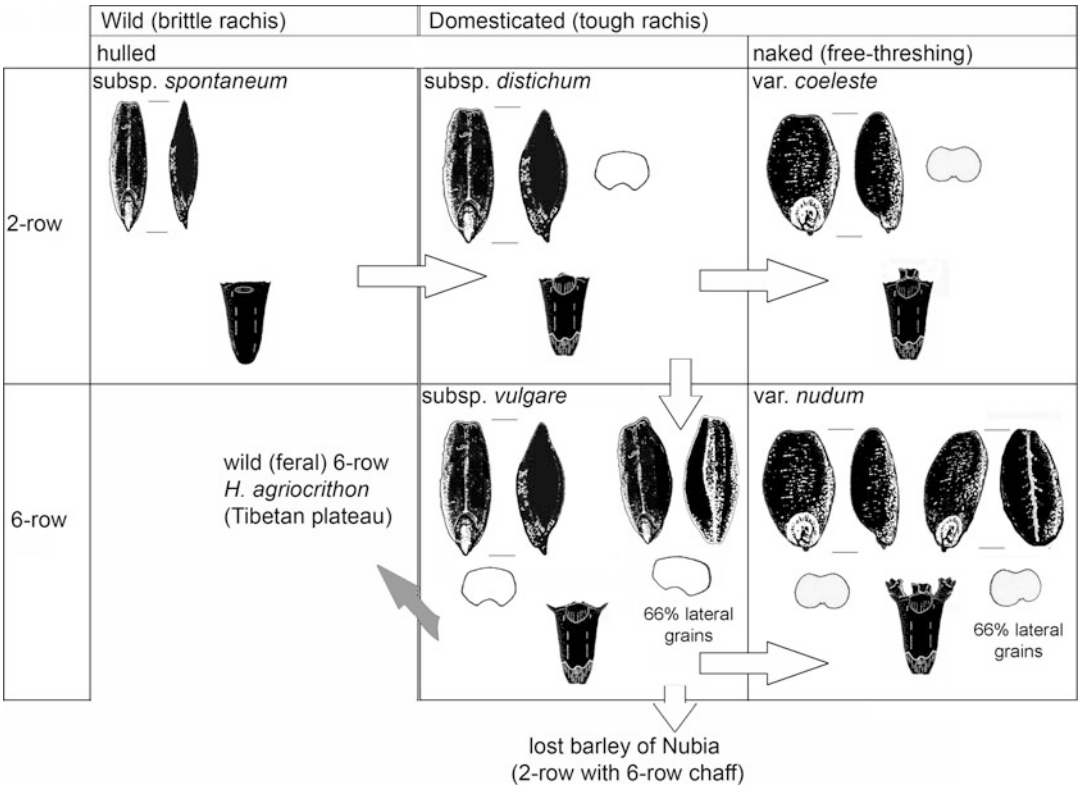

Barley: Origins and Development, Fig. 2 Diagram of the main types of barley and evolutionary pathways between them. These are illustrated by potential archaeobotanical differences in grain and rachis morphology

change between the Late PPNA (c. 9000 BCE) and the Late PPNB 7000–6000 BCE and indicate gradual domestication over a ~3,000-year period.

Archaeobotanical evidence for barley is widespread, allowing the spread of this crop to be tracked (Fig. 1). It was an essential part of the founder crop package that dispersed from the "Fertile Crescent" westwards to Neolithic Europe, starting about 7000 BCE and reaching the British Isles just after 4000 BCE. Similarly, it spread rapidly eastwards to the Indus Valley and Turkmenistan, where it is present by 6000 BCE. The dispersal into Egypt and up the Nile is later (c. 4000 BCE), while the spread of barley in monsoonal India or to southern Arabia took place after 3000 BCE. The first barley in southern India or China appears to date more recently than 2000 BCE.

Barley has evolved into a number of distinct varieties, illustrated diagrammatically in Fig. 2. Whether barley has 2 or 6 rows of grains on the ear and has free-threshing (naked) grains or hulled ones should be separable in archaeobotanical remains (see Fig. 2). Wild barley normally has two rows of grains, and grains have tightly fitting hulls; this is a two-row, hulled, and shattering wild type. The first change with domestication is the loss of spike shattering, which can be tracked archaeologically with the recovery of tough rachis remains. Two changes that occurred after were the increase to six-row and the development of free-threshing (or naked) barley. While naked barley appears to have evolved once, originally in early two-rowed forms, 6-row barley has evolved 3 times, including local independent parallel mutations in eastern Asia and the western Mediterranean (Komatusda et al. 2007).

Thus there are three main variant genes that create six-row barley (*Hordeum vulgare* var. *hexastichium*), a condition that only exists among domesticated races, and these also show east/west patterning (Tanno & Takeda 2004). In ancient Nubia there was a unique, now lost, barley that has six-row architecture and chaff and only produces two grains. Palmer et al. (2009) demonstrate that this has 6-row genetics and may represent a local reversion as adaptation to the extreme aridity in Nubia. Recent work on genetic variation in wild barley (*Hordeum spontaneum*), which unlike wheat has a large eastern range extension into Pakistan, Afghanistan, and Central Asia, shows systematic variation in allele frequency. Morrell and Clegg (2007) have demonstrated that allele frequencies in cultivated landraces are best explained by two origins from differentiated wild barley populations, one of which was in the Levant, while the other is suggested to lie somewhere from Zagros mountains eastwards towards Central Asia.

Hordeum agriocrithon, a wild six-row barley of the Tibetan Plateau, is likely to be a feral derivative of domesticated 6-row barley or a hybridization from a 6-row crop into two-rowed *H. spontaneum*, rather than truly wild (Tanno & Takeda 2004). All naked barleys, including the naked 6-row commonly grown in the Tibetan Plateau, share the same nude genetic mutation (Pourkheirandish & Komatsuda 2007). This suggests that they derive this trait from the early naked barleys that had appeared by the Late Pre-Pottery Neolithic of Southwest Asia.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Chickpea: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Lentil: Origins and Development
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Wheats: Origins and Development

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Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk

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Introduction

The Barrow area is home to several important archaeological sites (Fig. 1). Among these are the sites which fall under the general heading of Utqiaġvik, including Utqiaġvik proper, Ukkuqsi, and Kugok; Nuvuk; and Birnirk (type site of the Birnirk culture), Alaska.

The earliest "archaeology" in the Barrow area was done by nonprofessionals, often by purchasing artifacts from residents who excavated for pay. Notable among them were Murdoch (1892), Stefánsson (1914), Wissler (1916), Ford (1959), and Van Valin (1941), a Barrow school teacher.

James A. Ford excavated at Nuvuk in 1932, Utqiaġvik in 1932, and Birnirk in 1936. Ford's report (1959) on his excavations on the Chukchi coast defined harpoon head typology for this region and provided extensive and well-illustrated descriptions of artifacts from Birnirk through contact period sites.

Definition

Utqiaġvik

Utqiaġvik (Iñupiaq for a place to hunt snowy owls) is the traditional Inupiaq name for the community of Barrow. The name Utqiaġvik (or Utkiavik) also refers to the archaeological component of the community as a whole, which also includes two areas which are sometimes referred to separately, Ukkuqsi, and Kugok. The precontact settlement was on the Chukchi Sea coast, concentrated on high ground on either side of Kugok Ravine. It consisted of at least 60 mounds, which had

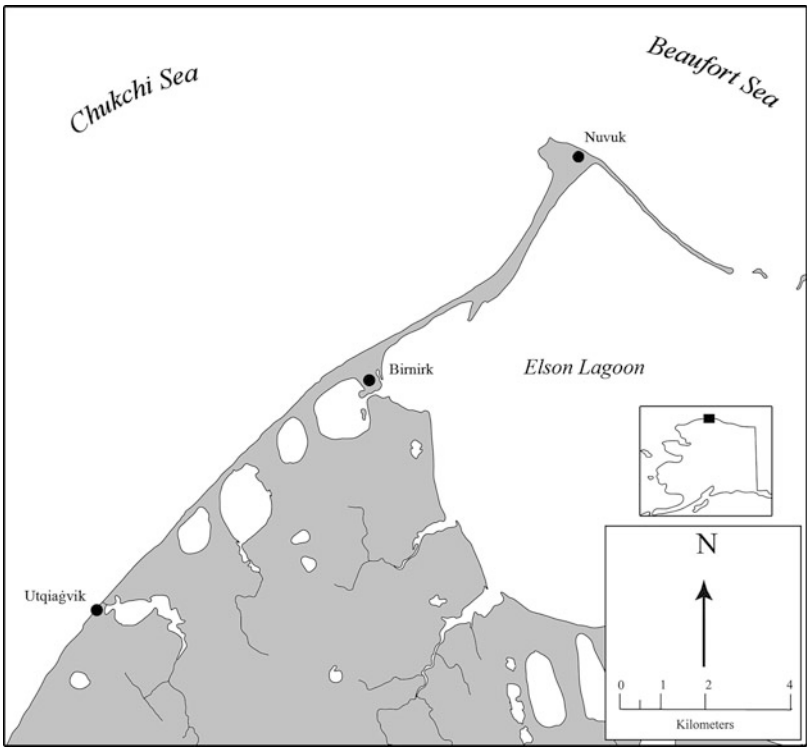

Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk, Fig. 1 Map of Barrow area sites

been built up in part by superposition of sod-covered semisubterranean houses.

Utqiaġvik has a very limited number of radiocarbon dates, given the amount of excavation that has taken place at the site. However, it has long been recognized as having been occupied from Late Western Thule times until the present day, and the majority of the material excavated from the site corresponds to this understanding. However, Birnirk burials were recovered from the Kugok area of the site as early as 1932 (Ford 1959), and more recently a Western Thule burial was recovered from a pit dug through the floor of a Birnirk house at Ukkuqsi (Zimmerman et al. 2000). Lithics, which have been identified as Arctic Small Tool Tradition (ASTt) have also been recovered from Utqiaġvik, indicating that the area was being used at least as early as 4000–5000 BP.

Utqiaġvik was originally mapped by Ford in 1932, with more extensive mapping by Stanford in 1968 (who began the mound numbering system) and the Utkiavik Archaeological Project (UAP). A number of the mounds have been hidden or destroyed by modern construction of roads. All portions of the site except Kugok are threatened by coastal erosion and sea level rise.

Utqiaġvik

In 1981 through 1983, major excavations were carried out at the Utqiaġvik site in Barrow (Hall and Fullerton 1990). These excavations concentrated primarily on houses, although some work was done on activity areas outside the structures. The vast majority of the material excavated was late precontact and post-contact. The excavations of Mound 34, which included a prehistoric *qargi* (ceremonial center), were published in a monograph (Sheehan 1997).

In 1986, a number of blocks of tundra from the Utqiaġvik site slumped onto the beach in Barrow. In 1990, a salvage excavation of the single remaining slump block was carried out. Radiocarbon dates averaged 1281–1395 calCE (Mason 1991).

A number of human remains have been recovered from Utqiaġvik. Ford recovered the frozen and partly desiccated bodies of two women from the floor of a house which some Barrow residents had begun excavating in imitation of Ford's work (Ford 1959). The Utqiaġvik Archaeology Project recovered a number of individuals in a similar state of preservation from a collapsed house in Mound 44 at Utqiaġvik (Newell 1984). These were catastrophic, not deliberate, burials.

Kugok

Kugok is the name of the ravine that bisects the settlement of Utqiaġvik. It contains a stream that was a summertime freshwater source for the residents. The name is generally applied to a group of mounds at the head of the ravine, which contained Birnirk burials. Van Valin may have recovered some Birnirk burials in this area. Ford reported the recovery of 15 individuals (Ford 1959: 25-30). Four additional individuals were recovered by the Utqiaġvik Archaeological Project (UAP) in 1981.

Ukkuqsi

Ukkuqsi is the name given to the subarea of Utkiavik located around the mouth of Kugok ravine, particularly a large mound on the south side of the ravine. In 1994, the frozen body of a young girl was exposed by erosion (Zimmerman et al. 2000). The autopsy indicated that she most likely died of starvation and had experienced disabling health issues in life. Artifacts recovered during excavation ranged in age from post-contact glass beads found at and near the surface to two harpoon heads and a Birnirk throwing board from the floor of a house through which the meat pit in which the little girl had been buried had been cut.

Nuvuk

Nuvuk is located at the tip of the Point Barrow spit (Fig. 2). At contact, the settlement was larger than Utqiaġvik; the last residents moved away in the late 1940s. Until recently, Nuvuk had been considered a late precontact through post-contact site and therefore of little archaeological interest. Recent work by a large community archaeology project (Jensen 2009a, b, 2012) has revealed the largest known cemetery in North Alaska, with graves dating from early Thule

Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk, Fig. 2 Excavating at Nuvuk. Burial excavations foreground and test pit excavation in rear. Beaufort Sea in background. View northeast

(possibly late Birnirk) through late Western Thule. Radiocarbon dates on the graves range from 614–770 calCE up to 1469–1648 calCE. That work also revealed a precontact/contact period work area located on lower ground at a distance from the graveyard and the winter village, with radiocarbon dates ranging from 1472–1649 calCE up to 1663–1953 calCE, and an artifact inventory including metal tools and imported wood, indicating some use after time of contact. There was also an earlier occupation at Nuvuk that contained the first evidence for Ipiutak north of Point Hope, including portions of two structures and faunal remains. Radiocarbon dates place it between 330 and 390 calCE. Nuvuk is currently the best dated of the Barrow area sites. All of the sites except Kugok are threatened by coastal erosion and sea level rise.

Wilbert Carter (1966) described Nuvuk in 1953 as made up of 19 "locations" with indications of houses. Some had multiple houses or rooms, giving a total of 46 houses or meat caches. His work resulted in the recovery of a number of artifacts, which he interpreted as recent (i.e., pre- and post-contact Inupiat), although illustrations in some of his reports suggest that early material was present.

When the Nuvuk Archaeological Project (NAP) began excavation (Jensen 2012), the village had eroded, but graves were noted in the erosion face. Initial salvage excavations of these graves revealed what proved to be the precontact cemetery. An adjacent Christian graveyard has markers dating from the early 1900s. During the period immediately preceding contact Barrow area residents had shifted to surface "burials." There is an extensive modern history of collection of human remains from the surface in the Nuvuk vicinity, which presumably removed many of these individuals from the Nuvuk mortuary precinct.

The human remains excavated from Nuvuk by the NAP were carefully documented by physical anthropologists prior to their reburial. Samples were retained for ancient DNA (aDNA) extraction, stable isotope analysis and radiocarbon dating. These studies are underway at the time of writing.

Barrow Area Sites: Nuvuk, Utqiaġvik, and Birnirk, Fig. 3 Some of Birnirk mounds from the air. Note Elson Lagoon waters encroaching. View north

Birnirk

Birnirk (Piġniq in Inupiaq) is located at the base of the Point Barrow spit, between Elson Lagoon and the Chukchi Sea (Fig. 3). It is made up of a group of 16 mounds near the shore of the lagoon, separated from the Chukchi Sea by a series of gravel beach ridges. Birnirk is the type site of the Birnirk culture and is currently designated a US National Historic Landmark. Some parts of the site are threatened by sea level rise.

James Ford's work indicated that the major occupation at Birnirk was relatively early, predating what was then known of occupation at Utqiaġvik. However, some of Carter's later work, as well as explorers' accounts suggest that the site was occupied to some extent past the time of contact. The few radiocarbon dates from the site are all early, ranging from 684–878 calCE to 992–1156 calCE. However, these dates were on harpoon heads chosen to date the transition between Birnirk and Thule, rather than materials chosen to clarify the duration of occupation (Morrison 2001). Ford produced very detailed (1 foot contour) maps of Birnirk. These maps were published together with his description of his 1930s work (Ford 1959). This remains the best published information on the site.

Stefánsson reportedly recovered one individual from Birnirk, but no further documentation is available. Ford (1959) recovered a number of individuals here, as did Carter, although it is not clear if they were the result of deliberate burials. The stratigraphy of the mounds at Birnirk is extremely complicated. It is unclear if the human remains were recovered from within houses, as in the cases at Utqiaġvik, or were deliberately buried in grave structures, as seems to have been the case at Nuvuk and Kugok.

Key Issues/Current Debates/Future Directions/Examples

A key research issue is clarifying the occupational history of these sites. Only Nuvuk has a reasonable suite of radiocarbon dates (Jensen 2009a, b). Both Birnirk and Utkiavik could benefit from a program of systematic dating of well-chosen existing specimens. However, modern excavation standards are quite different than when Birnirk was last excavated, so some controlled excavation would help. There is a large well-excavated collection from Utqiaġvik. However, the existence of multiple Birnirk burials at Kugok, coupled with the Birnirk finds from the

house floor at Ukkuqsi, suggests that there was at least a small Birnirk occupation at Utqiaġvik, which apparently was not encountered by earlier excavators. Resolving this issue will make it feasible to address other questions.

One question of interest concerns changes in the material culture found at the sites, and whether they relate solely to in situ cultural development or whether a population replacement from elsewhere was involved. The aDNA studies from Nuvuk, coupled with modern DNA studies of the North Slope, should help to resolve this question. Improved chronological control should better identify the timing of changes in material culture, as well as apparent changes in social and cultural organization. This will permit these changes to be situated in an environmental context, in order to investigate the human ecodynamics.

A related question is what role the Barrow area played in the development of the Thule culture and whether it was the source for the Thule migration. Various conflicting theories exist, an extreme one of which includes a multi-century abandonment of the Barrow area. Although neither the stratigraphy at the sites nor the known radiocarbon chronology appears consistent with this scenario, better understanding of individual site chronologies will clarify the situation.

The broad outlines of paleoeconomy in the Barrow area are understood from prior excavations. However, none of the sites has had a rigorous zooarchaeological study carried out. Midden deposits still exist at Birnirk and Utqiaġvik where productive studies could be carried out.

All of these sites are threatened by coastal erosion and sea level rise. The warming of permafrost and concurrent deepening of the active layer is also a major threat to the generally excellent preservation which currently exists at these sites.

Cross-References

- ▶ Biomolecular Archaeology: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Cape Krusenstern Societies
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Outreach
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethics and Human Remains
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Permafrost Digging
- ▶ Zooarchaeology

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Basilica in Classical Archaeology

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Introduction and Definition

The Latin term basilica is a transliteration of the Greek Βασιλική ("belonging to the king", "royal") and generally refers to a wide and sumptuous covered hypostyle hall, mainly associated with a forum square (Gros 2001: 260-89, with bibliography). This definition is ably demonstrated by an important inscription from the Roman theater of Iguvium (modern Gubbio) (*CIL* XI.5920a-b = *ILS* 5531: "Cnaeus Satrius, son of Cnaeus, a colonial commissioner, provided the *basilicae* with paneled ceilings") ("*C*]*n*(*aeus*) *Satrius Cn*(*aei*) *f*(*ilius*) *Rufus*, *IIIIvir iur*(*e*) *dic*(*undo*) / *basilicas sublaqueavit*. . ."). The term can also be employed to designate rooms with the same spatial and architectonic characteristics belonging to other public, and even private, complexes (Gros 2003, 2004). As a matter of fact, as the *basilicae forenses*, the two *basilicae* of Gubbio's theater, built flanking the scenic sector during the early Augustan period, constituted large and luxurious halls provided with columns, roofing, and pavement, designed for the reception, passage, and shelter of citizens in a manner similar to the more common *basilicae* of forum spaces. The basilica, therefore, was a monumental, multivalent space that, in the case of a *basilica forensis*, added the basic functions of hospitality and accommodation to the judicial, administrative, and commercial activities specifically linked to the forum and which originally had been conducted outdoors.

Key Issues/Current Debates/Future Directions/Examples

The typology, elaborated in Rome from the end of the third century BCE onward, was most likely inspired by similar structures of the Hellenistic eastern Mediterranean (e.g., Wilson 2005). The basilica gradually replaces *atria* with *tabernae* that would normally border forum squares of the middle Republican period. These buildings were modeled along the lines of the traditional Italo-Roman atrium house and were mostly private property that could be rented for public activities, such as auctions, or religious activities, such as the *Tubilustrium* (Varro *LL* 6.14). The *atrium Regium* of the Forum Romanum, located between the *forum Piscarium* and the *Comitium* in the area of the Basilica Aemilia, is considered, also thanks

to the onomastic correspondence (*aule basilike* = *atrium Regium*), the "ancestor of the Roman basilicas" (Gros 2001: 260-4). The construction of Basilica Porcia in 184 BCE, the first to be designated, as many *atria* previously, with the gentilician name (*nomen gentilicium*) of the founder (*De viris illustribus*, 47), has been realized at the site of "*atria duo* [...] *et quattuor-tabernas*"; and to be more precise at the site of *atrium Maenium* and *atrium Titium*, purchased by Cato the Elder with public funds in the area of the *Lautumiae* (Liv. 39.44.7). An analogous development takes place in Republican colonies as demonstrated by the forum of Cosa, which is bordered on three sides by *atria publica* that anticipate the construction of the basilica (c. 120 BCE) (Brown et al. 1993: 207-45).

The influx of Hellenistic traditions soon rendered the buildings of the republican tradition both inadequate and outdated, an inadequacy that led to the genesis and elaboration of the prototypical basilica. This transformation is evident in the monumental center of Rome in the space of only a few decades, with the identification, attested in Plautus (*Curculio* 1-472; *Captivi* 813-815), of the *atrium Regium* as a basilica. The construction of the Basilica Porcia (184 BCE) and the Basilica Aemilia (179 BCE during the censorship of M. Fulvius Nobilior) soon followed, as did the Basilica Sempronia (169 BCE). All of these building projects conferred both effectiveness and regularity to the Forum Romanum. The complex archaeological research into the first urban *basilicae* seems to demonstrate the gradual architectural development of this typology, which quickly acquires monumentality thanks to the installation of internal arcades erected to delimit wider naves and through the longitudinal axis of the building with respect to the square (Coarelli 1985: 135-66). This collocation may be noted in the several cities of Republican Italy, including Cosa, Alba Fucens, Ardea, and Aquileia, although it must be noted that one of the best known *basilicae* of the late second century BCE, that of Pompeii, opens up on to the city's forum along one of its short sides (Ohr 1991).

The basilica of Pompeii is of great interest for many reasons: it preserves in the substantially intact interior one of the recurrent elements of forum *basilicae*, namely, the *tribunal* (David 1983), which was a high podium (sometimes with columns) where magistrates used to sit during judicial proceedings. The example at Pompeii, furthermore, anticipates with some of its architectonic and planning details the model of basilica that Vitruvius would postulate in the late first century BCE (Gros 1984) when he planned the colony of Fanum Fortunae, an example that remains unknown to archaeology (*Arch*. 5.1.6-10). The isolation of the internal space by means of continuous walls at the expense of the more common arcades and the use of a so-called "colossal" order for the internal colonnade are principal factors of the analogy drawn between Fanum Fortunae and Pompeii. The basilica of Pompeii, however, respects the Vitruvian prescriptions in the organization of the central space and for the presence of the *tribunal* as well. The position of the building is different compared to the forum square and, accordingly, the *tribunal* inside the basilica that in the Vitruvian model is located in relation with an *aedes Augusti* in a quadrangular exedra that opens at the end of the minor, central axis. The pattern of the exedra with judicial, administrative, and/or religious functions will be replicated with success in many *basilicae* starting in the early Imperial period, as demonstrated by the cases of Rusellae, Lucus Feroniae, Iuvanum, Saepinum, Herdonia, and Gnathia as discussed by P. Gros (Gros 2001: 270).

Rooms with apsidal or even more simple quadrangular *exedrae*, very common annexes inside the basilica starting from the early Imperial period, were used as *tribunalia* or as traditional curia (Balty 1991), but, as shown by the Vitruvian basilica with its *aedes Augusti*, they could include inside statues of dynasts ideally destined to protect and guarantee the correct execution of administrative and judiciary activities (cf. also the statuary groups of the *basilicae* of Velleia, Otricoli, and Bologna).

"The basilica is provided with an apse defined as a *tribunal*, a curia, and a sanctuary of Augustus at the same time, it is probably the monument which architecture expresses more effectively

compared to others the new hierarchy of functions imposed by the political structure at the beginning of the Imperial period. No other composition allows us to appreciate better the sense of the evolution of power that took place between the end of the Republic and the beginning of the Empire; the consensus organization that implied an institutional and urban relationship between the sacred and the political at the beginning is now overcome by a subordination of the judiciary to the sacred, where the sacred assumes the forms of the Imperial cult [. . .] This takeover of judiciary (*tribunal*) and administrative (curia) functions under the aegis of power is typical of the monarchical drift of a system in which the local autonomies traditionally recognized by the citizen status have the right to exist only in a restricted and symbolically controlled framework . . .." (Gros 2001: 296-7).

In the meantime, from the final decades of the first century BCE, the *basilicae* that bordered the Forum Romanum were also linked with more or less radical projects dedicated to the Imperial family and their glorification. The Basilica Aemilia, the only one among the more ancient Roman *basilicae* to survive in any measure, which for centuries had celebrated the name of the famous Republican *gens*, had a two level arcade dedicated to Caius and Lucius Caesar added on its facade facing the square in front of the *tabernae novae* (14-2 BCE) (Coarelli 1985: 173-89). This construction replaced arcades that were already present from the previous chronological phases (Coarelli 1985: 201-9). An even more decisive action took place on the southern side of the Forum Romanum that had been partially occupied by the Basilica Sempronia since 169 BCE. It was now removed and replaced by Basilica Iulia, started by Julius Caesar and completed by Augustus; it was thereupon destroyed by fire almost immediately and was therefore rebuilt and rededicated to the emperor's adopted children (12 CE).

The planimetric organization of these two, exceptional urban *basilicae*, numbered among the most beautiful buildings ever built in Rome, was similar and, in clearly emphatic forms, also repeated the common pattern of the basilica type: a wide central room with a major height (*spatium medium*), surrounded by one or more aisles on which could stand galleries or an ambulatory and anticipated by a facade or *porticus* opening toward the forum's square. As building types became progressively more monumental during the Imperial period, an even more radical application of this tendency may be observed in the Basilica Ulpia of the Forum of Trajan (106–113 CE), which was, at the time, the largest basilica ever built with 8,500 m^2 of covered space and five naves (Fig. 1). The main novelty of the Basilica Ulpia is represented by the presence of two apses at the nave's sides, and this pattern will have great fortune into the realization or renovation of some important peripheral *basilicae*, mostly in Africa (e.g., Aquileia, Augusta Raurica, Leptis Magna, Bulla Regia, Sabratha, Volubilis) (Gros 2001: 282-7).

If, as observed, in Rome and in the urban centers of the western Mediterranean, a strict relationship existed between the basilica and the *porticus* (Nünnerich-Asmus 1994), this relationship is not well attested in the eastern provinces of the Roman empire. As a matter of fact, considering, for example, the plans of the *basilicae* of Ephesus and Smyrna, it is difficult to formally distinguish them from the numerous, long *stoai* that usually bordered the civic *agorai*. On the other hand, the three *basilicae* of the *agora* of Corinth, a *colonia libertinorum* that became capital of the Roman province of Achaea under Augustus, are linked to the Western rules.

A "normal" pattern that, applied also to the *basilicae* of other provincial capitals such as Tarragona and Carthage, will have a long life in the West, partially transformed under the influence of the architecture of public baths – *basilicae thermarum* are also well known – and by the need for dynastic propaganda implemented with more and more daring and emphatic forms. In Rome the Basilica of Maxentius (or Basilica Nova) was completed by Constantine I. The great nave, covered by three cross vaults, does not adopt the usual side aisles with columns, but rather employs a system of three large rooms per

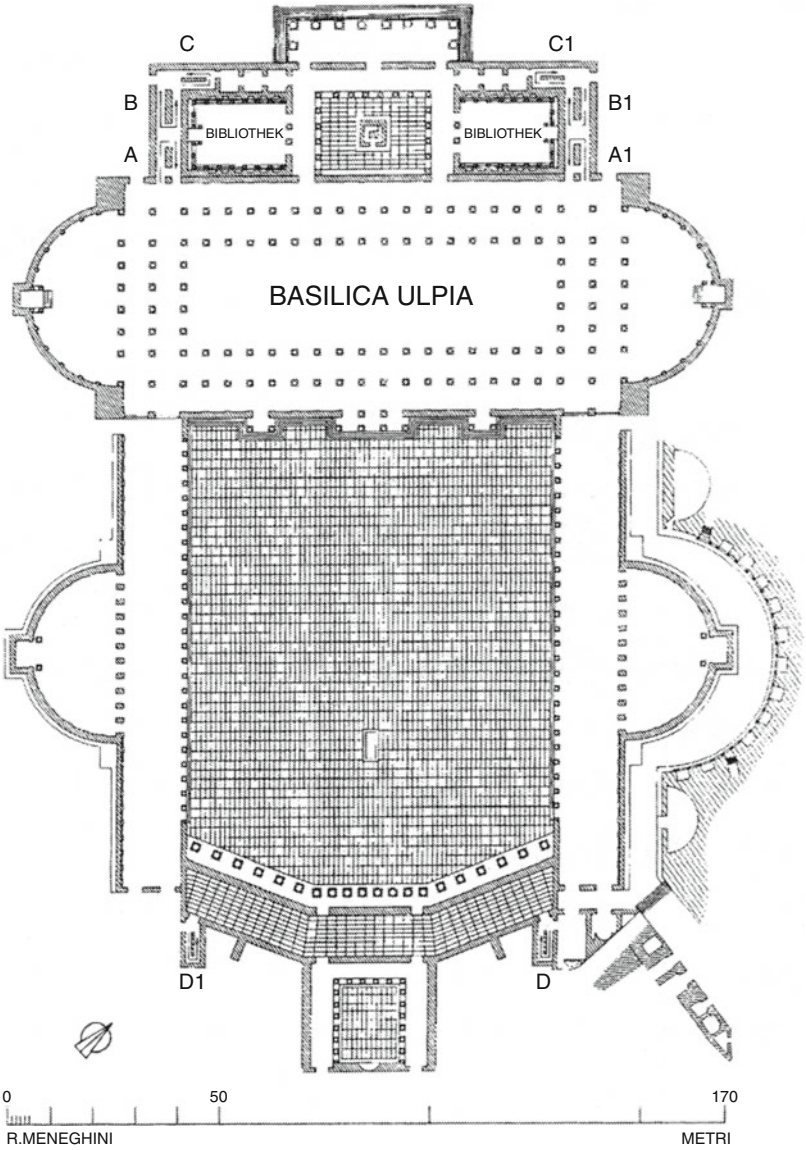

Basilica in Classical Archaeology, Fig. 1 The Basilica Ulpia in the Forum of Trajan (From Gros & Torelli 2007: 227, Fig. 121, with kind permission)

side interconnected and covered by mighty barrel vaults, according to construction indications that resemble closely the colossal rooms of the Imperial baths. The long central room, whose rhythm was quite different from the side rooms, was focused at its western side on an apse that hosted a colossal acrolithic statue of the emperor as Zeus enthroned (the fragments of which are now housed in the Palazzo dei Conservatori of the Capitoline Museums in Rome). This statue, god on earth with his gaze cast *instinctu divinitatis* toward the sky, together with analogous *simulacra* and apses, must have contributed to select the basilica as the ideal building type to celebrate the Christian god as well.

Cross-References

- ▶ Agora in the Greek World
- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman

▶ Forum
▶ Imperial Cult, Roman
▶ Romanization
▶ Stoa
▶ Topography of Rome

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Bass III, William M.

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Basic Biographical Information

Education and Professorships

Dr. William "Bill" Bass (Fig. 1) was born in 1928 and raised in Virginia, receiving a B.A. in Psychology from the University of Virginia and his MS in Anthropology from the University of Kentucky. He had already earned two university teaching positions in departments of anthropology a year and a half prior to completion of his doctorate from the University of Pennsylvania in 1961. These appointments were Instructorships at the Universities of Nebraska and Kansas. Bass's graduate mentors, Drs. Charles Snow and Wilton Krogman, heavily influenced him throughout his career. With the Ph.D., he earned Assistant, Associate, and full Professorships during his tenure at Kansas from 1961 to 1971. He came to the University of Tennessee in 1971 to head the Department of Anthropology and develop a graduate program, remaining chairperson until 1992. Bass became Professor Emeritus in 1998, after 6 years as Professor and Director of the Forensic Anthropology Center.

Major Accomplishments

Bioarchaeology

Dr. Bass guided his student excavation crews during the summers of 1956 through 1959 pioneering the formulation of prehistoric Plains mortuary site archaeology. As the physical anthropologist for the Smithsonian Institution's River Basin Survey, Bass and his students excavated numerous cemetery sites, chiefly in South Dakota at Sully, a protohistoric Extended Coalescent site, Mobridge; a protohistoric Postcontact Coalescent, Le Beau phase site; and

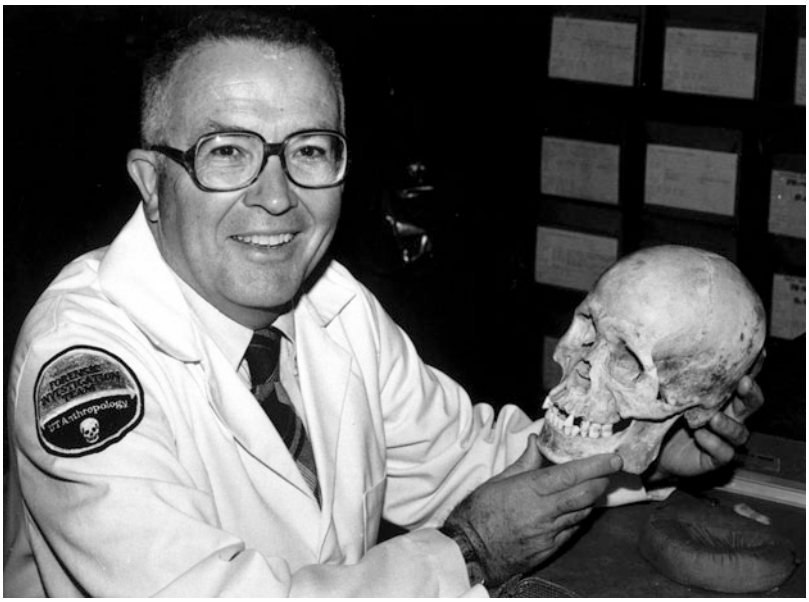

Bass III, William M., Fig. 1 Dr. William M. Bass, III, in the Human Osteology Laboratory at the University of Tennessee, Knoxville, c. 1978

Leavenworth, a historic Arikara site, uncovering hundreds of burials that produced thousands of human skeletons in exquisite states of bone and dental preservation. From 1961 until 1970, Bass was field director for the National Science Foundation and National Geographic Society that serially funded field excavations of prehistoric skeletal remains from the Northern and Central Plains region, particularly, South Dakota.

Half a century of graduate students from Kansas and Tennessee and numerous researchers studied these pristine skeletal collections creating data sets and quantitative and qualitative methods and techniques to answer questions about the Plains people's prehistoric lifeways, from demography to pathology and warfare. Those students, Douglas Ubelaker, Walter Birkby, Richard Jantz, Pat Willey, and Ted Rathbun, to name a few, all continued studying becoming professors of human skeletal biology in both bioarchaeological and forensic contexts. In 1994, Douglas Owsley and Richard Jantz dedicated to Bass an exciting volume, *Skeletal Biology in the Great Plains*, culminating much of these results.

Dr. Bass's interest in bioarchaeology continued at the University of Tennessee where in the late 1970s he and Professor Walter Klippel directed, with US National Park Service funding, the excavation of a large Mississippian cemetery at the Averbuch site in central Tennessee. Similar to the Plains skeletal series, the Averbuch remains of nearly 1,000 skeletons have provided a research base for numerous theses, dissertations, and research articles. A book that Bass initiated during his tenure at Kansas, *Human Osteology, A Laboratory and Field Manual*, now in its 5th edition (Bass 2005), has served as a cornerstone text in the teaching of human osteology at both undergraduate and graduate levels.

Forensic Anthropology

Dr. Bass's initial exposure to forensic anthropology was with Dr. Charles Snow making a positive identification from a burned body, and Drs. Bass and Krogman are the only anthropologists who have examined the remains of the Lindbergh baby. The victim was the 20-month-old son of famed trans-Atlantic aviator Charles A. Lindbergh and his author wife, Anne Morrow Lindbergh. The child was kidnapped from the family home in 1932, and skeletal remains were discovered several months later.

These mentors sparked an interest that Bass formally developed into a graduate curriculum at

the Universities of Kansas and Tennessee. While he performed human identification services in Kansas, a near, full-time shift of interest to forensic anthropology occurred when he became Head of Anthropology at the University of Tennessee. During this transition, Bass realized that academic departments of physical anthropology were producing new professors more rapidly than university positions could support. He also noticed an ever-increasing reliance among the pathologists, medical examiners, and coroners he was consulting with, for a resource with expertise in forensic osteology.

During his first year in Tennessee, Dr. Bass was exposed to several cases where the remains were neither skeletal nor fresh. This contrasted to his work in Kansas where most remains were skeletal. In 1977, the examination of Confederate Civil War Colonel William Shy, a casualty from the 1864 Battle of Nashville (Bass 1997), made a profound impression on Bass; science had no idea how long it took for soft tissues to decompose. Bass turned his research energy to studying soft tissue decomposition, the process of skeletonization, and requested an outdoor laboratory to document the process. By 1980, he began in earnest witnessing decomposition events firsthand with bodies donated from medical examiners. Time since death estimation became a steadfast research focus of a fledgling crop of Bass's graduate students dedicated to understanding this process.

The dual reputation of an engaging and theatrical teaching presence and a burgeoning avant-garde research program deciphering the stages in human decomposition combined to the granting of the prestigious award of National Professor of the Year in 1985 by The Council for Advancement and Support of Education. Subsequent to that recognition, Bass created the Forensic Anthropology Center, an endowed research program in the Department of Anthropology focusing on research in all realms of forensic anthropology, including archaeology and other diverse components of victim decomposition and scene dynamics.

As Dr. Bass's expertise and reputation in understanding decomposition strengthened because of his outdoor laboratory observations at the research "facility," he was summoned to examine more cases and venture estimations of time since death for medicolegal testimony. This prompted more cases, more research, and more students. Virtually everything we now understand about the entomological foundations of decomposition originated from studies initiated at Bass's facility by him and his students. Besides a comprehensive understanding of how temperature guides gross decomposition events, soft tissue histology from organ biopsy has been examined during the decomposition process along with soil and odor biochemistry and situational scenarios with burial, body position, clothing, coverings, fabric variety, trace evidence, cadaver dog exposure, and water submersion. In 1994, a symposium in honor of Dr. Bass was presented by his students at the American Academy of Forensic Sciences meeting, and the following year those papers were published in a special volume (see References).

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ Ethics and Human Remains
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains in Museums
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ North American Plains: Geography and Culture
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

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Bass, George Fletcher

Cemal Pulak
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Basic Biographical Information

George F. Bass was born in Columbia, South Carolina, on 9 December 1932. He graduated from The Johns Hopkins University in 1955 with an M.A. in Near Eastern archaeology and attended the American School of Classical Studies at Athens, Greece, between 1955 and 1957. During that time he participated in preclassical excavations at Lerna in Greece and Gordion in Turkey. After serving in the US Army as a lieutenant in South Korea (1957–1959), he began doctoral studies in classical archaeology at the University of Pennsylvania.

In 1960, at the request of his department chairman, Rodney Young, Bass learned to dive prior to excavating a Bronze Age shipwreck of around 1200 BCE reported by journalist Peter Throckmorton off Cape Gelidonya, Turkey. That summer, with Throckmorton, Bass directed the excavation of the wreck, the first ancient wreck excavated in its entirety on the seabed and the first excavated and published by a diving archaeologist. With this excavation, Bass set the example for future underwater archaeological research by demonstrating that shipwrecks could be recorded and excavated to the same rigorous archaeological standards applied to terrestrial sites. Based on the ship's cargo of scrap bronze, and copper and tin ingots, Bass concluded that the ship was Canaanite in origin and that the role of Bronze Age Near Eastern seafarers had gone mostly unnoticed because their trade goods consisted primarily of raw materials, which left no trace in the archaeological record, because on arrival they were soon manufactured into artifacts characteristic of the importing cultures – a view now widely accepted, but radical for its time.

While excavating a seventh-century CE Byzantine wreck (1961–1964) and a fourth-century CE Late Roman wreck (1967–1969) at Yassıada, Turkey, Bass implemented new techniques and tools, including an underwater telephone booth, a submersible decompression chamber without surface support, and a method of mapping shipwrecks by stereophotogrammetry. In 1964, he launched the two-person *Asherah*, the first commercially built research submersible in the United States.

In 1964, Bass received his doctorate from the University of Pennsylvania and joined its faculty. In 1967, Bass's team was the first to locate an ancient shipwreck, with side-scan sonar, a second or first century BCE Hellenistic wreck near Yalıkavak, Turkey. He assisted the excavations of a Bronze Age city on Santorini, Greece, in 1968; spent a sabbatical year at the University of Cambridge (1969–1970); and in 1971 excavated a preclassical site in southern Italy, his last terrestrial excavation.

In 1973, Bass resigned from the University of Pennsylvania to form an institution devoted to the exploration and study of underwater cultural heritage, the American Institute of Nautical Archaeology (AINA). AINA's first field project was a Turkish-coastal survey that located a dozen ancient shipwrecks. In 1976, Bass affiliated AINA with Texas A&M University, which started a graduate program in nautical archaeology, a new branch of archaeology that has achieved academic recognition largely through his and his colleagues' work. A Distinguished Professor Emeritus at Texas A&M since 2000, Bass directed the Nautical Archaeology Program (NAP) until 1993. AINA – renamed the Institute of Nautical Archaeology (INA) in 1979 – became world-renowned by conducting underwater research on four continents.

In 2000, INA added a research and conservation center in Bodrum, Turkey.

In the 1970s, Bass initiated the excavations of two shipwrecks of the American War of Independence: the American privateer *Defence* in Penobscot Bay, Maine, and the British "Cornwallis Cave Wreck" in the York River, Virginia, before turning the excavations over to other scholars. He was no less active in the Caribbean, initiating surveys and excavations in Jamaica and the Turks and the Caicos Islands, all of which he turned over to colleagues and students.

Between 1977 and 1979, Bass excavated an eleventh-century CE shipwreck at Serçe Limanı, Turkey, which was then the earliest known wooden hull built according to modern construction methods. In 1979, INA purchased the 65-ft, steel-hulled *Virazon*, which Bass had taken to Turkey on loan from the US Navy in 1964, and outfitted it with a recompression chamber and equipment for underwater surveys and excavations.

In 1984, Bass began the deepest large-scale excavation ever conducted under water, of a Bronze Age ship lost around 1300 BCE at Uluburun, Turkey. Its cargo of raw materials and personal possessions provided further evidence for Bass' theory of Bronze Age Near Eastern traders that he had proposed in his book on the Cape Gelidonya wreck. In 1985, Bass turned over the Uluburun excavation to another of his students.

Bass codirected with former students the excavations of the fifth-century BCE Tektaş Burnu wreck (1999–2001) and the sixth-century BCE Pabuç Burnu wreck (2002–2003) in Turkey. During that time, INA acquired a two-person submersible of revolutionary design, *Carolyn*, and built a 45-ft catamaran to support it in its successful surveys.

Major Accomplishments

Bass has been widely recognized for his significant achievements and contributions to the field of nautical archaeology. He has been awarded the Archaeological Institute of America's Gold Medal for Distinguished Archaeological Achievement (1986), the Explorers Club's Lowell Thomas Award (1986), the National Geographic Society's La Gorce Gold Medal (1979) and its Centennial Award (1988), the J.C. Harrington Medal from The Society for Historical Archaeology (1999), and the Historical Diving Society's Pioneer Award (2006). In 2002, President George W. Bush presented Bass with the National Medal of Science. The Archaeological Institute of America established a lecture series in his honor and presented him with the Bandelier Award for Service to Archaeology (2011); he was elected a fellow of the American Academy of Arts and Sciences in 2012. Bass received honorary doctorates from Boğaziçi University in Istanbul (1987) and the University of Liverpool (1998).

Bass has written, coauthored, and edited eleven books; published more than 200 scholarly and popular articles; and lectured around the world. His books include *Archaeology Under Water* (1966), *A History of Seafaring Based on Underwater Archaeology* (1973), *Archaeology Beneath the Sea* (1975), *Yassı Ada I: A Seventh-Century Byzantine Shipwreck* (1982), *Ships and Shipwrecks of the Americas* (1988), *Beneath the Seven Seas: Adventures with the Institute of Nautical Archaeology* (2005), *Serçe Limanı* I*: An Eleventh-Century Shipwreck* (2004), *Serçe Limanı* II*: The Glass of an Eleventh-Century Shipwreck* (2009), and *Archaeologist Beneath the Sea* (2012).

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- ▶ Frost, Honor
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Throckmorton, Peter

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Bates, William Brian (Badger)

Christopher Wilson
Yunggorendi First Nations Centre, Flinders University, Adelaide, SA, Australia

Basic Biographical Information

William Brian (aka "Badger") Bates was born in 1947 at Wilcannia, New South Wales (NSW). His mother Emily Clark (c. 1925) was the youngest daughter of Annie Moysey, a Kurnu Paakantyi matriarch from the Louth area. His stepfather Gilbert Bates was from Yancannia in the Mutawintji area, and his biological father was Mick "Stinger" Hornell, a nonindigenous man from White Cliffs, NSW. Bates is an Elder of the Paakantyi group from the Paaka or Darling River between Wentworth and Bourke. His closest association is with the Kurnu Paakantyi country between Wilcannia and Bourke including the Darling and Warrego River junction, the lower Paroo River, and Mutawintji. He was raised by his extended family, and his main cultural educator was grandmother Granny Moysey, with whom he traveled his country, learning language, history, and culture. At the age of eight, his grandmother began to teach him how to carve emu eggs and make wooden artifacts which later became part of his artistic repertoire.

He worked as an Aboriginal Sites Officer with the National Parks and Wildlife Services, Broken Hill, NSW, for 22 years (1983–2005) until the age of 59, when he retired to focus on art and his role as a cultural heritage advisor full time. Badger worked with many Australian archaeologists including Peter Clark and Allen Thorne (Mungo National Park); Dan Witter, Jeanette Hope, Harvey Johnson, and Sarah Martin (National Parks Regional Archaeologists); Colin Pardoe (Lake Victoria Project); Ben Gunn (Mutawintji rock art projects); as well as Simon Holdaway and Trish Fanning on the Western NSW Archaeological Project. Badger's cultural knowledge was vital for understanding Australian archaeology particularly the process for cooking in heat-retainer ovens and eating marrow from kangaroo tail cooked in ashes for which archaeologists began to realize why kangaroo bones were broken into small pieces in some sites. Badger has attended and spoken at many national and international conferences, including ICOMOS and Indigenous Land Conferences where he presented papers in Mutawintji. He continues to campaign for more substantial involvement of Aboriginal people in the management of National Parks and Reserves throughout Western NSW.

Bates is regarded as both a traditional and contemporary indigenous artist who is well known nationally for his carving and linoprint (Fig. 1). Bates works in a variety of media including wood, stone, lino, metal, and found objects and produces themes that include anthropological, archaeological, and political references associated with his cultural attachment to the Darling, lower Paroo, and lower Warrego Rivers. His artwork is an extension of indigenous oral traditions, and his work shares important knowledge about ceremonial and mythological places, traditional life ways, stories about the ancestral spirits, as well as contemporary issues such as the degradation of the Darling River and Stolen Generations issues (see Fig. 2). As an arts educator, Bates has held several roles while teaching linocut, sculpture, and carving including TAFE lecturer at Wilcannia; outback field trip mentor for the College of Fine Arts, University of New South Wales; artist's residency at Wilcannia Arts

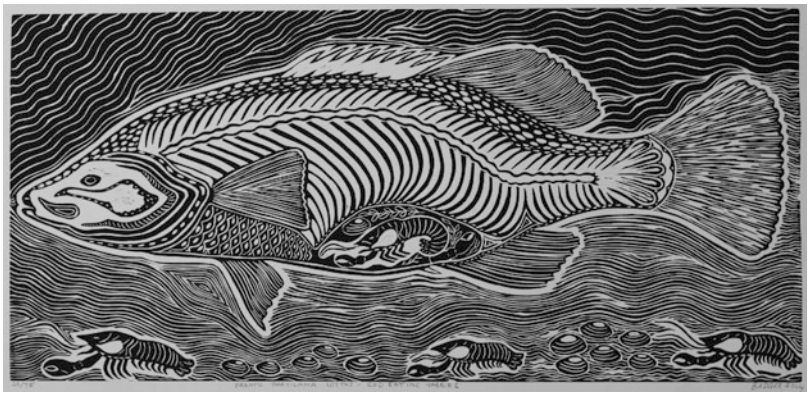

Bates, William Brian (Badger), Fig. 1 Parntu Thayilana Wiithi – cod-eating yabbies, Linocut print 2004

Bates, William Brian (Badger), Fig. 2 Stone Sculpture – Stolen Generations Memorial, Mt Annan, Sydney, 2007

Community in 2006 and 2007; and mentor for the River Red Gum art project, NSW, in 2011.

Bates has been heavily involved in activism, education, archaeology, and cultural heritage management in Australia. He successfully campaigned on behalf of indigenous land rights and the protection of significant sites against unacceptable management, spoilage by mining, agricultural practices, and urban expansion. This included the Mutawintji National Park hand back.

Major Accomplishments

Contributions to Archaeology

During his extensive period working as an Aboriginal Sites Officer for the National Parks and Wildlife Services, NSW, for 22 years (1983–2005), Badger was heavily involved in indigenous cultural heritage management and archaeology within this region. This included ongoing protection and management of many cultural and archaeological sites in Western NSW (i.e., burials and middens at Lake Victoria and Menindee Lakes; rock art sites at Mutawintji, Sturts Meadows, and Peery; and, stone quarries, open sites, and stone arrangements at Tibooburra), and he campaigned against unacceptable management practices and lack of indigenous involvement at Mutawintji National Park between 1983 and 1998 (Fig. 2). Badger was also instrumental in the controversial return of "Mungo Girl" from ANU, after the Paakantyi, Ngiyampaa, and Muthi Muthi elders sent him to Canberra to support their case in 1992 (Fig. 3). Furthermore, he was a cultural educator, providing education and training to archaeologists and other community members about the cultural and spiritual dimensions of archaeological materials and country (see Fig. 3).

Bates, William Brian (Badger), Fig. 3 Badger at a canoe scar cut out by his grandmother Granny Moysey c. 1922, Wilcannia

Selected Art Exhibitions

2010 Museum of Contemporary Art, Sydney, "*In The Balance: Art for a Changing World*." Badger exhibited three linocut prints as part of a group exhibition.

2009 "Tin Huts, Grilled Fish, and Johnny Cakes," solo exhibition of linocut prints, wooden, metal, and found object sculptures. Mildura Regional Gallery.

2009 and touring till 2012 Objects Gallery and Australian Museum exhibition "Menagerie, Animal Sculptures by Aboriginal and Torres Strait Islander Artists." Badger contributed 3 sculptures.

2008 "Life on the Darling" exhibition of Badger's linocut prints and sculptures, together with paintings of other Wilcannia artists Phillip Bates, Murray Butcher, and Willy Hunter, Australian Museum, Sydney.

2007 "*Bubbles on the Surface II*" at Monash University Gippsland Campus, solo exhibition featuring Badger's recent linocut prints and wooden sculptures.

2005 Solo exhibition of 20 linocut prints, Hazelhurst Regional Gallery and Arts Centre, Gymea, Sydney.

2004 "Wilcannia Mission School Kid," inaugural solo exhibition for the opening of the relocated Broken Hill Regional Art Gallery, Sully's Building, featuring linocut prints, wood, and steel sculptures.

2009 "Marella : The Hidden Mission." Badger contributed 3 linocut prints.

2009 Wilcannia Artists in Residence and Community Artists. Exhibition of the eight artists and community participants of the 3-year program. Broken Hill Regional Gallery.

2008 "Bubbles on the Surface III" Exhibition, Switchback Gallery, Monash Gippsland, featuring work of Badger Bates and Treanha Hamm, with Daphne Wallace and Chrissie Joy Marshall. Badger contributed 23 works, including linocut and photopolymer prints and embossings, wooden sculptures, and metal sculptures.

2006 New England Regional Art Museum (NERAM) exhibition *"Bubbles on the Surface I"* with Daphne Wallace, focusing on indigenous artists interpreting their association with water, in this case the Narran River and Narran Lake and the Darling River.

2005 "First People: First State," an exhibition of NSW Indigenous Art, NSW Parliament House, Sydney, with other NSW indigenous artists

Prizes and Awards

- Finalist in the NSW Indigenous Art Prize in 2012, Telstra Art Award
- Finalist in the Inaugural NSW Indigenous Art Prize in 2005
- Murdi Paaki Regional Council Citizen of the Year 2003
- Murdi Paaki Regional Council Community Service Award 1997 in for Outstanding Services to Heritage and Culture
- NSW National Parks Aboriginal Heritage Achievement Award 1993

Cross-References

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- ▶ Australia: Indigenous Cultural Property Return
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Ethnoarchaeology
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Intangible Cultural Heritage

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Baths and Bathing, Greek

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Introduction

Across time and in every culture, bathing is a primal necessity, and the bathing techniques and practices of a culture are revealing for its social concepts, values, and ideas. Thus, the analysis of bathing culture in Greek societies from the Archaic through Hellenistic periods (c. sixth to first century BCE) gives intriguing insights into changing attitudes towards key issues such as cleanliness, purity, leisure, collective pleasure, and enjoyment.

The evidence of Greek bathing culture includes three different sources:

1. Bathing images that are mainly represented on vases from sixth to fifth century BCE Athens and also on some South Italian vases of the fourth century BCE. These images show either nude young women or nude young men washing their entire body at high pedestal basins (*louteria*). Genders are strictly separated in these scenes, but bathing is still performed predominantly collectively, in groups of 2–5 persons. This corpus of bathing images is unique in the ancient Mediterranean world, and in its highly standardized imagery also has no parallel in any later cultures. While many aspects of these images are debated, it is obvious that they served primarily to display perfectly beautiful, well-groomed nude bodies in an intriguing variety of poses and did not faithfully depict contemporary bathing practices and facilities. Even as largely fictional representations, the bathing images were clearly shaped by and in turn reinforced and reflected contemporary social concepts of beauty, body, and gender (Kreilinger 2007; Stähli 2013).
2. Literary, epigraphic, and papyrological texts from different regions of the Mediterranean.

Some date to the fifth to first centuries BCE and others come from the Roman Imperial period, but cite earlier authors or clearly refer to earlier periods. While the texts are scanty overall and heterogeneous in date, genre, and provenance and offer no detailed description of a visit to Greek baths, they can be exploited for important information about the reputation, use, and management of baths, as well as related topics such as concepts of cleanliness.

3. Archaeological remains of over 200 bathing facilities from the fifth century BCE onwards that are located across the entire Mediterranean. These remains are by far the most important and conclusive evidence for an assessment of Greek bathing culture and will be the main focus in the following.

Definition

Greek societies washed and bathed regularly for ritual-cultic purification, personal hygiene, and relaxation and recreation. While purifying ablutions and simple cleansing required only cold water and could be performed in natural bodies of water or at simple basins, thorough cleansing and particularly relaxing bathing practices entailed the development of purpose-built bathing facilities, including a sophisticated technology to heat water and spaces. How Greek bathing facilities can be clearly distinguished from that of other ancient Mediterranean cultures (e.g., Etruscan, Punic, Roman) is debated; identification is mainly based on date (above all fifth to first century BCE), context (e.g., Greek city, Greek sanctuary, Greek *gymnasion*), and bathing program (see below).

"Greek" bathing facilities were mainly found in three different contexts:

1. Houses and royal palaces, which provided mostly single rooms for individual bathing and rarely more extended bath suites for collective bathing. Bathing forms employed mainly hot water and occasionally hot air to induce sweating. Comprehensive statistics cannot be provided for this vast category, because standards varied widely between different cities. Thus, while in Olynthos (northern Greece, 432–348 BCE) about 27 % of the known 86 houses had their own bathing room, in Delos (Cycladic island, 167/166–69 BCE) this standard was only provided in about 14 % of the known 89 houses. In general it is obvious that a private purpose-built room for bathing was always a luxury and never became standard in the Greek world (Trümper 2010).
2. Sports facilities (*gymnasia*/*palaistrai*) that provided single rooms for collective bathing and sometimes more extended bathing facilities. The default bathing form consisted of simple basins for washing with cold water; these were occasionally complemented by pools for collective cold plunge baths. By contrast, hot bathing was only rarely and tentatively introduced and exclusively in the form of sweat baths. Bathing facilities were most likely a standard of sports facilities, because athletes had to clean themselves after training. However, of the 22 Greek *gymnasia* that are partially or fully excavated, only 13 so far have yielded evidence of bathing facilities (Delorme 1960; von den Hoff 2009; Trümper 2013a).
3. Independent publicly accessible baths ("public" baths, *balaneia*) which offered a broad variety from single to multiple collective bathing facilities, always including bathing forms with hot water and, much more rarely, hot air for sweating. By contrast, cold water was used for washing hands and feet and only exceptionally for immersion baths. While the "public" baths were mostly freestanding buildings, they could also be incorporated in larger building complexes, albeit always as self-contained, independently accessible units. Most of them were built in urban or suburban contexts, with the exception of four examples in extraurban sanctuaries, among them most prominently the sanctuary of Zeus in Olympia. Currently, 70 "public" baths are known from the entire Mediterranean, 39 of which were discovered in the southeastern Mediterranean (Libya, Cyprus, and mostly Egypt),

22 in the northeastern Mediterranean (Turkey, and mostly Greece), and nine in the western Mediterranean (mostly Sicily and South Italy) (Trümper 2006, 2009; Lucore & Trümper 2013).

The "public" baths, built exclusively for the purpose of bathing, offer the best evidence for reconstructing the development and crucial changes of bathing standards. House owners strove to emulate the standards and innovations of "public" bathing culture, whereas bathing facilities in *gymnasia* developed largely independently, obviously for sociocultural reasons. According to literary sources, hot baths had a somewhat dubious reputation, at least in fifth and fourth century BCE Athens, because they would destroy the morals and bodies of bathers, most notably young men, who were supposed to devote their day to exercising in the *gymnasion* instead of to idle chatter in the *balaneion* (especially Aristophanes, *Nubes 1046, 1053-1054;* see also Plutarch, *Demetrius 24.2-3;* Athenaeus, *Deipnosophistae 1.18c;* Trümper 2013b).

Historical Background

Literary sources from the second century CE refer to the existence of *balaneia* ("public" baths) in Sybaris (Greek colony in South Italy) at the end of the sixth century BCE (Athenaeus, *Deipnosophistae* 12.518 c). This may be an anachronism, however, because Sybaris was notorious for its wealth and luxurious lifestyle, of which public hot baths obviously constituted an indispensable part for an author of the Roman Imperial period. The earliest archaeological remains date only to the fifth century BCE. The earliest *balaneion* so far was discovered in Athens outside the city wall near the Dipylon Gate. It has been dated to the period when the city and particularly its fortifications were rebuilt after the Persian wars (after 480/479 BCE). Slightly later, around 400 BCE, the most famous sanctuary of the Greek world, that of Zeus in Olympia, was provided with its first *balaneion* for the convenience of the visitors (see below). At the end of the fifth century BCE, private bathrooms are testified to in some houses, such as the houses of Olynthos, which were, on average, large and well appointed (Trümper 2010).

When cities and sanctuaries were gradually monumentalized and provided with standard building programs from the fourth century BCE onwards, the number of bathing facilities increased. Thus, ten of the 70 *balaneia* were constructed in the fourth century BCE, in Greece, Asia Minor (Turkey), and a Greek colony in France (Marseille). At the same time, *gymnasia* appeared as monumental edifices with simple cold water bathing facilities (Delorme 1960; von den Hoff 2009; Trümper 2013a).

The revolution of Greek bathing culture occurred in the Hellenistic period (end of fourth century to 31 BCE), however, both in terms of quantity and quality. Thus, most of the known *gymnasia* and particularly 59 of the 70 known *balaneia* were built in this period, in settlements all over the Mediterranean. Furthermore, innovative concepts and standards of bathing were introduced in all different urban-architectural contexts (see below). This agrees well with general sociocultural trends of the Hellenistic period, notably a significant increase in the dissemination and refinement of urban culture; a new focus on individual well-being, pleasure, and luxury; and major advances in the fields of science, technology, as well as architecture and urban planning. While most of the Hellenistic societies were affected by these same trends, distinct bathing practices developed in different regions of the Mediterranean. Three different regions can be discerned: the western, northeastern, and southeastern Mediterranean (Trümper 2006, 2009). Regional diversity was most likely due to different traditions, behaviors, and norms in societies that were now often multiethnic and multicultural. For example, Greek settlers that were invited by the new Greek rulers (Ptolemies, 306–31 BCE) to settle in recently conquered Egypt brought their own bathing practices, and Greek *balaneia* appeared all over Egypt from the third century BCE onwards. According to written sources, indigenous people also frequented these

Greek baths and may have had significant impact on the development of an idiosyncratic Graeco-Egyptian bathing culture (see below).

Despite the significant changes in bathing culture from the fifth through first century BCE, the important feature of patronage did not alter during this period. Written sources confirm that *balaneia* were predominantly, if not exclusively, privately owned and managed as profitable business investments (e.g., IG 2^3 84, 418/417 BCE; IG 2^2 2495, 335/334 BCE; ID 98, B, 33–34, 377/376–374/373 BCE; Isaeus, *Dikaiogenes* 22–24; Isaeus, *Philoktemon* 33; for references in Ptolemaic papyri, see Préaux 1947: 44). They did not figure among the standard building tasks of cities, such as political-administrative buildings, theaters, and *gymnasia*, nor were they popular targets for generous donors before the first century BCE. Exceptions were probably the few baths in sanctuaries that were under the responsibility and supervision of the respective administrations (see especially the *diagramma* of Andania, IG 5,1 1390, lines 106–111, 91/90 BCE or first century CE). Thus, the "public" aspect of most *balaneia* refers to their accessibility – publicly accessible for entrance fees – and not to their patronage, ownership, or management. By contrast, *gymnasia*, including their bathing facilities, were commonly financed by the cities and were the preferred objectives of private benefactors from the second century BCE onwards.

Key Issues/Current Debates

Greek bathing culture was first studied comprehensively and masterfully by the French scholar René Ginouvès (1962). Although the archaeological evidence has almost doubled since 1962 and research questions have changed significantly, Greek bathing culture did not receive much attention, particularly in comparison to the more popular Roman equivalent. Instead, it has long been underestimated in its significance, both for the ancient Greek world and in modern scholarship, notably cultural and sociohistorical studies.

This changed only recently, with the reexamination and excavation of numerous Greek baths (e.g., Caulonia, Locri Epizefiri, Morgantina, and Velia in Italy; Hephaistia, Olympia, Pella, and Thessaloniki in Greece; Buto/Tell el-Fara'in, Euhemeria/Quasr el-Banat, Karnak, Kom el-Khamsin, Krokodilopolis/Medinet el-Fayoum, Schedia, Taposiris Magna/Abusir, and Theadelphia/Kharabet Ihrit in Egypt) and with the first international conference dedicated to this topic, which took place in Rome in 2010 (Lucore & Trümper 2013).

Greek baths are now explored as important evidence of sociocultural concepts, practices, and traditions. A key concern is to carefully reconstruct all bathing practices and standards, their social significance, and the technologies and resources they required. Major emphasis is placed on chronological development and regional differences and the political, social, and cultural factors that may have affected and inspired changes and diversity. This reassessment of Greek bathing culture is based on new excavations that employ modern methods and technologies, a critical reevaluation of old excavations, and extensive cross-cultural studies, notably comparisons with societies whose bathing culture is well known and thus may give crucial insights into the sociocultural complexity and intricate connotations of bathing.

Balaneia ("Public" Baths)

Balaneia in the Northeastern Mediterranean

The development of Greek bathing culture can be demonstrated exemplarily in the sanctuary of Zeus in Olympia, which was provided, from about 400 BCE onwards, with a sequence of *balaneia* that were constantly refurbished and modernized. The first *balaneion* ("Older Sitzbath"), built around 400 BCE, included only one bathing form, notably 11 small hip-bathtubs (or sitz bathtubs) for simple cleansing shower baths (Fig. 1). Warm water was poured over the sitting bather with vessels, either by the bather or by an attendant; the used water was then collected in a hemispherical cavity at the bottom of the bathtub and had to be bailed out by hand. While hip-bathtubs were arranged in Olympia along the walls of a rectangular room (II), in other baths round bathing rooms (*tholoi*) predominated.

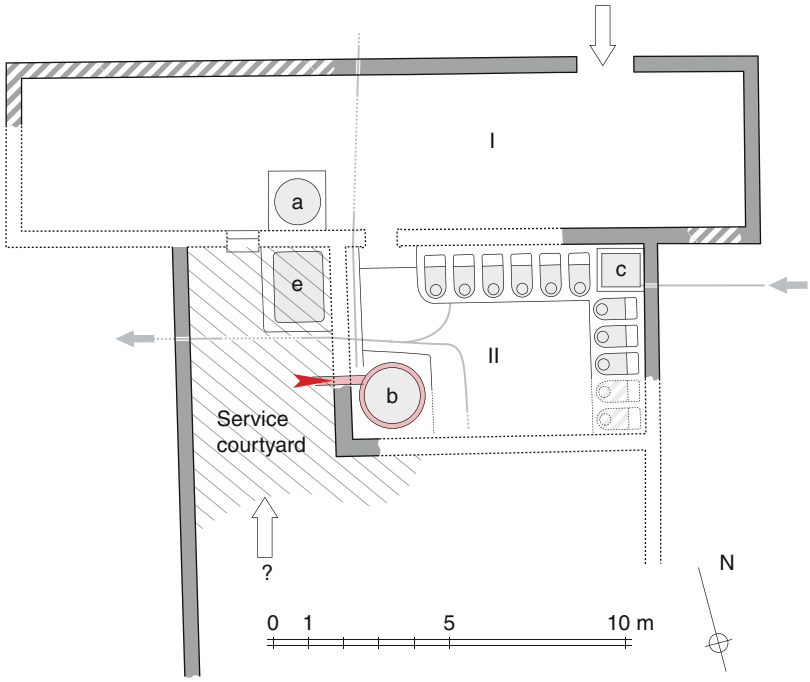

Baths and Bathing, Greek, Fig. 1 Olympia, "Older Sitzbath": plan of the second phase, late fourth century BCE; © Thibaud Fournet (After Kunze & Schleif 1944: pl. 13)

Although the bathing process was performed individually, the lack of walls or screens between bathtubs assured that bathing in a *balaneion* was overall a collective experience. Better preserved baths show that niches were inserted in the walls above bathtubs for storing clothes, bathing utensils, and occasionally oil lamps. Furthermore, bathing rooms were, in general, decorated with waterproof pavements, stucco, and furniture. The Olympian bathroom, probably from the beginning and certainly after a remodeling in the late fourth century BCE, had a cauldron for heating water, which was operated and supplied from an adjacent service courtyard (with water reservoir e). While the function of the large entrance hall (I, with well a) that was taken over from a previous building cannot be safely identified, it may have been used for activities related to bathing (strolling, waiting, light exercise, drinking water supply).

This first bath was replaced by another ("Younger Sitzbath") around 300 BCE (Fig. 2), which provided essentially the same bathing standard as its predecessor, albeit with increased capacity (room III with 20 hip-bathtubs), multifunctional lounges (I, II), and improved service installations. The latter were now located outside the bathing room, but adjacent to it (furnace with boiler in h, water reservoir f) so that hot water was conveniently available through an opening between furnace and bathing room. These key elements – a room with hip-bathtubs and, well separated from this, service facilities for storing and heating water – constituted the standard of all *balaneia* from the fourth century BCE onwards. These baths were simple and mostly functional in design and decoration. Most challenging was the roofing of round rooms, whose interior diameter could be about 11 m (c. 40 hip-bathtubs). In this case, a central support was required, evidence of which in the form of bases was found in several baths (e.g., in Athens: Dipylon Bath, Baths outside the Piraeus and Diochares Gates). Some fourth century BCE baths in Greece, however, had lavish decoration with polychrome figured pebble mosaics in bathrooms or entrance rooms suggesting that this building type had gained in prestige and importance (e.g., Ambrakia; Athens, Bath outside Diochares Gate; Corinth, Centaur Bath; Piraeus, Serangeion Bath). Another innovation of fourth century BCE baths was the duplication

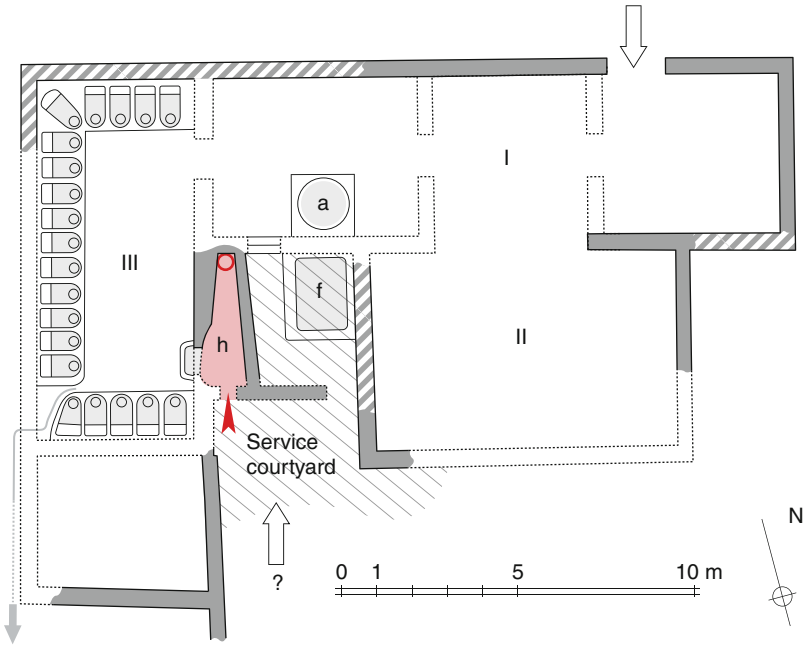

Baths and Bathing, Greek, Fig. 2 Olympia, "Younger Sitzbath": plan, c. 300 BCE; © Thibaud Fournet (After Kunze & Schleif 1944: pl. 16)

of bathing rooms with hip-bathtubs (mostly two *tholoi*; e.g., Ambrakia; possibly Piraeus, Serangeion Bath), which were most likely designed for use by the different sexes. Written sources testify that women frequented *balaneia* and that gender separation was a major concern. Some papyri from third century BCE Egypt mention a women's *tholos* and possibly also a men's *tholos*, suggesting that baths with double *tholoi* reserved one round bathing room for each of the sexes (Ginouvès 1962: 222–3; Meyer 1992; Trümper 2012). By contrast, if *balaneia* with single bathing rooms were used by both sexes, gender separation could only have been achieved through different bathing hours.

The simple functional *balaneion*, introduced in the fifth century BCE at the latest and consolidated and partially refined in the fourth century BCE, was continuously used through the first century BCE and in some regions even beyond that date. At the same time, a significant change in bathing standards occurred in the Hellenistic period, from the third century BCE onwards, with the introduction of new relaxing bathing forms. Cross-cultural studies on bathing clearly show that two criteria are considered as standard for relaxing bathing: heat and time. This means that a certain amount of time has to be spent in a comfortably warm or even hot environment that consists commonly of water, dry heat, or steam. All relaxing bathing forms also have a physically cleansing component, through the use of water or sweating. Relaxing bathing forms are thus not a real antipode to merely cleansing ones, but include and thereby substitute for them. In Greek bathing culture, the new relaxing bathing forms entailed and required advanced technology, increased monetary expense, and, above all, a collective societal endorsement of leisure, pleasure, and indulgence. They would most likely have enticed people to extend their visits to the baths and would have increased the importance of bathing as a social event.

To return to Olympia, shortly before its abandonment in the first quarter of the second century BCE, the "Younger Sitzbath" was provided with such a new relaxing bathing form, whose nature cannot be safely determined, but which was heated with hot air that circulated in a subterranean channel (hypocaust system) (Fig. 3: IV, i, supplied by new water reservoir g). The successor of this bath ("Late Hellenistic Bath"), built in the second half of the second century BCE, incorporated fully developed modern standards (Fig. 4): a – still predominant – *tholos* with 13

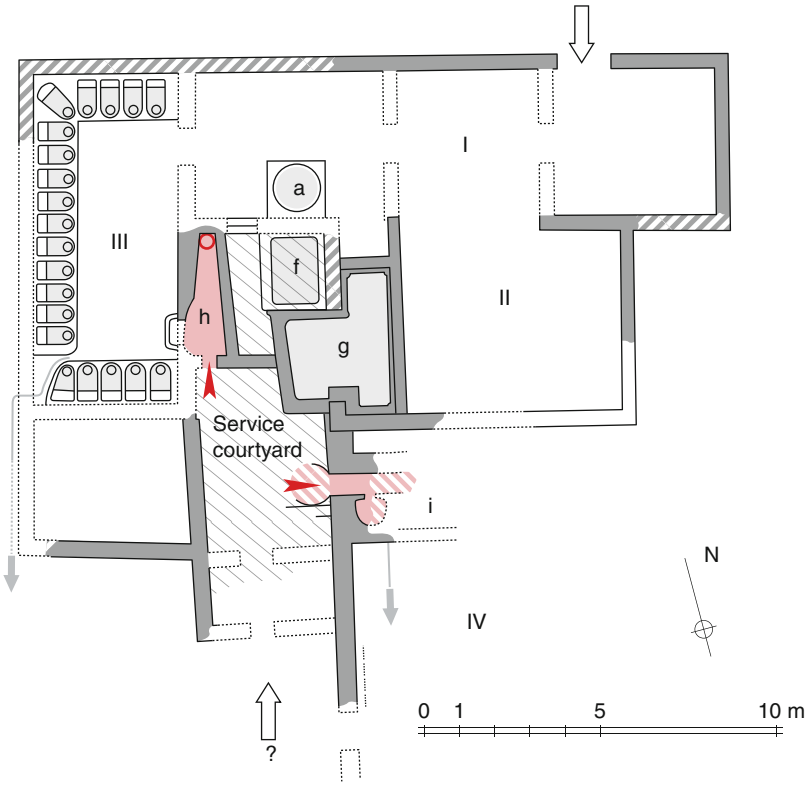

Baths and Bathing, Greek, Fig. 3 Olympia, "Younger Sitzbath": plan, c. early second century BCE; © Thibaud Fournet (After Kunze & Schleif 1944: pls. 16-17)

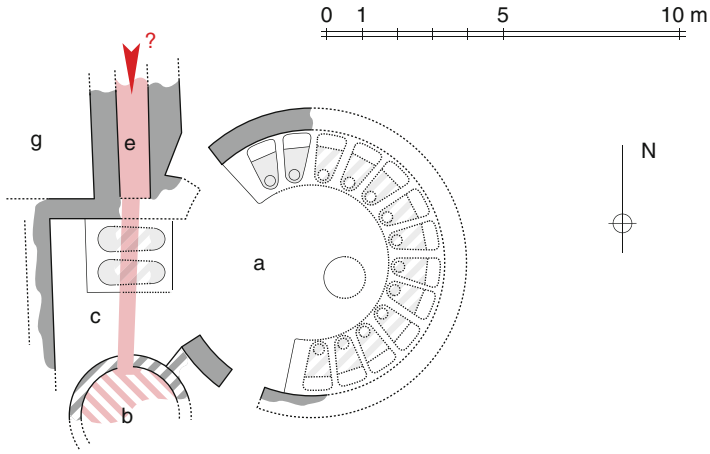

Baths and Bathing, Greek, Fig. 4 Olympia, "Late Hellenistic Bath": plan, second half of second century BCE; © Thibaud Fournet (After Sinn et al. 2003: 619, Figs. 4-5)

hip-bathtubs (a), two large bathtubs for individual relaxing immersion baths in hot water (c), and a small round room for collective sweat bathing in hot air (b). The two new bathing forms were heated by a sophisticated hypocaust system (e) that also provided hot water for the hip-bathtubs.

Several other baths in Greece offered a similarly complex bathing program, among them the fully excavated example in the sanctuary of Asklepios in Gortys (Peloponnesus) (Ginouvès 1959) (Fig. 5). Although this bath was, probably in the second century BCE, inserted into a preexisting building with a

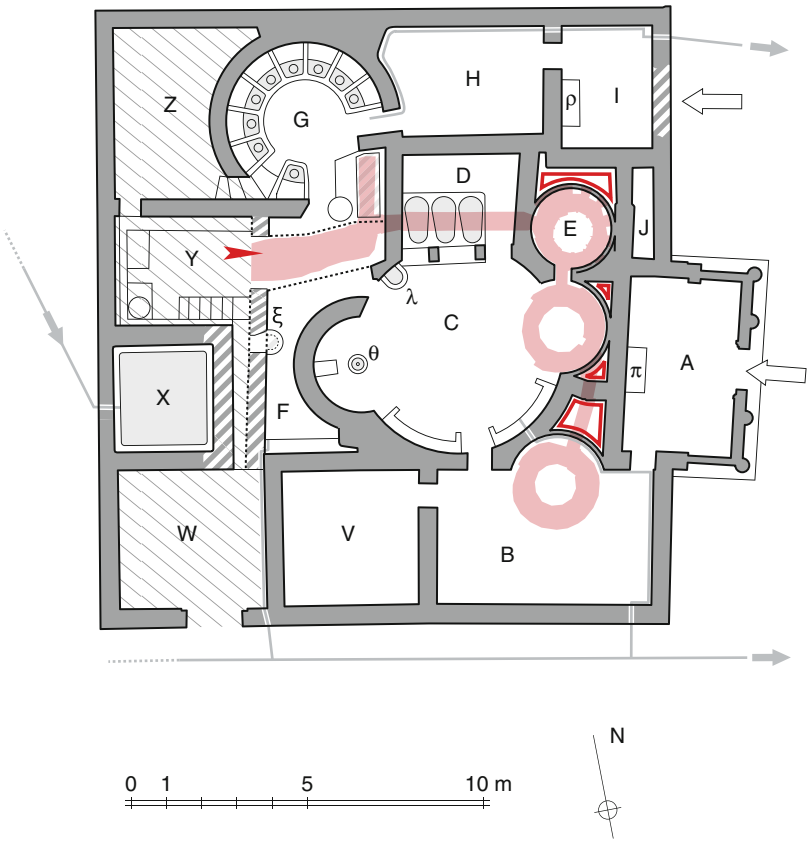

Baths and Bathing, Greek, Fig. 5 Gortys, Bath in the Sanctuary of Asklepios: plan, c. second century BCE; © Thibaud Fournet (After Ginouvès1959: 165, Fig. 187)

different function, its design represents key elements of the new standard: a clear separation of bathing (A–F, V) and service (W–Z) sections; a lavish colonnaded entrance (*propylon* A); a *tholos* (G) with nine hip-bathtubs; a room (D) with three individual immersion bathtubs; a small round collective sweat bath for about four bathers (E); several multifunctional lounges and a distributive room with benches and various cold water basins (B, C with basins θ and λ, H); a fully developed hypocaust system with a ring-shaped channel for heating water, the relaxing bathing forms and parts of two lounges (B, C); and finally double entrances to the bathing section (A and I, both with statue bases π and ρ; third service entrance to room W) for differentiated use. The archaeological evidence even suggests that bathers could not pass over the hypocaust system (Y) from the distributive room C to the *tholos* G; thus, the two bathing sections were probably entirely independent, just using a common heating system (Y). The nature of this differentiated use cannot be safely determined, but the different circulation patterns may have provided the option to choose between a quick cheaper merely cleansing bath (G–I) versus an extended costlier stay in the relaxing section (A–F, V).

While this bath is located in an urban or suburban sanctuary of the healing god Asklepios, it did not necessarily serve as a specific medical-therapeutic facility. Water was not supplied by a particular mineral spring, and the bathing program has parallels in urban-secular baths. Despite major progress of medicine in the Hellenistic period, neither medical texts nor the archaeological remains of other Asklepios sanctuaries reveal a particular concern with the development of specific therapeutic bathing practices (Flemming 2013). Similarly, general ritual purifying bathing did not require sophisticated *balaneia* with hot bathing forms, but consisted mainly of washing

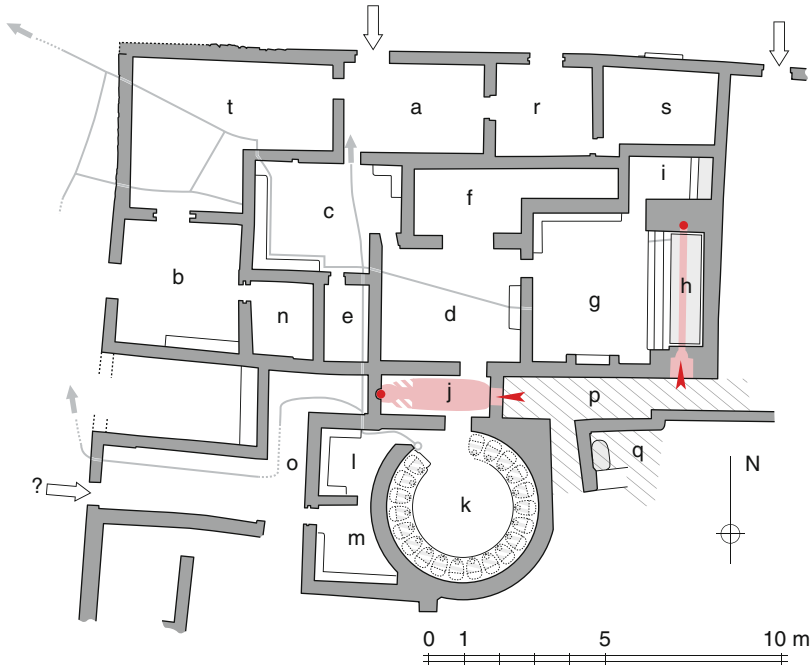

Baths and Bathing, Greek, Fig. 6 Megara Hyblaea, Bath in the Agora: plan, c. mid-third century BCE; © Thibaud Fournet (After Vallet et al. 1983: 51, Fig. 37)

parts of the body (hands, head, and feet) at simple basins with cold water. Therefore, *balaneia* in sanctuaries most likely granted visitors the same cleansing and relaxing bathing experience and convenience as their equivalents in urban-secular contexts (Trümper 2013b).

In the northeastern Mediterranean, the complex refined bath type and its simpler equivalent were used well into the first centuries BCE and CE and then gradually replaced by new bathing standards, notably Roman baths. The sanctuary in Olympia was again among the first sites in Greece to be provided with a fashionable Roman-type bath around 40 BCE ("Greek Hypocaust Bath"). This bath no longer included a cleansing section with hip-bathtubs, but only a large pool for collective relaxing immersion baths in hot water (see below). This pool, as well as the entire bathing room, was now heated by a modern hypocaust system with brick pillars.

Balaneia in the Western Mediterranean

New bathing standards were also introduced in other regions of the Mediterranean in the Hellenistic period, albeit with noticeable differences. The most sophisticated and advanced bathing culture was developed in the western Mediterranean, notably Sicily and South Italy. Most of the nine known baths in this region were built in the mid-third century BCE and abandoned around 200 BCE and included two distinct sections, spatially and conceptually clearly separated. For example, the well-preserved *balaneion* in the Agora of Megara Hyblaea (Sicily) (Fig. 6) had a cleansing section with traditional *tholos* (k, c. 20 hip-bathtubs), two multifunctional rooms with benches (l, m), an entrance from the adjacent street (o?), and a large bottle-shaped furnace for heating water (j). By contrast, the much larger and better appointed relaxing section had its own entrance on the Agora (a), a series of multifunctional rooms with (c, d) or without (e, f) benches, and a large bathing room (g) with a bench and a collective immersion pool (h). The latter was heated by its own hypocaust channel to keep the water warm. This large collective heated immersion pool differs significantly from the individual immersion bathtubs in northeastern baths; not only was its construction, operation, and maintenance far more costly, but it promoted above all a truly collective bathing experience, requiring

bathers to use the same water and to face potential physical contact.

Both the cleansing and the relaxing sections in the *balaneion* of Megara Hyblaea were served by the same conveniently located service facilities (service courtyard p, well room q). While the central distributive room of the relaxing section (d) also had an access to the bottle-shaped furnace (j), probably for drawing warm water for various basins (in rooms d and g), room j was most likely completely filled by installations for heating water and thus could not be crossed in order to proceed from the relaxing to the cleansing section, and vice versa (cf. the similar situation in the bath of Gortys, see above). Hierarchy was clearly established by size, accessibility, and decoration, both within each section and between the sections. Thus, while all bathing rooms were provided with waterproof mortar pavements, only some of these pavements were decorated with small stone or marble pieces: room g with the immersion pool received the most intricate decoration pattern, followed by room d and *tholos* k, then room f, then room c, and finally, at the bottom of the decoration scale, rooms e, i, l, and m which had simple mortar pavements without any decoration.

It is obvious that the heating systems of these western Greek baths were more advanced than those of their northeastern equivalents, but the precise reconstruction and functioning of the furnaces and hypocaust systems is currently still much debated (Lucore 2013). The large bottle-shaped furnaces may have held large water basins or a series of juxtaposed (metal) cauldrons, heated by hot air from below; the immersion pools may have been supplied by their own hot water boiler or by innovative intricate devices such as a "tortoise" (*testudo*). The latter, so far only known from Roman baths and authors, consisted of a semicylindrical metal container that was situated over the fire in the furnace, on a slightly lower level than the bottom of the immersion pool. This container was closed at one end and open at the other, towards the immersion pool so that water could circulate constantly between the pool and the hot tortoise and thus be kept warm.

Other groundbreaking technologies were used in and maybe even developed for western Greek baths, most notably vaulting techniques. In the North Baths at Morgantina, the *tholoi* with hip-bathtubs and two rectangular bathing rooms were covered with a dome (diameter 5.75 m) and barrel vaults (spans of 5.00 and 5.00 m), respectively (Lucore 2009, 2013). These vaults were made of interlocking hollow terracotta tubes that were covered with a rough mortar on both sides and on the interior with additional painted plaster. Apart from the stunning aesthetic effect that these innovative vaults must have had on viewers, domed and vaulted roofs also had practical advantages: heat would have spread more evenly and condensation would not have dripped from the ceiling, but run along the curved walls. In the long run, the advance of vaulting techniques that was closely connected to the development of both Greek and, above all, Roman baths would allow the spanning of ever larger, impressive spaces.

Why the patrons and builders of western Greek baths pressed so much ahead in the development of the designs and related technologies of baths in comparison to their peers in the eastern Mediterranean, cannot be safely determined. Western Greek cities prospered in the third century BCE and were centers of inventions in the arts and sciences. This favorable, stimulating cultural and historical climate may well have had an impact on the promotion of the local bathing culture (Lucore 2009).

The western Greek baths shared significant characteristics with early Roman baths, which developed in the early second century BCE at the latest and are currently known from some 17 cities in Italy, France, and Spain. These early Roman baths commonly included only one or two multifunctional entrance rooms or lounges for activities related to bathing (*apodyterium*, *tepidarium*) and a single bathing room with a collective heated immersion pool (*caldarium*) (Tsiolis 2013). Thus, the crucial difference between western Greek and early Roman baths is that the latter entirely abandoned the separate cleansing section with hip-bathtubs.

Currently, the evidence of western Greek baths and early Roman baths is strangely

distributed: no city has yielded clear evidence of both a Greek bath and an early Roman bath (second or early first century BCE), with the possible exception of Pompeii. Indeed, the famous Stabian Bath in Pompeii has often been identified as a Greek bath that was transformed into a Roman bath in the second century BCE, but the complex history of this building is much debated and requires critical reassessment. Another recently excavated example, the bath of Fregellae (Latin colony southeast of Rome, 328–125 BCE), provided evidence of two phases (Tsiolis 2013). The bath of the second phase, dated to the early second century BCE, was clearly Roman, but the predecessor from the late third century BCE cannot be fully reconstructed. While it certainly contained a relaxing section with a heated collective immersion pool, the existence of a separate cleansing section cannot be fully excluded – the more so because remains of a bottle-shaped furnace, a characteristic feature of the cleansing section in western Greek baths, have recently been uncovered.

Therefore, the intriguing relationship between Greek and Roman baths cannot yet be fully assessed and reconstructed. It seems only obvious that the western Mediterranean was the "think tank" of bathing culture in the decades around 200 BCE and very much influenced its development in future centuries. Greek baths may have anticipated their Roman equivalents for a short period in the crucial advancement of bathing culture, notably in the development of both collective leisure bathing as a sociocultural concept and the appropriate technological requirements. Alternatively, these innovative features could have been developed simultaneously in different settings, with two different results, notably the rather short-lived western Greek cleansing and relaxing bath type and the more successful early Roman relaxing bath type, which was maintained and refined in the following centuries.

Balaneia in the Southeastern Mediterranean

In contrast to the bathing culture in the northeastern and western Mediterranean, that of the southeastern Mediterranean was more conservative and austere. In southeastern *balaneia*, hip-bathtubs were, from the second century and probably already third century BCE onwards, only complemented by individual immersion bathtubs that were not heated by a hypocaust system, but simply filled with hot water. Arranged mostly in separate rooms in groups of 2–6, the immersion bathtubs were always far outnumbered by the hip-bathtubs, suggesting that cleansing bathing always prevailed (Fig. 7: 1–2, 7). While in about half of all *balaneia*, rooms with hip-bathtubs were duplicated, this almost never occurred for rooms with immersion bathtubs. Thus, relaxing bathing was clearly reserved for a few privileged bathers and possibly even for one of the sexes, notably the male. The *tholos* or *tholoi* commonly constituted the center and focus of the *balaneia* and were surrounded by extended corridor systems and secondary (bathing or service) rooms. Idiosyncratic to southeastern baths, these corridors certainly facilitated circulation but may also have served for strolling and as a substitute for multifunctional lounges that were mostly missing in these baths.

Recent research on the Hellenistic bath of Taposiris Magna (northern coast of Egypt, west of Alexandria; Fig. 7) has shown that heating systems of southeastern baths could be far more complex and sophisticated than hitherto assumed (Fournet & Redon 2009, 2013). This bath was partially cut into the rock (rooms 1–5, 10, northern part of room 7) and is therefore exceptionally well preserved. Its heating system (3bis), however, refined in a second phase around 100 BCE, was built in front of the rock-cut parts, close to the *tholoi* with hip-bathtubs (1, 2). While the circular furnace served primarily to heat water for the bathtubs, it also heated adjacent spaces through openings (3) and a heating wall (7). The latter is similar to the wall heating systems of Roman baths, where hot air circulated in "hollow walls." Made of large tiles, the heating wall in Taposiris Magna heated the small relaxation section of the bath (7).

Some southeastern *balaneia* were modernized under Roman rule (after 30 BCE) by transforming *tholoi* into sweat baths or constructing collective cold or hot water pools, but the Greek bathing concept was still

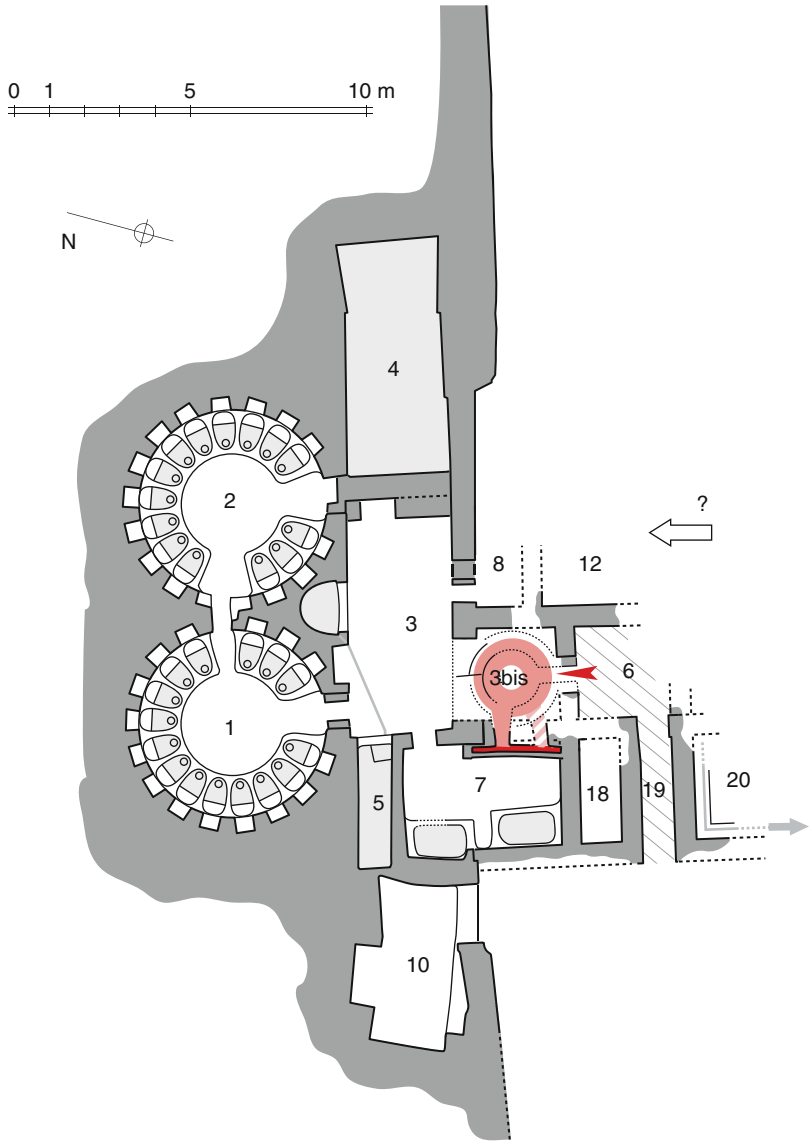

Baths and Bathing, Greek, Fig. 7 Taposiris Magna/Abusir, Bath: plan of the second phase, c. 100 BCE; © Thibaud Fournet & Bérangère Redon (Fournet & Redon 2013: 245, Fig. 6)

astonishingly long-lasting. Thus, Greek baths, with a clear focus on simple cleansing hip-bath-tubs, were still used and even constructed in the second century CE, and Roman bathing customs were overall only reluctantly introduced and accepted. This may be one of the reasons why Egypt has yielded more evidence of Greek baths than any other region in the Mediterranean and why the Egyptian baths show significantly more traces of constant repairs and remodeling than their equivalents in other regions. Remarkable also is the distribution of baths which clearly reflects the enormous popularity of public bathing in this country. Thus, even small settlements (e. g., Euhemeria/Quasr el-Banat, Theadelphia/Kharabet Ihrit) were provided with two large public baths, and large cities with an even denser network of such establishments (e.g., in both Buto/Tell el-Fara'in and Krokodilopolis/Medinet el-Fayoum four public baths were found so far).

Sports Facilities *(Gymnasia/Palaistrai)*

While bathing facilities of sports facilities remained largely simple and ascetic for the

above-mentioned sociocultural reasons, even they were affected by the dramatic evolution of bathing culture in the Hellenistic period, albeit to a different degree than the *balaneia*. The default athletic bathing form, notably simple bathing rooms with basins for cold water ablutions (*loutron*/*loutra*), was continuously built and used from the fourth through the first century BCE. Epigraphic sources show that these *loutra* enjoyed a certain popularity and prestige because generous donors paid for their construction and refurbishment from the second century BCE onwards. For example, according to inscriptions, the bathing facilities of the *gymnasion* in Pergamon (Asia Minor/Turkey, capital of the Attalid kingdom), built in the first half of the second century BCE at the expense of King Eumenes II, were improved several times by well-known local citizens, notably in the late second century BCE and again in the mid-first century BCE. Although the building is fully excavated, these improvements cannot be safely identified in the archaeological record, however, and they seem not to have changed the general bathing standard (Trümper 2013a).

In some other *gymnasia*, however, the austere *loutra* were either supplemented or even substituted by extravagant facilities for collective sweat bathing in hot air in the second century BCE. These consisted either of rectangular rooms with barrel vaults (Delos, "Sea Palaestra," and "Gymnasium") or of large round rooms (diameters of 5.90–10.20 m: Assos in Asia Minor/Turkey, Eretria and Thera in Greece, Solunto and possibly Akrai in Sicily) (Trümper 2008: 250–75, 2013a). For example, the *gymnasion* of Eretria (Euboea/Greece, Fig. 8) was built at the end of the fourth century BCE with a simple *loutron* (B) and remodeled in the second half of the second century BCE to include a large round sweat bath (G). These round rooms are well known and were much debated for a long time, and only recent research has ascertained that both the challenging roofing (with conic or domed roofs) and the heating (most likely with hot stones or braziers) could be realistically accomplished.

While these various sweat baths must already have revolutionized the experience and concept of athletic bathing, the most significant change occurred only from the late first century BCE onwards when independent sophisticated Roman baths were built in or next to Greek *gymnasia* and hot water was used for the first time in the Greek athletic context. For example, the *gymnasion* of Pergamon was provided with a Roman bath ("West Bath") in the first century CE and a second larger equivalent ("East Bath") in the second century CE (Trümper 2013a). Consequently, in Asia Minor (Turkey) the formerly two distinct concepts – Roman bath and Greek *gymnasion* – were merged into a new building type in the first and second centuries CE, the so-called Bath-Gymnasia. This granted the survival of the Greek *gymnasion* by simultaneously accommodating a dramatically changed concept and perception of bathing.

Future Directions

Since research on Greek baths and bathing culture has only been revived in the last 10–15 years, many of the issues addressed here still require more in-depth analysis. Most important is the full publication of recent and ongoing excavations of both Greek *balaneia* in the different regions of the Mediterranean and early Roman baths in the western Mediterranean. This will provide crucial new insights into important aspects such as the often neglected and little known history of baths (date of construction, remodeling phases, and abandonment); heating and vaulting technologies; water management, particularly water supply, which is so far poorly understood, especially with regard to quantity and consistency or seasonal variances as well as distribution within the baths; circulation patterns and user differentiation; and the urban context of baths that is often insufficiently known.

Based on such comprehensive fundamental research, broader synthetic questions could be reassessed, most notably the possible sociohistorical reasons for obvious regional differences in bathing culture, including the complex interrelation and transition between Greek and Roman bathing customs.

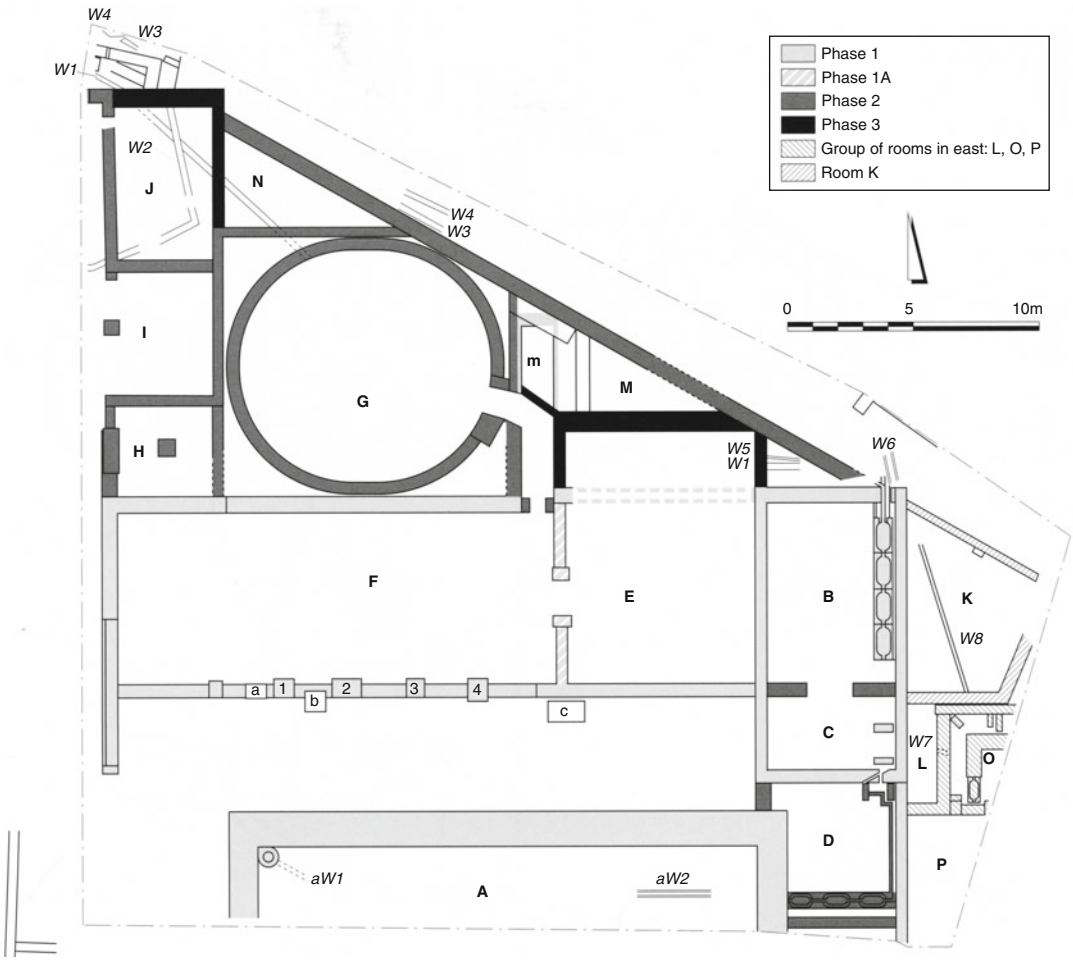

Baths and Bathing, Greek, Fig. 8 Eretria, Gymnasion: phase plan; phase 1 end of fourth century BCE, phase 2 second half of second century BCE; Mango 2003: 56, Fig. 58

While the bathing images on vases have been much studied in recent years (Kreilinger 2007; Stähli 2013), a comprehensive assessment of all written sources related to bathing in the Greek world is still missing.

A reassessment of all different sources – images, texts, and archaeological remains – could finally result in a more differentiated comparative evaluation of the discourses on Greek bathing culture in the various media. Greek bathing culture could then finally receive the attention it deserves, both in interdisciplinary studies of the ancient Mediterranean world and in cross-cultural studies on bathing and related topics.

Cross-References

- ▶ Baths and Bathing, Roman
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Sicily and Magna Graecia, Archaeology of

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Further Reading

This topic is currently not conveniently and easily accessible in recent English handbooks or textbooks. The standard handbook is still Ginouvès 1962 (in French), which is excellent, but partially outdated for the assessment of bathing images and the archaeological evidence of baths.

An overview of recent and current research is available in the proceedings of the recent conference on *Greek*

Baths and Bathing Culture. New Discoveries and Approaches (Lucore & Trümper 2013). The 14 English contributions include summaries of recent and ongoing fieldwork (Caulonia, Fregellae, Locri Epizefiri, Monte Iato, Morgantina, and Velia in Italy; Hephaistia/Lemnos and Thessaloniki in Greece; Euhemeria/Qasr el-Banat, Taposiris Magna/Abusir, and Theadelphia/Kharabet Ihrit in Egypt) as well as synthetic assessments of topics such as bathing images; bathing in Greek medicine; heating systems; vaulting systems, also in relation to contemporary science (Archimedes); urban context of Greek public baths; and the relationship between Greek and Roman baths. The second part of this book consists of a catalog of all currently known Greek *balaneia* (for each bath: short catalog text, bibliography, standardized plan).

Baths and Bathing, Roman

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Introduction

Public baths were arguably the primary social institution of the Roman world. A trip to the local public bath was both a practical and pleasurable ritual, fundamental to the routine of daily life – we have evidence of everyone from slaves to the emperor himself frequenting the public baths on occasion. Many baths also catered for experiences well beyond that of simply getting clean; bathers could spend several hours in the baths, socializing or attending to a multitude of other needs and desires.

The baths were at the forefront of Roman architectural, engineering, and design development. The forms expressed in the bath buildings, along with their materials and technologies, were among the most innovative, ambitious, and impressive of their day and have remained influential through to modern times. Public baths were a ubiquitous feature of most cities and towns, irrespective of size, as well as in many sanctuaries and military camps; they became a defining feature of Roman civilization throughout the Empire and beyond.

Sources and Reception

It is obvious from the sheer number of baths alone (see Types of Bathing Facilities) that the act of public bathing was extremely popular, and their centrality to daily life is confirmed by the fact that references to bathing are to be found everywhere, including in official inscriptions, on informal graffiti, in school books, on tombstones, and of course in the literary sources, where they are frequently mentioned by poets (most notably Martial), historians, philosophers, and the like.

The sources make frequent references to positive aspects of the baths, including their grandeur, beauty, atmosphere, and social and medical benefits. However, as to be expected with any popular institution, they were not universally praised and we do hear the occasional dissenting voice. Gripes with the baths ranged from annoyance at the drunken, lecherous, licentious, sycophantic, or arrogant behavior of some regular visitors, to instances of theft (a common issue at the baths, subject to strict laws, and, if the laws did not work, curse tablets [Fagan 1999: 36-38]), to the water being too dirty, cold, or hot (Nielsen 1990: 18; Fagan 1999: 181-186). There were also moral objections to the popularity of the baths, with several commentators raising concerns about the negative effects on society of the perceived indulgences and luxuries offered at the baths (Seneca Letters 86 is one such lament). These objections, though eloquent, would appear to be the viewpoint of a conservative minority, and even their objections were not serious enough, in most cases, to stop the critics themselves from frequenting the baths, further highlighting their importance as a social and cultural hub.

Definition

The Roman public bathhouse in its many contexts may be distinguished from earlier forms of

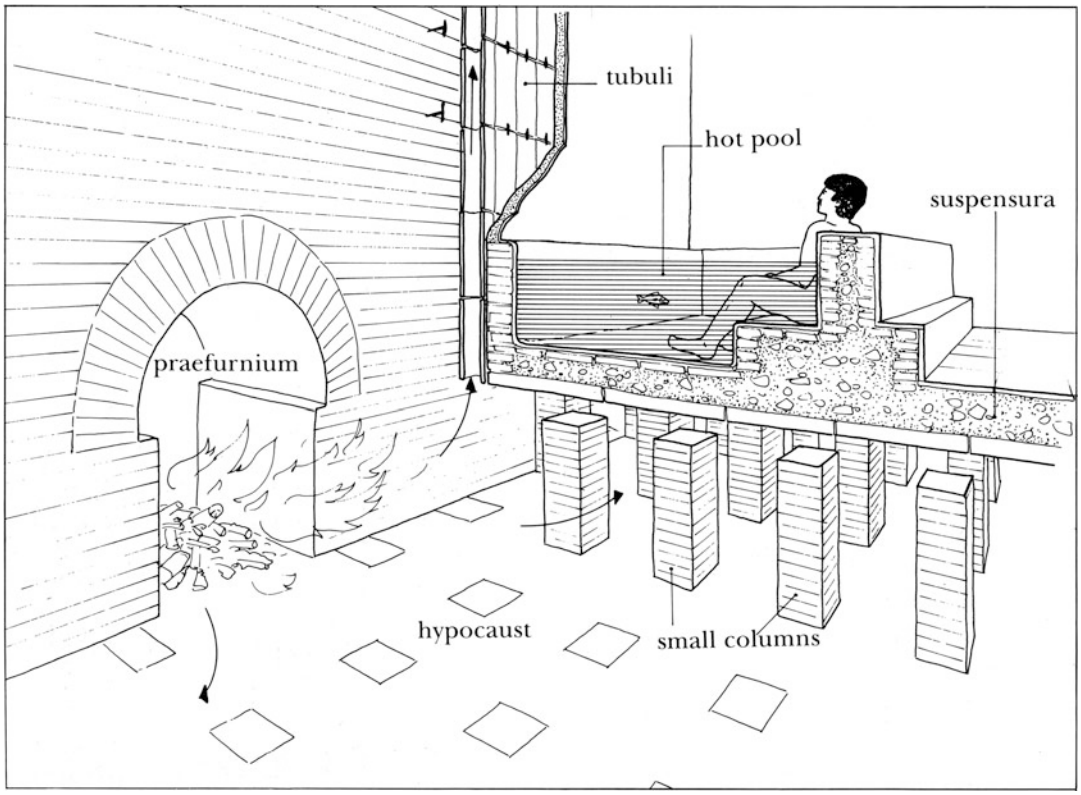

Baths and Bathing, Roman, Fig. 1 The heating system of a Roman bath (modelled on the *caldarium* of the Central Baths in Pompeii). Image: Jean-Pierre Adam (Adam 2011), with permission

public bathing (see the entry on ▶ Baths and Bathing, Greek, in this encyclopedia) and defined by the existence of three primary characteristics: (1) a complex heating system based around the hypocaust, (2) bathing rooms of differing temperatures, and (3) the presence of communal pools. While some of these elements could be present in the earlier "Greek-style" baths (with which the Roman baths had many aspects in common – see Historical Background), it is the combination of these elements that epitomizes the Roman style of public bathing regardless of context.

Heating

A Roman bath was heated by the hypocaust; an underfloor system of heating that was fully developed by the early second century BCE. Prior to this time, heating of rooms and water tended to be carried out with the use of braziers or on occasion by simpler forms of underfloor heating (see Historical Background and the entry on ▶ Baths and Bathing, Greek, in this encyclopedia). The hypocaust functioned by allowing hot air and gasses to flow through a space created beneath the floor of a room (Fig. 1). The most common way to create this space was to raise the floor via the use of multiple square or circular brick columns (*pilae*), typically standing between c. 0.70–1.40 m in height, and placed roughly 0.80 m apart from center to center. Resting on the *pilae* was the floor matrix, usually consisting of large square tiles (*bipedales*), upon which was laid a 0.30–0.40-m-thick brick and mortar packing into which the desired surface material was laid.

The heat was generated by a simple, slow-burning furnace (*praefurnium*), consisting of

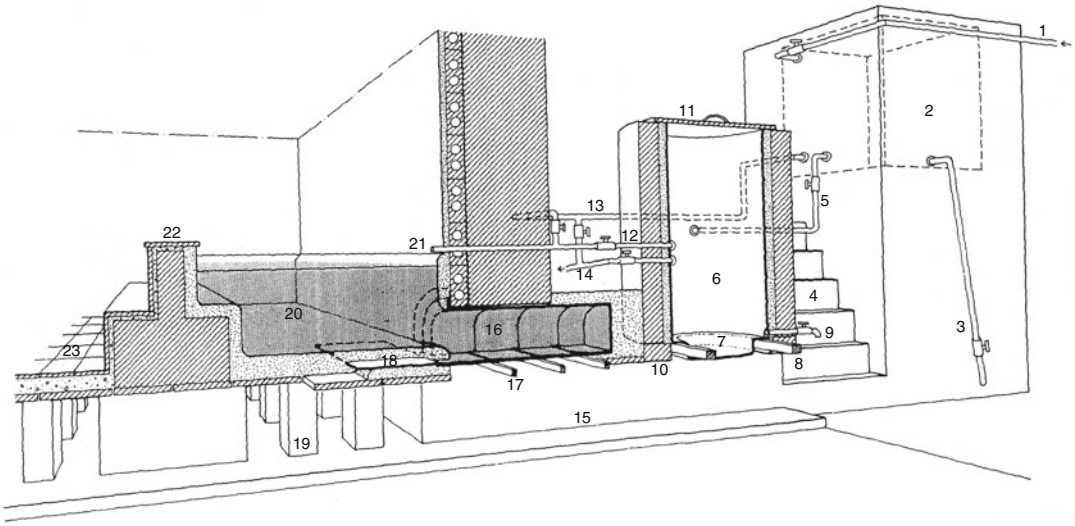

Baths and Bathing, Roman, Fig. 2 Reconstruction of the heating and water systems of a *caldarium*, including boiler and *testudo*. © Koninklijke Brill NV (after Manderscheid 2000: 496)

a fire placed in one or more openings in the external wall below the floor of the heated room (Fig. 1). Two spur walls (not pictured) were often built either side of this opening (and either side of the wall) to help draw the hot air and gasses through the system. The hot air and gasses eventually rose up through flues set into the wall and exited the system via vents set just below the eaves of the building (see also "tubulation" below). As to be expected, there were many design variations with the hypocaust system, not least with the *pilae*. One such variation – and a notable example of ancient recycling – is still to be seen in Athens, with the reuse of 17 Hellenistic period columnar grave monuments as *pilae*.

Service areas were invariably situated outside these heated rooms. Depending on the size or build of the bath, these areas could vary from simple semi-open spaces (usually with some form of screening to hide the work areas from the public) through to a complex network of underground passages (such as those at the Baths of Caracalla in Rome). It was from these services areas that the water supply for the baths was also controlled. The water to be used in the heated pools was piped into large metal boilers that were often sensibly positioned above the furnace (Fig. 2). Once heated by the boiler, the water could be mixed with cold water (as required) by the service attendants as it was being piped into the pools: a particularly well-preserved example of a water-supply system was found in a villa at Boscoreale, a settlement buried in 79 CE by the same eruption of Mt. Vesuvius that destroyed Pompeii and Herculaneum. Some baths also incorporated a semicylindrical metal container known as the *testudo* into their water-heating systems (Fig. 2). The closed end of this device was placed above the furnace in direct contact with the fire, while the open end was incorporated into the sidewall of the pool. This configuration allowed the pool water to circulate directly above the furnace, thereby maintaining a much warmer water temperature for the bathers.

From the first century BCE onwards, it became common to create hollow passages in the walls of the heated rooms (beyond the basic, but necessary flue system), in a technique known as tubulation. This provided several structural and functional benefits: it allowed for the improved circulation and extraction of hot air and gasses; it provided the walls with dry lining, thereby alleviating dampness in such a hot and humid environment; and it led to a more efficient use of fuel through the effects of radiant heat

contributing to a higher room temperature while simultaneously allowing for a more uniform and safer temperature for the floors and the walls – an important concern for the patrons (Nielsen 1990: 17-8; Yegül & Couch 2003: 175; Schiebold 2006; Yegül 2010: 88-9). The radiant heat generated by tubulation also allowed for larger heated rooms to be built and for these rooms to be well lit, because large windows could now be placed in the walls of heated rooms without the loss of too much temperature. The interplay between the sun and the variously decorated surfaces of the baths, coupled with the potential for pleasant views, added to the spectacle of a visit to the baths. As Seneca colorfully informs us (*Letters* 86.8), well-lit baths were popular among patrons.

Tubulation appeared in several forms and subtypes, varying over time and region, but two forms, *tegulae mammatae* and *tubuli*, were by far the most commonly utilized throughout the Empire (Fig. 3). *Tegulae mammatae*, literally "tiles with nipples," consisted of specially constructed flat tiles with projecting studs on each corner that were attached to the wall with metal clamps. *Tubuli* were custom-made hollow box-shaped tiles, open at both ends and often on the sides. These could be stacked on top of, and next to, each other to create an interconnecting network. *Tubuli* are considered to have been the most effective method for heating, as the air and gasses circulated through *tubuli* with less turbulence than with other solutions (Adam 1994: 269). They also had the added benefit of not necessarily requiring the use of costly, and ultimately ephemeral, metal clamps to attach them to the wall, thus saving on both materials and effort while also extending the life of the building. The use of *tubuli* essentially superseded *tegulae mammatae* in many parts of the Empire from the end of the first century CE onwards. However, the continued use of *tegulae mammatae* would seem to be a trend throughout Greece and in parts of the Western Empire (Nielsen 1990: 15, 1999: 36; McCallum 2010). There are also many examples of more than one type being utilized within the same building, as was the case in the Great Bath at Corinth where three different systems have been observed

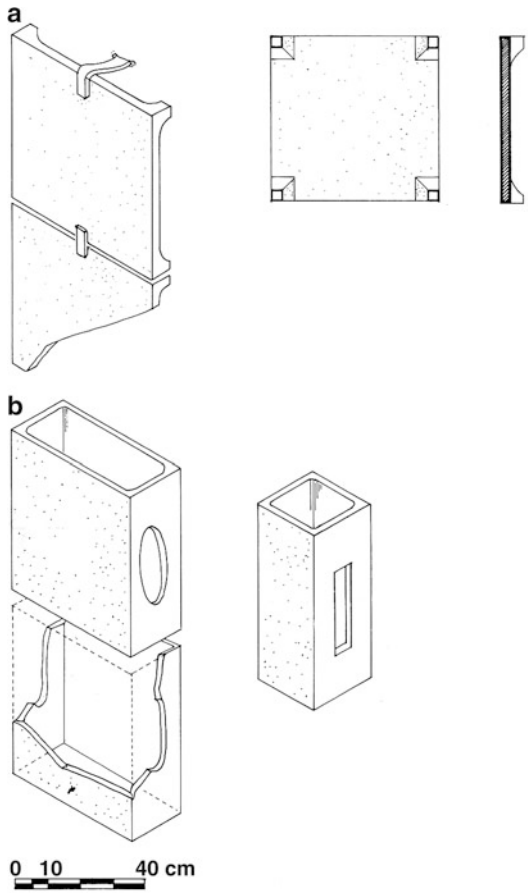

Baths and Bathing, Roman, Fig. 3 Detail of a diagram showing **a**) tegulae mammatae **b**) tubuli. © Fikret Yegül (after Yegül 2010: 88, fig. 38)

(Biers 2003: 310). Tubulation was also utilized in some bath ceilings, providing further insulation and structural benefits, including in the thermal baths at *Aquae Sulis* (Bath, England).

When taking into account that the floor, walls, ceilings, pools, and water boilers were all heated by the same furnace, in effect every element of a room could be heated from a single source of fire under the floor – an ingenious and very efficient system.

Variated Temperatures

Not only did the Romans heat certain rooms of the baths, but they also manipulated the temperatures of these rooms and their waters to provide a variated experience for the bather as

they moved from room to room. Consequently, the three fundamental room types experienced when taking a Roman bath were the cold bathing room (*frigidarium*), the warm room (*tepidarium*), and the hot bathing room (*caldarium*). Many baths also included a dedicated sweat room, referred to variously as a *sudatorium* or *laconicum*. Depending on the establishment this could be based around a wet heat or a dry heat.

Communal Pools

The physical process of bathing in a Roman bathhouse took place primarily in communal, fully immersible pools, often large enough for several people to bath simultaneously. Typically two or more pools were present in both the *frigidarium* and the *caldarium*; the *tepidarium* often functioned as a heat lock between the cold and hot rooms, although pools are present on occasion. In addition to communal pools, many baths (especially down to the first century CE) also featured a pedestalled washbasin (*labrum* –). This piece of bathing furniture had a long history in public bathing, from at least the Greek Archaic period onwards. Also extremely popular in Roman baths (and some earlier Greek gymnasia) were large swimming pools (*natatio*); these could be indoor or outdoor, heated or unheated, depending on the climate and the establishment.

Auxiliary Rooms

Aside from the rooms devoted to the actual act of bathing, public baths, regardless of size, also regularly included a dedicated changing room (*apodyterium*) with niches for the bather's clothes and personal effects as well as oiling rooms, latrines, and, depending on time and place, a courtyard and/or a large all-purpose indoor room for light exercise or socializing. Some baths even featured facilities for massage and sunbathing, as well as shops, mills, offices, large garden areas, running tracks, fountains, and cult spaces (typically of the Imperial family or Mithraea), with the largest baths even including further educational and entertainment zones such as libraries, lecture halls, class rooms, and eclectic art galleries (for a discussion of the individual elements of the baths, see Nielsen 1990: Appendix). The patronage and display of sculptural art in the bathhouses presented the Imperial family, local administrators, athletic clubs, and other personages and institutions of note a wonderful opportunity to honor gods and mortals while increasing their own status and reputation. Public baths regularly provide us with impressive examples of Roman art, along with copies of Greek sculpture and even pilfered Greek originals.

The written sources inform us that the rooms of the baths were also home to more ephemeral services and entertainments (professional and otherwise): food and drink sellers, depilators, poets, jugglers, musicians, dancers, mimes, and even male and female prostitutes are all known to have added to the bathing experience. One of the liveliest descriptions of the atmosphere in a small bath is from Seneca, who in the mid-first century CE complains of the noise made by people enjoying themselves or making a living at the baths (*Letters* 56.1-2). With so much available space and so many facilities on hand, some of the largest baths even became regular places of assembly for events and political gatherings, thereby taking on some of the roles traditionally reserved for the forum.

Bathing Pattern

There appears to have been no universal set pattern to how one would experience the baths; they vary tremendously in layout and features (as to be expected over such an immense chronological and geographical expanse), suggesting that, in essence, the baths could be approached how the individual bathers themselves desired. Furthermore, very few surviving sources describe in any great depth and clarity what was to them an everyday process. Undoubtedly, force of habit and the inherent restrictions imposed by the layout of the individual bathhouse would have played a role, as would have contemporary medical advice. One way to approach the bathing process would be to pay the fee (if there happened to be one at that particular establishment), get changed in the *apodyterium*, oil up, then work up a sweat (via light exercise or a dedicated sweating room), before finally entering the

bathing rooms proper (perhaps most often in the basic order of *tepidarium*, *caldarium*, *frigidarium*), where first the oil, sweat, and potential dirt could be scraped off with a *strigil* (– soap was not widely used in the Roman Empire) and then one could enjoy a dip in the various plunge pools or even a swimming pool. A hefty dose of socializing and the enjoyment of any of the other delights on offer would supplement this process. Eventually the bather would return to the *apodyterium* to get changed and exit the establishment.

Types of Bathing Facilities

The widespread popularity and long history of the baths meant that many types of bathing establishment existed throughout the Empire. The two most basic types were freestanding baths and bathing facilities attached to larger complexes. There was of course a lot of variation within these two basic types.

Freestanding Bathhouses

The most common type of public bathing establishment throughout the Empire was the freestanding bathhouse, dedicated primarily to the act of bathing and socializing for groups of people. They varied greatly in size and accessibility (see Key Issues). The ubiquitous, smaller freestanding establishments are commonly referred to as *balnea*, while the larger and more imposing baths tend to be referred to as *thermae*. The interchangeability of these terms, and indeed many of the terms related to the baths in ancient times, still causes problems today (see Nielsen 1990: 3, Appendix; DeLaine 1993: 352-4; Fagan 1999: 14-9 with further references).

Balnea were often privately owned and varied greatly in layout and size, with some very innovative and unique design variations – in part caused by the necessity of fitting into preexisting town plans and the lay of a particular plot of land. Thermae tended to be state- or city-run enterprises; they were often more symmetrical in design and layout but were nevertheless among the most innovatively designed and decorated buildings to be found in a city of the Empire. In Rome alone, during the fourth century CE, census documents record that an incredible 856 small baths and some 10 or 11 massive thermae were in use (the exact number varies for both categories – *Notitia Urbis Regionum* and *Curiosum Urbis Romae* Regionum; Fagan 1999: 41-2; Yegül 2010: 2-3). Agrippa constructed the first thermae in the city of Rome during the last quarter of the first century BCE, and then we know of increasingly more elaborate and monumental thermae constructed by leading citizens and emperors, including (but not limited to) Nero, Titus, Domitian, Trajan, Commodus, Septimius Severus, Caracalla, Decius, Diocletian (the largest of the Roman Imperial thermae), Maxentius, and Constantine. Many other major cities also featured at least one thermae, including, but by no means limited to, Constantinople, with at least 8 thermae and 153 small baths (*Notitia Urbis Constantinopolitanae*; Yegül 2010: 3, 183), Carthage, Ephesus, Antioch, Lepcis Magna, Paris, Trier and Athens, with at least 2 thermae and over 50 small baths of various types (McCallum 2010). Even Ostia, the port of Rome, has seen several thermae and over 20 smaller baths uncovered during excavations (Yegül 2010: 69).

Bathhouses Attached to Larger Complexes

Bathing facilities were also regularly constructed as an element of much larger complexes, including gymnasia, military forts, sanctuaries, thermo-mineral resorts, domestic dwellings, and even churches.

Gymnasia

In those parts of the Empire where the gymnasium was an important cultural institution, notably in Greece and the Hellenized East, the tradition continued of incorporating bathing facilities to assist with cleaning after exercise (a practical tradition considering their exercise regime combined dirt, sweat, and oil), the difference being that during the first centuries of the Empire, most were outfitted with the latest in Roman heating technologies (see the entry ▶ Baths and Bathing, Greek, in this encyclopedia).

Conversely, many standard freestanding Roman baths incorporated some elements of the

gymnasium into their design, most notably with the appearance of a small courtyard for light exercise, but it is with the great bath-gymnasium complexes of Asia Minor that we see the truest fusion of the features and activities of the Roman bath and the Greek gymnasium. Some of the most notable examples of this phenomenon are preserved at Ephesus (Harbour Bath-Gymnasium, Vedius Bath-Gymnasium, East Bath-Gymnasium, Theatre Baths), Sardis (Imperial Bath-Gymnasium – Fig. 4), Perge (South Gate Baths), and Miletus (Bath-Gymnasium of Faustina).

Military Baths

Wherever Romans went, so went the baths. As a result, baths were a regular feature of military forts (*castrum*/*castra*) around the outskirts of the Empire. These baths can be divided into two categories: large legionary thermae, typically located inside the fortress, and smaller *castellum* baths, which lay outside of the fort (Nielsen 1990: 77). The baths were designed by the military architects that accompanied the army, and it was these same architects who were often responsible for designing and constructing the baths in the newly conquered, assimilated, or created settlements at the frontiers of the Empire. As a result, we see in places like Roman Britain that the settlement baths regularly share design similarities with the baths from nearby military forts.

The Roman military can thus be seen as an important contributor to the spread of baths throughout the provinces of the Empire, with the baths themselves playing a significant role in the complex process of sociopolitical and cultural interaction and domination known as Romanization.

Sanctuary and Thermo-Mineral Baths

Any place where large crowds of people would be gathering or staying for an extended period benefitted from having public baths, and this was certainly the situation at sanctuaries where devotees congregated for days or even weeks at a time, be it for festivals (athletic or otherwise) or for healing. Baths were an integral part of many healing sanctuaries, as the medical writers of the time regularly recommended water-based cures for the treatment of various ailments. No more is this relationship more apparent than with the huge thermo-mineral bath centers in places such as Baiae in the Bay of Naples (Italy) and Allianoi in modern Turkey (located some 20 km northwest of ancient Pergamon). Thermo-mineral resorts such as these were extremely popular healing and holiday destinations, with the town of Baiae in particular gaining a reputation as a debauched playground of the well-to-do. Baiae was a very long-lived resort, in use from at least the early Roman Republican period through to the seventeenth century CE. Allianoi made the news again recently, threatened ironically by the very thing that gave it life – water – with the construction of the Yortanli dam condemning this ancient health retreat to be lost once more to history in late 2010/early 2011.

Houses, Villas, and Palaces

Bathing facilities were a common, but by no means universal, feature of domestic properties throughout the Empire. These ranged in size from small bathrooms with a simple tub through to luxurious miniature versions of public bathing establishments for use by several individuals simultaneously, be they family, friends, or business associates. Some of the best-preserved early examples are, not surprisingly, from the towns of Pompeii and Herculaneum; however, from the later Roman period, several huge and centrally located residences have been found in cities throughout the Empire, including Constantinople and Athens (Fig. 5). These buildings are sometimes referred to as palaces, with bathing facilities on par with their more public brethren.

It is important to stress that not every property had elaborate bathing facilities; this is especially true of the multistory apartment complexes (*insulae*) where the greater urban population lived in Rome and other large cities. For these people the public baths were a vital utility.

Church/Baptistery Baths

The adoption of Christianity as the official religion of the Empire over the course of the fourth century CE did not halt the construction and use

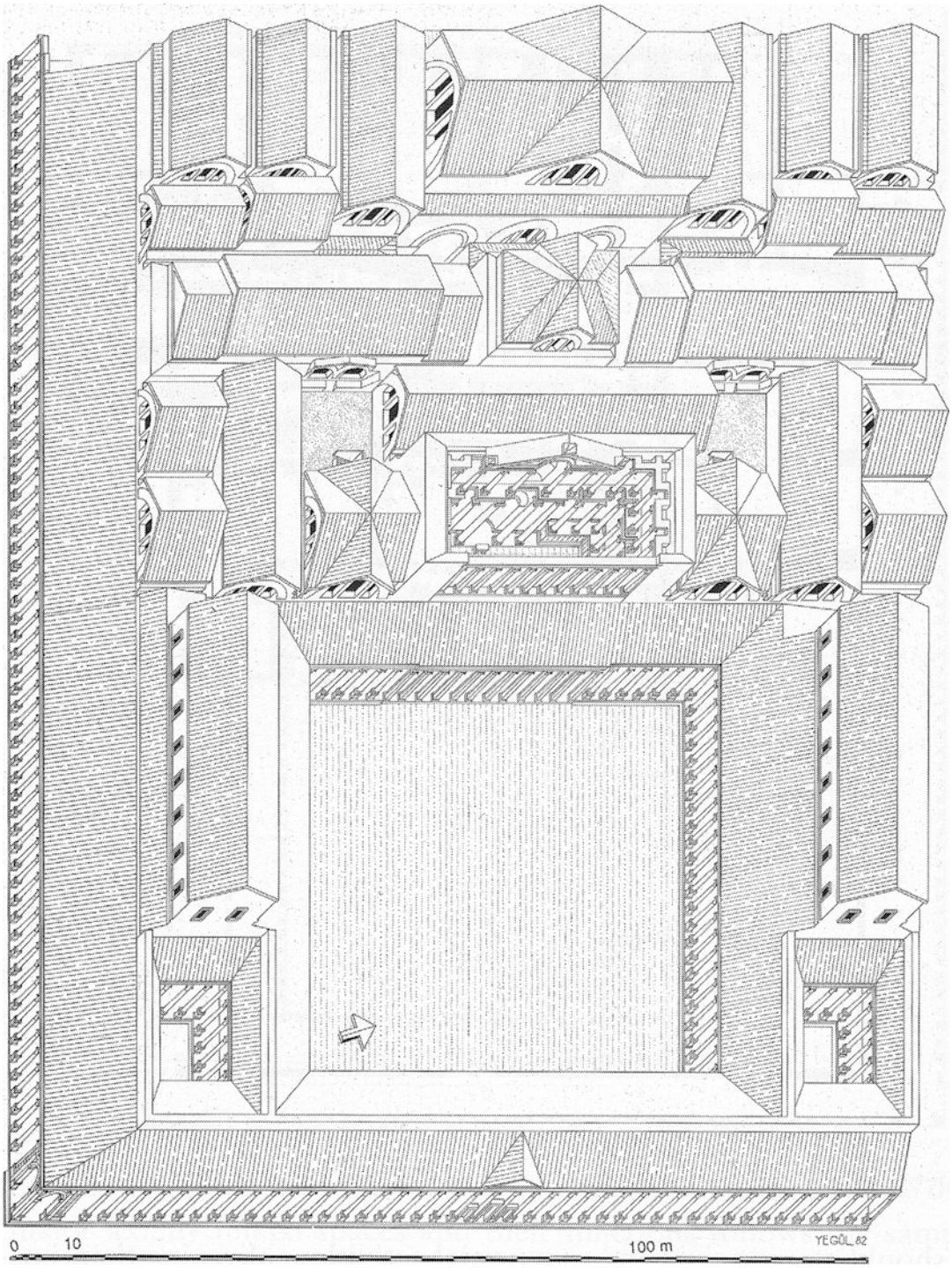

Baths and Bathing, Roman, Fig. 4 Axonometric restoration of the Imperial Bath-Gymnasium complex at Sardis. © Fikret Yegül (after Yegül 2010: 164, fig. 74)

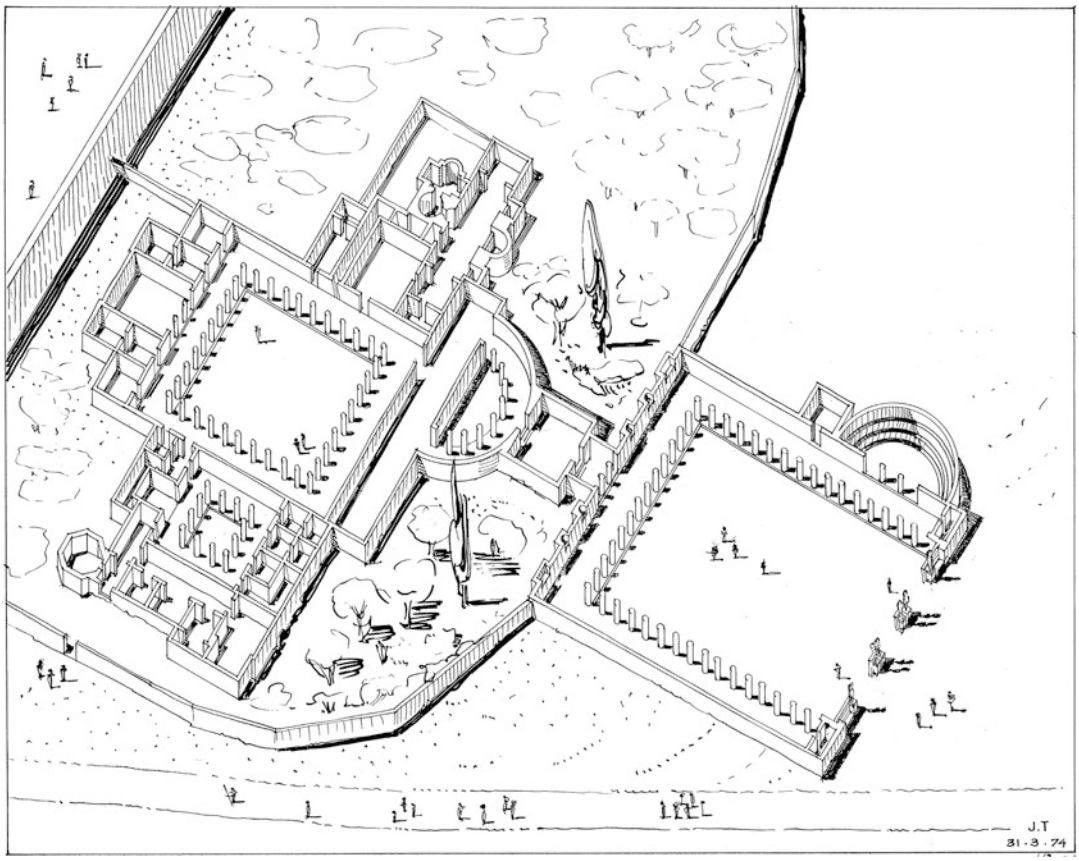

Baths and Bathing, Roman, Fig. 5 Cut-away perspective of the Palace of the Giants by J. Travlos. © American School of Classical Studies at Athens: Agora Excavations

of public baths. Indeed, it was not uncommon to build baths in connection with churches and monasteries or to utilize preexisting bathing establishments as baptisteries (see Historical Background).

Historical Background

Origins of the Roman Bath

The origins of Roman public bathing may be sought from several sources, although the degree of influence imparted by each source is debated and routinely subject to reassessment when new evidence is uncovered or published. A major influence is undoubtedly to be found in the long-standing public bathing and gymnastic habits of the classical and Hellenistic Greek world, especially from the Greek colonies in South Italy and Sicily (see the entry on ▶ Baths and Bathing, Greek, in this encyclopedia). There is also evidence to suggest that local bathing traditions of rural central Italy may have played their part in the development of Roman-style bathing and architecture, most notably through the use of bathing rooms with graduated temperatures in their farm houses (Varro *Ling*. 9.68; Fagan 2001: 417; Yegül 2010: 45-7). The influence of Etruscan and Punic public bathing habits on Roman bathing habits is currently less well understood.

The development of the hypocaust is a popular topic of debate. Based on the writings of Pliny the Elder (*Natural History* 9.168) and Valerius Maximus (11.1.1), the tradition has been to link the development of the hypocaust to the

Campanian oyster farmer and merchant Sergius Orata (flourished c. 90 BCE–80 BCE), but the archaeological evidence (and critical literary analysis) shows that this is incorrect. Examples of fully fledged hypocausts are known already from Central Italy at Fregellae (Latium) in the early second century BCE, from the late second century BCE in Pompeii (Stabian Baths), and from the second and first centuries BCE in Greece (Gortys, Olympia, and Athens) and Sicily (Megara Hyblaea) (DeLaine 1989; McCallum 2010; see the entry on ▶ Baths and Bathing, Greek in this encyclopedia), while more simple predecessors are known already in the Eastern Mediterranean from the sixth century BCE onwards (DeLaine 1989; Fagan 2001; Yegül 2010, 81-2, 84-6; see the entry on ▶ Baths and Bathing, Greek, in this encyclopedia). Wall heating (tubulation) on the other hand is considered to be of completely Roman/Italian origin (Yegül 2010: 86; although note the recent evidence from Taposiris Magna in Egypt and the hollow walls at Gortys mentioned in DeLaine 1989: 112).

The thermo-mineral resorts at Baiae and Himera in Sicily were in use from at least the early stages of the Republican period. It is therefore possible that aspects of the later public baths, such as the large communal pools, advanced heating systems, and not least the acceptance of public bathing as an enjoyable and socially acceptable event in Rome, may have some roots here (DeLaine 1989: 123; Fagan 2001; Yegül 2010: 49-50).

Whatever the exact origins of the Roman style of bathing, it is clear from the archaeology and their appearance in the literary sources that they were certainly a feature of Republican Roman life from at least the third century BCE onwards and that making a visit to a public bath became a commonplace daily event over the course of the second to first centuries BCE. As mentioned previously, the Roman bathing habit spread with the Empire. Those provinces with pre-existing public bathing cultures incorporated Roman bathing norms to differing degrees (notably in the Hellenized East and Egypt), but the adoption of Roman technologies and habits is seen everywhere to some extent.

Christianity

Over time, as to be expected, there are some changes to the public bathing habit, but the core experience remained fairly stable for an extraordinarily extended period. Even after Christianity was adopted as the official religion of the Empire during the fourth century CE we do not see an instant effect on the popularity of the baths, and there was certainly no universal ban on public bathing or even seriously sustained official opposition from the Church. Indeed, in some instances, the Church owned and operated public baths as a profitable business, and other times we see baths used for ablutions on religious holidays or attached to churches and monasteries for use as charity baths or for baptisms (Nielsen 1990: 147-8; Yegül 2010: 185, 202-3). Even bishops and monks were known to bathe in the baths and sometimes even with women (Nielsen 1990: 147).

There was some Christian opposition to the excessive wealth displayed at the baths and the phenomenon of mixed bathing (Nielsen 1990: 148 and see below) as well as to some of the more pleasurable and extracurricular aspects of a visit to the bath. We see this expressed clearly in the late sixth century CE by Pope Gregory the Great (540-604): "[Baths are] for the needs of the body. . .not for the titillation of the mind and sensuous pleasure" (Gregorius I Papa *Registrum Epistolarum* I, xiii, 3; Yegül 2010: 204). Additionally, some devotees did pursue the concept of *alousia* (abstinence from washing), but it was nothing like the phenomenon seen in Europe for some two centuries from the mid-sixteenth century CE. More serious was Christian opposition to exercise and nudity and indeed the whole cultural and educational institution of the gymnasium; this did lead to the dwindling of the gymnasium/exercise segment of the baths. The effects of this opposition were especially clear in the East, where the bath-gymnasium complexes had previously been so popular (Yegül 2010: 182, Chapter 11).

The Decline of the Roman Bathing Habit

While the Roman public bathing habit in some sense never ceased completely (it still lives on in altered form in the Turkish bathing habit), by the seventh century CE, and earlier in many places, it

had undoubtedly ceased to be the widespread and integral social institution it once was. So what caused this to happen?

The downfall of many of the bathing establishments, especially the larger ones, can be linked to the civic and economic disorder and profound societal changes brought about by various "barbarian" incursions in Rome and throughout the Empire during the so-called Migration Period in the fifth through eighth centuries CE; the fate of the large baths was inextricably linked to the fate of the wider city. In a time of regular infrastructure damage, severe hardship, and depopulation, cities were simply unable to repair and maintain multiple city baths – they were too expensive to keep running, and, critically, they required a functional and plentiful water supply. The aqueducts, which could run for dozens of kilometers outside of the city, were especially prone to sullying or destruction by besieging armies, and priority was needed to be given to drinking water over the baths.

Baths continued to be built and maintained much later in the East than West, perhaps due to a more stable environment during these centuries of upheaval and change, but even these baths were in serious decline by the ninth century CE (Yegül 2010: 200). Undoubtedly, some of the thousands of smaller bathing establishments, with their much more modest water-supply needs, continued operating in some form or another, especially in the early Islamic East, where public bathing has continued through to the modern hammam still used in places like Turkey, Syria, Iran, and Tunisia today. We also know that many thermo-mineral health resorts remained in use over the next 1,000 years, most notably Baiae, which, as mentioned previously, continued in use until the seventeenth century. Despite the existence of these remnants of Roman bathing, it is clear that by the seventh century CE, the public baths had ceased to be a cornerstone of daily life.

Key Issues/Current Debates

While the Roman baths have received scholarly treatment at various times previously, interest in baths and the act of bathing in the Roman world has increased dramatically in the past 30 years, most notably through the 1980s and 1990s when there was a surge of literature and new approaches to balneological studies (including, but certainly not limited to, general works by Brödner 1983; Heinz 1983; Pasquinucci 1987; Nielsen 1990; Yegül 1992, 2010; Fagan 1999, 2001; DeLaine and Johnston [ed.] 1999; also several important articles by DeLaine that critically assess the state of the discipline, DeLaine 1988, 1992, 1993, 1999; and the comprehensive bibliographies compiled by Manderscheid in 1988 and 2004). This expanding scholarly corpus has incorporated the archaeological, literary, and epigraphic evidence over a vast chronological and geographical scale to provide us with a reasonably solid understanding of many aspects of the practical, physical, social, technological, and cultural aspects of bathing during the Roman period. Several of the current, and in some cases seemingly eternal, debates and key issues have been touched upon already (origins of the Roman style, developments over time, how they were perceived, their role as agents of Romanization, and the reasons behind the eventual decline of the Roman-style bathing habit); now three more are briefly addressed: "Who was bathing?" "How widespread was mixed bathing?" and "Why were the baths so popular?"

Who Was Bathing?

The question of who was bathing in the public baths is complicated in the sense that we are dealing with such disparate evidence over a huge expanse of geography and time. Further exacerbating this state of affairs is that the situation would have varied from bath to bath. Individual bathing establishments varied not only in size but also in degree of accessibility and exclusivity. While the largest baths catered for most, if not all, elements of the population with their immense size and cheap or free bathing (male/female, adult/child, rich/poor, and apparently even slave), the vast majority of baths were smaller facilities, inevitably catering to a more limited clientele based purely on their size alone. It is then perhaps best to envisage, and

the sources suggests as much, that most public bathing establishments were similar to the nightclubs, cafes, or pubs of many modern cities. A particular bath attracted a certain clientele based on their facilities, decor, location, cleanliness, entry charge, and reputation (which could change very quickly). The choice of bath was apparently important enough among high society that one could enquire of a stranger which baths they used (Ammianus Marcellinus 28.4.10; Fagan 1999: 20). Furthermore, some bathing facilities explicitly served a specific gender, class, guild, or religious group, and of course those baths operating inside sanctuaries and military camps, or attached to buildings such as gymnasia and the like, would have all been accessed by, and potentially restricted to, certain groups. By gaining an understanding of the various locational contexts of bathhouses, we open a window into the principles of social ordering of the people who utilized these facilities.

How Widespread Was Mixed Bathing?

That both men and women around the Empire utilized the public baths is beyond all doubt, but the extent to which men and women bathed together has been a regular source of debate and disagreement. There can be no doubt that mixed bathing did occur throughout the long history of Roman baths (indeed several emperors and even the Church attempted, unsuccessfully, to legislate against it, with the last decree coming as late as the eighth century CE), but the degree to which it was the norm or how much it varied from place to place over time and facility is uncertain. The available evidence reveals several solutions when it comes to men and women using the baths:

1. Separate establishments for men and women (a phenomenon more common in the earliest and latest Roman baths).
2. A single establishment with separate entrances and duplicated facilities (not necessarily of identical size or quality). Not all facilities were duplicated in some baths, suggesting some shared areas in those instances.
3. A single establishment with different bathing times for men and women. This solution is still seen today in some hammams (Turkish baths).
4. Freely mixed bathing (a regular theme in Martial and Imperial decrees).

Why So Popular?

The vast popularity of the public baths can be explained citing both practical and sociocultural reasons. The core function of public baths was obviously to get clean, and this was an important community service in a time when bathing facilities in many homes were simple or nonexistent. Bathing in water is in itself a physiologically relaxing and pleasurable experience. This experience, coupled with the communal aspects of the baths (socializing, networking, seeing, and being seen), ensured that bathing was a relaxed, potentially intimate, and important social event. Over time, these characteristics led to bathing becoming a daily habit ingrained in the social flow of Roman society, which in turn caused the facilities, both bathing and secondary, to be expanded and improved. As the secondary facilities and services expanded, people would have even more reason to spend more time in the pleasant environment of the baths (they could eat, drink, exercise, primp, study, and socialize all in the one building). The extreme popularity of the baths led emperors, local officials, and other rich benefactors to construct and maintain ever larger and awe-inspiring edifices, for both the public benefit and to increase their reputation among the populous. By offering heavily subsidized or even free entry, they could further enhance the positive effect for both themselves and the baths. This cycle fed on itself for centuries, and the public baths became arguably the dominant social and cultural institution in the Roman world, to the extent that by the late Roman period, the largest baths in some towns had overtaken several of the social and political functions of the forum.

Future Directions

With the relatively recent surge in bath-related scholarship, our knowledge of Roman baths and

bathing has increased markedly. However, there is still plenty of important work to do, especially at the individual, local, and regional levels. Thanks to the central and long-lived role baths played in Roman society (both in the heartland and the provinces), their ubiquitousness within most settlements, and the sturdy nature of their construction, new evidence for baths is regularly being uncovered. Improved excavation and data collection techniques ensure that the baths being excavated today can provide us with much more information than was previously possible. This, coupled with an abundance of previously exposed material that has either never been published or only summarily published, means there is fundamental work to do at the level of individual bathing establishments.

Similarly, while many have examined baths at local and regional levels in the past, there is a great disparity in the quantity and quality of work that has been done. By gaining deeper understandings at the local and regional levels (where there is quite a lot of variation), we will be in a much stronger position to discuss how the baths and Roman bathing culture were integrated and utilized in the disparate corners of the Empire.

At the general level, fundamental questions concerning origins, development, transformation, and decline are still open for further discussion, and there remains more to learn about the functioning of baths in their various contexts, their decoration, secondary facilities, and post-Roman existence, particularly in the West.

In a topic so universal and fundamental to the Roman experience as the baths, the potential and importance of continued study is clear. Future directions for balneological studies are almost as numerous as the baths themselves. Evidence, both old and new and archaeological and literary, needs to be (re)appraised using current analytical methods and theoretical frameworks. Coupled with the magnificent opportunities provided by advances in digital technology and cloud computing, there is tremendous potential for different questions to be asked and new perspectives to be gained in the world of Roman bathing.

One such digital project, to be undertaken by the author, is an online catalog of Greek and Roman baths. Previously, two major general catalogs of Roman baths have been compiled featuring baths from throughout the Empire: Manderscheid (1988/2004), which is in essence a collection of bibliographic references but also works as a catalog, and Nielsen (1990), who cataloged 387 baths. Due to their wide-ranging nature, self-imposed limits, and increasing age, these lists are invariably incomplete, but they nevertheless provide an excellent starting point for future research. Building on these solid foundations, the author is in the very early stages of developing and implementing a multirelational online database to allow information on baths, Roman and otherwise, from all over the Mediterranean and beyond to be cataloged and available in a freely accessible and easily updatable website. The author will add more information about this online database as work progresses.

Cross-References

- ▶ Architecture, Roman
- ▶ Baths and Bathing, Greek
- ▶ Urban Planning, Roman

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Battlefield Archaeology

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Introduction

A dedicated archaeological approach to the study of historic battlefields is a recent development, beginning with work at the Little Bighorn, USA battlefield in the 1980s where the methodology of using metal detectors to locate spent bullets was first applied. Since then, it has spread to the UK and mainland Europe, with some work in other parts of the globe. While the battlefield archaeology community is still relatively small, interest in the field has grown so it now can boast regular conference series and a dedicated journal, as well as more than one course of formal study.

Definition

Battlefield archaeology is a term used in two ways. In one – very specific – sense (and the one used in this entry), it is the application of particular techniques to study the material residues of past battles. As used in this sense, it focuses upon sites where armies came together to engage in a formalized style of fighting which was heavily rule bound and sanctioned. Battlefield archaeology generally therefore excludes sites of conflict between less organized bodies of armed people such as uprisings and revolts,

Battlefield Archaeology, Fig. 1 Metal detector survey at the Oudenaarde battlefield, Belgium, September 2011

sieges, and smaller and more fluid military actions such as skirmishes.

In a second, looser, sense it covers the archaeological study of all aspects of conflict from the most ancient to the most recent, regardless of period or style, and not limited to sites of violence but extending to military encampments and bases, issues of logistics, prisoner-of-war camps, and the location and reburial of the dead from past wars. The currently preferred term for this wider concern is "conflict archaeology," with "battlefield archaeology" reserved for its more specific sense (Fig. 1).

The archaeology of historic battlefields requires, as well as the usual skills of the archaeologist, a specific set of techniques and technology. While some battlefields will contain built features – trenches, walls, palisades, and other earthworks, buildings, and mass graves – to be surveyed, excavated, and interpreted in accordance with standard archaeological practice, others do not. For these, the primary evidence will come from scatters of material left in the topsoil or plowsoil and detectable by metal detector. The evidence that is available will depend upon the period of the fight, the weapons used, the type of action – whether mainly infantry or mainly cavalry – and postdeposition factors that will determine survivability. As well as soil chemistry, overbuilding, and changes in land use, the effects of collecting and looting will have significant impacts upon the material.

Historical Background

While battles as events have been the focus of historical interest since the discipline of history was first invented, a specific interest in the material record of battlefields took longer to develop. Early efforts include those of Edward Fitzgerald from 1842, whose work at Naseby in England includes the recording of field names and other topographical features, drawing the contemporary appearance of the landscape, noting where local people had found artifacts from the battle, and recording where local tradition placed particular events of the battle. Fitzgerald's work went on to include the digging of test pits and finding a mass grave. At about the same time, Richard Brooke was pursuing his interest in the battlefields of the Wars of the Roses, inspired in him by his birth near the site of the battle of Stoke. His *Visits to the Battlefields in England of the Fifteenth Century* comprises largely discussions of the historical sources he drew upon and concerns the events of the fight and the names of the prominent killed and

wounded. He does, however, provide useful sketch maps of each site, some of which are of more practical use today than more modern ones.

Subsequent interest has largely remained in the realm of Brooke's primary concern, of identifying the places where battles took place, rather than using them as research objects in their own right. Once identified, the tendency is to assume that the landscape as seen today is similar – if not identical – to that on the day of the battle. As Foard makes clear in his criticism of both the standard form of battlefield "guide" and the English Heritage *Register* (1995) which so closely resembles such guides, most publications on battlefields continue to "place stylised battle formations and key topographical features... almost arbitrarily against a modern map base" (Foard 2001: 88). Frequently, however, students of military history have taken the trouble to visit the sites of the battles they discuss and to relate the topography to contemporary accounts. Nevertheless, the primary focus has always been upon the literary evidence for battle action, rather than what evidence the place itself could provide.

However, a group of unrelated twentieth-century research moved closer to a direct concern with the battlefield itself, and while all have much to teach us in pursuing this field, only the last has led to the recent explosion of interest in battlefield archaeology. The first exercise in battlefield archaeology in the twentieth century took place in the late 1950s and early 1960s, when the then military government of Portugal sought – among other things – to celebrate Portugal's military past by promoting the deeds of its medieval chivalry. Excavations in advance of building a monument and a museum at the site of the battle of Aljubarotta, where Portugal first emerged as an independent state, revealed a mass grave and battlefield features. This exercise in battlefield archaeology has gone largely unnoticed by the battlefield archaeology community. A decade later in England, work at Marston Moor (an English Civil War battle site) and roughly contemporary geological work at Maldon (site of a Viking attack on the East Saxons, CE 991), testify to the importance of topographical research and careful reconstruction of the historic landscape by revealing how accounts based upon the modern appearance can be highly misleading. At Marston Moor, the realization that the sunken road which played such a large part in nineteenth- and twentieth-century accounts of the battle was a feature added in the eighteenth century (and therefore was not present on the day of the battle) altered understanding of contemporary seventeenth-century accounts. At Maldon, confirmation that a significant change in sea level had occurred from the tenth century to the twentieth forced a reassessment of the one contemporary account of the battle; this in turn required the removal from the accepted story of the battle several events which had been added later to allow the modern appearance of the site to fit the ancient account (see Carman & Carman 2006: 7-8).

The combination of careful recording of artifact scatters, topographic research, and the search for remains of the dead at the Little Bighorn site in the USA (Scott et al. 1989) finally brought battlefield archaeology attention, and these techniques have since been applied in the USA at Palo Alto, Texas (Haecker & Mauck 1997), in the UK at Towton (Fiorato et al. 2000), and elsewhere (e.g., see Freeman & Pollard 2001; Pollard & Banks 2006; Scott et al. 2007). As a result of successful battlefield archaeology projects in a number of countries, the number of specialist battlefield archaeologists in Europe has grown over the years and the field is increasingly recognized as one of significance. The most recent *Fields of Conflict* conference – the leading conference in the field – held in Germany had participants from 14 countries of Europe as well as the USA and Canada.

Key Issues and Current Debates

Practitioners of battlefield archaeology have in general been more concerned with issues of methodology than other aspects of the field. In part, this is because the techniques are still under development and – although there is general agreement on the approach to be taken – questions arise as to specifics. In part, it

is because both the underlying purpose of battlefield archaeology and the underlying theory go unquestioned. The purpose is generally taken to be to provide an insight into past military practice, drawing on inspiration from military history. The theoretical approach, whether acknowledged or not, is an overtly processualist one, deriving directly from the search for "patterns" – as evident in the work on the Little Bighorn site. Despite the expressly anthropological concerns of that research, more recent attempts to incorporate anthropological theories of war into the field (e.g., Carman & Carman 2006) have generally been resisted.

The much-cited book *Archaeological Perspectives on the Battle of the Little Bighorn* (Scott et al. 1989) is largely the inspiration for the rise of battlefield archaeology over the past two decades. Taking advantage of the cutting of the grass at the Custer Memorial site, Scott and his colleagues used metal detectors to trace the fall of bullets and the ejection of cartridges across the space of the fight between units of the seventh US Cavalry and Lakota and Cheyenne warriors. Differences in weapons used by one group of participants from those used by others allowed the researchers to identify Native American shot from that of the soldiers, and the distribution especially of cartridge cases across the space identified the movement of individual weapons – and therefore of men and formations – through the space. From this, a model of the sequence of events emerged which confirmed Native American accounts frequently dismissed. Other work on soldier burial sites allowed also the identification of individuals, the opportunity to infer the location of the bodies of missing soldiers, and the chance to develop a picture of the "typical" soldier for the late nineteenth century in North America. In particular, the researchers sought to identify the "patterns" revealed by the distribution of bullets across the space: the "static" pattern of the present distribution of bullets and casings, the "dynamic" pattern of movement through space this represented, and from this the standardized "post-Civil War battlefield pattern" of military behavior that would provide a model for interpreting other sites of the period.

A combination of discussions by Pratt and Sivilich (see papers in Scott et al. 2007) allows an appreciation of the techniques of battlefield archaeology as they have developed since the 1980s. Pratt outlines an effective survey technique by metal detector, whereby two operators survey an area, each using a different machine and at a 90° angle to one another, locating individual finds on a GPS recorder. As he puts it, by using this survey technique, "coverage [of ground] is improved and typically result[s in an] increase of collected artifacts or more thoroughly substantiates the lack of metal remains" (Scott et al. 2007: 8). Sivilich in the same volume provides a useful survey of what can be learned from musket balls deposited on pre- to mid-nineteenth-century battlefield sites, which (because they are used in smooth-bored weapons and are lacking the distinctive features of rifle markings) cannot be associated with individual weapons. These include an idea of the type of weapon for which the ball was made, derived from its diameter and weight. Similarly, it is possible to identify whether it had been fired – from scorching and powder burns on one side and the distinctive "ring" around the center caused by scraping along the inside of the gun barrel – or dropped, by the continued presence of mold seams and sprues from manufacture. A scatter of fired bullets can be assumed to have been aimed at a target but to have missed it unless deformed and to have traveled beyond it, whereas bullets fired and deformed may have hit the target but with insufficient force to cause harm: A combination of this information may indicate where the soldiers being fired at stood. A scatter of dropped bullets may indicate where firing soldiers stood. A particular development has been experimental work on firearms in order to ascertain what finds of shot on sites of battle may indicate. It is clear that fired bullets discovered by metal detector will mostly have failed to hit a target, but what is not immediately obvious is how far the bullet may have traveled beyond where any target was standing and how it may have been deflected by bouncing. Examples include work on case shot and on eighteenth-century muskets in the USA. Although not – as at Little Bighorn – indicating

the movement of weapons and therefore individuals through the battlefield space, this kind of information can inform an understanding of the placement of troops during the action.

A central issue remains the search for sites to investigate. The precise location of battles from earlier historical periods is rarely known from written records, and much effort can be spent in locating them. In recent years, two battles from the Roman period have been securely located entirely by archaeological effort, both in northern Germany: Kalkriese, the site of the destruction of Varus' three legions in CE 9 (Rost 2007; Wilbers-Rost 2007), and a previously unknown action from the third century CE at Harzhorn. In both cases, scatters of material brought archaeologists to the site, and careful analysis of the distribution allowed an understanding of the fight to be constructed. At Kalkriese, excavations brought to light the barrier constructed by the Germans to prevent the escape of Roman troops into the surrounding country, thereby trapping them between attackers and swampy ground.

Elsewhere, a combination of material scatters and close reading of the available textual evidence allowed the identification of the likely site of the eleventh-century CE battle of Fulford in England (Jones 2011). Close reading of topographic descriptions contained in the main contemporary texts allowed the identification of likely locations. Environmental and other survey then established the extent to which each of them might match the description given in those texts. Survey by metal detector then sought to locate the material evidence at each site that a battle of the period had taken place. What was found – rather than scatters of weaponry such as arrowheads, broken swords, and spears – was intensive evidence of metalworking, including artifacts such as anvils and other metalworking tools, the bases of hearths, and incomplete and unfinished metal objects such as arrowheads. In similar vein – but also including an explicit search for evidence of fighting – the much later battle of Bosworth was finally located only in 2009 after extensive topographical research supported by metal detector survey.

The problems of investigating earlier sites are well recognized by battlefield archaeologists. It is therefore no surprise that the bulk of battlefield research focuses on later periods, where the location of actions is more firmly established. Such work covers the periods from the sixteenth to the nineteenth centuries, with clusters around certain periods within that time frame. Here, other questions dominate. In particular, in an effort to establish the value and legitimacy of battlefield research, effort has been spent on proving the techniques of battlefield archaeology to official agencies who are then encouraged to arrange for the preservation of key sites so that they will in turn become available for investigation and study.

However, battlefield archaeology is no more than 15 years old in Europe and is still young as a specialized field. Techniques are increasingly well established, an increasing number of scholars are taking an interest, and broader research questions – such as the development of gunpowder warfare from the fifteenth to seventeenth centuries – are emerging. Although a close-knit community of battlefield archaeologists has been formed, especially through the *Fields of Conflict* conferences from 2001, the largest impact of developments in the field has yet to be recognized, and the recognition by official agencies of the value of this kind of work has also yet to be achieved beyond English-speaking countries.

International Perspectives

Battlefield archaeology was until recently an entirely Anglophone field, limited to American, Irish, and British archaeologists. However, it is now a global field with practitioners from all across Europe and beyond.

In the USA, much work focuses on battles from the nineteenth century. The work at the Little Bighorn site established the basic techniques of battlefield survey by metal detector and established the value of such an approach (Scott et al. 1989). Such work has since expanded to the battles of the American Civil War (Geier & Potter 2001) and to other military actions against Native Americans (see papers in Scott et al. 2007).

In much of Europe, the focus lies upon earlier periods – especially the seventeenth and eighteenth centuries. The last battles in England and Scotland were fought in 1685 and 1746, respectively, and so British battlefield archaeology in particular has focused on these centuries. Foard has worked extensively on the battlefields of Naseby and especially Edgehill, both of the English Civil War of the mid-seventeenth century. Edgehill remains the only early modern battlefield to have been subject to total survey, following extensive historical and topographical research to reconstruct the seventeenth-century landscape. This, together with metal detector survey, established that the traditional accounts of the battle were seriously wrong in the way they positioned troops, affecting any understanding of the course of the action (Foard 2005). Work at Naseby also provided a revised sequence for the battle, including evidence for initial success by Royalist infantry, and their "fighting retreat" after subsequent defeat (http://battlefieldstrust.com/). At Culloden in Scotland, survey in advance of the construction of a new visitor's center soon established that the traditional accounts of the action and its limitation to certain ground only were incorrect (Pollard 2006). Elsewhere in Europe, research on battlefields of these periods has been carried out and is ongoing in Belgium at Oudenaarde, in Germany at Lützen, in the Ukraine at Poltava, in Sweden at Landskrona (Knarrström 2006), and in Spain at Almenar and Talamanca (Rubio 2008).

A limited amount of work has been undertaken beyond North America and Europe, including preliminary surveys of nineteenth-century battlefields in South America (Pollard 2007).

Future Directions

The identification of unknown or disputed sites has led battlefield archaeologists into periods otherwise little examined and where it is uncertain what material residues of conflict may be encountered. These "signatures" (Sutherland & Holst 2005) are well known for battles of the seventeenth to nineteenth centuries where firearms predominate, but for earlier periods are less clear. The work at both Kalkriese (CE 9) and Fulford (1066) suggest that a key indicator of early battle sites may not be deposits of weapons, such as arrowheads, or of human remains, as at Towton (1461), but evidence of prebattle metalworking.

Some historic periods suffer from a lack of explicit focus. The sixteenth century in Europe, although a period that may be considered significant in terms of a shift of warfare style from "shock" to gunpowder and the commencement of Europe's global expansion as a colonizing force, is relatively untouched apart from studies of fortifications or shipping. However, work on sites related to Spanish expeditions into North America in this period provides an interesting alternative approach (see Scott et al. 2007). The late nineteenth century is also low in coverage, except for North American conflict with Native Americans: This may partly be explained by the generally successful exportation of warfare by the major European states to colonial contexts from the close of the Napoleonic Wars to 1914. There are some exceptions to this general rule such as the Crimean War, the Franco-Austrian and Franco-Prussian Wars, and the wars of German and other national unifications from mid-century, although these too remain largely unexamined from an archaeological perspective. Consequently, there is a chronological leap from the eighteenth century to the twentieth century, the latter forming an entirely separate area of study from that of the historic period (Schofield et al. 2002).

Further developments which are beginning to emerge include the recognition that the archaeology of periods beyond those of the historic may have things to contribute to the study of historic battlefields (Carman 2012). However, the battlefield archaeology of more recent periods remains an issue to be addressed: The standard techniques of battlefield archaeology – landscape regression and metal detector survey – do not necessarily lend themselves well to reinterpretations of the sites of the large and highly technological warfare of the last century, confirming this as a separate field of investigation.

Cross-References

▶ Fortifications, Archaeology of
▶ Metal Detecting in Archaeology

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Bauer, Alexander

Alexander A. Bauer
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Basic Biographical Information

Alexander A. Bauer is an archaeologist whose research foci are the archaeology of the Near East and Eurasia, ancient trade, archaeological method and theory, archaeological ethics, and cultural heritage law and policy. Having studied the prehistory of the eastern Mediterranean as an undergraduate in the Department of Classical and Near Eastern Archaeology at Bryn Mawr College with professors James C. Wright and J.P. Dessel, he earned his Ph.D. in anthropology at the University of Pennsylvania in 2006, where he studied interregional interaction during the pre-Colonial period of the Black Sea region, first under the guidance of Dr. Fredrik T. Hiebert and then Dr. Robert W. Preucel. He is currently an assistant professor of anthropology at Queens College and the Graduate Center of the City University of New York.

Major Accomplishments

Since 2005, Dr. Bauer has served as the editor (in chief) of the *International Journal of Cultural Property*, an interdisciplinary journal on cultural heritage law and policy. He has conducted fieldwork in Greece, Israel, Jordan, the United States, and Turkey, where he is currently associate director of the Sinop Regional Archaeological Project, under the direction of Dr. Owen Doonan. He has served as a senior editor of the second edition of the *Oxford Companion to Archaeology* (Oxford University Press, 2012). His 2001 article with Robert W. Preucel entitled "Archaeological Pragmatics" was among the first archaeological engagements with Peircean semiotics, and since then, he has continued to research and write on its utility for archaeology.

Cross-References

▶ Cultural Property, Trade, and Trafficking: Introduction
▶ Ethics in Archaeology
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Beach, Timothy

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Basic Biographical Information

Timothy Beach is a geographer who uses geoarchaeological techniques, such as archaeological geomorphology and pedology, to illuminate the dynamic interrelationships between ancient humans and their environments. Originally from California, he earned his Ph.D. in Geography from the University of Minnesota in 1989, concentrating on geomorphology, soils, and geology. He has taught at Georgetown University in Washington, DC, since 1993, where he currently holds the Cinco Hermanos Chair in Environment and International Affairs. He is also Professor of Geography and Geoscience in the Science, Technology, and International Affairs program at Georgetown's well-known School of Foreign Service. Previously, he was for 8 years the Director of the Center for the Environment at Georgetown. He has been awarded a John Simon Guggenheim Fellowship and has held a Dumbarton Oaks Fellowship in Pre-Columbian Studies. In 2006, he was elected a Fellow of the American Association for the Advancement of Science.

Beach has worked in the United States, Germany, Syria, and Iceland. He has performed fieldwork at important archaeological sites in Turkey (e.g., Beach & Luzzadder-Beach 2008), but the majority of his research, and that for which he is best known, has been carried out in the ancient Maya lowlands, in Mexico, Guatemala, and Belize. In this region, he has participated in many research projects that have focused on different sites to address varied but interrelated scientific problems using a wide range of field and laboratory techniques. Through interdisciplinary collaborations, he has made major contributions to our understanding of ancient Maya climate, agriculture, agricultural intensification, and the development of anthropogenic soils and landscapes. These studies have allowed him to significantly influence the debates surrounding both the origins and collapse of ancient Maya civilization as well as its economy and adaptation (Fig. 1).

Major Accomplishments

In the state of Yucatán, Mexico, he has worked extensively at the important Classic site of Chunchucmil (e.g., Beach 1998), where he has helped elucidate the paradox of an enormous and populous archaeological site situated in a region with low agricultural potential. At Mayapán, also in Yucatán, he has studied the extensive black earth midden that blankets most of the 4 km^2 ceremonial and residential zone of the site, a mysterious anomaly in the region.

His and his colleagues' extensive work in the Pasión River region around Dos Pilas in the Department of Petén, Guatemala, has helped clarify the complexity of the Classic Maya collapse. In contrast to previous paleoclimatic studies that implicated drought as the primary cause of societal implosion at the end of the Classic period (c. CE 800–900), Beach and his colleagues found little evidence for drying. Nor did they find significant evidence for environmental degradation, such as accelerated soil erosion, during the peak of population in the Late Classic period, another favored environmental explanation of the collapse (e.g., Dunning et al. 1998). Subsequently, Beach's intensive research in northwest Belize has reinforced the inference that the Maya collapse was not triggered by a singular, apocalyptic event, such as a drought, or even by a series of them; instead, it was a complex, long-term, and heterogeneous set of processes without a prime mover (Dunning et al. 2012; Luzzadder-Beach et al. 2012).

His work in northwest Belize in the vicinity of Blue Creek has also helped resolve a sometimes contentious dispute about the nature of Maya agricultural intensification. Previous researchers viewed the ancient Maya wetland fields either as similar to the Aztec raised fields in the Valley of Mexico or as a largely natural phenomenon caused

Beach, Timothy, Fig. 1 Map of the Maya region showing important sites where Timothy Beach has carried out geoarchaeological research

by a combination of sea-level rise and associated landscape aggradation. Beach and his colleagues have shown, however, that their more extensive data sets can be better explained by new models that combine elements of both older models with evidence for additional variations in patterns and methods of field construction (e.g., Beach et al. 2009). This work has also clarified the timing and mechanisms of landscape aggradation in the region, which can now be attributed primarily to gypsum precipitation caused by a rising water table, although other factors contributed to a lesser degree (Luzzadder-Beach & Beach 2009).

Beach and his colleagues' work in the large karst depressions that occupy some 40 % of the Maya lowlands, known locally as *bajos*, has contributed evidence that these features played an important ecological role in the development of Maya civilization in the Preclassic period (Dunning et al. 2002). Previously, some scholars had argued that these wetlands were marginal environments of little direct significance to Maya cultural evolution.

Beach's scholarship cannot be understood in isolation, for he has collaborated closely with a number of geographers and archaeologists. Among these collaborations, the closest and most persistent has been that with his partner, Sheryl Luzzadder-Beach, a Professor of Geography at George Mason University in Virginia who specializes in hydrology and water chemistry. Beach has also worked closely with Nicholas P. Dunning, a geographer with similar interests at the University of Cincinnati. Beach's partnerships with archaeologists such as Stephen Houston, Arthur Demarest, Thomas Guderjan, and the late Bruce Dahlin undoubtedly influenced his research by stimulating interactions with specialists investigating related questions using different approaches.

In summary, Tim Beach has contributed significantly to our understanding of ancient Maya civilization. He has helped to dispel the myth of the "pristine landscape," according to which American Indians had only a minimal impact on their environment. Beach's overarching contribution has been to show how the geosciences can paint a detailed and nuanced portrait of cultural ecological history that does not succumb to an overly simplistic environmental determinism. His work illustrates how such a portrait can be realistic, scientific, and humanistic when colored by a fine appreciation of the complexity of human agency and filled in by sufficiently detailed and diverse data.

Cross-References

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- ▶ Amazonian Dark Earths: Geoarchaeology
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- ▶ Archaeological Chemistry: Definition
- ▶ Chan: A Tropical Rain Forest Site in Belize
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Karstic Landscapes: Geoarchaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
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Beans: Origins and Development

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Basic Species Information

The genus *Phaseolus* comprises some 70–80 species (Freytag & Debouck 2002), distributed exclusively in the Americas (Delgado Salinas et al. 2006) but with a clear focal point in Mexico and Central America. This region contains the largest number of species of the genus; it also harbors a very diverse range of environments in which the genus *Phaseolus* radiated following the last major tectonic event, namely, the appearance of the Transverse Volcanic Axis in Mexico. It is in this diverse landscape that five *Phaseolus* species were domesticated (Fig. 1). Of these five species, common bean (*P. vulgaris*) is by far the one with the broadest geographic distribution (Fig. 2) and largest agronomic, nutritional, and economic impact. Other domesticated species are

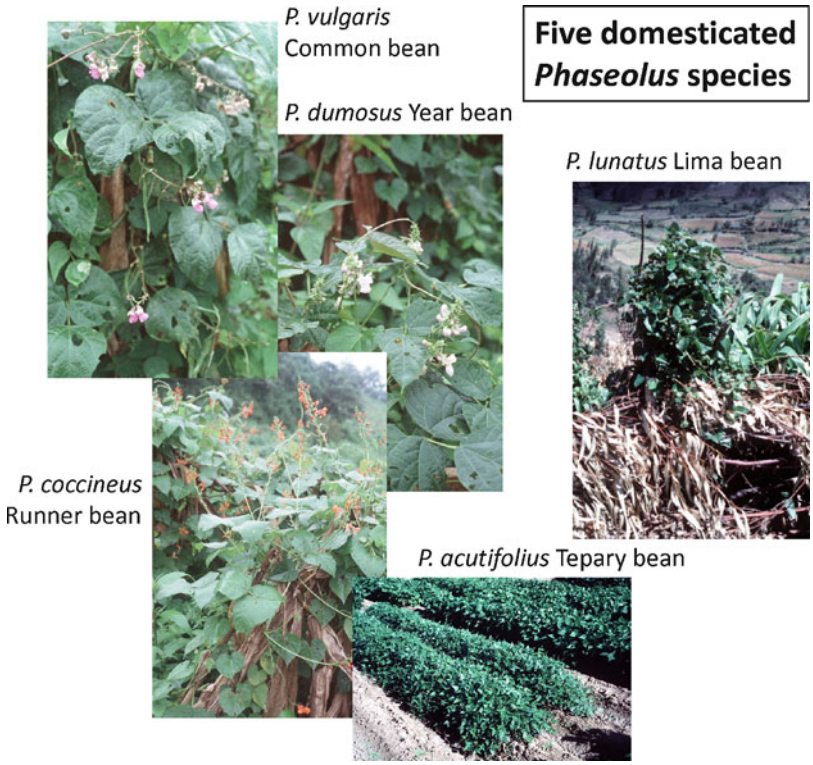

Beans: Origins and Development,
Fig. 1 Five domesticated *Phaseolus* species. Lima bean is phylogenetically more distant from the other four species

runner bean (*P. coccineus*), tepary bean (*P. acutifolius*), lima bean (*P. lunatus*), and year bean (*P. dumosus*). In addition to the Mesoamerican domestications, two additional domestications took place in the Andes, one each for common bean (southern Andes, between southern Peru and northwestern Argentina) and lima bean (western Ecuador).

The five domesticated *Phaseolus* species have overlapping, yet distinct, geographic distributions, ecological adaptations, life histories, and reproductive systems (Table 1 and Fig. 2). Common bean grows in mesic environments (i.e., at intermediate temperatures [yearly average of 24 °C] and rainfalls [around 600 mm/year]) at the transition between dry, deciduous, and pine forests. This species is annual with cycle lengths for most varieties from 80 to 120 days. Its reproductive system is primarily autogamous.

Nevertheless, bursts of outcrossing can take place occasionally, which can significantly affect the distribution of genetic diversity within and among populations (Papa et al. 2005; Zizumbo-Villarreal et al. 2005). Runner bean is the domesticated bean species with adaptation to the coolest (and humid) environments. Its tuberous root system, in addition, provides a way for plants to survive winter frosts as new stems can regrow from the roots. Thus, this species is also perennial, surviving for several years. It is an allogamous species, which relies obligatorily on foraging by carpenter bees and humming birds for seed production (Búrquez & Sarukhán 1980). In contrast with runner bean, tepary bean originated in warmer, arid environments. It is a short-lived (part of its drought adaptation) annual species, with a highly selfing (even cleistogamous) reproductive system. Lima bean is perhaps the species with the broadest adaptation of all five domesticated species. It is generally grown in warmer, more humid environments. It is a long-lived, annual species with a mixed autogamous-allogamous reproductive

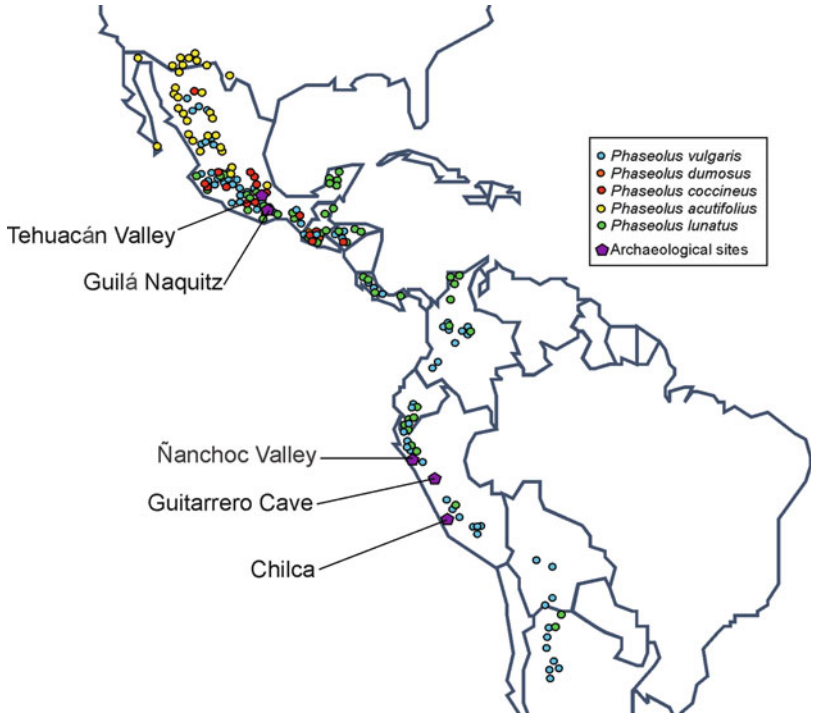

Beans: Origins and Development, Fig. 2 Geographic distribution of the wild progenitors of the five domesticated *Phaseolus* species and sites with the oldest *Phaseolus* archaeobotanical remains (see Table 2)

Beans: Origins and Development, Table 1 Comparative of five domesticated *Phaseolus* species

	Common bean	Year bean	Runner bean	Tepary bean	Lima bean
Growth habit	Upright bush to climbing; includes bush determinate	Climbing	Mostly climbing; some bush, including bush determinate	Prostrate bush	Upright bush to climbing; includes bush determinate
Reproduction	Predominantly selfing	Predominantly outcrossing	Predominantly outcrossing	Selfing, cleistogamous	Selfing to outcrossing
Adaptation	Mesic	Mesic to cool	Cool, humid	Hot, dry	Selfing to outcrossing
Number of domestications	2	1	1 or 2	1	2
Locations of domestication	West-central Mexico	Guatemala	Mexico	Northwest Mexico	Mesoamerica and Ecuador/N. Peru

system. Finally, as a stabilized hybrid between common and runner beans, the year bean has intermediate characteristics between these two parental species.

Domestication has induced drastic changes in the two most domesticated *Phaseolus* species, common and lima bean. These two species show the full array of traits characteristic of crop domestication (the "domestication syndrome"). In these seed-propagated crops, two domestication traits stand out. Compared to their wild progenitors, domesticated varieties show a reduction or elimination of seed dormancy and dispersal. As a consequence, domesticated common and lima beans have ready germination and limited grain loses from premature pod shattering. In addition, in contrast with wild ancestors, which have exclusively a climbing, viny growth habit with indeterminate branches, these two domesticates' growth habits

range from viny to a more compact growth habit with fewer and shorter branches. In some cases, domesticated varieties have a bush growth habit and determinate branches. This trend to smaller plants correlates with a more precocious life cycle, an essential characteristic of most agricultural production systems. Additional changes included gigantism (increase in organ size, especially pods and seeds); development of photoperiod insensitivity, which broadened latitudinal adaptation; acquisition of broad phenotypic diversity for the principal harvested organ pods and especially seeds (e.g., the colorful array of domesticated bean seeds) as a result of selection for novelty; and reduction in toxic compounds, such as the cyanogenic glycosides in lima bean. The inheritance of the domestication syndrome has been investigated in common bean (Koinange et al. 1996). The results show that the inheritance of the domestication syndrome in common bean was relatively simple genetically; few, major genes were responsible for a majority of the phenotypic variation (i.e., domestication traits have a generally high heritability). In addition, these genes are distributed on few chromosomes, and several crucial genes seem to be loosely linked. This genetic architecture would allow a relatively speedy evolution under domestication, provided selection was applied regularly and with sufficient strength (Gepts 2004).

Timing and Tracking Domestication

Molecular analyses in wild and domesticated forms of the various domesticated *Phaseolus* species have provided a picture of "hyperdomestication" in the genus. Not only are there five different domesticated species, but two species – common and lima bean – have been domesticated twice (Fig. 1). Common bean was domesticated in western Mexico and the southern Andes (Kwak et al. 2009; Kwak & Gepts 2009; Chacón et al. 2005). Likewise, lima bean was domesticated in Mexico and Ecuador (Gutiérrez-Salgado et al. 1995; Serrano-Serrano et al. 2012). In both species, these two domestications occurred in distinct geographic regions from already diverged wild progenitors (named the Mesoamerican and Andean gene pools). Runner bean was domesticated once (and possibly twice) in Mexico (Angioi et al. 2009). In contrast, both tepary and year bean were domesticated only once, in northwestern Mexico and Guatemala, respectively (Schinkel & Gepts 1988, 1989; Freytag & Debouck 2002; Blair et al. 2012). Within species, some traits have appeared multiple times, adding to the picture of hyperdomestication. One example in common bean is the multiple origin of the determinacy, which originated independently four times in the Andean gene pool and once in the Andean gene pool, based on DNA sequence data of the gene responsible for the determinacy phenotype (Kwak et al. 2012). This sequence or a related one is also responsible for the presence of determinacy in Mesoamerican and Andean lima beans and in runner bean.

The overall picture created by these domestication studies is one in which farmers have actively shaped the domesticated diversity of beans at multiple taxonomic levels and times and in different areas of the Americas where the genus *Phaseolus* originated. Rather than relying on a single domesticate such as in maize, farmers have adopted different bean species for cultivation in different environments and have further selected – presumably independently – similar phenotypic variation. This may have been made possible by the relatively young age of the genus *Phaseolus* (4–5 Ma; Delgado Salinas et al. 2006) such that the domestication potential was maintained in part of the genus, while allowing for the development of differential adaptation among species (Kwak et al. 2012).

Archaeological and linguistic data point to the antiquity of bean cultivation both in Mesoamerica and Andean South America. The first archaeobotanical remains of *Phaseolus* were identified in Peru in the nineteenth century (de Candolle 1882). Since then, additional remains have been obtained in both regions (Table 2 and Fig. 2), the oldest of which suggests a presence of domesticated forms by 8,000 years B.P. (^{14}C age) in Peru but only 2,300 years B.P. (^{14}C age) in Mexico. Glottochronological analyses show that

Beans: Origins and Development, Table 2 Oldest archaeobotanical remains of *Phaseolus* spp.

Location	Taxon (status)	Type	^{14}C Age (year B.P.)	Age (year cal. B.P.)	Source
Andes					
Ñanchoc Valley, Peru	*Phaseolus sp.* (domesticated)	Starch grains from teeth calculus	8,210–6,970	8,600–7,000	Piperno & Dillehay 2008
Chilca, Peru	*P. lunatus* (domesticated)	Pod, non-carbonized	5,600	6,400	Kaplan & Lynch 1999
Guitarrero Cave, Peru	*P. vulgaris* (domesticated)	Seed, non-carbonized	4,300	5,000	Kaplan & Lynch 1999
Mesoamerica					
Oaxaca Valley, Mexico	Phaseolinae (wild)	Seed and pod, non-carbonized	7,600	8,300	Kaplan & Lynch 1999
Tehuacán Valley, Mexico	*P. vulgaris* (domesticated)	Pod, non-carbonized	2,285	2,300	Kaplan & Lynch 1999
Tehuacán Valley, Mexico	*P. acutifolius* (domesticated)	Seed, non-carbonized	2,360	2,400	Kaplan & Lynch 1999
Tehuacán Valley, Mexico	*P. coccineus* (domesticated)	Seed, non-carbonized	410	500	Kaplan & Lynch 1999

the oldest language for which a term for bean has been identified is a Proto-Mayan language (3,400 B.P.; Brown 2006).

The fact that the oldest age available was obtained from micro-remains rather than macro-remains and the glottochronological data suggests that current dates for bean domestication are most likely underestimates. Furthermore, many of the remains originated in very arid areas, outside the distribution of wild progenitors and putative domestication areas determined by genetic means (e.g., west-central Mexico for one of the two common bean domestications: Kwak et al. 2009). Thus, a more active search for archaeobotanical micro-remains (starch grains, phytoliths) in late pre-agricultural or early agricultural contexts should be pursued.

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- ▶ Agriculture: Definition and Overview
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- ▶ Maize: Origins and Development
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Basic Biographical Information

Mary Carolyn Beaudry is an anthropological archaeologist who has specialized in historical archaeology, mainly in the eastern United States, and has made broad theoretical and practical contributions to household archaeology, the archaeology of gender and inequality, and archaeological material culture studies.

Beaudry received her first degree in Anthropology from the College of William and Mary (1973) and her M.A. (1975) and Ph.D. (1980) in Anthropology from Brown University. Beaudry was advised at Brown by James Deetz, who made a long-lasting impact on her research: an influence most visible in her doctoral thesis, *"Or What Else You Please to Call It": Folk Semantic Domains in Early Virginia Probate Inventories* – which used probate inventories to study the material culture of Virginian households in the seventeenth and eighteenth centuries.

A period working in the cultural resource management sector during the 1980s led to a series of scholarly publications, most notably the 3-volume *Interdisciplinary Investigations of the Boott Mills, Lowell, Massachusetts*, which was edited by Steve Mrozowski. In this publication, Beaudry pioneered methods of associating excavated assemblages with historical households, reconstructed from documentary sources. In 1996, her account of the "boarding households" of nineteenth-century Lowell, written to Mrozowski and Grace Ziesing, contributed an important empirical case study to the development of the archaeology of gender in the United States. Beaudry's edited volume, *Documentary Archaeology in the New World*, developed her interests in the archaeological use of historical documents further.

Major Accomplishments

Beaudry's research into material culture has developed in both theoretical directions – for example, in her 2001 paper with Anne Yentsch on "American Material Culture in Mind, Thought, and Deed" or in her coedited volume *The Oxford Handbook of Material Culture Studies* (2010, edited with Dan Hicks) – and in more applied directions, for example, with her introduction to *Findings: The Material Culture of Needlework and Sewing* (2006). A central theme in such work has been the idea that archaeological material culture can provide distinctive insights into otherwise undocumented lives.

Her most sustained contributions to archaeology have, however, been a series of influential reflections on method and theory in historical archaeology – from her 1996 account of "reinventing historical archaeology" to her coedited *Cambridge Companion to Historical Archaeology* (2006, edited with Dan Hicks).

Beaudry has been an active member of the Society for Historical Archaeology (serving as President in 1989), as well as the Council for Northeast Historical Archaeology, and has been a leading figure in the development of international collaborations and exchanges in historical archaeology, especially between the UK and the USA. While Beaudry's fieldwork has led her as far afield as the Outer Hebrides and Montserrat, it is her sustained contributions to the archaeology of early American life in the eastern United States and to the archaeology of gender and households that has dominated her publication record.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archival Research and Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Consumption, Archaeology of
- ▶ Deetz, James (Historical Archaeology)
- ▶ Engendering Historical Archaeology
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Labor Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Plimoth Plantation: Public Archaeology
- ▶ Semiotics in Archaeological Theory
- ▶ Social Identity in Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Urban Archaeology

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Beazley, Sir John Davidson

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Basic Biographical Information

Sir John Davidson Beazley (1885–1970) was a founding figure in the modern study of Greek ceramics. Building on (then innovative) nineteenth-century modes of stylistic analysis, he refined a system of attribution and identification, for Attic pottery with black- and red-figure decoration from the sixth to fourth centuries BCE. He was born in Glasgow, Scotland, to Mark John Murray Beazley and Mary Catherine Davidson. He attended King Edward VI School in Southampton and Christ's Hospital before enrolling in Balliol College, Oxford University. There he excelled and was tutored by the well-known classicists Cyril Bailey and A.W. Pickard-Cambridge. In 1908 he was elected as student and tutor at Christ Church, a position he held until 1925, when he became the Lincoln Professor of Classical Archaeology at Oxford, a position he would hold for the next 30 years. He was knighted in 1949. He met Marie Bloomfield in 1913 and married her on August 13, 1919. They lived and traveled together for forty-eight years, until her death in 1967. Beazley died on May 6, 1970 in Oxford. He and his wife had no children (Ashmole 1970).

Major Accomplishments

Beazley's contribution to the field of Greek archaeology is immense, demonstrated by the publication of over 250 articles and monographs on Greek vase painting and other topics of Classical antiquity (Ashmolean Museum 1967: 177-188). He systematically identified and attributed "hands" of specific vase painters, who were otherwise unknown, by examining the inherent style expressed in their painting. His methodology was based heavily on Giovanni Morelli and Bernard Berenson, who used a similar method to study Renaissance painting (Kurtz 1985: 236). Adolf Fürtwangler, Paul Hartwig, and Friedrich Hauser also influenced his work, although Beazley differentiated himself from these scholars by his emphasis on vase painters of all qualities, not just the masters, and stylistic analysis. Beazley's technique involved the analysis of details such as ears, eyes, drapery of fabric, and decorative details like borders, with the belief that such features were formulaically repeated by an artist (Ashmole 1970: 453-4). In this way, he identified both individual artists and workshops of painters working under one master. His method allowed for the refinement of relative chronology in pottery playing a major role in the dating of archaeological contexts, and his method remains the foundation on which approaches to iconographic and iconological studies in Classical art are based. Scholars such as Martin Robertson and Richard Neer, among others, have since addressed problematic aspects of Beazley's methodology and attributions (Robertson 1976; Neer 1997). Beazley's most substantial publications were volumes on both red- and black-figure Athenian vase painters from the Archaic and Classical periods. These were *Attic Red-Figure Vase-Painters* (1942) and *Attic Black-Figure Vase-Painters* (1956). In addition, he produced monographs on vases in a large number of collections around the world and wrote a number of works on the Berlin Painter, whom he considered to be his favorite (Ashmole 1970: 454). The "Beazley Archive," built from his collection of photographs, drawings, and notes, is housed at the Ashmolean Museum but also exists as a major online database (http://www.beazley.ox.ac.uk/index.htm). It is now one of the quintessential sources for the study of Greek vases (Beazley Archive n.d.). Students of Beazley, who studied under him at Oxford or trained closely in his methodologies, include Humfry Payne, T. J. Dunbabin, Llewelyn Brown, Dietrich von Bothmer, A.D. Trendall, and Martin Robertson (Ashmole 1970: 451-2).

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Iconography in the Roman World
- ▶ Symposion

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Beck, Wendy E.

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Basic Biographical Information

Wendy Elizabeth Beck is an Australian archaeologist. She grew up in Melbourne, attended Laburnum Primary School, and graduated from Methodist Ladies College, Kew, in 1975. She completed a B.Sc. at the University of Melbourne during 1976–1978 with a double major in microbiology and biochemistry. After attending a Summer School held by the Victorian Archaeological Survey in 1978–1979, she was converted to archaeology and undertook postgraduate study in prehistory at LaTrobe University (1979–1985). While there she took part in several large research excavations (see Fig. 1). In 1981 she was awarded a Visiting Fellowship from the Australian Institute of Aboriginal Studies which funded her research into Aboriginal toxic food plant processing. Her Ph.D. was awarded in 1986 and her principal thesis supervisors were Drs. David Frankel and Neville White, together with AIATSIS mentor Dr. Betty Meehan. Her Ph.D. *Technology, Toxicity and Subsistence: A Study of Australian Aboriginal Plant Food Processing* was the first Victorian doctorate awarded in Australian archaeology and included fieldwork in Arnhem Land in addition to laboratory research. In 1985 she worked as a postdoctoral Fellow (Australian National University) on a bush food dietary project sponsored by the Office of the Supervising Scientist in the Alligator Rivers Region of the Northern Territory. In 1986 she was appointed Lecturer to the Department of Archaeology and Palaeoanthropology, University of New England, NSW, where she is currently employed as Associate Professor.

Beck, Wendy E., Fig. 1 Wendy Beck excavating at Moonlight Head, Victoria, in 1980 (Photo: D. Frankel)

Major Accomplishments

Her most significant contributions to archaeology fall into several fields:

1. Plants and Gendered Archaeology (1981–Present)

   Her Ph.D. research concerned Aboriginal plant knowledge and included analysis of a range of different sources: archaeology, ethnographic fieldwork in northern Australia, and documentary resources, as well as laboratory work in chemistry and genetics. She was also interested in the survival and recovery of macroscopic and microscopic plant remains. She coedited the first volume which comprehensively reviewed practical methods as well as research case studies of archaeological plants in Sahul (Beck et al. 1989). Another related issue is gendered archaeology, and she also researches links between plants and women in prehistory as well as women as archaeologists and researchers (Balme & Beck 1995).

2. Place Studies in Archaeology (1989–Present)

   Major research interests are how archaeology helps to understand how and why people used spaces and the concept of place as an organizing principle. In her research, there are a number of levels from World Heritage areas, through regions, down to the individual site. Her research in Indigenous community archaeology has also included a number of scales, ranging from the spatial analysis of a single rockshelter (Balme & Beck 2002) to spatial patterns at Gumbaingirr nation level (Beck & Somerville 2002) to upland wetland landscapes (Beck 2006a) (see Fig. 2) and World Heritage places (Beck 2006b). This research has been funded by five Australian Research Council grants. The *Yarrawarra Place Book* series was published jointly by UNE and Yarrawarra Aboriginal Corporation and represented a major research outcome for the 1997 ARC Industry Collaborative Grant project "Ecotourism on the Mid-North Coast of NSW." It presents original research results in archaeology, oral history, and history but presented in an accessible interpretative form. The books and accompanying teacher's kit were shortlisted for a publishing award (The Australian Educational Publishing Awards) and awarded the 2001 ATSIC Many Rivers NAIDOC Community Achievement Award. The first book of the series (*Arrawarra: Meeting Place*) was also used to develop a school teaching kit with the Australian Marine Parks Authority in 2006. Professor Rosemary Joyce wrote:

   > Some of the most engaging contemporary archaeological writing, works that exploit the possibilities of narrative and dialogue to the fullest. . .a series of five interpretative booklets published by the University of New England and the Yarrawarra Aboriginal Corporation. . . .Embedded in a narrative of place, the archaeological reports work both as alternative forms of knowing the place, and as clearly positioned voices with a unique, and consequently valuable, perspective (Joyce 2002: 128).

Beck, Wendy E., Fig. 2 Wendy Beck at Barley Fields Lagoon, New South Wales, in October 2012 (Photo: J. Appleton)

3. Learning and Teaching in Higher Education (2004–Present)

   She has contributed to developing and applying standards in archaeology study, stressing the range of transferable and subject-specific skills which can be gained, as well as how general Humanities degrees can

assist students to become employable. In 2009 she was awarded an ongoing Teaching Fellowship by the Australian Learning and Teaching Council for "Improving Graduate Employability by Implementing Subject Benchmarks" which has funded some of her research on standards (Beck & Clarke 2008; Sinclair & Beck in press).

4. Service to the Archaeology Profession (1980–Present)

While in Melbourne as a postgraduate, she was a member and Secretary of the Anthropological and Archaeological Society of Victoria, and after moving to UNE, she became President of the Australian Archaeological Association in 1989–1990. She was founding Chair of the Australian National Committee on Archaeology Learning and Teaching (an AAA subcommittee) in 2005 and continues in an active role. She has been a member of many UNE committees, including Academic Board, Promotions, Ph.D., and Teaching and Learning.

She is a successful earner of competitive research grants and has been awarded over 20 external research grants, worth over $2 million dollars (AUD). Wendy Beck has also been an Australian Research Council (ARC) Assessor for archaeology grant applications from 2001 until the present, and she has reviewed at least 200 ARC applications. She has also completed two large reports for the NSW National Parks and Wildlife Service, *A Cultural Heritage Assessment of Mt. Yarrowyck* (2003 with Somerville, Duley & Kippen) and *Aboriginal Cultural Heritage Offsets in Mining Areas* (2011 with Bartel).

She also has a successful record in fostering the research of others. At UNE she runs successful one-day research writing "retreats" for a wide variety of groups, including both postgraduates as well as Professors (Beck et al. 2008). She has supervised a steady throughput of graduated Higher Degree Research students (D. Donlon, P. Gaynor, R. Cliff, A. Gorman, H. Burke, R. James, D. Vale, S. Martin, R. Fife, C. Clarke) together with B.A. (hons) and dissertation students, most of whom have continued with archaeological careers.

Cross-References

- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Frankel, David
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Heritage and Higher Education
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Meehan, Betty

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Bednarik, Robert G.

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Basic Biographical Information

Robert Bednarik (Figs. 1, 2) was born in Vienna but since the 1970s has become a highly regarded Australian-based scholar achieving recognition in the field of prehistoric rock art with a host of publications and projects to his name. His foremost interest lies with the minds of ancient people and how they became human or "civilized;" the origins of the human ability, intellect, and imagination; and in a selection of fields that provide complementary information. This embraces the early stages of art and language and technological growth providing a gauge of early human faculties and capabilities, for example, seafaring,

Bednarik, Robert G., Fig. 1 Robert Bednarik at the entrance shaft of the cave art site near Mount Gambier

Bednarik, Robert G., Fig. 2 Senior Rock Art Custodian Monty Hale at huge eastern Pilbara petroglyph site, with IFRAO President R. G. Bednarik

paleo-art of the Ice Age, stone tools, and the use of beads. This talented scholar retains a wry sense of humor despite his immense success and contributions to the field of archaeology, in particular rock art.

Major Accomplishments

Robert Bednarik has held a number of high-profile positions throughout his career. These include being a cofounder of the International Federation of Rock Art Organizations (IFRAO) in 1988; secretary of the Australian Rock Art Research Association (AURA), which he founded in 1983, and editor of its journal, *Rock Art Research*, and monograph series; a national coordinator of the International Comite pour l'art Rupestre (CAR), for the International Council on Monuments and Sites (ICOMOS); and being a member of the International Union of Prehistoric and Protohistoric Sciences (IUSPP) Commission on Rock Art.

Bednarik is a passionate champion of Aboriginal rights, energetically campaigning for

Aboriginal control of sites of indigenous heritage, and is frequently engaged in endeavoring to thwart the destruction of rock art worldwide. He has also conducted comprehensive ethnographic research among Aborigines.

Bednarik has cultivated novel techniques for assessing weathering of silica minerals and for studying cave climate; has also created an apparatus to measure the porosity of rock; directed the first comprehensive survey of wall markings in caves; is the pioneer in the investigation of Pleistocene seafaring; and established taphonomic logic in 1993 and metamorphology in 1995. He was one of the earliest individuals in the world to date rock art directly with radiometric methods (reprecipitated carbonates in Malangine Cave, Australia); developed the first non-interfering rock art dating method (microerosion method, initially applied at Lake Onega, Russia); and was an advocate for advanced statistics in Australian archaeology (Brainerd-Robinson method).

Many of the key scientific discoveries in several countries, including the oldest known rock art in the world, first Paleolithic art of China, first petroglyphs in central India, principal petroglyph concentration in the world (1967–1970, Dampier Archipelago, Western Australia), and a great deal of the cave art of Australia, are a credit to the remarkable work ethic of Bednarik.

Specialized Projects

Robert Bednarik's specialized projects include research into portable Paleolithic art of Eurasia and the beginnings of art and symbolism; early fieldwork at major Pilbara rock art concentrations in Western Australia, undertaken between 1967 and 1970; Pleistocene seafaring and maritime replication studies; and numerous geomorphological and sedimentary/pedological projects.

Robert Bednarik has published over 400 refereed scientific periodicals, in 32 languages, principally in cognitive epistemology and paleo-art studies, also general and replicative archaeology, soil science, speleology, deontology, semiotics, and geomorphology. His overall publication record is over 1,200 print publications. He has appeared in several film documentaries and given an excess of 200 interviews with print and electronic media, in many parts of the world.

Robert Bednarik has conducted intensive fieldwork in across the world, especially in central, northern, eastern, western, and southern Europe. He has also undertaken fieldwork in Siberia, India, China, Canada, the USA, Mexico, the Caribbean, various South American countries, southern Africa, Morocco, and in all regions of Australia.

Cross-References

► Australian Paleoart
► Europe: Prehistoric Rock Art

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Behavioral Archaeology

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Introduction

Behavioral archaeology is a social science with a unique approach to the study of human behavior. Inspired by the New Archaeology early in the 1970s, J. Jefferson Reid, William L. Rathje, and Michael B. Schiffer ambitiously redefined archaeology as a discipline that focused on the role objects play in all human activities past and present. By giving material objects an active role in behavior, they could extend the rigor of archaeological analyses of artifacts into other social science arenas, giving archaeology a more central role in the production of method and theory. Not surprisingly, behavioral archaeologists developed new models of inference for handling archaeological evidence and material culture. This has led to detailed studies of how technologies are developed and change as well as the extension of behaviorally oriented studies on subjects such as ritual and communication that have typically not been arenas for object-focused studies of behavior. Indeed, behavioral research anticipated the renewed interest in material culture studies described in the recent materiality literature (Hicks & Beaudry 2010).

Definition

Behavioral archaeology is a social science whose subject matter is the interaction between people and other objects (e.g., people, portable artifacts, architecture, places) in all times and places. At the core of behavioral archaeology is the recognition that material objects are not a separate realm acted upon by people but instead are an attribute of human action. In behavioral archaeology, human behavior is defined as interaction between people and things. The material matrix that envelopes people during their entire lives is the proper subject matter of those seeking to understand organization and change in human activities. Thus, behavioral archaeology, while a necessary component of any traditional archaeological research project, reaches beyond that role to understand the material matrix that is the human world of action.

Historical Background

The roots of this material culture-centered approach to behavior lie in reactions to functionalist (1940s and 1950s) and neoclassical evolutionary social theory (1960s and 1970s). In the 1940s and 1950s, functionalist archaeologists broke with visions of cultures as a historically contingent clustering of culture traits (e.g., pottery types, projectile point types, house forms) created by the migrations, innovations, or borrowing of their participants. By theorizing culture as a set of integrated institutions (kinship, religion, politics, economy), artifacts became indirect traces of human activities comprising these institutions. For example, treating artifacts and architecture as the indirect traces of activity led to settlement pattern studies in the 1950s and stimulated the rise of archaeological survey methods and further inferences about political organization, technology, and human-environment relationships (see Willey & Sabloff 1980). The subsequent 1960s was a revolutionary time in archaeology that inspired many young graduate students to push archaeological boundaries.

New Archaeologists during the 1960s promoted a theoretically driven archaeology, arguing that new questions required new models of culture and its attributes. They redefined cultures as ecologically adapting systems that

integrated people, objects, and energy. Employing a neo-evolutionary framework (White 1949), they analytically refashioned functional institutions into adaptive technological, social, and ideological subsystems (Binford 1962). They assumed that technology was at the heart of basic survival, and so these subsystems could be placed in a causal hierarchy with subsistence technologies as the sources of change whose effects rippled up through the social organizational and belief subsystems. New Archaeologists called the generalizations they used to describe causal relationships in these subsystems material correlates or correlates (e.g., Hill 1970). Ethnoarchaeology, which began in the functionalist era, was expanded by the New Archaeology and became a prominent means for developing correlates for building models of past systems and subsystems. It was in this context of change that behavioral archaeology was created.

Two doctoral students working as teaching assistants (J. Jefferson Reid and Michael B. Schiffer) for William L. Rathje at the University of Arizona in the early 1970s argued that archaeology could be its own social science that focused not simply on past peoples or artifacts but instead on the interaction among them in all times and places (Reid et al. 1975). Behavior defined relationally as an interaction with material objects was the analytical lynchpin around which the burgeoning studies of prehistoric, historic, and contemporary societies revolved. They therefore defined behavioral archaeology as "the study of material objects regardless of time and space in order to describe and explain human behavior" (Reid et al. 1975: 210). Their goal was twofold: (1) to systematize what they believed New Archaeology could become and (2) simultaneously address some of its weaknesses.

By the early 1970s, it had become apparent that the systems approach as applied in archaeology tended to obscure or simply ignore lower-scale behavioral variability critical for explaining the structure of archaeological deposits and, arguably, addressing the evolutionary questions that the New Archaeologists posed. Initially, behavioral archaeologists viewed their efforts as consistent with the goals of the New Archaeology.

Trained as a Mayanist, Rathje recognized the symmetry between the study of ancient Maya cities and the study of garbage in contemporary cities and founded the Le Projet du Garbage, applying archaeology to the present (see Rathje & Murphy 1992). Reid and Schiffer developed behavioral archaeology method and theory in their dissertations and subsequent research. Reid (1985, 1995) has largely focused on prehistoric archaeology, while Schiffer has tended to pursue a broader method and theory agenda (see LaMotta & Schiffer 2001). In early work, Schiffer developed a behaviorally based model of inference and applied it in studies of the formation processes of archaeological deposits (Schiffer 1976, 1987). Subsequently he turned his attention to experimental and historical studies of technology (e.g., Schiffer & Skibo 1987; Schiffer et al. 1994a), communication (Schiffer & Miller 1999), and the history of science (e.g., Schiffer 2008). Recent students have expanded the reach of behavioral archaeology to include ritual and religion (Walker 1995, 1998, 2002; Hollenback 2010a), landscapes (Zedeño 1997; Hollenback 2010b), and social power (Walker & Schiffer 2006).

Key Issues/Current Debates

Three broad contributions of behavioral archaeology have shaped debates in the discipline: the synthetic model of inference, a behaviorally based approach to technology studies, and extensions of a behavioral approach to what have traditionally been considered nonbehavioral realms including ritual and religion, communication, and political power.

The Synthetic Model of Inference

Beginning with the New Archaeology's interest in material correlates, behavioralists' initial contributions revolved around systematically laying out a behavioral approach to the material matrix of human activity. They described forms of artifact variability, categories for organizing that variability, and a synthetic model of inference for drawing that variability together in explanations of human behavior. Eventually these studies were

pulled together in Schiffer's (1987) *Formation Processes of the Archaeological Record*.

Behavioralists argued that new archaeologists had heavily theorized ongoing cultural systems but that the same could not be said for the proximate activities making up those systems nor for the human and natural actions that instrumentally contributed to the formation of the archaeological record. Initial papers laid out the important distinction between patterning in ongoing cultural systems or "systemic contexts" and patterns in the archaeological record, "archaeological contexts." Behavioralists argued that to link these patterns, we needed to identify the causally connected sequences of behaviors that eventually transformed these patterns from cultural contexts into archaeological contexts (Schiffer 1976; Sullivan 1978). They described these sequences as "behavioral chains" illustrated by flow models. They also used the more anthropocentric term "life histories" in order to emphasize that human behaviors and lives are inseparable from object histories in the material matrix. To measure patterning in these contexts and sequences of behaviors, they defined four dimensions of archaeological variability: formal, spatial, quantitative, and relational (Rathje & Schiffer 1982; Schiffer 1987). The formal category includes any physical measure that can be taken on an object (weight, specific gravity, completeness, length, width, color, etc.); the other dimensions have more constraints. In any given activity, one or more objects are associated with each other (relational), their frequencies (relative and absolute) can be counted, and their location(s) in space measured. The term correlate, adapted from the new archaeology, became the regularities in interactions between people and objects recognizable in these life histories, measured in relation to the four dimensions of variability.

This research revealed that patterns of cultural deposition could be modeled quantitatively for a community by employing variables such as the number of an object type in use, the length of its use life, duration of use period, and rates of reuse (Schiffer 1976). The implications of these and other variables dramatically changed how archaeologists perceived the opportunities afforded by different sites and archaeological contexts. Any archaeological interpretation requires a series of inferences and can be conceptualized as a series of hypothetical people and object life histories. A behavioral consideration of those hypothetical histories can only lead to better, more-informed interpretations. Even seemingly pedestrian inferences about the dates of an assemblage are deeply enmeshed in formation process questions. How do the relative frequencies of pottery in a site reflect known or hypothesized cultural phases, given the variability in ceramic life histories, as denoted by the variables listed above? Similarly, how does the life history of a piece of organic material with a specific radiocarbon date shed light on the dates of materials associated with it in an archaeological context (Dean 1978)?

The synthetic model of inference drew together various sources of actualistic knowledge, including ethnography, ethnoarchaeology, history, and experiments, to create correlates that could be used in inferences about unknown relationships between past peoples and objects. Such a model necessarily assumes continuities between past and present relationships: (1) the sequential nature of behaviors forming objects' histories, (2) the causal contribution objects make to behaviors that propel the forward motion of activities in life histories, and (3) four kinds of measurement that make possible the empirical study of object performances and life histories. To call attention to the generalizations concerning artifact disposal activities and subsequent archaeological patterning, Schiffer coined the terms c- and n-transforms, which denote the effects that natural and human or cultural processes have on the formation of archaeological deposits. The articulation of this model and its parts led to a break between new archaeologists and behavioralists.

The Pompeii Premise

The initial discussion of behavioral chains, systemic and archaeological contexts, and the lawlike relationships between people and artifacts, although offered as contributions to the cause of new archaeology, was quickly

recognized as different and even threatening by Binford and other new archaeologists because it demonstrated that a realm of messy behavioral variability had not been accounted for in their broad theoretical perspectives. For some new archaeologists, the behavioral perspective became a subject for puerile satire (Flannery 1982), but for others, it represented a theoretical heresy requiring extirpation (Binford 1981). Binford (1964) had claimed that the archaeological record was like a fossil, preserving the skeleton of past cultural subsystems. Behavioralists, however, knew like any taphonomist that the organization of peoples' relationships with objects changed from their living context (systemic context) to the archaeological context and that understanding how that transformation occurred was central to any archaeological inference. Behavioralists therefore criticized metaphorical references to the archaeological record as a fossilized cultural system, labeling them as the Pompeii premise (e.g., Schiffer 1985).

Binford (1981) took up the challenge and a debate ensued over whether there was a Pompeii premise in archaeology. As it was framed by Schiffer and Binford, the issue was whether the archaeological record accurately reflected the past and its implications for archaeological research. Binford argued that it did, while Schiffer (1987) argued that patterning in the archaeological record was a distortion of past cultural systems. Binford uncritically suggested that because Schiffer highlighted the differences in archaeological and systemic contexts and advocated bridging them through the reconstruction of past object life histories, he would only be satisfied to work with Pompeii-like assemblages where the transformations were purportedly trivial. Schiffer argued that to study the proximate causes of variability in archaeological deposits, one had to consider the archaeological record as transformed in order to take advantage of the information offered by any particular archaeological context. In hindsight, this debate concerned two different visions for material culture study and the role of archaeological research in that study.

For Binford, the archaeological record was analytically conceptualized as the product of the interacting subsystems and therefore necessarily if only vaguely encompassed all the variability in life histories of objects, including their disposal, as attributes of the system. Therefore, the system could not be a transformation of itself. For Schiffer and others, the archaeological record was a creation of specific natural and human interactions that changed through the course of peoples' and objects' lives. As such, the debate exposed the differing scales of analysis that were central to the visions behavioralists and New Archaeologists had for archaeology. New Archaeologists had a priori a causal theory of evolutionary change they sought to implement, while behavioralists had an understanding of the material matrix of human behavior they sought to document and explore. Although it was never explicitly stated, this debate seems to have freed behavioralists to pursue their vision without further attempting to justify it within a unified archaeology. They realized that to pursue studies of the material matrix, they would need to shape their own questions, methods, and data independently of the strictures of social evolutionary theory.

Schiffer and others turned their attention to exploring behavioral approaches to technology and expanding the role of behavioral research to topics such as communication and ritual where the material matrix of behavior had been undertheorized.

Technology

Given the expanded understanding of behavior as interaction with objects, it runs awfully close to general understandings of technology. Technologies being central to understanding the material matrix of behavior, behavioralists have focused on how they perform in particular contexts and how they change over time. They elaborated the concept of performance characteristics for studying activity-based interactions, especially during use (Skibo & Schiffer 2008), and have employed the processes of invention, development, manufacture, and adoption in framing questions about technological change (Schiffer 2011).

Performance Characteristics

Inspired by the work of Braun (1983), behavioralists recognized that to study the behaviors associated with technologies – indeed all interactions with objects – they needed to develop an analytical concept that could capture the causal influences that material objects contribute to interactions with people. Archaeologists had long known that the material properties of objects such as temper in pottery or the toughness of chipped stone tools affected how people used them. Yet analysis of the performance of an object in a specific interaction requires more than a listing of its formal properties. A performance characteristic is a capability, competence, or skill that can be exercised in an activity-specific interaction. Formal properties, influenced by an object's chemical and physical properties, affect performance characteristics. In traditional pottery, for example, temper, surface treatments, and wall thickness affect how rapidly a vessel can heat its contents – a performance characteristic known as heating effectiveness. Heating effectiveness might be favored in cooking pots but not typically in serving vessels. A performance characteristic is a relational construct, not an essential property of an object. Thus, a vessel's closeness to the fire influences its heating effectiveness in a specific cooking activity.

Braun's (1983) interpretation of performance characteristics was focused narrowly on the interactions that an object required in order to perform its utilitarian functions. To accommodate other kinds of interactions, behavioralists have expanded the concept of performance characteristics to include any sort of interaction between objects and other objects, between people and objects, and so forth (Schiffer & Miller 1999; Skibo & Schiffer 2008; Schiffer 2011). And so behavioral archaeologists speak of sensory performance characteristics as relating to basic human senses (sight, sound, touch, taste, smell); performance characteristics also pertain to human competences in, for example, social and economic interactions; thus, an object's replacement cost is a performance characteristic that affects interactions in an acquisition activity. Communication of group identities – indeed any social information – as well as communication with supernatural entities may also be framed in terms of particular performance characteristics. In the hands of behavioral archaeologists, performance characteristics have become a versatile construct essential for studying object interactions of any kind in activities.

Study of Technological Change

In approaching the study of technological change, one of archaeology's oldest preoccupations, behavioralists recognize that generalizations – theories, models, etc. – ought to be process specific, focused either on invention, development, manufacture, or adoption (Schiffer 2011). Thus, in dealing with invention processes, behavioralists have fashioned the cascade and cultural imperative models. The cascade model specifies that during the course of developing a complex technological system (anything from a bow and arrow to a nuclear submarine) performance problems arise. To solve a performance problem requires a burst of inventive activities, which may lead to a solution; further problems are usually encountered, which generate other invention cascades. The cultural imperative model states that the vision of an imagined technology, as defined by anticipated performance characteristics, is held by a constituency, a group of people who believe that its creation is inevitable. Thus, whenever apparently appropriate parts or components become available, a flurry of inventive activities takes place as people strive to materially realize the cultural imperative. It would appear that the cultural imperative model is applicable mainly to industrial societies. Behavioral archaeologists also made contributions to the study of adoption processes by creating the performance matrix – a heuristic for comparing the performance characteristics of two or more technologies among which consumers choose (Schiffer 2010, 2011). A well-constructed performance matrix, which includes all potentially relevant performance characteristics, usually displays patterns, such as one technology that excels in use-related performance characteristics, while another excels in manufacture-related ones. These patterns

furnish grist for the archaeologist's explanatory mill. First employed in a study of ceramic change in the eastern United States (Schiffer & Skibo 1987), the performance matrix has been elaborated and employed in diverse studies of technological change (Skibo & Schiffer 2008; Schiffer 2010, 2011).

Performance and the Expansion of Behavioral Studies

Simultaneously with the development of behavioral approaches to archaeological inference and the study of technology, in the 1980s archaeology witnessed the advent of postprocessual archaeology. This new school of thought dramatically changed the landscape of archaeological method and theory. In his postprocessual manifestos, Hodder (e.g., 1985) argued among other ideas that that the "materialist" scientific approaches favored by processualists ignored the roles of peoples' beliefs in shaping their actions, relegating beliefs to the least causal realm of ideology, which left no room for individuals to shape the organization of cultures. Initially this postprocessualism seemed an anathema to behavioral archaeologists who saw themselves as scientists. Many wondered whether the discussion of beliefs and mind would shift attention away from concrete behavioral variability and toward immaterial conceptual variability. However, as debates evolved inside and outside of behavioral archaeology, it became clear that the issue of scale exposed in the Pompeii premise debate was one shared with postprocessualism, as particular behaviors could, independently of the scale of system organization, contribute directly to the formation of archaeological deposits. Further, it was also clear that human behavioral variability extended to any activity involving objects; therefore, activities pertaining to ritual and religion, communication, and technological organization that did not pragmatically relate to subsistence were still interesting and important arenas for behavioral research. Consequently, the postprocessual critiques actually opened up opportunities for behavioralists to show how their approach could be fruitfully applied to these important topics without necessarily accepting the assumptions of postprocessualists concerning the role of science or the centrality of "meaning" as an analytic construct for studying human behavior.

In the 1990s, behavioralists plunged directly into these contested realms. Walker et al. (1995) called this "expanding behavioral archaeology" and referred to themselves as new behavioral archaeologists. They stressed the importance of a relational understanding of behavior and its relevance to a broad range of research topics including ritual site formation processes, political power, and technological change. Given that interactions with material objects take place in ritual and political realms, which also affect archaeological deposits, it made perfect sense to explore how such realms were materially constituted – regardless of one's ultimate stance on evolutionary causal hierarchies. Similarly, given that behavioralists were committed to studying behavior rather than the archaeological record per se, Schiffer could undertake, from a behavioral perspective, case studies of technological change using the history of radios and electric cars (Schiffer 1991; Schiffer et al. 1994b).

Ritual Studies

Walker (1995, 1998, 2002) and others (e.g., Montgomery 1993; Zedeño 2008) have sought to extend the study of behavioral archaeology to include ritual and religion. The lessons learned so far are that – like all behaviors – ritual behaviors contribute to the forward motion of object life histories and that those histories can be identified in the archaeological record because they affect the four dimensions of artifact variability. Like all activity-based interactions, performance characteristics come into play, but they are complicated and cannot be corralled by assumptions about the pragmatic uses of the objects.

A legacy of the New Archaeology's hierarchy of material causality had been a conflation of those activities deemed materially less causal (i.e., ritual practices) and the material evidence of those activities. It was a traditional assumption, well into the 1990s, that ritual activities left little material evidence. Yet this makes no sense in terms of the material matrix created by human behavior. All activities are by definition

materially constituted; thus, given the plethora of ritual activities in every society worldwide, it is a physical impossibility that these diverse behaviors leave no archaeological traces. Acting on the basis of the traditional assumption, few traces were found, which only highlights the strength that theoretical assumptions may have over the formation of questions, methods, and data. As behavioralists began to look for evidence of ritual in object life histories, they found it everywhere. In well-documented archaeological contexts such as the pueblos of the American Southwest, it was evident that much time and energy went into the ritual construction, use, and disposal of ceremonial architecture as well as associated artifacts. It also became clear that, by relegating religion to the immaterial realm of ideology without pragmatic consequence rather than treating it as a kind of activity, archaeologists had assumed that ritual artifacts could be identified by default as nonutilitarian objects. Examination of known behavioral contexts such as ethnographies demonstrated that this was far too simplistic. Indeed, in the American Southwest, the houses of all nonpueblo peoples are central to ritual activities; moreover, everyday subsistence staples such as corn and water are the most revered ceremonial objects among many southwestern cultures. Finally, reuse is a critical factor in understanding their life histories, as many artifacts can move into and out of ritual contexts independently of our preconceived notions of utility. What appear to be old, even well-worn cooking pots and water jars are often used by Hopi peoples in their most sacred ceremonies.

Ritual and religious studies are just beginning to take advantage the material matrix. Recent ritual research (Walker 2008, 2009) has begun to combine study of performance characteristics, oral traditions, and interaction with nonhuman beings. Behavioral approaches to communication offer a useful model for integrating these facets of ritual studies.

Communication Studies

In one of the most innovative applications of behavioral archaeology, Schiffer and Miller (1999) designed an object-based model of communication. Typically communication studies focus on the transfer of information between two or more people and prioritize the intentions of the information senders. This move represents the height of common sense, but it fails to take advantage of, and indeed is actually undermined by, the complexity of the material matrix of behavior. Communication – like all other interactions – involves objects, and so an exclusive attention to people leaves out significant parts of the communicative process. What is more, although people may intend to send information, what is actually sent is only as real as what the receiver gets. Therefore, attending only to the sender's intent is fraught with problems. Also, much information is sent and received independently of conscious goals on either end.

Schiffer and Miller as behavioralists were aware of the limitations of conventional formulations based on prioritizing the sender's perspective and called attention to a symmetry between the process of communication and the process of archaeological inference. Archaeologists, after all, receive information about past peoples through interaction with artifacts. The process is often a lot slower than communication in everyday interactions, but they argue that the processes are analogous. Accordingly, they proposed a receiver-oriented approach to the study of communication in which artifacts as well as people are incorporated into the process. They developed a model composed of three information-related roles: senders, emitters, and receivers. In simple formulations similar to traditional "mediated" models of communication, one person (the sender) encodes or inscribes information through interaction with an artifact (the emitter), and from that artifact's subsequent performance, the receiver obtains information. This process of communication would be tracked by studying how receivers reacted to information they gleaned in an interaction with the emitter. However, there is no reason to restrict communication to such a narrow range of possibilities. In theory, these roles could be played by any of the interactors. Thus, an artifact could, while interacting with a person, modify that person who would then nonverbally emit information to another person. A serrated knife (sender),

for example, inscribes its signature in a mortal wound (emitter) that emits information to a forensic pathologist (receiver). Perhaps even more interesting is the possibility of passing information about the hidden world of supernatural entities. While the process is a material one, there is no reason that the information need be materially scientific. After all, how much information flowing through the material matrix has been so vetted? In many cultural contexts, evidence of the presence and intentions of witches, spirits, or other nonhuman agents are received regularly.

Future Directions

Behavioral archaeology has consistently fine-tuned its understanding of human behavior as the interaction of people with objects while simultaneously expanding its reach into the material matrix created by that behavior. Likely behavioralists will continue to study formation of archaeological deposits, technology, ritual, landscapes, communication, and social power. Behavioral archaeology like any productive program is constantly building and systematizing its assumptions and their implications for future research. In seeking to bring order to studies of a material matrix that by its very nature changes and moves through time, behavioralists find that a broad range of social and sensory performance characteristics remain only minimally integrated. Recent application of the synthetic model of inference to the study of communication has demonstrated that interactions between people and objects and the attendant performances of interactors highlight a logical equivalence between behavior and flows of information. This equivalence suggests that for some questions interactions are fruitfully studied as behaviors and for other questions as communicative processes. Likely behavioral archaeologists will continue to explore these and other symmetries as they push deeper into the material matrix of human object interactions.

Future directions in behavioral archaeology are only limited by a researcher's creativity in asking and answering behavioral questions about any human behavior in the material matrix. One area that should see much more attention is scientific activities, as practiced in any society. Discovery processes, for example, have been resistant to the generalizations of historians, philosophers, and social scientists. We suggest that a behavioral approach can make useful contributions because it is grounded in the people-artifact interactions that are the settings for discovery.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Ethnoarchaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Materiality in Archaeological Theory
- ▶ Processualism in Archaeological Theory
- ▶ Technological Studies in Archaeological Science

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Bell, Gertrude

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Basic Biographical Information

Gertrude Margaret Lowthian Bell was born on 14 July 1868 in Washington Hall, County Durham, England. She came from a line of wealthy ironmasters. Her grandfather, Sir Isaac

Lowthian Bell, and her father, Sir Hugh Bell, were heavily involved in politics. Her mother died when she was a young child and she was brought up by her stepmother Dame Florence Bell, who was a playwright and author.

Gertrude Bell's early education was at Queen's College in London. She enrolled at Lady Margaret Hall, Oxford University in 1886. She specialized in modern history, becoming the first woman to earn a first-class degree in the subject. She was not formally trained in archaeology, aside from a few weeks spent with Dr. David Hogarth in Greece while on holiday in 1898 (Burgoyne 1958; Winstone 1978). The beginning of her lifelong passion for the Middle East can be traced to a visit in 1892 to her uncle, who was an ambassador serving in Tehran, Iran (Winstone 1978). In 1899, she began a period of sustained travel in Asia, Europe, Mesopotamia, and Arabia. She became fluent in Arabic, Turkish, and Persian and wrote of her experiences in five works that were published in the two decades preceding the First World War (Howell 2006). During this war, Gertrude Bell worked as a spy for the British Government gathering information on Turkish railways and forming alliances with Arab tribes, alongside T.E. Lawrence. Following the British capture of Baghdad in 1917, Bell became heavily involved with the political reinvention of Mesopotamia due to her understanding of the area and fluency in the language. Bell was a passionate believer in Arab independence, and assisted in setting up infrastructure and installing ruler Faisal I as monarch of Iraq (Burgoyne 1958).

Major Accomplishments

Gertrude Bell's career focused on the archaeology of Greater Syria, Mesopotamia, Asia Minor, and Arabia. Her major accomplishments in archaeology include scholarly publications on Byzantine monuments in Asia Minor, the establishment of legislation and methods that significantly improved the protection of cultural heritage in Iraq, and establishment of the National Museum of Iraq. However, she is perhaps best known for her role in developing the political borders in the Middle East after the First World War, particularly those of Jordan and Iraq.

In her own words, Gertrude Bell considered herself "nothing better than an antiquarian at heart" (Bell 1927). However, many of her scholarly works on Byzantine monuments in Asia Minor are still considered the standard works on the subject (Howell 2006). Bell conducted several surveys over the course of her travels, especially during her 1905 trip to western Syria and Anatolia (Lawler 2008). Chief among these surveys was her work at Bibnirkilisse, with the resulting book completed with Sir William Ramsay considered "one of the most enduring works of scholarship" of the area (Ousterhout & Jackson 2008: ix). Bell's book *The Palace and Mosque at Ukhaidir* (1914) is considered by some to be "her most important contribution to archaeology" (Lukitz 2006).

One of Bell's major contributions to archaeology is the early development of practical methods for a government to work with archaeologists to protect a country's cultural heritage. She played an eminent role in setting up the necessary infrastructure needed for serious and scholarly excavation rather than the treasure hunting and amateur excavation seen in the Middle East before the First World War. The stable political climate in Iraq that existed at that time brought renewed interest from archaeologists to conduct excavations in Iraq. Responding to a need for updated antiquities legislation, Bell began writing a Law of Excavations, which was enacted at the end of 1922 (Bell 1927). The progressive attitude of these laws and their favorable conditions for archaeologists allowed the development of new techniques and new methods of excavation. In this way, Bell's work is still relevant and influential on younger generations of archaeologists.

Gertrude Bell pioneered the idea of retaining antiquities in their country of origin rather than transporting them to European museums or collections. In 1926, she established the National Museum of Iraq, which held one of the world's greatest collections of Mesopotamian antiquities prior to the 2003 invasion by the United States and its allies (Wallach 1996; Lawler 2008).

Driven by her love of the country, Bell became Iraq's Honorary Director of Antiquities in 1922. She dedicated the last years of her life to developing Iraqi national identity through ownership of its cultural heritage (Winstone 1978). To implement this, Bell traveled to archaeological sites at the end of each excavation season to divide the finds between the archaeologist and Iraq (Winstone 1978). She also traveled to places where local people were undertaking their own excavations and bought any significant finds (Bell 1927). She left behind a competent record of archaeological sites, including a highly valuable photo record of 7,000 photos, taken between 1900 and 1918.

Gertrude Bell is lauded today as a pioneering woman in archaeology. It is somewhat ironic, however, that she opposed the right of women to vote, contending that women were not ready to vote while they remained confined to the domestic sphere (Bell 1927). This may be due in part to the influence of her stepmother, Dame Florence Bell, who encouraged her involvement in the intellectual activities of the Anti-Suffrage League (O'Brien 2000). Gertrude Bell's commitment to education, however, is demonstrated through her dedicated promotion of the education of Iraqi women.

The times in which Gertrude Bell practiced archaeology were vastly different from those of the modern day. She practiced during a period when the British Empire held great sway over much of the wider world and when archaeology was practiced as an eccentric oddity, with little accountability, except to their intellectuals. Archaeologists of the time were yet to embrace the scientific approaches of "new archaeology," or address the politics of cultural ownership, a matter which is so pressing today. However, Gertrude Bell excelled in both areas. Her thoroughness and attention to detail were congruent with the tenets of scientific archaeology and her political awareness, respect for the people whose cultures she studied and support for repatriation and self-rule is a model for postcolonial archaeology today. Beyond this, Gertrude Bell was a role model for the archaeologist as hero – feminist hero.

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Beltrán Martínez, Antonio

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Basic Biographical Information

Antonio Beltrán Martínez became professor at the Department of Archaeology, Epigraphy and Numismatics at the University of Zaragoza in 1949, the place from which he worked most of his academic life. For 60 years and with a clear mind until the very end, he was a prolific university lecturer, manager, and researcher, while at the same time, he was an excellent communicator

with an incredible ability to maintain the interest of all kinds of audiences, academic as well as general public. He inspired the creation of publications, museums, and cultural parks and organized 27 archaeology conferences. He founded the series of archaeological monographs for the University of Zaragoza, where he published the majority of his books. Among many other honors, he was named the city's official Chronicler, and he was awarded the Aragón Award. Author of more than a 100 books and more than a 1,000 articles (367 on rock art), he was a true scholar with a knowledge so encyclopedic that he could write numismatics handbooks as well as speak about the food culture of Aragón, the typical dress, or the local patron saint.

However, what made him truly happy was the study of rock art, the subject to which he dedicated his later research career and which brought him international recognition. He was member of the International Rock Art Committee (ICOMOS), represented Spain in the International Union of Prehistoric and Protohistoric Sciences (IUPPS), and chaired the ninth Commission of Prehistoric Art. He travelled wherever there was rock art, like Kakadu National Park in Australia, Serra da Capivara in Brazil, and the paintings in Namibia. He collaborated in the defense of the Portuguese rock art site at Foz Coa. He was always ready to go to the most inaccessible caves, like Los Estrechos in Albalate where, at almost 80 years of age, he rope climbed to study the schematic paintings (Figs. 1, 2, and 3).

Beltrán Martínez, Antonio, Fig. 1 A. Beltran (aged 82)

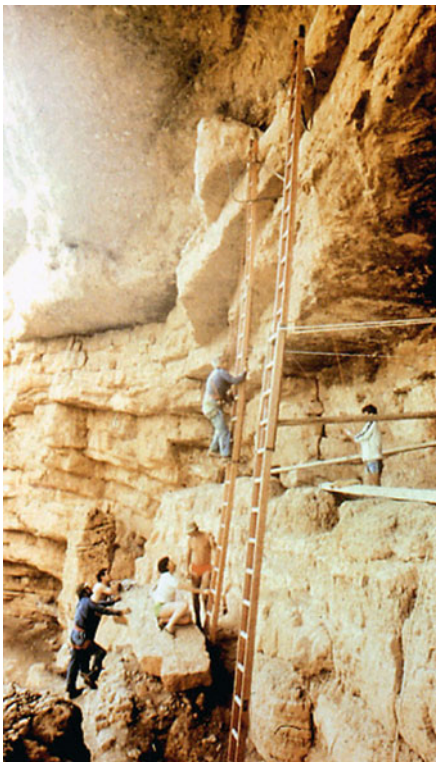

Beltrán Martínez, Antonio, Fig. 2 A. Beltran (aged 75) climbing up a ladder to take photographs of the schematic rock paintings of Los Estrechos (Albalate del Arzobispo, Spain)

Major Accomplishments

A brief itinerary of his work relating to rock art can be divided into two distinct stages:

1. From 1966 to 1988: Fieldwork outside of Aragón: he studied various Paleolithic caves in the French Pyrenees, and he travelled all the Spanish east coast studying post-Paleolithic art and travelled to the Canary Islands to study its engravings and paintings. Among his publications, three archaeological monographs about Paleolithic art stand out (Le Portel, 1966; Bedeilhac, 1968 y Niaux, 1973), five more about the Levantine rock art (1969: los Grajos; 1970: Valdelcharco; 1972: Cañaíca del Calar y Fuente del Sabuco; 1976: La Sarga; 1988: Peña Rubia) or schematic art (1972: Lecina), and two books about the rock art of the Canary

Beltrán Martínez, Antonio, Fig. 3 A. Beltrán (aged 90) presides his last Ph.D. jury in the University of Zaragoza

Islands (Barranco de Balos, 1971; Gáldar, 1973). His book of synthesis *Arte Rupestre Levantino (Levantine rock art)* (Zaragoza, 1968) provided a global vision about the geographical location, technique, and themes and approached the problem with chronology advocating the most popular sequence, from the most naturalistic to the most schematic, theory that years later he himself would question. He published Italian versions in Milan like *Da cacciatori ad allevatori: l´arte rupestre del Levante spagnolo* (1980) and *Arte rupestre preistorica* (1993), which were also translated into English and French.

2. From 1989 to 2006: At the age of 60, he focused only on Aragón and began doubting his own chronological system. In his book of synthesis *Arte prehistórico en Aragón* (1993) (*Prehistoric Art in Aragón*), he includes surprising results about the chronology of schematic art. This versatile style that he believed to be typical of the Bronze Age acquired an apparent great antiquity with the appearance of geometric figures at Riparo Villabruna, similar to those from Chaparros site, located below "open-legged" Levantine motifs, which brought him to speak of a continuity since the end of Paleolithic art. On the other hand, the appearance of the sealed figures of Porto Badisco (Port Badisco) or the discovery of the Petracos style in Alicante forced him to outline the Neolithic chronology and to distinguish the semi-naturalist from the purely schematic.

Although he studied the schematic paintings of Estadilla in Huesca (1989), he focused with great eagerness on Bajo Aragón (lower Aragón, Teruel) where he led the creation of Río Martín's Cultural Park, the place he was most fond of. He dedicated his last eight monographs to the Levantine rock art sites located within this park (1994: La Higuera; 1995: Tía Chula y Cañada de Marco; 1989 and 1997: Los Chaparros y los Estrechos de Albalate; 1998: El Mortero; 2000: Garroso; 2002: Valdelcharco; 2005: Cerro Felío). In 2005 he finally published a complete catalogue of Río Martín. The impatient octogenarian seemed to want to quickly wrap up his knowledge before taking his final breath, which he did few months later, at 90 years of age.

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- ▶ Rock Art, Forms of

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Berenike, Archaeology of

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Introduction

Ptolemy II Philadelphus founded the Egyptian Red Sea emporium of Berenike (23° 54.62' N/35° 28.42' E) in c. 275 BCE. Berenike, approximately 825 km south southeast of Suez and c. 260 km east of Aswan, was the southern-most Red Sea emporium in Ptolemaic and Roman Egypt (Fig. 1). This entrepôt functioned for approximately eight centuries until abandoned sometime before the mid-sixth century CE. Building this settlement was part of a larger infrastructure project, which included excavating a Nile-Red Sea canal (termini at/near Bubastis-near Suez; at Babylon-near Suez in Roman times), establishing other ports along the Red Sea coast (both in Egypt and farther south on the African littoral), creating roads – and forts and watering stations – in the Eastern Desert of Egypt linking Red Sea ports to counterparts on the Nile, and exploiting the desert primarily for gold and some amethysts. The Romans increased exploitation of mineral wealth in the Eastern Desert (beryls/emeralds, amethysts, gold, and hard stone for building and statuary, including marble). The Romans enlarged Red Sea ports in Egypt and expanded the desert highway system. The latter included renovation/extension of old roads and construction of new ones with additional watering points, *praesidia* (forts) and *skopeloi* (watch and signal towers). Roads in the Eastern Desert in both Ptolemaic and Roman times consisted of cleared tracks of varying widths with surface debris pushed to the edges forming windrows; none of the highways appears to have been paved and few, if any, milestones were erected.

G.B. Belzoni (re)discovered Berenike in 1818 and throughout the nineteenth and early twentieth centuries European visitors (including J.G. Wilkinson, J.R. Wellsted, W. Golénischeff, and T. Bent) conducted cursory examinations and cleared portions of the so-called Serapis Temple on the highest part of the site. The current project, 1994–2001 (University of Delaware, USA-Leiden University, the Netherlands/UCLA) and 2008-present (University of Delaware-Polish Centre of Mediterranean Archaeology, University of Warsaw), has undertaken systematic, scientific surveys, excavations, documentation, and extensive publication (Fig. 2).

The ruins of Berenike cover approximately 28.5 ha with a maximum east-west length of about 700 m × 400 m (in one area an additional 5,000 m^2) north-south. Geological coring

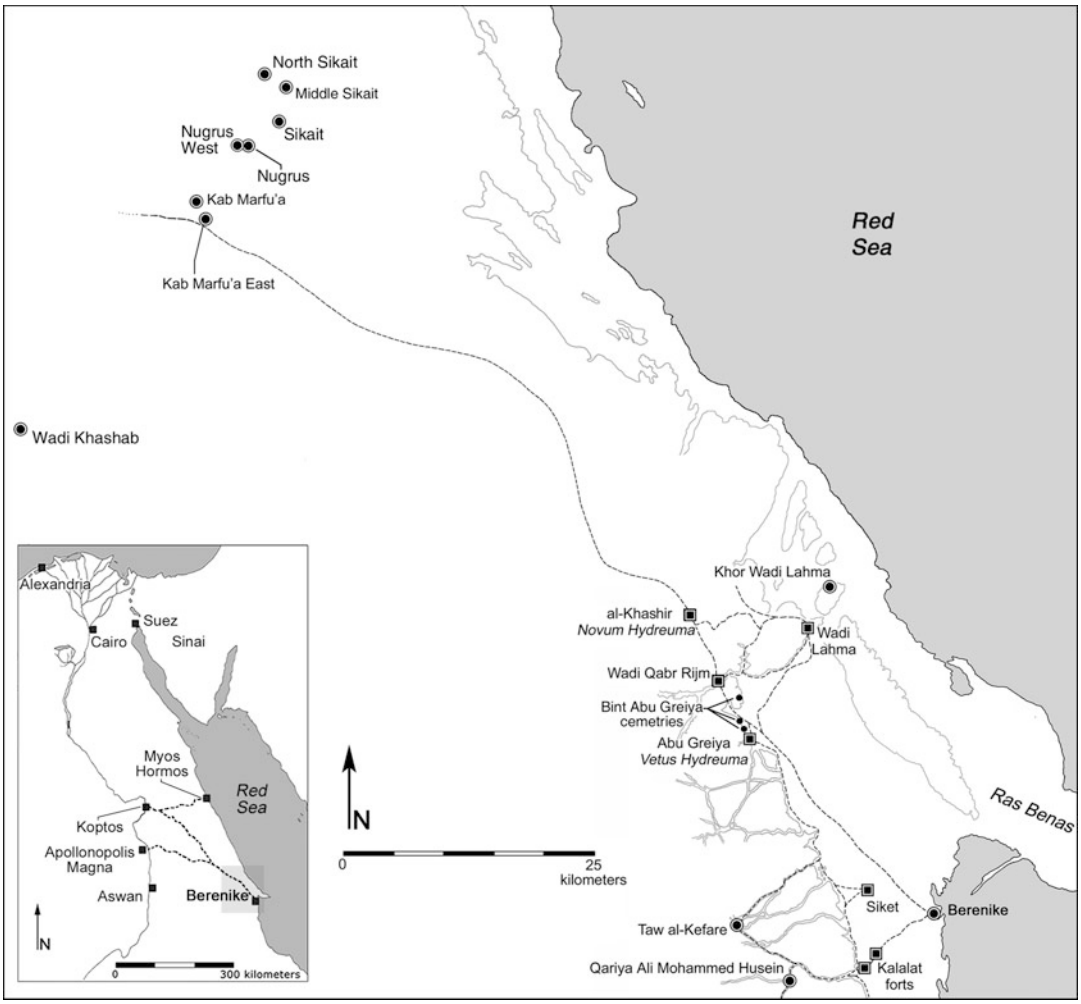

Berenike, Archaeology of, Fig. 1 Map of Egypt showing location of Berenike and environs. Drawn by M. Hense

combined with studies of seismic and tectonic activities in the Red Sea in general indicates sea level changes over the past two millennia; inflow of sediments via wadis debouching into the Red Sea immediately north and south of Berenike resulted in silting of the northern, southern, and southwestern harbors. The ancient inhabitants made no attempt, apparently, to dredge (as was the case at Myos Hormos, a Roman – and likely Ptolemaic – port c. 300 km north of Berenike) to keep the harbors operational; instead, due to progradation of the coastline, residents moved the settlement eastward. Excavations thus far have shown that the Ptolemaic settlement lay farthest west, the early Roman community was east of that and the late Roman city lay the farthest east of all (Figs. 2 and 3).

Archaeological evidence indicates three peak periods at Berenike: early-middle Ptolemaic (mid-third to mid-second centuries BCE), early Roman (first to early second century CE), and late Roman (mid-fourth through fifth centuries CE). These were interspersed with nadirs (late Ptolemaic: second-first centuries BCE, middle Roman: much of the second to fourth centuries CE and later Roman: mid-late fifth to mid-sixth centuries CE) until abandonment sometime before the mid-sixth century CE.

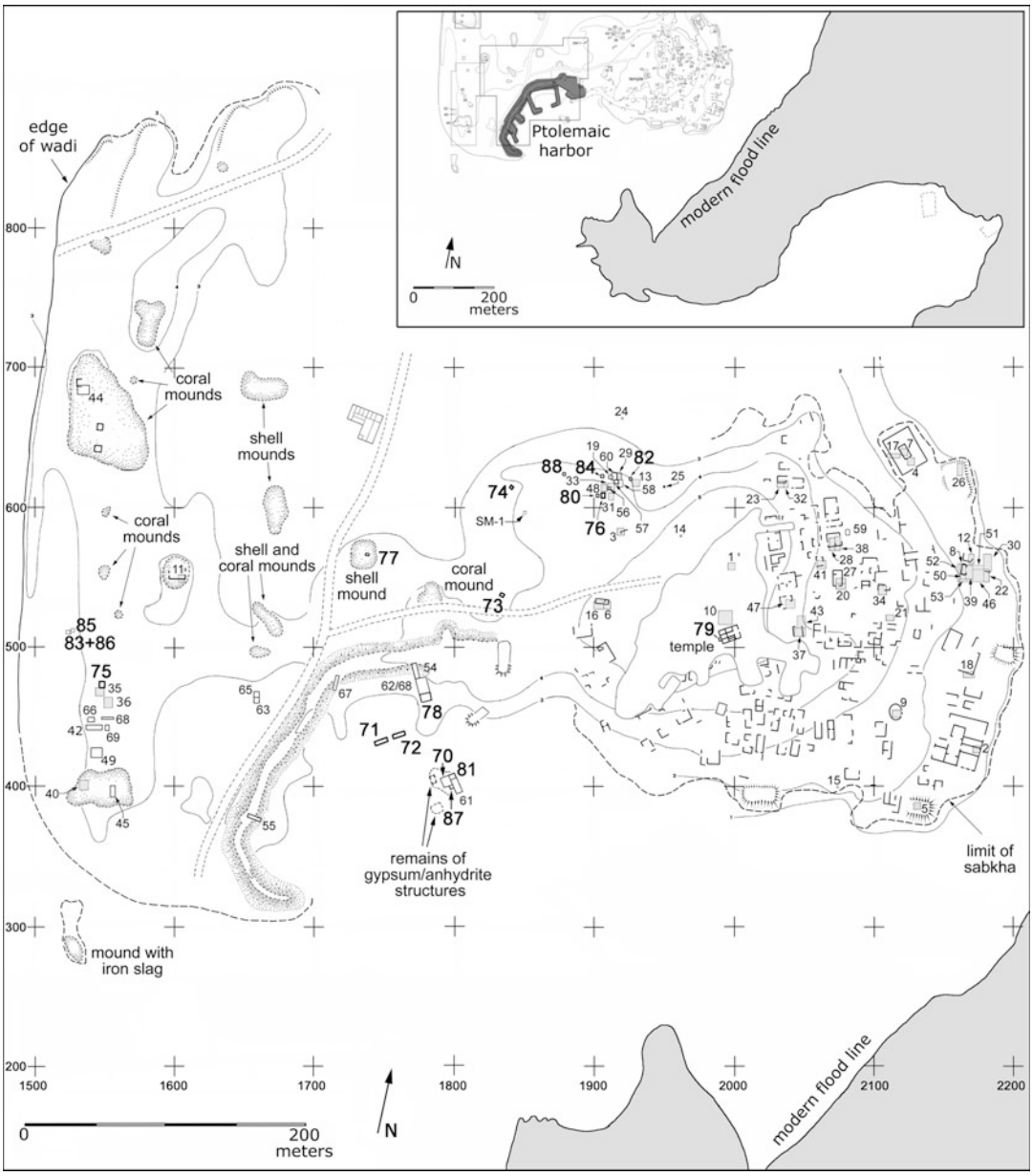

Berenike, Archaeology of, Fig. 2 Plan of Berenike with numbers indicating trenches excavated 1994–2001 and 2009–2012. Drawn by M. Hense and S. Maslak

Definition

Ptolemaic Era

Initially, Berenike's raison d'être was to meet the needs of the Ptolemaic government and military: importation of elephants (likely either the bush: *Loxodonta africana* or forest: *Loxodonta cyclotis* species) for the army, gold, and ivory. Some merchandise for civilian consumption also passed through Berenike on which the government levied substantial taxes. In Ptolemaic times there was contact mainly with other areas of

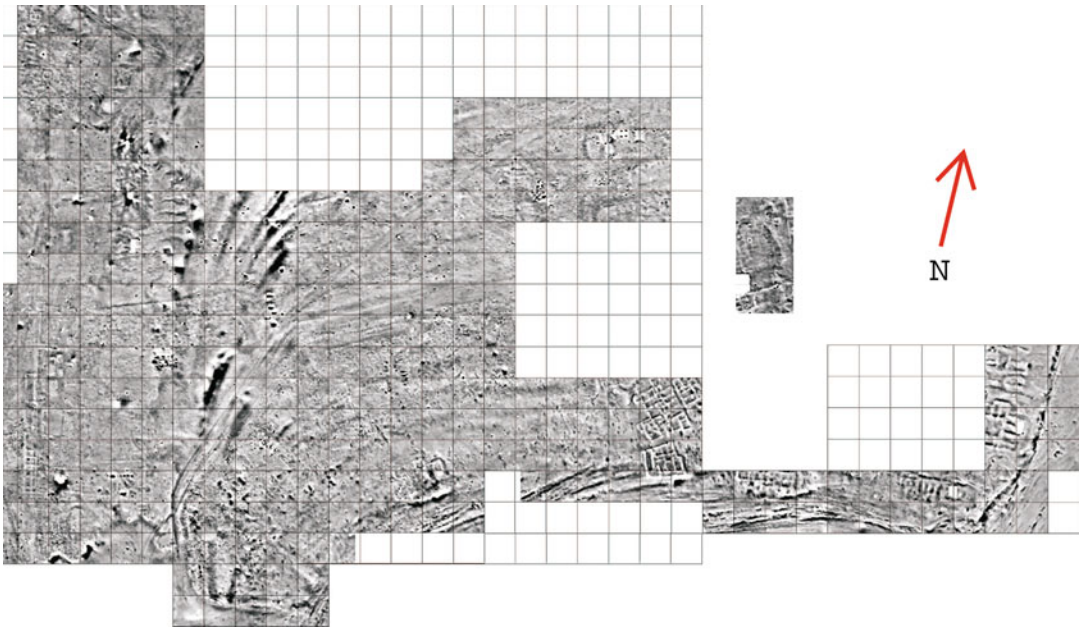

Berenike, Archaeology of, Fig. 3 Geophysical map of Berenike showing those areas examined (in *gray*) and those unexamined (in *white*). Prepared by T. Herbich

Egypt, Nilotic and Red Sea coastal Africa, and the Eastern Mediterranean/Levant. There were diplomatic exchanges between Ptolemaic Egypt and Aśoka, the Mauryan king of India, in the third century BCE and some contact with southern Arabia. A road across the Eastern Desert linked Berenike to Apollonopolis Magna (modern Edfu) on the Nile c. 340 km to the northwest.

Ptolemaic areas of Berenike lay primarily in the western part of the site, also some in the northern and central portions, and include zones for manufacturing activities (brick making, the production of lead, copper alloy, iron, creation of small-scale sculpture), a ditch (possibly for retaining elephants), and remains of a tower/other fortification (now badly robbed); the latter suggests military presence at this time. There are human skeletons deposited at some unknown date in antiquity atop some of the Ptolemaic ruins. Ptolemaic trash deposits lay north of the southwestern-most harbor. Building materials include gypsum/anhydrite, limestone, and assorted stones. Fired brick appears in a section of a cistern; this material is not evident in other excavated structures on the site though individual loose fired bricks appear throughout the archaeological record in the Roman period.

Artifacts and ecofacts from the Ptolemaic era are mainly amphora sherds (some with stamped handles: mainly from Rhodes), lead sheets (sheathing for ships' hulls), copper alloy and iron nails and tacks, some sculpture, beads, ostraka written in Demotic, burned industrial waste and some organic remains (faunal, botanical, basketry, cordage, matting). There are also some Ptolemaic silver and *aes* coins. The oldest artifact documented thus far is a fragment of a faience scarab-heirloom with a hieroglyphic text from the tenth century BCE (twenty-first Dynasty Pharaoh Siamun) excavated from an early Ptolemaic trash deposit. Faunal analysis indicates mainly an Egyptian and desert dwelling population at this time.

Early Roman Era

Roman (30 BCE to mid-sixth century CE) activities were more commercial and civilian in nature than under the Ptolemies. The volume of

trade also increased. During the Roman occupation networks expanded geographically throughout much of the Mediterranean basin. In early Roman times these stretched as far west as Gaul and the Iberian Peninsula and at least as far east as India and Sri Lanka on a regular basis. Interaction with the Persian Gulf was minimal and indirect via emporia in southern Arabia (Sumhuram, Qana'); there appears to have been little exchange with the Indian Ocean coast of Africa. At this time Berenike was one conduit in a network that included routes (intra-Mediterranean, trans-Saharan, Amber, trans-Arabian, and so-called Silk) linking portions of Africa, Asia, and Europe together. There are numerous ancient literary references to Berenike and its importance in the commerce of this era (e.g., Strabo, Pliny the Elder, *Periplus Maris Erythraei*). The Roman government profited handsomely from taxes and tolls levied on merchandise and its transport across the desert. In the Roman period the main thoroughfare connected Berenike to the Nile emporium of Koptos (modern Quft), c. 381 km to the northwest (north of Apollonopolis Magna).

Early Roman remains at Berenike comprise portions of the southwestern harbor with putative wharfs/quays and other unidentifiable structures including one sunken and made of white gypsum/anhydrite ashlars. The appearance and method of construction of the latter closely resemble those of the so-called Serapis Temple at the topmost part of the city, which may be Ptolemaic or early Roman in its original construction. There are early Roman (mainly second and third quarters of the first century CE) rubbish deposits north of the city, edifices in the city center (so-called Serapis Temple and associated structures), and eastern edge of the inhabited area (including waterfront walls/a wharf) near the modern shore line. The scant remains of early Roman era structures indicate construction from limestone boulders and gypsum/anhydrite ashlars quarried from nearby sources.

Early Roman period finds include extensive organic and inorganic remains of artifacts and ecofacts (faunal and floral) mainly, but not exclusively, from the early Roman rubbish deposits north of the city. Most written documents from the site date from this era (ostraka, papyri, inscriptions on stone and dipinti on wood and shell, and stamped and/or painted plaster jar stoppers). Most ostraka are public documents, while the majority of papyri detail private affairs. Several ostraka archives contain information on the Roman customs house in the city at this time. Quantitatively, most identifiable coins found from all phases of site occupation (both billion and *aes*) also date from this era. Finds from the southwestern harbor include ship timbers made of cedar wood, rigging, lead hull sheathing, and ships' ballast comprising vesicular basalt imported from Qana' in Southern Arabia. There is also redeposited industrial waste: stone – including large amounts of imported obsidian – some sard, selenite, beryl, worked turtle and mother-of-pearl shell, and extensive burned deposits: likely evidence of charcoal manufacture using discarded ships' timbers. The population at this time came from throughout the Mediterranean basin (Europe, North Africa, Middle East), Egypt, the Red Sea, and Indian Ocean littorals.

In early Roman times and later, there was military presence both at the port and in *praesidia* in the environs. Ten *praesidia*, ranging from southwest to northwest of the city and varying from 7.2 to about 25 km distant, protected approaches to Berenike in the early Roman period. Some of these installations witnessed Ptolemaic occupation and later Roman use as well. Several hundred early Roman era ostraka from the trash dump north of the city center indicate that the Roman army secured, transported, and distributed potable water from some *praesidia* for consumption at Berenike and, perhaps, for use aboard outbound ships. Military and police units also guarded/patrolled the route between Berenike and the Nile at Koptos and some of the mines (notably beryl/emerald, and likely gold) in the region.

Late Roman Era

In the late Roman period Berenike's network contracted in the north and west to include

primarily the eastern Mediterranean/Levant, but remained extensive in the Red Sea-Indian Ocean basin (there is also a bead from Jatim, eastern Java). The main Nile terminus for the late Roman-era road lay at Koptos. The latest literary reference to Berenike is in 524/525 CE in the *Martyrium Sancti Arethae* (27–29), but the port had clearly declined in importance by that time. By the mid-sixth century Berenike lay abandoned due, perhaps, to continued harbor silting, a plague (bubonic), which Procopius mentions passing through the region and/or increased competition from South Arabian and Axumite middlemen. There is no evidence of Islamic occupation.

The bulk of the visible remains at the eastern edge and central parts of the site are late Roman structures (mid-fourth into the fifth century CE) built primarily of fossilized coral heads; these buildings have quoins, staircases, and some thresholds made from gypsum/anhydrite ashlars – including at least one bilingual (Greek-Latin) inscription built into a wall – recovered from earlier edifices. Teak and cedar wood timbers, likely recycled from dismantled ships, often appear as supports built into the walls or forming partial roofing for buildings in this period. The structures in this part of the site comprise cult centers, small-scale industrial areas, commercial-residential buildings, and trash dumps; the latter were deposited atop, inside, and outside of abandoned buildings. In the southwestern harbor are remains of a late fourth to fifth century CE temple adjacent to a sunken structure of unknown function built of white gypsum/anhydrite ashlars (see supra). The only formal necropolis thus far identified in/near the city dates from the late Roman era. In addition, hundreds of late Roman era tombs lay west/west southwest of Berenike; most of these have been robbed.

Late Roman era finds include many floral and faunal remains, both organic and inorganic artifacts (especially ceramics, textiles, basketry, matting and cordage, glass, beads, industrial waste and coins). Roman *aes* coins, mainly of the smaller denominations, are the second most abundant on site (after the early Roman issues). A few non-Roman coins date from this era: an issue of the Axumite King Aphilas (c. 270/290-before 330 CE), a silver example of Rudrasena III of the Kshatrapa Dynasty in India (dating 362 CE) and a few, apparently, barbarous *aes* productions of unknown provenance. The few written (non-numismatic) documents from this era of the city's history comprise laconic dipinti and graffiti on sherds. The population was primarily Egyptian (both desert dwelling and marine oriented based on faunal analysis of items they consumed) though there is evidence of contact with and, perhaps, people from Axum, Southern Arabia, and the Indian subcontinent/Sri Lanka who were trading with, passing through, or dwelling in the city.

Key Issues/Current Debates

General Observations

Berenike was very cosmopolitan. Twelve different written languages (European, African, and Asian, also an early second century CE inscription in Greek recording an interpreter/translator), a variety of religious practices and an array of floral and faunal remains (a reflection of diet and, often ethnicity) indicate the presence of diverse groups of men, women, and children, as do burial practices/skeletal remains. Texts indicate that some women played a prominent role in the life of the city, at least in early Roman times. Cats and dogs were among some of the pets of the residents in the early Roman era. In addition to commercial activities, there must have been cultural interaction among the diverse populations.

The port's ethnically diverse inhabitants ranged from those of lesser means to relatively wealthy (e.g., gold and pearl earring, undecorated and decorated gemstones from signet rings, Proconnesian marble imported from Asia Minor used as floor/wall revetment, consumption of escargots from southern France/Northern Italy, fancy tapestries used as wall hangings/furniture or floor coverings, other semiprecious stones – including a nice sapphire – and beads, many made of semiprecious

stones and gold foil). Merchandise not only passed through Berenike enroute to markets in the Red Sea-Indian Ocean littorals or to Egypt and the wider Mediterranean world, but was also consumed at the emporium itself.

Berenike had some industrial activities: brick manufacture, production of lead, copper alloy and iron nails, tacks and fittings (for ship repair, furniture making and likely some architectural applications), recycling of glass, making items from mica, beryl, sard, obsidian, selenite and turtle and mother-of-pearl shell, manufacture of cordage, basketry and matting, wood, leather and animal horn working, and small-scale sculptural production in both Ptolemaic and Roman times.

Scholars have debated extensively the nature of the commerce passing through Berenike, and the trade between the ancient Mediterranean basin on the one hand and the "East"/northeastern Indian Ocean littoral (Southern Arabia, East Africa, South Asia, to a much lesser extent the Persian Gulf) on the other. The long held view that this was mainly a "luxury" trade for the elite must be reconsidered/discarded in light of all the evidence (literary and archaeological) pertaining to Berenike and other contemporary Red Sea and Indian Ocean emporia. This commerce included both "necessities" and also more "exotic" items. The term "luxury" must be used with great caution as it often reflects modern cultural bias rather than ancient sensibilities.

Some of the more noteworthy/unusual imports found in excavations at Berenike, mainly from the Roman era, were black peppercorns, coconut, rice, bamboo, jobs' tears (grass seeds from northeast India), rosary beads (*abrus precatorius* seeds from India), mung beans, *boswellia* (genus of frankincense), seeds of the baobab tree, mastic, camphora, perhaps sandalwood, teakwood (from south India), and cedar wood (from Lebanon). The teak and cedar, for the most part, appear to have been the remains of dismantled ships recycled into the walls of buildings. There was a long Egyptian tradition for such reuse of ship timbers. Other imports included Indian textiles, Syrian fir tree resin (used in mummification), sapphires (from south India/Sri Lanka), pearls (including five on a gold wire earring), lapis lazuli, beads (many from India, one from Java, some perhaps from Vietnam/Thailand), banded agate cameo blanks (from northwest India), travertine (from southern Arabia) balsam, Indian (both fine wares and cooking/coarse wares) and Axumite pottery, as well as some sherds of Persian Gulf provenance. No extant literary evidence mentions some of these, while others were not trade items per se (the pottery), but likely ancillaries to commerce (containers for commodities) or were personal baggage. The bulk of the pottery from Berenike is amphorae deriving from throughout the Mediterranean basin and Middle East.

Conclusion

Excavations at Berenike and elsewhere in the Red Sea and Indian Ocean basins over the past 25–30 years have shown that the scale of this global exchange was commercially greater in volume, involving a wider array of items and more extensive geographically than previously believed especially in the Roman period. The cultural exchanges are more difficult to identify and measure, but most certainly occurred.

Concomitant to work at Berenike the project has also conducted wide ranging surveys and excavations in the environs and farther afield in the Eastern Desert, between the Red Sea coast and the Nile. This research provides a wider context in which to understand better Berenike's interaction with and importance to local and regional settlements as well as with the broader network within Egypt, the Mediterranean basin, and the Red Sea-Indian Ocean regions.

The American-Polish project will continue excavations at Berenike and survey-excavation in the desert hinterland for the foreseeable future.

Cross-References

- ▶ Economy, Roman
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Late Antique Egypt, Archaeology of
- ▶ Red Sea: Maritime Archaeology

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Berlin Wall

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Introduction

In a surprise action during the night of August 12/13, 1961, the Communist government of East Germany (the German Democratic Republic or GDR) erected barbed-wire barriers to stop all traffic between East and West Berlin (Hertle 2011). These linked up with a system of barriers already in existence along the border between West Berlin and the GDR, effectively isolating West Berlin and controlling all access to it. The closed border quickly grew into a fortification system that became universally known as the Berlin Wall.

Since 1945, Berlin as the capital of Germany had been under Four-Power administration, internally divided into the Soviet sector (East Berlin) and the American, British, and French sectors (West Berlin). While the inner German border between the GDR in the east and the Federal Republic of Germany in the west (both founded in 1949) had been effectively sealed since 1952 as part of the Iron Curtain, communication and traffic between the western and eastern sectors of Berlin had remained practically unhindered, with many East Berliners crossing daily into West Berlin to work or to study and West Berliners buying cheap goods in East Berlin, thus adding to the pressures on East German economy. Even more problematic was the fact that Berlin remained, all through the 1950s, the one loophole in the Iron Curtain: East Germans could travel to East Berlin, the capital of the GDR: once in East Berlin, they could cross to West Berlin, be registered as fugitives from the GDR, receive West German citizenship and move out to West Germany via the official transit routes,

Berlin Wall, Fig. 1 Section of the Berlin Wall built in 1961 (Michael-Reiner Ernst)

particularly the air corridors. Until 1961, not less than 2.7 million East Germans had left in this way – a dramatic loss for a country of roughly 17 million inhabitants (Wilke 2011).

The East German decision to close the border in Berlin depended on Soviet approval which was finally granted in the summer of 1961 (Harrison 2005). Part of the power play between the Soviet leader Nikita Khrushchev and US President John F. Kennedy, the closing of the border, and the propagandistically effective move of erecting a wall in the center of Berlin were not initially meant to be permanent, but to intimidate the West into agreeing to proposals of turning West Berlin into a "Free City" evacuated by the Western powers and dominated by the East. When it became clear that this strategy had failed, the GDR was faced with the task of turning the improvised barriers into a permanent "border regime" (Schmidt 2011a).

Key Issues/Current Debates/Future Directions/Examples

The Berlin Wall as a Structure

Within days, the barbed-wire barrier erected through Berlin was replaced by a wall – although it is worth noting that this first wall never extended beyond the city center. This first border wall was composed of breeze-block elements that were available in large numbers as they had been produced for the early prefabricated apartment houses of the GDR. This wall, usually about 2 m high, was topped by barbed wire strung along Y-shaped metal stakes (Fig. 1). Its perhaps deliberately brutal design and the fact that it was very unstable support the interpretation that this wall was largely built for propaganda purposes: It is known that the East German military favored the barbed-wire fencing that surrounded most of West Berlin and that it was Party Chief Ulbricht who insisted on a wall, presumably because it was more impressive visually.

During the following months, this initial structure was fortified and augmented in a number of ways, and in many places, the wall was raised by adding of extra courses. As a reaction to several successful escapes by fugitives breaching the wall with heavy vehicles, the breeze-block wall was sometimes replaced by barriers made of massive concrete slabs. Equally solid concrete elements were also employed in other locations, notably in Bernauer Strasse after the demolition of houses which stood directly on the border. Although involving only a limited modification of the earlier breeze-block structure, this concrete barrier has been termed the "second generation" Wall.

When it gradually became clear that the West was not going to give in to the Communists'

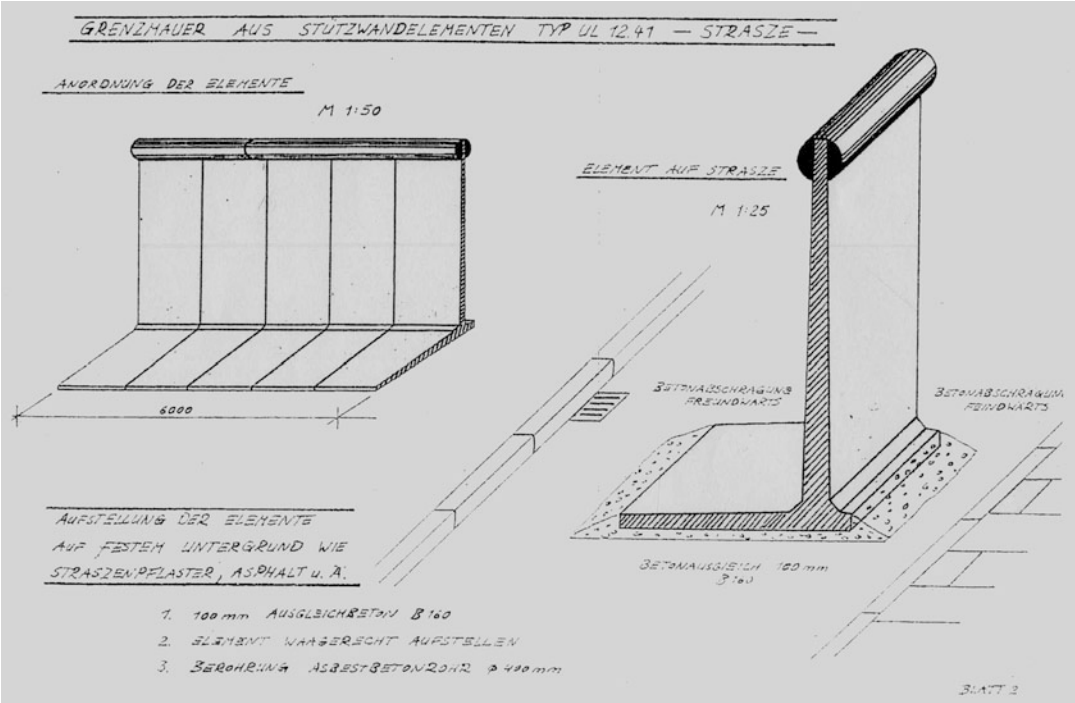

Berlin Wall, Fig. 2 Construction principles of 'Border Wall 75' (BTU)

demands and that the closed border in Berlin would become a permanent feature, the GDR began to devise a border system. In mid-1962, a border zone was institutionalized. Many buildings were demolished to make space for a death strip of varying depths – mostly about 50 m. A patrol road and a light strip parallel to the border were laid out, rough observation towers built of masonry or as wooden structures were erected, and the rear of the border strip, facing east, was secured by fences and a restricted area (Feversham & Schmidt 1999).

From the mid-1960s onward, all these border structures were superseded by a system of new border elements, consisting of a border wall constructed from concrete slabs set between concrete posts and topped by a sewage pipe (rendering it impossible for fugitives to get a grip on the top of the wall), a series of specially designed watchtowers featuring polygonal observation cabins on top of slender cylindrical concrete shafts, various anti-vehicle ditches and other obstacles such as "area barriers" consisting of metal grids with large steel spikes to impale fugitives trying to jump into the death strip from its eastern wall. Guard dogs in specially constructed runs also were an important feature, but – unlike the inner German border – no mines were ever used along the Berlin Wall.

Whilst this "third generation" Wall constituted a definite improvement over the improvised first version both in visual and structural terms, it proved to have so many defects and weaknesses that it was superseded, from the mid-1970s onward, by a "fourth generation," dubbed Grenzmauer 75 by its builders ("Border Wall 75"). This format was the result of an extensive research and trial program. Test walls were assembled from various prefabricated concrete elements – originally developed for agricultural purposes – and were exposed to simulated attacks. As a result of these tests, the L-shaped element UL12.41 – 1.2-m wide and 3.6-m high – was deemed most suitable for the border purposes (Fig. 2).

The "Border Wall 75" needed no foundations and was far stronger than its predecessor. Furthermore, it presented a smooth face toward

West Berlin: an aspect of some significance to the GDR rulers who, from the early1970s onwards, became increasingly preoccupied with the image of their state toward the international public – an image tainted by the all-too obvious brutality of the border fortifications (Schmidt 2011a). The seamless and smooth western face of the "Border Wall 75" was quickly perceived as a limitless public canvas that seemed to invite the application of graffiti (Gründer 2007).

It should be noted that the structures of the border strip visible in Berlin – such as the border wall and the watchtowers – only constituted a part of all the elements that constituted the border system as this also comprised the extensive infrastructure required to control the border, such as the barracks for the border guards (roughly 10,000 soldiers) who patrolled the border with orders to shoot "border perpetrators" on sight rather than let them escape (Maurer 2011). The barracks of the five border regiments of Border Command Centre were arranged at different locations around West Berlin (Klausmeier 2009).

The Fall and Rise of the Wall

The story of the bloodless revolution that led to the sudden fall of the wall on November 9, 1989, has often been told (Henke 2009). In spite of warning voices, there was a broad consensus in favor of clearing away the hated border surrounding West Berlin as thoroughly as possible. Official demolition, carried out mostly by GDR Border Guards, began on June 13, 1990, in Bernauer Strasse, and was largely completed by the October 3, 1990, the day of German reunification. Thanks to efforts initiated by GDR Institute for Heritage Conservation as early as December 1989 and continued by the Berlin State Conservation Authority, a total of seven sections of the Wall and other border installations were listed and preserved as Historic Monuments by 1992. By 2011, this number had risen to 27, following intensive field research in and around Berlin (from Baker 1993 and Klausmeier & Schmidt 2004 to Cramer 2011; Berlin Wall GIS n.d.). While Berliners and their politicians had, all through the 1990s, mostly tried to forget the time of the division and to ignore the remnants and scars of the Wall in their city, the 2000s saw the rise of a new awareness of the Wall's significance, culminating in the celebrations of the 20th anniversary of the fall of the Wall. The Stiftung Berliner Mauer (Berlin Wall Foundation) funded in 2008 jointly by the Federal Republic of Germany and the Land of Berlin and its Landscape of Memory and Documentation Centre in Bernauer Strasse, both grown out of a private initiative in the 1990s, are a result of this new policy (Stiftung Berliner Mauer n.d.).

Perception and Cultural Significance

From the very start, public perception of the Berlin Wall was clouded and distorted by propaganda efforts. For example, even today, most people worldwide, when they think of the Berlin Wall, only ever imagine its western aspect. This is due to the fact that the GDR, whose name for the Wall was the "Anti-Fascist Protection Rampart," was interested in sustaining the fiction that the Wall was facing west – to repel the GDR's external enemies – rather than admitting that it was in fact facing east and had the primary purpose to prevent East Germans from leaving their own country. This fiction was upheld by rigorous control of any visual representation of the border's eastern aspect (hidden deeply within a restricted area) and aided by an attitude of the West of accepting the Border Wall they could see and touch as the only important element of the complex border fortifications.

By contrast, the eastern-facing wall – misleadingly called the "hinterland security wall" although it was, in functional terms, the main facade of the border installation – was never pictured or published in East or West. Therefore, the view of the border from the east must today be reconstructed as a computer visualization (Fig. 3). Perhaps ironically, the fact that the Berlin Wall was largely identified with the border wall and the watchtowers led to the effect that these elements were demolished with particular thoroughness whereas considerably more survived of the "hinterland wall" and other largely unnoticed border elements.

Berlin Wall, Fig. 3 Computer visualization of the border seen from the east (BTU)

Archaeological field research was able to identify previously unknown but revealing elements such as the "perimeter defenses": concrete walls, fences, and various obstacles (such as the heavy square concrete tubs known as "flower bowl barricades"); there were also metal grids barring windows close to the border strip, various spiky obstacles to prevent people from scaling fences and walls as well as additional light installations illuminating any possible hiding places in the vicinity of the hinterland Wall.

The color markings for Vordere Postenbegrenzung ('patrol limit') may be seen as a particularly graphic element of the border system revealed by archaeological field research and interpreted through oral history (Klausmeier & Schmidt 2004: 26). These markings, usually displayed on the lamp-post along the western side of the patrol road (Fig. 4), signified the line which ordinary border guards were not allowed to cross: If they did, they would themselves be regarded and treated as border violators. In fact, many Border Guards did attempt to flee, some of them either killing comrades or losing their own lives in the attempt (Hertle & Nooke 2011).

Berlin Wall, Fig. 4 'Patrol limit', color marking on lamp-posts along the patrol road (BTU)

The exaggerated, even exclusive importance of the border wall in public perception is reflected in the curious phenomenon of the cult of Wall fragments. These are taken invariably from the Border Wall, and more specifically from its graffiti'd western face: No Wall fragment is deemed authentic unless it shows the colorful traces of paint layers. Immediately after the fall of the Wall in November 1989, "wallpeckers" began to hack fragments from the Wall; millions

of these fragments were taken away by tourists and sold all over the world – like splinters from the True Cross, proof of our deliverance from the Cold War. The cult of Wall fragments is the result of a radical change of identity experienced by the Wall on November 9, 1990: From a symbol of oppression and death it had, by its unheralded fall, suddenly become an icon of liberation and hope. But not only small fragments of the Wall found their way to countless places around the globe: At least 120 Berlin Wall monuments, mostly made of full-size elements of the Border Wall, exist outside Germany, most of them in public, often very prominent spaces, but also within museums and public buildings – a unique case of a building or monument dispersed in authentic elements over all continents and recontextualized in many different forms (Kaminsky 2009; Schmidt 2011).

The Berlin Wall has been a symbol and icon for many things (Kuhrmann et al. 2011) although the joyful memory of its fall overlays, for most people and particularly non-Germans, the memory of oppression and death. It is often used in comparison with other painful borders in the world although it should be pointed out that, unlike most other walls and fortified borders throughout history, the Berlin Wall was built to keep people in, not out.

Cross-References

- ► Cold War
- ► Social Archaeology
- ► Social Memory in Archaeological Theory

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Basic Biographical Information

Robert "Bob" Bettinger (known simply as "Dr. Bob" to students of any age or degree) was born in Berkeley in 1949 and raised in the boom years of postwar California. Regular family expeditions from the Bay Area north to Fortuna

(along the Eel River, in the redwood timber country of northern California) induced lifelong interests in archaeology and ethnography. Indeed, it was the splendor and mystery of Native California that drew him to the prospects of anthropology in the first place, and to this day his research in archaeology is notable for its attention to ethnographic detail and insight.

As a college student at the University of California, Riverside, he was introduced to the challenges of archaeological fieldwork and to faculty commitments to economic anthropology, ecology, and analytical parsimony. Graduating Phi Beta Kappa in 1970, he continued his education at Riverside, completing a Ph.D. in 1975 under the guidance of Sylvia Broadbent, Erv Taylor, James O'Connell, and Martin Orans. During this time, O'Connell sent him to the Reese River Valley of Nevada to work with David Hurst Thomas on a pioneering effort to test hypotheses built from ethnographic records with systematic archaeological survey, sampling, and quantitative analysis. Bettinger's own dissertation (Bettinger 1975) expanded Thomas's Reese River program to the Owens Valley of California where better archaeological and ethnographic data helped to refine the analysis and interpretation of spatial patterns in hunter-gatherer activity.

By 1974 he was on faculty at New York University, where he made tenure in 1980. During the years at NYU, Bettinger and Thomas (also in New York, at the American Museum of Natural History) made the cross-country trek with their families to work in the Great Basin on a variety of collaborations and independent projects including excavations at Gatecliff Rockshelter, and systematic surveys in Monitor Valley, Nevada and Owens Valley, California. In addition to the volumes of first-rate research that came of it, the Great Basin archaeology of the 1960s and 1970s earned a separate reputation: a generation of archaeologists trained in western North America was raised on the preposterous exploits of these desert expeditions; subsequent generations were raised on the equally preposterous mythology of them.

A move to an untenured position at the University of California, Davis in 1980 brought him closer to home, closer to work, and on to a new research program in the White Mountains of eastern California. Some of the most enduring legacies of this period were the discovery of the highest elevation villages in North America and the behavioral logic explaining their existence (Bettinger 1991a). Tenure came quickly (by 1982) and this he attributes largely to the impact of a theoretical collaboration with the late Martin Baumhoff that explained the spread of the Numa, and the Uto-Aztecan language family, across the desert West (Bettinger & Baumhoff 1982).

In 1989, Bettinger and Great Basin veterans Robert Elston and David Madsen traveled to the interior of China on an invitation to apply the method and theory of Americanist archaeology to the Alashan Desert of Inner Mongolia (Bettinger et al. 1994). This international collaboration continues today and has expanded into neighboring Chinese provinces of Ningxia and Gansu, while remaining focused on late Pleistocene and early Holocene adaptive strategies and the origins of agriculture (Bettinger et al. 2010).

Major Accomplishments

Coursing through these regional, temporal, and topical foci is a career-long effort to refine and improve the theoretical foundations of hunter-gatherer archaeology. At the root of this effort is old-fashioned cultural ecology: Julian Steward's ethnography and interpretation of aboriginal life in the Great Basin permeate Bettinger's writing, from his dissertation on "man-land relationships" to some of his most recent work on the origins of private property. However, the early 1970s were awash in novel, elegant approaches to the biology of social organisms, and Bettinger (along with many other scholars) was unsatisfied with Steward's understanding of change through time. From this dissatisfaction emerged a new paradigm in human evolutionary ecology, and Bob Bettinger has been part of it ever since. Both his explanation for the Numic Spread, and the papers that preceded it were pioneering efforts to combine the economic logic of evolution in rational actors with the time-space dynamics of a multi-peaked adaptive landscape. His ground-breaking,

green-covered handbook on the evolutionary ecology of hunter-gatherers (Bettinger 1991b) continues to guide students through the simplifying logic of foraging theory and economic modeling. A more recent manual of step-by-step instructions, exercises, and practical applications (Bettinger 2009) makes the foraging models easier to learn. Critics of rational actor economic models often argue that their simplicity is unrealistic and that humans (indeed, any organisms) are too complex and too unprogrammed to follow such reductionist logic. Proponents of evolutionary ecology are of course aware of this complexity but prefer to approach the evolutionary consequences of it conservatively. They might instead begin with the insights of the basic evolutionary framework, expanding piecemeal to explore more complicating features of human behavior affecting inheritance, adoption, variation, and survival. For example, if the very mechanics of human learning and information-transfer affect the evolutionary process, how might these patterns of learning and evolution be detected in the archaeological record? Bettinger and colleague Jelmer Eerkens (1999) provide us with one of the earliest and to date one of the best applications of this cultural transmission theory in archaeology, by evaluating Great Basin projectile points and the spread of bow-and-arrow technology.

Underpinning this career-long dedication to the patterns of human cultural evolution is a very general philosophy for archaeology: "good science can handle meager data with excellent theory, but without really good theory you better have damn-good data." To students and colleagues from California to China and Argentina to Siberia, this oft repeated dictum is known as "Robert's Rule."

In 2007 Bettinger received the annual Award for Excellence in Archaeological Analysis from the Society for American Archaeology.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Analogy in Archaeological Theory
- ▶ Cultural Ecology in Archaeology
- ▶ East Asia: Paleolithic
- ▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic
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- ▶ Surface Survey: Method and Strategies

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Basic Biographical Information

Dibyendu Kanti Bhattacharya (Fig. 1) was born on June 28, 1939. He was the son of Mr. Jitendra Mohan Bhattacharya and his wife Manorama. He has five brothers and two sisters. When he was 5 years of age, he was not a healthy person, and he once heard his parents discussing that he could not survive for long and he should be allowed to do whatever he wished while he was alive. This whisper affected him strongly, and he would never give in to his weakness. Even today, in the throes of severe asthma during certain parts of the year, he has never stinted from his teaching, research, and fieldwork. In May 1958, he ran away from home and joined the Bhoodan movement under Vinoba Bhave because he wished sincerely to work for the people. He remained in there for 6 months travelling all over Sholapur district in Maharashtra. Due to this, he had trouble in getting admitted to the University of Delhi in the M.Sc. course. He completed his M.Sc. in 1960, securing a first division, and was awarded a Ph.D. in 1965, his thesis titled *A Study of ABO, RH-HR, MN Blood Groups Among the Anglo-Indians of India With a Note on Some Other Morphological Traits* from the Department of Anthropology, University of Delhi.

Bhattacharya, Dibyendu Kanti, Fig. 1 Photo of Bhattacharya, Dibyendu Kanti

He was the lecturer at the Department of Anthropology, Lucknow University, in 1965–1966. In 1966, he joined as a lecturer at the Department of Anthropology in the University of Delhi. In 1969, he was married to Pratibha, a grandniece of Veer Savarkar. In December 1971, he went to Germany and stayed there for 3 years. He also went to Great Britain, Denmark, Norway, Sweden, Austria, and Switzerland.

In August 1974, his daughter was born. He became a reader in 1985 and in 1991 became a Professor in the Department of Anthropology, University of Delhi. Between 1993 and 1996, he was the Head of the Department, Department of Anthropology, and University of Delhi. He was the visiting Professor at the Department of Anthropology, Lucknow University

(in April 1997), at the Karnataka University, Dharwad (September, 2002) S.V. University, Tirupati, in October 2002.

He was the member of the UGC's visiting team to evaluate the tenth plan at Vidyasagar University, Midnapur, in November 2002. He is an associate of the Journal Current Anthropology, published by the Wenner-Gren Foundation from the USA. He is a member of the Anthropological Society of Nippon, Japan, and a life member of the Indian Science Congress Association, Kolkata; the Indian Anthropological Association, Delhi (of which he was one of the founders); the Ethnographic and Folk Culture Society, Lucknow; the Indian Society for Prehistory and Quaternary Studies, Pune; the Indian Archaeological Society, New Delhi; and the S. C. Roy Institute of Anthropological Studies, Ranchi.

Bhattacharya speaks English, Hindi, Bengali, German, and Marathi fluently. His major geological areas of interest include in other areas of Madhya Pradesh, the Chotanagpur region, and West Bengal, though he has also worked in other areas including Rajasthan, Orissa, Gujarat, and Maharashtra.

Major Accomplishments

Professor Bhattacharya has spanned a career in Indian Archaeology for almost 40 years. In his career, he has been bestowed with many honors. During his time at the Department of Anthropology in the Lucknow University, he was assigned an almirah in which he found several bones. On asking he was informed that these bones were from a place called Roopkund in the Uttaranchal Himalayan region. After reading up on the mysteries of this region, he had decided to work on this and other materials found from the region. This was awarded recently, when he and others worked on this material in 2001 for the National Geographic Program to give a summary on the findings of the Roopkund Mystery.

In 1972 he had written the first of his textbooks on this subject. He was awarded a D.Litt. from Ranchi University in 1983, in which he worked on a major outline of European prehistory entitled Paleolithic Europe. This book was later published by the Humanities Press. When Prof. Bhattacharya came back to India, he had written a book on stone tool typology, realizing that such a work was unique and had not been systematized. In India, under the guidance of Prof. Bhattacharya, the first such typo-technologies of Stone Age tools were available. Till date, even in many foreign universities, such a typo-technology is not aught and is expected often to be worked out by the students on their own. As a result, his special interest ranged from Physical Anthropology, Palaeoanthropology, Prehistoric Archaeology, and Human Ecology.

He delivered the Panchanan Mitra lecture at the Asiatic Society, Kolkata, in 1993. He was granted the Dharni Dhar Memorial Plaque by the Department of Anthropology, Calcutta University, on March 13, 1997. He was unanimously selected the President of the Anthropology and Archaeology Section of the 86th Indian Science Congress held in Chennai in January 1999.

He also delivered the first D.N. Majumdar Memorial Lecture at Lucknow on March 2, 2003. He was also the coordinating author for the chapter on "Cultural Services" sponsored by the Millennium Ecosystem Assessment. As a result, he visited Indiana University, Bloomington and Indianapolis, USA (in January 2003); Frankfurt, Germany (in May 2003); and Czech Republic (in October 2003).

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ Bone Tools, Paleolithic
- ▶ Heritage and Archaeology
- ▶ Interpretation in Archaeological Theory
- ▶ Material Culture and Education in Archaeology
- ▶ Mousterian Industry Tradition

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Bhimbetka Rockshelters

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Introduction

Bhimbetka is a hill containing over 200 caves and rockshelters located 45 km south of Bhopal, of Raisen district, near the Bhiyapura village of Madhya Pradesh, situated along the Bhopal-Hoshangabad highway, in the northern fringes of the ancient Vindhyachal range. The rock paintings were discovered by V. S. Wakankar, who surveyed the area in 1957. Since 1990, this complex of sites is protected and maintained by the Archaeological Survey of India and recognized as World Heritage by UNESCO. Other adjoining hills are equally rich in caves and rockshelters, and altogether there are over 1,300 of them in an area of 10 km length from east to west. More than 500 of these sites contain paintings. Excavations in over a dozen shelters at Bhimbetka have revealed a continuous occupational history from Acheulian to Mesolithic times. The paintings are found on walls and ceilings of the shelters, usually on large even surfaces but sometimes also in small hollows or niches. The majority are within easy reach but some are situated at considerable heights and also at inconvenient places where standing support would be needed.

Key Issues/Current Debates/Future Directions/Examples

Content and Style of the Art

The majority of the paintings are in red or white colors but some are also in green. Based on the Raman spectra and the elemental analysis, mineral-based pigments such as calcite, gypsum, hematite, whewellite, and goethite could be identified to have been used for painting. The latter are most poorly preserved and are probably the oldest. Broadly the paintings can be divided into two cultural and chronological phases: (1) prehistoric and (2) historic. The prehistoric paintings are dominated by the depiction of wildlife, which includes various species of deer, antelopes, wild boar, elephant, rhinoceros, tiger, wild buffalo, wild cattle, fox, jackal, and fish. Birds are shown but are rare. The animals are shown individually as well as in groups and in standing, grazing, moving, and running positions. Some animal figures are marked by composite characters, like those of a boar and a bull, and probably represent mythical creatures. There are frequent hunting scenes with men hunting individually or in groups and using spears, bows and arrows, traps, and snares. The spears and arrows are tipped and barbed with what appear to be microliths. Other food-gathering activities shown include men and women fishing and climbing trees with baskets suspended on their backs to collect fruit, flowers, and honey. There are scenes

Bhimbetka Rockshelters, Fig. 1 Deer of Bhimbetka

of human life like group dances, drinking, pregnancy, care of the sick, and mourning. Two petroglyphs excavated in Auditorium Cave (Bhimbetka III-24) were covered by the uppermost part of a substantial Acheulian layer, which according to R. Bednarik must be the oldest rock art in the world. This assertion remains controversial and has yet to see wide acceptance by rock art researchers in India and beyond. The later and historic paintings, which are often superimposed over earlier paintings, have limited repertoire of themes. They mostly depict royal processions and battle scenes with men riding caparisoned horses and elephants and fighting with metal tipped spears, bows and arrows, swords, and shields (Figs. 1–3).

A brief description of seven periods of the rock art in Bhimbetka is as follows:

Period I-(Upper Paleolithic) These are linear representing, in green and dark red, huge figures of animals, such as bison and boar beside stick-like human figures.

Period II-(Mesolithic) Smaller in size compared to the earlier period, the stylized figures using symbols in this group show linear decorations on the body containing animals, human figures, and hunting scenes giving a clear picture of the weapons they used like barbed spears, pointed sticks, bows, and arrows. The depiction of communal dances, birds, musical instruments, mother and child, pregnant women carrying dead animals, drinking, and burials appear to capture motion in different situations.

Period III-(Chalcolithic) Similar to the paintings on the pottery of the Chalcolithic, these drawings reveal that during the period, the cave dwellers of this area were in contact with the agricultural communities of the Malwa plains and exchanged goods with them moving towards more civilized societal colony.

Periods IV and V-(Early Historic) The figures of this group have a schematic and decorative style and are painted mainly in red, white, and green. The presentation of riders, depiction of religious symbols, tunic-like dresses, and the existence of scripts of different periods are significant departure from the earlier period. The religious beliefs are represented by figures of Yaksha, tree gods, and magical sky chariots.

Periods VI and VII-(Medieval) These paintings are formed out of geometric, linear, and more schematic, but they show degenerations and crudeness in their artistic style compared to the earlier stage may be due to mass production of routine themes. The colors used by the cave dwellers were prepared combining manganese, hematite (soft red stone), and wooden coal. Paintings on the concepts of Brahmanical gods like Ganesh and Nataraja are considered the contribution of this period.

There is considerable variety in the portrayal of animal figures of the earlier phase. The animal body is drawn only in outline, or it is wholly or partially filled with color or is decorated by geometric patterns like straight or wavy lines, dots, crisscrosses, and other more complex designs. The animal figures are characterized by naturalism, vitality, and vigor. The majority of these paintings are highly mature artistic creations and suggest a long evolutionary period behind them. In contrast, the paintings of the historic phase are stylized, repetitive, and devoid of realism. The latest among them depict animals in a highly distorted and conventionalized manner. It is obvious that the artists who drew them were no longer inspired by natural life around them but were only repeating traditionally accepted motifs.

Bhimbetka Rockshelters, Fig. 2 Mail Hall of Bhimbetka

Bhimbetka Rockshelters, Fig. 3 Bull of Bhimbetka

Cross-References

- ▶ Art, Paleolithic
- ▶ Australian Paleoart
- ▶ Australian Rock Art
- ▶ Europe: Paleolithic Art
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Willendorf II: Geography and Culture

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Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)

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Basic Biographical Information

Lewis R. Binford (1931–2011) was born November 21, 1931 in Norfolk, Virginia.

He studied wildlife biology at Virginia Polytechnic Institute. But military service in Japan during the Korean War led him to an interest in other cultures, and, after the war, he studied anthropology and archaeology at the University of North Carolina. He attended graduate school at the University of Michigan, graduating in 1964 with a dissertation on the archaeology and ethnohistory of coastal Virginia.

Binford taught at the Universities of Chicago, California (Santa Barbara and Los Angeles), New Mexico, and Southern Methodist University. He published over 150 papers, books, reviews, and comments and received much recognition, including election to the National Academy of Sciences.

Major Accomplishments

Binford was the chief architect of the *new* or *processual* archaeology. In the 1950s, archaeologists focused on artifact classification, and they saw artifacts as reflections of mental templates, useful for tracking the migration of cultures or the diffusion of ideas. Through a series of papers, Binford (1962, 1964, 1965, 1967, 1968a) challenged archaeologists to do more, to fully participate in anthropology, and to rely on scientific methods. Revolutionary at the time, Binford's approach became *de rigueur* by the 1970s (see compendiums of his papers in Binford 1972, 1983b, 1989).

Binford took a materialist approach to prehistory, relying on Leslie White's concept of culture as *man's extrasomatic means of adaptation*. He focused on hunter-gatherer societies and helped pioneer ethnoarchaeology (with research among the Nunamiut and Australian Aborigines), as well as faunal analysis, sampling, spatial analysis, and the use of statistical methods. He introduced concepts that are now so common in archaeology that one forgets he invented them, e.g., residential and logistical mobility, foragers and collectors, curated and expedient tools, technological organization, and, most importantly, middle-range theory (e.g., 1978a, 1979, 1980).

Middle-range theory was aimed at making reliable inferences from archaeological remains. Binford argued that archaeologists relied on simple rules of thumb for interpretations (1977, 1981a, 1983a). Using the geological principle of uniformitarianism, he sought unambiguous links between human behavior or natural processes and their material traces. His work with the Nunamiut was pivotal here (1978b). Grounded in the food utility of different parts of animal anatomy, he used Nunamiut butchering practices to show how faunal assemblages differed depending on circumstances (e.g., fall hunts designed to store food vs. spring hunts for immediate consumption). The resulting patterns in Nunamiut faunal assemblages could then be used to interpret archaeological assemblages – not as analogues but as middle-range theory because the *causes* of the patterns were sought and explained in terms of the intrinsic elements of animal anatomy. As long as ancient and modern animal anatomy was the same, the patterns of different butchering goals should also remain the same.

Binford was not interested in an ethnographic reconstruction of the past. Instead, he argued that

archaeology's power lay in its ability to see processes on a scale that ethnography could not – time spans of thousands of years and spatial variation across continents. He used specific archaeological cases to understand processes of change and causes of diversity among hunter-gatherers. Consequently, he was never a prehistorian of a particular region. Nonetheless, he contributed seminal research to several important questions, including the meaning of variability in Mousterian stone tool assemblages, the origins of agriculture, and the role of hunting in human evolution.

French archaeologist François Bordes argued that variability in Mousterian stone tool assemblages reflected different mental templates and hence different *tribes* of Neanderthals. Binford (Binford & Binford 1966) argued that the assemblages reflected different functional uses of a cave as the settlement system shifted to adapt to changing circumstances (1982). Likewise, he argued that agriculture was not the inevitable product of the accumulation of knowledge but was instead an adaptation to high population density (1968b). In the 1980s, he used ethnoarchaeological and taphonomic research on faunal remains to argue that our earliest human ancestors were not hunters of large game, who foraged in much the same manner as modern hunter-gatherers, but were instead lowly scavengers of the animal carcasses left behind by large carnivores (1981b, 1983a). His studies of variability in lower Paleolithic stone tool assemblages led him to argue that those early makers of stone tools were not simply shorter, hairier versions of ourselves but hominins who were not human in the way we know humans.

His magnus opus, *Constructing Frames of Reference* (2001), was the result of a lifelong effort to compile ethnographic data on hunter-gatherer societies and environmental data in order to model prehistoric life based on paleoclimatic reconstructions.

Binford was a thinker who thrived on challenging orthodoxy and authority. He was a prolific writer, a mesmerizing speaker, an excellent teacher, and a theoretician who understood dirt archaeology. While many of his specific interpretations may not stand the test of time, he helped shape archaeology into the field it is today.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ East Asia: Paleolithic
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ Hunter-Gatherer Settlement and Mobility
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Binford, Lewis R. (Theory)

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Basic Biographical Information

Lewis Roberts Binford was born on November 21, 1931, to J. Lewis Binford, from rural Appalachia, and Eoline Roberts Binford, of the genteel Tidewater area of Virginia. When he died on 11 April 2011, newspapers around the world noted his passing and memorialized his accomplishments. Binford was the quintessential southern gentleman, a charismatic lecturer, and an inspirational teacher, who, through force of personality, great intellect, and roll-up-your sleeves hard work, transformed the conduct of archaeology. He loved life and living, which for him was synonymous with learning and challenging. Everything he did during his time on the faculties of the University of Chicago (1961–1965), University of California–Santa Barbara (1965–1966), University of California–Los Angeles (1966–1968), University of New Mexico (1968–1991), and Southern Methodist University (1991–2003) was accomplished with infectious gusto, attracting both loyal admirers and some detractors, too.

Binford's formal education included undergraduate studies in wildlife management and wildlife biology at Virginia Polytechnic Institute, laying a foundation for his scientific ecological approach. From 1952 through 1954, he served in the US Army as an interpreter to anthropologists charged with the post-World War II transition in the western Pacific, which exposed him to new career possibilities. When he returned to school at the University of North Carolina, he shifted to anthropology, studying with Joffre Coe and completing a B.A. (1957). His M.A. (1958) and Ph.D. (1964) were completed at the University of Michigan, where he was influenced by Leslie White, champion of the scientific study of culture change, and where he challenged James Griffin, dean of eastern North American culture history.

Family and the school of hard knocks also shaped Binford. His father was an important influence, and, like others, Binford's family circumstances during the Great Depression and after were difficult; even as a boy he was working to help his family get by. There were no handouts for Binford and anything that came his way was through hard work, which continued throughout his life. His skills as a carpenter fed him during graduate school and served as a counterpoint for his writing; students in the 1970s and 1980s saw him transform his house in Corrales, New Mexico, by day and, by night, transform archaeology as he crafted *Nunamiut Ethnoarchaeology, Bones: Ancient Men and Modern Myth*, and other tracts. And, from an early age, Binford was keen observer of the human condition, noting the tensions between class and privilege (associated with his mother's family) and getting the job done so one could eat (seen in his father's family) (Sabloff 1998). The challenges to voices of authority for their insistence on privilege over substance, unmistakable in Binford's early career, perhaps emanated from these formative experiences.

Major Accomplishments

In 1962, Lewis Binford (1962a) published "Archaeology as Anthropology" in the flagship journal for archaeology in the United States, *American Antiquity*. Adapting Leslie White's (1959) definition of culture as a system, with material culture viewed as simultaneously operating in technomic, socio-technic, and ideo-technic cultural subsystems, Binford argued that ALL aspects of culture were archaeologically accessible, fundamentally transforming archaeological discourse (Watson 1995).

"The most competitive people are the ones who do the most similar things" noted Binford (Sabloff 1998: 8), referring to the late 1950s debates between Julian Steward and Leslie White. This also described his own working style. For Binford, insights emerged not from the discovery of facts in the field but from thinking about and through these encounters with the real world. To this end, public debate with other competent thinking debaters – in print or, better still, in person – was a vital learning tool. Thus, he challenged Robert Braidwood, preeminent Near Eastern scholar, on the nature of the origins of agriculture there (Binford 1968); sparred with François Bordes, master of the French Middle Paleolithic, over the interpretation of Mousterian assemblages (referred to as the form vs. function debate, authored with his third wife, Sally Binford; Binford & Binford 1966); and jousted with Glynn Isaac, the reigning expert on early hominid behavior in East Africa, over interpretation of east African materials (Binford 1987). His 2001 book, *Constructing Frames of Reference* (for which he acknowledges the substantial assistance of his fifth wife, Nancy Medaris Stone) represents in part his response to the critique of Processual Archaeology offered by Ian Hodder and others beginning in the 1980s. Binford rarely passed up a good argument, and, after putting away the boxing gloves, he often supped and celebrated with his opponent.

Binford's accomplishments and contributions are best described as fundamental and groundbreaking. He is often acknowledged for launching, with collaborators at the University of Chicago, the New Archaeology (later, Processual Archaeology), a self-styled movement within archaeology that asserted that archaeology could contribute fully to the project of anthropology and need not be the hapless sibling of cultural anthropology, crippled by an impoverished data set. The 1968 edited volume, *New Perspectives in Archaeology* (coedited with Sally Binford), presented early challenging case studies. As part of this large and continuing effort to refashion archaeology, Binford laid several metaphysical, paradigmatic, conceptual, and methodological foundations that the discipline continues to build upon today.

Metaphysically, Binford (and others, notably, David Clarke and Michael Schiffer) moved the discipline from one based in simple synchronic reconstruction, consistent with functional goals, to one situated in a taphonomic or formational metaphysic, i.e., recognizing and exploiting the many agents that interact to form archaeological deposits. His work with Middle Paleolithic and hominid deposits emphasized that others besides protohumans accumulate and arrange bones in caves and that fire was not a gift uniquely given to humans (*Bone: Ancient Men and Modern Myths*, 1981). This less often acknowledged metaphysical transformation has greatly expanded archaeological interpretative possibilities.

From the inception of archaeology, debate has ensued over the nature of archaeological science. In the 1950s, archaeological science involved an eminent authority amassing observations on archaeological deposits and, from these, weaving a comprehensive interpretation based in common sense (sensu Dunnell 1982). Binford argued for a very different version of archaeological science. For him, science was solely about the evaluation of ideas, whatever their source, with experience. This meant that one had to identify what one securely knew (both archaeologically and in the contemporary world), identify the domains of ignorance, and then build bridges from knowledge to illuminate ignorance. *Constructing Frames of Reference* (Binford 2001) is an explicit statement and extended example of Binford's version of science. Here, in an effort he worked on throughout his career

(see Binford 1980), Binford organized and presented two sets of information about hunter-gatherer-fishers between which he tacked to identify provocative patterns in need of further exploration. The first includes basic structural information on physical environments, along with an energy-based model of how clever human predators deploying different organizational structures operate in those environments. The second includes a compendium of ethnographically documented hunter-gather-fishers and how in fact they are found to have behaved in different environments. Binford moves back and forth between these two domains, identifying patterned variation seen in foragers through time, proposing explanations for this variation, and, contra his earlier critics, recognizing the contingent role of prior organizational poses.

Buttressing his metaphysical and paradigmatic innovations, Binford's methodological innovations are many. Two stand out. The first are various tools for managing archaeological variation. Certainly, a budding appreciation for the important role of variation in phenomenon under scientific scrutiny is evident in the work of 1950s archaeologists (e.g., see the Ford-Spaulding debate). With his 1964 *American Antiquity* article, "A Consideration of Archaeological Research Design", Binford brought to archaeology the parlance of sampling, which has since been reified in practice in heritage archaeology. His 1966 paper with Sally Binford, "A Preliminary Analysis of Functional Variability in the Mousterian of Levallois Facies", was one of the early applications of multivariate analysis in archaeology, identifying dimensions of variation in Near Eastern Middle Paleolithic assemblages. With the desktop computing revolution in the 1980s, such applications have become more routine and sophisticated.

In addition, Binford enlightened a critical component of the archaeological enterprise, which he referred to early on as middle-range theory (1977; see also formation theory, middle-range research, midrange theory, source-side knowledge, bodies of reference knowledge). That is, recognizing that archaeological materials cannot speak for themselves, Binford emphasized that archaeologists must give archaeological materials a language with which to speak. This language comes from the contemporary world and requires development by archaeologists for archaeological interpretation. Binford's 1967 *American Antiquity* article, "Smudge Pits and Hide Smoking: The Use of Analogy in Archaeological Reasoning", was his first article expressly concerned with how archaeologists assign meaning to archaeological materials. Thinking on this topic matured as Binford confronted Middle Paleolithic assemblage variation and its interpretation, recognizing that the functional interpretation he and Sally Binford had offered represented a "just so story" slightly more compelling than that offered by Bordes. As illustrated in his *Nunamiut Ethnoarchaeology* (1978b), middle-range work proceeded on two fronts. Binford turned to work with contemporary native hunters in the Brooks Range of Alaska not as analog for the Middle Paleolithic ice age but to understand some of the many conditions under which variation was introduced into faunal assemblages. In addition, he undertook experimental studies to map the economic dimensions of carcasses, against which assemblage variation could be assessed. Ethnoarchaeological, experimental, and other taphonomic studies established what Binford referred to as intellectual anchors to be used in interpreting archaeological patterning. Construction of similar intellectual anchors was attempted for spatial data (Binford 1978a) and chipped stone assemblages (Binford & O'Connell 1984).

Further maturation on this topic is clear in his *Constructing Frames of Reference*, in which he moved beyond "middle-range theory" as a simple Rosetta stone connecting pattern and process. In part, this is owed to his enduring interest in culture systems, how they are organized and how they change through time. Middle-range research, confined as it is to ethnographic scale phenomenon, could not illuminate the supra-generational phenomena that so interested Binford. *Constructing Frames of Reference* offers a research strategy for such phenomena.

Throughout his career, Binford was an innovator and a pioneer. His 1962 regression formula for dating pipestems is still widely cited in historical North American archaeology (Binford 1962a).

And, while employed by the National Park Service on the Carlyle Dam project in southern Illinois, he collaborated in pioneering systematic surface collection (Binford et al. 1970).

Over the last several decades, the contributions of Lewis Binford, the provocateur and the scientist, have been increasingly recognized. Binford received honorary degrees from the University of Southampton (1983), Pierre Mendez France University (1999), the University of Leiden (2000), and the University of Verona (2005). In 1986, he received the Huxley Medal from the Royal Anthropological Institute. He was elected a corresponding fellow of the British Academy in 1997 and elected to the US National Academy of Sciences in 2001. In 2008, he received the Lifetime Achievement Award from the Society for American Archaeology. An asteroid (213629 Binford = 2002 QK67) orbiting the Sun between Mars and Jupiter was named for him in 2010. His 1984 book *In Pursuit of the Past*, distilled by John Cherry and Robin Torrence from a series of lectures delivered in Europe in the early 1980s, has been reissued (2002) and translated into multiple languages.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hypothesis Testing in Archaeological Theory
- ▶ Middle-Range Theory in Archaeology
- ▶ Post-Processual Archaeology

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Bioarchaeology in the Roman Empire

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Introduction

Much of a person's life history is written on his or her bones. Skeletal remains of past populations are palimpsests of information about the behaviors people engaged in during their lives. The bioarchaeological study of burials from around the Roman Empire is a relatively new undertaking but has proven to be an essential line of evidence for understanding the demographic makeup, health status, and dietary regimes of the heterogeneous peoples that comprised the imperial population. Owing to a growing database of skeletal remains, bioarchaeologists are leading the way in answering questions about migration and urban life in the Roman Empire. Through an integration of bioarchaeological studies with traditional analyses of material culture and texts, the diversity of the Romans in all areas of the empire is becoming apparent.

Definition

Bioarchaeology is the study of skeletal remains from archaeological sites. The term osteoarchaeology is also used, primarily in Europe, and through the years, both terms have been broadly defined as including skeletal material from both humans and animals. Owing to the influence of New Archaeology, however, since the 1970s, bioarchaeology has conventionally dealt with the physical remains of humans from burials found in the archaeological record. In the United States, bioarchaeology is considered a subspecialty of biological anthropology, whereas in Europe the field is more closely allied with archaeology and anatomy.

An individual skeleton is the unit of analysis in bioarchaeology, but inferences about past behavior can only be reconstructed through a survey of the population and its sociocultural context. As such, bioarchaeology is an interdisciplinary field, incorporating techniques and theoretical approaches drawn largely from biology, anatomy, demography, anthropology, and archaeology. When used as a way to study the people of the Roman Empire, bioarchaeology also draws from classical philology, historiography, epigraphy, architecture, and artifact studies in order to situate the skeletal population under consideration within a cultural milieu.

Historical Background

In one sense, the roots of classical bioarchaeology can be found in ancient authors. In the mid-fifth century BCE, Herodotus, reporting on the aftermath of a Persian War battle (*Histories* 3.12.2-3), noticed that the skulls of the Persians were brittle whereas those of the Ethiopians were quite strong, and he attributed this difference to sun exposure by the Africans. While Herodotus was not correct in this correlation, his observation foreshadowed discussions in biological anthropology of the effects of the environment on the human skeleton.

The osteological study of burials has been a part of Roman archaeology since at least the nineteenth century. At this time, cursory analysis of skeletons with the objective of culling demographic histories was always subsumed by publication of grave goods in large site reports, sending biological material to languish in appendices. The sex of a skeleton was assigned based on associated artifacts as often as estimated by biological markers.

In the early twentieth century, biological anthropology in the United States and Europe developed similarly, as researchers attempted to look at skeletons, especially the skull, for evidence of diffusionary traits. Coupled with such pseudoscientific tools as Retzius' cephalic index, biological anthropology in Italy, for example, became heavily invested in discovering the "true race" of the Italians and explaining the Mezzogiorno, and American anthropology in

finding a biological basis to support the practices of slavery, racism, and forced removal of natives. Skeletal measurements, when twisted to fit preconceived notions of racial superiority, represented both a reliance on early empiricism and the rise of nationalist movements in Europe and America. This legacy of cranial indices and cephalic suffixes, unfortunately, is still seen today in some Mediterranean bioarchaeological publications, but the field has evolved immensely just in the last decade.

Bioarchaeology arose as an independent field of research in the 1970s under the guidance of Jane Buikstra and other proponents of the science-focused New Archaeology. Researchers began to study skeletal collections housed around the world in order to answer research questions beyond chronology and typology of burials. In the 1980s, with the advent of post-processual archaeology, bioarchaeologists started asking how diet, behavior, and disease differed along the lines of status and gender. By the 1990s, bioarchaeology was coming into its own. Data recording practices and techniques were standardized in the United States, but many European researchers still use a variety of data standards. At the end of the twentieth century, several international laboratories and research centers that deal with classical bioarchaeology had been established, such as the Wiener Laboratory at the American School of Classical Studies at Athens, the Servizio di Antropologia of the Soprintendenza Speciale per i Beni Archeologici di Roma, the Centre National de la Recherche Scientifique in France, and English Heritage in the United Kingdom.

Within the last decade, bioarchaeology has entered the twenty-first century by increasingly employing chemical techniques such as isotope and DNA analyses to answer questions about population interaction, dietary differences, and the origin and spread of disease. There has also been a trend toward osteobiography, or creating detailed, individualized life histories from skeletal remains, often accompanied by a forensics-based facial reconstruction. Classical bioarchaeology today is balancing scientific and humanistic approaches in order to understand life in antiquity.

Key Issues and Current Debates

Today's Roman bioarchaeologists ask questions about what life was like in ancient times, in part to provide a history to those segments of society that did not merit inclusion in elite writing, such as women, children, immigrants, and slaves. Key areas of Roman bioarchaeology research in the past decade have focused on questions about diet, migration, and disease in the empire. The majority of this research has been done on skeletal assemblages from Rome and from Britain and has been published in the traditional venue of peer-reviewed anthropology journals. There is a growing movement toward synthetic treatment of bioarchaeological data from the classical world, however, that is reaching an interdisciplinary audience.

Variation in the Roman Diet

The imperial Roman diet, particularly for the lower classes, has been reconstructed primarily through the agricultural writings of authors such as Cato, Varro, and Columella. People in all parts of the empire subsisted on cereals, fruits, and vegetables generally in the form of bread, olive oil, and wine. There is little evidence, however, of the diversity that existed in the Roman diet, and there has been disagreement about the role of seafood and the consumption of millet. Bioarchaeologists have weighed in with chemical analyses of skeletal tissue in an effort to demonstrate that different imperial populations used different alimentary resources.

Carbon and nitrogen isotope analyses from bone collagen yield a general picture of a person's diet in the years leading up to death. Because carbon enters the food chain through photosynthesis, a human's carbon isotope ratio is largely affected by the kind of plants he or she ate. Additionally, there are two major photosynthetic pathways, which mean that carbon isotopes can distinguish a diet reliant on temperate grasses such as wheat and barley from a diet reliant on tropical grasses such as millet and sorghum. Nitrogen in the human diet is obtained primarily through consumption of other organisms, so understanding nitrogen isotopes means

understanding an organism's position in the food chain. The values of nitrogen isotopes therefore range from very low, indicating a diet composed of legumes, to very high, indicating a diet composed primarily of aquatic resources.

Isotope research on skeletons from Imperial Italy has shown great differences in diet. In the shadow of the city walls of Rome, people were eating more millet and less seafood than were people from Portus Romae (Prowse 2001; Killgrove 2010). Skeletons from the early Christian necropolis of San Callixtus in the Roman suburbs revealed an ascetic diet for this religious group, with consumption of freshwater fish from the Tiber River (Rutgers et al. 2009). Correlation between frequency of external auricular exostosis, an ear pathology related to cold-water immersion, and nitrogen isotope values for people from Portus and Velia, a site on the Tyrrhenian coast, further demonstrates that the population of Imperial Italy was indeed consuming both freshwater and saltwater resources (Crowe et al. 2010). Differences in diet at Portus have also been found to reflect age, with children eating more terrestrial food and older adults consuming more olive oil and wine (Prowse et al. 2005), and there is evidence that foreigners at Rome changed their diet after immigrating (Killgrove 2010). Diet also varied within populations and through time in Roman Britain (Müldner & Richards 2007); nevertheless, isotope studies on several skeletal series have revealed that Romano-British people ate a largely terrestrial diet composed of plants, meat from herbivores, and a small amount of marine or freshwater fish. Chemical analyses of skeletal remains are therefore providing bioarchaeologists with information at the individual and population level, giving new insight particularly into the diet of lower-class imperial residents.

Demographic Effects of Migration

The phenomenon of migration and its implication for the demographic structure of the empire has previously been investigated through census records and inscriptions on tombstones. As the center of imperial power, Rome itself had a great number of free immigrants and slaves who hailed from elsewhere. Identifying immigrants and slaves in the archaeological record has been challenging, however, because most were not noted as such in inscriptions or through artifact assemblages in graves. A major contribution of bioarchaeology in recent years has been the application of chemical techniques to identify population diasporas within the empire.

Isotopes of strontium and oxygen are most commonly used to distinguish immigrants from locals in a skeletal assemblage. Strontium is incorporated into the human body during growth via groundwater, and the strontium isotope ratio derived from a human's dental enamel reflects the geology of the area in which the person grew up. Lower strontium values generally indicate younger geology, such as volcanic areas, while higher values are indicative of older rock. Oxygen isotopes incorporated during tissue development are related to the overall climate of the area; lower values suggest a person grew up in a colder, wetter climate, and higher values suggest life in a warmer, drier climate. Some strontium and oxygen isotope studies have been done in the Roman Empire, but until significantly more data are available, interpretations are necessarily conservative in nature.

In the Roman suburbs, a strontium and oxygen study of dental enamel from the first molar, which forms between birth and three years of age, showed that roughly one-third of the people tested arrived at Rome from elsewhere (Killgrove 2010). Interestingly, these immigrants to Rome did not have significantly more diseases than the locals, but the two groups ate different diets as children. Similarly, an oxygen isotope analysis of the first and third molars from individuals buried at Portus Romae suggested one-third of the population moved there during childhood (Prowse et al. 2007). It is not currently possible to pinpoint an immigrant's homeland, but general trends in the data from Rome and Portus suggest that people were arriving in these cities from nearby areas such as the Apennines but also from areas with strikingly different geology and climate. Further, research on migration in the Roman suburbs suggests that the practice was not confined to young men, as there is ample evidence of immigrant women and children in the bioarchaeological record.

Migration did not occur just to Rome and to other large urban centers (Eckardt 2010). In southern Italy, a combination of oxygen isotope analysis and ancient DNA analysis revealed an adult female with east Asian ancestry, whose burial form and grave goods otherwise did not indicate she originated elsewhere. In the Romano-British burial ground of Spitalfields, a woman who was buried in a decorated lead coffin was shown through lead (Pb) isotope analysis to have originated in Rome. Several strontium and/or oxygen isotope studies have been conducted on Romano-British skeletal series in the past decade; by and large they reveal a great deal of mobility in the area. At the sites of York, Gloucester, and Lankhills, for example, only about half of the people studied could be considered locals, while about 15–20 % were from elsewhere in England, and 20–35 % were long-distance migrants. In Bavaria during the later empire, a skeletal series affiliated with a Roman fort at Neuburg revealed through strontium isotope analysis that approximately 30 % of the population came from elsewhere; women and children immigrated to the site in addition to men (Schweissing & Grupe 2003).

Isotope analyses of skeletal tissue are yielding new information on patterns of migration within the Roman Empire as well as on the demographic makeup of both urban and rural settlements. Physical mobility within the empire was quite high, and immigration was not by any means unidirectional. The reasons for population mobility, however, are still uncertain. Diasporas of people likely occurred with slavery and to a lesser extent with military service, but migration may also have been an option for families and for free individuals looking for work or for a spouse. The growing database of strontium and oxygen isotope data is revealing the great distances that people migrated in antiquity, and new applications of DNA analysis point the way forward for bioarchaeologists interested in contributing to the conversation about mobility and migration in the empire. In the future, the challenge will be to integrate the scientific data drawn from chemical analyses of skeletons with the historical evidence from inscriptions and censuses to glean new information about the demographic fluctuations of imperial populations.

Health and Disease in the Empire

Only within the last 10–15 years have reports of trauma and disease in the archaeological record evolved from case studies of pathological conditions to large-scale research into the prevalence of specific diseases in imperial populations. The recent debate on health in the Roman Empire starts with a look at systemic factors that may have increased people's stress, including urbanization, malnutrition, hygiene, and sanitation, as well as the comorbidity of various infectious diseases and parasites. The health of an individual and of a population is multifaceted, and researchers have employed skeletal remains from both Rome and Britain, in addition to primary and secondary source material, to argue that the empire was not a particularly salubrious place to live.

Pathological data from several skeletal series in Rome have been published (Catalano et al. 2008; Eckardt 2010). Most suggest that there were significant health stressors for people living in the city and suburbs, as evidenced by high frequencies of enamel hypoplasia and cribra orbitalia and by a decrease in overall stature during the empire. Hypoplasias are defects in the formation of dental enamel and can be caused by a number of health issues, including malnutrition, disease, and weaning; cribra orbitalia is generally considered to result from iron-deficiency anemia, which in turn can be caused by nutritional deficiencies or disease; and variation in adult stature, particularly a trend in shorter stature, results when an individual is stressed during childhood, as from disease or malnutrition. In general, skeletal series from Rome show higher frequencies of enamel hypoplasia and cribra orbitalia and shorter stature than do series from Britain, likely owing to the urban nature of Rome, which had high population density and unequal resource allocation. Through time, the British skeletal series also provide evidence for a decrease in stature as well as increased exposure to anthropogenic lead in the Roman period. One suggestion for the decline in

health during the Roman Empire is the presence of endemic malaria in the Mediterranean. Malaria in antiquity has been the subject of debate for a number of years; however, the skeletal evidence is still inconclusive, particularly since not all Roman skeletal series show high frequencies of cribra orbitalia. Also problematic in the debate about disease in the empire is the current lack of standardization in data collection practices, particularly for lesions that may indicate anemia and, by extension, malaria.

Morbidity and mortality in a population are complicated processes dependent on a variety of environmental and sociocultural factors. With few fully published skeletal series outside of Roman Britain, the disease ecology within the empire as a whole is still largely unknown. Research that synthesizes the available historical and osteological information on population size, sanitation, nutrition, and disease is becoming more common in bioarchaeological research in general, opening up a worldwide discussion about health and disease in antiquity. Combined with the growing use of chemical techniques to identify pathogens, bioarchaeological research is beginning to produce novel information about health in the Roman Empire.

In the past decade, bioarchaeological research in the Roman Empire has surged from basically nothing to an active international research program tackling difficult questions about diet, disease, and demographics from a scientific standpoint. Bioarchaeologists in the Roman world have only recently begun to reflect on the accumulated data, however. Synthetic works that explicate current osteological knowledge about diet, health, and foreigners in the empire have not yet been created, meaning the historical and epigraphic records are still the primary sources for these topics. Yet bioarchaeological approaches have already clearly demonstrated that the Roman Empire was a strikingly diverse place. Heterogeneous groups of people from different homelands lived in cities, rural outposts, and forts on the *limes*. Their diets were composed primarily of cereals, meat, and plants, but the proportions of these resources and the types consumed varied dramatically. The people likely differed biologically in their risk of mortality and culturally in their attempts to mitigate disease and maintain health. Recent research has demonstrated that literature frames our understanding of life in the Roman Empire but that bioarchaeology adds necessary details to complete the picture.

International Perspectives

For most of the twentieth century, North American researchers led the field of bioarchaeology in the classical world. J. Lawrence Angel published scores of articles between the 1940s and 1970s, many on the paleopathology of skeletal remains from the eastern Mediterranean, at sites such as Athens, Corinth, Pylos, Olynthus, and Troy. In the 1980s, Sarah Bisel tackled the remains from Nichoria and the Kerameikos and also delved into the skeletal remains from Herculaneum. Marshall Becker has been prolific in his research throughout the Italian peninsula and Sicily. By the 1990s, however, an international group of scholars was engaging in the bioarchaeology of Greece, Italy, and Britain, including Sherry Fox, Luigi Capasso, Gino Fornaciari, Anna Maria Bietti Sestieri, Loretana Salvadei, Giorgio Manzi, Simona Minozzi, Estelle Lazer, Renata and Maciej Henneberg, and Simon Mays.

The international picture of imperial Roman bioarchaeology in the twenty-first century is still primarily focused on Italy, Greece, and Britain, which have produced a wealth of skeletal remains in the past few decades, but research is also being undertaken by bioarchaeologists in far-flung provinces of the empire, including Egypt (Tosha Dupras), Bavaria (Gisela Grupe), Croatia (Mario Šlaus), and Tunisia (Anne Keenleyside). Although the population of bioarchaeological practitioners has diversified since the end of the twentieth century, British researchers remain at the forefront of the field, particularly those at Durham University (Charlotte Roberts, Janet Montgomery, and Rebecca Gowland), the University of Reading (Hella Eckardt, Mary Lewis, and Gundula Müldner), the British Geological Survey (Janet Evans and Carolyn Chenery), the

Museum of London (Rebecca Redfern), and English Heritage (Simon Mays). With large skeletal series such as the population from Poundbury Camp and cutting-edge technology, the bioarchaeology of Roman Britain is yielding in-depth reports on paleopathology, demography, mobility, and diet. New techniques in chemical analysis are just beginning to be applied to Rome and Ostia Antica by Italian researchers affiliated with the Servizio di Antropologia in Rome (Paola Catalano, Walter Pantano, and Carla Calderini) and the Museo Nazionale Preistorico Etnografico (Luca Bondioli and Alessandra Sperduti), as well as by North American scholars (Tracy Prowse and Kristina Killgrove).

In this age of digital connections, however, information on classical bioarchaeology is being shared across linguistic divides not just at international conferences but also through social networking, newsgroups, blogs, and interdisciplinary journals. Although there is not yet an international database of Roman skeletons, a movement toward data sharing and open access is underway in American biological anthropology, which will pave the way for synthetic treatments of bioarchaeological information by its international creators.

Future Directions

The past decade has seen bioarchaeological research expand from the core of the Roman world to the lesser-investigated provinces of the empire. More work is needed, however, in places like Hispania, Gaul, Illyricum, Asia Minor, Syria, and Judaea. The city of Rome itself has produced thousands of skeletons in recent years, but most cemeteries remain unpublished, making synthetic treatments challenging at the moment. Future studies at both the center and periphery of the empire will make it easier to understand the diversity of the heterogeneous peoples who comprised the imperial population.

As the publication of case studies of diet and demographic trends has picked up in the last few years, synthesis of this information is needed. Knowing the dietary proclivities of a handful of average Romans is useful, but bioarchaeologists would do well to produce a volume or series of volumes on isotopic evidence of dietary practices. In this way, bioarchaeological data can be integrated with texts and artwork to create the most in-depth understanding of the ancient diet to date. Similarly, demographic trends have been published from a few sites in Roman Britain and in the Roman suburbs, but the bioarchaeological data have not been commanded in the same way as census records and tombstone inscriptions have been by historical demographers. The time is right for producing synthetic works that incorporate bones, texts, and material culture in a new and exciting way.

Moving forward, Roman bioarchaeologists can address research questions about disease ecology, identity formation, and population interaction. Paleopathological research has primarily been focused on identifying diseases in the skeletal record of the Roman Empire, but more could be done to understand the ecology of those diseases. In Rome, for example, wildly varying frequencies of skeletal markers of stress and infection suggest living in different areas of the city and suburbs put people at different risk for diseases such as malaria. Investigating the topography, climate, and water sources of Rome is just as important as doing macroscopic and chemical analyses of skeletons for understanding morbidity patterns, and a bioarchaeological approach that incorporates disease ecology will move the study of Roman health forward.

Isotope and DNA analyses have already yielded key information about migration within the Roman Empire, by isolating individuals who traveled to and from Italy during their lifetimes. These data, however, have seldom been used to draw conclusions about identity formation in the multiethnic empire, which would be a key step forward for Roman bioarchaeology. Pushed even further, data from chemical analyses combined with material remains and demographic models may allow Roman bioarchaeologists to investigate the practice of slavery in a novel manner. With more isotope analyses and additional DNA studies, a bioarchaeological approach to understanding Roman slavery cannot be far off.

Thirty years ago, Colin Renfrew wrote that there was a place "for anyone who can command the data and the scholarship of the Great Tradition while employing the problem-orientation and the research methods of current anthropological archaeology" (Renfrew 1980: 297). Bioarchaeologists who work in the Roman Empire have taken up this challenge and are weaving together scientific and humanistic data on a daily basis. Roman archaeology has already benefitted immensely from a bioarchaeological approach that integrates textual, artistic, and other material evidence with biological remains to create a more holistic picture of all levels of life and culture in the Roman world. There is a great deal more work to do in the bioarchaeology of the Roman Empire, but the amount of research that has already been produced demonstrates the promising future of this field.

Cross-References

- ▶ Burial Practices and Tombs in the Roman World
- ▶ Tombs, Etruscan

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Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments

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Introduction and Definition

The analysis and interpretation of human skeletal remains focuses largely on what can be learned from these remnants, as well as the individuals and populations they represent. The terms bioarchaeology, human osteology, and human skeletal biology all refer to scholarly inquiry in this area, but each conveys a distinct emphasis. Osteology represents the most traditional term used, with its accent on comparative morphology. Skeletal biology also refers to comparative morphological study but recognizes the dynamic nature of skeletal growth and maintenance, as well as biomechanical and environmental factors that shape bone morphology. Bioarchaeology includes all of the above, but focuses on remains recovered from archaeological contexts with special consideration to the associations of biological and cultural factors.

Historical Background

The academic roots of this discipline extend back primarily to Europe and Asia with an interest in the evidence for human evolution (paleoanthropology) linked with the recovery of ancient human remains. The early discovery and interpretation of fossil hominids required knowledge of comparative skeletal anatomy. Such perspective could be ascertained from collections of modern human remains recovered from archaeological contexts.

Although some human remains were recovered through construction activities and other accidental encounters, increasingly collections were assembled from systematic archaeological excavations. Such excavations not only yielded human skeletal material but usually abundant associated cultural information as well. This information frequently enabled the remains to be dated and placed in cultural context. As these collections grew in number and size, they facilitated the development, growth, and evolution of the discipline.

Academic interest in skeletal analysis during the nineteenth century focused largely on the skull with the general belief that it presented the primary evidence for the topics of research at the time, including human variation and documentation of regional physical types. The evidence for disease was also of interest due to the medical background of many of the field's practitioners.

A key historical development in the emergence of human skeletal biology was the 1855 formation of the Society of Anthropology of Paris by Paul Broca (1824–1880). A surgeon by profession and an expert in neuroanatomy, Broca called together key professionals in the fields of medicine, anthropology, archaeology, and related areas to focus on academic advancements relating to the interpretation of human skeletal remains. This effort led to the development of measuring techniques, instrumentation, and training. Most importantly, it provided a forum for scholarly discussion and interaction, with a stress on human skeletal anatomy and its interpretation.

Shortly thereafter (1861), German physical anthropologists gathered in Göttingen for scientific interaction and to discuss standardization of methodology. Subsequent meetings led to the 1866 formation of the journal Archiv für Anthropologie, a publication later sponsored by the Deutsche Gesellschaft für Anthropologie (DGA). Prior to that time, the noted German scientist Johann Friedrich Blumenbach (1752–1840) had assembled large international collections of human remains in Göttingen. Other large nineteenth century German collections were organized by pathologist Rudolf Virchow (1821–1902) in Berlin and Alexander Ecker (1816–1887) in Freiburg. German efforts to promote standardization in methodology led to the 1882 Frankfort agreement in which the Frankfort horizontal was defined, a standard for cranial

orientation still of universal acceptance today. Another key contribution consists of the 1914 publication of Lehrbuch der Anthropologie, written by Rudolf Martin (1864–1925), which contained a detailed presentation of standard techniques of analysis.

The developments in France and Germany described above were echoed in varying ways throughout Europe and other areas of the world in the nineteenth and early twentieth centuries. Globally, academics assembled collections of human remains, developed scholarly organizations and publications, and initiated training programs. Research inquiries continued to conform to those established in the early nineteenth century.

Aleš Hrdlička (1869–1943) represents a key figure in the historical development of human skeletal studies in the Americas. An 1881 immigrant from Bohemia (now the Czech Republic) to the United States, Hrdlička assembled large collections of human remains at the Smithsonian Institution in Washington, D.C. Although medically trained, he had studied in Paris with Broca and developed a strong interest in anthropology. His own 1920 publication Practical Anthropometry complemented Martin's work and contributed to the standardization of methodology. He also founded the American Journal of Physical Anthropology in 1918 and later the American Association of Physical Anthropologists in 1930.

By the mid-twentieth century, scholarly institutions around the world had assembled large collections of human remains, developed standard approaches for recording data, initiated training programs, and inaugurated publication programs with a strong focus on comparative human osteology. Much of the goal of this effort was to collect skeletal data in a standard format to facilitate comparative studies. Compilations of measurements and observations frequently were presented as appendices to archaeological reports and tabulated in monographs. Throughout these advancements in comparative studies, work within the field remained tied to its traditional topics of investigation.

As data and collection sizes grew, researchers, particularly in North America, gradually recognized the value of a more problem-oriented approach to skeletal analysis and interpretation. Although comparative morphological studies continued, researchers began to emphasize the dynamic nature of bone growth, development, and maintenance. This emphasis led to studies of bone remodeling, histological age changes, details of bone response to disease insult, and environmental influences. Biomechanical factors were considered in more elaborate research designs that evaluated bone strength and stress factors. Skeletal collections continued to be regarded as reservoirs of information on past population relationships. However, a new emphasis appeared, recognizing that bone morphology also reflected factors of the environment, nutrition, disease, and human behavior, including occupation/habitual use of the skeleton. This perspective is generally reflected in the shift to use of the term "skeletal biology" to define the field. Sorting out the factors of genetics and environment on skeletal morphology became a major issue and subject of research.

A related key historical development involves strengthening of statistical rigor in analysis of skeletal morphology. Much of this effort can be traced to the biometric school established by Karl Pearson (1857–1936) in 1903. Enhanced statistical treatment of skeletal biology data enabled more robust interpretation and assessment of the probabilities involved.

The general trend toward more problem-oriented studies also stimulated novel methods of recording data and observations. These were designed to address specific research issues and moved away from the standardized approaches previously adhered to.

Key Issues/Current Debates

The use of cranial indices and recognition of cranial variation gradually gave way to biological distance studies. These problem-oriented approaches also recognized the genetic component in skeletal, especially cranial, morphology but utilized large, well-documented samples and statistical analyses that presented the variation and probabilities involved. The traditional use

of cranial measurements continued, enhanced with observations of discrete traits on the skeleton, dental measurement, and dental observations. Very recently, distance studies have included three-dimensional shape analysis made possible by sophisticated computer software and new instrumentation. These approaches not only enabled a more powerful and revealing look at likely population relationships of the past but also a more nuanced presentation of the variability involved. The recent amplification and analysis of ancient human DNA recovered from archaeological contexts provides modern perspective on past population relationships.

Many of the areas of new interest in skeletal biology relate to the realization that the nongenetic influences on skeletal morphology present opportunities for expanded research. Historically, those interested in using cranial morphology to assess human variation either ignored environmental influences or regarded them as undesirable factors detracting from the research mission. However, others emphasized that these influences presented valuable information on human behavior, adaptation, occupation, and habitual posture. This functional orientation also had deep roots, especially in Germany with the work of Virchow, Julius Wolff (1836–1902), and others. These early researchers recognized the relationship between structural features of bone and the nature of the external stresses/forces acting upon it. Investigators in more modern times built upon the knowledge advanced by these early workers to examine cross-sectional geometry, patterns of trauma, and arthritic alterations as well as other indicators of musculoskeletal stress. Bones are shaped by how they are used; thus, shape analysis potentially reveals information on use.

Routine analysis of remains from archaeological contexts calls not only for detailed inventory but also estimates of sex and age. Methodology for the estimation of sex and age continues to evolve and recognizes the dynamics of growth and development as well as human variation in the expression of sexual dimorphism and the process and timing of adult ageing. Data on the age and sex distribution of skeletal samples have led to advances in the field of paleodemography. Modeled after the demographic study of living populations, paleodemography utilizes age and sex information to construct life tables, mortality curves, survivorship curves, and related expressions of demographic profiles. Such formulations produce valuable projections of life expectancy, age-specific mortality, and similar statistics of past populations that can be compared with those of modern times. However, procedures in this field have sparked lively debate, especially regarding the accuracy of age estimation and sampling issues.

Paleopathology has remained an area of interest throughout the history of skeletal inquiry. Much of the early history of paleopathology studies focused on the evidence for and history of specific diseases, especially leprosy, tuberculosis, and syphilis. Such interest has been sustained and continues today. Modern developments include more sophisticated models of differential diagnosis, improved documentation of studied samples, and new molecular approaches aimed at identification of specific pathogens.

A significant development also has been a population approach to the study of disease. Termed paleoepidemiology, this approach consists of examining the prevalence of expressions of mortality in the past, especially viewed in cultural, geographic, and temporal context. This research focus departs from attempts to diagnose particular diseases in favor of gathering population data on categories of disease/morbidity that reflect such factors as population size and density, diet, nutrition, sedentism, and sanitation. Such research has proven especially valuable in examining long-term temporal trends of morbidity and mortality in specific regions of the world. The endeavor is closely linked with the methodology and results of paleodemography and regional studies of adaptation, including those in archaeology. Research in this area also has addressed quality of life factors and added thoughtful perspective to traditional analyses.

The term bioarchaeology emphasizes the integration of biological information gleaned from skeletal analysis with the cultural/archaeological information available from the provenience. This term recognizes the nature of many of the large skeletal collections throughout the world and

their known archaeological contexts. Data on sex, age at death, disease alterations, cultural effects on the skeleton, estimates of living stature, and other biological variables can be correlated with cultural mortuary site information when working with well-documented collections. Such research enables studies of status, gender roles, social relationships, and factors contributing to mortuary site complexity. In broader context, related studies contribute to understanding of dietary adjustment, environmental adaptation, demographic patterns, migration, and regional disease expression. Such studies are completely dependent on sufficient archaeological documentation, not only regarding burial provenience but site and regional complexity as well.

Advances in the discipline of bioarchaeology depend extensively not only on the availability of adequate documented collections but also appropriate interpretive models and methodology. Methodology has grown increasingly technological and sophisticated in recent decades. Early studies in this discipline focused primarily on procedures and instruments to manually gather data. This approach recognized the interests of the time but also the limitations of data analysis. Data synthesis was limited by what could be processed using adding machines and simple calculations. In more recent times, computers have enabled sophisticated approaches including the formulation of large databases and complex statistical analyses.

Technological advances in other areas have also opened up new approaches to research. Advances in microscopy and thin-section preparation brought histological analysis into prominence within the discipline. Impacts were especially evident in methodology for age at death estimation and disease diagnosis. Scanning electron microscopy facilitated studies of microwear on occlusal tooth surfaces, contributing to interpretations of diet and the use of teeth as tools. Radiocarbon dating enabled more exact chronological placement of skeletal collections and improved interpretation of the associated cultural information. In forensic anthropology, radiocarbon analysis with reference to the modern bomb curve also has facilitated time since death determination.

Dietary reconstruction became possible through analysis of elemental isotopes and trace elements. In particular, the isotopes of carbon, nitrogen, hydrogen, oxygen, and strontium potentially reveal dietary food chain information. Carbon isotope analysis has been used to identify consumption of plants with distinct photosynthetic pathways. The availability of dietary information enabled the use of more sophisticated bioarchaeological studies of associations of disease, diet, and environmental context. These in turn could be related to paleodemographic information for a more holistic approach to understanding past populations.

Radiographs and X-ray technology in general have proven very important for skeletal biology research. Radiographic techniques have enabled nondestructive studies of mummified remains and a more sophisticated analysis of skeletal structure. Examples include recognition and interpretation of lines of arrested growth in long bones, patterns of cortical thickness in studies of age change and cross-sectional biometrical analyses, and trauma interpretation. Recent computerized tomography (CT) scan technology has improved the precision of such analysis and offered three-dimensional approaches.

Forensic anthropology shares many of the techniques of other areas of skeletal biology but includes some methods that are unique to its own field. Forensic anthropology refers to the application of knowledge and methodology in physical anthropology to medicolegal problems. Such problems usually involve identification of recovered human remains and deciphering what happened to them. This interpretation consists of determining if recovered evidence represents skeletal or dental tissue; recognizing species; estimating age at death, sex, living stature, time since death, and ancestry; evaluating evidence for identification; assessing postmortem alterations (taphonomy); and interpreting any evidence for foul play.

The history of forensic anthropology closely follows that of skeletal biology/osteology in general with a stronger North American focus. The academic roots extend back to early European pioneers but much of the development occurred in North America as a response to needs within

the medicolegal community. Although Aleš Hrdlička was involved in some forensic application, his successors in the United States, T. D. Stewart (1901–1997), J. Lawrence Angel (1915–1986), Wilton Krogman (1903–1987), Mildred Trotter (1899–1991), Ellis R. Kerley (1924–1998), William M. Bass, Clyde Snow, and others, provided momentum. Key administrative developments include the formation of the Physical Anthropology Section of the American Academy of Forensic Sciences in 1972 and the American Board of Forensic Anthropology in 1977. The former provided an annual forum for discussion and presentation of research results in forensic anthropology. The latter offered a certification program for qualified forensic anthropologists who had a Ph.D. degree, experience, and could pass a written and practical examination. In 2011, membership in the physical anthropology section of the AAFS totaled 423 and 88 forensic anthropologists had been awarded diplomate status by the ABFA.

Global interest in forensic anthropology has strengthened in recent years due to augmented training programs, growing recognition of the value of incorporating forensic anthropological perspective with medicolegal initiatives, and the investigation of human rights issues. Anthropologists are especially needed in recovery efforts and have been utilized extensively by such organizations as the International Commission on Missing Persons (ICMP), the International Committee of the Red Cross (ICRC), the Argentine Forensic Anthropology Team (EEAF) and many others.

Work in forensic anthropology relates very closely with other areas of skeletal biology. Most of the techniques of human skeletal biology are needed in the analysis of human remains in a forensic context. Information garnered from forensic analysis and research improves interpretation in the more general field of skeletal biology, especially in regards to trauma interpretation.

Future Directions

From its inception, the discipline has been dependent on the availability of well-documented collections of human remains throughout key areas of the world. Through the work of pioneers like Blumenbach, Virchow, Hrdlička, Samuel Morton (1799–1851), Bass, and many archaeologists worldwide, documented collections of human remains have been compiled and made available for research. These assemblages include key reference collections of individuals, whose age at death, sex, and partial life histories are documented, providing a strong foundation for the development of methodology. The bulk of the collections are from archaeological contexts and store the information about past lives and living conditions that can potentially be made available through research. Further advances in the field are dependent upon their growth and continued availability to researchers.

Fortunately, well-documented collections continue to be assembled worldwide. This development reflects the growing recognition of how much can be learned from them and how vital that knowledge is to forensic applications, justice, and understanding of the human condition, past, and present. In addition, these collections are originating from previously underrepresented areas of the world. They provide new perspective on human variation in all of the science areas investigated. They also allow regional development of methodology that meets the needs of anthropologists working in the area.

In contrast, some areas of the world have witnessed developments regarding repatriation and/or other constraints on the growth of skeletal collections. A strong expression in this development has occurred in the United States through policies and laws that affect continued curation of some collections of human remains. In the USA, many collections relating to the American Indian communities, including some of great antiquity, have been transferred to American Indian groups desiring custody. Similar developments have occurred in Australia and other parts of the world on a lesser scale. Likewise, policies and laws have also affected the disposition of recently recovered ancient human remains, limiting growth of new collections.

While these developments appear to restrict future expansion and maintenance of some

collections in particular world areas, they also have stimulated systematic data collection. Recognizing that the affected collections may not be available to future researchers, thoughtful protocols have been development to capture key measurements, observations, and images that likely will be useful for future research. These initiatives have stimulated attempts to develop standards for data collection, reminiscent of the efforts by the early pioneers of Broca, Martin, Hrdlička, and others. With the availability today of computer technology, large databases can be assembled that will hopefully facilitate the work of future physical anthropologists.

The discipline has evolved extensively over the centuries and continues to change. The future appears bright as many highly motivated and intelligent students continue to enter the field, especially in the areas of paleopathology and forensic anthropology. New technology and improved interpretive models enable novel issues to be addressed, with growing applications in forensic anthropology. Research has become increasingly interdisciplinary, frequently involving teams of specialists. The early pioneers would be amazed at how far this field has advanced, but likely pleased that their work enabled so much of the progress to be made.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Dental Anthropology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Osteology Reference Collections
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy: Definition

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Bioarchaeology: Definition

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Brief Definition of the Topic

Bioarchaeology is the study of human remains from archaeological contexts. Although the term was first used in reference to the study of animal remains, it has generally become exclusive to human remains, but sometimes called human osteoarchaeology or human bioarchaeology. The field emphasizes integrative, interdisciplinary analysis of the links between biology and culture in past societies. This approach has contributed to an informed understanding of the range of social, behavioral, and economic conditions and circumstances that have shaped the human experience – especially health and well-being, lifestyle, and quality of life – during the last 10,000 years of human evolutionary history.

Cross-References

- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Skeletal Biology: Definition

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Biological Distance in Bioarchaeology and Human Osteology

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Introduction

Biological distance, or biodistance, is a measure of relatedness or divergence among groups separated by time and/or geography based on morphological variation (Buikstra et al. 1990). Biological distance studies, which are undertaken to reconstruct population history and to assess ancestry, dominated bioarchaeological research during the nineteenth and early twentieth centuries. The earliest attempts to comprehend human variation and measure relatedness among human groups, through the construction of typological racial classifications, fell short of their predicted goals. These early attempts were flawed due to limitations of the approach, which included the mistaken belief that humanity could be divided into a finite number of pure races, and the lack of adequate quantitative methods. Advances in evolutionary theory, including quantitative and population genetics, and improvements in computing and statistical procedures in the early twentieth century provided a much sounder basis for measuring and interpreting morphological variation within and between human groups.

Because of the demonstrated correlation between phenotypic and genotypic similarities, measures of biological distance in bioarchaeology are generally determined through the application of quantitative methods to metric and nonmetric variation recorded in skulls, teeth, and skeletons. Ancient DNA (aDNA) and other biochemical and geochemical traits are beginning to find their way into biodistance studies.

Studies of cranial form, most notably cranial measurements (or craniometrics) that quantify morphology, figured prominently in the early development of the discipline and continue to occupy a central role in modern biological distance studies. While morphological variation, especially quantitative variation, is subject to nongenetic or environmental influences, this category of variation is generally assumed to reflect genetic similarity resulting from neutral evolutionary forces (genetic drift, gene flow, and mutation). There is now an emerging consensus that craniometric data can be used as a proxy to genetic data, hence the popularity of this category of variation in biodistance studies.

The continuing interest in cranial form for reconstructing population history is supported by a number of factors including the precision and repeatability of measurements, the conservative nature of craniometric variation, the direct link with the past, and the demonstration of a genetic component for this category of biological variation. Likewise, the strong geographic patterning (e.g., Howells 1973), selective neutrality of phenotypic (craniometric) variation

(e.g., Relethford 2009), and the amenability of continuous variation to multivariate statistical analysis have ensured the continued use of this category of variation in biodistance analyses.

Teeth, especially dental nonmetric traits, have also figured prominently in assessing biological distance among ancient and modern populations. Standardization of dental scoring methods, high genetic component, and conservatism of this category of variation have made the dentition a popular choice for reconstructing population history.

Mathematically based methods, which are often based on quantitative and population genetic analyses, allow bioarchaeologists to address a broad array of research topics that include:

- Tracing biological relationships, temporally and spatially, for reconstructing past population history, origins, and movement of human groups
- Investigating microevolutionary processes (e.g., gene flow, genetic drift, selection) and the influence of geography and other isolating mechanisms on the observed patterns of biological relatedness
- Identification of postmartial residence patterns, familial and kin groupings, cemetery structure, social status, immigrants, and admixture
- Sorting of commingled skeletal and dental remains
- Assignment of an unknown individual (or skull) to a known reference group in repatriation claims and forensic cases

By identifying the population structure, biological distance studies provide an important context for addressing other topics in bioarchaeology such as paleopathology, paleodemography, health, and diet.

Definition

Biological distance, or biodistance, is the measure of biological relatedness (or divergence) between and within human groups, living and past, based on human skeletal and dental variation.

Key Issues

Although equally applicable to morphological/phenotypic variation, the discussion of the key issues in biological distance studies will focus on the use of cranial measurements, or craniometrics, unless otherwise noted.

Underlying Assumptions

While morphological variation, including craniometric variation, is subject to nongenetic or environmental influences, this category of variation is generally viewed as reflecting genetic similarity. It is assumed that groups that display more phenotypic similarity are the most closely related. Additionally, various studies have demonstrated a significant genetic component for many cranial measurements (e.g., Martínez-Abadías et al. 2009).

Geographic Patterning and Neutrality of Craniometric/Phenotypic Variation

Beginning with the pioneering work of W.W. Howells (1973), there is now near universal acceptance that human cranial variation is geographically structured making it highly attractive for reconstructing population history and for assessing ancestry.

While some aspects of cranial morphology (i.e., face and nose, Hubbe et al. 2009) are susceptible to climatic adaptation, numerous studies have demonstrated that phenotypic distance and global patterns of craniometric variation, on average, correlate with neutral genetic distance globally and are consistent with neutral traits under an isolation by distance model (Relethford 2004; Roseman 2004; Harvati & Weaver 2006; von Cramon-Taubadel 2009; Betti et al. 2010). Studies such as these reiterate that cranial form provides valuable information about past population history and for investigating microevolutionary processes (Smith 2011). Furthermore, that craniometric variation is geographically structured allows high levels of classification accuracy when crania from different parts of the world are compared (Relethford 2009).

Variables and Methods

Studies of biological distance, beginning in the 1970s, increasingly relied on the application of multivariate statistical procedures to craniometric data. Multivariate statistical procedures comprise a family of related mathematical procedures that allow the simultaneous analysis of many random but interrelated variables whose effects cannot be interpreted individually in a meaningful manner. These procedures are exceptionally well suited for investigating patterns of biological variation, measuring relatedness among groups, and making other inferences of the variables and groups selected. The primary multivariate statistical procedures applied to craniometric traits in biological distance studies include principal components analysis, stepwise discriminant function (canonical) analysis, and Mahalanobis' generalized distance statistic. Various clustering algorithms, such as the unweighted pair group method algorithm (UPGMA), facilitate interpretation of relatedness between groups through the construction of dendrograms (see Case Study 1). A more detailed discussion of the methods used for analyzing metric data is provided in Pietrusewsky (2008a). C.A.B. Smith's mean measure of divergence (MMD) remains one of the most popular distance statistics for analyzing dental and cranial nonmetric traits.

In addition to traditional landmark measurements (linear distances, areas, volume, angles), the use of Cartesian coordinates of cranial landmarks recorded in two or three dimensions using digitizing equipment is a recent alternative approach for quantifying size and shape. Geometric morphometric techniques, including Procrustes analysis, have become standard tools for analyzing coordinate data (Slice 2005).

Model-Free and Model-Bound Approaches

The earliest biological distance studies were largely model-free approaches that focused more on the overall similarities among groups than on the causes of the observed patterns of variation. Later studies applied a population genetic framework for analyzing quantitative traits (e.g., Relethford & Blangero 1990; Roseman 2004; Smith 2011). These model-bound approaches allowed the estimation of microevolutionary processes such as gene flow and genetic drift.

Selection of Samples and Variables

Because skeletal series represent only samples of past biological populations, which often span considerable periods of time and may be biased in their representation, extreme caution should be exercised when skeletal (cranial) samples are used in biological distance studies. Using relatively large samples that are free of systematic bias helps to alleviate some of the concerns. Likewise, the selection of traits that are less susceptible to environmental and cultural influences further ensures that the results of biological distance analysis more faithfully estimate genetic relatedness. Recent studies (e.g., von Cramon-Taubadel 2009; Smith 2011) suggest that some bones of the neurocranium such as the temporal bone because of its stronger correlation with neutral genetic data might be more reliable for reconstructing human population history than other regions of the cranium.

Current Debates

Origin and Dispersal of Modern Humans/New Hominin Species

Refinements in methods and techniques continue to influence work in biological distance studies. Some of the recent developments are associated with the debate over the origin and pattern of dispersal of anatomically modern humans (e.g., Smith 2011). The association of craniometric variation and geography has been viewed within the context of this larger debate. The question of whether long distance gene flow mediated by geographic distance (isolation by distance model) or population dispersal, such as with the spread of modern humans out of Africa 100,000–150,000 years ago, is responsible for

this observed correlation has been examined (e.g., Weaver et al. 2008).

Biological distance studies have also been used to evaluate claims for the designation of new hominin species, such as *Homo floresiensis*, in paleoanthropology.

Origins of Native Americans

Studies in biological distance contribute to reconstructions of population history at both the global and regional levels. Craniometric variation studies addressing the origin and dispersal of the first humans to reach the Americas are illustrative of regional analysis (e.g., Ross et al. 2003). Many other studies examining the population history of various regions and time periods, too numerous to cite in this entry, have appeared in the literature in recent years.

Transition from Hunting-Gathering to Agriculture

Another debate that biological distance studies have contributed to in recent years is the transition to farming in Europe and whether indigenous hunter-gatherers were replaced (demic diffusion model) by agriculturalists from the Near East or whether these indigenous groups adopted farming practices (cultural diffusion model) from their neighbors (e.g., von Cramon-Taubadel 2011). Studies that focus on the transition to farming in other regions of the world have also appeared.

Boas' Immigration Studies and Cranial Plasticity/Climate and Environmental Influences

Several recent investigations (e.g., Sparks & Jantz 2002) examined the statistical and biological significance of Franz Boas' immigration studies as they relate to cranial plasticity. Often, these studies are discussed within the broader context of the debate over genetic and environmental influences on craniometric variation and the degree to which skeletal and dental morphology are influenced by environmental and/or selection pressures (e.g., Harvati & Weaver 2006; Hubbe et al. 2009).

In the field of forensic anthropology, discussion continues over the existence of races and the use of computer software programs (e.g., FORDISC & CRANID) designed to assign unknown individuals to a reference group.

Individual Bones of the Skull and Biodistance Studies

Several recent studies have identified the possible influence of environmental factors that may affect craniofacial morphology. These, in turn, have led to specialized studies that examine the shape of individual bones of the cranium to identify which are more strongly correlated with neutral genetic expectation and thus better suited for use in reconstructing human population history and primate phylogeny (e.g., von Cramon-Taubadel 2009; Smith 2011).

Future Directions

Future work in studies of biological distance is anticipated to build on previous work in evolutionary quantitative genetics and contribute to a broad array of evolutionary questions in bioarchaeology and biological anthropology. Refinements in quantitative methods including Bayesian statistical modeling and new imaging technology will continue to shape future work in this field. The use of geometric morphometrics and Cartesian coordinates of cranial landmarks for analyzing size and shape will likely witness an increased presence in the field. While the use of digitizing equipment for recording 3D coordinate data is expected to become more common in future work, reliance on traditional landmark measurements made with calipers will persist as an attractive and convenient alternative.

The multivariate statistical procedures associated with traditional morphometric analyses, such as principal components analysis, discriminant (canonical) analysis, and Mahalanobis' distance, will continue to occupy an important role in future biodistance studies. The reliance on multivariate methods associated with biological distance studies, old and new, reinforces the need for students to be adequately trained in statistical and quantitative methods.

Biological Distance in Bioarchaeology and Human Osteology, Table 1 Fifty-six male cranial samples used in the example

Series Name (abbrev.)[a]	No. of Crania	Location[b] and Number of Crania	Remarks
Polynesia			
1. Tonga-Samoa (TOG)	19	BER-3; AMS-2; DRE-1; PAR-1 BPB-4; AIM-2; AUK-5; SIM-1	Fourteen specimens are from Tonga and five are from Samoa. Included in the Tongan series are three skulls from Pongaimotu excavated by McKern in 1920; two from To-At-1 and To-At-2 excavated by Janet Davidson in 1965; and five from To-At-36 excavated by Dirk Spennemann in 1985/1986. The remaining specimens are from museums in Berlin, Paris and Sydney. Although the exact dates for a few specimens are not known, the majority are believed to be prehistoric
2. Easter Island (EAS)	50	BER-5; DRE-9; PAR-36	Most of the crania in Paris were collected by Pinart in 1887 at Vaihu and La Perouse Bay, Rapa Nui (Easter Island). The exact dates of these specimens are not known
3. Hawai‘i (HAW)	60	BPB-20; HON-20; SIM-20	An equal number of specimens have been randomly chosen from three different skeletal series: Mōkapu (O‘ahu), Honokahua (Maui), and Kaua‘i. All specimens are presumed to be prehistoric (pre-1778)
4. Marquesas (MRQ)	63	PAR-49; LEP-1; BLU-1; BPB-12	Crania are from four islands, Fatu Hiva, Tahuata, Nuku Hiva and Hiva Oa. The exact dates of these specimens are not known
5. New Zealand (NZ)	50	BRE-3; PAR-21; SAM-1; AIM-13; GOT-1; ZUR-5; DRE-6	A representative sample of New Zealand Maori crania from the North and South Islands of New Zealand. The exact dates of these specimens are not known
6. Chatham Islands (CHT)	45	DUN-8; OTM-2 WEL-4; CAN-10 AIM-3; DRE-5 AMS-2; DAS-3 GOT-4; PAR-4	Moriori crania from the Chatham Islands, New Zealand. The exact dates of these specimens are not known
7. Society Islands (SOC)	44	PAR-33; BPB-11	Crania are from the island of Tahiti, Society Islands. The exact dates of these specimens are not known
8. Tuamotu Archipelago (TUA)	18	PAR-18	The majority of the specimens are from Makatea in the Tuamotu Archipelago. The exact dates of these specimens are not known
Island Melanesia			
9. Fiji (FIJ)	42	BER-1; SAM-3 ; QMB-1; DRE-4 FRE-3; CHA-1; BPB-11; PAR-7 AMS-3; DUN-6; SIM-2	Crania are from all major islands including the Lau Group in the Fiji Islands. The exact dates of these specimens are not known
10. Vanuatu (VAN)	47	BAS-47	Most of the specimens were collected by Felix Speiser in 1912 from Malo, Pentecost and Espirtu Santo Islands, Vanuatu. The exact dates of these specimens are not known
11. Loyalty Islands (LOY)	50	BAS-43; PAR-7	Crania are from Mare, Lifou, and Ouvea Island Groups, Loyalty Islands The exact dates of these specimens are not known
12. New Caledonia (NCL)	50	BAS-34; PAR-16	Crania are from several coastal and inland locations on New Caledonia. The majority of these specimens were collected in the late nineteenth century. The exact dates of these specimens are not known

(*continued*)

Biological Distance in Bioarchaeology and Human Osteology, Table 1 (continued)

Series Name (abbrev.)[a]	No. of Crania	Location[b] and Number of Crania	Remarks
13. Santa Cruz Islands (SCR)	46	SAM-4; AMS-2; BAS-40	The crania in Basel were collected by Felix Speiser in 1912. The exact dates of these specimens are not known
14. Solomon Islands (SOL)	49	DRE-3; BER-1; NMV-1; QMB-3; AMS-16; DAS-10; BAS-14; GOT-1	Crania are from New Georgia (5), Guadacanal (9), San Cristobal Island (7), and other locations in the Solomon Islands. The exact dates of these specimens are not known
15. New Britain (NBR)	50	CHA-20; DRE-30	The specimens from New Britain in Dresden were collected by A. Baessler in 1900 and those in Berlin were collected by R. Parkinson in 1911. The specimens were collected from trading posts near Rabul in the Gazelle Peninsula and most likely represent Tolai crania. The exact dates of these specimens are not known
16. New Ireland (NIR)	53	AMS-4; BER-2; BLU-6; DRE-18; GOT-15; QMB-1; SAM-6; TUB-1	Most of the crania in Dresden were collected by Pöhl in 1887–1888 from the northern end of the island; the specimens in Göttingen were collected during the Südsee Expedition in 1908. The exact dates of these specimens are not known
17. Admiralty Islands (ADR)	50	DRE-20; GOT-9; CHA-6; TUB-15;	Specimens from Hermit, Kaniet and Manus Islands of the Admiralty Islands. The exact dates of these specimens are not known
New Guinea			
18. Sepik R. (SEP)	50	DRE-33; GOT-10; TUB-7	The specimens in Dresden were collected by Otto Schlaginhaufen in 1909 from various locations along the Sepik River, Papua New Guinea. The exact dates of these specimens are not known
19. Biak Island (BIK)	48	DRE-48	Most (45) of the specimens were collected by A.B. Meyer in 1873 on Biak Island (Mysore), Geelvink Bay, Irian Jaya. The exact dates of these specimens are not known
20. Purari Delta (PUR)	50	DRE-50	Decorated (engraved) skulls obtained by Gerard and Webster between 1900 and 1902 are from along the Purari River and Purari Delta regions, Papua New Guinea. The exact dates of these specimens are not known
Australia/Tasmania			
21. Murray R. (MRB)	50	AIA-39; DAM-11	Australian Aboriginal crania were collected by G.M. Black along the Murray River (Chowilla to Coobool) in New South Wales between 1929–1950. The exact dates of these specimens are not known
22. New South Wales (NSW)	62	AMS-21; DAS-41	Australian Aboriginal crania from the coastal locations in New South Wales. The exact dates of these specimens are not known
23. Queensland (QLD)	54	AMS-21; DAS-3; QMB-30	Australian Aboriginal crania from the southeastern and middle-eastern regions of Queensland. The exact dates of these specimens are not known
24. Northern Territory (NT)	50	AIA-4; AMS-3; MMS-1; NMV-38; QMB-1; SAM-3	Australian Aboriginal crania from Port Darwin (14) and Arnhemland (36) in the Northern Territory, Australia. The exact dates of these specimens are not known

25. Swanport, S.A. (SAS)	36	SAM-36	Australian Aboriginal crania representing the Tarildekald and Warki-Korowalde tribes in the lower Murray River basin. The specimens were collected by F. R. Zeitz in 1911 from an aboriginal cemetery located approximately 10 km southeast of the Murray Bridge in South Australia (Howells 1973:21). The exact dates of these specimens are not known
26. Western Australia (WA)	47	WAM-47	Australian Aboriginal crania from central (20), eastern (4), northern (14), and southern (9) regions of Western Australia. The exact dates of these specimens are not known
27. Tasmania (TAS)	26	THM-22; CHA-1; SAM-2; NMV-1	The crania represent Tasmanian Aborigines. The exact dates of these specimens are not known
Micronesia			
28. Guam (GUA)	46	BPB-42; PAR-4	Pre-Spanish Chamorro crania associated with *latte* structures collected in the 1920s by Hans Hornbostel along Tumon Beach, Tumon Bay, Guam. The majority of these specimens represent prehistoric (pre-1521) Chamorro
Island Southeast Asia			
29. Sumatra (SUM)	39	BER-1; BRE-1; DRE-5; LEP-4; PAR-3; ZUR-25	The specimens in Zürich are designated "Battak," specific locations within the island of Sumatra are not known. The exact dates of these specimens are not known
30. Java (JAV)	50	BER-1; BLU-8; CHA-9; DRE-1; LEP-24; PAR-7	Crania were collected from several different localities in Java. The exact dates of these specimens are not known
31. Borneo (BOR)	34	BER-2; BRE-2; DRE-6; FRE-4; LEP-8; PAR-12	A great many of the specimens are indicated as representing Dayak tribes, some have elaborate decorations. The exact dates of these specimens are not known
32. Sulawesi (SLW)	41	BAS-7; BER-10; DRE-4; FRE-7; LEP-5; PAR-8	An exact location is known for many of these specimens. The exact dates of these specimens are not known
33. Lesser Sunda Islands (LSN)	61	BAS-5; BER-15; BLU-2; CHA-1; DRE-24; LEP-1; PAR-6; ZUR-7	Crania from Bali (13), Flores (9), Sumba (1), Lomblem (2), Alor (2), Timor (11), Wetar (2), Leti (4), Barbar (1), Tanimbar (13), Kai (2) and Aru (1) Islands of the Lesser Sunda Islands. The exact dates of these specimens are not known.
34. Southern Moluccas Islands (SML)	65	FRE-48; DRE-17	Crania are from Seram (48) and Buru (17) Islands of the Southern Moluccas Islands. The exact dates of these specimens are not known
35. Sulu (SUL)	38	LEP-1; PAR-37	The specimens in Paris were collected by Montano-Rey c. 1900. The exact dates of these specimens are not known
36. Philippines (PHL)	28	BER-9; DRE-19	Most specimens are from Luzon Island. The exact dates of these specimens are not known
Mainland Southeast Asia			
37. Vietnam (VTN)	49	HCM-49	Near modern crania from Hanoi (Van Dien Cemetery) and Ho Chi Minh City
38. Bachuc Village, (BAC)	51	BAC-51	Victims of the 1978 Khmer Rouge massacre in Bachuc Village in western Angiang Province, Vietnam

(*continued*)

Biological Distance in Bioarchaeology and Human Osteology, Table 1 (continued)

Series Name (abbrev.)[a]	No. of Crania	Location[b] and Number of Crania	Remarks
39. Cambodia & Laos (CML)	40	PAR-40	A combined sample of crania from various locations in Cambodia and Laos collected between 1877 and 1920. The exact dates of these specimens are not known.
40. Thailand (THI)	50	SIR-50	Most of the specimens represent dissecting room cases from Bangkok
41. Burma (BUR)	16	ZUR-16	The crania in Zürich are from a series (Cat. Nos. 93–125) of skulls collected in Mandalay, Myanmar (Burma), described in a catalogue dated c. 1900. The exact dates of these specimens are not known
East Asia: Japan			
42. Kanto (KAN)	50	CHB-50	A dissecting room population of modern Japanese from the Kanto District of eastern Honshu. The majority of the individuals were born during the Meiji period (1868–1911) and died well before 1940
43. Tohoku (TOH)	53	SEN-53	Dissecting room specimens of modern Japanese from the Tohoku District in northern Honshu Island
44. Kyushu (KYU)	51	KYU-51	Modern Japanese, which derive mostly from Fukuoka Prefecture in Kyushu Island. Other specimens are from Yamaguchi, Saga, Nagasaki and adjoining prefectures
45. Ainu (AIN)	50	SAP-18; TKM-5; TKO-27	Modern to near modern skeletons collected by Koganei in 1888–1889 from abandoned Ainu cemeteries in Hokkaido
46. Ryukyu Islands (RYU)	60	KYO-18; KAN-21; RYU-8; KYU-5; TKO-8	Eighteen near modern crania are from Tokunoshima Island of the Amami Islands located north of the Okinawa Group in the central Ryukyu Islands; 21 specimens are from two different locations on Kume Island, an island located west of Okinawa Island: Yattchi (17) and Hiyajo (4); 21 specimens are from five separate islands in the Sakishima Group of the southern Ryukyu Islands: Hateruma Island (2); Miyako (4); Iriomote Island (2); Ishigaki Island (1), and Yonaguni Island (12)
China and N.E. Asia			
47. Shanghai (SHA)	50	SHA-50	The specimens are mostly from post-Qing (post-1911) cemeteries in Shanghai
48. Nanjing (NAJ)	49	SHA-49	The series represents near modern crania exhumed from the modern city of Nanjing, Jiangsu Province, eastern China
49. Chengdu (CHD)	53	SHA-10; CHE-43	A majority of these specimens date to the Qing Dynasty (CE 1644–1911) and are from Chengdu, Sichuan Province in western China. Ten crania are from Leshan, Lizhong County, Sichuan Province
50. Hong Kong (HK)	50	HKU-50	Specimens represent individuals who died in Hong Kong between 1978 and 1979

51. Taiwan (TAI)	47	TPE-47	Modern Chinese living in Taiwan who trace their immediate origins to Fujian and Guangdong Provinces on the mainland of China
52. Hainan Island (HAI)	47	TPE-47	Near modern Chinese whose ancestors began migrating from the Canton region of China to Hainan Island around 200 BCE. This material was excavated by Takeo Kanaseki in Haikou City on Hainan Island
53. Manchuria (MAN)	50	TKO-50	Many of the specimens are from northeastern China or the region formerly referred to as "Manchuria," which today includes Heilongjiang and Jilin Provinces and adjacent northern Korea. A great many of these specimens are identified as soldiers, or cavalrymen, who died in battle in the late 19th century CE
54. Korea (KOR)	32	KYO-7; SEN-3, TKM-2; TKO-20	Specific locations in Korea are known for most of these near modern specimens
55. Mongolia (MOG)	50	SIM-50	The skulls are identified as coming from Ulaanbaatar (Urga), Mongolia and were purchased by A. Hrdlička in 1912
56. Atayal (ATY)	36	TPE-28; TKM-7; TKO-1	The Atayal are the second largest surviving Aboriginal tribe in Taiwan. The specimens are Atayal slain in the Wushe incident in 1930. The specimens were collected by Takeo Kanaseki in 1932

[a, b]AIM, Auckland Institute and Museum, Auckland, New Zealand; AIA, Australian Institute of Anatomy, Canberra, Australia; AMS, The Australian Museum, Sydney, Australia; AUK, University of Auckland, Auckland, New Zealand; BAC, Bachuc Village, Angiang Province, Vietnam; BAS, Naturhistorisches Museum, Basel, Switzerland; BER, Museum für Naturkunde, Berlin, Germany; BLU, Anatomisches Institut, Universität Göttingen, Göttingen, Germany; BPB, B. P. Bishop Museum, Honolulu, U.S.A.; BRE, Über-see Museum, Bremen, Germany; CAN, Canterbury Museum, Christchurch, New Zealand; CHA, Anatomisches Institut der Chairté, Humboldt Universität, Berlin, Germany; CHB, Chiba University School of Medicine, Chiba, Japan; CHE, Dept. of Anatomy, Chengdu College of Traditional Chinese Medicine, Chengdu, China; DAM, Dept. of Anatomy, University of Melbourne, Melbourne, Australia; DAS, Dept. of Anatomy, University of Sydney, Sydney, Australia; DUN, Dept. of Anatomy, University of Otago, Dunedin, New Zealand; DRE, Museum für Völkerkunde, Dresden, Germany; FRE, Institut für Humangenetik und Anthropologie, Universität Freiburg, Freiburg im Breisgau, Germany ; GOT, Institut für Anthropologie, Universität Göttingen, Göttingen, Germany; HCM, Faculty of Medicine, Ho Chi Minh City, Viet Nam; HON, Honokahua, Maui, Hawai‘i, U.S.A.; HKU, University of Hong Kong, Hong Kong; KAN, Kanegusuku Storage Room, Board of Education Cultural Division, Kanegusuku, Okinawa, Japan; KYO, Physical Anthropology Laboratory, Faculty of Science, Kyoto University, Kyoto, Japan; KYU, Dept. of Anatomy, Faculty of Medicine, Kyushu University, Fukuoka, Japan; LEP, Anatomisches Institut, Karl Marx Universität, Leipzig, Germany; MMS, Macleay Museum, University of Sydney, Sydney, Australia; NMV, National Museum of Victoria, Melbourne, Australia; OTM, Otago Museum and Art Gallery, Otago, New Zealand; PAR, Musée de l’Homme, Paris, France; QMB, Queensland Museum, Brisbane, Australia; RYU, University of the Ryukyus, Naha, Okinawa Island, Japan; SAM, South Australian Museum, Adelaide, Australia; SAP, Dept. of Anatomy, Sapporo Medical College, Sapporo, Japan; SEN, Dept. of Anatomy, School of Medicine, Tohoku University, Sendai, Japan; SHA, Institute of Anthropology, College of Life Sciences, Fudan University, Shanghai, China; SIM, National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.; SIR, Dept. of Anatomy, Siriraj Hospital, Bangkok, Thailand; THM, Tasmanian Museum and Art Gallery, Hobart, Australia; TKM, Medical Museum, University Museum, University of Tokyo, Tokyo, Japan; TKO, University Museum, University of Tokyo, Tokyo, Japan; TPE, Academia Sinica, Nankang, Taipei, Taiwan; TUB, Institut für Anthropologie u. Humangenetik, Universität Tübingen, Tübingen, Germany; WAM, Western Australian Museum, Perth, Australia; WEL, National Museum of New Zealand, Wellington, New Zealand; ZUR, Anthropologisches Institut, Universität Zürich, Zürich, Germany

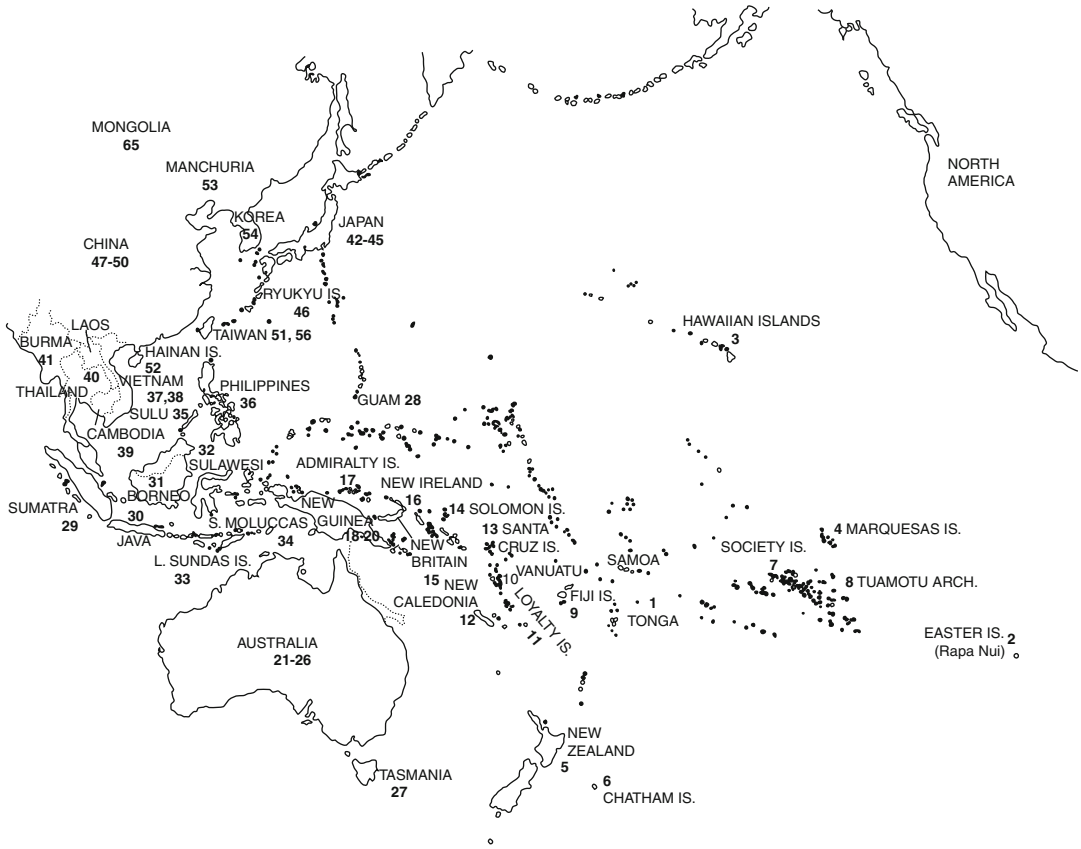

Biological Distance in Bioarchaeology and Human Osteology, Fig. 1 Map showing the approximate locations of the 56 cranial samples used in the example (This figure, reproduced here courtesy of Etty Indriati, was originally published in Pietrusewsky (2008b))

In addition to studies of skull form and teeth, the analysis of aDNA and other geochemical data will attract future research in biological distance. Combining data from multiple sources (e.g., Ricaut et al. 2010) will likewise provide new opportunities for reconstructing evolutionary and population history.

As never before, access to computers, imagining technology, user-friendly software for conducting biological distance studies, and sharing of data and quantitative methods will guide and encourage future studies.

Given the current repatriation claims and issues surrounding the accessibility of skeletal remains, the creation of data banks such as W.W. Howells' craniometric data bank, and the sharing of data worldwide will provide a wealth of information that is nonrenewal. Many of the skeletal series examined in biodistance studies just a few decades ago using traditional morphometrics (e.g., Polynesians and Australian Aboriginals) are no longer accessible to researchers.

Case Study 1: An Example of Biological Distance Analysis

In this example, two multivariate statistical procedures, stepwise discriminant function (canonical) analysis and Mahalanobis' distance, are applied to 27 landmark cranial measurements recorded in 56 modern and near modern male cranial samples for understanding the population history of the Asia-Pacific region (Table 1, Fig. 1) (Pietrusewsky 2008b). Discussion of these results is restricted to a canonical plot of group means and the dendrogram of Mahalanobis' distances, with detailed discussion provided in Pietrusewsky (2008a).

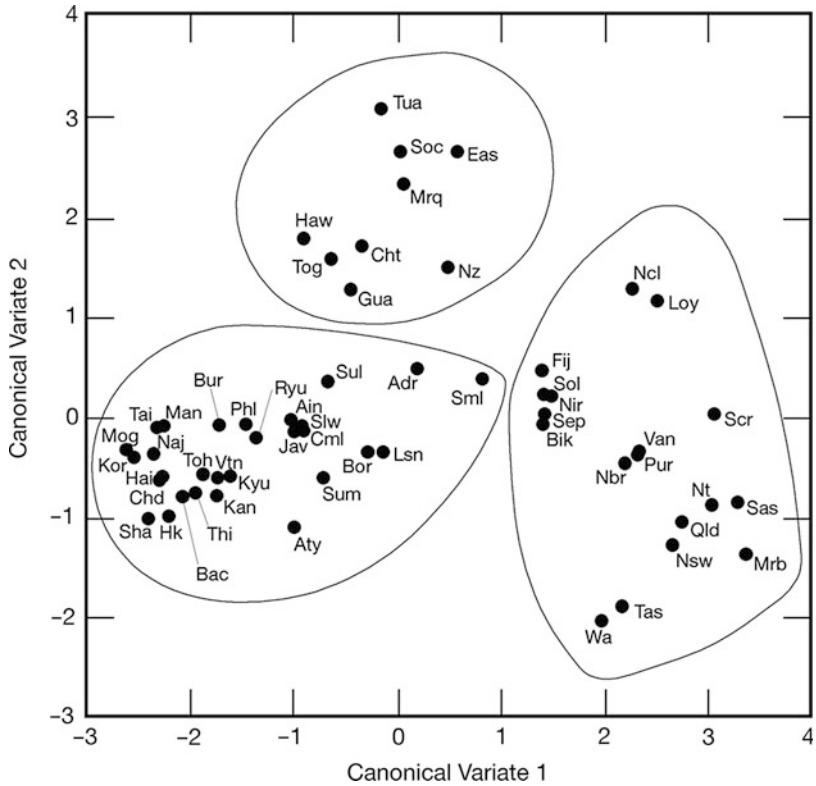

Biological Distance in Bioarchaeology and Human Osteology, Fig. 2 Plot of 56 group means on the first two canonical variates after applying stepwise discriminant function analysis to 27 cranial measurements. Abbreviations of the cranial samples are explained in Table 1 (This figure, reproduced here courtesy of Etty Indriati, was originally published in Pietrusewsky (2008b))

Stepwise Discriminant Function Analysis

Three clusters emerge when the group means for the 56 group are plotted on the first two canonical variates (Fig. 2). One of these includes the cranial series from Australia, New Guinea, and geographical Melanesia. A second cluster includes the cranial series representing Polynesia and Guam. Cranial series from Mainland Southeast Asia and East Asia form a third major constellation. Of note, the cranial series from the Southern Moluccas, Admiralty Islands, and Lesser Sunda Islands occupy an intermediate position between the Polynesian and Australo-Melanesian cranial series.

Mahalanobis' Generalized Distance

Applying the UPGMA clustering algorithm to Mahalanobis' distances results in the dendrogram shown in Fig. 3. The primary division evident in this diagram places all the cranial series from Australia and Melanesia in one branch while the second includes the cranial series from Polynesia, Southeast Asia, and East Asia. Within these major divisions, there is internal differentiation that generally mirrors geography. It is also worth noting that New Zealand Maori (Polynesia), Southern Moluccas (Island Southeast Asia), and the Admiralty Islands (Melanesia) cranial series form a cluster that ultimately links with the Australian-Melanesian branch in this diagram.

Australia/Melanesia Versus Southeast/East Asia and Remote Oceania

The presence of two major divisions demonstrated in these results supports archaeological, linguistic, and genetic models that the indigenous inhabitants of Australia, Tasmania, and geographical Melanesia share a common origin that is unrelated to that for the modern inhabitants of Southeast Asia and East Asia. The sharp separation between Polynesian and Australian-Melanesians series further reinforces archaeological and linguistic models. These models hypothesize an earlier colonization of Australia,

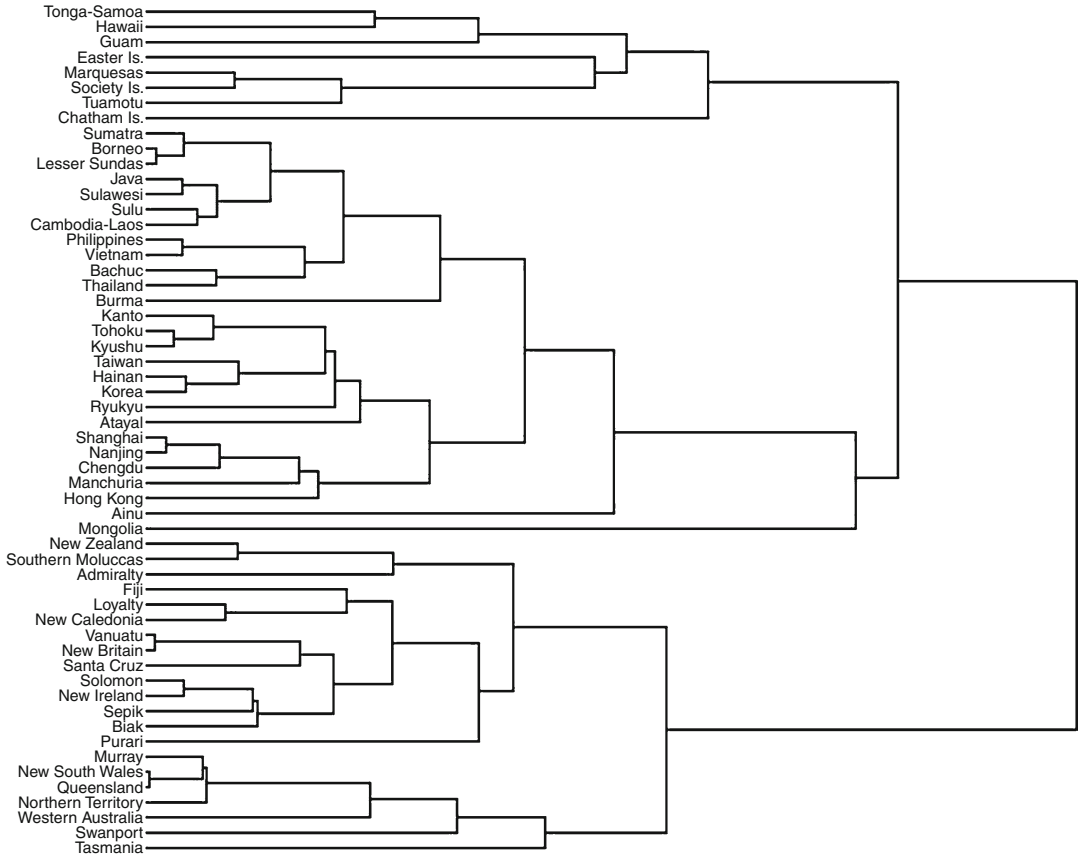

Biological Distance in Bioarchaeology and Human Osteology, Fig. 3 Dendrogram (or diagram of relationship) that results from applying the UPGMA clustering algorithm to Mahalanobis' distances using 27 cranial measurements recorded in 56 male groups (This figure, reproduced here courtesy of Etty Indriati, was originally published as Fig. 4 in Pietrusewsky (2008b))

New Guinea, and neighboring regions of Near Oceania and a much later colonization that led to the peopling of previously uninhabited remote Oceania.

Southeast Asia and North/East Asia

These results further allow an examination of some of the current archaeological models advanced to explain the population history of East and Southeast Asia. The sharp contrast between East/North Asian and Southeast Asian cranial series does not support linguistic and archaeological models that argue that the indigenous inhabitants of Southeast Asia were replaced by immigrant groups of people of a more northern origin during Neolithic times.

Island Southeast Asia/Polynesian Homeland

Finally, these results also support an ancestral Polynesian homeland in East/Southeast Asia and not one within geographically adjacent Melanesia. The connection between New Zealand Maori (a Polynesian series) and the Southern Moluccas (Island Southeast Asia) cranial series supports a probable Island Southeast Asian origin of the Polynesians, an association also demonstrated in previous analyses of genetic data.

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Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ Forensic Anthropology: Definition
- ▶ Hokkaido Sequence and the Archaeology of the Ainu People
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Human Remains in Museums
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Skeletal Biology: Definition

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Biometry in Zooarchaeology

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Introduction

The measurement of bones is a routine aspect of zooarchaeological analysis. Requiring minimal

equipment and relatively little experience, it nonetheless has the potential to contribute to many of the discipline's major recurring themes, including domestication, herd management, hunting strategies, and environmental change. Most analysts currently use the same standard set of measurements for mammals and birds – published by Angela von den Driesch in 1976 – allowing considerable scope for comparison between sites. A number of promising new statistical techniques such as mixture analysis have been applied to zooarchaeological biometry in recent years, but the development likely to have the biggest impact in the near future is the establishment of online repositories of measurement data, facilitating large-scale meta-analyses.

Definition

In the context of vertebrate zooarchaeology, biometry refers to the measurement of individual dimensions of hard tissues – primarily bone – and the calculation of simple indices. Common uses of measurements include species identification, sex determination, age estimation, assessment of domestication status, and tracing environmental changes.

Key Issues/Current Debates/Future Directions/Examples

Techniques and Standardization

For measurements to be useful, they must be repeatable and comparable. It is therefore necessary both to use equipment capable of producing reliable, accurate measurements and to ensure standardization between analysts in the exact dimensions to be measured.

The most common tools for zooarchaeological biometry are simple sliding calipers – typically digital, although many analysts prefer to use purely mechanical vernier or dial versions (Fig. 1). These have a main pair of (typically) straight arms allowing accurate external measurements up to 150 or 200 mm on moderate-sized bones, and usually also a smaller secondary pair of arms for simple internal measurements of foramina, diastemata, etc. Technical precision is typically 0.01 mm, although this will rarely be achieved in practice due to observer error.

Biometry in Zooarchaeology, Fig. 1 Dial calipers being used to measure a cod vertebra (Photo by author)

Larger calipers are also available, as are specialized versions with longer, narrower, and/or angled arms to permit measurement of larger or more awkwardly shaped bones. More commonly, however, such measurements are taken using a measuring box. Various designs exist but all feature a horizontal surface marked with a scale and two vertical blocks perpendicular to this: the first fixed at the zero point and the second capable of sliding along the scale in order to take a measurement on a bone held against the first. Measuring boxes are particularly useful when more than two measurement (i.e., contact) points are required in order to ensure the correct orientation for the dimension to be measured.

For very small bones, measurements can be taken through a microscope using a scaled graticule, or alternatively using digital image analysis. Finally, curved measurements are occasionally taken using a simple tape measure, for example for the outer length of a horn core or the basal circumference of an antler.

Inter-analyst comparability can only be achieved through the use of standard measurement definitions and clear indication of the standards employed in each case. Fortunately, a near-universal standard for terrestrial mammals and birds exists in Angela von den Driesch's

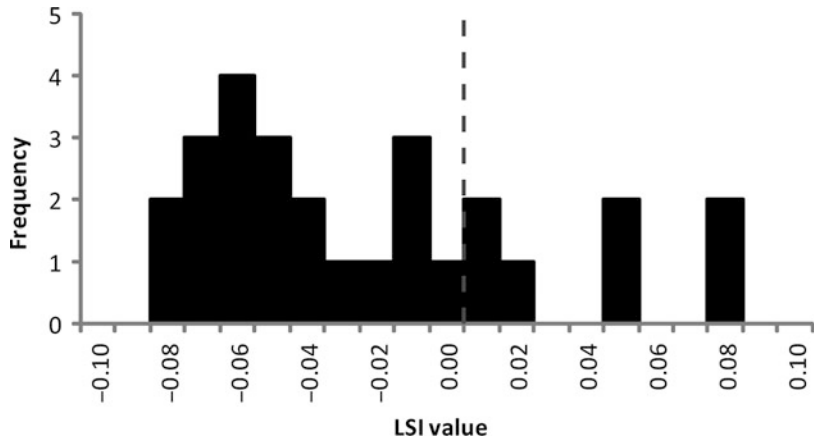

Biometry in Zooarchaeology, Fig. 2 Distribution of LSI value for goats (*Capra hircus*) from Çatalhöyük, West Mound, by reference to Uerpmann's (1979) standard animal. The *dotted line* marks the position of the standard (Author's own data)

A Guide to the Measurement of Animal Bones from Archaeological Sites (1976) – a comprehensive and fully illustrated list of measurements designed for the major taxa encountered on Holocene sites in Europe, with abbreviations allowing easy reference to specific measurements (e.g., "Bd" = distal breadth). These can generally also be applied for related taxa found in other parts of the world, but run into trouble for species that differ substantially in morphology, such as beavers or primates. Other measurement lists do exist, but are typically specialized sets to be used as supplements rather than alternatives to von den Driesch (e.g., additional sheep metapodial measurements in Davis 1996). The degree of morphological variation in fish makes definition of standard measurements more difficult, although some of those set out by Morales and Rosenlund (1979) are widely used. The existence of widely accepted standards allows for inter-site comparison and compilation of measurement databases such as ABMAP, hosted by the UK's Archaeology Data Service.

Log-Ratio Techniques

Isolated measurements may be useful if they can be compared with published datasets, but for many purposes a large sample of measurements from the same assemblage is required. Even in a large collection of bones, the number of measurable specimens of any given element and portion (e.g., distal humerus) may be very small, however, and it is often impossible to draw meaningful interpretations from measurements of individual elements.

The log standard index (LSI) or "log-ratio method" can be used to circumvent this problem by combining measurements from multiple elements. Originally developed by paleontologists, it was introduced to archaeology by Hans-Peter Uerpmann (1979) and Richard Meadow (1981). Each measurement in the assemblage is converted into an index representing its magnitude relative to the equivalent measurement on a "standard animal" – either a modern specimen, average values from a modern population, or a more or less complete archaeological skeleton. This is done by dividing the observed measurement by the standard measurement and then taking the base-10 logarithm: a measurement identical to that on the standard will result in an LSI value of zero; a positive value indicates that the specimen is larger than the standard; and a negative value that it is smaller. The zero point is thus fairly arbitrary, but the LSI values can be used to assess the size distribution of specimens in an assemblage (Fig. 2).

One problem with this technique is that it assumes that *shape* does not vary systematically, that is, that the relative proportions of the standard animal are identical to those in the archaeological populations under study. Differences in relative proportions between the standard and the target population(s) have a blurring effect, increasing the dispersion of LSI values and making it harder to distinguish subgroups within the archaeological material. In theory this can be

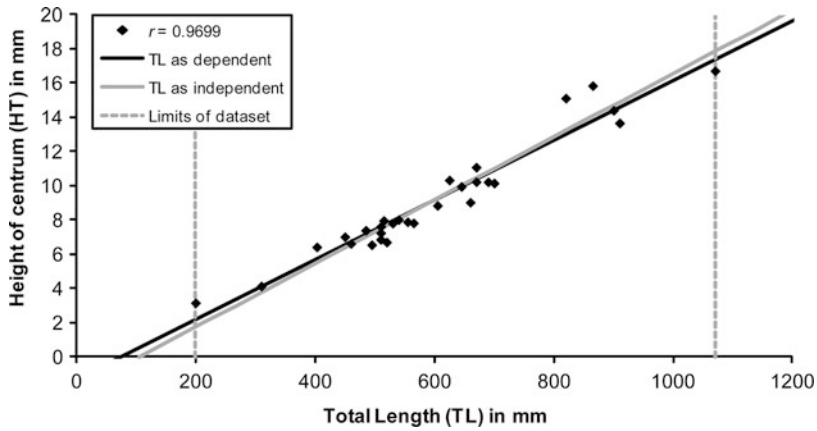

Biometry in Zooarchaeology, Fig. 3 Linear least-squares regression of first vertebra centrum height and total length in cod (*Gadus morhua*). The exact line depends on which variable is treated as dependent, neither being strictly correct. Length estimation is only reliable within the limits of the original dataset (Author's own data)

minimized by choosing an appropriate standard – ideally from as close as possible to the target assemblage in both time and space – but there is often little choice: studies of prehistoric cattle, for example, almost always use the "Ullerslev cow," a Danish Neolithic aurochs (Degerbøl & Fredskild 1970). Equally problematically, there may be systematic differences in proportions between the subgroups that one is trying to distinguish, for example males and females or wild and domestic specimens.

Of course, LSI values also provide a means to investigate shape changes, which may be of considerable interest in their own right. Given a large enough sample, LSI values may be plotted by element, with variation in mean values revealing differences in anatomical proportions compared to the standard (e.g., Davis 1996). Shape variation between individuals within a single population is also an issue, and Davis notes that while measurements in the same axis – that is, lengths *or* breadths *or* depths – tend to be highly correlated throughout the body, correlations are typically weaker *between* these categories.

In addition, pooling measurements from multiple elements is likely to lead to sample inflation: the same individual may be represented multiple times, increasing apparent sample size, violating assumptions of independence, and making "significant" results more likely in statistical tests. The LSI approach can be very powerful despite these problems, but wherever possible it should be used to supplement rather than replace analysis of size on an element-by-element basis.

Estimating Body Size/Weight

Bone measurements and derived indices are both useful for assessing relative size, but neither represents data of interest in and of themselves. It is often useful to estimate a more intuitively meaningful dimension from the measurements: whether discussing domestication-linked size reduction in the Neolithic or livestock improvements in the postmedieval period, for example, most readers will get a better idea of the changes involved if they are expressed in terms of withers height (i.e., height at the shoulder) rather than, say, metacarpal distal breadth or an index of size relative to one specific Danish aurochs. In some cases the role of derived size estimates may go further. For fish, the distribution of estimated total lengths may help to infer capture technology, while length is also a proxy for age (see below).

Modern reference data have been used to calculate linear regression equations for deriving major dimensions of numerous species from common bone measurements (e.g., May 1985 for horse withers height, Jones 1991 for gadid fish total lengths). In most cases these are simple bivariate linear regressions (Fig. 3), although it is also possible to build several measurements into a multiple regression. Such regression equations should ideally only be used for archaeological specimens which fall within the range of the reference data used in their construction (interpolation); application to specimens outside this range (extrapolation) may not be reliable. They should also ideally be based upon measurements

taken in approximately the same axis as the dimension to be estimated, but this is not always practical. For example, withers height in livestock can be most reliably estimated from long bone *lengths*, but since long bones are typically fragmented in zooarchaeological assemblages, it may be necessary to use breadth or depth measurements instead, accepting a weaker correlation and hence larger error term (see Davis 1996).

For other purposes it may be the weight of an animal (or at least the weight of meat and fat) that is of most interest to the zooarchaeologist, but predicting live weight is more complicated than estimating height or length. Since weight is correlated with volume – a three-dimensional property – it should increase in a cube ratio relative to any given dimension, resulting in a nonlinear regression curve. An additional complication is introduced by allometry: that is, size-correlated variation in anatomical proportions. In the context of zooarchaeology, the most important allometric effect is that between overall body size and the proportion of the body consisting of bone. Whereas weight depends on volume and hence increases in a cube ratio, the ability of bones to support this weight is (broadly speaking) a function of cross-sectional area – a two-dimensional property – and thus only increases in a square ratio. As animals get heavier, the size of their bones must therefore increase disproportionately in order to support their weight, further complicating the relationship between bone measurements and animal size.

Age and Sex Determination

Sex ratios may be of considerable interest to zooarchaeologists, shedding light on herd management or hunting techniques. Sex can most reliably be determined from qualitative differences such as pelvic or dental morphology, but many species also show marked quantitative sexual dimorphism, with males typically larger among mammals and the opposite occasionally true for birds. Unless dimorphism is extreme, however, distinguishing male and female specimens on the basis of measurements is necessarily a probabilistic rather than absolute process: while the very largest and smallest specimens may be attributable to sex groups with some confidence, there is typically considerable overlap between male and female ranges. Even where it is impossible to determine the sex of individual bones, however, it may nonetheless be possible to estimate sex ratios within the assemblage as a whole, based on the shape of the observed distribution.

Since size distribution depends on a range of genetic and environmental factors, it must be treated as population specific; that is, one cannot rely on size ranges observed in modern populations to assign archaeological bones to sex groups. Rather, the zooarchaeologist must plot the available measurements and look for clustering empirically. In exceptional cases discrete size groups may emerge, but the best one can normally hope for is a continuous but bimodal distribution, which may be easier to interpret following smoothing with the kernel density estimate technique (Fig. 4). The degree to which sex groups can be determined within a population depends not only on the degree of dimorphism and the variation within each group but also on their relative abundance: where a small number of (larger) males are present alongside a much greater number of (smaller) females – as is typical in domestic herds – the male peak size may be obscured by the upper tail of the female distribution, perhaps visible only as a small "shoulder" towards the upper end of the overall distribution. A size distribution exhibiting positive skew may well indicate a small number of male specimens (or perhaps the inclusion of a few wild individuals – see below). Without independent information on the degree of dimorphism, it is very difficult to estimate relative frequency, although mixture analysis may help by fitting two (or more) normal distributions to the data as closely as possible (Monchot et al. 2005).

Where two groups emerge, these *may* represent males and females, although other factors such as the presence of wild and domestic populations (see below) may be responsible.

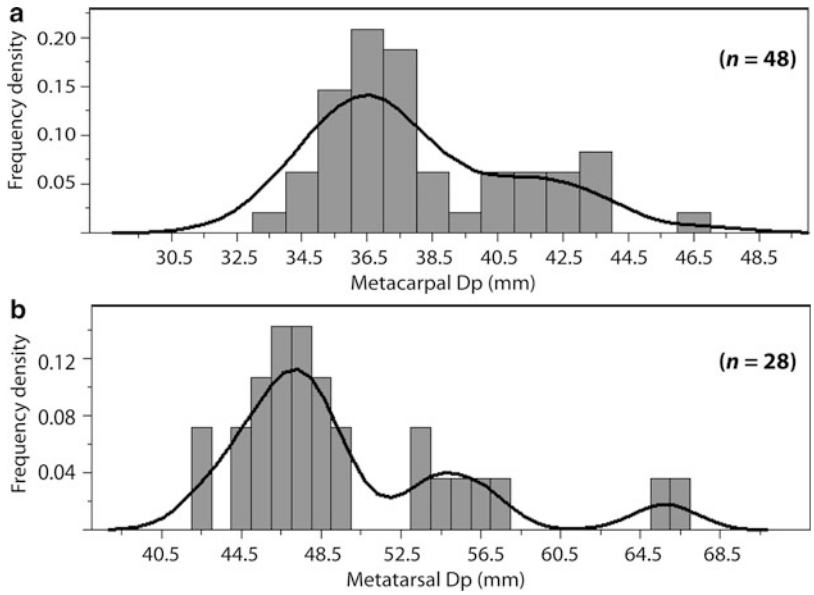

Biometry in Zooarchaeology, Fig. 4 Histograms of metacarpal (**a**) and metatarsal (**b**) proximal breadths for cattle (*Bos taurus*) from Neolithic Gomolava, Serbia, with overlaid kernel density estimates. The main groups *probably* represent domestic females and males, while the upper outliers may be wild specimens (After Orton 2008)

If a few specimens of known sex (based on nonmetric characters) are included in the dataset, then they can be used to help test the assumption that observed size clusters represent sex groups. An additional complication among domestic animals is the possibility of castration, effectively introducing a third sex group. The exact effect of castration varies depending on the technique and timing (Moran & O'Connor 1994), but as a rule-of-thumb castrates tend to have relatively long bones due to delayed epiphyseal fusion (Davis 2000, see also Popkin et al. 2012). This effect is visible for metacarpal length versus breadth in a study of known-sex Shetland sheep, but there is too much overlap between rams, ewes, and wethers (castrated males) for reliable application to archaeological specimens (Davis 2000).

Metric data are generally of more limited use for determining age at death, although taxa with continuous ("indeterminate") growth, notably fish, are an exception. On a fine scale, the size of young fish may even be used to make inferences regarding season of catch. In the case of mammals, however, growth more or less ceases in most elements by the point of epiphyseal fusion, and wide variation in growth rate (see e.g., Popkin et al. 2012) means that measurement of immature specimens is of little use for estimating age.

Metric data may nonetheless contribute to understanding of kill-off patterns of domestic stock at an assemblage level. For obvious reasons, size distributions are normally constructed only from mature specimens – indeed, many zooarchaeologists do not even measure immature bones – and hence represent only the (sub)adult fraction of a population. Since males are typically slaughtered younger than females in domestic herds, size distributions will be heavily biased towards female specimens. Where measurements are available for unfused or otherwise immature specimens, however, these are likely to be biased in the other direction – towards males. Counterintuitively, the unfused bones may thus actually be larger on average than their mature counterparts, especially for late-fusing elements. Comparing the size distributions of fused and unfused specimens element by element, from earlier to later fusing, can thus help to identify the timing of the main male cull (Fig. 5), although once again the presence of castrates would complicate matters.

Finally, the use of tooth measurements to estimate age at death should be mentioned. Since tooth crowns wear down over time, particularly among herbivores, the remaining height of the crown can theoretically be used to estimate the length of time for which the tooth has been in use and by extension the age of the animal

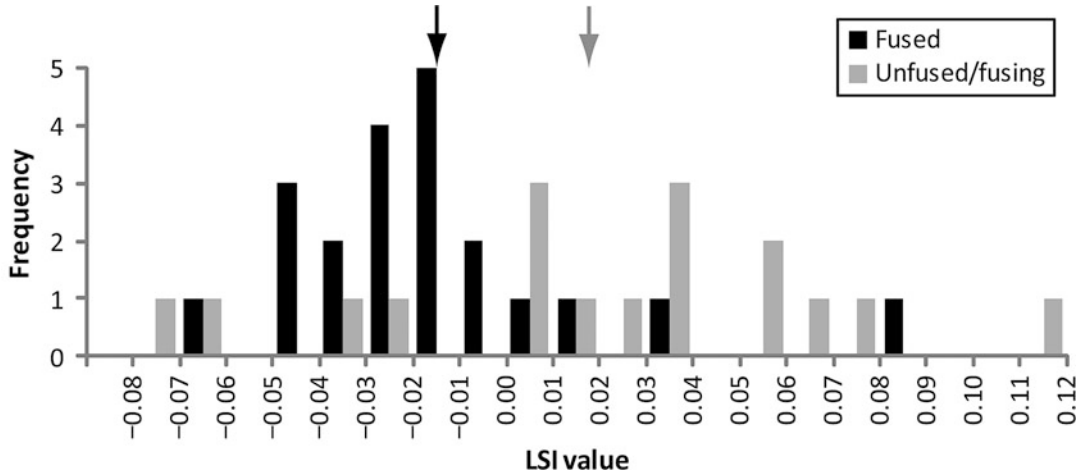

Biometry in Zooarchaeology, Fig. 5 Distribution of LSI values for distal metacarpals of sheep (*Ovis aries*) from Çatalhöyük West Mound, including both fused and unfused/fusing specimens. *Arrows* show mean values. The narrower range and smaller average size seen for mature specimens suggests that they are predominantly female and thus that most males were killed before fusion of the distal metacarpal (18–30 months according to Zeder 2006) (Author's own data)

(e.g., Klein & Cruz-Uribe 1983). Several variants on this "crown-height" approach have been developed, with a range of different measuring protocols and varying complexity in the formulae used to estimate age, but all suffer from several drawbacks – most notably inability to account for variation in the height of the unworn crown (see Twiss 2008).

Domestication

One of the most hotly debated applications of zooarchaeological biometry is to the detection of domestication and the distinction of wild and domestic specimens within an assemblage. Most species saw a rapid reduction in both size and dimorphism following domestication, thought to be due to the relaxation of certain selection pressures that applied within wild populations (Zohary et al. 1998). Biometry is thus one of the main lines of evidence that has been used to document the process of animal domestication, alongside changing age and sex structures, pathologies, and artifactual data.

Changes in morphology must necessarily have lagged behind the changes in human-animal interaction that represent domestication per se, but the speed with which size reduction manifested is hard to establish. Tracing size declines in a population over time will only ever provide a terminus ante quem for domestication in this sense, although the question of when domestication can be said to have occurred is in any case as much a theoretical as a practical one. Ideally, biometry should be complemented by assessment of changes in age and sex profiles, the latter being likely slightly to predate reduction in size.

Of course, domestication is only one possible cause of size decline: intensive selective hunting can depress the size of available prey over time, for example, while environmental changes may result in shifts in size distribution among wild populations without any human intervention. A stronger case that size decline represents domestication can be made where other species with similar habitats can be shown not to have undergone the same changes over the same time span (e.g., Arbuckle & Makarewicz 2009).

Once a domestic population of a species has been established, hunting of wild individuals may nonetheless continue. Separating wild and domestic individuals within a zooarchaeological assemblage – or at least estimating their relative abundance – presents a challenge analogous to that of distinguishing sex groups, but with the added complication that both wild and domestic populations will include male and female groups.

		Group 1	Group 2	Group 3
Bimodal	*a*	dom. ♀	dom. ♂	
	b	wild ♀	wild ♂	
	c	dom. ♀, ♂	wild ♀, ♂	
	d	dom. ♀, ♂, wild ♀	wild ♂	
Trimodal	*e*	dom. ♀	dom. ♂, wild ♀	wild ♂
	f	dom. ♀, ♂	wild ♀	wild ♂

Smaller ⟵ ⟶ **Larger**

Biometry in Zooarchaeology, Fig. 6 Potential interpretations of observed bi- or trimodal size distributions for a dimorphic species with wild and domestic forms. Options *a* to *f* are not exhaustive but represent some of the more likely interpretations (excluding the possibly of castrates)

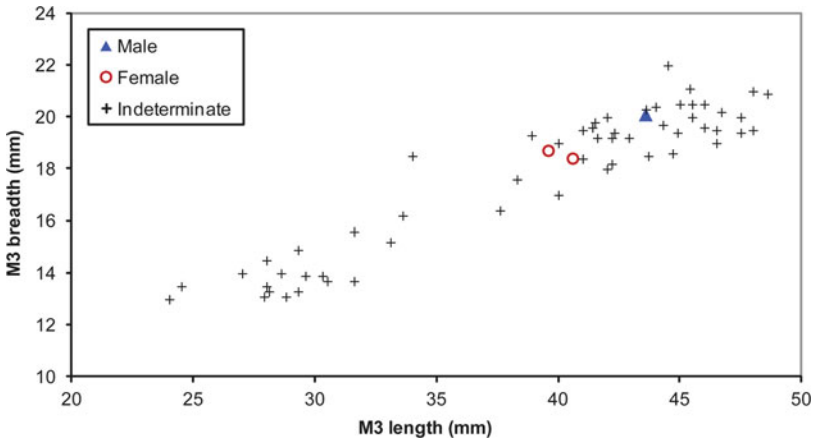

Biometry in Zooarchaeology, Fig. 7 Lower third molar measurements from pigs (*Sus scrofa*) at Neolithic Gomolava, Serbia, with sex highlighted where known (from canine morphology). The two clusters could represent either male and female or wild and domestic (options *a*/*b* or *c*, respectively, in Fig. 6), but the presence of both sexes in the upper cluster strongly supports the latter (after Orton 2008)

One cannot even assume that the offset between the sexes is the same in each population, since dimorphism is often much reduced in domestic herds (Zohary et al. 1998).

Where both wild and domestic populations of a dimorphic species are likely to be present in an assemblage, interpreting the size distribution can become quite complicated, with a trimodal distribution not uncommon (Figs. 4b; 6). Mixture analysis may again help to tease apart components within relatively large samples, but cannot entirely circumvent fundamental problems of equifinality: statistics may help to identify and quantify subgroups within a sample, but cannot reveal what they represent. Once again, the presence of a few known-sex specimens can help to choose between different interpretations of a bi- or trimodal size distribution (Fig. 7).

Cross-References

- ▶ Geometric Morphometrics and Environmental Archaeology
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ von den Driesch, Angela
- ▶ Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Biomolecular Archaeology: Definition

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Brief Definition of the Topic

Biomolecular archaeology, a subfield of archaeometry, is the study of ancient molecules (especially nucleic acids, proteins, lipids, and carbohydrates) produced by past living organisms, most often applied to identifying organic residues from archaeological sites and objects, recovering DNA from human tissues and skeletal remains, and studying genetic parameters of plant and animal domestication. Research seeks to understand the processes that result in the preservation of biomolecules as well as the ways in which biomolecules can be used to reconstruct

paleoenvironments and, more broadly, assess human biological and cultural evolution. Analytical techniques derive principally from chemistry (e.g., mass spectroscopy, isotope analysis), evolutionary biology (e.g., PCR), and proteomics (e.g., immunoassay, decoding genomes), among other sources. Recent texts by Gaines and colleagues (2008) and by Brown and Brown (2011) review the field and current applications.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Human Evolution: Molecular Timescale

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Bird, Junius

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Basic Biographical Information

Junius Bird was born in 1907 in Rye, New York, and from an early age was attracted to both archaeology and maritime adventures. As a young man, he participated in several expeditions to the Arctic Ocean, starting in 1927 when he joined Bartlett's Arctic expedition. He entered the field of archaeology without academic training, but his field knowledge and capacity led him to a post as a field assistant at the American Museum of Natural History in New York. From that base, he participated in numerous archaeological expeditions to different regions of the Americas, especially in Canada, the United States, and Central America, particularly in Panama, Peru, and Chile. In time, he became the museum's head curator of South American archaeology. In 1932, he visited Navarino Island, north of Cape Horn, where he spent several months surveying the entire north shore, excavating a shell midden at Puerto Pescado. It was there that he began the systematic application of stratigraphic principles to archaeological research, and he became convinced of the possibilities for archaeological discoveries in Patagonia and Tierra del Fuego.

In 1934, Bird and his wife, Peggy, departed to South Chile for a period of two and half years to survey its channels. There, they explored the maze of southwestern channels by sailing for six months in a 19-foot sailboat. This was a dangerous trip through a sparsely populated and almost unknown area characterized by heavy rainfall and continuous storms. The trip was successful due to the discovery of many sites, mostly shell middens, and opened up a whole new region for archaeological research (Martinic 1984). Following this trip, Bird began

the archaeological exploration of the Patagonian steppes, discovering important sites in Cañadón Leona and Pali Aike.

Major Accomplishments

Bird was the definitive fieldman, with the capacity to produce good results with minimal equipment. He was famous for traveling the dirt roads of the Patagonian steppes in a Model T Ford. He constructed his own dump sifters, perfecting them over time. During his coastal trips, he discovered shell middens in many places, some of which he placed chronologically by making meticulous geological observations. It must also be noted that Bird made several relevant and astute taphonomic observations about the process of accumulation of bones in caves. He was a keen observer of what we now call formation processes.

As a result of these trips, particularly those to South Chile, Bird discovered some of the earliest evidence of the presence of humans in the Americas. He discovered in the Pali Aike Volcanic Field some of the sites that would become classic references when discussing human interaction with extinct Pleistocene fauna in the Americas. Both at Pali Aike and the Fell Caves, he was able to recover ground sloth (*Mylodon darwinii*) and horse (*Hippidion saldiasi*) bones as well as abundant camelid (*Lama* sp.) bones associated with hearths and lithic and bone artifacts. The lithics discovered include the world-famous "fishtail" projectile points, a marker of the earliest Americans.

Junius Bird's interest in Patagonia continued until the end of his life. He returned several times to collect samples for specific analyses. For example, he was among the first archaeologists to use Willard Libby's discovery of the radiocarbon dating technique to date human occupations, and using this technique, he was able to place human arrival in southern South America at around 11,000 years BP. This is more or less the oldest age that can be defended today, some sixty years later, for the first human peopling. He also returned to excavate new sites. His last field work in Patagonia took place in 1980, when he excavated the Tom Gould site, a rich open-air site in Pali Aike (Massone 1989-1990).

Bird's publications constitute classic references not only for the archaeology of the early peopling of America (i.e., Bird 1938, 1946, 1988) but also for the history of human occupation at different places along the Pacific coasts of South America.

One important result of Bird's studies is that he constructed a cultural and chronological scheme for Patagonia that is still in use today (Martin et al. 2011). However, it must be emphasized that he never restricted the scope of his interest to Patagonia, and his excavations in North Chile and North Peru rank among the most important archaeological antecedents for modern archaeology in South America.

After a long and productive life, Junius Bird died in New York in 1982. The people who knew him noted his enthusiasm and skills in the field, as well as the clarity of his research goals. Junius Bird's great contributions to our present understanding of Patagonian archaeology cannot be exaggerated.

Cross-References

- ▶ Glacial Landscapes: Environmental Archaeology
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia

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Black, Davidson

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Basic Biographical Information

Davidson Black, FRS, was born on July 25, 1884, in Toronto, Ontario, Canada, and died on March 15, 1934, in Beijing, China. As a Canadian-trained anatomist and medical doctor, he was best known for his anatomical descriptions and naming of a new fossil human species, *Sinanthropus pekinensis*. Unlike most foreigners, Black got along extremely well with his Chinese colleagues as he treated them as equals and involved them in decision-making. He was known as 步達生 (pinyin: Bù Dáshēng) in China.

His father died when Dyo (as he was known by his family) was 2 years old and was brought up by his mother and uncles. Many summers were spent in the Kawartha Lakes region of southern Ontario, and when he was old enough for employment, he worked as a biological field assistant and a voyageur/fire ranger in forested regions of northern Ontario and later as a mining engineer for the Geological Survey of Canada on Vancouver Island. During these jobs, he got to know his First Nations' friends and was given the name "Mushkemush Kemit" (thought to be an Ojibwe phrase meaning "fast through the forest"). Like his father, he had a fragile heart, further weakened during a bout of rheumatic fever during his mid-teens. He eventually died at the height of his anthropological career at age 49 of congenital heart failure.

Starting in 1903 he studied at the University of Toronto, where he graduated with his Bachelor's degree in Medicine in 1906. He promptly returned to the University to complete his Arts degree, but with a delay in completing language requirements, he formally graduated in 1911. Before convocating, in 1909 he took a full-time teaching position in Anatomy at Western Reserve University in Cleveland, and during one of his visits to his Toronto home, he met Adena Nevitt, his future wife. Adena (second daughter of Richard Barrington Nevitt, a prominent Toronto physician who was a medical doctor for the Northwest Mounted Police) and Davidson married in December 1913. They had two children, a son Davidson (b. 1921) and daughter Nevitt (b. 1925). It was Black's close Anthropology colleague Wingate Todd who recommended that Black travel to England to work with well-respected neuroanatomist (Sir) Grafton Elliot Smith. Black followed Todd's advice during a sabbatical in 1914 when he visited Elliot Smith at his University of Manchester laboratory just as Elliot Smith was pondering the newly discovered Piltdown fossil puzzle. This visit was Davidson Black's first introduction to Anthropology, which fired his scientific imagination! Eventually returning to Cleveland (and with his new contacts in England including Woodward Smith and (Sir) Arthur Keith), Black set about to build anthropological teaching collections. Through this work, Black was introduced to American Henry Fairfield Osborn and the work of fellow Canadian William Diller Matthew, both of whom were intrigued by the potential of Asia as a fossil-hunting ground. Matthew's 1915 writings convinced Black that Asia was central to the search for primate ancestors.

In 1917 (after three attempts to join the war effort, because of his weak heart), Black joined the Canadian Medical Corps and was based at a military camp in southern England. During this overseas experience, unknown to Black, his medical passions were being discussed by members of the American Rockefeller Foundation,

an agency that had initiated plans for a "Johns Hopkins" of the East. Black was being considered for the position of Neurology/Embryology professor at the newly conceived Peking Union Medical College, in Beijing, China. This invitation was Black's chance to now fully dedicate himself to the questions of Asian prehistory. In September 1919, Adena and Davidson Black arrived in China.

Major Accomplishments

Davidson Black is often identified as "discoverer" of Peking Man or *Homo erectus* from China. He did not discover these fossil human remains but instead initially recognized three teeth as belonging to a human ancestor that had not been identified previously. In 1927, Black published a monograph in which he named this species – *Sinanthropus pekinensis*.

Black was keen to search for human ancestors in Asia but had to concentrate on his professorial duties. Initially he published scientific analysis of human remains found by his Swedish colleague J.G. Andersson who worked for the Geological Survey of China. In 1926 Black learned of two fossil teeth found near Zhoukoudian (Dragon Bone Hill) village southwest of Beijing. He recognized these two teeth as human and arranged for Rockefeller Foundation funding for systematic excavations starting in 1927. Upon finding a third tooth, in situ, Black was confident in identifying the first-ever fossil human remains from China. By now the College recognized Black's dedication to Anthropology and also the key role that the PUMC along with the Geological Survey/Society of China might make to the human sciences, and Black was allowed to focus his energies on research. Black was central in the creation of a "union" between the GSC and PUMC that became a human origins facility known as the Cenozoic Research Laboratory. Annual excavations by teams of young men and boys resulted in the discovery of numerous teeth and jaw fragments and in 1929 the first evidence of a "complete" human cranium (Skull III) from the site by Pei Wenzhong. Black's responsibility was describing and analyzing these human finds; his papers were published by the GSC and in a journal called *Palaeontologia Sinica*. Davidson Black was the voice for *Sinanthropus* as he travelled to conferences in southern Asia, North America, and throughout Europe, illustrating replica examples and visual images (photographs and drawings) of these fossils to his scientific associates.

Black received numerous honors including:

- Grabau Medal, Geological Society of China in 1929
- Honorary D.Sc., University of Toronto in 1930
- King Gold Medal, Peking Society of Natural History
- Fellow of the Royal Society in 1932 for work on *Sinanthropus* (Croonian Lecture entitled *The Discovery of Sinanthropus*)
- Daniel Giraud Elliot Medal for work on Peking Man from US National Academy of Sciences awarded for 1931, conferred posthumously in 1934
- Recognition of his work in human origins with the species name *Gigantopithecus* "*blacki*"

Cross-References

- ▶ Peking Man
- ▶ Weidenreich, Franz
- ▶ Zhoukoudian, Archaeology of
- ▶ Zhoukoudian: Geography and Culture

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Blombos Cave: The Middle Stone Age Levels

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Introduction

Blombos Cave, an archaeological site situated on the southern Cape coastline, South Africa, contains Middle Stone Age (MSA) deposits dated at between c. 130 and 72 ka (ka = 1,000 years ago), possibly the most important period in the early development of modern human behavior. Since 1992 each excavation season at the site has yielded important new information on the behavioral evolution of *Homo sapiens*. This includes, at c. 75 ka, among the earliest known evidence for the manufacture of personal ornaments on shell beads, formal bone tool production, engraving of abstract designs on ochre and bone, the deliberate heating of silcrete, a lithic raw material, and the subsequent manufacture of bifacial stone points on this material using pressure flaking. In the 100 ka levels, a complex toolkit was uncovered that provides the oldest known evidence for the use of containers and for the production of an ochre-rich pigment or paint. These findings from Blombos Cave and subsequent reanalysis and excavation of other contemporary sites have resulted in a paradigm shift with regard to our understanding of the timing and location of the development of modern human behavior.

Definition

In tandem with the anatomical evolution of modern *H. sapiens* in Africa after 200 ka was the increasing capacity for symbolically driven behavior. Exactly when or how this capacity first translates into material culture that carried symbolic meaning is unclear. Innovative material culture recovered from Blombos Cave provides a clear signal that by 100 ka human behavior was mediated by symbols. This evidence is likely only one part of a behavioral mosaic, a "wind of change" throughout the African Middle Stone Age that culminated in the diasporas at c. 60–80 ka – a series of human expansions from Africa that first introduced fully symbolic *sapiens* behavior to Eurasia and the rest of the world.

Key Issues/Current Debates/Future Directions/Examples

A major research challenge in archaeology is identifying when and how symbols were used for the first time to mediate hominin behavior. Once in place this innovation provided an ability to share, store, and transmit coded information and played a crucial role in creating the social conventions and identities that now characterize human societies. Over the last decade, the Blombos Cave (BBC) results have challenged long-held beliefs that the origins of behavioral modernity and the first use of symbolic material culture lay in Europe and commenced about 40,000 years ago. The focus for modern human behavioral origins has since switched to Africa and now generates lively debate, worldwide. Further analyses of the BBC materials and ongoing excavations at the site continue to contribute to this debate. A new dimension, paleoclimatic reconstruction, has been added to this research paradigm and suggests that the variable climates that characterized the Late

Blombos Cave: The Middle Stone Age Levels, Fig. 1 Blombos Cave site entrance

Pleistocene had a major effect on the continuity of key cultural innovations. The adaptive responses of *Homo* to changing climates are however poorly understood; researching the role of climate in shaping the cognitive evolution of *H. sapiens* is therefore a priority. It is expected that existing and future results from BBC and other nearby sites will provide important information for understanding the development of human behavior within the context of climatic variability in the southern African Late Pleistocene.

Description of Blombos Cave

Blombos Cave lies 300 km east of Cape Town and is situated in a steep wave-cut calcrete cliff, 100 m from the Indian Ocean and 34.5 m above modern sea level (34°25′S, 21°13′E) (Figs. 1, and 2). It is set into the calcified sediments of the Tertiary Wankoe Formation, and the calcareous environment is at least partially responsible for the good preservation of the recovered deposits (Henshilwood et al. 2001b).

Stratigraphy and Ages

The earliest Later Stone Age (LSA) occupation is c. 2 ka. The MSA levels are divided into four phases comprising a number of discrete layers within each phase (Fig. 3). These phases are named M1, upper M2, lower M2, and M3.

A hiatus level composed of undisturbed aeolian sand above the M1 phase, DUN (Fig. 3), is dated to c. 70 ka. This layer of sand sealed the mouth of the cave and it reopened after the mid-Holocene high sea level stand at c. 4–3 ka. The upper part of the M1 phase dates to c. 73 ka and the upper M2 phase to c. 75 ka. The lower M2 phase layers date to c. 85 ka. The M3 phase dates to c. 100–94 ka and the ages of the lower levels, below level CQ hiatus, are currently being determined. The majority of dates were determined using optically stimulated luminescence (OSL) (Jacobs et al. 2006), but other methods, such as thermoluminescence (TL) (Tribolo et al. 2006) and uranium-thorium (U/Th) (Henshilwood et al. 2011), have also been employed.

Material Culture: M1 and Upper M2 Phases (Still Bay c. 75–72 ka)

The M1 and upper M2 phases fall within the Still Bay complex. Artifacts from these phases include bifacial stone points, bone tools, marine shell beads, and engraved ochre (Fig. 4).

Blombos Cave: The Middle Stone Age Levels, Fig. 2 Interior of Blombos Cave (Image: Magnus Haaland)

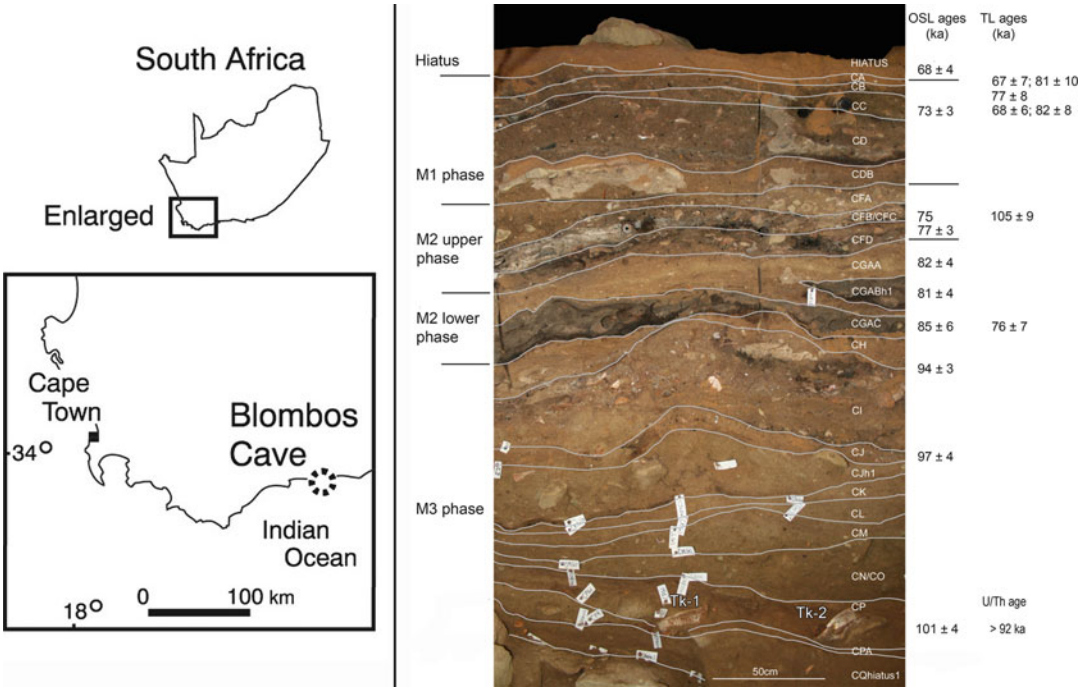

Blombos Cave: The Middle Stone Age Levels, Fig. 3 Location of Blombos Cave showing west section of the excavation. M1, upper and lower M2, and M3 are occupation phases within the Middle Stone Age levels. The ages of each phase are shown at right (*OSL* optically stimulated luminescence, *TL* thermoluminescence, ka = 1,000 years, U/Th = uranium/thorium)

Bifacial Points (Fig. 4a): Still Bay points, or "leaf-shaped" points, are a distinct type restricted to the Still Bay techno-tradition of southern Africa. Henshilwood et al. (2001b: 429) state "We propose 'Still Bay sub-stage' as a regional, culture-stratigraphic term for assemblages with fully bifacially flaked, lanceolate shaped points." The bifacial points from BBC are made from

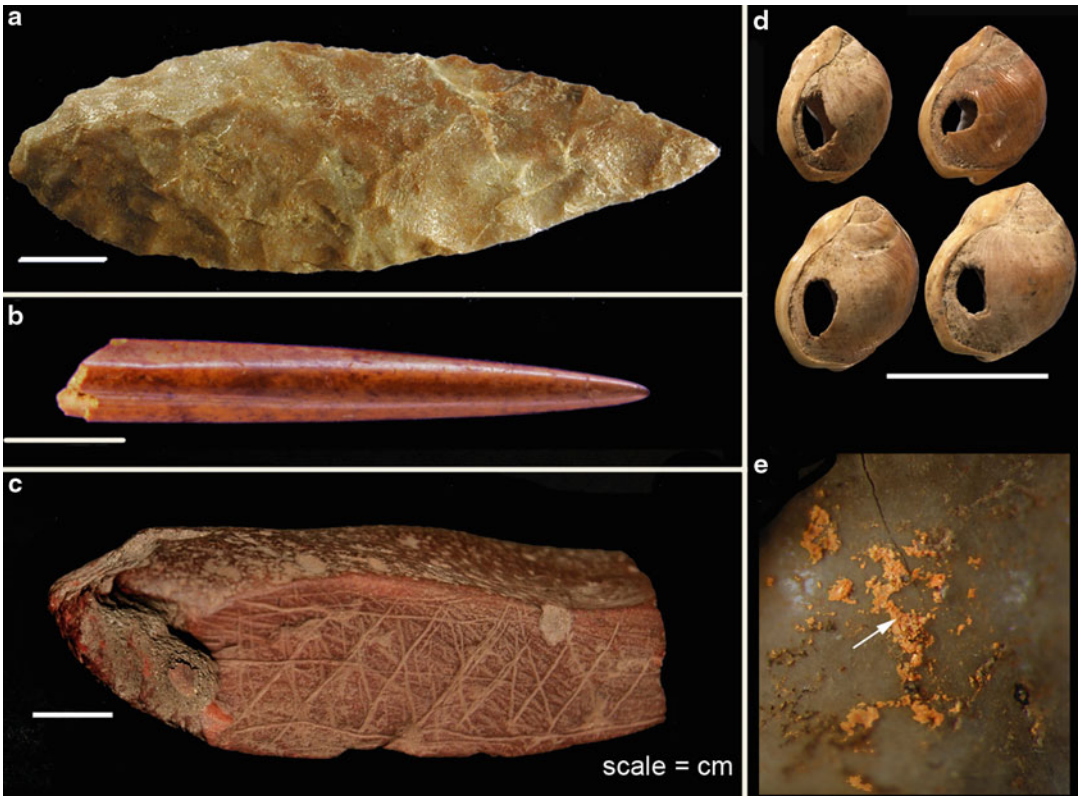

Blombos Cave: The Middle Stone Age Levels, Fig. 4 Artifacts from the Still Bay levels at Blombos Cave: (**a**) silcrete bifacial point, (**b**) formal bone tool, (**c**) engraved ochre SAM (AA-8938), (**d**) Nassarius kraussianus shell beads, and (**e**) ochre deposit on a shell bead (Images by C. Henshilwood & F. d'Errico)

silcrete, quartzite, and quartz. A macrofracture study of these points shows that some were used as spear points for hunting but that others probably served also as multifunctional tools (Lombard 2007). Approximately half of the silcrete points were heat treated and then finished using the pressure flaking technique (Mourre et al. 2010).

Bone Tools (Fig. 4b): Bone tools are an unexpected technological innovation in the Still Bay at BBC. Regarded as a distinctive marker in the Eurasian transition to modern cognitive behavior, they are rare at MSA sites. More than thirty formal bone artifacts have been recovered from the Still Bay levels at BBC (Henshilwood et al. 2001a; d'Errico & Henshilwood 2007). The majority are awls made on long-bone shaft fragments, further manufactured by scraping and then used to pierce soft material such as leather, or small shells to make beads (d'Errico et al. 2005). At least some bone tools that were carefully polished after being shaped by scraping are probably projectile points made for hafting. It is noteworthy that points are treated differently to awls. The high polish on these points has no apparent function that can be detected but seems rather a technique that gives a distinctive appearance – an "added value" – to these artifacts. These may have formed part of a material culture exchange system among groups to maintain or even enhance social relations. The BBC bone tools provide comprehensive evidence for systematic bone tool manufacture and use, but we cannot be certain if this was also the case at other Still Bay sites. A note of caution is that we are not certain that the production of worked bone gives a modern character to all MSA material culture since little is known about the evolutionary significance of bone shaping (Henshilwood & Marean 2003). Symbolic

marking on bone is a likely feature that supports a symbolic interpretation. Microscopic analysis of a bone fragment marked with eight parallel lines from the Still Bay levels at BBC indicates they are the result of deliberate engraving and were possibly made with symbolic intent (d'Errico et al. 2001).

Engraved Ochres (Fig. 4c): Red ochre is a hydrated iron oxide with sufficient hematite (Fe^2O^3) content to be used as pigment. At BBC more than 2,000 pieces of ochre, many bearing signs of utilization, have been recovered from the Still Bay phases. During excavations in 1999 and 2000, two ochre pieces with deliberately engraved cross-hatched patterns AA-8937 (Fig. 4c) and AA-8938 were discovered from the M1 phase (Henshilwood et al. 2002). Two ground facets are present on specimen AA-8937, and on the larger of these, the cross-hatched design is engraved. It is clear that the design results from deliberate intent and it is arguably among the most complex and clearly formed of objects claimed to be early abstract representations (d'Errico et al. 2003). Six additional engraved ochre pieces from the Still Bay phases have subsequently been recovered (Henshilwood et al. 2009).

Marine Shell Beads (Fig. 4d, e): A strong argument for early behavioral modernity in the Upper Paleolithic is the presence of personal ornaments. The discovery of more than 65 *Nassarius kraussianus* ("tick shell") beads in the Still Bay phases at BBC has added a new dimension to the modern human behavior debates (Henshilwood et al. 2004; d'Errico et al. 2005). All the recovered "tick" shells were carefully pierced using a bone tool to create a keyhole perforation. These were then strung, perhaps on cord or sinew and worn as a personal ornament. Repeated rubbing of the beads against one another and against the cord resulted in discrete use-wear facets on each bead that are not observed on these shells in their natural environment. These use-wear patterns are the principal factor that defines the shells as beads. Microscopic residues of ochre occur inside some of the beads and result from deliberate coloring or by transfer when worn.

The wearing and display of personal ornaments during the Still Bay phase was not idiosyncratic. Discrete groups of beads with wear patterns and coloring specific to that group were recovered from various levels and squares within the site. This patterning suggests that at least a number of individuals may have worn beads, perhaps on their person or attached to clothing or other artifacts. The shell beads also provide insights into technological aspects of the Still Bay including the ability to drill, the use of cord or gut for threading, and the probable tying of knots to secure the beads. A comprehension of self-awareness or self-recognition is implied by the wearing of beads or other personal ornaments and was likely an important factor in cognitive evolution that was selected for long before the introduction of beads. Further, syntactical language would have been essential for the sharing and transmission of the symbolic meaning of personal ornaments within and between groups and also over generations, as is also suggested for the engraved ochre pieces.

Material Culture: Lower M2 Phase (c. 85 ka)

Bone tools, bifacial points, and shell beads are absent from the lower M2 phase. The intensity of the cultural deposits is low in this phase but includes a few basin hearths; a very large hearth in layer CGAC; small quantities of blades, flakes, and cores in silcrete, quartz, and quartzite; and some small ochre pieces. Some of the ochre pieces are ground or scraped but none have deliberate engravings. A detailed analysis of these artifacts is currently underway and the overall impression is that human occupations in the M2 phase were of short duration and possibly that the size of the groups was also limited.

Material Culture: M3 Phase (c. 100–94 ka)

In this lower phase, lithics are abundant and silcrete is the dominant raw material. Retouch on the lithics is mostly informal and a higher incidence of ventral flaking and denticulate or notched edges distinguish them from those in the upper phases. The M3 lithics are currently under study. No bone tools have been recovered.

Modified ochre is common in this phase and eight slabs deliberately engraved with either

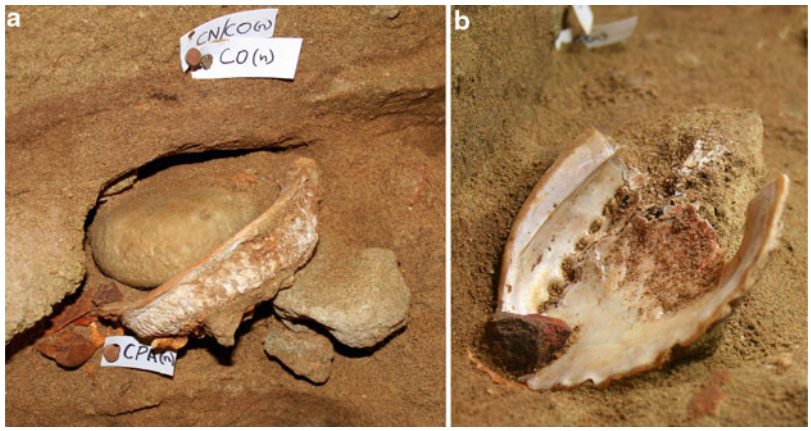

Blombos Cave: The Middle Stone Age Levels, Fig. 5 Ochre-processing toolkits in situ showing toolkit 1 (Tk1) (**a**) and toolkit 2 (Tk2) (**b**) (Images Grethe Moéll Pedersen)

cross-hatched, Y-shaped, or crenulated designs were recovered (Henshilwood et al. 2009). This indicates a tradition for the production of geometric engraved representation in the MSA at BBC with roots that go back in time to at least 100 ka and which includes the production of a number of different patterns.The findings support the view that the use of ochre during the MSA at BBC was not only functional but that it also served, perhaps primarily, in a symbolic role. In a wider context, this was also likely the case at other MSA sites in the southern Cape. Incised ochre pieces recovered from these latter sites also fall within the definition of engraved representations and demonstrate that there was a spatial and temporal continuity in the production and use of symbols in the region. The intra-site similarity of the abstract designs and methods used for the motifs at BBC and on regional intra-site level during the MSA is consistent with the continuity found in more recent symbolic systems that have been globally described for the Later Pleistocene and early Holocene.

Ochre-Processing Workshop, M3 phase (Fig. 5): In 2008 an ochre-processing workshop consisting of two toolkits was uncovered in the 100,000-year-old levels at Blombos Cave, South Africa. Analysis shows that a liquefied pigment-rich mixture was produced and stored in two *Haliotis midae* (abalone) shells and that ochre, bone, charcoal, grindstones, and hammerstones formed a composite part of the toolkits.

As both toolkits were left in situ and as there are few other archaeological remains in the same layer, it seems the site was used primarily as a workshop and was abandoned shortly after the compounds were made. Dune sand then blew into the cave from the outside, encapsulated the toolkits, and by happenstance ensured their preservation before the next occupants arrived, possibly several decades or centuries later.

Recent support for a southern African origin for *H. sapiens* comes from genomic and phenomic diversity studies. The recovery of these toolkits at Blombos Cave adds evidence for early technological and behavioral developments associated with *H. sapiens* to this scenario. It documents the first known instance for the deliberate planning, production, and curation of a pigmented compound and for the use of a container. Evidence for the complexity of the task includes procuring and combining raw materials from various sources (implying they had a mental template of the process they would follow), possibly using pyrotechnology to facilitate fat extraction from bone, using a probable recipe to produce the compound, and the use of shell containers for mixing and storage for later use. An elementary knowledge of chemistry and the ability for long-term planning suggest conceptual and cognitive abilities previously unknown for this time and serve as a benchmark during the early evolution of the technological and cognitive abilities of *H. sapiens* in southern Africa (Henshilwood et al. 2011).

Subsistence in the MSA Levels

The faunal collection from Blombos shows that MSA people practiced a subsistence strategy that

included a very broad range of animals. This means they were able to hunt large animals, such as eland, but also gathered, collected, or trapped small animals such as tortoises, hyraxes, and dune mole rats. They also brought seal, dolphin, and probably whale meat back to the cave. The latter two were almost certainly scavenged from beach washups, but seals may have been speared or clubbed.

The shellfish provide early evidence for the use of seafoods. Shellfish were collected and brought back to the cave, and the M3 phase, with an age of c. 100 ka, is a particularly rich shell midden. Common species include the giant periwinkle (*Turbo sarmaticus*), limpets (Patella sp.), and brown mussels (*Perna perna*). Species variations may, with larger sample sizes, inform us of past changes in ocean paleotemperatures.

Fish remains are present, but not abundant, in all phases at BBC. Fish remains are more abundant in the LSA, but a wider range of species are present in the MSA. Chemical analysis of fish bone from the LSA and MSA levels using the carbon/nitrogen method confirms the antiquity of the MSA specimens. Most of the species present are not known to wash up after cold-water upwelling events; hence, scavenging of washups was not the primary source of fish. No artifacts that appear to be obvious fishing equipment have been found, but the range and sizes of species present indicate that a number of methods must have been employed. These include baited hooks, spearing, and tidal traps. Comparison of the elements from the same species that have survived in the MSA relative to the LSA at BBC has shown a large deficit in the MSA – in other words, age-related taphonomic processes have resulted in the loss of many fish bones, and there were likely many more fish deposited in the MSA than we can currently see. Fish are seldom reported from other southern African MSA sites, and by implication, it was thought that MSA people were incapable of exploiting coastal resources efficiently. The evidence for fishing at BBC and Klasies River contradicts this theory (Van Niekerk 2011).

The overall subsistence pattern at BBC signifies that no clear distinction can be made between Later Stone Age and Middle Stone Age subsistence behavior at the site (Henshilwood et al. 2001b; Henshilwood 2008). The implication is that during the MSA occupations, the subsistence mode was essentially modern.

Human Remains

The amount of human material recovered from the Blombos MSA is small – seven teeth (Grine et al. 2000; Grine & Henshilwood 2002). The crown diameters of at least some of these teeth suggest that the people at Blombos were probably anatomically modern. This conclusion is supported by similar evidence from a nearby archaeological site, Klasies River, that dates to a similar time period.

Summary

The origins of "modern" human behavior generate lively debate, worldwide, but an African evidence for its origins has long remained elusive. Published results from the Blombos Cave excavations complement recent and older findings from a number of African MSA sites that suggest some aspects of "modern behavior" evolved during the early Late Pleistocene in Africa. The discoveries at Blombos clearly reflects the acquisition of fully modern cognitive abilities by southern African populations by at least 100,000 years.

Cross-References

- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Fossil Records of Early Modern Humans
- ▶ Hominids, Earliest African
- ▶ Out-of-Africa Origins
- ▶ Pinnacle Point: Excavation and Survey Methods

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Blue Shield

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Introduction

The last quarter century has been a particularly traumatic period for cultural heritage exposed to

damage by armed conflicts and natural disasters. Armed conflicts can be international or internal in nature, often causing humanitarian casualties as well as damage to cultural heritage. The damage is often deliberate, as in looting of sites and collections or the destruction of cultural heritage as a part of ethnic strife. Bosnia, Kosovo, Afghanistan, Iraq, Georgia, Egypt – these are just a few of the countries which have seen damage done to their heritage in recent years. Natural disasters were even more numerous in this period and were often more deadly and destructive than armed conflicts.

Since 2005, the International Council of Museums Disaster Relief Task Force (ICOM DRTF) has monitored at least 27 natural disasters affecting cultural property (taken from unpublished email correspondence between ICOM-DRTF members.) These include the Indian Ocean tsunami, the Haiti earthquake, and the Japan earthquake/tsunami/Fukushima nuclear meltdown, among many others. Natural disasters and armed conflicts are obviously here to stay and, in fact, may increase with global climate change and political instability. The Blue Shield may offer some hope to prevent or mitigate damage to cultural property in future disasters through networking, monitoring, and emergency planning and response.

Definition

The Blue Shield is an overarching term describing a group of organizations whose goal is to promote the protection of cultural property in the event of armed conflict and natural disasters. These are divided into the International Committee of the Blue Shield (ICBS) and its member organizations, the Blue Shield National Committees (BSNCs) and their individual and organizational members, and the Association of National Committees of the Blue Shield (ANCBS). The Blue Shield organizational structure is loosely based on the Red Cross model, which includes the International Committee of the Red Cross (ICRC), the various Red Cross committees in each individual country (such as the American Red Cross), and the International Federation of the Red Cross (IFRC), which helps coordinate the activities of the national committees. The Blue Shield is sometimes referred to as "the Red Cross for culture."

Historical Background

A follow-up to the 1899 and 1907 Hague Conventions (both setting forth rules of war), the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict is the first international treaty dealing exclusively with cultural heritage during war. Drafted in response to the damage and looting of cultural heritage during World War II, the 1954 Hague Convention deals primarily with conflicts between nations and describes each nation's responsibilities toward cultural heritage (1954 Hague Convention, Chapter 1). Basically, these include planning during peacetime for the protection of each nation's domestic cultural property should an armed conflict occur and to safeguard and respect the cultural property of other States Parties with whom they are in armed conflict. The treaty also describes the protective symbol of the Blue Shield and the terms of its use to designate protected cultural property and personnel (Fig. 1).

The 1954 Hague Convention was violated repeatedly during the Bosnian conflict (1992–1996), with evidence that some military forces deliberately destroyed cultural sites bearing the blue shield, the international symbol for the protection of cultural property during armed conflict. This included the destruction of multiple mosques, minarets, churches, and other religious institutions, along with the infamous shelling of the historic city of Dubrovnik and the Stari Most Bridge. Several individuals have been charged with war crimes under the United National International Criminal Tribunal for the former Yugoslavia.

The situation in Bosnia initiated a discussion within the international cultural property community about how to better support the 1954 Hague Convention. The International Committee of the

Blue Shield, Fig. 1 Blue Shield symbol used to mark the archaeological site at Tikal in Guatemala. Photo courtesy David Mitchell

Blue Shield was founded in 1996 and is headquartered in Paris, also the home of UNESCO, which administers the Hague Convention treaty. In addition, a Second Protocol to the Hague Convention was drafted in April 1999 and came into force in 2004. Its purpose is to strengthen the main convention by including more specific language about punishing violations.

Key Issues/Current Debates

International Committee of the Blue Shield (ICBS)

ICBS consists of the International Council on Archives, the International Council of Museums (ICOM), the International Council on Monuments and Sites (ICOMOS), the International Federation of Library Associations (IFLA), and the Coordinating Council of Audiovisual Archives Associations (CCAAA). Its board is made up of the five directors general of these organizations with a rotating presidency. While ICBS does not have a permanent office or staff, the staffs of these individual organizations coordinate and carry out the daily activities of the ICBS.

The mission of ICBS is to "work for the protection of the world cultural heritage by coordinating preparations to meet and respond to emergency situations as well as post-crisis support" (http://icom.museum/what-we-do/programmes/museums-emergency-programme/international-committee-of-the-blue-shield.html). The Second Protocol to the 1954 Hague Convention mentions ICBS and recognizes its role as an advisory body to international organizations such to the intergovernmental Committee for the Protection of Cultural Property in the Event of Armed Conflict at UNESCO and the International Criminal Court.

National Committees of the Blue Shield

Blue Shield national committees (BSNCs) strive to mirror the structure of the ICBS as closely as possible by including the national equivalent cultural organizations. For example, the International Council of Museums–USA is a founding member of the US Committee of the Blue Shield and represents the interests of museum professionals interested in implementing the 1954 Hague Convention here in the USA.

Each BSNC must apply for and receive official recognition from the ICBS; however, there is a great deal of flexibility from country to country. In some countries, the BSNC is a function of the Ministry of Culture or some

other government body; in others it may be formed by other NGOs or organizational members, and in still others, such as the US, it may be a nonprofit organization with both individual and institutional members.

There are now more than 20 BSNCs, with many more under construction. Their primary mission is to promote implementation of the 1954 Hague Convention in their individual countries. The treaty is essentially a legal agreement between nations, and the BSNC members, as citizens of their respective nations, can influence political leaders, coordinate and train their militaries, and generally raise public awareness. In addition, BSNCs have a responsibility to raise awareness about the importance of domestic emergency preparedness and response for culture, both within their own countries as well as to help colleagues abroad. This may take place either as part of their own national humanitarian response or as part of the Blue Shield network. (see www.uscbs.org for an example of a BSNC).

An emerging function of BSNCs may be an active role in raising military awareness about protecting sites during armed conflict. Prior to the 2011 NATO "No-Fly Zone" in Libya, the US Committee of the Blue Shield worked with archaeologists and other NGOs within the Blue Shield network such as ICOM, ICOMOS, and the Archaeological Institute of America, to produce a list of coordinates of important Libyan cultural sites. USCBS then shared this information with the US Department of Defense prior to the initiation of the no-fly zone, resulting in minimal damage to cultural sites during the NATO bombing.

Association of National Committees of the Blue Shield (ANCBS)

ANCBS was formed by a group of BSNCs and the ICBS by the 2008 Hague Accord to better coordinate the efforts of BSNCs, particularly with regard to emergency response (www.ancbs.org). The founding of ANCBS came in part from the feeling among cultural heritage professionals that there was not a timely or effective international response to the looting of the Iraq National Museum in 2003 and that BSNCs could better coordinate an emergency response in such situations. It also seemed natural that the National Committees have their own organizational structure for mutual coordination.

The ANCBS board consists of members (mostly the presidents or chairs) of various BSNCs and is based in The Hague, which in addition to being the home of the 1954 Hague Convention is also deemed the "international city of peace and justice" because it is home to the International Criminal Court. The board meets regularly in The Hague and in other cities around the world, as well as with the ICBS board in Paris.

Current Debates

One roadblock to the success of the Blue Shield is the perception that it is wrong to worry about saving culture during natural disasters and armed conflicts. While humanitarian assistance must always come first, a response for cultural property often comes too late or does not come at all. Up until recently, it has also been left out of emergency planning and response. This is changing slowly and is an area where BSNCs can make a real difference by raising awareness in their respective countries. One recent example is the US Committee of the Blue Shield's organizing a partnership with a number of US NGOs and government organizations after the 2010 Haitian earthquake. As a result, a very small percentage of the total US government humanitarian aid package for Haiti was set aside for culture, resulting in the Smithsonian Haiti Cultural Recovery project (www.haiti.si.edu).

Future Directions

As more BSNCs develop and ICBS becomes better staffed and funded, Blue Shield will become a more effective advocate for implementation of the 1954 Hague Convention and for emergency response for cultural heritage. Better preparedness and increased awareness among the population, governments, and military leaders will hopefully lead to a decrease in the loss to our shared cultural heritage worldwide.

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)

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Bobrinsky, Alexander A.

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Basic Biographical Information

Alexander Afanasievich Bobrinsky (1930–2010) (Fig. 1) was an outstanding Soviet and Russian researcher of ceramics and ancient pottery production. From 1952 until 1956, Bobrinsky was a student of the History Department at the Lenin Moscow State Pedagogical Institute, and during 1959–1962, he was a postgraduate in archaeology in Lomonosov Moscow State University under the scientific leadership of corresponding member of Russian Academy of Sciences, Artemiy V. Artsihovsky. In 1962, Bobrinsky successfully finished a thesis titled *Pottery Wheels of Eastern Europe in 9-13th Centuries AD*, and in 1979, he completed his doctor of history thesis, *Pottery Production in Eastern Europe. Sources and Methods of Study*. From 1963 until 2010, he worked as a leader of the History and Ceramics Laboratory at the Institute of Archaeology Russian Academy of Sciences.

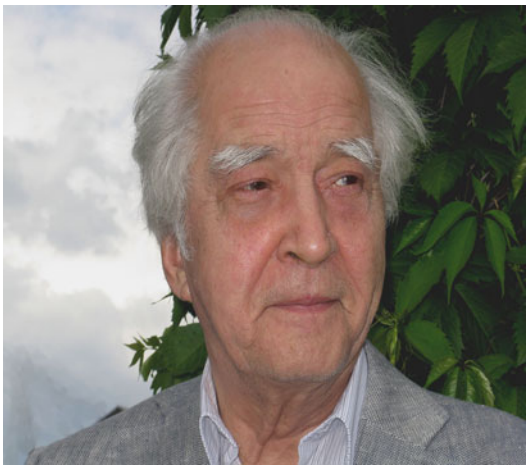

Bobrinsky, Alexander A., Fig. 1 Alexander Afanasievich Bobrinsky

As early as 1959, Bobrinsky began to collect a database of ethnographic information on the rural pottery production of various peoples from Eastern Europe, the Caucasus, and Central Asia. That work included, on the one hand, mass and systematic fill-in-the-blank requests of the population of these regions, and, on the other hand, many years of studying at recent rural pottery production centers. This work produced a tremendous resource of ethnographic data from about 1,000 pottery centers of European Russia, Baltic countries, the Ukraine, Belarus, Moldova, Caucasus, and Central Asia. This compendium became the basis for deeper understanding of important regularities in the history of ancient pottery production.

Major Accomplishments

A.A. Bobrinsky is a creator of the new "Historical-and-Cultural Approach" for analysis of ancient pottery production. The core of this approach consists of the reconstruction of concrete potters' skills and cultural traditions in pottery technology, vessels' shapes, and pottery decoration through archaeological ceramics. In this field, A.A. Bobrinsky elaborated a general system of pottery technology investigation (1978, 1999), and new methods to study the shape of vessels (1987, 1988, 1991). Furthermore, his research revealed the main historical regularities in the development of special constructions for firing of vessels – bonfires, ovens, stoves, and kilns (1991, 1993). Moreover, Bobrinsky proposed well-proven new theories of the emergence, initial development and evolution of pottery wheels (1993, 1996), pottery kilns (1991), and ancient pottery production as well (1993, 1997, 1999, 2006). In recent years, he has focused a lot of attention on methods for studying the sex and age of ancient potters, ascertained through the nail prints on ceramics (2008).

All the new methods elaborated by Bobrinsky aimed to solve a core scientific goal – ceramics as a valuable source of historical information on ancient populations. A.A. Bobrinsky always tried to impart his knowledge to young scholars and that is why a strong scientific school in the study of ancient ceramics and pottery production now exists in Russia and in the countries of the former USSR.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Interpretation in Archaeological Theory
- ▶ Modern Material Culture Studies
- ▶ Medieval Pottery Research Group (MPRG)
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Bonavia, Duccio

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Basic Biographical Information

Duccio Bonavia, born in Spalato (Dalmatia) on March 27, 1935, was the son of Aurelio and Neda Bonavia, both native Italians. After the Second World War, when Duccio was 14 years old, his family moved to Peru in July 1949 and settled in Lima. In 1965, Duccio received his Peruvian citizenship while still retaining his Italian citizenship (Fig. 1).

Duccio received his primary education from a school in Spalato (1940–1944) and his secondary education in Bassano del Grappa, Possagno, and Treviso (1945–1947). He finished his high school studies at Colegio Italiano Antonio Raimondi in Lima (1950–1951). He then enrolled in the National Engineering School, today known

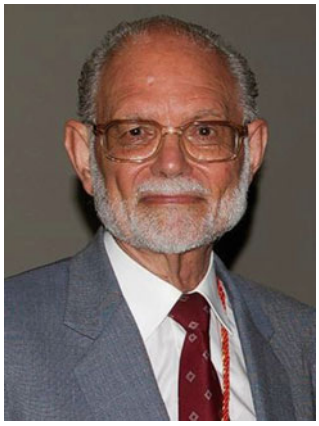

Bonavia, Duccio, Fig. 1 Duccio Bonavia

as the National University of Engineering, where he intended to study architecture (1952–1954). Duccio, however, did not enjoy his engineering courses and soon switched to the University of San Marcos (1955–1960) where he studied archaeology and anthropology.

Duccio married Ana Mori Tomatis from Lima though of Italian descent on June 15, 1962. They had two children, Bruna and Aurelio. Both children went on to earn their Ph.D., Bruna in biology and Aurelio in microbiology. Anita was the great love of Duccio's life, both at home and in their travels together. Duccio dedicated several of his publications to Anita.

After the death of his wife in 2004, Duccio was practically alone in Lima. He decided to move to Saskatchewan in Canada to be with his daughter, Bruna, and her husband, Thomas Fisher, and their sons, Lucas and Stephen. Duccio's son, Aurelio, lives in Seattle. Duccio left Lima in the spring of 2010 and lived in Canada for a year. Duccio died at the age of 77 on Saturday, August 4, 2012, in Magdalena de Cao, Ascope in Peru. He died during the last phase of his fieldwork at Huaca Prieta, Magdalena de Cao on the north coast of Peru. Duccio and Tom Dillehay were codirectors of the research project.

Just a few days before Duccio left for his last trip to Peru, he finished editing the English translation of his book on corn (Cambridge University Press). His research on the subject was kept in characteristically good order and is ready for another scholar to continue. In Peru, he donated his archaeology library to the University of Trujillo as well as his collection of plant and small animal samples, which were left to the archaeobiology lab at the university. The remainders of his things including his extensive library on Peruvian archaeology were sent to his most recent residence in Saskatchewan. It was Duccio's wish that after his passing, his library would be donated as well.

Major Accomplishments

Duccio's career in archaeology began when he studied under Dr. Raúl Porras Barrenechea, a professor of history at the University of San Marcos. His teachers at the university also included Jorge C. Muelle, an art historian; Luis E. Valcáreal, an Andean ethnohistorian; Ella Dunbar Temple, a specialist in colonial institutions; Mons. Pedro Villar Córdova and Edward P. Lanning, both archaeologists; and, lastly, José María Arguedas, an anthropologist with a great passion for indigenous cultures. For Duccio, archaeology was not only a scientific discipline but a great passion for the living cultures of the past.

While he was still a student, he participated in the *First Roundtable for Anthropological Sciences*, organized by the University of San Marcos in 1958, and, with Lumbreras and Caycho, presented his archaeological study of Aya Orjo (1958). The same year, at the Second National Congress of Peruvian History, Duccio presented another paper dedicated to the analysis of ceramics from Puerto Viejo, Chilca (1959).

Duccio obtained his Bachelor's degree in 1960 with a thesis called *On the Teatino Style*. A year later, he received his Doctor of Letters with his thesis *Six Occupation Sites from the Bottom of the Lurin River Valley*. Both of Duccio's theses were in the field of ethno-archaeology and were completed at the University of San Marcos in Lima.

Immediately after obtaining his academic degrees, Duccio embarked upon a number of archaeological explorations, including excavations

in the Huarmey Valley on behalf of the Botanical Museum at Harvard University (1960). He explored the northern Peruvian valleys with Donald Thompson (1961) and organized the Italo-Peruvian expedition in northern Peru (1961). He explored the Casma Valley with Donald Collier in 1962, and from 1962 to 1963, he took over the Catastro project dedicated to the pre-Hispanic monuments in the Lima Valley. This last project was commissioned by the Metropolitan Deliberations Board and included participation from Ramiro Matos and Félix Caycho. The report was published in five volumes, which are currently in the archaeological monuments inventory in Lima. From the 1960s through today, more than 70 % of the registered archaeological sites in the Lima Metropolitan area were destroyed.

In 1965, Duccio traveled to Rome to represent the National Culture Commission of Peru and participated in postgraduate courses on new techniques in archaeological exploration, which was sponsored by the Lerici Foundation (1965). From 1967 to 1968, he obtained a scholarship from the French government to further his studies in the Quaternary Geology Laboratory at the University of Bordeaux in France under the guidance of Professor François Bordes.

Duccio was a consistent participant in conferences and academic events dedicated to Andean archaeology, such as the XXXVII International Congress of Americanists in 1966 (La Plata, Argentina), the XXXVII International Congress of Americanists in 1968 (Stuttgart, Germany), and the International Congress of Americanists in 1970 and the XLI International Congress of Americanists in 1974 (Mexico). He also participated in the International Symposium "Criticism and Perspectives of Andean Archaeology" organized by the National Institute of Culture of Peru, UNDP, and UNESCO (Paracas, 1980) as well as the World Archaeological Congress in Southampton, UK, in September of the same year. He was a speaker at the Symposium "Recent Advances in the Understanding of Plant Domestication and Early Agriculture" in 1986. He also organized the international meeting on the "State of Peruvian Archaeology" with Ramiro Matos (Lima, 1988) and the Symposium on "French Research in Peru" with the French Embassy, IFEA, and ORSTOM (Lima, 1988).

Duccio Bonavia taught at several Peruvian and foreign universities such as the National University of San Cristóbal de Huamanga in Ayacucho (1963–1964), the University of San Marcos (1964–1970), and the Peruvian University of Science and Technology (1968). He was a professor in the Biology Department at the University Peruana Cayetano Heredia de Lima (1971–2005). He was also twice a professor at the Friedrich Wilhelms University in Bonn, Germany, and participated in a seminar on anthropology under Max Uhle (1981 and 1983–1984).

His academic merits earned him several positions such as Honorary Professor at the National University of Trujillo (1994), Extraordinary Investigative Professor at the Peruana Cayetano Heredia University (2002), Honorary Professor at Ricardo Palma University in Lima (2005), and Doctor Honoris Causa at the National University of Trujillo (2006). Duccio also spoke several languages including Italian, French, Spanish, Serbo-Croatian, and English, following in the footsteps of his mentor Dr. Jorge C. Spring (Jorge C Muelle). Dr. Spring and Duccio were good friends and hosted several visitors to the National Museum of Anthropology.

Duccio was a member of the Society for American Archaeology, the Société des Americanistes de Paris, Société des Americanistes (Switzerland), Société Préhistorique Française, and the Institute of Andean Studies. He was an honorary member of the Permanent Council of the International Union for Prehistoric and Protohistoric Sciences (USA). He also served as a representative of Peru at the Peruvian Historical Society and the National Academy of History. He was also a corresponding member of the Royal Academy of Spanish History and the National Academy of Argentinian History and a member of the Sciences Academy of Latin America and a life member of the College of Peruvian Archaeologists and also of the Società Dalmata di Storia Patria.

Duccio traveled extensively throughout Peru, mainly in the coastal valleys as well as several places in the sierra and the jungle. With a team from the Biophysics Laboratory from the University Peruana Cayetano Heredia, he climbed the Pariacaca Mountain in 1985 to study the Inka sanctuary of the same name.

Among his major studies in the field of archaeology was a study of a Mochica mural painting in the Valley of Nepeña (1958), an exploration of the north coast with Ernesto Tabío and Donald Thompson (1959), a stratigraphic excavation at Ancon (1960), and an excavation at Huarmey commissioned by the Harvard Botanical Museum (1960). He organized the scientific expedition to the jungles of Ayacucho sponsored by the National University of San Cristóbal de Huamanga (1963). He also organized the excavations at the ruins of Yaro (Pajaten, 1966) and in the Chancay River basin (Lambayeque) under the auspices of the Royal Ontario Museum (1971), among others.

Duccio has contributed to the creation and the strengthening of several institutions devoted to Peruvian archaeology. He was the Chief of Investigations at the Archaeological Museum at the University of San Marcos (1956–1961). He was the head of the technical team of the Metropolitan Deliberations Board in their studies of historic and archaeological sites (1963), head of the Explorations Department of the National Museum of Anthropology and Archaeology in Lima (1964), then assistant director (1968–1979), and an archaeologist affiliated with the National Archaeological Board in Lima (1963). He was a member of the Committee of Monuments as part of the Peruvian Commission of UNESCO (1967), a consultant to the Ford Lima Foundation (1975–1980), founder of the Laboratory of Prehistory in the Department of Biology at the University Peruana Cayetano Heredia (1978), a member of the Commission for the technical rating of archaeological projects at the National Institute of Culture (1979–1985), and a founding member and director of the Peruvian Association for the promotion of the social sciences (FOMCIENCIAS 1980).

Duccio received several fellowships throughout his life, including one from the Harvard Botanical Museum for his excavations in Huarmey (1960) and from the Ministry of Foreign Affairs of France for his studies at the University of Bordeaux with professor François Bordes (1967–1968), from the Royal Ontario Museum (Canada), from the Ford Foundation to excavate in Huarmey (1974), from the John Simon Guggenheim Memorial Foundation (New York, USA), and from the Harvard Botanical Museum (1976–1977), to investigate preceramic corn in Huarmey. He also received fellowships from CONCYTEC to draw a map of mural paintings in Peru (1983) and from the Ford Foundation to analyze the conditions of university teaching in archaeology in Peru along with Ramiro Matos (1989–1990). Their report was subsequently published.

He received funding from the French Institute of Andean Studies in 1993 to write a book on Andean camelids and to translate into English the Fish and Wildlife Service (1999). To write his last book on corn, he received funding from the University San Martín de Porres (2006).

Duccio's academic bibliography is incredibly varied and comparable to the classics in American anthropology. He dabbled in art, pre-Colombian urbanism, botany, zoology, ecology, paleopathology, the indigenous diet, parasitology, physiology of height, and some aspects of medicine. The following bibliography includes 14 books, seven monographs, 44 inserts as chapter books, 139 specialized articles in magazines, 39 articles, and 20 reviews and comments devoted to the publications of his colleagues. He has been a big supporter of the theory of the second center of domestication of corn in the Andes.

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► Andes: Prehistoric Art
► Andes: Prehistoric Period

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Bone Chemistry and Ancient Diet

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Introduction

Dietary practices are a fundamental aspect of human life, from the basic caloric necessities to the socioeconomic variables which affect food production, acquisition, preparation, and consumption. Archaeologists have used many different data sources to study ancient dietary practices, including direct evidence from animal bones, macrobotanical plant remains, pollen and phytoliths in the soil, organic residues in pottery, and coprolites, as well as indirect evidence from skeletal pathology, dental wear patterns, ethnographic observations, writings, and artistic depictions. Nevertheless, for most such studies, the results are just the determination of the main menu, with animal foods the only source of semiquantitative dietary estimates.

It was only in the late 1970s that a new area of research developed – bone chemistry – which has expanded considerably our understanding of human dietary practices (Vogel & van der Merwe 1977). Biochemically, you are what you eat, and bones, teeth, and other tissues preserved in the archaeological record may be analyzed and provide direct information about the diet of individuals. This has led to research on how diets may vary based on age, sex, and socioeconomic status, as well as between different sites and time periods (here are some of the recent synthetic publications about stable isotope analyses and human diet: Tykot 2004, 2010; Pollard & Heron 2008; Lee-Thorp 2008; Price & Burton 2011).

Specifically, the combination of stable carbon and nitrogen isotopes in bone collagen and other tissues, and carbon and oxygen isotopes in bone apatite or tooth enamel, may be used to reconstruct prehistoric diet because of differential isotope fractionation between certain plant groups of atmospheric carbon dioxide during photosynthesis and trophic level increases in nitrogen isotopes. This allows us to distinguish between plants that follow different photosynthetic pathways; those which are nitrogen fixing versus absorption; and consumption of foods from different trophic levels, especially aquatic fish and mammals versus terrestrial plants and animals, but also between hunter-gatherers and agriculturalists, and even address short-term dietary change through microsampling of tooth roots and hair. Trace elements such as barium and strontium provide additional information about food sources and diet, while oxygen isotope analysis is used to study potential seasonality of shellfish gathering, and along with strontium and lead isotope analysis the mobility of the consumers.

Reliable isotope results have been obtained from samples of our early human ancestors, while the use of modern instruments which require only tiny samples and have a low per-sample cost has led to hundreds of archaeological bone chemistry studies around the world, with frequent publications in the *Journal of*

Archaeological Science, the *American Journal of Physical Anthropology*, *Archaeological and Anthropological Sciences*, and the *International Journal of Osteoarchaeology*.

Key Issues

Principles of Stable Isotope Analysis

There are two stable isotopes each for carbon (^{12}C, ^{13}C) and nitrogen (^{14}N, ^{15}N), and three for oxygen (^{16}O, ^{17}O, ^{18}O) (Fig. 1). The lightest isotopes for each are the most abundant in nature (c. 99 % for each), while the small but measurable amount of variation in the heavier isotopes is measured in parts per thousand or per mil (‰). High-precision stable isotope measurements using stable isotope ratio mass spectrometers are reported using the delta notation ($\delta^{13}C$, $\delta^{15}N$, $\delta^{18}O$) relative to internationally recognized standards:

$$\delta^{13}C\,(\text{in } ‰ \text{ or per mil}) = [\{(\text{sample } {}^{13}C/{}^{12}C)/(\text{standard } {}^{13}C/{}^{12}C)\} - 1] \times 1000$$

For carbon and oxygen, the standard is *Belemnitella americana* from the Pee Dee limestone formation in South Carolina, while for nitrogen, it is AIR.

While all terrestrial plants photosynthesize CO_2 from the atmosphere and turn it into complex carbon-based molecules, there are three different photosynthetic pathways for plants which result in differences in their carbon isotope ratios which are then passed on to their consumers (Fig. 2). Trees, shrubs, and grasses from temperate regions follow the C_3 (Calvin-Benson) pathway, and have $\delta^{13}C$ values averaging about −26.5 ‰, while grasses native to hot, arid environments follow the C_4 (Hatch-Slack) pathway and have $\delta^{13}C$ values averaging about −12.5 ‰ (although maize is more positive, c. −10 ‰). There are also some differences between particular species of plants and for the same plant grown at different latitudes (Fig. 3). Succulent plants like cactus utilize the CAM (crassulacean acid metabolism) photosynthetic pathway, with carbon isotope ratios often similar to those of C_4 plants but much more variable due to local ecological settings. In heavily forested areas, a canopy effect occurs due to incomplete atmospheric mixing and results in even more negative carbon isotope ratios. Atmospheric carbon isotope ratios have become depleted by about 1.5 ‰ since the industrial revolution, so values obtained on modern terrestrial plants and animals must be adjusted accordingly for comparison with most archaeological studies.

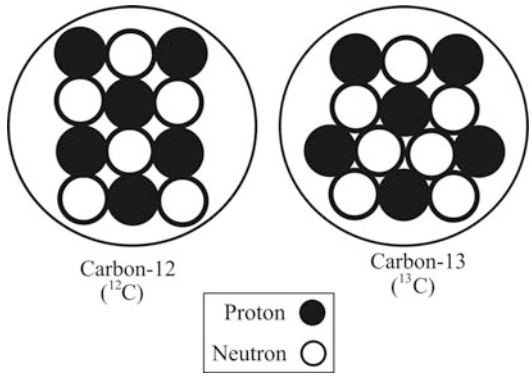

Bone Chemistry and Ancient Diet, Fig. 1 Stable isotopes with different numbers of neutrons in the nucleus

Wheat, barley, and rice are the most widely used domesticated C_3 cereal crops, while maize (corn), millet, and sorghum are the main C_4 domesticates. Stable carbon isotope analysis therefore has been widely used to address the importance of maize in the Americas and millet in Europe, Africa, and Asia.

For isotopic analysis of human remains to study diet, different tissues may be tested. Bone is made of a complex organic material called collagen (mostly a combination of essential and nonessential amino acids) and the bone mineral known as apatite (calcium hydroxyphosphate carbonate). Tooth enamel has a similar structure to bone apatite, while tooth roots have both collagen and apatite. Hair is made of keratin, a proteinaceous compound like collagen.

Empirical carbon isotope data for large mammals, along with data for laboratory-raised

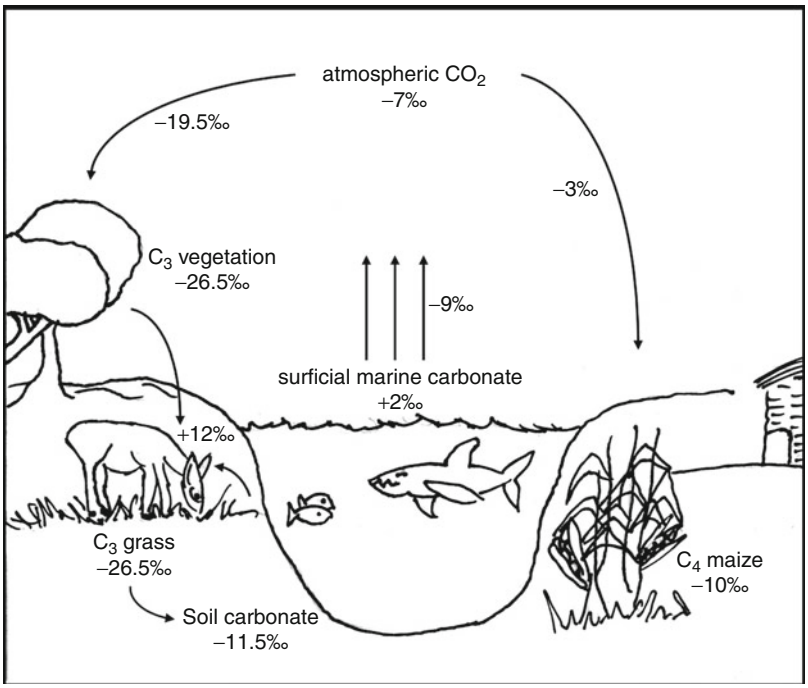

Bone Chemistry and Ancient Diet, Fig. 2 General pattern of photosynthesis showing carbon isotope fractionation

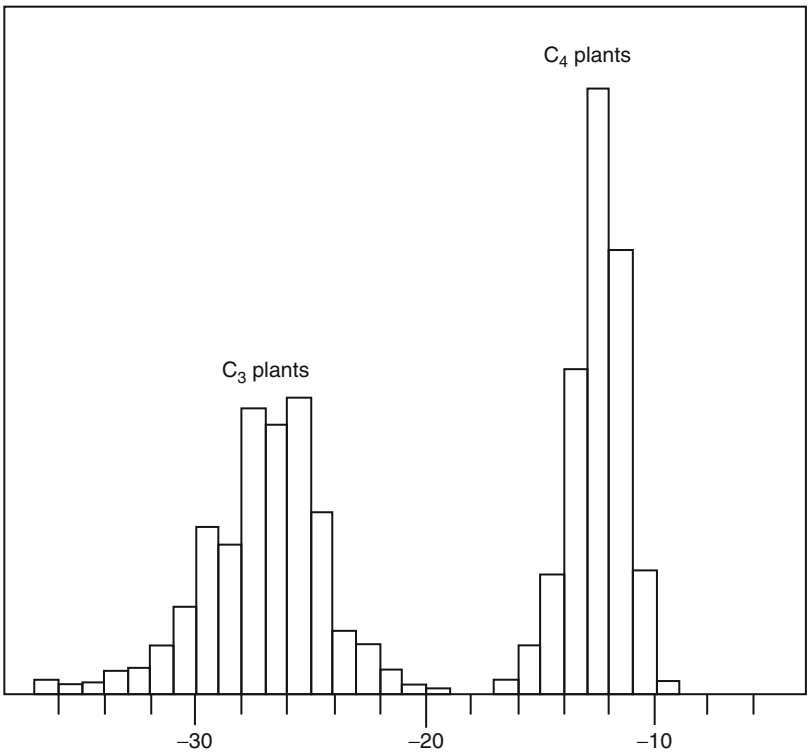

Bone Chemistry and Ancient Diet, Fig. 3 Carbon isotope ratios for modern C_3 and C_4 plants

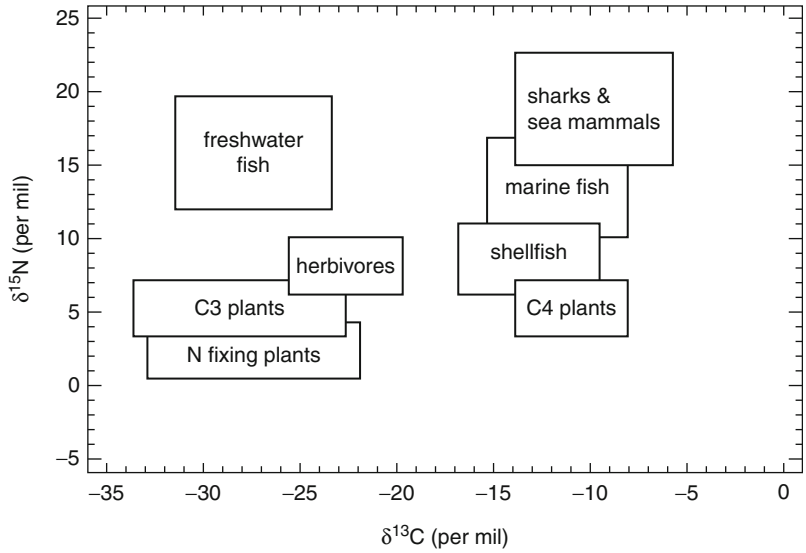

Bone Chemistry and Ancient Diet, Fig. 4 Carbon versus nitrogen isotope ratios for a typical food web. Isotope ranges may vary by region

rats and mice, indicate that bone collagen $\delta^{13}C$ is metabolically enriched about +5 ‰ relative to diet, although this value is affected by the proportion of protein in the total diet and any differences in $\delta^{13}C$ values between protein and energy sources. Studies have shown that bone collagen is disproportionately produced from the protein portion of the diet, while bone apatite and tooth enamel are produced from a mixture of dietary protein, carbohydrates, and fats (lipids). Experimental data on rats shows that bone apatite is enriched about +9.5 ‰ relative to the whole diet, regardless of the variety or isotopic composition of the foods consumed (Ambrose & Norr 1993; Tieszen & Fagre 1993), while data for larger herbivores and humans suggest that the diet-apatite spacing is about +12 ‰ (Tykot et al. 2009). Stable carbon isotope analysis of both bone collagen and apatite thus permits quantitative estimates of several dietary patterns.

Carbon isotope ratios for freshwater and marine foods are more variable than terrestrial plants and animals, due to differences in carbonate values in the water and trophic status, with marine (saltwater) fish having positive $\delta^{13}C$ values similar to that of maize. Fish and sea mammals, however, typically have much higher nitrogen isotope values, and their high protein content contributes much more carbon to bone collagen than does maize (c. 10 % protein) or other plants. In contrast, carbon isotope ratios for bone apatite, which equally represent dietary carbohydrates, fats, and proteins, allow for the identification of just a few percent of C_4 plants in an otherwise C_3-based diet.

Nitrogen isotope ratios for plants depend primarily on whether they obtain their nitrogen by symbiotic bacterial fixation or directly from soil nitrates, but also vary according to rainfall, altitude, and other factors. Plant values also may be elevated due to human-led fertilization practices. From their local baseline values, nitrogen isotope ratios increase about 3 ‰ for each trophic level due to metabolism, with lots of variation among marine organisms. Humans dependent on terrestrial plants and animals usually have $\delta^{15}N$ values in bone collagen of about 6–10 ‰, whereas consumers of freshwater or marine fish and sea mammals may have $\delta^{15}N$ values of 15–20 ‰. The most accurate interpretations may be made when there are isotopic data available for the animal and plant foods likely to have been consumed by a specific population, so testing is often done not just on human remains but also faunal and floral samples found at archaeological sites (Fig. 4).

Oxygen isotope analyses are also used to study ancient diet. Oxygen isotope values relate

directly to local climate, temperature, and humidity and are used for determining the seasonality of shells, climate studies, mobility, and their impacts on dietary patterns. Analyses have been done on oxygen in both the carbonate and phosphate components of bone apatite and tooth enamel. Strontium isotope ratios directly represent the geographic area of food production/acquisition and thus the mobility of dietary resources and/or their consumers. Strontium isotope analysis has been used for migration studies in many parts of the world (see Meiggs & Freiwald's entry on ▶ Human Migration: Bioarchaeological Approaches in this encyclopedia).

Bone collagen and bone apatite have resorption/replenishment rates estimated at 7–10 years or more, so that isotopic analysis of bones of adults provides the average diet for many years prior to death. Tooth tissues, however, do not turn over, so their isotope values represent diet from the time of formation, regardless of age at death. Tooth formation begins in utero for deciduous teeth and ranges from 0 to 18+ years of age for permanent teeth. The analysis of multiple teeth from the same adult individual may reveal the age of weaning (first the introduction of solid foods and later the cessation of breast feeding) since a nursing infant is effectively a carnivore and will have much higher $\delta^{15}N$. Differences between juvenile teeth and adult bone values may reflect changes in diet due to geographic movement (e.g., for marital reasons) or change in status.

Stable isotope analysis of multiple human tissues can provide a science-based dietary life history of an individual. Although collagen is rarely preserved in bones predating the Upper Paleolithic and even for recent time periods is often badly degraded in hot and moist environments, bone apatite has provided reliable results throughout the Holocene and tooth enamel for early hominins back into the Miocene. Microanalysis of tooth segments (or hair or fingernails, when preserved) may be done to address short-term isotopic dietary variability, perhaps due to seasonal mobility or harvesting practices.

Sample Preparation and Stable Isotope Analysis

For isotope analysis of archaeological bone, the first step is to remove any potential contamination, either from the soil or from added preservatives, for a sample weighing about 1 g. It is then necessary to separate the specific tissues to be analyzed. For collagen, this involves demineralization of the bone using acid and separation from any residual lipids. The procedures used in the Laboratory for Archaeological Science at the University of South Florida involve demineralization in 2 % hydrochloric acid (72 h), removal of base-soluble contaminants using 0.1 M sodium hydroxide (24 h before and after demineralization), and dissolution of residual lipids in a 2:1:0.8 mixture of methanol, chloroform, and deionized water (24 h) (Fig. 5).

Bone collagen is often not well preserved, and a yield of less than 1 % is considered unreliable for isotope analysis (bone originally has more than 20 % collagen). The main issue for low yields is that degradation may have resulted in unequal breakdown and loss of the different amino acids, which individually have different isotope values because of the different chemical reactions involved in their initial production. The amount of carbon and nitrogen measured by the mass spectrometer, relative to the size of the sample put in for analysis, and the C to N ratio of the gases produced (which should be the same as in living organisms) are additional tests of reliability. Duplicate 1 mg samples of collagen pseudomorphs are placed in tin capsules and analyzed for $\delta^{13}C$ and $\delta^{15}N$ in continuous flow mode using a Carlo-Erba NA2500-II EA with a Costech Zero-Bank autosampler, coupled with a Thermo Delta + XL stable isotope ratio mass spectrometer in the Paleolab at USF (Fig. 6a).

Bone apatite and tooth enamel carbonate are prepared using procedures designed to remove non-biogenic carbon without altering the biogenic carbon isotope values (see Tykot 2004). About 10 mg of powdered sample is immersed in 2 % sodium hypochlorite to dissolve organic components (24 h for enamel, 72 h for bone

Bone Chemistry and Ancient Diet, Fig. 5 Chemical extraction of bone collagen for isotope analysis

apatite), followed by the removal of non-biogenic carbonates using 1.0 M buffered acetic acid for 24 h. The integrity of apatite and enamel samples is assessed through yields obtained in each stage of the pretreatment process and the CO_2 yield during the mass spectrometry analysis. More complex tests of sample reliability have been used in some laboratories, however, including Fourier transform infrared spectroscopy (FTIR). Apatite and enamel samples weighing 1 mg are isotopically analyzed on a second Thermo Delta + XL mass spectrometer equipped with a Kiel III individual acid bath carbonate system (Fig. 6b). It is a scientifically sound idea to perform repeat isotope analyses for outliers when testing a group of individuals thought to have had similar isotope values.

For both bone collagen and apatite/enamel carbonate analysis, reference gases and solid standard samples are analyzed to ensure reliability of the isotope results. The analytical precision for stable isotope ratio mass spectrometers is typically 0.1 ‰ or less for ^{13}C and ^{8}O and 0.2 ‰ for ^{15}N.

Estimating the percentage of C_4 plants in human diet is fairly straightforward for herbivores and human agriculturalists, if seafood was not available and animals were not consuming wild C_4 grasses, by simple interpolation between the endpoints of bone apatite for a pure C_3-based diet versus a pure C_4-based diet. Rather than using the average endpoints of −26.5 and −12.5 ‰, the specific carbon isotope values for the C_3 plants most likely consumed should be used, since they do vary between grasses (e.g., wheat, barley, rice) and legumes, etc., in order to set an accurate baseline. For a C_4 endpoint based on maize, the value would be about −10 ‰. So if the range was from −24 ‰ to −10 ‰ (14 ‰), then each per mil more positive than −24 ‰ would represent about 7 % maize in the overall diet.

When animal or aquatic foods are a significant part of the diet, the bone collagen carbon and nitrogen isotope data are necessary to include in the percentage calculations. Mathematical models have been developed to combine collagen and apatite isotope data for distinguishing between plant and animal food sources with similar isotopic signatures, most recently by using multivariate statistics (Froehle et al. 2012).

Trace Element Analysis

A number of studies have been done measuring and interpreting trace elements in bone mineral, including Sr, Ba, Fe, Cu, Mg, Mn, Zn, and Pb. Lead is a toxic element known to accumulate in bone due to the usage of lead-based drinking, cooking, and eating materials, as well as toy soldiers, paint chips, and other items children have ingested. Strontium and barium however are structural substitutes for calcium in bone apatite and tooth enamel and show significant trophic level variation in their concentrations. Both Sr and Ba are acquired by plants through the soil and are then passed on to their consumers, with a decrease in concentrations for each trophic level. This fractionation is even greater for Ba than Sr due to its chemical structure as barite ($BaSO_4$) in the soil. There is, however, considerable geological variability in the soils, so that archaeologists must be extremely careful in making interpretations about the relative importance of plants versus meat in the diet. Testing of herbivorous and carnivorous animals, and plant foods if available, from the same area is highly recommended. In addition, care is needed in taking samples from bone with minimal contamination or diagenesis (Burton & Price 2000). Most elemental analyses of bone have been done by ashing the sample, dissolution, and using an ICP spectrometer; some more recent

Bone Chemistry and Ancient Diet, Fig. 6 Stable isotope mass spectrometers in the Paleolab at the University of South Florida connected (**a**) to a CHN analyzer for collagen and other organic samples; (**b**) to a Kiel III acid bath for bone apatite, enamel, and other carbonate materials

studies where sample removal was not allowed have been done nondestructively using an X-ray fluorescence spectrometer (Fig. 7).

Trace element measurements of bone are reported relative to calcium, e.g., Sr/Ca and Ba/Ca, or logarithmically, e.g., log (Ba/Sr). Much greater differences in the Sr and Ba concentrations and in the Ba/Sr ratios have been observed for marine versus terrestrial diets.

Recent Applications

Stable isotope analysis of human remains to study ancient diets has expanded considerably in the last decade, with several dozen or more publications just in the last few years. The main issues being addressed include:

- Early hominin dietary practices
- Seafood consumption by near-coastal populations

Bone Chemistry and Ancient Diet, Fig. 7 Nondestructive trace element analysis of bone using a portable X-ray fluorescence spectrometer

- Dietary contribution of freshwater resources from lakes and rivers
- Mesolithic-Neolithic dietary changes
- Importance of millet in east Asia, Africa, and Europe
- The spread of maize in the New World
- Dietary differences based on sex and/or status
- Weaning practices
- Mobility and migration

Following is an overview of two areas of my own research, specifically the importance of maize and seafood in different areas of peninsular Florida and the dietary practices of coastal and island inhabitants in the Mediterranean.

Florida

Bone collagen and apatite for more than 100 human individuals from 7 sites in peninsular Florida were analyzed by stable isotope mass spectrometry to test for the presence and increasing importance of maize in the southeastern United States (Tykot et al. 2005; Kelly et al. 2006). Previous studies, mostly on bone collagen, had clearly indicated maize was a dietary staple for the Mississippian culture by about 1000 CE, but it had been thought that maize may never even have reached southern Florida. At the inland site of Melton Mound, however, positive carbon isotope ratios especially for bone apatite and tooth enamel fully support that C_4 plants such as maize were a small but noticeable part of the diet by 600–800 CE. Four sites near the Gulf Coast were tested, with individuals from Bayshore Homes (Safety Harbor period) and Dunwoody (Late Caloosahatchee) averaging much lower $\delta^{15}N$ in bone collagen and more positive $\delta^{13}C$ for bone apatite, relative to the earlier Bay Pines (Weeden Island I) and Pillsbury (Manasota) sites, while the $\delta^{13}C$ results for bone collagen were similar for all four (Fig. 8). This strongly supports that it was a plant such as maize (with much less protein than fish but having an equal impact on apatite $\delta^{13}C$ values) did become a dietary staple in this region by the early 2nd millennium CE. For all sites, however, there was also a large range of variation among individuals, and at least at one site, it seems that males had higher nitrogen isotope values than females, perhaps due to greater fish consumption. This is being investigated further through elemental analysis of Ba and Sr, which in a separate study has shown a much greater importance of seafood at sites on the Gulf Coast when compared with those near Miami on the Atlantic side of Florida (Fig. 9).

The Mediterranean Region

In the Mediterranean world, while seafood is a regular part of many modern people's diet, there is little in the way of shell mounds or other archaeological evidence that it was a staple in ancient times, even prior to the Neolithic. However, for Mesolithic sites on the Atlantic coast, including Portugal and Spain, isotope studies have shown that seafood was a major part of the diet (e.g., Richards & Hedges 1999). In contrast, an early study using both stable isotope and elemental analysis on Mesolithic coastal sites of Arene Candide in Liguria and Grotta dell'Uzzo in Sicily (Francalacci 1989; Mannino et al. 2011) suggested that seafood was

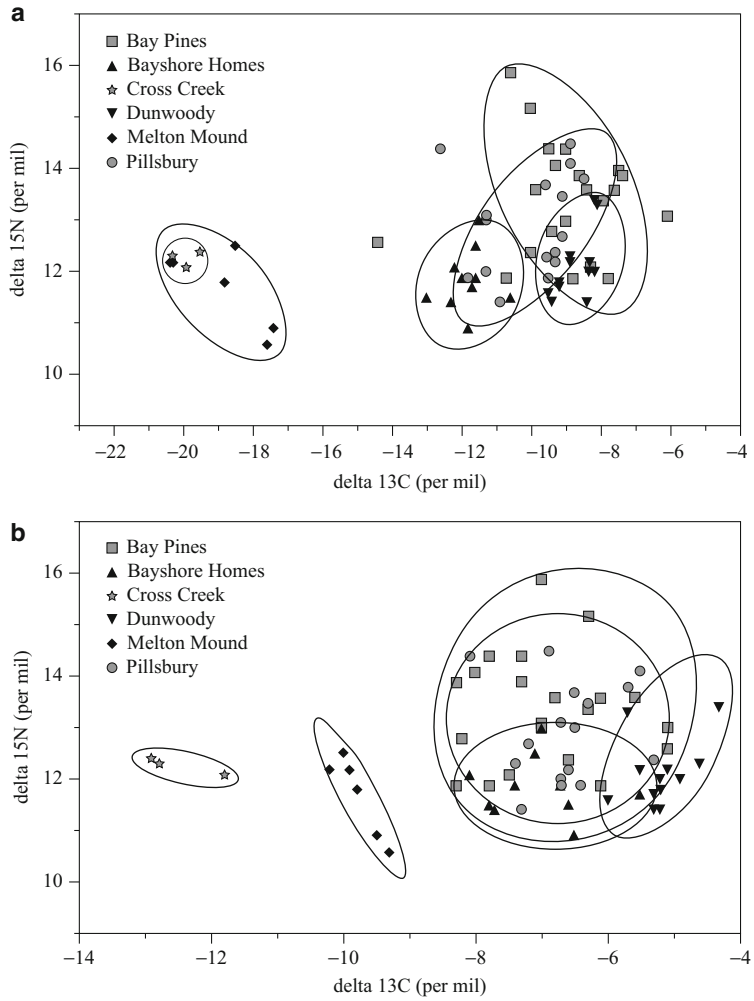

Bone Chemistry and Ancient Diet, Fig. 8 Stable isotope data for selected precontact archaeological sites in Florida. (**a**) $\delta^{15}N$ versus collagen $\delta^{13}C$; (**b**) $\delta^{15}N$ versus apatite $\delta^{13}C$

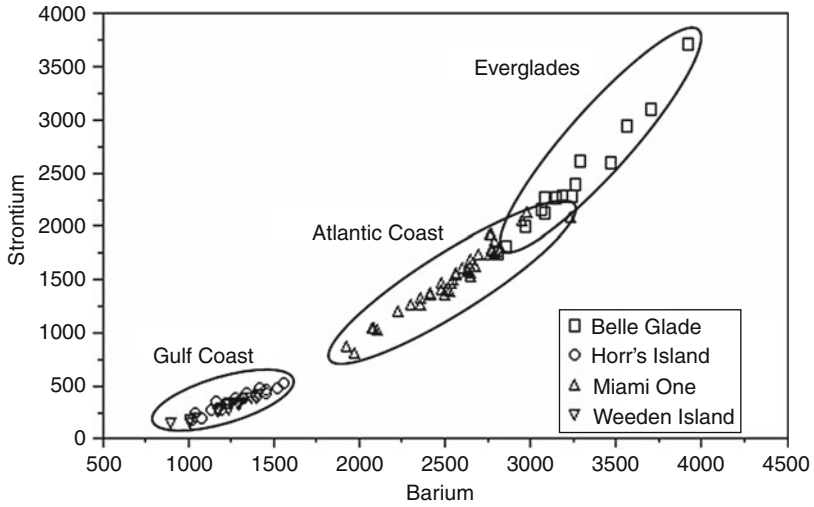

Bone Chemistry and Ancient Diet, Fig. 9 Barium versus strontium trace element data for selected Florida sites showing differences based on geographic regions

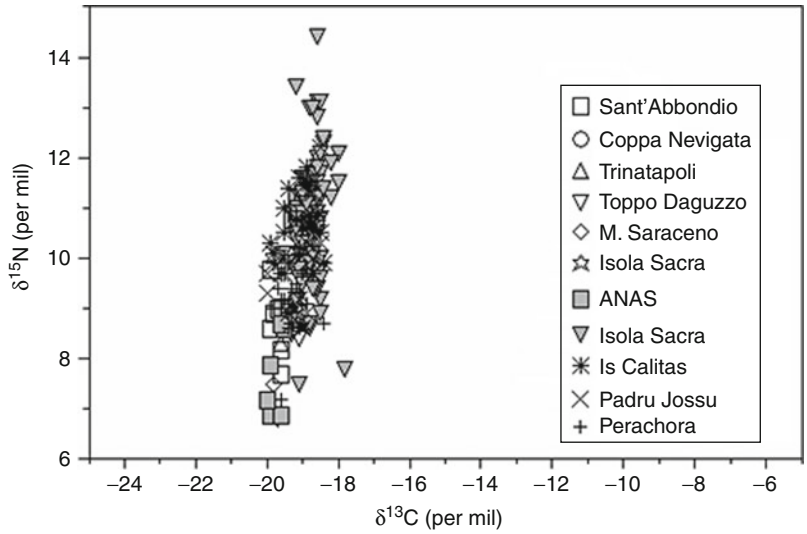

Bone Chemistry and Ancient Diet, Fig. 10 Human bone collagen $\delta^{13}C$ versus $\delta^{15}N$ for selected Bronze-Iron Age sites in the central Mediterranean

not a staple in the Mediterranean, and beginning in the Neolithic when there were domesticated sheep, goat, cattle, pig, wheat, barley, and other crops, studies by many scholars have shown it was negligible at sites in Italy, Croatia, Greece, Tunisia, and even on the islands of Sardinia (Lai et al. 2007), Malta, the Balearics, and Crete. There are some modest isotopic differences in diet based on status in the Late Bronze Age, e.g., at Mycenae (Richards & Hedges 2008), while freshwater fish become important at some sites, but even in Roman times when there was regular, large-scale maritime seafaring, it appears there was little seafood consumption even at the port site of Isola Sacra near Rome (Prowse et al. 2004; Killgrove & Tykot 2013) (Fig. 10). It is important, however, to have isotope data for fish and shellfish in the specific region of study since there are cases where their isotope values are rather negative and thus overlapping with terrestrial plant and animal values. African millet, a C_4 plant, was apparently present in Europe in the Neolithic, but not isotopically noticeable until the Bronze Age in northern Italy (Tafuri et al. 2009) and Iron Age at sites in Greece and Slovenia (Murray & Schoeninger 1988).

Future Directions

The analytical methods and examples presented above for human bone and other tissues do not include all of the scientific ways to study ancient diets. Stable isotope analyses have been done on individual amino acids in bone collagen, on cholesterol preserved in bones and teeth, on dental calculus, on carbonates and humic matter in soils, and organic residues (lipids) absorbed in pottery. Still being developed are other ways to study diet, including isotopic analyses of calcium, sulfur, and hydrogen, and decreasing even further the size sample necessary for analysis.

Acknowledgments I especially thank Nikolaas J. van der Merwe for getting me involved in isotope analyses more than 20 years ago, the dozens of colleagues I have worked with on six continents, and the many undergraduate and graduate students who have worked in my lab. For more than 10 years, most of my isotope samples have been analyzed in the Paleolab, managed by Ethan Goddard.

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bone: Chemical Analysis
- ▶ Isotope Geochemistry in Archaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Maize: Origins and Development

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Bone Density Studies in Environmental Archaeology

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Introduction

Archaeologists and paleontologists have long recognized that the ability of bones to survive in the fossil record varies as a function of their intrinsic physical characteristics. Of these characteristics, bone density has become the most commonly used proxy measure of the potential of a specific skeletal element to survive site formation processes. In the analysis of archaeological faunal assemblages, bone density data have provided a framework for the assessment of preservational bias. Density-mediated destruction of faunal remains may result in a *sample assemblage* that is not representative of the *deposited assemblage* (terminology after Klein & Cruz-Uribe 1984), and this bias may affect the interpretation of important lines of faunal evidence such as skeletal element abundance, age/mortality profiles, and species representation. Studies have documented a wide range of bone density across the various elements within a skeleton, demonstrating the importance of basing counts of elements (MNE) and individuals (MNI) in archaeological assemblages on skeletal portions of high density.

The primary challenges in bone density research have been the derivation of accurate density measurements and the establishment of methodological standards. Over the past three decades, density data sets have been published for numerous species of mammals, birds, and fish. However, researchers have employed different methods in measuring and calculating "bone density" values. As a result, published bone density data sets vary significantly in their accuracy and are typically not suitable for comparison with one another. Most studies have been based on very small samples; those that have involved large samples have documented significant intraspecific variation in bone density.

Definition

Bone is made up of an organic matrix, a mineral component, and water. The organic matrix is primarily collagen, with a small proportion of noncollagenous proteins. The mineral component consists almost exclusively of hydroxyapatite, a calcium phosphate (Martin et al. 1998). The (dry) mass of a bone divided by its volume is known as its *apparent density* or *structural density*. Lyman (1984) emphasized a further distinction between *true density* (mass divided by volume exclusive of pore space) and *bulk density* (mass divided by volume inclusive of pore space); "pore space" includes any medullary cavity. Many studies have employed techniques that measure exclusively the mineral component of bone samples, producing data on *bone mineral density*.

The "bone density" data sets published in archaeological literature differ in terms of which property ("true density" or "bulk density") they attempt to represent and how accurately these properties have been measured. This variability reflects the diversity of methodologies used by researchers and has resulted in a current state of uncertainty in which "bone density" may refer to a certain property in one study but a different property in another. Consequently, the bone density data set from any given study is typically unsuitable for comparison with those from others. This observation may even apply to studies conducted by the same research group; in a number of cases, researchers have altered their methodology for calculating bone density over time, with the result that the data produced in their more recent studies are not appropriate for comparison with those of their earlier studies. In numerous cases, methodological shortcomings have resulted in published bone density data that are inaccurate and of limited use in archaeological analyses (Lam & Pearson 2005).

The methodology for any study must be examined carefully in order to determine the actual property to which "bone density" refers.

Key Issues/Current Debates/Future Directions/Examples

Archaeological studies of bone density were first conducted by some of the pioneers of taphonomic research (Brain 1969; Behrensmeyer 1975; Binford & Bertram 1977), who were interested primarily in applying these data to interpretations of the Plio-Pleistocene archaeological record. Perhaps the most well-known application of bone density studies was that of Brain (1969), in his assessment of Dart's proposal of an osteodontokeratic culture among australopithecines. Brain observed that the faunal preservation at the early South African cave sites more likely reflected patterns of bone density than selection, use, and manufacture by early hominins.

These early studies of bone density used water displacement to measure a range of artiodactyl skeletal elements, but differences in methodology resulted in inconsistencies between the density data produced by each study. Subsequently, most studies of bone density have been conducted using photon densitometry, a technique introduced to zooarchaeological research by Lyman (1984). Photon densitometry provided the advantages of being nondestructive and able to measure elements at very specific locations – known as "scan sites" or "regions of interest" (ROIs). While the earlier water displacement studies had measured the density of entire elements (providing a single value for each element) or, in the case of long bones, proximal and distal halves, Lyman's use of scan sites took into account the heterogeneous composition of most skeletal elements by defining multiple points of measurements for each. The scan sites defined by Lyman have become accepted as standard locations of density measurement by subsequent researchers, with modifications made to account for morphological variations among different taxa.

Despite Lyman's attempt to provide standardized parameters for bone density studies, the adoption of photon densitometry ironically resulted in greater incompatibility among the bone density data sets produced in the past two decades. Photon densitometers measure bone mineral *content* across a scan site (Fig. 1). In order to transform this measure of bone mineral content into a (bone mineral) *density* value, researchers must independently determine the volume of the scan site – the cross-sectional area of the site multiplied by its thickness, which is typically set by the machine (e.g., 1 mm). Despite having in common their use of photon densitometry, Lyman and other researchers employed different methods to estimate this cross-sectional area, affecting the accuracy and comparability of their density data sets. The end result has been that the practical definition of "bone density" varies from study to study. In some studies, the cross-sectional areas of all scan sites have been assumed to be a rectangle or a circle. Other studies have devoted greater effort to produce more precise measurements of the shape of the bone cross section. However, photon densitometry cannot determine the volume or shape of internal cavities; at best, it can measure *bulk density*, but not *true density*. With a few exceptions, researchers who employed photon densitometry did not take the additional steps to exclude internal cavities in their calculations of "density"; the failure to account for such cavities results in artificially low density values at the scan sites where they occur.

In order to address this shortcoming of photon densitometry, computed tomography (CT) has been used to measure bone mineral density for several species of mammal (Lam et al. 1999). The use of CT enabled precise assessment of the cross-sectional shape, including that of internal cavities, of each scan site and resulted in the most accurate bone mineral density measurements to that point. CT analysis of several ungulate taxa documented the highest bone density to be, among cranial elements, in the teeth and the petrous and, among postcranial elements, in the middle shaft portions of long bones (Lam et al. 1999).

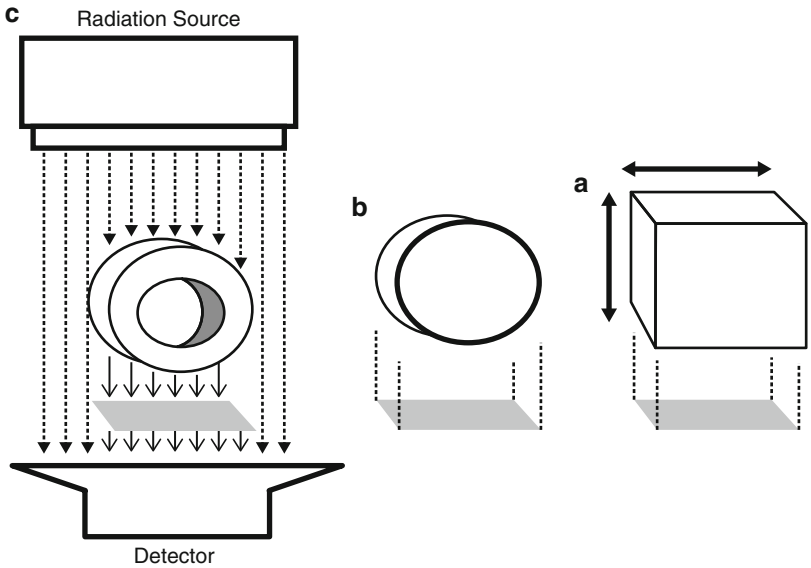

Bone Density Studies in Environmental Archaeology, Fig. 1 A schematic representation of photon densitometry, after Kreutzer (1992). The detector cannot determine the shape of the bone; it measures bone mineral *content*. The accuracy of the density value derived for each scan site (in this illustration, the middle shaft portion of a long bone) directly reflects the accuracy of the determination of the cross-sectional area. In "A," the cross section of the scan site is estimated to be a *rectangle* of maximum width and height. Such data underestimate the density of all scan sites and are categorized here as Class A. In "B," the external outline of the cross section is measured, but the internal cavity is not. Data produced in this manner are categorized as Class C and represent *bulk density*. They underestimate *true density* wherever an internal cavity occurs. Data that account for both external and internal shape ("C") are categorized as Class D and represent *true density*. The assessment of internal shape must be conducted independently of photon densitometry

Despite the advantages of CT, the use of photon densitometry has remained common in bone density studies. Recently, another nondestructive technology – digital photodensitometry – has been introduced to archaeological research into bone density. This technology allows the examination of large samples at low cost but, like photon densitometry, cannot measure internal cavities (Symmons 2004). In order to produce accurate density measurements, these technologies must be supplemented with the use of an independent method, such as water displacement or CT, that can determine the size of internal cavities.

The problematic effects of multiple methodologies of variable accuracy and precision can be seen in the divergent density values that have been produced for a single taxon (Fig. 2). Lam and Pearson (2005) conducted a review of bone density studies in archaeology, categorizing published density data sets for mammalian taxa into one of four classes: A–D, from least accurate to most accurate. Class A studies calculated density as if the cross section of the bone was a rectangle, with sides of maximum width and height (Fig. 1A). This invariably represents an overestimation of the cross-sectional area, resulting in an underestimation of bone density. The degree of inaccuracy varies with scan site, depending on how closely the cross section of that site corresponds to a rectangular shape.

Studies categorized as Class B and Class C accounted for the external shape of the cross section, with Class B studies using a rough, geometric estimate (e.g., circle, triangle, polygon) and Class C studies deriving an actual measurement of the external outline of the scan site; however, neither accounted for the presence and size of the medullary cavity. The accuracy of Class B data varies according to how closely the geometric estimate matches the shape of the cross

section. Class C data should be accurate for scan sites that have no internal cavity (Fig. 1B). Only Class D data demonstrate accuracy across all scan sites, accounting for both the shape of the external contour and any internal cavities, but data sets in this class remain few. Some studies have derived density values in more than one class for comparative purposes. Class C density values have been found to be up to 1,000 % higher than Class A values and Class D values up to 120 % higher than Class C values for the same scan site (Lam & Pearson 2004).

The publication date of a bone density study does not inform as to the accuracy of the data it presents. In the past decade, some studies have continued the publication of Class A data, while others have presented methodological advances such as the combination of photon densitometry (to measure bone mineral content) and CT (to determine cross-sectional area) in the same study (Novecosky & Popkin 2005).

Class D data have proven significant in documenting the large difference in density between the epiphyses and shafts of long bones, a difference obscured by the inclusion in Class A–C data of the marrow cavity in the density calculations (Fig. 2). This observation has illustrated the importance of incorporating shaft fragments into the quantification of long bone abundance. Such fragments are more likely to survive in the archaeological record than those of epiphyses. Quantification based primarily on epiphyses will underestimate the overall abundance of long bones for situations in which density-mediated destruction has occurred; in addition, it may result in a bias for metapodials, which have relatively dense epiphyses and represent low-utility elements, over high-utility long bones such as femora, whose epiphyses are less dense. At Paleolithic sites, the failure to count shaft fragments may lead to a biased overrepresentation of low-utility elements, potentially resulting in the erroneous interpretation that the assemblage was accumulated through scavenging behavior (Marean & Kim 1998).

Lyman's (1984) bone density data set for deer was used widely by researchers, even in cases in which the species of interest was not deer. In the past twenty years, efforts have been made to collect density data for other species – primarily mammals (including humans [Galloway et al. 1997]), but also several species of fish (e.g., Butler & Chatters 1994) and bird (e.g., Cruz & Elkin 2003). Some studies of mammal species have observed significant intertaxonomic differences in bone density patterns; however, it remains unclear the extent to which they reflect differences in research methodology rather than actual differences in density. Lam et al. (1999) derived bone mineral density values for a small sample of bovid, cervid, and equid species, finding that overall patterns of bone density were extremely consistent among the three groups. Other studies (e.g., Gutiérrez et al. 2010) have found, for individual scan sites, a high degree of variation in bone density among individuals within the same taxon. While some of this variation may be attributable to differences in age, with the bones of juveniles being less dense than those of adults, the effects of other variables such as sex, diet, health, and activity levels on bone density require further investigation. A thorough documentation of the range of intrataxonomic variability is a prerequisite to any assessment of differences in bone density between species.

Additional challenges to be addressed include the use of bone density data in quantitative

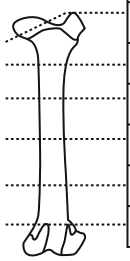

	I	II	III	IV	V
FE 1	0.28	0.34	0.57	1.03	0.60
FE 2	0.16	0.40	0.38	0.75	0.61
FE 3	0.20	0.39	0.46	0.76	0.66
FE 4	0.36	0.51	0.69	1.01	1.33
FE 5	0.24	0.41	0.54	0.81	0.56
FE 6	0.22	0.23	0.35	0.85	0.50

bone mineral density (g/ml)

Bone Density Studies in Environmental Archaeology, Fig. 2 Published bone density values for different scan sites of a sheep or goat femur, taken from five different studies. Columns I, II, and III represent Class A data; column IV represents Class C data (bulk density); column V represents Class D data (true density) (see Lam & Pearson (2005) for sources)

analyses. The standard use of correlation/regression analysis in many studies to examine the relationship between bone density and bone survivorship requires the condition that each individual identified in a faunal assemblage was originally represented by an entire skeleton. It also requires the condition that all the preserved remains of that skeleton were recovered and identified. As neither condition is likely to hold for most archaeological fauna assemblages, researchers must modify their quantitative analyses as appropriate (Lam & Pearson 2004; Novecosky & Popkin 2005). Continued research is required to produce accurate density values for larger samples, to assess the range of intrataxonomic and intertaxonomic variability in bone density, and to provide effective methods for incorporating bone density data into archaeological analyses.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Dart, Raymond Arthur
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Middle-Range Theory in Archaeology
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy in Human Evolution
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts

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Introduction

Differentiating human and nonhuman bone has important applications in both archaeological and forensic contexts and can be particularly challenging when skeletal remains are fragmentary. Archaeologists often make initial determinations about whether skeletal remains are human or not in the field, although more detailed analyses often take place in the laboratory, particularly for bulk bone recovered during excavation. In cases where skeletal remains are found unexpectedly, one of the first questions in establishing whether the remains have forensic significance involves determining whether they are of human or nonhuman origin. Differentiating human and nonhuman bone can be achieved through a variety of methods, including gross, histological, and molecular analyses. More detailed reviews of these methods can be found in Hillier & Bell (2007), Mulhern (2009), and Mulhern & Ubelaker (2012).

Definition

Human bone is most likely to be confused with mammalian bone, particularly mammals that are about the same size. However, the human skeleton is adapted for bipedal locomotion, resulting in many easily distinguishable skeletal features throughout the skeleton, particularly related to the morphology of joints and muscle attachment sites. The human skull is also readily identifiable, with the combination of a very large brain case and flat face. In general, human bones show less pronounced muscle markings and flatter, less sculpted joint surfaces than nonhuman mammalian bones. For a photographic reference for distinguishing human and nonhuman mammalian bone, see France (2009).

A large cranial vault and thinner cranial bones distinguish the human skull from other mammals of comparable size. Also, the opening to the brainstem (foramen magnum) is located directly underneath the skull in humans and toward the back of the skull in quadrupedal animals. The human face shows no projection of the nasal area or the jaws, unlike other mammals.

In humans, the spine exhibits a characteristic "S" shape when fully articulated to accommodate upright posture. In addition, the size of the vertebrae becomes dramatically larger toward the lumbar spine because of the need to support body weight. In quadrupeds, the articulated spine has more of a "C" shape with vertebrae that are more uniform in size throughout the spine.

The human thorax is most similar to an ape, with a broad, shallow rib cage resulting in ribs that have a more pronounced c-shaped curve than seen in a typical quadruped. Humans have a long clavicle and very mobile shoulder, elbow, and wrist joints. Also seen in apes, this combination of features is not characteristic of other mammals of similar size. Most mammals have greatly reduced or absent clavicles as well as more stable, restricted shoulder girdles and elbow and wrist joints. Specific skeletal features to look for in humans included a rounded humeral head, reduced olecranon process of the ulna, and broad contact between the capitulum of the humerus and the radial head.

The human pelvis is unique among mammals, with a bowl shape capable of supporting internal organs with an upright posture. The broad iliac blades accommodate the repositioning of gluteal muscles needed to offset torque forces caused by supporting the body weight on alternating limbs during bipedal striding.

The lower limbs in humans show many adaptations to bipedal locomotion. The thighs are angled from hip to knee to position the limbs directly underneath the body. This can be seen in the medial angle of the femur. The hip, knee, and ankle joints in humans are robust to

accommodate body weight. The human tarsals are also very robust compared to other mammals. Humans have five digits in the foot; the first (medial) digit is the most robust. Many mammals have a reduced number of digits. Due to similarities in size and overall morphology, bear paws are commonly mistaken for human feet (and hands) in North America, particularly when partially fleshed with the claws missing. Anatomical differences between a human foot and bear foot include the relative length of the digits; humans have longer medial digits, and bears have longer lateral digits. Also, the tarsal bones of a bear are not as robust as their human counterparts, and the metatarsal heads of bears each have two associated sesamoid bones, whereas only the first metatarsal head in humans exhibits sesamoids. Specific features of the lower limbs characteristic of humans include a femoral greater trochanter that is shorter than the femoral head, a lateral lip on the anterior aspect of the distal femur that helps to hold the patella in place, and a platform-like talus.

In cases where it is not possible to confirm or exclude human origin based on gross analysis, histological methods may be useful (Mulhern & Ubelaker 2012). Histological analysis is necessarily destructive and requires specialized equipment and training. Preparation of histological specimens typically involves removing a cross section of a bone and grinding it down to a thin wafer that can be mounted on a microscope slide for viewing under a light microscope. The overall organization of histological structures, as well as the size and shape of structures may provide important clues regarding the bone's origin.

Mammals that grow quickly in size such as cows, deer, and sheep typically have bone that exhibits a plexiform structure, with a rectangular organization (Fig. 1). This type of pattern is not found in human bone and, if observed, can be used to rule out bone of human origin (Mulhern 2009). A pattern of linear bands of primary and/or secondary osteons is also consistent with nonhuman bone (Fig. 2) and rarely seen in human bone. Human bone is characterized by haphazardly distributed secondary osteons, or Haversian systems embedded within lamellar bone (Fig. 3), but is not unique in this respect, as many other mammals (including those with plexiform bone) also have bone with this type of pattern. In particular, large carnivores exhibit Haversian bone-like humans. This is potentially problematic in a forensic context, since size of the bones could be similar.

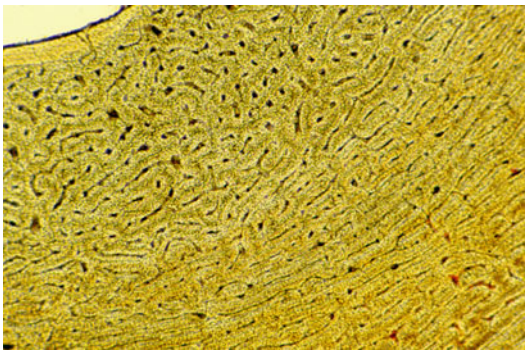

Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts, Fig. 1 Plexiform bone in a sheep femur

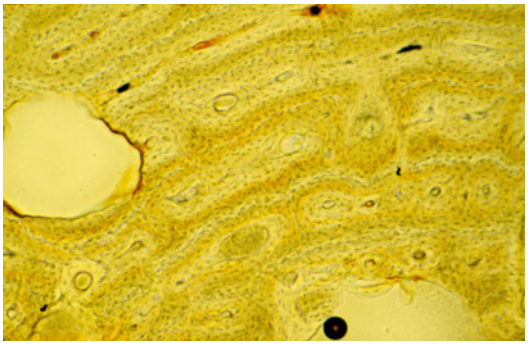

Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts, Fig. 2 Osteon banding in a miniature swine femur

Key Issues/Current Debates

Attempts have been made to apply metric analysis of histological structures (such as osteon size or Haversian canal size) to identify

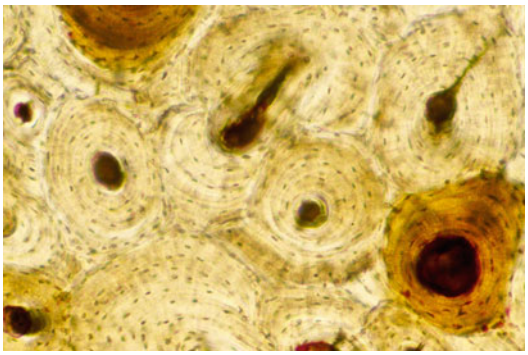

Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts, Fig. 3 Haversian bone in a human femur

differences among species, but the accuracy of many of these studies is questionable because they are based on small sample sizes (Mulhern & Ubelaker 2012).

Overall, studies show that humans have larger Haversian canals than most mammals; however, most studies are based on relatively small sample sizes, so the extent of variability is not well understood. Osteon sizes in humans overlap those of other mammals, particularly those with medium or large body sizes. Several studies have also attempted to develop discriminant function equations that can be used for distinguishing human and nonhuman bone based on histomorphometric variables such as osteon and Haversian canal size. A new area of research involves an investigation of the circularity of osteons, which suggests that osteons in nonhuman bone are more circular than those found in human bone. A complete review of these methods can be found in Mulhern and Ubelaker (2012).

Biomolecular methods including radioimmunoassay and mitochondrial DNA analysis have also been used for species identification, which is particularly important in wildlife forensics; applications of these studies are summarized in Mulhern (2009). The cost of such methods makes gross analysis and histological methods preferable when possible.

Future Directions

Future directions for distinguishing human and nonhuman bone include an expansion of our understanding of the variability of bone histology among species as well as among and within bones of individuals. As more studies involving larger sample sizes provide additional data, the accuracy of methods used to distinguish human and nonhuman bone based on histological structures will likely improve.

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ Bone, Trauma in
- ▶ Bone: Chemical Analysis
- ▶ Bone: Histological Analysis
- ▶ Commingled Remains: Field Recovery and Laboratory Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

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Bone Tools, Paleolithic

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Introduction

"Bone tool" is a generic term used to identify implements made of various animal tissues that include bone, tooth, antler, and ivory. During the Paleolithic (2.6 Ma to ~10,000 BP), these tools took different forms and have been studied by archaeologists to address a variety of questions. Researchers have investigated early purported bone tools in an attempt to identify firm criteria to distinguish between marginally modified or used tools and bones altered by natural causes. Bones interpreted as genuine tools have been investigated to gain a better understanding of early hominin adaptation, technology, and cultural traditions. Different research questions have concerned the emergence and diversification of formal bone tools, defined as functional artifacts shaped with techniques specifically conceived for bony tissue, such as scraping, grinding, grooving, and polishing. For much of the twentieth century, formal bone tools were seen as a technological innovation directly stemming from the spread of anatomically modern humans across Europe at the beginning of the Upper Paleolithic and strictly associated with a suite of critical inventions that followed this peopling event (cave and mobiliary art, personal ornaments, blade technology, complex funerary practices, musical instruments, etc.). Upper Paleolithic bone industries were used in this framework to support the scenario of a cognitive revolution occurring in Europe at c. 40,000 years ago. The discovery of bone awls and projectile points at a number of Still Bay (d'Errico & Henshilwood 2007) and Howiesons Poort (Backwell et al. 2008) sites from southern Africa, securely dated to between 75 and 60 ka, has challenged this view, but not the significance attributed by many archaeologists to this category of material culture. The early appearance of bone tools in the African Middle Stone Age, together with pigments and personal ornaments, has been used to support the so-called Out-of-Africa scenario for the origin of behavioral modernity, linking the origin of our species in Africa around 200,000 years ago with the gradual emergence of modern culture on that continent. In this context, bone tools are interpreted as a significant behavioral corollary of the emergence of anatomically modern humans in Africa. However, some authors have cautioned that Middle Stone Age sites with advanced bone tools are rare and that the cognitive implications of formal bone tool manufacture are uncertain (Backwell et al. 2008). In addition, bone industries that show a level of technological complexity, equivalent to that normally associated with Upper Paleolithic cultures produced in Europe by modern humans, are associated with transitional technocomplexes such as the Châtelperronian in France and Spain and the Uluzzian in Italy and Greece. The former technocomplex is now firmly attributed to Neanderthals, but the authorship of the latter is uncertain due to the scarcity and ambivalent features of the human remains associated with those layers. This implies that the ability to produce formal bone tools may not be the preserve of modern humans. In parallel with these studies, the complexity of Upper Paleolithic bone tools has stimulated research seeking to document the technological, typological, and functional changes that characterized bone tool industries in Eurasia between 40 and 10 ka. In this review we will focus on these different topics and summarize recent advances in the field.

Definition

A bone tool is taken here to be an implement that can be used to achieve a task or modify or

produce an item. This definition does not include categories of bone artifacts used in nonfunctional activities, such as musical instruments, notations, and ornaments. This entry focuses on Paleolithic bone tools from Africa and Europe.

Historical Background

Earlier Stone Age of Africa

Ever since Dart interpreted bones from Makapansgat as tools, an interpretation largely rejected, research interest has focused on whether some bone objects from early hominin sites should be interpreted as artifacts or the result of nonhuman taphonomic processes, which are known to produce pseudo-bone tools morphologically similar to human modified or used artifacts. Criteria for characterizing the patterns produced by specific agents are not always clearly defined, and the issue of equifinality compounds the problem. In light of this, it has become widely accepted that in order to distinguish between pseudo-tools and true tools, it is necessary to adopt an interdisciplinary approach, combining the analysis of a wide range of bones modified by known agents, taphonomic analysis of the fossil assemblages from which the purported bone tools derive, microscopic studies of possible traces of manufacture and use, experimental replication of the purported tools, and the quantification of the wear pattern. In 1959 Robinson proposed that a metapodial shaft fragment with a smoothed and pointed end from Sterkfontein Member 5 West (~1.7–1.4 Ma) was a tool. Thirty years later Brain described 68 similarly modified bones and horn cores from Members 1–3 at Swartkrans, dated ~1.8–1 Ma. Comparative scanning electron microscope inspection of replicas of the worn area on archaeological specimens, and experimental shaft fragments used to extract tubers from the ground and work skins, suggested to Brain and Shipman that the wear patterns on the smoothed tips of the Swartkrans specimens matched those produced experimentally. The anthropogenic nature of the material was later confirmed by Backwell and d'Errico (2001), based on comparison with a large reference collection comprising fauna modified by ten nonhuman agents, morphometric and fracture analysis of bone flakes from Swartkrans Member 1–3, experimental use of shaft fragments in a variety of tasks, microscopic analysis of natural, experimental, and archaeological wear patterns, and quantification of striation width and orientation on archaeological and experimental specimens. The breakage patterns and size of the bone tools, compared with the remainder of the faunal remains, indicated that early hominins selected heavily weathered, elongated and robust bone fragments for use as tools (Fig. 1). The wear pattern on the Swartkrans tools fitted most closely that created when excavating termite mounds in the Sterkfontein Valley. Evidence of shaping by means of grinding on some of the more robust horn cores suggests that the users had the cognitive ability to modify bone intentionally for optimal efficiency in the task for which they were used. These authors described 16 new bone tools from Swartkrans and used the enlarged collection to search for patterns of variation between members. No significant differences were observed between Members 1 to 3 in the type and size of the bone fragments used as tools, as well as in the length and type of the wear pattern, demonstrating that no major changes occurred through time in the bone type favored and the motion in which the tools were used. A functional study of the Sterkfontein and Swartkrans bone tools was also conducted by Van Ryneveld, who experimentally used bone tools in a number of tasks and compared the resulting patterns with that present on the Swartkrans specimens using scanning electron microscopy. She concluded, based on visual comparison between wear patterns and the productivity of the various activities involved, an anthropogenic origin for the wear and that archaeological tools were used to excavate subterranean plant foods in dolomitic ground, debark softwood trees, process hides, and extract termites from their mounds. More recently, Backwell and d'Errico (2008) recognized 14 bone pieces from the nearby site of Drimolen as digging tools (Fig. 1), indicating that the use of these tools was widespread at sites in the Sterkfontein Valley. In an attempt to refine the

Bone Tools, Paleolithic, Fig. 1 Selection of bone tools from the South African early hominin sites of Swartkrans (*top*) and Drimolen (*bottom*) (Images: Backwell & d'Errico)

functional interpretation of the bone tools from Swartkrans and Drimolen, they conducted a statistical analysis of 2D and 3D roughness variables obtained from a representative sample of archaeological, ethnographic, and experimental bone tools (d'Errico & Backwell 2009). Results show that the wear pattern on the early hominin bone tools from Drimolen is incompatible with that of tuber digging and very similar to termite foraging and fruit processing. Members 1–3 at Swartkrans contain the remains of the robust australopithecine *Paranthropus robustus*, while Members 1 and 2 have additionally yielded the remains of *Homo erectus*. The absence of this taxon in Member 3, from where most of the bone tools derive, suggests, but does not prove, that these implements were used by *Paranthropus robustus*. The association of a high number of *Paranthropus* remains with bone tools and the virtual absence of stone tools at Drimolen reinforces the hypothesis that *Paranthropus robustus* was the user of the South African bone tools. A different bone tool tradition is observed in East Africa, where Mary Leakey reported 125 artificially modified bones and teeth from Olduvai Beds I and II bearing evidence of intentional flaking, battering, and abrasion. These specimens derive from massive elephant, giraffe, and *Libytherium* limb bones, and to a lesser extent from equids and bovids, as well as from hippopotamus and suid canines. Shipman analyzed the collection microscopically and concluded that 41 of the bone pieces were modified by hominins and the remainder bore ambiguous

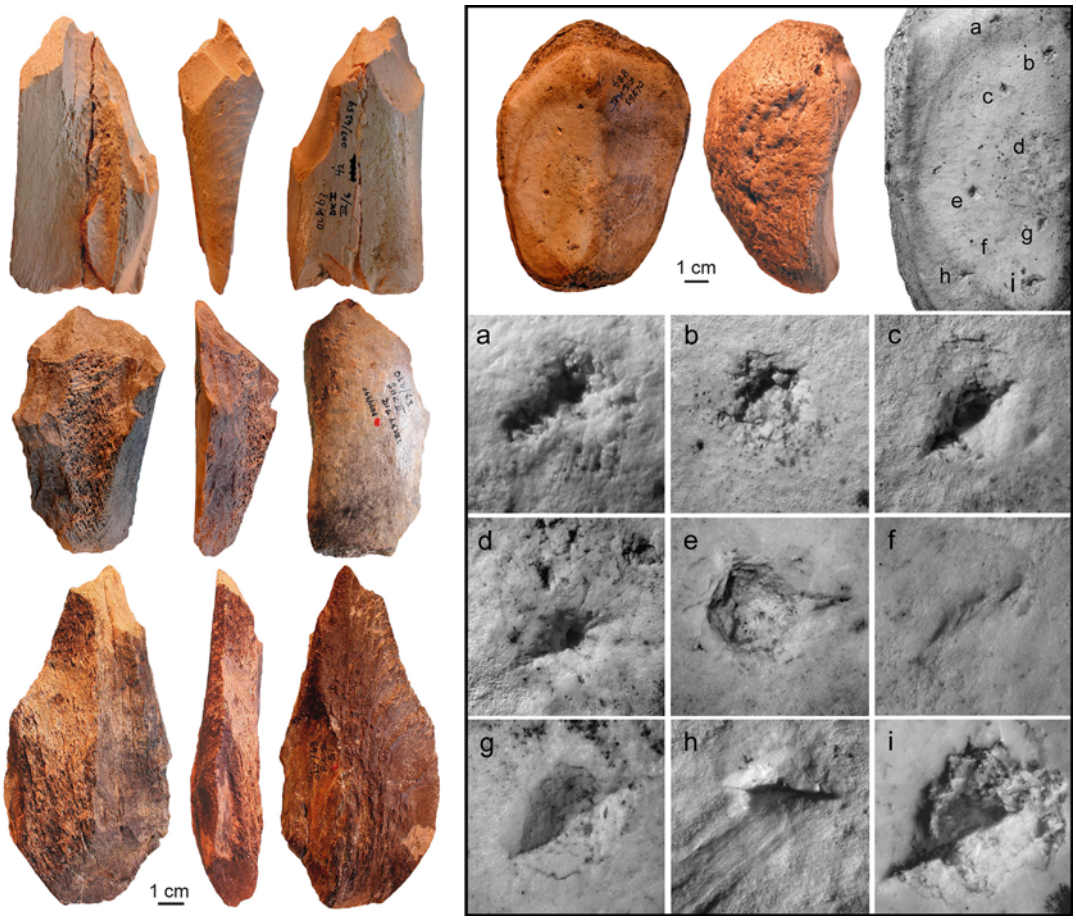

Bone Tools, Paleolithic, Fig. 2 Selection of bone tools from Olduvai Gorge showing intentional shaping through knapping (*left*), and an elephant patella (*right*), with impact marks (details) resulting from repeated striking against a pointed stone (Images: Backwell & d'Errico)

traces, or evidence of abrasion by sediment. A patella, astragalus, femoral condyle, and magnum bearing puncture marks were interpreted as anvils, and 35 implements were described as bones shaped by flaking prior to use. Twenty-six were interpreted as light-duty implements used on soft substances (hide-working), and the remaining 11 described as heavy-duty tools utilized on mixed substances, perhaps in butchering or digging activities. Backwell and d'Errico (2004) reanalyzed the collection, focusing on fracture patterns and flake removals. Comparative microscopic analysis of different areas of the purported Olduvai tools, and of the edges of bone pieces from the rest of the faunal assemblage, suggested to these authors that the surfaces of all of the purported bone tools are affected by postdepositional abrasion, rendering impossible the interpretation of the function of the tools based on the wear pattern alone. However, analysis of breakage patterns and removals identified a reduced number of pieces that are likely candidates for having been intentionally knapped. These comprise fresh bone shaft fragments and epiphyseal pieces bearing five or more flake scars, some of which are contiguous, with one or more anomalously invasive primary removals (Fig. 2). Most of them reveal a particularly high proportion of bifacially arranged removals, and they are virtually unaffected by

carnivore damage. They proposed that some bones functioned as handheld hammers (Fig. 2). An interesting aspect of their results lies in the stratigraphic occurrence of the bone tools. While Leakey and Shipman identified bone tools in all the beds, they identify, with one possible exception, bone tools only in Bed II. This suggests modification of bone fragments by knapping is not a behavior associated with the Oldowan, but with the more developed phases of this technological tradition (Developed Oldowan B) and/or the Early Acheulean. Knapped bone tools appear more systematically, according to their results, in coincidence with the appearance of remains of *Homo erectus* in middle and upper Bed II. The presence in a Bed II site of an intentionally knapped bone hand axe constitutes supplementary evidence that *Homo erectus* was responsible for the production of at least some of these bone tools. Similarly flaked bones are reported from other Acheulean sites, namely, Ternifine in Algeria, the Grotte des Ours in Morocco, and Gesher Benot Ya'aqov in Israel. Bones bearing traces interpreted as resulting from use are also reported at Melka-Konturé, Ethiopia, in layers dated to 1.7 Ma.

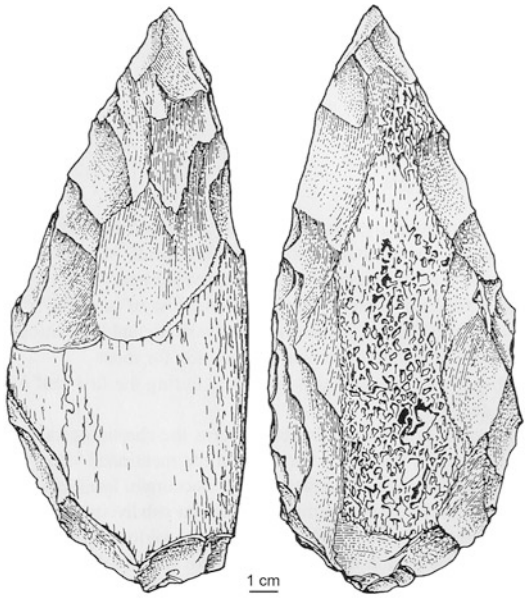

Bone Tools, Paleolithic, Fig. 3 Lower Paleolithic bone hand axe made of *Elephas antiquus* limb bone from Castel di Guido, Italy (Drawing: F. d'Errico)

Lower Paleolithic of Europe

Intentionally flaked tools are reported from 12 Lower Paleolithic sites in Europe, eight of which are in Italy. Acheulean-type bifaces, made by flaking elephant long bones, are known from three Middle Pleistocene sites in Italy: Castel di Guido, Fontana Ranuccio, and Malagrotta (Costa 2010). The Castel di Guido and Fontana Ranuccio specimens, in particular, show multiple scars on both faces with clear negative bulbs of percussion (Fig. 3). The use of long bone shaft fragments and an equid phalanx used to retouch stone artifacts is documented at the Middle Pleistocene site of Boxgrove in England. Putative bone and ivory points have been reported from at least six Lower Paleolithic sites in Europe, namely, Mesvin in Belgium, Bilzingsleben in Germany, Lunel Viel in France, Castel di Guido in Italy, and Torralba and Ambrona in Spain. Shaped bone and ivory points from the sites of Torralba and Ambrona were thought to have been used as awls or with wooden hafts, with the use of hafted bone and ivory points implying the employment of a spear armature technology. However, a reappraisal of the ivory points from Torralba, Ambrona, and Castel di Guido concluded that these pieces are natural, resulting from the accidental breakage of the tusks during the life of the animal (Villa & d'Errico 2001).

Middle Paleolithic of Europe

The use of bone or antler bases to retouch stone artifacts is documented at many Mousterian sites from Europe including Combe Grenal, Artenac, and La Quina in France, Riparo di Fumane and Riparo Tagliente in Italy, and on the Crimean peninsula (Patou-Mathis 2002). Recently, a human skull fragment from the Mousterian site of La Quina has been shown to be the oldest evidence of a human bone used as a tool in the form of a retoucher (Verna & d'Errico 2011). Bone and antler points are reported from at least 12 Middle Paleolithic sites: Butesti and Budzujeni in Moldavia, Prolom II in Crimea, Salzgitter-Lebenstedt in Germany, the Broion

cave in Italy, Castillo in Spain, and several French sites such as Combe Grenal, Vaufrey, La Quina, la Grotte de l'Hermitage, Pech de l'Azé 1, and Camiac. Some of the pieces were interpreted as points hafted on throwing or thrusting spears, while others were described as awls and borers. A collection of mammoth ribs and fibulae from Salzgitter-Lebenstedt in Germany is said to have been intentionally pointed and/or flattened, but these objects require reappraisal before they can be accepted as genuine artifacts because similar objects have been shown to be the result of natural processes. Bone described as intentionally flaked or retouched has been reported from a number of Mousterian sites (e.g., Cueva Morin and La Quina), but the possibility that flaking may have resulted from fracture for marrow extraction by humans or carnivores has been excluded in only a few cases. Firm evidence of worked, and in some cases decorated, bone awls comes from Châtelperronian and Uluzzian sites in France and Italy (d'Errico et al. 2011). Findings at Arcy-sur-Cure and Quincay in France (Fig. 4), dated to between 40 and 38 ka BP, have yielded good evidence of complex bone technology in the form of shaped and decorated awls. The late Mousterian levels at Buran Kaya III in Crimea have yielded one bone haft made of a horse metapodial and several bone tubes made on wolf and hare long bones, dated to between 36 and 32 ka BP.

African Middle Stone Age

An increasing number of bone tools are reported from Middle Stone Age (MSA) sites in Africa. These include bone objects from Broken Hill (Kabwe), Zambia, attributed to the early MSA and thought to be associated with *Homo heidelbergensis* (elsewhere named *Homo rhodesiensis*) and interpreted as two gouges and a point. A point from Mumbwa Cave is considered doubtful. Other evidence for bone working in the MSA is provided by barbed and unbarbed bone points from the Katanda sites (Fig. 5) in the Semliki Valley, Democratic Republic of the Congo, dated ~90–60 ka (Yellen et al. 1995). A point tip, a mesial fragment, an almost complete spear point, a tanged bone point, and 26 awls are reported from M1 and M2 layers at Blombos Cave, with ages ~84–72 ka (Fig. 6). A single massive point, different from those found in the MSA and LSA layers at Blombos Cave, was recovered in the dune sand layer, with an age of ~70 ka (d'Errico & Henshilwood 2007). An awl and a possible flaked shaft fragment come from the Blombos M3 phase, with an age of 98.9 ± 4.5 ka. The morphological variability in the bone points from Blombos Cave, and the size and weight of the one complete specimen, suggests that they are more likely spear points than arrow points. The interpretation of the Blombos bone artifacts as spear points is consistent with ethnographic and recent archaeological stone point dimensions, which show spear tips to be five times larger than arrow heads. A bone point from Peers (Skildergatkop) Cave was retrieved from either the Howiesons Poort (HP) or Still Bay layers at the site. A recent study of carbon-nitrogen ratios in the Peers point, and a sample of Later Stone Age (LSA) and MSA faunal remains from this site, confirms that the point originates from MSA layers (d'Errico & Henshilwood 2007). A single bone point was discovered at Klasies River in layer 19 of Shelter 1a at the base of the HP. A date of approximately 80–60 ka, centered on 70 ka, was suggested for the HP at Klasies River. The only other pointed bone implements known from the MSA come from Sibudu Cave. These items include a polished bone pin attributed to the late MSA, from layer Co with an age of ~35 ka, a second bone pin, from layer PGS, and a large bone point from layer GS. These two items occur in the HP sequence with age estimates >61 ka. In addition to a small spatula-shaped tool, the discovery of a collection of worked bone at Sibudu Cave (Backwell et al. 2008) confirms a bone tool industry for the Howiesons Poort technocomplex. Comparative microscopic and morphometric analysis of the large bone point from Sibudu with bone tools from southern African Middle and Later Stone Age deposits, an Iron Age occupation, nineteenth-century San hunter-gatherer toolkits, and bone tools used experimentally in a variety of tasks revealed that it is most similar to arrow points from LSA, Iron Age, and historical

Bone Tools, Paleolithic, Fig. 4 Selection of Châtelperronian bone tools from Grotte du Renne at Arcy-sur-Cure, France (*left*), and Uluzzian sites from Italy (Images: d'Errico/Vanhaeren/Borgia)

San sites. This is interpreted, together with the extreme symmetry recorded in the tip of the Sibudu point, as a shift from the use of hand-delivered bone spearheads in the Still Bay (at Blombos) to bow and arrow technology in the HP. If confirmed, the bone point from Sibudu Cave pushes back the origin of bow and bone arrow technology by at least 20,000 years, substantiating arguments in favor of the hypothesis that crucial innovations took place during the MSA in Africa. The Sibudu bone point also falls within the morphological variability of a type of unpoisoned fixed bone arrow point used by Bushmen for hunting small game and birds, which is in accordance with the associated fossil fauna, represented mostly by small forest antelope.

African Later Stone Age

Projectile bone points and awls are associated with the Border Cave Early LSA assemblage, with an age of ~36 ka BP, and bone points similar to those known ethnographically occur at many

Bone Tools, Paleolithic, Fig. 5 Selection of barbed bone points from Katanda, Democratic Republic of the Congo, interpreted as harpoons used for fishing (Images: F. d'Errico)

LSA sites in southern Africa, including Rose Cottage, Oakhurst, and Nelson Bay caves, as well as Jubilee, Bushman Rock, and Giant's Castle Rockshelters (Deacon & Deacon 1999). Unlike MSA points, which were typically modified through scraping, LSA points evidence shaping through scraping and grinding. Later Stone Age bone tool categories include finely worked arrowheads, linkshafts, spatulas, polished needles, awls, fish hooks, gorges, and pegs, many of which are incised and decorated. The production of a range of tools from different raw materials is thought to imply increased technological and social complexity and the possible emergence of craft specialization. Later Stone Age bone tools are frequently associated with a suite of other innovations that include microlithic stone tool industries, rock art, and decorative items like beads and shell pendants. Formal bone tools, as with many of the innovations that became common in the LSA, were already present, although rare, in the MSA. Grinding to shape formal tools is the only shaping technique that is virtually absent before the Later Stone Age.

Upper Paleolithic of Europe

This period is characterized by previously unseen complexity in the techniques used to manufacture bone artifacts, greater diversity in the raw materials used, and a proliferation of bone tool types and patterns used to decorate them (Camps-Fabrer 1988; Knecht 1993). During this period we also observe for the first time clear consistencies in the geographic distribution and association of bone tools, with some types widespread over large regions and others characterizing an area or a specific cultural facies. The Upper Paleolithic can be seen in this respect as a time in which all the bone/organic tools specific to hunter gatherers of high latitude appear and become established. Projectile point types, size,

Bone Tools, Paleolithic, Fig. 6 Bone tools from the Middle Stone Age deposits at Blombos Cave (Images: d'Errico/Henshilwood)

and the way in which they are prepared for hafting reveal a previously undocumented variability and complexity, suggesting the emergence of prey-specific and perhaps season-specific hunting equipment (Fig. 7). Evidence for the use of complex foreshaft and detachable projectile points appears at the beginning of the Upper Paleolithic and becomes more elaborate at the end of this period. Among the new tools that appear for the first time in this period, we find the boomerang – a specimen in mammoth ivory was discovered at Oblazowa, Poland, in levels dated to 23 ka BP (Valde-Nowak et al. 1987) – bone needles, spear throwers, and perforated batons at French sites dated to ~20 ka BP (Fig. 8). Harpoons made of reindeer and red deer antler become common in the Magdalenian ~13 ka BP (Julien 1982). Bone and antler tools

Bone Tools, Paleolithic, Fig. 7 (**a**) Aurignacian split base point from Spy, Belgium; (**b**) Early Gravettian spear point from Mazière, Belgium; (**c**) fragment of a spear point with bladelet inserts, and spear point (**d**) from the Upper Magdalenian levels of Pincevent, France (Images: courtesy M. Vanhaeren)

used as soft hammers, pressure flakers, and punches used for intermediate percussion flaking also become common during this period. A number of tools used in hunting and domestic activities, typologically labelled as perforated batons, spatulas, pegs, and knives, still need to be investigated to elucidate their most likely functions.

Key Issues/Current Debates

A review of the literature shows that research interest in prehistoric bone tools has focused mainly on three areas. The first concerns verifying the existence, deciphering the functions of early hominin bone tools dated to between 1 and 2 Ma, and identifying who used them. The second area of interest concerns formal bone tools from MSA deposits in Africa, and whether they may be taken as reliable proxies for the emergence of modern humans and so-called modern behavior. The third relates to Upper Paleolithic bone industries and the reasons for the high degree of technical and symbolic investment in their production. The manufacture of bone and ivory implements using techniques specifically conceived for these materials, such as scraping, grinding, grooving, and polishing, is generally considered to be associated with

Bone Tools, Paleolithic, Fig. 8 Harpoon (**a**) and *baton percée* (**b**) from the Late Magdalenian levels of the La Madeleine shelter, Tursac, France; (**c**) spear thrower decorated with a female ibex interpreted as giving birth (**a** and **c**, courtesy of Musée National de Préhistoire, Les Eyzies-de-Tayac; **b**, photo Descouens, courtesy National History Museum of Toulouse)

modern human behavior and advanced cognition. A reason for this view is that the final shape of a bone tool manufactured with these techniques can be accomplished with a high degree of accuracy, which makes "formal" bone tools especially appropriate for inferring the degree of standardization and complexity of a technical system. Another reason is that the production of tools from a range of raw materials is thought to imply a diversified strategy of raw material acquisition and the possible emergence of craft specialization and increased complexity in social roles. A third reason for linking social and cognitive complexity with the presence of bone tools is the view that elaborated bone tools are a technological innovation associated with the spread of anatomically modern humans across Europe at the beginning of the Upper Paleolithic, forming part of the suite of critical inventions that followed this peopling event. As such, Upper Paleolithic bone tool industries have been used to support the scenario of a cognitive revolution occurring in Europe at ~40 ka, but the discovery of bone awls and probable projectile points at a number of securely dated MSA sites in South Africa challenges this view.

International Perspectives

The emergence of bone technologies has traditionally been considered as coeval with the arrival of modern humans in Europe. Recent discoveries and reappraisal of old evidence reveal a more complex pattern, with two traditions of bone modification and utilization in South and East Africa during the Early Stone Age, convincing instances of bone shaping

through percussion at a number of Acheulean and Mousterian sites from Europe, and the systematic use of bones as retouchers in the Lower and particularly Middle Paleolithic of Eurasia. Clear evidence of complex bone technologies is found at Middle Stone Age sites in sub-Saharan Africa, at late Neanderthal sites from France and Italy, and at early Upper Paleolithic sites from Europe, Siberia, and the Near East. Abundant and diverse evidence for the use of bone as a raw material is associated with most Upper Paleolithic cultures, starting with the Ancient Aurignacian at ~40 ka. The broad implications of this emerging pattern for the cultural evolution of our lineage have not been explored in detail, mostly because researchers focus their attention on a single topic, site, or time period. Outdated paradigms regarding the evolution of stone and bone tool technology appear to have become established in the literature and thus in the minds of many scholars. It is widely accepted, for example, that the development of technology was a gradual process that proceeded in parallel with biological evolution and that the early use of bone tools was essentially immediate, involving only a short series of single-stage operations, and thus a low degree of conceptualization. It is also thought that bone tools shaped by knapping simply reflect the transfer of the percussion flaking technique from stone to bone and that early humans were incapable of developing sophisticated techniques specifically conceived for bone. Multidisciplinary research in the fields of archaeology, primatology, paleoanthropology, ethnography, genetics, and radiometric dating indicates a different scenario. The Paleolithic record of bone and stone tools shows that hominin technological evolution advanced in a nonlinear manner and that from the outset bone tools exhibit signs of innovation, manifest as implements intentionally modified through knapping and grinding. Current findings are at odds with the idea that hominins of the genus *Homo* were the only modifiers of early bone tools and do not support the hypothesis that the manufacture of formal bone tools is the exclusive domain of behaviorally modern humans. The identification of a discontinuous pattern, with innovations appearing and disappearing, or being associated in a way that does not match the expected trend, supports the view that bone and complex lithic technology do not necessarily represent reliable hallmarks of "modern behavior" and cannot be attributed an unequivocal evolutionary significance. A paucity of sites that have been excavated or dated using modern standards makes it difficult to establish whether the apparent disappearance of cultural innovations, particularly when these are embodied in small, fragile items, is due to sampling, excavation methods, destructive taphonomic processes, variability in subsistence strategies, or a loss of previously acquired cultural traits. In order to explain the discontinuous pattern in hominin technological evolution and the trans-species phenomenon of bone tool utilization in prehistory, we need to evoke social, demographic, and climatic factors, and their potential impact on similar innovations among geographically dispersed populations in Africa and Eurasia.

Future Directions

There is a cogent need to promote collaborative interdisciplinary research, bringing together specialists from different research traditions to analyze material and find the most suitable ways forward. We need to combine technological and morphometric attributes of bone tools to evaluate differences between sites and periods and identify regional clines and diachronic evolutionary trends. Finally, a georeference database of bone tool distribution across regions in which there are abundant sites with bone tool industries would assist in addressing the link between cultural and environmental change.

Cross-References

- ▶ African Stone Age
- ▶ Archaic *Homo sapiens*
- ▶ Australopithecines
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Dart, Raymond Arthur

- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Handaxes and Biface Technology
- ▶ *Homo habilis*
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Neanderthals and their Contemporaries
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Southern and East African Middle Stone Age: Geography and Culture

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Bone, Trauma in

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Introduction

Forensic anthropology is playing an ever increasing role in medicolegal death investigations. Beyond osteological analysis in a laboratory setting, forensic anthropologists work with law enforcement agencies to search for clandestine graves, assist at crime scenes in the recovery of human remains and associated evidence, assist medical examiners with trauma analysis in relatively recent cases, and conduct research, casework, and educational programs through academic settings. At the core of medicolegal death investigations are questions about cause and manner of death which may determine whether or not a crime was committed. Bioarchaeologists may apply a similar protocol of osteological methods to historic and archaeological populations for individual or population level trauma analysis. For forensic anthropologists who apply these methods to homicide investigations, the role is increasingly demanding as

they are called to testify in court about human identification, interpretations about inflicted trauma, and the time since death.

Deaths resulting from traumatic injuries are better contextualized through the study of skeletal trauma. On an individual level, ante- and perimortem injuries provide details about a person's life and death, and healed trauma reflects injuries or events that occurred throughout a person's life while those occurring in association with the death event may indicate the manner of death. Across a population, the prevalence of trauma provides information about activities, mobility, warfare, and the general health of a population. Several comprehensive literature reviews and original studies are included in Grauer (1995), Larson (1997), Roberts and Manchester (2005), and Buikstra and Beck (2006).

The population approach has been more widely used in bioarchaeological research involving analysis of historic or archaeological populations. However, a population approach to documenting trauma is critical to war crime and genocide investigations in which establishing the scale and widespread pattern of injuries prove the occurrence of unlawful mass atrocities (Kimmerle & Baraybar 2008). Consequently, the analysis of trauma in bone has many applications for anthropological research today.

Historical Background

Skeletal trauma has been used to document injuries that occurred during a person's life (antemortem trauma) as it may be useful in human identification when antemortem records are available for comparison or show patterns of activity (Fig. 1). In traditional approaches, the process of documenting skeletal trauma has been largely descriptive and focused on fracture classification (Ortner & Putschar 1981; Mann & Murphy 1990; Buikstra & Ubelaker 1994; Galloway 1999). Increasingly, contextual information is incorporated into an interpretation of which injuries occurred and to some extent, the circumstances surrounding the event. Contextual information may include burial factors at the crime scene, clothing, associated artifacts, radiography and other scanning technologies, bone density, and histology (Brogdon et al. 2003; Kimmerle & Baraybar 2008; Komar & Buikstra 2008).

Bone, Trauma in, Fig. 1 Close-up view of left face showing healed, antemortem fractures to the nasal bones and maxilla

Key Issues

Terms and Concepts

Skeletal trauma is typically described by the mechanism of force: sharp, blunt, sharp-blunt, or projectile trauma (Table 1). Injuries resulting from gunfire (GSW) are categorically placed with blunt trauma as they produce a crushing force to the bone. However, for practical purposes, GSW injuries are often uniquely categorized. Likewise, projectile trauma may include gunfire or explosives. Injuries resulting from explosive or blasting forces result from blunt trauma, projectile trauma, pressure changes, and burning. Increasingly, modern investigations into crimes occurring during conflicts include many examples of explosive injuries such as those resulting from the shelling of civilian populations, mortars, grenades, or other acts involving explosive devices. Since these types of injuries result from

Bone, Trauma in, Table 1 Mechanisms of skeletal trauma

Category	Mechanism of force	Examples
Blunt trauma	Crushing, bending, twisting	Hammer, bat, club, crowbar, fist or foot (stomping)
Sharp trauma	Cutting, stabbing, puncturing	Knife or blade, saw
Blunt-sharp trauma	Crushing, cutting, hacking	Machete, axe, hatchet
Blasting trauma	Crushing, projectile, burning	Explosive ordinances, mortars, grenades, pipe bombs
Gunfire trauma	Crushing, projectile	Handgun, rifle, shotgun, submachine or machine gun

several mechanisms (i.e., projectile and blunt trauma), they are also often described in a unique category.

The timing of fractures or injuries is critical to correctly interpreting the circumstances surrounding the incident (Table 2). Trauma occurring at the time of death and in association with the death event is called perimortem trauma. Differentiating perimortem "injuries," "fractures," "defects," or "trauma" from postmortem "damage," "breakage," or "scavenging" is often highly scrutinized in court when one party wants to cast doubt on the timing of the injuries or the opinionated cause of death (Fig. 2).

The use of the terms "ante-" and "perimortem" trauma can also be confusing at times, since the pathologists occasionally combine "ante- and perimortem trauma" into one category of "antemortem." The difference is the presence of tissue reaction to the injured area, be it inflammation or repair, which does not have time to develop in the perimortem period. Usually, such determination can be based on microscopic rather than gross examination. An anthropologist, relying on skeletal evidence, also attempts to differentiate trauma that occurred while a person was living (antemortem) from that which is associated with the death event (perimortem). This can be based on evidence of healing or patterns of the injury and its survivability. However, the window of timing would be typically wider than the one based on microscopic evaluation of inflammatory reaction, which has sequential pattern. Examination of skeletal remains usually would not inform directly about the mechanism of death, for example, hypovolemic/hemorrhagic shock and

Bone, Trauma in, Table 2 Timing of fractures

Category	Morphological characteristics of fractures and/or defects
Antemortem (injury occurred prior to death and is NOT associated with the death event)	Fractures show signs of healing, i.e., porosity, new bone growth, callus formation, or infectious lesions
Perimortem (injury occurred at or around the time of death and IS associated with the death event)	Fractured margins are sharp and even. Bone may bend inward or away from direction of force. Radiating fractures from point of impact may be present
Postmortem	Damage to bone may include breakage, weathering, and erosion due to soils and water, or animal scavenging. Damaged margins tend to be uneven and rough in texture without evidence of radiating fractures. Bone elasticity is diminished and fractures are not consistent with "bending" quality of living tissue

Bone, Trauma in, Fig. 2 Postmortem breakage – an artifact of taphonomic processes, not inflicted trauma (Modified from Kimmerle & Baraybar 2008)

suffocation; however, it may be often reasonably inferred, and on occasion, microscopic findings at the injury site may be helpful.

In the course of homicide investigations, differentiating perimortem trauma from postmortem artifacts is important for determining the cause of death and other mitigating factors such as the intent to kill vs. wound or the atrociousness of the crime. In human rights investigations, such as those associated with modern conflicts, patterns of injuries may be indicative of specific crimes that are committed and differences are often observed among civilian causalities vs. genocide victims (Meddings 1997; Coupland & Meddings 1999; Michael et al. 1999). Due to protective clothing and the nature of modern combat, fewer casualties sustain gunfire injuries to the thorax. However, a group of casualties exhibiting multiple gunfire injuries to the thorax, shot back to front, are more likely civilians or executed soldiers rather than soldiers who were lawfully killed on the battlefield.

The protocol and methods used to identify, document, analyze, and present trauma are applied to both past (i.e., bioarchaeological) and current populations (i.e., forensic cases or war crime investigations) (see Table 3). However, the context, location, culture, and timing of the incident must be taken into account when approximating a specific weapon or the general circumstances around the mechanism of the injury. For example, a semi-patterned defect on a skull may be the result of blunt trauma. Determining the specific weapon used and context of events that occurred will depend on whether the skull relates to a recent homicide victim or, for example, a Roman soldier from the third century. Understanding the context and accounting for a number of variables about the individual and population are important for creating the most accurate and comprehensive interpretation of events. Therefore, part of the protocol for interpreting skeletal trauma should include a range of factors as discussed in Table 4.

Bone, Trauma in, Table 3 Protocol for trauma analysis

Specific anatomical location
• Describe the bone, side, and aspect of each area affected
• Where necessary and/or possible, reconstruct bony fragments. Establish the number of injuries which may consist of one or more bone fractures/defects
Type of fracture and/or defect
• Simple or comminuted/complex
• Complete, incomplete, partial
• Linear, radiating, concentric
• Fracture line or defect: describe morphology, size, and location
• Mechanism of force such as crushing, compression, or twisting/spiral
Number of injuries
• This may be fewer than the number of fractures if one injury caused multiple bones to fracture
Sequence of multiple injuries
• To sequence multiple bone injuries, assess where the factures or evidence of injuries overlap one another
Direction and speed or "velocity" of force
• Use only very general or broad descriptions and avoid commenting on "velocity" in cases of GSW. The range of ammunition and types of weapons do not conform to allow a standard use of these terms
• Location of injuries should include bone, side, region, and aspect
• Direction of force should be broadly descriptive, i.e., "left to right" or "up to down"
Timing of injury
• Morphological characteristics of fracture margins (ante- or perimortem)
• Histological analysis of fracture margins for timing of injury
• Report any postmortem damage if present and differentiate from traumatic injuries
Documentation methods
• Draw, sketch, and photograph bones
• Document injuries both prior to and following cleaning, washing, or processing
• Radiograph bones and clothing
• 3D imaging through laser or CT scanning
• Microscopy of fractured edges, particularly useful for cut marks and sharp trauma
• Histology of fractured edges may assist with timing of injury (i.e., ante- vs. perimortem)

Interpreting skeletal trauma by direct examination of the skeletal remains reveals evidence that soft tissues or radiographs alone cannot always demonstrate. In some cases, the number of skeletal fractures is greater than the number of soft tissue injuries evidenced by an external examination of the body. In contrast, inflicted trauma resulting in death may consist of soft

Bone, Trauma in, Table 4 Epidemiological approach to interpreting skeletal trauma

Demography (i.e., age, sex, ancestry of decedent)
Context (i.e., facts about the scene, modes of deposition, witness statements, crime scene forensic evidence such as blood patterns)
Location of death (i.e., public place or private residence)
Burial factors (i.e., primary or secondary crime scene/burial location, buried or surface remains, use of containers for concealment)
Intent
Scientific protocols
Methods for differential diagnosis
Weaponry and ballistics science
Cause, manner, and mechanisms of death

tissue injuries without the presence of skeletal fractures or defects. There is a misperception that without soft tissues, investigators are limited in their ability to reach definitive conclusions about the cause or manner of death. Even in cases where the specific cause of death is unknown (whether due to decomposition, the mechanism of injury or incomplete recovery), the manner of death may be homicide as evidenced by the circumstances of the death. In such cases, the context and other investigative facts combined with skeletal trauma enable a ruling such as "*homicide due to unspecified traumatic causes, homicidal violence*, or *battered baby/child syndrome*."

The morphology of skeletal trauma is shaped by internal (i.e., the particular area of bone affected), extrinsic (i.e., the type of weapon), and other factors (i.e., whether or not it resulted from act of volition). By reconstructing the bony fragments, information may be gained about the type of weapon, the number, and in some cases, the sequence of injuries. The critical first step is to differentiate perimortem trauma from postmortem or taphonomic artifacts. In other words, fractures that result at the time of death and may have contributed to the death have to be differentiated from animal scavenging, warping due to ground pressure for buried remains, surface weathering, or excavation damage (Fig. 2).

Documentation of Skeletal Trauma

The documentation of injuries should include a description of the specific bone/side/aspect affected and the particular features present such as the type of fracture or defect, its size, and extent. Skeletal trauma may consist of a fracture, dislocation, subluxation, or defect. Fractures may be classified as simple and complete, partial/incomplete or "greenstick," comminuted, spiral, compression, depressed, hinge, or buckle. A number of references define and outline characteristics for each type of fracture, as well as the common eponymous fractures referred to in pathology (refer to Ortner & Putschar 1981; Mann & Murphy 1990; Buikstra & Ubelaker 1994; Galloway 1999; Kimmerle & Baraybar 2008; Waldron 2009).

Mechanisms of Injury

Once skeletal injuries are delineated, the morphology of wounds, defects, and fractures provides information on the mechanism of injury (Kimmerle & Baraybar 2008). The common mechanisms and general characteristics for each category are summarized below:

- Blunt Trauma
  - Characterized by an object that crushes tissue. Skeletal tissue bends and may have a depressed or bent appearance. If enough force is applied, the tissue will fracture.
  - An object may strike the individual or the individual may be expelled toward an object (i.e., a person's head hits the dashboard of a car during a motor vehicle accident).
  - Gunfire injuries and shrapnel or explosive injuries are forms of blunt trauma, but generally are categorized separately due to the amount of force and other characteristics also involved with these mechanisms such as burning and the presence of shrapnel.
  - Examples of objects resulting in blunt trauma include a fist, baseball bat, hammer, and floor (Figs. 3–5).
- Sharp Trauma
  - A penetrating object that cuts tissues and bone.
  - May be associated with blunt trauma, particularly with hacking types of weapons

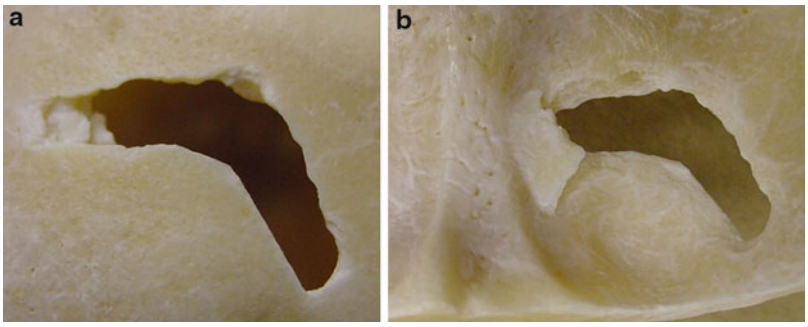

Bone, Trauma in, Fig. 3 Patterned cranial defect resulting from blunt impact. The ectocranial (*A*) and endocranial (*B*) views are demonstrated (Modified from Kimmerle & Baraybar 2008)

Bone, Trauma in, Fig. 4 Patterned cranial defect with concentric and depressed fractures, resulting from blunt impact from a long, linear object (Modified from Kimmerle & Baraybar 2008)

Bone, Trauma in, Fig. 5 Multiple blunt impacts to the right side of the skull, toward the posterior aspect of the cranium. Multiple points of impact evident by the depressed and concentric fracture patterns (Modified from Kimmerle & Baraybar 2008)

such as machetes or axes. Hacking trauma is often classified as sharp-blunt trauma due to the amount and nature of the force applied as well as the characteristics of hacking instruments.

- Sharp trauma includes different types of wounds: stabbing, incised, and puncture.
- Stab and incised wounds to bone often result in cut marks, whereas puncture wounds may result in patterned defects depending on the instrument/weapon.
- Sharp trauma such as cut or saw marks resulting from postmortem dismemberment should be carefully delineated as such. While it may not be possible to determine whether the person was alive at the time of dismemberment if there is not clear evidence of the cause of death, it should be pointed out when sharp trauma is present in the form of dismemberment as opposed to incised or puncture wounds from cases of stabbing. The number, location, and type of sharp defects in the areas of major joints provide strong evidence of dismemberment.
- Many postmortem artifacts such as animal scavenging and surface cracking due to weathering may mimic sharp trauma.

Bone, Trauma in, Fig. 6 Anterior view of body of a cervical vertebra illustrating numerous linear cut marks, resulting from sharp trauma (Modified from Kimmerle & Baraybar 2008)

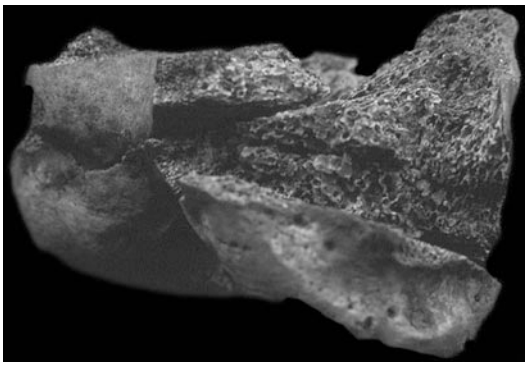

Bone, Trauma in, Fig. 7 The lateral aspect of the distal articular surface of the left femur with multiple depressed and cut areas of bone resulting from numerous injuries with a machete. The presence of crushed, bent, and cut bone is indicative of hacking trauma (Modified from Kimmerle & Baraybar 2008)

Bone, Trauma in, Fig. 8 Gunshot entrance wound, resulting from a handgun. The small circular defect has two very small radiating fracture lines (*A*) and (*B*). The bullet did not exit the skull but extended to the left side and ricocheted leaving behind gunshot residue evident in the radiograph

Bone, Trauma in, Fig. 9 Gunshot entrance wound resulting from an AK47. Note the larger diameter of the defect featured in Fig. 8 and the presence of radiating fractures (Modified from Kimmerle & Baraybar 2008)

  - Examples include knife, axe, hatchet, machete, and glass (Figs. 6, 7).
- Gunfire
  - Injuries characterized by a handgun, rifle, shotgun, submachine, or machine gun (Figs. 8–12).
  - The class of weapon, general distance of shot (close vs. distant), number, and sequence of injuries may be determined from skeletal injuries.
  - Skeletal defects tend to be patterned and reflect the shape of the projectile. Therefore, bullets that hit bone perpendicular have a circular appearance with a diameter consistent with the size of the bullet. Projectiles that are irregularly shaped or hit the bone at an angle or tangentially will produce a sideways or irregular-shaped defect.
  - Bullets that penetrate the body may fracture more than one bone and/or change direction within the body or calvarium, sometimes referred to as "ricochet." The number of wounds needs to be delineated

Bone, Trauma in, Fig. 10 Gunshot exit wound. Note its irregular shape and the external beveling along defect margins (Modified from Kimmerle & Baraybar 2008)

Bone, Trauma in, Fig. 11 Gunshot exit wound. Note the external beveling along defect margins and extensive fracturing (Modified from Kimmerle & Baraybar 2008)

from the number of injuries as one bullet may cause several wounds.

- Blast Injuries
  - Creates thermal, blunt, sharp, and penetrating trauma (Fig. 13).
  - Shrapnel creates irregular-shaped penetrating defects in skeletal tissue and may become embedded in bone.
  - Skeletal defects and fracture morphology are largely affected by extrinsic factors such as the type and amount of explosive, location of the incident (i.e., in an enclosed space vs. outdoors), and the type of surrounding materials which may become projected shrapnel.

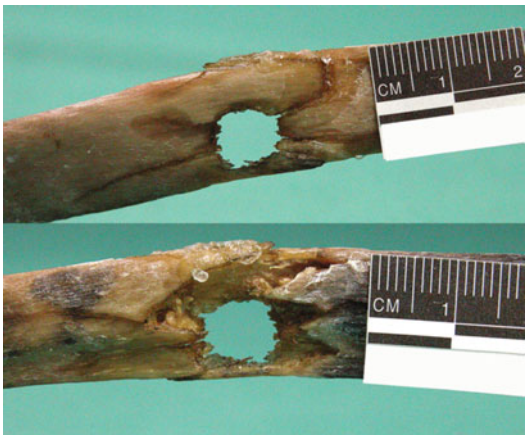

Bone, Trauma in, Fig. 12 Gunshot wound, through and through to rib showing entrance and exit sides of the bone with radiating fractures and beveling (Modified from Kimmerle & Baraybar 2008)

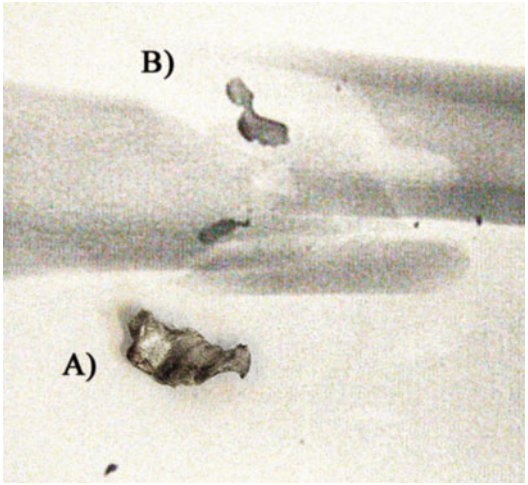

Bone, Trauma in, Fig. 13 Shrapnel recovered from thigh region following mortar attack. The metal fragment (*A*) is shown next to the radiograph which depicts the fragment embedded in the bone (*B*)

- Burning Injuries
  - Causes discoloration, fractures, bone shrinkage, and dismemberment.
  - Trauma inflicted prior to burning is still evident even after severe burning.
  - Burning may result from the incident at time of death, such as an automobile accident or explosion. Burning may also be used postmortem in an attempt to hide or destroy evidence.

- Evidence of Chronic Abuse, Neglect, or Torture
  - Skeletal evidence of prolonged abuse or torture has been used in domestic cases involving children and the elderly and in international courts involving political detainees or prisoners of war.
  - Evidence of chronic abuse includes multiple fractures in various stages of healing, nutritional deficiencies, malnutrition or starvation, untreated medical conditions, or insufficient health and dental care.

Uncovering Abuse When the Baby "Falls"

Six cases of child deaths from Lincoln, Nebraska, resulting from blunt trauma are compared to illustrate patterns of intentional vs. accidental trauma. Five of the six cases involved female victims, ranging in age from several months to 3 years. Of these cases, five were homicides and one was an accident. Among the homicides, three parents reported that the infant "fell" accidentally upon seeking medical treatment for their children. Victims in all cases had multiple blunt injuries throughout the body: head trauma (5/5), neck (2/5), chest (2/5), abdomen and back (1/5), and extremities (4/5). In all cases, brain trauma was present, though only one case exhibited cranial fractures. Further, in only two cases was evidence of prior neglect or abuse present. In all cases, medical intervention was sought. Survival time ranged from 27 min to 4 days. The amount of activity among victims immediately following the injury ranged from immediate incapacitation to full activity/movement and alertness. The infant who survived the longest had shown the most amount of activity following the injury but went into cardiac arrest three days after the incident. In only one case were there no signs of trauma visible externally.

The only male victim (10 months old) suffered the greatest amount of injuries with multiple traumas to each region of the body. He further suffered a 5.2-cm cranial fracture and two fractures to the seventh and eighth ribs that were in the process of healing, thereby showing evidence of a prior incidence of abuse. Three soft tissue injuries were evident on the face and back of the head. In this case, the infant had soft tissue injuries evident on the abdomen and back with associated organ damage in the abdomen. It was alleged that the infant "fell" from the arms of his mother's boyfriend. In a second case, the infant reportedly "fell" in the bathtub yet was found to have soft tissue injuries on the head, face, buttocks, and hand, including human bite marks. This infant also had a 25-g subdural hematoma (pooling of the blood in the space between the dura and meninges or outer and middle layers of the brain covering) but no skeletal fractures.

It is common in cases of child abuse that the parent or caregiver tells authorities that the child fell or had an accident, even while seeking medical treatment for inflicted trauma (Kimmerle & Chrowstowski 2011). Therefore, it is incumbent upon investigators, medical examiners, and forensic anthropologists working on such cases to present clear evidence that will either support or refute such claims. Investigators had such a case when a 10-month-old male infant was taken to the emergency room by his father. It was alleged that the infant fell from the father's arms and hit his head on the floor. The infant sustained multiple injuries on the head, neck, chest, abdomen, and back, including multiple brain injuries. Postcranial fractures were present but no skull fractures were present. In this example, investigators had all lines of possible evidence open for interpretation. Since medical intervention was sought, there was abundant documentation about the injuries at the time of autopsy. However, this is not always the case, when the remains of abused children are hidden or buried. In such cases, it may be years before the remains are uncovered and the incidence is investigated. When this occurs, it may be that skeletal trauma is the only physical evidence present to support or refute allegations of abuse.

The injury occurred at 7:00 am and the infant died at 3:30 pm, having survived 8½ h with medical intervention. Immediately following the injury, the infant was incapacitated and never exhibited any sign of physical activity. The postmortem examination revealed healing fractures from prior injuries. In Table 5, the epidemiological factors for three cases are presented, the case study discussed here and two comparative examples

Bone, Trauma in, Table 5 Differential case factors for accidental versus inflicted trauma in comparative baby death cases

Factors	Case I	Case II	Case III
Manner	Homicide	Homicide	Accident
Circumstances	Reportedly fell from arms of caretaker	Reportedly fell in bathtub	Fell downstairs
Demography	10-month-old male	3-year-old female	1-year-old female
Injury location	Head, neck, chest, abdomen, back, extremities	Head, extremities	Head, extremities
Survival time	8.5 h	46.9 h	78 h
Amount activity	Immediately incapacitated	Immediately incapacitated	Unknown
Skeletal fractures	Skeletal fractures	No fractures	No fractures
Prior evidence of abuse	Fractures in various stages of healing	None	None

which illustrate some of the epidemiological variants present. All three cases represent infants, ages 10 months to 3 years, who either died as a result of a fall or were reported to have "fallen." In a comparative case (Case 2), the death was reported to have resulted from injuries the 3-year-old child received after falling in the bathtub. Further investigation of witness statements and an autopsy revealed in fact this was a case of abuse and it was ruled a homicide. In contrast, Case 3 consists of a 1-year-old female who fell and died of her injuries several days later. There was no history or indication of abuse, and the manner of death was ruled an accident. In all three cases, the children died of blunt trauma and all three sustained brain trauma, though only one case exhibited skeletal fractures (Case 1).

Establishing Cause and Manner of Death

The skeletal remains of a 20–30-year-old male along with clothing, a shotgun, pellets, and a shell casing were recovered in a remote, wooded area along a roadside during the winter months (Fig. 14). The bones of the face, cranial vault, and mandible were fractured (Fig. 15). The fracture patterns and scalloped edges along the fractured margins of the left temporal, frontal, and occipital bones were indicative of a shotgun injury. Further, the fractured edges and semicircular defects were the same color and texture as the rest of the bone and were consistent in appearance and morphology of perimortem injuries.

Bone, Trauma in, Fig. 14 Fragmented bone remains with clothing recovered from outdoor crime scene in snow

Bone, Trauma in, Fig. 15 Fragmented cranial vault (left lateral view) following near contact shotgun wound to the mouth. Note the scalloped edges along the inferior fractured margins

The maxilla was completely fractured along the palatine suture and bilaterally in the transverse plane inferior to the zygomatic processes (Fig. 16). The palate exhibited an irregular-shaped defect (Fig. 17). The mandible was

Bone, Trauma in, Fig. 16 Maxilla and mandible of shotgun case. Pellets entered through the open mouth

Bone, Trauma in, Fig. 17 Fractured palate showing shotgun entrance wound

Bone, Trauma in, Fig. 18 Left mandible showing fractured condyle and ramus following shotgun wound to the mouth

bilaterally fractured in between the mandibular body and ascending rami. The left coronoid process was also completely fractured from the ascending ramus of the mandible (Fig. 18). The specific fracture patterns and defects present in this example demonstrate the causative agent while the manner of death is determined based on associated evidence and the police investigation. In this case, there was a single shotgun wound in the face and cranium, from front to back. While the mechanism of death may not be known without the presence of soft tissues, the cause of death is inferred from the shotgun wound to the head. Based on circumstantial information, the manner was ruled a suicide.

International Perspectives

Illegal detainments, torture, and extrajudicial executions are some of the most common forms of human rights violations throughout the world. They can also be some of the most challenging cases to prove as victims tend to "disappear" and cases may not be investigated until many years after the fact. International and local investigations for the prosecution of torture, war crimes, and genocide rely heavily on forensic anthropological and pathological evidence of perimortem injuries for these same reasons (i.e., examples tried by the International Criminal Tribunal for the Former Yugoslavia (ICTY): *The Prosecutor v. Rutaganda (ICTR-96-3), The Prosecutor v. Krstić (IT-98-33)*, and *The Prosecutor v. Brdjanin and Zupljanin (IT-99-36)*). For example, in the case of the *Prosecutor v. Limaj* et al. *(IT-03-66), Milutinovic* et al. *(IT-05-87), Popovic* et al. *(IT-05-88)*, skeletal evidence of torture was critical at trial. Numerous factures throughout the ribs and limbs exhibited bone remodeling in various stages of healing dating from weeks to months, thereby demonstrating evidence of repeated beatings (blunt trauma)

during the period of detainment (Kimmerle & Baraybar 2008). Additional injuries in the form of skeletal defects resulting from gunshot wounds to the head and body showed no evidence of healing and were classified as perimortem trauma, proving the cause and manner of death was homicide due to multiple gunfire injuries. In this example, skeletal injuries provided evidence that several crimes were committed including torture and homicide.

Collectively, the body of research into skeletal evidence used to document torture is limited. A review of extrajudicial executions from various published reports and publications from Central and South America and the Balkans were discussed in Kimmerle and Baraybar (2008) representing a collective sample of 45 cases. In all of these examples, the mechanism of death was attributed to blunt trauma (BFT), sharp-blunt trauma (i.e., machete), or gunfire injuries (GSW) associated with some form of BFT resulting primarily from beatings prior to death. The type and location of skeletal fractures are documented, including evidence of antemortem fractures that were in various stages of healing at the time of death. In most cases, individuals were detained prior to death and the history of abuse reflects torture as documented by the associated medicolegal death investigations. Among the cases reviewed from the literature, BFT was the most common mechanism of injury (77.7 %), followed by gunshot wounds (66.6 %), and sharp-blunt trauma (24.4 %). The overall distribution of fractures illustrates that the thorax is most commonly affected (64.4 %), followed by the skull (35.5 %), arms and legs (2.0 %), and lower back (0.04 %). Several other interesting patterns were noted:

- All cases of documented torture involved males, aged 14–68 years.
- These cases typically represented enforced detainment, repeated beatings, and finally murder.
- All cases with fatal gunshot wounds also had blunt trauma from assault to the ribs and sternum, indicating beatings prior to death.
- Almost 78.0 % of cases of extrajudicial execution involved BFT to the chest, indicating beatings prior to death.
- In four of these cases, individuals also had previous fractures in various stages of healing – further indicating torture during their detainment prior to the fatal attack.

Evidence of sharp-blunt trauma was present in 11 cases involving machetes. Interestingly, among these cases, the arms and legs were also injured in addition to the thorax. "Defensive wounds" on the forearms and hands were present in 81.8 % (9/11) of cases. Only 35.5 % of cases involved the skull, but among these, gunshot injuries were also present in addition to blunt force injuries. It is important to note that the context is critical when trying to summarize trends such as these. In cases involving machetes, gunshot wounds were typically not present. Therefore, if one considers only cases with blunt force or gunfire injuries, the overwhelming majority of extrajudicial executions (88.2 %) include both mechanisms of injury.

Population level analyses of trauma may also provide evidence of the particular type of crimes committed and will be critical in attempting to prove cases of genocide and war crimes. Specifically, injuries that are widespread demonstrate patterns of abuse or maltreatment, such as the ubiquitous machete trauma present in the 1994 Rwandan genocide which provides evidence of the intent to kill civilians outside the context of lawful warfare.

Future Directions

Today, methods used in forensic anthropology and bioarchaeology document physical evidence of the patterns of crimes committed and increasingly provide critical evidence at trial. There is need for further research in the areas of skeletal trauma, histological timing of fractures from degraded bone, and the ways in which paleopathology and population studies can be used for analyses of modern populations. Increased research and education with specific regard to international applications will further help improve best practice standards and expand the role of forensic anthropology in criminal investigations.

Cross-References

- ▶ Burned Remains in Forensic Contexts
- ▶ Commingled Remains: Field Recovery and Laboratory Analysis
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

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Bone: Chemical Analysis

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Introduction

The general structure and chemical composition of bone are similar for all individuals, but there is some tolerance for variation in the elemental and isotopic composition of both the organic and inorganic components of bone tissue. This variation is tied to the local environment and to diet. Both trace elements and stable isotopes act as natural tracers that provide information to archaeologists about details of the lives of past people, including diet, place of residence, and migration. Following early attempts to use chemical variation in bone for information about the past, several doctoral dissertations in the areas of trace element analysis and stable isotope analysis of archaeological human bone appeared in the 1970s and early 1980s. Much of this research is presented in an edited volume by Price (1989) which resulted from the first Advanced Seminar

on Paleodiet. Subsequent research has grown exponentially with a much greater emphasis on stable isotope analysis due to concerns about chemical exchange between soil and bone which may alter trace element contents in the burial environment.

Definition

Bones are the skeletal elements that provide structural support for the vertebrate body. Bone tissue has both organic (approximately 30 %) and inorganic (approximately 70 %) components. The organic component is predominantly collagen (90 %), a structural protein, and a small amount of other proteins, collectively referred to as non-collagenous proteins. The inorganic component of bone is made up of hydroxylapatite, a calcium phosphate mineral [$Ca_{10}(PO_4)_6(OH)_2$]. The chemical analysis of the organic component of bone most often refers to the study of stable isotopes of elements included in the collagen, such as carbon, nitrogen, and sulfur. The chemical analysis of the inorganic component of bone refers to the analysis of trace element substitutions in hydroxylapatite, and stable isotopes of carbon and oxygen in the carbonate (CO_3), that substitutes in minor quantities for phosphate (PO_4), an additional source of oxygen. Most trace elements substitute for calcium and, as such, are chemically similar to calcium (other alkaline earth elements, and lead). Some trace elements, such as strontium and lead, may be measured for overall quantity (elemental analysis) and for stable isotope variation.

Stable isotopes are variant forms of an element with the same number of protons and electrons but varying numbers of neutrons. Unlike radioisotopes, stable isotopes do not decay, so their quantity in a substance does not change over time. For most elements, one isotopic form predominates with very minor quantities of other isotopes. For example, 99 % of all carbon occurs as ^{12}C with 1 % ^{13}C. Nitrogen occurs as ^{14}N (99.6 %) and ^{15}N (0.4 %) while there are four stable isotopes of sulfur (Fry 2006). Stable isotope ratios for carbon, nitrogen, oxygen, and sulfur are usually expressed using delta terminology as follows:

$$\delta ‰ = \frac{R_{(sample)} - R_{(standard)}}{R_{(standard)}} \times 1000$$

where R = the ratio of the number of heavier to lighter isotopes.

Due to the difference in the number of neutrons, the isotopes of an element have different atomic weights and, therefore, react slightly differently in chemical reactions including those associated with physiological functions. This results in changes in the ratio of the heavier and lighter stable isotopes from one step to another in biochemical processes such as photosynthesis, digestion, and tissue formation. Details on stable isotope terminology, measurement, and standards can be found in textbooks by Fry (2006) and Hoefs (1997).

Carbon is found in both the organic and inorganic components of bone. In hydroxylapatite, carbonate substitutes for phosphate in minor quantities (approximately 5 %). Oxygen isotopes may be measured from carbonate or phosphate.

Trace elements are chemical elements that occur in minor quantities in a substance. Prior to the development of more sensitive analytical equipment, trace elements were defined as those present in quantities too small to be measured. With more sensitive instruments, trace elements can be measured and are normally present in parts per million (ppm) or parts per billion (ppb). In bone, trace elements from group two of the periodic table often substitute for Ca in hydroxylapatite. Such elements include magnesium (Mg), strontium (Sr), and barium (Ba).

Instrumentation

Stable isotopes of lighter elements, such as carbon, oxygen, hydrogen, nitrogen, and sulfur, are analyzed on a light isotope mass spectrometer (Katzenberg 2008). Heavier elements such as strontium are analyzed on a solid source mass spectrometer. Trace elements may be analyzed on a range of instruments, including atomic absorption spectroscopy, inductively coupled plasma emission spectroscopy, and neutron activation (Burton 2008).

Key Issues

Diet

Early studies on both trace element and stable isotope analysis focused on determining diet and dietary change over time. The trace element strontium was known to vary between plants and animals given constant background levels, based on studies in health physics (reviewed by Burton 2008). Researchers interested in the relative contributions of plant and animal foods in the diet attempted to analyze strontium as well as strontium/calcium ratios in prehistoric human skeletal remains to chart dietary change. Burton and Wright (1995) demonstrated that the relationship between strontium in bone and dietary input is not linear. Trace elements are also subject to exchange in the burial environment and are no longer the method of choice for paleodiet studies. Burton (2008) provides a detailed overview of trace element research on bone.

Stable carbon isotopes were first studied by archaeologists interested in the introduction of maize in the diets of people in the Americas. Maize consumption is evident in bone collagen since maize is a C_4 plant and therefore contains more ^{13}C relative to ^{12}C in comparison to C_3 plants. Economically important plants which use the C_4 mode of photosynthesis include maize, millet, sorghum, and sugar cane. These plants are adapted to hot and dry conditions. Most plant species growing in moist conditions follow the C_3 mode of photosynthesis and contain relatively less ^{13}C to ^{12}C. The difference in the stable carbon isotope ratio ($\delta^{13}C$) in these plant types is passed along to consumers. This was first demonstrated in the 1970s by Vogel and van der Merwe (1977) with numerous applications subsequently (see reviews by van der Merwe 1982; Katzenberg 2008). Plants obtain carbon from atmospheric carbon dioxide (CO_2). Organisms from the ocean obtain their carbon from dissolved carbonate in seawater, which is enriched in ^{13}C in comparison to atmospheric CO_2 and therefore, $\delta^{13}C$ values are higher in marine organisms and this difference is passed on to consumers. This was first demonstrated by Tauber in 1981 and Chisholm and colleagues in 1982 with subsequent applications by many scholars.

Stable isotopes of nitrogen have been used to explore trophic level differences in diet. There is enrichment of the heavier isotope (^{15}N) with each step in a food web (Minagawa & Wada 1984). In a terrestrial environment, leguminous plants generally have lower $\delta^{15}N$ values than nonleguminous plants. Animals feeding on plants will have $\delta^{15}N$ values approximately 3 ‰ higher than their food. Carnivorous animals will exhibit an additional 3 ‰ increase and omnivores will have values intermediate with respect to carnivores and herbivores. Unfortunately, this is not always the case as there are additional variables to consider. As is true for all stable isotope studies, the source of nitrogen determines the $\delta^{15}N$ values at the base of the food web. Fertilizers used to provide nitrogen to growing plants will have an impact on plant $\delta^{15}N$ values, which in turn, influences $\delta^{15}N$ values higher up the food web. For example, the use of manure will raise the $\delta^{15}N$ value of nitrogen available to plants. Because of such variables, it is important to analyze potential food items in addition to human skeletal remains when attempting a dietary reconstruction. In aquatic and marine systems, $\delta^{15}N$ values also increase with trophic levels but there are more steps in the food web, resulting in very high $\delta^{15}N$ values in aquatic and marine mammals and piscivorous fish. This makes it possible to use stable nitrogen isotopes to investigate the relative use of terrestrial and aquatic or terrestrial and marine foods in dietary reconstructions (e.g., Coltrain et al. 2004; Katzenberg et al. 2012).

Stable isotopes of oxygen have been used to study mobility in prehistoric societies. The tissue of choice for oxygen isotope analysis is tooth enamel (e.g., Buzon et al. 2011) but some studies have also been carried out on the phosphate in hydroxylapatite (e.g., White et al. 2007). Oxygen isotope ratios in human tissues reflect ingested water and oxygen isotopes in water vary due to latitude, altitude, and distance from the coast (Bowen et al. 2005).

Strontium isotopes have also been used in mobility studies as they reflect the underlying

bedrock in a region. Derived through diet, strontium isotope studies must consider both the regional geology and the diet. Unlike the other isotopes discussed so far, strontium isotope studies do not use the delta notation. Instead, the ratio of $^{87}Sr/^{86}Sr$ is simply expressed as a number, usually to five significant decimal places depending on the precision of the analytical instrument (Bentley 2006). Strontium isotopes have been used to study migration in many regions of the world with increasing baseline data becoming available. Often, oxygen and strontium isotopes are both used to provide two perspectives for assessing mobility.

All bone chemistry studies are based on chemical tracers that are taken up during life. However, bone is a porous substance and researchers must always perform tests to determine whether chemical tracers have been altered in the burial environment. The chemical exchange that can occur after death is referred to as diagenesis. For studies of bone collagen, preservation is assessed from the percentage of carbon and nitrogen in the sample, and from the ratio of carbon to nitrogen (C/N) in the sample. Well-preserved collagen has a C/N ratio of 3.2. Some tolerance for variation is allowed, but most researchers reject samples if the C/N falls below 2.9 or exceeds 3.6 (Ambrose 1990). For bone mineral, it is more difficult to assess diagenesis (Burton 2008). Some researchers use infrared spectroscopy to evaluate the crystallinity of bone. Normally bone is poorly crystallized in comparison to hydroxylapatite in the earth, but with exchange in the burial environment, bone may become more crystallized and the relative amounts of calcium and phosphate may shift. Studies to detect diagenesis are ongoing.

Future Directions

Future directions of bone chemical research in archaeology involve increasing knowledge of other isotopic systems such as sulfur and hydrogen. Stable isotopes of sulfur are useful in detecting marine versus terrestrial foods in the diet, but sulfur is present in very low quantities in bone collagen. Increasingly sensitive analytical instruments have made it possible to analyze such isotopic systems in smaller quantities. Stable isotopes of hydrogen and oxygen have been used in wildlife studies for tracking movements, and the same types of studies can be done with humans (Bowen et al. 2005). Other improvements in analysis include the use of laser ablation to isolate small regions of a sample, such as parts of a tooth, to analyze seasonal variation in the diet (Sponheimer et al. 2006).

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

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Bone: Histological Analysis

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Introduction

The analysis of hard tissue (bone and tooth) can be approached on many levels, ranging from the macroscopic to the molecular level. Intermediate to this range is the tissue level or histological level of organization. By definition, *histology* means *the science of the tissues*. More specifically, *histological analysis* is the study of the microscopic anatomy of tissues in plants and animals. Thus, histological analysis requires specialized equipment to prepare tissues for analysis and to magnify structures, making them visible. There are two analytical approaches used in anthropology when studying microstructures. One, referred to as histomorphology, is the qualitative analysis of microstructure morphology and organization. The other, referred to as histomorphometry, is the quantitative study of the microscopic organization and structure of tissue. These analyses can be performed using a static or dynamic approach to studying tissue. Static histological analysis allows for the evaluation of a tissue at a particular point in time. For example, anthropologists typically study histological samples from deceased individuals, which would only provide an assessment of the tissue at the time of death. Dynamic histological analysis allows for the evaluation of bone over a period of time. In order to observe microstructural responses using this method, analysis is performed in vitro or in vivo and the subject is exposed to various labeling techniques for histological tracking of cells. Regardless of the approach, histological analysis is an essential tool in many disciplines outside of medicine and biology.

The histological analysis of hard tissue within the discipline of anthropology has been used to study historical human remains from archaeological sites, as well as to assist with modern forensic investigations. Through histomorphology and histomorphometry, anthropologists are able to develop techniques to distinguish human from nonhuman bone, estimate age at death, evaluate biomechanical load history, assess skeletal health, and categorize pathological conditions. To fully interpret the information gathered through these techniques one not only needs to appreciate the limitations of evaluation methods, but more importantly have an understanding of the biology underlying the creation of

histomorphological structures and the intrinsic and extrinsic factors that affect bone (or tooth) microstructure.

Bone is a dynamic tissue, constantly changing over an organism's life and providing a record of structural, mechanical, and compositional changes that anthropologists study in order to interpret the biological information hidden within. Teeth, with their hard enamel, are the most likely remains of an organism to endure through time. While a wealth of information is stored within the histological structure of teeth, the following text will be limited to discussions regarding cortical bone histology. For further reading about dental histology and its use within anthropology, see Guatelli-Steinberg and Huffman (2011).

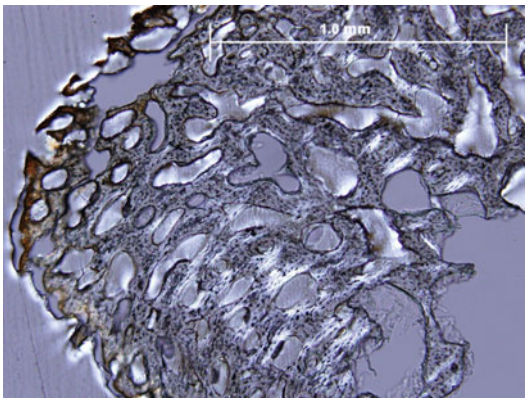

Bone: Histological Analysis, Fig. 1 Histologically, woven bone is characterized by wide spaces and poor organization. It is found in immature bone and at the sites of fracture repair or pathological conditions (Pig rib at 100× magnification)

Key Issues

Bone Biology and Cortical Bone Histomorphology

At the gross level, bone classifies as either cancellous (trabecular) or compact (cortical). Cancellous bone is porous, consisting of a network of thin spicules called trabeculae. Cortical bone is densely mineralized and relies on a vascular system to pass oxygen, nutrients, and waste in and out of bone. At the histological level, there are two basic bone types, woven and lamellar. Woven bone is laid down quickly; a structurally weak temporary construct of poorly organized collagen fibers and mineral crystals (Fig. 1). Lamellar bone takes longer to form but is stronger than woven bone due to its highly organized "plywood" arrangement of collagen bundles (Fig. 2). Embryonic skeletal development consists almost wholly of woven bone, which is slowly replaced by lamellar bone as an individual grows. As such, woven bone occurs rarely in the adult skeleton, except at sites of fracture healing and/or pathological conditions.

Mature compact bone is comprised of Haversian systems, which are characterized by uninterrupted, centripetally deposited lamellae surrounding a centrally located Haversian canal. The layers of concentric lamellae connect to each other via Volkman's canals, which are smaller and run at oblique angles to create a network for circulating blood and nutrients throughout the bone. Complete Haversian systems are bordered by a scalloped reversal line and are also known as secondary osteons (Fig. 3). Secondary osteons are a product of bone remodeling (bone turnover).

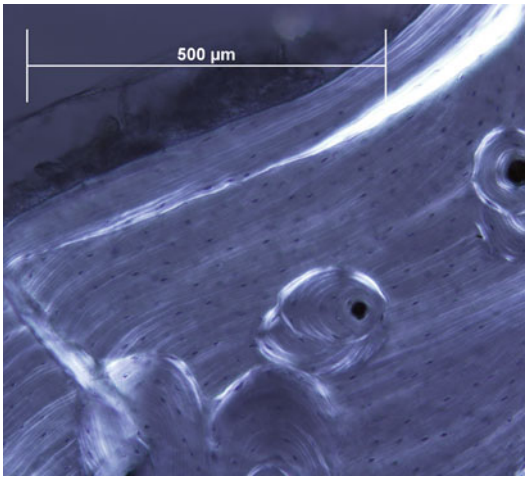

Bone: Histological Analysis, Fig. 2 Lamellar bone is characterized by organized, parallel bands of bone. The secondary osteons are signs of remodeling in these lamellae (Human rib at 200× magnification)

Two main processes directly shape bone, modeling and remodeling. In modeling, bone is

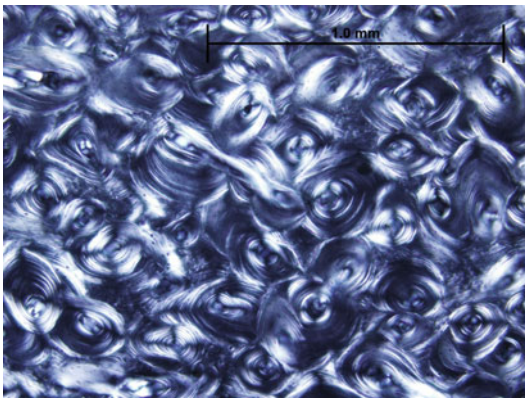

Bone: Histological Analysis, Fig. 3 Human Haversian bone showing secondary osteons (Human femur at 100× magnification)

removed in one location and added in another. Through periosteal and endosteal formation and resorption, bone modeling modifies bone size, shape, and relative orientation (Maggiano 2011). Bone remodeling, or internal bone turnover, is the process of continuous removal of older bone with the replacement of new bone throughout life. It occurs through the localized coupling of osteoclasts and osteoblasts forming an assembly of cells called the basic multicellular unit, or BMU (Frost 1969). Active BMUs follow a pattern of activation, resorption, and formation of bone known as the A-R-F sequence (Martin et al. 1998).

Unlike bone modeling, remodeling generally does not affect the overall size and shape of the bone. Bone remodeling is often described as having two functions: microscopic fracture repair and maintaining metabolic homeostasis of the bone matrix. Microscopic fracture repair is likely the primary function of bone remodeling, allowing the skeleton to adapt to its mechanical environment by reducing the risk of fractures and repairing damage created by repetitive cycles of mechanical loading (Burr 2002). Both modeling and remodeling can occur on the four bone envelopes: the periosteal, Haversian (intracortical), endosteal, and trabecular surfaces (Frost 1969, 1987; Parfitt 2002). Because each envelope is distinct, modeling and remodeling can occur at different times, rates, and magnitudes within the bone.

Applications of Bone Histology in Anthropology

Anthropologists are increasingly performing histological analysis to study both ancient and modern bone. As with other anthropological analyses of bone, the interpretation of histological results must be made within the context of skeletal biology. Histological analysis of skeletal remains in anthropology is applied to (but not limited to) the following categories: the differentiation of human from nonhuman bone, constructing the biological profile, reconstructing habitual activities or traumatic episodes in life, and the diagnosis of pathological conditions including an overall assessment of skeletal health. The following provides a brief summary of each type of analysis.

Human Versus Nonhuman

In instances where bone is too fragmentary, too weathered, or in some other way rendered unidentifiable by macroscopic observation, histological analysis can serve to differentiate human from nonhuman bone. Histological methods are less destructive, easier to perform, and less expensive than DNA analysis for distinguishing human from nonhuman bone. The typical method to differentiate human from nonhuman bone is to evaluate specific qualitative microstructural traits considered distinctive of nonhuman species. Researchers attribute two particular features of bone microanatomy to nonhuman species, plexiform bone and osteon banding. Plexiform bone is a fibrolamellar bone type described as having a "brick wall" appearance, a result of the linear vascular spaces that separate the lamellar "bricks" when plexiform bone is viewed in cross section (Martin et al. 1998: Fig. 4). Osteon banding is defined as distinct rows of five or more primary and/or secondary osteons, which often alternate with bands of lamellar bone (Mulhern & Ubelaker 2001).

In the absence of these easily observable and definitive nonhuman features, morphological characteristics of secondary osteons are often considered. Bone deposition and remodeling processes are similar in human and nonhuman mammals, making secondary osteons a prevalent

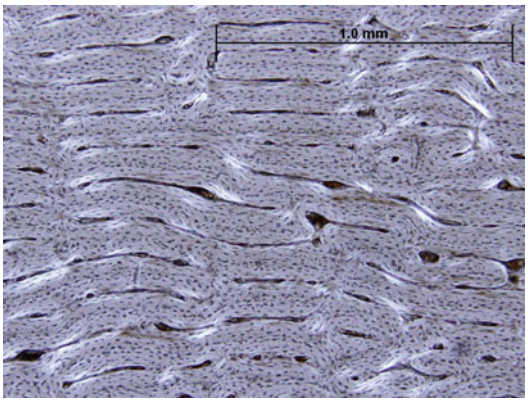

Bone: Histological Analysis, Fig. 4 Plexiform bone is brick-like in appearance and characteristic of non-human bone (Pig humerus at 100× magnification)

feature of bone microstructure in most animals. Early research focused heavily on size differences in human and nonhuman microstructure, but provided little in the way of broadly applicable methods for identifying human or nonhuman material. Jowsey (1966) established that secondary osteon size varied across species and that there are age-related changes in Haversian canal size. More recently, it has been shown that human osteons tend to be elliptical, whereas nonhuman osteons tend to be circular. This supports anecdotal evidence that nonhuman osteons appear more circular than human osteons, suggesting that circularity may be a key variable to differentiate human from nonhuman Haversian bone. While histomorphometric data (i.e., osteon area and osteon circularity) appear promising for differentiating human and nonhuman bone, current methods lack sufficient validation and should be used with caution.

Constructing the Biological Profile

In anthropology, constructing a biological profile for unknown skeletal remains consists of a series of analyses that include the estimation of sex, age, ancestry, and stature, as well as the recognition of pathological conditions. Within forensic anthropology, the biological profile may be used in two ways: the first is to provide biological information that may be used to support the identification of an individual and the second is to use the information to narrow a potential missing person's list to streamline investigations involving unknown human remains. Outside of forensic applications, the biological profile is used to construct the demographics of ancient human populations (paleodemography). Considering the components of the biological profile, the estimation of age currently constitutes the majority of histological research in anthropology. While histological methods have not been used to estimate sex or ancestry, research has demonstrated that a relationship between histological variables and these factors likely exist. Although research suggests allometric relationships (e.g., relationship of body size to shape) with histological structures, stature estimation is not within the scope of histological analysis. Therefore, this section discusses histological age estimation with consideration of sex and ancestry as contributing factors in histological variation.

Age Estimation

The estimation of age at death is an essential part in the reconstruction of population demographics and the individual analysis of human remains. Estimating the age at death of children and young adults can be performed with greater accuracy owing to methods that are based on the growth and development of the human skeleton. Skeletal growth and development are regulated by endocrine and genetic factors producing biological age indicators that have a more predictable relationship with chronological age. The estimation of age at death for adults, in most cases, demonstrates a progressive decrease in accuracy as chronological age increases. Most methods for adult age estimation are based on degenerative changes of the skeleton, which can vary between individuals, geographic populations, and ancestral groups. The premise of histological age estimation is based upon clinical and anthropological research demonstrating that bone turnover occurs in cortical bone at a predictable rate over an individual's lifetime. As turnover occurs over time, the relative density of secondary osteons will increase, which should be evident until remodeling rates begin to fluctuate during the later decades of life (Fig. 5).

Bone: Histological Analysis, Fig. 5 Mean osteon population density (OPD) values for a known age sample separated into age cohort showing the relationship of OPD with age

Since the introduction of the first quantitative histological approach for the estimation of age at death by Ellis Kerley in 1965, histological parameters of age-related bone turnover have been well-documented in the anthropological literature for various skeletal elements. Crowder (2005) reviewed some of the most frequently employed methods, determining that the assessment of bone histology is a useful method for estimating age, producing accuracy values that are comparable to many gross morphological methods. Considering the myriad of methods, only a few have received significant attention within the field culminating in multiple validation studies applied to archaeological, cadaveric, and forensic samples. Regardless of the method, analysis involves evaluating a cross section or portion of a cross section of bone at the histological level and collecting variables that exhibit a relationship with chronological age. As with any method, it is imperative to perform the analysis as it is described in the literature.

Current methods typically quantify the amount of intact or fragmentary osteons within the cross section or region of interest within a cross section. More recently, histologists have turned to osteon geometry (i.e., shape and size) as an age indicator creating new approaches to the analysis of bone. Two variables that have received considerable attention are osteon circularity and area, which have both been found to correspond with age. Osteon circularity examines the geometry of the osteon in relation to a circle. Osteon area establishes the amount of bone area within the reversal line of an osteon. Research has indicated that mean osteon area decreases and circularity increases in older individuals; however, the control mechanisms for osteon size and shape over time are not fully understood and may be related to factors such as bone formation rates, activation frequency, and osteon population density. The material currently available for elucidating the specific relationship between osteon geometry and age is at a preliminary stage and significantly more research is needed.

Sex and Ancestry

While it has been documented that bone density and the rate of bone remodeling differ between the sexes and between individuals from different ancestral groups, there is no agreement among studies that these differences exist with measurable consistency. Many histological methods for age estimation have developed sex-specific and ancestry-specific equations (Thompson 1979; Cho et al. 2002), while others indicate no significant differences between groups (Stout & Paine 1992). Sex differences observed in histological variables are likely related to biological factors involving the endocrine system that affect bone turnover in the female skeleton, such as pregnancy, lactation, and menopause. Females experience bone loss associated with a drop in estrogen levels following menopause, which manifests in the loss of trabecular connectivity and increased porosity within the Haversian envelope of cortical bone. Biocultural factors (i.e., fecundity, breastfeeding practices, types of food consumed, or activity levels) may produce or extenuate histological differences between males and females that significantly impact bone biology. For example, a division of labor between sexes in a population may produce higher activity levels in one sex, causing bone to respond differently to the mechanical stresses and resulting in a perceived sex difference.

Histological differences observed between ancestral groups may be attributed to the population variability in cortical bone mass and density. Differences in skeletal growth velocity and duration will result in differences in bone mass and density. African-Americans, compared to European-Americans, have a slower bone turnover rate and a higher subperiosteal apposition rate resulting in greater bone volume (Cho et al. 2002). While differences in hormone levels that govern growth and development vary between populations, cultural aspects should also be considered when evaluating population variation at the histological level. Socioeconomic status may produce differences in activity levels, diet, and overall health, which may manifest at the histological level in bone.

Considering that histological methods produce conflicting results regarding sex and ancestry, it is also possible that some perceived group differences are an artifact of small sample sizes, skewed sample distributions, or differences in histological sampling location. Therefore, caution should be followed when interpreting histological variables and results. Overall, population variation in bone histology likely reflects biological, genetic, and cultural factors.

Physical Activity

Biomechanical strain levels may vary depending on patterns of physical activity, which may be attributed to sex or ancestral group differences. Bone, being a dynamic tissue, will respond to biomechanical forces, or lack of forces, by altering bone resorption and formation rates (Inque et al. 2000). All bones receive biomechanical loading, including non-weight-bearing elements. Through histological analysis one may evaluate the microstructural changes caused by this biomechanical loading. A difficulty in anthropological studies is interpreting the load history where strain data are lacking or insufficient (Skedros 2011). The evaluation of mechanical loading in bone provides an understanding of bone adaptation within the lifetime of an individual in that bone structure and/or material organization will change in response to certain loading conditions (including reduction of loading as seen in disuse osteoporosis). The effects of stress/strain on bone are varied; however, bone must remain mechanically stable to reduce fracture risk. Biomechanical loading resulting from physical activity, assuming that the loading conditions are outside the normal physiological stress/strain range, provides stimuli that can accelerate intracortical bone remodeling. Studies from archaeologically derived contexts suggest the effect of habitual behaviors on bone results in both changes in gross geometry and intracortical bone remodeling. Therefore, one must consider that subsistence patterns and activity patterns vary between populations over geography and time.

Considerable research suggests that variation in the size and shape of osteons is linked to the biomechanical loading of bones. The analysis of this variation may be helpful in interpreting the load history of past and present populations; however, the challenge is in differentiating load history from other biological variables. While a well-substantiated framework for interpreting load history remains to be developed, Skedros (2011) introduced a worksheet/checklist of considerations to facilitate the interpretation in limb-bone diaphyses and ribs. Further work is needed to establish the control mechanisms determining osteon shape and size.

Pathological Conditions

Pathological conditions in skeletal remains can be often classified into particular disease groups through histological analysis. The interpretation of morphological structures at the histological level in archaeologically derived bone is particularly difficult due to postmortem changes and the maceration process, when compared to the information available from fresh tissue samples. Identifying pathological conditions in bone provides the basis for reconstructing the etiology and epidemiology of disease in past populations (Schultz 2001).

In the forensic context, the evaluation of pathological conditions in bone may assist with the determination of the cause of death. Of particular interest to forensic pathologists is identifying pathological conditions that increase the fracture risk of bone. Two conditions commonly explored

that result in abnormally brittle bones are *osteogenesis imperfecta* and osteoporosis. In addition, metabolic conditions, dietary deficiencies, or other pathological conditions often lead to abnormal secondary osteon counts, which if used for histological age estimation, will produce inaccurate results. When evaluating bone for potential pathological conditions, it is important to consider the role of diagenesis and the impact of taphonomic factors that may mimic the histomorphology of diseased bone (Schultz 2001). Diagenesis refers to post-depositional changes that may affect both the chemical and structural integrity of the bone caused by taphonomic agents, such as water intrusion, bacteria, and fungi (Jans et al. 2004). Failure to recognize diagenetic agents may affect the reliability of histological analyses.

Conclusions

Skeletal remains are a storehouse of information regarding the biological processes experienced during the life of the individual. The use of histological methods in anthropology can strengthen other analytical results and provide information that cannot be obtained from gross methods alone. Through the qualitative evaluation of histomorphology and quantification of bone remodeling through histomorphometry, anthropologists are able to develop techniques to estimate age at death, evaluate load history, and assess skeletal health, contributing to the comprehensive understanding of skeletal biology.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology

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Bones: Preservation and Conservation

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Introduction

This entry discusses the conservation of a common archaeological remain: bones, or more specifically bony elements. Our main purpose is to consider bony elements, common to all vertebrate, human and animal, from archaeological contexts and their final destinations in museums and laboratories.

Definition

"What Is Bone?"

Bone is made of two main elements: organic (collagen-protein) and mineral (hydroxyapatite $Ca_{10}(PO_4)_6(OH)_2$). These elements have very different functions and properties that in combination allow bone to be at the same time hard and flexible, and as such it is an excellent raw material for several archaeological artifacts (White & Folkens 2000), such as Amazonian flutes, Paleolithic and Neolithic needles, and Paleolithic sculptures.

In a body, bones serve to protect and support soft tissues, to produce blood cells, as a storage facility for fat and a reservoir of calcium. Bony elements vary in size and shape according to the species and the individuals, but these are normally also related to sex and domestication. Living bone is constantly transforming, it can repair and reshape itself depending on the type of stress it is put under.

The proportion of mineral and organic parts in bony materials depends on the function of the structure: Bones, teeth, tusks, antlers, and shells, all have different functions and therefore the compositions and forms can differ quite a bit, for example, teeth have more mineral parts than bone, shafts are hollow while tusks are dense and compact, etc. The composition of bony elements affects the way these structures can be manipulated and has implications on their reactions to taphonomic processes following deposition (and after being excavated!).

Key Issues/Current Debates/Future Directions/Examples

Taphonomic Processes: "What Damages Buried Bony Elements?" and "What Can Preserve Bony Elements?"

The word taphonomy entered the academic record in 1940 when the Russian researcher Yefremov applied it to define "the study of the laws of burial" in paleontological contexts. Eventually its meaning was extended to the study of fossilization processes, paleoecological biases resulting from the passage of a body (human or animal) from a living community to a fossil one, and from the environment where the body was buried (Behrensmeyer 1978).

Even though bony elements have a very significant percentage of mineral components – giving a false impression of being

a stone-like material – there are numerous processes that can damage the structure of bones, be it mammal, reptilian, avian, or fish:

1. Decomposition: The bacteria responsible for soft tissue decomposition can also "attack" the organic part of the bones.
2. Environment: Exposition to weather conditions, rain, sun, wind, snow, and temperature can cause cracking and breaking.
3. Burial and Transportation: A rapid burial is an essential element for conservation, long-term transportation can physically destroy bones rapidly.
4. Soil characteristics: Acidity, mineral composition, granulometry (clay, sand or silt), they all affect preservation. In fine sands, the surface of bones can become coarse with time, while in clay, soil "attaches" itself to bone, being difficult to separate – some cleaning procedures might even damage the bones if the sediment is too attached.
5. Pre-depositional treatment: Human and animal bones frequently undergo some kind of treatment prior to being buried or discarded. One should expect treatments that vary from defleshing to cremation, boiling, painting, etc. All of these activities have an impact on preservation. For instance, burnt bones survive quite well, but are normally highly fragmented, while teeth usually explode into micro unidentifiable fragments when burnt. Mummification processes, be they natural or artificial, can help preserve not just bones, but also soft tissue and keratin elements (like hairs and nails).

Most bones found in archaeological sites are in fact decomposing not fossilizing; the site's environment affects the rate of this process. For instances, in tropical areas, where the soil is normally very acidic and the weather conditions are quite rough (temperature and humidity are high), bones sometimes do not preserve beyond a few hundred years (or less), and when they are recovered, the deterioration is so advanced that it renders identification and other analyses (like dating) difficult or impossible. Meanwhile in Europe, where the soils are neutral or slightly basic, it is quite normal to find non-fossilized bone in archaeological sites thousands of years old. Some kind of equilibrium is needed in order for long-term preservation to exist.

It is important to note that finding preserved bone does not mean finding fossils. Fossils are bones or teeth that no longer have organic parts, because they have been replaced by mineral elements.

What Can We Learn from Bony Materials?

The study of bony materials can provide information about a range of archaeological questions and these applications justify the long-term storage of bone (Lyman & Fox 1997):

1. Differentiating human from animal contexts (see Figs. 1 and 2)
2. Estimating, minimum individual number, sex, age, stature, and health
3. Domestication processes for animals
4. Cultural materials and artifacts
5. Feeding habits
6. Disposal habits
7. Environment
8. Population patterns
9. Funerary practices
10. Death patterns (isolated, catastrophic, etc.)

How to Preserve Bony Elements?

Unfortunately, few museums currently have the proper means to care for all their archaeological artifacts. Simple and practical actions do exist that can help preserve bony elements. To conserve such artifacts correctly, one must understand:

1. The conditions where the elements were found. Changing the environment too abruptly and permanently usually leads to deterioration of the organic parts and sometimes to total destruction.
2. The bony elements state at the moment of their retrieval. If the conservation conditions at the field site are precarious, it may be necessary to apply stabilizing agents such that the elements can be removed and the excavation finished in the laboratory.

Bones: Preservation and Conservation, Fig. 1 Animal bones recovered from an Amazonian Site. Notice conservation (Photo by V. Moraes)

Bones: Preservation and Conservation, Fig. 2 Funerary urn containing one cremated individual, the bones are very fragile (Photo by C. Moraes)

3. The final destination: Most organic materials react rather badly to environment variation. So in order to preserve these elements, there must be continuity! This means understanding and controlling the environment at the final destination.

Collagen (organic part) in the bony elements reacts to removal from the soil by drying and shrinking or by moistening and swelling; in both cases, this leads to cracking of the bone's surface and, sometimes, inner structures.

"When," "How," and "Why" to Clean Bones Are Dependent on the Conditions in Which the Bony Elements Were Found and the Projected Analyses

Before starting the cleaning procedures, it is necessary to make a thorough evaluation of the bony element, noting how preserved or damaged it is. Dry and wet materials react differently once taken from dry soil or flooded areas and the preventive actions (glues, consolidants) that might have been needed may subsequently

interfere with the cleaning procedures. Another important factor to be taken into consideration is that bones (human and animals) are often transformed into artifacts or by pre-depositional treatments; therefore, cleaning should not "erase" or "remove" these traces, when possible X-rays can assist in this process of evaluation.

Differently from other more robust archaeological remains, like stone and some ceramics, washing with abundant water and brushes can damage bony elements by removing the superficial layers or causing them to crack and eventually break into small fragments. Therefore, many archaeologists are experimenting dry-cleaning their materials with scalpels and using controlled solvents in specific areas. Scalpels are delicate to use because they are very sharp and therefore dangerous, but it is easier to clean with a scalpel, even hard and attached clay soils can be removed without much effort, and if by misfortune, the archaeologists "carves" the bone, it leaves a very distinctive mark, easily differentiated from prehistoric artifacts. Wooden utensils demand the application of more strength during cleaning procedures and can eventually cause the bone to shatter, but it is still a good utensil. Solvents are good for removing incrustations that cannot be cleaned mechanically, but they must be used carefully because in large amounts, they can erode the bone's surface.

Bony elements that are found in wet/damp conditions are best cleaned before the surrounding soil dries out completely. Once dried, bones should not be remoistened, as abrupt climatic changes should be avoided.

Issues of Long-Term Storage

Like in all scientific work, in archaeology, one should leave part of the material studied for future analyses: thinking of future researchers who might create better techniques or have different opinions.

Conducting archaeological excavations implies recovering old materials that need to be cared for a very long time. Appropriate storage areas are a problem for archaeologists and museums in general. The need for space is forcing some archaeologists to rethink their fieldwork plans and to choose smaller expeditions where fewer materials are recovered.

Scientific collections demand special care. Most recovered bones were in a slow (or not so slow) process of decomposition, and this needs to be taken into account when planning excavation and long-term storage. Remembering that all organic materials should only be stored once they are completely stabilized, one must first think of the bone's condition and which materials will be in direct contact with the bony elements (see Fig. 3).

As Cronyn (2004) states stabilization can either be passive or active – unfortunately, most laboratories only have the first option. A passive stabilization involves controlling the "new" environment and allowing the bony materials to dry (or keeping them wet) until they achieve an equilibrium. The density of the bony materials (bones, ivory, etc.) will also have an impact on the time it will take for stabilization to occur. When bony materials have to go through an abrupt change in environment, like the removal from wet conditions, the application of a chemical product (Cronyn 2004) to consolidate and "force" stability is usually needed – the most frequently used are PVAC and polyethylene glycol.

Once the archaeological remains are stabilized, storage considerations should include appropriate conditions:

- Bony materials should be in direct contact with "soft" materials, like plastic bags or preferably bags made of polypropylene, that are neutral and not toxic.
- Storage should not be in paper bags or cardboard boxes that decompose rapidly and attract animals like termite and ants.
- The integrity of the bony material is a key element; when cracking and breaking are observed, it is valuable to consider storage in areas where there is little handling.
- Cracking bones should not be kept in direct contact with each other.
- Large and heavy bones should not be stored with small fragments or teeth.
- Common sense is always the best policy.

Bones: Preservation and Conservation, Fig. 3 An example of storage procedures: human bones being stored in polypropylene material (Photo by A. Rapp Py-Daniel)

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bioarchaeology: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone Density Studies in Environmental Archaeology
- ▶ Bone Tools, Paleolithic
- ▶ Bone: Chemical Analysis
- ▶ Conservation in Museums
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Zooarchaeology

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Boni, Giacomo

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Basic Biographical Information

Giacomo Boni was born in Venice, Italy, on April 25, 1859. He studied architecture in

Venice and worked there as an architect, but is best known for his excavations at Rome, especially those in and around the Forum Romanum undertaken from 1898 onward. He saw military service in World War I and resumed his fieldwork in 1916. He was appointed as a member of the Italian senate in 1923 and died in Rome, Italy, on July 10, 1925, and is interred in the Orti Farnesiani on the Palatine Hill.

Major Accomplishments

Boni's excavations in Rome resulted in many significant archaeological discoveries and it is for this work that he is most well known; in fact, Boni was a pioneer in terms of excavation methodology. Boni's stratigraphic excavations in the center of Rome were revolutionary, as no one had ever undertaken deep soundings at Rome that followed stratigraphic principles before (Ammerman 1990: 630). Indeed, Boni's stratigraphic excavation was one of the first of its kind in the field of Classical archaeology. Beginning in 1903, Boni's excavation reached a depth of more than 6 m, taking him below the modern water table, an excavation in which his early experience as an architect working in Venice proved useful. In the deep soundings at the center of the Forum Romanum, Boni would document more than 30 anthropic strata that told the story of the artificial landfill project undertaken in the archaic period to raise the ground level of the Forum itself. These layers, and Boni's work, would be returned to in the middle of the twentieth century by Swedish archaeologist Einar Gjerstad.

Boni's excavations also revealed important finds in an around the area of the Forum Romanum. These included the Iron Age necropolis near the Imperial temple of Antoninus Pius and Faustina known as the *Sepolcretum* (1902), the *Lapis Niger* (1899–1905), and the *Regia*, as well as sites on the slope of the Palatine Hill including the House of the Griffins. Despite interrupting his work to serve in World War I, Boni returned to digging at Rome and continued to work there until the end of his life.

Cross-References

- ▶ Forum
- ▶ Lanciani, Rodolfo
- ▶ Topography of Rome

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Bowdler, Sandra E.

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Basic Biographical Information

Sandra Bowdler was born in 1946 and is now Emeritus Professor in Archaeology at the University of Western Australia. She grew up in Sydney, Australia and obtained a first class Honours degree with University Medal in Anthropology at the University of Sydney in 1971. She then worked as a tutor at the University of Papua New Guinea before going on to undertake a Ph.D. through the Research School of Pacific Studies at the Australian National University. Her Ph.D., on aspects of the archaeology of Hunter Island, Tasmania, was conferred in 1979. Towards the end of her Ph.D. Sandra Bowdler took up a lecturing post at the University of New England where she stayed for 4 years before working as a consultant archaeologist, particularly to the Forestry Commission of New South Wales. In 1983 she was appointed as foundation chair in archaeology at the University of Western Australia - a testament to the contribution that she had made to the discipline so early in her career. Professor Bowdler continued in that position until her retirement in 2008.

Major Accomplishments

In the course of her archaeological career Sandra Bowdler's research has spanned a diversity of themes, theoretical concerns and geographic areas although primarily her interest has lain in the Australasia and Southeast Asia regions. Sandra's earliest research on coastal midden sites in New South Wales was particularly concerned with the way in which Aboriginal people had organised themselves. In writing up her first professional excavations of these middens Sandra attempted a new type of midden study which was both "testable," in line with the then "New Archaeology," but at the same time was "about people". Social groups, especially women, had been invisible in Australian archaeological writings and Bowdler's (1976) study remains one of the few pieces of research in Australia that has exploited the potential of using gender as an analytical category. Her interest in the way in which we construct or engender the past has continued throughout her career. Sandra's early research on coastal middens expanded to include an interest in all aspects of coastal archaeology but particularly the unique conditions imposed for colonisation (e.g. Bowdler 1977, 2010), Tasmania (e.g. Bowdler 1984a) and the use of small offshore islands (e.g. Bowdler 1995).

Sandra brought a new level of professionalism to consulting archaeology in Australia during her brief period as a consultant in the 1980s. Consultancy in Australia has expanded exponentially recently, led by the pace of oil and mineral exploration and Sandra's challenging contributions on significance assessment (e.g. Bowdler 1984b) and the imperative to make consultancies relevant to timely research questions, remain as important today as they were at the time of publication.

Working as a consultant meant that Sandra also had to confront the many of grievances of Indigenous peoples in the heritage process and in archaeological practice generally. Questioning the objectivity of concepts of "significance," and whether or not scientific objectivity was possible in a heritage framework were big issues for archaeologists at the time. Sandra advocated the primacy of Indigenous interests in archaeology. When the rights of Indigenous people to repaint their sites was questioned by some academics and rock art practitioners following the 1987 Ngaringin Cultural Continuity Project, Sandra took a strong ethical stand arguing that Indigenous rights should take precedence over non-Indigenous national heritage agendas and urging those critical of the

repainting project to "ask themselves what is more important, the preservation of a few relics of the recent past, or the active continuation of that living culture?" (Bowdler 1988: 523).

In the 1990s Sandra became increasingly interested in the Southeast Asian region, in the colonisation of Sunda and Sahul by modern humans and in comparisons between the material cultures of the two regions. This led to comparative studies of Pleistocene stone industries from Australia and Southeast Asia and her interest in the Hoabinhian culture complex (e.g. Bowdler 2006).

Despite her retirement Sandra continues her interest in archaeology alongside her new venture in music festival administration of the "Festival Baroque".

Cross-References

- ▶ Balme, Jane
- ▶ First Australians: Origins
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Hunter-Gatherers, Archaeology of
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Braidwood, Robert John

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Basic Biographical Information

Robert John Braidwood (Fig. 1) was born July 29, 1907, in Detroit, Michigan. He completed a degree in architecture at the University of Michigan in 1929 and spent several months in an architectural office. However, the Great Depression made his future as an architect tenuous. He decided to go back to school to take courses in anthropology, a field that had interested him during his undergraduate years. He took an ancient history class taught by Leroy Waterman, director of the University of Michigan excavations at Tell Umar (the ancient city of Seleucia) in Iraq. Braidwood's skill at drafting and free-hand lettering made such a positive impression on Waterman that he invited the young man to join the 1930–1931 season at Seleucia as surveyor and draftsman. Braidwood returned to Michigan to complete his B.A. (1932) and M.A. (1933) in anthropology and was then hired (1933–1938) by the University of Chicago's Oriental Institute as field assistant to the Syrian Expedition working in the Amuq (the Plain of Antioch). In 1937,

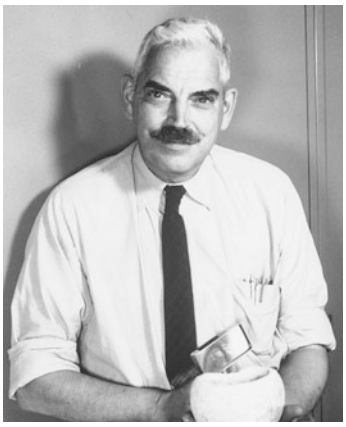

Braidwood, Robert John, Fig. 1 Braidwood with Jarmo artifact, Oriental Institute, University of Chicago, c. 1965. Photo courtesy of P. J. Watson

he married Linda Schreiber, whom he had first met during their undergraduate years at Michigan, the two forming a team that endured for the next 66 years. In 1938, he entered a doctoral program at the Oriental Institute (also taking coursework in Anthropology), which he completed in 1942. From 1941 to 1945, Braidwood was a part-time faculty member of the University of Chicago. In 1945 he was promoted to professor with joint appointments in the Oriental Institute and in Anthropology, a position he held until his retirement in 1978. He and Linda continued to participate in the Turkish Prehistoric Project for several more years.

Braidwood was the first archaeologist to seek empirical evidence (floral and faunal remains) for the beginnings of agriculture and pastoralism in Western Asia. He began his work initially at the site of Jarmo in northern Iraq (Braidwood & Braidwood 1950, 1953). Funding from the US National Science Foundation in 1954–1955 (the third Iraq-Jarmo Project field season) enabled Braidwood to add a botanical expert, a zoologist, a geologist, and a radiocarbon specialist to his field staff. When the 1958 nationalist revolution in Iraq made fieldwork there impossible, he transferred this collaborative research team to Iran (the Iranian Prehistoric Project 1959–1960) and then to Turkey (the Joint Turkish Prehistoric Project-Istanbul/Chicago, Diyarbakır region, 1963–2003) (Braidwood & Çambel 1980). Jarmo was the first "oldest food-producing community" to be revealed, the precursor of many other such communities now known in the Levant, Turkey, Iraq, Iran, and elsewhere (Braidwood 1967, 1973; Braidwood et al. 1983). Archaeologists around the world have joined the Braidwoods in pursuing evidence for the origins of plant and animal domestication and of food-producing economies in many regions of Asia, Europe, Africa, Oceania, and the Americas.

Braidwood received numerous honors over his career. He was elected to the National Academy of Sciences, the American Academy of Arts and Sciences, and the American Philosophical Society. He was made a foreign correspondent or honorary fellow of the German Archaeological Institute, the Austrian Academy of Sciences, and the Society of Antiquaries. He was also awarded honorary degrees by the Sorbonne and the University of Rome. In 1971, the Archaeological Institute of America presented him with its Gold Medal for Distinguished Archaeological Achievement, and the American Anthropological Association designated him its Distinguished Lecturer in Archaeology. In 1995, the Society for American Archaeology awarded him the Fryxell Medal for Interdisciplinary Research in Archaeology.

Major Accomplishments

The "agricultural revolution" is foundational to the origins of urbanized, state-based civilization in southern Mesopotamia. Braidwood's interest in the topic derived in part from publications by Harold Peake and Herbert Fleure (*The Corridors of Time*, eight volumes, Yale University Press, 1920s–1930s), V. Gordon Childe (1934), and Raphael Pumpelly (1908). His primary accomplishment was introducing, demonstrating, and advocating interdisciplinary archeological field research aimed at recovering primary evidence (physical remains of the earliest plant and animal domesticates) documenting agropastoral origins in western Asia. Moreover, he initiated a major

conceptual shift regarding West Asian agricultural origins when he based his fieldwork program – not in the lower Tigris-Euphrates region – but rather in the natural habitat zone of the first domesticates (e.g., goats, sheep, wheat, barley, legumes): rain-watered uplands above the irrigation-based, earliest Mesopotamian cities. He referred to this nuclear zone as "the hilly flanks of the Fertile Crescent" (Braidwood & Braidwood 1950, 1953; Braidwood & Braidwood et al. 1983).

Braidwood also implemented a radical change in the organization of Near Eastern fieldwork. Fieldwork was traditionally carried out at big sites employing dozens, even hundreds, of workmen whose main job was to open up large-scale exposures of architectural remains. Recovery of artifacts was centered primarily on those that were complete or nearly so, beautiful, or intrinsically interesting to those directing the excavations. Braidwood's crews of workmen were smaller and much more closely supervised by field staffs that included botanical, geological, and zoological experts at a time when the collaborating scientists had to bootleg field and analytical time from their regular jobs. It was only many decades after the NSF-funded Jarmo field season of 1954–1955 that new subdisciplines of archaeobotany/paleoethnobotany, geoarchaeology, and zooarchaeology came to characterize modern archaeology.

Another of Braidwood's accomplishments was to highlight the period immediately preceding the first appearance of established agropastoral economies. He called this the "era of incipient food production" and was the first archaeologist to direct attention toward elucidating key characteristics of those Early Holocene foraging/hunting-gathering peoples who created the first agricultural and pastoral economies.

As early as the 1950s, Braidwood was also advocating ethnographic research in Near Eastern villages where many ancient techniques and practices (e.g., building and maintaining adobe or puddled-adobe structures; caring for mixed flocks of sheep and goats and processing their wool, hair, and milk; growing and processing wheat, barley, and legumes) were so successful that they could still be seen and documented thousands of years later in contemporary communities (e.g., Watson 1979; Kramer 1982).

Braidwood's primary contributions to archaeological knowledge center upon his research and publications concerning one of the most important transitions in the human past, namely, the origins of agriculture and pastoralism in western Asia. His work on this topic inspired an international research trajectory whose practitioners continue to expand, revise, and refine knowledge of agricultural and pastoral economies ancestral to the array of food-producing systems currently supporting human societies upon this planet.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Childe, Vere Gordon (Theory)
- ▶ Ethnoarchaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Paleoethnobotany
- ▶ Zooarchaeology

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Brazil: Cultural Heritage Management Education

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Introduction

Although cultural heritage management (CHM) has become a legal and effective concern in Brazil since the end of the 1980s, professional training as regards its legal and methodological specificities is still at its beginnings, mostly due to an apartheid between "archaeological" (i.e., Native-American) and "historical" (colonial or more recent) heritages. While historical heritage has long been recognized and explored, usually by means of historical and architectural perspectives (with museological/educational resonances), most of Native American heritage remained within academic research circuit and under specific legal protection background. This has promoted little concern for issues such as site management and collections curatorship, as well as its use for educational approaches.

Historical Background

The development of an "official Brazilian culture" (since Independence Day) has segregated Native American societies (and their material record) into the "ghetto of the exiled memories," that is, their existence is known but from a very exogenous and diffuse perspective (Bruno 2007). Thus, Native cultural contents have been systematically kept outside from formal education, as well as from the first legal diplomas (from 1937) regarding national heritage, focused, as they were, on "historical" heritage. The first "national museums," appearing by the end of the nineteenth century, are historical in nature and devoted also to Natural History and Ethnology. There is interest in archaeological research, but it has never been considered mainstream at any official institution, the first formal archaeologist been hired only in the 1920s. But, interestingly, these museums have gathered, since their very beginning, several important archaeological collections assembled by amateurs or naturalists, usually treated as of secondary importance.

From the 1950s on, systematic archaeological research takes off, but the predominance of research interests led by foreign initiatives (or "missions") prevents adopting the notion of management as a priority. In the following decades (up to the 1990s), most archaeological investigations have been performed by academic research groups housed at universities, usually

more concerned with scholarly perspectives than management approaches (Funari 2004).

Heritage management in Brazil has appeared as a way to cope with the increasing destruction of archaeological remains due to fast economic development. This is the spirit of the first archaeological law, from 1961: to preserve, it is necessary to prevent/punish the destruction. With a few exceptions, there is no concern as regards management or education. Through the following decades, the IPHAN has been responsible for the protection and management of archaeological sites and collections, but with a legal and operational apparatus apart from historical/architectural sites and also strange from general national politics on museums and historical heritage management. (The Instituto do Patrimônio Histórico e Artístico Nacional – IPHAN (National Historical and Artistic Heritage Institution), established in the 1930s, has always been a reduct of architects; the first archaeologists have been hired only in the 1980s).

The formidable expansion of preventive (or "contract") archaeology (CRM projects) since the end of the 1980s and the overwhelming multiplication of recorded archaeological sites have evinced the need for the development of heritage management plans and strategies in three different levels: legal (with more specific diplomas regarding how to proceed as regards archaeological contexts), educational (law-enforced inclusion of heritage education programs into CRM projects), and museological (regarding the organization and management of the archaeological collections). Again, it must be stressed that these policies have been developed with no formal connection with established national heritage and museums programs, having a legal and operational apparatus on its own (for a more comprehensive review see DeBlasis 2010).

Current Debates

Heritage Management and Archaeology in Brazil: The Status of Art

As stated above, the inception of "education" into archaeological professional and academic career is recent and law-enforced in Brazil, becoming mandatory in every single research project since 2002. Legal diplomas, albeit well intentioned, have created a sort of "cake recipe," a report formula that (re)produces rather innocuous results from a scientific and educational standpoint, unfortunately supported by regulating agencies.

Education through, or for, heritage has long been an important concern into museums relationship toward the public (especially art education) and other means of scientific diffusion, as well as interpretive communication (tourism), particularly as regards historical heritage. These programs have strongly benefited from the development of robust pedagogical approaches such as the well-known *liberation education*, essentially based in learning and enhancing critical consciousness from the concrete experience of the surrounding reality (Freire 2000, 2005) and "educational city," enhancing urban identity and citizenship. There is also a strong focus on environmental education and sustainability, as well as education toward social inclusion, mostly among risk groups. Museological pedagogy, exploring communication through collections/landscapes and using memory indicators (and the so-called places of memory), has also known an enormous development, together with heritage education through material/cultural evidence (Horta 1984; Hooper-Greenhill 1995).

Particularly as regards archaeology, educational efforts have been confined to a few museums (usually linked to universities), focusing on the scientific perception of the discipline and exploring, occasionally, experimental archaeology. Through the last 10 years, a bigger concern with public archaeology has emerged, due to the growing awareness, by archaeologists, of the social, ethnical, and political problems involved on the praxis of their profession (DeBlasis 2010). A very interesting case came out within a project near the Xingu indigenous reservation, located at the southern Amazonian area, where archaeology (and archaeologists), with the support of the IPHAN, has led local community interests to be included into the scope of the project and to the creation of additional reservation territories based on indigenous knowledge.

Future Directions

Although it is possible to recognize the existence of advanced heritage legislation in Brazil, well tuned to environmental and sustainability perspectives, it is still poorly connected to formal education. Curiously enough, the management of archaeological heritage has taken an alternate path, apart from the mainstream educational tendencies and divorced from national museums politics. The protection of archaeological collections is a nuclear management problem today, due to its impressive accumulation in regional museums appearing everywhere, with few curatorial concerns. Despite the recent multiplication of grad schools of archaeology all over the country, the attention given to these and other management problems is still very timid. The distance between standard research procedures and effective management initiatives, on one side, and formal heritage education, on the other, needs urgent bridging. This rather peculiar situation, that is, the absence of site and collections management issues at the school curricula, as well as the overwhelming expansion of CRM projects all over the country, jeopardizes the continuity and acquisition of higher standards in heritage education in Brazil.

Besides these difficulties, public outreach of the archaeological heritage studies, whether academic or CRM based, is slowly growing, and in fact archaeologists themselves have become more attentive to it. Cultural sections of the most important newspapers show full-page texts on brand new discoveries; ecological TV programs bring archaeological reports every now and then, and easy reading books for the general public have also been published. Public education has become one of the forefront activities on recent archaeological research projects, and archaeologists now go to local schools and community centers to speak about the past, the environment, the things they find, history, and material culture – after all, what the hell are they (we) doing? It also has become common seeing flocks of school kids visiting archaeological excavations, often conducted by trained guides. Important to remember, public education has become mandatory in CRM projects from 2002 on, and these activities also must be reported at the project outset. But very often, unfortunately, the lack of prepared personnel brings, to these opportunities for effective educational contact and interaction, a rather deceptive outcome.

To overcome this situation, CHM education must be expanded to encompass a fully humanistic, as well as technical, professional formation for archaeologists and heritage managers. Archaeological practitioners need to go beyond descriptive standards and normative interpreting categories. They must dare to incorporate the living landscapes into their imaginary and cartography and realize that their work makes a difference for a more encompassing, socially and environmentally diversified future.

Cross-References

- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Community Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Constructivism in Archaeology Education
- ▶ Cuba: Archaeological Heritage Rescue and Management
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Management: Project Management
- ▶ Heritage Areas
- ▶ Heritage and Public Policy
- ▶ Heritage Landscapes
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Multicultural Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview

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Brazil: Historical Archaeology

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Introduction

Following a general trend in South America, historical archaeology in Brazil has experienced a growth since the mid-1980s. This contribution reviews its history and development, particularly in the last 20 years. It begins by focusing on the wider South American context and proceeds with an analysis of some of the most outstanding projects undertaken in Brazil over the last two decades or so.

Definition

Historical archaeology in Brazil is a field that started to be developed in the 1960s, initially without any difference, whether in goals or in methods, from the prehistoric archaeology. In the last 20 years, it has had a significant development, insofar as the focus on a descriptive culture-historical approach has being gradually substituted by approaches more influenced by contemporary social theory. In recent decades, Brazilian and other South American historical archaeologists, in an effort to move away from the strong influence of North American historical archaeology, have been concerned with building a proper identity for the field, based on the historical and cultural particularities of South American countries (Funari et al. 1999; Lima 1999; Senatore & Zarankin 2002).

Historical Background

Historical Archaeology in South America

The emergence of historical archaeology in many South American countries occurred concurrently with the development of prehistoric archaeology, during the first half of the twentieth century; however, it was only in the 1960s that more systematic studies started to take place. During the 1960s and 1970s, research on historical sites was usually conducted by non-archaeologists – amateurs, historians, and architects (Lima 1993; Funari 1994). Basically, their investigations shared as a main goal the contribution towards the building of national identities based on the colonial European splendor. These early works are characterized by a set of common features, such as the straightforward correlations between material culture and documentary data, the rescue of valuable historic artifacts and structures, and supplying information for restoration projects.

It was only in the 1980s that archaeology in South America started to develop as an independent field of knowledge, being recognized its potential in the construction of alternative discourses about the past. As a consequence, historical archaeology started to enjoy an independent status for the first time. In this way, archaeologists began to create multiple visions about recent history, which could be opposed to or different from official history or "master narratives."

Brazil: Historical Archaeology, Fig. 1 Map of Brazil showing the locations mentioned in this text

This multiplication of counter-hegemonic discourses was closely related to the end of military dictatorships and the consolidation of democratic governments in Latin America (Funari 1994). The new sociopolitical context allowed archaeology to experience an accelerated growth, a process which was particularly intensified during the 1990s. This growth was reflected in the development of several research programs that focused on the study of diversified problems and regions, in the creation of specific courses in undergraduate and graduate programs, in the spread of national and international meetings, and in the increasing number of publications.

Historical Archaeology in Brazil

Historical archaeology in Brazil (Fig. 1) emerged during the 1960s, when some scholars started to give attention to southern Jesuit missions from the seventeenth and eighteenth centuries in the states of Paraná and Rio Grande do Sul and to northeastern European-indigenous contact sites from the sixteenth century in the state of Pernambuco (Lima 1993). Most of these former historical archaeologists had been trained as prehistorians in that same decade to participate on a wide research program, the Programa Nacional de Pesquisas Arqueológicas (National Program of Archaeological Research), coordinated by Betty Meggers and Clifford Evans, from the

Smithsonian Institute. This program identified some of the major archaeological complexes for the Brazilian territory. These archaeologists, following the goals of the culture-historical approach, were concerned with the identification and spatial-temporal delimitation of complexes of artifacts. Such complexes, named traditions and phases, were considered as material correlates of specific prehistoric cultures. In the case of the historical sites, the major focus was on pottery, analyzed with the purpose of building typologies to be inserted in specific historical phases and traditions (e.g., Symanski 2009). Although subjected to several criticisms, this approach was productive during the 1960s and 1970s, when scholars such as Igor Chmyz, Marcos Albuquerque, José Brochado, and Pedro Mentz Ribeiro studied the locally made pottery found in European-indigenous contact sites. Their goal was to discuss acculturative processes involving indigenous populations in contact with colonizers, an issue that continued to be approached up to the mid-1980s.

During the 1970s historical archaeology in Brazil experienced a slow development. Among its major accomplishments was its insertion in restoration projects of architectural national monuments, like fortresses and churches, but employed as a mere technique, totally subordinated to architecture. As new perspectives appeared in the 1980s, archaeologists became increasingly conscious of the potential of the discipline to investigate subjects that could lead to reinterpretations of the official history, such as unprivileged groups, social memories, and daily practices (Lima 1993). In this way attention started to be given to more ordinary kinds of sites. Tania A. Lima and Margarida D. Andreatta began to study urban and rural households in São Paulo and Rio de Janeiro, while Carlos M. Guimarães excavated maroon settlements in Minas Gerais. Paulo E. Zanettini (e.g., 1996), in turn, studied the peasant village of Canudos, in Bahia, which was the core of a messianic movement of contestation violently suppressed by the Brazilian army in the early Republican period (1896–1897).

Although most of the works undertaken in historical archaeology in the 1980s were still descriptive in nature, some scholars started to apply more analytical approaches. This was the case of Carlos Guimarães' study of settlement patterns in maroon sites of Minas Gerais (e.g., Guimarães 1988) and of Tania A. Lima's and Paulo E. Zanettini's studies on the relationships between European wares and household socioeconomic variability in Rio de Janeiro (e.g., Lima 1995) and São Paulo.

Key Issues/Current Debates

The 1990s witnessed an increasing interest in types of sites that had been overlooked until then. These included mining areas, collective trash dumps, colonial houses, slave quarters, cemeteries, colonial roads, and plantations. This diversification was largely the result of two factors: the establishment of contract archaeology, which slowly emerged in the previous decade, and the expansion of graduate programs in archaeology (Symanski 2009). Regarding the theoretical landscape, the setting established since the 1990s has been characterized by a diversity of influences, including processual, symbolic, poststructuralist, and critical approaches.

The processual approach influenced urban archaeology projects in the cities of São Paulo and Porto Alegre, through the systemic concept of city site, and consumer behavior studies concerning the relationships between European wares and household socioeconomic status (Symanski 2009). In the cities of São Paulo and Porto Alegre, the concept of city site has been used as a heuristic tool in general programs of cultural resources management developed by these cities' town halls cultural offices. The goal has been to consider any site located in the urban space as a product of the wider urbanization process and thus to study the material remains of this process and their relationship with the development of urban lifeways. Consumer behavior studies, in turn, have focused on the variability of nineteenth-century European wares in urban and rural contexts, discussing, on one hand, diachronic changes in these items as related to changes in social practices in direction to a Western European

ideal of domesticity and, on the other, synchronic changes according to specific social and cultural backgrounds that could have influenced the consumers' choices. These studies have demonstrated that European ideals of consumption were far from being uniformly incorporated by the Brazilian society, rather, distinct social and cultural groups attributed distinct sets of value to these items, in some cases, as those of the urban elites, emulating European tastes and social behaviors but in others, as seem to have been the case with some farmers, peasants, and slaves, rejecting or adapting such values according to local cultural logics.

In the mid-1990s, Tania Lima published three articles that can be considered the foundations of the post-processual historical archaeology in Brazil (Lima 1994, 1995, 1996). Based on a strongly poststructuralist perspective, she studied the practices and representations of nineteenth-century society in Rio de Janeiro and the ways in which this changed as a result of European-influenced ideals of modernization that were increasingly incorporated during the second half of that century. Through the analysis of contexts which included cemeteries and households, Tania Lima discussed issues such as the representations linked to death, practices of personal hygiene and health, and the habits and rituals involving the social and private consumption of meals. During this same period, Pedro Funari was engaged in developing a critical and interpretative program for Brazilian historical archaeology, discussing the disciplinary status of the field, the relationship between written documents and material culture, and the rescue of the history of underprivileged and marginalized groups (Funari et al. 1999). These works represent the starting point of the development of works that, since then, have explored a diversity of issues including power relations, gender, social and cultural identities, and the structuring role of the built environment and landscape.

In Brazil, as in other Latin American countries, there has been a strong focus on the processes of change caused by the development and expansion of industrial capitalism. This system produced changes in practically all spheres of social and private life, including the separation between domestic and working spaces, the segmentation of meals, the mechanical measurement of time, the intensification of the process of urbanization, and the adoption of European-influenced ways of life. Although the influence of North American historical archaeology perspectives regarding these issues is undeniable, archaeologists studying the emergence of modern society in Latin America have tended to highlight the economic, social, and cultural specificities of this region (Lima 1999; Funari 2002; Senatore & Zarankin 2002). A case in point is Tania Lima's research which focused, on the one hand, on the strategies developed by the European industrialized countries, through the imposition of ideologies and practices involving the growing consumption of their industrialized items, and, on the other, on the creative ways in which Brazilian society was able to mix these practices with its own traditions, creating hybrid expressions (Lima 1999). Some scholars, like Ana Sousa, Luis Symanski, and Fernanda Tocchetto (e.g., 2003), have followed this line of investigation, discussing how groups with distinct social and cultural backgrounds, such as urban merchants, planters, industrial laborers, peasants, and slaves, differentially incorporated, rejected, or even ignored the ideology of industrial capitalism, despite the ubiquity of European industrialized items in these sites.

Landscape archaeology is another avenue of inquiry that has revitalized Brazilian historical archaeology in the last decades. Pioneering these approaches was Tania Lima's (1994) study on the representations of death in the nineteenth-century cemeteries of Rio de Janeiro. In this work she discusses the ways in which changes in these representations were related to wider changes in the social, economic, and political dimensions of Brazilian society, during its transition from the Imperial to the Republican period. Subsequent works include Marcos Souza's study of the socio-spatial organization of a southern colonial fortress in Laguna (Santa Catarina state) and its role as an expression of the colonizing ideology of the Portuguese Crown (Souza 1995); Ana Souza's analysis of the

role of a southeastern colonial road in the production and reproduction of social relationships among its users, including planters, peasants, merchants, slaves, and travelers (Souza 1995), and Beatriz Thiessen's discussion of the ways in which the façade and Greek-style sculptures of an early twentieth-century German-Brazilian beer industry in the city of Porto Alegre expressed the discourses of an emerging bourgeois in the early Republican period (Thiesen 2006). Landscape approaches have been applied as well in plantation archaeology. This is exemplified by Marcos Souza's discussion of the arrangement of the landscape of the plantation – *engenho* – São Joaquim, in Pirenópolis (Goiás state), which was constructed according to Enlightenment ideals that created differentiated temporalities among planters and slaves (Souza 2007). Symanski's (2007) study on the tactics applied by enslaved groups to subvert the hierarchically organized space of the plantations of Chapada dos Guimarães (Mato Grosso state) is another good example of a landscape-scale analysis.

The processes of construction and maintenance of ethnic and cultural identities have also received growing attention from scholars. Regarding the archaeology of southern Jesuitical missions, Fernanda Toccheto's work represents a departure from the traditional focus on acculturation, approaching the maintenance of traditional techniques of ceramic production among the indigenous population as a strategy of cultural resistance to Jesuit domination (Tocchetto 2003). It must be noted that since the 1990s, research on the Jesuit missions decreased insofar as archaeologists started to study the material remains related to African slavery. Research of this kind of context was inaugurated by Carlos Guimarães in 1980, as aforementioned. In 1990, Carlos Guimarães and his colleagues excavated the Quilombo do Ambrósio, recovering a significant amount of low-fired earthenware, pipes, and zooarchaeological material. In 1992 and 1993, Charles E. Orser, Pedro Funari, and Michael Rowlands conducted research on the largest maroon settlement known from Brazil, namely, the seventeenth-century Quilombo dos Palmares, located in the state of Alagoas (Funari 1999). They recovered indigenous and colonial coarse earthenwares and European majolicas. Additionally, early in the 1990s, Tania Lima and colleagues excavated the slave quarters of the coffee plantation São Fernando in Vassouras (Rio de Janeiro state), recovering a small assemblage composed of European whitewares and glass fragments (Lima et al. 1993). This scarcity of material was interpreted by the authors as indicative of the slaves' very low standards of life and supported the idea – currently surpassed – that the contexts of African slavery in Brazil were characterized by the paucity of material culture.

More recently, research on plantations in Central, Western, and Southeastern Brazil, carried out, respectively, by Marcos Souza, Luis Symanski, and Camilla Agostini, has revealed a large amount of material items related to slave lifeways, including coarse earthenware vessel forms such as pans, bowls, and storage jars; European whitewares consisting of plates, cups, saucers, and bowls; glass bottles, copper ornaments, and iron tools. Discussions regarding these artifacts have taken into account their role in the building of a sense of collectivity in the slave community, the development of an internal economy in the slaves quarters, the affirmation of discrete identities in the plantations space, and the existence of a market specifically directed to slaves and African-descent consumers, characterized by low-price commodities such as coarse earthenwares.

A growing interest in the archaeology of African-Brazilian experience has encouraged scholars to apply models of cultural encounters more sophisticated than acculturation, which, traditionally, has been the dominant model in the study of Jesuit missions and Euro-indigenous contact sites. This is the case with models of creolization, transculturation, and ethnogenesis, which tend to highlight the selective appropriation and reinterpretation of the culture of the "other," as well as the mutual cultural influence between colonizers and colonized, which results in the emergence of new cultural forms. The case of the

Quilombo dos Palmares has been approached from the perspective of such models by Scott Allen, who has studied the ceramics from this site, and Pedro Funari (1999), who highlighted the multicultural configuration of this maroon settlement and the processes of interaction between maroons and other groups that occupied the region.

Marcos Souza (2000), in his study of the colonial mining village of Ouro Fino (Goiás state), has discussed the ways in which a culturally diversified population, composed by Portuguese, Portuguese-Brazilians, Amerindians, Africans, and African descents, used regionally made material culture to build a wide sense of regional identity founded over a baroque worldview. Nevertheless, this effort to build a common creole culture was rejected in the domestic sphere, where Souza notices the maintenance of strong ethnic and gender asymmetries, expressed in the dichotomy between European majolicas and the locally made pottery, which reflected the differences between white men and enslaved women of African descent.

The research carried out by Marcos Souza and Luis Symanski (2009) on three sugar plantations and one maroon settlement in Chapada dos Guimarães (Mato Grosso state) addressed the process of creolization of African and African-descent groups through a diachronic perspective on the period between 1780, when the first sugar plantations were established in the region, and 1888, when most of these establishments were abandoned due to the abolition of slavery in Brazil. In the earlier decades, the African component was restricted to a low number of regional identities, predominantly from the Mina Coast, in West Africa, and from Benguela, southern Angola, and the locally made pottery presented little decorative variability, predominating designs in zigzags, diamonds, and waves, generally incised over exposed coils in the upper part of the vessels. This setting changed during the second third of the nineteenth century, when large numbers of Africans, from Western, Central, and Eastern Africa, arrived in the region and Mina and Benguela slaves strongly dropped in number. The locally made pottery from the contexts of this second period, in turn, presented a much larger decorative variability, with the introduction of new techniques, such as stamped, impressed, punctured, and finger-nailed decoration, in a wide diversity of motifs and combinations. Finally, in the last third of the nineteenth century, a creole generation, which was born on these plantations, started to dominate the demographic regional setting, coming to represent more than three quarters of the slave population in the 1870–1888 period. During this period, decorated vessels strongly dropped in popularity, demonstrating that the decorative dimension of the locally made pottery had little significance to this more culturally homogeneous, creole generation. These correlations suggested that Africans used these items to express cultural differences whereas African-Brazilians did not, demonstrating that in this region, the process of creolization was strongly linked to generational changes in the slaveholdings.

Marcos Souza has also studied the slave quarters of the São Joaquim sugar plantation in Pirenópolis (Goiás state), focusing on the active role that material culture exerted in the social universe of the enslaved groups. He concludes that the process of creolization in that context involved the formation of a coherent cluster of references by those groups, which was constantly recreated and reinvented over the generations (Souza 2007).

Another field that has seen significant development in recent years is underwater historical archaeology, particularly through the work of Gilson Rambelli (e.g., 2002), who has studied shipwrecks along the Brazilian coast. Rambelli has created a Laboratory of Underwater Archaeology and is responsible for the formation of a new generation of Brazilian underwater archaeologists.

Also, Pedro Funari has recently raised awareness among Brazilian archaeologists the diverse issues regarding archaeological practice, the political enrollment of archaeologists inside the local communities in which they work, and the effects that interpretations about

the past can have over the present. The growing importance of these discussions has led Funari to create a Public Archaeology Center at the University of Campinas, São Paulo (Funari 2004). This focus on the political role of archaeology has also led to the emergence of new issues, such as the archaeology of repression (Funari et al. 2009), the decolonization of the discipline, and the development of what Daniel Miller has termed "material culture studies," which involves the archaeology of present daily life (Zarankin 2010).

International Perspectives

Although most of the academic production in historical archaeology in Brazil is still directed just to a national or sometimes Latin American audience, this picture has tended to change since the 1990s, when some Brazilian archaeologists started to discuss the singularities of social conformation at the local level, highlighting the role of agents in the definition of the practices they use to construct their identities (e.g., Funari et al. 1999; Lima 1999, 2002b). The work of Pedro Funari and Tania Andrade Lima, especially, is well known internationally, being frequently cited in articles and books in Europe and United States. Currently, Brazilian historical archaeology is entering a phase of growing internationalization, with an increasing number of scholars publishing articles in some of the major international journals dedicated to the field. It must also be noted that Brazil has had an important role in the development of historical archaeology in Latin America in this century, particularly by spreading academic research results. This is in great part due to the publication, since 2008, of the journal *Vestígios – Revista Latino-Americana de Arqueologia Histórica*, a biannual periodical edited by Andrés Zarankin and Carlos Magno Guimarães and published by the Federal University of Minas Gerais, the aim of which is to promote interaction between scholars working in the field of historical archaeology across Latin America.

Future Directions

In the last 20 years, Brazilian historical archaeology has attained a state of maturity, constituting a fully integrated field of study in the country's research agenda. The heterogeneity that currently characterizes the field is also its major strength, insofar as it guarantees a plurality of perspectives, critical for the building of more inclusive, multivocal pasts, which are essential for the social development of a country historically characterized by enormous social inequalities. The current development of the field in Brazil illustrates a growing concern with the study of underprivileged groups, such as slaves, peasants, immigrants, Amerindians, and urban proletarians. These studies will serve not only to highlight the living and working conditions and identities of these groups in the past but also to strengthen the memory and identities of the contemporary descendant communities, insofar as public archaeology has been growing as an important part of archaeological agenda in academic as well as in cultural resource management researches.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Critical Historical Archaeology
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ Landscape Archaeology
- ▶ Latin American Social Archaeology
- ▶ Lima, Tania Andrade
- ▶ Modern World: Historical Archaeology

▶ Orser, Jr., Charles E.
▶ Plantation Archaeology
▶ Post-Processualism, Development of
▶ Processualism in Archaeological Theory
▶ Urban Archaeology

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Breadfruit: Origins and Development

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Basic Species Information

Taxonomy

Breadfruit has been a major staple crop for millennia in the islands of Oceania, where hundreds of cultivars have been developed and named. The first accepted botanical description of breadfruit dates back to 1773 by Sydney Parkinson, one of the artists who accompanied Joseph Banks on the voyage of the *Endeavour*. Since then a proliferation of names for breadfruit and its close relatives have been published, leading to much confusion in the literature about the correct scientific name for and the delimitation of the domesticated breadfruit. Recent examination of both morphological and molecular characters of hundreds of samples of breadfruit from throughout Oceania as well as related species has lead to a better understanding (Zerega et al. 2005a). The domesticated breadfruit is *Artocarpus altilis* (Parkinson) Fosberg (the most commonly seen synonyms include *A. communis* (Forster) and *A. incisa* (Thun.) L.f.). Two closely related species that contributed to breadfruit domestication are *A. camansi* Blanco and *A. mariannensis* Trécul (Fig. 1). Hybrids *A. altilis x mariannensis* also exist (Fosberg 1960).

Species Description

Artocarpus altilis is a large evergreen tropical tree that can reach up to 30 m tall. It is monoecious with separate male and female inflorescences on the same tree and produces copious amounts of white sticky latex throughout the plant. There is great diversity in the leaf and fruit (breadfruit is technically a compound fruit) characteristics of breadfruit. Adult leaves are typically glossy, dark green, and pinnately lobed and range in size. The number and size of the lobes can vary greatly, with

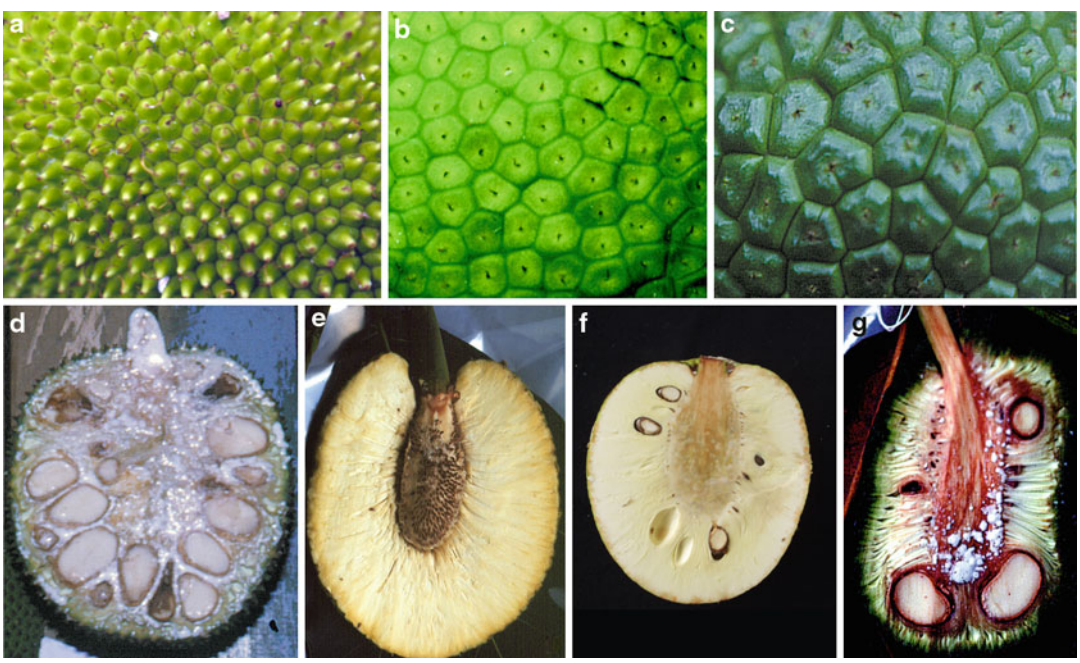

Breadfruit: Origins and Development, Fig. 1 Breadfruit and its relatives. Fruit surface and cross sections of *A. camansi* (**a**, **d**), *A. altilis* (**b**, **e**, **f**), and *A. mariannensis* (**c**, **g**)

some cultivars having no lobes at all. Fruits are variable in size (up to 20 cm wide × 30 cm long), skin color (typically yellowish to greenish), flesh color (creamy white to pale yellow), surface texture (smooth, bumpy, or spiny), and whether or not seeds are present. Seedless cultivars are typically triploid.

Although the tree is primarily grown for its starchy fruit, it is a multipurpose crop. The tree itself is used in multicropping agroforestry systems in the tropical Pacific Islands. The wood is prized for its resistance to termites and is used for dugout canoes, carvings, and in construction; the bast fibers can be used to produce cloth and cordage, the latex can be used as an adhesive, for caulking or birdlime; and all parts of the tree are used for a variety of medicinal purposes (Jones et al. 2011a).

Geographical Distribution

Oceania is home to the greatest morphological and genetic diversity of breadfruit, and this is where the crop was originally domesticated. In the eighteenth century, Europeans began distributing a select few cultivars beyond the Pacific Islands and today it can be found in over 80 countries throughout the tropics. However, the diversity of cultivars outside of Oceania is extremely low (Zerega et al. 2005b). Breadfruit remains most widely cultivated in Oceania, with the Caribbean region second. Breadfruit is considered an underutilized crop that has great potential in the future and its distribution throughout the tropics continues to expand. Outside of the tropics, it is often well known due to its role in the infamous mutiny aboard the *H.M.S. Bounty* in 1789.

The progenitor species of breadfruit, *A. camansi* (breadnut) and *A. mariannensis*, are both cultivated for their fruits and seeds in their native ranges and beyond. Breadnut is native to New Guinea and the Moluccas and probably naturalized in the Philippines. It is also cultivated for its seeds in parts of Southeast Asia, the Caribbean Islands, tropical Central and South America, and Africa. *Artocarpus mariannensis* is native to the Mariana Islands and Palau and has been introduced to other Micronesian and Polynesian islands.

Major Domestication Traits

The hundreds of named breadfruit cultivars found in Oceania were domesticated from either *A. camansi* alone or from both *A. camansi* and *A. mariannensis*. Selection in breadfruit appears to have focused on increased flesh content, at the expense of seeds (many cultivars are seedless), and through a decrease in the fruit core size. In addition, the fruit surface texture is smoother in the domesticate, making it easier for peeling (Jones et al. 2013). These characteristics may have been selected for since they make pit fermentation easier – a traditional way for Pacific Islanders to store food and ensure a predictable food supply. The change in seediness correlates with a change in propagation methods; the progenitor species are seed propagated, while breadfruit is predominantly vegetatively propagated with most of the seedless cultivars being sterile triploids. Seeded cultivars are most common in the southwestern Pacific Islands, while seedless cultivars are most common in Micronesia and the eastern islands of Polynesia. Virtually all breadfruit found elsewhere in the tropics is seedless. In addition to the loss of seeds, other changes occurred in the texture and color of the fruit flesh and surface, as well as in leaf shape, size, and leaf pubescence. To date, limited studies have been conducted on the change in nutritional content of breadfruit compared to its progenitor species (Jones et al. 2011b).

Timing and Tracking Domestication

Archaeological remains of breadfruit have been found on several islands throughout Oceania; however, available records are limited and a systematic study aimed at tracing the history of its domestication based on these data does not exist. Breadfruit is a significant part of the culture in Oceania, and there are numerous legends throughout the islands about its origins. Although the exact details differ, many of these stories in Polynesia describe the tree arising from the body of a god or man who willingly sacrificed himself in order to provide sustenance to a family or

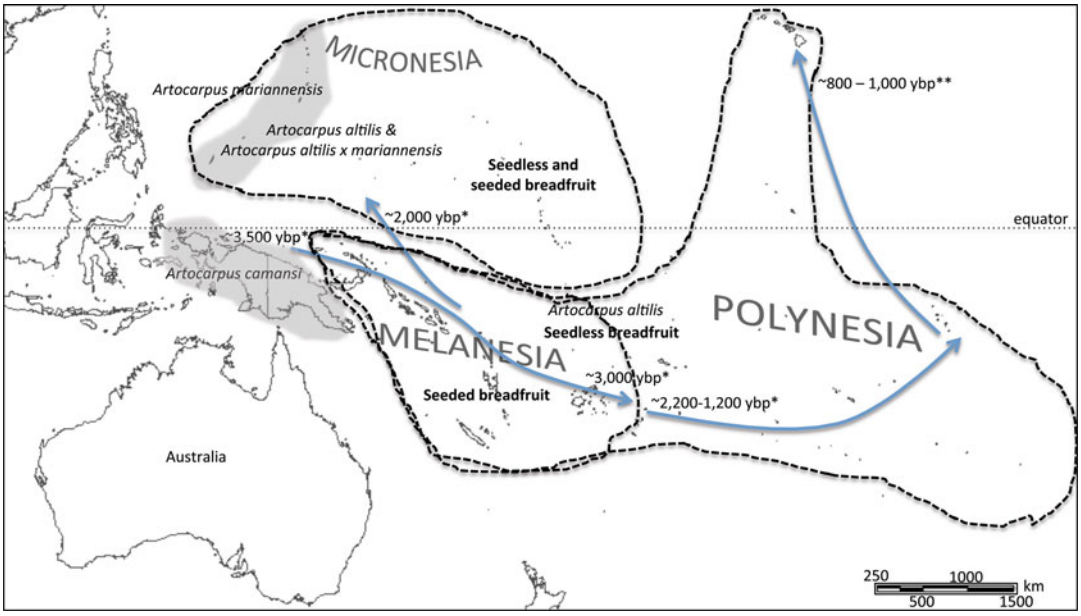

Breadfruit: Origins and Development, Fig. 2 Distribution and proposed human-mediated migration of breadfruit and its relatives. The native range of *A. camansi* and *A. mariannensis* are shaded in gray. The range of domesticated breadfruit and hybrids and their level of seediness are indicated within the dotted lines. Arrows indicate general directions of human migrations and are simplified from actual migration routes. Times are estimates of Lapita migrations likely carrying breadfruit or its progenitors and are given in years before present (YBP) and come from Kirch (2000)* or McCoy et al. (2010)**

village during a time of famine. The similarities suggest that the stories may have been passed along with the breadfruit from island to island.

Genetic and morphological data from hundreds of breadfruit cultivars and the two progenitor species are now available and have begun to paint a picture of breadfruit origins and its path of human-mediated distribution throughout the islands of Oceania (Zerega et al. 2004). Breadfruit in Melanesia and Polynesia bear the genetic fingerprint of breadnut alone, while much of the breadfruit in Micronesia bears the fingerprint (and morphological characteristics) of both progenitor species. Considering these data in light of what is known about human colonization of the islands helps explain this pattern (Fig. 2).

The Lapita were a seafaring people on the move out of Southeast Asia, and they quickly fanned eastward from northern New Guinea about 3,500 years ago, spreading through Melanesia and Polynesia bringing plants (like breadnut) with them. *Artocarpus* seeds remain viable for only a few weeks, so as the distances of voyages increased into the more remote and not yet colonized islands of Polynesia, vegetative propagation through root cuttings would have been the preferred method of transport – this is also true for many other important crops in Oceania which are vegetatively propagated, including *Colocasia esculenta* (taro), *Dioscorea spp.* (yams), and *Piper methysticum* (kava). Successive generations of vegetative propagation eventually gave rise to seedless triploid cultivars that were preferentially selected. Additionally, the genetic diversity and level of seediness of breadfruit decreases eastward from Melanesia into Polynesia with the progressive narrowing of the gene pool with subsequent migrations. Generally, the prominence of seedless cultivars increases as one travels from New Guinea eastward through Melanesia (where seeded cultivars are common) into western Polynesia (where few-seeded and seedless cultivars are prevalent) and into eastern

Polynesia (where virtually all cultivars are seedless triploids). Finally, a long-distance migration from eastern Melanesia (possibly from Vanuatu or the Solomon Islands) into Micronesia brought *A. camansi*-derived breadfruit into the range of *A. mariannensis* where the two species hybridized, giving rise to a new suite of breadfruit diversity bearing the genetic fingerprints of both progenitor species.

Cross-References

- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Oceania: Historical Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology

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Breasted, James Henry

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Basic Biographical Information

James Henry Breasted (1865–1935) was an American Egyptologist best known for his work as a historian, philologist, and epigrapher and as the founder of the Oriental Institute at the University of Chicago. Born in 1865 in Rockford, Illinois, Breasted was from a family of modest means; his father was a hardware store owner and, later, a traveling salesman. Consequently, Breasted's path to academia was fraught with financial struggle. The need to support his family was a factor in the considerable amount of educational outreach work – from public lectures to popularizing books – that he accepted; as a result, he became one of the most widely known historians of his generation (Ambridge 2010; for examples of popular work, see Breasted 1908, 1916).

Between 1880 and 1890, Breasted studied at several institutions: Northwestern College in Naperville, IL, where he concentrated in Latin; the Chicago College of Pharmacy; and the Chicago Theological Seminary. After excelling in Hebrew at the seminary, he was encouraged to

pursue graduate work in Semitic languages with William Rainey Harper at Yale University (Breasted 1943: 13-25; Abt 2011: 4-16). After a year of study at Yale, and with the encouragement of Harper, Breasted departed for Germany in order to obtain a doctorate in Egyptology, a field of study not yet well established in American academia. In 1891 he matriculated at the Humboldt University of Berlin (known at the time as Friedrich-Wilhelms-Universität) and studied for the next 3 years under Adolf Erman, one of the foremost Egyptologists in Germany. By the fall of 1894, Breasted had completed his doctorate with a dissertation on the sun hymns of the New Kingdom pharaoh Akhenaten; married Frances Hart, a fellow American expatriate living in Berlin; secured a position as assistant in Egyptology at the University of Chicago; and embarked on his first tour of Egypt (Breasted 1943: 33-40, 58-66; Abt 2011: 23-40). He would remain with the University of Chicago for the duration of his career.

Major Accomplishments

Breasted excelled in languages; among those that he commanded were German, French, Latin, Hebrew, Arabic, ancient Egyptian (including Coptic), and Assyrian. With his educational background rooted in philology, he gradually pioneered new epigraphic methods of copying, recording, and photographing ancient inscriptions. Crucial to the development of his epigraphic methodologies were the years from 1894 to 1908, when he was granted several leaves of absence from the University of Chicago in order to conduct research abroad. From 1899 to 1901, he toured the major museums of Europe, where he photographed, transcribed, and translated all of the museums' historical inscriptions of ancient Egypt (Wilson 1936: 99; Breasted 1943: 103-15; Abt 2011: 75-8). This work contributed to Adolf Erman's Egyptian dictionary – the *Wörterbuch der ägyptischen Sprache* – and culminated in Breasted's own multivolume *Ancient Records of Egypt*, published in 1906. His first tour of Egypt occurred in the winter season of 1894/1895, during which he recorded inscriptions at major archaeological sites in the Nile valley north of Aswan. In the winter seasons of 1905/1906 and 1906/1907, he led expeditions through both Upper and Lower Nubia from Naga in the south to Beit el-Wali in the north, further refining his epigraphic methods (for photos of these expeditions, see Larson 2006).

In the years between 1908 and 1919, Breasted focused on teaching, writing, and administration; he was the chair of the University of Chicago's Department of Oriental Languages and Literatures as well as the director of the Haskell Oriental Museum (now the Oriental Institute Museum). The most notable publications from the first half of his career include his popular and widely read *A History of Egypt from the Earliest Times to the Persian Conquest* (1905); *Ancient Records of Egypt* (1906); *Development of Religion and Thought in Ancient Egypt* (1912); and *Ancient Times, a History of the Early World* (1916), a textbook written for high school students.

Ancient Times had a significant impact on the future of American Egyptology when the book received a favorable response from Frederick Gates, business advisor to John D. Rockefeller, Sr. and his son, John D. Rockefeller, Jr. Consequently, Breasted sought research funding from the Rockefeller Foundation and in 1919, John D. Rockefeller, Jr. committed to 5 years of financial support, enabling Breasted to found the Oriental Institute at the University of Chicago. The Institute's first project in 1919/1920, led by Breasted, was a 9-month reconnaissance survey throughout the Middle East, a region of the world undergoing profound changes in the aftermath of World War I. On this trip, Breasted's team evaluated such sites as Ur, Lagash, Babylon, Assur, Nineveh, and Khorsabad (Emberling 2010).

With continued funding from Rockefeller, Breasted established permanent field headquarters for the Oriental Institute in Luxor, Egypt. Named "Chicago House," the site still serves as the base for the Institute's ongoing Epigraphic Survey of Theban temples, a project initiated by Breasted in 1924. By 1928, Breasted secured a multimillion-dollar grant from the Rockefeller Foundation, resulting in

a permanent endowment for the Oriental Institute and the construction of the Institute's research center, completed in 1931 (Abt 2011: 284-6, 345-9). Although Breasted did not identify himself as an archaeologist – he acknowledged the difference between the goals and methodologies of his epigraphic work and those of excavations run by such archaeologists as Flinders Petrie and George Reisner – in his capacity as director of the Oriental Institute he initiated excavations at such sites as Megiddo, Çatal Hüyük, Khorsabad, Tell Asmar, and Persepolis.

The heavy administrative duties of the Oriental Institute slowed Breasted's own research during the second half of his career. Two notable publications from this period are *The Edwin Smith Surgical Papyrus* (1930) and *The Dawn of Conscience* (1934). His wife, Frances, died in 1934; in June of 1935, he married his wife's younger sister, Imogen. The marriage was short-lived, however, as Breasted fell ill on the return journey from a tour of the Middle East in that same year. By the time his ship arrived in New York, Breasted had developed a streptococcal infection and he died on December 2, 1935, at the age of 70. He was survived by three children: Charles, James Henry, Jr., and Astrid.

Cross-References

- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ History and Archaeology: Relationship Over Time (US Perspective)

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British Isles: Medieval Archaeology

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Introduction

As a geographic entity the British Isles refers to the two large northwest European islands of Great Britain (England, Scotland, and Wales) and Ireland and the smaller offshore islands

which belong in their jurisdictions. The term is not popular in the Republic of Ireland, independent of British rule since 1922 and a republic since 1949, but, with attempts to re-brand the two islands as an Atlantic archipelago not having had much success, Irish commentators across a multiplicity of scholarly fields refer instead to "Britain and Ireland" (or "Ireland and Britain"). Historically, the "British Isles" is acceptable, however, and has no relationship with issues of modern sovereignty.

Definition

Traditionally, there are two problematic areas of definition, one of the discipline itself and one of the temporal boundaries and internal temporal subdivisions of the Middle Ages. These matter less to those medieval archaeologists (increasing in number) who engage directly with archaeological theory than they do to archaeologists of a more traditional, cultural-historical, persuasion, but they remain at the core of the discipline nonetheless.

Regarding the former, there are two ways of viewing Medieval Archaeology. One is period based: it is simply the study of the archaeological record of the Middle Ages and differs from prehistoric archaeology only insofar as a historical record provides clues to understanding and dating material remains. The second is sensitive to the particular epistemological challenges posed by a written record alongside a material record and is conscious of the skills required to negotiate the historical record without feeling reliant on those skills. In many ways, this distinction between two types or conceptions of Medieval Archaeology parallels a similar distinction in the field of Historical Archaeology.

Regarding the second of the two problematic areas of definition, the debate as to the start and end dates of the Middle Ages is a slightly irrelevant one in that there was no understanding among medieval people that they were in the middle of anything. But the consensus now is that if a start date for the Middle Ages in the British Isles is required, the best option is to assign the collapse of the Roman Empire in the early fifth century and the near-simultaneous diffusion of Christianity from that Roman world into the "Celtic West," to the very end of the premedieval period. This brings the insular chronology into line with that of much of Continental Europe, especially western Europe and the Mediterranean lands. The watershed in England, southern Wales, and southern Scotland is marked specifically by the departure of Roman legions and, in eastern England, by the beginnings of Anglo-Saxon period, the latter a phenomenon that is still hotly debated. The transition from premedieval to medieval is less well defined in other parts of Britain, but the indigenous populations of these areas, speaking what are described by modern scholars as Celtic languages, would not have been unaffected by the presence of Roman culture and so would not have been unaffected by its ending, even if it took time for the cultural implications of the Roman departure to be absorbed. Ireland was not part of the Roman Empire, but the earliest documentation of Christianity dates from the early fifth century and specifically the sending by the pope of a bishop (Palladius) to minister to Christians (presumably Roman traders) resident on the island. A later though still fifth-century bishop, Patrick, is credited with the conversion of the people of Ireland, though other unnamed missionaries must have been involved and the process must have continued into the 500s if not also the 600s.

There is less consensus on the end date of the Middle Ages, mainly because moments or events which stand out as historically pivotal do not necessarily chime with shifts in worldviews or changes in material practice, the indicators that archaeologists use in periodizing. For archaeologists who like historical correlatives, the period of Henry VIII's reign (1509–1547) provides two key touchstones: his establishment of the Protestant Church in the 1530s and the dissolution of the monasteries between 1536 and 1541. Archaeologists who work more independently of historical narratives prefer to focus on the emergence of Renaissance culture or the shift from "feudalism," which is a hotly contested concept, to "capitalism," which is

slightly less hotly contested (Gaimster & Stamper 1997; Gaimster & Gilchrist 2003). For these phenomena there is no fixed chronology and certainly none that can be applied to all parts of the British Isles. There is at least some agreement that, even in the most remote parts of the islands, the medieval period is over by the start of the seventeenth century.

Key Issues/Current Debates/Future Directions/Examples

Aspects of the medieval past on the two islands, whatever the chronological boundaries given to that past, have been the specific subject of archaeological investigations as we might understand them today since the early twentieth century (Gerrard 2003). Archaeological work of the 1800s, fitful with respect to the medieval heritage, is best regarded under the heading of "antiquarianism": conservation work on medieval monuments in Great Britain, for example, usually necessitated wall-chasing trenches, dug and emptied with little concern for data other than structural and material. Among the key works establishing the modern discipline was E.T. Leeds, *The Archaeology of the Anglo-Saxon Settlements* (1913), a work which, through opening up the potential of archaeological investigations to reveal the origins of the English people, laid the foundation for the especially enduring richness-of-tradition of Anglo-Saxon archaeological scholarship, a foundation built upon by the discovery of the Sutton Hoo Anglo-Saxon burial in 1939. There are no such benchmarks in Ireland until the publications of the excavations of a series of early medieval sites by Hugh O'Neill Hencken of *The Harvard Mission to Ireland 1932–36*. To the preoccupation with Anglo-Saxon and Celtic archaeologies during the first decades of the last century was added a concern, mainly in the 1970s, for Viking Archaeology, the impetus being the urban excavations in York and Dublin. By that stage the discipline had its own dedicated society, the Society for Medieval Archaeology, founded in 1957, the journal of which, *Medieval Archaeology*, still generously offers a forum for pan-European investigations but is still largely comprised of papers on British themes. Research on the High Middle Ages, the period starting with the Norman invasion of England of 1066, followed by the Anglo-Norman spread into lowland Scotland and (especially) eastern Ireland in the twelfth century, was less systematically conducted, reflecting somewhat ironically the much greater diversity and volume of high-medieval archaeological material on the one hand and the availability of an historical record to provide an overarching interpretative framework on the other. That is not to say that there was no systematic research; on the contrary, projects like the excavations at Wharram Percy, and organizations such as the Medieval Pottery Research Group (founded in 1975), created a rich tradition. Works of synthesis only appeared late in the century (Clarke 1984; Barry 1987; Yeoman 1995), after the Society for Medieval Archaeology had celebrated its quarter-century anniversary with a volume of essays (Hinton 1983) which revealed a youthful discipline in thrall to historical narratives and, arguably, struggling to achieve some rapprochement with the New Archaeology (or processual archaeology, as we call it now).

The last quarter of the century has seen significant growth in Medieval Archaeology in these islands. The expansion of lectureships in British and (mainly in the 1990s) Irish universities puts it alongside longer-established areas on the educational curriculum. Medieval Archaeology remains a strongly cross-disciplinary pursuit in these islands, and most archaeologists possess a cognizance of the historical record and an ability to make sense of it without feeling enslaved by it. Traditional questions remain on the agenda – the origins of the English village and, by extension, the origins of Englishness itself; rural settlement in Scotland and Wales; and the fugitive archaeology if Gaelic-Irish communities in high medieval Ireland – but answers, while not definitive, are more advanced. More significantly, progress in "scientific archaeology" – the reconstruction of diet from skeletal remains and DNA analysis of human populations and remote sensing (such as LiDAR) on the other – has had

a transformative impact on our understanding of medieval populations and their activities and, to the credit of practitioners, has been advanced with full cognizance of the importance of connecting "scientific" understandings to "cultural understandings." Moreover, there has been a parallel growth in awareness of the value of thinking theoretically beyond traditional culture-history (although it is markedly less advanced in Ireland, where even the New Archaeology was eschewed in the 1970s), than in the United Kingdom; comparison between the publication celebrating of the Society for Medieval Archaeology's half-century anniversary (Gilchrist & Reynolds 2009) and that of 25 years earlier shows the extent to which the subject has grown in recent years.

Cross-References

- ▶ Burial Excavation, Anglo-Saxon
- ▶ Council for British Archaeology (CBA)
- ▶ Crannog Investigations in Scotland
- ▶ Medieval Pottery Research Group (MPRG)
- ▶ Society for Medieval Archaeology
- ▶ Urban Archaeology
- ▶ York Archaeological Trust

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British Museum

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Basic Information

Situated in Great Russell Street, London, the British Museum (http://www.britishmuseum.org/) was created by an Act of Parliament in 1753 and opened to the public in 1759. Governed by a board of 25 trustees in accordance with the British Museum Act of 1963 and the Museums and Galleries Act of 1992, the museum is a nondepartmental public body, sponsored by the Department for Culture, Media and Sport. The museum's stated purpose is "to hold for the benefit and education of humanity a collection representative of world cultures and to ensure that the collection is housed in safety, conserved, curated, researched and exhibited" (British Museum n.d.).

The British Museum originated with the collection belonging to physician and naturalist, Sir Hans Sloane (1660–1753), which consisted of natural history specimens, ethnographic material, antiquities, jewelry, coins, medals, prints, and Orientalia. This was combined with a large library of manuscripts assembled by Sir Robert Cotton, and the Harleian Library, the manuscript collection of the earls of Oxford. Expanded in

1757 with the addition of King George II's donation of the old Royal Library, the museum thus originally mainly consisted of natural history specimens, books, and manuscripts. In 1772, the museum acquired its first collection of notable antiquities with the Greek vases belonging to Sir William Hamilton. In 1807, it created a specific Department of Antiquities which, in 1860, was divided into three: Greek and Roman Antiquities, Oriental Antiquities, and Coins and Medals. In the early 1880s, the museum divested itself of its Natural History collection, consequently making space for its expanding collection of antiquities. In 1997, the books and manuscripts making up the National Library were moved from the British Museum to their new home at St Pancras, and the museum's circular Reading Room subsequently incorporated, in 2000, into the redesigned Great Court (Wilson 2002).

Today the Museum is made up of ten departments, primarily consisting of antiquities, which together contain eight million objects: The Department of Ancient Egypt and Sudan houses material from the Nile Valley, spanning the Predynastic Neolithic c.10,000 BCE to the Coptic Christian period in the twelfth century CE. It includes such famous objects as the colossal bust of Ramesses II, the Gayer Anderson cat, the Amarna Tablets, and the Rosetta Stone. The Department of Greece and Rome houses Mediterranean antiquities dating from the Bronze Age to the fourth century CE and includes bronze sculpture, Greek vases, elements from the Mausoleum at Halicarnassus and the Temple of Artemis at Ephesus, and the controversial Elgin Marbles. The Department of the Middle East focuses upon the material culture of Mesopotamia, Iran, the Levant, Anatolia, Arabia, Central Asia, and the Caucasus from the Neolithic period to the present. It contains objects such as Sumerian material from the royal cemetery at Ur, the Old-Babylonian "Queen of the Night" plaque, the Black Obelisk of Shalmaneser III, and the lion-hunt reliefs from the Assyrian palaces at Nimrud and Nineveh.

The museum's Department of Prehistory and Europe focuses on the Paleolithic and Neolithic periods, the Bronze and Iron Ages, Roman Britain, and the Medieval and Renaissance periods up to the present. It houses such objects as the seventh-century CE Sutton Hoo Anglo-Saxon ship burial and the Lewis Chessmen. It works in conjunction with the Department of Portable Antiquities and Treasure which coordinates the Portable Antiquities Scheme through which archaeological objects found by members of the public are recorded, and which administers the Treasure Act 1996 on behalf of the UK Government. The Department of Asia contains material spanning the Neolithic c. 4000 BCE to the present and includes the Buddhist limestone reliefs from Amaravati. The Department of Africa, Oceania and the Americas combines ethnographic, historical, archaeological, and contemporary material and includes the controversial Benin bronzes. The Department of Coins and Medals is concerned with the history of coinage from the seventh century BCE to the present. The Department of Prints and Drawings contains the National Collection of Western prints and drawings, dating from the fifteenth century to the present day. And the Department of Conservation and Scientific Research works with the other departments to conserve and study the collection.

Major Impact

The British Museum can claim to be the first national museum in the world. Its collection is among the largest and most extensive in existence and formed the basis of what later became the Natural History Museum which opened in 1881 and the British Library created in 1973. The museum has a long association with archaeological excavation, beginning with Charles Fellow's expedition to Xanthos in Asia Minor in 1840. It supported Austen Henry Layard's excavations in Assyria which resulted in the discovery of Ashurbanipal's great library of cuneiform tablets. The museum was also involved in the creation of the Egypt Exploration Fund in 1882. The museum maintains an active role in many national and international archaeological fieldwork projects. It encourages its staff to participate in excavation and fieldwork and is one of the chief British sources of funds for research excavation. The museum is also inextricably involved in the debate

about the Return of Cultural Property, with the Elgin Marbles, the Rosetta Stone, and the Benin Bronzes as the most prominent among the contested objects in its collection (Wilson 2002).

The museum is the UK's most popular visitor attraction (FitzGerald 2012) and seeks to actively engage with the public. Museum facilities such as departmental study rooms and libraries are accessible to members of the public undertaking their own research. The museum collection is available online with a searchable database containing 2,036,885 objects, 703,883 of which are accompanied by photographs. The British Museum Press publishes books relating to exhibitions and aspects of the collection, and the museum also has three online journals – *The British Museum Studies in Ancient Egypt and Sudan*, *British Museum Technical Research Bulletin*, and *Bronze Age Review*. The museum website also includes a blog containing regular posts by members of staff on recent news, exhibitions, acquisitions, aspects of the collection, and archaeological excavations. The museum works in partnership with universities to offer higher education courses, actively encourages visits by school groups, and holds family-focused events.

Cross-References

- ▶ Conservation in Museums
- ▶ Encyclopedic Museum
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Repatriation: Overview

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British Pioneers and Fieldwork Traditions

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Introduction

From its antiquarian origins, the development of field method in Britain reflects attempts by archaeologists to balance the merits of survey against excavation, research against rescue, and empiricism against theorized interpretation. While early methods lacked consistency, most were based on a modified form of empiricism known as inductivism: observations in the field gathered together to create interpretative statements (Marsden 1983). Richard Colt Hoare (1758–1838), excavator of more than 500 sites in the early 1800s, memorably summed up the position by declaring that "We speak from facts not theory" as the epigraph to *Ancient Wiltshire* published between 1812 and 1820. Importantly, a community of practice emerged to foster a network of amenity societies.

Key Issues/Current Debates/Future Directions/Examples

The late nineteenth century was a watershed in the development of archaeological fieldwork. Positivism strengthened as the preferred philosophy, suiting archaeology well by perpetuating distinctions between *facts* as things that could be observed and *laws* or *interpretations* as statements making sense of the facts. Maintaining the integrity of the facts therefore became important, and one of the main steps toward achieving this involved structuring investigation methods and recording systems. Leading this field was General Pitt Rivers (1827–1900) whose interests in social evolution carried through to developing a method of excavation that charted sequences of activity at particular sites. In practice, this meant recording every object so it could be replaced accurately in its findspot through the use of plans and section drawings – essentially three-dimensional recording of finds. A generation later, Mortimer Wheeler (1890–1976) added the need to record strata (every layer) three dimensionally as well. To achieve this, he developed an excavation method that still bears his name – the Wheeler system – in which the area of investigation was divided into squares with balks between. Each square was separately excavated, and the plans and four sections of each carefully drawn (Wheeler 1954).

Continental methods of *open-area excavation* were meanwhile imported into Britain, notably by Gerhard Bersu (1889–1964) at Little Woodbury, Wiltshire, in 1938–1939. This approach to excavation and recording had far-reaching consequences after the Second World War, but even during the war, a small team of archaeologists led by W.F. Grimes (1905–1988) recorded sites in this way before they were destroyed by the construction of military installations. Noteworthy was Grimes' rigorous open-plan excavation of the Burn Ground long barrow, Gloucestershire, in 1940–1941, where he planned every stone in the mound. After the war, rebuilding programs coupled with industrial expansion, agricultural extensification, urban regeneration, and infrastructure renewal created many opportunities for archaeological investigation. Subsequent changes in methodology can be gauged from five successive textbooks on the subject by Richard Atkinson (1946), John Coles (1972), Philip Barker (1977), Ian Hodder (1999), Steve Roskams (2001), and Martin Carver (2009).

Operationally, work has expanded into hitherto under-investigated environments such as occupied towns, wetlands, uplands, agricultural land, and coastlands, often with rich rewards. Practically, there was much experimentation with the shape and size of excavation trenches, including uses of quadrant methods, *planum* systems, and large-scale open-area excavation taken from continental innovations. However, in Britain, attention remained focused on the removal of individual layers or *contexts* as they became widely known, in the reverse stratigraphic order to deposition. Teasing apart complicated sequences, finding natural construction or erosional surfaces, positive and negative features, deposits, and cuts became a technical as well as an intellectual challenge. Finds were associated with contexts as the basic unit of recovery, and the application of archaeological site science promoted systematic sampling for ecofacts and artifacts down to microscopic levels as well as the recovery of environmental indicators and chemical characterization.

In field survey, the tradition based on the idea of cultural property and monuments promoted by Pitt Rivers was continued for much of the twentieth century by government-sponsored *Royal Commissions* which had the remit of recording everything visible on the surface (Crawford 1960). Aerial photography was adopted for archaeology immediately after World War 1 and exported to the countries of the then British Empire. The postwar period saw the development of *landscape archaeology*, a set of more sophisticated and analytical approaches that focused on wide geographical areas and assumed that the land was regularly overwritten by successive generations to form a *palimpsest* (Darvill 2001). Aerial photography, remote sensing, ground surveys, place-name studies, and past cartography were among the many primary sources used to create landscape regression models – snapshots of a landscape as it might have been at

a particular period. Uniquely, in England, where treasure hunting on private property remains legal, a new voluntary scheme has encouraged the reporting of objects found by metal detectorists. The *Portable Antiquities Scheme* has produced an immense harvest of reported finds, creating a rich geographical database of dated artifacts, the majority of metal.

From the 1960s, representatives from museums, universities, local and national archaeological societies, local authorities, and the government agencies began working together to meet the needs of *rescue archaeology* in their locality. While the rescue of archaeological sites in Britain is not obligated by law, in 1990, its justification was embedded in Planning Policy Guidance Note 16 (=PPG16 *Archaeology and Planning*) for England, with similar statements for other parts of Britain, and these have remained the basis for the funding of archaeological intervention by the private sector. In excess of 4,800 investigations a year were being undertaken in England alone by the year 2000. This has coincided with a revolution in IT, resulting in innovative approaches to on-site data capture and the subsequent production and processing of plans, sections, photographs, and descriptive records. Compiled in *client reports*, these are presented to the commercial sponsors of the work in fulfillment of contact.

More than 95 % of archaeological fieldwork in Britain is now prompted by planned commercial development. It comprises predetermination work such as desk-based assessments, field evaluations, and environmental impact assessments, and post-determination work that focuses on mitigating impact, implementing conservation measures, recording buildings, and investigating deposits faced with destruction through a range of techniques that include both trenching and open-area excavation. Conceptually, the *archaeological resource* of the 1970s and 1980s, *heritage* as it was called in the 1990s, has now been redefined as *historic environment assets*. Large-scale projects remain common, including, for example, the high-speed railway line from London to the Channel Tunnel and Terminal 5 at London's Heathrow Airport. But size is less important than quality. Since revisions to the planning system in 2010 and the gathering strength of *localism* as a political philosophy, integrating archaeology with local communities and using the knowledge generated to create public value have taken center stage.

Economic instability and the global recession are having an effect on archaeological fieldwork traditions in Britain at the time of writing (early 2012). The profession has already scaled back, and more cuts are anticipated in order to meet lower demand for archaeological services (Aitchison 2010). On the brighter side, current conditions allow the chance to take stock of achievements over the past 20 years: to rebalance the scope and aims of fieldwork, reconcile positivist and relativist approaches under the rubrics of creative science and community engagement, promote academic recognition and definitions of the discipline, and integrate opportunities offered by development-driven research with the power of problem-orientated research – in fact, a twenty-first-century version of the agenda faced 300 years ago by the founders of Britain's fieldwork traditions.

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▶ Archaeological Record
▶ Excavation Methods in Archaeology
▶ Landscape Archaeology

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British School at Athens

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Basic Information

The British School at Athens is a research institute for Hellenic studies across all fields and periods. Situated in the center of Athens, the school consists of a hostel for resident scholars, an extensive library with map and archive collections, a small museum, and the Fitch Laboratory for science-based archaeology. At Knossos, the BSA maintains a residential field center and Stratigraphical Museum which form the base for its excavations and research in Crete. Work conducted by the school was published in the *Journal of Hellenic Studies* until the establishment of the first volume of the *Annual* for the 1894–1895 session. Each year since 1955 the school has produced a digest of all fieldwork in Greece, *Archaeology in Greece*, jointly with the Hellenic Society and now supplemented online in a collaboration with the French school. The school's website is at www.bsa.ac.uk.

Foundation and Early History

As the discipline of archaeology rapidly developed in the nineteenth century, a number of countries established foreign schools in Greece. The first to open in Athens was the École française d'Athènes in 1846, followed by the Deutsches Archäologisches Institut in 1874, and in 1881 the American School of Classical Studies. The idea for a British institute in Athens was championed by Sir Richard Jebb, whose "Plea for a British Institute at Athens" in the *Fortnightly Review* in May 1883 provided the impetus for a public meeting held by the Prince of Wales, later King Edward VII, at Marlborough House in London, with guests including Lords Salisbury and Rosebery and the Prime Minister, William Gladstone. A committee was formed for the school which gathered donations toward the construction of a building in Athens.

During a visit to Athens in 1878, Jebb had contacted Charilaos Tricoupis, then foreign minister of Greece. In 1882 Tricoupis became prime minister and the following year offered a plot of land donated by the monastery of Petraki for the school on the slopes of Mt. Lykavittos. Opened in November 1886, the school building (now the Director's residence) was completed according to a design by the first Director, Francis Penrose, who had studied Athenian architecture for the Society of Dilettanti. Increased student numbers necessitated the building of a separate hostel at the lower end of the garden in 1897, which after three subsequent enlargements now comprises accommodations, offices, and common areas and is linked to the Penrose Library, built in 1904 and itself subsequently enlarged.

Financially, the school was reliant upon subscriptions and donations until Her Majesty's Treasury was persuaded to support the institution with an annual grant. Today, the school's principal funding is provided by the British government through the British Academy.

Major Impact

Archaeological Fieldwork

From its origins, the school was interested in a wide spectrum of fields: anthropology and ethnography, history, epigraphy, linguistics, art, and architecture. Among its archaeological fieldwork

the school has excavated widely in the Cyclades, Crete, Laconia, and Macedonia. One of the earliest major digs was at Phylakopi on Melos, begun in 1896, which began a long-standing focus for the school on the prehistory of Greece. Duncan Mackenzie's stratigraphical work here was advanced for its time, providing him with skills he would later bring to Knossos in 1900 as the deputy of Sir Arthur Evans.

In the early years of the twentieth century, the school began its long association with Sparta and its surrounding Lakonian territory. Excavation began at Sparta in 1906, and investigations over a hundred years have uncovered the shrine of Athena Chalkioikos and the city's theater, the Sanctuary of Artemis Orthia, the Menelaion, Agios Stephanos, Kouphovouno, and Pavlopetri.

The school also maintains a long association with Mycenae. In 1920 the then Director of the school, Alan Wace, began working within the citadel as well as excavating the prehistoric cemetery outside it, investigating all nine tholos tombs in the surrounding area; his work was continued by Lord William Taylour in several seasons between 1960 and 1969; Wace's daughter, Elizabeth French (BSA Director, 1988–1994), has continued the school's work there in cooperation with the Greek Archaeological Service in the Mycenae survey.

Other important excavations carried out by the school include the following: the harbor and sanctuary site at Perachora in the Corinthia, conducted between 1930 and 1933 by the then Director Humfry Payne; work of the islands of Chios and Mytilene, including the 1930s excavations of Winifred Lamb at Kato Phana and Thermi, respectively; and at Lefkandi in Evia, where investigation of the settlement of Xeropolis began in 1964 under Mervyn Popham and Hugh Sackett, followed by discoveries in the cemeteries, including the remarkable Toumba building.

The BSA also has a strong tradition in archaeological survey from the broad regional surveys of Wace and Thompson in Thessaly and Macedonia and John Pendlebury on Crete to the pioneering intensive surveys of Melos by Colin Renfrew and John Cherry. In more recent years large-scale field surveys have investigated Laconia, Boeotia, Kythera, and the Knossos valley, adding greatly to the methodological underpinning of this important field.

Crete

The school has a history of involvement in Crete beginning with the formation of the Cretan Exploration Fund in 1899, a joint venture between Sir Arthur Evans and the then Director D. G. Hogarth. Evans began digging at Knossos in 1900, while Hogarth investigated the Dictaean Cave, one of the supposed birthplaces of Zeus, and at the Minoan palace site of Kato Zakro. In 1901 and 1902, R. Carr Bosanquet excavated at the east Cretan site of Praisos, discovering inscriptions in the non-Greek language of Eteocretan; he later excavated the Minoan town of Palaikastro, where further excavations have continued since the 1960s.

Evans continued his work at Knossos for 21 years, with regular reports in the *Annual of the British School at Athens*. The spectacular excavations caught the imagination of the world in much the way that Schliemann's earlier excavations of the shaft graves at Mycenae had done. In 1926 Evans donated his entire Knossos estate to the school, including the palace, his own house (the Villa Ariadne), various other excavated areas, and outlying buildings. A Knossos curatorship was instituted, thus establishing a permanent BSA presence on site. In 1955 the school donated the bulk of the estate to the Greek state, retaining the Curator's house and a residential and study facility, and is responsible for the Stratigraphical Museum, where the bulk of recent excavation finds are housed.

BSA Collections

The BSA library covers all aspects of Hellenic studies, holding more than 70,000 books and over 1,300 periodical titles with special emphasis on art, archaeology, epigraphy, archaeological sciences, Modern Greek, and Balkan history and society. The archives form the official repository for the records of the BSA, including documents from fieldwork projects, corporate papers, personal collections of BSA members, various

historical documents associated with the early travelers to Greece, a photographic archive, and a unique collection of drawings from the Byzantine Research Fund. A museum houses a study collection of antiquities donated or excavated by the school and a sherd collection of survey pottery from across Greece. The core of the original library and antiquities collection were donated in 1899 by the executors of the Philhellene George Finlay (1799–1875), who first came to Greece in 1823 aged 24, became actively involved with the Greek struggle for independence with Lord Byron, and settled in Athens for the remainder of his life.

The Fitch Laboratory

Founded in 1974, the Mark and Ismene Fitch Laboratory promotes the integrated use of scientific methods and techniques in the archaeological study of material culture. Its research focus is on the study of ancient pottery and metals from Greece and the central and eastern Mediterranean employing optical microscopy and chemical analysis techniques. The Fitch houses reference collections of animal and fish bones, seeds, and pottery thin sections.

Cross-References

► American School of Classical Studies at Athens (ASCSA)

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Brown Top Millet: Origins and Development

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Basic Species Information

Brown top millet, which goes by the scientific name *Brachiaria ramosa* (L.) Stapf. or *Urochloa ramosa* (L.) R.D. Webster, is known locally as *pedda-sama* and *korne*, and has a limited cultivation largely confined to southern India. Domestic and wild/weedy forms of brown top millet are found in agricultural systems, often within the same field. It is used as both a human food crop and fodder. Outside of India, it is grown in some parts of the USA as a fodder crop, largely to provide food for game birds, and was introduced from India around 1915. Although its distribution is highly relict today, restricted to parts remote parts of Andhra Pradesh, Karnataka, and Tamil Nadu states in southern India (Kimata et al. 2000), it appears to have been a major staple crop in the late prehistory of the wider region of the Deccan (Fuller et al. 2004).

In several parts of India, brown top millet is known by local names which translate to "illegal wife of little millet [*Panicum sumatrense*]," reflecting its tendency to grow within fields of little millet as a mimic weed (Sakamoto 1987). Brown top millet can grow with either a compact or open panicle and can have either shattering or indehiscent spikelets. The domestic form, however, tends to act like other domestic cereals and is both compact and partially indehiscent

(Kimata et al. 2000). Where brown top millet occurs as a weed of other millet fields, it is usually treated as an insurance crop.

Major Domestication Traits

Brown top millet is particularly tolerant of drought and is well adapted to semiarid areas. It grows well at altitudes of 2,000–2,500 m, with 75–150 cm annual rainfall (Roecklein & Leung 1987). Cultivation is more common in the dry areas of Karnataka and Andhra Pradesh at lower elevations, South India, than in other parts of the world. Brown top millet grows and matures over around 90 days, a shorter time than several other millets including pearl millet (*Pannisetum glaucum*). It is usually grown as a single crop and not incorporated into mixed field systems. Harvesting in the early morning while the dew is still on the crop reduces the amount of grain lost through panicle shattering. Shattering (dehiscence) is reduced compared to the wild forms, but it is still partially shattering. The crop tends to be cut at the base, then winnowed, dehusked, and polished. Because it is semi-shattering, its grains can become dislodged just by being dried which reduces the need to thresh, although it requires dehusking like most other millets. Straw and chaff is often used as animal fodder; however, the grain is reserved for human consumption and is said to be tastier than rice. Brown top millet tends to be ground into flour and used to make flat breads (*roti, dosa*) or polished and boiled to make gruel (*anna, kheer*). Some of these foods are used in religious rituals, which may partly account for its persistence in cultivation (Kimata et al. 2000).

The identification of brown top millet grain and spikelets can be difficult due to its similarity to *Setaria italica* (Fig. 1). Although the panicle is distinct from *Setaria* by being looser and non-bristly, the grains themselves are very similar. Grains are ovate to round and have a long embryo, roughly two thirds to three fourths of the length of the grain. They tend to be smaller than *Setaria italica* and squatter in cross section. The surface of well-preserved grains can be used for identification as these have a distinctive undulating pattern, although this again has similarities to *S. italica* (Fuller et al. 2004). The husk

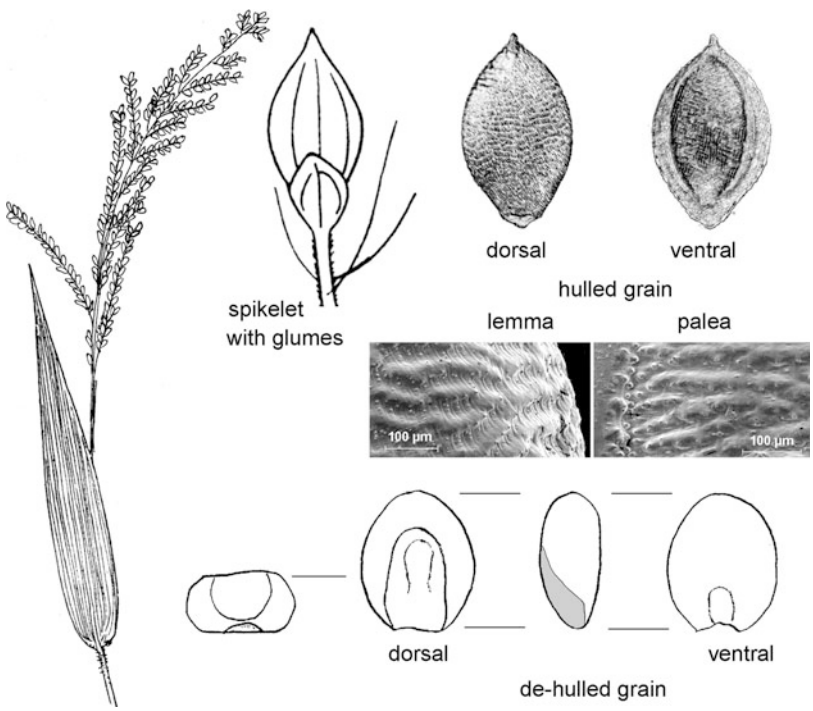

Brown Top Millet: Origins and Development, Fig. 1 Drawing of *Brachiatia ramosa* panicles, spikelet, hulled and de-hulled grains, showing the rugose husk patterns of the lemma and palea. SEM images of lemma and palea patterns inset

has a fine beaded and rugose pattern, which again has some resemblance to that of *Setaria* spp., but it is somewhat coarser than *S. italica* and finer than *S. verticillata*.

Timing and Tracking Domestication

The domestication of brown top millet probably occurred in South India, in the Deccan, and it spread during prehistory outward to other parts of India (Fig. 2). Charred grains identified as "*Brachiaria ramosa* type" have been recovered from most Neolithic South Indian sites where systematic archaeobotanical work has occurred. On these sites brown top millet has a high ubiquity and relative frequency. Dating the time of domestication is complicated by the fact that little archaeobotanic work has been carried out on early Neolithic or preceramic period (Mesolithic sites); however, the evidence suggests that this crop, along with other South Indian crops (i.e., *Macrotyloma uniflorum*, *Vigna radiata* and *Setaria verticillata*), developed from indigenous wild populations around the beginning of the third millennium BCE (Fuller 2006). During this period, local millets and legumes were incorporated into an agro-pastoral system, part of the ash-mound culture of the southern Neolithic of India, which employed both mobile cattle pastoralism and small-scale crop cultivation. Brown top millet spread out from the Deccan to Tamil Nadu in the south (Cooke et al. 2005) and Gujarat in the north by the end of the second millennium BCE. Small quantities of the grain have also been found from Chalcolithic (late second–early first millennium BCE) sites in Odisha (Orissa) in the east and some sites in the Ganges plains (Harvey 2006), however, the number of grains recovered does not suggest cultivation and may represent wild plants. Over time, brown top millet has seen reduced use, although it was still present at the site of Paithan in Maharashtra up to the seventh century CE. Its gradual reduction in use can be attributed to

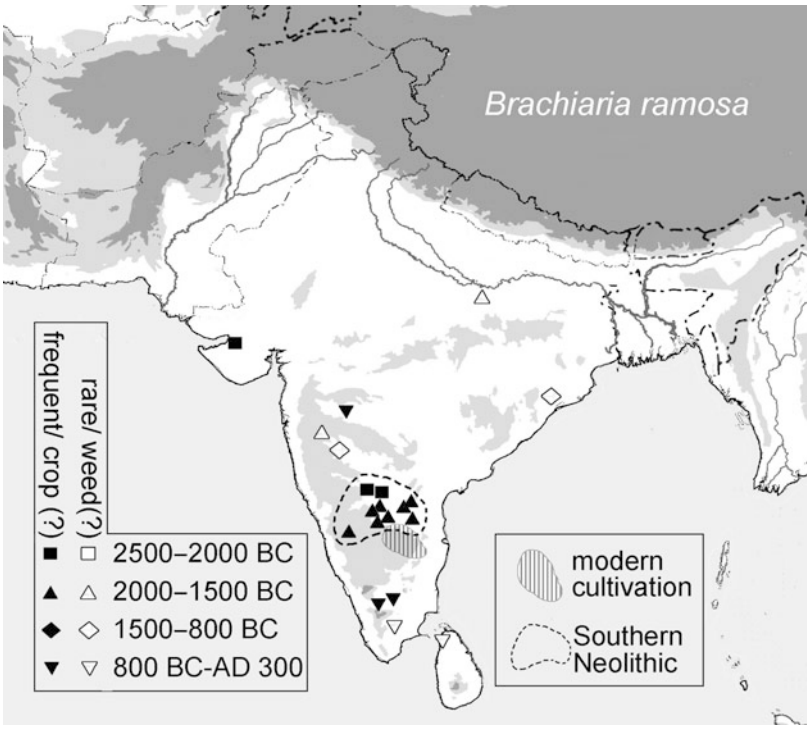

Brown Top Millet: Origins and Development, Fig. 2 Distribution map of archaeological finds of *Brachiaria ramosa* in relation to the Southern Indian Neolithic and modern cultivation of this crop

displacement by alternative, more productive millets, including the African millets (*Sorghum bicolor*, *Eleusine coracana*), as well as foxtail millet (*Setaria italica*) that probably contributed to this. Today brown top millet is a relict cultivar but one with some important ritual uses.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Finger Millet: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Millets: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Buckley, Kristal

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Basic Biographical Information

Kristal Buckley (AM) received her B.A. (Hons) from Australian National University in 1980. She holds a Graduate Diploma in Social Sciences from the University of New England (1985). Her Master of Public Policy degree was conferred in 1998 from the University of Melbourne.

Major Accomplishments

Kristal Buckley (AM) has served as an International Vice-President of ICOMOS since 2005, and has been an active contributor to many aspects of the work of the International Executive Committee including the ICOMOS World Heritage programme and Scientific Council, and with ICOMOS members and National Committees in the Asia-Pacific region. Trained in archaeology, anthropology, and public policy, Kristal Buckley is a lecturer in Cultural Heritage at Deakin University's Cultural Heritage Centre for Asia and the Pacific in Melbourne, Australia. She has worked as a heritage consultant in private practice and in government. She served as a full member of the Heritage Council of Victoria for 9 years, and has represented cultural heritage professionals at advocacy and advisory forums at the national level. Her work in Australia has included Indigenous and non-Indigenous heritage projects, policy, and management, with an emphasis on community involvement. She is a member of the ICOMOS ISC for Intangible Cultural Heritage. She has also

worked as an advisor to governments in environmental policy – particularly in relation to sustainability and climate change and was recently appointed as Member of the Order of Australia for significant service to conservation and the environment, particularly in the area of cultural heritage, and to education.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australia: Cultural Heritage Management Education
- ▶ Community Archaeology
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Buckwheat: Origins and Development

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Basic Species Information

Buckwheat, including common buckwheat (*Fagopyrum esculentum* Moench.) and tartary buckwheat or bitter buckwheat (*Fagopyrum tartaricum* (L.) Gaertn.), is one of only three important non-grass starchy grain crops, or pseudo-cereals, the others being grain amaranth (*Amaranthus* sp.) and various chenopods, such as Andean quinoa (*Chenopodium quinoa*). An important crop of marginal lands, buckwheat, is grown in nearly every country that cultivates grain crops and is usually consumed locally (Campbell 1976), but it is especially important in colder regions of high altitude or high latitude in Asia. It is mainly grown for the starchy white endosperm of its seeds which produces buckwheat flour used for pancakes and *blini*, and soba noodles (Japan). The whole hulled seeds are used as breakfast food and to thicken soups. Dehulled grains, milled to remove the pericarp, are used in *kasha*, a traditional Russian dish. Buckwheat has a level of around 9 % protein, has 330–350 kcal per 100 g, and does not contain gluten. Buckwheat is grown as a green manure, is a common animal feed, and is also a major honey-producing plant (Campbell 1997; Van Wyk 2005).

The name *Fagopyrum* is derived from the Greek *fagos*, beech and *pyrum*, wheat. The common name, buckwheat, is from *Buchswein*, German for beech wheat on account of the triangular seeds that look like small beech nuts. Other common names include: *Sarrisin* (French); *grano saraceno*, *fagopiro* (Italian); *kyoubaku*, *soba* (Japanese); *trigo-sarraceno* (Portuguese); *grano sarraceno* (Spanish). Many of the common names, *Sarrasin*, *gran saraceno*, *trigo-sarraceno*, *grano sarraceno*, mean Saracen grain, demonstrating buckwheat's eastern origins, although it actually comes from much further east (van Wyk 2005). For Chinese, it is *qiao-mai*, and in Hindi *kotu*. Less widely cultivated is *F. tartaricum*, the Siberian, Indian, Tartary, or bitter buckwheat, which is especially important for its height tolerance in the Himalayas and Tibet. Another species occasionally cultivated in northeastern India and southwest China is *Fagopyrum emarginatum*.

Major Domestication Traits

Buckwheat is an annual plant with a succulent hollow angular stem, swollen nodes, and

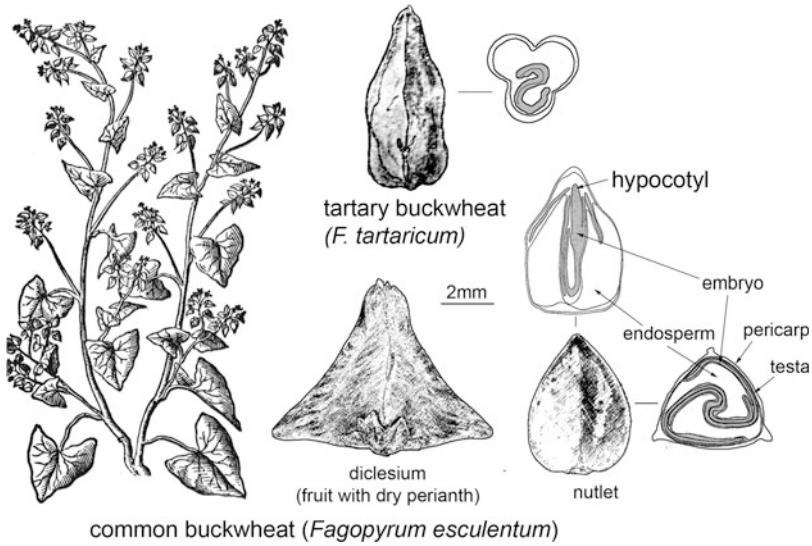

Buckwheat: Origins and Development, Fig. 1 Images of buckwheat, showing the growth habit of cultivated buckwheat (*Fagopyrum esculentum*), the fruit and nutlet with cross sections, with a comparison of the nutlet and cross section of tartary buckwheat (*Fagopyrum esculentum*)

alternate triangular acute leaves 5–10-cm long (Fig. 1). It has terminal and axillary white pink red or yellow flowers, which produce small dry fruits (achenes), which are gray brown to black. These may be technically classified as a diclesium, and after removing the outer dry bracts, yield an edible reddish nutlet with white starchy endosperm (Fig. 1) (Stevens 1912). Comparison of domesticated and wild species suggests selection for annual habit, non shattering inflorescence, low seed dormancy, and increased seed size, much as in cereal crops (Fuller & Allaby 2009). Common buckwheat is normally self-incompatible, and tartary buckwheat readily self-pollinates (Campbell 1976). Plants grow to full height of around 1 m in about 6 weeks and the seeds ripen at around 10–11 weeks. This short growth cycle allows for cultivation in highly marginal habitats and short high elevation summers, although buckwheat has low yield compared to other grain crops. Buckwheat extends easily to above 3,000 m under cultivation, and is grown alongside barley at the highest elevations. Tartary buckwheat is even better adapted to the highest elevations, up to c. 4,000 m.

Buckwheat originates in the Tibetan plateau or nearby mountains of Yunnan, southwest China. There 16 wild species of *Fagopyrum*, all focused on the Himalayan and southwest China region (Campbell 1997). The wild progenitor of *F. esculentum* is thought to be *F. esculentum* ssp. *ancestralis*, which has a limited distribution in the mountains of western Yunnan and Sichuan (Fig. 2). It has a narrow distribution, growing at 1,000–1,500 m above sea level in barren rocky habitats with poor soils along the Jinsha River, Yunnan, and the Yalong River in Sichuan never entering cultivated fields (Ohnishi 2004). Wild tartary buckwheat, *F. tartaricum* ssp. *potanini*, is more widespread on the Tibetan plateau (Fig. 2; see Campbell 1997; Ohnishi 2004).

Timing and Tracking Domestication

Archaeological remains are rare, and much evidence for its spread comes from pollen appearances in palaeoenvironmental sequences. These data have been recently assessed by Boivin et al. (2012), with particular reference to the dispersal westward toward Europe. Pollen finds in three areas of China from c. 4500 BP suggest that cultivation began by the early Third Millennium BCE at the latest (Fig. 2). Finds include from the Liaohe river basin in northeast China after c. 2200 BCE, Xishanping in Gansu to the northwest, where pollen could be as early as c. 2500 BCE, although there are some stratigraphically inconsistent AMS dates might be only about 1000 BCE (Li et al. 2007). Additional evidence comes from the

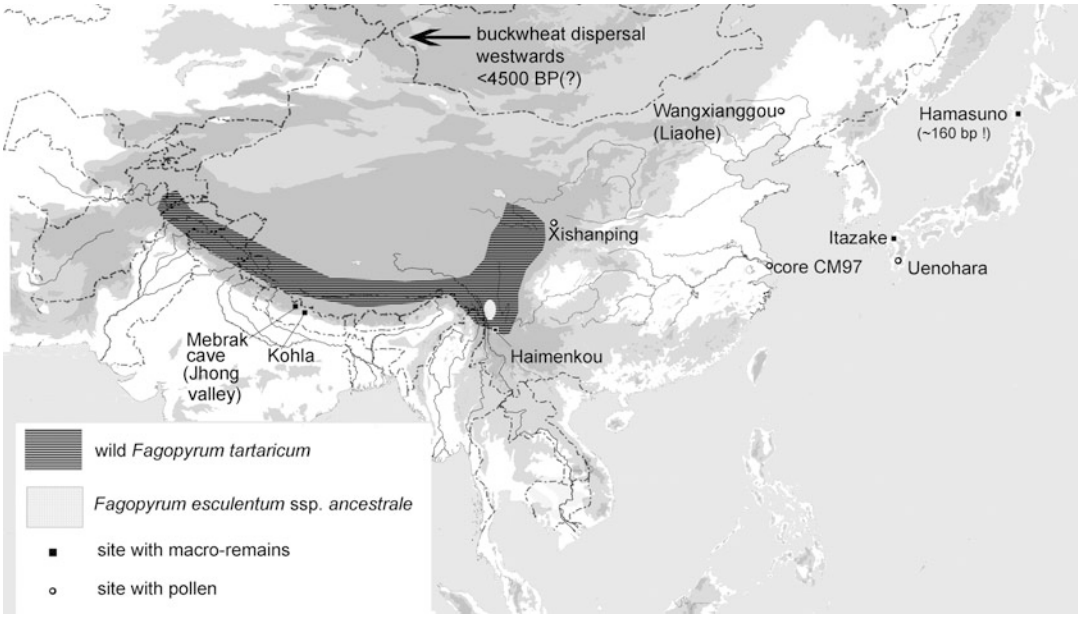

Buckwheat: Origins and Development, Fig. 2 Map showing distribution of wild *Fagopyrum tartaricum,* the subzone of wild *F. esculentum,* and archaeological and palynological sites that have produced early evidence for buckwheat

Lower Yangzte, suggesting some buckwheat cultivation in the hills south of the Yangzte as early as 4500 BP. Finds from Japan all occur after 4000 BP, with an early reported nutlet from Hamanasuno in north Japan being shown to be intrusive by AMS dating. A few macro-remains finds can be placed in the First Millennium BCE, including from central Nepal and at Haimenkou, Yunnan (Boivin et al. 2012). Later evidence from Nepal is that of Kohla, a site at over 3,000 m from the twelfth to thirteenth century CE.

The westward dispersal across Eurasia is particularly controversial. Some have suggested that pollen evidence indicates Neolithic presence in Europe by the Fifth Millennium BCE (Janik 2002), but a critical review of the archaeological and historical evidence would suggest buckwheat reaches the eastern margins of Europe not earlier than about 4,000 years ago, and central and western Europe only in the late Middle Ages, c. CE 1300 (Boivin et al. 2012). Despite the importance of this crop for allowing expansion of human settlement into some of the most marginal and cold environments, there is still little known of its early cultivation and dispersal.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Buikstra, Jane E.

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Basic Biographical Information

Jane Ellen Buikstra (1945–) is one of the most influential and outstanding American anthropologists in the field. Her scientific and academic work has had global influence. She obtained her Bachelor's degree in Anthropology from DePauw University in Indiana in 1967, and her Master's (1969) and Doctorate (1972) degrees from the University of Chicago.

She had faculty positions at Northwestern University, University of Chicago, and University of New Mexico. She was Research Associate at the Field Museum of Natural History, the Museum of the American Indian, the University of Florida, and the National Museum of Natural History. Buikstra is currently a Regent's Professor of Bioarchaeology and Director of the Center for Bioarchaeological Research of the School of Human Evolution and Social Change at Arizona State University, Tempe, Arizona.

She has a long association with the Center for American Archaeology where she is President of the Board of Directors. This institution has had a very important role in the development of bioarchaeology. Associated field seasons in Kampsville, Illinois, have included training and educational programs associated with continuous research in numerous archaeological sites including Koster and Mound House as part of contract work with the Central Illinois Expressway program.

Buikstra defined and promoted the field of bioarchaeology, a specialty of archaeological research focused in the integration of information recovered from human remains in the reconstruction of ancient lifeways. This approach has redefined the role of physical anthropologists and archaeologists working with mortuary remains. The specialist trained in the study and recovery of human biological evidence is involved from the recovery fieldwork up to a range of specialized studies including chemistry, diet, growth and health, genetics, and paleodemography. In the area of paleopathology, Buikstra is recognized for promoting the use of rigorous differential diagnosis in the evaluation of lesions in human remains (e.g., Buikstra & Roberts 2012).

Buikstra has received numerous awards and distinctions in recognition of her accomplishments. She was elected a member of the National Academy of Sciences in 1987; was the Harold H. Swift Distinguished Service Professor at the University of Chicago, the Leslie Spier distinguished Professor of Anthropology at the University of New Mexico, and the George E. Burch Fellow in Theoretic Medicine and Affiliated Sciences at the Smithsonian Institution; and received the Pomerance Award for Scientific Contributions to Archaeology from the Archaeology Institute of America.

Buikstra's work has focused on the study of prehistoric skeletal collections incorporating cultural and biological data to evaluate evolutionary change, growth, health, and

development. Her studies include important contributions to more fully understanding mortuary behavior, demography, paleopathology, biological distance, and paleonutrition, among numerous topics related to the adaptation and history of prehistoric societies. Buikstra has published numerous articles, books, reviews, and nontechnical publications (see Further Reading section below).

Her publications and academic work show an intense dedication to the promotion of science, the field of anthropology, and the status of women. Buikstra has mentored students and scientists from all over the world, including Indonesia, Australia, Peru, Chile, Argentina, Spain, China, and Ireland, and has contributed to academic programs and professional meetings. Buikstra and her collaborators have significantly influenced aspects of the scientific work involving the recovery, study, and conservation of human remains, both ancient and modern.

Major Accomplishments

Buikstra has received numerous grants to support her research including from the National Science Foundation, the National Institute of Health, Wenner-Gren Foundation, National Geographic Society, National Endowment for the Humanities, the Illinois Department of Transportation, and the Illinois Historic Preservation Agency, among others. She has directed and participated in bioarchaeological projects in most parts of the world, numerous projects in the North American Midwest, as well as in the Canadian Arctic, Argentina, Brazil and Peru, as well as in Spain, Israel, Turkey, and Honduras.

Buikstra has actively participated in professional associations and committees. She has served in different capacities including the top positions in the American Anthropological Association, the American Association for the Advancement of Science, the American Association of Physical Anthropologists, the American Board of Forensic Anthropology, and the Society for American Archaeology.

Buikstra has also contributed as editor of several professional journals such as *American Anthropologist*, the *Journal of the American Association of Physical Anthropologists*, *Evolutionary Anthropology*, the *International Journal of Osteoarchaeology*, *International Journal of Paleopathology*, the *Journal of Forensic Sciences*, and the *Journal of Anthropological Research*, *Chungara*, of the University of Tarapaca in Chile. She has participated, in and promoted research groups that have proposed standards for the analysis of ancient human remains, the evolution of infectious diseases such as tuberculosis, and research and ethical aspects of the fields of forensic and biological anthropology and archaeology.

The ongoing career of Jane Buikstra is characterized by excellence in science reflected in her numerous publications and academic work and her strong commitment to teaching and professional development which has outreached to different parts of the globe.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Commingled Remains: Field Recovery and Laboratory Analysis
- ▶ Cremation in Archaeological Contexts
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethics and Human Remains
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Skeletal Remains: Identification of Individuals

▶ Osteology Reference Collections
▶ Osteology: Definition
▶ Pathological Conditions and Anomalies in Archaeological Investigations
▶ Pathological Conditions and Anomalies in Forensic Contexts
▶ Sex Assessment
▶ Skeletal Biology: Definition
▶ Stature Estimation

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Building Biographies

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Introduction

Developing a biography of a building can be an important way of obtaining information about the activities and beliefs of past societies. The term "building biography" was first used in historical studies, where the approach is different from that of archaeology. In the historical tradition, the house is studied more as the frame around which a family or other social group or institution is investigated, as a case study to gain inside into social conditions of a certain period in a certain area (Russell Ellis et al. 1985; Dakers 1993; Silver 1994; Zaknic 2004; Alexander 2008). Such studies incorporate non-architectural evidence, such as photos and written records made during the lifetime of the building. As these forms of evidence are not available in much archaeological research, an archaeological building biography must focus on evidence from the architectural body itself.

The archaeological building biography was developed from the biographical study of artifacts, a concept influenced by anthropological theory that perceives artifacts as objects with a life history, from which conclusions can be drawn about the human society that produced them and used them. While the term "building biography" is used explicitly only in some archaeological publications (Gerritsen 1999a; Rogasch 2012), the underlying concept is employed in many more.

Definition

A building biography interprets architecture by focusing on the sequences of human activities and decisions that went into creating a building,

using a building, and abandoning a building, part of a building, or a group of buildings. It is an interpretative model based on which research questions can be developed, and appropriate methods of analysis can be chosen to answer them. The aim is to reach an interpretation of larger processes in past societies from a detailed study of human activities that are preserved in the architectural record.

Key Issues/Current Debates/Future Directions/Examples

The key assumption of the biographical approach is that when people interact with "things," the people, the things, and the relationships between them are altered during and by this interaction. Among the many possible different paths each of these intertwined biographies could theoretically take, only certain biographical possibilities are actually realized, and this range of acceptable options is determined by the given social context (Kopytoff 1986: 66, 68; Bernbeck 2008: 52).

The possible archaeological application of the concept was first explicitly outlined in a book edited by Appadurai (1986) in his book *The Social Life of Things*, and subsequently embraced by many archaeologists and used on a broad range to research questions (for overviews, see *World Archaeology Journal* 31(2) 1999; Skibo & Schiffer 2008). A number of terms are used to capture the target of these studies: "life" or "social life"(Appadurai 1986; Horne 1994: 170; Tringham 1995: 98), "use life" (Banning & Byrd 1987: 321; Tringham 1995; Tringham & Stevanović 2012), "life history" (Appadurai 1986: 41; Tringham 1995: 97; Gerritsen 1999a: 82; Holtorf 2002; Tringham & Stevanović 2012), "life course" or "life cycle" (Horne 1994: 185; Boivin 2000: 367; Matthews 2005), "development cycle" (Banning & Byrd 1987: 309, 321; Boivin 2000: 367), "career" (Appadurai 1986: 41; Horne 1994: 185) and "biography" (Appadurai 1986: 17; Tringham 1995: 97; Gerritsen 1999a: "biography" and "cultural biography").

Archaeologists concerned with research into architecture soon adopted the biographical approach. Through building biographies, archaeologists have reconstructed household-related processes (Banning & Byrd 1987: 321; Tringham 1995: 97; Gerritsen 1999a; Boivin 2000; Matthews 2005; Tringham & Stevanović 2012); rituals and beliefs (Banning & Byrd 1987: 322; Gerritsen 1999a); issues of ownership (Banning & Byrd 1987: 323; Gerritsen 1999a: 95); the interplay between architecture and the surrounding landscape (Tringham 1995: 97; Gerritsen 1999a: 93); community construction (Düring 2005; Rogasch 2012); and mobility practices (Gerritsen 1999a; Bernbeck 2008; Rogasch 2012).

The following beneficial results of the biographical approach to architecture have been pointed out by researchers using it, and their reviewers:

1. *Comprehensiveness*: A biography considers the entire life of a building, from pre-construction to post-abandonment, and thus fully appreciates all available data and interpretational possibilities.

   Traditionally architectural studies focus on what they perceive as the main or intended use phase of the building (Tringham 1995: 81). However, recent archaeological research has demonstrated the interpretational potential of knowledge employed and choices made during and even before a construction process (Gerritsen 1999b: 109; Love 2012) and behavior during house abandonment (Gerritsen 1999a: 83-5, 87-91; Matthews 2005; Rogasch 2012).
2. *Resolution*: As a biography renders importance to the small scale, it fosters meticulous analysis and the recognition of important differences in the biographies of different architectural units, whose interpretation can lead to a clearer and more realistic picture of societies. This counteracts the tendency in architecture studies to brush over inconsistencies in search for a greater truth (Tringham 1995: 95; Vellinga 1999: 98-99): in terms of temporal resolution, that often results in a more fine-grained relative sequence of events even in the absence of absolute dating.

3. *Dynamism*: Such high-resolution sequences facilitate the identification of dynamic processes happening around a building (Vellinga 1999; Nevett 1999), which reflects complex realities observed in modern societies (Horne 1994; Carsten & Hugh-Jones 1995) better than the traditional archaeological thinking of seeing architecture as static (Tringham 1995: 65; Vellinga 1999: 98). The term "biography," as drawing comparisons with human life histories, points out the unplanned nature of life ways that resulted in biographies which could not have been foreseen when the life started.
4. *Workability*: It is possible and relevant to apply the biographical approach on different scales: the biography of one wall, one post, one room, one building (Rogasch 2012), a settlement (Bernbeck 2008), up to the biography of a landscape with built and unbuilt spaces (Vermeulen 2001; Pollard & Reynolds 2002; Gerritsen 2003; Darvill 2006; Roymans et al. 2009). It can therefore be applied to all evidence at hand, even if only fragments of buildings have been excavated.

For a *critical evaluation* of the biographical approach in general, see Holtorf's (2002) work who states that the concept is too loosely defined and used rather arbitrarily ("intellectual virus") to solve very different kinds of problems (also remarked by Nevett 1999: 102).

Nevett (1999: 102; similarly Vellinga 1999) criticizes that biographical studies often simply collect a lot of facts without actually subjecting them to systematic analysis, thus resulting in "lack of explanatory force of the biographical approach" (Gerritsen 1999b: 109) or even the perception that "the application of the biographic approach to the study of late prehistoric houses is ultimately inadequate" (Vellinga 1999: 101).

This shows again that a building biography is a model of interpretation that does not replace analysis. The biography has to be filled with detailed evidence generated through traditional tools of architecture research such as stratigraphical research or studies of building materials and constructions techniques. The number of very recent publications in the list of references below demonstrates that the biographical study of architecture is constantly being refined and will develop further in the near future.

Cross-References

▶ Buildings Archaeology
▶ Buildings, Archaeological Study of
▶ Historical Archaeology

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Buildings Archaeology

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Introduction

This entry seeks to outline the context and current practice of buildings archaeology. It focuses primarily on the UK but sets current practice here within the wider context of Northern Europe, the USA, and Canada. The entry commences with a definition of the discipline, during which its emergence in the late twentieth century as a subdiscipline of archaeology is charted. Key issues and current debates in the practice of buildings archaeology are then considered. These include its internationally significant role in the documentation and preservation of global cultural heritage, the development of recording methods and techniques, and interpretative issues such as the application of stratigraphic analysis to standing buildings, the impact of theoretical paradigm shifts on the discipline, and the potential of new virtual and visualization technologies to transform both methodological and interpretative approaches in the future.

Definition

"Buildings' archaeology" can be defined as the application of the archaeological principles of systematic recording, analysis, and interpretation to "above ground archaeology" or standing buildings. In many countries, buildings' archaeology has emerged from well-established traditions of researching and analyzing buildings within disciplines such as art and architectural history. Indeed, the development of the discipline often provoked anxiety and hostility from specialists within these fields. However, in the UK, a distinctive approach to recording buildings also emerged in the 1980s out of the specific

context of "rescue archaeology." Here, buildings' archaeology rapidly became associated with the application of "metrically accurate" recording methodologies and "stratigraphic" principles of analysis to the phasing and interpretation of buildings. During the 1990s and early part of the twenty-first century, the emergence of buildings' archaeology has coincided with, and informed, approaches to the "documentation" and preservation of cultural heritage. Throughout this period, the interpretation of buildings has also been informed and enhanced by critical engagement with developments in contemporary archaeological theory. While these trends are most evident in the approaches followed in the UK, they have much in common with the well-established German tradition of "*bauforschung*" or "*stadtbaugeschicte*," which form part of both commercial practice and many archaeology curricula (Grossman 2001), with the Swedish and Danish practice of buildings' archaeology, building history and "documentation hermeneutics" (Haedersdal 1999–2000), and Belgian building recording (Mignot & de Meulenmeester 2003).

Historical Background

Buildings archaeology in the UK traces its origins to the emergence of a systematic and scientific approach to the observation and recording of buildings by early Antiquarians associated with the Society of Antiquaries of London, founded in 1707. During the nineteenth century, architectural history emerged as a self-conscious specialism, particularly in the field of ecclesiastical buildings, where the analysis of past examples of Gothic architecture was linked both to the desire to develop systematic typologies of the style and to its use as a source for contemporary architectural designs within the Oxford and Cambridge movements.

It was only in the later part of the twentieth century, however, that the discipline of buildings' archaeology really emerged in the UK. Throughout the 1970s, groups of like-minded archaeologists and architectural historians began to develop what became known as "church archaeology": a multidisciplinary approach to excavating, recording, and researching all aspects of church sites, buildings, fittings and fixtures, and burials. Techniques were informed by the contemporary development of "rescue" archaeology, where large-scale open-area excavations at sites such as Coppergate (York) and The Brooks (Winchester) shed important light on the below-ground remains of medieval buildings and provided a model for the integrated historical and archaeological analysis of medieval structures (Carver 2009). Rescue archaeology also led to rare examples of the systematic excavation and recording of a pair of medieval and later town houses along the city wall at Shrewsbury. Gradually, as traditional industries declined and development pressures increased in the 1980s and 1990s, larger numbers of industrial structures also formed the focus for archaeological recording of both buildings and the evidence of industrial processes which had occurred within them.

Gradually, the significance of historic buildings as part of the archaeological resource began to be accepted in the UK. In 1979, the Ancient Monuments and Archaeological Areas Act provided statutory protection for those buildings which had been designated scheduled ancient monuments, while in 1990, listed buildings were also protected under the Listed Buildings and Conservation Areas Act, although parish churches and cathedrals are subject to separate legislation under the Ecclesiastical Exemption (revised 2010) and Care of Cathedrals Measure (revised 2011).

Key Issues/Current Debates

From tentative origins within church, rescue and industrial archaeology, buildings' archaeology emerged gradually in the 1990s as a distinctive subdiscipline within the field. However, its development sparked strong responses from other disciplines, particularly architectural history. Church archaeology had demonstrated how the methods of below-ground recording, particularly the idea of a "total" recovery of data destroyed during the excavation process, could be

transferred to the recording of standing buildings. However, doubts were raised about the problems inherent in the "misapplication to building recording of the practices of dirt archaeology." Buildings archaeology was largely a nondestructive recording process, associated only rarely with the creation of "preservation by record" where a building was to be completely destroyed. However, building recording methods did seek to replace art historical approaches to recording buildings, which were considered to be partial and subjective, with a more objective and totalizing approach to recording.

At the heart of this debate lay a fundamental difference of opinion about what constituted authority within the disciplines of architectural history and archaeology in the UK. A consensus began to emerge, first that the idea of the "total" record was a chimera, and, second that from the moment a decision was taken to record a building, choices were made about what – and what not – to record. The subjectivity of the recording process itself was acknowledged (Grenville & Morris 1992: 301), and the importance of recording and interpretation being driven by clear research questions and a thorough understanding of building types was also emphasized. Today, one of the most important legacies of this debate for buildings' archaeology is the idea that although it is impossible – and perhaps undesirable – to be objective in the recording of buildings, it is still important to document the process in a systematic and accessible manner, which can be interrogated and reinterpreted by subsequent scholars.

As early as the 1990s, the value of recording as "an essential prerequisite and accompaniment to the repair and conservation process" was emphasized by buildings' archaeologists and conservation practitioners in the UK. The role of buildings' archaeology was argued to be not simply that of facilitating alteration but also informing decision-making. This might involve weighing up possible development proposals against the perceived value or significance of a building, and academics argued strongly that a necessary precursor of conferring value on a building was scholarly "understanding." These debates had important implications for the relationship between buildings' archaeology and conservation.

Example 1

A landmark volume, *Buildings Archaeology: Applications in Practice* (Wood 1994), brought together academics and practitioners from across the commercial and public sector, including English Heritage (EH), the RCHME, the National Trust, National Parks, and archaeological units in a series of thematic essays and case studies demonstrating the value of buildings' archaeology within the heritage and conservation sector. "Extensive" survey examples featured in the volume included a survey of an entire building type – "bastles" – by the Northumberland National Park and a survey of three nineteenth-century industrial Welsh "housing stocks," both of which were designed to target recording and conservation resources effectively. More "intensive" survey examples included targeted recording for limited alterations in English Heritage's secular buildings and the detailed recording by the Lancaster Unit of major conservation works at the scheduled monument Furness Abbey in advance of major restoration works. Two further case studies involved intensive survey prior to demolition of vernacular buildings and dismantling prior to re-erection at Kellington church.

Another example of this role of buildings' archaeology is Pearson and Meeson's (2001) edited volume, *Vernacular Buildings in a Changing World: Understanding, Recording and Conservation*. Many of the case studies in this volume were concerned to emphasize the significance and the potential of the vernacular architecture resource and to highlight the particular vulnerability of vernacular, often unlisted buildings, to insensitive alteration and development without adequate archaeological recording. Through a series of case studies, the volume reflects critically on tensions within the system: the lack of effective use by Conservation Officers of PPG15; the misconception that "conservation" was synonymous with resistance to change; and the lack of dialogue between buildings' archaeology and other professions, such as conservation

architects, surveyors, structural engineers, and planners.

Throughout the latter part of the twentieth century, debates about the interrelationship of legislation and planning guidance, academic research frameworks, and commercial practice have continued to dominate the discourse of buildings' archaeology. Of particular significance in recent years has been the way in which research-based building recording has been placed at the heart of heritage practice and planning guidance, largely as a result of the widespread dissemination of international heritage conventions and charters such as Athens, Venice, Burra, and Faro. The global cultural and economic impact of developments in international conservation charters and conventions has recently been explored by Letellier and The Getty Institute's (2012) two-volume publication, Volume 2 of which consists of a series of international conservation-led recording case studies (see also ICOMOS 1990). In the UK, the high-level philosophical concepts such as "significance" and "value" defined in these charters have become embedded in national policy guidelines, such as EH's (2008) *Conservation Principles*. *Informed Conservation* (Clark 2001) has also had particular resonance for buildings' archaeology, coining the acronym CoBRA (Conservation-Based Research and Analysis) to describe "the research, analysis, survey and investigation necessary to understand the significance of a building and its landscape and thus inform decisions about repair, alteration, use and management."

Example 2

Informed Conservation not only explained the value of understanding as the basis of defining significance but also discussed the appropriate levels of information required for different kinds of conservation projects, the forms of strategic document used and the specific analytical techniques available. Throughout, examples drawn from the work of EH's own metric survey team, such as the eighteenth-century town house, Danson House, Bexleyheath, were used to illustrate CoBRA in practice. Although CoBRA has never really made it into the common parlance of buildings' archaeologists, its principles have become widely accepted. Other useful published examples include Acton Court, Burlington House, and Stowe. In Spring 2009, an entire edition of EH's *Conservation Bulletin* provided examples of "Conservation Principles in Practice," and Heaton (2007) and Neale (2010) provide a similarly useful surveys of case studies in which attitudes to the "restoration" of historic buildings have been transformed by initiatives such as *Conservation Principles*. At the time of writing, major changes are occurring in the UK's system of planning policy and guidance which are already having an impact on the role of building recording in the heritage and conservation process (Morrice 2011; Heaton 2012).

The Practice of Building Recording: Guidelines and Principles

Early reactions against the idea of total and objective recording methodologies in the UK gradually informed the development of principles and guidelines governing a "selective" approach to recording. This was enhanced by the increasing recognition that archaeological projects needed to justify a level of recording appropriate not only to the significance of the building but also the practical and financial constraints imposed by the commercial sector. Buildings archaeology in the UK tends to draw on two main guidance documents. EH's (2006) *Understanding Historic Buildings*: *A Guide to Good Practice* provides "clear practical guidance on the ways in which the wealth of historical evidence embodied in buildings can be gathered and disseminated for the lasting benefit and enjoyment of all." At the heart of the guidance is the definition of four "levels of recording" (where 1 is the most basic and 4 the most complex form of record) described in relation to three forms of record: written, drawn, and photographic. A table within the guidance maps the "circumstance" and "principle need" of recording against the four levels and forms of record. Similar, but subtly different, commercial priorities can be seen in the professional guidance of the UK's Institute of Field Archaeologists' *Standard and Guidance for the*

Archaeological Investigation and Recording of Standing Buildings or Structures (2008). Once again, the need for archaeological building investigation and recording to be driven by a written specification or project design, in which appropriate levels of survey, accuracy, and the forms of reports are identified, is emphasized.

Understanding Historic Buildings emphasizes that its guidance is not intended to be prescriptive or definitive and acknowledges that different levels of recording may be required by different user groups, while different levels might be adopted within a single project or across a single site. Nevertheless, they provide a standard which is widely used by those commissioning and delivering building recording in the UK. Although neither of these documents provide explicit guidance on recording or interpretative methods, they do acknowledge technological advances are reflected in both documents, with sections on digital photography and digital archiving. However, both also emphasize the importance of historical research and the use of documentary sources, maps, and pictorial sources in researching and interpreting buildings. This contrasts with the methodology of buildings' archaeology outlined in the UK's principle textbook on the subject, where the use of documentary sources is relegated deliberately to Chap. 12 on the grounds that "The archaeology of buildings is really about the study of the evidence of the buildings themselves" and that undertaking documentary research prior to survey and interpretation can, "at the risk of sounding priggish, affect the purity of the purely archaeological analysis" (Morriss 2000: 165)!

Guidance on the practice of recording buildings can be found in a variety of sources. Morriss' (2000) volume provides basic guidance on hand survey, but one of the most useful step-by-step guides to historic building survey methods is that of Swallow et al.'s (2004). The volume provides a factual description of different survey methods but also reflects critically on their potential and limitations. It also provides a series of case studies which reflect on the interrelationship of selective recording principles and the choice of particular recording methods. This "toolbox" approach to guiding practitioners through choices of survey methods and case studies is also evident in EH's (2003) *Measured and Drawn* and in the second volume of Letellier and The Getty Institute's (2012) recent publication, with which English Heritage were closely involved. Useful individual articles on particular techniques can also be found on the building conservation directory website: http://www.buildingconservation.com/articles/.

As well as guidance on survey methods, UK buildings' archaeology has also sought to establish standardized conventions relating to the visual outputs of building survey methods. Early guidance on the artistic conventions and production of standardized plans, sections, and elevations was also provided by the Association of Archaeological Illustrators and Surveyors (1995). Specific guidance on the use of CAD has also been produced (English Heritage 1998 and the Archaeology Data Service's 'CAD Guide to Good Practice': (http://ads.ahds.ac.uk/project/goodguides/cad/)).

Currently, there is considerable debate within buildings' archaeology in the UK about the relationship between the increasingly technological aspects of building survey, such as laser scanning and the analysis and interpretation of buildings. Some practitioners have argued that laser scanning offers a new, more objective, and "total" method of recording historic buildings. However, interestingly, projects such as Heritage3D (http://www.heritage3d.org/) have also recognized the current limitations of such technologies and emphasized the need for laser scanning to be selected on the same grounds as alternative recording techniques, namely, its ability and suitability to answer the research questions, or problems being posed.

Another current debate concerns visualization and the use of virtual reality models. Projects such as the historical theater modeling project, Theatron (www.theatron.co.uk), have demonstrated the potential of virtual reality technologies to generate visually pleasing computer graphics designed to evoke the visual experience of now-lost buildings. However, they have also raised questions about the extent to which "a"

virtual model can inadvertently close down alternative and multiple interpretations of the same evidence. Heritage technologies can not only mask the process of recording but also "gap" between recording and subsequent scholarly interpretation. Increasingly, digital heritage practitioners have called for the development of a more critical approach to the use of computer reconstructions. This has resulted in the development in the UK of the "London Charter for the Computer-Based Visualisation of Cultural Heritage" initiative (www.thelondoncharter.org; Beacham et al. 2006). The London Charter encourages greater "transparency" in the creation and use of models through the publication of the "paradata" on which they are based.

Example 3

The Guild Chapel, Stratford-upon-Avon (Warwickshire), is a recent example of an integrated buildings' archaeology and virtual modeling research project (Giles et al. 2012). The chapel is an internationally significant late fifteenth-century building built by the Guild of the Holy Cross and Hugh Clopton, a guild member, merchant, and former Lord Mayor of London. The project sought to use a virtual model to reconstruct the chapel's original decorative scheme of wall paintings, which were partially destroyed at the Reformation but which came to light during restoration works in the nineteenth and twentieth centuries, when they were drawn by a series of Antiquarians. A metric survey of the chapel was used as a basis for a digital model. However, rather than seeking to reconstruct "the" appearance of the Guild Chapel, the model and its accompanying text was used explicitly to present the "paradata" of the wall paintings by layering different Antiquarian drawings and descriptions of the same images over each other, so that their similarities and differences can be compared directly by the user him/herself. In this way, the project seeks to remind the user of the "gaps" between the reality of the past and the interpretative processes of recording and representation discussed above.

One issue that greatly dominated the emergence of UK buildings' archaeology, but which no longer seems current, is the use of stratigraphic analysis in the interpretation of historic buildings (Grenville & Morris 1992: 301). Early buildings archaeologists maintained that stratigraphic recording provided a more systematic and reliable form of record than the fluid and partial records made by other disciplines. From the outset, however, it was acknowledged that there were profound differences between the unconsolidated contexts of below-ground archaeology and the consolidated structures encountered within buildings, particularly with regard to the principle of superimposition and the definition of stratigraphic contexts.

Example 4

The most cogent discussion of these issues to date has been by Jones (2000), analysis of the ceiling over and partitioning of a medieval "Cruck Cottage," Cuppenham (Hampshire). Jones argues that stratigraphic units must be defined by the investigator in relation to the purpose and level of the record. At Cruck Cottage, context numbers were given not only to individual roof timbers but also to evidence of human activity such as "smoke blackening" to illuminate the process of "closure" in vernacular buildings. Jones' work also demonstrates how the systematic use of stratigraphic terms such as "cut" and "fill" or "abutment" provides a much clearer way of describing relationships within and between contexts than the traditionally ambiguous concept of the "building break" used more commonly in architectural history.

Early enthusiasm for the application of stratigraphic analysis to buildings encouraged the development within organizations such as the Central Archaeology Service at English Heritage of "recording manuals" and pro formas for the recording of "built structures" and "timber structures." However, skeptics of the stratigraphic approach have tended to question the value of such time-consuming recording methods, which, in presenting all information as being of equal value, "fail to guide the user to that which is significant." In Morriss' (2000: 154-5) volume, while the importance of the principle of analyzing the relationship between contexts is acknowledged, it is argued that the use of colored phase

drawings is far easier and more effective method of interpretation than the creation of context sheets and Harris matrices. Over the past ten years, the detailed application of stratigraphic analysis to standing buildings, the use of pro formas and production of site matrices, seems to have become less common in both academic and commercial practice. However, rather than representing its abandonment of stratigraphic analysis, it can be argued that this represents the maturity of the discipline. The key significance of stratigraphic analysis for buildings' archaeology was that it represents "an intellectual framework which can be used to organize the different sources of evidence used to interpret a building." While the *principles* and *terminology* of stratigraphic analysis have been widely adopted and used in buildings' archaeology, it appears that they have been combined highly effectively with conventional and traditional ways of communicating and presenting such analysis – in the form of written descriptions, phased drawings, and reconstructions.

Theory and Buildings Archaeology

Alongside its function within the cultural heritage process, buildings' archaeology has also continued to explore theoretical approaches to the research and interpretation of historic buildings (Hicks & Horning 2006). Although early approaches to the interpretation of vernacular and industrial buildings tended to be very descriptive and functionalist, gradually buildings' archaeologists began to embrace structuralist and contextualist approaches such as the idea of "generative grammars," borrowed from historical archaeology in the US, and spatial analysis techniques such as space syntax and "isovist" or viewshed analysis (Locock 1994). As postmodern, or "post-processual," theoretical approaches began to impact the discipline, and buildings' archaeologists began to eschew the kinds of totalising narratives which these studies often produced and to focus rather on the complexity of the material evidence and the diversity of historical interpretations which could emerge from detailed building analysis (see Reynolds 2009). Current studies are particularly interested in the potential of applying "biographical" approaches to the study both of the individual occupants of buildings and the material biographies or histories of buildings themselves and of developing more phenomenological or experiential approaches to the theoretical interpretation of buildings. More broadly, UK archaeologists have extended their remit to include the study of buildings across the historical period, including polite houses and gardens, institutional architecture, industrial buildings, and contemporary buildings.

International Perspectives and Future Directions

In 2012, the role of building recording, documentation and information management as being at the heart of cultural heritage and resource management appears to be recognized internationally. It is embedded in the charters and policies of ICOMOS and in European and US legislation and practice. The value of research-informed conservation for understanding and conserving high-profile, internationally significant buildings and much humbler, regionally and nationally significant structures is also acknowledged. The potential of building recording methodologies to be extended to wider cultural landscapes, and to inform structural and condition surveys, has also been demonstrated and recognized. The gradual acceptance of the methodology across the heritage profession has resulted in dialogue and information exchange, rather than the interdisciplinary hostility and protectionism which characterized its early days. New technologies are also being harnessed to enhance the presentation and interpretation of research. As building recording is gradually embedded in academic curricula, a new generation of professionals is emerging internationally, with a greater understanding of its benefits and potential to enhancing understanding and inform conservation.

The greatest threat to the future development of the field is the economic crisis currently affecting most of Europe and North America. The loss of conservation professionals at both local, regional, and national level due to budget cuts,

and the absence of dialogue between practitioners, is a major source for concern in the UK. The desire to boost the construction industry by removing or waiving existing legislation and policy also threatens the role of recording in the planning and development process in many countries, regions, and localities. Commercial units are under greater pressure than ever to deliver rapid results for minimum cost. Moreover, leading organizations, such as English Heritage in the UK and Parks Canada in North America, have experienced drastic budget cuts to units involved not only in recording but also in setting standards and monitoring their application within the profession. Only time will tell how the discipline emerges from this latest challenge, but it seems likely that academics and professionals will need to collaborate more than ever if we are to ensure that building recording continues to inform the understanding, conservation, and management of historic buildings and places into the twenty-first century.

Cross-References

- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Historic Building Conservation: Current Approaches
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Society for Medieval Archaeology
- ▶ York Archaeological Trust

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Buildings, Archaeological Study of

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Introduction

The study of buildings has always formed a significant part of archaeological endeavor. In Britain, research, illustration, and publication began to mount through the first half of the nineteenth century, not least through the national work of John Britton and Robert Willis and their regional contemporaries. These early students of historic buildings applied archaeological standards of draftsmanship and subsequent dissection, phasing, and analyses that permitted logical insights about dating, periodization,

and typology. Indeed, Willis used the term "archaeology" to describe his recording techniques and their application at several English cathedrals. He knew the value of demonstrating structural and dating arguments through making proper records, and his work remains as valid today as it ever was. Of course, succeeding generations would set new standards and devise new procedural models, but Willis stands close to the start of the archaeological tradition that requires accurate measurement and drawing before an analysis is undertaken.

Key Issues/Current Debates/Future Directions/Examples

Research and Understanding

For Willis, and the subsequent researchers that he inspired, it was enough to demonstrate the academic benefits that accrued from the study of buildings. The notion of "pure" research for its own sake, simply to find out, may be unfashionable these days, but it is still alive. In this age of public accountability, however, academic curiosity and challenge may not be enough to secure the necessary financial or legislative support. Other benefits, such as opportunities for innovation and community engagement, must be demonstrated. Today, the study of buildings needs to be set within a wider intellectual context, and the archaeologist must ensure that research programs are carefully considered and coordinated with others in similar fields before work begins.

In recent years, the role of the archaeologist and the application of modern archaeological practice have been extended to inform the conservation and management of historic buildings. This is based on the firm belief that it is not possible to conserve or manage a building without first understanding its history. There is a need to know how and why a building was constructed, how the spaces within a building and between buildings were altered and used through time, what survives of the building and what has been lost, as well as any association with individuals and events. In this way, the study of buildings is inevitably drawn down the path of research – albeit research directed toward a practical outcome. This understanding is documented through the process of making analytical records.

The ultimate aim of understanding buildings is to define their *significance*, so that the historical asset may be retained and enhanced. In particular, it is essential to recognize those aspects that make buildings important enough to justify the necessary conservation time and effort. It is impossible to say, for example, whether or not a particular roof structure should undergo extensive repair or be renewed until it is known what date that roof structure is and how important it is relative to comparable roof structures elsewhere. To put it in a single word, the importance of a building or group of buildings will need to be "*characterized*" and to gain credibility that characterization must be well documented.

Having characterized a building, the knowledge gained can then be used to address any sensitive management problems. This may lead to more intensive study to inform particular conservation or development proposals. Clearly not all buildings need to be studied in the same detail: different circumstances will demand different responses. The scope and level of documentation need to be economically tailored to particular conditions and will be dependent on a number of factors, such as the type and complexity of the building and the nature and scale of proposed works. Consideration should carefully be given to the appropriate kinds of analytical recording in each case. For instance, further research will be especially important for elaborate works programs on multiphase buildings where a greater understanding of the structural and material performance of the fabric is required to avoid damage and allow for appropriate preservation. Where, for example, it is necessary to deconstruct the timber frame of a building to repair decay, or where partial demolition of its masonry to remove rusting metal cramps cannot be avoided, it will be important to prepare precise records. For the dismantling of buildings for re-erection elsewhere, for example, in a museum, very detailed three-dimensional recording and numbering of all components will be required,

Buildings, Archaeological Study of, Fig. 1 The major repair project at Ightham Mote, Kent (UK), undertaken on behalf of the National Trust, had the benefit throughout of an archaeologist working alongside the architect and contractor to inform the process and record what was discovered (Photo: Jason Wood)

in order to recreate the disposition and assembly of as much of the original fabric as practicable.

In such situations, the role of the archaeologist, often working in close partnerships with other disciplines, needs to be properly integrated with the project direction and monitoring team, usually under the leadership of the project architect. The most satisfactory projects will be those which, from the earliest possible stage, work with and take into account the skills and experience of a wide variety of specialists. As well as archaeologists, these may include architectural historians, structural engineers, materials specialists, and others (Fig. 1).

It should be noted that as a part of an historic building conservation or development project, the work of an archaeologist differs significantly from that associated with conventional archaeological fieldwork, in that the data can form a vital part of the subsequent works specification. Scaled drawings and photographs often provide the essential basis for detailed works proposals and consent applications. Such records may also be used for issuing instructions to building contractors. The need for accuracy and legibility are therefore paramount.

Techniques for Studying Buildings

Documentary research is important to establish the architectural and historical interest of a building and to elucidate the evidence for its history and development. This can be achieved in a number of ways. Most research should start with the obvious sources – the relevant statutory designation, a survey of standard reference works and existing secondary sources on both the individual building and of that class of building in general. Local authority record systems and record offices are often a good source of information, as well as national records and specialist archives. It is advisable not to restrict research to locally available material, as in many cases, crucial information will lie in national collections and may have been overlooked in the past.

In general, work should concentrate initially on the sources most likely to reveal evidence for the history of the fabric of the building, such as maps, plans, photographs, and other historic images. Most studies will benefit from a map regression exercise. This involves gathering copies of all relevant maps, starting with the most recent and working back through the whole sequence of every period. Topographical or other drawings, published views, and photographs are especially useful. Their collation can be time consuming, but the effort is not often wasted as these images frequently shed light on the original context and tell much about a building's function and pattern of alterations.

Buildings, Archaeological Study of, Fig. 2 Laser scanning carried out by the University of Birmingham at Chedworth Roman Villa, Gloucestershire (UK), on behalf of the National Trust (Photo: Jason Wood)

Beyond these sources is a whole range of information including title deeds, taxation lists, and rate books, which can all be helpful to construct a simple chronology of ownership and tenancy.

Oral history has an important role to play in the study of buildings. People who have direct experience of a building's use and adaptation in the recent past may present opportunities to gather supporting evidence for changes in form or function. For example, the redevelopment of industrial buildings can benefit from contact with former employees resulting in a greater understanding of any surviving plant and its significance, informing decisions on retention or disposal. Defining significance is now

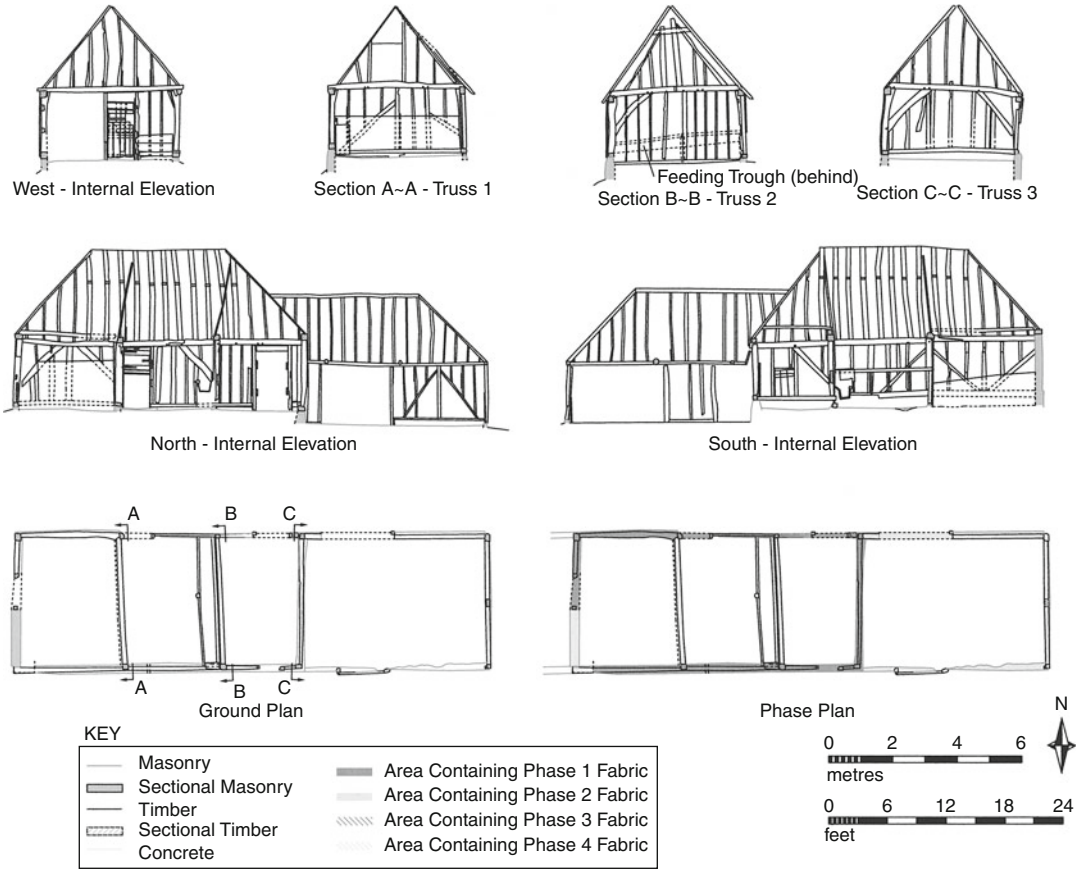

Buildings, Archaeological Study of, Fig. 3 Plans, elevations, and sections of the timber-framed stable block at Abbey Farmstead, Faversham, Kent (UK), recorded in advance of repair and refurbishment works (Drawing: Lancaster University Archaeological Unit; courtesy of Oxford Archaeology and Swale Borough Council)

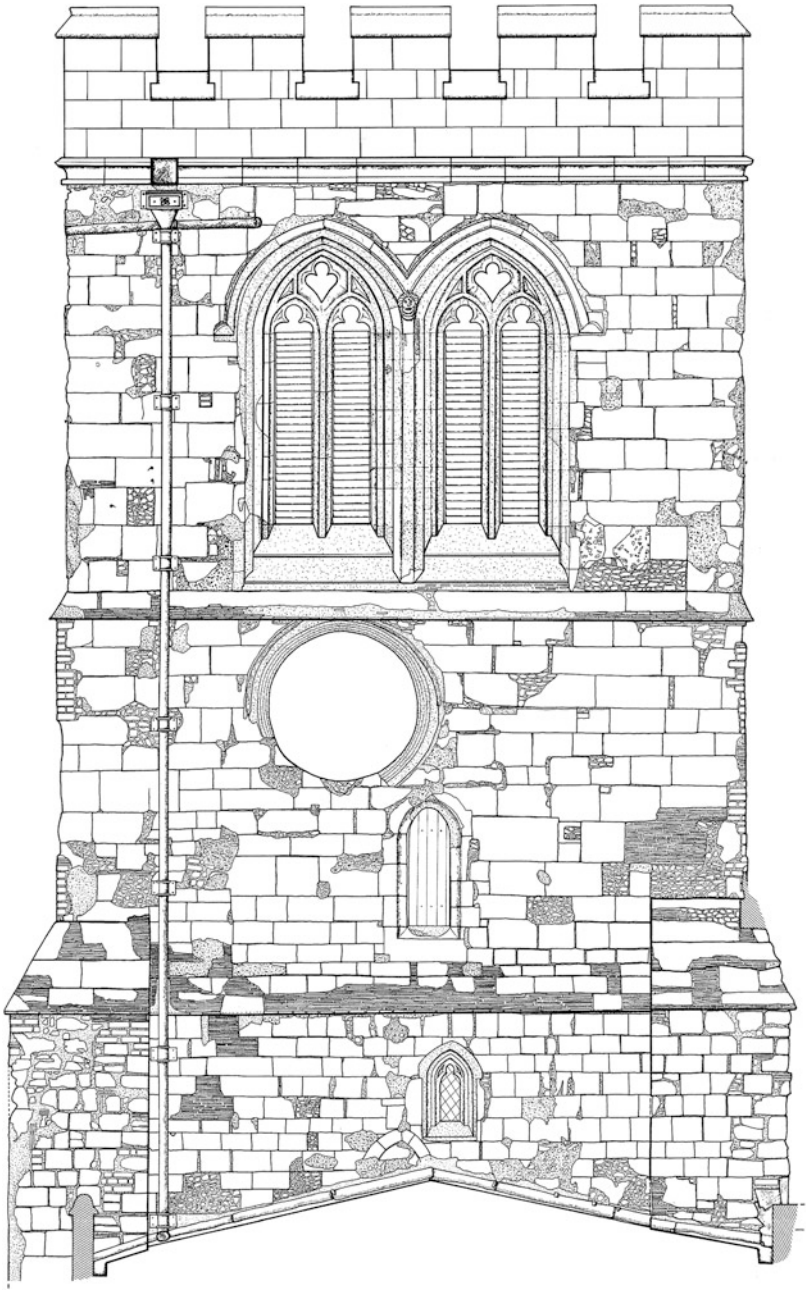

Buildings, Archaeological Study of, Fig. 4 An elevation drawing of the church tower of St. George of England, Toddington, Bedfordshire (UK). Recording and analysis provided accurate base level information about the nature and historical development of the fabric to inform the repair program (Drawing: Network Archaeology Ltd; courtesy of Toddington PCC)

a process that increasingly goes beyond expert values to encompass the wider community and to embrace public history. Capturing peoples' views and attitudes about buildings that are significant to them can be illuminating. A crucial aim must be to encourage people to tell their own stories, to share their personal and often "unofficial" history, and to explore further the forces that link these memories to specific buildings.

Fabric Survey and Analysis

Historical research alone is not sufficient: there must always be some degree of engagement with

Buildings, Archaeological Study of, Fig. 5 An annotated ground plan showing suggested periods and phases of part of Whalley Abbey, Lancashire (UK) (Drawing: Lloyd Evans Prichard)

the fabric of the building. Drawings are an indispensable part of studying buildings. These can be produced using a variety of different survey methodologies, equipment, and related software packages:

Hand-measured survey involves the use of tape measures, plumb bobs, frames, and surveyor's levels.

Instrument-based survey involves the use of total station theodolite control, consisting of a closed-traverse run around and through a building, followed by trigonometric intersection of suitably observed points on a façade, or electronic distance meter tacheometry utilizing microprisms for cross sections through complex enclosed structures.

Photographic-based survey (often used in conjunction with hand-measured and instrument-based control) includes

Rectified photography, consisting of single photographs or a mosaic of overlapping photographs taken using large- or medium-format cameras aligned square to the object

Photogrammetry, based on stereophotography taken using metric cameras

Laser-based survey using terrestrial laser scanners. These record three-dimensional positions at a predetermined resolution over a chosen area, generating thousands of high-accuracy coordinates. The coordinates are stored as a series of XYZ measurements which visually constitute a point cloud that represents the geometric form of the building being scanned in three dimensions. Laser scanners also operate in complete darkness and are therefore unaffected by varying light levels, unlike more traditional recording methods (Fig. 2).

The resulting drawings are usually provided as a set of scaled plans, sections, elevations, and details (Fig. 3):

Plans: The requirement may include basement, ground and upper level floor plans, including

Buildings, Archaeological Study of, Fig. 6 A cutaway reconstruction drawing of the church at Furness Abbey, Cumbria (UK) (Drawing: David P Cooper)

plans of ceilings, vaults, and roof structures, showing relevant external and internal detail and features. The location of all sections and elevations should be identified. Plans are the fundamental product to which all other material can be related.

Sections: The requirement may include sections corresponding to the bay divisions or axes through the relevant parts of a building. These should normally define the principal wall plane and also include detail through adjacent openings and voids such as windows, doors, passageways, and smaller features such as putlog holes and beam sockets, as well as roof and floor detail. The height locations of all plans should be identified.

Elevations: The requirement may include external and internal elevations of the relevant parts of a building, depicting architectural features with associated detail (Fig. 4). Walls adjoining elevations should be depicted in section. The height locations of all plans should be identified.

Details: The requirement may include separate plans, sections, and elevations of representative openings and architectural features, with exploded views to supplement the two-dimensional record where appropriate (for example, carpentry joints), and representative

architectural, decorative, and ornamental details, both loose and in situ (molding profiles, inscriptions, setting-out lines, tooling, nail positions, masons' and carpenters' marks, graffiti, etc.).

It is not possible, however, to understand an historic building on the basis of record drawings alone. Close analysis of the fabric will be required to establish the relative chronology of the building and its structural phases:

Analytical records: The requirement may include annotating the plans, sections, and elevations to depict boundaries between different types of building material (stone, brick, tile, wood, metal, glass, etc.); surface finishes (mortar, render, plaster, daub, paint, industrial lining, etc.); building periods, phases of construction and repair; constructional detail (wall alignments and thicknesses, bonding patterns, blockings, putlog holes, beam sockets, chase scars, butt joints, building lifts, work-gang breaks, fittings, etc.); occupational detail (wear marks, blackened timbers, industrial residues, etc.); and evidence for abandonment or demolition (robbing, salvaging, fire damage, etc.).

Interpretation records: The requirement may include plans, sections, and elevations depicting outline reconstruction of the principal elements and features, for each of the periods identified. Output may be presented as an annotated plane (Fig. 5) or three-dimensional or cutaway projection (Fig. 6).

Intervention records: "As-built" records, showing the extent of conservation or development works, should depict areas of rebuilding, rebedding, repointing, grouting, new fabric insertions, etc. "As-built" records are particularly important where a component or structure is dismantled, repaired, and then reassembled.

General photographic recording of the external and internal appearance of the significant parts of the building should be undertaken. Close-up photography will also often be required for architectural details.

Finally, detailed physical or chemical analysis of certain building materials, surface finishes, or residues can often provide essential corroborative information including technological and supplementary dating evidence.

Cross-References

- ▶ Buildings Archaeology
- ▶ Historic Site and Historic Building Preservation: Overview

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Burial Archaeology and the Soviet Era

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> "Also the dead remain silent – until it is time for them to speak."
>
> Stanislaw Jerzy Lec

Introduction

There is something paradoxical in the fact that in 1943, the representatives of one totalitarian dictatorship, the Germans, began the excavation of the graves of the victims of another totalitarian dictatorship, i.e., the Soviet Union. The location

was the site of the mass murder of Polish officers, NCOs, and officials at Katyn in Russia (e.g., Drazkowska 2010; Johansson 2010). The Stalinist terror (e.g., Conquest 1992) applied not only to the citizens of the Soviet Union but also to segments of the population regarded as politically dangerous in the areas conquered and occupied by the Soviets. It must also be mentioned that the archaeological profession suffered heavily from the terror (e.g., Klein 1997; Formozov 2006; Platonova 2010: 184-8).

After the collapse of the Soviet Union, the search for the remains of the victims of the terror and their exhumation has become a new area of work for archaeologists. Numerous mass graves have been discovered, but there have also been systematic searches for them. The reasons for this have been above all human, humanitarian, and political. The work of locating these grave sites outside the Russian Federation has been carried out actively in the Baltic republics, Poland, and the Ukraine (Tamm et al. 2008). In human terms, the need for archaeological and physical-anthropological exhumation is obvious and needs no explanation. The nations, ethnic groups, families, and individuals that experienced the terror have finally been given a chance to know the fate of their lost members and loved ones and their possible places of burial and to complete the process of individual and collective grieving (on the commemoration of the terror in present-day Russia, see Etkind 2009). According to Zoe Crossland (2011: 286 and cited literature), this involves "the increasingly pressing question of the memory and commemoration of recent conflict."

Apart from the human aspect, the reasons for investigating the material remains of the Soviet terror can be summarized as three main considerations (see, e.g., Zemitis 2005): (1) the legal aspect with research for the purposes of establishing historical truth and possible crimes against humanity (e.g., Kalbarczuk 2008), (2) the preservation and cherishing of the memory of the dead, and (3) to generate interest in history. The goals of national unity have also been in the background, and the present administration seeking reforms has reinforced its own legitimacy by revealing the victims of the old system of government (Paperno 2001: 89-90).

Since these investigations, however, are due more to human, humanitarian, and political reasons than the actual needs of research, their nature cannot always be merged with archaeological or forensic procedures in completely unproblematic ways (Crossland 2011). The Estonian, Latvian, and Lithuanian research teams, however, involve a prominent archaeological, physical-anthropological, and medical contribution. They have also made use of expertise from beyond their own national borders (e.g., Lõugas 1991: 83). Lithuanian experts, in particular, have been employed in the other Baltic countries. The origins of Lithuanian forensic anthropology date from the 1960s, one of its roots being the exhumation of mass graves of the Holocaust (Garmus & Jankauskas 1999). Thus, the Soviet system provided the necessary training for later exhumation work.

Key Issues/Current Debates/Future Directions/Examples

Investigations have been organized in the Baltic countries by the institutes of archaeology of the national academies of science, the departments of archaeology, medicine and anthropology of the universities, and antiquarian societies (Tamm et al. 2008). This work has also involved large numbers of volunteers, various state and municipal bodies, and organizations including the successors of the state security organizations.

While the investigations have primarily concerned mass graves, execution sites of officers and other ranks of national armies and places where resistance fighters of the long period of occupation were killed have also been excavated. A separate area of work consists of locating the graves of heads of the state and other dignitaries and the identification of their remains (Jankauskas et al. 2008). The grave and remains of Konstantin Päts, the last president of the first Estonian Republic, for example, were located, and the remains were reinterred in a solemn state ceremony in Tallinn (Lõugas 1991; Verdery 1999;

Puustak 2008), while the body of Karlis Ulmanis, the last pre-Soviet president of Latvia, has not been found (Zemitis 2005: 2). The remains of Prime Minister Imre Nagy of Hungary have also been exhumed (Tallai & Keve Kund 2008).

There was, in fact, interest in the Soviet Union in the remains of dignitaries and especially of Tsar Nicholas II and his family. There was a secret search for them already in the late 1970s, and investigations were officially resumed in 1991, leading to the scientific identification of the remains, their reburial, and canonization (Rousselet 2011). In Russia, however, the main focus has been on investigating the burial sites of victims of mass murders. The main organization involved in this work is Memorial (http://www.memo.ru), which also operates in Ukraine, Kazakhstan, Latvia, Georgia, and Italy, in addition to Russia. One of Memorial's main objectives has been "the awakening and preservation of societal memory of the severe political persecution in the recent past of the Soviet Union." In fact, the perpetuation of the memory of the victims was the very idea around which Memorial was formed. These activities have involved the preparation of "Books of Memory," special publications listing victims of Soviet repression (e.g., Gil'di & Braudze 2010).

The main part of the work of Memorial has been the search for the burial sites of victims of the terror and related exhumation. The Soviet terror particularly concerned ethnic minorities, and some examples and results from their territories can be presented. Large numbers of mass graves have been found in Russian Karelia, including Sandarmokh in the District of Medvezh'egorsk (Karhumäki), the largest known burial site of victims of the Stalin terror of 1937–1938 in Northwestern Russia, which was discovered in 1997 (Etkind 2009: 182-4). The 9,000 executed victims at Sandarmokh represent approximately 60 different nationalities (on burial sites in Karelia, see, e.g., Trubin 1989; Korablev n.d.).

In the Republic of Mari El in Central Russia, research was launched during the period of *perestroika*, and as early as by 1991, at least 12,000 bodies had been found in 200 identified mass graves (Patrushev 1991) within a 13-km radius of Joskar-Ola, the capital of the republic. The purges were particularly aimed at liquidating the intelligentsia of the Mari people. By way of comparison, it should be noted that under Stalin the republic had a population of approximately 600,000.

The work of the association of children of the victims of the repression of the Mari is an example of how searches were carried out for the graves. Firstly, people with knowledge of the executions were sought and interviewed. Eye-witness accounts were supported by aerial photographs of forested areas from 1955 with the notable detail of depressions on the surface of the ground where no trees grew. The investigations involved the local authorities and students of history at the Mari University under the direction of an archaeologist. The excavations revealed details of execution methods, and artifacts ranging from the headwear of members of the national intelligentsia to officers' sword belts pointed to ethnic and professional groups. The artifacts indicate the wide social spectrum of the victims. The process also included the erection of monuments at the burial sites (Patrushev 1991).

The research conducted in Mari El is a good example of the investigation of graves. The results include the surveying of burial sites based on archive materials, interviews, and aerial photographs, establishing the numbers of victims and their ethnic and social backgrounds, the reconstruction of methods of execution, and remembrance. For the time being, compilations of this area of archaeological work have not appeared in the former area of the Soviet Union. Katyn and other execution sites of Poles were not the only mass graves excavated and studied by the Nazis. Paradoxically, the results concerning the mass graves at Vinnytsia, issued in 1944 by the publishing house of the National Socialist Party, are still the most thorough forensic studies of mass graves from the area of the former Soviet Union (Paperno 2001 and literature therein).

In some cases, excavations have left unverified the wildest assumptions concerning grave sites. There is also, e.g., a rumor in Minsk

that the local porcelain factory tried to improve its wares by adding powdered bone of human skeletons collected for this purpose. No one has yet been able to prove this claim, but people familiar with the period believe that it may well be true (Lõugas 1991: 80).

As Lõugas (1991: 84) writes: "Every East European archaeologist is familiar with the Early Iron Age "kosti" of Glayadenevo Baskiria, 25 km from the city of Ufa. It is a mountain of bones, containing the remains of thousands of animals. This site is a well-known point of departure and comparison for the study of similar sites and antiquities of smaller scale. Perhaps a chronological starting point for future archaeologists will be the 'East European and Siberian layer of bones' from the second quarter of the 20th century."

Military graves in the former Soviet Union must also be mentioned in connection with Soviet-era burials. Interest has now arisen in Russia in keeping and maintaining them. The Red Army usually left its dead unburied in the field. Now the remains have begun to be collected into military cemeteries, the care of which has begun.

An additional theme here consists of the burial sites and remains of lost soldiers of former enemy nationals in the present area of the Russian Federation. An example is the situation involving Finland and the Soviet Union/Russia. Finns have shown interest in the Finnish war dead of the areas ceded to the Soviet Union and the repatriation of their remains. This work was launched by the Finnish Ministry of Education, and it has led to a Finnish-Russian agreement on keeping the memory of both Finnish soldiers who died in Russia and Russian (Soviet) soldiers fallen in Finland, and an official statute on its implementation. These activities are of a bilateral nature. Finns assist Russians in their search for remains of soldiers in Finland, provide information on finds of this nature, and participate in keeping and maintaining the grave sites.

There are also results from Finland. The Association for Cherishing the Memory of the Dead of the War (http://www.sotavainajat.net/perussivut/sivut/english.htm; see also Blinnikka 2004) continues the work previously carried out by the Ministry of Education. This work and its results are cited below as described by the Association.

In practice, the work involves searching for and bringing back remains of Finnish soldiers from the battlefields of the wars of 1939–1945 that are currently located in Russia. During the wars between 1939 and 1945, approximately 13,000 Finnish soldiers were either lost on the battlefields or reported missing. The identification of the dead and their burial in their home areas is the main goal of the work. The remains of almost 1,100 Finnish soldiers have been found so far. Of these, the identities of some 300 soldiers have been established. The majority of the c. 90,000 killed were evacuated and buried in the home graveyards.

Another field of activity is the restoration and maintenance of seven field graveyards in the ceded territory. These were established during the war and are today a final resting place for nearly 900 Finnish soldiers. Later, monuments have been raised at each of these graveyards.

During the wars of 1939–1945, around 4,000 Finnish soldiers were captured as prisoners of war. Of them, a little more than 2,100 were able to return to Finland after the war. It has been confirmed that 760 soldiers perished during their captivity. The fate of the others is still unknown. Five monuments have been raised in the locations of the former prisoner of war camps for those who perished there.

Cross-References

- ▶ Forensic Anthropology: Definition
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives

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Burial Excavation, Anglo-Saxon

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Brief Definition of the Topic

Human burials constitute a major source of evidence for human history. Burials excavated by archaeologists may report on both the individual commemorated and on society more broadly. Human remains may be encountered as burnt bone in containers or in pits (*cremations*), or as skeletons in graves (*inhumations*), or as mixed collections of bones, created by communal deposition (as in European Neolithic long barrows), or by reburial (*charnel*). The state of the remains (and their potential for further research) is dependent on the local terrain and consequent degree of decay (see ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes; that associated with human remains is termed *taphonomy*). In general, acid soils (e.g., sands and gravels) attack bones, while more alkaline soils (chalk) tend to preserve them better. Anaerobic conditions (excluding air) can preserve the

Burial Excavation, Anglo-Saxon, Fig. 1 A cremation urn

soft tissues. Thus *bog burials* (seen in the Scandinavian Iron Age) have preserved skin and inner organs and even the last meal of the deceased, but the acid solution of the bog has nevertheless dissolved the bone (Glob 1969).

The purpose of excavating cemeteries is to gain an insight into the population and thinking of an ancient community and generally involves two lines of inquiry: the study of the burial rites and the study of the skeletal material. The *burial rites* include the form of the grave, its orientation, and the disposition and character of the objects placed in the grave – the *grave goods*. In burial rites, variat ions in space imply different ranks or families; variations through time may relate to changes in religious or political thinking. *Skeletal material* reveals evidence for basic demography through a study of anatomy: This gives age at death, sex, major diseases, and injuries. The carbon contained in the collagen in the bone (including cremated bone) can be extracted and *radiocarbon*-dated, using the

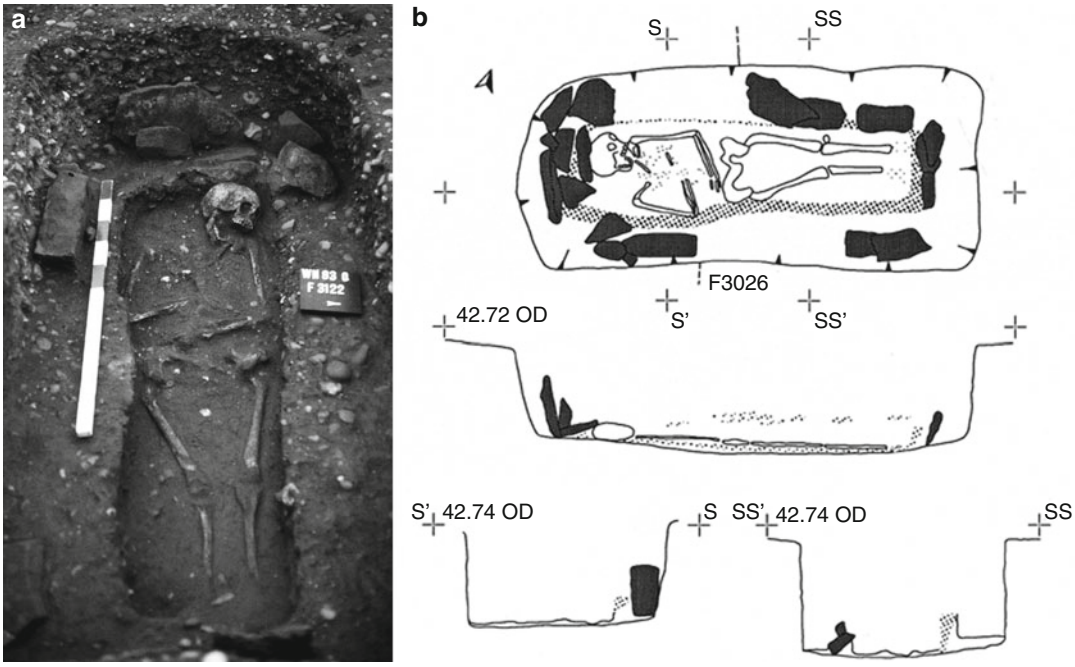

Burial Excavation, Anglo-Saxon, Fig. 2 An inhumation with typically poor bone preservation. The stones are part of the burial rite

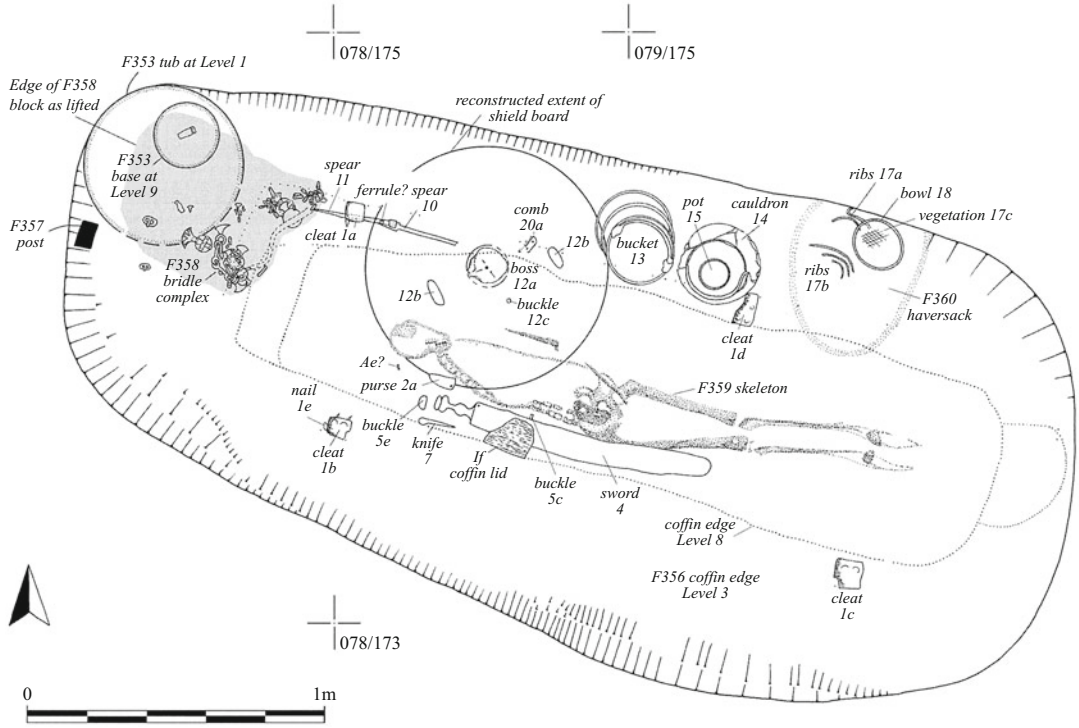

Burial Excavation, Anglo-Saxon, Fig. 3 Plan of a furnished inhumation (from Sutton Hoo, Mound 17)

proportions of carbon isotopes. Carbon and nitrogen isotopes present in the bone are also used to assess the emphasis of diet (it will show whether the diet of an individual had a strong or weak marine intake, i.e., fish). Oxygen and strontium isotopes trapped in teeth indicate the character of the groundwater where a person grew up. *Ancient DNA* (aDNA) can now be recognized in skeletal material.

The excavation of Anglo-Saxon burials (fifth to seventh century), used here as an example, has generated a notable range of techniques (Williams 2006; Carver 2009: 131-8). The pits containing cremations are exposed on the surface by troweling, and the pot exposed and removed, intact wherever possible, for excavation indoors (Fig. 1). The contents of the pot are removed in very small spits to document the association of the fragments of burnt bone with each other and with the fragments of grave goods. The objective is to discover which humans, animals, and grave goods had originally been on the funeral pyre.

Inhumations accompanied by grave goods are commonly encountered in Anglo-Saxon cemeteries (Fig. 2). The graves are revealed on the surface by troweling, and the grave fill is then removed in 5- or 10-cm spits against the long axis: This will provide a profile through the grave. The skeleton and all the grave goods (e.g., sword, shield, brooch) are photographed and plotted individually on a grave plan (Fig. 3).

An example of a research project at an Anglo-Saxon cemetery is given by Sutton Hoo. A ship burial discovered by chance at the site in 1939 drew attention to its potential. The site was

Burial Excavation, Anglo-Saxon, Fig. 4 The burial under Mound 17 being excavated from a cradle

Burial Excavation, Anglo-Saxon, Fig. 5 A 'sandman' burial' where the form of the body is preserved (but less so the bone)

subjected to a 2-year evaluation in the 1980s, with a view to determining what had survived the effects of taphonomy, plowing, and treasure hunting, and a project design was then published. In addition to regional surveys, this design proposed the excavation of 1 ha of the 4 ha site, encompassing five of the 18 known burial mounds (and the spaces in between). Several of the mounds contained cremations, two had contained ships, and one contained a young man buried in a coffin (Fig. 4). His horse was buried in a separate pit adjacent. In the later Saxon period (eight to eleventh century), this high-ranking pagan cemetery became a place of execution.

The ground conditions at Sutton Hoo were hostile, and although fragments of bone were sometimes present, human bodies had decayed markedly in the acid sand, creating "sand fossils" rather than skeletons. The majority of burials, still marked by mounds, had been severely pillaged, scattering bone and objects. The medieval use of the mounds as rabbit warrens had further dispersed the burials.

Nevertheless, the horse and rider burial was undisturbed and could be excavated in precise detail. The execution burials (sand fossils) proved susceptible to excavation in three dimensions, and their shapes were sufficient to show examples that had been killed by hanging or beheading (Fig. 5). The chamber in a pillaged mound, Mound 2, was surveyed by intensive chemical mapping, which showed the location of the now vanished body, a copper alloy cauldron, and other grave goods (Fig. 6). In spite of the evident battering the cemetery

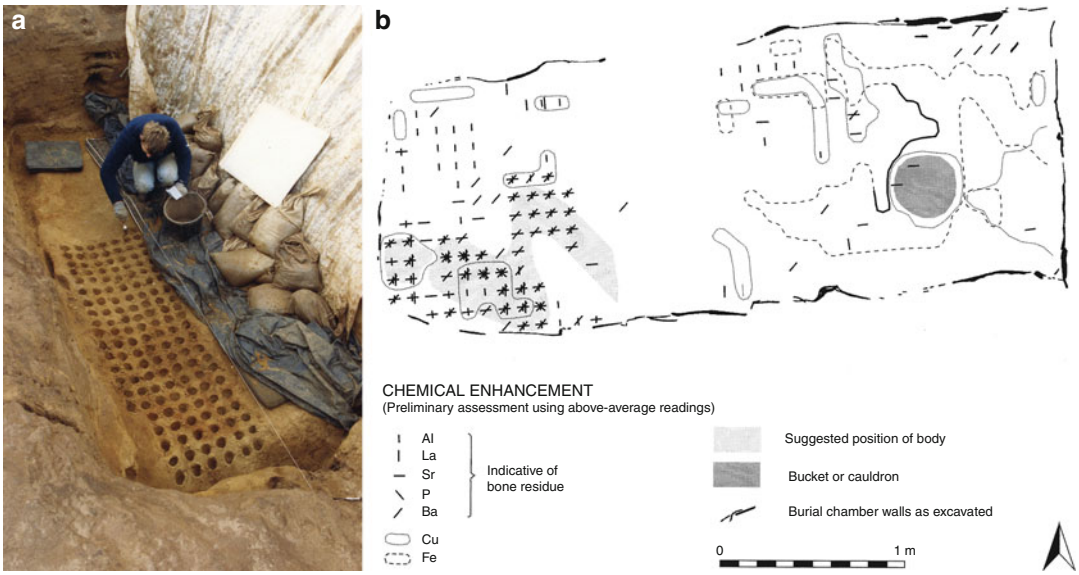

Burial Excavation, Anglo-Saxon, Fig. 6 Chemical mapping of the floor of a robbed chamber

has suffered through the ages, there was sufficient bone to radiocarbon-date the whole sequence, from 580 to 1,050, and align it with the typological dates of the rich grave goods from the famous ship burial.

Cross-References

► Excavation Methods in Archaeology

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Burial Mound Dissection in Sweden

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Introduction

In 1949, it was decided to excavate the first of the four Migration Period large mounds in Högom at a cemetery a few kilometers west of Sundsvall in the county of Medelpad, North Sweden. Concentrations of large mounds (>20 m in diameter) in Scandinavia are known at Old Uppsala in Uppland, Bertnem in Trøndelag, and Borre and Snartemo. Often arranged in rows, these are high status burials representing generations of regional leadership. The four mounds in Högom ("mounds") Medelpad north Sweden clearly belonged to this exclusive group. When investigations began in 1949, the site had been largely forgotten and was encumbered by houses, barns and cellars, driveways and threshing places. The National Heritage Board decided to purchase the area, remove the buildings, and restore

a cultural landscape around the cemetery. But before restoration, it was decided to investigate the most damaged of the burial mounds (No. 2). The project was one of exceptional innovation.

Key Issues/Current Debates/Future Directions/Examples

The mound was 40-m across and at least 4-m high, and in accordance with the excavation methods of the late 1940s, it was initially investigated with a trench. This was placed on the NE side of the mound on the site of a demolished building. Beneath the topsoil, the excavators encountered a stone cairn, which was then exposed in its entirety (Fig. 1). It proved to be 20 m across, and seen from a tower was clearly no random heap, but the stones had been deliberately sorted by size. To record this information, the whole cairn was carefully planned, stone by stone.

While the stones were being removed, it became apparent that there was a central burial chamber measuring 5 × 2 m in plan that had been constructed in timber. It had been compressed by the weight of the mound into a compact layer 10-cm thick containing all the wood, the body, and the objects, some of which showed through the matt surface of the compressed wooden roof (Fig. 2). Attempts to excavate the chamber in situ were frustrated by the hardness of the wooden layer; more forceful digging threatened to destroy the objects.

Inspired by the successful lifting of a whale jawbone during the excavation of a Stone Age settlement in Bohuslän (western Sweden) in 1935, it was decided to try and lift the whole chamber in order to excavate it in the laboratory. This much more challenging project was achieved by engineers from the construction firm, Hallström & Nisses of Sundsvall. To provide access, a wide and deep trench was dug around the chamber, making an archaeological record of the layers disturbed. The chamber

Burial Mound Dissection in Sweden,
Fig. 1 Dagmar Selling, excavator (with Sverker Janson) of Högom Mound 2, working on the central cairn (Ramqvist 1992, Fig 17a)

Burial Mound Dissection in Sweden, Fig. 2 Metal buttons on the leggings of the buried person showing in the compressed roof of the chamber (Ramqvist 1992, Fig 24)

Burial Mound Dissection in Sweden, Fig. 3 Metal plates being driven beneath the chamber with jacks (Ramqvist 1992, Fig 25)

proved to be resting on silty deposits without a wooden floor. The engineers then built a wooden box around the chamber and drove steel pipes beneath it, with horizontal steel plates jacked into position above them to create a base for the chamber deposit (Fig. 3). The wooden box was infilled with plaster to prevent movement of the deposit and the whole encased in a steel frame. It was then lifted and transported to the National Historical Museum in Stockholm.

Burial Mound Dissection in Sweden, Fig. 4 The encased burial chamber is unloaded outside the laboratory in Stockholm

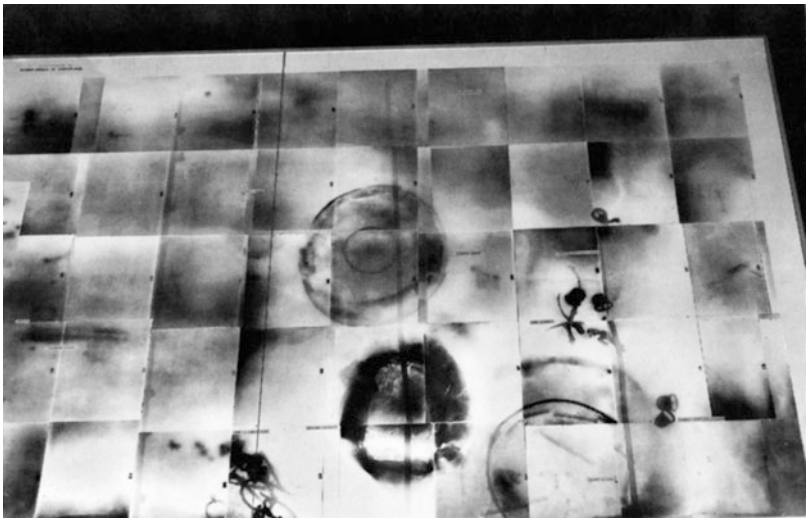

Burial Mound Dissection in Sweden, Fig. 5 The set of X-ray plates from the eastern part of the chamber showing the bridle and cauldron in position in the laboratory (Ramqvist 1992, Fig 28b).

When unloading the box in Stockholm (Fig. 4), it was turned completely upside-down, so that the continuing investigation could take place "from below," with the impenetrable roof now as the base. Before excavation in the laboratory, the entire deposit was X-rayed, producing a set of plates at 1:1 which proved to be an invaluable guide to the indoor excavators (Fig. 5). The burial was excavated in minute detail. Dating to c. 500 CE, it is known as one of the richest and best excavated in the Baltic area.

In 1984, the site was surveyed in detail and the previously unexcavated perimeter around the cairn was examined, revealing large postholes of a building erected before the mound, probably a three-aisled long house. The whole site was eventually published by Ramqvist (1992).

Cross-References

- ▶ Archaeological Record
- ▶ Excavation Methods in Archaeology
- ▶ Scandinavia/Northern Europe: Historical Archaeology
- ▶ Scandinavia: Field Methods
- ▶ Trade and Transport in the Ancient Mediterranean

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Burial Practices and Tombs in the Roman World

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Introduction

Understanding the rituals associated with death and burial can help reveal a past society's attitudes toward death and beliefs about the afterlife. Information concerning burial practices and commemoration in the Roman world is derived from ancient literary sources written by elite male members of Roman society, often about the funerary practices of aristocrats from the city of Rome. The archaeological record also provides invaluable information on burial practices, but only a small percentage of burials have survived intact from the Roman period and are overrepresented by monumental tombs that belonged to a small elite segment of Roman society. Through the integration of different lines of evidence, general patterns can be discerned, but it is important to emphasize that there was not one universal "Roman" way of burying the dead throughout the Roman world and that these practices varied both geographically and temporally.

Definition

The term "burial" refers to the act of placing the deceased in the ground and can also indicate the location where the deceased is interred, which is often used interchangeably with "grave." "Burial practices" refer to the activities surrounding the preparation of the deceased for burial and deposition of the remains in the ground or in some type of burial structure. A "tomb" can be used to refer to the general location where the deceased is buried, but more commonly it is used to describe a freestanding architectural structure that is used to house the dead.

Key Issues

Death Pollution

A number of factors influenced the treatment and burial of the dead in ancient Rome. The widespread belief in death pollution, both spiritual and physical, meant that rituals were required to separate the deceased from the living and to cleanse the survivors of any contamination associated with death (Toynbee 1971; Lindsay 2000). Attitudes toward the dead were also influenced by the belief that some part of the individual continued to exist after death and could have an impact on the living, so appropriate burial practices were required to guarantee a smooth transition into the afterlife. A "proper" burial ensured that the deceased made this transition successfully, made certain that deceased spirits were not restless, and helped to reintegrate the survivors back into society (Hope 2000).

The period of mourning, known as the *feriae denicales*, began with the death of the individual

and ended after the ninth day. Pine or cypress branches were placed outside the front door of the house to advise other members of the community that a death had occurred (Lindsay 2000). Once the body was washed and prepared for burial, either by family members or by hired professionals for more affluent members of society, the body was then laid out for exposition in the home. For wealthier members of society, the display of the deceased and the funeral procession may have been an elaborate affair involving professional mourners and actors hired to wear the wax masks (*imagines*) of the deceased's ancestors and public eulogies in honor of the deceased in the forum (Flower 1996; Lindsay 2000). For a description of a Roman elite funeral procession, see Polybius (*Histories* 6.53–54). For the majority of people in the Roman world, however, the funeral procession from the home of the deceased to the grave or tomb was likely a more modest affair taken care of by the family.

The association of death with pollution and contagion also had an impact on the location of burials and tombs. Roman law dictated that burial had to occur outside the sacred boundary of the city (the *pomerium*), with the exception of a small number of elite members of Roman society who were buried within the walls of the city (Patterson 2000; Retief & Cilliers 2006). The tombs of aristocrats and their household members often lined the main roads leading into the city, such as those found along the Via Appia outside Rome and the Street of the Tombs outside Pompeii. Less wealthy members of society were buried in a variety of structures in cemeteries outside the city (see "Burials and Tombs," below), but these cemeteries were often not clearly defined (Hope 2000).

After the funeral ceremony, the participants consumed a meal, the *silicernium*, at the site of interment or cremation, and food and drink were also offered to the deceased. Food was an essential part of the transition of the deceased from the world of the living to the afterlife, and the ritual of feasting with the dead continued through annual festivals to commemorate the dead. After returning from the funeral, family members and other mourners had to be cleansed of the pollution associated with death with water and fire (the *suffitio*), and the house of the deceased had to be purified to once again reintegrate the survivors back into society. At the end of the 9 days, another meal (the *cena novendialis*) was held to mark the end of the mourning period and the reintegration of the mourners back into society. Some ancient texts also refer to the practice of sacrificing a sow to the goddess Ceres at the grave site so that the burial was legally considered a grave (Lindsay 1998; Erasmo 2008).

Inhumation

Inhumation involved placing the wrapped body either directly into the ground or inside a coffin for burial. If communal tombs were used, the individual might be placed inside a freestanding sarcophagus, interred in spaces along the walls, or placed in pits in the floor of the tomb. In order to have a proper burial, it was important for soil to be scattered over the deceased; otherwise, the spirit was trapped between the worlds of the living and the dead and would remain restless (Hope 2000; Graham 2006). Disturbing a burial or damaging a tomb was a criminal offense.

The burial or tomb was viewed as the house of the deceased, consistent with the belief in the afterlife and that the spirits of the deceased still required sustenance through regular offerings of food and wine, and a permanent place to reside (Patterson 2000; Wallace-Hadrill 2008). The deceased was typically buried with personal items or grave goods that would be of use in the afterlife, such as pottery vessels and oil lamps, although the quantity and quality of the objects would vary according to the gender, age, and status of the individual. The presence, absence, quality, or quantity of grave goods must be interpreted with caution, as changing patterns in burial contents may also be related to shifting attitudes toward the inclusion of grave goods on the part of those responsible for burial (e.g., asceticism). Literary sources from the fifth century BCE to the second century CE also describe the common practice of placing a coin in the mouth of the deceased to pay the ferryman, Charon, for transport across the river Styx to the underworld. The archaeological evidence, however, does not support the ubiquitous use of coins

in burials or the consistent placement of coins in the mouth of the deceased when present (Hope 2009). Coins are not found in all Roman burials, and when present, they are found in association with other areas of the body. Thus, the prescribed ideals for Roman burial ritual could be adapted or ignored depending on local customs and individual choice.

Cremation

Cremation of the dead involved transporting the deceased to the cemetery and burning the body in the location of the burial (*bustum*) or cremating the body in an area of the cemetery reserved for this process (*ustrinum*). In *bustum* burials, the individual was placed on a wooden pyre above the grave, and as the cremation progressed, the burnt remains and ashes would fall into the burial along with any grave goods that were placed with the body. The presence of *bustum* burials can be recognized archaeologically by the presence of cremated remains interspersed with ash and traces of carbonized wood (Fig. 1). These funerary pyres did not produce enough heat to fully incinerate the bones of the deceased, so carbonized bone fragments are typically present. Once the pyre had cooled, the remains were sprinkled with wine and the grave would be filled in by soil and/or covered by a more permanent tomb structure.

After the deceased was cremated in an *ustrinum*, the remains were sprinkled with wine and soil and then placed in a container that would eventually be interred in a columbarium or family tomb (see "Burials and Tombs," below). Remains of *ustrina* from the Roman period have been found associated with the mausoleum of Augustus in the Campus Martius and along the Via Appia outside Rome. The preparation and tending of the funerary pyre likely required specialized knowledge in order to ensure that the remains would be properly cremated and required the skills of a professional pyre burner (*ustor*) (Noy 2000; Graham 2006). An incomplete or partial cremation was considered an insult to the deceased and was potentially dangerous to the living because the deceased had not been properly laid to rest (Noy 2000). The ancient authors

Burial Practices and Tombs in the Roman World, Fig. 1 In situ cremation burial (*bustum*) showing carbonized wood and ash. Cremated bone is distributed throughout the burial and grave goods are in the foreground

Cicero and Varro describe the practice of removing a fragment of the body (*os resectum*) prior to cremation for later reburial, which is attributed to the requirement of symbolically burying the deceased to ensure a proper burial (Retief & Cilliers 2006). This ritual is often described in the literature on Roman burial practices, although obtaining archaeological evidence for this practice is unlikely due to the fragmentary nature of cremated remains and the uncertainty concerning where the body part, usually described as a finger bone, would later be deposited (Hope 2009). It has also been suggested that the body fragment would be placed in the urn along with the ashes (*ossilegium*) (Erasmo 2008).

Changing Patterns of Cremation and Inhumation in the Roman World

Ancient texts indicate that inhumation was the standard method of disposal of the dead in

pre-Roman Italy and that the practice of cremation slowly gained popularity between the fourth and first centuries BCE (Graham 2006). This burial custom was not universally adopted throughout Roman Italy and there is archaeological evidence that inhumation remained the predominant practice among local populations in southern Italy, possibly linked to the influence of Greek colonial inhumation practices in the region (Davies 1977). The persistence of inhumation may also have been related to the retention of indigenous cultural practices in response to Roman expansion, or it may simply have been due to financial considerations and the reportedly lower cost of inhumation. Cremation remained the predominant custom in urban centers such as Rome from the first century BCE through the second century CE, but beginning in the second century CE, inhumation regained popularity and became widespread across the Roman Empire (Graham 2006; Hope 2009). Recent explanations for the shift from cremation to inhumation after the second century CE have discounted the idea that this was linked to the spread of Christianity and was more likely the result of changing patterns in burial display and commemoration (Morris 1992; Graham 2006; Bodel 2008).

The Burial of Infants and Children

Writers from the Roman period advised parents to be stoic about the loss of very young infants since they were not yet fully integrated into Roman society. Infants less than 40 days old were to be buried in or around domestic buildings and those under the age of six months could not be cremated, although the assertion that Romans did not provide young infants with proper burials has recently been challenged by Carroll (2011). Archaeological and epigraphic evidence indicate that infants under one year of age are underrepresented in cemeteries from the Roman period, but this does not necessarily reflect a lack of concern or grief over the loss of a child (Hope 2009; Carroll 2011). Preservation of infant remains and the ability to recognize and recover the bones of young children, may also contribute to the underrepresentation of infants in the archaeological record (Norman 2010; Carroll 2011). It has also been suggested that the funerals of children were held at night, in part due to the association with death pollution and due to their marginal status in society (Hope 2009). Infants were sometimes buried in broken amphorae, interpreted as symbolic of the infant's return to the womb (Norman 2010). Older children were cremated or buried in a similar manner to adults and there are proportionally more funerary epitaphs to children over the age of one year, reflecting the increased emotional investment of the parents in older children and the public expression of grief at the loss (Hope 2009).

Maintaining Relationships with the Dead

The relationship between the living and the dead did not end after the burial rituals. There was an ongoing relationship between the living and the dead, consistent with the belief that the spirits of the dead could affect the living and the responsibility of surviving family members to maintain the burial or tomb. Regular visits to the grave would occur throughout the year to commemorate birthdays and the anniversary of the day the person died. The Roman festival of *Parentalia* (13th–21st of February) was held annually to honor the deceased members of the family. Food and wine (libations) would be offered at the grave site to share with the deceased, often through the presence of libation tubes inserted in the ground above the burial (Fig. 2), or food could be left on potsherds or at small altars at the grave site (Dolansky 2011). The consumption of food at the grave site is further attested archaeologically by the presence of dining benches inside or outside communal tombs, such as those found at the necropolis of Isola Sacra near the Roman port city of Ostia (Fig. 3). The festival of *Lemuria* took place on the 9th, 11th, and 13th of May each year when restless spirits returned to their homes and rituals had to be performed by the patron of the house to make the spirits leave. Burial was also a means of commemoration, and so tombs were not only for the dead but were also competitive expressions of status for the living to witness as they passed by.

Burial Practices and Tombs in the Roman World, Fig. 2 Libation burial with two curved imbrices inserted vertically in the soil above the burial cover

Burial Practices and Tombs in the Roman World, Fig. 3 House tomb with two benches (*biclinia*) for funerary banquets flanking the main door

Burials and Tombs

Single Burials

Simple inhumations – Poorer members of society were likely buried in simple pits in the ground or in a burial container like a wooden coffin or sarcophagus. The location of these burials may have been unmarked or indicated with a grave marker that could vary in size and permanence. Sometimes stone *stelae* marked the location of the burial, or more elaborate funerary altars were placed over the burials that were designed to resemble a sacrificial altar (Hope 2009). Fragmentary amphorae were sometimes reused in burial contexts to mark the location of a burial in a cemetery and also to act as libation tubes, such as those found outside the monumental tombs at the necropolis of Isola Sacra near Rome (Fig. 4).

Cappuccina burials – This was a common burial structure found throughout the Roman world in which the deceased would be placed in a simple pit or laid out on a series of large flat roof tiles (*tegulae*). The deceased was then covered by

Burial Practices and Tombs in the Roman World, Fig. 4 Amphora burial from the Roman necropolis of Isola Sacra

a series of paired *tegulae* inclined over the body in an inverted "V" shape, with the narrowest part of the burial at the top (Fig. 5). The ridge formed by each pair of tiles would sometimes be capped with curved tiles (*imbrices*) or fragments of pipe. The burial would then be partially or completely covered with soil.

Libation burials – Not all burials possessed libation tubes, but when present, they were simple pit burials, sometimes covered with a series of horizontal *tegulae*, and a terracotta tube or two *imbrices* were inserted vertically in the soil above the burial (Fig. 2). Cappuccina burials could also have libation tubes inserted into the soil above the grave.

Sarcophagi – Stone boxes with flat or gabled lids that were often elaborately carved with biographical scenes of the deceased, mythological scenes, hunting scenes, or representations of military conquests on the exterior, but the interior was usually left undecorated. This type of burial container gained popularity among wealthier members of society with the shift from cremation to inhumation in the second century CE and was usually placed inside larger monumental tombs (Morris 1992).

Burial Practices and Tombs in the Roman World, Fig. 5 Cappuccina burial from the Roman cemetery at Vagnari

Burial Practices and Tombs in the Roman World, Fig. 6 Interior wall of a tomb at Isola Sacra showing a series of niches for cremation urns

Cassone – Barrel-vaulted brick structures built directly above single inhumation or cremation burials, examples of which are found in the necropolis of Isola Sacra and the Vatican necropolis in Rome (Graham 2006).

Multiple Burials

Puticuli ("little pits") – There are a small number of references in ancient texts to the existence of mass graves outside the Esquiline gates in Rome that were used for the disposal of slaves and poorer members of society. Excavations in Rome by Rodolfo Lanciani in the nineteenth century reportedly revealed the presence of "hundreds" of these pits containing human and animal remains, although the archaeological evidence for these estimates has been called into question (Graham 2006). A critical examination of the archaeological and literary evidence reveals that the Esquiline pits were only used for a short period of time (i.e., between the third and second centuries BCE) and were likely not used as a normal mode of disposal for the poor in the city of Rome, but rather may have been associated with epidemics or other catastrophic events (Patterson 1992; Graham 2006). Horace refers to the presence of a graveyard scattered with bones on the Esquiline hill, which was eventually covered over by gardens in the first century BCE and may have been a cemetery for poorer members of society (Morris 1992; Bodel 2000). It has been suggested that cremation in public crematoria became the common mode of disposal of the urban poor during the Imperial period (Bodel 2000; Patterson 2000).

Columbaria – Communal tombs containing a series of niches intended to hold cremation urns (*cineraria*) that gained popularity in the first century BCE and staying in fashion through the second century CE (Morris 1992; Bodel 2008). *Columbaria* varied in size, from small family tombs (Fig. 6) to larger structures that contained hundreds of niches, and could be built above or below ground. These communal tombs could contain members of the patron's extended family, along with household members including slaves, freedmen, and their descendants (Patterson 2000). Funerary societies, called *collegia*, also existed to provide less wealthy members of society a means to ensure a proper funeral through regular payments to the society and guaranteed that members would be interred in communal *columbaria* (Toynbee 1971). These funerary clubs did not, however, replace the role of the family in the proper disposal of the dead but acted in cooperation with the family to guarantee a proper funeral and final resting place (Patterson 2000; Bodel 2008).

Catacombs – A form of subterranean collective burial in ancient Rome that gained popularity in the second century CE, following the gradual shift in burial practice from cremation to inhumation. This period also coincides with the emergence and spread of Christianity in the Roman world, but catacombs were not originally a Christian phenomenon and likely developed from earlier forms of subterranean burial chambers called *hypogea* (Morris 1992; Bodel 2008). The catacombs discovered outside the city of Rome are characterized by complex subterranean tunnels carved into the volcanic rock with niches lining the walls (*loculi*) for individual interments and the presence of larger chambers (*cubicula*). According to Bodel (2008), the criteria for identifying catacombs are independent entrances at ground level, space for large numbers of inhumations, and the capacity for extension of existing galleries to accommodate further burials.

Monumental tombs – The size and structure of monumental tombs varied according to the tastes and wealth of the owners, the competitive expression of social status, and changing fashions in commemoration. Masonry-built tombs varied in appearance from simple open-air tomb enclosures to a wide variety of tomb structures including houses, towers, temples, and pyramids (Toynbee 1971; Hope 2009). From the first century BCE through the second century CE, these communal tombs were in fashion, and the tombs of elite members of society often lined the main roads outside the city. Tombs from the Republican period were mainly constructed for members of the immediate family, but in the Imperial period they included members of the extended family, their slaves, and freedmen (Patterson 2000).

House tombs, like those found at the necropolis of Isola Sacra near Ostia, are rectangular roofed structures with doorways, windows, internal decoration (e.g., mosaics and frescoes), and some with benches for funerary banquets (Hope 1997). Earlier tombs contained small niches for funerary urns, consistent with the preference for cremation up to the second century CE, while later tombs also contained spaces in the walls for inhumations (*arcosolia*) and others contained spaces underneath the floors (*formae*) for additional burials.

According to Toynbee (1971), circular tombs found in Roman Italy likely developed from the Etruscan tumuli found near Rome. The most famous example of a circular tomb is the mausoleum of Augustus located in the Campus Martius in Rome, characterized by a series of concentric walls surrounding a central chamber. The structure was covered by an earthen mound and a statue of Augustus was on the top of the mound (Toynbee 1971; Hope 2009). Other famous examples of circular tombs include the tomb of Caecilia Metella, the *tomba rotunda* of Lucilius Peto, and the mausoleum of the emperor Hadrian, more commonly known as Castel Sant'Angelo.

International Perspectives

Systematic and comprehensive excavation of urban and rural cemeteries found on Roman period sites will help to identify variability in patterns of burial and commemoration. In addition, better integration is needed between epigraphic evidence (when present), the analysis of burials and their contents, and the osteological analysis of the people buried within. Excavation and analysis of burials should be undertaken by archaeologists and/or bioarchaeologists who are trained in the identification of human remains, particularly the recognition of small, delicate infant remains, so that the maximum amount of information can be obtained from each burial. This will help to provide a more nuanced understanding of differences in burial treatment and attitudes toward the dead based on variables such as age, gender, and health (e.g. Gowland & Redfern 2010; Prowse 2011).

Future Directions

Much of what we know about the burial practices and tombs in the Roman world comes from literary evidence and monumental tombs associated

with large urban centers like Rome and Pompeii. What ultimately happened to the enslaved and poor after death is not fully resolved, particularly with respect to the existence and role of *puticuli*, and what we know about these mass graves is cited mainly from one nineteenth century source. Continued research on the burial treatment of traditionally underrepresented members of Roman society (i.e., women, children, and slaves) will contribute to a greater understanding of burial practices and commemoration of different segments of ancient Roman society.

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Cremation in Archaeological Contexts
- ▶ Demography of the Ancient Roman World
- ▶ Ethics and Human Remains
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Tombs, Etruscan
- ▶ Tombs, Greek (Iron Age)

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Burke, Heather

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Basic Biographical Information

Heather Burke (Fig. 1) received her Bachelor of Arts with First Class Honours from the University of New England, Australia, in 1987. She studied for her Ph.D. under the supervision of Iain Davidson and Graham Connah and was awarded the Doctor of Philosophy (Archaeology) from the University of New England in 1997.

In 1988, Dr. Burke started her practicing archaeological career as the Acting Yengo Archaeologist for the NSW National Parks and Wildlife Service. After that she became a tutor with the Department of Archaeology and Paleoanthropology at her alma mater, the University of New England, from 1988 to 1991. She worked throughout New South Wales, the Northern Territory, and Queensland, serving as an Assistant Regional Archaeologist for the NSW National Parks and Wildlife Service (1990–1991), a private archaeological consultant (1991–2000), and a senior archaeologist for Gordon Grimwade & Associates, Yungaburra (2000–2002). Dr. Burke joined the Department of Archaeology at Flinders University in South Australia in 2002. Currently, she is an Associate Professor and the Graduate Program Coordinator.

Burke, Heather, Fig. 1 Heather Burke

Dr. Burke's research interests range from European constructs of cultural landscapes to women in historical archaeology and the archaeology of World War II. She has also conducted long-term fieldwork with Claire Smith in the Barunga region of the Northern Territory. Dr. Burke's professional and community engagement projects show her passion for these research interests and have included excavations at the Repatriation General Hospital in Adelaide and at historical sites in Penola and Mallala, South Australia. Her excavations have

provided communities with valuable information about their local history and archaeology and numerous students with meaningful learning experiences.

Dr. Burke's commitment to her students and their future careers is a shining light in the Department of Archaeology at Flinders University. Her dedication to her teaching profession has been recognized in several awards, most notably the Flinders University Vice Chancellor's Award for Teaching, Flinders University, Team Category, with Claire Smith, and the national Carrick Award for Teaching Excellence, Team Teaching.

Major Accomplishments

Dr. Burke's accomplishments in archaeology lie in three areas: in her research as a theoretically sophisticated and community-oriented historical archaeologist; in service to her profession through administrative roles, such as editing and conference convening, that have allowed peers and young scholars to flourish; and in her contributions as an outstanding teacher, who has developed world-leading graduate programs in professional archaeology (Fig. 2).

Dr. Burke's research publications on the links between style, class, and identity have made major theoretical contributions to underrepresented and under-theorized areas of historical archaeology. Her authored book *Meaning and Ideology in Historical Archaeology* (Burke 1999) undertook landmark investigations of the construction and maintenance of capitalist ideologies in rural Australia:

> The theoretical sophistication of the study is admirable, and it should serve as a model for research in other parts of the world . . . The study of capitalism challenges archaeologists and thus it is impressive when a scholar successfully rises to this challenge. Meaning and Ideology in Historical Archaeology meets this challenge and should be read by any scholar interested in understanding capitalism (McGuire 2001: 172-73).

Dr. Burke also publishes in the areas of Indigenous contact and social archaeology. The edited volume *Kennewick Man: Perspectives on the Ancient One* (Burke et al. 2008) redressed a lack of Indigenous views on one of the most contentious topics in modern archaeology in the United States. This book canvassed a range of responses from Indigenous and non-Indigenous archaeologists, judges, anthropologists, tribal elders, students, and specialists over the landmark legal struggle for control

Burke, Heather, Fig. 2 Heather Burke working with children at Barunga School, Northern Territory, Australia

over one of the oldest skeletons in the US Pacific Northwest.

Dr. Burke's contributions to her profession are evident in the administrative and organizational roles she has held within her career. These roles can be roughly divided into conference organization and editorship. Dr. Burke's conference organization includes being Program Chair for the Fifth World Archaeological Congress (WAC-5), held in Washington, DC, in 2003; the 1997 Fulbright Symposium ("Indigenous Cultures in an Interconnected World"), at the Museum and Art Gallery of the Northern Territory, Darwin; the "Women in Archaeology" conference at the University of New England, NSW, Australia; and the World Archaeological Congress symposium "Cultural Heritage and Intellectual Property Rights," held in Burra, South Australia. Her editorial service to the profession includes being coeditor of *Australian Archaeology*, the journal of the Australian Archaeological Association, and series editor for two international book series: the *Global Cultural Heritage Handbooks*, published by Springer, and *Worlds of Archaeology*, published by Alta Mira Press.

Dr. Burke's teaching is characterized by intelligent innovation. Her teaching innovations include the development by undergraduate classes of online and community accessible databases that provide a unique source of primary information for the wider community that exists nowhere else and experiential learning through role-playing as archaeological theorists (see Smith & Burke 2005) and elegant Victorian-era tea parties. Dr. Burke's major publication in relation to teaching innovation is the edited volume *Archaeology to Delight and Instruct* (Burke & Smith 2007). This volume was an attempt to take Horace's philosophy that the purpose of literature is to "delight and instruct" and apply it to the teaching of archaeology at a tertiary level. The contents explore ways to integrate the formal process of teaching archaeological theory with the potential to have fun in a university classroom.

Dr. Burke's commitment to ensuring standards of excellence in the field practice of archaeology has manifested in two principal ways. The first way is through her publications, notably the *Archaeologist's Field Handbook* (Burke & Smith 2004), which provided the first comprehensive field manual for archaeologists in Australia in almost 20 years, and *Digging It Up Down Under: A Practical Guide to Doing Archaeology in Australia* (Smith & Burke 2007), written to make the processes of doing archaeology in Australia transparent and to engage archaeologists in cross-cultural discussion of their roles as heritage managers. The *Archaeologist's Field Handbook* won the White Bequest Award from the Australian Academy of the Humanities. The success of this manual was furthered in an international context through regionally specific editions, published for the United States (Burke et al. 2009) and Spain (Domingo Sanz et al. 2007). The second way in which Dr. Burke has engendered excellent standards in the field archaeology has been in her role as Head of the Department of Archaeology at Flinders University in the development of a Master of Archaeology and a Master of Cultural Heritage Management. These programs are embedded with industry partners and have provided unprecedented industry-engaged training for cultural heritage practitioners. They have become the premier graduate training programs in Australia.

Dr. Burke is a community archaeologist with a serious commitment to engaging the academy with industry and community groups so that the advantages of a university system can also benefit wider society. Her success in archaeology, commitment to her students, and contributions to the field of archaeological education in Australia are inspiration to her students at Flinders University and to the communities in which she has been involved during her archaeological career.

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▶ Smith, Claire
▶ World Archaeological Congress (WAC)

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Burned Remains in Forensic Contexts

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Introduction

Burned human remains may be found in a variety of contexts (Fairgrieve 2008, 2010; Schmidt & Symes 2008). Such remains recovered from a "forensic context" have relevance to a legal inquiry as do cases where a death is suspicious must be investigated. In many countries, legislation is in place which states that any death that is not attended by a physician must be investigated (e.g., in the Province of Ontario, Canada, see the Coroner's Act; RSO 1990 c. C.37, s.31). Under such an investigation the investigative authorities attempt to answer the following five questions:

1. Who the deceased was?
2. How the deceased came to his or her death?
3. When the deceased came to his or her death?
4. Where the deceased came to his or her death?
5. By what means the deceased came to his or her death?

Burned skeletal remains may be difficult to locate, recover, analyze, and interpret. For example, remains associated with mass disasters, such as plane crashes, train derailments, domestic fires, and even automotive collisions, are often highly fragmentary, and commingled with other individuals and other items at the scene. The recovery, documentation, and identification of these remains may provide further evidence of the cause of death and have serious implications for the interpretation of the scene. A multidisciplinary approach to the processing of these scenes is without question the best practice.

Burned remains may be found in clandestine contexts. The use of fire to dispose of remains is not a new concept. It has been practiced in a variety of cultures over thousands of years (Fairgrieve 2008). Given enough fuel and time, a perpetrator may eliminate all of the soft tissue leaving only bones and teeth. This material may be intentionally broken and crushed in order to fragment the remains further. These remains may be subsequently moved to another location or buried.

The discovery and recognition of burned human bone is clearly a challenge, regardless of the context. There are many issues when it comes to processing such scenes. It is necessary for the forensic anthropologist to have a clear understanding of how bodies burn and how various soft and hard tissues are altered by fire. Hence, precautions regarding the recovery, documentation, and understanding the limits of an analysis are outlined below.

Key Issues

Burning of Soft and Hard Tissues

Fire consists of heat and light that is generated by an oxidation reaction (DeHaan 2002). This process, known as flaming combustion, is the gaseous combination of a fuel (tissues of the body) and an oxidizer (oxygen). Although the full mechanics of how fuel, heat, air (oxygen), and an uninhibited exothermic chemical chain reaction all combine to result in a sustained combustion reaction is beyond the scope of this entry, it is sufficient to note that there is a chemical breakdown (pyrolysis) of the molecular structures of a fuel that results in the production of vapor, gases, and a residual solid (char). The heat converts the mass of the fuel into a form that can be ignited and a sustained combination may ensue if appropriate proportions of oxygen are present.

The combustion of a human body is not an even process. A body consists of soft tissues of varying thickness and densities over bone. Therefore, some areas with bones closer to the surface, such as the neurocranium, will have the soft tissue eliminated prior to that of the abdominopelvic cavity. In general, the tissues of a body pass through the clinically defined degrees of burning (e.g., 1st through to 5th degree burns). When the burning process has proceeded to the point at which bone is being burned directly, such burns are said to be either fourth degree or fifth degree (DeHaan 2002). Prior to this state the superficial layers of the skin initially blister (a separation of the epidermis from the underlying dermis). The layers of skin contract due to the dehydrating action of the fire. Large fissures open in the skin, exposing the fatty hypodermis. With the consumption of fat, muscle is then directly charred and burned. The heating of the muscle tissues causes a contraction, and the larger flexor muscles overpower the typically smaller extensor muscles resulting in the flexion of various joints of the body, particularly in the appendages and the posterior of the neck. The bending of the arms and the fingers of the hands are said to mimic the stance of a boxer, referred to as the "pugilistic pose."

The clinical scale for degrees of burning is not sufficient for describing the state of burned human remains in forensic contexts. The Crow-Glassman Scale (CGS) remedies this situation and reflects a systematic pattern of burning (Glassman & Crow 1996) (see Table 1 below for the full scale).

The differing levels of the CGS also serve to describe the inherent difficulties in processing scenes with burned human remains. These range from the recognition of the remains to the collection of bones and teeth when a body has reached CGS 5. The CGS also reflects the fact that the body does not burn evenly. The head and the appendages will burn and eventually fall away from the body after having assumed the pugilistic pose. Meanwhile, depending on the amount of subcutaneous fat, and the presence of clothing, the torso of the body will burn starting with the ribs and the spinous processes of the vertebrae. The body position and location, in relation to other objects, may hinder the burning of the body. This is why the context of the body is of such importance.

The time that it takes to burn a body to CGS 5 is variable. There is a distinct difference between a body burning in a confined space (a house) and an open space (an outdoor fire pit). House fires can easily expose a body to temperatures between 670°C and 810°C and after approximately 10 min and may exhibit the "pugilistic pose" (Bohnert et al. 1998). At 20 min, the vault of the skull is free of soft tissue and the outer table may have fissures. At 30 min, the body cavities are visible and a further 10 min of exposure results in shrunken internal organs. At approximately 50 min, the extremities have been rendered to bone and fallen away from the body and may be difficult to discern from the related debris around the body. Beyond this, the remaining torso of the body is further consumed down to calcined bone. The entire process, at the stated temperature range, may take 2–3 h.

Microstructural and Ultrastructural Alterations

Once the soft tissue is eliminated, the exposed bone will also undergo heat-induced alterations.

Burned Remains in Forensic Contexts, Table 1 The Crow-Glassman Scale (CGS) of burn injury to human remains (Glassman & Crow 1996)

CGS level	Description
1	Burn injuries characteristic of typical smoke death. The body may exhibit blistering of the epidermis and singeing of the head and facial hair. Recovery of the body is similar to that for other victims not involving burn injury. The body is recognizable for identification at this level
2	The body may be recognizable, but most often it exhibits varying degrees of charring. Further destruction of the body is limited to the absence of elements of the hands and/or feet, and possibly, the genitalia and ears. Additional search near the body is warranted for recovery of the disarticulated elements. Identification is made, most often by the collaboration of the medical examiner and a forensic odontologist
3	Further destruction of the body is demonstrated by missing major portions of the arms and/or legs. The head is present at this level, although identity is not evident. The search area for associated disarticulated remains should be widened. A forensic anthropologist should be included to facilitate successful search and recovery procedures at the death scene. Identification is coordinated by a medical examiner, who may require the aid of a forensic odontologist. If needed, a forensic anthropologist may be called on to determine sex, age, race, etc., from the skeleton
4	The skull has fragmented and is absent from the body. Some portions of the arms and/or legs may still remain articulated to the charred body. Search and recovery should be aided by a forensic anthropologist, using systematic bioarchaeological methods, including screening procedures to locate small body fragments and dental elements. Identification is coordinated by a medical examiner using a forensic anthropologist and an odontologist as consultants as needed
5	The body has been cremated and little or no tissue is present. The remains are highly fragmentary, scattered, and incomplete. A forensic anthropologist should be an on-site consultant for the identification and recovery of cremains. Personal identification is most difficult at this level, and a forensic anthropologist may be best trained to interpret cremains for identifying physical attributes of the deceased. Recovery of dental elements will require the expertise of a forensic odontologist. As with all fire deaths, a medical examiner is, most likely, the designate to coordinate consultant activities

Again, the burning process of bone dehydrates the bone tissue and consumes the organic portion of the bone and even alters the microstructure of the hard matrix. This can result in a color change, splitting, and warping. The color of burned bone may be interpreted in a variety of ways (Fairgrieve 2008: Table 3.5). However, a range of colors exhibited on the same burned bone may be the result of the fuel load, oxygen availability, and contact with other substances, such as metals. The range of color exhibited by burned bone will depend on the temperature reached by the bone, and the duration of time at that temperature. Initially, the bone is a light amber color. The organic components of the bone remain (Fairgrieve 2010). As the process continues, the bone will begin to blacken; the periosteum is burned away and the organic constituents of the bone, including the marrow begin to be consumed. The black color of the bone indicates that the bone has reached a temperature of approximately 300°C and the lamellar microstructure of the bone persists (for a review see Holden et al. 1995).

A gray color is attained once the bone temperature reaches at least 600°C. The organic portion of the bone has leached out at this stage. Microscopic spherical-type crystals are formed (Holden et al. 1995). With further exposure to the heat, these crystals change their shape and size. The organizational structure of lamellar bone is broken down. However, bone collagen has been found in bone reaching temperatures of 600°C (Walker et al. 2008). With further heating, the bone will transition to a blue-gray appearance that may ultimately yield to a final white color. This occurs when the bone has attained a temperature of at least 800°C. The crystals are now hexagonal, and there is no discernible lamellar pattern (Holden et al. 1995).

Along with these microstructural changes there are associated ultrastructural changes beyond the color changes. With the consumption of the organic portion of bone there is a concomitant reduction in the bone's dimensions (length and caliber). Such changes will affect any metrical analysis of skeletal elements. Therefore, it is generally not recommended to take metrics

of burned bones if they are to be used in aging and sexing. However, in order to interpret the presence of any pre-incineration fractures, it is essential that heat-induced fractures be clearly understood.

Heat-induced fractures can be broken down into five general types. *Patina* fractures occur on the surface of a bone. The intersecting surface fractures do not penetrate to the medullary cavity. *Longitudinal* fractures follow the long axis of a long bone and may penetrate the medullary cavity. Such fractures follow the longitudinal orientation of the collagen fibers parallel to the cylindrical osteons. *Curvilinear (or curved transverse)* fractures extend around the bone from one side to the other. *Transverse* fractures are perpendicular to the longitudinal axis of the bone and tend to penetrate through the medullary cavity and may even divide the bone into proximal and distal portions. *Delamination* fractures appear as a superficial peeling or flaking of bone from a deeper layer of cortical or cancellous bone.

To distinguish the aforementioned heat-induced fractures from peri-mortem trauma, it is necessary to reassemble the pieces and observe the overall fracture pattern. This way heat-induced fractures may be distinguished from tension, compression, and shearing fractures (Mayne 1990). The color of the fracture margins, relative to those that are heat-induced, may assist in the analysis. Additionally, pre-incineration, penetrating trauma, to the cranial vault, will result in the venting and burning of fluid that is forced out of the vault at that location. This discoloration also indicates the orientation of the head during the burning process (see Fig. 1).

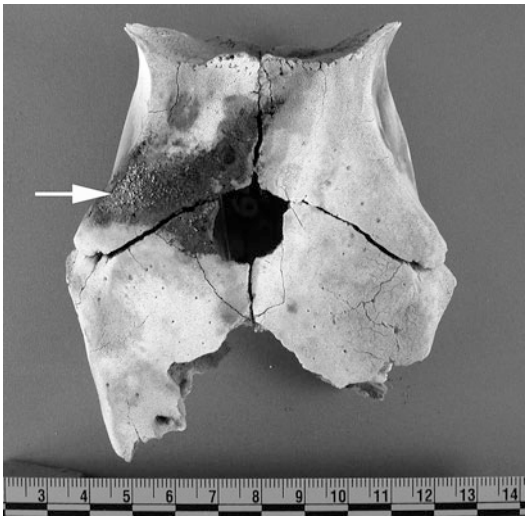

Burned Remains in Forensic Contexts, Fig. 1 The *arrow* indicates charred residue of material that is the result of venting at the time of burning of a pig (*Sus scrofa*) skull (posterior at *top*). In this case, the presence of venting is evidence of a pre-incineration opening in the skull. The pig was lying on its right side

Recovery Issues

In forensic contexts, the issues that pertain to burned human remains are similar to those found in archaeological contexts. These issues include the detection, recording, collection, analysis, and interpretation of the remains. Ultimately this process leads to producing a report that meets the needs of investigators and the courts.

The detection of burned remains may be quite simple. Burned human remains may be obvious as a darkened mass within the debris being observed. However, in cases that have remains buried under large amounts of debris, a systematic approach to searching the scene, such as superimposing a grid and proceeding square by square through each level of the debris, will yield the best results.

In certain instances, the use of alternate light sources may be used. Bones and teeth will fluoresce when exposed to light at the violet-blue-green region of the spectrum and viewed through an orange barrier filter (Craig & Vezaro 1998). Calcined bone is not likely to fluoresce with any combination of light and barrier filters, however, burned bones have been found to appear dark purple when exposed to a light of 450 nm (nm = nanometers) when viewed with a yellow barrier filter (Mavin 2001). This may be helpful as the body will burn unevenly and may be at intermediate stages depending on the duration of the burn. Other items in the debris may also fluoresce.

The use of human remains detection (cadaver) dogs is a common practice. Such dogs may be valuable in detecting burned human remains. However, the use of dogs is no substitute for a systematic search as dogs have been known to give false positive indications as to the presence of remains. In all cases, confirmation of positive indications is essential (Fairgrieve 2010).

The documentation of the location and position of burned bone will be more productive if one recalls that the bones of the victim will be found in relative anatomical order unless they have been moved. The position of the remains must be considered in both the vertical and horizontal planes. Remains found in direct contact with the basement floor with debris on top indicate that the victim was in the basement at the time of the burning. Whereas, a victim's remains positioned between debris indicate that their original position was on an upper floor of the house. It is ideal to use computerized survey equipment during the recovery of remains at most scenes. This evidence may refute or corroborate witness and suspect statements.

Burned remains that have been moved out of relative anatomical position may have been subjected to taphonomic forces (Haglund & Sorg 1997). Natural phenomena, such as gravity, can cause the remains to fall through the superstructure of the house, altering their position. However, a perpetrator may have dismembered a body and then burned the remains. Another artificially induced change may come from the recovery process itself. Careful examination of the remains to explain all marks is necessary for a successful analysis.

Analytical Issues

Analytical questions are no different than those of unburned remains. The obvious difficulty is with the fragmentary state of the remains and the friable nature of the bones. This means that the analysis has the potential to be highly limited. However, cataloging all identifiable skeletal elements can yield a minimum number of individuals, as can an overall weight of the remains recovered.

The repair and reconstruction of fragments is done to facilitate the analysis of fracture patterns. The margins of fractures may have been degraded to the point where a physical mend is not possible. However, all mended bones must be photographed both individually and collectively. An overall photograph of the mended bones in relative anatomical order can be a useful visual aid in court. This will also aid in the analysis of fracture patterns and burn patterns.

Age, sex, ancestry, and even stature may be possible to discern from burned remains. However, as fire alters the dimensions of a bone, this must be considered when applying metrics to an analysis (Thompson 2004). As a result, the reliability of analytical methodologies may be called into question.

The analytical goal is to lead to a positive identification of the victim. The remains may be complete enough to use in a comparison of antemortem and postmortem radiographs. DNA may be recovered from burned tissues, in order to arrive at an identity (e.g., Williams et al. 2004). Burned dental remains, such as tooth roots and crowns, may be very helpful in establishing a positive identification (Hardy 2007).

The identification of trauma is a central issue in the analysis of burned skeletal remains. As noted above, the analyst must differentiate heat-induced fractures from traumatic fractures that have occurred antemortem, perimortem, and even postmortem. Fractures without healing are usually classified as perimortem. However, when a non-burned bone is broken after the soft tissue has decomposed, and the bone is dry, there is a color difference between the break and the surface. This can be discerned in burned bone if it is broken after the fire, and the color of the inner bone tissue differs from the exterior. In the case of a bone exhibiting differential burning, the variation of the color of the bone must be considered carefully in order to interpret the nature of the fracture. Generally, fracture margins that are the same color as the adjacent surface usually indicate that the fracture was present at the time of burning. Bones burned to a calcined (white) state tend to be highly

fragmented and uniform in color. Hence, determining the relative timing of the fracture may not be possible.

Future Directions

The recognition and analysis of burned human remains in forensic contexts pose various challenges. Knowledge of the uneven burning of a body can assist in the documentation, recovery, and interpretation of the remains. Standard osteobiographical analysis may be limited depending on the state of the burned remains. However, it may be possible to derive the age, sex, and ancestry with such remains. Additionally, a positive identification from the remains, including dental remains, may not be precluded in such cases. The successful outcome of an analysis is dependent upon the documentation and recovery at the scene. Understanding how a body burns is essential to the interpretation of the state of the remains.

Future research directions tend to be in the area defining criteria for the diagnosis of trauma from burned remains. Such new studies include attempts at examining the effects of fire on dental tissues. By defining criteria for the diagnosis of trauma from burned skeletal remains, the analysis will conform to the standards that are currently being demanded by the courts.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Bone, Trauma in
- ▶ Cremation in Archaeological Contexts
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Sex Assessment
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology

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Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)

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Introduction

The Australia ICOMOS *Burra Charter* was first adopted in 1979, in the historic mining town of Burra Burra in South Australia. Since then – with amendments – the Charter has provided guidelines for cultural heritage management in Australia to ICOMOS members, heritage agencies at all levels of government, and planning bodies. ICOMOS, the International Council on Monuments and Sites, is the international non-government professional organization primarily concerned with the philosophy, terminology, methodology, and techniques of conservation for places of cultural significance. ICOMOS is also an advisor on the UNESCO World Heritage and Intangible Cultural Heritage Conventions and has 100 national committees and 27 specialist committees (see www.icomos.org). Australia ICOMOS is a national committee founded in 1976, now with some 500 members.

The *Burra Charter* reflects an Australian understanding of heritage place conservation practice, and amendments to the Charter over time have incorporated a widened and deepened professional understanding of heritage issues. Widely regarded as best practice, the Charter has been endorsed and accepted by all levels of government in Australia. The *Burra Charter* has also been adopted, adapted, and applied in other countries in all continents. This entry provides an outline of the Charter, its principles and processes, and changes to it over time.

Definition

The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance provides guidance for the conservation and management of places of cultural significance. The full text of the Charter is online at http://australia.icomos.org/wp-content/uploads/BURRA_CHARTER.pdf. The *Burra Charter* provides a series of principles and a conservation management process setting a standard for practice for those working in cultural heritage management – primarily heritage places – and related objects, with both tangible and intangible values.

The *Burra Charter* includes definitions, conservation principles and process, and practice (Articles). The Conservation Principles (Articles 2–13) form the basis for the process to be undertaken when making decisions about heritage places as shown in the chart below (Australia ICOMOS 2000: 10). A key principle in the Charter is that the cultural significance of a place is the basis for decisions on managing the place (Article 6.2). Cultural significance is interpreted as having key values for past, present, or future generations (Article 1: 2), namely, *aesthetic*, *historic*, *scientific*, and *social*, with *spiritual* added in 1999. These values are explained further in the guidelines to the Burra Charter: Cultural Significance (Australia ICOMOS 2000: 11–3). The Charter insists that such values may be held by different groups in societies and may conflict, yet should be recognized and respected (Article 13).

A core principle when making decisions about a place assessed as having cultural heritage significance is to take a cautious approach: "changing as much as necessary but as little as possible" (Article 3). Other key principles inherent to the *Burra Charter* are found in Articles 2–13, as summarized by Walker (1996):

There are places worth keeping because they enrich our lives – by helping us understand the past; by contributing to the richness of the present environment; and because we expect them to be of value to future generations.

The cultural significance of a place is embodied in its physical material (fabric), its setting and its contents; in its use; in the associated documents; and in its meaning to people through their use and associations with the place.

The cultural significance of a place, and other issues affecting its future, are best understood by a methodical process of collecting and analysing information before making decisions.

Keeping accurate records about decisions and changes to the place helps in its care, management and interpretation.

The Burra Charter's section on the conservation process (Articles 14–25) refers to more than physical conservation, but the entire range of decisions made including retention of reintroduction of use to reconstruction, adaptation, and interpretation (Article 14). Associations between people and place are to be respected, and opportunities taken for the meanings of place be not only maintained but revived where possible (Article 24). Following the Charter's conservation process in undertaking the relevant research and assessments can better guarantee that decisions about the heritage place are well informed and guided by heritage significance. The following chart demonstrates the *Burra Charter* Conservation Process (Fig. 1):

The *Burra Charter's* section on conservation practice (Articles 26–34) provides some practical guidelines for the hands-on process once cultural significance is established, physical conservation issues identified, and external factors such as planning, zoning, and other statutory considerations. Matters such as dealing with disturbing or removing physical elements and recording all decisions and changes are important when affecting any change to a heritage place. In doing so, key definitions in the Charter enhance understanding and decisions regarding what actions are appropriate for each individual heritage place, particularly in Article 1:

1.4 *Conservation* means all the processes of looking after a place so as to retain its cultural significance.

1.5 *Maintenance* means the continuous protective care of the fabric and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction.

1.6 *Preservation* means maintaining the fabric of a place in its existing state and retarding deterioration.

1.7 *Restoration* means returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

1.8 *Reconstruction* means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric.

These definitions clarify the different decisions that can be made and when they are applicable given the potential impacts on the cultural significance on the place, depending on the nature of the heritage values found. Potentially a place where the fabric is of little significance compared to its use and association with the community may be rebuilt as a new structure yet maintain a continued use; whereas another place's significance may reside in its architectural style, therefore to be retained, yet possibly with a quite different use.

Exemplars of best cultural heritage conservation practice have been presented in *The Illustrated Burra Charter*, both in 1992 updated after the 1999 changes to the Charter (Marquis-Kyle & Walker 1992; Walker & Marquis-Kyle 2004). They provide a useful array of situations and issues in heritage management and how such can be resolved by applying the Burra Charter principles and processes. These publications are not available online, but can be purchased from Australia ICOMOS.

Current Debates and Future Directions

Conservation of Places of Cultural Significance, although generally referred to as the "Burra Charter." In 1999 not only were several amendments

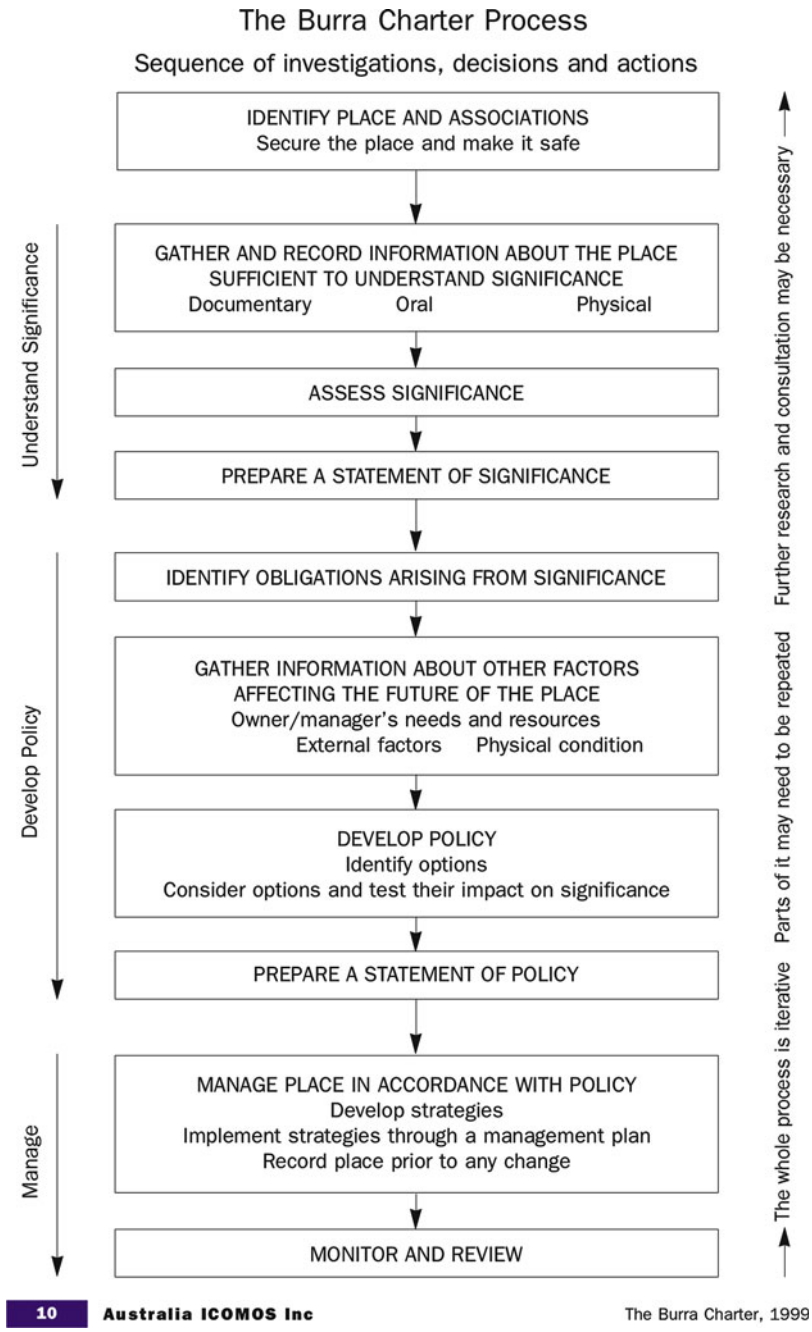

Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999), Fig. 1 The conservation process (Australia ICOMOS 2000: 10)

passed, but a name change was also adopted: *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. This is not merely a semantic change but reflects a widened as well as deepened comprehension of heritage places, their values, and associated conservation management issues. While previous amendments in 1982, 1984, and1989 had been relatively minor (these can be found at http://australia.icomos.org/publications/charters/), those adopted in 1999 after five years of member consultation show a greater shift. The name change reflects a move

from a focus on purely physical conservation to a broader engagement to sustaining cultural heritage places for all their values, whether expressed in their physical structure or intangibly.

The 1999 amendments resulted in the greatest shifts to its text. The key changes (beyond the change of title) related to the following (see Truscott & Young 2000 for more information):

- A broadening of the understanding of what is cultural significance, not only fabric of a place but its use, associations, and meanings, particularly to relevant community groups (Articles 1.2, 12, 26.3).
- The coexistence of values, particularly perhaps in a multicultural society such as Australia; this also reflects the Australia ICOMOS Code on the Ethics of Co-existence in Conserving Significant Places, adopted in 1998 (Australia ICOMOS 2000: 20–1).
- Reference to interpretation, that the previous Charter had been silent on; it was recognized that interpretation is important and also that restoration and reconstruction are acts of interpretation (Articles 1.17, 25).
- An expanded preamble to make the document more approachable, with a statement about a rationale about "why conserve?"
- Changes to Article 2 to provide an obligation to conserve and a recognition that conservation is an integral part of good management, arguing that only when conservation is included in other aspects of managing a place will there be satisfactory outcomes.

The review of the Burra Charter that led to the 1999 amendments was in some ways fraught, showing up differences in perceptions of the charter. Some members and heritage practitioners tended to apply the Charter to the letter, in its literal content, others in terms of its intent or spirit. A major conflict occurred in the proposed adoption of the changes in 1997, and the working group went back to a greater consultative process that resulted in an almost unanimous adoption of the amendments at its meeting in 1999 (Truscott & Young 2000).

Australia ICOMOS has a commitment to ongoing review and update to reflect changes in heritage practice. This is unlike the ICOMOS *Venice Charter* (the International Charter for the Conservation and Restoration of Monuments and Sites, see www.international.icomos.org/charters/venice_e.pdf). The Venice Charter has not been changed and in 2004 ICOMOS decided to keep it as an original doctrinal text (see Pécs Declaration: www.icomos.org/venicecharter2004/pecsdeclaration.pdf).

Currently, the Burra Charter is again being reviewed, with proposed amendments expected to be submitted to the membership for comment later in 2013. The guidelines that were not updated in the 1999 amendments are also being updated (Australia ICOMOS 2000: 11–9). Over a decade after the 1999 *Burra Charter* was adopted, the amendments are expected again to reflect changes in perceptions of heritage and practice in its conservation. The amendments will hopefully provide guidance as to how to practice heritage conservation in a way to ensure those changes are incorporated. It is likely that they will include a greater inclusion of community interests and how to balance these with best physical conservation; an appreciation that "experts" and community members have different perceptions of what is important; and a more integrated approach to place, landscape, and the wider environment.

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

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Burrup Peninsula

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Introduction

The Burrup is a region of Northwest Western Australia known for its petroglyphs, stone arrangements, stone quarries, shell middens, and other archaeological sites (Bird & Hallam 2006). In an area of about 100 km^2, it has been estimated that there are between 0.5 million and 1 million petroglyphs, some of extraordinary beauty (e.g., Fig. 1), carved on natural blocks of hard granophyre and gabbro. The area is on the Australian National Heritage List (McDonald & Veth 2009), and the case has been made for World Heritage nomination.

Definition

The Burrup is the name given to that part of the Dampier Archipelago which was formerly called Dampier Island. Large concentrations of petroglyphs have been found in many islands of the archipelago. The name change was a consequence of the establishment of several heavy industries in the region (against growing opposition from rock art specialists). The establishment of a salt industry replaced the wetlands that had separated Dampier Island from the mainland and established it as a peninsula – the Burrup.

Key Issues/Current Debates/Future Directions/Examples

History of Industry Impacts on the Cultural Heritage

Aboriginal people generally avoid the peninsula because of the history of massacre in the nineteenth century, but historically, they continued to use it for ceremony, for sheep pastoral activities because of the good water, and as a base for collecting shells. During these activities, elders explained the images to their young people. As a result, present-day Aboriginal people of the Ngarluma (including the Wong-goo-tt-oo, the Coastal Ngarluma), Yindjibarndi, Mardudhunera, and Yaburara recognize the importance of the images which were made by the *Marga* ancestors (Palmer 1975), including ongoing connections to rock art traditions further inland.

Since the 1960s, Western Australian Governments (of all political leanings) have encouraged the development of heavy industry in the region. Before the Western Australian Government (W.A.Govt.) passed the Aboriginal Heritage Act 1974 (AHA) (which offers the possibility of slight protection for heritage), there was a search for a port site in the region for shipping iron ore. This survey suggested that Dampier Island was a better option than Depuch Island, 100 km east of Dampier where petroglyphs had been known since the visit of HMS Beagle in 1840 (Wickham 1842), because a cursory survey had concluded (erroneously) that the petroglyphs on Dampier Island "do not form such a rich display" (Ride et al. 1964). According to anecdotes, when the port was established, there was substantial destruction of petroglyphs without documentation. Further, recent scientific studies of the threats from

Burrup Peninsula, Fig. 1 Four Ibis from Gum Tree Valley (Photo: Iain Davidson)

industry (Sinclair Knight Merz 2009) to the petroglyphs have shown that there is little threat, but the continuing presence of the port has left the petroglyphs vulnerable to ongoing damage from the presence of particulate iron ore dust in the atmosphere. Chemical concentrations in the atmosphere were all low, lower than those recorded in Karratha, where they are probably due to urban activities rather than the effects of industry.

In the late 1970s, approval was given for a Joint Venture, led by Woodside Energy Limited, to establish a plant for processing liquefied natural gas subject to certain conditions resulting from the application of the AHA. This led to detailed and prolonged field study of the petroglyphs by teams led by Patricia Vinnicombe, Ken Mulvaney and Jim Rhoads (Vinnicombe 2002). Most of this work did not include local Aboriginal participation, although Aboriginal staff from the Western Australian Museum did participate. Many petroglyphs were documented, some were salvaged with the intention of relocating them after the establishment of the gas plant, and others were documented before being destroyed. Those that were salvaged have not yet been relocated (Fig. 2), causing ongoing friction between Aboriginal and other stakeholders in rock art and government and industry. An audit of the petroglyphs on Joint Venture leases in 2007 showed that in many cases where approval had been given for removal or destruction, the petroglyphs are still present in the lease.

Burrup Peninsula, Fig. 2 Outline kangaroo in Salvage Yard (Photo: Iain Davidson)

In 2003, in advance of a determination on Native Title, the W.A. Govt. established industrial zones on the Burrup and obtained Aboriginal consent through the Burrup and Maitland Industrial Estate Agreement (BMIEA). There is a perception that the W.A. Govt. did not deliver the agreed benefits in return. Approvals under the

AHA subsequent to this have followed Aboriginal involvement in surveys, but industries (including another gas plant) have been established against Aboriginal wishes.

Results of Cultural Heritage Work on the Burrup

Attempts have been made, under existing legislation, to mitigate the direct impact of industry in some cases, but government deemed the cumulative impact on sites in the region, and the broader impact on the sites in the landscape less important than the development of industry.

A major conveyor carries salt through the rocky part of southwest Dampier Island (Virili 1977), and Michel Lorblanchet undertook archaeological work (funded by the Australian Institute of Aboriginal Studies, as it then was) in the adjacent Gum Tree Valley and Skew Valley from the early 1970s (Lorblanchet 1992). This work has produced the only secure dates for the production of petroglyphs. These dates come from excavation of shell middens at the entrance of Skew Valley which revealed images produced more than 4,200 years ago. In addition, among the engraved blocks in Gum Tree Valley, Lorblanchet found a trumpet shell which was dated to about 22 thousand years ago. This shell does not definitely date the art but shows that people were present in the region at the period of maximum cold of the last glacial when sea levels were much lower: the shore was 100 km or more distant, and the islands of the archipelago were the tops of hills in the Dampier range. Radiocarbon dates from shell middens on Rosemary Island confirm that the island was used between 9.5 thousand and 7.2 thousand years ago, corresponding to the interval in which the rising sea reached the hill, and then isolated it (Bradshaw 1995). The petroglyphs on the island do not show the full range of images found on the mainland, suggesting that the older ones (including faces called "archaic") predate the earliest shell middens and the latest ones (including many turtles) (Fig. 3) could be later depending on when water crossings became possible.

The petroglyphs were made by removing some of the weathered outer surfaces of the blocks, revealing a lighter-colored surface below (Donaldson 2009). Both Lorblanchet and more recently Ken Mulvaney (2013) have documented that there are several stages of weathering after the images were made, allowing the construction of a sequence of relative ages for the images. Some image classes show several stages of weathering. Considering only those that have only one stage, in the oldest class were very small images of birds and quadrupeds and in the next oldest some of the large tracks of birds and macropods as well as large outline images of them. In the second youngest class, there were lines of people dancing (Fig. 4), and, in general, images of fish, turtles (Gunn & Mulvaney 2008), and other

Burrup Peninsula, Fig. 3 Turtles from Rosemary Island (Photo: Iain Davidson)

Burrup Peninsula, Fig. 4 Line of dancing people, Dugong Heights (Photo: Iain Davidson)

Burrup Peninsula, Fig. 5 "Archaic face" at Picnic Creek, showing Joint Venture Plant in background (Photo: Iain Davidson)

marine species are the least weathered. Some of the "archaic faces," particularly those with concentric framing (Fig. 5), occurred in the oldest weathering stage (Dix 1977).

Finally, there are many images of the carnivore, *Thylacinus* (Wright 1972), which became extinct on mainland Australia about 3 thousand years ago. These animals were represented at many different times, including some in the oldest weathering stage. They are never in the youngest weathering stage.

Cross-References

- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Paleoart
- ▶ Australia's Archaeological Heritage
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dampier Archipelago Petroglyphs
- ▶ Heritage and Archaeology
- ▶ Heritage Ethics, Cultural Base of
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- ▶ Rock Art, Forms of

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Bushell, Robyn

Robyn Bushell
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Basic Biographical Information

Robyn Bushell holds a doctorate from the University of Sydney. She is an Associate Professor in the Institute for Culture and Society at the University of Western Sydney. In addition to her interests in cultural heritage research, Dr. Bushell has worked for many years with natural heritage, sustainable tourism planning, and community development across the Asia Pacific region.

Major Accomplishments

Her teaching and researching is located at the interface of critical heritage studies and community well-being, focusing on the values underpinning everyday life, sustainable development and heritage management, and the entangled relationships between the local and global, between conservation and development, in heritage places in both developed and developing countries, particularly in SE Asia. While "heritage" has become an effective means for protecting landscapes, rituals, materiality, and values of place, it has emerged as a valuable resource for achieving wider goals such as poverty alleviation. Heritage worldwide faces unprecedented threats. Her current work focuses on policy frameworks and theories of social entanglement and the efficacy of international instruments including the World Heritage Convention and the Convention for Biological Diversity, with particular interest to Indigenous and developing nation peoples.

A successful collaborative researcher on funded grants around tourism, community well-being, heritage management, and sustainability. Prof. Bushell has over 44 refereed edited books, book chapters and journal articles, and commissioned reports. In addition she has contributed to a number of international policy documents – for the IUCN, UNESCO-World Heritage Centre, UN-World Tourism Organization, the World Health Organization, and ASEAN Secretariat. These include a report to the 34th meeting of the World Heritage Committee as part of the review of the Operational Guidelines for the World Heritage Convention with the development of Principles for World Heritage and Sustainable Tourism practices, which was a joint initiative of UNESCO-World Heritage Committee, IUCN, ICOMOS, and ICROM. Her latest book *Heritage Tourism: Place, Encounter & Engagement* in the Routledge Series *Key Issues in Cultural*

Heritage is coedited with Russell Staiff and Steve Watson (Staiff et al. 2012).

Prof. Bushell initiated led the European Union – Australian Gov't funded: Post Graduate Training Scheme "*Sharing Our Heritage*": *Master Classes In Cultural & Natural Heritage Management* with in-kind support from UNESCO-WHC and Parks Australia, 2005–2007. The project involved four universities in Australia and four in Europe. She also supervises doctoral scholars engaged in research around a range of topics related to heritage management and community development issues.

Dr. Bushell works with a range of national and international heritage governance bodies and academic institutions. She is a member of Forum-UNESCO; the Australian Department of Environment and Heritage World Heritage Reference Group (2009–2012); IUCN representative on Steering Committee World Heritage and Tourism (2009–2011), Blue Mountains World Heritage Advisory Committee; ICOM-Australian chapter; Ministerial Appointment, Booderee National Park Board of Management, comanaged with the Wreck Bay Indigenous community (2003–present); Ministerial Appointment to the NSW NPWS Regional Advisory Council for Blue Mountains National Park, Executive Ctee for the Oceania Regional Steering Committee of the World Commission for Protected Areas (WCPA) of the International Union for the Conservation of Nature, IUCN (1998–present); Vice Chair, International Specialist group on Tourism, WCPA–IUCN (1998–present); and IUCN "Healthy People Healthy Parks" Steering Committee (2011–). She was a member of the Expert Liaison Committee for Protected Areas to develop input to the SBSTTA 9 for the Convention on Biological Diversity (1998) and member of the UN-World Tourism Organization Expert Advisory Group on Indicators of Sustainable Tourism.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ Stakeholders and Community Participation
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview

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Butzer, Karl W.

Rolfe D. Mandel
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Basic Biographical Information

Karl W. Butzer (1934–) is an American geographer, geoarchaeologist, cultural ecologist, and environmental archaeologist. Much of his research has focused on the relationships between the environment and prehistoric people and more recent societies. He has collaborated with many paleoanthropologists and archaeologists, working at both larger, regional scales and at the site-specific microlevel.

He was born in Germany and emigrated to England and then Canada as a child. He attended McGill University, where he received a B.Sc. in Mathematics (1954) and an M.Sc. in Meteorology and Geography (1955). With the support of an Exchange Fellowship, he went on to the University of Bonn (Germany), where he received a Doctor of Science (Dr. rer. nat.) in Physical Geography and Ancient History (1957).

After two years as a research associate at the German Academy of Sciences and Literature, he was appointed Assistant and then Associate

Professor at the University of Wisconsin-Madison (1959–1966). In 1966 he took a position as Professor of Anthropology and Geography at the University of Chicago and in 1980 was named the Henry Schultz Professor of Environmental Archaeology. During 1981–1982, he was Chair Professor of Human Geography at the ETH (Swiss Federal Institute of Technology), Zurich, but returned to Chicago. During his tenure at Chicago, he was elected to various subdepartmental units, including the Committee on African Studies, Committee on Evolutionary Biology, and Committee on Archaeological Studies (Humanities). He also served as Professor in the Oriental Institute.

In 1984 he joined the faculty of the Department of Geography and the Environment at the University of Texas, Austin, where he is today, and was named the Raymond Dickson Centennial Professor of Liberal Arts. In 1995 he was Cecil and Ida Green Visiting Professor at the University of British Columbia.

Major Accomplishments

During the early part of his career, his research focused on two general topics: the geomorphology, geoarchaeology, and Quaternary climates of Egypt (especially Nubia) and the paleoecology and geochronology of early hominins. His dissertation, *Quaternary Stratigraphy and Climate in the Near East*, was largely based on his field research in Egypt and was published in 1958 and reprinted in 1969. As a member of the Yale Prehistoric Nubia Expedition of 1962–1963, he spent seven months in the field studying late Quaternary landscape evolution and the prehistoric archaeological record in Egypt's southern Nile Valley. His early research on Egypt was coalesced in two major works: *Desert and River in Nubia*: *Geomorphology and Prehistoric Environments at the Aswan Dam* (1968) and *Early Hydraulic Civilization in Egypt*: *A Study in Cultural Ecology* (1976). The latter was the first effective attempt to isolate, understand, and synthesize the critical factors involved in the rise of an "irrigation civilization."

In the late 1960s and early 1970s, he turned his attention to the paleoecology and geochronology of early hominins. He participated in the University of Chicago Omo Expedition in southwestern Ethiopia (1967–1969), which involved collaboration with Richard Leakey, and in 1971 and 1973 he worked independently at Axum, Ethiopia. He was especially interested in the paleoecology of the African australopithecines and *Homo erectus*, Neanderthal spatial behavior, and the first appearance of anatomically modern humans. His argument that both archaic and modern *Homo sapiens* coexisted 135,000–65,000 years ago is supported by the results of recent biomolecular research.

The early part of his career also included research in Spain and South Africa. He was involved with the University of Chicago's excavation of Acheulian sites at Torralba and Ambrona in central Spain (1961–1963, 1967, 1980–1981), and he directed the Sierra de Espadan Project in anthropology, historical archaeology, and environmental history (1980–1987). Also, he conducted independent research in Mallorca and Catalonia, Spain (1969–1971). Between 1969 and 1983, he spent 9 field seasons investigating the geoarchaeology of some 30 sites, including Taung and Swartkrans, in South Africa.

During the second half of his career, he focused on the more recent prehistoric and historic periods in order to obtain and interpret high-resolution records, including written accounts, of human impacts on the environment. The skills of his wife, Elisabeth Butzer, in archival research and interviewing have been key factors in facilitating this change of direction. For example, as director of the University of Texas Laguna Project (1995–2000), he considered the recent environmental history of northern Mexico. This project led to a series of papers with Elisabeth, all heavily based on archival sources, addressing the impact of livestock grazing on Colonial Mexico. In a similar study, he evaluated the environmental impact of livestock introduction to New South Wales, Australia (with David Helgren, 1999, 2003). He also has investigated the recent history of French coastal reclamation in Nova

Scotia (1999), the environmental history and geoarchaeology of Cyprus (2004), and the geoarchaeology of Celtic hillforts in northern Portugal (2010–2011).

He is author or editor of 15 books and monographs and author or coauthor of some 275 refereed, scientific papers or book chapters. His seminal book, *Environment and Archeology*: *An Introduction to Pleistocene Geography*, was first published in 1964; a new and expanded edition, with the subtitle *An Ecological Approach to Prehistory*, appeared in 1971. This work served to shift "environmental archaeology" from a technical to a synthetic and processual overview of world prehistory. He characterized Pleistocene geography as "environmental reconstruction as applied to an understanding of ecological setting and prehistory" and took issue with Gordon Willey and Philip Phillips' (1958) acclamation that "archaeology is anthropology or it is nothing," pointing out that "Archaeology. . .has been equally dependent on geology, biology, and geography. . .during its development [and] is heavily dependent on the natural sciences."

His book *Archaeology as Human Ecology* (1982) represents another major contribution to the archaeological community. In that work he stressed the significance of "contextual archaeology," whereby archaeological sites are placed in their cultural, biological, climatic, and landscape context. This approach is now standard in archaeological investigations.

He has received many awards and honors in recognition of his contributions to archaeology, geoarchaeology, and geography, including a Guggenheim Fellowship (1976), the Royal Geographical Society's Busk Medal (1979), the Society for American Archaeology's Fryxell Award for Interdisciplinary Research (1981), the Geologists' Association of London's Henry Stopes Medal (1982), the Geological Society of America's Rip Rapp Archaeological Geology Award (1985), and the Archaeological Institute of America's Pomerance Medal (1991). He was elected a Fellow of the American Academy of Arts and Sciences in 1984 and a Fellow of the National Academy of Sciences in 1996.

During the course of his career, Karl Butzer has been at the forefront of geoarchaeology, cultural ecology, and environmental archaeology. He is often described as one of the "fathers" of geoarchaeology, and he remains deeply engaged with interdisciplinary environmental archaeology and history.

Cross-References

► Geoarchaeology

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C

Cahokia

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Introduction

Cahokia is the largest and most complex archaeological site north of Mexico; indeed, it was probably one of the largest cities in the world at its peak around CE 1200 (Fig. 1). Because of its "outstanding universal value," it is recognized by UNESCO as a World Heritage Site. To the local community, Cahokia is known as "Cahokia Mounds" because of the many mounds located there. To the archaeological community, however, there is a much greater story hidden below the modern ground surface. While archaeologists have studied Cahokia for much of the past century, it was only with interstate highway construction beginning in the 1970s that serious attention was paid to the smaller sites that supported Cahokia. They too tell an important part of Cahokia's story. The "downtown" portion of Cahokia can be visited at Cahokia Mounds State Historic Site in Collinsville, Illinois.

Definition

Lying across the Mississippi River from modern day St. Louis, Cahokia in its heyday served as a cosmopolitan gateway (Kelly 1991) just as historic St. Louis did. As many as 20,000 people may have lived at Cahokia, but most visible to the casual visitor today are the mounds they built. At least 120 mounds have been recorded at Cahokia, the largest of which, Monks Mound (Fig. 2), is approximately 100 ft tall and has a footprint of approximately 17 acres (Fowler 1997; Dalan et al. 2003). Other monumental features of the site include a palisade and so-called woodhenges.

Key Issues/Current Debates/Future Directions/Examples

Cahokia is situated in the heart of the American Bottom, a vast and rich expanse of Mississippi River floodplain (Iseminger 2010). Mobile hunter-gatherers "camped" at Cahokia as early as the Late Archaic period (3500–1000 BCE), gathering nuts, hunting deer and other native fauna, and fishing in nearby Cahokia Creek and backwater lakes. However, even at this early date, inhabitants of the American Bottom probably experimented by growing native plants such as squash (*Cucurbita pepo*) and goosefoot (*Chenopodium berlandieri*). Cahokia was again occupied during the Late Woodland Patrick phase (CE 700–900). At this time, Cahokia was probably just one of a number of small horticultural villages dotting the American Bottom. Their inhabitants grew squash, goosefoot, and a host of

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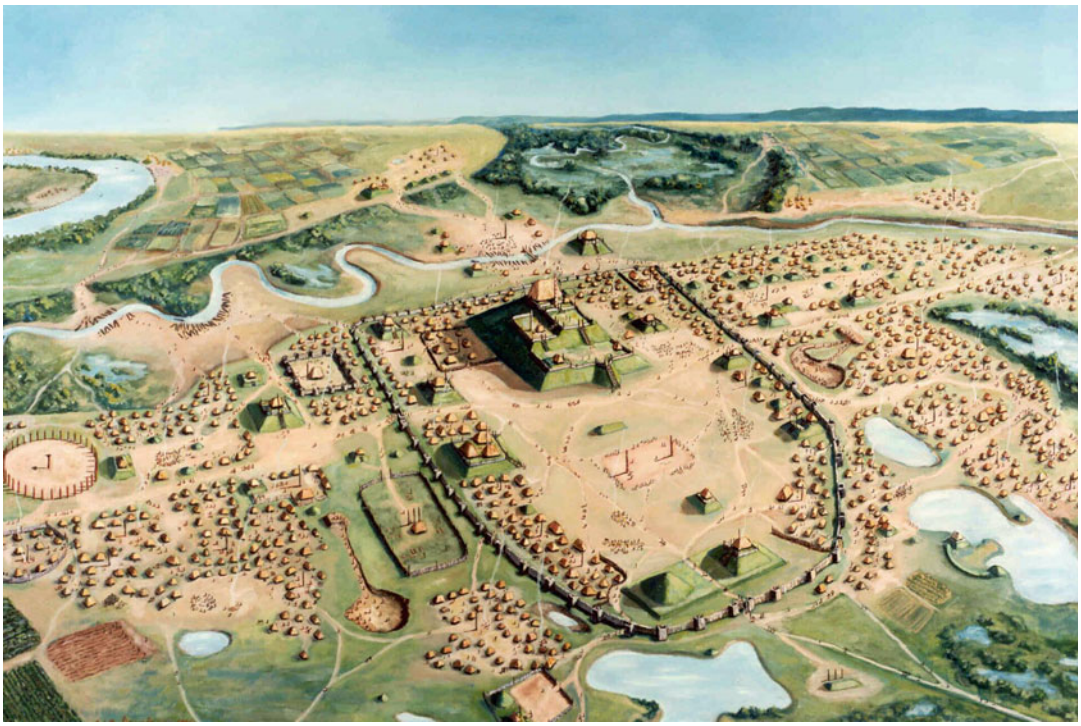

Cahokia, Fig. 1 Downtown Cahokia, c. CE 1200 (Courtesy of Cahokia Mounds State Historic Site. Painted by William R. Iseminger)

Cahokia, Fig. 2 Monks Mound, Cahokia (Courtesy of Cahokia Mounds State Historic Site)

other native plants in their gardens. A newly introduced technology, the bow and arrow, would have improved the efficiency of hunting. After CE 900, maize was brought to the American Bottom and quickly became a staple, yet Cahokians and their neighbors continued to rely on native cultigens, nuts, and wild game. As the population of the American Bottom grew, fish, a resource more easily renewed than deer, was increasingly important in the diet. Despite the diversity of the subsistence base, however, there can be little doubt that the growth of Cahokia in the Mississippian period (CE 1050–1400) was fueled by maize agriculture.

Around CE 1050, Cahokia experienced its so-called "Big Bang" (Pauketat 2004, 2009), and it was no longer just another American Bottom farming village: most archaeologists would agree it became a city unlike any other north of Mexico. Whether Cahokia's seemingly meteoric rise was led by a single charismatic individual or a powerful family is unknown. However, it seems likely that Cahokian society, like any Native American society, would have been focused on kin networks, and kin support would have been necessary for the reorganization of society. The exact nature of Cahokia's new power structure is also debated. The dominant model since the highway archaeology of the 1970s, with its focus on rural sites, has been that Cahokia was the center of a chiefdom (Milner 1998). Despite the acceptance of this model, it is commonly acknowledged that by virtually any measure, Cahokia was something monumentally greater than any other Mississippian chiefdom. For example, although Moundville, Alabama, is often claimed to be the second largest Mississippian center, it had only around 25 mounds, and all of Moundville would have fit within the Grand Plaza of Cahokia (Dalan et al. 2003). By mound count alone, the second largest Mississippian site was actually the East St. Louis site, with approximately 50 mounds; St. Louis, known historically as "Mound City," featured another 25 mounds or so. If not for the Mississippi River and other water features, Cahokia and the sites at East St. Louis and St. Louis would likely have merged to form continuous suburban sprawl. Clearly, though, the center of power was at Monks Mound. The idea that Cahokia was the center of the "Ramey State" (O'Brien 1991) has recently been reevaluated, but rejecting a western notion in which the power of the state is based on coercive power (Holt 2009). Instead, Geertz's "theatre state" model (Geertz 1980) seems more appropriate: that is, Cahokia's power was based on theatrical rituals which drew people to Cahokia. People helped build Cahokia, helped feed Cahokia, and sometimes gave their lives for Cahokia, not because they were forced but because they wanted to take part in this dramatic and monumental social experiment.

Rural villages and isolated farmsteads in the American Bottom and adjacent uplands probably grew surpluses of maize to send to Cahokia (Lopinot 1997). They probably also gave tributes of venison to be served at Cahokian feasts (Kelly 2001). Like the residents of Cahokia, these rural farmers lived in small, single-family thatch houses, but they had access to fewer exotic goods than Cahokians did (Pauketat 2004). Still, given that they were part of the Cahokian social and ritual arena, those rural farmers were probably considered Cahokians. Their labor would have been necessary to build not only Cahokia's many mounds but also its multiple plazas, massive palisade, and woodhenges. The woodhenges, for example, were built at Cahokia's peak, west of Monks Mound. These monumental circles of large posts are believed to have served as sun calendars, but they might also have played a role in mourning and warfare rituals. The Grand Plaza in downtown Cahokia covered an area two or three times the foot print of Monks Mound, and leveling this area would have required as much effort as building Monks Mound (Dalan et al. 2003). Around CE 1200, a massive palisade was built to surround Monks Mound, the Grand Plaza, and other mounds at the heart of Cahokia. What residents might have been protecting themselves from is unclear. It seems unlikely that there was a group large or organized enough to offer serious threat to downtown Cahokia, although evidence of burning at the East St. Louis site might indicate competition from within the American Bottom.

Perhaps the strongest indicator of conflict or coercive power found at Cahokia is the evidence of human sacrifice at Mound 72 (Fowler et al. 1999). The primary burial in this mound contained a middle-aged man laid upon a bed of marine shell beads in the shape of a hawk; a second man was buried face down beneath him, and abundant grave goods, many exotic, were buried nearby. Some 250 other people were also buried in Mound 72. These were buried in groups of up to 50 people, mostly young women. Another notable burial in the mound contained four headless, handless young men. Fowler, who excavated the mound, argued that the sacrificed individuals were retainers buried to accompany the high status man in the main burial. However, Hall (2006) suggests these were ritualized or "scheduled deaths," not simply retainer burials. Similarly, Brown (2003) suggests these deaths were part of a theatrical reenactment of the Red Horn myth. Thus, these deaths were likely part of a dramatic ritual, and participation was probably an honor. Evidence of mass human sacrifice at Cahokia therefore need not be interpreted as evidence of conflict or coercive power.

Given that it was the earliest and greatest Mississippian center, Cahokia's influence on contemporary and later societies might be seen through the spread of the so-called "Southeastern Ceremonial Complex" (Brown & Kelly 2000; Brown 2004). While Cahokians did not invent mound building nor did they necessarily invent the mythology and associated symbols that they surely exported, their city served as a model for others to imitate. Cahokians surely made ties with contemporary peoples through reciprocal exchanges of material goods and, in common Native American fashion, through adoption ceremonies and creation of fictive kinship ties (Hall 2006). Material evidence of these exchanges would include the presence at Cahokia of marine shell from the Gulf Coast and copper from the Great Lakes. Artifacts probably manufactured at and exported from Cahokia would include Ramey incised pottery found at sites such as Aztalan (in modern day Wisconsin) and flint clay sculptures found at sites including Spiro (in modern day Oklahoma). Given the clear material links between Cahokia and sites such as Aztalan and Spiro, these distant groups may also have seen themselves as Cahokian kin, at least adopted kin. Indeed, sites to the north such as Aztalan and Dickson Mounds (in Illinois) have been interpreted as colonies of Cahokia (O'Brien 1991). While the ceramic diversity at Cahokia and in the greater American Bottom can be seen as evidence that theirs was a multiethnic society, at the same time Native American notions of adoption and kinship suggest that Cahokians and at the very least other residents of the American Bottom saw themselves as a single people.

Although the hypothesized Big Bang that began Cahokia's ascendancy may be metaphorical, the city might have ended with a more literal bang. A multitude of environmental factors, some beyond human control and others directly caused by humans, probably reduced the desirability of Cahokian real estate over time. Cahokia seems to have reached its peak during a period of favorable climate; bountiful maize harvests during this time probably increased the carrying capacity of the American Bottom significantly and enabled Cahokia's rise. Later, a period of recurring drought (Benson et al. 2009), possibly associated with the cooling of the Little Ice Age, may have contributed to Cahokia's demise. Agricultural yields would have been diminished not only by drought but also by decreasing soil fertility caused by growing maize (which is nitrogen-depleting) without beans (which are nitrogen-fixing). Despite the episodes of drought, flooding of farm fields, not to mention homes, would have become an increasing problem, due to deforestation (Lopinot & Woods 1993). Deforestation would have occurred when clearing agricultural fields and also to provide wood for fuel and construction of houses, woodhenges, and the palisade, which was rebuilt several times. Deer herds were probably diminished, which meant not only a decrease of meat in the diet but also a loss of deer bones and antler for tools, and hides for clothing and coverings. The quality of the diet would have also been reduced by heavy reliance on maize without beans to balance protein content. The ultimate bang, however, might have

come with an earthquake emanating from the New Madrid fault (Pauketat 2004; Holt 2009). The New Madrid earthquakes of 1811–12 devastated agricultural systems, flattened forests, and even reversed the course of the Mississippi River. A bang such as this might have been the final straw for Cahokian society, which was already struggling with mounting environmental and presumably social challenges.

At Cahokia we can see the transition from a mobile hunting-gathering society, experimenting with horticulture, to a complex, sedentary agricultural society. It might be tempting to say that the experiment failed, or at least that the environment failed, in the end. However, it is important to stress that Cahokians did not simply disappear. While the Mississippian groups of the southeast encountered by the Spanish might be thought of as their cultural descendents, many archaeologists today think that Siouan groups such as the Omaha, Osage, and Ponca were the actual descendents of the Cahokians (Hall 2006). That is, Cahokians did not die out: they adapted to the dynamic world they lived in, moving on to make new lives elsewhere.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Hall, Robert Leonard
- ▶ North America (USA and Canada): Museums
- ▶ Woodland and Mississippian Cultures of the North American Heartland
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

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Basic Biographical Information

Halet Çambel was born in Berlin in 1916 where her father was a military attaché. She graduated from Arnavutköy American College for Girls in 1935, and went to Paris to study at the University of Sorbonne education in archaeology, Hittite, and ancient Hebrew. She completed her M.A. in 1938, and wanted to return to the university to start research for her Ph.D. dissertation, but World War II had just begun. Halet Çambel was the first Turkish woman to participate in the Olympic Games, competing in fencing with Suat Fetgeri Aşeni in 1936.

Major Accomplishments

Çambel attended excavations held by the French Archaeological Institute in Afyon Yazılıkaya/ Midas City in 1939, and later, she continued to work with the excavation director, Dr. Emilie Haspels, in the archaeological museums of Istanbul. Later Prof. Dr. Bossert, from Istanbul University, invited her to be his assistant in 1943. She carried out a controlled excavation in Kırşehir Hashöyük on behalf of the Turkish Historical Society. With Prof. Dr. Bossert, she participated in numerous research trips all around Anatolia until 1946 when the site of Karatepe, which created a strong impact on Anatolian archaeology, was discovered.

While continuing to work in Karatepe, she carried out the excavations of Afyon Yazılıkaya/ Midas City with the French Institute of Archaeology in 1948and 1949, and Istanbul Fikirtepe with Kurt Bittel in 1950 and1951. As well as starting site restoration after 1952, she helped to organize Karatepe-Arslantaş National Park, the first open-air museum in Turkey.

Çambel became professor in 1960, and was a guest lecturer at the University of Saarbrücken in 1962 and 1963. When she returned to Istanbul University, she founded the Department of Prehistory at this university. Between 1965 and 1966, she documented archaeological values in Adana region for a study organized by the Bank of Provinces.

Çambel organized a comprehensive study of antiquities around Adana, Hatay, and İçel with a student team during 1966–1971 with the cooperation of State Planning Organization and the Çukurova Regional Directorate of Ministry of Development Planning Project.

In association with the Prehistoric Southeastern Anatolia Research Project, Çambel made a large scale survey in Siirt, Diyarbakır, and Şanlıurfa provinces which afterward led to excavations in Urfa Biris Cemetery and in Diyarbakir Girikihacıyan.

Her other significant study was the excavation of Çayönü which started in 1964.

She organized a team from İstanbul and Michigan Universities to screen the region which was going to be inundated after Keban Dam construction in 1966. This study led to projects by Middle East Technical University for Keban recovery and evaluation of historic monuments (1967) and Lower Euphrates (1974). She also accomplished salvage excavations in Kumkale and Domuztepe from 1981 to 1984.

Even after her retirement in 1984, she continued to carry out the studies in Karatepe and Çayönü as well as the development of projects in Karatepe open-air museum, and at the national park. Halet Çambel received numerous awards

including the Kingdom of the Netherlands, Prince Claus Award (2005), awards from Republic of Turkey Ministry of Culture, Troy Culture and Arts, and the University of Tübingen (Germany) honorary doctorate (2004). She is the member of many scientific institutions such as The German Archaeological Institute, the American Philosophical Society for the Advancement of Knowledge, and the American Institute of Archaeology, Thracology Institute.

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- ▶ Çayönü: Agriculture and Domestication
- ▶ Çayönü Tepesi: Bioarchaeology

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Cambodia: Cultural Heritage Management

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Introduction

Cambodia, in terms of cultural heritage, is one of the world's wealthiest countries, but the kingdom's economic poverty places this marvelous heritage in constant peril. Since the cessation of hostilities in the late 1990s, much effort has been expended in protecting Cambodian heritage sites with governmental agencies including the Ministry of Culture and Fine Arts, the APSARA Authority, and intergovernmental organizations such as UNESCO working to safeguard sites around the country. More recently, nongovernmental organizations, such as Heritage Watch, have been founded to highlight the threat to prehistoric heritage in Cambodia. This entry briefly examines the efforts of these varied organizations and the changing threats to Cambodia's heritage.

Key Issues/Current Debates/Future Directions/Examples

Cambodia is home to a rich cultural heritage which stretches into the prehistoric period. The first Khmer polities, however, were established in the fourth to fifth centuries CE, with the rise of polities known as Funan and Chenla which grew powerful due to the burgeoning trade between the Indian subcontinent and China.

Over time, power became concentrated in Cambodia's North, culminating with the civilization of Angkor which reached its zenith in the twelfth to thirteenth centuries CE, which held hegemony over much of Southeast Asia. The Angkorian empire has left its mark on the region in the form of temples, reservoirs, and roadways, most concentrated within modern Cambodia.

Cambodia's heritage has been treasured and coveted for hundreds of years. Thai invaders carried off innumerable treasures (and many of the skills of the Royal court) in the fifteenth century, some of which now rest in Myanmar after the Thai themselves were invaded by the Burmese. Further depredations against Cambodia were seen under the French protectorate. The tale of André Malraux's attempts to pillage the magnificent temple of Banteay Srei is well known. The French, while they did carry off a good deal of the kingdom's treasures for Parisian museums, did make efforts to conserve much of Cambodia's heritage through the enactment of legislation. These laws, in fact, were cited in the arrest of Malraux.

There have been significant developments both positive and negative in the field of heritage management in Cambodia since the country's independence in 1953. The civil war in Cambodia represents the lowest ebb for Cambodia's heritage as countless statues and other treasures were spirited out of the country.

As Angkor continues to attract thousands of tourists, the pressure on Cambodia's heritage is of a different nature, one in which the masses of tourists are managed while the site retains its integrity. The international community has become involved in Cambodia in the form of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The organization was established in Cambodia in the 1950s but closed in 1975 due to the conflict. In May 1989, UNESCO was able to complete an initial assessment of the safeguarding needs of Angkor, and an office was reestablished in 1991.

UNESCO has several goals in Cambodia:

1. Design and implement programs and projects contributing to strategic objective of UNESCO in the country.
2. Develop projects, raise funds, and implement the projects in the areas of the competence of the Office to reinforce program activities.
3. Promote and enhance partnerships and networks for disseminating and sharing information and ideas with the stakeholders in the country.
4. Enhance the capacity of the staff for strategic planning and management of the programs and projects for delivering results in the country.
5. Position the environment of the Office for efficient and effective delivery of programs and projects in the country.
6. Prospect and expand knowledge management of the Office to facilitate decision making and problem solving by the staff for the delivery of results (REF 2008 UNESCO Phnom Penh Office Annual report).

UNESCO's budgetary expenditures are indicative of the importance the organization places on culture. Twenty-five percent of the budget (in 2009–2010) is dedicated to culture vs. other priority areas (education, natural sciences, communication and information, and program support costs) (UNESCO 2010: 16). Further, many of the extra-budgetary expenses are focused on culture (87 % in 2009–2010), mostly the conservation and restoration of temples around the country.

In 1993 the site of Angkor, comprising hundreds of monuments, was inscribed to the World Heritage List and the International Coordinating Committee for the Safeguarding and the Development of the Historic Site of Angkor (ICC-Angkor) was established, under the patronage of the Japanese and French governments. Annual meetings hosted in Siem Reap by the APSARA National Authority in charge of the management of the site, UNESCO, and the international community ensure proper management of the site. Independent experts in conservation, archaeology, and sustainable development oversee project quality and project management. In 2008 UNESCO's Phnom Penh Office in close cooperation with the World Heritage Centre negotiated a "Heritage Management Framework" project with the Australian Government and Cambodian authorities. The project is designed to strengthen the technical expertise and governance of APSARA, so that the benefits of tourism and development at Angkor can be shared fairly, as well as to ensure environmental protection.

The temple of Preah Vihear, situated in Cambodia's north, on the edge of the Dang Rek Mountain Range in Preah Vihear Province, was

inscribed as a World Heritage site in 2008. The Cambodian government has established the National Authority for Preah Vihear (NAPV) to function much in the same way as the APSARA Authority does. The challenges to protecting the temple have, so far, been substantial as the nomination to World Heritage status has contributed to an escalation in armed conflict between Cambodia and Thailand. Thailand objected to the nomination and has never fully accepted the International Court of Justice's 1962 decision that found "that the Temple of Preah Vihear is situated in territory under the sovereignty of Cambodia." Internal political maneuvering within Thailand since 2009 has seen an escalation in tension at the site and conflict resulting in several civilian and military deaths (National World Heritage Committee 2009).

Intangible Cambodian heritage has also been inscribed on the World Heritage List, including the Royal Ballet of Cambodia or Khmer Classical Dance. UNESCO proclaimed Khmer Classical Dance as a Masterpiece of Oral and Intangible Heritage in 2003 and inscribed it on the Representative List of the Intangible Cultural Heritage of Humanity in 2008. *Sbek Thom*, a form of shadow puppetry, was also recognized as a Masterpiece of the Oral and Intangible Heritage of Humanity in 2005, and in 2008 it was also inscribed on the Representative List of the Intangible Cultural Heritage of Humanity (National World Heritage Committee 2009).

In an effort to further support intangible heritage and the knowledge that is passed through the generations, the Spanish government supported the Creative Industries Support Programme (CISP). The project was designed not only to promote the preservation of heritage but also to provide sustainable income for the poor in remote parts of Cambodia, with a strong focus on Cambodian indigenous peoples. The project, which involved four UN agencies, aimed to select traditional crafts, art, and performances and promote them as commercially viable ventures. Efforts were also made to "improve the capacity of national institutions to preserve and develop Cambodia's cultural heritage and living arts, to improve employment opportunities and income generation in the creative industries, to improve the commercialisation of local cultural products and services, and to empower women and indigenous peoples" (UNESCO 2011).

Aside from UNESCO and multinational organizations, there have been other initiatives that have sought to promote heritage preservation in Cambodia. The NGO Heritage Watch was established in 2003 following the rise in looting of prehistoric sites in Cambodia. The illegal excavation and sale of prehistoric artefacts is, perhaps, the largest challenge facing Cambodia's heritage professionals. Where previously temples were targeted, now it is archaeological sites, usually cemeteries containing burials with semiprecious stones, metal, and ceramic artefacts, that are being destroyed.

With funding from the US Department of State, it launched a national public awareness campaign targeting both those who loot and those who buy antiquities. Heritage Watch attacked the supply end of the trade through radio and television commercials, educational comic books, and community workshops for villagers in heavily looted areas and the establishment of a telephone hotline. Tourists were informed about the negative consequences of buying looted antiquities through public exhibits, airport kiosks, and public lectures.

Early in 2006, Heritage Watch began rescue excavations at Wat Jas, an Iron Age cemetery in northwestern Cambodia that was increasingly targeted by looters. This project also involved the training of young Cambodian archaeologists in survey and excavation techniques. In addition to this, Heritage Watch documented threatened sites across the country, recording at-risk objects in case they are stolen in the future.

At the ancient temple complex of Koh Ker, Heritage Watch launched an innovative project combining preservation with sustainable tourism development. Small business training, language skills, craft production, and tourism activities were introduced at Koh Ker to provide the locals with an alternative to looting. Also, Heritage Watch furthered its educational efforts with the publication of a children's storybook promoting

heritage preservation that was distributed for free in many Cambodian schools.

2007 saw the launch of the Heritage Friendly Tourism campaign in Cambodia. The aim of the campaign is to encourage responsible tourism, raise interest in remote heritage sites (improving their chances of protection), and encourage corporate Cambodia to support art, heritage, and development. The campaign involved a major advertising push encouraging visitors to Cambodia to support businesses that have been certified as Heritage Friendly (in that they actively supported the aforementioned sectors).

Other initiatives include the Database of Historical and Archaeological Regulations for the Management of Antiquities (DHARMA), the aim of which is to compile a resource of all laws that are applicable to Cambodian heritage issues in one location. Heritage Watch has also been involved with the training of guides at the temple site of Banteay Chhmar in Cambodia's Northwest as part of an effort to boost tourism to the local community and reduce heritage destruction in the area, one of Cambodia's worst affected by looting. In 2011, Heritage Watch worked with the Australian government in the repatriation of antiquities smuggled into Australia and also assisted in establishing a bilateral agreement between the Australian and Cambodian government that will limit the illegal trade in antiquities.

The Phnom Kulen Archaeology and Sustainable Development Program is a project of the Archaeology and Development Foundation (ADF), a London-based nongovernmental organization. In this innovative program, archaeology and sustainable development go hand in hand. Working to the north of Siem Reap, this site-specific effort has four main components which aim to reduce poverty and strengthen civil society. The emphasis is on letting the local community at Kulen make their own decisions regarding food security, health center support, infrastructure and education, and income generation. This program provides an excellent model in the ways archaeological research, heritage preservation, sustainable development, and tourism can work together successfully.

The Ministry of Culture and Fine Arts (MoCFA) of Cambodia also has taken great steps in efforts to protect Cambodia's cultural heritage. Two bilateral agreements have been signed by the MoCFA with the United States that limits the export of antiquities from Cambodia. As the government ministry charged with protecting Cambodia's heritage, the MoCFA is an integral part of all efforts in heritage preservation and works closely with NGOs and UNESCO in these efforts.

Cambodia faces considerable challenges in protecting the vast heritage resources it is blessed with, ranging from the monuments of the Angkorian period to the subsurface remains of prehistoric sites and cemeteries, as well as its living heritage, that is under continual threat. There is, however, considerable support for Cambodian heritage, and it is a question of whether this support will balance the demand for Cambodia's antiquities. Past trends suggest not and the difficulty nongovernmental agencies working in heritage face in raising funds further suggests that the challenge to protect Cambodia's treasures will be an uphill battle.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- ▶ Looting and Vandalism (Cultural Heritage Management)

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Camels: Domestication

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Basic Species Information

Systematic Classification

Camelus ferus wild two-humped camel
Camelus bactrianus domesticated two-humped/Bactrian camel
Camelus dromedarius domesticated one-humped/Arabian camel/dromedary

The genus *Camelus* contains the domestic species *Camelus bactrianus* and *Camelus dromedarius* (Walker 1964). In 1877 N. M. Przewalski discovered the wild two-humped camel (*Camelus ferus*) while on expedition in Eurasia (Przewalski 1879; Bannikov 1976; Hare 1997). Archeologists commonly assume the extant wild two-humped camel *C. ferus* to be the progenitor of the domestic two-humped camel *C. bactrianus* (Benecke 1994, Peters & von den Driesch 1997); however, recent paleogenetic studies show that *C. bactrianus* more likely originated from an as yet undetected wild camel species (Trinks et al. 2012).

Phylogeography of Old World Camels

The family *Camelidae* originated during the Eocene, about 40–45 Ma ago in North America (Gauthier-Pilters & Dagg 1981). Four to five million years ago, the ancestors of the modern New World camels dispersed from the North into the mountainous regions of South America, while *Paracamelus*, the progenitor of modern Old World camels, reached Eurasia about three million years ago via the Bering landbridge (Gauthier-Pilters & Dagg 1981; Koehler 1981; Peters 1997). The remaining camel forms in North America disappeared ~10,000 years ago due to climatic changes (Irwin-Williams 1967; Frison et al. 1978).

The earliest camel forms were well adapted to the open steppes and spread rapidly westward after migrating to Eurasia. By the middle Pleistocene, the habitat of the Old World camels ranged from Central Asia to the Arabian Peninsula, including parts of North Africa and Eastern Europe (Koehler 1981; Titov 2008). Fossil evidence has yet to substantiate whether the different number of humps is related to adaptation to diverse environments. Paleolithic cave paintings (Chojt-Zenker cave) in Eastern Mongolia suggest that the existence of a wild two-humped camel is certain at least for Central Asia (Nowgorodowa 1980; Benecke 1994).

By the end of the Pleistocene, a severe reduction in the range of wild camels occurred as a result of change towards a dryer climate (with the beginning of the Dnepr-Ice Age) and increased human hunting activities (Gauthier-Pilters & Dagg 1981; Kozhamkulova 1986; Titov 2008).

Over time, the wild camel species inhabiting the steppes and semidesert of the Old World became extinct, leaving only *C. ferus*. Today, the distribution of the remaining 900–1,400 individuals is restricted to parts of the Chinese and Mongolian Gobi desert (Bannikov 1976; Hare 1997; Mix et al. 1997; Reading et al. 1999; Mix et al. 2002).

C. bactrianus, the domestic form, has spread throughout the dry steppes and semidesert zones in Central Asia and is now found from Northeast China, Mongolia and Siberia, in Kazakhstan, South Russia, and parts of Afghanistan, Pakistan, and Iran. In Asia Minor, its distribution overlaps with that of the one-humped camel *C. dromedarius* (Walker 1964).

Archaeology and Domestication of the Two-Humped Camel

The domestication of the two-humped camel, used as a pack, draft, or riding animal, but also for milk, meat, and wool production, built the basis for long-distance trade between the Central Asian steppes and Europe during the Bronze Age (Benecke 1994; Kuzmina 2008). Archeological

evidence suggests that camel husbandry gained importance during the second millennium BCE, though where the domestication process began remains controversial.

Archeological records show evidence for a closer relationship between people and the two-humped camel during the late fourth and beginning third millennium BCE (Bulliet 1975; Benecke 1994). The earliest records of camel bones come from sites of the Kopet-Dagh foothills in the borderland between Turkmenistan and Iran dating to the second half of the fourth millennium (Kuzmina 2008). A similar situation appears at the northern edge of Kopet-Dagh mountains, where archeological layers at Shor- and Khapuz Depe produce finds of *C. bactrianus* dating to the early third millennium BCE (Compagnoni & Tosi 1978). Further, camel bones dating between 2500 and 2200 BCE originate at Turkmen settlements of Altyn Depe, Namazga Depe, and Kelleli (Peters & von den Driesch 1997; Kuzmina 2008). At the site of Shahr-i-Sokhta (Iran), camel bones and finds of hair and collected camel dung (which replaces the scarce firewood in the usually treeless steppes) dating to the first half of the third millennium suggest the presence of animals that lived in close association with the site inhabitants and hence represent domesticates (Koehler 1981; Peters & von den Driesch 1997). Also clay figures of cart-drawing camels of the same period from Ulug Depe (Turkmenistan) imply a use of domesticated camels as draft animals (Kuzmina 2008).

Given the presence of camel bones in Bronze Age strata from sites in Iran and southern Turkmenistan, it has been hypothesized that the inhabitants of the Iranian Plateau and the Kopet-Dagh-foothills area played a major role in the domestication of the two-humped camel (Benecke 1994).

Some archeologists and zoologists, however, do not believe that paleontological and archeological evidence from southwestern Central Asia can be interpreted as evidence for an ongoing process of domestication because there is not yet evidence for the presence of the wild *C. ferus* during the early to middle Holocene in this area. The authors argue that the center of domestication must lie further east, in areas where people were acquainted with the wild form over an extended period of time, perhaps in southern Kazakhstan or northwestern Mongolia (Peters & von den Driesch 1997). The sudden appearance of camel bones in Turkmen and Iranian archeological layers dated to the Bronze Age as well as the absence of skeletal remains of wild camels in earlier Neolithic strata in these regions suggest that people from the Kopet-Dagh foothills acquired the fully domesticated two-humped camels from eastern Asia. However, differentiation between wild and domestic camel bone material is difficult and the earliest evidence of fully domesticated camels from southern Kazakhstan and northwestern Mongolia dates to the second millennium BCE (Köhler 1981; Peters & von den Driesch 1997; Mukhareva 2007).

A recent genetic study of Late Bronze and Early Iron Age skeletal remains of *C. bactrianus* from Western Siberia and Southern Uzbekistan revealed homogeneity between modern domesticated camels from China and Mongolia and Bronze and Iron Age camels from Siberia and Uzbekistan. These results suggest that a single population was domesticated, though where that process took place remains uncertain. Furthermore, sequences of the extant wild camel are phylogenetically extremely distant to domestic two-humped camels, pointing to a population split long before domestication (Trinks et al. 2012).

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Canada: Cultural Heritage Management

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Introduction

While cultural heritage encompasses tangible and intangible aspects of past and contemporary cultures, here we focus on the management of places and material items of archaeological and historical significance in Canada, conducted in compliance with preservation laws. In Canada, legislative protection for cultural heritage resources reflects the division of powers split between federal and provincial-territorial governments. Since the 1970s, cultural heritage resources on most public and private lands have received some form of protection, although significant gaps exist for lands under federal jurisdiction (Pokotylo & Mason 2010). "Compliance" or "contract" archaeology is the most common practice of cultural heritage resource management conducted throughout the country.

Historical Background

The concern with cultural heritage resource management in Canada can be traced back prior to confederation of the country in 1867. As early as

the 1850s, discoveries of archaeological sites during colonial expansion and the rise of relic hunting in eastern Canada prompted individuals, such as Sir Daniel Wilson and Sir John W. Dawson, and natural history societies to collect information on sites and encourage collectors to donate artifacts to museums (Trigger 1966a, 1966b; Killan 1998: 16-7). The recovery of artifacts from a Montréal construction site by John Dawson in 1860 (Trigger 1966a) marks the birth of Canadian archaeology, and the earliest documented case of "rescue" archaeology in Canada.

The earliest legislation that was concerned with cultural heritage protection – the Indian Graves Ordinance – was enacted by the Colony of British Columbia in 1865. While some legislation for the protection and management of cultural heritage resources was present in the first half of the twentieth century (e.g., Quebec's 1922 heritage act, *Loi relative à la conservation des monuments et des objets d'art ayant un intérêt historique et artistique*; British Columbia's 1925 *Historic Objects Preservation Act*; the Northwest Territories' 1930 *Ordinance Respecting the Protection and Care of Eskimo Ruins*; and, Canada's 1930 *National Parks Act*), major developments did not occur until the 1960s and 1970s. Charles Borden's 1951–1952 survey and salvage of archaeological sites threatened by damming of the Nechako River in central British Columbia, constituted the first formal mitigation project in Canada, and was the catalyst for British Columbia's *Archaeological and Historic Sites Protection Act* (1960) that became a model for many other provinces developing similar legislation in the 1970s.

Key Issues

Legal Framework of Cultural Heritage Management

Each province and territory in Canada has cultural heritage protection legislation, and an administrative unit to implement and manage activities resulting from it (Table 1). The administrative units charged with regulating work under these acts are situated in a variety of ministries or departments that often have a broader scope beyond cultural heritage. The basic principle of most of this legislation is to provide blanket protection for all cultural heritage remains and sites, on private or public property, recorded or not, and the use of permits or licenses to control any alterations to those sites. Although these laws vary, they share many common elements regarding the nature and kind of heritage resources protected, special protection provisions, control over the conduct of work, ownership and stewardship, management of impacts, and civil remedies for contravention. Penalties, which may include fines and/or incarceration, vary across the country with differentiation between individual and corporate violators.

While some federal legislation is relevant to cultural heritage resource protection (e.g., *Canadian Environmental Assessment Act*, *Canada Shipping Act*, and *Cultural Property Export and Import Act*), Canada is the only G8-nations member lacking comprehensive federal cultural heritage resource management legislation (Lee 2002). The Heritage Branch of the Department of Canadian Heritage addresses questions of cultural heritage policy and legislation and, with the Archaeological Services Branch of the Parks Canada Agency, has developed directives governing cultural heritage under the control of either Parks Canada or the Department (Parks Canada 2005). The Archaeological Services Branch is responsible for cultural heritage within Parks Canada lands and also responds to requests for advice from other federal government departments.

In the early 1990s, the Government of Canada outlined its plan to pass legislation to protect archaeological resources on federal lands, including First Nations reserve lands, across Canada. However, this plan never reached fruition. A number of reasons have been cited to explain this failure (see Burley 1994: 77-8), including First Nations' objection to Crown ownership of archaeological resources (Dunn 1991a: 1, 1991b: 3) and proposed powers of the federal

Canada: Cultural Heritage Management, Table 1 Canadian provincial-territorial statutory laws affecting cultural heritage and responsible ministries or departments

Jurisdiction	Statute	Date[a]	Responsible ministry or department[b]
British Columbia	Heritage Conservation Act	1996	Ministry of Forests, Lands and Natural Resource Operations
Alberta	Historic Resources Act	2006	Culture and Community Services
Saskatchewan	Heritage Property Act	2010	Tourism, Parks, Culture and Sport
Manitoba	Heritage Resources Act		Culture, Heritage and Tourism
Ontario	Ontario Heritage Act	2006	Tourism Culture and Sport
Québec	Cultural Heritage Act	2011	Department of Culture, Communications and the Status of Women
New Brunswick	Heritage Conservation Act	2010	Wellness, Culture and Sport
Nova Scotia	Special Places Protection Act	1995	Communities, Culture and Heritage
Prince Edward Island	Archaeology Act	2006	Department of Health and Wellness
Newfoundland-Labrador	Historic Resources Act	2005	Department of Tourism Culture and Recreation
Yukon	Historic Resources Act	2002	Department of Tourism and Culture
Northwest Territories	Archaeological Sites Regulations	2001	Department of Education, Culture and Employment
Nunavut	Archaeological and Palaeontological Sites Regulations	2001	Department of Culture, Language, Elders and Youth

Source: Data drawn from publicly available Canadian provincial and territorial government websites
[a]Date refers to the most recent amendment of the statute, which may not be the initial date of enactment
[b]Ministry-department responsible for administering cultural heritage legislation as of December, 2011

government to unilaterally impose policy on Aboriginal archaeological resources (Dunn 1991b: 3). In 1999, the Canadian government initiated the Historic Places Initiative that included provision for a proposed "historic places act" to protect federally owned historic places, including archaeological sites, but such legislation has yet to be realized.

Cultural Heritage Management Practice in Canada

These mandates have changed the practice of archaeology in Canada over the last four decades. Most of the archaeological work conducted in the country is initiated by legislation and is associated with proposed development projects. The compliance process, irrespective of the specific legislation, consists of the following general steps:

- A proposed development is reviewed by the responsible government agency/agencies.
- This review may identify requirements for cultural heritage assessment studies.
- A qualified heritage consultant (typically private sector) is retained by the proponent and investigation permits are sought from government.
- Cultural heritage resource assessment studies are undertaken, followed by agency review and acceptance of the study recommendations. Depending on the nature of the results, additional studies may be required.

The organizational structure of cultural heritage management varies across the country and jurisdictions. While some government agencies (e.g., Parks Canada 2005) undertake some of their own work, a substantial private-sector industry of cultural heritage professionals has emerged to deal with the explosion of cultural heritage resource management work in Canada (estimated to be in the tens of millions of dollars). In effect, the private sector acts as an extension of government in that it undertakes investigations to fulfill the requirements of legislation. The development of the private-sector industry has also resulted in the creation of professional

organizations, mainly at the provincial level (e.g., British Columbia Association of Professional Archaeologists, Alberta Association of Consulting Archaeologists), but also at the national level (e.g., Canadian Association of Heritage Professionals), to support and self-regulate practitioners as well as to develop statements of ethics and codes of conduct specific to the needs of management-related activity.

Over the past two decades, an emerging disconnect between academic research and cultural heritage management has lessened in Canada. An increasing number of Canadian universities now offer relevant courses and programs to train future cultural heritage management professionals. Some governments (such as British Columbia and Alberta) have taken proactive steps to make grey literature more widely available to the cultural heritage community. Nevertheless, the sheer volume of material from development-driven work continues to present challenges to some museums serving as repositories for the resulting collections.

This legislation and resulting activity has also raised the public profile of archaeology, and the involvement of a variety of stakeholders in decisions on cultural heritage management. There is acknowledgement that public outreach and access is essential to effective cultural heritage management. This has resulted in the increased development of interpretive centers based around archaeological sites, by First Nations, as well as provincial and federal agencies.

First Nations in Canada are increasingly demanding more control over their cultural heritage (Ferris 2003) and changes are occurring at different levels throughout the country. While there are some commonalities, interpretations of what cultural heritage resources are, and their values, can vary considerably among First Nations across Canada, and often differ from current definitions provided by government statutes. For example, many First Nations groups do not differentiate between archaeological sites, traditional use sites, or sacred sites. For proposed development projects in Canada requiring government permits or approval, there is a common law "duty to consult" with Aboriginal peoples, based on judicial interpretation of the obligations of the Crown (i.e., federal, provincial, and territorial governments) with respect to potential, or established, Aboriginal or Treaty rights of Aboriginal peoples. Cultural heritage issues now figure prominently in these formal consultative processes. In some provinces and territories (e.g., British Columbia and Northwest Territories), First Nations have input into the licensing-permitting process, while other jurisdictions (e.g., Nova Scotia, Ontario) stipulate that First Nations must be involved once aboriginal cultural heritage resources are identified in assessment studies. In response to the desire for greater control over their cultural heritage, an increasing number of First Nations groups have developed their own heritage policies and permitting systems to assert influence within their traditional territories. While not legally binding, the professional community has largely respected this parallel management regime. A number of memoranda of understanding have been signed between Aboriginal peoples, government, and industry for the management of cultural heritage resources on traditional lands (Budhwa 2005; Nelles & Alcantara 2011). Addressing the above issues remains a challenge, and requires continued dialogue with First Nations to find common ground.

Cultural heritage management in Canada involves government, Aboriginal people, cultural heritage professionals, and academics. The successful implementation of cultural heritage management requires all of these groups to recognize and respect the validity of each other's values to achieve what is essentially the same common objective.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: Cultural Heritage Management Education
- ▶ Canadian Archaeological Association (CAA)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Heritage and Public Policy

▶ Heritage Legislation, The Introduction of: Disciplining Through Law
▶ Legislation in Archaeology: Overview and Introduction
▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

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Canada: Cultural Heritage Management and First Nations

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C

Introduction

Canada is a large (9,984,670 sq. km) country with a population of approximately 34.5 million that includes 633 recognized First Nations; each of these aboriginal groups is distinctive with their specific cultural practices, language, and priorities. (Names are a problem and, in the case of Canadian Aboriginal people, have changed with the times. Although the Indian Act remains in force in Canada, the term "Indian" is widely disfavored by those whom the term is used to describe. "Native" (but not "Native Canadian") and "Aboriginal" are occasionally used in self-reference, but "First Nations" and "First Peoples" are more commonly accepted at present. As there is no universally accepted term or definition, these four terms are used interchangeably in this entry.) The present relationship between cultural heritage management (of which archaeology constitutes a major component, and is the main focus here) and First Nations in Canada is multifaceted. It is useful to review the historical background of its development to better understand the current context.

Historical Background

Archaeological evidence of aboriginal people's occupation of the lands now known as Canada extends back at least 12,500 years (and possibly to 28,000 years ago) (Goebel et al. 2008). Notwithstanding the eleventh century Norse settlement at L'Anse aux Meadows – the earliest evidence of European settlement in the New World – the French initiated colonization of the country in the sixteenth century. This was

followed by British conquest and control in the mid-1700s, and then the confederation of several British North America colonies to form the country of Canada in 1867. The federal system of government that was established split many responsibilities of culture and heritage between federal and provincial-territorial governments that continues to the present. As the country expanded westward, the Canadian government continued the previous British colonial practice of military conquest and/or creating treaties with aboriginal people. Similar to other colonial countries, the federal government also attempted to assimilate aboriginal peoples through institutions such as Indian residential schools and legislation to systematically repress cultural expression (e.g., language, Potlatch and other ceremonial practices).

In the late 1800s, aboriginal lifeways throughout the country were viewed as disappearing in the face of territorial expansion. The Geological Survey of Canada's Anthropological Division was established in 1910, with a mandate to preserve information on aboriginal societies in Canada, and was housed in the newly established National Museum of Canada. While its focus was "salvage ethnography," rather than archaeological sites (which were not considered endangered), Harlan I. Smith was appointed as the Survey's first archaeologist in 1911. Thus, Canada's first professional anthropologists and archaeologists were situated in federal government departments, rather than in universities in the country. While archaeologists such as Smith worked with aboriginal communities, aboriginal participation was usually limited to field assistance, such as finding sites and acting as informants about their contents. While this significantly contributed to the success of the fieldwork, aboriginal people had little if any input into the direct practice of the archaeological research, as well as actions affecting their cultural heritage (e.g., removal of totem poles, excavation of burials, building museum collections).

Up until the 1960s, archaeology in Canada continued in its infancy, with only a few people professionally involved in archaeological work in the country. The 1960s was a time of substantial growth and development, impacting cultural heritage resources across the country. Archaeologists in Canada faced the monumental task of establishing a baseline understanding of the country's archaeological record as it was being diminished by increasing land development. Prior to World War II, there was minimal provincial-territorial or federal legislation for archaeological protection (e.g., Quebec's 1922 heritage act, *Loi relative à la conservation des monuments et des objets d'art ayant un intérêt historique et artistique;* British Columbia's 1925 *Historic Objects Preservation Act*; the Northwest Territories' 1930 *Ordinance Respecting the Protection and Care of Eskimo Ruins*; and, Canada's 1930 *National Parks Act*). The federal *Indian Act*, dating back in various forms to 1927, provided some limited protection to some sites and objects (e.g., grave houses and poles, totem poles, petroglyphs) located on reserve lands, but aboriginal people had no direct involvement in establishing these protocols. Archaeological heritage protection legislation emerged in Canada in the 1960s in British Columbia, and then throughout the country in the 1970s. These laws and their policies focused on general mainstream societal values, and did not explicitly address concerns of the aboriginal communities whose ancestors were responsible for the majority of the archaeological record in the country. First Nations lacked authority to make, or provide input to, and exert control over the preservation and management of their heritage, although issuance of permits for archaeological work in the province of British Columbia and the Northwest Territories encouraged consultation with local First Nations communities, when applicable.

As cultural heritage legislation came into effect across the country, aboriginal people were mobilizing to press their case for self-determination and control over rights and representation, including traditional lands and cultural heritage. The initial catalyst was the federal government's 1969 *Statement of the Government on Indian Policy*, (Canada. Department of Indian Affairs and Northern Development (DIAND) 1969) that provoked aboriginal reaction and resistance that continues to the present.

This has resulted in a series of landmark court cases that recognize inherent aboriginal rights in land and resources, the establishment of various kinds of aboriginal self-government, and negotiation of treaties in regions that previously lacked treaties. Of particular relevance to cultural heritage management is the Supreme Court of Canada's decision that the "Crown" (i.e., federal, provincial and territorial governments) has a duty to consult with First Nations and, where appropriate, accommodate their concerns when considering an action that may adversely impact potential or established aboriginal or treaty rights. In the context of such consultations, the prominence of cultural heritage matters is now reaching unprecedented levels and, for the first time, has the potential to significantly impact outcomes.

Key Issues

Milestone Events in Changing and Developing Relationships

Subsequent to the 1984 Declaration of Principles of World Indigenous Peoples (McGhee 1989: 15), First Nations in Canada have increasingly focused attention on their cultural heritage issues. Three events have had a major impact on archaeology and museums in the country.

In 1988, the Lubicon Cree First Nation protest of *The Spirit Sings* exhibit of First Nations material culture at the Glenbow Museum in Calgary (during the Olympic Winter Games) had a profound impact on museums and First Nations relationships, particularly recognition that only aboriginal people can speak for themselves. The Lubicon Cree First Nation, and numerous other aboriginal groups, requested academics and museums to boycott the exhibit, claiming it fostered a colonial perspective of First Nations rather than presenting the contemporary context (see Harrison et al. 1988). At the same time, controversy arose at the Canadian Museum of Civilization in Hull, Quebec, during the planning of its First Nations Gallery. Numerous aboriginal organizations strongly protested the presentation of the Bering Land Bridge theory to account for the origins of First Nations peoples in Canada. This raised the issue of who "owns" prehistory, and the implications of archaeologists' research for First Nations communities (McGhee 1989). These events resulted in the establishment in 1990 of the joint Assembly of First Nations and Canadian Museums Association (AFN-CMA) Task Force on Museums and First Nations. The resulting *Task Force Report on Museums and First Peoples* recommendations included: equal partnerships to be forged between museums and aboriginal peoples, increased involvement of aboriginal people in museum work to improve representation and interpretation of their culture and history; improved access to museum collections for aboriginal people; and repatriation of artifacts and human ancestral remains (Hill & Nicks 1992). In a typically Canadian style, the Task Force elected not to recommend legislation to realize these recommendations (particularly repatriation) preferring to build partnerships, as legislation (such as the *Native American Graves Protection and Repatriation Act* (NAGPRA) enacted by the USA in 1990) was perceived as potentially obstructive to fostering positive relations.

The Royal Commission on Aboriginal Peoples (RCAP) report, resulting from a 1990 confrontation over a golf course development in Quebec that included a Mohawk cemetery, presented a series of recommendations on aboriginal self-government, health, education, treaties, heritage, lands, and resources (RCAP 1996). It included a reconfirmation of the significance of a "firm cultural base" in the general health and wellness of aboriginal communities and members (Royal Commission on Aboriginal Peoples 1996: vol. 3, 586-602), and considered aboriginal people to be "the owners of cultural sites" with "sole jurisdiction" over them (Royal Commission on Aboriginal Peoples 1996: vol. 2, 648-9).

In 1996, the Canadian Archaeological Association (CAA), the main national-level professional society in the country, formed a First Nations Archaeology Committee to review the relationship between First Nations and archaeologists and establish ethical guidelines and obligations for the profession. After extensive

nation-wide consultation with the professional archaeological community and aboriginal people, the CAA prepared the *Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples* in 1996 (Canadian Archaeological Association 1997). These principles acknowledge aboriginal people's interest in protection and management of the archaeological record, its interpretation and presentation; recognize the need to consult with aboriginal communities to negotiate protocols of archaeological practice; and encourage partnerships with aboriginal communities in archaeological research, management, and education, based on respect and mutual sharing of knowledge and expertise. However, these principles do not explicitly define the relationship between First Nations and their heritage with respect to physical or intellectual ownership rights, and are not explicit on how to evaluate the appropriateness of protocols of practice. In May 2000, the CAA further broadened its archaeological code of principles by adopting *Principles of Ethical Conduct* for the profession that state compliance with the *Principles Pertaining to Aboriginal People*.

While they do not carry the weight of law, many cultural heritage institutions and archaeologists in Canada have adopted recommendations from both the AFN-CMA and CAA documents as guidelines in structuring their relations with First Nations, and these principles are changing the practice of cultural heritage research and management in the country. There are an increasing number of examples of shifts from policy to practice, as well as evaluations of the success of collaborations with First Nations communities (Holm & Pokotylo 1997; Hanna 2005; Rowley & Hauser 2008).

Issues and Challenges

Nevertheless, there remains a legacy of mistrust and apprehension among First Nations toward government, academic institutions, and the professional cultural heritage community that needs to be addressed. Major continuing concerns include: repatriation of both ancestral human and cultural remains, representation of First Nations culture and history, dissatisfaction with existing cultural heritage protection legislation, authority in stewardship, and participation in the protection of cultural heritage and the care of collections (see Nicholas 2009).

Repatriation has now been a pressing issue for over three decades in Canada. It was first raised as an issue at The Canadian Museum Association consultations with the Assembly of First Nations at the 1988 "Preserving Our Heritage" conference (McGhee 1989: 15). In 1990, the CMA-AFN Taskforce concluded that it was better to handle repatriation efforts on a case-by-case basis. At present, there is no national repatriation legislation, although one exists at the provincial level: Alberta's *First Nations Sacred Ceremonial Objects Repatriation Act* was enacted in 2000. The recent CAA guidelines, in conjunction with provincial and territorial permitting requirements, have resulted in a decreased number of human remains coming into museum and repository collections. Successful repatriation efforts (see Hanna 2005; Rowley & Hauser 2008) have been carried out under the AFN-CMA general guidelines, and protocols established by individual "ad hoc" museum polices that vary across institutions.

Issues of representation have become a focal point in discussions between Canadian museums and First Nations. Historically, the representation of aboriginal people within a museum context was characterized by little meaningful collaboration and involvement by aboriginal people. There has been a significant shift in the nature and scope of collaboration for aboriginal people to be able to represent themselves and their own histories (see Holm & Pokotylo 1997), as well as efforts to increase dissemination of knowledge to aboriginal peoples to make more informed decisions about the management, research, and presentation of their past and culture (see Rowley et al. 2010).

First Nations have raised objections to existing cultural heritage protection legislation, as well as the absence of federal legislation – Canada is the only G8-nations member lacking comprehensive federal cultural heritage resource management legislation (Pokotylo & Mason 2010). In the absence of

federal legislation, the Archaeological Services Branch of Parks Canada is responsible for cultural heritage within Parks Canada lands and responds to requests for advice from other federal government departments. Although, the Canadian government in 1999 took steps to establish a proposed "historic places act" that involved consultation with First Nations, legislation is not yet forthcoming. There are increasing demands by First Nations for control over their heritage, but present heritage preservation acts are still not explicit about Native ownership of their archaeological heritage. An initiative to pass federal legislation in the 1990s was unsuccessful, due in part to First Nations' objection to government ownership of archaeological resources (Dunn 1991: 3; Bell 1992: 482) and proposed federal powers that would unilaterally impose policy on aboriginal archaeological resources (Dunn 1991: 3). Given recent Canadian Supreme Court rulings that reaffirm the principle of fiduciary responsibility to protect the interests of aboriginal people, some archaeologists suggest there is a basis for arguing a case for a fiduciary obligation on the part of the Crown to care for aboriginal heritage sites and material (Ferris 2003).

Recent amendments to some provincial-territorial legislation provide greater direct aboriginal involvement and decision-making. In some provinces and territories (e.g., British Columbia and Northwest Territories), First Nations have input into the licensing-permitting process, while other jurisdictions (e.g., Nova Scotia, Ontario) stipulate that First Nations must be involved once aboriginal cultural heritage resources are identified in assessment studies. Given the desire for greater control over their cultural heritage, an increasing number of First Nations groups are developing their own heritage policies and permitting systems to assert influence within their traditional territories (e.g., Nicholas 2009). While not legally binding, the professional community has largely respected this parallel management regime. As well, more First Nations groups are hiring their own heritage specialists to inventory, research, and manage their own cultural heritage resources. These initiatives are establishing First Nations as not just collaborators, but cultural heritage managers, in provincial-territorial management schemes. An increasing number of memoranda of understanding are also being signed between aboriginal peoples, government, and industry for the management of cultural heritage resources on traditional lands.

Interpretations of what cultural heritage resources are, and their values, can vary considerably among First Nations across Canada, and often differ from current definitions provided by government statutes. For example, many First Nations groups do not differentiate between archaeological sites, traditional use sites, or sacred sites and object to the narrowly defined scope of cultural heritage assessments, given adherence to legislation, that often exclude traditional use sites and sacred sites to provide a more representative perspective of past aboriginal land use. Assessing the significance of aboriginal cultural heritage sites is also a major concern – although First Nations values are on the list of significance evaluation criteria, there is often criticism that Western perspectives and scientific values weigh heavily in the evaluation process, particularly in cases where there is little material evidence. This is compounded by concern over the relative ranking of significance of heritage resources that contradicts aboriginal perspectives that all ancestral sites are significant. Both provincial-territorial and federal heritage policies are starting to address this, but aboriginal knowledge and value systems need to be incorporated to effectively remedy the problems.

Future Directions

Although we have identified above many issues in the relationships of First Nations and Canadian heritage institutions and professionals involved in the research and management of aboriginal cultural heritage in Canada, and challenges to be faced, we can also point to positive developments. Over the past two decades, there has been a slow but progressive shift toward partnership and collaboration based on mutual respect and shared responsibility. Some examples are

noted here. Although the country still lacks comprehensive federal heritage legislation, the Canadian government has placed greater emphasis on commemorating aboriginal heritage sites nationally and internationally (as World Heritage Sites) to correct imbalance in representation of the pre- and post-contact heritage of the country, and a number of aboriginal sites are currently on Canada's World Heritage Site tentative list.

In British Columbia, few treaties were negotiated at the time of colonial settlement, and negotiation land claims remain a major political issue. Over the past two decades, archaeologists are increasingly working closely with First Nations, who have recognized the potential contribution of archaeology in presenting their court cases for continuous occupation of unceded traditional lands (see Nicholas 2006). Over this same time period, there have been a number of Treaties signed with British Columbia First Nations that include provisions for cultural heritage resources. For example, with the Nisga'a Nation, cultural resources are addressed in a comprehensive fashion. In Chapter 17, Protection of Heritage Sites (Sections 36 to 39), of the *Nisga'a Final Agreement* (Nisga'a Nation et al. 2000), the treaty allows the Nisga'a Nation to develop their own processes to manage cultural heritage sites on Nisga'a lands. Further, the treaty states that the government of British Columbia will develop or continue processes to manage heritage sites until the Nisga'a Government establishes their own policies. In other words, the treaty allows the Nisga'a to develop their own heritage protection processes, and until such time that this has been implemented, the provincial status quo is maintained.

First Nations have more influence, power, and involvement in cultural heritage matters than they did just a few years ago, given recent court decisions on the "duty to consult" that brings First Nations to the negotiating table. They are taking on a major role in the management of heritage resources within their traditional territories. There is also an increasing level of day-to-day inclusion and involvement of aboriginal people on cultural heritage management projects (although this varies dramatically across the country); this can range from acting in the capacity of "site monitors" representing First Nations' interests, "field assistants" providing assistance with the field investigations up to the level of principal investigator. While things are getting better, there is still a considerable way to go for First Nations to assume a major participatory and authoritative role in the management process, and formal transfer of responsibility has just begun to be realized in cases of treaty settlement lands (Grier & Shaver 2008).

Increased educational opportunities for aboriginal peoples, particularly in post-secondary education, have now resulted in the emergence of Canadian-educated First Nations cultural heritage specialists who now hold positions ranging from heritage consultants working for First Nations and private industry to university faculty. This is having an impact on capacity-building within First Nations communities, provides a stronger aboriginal perspective in cultural heritage management practice, and, ultimately, contributes to methodological and theoretical developments within the discipline (e.g., Yellowhorn's 2002 "Internalist Archaeology",) as Indigenous Archaeology (Nicholas 2010) becomes a distinct recognized subdiscipline.

Looking to the future, we can expect a greater convergence of government legislation and policy that addresses First Nations' interests, values, and priorities, and greater participation and influence of First Nations in the cultural heritage resource management process. New treaties will likely follow the precedent of including provisions to transfer control of day-to-day management of cultural heritage sites on treaty settlement lands. Cultural heritage professionals and institutions will continue to be proactive in developing meaningful partnerships with First Nations communities that realize increased aboriginal power in the design, conduct of cultural heritage research and management. The rate of this change will be determined by attitudes of provincial-territorial and federal governments, First Nations' capacity-building, and their ability to take the time to address the question of cultural heritage resources in the face of other competing priorities such as health care, housing, and employment.

Acknowledgments The authors would like to thank the following individuals for providing their observations and reflections on the topic of cultural heritage management and First Nations in Canada: William Moss, Susan Rowley, Bruce Stewart, and Ron Williamson.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Canadian Archaeological Association (CAA)
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Postcolonial Archaeologies
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Stakeholders and Community Participation

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Canada: Cultural Heritage Management Education

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Introduction

Canada is the northern nation in North America. Historically, the territory now called Canada was settled in waves. Archaeological evidence suggests it began perhaps 30,000 years ago with First Nations (Wright 1976). Europeans – Scandinavians (about 1,000 years ago), French, and finally British (from 500 to 100 years ago) – colonized the land. Four British colonies joined, and Canada became a nation in 1867. The nation has continued to develop to have ten provinces and three territories.

The large area and the history of the country fragmented cultural heritage management policy and practice across Canada. That area and history also allowed heritage policies to change with the development of the nation so that now, stewardship of and education about Canada's archaeological heritage work to protect that heritage and strengthen the cultural identities of Canadians.

Initially, a federal system of government was adopted. This established that the federal government was responsible for cultural heritage on federal lands and on First Nations' lands as per treaties. The federal government was also responsible for the international trade in cultural heritage. Provincial (now 10) and territorial (now 3) governments had jurisdiction over education and culture otherwise (see Table 1 below).

Under the "National Policy" of economic development and territorial expansion in the late nineteenth century, the recording and display of (then) present and past life ways of First Nations peoples were undertaken before their assumed assimilation. The National Museum of Canada was founded in 1911 and became the home for this work, done by Canada's first archaeologist Harlan I. Smith and first anthropologists Edward Sapir and Marius Barbeau (Dyck 1998: 116).

Barbeau's close work with American anthropologist Franz Boas began the influence of American anthropological theory on Canadian cultural heritage management both federally and in the developing provincial museums. Change would begin in the 1960s.

The first Canadian Archaeology department (not as part of Anthropology) was opened at the University of Calgary in 1964. Canada's first Canadian-trained Ph.D. in archaeology graduated in 1967 (Mackie 1995: 181-2). That year, 1967, was the centenary of Canada's birth as a nation, and the focus on, and funding for, Canada's heritage expanded.

Canadian archaeologists, mostly at the National Museum, organized themselves into the Canadian Archaeological Association (CAA) in 1969 (Simonsen 1996: 1) and began publishing the Canadian Journal of Archaeology. The Archaeological Survey of Canada (ASC) was created out of the archaeological staff of the National Museum of Canada to work on federal lands. First Nations did not have input into policies concerning their lands (Arawack 1986). Parks Canada had the mandate for archaeological work at National Historic Sites and National Parks (Burley 1994: 83). There was therefore a de facto split, with the CAA and ASC focused on precontact (i.e., of First Nations with Europeans) and Parks Canada focused on postcontact archaeology.

The federal government decentralized its offices from the capital of Ottawa to create regional centers in 1970. In 1971, funding and policy favored the establishment of museums across Canada, not just in major centers (Dixon et al. 1974: 2). Federal legislation was drafted to deal with international import and export of antiquities (*Import and Export Act* RSC 50.51 1974-75-76 Canada).

Also in this period after 1945, avocational or nonprofessional archaeological groups developed formally across the country (see Table 1). At about the same time, professional, contracted "cultural resource management" archaeology companies were also developing, mostly in urban areas to work with archaeological heritage threatened by building and development. This urban work, or work at historic sites took place in the public eye, with increasing public interest and involvement.

Key Canadian archaeologists worked on these postcontact urban sites and began to develop public programming to create a sense of stewardship and belonging in order to protect the archaeological heritage. However, they found neither a theoretical base nor professional acceptance for their work in Canada and so, sought these outside the country.

Theoretically, Canada was pursuing a cultural-historical approach to archaeology with a focus on First Nations' cultures. In this environment, Canadian archaeologists sometimes avoided American theory to assert Canadian national identity, and some stated that fieldwork could be the same as theory (Kelley & Williamson 1996: 10).

Therefore, Canadian public archaeologists had to seek a theoretical basis for their work outside of Canada. Paul Erickson of Nova Scotia, founder of the Teaching Anthropology Newsletter, worked through the American Anthropological Association (AAA); Québec archaeologists from Montréal and Québec City made contacts with other urban archaeologists at the Society for Historical Archaeology (SHA); and Karolyn Smardz (now Smardz Frost) of Toronto and Heather Devine of Alberta joined the Society for American Archaeology (SAA) Public Education Committee. Smardz also worked closely with Stone and the World Archaeological Congress (see Stone & Mackenzie 1990: 293-307).

These archaeologists became the vanguards in Canada for American and British archaeological theory such as Critical Theory (see Leone & Potter 2003) or Interpretive Archaeologies (see Hodder 1991, 2000) and the practice that was becoming known as public archaeology. These pioneers of public archaeology in Canada established influential programs and resources such as Paul Erickson's *Teaching Anthropology Newsletter*, the Reseau Archéo-Québec, and the Pointe-à-Callière Museum. Devine authored teaching resources and Smardz founded the Archaeological Resource Centre for the Toronto Board of Education and published widely for

Canada: Cultural Heritage Management Education, Table 1 Federal, provincial, territorial governments, museums, societies/agencies, programs for Canadian archaeology CHME

Government (search "archaeology" for relevant department)	Museum	Society or agency	CHME programs and resources of note for archaeology
Government of Canada www.gc.ca	Canadian Museum of Civilization www.civilization.ca	Parks Canada Agency (Archaeology) www.pc.gc.ca	Canadian Heritage Information Network (CHIN) www.chin.gc.ca
	Virtual Museum of Canada www.virtualmuseum.ca		Parks Canada – Fortress of Louisbourg www.fortressoflouisbourg.ca/ArchaeologyE/
Alberta http://alberta.ca	Royal Alberta Museum www.royalalbertamuseum.ca	Archaeological Society of Alberta www.arkyalberta.com	Glenbow Ranch Park Foundationwww.grpf.ca
			Head-Smashed-In Buffalo Jump www.head-smashed-in.com
British Columbia www.gov.bc.ca	Royal British Columbia Museum www.royalbcmuseum.bc.ca	Archaeology Society of British Columbia www.asbc.ca	Museum of Anthropology at The University of British Columbia www.moa.ubc.ca
		Underwater Archaeology Society of British Columbia (UASBC) www.uasbc.com	UASBC Nautical Archaeology Society Courses (see UASBC)
Manitoba www.gov.mb.ca	The Manitoba Museum www.manitobamuseum.ca	Manitoba Archaeological Society www.manitobaarchaeologicalsociety.ca	Manitoba Heritage Network http://home.cc.umanitoba.ca/~anthrop/manarchnet
New Brunswick www.2.gnb.ca	New Brunswick Museum www.nbm-mnb.ca	New Brunswick Archaeological Society	Metepenagiag Heritage Park www.metepenagiag.com
Newfoundland and Labrador www.gov.nl.ca	The Rooms www.therooms.ca	Newfoundland Historical Society www.nlhistory.ca	Cupids www.baccalieudigs.ca
			Ferryland www.heritage.nf.ca/avalon/arch
Northwest Territories www.gov.nt.ca	The Prince of Wales Northern Heritage Centre www.pwnhc.learnnet.nt.ca		
Nova Scotia www.gov.ns.ca	Nova Scotia Museum www.museum.gov.ns.ca	Nova Scotia Archaeology Society www.novascotiaarchaeologysociety.com	
Nunavut www.gov.nu.ca	Virtual Museum of Nunavut www.cley/gov.nu.ca/en/museum		
Government	Museum	Society or agency	Programs and resources
Ontario www.ontario.ca	Royal Ontario Museum www.rom.on.ca	Ontario Archaeological Society www.ontarioarchaeology.on.ca	Cataraqui Archaeological Research Foundation www.carf.info
			Museum of Ontario Archaeology www.uwo.ca/museum/
			Ontario Heritage Trust www.heritagetrust.on.ca
			Toronto and Region Conservation Authority Boyd Archaeological Field School www.boydfieldschool.org

(*continued*)

Canada: Cultural Heritage Management Education, Table 1 (continued)

Government	Museum	Society or agency	Programs and resources
Prince Edward Island www.gov.pe.ca	Provincial Museum of PEI and Heritage Foundation www.gov.pe.ca/peimhf		
Québec www.gouv.qc.ca	Musée de la Civilisation www.mcq.org/index_en.html	Comité d'histoire d'archéologie subaquatique du Québec (see government or Reseau)	Pointe-à-Callière www.pacmusee.qc.ca
		Recherches Amérindiennes au Québec www.recherches-amerindiennes.qc.ca	Reseau Archéo Québec www.archeoquebec.com
Saskatchewan www.gov.sk.ca	Royal Saskatchewan Museum www.royalsaskmuseum.ca	Saskatchewan Archaeological Society saskarchsoc@sasktel.net	University of Saskatchewan www.arts.usask.ca/archanth/
			Wanuskewin Heritage Park www.wanuskewin.com
Yukon www.gov.yk.ca			Dawson City Museum www.dawsonmuseum.ca

a broad audience. Pokotylo and Guppy (1999, 2002) jointly authored and wrote studies about Canadian attitudes to archaeology, founded a graduate course in Public Archaeology at the University of British Columbia, and as joint chair of the CAA, worked to establish a statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples (see www.canadianarchaeology.com/caa/about/ethics).

From these efforts, the groundwork was laid that gained acceptance for public archaeology in Canada so that interpretation and education programming about archaeological heritage has become part of cultural management across Canada. Public archaeology programming was mandated at Parks Canada sites under Parks' Guiding Principles (see Canada 1994) though has been reduced through budgetary cuts from 2012. It is found at Canadian museums and as part of provincial policy for licensing and permitting archaeological research. It is also part of archaeological work for and with local communities and First Nations. Some exemplary programs and resources that have developed are listed below in Table 1.

Definition

The aspect of Cultural Heritage Management known as public archaeology, as practiced in Canada, is multifaceted. It grew from the definition coined by McGimsey (1972: 5).

Under the umbrella term of "Archaeology Education," stemming from Smardz and Smith's *Archaeology Education Handbook* (2000), public archaeology is seen to include teaching about archaeology in formal education systems – elementary, secondary, and postsecondary; undertaking archaeology programs in museums, at archaeological, and historic sites; publishing and creating media productions for wide public audiences; and lobbying politically for changes to heritage legislation.

As well, community archaeology programming is undertaken, following the model of an empowered public directing archaeological research (as per Pope & Mills 2004).

The public for public archaeology in Canada is also multifaceted and reflects McManamon's (1991: 121) use of the term "publics" to indicate various stakeholders in archaeological heritage. As an officially multicultural country (as per the Canadian Multiculturalism Act RS 1985 c. 24), Canada is incorporating the multivocal and inclusive approach of public archaeology. This includes the reclamation of identities by colonized peoples (see Cooper & Stoler 1997: 31), the foundation for a sense of belonging for immigrants, and even the development of regional economies through sustainable tourism.

Current Debates and Future Directions

There remain areas to be addressed in Cultural Heritage Management Education (CHME) in Canada. There is the lack of a national forum for Cultural Heritage Management Education. There is no national professional body for CHME work, despite some CAA work. There is no national forum in which to link provincial or territorial and avocational groups, and there is no national heritage legislation. This has led to duplication of programming and services across the country and to uncertainty about federal oversight or protection of archaeological heritage that is not located on federal lands or on First Nations' territories.

As a result, with regard to First Nations' cultural heritage management, the Canadian Museum Association (CMA) only began consultation in 1988 with the Assembly of First Nations. Consultation continued at the 1991 Aboriginal Archaeology Symposium at the Canadian Museum of Civilization and at the CMA's Curatorship and Indigenous Perspectives in Post-Colonial Societies Conference in 1996. That year also, the CAA adopted its Principles for Ethical Conduct Pertaining to Aboriginal Peoples.

By 2006, the CAA hosted meetings on Evolving Discourses in Indigenous Archaeology in Canada, and by 2009, elected a member of a First Nation as CAA president.

Despite these initiatives, the role of First Nations in protecting and interpreting their own archaeological heritage remains a matter of negotiation among stakeholders.

Therefore, while CHME has become a recognized aspect of archaeological research in Canada, there remain areas of political will and legislated change that are required to include all Canadians in the management of their archaeological heritage.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Canada: Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canadian Archaeological Association (CAA)
- ▶ Community Archaeology
- ▶ Constructivism in Archaeology Education
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Outreach
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Museums and the Public
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Heritage: Public Perceptions
- ▶ Parks Canada: Historical Archaeology

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Canada: World Heritage

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Introduction

The Convention concerning Protection of the World Cultural and Natural Heritage (the World Heritage Convention) was adopted by UNESCO Member States in 1972, and entered into force on December 17, 1975. The World Heritage Committee and World Heritage Fund became operational in 1976.

There are three official scientific advisory bodies to the UNESCO World Heritage Committee: (1) the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), an intergovernmental organization dedicated to the conservation of cultural heritage; (2) the International Council on Monuments and Sites (ICOMOS), a non-governmental organization (NGO) that provides expertise and evaluation of cultural properties nominated for inscription on the World Heritage List; and (3) the International Union for the Conservation of Nature (IUCN), another NGO that provides expertise and evaluation of natural properties nominated for inscription on the World Heritage List (Cameron 1990).

Objectives of the World Heritage Convention include "…identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage of outstanding universal value" (UNESCO 2008: 2). The core concept of "outstanding universal value" is defined as "..cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity" (UNESCO 2008: 14). The protection of heritage sites of such significance is viewed as the responsibility of the international community and by becoming a State Party to the World Heritage Convention, countries are obligated to fulfill this mandate.

Historical Background

In 1972, Canada sent federal government representatives, from Parks Canada, as delegates to the World Heritage Convention founding meetings in Paris and on July 23, 1976 Canada became a State Party to the World Heritage Convention (Pinkerton 2010). Parks Canada was designated as the lead agency for the implementation of the Convention in Canada – a role which continues to this day. This responsibility of Parks Canada is a logical extension of its original mandate defined in 1930, when Canada's parliament passed the *National Parks Act* (amended in 1988) that created Parks Canada to protect and develop areas of national significance to Canada's natural and cultural heritage (Lothian 1976, 1977, 1979, 1981).

Canada has played a prominent role in the development and implementation of the World Heritage Convention from its origins to the present day. To date, at least three Canadians have served as Chair of the World Heritage Committee.

Equally important is Canada's leadership in the technical and advisory aspects of the World Heritage Convention for both natural heritage and cultural heritage. For example, Canadians have held prominent roles within ICCROM, ICOMOS and the IUCN.

Canada's date of adhesion to ICCROM was July 11, 1978 and numerous Canadians and Canadian Agencies have provided resources, leadership and technical expertise to this organization. A recent example acknowledging the leadership role played by Canadian heritage professionals in ICCROM was UNESCO's nomination in 2011, of Carleton University Professor Herb Stovel for the prestigious ICCROM award. This award recognizes exceptional contributions to the conservation community, and is given to individuals who have made significant contributions in the field of conservation, protection and restoration of cultural heritage.

With respect to cultural heritage, Canadians have held the position of Secretary General or Director for the ICOMOS Secretariat in Paris, including the early years (1979–1983) following the implementation of the World Heritage Convention (see LeBlanc 1984). Other Canadians have served as ICOMOS World Heritage Advisors, chaired expert meetings, and played a crucial role in the development of doctrinal texts such as the Appleton Charter for the Protection and Enhancement of the Built Environment (1983).

With IUCN, Canadians have held several prominent roles (including Director General). In the early years of the World Heritage Convention, Parks Canada's Chief of Planning (Harold Eidsvick) was seconded to IUCN in Switzerland (1977–1980) and elected Chair of what is now the World Commission on National Parks – the unit of IUCN then responsible for the World Heritage Convention. Other Canadians have served as Executive Officer for IUCN's commission on National Parks and Protected Areas, and Senior Advisor to IUCN's World Heritage Committee.

At the first meeting of the World Heritage Committee, where the initial sites were inscribed on the World Heritage List (1978), the Canadian government nominated two sites: Nahanni National Park Reserve in the Northwest Territories, based on natural criteria; and L'Anse aux Meadows National Historic Site in Newfoundland, based on cultural criteria. This latter site was actively being investigated at that time and is the earliest known European settlement in the New World, dating to c. CE 1000.

As of January 2012, Canada has 15 World Heritage Sites (nine based on natural criteria; six based on cultural criteria), eight of which are managed by Parks Canada (Table 1) (UNESCO 2010). Of the six cultural sites, four represent post-contact settler history (one French, two English and one Norse); the other two commemorate both pre- and post-contact aboriginal cultures (Haida and Blackfoot). Two of these sites, Waterton-Glacier International Peace Park and Kluane/Wrangell – St. Elias/Glacier Bay/Tatshenshini-Alsek, are examples of international cooperation where existing Canadian and American National Parks were jointly proposed to the World Heritage Committee for World Heritage Site status.

Canada's only official Tentative List was submitted in 1980. In recognition of its age, Parks Canada initiated a process to prepare a revised list in 2002 (Table 2). Of the 11 sites on this revised Tentative List, two have since been inscribed: The Rideau Canal (2007) based on cultural criteria and Joggins Fossil Cliffs (2008) based on natural criteria. Of the remaining nine sites, seven are under consideration, at least in part, based on cultural criteria (four aboriginal, one Acadian, one Basque and one English).

Key Issues/Current Debates

At present, there are no significant national or international debates over Canada's existing or proposed World Heritage Sites. The Canadian government is quietly preparing nomination dossiers and sites will be brought to the World Heritage Committee in due course. With respect to existing World Heritage Sites in Canada, as in most other countries, government funding and land use pressure are current and future issues that need to be addressed. The latter is

Canada: World Heritage, Table 1 Canada's natural and cultural world heritage sites

Name	Type	Date inscribed	Culture[a]
Kluane/Wrangell – St. Elias/Glacier Bay/ Tatshenshini-Alsek (Yukon and British Columbia)	Natural	1979	
SGang Gwaay (British Columbia)	Cultural	1981	Aboriginal
Nahanni National Park Reserve (Northwest Territories)	Natural	1978	
L'Anse aux Meadows National Historic Site (Newfoundland and Labrador)	Cultural	1978	Norse
Head-Smashed-In Buffalo Jump (Alberta)	Cultural	1981	Aboriginal
Dinosaur Provincial Park (Alberta)	Natural	1979	
Wood Buffalo National Park (Alberta and Northwest Territories)	Natural	1983	
Canadian Rocky Mountain Parks (Alberta and British Columbia)	Natural	1984	
Historic District of Old Québec (Québec)	Cultural	1985	French
Gros Morne National Park (Newfoundland and Labrador)	Natural	1987	
Old Town Lunenburg (Nova Scotia)	Cultural	1995	English
Waterton-Glacier International Peace Park (Alberta)	Natural	1995	
Miguasha National Park (Québec)	Natural	1999	
The Rideau Canal (Ontario)	Cultural	2007	English
Joggins Fossil Cliffs (Nova Scotia)	Natural	2008	

[a]Primary cultural/ethnic association

Canada: World Heritage, Table 2 Canada's Tentative Nomination List (2004) for natural and cultural world heritage sites

Name	Type	Culture[a]
Áísínai'pi (Writing-On-Stone) (Alberta)	Cultural	Aboriginal
Atikaki/Woodland Caribou/ Accord First Nations (Pimachiowin Aki) (Manitoba and Ontario)	Natural	
Grand-Pré (Nova Scotia)	Cultural	Acadian
Gwaii Haanas (British Columbia)	Natural/ Cultural	Aboriginal
Ivvavik/Vuntut/Herschel Island (Qikiqtaruk) (Yukon)	Natural/ Cultural	Aboriginal
The Klondike (Yukon)	Cultural	English
Mistaken Point (Newfoundland and Labrador)	Natural	
Quttinirpaaq (Nunavut)	Natural/ Cultural	Aboriginal
Red Bay (Newfoundland and Labrador)	Cultural	Basque

[a]Primary cultural/ethnic association

particularly acute in the Canadian Rocky Mountain Parks World Heritage Site where there is a strong demand for visitor amenities, employee accommodation and associated infrastructure. Limits on available funding and land use pressure can potentially erode the integrity of the listed sites. This is a common challenge for many World Heritage Sites throughout the world, although Canada's sparse population (34.5 million, largely concentrated along its southern border with the United States) and sheer size (9,984,670 sq km) exacerbates this problem.

Representativeness of Canada's World Heritage sites is certainly a challenge for the country. Canada is a massive country with huge natural and cultural diversity. The French – English dichotomy of Canada is well known, but there also is the mosaic of cultures reflected in Canada's other immigrant population and the 633 recognized, distinct aboriginal groups in the country. While this diversity constitutes a great wealth, it also creates an obligation to guard against bias in selection of sites for nomination (e.g., non-aboriginal/aboriginal or French/ English) and the need to engage and collaborate with these groups on nominations put forward for consideration (Pinkerton 2010). The provinces of Saskatchewan and Prince Edward Island are not represented in Canada's World Heritage Sites (existing or on the Tentative List).

Future Directions

Canada's existing and tentative list of World Heritage Sites demonstrates there are sites in Canada with outstanding universal value warranting commemorating on the world stage. This includes natural and cultural heritage worth recognizing, rather than just emphasizing natural history which is a common Canadian stereotype. As reflected by the Tentative List, natural history, wildlife, aboriginal and non-aboriginal cultures will be acknowledged. The Tentative List includes mixed nominations (cultural and natural criteria) as well as less common "types" of cultural heritage (e.g., cultural landscape). These are positive signs and reflect a certain maturity in Canada's approach to World Heritage (see Pinkerton 2010: 29).

While Parks Canada does not have an overarching strategic plan for the World Heritage Site nomination process, in all likelihood Canada will continue to work through its portfolio of tentative sites with new sites added as considered appropriate and resources allow. For its existing World Heritage Sites, Canada will continue to treat these sites with the respect they deserve and will address management challenges as they emerge to the best of its ability (see Pinkerton 2010: 25). Canadian heritage professionals will undoubtedly continue the legacy of providing expertise and leadership in the arena of World Heritage for many years to come, either as private individuals or with organizations such as ICCROM, ICOMOS and IUCN.

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▶ Canada: Cultural Heritage Management and First Nations
▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
▶ Cultural Heritage and Communities
▶ Cultural Heritage Management and the Colonial Culture
▶ Cultural Heritage Management: Building Bridges
▶ International Conventions Pertaining to Heritage Policy: Introduction
▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
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Canadian Archaeological Association (CAA)

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Basic Information

Anthropologists, such as Franz Boas, once thought that grave robbing was an appropriate research method. While on a collecting expedition near Victoria, British Columbia, he regularly sought out Indian graves and collected any bones and artifacts he found (Cole 1999). Of course he was not alone in that endeavor as people had been looting Indian cemeteries long before Boas visited the northwest coast. During the Gold Rush days, in 1865, the Crown Colony of British Columbia enacted the *Indian Graves Ordinance; An Ordinance to Prevent the Violation of Indian Graves*, which prohibited the taking of property that the Crown claimed as part of the public domain. The penalty for breaking this law was a fine and imprisonment. Given its intent and what it reveals about research methods then in vogue, ethical practices could only evolve and improve.

Over a century later, in 1968, archaeologists reached a milestone when they created the Canadian Archaeological Association (CAA) to be their national voice. Prior to that, they had only organized on the provincial level. Such was its fledgling status that some years would pass before ethics became a subject in their profession's conversation, though the topic did simmer. At a symposium organized by the Royal Society of Canada, in 1976, ostensibly convened to discuss new perspectives in Canadian archaeology, any mention of ethics was notably absent. Only Basil Johnston, an Ojibway who worked as an ethnologist at the Royal Ontario Museum, directly addressed the issue of museums, human remains, and ethical research. He expressed his concern at a time when Native people were reacting to government policy and finding their own voice in the nation's politics (McKay 1976).

Major Impact

Native activists of the 1970s and 1980s advanced the cause more forcefully until their efforts began to elicit a dialogue with the archaeological community. They protested that the treatment of human remains inflicted harm on Aboriginal people by putting their ancestors on display as if they were mere specimens. They argued that their heritage should not be routinely exhumed with methods that represented an arrogant display of power. Moreover, judgments from the Supreme Court after 1982, when Aboriginal rights were included in the modern constitution, generally made Canadians aware that these rights had to be accommodated. Thus, by the beginning of the 1990s, the trajectories of archaeological research and Aboriginal rights discourse were finally intersecting. Changes in public policy began to affect matters within the profession too, though the dialogue showed more influence from legal precedents and public laws than ethical considerations. Negotiated settlements for comprehensive land claims in northern Canada shed more certainty on the rights of Aboriginal people to control their own heritage. Once passed through the parliament, they became legal documents with the full weight of federal law and subsequent agreements, all containing similar articles clarifying that process. Coeval with these developments, the Social Sciences and Humanities Research Council announced that it would put more emphasis on ethical research and would consider only research proposals that had passed ethical review.

Against this backdrop, the CAA acknowledged that it could no longer avoid issuing a statement to direct its members when communicating with Aboriginal peoples. In 1992, with a grant from the federal government's Department of Communication, the CAA began a consultative effort to define guidelines for its membership. The executive created an ad hoc committee called the Aboriginal Heritage Committee, which had members from all regions of the country and Aboriginal communities. Its terms of reference were to organize regional

meetings and to solicit input from as many stakeholders as possible. To this end, the members sought the advice of varied individuals and groups on the issues to be included in a draft statement that would be brought to the general membership. After 2 years, the draft, Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples, was completed and articulated 12 core principles organized around four themes. CAA members debated the draft statement at their annual meeting in 1994 and voted by a substantial margin to accept it. The full text was published in the Canadian Journal of Archaeology in 1997 (CAA 1997; see also Rosenswig 1997 and Wylie 1997).

The Canadian Archaeological Association's *Principles of Ethical Conduct* and the *Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples* can be consulted at the following stable hyperlinks:

- http://canadianarchaeology.com/caa/about/ethics/principles-ethical-conduct
- http://canadianarchaeology.com/caa/statement-principles-ethical-conduct-pertaining-aboriginal-peoples

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Ethics in Archaeology
- ▶ Yellowhorn, Eldon

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Cape Krusenstern Societies

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Introduction

Cape Krusenstern is one of the most extensively documented coastal archaeological sites in the North American Arctic. The site complex is located in northwest Alaska on the western shore of the Chukchi Sea and north shore of Kotzebue Sound; the beach ridge system is above the Arctic Circle and at the southeastern tip of Cape Krusenstern National Monument (Fig. 1). The site complex consists of more than 4,000 years of human occupation on a prograding beach ridge system that began forming shortly after sea level stabilized in the region approximately 5,500 years ago. The oldest beach ridges are found near the modern day lagoon, with the ridges successively younger as one travels seaward (Fig. 2, Table 1). The older human occupation of the site complex is therefore found near Krusenstern lagoon, while the more recent occupations are located closer to the modern shoreline where people still camp, fish, and live today. Before the widespread use of radiocarbon dating, this horizontal stratigraphy played a key role in establishing the regional and Arctic-wide archaeological chronology for the last 4,000+ years. This sequence includes Denbigh (Arctic Small Tool tradition), Choris, the anomalous "Old Whaling" site, Norton-Near Ipiutak, Ipiutak, Western Thule, Kotzebue, and Historic Inupiat,

Cape Krusenstern Societies, Fig. 1 Location of Cape Krusenstern beach ridge complex in northwest Alaska

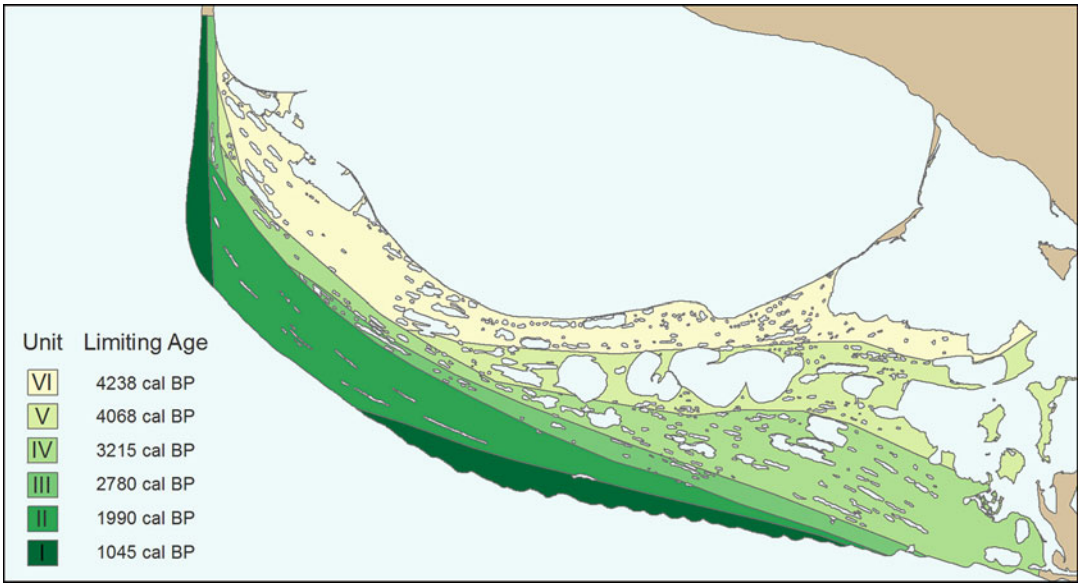

Cape Krusenstern Societies, Fig. 2 Cape Krusenstern beach ridge complex with archaeological limiting age for each depositional unit

Cape Krusenstern Societies, Table 1 Comparison of new limiting ages for beach occupations to prior age ranges and archaeological cultural designations (Giddings & Anderson 1986; Mason & Ludwig 1990; Mason & Jordan 1993; Darwent & Darwent 2005)

Beach segment (Mason and Jordan 1993)	New limiting date	Prior age range	Archaeological culture
I (VII)	1,045 cal BP	900 cal BP to present	Thule, Kotzebue, Historic Inupiat
II (VI)	1,990 cal BP	1,500–1,000 cal BP	Ipiutak, Birnirk, Thule
III (V)	2,780 cal BP	2,500–2,000 cal BP	Norton/Near Ipiutak
IV (IV/III)	3,215 cal BP	2,900–2,500 cal BP	Choris (including Old Whaling)
V (II/III)	4,068 cal BP	3,500–3,000 cal BP	Denbigh, early Choris
VI (I)	4,238 cal BP	4,200–3,500 cal BP	Early – classic Denbigh

including several type sites of the later archaeological cultures. The beach ridges themselves are a record of past coastal environment and landscape evolution. For these reasons, the Cape Krusenstern beach ridge site complex was designated a National Historic Landmark in 1973. It remains one of the most significant archaeological sites in the North American Arctic.

J. Louis Giddings led the earliest archaeological research at Cape Krusenstern. While carrying out dendrochronological and archaeological fieldwork throughout northwestern Alaska and the Seward Peninsula, Giddings struck upon the idea of "beach ridge archaeology" as a framework for chronologically ordering archaeological deposits as well as studying coastal formation processes and sea level change (Giddings & Anderson 1986). Giddings' field assistant and interpreter of two seasons, Almond Downey of Noatak, suggested Cape Krusenstern as a possible study site. Giddings' team subsequently worked at Krusenstern from 1958 to 1962. Giddings's student, Douglas Anderson, returned in 1965 to carry out additional excavation and also spent the 1973 season mapping unexcavated features. Several smaller-scale archaeological projects were carried out at the Cape and in the surrounding region in the intervening years (e.g., Anderson 1977; Zimmerman 1981; McClenahan 1993; Young 2000; Darwent & Darwent 2005). Various projects (Mason & Ludwig 1990; Mason & Jordan 1993, 2002; Jordan & Mason 1999) expanded on initial work on coastal geological processes by Hopkins (Giddings & Anderson 1986) and furthered the coupled archaeological-paleoenvironmental research agenda initiated by Giddings at the Cape. Linked archaeological, geological, and environmental research continues in the region to this day. Research ongoing in 2012 focuses on study of human-environment interactions, with the broader goal of better understanding how people adapted to and altered their changing Arctic environment in the past (Anderson & Freeburg 2009).

Definition

The beach ridge landscape is characterized by low, undulating ridges that can be divided into geochronological sections in part through differences in beach ridge height, width, and composition; differences in these characteristics across sections reflect changes in the coastal environment over the last 5,000+ years (Mason & Jordan 1993; Jordan & Mason 1999). The ages of the beach ridge sections are roughly defined based on archaeological dates (Fig. 2, Table 1), but current efforts to geologically date ridge formation are key to refining the local chronology of landscape evolution and coastal paleoenvironmental change. The Cape Krusenstern beach ridges, for the most part comprised of pebble and cobble-size rock rather than sand, were deposited during periods of fair weather and eroded over episodes of extended coastal storminess in the region. Correlated beach ridge complexes around the Chukchi Sea coast form a coastal storminess

proxy for the region (Mason & Jordan 1993; Jordan & Mason 1999). Initially, the ridges at Krusenstern formed a series of spits that were connected to the mainland at the north end of the beach ridge complex. Over time, these spits grew eastward and eventually connected with the mainland at the east end of the beach ridge complex; this created the brackish lagoon that today serves as the northern boundary of the site and beach ridge system (James Jordan, *pers. comm.*, 2011).

The beach ridge system is punctuated by areas of marsh, tundra ponds, and small lakes (Fig. 2). The development of small ridge systems on the eastern and western ends of the largest lakes suggests that the lakes are fairly stable and are at least several centuries old. The lagoon is drained into Kotzebue Sound by the Tukrok River. A series of small seasonal streams and wetlands bound the eastern end of the beach ridge complex. Because of this diverse environment, past and present people living at the Cape have access to diverse marine, terrestrial, and riverine resources. Archaeological faunal deposits indicate that for at least the last 2,800 years, people here relied mainly on bearded and ringed seals as well as other small ice-associated seals and, to a lesser extent, other marine species such as walrus, beluga, and gray and bowhead whales. It is likely that in the past, as in the present, inhabitants of the Cape used the area for late spring/early summer seal hunting. Fish and bird bone preservation is generally poor, and terrestrial fauna are only minimally represented in archaeological deposits although caribou, musk ox, fox, and hare are present. Although the Cape is within the modern territory of the Western Arctic Caribou Herd, caribou do not typically move over the Cape in large numbers today. Presumably people in the past also relied on the plant resources at the Cape for food and other subsistence needs, although there is little direct evidence of this because of poor organic preservation.

Occupation of the beach ridges spans several significant mid- to late Holocene environmental shifts, specifically the Neoglacial and Little Ice Age (LIA). Periods of sustained storminess marked by beach ridge degradation at Krusenstern and other Chukchi Sea beach ridge systems are known from 3,300 to 1,700 ^{14}C yr BP and from 1,200 to 900 ^{14}C yr BP (Mason & Jordan 1993; Jordan & Mason 1999). The relationship, however, between local storminess, climate, and ice conditions is complex. From various regional paleoclimate proxies, it is apparent that the mid- to late Holocene environment throughout northwest Alaska was cooler and wetter than the early Holocene but also highly variable overall. Variability and, perhaps, unpredictability in environmental conditions increased after 1,500 years ago. A period of significant Neoglacial cooling from 4,000 to 1,000 years ago was followed by a period of warming – perhaps related to broader Medieval Climatic Optimum conditions – between 1,000 and 300 years ago. LIA cooling prevailed across the region between about 300 cal BP and the mid-1800s (see Anderson & Freeburg 2009 for summary).

The archaeological site complex encompasses components of the major Western Arctic archaeological cultures of the mid- to late Holocene: Denbigh, Choris, Norton-Near Ipiutak, Ipiutak, Thule, Kotzebue, and Historic Inupiat (Table 2). The oldest beach ridge sites, linked to the Denbigh complex, are small stone tool scatters and hearth features that represent the earliest evidence of seasonal or short-term coastal occupation in northern Alaska. The size and low density of these older sites at the Cape indicate that for more than 1,000 years, people continued to visit Krusenstern only seasonally; lack of faunal preservation makes it difficult to understand what time of year people visited the coast.

Beginning around 2,800 years ago, there is an increase in the number of sites at the Cape and a change in tool technology. Pottery is added to the toolkit, along with ground slate tools and labrets, and chipped tool styles shift as well; these changes suggest increased interaction across the Bering Strait during this period, known as the Choris culture. At Krusenstern, the small-size and limited archaeological deposits suggest continued seasonal or short-term visits to the beach ridge complex. More substantial contemporaneous sites on the Choris

Cape Krusenstern Societies, Table 2 Summary of northwest Alaska and Bering Strait archaeological cultures for the last 4,500 years (see Mason 2009 for additional information). Note the overlapping date ranges

Archaeological culture	Approximate age ranges (cal BP)	Geographic distribution
Denbigh	4,500–2,750	Kotzebue Sound, Brooks Range
Choris	2,750–2,250	Kotzebue Sound, Brooks Range, northern Yukon Territory
Norton (Norton-Near Ipiutak in northwest Alaska)	2,250–1,350	Southern AK Peninsula to Western Canada, unknown in Siberia and Chukotka
Ipiutak	1,750–1,150	Norton Sound to Point Barrow, interior of northwest Alaska and Brooks Range
Birnirk	1,350–750	Eastern and western shores of Chukchi Sea
Thule	1,000/950–550	Bering Strait to Greenland
Arctic Woodland	750–250	Inland areas of northwest Alaska
Kotzebue	550–250	Coastal areas of northwest Alaska

Peninsula and at Wales, however, indicate that after about 2,800 years ago, some people began to live on the coast for longer periods of time, building semisubterranean houses for winter use. These changes in technology, subsistence, and settlement patterns indicate increased reliance on marine resources, although caribou continued to be an important part of the diet as well. The potentially unique Old Whaling site at Cape Krusenstern dates to the Choris period as well. As far as is currently known, Choris is the oldest occupation in NW Alaska with a developed maritime adaptation, though it remains possible that evidence for earlier maritime lifestyles has been lost to rising sea level.

The relationship between Choris and subsequent Norton-Near Ipiutak, Norton, and Ipiutak cultures is unclear. Norton-Near Ipiutak culture may have developed out of Choris culture in northern Alaska around 2,500–2,000 years ago (Giddings & Anderson 1986) and can be considered a Bering Strait/northwest Alaskan variant of the broader Norton cultural tradition that extends across western Alaska. In northern Alaska, the limited evidence suggests that residence patterns shifted from large Choris settlements to isolated winter houses and people seem to have had a varied subsistence base during this period. Across northwest Alaska, there is a dramatic increase in settlement size, subsistence, and social complexity after about 1,500 years ago. This period is also marked by considerable technological and subsistence variability, as well as evidence of increased conflict and interaction. At Krusenstern, there is a marked increase in the number and type of sites at the Cape, with the presence of semisubterranean houses indicating permanent or semipermanent cold season occupation of the coast. The relationship between various chronologically overlapping archaeological cultures from this period including those identified at the Cape (Ipiutak, Birnirk, Thule) is not well understood (Table 2). The Ipiutak period occupation at Cape Krusenstern, dated to between about 2,000 and 1,050 years ago, is one of the largest in the region. More than 20 Ipiutak houses and multiple settlements were identified at the Cape through survey and excavation. Ipiutak archaeological culture is defined by the lack of key elements of earlier Norton-Near Ipiutak and Choris technology such as ground slate, lamps, and pottery and also by a distinct lithic technology and artistic tradition that includes intricately carved bone, antler, and ivory objects. Elaborate burial traditions indicating the development of social difference are less prevalent at Krusenstern compared to other Ipiutak settlements (e.g., Point Hope).

The Birnirk cultural component at Krusenstern is small, limited to two settlements, and lacks many characteristic Birnirk artifacts found at the type site near Barrow. This pattern may be due to differences in subsistence at Krusenstern where caribou and seal, rather than

whale, were the primarily focus (Giddings & Anderson 1986: 94). It may be more accurate to describe these "Birnirk-like" sites at Krusenstern as part of a larger Neoeskimo archaeological culture that varies somewhat by region; these sites would then be considered older variants of the northwest Alaskan Thule archaeological culture. The size and abundance of Thule settlements at Krusenstern indicate that occupation of the Cape continued to increase during this period. House sizes are larger and differ in composition from prior periods. Beginning around 550 years ago, there was a shift in the settlement patterns at Krusenstern, with smaller and more dispersed settlements replacing the extensive Thule period settlements. The reason for this change across the region is the subject of much debate. Environmental factors, such as changing resource availability, are commonly cited as an explanation; sociopolitical change brought about by greater articulation with international exchange networks is also a possible factor. Over time, settlement and use of the Cape diminished, particularly after direct contact with Russians and Euro-Americans; across northwest Alaska, people became centralized in larger villages and towns. Today, some families still camp seasonally at the Cape, and many visit for shorter periods of time as part of subsistence activities.

Key Issues and Current Debates

The role of environmental change in the origins and migration of Neoeskimo culture is a topic of debate. Neoeskimo culture (approximately 1,450 cal BP to eighteenth century CE) is considered the antecedent to modern Yupik and Inupiat cultures in Alaska and across the Arctic. In the past, it was thought that Neoeskimo populations expanded into the eastern Arctic when climate warmed around 950 cal BP, about 100 years after the initial influx of Neoeskimo people into Alaska. New paleoenvironmental data and archaeological dates now indicate that this was not the case, and archaeologists are currently exploring new explanations for the rapid expansion of Neoeskimo culture across the eastern Arctic perhaps beginning around 700 years ago, 100–200 years later than previously thought. Cape Krusenstern is located north of the Bering Strait region and is part of a greater Beringian region of long-term human interaction and migration. This location, coupled with a long-term and near continuous archaeological and paleoenvironmental record, makes the Cape Krusenstern beach ridges a key research locale for better understanding the factors underlying the development and expansion of Neoeskimo groups across the Arctic. These efforts to better understand how people survived and thrived in past periods of environmental variability are increasingly important in the face of modern environmental change in northern regions.

A key issue in the archaeology of northwest Alaska concerns the origins of fully maritime adaptations, which is usually taken to mean significant dependence on the hunting of sea mammals such as the seals, walrus, and whales that still predominate in Inuit subsistence economies across the Arctic. While dwellers of the Pacific Asian coast south of the Sea of Okhotsk and in western North America south of the Bering Sea developed these adaptations in the early to mid-Holocene, available evidence suggests that maritime adaptations arrived or were innovated only around 3,000 BP by people living on the seasonally frozen subarctic and arctic coasts of the Okhotsk, Bering, and Chukchi Seas. Dumond and Bland (1995) suggest that this may have been a result of the movement of North Pacific Eskaleut marine mammal hunters into the Bering Strait and Chukchi Sea regions (see also Crockford 2008). Following Mason and Ludwig's (1990) reinterpretation of the beach ridge sequence at Cape Krusenstern, Dumond and Bland suggest that the anomalous "Old Whaling" site at Cape Krusenstern represents this initial expansion. They then suggest that the better represented Choris phase assemblages at Krusenstern and elsewhere are descendants of Old Whaling. This interpretation makes sense of the available evidence, which is very sparse, and provides a hypothesis for continued research at Cape Krusenstern and elsewhere in the Bering and Chukchi Seas.

Another dimension of the question of maritime adaptations concerns the origins and antiquity of whale hunting itself. Despite its name, considerable debate surrounds the significance of the whale bones found at the Old Whaling site (see Ackerman 1998; Darwent & Darwent 2005). Although archaeologists have sought connections between Old Whaling and contemporary or earlier occupations on the Chukchi coast and northern islands of Siberia (Ackerman 1998), the origins of Old Whaling culture at Cape Krusenstern remain unclear. On the basis of the presence of long lance points and whale bones, Giddings and Anderson (1986) argued that the site represents an early manifestation of active whale hunting. Confounding this interpretation is the absence of harpoon technology there and the absence of any evidence of whale hunting for roughly 1,000 years afterward anywhere in the Bering Strait region. Other researchers suggest that the whale bones may have been scavenged from beached carcasses and the points used for hunting smaller sea mammals. If confirmed through additional research, the recent discovery of a 3,000-year-old carving of a whale hunting scene at the *Un'en'en* site on the south coast of the Chukchi Peninsula, in a site reportedly similar to Old Whaling at Cape Krusenstern (Dan Odess, *pers. comm.*, 2008), supports Giddings and Anderson's original interpretation of an actively whale hunting culture tracing back to the beginning of the record of committed maritime lifestyles. If and why whaling was then suspended until the emergence of Neoeskimo traditions 2,000 years ago remains a mystery.

Future Directions

Renewed research at Cape Krusenstern has revised the regional paleoenvironmental and archaeological chronology and settlement history established by Giddings and Anderson in the 1950s and 1960s. Ongoing analysis of systematically collected survey data from the Cape indicate that the settlement record from the last 2,000 years is more complex, and more extensive, than previously thought. Future research focused on human-environment interactions during this period will shed light on the question of Neoeskimo origins and migration, as well as the factors behind significant settlement and subsistence changes in the last 500 years. Research directed at testing hypotheses about the origins of whaling, and the development of maritime adaptations in general, would contribute key data to broader debate on these topics. Crucial to future efforts is connecting research at Krusenstern with current work in Russia; joint international research directed at addressing the research questions outlined here would result in a more comprehensive picture of the mid- to late Holocene human-environment record in the Arctic. Less research driven but more emergent is the rapid erosion of parts of the coast line at Krusenstern and across the Arctic, which is quickly destroying significant portions of the coastal archaeological record. This modern coastal erosion threatens to erase the archaeological record at Krusenstern; excavation aimed at mitigating this loss is as important as pursuing other research goals at the Cape.

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► Arctic Ocean and Bering Sea: Maritime Archaeology

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Capitalism in Archaeological Theory

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Introduction

At the turn of the twenty-first century, discussions of capitalism permeate historical archaeology. Most of these works are by Marxist scholars, but archaeologists have used a variety of other theoretical perspectives to study capitalism. All of these discussions, however, emphasize everyday life and social relations as the keys to understanding capitalism. Archaeologists also live capitalism, and increasingly scholars are calling for an activist archaeology that challenges capitalism.

Definition

No consensus exists on a precise definition of capitalism or on the historical context of its making. This is because capitalism is not a thing that can be isolated, dissected, weighed, and measured. Rather, capitalism is a complex set of dynamic human relationships that are at the same moment economic, social, cultural, and ideological. People experience capitalism differently, depending upon their position in this web of relationships, and these differences in experience motivate people in their struggle to transform society and their positionality. Modern scholars cannot step away from capitalism to objectively view it because they live and work within the relations of capitalism. As an economic system, capitalism entails private ownership of the tools, resources, and raw materials necessary for production (the means of production) for the creation of goods and services to exchange for profit in a market. The social relationships of capitalism necessitate that workers sell their labor power to the owners of the means of production in order to survive. In the capitalist wage labor relationship, the owners gain profit by paying workers less than the value that they add to the product. Capitalism promotes a subjectivity that leads individuals to see the self as existing before its cultural construction in relations of kin, community, race, belief, gender, or sexuality. When individuals use the market to distinguish themselves from others, capitalism validates the self. Capitalist ideologies present the autonomous self as human nature and the economic and social relationships of capitalism as either universal or inevitable.

Archaeological studies have focused on the social, cultural, and ideological relations of capitalism.

Capitalism transformed labor from a self-affirming, community-building activity that was the source of property rights to a commodity sold in a labor market. This relationship defines social roles. Workers lack access to the means of production and must sell their labor power in the market. Capitalists control the means of production and buy labor power in the market. The capitalist owns the labor process and can sell the products to make profit. On the other hand, worker can only sell their creative energy and their liberty for a given period and are alienated from their own labor as well as its products. Thus, capitalism bases ownership rights to newly created value on ownership of the tools and raw materials used in the production of value, not the labor used to create value.

Alienation refers to the separation of aspects of the human condition that naturally belongs together or to antagonism between aspects that are properly in harmony. Workers lose control of the products of their labor. Capitalist workers do not determine the design, the manner of production, or the disposition of the objects that they create with their hands and minds. Capitalism alienates workers from the act of producing. Deskilling breaks the work down into a series of mindless and repetitive tasks (imagine an assembly line), and mechanization requires workers to serve machines rather than machines to serve people. Capitalism alienates workers from themselves. They become replaceable cogs in an abstract machine instead of human beings capable of defining their own value through direct, purposeful activity. Finally, capitalism alienates workers from other workers by reducing labor to a commodity instead of a social relationship between people involved in a common effort for survival or betterment. The competitive labor market serves to reduce labor costs and increase profits. Workers must compete with each other to sell their labor and to survive. Alienation "frees" individual workers from the social relations of kin, guild, union, or community to act in their own self-interest. This subjectivity of individualism treats relationships between people as if they were interchangeable, modular, and reproducible and fetishizes these relationships in things.

The labor market, the alienation of workers, and the concomitant rationality of capitalism enhance commodity fetishism. Commodity fetishism expresses, mediates, and transforms social relationships between people into objectified relationships between things. Commodities are things produced mainly for exchange. In production, workers make objects. However, capitalist production breaks down production into a chain of many steps so that the workers no longer recognize the input of their own labor. Instead, the finished thing turns into a mystical entity with a monetary market value, as if that latter value was no longer due to the workers' own labor. In capitalism, individuals must enter into the market to procure the things necessary for life. In the market, their only connection with other individuals may be limited to the economic transaction. In capitalist production and exchange, commodities and money express, negotiate, and meditate social relations so that things may come to dominate people. Commodity fetishism prods individuals to use the market and commodities to construct their identities of self.

Capitalist ideologies represent individualism as human nature and deny the historic construction of the economic and social relationships of capitalism in at least two ways. First, ideology naturalizes the cultural by making capitalist cultural and historical values, attitudes, and beliefs seem entirely "natural," "normal," self-evident, timeless, obvious "common sense," – and thus objective and "true" reflections of "the way things must be." Second, ideology obscures masks or denies the inequalities and exploitation inherent in individualism and capitalist relations. Ideologies implicitly and explicitly invest meaning in material culture, and these meanings influence and are influenced by social behavior.

People live capitalism in their everyday lives. A wide variety of social relations affect that lived experience including class, race, gender, sexuality, and ethnicity. In this experience, people have embraced, negotiated, resisted, and fled

capitalism. The realities and reach of capitalism have varied over time. Thus, capitalism has never been unchallenged or totally successful in reducing the social to the individual or every aspect of lived experience to a commodity. Scholars who confront capitalism find lessons for struggle and the means to engage capitalism in this contested experience.

Historical Background

Much about the history of capitalism is contested. Capitalist ideology claims that capitalism does not have a history but rather is an expression of human nature or the expansion of age-old practices of antiquity. Challengers to this ideology write the history of capitalism to show that it has a history, that this history was not inevitable or predestined, and that capitalism springs from a specific historical context. These critical scholars disagree on the epoch of capitalism's origins and on the historical processes that created capitalism. They can agree on two things concerning the history of capitalism. It is a phenomenon of the modern era (post-CE 1500), and it is the dominant form of social relations in the West and probably the world today.

At the broadest level, the debate over capitalism's origins breaks down into three positions (Appleby 2010). Exchange theorists link the origins of capitalism to the early-sixteenth-century development of merchant capitalism, based on exchanges for profit, in a global market (Wallerstein 1974). Production theorists argue that the Industrial Revolution at the end of the eighteenth century establishes wage labor as the dominant social relationship of the European economy and marks the beginnings of capitalism (Wolf 1982: 296-8). More recently, these discussions have shifted to debates opposing theories that find capitalism's origin in European agrarian relationships to more global perspectives (Wood 2002).

Merchants profit results from buying goods in a location where they are common and then transporting them and selling them in a location where they are rare. As such, merchant profit has existed far back into antiquity. Exchange theorists argue that technological advances in late medieval/early modern Dutch and English agriculture increased production and freed more people and resources for trade. These agricultural advances coupled with the looting of the indigenous civilizations of the Western Hemisphere built up capital for investment in Europe. Unlike the merchants of antiquity who traded for themselves, Dutch and English merchants invested capital in the first joint-stock companies, such as the Dutch East India Company. These companies traded in exotic goods, enslaved humans, and increasingly in raw materials such as beaver pelts to make felt, deer hides, sugar, and cotton. The profits from these exchanges provided the capital necessary for industrial production and mass wage labor. By second half of the eighteenth century, merchant profit became linked to production and the extraction of profit via wage labor. Merchants brought raw materials from around the globe to Europe where waged workers converted them into finished goods, most of which merchants then sold abroad to meet the needs of the primary producers of the raw materials.

Production theorists find the beginnings of capitalism in the mass expansion of wage labor during the eighteenth century and the rise of industrial capitalism. The British "enclosure movement" encouraged this process as large landowners appropriated communal lands and displaced tenets that had grown food crops. Innovation in agricultural technology and the introduction of new crops, principally the potato, allowed fewer farmers to produce more food. Landowners replaced the tenets with sheep that they sheared for wool. Textile production shifted from craft work to factory production to weave greater quantities of wool into cloth to meet growing demand in a global market. The factory systems of production entailed a complex division of labor between and within production processes and the routinization of work tasks. Increased mechanization, the division of labor and routinization allowed the first capitalists to replace skilled artisans with unskilled, disenfranchised tenets who had been displaced

by enclosure and therefore had to work for a wage to survive. This shift to waged labor gave the capitalist more control over the production process and the ability to extract greater profit from that process. This increased production and generation of capital established the global domination of the capitalist mode of production.

The drive for greater profits in industrial capitalism generates economic cycles of 40–60 years in duration. Modern scholars refer to these cycles as Kondratieff Waves, named after the Russian economist Nikolai Kondratieff who defined them in the 1920s. Capitalists can increase profits by reorganizing the work place (which usually involves increasing mechanization and/or cutting wages) and by expanding markets. During the initial A phase of a Kondratieff Wave, the rate of profit increases, and in the second B phase of a Kondratieff Wave, the rate of profit decreases and economic depressions occur. Innovations in production and/or a shift in production to new commodities initiates the A phase of the wave. We can characterize each A phase by the products produced and the markets that it creates. As production swells, competition between capitalist firms increases saturating markets and the demand for the products. This saturation or realization crisis results in declining rate of profits (the B phase of the wave) until innovations in technology or the reorganization of the workplace create new markets and demands to spur another A wave. Some scholars claim that increased competition over less profit in the B phase leads to major wars. Regional shifts in the centers of capitalism, transformations in the relations of production, and significant changes in markets occur at the transition between the B and A part of the wave.

The maturation of industrial capitalism initiated the first Kondratieff Wave toward the end of the eighteenth century, and the B phase of this wave hit bottom in the 1840s. During this wave, waged factory workers in Europe and, later, the United States produced consumer goods for rural populations in these centers and for primary producers in the rest of the world. These consumer goods included the factory-made ceramics, glass, smoking pipes, and buttons that archaeologists dig up, but most important was cotton. Peasants in India and enslaved Africans in the southern United States grew cotton that merchants carried to Manchester, England, and Lowell, Massachusetts. Here, waged workers wove that cotton into cloth. These workers drank tea grown by Asian peasants and sweetened by sugar produced by enslaved Africans in the Caribbean as a stimulant that allowed them to stand longer at their looms. Capitalists sold the cloth primarily to the rural peasants and yeoman farmers of Europe and the United States and to clothe the Asian peasants and enslaved Africans who produced the cotton, tea, and sugar. Thus, a small minority of the world's workers labored in capitalist relations of production (wage labor), but their production called into being and maintained noncapitalist relations of rural production and racialized slavery elsewhere in the world. Commonly capitalist seeks to maintain the growth of the A phase by opening new markets. Thus, in the early nineteenth century, the British sponsored and supported the liberation of Spanish America which removed Spanish restrictions on British trade to the region.

Steam power and railroads drove the next Kondratieff Wave that began in the 1840s and continued until the end of the nineteenth century. The expansion of transportation infrastructure (railroads) drove the A phase of this wave. Railroads increased the efficiency of transportation and lowered the cost of goods. Railroad construction also created demand for steel, wood, cloth, and glass to build the tracks and trains. Steam powered the locomotives and also larger factories that employed more waged laborers to produce consumer goods. Increasingly waged laborers took up more of the market for consumable goods in core industrial states, but outside of Europe and North America, the vast majority of people of the world labored in noncapitalist relations of production. The completion of the railroad net in core states initiated the B phase of the wave. For the United States, this event occurred in 1877, and the immediate decrease in demand plunged the country into a deep depression. In the B phase, capitalists sought new markets and built railroads in South America, Asia, and Africa.

In South America, the United States and European powers controlled economies and expanded both wage labor and debt peonage. European powers divided up Asia and Africa into colonies. Significant shifts also occurred between centers. For example, at the transition to the B phase in the mid-1870s, industrial production in the United States exceeded that of Great Britain and Japan industrialized.

During the first half of the twentieth century, the third Kondratieff Wave began, driven by steel production, chemicals, electric motors, and internal combustion engine. In this wave, wage laborers became the majority of workers in the core industrial states of Europe and North America but not in the rest of the world. Much of this production focused on durable goods primarily for consumption by the bourgeois class. In Europe, production for the colonies drove a great deal of the demand. In the United States, production of consumer goods still focused on rural populations with an increase in production of durable goods. At the end of the A phase of this wave, capitalists sought new markets by expanding the production of durable goods for wage laborers. The most famous example of this is Henry Ford who initially produced the Model T automobile for farmers but then shifted the market to industrial workers. This period witnessed the widespread reorganization of the work processed to assembly line production, which allowed capitalists to increase profits but still increase wages. The third wave ends with the Great Depression of the 1930s and World War II. In the B phase of the wave, state communism established itself first in Russia and later in Eastern Europe and China. During World War II, industrial production expanded in Latin America, especially in México and Brazil.

The automobile drove the fifth Kondratieff Wave from World War II to the 1990s. In the core areas, factories produced durable goods for waged laborers. Generally in this wave, capitalists increased profits through mechanization. Increases in wages allowed more workers to buy more stuff, especially durable goods, most notably the automobile. During this wave, the United States was unquestionably the dominant economic and political power in the world. In the B phase, capitalists sought to raise falling profits by lowering wages. They did this by increasingly shifting consumer goods production from the core industrial states to Asia and Latin America. In the A phase of this wave, independence movements swept the colonies of Europe, and during the B phase, communism collapsed in Europe and was transformed into a state capitalism in China.

It is difficult to study and understand a long wave when you are in the midst of it. Several clear shifts have occurred in contemporary capitalism. These would include the following: (1) the rise of information technology and computers which has increased the importance and volume of production of intellectual and creative commodities such as computer programs, entertainment, and apps; (2) capitalists increasing profits principally by lowering wages; (3) deindustrialization of core economies especially in Western Europe, Great Britain, and the United States; (4) production of consumer goods primarily occurs in Asia (especially China) and Latin America; (5) global advances in communications and transportation that speed up the global processes of capitalism; and (6) the rise of China as capitalist economic power and the establishment of the European Union.

Some scholars and popular pundits argue that we now live in a postindustrial or postcapitalist world. We may be able to speak of Detroit, Michigan, as a postindustrial city or Great Britain as a postindustrial nation, but in no sense is the world postindustrial or postcapitalist. To the contrary, capitalism has intensified and extended its reach further than any other time in history. We live in an era of fast capitalism (Agger 2002).

We still live in a capitalist world where economic processes are based in the ownership of private property and waged labor. Modern capitalism, however, is an accelerated, hyped-up capitalism that holds a more profound sway over the peoples of the earth than it ever has before. The world is, in fact, more capitalist today than it was when Marx wrote in the middle of the nineteenth century. At that time, private property and

waged labor only dominated in Europe. For most of its existence, capitalists increased profits by incorporating noncapitalist regions of the world or by expanding wage labor into new geographic areas. Today, virtually no corner of the world lies outside of capitalism's control. Capitalists now increase profits by speeding up the processes of capitalism and by penetrating all aspects of social life. The globalization of the modern world is neither new nor unique. Capitalism began as a global phenomenon. What has changed is the speed of global capitalism. The rapid expansion of information technologies (including computers, software, satellites, fiber optics, and the Internet) has transformed the global economic landscape. These expansions accelerate capitalism both in terms of speed and reach. Advances in transportation, such as container ships, allow goods to be produced wherever in the world wage rates are lowest. The new information technologies allow technical, clerical, and even professional services to cross the globe seeking the lowest wage. To make a profit, firms must cut wages and overhead. Workers who do not accept less lose their jobs as whole industries hop around the world. The pressures to deliver all goods and services at the least possible cost create hypercompetitiveness. This process erodes worker's rights and benefits and proletarianizes professional occupations including archaeology. Fast capitalism expands by oozing into every nook and cranny of society to create new needs. Powerful capitalists in business, education, and government embrace hypercompetition to make market principles the dominant ethic for all social relations. They evaluate all social relations in terms of costs and benefits and by the bottom line of profit. Their success corrodes socially derived moral frameworks and political programs.

Key Issues

Archaeologists confront many issues in the study of and the living in capitalism. Scholars studied prehistory and ancient civilizations to demonstrate that the relations and ideology of capitalism are not simply human nature or universal. Archaeologists have asked how the temporality of the everyday is enmeshed within the broader developments of the capitalism. In particular, they have examined how people have challenged capitalism in the everyday. Archaeologists have paid particular attention to the development of capitalist ideologies and their manifestation in the material world. Finally, archaeologists work and live within capitalism. Some have examined how our work reinforces or challenges capitalism and others have examined how capitalism shapes the practice of archaeology.

Archaeologists have demonstrated that capitalist class relations are but one of many different ways in human history that elites have appropriated labor and the products of labor from primary producers. Moreover, these scholars also seek to use a deep understanding of past societies to show that as a historical product capitalism can be changed. Such studies begin with V. Gordon Childe (1951) who argued that scholars must take sweeping historical views to see past the immediate realities and beliefs of capitalism. Luis Lumbreras (2005) has followed in Childe's footsteps, asking questions about the origins of stratification and writing the history of stratification before capitalism in Latin America. Bruce Trigger (2003) did a comparative study of early civilizations to define similarities and differences with an eye to how such an understanding could better enable us to alter our capitalist world. Robert Chapman (2003) argues that to understand how inequality was created and maintained in the long sweep of human history is the basis for critique and action to transform the complex and unequal world of capitalism.

Numerous researchers have argued that archaeology provides a necessary approach to study the lived experience of capitalism and to subvert the ideological masking of this experience (Orser 1996; Leone & Potter 1999; Matthews 2010). The historical changes in production and the extraction of profit in capitalism are written upon the artifacts and feature that archaeologists study. Archaeologists find these things as the result of their use in daily life. More importantly, material things are more than

just the reflection or outcome of human hands and machines. They express the social relations that are the conditions for their existence. They are both the products of social relations and part of the structure of those relations. Through them, we can study how capitalism transforms and is transformed by daily life. Archaeology also gives us an access to daily life that avoids ideologically loaded written records.

In Great Britain, archaeologists have researched the transition from feudalism to capitalism, while US researchers have looked for the beginnings of industrial capitalism. Matthew Johnson's (1996) *An Archaeology of Capitalism* is the seminal work in this vein. Johnson finds the roots of capitalism in the movement from openness to closure in this landscape. Other archaeologists have excavated in tenant cottages abandoned due to enclosure. For example, Chris Dalglish's (2003) study of rural southern Scotland compares changes within the domestic space of the house with larger transformations of the landscape that were labeled "improvements." Both of these works emphasize the contradictions and conflicts between the domestic and the broader world and in the social relations that exist in each of these contexts. Sarah Tarlow (2007) shows how the archaeology of late-eighteenth-century England manifests a widespread and crosscutting ethic of improvement in early capitalism. Thomas Cuddy (2008) examines archaeological sites in the Chesapeake region of Maryland to explore the origin of industrial capitalism in the United States. He charts the stages of production from household manufacturing to larger workshops to mechanized factories.

North American archaeologists have found new insights about rural, Native American and African-American experience by examining them as aspects of capitalism. Mark Grover (2003) studied a rural farmstead in eastern Tennessee that might be facilely dismissed as marginal hillbillies. He shows how the household was economically part of the larger experience of American capitalism. In the history of California, Native Americans often disappear after the missions are closed in 1840. They of course did not but instead became an ethnically distinct part of the California working class. Stephen Silliman (2004) reconstructs the everyday life of indigenous workers and the social relationships of labor that shaped that experience to show how they were a key component in the multiethnic labor force of mid-nineteenth-century California. Paul Mullins (1999) examines how African-Americans in twentieth-century Annapolis used consumption to negotiate class and racial identities.

Many archaeologists have looked at capitalism in terms of the challenges and resistance that it engenders. Some of these studies have focused on working-class life, strikes, and how workers subverted the work disciplines of capitalism (Shackel 2009). Archaeologists have also sought to humanize and treat as active agents populations that capitalized ideology demonized. These studies include extensive research on enslaved Africans and indigenous peoples, investigations of urban slums and of prisons, and communities of deportees. Others write alternative histories that challenge capitalism by revealing life ways that existed at the edge of/or beyond capitalism. These life ways include utopian communities, cultural practices such as African-American hoodoo, cooperative housekeeping, and communities of escaped slaves or quilombos (Matthews 2010).

Much contemporary archaeological research work focuses on capitalist ideology. They find material culture to be an active component in the creation and negotiation of ideology. This work starts with Mark Leone's (2005) interpretation of the Georgian Order of the eighteenth-century Anglo world as the ideology of merchant capitalism. Heather Burke (1999) uses a study of the nineteenth-century Australian town of Armidale to explain variation in architectural style through relationships of ideology, capitalism, and identity. James A. Delle (1998) examines a nineteenth-century Jamaican coffee plantation as a cultural, ideological, landscape that structures relations of race, gender, and the division of labor. Concerns with ideology have also expanded into broader, archaeological studies of capitalist cultural production.

Archaeology is a product of capitalism and practiced in capitalism. It originated in early-nineteenth-century Europe as a practice that served the interest of bourgeois nationalism (Trigger 2006). Scholars have questioned archaeology's history of advancing imperialist, colonialist, and racist objectives (Hamilakas & Duke 2007). These critics argue that archaeologists need to recognize that the discipline is about living individuals and communities whose lives and heritage suffer from the abuse of capitalist power relationships and to adopt a political ethic for the discipline. Fast capitalism has not been kind to archaeology (McGuire 2008). Fast capitalism attacks the values and social relations that created and sustained archaeology. Hypercompetition leaves slight place for the life of the mind that does not produce profits. The camaraderie and shared purpose of fieldwork do not generate earnings. Fast capitalism undermines the relationships of apprenticeship and mastery and grinds down the community of scholars that draws most people to the craft of archaeology. Capitalists' search for profit transforms archaeological knowledge, heritage, and education into commodities to be produced at the lowest cost for sale in a competitive market.

International Perspectives

Most scholars have viewed capitalism through a Eurocentric lens, as reflected in the historical summary in this entry. More recent analysis has focused more on capitalism as a global phenomenon not fully understandable in terms of its European/US core. Archaeologists have also expanded their studies beyond the core.

The development of dependency theory in the 1970s questioned both capitalist theories of modernization and a Eurocentric perspective on capitalism. Researchers from the Global South including Samir Amin of Egypt, Celso Monteiro Furtado of Brazil, and Raúl Prebisch of Argentina wrote the first drafts of this theory. They challenged the basic tenant of post-World War II modernization theory, to wit, that the Global South was poor because it was underdeveloped. Instead, they argued that the underdevelopment of the Global South was both a cause and a result of the development of capitalism. They noted that during the medieval period, Europe had been the poor backwater and the Islamic world the wealthy metropole. In a similar vein, they observed that México City and Lima, Peru, had been wealthy cities with great buildings and universities when New York and Philadelphia were provincial towns with muddy streets. Dependency theorists argued that the modern periphery of the world economic system (the Global South) became poor because core states coercively integrated the periphery into the European economic system. This integration reduced the periphery to producers of raw materials or to serve as repositories of cheap labor, and dominant states denied the periphery the opportunity to competitively market their resources. Eighteenth-century India provides an example of this process. Before the British conquest, India produced the greatest quantity of cotton cloth in the world. The British forbade the spinning and weaving of cotton in India and transported Indian cotton to Manchester, where British wage laborers wove it into cloth that British capitalists sold to India. The German-US economist Andre Gunder Frank and the US sociologist Immanuel Wallerstein picked up on these ideas and expanded them into World Systems Analysis.

World Systems Analysis expands the scope of capitalism and rejects the idea that scholars can understand the origins or the development of capitalism from a perspective of European history. It also calls into question those who see contemporary globalization as a new or unique feature of capitalism. Some authors have criticized this theory as still being top-down and as over emphasizing a functional view of economic relations while ignoring the importance of culture. Eric Wolf (1982) has criticized the approach because it leaves the active, creative force of history in Europe and focuses on how Europe created the periphery. For Wolf, this perspective does not capture the dialectical relationship whereby the periphery also created the core, and it trivializes the cultural diversity of the periphery.

Some archaeologists have expanded their considerations of capitalism beyond the core to the peripheries of the Global South. Many have followed the path of World Systems Analysis, while others have focused more on the active and creative role of cultural and economic processes in the Global South. In South Africa, Gavin Lucas (2006) examines the Dutch East India Company; free settlers and enslaved Africans used material culture to construct identities. He mobilizes archaeological evidence to show how these different groups were enmeshed within racial, sexual, and class ideologies in the broader context of capitalism and colonialism. Sarah Croucher (2011) works in Zanzibar. Here, in the nineteenth century, Omani Arab colonial rulers of the East African Coast established clove plantations that marketed the spice in the global capitalist market.

Future Directions

Archaeologies of capitalism have increasingly focused on the contemporary and political action. Traditionally, archaeologists studying capitalism have sought to better understand capitalism and engage a culture critique of capitalism. Following Bourdieu, archaeologists are increasingly trying to be scholars who help a little bit by providing tools for liberation.

Archaeologists find violence, destruction, and ruination in the contemporary. The authors in Pedro Funari and Andrés Zarankin's (2006) collected volume use archaeology to look at the repression that swept Latin America, particularly in Chile, Argentina, and Brazil, from 1960 to 1980. Alfredo González-Ruibal (2008) invokes a concept of supermodernity that parallels the notion of fast capitalism to examine the outstanding relevance of destruction in out times. Shannon Lee Dawdy (2010) uses the theory of Walter Benjamin to study the spatial and temporal dynamic s of captialism's creative destruction in post-Katrina, New Orleans.

A major focus of contemporary archaeological practice has been on building public scholarship and activism that disputes capitalism. Barbara Little's (2007) book, *Historical Archaeology: Why the Past Matters* builds on Marxist critical theory and feminist perspectives to address questions of ethics and public scholarship in capitalism. She encourages archaeologists to ask questions that go against the status quo and take action to make untold histories known. Little argues that the social relevance of historical archaeology lies in social capital, civic renewal, and transformative learning. She shows how historical archaeology is inextricably linked to public education, justice issues, and our collective understanding of the past. My own book, *Archaeology as Political Action* (McGuire 2008), builds a Marxist dialectical theory of praxis to show how archaeologists can use their craft to challenge capitalism. Praxis springs from the realization that people make the social world in their everyday lives and that they can also subvert and transform that world. Praxis entails a complex dialectic between knowing the world, critiquing the world, and taking action in the world. The vast majority of twenty-first-century North American archaeologists continue to do archaeology to learn about ancient pasts even as some of us embrace an archaeological study of the present. Today, however, the study of the past cannot be an escape from the present.

Cross-References

- ▶ Activism and Archaeology
- ▶ Annapolis: Historical Archaeology
- ▶ Childe, Vere Gordon (Theory)
- ▶ Consumption, Archaeology of
- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Johnson, Matthew (Theory)
- ▶ Leone, Mark P. (Theory)
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Post-Medieval Archaeology

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Capitalism: Historical Archaeology

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Introduction

The development and persistence of capitalism is one of the big questions about the trajectory of humankind, equal in importance to the rise of agriculture and sedentism or the advent of the state. Though the time and place of its beginnings are a matter of debate, capitalism is a relatively recent phenomenon, falling squarely within the epoch of written history. For these reasons, capitalism is an anthropological subject and an historical one, and because it is a materialist

scheme bound up in the production of commodities, the archaeological record holds crucial information about the ways in which the capitalist system has played out in peoples' lives. Many researchers, especially those in the capitalist core – the USA and Europe – argue that capitalism is the central subject of historical archaeology (e.g., Johnson 1996: 1-3; Orser 1996: 71-81; Leone & Potter 2003: 19; Matthews 2010). (Though China today is a capitalist force, there is no available Chinese literature on the historical archaeology of capitalism).

Historical archaeology has expanded dramatically over the last two decades, and the literature on the historical archaeology of capitalism today is substantial (Orser 2010). Much of this work has been carried out in the USA and Britain, or by researchers from these countries who work in the so-called developing world. Yet outside the capitalist core, the colonial world system brought into play diverse modes of production – European-imposed tribute, feudal systems, debt peonage, and indigenous practices (Wolf 1982; Stern 1993a & b); introduction of the full-fledged, wage labor-based capitalist mode of production has been variable across time and space, and still does not prevail everywhere in the developing world. Further, as Charles Orser (2010: 114) notes, insisting that capitalism is the true subject of historical archaeology is Eurocentric. Thus to date, most historical archaeologists outside the "developed world" have explored a different set of issues rooted in the colonial/postcolonial condition, including domination and resistance, and sociocultural identity (Funari et al. 1999).

Because this entry is necessarily brief, it is limited to the English and Spanish-language literature. And because capitalism has not been a central focus for Latin American researchers, the content is skewed toward the so-called developed world. Yet some Latin American scholars are concerned with questions of capitalism, and key works are cited below.

In the USA, there are two main approaches to the historical archaeology of capitalism; both, not surprisingly, are forms of neo-Marxism. Critical neo-Marxists (or "critical theorists") are concerned with how the dominant ideology masks social inequalities, how capitalists use this ideology to perpetuate the system, and how workers use it to negotiate the system's demands. World systems researchers "break the crust of Marxism" (Wallerstein 2007: 14) by examining the relations of production beyond the boundaries of the state; they examine local or regional data through the lens of global economic links in order to follow the broad, systemic processes of change that occur as regions integrate into the expanding capitalist world economy or undergo booms and busts that shift their position within the hierarchy of global economic interaction.

Investigators also are divided over the timing and definition of capitalism. The critical theorists generally begin with the eighteenth century. It is then, in the USA, that "putting-out" capitalism, in which surplus goods were produced in the household and sold to merchants for resale at profit, began to shift toward capitalist labor relations in the Marxist sense. Two interrelated factors facilitated this change. Laizzez-faire capitalism overrode state regulations on trade, allowing merchants increasing wealth and control. Merchants at the top were able to purchase the means of production, and the resulting wealth allowed them to industrialize. The essential condition of industrial capitalism is the abstraction of labor; in other words, labor is separated from the household context. Workers no longer own the means of production; instead, they must sell their labor – the only commodity they still possess – to the capitalists. This break with the past precipitated radical changes in the structures of everyday life, which are the main subject of the critical theorists' investigations.

Yet the central purpose of capitalism is to produce wealth from profits made through the sale of commodities at prices higher than the cost of making them (Matthews 2010: 16), and this kind of economic system has been functioning since well before industrialization. Thus, some researchers take the sixteenth century as their point of departure. Though capitalism in this epoch did not, in general, involve the abstraction of labor (Wolf 1982: 86-7), Charles Orser (1996: 27) lays out a set of intertwined "haunts" that he defines as the true subject of historical

archaeology – "eurocentrism, colonialism, capitalism and modernity" – all of which are rooted in the age of European expansion.

Orser is not a world systems researcher, per se, but he is interested in the changes the growing capitalist world economy has wrought on disparate communities across the globe (e.g., 1996: 18-21) since the dawn of the sixteenth century. And as investigators directly linked to world systems theory, including historical sociologist Andre Gunder Frank (1979) and cultural anthropologist Eric Wolf (1982) point out, multiple political-economic systems can participate in the same world system. Thus, trade flourished between Europe's petty kingdoms and the Mongolian empire in the thirteenth century (Abu-Lughod 1989), and goods produced under various economic systems flowed into the Europe-dominated global economy in the sixteenth century. Immanuel Wallerstein, one of the chief formulators of world systems theory, wrote (1979: 6) that in the sixteenth century, "we saw the full development and economic predominance of market trade. This was the system called capitalism. Capitalism and a world economy (that is, a single division of labor but multiple polities and cultures) are obverse sides of the same coin."

A world economy is built on what Annales historian Fernand Braudel (1986: II: 582) called "the miracle of long-distance exchange" – the wider the circulation net, the more profitable it becomes. Wallerstein's single division of labor is the key characteristic of this widening exchange; with it comes interpenetrating accumulation, in which elites in one polity capture part of the surplus exacted by their counterparts in another (Gills & Frank 1991). Interpenetrating accumulation is systemic – it engages people from multiple social strata, creating a complex political economy that shifts some labor (formerly invested in domestic production) to surplus production for exchange. As more workers are tied up in production for long-distance trade, more surplus in essential domestic goods is needed to meet local and regional demands. Markets arise to distribute goods that supplement domestic economies, and monetarization emerges so that prices for commodities can be fixed.

Interpenetrating accumulation and markets are necessary but not sufficient conditions of incipient capitalism (Blanton 1985; Braudel 1986: II: 589-94) – the crucial factor is the appearance of economic forces unregulated by the state. Strong states control accumulation and dampen competition; under weaker political conditions (such as the petty kingdoms of medieval Europe), merchants can reach the top of the economic ladder, from which they can control surplus production and distribution. In some cases, the conditions for incipient capitalism were in place even before the sixteenth century. Historical sociologist Janet Abu-Lughod (1989) finds them associated with thirteenth century textile industry in Flanders; Braudel (1986: II: 589-94) argues for their presence more generally in feudal Europe and in late feudal Japan. These studies are based on the written record, though the documents were sifted for material evidence. And there is archaeological evidence of pre-sixteenth century capitalism in late prehispanic Mesoamerica. Within the late prehispanic Mesoamerican world system (Blanton & Feinman 1984; Smith & Berdan 2003), traders from the Aztec tributary empire exchanged goods with their counterparts from the small, politically decentralized polities of Yucatan, where Kepecs (2003, 2005) finds evidence for incipient capitalist conditions in both the material record and the native Books of Chilam Balam. (The Chilam Balams are colonial period documents written in Yucatec but in European script, though the literate prehispanic Maya wrote in glyphs. The books, which mixed prophecy and history, were kept throughout the colonial epoch, though they contain sections that clearly refer to the late prehispanic past). What distinguishes incipient capitalism from its modern counterpart is core-periphery hierarchy, which refers to the so-called developed world and the developing world – a phenomenon that emerged as Europe became the core of the global economy in the sixteenth century (Kepecs & Kohl 2003).

Historical Background

The use of the critical neo-Marxist and world systems frameworks in archaeology began in

the 1980s. Both appeared in response to processualism, a generalizing, positivist practice aimed at discovering laws of human behavior (Binford 1968; also see Trigger 1989) that characterized the cutting edge of prehistoric archaeology during the 1970s and early 1980s. Processualism was also, as its name implies, about processes – it developed in response to the culture-historical explanations of culture change rooted in early twentieth century archaeological practice. The atheoretical culture historians explained change as the result of migration or diffusion, leading to notions such as the one that Mesoamerica's prehispanic pyramids were built by ancient Egyptians. The processualists believed that social formations developed in situ, through similar general processes that could be found worldwide (i.e., population pressure on resources led to increased organizational complexity, and sometimes to eventual collapse).

Critical neo-Marxism is one of numerous post-processualist approaches that were forged in the crucible of European philosophy between the World Wars (Johnson 2006: 126). Post-processualism is a radical departure from processualism because it focuses on historical rather than general processes. Further, post-processualists are concerned with how the investigator, in the present, interprets the past. In this context the critical theorists are activists, engaged in a two-pronged pursuit: They aim "to produce the enlightenment necessary to overcome the coercive social forces that have facilitated the long-term success of capitalism" (Leone et al. 1987: 284), and also to clarify how specific political interests are served by archaeological interpretations made in the present (Preucel 1995; Leone 2010).

World systems theory, a branch of historical sociology, entered prehispanic archaeology when some processualists, unable to explain certain diachronic changes in their archaeological data in regional terms, sought a way to examine macroregional shifts without resorting to simplistic claims of migration or diffusion (e.g., Blanton & Feinman 1984). World systems research is historical, in that its aim is to account for the rise and persistence of capitalism. But like processualism, it also is comparative – observed local or regional patterns are considered in the context of macroregional information and then, through appropriate middle range assumptions, checked against the model. General world systems characteristics include core-periphery hierarchy, interpenetrating accumulation, and also a number of long- and short-term cycles in which the world economy rises and falls (Frank 1979; Modelski & Thompson 1996).

Critical Neo-Marxist Studies

Most investigations to date are informed by the critical neo-Marxist perspective. The roots of this research are found in James Deetz' *In Small Things Forgotten: The Archaeology of Early American Life* (1977). Deetz examined various material categories – houses, gravestones, foodways (faunal remains), ceramics and cutlery, furniture – and found a consistent pattern: Between 1760 and 1800, a profound shift in American material culture occurred. House forms, once vernacular, with corporately used, multipurpose space, gave way to formal, symmetrical structures with specialized spaces, based on English interpretation of Renaissance style. This Georgian style quickly was adopted in urban New England. With this transition came additional changes that underscored increasing social isolation. The colonists once ate from shared wooden vessels, called trenchers; in the Georgian epoch, individual place settings appeared. Foodways also shifted; ubiquitous stews gave way to meals in which meats, vegetables, and carbohydrates were served separately, as they commonly are today.

Deetz does not name capitalism as the specific cause of this new worldview, but Leone (1999: 196-8), taking the next step, spelled out the Marxist conditions of capitalism in detail. What Deetz had observed was the shift from corporate lifeways based largely on household or community-based production to the spatially and psychologically segregated lifeways created by the isolation of individuals who compete to operate the means of production owned by capitalist bosses. People in the capitalist

workforce are treated as interchangeable modules; when it originated, this practice gave rise to a cognitive pattern in which the individual, rather than the family or community, is the social actor. Moreover, while Deetz assumed uniformity in the transition that swept the American colonies in the latter half of the eighteenth century, Leone assumed that individuals would participate differently in the developing system.

For Leone and other critical neo-Marxists, the archaeological key is to understand commodities as highly symbolic social things that play an active role in capitalist society. To do this, the researcher must grasp the ideology behind the material record, a task accomplished in part by working backward from an acute consciousness of the researcher's own views. Through this process, it is possible to understand how the switch from trenchers to ceramic place settings both reflects and reinforces the separation of individuals and their labor from the household context – a dual phenomenon that is imposed by the wage labor system, and facilitates the capitalist mode of production.

Leone has applied this approach to the material record in a great variety of settings, including the William Paca Garden in Annapolis, Maryland (e.g., 2010: 67-84), a formal, planned landscape originally created in the 1760s and reconstructed in the 1970s. Paca, a signer of the Declaration of Independence, was both a supporter of liberty and a slave owner – an inherent conflict that provides another example of increasing social segmentation. Paca's garden, set beside his Georgian mansion, was laid out in a series of segmented spaces and emphasized Renaissance principles of perspective, creating an illusion of distance. Leone argues that formal gardens of this sort used natural elements – plants, trees – and references to the past (Renaissance references to classical antiquity) – to "naturalize" the social order of the present in which they were built.

British archaeologist Matthew Johnson (1996, 2007) takes an approach that is arguably similar to Leone's – though Leone (2009: 160-1) claims Johnson eschews Marxism, while Preucel (1995: 152) refers to Johnson as a hermeneutic neo-Marxist, as opposed to a critical neo-Marxist. Terminological discrepancies aside, Johnson's subject is the transition from medieval to capitalist economy in rural England. During this shift, rectangular boundary walls were superimposed over old plow ridges spread organically over the ground. Similar divisions occurred in house forms – medieval rural dwellings with central, multipurpose halls gave way to houses built on Georgian plans; fortified medieval castles were replaced with rural estates built according to classical ideals, with formal gardens created to transform nature in order to "mystify what was really going on" in the countryside (Johnson 1996: 149).

In the USA, where archaeologists face a longer and more complex history of social diversity than their British counterparts, the critical theorists often consider the ways in which disenfranchised individuals or groups – women, African-Americans, religious offshoots – managed to resist the dominant ideology while still functioning within the capitalist system. For example, in his synthetic volume on the archaeology of American capitalism, Matthews (2010: 184-7) summarizes multiple studies of colonoware – simple, low-fired pots manufactured locally by slaves and often found in rivers near large plantations. Many of these pots bear African symbols, including a cross or "X" that is the basis of a cosmogram used by the Bakongo, a Bantu group from the West African coast. The Bakongo cosmograms represent crossing over, from living to dead or material to spiritual. Thus, the presence of colonoware in plantation rivers may represent a ritual designed to transcend the boundary between land and water. Most researchers, Matthews notes, interpret the use of Bakongo symbolism by African slaves as an affirmation of their spiritual heritage; yet this reasoning fails to take the American context in which these pots are found into account. In addition to their role in African rituals of transcendence, Matthews maintains, these vessels crossed the line between their potential capitalist function – that is, market value – and their spiritual function. By imbuing their pots with ritual purpose, the slaves on American plantations symbolically challenged the capitalist order.

Most critical neo-Marxist studies are carried out in the USA. However, a few US

archaeologists studying Mexico's enormous late nineteenth century haciendas, which were industrialized with loans from US banks, are tackling the issue of power relations on these agrarian capitalist facilities. This work is not specifically tied to tenets of critical theory. Allan Meyers (2012; also Meyers & Carlson 2002) follows James C. Scott's (1990) approach to domination and resistance instead. Meyers focuses on how the spatial layout of Hacienda Tabi, a sugar plantation in Yucatan, exemplifies class antagonisms between master and servant; hacendados reinforced control over labor by facilitating surveillance of resident workers, though the latter often took refuge out of sight, in the woods.

World Systems Studies

While various archaeologists have applied the world systems framework to prehistoric cases, the number of studies based in historical time frames is few. Within that small set, some researchers simply have employed the notion of the world system without engaging the elements of world systems theory. Stanley South et al. (1988), for example, set out to show how the sixteenth century Spanish colonial settlement of Santa Elena, South Carolina, was linked to the world system. South's meticulously quantitative analysis of artifact types – useful in itself – was tied to a series of assumptions about artifact variability and frequency. But in fact, almost all of these assumptions were aimed at determining patterns not directly tied to the world system, such as public versus private structures or elite versus laborer dwellings. Only one very simple assumption – that certain artifact types would serve as indicators of the world trade network – was expressly related to the stated theme.

Thomas Charlton et al. (2005) similarly used pottery as an indicator of the Spanish-dominated world system. These researchers compared the ceramics of early colonial Mexico City/Tenochtitlán, the regional center of the externally imposed "Hispanic worldwide empire" (Charlton et al. 2005: 50), with pottery from Otumba, a rural settlement in the Basin of Mexico. In Mexico City/Tenochtitlán, ceramic change was rapid; Spanish and Oriental ceramics were introduced quickly, and locally made indigenous wares showed clear Spanish influence. At Otumba, on Mexico City's periphery, ceramic change was minimal, indicating weaker integration into the Spanish world system.

Yet, some investigators have considered the systemic effects of world systems processes, which they access by bringing some of the comparative elements of the world systems framework into play. Groover (2005) focuses on a single farmstead in southern Appalachia to show how this region, a subsistence farming backwater in the eighteenth century, became an internal periphery within the economic core in the 1800s. This shift occurred when the immense plantations of the deep south became so dedicated to monocropping cotton that they were no longer used to raise food for resident slave labor forces. To fill the gap, Appalachian farmsteads began producing surplus foodstuffs for the plantation market. When the plantation economy declined, partly as the result of westward expansion, production at Groover's farmstead also dropped. Groover, however, also links his work to that of the critical theorists, noting that when his farmstead became integrated into the capitalist market, household space became compartmentalized and ceramic inventories increased. Yet, the social processes of urban capitalism were incomplete in this rural periphery since foodways retained their essential folk character.

Alexander's (1999) world systems-based analysis of central Yucatan, on the global periphery of the world system, provides another important point of comparison to core capitalism. She uses written and material evidence to show statistically variable degrees of capitalist market integration among small independent ranchos (small rural settlements), pueblos (small aggregated settlements), cabeceras (administrative towns), and small cattle haciendas in the nineteenth century. Though market integration was low in all cases, most of the settlements in her study, regardless of size, yielded some evidence of nonlocal, usually foreign goods – evidence that local producers participated, to varying degrees, in the global market system, and thus produced some surplus for exchange. Nevertheless, the

degree of world systems integration in this peripheral region was insufficient to create the compartmentalized, disenfranchised labor force demanded by industrial capitalism in the core.

Farther back in time, Kepecs (2003, 2005) uses written and material evidence from the late prehispanic epoch in northeast Yucatan to reveal conditions of incipient capitalism: intensive surplus production, regional and macroregional markets, interpenetrating accumulation, visible macroregional ideology of trade and production, and competition among the Maya merchant kings of several small polities on the northeast coast. The systemic exchange in which these rulers engaged involved bulk goods – fine white Yucatecan salt for cacao grown on the humid plains of the Gulfs of Mexico and Honduras. Specialized labor for the extraction of salt, a highly localized resource, was, in fact, separated from the household context; as in industrial capitalism, rulers or entrepreneurs controlled, to large degree, the means of production. In the Spanish colonial period, two capitalist systems operated simultaneously in northeast coastal Yucatan. Indigenous workers amassed great quantities of salt for the Spaniards' profit; from the 1570s through the early years of the seventeenth century, several thousand metric tons of salt were shipped annually to Mexico City and Cuba (Andrews 1983: 137). Yet indigenous capitalist ideology, hidden from the Spaniards, remained strong, and Spanish control over native labor was far from complete. Until the mid-seventeenth century, the Maya rulers of this region retained a separate, clandestine economy. In addition to salt harvested for Spanish enterprise, they produced enough surplus to supply their own long-distance exchange circuits. In return for salt, they received cacao, incense, and ceramic *incensarios* (incense burners) produced by other Maya groups in the Guatemalan Petén.

Latin American Research on the Historical Archaeology of Capitalism

Latin American historical archaeologists concerned with capitalism approach the issue empirically, though their studies are tightly focused, in contrast to the culture history of the early twentieth century. Andrews et al. (2006) – the lead author on this article is a US citizen, though he grew up in Yucatan and is part of a Yucatecan research team – lay out the archaeological record of El Real de Salinas, a late nineteenth century port on the coast of Campeche, Mexico, from which salt, dyewood, and other coastal resources were harvested in great quantities and shipped to other parts of Mexico and beyond. This is the only work to date that provides detailed descriptions of productive and shipping infrastructure built to facilitate the export of raw materials from the world systems periphery to the USA, which, by this time, had superseded Britain as the global economic core.

Schávelzon (2002) addresses some of the concerns of both critical neo-Marxism and the world systems framework in his detailed look at the rise of capitalism in Buenos Aires, but he does not address directly the theoretical positions of these approaches. Instead, he documents the rise of the bourgeoisie by focusing on the increasing material evidence of European goods from the sixteenth through nineteenth centuries. Schávelzon notes the incorporation of individual eating utensils following the rise of Britain's Industrial Revolution, but there is no accompanying consideration of whether this phenomenon was linked to a shift toward social isolation, or whether that occurred later in the nineteenth century when production in Argentina was industrialized.

Sanoja and Vargas (2007) provide a similar, implicitly Marxist reading of the economic culture history of Santo Tomé in Guyana, Venezuela, where Capuchin missionaries from Catalonia, Spain, used slavery and feudal peonage systems to organize indigenous and African labor for the intensive production of agricultural products, silver, and cotton cloth. These goods fed an import/export economy that underwrote capitalist development in Catalonia during the colonial epoch, and after Independence surpluses that had accumulated in mission warehouses were used to finance the development of the modern capitalist state centered at Caracas.

The above-cited works are by leading Latin American researchers, but a number of young

scholars putting out papers on the Internet also are starting to consider the historical archaeology of capitalism. For example, Cuba's nineteenth century wealth was built on slave labor, but the fruits of the island's plantations allowed Cuba's elite to accumulate wealth and abundant goods from the global capitalist market. Until now, Cuban historical archaeologists working in Old Havana have not discussed overtly the links between these luxury goods and the capitalist system in Europe and the USA that produced them, or addressed the class divisions that arose from this wealth on the island. But one young investigator, Darwin Arduengo-García, (2011), points out that the written and material records of Old Havana will allow researchers to follow the steps of Havana's integration into the world capitalist market.

Key Issues/Current Debates

There is no longer any question that the study of capitalism is a major area of investigation in the field of historical archaeology, though debates about how best to approach the subject remain. Tightly focused empirical studies like those by Andrews et al., Schávelzon, and Sanoja and Vargas make important contributions to the literature without the baggage of explicit theory. This raises the issue of whether a theoretical perspective is always important. In fact, given the ongoing explosion of philosophy-derived, terminologically imprecise, post-processual approaches, some US archaeologists are returning to culture-historical practice (see Pauketat 2001: 74), albeit with the kind of systematic focus that typifies the Latin American work.

Nevertheless, using theoretical frameworks as a way to organize empirical information and compare it with similar cases can facilitate important insights. The historical archaeology of capitalism has advanced through the use of both critical theory and world systems theory, though both are subject to critique. There is a fine line between critical neo-Marxism, which takes the investigator's own political consciousness into account when interpreting the past (Leone 2010: 54-5), and phenomenology, a school of post-processual thought in which interpretations are based on the investigator's personal experience (Preucel 1995). Phenomenological research is inherently subjective; Matthews' argument about the colonoware pots, encapsulated above, is a case in point. While the pots, given their archaeological provenience, may well have been used ritually, Matthews offers no information supporting his claim that these rituals were designed to challenge the capitalist order. Rather, that is how Matthews himself, as a twenty-first century archaeologist looking for ways to challenge the capitalist order, reads the evidence.

Another problem with the focus on "small things forgotten" is that it fails to hook the structures of everyday life to the global political-economic forces that created them. Although critical theory and world systems approaches can function together, as the studies by Groover and Alexander, cited above, confirm, many historical archaeologists have yet to grasp how world systems theory actually works. Criticisms abound. Orser (2010: 119-120) is concerned about the problem of scale, since archaeological fieldwork necessarily is local. He concludes that archaeology ultimately is "best-suited to small-scale analysis and tightly focused interpretations of individual artifacts and discrete places." To make the world systems approach viable, Orser contends, archaeologists will have to find new ways to use it "that move beyond simply noting that similar artifacts occur in diverse places in the world". Other misunderstandings include the idea that world systems theory fails to provide ways to study indigenous cultures, is unable to deal with issues of resistance, offers no links between past and present, and has no mechanism to account for emotion or failure (Leone & Potter 2003: 4-5).

It is indisputable that world systems theory does not account for emotion, though emotions are not artifacts – without direct support from the written record, any interpretation of potsherds that attributes feelings to the possessors of the original pots will be subjective. The rest of the criticisms, however, do not hold up. World

systems studies account for failure by considering decline in the context of economic cycles, as Groover's above-cited study shows. Groover, Alexander, and Kepecs are among world systems archaeologists who go considerably beyond finding similar artifacts in diverse places – they deal with the systemic consequences of capitalism, and their studies variably involve indigenous groups, resistance, and change through time.

Future Directions

There is a clear need to achieve a fuller picture of capitalism by examining the evidence at multiple scales. To do that, researchers will need to move past obstacles that prevent considering local evidence in terms of broader political-economic processes. Several of the above-cited studies foreshadow how this might be accomplished.

On another front, Leone (2010: 7-11) calls for making the historical archaeology of capitalism socially relevant by connecting the present to the past in ways that make people care about the historical link between the archaeological case at hand and their own lives. The type of research he advocates is not fully diachronic; instead, it employs questions about the present, such as why racism and poverty exist – or why the Paca Garden was so extraordinary – as the basis for investigations into a particular situation or shift in the past.

But the long-term (longue durée) development of capitalism itself is an important issue, and since the archaeological record is a palimpsest, studies that follow the full diachronic trajectory also utilize fully the power of archaeology. Schávelzon, and Sanoja and Vargas, take a longue durée approach to their empirical investigations of capitalism in Latin America. And certain current, still unpublished investigations in Mesoamerica deal with economic cycles in the world system from the late prehispanic past through the present.

Some of the most dramatic possibilities for relevance, however, lie in material studies of the very recent past. During the latter half of the twentieth century, for example, leftist rebellions across Latin America threatened US capitalist interests in the periphery. Yet much remains unknown about this clash. Patricia Fournier and Jorge Martínez Herrera (2009) provide a brave road map for a multidisciplinary study, yet to be implemented, of the Tlatelolco massacre that occurred in the Plaza de Tres Culturas at the heart of Mexico City in October, 1968. On the eve of the Olympic Games, slated for the stadium at the National Autonomous University of Mexico, the CIA put down a massive, largely student-led demonstration against Mexico's glaring political-economic injustices. In the name of core capitalism, untold numbers of demonstrators were murdered or disappeared. Almost all of the evidence was covered up by the Mexican government. Fournier and Martínez Herrera (2009: 169) call for forensic anthropologists, archaeologists, and historians to retrieve missing information, to recover historical memory through analysis of material culture, and to finally record the details of state terrorism carried out in the name of protecting US financial interests. Projects such as this have the potential to unmask late-stage capitalism in the periphery, and to awaken the public at large to the crucial role of historical archaeology.

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Ceramics: Colonoware
- ▶ Critical Historical Archaeology
- ▶ Critical Theory in Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Fournier, Patricia
- ▶ Funari, Pedro Paulo A. (Indigenous Archaeology)
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Mexico: Historical Archaeology
- ▶ Modern World: Historical Archaeology

▶ North America (USA): Historical Archaeology
▶ Orser, Jr., Charles E.
▶ Phenomenology in Archaeology
▶ Postcolonial Archaeologies
▶ Schávelzon, Daniel
▶ World-Systems Analysis

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Capsicums/Chiles: Origins and Development

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Basic Species Information

Chile peppers are the fruits of Neotropical plants that are classified within the genus *Capsicum* (Fig. 1). At least five different species of chile peppers were brought into cultivation and were eventually domesticated by the indigenous peoples of the Neotropics. These five species are still in cultivation today around the globe, and the pungency of chiles, a result of the chemical capsaicin in the tissues of the fruit and seeds, can range from nearly nonexistent in sweet peppers to searingly spicy in other cultivars (Andrews 1984).

Capsicum annuum is very likely the most widely cultivated species, and common cultivars in the Americas are sweet bell, *poblano*, and *jalapeño* peppers. The species *Capsicum baccatum* includes the cultivar *aji amarillo*,

Capsicums/Chiles: Origins and Development, Fig. 1 Various modern cultivars of peppers (four species represented). Photo by Linda Perry

a chile that is integral to Peruvian cooking. *Capsicum chinense* varieties include the *habanero* and Scotch bonnet peppers, both known for their intense heat. *Capsicum frutescens* is the species that includes the famous Tabasco pepper and is considered by some to be wild rather than domesticated. Varieties of peppers like the *rocoto* and *manzano* that thrive in higher elevations are classified in *Capsicum pubescens*, and differ from the other species of peppers in their seed color, a velvety black.

Major Domestication Traits

While it is generally agreed upon that the genus *Capsicum* arose in Bolivia, the regions in which each species was initially brought into cultivation and eventually domesticated are subject to debate. Prior to the arrival of humans in the Neotropics, the fruits and seeds of the wild ancestors of each domesticated species of pepper would have been dispersed by birds and other animals (Pickersgill 1984). Thus, the first humans to arrive would have encountered the small, brightly colored fruits over a broad, tropical landscape. A combination of various lines of evidence including archaeological data, phytogeography, and genetic analyses have led researchers to suggest that *Capsicum annuum* was initially domesticated in Mexico or northern Central America, *Capsicum frutescens* in the Caribbean, *Capsicum baccatum* in lowland Bolivia, *Capsicum chinense* in northern lowland Amazonia, and *Capsicum pubescens* in the mid-elevation southern Andes (Pickersgill 1971, 1984; Loaiza-Figueroa et al. 1989; Eshbaugh 1993).

The most solid evidence for the use of chiles by ancient humans is derived from archaeobotanical remains recovered from archaeological sites. Archaeobotanical remains of peppers are typically recovered as large fragments or entire fruits (macroremains) or as microscopic residues that include starch grains from the pericarp tissue of the fruit (microremains). Macroremains of chiles are usually reported from sites in unusual environments including those with arid or waterlogged conditions that allowed for exceptionally good preservation. Where preservation is less than ideal, microscopic resides of starch grains can be recovered from sediments, ceramic sherds, and lithic processing tools (Perry et al. 2007).

The only sequence documenting the domestication of chiles comes from Mexico. The remains of wild chile peppers recovered from several levels at Coxcatlán Cave in the Tehuacán Valley are the earliest evidence for what would later become an important domesticate in this region (Smith 1967). The analysis of pepper remains from the entire cave records what is believed to be wild chile harvesting beginning about 8,000 years ago followed by the cultivation and eventual domestication of the pungent fruits of *Capsicum annuum* by about 6,000 years ago (Smith 1967). The sequence of cultivation documents changes in the fruit size from small, wild-type forms to larger, cultivated and domesticated landraces.

Microremains of chiles from sites in Ecuador, however, are derived from chiles that were already domesticated by 6,000 YBP (Perry et al. 2007). Because the wild ancestors of chiles do not occur in the local flora, the most likely scenario is that chiles were domesticated elsewhere, prior to this time and were brought into the area by trade or other human interaction. Because five distinct species of *Capsicum* were domesticated in five different areas, and there are few early sites that have yielded remains, there is a great deal more work that needs to be completed to locate the origins of these plants and track their trajectories through human use. Nonetheless, it is clear that chiles were an early domesticate in the Neotropics.

The remains of chile peppers have been recovered from New World archaeological sites ranging temporally from about 8,000 years before present to European contact, and geographically from what is today northern Mexico, to the Caribbean, to coastal South America (for a review, see Perry 2012). Thus, the use of chiles as a spice by human populations has great time depth and was geographically quite widespread prior to European contact.

Further, chiles have been found in sites where groups had different food procurement strategies

and population sizes (Perry 2012). The remains of chiles appear first as wild-collected plant foods, then continue to occur in areas where cultivation took place in forest swidden plots, in complex drained field systems, and in both small and large agricultural fields, both nearby and far from settlements. They occur in sites that had a few, seasonal inhabitants, in medium-sized villages, in large permanent settlements, and in ceremonial feasting contexts. Chiles also occur in coastal sites, inland sites, cave sites, open air sites, highland sites, and lowland sites. Clearly, the popularity of chiles transcended time, space, and culture.

Because they are a spice plant, chiles do not occur in isolation in archaeological contexts. They appear in concert with maize, beans, and geophyte food plants, and in the case of microfossil analysis, they frequently occur together on the same tool (Perry 2012). The spice of chiles would undoubtedly be appealing to people who were subsisting on a relatively bland diet of maize, beans, roots, and tubers. These staple crops are plant foods that supply a significant portion of a person's daily calories. Chiles, in contrast, are not staple foods, but are commonly used as vegetables, as condiments, or as a spice.

The exploitation of chiles, a spice, during the earliest periods of occupation in the Americas provides solid evidence that sophisticated agriculture and complex cuisines arose very soon after initial colonization. The widespread geographic and temporal spread of archaeological remains indicates that, once chile peppers became incorporated into local cuisines, they persisted, and both ethnohistorical accounts and modern distributions indicate that humans have never lost their taste for these spicy foods.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Caral: The Sacred City

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Introduction

The Sacred City of Caral-Supe was constructed by one of the oldest civilizations on the planet,

created from the organized labor of its settlers, led by a dominant class, in a territory of contrasting geographic configurations.

Many know of Cusco as the capital of the Inca Empire and Machu Picchu as the estate of the last Incas, but few know, even now, that the Sacred City of Caral was built by the first political state to be formed in Peru, 4,400 years before the Incas ruled.

The Caral-Supe civilization was forming in America almost simultaneously with those in Mesopotamia, Egypt, India, and China. The inhabitants of Peru were at least 1,500 years ahead of those occupying Mesoamerica (where another cradle of civilization has been identified, of six that are acknowledged worldwide) and more than 3,000 years ahead of the society that built the well-recognized Mayan cities.

Unlike other cradles of civilization, such as Mesopotamia, Egypt, and India, that interchanged knowledge and experiences, Caral-Supe attained advancement without any precedents, in complete isolation from its contemporaries either in America or the Old World.

In Peru, the forms of economic, social, and political organization of the Caral-Supe people had a strong impact on the history of the area; they transcended space and time, and laid the foundations for the sociopolitical system of much of the population of the Central Andes.

In the north-central zone of Peru, the organizational model designed and implemented by the Supe State determined the actions of individuals for several centuries, in different fields: economic, social, political, and religious.

Key Issues/Current Debates/Future Directions/Examples

The Supe Society at the Dawn of Civilization

Caral is the most significant settlement of the 20 that have been identified along 40 km of the lower middle Supe Valley; each one combines public buildings with a characteristic sunken circular court and groups of domestic units. Caral is not the most extensive, but shows a planned architectonic design and substantial investment in an extensive workforce to construct the pyramidal buildings. From the size of the settlement, and from the amount of labor invested, it is obvious that they had a hierarchical command system and a unified social organization in the valley. This pattern extended to the valleys of Pativilca, Fortaleza, and Huaura which, alongside Supe, would have constituted the territorial foundations of the original state.

The city of Caral is situated at the entrance to the middle Supe Valley, Barranca Province, at kilometer 184 on the Pan-American North Highway, in the north-central region of Peru. Due to its size and architectonic complexity, it is the most outstanding urban settlement of all those identified in Peru as flourishing between 3000 and 2000 BCE.

Caral covers 66 ha, with distinct core and marginal zones. In the center, the buildings are distributed in two large segments: one high, where one can observe the most imposing pyramidal constructions, a sunken circular court, and two massive public meeting places, as well as the domestic units of the officials and an extensive residential neighborhood. The lower segment has smaller buildings, although they display the same architectonic complexity as the amphitheater, plus a similar residential group, but less extensive. The peripheral zone has many grouped dwellings distributed as an archipelago, in "islets" along the terrace that borders the valley.

Millions of stones were cut and transported to the city for the construction of the public buildings, to remodel their architectonic designs or to cyclically bury them and build anew.

Economic Conditions that Sustained the Life and Work of Supe Society

The technological advances achieved in the areas of agriculture and fishery, in the inter-Andean valleys and on the coast, respectively, influenced the development of a productive force within the societies of the coastal valleys of the north-central region, in particular the Supe. Production of cotton and the manufacture of fiber, destined for a clothing industry and, more importantly, for nets to capture massive amounts of fish, encouraged labor specialization and favored economic complementarities, by means of a permanent

exchange of goods between the agricultural and fishing settlements. This enabled the accumulation of production and the social division of labor, specialization, and exchange of goods over short and long distances.

The Social Weave and State Formation

The surpluses derived from production, as much in agriculture as in fisheries, were unequally distributed, to the benefit of the aristocratic lineage and those in charge of the activities that were necessary to guarantee continuance of the system; in this way, north-central regional communities were formed, from farmers and fishermen, or "pachucas," supervised by authorities and "principals," with their respective public buildings for administration and ceremony, their residential enclaves, and their territory of economic production.

This productive surplus favored the populations of the middle Supe Valley, being better situated for the exchange of goods. The aggregated value from manufacturing the cotton fiber and processing the anchovies and sardines, destined for exchange, enriched and augmented the prestige of the "principals" in charge of interethnic commerce. Among the authorities, the "hunu" was chief, the lord of lords of the valley and coastal settlements, and above all these "hunus" would be the lord of the whole territory between the Valleys of Santa and Chancay. This model of political organization would continue for some time in pre-Hispanic Peru.

The original state of Supe managed to mobilize large quantities of labor and, through complex relationship networks, to garner the benefits of the production surplus from an extensive territory, which included, apart from the coastal region, the Huaylas Corridor, the Huallaga, and the Marañón (the Labarynth).

The majority of the population made up the lower social strata, dedicated to agricultural or fishing activities, and to all the jobs demanded of them by the State.

The Importance of Knowledge in Civilizing Development

Under these socioeconomic conditions, there developed the sciences, technology, and the arts. Their knowledge of astronomy, geometry, arithmetic, biology, medicine, and so on was applied to climate forecasting, the development of a calendar, the construction of architectonic works, soil management through construction of irrigation and drainage channels and the fitting-out of small farms, the genetic improvement of plants, the treatment of some afflictions and diseases, to public administration, and to the manufacture of artifacts for ceremonial, commercial, and luxury purposes. These advances in knowledge, carried out by specialists, also gave them power and improved the lifestyles of the north-central people at the dawn of civilization.

Today we can marvel at the urban orderliness, the architectonic works, and the geoglyphs that predated, by over 3,000 years, the famous Nasca lines; the wall ornamentation, the musical instruments, the manufactured textiles, and the personal adornments; and the genetic variety of their produce, as represented by over a hundred small statues of unbaked clay.

The Role of Religion

An elaborate system of beliefs, ceremony, and rituals pervaded the societies of the valleys situated between Santa and Chancay, and of the mountains and jungle on their borders, articulated by the primitive political State of Supe, or attracted by its prestige. Universal mythological and symbolic complexes arose.

In the absence of a military unit, religion became the force of social cohesion and control. Life and the daily routine of the population passed by, dedicated to subsistence production as well as support for the gods, the authorities, the officials, and the public servants; at the same time they carried out construction work and the interment and remodeling of temples, for which they were periodically summoned.

Caral and Social Self-Esteem

The primary contribution of Caral to present-day society is in the area of historical knowledge, to show how ancient this civilization is, in Peru and in America, and so to modify current conceptions of the human condition on this planet.

In the more concrete case of this, our country, research at Caral allows us to understand the responses to life developed by societies that inhabited this territory before we did; we can take full advantage of the positive experiences and cast aside the unsuccessful.

From a cultural perspective, Caral is destined to become one of the most important instruments for elevating the self-esteem of Peruvians and the most prominent symbol of national identity, due to its being the first civilization, the oldest in America, and the model of the sociopolitical organization that other societies would develop in later times, in the territory of Peru. It is clear to us the creative capacity of the inhabitants of this humble territory; that with effort and organization, they managed to become a civilized state, a millennium and a half before the other populations of the continent.

From the economic point of view, the value proposition of Caral comes via the activities of research, consolidation, and restoration of its imposing monumental structures; these will convert it into a first-class tourist destination on a national and international scale, and into a source of considerable income, which will improve the living conditions of the local population and of the country in general. Due to its historical, cultural, and economic value, allocating funds to Caral is not an expense but an investment which will contribute to the development of the whole nation. We are confident about the changes in attitude: the acknowledgement of the value of our millennial history that should make every Peruvian self-affirmed and able to forge on with confidence, centered in the same vision of development, to the benefit of all of us that make up this nation.

Cultural Heritage as the Basis for Promoting Socioeconomic Development

The Caral-Supe Archaeological Zone management believes that the valley's archaeological wealth can promote the socioeconomic development of the population in their diverse aspects. To achieve that, it has proposed a master plan of organized development with projects in various fields: agrarian, systemization of the basin catchment area, reforestation, artisan and manufacturing production, environmental sanitation, and tourist services. It is believed that this important cultural resource can be valued in an adequate social context. Then the current population will be able to identify with it as the source from which it derives a better quality of life and will not convert into a mere spectator of the well-being of visitors. With this in viewpoint, we work to obtain the support of the diverse sectors of government: central, regional, and local, as well as secular society, so that by uniting this integrated vision of development can be made reality, to the benefit of the archaeological heritage and of the current population that lives alongside.

With this outlook, the Caral-Supe Archaeological Zone management carries out archaeological excavations at Caral and at other sites on the outskirts, and contemporary to this; it studies and analyzes the materials obtained; it develops a permanent monitoring and conservation program for the architectonic structures of the site; it publishes reports both scientific and informative; it designs tourist visitor circuits; it organizes events to adequately raise awareness of the historic and cultural importance of the place; and it promotes the integrated development of the local and national populations.

The Caral Archaeological Zone

The Caral Archaeological Zone (ZAC) is a Peruvian State institution which, for 18 years, has been working in many parallel endeavors: in the scientific study of the archaeological sites of the origins of civilization, namely, Caral, Chupacigarro, Miraya, Lurihuasi, Allpacoto, Pueblo Nuevo, El Molino Era de Pando (Supe, Barranca), Áspero (Supe Puerto, Barranca), and Vichama (Végueta, Huaura); in the physical preservation of the monuments; in the value proposition of these as tourist destinations; and in the search for ways to apply an integral program for fomenting the socioeconomic development of the surrounding population centers.

Our ultimate goal is to convert the rich cultural heritage of the Caral civilization, the most ancient in America, into the axis that drives development of better living conditions for

present-day society. These activities were acknowledged on an international level when, at the 33rd Convention of the Committee of World Heritage of UNESCO, the Sacred City of Caral was named a Cultural Heritage of Humanity.

Cross-References

► Peru: Cultural Heritage Management and Education

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Caribbean Historical Archaeology

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Introduction

Caribbean historical archaeology comprises the study of Amerindian, European, African, and Caribbean societies and cultures from before fifteenth century European exploration to the present day. Key areas of research include (1) culture change and continuity in Amerindian societies before, during, and after contact with Europeans; (2) early Spanish and European exploration and colonization, including adaptation to diverse Caribbean physical and sociocultural environments; (3) material, spatial, and sociocultural impacts of plantation economies, African slave trade and slavery, emerging freedom for communities of African descent, and the arrival and influence of Asian laborers and migrants; and (4) transformations in urban and maritime communities and economies. The field contributes to advancements in archaeological methods and theories in areas, such as applications of Geographic Information Systems (GIS) and multiscalar interpretation. In turn, the progression of historical archaeology in the Caribbean has created a means through which nations and territories in the region develop cultural resource management and historic preservation policies that benefit local and visitor populations.

Definition

Caribbean historical archaeology encompasses archaeological and anthropological studies of Amerindian, European, African, Asian, and Caribbean societies and cultures from before fifteenth century European exploration to the present day. Studies routinely combine archaeological survey, excavation, and site and artifact analysis with interpretations of historic documents, ethno-history, and oral history. The discipline of Caribbean historical archaeology derives in part from ties with Caribbean Amerindian archaeology of the proto-historic period, North American historical archaeology, and Caribbean socialcultural anthropology, all of which address some aspects of the research foci listed above. Historical archaeology in the Caribbean increasingly involves a mix of West Indian and non-West Indian nationals, including scholars, cultural resource managers, members of profit- and not-for-profit organizations, descendent communities, students, and the general public.

Key Issues/Current Debates/Future Directions/Examples

Key issues or areas of research include myriad topics that demonstrate the diversity of the Caribbean's past and present. Over the last decade, the number of volumes and reviews showcasing Caribbean historical archaeology has grown. Works such as *African Sites Archaeology in the Caribbean* (Haviser 1999), *Island Lives: Historical Archaeologies in the Caribbean* (Farnsworth 2001), "Boundaries, Borders, and Reference

Points: The Caribbean Defined as Geographic Region and Social Reality" (Meniketti 2009), "A Sea of Diversity: Historical Archaeology in the Caribbean" (Armstrong & Hauser 2009), and *Protecting Heritage in the Caribbean* (Siegel & Righter 2011) outline the Caribbean Basin's past and present research trends and developments in publicly engaged archaeology and cultural resource management. Though such comprehensive overviews of Caribbean historical archaeology are relatively recent, archaeological research in the area has existed for over a century and today the multidisciplinary field exemplifies the region's rich historical complexity and current sociocultural diversity (Armstrong & Hauser 2009: 587-90).

Projects have interpreted the remains of sites and material culture reflecting the emergence of and contact between peoples and cultures derived from the Americas, Europe, Africa, Asia, and the Caribbean in contexts of colonialism, trade, globalization, power, slavery, and freedom (Armstrong & Hauser 2009: 583; see also the International Association for Caribbean Archaeology at http://museum-server.archanth.cam.ac.uk/iaca.www/Eng_webset/iaca_eng.htm). Two of the discipline's longest-standing research foci concern (1) Amerindian sociocultural change and continuity before, during, and after contact with Europeans, and (2) European exploration, colonization, and adaptation to diverse Caribbean environments. (Research on enslaved and free communities of African descent followed. See below). These two areas of research developed out of studies evaluating pre-European contact Amerindian settlements and occupations in the Caribbean. By the early twentieth century, scholars of Amerinidian Caribbean lifeways often commenced reconstructing the cultures and societies of Taínos and their predecessors by working back from historical period Amerindian sites and European documents containing ethnohistoric information (Keegan 1992). They connected this data to earlier occupation evidence to interpret change and continuity from the earliest periods of occupation to the post-European contact era. A subsidiary to Amerindian archaeology and ethnohistory research emerged by the mid-twentieth century and investigated European, primarily Spanish, exploration, colonization, and adaptation to diverse environments in the region. Scholars have attempted to reconstruct landfalls and early settlements devised by Christopher Columbus, his envoys, and subsequent expeditions in Hispaniola (the island comprised of the Dominican Republic and Haiti) (Ewen 1991), Jamaica (Delle et al. 2011), and Florida (Deagan 1988). The Historical Archaeology Division at the Florida Museum of Natural History (http://www.flmnh.ufl.edu/histarch/research.htm) is a useful public resource that offers information on completed and ongoing research in this area.

Interest in the European presence in the Caribbean did not only begin with Amerindian archaeology and ethnohistory. On the contrary, the first European explorers and settlers documented their personal experiences and observations of their comrades in official and personal record keeping (Armstrong & Hauser 2009: 588). Accounts from the likes of settlers, travelers, military and government personnel, clergy, property owners, and traders contain insight into daily life, unique events, and physical and social surroundings that remain useful to historical archaeology interpretations. Certain pieces, such as Jeremiah Murphy's 1859 description of Jamaica's Fort James, voiced the desire to preserve and restore historic buildings and landmarks (Armstrong & Hauser 2009: 588). About the same time, the Natural History Museum of the Jamaican Society (founded in 1830) and the Institute of Jamaica (founded 1879) increased efforts to document landscapes, architecture, and settlements, most of which pertained to European military sites, plantations, trade networks, and places of religious worship (Armstrong & Hauser 2009: 588). Such efforts sparked early twentieth century preservation attempts elsewhere in the region, such as at the colonial forts of El Morro in Puerto Rico, Brimstone Hill in St. Kitts, and the Citadel in Haiti (Armstrong & Hauser 2009: 588). Since such early efforts, increased numbers of diverse archaeological, cultural, and historical sites of interest are analyzed and protected, despite differences in the amounts of preservation and

analysis carried out on each island (Siegel & Righter 2011). Without such long-standing interests in Caribbean cultural history, current understandings might not be as rich.

By the 1960s and 1970s, historical archaeology and anthropology in the Caribbean gradually included research on enslaved and free communities of African descent. This was in part a product of many Caribbean islands gaining independence from their colonial administrators. Research and academic institutions also intensified their work on local history and culture. Through these processes, island nations developed a focus on understanding and celebrating Creole and African-derived elements of local history, culture, and society (Armstrong & Hauser 2009: 591-3). By the 1980s and 1990s, increasing numbers of projects focused on the African diaspora in the Caribbean and investigated the sites and experiences of enslaved and free people of African descent, including material, spatial, and sociocultural impacts of plantation economies, African slave trade and slavery, emerging freedom for communities of African descent, and the arrival and influence of Asian laborers and migrants. For web-based material on Caribbean African diaspora archaeology, go to the African Diaspora Archaeology Network (http://www.diaspora.uiuc.edu/).

Today, research questions are numerous and encompass broad categories of investigation. These include material and industrial transformations in the production of the following: sugar cane and its by-products (i.e., sugar, molasses, rum, etc.); coffee, indigo, and cotton agriculture; imported ceramics and goods; and local craft and ceramic production (see Armstrong & Hauser 2009 for specific studies). As much of this research indicates, material studies of plantations and colonial industries are closely tied to a second category of research on socioeconomic and sociocultural shifts in free, enslaved, and emancipated societies from diverse backgrounds. For instance, the production of sugar, coffee, and ceramics placed free, enslaved, and emancipated peoples of European, African, Asian, and Caribbean descent in complex and fluctuating negotiations of power over personhood, community, labor, goods, and sociocultural behaviors. Good overviews of social trends and changes seen through historical archaeology in the Caribbean include Haviser (1999) and Farnsworth (2001). These volumes comprise studies from the English-, Spanish-, French-, and Dutch-speaking Caribbean. Additional examples of research on social and material change and continuity in the former Danish West Indies, Jamaica, the French West Indies, Barbados, and the Bahamas are provided in Armstrong and Hauser's 2009 article, "A Sea of Diversity: Historical Archaeology in the Caribbean." In addition, James Delle, Mark Hauser, and Douglas Armstrong recently edited the volume, *Out of Many, One People: The Historical Archaeology of Colonial Jamaica* (2011). This timely piece showcases projects from the last three decades that have addressed diversity, change, and continuity in Jamaica's politics, economies, and societies – enslaved, free, and emancipated. Caribbean historical archaeology also interprets site remains of Maroon communities, or groups who escaped slavery and created autonomous settlements. Kofi Agorsah and the Maroon Heritage Research Project work closely with current Maroon communities to document their heritage, particularly in Jamaica and Suriname (Agorsah 1993; http://www.maroonheritage.pdx.edu/index.html; see also Norton & Espenshade 2007 for discussion on historic Maroon sites in St. Croix, Virgin Islands). Furthermore, the discipline is informed by extensive underwater projects that seek to understand the relevance of submerged sites, ships, and material culture. One such project concerns work on Port Royal, Jamaica conducted by Donny Hamilton (2006) and former and current members of the Institute of Nautical Archaeology at Texas A&M University (http://nautarch.tamu.edu/portroyal/research.htm).

Within the research categories briefly outlined above, Caribbean historical archaeologists and those interested in studying the Caribbean past interpret fluctuating structures and identities of personhood, community, race/ethnicity, gender,

age, class, and religion within Amerindian, European, African, Asian, and Caribbean contexts. They evaluate such topics from multiple vantage points encompassing at least one or several of the following: households, camps, villages, factories, plantations, workshops, port towns, cemeteries, places of religious worship, military posts, transportation networks, and sites of resistance (Armstrong & Hauser 2009). In light of the historic diversity in peoples, places, and objects, scales of analysis in Caribbean historical archaeology are increasingly designed to interpret multivalent contexts, meanings, and relationships derived from local, regional, and global processes (Kelly & Hauser 2009).

New Directions

Research is ongoing in many of the arenas described above, and new avenues of inquiry, more numerous than can be discussed here, are regularly created. Recent developments include new evaluations of urban and rural settlements, advancements in archaeological methods, and progress in cultural resource management policies. Projects of Caribbean urban historical archaeology currently reconsider the importance of interpreting transformations in Caribbean city centers and towns, and assessing the relationships between urban, rural, and plantation contexts. Caribbean historical archaeology reveals that port and market towns acted as important loci for the exchange of goods, labor, and information for free, enslaved, and emancipated people (Hauser 2008; Delle et al. 2011). Towns such as Charlotte Amalie, St. Thomas; Roadtown, Tortola; Port Royal, Jamaica; Havana, Cuba; and Bridgetown and Holetown on Barbados connected urban and rural residents and visitors to the same city markets (see Armstrong & Hauser 2009 for specific studies). Urban centers and market towns provided terrestrial and maritime jobs and services often unavailable in plantation and rural contexts. Finally, local communities and resources directly and indirectly attached themselves to those in Europe, Africa, the Americas, and Asia through trans-atlantic trade, the success of which depended on the state of Caribbean ports and market towns. Comparisons in the transformation of urban and rural centers, as well as Caribbean space in general, benefit from the use of Geographic Information Systems technology, or GIS (Reid 2008). This tool allows researchers to effectively combine multidisciplinary and disparate evidence into spatial and chronological databases from which they produce informative maps illustrating innovative inquiries and relationships. Through the combination of maps, images, and written records, Caribbean historical archaeologists regularly expose new information and creative thought on transformations in Caribbean environments, land use, and human interactions. The use of GIS in Caribbean historical archaeology is gradually improving preservation policies and procedures in many of the region's cultural resource management offices. GIS technology allows such departments to more effectively document, manage, and preserve heritage sites for the benefit of local and visitor populations. As a whole, Caribbean cultural resource management, in part influenced by Caribbean historical archaeology, provides the region with invaluable training, jobs, and economic boosts (Siegel & Righter 2011). To conclude, Caribbean historical archaeology continues to provide intellectual and applied opportunities in the region on local, regional, and global levels.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Caribbean Maritime Archaeology
- ▶ Cuba: Archaeological Heritage Rescue and Management
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Historical Archaeology
- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Multivocality and Archaeology

▶ Postcolonial Archaeologies
▶ Race in Archaeology
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Caribbean Maritime Archaeology

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Introduction and Definition

Maritime archaeology in the Caribbean Sea involves the study of past people and cultures through the study of objects and features discovered in the underwater and maritime landscapes of the region. It frequently involves archaeology practiced in underwater environments, such as oceans, seas, bays, lakes, rivers, springs, marshes, and cenotes; such submerged environments require the use of specialized tools, although the archaeological research objectives remain similar to those used on land (Leshikar-Denton & Luna Erreguerena 2008a, b; Leshikar-Denton 2011; Leshikar-Denton & Scott Ireton 2013).

Historical Background

In the Caribbean region, there are prehistoric and historical heritage sites that reveal a tapestry of intercultural experiences. From the sixteenth century forward, shifting waves of European explorers, conquerors, and settlers, indigenous and African-enslaved laborers, passing merchants, and colonial powers interacted and influenced the development of the rich, multilingual cultures of today. Among Caribbean maritime heritage sites are settlements and defensive fortifications, fresh water procurement features, lighthouses and navigational aids, fishing areas, anchorages, careening places, ports, harbors, wharves, bridges, shipbuilding sites, shipwrecks, shipwreck salvage sites, and aircraft lost at sea. Sites range from cenotes and eroded coastal features to remains of catastrophic shipwrecks and earthquakes, at times with exceptional levels of preservation of cultural material (Smith 2000; Leshikar-Denton 2002, 2004, 2011;

Echeverria 2004; Pateman 2004; UNESCO 2004; Grenier et al. 2006; Keith 2006; Leshikar-Denton & Luna Erreguerena 2008a, b; Gray 2008; Hamilton 2008; Harris 2008; Leshikar-Denton & Scott-Ireton 2008, 2013; Nagelkerken & Hayes 2008; Nagelkerken et al. 2008; Sadler 2008).

The research potential for archaeological sites in the Caribbean is significant, but their heritage value can be overshadowed when commercial interests divert attention to the possibility of treasure on historical shipwrecks that they wish to exploit. The situation poses a constant threat to the archaeological heritage of the Caribbean region, and a challenge to its protection and management.

Key Issues and Current Debates

The Caribbean Sea encompasses English-, Spanish-, French-, and Dutch-speaking countries, some of which are independent and others that are in various levels of dependency, resulting in cultural, linguistic, and legislative differences among them. Yet they share elements of a common maritime heritage. In today's global world, these Caribbean countries are uniting and working toward establishing common goals in many areas, not the least of which is in attention paid to their underwater and maritime cultural heritage, especially for the benefit of Caribbean culture, education, and tourism (Leshikar-Denton 2002, 2011; UNESCO 2004; Leshikar-Denton & Luna Erreguerena 2008a, b; Leshikar-Denton & Scott-Ireton 2013).

In 1997, Caribbean countries formed a technical commission on underwater cultural heritage (UCH) known as the Latin American and Caribbean Group (GRULAC). GRULAC met in Santo Domingo, Dominican Republic, in 1998 and 1999, in preparation for a series of expert meetings held by UNESCO in Paris between 1998 and 2001. They united in support of the 1996 ICOMOS *International Charter on the Protection and Management of Underwater Cultural Heritage*, a charter defining best professional practice (ICOMOS 1996). At the Paris meetings, at which GRULAC was influential, 88 countries adopted the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage*, which establishes an international legal framework (UNESCO 2001). Since that time, worldwide regional UNESCO meetings have encouraged countries to ratify the 2001 Convention. Jamaica hosted two regional meetings in 2002 and 2011, and a capacity-building training course in 2012, and is the most recent Caribbean country to ratify. Saint Lucia was the first Caribbean nation to ratify the 2001 UNESCO Convention; the country hosted subregional UNESCO meetings in 2003 and 2008 to assist and inform Eastern Caribbean countries about the benefits of this international legal instrument. Success in the area is due in part to the efforts of the Saint Lucia Archaeological and Historical Society, an organization with a long history of professionally addressing the island's terrestrial archaeological heritage, and a leader in advocacy for ethical underwater and maritime archaeology in the subregion.

The 2001 Convention entered into force on 2 January 2009. At present GRULAC countries represent 15 of the 41 ratifications on record: Argentina, Barbados, Cuba, Ecuador, Grenada, Haiti, Honduras, Jamaica, Mexico, Panama, Paraguay, Saint Lucia, Saint Kitts and Nevis, Trinidad and Tobago, and Saint Vincent and the Grenadines. The Caribbean countries are now discussing the benefit of establishing compatible national legislation, and have asked the ICOMOS International Committee on Underwater Cultural Heritage (ICUCH) and UNESCO for guidance. Clearly, the 1996 ICOMOS Charter and the 2001 UNESCO Convention are powerful international instruments that lay the foundation for protection and management of the world's UCH. Their endorsement by a growing number of Latin American and Caribbean countries sets a positive example for countries worldwide to take action to identify, protect, and manage it, regardless of their political and economic situations.

In previous publications, brief case studies have appeared by country for many Caribbean islands: the British Overseas Territories of Anguilla, the Cayman Islands, and the Turks and Caicos Islands; the French islands of

Martinique and Guadeloupe; the Dutch islands of Saint Maarten, Saint Eustatius, Saba, Curacao, and Bonaire; the Commonwealth of Puerto Rico, a territory affiliated with the United States; independent countries in the Greater Antilles, including the Bahamas, Cuba, the Dominican Republic, Haiti, and Jamaica; and independent countries in the Lesser Antilles, including Barbados, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago (Leshikar-Denton 2002, 2004, 2011; UNESCO 2004; Leshikar-Denton & Luna Erreguerena 2008a, b; Leshikar-Denton & Scott-Ireton 2013).

Emerging Themes

Island nations are working to develop research and preservation programs to protect, manage, and interpret sites and to promote heritage tourism. They are exploring issues of proper uses of heritage and negotiating approaches from commercial salvors. Emerging themes in Caribbean maritime archaeology include heritage legislation, management, research, meaning to descendent communities, and international perspectives and future directions. Not all Caribbean countries have experience in research, protection, management, and interpretation of UCH, but there is a growing regional concern that commercial exploitation is not beneficial. Caribbean people are exploring and adopting principles like creativity in managing cultural resources and cooperation in sharing knowledge, technical skills, and professional expertise. Many recognize the value of asking for and accepting professional archaeological assistance from outside of the region, but there is a growing understanding that sustainability must come from within the Caribbean islands themselves (Leshikar-Denton & Luna Erreguerena 2008a, b; Leshikar-Denton 2011).

Heritage Legislation

Among Latin American and Caribbean countries, Mexico, Argentina, and the Cayman Islands are exemplary in not having granted permits to salvors in the past quarter-century, and Argentina has achieved specific national legislation to protect UCH. In the countries of Bermuda (often grouped with the Caribbean), the Turks and Caicos Islands, Jamaica, and the Dominican Republic, where professional archaeological work has achieved success, the governments have also granted permits to salvors in the past. Bermuda, however, notably enacted the Bermuda Historic Wrecks Act (2001), compatible with the 1996 ICOMOS Charter and 2001 UNESCO Convention. More and more countries are waking up to the need to establish similar compatible legislation. A more comprehensive overview is available in Leshikar-Denton and Luna Erreguerena (2008a, b).

Heritage Management

Political, economic, and social factors in the Caribbean have meant that heritage management is less than ideal. Caribbean countries, nonetheless, are using traditional and creative means to achieve progress, whether through governmental or private means. In addition to using legislative approaches, efforts exist to: discourage treasure hunting; create site inventories; mitigate impact to endangered sites; protect and interpret sites in situ as a first option; excavate when scientific objectives justify it, and when there is adequate funding, professional staff, and provisions for documentation, conservation, curation, and reporting, and plans to share results of research with the public through museum exhibitions, the media, and publications. In the Caribbean, sustainable economic and tourism objectives go hand-in-hand with successful promotion to protect and manage heritage sites (Leshikar-Denton & Luna Erreguerena 2008a, b). In the Cayman Islands, for example, a Maritime Heritage Partnership launched a land-based Maritime Heritage Trail in 2003 that consists of 36 sites located around the coastlines of three islands, highlighting a range of themes (e.g., early explorers, maritime place-names, historic anchorages, shipwrecks, wrecking practices, lighthouses, seaside forts, shipbuilding, turtle-fishing, and hurricanes); plans are underway to create shipwreck preserves on robust Cayman Islands shipwreck sites. Similar land-based trails are being created in Jamaica and Anguilla, the wreck of the SS

Mediator is being interpreted in situ in Curacao, while the Dominican Republic has created underwater museums featuring artifacts from shipwrecks that were replaced on the seabed and interpreted for divers and snorkelers.

Archaeological Research

Archaeological research is on-going in island countries bordering the Caribbean Sea, as well as in the coastal Caribbean countries of Mexico, Central America, and South America. Work by regional researchers, as well as teams from overseas academic institutions in the United States, Canada, Great Britain, France, the Netherlands, and Spain, among other countries, is contributing to a growing body of knowledge. The following summary provides a glimpse into archaeological work that has been accomplished (Smith 2000; UNESCO 2004; Leshikar-Denton 2002, 2004, 2011; Echeveria 2004; Pateman 2004; Grenier et al. 2006; Keith 2006; Leshikar-Denton & Luna Erreguerena 2008a, b; Gray 2008; Hamilton 2008; Harris 2008; Leshikar-Denton & Scott-Ireton 2008, 2013; Nagelkerken & Hayes 2008; Nagelkerken et al. 2008; Sadler 2008).

With the probable exception of the Cayman Islands and Bermuda, aceramic- and/or ceramic-age peoples prehistorically occupied most Caribbean islands; current archaeological research is providing theories as to their origins and routes of migration into the region. One thing is certain, the settlers traveled to the islands using watercraft; by1492, when Columbus first sighted land, the people who came to meet him paddled out in dugout canoes. These Caribbean seafarers were adapted to aquatic navigation and coastal settlement and procured marine resources, as generations had done before them. In 1995, the University of South Carolina's Institute of Archaeology and Anthropology, at the request of the government of the Bahamas, recovered a ceremonial Lucayan canoe found in Stargate blue hole (a submerged cenote) of Andros Island. In 1996, researchers discovered a Lucayan paddle of about CE 1100 in North Creek, Grand Turk; they assessed its origin to be associated with a nearby outpost of the Taíno from Haiti. The Turks and Caicos National Museum displays this paddle, one of only two such paddles from the Bahamian Archipelago. In the Dominican Republic, Indiana University and Pan-American Consultants investigated a prehistoric plaza and a cenote containing Taíno artifacts at Manantial de la Aleta. In 2008, the Puerto Rican *Instituto de Investigaciones Costaneras* (IIC), the Centre for Maritime Archaeology and Conservation (CMAC) at TAMU, and the Institute of Nautical Archaeology (INA) surveyed the northern coast of Puerto Rico between Loíza and San Juan Bay. The multi-organizational team located early sites in an area where pre-Columbian settlements existed and over 66 ships were lost.

During four Spanish voyages between 1492 and 1504, Columbus achieved the earliest recorded European explorations of the Caribbean. He lost ships during these journeys: the nao *Santa María* during the first voyage, and the caravels *Mariagalante, Gallega, San Juan*, and *Cardera* during the second, all off the north coast of Hispaniola; and during the fourth voyage, the caravels *Gallega* at Rio Belén and *Vizcaína* at Portobelo, Panama, as well as the caravels *Capitana* and *Santiago de Palos*, both run aground in 1503 in St. Ann's Bay, Jamaica. Since the early 1980s, INA has launched surveys and test-excavations to locate remains of Columbus' ships in Hispaniola, Jamaica, and Panama, while Ships of Discovery has searched for *Gallega* in Panama. Indiana University and Pan-American Consultants have worked cooperatively in a quest for Columbus' ships off Hispaniola.

In the Caribbean, investigators have discovered the unidentified remains of early sixteenth-century ships of exploration and discovery. INA teams investigated three wrecks in the 1980s, all providing clues to a ship-type known as the caravel: the Molasses Reef Wreck in the Turks and Caicos Islands; the Highborn Cay Wreck in the Bahamas; and cooperatively with the Mexican *Instituto Nacional de Antropología e Historia* (INAH), the Bahía Mujeres Wreck located off the northeast coast of the Yucatan Peninsula. The Molasses Reef Wreck, dating to the 1520s, is presently the

earliest shipwreck discovered in the Western Hemisphere. Archaeologists excavated the vessel between 1982 and 1985, and initiated conservation treatments on the artifacts. From 1988 forward, Ships of Discovery took over conservation treatments and, working in cooperation with the Turks and Caicos National Museum, prepared an exhibition which today forms the central exhibition of the National Museum. In cooperation with INAH in the 1990s, they undertook additional excavation on the Bahía Mujeres Wreck. Meanwhile, other investigators discovered the sixteenth-century vessel know as the St. Johns Bahamas Wreck on the Little Bahama Bank. Early colonial shipwrecks are also known to exist in Cuban waters, such as the Cayo Ines de Soto Site, thought to have sunk in 1555–56.

Sixteenth-century European navigators learned that it was advantageous to follow prevailing winds and ocean currents when sailing to and from the New World. Ships entering the Caribbean through the Lesser Antilles could exit through the Windward, Mona, and Anegada Passages, or maintain a westward course to the Leeward Passage, by which ships would exit through the Yucatan Channel, enter the Gulf Stream, and follow the currents through the Straits of Florida out into the Atlantic for the return passage to Europe. European powers soon established colonies and seaborne trade networks in the West Indies. Until the latter-seventeenth century, Spain claimed a monopoly on all New World territories that were sighted during the Spanish voyages. The country depleted the supply of precious metals in the West Indies, and then exploited the gold and silver resources of Mexico, Bolivia, and Peru. Mexico City displaced Santo Domingo on Hispaniola as Spain's main administrative center in 1535, and Spain created a second center in 1544 in Lima, Peru, while Cuba, located adjacent to the Leeward Passage and Straits of Florida, remained strategically valuable.

Single armed merchantmen made the trans-Atlantic passage, but by 1537, Spain organized a convoy system so that merchant ships laden with cargos of gold, silver, and pearls would sail together under the protection of armed vessels to ensure a safe passage back to Spain. Still, treacherous reefs and hurricanes claimed many Spanish treasure ships over the course of three centuries. Archaeologists have investigated Spanish merchantmen, including ships of the 1554 Fleet excavated by the Texas Antiquities Committee off Padre Island, Texas, the *Cayo Nuevo Wreck* documented by a joint INA/INAH project in the Gulf of Mexico, the seventeenth-century Rincón Astrolabe Wreck in Puerto Rico, and the 1766 *Nuevo Constante*, investigated offshore by the State of Louisiana, but the majority of sites found have been salvaged by treasure hunters whose ethics regarding historical resources are not consistent with those of scientific archaeology. Among shipwrecks worked in cooperation with salvors are names such as *San Pedro* and *San Antonio* off Bermuda, *Nuestra Señora de Atocha* in the Florida Keys, *Nuestra Señora de la Pura y Limpia Concepción* (1641) on the Silver Bank of Hispaniola, and *Nuestra Señora de Guadalupe* and *Conde de Tolosa* (1724) off the northeast coast of Hispaniola.

Although treasure hunters compromised vessels of the 1715 Spanish Plate Fleet, discovered off the east coast of Florida, archaeologists investigated the *Urca de Lima*; in 1987, Florida designated the site as Florida's first Underwater Archaeological Preserve. Salvors also impacted the remains of the 1733 Spanish Plate Fleet that wrecked in the Florida Keys, although State of Florida archaeologists are undertaking scientific studies on a number of these vessels. In the Cayman Islands, archaeologists identified a site thought to be the remains of the inbound *San Miguel*, lost in 1730. In 1996, East Carolina University began a survey of the waters of Anguilla, which included assessment of two 1772 inbound Spanish merchantmen, *El Buen Consejo* and *Jesús, María y José*, at the invitation of the Historic Wrecks Advisory Committee; they produced a map and site analysis for the government. In Jamaica, INA assisted the government in the 1980s in surveys on the Pedro Banks for early shipwreck sites. Remoteness, complicated logistics, and nominal funding, however, discourage scientific work on

these sites. In Puerto Rico, archaeologists have documented the Cerro Gordo sites in Vega Alta – a Spanish shipyard of the seventeenth to nineteenth centuries.

England, France, and the Netherlands challenged Spain's monopoly in the sixteenth and seventeenth centuries through official and entrepreneurial voyages; the Dutch created a wide commercial network, while the English and French began to settle the eastern Caribbean by the early 1600s. Meanwhile, Spanish colonies illicitly imported European products and African slaves from passing foreign merchant ships. In the Dominican Republic, the Pan-American Institute of Maritime Archaeology excavated a seventeenth-century interloper into the Spanish colonies. The investigators believe that the ship, known as the Monti Christi Shipwreck, was *en route* from Europe to North America, via the Caribbean when it wrecked. It appears to be an English-built merchantman carrying a Dutch cargo of clay tobacco pipes from Amsterdam. It wrecked between 1652 and1656, off the north coast of Hispaniola. French Louis XIV-period shipwrecks, lost during a 1677 battle with the Dutch in the Eastern Caribbean, were discovered during harbor-dredging activities in Tobago. In response, Trinidad and Tobago enacted legislation, based on the United Kingdom's Protection of Wrecks Act (1994), to safeguard these sites.

England and France established permanent settlements in the western Caribbean during the seventeenth century. In 1655, England seized Jamaica from Spain, while Spain eventually recognized the English claim in 1670, by the Treaty of Madrid. In 1655, France took Tortuga and progressively occupied all of St. Domingue (the western third of Hispaniola), but it was not until the 1697 Treaty of Ryswick that Spain recognized the French claim. It was an era of pirate and privateer exploits. In 1979, INA investigated the *Turtle Wreck*, an English turtle-fishing vessel likely burned in 1670 by Spanish privateer, Manuel Rivero Pardal in Little Cayman, and the Duck Pond Careenage used for overhauling vessels for at least three centuries in the Cayman Islands. In 2007, pirate Captain William Kidd's ship *Quedagh Merchant* was discovered in the Dominican Republic by a team from Indiana University; lost in 1699, this shipwreck will be scientifically investigated and also interpreted for the diving and snorkeling public. The Cayman Islands National Museum (CINM) test excavated a turtle-fishing encampment dating to about 1700 on the north coast of Grand Cayman, and excavated an early historic step-well on the island's western waterfront. They have found clues to HMS *Jamaica*, a British sloop on patrol for pirates when it wrecked in 1715 entering the great North Sound.

A catastrophic earthquake hit the thriving English colonial city of Port Royal, Jamaica, in 1692, causing much of it to subside into the liquefied sand of Kingston Harbour. Edwin Link and the National Geographic Society carried out underwater excavations in the 1950s, resulting in a pre-1692 map of Port Royal, while Robert Marx excavated caches of artifacts in the 1960s. Philip Mayes began terrestrial excavations in 1969. Texas A&M University and INA, under the direction of Donny Hamilton, and in association with the Jamaica National Heritage Trust (JNHT) conducted the first scientific underwater archaeological excavations. Hamilton led field schools from 1981 to 1990 in excavations of eight buildings and a ship that crashed into one building during the earthquake, training at the same time, Jamaica's first underwater archaeologist, Dorrick Gray, who now serves as Technical Director of Archaeology at the JNHT. Much of Port Royal remains in situ, and as such represents a time-capsule of seventeenth-century life. The Jamaican government is seeking World Heritage status for Port Royal; it is considering management options, and issues of preservation, research, conservation, and disposition of artifacts.

Britain and France dominated control of the Caribbean during the eighteenth century, protecting their colonies and lucrative sugar trade through naval power. They were opponents during a series of wars, with Spain and the Netherlands inconsistently allied with one or the other country: the War of Spanish Succession (1702–1713), the Seven Years War (1756–1763), the American War of Independence (1775–1783), the French Revolutionary Wars (1792–1802), and the

Napoleonic Wars (1803–1815). Not surprisingly, a great number of merchantmen and warships were lost in the eighteenth-century Caribbean. Archaeologists discovered at least six eighteenth-century merchant ships in St. Ann's Bay, Jamaica; Greg Cook and a team from INA/JNHT investigated one British sloop, the Reader's Point Wreck, in the 1990s.

The French islands of Martinique and Guadeloupe compiled an inventory of at least 73 UCH sites. Among the 19 identified sites are *Notre Dame De Bonne Espérance* (1687), HMS *Raisonable* (1762), and *Le Cygne* (1808). In Saint Kitts and Nevis, the Nevis Maritime Archaeological Group, composed of local and international members, began conducting research in 2011 on HMS Solebay, lost on 25 January 1782 during the Battle of Frigate Bay. Established in 1979, the Dominican Republic's Comisión de Rescate Arqueológico Submarino conducted excavations in cooperation with commercial interests on the French warship *Scipión* (1782), and the French ships *Diómedes* and *Imperial* (1806); the *Museo de las Reales Atarazanas*, the *Museo de Arqueología Submarina del Faro a Colón*, and the *Museo de las Casas Reales* display artifacts from these shipwrecks.

In the 1990s, Margaret E. Leshikar-Denton, working with Texas A&M University and the CINM, investigated the 1794 Wreck of the Ten Sail: HMS *Convert* and nine ships of her merchant convoy lost together on the East End reefs of Grand Cayman during the French Revolutionary Wars. The *Convert* was a captured French-built frigate, formerly called *l'Inconstante*, which retained her original French ordnance. The CINM's special two-hundredth anniversary exhibition commemorated the historical event in 1994; Queen Elizabeth II visited the exhibition. The Saint Maarten National Heritage Foundation, the Saint Maarten Department of Planning and Environment, and Maritime Archaeology and Research investigated HMS *Proselyte*, the captured Dutch frigate *Jason*, in 1994–95; the ship was lost in 1801. In the 1980s, the Archaeological and Anthropological Institute of the Netherlands Antilles (AAINA) investigated the Dutch frigate *Alphen* which exploded and sank in 1778 in Santa Anna Bay, Curacao; AAINA also recorded the SS *Mediator*, lost in 1884 in Willemstad Harbor. In cooperation with the Maritime Archaeological and Historical Society (MAHS), AAINA surveyed the historical anchorage adjacent to Fort Orange and Kralendijk, the population center in Bonaire, and identified the Dutch warship *Sirene*, lost in 1831. In Saint Vincent and the Grenadines, with the cooperation of the Government of Saint Vincent and the Organization of American States, a joint team of Florida State University and Institute of Maritime History researchers and students carried out a project in Kingstown Harbor on a late eighteenth-century shipwreck in 1997–98. In Puerto Rico, archaeologists have recorded an eighteenth-century English warship wrecked on the Laurel Reefs of La Parguera, Lajas.

A significant part of Caribbean history is reflected in the search for the slave ship *Trouvadore*, a Spanish ship that was lost in 1841 with a human cargo of 193 people. Intended for slavery in Cuba, the Africans instead found freedom in the Turks and Caicos Islands and thereby influenced the cultural future of that country. In 2008, Ships of Discovery investigated remains of a vessel believed to be *Trouvadore* and also located remains of the US Navy brig *Chippewa*, lost in 1816 while patrolling the Caribbean on a mission to counter the African slave trade and piracy.

The nineteenth century brought the end of the Age of Sail and the flourishing of the Age of Steam. In Puerto Rico, the Underwater Archaeology Office of the *Consejo para la Conservación y Estudio de Sitios y Recursos Arqueológicos Subacuáticos* recorded the Spanish steamships *Alicante* wrecked in 1881 and *Antonio López* lost in 1898 during the Spanish-American War. Archaeologists have also assessed Buoy 4 in San Juan to investigate the *Manuela* and *Cristobal Colon*, also casualties during the Spanish-American War. In Anguilla, Lillian Azevedo and a team from the University of Southampton have recorded early historic wrecks and a nineteenth-century shipwreck.

Even twentieth-century wrecks are subjects of research and eco-tourism in the Caribbean.

Bert Ho and a team from Florida State University assisted the CINM in documentation of the Norwegian-flagged *Glamis*, lost in 1913, providing the foundation to create a future shipwreck preserve on the robust shipwreck site in the Cayman Islands. *Glamis* had been built in Dundee, Scotland, in 1876. *Geneva Kathleen*, a three-masted schooner wrecked in 1930 loaded with lumber, was documented by Ball State University, also in the Cayman Islands. In Puerto Rico, archaeologists have documented World War II era vessels, including a PT boat in Desecheo Island, and two aircraft – a B-29 in Aguadilla and a PBY Catalina flying boat in La Parguera – for the US Navy.

Meaning to Descendent Communities

An important theme in the Caribbean is the meaning of maritime and underwater cultural heritage to descendant communities. In the Turks and Caicos Islands, the case study of a descendant African community whose ancestors escaped intended slavery in Cuba, through wrecking in the Spanish ship *Trouvadore*, is remarkable; it provides the opportunity for people to learn more about themselves, where they came from and how they have survived. Maritime themes like shipwrecks, historical shipbuilding of schooners and catboats, place-names, and hurricane caves, among other topics, are important to the people of the Cayman Islands; thus, involving all levels of society in the Maritime Heritage Trail engages people in their heritage. In every country, there are unique examples that can link communities to their heritage and this communication provides value and self-esteem in return to living people.

International Perspectives and Future Directions

Since the mid-twentieth century, the world's underwater cultural heritage has become more and more accessible, and has become an easier target for exploitation. At the same time, professional underwater and maritime archaeological research has experienced a profound period of growth. It is also becoming clear that UCH has value not only to scientific research, but also has a role to play in cultural, educational, and economic terms. Countries, including those in the Caribbean, are discovering innovative ways to manage and preserve maritime and underwater cultural heritage sites, and to promote them locally, regionally, and internationally.

Today is a good day for maritime archaeology in the Caribbean – today we have tools in our kit that have been created through negotiations among countries of the world, including those from Latin America and the Caribbean. Using the 1996 ICOMOS Charter and the 2001 UNESCO Convention, we can speak the same language in attributing value to UCH and providing for its protection, management, interpretation, and public access and benefit – these documents can guide us in "best practice" and in establishing compatible national legislation. As a brilliant Argentinian lawyer put it during the Paris negotiations, the magic word is "cooperation" among stakeholders – and so, countries, governments, professionals, and the public who communicate and assist one another through local, regional, and international agreements and through sharing technical and professional resources can shape a positive future.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Caribbean Historical Archaeology
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Deep-Water Archaeology
- ▶ Ethics in Archaeology
- ▶ Heritage Values and Education
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Public Archaeology, The Move Towards

▶ Public Involvement in the Preservation and Conservation of Archaeology
▶ Ship Archaeology
▶ Submerged Indigenous Sites
▶ Underwater Archaeology
▶ Underwater Cultural Heritage: International Law Regime
▶ Underwater Sites in Archaeological Conservation and Preservation
▶ World Archaeological Congress (WAC)

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Carman, John

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Basic Biographical Information

Dr. John Carman, known best for his work with historic battlefields, is among the prominent researchers who have focused on the notion of "value" within the context of heritage studies. Coming to heritage studies via archaeology and an early career in management, his earliest work explored value with particular references to English law (Carman 1996). In addition to his work with historic battlefields, he has a wide-ranging set of research interests within heritage which include public interpretation, the public, and ownership, and which are all anchored by his interest in value. This work has resulted in an extensive list of publications and his journal articles are to be found in subject areas including conflict studies, public archaeology, and museum studies.

John Carman's early training as an archaeologist began at the University of London and later continued his academic training in the Department of Archaeology, Cambridge University, where he received an M.Phil. (1989) and Ph.D. (1993) in heritage studies. Since then, his interest in value has been married to practical and theoretical explorations in public interpretation, commemoration, and the marking of heritage sites. These interests have been refined into a long-term investigation of landscape of battlefields. His *Bloody Meadow*s project undertaken with Patricia Carman (Carman & Carman 2006) represents more than a decade of focused research into the heritage of battlefields and explores these landscapes as heritage objects. Since 2005, he has held the post of University Fellow and Senior Lecturer in Heritage Valuation in the Institute of Archaeology and Antiquity, Birmingham University.

John Carman's career and his scholarship in heritage parallels the development of "Heritage Studies" as a distinct area of study within the humanities. Heritage Studies in the late 1980s and early 1990s was in a new field when John Carman graduated in 1989 as one of the earlier graduates of a dedicated Master's-level program in Heritage Studies within the Department of Archaeology at Cambridge University. After completing his Ph.D., he continued at Cambridge as a lecturer until he left for Birmingham University in 2005. Part of a small heritage-focused faculty at Cambridge, he was among the shaping influences in the development of the M.Phil. in Archaeological Heritage and Museums at Cambridge University from a small program with a few dedicated students to a developed and dedicated cohort of Masters and Ph.D. students which has created a distinct group of heritage scholars in Europe, Africa, United Kingdom, and North America.

Major Accomplishments

During his tenure at Cambridge, the foundation for his current work was laid and his early explorations of the notion of value built on the foundational work by scholars such as Timothy Darville. His focus on value came at a time when many of the definitions and understandings of the notion of "heritage" and the approaches to cultural heritage management first were being explored. His dissertation published in 1996, *Valuing Ancient Things: Archaeology and Law* (Leicester University Press), was the beginning of important work in defining and interrogating how value is created with respect to heritage. Later work exploring cultural property and what he refers to as the "silent discourse" of ownership of heritage (Carman 2005) is a refinement of his earliest research interests and continues to be developed within the context of conflict studies, public interpretation, and in memory studies.

He was an early advocate for the recognition of heritage studies as a distinct field. His 2002 publication *Archaeology and Heritage: An Introduction* (Routledge) was in response to the critical lack at the time of an introductory volume/text for beginning scholars in archaeology, heritage, and museum studies. Moreover, like much of his

work, the volume was notable for its interdisciplinary approach to heritage, acknowledging the essential and important relationship between archaeology and heritage, yet also recognizing the distinct qualities of these two means of investigating "the past." The 2009 volume, *Heritage Studies Methods and Approaches* (coedited with Marie Louise Stig Sørensen, Routledge 2009), which arose out of a conference organized by co-organized by John Carman, Marie Louis Sørensen, and their heritage graduate students, typifies his continuing concerns with developing a body of method and theories tailored to and evolving out of research within heritage studies.

A strong proponent of ensuring a continuing dialogue within the field, he has participated in and convened conferences, symposia, and research groups at the local, national, and international levels. Many of these are centered upon the exploration of historic battlefields as objects of heritage. Anchored by his interrogation of how heritage value arises and is assigned – and lately the ideas of ownership and property – he has pursued his wide-ranging research interests in historic battlefields, memory, public archaeology, and the notion of "the public" and museums in international contexts.

Cross-References

► Cultural Heritage and Communities
► Heritage Theory

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Cartajena, Isabel

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Basic Biographical Information

Isabel Cartajena was born in Santiago de Chile in 1965. With a Chilean father and a German mother, she grew up in traditional environment together with his youngest brother. During her youth, she spent short stages in Germany where she could learn about both worlds. Her first link with Archaeology was in her teens during a family trip to Eastern Island where she saw an open-air like museum. Fascinated with the landscape as well as the culture later she would spend several summer periods in the Island.

She firstly was enrolled in Oceanography – claiming that Chile's future was linked to the ocean, however during 1986 she was accepted in the Archaeology program at the University of Chile. As part of the student curricula, she made her practical fieldwork at the Atacama Dessert. Since then, most of her professional career has been linked to the desert.

Today, Isabel is an Assistant Professor at University of Chile, where she has been a faculty member of the Department of Anthropology since 1995. She has been involved in the Zooarchaeological research line in the Department during the last decade, which includes several courses as well as supervising thesis and practical lectures.

Since 1993, Isabel has been engaged in many multidisciplinary research projects together with Lautaro Núñez and Martin Grosjean. With the support of several competitive-based public funded grants, they have developed a long-term research area linking archaeology, geoarchaeology, and zooarchaeology in studying human occupation and paleoenvironments in the western slope of the Atacama Desert. She has participated bringing along her knowledge and experience in the study of animal bone remains that became a relevant indicator about human activities in this area. As a result of this collaboration, the group has published several book chapters and papers worldwide (Núñez et al. 2002, 2005, 2010, Grosjean et al. 2003, 2005).

Recently, she has been fascinated by underwater archaeology. The study of extinct animal remains in a drowned terrestrial site in the Central Chile Pacific coast opens a new research agenda for her.

Above all, Isabel manages to combine her academic and teaching activities with her family duties.

Major Accomplishments

Since her undergraduate studies, she has been working on South American camelids in the Loa Basin and Salar de Atacama region, northern Chile. With the support of national grants as well as from the National Geography Society, she contributed to a multidisciplinary team in several dimensions, especially in the analysis of animal bones and problems addressed to the camelids domestication in the Southern Andes.

With this background, Isabel was enrolled in the Doctoral Program at Freie Universität Berlin and obtained a DAAD scholarship granted by the German government. As part of her doctoral study, she spent 2 years in München at the Institut für Paleoanatomie, Domestikationsforschung und Geschichte der Tiermedizin from the Ludwig Maximilians Universität where she closely worked with Prof. Dr. A. von den Driesch, a world known specialist in Archaeozoology.

Back in Chile, Isabel returned to University of Chile. She is a dedicated teacher and has been recognized among the best scholars of the Archaeology program at University of Chile. She still works in Quebrada Tulán, at the south of the Atacama Basin (Núñez et al. 2006a, b), and is currently researching Early Holocene sites located in the Salar de Imilac and Punta Negra further south.

During 2012, she was the head of the organizing committee of the Second Latin-American Meeting of Zooarchaeology (II ELAZ) held at the University of Chile in Santiago.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Hunter-Gatherers, Archaeology of

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Castro Rojas, Victoria

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Basic Biographical Information

María Victoria Castro Rojas was born in Santiago in Chile on July 5, 1944 (Fig. 1). Known as Vicky, she was the second daughter of Luisa Rojas and Juan Castro, a biology and chemistry teacher, who was strongly involved in public education. At an early age, Victoria lost both her parents. Soon after this, she moved to live with her elder sister Nidia del Carmen with whom she became very close. Probably, this sad lost and the experience in attending a boarding school triggered in her a strong sense of empathy and warmth. One of her outstanding qualities is that she always finds something special and valuable in each student and person.

Castro Rojas, Victoria, Fig. 1 Victoria Castro at her office in the Department of Anthropology, Universidad de Chile, her intellectual refuge (Photo courtesy of Department of Communication of Facultad Ciencias Sociales, Universidad de Chile)

The academic career of María Victoria Castro Rojas began in 1969 when she became an assistant in archaeology with the Department of Anthropology, Universidad de Chile. Besides her deep vocation in archaeology, her extraordinary teaching skills were greatly enriched by her previous training as teacher in philosophy (1978, Universidad de Chile). It was around this time that she obtained a position with the Department of Anthropology at the Universidad de Chile. In 1982, she became a professional archaeologist, having obtained a bachelor degree in philosophy with a minor in prehistory and archaeology from Universidad de Chile in 1981. In 1998, with an outstanding final dissertation about evangelization and Andean religion in the Southern Andes, she obtained her master's degree in ethnohistory from the University of Chile.

Victoria Castro has received national and international awards and recognition, as well as numerous grants and fellowships that highlight

her career trajectory and her constant dedication and conviction in the importance of academic education. In 2000, she was distinguished as the faculty's best teacher of the anthropology program, which earned her the highest recognition of the Universidad de Chile to their academics. During 2003, she was awarded the *Mujer Generación* XXI distinction, annually given to 21 outstanding women for their work at the Universidad de Chile. In 2005, she received the Medal to the Academic Merit Valentin Letelier, a recognition by the University of Chile awarded only to those academics who, through their permanent and relevant actions, have made a significant contribution to the institution, through science and education. In 2007, Victoria Castro was appointed emeritus professor at the University of Chile.

In 2009, the Sociedad Chilena de Arqueología honored Victoria Castro for her outstanding contributions to archaeology in Chile and South America at the launch of her book *De Ídolos a Santos* at the XVIII Congreso Nacional de Arqueología Chilena, the national archaeology congress of Chile. It would be remiss not to note that Professor Rojas' role as the mother of three sons is as important as her contribution to the academic world. Despite the difficulties involved, she has managed to successfully balance her demanding academic responsibilities with family duties. As one of her sons said, "She is simply the best!"

Major Accomplishments

María Victoria Castro Rojas has been a key figure in the creation and development of academic and professional institutions. Since the 1960s, she has made outstanding contributions as professor in graduate and professional programs in archaeology, anthropology, museology, ecology, and community training, none of which were in existence when she started her academic career. Since 1973, Victoria has trained several generations of undergraduate students in archaeology and cultural anthropology, who today are the Chilean scientific core who promote innovative research in the fields of archaeology, anthropology, ethnology, and ecology. Recently with the creation of graduate programs in the Chilean university system, María Victoria Castro Rojas has been invited to be a faculty member of both master's and doctoral programs in these fields.

With more than 40 years of highly active and influential research and teaching, Professor Victoria Castro is a highly respected figure in Andean American archaeology. This was not an easy task for a female scholar whose career evolved within a rather tough – and at a times dangerous – institutional and political environment.

Throughout her career, Professor Castro created and participated in numerous multidisciplinary projects that have integrated different fields and included both national and international specialists (botanists, ecologist, marine biologist, linguists) to address new questions about the Andean past in the context of the northern Chile Atacama Desert (Castro & Aldunate 2004; Castro & Varela 2004). For this purpose, she has obtained grants from national and international sources. She has been recognized for her great generosity in creating long-lasting collaborative groups with scholars and students from both inside and outside of the country.

Professor Castro has a wide range of research interests that span from early Archaic societies to modern local communities. A particular interest in her studies is the social structures, ideology, and technology of farming societies that inhabited the valleys and oases of the Atacama Desert. The complex processes involved in creating cultural landscapes during the Inka estate expansion into the Atacama have been especially significant in her career. In recognition of her work in this area, UNESCO invited her to be part of the international panel of experts for the nomination of the *Qhapaq Ñan* (Inka Royal Road system) as one the largest human artifact systems in the world. This megaproject was promoted by six countries in South America, all of which were part of the Inka road network.

Professor Castro has been involved in the creation of programs for the preservation of archaeological resources, ethnoarchaeology, and cultural studies and has long promoted the active

participation of local communities in archaeological research projects (Castro & Varela 1994; Castro et al. 2013). She has been a visible leader in fighting for the recognition of local communities, for the respect and preservation of natural and cultural patrimony (Castro 2008), and for the demands of human and professional rights, even risking her integrity and job position at a time when such views were politically punished.

Throughout her career, Victoria Castro has been able to combine and innovate different lines of inquiry, the results of which have been published widely nationally and internationally. She has been very concerned with transferring knowledge to local communities and to the general public and in making community people active agents of their ethnogenesis processes and reconstruction of ethnic identity.

Victoria has been tireless in writing and communicating Chile's pre-Hispanic past within a Latin American context. Aiming to consolidate a different view with regard to the pre-Hispanic past has not always been considered in political, economic, educational, and cultural policies (Castro 2004). Victoria has managed to reach out to audiences beyond her home country by publishing in English and by participating in international events that bring her into contact with peers throughout Latin America. Few archaeologists of the region have been so successful in crossing disciplinary and geographic borders, considering that our modern borders have also been intellectual boundaries. In sum, Victoria Castro is a superb scholar.

Cross-References

- ▶ Andes: Origins and Development of Agriculture
- ▶ Andes: Prehistoric Period
- ▶ Archaeology and Politics
- ▶ Chile's World Archaeological Heritage and its Management
- ▶ Cultural Heritage and Communities
- ▶ Ethnoarchaeology

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Cat: Domestication

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Basic Species Information

Based on numerous representations of cats in Egyptian art, it has been widely accepted that Egypt was the place where the intensification of the relationship between cats and humans first began. More specifically, several wall paintings dated to the sixteenth century BCE (18th Dynasty, Middle Empire) dedicated to the cat goddess Bastet make clear that hunters of the Nile Valley used cats to threaten wild birds and chase them from reeds (Zeuner 1963). In the tomb of Baket III, a local administrator at Beni Hasan during the 12th Dynasty (c. 1950 BCE), a painting with a cat associated with a human faces a rat suggests that cats were also considered efficient companions for fighting pest rodents (Malek 1993). Additional evidence comes from a tomb in the Abydos cemetery (1980–1801 BCE) that contained 17 complete cat skeletons associated with offering pots.

It is not clear, however, if the cats of the Middle Empire can be considered domestic animals (controlled and biologically modified by the interaction with humans) or if they were only captive wild animals used by people. Juliette Clutton-Brock (1981) suggested that even modern cats are "intermediate between domestic and domesticated," and she excluded it from the "man-made animals" or even from the "exploited captives" and instead created a specific designation of "exploiting captive." Except for the sophisticated breeds which have been selected during the twentieth century, the behavior and morphology of domestic cats are the least modified by domestication. This is especially true for the skeleton and it is nearly impossible to differentiate archaeological bones of wild cats from those of domestic cats, except the brain case

for the latter is slightly smaller. This is why Frederich E. Zeuner (1963: 389) wrote that "Domestication [of cat] is (...) often more easily established by the archaeological circumstances of a find than by its osteological investigations." This is also why many scholars who investigated the origins of cats in Ancient Egypt agreed on the fact that the process of domestication of cat could have been initiated earlier than the Middle Empire as suggested by High Empire (5th and 6th Dynasties; Malek 1993) hieroglyphs.

In 1984, a cat mandible was found in the Pre-Pottery Neolithic Cypriot village of Khirokitia (c. 6500 BCE) (Davis 1987). Since there was no wild ancestor of cats on the island during the Pleistocene, this find indicated that the Neolithic people intentionally introduced cats to the island more than 4,000 years before the earliest evidence of incipient cat domestication in Egypt. Even though this discovery has been followed by additional cat bones in other sites of the same period, it was not clear if cats were transported to Cyprus as wild animals and released in the wild, since there was no archaeological evidence in either Eastern Anatolia or the Levant for an intensification of the relationship between cats and humans prior to their introduction. Though the controversial presence of a cat on the arms of one of the woman statuettes of Hacılar (Turkey, 6th millennium BCE) suggests cats may have been domesticated earlier, the earliest reliable archaeozoological evidence of domestic cats in the Levant that dates to 3300–3000 BCE (Tell Sheikh Hassan, Huruck phase; Vila 1998) is later. However, it still precedes the evidence in Egypt.

The discovery which definitely made clear that cats were domesticated during the Early Neolithic in the Near East came from a Pre-Pottery Neolithic human grave in Cyprus at the site of Shillourokambos dated to 7500–7000 BCE (Vigne et al. 2004). In this grave the skeleton of a young adult human was tightly associated with an eight-month-old cat which was probably sacrified for the burial ceremony then buried without any skinning or disarticulation. Contrary to other animal deposits in the Neolithic human burial that are composed of parts of animals considered to be provisions for the hereafter, the deposit of a complete cat emphasizes the animal as an individual and implies a strong association between a human and a cat. This means the relationship was not "restricted to material benefit of humans, but also involved spiritual links" (Vigne et al. 2004). Of course, the Shillourokambos cat skeleton does not possess any evidence of morphological modification as a result of the domestication process, nor do the bones of several additional cats found in the same village with clear marks of meat consumption.

More recently, cat remains have been found in much earlier deposits in Cyprus dated to 8300–8600 BCE, a date which precedes the earliest domesticated ungulates in the Near East but commensurate with the cultivation of cereals and legumes on the mainland and in Cyprus (Vigne et al. 2011, 2012). The grey mouse, which rapidly infested cereal stocks, was also introduced to Cyprus about this time (Vigne et al. 2011). Based on these observations, it is possible that humans used cats as efficient agents for fighting rodent pests. In this scenario, which possibly occurred independently 5–6 millennia later in Egypt (Malek 1993), the process of cat domestication could be understood as a kind of auto-domestication: early cereal stocks would have attracted mice to the Neolithic villages, which would have in turn attracted cats (and other small carnivores). Humans may then have encouraged cats to settle in villages to control mice, creating a tighter bond which led to domestication (Vigne et al. 2004).

Elsewhere in the world the domestic cat appears much later. They were introduced to Western Europe just before 0 CE and increased in frequency only during the Late Medieval times (Bobis 1991). In China, domestic cats were present during the Han Dynasty (206 BCE–220 CE) but only become popular several centuries later (Pasquet 1993).

Recent population genetic analyses have excluded all other subspecies as potential ancestors of modern domestic cats except the Near-Eastern and North African *F. s. lybica*.

This study demonstrated that modern domestic cats "derive from at least five founders from across this region, whose descendents were subsequently transported across the world by human assistance" (Driscoll et al. 2007).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Çatalhöyük Archaeological Site

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Introduction

The 9,000-year-old archaeological site of Çatalhöyük (pronunciation cha-tal-hoo-yuk) is located in central Anatolia, Turkey, 40 km from the modern regional capital of Konya. The site represents two mounds divided by dried-up river channels that today sit in a flat agricultural landscape. The name of Çatalhöyük means "fork mound" which probably refers to the fact that the road from the nearby town of Çumra divides here in multiple directions.

The East Neolithic mound of Çatalhöyük was a settlement inhabited for over 1,400 years between 7,400 and 6,000 BCE cal. Up to 18 stratifications of occupation have been identified as people abandoned old houses, filled them in, and built new ones on top as well as extending outward. Through centuries of this repeated practice, an artificial mound of about 21 m at its highest point was produced from virgin soil, which by the end of the period extended over 13.5 ha (33.5 acres). An estimated population of between 3,000 and 8,000 people is given for any one time (Cessford 2005a).

Today's irregular topography of the mound implies that perhaps a number of discreet districts evolved into mini centers, which through the centuries of occupation developed into one mound. At the end of the occupation on the East mound, or likely overlapping the end, the focus of settlement moved to the West mound attributed to the Late Neolithic and following Chalcolithic period, which continued in use until 5,500 BCE. The West mound is defined as 5.41 ha but continues beyond the fenced limits of the site under the surrounding fields and therefore likely larger in area than currently mapped. It also appears as

a low-lying mound in comparison to the East mound but perhaps was a more sprawling settlement. The transition from Neolithic to Chalcolithic appears to have been seamless, continuing from the last activity at the top of the East mound to the West mound. The definition of this later period is based on technological changes distinguished primarily through pottery production. After the Chalcolithic period, both mounds of the site were used intermittently as a burial ground. These burials span the Classical, Late Byzantine, and Early Islamic periods, but there was no major occupation that disturbed the Neolithic or Chalcolithic sequences.

The site is famous for its great size and duration at this early period in history when people started to settle down in permanent settlements and began herding livestock and planting crops. It is also well known for its dense concentration of "art" and symbolism in the form of wall paintings, wall reliefs, sculptures, and installations.

The flat environs of today owe much to the fact that some twenty-five thousand years ago, during the Pleistocene period, the Konya plain was a lake. By the end of this period, about 13,000–11,500 BCE, the lake was drying out, leaving smaller lakes dotted around the landscape, but the Konya plain was still cold, dry, and inhospitable. It was not until Anatolia experienced a rise in humidity in the early Holocene, the period around 10,000 BCE after the Pleistocene or Ice Age, when alluvial fans began to be formed by the increased flow of rivers into many parts of the plain, which led to soil development and vegetation growth (Hodder 2006).

At the time of the earliest occupation at Çatalhöyük, the landscape may be interpreted as largely treeless grassy steppe on the drier Anatolian plateau, giving way to open oak-grass parkland with some juniper, pistachio/terebinth, and birch on the foothills and to oak-pine-cedar woodland in the better-watered Taurus mountains. Vegetation would have included a patchwork of grassy steppe around marshlands, sedges, and common reeds within the marshy areas, shrubs on the better-drained soils, and trees along the river margins (Asouti 2005).

Within this richly diverse environment, the site was bordered to the south and east by the mountain ranges of Karadağ, Karacadağ, and Hasan Dağ, the latter only visible on clear days.

Excavations and research have clearly shown that the diversity of resources exploited was from a very different landscape as seen today, one that can be best described as a mosaic of different environments and types of vegetation with marshy areas and perhaps small shallow lakes as suggested by some of the bird and fish bones.

The story of Çatalhöyük began beside a river, today only witnessed by a line of trees that grow along the ancient river course. It was here that the Neolithic site was located near a network of pools joined by small channels, in which the water was relatively slow moving. These pools would have provided clean drinking water, although they may well have dried down considerably in the hot summers, and these pools would have supported small fish, freshwater shellfish, waterfowl, and amphibians (Christopher Doherty pers comm). The proximity of the river also provided other excellent water resources; there were reeds for matting and roofing, and the river may have provided a means of transport for large juniper and oak timbers used in construction. Çatalhöyük's location in the middle of a marsh allowed abundant wild plants, as well as water birds and eggs, to be exploited. Through drier periods, rich alluvial clays, sand, and lake marl clay used as building material could be collected from the settlements edges. It seems quite clear that from here, the people of Çatalhöyük were able to exploit a range of resources, domestic and wild, wet and dry, upland and lowland, and animal and plant (Hodder 2006).

Definition

A survey of the surrounding region (Baird 2002, 2005) suggests that the settlement developed from small local communities, perhaps to centralize resources that led to the development of longer-term and larger-scale social relations. Little is known about the earliest occupation at the site (restricted by the logistics of excavation); it is

possible that the first settlers built stand-alone houses which by the mid sequence (where most of the excavation work has been conducted) flourished as an agglomeration of densely packed mudbrick houses.

Each house was constructed with its own set of four walls built side by side against neighboring structures, creating tightly clustered buildings. There were no ground level access points and no streets or alleyways have yet been identified between houses. People moved around at roof level, which may have been at differing heights and traversed by a series of steps and small ladders. Thus, the roof scape may well have been a focus of daily life along with regular activities that took place inside the buildings. Access into the house was by ladder from an opening through the roof located against the south wall.

Between groups of houses were open areas where domestic waste accumulated. It is from these deposits that the wealth of the daily lives of the Neolithic population is learned through their refuse.

The internal configuration of houses displays remarkable conformity across the site. Houses were typically one or two roomed, although more roomed buildings are found, and access between rooms was through small accessholes built in the walls. Size, shape, and orientation of the houses, however, varied. Inside, wooden posts set in small pits against the walls were generally positioned symmetrically that supported crossbeams for the roof made of mud plaster and reeds. Through time, the wooden posts were increasingly replaced as clay pillars, at which stage their function is not currently fully understood.

Internal demarcations created zones for different activities indicating a strong sense of social organization. The smaller of the rooms generally represented the storage area of the house where clay bins were housed and sometimes other food preparation fittings in the form of shallow plaster-lined basins. The larger of the rooms were furnished with shallow platforms made of an earth core that lined much of the walls, which may have been used for sleeping but also other functions. It was the edges of these platforms that formed the kerbs that defined the internal demarcation for designated zones for food preparation and cooking and crafts such as bead making from stone and bone, basketry, and crafting tools such as obsidian knives and blades.

Some houses were also furnished with a bench extending lengthways into the room. A large domed oven was regularly positioned against the south wall, over which the access hole from the roof was located with a ladder and nearby were small circular hearths for a different type of cooking. Other house "furnishing" would include shallow basins and small plinths. Shallow pits near the cooking area were used as storage pits for stocks of obsidian – a volcanic glass worked into cutting tools, or clay balls (baked balls of clay used in heating and cooking as pot boilers). Changes and variations in the layout of the internal features took place during the life of the buildings. New ovens and hearths were built or storage bins and basins were added or removed.

The walls of the house were repeatedly plastered with white clay that was also used to render the house furniture. Different parts of houses were replastered more regularly than others with some areas having been replastered up to 450 times. In some houses, sections of wall plaster were elaborated with paintings, incised decoration, and relief moldings.

The wall paintings and relief sculpture possibly reflect an insight into belief and rituals of the Neolithic people. This "art" is unique, and even today, after the exciting discovery of parallel sites in southeastern Anatolia with elaborate art, the Çatalhöyük material remains the densest concentration of symbolism found so far in the eastern Mediterranean dating from this time. The wall paintings are generally red and/or black on the white background of the plastered walls. The red is ochre based, and black is generally carbon black. All colors identified at Çatalhöyük to date are mineral based. Some of the wall paintings are abstract compositions of geometric designs or composite handprints; others depict hunting scenes with figures and wild animals. One unusual depiction interpreted as a vulture-type bird hovers over a headless figure that may relate

in someway to the headless burials and also a depiction with parallels at the site of Göbekli Tepe in SE Turkey (Schmidt 2001).

Çatalhöyük is well known for the dramatic animal symbolism in the relief moldings and the incorporation of animal parts into installations and architecture, such as leopards' and bulls' heads with large protruding horns set into wall niches and rows of bulls horns set along the edge of benches.

One of the most striking characteristics of the Neolithic houses is that the dead were buried below the floors and platforms. Some houses had up to 65 burials as in one house, others as few as 2 or 3, and some with none at all, suggestive of "kinship" houses where most of a kin-group may have been buried.

The majority of the human burials were primary interments in tightly crouched positions, and there is evidence that they were bound by reed rope or matting. Babies were often buried in baskets made of reeds. Many burials were disturbed due to the repeated use of the same burial location; each time a grave was cut, it disturbed the previously buried body, parts of which were moved aside to make room for the recently dead.

Grave goods are not ubiquitous; many burials contain none. Most are ornaments or components of clothing such as beads, pendants, rings, and belt hooks. Occasionally, burials include tools such as bone points and spatulas and obsidian projectile points or shells containing pigment of red from ochre or cinnabar, green from malachite, and blue from azurite. All of these burial goods represent personal items; but not necessarily exclusive to items that were owned by the dead, some may have been "gifted" to the dead from the living, especially those found with babies and infants.

Some skeletons have been found with removed skulls, which can be linked to the skull cult that is widespread in Anatolia and the Levant in the Pre-pottery Neolithic periods. When found in the excavations, the contextual location of the skulls varies; some are discarded at the end of the use of the building, and some are placed in post pits at the beginning of the house history. One of the more unique finds was that of a plastered and painted plaster skull found in the arms of a skeleton. On close inspection, it was clear that the skull had been repeatedly plastered and painted over time, a clear indication that this particular head was kept and used in a later ritual. At Çatalhöyük, more emphasis seems to be placed on the individual and particular people and their skulls as seen in this example in contrast to other sites such as 'Ain Ghazal in Jordan where plastered human figures are buried under plastered floors of houses and later dug up for the heads that are then found reburied in caches in pits, and similar examples found on Syrian sites such as Tell Aswad in northern Syria. In eastern Turkey at the Neolithic site of Çayönü, the skull cult is represented in the "skull building" in multiples, and the slightly later site of Köşk Höyük in central Anatolia, skulls are found in cashes (Hodder 2006).

In general, the health of the Neolithic population can be determined by different methods. The limb bone length represents body size from which preliminary results suggest that the Çatalhöyük people were slightly smaller on average than other Neolithic groups in Europe and the Near East at about 1.55–1.85 m. The state of dentitions reflects the diet and the other uses to which teeth were put. The teeth were worn rapidly, as would be expected for early agriculturalists in view of the grit added to food by grinding stones. In adults and younger adults, however, there is very little dental decay. This disease became much more common from middle age onward, so in older people, it is common to see very heavily worn and markedly decayed teeth. This pattern suggests that a good deal of carbohydrate was consumed but that it was largely in the form of starches rather than sugars (Simon Hillson, *pers. comm.*). Life expectancy was as much as 55 in a few cases, and baby and infant mortality was high.

Research of the human remains through the analysis of their bones, teeth, and isotopic traces, thus far indicates little difference between men and women. They ate both farmed (domesticated) and wild (non-domesticated) plants and animals and worked hard to grow, collect, and hunt their food (Richards & Pearson 2005). Many of the

adult skeletons of both sexes have pronounced arthritis. Osteoarthritis results from a high degree of physical activity, which at Çatalhöyük would include climbing up and down ladders, hunting, plant food collection, and raising and tending crops and animals.

Typically, each house was occupied for between 45 and 90 years, after which they were generally emptied of portable items and the floors cleaned. The roof was collapsed in and posts and beams removed. The tops of the walls were dismantled, broken up and crushed, and used to fill the lower portion of the house. Only when the infill had reached the top of the razed walls were the walls for the new house built, mostly directly on top of the walls of the old house. This "infilling" provided a level and firm foundation over which a new house was built. More importantly, the lower half of each building with its internal furnishings was preserved for archaeologists to discover 9,000 years later. The closure and rebuilding was done on a house-by-house basis possibly with several years between each new construction. This means that houses had to be constructed on the exact footprint of the demolished house, as there was no way to expand in either direction because of other extant houses. Therefore, the plan of the settlement stays very much the same through its accumulation. In this way, the settlement grew as a steady development without any serious breaks or disturbances. Despite being a highly organized settlement, there is as yet no evidence of central administration or any large or "different" structures that may have been the foci of a social hierarchy.

Historical Background

The site was first excavated between 1961 and 65 by James Mellaart. It was in 1952 that James Mellaart first spotted and noted the site of Çatalhöyük from a distance as he was conducting a survey of the Anatolian Plateau mapping archaeological sites of all periods. This was during his time as a visiting scholar at the British Institute of Archaeology at Ankara (Balter 2005). But it was not until 1958 that he and colleagues reached the site and recognized it as of immense importance (Mellaart 1967). Millennia of erosion had scoured clean the outlines of mudbrick houses with plastered internal walls, while scattered artifacts indicated that the site was wholly Neolithic (Todd 1976). At the time, however, Mellaart was conducting excavations at the Chacolithic site of Hacilar, and so it was not until the 1960s that Mellaart began excavations at Çatalhöyük, and the Neolithic site became widely recognized as of unique international significance.

At the time little was known about the Neolithic outside of the Fertile Crescent, where food-producing societies first emerged as herding livestock, planting crops, and building permanent houses. Indeed, it was generally accepted that there was no evidence of the Neolithic in Anatolia due to the cold climate conditions (Hodder 2006). Mellaart's excavations therefore shifted the boundaries of the Neolithic profile westward, which included the identification of crop cultivation and domesticated sheep, goat, and cattle.

Mellaart's excavations came to an abrupt halt in 1965, and it was not until 1993 that Ian Hodder reopened excavations with permission from the Turkish Ministry of Culture and Tourism and under the auspices of the British Institute at Ankara. Also with Mellaart's blessing.

The Turkish authorities granted Ian Hodder a 25-year-long project by which they were investing in Hodder not only long-term commitment to excavation and research but his commitment to develop Çatalhöyük as a heritage site. The Turkish authorities are keen to realize the long-term benefits of regional tourism and overall, to promote Turkeys rich archaeological heritage. Hodder had committed to develop the site as a major tourist attraction with an on-site visitor center, public display of the Neolithic houses, and dissemination of information, all within the boundaries of due care for preservation and conservation issues of the site.

Hodder had progressed through academia to become a lecturer at the University of Cambridge at the time when he initiated the new project in the early 1990s. Today Ian Hodder is Dunlevie

Family Professor in the Department of Anthropology at Stanford University from where he directs the project via its head office at the Institute of Archaeology, University College London. The project is a British-led international project with up to 250 team members from across the globe. Today, the project can boast up to 20 different nationalities in a team of up to 170 team members in any one summer campaign. Hodder's vision of the project was to restart excavations within a theoretical approach using modern archaeological methods. By utilizing the latest techniques, the project is able to conduct intensive and detailed studies to enhance the large-scale results that Mellaart had collected. A large array of scientific techniques and analytical tools are put into practice within a robust excavation and sampling framework.

As well as the full-scale modern archaeological excavation and research, Hodders aim has been to address global heritage needs of conservation and public presentation within a site management plan (Site Management Plan 2004). The ultimate aim is to provide the Turkish Ministry of Culture and Tourism with a well-planned heritage site. Since the start of current excavations in 1993, the project has conducted a detailed program of presentation and public engagement as well as local community projects to enhance local awareness of the site, the Neolithic and archaeology in general. Teams have been involved with the conservation and restoration of parts of the excavated areas. These have been covered with custom-built shelters so that visitors can see the Neolithic houses within their neighborhood setting and also within the temporal sequence. The first of a series of planned replica Neolithic houses has been built for visitor entry, and an on-site visitor center provides small temporary exhibits that allow the project to test visitor responses and tailor displays to changing interests and populations. By providing a range of visitor experiences, the full heritage potential of the site can begin to be exploited.

One of the foundations of the project is the team's acknowledgement that it is the combined skills of different types of archaeological practices and other perspectives that enhance and help to understand the complexities of a site like Çatalhöyük and the understanding of this period in history. All this is reflected in the makeup of the Çatalhöyük Research Project team.

Key Issues/Current Debates

Material Culture

The excavations and research have clearly demonstrated that a diversity of resources was exploited. Through source analysis and environmental reconstructions, much can be learned about procurement activities and distances people covered for these resources.

Obsidian was one of the most important raw materials that was used, a black volcanic glass that by careful crafting is transformed into razor-sharp tools. Each natural source for obsidian is unique, and artifacts found at Çatalhöyük have been sourced to the mountainous region of Cappadocia, to Göllü Dağ-East and Nenezi Dağ, 190 km away from the site in a direct line. Reaching the obsidian source would have taken several days journeying as the route taken would probably have been circuitous in order to have regular access to water supplies. Through the obsidian route, we may address issues of trading with other people on route or at source. Once the obsidian "supplies" were brought back to site, they were placed as caches in shallow storage pits cut through the floor of the houses and accessed when needed (Carter 2011).

The site is also famous for its many representations of the female form modeled from clay or carved from stone as robust representations of fecundity and interpreted as symbols of fertility and matriarchy. Such iconography attracts groups from the Goddess Community from around the world to visit the site as a place of homage. Other clay figurines include small representations of animals and genderless figures. Male symbols are also represented but much less discussed and perhaps fewer in numbers. These appear as seated stone figures and phallic-shaped natural stones. Male symbolism is also present in the form of bull representations in the wall art and installations.

Different styles of cooking and food preparation were indicated by the presence of both ovens and hearths as well as baked clay balls found in large quantities that were used as "potboilers" in cooking (Atalay 2005). Pottery vessels appear not to have been used for cooking until midway through the sequence when a gradual change in technology created a stronger fabric that was then followed by an increase in the use of pottery. In the early sequence, the absence of pottery has defined the beginning of Çatalhöyük as aceramic (Last 2005), but this is based on small area excavations and may simply indicate that pottery was rare. Nonetheless, the change in pottery technology can be traced through the sequence. Other vessels were made of wood and basketry. Food preparation is studied through the assemblage of ground stone artifacts used for grinding and milling and by investigating the contextual relationships between the ground stone and other materials and cooking facilities. The charred botanical remains provide invaluable information on aspects of the human diet as well as of animal feeding and the management of animals. Through bone chemistry – the study of nitrogen and carbon and the study of microscopic wear on the chewing surfaces of teeth from the human skeletal data – it is clear that meat was eaten but also that domesticated plants were a central part of the Çatalhöyük diet. Analysis also centers on wild versus domesticated plants as sources of food, fodder, matting and basketry, building material, and so on; basically, all plant remains that are used in everyday routines in and around the house and the scope and nature of associated activities across the surrounding landscape.

Çatalhöyük has long been known as a center of cattle domestication, but analysis of the animal bones from the recent excavations shows that the cattle are in fact wild. Moreover, the animal bone data is numerically dominated not by cattle, as previously thought, but by sheep and goat. The vast majority of these sheep and goats are domestic, and their meat supplied most of the protein in the diet. The culling pattern, with most animals slaughtered as juveniles or subadults, indicates that they were raised primarily for meat, with wool (these early sheep are unlikely to have been woolly) and dairy products of little importance. The ratio of sheep to goats among the specimens determined to species is 7:1, making sheep the main herd animal at the site. The only other domestic animal present is dog. But while sheep provide the staple meat source, wild animals, particularly cattle, appear to hold much greater symbolic significance (Russell & Düring 2006).

By studying the minutiae of the Neolithic settlement, house by house, we build up a picture of a household economy through which, when placed into the larger neighborhood context, allows us to explore the wider issues of settlement, economics, and organization. Were individual households self-sufficient in food preparation and craft production or do we see evidence of communal activities? How big were these communal groups and were they based on kinship and lineage? With a noticeable absence of central administrative organization at Çatalhöyük, these questions are central to our research.

The aims of the current international project at Çatalhöyük involve full-scale modern archaeological excavation and conservation and promotion of the site for visitor access.

The main research direction is to place the paintings and symbolism within a full environmental, economic, and social context. Central questions concern the origins of the site and its early development, social and economic organization, and variation within the community, the reasons for the adoption and intensification of agriculture, the social context for temporal trends in the life of the community, trade, and relations with other sites in the region.

Since the 1960s, much has changed in archaeology. It is simply not enough to present what is found by excavation and how people lived in the past. Most questions posed today are why? What led to changes and developments in our past? How does one Neolithic site relate to another? To this end current research is looking at how Çatalhöyük fits into the overall picture of the spread of farming and community lifestyle after the first appearance of agriculture in the Levant at least two thousand years earlier than the dates for the founding of Çatalhöyük. Since the 1960s,

many other important Neolithic sites have been excavated in Turkey, and many more are being discovered. These help to fill the chronological sequence as, as it appears, the Neolithic spread from east to west.

The research at Çatalhöyük therefore looks inward and outward and back and forth. To help us understand why this particular location was settled, we are reconstructing the ancient environment around Çatalhöyük, including the climate through pollen analyses. We can reconstruct the nature of the landscape through the carbonized plant remains and piece together from bone remains the animals native to the region. By studying what the Neolithic people were utilizing around them and bringing into their homes, we should be closer to understanding what is was about this location that attracted these people to settle, why they stayed and what brought about the end.

International Perspectives

While today Çatalhöyük is still one of the best known Neolithic sites in Anatolia and the Near East, roughly contemporary with later Pre-Pottery and the following Pottery Neolithic in the Levant, much has changed in our knowledge of the Neolithic in Anatolia today, and in some ways, Çatalhöyük is no longer unique. We know that there are many earlier settled sites in eastern and central Anatolia and in the Levant that compare in size and complexity. We also know that domestication of plants and animals was well underway in these areas thousands of years before Çatalhöyük. There are local sequences, which lead up to and predate Çatalhöyük, such as nearby Boncuklu Höyük and Pinarbaşı (Baird et al. 2011). In southeast Turkey, the earlier sites of Çayönü (Özdoğan & Özdoğan 1998) and Göbekli Tepe (Schmidt 2001) already show substantial agglomeration and elaborate symbolism while in central Anatolia; Aşıklı Höyük (Esin & Harmankaya 1999) has dense packed housing through the millennium prior to Çatalhöyük. There are many other sites contemporary, or partly contemporary with Çatalhöyük that are known in central Anatolia and the adjacent Burdur-Lakes (Duru 1999; Gérard & Thissen 2002) region, yet Çatalhöyük retains a special significance because of the concentration of aspects of all of these sites in one place.

Future Directions

The aim for future work remains as before: to situate the elaborate symbolic production at the site within its full environmental, economic, and social context. Another direction is to understand the temporal structure of the stratigraphy at the site. Why is it that some columns of houses made up of several rebuilds endure through time and others don't? Could this stability and "ancestry" be linked to success in production?

Another aspect of the research is the role of religion in the emergence of complex societies (Hodder 2010). The premise is that archaeologists can identify religious behavior in the early Middle East and that changes in such behavior were tied to the emergence of large settled agricultural towns. Current research is addressing who the controllers of such societies were and was control of religion linked to social and economic dominance or a collective involvement in ritual and its relationship to a single place.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Animal Paleopathology
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Cattle: Domestication
- ▶ Çayönü: Agriculture and Domestication
- ▶ Conservation and Management of Archaeological Sites

- ▶ Cultural Heritage Management: Project Management
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Hodder, Ian (Modern World)
- ▶ Hodder, Ian (Theory)
- ▶ Mobiliary Art, Paleolithic
- ▶ Multivocality and Archaeology
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Pigment Analysis in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Turkey: Domestication

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Cattle: Domestication

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Basic Species Information

Cows are a major source of milk, meat, hide, and draft power. In addition, they fulfill roles in religious rituals, festivals, and fighting games.

Several species of cattle were domesticated independently. Around 8,500 BCE, after the domestication of sheep and goat, taurine cattle (*Bos taurus*) were domesticated in the Southwest Asian Fertile Crescent by taming the wild and now extinct aurochs (*Bos primigenius*). This is consistent with the high diversity of mitochondrial DNA (mtDNA) in Southwest Asia cattle with haplogroups T, T1, T2, T3, and T5. Independent taurine domestications were postulated to have occurred in East Asia and Africa. However, these claims have been questioned by a phylogeny of complete mtDNA sequences which shows that the African and East Asian haplotypes (T1 and T4, respectively) are closely related to mtDNA variants from Southwest Asia (Ajmone-Marsan et al. 2010; Groeneveld et al. 2010).

The ancestral aurochs is now extinct but was recorded to be a large and fierce animal with a broad distribution range in Eurasia and North Africa and to prefer a forest habitat (Van Vuure 2001). As in other bovine species (see below), domestication reduced sexual dimorphism. Cattle further adapted to the habitat of pastoral society by becoming docile, while ~4,000 years after domestication, taurine cattle became predominantly short-horned. The development of a large variety of coat color patterns and milk or beef production traits continues today (Felius 1995; Felius et al. 2011).

About 6,000 BCE, domestication of the related *Bos primigenius namadicus* in the Indus valley resulted in the zebu (*Bos indicus*), which acquired its characteristic hump only after domestication. Further to the east, other bovine species were domesticated (Felius 1995). About 2,500 BCE on the Tibetan plateau, domestic yak (*Bos grunniens*) diverged from the ancestral wild yak (*Bos mutus*, q.v.). In Assam and Myanmar, the semi-feral gayal (*Bos frontalis*) was derived from the wild gaur (*Bos gaurus*). In Indonesia and Indochina, domestication of banteng (*Bos javanicus*) resulted in Bali cattle. Other domestic banteng populations in Indochina and Indonesia

became introgressed by zebu (see below). Yak, gayal, and Bali cattle were adapted to local conditions and did not spread far from their original wild and domestic range. In contrast, both taurine and zebu cattle spread over most continents (Ajmone-Marsan et al. 2010).

Taurine cattle now occupy a large variety of habitats, ranging from tropical Africa to the more temperate Mediterranean, Central and Northern Europe, and the cold of North Siberia. Male introgression by local aurochs may very well have occurred and have resulted in different origins of the nuclear and mitochondrial genomes. Remains of Neolithic farms revealed that cattle and other livestock migrated into Europe following two routes, along the Mediterranean coasts and along the Danube, respectively, and arrived 3,000 BCE at the North Sea coast. North Asia may have been populated via the Caucasus or via Europe. From 4,000 to 5,000 BCE, long-horned cattle migrated into Africa and were followed by short-horned taurines.

mtDNA haplotypes have revealed several introgressions and transcontinental migrations. Various taurine mtDNA haplogroups are found in Southwest Asia, but the T1 and T3 types dominate in Africa and Europe, respectively. European aurochs carried P haplotypes, which also have been found in European domestic cattle at a frequency of c. 1/1,000. This, as well as the sporadic finding of R haplotypes, indicates an occasional recruitment of domestic cows from the European aurochs population. Conversely, T3 mtDNA haplotypes have been found in remains of pre-Neolithic Italian aurochs (Ajmone-Marsan et al. 2010).

Surprisingly high frequencies of both T1 and T2 in several Tuscan breeds suggest direct contacts with Anatolian cattle, possible during the Etruscan period (Ajmone-Marsan et al. 2010). A relatively high frequency of T1 in Iberian cattle indicates prehistoric or medieval immigration of cattle from Africa. Because many Central and South American cattle were imported from Portugal, Spain, and Africa, T1 is also found frequently in Criollo cattle (Groeneveld et al. 2010).

From the Indus Valley, zebu moved to the tropical zones of all continents (Ajmone-Marsan et al. 2010). Going eastwards, zebu reached China, Indochina, and Indonesia, which led to crossing with taurine cattle from the north or indigenous *Bibos* (banteng, gayal) cattle (Payne & Hodges 1997). Banteng mtDNA in Indonesian zebu populations testifies that herds of domestic banteng were incorporated in the zebu breeds (Mohamad et al. 2009).

A westward movement from 2,000 BCE brought zebu to the Southwest Asian region of taurine domestication and Africa. A second immigration in Africa was prompted by the Islamic invasions after 700 CE. The exclusive finding in African zebu breeds of taurine mtDNA was one of the first demonstrations that mtDNA and autosomal DNA reveal different aspects of the genetic history and demonstrated that zebu expanded via crossing with indicine bulls (Ajmone-Marsan et al. 2010). From the nineteenth century, zebu was in the same way introduced in America. In fact, descendants of Ongole cows imported in Brazil are the only zebus outside Asia that carry the original indicine mtDNA.

Domestication of cattle resulted in a decrease in size, which continued until the Middle Ages. The eighteenth century saw the development of specialized breeds, which especially in the Western world had a profound influence on the exterior, productivity, and genetic constitution of cattle. Systematic and selective breeding and genetic isolation eventually led to the development of hundreds of specialized breeds. However, crossbreeding was common, and genetic surveys demonstrated that breeds still contain a large part of the total variety of the species (Groeneveld et al. 2010).

For comparison of breeds, nuclear genetic markers are more informative than mtDNA (Groeneveld et al. 2010). Y-chromosomal haplotypes as indicators of paternal lineages revealed a sharp genetic boundary that divides both France and Germany in northern and southern parts (Edwards et al. 2011). This reflects the contrast of specialized dairy cattle from the northwestern continental lowland dairy with the central

European beef or dual-purpose cattle but also coincides with traditional cultural differences between Northern and Southern Europe.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Goat: Domestication
- ▶ Nabta Playa: Agriculture and Domestication
- ▶ Sheep: Domestication
- ▶ Water Buffalo: Domestication
- ▶ Yak: Domestication

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Çayönü Tepesi: Bioarchaeology

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Introduction

Çayönü Tepesi is a mound site located on the Ergani Plain, about 40 km northwest of Diyarbakır, southeastern Turkey. The site is situated near a tributary of the Tigris in the ecologically transitional zone of the Taurus foothills at an elevation of about 830 m. The research at Çayönü was part of the Joint Prehistoric Project of the Oriental Institute of the University of Chicago that included expeditions in Iraq, Iran, and Turkey beginning in 1947. Excavations at Çayönü were initiated by H. Çambel and R. J. Braidwood as the Joint Istanbul-Chicago Universities' Prehistoric Project of Southeast Anatolia and continued from 1964 to 1991 with some intervals (see Braidwood & Braidwood 1982; Erim-Özdoğan 2011 for summary and current status of research at Çayönü). From 1985 the excavation continued under the direction of M. Özdoğan, and various studies of excavated material are ongoing under the leadership of A. E. Özdoğan. The site covers an area of 2–3 ha, and by the end of the field season in 1991, the total area exposed was 6,000 m^2, making it one of the most extensively excavated Neolithic sites in West Asia. With about 3,000 years of archaeological sequence (c. 10000–6500 cal. BCE), the site also provides important material for investigating economic and social development through the Prepottery Neolithic (PPN) into the beginning of Pottery Neolithic (PN). The PPN at Çayönü is divided into six subphases as listed in Table 1. This Prepottery sequence is immediately followed by early PN (Erim-Özdoğan 2011).

Çayönü Tepesi: Bioarchaeology, Table 1 Chronology of Prepottery Neolithic at Çayönü Tepesi (Erim-Özdoğan 2011)

Subphase	Abbreviation	Date (uncal. BP)	Period
Round building	r	10,200–9,400	PPNA
Grill building (early)	g	9,400–9,200	PPNA
Grill building (late)	g	9,200–9,100?	Early PPNB
Channeled building	ch	9,100–9,000	Early PPNB
Cobble paved building	cp	9,000–8,600?	Middle PPNB
Cell building	c	8,600–8,300	Late PPNB
Large room building	lr	8,200–8,000?	PPNC, transitional phase between PPN and PN

Definition

The major research focus of the Çayönü project was "the recovery and interpretation of evidence of the cultural and palaeoenvironmental conditions within which effective food production was achieved in southwestern Asia" (Braidwood et al. 1974). The project included the pioneering use of interdisciplinary studies in archaeology, with staff members from the fields of physical anthropology, botany, and zoology. As the origins of agriculture and animal husbandry were some of the main questions to be investigated, bioarchaeology constituted the core of the research project.

Key Issues/Current Debates/Future Directions/Examples

Zooarchaeology

Faunal remains collected in the 1978 and 1980 seasons were studied and reported by B. Lawrence (Lawrence 1980, 1982). Although the understanding of stratigraphy of the site at the time was still preliminary, Lawrence observed a shift from the hunting of large game such as aurochs and red deer to the use of domestic sheep and goats by the "uppermost" levels at the site. As fieldwork progressed, these "uppermost" levels came to be understood to correspond to the final two of the six building subphases of the PPN, namely, the Cell and Large Room subphases. The observed changes in the faunal assemblage that were suggestive of domestication include a smaller average size for the sheep and goats, changes in their body proportions, the existence of hornless sheep, and higher proportions of young animals. Equid bones were studied and published by R.H. Meadow (1986), who determined that they were most likely from the wild *Equus hemionus* (onager).

Zooarchaeological studies of materials collected between 1985 and 1991 have been conducted since 1996 (Hongo & Meadow 1998; Hongo et al. 2004). As the understanding of the stratigraphic sequence became clearer and since large amounts of faunal remains had been added to the collection after the initial study by Lawrence, the major goal of the new study has been to document the change of animal exploitation through time. Especially of interest is the timing of the appearance of domestic forms of ungulates and the process of the development of pastoralism. In addition to identification of body parts and taxa, measurement data as well as data on age, sex, and modification of bones have been recorded in the study. Targeted studies of cattle and red deer remains were carried out as they also were for pigs (see below).

Through the 3,000 years of occupation at Çayönü, decreasing exploitation of wild mammals, probably due to continuous human impact on the environment around the site, was coupled with increasing dependence on domestic animals. Through the beginning of the Early PPNB, animal exploitation at Çayönü was based on intensive hunting of wild boar combined with broad-spectrum exploitation of other wild

animals. Pigs are the single most abundantly represented taxon through subphase c, their bones comprising more than 30 % of the identified specimens. Cattle, sheep, goats, and a wide range of wild taxa, including red deer, gazelle, roe deer, onager, bear, leopard, red fox, hare, and a few other small mammal species as well as some birds, tortoise, and a few fish were also exploited. The proportions of miscellaneous wild taxa (excluding cattle, sheep, goats, and pigs) began to decrease in the cp subphase, dropping to less than 10 % in the lr subphase and early PN. Instead, remains from the animal taxa that were to become domestic at some point in Neolithic – pigs, sheep, goats, and cattle – gradually increase in frequency through time and by the lr subphase comprise close to 90 % of the identified bone specimens. The main contributors to this trend were the increasing numbers of sheep and goat represented, especially sheep, which were rather scarce in the PPNA levels where they comprised only 10 % of the identified specimens. Several lines of evidence (relative abundance of taxa, body size, kill-off patterns, isotope studies of cattle bones) suggest that domestic sheep and goats, as well as pigs and cattle, start to appear as early as in the ch subphase (or even earlier in the case of pigs, see below) (Hongo et al. 2009). Appearance of domestic forms of cattle, sheep, and goat at the end of Early PPNB or beginning of Middle PPNB corresponds with what is happening at contemporary sites in southeastern Anatolia and northern Syria. It seems, however, that the role of domestic ungulates was as merely an additional subsistence option in a broad-spectrum subsistence strategy that lasted for about 1,000 years after their initial appearance. Increased reliance on domestic animals can be seen in the c subphase, contemporary with the clear shift from a broad-spectrum animal exploitation strategy to a strategy concentrating on sheep and goats that was taking place throughout southeastern Anatolia by the Late PPNB.

An important focus of the recent analysis of faunal remains from Çayönü has been pigs, the remains of which represent the most intensively studied part of the site's bone assemblage. Pig remains are the most abundantly represented fraction of the assemblage until sheep and goat remains became the majority in the final PPN phase (c. 7000 cal. BCE). Whether there is evidence for pig domestication at Çayönü is of particular interest primarily because southeastern Anatolia has been considered as a likely region for early pig domestication, based on the determination of "cultural control" of those animals in the 10th milllennium cal. BCE at the site of Hallan Çemi located near Batman (Rosenberg et al. 1998). In the beginning years of the Çayönü project, Stampfli (1983, in ms. 1966) had already observed that the ratio of domestic to wild pigs at Çayönü was about one to one. Kuşatman (1991) reviewed the evidence for pig domestication using the material excavated in 1978, 1980, 1981 and 1984 and suggested the possibility of the existence of domestic pigs at Çayönü as early as the Middle PPNB. Kuşatman, however, in her analysis did not study trends through time but grouped into one analytical unit the pig remains from all the aceramic levels. Consequently, any change there might have been over time in the Çayönü sequence remained unclear. The new study beginning in 1996 revealed diachronic trends in the pig data through the course of the PPN toward features that can be considered characteristic of domestic populations, namely, smaller body size and teeth, younger kill-off, and increasing frequency of dental defects (Linear Enamel Hypoplasia) (Hongo & Meadow 1998; Ervynck et al. 2001). Some smaller individuals comparable in size to domestic pigs are found already in the g subphase, and a shift toward smaller-sized animals is clear in the later c and lr subphases. Length measurements of the pig mandibular third molars show that most specimens from PPN Çayönü fall in the size range for modern wild pigs, but increasing numbers of smaller teeth appear in later subphases. Teeth that fall in the size range of overlap for wild and domestic pigs begin to appear in the c and lr subphases. In the PN period, there is an overall shift toward smaller length measurements, with the appearance of teeth that are smaller than the smallest documented for modern wild pigs in the region. Overall, a gradual intensification of

human-pig relationships is suggested rather than a sudden domestication event or an introduction of domestic pigs from elsewhere.

Carbon isotope analysis of fatty acid residues on pottery point to the significant use of pork/pig fats at Çayönü (Evershed et al. 2008). There is scarce evidence of ruminant dairy fats, suggesting that the use of milk was later in southeastern Anatolia than in the northwestern regions.

Shells

A few hundred shells were identified by D. Mayer Bar-Yosef (unpublished report). Both marine shells and freshwater mollusks were found. Some, especially marine shells had been holed and were probably used as ornaments. A *Murex trunculus* has traces of malachite inlay. All of the freshwater mollusks are available from the local river system. Marine shells were brought from the Mediterranean, or possibly from the Red Sea, implying the existence of a long-distance trade network.

Ethnoarchaeobotany

The archaeobotanical data at Çayönü is rather limited, as plant remains were not always collected in every field season. Flotation of soil samples was initiated during 1968 season by R.B. Stewart, but no identifiable botanical remains were obtained. Archaeobotanical studies were carried out by W. van Zeist in 1970 and by R. Stewart in 1972 (Stewart 1976). In the 1985, 1986, 1987 and 1988 seasons, van Zeist and G.J. de Roller studied the plant remains in reference to a newly clarified stratigraphic sequence (van Zeist & de Roller 1994). The results of these studies suggest that the habitat of Çayönü in the Neolithic did not differ greatly from the present. The site was situated in a steppe-forest (or savannah) environment of an ecologically transitional zone. The identification of charred wood remains revealed the area to be an open forest of oak, pistachio, ash, almond, and tamarisk. Overall, archaeobotanical studies showed that the mode of subsistence in the environmentally rich eastern Taurus zone was different from that of the Levant. There is no firm evidence of plant cultivation in the earliest r subphase. Wild lentil and wild vetch were intensively gathered. Although morphologically still wild, einkorn and emmer wheat were probably cultivated as early as the ch subphase. Pulses were more abundant than cereals. Field pea, lentil, and bitter vetch were also cultivated. It has not yet been determined whether grass pea and chickpea remains are of the domestic forms. An important point was made in the study of the material from the 1972 season, which is that domesticated plants apparently appeared earlier than did animal domesticates. Fat-rich nuts such as pistachio and almond were, however, widely gathered and, together with wild lentil and wild vetch, continued to play an important role in subsistence even after the cultivation of einkorn, emmer, and pulses had begun. Linseed was also collected. A textile fragment made of flax wrapped around an antler sickle was found in 1988 from the level of the end of c subphase. Small amounts of wild barley were recovered, but barley was probably neither cultivated nor purposely gathered. The abundance of grinding tools and sickles also suggests that cereals became increasingly important during the c subphase.

Anthropology

Human skeletal remains of a total of about 600 individuals have been found at Çayönü. In the earliest r subphase, pit burials were dug in the open areas or under the floors, and the dead were generally placed in flexed positions on their right side in a north–south alignment. These burials and those of the following g subphase were primary and often accompanied by red ochre, stone artifacts, or sometimes beads. A skull with a trace of trepanation was also found from g subphase. The remains of more than 300 individuals were discovered from the so-called Skull Building, a special public building used mainly for secondary inhumations, which was in continuous use from ch subphase up until the end of cp subphase. Most of the skeletons found in the Skull Building are secondary burials, such as those found in a pit filled mainly with skulls and a crypt containing long bones (Yilmaz 2010). An example of their distinctive mortuary practices can be seen in the rows of skulls arranged carefully to face in different directions and separated from each other by

piles of long bones. Primary burials lacking their skulls have also often been found in association with the Skull Building. The Skull Building fell out of use in c subphase, and in this period, primary burials are found under the floors of buildings. Burials are absent in the lr subphase, so that the dead might have been buried outside of the settlement.

General demographic studies of the skeletons, such as age, sex, and fertility, as well as their pathology and modifications before and after death, were carried out by M. Özbek (1988, 1995). Among the pathological conditions in the adults are cribra orbitalia, porotic hyperostosis, osteoarthritis, ankylosing spondylitis, and also osteomyelitis. About 4 % of the permanent teeth had dental caries, which signify the consumption of carbohydrates as dietary staples. Studies of the burial practice and taphonomy of burnt human skeletons found from the Skull Building were also conducted (Le Mort et al. 2001). Some of the human bones bear cut marks, suggesting that some skeletons were defleshed before being placed in the Skull Building. Both animal and human blood have been identified by analysis of blood residues (hemoglobin crystals) (Loy & Wood 1989) recovered from the skeletons in the Skull Building, suggesting that mortuary rituals involving animal sacrifice took place. However, these results are open to debate, especially concerning the identification of the species of origin (Smith & Wilson 1992).

Analyses of stable carbon and nitrogen isotopes of the human remains were also carried out in recent years (Pearson et al. 2010, 2013). Samples for analysis were collected from all subphases of the Prepottery Neolithic. The study focused on whether diet was different between the primary inhumation skeletons buried under the houses and those from the secondary burials in the Skull Building. Animal bones were also analyzed to see if there were any fluctuations in isotope ratios resulting from environmental change. The results showed that both animals and humans had a C3-based terrestrial diet. The nitrogen isotope ratios in human, however, revealed a wide range of variation, which meant that there was differential access to food among the inhabitants. The meat of wild and domestic pigs had contributed significantly as an animal protein source. Individuals buried under houses exhibited lower nitrogen isotope ratios, suggesting that legumes and small games were main parts of their diet. Individuals in the secondary inhumations in the Skull Building had higher nitrogen isotope ratios, implying a higher intake of meat (and perhaps more bovid meat, which has a higher nitrogen isotope ratio) and cereals. Analysis of sexed skeletons from c subphase showed that males had more access to meat in general, or to food with higher nitrogen isotope ratios (bovid meat and cereals), than females. Thus, it is surmised that differential access to food resources was dependent on social rank and sex. In addition, analysis of nitrogen isotopes of infant and juvenile skeletons recovered from the burials under houses in c subphase points to the possibility that weaning at Çayönü was done at a time later than that of other contemporary sites in Central Anatolia. At Çayönü, juveniles were weaned between 2 and 3 and a half years of age, about a year later than at other sites. A demographic study of these same skeletons suggests that infant mortality at around 3–4 years of age is much higher at Çayönü and that this might have been an outcome of their weaning practices.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone, Trauma in
- ▶ Braidwood, Robert John
- ▶ Çambel, Halet
- ▶ Cattle: Domestication
- ▶ Çayönü: Agriculture and Domestication
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Goat: Domestication
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Özdoğan, Mehmet
- ▶ Paleoethnobotany
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pig: Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sheep: Domestication
- ▶ Zooarchaeology

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Çayönü: Agriculture and Domestication

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Introduction

The Neolithic site of Çayönü is a flat mound, situated at the southern flanks of the East Taurus range in the plain of Ergani, 60 km north of the province center of Diyarbakır in southeastern Turkey. The site is located at an elevation of about 800 m within the catchment area of Tigris River, extending 200 m along a small perennial stream; the exact dimensions of the site are difficult to estimate; as 120 m in from the stream, archaeological deposit dips under the cover of the present level of the plain.

The site was discovered in 1963 during surveys of the Istanbul-Chicago joint project under Halet Çambel and Robert J. Braidwood. Excavations at Çayönü took place firstly under H. Çambel and R. J. Braidwood in 1964, 1968, 1970, 1972, and 1978–1984 (Braidwood & Çambel 1982) and from 1985 to 1991 by M. Özdoğan (Özdoğan & Özdoğan 1990) uncovering an area of over 4,000 m^2, being one of the largest exposures of the Pre-Pottery Period in the Near East (Fig. 1).

Key Issues

Even though Çayönü covers almost the entire span of the Neolithic Period from the early Pre-Pottery Neolithic up to the end of the Pottery Neolithic Period, the site owes its reputation to its long sequence of the Pre-Pottery occupation. The Pre-Pottery deposits have been categorized into six phases according to the distinct building plan types that characterize evolutionary stages in the architecture of the Neolithic Period, each phase being denominated accordingly by the ground plan type of the buildings. Even though each sub-phase comprises several building layers, the main sequence runs as (Erim-Özdoğan 2012) follows (Table 1):

Çayönü has revealed an uninterrupted cultural sequence covering the formative stages of the Neolithic Period, providing the missing links between various evolutionary stages that have been more extensively documented at other sites. The earliest occupation at Çayönü presents a unique model of a complex sedentary hunter-gatherer community, evidencing in its later stages cultivation of cereals and certain pluses and introduction of domestic animals, finally developing the principle components of a farming village. A significant contribution of Çayönü has been to the history of architectural practices, beginning with round-planned hut-like structures of wattle and daub, developing in time to rectangular

Çayönü: Agriculture and Domestication, Fig. 1 Çayönü, the eastern exposure from the air

Çayönü: Agriculture and Domestication, Table 1 Pre-Pottery Phases

Pottery Neolithic	PN (c. 7,000–6,400)
Large Room Building Sub-phase	PPNC (c. 7,200–7,000 BCE)
Cell Building Sub-phase	PPNB Late (c. 7,200–7,500 BCE)
Cobble-Paved Building	Early PPNB (c. 7,900–7,600 BCE)
Channelled Building Sub-phase	Early PPNB (c. 8,000–7,900 BCE)
Grill Building Sub-phase	PPNA-early PPNB transition (c. 8,400–8,000 BCE)
Round Building Sub-phase	PPNA (c. 9,500–8,400 BCE)

buildings with stone foundations. The excellent state of preservation of its architectural remains has made it possible to evince the transformation of simple dwellings to structurally developed houses attaining new functions. Grill Sub-phase phase marks the initial stages of transition to tripartite rectangular plan type with raised living floors and vault-like roofing of light materials such as reeds and/or twigs (Fig. 2). Architectural practices have developed through later stages of the Pre-Pottery occupation, by the Cell Sub-phase becoming two-story flat-roofed buildings with solid stone foundations and walls of mudbrick.

From the Grill Sub-phase on, the settlement presents a pre-planned layout with a special communal building being located at the eastern end of the site. By the Cobble-Paved Sub-phase, special buildings were aligned around a large and well-kept plaza that was adorned with standing stones. The plaza persisted until the end of the Pre-Pottery Period. By the Pottery Neolithic Phase, the orderly layout of the settlement was no longer maintained. Special buildings have strong stone walls reinforced with buttresses, framing a large rectangular space with benches along the side-walls. The floors of earlier ones are either paved with flagstones or covered with sand, while the latest one corresponding to the Cell Sub-phase has a pink terrazzo flooring decorated with lines of white stones set into the cement-like flooring of burned limestone. One of the special buildings, the so-called Skull Building, signifies the death cult, as the skeletal remains of over 400 individuals were interred in the building (Fig. 3). The Skull Building has several rebuilding phases; the earlier ones consisted of a large round space, while the later had a large rectangular court and adjoining cell-like crypts. While the earlier building phases housed secondary burials, caches of leftover bones, and articulated skeletal parts, the final phase consisted mainly of skulls and long bones. Most of the Cell Sub-phase buildings have single or multiple burials beneath the floors, some adorned with burial gifts (Le Mort et al. 2000).

Çayönü: Agriculture and Domestication, Fig. 2 Çayönü, a Grill building

Çayönü: Agriculture and Domestication, Fig. 3 Çayönü, the "Skull Building" showing two phases: the (round) earliest and the latest

The Pre-Pottery Phase has revealed a rich and varied assemblage. There is a relatively high percentage of obsidian among the chipped stone assemblage; the ratio between obsidian and flint is almost equal by the end of the period. Along with conventional tools of its time period, there were also long obsidian blades – known as "Çayönü blades" – that sometimes exceeded 20 cm in length, with steep-sided retouch and heavy traces of abrasion on ventral surfaces; these artifacts have become the markers of the PPNB horizon at the site (Caneva et al. 2001). Çayönü has revealed some of the most outstanding specimens of ornamental objects of various rocks and minerals; a workshop specialized in bead manufacturing has been recovered in the Cell Sub-phase, revealing the entire process from blanks to finished products. The recovery of artifacts made of native copper and malachite has been an astounding discovery, because in strong contrast to the conventional view, the use of metal was earlier than pottery. The native copper was heat treated and hammered to shape simple tools such as hooks, pins, and inlays (Özdoğan & Özdoğan 1999).

In the earliest stage, Çayönü was dependent on hunting, fishing, and gathering of plants. Wild

boar, wild cattle, deer, sheep, and goat are among the most hunted species, and among plants, pulses and wild lentils were important (van Zeist & de Roller 1994). There is some controversy on the date of the earliest domestic pig at Çayönü; however, they appear as the first domestic species at the site during the Channelled Building Sub-phase followed by sheep, goat, and cattle (Hongo & Meadow 2000). Even though pulses continued as the main component in subsistence, wild emmer (*Triticum dicoccoides*) and einkorn (*Triticum boeoticum*) are also present in the Channelled Buildings Sub-phase (van Zeist & de Roller 1994). During the PPNB stage, fully cultivated emmer wheat, domestic sheep, and goat take over from hunting-gathering.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeology and Anthropology
- ▶ Braidwood, Robert John
- ▶ Breasted, James Henry
- ▶ Çambel, Halet
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Pig: Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Wheats: Origins and Development
- ▶ Zooarchaeology

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Central America: Historical Archaeology of Early Colonial Urbanism

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Introduction

Central America as a cultural and geopolitical area comprises the modern nation-states of Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama.

Definition

Historical archaeology in Central America developed as an outgrowth of anthropological archaeology and ethnohistory focused on pre-Columbian indigenous peoples and the investigation of their history and culture based on postconquest historical data (e.g., Fowler 1989). One of the primary topics of research in Central American historical archaeology has been the study of early colonial urbanism.

Historical Background

The development of the field has also benefitted from shared interests with architecture, art history,

historical demography, historical geography, and social history focusing on the native peoples of Central America during the Conquest and the Colonial period. Some key reference works from these allied fields for Central America are cited in Further Reading.

Key Issues

The forces of the modern world, referred to as "haunts" by Orser (1996), crosscut through a number of key issues: power, status, domination, race, ethnicity, gender, identity, hybridity, and resistance. These issues form the "effective scales" (slices of space and time, like a geographer's "level of resolution") in multiscalar, dialectic analysis of archaeological landscapes or material culture (Orser 1996: 184–90). In the present case, these issues came into play as distinct social and biological groups – Spanish conquistadors, indigenous Mexican allies, and conquered local indigenous populations – made efforts to preserve their own history and ways of life as they lived alongside each other and entered into social relations in new communities. Unequal relations of power and status led to dialectical contradictory relationships such as domination and resistance. Attempts to assert, protect, and maintain identities succeeded partially or failed completely, leading to a hybridity derived from an intersection of biological and sociocultural practices which was, in turn, a product of close proximity and permeable social boundaries between groups. Rather than discuss the haunts and issues individually, one may focus on how they relate and intersect in the nexus of everyday practice as seen through a multiscalar, dialectical analysis (Orser 1996: 184–90) of one major theme of recent research, early Spanish colonial urbanism.

The theme of early Spanish colonial urbanism interrogates the forces of colonialism, Eurocentrism, capitalism, and modernity while contextualizing scales of power, gender, hybridity, and so on. A focus on urbanism stems from the trope of the Spanish colonial grid-plan city: a systematic implantation of Eurocentric spatial concepts and values as a strategic element in colonization throughout the Americas. Examination of this theme shows the dialectic between the big forces (Orser's haunts) and issues such as domination and resistance, identity, race, hybridity, and others.

Early Spanish colonial cities in America played a crucial part in the radical transformation of the landscapes of Spanish America. Conquistadors endeavored to found cities in the New World almost immediately after entering a region – in some cases even before violently subduing local native societies. These towns, with few exceptions, were built on a grid plan for reasons of both practicality and cultural tradition.

Henri Lefebvre (1991: 151), taking a Marxian perspective, points out that the grid-plan town was "an instrument of production: a superstructure [serving] a political means of introducing a social and economic structure in such a way that it may gain a foothold and indeed establish its 'base' in a particular locality." Other scholars emphasize that the grid-plan town represented an ideological statement by conquistadors acting on behalf of the Crown to impose moral, legal, and religious order or *policía* (Kagan 2000: 26–8) on indigenous populations. As the embodiment of policía, the grid-plan city symbolized Hispanic civilization itself and evoked a propagandistic statement concerning the power of the empire that translated into very specific notions of spatial patterning derived from the social structure of the Conquest. The symbolism of the siting of the government buildings and church on the central plaza underscored the power of the sword and the cross in imposing the Spanish imperial will locally. Thus, in a very real spatial sense, the Conquest emanated outward from the plaza and the grid to the surrounding countryside. "The main point to be noted, therefore, is the production of a social space by political power – that is, by violence in the service of economic goals" (Lefebvre 1991: 151–2).

Caribbean Antecedents

The first Spanish settlement in the New World was La Isabela, built in 1494 in Taino territory, on the north coast of the island of Hispaniola, by members of Cristobal Colón's second voyage to

America and abandoned in 1498. La Isabela was a fortified town not built on a grid plan. Santo Domingo in 1502 and 14 other cities quickly followed suit on the island, built by Governor Nicolás de Ovando who had been instructed by the Crown to use town foundations as an instrument of colonization. Ovando is often credited with implementing the grid plan in these new towns, but there is some ambiguity on the point of the form of the grid plan employed. The plan of Santo Domingo, while indeed built on a grid, is not rigid; the streets are straight but not parallel, and the polygonal blocks vary in size. Similarly, the main plaza is polygonal and off-center (Tejeira-Davis 1996: 33). Puerto Real, another of Ovando's towns, was laid out in a regular, rectangular format, aligned to a common orientation, and was probably built on a grid plan.

The first two decades of the sixteenth century witnessed the first wave of Spanish urban expansion on the islands of Hispaniola, Puerto Rico, Jamaica, and Cuba, followed by an extension to the mainland in the Isthmus of Panama in 1502 and to Mexico by 1519. Spanish American urbanism then spread from Panama and Mexico to Central America beginning in the 1520s. By the end of the sixteenth century, approximately 44 Spanish towns and cities had been founded during the sixteenth century in Central America (Meléndez Chaverri 1977). Roughly half of these failed to survive more than 10 years; they probably had little formal architecture and were probably not laid out on a grid plan.

Panama

The first permanently established Spanish town on the American mainland was in the eastern extreme of the Isthmus of Panama; the *villa* of Santa María de la Antigua del Darién was founded in the Darién region on the west side of the Gulf of Urabá in 1510 by Vasco Nuñez de Balboa (Sauer 1966: 174). The initial population consisted of about 200 Spaniards, refugees from a failed earlier expedition, who elected Nuñez de Balboa and Martín Samudio as *alcaldes mayors* (chief magistrates). The founding of the town and the election of municipal officials was an act of resistance since these actions took place without legal authority granted by the Crown, yet these were actions structured by Spanish historical traditions of municipal power.

In 1514 Governor Pedrarias Dávila arrived in Santa María de la Antigua del Darién, dispatched by the Crown to take over the government and resolve personal disputes in the colony (Fernández de Oviedo 1959: bk. 29, ch. 8, p. 232). Pedrarias was armed with a series of formal instructions from the Crown to found Spanish conquest towns. This order effectively marked a change in Spanish overseas strategic policy from discovery to colonization. The founding of towns represented a strategy to establish a Spanish military and political presence so that, within the framework of Castilian law, their founders could legally appropriate indigenous labor and goods and enslave local populations.

We know virtually nothing of the townscape of Santa María la Antigua. Archaeological research conducted since 1956 has shown that the ruins of Santa María are located on the Tanela River near the modern village of Tanela, approximately 10 km inland from the coast of the Gulf of Urabá, in the department of Chocó, Colombia (Arcila Vélez 1986; Alzate Gallego 2006). Excavations of the Tanela site conducted by Graciliano Arcila Vélez (1986) indicate habitation by a mixed Spanish and indigenous population but provide few clues as to the plan of Santa María. The zone of occupation appears in seven discrete clusters on a series of low hills ("lomitas") rising above the surrounding lowlands. While each individual cluster may have had its own internal arrangement, a formal grid plan is not suggested by Arcila Vélez's data. The core of the town seems to have been located on Lomita A where Spanish ceramics, bricks, nails, glass, mosaic fragments, and other objects were recovered in test excavations placed in an area of 1.9 ha. In this and excavations on the other lomitas, these relatively scant items of Spanish material culture were accompanied by a large number of ceramic fragments of indigenous tradition, figurines, roller stamp seals, lithics, grinding stones, and other artifacts. Stratigraphic counts indicate that Spanish material is minimal early on and increases in frequency in uppermost levels. The increase in upper levels could

correspond to the arrival of Pedrarias Dávila and the increase in population in 1514. The co-occurrence of Spanish and indigenous materials in all excavation units throughout the site shows that Spaniards and Indians lived and worked together ("convivencia") in Santa María, but there are no indications of technological or stylistic hybridity in material culture (Arcila Vélez 1986: 168).

Pedrarias founded six conquest towns in Panama, but the only ones known and available for study today are Panamá Viejo (1519) and Natá (1522). Eduardo Tejeira-Davis (1996) compared the plans of these two cities and found an irregular and polycentric layout for Panamá, a port city, with the plaza being off-center, the house lots long and narrow, and the streets skewed. The layout of Panamá appears to be closer to the medieval conception of urbanism than to the novel Conquest-period grid-plan city (Tejeira-Davis 1996: 43). On the other hand, Natá, an inland site located 15 km up the Río Chico from the Gulf of Parita, near the populous sixteenth-century chiefdom center of the same name, was laid out on a spacious, orthogonal grid with a central plaza, (probably) square lots, and four-lot blocks enclosed by parallel streets (Tejeira-Davis 1996: 45). Natá represents the first example of a large-scale, orthogonal, grid-plan city in Spanish America. Tejeira-Davis (1996: 52) suggested that it served as the model for similar plans of later cities built in Central America and Mexico, especially Granada (1524), León (1524), Santiago de los Caballeros, Guatemala (in Almolonga) (1527), San Salvador (1528), and Antequera de Oaxaca (1529).

Nicaragua

Some limited archaeological work has been conducted at León Viejo. Most of this work has been aimed at revealing specific buildings: the *convento* of La Merced, the church of La Merced, the Mercedarian chapter house, the cathedral of Santa María las Gracias, the convento of Santo Domingo, and the Fortress. Argüello Argüello (1969: 136–42) presents a detailed description of the cathedral, its dimensions, and building materials. The site was buried by the eruption of Momotombo volcano in 1610, and it has been difficult to reconstruct its plan, but scholars assume that it was built on a grid plan. The total area of the town is estimated at 40 ha.

Honduras

Six separate and independent conquistador companies operating in Honduras-Higueras from 1524 to 1539 launched *entradas* (armed incursions), struggled against one another for jurisdiction, founded towns, relocated towns, assigned *encomiendas* (formal grants of labor and commodity tribute), and started slaving and mining operations. All of these actions took a heavy toll on the indigenous populations. Not surprisingly, a series of indigenous rebellions also occurred in the regions of Spanish intrusion from 1524 until 1544, especially during the great revolt of 1537–1539 (Chamberlain 1953). With regard to the critical role of urbanism and the deployment of the sword and the cross in the wars of conquest, an especially interesting episode concerns the resiting by Montejo of Gracias a Dios in 1539 from the site originally chosen by Gonzalo de Alvarado in 1536 which was said to be too low, too unhealthful, too weak militarily, and too far from centers of indigenous population for the service that *vecinos* (resident heads of households) of the city required. Montejo appointed his brother, Juan de Montejo, and an ally, Bishop Cristóbal de Pedraza, as co-administrators to transfer the town to the new site (Chamberlain 1953: 108). The plan of the new city was traced, and Pedraza erected a cross at the main plaza. Pedraza described the transfer and the ceremony of the reestablishment of the town which involved the construction of a shrine at the place where the church was to be built, the singing of a hymn, the ringing of bells, and the saying of a mass (Chamberlain 1953: 109).

Guatemala

The first Spanish foothold in Guatemala was established during the first invasion of Guatemala in 1524 at the Kaqchikel city of Iximche'(Guillemín 1965; Luján Muñoz 1994). Although it was not much more than a military encampment, it is regarded historically as the first capital of Santiago de los Caballeros. After its

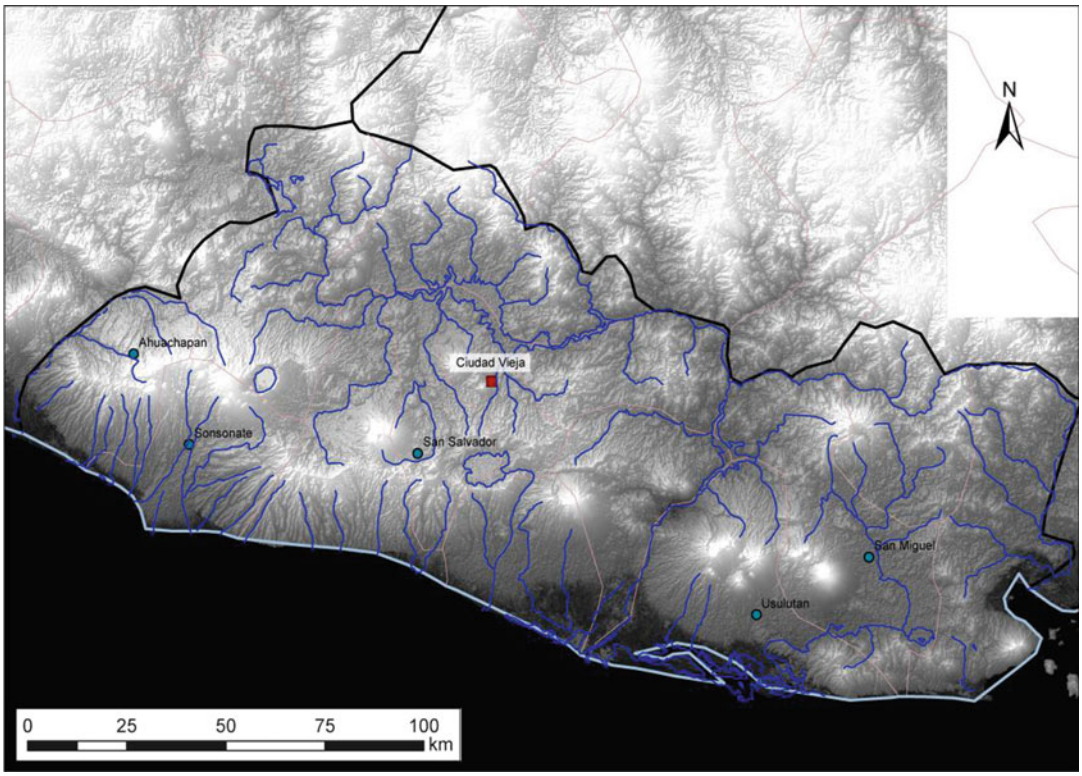

Central America: Historical Archaeology of Early Colonial Urbanism, Fig. 1 Location of Ciudad Vieja within the modern republic of El Salvador (Map by Lauren Kohut, Vanderbilt University Spatial Analysis Research Laboratory)

location at Iximche', Santiago became a peripatetic capital for three years, with sequential locations in Olintepeque and Comalapa. The Hungarian historian Janós de Szécsy identified the first permanent location of Santiago de los Caballeros, occupied from 1527 to 1541, beneath the modern village of San Miguel Escobar, in the Valley of Almolonga. This conquest town had about 100 to 150 Spanish *vecinos* with indigenous slaves and servants. As this was a time of warfare and instability, however, it is doubtful that many of the *vecinos* lived a settled urban existence. It is assumed that the layout was a typical grid plan, but this assumption has not been confirmed archaeologically. An indigenous town of several hundred resettled Mexican auxiliaries, and their families was located in the village of Almolonga or "Ciudad Vieja," about two km to the west. Destroyed by an earthquake and lahar (mudflow) in 1541, Santiago was relocated and rebuilt in the valley of Panchoy on the site known today as Antigua, Guatemala, beginning in 1543. Early colonial Antigua is known only through textual descriptions. Most archaeological excavations conducted in Antigua have been salvage operations on the remains of colonial churches and monasteries (under the stewardship of the Consejo Nacional para la Protección de la Antigua Guatemala [www.cnpag.com]).

El Salvador

The best preserved example of a Conquest-period grid-plan town in Central America is Ciudad Vieja, El Salvador, the ruins of the first *villa* of San Salvador, located in a rural area 10 km south of the modern town of Suchitoto (Fig. 1). Dispatched from Santiago in Olintepeque, Guatemala, under the command of Gonzalo de Alvarado, a small group of Spaniards, accompanied by Mexican auxiliaries, founded the first villa of San Salvador in April 1525, probably on the same site as the later 1528 settlement. The first European town of El Salvador was built in

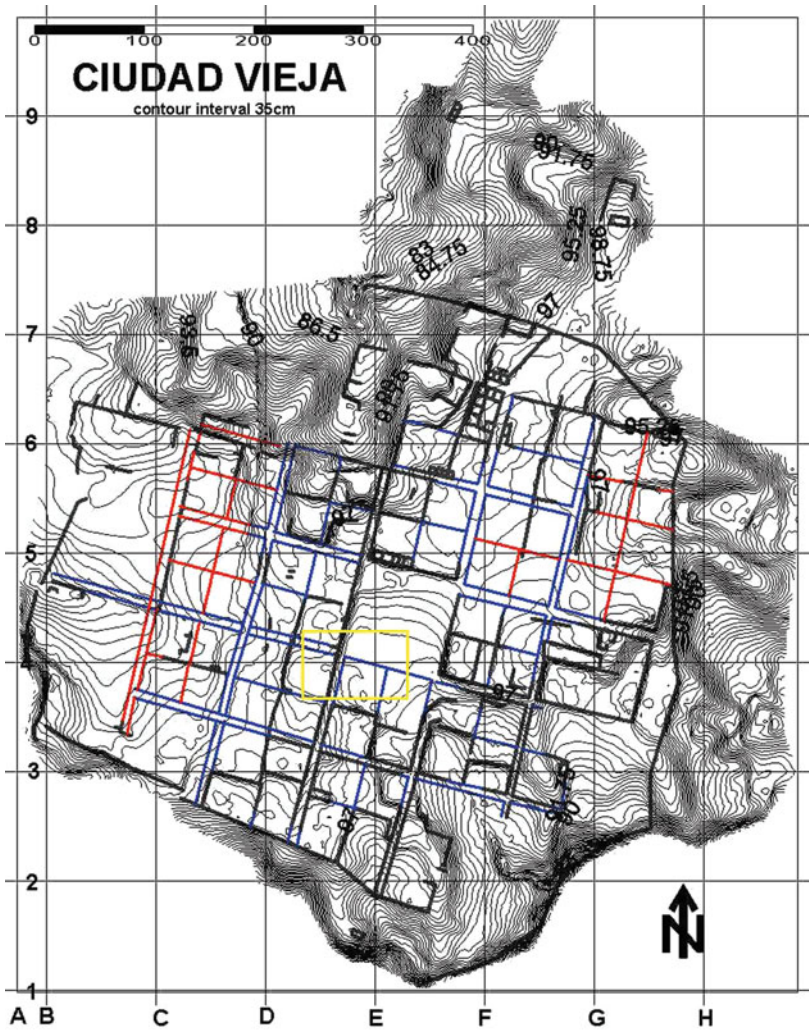

Central America: Historical Archaeology of Early Colonial Urbanism, Fig. 2 Plan of Ciudad Vieja, El Salvador, showing natural topographic and cultural features (Map by Conard Hamilton, Ciudad Vieja Archaeological Project)

the valley of La Bermuda, a small pocket to the north of Cuscatlan Pipil territory that had little or no indigenous settlement at the time of the Conquest (Fowler & Earnest 1985), but it was still prone to attack, especially from the west and the south. The Pipils rebelled and drove out the Spaniards sometime in 1526 (Barón Castro 1996: 39–44), forcing them back to their base in Guatemala. Pipil resistance waned by early 1528, however, allowing the Spaniards to return and found a permanent settlement, which resulted in the second founding of the villa of San Salvador on 1 April 1528 by 73 conquistadors and their Mexican allies under the command of Diego de Alvarado. All of the Spaniards declared themselves residents of the town; many of the Mexican allies remained as well (Barón Castro 1996: 87–91, 197–202; Fowler 2011). The town was abandoned 15 years later and moved to the modern location of San Salvador in 1545 (Fig. 1).

Archaeological research at Ciudad Vieja conducted from 1996 to 2005 (Fowler 2011) has established that the town was built on a grid plan on a site with no previous occupation covering a core area of 45 ha (Fig. 2), virtually all of which was artificially leveled and filled with various types of constructions making it an urban landscape of truly impressive proportions. Like the urban plan of Natá, described above, the plan of San Salvador is strictly orthogonal, a paragon of

the Conquest-period Spanish American grid-plan city. Visitors to the city, Spanish and Indian alike, in its prime of occupation and expansion, say about 1535, surely would have been impressed with the strict, orderly layout of the townscape with the spacious plaza at the center, the church to the east of the plaza, the *cabildo* (town hall) and other municipal buildings on the north, stores and shops on the west, and a tavern and blacksmith's shop on the south. Long, straight streets run from (or into) the four corners of the plaza in the cardinal directions. The one exception to the straightness of the streets is the street running south from the church (and the southeast corner of the plaza) which curves around a natural spring, probably an important water source during the period of the town's occupation. Other streets run parallel and perpendicular to the main streets, bisecting each other to form large lots, most of which were probably subdivided into quadrants for the purpose of assigning them to residents. The plaza measures approximately 100 m on a side including the spaces around the interior streets along the edges of all four sides. The square city blocks measure approximately 80 m (roughly 100 Spanish *varas*) (1 vara = 83.5 cm) on a side, bounded by streets about 8 m in width. Most of the blocks were probably subdivided into four *solares* or house lots of approximately 40 × 40 m (50 × 50 varas) as shown on the projected grid in Fig. 2.

The town displays a great deal of internal functional variability. Among the 18 structures and activity areas that have been excavated, Spanish and indigenous or mestizo residences, ritual spaces, civic/administrative buildings, food preparation areas, commercial and industrial buildings, warehouses and storage areas, terraces, ramps, and defensive features have all been identified. The latter consist of guardhouses, sentry stations, and a steep defensible cliff sloping away from the south and east sides of the site. While the overall town plan shows strong adherence to the grid-plan layout, excavations and remote sensing data show that there was no prevailing norm governing the locations of structures within solares or the size, shape, and internal arrangement of rooms within structures. There is even significant variation in orientation of structures or units of structures. Spanish buildings are distinguished by multiroom floor plans, substantial stone foundations measuring 83–84 cm (1 *vara*) in width, brick tile floors, ceramic roof tiles, and the use of iron nails and other hardware to secure structural elements. They are generally oriented to the overall site alignment of 12°, but exceptions do occur. Buildings assumed to be indigenous or mestizo related tend to be one-room structures with narrow foundations, packed earth floors, and no evidence for roof tiles (indicating thatched roofs). Their orientation does not follow the overall site grid. Thus, while the overall urban layout appears quite rigid at first glance, there is actually a great deal of flexibility and variability in internal distribution and use of space.

While Spanish presence is clearly indicated by the townscape, the architecture, and certain industries and classes of material culture such as iron, brick, and glass, we also see a strong indigenous presence at San Salvador reflected in the material culture of Ciudad Vieja. Indigenous residents of the town would have included indigenous Pipils as well as Mexican (Nahua and Mixtec) and Kaqchikel groups allied with the Spaniards during the Conquest. Excavations and surface collection recovered more than 60,000 sherds, and project ceramicist Jeb Card (2007) analyzed more than 10,000 sherds. Aside from a very small number of Spanish imports, the ceramic complex is eminently indigenous displaying many forms and decorative modes representing continuities with Late Postclassic materials as well as hybrid forms and motifs developed during the Conquest period. In addition to the highly visible concentrations of ceramics, obsidian artifacts occur in great numbers on the surface and were recovered in excavations in all excavated loci. *Manos* and *metates* (grinding stones) for maize processing occur in domestic contexts and on the surface. Ceramic spindle whorls for spinning thread, found in association with indigenous residences, suggest gendered production practices. Polished ceramic ear flares and jade objects – elite bodily adornment – are significant in the inventory of

indigenous-associated items and maintenance of indigenous identity. In sum, the archaeological evidence indicates that this Spanish American town had a native Mesoamerican population of significant proportion and that at least some members of this population were engaged in maintenance or construction of indigenous identity. Nevertheless, others entered into relationships and engaged in activities that led to hybridization.

Jeb Card (2007) analyzed the ceramics from eight excavated contexts and structures at Ciudad Vieja and from an extensive surface collection of the site. The most striking aspect of the collection is a class of serving plates produced with native Mesoamerican techniques and painted designs but with forms copied from European majolica. Card refers to these vessels as "hybrid plates." Card seriated the forms of published European majolica plates and found that the hybrid plates of Ciudad Vieja could be dated very precisely with this method. Application of this method confirmed the historically documented occupation span of the site (1525/1528–1545), with a slightly later abandonment than documentary sources indicate, possibly to as late as around 1560. The heavy use of hybrid plates in Spanish and indigenous or mestizo households invites comparisons with other cases of forced indigenous displacement in early colonial Spanish America (Card 2007: 276–99). Analysis of vessel form and function from eight excavated contexts of Ciudad Vieja shows similar activities in Spanish and indigenous households, as well as the identification of a tavern or other commercial food and beverage vendor in the center of town. Three microstyles crosscut other classificatory categories suggesting localized or household distribution and likely local production of ceramics in the town. These microstyles disappear during the later years of the occupation of the villa of San Salvador, and Card suggested that this development indicates the formation of new community cultural practices that tended to swamp the initial microstyle variability. Card used these analyses to evaluate models of colonial societies, suggesting that a model of creolization and ethnogenesis would be useful for understanding other interactions in early colonial Mesoamerica.

Subsistence production taking place in or near the town would have included local cultivation, hunting, and fishing – male activities – but the majority of food consumed in the town probably was obtained from tribute rendered by conquered Pipil and Lenca towns in the surrounding region and the hinterlands. Tribute payments to San Salvador are enumerated in the 1532 *Relación Marroquín* (Fowler 1989: 25–6, 155–86). This extraordinary document from the Archivo General de Indias in Seville (Audiencia de Guatemala, legajo 52) contains rich economic and demographic data on approximately ninety indigenous settlements that had been assigned in *encomienda* to the Spanish *vecinos* of San Salvador. The document shows that maize, beans, chili peppers, turkeys, venison, salt, dried fish, honey, beeswax, firewood, and a variety of woven cotton cloth and clothing were paid in tribute by Pipil- and Lenca-conquered communities. Tribute was delivered to San Salvador by male porters from the communities. Failure to pay tribute was met by violent force.

Encomienda labor was virtual slavery, and labor tribute was rendered by almost all Pipil communities, taking the form of male agricultural, construction, mining, or trade labor (in addition to burden bearing) and female domestic service such as cooking, cleaning, and child-rearing. Many if not most Spanish households would have had numerous servants from *encomienda* communities as well as indigenous slaves obtained as war captives or through barter. During the great Indian revolt of 1537–1539, Governor Francisco de Montejo of Honduras appealed to the *vecinos* of San Salvador for support and war materiel. They responded by sending a Spanish captain with 100 native auxiliaries and 1,000 indigenous (probably Pipil) porters carrying gunpowder, harquebuses and balls, crossbows and bolts, swords, lances, shields, armor, and iron bars from which to manufacture points for crossbow bolts. They also sent livestock. The porters delivered their loads to Honduras and remained for an unstated period

to serve the Spaniards at their destination (Chamberlain 1953: 87).

A significant but poorly known aspect of the economy of San Salvador, and early colonial Central American cities in general, was slaving and slave trafficking. Until the passage of the New Laws in 1542, the enslavement of indigenous people was legal as long as their captors claimed that the natives resisted colonial domination. Even after the enactment of the laws, slaving was still rampant until the implementation of the laws with the arrival of Alonso López de Cerrato from Santo Domingo in 1548 as president of the new *audiencia* in Gracias a Dios (Sherman 1979: 132–6). Slaving operations began in Guatemala and Cuscatlan during the first Spanish invasion led by Pedro de Alvarado in 1525 (Sherman 1979: 27). Alvarado himself is credited with being the largest slaver in Guatemala and one of the largest slaveholders in Central America, but Diego de Holguín, the first *alcalde* of San Salvador in 1525, claimed that his 50 slaves had been taken away from him when the New Laws were enforced in 1548 liberating the slaves (Sherman 1979: 71). The construction and maintenance of San Salvador would not have been feasible without a large slave labor force. Wealthy *vecinos* of Santiago and San Salvador had trained gangs of slaves working in gold and silver extraction operations in Honduras. During Alvarado's time in Honduras-Higueras there were 20 or more of these gangs each with an average number of slaves of 15–25 (Chamberlain 1953: 112). Slaving was the most important economic activity in Nicaragua in the 1530s; slaves taken in Nicaragua were shipped to Panama and Peru. Spanish *encomenderos* of San Salvador participated in the same activity, although on a relatively smaller scale, taking slaves in the eastern Lenca territory of Chaparrastique or Popocatepetl, until slaving was curtailed by native population collapse in the 1540s and the implementation of the New Laws in 1548 (Barón Castro 1996: 136, 166–167). Cerrato liberated 500 Indian slaves from about 40 *vecinos* of San Salvador in 1548 (Sherman 1979: 148).

International Perspectives

The people and politicians of the Central American republics regard early Spanish colonial towns as the places of origin of their national identities. Yet, Central American conquest towns are few in number, and even for those that are reasonably well known and accessible, such as Ciudad Vieja in El Salvador, León Viejo, Nicaragua, and Panamá Viejo, research and cultural heritage management has been underfunded. These sites, with the possible exception of Panamá Viejo (Arroyo 2010), remain underdeveloped as places of educational tourism.

Historically, the Spanish perspective has tended to regard these towns as *sui generis* accomplishments of Spanish civilization, seldom taking into account that in many cases the majority population of the towns was indigenous. Interpretations have emphasized the rapid spread of the grid-plan layout in the Caribbean and on the American mainland and the accompanying implantation of structural (institutional) frameworks. This perspective is beginning to change as Spanish scholarship on early Spanish American conquest towns adopts a practice-based rather than an institutional-based approach in research.

Future Directions

Future research at early Spanish American colonial urban sites will profit from research designs that combine meticulous fieldwork methodologies with dialectical, multiscalar analysis. The discussion here is less a rigorous application of multiscalar analysis than a demonstration that such analysis is feasible and productive.

A promising direction for future research could be the development of a focus on archaeological studies on the scale of resistance, and perhaps even studies of overt rebellion rather

than everyday resistance to Spanish political and cultural domination in sixteenth-century indigenous settlements, contemporaneous with Spanish conquest towns. The realization of this goal will involve stepping outside the grid plan and devising research on rebellious communities in the surrounding catchment regions. Another underdeveloped scale of analysis in Central American historical archaeology has been sexuality and intimacy. A trend-setting example may be found in the recent research of Russell N. Sheptak and colleagues (2011, 2012) on the pre-Hispanic and colonial town of Ticamaya, Honduras, an important settlement in native military and political strategies of resistance in the early sixteenth century. These authors present an intriguing practice-theory approach to Ticamaya dealing with sexuality mediating race, class, and warrior status and the transcendence from this scale to that of resistance to colonial domination.

Cross-References

- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Deagan, Kathleen A.
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Practice Theory in Archaeology
- ▶ Urban Landscapes: Environmental Archaeology

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Central and West African Middle Stone Age: Geography and Culture

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State of Knowledge and Current Debates

Introduction

The Middle Stone Age (MSA) of sub-Saharan Africa is defined by the appearance in the archaeological record of stone tools struck from carefully prepared Levallois cores. Currently dated to around 300,000 years ago, this innovation in toolmaking is associated with the rapid emergence of distinctive regional artifact styles and the effective abandonment of the large handheld hand axes and cleavers that were the hallmark of preceding Acheulean lithic industries (Clark 1988). This technological change reflects a fundamental shift from the use of handheld tools to the attachment (hafting) of stone implements to organic handles for use. In the last three decades, knowledge of this transition and of the MSA cultures that followed has taken center stage in the study of human evolution (Barham & Mitchell 2008). New scientific dating techniques accurate beyond the 40,000 year limit of the radiocarbon method have revealed the time span of the MSA to be approximately 300 to 45 thousand years ago, a period now known from genetics and the fossil record to encompass the anatomical evolution of our species, *Homo sapiens*, in Africa. Archaeologists have thus focused on the African MSA as the probable source of the distinctively modern behavior and cognition (thought processes) that makes us human.

The question of exactly when, where, and how the brains of MSA hominins (humanlike ancestors) evolved into recognizably human minds has led researchers to focus on a range of key archaeological indicators that are generally considered to reflect "modern" behavior and cognition. In addition to the use of hafted technologies and artifacts made of organic materials, these behavioral markers include (but are not limited to) the manufacture of blade and deliberately blunted ("backed") blade stone tools; the dedicated and cooperative hunting of large, dangerous animals; dispersal into new, challenging environments (e.g., forests, highlands, deserts); extended mobility and intensive, seasonal resource exploitation; and symbolic activities including self-adornment, image representation, and burial (McBrearty & Brooks 2000). Paleoanthropologists continue to debate whether these behaviors emerged gradually among archaic *Homo sapiens*/*Homo heidelbergensis* populations before the anatomical evolution of *Homo sapiens* 200,000 years ago or appeared only later, after *Homo sapiens*' anatomy. Interpretations of the archaeological record and of the criteria used to identify "modernity" remain contentious; however, it is increasingly clear that the cognitive and behavioral adaptations that evolved in the African Middle Stone Age played a critical role in the subsequent global dispersal of our species out of Africa sometime after 100,000 years ago.

Knowledge of the MSA and its potential evolutionary significance has not developed evenly across all geographical regions of the African continent. Current understanding has primarily been advanced through archaeological fieldwork exploring long, datable sites and sequences found in Southern and East Africa and North and Saharan Africa. Far from leading this debate, the Middle Stone Age in Central and West Africa remains critically understudied and very poorly understood, a fact perhaps made more surprising when the scale of these two regions is considered. As defined by modern political boundaries, Central and West Africa exceed 6.1 and 2.6 million km^2 respectively, and in combination cover some 28 % of the African landmass. The location and geographical size of these regions is shown in Fig. 1, along with the key archaeological sites referred to in this entry. The legacy of colonialism means that both regions today include French- and English-speaking nations and peoples. Central Africa stretches from the volcanic highlands and vast lakes of the Rift Valley in the East to the Atlantic Ocean Coast in the West and from the Okavango Delta and Zambezi Rivers in the South to Lake Chad in the North, where it borders West Africa. Geographically, Central Africa is dominated by the massive lowland basin formed by the circuitous route of the powerful Congo River and its tributaries, including both the Kasai and Ubangi rivers, but also takes in several smaller river basins to the northwest (e.g., the Ogooué River of Gabon). Lake Chad and the Bight of Biafra mark the eastern extremity of sub-Saharan West Africa, which stretches westward to the Atlantic Coast of Senegal, and north from the Guinea Coast to the edge of the Sahara Desert. This is a region characterized by low-lying plateaux, through which the Niger River takes a meandering route northeast from Guinea, before turning southeast and finally draining into the Atlantic Ocean in Nigeria.

Serious archaeological interest in the deep prehistory of Central and West Africa began in earnest in the earlier part of the twentieth century; however, a combination of human, ecological, and geomorphological (land form) obstacles has conspired against their continuous and systematic archaeological survey. Limited transport infrastructure, dense rainforest and woodland vegetation, and periodic political upheaval present barriers to most fieldwork projects designed to address specific research questions. Instead, archaeological enquiry and knowledge of prehistoric human presence is generally restricted to locations where modern developments (e.g., roads, settlements, mining operations) enable access. These logistical impediments are made even more severe by tropical African soil conditions and climate. Acidic soils typically cause the rapid decay of plant, animal, and human remains, while monsoon rains remove artifacts from their depositional contexts and in some areas create

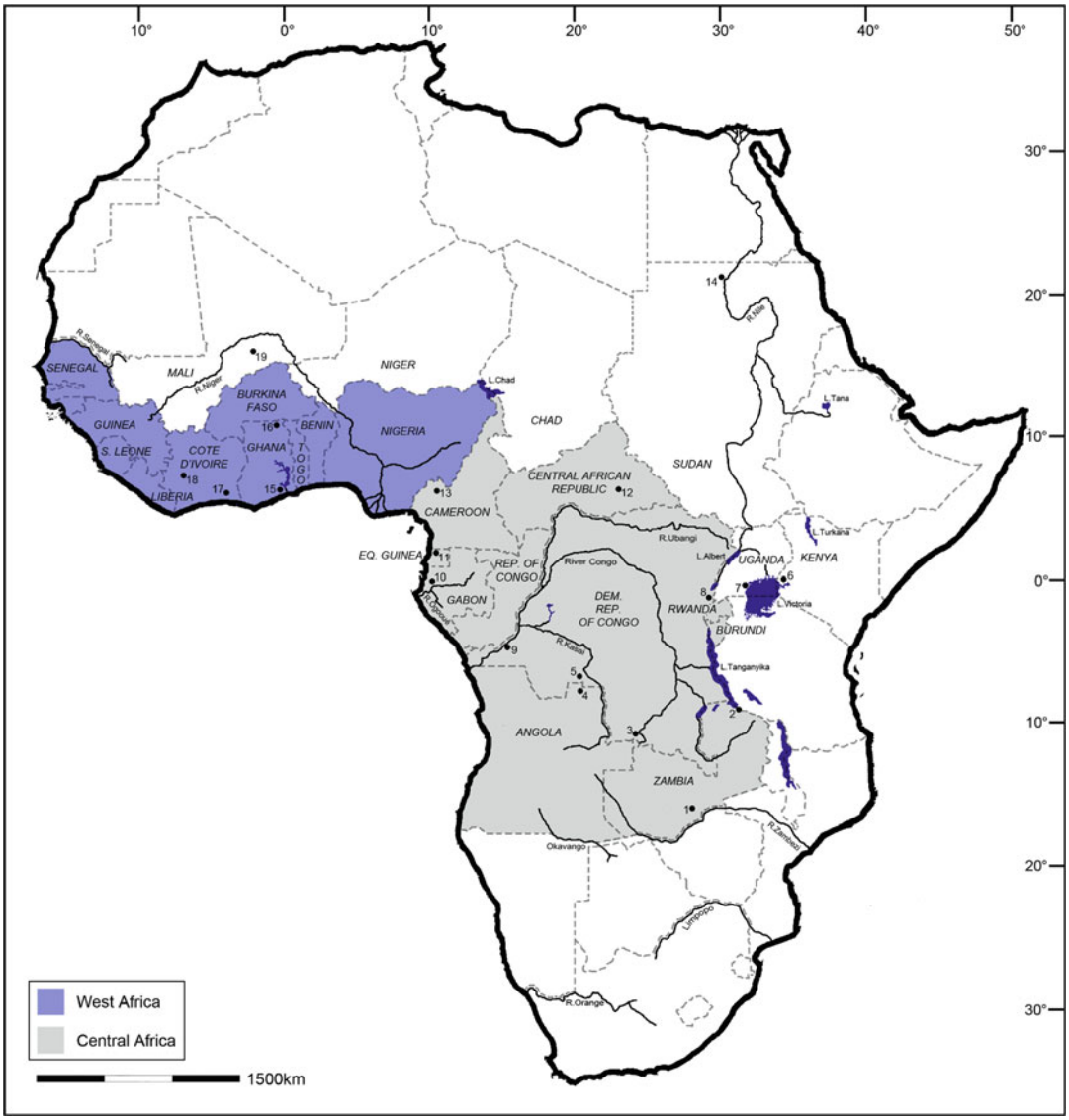

Central and West African Middle Stone Age: Geography and Culture, Fig. 1 Africa showing major river and lake systems and the locations of central and West Africa, as based on political boundaries. Sites discussed in the text include *1* Twin Rivers, *2* Kalambo Falls, *3* Kamoa, *4* Lunda Province, *5* Lupemba, *6* Muguruk, *7* Sango Bay and Nsongezi, *8* Katanda, *9* Gombe Point, *10* Okala, *11* Mosumu, *12* Nzako, *13* Shum Laka, *14* Sai Island, *15* Asokrochona and Tema West, *16* Birimi, *17* Anyama, *18* Bété I, and *19* Ounjougou

erosional hiatuses (gaps) in buried cultural sequences. Very little human skeletal material has yet been recovered from Middle Stone Age contexts in Central or West Africa, the archaic *Homo sapiens*/*Homo heidelbergensis* crania and postcranial fossils from Broken Hill (Zambia) on the margins of Central Africa being one of very few relevant specimens. Additionally, insects and tree roots cause subsurface disturbances, moving artifacts and other materials (e.g., charcoal) up and down in soil profiles (van Noten 1982). Discussed in detail below, these severe post-depositional processes mean archaeologists are still struggling to reconstruct the basic Stone Age cultural sequences, chronologies, and past environments needed to understand prehistoric

human activities in time and space. It is only in the last decade that very tentative steps have been taken to start addressing long-standing questions surrounding the behavioral adaptations of MSA hominins in Central and West Africa.

In spite of these problems, important new data on the MSA is still slowly emerging from the central and western parts of sub-Saharan Africa. Since the 1990s, both newly discovered and re-excavated sites have revealed some startling insights into the early technological sophistications of *Homo sapiens*. Finds including 80,000-year-old carved fishing harpoons from the site of Katanda (Yellen et al. 1995) in the eastern Democratic Republic of Congo (DRC) and 270,000-year-old advanced blade tools and modified pigments at Twin Rivers (Zambia) (Barham 2000) are of continent-wide – and arguably also global – significance. The importance attributed to these discoveries stems from their great age, rather than their inherent character alone. Indeed, perhaps more important than any individual discovery has been the fresh chronological context given to Central and West African MSA technologies by very old dates from the sites of Twin Rivers, Kapthurin, Sai Island, and Bété I (Fig. 1). These dated sequences indicate the emergence of distinctive MSA toolkits across these regions by at least 180,000 years ago – and probably earlier than 250–300 thousand years ago – well before the anatomical appearance of *Homo sapiens*.

Dense archaeological literatures exist in both French and English respectively for the Stone Age records of the Francophone and Anglophone countries making up Central and West Africa. Authoritative historical accounts of the archaeological work conducted have been presented by de Maret (1990), Kense (1990) and de Barros (1990) in Robertshaw's *A History of African Archaeology*, however, there has been no truly complete synthesis of work conducted on the MSA for many years. Relatively recent overviews of the state of research have been provided by Barham (2000), Casey (2002), and Cornelissen (2002), while the most up-to-date contribution is that offered by Taylor (2011). This entry aims to outline the current state of archaeological knowledge on the MSA in Central Africa and West Africa. It is structured thematically, according to the principal questions that continue to occupy the attention of researchers.

Identifying Key Issues

Knowledge of the Middle Stone Age in both Central and West Africa remains immature, with current debates still troubled by a lack of intact archaeological sequences and by fundamental uncertainties over the composition, sequencing, and age of the prehistoric cultures that have been previously recognized and reported. Indeed, as Barham (2001: 67) has stated, after 90 years of scientific work, researchers working in these regions are "still in the process of sequence building." While many critical facts remain open to debate, Table 1 provides a generalized scheme of the Stone Age cultures so far identified in Central and West Africa, along with some of their key features, as currently known. Tellingly, with the exception of revised dates, this information has remained fundamentally unchanged since the late 1960s.

The 1950s, 1960s, and 1970s witnessed a period of intensive and seemingly productive research that in hindsight can be considered the "golden age" of scientific investigation into the Stone Age archaeology of Central and West Africa. At this time, some of the most preeminent Africanist archaeologists of the twentieth century, including Desmond Clark, Louis Leakey, Georges Mortelmans, and Oliver Davies, undertook excavations and comparative studies on vast scales unknown in more recent decades. At locations across Central and West Africa – for example, in the Dundo region of northeast Angola, on the Kinshasa Plain in the DRC, and at the sites of Kalambo Falls, Zambia, and Asokrochona, Ghana (Fig. 1) – the exposed sections of massive excavated trenches revealed broadly similar successions of post-Acheulean Stone Age industries that formed the basis of an emerging regional cultural sequence for the MSA (de Maret 1990). From older to younger, these cultures were respectively named the Sangoan and the Lupemban and are discussed at length in this entry, while the stone tool types characteristic of these MSA industries are detailed below and shown in Fig. 2. Towards the end of the

Central and West African Middle Stone Age: Geography and Culture, Table 1 Key features of the principal cultures present in the Stone Age archaeological record of Central and West Africa. Note that taphonomic problems mean this generalized scheme remains open to question and, with the exception of new dates, unchanged since the late 1960s. (?) symbol denotes unresolved question, considered likely. (??) symbol denotes unresolved question, considered unlikely

Sequence			Age		Toolkit	Issues
			Previous (^{14}C)	Revised		
YOUNGER ← OLDER	ESA	Final Acheulean	50,000	400,000	Refined: – Handaxes – Cleavers – Small scrapers	– Well defined – Hand-held technology – Present in forested C. & W. Africa??
	MSA	Sangoan	Older than 40,000	Older than 250,000	Heavy-duty: – Picks – Large core axes – Choppers – Core scrapers	– Very poorly defined. – Very poorly dated. – Hafted?? – Forest-adapted?? – Present in W. Africa?
		Lupemban	40,000–15,000	300,000–150,000	Distinctive: – Large foliate points – Core axes – Small points – (backed) Blades	– Most sites poorly dated. – Hafted technology? – Hunting? – Forest-adapted? – Present in W. Africa??
		Lupembo-Tshitolian (SW Central Africa only)	Younger than 25,000	Undated	Small: – Foliate points – Core axes – Backed pieces – Tranchets	– Very poorly defined – Result of mixing? – Very poorly dated – Woodland adapted? – Unknown in W. Africa
	LSA	Local variants; e.g., Tshitolian	Younger than 10,000	Younger than 40,000?	Microlithic, sometimes with: – Small points – Small core axes – Tranchets	– Complex hafted toolkit – Hunting & Gathering – Better dated – Gradual post-MSA change?

MSA, the Lupemban was considered to change slowly into a variety of Later Stone Age (LSA) cultures typified by microlithic technologies. The Tshitolian industry is a local variant of the LSA found in the southwestern part of Central Africa and may have developed from an intermediate "Lupembo-Tshitolian" culture containing elements of both late MSA and early LSA technologies (Table 1). The Sangoan, Lupemban, and Tshitolian were, respectively, named after type sites at Sango Bay (Uganda), Lupemba (DRC), and Bena Tshitolo (DRC) where they were first found and defined (Clark 1971).

Since the 1970s, there has been a precipitous decline in fieldwork intensity across Central and West Africa due to the effects of postcolonial political and socioeconomic instability. Of equal, or perhaps even greater, influence has been the recognition of several seemingly insurmountable obstacles that make studying the Stone Age archaeological records of these regions extremely challenging. Discussed in detail below, these brakes on data collection and the progress of research mean that the key questions about the MSA of Central and West Africa that emerged in the mid-twentieth century have remained unresolved for more than 50 years and are still current. These long-standing and unsettled issues provide the essential structure of the remainder of this entry. Issues focusing on the nature of the Central and West African Stone Age records, their characteristic MSA industries, and chronology are discussed first. Following this, key theoretical issues centering on the possible

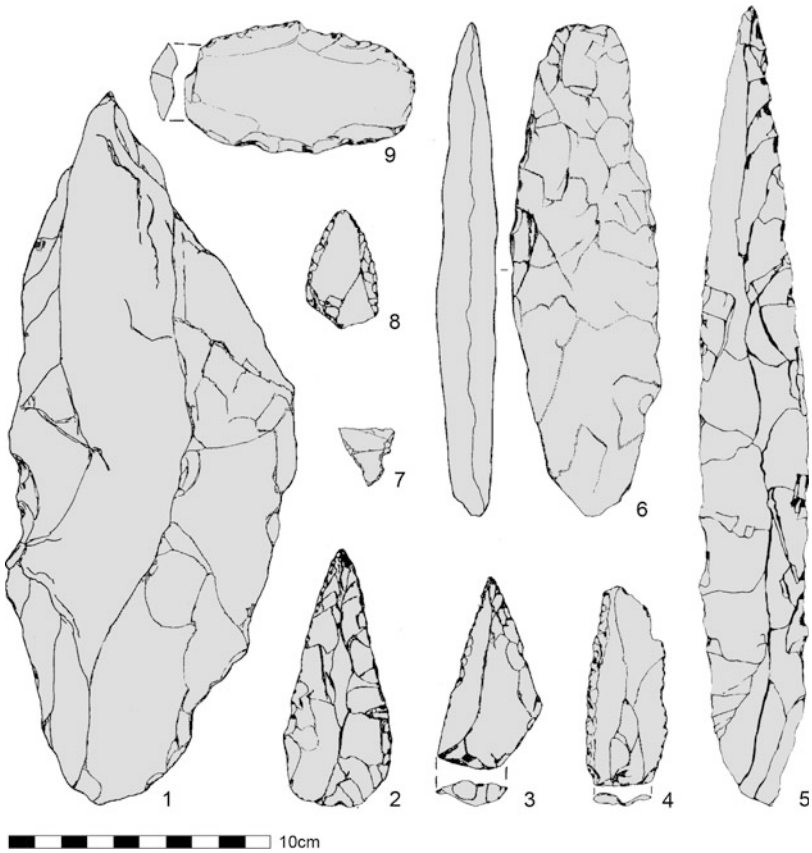

Central and West African Middle Stone Age: Geography and Culture, Fig. 2 Lithic artifacts of the Central and West African Middle Stone Age: *1* large, Sangoan-type pick, Camafufo, Angola; *2* prepared core (PCT) point, *3* convergent PCT point with facetted platform, *4* blade with lateral retouch ("backing"), *5* double-ended bifacial lanceolate point of Lupemban-type, *6* bifacial core axe of Lupemban-type, *7* tranchet point, *8* small PCT point, and *9* prepared core suitable for Levallois flake removals. No *1* from Camafufo, Angola; Nos *2–4* and *8–9* from Kalambo Falls, Zambia; No *5* from Gombe Point, DRC; No *7* from Twin Rivers, Zambia

adaptations represented by these cultures are outlined. The issues addressed can be summarized as follows:

- What is the general sequence of MSA cultures in Central Africa and West Africa, and how can Sangoan and Lupemban lithic industries be defined?
- How old is the MSA in Central and West Africa, and for how long did it last?
- Were Sangoan and Lupemban stone tools routinely hafted for use?
- Were Sangoan and Lupemban technologies adapted for hunting and gathering in woodland and rainforest environments?

Central and West African MSA Sequences: Defining the Sangoan and Lupemban

Archaeological fieldwork projects of the 1950s and 1960s attempted to make real progress towards the construction of a reliable Stone Age sequence for Central and West Africa. The Sangoan industry was found to overlie the Acheulean at the sites of Nsongezi (Uganda), Asokochona (Ghana), and Kalambo Falls (Zambia). In a remarkable departure from the refined symmetry of late Acheulean hand axes, the Sangoan was characterized as a rugged toolkit dominated by thick and heavy biface tools, including core axes, picks, choppers, and core scrapers, which were shaped roughly by striking a few flakes from large cobbles of tool stone. An example of a Sangoan pick is shown in Fig. 2: 1. The Lupemban was found to sit above the Sangoan at Kalambo Falls (Zambia), and was said to include refined bifacial lanceolate points, core axes, Levallois points, and blade tools. A range of implements typical of the Lupemban are shown in Fig. 2: 2-6; 8-9. At sites across Central Africa, LSA assemblages were found to lie above MSA industries and were identified as informal quartz-based industries, or as "Tshitolian" toolkits based on the continuation

of bifaces in smaller, more delicate forms, as well as segments, *petit tranchets*, backed pieces, and points finely retouched by pressure technique. The absence of undisturbed archaeological sequences spanning the period between the Lupemban and the LSA led to speculation that over time Lupemban technologies in South West Central Africa gradually phased into the Tshitolian, a change in which Lupemban tools became smaller and more refined, with toolkits featuring an increased number of Tshitolian-type *petit tranchet* (Fig. 2: 7) and microlithic elements. By the close of the 1960s, researchers might reasonably have concluded that they were close to resolving the essential makeup of Sangoan and Lupemban industries and to defining their place in space and time (Table 1). Subsequent research developments have shown such a view to be overly optimistic.

The work conducted across Central Africa during this period built on the fieldwork undertaken in the 1920s by Jean Colette, at a site today known as Gombe Point. This site, located on the banks of the Congo River in modern-day Kinshasa (DRC), revealed a succession of cultures that formed the basis for the first detailed framework for the Stone Age in Central Africa (Clark 1971). At the base of the excavated sediments was a culture Colette called the Kalinian that was dominated by large, minimally worked Acheulean-like bifacial implements, along with some flake tools. Above this, a culture characterized by a smaller, flake-based technology consistent with the Middle Stone Age was recovered alongside refined, daggerlike bifaces, to which the name Djokocian was applied. Higher up in the sediments, an assemblage containing microlithic artifacts of Later Stone Age type was named the Ndolian. Despite the different names given to them at that earlier time, these stone tool assemblages remain roughly equivalent to the Sangoan, Lupemban, and Tshitolian industries, as known since the 1950s (Barham 2001). Re-excavation of this important sequence by Daniel Cahen in the mid-1970s, however, identified a range of critical problems that call into question the vast majority of work conducted across Central and West Africa in preceding decades. The impact of this research is still felt today by archaeologists who continue to research the MSA in these regions.

Jean Colette accurately reported that the stone tool industries at Gombe Point rest beneath the modern soil surface in a single, approximately 7 m thick layer of sediment. Like Colette, Cahen's work (1978) identified multiple stone tool horizons in this soil layer but, crucially, he found that refitting stone tools (which must have been produced at the same time, during a single prehistoric stone tool knapping event) were vertically separated by up to 1.5 m in the sequence. This observation showed that severe subsurface soil movements resulting from bioturbation – the mixing of sediments by tree roots and insects – had moved artifacts up and down in the sequence since their ancient deposition, blending tools of different ages together into what *appear* to be distinct cultures in different stratigraphic positions (Cahen & Moeyersons 1977). The importance of this finding cannot be overstated; rather than accurately reflecting a series of changes in technologies over time whose study could reveal insights into prehistoric human behaviors, the Stone Age "industries" at Gombe Point instead result from the mixing of once discrete cultures into artificial levels of Stone Age material. Called "stone lines," these accumulations of mixed archaeological material have very low stratigraphic and cultural integrity and prevent the reliable definition and comparison of prehistoric stone tool industries over time and space (Moeyersons 1978). Similar processes also move other materials – including charcoal and pollen – that are useful both for dating and for reconstructing prehistoric environments, such that their association with particular stone tool assemblages cannot be determined reliably. This has implications for understanding the age and environmental context of MSA industries, issues that are explored later in this entry.

Revision of the Gombe Point sequence showed that the time-depth relationships that underpin the principle of stratification (in which the more deeply buried layers in a sequence are relatively older, and those nearer the surface are relatively younger) are confounded at this site.

This understanding led Cahen to conclude that the integrity of the archaeological record across Central and West Africa may be so poor that only two broad cultures can be firmly distinguished in these regions – the Acheulean and a subsequent "Post-Acheulean Industrial Complex." According to this view, distinct Sangoan and Lupemban industries, as previously identified and described within the Congo basin, are erroneous and do not reflect prehistoric reality. More recently, "stone lines" have been seen to characterize the archaeological sequences of a large number of Central and West African sites, including Asokrochona, Chaminade, Kamoa, Mosumu, Nsongezi, and several sites located on the Kinshasa Plain (Fig. 1). Identifying the exact processes that cause buried lithic artifacts and other materials to disperse and reform as stone lines has proven difficult. Shifting sandy soils, in combination with tree-root activity (Moeyersons 1978), erosion (Schwartz 1996), and burrowing termites (McBrearty 1990), have been the principle explanatory factors forwarded, but should not be considered as mutually exclusive (Mercader et al. 2002).

Knowledge of the Sangoan and Lupemban MSA is now widely recognized to be extremely poor. Numerous MSA sites exposed by diamond mining in the Dundo region of Angola, including Musolexi, Camafufo, and Catongula (Clark 1963), provide much-needed information about the Stone Age in the southern part of the Congo basin, but here Sangoan and Lupemban artifacts are found mixed together in a gravel layer and cannot be reliably separated based on stratigraphy. Knowledge of the MSA on the northern edge of the Congo basin is particularly poor, with a few disturbed sites studied by Bayle des Hermens (1975) providing essential data. Similar mixed aggregates also typify the MSA recovered from the "N" and "O" horizons at Nsongezi while, despite being in better stratigraphic context, McBrearty (1988) could not be completely confident in separating Sangoan- and Lupemban-like assemblages at Muguruk, preferring instead to describe them using the compound name "Sangoan–Lupemban." At the site of Kamoa, no Sangoan material is present at all – rather, an occupation gap or erosional phase is indicated in which the Acheulean is followed by a small, probable Lupemban assemblage in insecure context (Cahen 1975). In contrast to these mixed gravel and surface accumulations, a series of sites on the Kinshasa Plain (near to Gombe Point) have revealed deep sequences of poorly stratified sandy soils, in which van Moorsel (1968) observed subtle changes in Sangoan and Lupemban technologies over time. Based on an apparent trend towards smaller and more refined biface tool forms, Clark (2001) and Mortelmans (1957) both argued for the existence of discrete Lower (older) and Upper (younger) phases within the Sangoan and Lupemban. Even at the well-stratified site of Kalambo Falls (see below), however, the stratigraphic record for the Central African MSA is simply too coarse-grained to allow the secure identification of subtle technological changes over time. Until a more intact, high-resolution sequence of Sangoan and/or Lupemban material is found, the existence and nature of change within these cultures will remain speculative.

In spite of these very significant problems, several researchers continue to see meaningful similarities between the more heavily disturbed Middle Stone Age sites found in the tropical, forested interior of lowland Central and West Africa and a handful of less-disturbed archaeological sequences excavated on their woodland margins. Located on the periphery of Central Africa, sites including Muguruk, Twin Rivers, and Kalambo Falls provide evidence that the general regional sequence of Acheulean–Sangoan–Lupemban grading into LSA is essentially accurate. At the southern end of Lake Tanganyika in northeastern Zambia, the site of Kalambo Falls in particular provides a key sequence for the Central African MSA. Here, overlying a series of stratified Acheulean layers with abundant hand axes, cleavers, and rarely preserved organic materials, archaeological horizons representing the Sangoan and Lupemban are identifiable. Critically, these are separated from the Acheulean, and from one another, by sandy horizons that ensure only extremely limited mixing has occurred between the industries (Clark 2001). That the essential integrity of this

sequence has been retained is also supported by technological differences between the two excavated technologies. Low numbers of characteristic MSA artifacts such as Levallois points and blade tools are found in the Sangoan horizons, which are contrasted in the Lupemban levels by an abundance of MSA tools made by Levallois methods, alongside bifacial, blade, and backed blade tools. Better, but still imperfect, stratigraphic control at these peripheral sites indicates that, although heavily disturbed, difficult to define or date, and poorly understood across most of Central and West Africa, Sangoan and Lupemban MSA technologies *are* valid prehistoric cultures.

Since the mid-1990s, new excavations at several sites located across Central and West Africa, including Twin Rivers, Sai Island, Mosumu, Birimi, Ounjougou, and Bété I, have provided new insights and a more positive foundation upon which future MSA research might build. At the collapsed cave of Twin Rivers, the Lupemban is capped above and below by layers of limestone that isolate the industry from any older or younger cultures and includes advanced backed blade technologies (Barham 2002a) that are the subject of detailed discussion later in this entry. This site, along with Sai Island, has also proven vital as a datable sequence enabling the construction of a more accurate chronology for the central African MSA, as discussed below. Sai Island is located far outside the geographical zone typically associated with the Central and West African MSA but has revealed a deep stratigraphic sequence that incorporates lithic assemblages, separated by sterile sands, that bear surprising affinities to the Sangoan and Lupemban (van Peer et al. 2004). When more fully understood, this site promises to clarify the nature and degree of any connection between the MSA in Central and West Africa, and that of North and Saharan Africa, especially in terms of hominin migrations and or social and cultural links. Work at Mosumu has provided important new information about the MSA in Atlantic Central Africa. Here, a problematic stone-line context includes an MSA–LSA assemblage with small bifacial foliate points that may reflect a late expression of the Lupemban. The Birimi site (Ghana) fills an important geographical gap between Central and West Africa. As reported to date, this site includes a small series of generic Levallois-type tools that is complemented by a few Lupemban-like lanceolate artifacts, and may form an important point of comparison between the two regions. Further to the West, Ounjougou and Bété I have yielded precious, datable sequences for the MSA in West Africa and are discussed below.

Dating the MSA in Central and West Africa

Middle Stone Age industries across sub-Saharan Africa were historically considered to be around 40–12 thousand years old, based on radiocarbon (^{14}C) dates taken on buried charcoal samples. Developed in the 1950s, this scientific dating tool was applied widely to date Acheulean and MSA industries throughout the 1960s, 1970s, and 1980s and indicated that MSA technologies were a relatively recent and short-lived technological interlude (perhaps lasting for less than 40,000 years) prior to the appearance of microlithic LSA cultures around 10,000 years ago. Once considered beyond doubt, this carbon-based time span for the MSA has, however, been comprehensively reassessed in the last 30 years. It is now recognized that even modern AMS ^{14}C dating methods are incapable of accurately ageing carbon samples if the charcoal has a true age greater than about 45,000 years; the application of ^{14}C dating methods to materials older than this results only in dates that agree with this technical limit. The development and refinement during the 1980s, 1990s, and 2000s of a range of new scientific dating techniques with greater time depth has since yielded much earlier dates for the emergence of MSA technologies across sub-Saharan Africa. These generally agree that MSA toolkits appeared during the period 400–200 thousand years ago and show that they continued in use until roughly 45 thousand years ago (McBrearty & Brooks 2000). Sangoan and Lupemban MSA industries of Central and West Africa are now associated with an emerging chronology within this date range and, in this context, can be

considered directly relevant to understanding the changes in hominin brains and behaviors that underpin the evolution of *Homo sapiens*.

The stratigraphic inadequacies of the Central and West African Stone Age records (as discussed above) create major problems for constructing cultural and technological sequences but also for building absolute chronologies based on scientific dating methods; most sites thus remain undated. For some researchers, particularly those working in the forested interior of these regions, the difficulty of applying dating techniques other than radiocarbon means the ^{14}C database still forms the only chronological framework (e.g., Cornelissen 2002). However, in addition to the technical limits associated with these dates, the vertical movement of artifacts and charcoal samples in stratigraphic sequences means the association of dated samples with particular tool horizons is frequently unreliable. This problem is particularly acute in the lowland interior of Central Africa, where several sites, including Gombe Point, Mosumu, and Dimba, exhibit profiles in which dates do not consistently increase in age with depth, showing significant vertical movement has occurred (Cahen et al. 1983). For all these reasons, and in light of a growing body of much older dates from the margins of Central and West Africa and from Southern and East Africa, most researchers now consider the radiocarbon dating record for the MSA to be essentially redundant and that sites to which only this technique has been applied remain effectively undated (Barham 2001). In spite of this understanding, the continued use of radiocarbon dates in some current research on the Central and West African MSA warrants their presentation here.

The radiocarbon record takes in sites and sequences found across most parts of Central and West Africa, from within the Congo basin, on its southern and eastern margins, as well as many West African sites. In addition to the problematic dates from Gombe Point, dated MSA materials attributed to the Sangoan and Lupemban at the sites of Basoko, Belgika and Lemba on the Kinshasa Plain (van Moorsel 1968) are also found in similarly disturbed "stone-line" contexts. Radiocarbon dates for the Sangoan here range from >26,000 to >30,000 years BP (before present), while estimates for the age of the Lupemban vary between 12,230 ± 250, 15,080 ± 480, and >30,000 years BP. The Gabonese site of Okala (Clist 1997) stands out in Atlantic West Central Africa as a site with a more intact, dated stratigraphy. Here, a horizon of charcoal resting on clay has recently been radiocarbon dated to 39,690 ± 670 BP and >40,000 years BP, indicating a minimum age for the small collection of generic and probably relatively late MSA artifacts found in association. In West Africa, absolute dates for the MSA, even by radiocarbon, are extremely rare, but estimates based on stratigraphic grounds have often registered more recent age estimates than those from Central Africa. At the two nearby sites of Asokrochona and Tema II (Ghana), Sangoan occurrences are present at the base and upper part of a laterite gravel layer considered by Nygaard and Talbot (1984) to have formed around 20,000 years ago, the relative ages of the assemblages being estimated as 13–20 thousand years old and 20–25 thousand years old, respectively. At Anyama (Ivory Coast), a Sangoan assemblage with both heavy-duty and Levallois elements remains undated.

On the southern margin of the Congo basin, radiocarbon dates for the Sangoan and Lupemban are similarly problematic, but some sites are now revealing markedly earlier dates for these MSA industries. In northern Angola, a series of dates have provided age estimates of 38,000 ± 2,500, >34, and >40 thousand years BP for the earliest "Sangoan/Lower Lupemban" industry and 14,503 ± 560 years BP for the "Upper Lupemban/Lupembo-Tshitolian" industry, but based on comparisons with other sites, dates for the earlier part of this record are certainly far too young. Twin Rivers (Zambia) is the only site across Central or West Africa to which both old and new dating techniques have been applied to the same MSA sequence and provide a case study for their effects on resulting chronologies. A Lupemban assemblage, here incorporated in limestone breccias, was twice dated in the 1960s by radiocarbon technique, yielding results of

22,800 ± 1,000 BP and >33,200 years BP. However, the redating of the stratigraphic profile by uranium-series technique in the 1990s established a secure time span of 265–170 thousand years BP for these same layers, highlighting both the potential difference in dating estimates between radiocarbon and longer-ranged techniques and the true antiquity of the Lupemban MSA on the southern margin of Central Africa (Barham 2001). Kalambo Falls, with its far larger yet technologically similar Lupemban MSA assemblage, probably represents an MSA record of comparable age to that at Twin Rivers but has yet to be dated reliably using methods other than radiocarbon. The existing Kalambo Falls radiocarbon chronology compares well with ^{14}C dates from elsewhere on the margins of Central Africa (e.g., northern Angola), the Sangoan levels ranging between >40 and 43 thousand years BP, and the Lupemban rubble horizons falling in the range 27–31 thousand years BP. These estimates are also best treated as far too young, however, particularly given that amino acid racemization dates on Acheulean age wood from the same sequence, have yielded an age of approximately 190 thousand years BP for the latest Acheulean (Clark 2001). At Mumbwa Caves (Zambia), a sequence extending back 170 thousand years includes generic MSA assemblages but lacks any elements distinctive of the Sangoan or Lupemban, further supporting an early time span for these industries in south-central Africa (Barham 2000).

Relevant dated sites exist elsewhere on and beyond the margins of Central Africa. Sai Island (Sudan) is located far outside Central Africa (Fig. 1) but includes in stratified sands assemblages showing affinities to the Sangoan and Lupemban (van Peer et al. 2004). Provisional optically stimulated luminescence (OSL) dating estimates of 182 ± 20 thousand years BP for sands immediately above the Sangoan assemblage provide a minimum age for this industry which, in combination with a date of 152 ± 10 thousand years BP from sands above the overlying Lupemban-like assemblage, provides an effective time span of >180–150 thousand years for the MSA at this site. While it remains unclear how representative these assemblages are of the MSA in Central and West Africa, they share certain technological features, including the occurrence of distinctive core axes. The Kapthurin Formation (Kenya) provides a key sequence for the Acheulean–MSA transition, since it shows the repeated appearance and disappearance of bifacial, Levallois, and blade-based technologies over time, indicating that a simple model in which toolmaking traditions are sequentially replaced over time may not apply here. Within the excavated sequence, assemblages with Sangoan-like heavy-duty picks predate 285,000 years ago (Tryon & McBrearty 2002), and are broadly coincident with dates for the origins of the Central African MSA in south-central Africa.

In West Africa, very few MSA sites have yet been dated using modern techniques capable of accurately resolving chronologies beyond 40,000 years. Bété I (Ivory Coast) records a series of Sangoan assemblages made up of characteristic picks, core axes, and bifaces that have been dated by thermoluminescence (TL) technique to 254 ± 51 thousand years BP (Liubin & Guédé 2000). Though associated with a large range of error, this date demonstrates the early emergence of MSA technologies in West Africa. Conversely, other dated West African sites have so far revealed more recent dates for the emergence of the MSA here. Currently one of the more intriguing MSA sites in West Africa is Oungoujou (Mali), which actually consists of an exposed landscape incorporating numerous profiles. The post-Acheulean sequence here includes an industry in Unit 2 that is typified by bifacial tools dated between 60 and 80 thousand years ago, followed by the development of blade technology at 60,000 years ago, and, only later, between 50 and 55 thousand years ago, the appearance of Levallois flaking strategies (Robert et al. 2003). Distinctive Sangoan and Lupemban toolkits do not feature here, while the sequencing of different technologies and their relatively late appearance in comparison to emerging dates for the MSA in Central Africa is difficult to account for at present. At Birimi (Ghana), surprisingly late dates of 23.6 ± 2.9 thousand years BP and 40.8 ± 11.8

thousand years BP for sediments encapsulating an MSA assemblage with possible, yet unconfirmed, similarities to the Lupemban industry might be explained as relating to a very late expression of the MSA but alternatively perhaps hint at the persistence of these technologies over time (Casey 2002). The overlap of these dates with problematic ^{14}C dates for the Sangoan and Lupemban MSA elsewhere in Central and West Africa might reflect the genuine later appearance of the MSA in this part of West Africa, but any interpretation should be drawn cautiously, given the wide error range associated with the lower date.

Currently available dates for the MSA in Central and West Africa are sparse and highly variable, reflecting technical differences in the dating methods applied and the difficulties involved in applying techniques other than radiocarbon. A growing body of data is, however, beginning to highlight that MSA industries across these regions appeared far earlier than was previously understood on the basis of the radiocarbon dating record. It is notable, however, that with the possible exception of Bété I, all of the very old estimates (Twin Rivers, Sai Island, Kapthurin) relate to sequences found on the fringes of these regions, and it is therefore possible that the numerous Sangoan and Lupemban sites known from the interior of the Congo basin are in fact far more recent in age. The absence of well-dated sites bridging the gap between these old chronologies and those derived through radiocarbon technique makes it particularly difficult to pin down when Central and West African MSA technologies began to transition into LSA industries or for how long the MSA lasted in these regions. On the balance of present evidence, Sangoan and Lupemban MSA technologies, when taken as a whole, seem to have first appeared sometime around 400,000 years ago and to have continued in use perhaps until around 40–50 thousand years ago. Although certainly in need of verification through the dating of many more sites from across the vast geographic range of Central and West Africa, this time span fits well with the known age of the MSA across Southern and East Africa.

Complexity in Tool Manufacture and Use

Middle Stone Age technologies from across sub-Saharan Africa have long been considered to reflect the hafting of stone tools into handles, as composite implements used for hunting and gathering (e.g., Clark 1959). The stone-tipped hunting spear is perhaps the most familiar example of such an implement and may have its earliest origins in the distinctive stone "points" that characterize regional MSA industries (Fig. 2: 2-3 and 8). In terms of their size, shape, and method of manufacture, points and other artifacts made by the Levallois technique mark a departure from preceding Acheulean biface tools. Alongside observations drawn from contemporary and historical stone tool-using hunter-gatherer societies, modern replication experiments back up the concept that MSA-type artifacts can be usefully deployed as a range of hafted foraging implements. Other tool types, including blades and deliberately blunted ("backed") blades (Fig. 2: 4), can be similarly hafted but moreover have traditionally been considered by archaeologists to be advanced LSA technologies made only by *Homo sapiens*. The identification of these artifact types in many MSA industries – including some Lupemban assemblages predating the appearance of anatomical *Homo sapiens* at 200,000 years ago – suggests the early evolution of technologically and behaviorally complex adaptations by MSA Central African hominins.

The advent of specialist projectile weapons, handled axes and adzes, and other complex technologies including nets, traps, and fishing equipment marks a fundamental change in human interactions with the environment. They confer an array of advantages to hunter-gatherers: providing a more effective and safe way to exploit existing sources of food (e.g., the more successful hunting of large, dangerous animals from a distance) and enabling the extraction of a wide range of otherwise inaccessible resources (e.g., hard woods, buried roots and tubers, tree-dwelling animals, fish), thus presenting a means to settle long term in environments previously inhospitable for human foragers, including highlands, deserts, and rainforests. Stone Age researchers have recently refocused attention on

the implications that multicomponent tool construction and utilization have for the evolution of hominin intelligence. This is based on the understanding that crafting a composite implement requires a well-developed imaginative ability (visualization of completed tool designed for a specific task), detailed environmental knowledge (selection of multiple organic materials that can be combined), sophisticated forward planning skills (preparation of each collected material to alter its individual properties), and technical expertise (assembly of materials to create tool form appropriate to task). The design and manufacture of complicated multi-element implements for an anticipated, specialized future use is now commonly recognized as indicating "modern" foraging behavior and mental abilities synonymous with *Homo sapiens*.

Except in extremely rare circumstances, the organic parts of composite implements degrade rapidly and are not seen in the archaeological record, and it has thus proven very difficult to provide definitive evidence of complex hafted tool manufacture and use in the MSA. Because they are typically used in remote locations and made only of soft organic materials, traps are virtually invisible in the archaeological record but, given the right soil conditions, the more durable organic parts of fishing gear can be preserved. Direct evidence of the use of bespoke, intricate organic implements in the Central African MSA comes from the site of Katanda on the western edge of the Great Rift Valley. In the late 1980s, an international team of archaeologists uncovered two carefully shaped, carved bone points with barbs in double rows (Yellen et al. 1995) in association with a generic MSA lithic assemblage lacking any clear affinities to the Sangoan or Lupemban. On first sight, the complexity of these unmistakable fishing harpoons might be assumed to reflect a very late MSA, or even a more recent LSA technology, but dating by optically stimulated luminescence (OSL) has confirmed that they are at least 80,000 years old. Unique across sub-Saharan Africa, these ornate MSA fishing tools highlight that complex toolmaking abilities and foraging strategies were likely well established across much of Central Africa by this time, and probably much earlier.

At most MSA sites, the analysis of stone artifacts offers the only method to identify complex tool use, and in recent years this field of study has been revolutionized by developments in the practices of lithic use-wear analysis and residue analysis. These techniques employ microscopes to examine stone artifact edges for traces of damage and adhering organic particles resulting from prehistoric tool use, including contact with handles (Barham & Mitchell 2008: 277-8). In Southern and East Africa, some well-preserved sites (e.g., Sibudu Cave in KwaZulu Natal, South Africa) have revealed numerous MSA points and backed pieces with distinctive edge damage, showing where they were routinely attached to handles (which have themselves long since perished) for use as hunting weapons. While many LSA and MSA cultures from sub-Saharan Africa are now well understood to include intricate, multicomponent technologies that were employed to hunt and gather, the evidence from Central and West Africa is still mostly circumstantial. In the Congo basin, Tshitolian LSA toolkits reflect an established hunting, gathering, and fishing culture based on composite tools; but the absence of any well-preserved MSA sites with intact stratigraphies across Central and West Africa places limits on the identification of complex hafted technologies and foraging behaviors in the Sangoan and Lupemban.

The large, roughly made bifacial tools characteristic of the earliest Central and West African MSA – the Sangoan – have been considered likely candidates for hafting since the 1950s (Clark 1959), but compelling evidence has only recently been reported. At Sai Island, use-wear analysis has shown that 27 Sangoan-type core axes were inserted into handles before being used in digging activities (van Peer et al. 2004). Given its location in northeast Africa and the vast area across which the Sangoan was made and used (Fig. 1), it remains unclear how representative this assemblage is of the industry. Larger Sangoan assemblages recovered from other sites, including Kalambo Falls and Bété I, lack clear evidence of stone tools made by the

Central and West African Middle Stone Age: Geography and Culture, Fig. 3 Three views of a bifacially flaked lanceolate point excavated from Kalambo Falls, Zambia. These tools have been repeatedly been hypothesized to have functioned as the stone tips of composite hunting spears as part of a rainforest-adapted toolkit

Levallois technique and cast doubt on the concept that Sangoan stone tools were made with the intention of hafting. In contrast, the wide range of stone artifact types present in the Lupemban toolkit may have provided a suitable basis for the manufacture and deployment of composite hunting and gathering implements. Finely crafted lanceolate points are the defining feature of the Lupemban toolkit (Fig. 3) and have often been theorized to have been hafted as the tips of hunting spears. Composite projectile functions have also been proposed for other tools such as small Levallois points and deliberately backed blades, while well-made Lupemban core axes have frequently been hypothesized to be the working ends of axes and adzes for working wood. However, the only systematic use-wear analysis of confirmed Lupemban tools (Taylor 2011) has so far found only limited evidence supporting the use of core axes as hafted heavy-duty woodworking implements.

At present, direct evidence linking the Sangoan and Lupemban to sophisticated hunting and gathering subsistence strategies is limited, but the balance of available data supports the concept that, rather than the Sangoan, the Lupemban MSA may reflect the first widespread adoption of composite hunting and gathering technologies. Some types of heavy-duty biface present in the Sangoan were probably hafted, but the industry lacks a broader range of stone tools suitable as part of a diverse composite toolkit incorporating projectile armatures. In contrast, the Lupemban includes heavy-duty and light-duty stone tools apparently designed for composite use, from which a specialist composite toolkit might be created. Taken alongside early dates for the Lupemban derived from Twin Rivers (see above), this stone tool industry may represent one of the earliest hafted technologies, anywhere. In addition, the occurrence of small numbers of advanced backed blades (Barham 2002a), alongside large quantities of yellow, red, and brown ochreous pigment that does not occur locally (Barham 2002b), indicates that the Stone Age people who occupied the Twin Rivers cave between 265 and 170 thousand years ago were undertaking cognitively complex and symbolic activities, including the construction of advanced LSA-like composite armatures and perhaps body decoration, well before the emergence of anatomically modern *Homo sapiens*.

Environmental Adaptations

Sangoan and Lupemban industries of the Central and West African MSA have been persistently thought of as prehistoric adaptations for foraging in dense jungle and woodland environments, which are today widespread across these regions. This concept originated with Desmond Clark (1959) and matured during the 1960s as researchers began to investigate seriously the patterning of MSA cultures in time and space and tried to explain the distinctive features of their toolkits. The similarity of heavy-duty biface tools in Sangoan and Lupemban assemblages to implements used for woodworking by modern stone tool-using hunter-gatherer societies partly inspired this hypothesis. The main observation upholding it is the apparent correlation between the location of Sangoan and Lupemban sites, and the modern distribution of rainforest and thick woodland ecosystems, as shown in

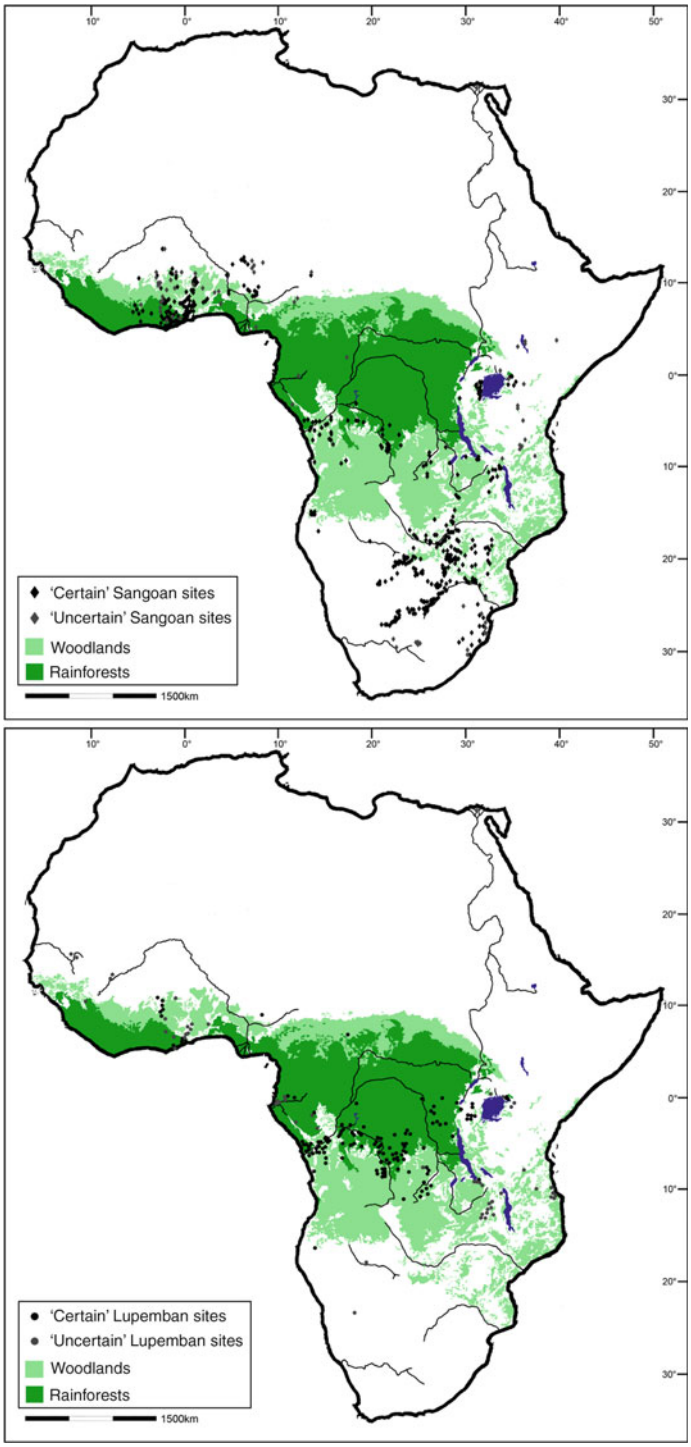

Central and West African Middle Stone Age: Geography and Culture, Fig. 4 The distribution of certain and uncertain Sangoan and Lupemban MSA sites in central and West Africa, as recognized in the 1960s. Shown with major river and lake systems of Africa and the contemporary extent of rainforest and woodland ecosystems

Fig. 4. Both industries are well represented in the lowland rainforests and river basins of Central and West Africa, even in spite of the fact that survey and fieldwork has been carried out patchily. Acheulean hand axes and cleavers are effectively absent from these same areas but are present across Southern and East Africa, and in North and Saharan Africa, suggesting

that MSA technologies (e.g., specialized hunting weapons, traps) and sophisticated hunting and gathering behaviors (e.g., cooperative hunting) played a vital role in the successful settlement of these environments (Barham 2001).

The colonization of new landscapes and environments such as remote highlands and islands, sparse deserts, and densely vegetated woodlands and rainforests signifies an enhanced ability to exploit nature. In comparison to savanna grasslands and light woodlands, access to the resources and foods needed by mobile hunter-gatherers (e.g., fresh water, protein, carbohydrates, minerals) is recognized to be extremely challenging in these ecological settings. Critical resources are generally either rare or occur in limited amounts but, moreover, are restricted to specific locations, unevenly distributed, and unpredictable, making them very difficult to obtain. Long-term survival in such resource-poor conditions is only possible by harnessing specialized extractive hunting and gathering technologies (a variety of dedicated projectile weapons, animal traps, etc.), putting into practice detailed ecological knowledge (e.g., the systematic seasonal exploitation of scattered foods and materials), and by establishing social networks (i.e., contact with other foraging groups to maintain food security) and cooperative behaviors (e.g., organized group hunting). The ability of hunter-gatherers to disperse into, and permanently settle, very challenging landscapes and environments – including rainforests – requires a degree of sophistication in foraging behaviors and mental capabilities matching those of *Homo sapiens*.

Although often thought to be lush places rich in large animals, edible plants, fruits and nuts, dense rainforests, and woodland environments in fact present natural barriers to hunter-gatherers. Barham (2001) has stressed that forest animals including tree-dwelling primates, duikers, and forest elephant can be hunted or captured only using specialized projectile technologies, traps, and nets in organized cooperative activities. Nutritious plant matter is surprisingly sparse, meaning humans must compete with other animals for access to tall fruiting trees and underground roots and tubers. Indeed, Headland and Bailey (1991), in their study of contemporary hunter-gatherers living in Central African rainforests, argued that energy-rich carbohydrates occur so rarely that even in modern times human foragers can live in jungles only by supplementing their hunter-gatherer diet with yams traded from local farming communities. Their analysis completely excludes the possibility that Stone Age foragers could have subsisted within the Central African rainforest belt; however, more recent anthropological and archaeological research has cast doubt on this extreme view. Excavations in the Ituri rainforest in the eastern part of the Congo basin (DRC) show this area was occupied by LSA hunters and gatherers 18,000 years ago, well before the emergence of farming (Mercader et al. 2000). Similarly flexible and sophisticated composite Sangoan and Lupemban technologies (see above) may reflect an earlier MSA origin for the presence of mobile human foragers in Central and West African rainforests.

Evidence for rainforest and woodland foraging in the MSA of Central and West Africa is problematic and still largely circumstantial. Although Sangoan and Lupemban cultures are seemingly associated with these vegetation zones today (Fig. 4), this same correlation did not necessarily hold true during the Stone Age. Central and West African environments are known from polar ice cores in the past to have undergone dramatic shifts in size and position as global climate has cycled between cool, dry glacial phases ("ice ages") and warm, wet interglacial phases in which conditions were broadly similar to today. Lasting for approximately 100,000 years, these periods are known as marine isotope stages (MIS). Supplementing this global climatic record, long pollen sequences cored from the Atlantic Ocean floor and deep lake sediments provide a record of regional vegetation change in Central and West Africa. Typically, interglacial stage vegetation consisted of a rainforest and woodland belt similar to that recorded for the last 10,000 years (the Holocene), while the dry climate of global glacial stages caused the severe contraction and breakup of

these environments into localized pockets, separated by expansive savanna grasslands (Dupont et al. 2000). Modelling past vegetation cover in coastal West Africa is a particular challenge, since fluctuating aridity is known to have caused major and rapid spatial rearrangements to environments not only during the last interglacial–glacial–interglacial cycle centering on the extremely dry conditions of the Last Glacial Maximum (LGM) but also during the Holocene. These regional records of climate and vegetation are also not currently refined enough to allow the distribution of African environments in high resolution before about 25,000 years ago which, in combination with the poor dating record available for Sangoan and Lupemban industries (discussed above), prevents the definitive association of archaeological sites with particular ecologies.

In addition to these global and regional climate and environment records, site sequences preserving animal bones and/or pollen alongside horizons of stone artifacts have sometimes provided local detail of Sangoan and Lupemban flora and fauna. As highlighted earlier in this entry, however, faunal remains are extremely rare at Central and West African MSA sites; indeed, only two examples are currently known: Simbi in western Kenya and Twin Rivers in Zambia. The position of these sites on Central Africa's periphery perhaps begs the question of how well they represent Sangoan or Lupemban industries as a whole. Charcoal and pollen are more frequently preserved; however, acute subsurface disturbance to the record means the stratigraphic position of buried materials and their relationship with particular stone industries is seldom reliable (van Noten 1982).

Very few Sangoan sites have revealed environmental evidence of any kind, with the key sites in this regard being Simbi and Kalambo Falls, on Central Africa's margins. The large Sangoan-type bifaces and flake tools from Simbi are associated with a substantial bone assemblage consisting of various grazing herbivore species reflecting an open savanna or lightly wooded habitat (McBrearty 1992). At Kalambo Falls, a reliable pollen sequence shows the persistence of deciduous woodlands during the site's use by late Acheulean and Sangoan toolmakers (Clark 2001). Less secure evidence comes from several sites in lowland Central and West Africa. Both Asokrochona and Tema (Ghana) have revealed Sangoan-like assemblages in "stone lines" that, although today found within areas of mosaic rainforest, woodlands, and grasslands, were likely located in dense woodland environments (though not rainforests) during the MSA. A possible Sangoan component in the basal layers at Njuinye (Cameroon) may have been made and used in a forest setting, given that a pollen core from 50 km distant Lake Barombi Mbo records the presence of forest species in the local area throughout the last 28,000 years (Mercader 2002). The apparent persistence of this vegetation through the extreme dry of the LGM suggests forests may have been a consistent feature here during earlier arid phases.

Environmental evidence derived from Lupemban site sequences is similarly meager and problematic. The small and fragmentary bone assemblage at Twin Rivers suggests Lupemban occupation of the southern part of Central Africa coincided with open woodland or grassland conditions (Barham 2000), while 850 km to the northeast, Kalambo Falls bears witness to a massive Lupemban assemblage dominated by bifaces, Levallois and blade tools, and a solid pollen sequence showing the endurance of woodlands throughout the late Acheulean and MSA. At Mufo in northeastern Angola, reworked gravels containing a later Lupemban or Lupembo-Tshitolian assemblage incorporates sparse grass pollen and charcoal hinting at open savanna conditions. In lowland Central Africa, pollen from within the "stone lines" at Mosumu and Ndjole provides some limited evidence for the use of Lupemban technology in humid rainforest habitats, but these sites have clearly suffered extensive subsurface disturbance.

The poverty of faunal and pollen records for the Central and West African MSA underscores just how little is definitively known about environmental adaptations. Current evidence suggests Sangoan and Lupemban industries may

relate to a range of environments, including open grasslands, dense woodlands, and forests, but with few exceptions this evidence must be treated with great caution owing to stratigraphic disturbances. Perhaps the strongest indication of a specialized woodland and jungle adaptation remains the apparent general correlation of MSA sites with the regions of Africa prone to the growth of dense vegetation (Fig. 4). The Lupemban in particular seems to offer a range of stone artifact types suitable for the construction of composite tools such as woodworking and projectile weapons that might have enabled the settlement of these environments. If the early dates for the industry at Twin Rivers are representative of the age of the MSA Lupemban across Central and West Africa, then the first settlement of the rainforest belt may have been undertaken by pre-*sapiens* hominins, with important implications for understanding the evolution of human intelligence and social behaviors in sub-Saharan Africa.

Future Directions

This entry highlights that the MSA record of Central and West Africa remains very poorly known in comparison to the Stone Age records of Southern and East Africa and North and Saharan Africa. These regions are beset by a range of stratigraphic problems that have inhibited the construction of reliable Stone Age sequences and a high-resolution chronological database. Significant questions remain regarding the technological complexity and environmental adaptations signified by the Sangoan and Lupemban, but also more fundamentally, about the precise content of these industries and their variation across time and space. At present, concepts of the Sangoan and Lupemban as early composite technologies used to hunt and gather in woodland environments are broadly supported by a range of evidence, but much work remains to be undertaken in order to demonstrate this beyond doubt. The archaeological record on the margins of these regions, especially south-central Africa (Zambia), has provided a critical new framework for understanding these issues, but may not be representative of these industries across their entire geographic ranges. New dates from sites on the margins of Central and West Africa may yet clarify the true age and time span of these technologies, but there is a desperate need for at least one intact, datable sequence that samples the Sangoan and Lupemban from the lowland interior of Central Africa.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Archaeological Record
- ▶ Archaic *Homo sapiens*
- ▶ Behavioral Archaeology
- ▶ Charcoal: Preservation and Conservation
- ▶ Clark, John Desmond
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Dating Techniques in Archaeological Science
- ▶ Fossil Records of Early Modern Humans
- ▶ Handaxes and Biface Technology
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ Taphonomy: Definition

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Central Asia: Paleolithic

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Introduction

Abundant evidence demonstrates the existence of Lower Paleolithic occupations in Tadjikistan and Kazakhstan more than a million years ago (Ranov 1965, 1972; Derevianko 2004), like those discovered in China. However, the Zagros region contains different cobble industries similar to the Oldowan (Otte et al. 2004). Cultural contact thus occurred between Central Africa and Southern Asia from at least 2 million years ago (Figs. 1 and 2). This dual interference, from Eastern Asia and Eastern Africa, affected this key region: Asia in its northern area and Africa in these southern areas. This fundamental setting describes all later populations and civilizations intermediate between Africa and Asia. Like elsewhere in the world, these technological trends fused and were standardized to form the Middle Paleolithic, with a shift to lighter tools. At this time, around 200,000 years ago, investment shifted from blocks of raw material (cobbles and bifaces) to the production of retouched flakes that were much smaller and adaptable and that could be used for a broader range of tasks. Nonetheless, persistence in some aspects took place despite this strong pattern.

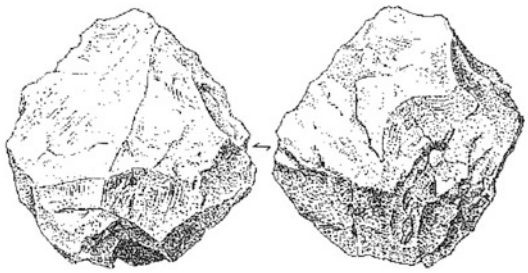

Central Asia: Paleolithic, Fig. 1 Iranian Azerbaijan, polyhedral (Otte et al. 2004)

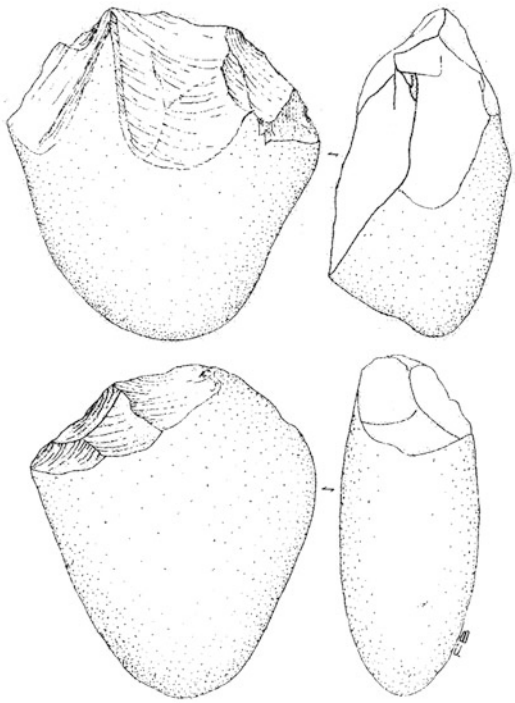

Central Asia: Paleolithic, Fig. 2 Qazialiad, chopping tools, Iran (Otte et al. 2004)

The northern plains developed Levallois technology, which is based on the careful preparation of cores to produce predetermined flake forms that were then retouched and used. Conversely, the mountainous areas of the south show intense reduction due to intense reuse of tools, retouching, and hafting, resulting in short tools. This pattern makes the "Zagros Mousterian" found in Turkey, Iraq, and Iran similar to the European Mousterian "Quina" facies (Otte et al. 2006). This industry is the basis for subsequent innovations leading to the Upper Paleolithic. Archaic modern humans are associated with this Mousterian facies, found at Shanidar (Iraq), Denisova (Altaï), Teshik-Tash (Uzbekistan), anatomically equivalent to the European Neandertals (Solecki 1998). The associated burials confirm as well their spiritual capacities.

Key Issues/Current Debates/Future Directions/Examples

The dichotomy observed during the Middle Paleolithic between the Zagros Mousterian and the northern Levallois blade industry continues until the onset of the Upper Paleolithic. In the mountainous areas, the trend toward bladelet (very small blades) production on thick flakes led to the Aurignacian in the west, via the Baradostian cultures in the Zagros region (Otte et al. 2009) (Figs. 3–5). With thrown weapons (in which bladelets were the points of small projectiles), techniques became oriented toward the processing of bone with all of the associated symbolism: ritual death of the animal, killing at a distance, and using animal products themselves to kill other animals (Fig. 6). This revolution, reflected in simply technological domains, thus corresponds more profoundly to a new attitude of humans with respect to their existence and place in nature. It also implies the occasional mounting of animals (e.g., horses) and the use of dogs for transport using the travois (Germonprez et al. 2009).

This new attitude, as much as such modes of transport, explains both the demographic explosion in Central Asia and population expansion to east and west, where they would be called Aurignacian. This tripartite relationship established between techniques, religion, and transport is seen, for example, in the creation and spread of pendants, a sort of trophy from a successfully vanquished animal. These decorative elements come from the natural defenses of the animal, canine teeth, and ivory, and thus embody their formidable and dangerous qualities. By their display, they designate the rank of the wearer both in the environment and

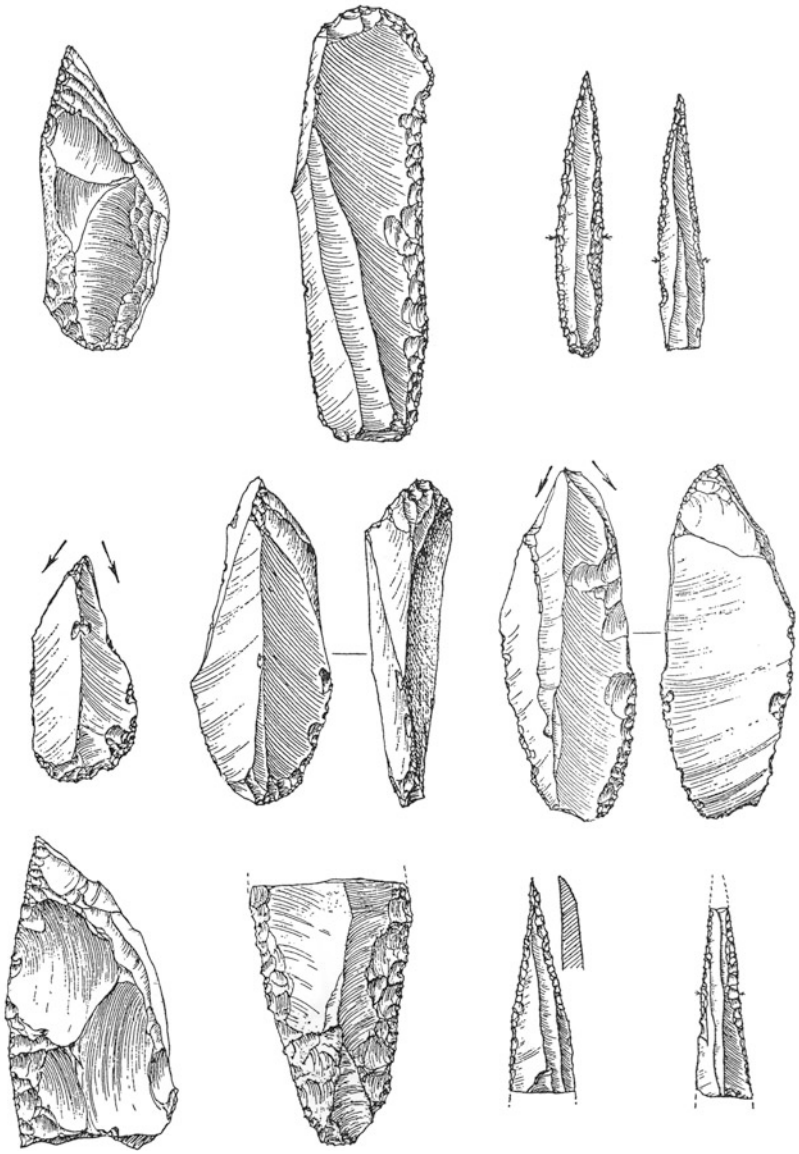

Central Asia: Paleolithic, Fig. 3 Jabrud, Aurignacian (Syria) (After Rust, in Otte & Kozlowski 2007)

in human society. The continuity of these processes in Central Asia appears natural and fundamental and contrasts logically with the abrupt movements that external migrations to the far southwest of Europe accentuated.

In parallel, the northern plains also underwent a lightening of tool size with techniques shifting from the production of Levallois blades to thinner blades and bladelets: Obi-Rakhmat in Uzbekistan (Derevianko 2004) and Kara-Born in the Altaï. Ultimately, this different demographic pressure spread to the west for reasons similar to the spread of the Baradostian, but on the northern plains and somewhat later, under the general term Gravettian.

The evolutionary sequence in Central Asia was oriented toward the production of thinner, even microlithic, blanks, called the Zarzian in Iran. These microlithic armatures demonstrate the extreme development of small projectile points and indicate the widespread use of the bow and arrow, and thus the particular

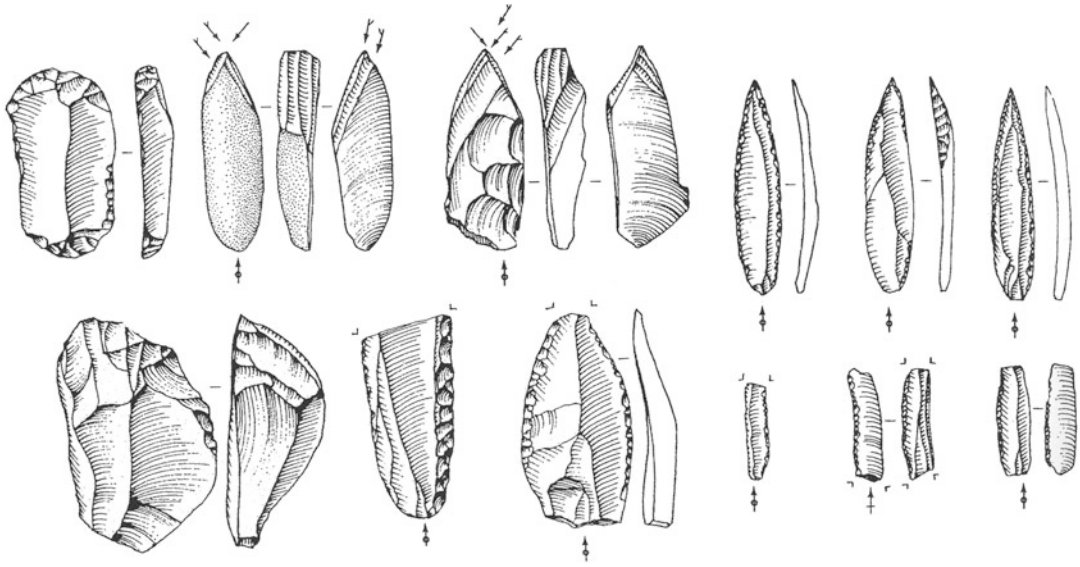

Central Asia: Paleolithic, Fig. 4 Shanidar, Aurignacian (Iraq) (Otte & Kozlowski 2011)

relationship of man with nature. The precision, rapidity, and long distance left little chance to the animal, which had become a dietary resource rather than mythical inspiration. In this form, 10,000 years later, the European Mesolithic and the Jomon culture in Japan are identical (Otte 2010). The Neolithic is very early in the Zagros Mountains with animal herding and permanent houses built of solid materials (Braidwood 1960). Due to its location and demographic density, Central Asia is an active center affecting its neighboring regions. We see here the development of modern anatomical morphology for this part of the world. The origin of techniques for throwing weapons and conquering mythologies also find their regional source here.

In all prehistoric periods, Central Asia functioned as a reservoir for populations and cultural experiences, seasoned by clear but sporadic external influences. The original population may have come from southern Asia (Meganthropus) or East Africa (*Homo ergaster*). However, the best comparisons for the first known industries (made on cobbles) are clearly from Africa (Oldowan culture). The bifacial tool tradition on massive blocks (Acheulean culture) also comes from East Africa. This long history is supported by evidence for the occasion closing of the straits: Bal-el-Mandep and Ormuz. This entire southern Asian zone seems to have formed a geographic and cultural unit extending from the African lakes to the Siwalik Mountains in Pakistan, India, and Nepal, for which the Zagros Mountains form the center of gravity. With the smaller tools of the Middle Paleolithic, regional diversification and technical solutions increase. In the southern regions, caves served as refuges and stone materials were transported to them in already reduced form. Everything was in place for a shift to exploitation of hard animal materials (bone, antler, ivory) and to the microlithization of stone armatures. The Aurignacian solution resulted from this combination. Demographic increase was a consequence of this trend and led to migrations as far as Western Europe. Conversely, the northern plains, with abundant materials of good quality, saw continuity but based on Levallois principles. The entire western Gravettian still shows traces of this. Central Asia then underwent evolution toward microlithization and then Neolithization, both particularly early. Technological innovations, renewal of religious systems, and anatomically evolved populations spread rapidly along

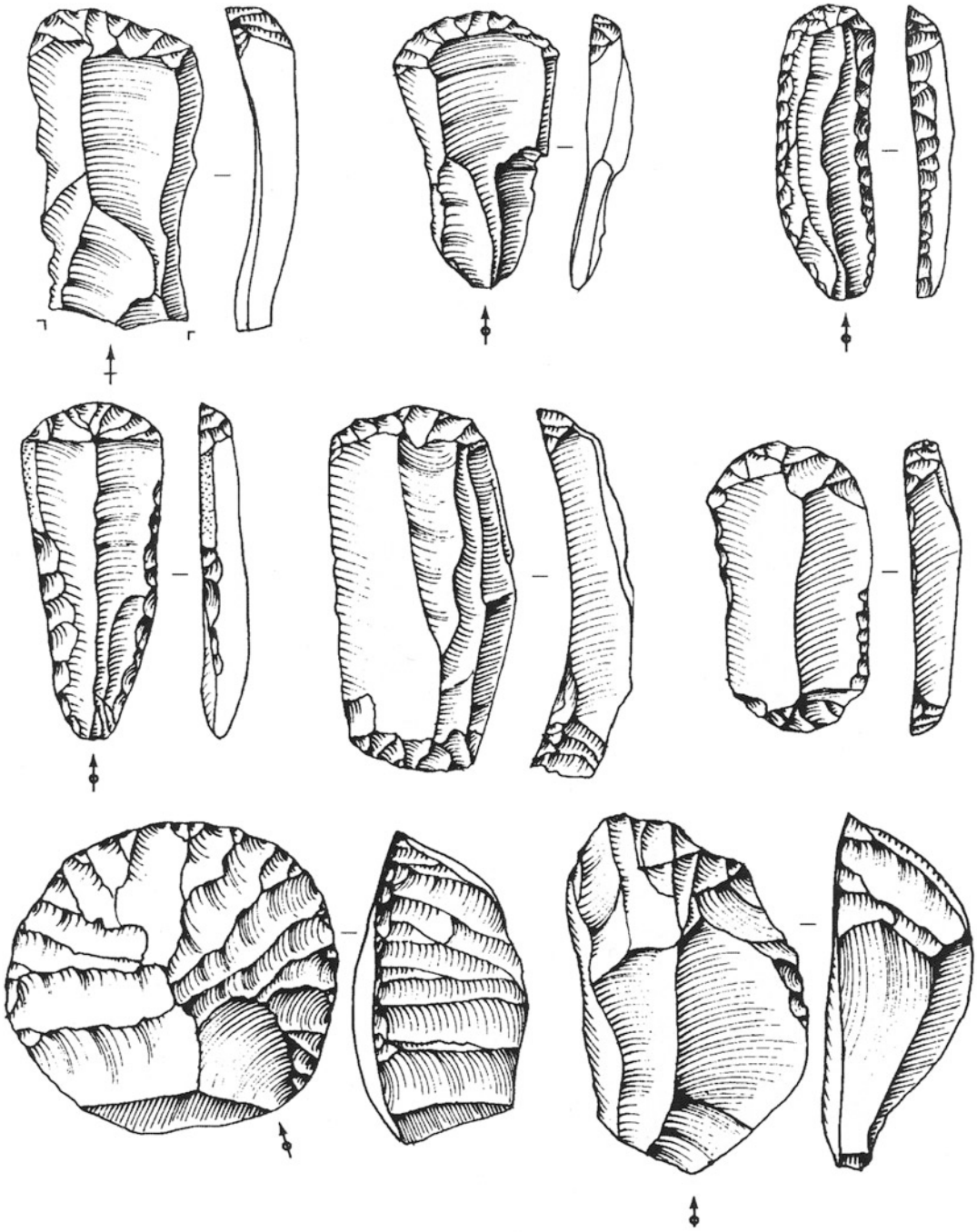

Central Asia: Paleolithic, Fig. 5 Yafteh, Aurignacian (Iran) (Otte & Kozlowski 2009)

a longitudinal axis, largely open via the steppe landscapes and the temporary drying of interior seas. Central Asia determined a good part of European prehistory and apparently also that of the Punjab region in northwest India. To understand this immense region also enables explanation of many events observed along its borders, in the Near East and Europe.

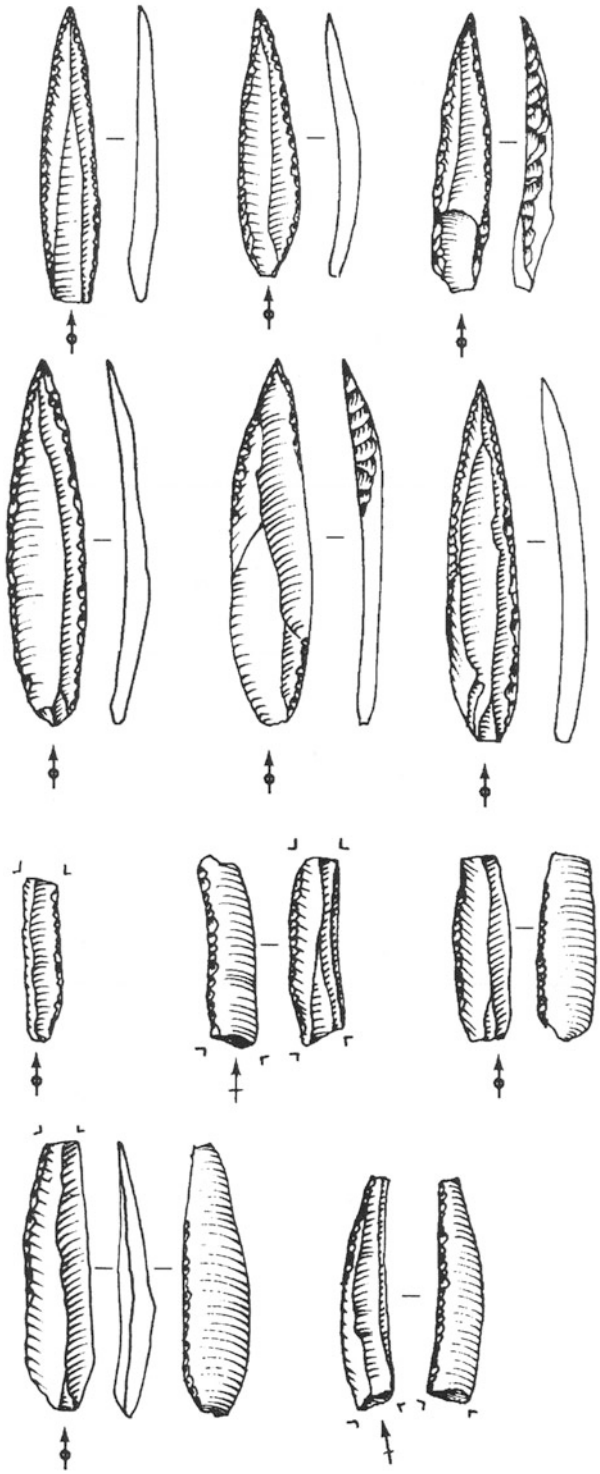

Central Asia: Paleolithic, Fig. 6 Yafteh cave, light armatures of the Iranian Aurignacian (Otte & Kozlowski 2009)

Cross-References

- ▶ Iran: Heritage Preservation and Tourism
- ▶ Iraq: Archaeological Heritage
- ▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
- ▶ Northern and Central Asia: Culture During the Lower Paleolithic Era

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Central Italy: Etrusco-Italic Sanctuaries

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Introduction

Sanctuaries had many functions in the societies of ancient Italy. As places of worship of one or more deities, they provided gathering places for individuals and groups and therefore attracted human endeavors such as trade and production of goods. While there is little evidence for how individuals expressed their own private religious beliefs, they definitely displayed their public practices of sacrifices, offerings, and other rituals.

Although Rome rose to become the politically most powerful city of ancient Italy and the Mediterranean, the ancient Roman historians were the first to acknowledge her debt to the neighboring peoples in central Italy. As early as the Iron Age (100–700 BCE), each community shared many features with its neighbors in terms of buildings (mostly huts), burials (mostly cremation), and production of pottery (impasto), but there were also distinct differences in their daily lives. Although we do not have direct evidence of the languages spoken in central Italy before the development of writing, continuity of other traditions suggests that forms of Latin and related languages (Faliscan, Osco-Umbrian) as well as the non-Indo-European Etruscan language were in use.

Evidence for religious practices in central Italy varies greatly depending on the archaeological remains and on written sources, whether local inscriptions or general historical accounts.

Definition

In terms of defining sacred spaces and sanctuaries, the common denominator seems to be the importance of choice of location and, depending on historical circumstances, continuity of cult. Offerings of pottery and other objects occur in close connection with the natural setting of mountains, caves, rivers, or springs as well as within communities and at burial grounds (Edlund 1987). If buildings were erected at such locations during the Iron Age, they can be identified as sacred by their location and use, rather than by the architectural form, and it is not until the Orientalizing (700–600 BCE) and Archaic (600–475 BCE) periods that sacred buildings, including temples, can be documented. During the early Roman Republican (475–300 BCE) and mid- to late Roman Republican (300–31 BCE) periods, creation and expansion of sanctuaries were part of the political and historical changes caused by the expansion of Rome, while at the same time providing continuity of cult in communities and in the countryside.

For the purposes of this discussion, the area included covers the territory of Rome and her immediate neighbors, the Etruscans to the north as far as the Arno, the Faliscans, Sabines, and Umbrians to the north and east, and the Latins and Samnites to the south (Fig. 1). As can be expected, our written sources for Rome overshadow those of the neighboring peoples, and if we were to believe the Roman historians, both political and cultural initiatives began in Rome and were imposed on their neighbors in a one-way direction.

In viewing the archaeological remains of sanctuaries throughout central Italy, it will, however, be clear that the historical development is quite complex and that Rome was part of a broad cultural context of exchange and interdependence in many fields, including forms of religion and their expression in sanctuaries. A key issue is to identify the common factors in the creation of sanctuaries and to follow the development of forms that spread throughout the Mediterranean and also inspired much of later European architecture.

Although central Italy represents only a small area of the peninsula and the Mediterranean as a whole, the study of its sanctuaries provides an example of balancing written and archaeological sources with the understanding that both have to be interpreted with caution. In particular, for the

Central Italy: Etrusco-Italic Sanctuaries, Fig. 1 Map of Etruria and central Italy (Created by Beth Chichester and Ingrid Edlund-Berry)

study of architectural form, we are dependent on the account of the Roman architect Vitruvius, whose important work *On Architecture* (Rowland & Howe 1999) provides valuable information on Roman temples that, however, cannot automatically be applied to time periods other than his own, the time of Augustus. Likewise, archaeological remains of temples built in communities that came under Roman authority are often regarded as Roman Capitolia, created at the time when the Roman or Latin colonies were founded, but may in fact reflect a combination of cultural and political interests.

Sanctuaries and Temples

Within the broader topic of sanctuaries in central Italy, textual and archaeological evidence provides information on location and relation to settlements, historical context, layout, architectural features of temples and other buildings, areas for offerings and sacrifices, and continuity of cults. While temples tend to stand out because of their size and decoration, they are part of the larger context of the sanctuary and its historical and religious importance (*ThesCRA* 2005).

Sanctuary Sites and Their Locations

The type of cult and the needs of its worshippers determined the location of sanctuaries. Cults for the living were linked to places of habitation, travel, or trade, whereas funerary cults were practiced at burial sites outside the boundaries of inhabited areas. As indicated by ancient authors such as Vitruvius, certain deities had specific requirements for the location of their sanctuaries, that is, for Jupiter, Juno, and Minerva as protectors of a city a high vantage point, Isis and Serapis in the marketplace, Apollo and Liber (Bacchus) next to the theater, Hercules by gymnasia, amphitheaters, or the circus, Venus by the harbor, and Vulcan (as well as Venus and Mars) outside the city (*De Arch.* 1.7.1). By analyzing the location of sanctuaries, their relation to nature and human habitations, and the evidence for cults and rituals, patterns emerge as to what determined the original choice of spaces and later modifications (Colonna 1985; Edlund 1987).

Access

Depending on the natural features of the landscape, a sanctuary would most likely be visible from afar and aligned with other sacred places along the roads and paths (e.g., the site of Brolio in Val di Chiana and the temple at Castiglion Fiorentino). The orientation of sanctuaries and their point of access were most likely determined by the cults practiced and natural features such as the sea (e.g., temples at Pyrgi). Since temples and altars seem to have been oriented in the directions prescribed according to the divisions of the sky, often independently of each other (Prayon 1997), visitors and worshippers could not necessarily expect to approach these structures by the most convenient or easiest route.

Boundaries and Precincts

The boundaries of a sanctuary could be determined by natural features (streams, mountain tops, woods) or by man-made features such as roads or boundary stones (Edlund-Berry 2006). Within a sanctuary precinct (known as *sacellum* or *locus consaeptus*), smaller units, usually centered around an altar, provided further distinctions of space and the transitions from one area to the next (Colonna 2006; Stek 2009). Because of find circumstances, the full extent of a sanctuary precinct may be difficult to determine (e.g., Orvieto, Campo della Fiera [Stopponi 2011]).

Sanctuaries in Nature

The connection between sanctuary sites and their geographical setting in nature is best documented by observation of context. Visibility, access, connection with paths, and roads for travel and transhumance are all relevant factors, in addition to the perceived notion of identifying deities with features of nature.

Finds of pottery, bronze, or stone and habitation of caves from the Bronze Age provide evidence of continuity into the Iron Age. Although it may be difficult to identify ritual activities, continuity of use suggests that certain places have been perceived as sacred throughout the early history of ancient Italy. Many of these remained open-air places for sacrifices and offerings, while others were incorporated into settlements or

Central Italy: Etrusco-Italic Sanctuaries, Fig. 2 Orvieto, Belvedere temple (Photo: Ingrid Edlund-Berry)

created to satisfy changing demands. As clearly defined spaces, *templa*, the function could thus dominate over the original location in nature.

Urban Sanctuaries

According to Servius, the late Roman commentator to Vergil's *Aeneid*, an Etruscan city should include three temples as well as three gates and streets (*Ad Aen*. 1.422), and, as can be expected, the location of urban sanctuaries took into account both the nature of the settlement (such as hills and access to water) and the demands of the cults and their practitioners. It is therefore not surprising to find Rome's most important temple to Jupiter, Juno, and Minerva located on the Capitoline hill, visible from the public area, the Roman Forum below, from the neighboring hills, and from the river Tiber. Depending on the layout of the settlement, temples occur on hills, within the areas of habitation or separated from them (Rome, Marzabotto, Veii, Orvieto [Fig. 2], Civita Castellana, Tarquinia, Fiesole) or as part of the public spaces such as fora (Rome, Pompeii, Roman and Latin colonies).

While sanctuaries may have begun as open-air sanctuaries within a future urban space, urban sanctuaries proper are likely to include temples and altars as their key features. Depending on their origin and function, the access to the temples was tied to roads but the orientation was governed by the cults practiced.

Extramural Sanctuaries

Many sanctuaries are placed immediately inside or outside city boundaries, including city walls. As such they protected the city inside, while at the same time marking the transition from inside to outside and identifying the type of boundary, whether or not marked visually.

Depending on the landscape, extramural sanctuaries could be placed at the foot of a hill (Veii, Portonaccio temple) or at city gates (Vulci), whereas in cities built on spread-out hills such as Rome, there existed two if not three kinds of boundaries: first, the confines of each hill; second, the outline of the political-religious boundary known as *pomerium*; and third, the man-made city walls (Servian and Aurelian walls) that determined the territory of the city as a whole (Richardson 1992).

Extra-Urban Sanctuaries

Depending on the size and political structure of towns in central Italy, their territory could be protected by sanctuaries serving as outposts but also as points of contact with neighboring communities. Inland cities such as Caere or Tarquinia were connected with the Tyrrhenian Sea, thanks

Central Italy: Etrusco-Italic Sanctuaries, Fig. 3 Orvieto, view (Photo: Ingrid Edlund-Berry)

to their ports at Pyrgi and Gravisca, and sanctuaries there provided important links for trade as well as cults.

Rural Sanctuaries

Sanctuaries in the countryside reflect both cults of rural residents and of travelers between communities. Examples include votive deposits along roads, in the fields, and at river crossings (Colonna 1985; Edlund 1987). As indicated by ongoing surveys and excavations, our knowledge of the countryside is expanding greatly, and as contexts are becoming better known, the term rural sanctuaries should be redefined to apply to those that are specifically related to the farms and the fields, previously perhaps thought to have been isolated. It is also possible to link some seemingly rural sanctuaries to a major central sanctuary (e.g., Pietrabbondante [Stek 2009]) for which they served as boundary sanctuaries.

Federal or "Political" Sanctuaries

According to Roman historians such as Livy and other sources, the Etruscans held meetings for a coalition of their major 12 (or 15) cities at a sanctuary of Voltumna (Edlund 1987). Neither the exact location nor the appearance of this sanctuary is defined in the texts, but the area of Orvieto has been suggested as a likely spot (Fig. 3), and recent excavations at a site just to the south of the city, known as Campo della Fiera, may well meet the criteria for this important gathering point (Stopponi 2011). Features in favor of the identification include the large size of the sanctuary, the number of altars, and the evidence of offerings, as well as the long tradition that this site was used for gatherings (hence the name Fiera or "market"). Remains of a temple have been uncovered, but to date there has been no definite identification of the deity honored there.

Throughout Italy, sanctuaries have been identified in the written sources as political centers under divine protection, ranging from urban temples (e.g., temple of Diana on the Aventine in Rome) to mountain sanctuaries (*Mons Albanus*, south of Rome; temple of Diana Tifatina at Capua), groves, and markets (Lucus Feroniae), but without historical texts or inscriptions, it is often difficult to identify such sites based solely on the archaeological evidence (Edlund 1987; Stek 2009).

Viewed from the point of view of the architectural form, monumental buildings consisting of rooms on three or more sides of an open courtyard such as those at Poggio Civitate (Murlo), Montetosto (near Caere), Acquarossa (near Viterbo), and Satricum illustrate spaces suited for residence as well as for gatherings of large numbers of people (Edlund 1987). Although lacking obvious evidence of sacred rituals

(temple, altar), such structures may well have had many functions, including gatherings for a political and religious purpose under divine protection.

Historical Background

The historical context of sanctuaries is tied to the communities to which they belonged, and, understandably, the best textual evidence comes from Rome. Here, in addition to the actual remains of temples, the records of temple foundations and dedications allow us to follow the long history of early cult places (e.g., the area of Vesta) to the first temples (S. Omobono) and the most monumental temple ever built in central Italy, the Capitoline temple, which stood as the symbol of the city's divine protection well into the imperial period. Other temples were erected as the result of Roman military victories (temple of Castor in the Roman Forum, Republican temples in the Forum Holitorium and Campus Martius) or in recognition of new deities introduced to Rome (temple of Apollo Medicus, temple of Asclepius) (Richardson 1992). Construction of temples is sometimes tied to the important patronage of individuals or families (e.g., the Tarquins for the Capitoline temple in the sixth century BCE), whereas inscriptions record other activities in sanctuaries, including vows and offerings.

Outside Rome, the creation of new sanctuaries and temples is often linked to the political and historical process in which Rome expanded within the Italian peninsula and ultimately throughout the Mediterranean. As part of this process, new cities were laid out, with public spaces, including temples honoring the chief Roman deities, Jupiter, Juno, and Minerva. In the Roman provinces outside Italy, these temples, commonly referred to as Capitolia, usually located in connection with a forum, are easily recognizable by their tall podium, front porch with columns, and three rooms in the back for the cult statues (*ThesCRA* 2005). Within Italy, new temples were often built in connection with the establishment of Roman or Latin colonies, but

Central Italy: Etrusco-Italic Sanctuaries, Fig. 4 Sora, church and temple (Photo: Ingrid Edlund-Berry)

it is not a given that they were intended to reflect a connection with the Capitoline temple in Rome, in spite of having the characteristic three-cella plan. At Cosa (Ansedonia), founded as a Latin colony in 273 BCE, a major temple was built at least 100 years later, and while usually considered modeled on the Capitoline temple in Rome, its function has recently been doubted (Bispham 2006). Similarly, temples built in the Latin colonies of Sora (Liris valley) (Fig. 4), founded in 303 BCE, and Isernia, founded in 263 BCE, are often categorized as Capitolia and may illustrate a close dependence on Rome but may also be part of a broader Etrusco-Italic tradition (Edlund-Berry 2008). It can therefore be misleading to use the term Capitolium for any temple built outside Rome, even if inspired by Roman temple planning and cult practices, and the chronology of such temples cannot be tied directly to the foundation dates of colonies. Regardless of the historical umbrella under which a temple was created, the term Capitolium should be used with

Central Italy: Etrusco-Italic Sanctuaries, Fig. 5 Pietrabbondante, temple and theater (Photo: Ingrid Edlund-Berry)

caution and the temple building be evaluated within its geographic and cultural context (Bispham 2006).

Key Issues/Current Debates

Layout of Sanctuaries

Sanctuaries represent sacred spaces that may include a number of buildings and other monuments as well as spaces for performing rituals.

Architectural Features of Temples and Other Buildings

The buildings associated with sanctuaries include temples, defined as structures holding the cult statue, and small shrines (*sacellum*, *naiskos*) used for a variety of cult activities. In addition, permanent or temporary structures may have been needed for the priests and assemblies of worshippers to provide lodging, dining areas, and other facilities. Pools or basins provided means of ritual cleansing if required as part of the activities at the sanctuary (Veii, Portonaccio). Natural slopes or man-made theaters (Pietrabbondante [Fig. 5]) could be used for gatherings or ritual activities. Production of votive offerings of clay or metal further required workshops and kilns, in addition to raw materials and fuel.

Temples

In Latin terminology, the word *templum* indicates a defined space used for ritual purposes such as the observation of signs sent by the deities. As a building, a temple was considered the home of the deity, where a cult statue or other object would occupy the main room (*cella*). If the temple was dedicated to more than one deity, then two or more cult rooms were included in the building (*ThesCRA* 2005).

Location

The location of a temple was determined by the other features of the sanctuary, and it is likely that the boundaries of the sanctuary were defined before a temple was constructed. Although the sanctuary precinct cannot be identified for all sanctuaries, the location and orientation of the temple seem to be independent of other structures, with the possible exception of a main altar.

Orientation

According to Vitruvius (*De Arch.* 4.5), the orientation of temples was based on several factors, related to both the cults and the surrounding areas. Ideally, a temple should face west so that the worshippers will view the cult statue within the temple with the rising sun in the east as a backdrop. Other considerations were to place the temples in such a way that the city walls were clearly visible, or to line them up near public roads to facilitate access.

Other criteria for the orientation are based on the division of the sky and the earth as documented on the Etruscan bronze model of a sheep's liver, the so-called Piacenza liver, and the text by the late Roman author Martianus Capella (Prayon 1997). Depending on the deity to whom the temple was dedicated, during the Archaic period the favored orientation for the Etrusco-Italic temple was toward the south and unrelated to the layout of the urban context. After the Archaic period, new and restructured temples were more likely to be coordinated with the city plan and surrounding structures.

Plan and Proportions of Temples

In addition to describing the ideal location for temples (*De Arch.* 1.7.1), Vitruvius classifies temples by their plan, based on the positioning of columns (3.2). Of the seven types mentioned ("*in antis*," prostyle, amphiprostyle, peripteral, pseudodipteral, dipteral, and hypaethral), Vitruvius is careful to include examples from Rome when these could be found, that is, for the "*in antis*" plan, the temple of Fortune; for the prostyle, the temple of Jupiter and Faunus on the Tiber island; for the peripteral, the temple of Jupiter Stator and the temple of Honor and Virtus; and for the dipteral, the temple of Quirinus.

Likewise, Vitruvius discusses the number of columns and their relation to each other and the temple proper (*De Arch.* 3.3). The categories (*species*) include pycnostyle, systyle, diastyle, araeostyle, and eustyle, of which the last is considered ideal. The examples included for Rome are for the pycnostyle the temple of Deified Julius and the temple of Venus in the Forum of Caesar, for the systyle the temple of Equestrian Fortune, for the diastyle the temple of Apollo and Diana, and for the araeostyle the temple of Ceres near the Circus Maximus and the Capitoline temple.

Proportions

While the preserved temples represent different sets of proportions, the theoretical model is presented by Vitruvius who defined different categories of temple architecture, based on what he perceived as perfect numbers and proportions (*De Arch.* 3.1-2). This principle is parallel to his definition of the ideal proportions of the human body, in which the foot is one component. Measured in numbers, the Roman foot equals about 29.5 cm., whereas the Oscan foot is slightly shorter, c. 27.5 cm. Of these, the Oscan foot is used, for example, at the Orientalizing and Archaic buildings at Poggio Civitate (Murlo) (Nielsen & Tuck 2001: 39), whereas the Roman foot is recorded at the sanctuary at Campo della Fiera (Orvieto) (Stopponi 2011: 26–7, n. 31).

The Tuscan Temple Design

The terminology for much of Greek and Roman architecture is based on Vitruvius, whose descriptions of the three main types (*genera*), Doric, Ionic, and Corinthian, have influenced architectural theory as well as practice since antiquity. Following his analysis of these types, he presents the Tuscan design, according to which the plan centered on certain proportions (six parts in length, five parts in width), arranged with a front porch with columns and a rear part with three rooms or one room with wings on the sides (*De Arch.* 4.7.1-5) (Fig. 6). The columns and superstructure were also to be planned with a fixed ratio of height and diameter in relation to the base, the shaft, and the capital. Vitruvius further prescribes that the types can be mixed so that Tuscan and Corinthian or Ionic features are combined (4.8.5).

In applying Vitruvius' analysis of the "Tuscan" temple design, it is important to realize that his terminology is different from other references to the Italy of his day where he uses the common Latin vocabulary for Etruria, Etruscan, or Tuscan (*Etruria, Etruscus, Tuscus*). Instead, the temple

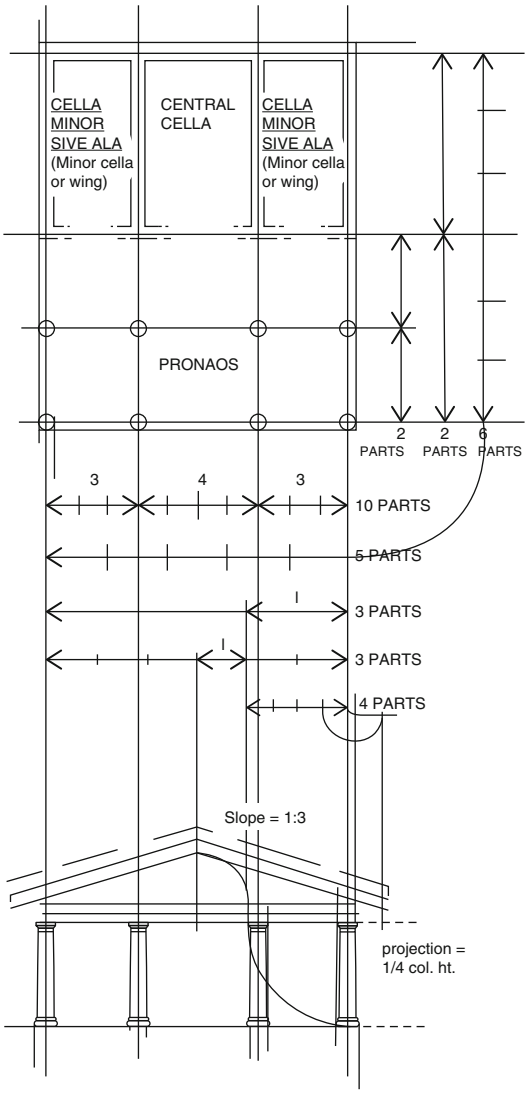

Central Italy: Etrusco-Italic Sanctuaries, Fig. 6 The Tuscan temple (with permission from Rowland & Howe 1999)

architecture is referred to as "*tuscanicus*," a word that implies something Tuscan-like or Tuscan-inspired rather than a description of the early Etruscan architectural styles of the Archaic period (Edlund-Berry 1997).

Archaeological Evidence

Vitruvius' description is often quoted as the norm for Etrusco-Italic temples, but the archaeological evidence provides a much more varied picture. While examples of his "Tuscan temple" with a squarish plan, three cellae, and a colonnaded front porch indeed exist, at other times evidence is lacking for the features he prescribes, including the meaning of the Latin word *ala*, usually translated as "wing" (Lake 1935).

The classic example of the Tuscan temple is the Capitoline temple in Rome, constructed during the reign of the Etruscan kings of the Tarquin dynasty but inaugurated in the first year of the Roman Republic, 509 BCE, by M. Horatius. In spite of the incomplete remains, the foundation of the temple, elements of the superstructure, and coin images allow for a reconstruction of the temple with three cellae and a colonnaded front porch. The dimensions of the temple as reconstructed are, however, so massive (54 × 74 m.) that it dwarfs all other temples from central Italy and instead shows links with Greek monumental temples (Davies 2006).

Although Vitruvius' description of the "Tuscan temple" is applicable to a number of temples in central Italy, it is prudent to separate the political function of the Capitoline temple in Rome from any temple with a similar plan. Rather, by following the development of early cult buildings in the shape of huts and simple one-room roofed structures (Satricum, Tarquinia, Veii, Pyrgi), we see that temple buildings were created to serve the local tastes, whether in the form of peripteral temples (Pyrgi, temple B; Vulci, Tempio grande; Marzabotto; Satricum) or temples with one or more cellae and a colonnaded porch (Rome, S. Omobono; Veii, Portonaccio; Pyrgi, temple A; Rome, temple of Castor; Ardea; Orvieto, Belvedere temple; Fiesole).

Archaeological Remains of Temples

Because of the perishable materials used in constructing Etrusco-Italic temples (and other buildings), every element of the preserved remains can be used to evaluate the plan and function of the building.

The foundation of the temples usually consists of local fieldstones or of cut blocks of volcanic or other rock. Vitruvius describes the necessary steps for securing a proper foundation course, above which the podium provides the visible support for the temple building proper

(*De Arch.* 3.4). The podium varies in height and decoration, with key elements consisting, from the bottom up, of a plinth (*quadra*), base moulding (*spira*), dado (*truncus*), cornice (*corona*), and top moulding (? cavetto; *lysis*) (Rowland & Howe 1999: Fig. 45).

As can be expected, the preserved temples display a variety of types of foundations, with or without a podium defined with mouldings. Although in all likelihood the Roman temples Vitruvius would have seen in his lifetime had podia with top and base mouldings, each city and area seems to have followed its own traditions. The earliest preserved examples of podium mouldings (Rome, S. Omobono, Pyrgi, Satricum) seem to have a small Etruscan round marking the top row of the podium, whereas later podia include two rows of Etruscan rounds of equal size, or with one large and small round, sometimes separated by vertical plain blocks (Rome, S. Omobono, Ardea). At other times, there is no evidence of a moulding, which may or may not have existed (Rome, Capitoline temple). The Etruscan round continues to be in use throughout the time of the Roman Republic and is found at sites such as Pietrabbondante (temple A). It was also used in temples built in towns where Roman or Latin colonies were founded (Sora, Isernia, Cosa) or in areas under Roman dominance (Villa S. Silvestro near Cascia) and may indicate a sense of continuity of architectural traditions even as Rome herself began to explore the cyma reversa moulding which was adapted from Greek forms mixed with variations of the curved Etruscan round (Rome, Largo Argentina, temple C) (Edlund-Berry 2008). As the cyma reversa moulding becomes dominant, most temples in central Italy displayed it as a top and base moulding, at times in combination with or replaced by the cyma recta moulding toward the end of the Roman Republic.

Walls of early temples were usually built of clay, reinforced with wood and occasionally of tuff blocks. Postholes may indicate the place for wooden columns that supported the walls and the roof.

While remains of foundation walls and other features on the ground provide evidence for the reconstruction of temples and other sacred buildings, models of buildings, usually in the form of urns for cremation burials, suggest different types of roofs. In the models that resemble Iron Age rounded or oval huts, the roof is shown as thatched with wooden crossing beams for stability. Later rectangular models indicate tiled roofs and sometimes ornamental akroteria along the ridgepole or at the ends.

In addition to such models, Vitruvius' statement about araeostyle temple roofs suggests that they made the building look top-heavy and low (*De Arch.* 3.3.5). It is, however, roof tiles that provide the best source for estimating the superstructure and for reconstructing temples for which even the foundations are no longer preserved. The basic roofing system consists of flat rectangular pan tiles, curved cover tiles, and large curved ridgepole tiles. Analysis of the clay composition and firing can provide clues for the production sources, and the local differences in size of the elements suggest chronological sequences of roofing systems, including new construction and replacements (Winter 2009). Estimates of the total weight of a roof also facilitate reconstructions of walls and supporting columns, with or without preserved foundation courses (Turfa & Steinmeyer 1996).

In addition to the actual roof covering, terracotta plaques provide information about the roofing elements, including horizontal beams and rafters, and indicate the methods used for drainage (Fig. 7). Most of these types of architectural revetments are mould-made, and a study of the clay components, mould sequences, and size of the individual plaques (e.g., the use of the Oscan foot) provides evidence for the number of roofs, estimated size of the buildings to which they pertained, and technical details such as the slope of the pediment or size of the eaves. These terracotta revetments were often decorated with painted or relief designs or mould-made features such as human or animal heads, which further assist in documenting workshops or trade exchange between different towns and communities in central Italy (Winter 2009).

In addition to the terracotta revetments, many temple roofs were decorated with statues of

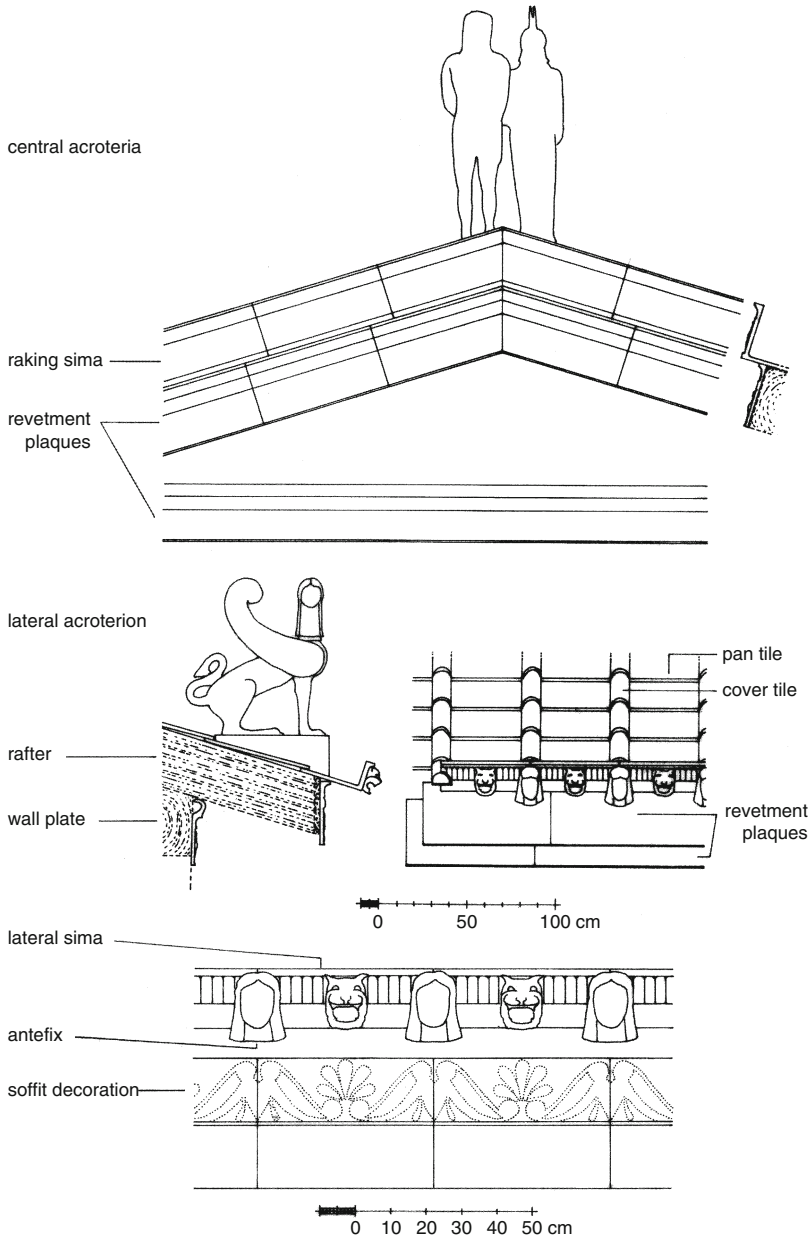

Central Italy: Etrusco-Italic Sanctuaries, Fig. 7 Architectural revetments (with permission from Winter 2009)

deities or human figures, animals, or floral elements, placed along the ridgepole or at the end of the roof as akroteria. As with the scenes depicted on the revetments, the motifs of the akroteria illustrate myths that usually are not related to the deity or deities to which the temple was dedicated. Although terracotta decoration, including akroteria, is common on sacred buildings such as temples, it occurs also on buildings used for other purposes, whether public or private (Winter 2009).

Places of Gathering and Residence

All sanctuaries, regardless of function, relied on a central location and good access, but those that served many different communities would by necessity include spaces for gathering of people as well as quarters for priests and other officials.

A particularly good example is the important Samnite sanctuary at Pietrabbondante that houses not only temples and a theater complex but also a structure identified as a *domus publica* for the priests, similar to that in Rome and Pompeii (La Regina 2010).

Altars

Altars for sacrifice and prayers are present at most sanctuaries and occur in many different forms. The primary example with altars ranging from irregular mounds of small stones to squares or rectangles built of tuff blocks comes from the important sanctuary at Pyrgi (Colonna 2006). In addition to the different forms of these altars, the variety of votive offerings, many of which include imported objects, and remains of sacrifices provide evidence of the cultic activity at the sanctuary. Other types of altars consist of free-standing blocks, often with double round Etruscan mouldings, found within the Etruscan and Latial territories (Orvieto, Fiesole, Lavinium, Rome, Ardea, Pieve Socana [Fig. 8]) throughout the Archaic and Republican Roman periods (*ThesCRA* 2005).

Central Italy: Etrusco-Italic Sanctuaries, Fig. 8 Pieve Socana, altar (Photo: Ingrid Edlund-Berry)

Areas for Sacrifices, Offerings, and Other Ritual Activities

Offerings to the dead were made at the gravesites, but there is also evidence of small shrines (Tuscania, Ara del Tufo; Blera, Grotta Porcina) or monumental steps leading up to a platform adjoining a tumulus grave (Cortona, Il Sodo) (Colonna 2006). Funerary cults may have required sources of water (Orvieto, Cannicella) or altars for sacrifices. On occasion burials are found in non-funerary contexts, perhaps suggesting human sacrifice and ritual burials (Tarquinia, Civita [Bonghi Jovino 2010]).

In addition to burnt animal sacrifices, common forms of offerings include miniature vessels probably containing food and liquids, bronze or terracotta statuettes of deities and worshippers, pottery, jewelry, coins, and other objects. While many of the objects were locally made or traded, others were imported from afar. Offerings can be found in dug pits ("votive deposits") or distributed over large areas of the sanctuary.

Rituals at sanctuaries required defined spaces, including areas for sacrifice, usually in connection with altars, and inspection of the sacrificed animals (hepatoscopy). Spaces were also set aside, for observation of signs in the sky (including haruspicy and brontoscopy) and for prayers and other rituals presented by priests, perhaps in conjunction with the altar in front of a temple and the steps leading up to the cult statue inside the temple.

In addition to sacrificial meals, evidence of dining rooms with couches and pottery for eating and drinking would suggest that meals were taken in the sanctuary by participants and spectators. Depending on the distribution of local sanctuaries within an area, visitors to a sanctuary would also need lodging and places to conduct business.

Continuity

What remains today of ancient sanctuaries, including temples, seems to be the result of chance as well as intentional preservation. Some

sites that were completely covered over by earth or sand (Ardea, Fosso dell'Incastro) have been rediscovered, whereas others have been visible continuously because of temple foundations built into churches and other buildings (Rome, Sora). At times the historical evidence confirms conversion of sanctuary sites to other uses (Pietrabbondante after the Social War [La Regina 2009]), whereas accounts of disruption such as the "calling out" (*evocatio*) of Juno from Veii after the Roman conquest of 396 BCE may be exaggerated (Stek 2009).

International Perspectives

The continued study of Etrusco-Italic sanctuaries has added to our appreciation of the form and function of sacred spaces. Although monumental temple structures were important throughout the ancient Mediterranean, different traditions, including the use of perishable building materials, have at times skewed our understanding of ancient cultures and their religious expressions. It is therefore important to incorporate the temples and sanctuaries of central Italy into a broader geographical and chronological framework as evidence for human activity documented primarily through archaeological evidence.

Future Directions

The most concrete result of a thorough study of Etrusco-Italic sanctuaries will be to reevaluate the history and development of architectural traditions in Rome and surrounding areas. Whether we define "Roman" as a chronological or cultural term, buildings, including temples, were part of life in the city of Rome proper, and Roman architecture is therefore as ancient as the city herself, with a modest beginning in the Iron Age. It is, however, important to try to separate the political advancement of Rome from her assumed role as innovator of art and culture, and to explore the interaction of all the peoples of central Italy that gradually resulted in a uniform Italo-Roman culture, spearheaded by Rome.

Cross-References

▶ Architecture, Roman
▶ Iconography, Etruscan
▶ Religion, Italo-Roman, Archaeology of

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Central Italy: Pre-Roman and Archaic Ceramics

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Introduction

The study of pre-Roman ceramics covers the field that deals with ceramics produced and used in the central part of Italy (Etruria, Latium, Campania) between the eleventh and the late fifth/early fourth century BCE. The area is considered to have a more or less similar material culture during this time span, and pottery research is usually carried out within shared thematic frameworks. The field is firmly grounded in typological analysis of grave goods, as (especially Etruscan) funerary archaeology has played an important role in the study of pre-Roman ceramics. In the past decades, interest has risen significantly in pottery coming from settlement excavations, and typological research of necropoleis is now complemented with a variety of sherd-based approaches such as technological analysis and statistics. As in the case of typological studies, these are often presented as part of a one-site study. General overviews or syntheses on pre-Roman pottery are therefore mostly found in original research publications, in exhibition catalogues, or in conference volumes that have become iconic over time.

The period of pre-Roman ceramics can be roughly subdivided into the Iron Age (eleventh to late eighth century BCE), the Orientalizing period (late eighth century BCE to late seventh/early sixth century BCE), the Archaic period (late seventh/early sixth century BCE to late sixth century BCE), and the Late Archaic period (late sixth/early fifth century BCE). The manufacturing of pottery in the Iron Age is done in households, but this slowly evolves into a workshop production from the Orientalizing period onwards, when the lifestyles of emerging local elites go hand in hand with craft specialization and the use of new pottery technologies. Mass production and distribution of both kitchen/storage wares and table wares only starts in the later Orientalizing and Archaic periods within the context of the emergence of urban environments in Central Italy.

Definition

Pre-Roman ceramics concern kitchen/storage wares such as impasto and coarse ware and table wares such as fine impasto, bucchero, and the painted wares (Italo-Geometric and Etrusco-Corinthian). Other functional categories of fired clay include small architectural ceramics such as building blocks, roof tiles, and architectural terra-cottas; weaving tools such as spools, spindle whorls, and loom weights; figurative objects such as small clay figurines; cooking stands and stoves; and pottery stands. Most

ceramic categories are not decorated and contain only a slipped, smoothened, or burnished surface. The table wares, however, are known for their decorations which can be painted, incised, impressed, or attached.

Historical Background

From the eleventh century BCE onwards, small hut villages slowly developed into proto-urban centers in Etruria, followed shortly by Latium and Campania. The proto-urban centers would become the monumental city-states of the seventh and sixth centuries BCE (Bietti Sestieri 1992). These developments occurred in tandem with a change from egalitarian communities to hierarchical societies. An "aristocratic ideology" emerges from the ninth/eighth century BCE onwards. Elites practice this ideology through the use and display of luxury items imported from the Near East and of new lifestyles including hero cults, gift exchange, and a Greek-inspired wine drinking ritual, the symposion (Bartoloni 2003; also Riva 2010). Women might have played some role in these activities as well: pottery that can be associated with the drinking and banqueting rituals as well as remains of wooden chariots have been found in burials of both sexes (Rathje 2000; Bartoloni 2003).

Whereas the aristocratic ideology is mainly expressed through funerary rituals in the Iron Age and Orientalizing period, there is a shift in the manner of expression from the later Orientalizing period onwards. The "heroic" cremations and "princely" burial mounds and chamber tombs with their large sets of grave goods give way to the embellishment of monumental sanctuaries and their rich votive deposits and to the construction of large private houses with stone foundations and tile roofs (Colonna 1988). This shift in expression is associated with a consolidation of power by elites but at the same time seems to be reinforced by an emerging middle class that promotes the mass production of formerly high value or elitist goods (Colonna 1979; Bartoloni 2003).

The mass production of goods is the result of a gradual craft specialization. In the later Iron Age and the Orientalizing period, local elites start controlling production and distribution of certain goods, often in so-called temple economies, and favor a specialized (mass) production of votive and funerary goods. The arrival of Greek and Phoenician traders in western Mediterranean waters from the ninth/eighth century onwards played an important role in this intensification of production. Greek traders, or even migrating Greek potters, can be held partly responsible for the introduction of new ceramic technologies such as the use of depurated clays, the potter's wheel, and a more efficient and controllable firing technique. Although the importation of Greek pottery (and of overseas trade in general) diminishes in the later Orientalizing period, the new technologies are now applied on a large scale in local pottery production. This forms the basis for the emergence of specialized workshops in the Archaic and Late Archaic periods (Nijboer 1998).

Key Issues

Impasto

Impasto is the most common pottery ware throughout Italy from the Early Iron Age until the Archaic period (eleventh to early sixth century BCE). At the same time, it is the pottery category with the loosest of definitions. Generally said, impasto concerns locally made pottery of non-depurated clay with a smoothed to burnished surface. Although impasto as a term is in use since the sixteenth century for the act of mixing water with clays and inclusions (Camporeale 2001), it is introduced as an archaeological term only in the late nineteenth century for handmade pottery made of non-depurated clay (Cuomo di Caprio 2007). In literature on ancient technologies, impasto can also refer to the actual mixture of clays used for pottery production (Cuomo di Caprio 2007). The term can also be used to describe burnished coarse wares used until Roman times.

A division is made between impasto of the Iron Age and impasto of the Orientalizing period.

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 1 Iron Age "dinner service" found in a dwelling on the site of ancient Satricum (modern Le Ferriere, Latina) (Courtesy and copyright Groningen Institute of Archaeology)

Impasto of the Iron Age concerns handmade pottery that is built up of coils or slabs of heterogeneous clays. The surface color varies due to the use of an open-air firing process at low temperatures, and it ranges therefore from red to very dark brown and black. Decorations can be incised (geometric motifs), plastic (cords or knobs), pressed (ribs or ripples), or cut (channels or grooves). The most common shapes are small storage jars and cooking jars, lids, bowls, cups, plates, spindle whorls and spools, cooking stands, pottery stands, and shapes used in funerary rituals such as biconical vases and (hut) urns. Although a utilitarian ware, impasto can be found in all kinds of contexts – including funereal, votive, and domestic (Camporeale 2001; Bartoloni 2002) (Fig. 1).

At the end of the Iron Age, technology and taste start to change: clays become partly depurated, surface colors are more homogeneous due to better firing control, and narrative decorations appear alongside geometric motifs. The shape repertoire continues within the traditions of the Iron Age, but some shapes are inspired on metallic prototypes of the Near East (Camporeale 2001) and on Greek and Phoenician pottery styles (Bartoloni 2003). During the Orientalizing period, shapes become more and more standardized. This is the result of the emergence of craft specialization and the beginnings of a workshop mode of production (Nijboer 1998). The main table wares of the Orientalizing period are brown burnished impasto (impasto bruno) and red burnished – sometimes slipped or even

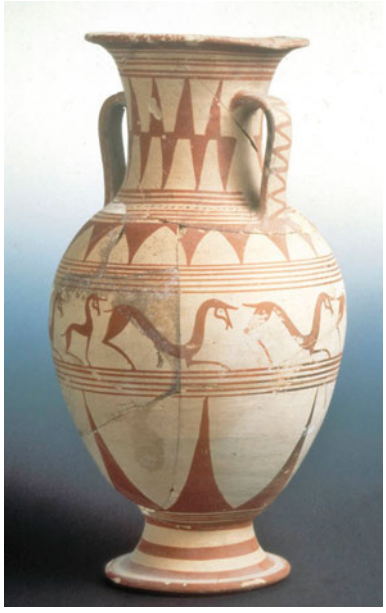

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 2 Red-on-white pottery stand and dinos with painted decoration of geometric motives (APM14344; courtesy and copyright Allard Pierson Museum, Amsterdam)

painted – impasto (impasto rosso). Other less frequent categories include buccheroid impasto and the painted wares red-on-white (Fig. 2) and white-on-red (or "sub-geometric"; see further below) and a coarser version of impasto with a burnished surface (impasto grezzo) (De Lucia Brolli & Benedettini 2000). The various shapes of these categories are associated with the diffusion of wine drinking, either as a practice of seated drinking or as a practice of recumbent banqueting. Although evidence of local wine

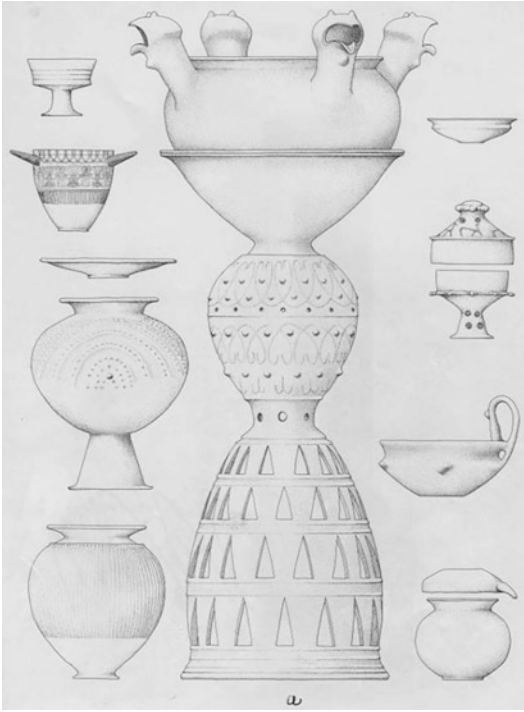

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 3 A banquet service from a domestic context from Ficana (Latium) (Drawing copyright Thora Fisker, University of Copenhagen)

drinking practices seems to exist for the Early Iron Age – while banqueting practices surely existed – the intensification of both wine drinking and banqueting is usually associated with the dissemination of Greek and Phoenician elite customs in Italy. An example of impasto pottery associated with wine drinking is, for instance, the Aegean-inspired pottery stand that can carry a large (mixing) crater or the two-handled kantharos that serves as a drinking cup, but also more indigenous impasto shapes are considered to have been part of such a ceremony, examples being the spiral amphora that might have served for drinking and the biforate handle cup that was probably used to transfer wine from crater to cup (Bartoloni 2003). A famous example of a complete banqueting set in a domestic context has been found in Ficana (Latium), among which was found an oversized impasto rosso pottery stand accompanied by a large wine mixing basin (Fig. 3).

In the later seventh century BCE, standardized pottery makes its appearance. Clays are tempered, a wheel is used, firing is done under controlled conditions in a closed oven, and surfaces are more often slipped or smoothed instead of burnished. The Archaic coarse ceramics of the sixth century make their first appearance and for the most part replace impasto as the main common-ware pottery (see further below).

Bucchero

Bucchero is the primary table ware of Central Italy in the seventh, sixth, and fifth centuries BCE. It is known for its distinct black surface color with high sheen and its specific shape repertoire. The first use of the term dates back to the years around the turn of the eighteenth century when Portuguese imitations of pre-Columbian ceramics labeled "pocaro" or "búcaro" were exported to Italy, and their resemblance to the newly discovered Etruscan pottery style gave bucchero its name (Camporeale 2001). Although bucchero has often been labeled as the national pottery of Etruria, it is clear now that it was also produced in non-Etruscan areas of Central Italy.

Bucchero is usually subdivided into bucchero sottile, bucchero pesante, and grayish bucchero. Bucchero sottile stands for very thin-walled handmade bucchero that has been mostly found within tombs in southern Etruria of the second and third quarters of the seventh century BCE. It is characterized by a shiny black surface color and a very dark core. The color of bucchero, the decorative motives, and the productive technologies have often been considered as indicative of imitations of oriental-style metal wares (Hirschland Ramage 1970), but the later date of metal wares makes it very likely that bucchero might have been a prototype itself (Camporeale 2001). Most probably diverse branches of craftsmen worked closely together on high-quality goods such as metals, ivory, and pottery and meanwhile mutually influenced one another in the production process (Gran-Aymerich 1995). The distinctive surface and core color of bucchero are (arguably) established by reducing the atmosphere during the firing process which turn iron oxides from

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 4 Spiral amphorae made in bucchero (*left*) and impasto (*right*) (APM11327a-b; courtesy and copyright Allard Pierson Museum, Amsterdam)

red into black, while the surface sheen is achieved through intense polishing before firing (Cuomo di Caprio 2007; Perkins 2007). The shape repertoire has clearly evolved out of eight-century impasto shapes, and it might well be that bucchero was produced alongside other kinds of pottery such as impasto. Examples of this continuation are the spiral amphora (Fig. 4) and the very popular and widespread kantharos, kalyx, and kyathos. On the other hand, shapes such as the kotyle, the olpe (Fig. 5) and the skyphos are clearly derived from the Corinthian pottery repertoire (Camporeale 2001).

The south Etruscan city of Caere is considered as the first production center of bucchero sottile and starts to produce and export bucchero in the early seventh century BCE. Other production centers soon follow in south Etruria and Campania, and in the later seventh century, bucchero is produced throughout the major part of Italy. Potters might have travelled between cities, especially in the case of Campanian bucchero: its strong resemblance to Caeretan bucchero indicates that either the bucchero or the potters might have been originally from Caere. In this period bucchero is considered a luxury table ware associated with wine drinking. Initially it is only used by elites, who display it in tombs as drinking services, offer it in sanctuaries, or use it in their aristocratic houses as ordinary ware for personal use or for special

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 5 Olpe of bucchero sottile used for pouring out wine (or other fluids) (APM10734; courtesy and copyright Allard Pierson Museum, Amsterdam)

occasions such as a drinking party in symposion style. The value attached to the ware is made clear through the many vases showing ownership inscriptions (Camporeale 2001).

After a transitional phase (Hirschland Ramage 1970), bucchero evolves into bucchero pesante,

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 6 Amphora and kalyx of bucchero pesante showing the technique of making decoration in relief (APM03503; courtesy and copyright Allard Pierson Museum, Amsterdam)

the thick-walled bucchero of the late seventh and the first half of the sixth century. Bucchero pesante has a slightly coarser clay and a more dull sheen than bucchero sottile and shows signs of standardization of shape and decoration when compared to the earlier bucchero. Decorations are now mostly in relief by using tools such as roller seals to make impressions (Fig. 6), by attaching plastic decorations or by pressing the clay; these can consist of floral or animal motives and narrative scenes. Initially, bucchero pesante is produced in large quantities and exported abroad to regions such as Greece, the Levant, the north African coast, the Iberian peninsula, and southern France. However, in the sixth century, bucchero is distributed more closely to its production center and is possibly in use by an emerging urban middle class which tries to imitate the customs of the elites (Camporeale 2001).

From the middle of the sixth century onwards, bucchero loses its distinct black sheen and grayish bucchero makes its appearance. Grayish bucchero is often not considered as proper bucchero, due to its gray surface color and light core. Surface treatments can vary from low burnished to slipped, and shapes are limited to predominantly low-footed bowls, jugs, and table amphorae. Despite a decline in quality, it remains a popular ware in tombs, sanctuaries, and domestic contexts throughout Central Italy.

Painted Wares

Italo-Geometric and Etrusco-Corinthian pottery are the main painted wares between the eighth and the sixth centuries BCE. Although both are inspired by Greek prototypes, they differ in style and date. Italo-Geometric pottery is inspired on the Euboean Geometric pottery of the middle of the eighth century and ignores the rise of Corinthian styles from the late eighth century, whereas Etrusco-Corinthian pottery is exactly an imitation of Corinthian styles, although only from the later seventh century onwards.

Italo-Geometric (or Etrusco-Geometric) can be executed in both a depurated and an impasto (as in non-depurated and burnished) version. Although the clays and most shapes are local, the decoration motives such as concentric circles, triangles, meanders, series of parallel or wavy lines, and checkerboards are clearly derived from Greek examples. This Greek connection has led to the idea of the first workshops of Italo-Geometric pottery being run by Greek craftsmen (De Lucia Brolli & Benedettini 2000; Gaultier 2001).

The oldest Italo-Geometric pottery is made in southern Etruria from the middle of the eighth century onwards alongside local impasto, and it closely follows Euboean examples (Bartoloni 2003). Despite the influx of new objects and styles from the Near East in the later eighth century BCE, the Italo-Geometric potters continue to stick to the Euboean Geometric motives. Even Corinthian objects that start to appear from the late eighth century onwards do not change their mind, although hybrid shapes or Greek-style shapes used for wine drinking and banqueting

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 7 Storage jar in white-on-red ware from southern Etruria with a lid in the shape of a drinking cup. The red burnished surface shows a painted decoration of two panthers sharing a head (at the back side two facing lions) (APM15400; courtesy and copyright Allard Pierson Museum, Amsterdam)

rituals are now made as well. This later phase of Italo-Geometric pottery is labeled sub-geometric and continues to be produced in only specific areas of Central Italy (Gaultier 2001).

A very recognizable subgroup of the sub-geometric pottery carries a characteristic decoration of metope friezes with geometric motives. These geometric schemes are here and there replaced by a more free figurative painting style which appears on vessels of depurated clay but also on burnished red impasto (the so-called white-on-red ware) (De Lucia Brolli & Benedettini 2000) (Fig. 7). This is one of the last geometric styles to be found in Central Italy. At the end of the seventh century, the influence of Corinthian pottery starts to play its decisive role, and the Etrusco-Corinthian pushes the Geometric off the stage of table wares (Gaultier 2001).

Etrusco-Corinthian (or Italo-Corinthian) pottery is a table ware inspired by the large influx of Corinthian pottery from the later seventh century onwards. Etrusco-Corinthian pottery is made of a depurated clay and has a painted decoration in which the Greek black-figured technique figures prominently. It can be difficult to distinguish Etrusco-Corinthian pottery from its prototype, especially when it is found in a fragmentary state in settlement contexts. Fortunately much has become known about the hands of various painters which can be used to distinguish between local workshops (Szilagyi 1992).

Initially, Etrusco-Corinthian pottery follows Corinthian models closely, and pouring vessels such as oinochoai and olpai, the alabastron perfume flask, and amphorae become highly popular in elite lifestyles. As in the case of Etrusco-Geometric and bucchero pottery, most Etrusco-Corinthian shapes probably serve in an elitist wine drinking or banqueting setting, although they are found in domestic contexts, sanctuaries, and tombs alike. However, from the beginning of the sixth century, Etrusco-Corinthian pottery becomes mass-produced. This mass production is probably to be associated with the needs of an emerging middle class that tries to imitate the elites, as in the case of thick-walled bucchero. The mass production is short lived, as around the middle of the sixth century, production shifts from large vases to small luxury items such as perfume flasks (alabastra and aryballoi; Fig. 8) and pyxides. Three easily recognizable main motif groups can be distinguished in this period: a group of human masks, a group of birds, and a group of facing roosters. These are the last testimonies of local pottery inspired by Corinthian models, as from the middle of the sixth century onwards, Etrusco-Corinthian pottery is gradually replaced by imported and imitation Attic black-figured pottery (Gaultier 2001).

Coarse Ceramics

Coarse ware or "ceramica grezza" (in Italian) is one of many names given to the wheel-made and mostly undecorated pottery of coarse fabric which is found in large amounts in settlement contexts from the early sixth century BCE onwards. For this reason it is also called domestic ware or ordinary ware, in Italian literature referred to as "ceramica comune" or "ceramica

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 8 Etrusco-Corinthian aryballos used for perfume (APM10559; courtesy and copyright Allard Pierson Museum, Amsterdam)

di uso domestico," but other names occur like utilitarian ware or kitchen ware, referring to the everyday function of the pottery. Other terms used are red-brown impasto, impasto grezzo, Archaic impasto, or wheel-made impasto in order to distinguish the ware from the earlier handmade, coarse impasto.

The term coarse ware was introduced by Einar Gjerstad in his publications on Early Rome of the 1960s. Giovanni Colonna used the term to indicate a distinct group of pottery within the larger class of impasto coming from the excavations of the area of the S. Omobono sanctuary in Rome (Colonna 1963–1964), whereas Murray-Threipland used the term for the development of this class of pottery during the fifth century in her studies on the pottery from Veii (Murray-Threipland 1963). Recent publications on excavations in Rome and Satricum (Carafa 1995; Bouma 1996; Gnade 2002) also use the term coarse ware and provide detailed typologies based on size and form/morphological aspects (Steures 1992; Carafa 1995; Bouma 1996).

The clay of this pottery is easily distinguished from that of the Iron Age impasto as it is characterized by a clearly visible presence of inclusions consisting of a wide array of mineral particles (mica, augite, biotite, olivine) as well as pieces of crushed pottery, small stones, and large amounts of fine sand. There appears to be a marked resemblance between the fabrics of the large vessels and those of the architectural elements, above all the roof tiles. This has been noted in Satricum (Latium) where the fabric of the earliest dark-red Archaic roof tiles, characterized by the natural presence of ferromanganese (FeMn) nodules, can be paralleled in the large storage jars (dolia); a similar correspondence can be noted for the later Archaic products where the clay of the roof tiles like that of the large basins is characterized by identical mineral elements among which rather large and irregularly shaped particles of augite. Given the mutual resemblance in fabrics, it may be suggested that architectural elements were produced in the same workshop as the larger vessels (Angelelli 2001; Gnade 2002). Another observation regards the color of the coarse ceramics which through time changes from dark to light, reflecting some chronological development within the Archaic red-firing and the Late Archaic pale-firing clays. For the fifth and fourth centuries, a predominance of orange fabric is observed probably due to higher firing temperatures.

In general the surface of the coarse ceramics must have been covered with a thin slip, the color of which matched that of the fabric. Often only slight traces have remained due to the course surface of the pots. Painted decoration is known from a clearly defined group of coarse white ceramics which occurs in many Central Italian settlements from the beginning of the sixth century and is variously defined as Late Italo-Geometric, referring to the painted bands (Gjerstad 1953); as cream coarse ware (Torelli & Treipland 1970) and as "ceramica sabbiata chiara" or "impasto chiaro sabbioso" (Angelelli 2001), referring to an obviously sandy quality of the clay; and as "impasto chiaro augitico," referring to the abundant presence of augite particles in the clay (Clementini & Rossi Diana 1988).

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 9 Coarse ware neckless jar or olletta used for cooking (Photo by Anneke Dekker, copyright Satricum Project/University of Amsterdam)

The repertoire of coarse ceramics shapes is rather limited and consists of four or five basic forms which show a considerable degree of uniformity per individual shape, suggesting a limited series of production centers that served large areas. The few basic shapes show continuity throughout the sixth, fifth, and fourth centuries BCE which makes it awkward, at the present stage of study, to make clear chronological distinctions in the individual shapes. Small differences in the forms of lips, rims, and bases have been used to establish detailed typologies of the individual shapes, but as it appears, this morphological approach seems of rather limited value to establish detailed chronologies for this material (Slej & Cullhed 2008).

The most common shape is the globular-ovoid, flat-based storage and/or cooking jar of medium size, also called neckless jar ("olletta" in Italian), which often displays traces of secondary burning on the bottom and lower half of the pot (Fig. 9). This particular shape is produced in enormous quantities in the fifth and fourth centuries BCE and continues until the Imperial period, be it in a different type of fabric. In the fourth century, the high-rimmed jar makes its appearance, though a few earlier specimens dated to the fifth century are known, often with a characteristic almond-shaped thickening on the outside of the lip and notably thin-walled. At the same time, the bodies of the later jars start to display plastic decorations like one or two encircling thin plastic cords, either plain or with finger impressions (Bouma 1996).

A much larger variant of the storage jar is the dolium, characterized by its thick outcurving rim often profiled with encircling grooves. This jar is sometimes provided with heavy grips or lugs placed on the shoulder. The fabric of this shape changes through time, from a rather friable quality in the Early Archaic period, probably due to low firing temperatures, to a more consistent, hard-fired quality. The early dolia often display a dark-red burnished surface. A smaller version of the storage jar shows large ring handles horizontally attached on the shoulder.

The shape associated with the neckless jar is the conical lid/bowl with wide spreading walls which served two functions. It is characterized by a proper knob which may be solid or ring-shaped, sometimes with upturned edges ("a becco a civetta") or edges decorated with impressions produced by the fingertip or a small stick. It occurs in many different sizes, suggesting that the shape was made independently from the jar. Flattened, disk-shaped lids without knobs can be attributed to the dolia.

Among the other open shapes within the repertoire are the basin-like vessels, either with high, spreading walls (trays) or with curved walls (basins). The first shape, also known under the Italian names "bacino" or "teglia," shows four lugs attached to the bottom. These are rounded, triangular, or tongue-shaped and often show fingertip impressions. A few "teglie" have an encircling finger-impressed cord decoration below the rim. The lugged tray becomes en vogue from the late seventh century BCE onwards and continues to be produced with some minor formal changes until the late fourth to early third centuries BCE (Colonna 1963–1964; Bouma 1996). With regard to the

Central Italy: Pre-Roman and Archaic Ceramics, Fig. 10 Red slipped bowl, also called red bucchero (Photo by Anneke Dekker, copyright Satricum Project/ University of Amsterdam)

function of this shape, it has been suggested that it may have served as a "testum," a kind of cover placed over a hearth through which a small oven was created. The bottom of the "teglia" could then serve as a baking plate (Zifferero 2004). A variation of the teglia type, which may be considered a later development, shows curving walls and a T-shaped rim. It often displays an encircling plastic ridge, with or without fingertip impressions, and is sometimes provided with two heavy, vertical loop handles attached on top of the rim (Gnade 2002; Argento 2006). When produced in light-colored clay, the vessel may be painted with red-brown or black encircling bands whereas the rim may show diagonal painted stripes.

The second shape, a wide and rather shallow basin of hemispherical shape (called mortaio in Italian), occurs from the second half of the sixth century BCE and has as its main characteristic a lip with band-shape thickening on the outside of various thickness and profile (Gnade 2002). It is sometimes provided with a spout. The clay of these basins is mainly light-colored containing many inclusions; many basins display encircling painted bands on the interior as well as the exterior of the vessel.

During the fifth and fourth centuries BCE, the production of coarse ware pottery continues with a larger range of shapes, more thin-walled and hard-fired.

Fine Wares

Fine wares continue to be produced alongside the coarse ceramics of the sixth and fifth centuries BCE, though their presence is less conspicuous than that of the latter category. Grayish bucchero of a poor quality is known from various sites. It often shows a flaking surface or slip which at times may also be red. In fact there exists a category of pottery that was produced alongside the gray bucchero and which is characterized by a very recognizable red slip for which it has tentatively been defined as reddish bucchero (Steures 1992). Its first occurrence is attested in the late sixth century, and it continues to be produced during the fifth and fourth centuries when the quality of the product seems to dwindle (Gnade 2002). A common ware for Satricum and known also from the Faliscan area, it occurs only sporadically in other Latial sites. The shape repertoire is limited to bowls and jars (Fig. 10).

The fifth century also witnesses the first appearance of black-gloss or black-glazed pottery (Italian: *vernice nera*), fine textured table ware with a characteristic shiny black-slipped surface. This pottery will soon become the main fine ware product in Central Italy and entire Mediterranean region.

Future Directions

Pre-Roman pottery represents many different ceramic classes which, apart from the traditional typological studies, encompass also other possibilities for research, the results of which can be mobilized to tackle issues such as the technology of pottery production and its organization, the mechanisms and intensity of pottery distribution, and patterns of consumption and use of pottery. To this end, a systematically executed and integrated approach of geological sampling and technological analysis of the various ceramic

classes, i.e., a combined mineralogical and chemical analysis, is opportune. This approach should not be limited to individual ware classes in individual sites and in particular periods but ideally should cover much longer periods and larger areas. Through the acquired data, a better understanding can be reached of the mechanisms underlying production and consumption processes and related commercial activities.

Different initiatives in this particular field of research have already been undertaken, especially with regard to Roman pottery from the middle/late Republican periods (Olcese 2006). However, a similar, large-scale, and integrated research is still lacking for the earlier, pre-Roman ceramics in the geographical regions of Central Italy. An abundance of ceramic material excavated in the nineteenth and twentieth centuries is stored in dusty storerooms and has not been looked at after an initial processing. Usually, only a very small proportion of the excavated ceramic material, the so-called diagnostics, is published in excavation reports or in typological studies. A situation which is regrettable considering the time and effort put into the collection of the material and considering the fact that much of the so-called non-diagnostic ceramics is not as non-diagnostic as it seems. It could tell us a lot more when more attention will be paid to those features that have been previously neglected in processing the ceramics.

Cross-References

- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Latium Vetus, Latium Adjectum
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Tombs, Etruscan

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Central–Eastern Europe: Historical Archaeology

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Introduction

This entry deals with the historical archaeology of the Eastern fringe of the Western Christian cultural area from the early Middle Ages onward,

covering especially the three kingdoms of Bohemia, Poland, Hungary, and their dependencies. In general, the historical archaeology of Central–Eastern Europe (CEE) follows the current direction of Western European research with respect to methods and conceptualization. There are, however, some dissimilarities. These mainly relate to the historical geopolitical situation of CEE which gave rise to specific discontinuities and interferences by different cultural, religious, and ideological forces and which often left distinct archaeological evidence.

Definition

In CEE, historical archaeology is perceived as the part of general archaeology that studies society on the basis of material remains from the periods for which numerous written sources are available. In principle, it therefore includes the archaeology of the medieval and modern periods. In individual national archaeologies, however, periodization varies depending on specific historical developments. Accordingly, this entry has a wide overall chronological span, but for individual areas the range is quite variable. Thus, for Hungary historical archaeology covers the period from c. CE 1000–1800, whereas for the Czech Republic and Slovakia the perspective is narrower, spanning only the late medieval and modern periods (CE 1450–1950). In Poland, although some scholars have begun to argue that historical archaeology spans roughly the same date range as used by their Hungarian colleagues (Kajzer 1996: 16–23), practically speaking, both in research agendas and academic study programs, the term "historical archaeology" is commonly attributed to the late medieval and modern periods (c. CE 1250–1945), which is why this narrower range is the one adopted here for this territory.

The concept of "historical archaeology," because it encompasses the traditional periods of historical and archaeological concern, is ideally suited to research the transitional periods between them, namely, between the early and high/late medieval (see Piekalski 2001; Klápště 2012), medieval and modern (e.g., Piekalski & Wachowski 2009), and early modern (preindustrial) and present (modern) periods. Moreover, the concept and concerns of historical archaeology in CEE overlap with both social-economic history and cultural anthropology (ethnology), as well as those of other disciplinary fields including historical anthropology, history of art and architecture, historical geography, history of science and technology, and legal studies (in connection with both forensic archaeology and the archaeology of material remains of past jurisdiction). The survey and documentary techniques used in historical archaeology are also closely related to those used in various branches of geography and biology (Krajíc 2007). The need for multidisciplinarity in historical archaeology is thus beyond doubt. The main methodological question is, however, how to combine the diverse information provided by different yet complementary groups of sources in order to gain new insights into past society, rather than simply using archaeology to illustrate or repeat the narratives elaborated by historians.

In terms of the dissemination of research results, there are several journals and periodicals devoted to the archaeology of the Late Middle Ages and the (early) modern period covering CEE. For the Czech Republic and Slovakia, the key ones are as follows: *Studies in Post-Medieval Archaeology* (in English, a new series, published every 2 years since 2007), the journal *Archaeologia Historica* (published since 1976), and *Studia Archeologica Slovaca Mediaevalia* (published irregularly since 1998). In Poland, the most important serial publication is *Archaeologia Historica Polona*; papers of likely relevance to CEE historical archaeology also appear frequently in *Kwartalnik Historii Kultury Materialnej* and in periodicals or serial editions devoted either to particular cities and regions. In this regard, *Wratislavia Antiqua*, edited in Wrocław, is especially worth mentioning, while articles on the Hanseatic towns on the Baltic coast may be found either in local periodicals, printed in Elbląg, Gdańsk, and Kołobrzeg, or, in German, in *Lübecker Kolloquienzur*

Stadtarchäologie im Hanseraum. Other publications concern particular themes or problems (e.g., *Funeralia Lednickie*, focusing on burial customs). In Hungary, there is a lack of journals dedicated specifically to the Late Middle Ages and the early modern period, but many articles and shorter reports can be found in several well-known and long-established journals like *Archaeologiai Értesítő* (Archaeological Bulletin published continuously since 1968) or *Acta Archaeologica Academiae Scientiarum Hungaricae* (published since 1950).

Historical Background

Through a large part of its medieval and early modern history, CEE was a contact zone between Western (Roman Catholic and Protestant) Christendom and the Orthodox and Muslim worlds. It developed in the cultural framework of Western Christian culture but against a strong local background (which leads to a variety of local attempts to adopt – and adapt – Western standards), owing to a very close contact with its Eastern and Southern neighbors where either Orthodox Christianity or Islam typically prevailed. Economically, the Northern part was linked to the Baltic sphere, and along with that it was gradually integrated into the strongly interconnected European economy and long-distance trade networks (1200–1800).

In the later Middle Ages, CEE encompassed the territories of three kingdoms (Bohemia, Poland, and Hungary) and the state of the Teutonic Order (Fig. 1). In the fifteenth–sixteenth centuries, Poland merged with the Grand Duchy of Lithuania into a unique Commonwealth (which also included the Ruthenian territories of present-day Belarus and Ukraine), whereas Bohemia and Hungary were integrated into the Habsburg Monarchy, facing the expansive Ottoman Empire. Central parts of Hungary were also conquered by the Ottomans, and the Eastern third of the medieval Hungarian monarchy, called Transylvania, became a duchy with a special vassal status within the Ottoman Empire. The state of the Teutonic Order was partly incorporated into Poland, whereas the rest of it developed into the Duchy and later Kingdom of Prussia. In the eighteenth and nineteenth centuries, CEE was dominated by the expansion of the Habsburg Monarchy, Prussia, and Russia. In the twentieth century, the region was subject to strong pressure and cultural influence from both Germany and the Soviet Union.

Key Issues/Current Debates

Historical archaeology in CEE has expanded in the last 25 years, although its first foundations were laid much earlier (Smetánka & Žegklitz 1990). This growth is largely a consequence of the gradual and ever-growing acceptance – both among relevant authorities and archaeologists themselves – of late medieval and modern material relics as subjects of legitimate research and of equal merit to pre- and protohistoric archaeological sites and artifacts. Historical archaeology is especially gaining in importance in the field of impact assessment surveys and rescue excavations accompanying new building development (which have been in all respective states legally integrated into the processes of acquiring building permissions). There are also research-driven studies in such fields as rural settlement (at least in Bohemia, Slovakia, and Hungary), battlefield archaeology, forensic archaeology (especially in Poland), and scholarly elaboration of some aspects of the material culture of these periods, rather than simply salvage exercises. Nonetheless, this close interdependence between historical archaeology and rescue excavations causes discrepancies in certain research areas. For example, because historical archaeology is so closely associated with predevelopment impact assessment and mitigation, the densest concentration of field research has been in the historical core areas of cities where architectural and archaeological heritage has been threatened by new building development (notably Brno, Elbląg, Gdańsk, Prague, and Wrocław). The same level of research into the historical archaeology outside the major cities has not been attained, however, and only in the last 25 years have attempts been made to improve the legal and practical status of

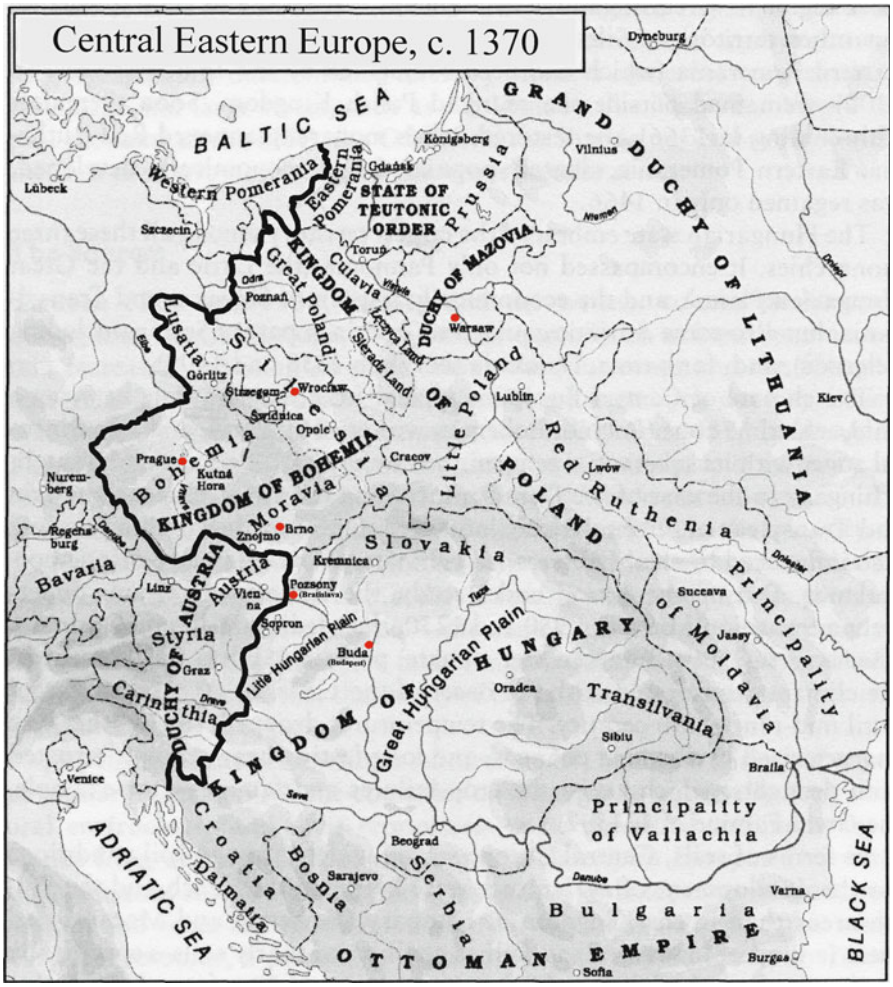

Central–Eastern Europe: Historical Archaeology, Fig. 1 Central–Eastern Europe in the Late Middle Ages. The thick line highlights the conventional (academic) border between Central–Eastern and Central–Western Europe. Today, CEE is perceived as the area encompassing Poland, the Czech Republic, Hungary, and the Slovak Republic. On the other hand, Central–Western Europe then consists of Germany, Austria, and Switzerland. Fluid borders remain between Southeastern (North Balkans) and Eastern Europe (After Myśliwski 2011, Fig. 8.1, slightly modified)

late medieval and modern archaeological sites in the countryside so as to accord them the same level of protection as given to monuments from earlier periods. This has mostly been accomplished by including archaeological surveys and excavations in the more general structure of heritage protection and by creating heritage protection areas, as has been attempted in Poland and the Czech Republic.

The broad spectrum of topics potentially reflected in the archaeological materials from historical periods allows for a variety of possible narratives to describe them. To accommodate this, in the following sections, current key research questions concerning the historical archaeology of CEE are also related to the grand concepts of European historiography and presented in chronological order.

The Medieval Transformation (1100–1350)

Archaeology has substantially contributed to the creation of the dominant historical narrative of

the medieval transformation of CEE (Klápště 2012). This model explains the historical processes of the eleventh–fourteenth centuries as a gradual cultural, social, and economic integration of Central–Eastern Europe into a wider Latin Europe. In the study of the transformation processes, which included, e.g., the commercialization of the economy and the structures of power, both the idea of a development convergent with Western European phenomena and the hypothesis of cultural diffusion of technologies and social patterns figure highly. In this regard, the contribution of archaeological research has mainly concerned the spatial spread of the changes, their relations to previous socioeconomic and cultural patterns, the diversity of local histories, and various local solutions to regionally common challenges (e.g., Piekalski 2001).

Late Medieval Archaeology: The Transition from the Medieval to the Post-Medieval World (1350–1550)

For this time period, archaeological interest has focused on researching continuities and changes in the urban milieu, rural settlement patterns, landscape, and technologies (cf. Scholkmann 2009; Carver & Klápště 2011). CEE development in the fifteenth–sixteenth centuries is typically portrayed as a gradual accumulation of diverse changes and responses prompted by developments in the previous period. However, the rate and intensity of the development were not the same across all parts of CEE, which emerged from this period as one subdivided into numerous differently functioning but interconnected socioeconomic regions. Some of these headed toward proto-industrialization and commercialization, while in others it was as if time stood still. In the fifteenth–sixteenth centuries, the development of Hungary, as a borderland on the margins of the Ottoman Empire, with large parts occupied by the Ottomans, was again special, characterized by the emergence of market towns involved in cross-border trade with their Islamic neighbors.

Post-Medieval Archaeology: Differentiation in the Early Modern Period (1500–1800)

In the early modern period, the individual parts of CEE underwent very diverse developments. The historical processes in the Western and Northern parts of CEE are traditionally conceptualized within the "grand historical narratives" of the early modern periods, such as the origin of modern society, industrialization, and commercialization. However, archaeological research along with micro-history and cultural anthropology creates parallel and less universalizing views of this period. Most parts of the Polish–Lithuanian Commonwealth, for example, did not head toward proto-industrialization. On the contrary, the demand for grain in Western Europe in the fifteenth–sixteenth centuries led to the development hereof extensive agrarian production and specialized long-distance trade. In the Southeast of CEE, the trajectory of change was influenced by the long-term expansion of the Ottoman Empire (c. 1300–1700). This area was characterized by military conflicts and instability in the cultural, ethnic–religious, and socioeconomic spheres. The process of early industrialization in Hungary was significantly affected by this unfavorable situation. The long-lasting Ottoman occupation of the Southern parts and the constant fear of the threat of invasion by the Ottoman Empire, combined with frequent clashes between the nobles and the monarchs, also meant that the area of present-day Slovakia and a large part of Hungary were focused almost exclusively on agriculture, with the exception of prosperous mining towns and settlements.

Modern Industrial Era (1750–Present)

The archaeological database for this period is enormously extensive and very rich in potential (Matoušek 2011). Nevertheless, historical archaeology of the industrial era in CEE continues to be regarded as a peripheral concern and often has been left to historical geographers, historians of science and technology and cultural anthropologists to research. This is now changing, however, with emerging interests in the historical archaeology of this era from the

perspective of (1) forensic archaeology and the archaeology of conflict, (2) the archaeology of totalitarian regimes and political crimes, (3) the archaeology of leisure (Vařeka & Symonds 2012), and (4) the archaeology of abandoned landscapes and depopulated frontier zones, such as along the Iron Curtain separating the Soviet Union sphere in Europe until 1989.

Thematic Approaches

Another way of approaching the historical archaeology of CEE, which is popular with many researchers especially those working on late medieval and modern materials, tries to dispense with the grand historical narratives and focuses instead on traditional, "anthropologically oriented" classification of finds and their functional contexts while also relating these schemes to local ethnography and the history of material culture (Smetánka & Žegklitz 1990; Krajíc 2007). The following paragraphs outline a selection of these.

Material Culture Studies

The amount of archaeological evidence concerning the last few centuries has recently increased exponentially. However, there are fundamental differences in terms of their information potential between the assemblages of artifacts concerning late medieval and modern society, and only some of them can be associated with a particular social context. In some cases, the artifacts both in their place of production and in their place of consumption can be studied simultaneously, as best illustrated by a recent study of the pottery workshop of Adam Špaček in Prague (1532–1571) and the distribution of its tile production in different social milieus (Žegklitz et al. 2009). This exposed the ambivalent character of some artifact types such as relief stove tiles and connected archaeology and art history. The former helps provide information on both the provenance and the social context of the users of these tiles, while their meaning and aesthetic significance are amenable to interpretation using the methods and analytical frameworks of art history (Fig. 2; Žegklitz 2012), including questions of symbolic culture and heraldry (e.g., stove tiles from the Wawel Castle in Cracow).

The enormous quantity of ceramic and glass evidence has also been studied by archaeologists, historians, and cultural anthropologists, and their complementary research frameworks often intermingle. Thus, some researchers have tend to use this material to explore the beginnings of modern consumer society with an emphasis on changes in well-being and easier access to goods; others have focused more on the impacts of technological innovations and the beginnings of new patterns of production, distribution, and consumption; and others still have explored changes in the direction, scale, and extent of long-distance trade and town-market exchange circles (Fig. 3; cf. Gaimster 2009). Only latterly have the transformations in the local ceramic wares become a topic of research and publication, with analyses focusing on the investigation of local craftsmen (Benkö & Kovács 2010). In Hungary, the first phase of research of this kind was marked by the investigation of prestigious ceramic wares, to a large part produced by Anabaptists (Fig. 4; with the local name Habans), and by the analysis of multicolored Majolica ware, e.g., Iznik ware, derived from the Ottoman Empire. Anabaptists (Habans) were a radical religious sect within the reform Christian movement who lived under the protection of the Protestant lords in South Moravia and Hungary. Their closed communities excelled in various branches of specialized agriculture as well as craft production. At the end of the sixteenth century, Anabaptist potters in Moravia and Hungary introduced modern Italian or Western European production technologies, such as tin-glazed pottery (faience).

Religious Culture as Reflected in Archaeological Evidence

Important research areas between the Late Middle Ages and the early modern period are the ideology and religiosity of these periods, in particular the diversity of popular responses to changes in everyday life driven by religious movements and phenomena such as Hussitism and the Reformation. In general, the research

Central–Eastern Europe: Historical Archaeology, Fig. 2 Artifacts between archaeology and art history. Images of the priest John Hus (Jan Hus, ca 1369–1415) burnt at the stake for heresy against the doctrines of the Catholic Church, after which he was considered by Luther and other early modern church reformers as one of their predecessors. (**a**) A stove tile, Prague Castle. (**b**) A semifinished stove tile, Prague, the pottery workshop of Adam Špaček (1532–1571). (**c**) A 1530s medal by Hieronymus Dietrich. (**d**) A woodcut by Erhard Schoen, c. 1530 (After Žegklitz 2012, Fig. 57)

deals with the artifacts as the means of maintaining and representing social, ideological, and religious identity in internally ambivalent societies. Unique insight into the religious culture of the Late Middle Ages and the early modern period may be obtained through studying artifacts of private devotion, such as the miniature crosses found in graves or pilgrim utensils, including badges, ampoules, and water flasks (e.g., the find of 25 late medieval ceramic pilgrim flasks from Trzebnica, related to the local saint, Princess of Silesia, Jadwiga/Hedwig). As a specific case of studying religious life, research on particular monastic communities is important, especially as this offers insight into their everyday life, economic situation, and the standards of living of their members (e.g., Łekno or Strzelno in Poland, the Capuchin monastery on Republic Square in Prague).

The influence of prevailing religious culture may be approached by archaeologists with special precision through research on cemeteries. There are unique opportunities for comparing religious customs and beliefs in the centers with a high degree of social stratification and confessional diversity (e.g., the cities of Wrocław, Brno, and Prague, where Catholic [including those of monastic communities], Protestant, and Jewish cemeteries have been excavated). An example offering considerable scope for the analysis of religious self-determination as well as of the social stratification is provided by the remains of late medieval and early modern clothes recovered from excavations at the former monastery of Boldva in Hungary which was also used by Protestant lords. Micro-historical insights can also been gleaned from uniconfessional village cemeteries, such as that in Maniowy in Lesser Poland, as the data recovered tends to concern the influence of more localized beliefs and customs of past societies. A special case of inhumations is those of "alienates," the men isolated from the

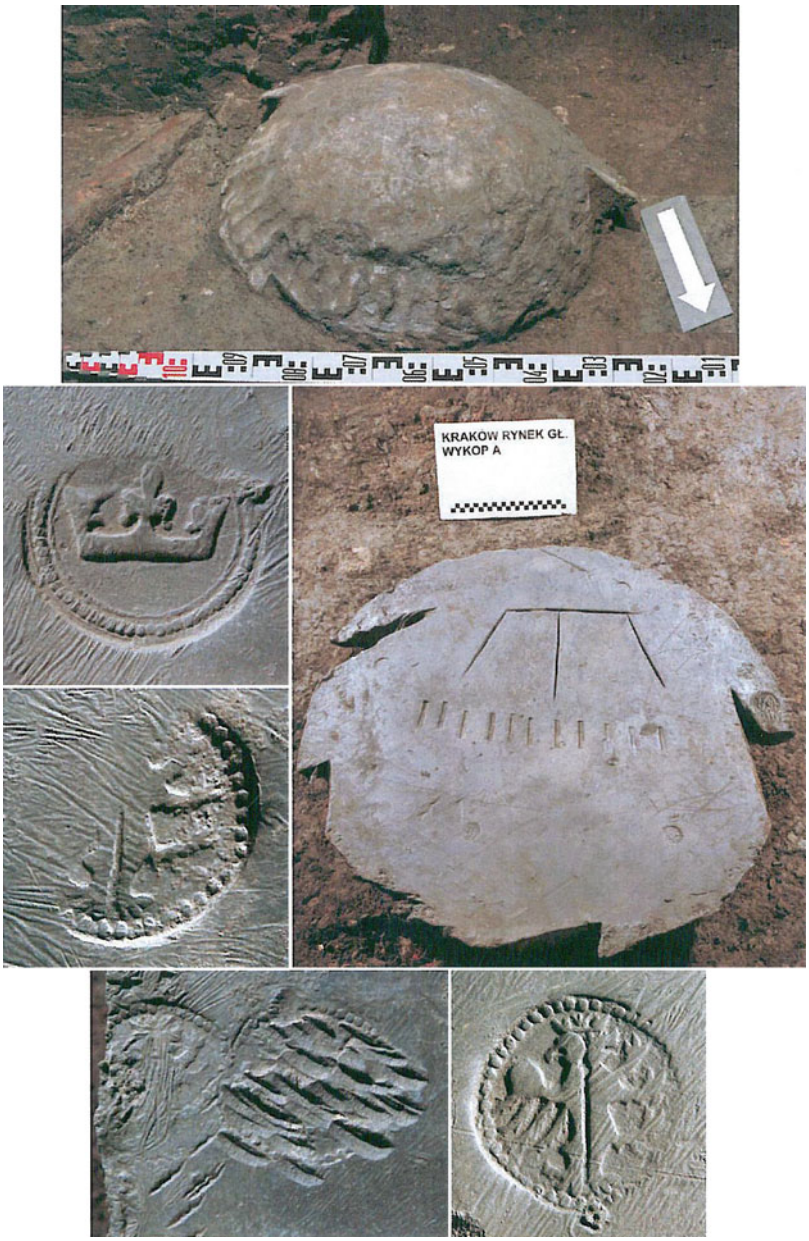

Central–Eastern Europe: Historical Archaeology, Fig. 3 Lump of lead (size 88.7 × 81 × 19 cm, weight 11 cwt = ca 570 kg) excavated in 2006 near to the remains of the Great Scales in the main Market Square, Cracow, with imprints of official seals from the fourteenth century, the only existing find of this sort in the world (After Buśko et al. 2009, Fig. 4)

"normal" majority of the buried populace because of their unusual physical or psychic characteristics (Unger 2006).

As far as the development of Christian burial rite in the thirteenth–eighteenth centuries is concerned, the archaeologically studied differences cannot be directly related to such religious changes as the Reformation in the sixteenth century. The influence of general cultural innovations, including the introduction and rise of Baroque religiousness, was stronger, essentially affecting the grave furnishings in both the Protestant and Catholic areas (Králíková 2007; Scholkmann et al. 2009).

Castles, Residences, and Manors

The problems of royal and noble seats – both fortified and purely residential – and castles are

Central–Eastern Europe: Historical Archaeology, Fig. 4 The motifs of Anabaptist ceramics in Moravia (ca 1600) and the excavated foundations of a pottery kiln (Strachotín, Ostrožská Nová Ves) (After Pajer 2001, book cover, příl. VIII–IX; Pajer 2007, Fig. 3)

being studied not only within all three preindustrial periods of the four periods discussed above but also between them, showing long-term changes and developments. Thanks to methodical excavations of noble residences of the Late Middle Ages (such as Plemięta and Siedlątków in Poland, the late medieval Rokštejn and Lelekovice in Moravia, and the late medieval layers of the castles of Nagykanizsa, Salgó, and Fűzér in Hungary), extremely interesting assemblages of artifacts have become known (which has made it possible, e.g., to reconstruct personal armories of that period – for an overview of such sites in Poland, see Marciniak-Kajzer 2011, concerning Hungary, Benkö & Kovács 2010) (Fig. 5). Thanks to some excavations of noble seats (e.g., Nowe Miasto and Zduny in Major Poland), such long-term developments, including the changes in the building techniques and architectural forms as well as the mobile inventories, are traceable from the thirteenth/fourteenth until the seventeenth centuries.

Castles are also being studied by archaeologists along with historians and architects in terms of their various functions (see generally Kajzer 1996: 113–55). As the castles reflected social and cultural changes, some of them were developing (e.g., being provided with modern fortifications), while others were abandoned or replaced with newly built palaces and other forms of elite residences. Royal residences such as Prague Castle in Bohemia, Buda Castle in

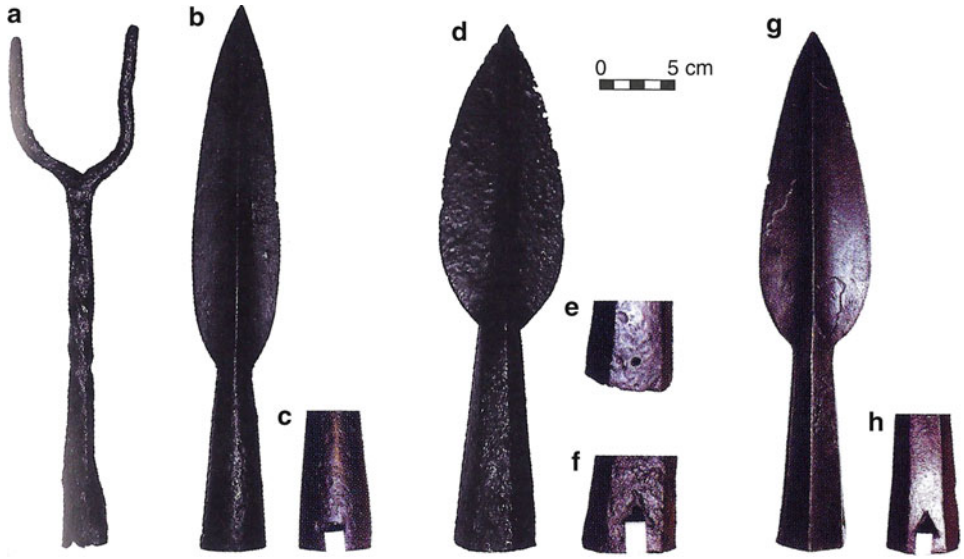

Central–Eastern Europe: Historical Archaeology, Fig. 5 Metal parts of hunting weapons discovered in the well at Castle Chojnik, Lower Silesia, Poland, sixteenth–seventeenth centuries (After Marek 2008, Fig. 2)

Hungary, Bratislava Castle in Slovakia, and the Wawel Castle in Cracow in Poland, as well as other defensive and residential structures of special significance (e.g., monastic castles of the Teutonic Order), have been the focus of much long-term research owing to the great interest among both researchers and the broader public in such spaces.

The Standards of Living in the Late Medieval and Modern Periods

Archaeological research has provided numerous testimonies of positive changes in the home comfort of late medieval and early modern townsmen, noblemen, and peasants depending on their social status and economic situation. Progress in the well-being of communities is mirrored in the technical infrastructure of urban and rural settlements (wells, paved roads, water and sewage management devices, water mills, etc.). However, the topics for discussion are (1) the chronology, geography, and detailed topography of such changes and (2) whether the development was general or reflected an increase of internal socioeconomic inequality. In this regard, urban and graveyard archaeology thus far has provided the best opportunities for studying subsistence change and the impacts of epidemics. Archaeology even makes it possible to study people's prophylactic activities (e.g., through finds of bottles in which mineral water was carried).

Landscape Archaeology

For the Western parts of CEE, there has been systematic research on the changes and continuity of settlement patterns and land use strategies, rural settlement abandonment, and the rise of small towns. Much of this has tended to support the notion of a late medieval crisis, although current research projects are also exploring the late medieval origin of the drivers of change. Increasingly, landscape archaeology of the early modern period is focused on the growing socioeconomic diversity at regional and macro-regional scales. The landscape evidence includes specific proof of both the early modern industrialization of mountainous regions (Klír 2011) and the complementary agrarian change in the lowlands and the commercialization of agriculture. In cooperation with cultural anthropologists, landscape archaeologists have begun to study

Central–Eastern Europe: Historical Archaeology, Fig. 6 Example of the archaeology of an abandoned landscape in the CEE – Rozpakov, Central Bohemia 2011: (**a**) a still-standing Baroque mill, (**b**) the perimeter wall of a defunct millrace, (**c**) dilapidated outbuildings (Photos by D. Vodáková)

human activities and social groups that are poorly represented in written sources, such as the activities of groups like charcoal burners in the forest areas. Nondestructive methods and GIS applications are also gaining in importance as is the degree of integration of various types of sources. Considerable scope for new research is also offered by those areas (frontier zones, former military areas, so-called interior periphery areas) which were populated and often intensively used for agriculture until the middle of the twentieth century but are currently depopulated and forested (Fig. 6).

The Archaeology of War and Warfare

A very attractive part of the archaeological evidence of the Late Middle Ages and the early modern period is the novel information it can provide concerning the various wars and conflicts connected with the rise of modern nation states in the region (Fig. 7; cf. Matoušek 2006). In particular, because CEE was a buffer zone, these data offer considerable scope to compare different (especially Western and Eastern) combat equipment and battle strategies. Both particular battlefields (e.g., the battlefields of Beresteczko in Ukraine, Třebel in Bohemia, and Mohács in Hungary) and their associated burial sites (e.g., on the field of the Battle of Grunwald in 1410) are being researched. Both provide insight into the techniques of warfare. The archaeology of warfare is not limited to campaigns led on land, and research is also being undertaken on sea-battle sites (e.g., underwater research of the wreck of the Swedish flagship Solen in Gdańsk Bay, Poland). In Hungary, a special branch of investigation focuses on the early modern (sixteenth–seventeenth century) fortifications on the Hungarian–Ottoman border with a special accent on newly erected forts. Work at one of them,

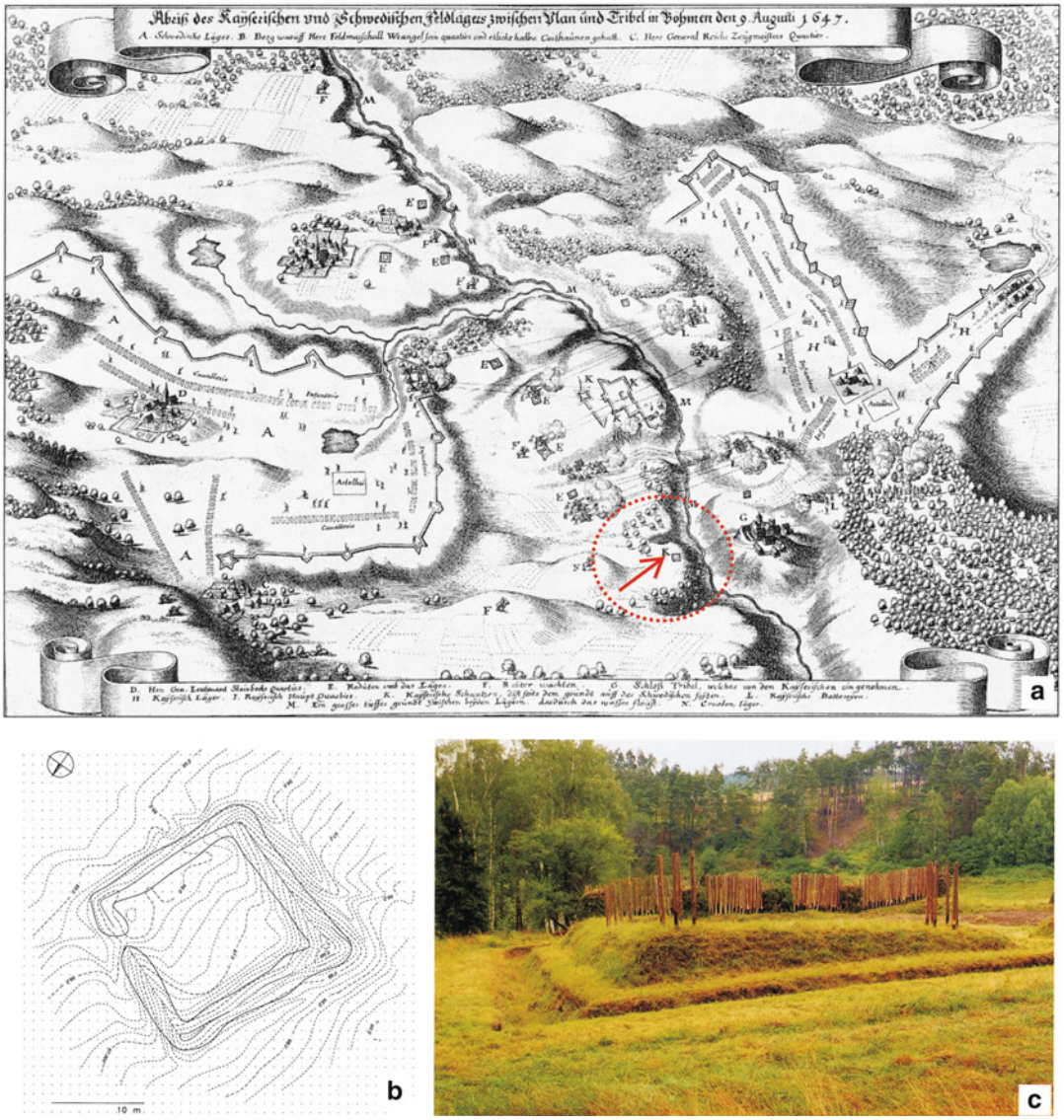

Central–Eastern Europe: Historical Archaeology, Fig. 7 The battlefield of the 30 Years' War beneath Třebel, Western Bohemia: (**a**) engraving in the Theatrum Europaeum VI depicting the battlefield on 19th of August 1647 showing the Swedish position to the left (*West*) and the Imperial Army's position on the right (*East*), (**b**) relicts of an archaeologically examined redoubt built by the Imperial Army (marked by the *arrow* on **a**), (**c**) an experimental reconstruction of the same redoubt (After Matoušek 2006, obr. 4, 38, tab. 6.)

Bajcsa/Weitschawar in the vicinity of the modern town of Nagykanizsa, built with finances from Steiermark, has became something of a benchmark, not only because of the large scale of excavations carried out but also because the fort is especially well preserved having been abandoned shortly after its erection (Benkö & Kovács 2010).

The Documentation of Politically Motivated Nazi and Soviet Crimes

A very specific branch of the archaeology of CEE is the research and documentation focused on the sites related to totalitarian political crimes. These are, namely, the remains of Nazi and Soviet concentration, forced-labor and prisoner-of-war camps, as well as places where the people

Central–Eastern Europe: Historical Archaeology, Fig. 8 Set of wooden chess figures discovered in a mass grave of Polish officers and officials executed by the Soviets, in Charków/Kharkiv (Ukraine), grave no. 7 (After Kola 2005, Fig. 88)

Central–Eastern Europe: Historical Archaeology, Fig. 9 Some metal finds from test-excavation trenches in the area of the former Nazi camp at Bełżec (After Kola 2000, Figs. 100–102)

prosecuted by these regimes were executed. This branch of research is especially developed in Poland, where it fits well into the institutional framework of the respective state offices (ROPWiM and IPN) and meets the expectations of the society – especially the relatives of the murdered persons, as archaeological excavation of mass graves often makes it possible to identify the victims (Figs. 8 and 9; e.g., Charków and Bykownia, Ukraine, or Bełżec camp, Poland; see Kola 2000, 2005). In Hungary, only one branch of these excavations has been executed as yet: the exhumation of the victims of the terror after the Revolution in 1956, with a special regard to the excavation of Imre Nagy and other leaders of this anti-Soviet movement.

Historical Medieval Archaeology in Southeastern Europe

Aims

The term "historical archaeology" has a separate and wider meaning in Southeastern Europe (SEE), especially as archaeological research on the Late Middle Ages and early modern period

has been virtually nonexistent apart from a few studies in Bulgaria. Only excavations within churches are carried out frequently, and generally such work has been treated as being part of art history not archaeology. This is because in all of the SEE countries, the period of Ottoman rule is still seen as one of total decline and contrasted with the "glorious" Middle Ages. Hence in this part of Europe, the term "historical archaeology" is really a synonym for "medieval archaeology" and also the "nationalist archaeologies" established in the nineteenth century. These typically used the analysis of the medieval material culture of given contemporary ethnic groups to underline the glory of their medieval past thereby lending support to arguments for the achievement of modern political goals.

SEE before 1918 was inhabited by numerous ethnic groups lacking formal affiliation with specific independent states. Because of this, "historical archaeology" was used to outline the territorial borders favored by a given nationalist movement. In this sense, "historical archaeology" shared the same role in "proving" the prior existence of a national identity as historiography, often taking over its nationalist narrative, vocabulary, and delimitation of appropriate research questions. The Christian clergy also played a crucial role in the formation of nationalist archaeology in the region especially within groups of the Orthodox faith: Serbs, Romanians, and Bulgarians. This was because a significant proportion of the medieval written records for Central and Eastern Hungary, Croatia, Bosnia, Serbia, Bulgaria, Wallachia, Moldova, and the SEE territories of the Byzantine Empire were destroyed following the Ottoman conquest of the region in the fourteenth–fifteenth century and the clergy need to find other sources that might confirm their view of pre-Ottoman history.

The events of the twentieth century only partially changed the direction of research in the region. After World War I, archaeologist in the victorious countries (especially Serbia and Romania) exerted great efforts toward justifying their new borders with reference to the archaeological record. At the same time, countries on the losing side (e.g., Bulgaria) also used historical archaeology to create arguments in favor of the revision of these borders! After World War II, the Communist takeover in almost all of SEE resulted in the introduction of a new vocabulary aimed at undermining older narratives of national glory. However, the new narratives that were developed still emphasized national identities rather than those more characteristic of historical materialism (such as the rise of the proletariat). Even in Albania, the country with the most rigid Communist regime, after 1945 archaeologists continued to interpret their evidence in terms of a prevailing nationalist ideology.

New approaches eventually appeared in the last third of the twentieth century, shortly before the end of Soviet influence. These changes were marked by development of interest in research questions dealing with everyday life and mentalities in the Middle Ages and the era of the Ottoman conquest. Historical archaeology could still be politically motivated, however, especially in the former Yugoslavia where multiple historical narratives were reformulated prior to the interethnic war of 1991–1994, with the goal of creating a climate for war. As part of this, numerous World War II mass graves were excavated, especially by Serbian authorities, in order to "prove" the genocidal tendencies of their opponents.

Chronological Framework

Today, the temporal range of what is considered to be "historical archaeology" still varies widely across SEE. In Albania and Romania the concept has its greatest temporal depth largely because archaeology in these nations is still directed toward proving that Albanian and Romanian ethnicities have formed the majority population since the Iron Age. The concept of continuity forms the central part of the historical narratives of these countries, regardless of the fact that until the Later Middle Ages, there is no firm evidence to support such a suggestion. The shortest time scale is used in Macedonia (=FYROM), where the rule of Tsar Samuil at the turn of the eleventh century is misinterpreted as the predecessor of the modern nation and state. In Slovenia, historical archaeology was tied to the period of the Duchy

of Carantania in the eighth century especially prior to the 1970s, but nowadays also the later parts of the Middle Ages are analyzed. In Croatia, the period analyzed is that of the royal Trpimirović dynasty (eighth–eleventh c.). In Bosnia, the main focus is placed on the period of the Kotromanić dynasty (thirteenth–fifteenth c.), and in Serbia and Montenegro it is the period of the Nemanjić dynasty (thirteenth–fifteenth c.) that marks the start of historical archaeology. In Albania, the time scale for medieval archaeology is formed, aside from analysis of the Illyrians, by the short rule of Gjergj Kastrioti Skënderbeu (1444–1468). Generally, the nationally interpreted historical archaeology in this region is a style of scholarship that selectively focuses only on those shorter periods of the Middle Ages that are of national interest. Only in Bulgaria is historical archaeology treated more broadly, covering the periods of the two medieval Bulgarian states (seventh–tenth c. and fifteenth–fourteenth c.), although there is still a lack of interest in the intervening period of Byzantine rule.

Major Projects

The level of the transformation of a national archaeology into a "standard" medieval archaeology of the continental type can be measured by the level of attention devoted to themes and sites associated with low prestige, such as rural settlements and their inhabitants. This has yet to occur in SEE, and given the strong nationalist tendencies outlined above, it is perhaps inevitable that the main focus of historical archaeology in SEE has been on sites that could be interpreted as reflecting earlier national achievements and glory. These include early medieval cemeteries with rich grave goods, royal residencies, forts, and various church buildings. In the field of early medieval funerary archaeology, the main projects have been in Slovenia, Croatia, and Bulgaria (such as on the sites of Kranj and Ptuj in Slovenia, Knin–Biskupija and Nin in Croatia, and Novi Pazar in Bulgaria). The results from these have been integral to interpretations of the Köttlach culture and the cultures of the old Croats and of the old Bulgarians. Concerning early medieval residencies, large-scale excavations have been carried out mainly in Bulgaria – at Pliska and Veliki Preslav. Large-scale excavations of medieval forts have been conducted in almost all countries in the region and regularly at strongholds serving as royal or noble residences. These sites include Bled and Ljubljana (Slovenia), Medvedgrad and Bribir (Croatia), Bobovac and Kraljeva Sutjeska (Bulgaria/Hungary), Ras (Serbia), Prilep (FYROM), Veliko Tărnovo (Bulgaria), and Krujë (Albania). Finally, many medieval churches in SEE have been identified as sites of national interest and have been excavated. In these projects, the importance of the excavated remains was often overestimated so as to support a national narrative. Of broader interest is the early medieval sacral architecture of Croatia and Bulgaria, as well as the thirteenth–fifteenth-century churches of Serbia, Kosovo, Macedonia, and Greece.

International Perspectives

From the viewpoint of an insider, CEE must be conceived simultaneously as a region in itself and as a transitional, buffer zone. It was not only an area which passed Western traditions eastward but also a very specific region which accepted cultural stimuli from the East (e.g., Oriental customs in clothing and military equipment). In one sense, CEE is very much a frontier zone, a place where Western trends and patterns end (and it is a matter of constant discussion where exactly and how they were adapted to local contexts) and where the Eastern ones did not yet begin. On the other hand, for each subperiod CEE must be conceived as responsive to different networks of external relations. Thus, for instance, in the Late Middle Ages, CEE was part of the peripheral zone of the West-European core, along with other "fringe" areas (e.g., Germania Slavica, Scandinavia, the British Isles). In the industrial era, on the other hand, CEE was part of a different periphery along with other areas on the Northern and Eastern edges of Western civilization, such as the Baltic and Danubian areas.

Future Directions

Historical archaeology in CEE is a young and rapidly expanding subdiscipline. In terms of its theoretical framework, objectives, research topics, and publications, late medieval and post-medieval archaeology (1450–1800) is already relatively well established and is widely taught at university level. In contrast, the archaeology of the later modern and recent past (1800–present) is still evolving. Currently it is fragmented into a myriad of component topics, more often inspired by topical issues in cultural and social anthropology and history than by archaeological concerns. However, the level of popular interest in the archaeology of the more recent past has grown enormously, largely thanks to a general shift of interest away from earlier history (the Middle Ages, the early modern period) to the region's most recent history, and it is no mere coincidence that the archaeology of the modern period has developed chiefly at newly established universities and other centers of higher education. This shift in popular interest toward modern history, especially World War II, forces both archaeologists and heritage management authorities to cooperate with amateur groups attempting to explore the material remains of the recent past. The development of a suitable legal and practical framework for such cooperation is certainly one of the most important tasks for the future. Southeastern Europe is specific also in terms of this problem. As at the turn of the 1990s, various "historical arguments" were produced concerning the territory of the former Yugoslavia that created a climate of war and revenge. Special effort is now needed to reveal the untruthful nature of these narratives, especially those elements connected with nationalist-inspired interpretations of the region's historical archaeology.

Cross-References

- ▶ Buildings Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Churchyard Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Hanse Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Landscape Archaeology
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Medieval Urbanism
- ▶ Modern World: Historical Archaeology
- ▶ Multicultural Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)

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Centre for Archaeological Sciences (Katholieke Universiteit Leuven)

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Basic Information

The Katholieke Universiteit Leuven (K.U. Leuven, Belgium, http://www.kuleuven.be/english), founded in 1425, has a rich tradition

of learning and research of almost six centuries. Among its most famous researchers are Vesalius, Rega, Erasmus, and Mercator. Fundamental research at the university is specifically profiled through the virtual disappearance of interdisciplinary boundaries. An example of this strategy in the past decades has been the cooperation between archaeological projects and several disciplines from the exact sciences. Especially the research unit on Eastern Mediterranean Archaeology, with the excavations at Turkish Sagalassos, had established an interdisciplinary approach, spanning more than 30 years. In the light of the increasing importance of such interdisciplinary research in all fields and areas of archaeology, it was decided in 2005 to create the *Centre for Archaeological Sciences* (*CAS*), 1 of only 12 excellence poles at the K.U. Leuven selected after international peer review. The main goal of this interdisciplinary center of excellence was to support K.U. Leuven and international archaeological research projects with an extensive and in-depth experience built up in the faculties of exact sciences, biomedical sciences, and engineering in Leuven. In 2010, it was decided to continue *CAS* as a center of excellence under the "program financing" scheme of the university. In this way, the center will certainly remain funded until 2017. A shift in focus was made from site-driven research to a more methodological approach to archaeological science. While the center was founded by Professor Marc Waelkens (2005–2010), the current director (as of 2010) is Professor Patrick Degryse.

Major Impact

CAS currently acts as a focal point for archaeological science research, to be made available to the international community, comprising several different specialities. In particular, prime research areas are palynology and paleobotany (including carpology), vertebrate and invertebrate archaeozoology, paleolandscape and climate reconstruction, remote sensing, human-environment interactions (integrating all of the aforementioned), physical anthropology (using stable isotopes, CT, and aDNA), organic (using residue and lipid analysis and aDNA) and inorganic (soil, clay, stone, etc.) raw material research and archaeological materials science, and archaeometry (ceramic, glass, metal, mortar, stone, etc. characterization through mineralogy, petrography, and geochemistry, including radiogenic isotopes). The center is composed of over 20 international postdocs and doctoral researchers in several disciplines of bio-, geo-, and medical sciences, supported by senior researchers from all the aforementioned faculties (www.archscience.be).

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- ▶ Archaeometry: Definition
- ▶ Geoarchaeology
- ▶ Provenance Studies in Archaeology

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Centuriation and Roman Land Surveying (Republic Through Empire)

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Introduction

Centuriatio or *limitatio* was a Roman method of land delimitation and division by means of

orthogonal and equidistant *limites* (literally, borders). Depending on the local geomorphology, these were roads and/or ditches and defined mostly square, less frequently rectangular, areas of fixed dimensions named *centuriae*; in many cases, each *centuria* was 200 *iugera* (50.4 ha) wide.

Centuriation accompanied Roman colonization and provided the new settlement with productive soil, proper infrastructure (roads, ditches, if necessary bridges), and a cadastral frame for allocating land to colonists (Fig. 1).

Centuriatio and land surveying are documented by Roman, late Roman, and medieval texts and also by archaeological evidence. The study is based on Roman, late Roman, and medieval texts and inscriptions; historical maps and scientific cartography; local geomorphology and paleogeography; archaeological survey and excavation; ancient surveying instruments; toponyms; remote sensing; geophysical surveys; computer-based analysis; and increasingly by GIS (geographic information systems).

The fundamental textual source is the *Corpus Agrimensorum Romanorum* (*CAR*), a collection of texts by different authors on several aspects of land surveying. The original compilation is dated to the fifth century CE; other writings were added afterward (Campbell 2000: xxii; Toneatto 2010).

In the Mediterranean and Near Eastern district, the basic and/or main principles of land division and allocation have very ancient origins, but instruments, terminology, peculiarities of Roman land surveying highlight the specific autonomy of the Roman procedure (Lewis 2001: 123).

Centuriatio/*limitatio* was applied from the late fourth century BCE, when Rome took over the Latin League and started founding colonies. It accompanied the whole history of Roman colonization, which consisted both of the foundation of new towns (*coloniae*) and the settling of individual colonists (*ager viritim divisus*: viritane settlement or viritane colony). In some areas, the territories of *municipia* or even smaller places came to be centuriated (Dilke 1971: 88, 221;

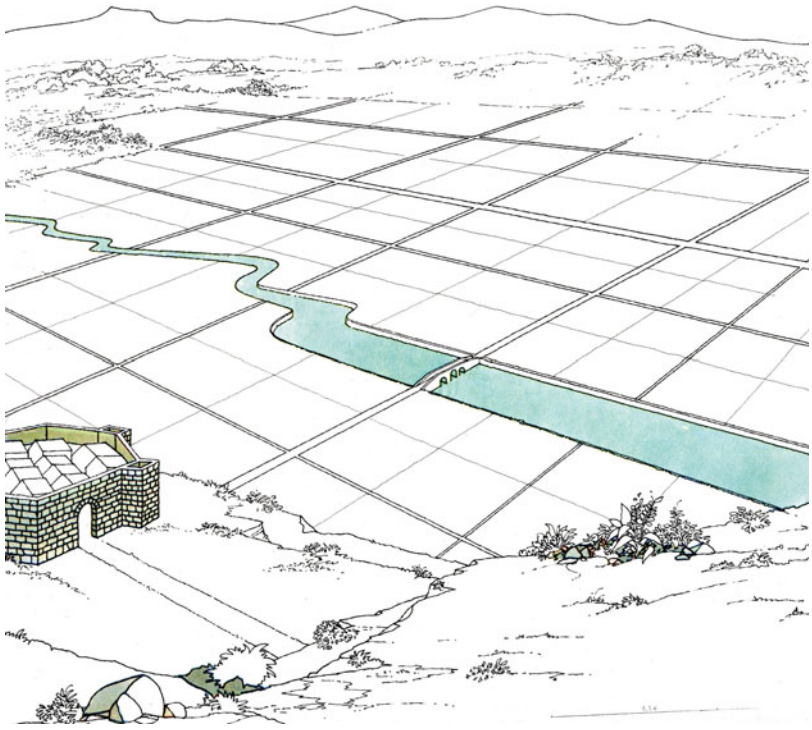

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 1 A colony and its centuriated landscape

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 2 Centuriated landscape of Modena (*Mutina*): an aerial view

Campbell 2000: 321-22). The *centuriatio* was constructed by land surveyors who first carefully explored the territory in order to choose the proper orientation of the centurial grid. Then, using their instruments (mainly the *groma*), they traced orthogonal *rigores* (straight lines) which were contextually fixed on the soil by stones or sticks and subsequently converted into *limites* (roads or ditches) by the colonists who worked under the supervision of the land surveyors and the magistrates appointed as commissioners for the new urban foundation. The two orthogonal *limites* intersecting at the central point of the centuriated area were named *kardo maximus* and *decumanus maximus*, according to their orientation: the former often ran north–south, the latter east–west. The other *limites* were then traced parallel to the first ones; they were called *kardines*/*cardines* and *decumani*/*decimani*.

In the closing phase of the colonial foundation, colonists were assigned their plots by drawing lots. The surveyors registered the results on temporary tablets first and finally on bronze or marble tablets which were carefully prepared and displayed to the public in the local archives. Copies were kept in the urban archives, showing that the procedure was centralized and strictly controlled by Rome and at the same time a relevant matter of public solicitude in local communities (Campbell 1996: 90). The operations described here usually required at least 3 years (Dilke 1971: 35). Centuriation had a relevant role in enhancing the rural economy and defining the rural property.

Since centuriation conformed to the local geomorphology and hydrography, in most areas of the Roman world these land divisions persisted through Late Antiquity and the Middle Ages and still persist in many landscapes of the Roman world; it is very evident in South Europe, and North Africa (Campbell 1996: 75) (Fig. 2). In some countries, the surviving evidence is protected by local cultural heritage agencies as specific and fundamental historical/cultural landscapes.

Definition

The term *centuriatio* derives from *centuria* and this from *centum* (one hundred) since, according to ancient sources, its size originally corresponded to one hundred *heredia*. *Heredium* (hereditary parcel) was the amount of land allocated by Romulus to each Roman citizen, according to a late Republican and anachronistic tradition (Gabba 1978). The term *limitatio* derives from *limes* (boundary, in agriculture

a path or baulk; Dilke 1971: 87). The roads and/or ditches (*limites*) forming the centurial grid were called *kardines* or *cardines* (often oriented north–south) and *decumani* (later *decimani*, often oriented east–west).

The main ones, intersecting at right angles in the center of the centuriated area, were the *kardo maximus* and the *decumanus maximus*, abbreviated as KM and DM. *Kardo* (hinge) was used also of any pivot, axis, or pole (Dilke 1971: 87, 231). *Decumanus* derives from *decimus* (tenth): according to the sources (*Siculus Flaccus* 153 and 136 L; *Hyginus* 115 L), the term derived from the number 10, since 10 *actus* of length were the sides of the squares forming an early land division called *agri quaestorii* (Dilke 1971: 88, 231-2).

Historical Background and Key Issues

Roman surveying theory and practice were closely intertwined with the Etruscan ones, on account of geographical vicinity, historical, and cultural connections. They largely derived from the Greek experiences, which in turn descended from Egyptian, Mesopotamian (mainly Babylonian), and possibly Persian ones (Lewis 2001: 13-18,115).

Although ancient traditions trace the main principles of land division and allocation to the origins of Rome, on the ground of evidence, centuriation originated in Italy at least in the late fourth century BCE (Lewis 2001: 122), when Rome took over the Latin League, becoming the main power in central Italy (338 BCE) and winning wars that ushered in a massive program of colonization. Since the Roman colonization involved land distribution to colonists, the *centuriatio* was certainly carried out since the earliest colonization and evolved in step with it.

At the conclusion of successful military campaigns, part of the territory belonging to the defeated communities was usually confiscated and annexed to the Roman state domain (*ager publicus populi Romani*). Part of it could be used to settle a colony: military motives were decisive in choosing the site and the type of the colony (Campbell 1996: 82).

In many cases, the colony consisted of a new town and a dependent territory partly centuriated and assigned to the colonists (*colonia*); in other cases, the territory was centuriated and distributed to individual settlers (*assignatio, ager viritim divisus*: viritane settlement or viritane colony) and no town was built; these communities were essentially rural ones, administered directly from Rome and eventually connected to a local administrative or market center (*conciliabulum* or *forum*) (Broadhead 2007: 154).

Prior to 200 BCE, the responsibility for foundations lay with the Roman Senate and in the second century with plebeian tribunes. The plebeian assembly (*concilium plebis*) determined by law (*lex coloniae*) the location where a new colony was to be settled, the number and legal status (Latin or Roman) of the colonists', funds, and size of allotments, etc. (Broadhead 2007). Then founding commissioners were appointed for the various aspects of the foundation. They were of senatorial rank, usually three in number (*tresviri coloniae deducendae [agroque dividundo]*: Campbell 2000: xlix; *triumviri agris iudicandis adsignandis*). They enrolled the colonists and directed them while marching and settling in the assigned area; their staff included land surveyors and related assistants.

The colony's territorial boundaries were laid out; the urban and the rural or, in case of viritane colonization, just the rural areas were defined; and part of the territory was centuriated and assigned.

In the Latin colonies (founded up until 180 BCE), allotments were rather large and distributed according to rank. In the Roman colonies, allotments were small in the earlier phase, but then became larger from the early second century BCE.

From the late second century BCE until the age of Augustus, colonization increasingly concerned land obtained through means other than traditional conquest and confiscation: Roman communities were often mulcted of their land in order to satisfy the economically disadvantaged or reward discharged army veterans (Roselaar 2010). From Sulla's dictatorship until

the end of the Republic, colonies were founded and land was distributed in Italy by the military dynasts without deferring to the senate (Campbell 1996: 81; Broadhead 2007: 158-62).

Augustus played a crucial role in land distributions to the veterans: after the ravages of civil war, he applied procedures which raised confident expectations that the object of government was to preserve property rights and the population would no longer be deprived of their property (Campbell 1996: 98-9). After him, the foundation of military colonies continued until the time of Hadrian, but more soldiers received cash handouts than were settled in military colonies (Campbell 1996: 81).

In the Imperial period, emperors themselves founded colonies. They usually delegated the various tasks connected with the foundation to an agent (Campbell 1995: 541, 1996: 94).

The foundation of a colony was formally started by the founder (a magistrate in the Republican period, the emperor or a member of the imperial family under the Empire) and an *augur*, since the religious and technical aspects were intertwined. The *augur* would take the auspices; in case they were favorable, the founder would duly approve the beginning of the land surveyors' work (Dilke 1971: 89).

The surveyors planned and constructed the centuriation, assigned the plots by draw, and settled possible (and frequent) legal quarrels, as documented by sources including the technical writings in the *CAR*. They were originally called *finitores*, then *metatores*, *mensores*, *agrimensores*, sometimes *decempedatores*, later *gromatici* after the names of their most typical tasks or instruments (Lewis 2001: 3, 21 n 32, 122, 323; Toneatto 2010: 53). The technical aspects of their profession were certainly in progress (Hyginus, *The Establishment of limites*, in Campbell 2000: 135-5, 23) from the earliest times through the Empire and Late Antiquity, but on evidentiary grounds, it is very hard to follow this development in detail.

The land surveyors had specific professional expertise and training.

In the Imperial period, the nonmilitary surveyors were freedmen, slaves, and possibly free citizens as well (none of these appear to be of senatorial or equestrian rank). The practitioners of surveying remained men of low rank. In the army, surveyors seem usually to be ordinary soldiers ranking among the *immunes* and attached to legions, praetorian *cohors*, and auxiliary units. Military surveyors could be involved in civilian projects both in Italy and in the provinces. In all cases, they executed decisions made by persons of higher status (Campbell 2000: xlvii-lii, l-li and n 150).

When large-scale foundations ended in the second century CE, the surveyors still had important tasks, which included overseeing or enlarging existing settlements, contributing to settle quarrels, and surveying land for the government for tax, boundaries demarcation, or other reasons (Campbell 1996: 98). They maintained an important role in the late empire (Campbell 2000: lii: Cassiodorus *Variae* 3.52).

The land surveyors explored the area first; observed the hydrography, slopes, and soil characteristics; and chose the proper orientation of the *centuriatio* in order to provide the territory with adequate drainage. Then they traced a grid of lines (*rigores*) using their instruments, marked them temporarily by stones or sticks, and directed the colonists in constructing the infrastructure (roads and ditches/channels) which converted the *rigores* into a grid of *limites*; eventually other infrastructures were built (e.g., bridges) (Fig. 3).

Their standard equipment was unsophisticated: it included the *groma*, measuring tools, plumb-line level, portable sundial, and writing and drawing aids, as documented by written sources (mainly the *CAR*) and archaeological evidence (Dilke 1971: 66-81; Moatti 1993: 31). As for the latter, in 1912 in Pompeii, Della Corte excavated the workshop (*Regio* I.6.3) used by the blacksmith (*faber aerarius*) Verus, who repaired and/or resold objects of various sorts. Among them, those related to the surveying equipment were a *groma* (see below), folding ruler, two bronze compasses, the bronze parts of wooden chests and a key, pincers, a conical ferrule, end pieces of a measuring rod, thin iron tools, an ink bottle and a stylus (evidence of wax tablets for

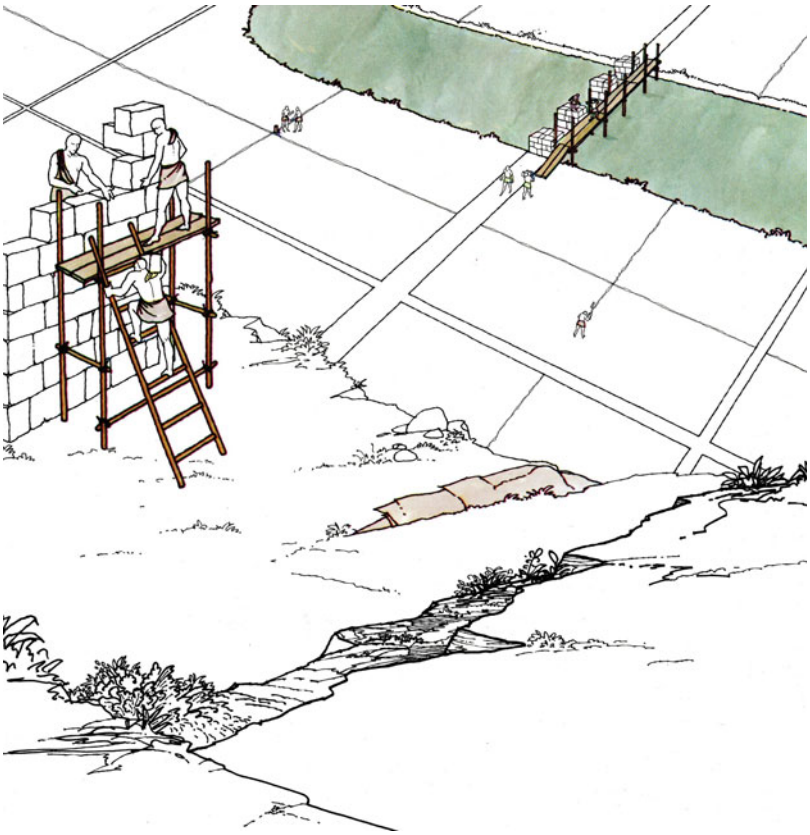

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 3 Construction of a centuriated landscape

notes and papyrus for writing), pieces of a measuring rod, and a portable sundial, in the form of an ivory box. The gnomon which was used with it was not discovered. On the lid, thirteen converging lines are incised, which showed the daylight hours from first to twelfth without seasonal correction; on two sides, the box has lines with marks indicating measurements (digit, inch??) (Dilke 1971: 70-3).

The principal surveyor's device was the *groma* (*gruma* and the verb *grumare*/*degrumare* in Republican Latin sources, *groma*/*croma* under the Empire: Lewis 2001: 125). The name derived via Etruscan from Greek *gnoma*, a by-form of *gnomon*. The term is usually applied to a sundial pointer, but could mean any indicator or mark (Dilke 1971: 66; Dilke 1974: 569-73; Schiöler 1994; Lewis 2001: 125). The *groma* is most probably the same instrument mentioned as *ferramentum* (iron instrument) by the authors in the *CAR* and was used in military and civilian surveying mainly to establish the orthogonal patterns of land divisions, town streets, and military forts and camps (Lewis 2001: 120-33). The understanding of the *groma* and related operations are based on archaeological and written sources, but some aspects remain unclear (Lewis 2001: 4, 124). Reconstructions have been proposed on the basis of *CAR* and archaeological evidence.

On the ground of the metal portions of the device interpreted as a *groma*, found in Pompeii (*Regio* I.6.3), Della Corte (1922) reconstructed the tool (Fig. 4) by adding the wooden parts and the plumb cords, which had perished, in the shape of a vertical wooden staff with a fluted iron shoe. At its top, a horizontal bracket made of wood and iron was fixed by a bronze pivot. At the opposite extremity of the bracket, a wooden cross (*stella*) with four arms (*corniculi*) and iron sheeting was pivoted. Near the end of each arm, a plumb line hung through a hole; a fifth one must have

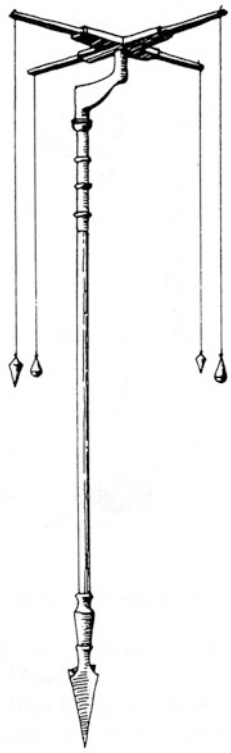

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 4 Groma according to Della Corte (1922)

been fixed in the center of the *stella* (Dilke 1971: 69-71, 1974: 569). In Pompeii (*Regio* I.6.3: *Verus*' workshop), four plumb bobs were found, identical in two pairs (Adam 1982; Schiöler 1994: Lewis 2001: 126-29; Figs. 5.1–5.2). Evidence of the *groma* is also provided by low-relief carvings on the tombstones of the surveyor *Lucius Aebutius Faustus* (from *Eporedia*/Ivrea: *CIL* 5.6786) and of *Popidius Nicostratus* (from Pompeii, Porta Nocera) dated to the first century CE, both showing parts of a dismantled *groma*.

Another fundamental device used in land surveying was the *decempeda* or *pertica*, a 10-ft-long wooden shaft; it was equipped at the end with a bronze ferrule marked in digits or inches for small measurements and flanged so as to abut neatly against its neighbor. Examples were found at Enns (Austria) and Pompeii. The Roman surveyors seem to have used ten-foot shafts in pairs, while there is hardly any evidence that they used cords for measuring long distances (Lewis 2001: 21).

The metal portions of a rigid iron cross, possibly a Roman surveying instrument, were found at Pfünz, on the Roman frontier near Eichstatt (Bavaria, Germany) before 1901 (Dilke 1971: 69; Dilke 1974: 569; Lewis 2001: 129).

The surveyors started (Campbell 1996: 82) at a point chosen as the main intersection (*tetrans*) of the orthogonal *limites* which were traced first, the *kardo maximus* and *decumanus maximus*: the intersection could be located at or near the central point of a settlement, on an existing road in a settlement, at a point not far outside an existing or planned new town, and at a distant point from this (Dilke 1971: 88-9). The starting point of any centuriation was called *locus gromae* evidently from the tool (in military camps Campbell 2000; li).

In order to construct the *centuriatio* in line with the chosen orientation, the compass points were preliminarily identified. South was precisely individuated by a sundial or a portable sundial following an established methodology (*Hyginus Gromaticus*, *Establishment*, 152.4-22; *Vitruvius*, *Arch.* 1.6.6-7): the surveyor drew a circle on flat soil and put a vertical sundial gnomon in its center. The shadow would at times fall in the circle, at times outside; when the shadow reached the circumference, the point was marked, the same when the shadow left the circle (i.e., before and after noon). A straight line was drawn through the two points and bisected: it identified south. A more complex method, certainly deriving from Alexandrian scholarship, was based on the use of a gnomon, the marking and measuring of three shadows (Dilke 1971: 56-8, 86; Lewis 2001: 22-3, 123).

The surveyor planted vertically the *groma* in the ground, the bracket length away from the chosen center of survey, which was fixed on the soil by a stone or stake, and plumbed the *groma* vertical. The horizontal bracket was twirled until its free extremity pivoting the center of the cross (*umbilicus soli*) was vertically above the marker, as checked by plumb lines. The cross was then swung until its arms and cords matched with the chosen alignment (Fig. 5).

Across opposite plumb cords, the surveyor sighted at shafts set by collaborators in order to mark a straight line and across another pair to

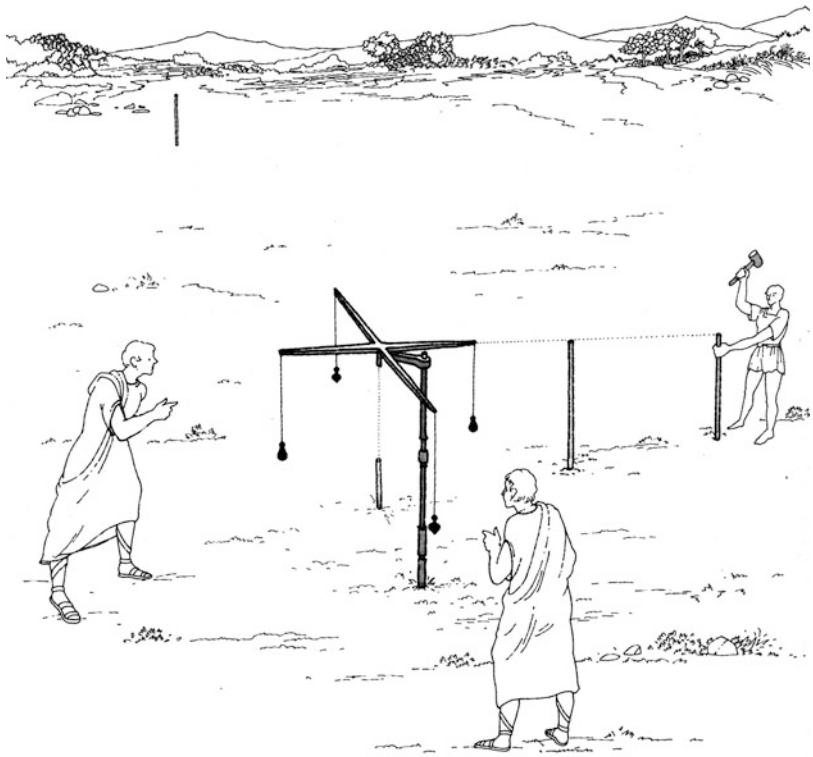

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 5 Surveyors at work

delineate the orthogonal one. The linear measures chosen for the *centuriae* (mostly 20 x 20 *actus*, 2400 x 2400 Roman feet, 709.68 m, producing an area of 200 *iugera*, 50.4 ha) were progressively marked off in both directions starting from the main intersection (Dilke 1971: 89; Campbell 1996: 84). The operation was repeated until the entire area was surveyed (Lewis 2001: 124, 127). The sighted lines (*rigores*) had no width, were made evident by placing stones or wooden stakes at definite distances, and marked the alignments of the *limites* which, according to the local geomorphology, took the form of roads and/or ditches or channels (Campbell 1996: 84).

The *groma* only enabled straight lines, squares, and rectangles to be surveyed. The Roman surveyors, like the Greek ones, worked with simple Euclidean geometry, notably in the form of similar triangles in the horizontal or roughly horizontal plane (Fig. 6). For arithmetical calculations, they no doubt used the *abacus*, which was well known throughout the ancient world (Lewis 2001: 22).

Whenever the surveyor encountered a steep-sided valley, he carried out the operation known as *cultellatio*. He held a ten-foot rod horizontal with one end resting on the ground at the start of the slope. From the other end, he dropped a plumb line and marked the point where it hit the ground. He moved the rod, still horizontal, so that its uphill end rested on this point; dropped the plumb line again; and so proceeded down one side of the valley and up the other, counting horizontal ten-foot steps but ignoring the vertical difference (*Frontinus*, *Sur*v. 18.12-16; *Nipsus*, *Resighting*, 51–76 seems also to take account of slopes) (Lewis 2001: 6, 124ff). Cross-checks were taken to ensure accuracy of angle measurements (Dilke 1971: 89).

The *decumani* and *kardines* parallel to the *decumanus* and the *kardo maximus* were progressively and respectively traced and labeled

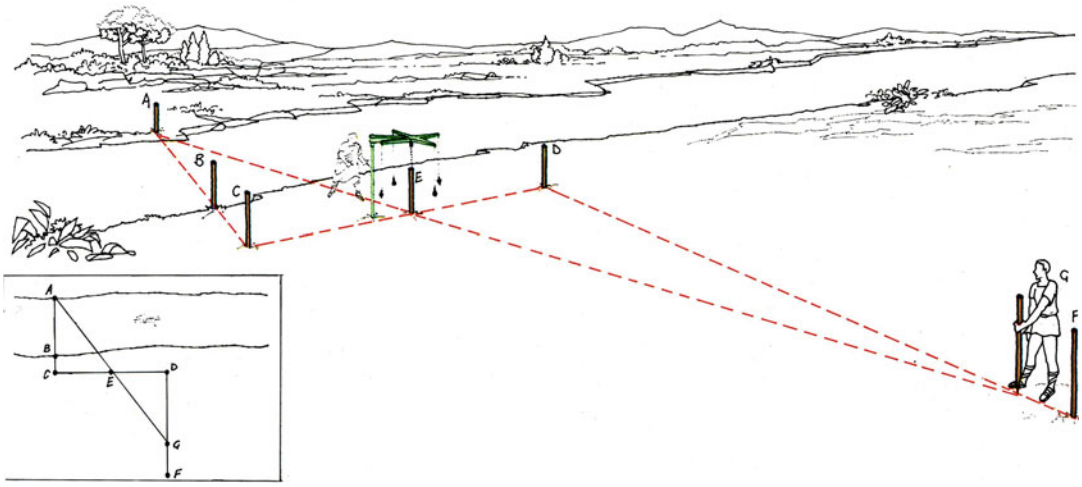

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 6 Surveyors at work: the *fluminis varatio*

DII and KII, then DIII and KIII, and so on. They were called *subruncivi* (weeded, i.e., kept clear) and minimum 8 Roman feet wide, in order to allow two vehicles to pass.

The DM and the KM were respectively 40 ft and 20 ft wide in the case of Augustan colonies for veterans, but in some areas, the KM, too, was 40 ft wide (Dilke 1971: 89, 93; Campbell 1996: 84). The *quintarius* was the most important *limes* after the DM and the KM; it closed the fifth *centuria* in both directions, hence its name. It was wider than the *decumani* and *kardines*, had a recommended width of 12 Roman feet, and was identified by stone markers (Campbell 1996: 85).

Within the *centuriae* were usually traced the *limites intercisivi* ("balks which cut inside": Dilke 1971: 93): a *centuria* could be divided by two orthogonal *limites intercisivi* into four equal parts (each of them measuring 50 *iugera* in size), by two parallel equidistant *limites intercisivi* into three equal parts, and by three parallel equidistant *limites intercisivi* into four rectangular areas (Campbell 1996: 85). Access to fields was safeguarded by law (Dilke 1971: 104-5, 124; Campbell 1996: 84).

Each *centuria* was identified by two coordinates related to its location to the right or left of the DM and on the near side of or beyond the KM, conforming to the following nomenclature:

- DD (*dextra decumani* or *decumanum*), to the right of DM;
- SD (*sinistra* decumani or *decumanum*), to the left of DM;
- UK (*ultra kardinem*, in early times *pars antica*), beyond KM;
- CK (less correct KK, *citra kardinem*, in early times *pars postica*), near side of KM.

Based on the surveyor standing at the DM and KM intersection and facing the original orientation, the *centuria* in front of him on his right was DDI UKI, the one in front of him on his left was SDI UKI, the one behind him on his right was DDI CKI, and so on. The other *centuriae* were numbered referring to the *limites* progressive number as far as the centuriation went (Fig. 7) (Dilke 1971: 90-3; Campbell 1995: 541-42, 1996: 86-7). The coordinates were inscribed on centuriation markers set up at the crossroads and in the surveyor's documents: within this system, the single plots were allocated and precisely recorded (Campbell 2005: 174). Other data could be inscribed, e.g., the specific commission data were added to the coordinates on stones set up by the Gracchan land commissioners (Dilke 1971: 92).

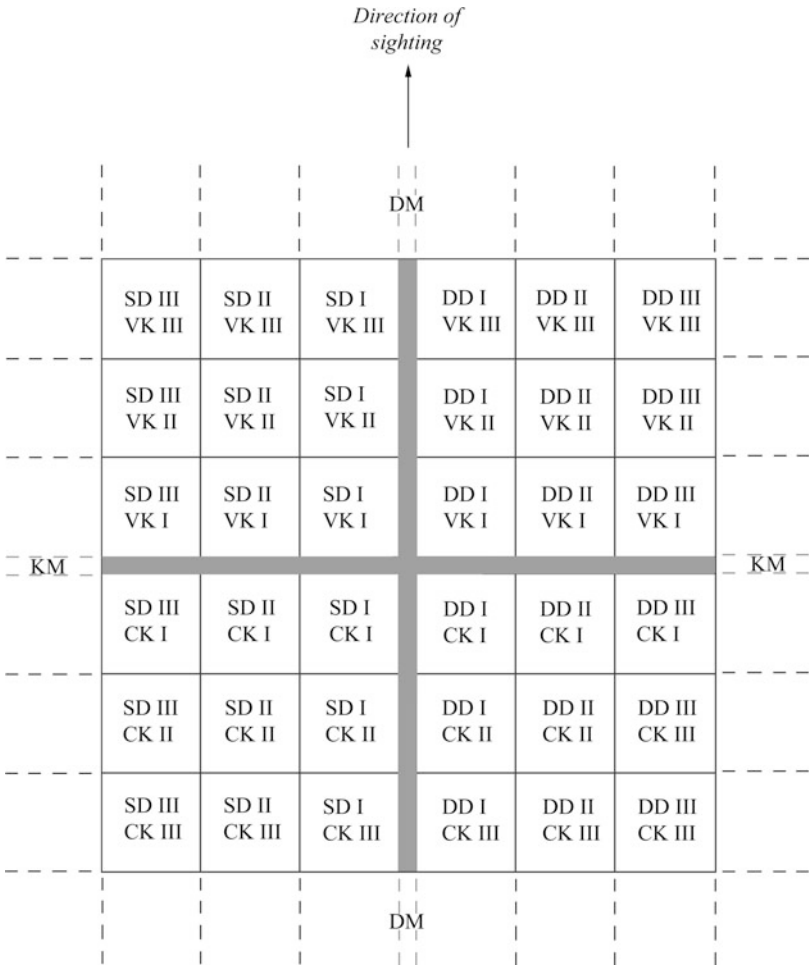

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 7 Each *centuria* was identified by two coordinates

Centuriation stones were either cylindrical or parallelepiped. They have been found in many sites, but the total number appears small if compared with estimates based on the orthodox procedure, according which markers were to be set up at every crossroad. Even assuming a high casualty rate, this modest number suggests that only a selection were set up in most centuriations. No doubt some crossroads were given wooden markers, as documented by writings in the *CAR* (Dilke 1971: 89, 103-5; Campbell 1995: 541).

While centuriation stones had no religious implication (Dilke 1971: 98), the boundary stones, on the other hand, either single or in groups, were set up with proper ceremonies; removing or changing their position without authorization (*terminus motus*) was deemed a religious and civic offence and punished (Dilke 1971: 98-9): defining and marking the boundaries was a very relevant task of the surveyors (Dilke 1971: 98-108).

A large variety of boundary stones is described and illustrated in the *CAR*. According to the late treatise *De terminibus*, specific boundary stones had to be erected in correspondence of a three- or four-way boundary or of specific components of a property like wells, water tanks, springs, and streams (Dilke 1971: 103). Natural boundaries were selected too, including groups of trees and isolated trees, which might be thought to be too fallible (Dilke 1971: 103; Campbell 2005: 179-80).

The next steps were parcelling and allocating land and sorting the plots (Moatti 1993: 23-26). The specific organization of sortition (*sortitio*) was left to the land surveyors; it is a relevant

topic in their writings. In order to allocate the land fairly and prevent disputes, the order of tenure of land plots (*sortes*) was decided by lottery, for which the surveyor used an urn (*urna* or *sitella*) (Dilke 1971: 96-7; Moatti 1993: 27-30; Campbell 1995: 541-2, 545). This practice is documented at least from 133 BCE onward.

The number of *iugera* of each holding was found in one, sometimes two, exceptionally in three, or more *centuriae* (Dilke 1971: 92; Figs. 27, 96, 114). During the lottery procedure, the surveyor recorded the data in preliminary sketches on wax tablets, papyrus, or parchment which formed his ledger. In order to achieve equity, landholdings were routinely assigned by group lottery applying a very complicated system (Dilke 1971: 96, 97, 114; Moatti 1993: 27; Campbell 1995: 542-4, 545). The practice is described in two passages (Hyginus 1, T 14.3-5 and Hyginus 2, T 162.12-164.5). Evidently the aim was being fair to all the settlers and respecting their equal status. The procedure implied a certain amount of literacy and consciousness by the colonists (Campbell 1996: 87-8).

The founder entirely disposed of the land that exceeded the original needs of the colony: he could retain it for himself, give it to friends, endow the colony with it as common pasture or woodland for profit, or restore it or part of it to its previous owners (Campbell 1996: 93).

The next duty of the surveyor(s) was accompanying the colonists in person to their plots in order to prevent any mistake concerning location, size, and boundaries of the allotted properties. When the allocation was concluded, he provided the final official written documents ((a) *libri aeris*, *tabulae*, *commentarii*, *libelli*; *scriptura, instrumentum mensorum*; (b) *libri subsecivorum*, (c) *libri beneficiorum*) and the mapping (*forma*, *forma agrorum*) (Dilke 1971: 97, 112-25; Moatti 1993: 49-62).

One copy of the *forma* and related written documents were usually in bronze. This was estimated as the most reliable material, although wood and parchment were used, too (Campbell 1996: 88-9). The documents were signed by the founder and kept in the colony (Moatti 1993: 73-5; Campbell 1995: 546), while copies of all that evidence, most likely on cloth, parchment, and papyrus, also signed by the founder, were saved in Rome in the imperial records office (Moatti 1993: 49-50, 62, 66-73; Campbell 1996: 88, 90).

The map of the colony (*forma*) was a cartographic, legal, and administrative document normally for public display. Originally, it recorded the *centuriae* and the assigned plots; under Trajan, the size and perimeter of the holdings were added, at least in some cases.

As specified in the *CAR*, on the *forma*, and in the land registers, the surveyor recorded all legal data (*data assignata*, *concessa*, *excepta*) including the various categories of land, e.g., *ager divisus et adsignatus* (divided and allocated), *quaestorius* (given to the *quaestores* for sale in blocks of 50 *iugera*), *arcifinius* or *occupatorius* (land without formal boundary), *ager relictus*, *ager extraclusus* (not encompassed in the land divided by *limites*; Campbell 1996: 79, 2000: 321, 2005: 176-9), and *subseciva*. The last, literally "land cut off by a line" (from verb *subsecare*), was applied to areas located between the *centuriae* and the outer boundary line of centuriated lands or to areas between the exterior boundary and the right-angled lines of other layouts or to areas either included in the *centuriae* but inappropriate for distribution or unallocated because of unavailability of landholders (Moatti 1993: 54; Campbell 2000: 320-1, 2005: 176-7).

Evidently the surveyor was to be well acquainted with land law in force, in order to provide each holding with its precise legal status on the map (Dilke 1971: 114). The word *forma* ("shape") is documented since the mid-second century BCE (Moatti 1993: 88-9): in the sense we are concerned with, it appears first in the agrarian law of 111 BCE and persists to the end of the empire and beyond (Dilke 1971: 112). Other words for the same document were *aes*, *scarifus*, *typum*, *mappa*, *pertica*, *cancellatio* (Moatti 1993: 32).

We can get a plausible idea of the working maps and the final *formae* produced by the surveyors from the *CAR* and its illustrations, and a few tablets (see below).

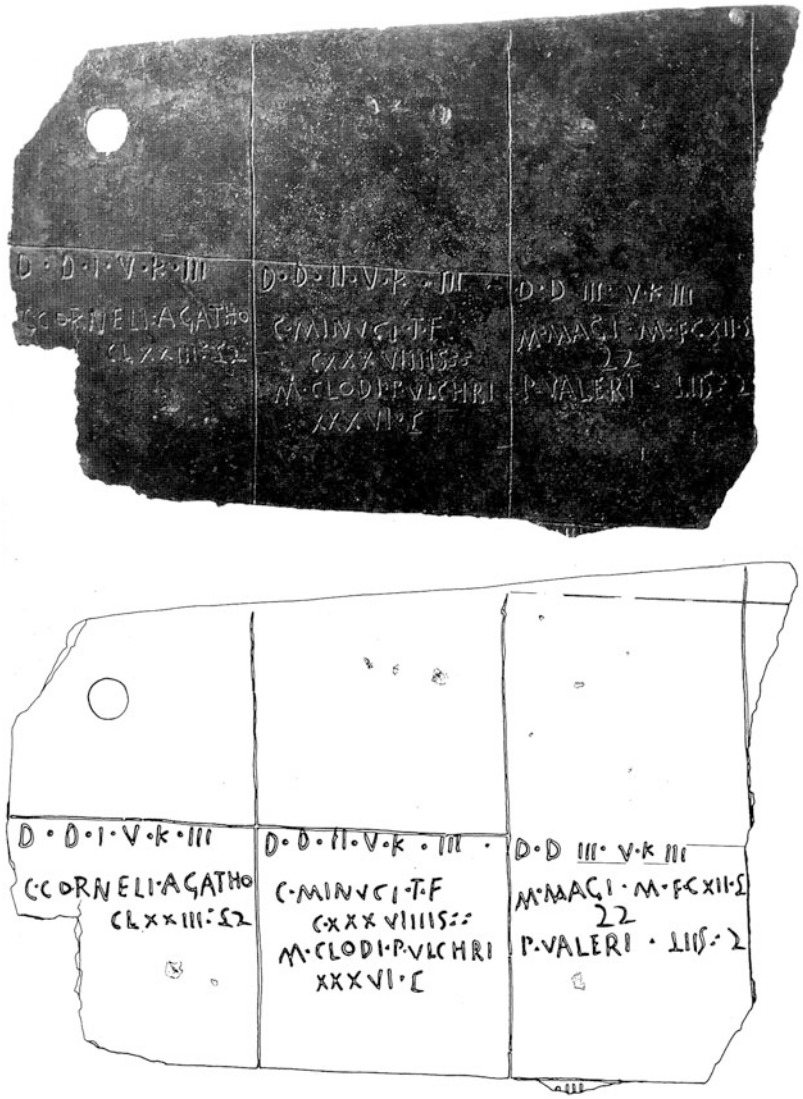

Centuriation and Roman Land Surveying (Republic Through Empire), Fig. 8 Bronze fragment of a *forma* from the Verona *Capitolium*

On these maps, some geographical features (main rivers, islands, mountains) and the *limites* were drawn; river names and sometimes their width, holdings extension and holders' names, and land status were added (belonging to the Roman people or religious bodies, land given and assigned or excluded from allocation or returned to the previous owners, granted, excepted, restored and exchanged for own property, *subseciva*, etc.); adjoining territories, public pasture, and woods were entered. Words were written in full but also sometimes abbreviated (Campbell 1996: 89). Such maps had large dimensions and a copy was made for public display in the colony (Campbell 1996: 89).

A bronze fragmentary tablet from SW Spain (area of *Augusta Emerita*) is interpreted as part of a *forma*. It depicts some *centuriae* and their size, the course of the river *Ana* (present Guadiana), and the adjacent territory of the *Lacimurgenses* (Sáez Fernández 1990; Moatti 1993: 33; Campbell 1996: 89). A fragment of a bronze *forma* depicting part of the Verona *centuriatio* was discovered in the Verona *Capitolium* (Cavalieri Manasse 2000) (Fig. 8).

The "Orange tablets," often named "cadasters," are fiscal documents engraved on marble slabs and record a survey made for taxation purposes under the Flavian emperors. Although not properly *formae*, they document Roman surveying procedures (Moatti 1993: 76-7, 91; Campbell 1996: 89, n.60). The tablets (labeled conventionally as A, B, C) were found in fragments in Orange, France (*Arausio*), both in the theater and in a nearby building interpreted as local *tabularium*. They are engraved with some topographical features (rivers, streams, islands, and roads), the *centuriae* (identified by their coordinates), the number of *iugera* withdrawn from the obligation of *tributum* (*ex tributario*), the number left in possession of the *colonia*, those handed back to the local people *Tricastini* (cadaster B), those belonging to the state (cadaster A), and *subseciva*. Annual rents and names of principal lease holders are specified (Piganiol 1962; Dilke 1974: 573-4).

Centuriatio was applied in some areas (see below) and periods. In other cases, land was parcelled applying other systems influenced by local traditions, soil and climate characteristics, and agriculture. Three systems are most frequently identified: allocation by *decumani*, by *laciniae* (narrow strips), by *strigae* and *scamna*. The last were long rectangles of land, the former bounded lengthwise as viewed with the orientation chosen, the latter breadthwise (Dilke 1971: 95). This strip system was pre-Roman but continued under the empire, in some areas alongside centuriation (Dilke 1971: 139-41).

The land surveyors had to be well acquainted with the legislation concerning boundaries and boundary disputes, as they were often charged to resolve or arbitrate boundary quarrels (Dilke 1971: 99, 105-8) arisen between/among private individuals, local authorities, and the state. Fifteen sorts of disputes are distinguished in *Frontinus*' treatise *de controversiis* (Campbell 2000: 5-49). The surveyors would operate as legal counsellors on arising disputes or as arbitrators or judges in establishing where the boundary line lay and defining the legal position of land within 5 ft of it (Dilke 1971: 99, 105-8) but were not lawyers and did not make the final decision in land disputes (Campbell 2000: xlv-liii, 475-77, 2005: 174).

The grid of centurial *limites* enhanced the local road network and could provide long-distance roads with a relevant framework, when they were constructed contextually or after the *centuriatio*. In fact, in some centuriated territories, the long-distance roads corresponded to *kardines* or *decumani* or to the diagonals of some *centuriae*, while in other cases, they had no connection with the centurial grid and run straight across the territory.

Place-names related with c*enturiatio* mostly derive from technical terms (*pertica, limes, fines, cardo, centuria*, possibly *decumanus*/*decimanus*), from cardinal or ordinal numerals, or from property owner's names (Dilke 1971: 137-8).

The primary written source on *centuriatio* is the *Corpus Agrimensorum Romanorum* (*CAR*): the earliest manuscript probably dates from the sixth century CE. The *CAR* assembles texts written by different authors of broadly differing dates, the main ones dated in the late first-early second to the fifth centuries CE (Campbell 1996: 74-9, 2000: XX).

The writings manifest a relevant diversity of interests and approaches; since they were edited and excerpted in transmission, we cannot identify the criteria applied in making the compilation.

On the whole, they were presumably produced with didactic aims for practicing and/or apprentices surveyors. Specific examples from Italy and the provinces are provided, often derived from vast personal experience; relevant test cases and hypothetical problems are tackled; the complexity of the surveyor's job is evident (Campbell 1996: 79-80).

Moreover, some manuscripts of the *CAR* preserve illustrations aimed at illustrating issues in the technical texts and/or teaching assumptions. They are of several kinds and include maps of divided land, scheme and layout of *limites*, boundary marking and boundary stones, astronomy, and geometry (Dilke 1971: 115-25; Campbell 1996: 99, 2000: xxiii-xxvi). We cannot date such illustrations with certitude, but their significance to the subject is indubitable.

After the early Middle Ages (Toneatto 1994-95; Del Lungo 2004), the origins and characteristics of *centuriatio* were gradually forgotten, although in many areas of the Roman world, more or less evident traces of such land division kept through centuries.

Thanks to the *CAR* and other ancient texts, *centuriatio* was rediscovered after centuries. By the Renaissance, the scholars of Roman metrology had calculated the equivalent of a normal *centuria* (200 *iugera*) based on written sources, while evidence of *centuriatio* in the landscape was rediscovered in 1833, when Captain C. T. Falbe, Danish consul in Tunis, surveyed the Carthage territory using a pocket sextant, identified square areas 708 x 708 m average, and interpreted them as *centuriae* based on Appian (*Bella civilia* 1.3.24). He reported the results of his investigations to the Académie des Inscriptions et Belles-Lettres (Falbe 1833).

In the 1840s–1860s, E. N. Legnazzi, P. Kandler, E. Lombardini, and others made alike observations in the territories of North East Italy and Pola (SETTIS 1983: 170-173).

In the meantime, in 1848–1852, most of the technical texts in the *Corpus Agrimensorum Romanorum* were edited in Berlin by F. Blume, K. Lachmann, and A. Rudorff. The publication stimulated surveys and archaeological researches.

In the 1890s, Beloch studied the Campanian centuriation and Schulten provided systematic comparisons between land evidence and Latin sources; in 1912, he also proposed the reconstruction of the *groma* on the ground of the *CAR*. In 1911, Barthel published a study of North African centuriations and observed the extensive remains in many areas of Tunisia and the scanty or no evidence in other districts of North Africa.

C. Thulin published the *Corpus Agrimensorum Romanorum* (Leipzig 1913; reprinted 1971); in 1912, Della Corte found elements of the Pompeii *groma* and proposed a reconstruction based on the Pompeii fragments in 1922. Further studies in Italy provided evidence of *limitationes* in the Po valley and other areas (Fraccaro 1957, esp. years 1937-56; Castagnoli 1943-1964). Later on, the study of *centuriatio* has identified many centuriated landscapes (Dilke 1971: 141-158) in Italy, South France, Spain and Portugal, the Netherlands (?), Belgium, Switzerland, Dalmatia, Greece, and North Africa (mainly Tunisia). The literature on this subject is enormous (Dilke 1974: 585-92; *Agri Centuriati*; etc.).

Traces of Roman field systems in Britain, Germany, and adjacent areas, where land patterns do not conform to the orthodox *centuriatio* scheme, are receiving increasing attention (Dilke 1971: 158, 188,191, 1974: 565; Peterson 2009; and http://www.uea.ac.uk/~jwmp/). Recently, scholars' interest returned to the *CAR*: Campbell (2000) has selected a certain number of writings and omitted a few ones, while individual texts (notably *Frontinus*, *Siculus Flaccus*, and *Hyginus*) were edited by several authors in the frame of an European COST G2 project under the direction of M. Clavel-Lévêque (1993, 1996).

Future Directions

Centuriation is a key subject in Roman history, archaeology and law, in landscape and settlement archaeology, history of science and technology, and Roman social and economic history. It is very complex and closely linked with the study of unorthodox field systems and with earlier and later land orthogonal divisions (Dilke 1971: 201-11).

The current debate is and should be increasingly focused on investigating centuriations applying a long-term diachronic perspective and an interdisciplinary approach: the systematic integration of paleogeographic and environmental studies, written and archaeological sources *in* the historical background, is fundamental, as well as the application of computer-assisted analysis and, in particular, of GIS (geographic information systems).

Update research methodology integrates landscape-based methodologies and approaches

(Orengo & Palet Martinez 2009), remote sensing, geophysical and archaeological surveys, and historical research in a long-term perspective. Some research directions that remain to be developed are:

- Define efficient strategies finalized to identifying the *limites* and testing the *centuriatio* proposal (Orengo & Palet Martinez 2009: 179-80);
- Establishing closer links between geomorphology, paleogeography, and centuriations, in order to link hydrography and subsoil architecture with local landscape evolution and centuriations (planning, continuity, or discontinuity);
- Provide systematic paleobotanical analysis in order to assess the *centuriatio* impact on local vegetation (agriculture, deforestation);
- Origins and development of *centuriatio* (chronology, metrology, technical aspects);
- Methods of dating centurial grids and other field systems;
- Defining the paleogeographic or historical explanations of entirely or partially overlapping centuriations;
- The dynamics of continuity or change of centurial systems or part of them and the related causes;
- The pre-Roman field systems and their possible influence on the Roman ones both in Italy and in the provinces;
- The "unorthodox" field systems and their complexity;
- The rural settlements (villages, villas, farmsteads, kilns, tombs) in the centuriations, in a long-term diachronic perspective;
- The impact of centuriations on the local rural economy and social history;
- Conservation and management strategies of centuriated areas as cultural landscapes;
- Development of digital technologies applied to the study of *centuriatio* and other field systems of the Roman world;
- Visualize the results of research properly;
- The textual, philological, historical, and archaeological studies should proceed applying an interdisciplinary approach.

Cross-References

- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ North Africa, Roman
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Romanization
- ▶ Topography of Rome
- ▶ Urban Planning in the Greek World
- ▶ Urban Planning, Roman
- ▶ Vicus
- ▶ Villas and Farms in the Mediterranean World
- ▶ Western Roman Provinces, Archaeology of the

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Ceramics as Dating Tool in Historical Archaeology

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Brief Definition of the Topic

Historical archaeologists have learned that excavated ceramics can be used to date the sites they study. The most useful ceramics for dating are the glazed, relatively highly fired, fine-bodied earthenwares common since the late eighteenth century.

By around 1750, European ceramic manufacturers had begun a concerted effort to mass-produce fine-bodied, durable earthenwares for the world market. Their overall plan imitated the Chinese, who had already developed porcelain factories for the production of vessels explicitly designed for export. The Europeans also attempted to mimic the porcelain itself by initially producing white-bodied earthenwares with blue decorations similar to those found on the Asian wares. European potters viewed their glaze formulas, decorative motifs, and production techniques as company-owned trade secrets, and because they worked within a competitive commercial environment, they usually kept meticulous records of their patterns, styles, and methods of manufacture. Historical archaeologists can use extant potters' records to date the creation and production of certain ceramic styles. Even where written records do not exist, historical archaeologists can use ceramic collections from several archaeological sites to chart the general trends of adoption, use, and eventual rejection of ceramic styles and patterns over time.

By the mid-nineteenth century, many potters had begun to put their company names – as well as symbols and even pattern names – on the bottoms of their pieces as marks of identification. Historical archaeologists can use these makers' (or bottom) marks – embossed, stamped, inscribed, or applied – to date specific pieces by referring to the ceramic historians' published catalogues of marks.

The use of makers' marks are relative dating tools because they provide a range of dates or perhaps only a beginning date for a certain style of ceramic. For example, a potter working in Staffordshire, England – the nineteenth-century's most prolific region – might be known to have used the mark of a crown set over the letters "EM" starting in 1813. The available records may not indicate precisely when the potter ceased using this mark. Upon finding a ceramic shard with this mark, however, an archaeologist would know that the specimen dates after 1813; he or she might even be able to date its end use by reference to other information.

In the 1970s, an archaeologist named Stanley South invented a more absolute way of dating collections of mass-produced, English ceramics. Using ceramic information mostly collected by another archaeologist, Ivor Noël Hume, South created a statistical formula that archaeologists could use to provide the mean date for an entire ceramic collection. Using his calculation, a ceramic collection from an archaeological site might yield a mean ceramic date (or MDC) of 1835. With this date in hand, archaeologists can apply another statistical tool, called the standard deviation (SD), to improve the reliability of this date. A collection with a mean date of 1835 might be found to have a standard deviation of 10. This

would mean, with a greater degree of certainty that the mean ceramic date actually falls within the 1825–45 era (±1 SD). Mean Ceramic Dating, though not without problem, still finds application in historical archaeology. In some cases, however, archaeologists using the formula must account for time lags in shipping and marketing.

Cross-References

- ▶ Ceramics: Colonoware
- ▶ Ceramics: European Cream to Whitewares in the USA
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis
- ▶ Ceramics: Stonewares
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Modern Material Culture Studies
- ▶ Portuguese Faience and Historical Archaeology
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology

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Ceramics, Ancient Greek

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Introduction

For scholars and the general public alike, ancient Greek ceramics are iconic images of ancient Greek culture and occupy a prominent place in the history of Western art. Because of their indestructibility, variety, and wide distribution, ancient Greek ceramics form a major field of research for Classical and Mediterranean archaeologies. It is mostly the exceptionally complex figural scenes rendered on these artifacts that have fascinated modern audiences and attracted research by specialists. Figured but also plain pottery provides information about ancient Greek society, daily life, economy, and ideology. Furthermore, Greek pottery, like all archaeological ceramics, helps to identify and date sites and deposits, distinguish between activities in different places and document contact between people, Greeks and non-Greeks.

Definition

The term "ancient Greek ceramics" can be taken to refer to vessels produced from baked clay in all lands of the Mediterranean and the Black Sea inhabited by Greeks during a period which ranges from the eleventh century BCE, which stands for the conventional end of prehistory, to the first century BCE, by which time the Romans conquered the entire Greek world. Not all scholars have perceived the term in a similar fashion (Oakley 2009: 599). Up to the mid-eighteenth century CE, this pottery was not even considered Greek, but Italian, and was attributed to the Etruscans because of major discoveries made in Etruria. Recently, some scholars consider that Greek pottery covers the varied output of potters/painters not only of Classical but also of Prehistoric Greece. Conversely, others limit the use of the term to the pottery produced in the central and southern Aegean from the eighth to the fourth century BCE, often focusing on Attic pottery from the sixth and fifth centuries BCE.

Historical Background

Ceramic production was introduced in Greece from the Near East in the seventh millennium

BCE, during the Neolithic period, and intensified in the course of the Bronze Age, not least because of the introduction of the fast-rotating wheel (traditionally dated c. 2000 BCE). Wheel throwing was the most widespread technique for much of the first millennium BCE, but other techniques (such as coiling) are also amply documented, especially for coarse and cooking wares. Ancient ceramics are nearly as durable and versatile as modern day plastic. Clay was not the only raw material which was used for the manufacture of containers in Greek antiquity, but the one which was most widely used and survives best. Vessels made in other materials survive only rarely, though their impact is sometimes reflected on the pottery itself (skeuomorphism): basketry and wickerwork influenced the styles of early Greek pottery, while an influential debate has focused on whether Attic Late Archaic and later pottery copies expensive metal vessels, particularly silverware (Sparks 1996: 145-51).

Ceramic production (on the modes of which, see Cook 1997: 259-62; Boardman 2001: 139-52; Mannack 2002: 23-32; Stissi 2002: 10-179) involves the basic elements of earth (clay), water, and fire. Ancient Greek potters worked in isolated facilities or in potter's quarters, which were within or – mostly – outside the settlement, preferably along major communication routes facilitating transactions. Outside the cities, pottery making was probably run in families and was a seasonal, part-time profession. For Athens, Corinth, and other centers of the Archaic and Classical periods, we assume a more intensive mode of production, involving personnel of several hundreds at any one time. Inscriptions rendered on vases indicate that some of the potters/painters in Athens had some degree of literacy and suggest that some were slaves or immigrants (Boardman 2001: 143-9; Wachter 2001; Stissi 2002: 111-21). Marks on mid-sixth to mid-fifth century BCE Attic vases further entail a communication code between potters/painters and traders and demonstrate that the origins of the traders were not necessarily similar to the provenance of the pots, that is, Attic pottery was occasionally exported by foreign traders (Boardman 2001: 153-67; Johnston 2006: 16, 28). The marks sometimes indicate prices, which are low, but rise in the case of long-distance transport (Sparkes 1996: 140-5; Stissi 2002: 189-210; Johnston 2006: 19-23).

Pottery was essential for a wide range of daily activities in ancient Greece (on use see Sparkes 1996: 64-89; Cook 1997: 207-29; Boardman 2001: 244-68; Stissi 2002: 211-87). A broad repertory of shapes accommodated the varying needs of storing and transport, cooking and food processing, and eating and drinking. People used pottery in public games, festivals, symposia (drinking parties) and religious rituals or dedicated it to sanctuaries. Ceramics were also essential in funerals, in containing oils for anointing the dead and wine for libations, providing for the funerary meals or serving as gifts. Vases were customarily buried with the dead and large pieces (pithoi and amphorae) were also used as coffins and urns or even as grave markers. Pottery carrying offerings was also used and/or placed at the graveside on later occasions, as an act of remembrance. In certain times and places, particular shapes/types and decorative scenes were considered appropriate for particular occasions or social groups. Women are usually associated with vessels like pyxides, lekanides, and alabastra, men with kraters and aryballoi. Such gender differentiations are also often reflected on the iconography of the pottery (Sparkes 1996: 68-89; Smith & Plantzos 2012: 17-25).

The stylistic development of ancient Greek ceramics is quite complex, much more than the following overview suggests: (Cf: Sparkes 1996: 3-27; Cook 1997: 5-205; Boardman 2001: 11-127; Mannack 2002: 65-167; and Smith & Plantzos 2012: 39-104. For Protogeometric to Archaic, see Boardman 1998 and Coldstream 2008. For Late Archaic and Classical, see Sparkes & Talcott 1970. For Hellenistic, see Rotroff 2006). The collapse of the palatial sociopolitical system of the Greek Bronze Age (c. 1200 BCE) brought about a demise in the production and circulation of Greek pottery. The eleventh century BCE is characterized by a ceramic repertory with a reduced number of shapes featuring simple decorative ornaments

Ceramics, Ancient Greek, Fig. 1 Euboean pendent semicircle skyphos, 825–750 BCE (APM 13102) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

and an increase in the production of handmade (as opposed to wheel thrown) pottery. The ceramic style which emerged is a debased version of earlier styles and is therefore known as sub-Mycenaean (sub-Minoan in Crete). There is a sharp contrast between the varied, curvilinear ornaments on Greek pottery of the late second millennium BCE, which are drawn freehand, and the relatively limited repertory of stylized ornaments (particularly circles and semicircles) normally drawn by multiple brush, which are introduced just before 1000 BCE. The impression of geometry conveyed by the shape and decoration of Greek pottery of the early first millennium is reflected in the stylistic terms Protogeometric and Geometric, applied to fine wares of the late eleventh to tenth and the nineteenth to eighth centuries, respectively. The Protogeometric style (Fig. 1: the vase represents the persistence of this style in later times, during which it is known as sub-Protogeometric) involves the application of a gloss of lustrous quality (which first appeared in Athens and slowly spread to other areas) over a large part of the vessel's surface and a narrow range of ornaments in reserved areas. The Geometric style (Fig. 2) is characterized by several new shapes and a much wider range of largely rectilinear ornaments, most notably the meander. From the second quarter of the eighth century BCE, figural decoration, which was extremely rare on Greek pottery after Prehistory, reappears. Funerals, battles, and other themes are rendered on the pots with figures in silhouette. For the first time,

Ceramics, Ancient Greek, Fig. 2 Attic mug, 750–735 BCE (APM 1932) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Greek ceramics carry alphabetic inscriptions, including potter's/painter's signatures (Cook 1997: 241-48; Wachter 2001; Denoyelle & Iozzo 2009: 37-8). From this period, Greek vessels, including the newly introduced transport amphorae (Whitbread 1995), were exported and occasionally imitated in quantity over much of the Mediterranean (Denoyelle & Iozzo 2009: 33-65; Coldstream 2008: 302-27), formulating a pattern which persisted for the rest of antiquity.

Ceramics of the seventh century BCE are often called Orientalizing because of the Near Eastern influences seen on their iconography of flora, fauna, and humans (Fig. 3). Orientalizing influences are, however, only seen on a fraction of the overall ceramic output, with simpler styles predominating. Silhouette drawing gives way to outline drawing, polychromy, and the black-figure technique, which involves incision and accessory colors (purple red and white) (Fig. 4). These technical developments suited the drawing

Ceramics, Ancient Greek, Fig. 3 East Greek jug, 675–650 BCE (APM 955) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 4 Corinthian alabastron, 575–550 BCE (APM 2962) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 5 Attic black-figure hydria, around 525 BCE (APM 15765) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

of complex scenes from Greek mythology. The black-figure technique, which was developed in Corinth in the early seventh century, spread over much of the Greek world between 620 and 480 BCE. Black-figure enabled more naturalism and finer detail than ever before and was perfected by Attic painters (Fig. 5), whose work was appreciated over much of the Mediterranean, particularly in Etruria. Several Attic (but hardly any other) potters and painters signed their works, on the basis of which we know that sometimes the potter was also the painter (Sophilos, Exekias), or the two could be different individuals (Lydos was a painter, Amasis a potter). Inscriptions and details of drawing in clothing and the human anatomy help distinguish the hands of individual painters of Attic black-figure and also red-figure. The latter technique (Fig. 6), which is the visual contrast of the former, was invented c. 525–520 BCE, at a time of experimentation in Attic vase painting (another technique introduced at the time and used throughout the fifth century BCE involved polychrome decoration on a white

Ceramics, Ancient Greek, Fig. 6 Attic red-figure krater, 425–400 BCE (APM 6262) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

ground: Fig. 7). Red-figure was more demanding for vase painters but offered new possibilities. Previously, figures were necessarily depicted mostly isolated and in profile; the new technique, which involves dark relief lines and drawing in dilute, translucent clays, enabled the rendering of spatial depth and of complex poses. Production in both black- and red-figures persisted until 450 BCE, but thereafter black-figure is hardly seen. The first painters to use the red-figure technique, also known as the "Pioneers," were innovative in many ways and are known to have consciously rivaled each other (Euphronios and Euthymides were two of the best). Red-figure vase painting reached its highest artistic level early in the fifth century BCE and in this century this craft often echoes monumental art (architecture, sculpture, and painting). From the fourth century, the repertory of Attic vessel shapes made in red-figure shrinks, but the best vases show elaboration with crowded, multilevel scenes, the use of added colors, and the application of relief figures. Attic red-figure pottery, which was widely exported in the Mediterranean, ceased to be produced around 330–320 BCE, but by that time it had stimulated local production in a few regions of the Greek mainland and most notably in South Italy and Sicily (Trendall 1989; Denoyelle & Iozzo 2009: 97-202). Greek pottery was being made there since the time of Greek colonization in the eighth century, but red-figure production became particularly widespread and developed into regional variants, extending from the advanced fifth to the early third century BCE (Fig. 8).

Ceramics, Ancient Greek, Fig. 7 Attic white-ground lekythos, 450–425 BCE (APM 627) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Decorated pottery formed a relatively small fraction of the overall ceramic production in the ancient Greek world. Much pottery used in daily life involved less labor input and was only covered in black gloss or remained plain (Sparkes & Talcott 1970; Rotroff 2006). Black gloss pottery was very widespread in the Classical and Hellenistic periods and was often manufactured by workshops which also produced painted wares. Any decoration on this pottery is limited to bands in added colors, ribbing, and incised and stamped patterns or appliqués (Fig. 9). Plain pottery involves a wide repertory

Ceramics, Ancient Greek, Fig. 8 South Italian (Lucanian) nestoris, 425–375 BCE (APM 1842) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

Ceramics, Ancient Greek, Fig. 9 Attic kantharos, 300–250 BCE (APM 7553) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

of shapes, including some used for cooking and food processing, storage, and transport, which only rarely have any decorated equivalents. Black gloss and plain wares dominate the repertory of Greek ceramics in the Hellenistic period, with a gradual shift to red gloss in the second century BCE. Painted pottery is much rarer than

Ceramics, Ancient Greek, Fig. 10 Relief bowl (production area unknown), 200–100 BCE (APM 1539) (Courtesy of the Allard Pierson Museum, University of Amsterdam)

before. West Slope and Gnathia, two popular wares, were produced from the third to the first centuries BCE and involved simple patterns rendered in tan-colored clay and white slip against a black gloss background. Dark-on-light decoration is restricted to a few ceramic centers and is best exemplified by the Hadra hydriae, while polychrome decoration occurs in South Italian pottery, particularly on the third century BCE vases from Centuripe, the figural compositions of which recall the earlier red-figure. Another novelty of the period, which is far more widespread, is the large-scale use of molds, particularly for the production of hemispherical relief bowls with floral and figural decorations (Fig. 10) (Cook 1997: 193-200; Boardman 2001: 122-7; Denoyelle & Iozzo 2009: 203-14).

Ceramic production in Greece obviously outlasted the Roman conquest but thereafter basically conformed to styles current over much of the Roman world. The Romans appreciated Greek art, but apparently did not show any interest in Greek pottery and this lack of interest would persist for more than one millennium and a half (Sparkes 1996: 36-63; Cook 1997: 275-311). Greek vases found their way to the cabinets of curiosities of the Renaissance but were not highly prized by the elites or the artists of the time. From the seventeenth century CE, these vases began to be collected more widely, a trend which became more prominent in the eighteenth century. By the mid- to late eighteenth century, this pottery, previously widely

considered to be Etruscan, was correctly identified as Greek on the basis of prefiring inscriptions rendered on some vases. Slightly later, the first major work on Greek pottery appeared; it is a four-volume, richly illustrated sale catalogue of the sizeable collection of vases amassed by Sir William Hamilton, a British envoy to Italy. Hamilton's purchases, the costly acquisition of his collection by the British Parliament and its subsequent exhibition in the British Museum brought about a serious rise in the appreciation of and demand for Greek vases. From this time onwards, Greek ceramics became a status symbol for the upper class and influenced the work of Western European artists. Scholarship on Greek pottery also flourished and in 1854 Otto Jahn published the vase collection in Munich in what came to be considered the first proper study of Greek pottery (*Beschreibung der Vasensammlung König Ludwigs in der Pinakothek zu München*, München: J. Lindauer).

Key Issues/Current Debates

Provenance and chronology have remained key issues in the study of Greek ceramics and pervade current debates. Other key issues include the development of manufacturing techniques and of styles of decoration, the identification of figural scenes and the attribution of vases to individual potters and painters, as well as the social and economic contexts of pottery production and consumption. These issues are treated in a growing number of publications, including excavation reports, museum catalogues, conference volumes, and other studies. All work is collected and summarized biannually in the "Bulletin Archéologique: Céramique" found in the journal *Revue des Études Grecques*.

The chronology of Greek ceramics (Cook 1997: 249-58; Mannack 2002: 53-61) relies (a) on relative sequences built on the basis of excavation data, particularly stratigraphy, and by the attribution of vases to painters and estimates over the development and overlap of their styles, and (b) on the pegging of these sequences to fixed points, whose calendar dates are known from historical sources. Because fixed points are uncommon in the pre-Classical period, the chronology is less and less accurate as one goes back in time. Major challenges to the traditional chronology were put forward some 20–25 years ago (around 1990). These suggestions have found little support but have raised awareness over some weaknesses in the existing chronology (Oakley 2009: 608-609). Arguments for adjusting parts of the traditional chronology by a couple of decades keep being proposed and are often accepted (i.e., the recently proposed slight down dating of the beginning of red-figure: Oakley 2009: 609), but there is widespread confidence in the precision obtained by the traditional chronology of Greek pottery among archaeologists working in the Mediterranean. Nonetheless, it is essential to check this chronology against scientific dating techniques, like radiocarbon dating and dendrochronology. This issue has not really been taken up, even though the relevant techniques are commonly used by prehistorians working in the Aegean and by specialists of the first millennium BCE elsewhere in the Mediterranean. There are currently two major problems with this line of inquiry; C14 determinations are not precise for much of the first millennium BCE and the dendrochronological data for the Aegean remain very selective. Radiocarbon dates obtained in the Eastern and Central Mediterranean suggest a readjustment of the ceramic sequence of the Greek Early Iron Age, but are not uncontroversial on their own (Smith & Plantzos 2012: 17-25).

Provenance has been a major issue in the study of Greek pottery ever since this was properly identified as Greek. In the last century, research has concentrated on the localization of production of particular vessels, types and wares in specific sites or regions (Oakley 2009: 611), often on the basis of different techniques of chemical analysis. Neutron activation analysis (NAA) has been the technique of choice and has offered invaluable information on the provenance of many Archaic Greek fine wares, most notably those previously grouped under the collective heading "East Greek" (Jones 1986, Fig. 3). Nowadays, NAA gradually gives way to X-ray

fluorescence (XRF) spectrometry and inductively coupled plasma emission spectroscopy (ICP-ES), and this makes imperative the comparability of results obtained by different laboratories by the use of different techniques. In recent years, the increasing interest in the circulation of semifine to coarse ceramics brought about the increasing application of petrography, with the first projects appearing in the 1990s (Whitbread 1995). The advantage of petrography lies in its focus on the rocks and minerals found in the fabric (rather than on the clay matrix) of nonfine wares; these inclusions point to a certain geological background which can be traced in the field and thus reveal the specific areas exploited by ancient potters.

Analytical techniques have also been used in research on the manufacturing technology of Greek pottery (Boardman 2001: 282-93; Oakley 2009: 611-12). Such work commenced in the 1920s and centered on the reproduction of the lustrous Attic black gloss. Thereafter, Attic and, to a lesser extent, other Greek pottery has been the subject of many scientific, experimental, and ethnoarchaeological projects focusing on clays, slips, colors and pigments, forming techniques, drawing tools, firing techniques, and repairs (e.g., Schreiber 1999). Scanning electron microscopy with energy-dispersive X-ray (SEM-EDX) analysis is currently the technique most widely used in technological investigation. This enables a microanalysis of clay and decoration and allows for an estimate of firing temperatures, two subjects which can also be studied by the use of X-ray diffraction (XRD). Likewise, computerized tomography (CT) scans shed light on the method used by the potter for building the pot. The techniques in question have largely overshadowed others previously used in analytical studies of Greek pottery, including optical emission spectroscopy (OES) and Mössbauer spectroscopy.

Applications of archaeological science to Greek pottery of the first millennium BCE remains limited in comparison to applications to earlier pottery from the same area. Even rarer is research on the contents of Greek vases through the study of residue, particularly gas chromatography (GC) and mass spectrometry (MS) or DNA analysis. There are, however, few current projects that employ these techniques, and future work on the production, distribution, and consumption of Greek pottery should increasingly involve integrated, interdisciplinary methodologies, combining traditional approaches with targeted applications of archaeological science.

Issues of provenance and vessel content are important for understanding the role of Greek pottery in trade and the economy (Sparkes 1996: 164-7; Cook 1997: 264; Boardman 2001: 153-67; Mannack 2002: 33-6; Stissi 2002: 288-332; Johnston 2006: 28-33; Oakley 2009: 612-13). The known exports of Greek ceramics, which are quite rich from the eighth century BCE onwards, only represent the tip of an iceberg, given that the surviving amount of Greek pottery is estimated to be less than 1 % of the original output (this estimate relies on the surviving record of a special class of Attic vases, the Panathenaic amphorae, the production rate of which can be reconstructed with some accuracy (Stissi 2002: 27-30)). Trade in two ceramic categories has attracted most attention: painted fine wares and transport amphorae. In the last few decades the importance of trade in painted fine wares has been strongly debated. This material, previously considered a serious trade item, has been called "spacefiller" and "saleable ballast." Most scholars now hold that although fine pottery was not the main cargo of ships and was traded along other, more essential commodities, it still was widely exported and yielded considerable profit. Current research is aimed at understanding trade by comparing the distribution patterns of specific shapes and types or the output of different workshops and the popularity of certain scenes over different regions and/or over time; statistics and quantitative analysis are instrumental in this respect (Boardman 2001: 293-96; Stissi 2002: 325-32). Transport amphorae have received less attention, but they offer more reliable evidence for trade and the economy than fine wares in that they were not traded per se but for their content, which involved a broad range of foodstuffs, particularly wine and oil

(Whitbread 1995). Shipwrecks found around the Western Mediterranean and the Black Sea are essential for understanding trade in Greek pottery.

Greek-painted pottery carries an amazingly rich array of scenes from mythology and everyday life but rarely shows specific historical figures and events (Sparkes 1996: 114-39; Boardman 2001: 168-243; Lissarrague 2001; Mannack 2002: 37-52; Oakley 2009: 613-17. See especially Figs. 5–8). Customarily, vessel shape/use shows no one-to-one link with the decoration, with few exceptions evidenced particularly in Attic pottery. Traditionally, scholarship has focused on iconography, that is, on identifying the individual figures shown and the entire composition through reference to literary texts (e.g., the gods on the wedding scene on the belly of the hydria of Fig. 5 or Herakles and the lion on the vase's shoulder). Lately, however, the distinction between images and texts has been emphasized and there are arguments suggesting that the images are mostly based on stories which circulated orally, rather than on literary texts. Iconographic studies often chart the ebb and flow in the popularity of a subject, the changes in emphasis, and the external prompting which may have stimulated them. These stimuli may include theatrical plays (e.g., the scene on Fig. 8 is inspired by Aeschylus's play *The Libation Bearers*), monumental art, and even politics. For several decades, iconographic studies have been supplemented by iconological ones. According to iconology, the many scenes from everyday life rendered on Greek pots (e.g., in Figs. 6–7) are not photographic documents. These scenes, together with mythological ones, are social statements and constructs conveying ancient ideas and practices. The meaning, function, and cultural relevance of images on Greek pottery are therefore to be tackled by different approaches informed by anthropology (structuralism, poststructuralism) and literary studies (narratology, semantics).

Instrumental to this key issue, but also to the understanding of the social role of Greek pottery in general, is the historical, cultural, and functional contexts of the pottery (Sparkes 1996: 155-64; Oakley 2009: 599-601). Contextual information enables scholars to pose varied questions on the identity and the motivation of the users and to understand the different modes of ceramic consumption in sanctuaries, cemeteries, households, and marketplaces. This necessarily involves a fair treatment of the processes that formed an assemblage, the range of activities manifested, and the different wares represented. Past scholarship primarily focused on decorated pottery, while plain and cooking wares were heavily discarded, often before any sorting. In the last decades, excavation pottery is normally preserved (almost) in its entirety (with resulting problems in storage space), plain and cooking wares receive increasing attention, quantitative approaches gain ground, stratigraphy and associated finds are integrated in relevant research, and these developments allow for a deeper and broader understanding of ancient Greek ceramics.

Another line of inquiry, known as connoisseurship, regards the stylistic affinities of individual vases and their attribution to specific potters/painters (Sparkes 1996: 90-113, 153-55; Boardman 2001: 128-38; Oakley 2009: 605-7). This topic was first researched in the nineteenth century CE but came to be associated with the seminal work of Sir John Davidson Beazley on Attic pottery. Scholars first considered vases signed in the format "X drew/made me," but Beazley devoted his life to attributing thousands of unsigned Attic vases (such as those on Figs. 5–7) to individual hands on the basis of the style of drawing. This exercise brought about a much deeper understanding of the Attic pottery industry and the development of Attic black-figure and red-figure. Beazley's method has provoked much debate in the last two decades. Critics stress the lack of an explicit methodology in Beazley's work and the subjectivity involved in attribution studies. Supporters have sought to define the inspiration for and the technicalities of Beazley's method, emphasizing that his attributions do not rely on few or random details, but on systems of rendering

human anatomy and secondary ornaments (the debate is summarized in Oakley 2009: 605-7). This line of inquiry remains popular with scholars working on pottery from Attica and, to a lesser extent, Corinthia, Laconia, and South Italy, mostly dating from the late eighth to the fourth century BCE. Comparable research is centered on ceramic shape and the identification of potters through the study of the fine details of the profile of vessels.

Much research on Greek ceramics is dedicated to the compilation of catalogues and databases or relies on them (Oakley 2009: 601-4). Catalogues are part of a long and persisting tradition in the study of Greek pottery, going back to the days of Sir William Hamilton and the work of Otto Jahn (see above). Catalogues of excavation and particularly museum pottery form a particularly prolific type of scholarship, which is dominated by the monumental series *Corpus Vasorum Antiquorum* (CVA). This long-term project (ongoing since 1922) currently encompasses 350 volumes publishing tens of thousands of vases, most of which are Greek, particularly Attic black- and red-figure. This material can also be researched through the on-line database of the Beazley Archive in Oxford. Originally based on the work of Beazley, the archive has steadily grown to include more than a quarter of a million photographs. A similar project for South Italian figured vases, the Trendall Archive (named after Arthur Dale Trendall, an expert on the subject), is housed at La Trobe University in Melbourne.

During the last two decades the reception of Greek vases has emerged as another key issue (Nørskov 2002; Oakley 2009: 617-9). This development is related to the growing attention devoted to the history of archaeology, the high prices paid for Greek vases in the art market (occasionally exceeding one million dollars), and the culmination of the problem of illicit antiquities. Scholarly attention has focused on the history of collecting Greek vases, the impact of these vases on modern and contemporary art, the ethics and practice of trade in antiquities, and their repatriation.

Future Directions

On-line publication of data and research, computer vision and pattern recognition, and digital applications in general are in the forefront of current developments in Greek archaeology. The potential of these tools for facilitating accessibility and cutting down cost are increasingly being appreciated by scholars working with Greek pottery, most notably by curators of vase collections. On-line databases, particularly the Beazley Archive in Oxford (www.beazley.ox.ac.uk/index.htm), have proved very useful for pottery studies. Before long, existing databases on ceramic fabrics will also appear on-line to facilitate discussions over provenance. Also, studies of provenance will increasingly make use of the range of analytical techniques outlined above, the application of which to Greek pottery of the first millennium BCE currently remains limited. Likewise, some of those techniques will be used to explore further the technology of ancient Greek pottery and fully document, for example, that wheel throwing was only one of several production techniques used widely.

Another direction, currently underexplored, but particularly promising regards the coverage of the full ceramic record of excavated assemblages, which is normally not limited to fine painted wares, but includes coarse and plain wares. Making the most out of the vast amount of pottery collected in excavations and surface surveys, and generally considered as undiagnostic, remains a major direction for future research. Likewise, there is an urgent need for balancing the Athenocentric character of Greek pottery studies by further analysis of regional variation as well as for traditional and interdisciplinary research on the modes of stylistic dissemination.

Lastly, potentially revolutionary for the chronology of Greek (and other) ceramics is the novel dating technique of rehydroxylation (RHX). The technique relies on the fact that fired clay immediately begins to chemically react with moisture from the environment and thus increases in weight. Estimating the rate at which any ceramic piece absorbs moisture is the key for establishing

its date of production. By 2011, experiments conducted on late antique to modern pottery had shown the potential of the technique, which remain to be explored with reference to ancient Greek pottery as well.

In conclusion, ancient Greek ceramics remain a major field of research for Classical and Mediterranean archaeology and an invaluable source of information for the study of the ancient world. The centuries-old fascination of scholars, collectors, and the wider public with Greek vases remains strong.

Cross-References

- ▶ Beazley, Sir John Davidson
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Epigraphy, Greek
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Radiocarbon Dating in Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Symposion
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Ceramics, Roman Imperial

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Introduction

For an introduction to Roman ceramics, see the entry on ▶ Ceramics: Roman Republican and Early Principate in this encyclopedia.

Ceramics, Roman Imperial, Fig. 1 Terra Sigillata at Museo della Città, Monte Porzio Catone (Photo taken by author)

This entry covers Imperial Roman ceramics, which are generally considered to date from the last quarter of the first century BCE to the fifth century CE. As with Republican ceramics, there are subcategories of coarse wares and fine wares. What changed in the Imperial Period, however, was that Roman ceramic production experienced a degree of pan-Mediterranean standardization and production that had not been seen in the Republican period, especially with regard to *terra sigillata* (Fig. 1). It was in the Imperial period that Rome reached its greatest geographic extent and controlled all of the shores of the Mediterranean basin. The widespread distribution of ceramic wares speaks to the near universality of Roman material culture, while more local types highlight the local traditions that developed prior to or as a result of Rome's conquests.

Definition

Due to the widespread nature of imperial ceramics and the fact that they are studied by scholars from the many modern countries which composed the Roman diaspora, each type tends to have at least one alternate name, if not more. The English name is used here whenever possible for the sake of consistency. Alternate names are

also listed. Unless otherwise specified, each of the following wares was produced throughout the Empire.

Coarse wares are defined as having a relatively rough fabric, with many inclusions and little to no decoration or surface treatment. These wares were durable and, for the most part, utilitarian. The fabric of fine wares generally was levigated to a greater degree and thus had fewer inclusions. These wares were often slipped or decorated and tended to be used as table vessels rather than cooking, transport, or storage vessels.

Coarse Wares

While fine wares tended to have finite production locations and periods of production, coarse wares were produced throughout the Roman Empire, both geographically and temporally. Since specific forms are not discussed, specific dates and production locations are not indicated underneath each type. For more detailed discussions of common wares, see the entry on ▶ Ceramics: Roman Republican and Early Principate in this encyclopedia.

Cookware: Ceramica Comune, Ceramica Da Fuoco, Cerámica De Cocina, and Ceramique Commune

This is the name given to ceramics that were for use on the fire. They were typically produced and distributed locally, although some cookwares, such as African cookware, were distributed throughout the Mediterranean beginning during or before the first century BCE. Cookware tends to have more and larger inclusions, which served to temper the ceramic and prevent it from exploding when heated. Common forms are pots, casserole dishes, lids, and pans. Cookware shapes did not vary significantly over time and are, therefore, somewhat difficult to date. Unfortunately, this difficulty has led many scholars to avoid studying them altogether. Typologies have been created, but ceramicists debate the precision with which the wares can be dated.

Tableware: Ceramica Comune and Ceramica Da Mensa

Tableware is a controversial category, since fine wares are often considered to be tablewares. Here tableware is taken to mean coarse or common wares used on the table. Fine wares are treated separately. Tableware often appears similar to cookware, but is made in different shapes and with slightly less temper. It was primarily intended as a utilitarian serving ware. As with cookware, it was largely produced and distributed locally. Forms include jugs, plates, bowls, basins, and cups. The same dating problems that plague cookware also make it difficult to date tablewares.

Amphorae

These transport vessels were primarily intended for sea transport. Their shapes and sizes varied depending on their cargo. Common cargoes include wine, olive oil, and fish sauce (*garum*). Less common cargoes were fruits and alum.

The production areas of some types of amphorae have been identified either through *tituli picti*, kiln excavations, or analysis of the locations of increased amphora type densities. *Tituli picti* – labels that are painted on the neck or shoulder of the vessel – typically recorded the weight of contents, the official in charge of weighing, and the geographical area of the amphora content's production. At first glance, *tituli picti* would seem extremely reliable for identifying production sites, but not all amphorae retain their *tituli picti*, not all amphorae had *tituli picti*, and *tituli picti* only indicate the production site of the amphora's contents, not the amphora itself. Kiln excavation is the most accurate method for determining amphora production centers, but for many types of amphorae, no kilns have been excavated. Finally, by mapping the densities of particular amphora types, scholars have postulated sources for particular types of amphorae. This method is less reliable than the preceding two primarily because density maps can be more indicative of where a particular area's amphorae were distributed rather than produced.

Nevertheless, by identifying amphora production sites and examining density maps, it has become possible to reconstruct trading patterns across the Mediterranean. While Greco-Italic amphorae were very common during the fourth

to second centuries BCE, Baetican, North African, and Eastern amphorae became more common in the first four centuries CE. Amphorae are regularly found at sites on land, but they are also quite commonly discovered at the sites of ancient shipwrecks. These shipwrecks have contributed substantially to our knowledge of trade routes and practices. Following their primary use, amphorae were often reused for shipping, construction, as funnels, and as children's sarcophagi, among other things (Peña 2007).

The largest singular context of amphorae discovered thus far is Monte Testaccio in Rome. This site was a refuse dump for transport ships unloading on the Tiber River from the late first century BCE until the 260s CE (Peña 2007). The hill consists primarily of Dressel 20 amphorae, which were used to transport oil from Baetica, but North African amphorae have also been found there. Archaeologists regularly find *tituli picti* and amphora stamps on the amphorae, thereby allowing for a better understanding of the organization of both the government-run *annona* system and the commercial oil trade.

Several different amphora designations exist: Dressel (primarily from the Iberian Peninsula), Lamboglia, LRA (Late Roman amphorae), and Keay, to name a few. Some series are named for the scholar who studied them, others are named for their type sites, and still others are named descriptively (carrot amphora, micaceous water jar, etc.).

Dolia

Dolia (sg. *dolium*) were massive vessels used for storage or agricultural processing (e.g., fermentation). These pots, typically between 4 and 5 ft tall and equally wide, were handmade with coils or slabs. They were typically sunk into the ground, to prevent damage and to limit environmental effects on the contents of the *dolium*. It is clear from the prevalence of mends to these pots that they were expensive and difficult to replace. Nevertheless, when they did break, they could be reused either as basins or ovens. For a brief period of time, *dolia* were used in so-called cistern boats, but this transport method was discontinued shortly after its inception, perhaps because it was much riskier than transporting amphorae. Notable cistern-boat wrecks are La Giraglia, Petit Conglué, Ile Rousse, and Diano Marina (Marlier & Sibella 2002).

Ceramics, Roman Imperial, Fig. 2 Roman lamp with figural relief in discus, Museo Archeologico di Pithecusae (Photo taken by author)

Mortaria

Mortaria were basin-type bowls that were used for grinding food. These vessels were wheel-made and had large, hard inclusions that would allow for more effective tearing and grinding. Typically the fabric of the interior surface of these vessels is worn away, leaving a rough surface of inclusions. There is often a pouring spout at some point along the rim of the vessel.

Lamps

Used for lighting and/or decoration, lamps range in size from that of one's palm to larger and more ornate pieces with multiple spouts for wicks (Fig. 2). These objects were typically made from molds and often featured decorative motifs in the discus. Common subjects were plants and animals, games and races, gods, or erotic scenes. While olive oil would have been the primary lamp fuel, other vegetable oils were also used.

Loeschke, Broneer, and Bailey established the standard forms for lamps in the early twentieth century (Bailey 1980).

Fine Wares

Fine wares are the ceramics that Roman archaeological excavations tend to rely on for stratigraphic dating. The evolution of most types and forms has been meticulously studied, particularly for *terra sigillata* throughout the Empire. Specific dates and production sites are available for these wares, which rarely had the consistent forms or temporal span of coarse wares.

Terra sigillata – Samian ware, Arretine ware

Produced: 50 BCE–180 CE

Location: Empire wide, especially Gaul, Hispania, and Italia

Terra sigillata is also commonly referred to as Samian or Arretine ware. The ware is easily identifiable by its glossy red, orange, or brownish slipped surface. The fabric is very fine, with few and minute inclusions. The slip was rich in iron and fired in an oxidizing atmosphere, which created the characteristic bright gloss. The successor to black gloss, *sigillata* evolved from pre-sigillata, which utilized black gloss forms and a duller, less even red slip. Some argue that *terra sigillata* also evolved from Italo-Megarian ware, which was molded but was unslipped. As with black gloss, similarities have been drawn that connect *terra sigillata* forms and decorations with forms and decorations seen on more expensive metal vessels.

For standardization and efficiency's sake, *terra sigillata* was made within a mold on a wheel. The molds were decorated beforehand with stamps and/or makers' marks. Not all pieces were decorated, however, and not all decorations were molded. In some instances, rouletting was used along the rims of the vessels, and in other instances, barbotine was applied to the vessels' sides or rims prior to firing. Decorative stamps were floral or figural in nature. Makers' marks applied to the vessels have been noted as belonging to the workshop owner, the mold maker, or the potter. Some vessels have been found with multiple marks on them. Oftentimes a mark integrated into the mold is taken to be the mold makers, while a stamp on the base or tondo of the pot probably indicated the workshop owner.

Forms were primarily for use on the table – cups, bowls, and plates – with occasional *terra sigillata* lamps.

The production of *terra sigillata* began in Italy toward the end of the first century BCE. A major production site was first identified in the area around Arrezzo, hence "Arretine ware." This, however, is misleading since there were many areas of *terra sigillata* production all across the Mediterranean. In addition to Arrezzo, some major production sites were Pisa, Ostia, and Pozzuoli in Italy, La Graufesenque and Montans in France, Rheinzabern in Germany, and Tricio in Spain. While each production center experienced different periods of popularity, all *terra sigillata* had largely stopped being produced by the third century CE, when African red slip had replaced it.

Terra sigillata africana is classified as African red slip, since it is not technically produced in the same manner as *terra sigillata*.

Eastern sigillata – Cypriot sigillata, Çandarli ware

Produced: 150 BCE–300 CE

Location: Asia Minor

Eastern *sigillata* A was produced in North Syria during the late Republican and early Imperial periods. Like *terra sigillata*, it has a red slip, but the fabric of the vessel is much lighter than that of terra sigillata. Later forms of ESA were similar to those of Italian *terra sigillata*.

Eastern *sigillata* C, or Çandarli ware, was produced around Bergama and Çandarli during the first and second centuries CE. Some examples have been found in fourth century deposits, but it is not clear whether they were produced in the fourth century or are residual. The fabric was pale brown to light red with an orangey slip.

Thin-walled ware – pareti sottili, paretes fines, parois fines, and paredes finas

Produced: 200 BCE–300 CE

Location: Began in Italy, spread to the provinces

This ware is easily recognizable by its refined fabric and very thin walls. It is hypothesized that this tableware was a ceramic imitation of metal

Ceramics, Roman Imperial, Fig. 3 Thin-walled ware, Museo Archeologico Nazionale di Cosa (Photo taken by author)

and glasswares. Thin-walled ware was made both on wheels and in molds. Its shapes are typically cups and mugs, either plain or decorated (Fig. 3). Beginning in the Augustan period, decorations included barbotine, sabbiatura (sand applied to the vessel's surface prior to firing and before slipping), rouletting, or incision. Also beginning in this period was the application of slip to the inner and/or outer surfaces of the ware, perhaps in order to increase its impermeability. Prominent workshops were in Chiusi, Aquilea, Sutri, Torrita di Siena, Syracuse, and Cremona in Italy, and Lyon and Lezoux in Gaul.

By the second half of the first century CE, the number of vessel forms had diminished. The vessels' fabric gradually became less refined, its walls thicker, and eventually it was very close in form and fabric to common ware (Guerrini & Mancini 2007).

African Red Slip – Terra sigillata africana
Produced: 80 CE–750 CE
Location: Modern Tunisia

Also known as *terra sigillata africana*, this ware originally imitated the forms and decorations of terra sigillata from Europe. By the second century, however, African red slip shapes began to be made broader and shorter, perhaps allowing for easier stacking and transport. Major production sites were located in Tunisia at el-Djem, Carthage, and Raqqada. While most African red slip forms were moldmade in the same manner as *terra sigillata*, some larger vessels were thrown onto upside down molds beginning in the fifth century CE. Hayes proposes this method allowed for application of feet to the vessels while they were still on the mold. He also points out that internal stamped decoration would have been part of the mold.

Fabric colors vary from orange-red to brick-red, and similarly colored, but slightly darker slip. The slip of African red slip is not as bright or shiny as that of *terra sigillata*. Decorations were typically stamped, appliqued, or rouletted.

African red slip ware is taken as the prime indicator of late Roman occupation in both archaeological surveys and excavations.

Historical Background

Beginning in the fifteenth century, *terra sigillata* caught the eye of antiquarians and researchers. Its durable nature, figural designs, and bright sheen ensured that it was easily spotted whenever earth was moved. Early finds were often only briefly mentioned in journals and were usually not illustrated (Tyers 1997).

The modern study of Roman imperial ceramics began with Hans Dragendorff's 1895 publication "Terra Sigillata: Ein Beitrag zur Geschichte der griechischen und römischen Keramik" in *Bonner Jahrbüchen*. In this article, he systematically described and drew Roman ceramic forms from continental Europe. His work is still used for identifying and dating *terra sigillata* forms across the Mediterranean. After Dragendorff's work was published, other

scholars became more systematic in their identification and illustration of Roman wares. Among these scholars were Howard Comfort and August Oxé, who, during the course of the early twentieth century, published extensively on *terra sigillata* stamps and vessel forms. Their detailed study of stamps furthered the understanding of workshop organization. While these early studies were focused on forms and decorative motifs, more recent studies have come to focus on the organization of ceramic production, questions of supply and distribution, and the role of fine and coarse ceramics in Mediterranean trade.

Unlike fine wares, amphorae have few aesthetic qualities to distract from their functional aspects. Thus, amphora studies have traditionally concentrated on the vessels' chronologies, production centers, distribution, and economic significance. Heinrich Dressel was the first to create a typology for amphorae. His 1899 effort, which appeared in the *Corpus Inscriptionum Latinarum*, was followed by Siegfried Loeschke (*Keramische Funde in Haltern: ein Beitrag zur Geschichte der augusteischen Kultur in Deutschland*, 1909), and some decades later by M. H. Callendar (*Roman Amphorae with an Index of Stamps*, 1965), M. Beltrán Lloris (Spanish amphorae, 1970), Riley (Benghazi ceramics, 1979), Laubenheimer (Gaulish amphorae, 1990, 1991, and 1992), Panella (1992), and others. Broader compendia on amphorae and their economic significance were penned by Peacock and Williams (1982) and Keay (1984).

Late Roman pottery was not extensively published until 1972 in John Hayes' aptly named *Late Roman Pottery*. This publication covers African, eastern, Egyptian, Gaulish, and assorted other wares known from later deposits.

Since computers and databases became easily accessible and common in the 1980s and 1990s, statistical analysis of ceramic quantities has blossomed. This has allowed for more detailed intra- and inter-site analyses of assemblages. Now, with the availability of Geographic Information Systems (GIS) software, it is possible to study ceramics not only quantitatively but also spatially.

Key Issues/Current Debates

For centuries archaeologists have looked to historical texts to explain ancient life. This often leads scholars to shape their material culture data to fit the literary sources. In the past two to three decades, there has been a distinct movement away from texts and toward the use of material culture to inform us about the past. The study of cultural interaction has benefited greatly from this new approach. While "Romanization" was previously thought to be a one-way process of cultural imposition, ceramic studies by Willis, Roth, and others have been used to show the opposite and draw conclusions about social and economic conditions of the Roman conquest (Millett 1992; Willis 1996; Roth 2007).

Following the rise of survey archaeology, archaeologists began to question the manner in which ceramic data collected from surveys could be interpreted. In survey archaeology's early years, the ceramics that appeared on the surface were taken at face value. All surveyors were presumed to have the same recovery rate, the extent of a ceramic spread was used to identify the size of a site, fine wares were recorded more frequently than coarse wares because of their greater visibility, and quantification (e.g., density and weight) was minimal. As survey archaeology became more methodologically refined and more intensive, the veracity of conclusions drawn from collected ceramics came under question.

One way in which scholars are tackling concerns about ceramic interpretations is by publishing not only their methodology but also the specific finds that were either recorded or collected. Such a transparent approach allows for other scholars to draw their own conclusions, but also makes it possible to compare sites that have been similarly documented. Such publications are ideal, but are by no means widespread as yet.

International Perspectives

In the United States, there is currently a lack of Roman ceramic courses for students who wish to

specialize in the field, as well as a dearth of jobs for Roman ceramicists. This is likely a result both of limited interest in the field and of restricted opportunity for first-hand study. While schools in Europe often have access to collections that they can easily study, very few schools in the North America can say the same. Often the collections that they do have are fragmentary or poorly documented. University courses in North America tend to focus on Greek ceramics for their art historical value and spend little to no time on Roman ceramics or the role of ceramics in archaeological interpretation. From a researcher's standpoint, the most useful publications tend to be in Italian, French, Spanish, or German, although detailed English publications are becoming increasingly available.

Future Directions

Important to the furtherance of Imperial Roman ceramics studies, and Roman ceramics studies more generally, is the integration of Roman ceramics courses at the university level outside of Europe and increased publication in English by scholars. In order for this to happen, there need to be positive relationships between schools and European governments so that collections can be temporarily held and studied in the United States and elsewhere. To this point, European nations have been hesitant to allow material culture to leave their borders, perhaps out of a postcolonial fear that the objects will never be returned. In this age of accountability and mass media, however, it is unlikely that any foreign institution could hold another country's ceramic collection indefinitely without massive outcry and the attendant legal ramifications.

In the field of survey archaeology, better publication of ceramic finds will not only back up archaeologists' conclusions but will also allow for contextual analyses and spatial distribution studies to be performed. The more information that is published, the easier it will be to draw meaningful comparisons between disparate geographical regions.

Additionally, increased comparison of survey finds to excavate material needs to occur on a more regular basis. Such comparisons may provide lead to more accurate interpretations of surface scatters.

Finally, ceramic data must be published and made available in order to make pan-Mediterranean site analysis and comparison possible. In addition to catalogs of relevant finds being published, syntheses of those ceramics should also be attempted. Publications such as Roth's show that ceramic data are useful not only for dating strata but also for understanding Roman identity and cultural change.

Cross-References

- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Economy, Roman
- ▶ Survey Archaeology in the Roman World
- ▶ Trade and Transport in the Ancient Mediterranean

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Ceramics, Southeast Asian and Chinese Trade

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Introduction

Ceramics have been in Southeast Asia since the early Holocene. The earliest, best-dated examples in Mainland Southeast Asia are cord-marked, net-marked, burnished, appliquéd, and incised Hoabinhian earthenware pottery sherds found at the Spirit Cave in north-western Thailand, dated to approximately 8,400 years old. In comparison, the earliest known earthenware ceramics found in the Malay Archipelago consist of plain and burnished pottery recovered in East Timor dating to a horizon of 4,500–3,700 years ago (Solheim 2003).

The use of paddle impressions with basket- or cord-marked patterns, carved paddle impressions, cord marking, incising, burnishing, and slipping are among the oldest pottery decorative techniques found in Southeast Asia (Solheim 2003). This early decorative pottery tradition is thought to be distributed across Southeast Asia by the "Neolithic Nusantao Maritime Trading Network" (Solheim 2006). Lapita pottery, as well as Solheim's Sa-Huynh-Kalanay and Bau-Malay pottery are thought to be derived from this Neolithic tradition, with Sa-Huynh-Kalanay ceramics believed to be gradually replaced by those of the Bau-Malay tradition during the first millennium CE in island Southeast Asia (Solheim 1990).

The Bau-Malay pottery rubric claims that all carved paddle impressed earthenware in the southern Philippines, west Borneo, western Indonesian islands, and the Malay Peninsula were produced from 700 CE onward. "Tanjong Kubor" ware is the only other proposed precolonial (700–1500 CE) major pottery style in the Malay Archipelago which affiliates earthenware ceramics from sites in Brunei, south Philippines, Sarawak, and Johor Lama. Bellwood and Omar (1980: 173) have argued that "the distribution pattern [of Tanjong Kubor ware] is related to the development of the Malay language as a trading language in those areas where it is most commonly spoken today."

Unlike their low-fired earthenware cousins, high-fired stoneware, and porcelaneous ceramics have had a relatively shorter life span in Southeast Asia. The Vietnamese, having had a long history of political and cultural interactions with the Chinese beginning as early as 111 BCE, started to produce stoneware ceramics approximately 2,000 years ago. However, it was not until the ninth century CE that the technique of producing high-fired pottery was first developed indigenously by the Khmers in Southeast Asia (Miksic 2009a). "Khmer ware," as these first Southeast Asian stoneware ceramics are now called, is believed to be a result of the diffusion of Chinese pottery manufacturing technology. It has been observed that Khmer ceramics share many similarities with contemporaneous products from the Xicun (西村 Xī Cūn) and Chao-an (潮安 Cháo Ān) kilns in the southern

Chinese province of Guangdong (广东 Guǎng Dōng) (Rooney 1984; Brown 1989). Southeast Asian potters did not achieve the required temperatures to produce true porcelain, an accomplishment solely achieved by the Chinese during the Tang dynasty (618–906 CE). The Chinese held a monopoly on porcelain until the Japanese and Germans discovered the technique in the seventeenth and eighteenth centuries (Yeo & Martin 1978). Nonetheless, Thai and Vietnamese potters were able to produce high-fired, glazed ceramics resembling Chinese porcelain – such as Thai celadon and Vietnamese underglaze cobalt blue – and exported them across the region between the fourteenth and sixteenth centuries.

Definition

Precolonial Southeast Asians acquired Chinese stoneware and porcelain ceramics through a long established maritime trading network with China, commonly referred to as the Nanhai (南海 Nán Hǎi or "South Sea") trade (Wang 2007). Chinese ceramics from the Western Han period have been found in south Thailand (Miksic 2009b), thereby suggesting the existence of a well-established trading network between both regions as early as the first to second centuries CE. However, Chinese porcelain was first recorded as a maritime trade item only during the Song dynasty, a period where foreign trade flourished under the incentive to secure additional revenue, especially after their defeat by the Khitan nomads in 1126 CE (Miksic 2009a).

The export of Chinese stoneware and porcelain ceramics into Southeast Asia generally occurred at two levels. Firstly, lower quality high-fired ceramics were produced and exported from the southern "provincial" or "folk" kilns (民窑 Mín Yáo) of Guangzhou (广州 Guǎng Zhōu) in Guangdong (广东 Guǎng Dōng) province and Quanzhou (泉州Quán Zhōu) in Fujian (福建 Fú Jiàn) province. Secondly, "national" or "imperial" kilns (官窑 Guān Yáo) at Jingdezhen (景德镇 Jǐng Dé Zhèn) and Jizhou (吉州 Jí Zhōu) in Jiangxi (江西 Jiāng Xī) province, Longquan (龙泉 Lóng Quán) in Zhejiang (浙江 Zhè Jiāng) province, and Dehua (德化 Dé Huà) in Fujian province produced ceramics of higher quality and value (Heng 2009).

Evidence of this early maritime trade is illustrated by numerous shipwrecks found in Southeast Asian waters. The Belitung shipwreck, found off the coast of Java, held a large cargo of Chinese Changsha ceramics dating to the ninth century (Flecker 2011), a period when Chinese ceramics were believed to be exported at a voluminous level for the first time. The Turiang, a fourteenth century (c. 1305–1370) shipwreck located off the eastern coast of the Malay Peninsula, was found to have set sail from Guangdong with a cargo containing monochrome, brown- and green-glazed stoneware vessels made in the provincial kilns of Guangdong as well as green-ware vessels from the imperial kilns in Zhejiang. High-fired Thai (Sukhothai, Sawankhalok and Suphanburi) and Vietnamese ceramics, the bulk of the ship's cargo, were recovered as well. Other shipwrecks such as the Nanyang (c. 1380), Longquan (c. 1400), Royal Nanhai (c. 1460), Xuande (c. 1540), and Singtai (c. 1550) also held an assortment of high-fired Chinese, Thai, and Vietnamese ceramics (Brown 2009), thereby depicting an intricate level of inter- and intra-regional trade.

Chinese ceramics were not only simply imported commodities, but also functioned as media of exchange between Chinese and local merchants in the conduct of trade in precolonial Southeast Asia. Southeast Asian societies adopted monetary standards based on "a directly measurable quantity" of highly valued substances or commodities (Wicks 1992: 301). When the Song court banned the export of precious metals such as gold and silver as well as copper cash in 1127, 1133, 1175, and 1219, porcelain ceramics became a commodity-substitute in overseas maritime trade and transactions. Ceramics were specifically named as one of the products to be used in place of gold and silver during the 1219 ban (Heng 2009). In exchange, Chinese traders received from Southeast Asian merchants various aromatic products, spices, and precious items such

as pearls, ivory, rhinoceros horns, and other tropical produce needed to satisfy the Chinese market.

Key Issues/Current Debates/Future Directions/Examples

Ceramic artifacts are ubiquitous throughout Southeast Asian archaeological sites, but as a field of study, ceramic analysis in Southeast Asia remains in its infancy and is confined mostly to the realms of ethnography and art history. The importance of ceramics in understanding ancient cultures, long established by generations of archaeologists in other parts of the world, has been overshadowed in Southeast Asian archaeological studies by the structural and monumental remains found across the region, and the pervasiveness of historical narratives reconstructed from epigraphic and textual sources. Consequently, archaeological research in this region remains largely oriented toward the study of major orthogenetic precolonial urban centers largely defined by the presence of architectural, statuary, and epigraphic remains (Miksic 2000). Conversely, there are relatively few archaeological studies of household architecture and status goods which might reveal "evolving wealth differentials and social stratification in prehistoric and early historic period societies" have been conducted (Junker 1999: 151).

Nonetheless, the efforts of archaeologists over the last few decades have produced considerable, albeit disparate, data and literature that have advanced the knowledge of socioeconomic, trade, and settlement patterns of precolonial societies in both mainland and island Southeast Asia. In particular, research on ceramics has demonstrated that greater socioeconomic and political complexity in precolonial Southeast Asian societies is typically accompanied by the development of a "political economy" where certain goods function as a "material fund of power" which is used to "reinforce social inequality and political authority," with hereditary "elites" controlling the specialized production and exchange of such goods (Junker 1994: 3). Ceramics were often used in precolonial Southeast Asia as a measure and indicator of social rank distinction. Stylistic, technological, and distribution analyses of decorative earthenware pottery found in the Philippines have also suggested that some decorative styles could have been iconographic representations of inter-chiefly elite alliances or shared identity in the late prehistoric and protohistoric period (Bacus 2003). As trade routes were established between Southeast Asian and Chinese markets over the centuries, Southeast Asian elites found a new source of high-quality and beautiful ceramics that they did not have the technology to produce (Heng 2009). Imported Chinese ceramics, such as small vessels with lids, came to be considered a luxury suitable for use only by the Khmer nobility in the eleventh century (Miksic 2009b). Chinese porcelain, among other exotic luxury goods, also became "key symbols of social status and political power" together with indigenously manufactured prestige goods for the Philippine chiefly elite (Junker 1999: 183).

Ceramics can also be used for stratigraphic dating in most Southeast Asian archaeological sites. It is possible to use thermoluminescence (TL) dating to determine the absolute date when the ceramics were fired, but its results will contain a range of error usually between ±90 and 110 years. This range of error is too great for TL dating to be of much use for most precolonial Southeast Asian sites which normally have a narrow life span between one to three centuries. Relative dating through established Chinese ceramic typologies, in particular, is a more accurate alternative. The stylistic features of these ceramics – such as the type of decorations, motifs, and glaze patterns – are distinctly associated with specific dynastic periods in Chinese history. The recovery of Chinese ceramics in situ not only allows for the successful dating of other material cultural remains in the same stratigraphic layer, but also reconstruction of the entire occupational sequence at a well-excavated site.

The precise provenance for each ceramic sherd in terms of the exact region, kiln site of origin as well as period of manufacture, is dependent on comparisons with other ceramics. However, the existing knowledge of ceramic

production and distribution is still far from complete; research on ceramic kiln sites in Southeast Asia is relatively underdeveloped, and despite a documented history of Chinese ceramic connoisseurship, there is a paucity of reliable information that can be gleaned from Chinese literary sources on the ceramic industry. Consequently, a detailed chronology for the majority of Chinese and Southeast Asian trade ceramics has not been established (Brown & Sjostrand 2004). Regional studies that compare the physical characteristics, forms, decorative styles as well as archaeological and historical contexts of ceramics have the potential to provide conclusive evidence in the identification of ceramics recovered in the region.

The study of Southeast Asian earthenware ceramics in particular has largely been overshadowed by that of its more aesthetically attractive high-fired ceramic cousins. Although earthenware sherds make up the majority of artifacts recovered from archaeological sites in the region, they still remain "neglected in reported finds, analyses, and published references" (Rooney 1987: 1). The lack of publication in Southeast Asian earthenware studies was still endemic in the region as late as 2003 (Miksic 2003). In an effort to remedy the situation and create a regional archaeological framework of earthenware analysis, Miksic (2003) seminal study *Earthenware in Southeast Asia* encompassed the latest earthenware research across the major Southeast Asian nations. To date, it remains the only publication which focuses solely on earthenware ceramics in Southeast Asia. At the same time, ethnographic records of traditional or rural earthenware potters remain few because research is narrowly concentrated on selected Southeast Asian ceramics which are "recognized as having great cultural and monetary value, such as the famous prehistoric Ban Chiang pottery and the high-fired celadon wares of Sukhothai and Sawankhalok" (Shippen 2005: 11). Consequently, any identification and analysis of earthenware ceramics can only rely on comparisons with the few existing published catalogs and be informed by the existing archaeological record and historical context that surrounds these artifacts.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Ceramics: Stonewares
- ▶ South and Southeast Asia: Historical Archaeology

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Ceramics: Colonoware

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Brief Definition of the Topic

Colonoware [also colono ware] was a locally produced, unglazed ceramic that was manufactured in parts of North America, including the Caribbean, beginning in the last quarter of the seventeenth century (Ferguson 1992: 18-22, 44-7). Its manufacture and use continued in some areas until the end of the American Civil War. Vessels were slab- or coil-built, but were never wheel thrown, and were fired at low temperatures (Ferguson 1992: 19, 27; Espenshade & Kennedy 2002: 210; Hauser & DeCorse 2003). Surfaces were often smoothed and burnished, and common forms include bowls and smoking pipes (Ferguson 1992). Vessel forms such as bowls were conducive to a diet based upon soups and stews, which some scholars suggest reflected African foodways (Ferguson 1992: 90). Soups were also a practical choice for people who labored long hours and whose diet included little meat.

In the United States, colonoware has been discovered from the Chesapeake region southward into Florida, and westward into Tennessee and Kentucky (Ferguson 1992: 35-7). The ware is typically found in contexts associated with enslaved laborers. Its spatial distribution across North America is not uniform: archaeological investigations have recovered large proportions of colonoware in ceramic assemblages on plantations in South Carolina and Florida, but in much lower quantities in the Middle Atlantic region and Georgia (Ferguson 1992: 7-9, 35-7; Espenshade & Kennedy 2002: 212, 216, 224). Influenced by data recovered from the archaeology of large plantations (especially in South Carolina), researchers initially suggested that the use of colonoware was fostered by large populations of enslaved laborers who lived some distance from the landowner's home. However archaeological investigations conducted at sites with small populations of enslaved workers, such as middling plantations and small farmsteads, have recovered colonoware, although in smaller proportions of the overall ceramic assemblage than characterized those of large plantation sites. Focusing upon local production in the nineteenth century, Espenshade and Kennedy (2002: 235) demonstrated that among the South Carolina communities that they studied, one colonoware producer manufactured vessels for their immediate community. Current research suggests that the use and persistence of colonoware needs to be evaluated in relation to market access, status, and the availability of mass-produced wares.

Some material culture analysts suggest that colonoware represented an ethnic marker, reflecting consumers of African descent who used the ware in deliberate resistance to mainstream consumer taste. Colonoware has been recovered from homes occupied by enslaved laborers, American Indians, and even the residences of planters. Discerning who used this ware within these respective, and often multiethnic, contexts requires conscientious study along dimensions of class, status, and ethnicity.

Debate persists concerning who made colonoware: American Indian, African American, and European American have been identified as candidates (Ferguson 1992: 6-22). Alternatively, colonoware may be attributed to a hybridization of the interaction of these peoples (reflecting the influence of two or more different cultural traditions) (Ferguson 1992: 18-22). Avenues of research include the degree to which colonoware use was influenced by foodways, ethnic expression, medicinal preparation, economic status, or the sale of materials for which the colonoware vessels merely served as a containers. It is unlikely that a single explanation for these questions can be applied universally. Given the variable use of colonoware over space and time, as well as its social and economic dimensions, analysis of this pottery is best conducted through prudent consideration of local social and material contexts.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ North America during the European Contact Period

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Ceramics: Conservation and Preservation

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Introduction

The study of ceramic manufacture, embellishment, trade, and permanence is only possible if

examples are preserved. Ceramics are perhaps the first synthetic materials made by people and they continue to contribute much to the study of human culture. By uniting earth, water, air, and fire, a type of artificial stone is created that can endure thousands of years. While often considered indestructible, ceramics include a wide range of physical properties that can also make them fragile and fragmentary. An ever-increasing use of analytical technology to derive chemical and physical details has required the conservation and preservation of ceramics to move well beyond mere washing and reassembly of sherds.

Definition

The word ceramic is from the Greek word *keramikos*. Ceramic objects are often identified as pottery which is a broad term referring to wares or vessels made from fired clays. Pottery types may include utilitarian or decorative vessels, tiles, sculpture, and figures. Damage may be the result of fire, frost, impact, plant roots, soluble salts, thermal shock, water, and human use.

Conservation is the profession devoted to the preservation and protection of cultural property for the future. Activities include examination, documentation, treatment, and preventive care.

Key Issues/Current Debates/Future Directions/Examples

Natural clays are formed by long-term mechanical weathering of rocks and are found at the earth's surface throughout the world. The varying mineral composition of clays produces a range of desired properties or visual effects when fired to form ceramics. Archaeological ceramics are commonly made from iron-rich clay that becomes red or black ceramic after firing at a relatively low temperature (below 900 °C or 1,650 °F). A slip or thin layer of dilute clay material applied to the surface may create a different surface color and texture. Less common in archaeological examples, but important, is the use of a glaze which is a glossy thin glass-like layer fired onto the ceramic surface. Many artisans experimented with available materials and techniques to create different finishes, designs, or colors. While the range of ceramic types is wide, it is the lower-fired ceramics that deteriorate more readily through mechanical and chemical degradation. (Buys & Oakley 1993).

Lower-fired ceramics, sometimes identified as terracotta or earthenware, tend to be porous and will absorb water easily. This makes them more sensitive to deformation, erosion, and salt damage. Exposure to water may be from the ground or deposition location, use as a storage container/cooking pot, or high humidity.

Highly alkaline or acidic conditions are damaging to ceramics through chemical deterioration. Acids are known to attack glazes or calcareous fillers in the clay body. Alkaline conditions more often affect glazes through breakdown of the silica component, resulting in iridescence or surface exfoliation.

Salts that are dissolved in the water enter porous pottery and crystallize when dry. Recrystallization may become a cyclic process and because the reformed crystals can continue to grow in size to occupy more space, they force the pottery to break up or flake. Different soluble salts have different properties and mechanisms.

If used as cooking vessels, serving bowls, or water jars, ceramic surfaces are more easily abraded, cracked, and damaged by repeated charring, residue depositions, and the mechanical action of ladles and stirrers. Ceramic objects that are softened through burial moisture may have plant root damage especially if there is nutrient-rich material inside. If humidity is high, mold and bacteria growth may be problem.

When ceramics are heated beyond their original firing temperature, they are likely to distort and melt. If there are glazes, these may become fluid and change color. Also, existing cracks may become sprung. Dating ceramics under these conditions is compromised. Conversely, when ceramics are exposed to long periods of very low temperatures, ice may form in the pores and cause spalling due to mechanical pressure.

The main hazard to ceramic objects is poor handling. Their brittle nature causes them to break, crack, and chip if they are dropped and suffer an impact. However, durable a ceramic may appear, it should be considered fragile. Ceramics often have weak joins between the handles and body. Never lift a ceramic by the handle, knob, or rim. Always check the weight and balance before you lift a ceramic object. It is important to use both hands and support ceramic pieces from the base when lifting. Use clean hands to avoid fingerprints on the surface and wear nonslip gloves with glazed wares to prevent accidents during handling.

Years ago, full restoration was the norm because the study of archaeological ceramics was limited to shape, style, volume, technique of production, and decoration. As the methods for chemical and physical analysis improved, ceramics came to be studied as evidence of human behavior and technological achievement as well. The earlier criteria for conservation offered techniques for full cleaning with acids and detergents and restoration techniques involving adhesives, splints, fills, and the inpainting of missing designs (Plenderleith & Werner 1971). Modern trends involve thorough consideration of cleaning (to avoid loss of residues, coatings, and temper) and the use of reversible adhesives for assembly of only original and vessel-specific sherds and parts. The conservation of archaeological ceramic items seeks to preserve all evidence that may yield insights to the date and temperature of the kiln fire, the temper, and any residues that illustrate aspects of function and use. Future researchers need to know if they are working with original or modified ceramics (Tennent 1999).

Routine cleaning presents risks. If residues are to be studied, a soft brush may be used (one hand holds the brush and the other steadies the object). Brushes should not be used to scrub or agitate the surface with friction, and care should be taken around painted, decorated, or damaged areas. Wet cleaning is typically necessary for initial sorting, but the water should be tested for pH (close to neutral) and soluble salts (low) prior to use. Pottery that is unevenly fired or simply baked will dissolve. Wet objects should be kept damp until they can be fully examined in a laboratory. Acid cleaning typically causes irreversible damage and should be carefully considered based on specific goals and protocols based on tested procedures. Professional conservators may use water and chemicals to clean but will take great care to test all surfaces, use purified water, and provide for even drying to avoid the development of unsightly tide lines or other surface deposits. Detergents and soaps are never recommended for most archaeological pottery.

Pieces that have been previously mended or restored often become weak or fail completely as the adhesive ages. A wide range of mending materials and techniques have been tried through the ages. In fact, ancient mends, including drill holes to hold breaks together with ties and natural adhesives such as pine resins, animal glues, bitumen, or lac, are important evidences to preserve. The mending, stabilization, or restoration of valuable ceramics is not appropriate for amateurs. It is easy to damage and misalign the edges of sherds, to select and apply an inappropriate adhesive, and to create an unstable or misleading object. Conservators have the skills and knowledge to carefully select modern (easily distinguished from original) materials to best match the ceramic material and its technology while considering the type of damage present (Acton & Smith 2003). Knowledge of the ceramic traditions, the chemistry of materials, and practiced dexterity enable conservators to execute successful treatments. Also, conservators always include documentation with their treatments.

Closed display cabinets provide the best protection from dust, lint, insects, and vibration. Use care to provide adequate space between pieces so that they do not touch each other and avoid stacking. Metal spring-type plate hangers should not be used on the majority of archaeological ceramics as these are designed for high-fired porcelain or stoneware ceramics. The exaggerated stress of the spring may open and extend cracks or chip fragile edges. If a piece is cracked, do not lean it to support its own weight.

The preservation of archaeological ceramics has a long tradition that is linked to the very long history of archaeology, but the origins of

professional conservation may be more closely linked to the mid-twentieth century. The guiding principles for any conservation action are reversibility and documentation.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis

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Ceramics: European Cream to Whitewares in the USA

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Introduction and Definition

A growing market demand for white-bodied wares led to the development of "creamware" in Britain in the 1740s. The Staffordshire ceramic industry had been transformed during the 1720s–1740s, with changes in scale, organization, and manufacturing methods that set the tone for pottery production elsewhere in Britain and beyond. The production of white-bodied earthenwares in tableware, teaware, tiles, and decorative forms in Staffordshire required white-firing clays from Devon and Dorset and flint used in clay bodies and lead glazes from the south and east coasts of England (Barker & Majewski 2006: 214). Josiah Wedgwood has often been credited with the invention of creamware, but it is now evident that he was one of a number of Staffordshire ceramic producers also making the ware (e.g., William Greatbatch and Josiah Spode). Creamware was often undecorated or minimally embellished through molded detail and simple enameled or painted decoration but also was made in various rococo and neoclassical styles using elaborate molding, colored glazes, over- and underglaze enameled and painted decoration, and various forms of printing as well as engine turning. By the early 1760s, creamware and other Staffordshire ceramic products were being exported in vast quantities to the British colonies in America and the West Indies as well as to almost every port in Europe (Barker 2001: 81).

Creamware was produced into the nineteenth century, but pearlware became the earthenware body of the early nineteenth century, and it was nearly always decorated. The ware was introduced by the mid-1770s and appears in archaeological contexts in America soon thereafter. Early on, decoration was a blue-tinted glaze over a white body with underglaze blue Chinese-style painted decoration in imitation of Chinese porcelain. Molded and painted "shell-edge" was used on less-expensive tablewares, and painted floral decoration was common on table- and teawares. By c. 1800, higher-end tea- and tablewares were transfer printed. In the 1780s, transfer printing using images transferred from engraved copper plates was introduced to earthenware manufacture and allowed for mass production of identically decorated wares. Printed wares were initially mainly in blue but from the late 1820s appeared in a range of colors, and color and style of print are useful for dating purposes. Although creamware manufacturers rarely marked their wares (except for some exceptions, such as Wedgwood and some of his contemporaries), with pearlwares, the practice became increasingly common, particularly on printed wares. Makers' marks can contain a wealth of useful information, including identity of manufacturer (which can be linked to company histories and dates) and occasionally the importer.

While archaeologists define white-bodied earthenwares as creamware, pearlware, or from c. 1830 as "whiteware," nineteenth-century manufacturers defined and marketed their products by type of decoration, e.g., printed, painted, dipped, and edged. The popularity of decorated ceramics, particularly transfer-printed earthenwares, increased throughout the nineteenth century, greatly changing the composition of excavated ceramic deposits and allowing for more interpretive analysis using the cost of wares (known from documentary evidence) to construct socioeconomic profiles of ceramic users, following George Miller's seminal work.

Beginning in the 1850s, the popularity of transfer-printed wares declined in the Americas, although a resurgence occurred in the last quarter of the nineteenth century that lasted until early in the twentieth century. Creamware, pearlware, and whiteware are all nonvitreous, white-bodied earthenwares, but by the mid-nineteenth century, the British were producing and exporting large quantities of molded "ironstone china" or "white granite," a heavy-duty semivitreous, white-bodied earthenware not to be confused with either the patent ironstone wares of the earlier nineteenth century or with porcelain and bone china of any period. White granite wares were durable, withstood shipment to the frontier regions of North America, and emulated the then-stylish and expensive French porcelains that were being exported to America (Barker & Majewski 2006: 216).

Key Issues/Current Debates/Future Directions/Examples

The sheer quantities of British white-bodied earthenwares recovered from excavations at Staffordshire factories known for their export business as well as from archaeological contexts in the USA and in the Americas in general undoubtedly attest to the British ceramic industry's superior capabilities, beginning in the late eighteenth century and continuing almost to the end of the nineteenth, for mass production of "useful" wares that could be effectively transported and distributed to American markets at a reasonable cost to the consumer. These markets included the Caribbean, South America, Central America, Mexico, Canada, Alaska, and everywhere in what was to become the continental USA. Among the consumers of British-made ceramics were urban dwellers purchasing from local shops; rural populations being supplied by country stores and traveling salesmen; early settlers, miners, ranchers, and the military on the frontier; and Native Americans. Sophisticated trading relationships have been documented between importers in major American cities and manufacturers in Britain. Trading companies also played a role in the ceramic export-import process. For example, in the mid-1830s, the Spode/Copeland pottery of Staffordshire became the supplier of tableware and toiletware to the Hudson's Bay Company, continuing in this capacity until the 1850s in the USA and until the early twentieth century in Canada.

The American ceramic industry for many years could not compete with British-manufactured white-bodied wares, even though American-produced (and -consumed) redwares, yellowwares, and stonewares had a long and successful history. Many Staffordshire potters immigrated to America, bringing their knowledge and experience with them. By later in the nineteenth century, American potteries in the clay-rich Ohio Valley and the Northeast were gainfully making nonvitreous white wares as well as white granite wares, with the latter laying the foundation for the successful American hotelware industry. Ceramic assemblages dating to the turn of the twentieth century and after come to be dominated by American-made ceramics. Trade tariffs, changing consumer profiles, and increasingly reliable and increasingly more cost-effective transportation made it possible for other pottery- and porcelain-producing countries to gain a foothold in the American market, although British white-bodied earthenwares continued to be exported to the USA in lesser quantities after 1900.

This discussion of European creamwares to whitewares in the USA has emphasized the British (particularly Staffordshire) ceramic

industry, rather than that of Continental Europe. This is because British products are the ones that appear most frequently in American archaeological contexts and because unfortunately less is known about the white-bodied earthenwares produced on the continent and whether they were exported in quantity to other markets (or primarily manufactured for home markets), although work is beginning in this area. Interestingly, the majority of Staffordshire ceramic exports went to European destinations until 1835, after which date the USA became the primary market (Barker 2001: 81).

Despite variable global economic and political factors, the Staffordshire potters succeeded in the international market because their products appealed to the mass-consuming lower, lower-middle, and middle sectors of the market who were interested as much in the price of their ceramics as they were in quality. Ewins (1997) charts the development of the Staffordshire trade with North America, demonstrating how the potters gained access to the American market and how they were able to respond rapidly to changing American tastes.

Barker and Majewski (2006: 215) note that "The success of Staffordshire ceramics during the later eighteenth century led to the establishment of factories making Staffordshire-type wares in many parts of Britain, in [Continental] Europe. . ., and in North America. . .." Standardized production developed not only because potters were moving to other areas but because the Staffordshire-based infrastructure supplied everything other producers would need to make white-bodied wares. To date, most scholars of continental ceramics have either focused on earlier time periods or on high-end ceramics such as the hard-paste porcelains produced by state concerns (e.g., Meissen in Germany or Sèvres in France). Some significant exceptions include documentation of the British-type whitewares made by Petrus Regout of Maastricht in the Netherlands that were produced for European and overseas markets for much of the nineteenth and twentieth centuries, of British-made creamware (in Canada), of British and French white-bodied earthenwares exported to the French West Indies, and of the *faiences fines* industry in France. Unfortunately, more foundational and synthetic work on ceramic bodies and forms using documentary and archaeological evidence remains to be done on the European white-bodied-earthenware industry before historical archaeologists will be able to accurately identify and fully assess the contribution of other ceramic-exporting countries to the ceramics found in the archaeological record in the USA.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Consumption, Archaeology of
- ▶ Hispanic South America: Historical Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology

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C

Ceramics: Majolica in Colonial Latin America

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Introduction

Majolica, often called tin-glazed earthenware today, can be found in colonial archaeological sites stretching from Canada to Argentina. During the sixteenth century, production acquired significant importance in Europe where it was known as *maiolica* in Italy, *faience* in France, *faiança* in Portugal, *Delft* in the Netherlands, *Delftware* in England, and *loza blanca* in the Spanish Empire. It was exported from those countries to the New World where, eventually, in a number of colonies it was replaced by local production.

Definition

In Latin American colonial sites, the study of excavated European and locally made majolicas, such as tableware and utilitarian vessels, decorative and architectural elements, can lead to an understanding of internal and external trade patterns, the level of reliance on contraband trade, and the degree of local consumerism.

Key Issues

The progressive Spanish conquest of the New World in the sixteenth century held great potential for Old World ceramics merchants – that of supplying the needs of settlers and government officials with simple majolica tableware, popular with those who could afford it, and for the more expensive, ever-changing, highly decorative Iberian and Italian majolicas popular with the elite. Spanish archival records from that time show that both were exported with each sailing of the fleet to New Spain/Honduras and to Panama. Archaeological evidence confirms their presence in varying degrees in almost all Spanish settlements that date to that period.

However, archival records originating in the interior of mainland colonies such as Guatemala indicate early complaints about the high cost of imported goods and later complaints about the irregular to almost nonexistent schedule of fleet sailings to their ports. With no Crown prohibitions against the local manufacture of ceramics, a lower-cost majolica production began on the New World mainland in the 1550s in Mexico City and gradually spread to Puebla de los Angeles, Oaxaca, Santiago de Guatemala, Panama la Vieja, and Cuzco well before the 1600s (e.g., Goggin 1968; Deagan 1987; Lister & Lister 1987; Jamieson 2001). The archaeological evidence from the first four sites tends to indicate that as local production quantity and quality increased, the amount of imported Iberian and Italian majolicas decreased, to the point that by the mid-seventeenth century, there is little to no evidence of them. This contrasts sharply with Brazil, Uruguay, and Argentina, for example, where there were no local industries and where the majority of archaeological majolicas are European.

Majolica made in Mexico City and Puebla has been found in archaeological deposits in New Spain, the northern frontier towns and mission settlements stretching from present-day California to Florida and into the Carolinas, the Kingdom of Guatemala, Cuba, and to lesser degrees in a number of southern colonial Latin American sites. Majolica from Panama reached at least as far north as Guatemala and as far south as Argentina and Chile. Fragments of vessels produced in Oaxaca and Santiago de Guatemala, however, are seldom found outside of the area of their immediate control, sphere of influence, or local trade routes (Figs. 1, 2).

Ceramics: Majolica in Colonial Latin America, Fig. 1 Mexican majolica. Puebla Polychrome, soup plate c. 1650–1725

Ceramics: Majolica in Colonial Latin America, Fig. 2 Guatemalan majolica. Chacra Tetrachrome, wash basin c. 1750

The widespread distribution of majolica from Mexico City and Puebla in the northern part of the Spanish New World was a direct result of supplying the vast area under the control of the Viceroyalty of New Spain and the lack of restrictions on trade with Guatemala. With the exception of Cuba, prohibitions on commerce between colonies in different administrative areas

severely limited the possibility of a much broader and more significant geographic distribution.

Panama was at the hub of the trade route between Spain and the Viceroyalty of Peru, and at the hub of trade, prohibited or not, between the Pacific ports of present-day Mexico, Guatemala, El Salvador, Nicaragua, Ecuador, and Peru. During the time in which it functioned, the majolica industry in Panama was a major supplier of fine majolica to the southern Viceroyalty, but no more than a minor player in northern areas along the Pacific coast competing with the workshops of New Spain. The Panama industry came to an abrupt end following the destruction of Panama la Vieja by pirates in 1671.

Majolica industries in early centers such as Oaxaca, Santiago de Guatemala, Cuzco and in later centers such as Lima, Quito, Cuenca, Cartagena de Indias, and Popoyán played an important role in providing vessels for the table and for decoration that, in spite of differences in quality between them and "foreign" counterparts, appear to have suited the tastes of the local population at prices that were more affordable in their respective areas than imports. The added cost of transporting low-grade majolica over great distances may account for the lack of a broader distribution of these products. An exception was the majolica industry founded in Guanajuato in the late 1700s; it supplied consumers in the greater part of northwestern Mexico.

Majolica from Portugal is seldom found in the towns of the Caribbean Basin and Pacific coast, but is present in Brazil, Uruguay, and Argentina (Fig. 3). French and Dutch examples related to open and contraband trade can appear in archaeological deposits of the Caribbean and surrounding mainland, and the southern Atlantic coast. British majolica has been reported in Argentina.

To date, the published evidence of majolicas in colonial Latin American tends to show that there were people or groups that could afford fine-grade majolica from Europe and from other administrative areas of the New World, and that the founding of a local industry could obviate the need for imports in meaningful quantities. Thus, archaeological deposits can present significant differences from colony to colony and from site to site within a colony, which need to be understood by referencing archival data and by interpreting the evidence in the framework of social theories and historical issues. In addition, majolica provides a valuable tool for dating colonial sites based on the development of thorough typological schemes, especially in the case of European, Mexican, and Panamanian examples, and in all cases for recording the tastes, customs, and diet of the local population.

Ceramics: Majolica in Colonial Latin America, Fig. 3 Portuguese faience. Polychrome plate, mid-eighteenth century

Future Directions

Ongoing research to determine the provenience of specific types supported by compositional chemical studies, for example, instrumental neutron activation analyzes, has been key to understanding where the vessels represented in archaeological collections were produced and thus to infer changes in trade and consumption trends through time (e.g., Fournier et al. 2009).

Refined typologies are still required for Guatemala and for several South American areas. In many regions, there are scant archaeological studies and in some cases, traditions recorded in documentary sources have not been studied in detail. In addition, few studies have been made of the historical records of prices to compare market costs of different ceramics and to gain a better understanding of consumerism in colonial Latin America.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Charlton, Thomas H.
- ▶ Deagan, Kathleen A.
- ▶ Fournier, Patricia
- ▶ Goggin, John M.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Mexico: Historical Archaeology
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Ceramics: Roman Republican and Early Principate

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Introduction

Roman ceramics served domestic and commercial purposes; they appear as lamps and perfume containers, as well as vessels for the preparation, cooking, service, storage, and transportation of foodstuffs. In archaeological sites in the Roman world, pottery is the most frequently found material. It is found in burials and ritual foundation deposits; fragments were frequently used to level floors for construction, to fill in negative features such as drains and cisterns, and reused whole, and in part, as part of wall construction material.

This entry covers material produced in Italy and the Roman provinces around the Mediterranean from about 500 BCE until the late first century BCE. In this period the definition of what it meant to be "Roman" was in its early stages of development. In the fifth and fourth centuries BCE, the city of Rome was only beginning to expand its reach outside the city limits, and the multiple entities of the Italian peninsula interacted with it and each other in constantly changing ways. By the end of the third century, Rome controlled the Italian peninsula, by the end of the second century, the whole of Greece and western Asia Minor, and by the end of the first century, Egypt and the Levant. As a result of this continued expansion, this entry covers material produced in various areas of the Mediterranean when they were under Roman control – reflecting the ever-expanding empire. The material discussed here is frequently found on archaeological sites in Italy and the wider Mediterranean together with material exported from outside areas of Roman control – together with ceramic and metal vessels which were Greek-made, Etruscan-made, or from the Near East or Egypt. The multitude of influences and interaction and the increasingly dynamic and mobile Roman world of artisans and consumers mean that ceramics which are "Roman" are difficult to discuss in a cultural vacuum.

Definition

Production

The majority of pottery in the Roman Republican period was made on a fast wheel or in a mold which was probably mounted on a wheel. The exceptions to this are *dolia*, large storage vessels which would have been made by coiling or hand building. Roman wheels were probably flywheels, or kick wheels, and usually made of wood; very few stone examples survive. Vessels were stacked in updraught kilns of quadrangular or circular design and fired at varying temperatures depending on the clay type and the desired effect. Typically, however, firing temperature for Roman pottery is between 850 °C and 1,000 °C (Cuomo di Caprio 2007: 497, 508–17).

This wheel-made pottery was produced in workshops throughout Italy and the Roman

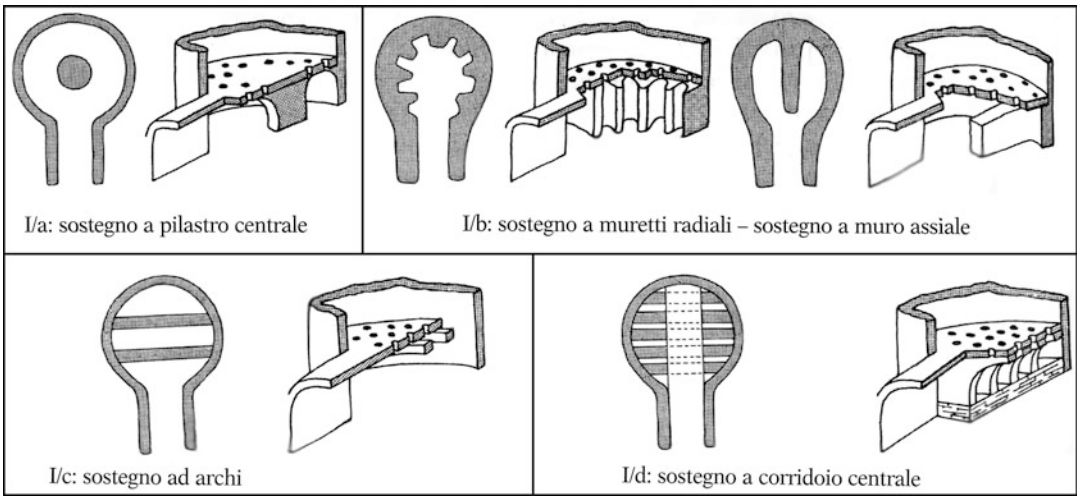

Ceramics: Roman Republican and Early Principate, Fig. 1 Roman kilns of circular design (Cuomo di Caprio 2007: Fig. 168)

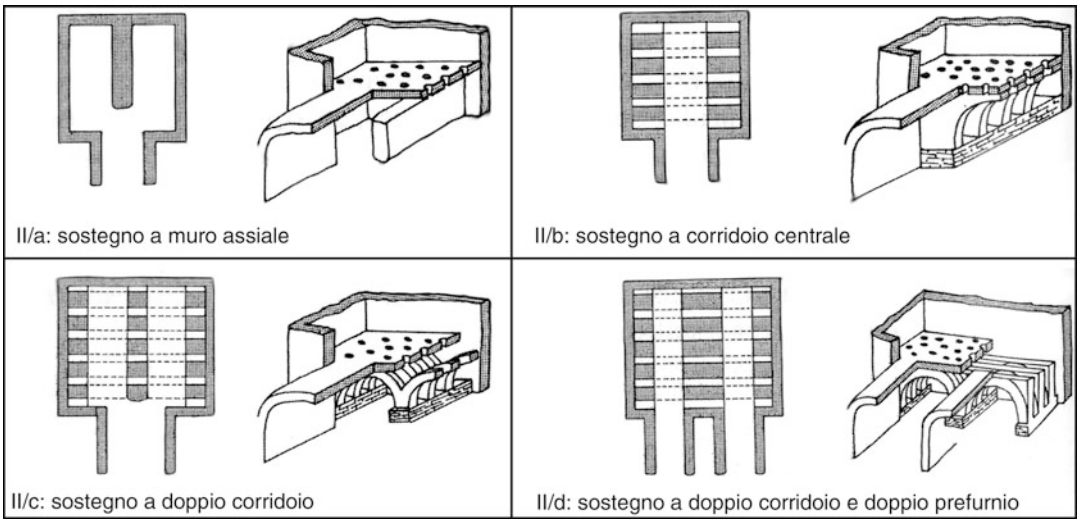

Ceramics: Roman Republican and Early Principate, Fig. 2 Roman kilns of rectangular design (Cuomo di Caprio 2007: Fig. 169)

Mediterranean. Simultaneously, however, there was likely a small-scale handmade pottery industry in areas throughout the Mediterranean which also engaged in active trading (Peacock 1982: 75–113) (Figs. 1 and 2).

Common Roman Ceramic Types of the Republic

Roman ceramic typologies have been created based on a combination of different attributes which have developed haphazardly over the centuries as groupings of artifacts have been recognized. The attributes governing the identification and naming of different ceramic types are not standardized. Some ceramic types are distinguished by a combination of their clay fabric composition, their form, and their surface treatment; some mainly by their fabric and surface treatment; or some mainly by their understood function.

Black Gloss

Produced: 400 BCE to 50 BCE

Location of Production: Black gloss vessels were produced in workshops throughout Italy. Early in the study of black gloss, scholars hypothesized main production centers near the Bay of Naples (called Campana A production), in southern Etruria in what is now northern Lazio, and southern Tuscany (originally called Campana B), and in Sicily (originally called Campana C) (Lamboglia 1952). Scholars have now acknowledged the role of smaller-scale local workshops in towns throughout the Italian peninsula which became especially active in the later history of the ware's production. There were workshops in Taranto, Cales, Volterra, Tarquinia, Falerii Veteres, Cosa, and Aleria, to name but a few (Cibecchini & Principal 2004: 159).

Identification: This pottery is also called *vernice nera* or black glaze; however, modern English-language publications increasingly refer to it as "black gloss" in recognition of its surface sheen being due not to glaze, but to a fine layer of slip made with the same clay as the ceramic body. The vessel would have been made on a wheel, then typically left to dry until it was leather hard. Then the vessel was either immersed in a bucket of slip or, particularly in higher quality examples, painted with slip.

Black gloss vessels were finished by firing them in a kiln between 900 and 1,000 °C sintering the slip to create its solid sheen (Mirti & Davit 2001: 21; Cuomo di Caprio 2007: 295, 314–7). Their external black color is achieved by firing the vessels in a reducing, or oxygen-poor, atmosphere. Ancient consumers desired vessels with this black sheen probably because it was a less-expensive way to have vessels which looked like bronze and silver.

The production of these vessels began as an imitation of vessels made in Attica, in Greece. The earliest examples from Italy emulate the Greek pieces in their red-orange matrix and their thickly applied iridescent surface slip. Throughout the fourth century BCE, workshops in southern Italy produced variations of this type with varying levels of quality (Stanco 2009a: 21).

The fourth century is also when black gloss painted over with linear and foliage designs was produced in southern Etruria and probably also east in Faliscan territory. This ware, often referred to as "overpainted ware" or "*sovradipinta*," is found in Greek-inspired shapes like *skyphos* cups and jugs with cutout necks. Vessels were covered in black gloss and then painted with fine lines of clay-based paint in white, pale yellow, orange, brown, or pink (Pianu 1982).

In the late fourth century BCE, a particular variant of black gloss vessels began being produced at workshops in the countryside around Rome in what is now northern Lazio and southern Tuscany and later also in southern Italy. This class of pottery is referred to by modern scholars as "*petites estampilles*" or "*piccoli stampigli*" because of the "small stamps" decorating the vessels' interiors. Vessels with these stamps appear in a handful of limited forms – typically, they are all variations of a small bowl with a defined ring foot (Stanco 2009a: 22). The stamps, about half a centimeter in diameter and most often palmettes and rosettes, are distributed around the central interior of the bowl. At the beginning of their manufacture, the stamps appear in fours or fives and are typically symmetrically arranged. Over the course of the development of the style into the late third century BCE, multiple stamps are gradually replaced by a single, larger central stamp (up to 2 cm in width) surrounded by incised concentric rings or rouletting (Stanco 2009b: 158 and Fig. 6a).

The third century BCE saw an expansion of the black gloss repertoire with the introduction of many closed-form pouring vessels in addition to bowls of various scales. Workshops at the cities of Volterra and Arezzo produced vessels with added clay décor on their exterior with forms very reminiscent of embossed metal vessels. Demand for Volterran production seems to have been widespread in the Po river valley (Stanco 2009a: 26–31).

By the middle of the second century, the shape repertoire of black gloss had changed significantly. The forms of what were once curved vessels with rounded edges became increasingly

Ceramics: Roman Republican and Early Principate, Fig. 3 Jug with overpainted decoration (Pianu 1982, pl. XXIX, n. 47c) (courtesy of the Soprintendenza per i Beni Archeologici dell'Etruria Meridionale)

toreutic or reminiscent of metal (Morel 1981: 524–8; Cibecchini & Principal 2004). The open form shapes are more angular and have sharper rims and carination. Flat platters are increasingly common. These are the forms that become part of later Roman red gloss pottery such as *terra sigillata*. Stamps often appear decorating the central interior of the vessels; however, these are more rectilinear with palmette leaves appearing more angular and an increased use of rectangular stamps (Stanco 2009a: 32–3) (Figs. 3 and 4).

Eastern Sigillata

(Eastern Sigillata A, Cypriot Sigillata, Eastern Sigillata B, Çandarli Ware)

Produced: 150 BCE to 300 CE

Location of Production: Various styles of what has generally been termed "eastern sigillata" were produced in particular locations throughout the eastern Mediterranean. In the Roman Republican period, the major producer of eastern sigillata A was probably located in what is now modern Syria (Lund 2005: 237).

Identification: The earliest type of this ware, and the one which appeared in the Republican period, has been termed eastern sigillata A (ESA). The interior clay matrix varies from yellow to orange and can be of a granular or smooth powdery consistency. It is very well levigated with few to no inclusions visible to the naked eye. Given how highly standardized the forms of ESA are, scholars have posited that it was made with the aid of molds (Hayes 1997: 20–1; Lund 2005: 238).

The slip, in contrast, is red-orange to red-brown in color. It was thickly applied by dipping the leather-hard vessel in slip before it was fired. This resulted in many extant vessels having a "double dipping streak" where the slip overlaps because one side of the vessel was dipped, the vessel was turned, and then the other side of the vessel was dipped (Hayes 1985: 9).

The earliest forms of ESA were several types of deep plates with both incurved or flaring rims and small bowls. Around the last quarter of the second century BCE, several new plate and bowl forms were added to this repertoire along with large krater (a large bowl for mixing water and wine) and jug forms (Lund 2005: 234).

A very similar red slipped ware, termed Cypriot sigillata, began to be produced in the early first century BCE. Cypriot sigillata was produced in western Cyprus, and the distribution of archaeological finds of this ware suggests that the island of Cyprus was its main market, with the West Coast of Turkey and Israel being secondary areas of consumption. Despite this rival production, ESA remained the dominant fine ware in the eastern Mediterranean in the first century BCE (Malfitana 2002: 155). Cypriot sigillata had very similar forms to ESA, but its different area of origin means that it has a different quality clay. Its clay matrix is more commonly brick red to purple brown in color with sometimes visible calcium inclusions. It too was dipped in slip and can have a "double dipping streak," but its slip tends to be applied more thinly

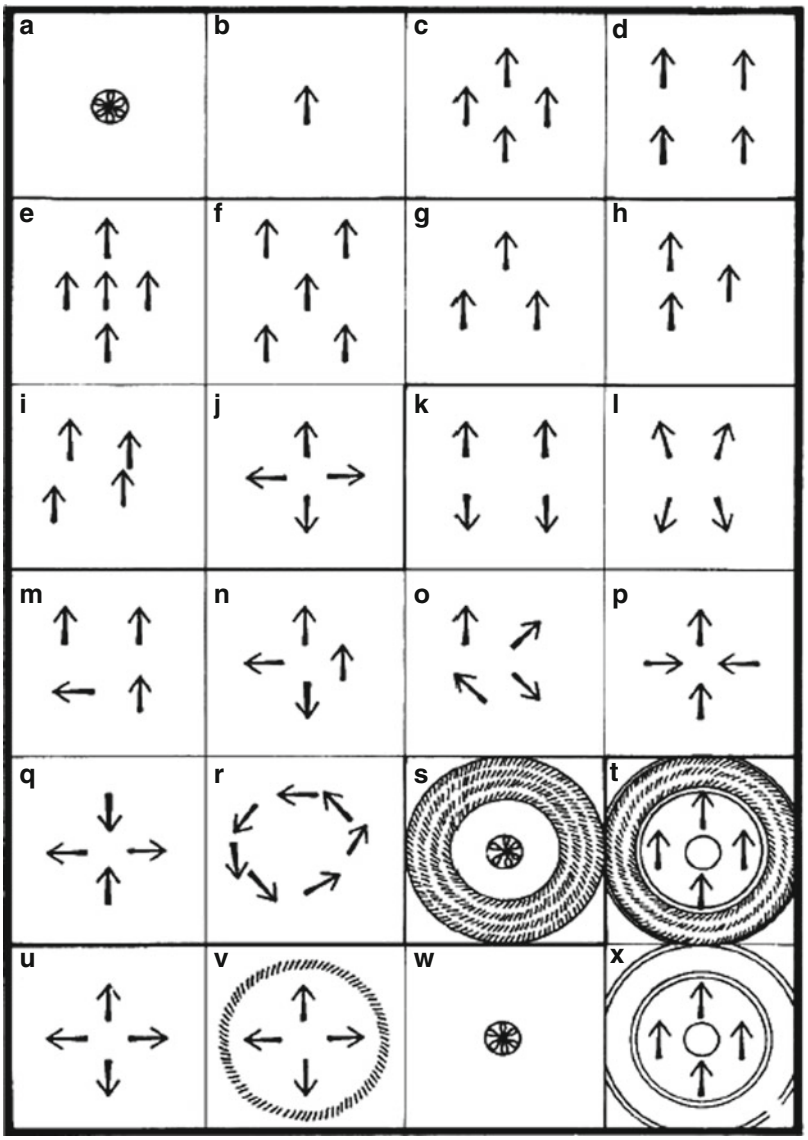

Ceramics: Roman Republican and Early Principate, Fig. 4 Typical arrangements of stamps in *petites estampilles* vessels (Morel 1969: Fig. 3)

and can be quite glossy and metallic (Hayes 1985: 79–80).

Gradually, the production of the other eastern sigillata wares and the introduction of red slipped fine ware produced in Italy, *terra sigillata*, took over the market in the east (Malfitana 2002, Fig. 3).

Italo-Megarian Bowls

Produced: Early second century BCE to end of first century BCE

Location of Production: Central and/or Northern Italy

Identification: These are hemispherical bowls or cups of around 13 cm in diameter which have intricate relief decoration on their exterior which most often appears in the form of foliage but can also include bands of meander, wave patterns, and sometimes faces. The vessels are made by placing a lump of clay in a mold on a wheel. They have a pale red-brown or grey fabric and are unslipped. No chemical or petrographic analysis has yet

Ceramics: Roman Republican and Early Principate, Fig. 5 Photograph of Italo-Megarian bowl from the site of Cosa (Courtesy of the American Academy in Rome)

Ceramics: Roman Republican and Early Principate, Fig. 6 Silver bowl of similar design to Italo-Megarian bowls, found in Naples (Strong 1966: Fig. 31a)

been done to associate specific clays or fine inclusions with production locations (Figs. 5 and 6).

Many of the cups have molded inscriptions naming their potters or workshop owners, and their study has therefore been focused on both establishing a chronology of their relief decoration and on attributing unstamped vessels to known artisans. The Italian version of this vessel appeared a few decades after they started to be made in the Greek East in the late third century BCE. The Greek examples are distinguished from the Italian ones because they bear a metallic-colored slip, have less sharply concaved rims, and are not so strictly hemispherical (Rotroff 1996: 316). The design and decoration of both the Italian and the Greek productions seem to owe a lot to the design of metal vessels from the same period (Marabini Moevs 1980: 185).

See also some excellent examples at the Metropolitan Museum of Art in New York City:
http://www.mfa.org/collections/object/early-relief-ware-bowl-154495
http://www.mfa.org/collections/object/early-relief-ware-cup-with-two-handles-scyphus-154496
http://www.mfa.org/collections/object/body-of-a-pitcher-lagynos-154501
http://www.mfa.org/collections/object/early-relief-ware-bowl-154498

Thin-Wall Pottery

Produced: 200 BCE to CE 300

Production Location: In central and northern Italy, probably in the Po Valley, at Aquileia, and near Ravenna.

Identification: These are small cup or bowl forms which have walls as thin as 0.5 mm. They often have two handles. Their clay is well levigated and usually red-brown to grey-yellow. Sometimes they have a thin black-brown or red-brown slip which had been applied with a brush, but this is not a consistent feature. Often their exterior is left without further ornament, but it is also common to have rouletting or barbotine (added bits of clay) patterned around their central exterior. In general, in the Republican period thin-walled vessels are usually plain or have barbotine design, and then the applied decoration gets progressively more complex and more formal (leaves, crescents, animals) into the first century CE.

These vessels, like many fine ware forms in the period, are often explained as deriving from

or referring to metal prototypes (Marabini Moevs 1973: 36). The repertoire of forms in the Republican period is very varied, and scholars have generally interpreted their forms as deriving from two cultural predecessors: the Golasecca civilization, or more generally Iron Age peoples of north Italy, and the Hellenistic world, namely, the Greek East (Marabini Moevs 1973: 36–8; Gervasini 2005: 285). Forms stemming from Iron Age Italy are taller than they are wide and have a slightly more restricted opening and no slip, whereas forms which are similar to Hellenistic shapes are low, wide cups with handles molded like metal (Figs. 7–9).

Common Ware

Produced: 700 BCE to today

Location: Throughout the Mediterranean

Identification: Termed *Ceramica comune* in Italian, common ware is a vast ceramic category including vessels meant for the preparation, serving, small-scale storage, and cooking of food. There is a great deal of inconsistency in the scholarly literature regarding this category of material; some scholars suggest that it is a category where material that does not fit in any other category is placed, while others see the unifying theme of "common ware" as being the daily preparation of food and a focus on function over aesthetic. This category is also referred to as "utilitarian ware" and as "coarse ware" in English-language publications and in reference to material which was produced in the late archaic period.

It is useful to subdivide this category in two ways: there are vessels used for cooking (in Italian, *ceramica comune da fuoco*, "for the fire") and those used for preparation, serving, and storage (*per la preparazione, da mensa, da dispensa*). These vessels have fundamentally different clay characteristics and forms. Most generally, cooking vessels in the Roman world are made with noncalcareous clays and are coarse-bodied, that is, they have a tendency to have more temper (either naturally occurring in the clay or added by the potter). These technological choices make them resistant to thermal shock. Roman cooking wares in the Republican period generally have an open form for easy access to the food. They appear in both deep pots ideal to contain liquids and soft foods as well as low-walled flat pans for roasting and grilling vegetables and meats.

Vessels suited for the preparation, serving, and storage of food, conversely, need to be relatively resistant to mechanical shock, that is, damage due to bumping or knocking. They tend to be made with calcareous clays which have a much lower concentration of inclusions when compared to cooking wares. The most common preparation and serving vessels made in central Italy in the second and first centuries BCE were fired between 900 °C and 1,000 °C in a reducing atmosphere and then cooled in an oxygen-rich atmosphere. The affect is that they are typically light beige to pink-yellow in color.

While the production of common ware is generally thought of as more locally oriented, it is increasingly clear that common wares both for cooking and for preparing and serving which were made in central Italy were exported around the Mediterranean beginning as early as the late third century BCE and especially by the late first century BCE (Olcese 2003: 21-3) (Figs. 10–15).

Transport Amphorae

Produced: From the third century BCE to end of first century BCE.

Location of Production: Italy and the West Mediterranean basin.

Identification: The shape of Roman amphorae, with their ovoid body, typically narrow neck and base (often ending in a point), and double handles comes out of a long tradition of similar storage and transport containers produced and circulated around the Mediterranean by Phoenicians and Greeks since the eight century BCE (Caravale & Toffoletti 1997: 52–89). Amphorae contained most often wine or olive oil but also fish sauce (*garum*) and possibly dry goods like wheat and nuts (Peacock & Williams 1986: 90). Scholars have determined the primary contents of different amphorae types from the painted labels on their exterior and from chemical analysis of residues from their interior.

Different amphora shapes can be attributed to the contents they were intended to hold,

MOTIFS DECORATIFS		FRANÇAIS	PORTUGAIS [2]	ESPAGNOL	ITALIEN	ANGLAIS	ALLEMAND
1		décor clouté	*Festões de pérolas*	*decoración puntillada*[6]	*motivi punterellati*[7] *festoni di punti*[12]	*dotted decoration*[16]	*Pünktchendekor*[23]
2		semis d'épines	*espinhos*	*decoración de espinas*[6]	*squame in rilievo*[12] *decorazione a spine*[11] *spine ravvicinate*[11]	*thorn decoration*[14] *pine scale decoration*[16]	*Grätendekor*[23]
3		décor cordé	*nervuras segmentadas*	*decoración cordada*[6]	*fasce oblique applicate e segmentate a rotella*[9]	*cord decoration*[16]	*Rippendekor*[23]
4		dépressions	*depressões*	*hoyitos*[3]	*depressioni*[24]	*thumb decoration*[16]	*Faltenbecher*[19]
5		guillochis	*guilhoché*	*decoración de ruedecilla*[4]	*vasi striati*[7] *incisioni a rotella*[10] *decorazione a rotella*[11]	*rouletting*[15] *rouletted decoration*[14, 16]	*Rädchenmuster*[20, 21]
6		incisions	*incisões*	*decoración incisa*[6]	*decorazione incisa*[11]	*incisions*[16]	*Federndem Blättchenverziert*[22]
7		incisions au peigne	*penteado vertical*	*Haces de lineas incisas*[4]	*decorazione a fasci*[7] *decorazione a pettine*[10]	*comb incised lines*[16]	*Vertikalrillen-verziert*[23]
8		décor sablé	*granitado arenoso*	*decoración arenosa*[4]	*decorazione arenosa*[7, 11]	*sanded bowls*[13] *roughcast sand*[15]	*Griesbewurf*[19]
9		crépi sablé	*crespos*	*reticulado*[6] *paredes rugosas*[25]	*pareti increspate*[24]	*webbed sand*[16] *rustic ware*[17]	*Grobes Netzwerk*[20]
10		écailles de pomme de pin	*escamas de pinha*	*pedúnculos*[6] *hojas de piña*[5]	*foglie di spigna*[11] *scaglie di pigna*[10, 24]	*pine scales*[15, 16] *pine cone decoration*[13]	*Schuppenmuster*[21]
11		réticulé de losanges	*rede de losangos*	*rombos*[6]	*puntellature*[7]	*diamond shaped rouletting*[16] *small squares in diagonal rows*[15] *lozange-grill*[13]	*Vertikaler Rhomben*[23] *Quadratische Pünktchen*[21]
12		perles	*pérolas*	*perlitas*[6]	*puntini*[8]	*dots*[14, 15, 16]	*mit Buckeln verziert*[19] *Pünkten*[22] *Perlreihe*[21]
13		mamelons	*mamilos*	*besantes*[3] *decoración mamilar*[5]	*decorazione mammillare*[7] *piccole mammillature*[11]	*pointed spines*[15]	*Warzenreihen*[21]
14		festons	*recortes*		*festoni*[12]	*scales*[15]	
15		lunules	*lúnulas*	*medias lunas*[6] *semi-circulos*[5] *crescientes*[5]	*motivo curvilineo rivolto in giù*[11]	*crescents*[13] *scales*[15]	*Deckelfalz*[19] *Bogenmuster*[21] *Runden Schuppen*[20]
16		bâtonnets	*bastonetes*	*tallos*[6]	*aghi*[7]	*ridges*[13, 15]	
17		godrons	*linguetas*	*hojas lanceoladas*[5]	*elementi oblunghi*[11]	*godroons*[13]	*lange Spitzblätter*[21]
18		feuille d'eau[1]	*folhagem de plantas aquáticas*	*hojas de agua*[6]	*foglie lanceolate*[8] *foglie d'acqua*[8] *tralci d'edera*[11]	*flat leaves*[13] *oval leaves*[18]	*Wasserblätter*[21] *Lanzettblätter*[22]
19		feuille de fougère	*palmetas*	*palmas*[6]	*palmette*[7]	*fern leaf*[13, 15]	*Palmenzweig*[21]

Ceramics: Roman Republican and Early Principate, Fig. 7 Table of decoration on thin-wall pottery (Mayet 1975: 8) (courtesy of F. Mayet)

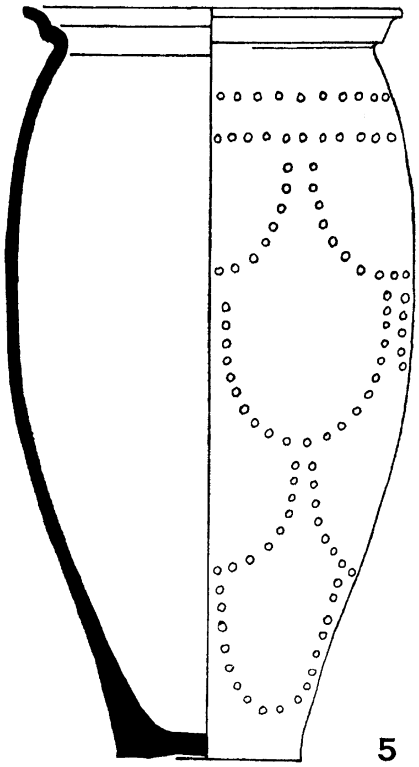

Ceramics: Roman Republican and Early Principate, Fig. 8 Thin-wall cup, Italian-inspired, type Mayet I (Mayet 1975: pl. 1, n. 5) (courtesy of F. Mayet)

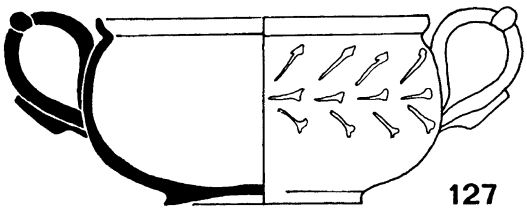

Ceramics: Roman Republican and Early Principate, Fig. 9 Thin-wall cup, Greek-inspired, type Mayet X (Mayet 1975: pl. XVI, n. 127) (courtesy of F. Mayet)

characteristics of the local clay, form precedents in their region of production, and transport concerns like how far they needed to be transported until they reached a harbor yard and the kind of ship in which they were to travel (Fig. 16).

There are several prominent amphora types in the Roman Republican period. *Greco-Italic* amphorae were produced in central Italy and the western Mediterranean from the third century BCE to the mid-second century BCE and are most obviously identified by the triangular profile of their rim. This triangle becomes progressively more elongated toward the end of their production date. The body of this amphora is ovoid, with a pointed base, a cylindrical neck, and two flat vertical handles. The typical height of a complete amphora is 80–90 cm (Caravale & Toffoletti 1997: 97). The fabric color varies, but in general it is buff-yellow to pink, and the exterior is slightly white. Greco-Italic amphorae held primarily wine.

Dressel 1 amphorae are similar to Greco-Italic in design features but have a narrower body and are generally more elongated. Dressel 1A and 1B also have quite a pronounced shoulder carination. Their overall height is 100–120 cm (Caravale & Toffoletti 1997: 98). Production of this type ran from the middle of the second century BCE to the late first century BCE in west-central Italy. These amphorae also began to be imitated by potters in southern France and Spain. Examples of Dressel 1 are found concentrated in Italy but also throughout the Mediterranean basin and in Britain. These vessels primarily transported wine, but perhaps also olive oil (Peacock & Williams 1986: 87, 90, 92).

For photographs and drawings:
http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/details.cfm?id=324&CFID=5196568&CFTOKEN=46649964

Another wine-carrying amphora from this period comes from around the Adriatic coast (Caravale & Toffoletti 1997: 104; Sondi & Slovenec 2003: 252). Amphorae of Lamboglia 2 type are very similar in style to Greco-Italic amphorae but with a shorter base point. Overall, they are typically 80–95 cm in height. These amphorae were produced from the late second century to the late first century BCE and are found primarily in the eastern Mediterranean.

For photographs and drawings:
http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/details.cfm?id=229&CFID=5196568&CFTOKEN=46649964

Finally, *Brindisi-type* amphorae from southern Italy are much more squat and wider than the above examples and have handles which are round in section instead of flattened ovoid.

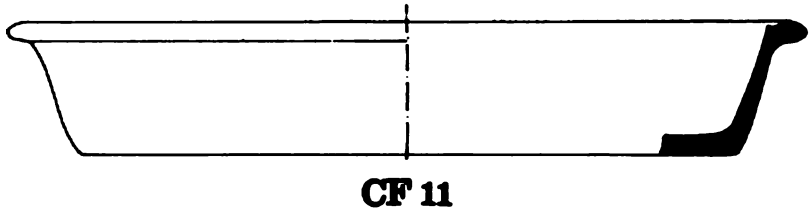

Ceramics: Roman Republican and Early Principate, Fig. 10 Flat pan for cooking (*tegame*, in Italian) (Dyson 1976: Fig. 1, CF 11)

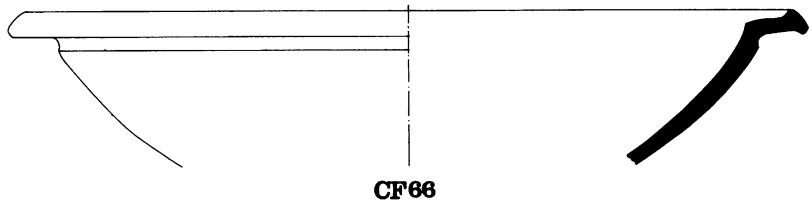

Ceramics: Roman Republican and Early Principate, Fig. 11 Deep pot for cooking (*pentola*) (Dyson 1976: Fig. 42, 22II-2)

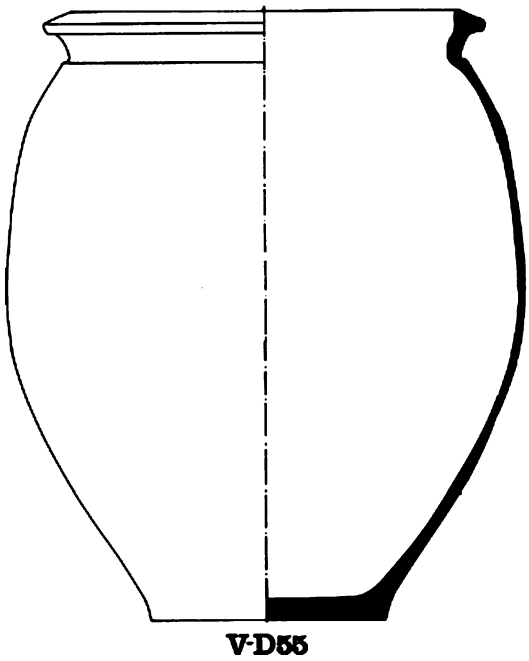

Ceramics: Roman Republican and Early Principate, Fig. 12 Deep jar for cooking (*olla*) (Dyson 1976: Fig. 22, V-D 55)

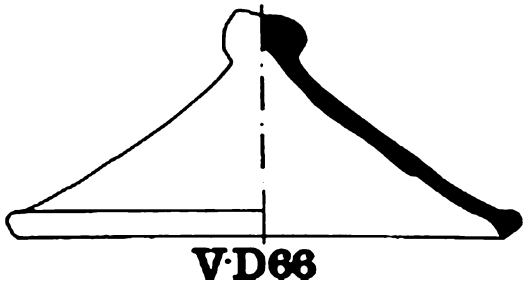

Ceramics: Roman Republican and Early Principate, Fig. 13 Lid for a cooking pot (Dyson 1976: Fig. 23, V-D 66)

They were produced from the late second to the mid-first century BCE and probably held olive oil (Peacock & Williams 1986: 83).

For photographs and drawings: http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/details.cfm?id=51&CFID=5196568&CFTOKEN=46649964

"Presigillata"

This was a term first coined by N. Lamboglia in 1951 to refer to what he interpreted as a transitional ware between black gloss pottery and pottery of similar manufacture which had a red slip. It has since come to be used to refer instead to any vessels with a red gloss which predate the manufacture of *terra sigillata* in the mid-first century BCE, and most problematically, it is often used when the ceramicist is unsure of the class or origin of the slipped material. It is generally agreed that because of the term's lack of precision, its continued use is problematic and unhelpful (Wells 1990).

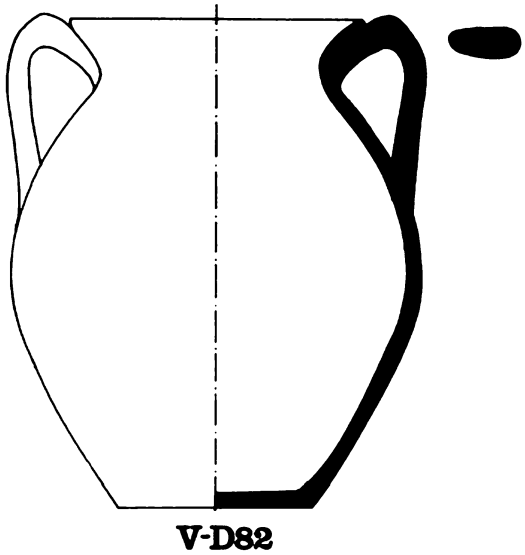

Ceramics: Roman Republican and Early Principate, Fig. 14 Pouring or storage jug (*brocca*) (Dyson 1976: Fig. 25, V-D 82)

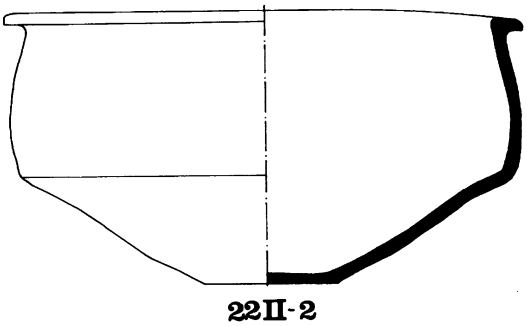

Ceramics: Roman Republican and Early Principate, Fig. 15 Bowl for preparing food (*ciotola*) (Dyson 1976: Fig. 5, CF 66) (Courtesy of the American Academy in Rome)

Historical Background

The study of Roman ceramics, like many fields of classical archaeology, has its roots in art history. The methods of connoisseurship used in the study of Greek vase painting were similarly applied to the study of Roman fine wares by scholars like H.B. Walters, who condemned the barbarity of Roman art when compared to the more refined products of the Greeks (Greene 2005: 37). The focus on the aesthetic aspect of Roman ceramics is a large part of the reason that the study of Roman common wares began so much later the systematic study of finer wares.

In 1879 G. F. Gamurrini published the first study of black gloss vessels found in the western Mediterranean and named them "Etrusco-Campanian" in type. Following this, black gloss received very little attention until Nino Lamboglia's 1952 *classificazione preliminare*. Lamboglia identified three fabrics and posited production locations near Naples (Campana A), Etruria (Campana B), and Sicily (Campana C). He also made a simple typological system to delineate the forms found in each fabric. J. P. Morel (1981) complicated this system with an open typology which allowed further types to be added to his categories. His classes are more focussed on the details of design (open versus closed form, rim shape), rather than on function. The groupings are based on the idea that the potters of a particular series were all aiming to make an "ideal type" and the variations they produced were as close as they could get to that ideal.

When it comes to non-fine wares, the focus of study has taken two different tracks. First, the systematic study of transport amphorae began in the late nineteenth century, spurred largely by epigraphers interested in the appearance of the painted inscriptions on amphorae. R. Schöne (1871), A. Mau (1898), and H. Dressel (1891) established the first typologies of amphorae produced in the Roman Mediterranean (Peacock 1982: 3).

On the other hand, it was only in the mid-twentieth century that attempts were first made to treat domestic common wares as a category worthy of careful study. Nino Lamboglia's 1950 publication of the utilitarian pottery from Albintimilium is an excellent early example which is still often referenced. Part of the difficulty in the study of common wares is the fact that they are often locally produced. Therefore, typologies based on forms may only be relevant for small regions. More recent studies have attempted to organize these wares by broad functional type or by fabric. The introduction of petrological analysis to Roman pottery studies

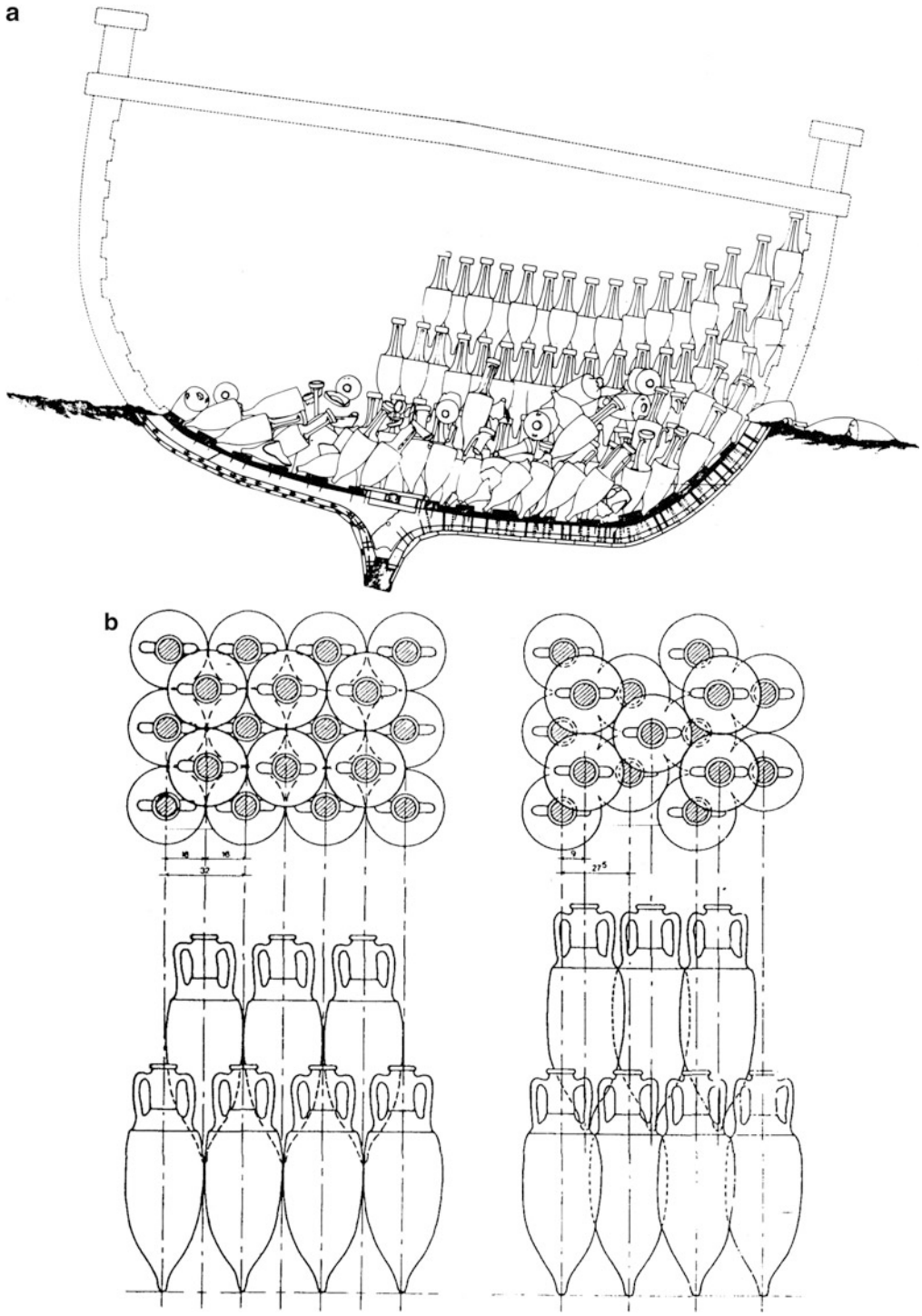

Ceramics: Roman Republican and Early Principate, Fig. 16 Schematic of how amphora are stacked inside the holds of ships (Caravale & Toffoletti 1997: 40)

in the 1970s driven by the work of David Peacock began a quiet revolution in the study of coarse-bodied ceramics including amphorae (Peacock 1977; Peacock & Williams 1986).

In 2003, Gloria Olcese and her collaborators created broad regional "type guides" for common ware produced in Italy from fourth to the first BCE (Olcese 2003). Her typology takes fabric into account and allows for significant variation within the form of each vessel. This study is also the first to combine large-scale XRF (energy dispersive X-ray fluorescence) and petrological analysis with traditional morphological analysis. The intention behind such work is to be a starting point to examine the presence of Italian coarse wares outside of Italy. This could not be done without first a clearer understanding of what was being produced in central Italy itself.

Key Issues/Current Debates

Several interrelated issues in Roman ceramic analysis have been raised recently in the scholarly literature. The primary purpose of initially creating ceramic typologies was to date archaeological stratigraphy. This purpose remains; however, the concern now is that although our understanding of typological development may be correct, our absolute and even relative dates for whole classes of material may be seriously flawed. For material in the Republican period, this could be especially true for black gloss ware. The increasing recognition of the complexity of black gloss production and the growing house of cards of sites dated using black gloss and sites dated using the dates of other sites mean that the revision of black gloss chronology would have significant consequences for Republican archaeology. Furthermore, as our understanding of the use-life of ceramic material and the formation processes of Roman archaeological sites develops, we discover that the production date of ceramic material differs greatly from the date of the use and deposition of various ceramic classes.

Related to this issue of redating is the issue of cost, value, and reuse of ceramics. The interrelationship between ceramic vessels and vessels made of other materials – glass and especially metal – is something which we can only estimate. It was in the middle Republican period that widespread experimentation with different raw materials and form began. Since so few metal and glass vessels are attested in the archaeological record when compared to pottery, our understanding of the economic and cultural value of ceramic vessels might be quite skewed. We wonder who the customers were for fine ceramics – the wealthy upper class? The second-tier moneyed class who could not afford metal wares? Recent scholars have used a combination of ancient literature and quantitative and qualitative material studies to consider this question (Lund et al. 2006; Roth 2007). The study of ceramic repair (pot-mends), use-life, and reuse can help illuminate some sense of the value of ceramic vessels. The work of J. T. Peña highlighting reuse (especially in the case of Roman amphorae) and modeling the ceramic cycle has been quite important to the increased consideration of the multifunctionality and use-life of Roman ceramics of various classes (Peña 2007). These types of studies are being taken into consideration for the redating and better understanding of the complexities of typological change and influence, and indeed site chronology.

The application of archaeometric study to Roman ceramics has also been adopted in the last 25 years. Determining ceramic provenance of coarse-bodied wares (common wares and amphorae) through petrology and XRF and of fine wares through neutron activation analysis (NAA) and chemical testing has both confirmed earlier assumptions about provenance and trade and greatly altered how we understand the movement of raw clay and completed vessels in the Roman world. The employment of archaeometry has allowed for the increasingly systematic study of common wares as well as the expansion and refinement of pottery's role in the Roman economy (Greene 2005). Residue analysis has also been applied to Roman ceramics, especially in Roman Britain, in order to better understand food production, storage, and consumption as well as to examine the reliability of textual sources in our study of ceramic function (Cramp 2008).

The interrelatedness of these issues and the increasing collaboration of material scientists, archaeologists, and classicists have also meant ceramology has become both an increasingly specialized and interdisciplinary field.

Future Directions

Future directions for the study of Roman ceramics in the Republican period relate to the concerns of current research both in their increased specificity and in their broad syntheses. Firstly, archaeometry will continue to play an important role. Defined most simply as the application of scientific methods (including mathematical, physical, and biological sciences) to archaeological materials, the effect of archaeometry on the questions and concerns of Roman archaeology is only just beginning to be felt. The examination of clay composition and provenance with methods like petrology, XRF, and NAA means an increased understanding of the details of natural resource economy (clay and fuel acquisition, movement, contacts and cooperation between regions), potting technology (clay processing, kiln technology), and human capital (workshop organization and output, training methods, potter individuality and identity), not to mention revealing even more about trade connections, market consumption, and consumer interests.

Residue analysis on archaeological ceramics (gas chromatography/mass spectrometry and liquid chromatography/mass spectrometry being two popular methods) has been used only tentatively by Roman archaeologists thus far because of the limitations of its results; however, these methods are being continually expanded and refined by archaeochemists. Furthermore, the increased accessibility and affordability of this technology means it will become a more popular tool to contribute to the study of vessel use. Research questions regarding foodways and subsistence are very much connected to issues of environmental economy, changing landscapes and urbanization, and cultural contact and identity – themes which are key in the Roman Republican period.

The use of archaeometric methods has run parallel to increasingly detailed study of coarse-bodied ceramics – ceramics for everyday use and used by every class of Roman society. In the future, there should be the continued study of these common wares and an increased recognition of typological series and vessel function. This brings us to our second area of future development: full data reporting and contextual analysis. Many past publications of Roman sites have divided artifacts up by type with the ceramics subdivided and separately studied and published by class. Difficulties of funding, time, and loss of interest have often meant that the overall interpretation and synthesis of the site happens before artifact study is finished, with no reference to ceramic artifacts, or not at all. In contrast, interest in the 1980s and 1990s in the quantitative analysis of Roman ceramics stressed the need to consider in detail all the artifacts in assemblages and to select quantitative methods which minimize recovery and fragmentation bias and allow for inter-site comparison. Many of these early studies used clunky project-commissioned computer programs which were not commercially available. Today, the increased use of digital applications in Roman archaeology including increasingly user-friendly statistical software, sophisticated database programs, GIS, and digital publishing means that we can harness technology in order to perform data organization, processing, storage, and dissemination which has been a slow and daunting process in the past. The coalescence of all of these factors (the equal study of all ceramic classes, the use of quantitative methods, digital applications) allows for the simplest development in Roman ceramic study: complete and explicit data reporting and broad site syntheses which are closely tied to the material record. With thorough ceramic study, ceramics can illuminate the archaeological formation processes at work in creating archaeological sites and excavation conditions and contribute to broad contextual concerns like the function of ancient spaces, status, access, discard practices, and the interconnections between individuals, households, sites, and regions.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics, Roman Imperial
- ▶ Economy, Roman
- ▶ Organic Residue Analysis in Archaeology
- ▶ Site Formation Processes

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Ceramics: Scientific Analysis

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Introduction

Scientific investigations on archaeological ceramics are carried out with three different purposes:

- Reconstruction of ceramic processing technology, which includes the definition of the type of raw material used, the possible corrections of the raw clay, the shaping technique, the firing system used, the cooking atmosphere and the maximum temperature reached, and the presence of coatings and decorations
- Identification of the production area of artifacts (the study of provenance), which often requires the analysis of possible local clays, with the main aim of contributing to the reconstruction of the routes of trade between different settlements and cultural contexts
- Definition of the conservation state, in order to better address the works of restoration and conservation

Only the analyses applied in the first two cases are dealt with specifically here because the information obtained is strictly relevant to archaeology.

Definition and Key Issues

Analysis of the Microstructure

The microstructure is defined by observation in polarized and transmitted (instead of reflected) light microscopy, using the so-called mineralogical microscope, with enlargements for the most part between 40 and 100 times. To do this, the sample is prepared in section thin enough (about 30 μm) to pass the light.

The observation allows to highlight many microstructural aspects, including:

- Degree of isotropy/anisotropy of the clayey matrix
- Homogeneity/heterogeneity of the clay matrix, such as the presence of argillaceous rock fragments (ARFs)
- Presence of grains larger than a minimum of about 30 μm
- Size distribution of these granules, which can be concentrated in a limited range or fairly evenly dispersed in the range from about 30 μm to maximum size present
- Nature (including any grog) and shape of these granules
- Presence, abundance, and form of any macropores, that is, voids larger than about 30 μm
- Presence, nature (clayey or vitreous), and thickness of coatings, if any
- Microstructure of the coatings, particularly the glazes (gradations of composition, crystalline inclusions, bubbles)
- Presence of cracks or fractures
- Any filling of pores and fractures with material deposited during the burial of the shards

Such information helps to make various deductions, such as the possible use of plastic

material to correct the clay, the origin of the ceramic material (especially for coarse ceramics), and an evaluation of the firing temperature (Montana et al. 2007).

Chemical Analysis

The chemical analysis serves to determine the chemical composition, expressed by the percentage content of chemical elements that constitute the analyzed material: ceramic body, coating, or decoration.

This type of analysis can be performed with different analytical techniques, among which today the most common are:

- Wavelength dispersion-X-ray fluorescence (WDS-XRF)
- Inductively coupled plasma-atomic emission spectrometry (ICP-AES)
- Energy dispersion spectroscopy coupled with scanning electron microscopy (SEM-EDS)

The elements typically analyzed for ceramic bodies and argillaceous coatings are 10 and are generally reported as oxides in the following order: SiO_2, Al_2O_3, TiO_2, Fe_2O_3, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5. For the analysis of the glazes, PbO and SnO_2 are added to these elements. Finally, for the decorations you can add different coloring oxides, such as CuO, CoO, Cr_2O_3, and As_2O_3, as well as Fe_2O_3 and MnO.

The chemical investigation is very important for the provenance studies, especially for ceramics with fine paste (Maggetti et al. 2011).

Mineralogical Analysis

The mineralogical analysis is performed through the X-ray diffraction (XRD) and serves to qualify and semi-quantify the crystalline phases, among which the main ones are quartz, feldspar, calcite, illite, gehlenite, pyroxene, and amphibole. But the list could go on with minerals less frequent or present in small quantities, for example, dolomite, kaolinite, smectite, chlorite, hematite, and rutile.

Some of these minerals are already found in the clays, while others (new-formation phases) are formed during firing. These phases are generated mainly as a result of the destruction of clay minerals and calcite and the subsequent reaction between the remnants of these components, with the formation of different compounds according to the thermal level reached during the ceramic firing. Therefore, knowledge of the crystalline phases present in ceramic bodies is essential for the evaluation of the firing temperature (Fiori et al. 2011) and can also provide useful information in studies of provenance.

Thermal Analyses

The compounds present in the ceramic material, when subjected to heat treatment, may undergo chemical changes. The thermal analyses record any loss of weight (thermogravimetric analysis, TGA) and the absorption or release of heat (differential-thermal analysis, DTA) caused by these reactions. Since the reactions occur in well-defined temperature ranges, the thermal analyses allow recognizing the original compounds.

The information obtained can be used to confirm the results of the mineralogical analysis and the evaluation of the firing temperature. The minerals that are modified or destroyed at a given temperature indicate, in fact, that this temperature was not reached during the ceramic firing (Fiori et al. 2011).

Examples

Sampling

The analytical techniques mentioned above require the availability of a sample taken from the object to be analyzed and brought to the laboratory to perform the different analyses. Therefore, it deals with invasive analyses but also destructive because a variable amount of material is destroyed during sample preparation or during the analysis. When you plan to run some analysis, it is imperative to take this into account (Artioli 2010).

The amount of material to be taken depends on the type of analytical technique used. For example, the preparation of a thin section for observation under a mineralogical microscope requires a fragment of at least 1 cm, indicatively corresponding to 1 g, while the thermal analyses consume only a few tens of milligrams of material.

The amount of sample depends also on the characteristics of the same ceramics that you want to analyze, because the sample for analysis must always be representative of the material under examination. Therefore, the sample to be taken for coarse-grained ceramic pastes should be much larger than that of fine ceramics, regardless of the type of analysis to be performed.

Finally, it is worth clarifying that there are also noninvasive analytical techniques and that often the analyses in this case can be made in situ (Fabbri 2012). Unfortunately, these techniques are not suitable or are not the most suitable for the analysis of ceramic materials aimed at obtaining information useful in archaeological terms.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Ceramics: Stonewares

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Brief Definition of the Topic

It could be argued that stoneware was one of the first western European commodities to have a truly global cultural impact. Archaeologically, it is virtually ubiquitous on first contact sites and European colonial settlements and shipwrecks around the world throughout the post-Columbian epoch, particularly those that have a western or northern European connection. Deriving from heaving industrial production, it could be made in large quantities and its robust body made it suited to long-distance trade. A fully fused true stoneware, with a highly vitrified body (porosity of 0.4 %) with firing temperature of 1300–1400 °C, emerged as a commercial product in the Rhineland around CE 1300 following over 100 years of proto- and near-stoneware evolution and successful business development. It is no coincidence this development not only coincided with the spread and growth of towns in northern Europe, and hence new markets from c. CE 1200. The colonization of the Baltic rim by western European Crusaders, clergy, merchants, and artisans required the transfer of western European lifestyles and all its physical attributes. Stoneware enabled the Hanseatic trading community to continue to enjoy their accustomed drinking and table customs and other domestic habits overseas. Stoneware was ideally suited to mercantile urban housing with tiles flagged floors, timber furniture, and with defined living space and service quarters.

Stoneware was a robust but lightweight, nonporous, stainless, and odor-free ceramic body that revolutionized domestic life, from the parlor and dining room to the kitchen, cellar, and latrine. According to the archaeological record, German stoneware penetrated the households of

rich and poor across the continent of Europe from the thirteenth century and forms a primary component of the European colonial toolkit from the late fifteenth century onward. Radical refinements in design and technology from the mid-fifteenth century, notably in the introduction of molded relief forms, transformed the status and function of domestic ceramics in western and northern Europe from essentially utilitarian commodities into symbolic artifacts in their own right. The fusion of mold technology and printed propaganda in the sixteenth century further revolutionized the medium though which topical religious and temporal concerns entered the home. These innovations gave the medium a radically new dimension: relief ornament enabled stoneware to compete for the first time in terms of visual impact as well as function in the dining sphere, particularly with metal vessels and decorated glassware. Stoneware manufacturers drew on a wide range of contemporary popular graphic design sources, which could be reproduced at a minimal cost through mold technology on an almost limitless number of vessels. The wide variety of decorative subject matter, ranging from purely ornamental motifs to biblical, mythological, allegorical, armorial to political and religious imagery, transformed stoneware from a primarily domestic commodity into a minor art form. The fusion of graphical reproduction and molded technology enabled German stoneware producers to respond immediately to rapidly changing political and religious loyalties in the development of a new iconographic repertoire during the course of the sixteenth century.

Unlike, say, Italian or Netherlandish maiolica, which is characterized by individually hand-painted ornament, stoneware potters could replicate complex products in bulk – the only investment required at the mold-manufacturing stage. Stoneware rose rapidly in status. A further technological innovation which amplified the effect of the relief-molded decoration was the deliberate introduction of salt into the glazing process during the course of the early sixteenth century. Analysis of wasters from Rhenish kiln sites suggests that this innovation coincided with the increasing use of applied relief ornament at this time. The combined result radically enhanced the symbolic status of stoneware still further. By the end of the sixteenth century, stoneware relief designs were embellished with the use of cobalt paint.

Although fired on a truly industrial scale from the thirteenth century, German stoneware remained an artisanal, workshop-based craft product until the introduction of machine mass-production in mid-eighteenth-century England. Rhenish stoneware potters attempted to replicate Staffordshire tea ware forms but to no avail and, bar a few specialist products, their presence in the international export market ceased abruptly. However, the instrumental role of the historic Rhenish stoneware production in establishing the British and North American stoneware industries of the eighteenth to twentieth centuries is undisputed. Today, German stoneware is regarded as a key artifact type for the archaeology of late medieval and early modern society, and in particular for the study of domestic life, table culture and for trade and long-distance cultural transfer. It is a type-fossil of European settlement archaeology around the globe.

Cross-References

- ▶ Consumption, Archaeology of
- ▶ Hanse Archaeology
- ▶ Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Scandinavia and the Baltic Sea Region: Medieval Archaeology
- ▶ Western Europe: Historical Archaeology

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Ceramics: The Ibero-American Shipping Container

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Introduction

Many goods from Europe were once packed and shipped around the world in a seemingly endless variety of ceramic containers. Today, they can be found at the bottom of almost every body of water that ships crossed and in almost every land on which European explorers, settlers, missionaries, and merchants set foot. To date, the only containers that have received serious study are those that John Goggin (1960) called "Spanish Olive Jars," a term that seems to have caused more problems than it has resolved. He limited his discussion to two varieties: one that is globular and one that has been referred to as "amphora-like," "egg-shaped," "carrot-like," "elongated," and "conical," among others (Fig. 1).

This entry presents the key definitional points and debates that have been published, usually under the English heading "Spanish Olive Jar," the Spanish heading "*botija*," the Portuguese heading "*anforeta*/*botijuela*" (depending on the shape), and under a variety of different headings by other investigators.

Ceramics: The Ibero-American Shipping Container, Fig. 1 Plain *botija* found in excavations at the historic district of Mexico City, probably dating to the 1600s; green-glazed *botija*, private collection

Definition

The earthenware vessels referred to here as "shipping containers" are part of a ceramic tradition dating back thousands of years, which was based on the need to find a low-cost method of safely packing and effectively stowing perishable food stuffs for maritime commerce.

For its colonial, transatlantic commerce, Spain adopted two principal ceramic container

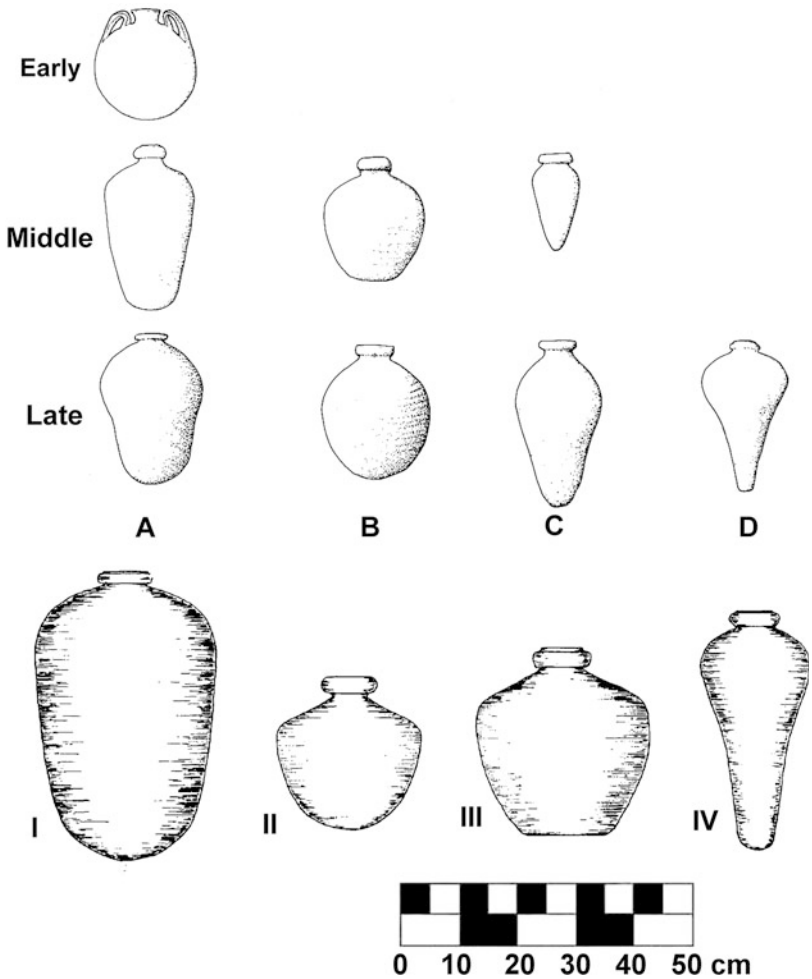

Ceramics: The Ibero-American Shipping Container, Fig. 2 Olive jar styles according to Goggin (*upper* rows, not to scale) and form types as proposed by James (*lower* row) [Adapted from Goggin (1960: 28) and James (1988: 48)]

forms: one that was globular and one that was conical. Over time, the two handles of the original, globular vessel were eliminated, and the vessel's method of production changed from the suggested preparation of two halves that were joined together to a single throwing on a potter's wheel. The conical vessel, always wheel-thrown, experienced significant changes in its size (Fig. 2). The neck rim was always added in the last stage of production, but studies show that its profile, on both varieties, changed significantly over time (Fig. 3). In terms of surface treatments, both varieties have examples with no treatment and examples covered with a lead-based glaze. To date, only some examples of the globular vessel show the application of a tin-based, lead glaze to the interior.

Spanish contracts for the production of ceramic shipping containers used a variety of names to indicate the specific vessel being requested, with no particular description that would indicate their shape (e.g., Gestoso y Pérez 1995). Ship registers, prepared by a large number of notaries, also used a variety of terms when listing the ceramic shipping containers in which goods were packed, again with no indication of the shape (see *Archivo General de Indias*, Section *Contratación*). No clear definition has been made that would establish an exact correspondence of contents to vessel type in terms of elements such as shape, size, name, and glazed/unglazed.

Spanish varieties often have stamped, impressed, embossed, in relief, incised, engraved,

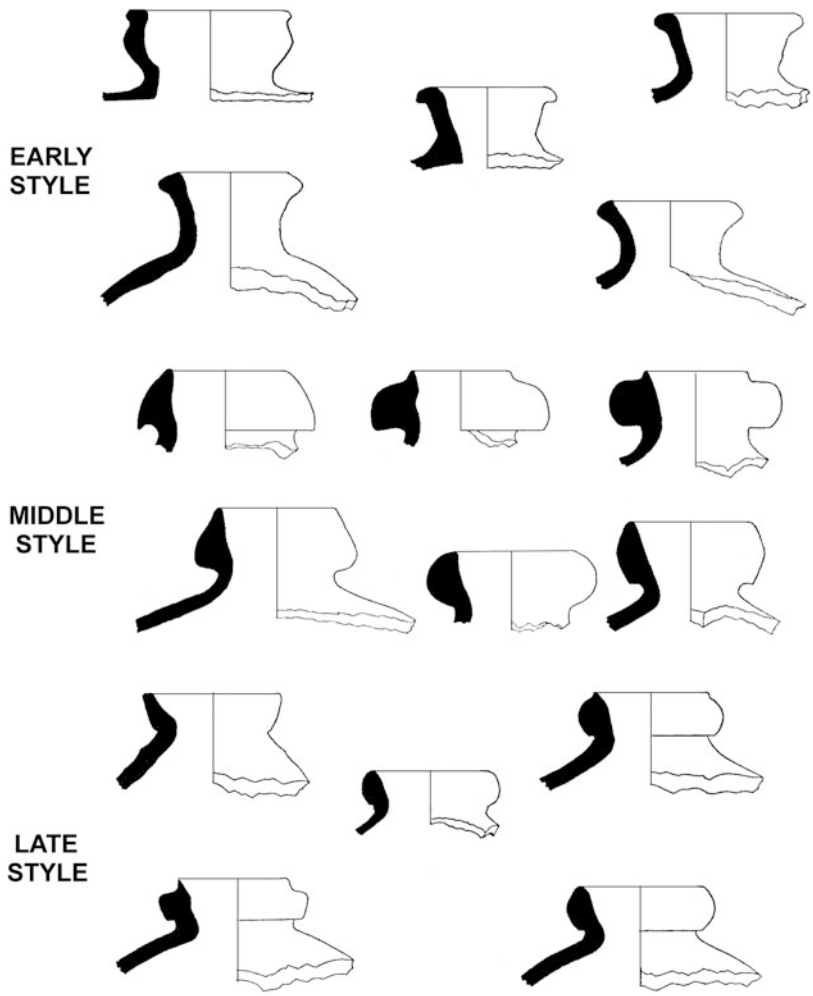

Ceramics: The Ibero-American Shipping Container, Fig. 3 *Botija* rim profiles and styles as proposed by Goggin [Adapted from Goggin (1960: 10, 13, 19)]

scratched, or filed marks on the neck rim or impressed marks on the shoulder (Fig. 4). They may also have "painted" marks on the vessel body. The wide distribution of the same rim mark across a number of disparate archaeological sites in the Americas raises more questions than it answers regarding the significance, if there is one, of these marks, considering their absence on any part of the visible surface of other Spanish earthenwares.

Documentary evidence (e.g., Zunzunegui 1965) indicates that both vessel varieties were wrapped in a protective matting of woven bands of esparto grass to which two handles were attached, using the same material.

Data from ship registers indicate that wine and olive oil were always a cargo item on each ship. The two products were packed, but not exclusively, in the globular or conical ceramic containers. They also indicate that the following list of products could, from time to time, be packed in the same kind of containers: vinegar, honey, olives, almonds, capers, chickpeas, hazelnuts, rice, tuna, myrrh, various types of fragrant oils, raisins, figs, eggplant, flour, pitch, soap, brandy, lard, gunpowder, and the accompanying, round, lead shot for firearms (e.g., James 1988; Velasquez & Fournier in press). However, register entries mentioning these products also indicate that they were shipped in barrels (a preferred method for some items) or in other types of ceramic containers for which there are no descriptions.

Ceramics: The Ibero-American Shipping Container, Fig. 4 *Botija* rim marks from archaeological samples found in the former monastery of Santo Domingo, Guatemala (*upper* rows), and in different excavations at the historic district of Mexico City (*lower* two rows)

Spanish ceramic shipping containers were recycled both in Spain and in its colonies. In Spain they were used as filler material in walls and as structural support in the construction of vaulted ceilings, and they were sometimes buried below floors to prevent ground moisture from seeping up (Amores Carredano & Chisvert Jiménez 1993). In the colonies they served the same purpose but were also used in domestic contexts for storing water, beer, and certain dry goods, such as flour, corn, and beans, and in military contexts for storing water. They may also have served to pack New World exports, such as pearls from Venezuela and *bálsamo* (balm) from Central America, for shipment to Spain.

Portugal, on the other hand, adopted and tended to maintain a wheel-thrown, globular, two-handled vessel for its oceanic commerce. However, archaeological evidence from the wreck of a Portuguese vessel off the coast of Mombasa, Kenya, appears to indicate the introduction of an elongated, two-handled version not previously mentioned (Sassoon 1981). To date, none of the vessels show indications of glazing. There is no evidence that these vessels were known locally as other than *anforetas*/*botijuelas* that they had rim or shoulder marks or that they were wrapped in matting. No studies have indicated changes over time to the triangular-profile, neck rims. The only products known to have been shipped in them were wine and olive oil, destined for merchants in northern Europe, in Newfoundland, in present-day Canada, and probably African or Asian Portuguese settlements. There is no evidence of recycling; in fact, they are reported as having been thrown away when empty (Newstead 2008). The "amphora-like" vessel called *anforeta* appears to be of Spanish origin.

The introduction of wine industries in some of the Spanish-American colonies appears to have created the need for the local production of ceramic containers in which wine could be distributed. Evidence has been published recently that shows that *botijas* were definitely produced in at least Peru's Moquegua wine region (e.g., Rice 2010: 44, Fig. 9) (Fig. 5), in the Mendoza region of Argentina (Ceruti 2005), but only possibly in present-day Chile (e.g., Lacoste 2007).

Peruvian wine appears to have had a wide distribution. *Botijas* from that colony have been found in Panama (Rovira 1983: 24) and in Guatemala. One example has been located on an island in the South Pacific, believed to have been brought on a ship that set sail from Peru to explore that part of the world (Bedford et al. 2009: 82, Fig. 2).

Published photographs indicate that the conical vessels were long and wide, had no neck rims, and were stoppered with something other than cork. Unpublished physical evidence from Guatemala shows that there were two sizes. The smaller vessel had a length of at least 51.5 cm and a diameter of 29.3 cm. The larger vessel had a length of at least 91.2 cm and a diameter of 40.8 cm. Both vessels had wall thicknesses ranging from 2.5 to 3.0 cm. The interior of the wall was covered with pitch. Like Spanish *botijas*, they were recycled, but to do so it appears that the recycler reworked the mouth opening to make it larger. Oral tradition in Guatemala suggests that these reworked Peruvian *botijas* were set into the ground and used for fermenting

Ceramics: The Ibero-American Shipping Container, Fig. 5 Example of a small Peruvian *botija* from monastery of Santo Domingo (Guatemala). The mouth rim was reworked in the recycling process to make it larger

clandestine liquor. Their sheer weight probably precluded them from being used in vaulted roof construction.

The early planting of olive trees in Peru seems to have resulted in a high level of local olive oil production prior to 1650 and the need for *botijas* in which to pack and distribute the oil. If those *botijas* have been found, they have not been identified as non-Iberian.

Current Debates

The current debates on ceramic shipping containers can be framed in terms of four perspectives: (1) defining the types of vessels that represent the full range of ceramic shipping containers; (2) finding an agreed-upon nomenclature for this group of vessels, which could be translated and understood easily from one language to another; (3) discovering the centers of production and determining the ceramics ecology involved in the production process of each vessel type; and (4) determining the processes followed to fill them and to transport them to ports for maritime shipment or to commercial centers for overland transport within a specific region. The level of these debates varies by investigative area.

Spanish America

The Spanish "ceramic shipping container" has undergone considerable archaeological debate within the realm of Spanish-American archaeological studies since 1960, when John M. Goggin (1960) gave it a ceramic-type name "the Olive Jar" and provided a definition, a description, and a dating chronology. However, he made four things clear: (1) his work was "an initial contribution"; (2) he found fragments of "extremely large vessels" with olive jar paste and neck rims similar to those of his studied vessels, but that he excluded them; (3) "olive jars. . . are a useful time marker for. . . a primary Colonial situation or in an aboriginal contact situation. . . Other Spanish ceramics, such as majolica, are more precise time markers"; and (4) they are sturdy vessels that can be seen still – used for multiple domestic purposes in Latin America.

In summary, through his investigations in Spanish colonial sites in and around the Caribbean, he divided his olive jar findings into three datable styles: Early (CE 1500–1580), Middle (CE 1580–1800), and Late (post CE 1800); and into four vessel shapes: A, B, C, and D (Fig. 2). Within each style/shape combination, he noted that the profile of the vessel's rim changed (Fig. 3). He made no attempt to date those changes nor suggested that there might be some significance associated with those changes.

It was through subsequent investigations that debates were opened regarding Goggin's findings. They began with Zunzunegui (1965), who expanded upon Goggin; were continued by James (1988), Marken (1994), and Avery (1997), who questioned some of his findings; and have been kept ongoing by many others (e.g., Carruthers 2003; Velasquez & Fournier in press).

There appears to be no consensus on the definition of a colonial, ceramic shipping container. If, in Greco-Roman times, it was defined by the "carrot-shaped" amphora, Goggin accepted that in his study but was forced to include the globular vessels also used in Spanish colonial, maritime commerce. Subsequent writers have brought into the discussion flat-bottomed containers, with their myriad of shapes and sizes (e.g., James 1988; Marken 1994).

There is still some question about the manufacturing process for the earliest globular vessels (two sections or a single wheel throwing) and for the large conical vessels, as well as the process followed to "add" the neck rims of both varieties (e.g., Avery 1997).

There is no consensus on a name for the vessels. Goggin established "olive jar" as his translation of the Spanish term *botijuela*, which appears in colonial Spanish documents. Therein lies the problem. *Botijuela* is the name of the container, without reference to its use or future contents. Perhaps for this reason, as time passes, English speakers seem to be coming more comfortable with using the Spanish term *botija* when discussing ceramic shipping containers made in Spain and Latin America.

From the number of proposals presented, a seemingly endless list can be made of the products that may have been packed into Spanish ceramic shipping containers. For many of the proposals, arguments have been put forward clearly refuting them, resulting in no clear definition. Only Avery (1997) appears to have attempted to analyze changes over time – from the use of ceramic containers to non-ceramic and vice versa.

Suggestions have been put forward, but an agreement has yet to be reached on the significance, if any, of the marks placed on the rim or shoulder and/or "painted" on the body of Spanish vessels, something that has not been noted on vessels produced in other countries.

Spain

Goggin knew that the manufacturing center for the ceramic shipping containers he discussed was Spain, in particular the area in and around Seville. Spanish archeologists do not disagree, but they claim that they have problems applying his work in their country. From evidence found in datable architecture, Amores Carredano and Chisvert Jiménez (1993: 306–11, Figs. 39–88), for example, eliminate the Early Style round vessel from Goggin's list, saying that it is a *cantimplora* (canteen) not a *botija* (Amores Carredano & Chisvert Jiménez 1993: 281). They eliminate the Middle and Late Style designations for the conical vessel, saying that the two existed simultaneously (Amores Carredano & Chisvert Jiménez 1993: 284). They add to Goggin's list the flat-bottomed vessels discussed in James (1988: Fig. 4) (Fig. 2) and add two more with the same basic form but with handles (Amores Carredano & Chisvert Jiménez 1993: Figs. 84–88).

Portugal and Its Trade Routes

Goggin did not investigate or consider Portuguese examples of ceramic shipping containers. Thus, his work is of little use to investigators working in Canadian sites that traded with Portugal or in West African sites that were on Portugal's trade route to the Orient. Portuguese shipping containers have been found in both areas. They may be present in Japan. Surprisingly, they are reportedly absent from Portugal's own archaeological sites. Current debates are of an investigative nature, using the *anforeta*/*botijuela* as an element in defining the extent of Portuguese colonial trade networks.

Peru, Argentina, and Chile

As with Portugal, the debates in Peru, Argentina, and Chile are investigative, focusing on finding the production centers, defining the forms, and understanding the extent of their respective distribution networks.

Future Directions

Olives, olive oil, and wine were characteristic of Mediterranean cuisine. As a result vines and olive trees were brought to the Iberian colonies in the New World, and wine and olive oil industries

developed in several regions of the Americas in the 1500s. However, most were either unsuccessful or banned by Crown policies protecting domestic production and exports to the colonies. Notable exceptions were the wineries in South America, for example, in the Peruvian Moquegua Valley (e.g., Rice 2010), supplying consumers at mining towns such as Potosí in modern Bolivia.

In Spanish-American colonies, the incorporation of indigenous material culture was partial, and Old World food and drink as commodities remained as signifiers of group culture and identity. The so-called olive jars as containers were mainly used for storage and for transporting goods by sea from the Iberian Peninsula to the Americas, Africa, and Asia, where they were reused as containers or for architectural purposes, where they were used to lighten the weight of vaults and as fill in floors.

They represent, to a certain extent, evidence of consumption trends among colonists of European descent who replicated foodways from the homeland, as well as colonialism processes and the rise of the modern world system.

Additional research is needed on samples from the Iberian Peninsula and sites all over the world where fragments of the ubiquitous shipping containers have been found, especially compositional studies by means of neutron activation analysis. Petrography may also be used but, so far, the results have not proven to be accurate enough to determine production locales. Future studies may provide direct evidence for site-specific production, identifying manufacturing centers with more precision, as well as the ancillary industries such as those producing the matting used to protect the vessels during transportation, thus furthering our knowledge of trade networks largely controlled by the Iberian monarchies from the late fifteenth to the early nineteenth century.

Cross-References

- ▶ Argentina: Maritime Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Caribbean Maritime Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Ceramics: Scientific Analysis
- ▶ Colonial Encounters, Archaeology of
- ▶ Colony of Avalon Archaeological Site
- ▶ Consumption, Archaeology of
- ▶ Goggin, John M.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology
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Chaco Canyon, Archaeology of

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Introduction/Definition

Chaco Culture National Historical Park, in northwestern New Mexico, USA, preserves the ruins of eight major and many smaller "Great Houses" (Lekson 1986) – large, impressive masonry buildings which represent a critical, eleventh-century-CE episode in the prehistory of the Pueblo Indian tribes and other native groups in the US Southwest (Fig. 1). The largest Great House, Pueblo Bonito, was a giant "D"-shaped building with carefully crafted sandstone walls standing five stories tall. Its 600-plus rooms and enclosed plaza cover almost one hectare. The Great Houses were built with an investment of labor and a precision of form seldom seen at other Southwestern sites. Tens of thousands of wood beams for roofs were carried into Chaco from distant forests; many hundreds of laborers marshaled for construction events. The Great Houses were planned as defined geometric forms, skillfully aligned to the sun, moon, and cardinals (Fig. 2). Excavations produced extraordinary assemblages of artifacts, of Southwestern and Mesoamerican origins. Impressive numbers of pots, lithic materials, foodstuffs, and so forth were brought to Chaco from substantial distances. (This essay is based on data summarized in Lekson 2006; 2007; 2009; see also Vivian 1990; Mills 2002; Noble 2004; Van Dyke 2007; Chaco Research Archives 2012).

Chaco Canyon, as a UNESCO World Heritage Site, is a major tourism destination within the US Southwest. In part, Chaco's attraction is its improbability, an unlikely setting for such impressive ruins (Fig. 1). Chaco Canyon is a remote, unremarkable, sandstone canyon with few resources. Water is scarce, wood for construction and fuel is (and was) almost nonexistent, and the canyon is a poor place for corn (maize) farming – the key crop of Chaco's times. Yet, Chaco's ruins are the largest, most famous monuments in the US Southwest. Great Houses at Chaco represent something of a "mystery" – a mystery polished by the popular press, by local heritage tourism industries and New Age communities, and – to some extent – by archaeology.

Key Issues/Current Debates

Archaeological research began at Chaco in the late nineteenth century and continued, with occasional pauses, to the present (Lister & Lister 1981; Frazier 2005). The ruins were originally interpreted as "Pueblos" – independent,

Chaco Canyon, Archaeology of, Fig. 1 Chetro Ketl, the second largest Great House at Chaco Canyon. Constructed 1000–1125

egalitarian farming villages, much like those of modern Pueblo Indians in New Mexico – curiously jammed into an improbable canyon. By the 1950s, the "Pueblo" view was no longer tenable (Vivian & Mathews 1965): Chaco was not a canyon of "Pueblos"; rather, Chaco was a complex settlement of many differing structures and edifices. Great Houses contrasted sharply with far more numerous, normal family houses (six rooms and a "kiva"). The total floor space of a normal house was about equal to a single room at Pueblo Bonito. Chaco Canyon, while dominated by Great House ruins, was home to hundreds of normal families. Based on burial data, the Great House residents were of markedly higher status (Akins 2003; Plog & Heitman 2010). The variety of structures suggests a polyglot, multiethnic population (Vivian & Mathews 1965). Moreover, tree-ring dating (developed in part at Chaco in the 1920s) demonstrated that Chaco was alarmingly early, dating to the eleventh and early twelfth centuries CE, compared to the thirteenth-century-CE cliff dwellings of Mesa Verde and later iconic ruins.

Research in the 1970s revealed Chaco as a regional center, its hinterlands defined by 150 smaller Chaco-style Great Houses scattered over an area the size of Ireland, densely dotted with thousands of normal homes. Normal homes housed 95 % of Chaco's people; less than 5 % lived in Great Houses. Chaco's region was held together, symbolically and materially, by an unprecedented network of "roads" (yet Chaco lacked wheels and beasts of burden) and by an extensive line-of-sight signaling systems. The roads and signaling systems, radiating out from Chaco Canyon, linked distant Great Houses back to the center. Chaco's region is gratifyingly clear, and Chaco Canyon was clearly its center. Pueblo Bonito, it seems, was but one element of a 10-km diameter aggregation of Great Houses and normal homes, platform mounds, and other

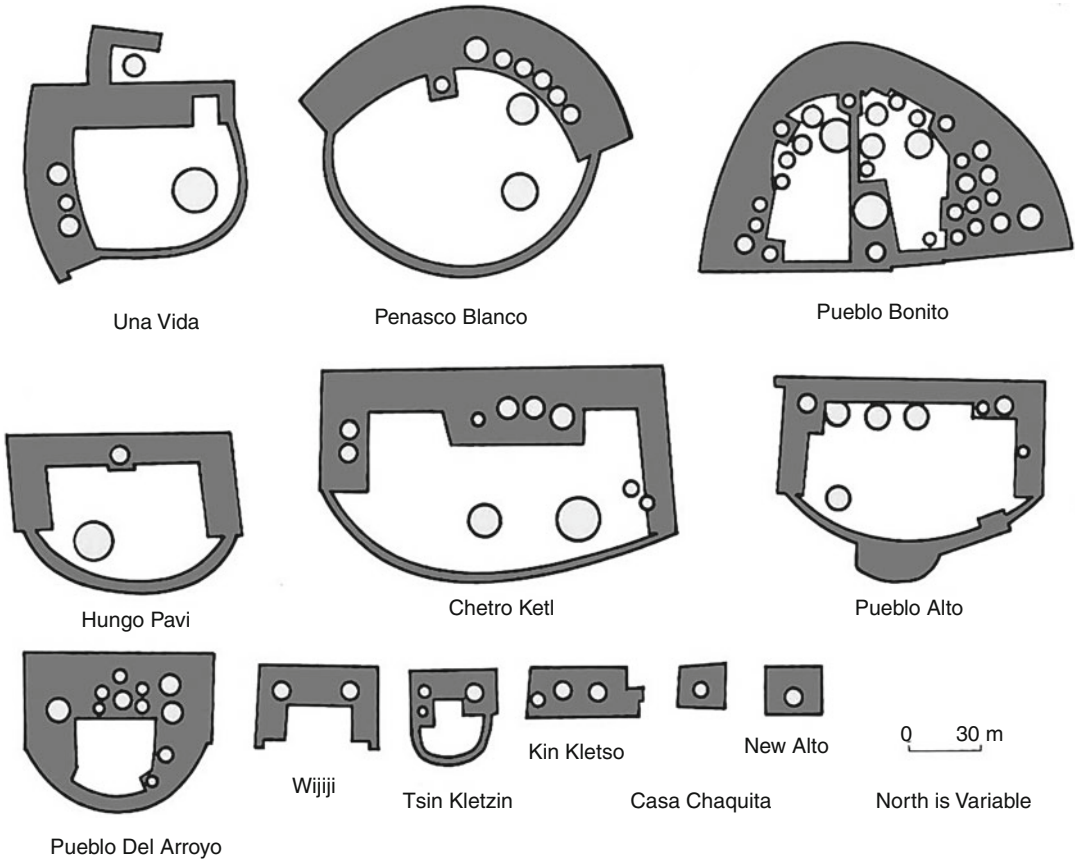

Chaco Canyon, Archaeology of, Fig. 2 Ground plans of major Chaco Canyon Great Houses

monuments, built to an urban plan that almost certainly reflected Chaco cosmology, on monumental scales (Van Dyke 2007).

Chaco's archaeology far exceeded anything archaeologists expected to see in the Pueblo Southwest. Chaco became a "phenomenon" or, more recently, a "mystery." Archaeology, to some extent, fosters that "mystery": Chaco scholars offer a bewildering range of interpretations, leading many to conclude that Chaco must remain unsolvable – and, therefore, mysterious.

Current interpretations form three themes: Chaco as Pueblo, Chaco as Uniquity, and Chaco as Polity. "Chaco as Pueblo" maintains that Chaco – whatever it was – will best be understood through the lens of Pueblo ethnology and traditions (e.g., essays in Ware 2001; Mills 2004; Noble 2004; Fagan 2005). Ethnographies and Pueblo traditions both provide significant insights, but Pueblo ethnographies and Pueblo traditions have no place for a predominant regional center – each Pueblo is independent and owes nothing to other Pueblos save benign ties of kinship and ceremony. Pueblo life revolves around ritual and ceremony, to the exclusion of centralized power. Pueblos are famously egalitarian; Chaco was not.

"Chaco as Uniquity" recognizes several interesting, if slightly outré, interpretations which see Chaco as something previously unknown in the Southwest – but still congruent with Puebloan emphasis on ritual and ceremony. For example, Chaco as a pilgrimage center: an empty valley periodically thronged by pilgrims, much like Mecca (Malville & Malville 2001). That interpretation is widely accepted. Mecca, however, and most New World pilgrimage centers were bustling cities, for example, Cholula, the

preeminent pilgrimage center in ancient Mesoamerica. Chaco may have served as a focus for pilgrimage but probably not as an empty ceremonial center – in short, a uniquity.

Before accepting unique interpretations, consider a better grounded alternative: "Chaco as Polity." North America in Chaco's time was awash with "chiefdoms," city-states, and empires; that was Chaco's world, the context in which Chaco rose and fell. And Chaco has all the hallmarks of a political capital, a seat of power. Great Houses are quite obviously elite housing (and more, of course). Chaco's control of labor and materials (quotidian and prestigious) would be notable in a (small) Mesoamerican capital. Indeed, that is what Chaco was: "Chaco as Polity" – or, rather, "Chaco as [Mesoamerican] Polity." Not a polity created by Mesoamericans but a local manifestation of a Mesoamerican ideal. The typical Mesoamerican polity was a small city-state or (in Nahua) *altepetl*: an association of a half-dozen or more noble families, each with its own palace ("noble house") in the central capital – which could be surprisingly small, Chaco-sized (Hirth 2003; Smith 2008). The noble families were equal; they elected from their ranks a king who ruled for life and later elected his replacement. City-states typically had from 10,000 to 40,000 commoners (Hodges 1997: 218; Smith 2008: 90), and each commoner family was tributary to a particular noble family or lineage. Indeed, the relationships of nobles and commoner defined the *altepetl*.

That model fits Chaco like a glove: a small city of perhaps 2,500 people (about one-third of documented *altepetl* capitals were under 3,000; Smith 2008: 152), dominated by eight Great Houses and many lesser monuments, with roads radiating out into pie-chart hinterlands encompassing – at a guess – around 50,000 commoners (a guess, but a good guess). The basic model and the demographic scales are consistent with *altepetl* organization; the major difference was regional scale. Most Mesoamerican polities were small, perhaps 50 km in diameter. Chaco reached ten times that far, with outermost Great Houses 250 km from the center. The difference lies, almost certainly, in the productive challenges of the desert Southwest compared to the tropical luxuriance of Mexico. In Mesoamerica, lots of food could be grown in relatively small areas; in the Southwest, arable lands were limited, patchy, and scattered. Chaco invented or adopted technologies to adapt *altepetl* organization to its deserts: roads and signaling systems overcame distances.

This is not to say that Mesoamerican nobles created Chaco. Rather, Chaco nobles-manqué adopted Mesoamerican forms. To legitimize their status, they probably visited southern (see Helms 1988). Chaco elites employed Mesoamerican objects and ideas (for example, macaw feathers, copper bells, and colonnades); they drank cacao (Crown & Hurst 2009). It is useful to imagine that Chaco elites considered themselves "Mesoamerican" (or whatever the appropriate term for Chaco's time) – that was, after all, their world, their frame of reference. In any event, Chaco elites adopted or coevolved a ubiquitous Mesoamerican form for their local polity: Chaco was an *altepetl* city-state.

Questions of this sort are often framed as discrete Mesoamerican "influences" in a conceptually distinct Southwestern region; but surely, it is more realistic to consider the US southwest as a northwestern frontier of Mesoamerica. Current archaeological frameworks perpetuate the separation of US and Mexican prehistories by a colonial border created by a war waged in 1846–1847. That border did not exist in Chaco's time. Accepting a more realistic framework for the question renders Chaco far less mysterious but no less interesting.

Construction at Chaco Canyon ended around 1125 CE. Not coincidently, a new capital rose at Aztec Ruins, about 60 km due north of Chaco about 1110 CE. That capital flourished for a generation; a major drought from 1130 to 1150 started a chain of events that culminated in warfare and the collapse of Aztec Ruins and the abandonment of its region, which included the cliff dwellings and towns of Mesa Verde.

Chaco Canyon (as "White House" and other names) figures in many Pueblo traditional histories, and Pueblos claim it as an ancestral site. The Navajo Nation includes several clans with strong

claims to Chaco. Chaco has other constituencies; it was a major site of the New Age "Harmonic Convergence" of 1987, and it appears prominently in current chatter about the "Maya calendrical cycle" of 2012. With a remarkable flurry of publications and videos in the early 2000s (e.g., Fagan 2005), Chaco has probably supplanted Mesa Verde as the most famous site in the US Southwest.

Cross-References

▶ Pueblo Bonito
▶ Tenochtitlan (Aztec): Geography and Culture

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Chaloupka, George

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Basic Biographical Information

George Jiri Chaloupka (1932–2011) (Fig. 1) was a true Bohemian born in Týniště nad Orlicí, Czechoslovakia, in 1932. At the tender age of 16, he fled his communist homeland and arrived in 1950 as a refugee in Perth, Australia. Six years

Chaloupka, George, Fig. 1 George Chaloupka in front of a simulated rock art panel painted by Dick Nguleingulei Murrumurru, Museum and Art Gallery of the Northern Territory

later, he and his family moved to Darwin where he started working as a government hydrologist for the Water Resources Branch. When he discovered a richly painted rock art gallery during his lengthy bush surveys, he had an epiphany and, as he says, fell under a spell that never left him. Although he had no formal qualifications, George started locating rock art galleries in his spare time with such passion and dedication; he was fast becoming the "go-to" person for people interested in rock art. In 1973 he was appointed as Field Researcher and then Curator of Rock Art at the Museums and Art Galleries of the Northern Territory (MAGNT) and from then on dedicated his life to recording the region's rich rock art heritage, continuing into his retirement as Emeritus Curator of Rock Art until his passing in 2011.

Major Accomplishments

George Chaloupka was regarded as the doyen of western Arnhem Land rock art and made a major contribution to the field. Before his arrival, the science of rock art within Australian archaeology was in its development phase, and his pioneering work shaped a milieu in which rock art is valued as an important part of cultural heritage and rock art studies.

As one of the first researchers to continuously engage in one art region over a long period of time, George established the distribution, diversity, and richness of a regional corpus of rock art by recording around 2,000–3,000 art sites. He produced a series of research papers, lavishly illustrated reports, and a major publication "Journey in Time." In films and books, he promoted the beauty and significance of rock art – especially of the exquisite dynamic style figures – and fought passionately for its conservation. Over the course of several decades of fieldwork, he built up a nationally important archive of images, field notes, and uniquely important Indigenous accounts of the rock art, now held by MAGNT. Famously, he also worked out a sequence of phases and changing styles over time, arguing for the deep antiquity of Kakadu rock art. He set out the first version of his rock art sequence at an Australian Institute of Aboriginal Studies conference in Canberra in 1974 at a time when detailed regional studies of style and sequence were unusual and before Lesley Maynard's seminal work put rock art studies on a new footing.

Throughout his life, George was also an outspoken advocate for Indigenous rights, and his opposition to uranium mining in the west Arnhem region was one of the factors that stalled Pancontinental's plans to develop the Jabiluka mine. In 1978, he nominated the Djawumbu massif for the Register of the National Estate and provided important anthropological information to the Aboriginal Land Claim that culminated in declaration of Kakadu National Park (Stage 1) in 1979.

Awards

George's contribution to rock art research was recognized during his lifetime. He was Inaugural President of the Australian Rock Art Research Association, won a Churchill Fellowship in 1983, was a recipient in 1986 of a research grant from the Australian Institute of Aboriginal and Torres Strait Islander Studies of which he was a member, was a visiting fellow at the Department of Prehistory in the Research School of Pacific Studies at the Australian National

University, received an Order of Australia in 1990, was elected an Honorary Fellow of the Australian Academy of Sciences in 1997, received a Doctor of Letters from NTU (now Charles Darwin University) in 1998, and was awarded a Centenary Medal in 2001. In 2008 the George Chaloupka Fellowship was established in his honor by the MAGNT Foundation "to promote and support research and conservation of Aboriginal rock art." On the prospect of dying, he commented "I'd sell my soul to the devil for another lifetime. There are thousands of sites still out there that I will never see."

Cross-References

▶ Australian Rock Art
▶ Kakadu National Park: Rock Art

Further Reading

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Chami, Felix Arkard

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Basic Biographical Information

Felix Arkard Chami (1958–), a third child of coffee farmers, Arkardi and Rosalia Chami, and was born in the Hai area of the Kilimanjaro Region of northern Tanzania, an area occupied by the Chagga community. His parents being staunch Catholics, Chami professes the same faith. Felix is married to Evalista Chami, and they have three children.

Chami attended Ulali Primary School and later Maua Franciscan Seminary both in the Kilimanjaro Region before proceeding to Ilboru High School in the Arusha Region for his advanced secondary education. Thereafter, he joined the university of Dar-es-Salaam where he graduated with a BA degree in sociology. He then proceeded to Brown University in the USA for his MA Anthropology (1986–1988) where he first came into contact with the discipline of Archaeology. He became interested in the Iron Age of East Africa and produced a dissertation on the Early Iron Age of Limbo district on the Tanzania coast. Between 1989 and 1994, Chami attended Uppsala University in Sweden for his Ph.D. This is where he refined his arguments on the East African Iron Age, and in his Ph.D. thesis, he revolutionized the thinking that was then prevalent in the region regarding the Early Iron Age. He, for instance, showed that Kwale Ware, which had been shown to be restricted to the coastal areas alone, was not so, but it would be found even on the East African hinterland. Chami also was instrumental in showing that the seventh century local pottery hitherto known as Tana Ware and ascribed to the pastoralists was indeed associated with farming communities and he argued that since incised triangles were the dominant motif and technique, the ware should be

renamed Triangular Incised Ware (TIW), a name that is still in current use.

Chami started his working career as a tutor at the university of Dar-es-Salaam in 1986 before moving up the ladder and becoming a full professor of archaeology in 2003. He has also held visiting professorship in a number of universities that include the universities of Zimbabwe (2000); Bristol, UK (2002); Ulster (Coloraine) (2003); Legon, Ghana (2009) and Comoro (2009); and INALCO, Paris (2010). He was also a visiting fellow at the Indian Archaeological Association, New Delhi/Allahabad Museum in 2004.

Other than his teaching responsibilities, Chami has, since 2003, been the General Coordinator of the African Archaeology Network, a group of African Archaeology scholars. In 2011, he was elected as a member of UNESCO's International Scientific Committee of the Slave Route Project. Chami is a member of several professional organizations that include the British Institute in Eastern Africa, Tanzania Association of Archaeologist and Paleoanthropologist, Historical Association of Tanzania, The Society for Arabian Studies, African Archaeology Network, and the Society of Africanist Archaeologists (SAFA).

Major Accomplishments

Chami is one of the new crops of African archaeologists who started questioning the colonial paradigm that had existed in African archaeology for a long time. One example is the hypothesis that there was no connection between the coastal communities and those in the hinterland because the coastal communities were outward looking and therefore foreign. But in his Masters and Ph.D. theses, Chami showed that the pottery type known as Kwale Ware and ascribed to the early iron using communities was not only a coastal phenomenon but was also found in the East African interior. Chami critically analyzed the mid-first millennium CE pottery type known as Tana Ware and concluded that unlike what was previously argued, this ceramic tradition did not belong to the coastal pastoral group, but was a development out of Kwale Ware. Using this evidence, Chami concluded that the East African coastal settlements had initially developed as a result of their contacts with the hinterland and, their foreign contacts through the Indian Ocean, only enhanced their further development.

Chami also argued and backed with evidence the existence of early settlements on the Islands of East Africa dating back from the early Stone Age through to the Neolithic period. He has examined issues of slave trade and excavated Bagamoyo, one of the slave trading towns of Eastern Africa. He has also demonstrated the participation of the Eastern African coastal settlements in the Egypt-Greaco-Roman trade. Later Chami has looked at the issue of equifinality, and its application to African archaeology and argues that archaeology is archaeology and nothing else; borrowing from other disciplines does not change what archaeology is. He has published a number of books, the most recent ones being *The Unity of African Ancient History (2006)* in which Chami critiques the colonial and neocolonial history of Africa that subdivides Africa into two racial categories – black sub-Saharan Africa and Arabic North Africa. Another notable of his publications is *Zanzibar and the Swahili Coast from 30,000 Years Ago (2009)*. Chami's work has contributed to a better knowledge of the archaeology of Africa and especially of the East African Coast.

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Chan: A Tropical Rain Forest Site in Belize

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Introduction

Nestled in Belize's lush tropical rain forest, the Chan site was long known to local farmers who still farm the area around the archaeological site. The area was noted by archaeologists in 1994 who were working on a regional settlement survey. The Chan project, a collaborative, international, multidisciplinary research project, began in 2002, bringing together a team of over 120 foreign and local archaeologists, botanists, geologists, geographers, chemists, computer scientists, artists, students, workers, volunteers, and local community residents from Belize, the USA, England, Canada, and China (Robin 2012).

Key Issues/Current Debates/Future Directions/Examples

Chan was occupied by a farming community with a 2,000-year history (c. 800 BCE–CE 1200) spanning the major chronological periods of ancient Maya society: the Preclassic, Classic, and Postclassic periods. Unremarkable in terms of community size or architectural elaboration, Chan nonetheless flourished while the fortunes of nearby major Maya civic centers waxed and waned. Research at Chan was aimed at investigating the everyday lives of Maya farmers and the impact farmers had on Maya society. Given that 2,000 years is a long period of time, what did Chan's residents do to facilitate the longevity of their community?

To address these questions, a three-staged research design was developed for the Chan project. Stage 1 involved a full coverage rain forest survey that utilized *Total Station* mapping and a *Geographical Information System* to digitally map the 3.2 km^2 area of the community and record the 274 households and 1,223 agricultural terraces that surround Chan's community center (Fig. 1). In Stage 2, extensive *coring* (using a post-hole digger) and full scale *area excavations* were conducted at all buildings in Chan's community center, along with a 10 % sample of households (26 households) and associated outdoor activity and work spaces that represent the temporal, socioeconomic, and vocational variability within the community (Fig. 2). Excavation in this terrain involves careful clearance of vegetation and roots to reveal the archaeological features without damaging the stone structures or the trees. Stage 3 research, which was conducted in the field in conjunction with stage 1 and 2 research to facilitate research collaboration, involved the analysis of roughly half a million objects of everyday life, one of the largest archaeological samples from a Maya farming community, and additionally incorporated scientific techniques of soil chemistry, paleoethnobotany, human bone, animal bone, obsidian sourcing, radiocarbon dating, and micro-artifact studies.

The structures and assemblages were classified and analyzed to produce a dated sequence of material practice at Chan over the two millennia. The terraced agricultural landscape was constructed by cooperating farming families, and the agricultural system developed and

Chan: A Tropical Rain Forest Site in Belize, Fig. 1 Undergraduate students Alex Miller, Shelley Khan, and Yasmine Baktash (left to right) set up a Topcon GTS 605 laser theodolite to digitally map Chan's settlement (Photograph by James Meierhoff)

Chan: A Tropical Rain Forest Site in Belize, Fig. 2 Archaeological illustrators Merle Alfaro (seated) and Nasario Puc (standing) illustrate a terminal deposit of broken ceramic on Chan's central ritual structure. Excavators Lazaro Martinez, Everaldo Chi, and Ismael Chan (left to right) are in the background (Photograph by James Meierhoff)

expanded through time. It avoided soil erosion and maximized water retention, incorporating complex small-scale irrigation and water storage systems. A forest management strategy maintained a diverse mature, closed-canopy, tropical forest even as the population expanded during the Classic period (BCE 250–900), and farmers had a growing need for fuel, construction material, and agricultural land. Extremes of wealth and power were avoided within the community, as all residents from the humblest farmer to the community leaders had access to

a similar range of exotic items and lived in perishable houses with similar outward appearances. Ritual and political practices within the community incorporated all residents and focused on the community as a whole rather than individual community leaders.

This long-term stability contrasts with that of the opulent Maya civic centers with their towering temple pyramids that form the usual focus of Maya archaeological research. Avoidance of extremes of wealth and power, more equitable distribution of goods, consistency in health, and communal focus of ritual and politics are some of the socially effective strategies established by Chan residents. The sustainable forest management practiced at Chan is distinct from the more extractive practices seen at the larger Maya civic centers where royals culled the mature forest across the Classic period. The consistent presence of a low degree of biological stress in the Chan skeletal population indicates persistent good health at Chan. This contrasts with that seen at larger Maya civic centers where residents' health declined by the end of the Classic period as indicated by increasing degrees of biological stress.

These studies, drawn from systematic fieldwork at a seemingly unremarkable place such as Chan, thus offer important lessons about human societies, particularly in the matter of social and economic sustainability.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Field Method in Archaeology: Overview
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Sustainability and Cultural Heritage

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Chang, Kwang-chih

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Basic Biographical Information

Over the course of his 40-year career, Kwang-chih (K.C.) Chang (1931–2001) (Fig. 1) integrated traditional Chinese historiography with American anthropological archaeology to help fundamentally transform our understanding of cultural developments in early China and Southeast Asia. Born in Beijing in 1931, K. C. and his family returned to their native Taiwan in 1946. As an undergraduate from 1950 to 1954 in the newly established Department of

Chang, Kwang-chih, Fig. 1 Kwang-chih Chang

Archaeology and Anthropology at National Taiwan University (NTU), K. C. studied under many of the most eminent scholars of early East Asia, including archaeologists Li Chi (1896–1979) and Shih Chang-ju (1902–2004), ethnographer Ling Shun-sheng (1902–1981), and historical linguist Tung T'ung-ho (1911–1963).

Following the advice of his mentor Li Chi (who had earned his Ph.D. in Anthropology at Harvard in 1923), K. C. undertook graduate studies in that department from 1955 to 1960, working closely with key Harvard faculty who would further shape his career, including cultural anthropologists Evon Vogt and Douglas Oliver, archaeologists John Otis Brew and Gordon Willey, and ethnologist Clyde Kluckhohn. Chang's primary faculty advisor was Hallam Movius Jr., with whom he worked at the Upper Paleolithic site of Abri Pataud near Les Eyzies, France, instilling in Chang a lifelong interest in Paleolithic foundations.

Hired as a lecturer in anthropology at Harvard during 1960–1961, K. C. was a quickly rising star in the field, invited to participate with much more senior scholars at the seminal 1960 Wenner-Gren Foundation symposium *From 15,000 BC to the thresholds of civilizations* at Burg Wartenstein, Austria. He joined the Anthropology faculty at Yale from 1961 to 1977, where he taught a range of courses on Chinese, East Asian, and Southeast Asian archaeology, and also served as departmental chair from 1970 to 1973. His enthusiasm for Chinese archaeology was enhanced by the steady flow of new discoveries from China slowly opening up after a decade of seclusion during the Cultural Revolution, sites that K. C. saw firsthand as a member of the American Paleoanthropology Delegation to China in 1975, his first trip there since leaving as a young boy three decades earlier.

In 1977, after considerable deliberation, Chang left Yale to return to his beloved Harvard as professor of anthropology and curator of Asiatic archaeology at the Peabody Museum. He was appointed as the John E. Hudson Professor of Archaeology in 1984 and taught courses tailored to his specific archaeological interests, including Chinese archaeology and Shang civilization, innovative courses in the college's evolving core curriculum, and, his favorite, the Harvard Freshman Seminars. He retired in June 1996 due to the debilitating effects of Parkinson's disease. "I consider it the highest honor," Chang would write to Harvard's president, "for any academic to retire as a Harvard professor—at least in the hearts of some diehard Harvard partisans and I confess to be one of them." K. C. Chang died in Boston on January 3, 2001.

Major Accomplishments

Chang's archaeological career, reflected in his more than 350 publications that cover an exceptionally broad range of topics, spanned a particularly critical time in the development of the field both in the West and in East Asia. His undergraduate and graduate teachers very much influenced his work on archaeological theory. In particular, Gordon Willey's research on settlement patterns in Peru's Viru Valley and discussion of concepts such as "traditions" and "horizons" helped to shape Chang's 1960 Harvard doctoral dissertation that explored settlement patterns in Neolithic and Bronze Age China. In his subsequent edited volume (Chang 1968), the importance of settlement data in understanding human organization was examined through an array of enlightening case studies and theoretical excursions. Chang quickly became an important player in the often contentious debate about the "New Archaeology" that dominated Western scholarship during the turbulent 1960s and early 1970s, and he brought these debates to bear on the archaeological data increasingly coming to light from China. His book *Rethinking Archaeology* (Chang 1967a) reflected his desire to introduce concepts and terminology that would allow material remains to be more culturally meaningful. That same year, his major essay on the importance of ethnographic analogy in archaeology (Chang 1967b) elicited strong disagreements from Lewis Binford and others. In these works, Chang also stressed the importance of recognizing that

archaeology was a tool that could be transformed to meet the needs of society, an awareness that would serve him well in understanding the changing role of archaeology in an evolving post-revolution China.

Chang sought to bring interdisciplinary archaeology to Taiwan, leading a collaborative Yale-NTU field project from 1964 to 1965 at the prehistoric sites of Tapenkeng and Fengpitou that examined early horticulture within a framework of comprehensive environmental reconstruction (Chang 1969). This was followed in 1972–1974 by his intensive study of subsistence, settlement patterns, and human-ecosystem interaction in central Taiwan, a project marked both by its broad interdisciplinary nature and its long-term impact as a training ground for a new generation of Taiwan archaeologists. He was a key consultant to the establishment of Taiwan's National Museum of Prehistory and also pressed for support for the study of Taiwan history and historical archaeology.

K. C. Chang's name is synonymous in the West with Chinese archaeology. His four editions of *The Archaeology of Ancient China* (e.g., Chang 1986) brought to Western readers an authoritative presentation and interpretation of the steadily increasing archaeological data coming out of China, each edition thoroughly updated to reflect the latest finds. His comprehensive work on China's early Bronze Age (17th–11th C. BCE), no doubt inspired by his teachers who represented the very first generation of Shang archaeologists in the 1930s, carefully integrated Western anthropological theory with a mastery of field data and early Chinese textual sources (Chang 1980, 1983).

International conferences on Chinese archaeology during the late 1970s and 1980s, many of them organized by Chang, helped to open up Chinese archaeology to foreign scholars and students and to expose Chinese scholars to world archaeological method and theory. When China's laws were changed in the early 1990s to allow Sino-foreign collaborative field projects, Chang was among the first to be invited, and the Peabody Museum-Chinese Institute of Archaeology project *Investigations into Early Shang Civilization*, based in the North China Plain at Shangqiu, Henan province, brought together Chinese and American scholars in an extended effort to locate and understand the predynastic phase of Shang culture (Murowchick & Cohen 2001). This helped to foster a collaborative atmosphere that today is represented by an array of international projects across China.

Recognition of Chang's accomplished career included his research appointments at Academia Sinica (Taipei), election to the US National Academy of Sciences (1979), American Academy of Arts and Sciences (1980), and the Society of Antiquaries of London. The Association of Asian Studies honored his "Distinguished Contributions to Asian Studies" (1986), and he won the University of Pennsylvania's Lucy Wharton Drexel Medal (1987), among many other honors. He was a transformative figure in the field of East Asian archaeology, a bridge between East and West, and a catalyst for the international collaborations that thrive today.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Movius, Jr., Hallam L.
- ▶ Nationalism and Archaeology
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Charcoal: Preservation and Conservation

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Introduction

Charcoal (carbonized wood) is of great importance in archaeology. In archaeological sites, charcoal is interpreted as evidence of the use of fire by past populations, and is a source for the absolute dating of contexts, for conducting paleoenvironmental reconstructions and for discussing past relationships between human groups and their environment. In order to reach the great potential existent in the study of archaeological charcoal, it is necessary to take into account the processes which affect preservation up to their moment of collecting, as well as the methods necessary for their conservation.

Definition

Archaeological charcoal preservation and archaeological charcoal conservation are somewhat distinct, although correlated, terms. Charcoal preservation refers to aspects both before as well as after charcoal is collected from an archaeological context, encompassing the moment it was first produced in the past, the natural and cultural processes it underwent through time, up to present day when it is collected and studied. Charcoal conservation, on the other hand, refers to efforts taken during and after charcoal is collected, such as the proper maintenance of its physical integrity during excavation, transportation, analysis, and storage.

Key Issues/Current Debates/Future Directions/Examples

Archaeological charcoal may be studied in a variety of ways. One way in which charcoal is regularly used in archaeology is as evidence of past human activity, such as in premodern human sites where charcoal can be considered evidence of past domain of fire by hominins.

Charcoal is also frequently used as material for absolute dating of archaeological contexts, especially in the time spanning the last 50,000 years.

Archaeological charcoal may furnish even more information about the past if certain methods and techniques are applied to its study. The quantification of charcoal fragments in archaeological units and profiles, for example, can furnish information on past human activities such as the clearing of areas through time for the establishment of settlements and preparing fields and gardens for cultivation.

Other types of information may also be gathered if an effort is taken in identifying which plants did charcoal fragments originate from. Through microscopic observation and comparison with reference collections from modern plants, it is possible to conduct charcoal analysis by taxonomically identifying charcoal fragments. By knowing which plants were used in the past, one can interpret what past environments may have looked like, the relationships that past human groups had with their surrounding environment, and for what sorts of purpose different plants were used, not only for everyday use as firewood but for other specific purposes, from the production of artifacts to mortuary practices.

It is important to take into account the fact that archaeological charcoal is a fraction of the total amount of wood that was used in past contexts. In order to better understand the relevance of archaeological charcoal in furnishing information on the past, it is imperative to try to understand the processes which, on the one hand, allow charcoal preservation until present day and, on the other hand, destroy or alter charcoal material, thereby furnishing us with a partial view of the past.

The burning of wooden material results in the production of ashes, when there is a total combustion of the organic matter, or of charcoal, when there is incomplete combustion of the material (Huisman et al. 2012). If charcoal is produced by burning with a limited supply of air, it is considered the result of "charring," while if it is produced by burning without oxygen, it is considered the result of "carbonization" (Braadbaart & Poole 2008; Théry-Parisot et al. 2010). The term "charcoalification" may be used to define the processes which result in the production of charcoal, regardless if the process was by charring or by carbonization (Braadbaart & Poole 2008). Charcoal may be a by-product of an activity (such as resultant from an extinct hearth) or it may be the desired end in itself (such as charcoal intentionally produced in charcoal kilns).

Archaeological charcoal assemblages are the result of human practices and natural phenomena. Wood collecting, management of hearth structures including wood arrangement, combustion characteristics such as temperature of burning and oxygenation, and wood features such as anatomy, density, and chemical composition are all factors which influence charcoal fragmentation and loss of mass material, which in turn affect charcoal preservation. After production and use, charcoal fragments are subject to further events through time, such as physical impact by humans and other animals and environmental factors such as wind, rainfall, and changes in temperature, processes which result in horizontal and vertical dispersion as well as fragmentation and disappearance of charcoal material (Théry-Parisot et al. 2010).

Charcoalified material is less subject to physical and chemical decomposition in soils, being the most common mode of survival of plant material in archaeological sites (Braadbaart & Poole 2008). It has been traditionally stated that through the process of burning, water and fugitive compounds are expelled from wooden material and the remaining structure would be a chemically stable mineral state not subject to organic decomposition (Dincauze 2000: 334). Recent research has shown, however, that charcoal is not composed of pure carbon, but in fact of aromatic compounds (benzenoids), making them unstable in alkaline conditions (Braadbaart & Poole 2008; Huisman et al. 2012).

The identification of various post-depositional processes affecting charcoal preservation, alongside recent demonstration that charcoal is not as stable as previously thought, has resulted in the increase in concern that charcoal's absence in certain archaeological contexts might, in fact, be due to processes of fragmentation and destruction of previously existent charcoal fragments. The absence of charcoal in many contexts might, for example, be the result of charcoal disintegration in alkaline soils (Bradbaart et al. 2009; Théry-Parisot et al. 2010). What's more, wood and plant ashes are alkaline, meaning that, in many contexts, charcoal fragments buried alongside ashes (as in fireplaces) might have disintegrated (Huisman et al. 2012).

Despite its shortcomings, charcoalification may be considered as a very fortunate event to

the study of the past. A great number of studies have shown that although charcoalification produces some changes in wood structure, most anatomical characteristics remain, including those of microstructural elements so important for taxonomic determination (Braadbaart & Poole 2008; Théry-Parisot et al. 2010). Even though charcoal is subject to various processes which affect their preservation, it is still identifiable as well as datable, proving itself a valuable study material for archaeology.

Another important factor in charcoal preservation consists of the methods and techniques chosen for recovery during excavation. Frequent scraping by trowel or other instruments has a destructive effect on charcoal fragments. Charcoal samples should preferentially be collected by removal of soil matrixes in small blocks, respecting the limits of archaeological layers and structures (Scheel-Ybert et al. 2006).

Collecting of charcoal concentrations in situ and by dry-screening, wet-screening, and flotation of soil samples are the main methods used by archaeologists in the field, and each of these methods has its own advantages and disadvantages, as well as consequences on the physical preservation of charcoal. If done without caution and with too much force, dry-screening and wet-screening can destroy charcoal fragments.

Flotation, which consists of the separation of material from the sediment matrix by immersion in water or a chemical agent, is an important technique for the recovery of botanical macroremains, but it may also affect charcoal preservation. Soil samples must be dried before flotation and treated gently, not packed tightly into bags or subject to heavy weights, being preferable to store them in sturdy plastic containers before flotation (Pearsall 2000: 13-76). After flotation, charcoal fragments must be dried in a shaded location before being handled due to a great fragility when wet (Scheel-Ybert et al. 2006).

All archaeological samples containing botanical material, be them soil samples for future screening or flotation procedures, or charcoal fragments themselves, must be properly identified at the site in adequate containers so as to be handled with care during transportation and storage, maximizing their preservation and conservation.

Conservation issues also possess great importance in certain contexts where charcoalified structures and artifacts are present, requiring adequate techniques for the maintenance of their physical integrity. Despite this importance, the conservation of charcoalified wood recovered from dry or waterlogged contexts is not a frequent practice, and few studies have been published on the subject (Caple & Murray 1994; Cobb 2005; Pizzo et al. 2011). The techniques applied to the conservation of charcoal found in waterlogged conditions are not directly applicable to material found in dry conditions (Pizzo et al. 2011), the same being true for techniques traditionally used for non-burnt wooden artifacts (Caple & Murray 1994).

Studies attempting conservation of waterlogged charcoalified material with the application of polyethylene glycol demonstrated that, although at times visual characteristics were preserved, the methods and material used were not successful in sufficiently strengthening charcoal structures (Triantafyllou et al. 2010) or large pieces of charcoalified artifacts (Caple & Murray 1994). Regarding the conservation of dry charcoalified material, tests demonstrated differences between consolidants, with risk to structural integrity shown when using thermoplastic resins on experimentally charred wood (Cobb 2005) and acceptable results when water soluble resins were utilized on a partially charred artifact (Pizzo et al. 2011). A consensus is seen, in which researchers advocate the need for further experimentation in order to better define consolidants and techniques adequate for the conserving of both waterlogged as well as dry charcoalified archaeological vestiges.

Charcoal from archaeological contexts is material proof of past intentional or unintentional fire events, and provides archaeological information regarding multiples dimensions of the human and environmental past. Attention to charcoal preservation and conservation issues is, therefore, imperative in order to access all the potential information that might be extracted from them.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Paleoethnobotany
- ▶ Radiocarbon Dating in Archaeology
- ▶ Seeds: Conservation and Preservation
- ▶ Wood: Conservation and Preservation

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Charlton, Thomas H.

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Basic Biographical Information

Thomas H. Charlton was born in Scarborough, Ontario, Canada, on August 17, 1938. He obtained a doctorate in Anthropology from Tulane University in 1966 with a dissertation in the vanguard of studies dealing with archaeological settlement patterns in central Mexico. His academic career as a faculty member in the Department of Anthropology at the University of Iowa began in 1967, where he became a senior archaeologist as a Mesoamericanist and New World specialist.

Charlton's research included studies of the Historical Archaeology of Plum Grove in Iowa City, the nineteenth century home of the first territorial governor of Iowa, a site included in the US National Register of Historic Places. At the site, he undertook collaborative investigations beginning in 1974 and directed an annual summer field school from 1995 to 2010. For almost four decades he was active in teaching and research and served in multiple academic activities in the anthropology department of the University of Iowa. He trained undergraduate and graduate students in the USA and in Mexico with research in the fields of Mesoamerican and

Historical Archaeology until his untimely demise in June 2, 2010.

Charlton's investigations were characterized by careful fieldwork in surveys and excavations, thoroughness in laboratory analyses, and detailed archival research. He was a man of three nations: born in Canada, residing in the USA, and with deep connections with Mexico, its history and its people. He was an outstanding, prolific, and generous scholar passionate about archaeology, ethnohistorical sources and ceramics, who had a soft spot for cats.

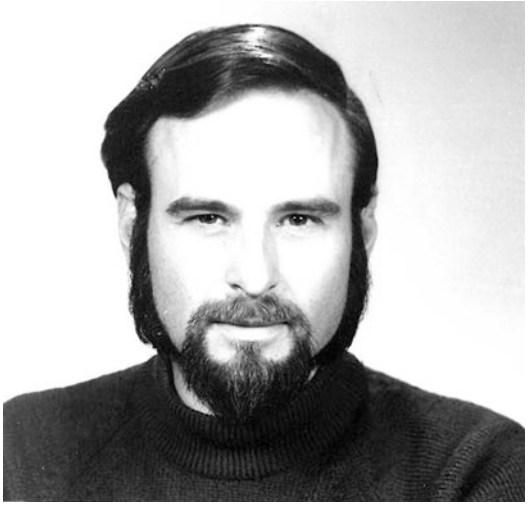

Charlton, Thomas H., Fig. 1 Thomas H. Charlton in 1970

Major Accomplishments

Thomas H. Charlton was the first scholar whose research in central Mexico explicitly applied scientific approaches and historical anthropological insights to the understanding of cultural continuities and change after the Spanish conquest in CE 1521. Since the 1960s his main interest was in understanding the development of pre-Columbian social complexity, mostly in central Mesoamerica, and particularly in the Basin of Mexico as a symbiotic region. He focused his research on the Classic period of urban and rural contrasts in the Teotihuacan Valley and the Late Post-Classic city-state of Otumba (e.g., Charlton 1972, 1973, 1986). He noted that in Mexico archaeologists traditionally had failed to venture into post-conquest studies (Charlton 1972: 107); therefore, Charlton advocated for a holistic approach to anthropological investigations, integrating ethnographic, ethnohistorical, and archaeological data, generating a combined approach to provide a better understanding of Colonial Mesoamerica (Charlton 1969: 286). He emphasized that analogy is a major approach by which ethnographic and ethnohistorical data contribute to an understanding of the past, constituting a zone of transfer and contact between disciplines. Moreover, he set the bases for the use of historical records to interpret archaeological data as a mode of direct historical analogy, and thus to strengthen inferences using relevant empirical data (Charlton 1981: 130, 154, 158) (Fig. 1).

Charlton developed the methodological foundations on which to conduct major studies of the historical archaeology of cultural transformations and dynamics during the Colonial and Republican periods (CE 1521–1910) in Mexico (Charlton 1986). His insights were based on hard empirical data, employing an elaborated culture history model to comprehend acculturative processes and cultural change from the Early Colonial period (CE 1521–1620) onto the twentieth century (e.g., Charlton 1975; Charlton & Fournier 1993: 214; Charlton et al. 2005).

His publications show explicitly how descriptive information may be framed to infer major social processes in historical archaeology, including acculturation, pre-Columbian to Colonial demography, changes in settlement patterns and land use, continuities and deterioration of indigenous ceramic traditions and styles after the Spanish conquest, craft specialization, transformations in trade and exchange patterns from the Post-Classic to the Colonial period, consumption trends, the development of ranchos and haciendas in rural areas, and other important topics.

Charlton was remarkably influential in promoting post-conquest archaeology in Mexico

as legitimate and noteworthy anthropological research. His methodology is applicable to almost any area for which there exists documentation (Charlton 1969: 292) and even for the understanding of cultural processes in regions or sites where historical records are scant or nonexistent but are suitable for broader comparisons with better documented areas.

His book, *Post-conquest Developments in the Teotihuacan Valley* (1973), constitutes a seminal and major contribution to the historical archaeology of the Basin of Mexico. Many American scholars specializing in historical archaeology have drawn on his perspectives and work. Moreover, since Charlton undertook collaborative research with several Mexican archaeologists, they and their students are and will continue to keep his methodological legacy alive to contribute to the field of historical archaeology.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Archival Research and Historical Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis
- ▶ Cultural Heritage and the Public
- ▶ Dating Methods in Historical Archaeology
- ▶ Ethnoarchaeology
- ▶ European Contact and Global Expansion (post-CE 1500): Historical Archaeology
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- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Mexico: Historical Archaeology
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- ▶ Plantation Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Tenochtitlan (Aztec): Geography and Culture
- ▶ Teotihuacan: Geography and Culture

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Charoenwongsa, Pisit

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Basic Biographical Information

Pisit Charoenwongsa is a prominent Thai professional archaeologist and a pioneer scholar in cultural resource management who has been active in these fields for a number of decades. He was born in 1941 and grew up in the eastern province of Chachoengsao, obtaining his B.A. in archaeology from Silpakorn University in 1964. He attended the nondegree postgraduate program in archaeology at the University of London in the UK from 1968 to 1971. He went on to pursue his graduate studies at the University of Pennsylvania, USA, where he received an M.S. in anthropology in 1972. In 2000, he was awarded an honorary Ph.D. (Prehistoric Archaeology) from Silpakorn University.

Pisit Charoenwongsa began his career as a full-time lecturer of archaeology in 1967 at the Silpakorn University Faculty of Archaeology, where he taught and conducted research on the prehistory of Thailand and neighboring countries for seven years (1967–1973) before transferring to the Fine Arts Department (FAD) in 1974. He served in the FAD for 16 years (1974–1990). In 1990, Pisit resigned from the FAD to assume a position as senior specialist and later was promoted to serve as director-general of the SEAMEO Regional Center for Archaeology and Fine Arts (SPAFA), an international organization with members from 11 Southeast Asian countries, until his retirement in 2000. In addition, Pisit has served in various capacities in a number of nonprofit, private, and public educational and cultural organizations, and has played a variety of significant roles in the study, development, and preservation of cultural heritage. To name a few, he served as the president of the Indo-Pacific Prehistory Association (1996–2000), executive member of the

International Council on Monuments and Sites (ICOMOS), editorial board member for Southeast Asia of the Journal of Conservation and Management of Archaeological Sites, and member of the International Coordinating Committee for Safeguarding and Development of the Historic Site of Angkor. Currently, he serves as chair of the Committee for Preparation of the Thai-Language Encyclopedic Dictionary of Global Archaeology, which is hosted and funded by Thailand's Royal Institute. The dictionary will be the first Thai-language dictionary of world archaeology and will serve as a major reference for teachers, students, archaeologists, and those who are interested in archaeology, history, history of art, and cultural resource management.

Major Accomplishments

Throughout his career as lecturer, archaeologist, academic advisor, writer, administrator, committee member, peer-reviewer, and so on, Pisit Charoenwongsa has contributed tremendously to the better understanding, promotion, development, and preservation of archaeological and cultural resources in Thailand in particular and in Southeast Asia in general. Pisit has been actively engaged at both national and international level in the research, study, protection, development, and management of cultural resources projects. He has been invited to share his expertise and insight on the subject throughout Thailand and other countries.

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Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)

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Brief Definition of the Topic

Introduction

In 1964, the Second International Congress of Architects and Technicians of Historical

Monuments, organized in Venice under the auspices of UNESCO, adopted 13 resolutions, the International Charter for the Conservation and Restoration of Monuments and Sites, better known as the Venice Charter, among them. The second resolution was the act establishing an international non-governmental organization for the protection of monuments and sites, the International Council on Monuments and Sites (ICOMOS). Lastly, the eighth resolution was a request for the protection and revival of historical centers. This entry has constituted the starting point of the efforts made by ICOMOS for the adoption of a policy for the protection and restructuring of historical towns.

ICOMOS elaborated the views expressed in the Charter in the 20 years' period following the Venice Congress, according to the developments in the debate and practice for the protection and conservation of monuments and sites. After the first papers were collected by CIVVIH (*Comité International des Villes et Villages Historiques* [International Committee on Historic Towns and Villages]) following a debate with ICOMOS National and Scientific Committees, the *Charter for the Conservation of Historic Towns* was adopted in 1987 by the General Assembly of ICOMOS in Washington, DC. The Charter has remained loyal to the objectives of the *"Recommendation Concerning the Safeguarding and Contemporary Role of Historic Areas" (Warsaw - Nairobi, 1976) of UNESCO*. However, without being a sole repetition of the Declaration, its Articles contain both its philosophical view and its practical objectives.

Definition and Scope

This Charter is intended for specialists (especially architects, urban planners, and spatial planning engineers, geographers and ecologists, and infrastructure engineers) and those involved in planning in general or making decisions regarding the urban development process. The Charter makes an appeal to the younger generations and to the wider society to mobilize themselves to protect historical towns. The Charter supports the development approach to conservation and restoration by adopting, as a basic principle, that conservation should be integrally connected to economic and social development. Moreover, its notion of historical town conservation comprises all necessary measures, not only for their protection but also for their development and adaptation to modern life.

The Charter consists of three parts: (1) preamble and definitions, (2) principles and objectives, and (3) methods and instruments.

The first part lays down the scope of the Charter, which includes historical settlements and towns (both small and large); historical centers and districts, as well as their greater environment (both natural and built); and the risks of degradation, de-structuring, and destruction thereof due to the modern urban development.

The second part lays down that the effective preservation of historical towns and districts must be related to economic and social development policy and be taken into account by the urban and spatial plans implementing it within the space. The primordial value of the town's historical character must be preserved. In fact, disciplined and careful intervention is recommended, as is the participation of residents.

The third part underlines the need for plans of the conservation of historic towns and districts to be preceded by multidisciplinary studies. A conservation plan must thoroughly break down the data available (archaeological, historical, architectural, technical, social, and economic) and suggest directions and actions at the legislative, administrative, and financial levels with the consent and participation of the residents.

Current Interpretations

Today, disciplinary views have converged as to acknowledge that the town is a global phenomenon created through historic and material processes and that it evolves to the extent that human societies evolve as well. To that end, it has been pursued that the Charter constitutes a framework document that is specified and adapted to the particularities of the urban phenomenon in each geographical area.

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Urban Archaeology
- ▶ Urban Heritage
- ▶ Urban Landscapes: Environmental Archaeology

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Charter for the Protection and Management of the Archaeological Heritage (1990)

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Brief Definition of the Topic

In the field of heritage management, international charters are important documents that establish guidelines and principles for best practices. Although essentially hortatory, in the sense that they lack the force of law embodied in the international cultural heritage conventions, heritage charters are an important source of guidance for governments, institutions, preservation practitioners, and the general public. The best-known and most influential example of a heritage charter is the 1966 Venice Charter (*International Charter for the Conservation and Restoration of Monuments and Sites*), drafted and adopted by ICOMOS, the International Council on Monuments and Sites.

ICOMOS is an international, nongovernmental organization dedicated to the preservation of the world's cultural heritage. Organized into national committees (there are currently 95) with numerous specialized scientific subcommittees, to date, ICOMOS has adopted 14 charters relating to heritage preservation, including archaeology, historic gardens and landscapes, historic towns and urban areas, and cultural tourism, to name just a few (ICOMOS n.d.). In 1990, ICOMOS adopted the *Charter for the Protection and Management of the Archaeological Heritage* in response to concerns about increasing threats to archaeological heritage from development, looting, and other activities (Elia 1993). It is the first comprehensive statement to express the need for effective policies relating to archaeological heritage management on the international, national, regional, and local levels. Although some of its provisions seem a bit outdated or lacking today (e.g., the limited role devoted to participation by indigenous and local peoples), the Charter remains an important articulation of the need for advance planning and rational decision-making in the realm of cultural heritage management. A later charter, adopted by ICOMOS in 1996, deals specifically with the challenges of managing underwater cultural heritage (ICOMOS n.d.).

The organization of the 1990 Charter reflects its effort to reach out to diverse interests (Table 1). Following an introduction that defines archaeological heritage very broadly as "all vestiges of human existence" (Article 1), the Charter addresses issues of primary concern to planners (Article 2) and lawmakers (Article 3), professional archaeologists and heritage managers (Articles 4–7), and academics (Article 8) and ends with an appeal for international cooperation (Article 9).

Recognizing that archaeological heritage is "a fragile and non-renewable resource," Article 2 of the Charter emphasizes the need for archaeological heritage management to be fully integrated into policies for land-use, development,

Charter for the Protection and Management of the Archaeological Heritage (1990), Table 1 Structure of the 1990 *Charter for the Protection and Management of the Archaeological Heritage*

Introduction
Article 1. Definition and Introduction
Article 2. Integrated Protection Policies
Article 3. Legislation and Economy
Article 4. Survey
Article 5. Investigation
Article 6. Maintenance and Conservation
Article 7. Presentation, Information, and Reconstruction
Article 8. Professional Qualifications
Article 9. International Cooperation

environment, culture, and education, including meaningful involvement of the general public and indigenous peoples. Article 3 terms the protection of archaeological heritage "a moral obligation upon all human beings" and a "collective public responsibility." This responsibility requires protection for the sake of all humanity, not just for national or local interests. Consonant with this perspective, Article 3 calls for legislation to protect archaeological heritage from unauthorized destruction or alteration; to require investigation and documentation in cases where destruction or alteration is permitted; and to provide for proper maintenance, management, and conservation. These provisions are especially relevant for development projects in order to minimize their potential adverse effect on archaeological heritage.

The next two articles of the Charter focus on professional practice. Article 4 stresses the importance of archaeological survey data to help planners make effective decisions relating to development. Article 5 emphasizes the need for nondestructive techniques and partial excavation in preference to total excavation and, significantly, gives a priority to the excavation of threatened sites over nonthreatened sites. The latter, according to the Charter, may be excavated "in exceptional cases ... to elucidate research problems or to interpret them to the public." Here, the Charter seems to be urging a move by archaeologists away from their traditional, research-oriented excavations of sites purely for scientific purposes to the perhaps less glamorous, but more urgent, excavations of a diminishing heritage resource base. It certainly reflects a broad shift in many nations away from academic archaeology to public archaeologists engaged in what has been called compliance, or contract, archaeology.

Article 6 states that "the overall objective of archaeological heritage management should be the preservation of monuments and sites in situ, including proper long-term conservation and curation of all related records and collections etc." Post-excavation maintenance and conservation is necessary, as is participation by local and indigenous peoples. In Article 7, the Charter highlights the importance of public access to sites, monuments, and heritage information but urges caution in the use of reconstructions.

In several respects, the *Charter for the Protection and Management of the Archaeological Heritage* envisions a field that is much larger than that of traditional academic or research archaeology. In its engagement with legislation, development, interpretation, and various stakeholders, archaeological heritage management requires different skill sets from what traditional academic archaeology has provided. The last two articles of the Charter address the needs of the developing profession of archaeological heritage management. Article 8 calls for academic training to "take account of the shift in conservation policies from excavation to in situ preservation." Article 9 stresses the importance of international cooperation in developing and exchanging expertise in archaeological heritage management.

More than two decades after the adoption of the ICOMOS *Charter for the Protection and Management of the Archaeological Heritage*, its essential principles remain valid, and the *Charter* remains an important aspirational document. While more and more nations have adopted, at least in principle, the conservation ethic that is embodied in the notion of archaeological heritage management and while greater numbers of archaeologists and other professionals are engaged in its practice than ever before, the need for more effective legislation, policies, and protection remains a pressing issue in most parts of the world today.

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Underwater Cultural Heritage: International Law Regime

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Charter for the Protection and Management of the Underwater Cultural Heritage (1996)

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Introduction

At its 11th General Assembly held in Sofia in October 1996, the International Council on Monuments and Sites (ICOMOS) ratified its Charter on the Protection and Management of the Underwater Cultural Heritage (see http://www.international.icomos.org/under_e.htm). The 1996 Charter was developed by the International Committee on the Underwater Cultural Heritage (ICUCH), comprised of 24 international experts in underwater cultural heritage (UCH) who assist ICOMOS and UNESCO in promoting the protection and management of submerged cultural resources in inland and inshore waters, shallow seas, and deep oceans. A guide to best practices in UCH management and protection in territorial and international waters, the 1996 Charter was later largely adopted as the Annex to the UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001), which provides an international legal regime for activities directed at submerged heritage (see Forrest 2010: 286-361). The guidelines established by the 1996 Charter serve to guard UCH from threats presented by commercial salvage and to harmonize the framework for protection of submerged sites with that already afforded to cultural heritage on land; as such, the 1996 Charter may be seen as a supplement to the ICOMOS Charter for the Protection and Management of the Archaeological Heritage (1990).

Definition

The 1996 Charter begins by defining UCH as "the archaeological heritage which is in, or has been removed from, an underwater environment," including submerged sites and structures, shipwreck sites, and their archaeological and natural contexts. UCH is further described as an international resource in character and often location, a finite and nonrenewable resource, a public interest, and a vehicle for knowledge about the human past.

The body of the 1996 Charter consists largely of 15 articles designed to ensure transparency and uniformly high standards in the aims, methodologies, and expected results of all investigations of UCH. Article 1 lists the fundamental principles for the protection and management of UCH, including a mandate to consider in situ preservation as a first option, alongside a preference where practical for nondestructive techniques of investigation over intrusive excavation. All projects that may encounter UCH should consider how to mitigate their impact on that UCH, avoid disturbance of human remains or venerated sites, and include adequate documentation. Public access to UCH is viewed as a primary aim of management and therefore encouraged. The remaining 13 articles provide detailed guidelines for responsible management and investigation of UCH when excavation or other intervention in a site is determined to be the best option. These guidelines consider: project design (Article 2); funding for all stages of the project, including conservation and dissemination (Article 3); timelines (Article 4); statement of research objectives,

methodologies and techniques (Article 5); qualifications of investigating team, with direction by a qualified and experienced underwater archaeologist for all intrusive investigations (Article 6); site assessment for vulnerability, significance, and potential (Article 7); comprehensive documentation (Article 8); material conservation at all stages (Article 9); site management and protection including public information, stabilization, and monitoring (Article 10); health and safety of investigating team (Article 11); reporting of objectives, methodology, results, and recommendations for future research (Article 12); curation and scientific integrity of project archives (Article 13); dissemination of research for public awareness through presentations and reports, cooperation with local communities and interest groups, and research collaborations (Article 14); and international collaboration to promote high standards of investigation and research (Article 15).

These guidelines for protection, intervention, and research aimed at UCH seek to provide practical rules and professional guidance for archaeologists and national authorities in research, management, and the institution of policy. Because it addresses in situ preservation, site investigation, management, maintenance, dissemination, and public outreach, the 1996 Charter has implications not only for heritage professionals involved directly with underwater sites and finds, but also for those whose work engages with or otherwise has an impact on UCH, including tourism and museum professionals as well as the public (Maarleveld in Couratier 2008: 50-62).

Key Issues and Current Debates

While the 2001 Convention functions primarily as a juridical document, its Annex, based on the 1996 Charter, aims to offer practical guidelines and best practices deemed by some to be the "heart and soul" of the 2001 Convention (See Petzet in Grenier et al. 2006: vii-ix). To facilitate its application, the Scientific and Technical Advisory Board to the 2001 Convention serves primarily to advise state authorities and to promote and define best practice; (Guérin & Egger 2010: 102). ICUCH acts on a practical level, offering technical expertise for the protection and management of resources underwater (Grenier et al. 2006: x-xv). The tenets of the 1996 Charter may serve to guide public policy on UCH by numerous agencies in states that, for various reasons, have not become signatories to the 2001 Convention.

The 2001 Convention entered into force for signatory states in January 2009; for non-signatory states as well, the principles expressed in its Annex and the 1996 Charter have been successfully enacted in various ways. Innovative approaches to in situ preservation of UCH have been undertaken by a variety of states, including the pioneering project at Red Bay, Labrador, Canada and the *William Salthouse* wreck in Victoria, Australia; trails at the Florida Keys National Marine Sanctuary; Ustica off Sicily and Baiae in Campania, Italy; Sebastos in Caesarea, Israel; and Ampurias in Catalonia, Spain. Metal cages above identified shipwrecks in Croatia and the video camera monitoring of wrecks in Sicily, for example, aim to allow diving access while preserving the integrity of sites; so too does the establishment of maritime parks for individual wrecks as at the site of the *Kronprins Gustav Adolf* off Helsinki (Finland) or the *Wellington* in New Zealand (Manders et al. 2008; Alves in Couratier 2008: 81-90. See also: http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/about-the-heritage/dive-trail-in-situ-presentation/). Initiatives toward submerged and partly underwater museums such as the Baiheliang Museum at the Three Gorges in China, the half-submerged Guangdong Maritime Silk Road Museum in China, and the Alexandria Underwater Museum Project also hold potential to expand the range of possibilities for in situ preservation and display (Koschtial in Couratier 2008: 63-9; see also contributions by Xiurun (309-340), Fuchs (372-80) and Amin (381-89) in Shuguang 2011). Continued archaeological investigations of sites provide a basis for new research not only on seafaring practices, ship construction technology, and trade goods, but also innovative education outreach through their display in museums of

maritime history and underwater archaeology that hold broad appeal for tourism (examples include the Mary Rose Museum (UK); the Vasa Museum (Sweden); the Viking Ship Museum in Roskilde (Denmark), the Bodrum Museum of Underwater Archaeology (Turkey), the Vancouver Maritime Museum (Canada), and the Western Australia Maritime Museum).

While it sets in situ preservation as a first option to be considered for the preservation and protection of UCH, the 1996 Charter neither prevents nor inhibits archaeological investigation (Manders in Couratier 2008: 31-41; Guérin and Egger 2011). The first principle requires investigators to consider the relative merits of in situ preservation versus intrusive excavation according to the individual circumstances of the site and any perceived threats. Such a principle does not deny the possibility of excavation if it serves as the better means of achieving research and mitigation objectives that fit within the parameters stipulated elsewhere in the 1996 Charter.

Perhaps, the most critical aspect of the 1996 Charter is its explicit prohibition against the disturbance of sites for commercial exploitation aimed at trade or speculation. Such activity, "intended to profit a few at the expense of many," is considered "fundamentally incompatible with the protection and management of the heritage" (Introduction). Article 6 stipulates, "All intrusive investigations of underwater cultural heritage will only be undertaken under the direction and control of a named underwater archaeologist with recognized qualifications and experience appropriate to the investigation." This article places control over decisions regarding UCH in the hands of trained professionals engaged with the methodology and standards of working in the underwater environment, the research questions appropriate to the project, and the long-term stewardship and management of cultural heritage. As part of a broader scientific discipline, underwater archaeology means more than the retrieval of objects from the marine environment; the field is defined by investigative techniques, theoretical grounding, and a shared set of ethical principles (Maarleveld 2011). As a final protection against commercial exploitation of UCH, the 1996 Charter includes the important provision (Article 13): "The scientific integrity of the project archive must be assured; deposition in a number of institutions must not preclude reassembly to allow further research. Underwater cultural heritage is not to be traded as items of commercial value." These guidelines ensure that materials are not made inaccessible for future research or public appreciation through dispersal into private holdings. The 1996 Charter's provisions for qualified archaeologists and its restrictions against the sale or dispersal of objects do not explicitly restrict private for-profit contract services for site protection and mitigation by professionals provided that proper principles are observed and the heritage remains in the public domain. Rather, they establish a dichotomy between research and preservation objectives and commercial goals; intrusive excavation should not set the sale of artifacts as an end unto itself.

The ethical and practical framework established by the 1996 Charter also raises significant questions regarding the treatment of UCH that has been previously recovered by salvors as commercial goods. Recent salvage, display, and sale of objects from the *Titanic*, lying at a depth of 3,700 m on the Canadian outer continental shelf, or the Belitung shipwreck discovered off the coast of Indonesia with its cargo of ninth-century ceramics, have brought this controversy to the forefront of discussion (see Green 2011: 449-52; Dromgoole 2006). Both the *Titanic* and the Belitung wreck were salvaged according to contemporary national and international law, but such commercial salvage does not match the principles expressed in the 1996 Charter. From an ethical perspective, under what circumstances should this or similar material be published in academic journals or displayed in scientific or educational institutions, and how can research interests be balanced with site mitigation and public access? (Johnston 1993). Can archaeological and ethical standards of acquisition and display be compatible with commercial salvage operations and the financial challenges of research in the deep sea? (Greene et al. 2011; cf. Kingsley 2011).

For states that have not become signatories to the legal framework of the 2001 Convention, such ethical questions about protection, excavation, and the deposition of artifacts recovered from shipwrecks may be answered in part through the 1996 Charter. More detailed regulatory provisions and mitigation strategies might be useful and necessary in the future to address the growing dangers presented by certain modern practices of marine construction, mineral recovery, and trawl fishing, yet these threats do not detract from an overall framework of protection that sees commercialization of UCH as unacceptable. As a guideline for best practices – nonintrusive site assessment, effective protection and management, and archaeological excavation as necessary – the 1996 Charter aims to offer a coherent set of strategies for the preservation and presentation of UCH for states, professional researchers, as well as private interests and the public at large.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
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Chemical Survey of Archaeological Sites

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Introduction

Soils and sediments are altered by human activity. These alterations can be direct and/or

indirect, physical and/or chemical, and can both result from the deliberate behavior of people or be caused inadvertently. Chemical alterations of soils and sediments are often subtle and complex to study since laboratory methods must be employed (Holliday 2004). Their study is based on the premise that human activities generate specific chemical compounds: Like a magnet, the negative charge of soil particles attracts positively charged compounds and forms a strong bond that is relatively resistant to horizontal and vertical movement and, therefore, very stable over time (Wells 2006; Wells & Terry 2007b).

Definition

Human-induced chemical alteration of archaeological soils and sediments can include an increase in phosphorus (P) levels due to the deposition of refuse and waste. The work of Arrhenius, a Swedish chemist, is regarded as pioneering in its interpretation of soil chemical properties in terms of archaeological significance. While working for the Swedish Sugar Manufacturing Company and generating soil maps, Arrhenius (1929) observed that areas on which medieval occupation occurred had higher levels of P when compared with those which were unoccupied. Arrhenius (1963) later continued with archaeological soil studies, while other researchers – especially Eidt (1977, 1985), who contributed important methodological developments from soil chemistry – aided in the development and application of field and laboratory techniques to detect archaeological sites based on soil P levels. Subsequently, P analysis has been used for various archaeological purposes throughout the world (Wells & Terry 2007a). For example, in Queensland, Australia, Mulvaney and Joyce (1965) used this method to show relative occupation intensity over time. In North Wilshire, England, Smith and Simpson (1966) utilized P analysis to determine the presence of perishable artifacts in burials. At the site of Roders Shelter, Missouri, Ahler (1973) examined activity intensity and demonstrated the correlation between levels of P and lithic debris density. Davidson (1973) reconstructed the evolution of a tell site and investigated population growth at the site of Sitagroi in northeastern Greece using P analysis. Also in Greece, Cavanagh and colleagues (1988) used P analysis to identify human occupation sites and their boundaries. In Mesoamerica, Parnell and colleagues (2002) examined the relationship between P and refuse disposal at Piedras Negras, Guatemala. Their research concluded that there was a positive correlation between ceramic density and P concentration and showed that in-the-field P testing can be used to identify middens and guide excavations. In South America and in Europe, research into settlement-related anthropogenic dark earths has examined links between high P concentrations and the presence of well-preserved, P-rich microscopic inclusions, especially bone (Arroyo-Kalin et al. 2008; Devos et al. 2009).

Key Issues

In recent years, investigations of chemically altered archaeological soils and sediments have expanded to include a variety of elements other than P. Multi-elemental analyses have allowed for the exploration of connections between specific human activities and the elements that they deposit. Along with P, other particularly useful elements include calcium (Ca), magnesium (Mg), and potassium (K). Additionally, carbon (C) and nitrogen (N) are commonly examined in association with human activities, and to a lesser extent sulfur (S), copper (Cu), and zinc (Zn) (Fernández et al. 2002; Woods 2003; Holliday 2004). Much of what we know about the relationship between these elements and human activities comes from various ethnographic studies on contemporary occupation floors. Most notably, Luis Barba and his colleagues at the Laboratory of Archaeological Prospection, part of the Institute for Anthropological Studies at the Mexican National Autonomous University, have worked with indigenous people in their households in small, rural villages throughout Mexico (Barba & Ortiz Butrón 1992). Other ethnoarchaeological studies have focused on different parts of Mesoamerica

including, Oaxaca, Mexico (Middleton & Price 1996), Guatemala (Fernández et al. 2002; Terry et al. 2004), and Honduras (Wells & Urban 2002). These studies have found connections between specific domestic activities, such as cooking, storage, and craft manufacture, and certain chemical elements, compounds, and soil properties. Information from studies of this kind can be used as tools to interpret chemical signatures on archaeological floors and thus interpret ancient activity patterns. For instance, areas near ovens, fireplaces, and hearths tend to have high pH values and low P concentrations while also maintaining high levels of Ca and carbonates. The presence of wood ash, possibly from a hearth or kiln, is associated with high levels of K, sodium (Na), and Mg. The deposition of extremely high levels of P can be associated with food and beverage consumption and preparation, with low pH indicating food consumption. More specifically, Ca and strontium (Sr) have been shown to be associated with the preparation of corn whereas, iron (Fe) has been shown to be associated with areas used for processing agave leaves. The elements barium (Ba), manganese (Mn), and P have been shown to indicate organic refuse disposal, and mercury (Hg) and lead (Pb) have been demonstrated to be associated with craft production. Additionally, the deposition of iron oxide and mercuric sulfide suggests the use of certain pigments, such as hematite and cinnabar, which were used in ceremonial settings including burials and caches throughout Mesoamerica (Holliday 2004; Wells 2004; Wells & Terry 2007b; Wells et al. 2007).

When interpreting concentrations of elements for archaeological purposes, it is not the absolute concentrations that are of interest, but rather the relative concentrations and spatial patterns of elements (see also Wells et al. 2000). By mapping concentrations of elements across archaeological surfaces, researchers can examine differences in spatial use as well as sometimes define areas where specific activities likely occurred. Paired with observations of traditional archaeological artifacts, important additional insights can be achieved into past activity patterns and human practices. It is thus unsurprising that chemical surveying of archaeological sites has become a popular technique in contemporary archaeological investigations.

Cross-References

- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Ash: Geoarchaeology
- ▶ Geoarchaeology
- ▶ Urban Dark Earth

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Chicken: Domestication

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Basic Species Information

The wild or red junglefowl *Gallus gallus* (Linnaeus, 1758) is the primary ancestor of domestic poultry. In areas where the distributions of the two species come into contact, red junglefowl is known to hybridize with grey junglefowl, *Gallus sonneratii* Temminck, 1813 (McGowan 1994). This happened in the past as well since domestic poultry acquired a gene responsible for yellow legs while retaining most of its genome from *G. gallus* (Erickson et al. 2008). *G. sonneratii* is confined to Peninsular India except for NE India, where it is replaced by the much more widely distributed *G. gallus* occurring from India to S China and south across Thailand, Laos, Myanmar, Vietnam, Sumatra, Java, and Bali (McGowan 1994).

Major Domestication Traits

Red junglefowl are small-medium phasianids exhibiting a bright, colorful plumage in mature males. The species is characterized by a marked sexual size dimorphism (♀♀: 500–1050 g, ♂♂: 700–1450 g) (McGowan 1994). Domestic forms show a high variation in plumage color and may attain weights >5 kg. In all domestic breeds a clear sexual size dimorphism is observed. Like their wild ancestor, domestic chicken are opportunistic, omnivorous feeders. Their diet

comprises a diverse spectrum of plant species as well as invertebrates. *G. gallus* breeds seasonally and can have up to three clutches of five to six, eventually up to nine eggs (McGowan 1994). Kept under natural conditions, *G. domesticus* can reproduce most of the year, except during winter when egg production ceases. Full clutches of domestic hens usually number about 12 eggs.

Genetic studies of modern wild and domestic *Gallus* indicate multiple maternal origins with possible domestication in the Indian subcontinent, SE China, and southern China and neighboring countries (Liu et al. 2006). However, this picture must be verified applying ancient DNA analysis because modern breeds may not be descended from local wild populations due to the introduction into Southeast Asia of more prolific, indigenous lineages during the last 200 years. Hybridization between wild, feral, and domestic *Gallus* has occurred as well, and fully wild red junglefowl is on the decline everywhere, if not already largely extinct.

Timing and Tracking Domestication

Written sources, iconography, and osseous remains of *Gallus* collected in archeological sites located beyond the natural distribution range of red junglefowl are indicative of domestic status. The earliest chicken finds come from sites along the Neolithic Yellow River and the Middle Yangtze (West & Zhou 1988). These findings would imply that domestication took place prior to 6000 BCE. This hypothesis must be verified based on a (re)evaluation of securely dated avifaunal assemblages. More than 3,000 years later, clay figurines and depictions of *Gallus* on ceramics illustrate the presence of domestic fowl in the Harappan sites (c. 2600–1900 BCE) of the Indo-Gangetic Plain. Trading contacts between the Indus Civilization and Mesopotamia initiated the westward diffusion of *Gallus* during the 2nd millennium BCE. From here, domestic chickens spread northward to the Caucasus region and westward to the Levantine coast. The fact that southern Mesopotamia was tributary to the Egyptian rulers explains why in the annals of Thutmose III (1479–1425 BCE) it was noted that the king received "birds which lay every day." Obviously, laying performance in chicken had already been improved considerably by human selection.

Since poultry can serve as living provisions on journeys, it is not surprising that seafaring people often carried chickens. Thus, early in the first millennium BCE, the Phoenicians introduced poultry keeping into their newly founded colonies located in coastal northern Africa and southern Spain, whereas the Greeks did the same in coastal and insular Mediterranean Europe. The need for provisions on sea journeys also explains the spreading of *Gallus* in Oceania since *c.* 3000–2800 BP and across Micronesia one millennium later (Storey et al. 2007).

If in the seventh–sixth centuries BCE domestic chicken made its appearance in temperate western and central Europe, poultry breeding only became popular under Roman cultural influence (27 BCE–478 CE). This trend is also observed elsewhere in the *Imperium Romanum*, e.g., in coastal N Africa and Egypt. Based upon currently available evidence, the diffusion of chicken husbandry into sub-Saharan Africa was a comparably late phenomenon starting in the fifth century CE.

While it is clear that European chickens were introduced into the Americas by Spanish or Portuguese explorers that arrived on the East Coast around 1500 CE, the presence of domestic fowl prior to this date remains a matter of dispute. An ancient DNA sequence and radiocarbon date from a single chicken bone excavated in coastal Chile has been interpreted as a Polynesian introduction in pre-Columbian times (Storey et al. 2007), but definite proof requires further analyses of ancient DNA sequences and radiocarbon and stable isotope data from archeological excavations within both Chile and Polynesia (Gongora et al. 2008).

A most remarkable aspect of domestic fowl is its role in symbolism and offerings in first millennium BCE Eurasia. Examples of this are the sacrifices in honor of Mercury, in the frame of the cult of Isis, and in Mithraism as well as its use in divination rites and as offerings with burials. Whether religious motifs initiated *Gallus* domestication or – as often stated in literature

(Garrigus 2007) – if it were for the purpose of cockfighting, a pastime in the Indian subcontinent known since the first millennium BCE cannot be decided for the moment. Because neither the outcome of the domestication process nor the future needs of a society can be predicted by the domesticator, postulating intentional domestication is a critical issue because it is usually based on hindsight.

Interestingly, gut contents of 37 wild birds in India were noted containing seeds of 30 plant species including a single cultivar, i.e., rice (*Oryza*) (McGowan 1994). First domesticated in the Yangtze River valley 8000–6000 BCE, rice agriculture diffused to South China around 3000 BCE, whereas in the Indus Valley Civilization, rice cultivation can be dated to the 1st half of the third millennium BCE (Glover & Higham 1996), which is broadly contemporaneous to the appearance of domestic chicken in the local faunal record. It can therefore be questioned if innovative agricultural practice in Southeast Asia did not create a new feeding niche for *Gallus gallus*, thereby paving the way for a closer relationship between humans and red junglefowl.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Chickpea: Origins and Development

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Basic Species Information

Chickpea is the cultivated legume, *Cicer arietinum* (L.). It is the only cultivated pulse from the tribe Cicereae (Family Fabaceae). Other names for this crop of Neolithic southwest Asian origin include garbanzo bean in the Americas, hamaz in Arabic countries, nohud or lablabi in Turkey, shimbra in Ethiopia, and bengal gram or chana in India (Redden & Berger 2007: 9). Chickpea ranks third in the world's production of seed legumes, after soybean (*Glycine max* L.) and pea (*Pisum sativum*). It is cultivated on nearly every continent, but major

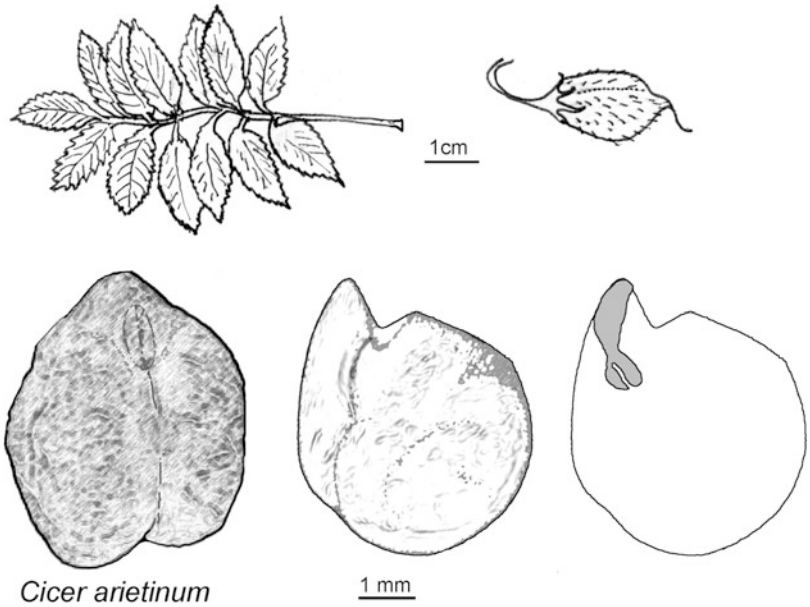

Chickpea: Origins and Development, Fig. 1 Sketch of the chickpea, including leaf and pod above and seed below. The seed is shown in basal view (with hilum), lateral view, and cross section showing the short embryo

traditional production is in India, Pakistan, Turkey, Myanmar, and Ethiopia. Chickpea can be consumed cooked, baked, roasted, popped (like popcorn), stewed, or ground into flour (gram flour). The success of chickpea on a global scale is due to its high seed-protein content (nearly 20 %) and, as a result, its potential as a valuable meat substitute. The high protein content makes it a perfect addition to cereals, as cereals are high in starch, and the combination of both of these provides a nutritional balance (Zohary et al. 2012). Kerem et al. (2007) have highlighted that chickpeas are especially rich in the rare amino acid, tryptophan, which may have made these of particular interest over other food plants. In addition to dietary benefits, pulses are useful when grown in fields together with cereal crops or when fields are rotated between the two. This is because pulses are able to fix atmospheric nitrogen in the soil, thereby replenishing nitrogen in soils depleted as a result of cereal cultivation (Zohary et al. 2012).

Major Domestication Traits

The seeds of chickpea are the most common plant part identified in archaeological contexts. The seeds of chickpea are dicotyledons, which can be divided into symmetrical halves. The morphology of chickpea seeds can be described as angular with wrinkly surfaces, with a defining characteristic, i.e., a protruding beak and a hilum under the beak (Fig. 1). Identification can be difficult due to fragmentation during charring and the specimens are then most likely to be identified to the family level (Tanno & Willcox 2006).

There are four primary changes in the evolution of chickpea under domestication. The first is an increase in seed size, which is most often the only surviving indicator for domestication in the archaeobotanical record. The second is the breakdown of the mechanism that retains the pod and seed on the plant. This allows the seeds to remain on the plant until the crop can be harvested as opposed to when the plant is ripe, as is the case for wild varieties. The third trait is a reduction of seed-coat thickness, which makes the seed coat more water absorbent and thus likely to germinate in the same year they are sown. This is in opposition to the wild types which have less permeable seed coats and as a consequence germinate over the course of several years. The fourth trait involves a change from autumn- to spring-sowing, which may be a result of the interaction between the pathogen *Digymella rabiei*

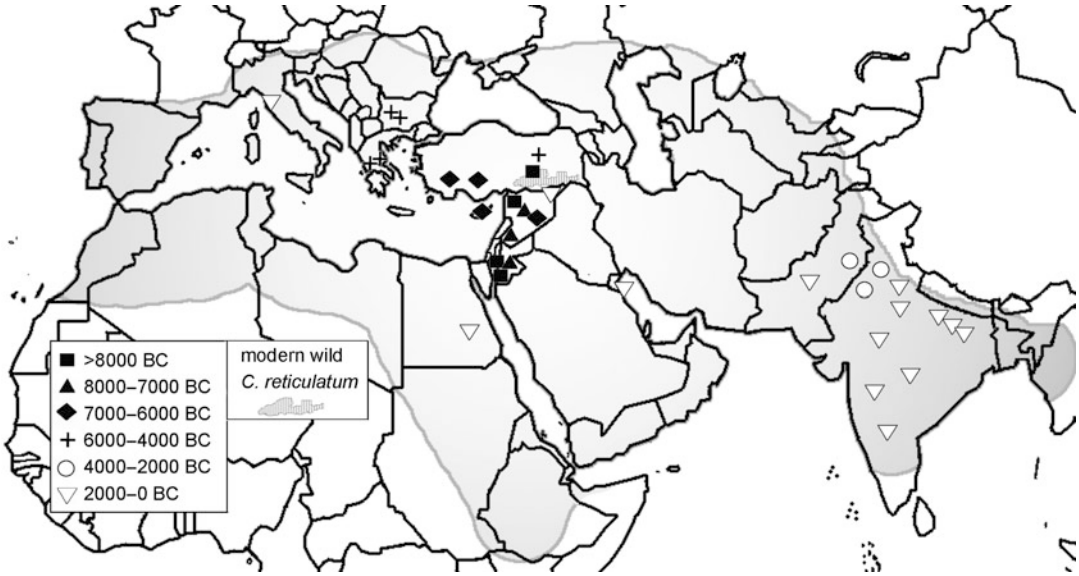

Chickpea: Origins and Development, Fig. 2 Map indicating the wild range of *Cicer reticulatum*, the general maximal extent of early/traditional chickpea cultivation and the distribution of representative early archaeobotanical finds (Based on data in Tanno & Willcox 2006; Fuller & Harvey 2006; Lippi et al. 2009; Zohary et al. 2012)

and the fact that lengthened summer daylight enhances seed maturation (Zohary et al. 2012: 75-89, with references; Tanno & Willcox 2006: 197).

Timing and Tracking Domestication

The chickpea (*C. arietinum*) appears to have been domesticated from the wild *C. reticulatum* (Ladizinsky & Adler 1976; Zohary et al. 2012). The natural distribution of *C. reticulatum* is restricted to southeast Turkey, which provides the location of chickpea domestication and an area from which the crop spread (Fig. 2). The dispersal of domestic chickpea out of southeast Turkey resulted in the development of two crop types, the Kabuli and Desi, associated with the western and eastern dispersal, respectively. The Kabuli type (var. *macrocarpa*) is common in the Mediterranean countries and the Near East and has large, light colored owl-head-shaped seeds. The earliest well-preserved archaeobotanical evidence of chickpea outside of its wild progenitor's natural distribution area comes from a site located 260 km south of this region, in northwestern Syria. Charred remains from the early Pre-Pottery Neolithic B (c. 8400 BCE) site of Tell el-Kerkh provide evidence for an "intermediate" stage between the wild and domestic type morphologies (Tanno & Willcox 2006). There are specimens from Çayönü in southeastern Turkey that date to the same time and were found near the wild range of distribution, with likely later finds an indication of its spread to the southern Levant (Fig. 2). In general, finds of chickpea are rare compared to other legumes, such as lentils or peas, which may indicate preservation biases against chickpeas. Nevertheless, the few finds indicate an early dispersal to the southern Levant and central Anatolia before 6000 BCE. Additional evidence for the westward spread include data from late Aceramic Neolithic Cyprus (c. 6500 BCE from Dhali-Agridhi), and finds from Greece just after 6000 BCE, with evidence from the Balkans by 5500 BCE.

The Desi variety (var. *microcarpa*) is associated with the eastern dispersal of chickpea and is common in India, Afghanistan, Ethiopia, and some parts of the Near East. This type is smaller

and darker in color and has ram-head-shaped seeds (Ladizinsky 1995; Zohary et al. 2012). Evidence from the eastern margins of the Middle East is, so far, lacking of a comparable age to the evidence for the westward dispersal. So too is early evidence from the western Mediterranean. Nevertheless, finds from the Indus Valley, including specimens from Harappa, put cultivation in Pakistan by c. 2500 BCE, with further spread into India at c. 2000–1500 BCE (Fuller & Harvey 2006). In Egypt, chickpeas are known from the New Kingdom, e.g., the Tomb of Tutankhamun (Zohary et al. 2012). The earliest report thus far from Italy is of a Middle Bronze Age date (Lippi et al. 2009).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Lentil: Origins and Development
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Childe, Vere Gordon (Political and Social Archaeology)

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Basic Biographical Information

Vere Gordon Childe (1892–1957) was arguably the most read and cited archaeologist of the twentieth century (McNairn 1980; Trigger 1980; Green 1981; Harris 1994). He produced broadly synthetic works that addressed fundamental questions relating to the pasts of Europe and the Near East, cultural evolution, and the nature of knowledge. He wrote in a clear way that appealed to popular audiences and to scholars outside of archaeology. Childe was an avid socialist and Marxist. In the 1930s, he recognized the role of prehistory in supporting the rise of Fascism in Germany. He asked and answered the question "Is Prehistory Practical" to challenge Fascism. After the Second World War, he confronted the Soviet perversion of Marxism and built an approach to knowledge to contest it.

Childe was born on April 14, 1892 in Sydney, Australia. He attended Oxford University in England, and in 1916, he earned a Ph.D. in classical philology. He returned to Australia where he became involved in leftist politics, and in 1921, the Australian Labour Party sent him to London

as a correspondent. When the party suffered defeat the following year, Childe lost his employment and returned to an academic life in Great Britain. In 1927, Edinburgh University appointed him a full professor and granted him the Abercromby Chair of Prehistoric Archaeology. Childe was never an avid fieldworker, but between 1927 and 1954, he did excavations at seven archaeological sites in Scotland and Ireland. In 1946, the Institute of Archaeology in London appointed him Director and Professor of European Prehistory. He held this post until his retirement in 1956 when he returned to Australia where he died on October 19, 1957.

Childe's (1925, 1926, 1928, 1929) earliest research focused on the prehistory of Europe, the definition of archaeological cultures, and the diffusion of ideas in order to challenge nationalist and racist interpretations of European prehistory. Childe took his initial concept of an archaeological culture from the German archaeologist, Gustaf Kossinna. In his book *The Danube in Prehistory*, Childe defined an archaeological culture as a complex of types of remains including artifacts, house forms, and burial forms that consistently reoccurred together (Childe 1929: v-vi). Kossinna equated archaeological cultures with races, and he sought to trace the migration of the German race. Childe tried to counter this racist notion by demonstrating that archaeological cultures primarily changed due to diffusion and thus did not differ in terms of creativity, intelligence, or accomplishments.

In the late 1930s, Childe formulated his approach to cultural evolution. Childe (1934) first discussed agricultural and urban revolutions in his book *New Light on the Most Ancient East* and he elaborated these ideas in his major popular work, *Man Makes Himself*, (Childe 1936). He discussed cultural evolution in substantive terms to account for historical developments in the Near East and Europe. He did not engage in polemic nor did he develop a universal evolutionary theory.

Childe argued that archaeology should be a historical, human science. He recognized that archaeologists could learn a great deal from the natural sciences, but he rejected the idea that the methods or concepts of the natural sciences could be applied directly to the study of prehistory. For Childe, evolutionary laws did not transcend time and space. Universal laws or truths could only exist if human nature and/or society were fixed and immutable. Childe began with the Marxist principle that both human nature and society are constantly changing. Childe defined evolution as what happened in history. From a dialectical perspective, he saw no dichotomy between history and evolution, and he linked diffusion and evolution in his substantive studies.

After World War II, when the failings of the Bolshevism of the Soviet state became apparent to scholars in the West, Childe wrote about the nature of knowledge and its relationship to society. Childe (1989:15-17) would later call Stalinism "the Marxist perversion of Marxism." With this critique, Childe became very concerned with epistemology, that is, with the nature of knowledge and how scholars create it. He rejected notions of laws that determined social change. He saw knowledge as complexly created and always subject to revision. His discussion of the nature of knowledge presaged current debates in Anglophone archaeology by a generation.

In *Society and Knowledge*, Childe (1956) argued that the function, structure, and content of knowledge are social and relate to action. Knowledge functions to provide rules for cooperative social action. The content of knowledge provides a working model of the "real world" that must be accurate enough for society to act. But, a society's knowledge is not always progressive, and scholarly critique reveals its conservatism. For Childe, the convergence between knowledge as a model of the "real world" and society's means of production provides the measure of a society's fitness to survive. Individual delusions or social illusions could hamper a society's knowledge or ability to act and progress (Childe 1956:115). Such delusions may serve the particular interests of classes or specific groups and, at the same time, be a buttress to the authority of the ruling class. These delusions transform knowledge and science into ideology, and this ideology

becomes a brake upon the progress of knowledge. Childe saw the development of knowledge as a dialectic in which people achieved understanding through the negation of error.

Major Accomplishments

Archaeologists continue to read, analyze, and discuss Childe (McNairn 1980; Trigger 1980; Green 1981; Harris 1994). The advent of radiocarbon dating in the 1950s revealed many of Childe's substantive interpretations of European prehistory to be false. His work, however, continues to be the starting point for questions of cultural evolution and domestication. Regrettably, Childe's discussions of epistemology have not received the attention of his other work. His observations, however, remain relevant and insightful as archaeology moves away from the sterile late twentieth-century debate between objectivist and relativist approaches to knowledge. Childe' ideas contributed to the three main archaeological movements of the twentieth century, culture-history, processual archaeology, and post-processual archaeology. Until archaeology transcends the issues raised in these movements, archaeologists will keep returning to Childe's work.

Cross-References

► European Mesolithic: Geography and Culture
► Marx, Karl

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Childe, Vere Gordon (Theory)

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Basic Biographical Information

Socialist, antiwar activist, and social theorist V. Gordon Childe was probably read by more people than any other archaeologist of the twentieth century. Childe was born in North Sydney, Australia, on April 14, 1892, and, fearing ill-health and being a burden on society, committed suicide on October 19, 1957, near Sydney. He graduated from the University of Sydney in 1913 with honors in classical studies and received a scholarship to attend Oxford University from 1914 to 1916, where studies of classical archaeology aroused his curiosity about what happened before written records. Returning to Australia, he spent the next six years engaged in antiwar and progressive politics, serving as a secretary to the prime minister and later as a research and publicity officer in London. When the Labor

government of New South Wales was ousted in 1922, Childe found himself without a job and with poor prospects of finding one in his home country and resumed his studies of prehistoric archaeology. For the next five years, he supported himself translating archaeology books into English and working as the librarian at the Royal Anthropological Institute. In 1927, he joined the faculty at Edinburgh University; in 1946, he became professor and director of the Institute of Archaeology at the University of London until his retirement a decade later.

Major Accomplishments

Childe's (e.g., 1925, 1926, 1929) studies in the late 1920s were concerned with cross-dating local cultural sequences from the Near East and Europe in order to explore changing relationships between the various cultures of this vast region. These studies heralded the replacement of nineteenth-century evolutionary schemes with culture-historical ones. Cultures, from his perspective at the time, were composed of objects and associations that repeatedly occurred together. He equated these with peoples and typically explained changes in terms of diffusion.

By the late 1920s, Childe had already begun to search the archaeological record for broader trends. In *The Most Ancient East* (1928), he argued that the development of agriculture (the Neolithic Revolution) marked a major change in human history. He adopted a version of the "oasis hypothesis" which argued that people domesticated the plants and animals that concentrated around water sources as the climate dried out at the end of the last ice age. In contrast to some advocates of this view, Childe argued that some groups may have developed agriculture or animal husbandry, while others did not. In other words, these historical contingencies accounted both for the diversity of cultures with different economic bases and for the different trajectories of sociohistorical development that are evident in the archaeological record. They implied an ongoing dialectical relationship between human beings and how they perceived and used the environments in which they lived. Thus from his perspective, these contingencies and interactions precluded explanations of change that were based on either environmental determinism or unilinear evolution (Childe 1951).

From 1930 onward, Childe (e.g., 1930, 1934, 1936, 1942, 1946a, 1950, 1958) published a series of studies of the prehistoric past that focused less on culture-historical sequences and increasingly on economic relations. These ranged from the rise of craft specialization to the role of states, class formation, exploitation, and written records in the rise of civilization (the Urban Revolution). Many of the studies were simultaneously comparative and functionalist. His thesis of combined and uneven development was the first sustained socioeconomic analysis of the rise of civilization. He argued that (1) agriculture facilitated surplus production over subsistence needs and underwrote both technical and social divisions of labor; (2) the ruling classes in the Mesopotamian lowlands used part of the surplus they appropriated from direct producers to support full-time craft specialists, notably metalsmiths, who relied on ores obtained from the periphery; and (3) different trajectories of sociohistorical development emerged on the peripheries of the lowland Mesopotamian states.

From the mid-1930s onward, Childe framed his functionalist, socioeconomic analyses in increasingly Marxist terms (e.g., 1936, 1942, 1946b, 1950). He understood cultural change as a consequence of the contradictions that appeared between the forces and relations of production and that were manifested in the social organization, class conflicts, and world views of a society. These contradictions were the dynamic force of history – the motor that underwrote the dissolution of existing social relations and world views and the emergence of new ones in the larger totality we call society. This, of course, is the mode of production concept that Marx (1859) sketched in the preface of *A Contribution to the Critique of Political Economy*. During this time, Childe (e.g., 1954, 1956a) was one of the few archaeologists to point

out that the rise of civilization had a dark side: exploitation, repression, and conquest, all of which impeded the growth of knowledge and progress by erecting ideologies (false consciousness) and practices that served the interests of ruling groups as exploitative social relations hardened.

Childe (e.g., 1946b, 1947a, 1947b, 1956b) viewed archaeology as an historical science similar to paleontology or history as well as a social science, like anthropology, that attempted to understand ancient societies in the context of their historically constituted social relations and paths of development. From his standpoint, archaeological research was indispensable for providing information not only about past societies but also about long-term processes of cultural and societal change. Throughout his career, he increasingly saw change as a consequence of endogenous factors (the resolution of contradictions) rather a product of the migration of peoples, war, or conquest. His theoretically informed discussions of archaeology and past societies repeatedly challenged the hegemonic historical accounts and understandings of how humankind developed that were held by the ruling classes. As a result, he was continually aware of the difference between the evidentiary base that archaeologists use to discuss the historical development of human society, the methods they employ to accumulate evidence and bring these accounts to life, and the social and cultural milieus in which they present their findings and the discourses that these presentations engender.

Cross-References

- ▶ Archaeology and Politics
- ▶ Braidwood, Robert John
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture

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Children in Bioarchaeology and Forensic Anthropology

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Introduction and Definition

The study of juvenile human skeletal remains in archaeological and forensic contexts is a relatively new development in bioarchaeology. Children (subadults, non-adults) are variably defined as those individuals aged up to 15, 17, 20, or even 25 years, but skeletons are generally considered to be "adult" when all of the ends of the bones (epiphyses) have fused and all the permanent teeth have erupted. Child skeletons may be further subdivided into perinate (around birth), infant (under one year of age), young child (1–5 years), older child (5–10 years), and adolescent (10–17 years), but these divisions vary between scholars and cultures. The ability for us to divide our non-adult categories in to smaller age groups is a recognized benefit in this area of research, allowing us to examine and compare changes in morbidity and mortality during different periods of development. It is generally agreed that ages based on dental development and eruption are a more accurate age marker than skeletal growth (diaphyseal length) and maturation (fusion) as they conform to a genetic "blueprint" (Acheson 1959). Methods of determining the biological sex for non-adult skeletons are less successful, as the secondary sexual characteristics (e.g., increased robusticity in males) only occur after puberty and the unfused pelvis in children under the age of around 14 years makes morphological traits difficult to define. Some non-adult sexing methods have been devised using canine size (De Vito & Saunders 1990), mandible morphology (Molleson et al. 1998), and the pelvis (Boucher 1957; Rissech et al. 2003). These generally show accuracy rates between 64 % and −90 % with the greatest accuracy achieved for dental size.

Key Issues and Current Debates

Much of the early research in physical anthropology was focused on the skull, with little regard for postcranial remains (Johnston 1968). As children's skulls are unfused during growth, their skeletons were often discarded by museum curators and researchers as they were considered to have: "comparatively little anthropological value" (Hooton 1930: 15). By the 1960s, Johnston was pioneering the study of child remains through his interests in the growth and development of past populations and, in particular, through his work on the non-adults from the Indian Knoll skeletal sample in Illinois. However, many researchers continued to concentrate on mortality rates and life expectancy in the past, where the underrepresentation of children in some cemeteries was noted to be detrimental to the accuracy of archaeological life tables (Bocquet-Appel & Masset 1982). Children were even described as disrupting the archaeological record through their use of objects and the landscape through play (Hammond & Hammond 1981). This negative attitude toward the analysis of child skeletal remains may stem from concerns regarding the preservation of their remains. Juvenile bones are smaller and generally more fragile than adult bones meaning that at certain ages, they may be more prone to decay (Guy et al. 1997). The tiniest of remains or epiphyses may go unrecognized by an inexperienced archaeologist, or newborns may have been excluded from the general cemetery as the result of illegitimacy, non-baptism, or infanticide, providing a skewed picture of the demographic profile of that population. Evidence that some societies provided separate burial grounds for their children has been found in Wales, Ireland (Cilliní) and Italy (Norman 2003).

As children often die from acute conditions before chronic diseases such as leprosy and tuberculosis become evident on their skeletons, studies of pathology in child remains has also lagged behind that of adult skeletons. In particular, the highly plastic nature of children's bones means that they are less prone to complete fracture but instead suffer partial breaks (greenstick fractures) or bowing deformities that are hard to identify in dry bone.

Today, the resurgence of feminist approaches in anthropology has led to an increased interest in the identity and role of children in the past, read through the archaeological record (Kamp 2001). Children are now recognized as contributing to information on social structures, population adaptation, rites of passage, child rearing, occupation, gender, and diet and are even acknowledged to have their own unique material culture, demonstrated through toys (Wilkie 2000). Child skeletal remains are now studied in their own right, with several texts dedicated to their analysis (Scheuer & Black 2000; Lewis 2007). Today, information on the age and health of children from past populations aids in our understanding of how well a society has adapted to their environment, by being able to keep the most vulnerable members alive into adulthood. The analysis of skeletal remains to determine age-at-death provides a "biological age" for the child. Once this has been established, comparisons in the burial treatment or health status of children between different sites and periods may identify specific rites of passage within each culture or a "social age" (Halcrow & Tayles 2011). How a child is buried can provide information on transitional periods within a society and add to debates on the life course in social archaeology.

Advances in the use of nitrogen and oxygen stable isotope ratios taken from the enamel of deciduous and permanent teeth have allowed us to explore the ages at which different societies began weaning their children and the types of food they were weaned onto. The majority of studies have shown that children tended to be weaned between 1.5 and 2.0 years of age, consistent with many documentary accounts, but that methods differed from abrupt weaning (Katzenberg & Pfeiffer 1995) to a gradual process lasting several years (Wright 1998).

Infant mortality is a barometer of population adaptation both today and in the past. The study of child paleopathology has also seen recent advances, with researchers becoming increasingly aware of the types of lesions that can be identified on child remains. Chief among them are metabolic (e.g., rickets and scurvy) and infectious disease (e.g., congenital syphilis, tuberculosis), and comparisons in prevalence rates of these conditions between societies and time periods can provide information on urbanization, industrialization, and health (e.g., Lewis 2002).

Forensic Anthropology

In the forensic context, children's remains provide additional challenges to the forensic anthropologist. Although knowledge of skeletal and dental development allow for more accurate ages to be assigned to a child than an adult, other biological identifiers such as sex, stature, and ancestry are more difficult to determine without the aid of soft tissue, clothing, or DNA analysis. The morphological traits used to identify the sex or ancestry in the pelvis and skull are not evident on the skeleton until after puberty. Personal identification may also be hindered by the fact that few young children have radiographic records as they tend not to undergo surgery. In some countries, there are no legal requirements to permanently store dental records. For example, in the UK, dental records are typically only kept for 8 years. However, with the development of digital radiographs, records may be kept indefinitely. In less developed countries, medical records may not exist at all or may be destroyed during conflicts.

In some cases, the presence of women and very young children in mass graves can provide supporting evidence for genocide. However, the presence of individuals under the age of 17 in war graves should be expected in areas where child soldiers have been recruited. Rosen (2007) records that internationally, the current average age of child soldier is 12.6 years, although in some countries children can be "recruited" as young as 5.

One of the main areas that forensic anthropologists play a role is in the identification of physical child abuse from skeletal remains (Walker 1997). Multiple rib fractures, in various stages of healing, are the most commonly cited lesions associated with such abuse, but examiners should be aware that underlying diseases or accidental injuries may also contribute to similar patterns of trauma on the skeleton. The main features of non-accidental injuries are nonspecific.

The study of non-adult skeletal remains in archeological and forensic contexts is a challenging area of anthropology. It has been hindered in particular by our inability to sex a child as accurately as an adult and the long held misconception that their remains do not preserve well in the ground. However, as recognition of the value of these remains to inform us of life and death in past societies increases, our methods and approaches are becoming more sophisticated and more scholars are turning their attention to these often tiny remains.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology and Anthropology
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic Anthropology: Definition
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

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Children in the Central and Western Mediterranean, Archaeology of

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Introduction

In the central and western Mediterranean, childhood was considered a distinct phase of life; the age at which children ceased to be children was likely fluid and may have varied depending on factors such as socioeconomic status and gender. Archaeologists have focused their research on the identification of children's material culture, the differences in the treatment of dead children, and the portrayal of children in iconography. Within the discipline of archaeology for this region, the term "subadult" is used to refer to the physical remains of individuals under the age of 18 years; it is not equivalent to the term "child," which refers to a sociocultural construct.

Definition

The term "child" in archaeology is generally regarded to imply an individual who is considered a child by his or her respective society. That is, to say, the concept of "a child" is regarded as a cultural construct involving individuals that are physically and socially dependent due to their physical age and cognitive state. Among the cultures of the central and western Mediterranean, childhood seems to have been regarded as a distinct life stage, though the precise nature of the age and social distinctions is one area of scholarly inquiry.

Though one of the key issues (see below) in the study of children in the central and western Mediterranean is the definition and identification of children's material culture, there are certain types of artifacts that archaeologists have determined that share an association with children. Archaeologists have focused specifically on games, toys, and infant feeders, all of which conform to modern notions of what constitutes children's objects, as the material culture of ancient childhood. In particular, there have been a number of studies and exhibitions of these artifacts in the past two decades (e.g., Ricotti 1994; *Jouer dans l'Antiquité* 2001). Dolls have attracted some of the most attention; the majority of research has focused on the form and possible intended functions of dolls themselves (Elderkin 1930; Mason & Simeoni 1987).

Iconography and burial evidence provide some tangible evidence of the association between children and particular types of artifacts, an association which in some cases is also bolstered by the historical record. Transition periods are particularly visible; the early and mid-teens, around the onset of puberty, seem to have been a critical point in the lives of children. Items, such as amulets and dolls, mentioned in historical sources associated with childhood and coming of age ceremonies, are found in association with children as associated grave goods and in iconography. For instance, a study of grave goods found with young girls between the ages of 8 and 14 years posited that dolls deposited with them symbolized that the girls never achieved marriage in life (Martin-Kilcher 2000). According to historical sources, young girls would have dedicated their dolls to the goddess Venus just before they married (Persius *Sat*. 2.70).

Figurines that were possibly dolls have been found at temples of Venus (Elderkin 1930). Other artifacts associated with children were protective amulets. Votive terracottas in the image of infants depict them wearing such objects (Coulon 1994; Ammerman 2007), and boys on Roman children's sarcophagi are portrayed wearing amulets known as *bullae* (Huskinson 2007: 331).

Burial evidence has also attested to the social distinctiveness of children. Subadults, in particular neonates and infants, are often underrepresented in cemeteries; they were often interred in separate locations. Some infant cemeteries have been excavated, such as the late Roman infant cemetery at Poggio Gramignano in Italy (Soren & Soren 1999) and the Yasmina cemetery at Carthage in North Africa (Norman 2003). The phenomenon of separate burial sites for subadults has been seen in mortuary sites throughout the world, though reasons for this may vary depending on culture and location (Becker 2007). They have been even found beneath the floors of houses in some of the western Roman provinces. Overall within different regions within the central and western Mediterranean, there were variations in the treatment of subadult remains.

In addition to determining relationships between children and material culture, the study of the iconography has yielded evidence of ideological and symbolic associations with children. For instance, circus scenes were frequently found on children's sarcophagi in Roman Italy. The circus, as a liminal place where supernatural forces played a heavy hand in fate, represented the connection between magic and children, liminal beings whose graves were sources of power for magicians. The spirits of children themselves could affect the outcomes of races and the well-being of the competitors (D'Ambra 2007). Funerary images and sculptures have also revealed a strong symbolic link between children and animals. Lizards, for example, which were frequently depicted in funerary art with the image of a sleeping child, may have symbolically represented the protectors of children (Sorabella 2007).

Key Issues/Current Debates/Future Directions/Examples

The issue of definition and identification of children's material culture is a key issue in the archaeology of the central and western Mediterranean. In all likelihood, children in this region lacked a distinctive material culture. For instance, human figurines may have served either as dolls or as votives (Shumka 1999: 617), as could other types of miniatures, such as pots (Kiernan 2009). Graffiti of alphabets can be associated with adult learners as well as children; both individuals of all ages would have made use of dice and gaming pieces.

Also of concern in the archaeology of children in the central and western Mediterranean regards their underrepresentation in cemeteries. Debate over whether this is actual underrepresentation due to sociocultural traditions or only the appearance of underrepresentation due to differential archaeological preservation concerning the survival of infant bones in the archaeological record continues to be debated (Blaizot et al. 2003). Some scholars have speculated that this is due to the relative fragility of children's small bones (Bourbou 2000: 187). Acidic soils can affect skeletal survival, and shallow graves of infants are more vulnerable to damage from plowing (Evison 1987: 146). Furthermore, imperfect excavation techniques can affect the recovery of the remains of infants and young children (Bello 2004).

Another key issue is the study of children's lives and activities (as opposed to sociocultural constructions) in the central and western Mediterranean. The goals of such studies have been to understand children as active social agents. Little is known of the archaeology of children's day-to-day lives, including the activities they participated in, the places they inhabited, the people with whom they interacted, and their contributions to their communities. The lack of a recognizably distinctive material culture makes identification of their presence difficult in contexts where either the image or the physical remains of a child is absent. There seems to have been no space within a Roman house designated specifically for children, as one

might expect in an Anglo-American home (Wallace-Hadrill 1994: 42). With the exception of a child's bed from Herculaneum (Wallace-Hadrill 1994: 113), both Pompeii and Herculaneum lack anything readily identifiable as children's objects: a study of artifact assemblages from 30 Pompeian houses did not yield a single identifiable "child's object" (Allison 2004: 155). As a result, there has been little work done on analyzing domestic artifact assemblages in the Mediterranean to look for evidence of children's activities (for an exception, see Johnson 2007 on the site of Karanis, Egypt). A study of children's graffiti in Pompeii and Herculaneum has shown that children had preferred smaller and obscured spaces within houses for more leisurely activities (Huntley 2010).

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Tombs, Greek (Iron Age)

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Chile's World Archaeological Heritage and Its Management

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Introduction

Chile's archaeological heritage as we envision it today is based mainly on the existence of aboriginal communities within the national territory; the significance, since the sixteenth century, of the occurrence of these societies and native cultures; and their historic importance in the development of the national society as well as its identity. The emphasis in the national character that played the increasing interest in rescuing the sources and antiquities that were part of the national heritage was crucial as it was the cultural and scientific European influence, especially from France and Germany that arrived in Chile during the nineteenth century.

Chile's National Council of Monuments by means of Legislative Act 17288, article 21, considers as archaeological monuments all the ruins, sites, and anthro-archaeological artifacts that are located in the surface and below of the land covers by the national territory. Officially, NCM recognizes in its web page a total of 21 main archaeological sites as of October 2008. However, the richness of archaeological material in Chile is far more numerous. In fact, only in Northern Chile, the landscape that is characterized by the dryness of the Atacama Desert, archaeologists have recorded thousands of sites with excellent conditions of preservation, due to the environmental conditions of the desert. This fact has allowed archaeologists to obtain a relatively complete 10,000-year chronological sequence that encompasses sites containing remains of hunters and gathering cultures, the Chinchorro cultural complex notable for the mortuary treatment that involves the world earliest mummies, and the typical Andean cultures during formative and later stages, where Tiwanaku and Inka influences are most typical. The oases of the Atacama Desert also played an important role in preserving past human occupations. Remarkable are the two examples of these oases, Pica and San Pedro Atacama, where, preceded by early hunting stages, relicts of Andean cultural development are found. Here the most typical pre-Hispanic features are the Tiwanaku and Inka influences that acted upon the regional San Pedro culture. Here, the late periods are characterized by the emergence of defensive settlements called pukaras stretching a line stretching from east to west. Additionally, this area also views the emergence of village life during formative times.

To the south, the semiarid mid-north of Chile, ancient hunting societies yielded to formative developments around the time of Christ. To the classic site of Quereo, newly discovered paleo-American hunters sites include Quebrada Santa Julia and Membrillo (Jackson & Mendez 2008). Archaic developments are represented by Huentelauquen complex characterized by cogged stones or lithics with geometric shape. Formative developments begin with El Molle complex followed by Las Animas phase of the Diaguita culture that permeates the regional development all the way up to the Inka incursion in the area.

Within Central Chile further south, important paleo-American sites were recorded at Tagua Tagua and Monte Verde. Thereafter, archaic and formative developments occurred in close connection with Chile's mid-north region. Later, the Araucanian regional cultures developed from the Andean Formative ceramic traditions.

Further south, two different types of adaptation occurred in the Patagonian settings. In the continental area, hunter societies developed, while in the coastal environments of the Pacific,

the main adaptive mechanism was fishing and sea hunting. Prehistoric development started with paleo-American sites from about 10,000 years ago up to present-day aboriginal people surviving in the area.

Definition

The Archaeological Patrimony

If we are to list Chile's most important archaeological patrimony, the following could be the most representative.

In Northern Chile, perhaps the most outstanding corresponds to the Chinchorro culture. Although it extends from about coastal Ilo in Southern Peru to nearby Antofagasta in Chile, the main archaeological sites are located in the vicinity of Arica city, at Chinchorro type site, Camarones valley, and around Iquique. Burial sites containing the world earliest mummies dated from about 6,000–1,100 BC were located at Morro 1 and Playa Miller 8 in Arica. To the south, other important sites are Camarones 15 and Patillos.

Human embalmed bodies that represent the Chinchorro culture have an inner reinforcement structure of bones, reeds, sticks, and clay and an external surface of skin and manganese paint. Facial features were reconstructed or insinuated, with a short wig added to the head. Additionally, some bodies were also stuffed, and incisions were made to the body removing internal organs. Then, grasses and feathers were used to fill in the thoracic cavity in order to recover the lost volume. Once reshape, the bodies were painted bright red, green, or black (Figs. 1 and 2). Wigs and teeth implants were used to ornament the head, and facial features were modeled (Arriaza 1995; Rivera 1995).

Further south, it is important to mention the early village complex that developed in the midst of the Atacama Desert during formative times. Among these are important to mention Guatacondo and Ramaditas, in the Guatacondo Valley; Tulor (Fig. 3), Calar, Tulan, Solor, and Vilama in the San Pedro area; and Chiu Chiu in the confluence of the Salado and Loa rivers. There, cluster types of settlements represent a good testimony of how man was coping with the harsh environment. In San Pedro Atacama, two later sites are also of importance, Pukara Quitor (Fig. 4) and the Inka site of Catarpe. Additionally,

Chile's World Archaeological Heritage and Its Management, Fig. 1 Mummified body from Morro-1, Chinchorro complex (© Mario A. Rivera)

Chile's World Archaeological Heritage and Its Management, Fig. 2 Chinchorro mummified head from Patillos site (© Mario A. Rivera)

Chile's World Archaeological Heritage and Its Management, Fig. 3 Tulor village site located in San Pedro Atacama area (© Mario A. Rivera)

Chile's World Archaeological Heritage and Its Management, Fig. 4 Pukara Quitor, San Pedro Atacama area (© Mario A. Rivera)

it has been recently reported the site of San Ramon in the coastal area of Taltal, south of Antofagasta. There, it has been claimed the 12,000-year-old iron oxide mine is believed to be the oldest mine in America (Salazar et al. 2009).

Vast areas covering designs visible from long distance and known as geoglyphs are important to mention. Thousands of them are distributed throughout the desert perhaps as indicators of ancient routes. The most important concentration is located around Pintados (Fig. 5 and 6) and further south in the Quillagua area.

In Chile semiarid zone, the impressive paleo-American sites of Quereo and Quebrada Santa

Chile's World Archaeological Heritage and Its Management, Fig. 5 Geoglyphs of Pintados, Atacama Desert (© Mario A. Rivera)

Chile's World Archaeological Heritage and Its Management, Fig. 6 Geoglyphs of Tiliviche, Pampa del Tamarugal (© Mario A. Rivera)

Julia contain excellent stratigraphic and contextual data on the issue of early man in America. Other sites that provided a complete sequence from about 7,000 years to present time is the rockshelter of San Pedro Viejo de Pichasca, located inland from Ovalle city. El Encanto, also near Ovalle, is a well-preserved site with hundreds of petroglyphs and archaeological remains from El Molle culture. In the vicinity of Copiapo, two important Inka sites are La Puerta and the metallurgical center of Vina del Cerro that has undergone an extensive conservation program. Further north, at the mining city of El Salvador, there are the remains of a turquoise mine of Inka origin still in place under the care of Museo Regional.

Stretching from north to south is the old Qapaq Nan or Inka Road. Sections of it have been

Chile's World Archaeological Heritage and Its Management, Fig. 7 Frozen body of child, Inka sanctuary of Cerro El Plomo, Santiago area (©Adriana Goni)

subject of thoroughly investigations, and it is now part of a major cooperative Andean program sponsored by UNESCO (Niemeyer & Rivera 1983; Santoro 1983; Berenguer & Caceres 2008).

Central Chile, particularly Santiago, and its vicinity contain mainly late sites of which the fortified outposts of Cerro Chena and La Compania are significant. The former an Inka site while the latter, of an earlier development probably belonging to Promaucae origin later occupied by the Inkas. An outstanding feature is the mummy of Cerro El Plomo. This is a child body, probably 8–9 years old that was sacrificed by the Inkas at the summit of Cerro El Plomo inland from Santiago at 5,430-m altitude. There, the Inka sanctuary kept the body frozen until it was discovered in 1954. It is in perfect shape with all garments and dresses still intact on display at the Museo Nacional Historia Natural in Santiago (Fig. 7).

South of Santiago, Tagua Tagua is the best recorded paleo-American site with clear evidence of mastodon remains associated to human activities. Further south, the Araucanian area is still poorly investigated, despite the fact that living groups of Mapuche people play a crucial role even today. Perhaps the most important sites are Los Catalanes Cave and Pucon, mainly because of their stratigraphy records. Puerto Montt is the site of Monte Verde where evidence of Pleistocene fauna had been linked to human activities at least by 11,000 BCE, if not earlier (Dillehay & Collins 1988).

In Patagonia as well as all the extreme south of Chile, a widely spread rock art known as Patagonian Style is found from General Carrera Lake in Chile Chico to Magellan Strait. It is believed is the oldest in South America as it is characterized by designs of red or black hands done its negative painting. Other motifs are guanaco figures and highly complex geometric designs. Due to the isolation of this southern land, the style remained unknown until recently and in excellent conditions. At Los Toldos rockshelter in Argentinean Patagonia, they have been dated at 10,000 years. Also in Patagonia, cave sites such as Fell, Palli Aike, and Eberhardt related to early hunters and gatherers, associated to Pleistocene fauna, have been found in connection with human activity. They are outstanding examples that have been in the literature since the 1890s, with important research done by renowned figures such as Junius Bird and the New York American Museum of Natural History and Joseph and Annette Emperaire and the French Archaeological Mission to Patagonia.

Key Issues/Current Debates/Future Directions/Examples

Management of the Archaeological Patrimony

Generally speaking, conservation and management of archaeological sites in Chile are poor. Corporacion Nacional Forestal, the equivalent to National Park Service, is the official institution

responsible for the management of sites. However, only a handful sites are actually under their supervision, most notably the geoglyphs of Pintados and the site of Tulor, in arrangement with the local Atacameno community of Coyo.

Responsibility of the archaeological patrimony is also a problem because of a lack of clear definition on accountability for managing, storing, and preservation both of archaeological sites and collections. Several institutions, from Chile's Departments of Education and Cultural Affairs to Chile's Departments of Agriculture and Land, are all concerned with issues related to archaeological patrimony. Aside from these facts, there is a suite of instances for managing archaeological collections. Museums' responsibility is varied, whether they are state or municipal museums, private or university ones.

Two other factors are against archaeological patrimony. Contract archaeology programs are done in response to contracting companies' goals that plan to intervene the landscape. A second situation that destroyed hundreds of archaeological sites in the Atacama Desert was the recent versions of the Dakar International Rally, originally the Paris-Dakar rally with participation of hundreds of vehicles and enterprises from all over the world. In the last three years, several stages took place in the Atacama Desert leaving a somber panorama of destruction in the sandy pristine landscape. A recent report from Consejo Monumentos Nacionales reveals that 283 of the 556 sites were affected by the rally with an almost 50 % of deterioration.

San Pedro Atacama is probably the only place in Chile where native organizations have claimed their right to manage archaeological sites. However, internal disputes do not allow a clear-cut outcome up to date. In any event, Museo Arqueologico Gustavo Le Paige in San Pedro has done an excellent job in conserving and managing the archaeological collections from the area. Corporacion Nacional Forestal manages the site of San Pedro Viejo Pichasca mainly because the archaeological site is part of the national paleontological reserve.

In Arica, conservation and display, as well as research of Chinchorro, is in care of Universidad Tarapaca and its Azapa Museum of Archaeology. Recently, they have added a new building containing excellent displays and storage facilities, especially designed for the Chinchorro remains. A new site museum located in downtown Arica on Colon street displays burials of the Chinchorro culture in situ.

In some instances, local institutions also manage archaeological sites. This is the case of cities like Iquique, Tocopilla, Taltal, and Ovalle, among others. In this last city, the city has taken control of El Encanto archaeological area transforming it in a city park.

There are several museums in Santiago where archaeological collections from Chilean territory are stored. The oldest and most important museum is Museo Nacional Historia Natural where reference collections from the entire country are kept. Additionally, the museum also stores collections from the most relevant field works done in Chile at least until 1980s. Museo Historico Nacional also contains some archaeological collections. Both museums are part of the Direccion de Bibliotecas, Archivos y Museos, an administrative organization that is under the Secretary of Education. Additionally, state museums are located in all the major cities along the country being those in La Serena, Antofagasta, and Valparaiso the most important. Private museums in Santiago are also important. The best known is perhaps Museo Chileno Arte Precolombino. It was founded in 1981, and it functions as a joint venture between Fundacion Familia Larrain Echenique and the city of Santiago. Other private museums managing archaeological collections are Museo Arqueologico de Santiago, founded in 1994 by Fundacion Cultural Plaza Mulato Gil. In addition, two museums belonging to private organizations are located nearby Santiago, Museo Andino founded by Fundacion Claro Vial in 2006 and Museo de Colchagua that opened in 1995 by Fundacion Cardoen.

In Valdivia, Universidad Austral de Chile takes care of Museo Historico y Antropologico Mauricio Van de Maele. In Patagonia and extreme Southern

Chile, managing archaeological sites and collections has been in the hands of a couple of museums, namely, Museo de la Patagonia and Museo Salesiano. A third institution, Universidad de Magallanes, and its Museo del Recuerdo managed by Instituto de la Patagonia have being pursuing intense lab work as well as research. Ultimately, conservation efforts as well as display of collections are all regulated by National Council of Monuments and the National Restoration Center.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Bird, Junius
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Geoglyphs
- ▶ Heritage and Archaeology
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Inca State and Empire Formation
- ▶ Peopling of the Americas

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China: Cultural Heritage Management

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Introduction

As the West Lake Cultural Landscape of Hangzhou was inscribed on UNESCO'S World Heritage List on June of 2011, there are a total of 41 World Heritage sites in China now, including 26 cultural sites, eight natural sites, four mixed properties, and three cultural landscapes. There are also 34 nominations of Intangible Heritage (Li 2011). In the 30-year period between 1982 and 2010, China has demonstrated stunning economic development, providing unprecedented opportunities for implementing managerial measures for cultural heritage management. At the same time, it has produced unforeseen preservation challenges that management authorities and professionals share.

Definition

China has a rich and diverse cultural heritage representing the foundation of Chinese civilizations and cultural traditions. Through thousands of years of historic interactions and cultural exchanges with other areas, China is now recognized for its important role in the cultural heritage of other parts of the world.

Key Issues/Current Debates/Future Directions/Examples

Situation: Policies and Practices

Chinese cultural heritage is managed in two general categories: immovable and movable cultural relics (Shen & Chen 2010). Since 1961, the state has established a sophisticated system of evaluating heritage sites for the three levels of

managerial responsibility – national, provincial, and municipal or county. In the category of movable cultural relics, artifacts are classified into four grades. By 2010, on the basis of the Third National Cultural Heritage Survey and Registration, Shan Jixiang, the General Director of the State Administration of Cultural Heritage (SACH), announced that China has more than 900,000 immovable heritage sites, and more than 20 million objects in museums and research institutes (State Administration of Cultural Heritage 2010).

The principal Chinese policy of cultural heritage management is that "in the work concerning cultural relics, the principle of giving priority to the protection of cultural relics, attaching primary importance to their rescue, making rational use of them, and tightening control over them shall be carried out," which is stated in Article 4 of the Law of the People's Republic of China on Protection of Cultural Relics (State Administration of Cultural Heritage 2007c). Now, all aspects of cultural heritage management are governed by – and related activities, including archaeological excavation, foreign collaboration, traveling exhibition and conservation, regulated under – this single law in China.

The establishment of a hierarchical administrative system has been effective for managing state affairs of heritage management for half a century. At the top of the administrative pyramid is the SACH, a powerful and independent bureau under the Ministry of Culture. The SACH directly administers 31 provincial bureaus of cultural heritage, which have similar functions on behalf of the provincial governments in affairs of cultural heritage preservation. Under the provincial bureaus, authorities in the cultural division of local government at the county and municipal levels are responsible for reporting and assisting with cultural heritage management activities in their respective administrative districts. At the bottom of this hierarchical system are the offices of representatives in villages where heritage sites have been given priority.

At the time of writing in 2011, a total of 2,351 sites were listed as National Major Heritage Protection Units (for the complete list of these sites, see State Administration of Cultural Heritage 2007a), 9,300 sites were named as Provincial Major Heritage Protection Units, and over 58,000 sites were designated as Municipal/County Major Heritage Presentation Units. In 1982, the state authority designated a new category of immovable cultural heritage: "cultural city/town/village with important historic and cultural values." By 2006, the State Council had verified 96 such cultural heritage cities, 44 heritage towns, and 36 heritage villages (see the SACH website for the complete list: State Administration of Cultural Heritage 2007b). Although most of the unlisted heritage sites are simply ignored if they are not in immediate danger, the establishment of this list plays an important role in cultural management in China.

Like many other countries with a rich heritage, China also experiences an inevitable loss of heritage to human looting, natural weathering, and especially to rapid economic development. During the past three decades, with an annual double-digit rate increase in the GDP, the scale of construction, land development, highway building, and urbanization have reached an unprecedented level. This activity leads to the loss of hundreds of immovable heritage sites, of hundreds of thousands of movable cultural relics, and of invaluable scientific information of the human past.

For Chinese cultural heritage management, bureaucratic problems with preservation increase when local governments set their own standards and priorities for the best interests of the region. In some regions where economic growth is well established but heritage sites are relatively few, such as Shanghai and Guangzhou cities, the support for cultural heritage preservation is substantial and consistent. However, in underdeveloped regions where cultural heritage sites are numerous, such as Henan and Shanxi provinces, work is merely at a satisfactory level.

The current understanding of cultural heritage in China is based on the past two state-backed surveys: the first done in the 1950s and the second in the 1980s. However, owing to some difficulties, these surveys could not be conducted in all the counties of the nation (Shan 2006). The incomplete database of the nation's cultural

heritage inevitably limits the preservation and management works that are possible. Therefore, the SACH started the Third National Cultural Heritage Survey and Registration in 2007. To this point, the study has discovered large numbers of previously unknown archaeological sites and cultural remains. This advance has provided new data for more feasible and durable policies and practices for long-term cultural heritage management activities across the country.

At the same time, cultural heritage management in China is also challenged by the assimilation or shock of other cultures, especially Western cultures, in the process of globalization and modernization. With deepening reform and opening up, the state has entered an important stage of active interaction with the rest of the world in both economic and cultural matters. Some traditional Chinese food, music, dress, and festival have been replaced by the Western fast food, pop music, clothing, and Christmas. Moreover, lots of traditional intangible heritage in underdeveloped regions or associated with ethnic minorities are changing and disappearing.

In order to strengthen heritage protection in China, the State Council, China's cabinet, has designated the second Saturday of June every year as Cultural Heritage Day since 2006 (Xinhua News Agency 2006). All protected sites, museums, and memorial halls across the country are ordered to open free to the public on the day in celebration. The activities are intended to encourage citizens to be more aware of the need to protect China's cultural heritage, as the protection of ancient relics is in the public's best interest. Establishing Cultural Heritage Day marks one of a series of steps taken by the Chinese government to improve protection of fine traditions in Chinese culture.

Strategies: Preservation of Great Heritage Sites

In China, Great Heritage Sites are defined as large archaeological sites, including settlements, city sites, palaces, mausoleums, and tombs of large scale or great value, in some of which have been listed as World Heritage. However, owing to the complexity and dispersion of this kind of heritage site and the speedy economic development, some have been seriously damaged.

Began in 2005, the SACH, supported by National Development and Reform Commission and Ministry of Finance, has taken a series of initiatives to promote the protection of Great Heritage Sites in China. One of the great achievements is the formulation of the "Overall project for Great Heritage Sites protection during the Eleventh Five-Year Plan." Many key programs have taken place with the aim of establishing a relatively complete system of protection and management of these sites, and to map out an efficient, scientific path for their display.

On October 11, 2006, the State Council published the "Great Wall Protection Ordinance" to begin the protection of the Great Wall as one of the 100 most important Great Heritage Sites. In 2006, the "Hangzhou Declaration on the Protection of Beijing-Hangzhou Grand Canal" was published, which proposed the World Heritage nomination of the Chinese Grand Canal. Meanwhile, the Chinese government has mapped out a comprehensive plan on the protection of the historical Xi'an area in Shaanxi Province and Luoyang area in Henan Province.

At the Liangzhu Forum on Great Site Protection, which was conducted by the SACH and Hangzhou government in 2009, all participants discussed the relationship between the protection of Great Heritage Sites and the construction of archaeological parks. Mr. Shan pointed out that archaeological parks will not only promote the conservation and exhibition of great heritage sites, but also explore their social value.

Stewardship: The Future for Cultural Heritage Management in China

Cultural heritage management, including archaeology, heritage-based education, and decision making in the public sphere, is a growing concern in China. Although it took three decades to systemize cultural heritage management, it is a sign that today, Chinese cultural authorities can play an important role with international communities

in this field. Until recently, international exchanges were limited to high-level administrators. Holding the ICOMOS General Assembly and symposium in China in 2005 was a good start to having international scholars participate directly in the front-line practice of Chinese heritage preservation.

Protecting and managing the past in the public interest is based on individual, community, and national values, as reflected in laws, regulations, policies, and guidelines. One of the keys to protecting the past is balancing heritage values with the needs and concerns of contemporary society (Smith 2010). It is clear that heritage values are the basis for management and policy formulation relating to our collective cultural patrimony. Our task now is to define and apply heritage values in contemporary society, in an effort to connect to the past in meaningful ways (Lowenthal 1985; Hewison 1987; Fowler 1992). In future, we need to understand the full range of heritage values and be able to quantify those values to ensure that heritage values are defined broadly and applied fairly (Smith 2010).

There has been a growing realization, both within the government and throughout the country, that cultural heritage is the country's identity and has relevance to contemporary society. Therefore, heritage needs to be preserved for posterity and it is the responsibility of every citizen to respect it. Public participation through community involvement in heritage preservation is the only way to achieve better management of China's numerous archaeological resources.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ China: Cultural Heritage Management Education
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List
- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Intangible Cultural Heritage
- ▶ Tangible Heritage in Archaeology
- ▶ Uses of Heritage
- ▶ World Heritage Education, Training, and Capacity Building

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China: Cultural Heritage Management Education

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Introduction

After the founding of New China, the Communist Party of China begins to devote more attention to the preservation of cultural heritage and carries out the preservation measures effectively.

Key Issues/Current Debates/Future Directions/Examples

Legislation and Preservation

The legislation of the cultural relics preservation is a long and gradual process. In 1961, the State Council enacted "the Temporary Rules of the Preservation and Administration of Cultural Relics" which set up the class-rate system of cultural relics. In November 1982, as the Law of the Preservation of the Cultural Relics was promulgated, the preservation of the cultural relics became institutionalized. At the end of 2005, "the Notice on Enhancing the Cultural Heritage Preservation" was announced by the State Council, which used the word "cultured heritage" as the key word for the first time. From the publication of the First List of the National Level Cultural Relics Sites to the Sixth List, the concept "cultural relics" has been deepened and widened; the preservation focus has shifted from the single site to the setting of the site and to its historical space even the historical district and the town. The connotation and denotation of cultural heritage is developing constantly.

Furtherance of the Concept Preservation

The concept preservation of cultural relics is updating continuously. In the early period, the display and utilization of cultural heritage has been excluded from the range of the "preservation" which is a kind of negative and isolated preservation. In 1992, the National Cultural Relic Work Meeting came up with the working principle "Preserve firstly, save primarily." In 2002, in order to solve the problem between the economic development and cultural relic preservation in the market economy, the Law of Protection of Cultural Relics puts forward the basic principle "Preserve primarily, save firstly, utilize reasonably, and manage intensively." This principle requires rational, proper, and scientific utilization in the preservation of cultural relics; helps to resolve the argument about the relationship between preservation and utilization; and makes our preservation policy more complete, definite, and practical.

School Education

The cultural heritage education in China can be divided into two parts: school education and public education. Universities play an important and creative role in the heritage conservation, research, and training. Since the establishment of the archaeology major in Beijing University in 1952, archaeology has attracted more and more attention and great achievements have been made. Now archaeology and museology have become two major subjects in many universities, such as Northwest University, Zhengzhou University, Jilin University, Nanjing University, Shandong University, and Sichuan University. Beijing University has been the pioneer to start the course "World Heritage" and built a professional research organization – the World Heritage Research Center which has been

regarded as the symbol of the new stage of Chinese World Heritage Research. After that, a number of research institutions have founded Cultural Heritage Research Organizations in succession. The Conservation and Plan Center set up in 2004 by Northwest University and the Cultural Relics Bureau of Shaanxi Province will perform a leading role in the preservation of cultural relics in Northwest China. Just two years later, the two organizations built a Cultural Heritage School which features two majors: Archaeology (including the Management of Cultural Heritage Direction) and Restoration and Protection of Cultural Relics. To our joy, in 2007, the Ministry of Education established the Cultural Heritage Research and Conservation Key Lab which focuses on relevant research on cultural heritage, conservation plan, and preservation technology. What is more, it promotes professional training and development of the cultural heritage conservation in Shaanxi Province. Thus, three major subjects come into being in the field of Chinese cultural heritage. They are, respectively, the Archaeology, the Museology, and the Cultural Heritage Research.

Public Education

Cultural heritage concerns not only the professionals but also every average people in the society. Therefore, the public education of cultural heritage by no means cannot be ignored.

Since 2006, the Chinese government has set up Chinese Cultural Heritage Day on which the government will organize various and abundant relevant activities to arouse public's consciousness of cultural relics preservation, encourage public participation, and help the public to deepen their understanding of the preservation of cultural relics.

Museums are the major places and propagating platforms for cultural heritage conservation. During the 11th Five-Year Plan Period, there are 1743 museums and bases for patriotism education, and memorial museums open to public for free. With these efforts, the number of spectators is increasing. As a result, more and more people have the chances to visit these museums and extend their knowledge in archaeology and its preservation. Consequently, a growing number of the public begin to appreciate and experience Chinese brilliant cultural heritage in this way.

In our daily life, through media like books, newspapers, and films, we can easily narrow the distance between cultural heritage conservation and the public. With the purpose of improving the public's conversation consciousness and attracting public attention and participating, we utilize media like the Internet, television, newspaper, exhibition, and lecture to promulgate sustainable developments of cultural heritage, to publicize the relevant knowledge of laws and conventions on cultural heritage conservation, and to arouse public's awareness of preservation. Since the year 2000, a series of popular reading, academic books, and symposiums have been published gradually. As to the Internet, the nonprofit Internet sites about historic cultural heritage and world heritage have been set one after another. These sites offer the public the general knowledge in heritage exhibition and inspection and help to exchange ideas between the professionals and the amateurs. And the national academic forum has been held every year. What is more, the China Cultural Relics Research Institution has grown rapidly and been renamed the Chinese Academy of Cultural Heritage, a national level institution of cultural heritage. Accordingly, cultural heritage education enters a brand-new stage.

Cross-References

- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List
- ▶ China: New Approaches to Heritage Administration
- ▶ Conservation and Management of Archaeological Sites
- ▶ World Heritage Education, Training, and Capacity Building

China: Cultural Heritage Preservation and World Heritage

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Introduction

In recent years, the People's Republic of China has become a vigorous supporter of the World Heritage movement. Consequently, government and Chinese Communist Party (CCP) officials at the national level have encouraged provincial and local authorities to identify, categorize, and promote both tangible heritage sites and intangible heritage practices. However, the purpose is not merely to preserve cultural heritage sites and practices but to utilize these as development and state-building tools. On the one hand, state and party officials view heritage as a means of attracting tourists, particularly in areas with few natural resources or industrial development. On the other hand, authorities also seek to use heritage preservation to help craft a collective national consciousness, particularly in minority areas.

Historical Background

While cultural production in China, both tangible and intangible, is some of the oldest in the world, cultural preservation is a relatively new concept. Private collections of objects such as porcelain, wall scrolls, and bronzes have been common for centuries. However, large-scale material preservation has been much less common, mainly for religious, aesthetic, and practical reasons. For example, during dynastic eras such as the Yuan (1271–1368), Ming (1368–1644) and Qing (1644–1911), rulers would renovate, expand, and in some cases replace temples and other public buildings, reflecting both a Buddhist and broader Chinese emphasis on copying and renovating rather than preserving material culture. This also was in part due to the fact that the primary building material in East Asia has historically been wood.

After the 1911 Nationalist Revolution, public and state interest in heritage increased. China's first archaeological research institute was established at Beijing University in 1925. In 1930, the KMT (Nationalist) government passed a *Law on the Preservation of Ancient Objects*, China's first formal regulations concerning cultural artifacts (Murphy 1994). This law was followed in 1931 by the "Statute for the Preservation of Scenic Spots, Points of Historical Importance, and Articles of Historical, Cultural, and Artistic Value" (Gruber 2007: 272). However, the weakness of the Republican government, along with the Japanese attack on Manchuria that began in 1931 and China proper in 1937, rendered any heritage protection law moot.

The first formal attempt to categorize China's material heritage occurred in 1948, shortly before the collapse of the Nationalist government, when professors at Qinghua University issued a list of 450 sites under the title of *A Brief List of Important Architectural Heritages in China*. Following the establishment of the People's Republic of China (PRC) in 1949, Communist authorities did not emphasize the preservation of the material past. Instead, they sought to reshape history, particularly in urban areas, through the selective destruction of cultural sites and their replacement with new symbols of state power (Wu 2005). For example, Beijing's city walls were destroyed during construction of the city's first subway line between 1965 and 1969, while historic areas to the south of the Forbidden City were demolished in 1958–1959 during the construction of the Great Hall of the People and expansion of Tiananmen Square. However, state authorities also preserved selected historic sites as examples of prerevolutionary feudalism. Thus in Lhasa, capital of Tibet, the Dalai Lama's former summer palace (Norbulingka) was opened to the public as a museum dedicated to his supposedly extravagant lifestyle shortly after he went into exile in 1959, while the house on Gulangyu Island near Xiamen, Fujian Province, where Nationalist

leader Chiang Kai-shek stayed the night before he fled China in 1949 was maintained as a symbol of the defeat of the old regime. Only in November 1961 did the State Council issue the first national heritage regulations, *Historic Heritage Conservation Administration Regulations*. This decree created the category of "National Cultural Heritage Protection Units," listed 180 such sites, and provided funding for restoration and preservation. This attempt to create a national cultural heritage system was disrupted by the outbreak of the Cultural Revolution (1966–1976), during which youthful Red Guards were encouraged by Communist Party Chairman Mao Zedong to destroy the "four olds" (customs, culture, habits, and ideas). During this decade of upheaval, thousands of historic sites including temples, churches, mosques, and other buildings were looted, destroyed, or turned into warehouses and other public buildings.

It was not until 1982 that the country's first *Law on the Protection of Cultural Heritage of the People's Republic of China* was issued by the State Council. This law established guidelines for the categorization of heritage, the excavation process, and site protection. Three years later, in January 1985, the Chinese government signed the *Convention on the Protection of World Cultural and Natural Heritage*. The 1982 law, which remains the basis of heritage policies in China, explicitly links heritage preservation with the political objectives of nationalism, socialism, and modernization (Sofield & Li 1998: 370–1). In other words, preserving the past was not an end in itself; this should instead serve to encourage a national consciousness, reflect socialist values, and aid with development in the present.

Key Issues

Since economic and social reforms began in 1979, the Chinese government has invested significant resources into the promotion and preservation of cultural heritage, including museums, theme parks, and heritage sites. For example, between 1980 and 2000, the number of museums in China increased from 365 to 1,353 (Denton 2005: 566). During the Maoist era, museums shared a single revolutionary narrative that emphasized self-sacrifice for the collective good, while built heritage sites that were not directly connected to either the 1911 Revolution or the history of the Chinese Communist Party were either ignored or physically attacked (Sofield & Li 1998: 363). New museums resolve the dilemma between a former emphasis on a revolutionary past and a contemporary state emphasis on individualism and self-interest by defining both as necessary aspects of "building the nation" (Denton 2005: 582). Similarly, an explosion of folk, ethnic, and historical theme parks, numbering approximately 2,500 by 2008, began with the opening in 1989 of the "Splendid China" theme park (*Jinxiu Zhonghua*) in Shenzhen, Guangdong Province. This was followed in 1991 by the opening of the first "China Folk Culture Village" (*Minzu Wenhua Cun*) nearby (Oakes 1998: 49–50). This park displays copies of the built heritage of 23 different minority groups, ranging from a Uyghur Mosque and Tibetan monastery to Mongolian Yurts and Dong bell towers (Sofield & Li 1998: 382–3). Like Disney's Epcot Center in Orlando, Florida, the park's "inhabitants" are all "authentic" minority peoples. This park, like similar folk parks throughout China, is designed for and visited by domestic tourists.

As of 2010, China had 40 World Heritage sites, 53 sites awaiting UNESCO approval, and approximately 1,200 heritage-related sites classified as "key cultural relics protection units" (*Zhongdian Wenwu Baohu Danwei*). These include built heritage sites such as the Forbidden City, Temple of Heaven, and Summer Palace in Beijing; natural sites such as the Wolong Panda Reserve and Jiuzhaigou Valley in Sichuan Province (examples of a national park system that now totals 187 sites); and cultural sites situated in natural setting, such as Buddhist pilgrimage mountain temple complexes, including Emeishan in Sichuan, Taishan in Shandong, and Wutai Shan in Shanxi provinces.

All official heritage sites are regulated by the *Cultural Relics Protection Law*, proclaimed on

November 19, 1982 and revised in 1991 and 2002. In 2003, additional regulations were issued by the central government for the enforcement of this law as well as for the supervision of auctions involving cultural relics. This law classifies heritage into three categories: sites, "blocs" (neighborhoods, villages, and towns), and cities. It requires a "buffer zone" around heritage sites in order to maintain historical context, special zones in historic villages and towns in which new construction is banned, and strict building codes in historic cities.

This national focus on heritage protection and preservation has encountered intense pressure at the local level, particularly from real estate developers in urban areas. As urban real estate prices continue to escalate in much of China, local officials must grapple with difficult choices between redevelopment projects that can generate economic growth and heritage preservation that must be funded at the local level. One solution has been the promotion of heritage tourism. This has taken the form of "ancient cities" (*gucheng*) development, usually shopping and entertainment simulations of historic areas, in large cities such as Beijing and Shanghai, as well as the promotion of heritage communities as tourist destinations. The most often-cited example of this approach is the nominally Naxi town of Lijiang in Yunnan Province, a World Heritage site that receives almost five million visitors each year yet has become, critics argue, a tourist-focused community devoid of local cultural practices (Su & Teo 2009).

In addition to economic development issues, heritage programs also carry a political element. While the 1982 cultural heritage law gave equal weight to nationalism, socialism, and economic development, policies in practice largely ignore socialist concerns. Instead, the enthusiastic promotion of "heritage" complements the state promotion of a "landscape of nostalgia," in which the Maoist revolutionary attempt to eradicate the "four olds" (culture, customs, traditions, and habits) has been replaced by an attempt to utilize the past for contemporary political reasons (Oakes 1997: 42). In particular, cultural brokers at the national level emphasize the country's multiethnic but unified cultural landscape. For example, the State Administration for Cultural Heritage (SACH) issued its "Principles for the Conservation of Heritage Sites in China" in 2000. Article One of this statement declares that China is a unified country "with an unbroken cultural tradition," and the purpose of heritage conservation is to "strengthen national unity and promote sustainable development of the national culture" (Agnew & Demas 2004: 59). Investments in heritage conservation and the promotion of heritage tourism in minority areas consequently cannot threaten national unity, which means in practice what is conserved and promoted must be presented as either not political or as examples of a national consciousness (Shepherd 2009). Thus, the Potala Palace in Lhasa, the former home of the Dalai Lama and a World Heritage site, is described in application documents as an example of Tibetan and Han Chinese cooperation, while Lijiang in Yunnan Province was recommended for World Heritage status based on its "harmonious fusion of different cultural traditions" (UNESCO 1997).

Finally, the promotion of domestic tourism as a by-product of heritage preservation has been linked by the national government to the development of "higher-quality" citizens with a "civilized" (*wenming*) consciousness (Chio 2010). Launched in 2006, the China Central Spiritual Civilization Steering Committee was tasked with molding "civilized" modern subjects. Just as rural migrant workers are perceived to serve national economic development goals, they are also tasked with bringing an increased level of "civilization" (*wenming de chengdu*) back with them to their rural communities. In like manner, domestic tourism is supposed to raise the levels of civility of both tourists and local residents of toured sites (Nyiri 2009: 154).

However, heritage protection in China also encounters significant bureaucratic obstacles. Although China has between 300,000 and 400,000 identified cultural heritage sites, only

approximately 15 % of these are legally protected, the vast majority (more than 55,000) at the local level, where resources are limited and regulations most lax. The remainder of these sites are only registered as heritage sites, which means they are known to authorities but remain in the public domain, without any official protection or regulation. This illustrates the fragmented realities of the Chinese political system, both horizontally and vertically. Many unregulated heritage sites are in fact archaeological sites uncovered during recent construction projects. In theory, local government officials are required to formally protect and fund heritage preservation. However, doing so not only is expensive but also can mean suspending or ending development projects. Moreover, different parts of the government bureaucracy have different interests, at the local, provincial, and national level. Tourism, environmental, economic development, educational, and heritage officials may not have shared interests concerning heritage preservation.

In summary, the Chinese central government seeks to use cultural heritage for economic, political, and social reasons. Heritage preservation is intimately linked to heritage promotion as well as to economic growth, nation building, and the development of a "civilized" sensibility among Chinese citizens.

Future Directions

The heritage process in China demonstrates both the practical limits of central government authority and the realities of a complex field of power within the PRC, driven by continual rapid economic development necessary to meet the demands of the country's enormous population. A growing domestic tourism industry, significant environmental damage, and large-scale construction projects pose further challenges to preserving China's material and natural cultural heritage (Gruber 2007). Yet perhaps the biggest threats are the illegal excavation and smuggling of cultural relics, a problem exacerbated by the increasingly decentralized political structure. In a paradoxical way, these current problems mirror the key threats to heritage preservation in China before 1949, when foreigners routinely excavated and removed a wide range of material artifacts which remain abroad in both public and private collections. In fact, the first law dealing with heritage in the People's Republic is a 1950 decree that banned foreign excavations and the export of cultural relics. In 1987, within a few years of the start of the economic reform movement, the State Council issued a decree banning both smuggling and illegal excavations. A year later, the Sixth People's Congress approved the death penalty for serious smuggling of cultural artifacts, and in 1991, the State Council issued a second decree that sought to stop unauthorized tomb excavations (Murphy 1994). All of these problems nevertheless persist, arguably as a direct side effect of the state-directed modernization drive. In fact, these problems have been exacerbated by the current campaign to "Go West" aimed at modernizing and developing and modernizing the country's interior provinces, as infrastructural and other projects in these less economically developed areas often uncover archaeological sites and artifacts. Yet local officials have few incentives to protect such sites because to do so usually requires significant funding from the local and provincial levels as well as sometimes curtailing specific development projects. This situation is exacerbated by the fact that personal promotion for local officials is largely judged on their success at promoting economic growth. Hence, many officials promote short-term economic development results, which are hardly conducive to heritage preservation. At best, this can result in a local focus on using heritage sites as tourist attractions, which often poses new challenges, as success in attracting heavy tourist volume may place fragile sites at risk. There is, in summary, no easy answer to the dilemma faced by every society that seeks to balance preserving the past with improving the material realities of its contemporary citizens. Indeed, China serves as an extreme example of this dilemma, as PRC

authorities must grapple with the largest population in the world on a land mass that has been continuously inhabited for thousands of years.

Cross-References

- ▶ China: Cultural Heritage Management Education
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Museums
- ▶ China: New Approaches to Heritage Administration

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China: Domestic Archaeological Heritage Management Law

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Introduction

China is commonly referred to as a source country, meaning it is rich in cultural arts and property, but poor in terms of economic resources. Many source countries face intense demand for their cultural relics, resulting in increased illicit excavation. Unfortunately, the impact of illicit excavation on archaeology can be devastating. When items are excavated without regard for the integrity of the original site, much information about the item, its use, and its historical context can be lost (Shuzhong 2001). With more than 7,000 years of cultural history, the People's Republic of China has an immense number of important archaeological sites and a growing need for help preserving those sites.

Illicit excavation is not the only archaeological problem China faces. Interest in China's history fuels tourism demands, as well. It is not uncommon for local towns or provinces to move archaeological sites or structures in their entirety to places more easily accessible by tourists (Shuzhong 2001). If not done properly, this can also result in a loss of the integrity of the original archaeological sites.

Culturally significant items protected by law are referred to as "cultural relics" in China's legislation. In order to protect these cultural relics, China has promulgated several important domestic laws including the Regulations of the People's Republic of China Concerning the Administration of the Work for the Protection of Underwater Cultural Relics (Regulations on Underwater Cultural Relics), Measures of the People's Republic of China for the Administration of the Foreign-related Archaeological Activities (Measures for Archaeological Activities), and the Law of the People's Republic of China on Protection of Cultural Relics (the 2002 Law). China has also become a signatory to several international agreements, including the 1970 United Nations Educational, Scientific, and Cultural Organization (UNESCO) *Convention* on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property and the 1995 International Institute for the Unification of Private Law (UNIDROIT) Convention on Stolen or Illegally Exported Cultural Objects. This entry focuses exclusively on China's domestic legislative regime.

Definition

Before exploring each of China's laws, it is important to understand that both China's legal framework and its legislation protecting cultural relics are extremely protective and nationalistic. These strict rules are reflective of the overall goal of all of China's domestic policies: legitimization of the communist regime (Murphy 2009). By comprehensively limiting the cultural relic activities within the country's borders, the communist government is able to showcase both its dominance to outsiders and its willingness to protect the country's treasures to its citizens. Additionally, China's status as a source nation may have created a state instinct to foster greater protection for its cultural relics (Maus 2009).

This protectionist theme is especially evident in the 2002 Law's definition of "cultural relics." According to the 2002 Law, these include a broad spectrum of things:

1. Sites of ancient culture, ancient tombs, ancient architectural structures, cave temples, stone carvings, and murals that are of historical, artistic, or scientific value
2. Important modern and contemporary historic sites, material objects, and typical buildings that are related to major historical events, revolutionary movements, or famous personalities that are highly memorable or are of great significance for education or for the preservation of historical data
3. Valuable works of art and handicraft articles dating from various historical periods
4. Important documents dating from various historical periods and manuscripts, books, and materials, etc., that are of historical, artistic, or scientific value
5. Typical material objects reflecting the social system, social production, or the life of various nationalities in different historical periods

Paleovertebrate and Paleoanthropoid fossils are also protected in the same way as cultural relics.

The 2002 Law distinguishes between "movable" and "immovable" cultural relics. "Immovable" cultural relics include sites of ancient culture, tombs, cave temples, and stone carvings. These cultural relics are designated for protection at either the national, provincial, city, or county level. "Movable" cultural relics include material objects, art, and documents. These are divided into two categories: valuable cultural relics and ordinary cultural relics. Valuable cultural relics are further subdivided into grade-one, grade-two, and grade-three cultural relics. These classifications are used for various reporting, export, and import requirements.

The Measures for Archaeological Activities, promulgated in 1991, provides definitions of

"archaeological investigations," "explorations," "excavation," and "recording." These definitions are also extremely broad. Archaeological investigations include activities conducted for the purpose of obtaining archaeological materials and information, such as the recording of ancient cultural sites, ancient tombs, ancient architecture, cave temples, underground or underwater cultural relics, and collecting cultural relics and natural specimens. Archaeological explorations include activities aimed at obtaining information about the nature, structure, and range of underground or underwater historical cultural remains. Archaeological excavations include activities conducted to obtain archaeological materials and information, archaeological recordings, and cultural relics and natural specimens. Finally, archaeological records are systematic activities such as writing descriptions, surveying, cartographing, rubbing, photographing, cinematographing, and videotaping.

Historical Background

Traditionally, cultural heritage and archaeological sites were widely respected by the Chinese people because they were thought of as the "soul of the ancestor" (Shuzhong 2001). In 1950, China adopted rules on the export of cultural heritage objects, and in 1961, it adopted regulations on the protection of those objects (Shuzhong 2001). But, during the "Cultural Revolution" from 1966 to 1976, loyalty to authority and respect for the past were branded foolish concepts, and many Chinese citizens adopted this attitude (Shuzhong 2001).

In 1978, China adopted a "reform and opening" policy where the country was opened up to foreign investment and travel. As a result of the influx of foreign money and tourists, the market for Chinese cultural relics boomed. Widespread poverty and a general lack of reverence for national cultural heritage following the "Cultural Revolution" prompted many Chinese citizens to take advantage of the valuable cultural relics that were, literally, in their own backyards. Relics in homes, yards, museums, and archaeological sites were pillaged and sold to eager foreigners, who often were able to resell the objects at a much higher price abroad.

Recognizing that its cultural relics needed additional protections, China promulgated the Law on the Protection of Cultural Relics in 1982 ("1982 Law"). This law was the first authoritative source of protection for Chinese cultural relics. Although of great general benefit, one of the law's weaknesses was that it did not clearly delegate responsibility between the national government and the regional municipalities because such responsibility was based on the rarity and value of the relic under consideration (Maus 2009). In addition, all cultural relics were deemed owned by China. The law did not allow citizens to acquire private ownership of any cultural relics, including those inherited from family members or purchased from stores and at auction (Maus 2009). As a result, there was little incentive for Chinese citizens to comply with the law if the benefit of ownership of relics held or discovered went only to the government. The 1982 Law was amended in 1988 and 1991 and eventually repealed with the passage of the 2002 Law.

Key Issues/Current Debates

Current Laws Protecting Cultural Relics

The 2002 Law provides broad rules for the protection of both movable and immovable cultural relics. Although it requires that many immovable cultural relics and all relics remaining underground or in China's waters belong to China, it also provides some mechanisms for individuals to obtain legal ownership of cultural relics. Although individuals may not own illegally obtained cultural relics, the 2002 Law provides "moral encouragement or material awards" to be provided to those who are diligent in implementing the law, fighting criminal acts under the law, donating important cultural relics, reporting discovered cultural relics, contributing to archaeological investigations or the science of protection techniques, rescuing cultural relics, or making outstanding achievements in work concerning cultural relics. The 2002 Law also

allows for the establishment of cultural relics stores and auction houses to be opened, subject to approval by the administrative department for cultural relics under the State Council. Private owners of cultural relics are still subject to the protection requirements of the 2002 Law.

The national government body responsible for overseeing cultural relic protection is the administrative department for cultural relics under the State Council, China's national government. Additionally, local governments are responsible for the administration of the 2002 Law at their respective levels.

Immovable cultural relics must be verified and announced by the respective national, provincial, county, or city government responsible for them. Cities, towns, neighborhoods, and villages with an unusual wealth of cultural relics may be designated for protection in their entirety. The local governments are then responsible for implementing plans to protect the historical relics, put up signs and notices recognizing the relics, establish records and files about the protected relics, and assign organs or individuals to be responsible for the relics. Construction plans that will affect cultural relics must include protective measures in consultation with the departments for urban and rural construction planning and the administrative departments for cultural relics. Deformation and pollution of protected sites is prohibited. And, while no construction is allowed within a protected area generally, approval for exceptions can be obtained from the governmental entity responsible for the area's protection. Similarly, where it is impossible to protect the relic's original site or the relic needs to be moved to avoid damage, approval is required. Expenses incurred in complying with these rules are borne by the entity in charge of construction.

Any necessary repairs to immovable cultural relics are subject to approval. Immovable cultural relics owned by the state may not be transferred or mortgaged to anyone. If the immovable cultural relic is owned by an individual, it may not be transferred or mortgaged to foreigners. Furthermore, any transfers or mortgages to citizens must be reported to the appropriate government level.

Museums, libraries, and other institutions with cultural relics must classify the relics in their possession according to grade, compile files for the relics, establish a strict system of control, and submit this information to the appropriate administrative department of cultural relics. These institutions are also required to enhance publicity and education of China's cultural heritage by holding exhibitions and conducting scientific research regarding the relics in their possession. They must install mechanisms to protect all relics against fire, robbery, and natural disasters. Relics may be transferred to and from state-owned cultural institutions with approval, but the period of transfer may not exceed 3 years. Institutions are prohibited from donating, leasing, or selling relics in their collections to other entities or individuals. When relics in a collection are damaged, stolen, or missing, such matters must be reported to the appropriate administrative department for cultural relics.

Generally, no state-owned cultural relics or privately owned valuable cultural relics may leave China, although special approval may be granted by the State Council. All relics that are removed from China are subject to examination and will be issued an exit permit.

Despite these protections, the 2002 Law has two weaknesses. First, it does not adequately incentivize citizens to return relics that are obtained illegally (Maus 2009). Although "moral encouragement or material rewards" may be issued to an individual who discloses illicit excavation, such a vague and unpredictable reward, when compared to the choice of keeping the object for oneself or selling it to an antiquities dealer for a profit, does not encourage citizens to follow the 2002 Law (Maus 2009). Also, although the 2002 Law requires entities and individuals in possession of cultural relics to perform particular duties, it does not provide specific funding for such activities (Maus 2009). The law vaguely requires that the governments incorporate cultural relic protection into their budgets and that revenue from museums and other cultural sites be directed to relic protection (Maus 2009). But, it does not guarantee any funds for cultural relic protection.

In 2003, the State Council adopted Regulations for the Implementation of the 2002 Law. These regulations supplement the 2002 Law, explaining how funds for the protection of cultural relics can be spent, the content of signs and notices for immovable cultural relics, the required content of records and files kept on cultural relics, and how a person becomes qualified to repair cultural relics. It also provides details for cultural institutions regarding how cultural relics should be recorded and tracked, how to gain approval for repairs, duplication, rubbings, and photographs of cultural relics, and what to do if cultural relics are stolen or go missing. The regulations provide specific instructions for individuals who own cultural relics, as well as information for how an entity can apply to become a cultural relic store or a cultural relic auction house. Finally, the regulations provide detailed instructions about importing and exporting cultural relics to and from China.

In 2007, the State Council amended the 2002 Law. Three amendments addressed the reconstruction (and new construction) of immovable cultural relics and the intrastate borrowing procedures for cultural relics (Maus 2009). The first amendment deals primarily with the procedures required to obtain approval for the reconstruction or improvement of cultural sites that have been completely destroyed (Maus 2009). The second amendment establishes the review procedures at the appropriate government level for all sites designated as protected (Maus 2009). The third amendment changed the procedure required for Chinese institutions to gain approval to borrow state-owned relics from other Chinese institutions (Maus 2009).

In 2009, China's Ministry of Culture issued Provisional Measures on the Recognition and Administration of Cultural Relics. These measures provide guidance about the recognition and rating of cultural relics by the government.

Underwater cultural relics have been specifically protected since 1989 by the Regulations on Underwater Cultural Relics. The regulations define underwater cultural relics as human cultural heritage that has historic, artistic, and scientific value and remain in the Chinese inland waters, Chinese territorial waters, waters under Chinese jurisdiction, and in the high seas. But, the regulations do not protect relics that are not associated with important historical events, revolutionary movements or renowned personages, and have remained underwater since 1911.

Similar to the 2002 Law, the Regulations on Underwater Cultural Relics designate the State Administration for Protection of Cultural Relics as the competent authority in charge of the registration of underwater cultural relics, the administration of their protection, and examination and approval of archaeological activities concerning such relics. Also similar to the 2002 Law, activities that may jeopardize the safety of underwater cultural relics are prohibited, discovery of underwater cultural relics must be reported and handed over to the state promptly, and approval is needed to conduct archaeological exploration and excavation activities.

Current Laws Regarding Archaeological Investigations

In 1991, the State Bureau of Cultural Relics promulgated the Measures for Archaeological Activities. Under these measures, any archaeological investigations by a foreign group must be undertaken in collaboration with a Chinese team, and the Chinese team members must be in charge. The State Bureau of Cultural Relics is in charge of the administration of all foreign-related archaeological investigations. Parties wishing to conduct an investigation must submit a written application to the bureau, and the investigation must satisfy certain conditions described in the measures.

Any data obtained must be collected in a report, and the Chinese experts in the group have first priority for publication of the findings. Any relics or specimens obtained are owned by China but can be transported out of China with permission. Approval is needed for students, and others visiting archaeological sites and investigations are subject to inspection by the bureau. Warnings or other penalties may result for violations of these measures.

The 2002 Law provides several additional rules about archaeological activities. Many of the measures described above are incorporated

into the 2002 Law, but the law focuses on excavations as a result of construction or impromptu excavations when relics are found. It also allows for a small amount of relics to be kept for scientific study.

Current Penalties for Illicit Excavation

There are strict penalties for those who illegally excavate cultural relics and violate the current laws regulating cultural relics. Both Chap. 7 of the 2002 Law and the 1997 Criminal Law ("Criminal Law") provide such penalties.

Under the 2002 Law, anyone caught illegally excavating relics, intentionally or negligently damaging or destroying valuable relics, selling or giving away relics without authorization, smuggling relics, robbing, plundering or privately dividing relics, or hindering the state's control over relics will be criminally investigated. Civil penalties will be imposed on individuals who cause a relic to go missing or damage a relic. Individuals who act against the security administration or smuggle relics will be subject to the relevant laws and administrative rules and regulations of the security administration or customs. Fines may be assessed for less serious violations of the law. Serious violations, such as conducting construction projects within a protected area, removing or dismantling immovable cultural relics, or repairing cultural relics without approval, may result in the entity or individual losing any certificate issued to perform such work.

There are also penalties for polluting a cultural relic site. Where the layout, environment, or historical features of a town, neighborhood, or village of cultural value are undermined, the State Council will revoke that municipality's special designation as a city of cultural importance.

Cultural relic stores, auction enterprises, and cultural relic institutions that engage in prohibited activities may have their licenses revoked, depending on the severity of the circumstances. Failures to comply with various reporting requirements in the 2002 Law will require the offending individual or entity to make the omission right by complying with the provisions violated.

Finally, individuals working for the administrative department for cultural relics, an institution for the collection of cultural relics, a cultural relics store, or a cultural relic auction enterprise and who violate the 2002 Law will be assessed an administrative penalty and may also face termination, depending on the severity of their offense.

Similar to the 2002 Law, the Criminal Law provides various punishments, ranging in severity from fines to prison sentences, for individuals who vandalize, destroy, steal, or illegally export, sell, or excavate cultural relics (Maus 2009). Although punishments under the Criminal Law appear harsh, in reality such penalties are applied without consistency (Maus 2009). As a result, the Criminal Law provides little disincentive to those engaged in the illicit excavation activities (Maus 2009). But, it should be noted that some individuals have been criminally prosecuted for cultural property crimes and received harsh sentences under this law (Maus 2009). For example, in 2002, China sentenced four individuals to death for using explosives and heavy machinery to plunder 2,500-year-old tombs (CBS News).

International Perspectives

Opinions about China's legislative protection of cultural relics are mixed in the United States. Criticisms of China's measures were openly and widely discussed while the United States was considering whether to adopt an international agreement with China under the UNESCO convention. In 2004, China requested that the United States signs an agreement to restrict the importation of all ethnological and cultural artifacts dated before 1911 in order to discourage smugglers from transporting such items into the United States (Maus 2009). The agreement was adopted, with modification in 2009 (Marton 2009). The memorandum of understanding (MOU) adopted by the United States and China restricts the importation of Chinese antiquities dating from the Paleolithic period to the end of the Tang dynasty and monumental Chinese sculpture and wall art that is at least 250 years old (Marton 2009).

The United States' delay in responding to China's request was unusual (Maus 2009). Suspected reasons for the delay include China's failure to adequately control its domestic illicit relic trade, as well as its general failure to enforce its current laws, such as the 2002 Law or the Criminal Law (Maus 2009). Additionally, although illicit excavation is a serious problem in China, many more relics are unearthed as a result of building and road construction (Marton 2009). Many scholars in the United States also believe that China values its economic growth and industrialization over its commitment to protecting cultural relics (Murphy 2009). Finally, funding of cultural relic protection is a major issue in China. It is generally understood that all cultural protection activities are underfunded and that the lack of funding negatively impacts enforcement of the laws currently in place (Marton 2009). Many in the international community believe that China must commit additional funding to its protection efforts before illicit excavation can be meaningfully curbed (Maus 2009).

Future Directions

China's cultural relic legislation is admirable and sends a strong message both domestically and abroad that the state values its cultural heritage and wants to protect it. However, going forward, China will have to square this policy with its sometimes antithetical policy of development. Some scholars believe that the Chinese government at all levels largely looks the other way when commercial development construction projects threaten to violate the cultural relics laws (Baskin 2009; Maus 2009; Murphy 2009). If China wants the international community to respect its domestic legislation and requests for repatriation of cultural relics, it will have to show that its relics garner the same level of respect within its own boarders.

On a more positive note, China may be opening up to educational and archaeological studies by foreigners. Although the 2002 Law and the measures for foreign-related archaeological activities greatly restrict archaeological and educational opportunities for foreigners in China, the MOU signed with the United States may relieve some of red tape faced by foreigners. In the MOU, China agreed to two important provisions. First, it agreed to promote the exchange of students and professionals in such fields as archaeology, art history, conservation, museum curatorial practices, and cultural heritage management between appropriate Chinese and US institutions (Hoffman 2010). Additionally, it agreed to facilitate the granting of permits to conduct archaeological research in China (Hoffman 2010). For students and scholars in the field of archaeology and related disciplines, this may mean greater access to the treasures of China's past.

Cross-References

- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: New Approaches to Heritage Administration

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Further Reading

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China: Managing Cultural Heritage and the World Heritage List

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Introduction and Definition

The World Heritage Convention was adopted by the General Conference of UNESCO at its 17th session in Paris on November 16, 1972. It concerns the protection of the World Cultural and Natural Heritage. China ratified the World Heritage Convention on December 12, 1985. As of 2012, there are 30 cultural sites, 9 natural sites, and 4 mixed sites in China that were inscribed on the World Heritage List (Fig. 1).

China established its own cultural and natural heritage classification and management system before it signed the UNESCO World Heritage Convention. There are eight major categories in China's classificatory scheme, including historic structures and other non-movable relics, movable cultural relics, historic cities, historic towns, historic villages, national parks, intangible cultural heritage, and natural reserves. These eight heritage types are managed by five different offices.

Before explaining the role of each office, it is critical to understand the hierarchy and organization of the Chinese central government and the administrative hierarchy of local governments. The State Council of the People's Republic of China is the highest executive state administration, with the prime minister as the head. There are six components that constitute and directly report to the State Council: ministries and commissions, special organizations, organizations, offices, institutions, and administrations and bureaus under the ministries and commissions. The offices that legally manage heritage belong to three of these six categories, and each has a slightly different level of administrative power and independence; the three categories are the ministries and commissions, the organizations, and the administrations and bureaus under the ministries and commissions. The typical administrative hierarchy is from the State Council to the ministries, then to the departments. However, the so-called organizations and administrations and bureaus are between the levels of ministry and department, yet have different administrative independence. The administrations and bureaus, even though they are directly under the State Council and operate independently, are managed by the corresponding ministries. Therefore, they are not as independent as the offices under the category of "organizations," nor do they have the same power; the heads of these offices, therefore, might have a slightly lower official ranking than the ones in charge of the "organizations." For example, the State Administration of Cultural Heritage and the State Administration of Grain belong to "administrations and bureaus," while the National Tourism Administration and the State Forestry Administration are categorized as "organizations."

For the administrative hierarchy of local governments, the provincial level is the one directly beneath the central government. The following levels (discussed in this study) are county, town, and village. "City" itself does not represent an administrative hierarchy, since cities could be categorized into multiple levels. It could be in the provincial level, such as Beijing and Shanghai; it could be in the regional level (in between the provincial and county levels), such as Chengde and Suzhou mentioned in the World Heritage List; it also could be in the county level, such as Dujiangyan and Dunhuang (importantly,

China: Managing Cultural Heritage and the World Heritage List, Fig. 1 Map of World Heritage Sites in China as of 2010 (Cultural and Mixed Sites only). The number indicates the sequence of being listed as World Heritage Sites; "1" represents the site listed in 1987. For the World Heritage Site that include more than one physical sites, only one is indicated in this map in the province where the major site(s) is (are) located

this is where the World Heritage Site of Mogao Caves is located).

Historical Background

Heritage Management

The State Administration of Cultural Heritage is directly under the State Council and is managed by the Ministry of Culture. It is legally in charge of the administration of historic structures and other non-movable relics, as well as movable cultural relics. Note that *relic* is the word used in China for ancient remains. There are seven subcategories under the rubric of historic structures and non-movable relics: archaeological sites, ancient tombs, historic buildings, religious grottos, stone carvings, frescos, and sites and buildings that are related to historical events and revolutions in modern (since 1840) and

contemporary Chinese history. There are three classes of relics: national cultural relics, provincial cultural relics, and city or county cultural relics, which represent various levels of importance. Movable cultural relics include artifacts, artworks, documents, manuscripts, and books. These are classified as either valuable cultural relics or ordinary cultural relics. Valuable cultural relics are further divided into grade-one, grade-two, and grade-three cultural relics. For the purpose of this entry, only the historic structures and non-movable relics that are classified as national cultural relics are included.

The State Council announced the first group of national cultural relics in 1961, after the completion of the first nationwide investigation and assessment of cultural relics by the State Administration of Cultural Heritage in the late 1950s. There are a total of 180 sites, which include 77 historic buildings, 33 revolutionary monuments and memorials, 26 archaeological sites, 19 ancient tombs, 14 religious grottos, and 11 stone carvings. More sites were subsequently added: 62 sites in 1982, 258 sites in 1988, 250 in 1996, 518 in 2001, and 1080 in 2006. Currently, there are a total of 2,351 national cultural relics. (Two sites in the first group were combined into one in 2001; three sites were later added into the 2001 list; one site was later added into the 2006 list. "National Cultural Relics," *Baidu*, accessed on December 4, 2010, http://baike.baidu.com/view/163959.html.) In general, the buildings and sites listed in the earlier dates might have higher cultural, historical, or artistic value than those added later, except for the potential new discovery of exceptional archaeological sites. Additionally, it is important to note that there is an increasing attention to vernacular architecture and its built environments.

In April 2007, the State Council announced the beginning of the third nationwide investigation and assessment of cultural relics, which was scheduled to be complete in December 2011. The question, then, is how many more sites will be added to the already very long list – an issue relevant to UNESCO's World Heritage List, which itself is nearing 1,000 inscriptions.

The Department of Urban–rural Planning, directly under the Ministry of Housing and Urban–rural Development, is responsible for the assessment, preservation, supervision, and management of the historic cities. Twenty-four historic cities were included in the first group announced by the State Council in 1982; 36 were added in 1986; 37 were added in 1994; another 12 cities were added between 2001 and 2010. This makes a total of 112 historic cities in China. Historic towns and historic neighborhoods are managed by provincial offices.

Another department under the Ministry of Housing and Urban–rural Development is the Department of City Development, which manages the National Park of China (also referred to as National Tourist Scenic Spots on earlier application dossiers for World Heritage Sites). The National Park of China includes sites with both natural beauty and historic built environments. It was created in 1982 with 44 sites and amended six times in the following years: 40 additional sites were added in 1988, 35 in 1994, 32 in 2002, 26 in 2004, 10 in 2005, and 21 in 2009. Currently, there are 208 national parks recognized by the state.

Since 2003, the Department of Urban–rural Planning, under the Ministry of Housing and Urban–rural Development, with the assistance of the State Administration of Cultural Heritage, started two new programs to evaluate historic towns and villages that have historical importance or that represent the traditional culture or character of a local ethnic group. Ten towns and 12 villages received the title of National Historic Towns and National Historic Villages in 2003, an additional 34 towns and 24 villages in 2005, 41 towns and 36 villages in 2007, 58 towns and 36 villages in 2008 and 2009, and 38 towns and 61 villages in 2010. Currently, there are 181 national historic towns and 169 national historic villages.

Obviously, buildings or structures can be part of a cultural relic, historic city, historic town, historic village, or national park. Therefore, they could be subject to the administration of three different offices. However, in terms of

their approaches to cultural heritage, the essential difference between the State Administration of Cultural Heritage and the Ministry of Housing and Urban–rural Development is clear. The former handles only singular buildings or building groups in isolation, while the latter extends its focus to large built environments and landscapes.

The first group of national cultural relics was announced in 1961, while the initial lists of national historic cities and national parks were created 21 years later in 1982. The concept of protecting an entire historic city (meaning that it has been continuously occupied) is a new approach in preserving cultural relics. The idea was generated by three scholars: Renzhi Hou (historical geographer), Xiaoxie Zheng (urban planner), and Shiyuan Shan (architect in historic preservation). It is difficult to judge how much of their idea was influenced by preservation theory and practice worldwide, inasmuch as China's economic reform started in 1978, a couple of years before the rise of this new concept.

The division between the singular building in isolation and the overall consideration of the built environment has the potential to create many problems during the process of preservation. The fact that these two types of heritage are managed by three different offices, under two different ministries, can cause difficulties in terms of administration and management. This division becomes more complicated following China's signing of the UNESCO World Heritage Convention. Currently, the State Administration of Cultural Heritage is responsible for nominating and managing the cultural World Heritage Sites; the Department of City Development (the office that also manages the National Parks of China), under the Ministry of Housing and Urban–rural Development, is in charge of nominating and managing the natural and mixed World Heritage Sites. The Department of Urban–rural Planning (which manages the Historic Cities), under the Ministry of Housing and Urban–rural Development, and the State Forestry Administration (which manages the National Natural Reserves) are left alone in this process.

The process of assessing and then nominating sites (by means of the Tentative List) to the World Heritage List should involve discussion with other departments, since the process of enlisting the National Parks of China usually includes eight departments. However, the department holding the ultimate responsibility is the one that takes the lead in organizing the procedure, as well as making the final decision. This might explain why the first 17 and the last 4 of the 53 sites on the Tentative List, arranged chronologically, are either natural sites or mixed sites, which are in relation to the National Natural Reserves and National Parks of China, respectively. In the meantime, out of the other 32 sites, all listed in the year of 2008, there is only 1 mixed site as an extension project of an existing mixed World Heritage Site; the remaining 31 sites are all cultural sites, including the Hani Terraces (the stepped rice terrace) that might be better described as a cultural landscape. For the World Heritage Sites, all four mixed sites and the first four listed natural sites hold the title of National Parks of China. It seems that these two offices have taken the lead in nominating World Heritage Sites in turns. It might not be their intention to only nominate the sites under their own administration, but they might simply not have enough information about other sites managed by other departments. Therefore, the fact that the department managing the historic cities has not been directly involved in nominating and assessing sites for the World Heritage List has a huge impact on the components of this list. Xi'an, which is one of the four most important historic cities of China – the others are Beijing, Nanjing, and Luoyang – (and surely should be inscribed on the World Heritage List) and which received the title of Historic City in 1982, does not even appear on the long Tentative List. Furthermore, only 2 out of the 32 World Heritage Sites (cultural and mixed sites) in China are historic cities or districts in mainland China (The Historic Centre of Macao, inscribed in 2005, may be managed by a different office and through a special procedure since Macao is officially designated as a "special administrative region").

Administrative Independence and Responsibility of the State Administration of Cultural Heritage

The State Administration of Cultural Heritage is the office that directly supervises 28 of the 32 nonnatural World Heritage Sites in China and also enforces China's heritage law. (The law can be read at this website: http://www.sach.gov.cn/tabid/311/InfoID/383/Default.aspx [this is the official address under the State Administration of Cultural Heritage]). Therefore, only this office, as well as its administrative independence and responsibility, is considered here.

The hierarchical relationship (impacting the level of administrative independence and responsibility) between the Ministry of Culture and the State Administration of Cultural Heritage has been changed and constantly redefined many times since being founded in 1949. The predecessor of the State Administration of Cultural Heritage is the Department of Cultural Heritage, which was founded in 1949. In the following 17 years until the Cultural Revolution started in 1966, the responsibility of the Department of Cultural Heritage changed many times; it was once in charge not only of cultural heritage and museums but also libraries, cultural centers, and long-distance education. In 1973, the Department of Cultural Heritage became the State Administration of Cultural Heritage, directly under the State Council. In 1982, it, along with four other departments, formed the new Ministry of Culture in 1982. In 1988, 3 years after China signed the World Heritage Convention, the same department with the same responsibilities once more became the State Administration of Cultural Heritage and started to report directly to the State Council. Its administrative independence appears to have remained the same since then. This department is directly under the State Council but is being managed by the Ministry of Culture. It operates independently and has its own schedules, budgets, and supplies.

The major responsibility of the State Administration of Cultural Heritage can be briefly summarized into the following categories, which include implementing cultural heritage law and enacting detailed regulations, managing the national cultural heritage, providing assistance to corresponding offices in case of heritage-related crime, assisting and supervising all the museums in serving the general public and sharing information, arranging and assessing related research projects, administrating training and professional development, and organizing information and cultural exchange with entities outside China. More specifically, there are detailed responsibilities in managing the cultural heritage. The State Administration of Cultural Heritage is required to establish the standards and procedures for assessing cultural heritage, manage and supervise the World Heritage Cultural Sites, assist the corresponding offices in assessing the World Heritage Natural and Mixed Sites and in managing and preserving the historic cities, organize the nationwide investigation and assessment of cultural relics, inspect and approve preservation plans and new constructions within the protected area of national cultural relics, assess and approve archaeological excavation, and approve the transfer and lending of certain national cultural relics within or outside the country.

Heritage Law: The Primary Law

The *Law of the Peoples Republic of China on Protection of Cultural Relics* is China's primary heritage law. It was initially adopted in 1982; Article 30 and Article 31 were revised in 1991. A revision of the heritage law was finalized on October 28, 2002. The current version was approved by the Standing Committee of the Seventh National People's Congress and signed by the president.

The law has seven chapters. These include general provisions, immovable cultural relics, archaeological excavations, cultural relics in state collections, cultural relics in private collections, transporting cultural relics across the national border, legal liabilities, and supplementary provisions. Here I consider critical points of the law within each chapter.

Chapter One

Chapter one lays out the general provisions. It first states the purpose of establishing this law

and the kinds of cultural heritage that are protected by the state and the law. Importantly, one of the purposes of this law is to promote the tradition of patriotism; therefore, one of the five categories of cultural heritage that receives protection by the state is dedicated to sites, objects, and buildings associated with historical events, revolutions, and noted individuals in modern and contemporary Chinese history. It is also notable that the law places emphasis on protecting cultural heritage from all time periods in history. Besides grand architecture and beautiful art works, the law also encompasses preservation of typical objects representing the daily life of all ethnic groups throughout China's history. The law then regulates the classification of cultural heritage (discussed earlier in this entry).

Chapter one also explains the ownership of cultural heritage. The state owns everything within the national border, either buried in the ground or in the water; the state owns all the archaeological sites and most of the historic building except privately owned buildings, which, in most cases, are houses. The law does protect privately owned heritage, but owners are obligated to obey all the heritage law and regulations.

Article 10 not only requires that all local governments that are higher than the county level have dedicated budgets for heritage preservation but also states that the central government will increase the national level budget for heritage preservation according to income.

Article 10 also states that the institutional income of state-owned museums, memorials, and cultural heritage sites shall be exclusively used for the protection of cultural heritage. Article 3 of the *Regulations for the Implementation of the Law of the Peoples Republic of China on Protection of Cultural Relics* further lists how the institutional income can be used. It can be used to store, display, preserve, and collect cultural relics; to renovate and construct the state-owned museums, memorials, and preservation facilities; to safeguard cultural relics; to support archaeological research and excavations; and to support related scientific research and education. The question is what kinds of income are considered institutional income and, therefore, subject to this regulation. It is important to note that the salary and the benefits of the staff are not mentioned here, which could come from the governmental budget, income generated by the institutions themselves, or the combination of these two. As nonprofit organizations, museums, memorials, and cultural heritage sites could have operational income upon approval. This includes income from collecting entrance fees, as well as gifts shops, restaurants, or lodging facilities. The operational income usually covers the cost for daily maintenance, including salary and benefits for the staff. In some cases, the operational income needs to be turned in to the appropriate governmental office in charge. Clearly, the use and distribution of the operational income is not subject to heritage law or regulation; the amount of money visitors pay is not necessarily used to protect the heritage. When the operational income of a heritage site is directly associated with the staff members' salary and benefits, this nonprofit institution would be no different than a commercial enterprise. This is when the heritage status might be threatened due to neglect, a situation well known around the world.

Chapter Two

Chapter two focuses on managing and protecting immovable cultural heritage, either state-owned or private-owned, which includes detailed regulations and procedures to follow in heritage preservation. Even though the State Administration of Cultural Heritage is in charge of managing the national level heritage, most of the work and the decisions are carried out by provincial offices, such as archiving, setting up an extended protected area, approving appropriate new construction within the protected area, and assessing restoration. However, the State Administration of Cultural Heritage will make the decision when an immovable national cultural relic needs to be relocated or rebuilt on the original site. When demolishing an element of cultural heritage due to unavoidable new construction, approval is required from the cultural heritage management office at a higher level. For example, only the State Administration of

Cultural Heritage can make a decision regarding whether to demolish a cultural heritage of provincial level; the immovable national cultural relics cannot be demolished, except as a special case approved directly by the State Council.

Article 21 is dedicated to the preservation and renovation of immovable cultural heritage. In particular, it states that the owner of the private-owned immovable cultural heritage is obligated for such responsibility. However, the local government at the county level and above shall provide financial help to those who are not financially capable of doing so. The local government shall impose the task of renovation when the heritage is in danger and pursue payment from the owner afterwards, if the owner is financially capable.

Articles 23 and 24 regulate usage of state-owned cultural heritage. State-owned immovable cultural heritage of all levels shall only be used as museums, preservation institutes, or tourist spots. For such a heritage to be used for another purpose, one must obtain approval from the heritage management office at a higher level, as well as approval from the same-level government to which the building is managed by the heritage office to which it belongs. Only the State Council has the right to approve alternative usage of national cultural relics. The law states that state-owned immovable cultural heritage of all levels shall not be transferred or mortgaged or used as assets for business operation.

Article 25 regulates the usage of private-owned cultural heritage. Private-owned immovable cultural heritage of all levels shall not be transferred or mortgaged to foreigners. When transferring, mortgaging, or changing the function of the heritage property, the owner needs to report to the appropriate heritage management office and document the change. The owner needs to get approval in this office only when the local government helped to renovate the heritage previously. This means a private owner of a house that is a national cultural relic can make his house a restaurant, a hotel, or a factory without being assessed and approved by any heritage management office.

When the law was initially written in 1982, there was not a single residential structure listed as a national cultural relic; it seems that being a museum or a tourist spot is the only way for the imperial palaces and tombs to show their historical importance to the general public. It was not until 1988 that the first few empty houses (expropriated by the government during the Cultural Revolution) and the first few living vernacular built environments were listed as national cultural relics. In recent years, there are more dwellings and built environments being added to the list. Since property ownership is complicated in China, a private dwelling does not necessarily mean a privately owned property, not to mention the different levels of ownership and the separation between ownership of the land and the property itself (there is no privately owned land in China). Therefore, the exact consequences of Article 25 cannot be fully understood without a detailed study.

Chapter Three

Chapter three handles the issues related to archaeological excavation. Only the State Administration of Cultural Heritage has the right to accredit the institutes participating in archaeological excavations and approve any archaeological excavations. An excavation within the protected area of an immovable national cultural relic needs to be approved by the State Council. The institutions that participate in the excavation shall turn over the discoveries to the appropriate museums, libraries, or other institution after archiving the relics. Only with exceptions approved by appropriate heritage management offices or the State Administration of Cultural Heritage can such institutions keep a few specimens for research purposes.

Chapters Four, Five, and Six

Chapters four, five, and six are dedicated to issues related to cultural relics in state collections, cultural relics in private collections, and transporting cultural relics across the national border, respectively. The articles focus on movable cultural relics, which are beyond the scope of this entry.

Chapter Seven

Chapter seven concerns legal liabilities. It lists different kinds of behaviors – either violating the heritage law or harming the cultural heritage – and categorizes them into criminal cases, civil cases, or noncriminal cases. It gives detailed information about what kind of administrative sanction or civil penalty each behavior will receive; the criminal case will be charged with the appropriate criminal law.

Chapter Eight

Chapter eight contains the supplementary provisions, which simply state that this law becomes effective on the date of its promulgation.

More Heritage Laws

In support of the *Law of the Peoples Republic of China on Protection of Cultural Relics*, the State Council promulgated the *Regulations for the Implementation of the Law of the Peoples Republic of China on Protection of Cultural Relics* on May 18, 2003, to be effective on July 1, 2003, which was signed by the prime minister. (All the dates listed here are the dates that each regulation was approved; the effective date of each regulation is usually months later than the approval date.)

Other than the fundamental heritage law and regulations, there are numerous ordinances and regulations promulgated by the central government or local governments. Regulations promulgated by the State Council also include the *Ordinance of Preservation of the Great Wall* (September 20, 2006), the *Ordinance of National Parks of China* (September 6, 2006), the *Ordinance of National Reserves* (September 2, 1994), and the *Regulations for Preserving the Historic Cities, Historic Towns, and Historic Villages* (April 2, 2008). There are 43 regulations promulgated by the Ministry of Culture that are listed under the webpage run by the State Administration of Cultural Heritage, such as *Regulations for the Management of the World Cultural Heritage* (November 14, 2006), the *Interim Regulations for Preserving and Managing the National Intangible Cultural Heritage* (October 25, 2006), and the *Regulations for Museum Management* (December 22, 2005).

Key Issues

Bundling Sites: A New Strategy to Achieve Inscription in the World Heritage List

One of the new phenomena of newly listed World Heritage Sites in China is that one World Heritage Site consists of more than one site and the sites can be quite distant from each other. There are two reasons for this phenomenon. First, the notion of promoting a site to become a World Heritage Site is a very attractive and popular idea for many people: the *government* who wants to establish a new image of the country with both economic strength and a rich culture; *local officials* who want to use this opportunity to build their resume and to improve the local economy by increasing tourists; the *local people* who are proud of having a World Heritage Site in their hometowns; and the *general public* who enjoy the convenience of traveling to World Heritage Sites without spending a lot of money and time to go outside the country, which is a dream that will never be realized by most Chinese people. Under this general social and cultural background, China is preparing 200 individual projects (not sites) for the World Heritage Tentative List. (See, e.g., State Administration of Cultural Heritage 2010). Considering that one country can only send one project per year, it will take hundreds of years for these 200 projects to become World Heritage Sites. Combining similar ones seems the only feasible approach that can expedite this process. Besides this obvious reason, there is another benefit to bundling sites together: it allows sites that are valuable, yet without exceptional value and quality, to become World Heritage Sites.

There are various kinds of approaches concerning *how* and *what* to bundle together. The first example is the Temple and Cemetery of Confucius and the Kong Family Mansion in Qufu (which should actually be documented as the Temple of Confucius and Cemetery and the Kong Family Mansion in Qufu), listed in 1994. Although the Temple of Confucius and the Kong Family's Mansion are separated in time by over 1,300 years, they are located right next to each other and received the recognition of

National Cultural Relic as one site in 1961. The Kong Family's Cemetery is far away; it is where Confucius was buried, as were over 100,000 of his descendants. Therefore, this bundling is reasonable and necessary to understand the value and meaning of the heritage site.

The Classical Gardens of Suzhou, listed in 1997, is another example. There are nine sites composing this World Heritage Site. At the time of application, only four of these nine gardens were honored as National Cultural Relics. Two more gardens were honored in 2001; the three remaining gardens received the title as one of the 1,080 sites in 2006. At that time, there were 34 structures or sites within the city of Suzhou with the title of National Cultural Relic. This is a clear case in which the somewhat valuable, yet not exceptional, sites benefit from being bundled together with the exceptional ones.

The Case of Dengfeng

The most manipulated and constructed nomination is "The Historic Monuments of Dengfeng in 'The Center of Heaven and Earth'," which was honored as a World Heritage Site on August 1, 2010 (State Administration of Cultural Heritage 2010). This "site" includes eight sites or 11 structures and building complexes. These 11 structures and building complexes were built in a time frame covering almost 2,000 years of history, including buildings for ritual, religious, educational, and scientific purposes. The title, "The Center of Heaven and Earth," is a constructed concept that bundles these various buildings and sites together.

Importantly, the same "site" went for the nomination of World Heritage Sites in 2009 and did not achieve its goal. In that nomination, the "site" was named "The Historic Monuments of Mount Song Area." After this experience, the regional heritage management office reflected upon the reasons for the loss, and they perceived a few main reasons. The following are mentioned: in general, the evaluation process of World Heritage Sites is getting more rigorous, especially for a country like China, which already has more than 30 sites listed. Furthermore, Mount Song is one of the mountains included in the project of the Four Sacred Mountains as an Extension of Mt. Taishan, which made UNESCO question the repetition. In the meantime, Mount Wutai was adjusted from a mixed World Heritage Site to a cultural landscape during the final decision-making process of UNESCO convention in 2009, because the aspect of its natural value did not get approved; the project of Mount Song has the potential of encountering a similar problem if it follows the path of Mount Wutai. More importantly, the concept of using Mount Song as central sacred mountain to connect all the sites is difficult for the World Heritage Committee professionals from different cultural backgrounds to understand and appreciate.

Based on these assessments, the regional management office decided to change the name of this application to "The Historic Monuments of Dengfeng in 'The Center of Heaven and Earth.'" Two major implications can be observed in this change. First, Mount Song is out of the equation, even though all these sites are still located with the area of Mount Song; the change places a clear emphasis on the cultural aspect of the site and leaves its natural value aside. Second, the new name also suggests that the implication and influence of this site covers a much larger area, therefore, as a heritage site, its cultural significance increases.

More importantly, the new application introduced the concept of "The Center of Heaven and Earth": the Chinese counterpart is "天地之中," which means "sky, earth, of, and center," respectfully. The Chinese name suggests a connection with an existing Chinese concept; however, it is manipulated and has a different meaning. The Chinese concept of the "Center of the Earth" (地中) or the "Center of the World" (天下之中) was well developed in ancient China in the beginning of the Western Zhou period (1046–771 BCE) as a political strategy to relocate the new capital of the Western Zhou period to the region previously occupied by another ethnic group (Wang 1990; Gong 1994). The ancient Chinese perceive "天" (sky) as everything above "地" (earth) (Wang 1999). Therefore, the phrase "天下" (literally means under the sky) and the word "地" (earth) are synonymous spatially

and conceptually. "天下" also refers to the world, a 2-dimensional earth radiating from the "center."

Although there are debates among scholars regarding where exactly the "Center of the World" was perceived by the ancient Chinese, it is generally acknowledged that Mount Song is located in the region considered as the "Center of the World" by the people of the Western Zhou period and many dynasties afterwards. In the case of renaming a World Heritage nomination, by changing the Chinese from "天下之中" to "天地之中," "天" (sky) becomes an independent concept, instead of something closely associated with the "地" (earth). The English translation, "The Center of Heaven and Earth," pulls them further apart both spatially and conceptually as the "heaven" and the "earth." As a result, the concept of the "center" here can be understood in two ways. It suggests a vertical axis, as the *axis mundi*, that connects the heaven and the earth; it can also be perceived as the space between the heaven and the earth, which is similar to the Western philosophical and religious ideas that put human beings at the center between heaven and earth. Both interpretations are manipulations of a classical Chinese concept; it is an adjustment tailored for the Western perspective, in order to make the World Heritage Committee professionals who evaluate the project easily appreciate this already heavily constructed cultural heritage site.

The following list gives a brief description of each of the 11 structures and groups of buildings that are covered under the umbrella of the "Center of Heaven and Earth." (The number indicates the year it was listed as National Cultural Relic when applicable.)

- Taishi Que (1961), a pair of large stone tablets with engravings, was built in 118 CE and marks the ritual path in front of the Zhongyue Temple.
- Zhongyue Temple (2001) was originally built in 110 BCE and has been rebuilt and enlarged many times throughout history. Its current layout and major buildings are based on the reconstruction during the Qing Dynasty (1644–1912 CE). It was a religious temple holding the imperial sacrificial altar for Mount Song.
- Shaoshi Que (1961) was built between 118 and 123 CE and used to be located in front of the Shaoshi-Shan Temple (destroyed), marking the ritual path.
- Qimu Que (1961), a pair of large stone tablets with engravings, was built in 124 CE used to be located in front of the Qimu Temple (destroyed).
- The 40-m-high Songyue Temple Pagoda (1961) was originally built between 520 and 525 CE, the oldest surviving brick tower in China.
- The Shaolin Temple, a Buddhist temple renowned for its martial arts, was originally found in 495 CE. It has three groups of structures, not all adjacent to each other, included in the World Heritage Site: the Kernel Compound (1963, provincial level only), the Pagoda Forest (1996), and the Chuzu Temple (1996, as one site with the Pagoda Forest).
- Huishan Temple (2001) is a Buddhist temple first built between 471 and 499 CE.
- Songyang Academy of Classical Learning (2001) was originally built between 934 and 936 CE and became one of the four largest study centers in the Song Dynasty (960–1279 CE).
- The Observatory (1961) was originally built between 1276 and 1279, as one of the oldest surviving observatories in China.

There is no doubt that all these structures and buildings have their unique historic and artistic values; the fact that 5 of them were part of the list of the first 180 national cultural relics supported this. However, there is no obvious theme shared by all the sites, since they not only represent different kinds of structures – from stone tablets, to towers, and to buildings – but also serve different functions – from ceremonial structures, to religious structures, to scientific structures, and to cemeteries. The concept of the "Center of Heaven and Earth" was clearly a constructed idea that was superimposed on all these sites so they could be bundled together as one World Heritage Site.

In the meantime, there are 16 sites in the City of Dengfeng that were registered as National Cultural Relics by 2006, the most recent date when the list was modified. The question is why the other seven sites were not included. If a site can become a World Heritage Site first, and then a National Heritage Relic 9 years later (in the case of Classical Gardens of Suzhou), there are definitely significant values for any of these seven sites. Perhaps lacking UNESCO's criterion of OUV (Outstanding Universal Value), we can see the benefit of bundling the sites together, according to the argument made by the regional heritage management office. If a cemetery for monks can be associated with the idea of the "Center of Heaven and Earth," those leftover temples, towers, and religious stone carving sites can as well. If the potential tourist income is one of the driving forces in selecting the sites, which is proven by many precedents, some of these leftover sites should be included as well. The entrance fee to enter the individual Fujian Tulou was increased between 40 % and 300 % of the original price after being inscribed as a World Heritage Site in 2008. The overall income from the entrance fee of the Ancient City of Ping Yao has increased 40 times since its promotion in 1997. However, according to ctrip.com, the leading website providing tourist service in China, out of the 22 sites recommended for the Mount Song area, Fawang Temple, a national cultural relic, is ranked as the 5th favorite site by the tourists, a much higher position than some of the sites included for the World Heritage Site, especially Huishan Temple, ranked as the 21st site.

Other Cases

The case of the Mount Qingcheng and the Dujiangyan Irrigation System, listed in 2000, had a very different approach. Mount Qingcheng is one of the birthplaces of Taoism with many Taoist temples, while Dujiangyan is an irrigation system built in the third century BCE and still in use. The two sites are in proximity to each other; however, I would argue that their difference should decouple them from being one World Heritage Site.

Another case is the Imperial Tombs of the Ming and Qing Dynasties, which eventually includes eight sites in five provincial jurisdictions. When the site was first listed in 2000, it included two clusters of tombs of the Qing Dynasty in Hebei Province and one tomb of the Ming Dynasty (the Xian Tomb in Hubei Province); the Qing tombs and the Ming tomb received the title of National Cultural Heritage in 1961 and 1988, respectively. As the only Ming tomb included, the Xian Tomb is not the most famous one in China. There are 13 Ming tombs scattered in the mountain area of Beijing and the Xiao Tomb of Ming, the burial land for the very first emperor of the Ming Dynasty, located in Nanjing, Jiangsu Province; both were honored as National Cultural Relics in 1961. The obvious questions are the following: who organized the application process? Who decided which tombs to include? What were the reasons for the exclusion of the majority of the Ming tombs even though the name of this World Heritage Site suggests collective tombs from the Ming Dynasty? However, this is not the end of the story. The Ming tombs of both Beijing and Jiangsu Province were added as an expansion to the existing World Heritage Site in 2003. Three additional Qing tombs in Liaoning Province were added in 2004. They are the Ancestral Tomb and the tombs for two earlier emperors of the Qing Dynasty, which became the National Cultural Relic sites in 1982 and 1988. I ask whether this World Heritage Site will one day be expanded to include all the imperial tombs in China. (Comparably, will a similar inscription named "Tuscan Hill Towns" be created and include all the hill towns in central Italy?)

Future Directions

China's vast territory, extraordinary history, and exceptional built environment facilitate a large numbers of sites to be nominated to UNESCO's World Heritage List. China's success in bundling sites for evaluation by the World Heritage Committee will inevitably set up a new precedent for the application and packaging of future World

Heritage Sites in China. Its potential impact on heritage policy, heritage management, the general public's attitude towards heritage sites, and the tourists' evaluation and preference of heritage sites are yet to be discovered. In the meantime, the direct outcomes of bundling to the sites, their local stakeholders, the Chinese public, and the tourism industry deserve monitoring and studying in the coming years.

Cross-References

- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: New Approaches to Heritage Administration

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China: Museums

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Introduction and Definition

Compared to the long written history in China, the word "museum 博物馆 博物馆 (bo-wu-guan)" is quite new: it was introduced to China by the Japanese in the late nineteenth century. In ancient Chinese, "bo-wu" means natural science or a person in command of broad or extensive matters; "guan" refers to places where cultural relics were kept or managed and where knowledge was taught.

Over the past 100 years, the concept of the museum in China has changed from a purely educational organization into one that collects and curates cultural relics and specimens and engages in propaganda and education, and scientific research. The role of museums in China needs to be considered in relation to the definition of the museum adopted by the International Council of Museums (ICOM) at the 21st General Conference in Vienna, Austria, in 2007:

A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment (ICOM 2012).

In practice, the concept of museum in China is a little different from ICOM's definition. The main functions of Chinese museums are to inherit and disseminate knowledge of Chinese culture, integrate social and ethnic memories, represent the historical attitudes of the government, and reflect on visual representations of China. Throughout China, governments at various levels invest heavily in museums, not only as a tool for propaganda and public education and for reflection on history but also as a physical symbol of the status and wealth of a particular city or region.

Key Issues

Key issues in Chinese culture can be understood through the lens of the museum, and through an understanding of the changing concept of the museum through time.

Brief History of Chinese Museums

It can be argued that collecting is one of the instincts of human beings, especially the collection of those objects of special significance to individuals, groups, and states in human society. Throughout the world, treasures, relics, and books are kept or buried together in secret places. That's why we now know a lot about the unwritten histories through archaeological excavations, such as the oracles inscribed on bones or tortoise shells of Shang Dynasty in China, because those bones and shells were buried together intentionally after divinations by the Imperial Family.

Traditionally, antiquities were held in the private homes of aristocrats and the Imperial Family. Ordinary people could not view them and there was no thought of these objects being used for scholarly research or public education.

The notion of the modern museum was introduced to China by people from other countries. For instance, the earliest recognized museum, Xu Jia Hui (徐家汇) Museum, was a natural history museum which exhibited specimens of

animals and plants. It was founded by a French Jesuit priest in 1868. The first modern museums in China were set up in the late 1870s. Important examples include the Imperial Tung Wen College (京师同文馆), established in 1876, and the Great Iron-House Museum (铁嵌玻璃房), established in 1877 by the Polytechnic Institution Shanghai (上海格致书院). In 1905, another major step in the development of museums in China was taken with establishment of the Nantong Museum (南被博物院), in Nantong, Jiangsu Province, by the famous industrialist and educator Zhangjian (张謇). The overthrow of the feudal imperial court during the Xinhai Revolution in 1911 facilitated the development of modern museums in China by removing social and cultural barriers to the public exhibition of treasured antiquities.

Chinese Museums of Note

The National Museum of China (NMC)

The National Museum of China is located on the east side of the Tian'anmen Square in Beijing. It was founded in 2003 after the merger of the former National Museum of Chinese History and the National Museum of the Chinese Revolution. NMC, an integrated national museum under the Ministry of Culture of the People's Republic of China, focuses on both history and art and is dedicated to its collection, exhibitions, research, archaeology, public education, and cultural communication.

The predecessor of the National Museum of Chinese History is the Preparatory Office of the National Museum of History, which was founded on July 9, 1912. Upon the founding of the People's Republic of China on October 1, 1949, the museum was renamed the Beijing Museum of History. In 1959, it was renamed the National Museum of Chinese History. The predecessor of the National Museum of the Chinese Revolution was the Preparatory Office of the National Museum of Revolution founded in March 1950 and renamed 10 years later. In August 1959, the construction of the new building on the east side of the Tian'anmen Square that housed both museums was completed. The building was regarded one of the "Ten Great Constructions" built to celebrate the tenth anniversary of the People's Republic of China. On October 1 of that same year, the two museums opened to the public.

The main aim of the National Museum of China is to be a leader within China and a first-class museum internationally. Its ethos is to put people first and for its development to be based on staff, collections, business, and academic research. This museum aims to protect Chinese cultural heritage, to display the time-honored history of China, to provide public education on history and culture, especially for young people, and to promote cultural exchange with other countries and regions. Through these efforts, the museum aims to create a classroom for lifelong learning and a palace for culture.

Palace Museum: Forbidden City in Beijing

The Palace Museum, China's largest museum, is situated in the center of Beijing. It was established on October 10, 1925. In Chinese, it is also known as the "Purple" Forbidden City, and in English as the Forbidden City. This museum covers 720,000 m^2 and was the imperial palace for a succession of 24 emperors and their dynasties during the Ming and Qing periods of Chinese history. The museum is China's largest and most complete architectural grouping of ancient halls. The construction of the Palace began in 1420, the eighteenth year of Yongle, so it is almost 600 years old.

More than 70 halls of various sizes, containing more than 9,000 rooms, comprise the Forbidden City. These halls are aligned along a north–south axis and extend out on either side in an east–west symmetry. The central axis not only passes through the Purple Forbidden City but extends south to Yongding Gate and north to the Bell and Drum Towers, for a length of some 8 km. This passage through the entire city of Beijing symbolizes the centrality of the imperial power: the imperial seat is at the very center of this line. The architecture is designed so that the buildings are

lined up neatly and with imposing scale. In a concentrated form, this assemblage expresses China's artistic traditions in the setting of China's unique architectural style.

Shanghai Museum

The scope, depth, and quality of the Shanghai Museum's collections, and its striking architecture, make this museum one of the most famous, if not the most famous, in China. It covers an area of 38,000 m^2, with a scale that greatly surpasses its predecessor museum. The exterior of the museum is inspired by the shape of an ancient bronze *ding* (cooking vessel) of the Chen Dynasty, with its rather archaic flavor. The structure and materials of the entire building, however, are an accomplishment of the most modern technology.

The Shanghai Museum focuses mainly on ancient arts. At present, it is divided into 10 sections, which are ancient Chinese bronzes, sculpture, ceramics, jades, seals, calligraphy, coin and currency, paintings, Ming and Qing Dynasty furniture, and crafts of China's national minorities. In addition to these 10 permanent exhibitions, the museum holds small-scale exhibitions and hosts visiting exhibitions. The museum also lends to other museums, both within China and abroad.

Chinese Silk Museum

The Chinese Silk Museum is not only the first national silk museum but also the biggest silk museum in the world. It is located on the bank of West Lake, Hangzhou, Zhejiang Province. It was opened on February 26, 1992 "to spread the ancient silk culture and develop a new Silk Road," according to former Chairman Jiang Zemin. The main hall of the museum tells the origin and development of silk, the categories of silk, the Silk Road, and the role of silk in the ancient social life. The hall of dyeing and weaving and the hall of achievements in modern times exhibit separately the progress of ancient weaving machines and the great success in production, research, and foreign trade after the Liberation of the New China.

Chinese Tea Museum

The Chinese Tea Museum is a national theme museum, located in the Shuangfeng Village, southwest of Longjing Road, Hangzhou City, Zhejiang Province, the area where Longjing Tea originates. This museum opened in October 1990. The museum consists of independent but interrelated halls that cover the history of tea, collections relevant to tea service, and customs, and explains the tea culture from various angles.

Hu Tsing Yu House: Chinese Medicine Museum

Hu Tsing Yu House: Chinese Medicine Museum is China's first Chinese pharmacopoeia museum. In 1874, a successful businessman named Hu Xueyan invested large sums in a handsome building of southern Chinese architectural style, which was the location of this museum. The exhibition halls display a wide variety of ancient implements and artifacts used in the conduct of the herbal medicine business. Hu Tsing Yu House is located in Hangzhou and enjoys the reputation of being a "magical science hall, brilliant medicine culture."

Cooking Culture Museum in Sichuan Cooking College

The Cooking Culture Museum is affiliated to Sichuan Cooking College. It focuses on the history, customs, and art of cooking and on relevant research, such as the relations between cooking and painting and calligraphy, cooking and celebrities, cooking and health.

Museum of the Terra-cotta Warriors and Horses of Qin ShiHuang

The Museum of the Terra-cotta Warriors and Horses of Qin ShiHuang was opened in 1979 to show the "Eighth Wonder of the World" in full scale. The museum was constructed on the site of the excavations. The main exhibits are three exposed pits with clay warriors and horses and more than 10,000 bronze weapons. In a sense, this museum is a treasure house of Qin's military affairs, science and technology, art, and culture. It is listed as a UNESCO World Heritage Site.

Zhoukoudian Site Museum

Zhoukoudian Site Museum is situated some 50 km to the southwest of the urban district of Beijing, where the world-famous Peking Man lived more than half million years ago. In 1987, UNESCO listed this site on the World Heritage List. More than 20 significant archaeological sites have been found at Zhoukoudian, including the Peking Man Cave, and the Upper Cave and New Cave. The discoveries of human and other animal fossils, human-made stone tools, and the evidence of fire use astonished the world when the discoveries were made in the 1920s. The Peking Man Site is not only a treasure house of human fossils but also the research base for paleoanthropology, prehistoric archaeology, paleontology, stratigraphy, chronology, and petrology.

Tonglvshan Ancient Copper Mine Museum

The Tonglvshan Ancient Copper Mine Museum was the first museum in China to focus on the history of ancient mining technology. The museum includes the copper mine's vertical shaft, heading, blind well, and inclined shaft. This ancient copper mining spot is thought to be the oldest in history. It is the largest in scale and the best-preserved mining museum in China.

Beijing Opera Museum

The Beijing Opera Museum is the 100th museum in Beijing. It is located in the Huguang Guild Hall, Xuanwu District, Beijing City, and has been open since 1997. The main hall was built in 1807 and includes the Grant Theatrical Stage, Ancestral Hall, and Wenchang Pavillion. During the period 1920 to 1940s, some of the most famous Peking Opera masters performed here, including Tan Xinpei, Yu Shuyan, and Mei Lanfang, making this one of the most attractive showplaces of that time. In 1912, Sun Yat-sen, the great revolutionary pioneer, visited the Huguang Guild Hall five times and used this location to host the founding conference of the Kuomintang. The masters from Beijing Peking Opera Theater perform operas here every night.

It is important to recognize that the Peking/Beijing opera is a member of a wider Chinese opera family. Many local opera museums have been set up all over the country, such as China's Kunqu Opera Museum in Suzhou, Tianjin Drama Museum in Tianjin, Cantonese Opera Museum in Guangdong, and the Shadow Puppet Museum in Xi'an.

Future Directions

Though China has a long history and abundant cultural heritage, it is a relative latecomer to museum ventures. In recent decades, the sector has undergone rapid development as social reform and opening up ushered in a wave of museum construction throughout the country. At present, about 80 large- and medium-sized museums are newly built, renovated, or expanded per year throughout China. So far, there are more than 2,500 museums in the country, 2,100 of which are state-run, with the other 400 being privately owned. These museums specialize in history, politics, economics, culture, education, nature, science, astronomy, geography, ecology, and many other categories. Together, they house over 20 million artifacts. Every year, around 10 thousand exhibitions are presented to the public and these exhibitions draw more than 150 million visitors. As a result, a network of museums in cities has been formed; moreover, it is gradually expanding into rural areas. The future of China's museum undertakings has never been more promising.

Cross-References

► Heritage Museums and the Public
► International Council of Museums (ICOM)
► Regional/Site Museums

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China: New Approaches to Heritage Administration

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Introduction

Cultural Heritage and Heritage Administration

Why should one give attention to administration in the field of heritage, with so many fascinating aspects of material culture and archaeological finds? The problem is that heritage works and professions do not happen in a vacuum but rather within organizations, and most of the time, they take place within the public sector (the USA appears to be the exception more than the rule). If one wants to compare the changes that occurred in the last few years in, say, Machu Picchu, Pompeii, and the Qin Mausoleum, for sure a good part of these changes are explained by the evolution of professional discourse at the global level, including the increasing role played by international agencies (UNESCO, ICOMOS, ICCROM, etc.). Nonetheless, a good part of the differences is likely to be explained by internal dynamics of public sector in Peru, Italy, and China.

Key Issues/Current Debates/Future Directions/Examples

China: One of the Most Decentralized Countries

China has experienced an exceptional process of transformation in the last 30 years. From the initial situation of totally planned economy–with economic failures experienced over time, from the Great Leap Forward to the Cultural Revolution – since 1978, the "gradual revolution" (Wang 1994) began with the open door policy in both political and economic terms, which will transform China in the second world economy, with growth rates rarely seen before and elsewhere.

This also had an enormous impact in the transformation of the public sector (Zan & Xue 2011). A dramatic decentralization process took place, transforming China in one of the most decentralized countries in the world, a sort of "de facto federal state," as it has been observed (OECD 2005). Central organism has been relocated from the center to the province level or lower, public expenditures has been moved from the central government to the local level, with huge transfer of resources from the center to the periphery (Straussman & Zhang 2001).

Decentralization in Heritage Management

This general trend has serious impacts on heritage as well. About 90 % of expenditures for the cultural sector are decentralized, not even at the province level but rather taking place at the municipal and town level (OECD 2005). In terms of employees, out of the 77,000 people working in the sector, only few hundreds work in the central offices in Beijing.

Decentralization emerges also in terms of institutional settings within public administration. At the local level (prefecture, municipality, town), there is often a Cultural Relics Bureau which reports directly to the local level (usually to the Cultural department which reports to the mayor), with a mere professional relationships with higher levels of the same functional department. For instance, the CRB of Luoyang reports directly to the municipality, while the relationship with higher level of the professional body – the CRB at the Province level and the SACH (State Administration for Cultural Heritage) – is involved only in case of special projects, extraordinary events, or within a mere supervisory roles.

Such an institutional design is largely responsible of heritage destruction related to building

and infrastructure constructions in the booming economy. Suppose the local administration is sensitive to economic development initiatives that have negative impacts on heritage preservation: in this case the professionals in charge of heritage protection have very little possibility to resist such project. They can try to stop it, simply on the basis of discussion and persuasion. In the end, the decision power is in the hand of the mayor, as well as their career and work assessment. The same situation would be different in Italy: the Superintendents – representatives of the Ministry of Culture at the local level – could easily express their negative opinion to the Ministry, in ways that are less subject to local dynamic and the pressure of vested interests at the local level. Though the term "centralization" tends to be seen as outdated, one of the serious problems in China preservation of heritage is indeed the excess of decentralization.

Economic Booming and Salvage Excavation

The general context of transformation of the country has other important impacts on approaches to heritage management in China. The extraordinary rates of economic growth and the associated rate of urbanization imply unprecedented levels of building and construction activities all over the country. And, consequently, there are extraordinary levels of new archaeological finds. The heritage chain – the chain of activities from excavation to conservation, research, and museum activities (Zan & Bonini-Baraldi 2012) – compared to other countries is here concentrated on early steps, on excavation, and on new finds, which have tended to completely revisit the taken-for-granted view of Chinese history, with very interesting controversies between archaeology and text historiography (von Falkenhausen 1993; Bagley 1999).

This huge archaeological activity however is once again related to administrative issues, with the explosion of salvage archaeology activities, which are responsible of most of the finds in recent years. According to the 2002 law on heritage protection (Law of the People's Republic of China on Protection of Cultural Relics, No.76, October 28, 2002: http://www.gov.cn/english/laws/2005-10/09/content_75322.htm, art. 30-32), before any construction can start, a preliminary archaeological inspection has to be run by the local administration (by the excavation team of the CRB at the local level). In case some sign emerges of archaeological finds, more extensive archaeological excavation is then run, funded – and this is the relevant peculiarity – by the construction company (see Article 31: "The expenses needed for the archaeological investigations, prospecting and excavations which have to be carried out because of capital construction or construction for productive purposes shall be included in the project budget of the construction entity"). Should the finds present high value, the building activity would be definitively halted.

Such an administrative mechanism could be seen as a very positive solution for China archaeology: the "business model" is that building and development activities "pay" for archaeological excavations (which mean huge amounts of money in a booming economy). Unfortunately, there are several shortcomings in such a situation (Guo et al. 2008): in the lack of clear definitions of principal and related activities, the archaeological teams at the local levels have strong incentive mechanism to simply "dig": no budgets are devoted to research or to conservation of the finds. Indeed the archaeological teams in archaeologically intense areas – such as Luoyang, for instance – are unusually rich departments. The situation is worsened by institutional fragmentation, which does not address the collaboration between different entities: for instance, in Luoyang there are two archaeological teams of the local CRB doing almost only salvage excavation, with little, if any, coordination with four archaeological teams of the Institute of Archaeology of the China Academy of Social Science with excavation stations in the area, including Erlitou, a crucial excavation for the debate on early dynasties. Even when norms are defined by laws, not always are they followed. For instance, extensive reports on

excavation should be presented within 3 years; finds should be transferred to the local museum's depot after this period. Actually, the lack of excavation reports is a serious problem undermining the possibility of knowledge diffusion; excavation teams sometimes are accused of not transferring the finds to museums.

National Identity Building and Museum Development: Administrative Issues

The general administrative transformation of the country has also direct implications for the ways in which museums are run, both in terms of design and development. From a formal point of view, museums (the same applies for archaeological sites) are defined as *shiye danwei*, as public sector units (PSUs), as this term is usually translated in English (Pilichowski 2005). They are, in a sense, "entities" established as operative arms of the respective governmental level, with their own collections and often building, financial statement, personnel, in a word their administrative identity.

There are very few national museums (directly reporting to the SACH); some important ones are provincial museums (they refer to the Cultural Relics Bureau at the province level); most are district, municipal, or town museum (i.e., reporting to the CRB of these levels). In any case, the process of decentralization is to be intended as devolution more than anything similar to the Anglo-American mechanism of the arm's length principle. The transfer of power is from the central government to the provincial level, and for the most part at lower levels, more than from each governmental level to autonomous operating entities. In other words, at each governmental level, there is a strict control over museums reporting to this level, and there is not an issue of autonomy of the entity in itself.

An important distinction made by the Chinese regulation was between museums that were totally funded, partially funded, and financially self-funded, in relation to different kinds of economy of each entity. This was likely to pose different issues in the day-to-day running of museums and in development terms. Self-funded museums tended to be very powerful centers: with interesting collections, good appeal to visitors and good location, with Western prices and Eastern costs, they could be profit-seeking entities as it is rarely in the West. They were often able to contribute to determining future developments, always in strict accordance with the governmental level to which they refer to. On the contrary, for museums that were not totally self-funded, resources for functioning were provided at the local level; developmental ones, link to special projects, were provided by the SACH in accordance with the CRB at the provincial level (and may be involving CRB of lower levels as well).

In any case, for day-to-day life, museums have to use administrative rules and the table of accounts that are common to the other (almost one million) *shiye danwei* in the country. This is raising serious problems for activities that are so crucial for museums but for whom it is even impossible to find an entry in the national table of accounts (e.g., conservation, maintenance). Indeed maintenance and conservation are some of the most problematic issues for Chinese museums (Li 2005), as it has been explicitly acknowledged even in formal documents (see, for instance, the 11th Five-Year Plan).

In terms of development, there is a strong policy at the central level to build new archaeological sites (about a hundred, in the 11th Five-Year Plan) and museums. According to the new 12th Five-Year Plan for Cultural Heritage, there should be one museum in each of the 333 prefectural levels, with a goal of passing from 3,020 to 3,500 museums in the five years). This is partly explained by the increase of tourism in the recent years (especially domestic), but it is also linked to a more general politics of national identity building, if not nationalism (a well-known issue in the international debate: see Vickers 2007). For such a developmental program, the center had already defined a sort of development plan during the previous Five-Year Plan horizon, offering a huge amount of money to gain the consensus at lower governmental levels' plans (for instance, for the archaeological

parks, the initial assumptions – later further expanded – were about 36 billion RMB for 2006–2010, where 53 % was provided by central government). However, running costs were not identified nor budgeted and much less so funded, which is likely to pose serious problems in the future, once the investment phase for new museums and parks will be over and the issue of "running costs" will emerge. Maybe some of the new entities will be self-funding; for the rest, serious problems of sustainability will take place, also in connection to the decision – taken by center – to generalize the free entrance to museums already started with a few exceptions since 2008. As always, the issue of sustainability appears as a problem at later stages if it is not being addressed as an issue in earlier stages. This happens very often in the arts and heritage sector: what is peculiar of the Chinese situation is however the scale of the phenomenon.

Between Centralization and Decentralization

Indeed administration matters. Both longer term administrative traditions and recent transformations have an impact on the ways in which heritage is managed in China, from excavation, to research, to museum opening. Curiously enough– and quite counterintuitively if one does not know the Chinese administration – the excess of decentralization explains to some extent the destruction of heritage often referred to (professionals in charge of protection are "hostages" to the local administration; incentive mechanisms toward digging activities; institutional fragmentation and jealously; lack of respect of norms).

However, there are also positive aspects related to the explosion of salvage archaeology and its intrinsic anarchist nature in pluralizing the past (the impossibility to plan and direct it in systematic ways). Similarly, potential influences refer to the following steps of the heritage chain (research, conservation), and particularly museum development, as narratives about the material culture and archaeological finds are unlikely to resist similar debates in the middle run. From this point of view, salvage excavation appears as a strong antidote to ideological uses of heritage from any central (and centralist) views. The variety of empirical evidence that characterizes China archaeology in the last few decades, largely based on salvage archaeology, has questioned to a serious extent traditional views of linear developments of China over millennia, with the emergence of a very interesting – and unusual elsewhere – conflict between archaeology and historiography in China, between empirical evidence and text-driven explanations. Moreover, the controversy about the very existence of the first dynasty is perhaps the best example of the dialectic between different forms of archaeology, where research archaeology was explicitly aimed at giving evidence to the 5,000 years of Chinese history within a nationalist frame (the Xia-Shang-Zhou Chronology Project. For a reconstruction, see Lee 2002: 16-17). These aspects have been extensively addressed by archaeologists in their substantive elements, sometime Western archaeologists (von Falkenhausen 1993; Bagley 1999) and sometimes Chinese archaeologists outside China (Lee 2002; Li & Xu 2007). Here the administrative foundations of this revolution have been addressed.

More difficult is to foresee how the dialectic between centralization and decentralization will have an impact in terms of museums and archaeological parks. On the one hand, a tension between different policy preferences can be found, with the central government pushing a policy of national identity building and free entrance, while often the periphery would be more seduced by profit-maximizing museum projects, related to tourism development (the over-commoditization of Lijiang is the best example in this sense: see, for instance, McKhann 2001, 2010). Heritage professionals and their values (archaeologists, museologists, and historians) sometimes find themselves in conflict with both the extremes of this kind of policy tension. On the other hand, it is the administrative mechanism that makes the overall result of similar tensions more uncertain than usual: the separation between investment and running conditions – a recurrent problem in the heritage field – is here associated with a separation between governmental levels in funding extraordinary projects and their running costs at a later stage.

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- ▶ China: Cultural Heritage Preservation and World Heritage
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- ▶ China: Museums
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Chinese Association for Quaternary Research (CHIQUA)

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Basic Information

The Chinese Association for Quaternary Research (CHIQUA) was established in February 1957 in Beijing, China. Geologist Siguang Li was elected as the first president and Chung-Chien Young and Defeng Hou the first deputy presidents (Liu 1957). From then on, CHIQUA has been dedicated to the organization and coordination of domestic and international academic communication and making great contributions to Chinese Quaternary Science. The Secretariat office is in Beijing and affiliated to the Institute of Geology and Geophysics in the Chinese Academy of Sciences.

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Major Impact

Quaternary is the latest period in the geological history, which refers to the origin and evolution of human beings, and dramatic climatic fluctuation. The impact of human activities to natural environment has been hotly debated for a long time by researchers from different working areas, and vice versa; the influence of geological and geographical contexts on human beings is also pursued in broad extent. With these research issues, quaternary research borrows modern technologies, with the help of the geological record, and aims at the reconstruction of geological history of our earth during past millions of years, pursues the motivation and mechanism of all the changes and the fluctuations, interprets the correlation of human beings and natural environment, and estimates the future changes of earth and the associated regulations.

With such goals, CHIQUA refers to multiple subjects including earth science, biological science, physical science, and even social sciences. One of the main responsibilities of CHIQUA is to integrate these disciplines and organize the researchers from all these fields for addressing the related issues. In this case, until now, 15 professional committees have been set up in CHIQUA, which cover all the research fields of quaternary science. These subjects are stratigraphy, high resolution, loess, paleoanthropology and paleolithic archaeology, coastal zone and ocean science, environmental archaeology, environmental change, education and science popularization, chronology, Holocene science, tropic and sub-tropic research, coral reef science, neotectonic movement, and applied quaternary science.

In 1982, the International Union for Quaternary Research (INQUA) admitted China to its national membership. From then on, CHIQUA involved the associated affairs on behalf of China and has made great contributions to international earth science.

For promoting the research of quaternary science, especially the Cenozoic paleontology and Qinghai-Tibetan Plateau environment and geology, and encouraging young scholars in these fields, CHIQUA set up the Liu Tungsheng Earth Science Foundation and established the awards of the Liu Tungsheng Prize for Young Earth Scientists and the Liu Tungsheng Scholarship for Earth Sciences. Every two years, not more than three awardees are selected.

Until now, 10 annual meetings have been held in different cities of China (Xia et al. 2010), during which researchers have presented their latest achievements and progress. The details can be found in Table 1.

Chinese Association for Quaternary Research (CHIQUA), Table 1 Annual meetings of the Chinese Association for Quaternary Research

Annual meeting	City	Time	Year
1st annual meeting	Beijing	February 11–15	1957
2nd annual meeting	Xi'an, Shaanxi	October 30–November 3	1964
3rd annual meeting	Beijing	June 10–16	1979
4th annual meeting	Beijing	April 10–15	1987
5th annual meeting	Beijing	August 2–9	1991
6th annual meeting	Guangzhou, Guangdong	November 15–22	1993
7th annual meeting	Beijing	November 2–6	1997
8th annual meeting	Dujiangyan, Sichuan	August 20–24	2002
9th annual meeting	Nanjing, Jiangsu	October 9–11	2006
10th annual meeting	Lanzhou, Gansu	August 18–20	2010

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Chinese Field Methods

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Introduction

Although the study of ancient artifacts has a long history in China, the modern science of archaeology was brought to China only in the late nineteenth century by foreign explorers and archaeologists. Since the 1920s, however, as the Nationalist government curbed foreigners' field activities in its land, native archaeologists, mostly Western-trained, from a few institutions (the Cenozoic Research Laboratory of the Geological Survey of China, the Institute of History and Philology of Academic Sinica and the Society for Historical Studies of National Beiping Academy) began to play the major role (Chen 1997: 87). The political fragility and economic feebleness of the time, however, did not allow science to develop significantly. Although much progress was made in excavation techniques, including the division of strata and typological analysis of artifacts (Chen 1997: 145–62, 227–49, 310–29), only a modest number of sites had been excavated and a small group of archaeologists had been trained by 1949, the year when the Communist Party took over the mainland China.

Dramatic changes came about after 1949. Having unified the country, the communist government set out to modernize its industry, science, and education. And having decided to dissect its relations with the West and sided with the Soviet Union, it urged the academic community to learn the "advanced experience" of the Soviet science. The archaeologists and their students, who were trained in the West or educated in the pro-West Nationalist Era, had little choice but to study Soviet theories and methods (Zhang 2011: 1052). Archaeology, which now received lavish state support, continued to be cast as a subdiscipline of history as in the Nationalist Era, but it was now imposed upon a new paradigm: Marxist dialectical materialism and historical materialism. While dialectical materialism introduces the concept of social evolution, historical materialism brings the subjects of social relations, economy, and technology to archaeology (Xia 1952: 81–4). The Soviet archaeology also demands that archaeologists devote themselves to the life of the subject and down-trodden people, as a counterforce to their natural instinct, that is, to excavate tombs and monuments of the social elites. It does not follow, however, that Chinese archaeologists give priority to settlements and tombs of the common people. In fact, apart from a few exemplary Neolithic settlements that were dug to fulfill the Marxist mandate, they continue to favor large urban centers, such as Erlitou, Anyang, Luoyang, and Chang'an, and monumental tombs for the purpose of uncovering treasures and wonders to illustrate the grandeur of Chinese history and civilizations (Zhang 2011: 1052).

Key Issues/Current Debates/Future Directions/Examples

Chinese archaeologists translated many Soviet publications to avail themselves not only of

ready-made models of integrating the Marxist theories into archaeological interpretation, but also of "advanced" fieldwork methodologies. As a result, they began their fieldwork with systematic survey, thereby acquiring the basic information of the location, chronology, and cultural definition of a single site as well as informing questions such as the geographic distribution and the ecological environment of a culture (Xia 1958: 2). In addition, Chinese archaeologists innovatively adopted the "Luoyang Spade," a coring device which local treasure hunters had developed to discover tombs, as a prospecting tool. Skilled hands were trained to identify various types of features (tombs, architectural foundations, trash pits, riverbeds) from the soil samples taken from underground. Thanks to its efficiency and low cost, the tool is still popular today; one can often use it to get a good idea of the layout as well as stratigraphy of a site without excavation.

When Chinese archaeologists excavate a settlement, they usually lay out box pits of 2 × 2 m, which they replicate to expose large areas (Fig. 1). This method is very helpful because many settlements in China comprise feature long habitation history and complex cultural deposit. Although it had also been used in the West, they were obliged by the ideology of the time to attribute the credit of inspiration to the Soviet archaeologist T. S. Passek (1903–1968). While earlier excavators were unable to discover houses at the Tripoly'e settlement because they had only opened narrow trenches and small areas, in the 1930s, Passek successfully discovered structures of 100–120 m^2 in dimension with the box excavation. In a country blessed with long history and thick cultural deposit, this method appears to be very useful, as it provides a better stratigraphic control and a better understanding of a settlement: division of space and episodes of reconstruction (Yan 1994: 252). Dubbed by Chinese archaeologists as "small excavation units but large-scale exposure," it was put to good use at the model Neolithic settlement of Banpo near Xi'an and Jiangzhai (Zhongguo Kexueyuan KaoguYanjiusuo 1963: 6; Banpo Museum, Shaanxi Institute of Archaeology, and Lintong County Museum 1988: 3–5). While the size of the unit is often adjusted to the specific circumstances and objectives of an excavation (it is now usually 5 × 5 m or 10 × 10 m), the box-pit excavation remains the standard operational method today (Shi 1982: 18–9).

Chinese Field Methods, Fig. 1 The 'small unit/large exposure' (box system) in action on an excavation in advance of road building at Boatou, Inner Mongolia in 2006 (China, State Administration 2007)

Ancient cities, especially those of the protohistoric and historical periods, demand a different approach. Following the Soviet guidelines, Chinese archaeologists first study historical documents to address questions about material production, social relations, and the spiritual life of the population. They can then turn to other questions such as spatial division, public amenities, and external economic connections. Since cities are much larger and more sophisticated than Neolithic settlements, it is unrealistic to

implement the full-coverage excavation; small excavation units are instead deployed at particular sections to address particular questions, such as layout and chronology. Three phases of deposit are generally investigated to define their chronology: those formed during construction, those formed during occupation, and those after abandonment. This set of methods was effectively applied to the excavation of Chang'an, a capital of the Western Han Dynasty (206 BCE–9 CE), near the present-day city of Xi'an. Together with the method of dividing cultural strata by soil content and color, it is still cherished as a working principle today (Zhang 1983: 62).

Regional Genealogy and Variations

The intense learning of the Soviet archaeology came to a halt after the breakup of the Sino-Soviet brotherhood in the 1960s. Having turned away from the West in 1949, Chinese archaeologists were now secluded from the development of archaeological theories and methods over the world. Without external inspiration, they were left to move forward from what they had inherited from the Nationalist Era and learned from the Soviet. In the volatile political atmosphere that lingered from the 1950s through to the 1980s, however, theoretical thinking, even in the name of Marxist theories, was a life-threatening venture. Hence, no middle-range theories and methodologies were developed to extrapolate the Marxist subjects of social relations, economy, and technology; discussion of these subjects was little more than filling fresh data into the old pigeonholes of Marxist theories. It was the typology and culture-historical paradigm inherited from the Nationalist Era, safeguarded by the sustained nationalism, that had the chance of further development in the subsequent decades.

It was Su Bingqi (1909–1997), a courageous thinker for his time, who held the beacon for theoretical development in China. He began his theoretical venture in the 1930s when he attempted to work out a chronology for the cemetery at Doujitai in Baoji, Shaanxi Province. Employing Montelius' typology but tempering it with his own interpretation, he selected the diagnostic ceramic ware li-tripod as the subjects of typological analysis, divided them into four types, and traced each type's evolutionary path (Su 1948 [1984]). Since the 1950s, the division of *xing* (type), and *shi*, which stands for the chronological subtype, became the standard method in Chinese typology (Su 1959 [1984], 1965). This method was further refined to fit the ever-growing excavation materials by Su Bingqi himself and his disciples. In his endeavor to set up chronologies for the Shang urban centers of Zhengzhou and Anyang, Zou Heng (1956, 1964) innovatively correlated stratigraphic and typological sequences of ceramic wares from these sites.

Su Bingqi's creativity did not end up at the typological analysis. He further developed a theory, namely, the "regional cultural genealogy and variations (quxileixing)," that offers a handy framework for organizing and explaining them (Su &Yin 1981, 1982). In this general and flexible formulation, the archaeological cultures that had been discovered by the 1970s were grouped into six macroscopic cultural-historical regions; each region comprises of a few micro-regions, whose cultures are lined up from the Paleolithic Age through to the Bronze Age. Rejecting the conventional assumption that Central China was the cradle of Chinese civilizations lifting the outlying regions from backwardness, he emphasized instead that it was the outlying regions that outshined and enlightened Central China in the Prehistoric periods. Believing in the historicity of traditional texts, he further linked some of the regional cultures with early ethnic groups recorded in these texts (Su &Yin 1981, 1982).

New Development

The typological analysis and the "regional cultural genealogy and variations" theory were imbued into a national fieldwork manual issued in 1984 (Ministry of Culture 1984). Su Bingqi and his disciplines, all prominent figures in Chinese archaeology, frequently traveled across the nation to deliver them to his fellow

colleagues, and urged them to mend up the gaps of the cultural lineages of their regions. Blessed by the growing excavations since the 1970s, each province was able to write its cultural history, more or less complete, from the Paleolithic Age well into the historical periods (Wenwu Editorial Committee 1979, 1991). They nevertheless brought much harm to Chinese archaeology in the meantime. Emphasizing on the importance of deposit strata and ceramic typology, they ignored many of other questions, such as the settlement pattern, and subsistence economy, as well as many types of data, such as soil, food residue, and botanical and faunal remains.

Since the late 1970s, however, China reopened itself to the World, and once again appreciated foreign archaeological theories and methods, mostly of the West and Japan. In 2005, the SACH commissioned the Archaeology Department of Beijing University, the leading institution in China, a major revision of the 1984 manual to catch up with the current development in archaeology over the globe. From manuals of Britain and Japan, the new manual, which was issued in 2009, adopts the social archaeology of the West and the research subjects of settlement pattern, subsistence economy, craft production, and social organization. It asks excavators to pay attention not only to stratigraphy, but also to spatial organization and formation process of a site. It inserts sifting and flotation facilities into the excavation process so as to gather tiny animal bones, plant seeds, and artifacts for future analysis. In addition, it demands on-site conservation for the purpose of protecting fragile artifacts and features (SACH 2009). In line with the new standards, an excavation project is no longer targeted at narrow subjects such as chronology and culture definition, but becomes a platform for multidisciplinary cooperation; it is no longer a closed domain for the excavators alone, but an open territory for many specialists who examine various types of materials. In this way, Chinese archaeology will surely interact with the world communities more actively in the future.

Cross-References

- ▶ Banpocun, Archaeology of
- ▶ Field Method in Archaeology: Overview
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology

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Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties

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Brief Definition of the Topic

In the late Ming dynasty, the imperial porcelain kilns in Jingdezhen, the largest and most important kiln complex in China, situated in Jiangxi province, declined due to a lack of resources, and after repeated riots they were forced to close in 1608. As a result, the best potters and painters went to work at privately owned kilns, bringing with them the technical expertise formerly monopolized by the imperial kilns. They were now free from strict official constrains, and thus innovation followed.

By this time, a new style of blue and white porcelain intended predominantly for export, commonly known as *kraak*, was being produced in vast quantities at several private kilns in Jingdezhen. This porcelain, made throughout the reigns of Wanli (1573–1620), Tianqi (1621–1627), and Chongzhen (1628–1644), was adapted to the taste and specific demands of its overseas customers. This led to the introduction of new shapes and decorative styles, some of which were after European models and designs. The sea routes of the Portuguese – the first Europeans to engage in maritime commerce in the Orient – the Spanish, and later the Dutch played an important role in the trade of *kraak* porcelain to Europe, Japan, Southeast Asia, Middle East, and the New World. A very fine blue and white porcelain decorated in "transitional" style began to be produced at Jingdezhen during the unstable and politically chaotic transition period, which occurred at the end of the Ming dynasty and the rise of the Qing dynasty. This high-quality porcelain, made during the reigns of Tianqi (1621–1627) and Chongzhen (1628–1644), was intended for both the domestic and export markets.

After the imperial kilns were reestablished in the early Qing dynasty, a variety of new decorative techniques and schemes were developed. A large quantity of the porcelain produced in or around Jingdezhen during the reigns of Kangxi (1662–1722), Yongzheng, and Qianlong, when the East India Companies (Dutch, British, French, and Swedish) dominated the trade with China, was delicately painted in underglaze cobalt blue. But there was also porcelain that combined the use of underglaze cobalt blue with overglaze enamels and porcelain decorated in *famille verte*, *grisaille*, Chinese Imari, and *famille rose*. As the quantities of the porcelain orders increased, the enameling work moved from Jingdezhen to Canton (present-day Guangzhou) in Guangdong province, where low-temperature muffle kilns fused the overglaze enamels onto already fired pieces. This *chine de commande* porcelain was decorated with elaborate Western designs that were based on prints and drawings sent by European traders. The Americans, who arrived in Canton in 1784, put an end to the trade dominance of the East India Companies. The European trade in *chine de commande* porcelain continued in the reign of Jiaqing (1796–1820), but exports to the West started to decline by the 1830s, during the subsequent Daoguang reign (1821–1850). These Chinese porcelains bear witness to the continuous trade and cultural exchange between the East and West, which lasted three centuries (from the sixteenth to the nineteenth century).

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▶ Colonial Encounters, Archaeology of
▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology

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Chongoni Rock Art Area

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Introduction

The Chongoni rock art area was declared a UNESCO World Heritage Site in 2006. The area lies at the southernmost tip of Malaŵi's central plain, an area also known as the Ngoni Highlands. It contains 127 declared rock painting sites, about one site per km^2, making it one of the richest concentrations of rock art in central Africa. The Highlands are scattered with hills, many having gneiss rock outcrops with natural shelters and overhangs as well as large boulders with protected surfaces. It is on these rocks that the painting sites are found (Figs. 1–5).

Key Issues/Current Debates/Future Directions/Examples

Early Studies

The existence of paintings in this area has been known since the 1920s when Margaret Metcalfe (1956) reported sites on Mphunzi, Chigwenembe, and Mlanda mountains. Further details were reported by Desmond Clark in 1959 as part of his general synthesis of Zambian and Malaŵian rock art. In 1978 N. E. Lindgren and Matthew Schoffeleers published an inventory of 61 rock art sites, the total then known in Malaŵi. Of these sites, 35 lay within the Chongoni rock art area. This brought about a broad recognition that Chongoni was the most important rock art region within Malaŵi. Lindgren and Schoffeleers set out a basic sequence for the art, dividing it into an earlier phase of geometric designs made by hunter-gatherers and a later phase of white finger

Chongoni Rock Art Area, Fig. 1 View of Mphunzi mountain, one of the major public rock art areas within Chongoni Rock Art World Heritage Site

Chongoni Rock Art Area, Fig. 2 Red geometric tradition art: made by hunter-gatherers; note the fine *white dots* over the *red finger lines*

paintings made by Chewa-speaking farmers. Emmanuel Anati worked in the area in 1986, evaluating the area on behalf of UNESCO for potential World Heritage Site listing. As part of this work, an updated inventory of known rock art sites was produced and a substantial number of sites were visited. This inventory listed 117 known painting sites, 61 of which were within the Chongoni rock art area. Yusuf Juwayeyi subsequently published more detailed information on a selection of sites and helped to confirm the stylistic sequence (Juwayeyi & Phiri 1992).

The Chongoni rock art area was comprehensively surveyed in 1995 as part of a doctoral research project by Benjamin Smith. It was at this time that the total number of sites in the area was raised to 127, as listed in the UNESCO nomination. Some areas on the larger mountains are densely vegetated and proved hard to survey, so the actual number of rock art sites in the area could be as many as 150. Smith confirmed the findings of early researchers that the art separated into distinctive hunter-gatherer and farmer traditions (Smith 1997). He identified four traditions of rock art from these two periods (Smith 1997, 2005a, b, 2006): the red animal tradition, red geometric tradition, white spread-eagled

Chongoni Rock Art Area, Fig. 3 White zoomorphic tradition art: made as part of nyau secret society rituals by Chewa language speakers

Chongoni Rock Art Area, Fig. 4 White spread-eagled tradition images from Chentcherere 2 rockshelter. This image was taken in the early 1990s before a series of tragic graffiti incidents

tradition, and white zoomorphic tradition. The exact chronology of each tradition remains unknown, but their approximate age ranges can be determined from their cultural associations. Hunter-gatherers survived in this part of Malawi into the 1800s (Crader 1984), and it seems likely that the hunter-gatherer traditions continued up until this time. The cool, misty climate of the area is not conducive to long-term rock art preservation and so while rock art has undoubtedly been painted in Chongoni over many millennia, most of the surviving art will be centuries rather than millennia old. The farmer rock art is linked by its distribution and ritual associations to Chewa-speaking groups who have only inhabited this area during the last one thousand years. The making of farmer rock art continued as recently as the 1950s (Zubieta 2006).

Current Understandings of Chongoni Rock Art

The hunter-gatherer art of this area is dominated by finger painted geometric designs typical of the red geometric tradition (Smith 1997). Geometric

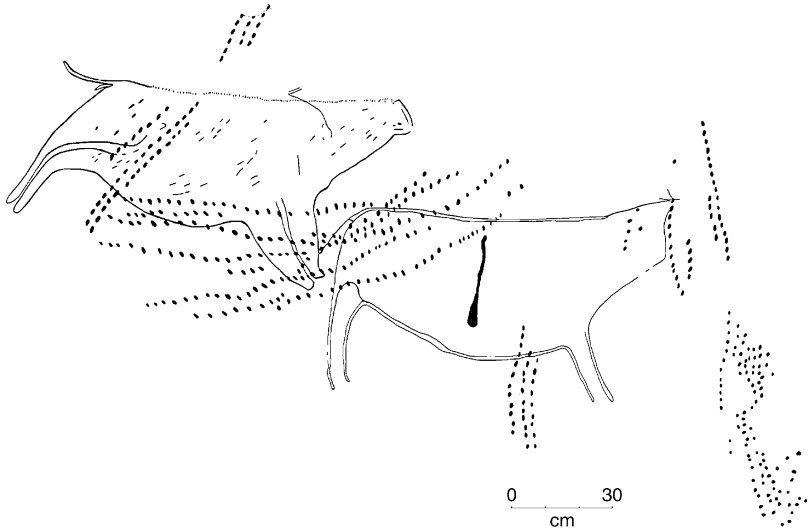

Chongoni Rock Art Area, Fig. 5 Red animal tradition images from Chentcherere 1 rockshelter

tradition art was originally termed "schematic art" by Desmond Clark and it is spread across most of central Africa. Typical designs include concentric circles, rayed circles, sausage shapes, and internally linear divided stretched circle forms. These designs are almost always in red, and where well preserved, there is sometimes a white fill and/or white microdots between or over the red lines. Alongside these geometric tradition images is a small scatter of sites with finger dots and highly styled animal paintings, usually quadrupeds with vastly inflated bellies. The animal tradition images are generally found separated from the geometric art, either in neighboring sites or in separated parts of the same site. Within central Africa there is a ratio of about ten geometric tradition sites for each animal tradition site, but in Chongoni the proportion of animal sites is even lower. The existence of two hunter-gatherer rock art traditions is explained in terms of a gender division, with the animal tradition being the art of men and the geometric tradition being the art of women (Smith 1997).

The former hunter-gatherers of Chongoni are remembered in a range of historically recorded oral traditions by the names BaTwa and Akafula (Rangeley 1963). While there are many traditions of their coming into conflict with farmer groups, archaeological evidence from Chongoni also points to localized symbiotic relationships with farmers (Crader 1984). The Malaŵian BaTwa are argued to have been closely related to modern-day Pygmy groups in terms of their culture and traditions (Smith 2005b, 2006; and see Namono 2010). Studies that have interpreted this art in terms of ongoing intangible heritage values associated with the sites combined with the application of Pygmy ethnographies have suggested that, while the ritual context and production of each of the two art traditions was separated, the symbolism underlying both traditions revolves around rainmaking, fertility, and social well-being (Prins & Hall 1994; Smith 1997, 2005b; Namono 2011, 2012).

The two more recent farmer traditions are of special importance because they comprise of one of the major concentrations of farmer rock art in sub-Saharan Africa. These traditions only occur in Chongoni and a small section of adjoining parts of Mozambique and Zambia. The farmer arts, as typical of all sub-Saharan African farmer arts, are finger painted and dominantly in white. The white spread-eagled tradition has been linked to a Chewa ritual ceremony called *chinamwali* (Smith 1997, 2005a; Zubieta 2006). *Chinamwali* is a girls'group initiation ceremony held at puberty. The art played a mnemonic role in the teaching of the young girl initiates (Smith 2005a; Zubieta 2012). While the art is no longer made today, some of its symbolism is still understood

and still utilized, away from the rockshelters, by women in modern-day ceremonies (Zubieta 2006, 2012). The other farmer rock art tradition, the white zoomorphic tradition, depicts spirit characters from the Chewâmen's secret society: *nyau* (Lindgren & Schoffeleers 1978; Smith 1997, 2005a). *Nyau* art was made during the time that the society was suppressed during the Ngoni wars, the early missions, and the colonial government (Smith 2001). The art served to train *nyau* initiates in the secret *nyau* terms and in the meanings of the large *nyau* spirit characters that dance at almost all major Chewâ social occasions. Today the art is no longer made; indeed, it is no longer needed because the suppression of *nyau* has ended and so *nyau* teaching now happens in its original context (usually the graveyard).

Current Management of Chongoni

The Chongoni World Heritage Site is managed by the Malawian National Department of Antiquities. Many of the sites are within the Chongoni Forest Reserve and so they also enjoy protection from forestry staff. Some sites are preserved in their original forest setting although much of the area is now under nonindigenous commercial pine forest. A rock art tourism welcome center was under construction in the forestry area during 2013. This center will house displays and offices for dedicated Antiquities management staff. The major sites open to the public include Chentcherere (excavated by Desmond Clark), Nthulu, Mphunzi, and Namzeze. In the absence of on-site management until 2013, there have been serious conservation problems, with dozens of sites severely damaged by fires and graffiti during the 2000s. In 2012, a US-based professional conservator, Claire Dean, worked at the major public sites removing graffiti. Chentcherere was returned to something close to its original glory. It is hoped that the new government management framework for the area will be able to ensure that the sites are more actively protected and conserved in the decades to come.

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- ▶ Clark, John Desmond
- ▶ Rock Art Sites: Management and Conservation
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

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Christianity: Survival and Reemergence

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Introduction

The spread of Christianity across Europe was a process that took the best part of a thousand years, from the very start of the Middle Ages when traces of Roman Christianity still remained to the fourteenth century when Christianity was introduced in Lithuania.

Definition

The study of this complex process involves the two key terms of conversion and Christianization. Conversion relates to the personal acceptance of Christianity, while Christianization is used to describe the long-term transformation of a non-Christian society into a Christian one.

Historical Background

The Christianization usually forms an important part of a country's grand, national narrative. Such accounts tend to be rather condensed versions of events, based on medieval written sources. This can be problematic, mainly since these sources do not provide any insight into the experiences of the people being converted. The sources also frequently focus on what can be termed the official conversion, i.e., the baptism of a ruler who created a Christian kingdom and spread the religion to the larger population, via the elite members of society. Well-known examples include the conversions of the Frankish king Clovis I by Bishop Remigius in 496, King Æthelberht of the Anglo-Saxon kingdom of Kent by the Roman missionary Augustine in 597, as well as the baptisms of King Mieszko I of Poland and King Olaf Haraldson of Norway during the first millennium. There is no doubt that royal conversions were significant moments in history, but in order to get a fuller picture of the Christianization, they must be viewed together with the large body of archaeological evidence.

This material shows that medieval Christianization was an extended process, which not only continued after royal baptisms but which also started long before the first documented missions. At this time pagan peoples were in frequent contact with the Christian world and in this way gradually built up their knowledge of the religion and its practices. It must be assumed that individuals converted to Christianity at this early stage, and over time the number of practicing Christians gradually increased, although this was not a linear development. It was this phase, which in many cases lasted several hundred years and is referred to as the infiltration phase, that led up to the royal conversions described in the written sources. Earlier missionary activity is at times mentioned in the accounts, but these sources do not provide detailed insights into cultural contact and exchange between peoples or the acceptance of Christianity by the wider population.

The archaeological evidence of Christianization cannot be treated as a simple reflection of religious affiliation, but each piece must be considered and examined within its own context. This type of evidence can, however, be seen to express variations of a Christian identity. The manifestation of Christianity through material culture is not uniform, as the religion forms but one part of a person's identity, together with other identities, such as age, gender, and status, with further variation added by political affiliation and local expression. Despite this, three main types of archaeological evidence can be used to examine the spread of Christianity on a general level.

These are ecclesiastical buildings, burial practices, and artifacts with Christian symbols.

Early churches are traced in the archaeological evidence via cruciform, equal-armed, apsidal, narrow-ended, or at times simple rectangular buildings, all east-west aligned. These structures were made of wood or stone, depending on the geographical area, with stone buildings generally becoming more common as Christianization moved on. Rectangular buildings found underneath later churches are often interpreted as churches too, but these identifications are less certain.

Burial evidence has formed an important core of evidence for the study of Christianization. Christian influence has been traced, e.g., in the disappearance of grave-goods and the shift from traditional burial grounds to Christian cemeteries. The foundation for this approach has been the assumption that burial is always a religious act. This does not necessarily follow, especially not in the early Middle Ages when the church did not require any certain modes of burial. At this time Christian burial was instead a privilege open to the elite members of society. Grave-goods were fully compatible with Christian burial, as evidenced in churches and churchyards across the Middle Ages, and variations in the amount of grave-goods have now been linked to social, rather than religious change. It was not until the High Middle Ages that Christian burial started to become a legal requirement, and even then it was generally just stated that the dead should be buried in churchyards. Despite these differences over time, across Europe the shift from traditional burial grounds to churchyard burial was a rather protracted process. Traditional burial practices were important for ancestral reasons and expressions of power, and many people most likely wished to hold on to these. The burial record is therefore unlikely to provide a direct reflection of religious change.

Artifacts that carry Christian symbolism, e.g., stone crosses and memorial stones with Christian symbols and text and portable items, such as crucifixes, chalices, and croziers, can be seen to show a growing local Christian identity, as well as contacts with the wider Christian world.

Key Issues/Current Debates

History of Research

In this entry, the spread of Christianity is examined through four case studies, each of which represents a version of the different types of Christianization that took place across medieval Europe. Two of the areas, Merovingian Frankia and Anglo-Saxon England, were part of Roman territory until the fifth century. In Frankia, after the decline of the Empire, Christianity remained in a relatively strong position, while in Anglo-Saxon England the religion seems to have more or less disappeared. Despite the shared Roman legacy, clear differences in early Christian practices developed. The other two areas, Scandinavia and most of Saxony, were never Romanized, and there was therefore no Christian legacy to make use of in the creation of churches and holy sites. Saxony, in particular, stands out as this area was violently Christianized by Charlemagne's conquest in the late eighth century, whereas in the other areas people were actively acquiring the religion from early on, albeit often with external aid or pressure. Scandinavia, on the other hand, was one of the last areas of Europe to be Christianized, and here the effects of long-standing contacts with the Christian world are particularly clear.

Frankia: In the late Roman period, Christianity was above all practiced in the urban areas. At this time the fortified cities were equipped with churches and bishops, as seen in Tours and Trier where cathedrals were constructed in the fourth century. After the decline of the Empire, the religion remained strong in the cities, and even continued to grow, especially in southern and central Gaul. Archaeological evidence demonstrates that Christianity was spreading on a wider scale from the sixth century, perhaps given a boost by the conversion of King Clovis I. At this time, some of the Roman churches within the city walls were still standing and were taken back into use, as e.g., at Tours where both the cathedral and episcopal residence had survived, together with the Basilica of St Martin, which was refurbished in the 550s. Roman secular buildings were also converted

for ecclesiastical use, famously seen at St Pierre-aux-Nonnains in Metz and the monastery of Oeren in Trier. In addition, suburban churches were erected near the city walls, in Lyon and Trier, for example, several such churches appeared during the Merovingian period.

Another common development took place outside the city walls, in the traditional Roman burial grounds. *Ad sanctos* burial, i.e., burial in proximity to holy relics, was an important concept in this period, and churches were therefore constructed on top of tombs of Roman saints and martyrs. Clovis I was buried in such a church, above the tomb of St Geneviève, in a cemetery outside Paris. Sites of this kind became popular foci for early Christian burials, as seen at Arles, Lyon, Tours, and Vienne, and these cemeteries at times held thousands of graves.

From the sixth to the eighth centuries, Christianity spread from the cities to rural areas, where churches were founded by aristocrats on their private estates. The nature of the early churches varies: some were funerary chapels built in traditional cemeteries, others were converted Roman villas, and others still were family monasteries. Many of these churches had "founder graves," prominent burials in a central position of the building. Over time, some of these propriety churches gained in status and became parish churches serving the wider community.

From the sixth century, the Roman ban on intramural burial was starting to break up with the new tradition of furnished elite burials in churches, e.g., in the cathedrals of St Denis, Arlon, and St Germain-des-Près. Other well-known examples are the sixth-century burials in Cologne Cathedral. Here a grave chamber was found, with a coffin containing a woman's body with an elaborate headband made with gold thread, dress fasteners, and an amulet container. Vessels of glass, pottery, and bronze had been deposited next to the coffin. Another burial contained a boy equipped with a helmet, various weapons, a wooden object interpreted as a scepter, as well as a bed and a chair.

In society as a whole, from the fifth to sixth centuries, burial practices were also changing, as traditional burial grounds were gradually abandoned in favor of *ad sanctos* burial, although this did not become the norm until the eighth century. It is, however, possible that wooden churches were erected in some traditional cemeteries, as has been suggested after the excavations at Sézegnin and Grobbendonk. In northern Gaul circumstances were slightly different as the traditional "row-grave" (*Reihengräber*) cemeteries continued as the main form of burial into the seventh century.

The great variation in Frankish early medieval burial practices is illustrated by Hordain (northern France), which is a cemetery with over 400 burials dating from the late fifth century to the end of the seventh century. The northern part, where the earliest burials are located, has been interpreted as the pagan zone. Here graves were on a north-west alignment, and two graves contained horses. The next identifiable phase, seen as the Christian one, started in the mid-sixth century, when east-west aligned burials appeared in a different area, and around the year 600, a church, an east-west aligned building with an altar, window glass, and a wealthy founder grave, was erected. At this site, no transition between different types of burial was seen, but instead throughout the lifespan of the site, burial continued in the two areas, keeping their respective orientations.

Until the middle of the seventh century, items with Christian symbolism were rare in Frankia. From this time, cross-shaped brooches on female dress started appearing in burials, and occasionally settlements, among the East Franks between the rivers Rhine and Mosel. This tradition seems to be connected to the late Roman Christian practices in northern Italy, which were still present in the fifth and sixth centuries. Among the western Franks, there is no evidence that cross-shaped brooches were worn.

Anglo-Saxon England: In the Roman period, Christianity does not seem to have been a major religion in England. The strongholds were in the urban centers and their hinterlands, while in rural areas Christianity was more mixed with pagan religion. After the decline of *Romanitas*, the British Church, which had developed from Romano-British Christianity, was pushed westward to

Wales and Cornwall by invading pagan Anglo-Saxon tribes. As a result, very little Christianity remained in England.

Material culture and burial practices demonstrate that the newly settled Anglo-Saxon tribes identified with pagan Germanic traditions and peoples of the north, but towards the end of the sixth century, their attention shifted to the Christian world and Frankia in particular. From this time, mainly Frankish but also Roman and Byzantine artifacts started appearing in England. In the light of this, King Æthelberht's invitation of Roman missionaries seems logical, and Augustine, who was to become the first bishop, arrived in 597.

The Anglo-Saxon fascination with Frankia and Roman Christianity led to some similar developments in terms of early Christian foci. One of the clearest examples is the old Roman town of Canterbury, reawakened as the first Anglo-Saxon episcopal seat. In the sixth century, a cathedral was constructed inside the walls, reusing an old Roman building, possibly a church. Outside the walls, in the Roman inhumation cemetery, a new Christian focus, which was to become the largest Christian cemetery of Canterbury, emerged. In the sixth and seventh centuries, the Church of St Martin was created here from a remodelled Romano-British structure, together with the monastery of SS Peter and Paul and St Augustine's Abbey. No other Anglo-Saxon examples of towns following the Roman tradition of extramural burial are known. In other towns of Roman origin, such as Leicester, York, Rochester, and London (the area around St Paul's Cathedral), however, the model with churches erected within the center was followed.

In rural areas, churches started to appear from the seventh century. From this time and throughout the early Anglo-Saxon period, the term minster (from Old English *mynster*) was used for any type of religious community, from churches with priests to monastic houses and any other ecclesiastical settlement. The minsters were aristocratic foundations, which quickly became important Christian centers, of which some survived as parochial mother churches in the later Anglo-Saxon period. They made a strong visible impact on the early Christian landscape in England and were located in carefully chosen spots, with hills, peninsulas, and confluences being particularly common. The material culture from eighth- to early ninth-century minsters, including Jarrow and Barking, is distinctive, with finds such as book and shrine mounts, styli, imported pottery, and glass vessels.

The reuse of Roman buildings and masonry was frequently occurring. Roman forts were popular choices, e.g., Bradwell-on-Sea and Reculver (Kent), where churches were erected in the seventh century. The reuse of forts was presumably driven by the desire for Roman remains together with the practical need for an enclosure around the church. A combination of written sources and excavations have shown that within the enclosure space was rather tight, at times with subsidiary chapels, oratories, and domestic buildings. Other major types of Roman remains adapted as churches were large villa complexes (e.g., Castor, Northamptonshire and Cheddar, Somerset) and martyria. Early medieval churches constructed on top of martyria include those at Wells (Somerset) and Stone-by-Faversham (Kent). St Alban's Abbey (Hertfordshire) may be the only known example of Christian continuity from Roman to Anglo-Saxon times. Outside Roman Verulamium, a Roman basilica erected over the grave of St Alban continued in use through the early Anglo-Saxon period.

Prehistoric sites and monuments became foci for early churches too. The most significant types include earthwork forts (e.g., Hanbury in Worcestershire and Breedon on the Hill in Leicestershire) and mounds (e.g., Taplow in Buckinghamshire). Some of these monuments may have functioned as pagan Anglo-Saxon cult sites, although in most cases this is very difficult to prove. The most certain case is Bampton in Oxfordshire, a minster dating from the tenth century or earlier, constructed in relation to a cultic complex including Bronze Age barrows and a pagan or conversion-period cemetery dating from c. CE 700. In contrast to Frankia, however, there is an almost complete lack of evidence of Anglo-Saxon churches erected in traditional cemeteries.

Anglo-Saxon burial practices were gradually changing at this time. In some cases, e.g., Shudy Camps (Cambridgeshire), new areas were added to existing burial grounds. More commonly though new, rather small, cemeteries without churches were created, as seen at Lewknor (Oxfordshire) and Bromfield (Shropshire). As in Frankia, the allure of *ad sanctos* burial seems to have led to a voluntary shift of burials to minster sites. Some of the earliest minster burials took place shortly after 700 at Minster-in-Thanet (Kent), Winchester (Wessex), and Waltham (Essex). By the middle of the ninth century, churchyard burial was becoming the norm, and some of the minster cemeteries grew very large, capturing the population from the surrounding areas.

The lack of a consistent expression of Christianity in the seventh and early eighth centuries is further demonstrated by the female burials with Mediterranean style jewelry and cross pendants. Despite their different characteristics, these graves are all seen as Christian, from the richly furnished grave at Swallowcliffe Down (Wiltshire) inserted into a Bronze Age barrow to the more sparsely furnished examples, such as the one found in a traditional cemetery in Lechlade (Gloucestershire) and the burials at Ixworth (Suffolk) and Desborough (Northamptonshire). These burials represent the transitional stage to elite minster burial, and in terms of grave-goods, the most appropriate parallel is the seventh-century burial of St Cuthbert with a pectoral cross. The pieces of jewelry from these graves are some of the most striking, early Anglo-Saxon examples of artifacts with Christian symbols.

Saxony: Charlemagne's conquest and Christianization of Saxony lasted between 772 and 805. The neighboring areas in the south and west had already been recently Christianized by the Franks, and although less violent, some similar strategies can be identified. One of the main schemes was the speedy establishment of bishoprics, as seen in Utrecht, Büraburg, Würzburg, and Erfurt. These episcopal sees were in carefully chosen locations, often reusing established strongholds. Excavations have demonstrated that both Büraburg and Würzburg were erected close to, or on top of, hilltop fortifications with important political and religious functions. In the Christian era, these bishoprics became important centers for administration, manufacture, trade, and not least for missionary and military activity. In Saxony, during the reign of Charlemagne, bishoprics were founded in, e.g., Verden, Osnabrück, Minden, and Bremen, with Hamburg, Hildesheim, and Halberstadt added during the reign of his successor, Louis the Pious. Excavations have revealed that Hamburg was erected on top of an older Saxon fort and that the Church of Christ the Saviour at Paderborn, constructed as part of the royal palace, was erected above the remains of an extensive wooden structure. Many of these early episcopal seats, such as Paderborn and also Münster, were surrounded by fortifications.

Excavations have shown that the earliest churches in Saxony were rather simple rectangular structures with a rectangular choir. One such example is the first church at Paderborn which consisted of a 25-meter-long nave, a chancel in the east and an atrium in the west, and with a cemetery inside and outside the atrium. This and other palaces with churches attached were erected with conscious style references to Roman antiquity, perhaps making up for the lack of Roman remains to reclaim as part of the Christianization. In addition, altar relics for the new churches were brought to Saxony already from the late eighth century. The body of St Liborius was translated to Paderborn in 836 and, as revealed by modern excavations, was buried in a ring-shaped crypt in the western transept of the cathedral.

Not all churches founded in the late eighth and the ninth centuries were cathedrals, but some were presumably proprietary churches built by Frankish and Saxon nobles in their own settlements. At this time, both stone and wooden churches were erected. A particularly early example is Oldenstadt, Stadt Uelzen, Niedersachsen, where the first phase of the wooden church dates from around 800. Other such examples of wooden churches are Tostedt, Niedersachsen, originating in the early ninth century, and the St Amandus Church in Aschendorf, which was built a few decades later.

As part of his violent conquest, Charlemagne introduced an extremely harsh law known as the *First Saxon Capitulary* in which practices regarded as pagan, such as cremations and mound burial, were outlawed. According to this law, people should instead be buried in "church cemeteries." Despite this piece of legislation, the changes in burial practices in Saxony are rather similar to those seen in other areas. The most common solution was to use specific areas of the traditional burial grounds, as seen at Ketzendorf, Maschen, and Oldendorf. Churchyards were few and far between at this time, although some examples are known: at the church in Oldenstadt, burial started around 800, while at the St Amandus Church and the St Firminius Church, Dötlingen Oldenburg, Niedersachsen, the first burials date from the middle of the ninth century and the ninth or tenth century, respectively.

Various types of artifacts with Christian symbolism are found in the wake of the Carolingian conquest and missionary work. Variants of the Carolingian cross-shaped brooches (*Kreuzfibel*) appeared in Saxony for the first time at the end of the eighth century, for example, in the cemeteries of Paderborn and Drantum near Oldenburg. During the ninth century, square, rectangular, and disk-shaped brooches with cross motifs appeared in graves and settlements, together with other types of brooches with Christian symbols. The cross motif is found on other objects too, such as the Tating ware jugs retrieved from excavations in Paderborn.

Scandinavia: The three Scandinavian countries of Denmark, Norway, and Sweden were officially Christianized by their respective kings around the turn of the first millennium, but archaeological evidence shows that the area had had long-standing contacts with the Roman Empire and the wider European Christian culture. Examples include the Migration-period book-shaped pendant from Hög Edsten, Bohuslän, Sweden; the sixth-century Coptic ladle and the eighth-century Irish crozier, both found on the island of Helgö, Uppland, Sweden.

The archaeological evidence of the process of Christianization is varied. Late Viking-age runestones from across Scandinavia are among the most important pieces of evidence. These monuments are generally interpreted as Christian as they almost exclusively have a Christian message in the inscription and/or the iconography. One of the most famous examples is the runestone from Jelling in Denmark where King Harald Gormson "Bluetooth" claimed to have Christianized the Danes. The decorations on this stone include an image of Christ.

The first major phase of church building in Scandinavia took place in the eleventh century. Most of the earliest churches in Scandinavia were presumably built of wood, which in Denmark and Sweden were replaced by stone churches, above all in the twelfth and thirteenth centuries. Many of the early wooden churches are difficult to find archaeologically as they are located underneath the later stone churches. Excavated examples include Jelling and Snoldelev in Denmark. In Sweden, the presence of a particular type of eleventh-century grave monument found in connection with stone churches often indicates the existence of an earlier wooden church.

The first stone churches in Denmark date from the first half of the eleventh century, e.g., Roskilde Cathedral and St Jørgensbjerg Church, while in Sweden one of the earliest stone churches was built in Sigtuna at the end of the eleventh century. Other early stone churches in Sweden, such as those in Herrestad, Örberga (Östergötland), and Sigtuna (Uppland), all date from the first half of the twelfth century. In Norway, wooden churches continued to be the norm for several centuries after the introduction of Christianity, with some famous stave churches still standing, e.g., Lom (Oppland) and Heddal (Telemark). Bø in Telemark is a rare Norwegian example of a twelfth-century stone church with remains of a wooden predecessor underneath. Across Scandinavia, early churches were often erected on farms and may therefore have been proprietary churches, of which some later became parish churches.

At least some churches were erected in the immediate vicinity of prehistoric monuments.

One clear example is Hørning in Denmark, where an eleventh-century wooden church was erected on top of a levelled burial mound, below which there was a chamber grave, dating from c. 1000 and containing a woman and large amounts of grave-goods. The closeness in time between the burial and the building of the church strongly suggests that the church was deliberately placed on top of the flattened mound. Another striking example is Frösö Church (Jämtland, Sweden). Underneath the high altar, large amounts of animal bones and the charred remains of a tree were found, which has been interpreted as evidence of a Viking-age cult site. Another interesting example comes from Mære (Trøndelag, Norway), where a twelfth-century church was built on top of a rectangular Viking-age building, which most likely had cultic functions. The establishment of the first Swedish episcopal see at the former cult site of Gamla Uppsala, Sweden, is also significant, although there is no direct archaeological link between Christian and pagan activities. This is, however, a clear example of the church taking over a site with important functions in the former pagan cult.

As seen elsewhere, burial practices were changing rather slowly. It is likely that in eleventh- and twelfth-century Scandinavia, churchyard burial was required by law, but this was clearly not enforced, presumably as churchyards were too few and far between. Instead, as was the case elsewhere, traditional burial grounds continued to be used for burial. A Norwegian example is Haug, Hadseløya, Nordland. An example of a particularly long-lived cemetery in Sweden was Valsta (Uppland, Sweden) which was used into the twelfth century. In some cases, such as Stav and Hässelby (Uppland, Sweden), possible Christian zones have been identified in the outskirts of the cemeteries. These areas contain graves marked by rectangular stone settings and represent the last phase of burial on the sites.

Delimited Christian cemeteries without churches also occurred from the tenth century, as seen at Birka (Uppland), Såntorp (Västergötland), and in the outskirts of Sigtuna, Sweden. Another example comes from Grødby on the Danish island of Bornholm, where a cemetery has been coin dated to the reign of Sven Estridsen, i.e., 1047–1076.

Another development was the erection of churches in existing Christian cemeteries, as, e.g., seen in Norway, where several churches from the second half of the eleventh century are located in Christian graveyards which date from the first half of the eleventh century, or even the tenth century.

Churchyard burial became the most common form of burial during the twelfth century, although some churchyards, such as St Stefan's and Löddeköpinge (Skåne, Sweden), Peter's Church in Tønsberg (Vestfold, Norway), and Gamlebyen in Oslo, came into use during the tenth century and the first half of the eleventh century. Remarkably early are the graves from the churchyard around Ribe Cathedral, Denmark, where the earliest phase of burials dates from the ninth century to the middle of the eleventh century.

Graves containing artifacts with Christian symbols appeared above all from the late eighth century to the eleventh century. Examples include Tating ware jugs, croziers, crosses, and crucifix pendants, as well as reliquaries, some of which had been reused as fibulae. Many of these objects come from female burials suggesting that Christianity played an important role for certain groups of elite women. One particular example comes from Birka, Sweden, where eight of nine pendant crosses were found in female graves dating from the first half of the tenth century. Several of these crosses are of "simple, almost poor" craftsmanship. This is not usual for Viking-age jewelry, and it therefore seems that the symbolic value of the crosses was greater than their value as pieces of jewelry, although the purpose of these grave-goods is of course unknown.

Future Directions

This survey of the spread of Christianity in Europe, examined via four case studies, clearly demonstrates that the process of Christianization, despite the different features and characteristics, on the whole shares a number of traits, visible in

the archaeological material. One clear observable difference is that in the areas that had not been Romanized, the official acceptance of Christianity took place at a later stage, demonstrating the significance of the infiltration phase for this process. Overall archaeological evidence is crucial for the study of Christianization as it provides insight into the pagan peoples that are being converted, as well as numerous groups of people at different levels of the new Christian societies. On a more individual level, great differences are naturally found between the different geographical areas, and future research is likely further to emphasize the variability in the processes of Christianization and Christian practices across Europe.

Cross-References

- ▶ Burial Excavation, Anglo-Saxon
- ▶ Churchyard Archaeology
- ▶ France: Medieval Archaeology
- ▶ Scandinavia and the Baltic Sea Region: Medieval Archaeology

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Chronological Systems, Establishment of

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Introduction

Today's student of archaeology might find it difficult to imagine an era when modern chronometric dating methods – radiocarbon and luminescence, for example – were unavailable. How, the student might ask, were archaeologists working, say, in the first half of the twentieth century able to place objects and sites in proper chronological sequence? Given the important roles that chronometric methods play in modern archaeology, together with the precision they seem to impart, it is little wonder that today's student might view earlier efforts to establish temporal control as rather crude and outdated. Such a view, however, overlooks the fact that early archaeologists devised a battery of clever methods to determine the ages of archaeological phenomena with considerable precision. This kind of chronological control is often referred to as *relative dating*.

Definition

Relative dating is defined as the production of a sequence of events for which no fixed or calendrical dates exist. Instead of knowing that a certain kind of pottery was made between, say, CE 200 and CE 400 and that another kind was made between CE 500 and CE 600, all we know is that the latter kind is of more recent origin than the former. The latter kind could postdate the earlier one by several hundred years or by a thousand years, but we do not know this. All we know is that it is more recent. Similarly, we might know, perhaps through historical evidence, the terminal calendrical date of manufacture and use of the later kind of pottery,

but we might not know when on a calendrical scale that kind of pottery was first made and thus when it began replacing the earlier kind. In contrast, *absolute-dating* methods – sometimes referred to as *chronometric* methods – yield the amount of time, within the limits of sampling error, that elapsed between each pair of events as well as a calendrical date indicating when each event occurred and perhaps each event's duration as well.

Absolute-dating methods thus provide more than a simple chronological sequence, but they in no sense render relative-dating methods obsolete. There are situations where the latter are preferable, especially when large areal chronologies are desired. Relative-dating methods are inexpensive, as opposed to methods, such as radiocarbon, which may cost as much as $1,000 per sample. Unfortunately, few modern archaeologists have more than a passing acquaintance with the origins of relative-dating methods and as a result have by-passed some of the most innovative work ever undertaken in archaeology. That research is as relevant today as it was a century ago.

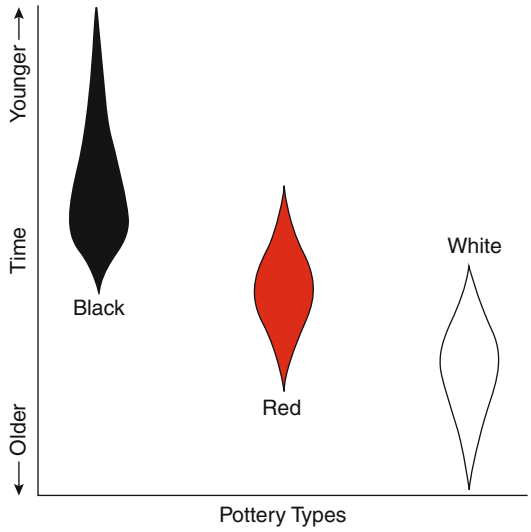

Chronological Systems, Establishment of, Fig. 1 Diagram showing temporal alignment of three hypothetical pottery types from latest (*black*) to earliest (*white*) (From O'Brien & Lyman 1999)

Historical Background

Numerous methods for working out relative chronological orderings have been devised in archaeology, one of which, stratigraphic excavation, had its roots in geological observations of the eighteenth century. *Stratigraphic excavation* is perhaps the best known of the various relative-dating methods used by prehistorians, no doubt because the majority of the archaeological record has a geological mode of occurrence (O'Brien & Lyman 1999). There are also two other methods – *seriation* and *cross dating* – that likewise deserve attention. All of them, however, depend on *artifact types*, especially those that pass the *historical-significance test*. This means that a type comprises specimens that were made during a single, relatively short interval of time and that the frequency distribution through time of the specimens approximates a unimodal curve (Fig. 1). Such a curve reflects the introduction of a type, its growth in popularity, and its decline and eventual disappearance. Any type that passes the test is referred to as a *historical type*, the gold standard of relative-dating methods.

Key Issues

Stratigraphic Excavation

Stratigraphic excavation is defined as removing artifacts and sediments from vertically discrete three-dimensional units of deposition (strata) and keeping those artifacts in sets based on their distinct vertical recovery proveniences for the purpose of measuring time (Lyman & O'Brien 1999). Vertical boundaries of spatial units from which artifacts are collected can be based on geological criteria, such as sediment texture, or on metric criteria, such as elevation. Stratigraphic excavation is based on the commonsense assumption that in a sedimentary column, strata stacked one on another represent the passage of time. More specifically, the assumption is that strata at the bottom of a column were deposited before those above. This is known as the *law of superposition*. Unfortunately, archaeologists

often fail to realize that depositional history does not necessarily represent the *age* of the sediments themselves. This includes objects in those sediments. Although artifacts in one stratum were *deposited* before those in a higher stratum, it cannot be assumed that artifacts in the lower stratum are *older* than those in the higher stratum. It could be the case, for example, that artifacts from one period were eroded from one locality and deposited downslope on top of artifacts from a later period.

Thus, superposition is an indirect dating technique when applied to artifacts within strata. It is indirect because the ages of the artifacts are *inferred* from their vertical positions relative to one another. Another way of saying this is that the target event is the age of an artifact's creation whereas the dated event is the age of the depositional event. The work of the archaeologist, like that of the geologist, is to analyze the superposed sediments and to determine when strata were deposited as well as when the sediments were formed. Archaeologists are interested in culturally derived sediments – artifacts – but they realize that the artifacts usually occur within noncultural (natural) sediments. The nature of the latter often is an important source of information relative to the nature of the former.

The problem of identifying the first stratigraphic excavation may never be solved, but historians of archaeology often point to Thomas Jefferson's 1784 excavation of a trench through one of the earthen mounds on his property in Virginia. He subsequently made notes on the stratigraphic relation of layers of earth and human bones in the mound and remarked on the chronological implications of the layering (Jefferson 1801). Jefferson's work was later said to have anticipated modern archaeological methods by a century, but it had no particular impact on Americanist archaeology. As the British archaeologist Mortimer Wheeler (1956: 59) later observed, "Unfortunately, this seed of a new scientific skill fell upon infertile soil. For a century after Jefferson, mass-excavation remained the rule of the day." It was 75 years later, and then in Great Britain, that Jefferson's approach was reinvented with effect. There, on the Devonshire Coast, the excavation of Brixham Cave of England by prominent British geologists and paleontologists in 1858 focused explicitly on stratigraphic context.

In North America, stratigraphic excavation became an art form during the second decade of the twentieth century through the efforts of two prehistorians working in New Mexico, Nels Nelson of the American Museum of Natural History in New York and Alfred V. Kidder of the Robert S. Peabody Museum in Andover, Massachusetts. Nelson started working at San Cristobal, an abandoned pueblo in the Galisteo Basin south of Santa Fe, New Mexico, to test a suspected local sequence of pottery types. In his report, Nelson (1916) stated that by the beginning of the 1914 field season he suspected he knew the chronological order of five types of pottery, two of which exhibited painted designs and three of which contained glazed designs. One of the painted types was suspected of being the earliest of the five because it occurred primarily on small pre-Puebloan sites. The other painted type was known to be the latest of the five types because it occurred in abundance on sites historically documented as postdating the Pueblo Revolt of 1680. Nelson viewed one of the three glazed types as being from the early historical period (1540–1680), given that it was found consistently with bones of horses and other historically introduced domestic animals. The other two glazed types were slid in between the early painted type and the historical-period glazed type. Despite his intuitions regarding the chronological arrangement of the types, Nelson (1916: 162) noted that "tangible proof was still wanting." He found that proof at San Cristobal.

Nelson excavated San Cristobal in arbitrary one-foot-thick levels (Fig. 2) rather than in natural stratigraphic units, and he kept sherds from each level separate. This is the feature of his work that has received attention in histories of Americanist archaeology. Nelson had visited the stratigraphic excavations of European prehistorians Otto Obermaier and Henri Breuil in Spain in 1913 and had seen levels marked off on the walls of the excavations, and he had participated in excavating Castillo Cave – an experience that,

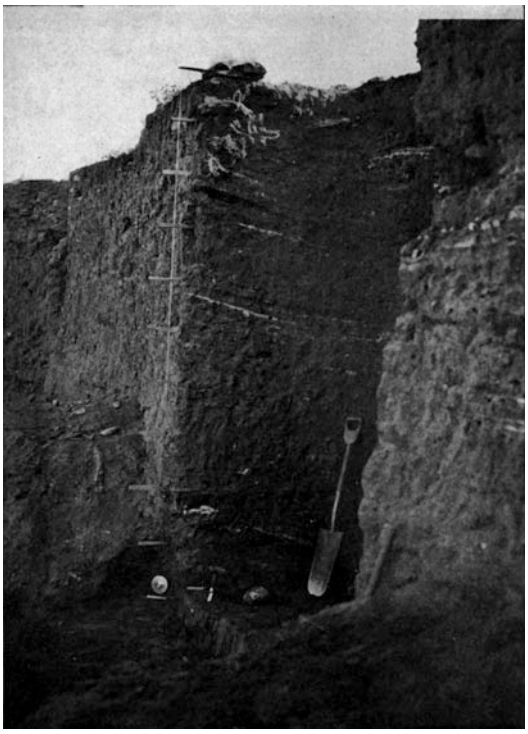

Chronological Systems, Establishment of, Fig. 2 Stratigraphic cut made by Nels Nelson through midden deposit at San Cristobal, New Mexico (From Nelson 1916 [courtesy American Museum of Natural History])

according to Nelson, served as inspiration for his excavation method at San Cristobal. His technique of excavating in arbitrary levels might have come from Europe, but certainly not the notion that superposed collections marked the passage of time. Everyone knew that. The innovative aspect of Nelson's work was his demonstration that pottery types altered in absolute frequency through time in a pattern that he characterized as "very nearly normal frequency curves [that reflected the fact that] a style of pottery…came slowly into vogue, attained a maximum and began a gradual decline" (Nelson 1916: 167).

Figure 3 shows Nelson's data graphically as percentages of four pottery types by excavation level. Three of his types – I–III – are of particular chronological usefulness in that they have continuous distributions in time: they come into being, they gain in popularity until they reach their zenith, at which point they begin to fade in popularity until they finally disappear [AR1]. In short, they are good historical types, useful for marking the passage of time. Corrugated ware does not follow this pattern and thus is not a good historical type.

Kidder, who was working at Pecos Pueblo, just to the east of the Galisteo Basin, took notice of Nelson's chronological ordering of pottery types. Kidder had chosen Pecos as his focus of study because historical documents indicated it had been occupied from 1540 until 1840, and preliminary surface reconnaissance had suggested that it had practically all the prehistoric pottery types identified up to that point in the Rio Grande drainage of northern New Mexico:

> [I] hoped that remains [at Pecos] would there be found so stratified as to make clear the development of the various Pueblo arts and to enable students to place in their proper chronological order numerous New Mexican ruins whose culture has long been known but whose relation to one another has been entirely problematical. This hope was strengthened by the fact that Mr. N. C. Nelson…had recently discovered very important stratified remains at San Cristobal a few miles to the west (Kidder 1916: 120).

Similar deposits at Pecos would allow comparative analyses and the extension of Nelson's chronology, which ended at 1680 when San Cristobal was abandoned, into the middle of the nineteenth century.

Early in his excavations, Kidder (1916: 122) recognized that pottery types in the lower levels of his trenches were "markedly different from [those] at the top and that there were several distinct types between." Not all excavations at Pecos Pueblo were undertaken with close attention to superpositional relations. Rather, such relations were observed by "tests made at different points as the [excavation] advanced. The tests consisted of the collection of all the sherds in a given column of débris, the fragments from each layer being placed in a separate paper bag" (Kidder 1916: 122). During the first year's field season – the summer of 1915 – those tests employed arbitrary levels that were 1–1.5-ft thick, but when it was apparent that the arbitrary levels split visible strata, "a new bag was started,"

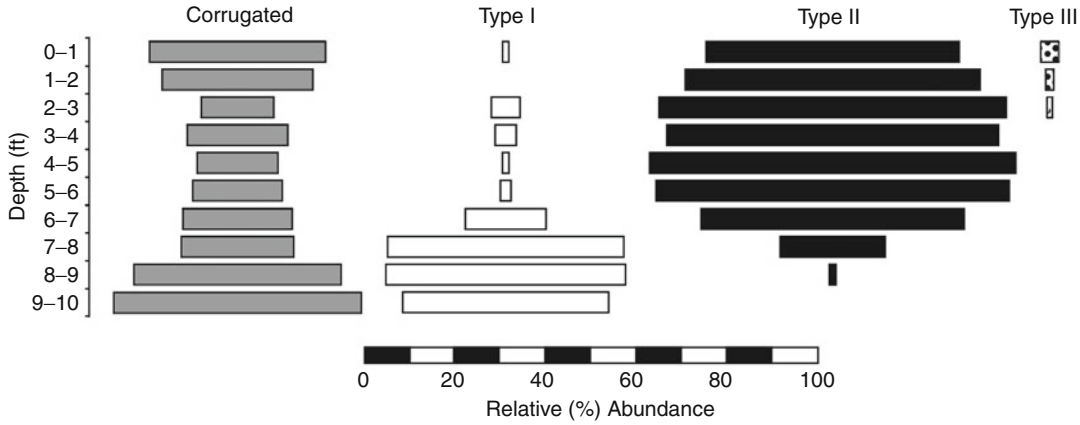

Chronological Systems, Establishment of, Fig. 3 Nels C. Nelson's pottery data from Pueblo San Cristobal, New Mexico, showing the waxing and waning popularity of types. Note that Nelson believed, correctly, that the frequency of corrugated ware was not a good indicator of age. Note also the essentially monotonic frequency distribution of his types I–III (After Nelson 1916)

which apparently meant that Kidder paid attention to the stratigraphic provenience of the artifacts found within his arbitrary levels (Lyman & O'Brien 1999).

After the first field season, Kidder excavated Pecos Pueblo strictly in visible stratigraphic layers. He not only listed the absolute frequencies of pottery types against their vertical provenience in tabular form, as Nelson had done, he also graphed the changes in relative frequencies of pottery types against his excavation levels (Kidder & Kidder 1917). This analytical technique was later referred to variously as "ceramic stratigraphy" or "percentage stratigraphy" (Willey 1939; Ford 1962). One of his graphs is shown in Fig. 4. Upon inspection of the graphs, Kidder & Kidder (1917: 341) noted that many, but not all, types displayed "approximately normal frequency curves," echoing Nelson in interpreting such curves as "indicating that each [type] had a natural rise, vogue, and decline" (Kidder & Kidder 1917: 349) – the popularity principle (Lyman & O'Brien 1999). In other words, they were good historical types.

Seriation

More than perhaps any other archaeological method, seriation has had a complex history. Textbooks often credit British archaeologists for introducing seriation into the United States, but in reality only one seriation technique – *evolutionary seriation* – was in use in nineteenth-century Britain, and although that technique was eventually introduced to American archaeologists, it differs significantly from the kind of seriation invented by Americanists in the second decade of the twentieth century. That distinctly American kind of seriation is known as *frequency seriation*, and it eventually led to the Americanist development of what is known as *occurrence seriation*.

Regardless of specific technique, seriation is a descriptive method that orders things – here, artifact assemblages – in a row or column. Seriation creates a linear order, but that order tells us only that the odds are good that two adjacent things are more alike than either is to things farther up or down the order. Seriation is used in archaeology for chronological purposes, but whether or not an order reflects the passage of time is an inference; it is not axiomatic. The term "seriation" is sometimes used as a synonym for "percentage stratigraphy," but this conflates two entirely different procedures. John Rowe (1961: 326) specifically excluded the use of superposed strata in his definition of seriation:

> [T]he arrangement of archaeological materials in a presumed chronological order on the basis of some logical principle other than superposition. . . The logical order on which the seriation is based is

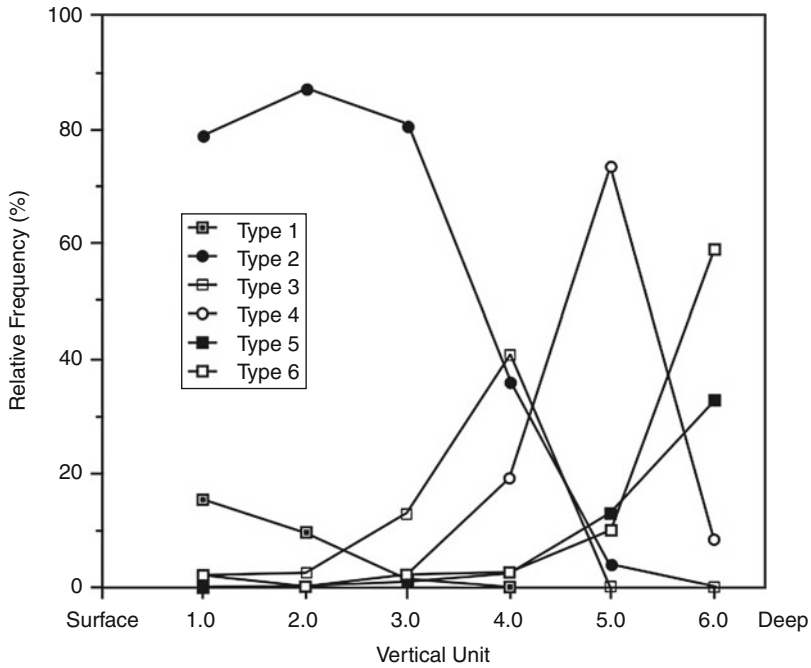

Chronological Systems, Establishment of, Fig. 4 A broken-stick graph of data from Pecos Pueblo, New Mexico, showing the fluctuating frequencies of pottery types over vertical space (time) (From O'Brien & Lyman 1999; redrawn from Kidder & Kidder 1917)

> found in the combinations of features of style or inventory which characterize the units, rather than in the external relationships of the units themselves.

This definition underscores that an ordering is based on formal attributes of the materials used in the seriation. That is, seriation is based on intrinsic properties of artifacts and not on their relative vertical positions in a column of sediments, which is an extrinsic property. Another way of saying this is that seriation is a direct-dating method whereas superposition is an indirect-dating method.

Evolutionary seriation is virtually identical to the technique of paleontologists, who arrange fossils of similar form in an order such that change in character states of the fossils is gradual and continuous. Perhaps the earliest use of evolutionary seriation was by John Evans, who seriated gold coins from Great Britain that were minted prior to and after the Roman invasion of Britain in 54 BCE. Evans (1850) used changes in two characters or dimensions of variation to seriate the coins – weight and design. A third dimension, die size, did not produce particularly useful results. Not visible in Evans's seriation (Fig. 5) is the decrease through time in coin weight. For example, Type 2 coins on average weighed 103.5 grains, Type 3 coins 91.5 grains, and Type 4 coins 87.25 grains. Highly visible, though, is the change in design on both sides of the coins. The sequence begins with the natural-looking laureated bust of Phillip II of Macedon on the obverse and a horse-drawn chariot on the reverse. Through time, the designs on both sides became successively more stylized until a point was reached at which they again became naturalistic:

> Thus far I may observe at present, that the coins generally recede farther from the prototype as the places of their discovery recede from the southern coast – as, for instance, the Yorkshire and Norfolk types Nos. 24 and 16; and that in the southwestern counties the workmanship of the coins appears continually to have deteriorated; while in the southeastern and eastern, after declining for a time, it again improves, probably through the introduction of foreign artists, till, under Cunobeline, it attains its highest perfection (Evans 1850: 137).

Similarly, British archaeologist Sir William Matthews Flinders Petrie used evolutionary seriation, together with a novel grouping procedure akin to occurrence seriation, to make

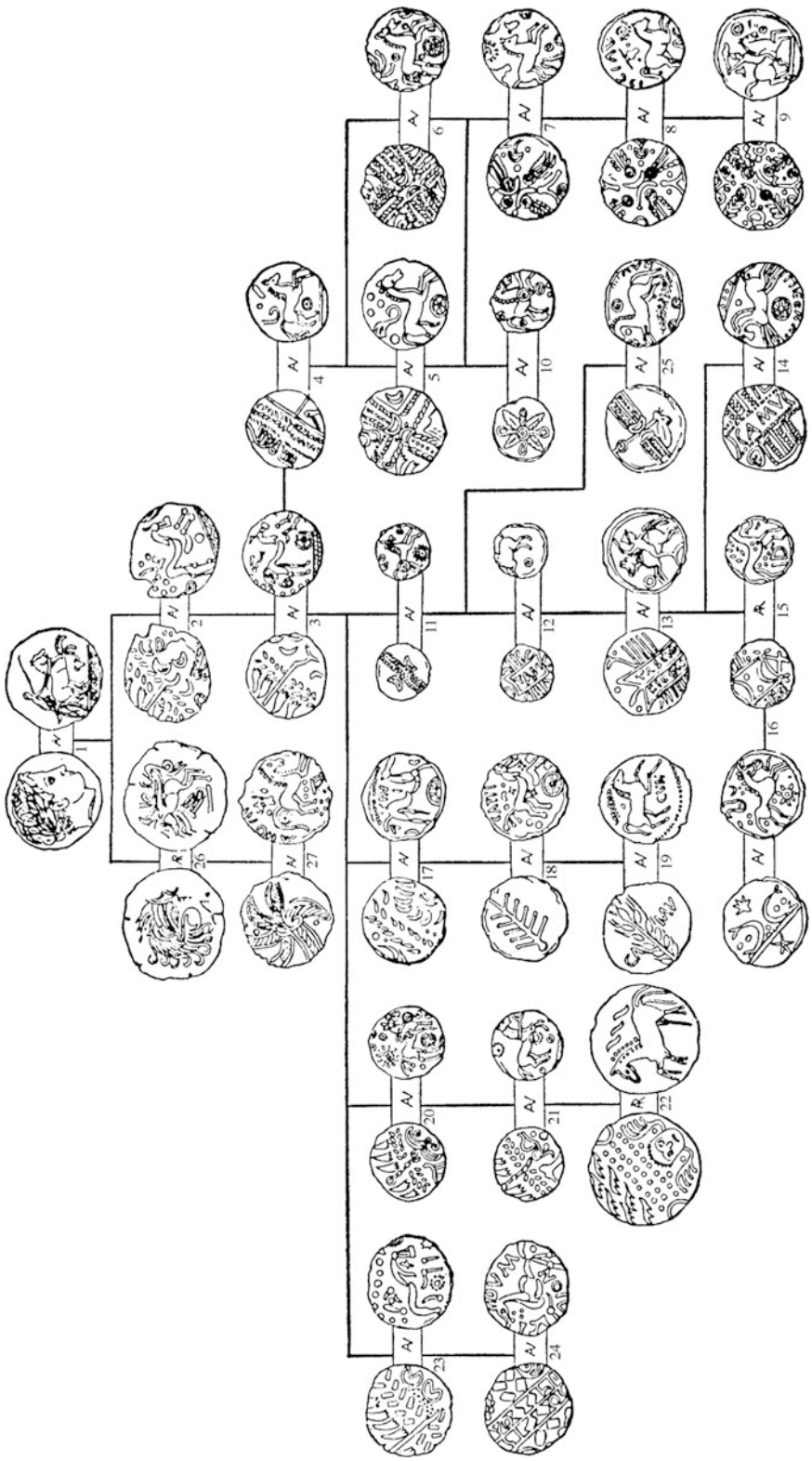

Chronological Systems, Establishment of, Fig. 5 Stylistic changes in British coins proposed by John Evans. The sequence begins with the natural-looking laureated bust of Phillip II of Macedon on the obverse and a horse-drawn chariot on the reverse. Through time, the designs on both sides became successively more stylized until a point was reached at which they again became naturalistic (After Evans 1850)

chronological sense out of some 4,000 predynastic burials from several localities along the Nile River north of the Valley of the Kings in Egypt. The key to Petrie's analysis was finding an attribute that changed states through time and then using that attribute to construct a temporal sequence of pottery forms. This attribute, as it turned out, was vessel handles. Petrie suspected that handles were functional on earlier jars, which tended to be large and bulky, but that through time they had become less functional and more decorative, such that by late in the sequence they were simply adornments: "The most clear series of derived forms is that of the wavy handled vases. . . . Beginning almost globular, with pronounced ledge-handles. . .they next become more upright, then narrower with degraded handles, then the handle becomes a mere wavy line, and lastly an upright cylinder with an arched pattern or a mere cord line around it" (Petrie 1901: 5). This is evolutionary seriation. Once Petrie had the vase sequence worked out, it then became a matter of ordering grave lots based on the vase forms associated with them. Further, vessel types that co-occurred with particular handled-vase types then became markers in their own right and could be used to place correctly other grave lots that did not contain handled vases.

As opposed to evolutionary seriation, frequency seriation is strictly an American innovation. A.L. Kroeber, a student of Franz Boas and the founder of the anthropology department at the University of California, gets the credit, based on analysis of pottery sherds he collected from the surfaces of some 15 sites in the countryside around Zuni Pueblo, New Mexico, in 1915. He noticed that some collections tended to be dominated by "red, black, and patterned potsherds," whereas other collections were dominated by white sherds (Kroeber 1916: 8). He concluded that "There could be no doubt that here, within a half hour's radius of the largest inhabited pueblo [Zuni], were prehistoric remains of two types and two periods, as distinct as oil and water. The condition of the sites indicated the black and red ware ruins as the more recent" (Kroeber 1916: 9). Based on historical evidence and on the condition of the sites, Kroeber (1916: 9-10) concluded that concerning "the type and period of white ware and the type and period of black and of red ware, the latter is the more recent [belonging] in part to the time of early American history; the former is wholly prehistoric."

Chronological Systems, Establishment of, Table 1 An example of a frequency-seriation procedure

	Historical type				
Assemblage	1	2	3	4	5
Unordered					
A	10		30	10	50
B			50	30	20
C	20		15		65
D			40	60	
E	30	25			45
F			20	80	
Ordered					
E	30	25			45
C	20		15		65
A	10		30	10	50
B			50	30	20
D			40	60	
F			20	80	

Kroeber's ordering of sites based on relative frequencies of pottery types can best be seen by using an imaginary case, as is shown in Table 1, which lists five historical types – in Kroeber's case, pottery types – across the top and six artifact assemblages (A–F) down the left-hand margin. The numbers in the rows indicate the percentage of a particular pottery type in a particular assemblage. For example, assemblage A contains 10 % pottery-type 1, 30 % pottery-type 3, and so on. Percentages add to 100 % for each assemblage. Table 1 begins with the assemblages in no particular order. The seriation procedure would be to sort the assemblages such that each column of percentages approximates a unimodal frequency distribution, such as is shown in the ordered part of Table 1. Note that it makes no difference if the ordering from top to bottom is "E, C, A, B, D, F" or "F, D, B, A, C, E"; knowledge of the direction taken by time's arrow must come from data independent of the seriation.

Before computing power was available, archaeologists performed frequency seriations

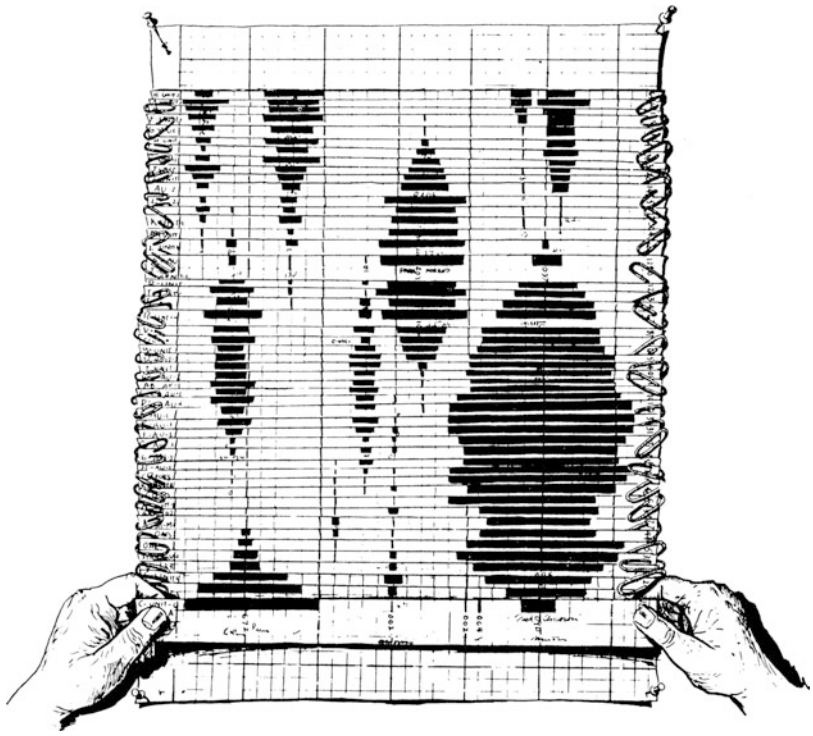

Chronological Systems, Establishment of, Fig. 6 James A. Ford's thumbs-and-paper-clips method of seriating collections. Each strip of paper represents a surface collection or excavation level; on each strip bars have been drawn to indicate the percentage of each pottery type. The strips are then moved around until the best fit is attained (From Ford 1962)

by hand. James Ford (1962) suggested using long strips of paper containing bars of length proportionate to the percentage of a particular pottery type in a particular assemblage. Each strip shown in Fig. 6 is a separate assemblage, with bars showing the percentage of each type of pottery contained in that collection. Eleven pottery types are shown on the graph, although no assemblage contains sherds of all 11 types. Once each collection is graphed in terms of type percentages, the strips are moved up and down until a best fit is found, meaning that there are as few violations of the unimodal distribution as possible. That is, the resulting type-frequency curves – what Ford (1952: 344) referred to as "'battleship' frequency curves" – are as close as possible to those shown in Fig. 1.

Occurrence seriation, which is based on the presence/absence of historical types instead of on their percentages, was suggested as an alternative to frequency seriation in the late 1950s and early 1960s by Rowe (1959) and Paul Dempsey & Martin Baumhoff (1963). Rowe argued that frequency seriation was subject to sampling problems, and Dempsey & Baumhoff pointed out that low-frequency types may be among the best time-indicators and that even the presence of single specimens of certain types could be significant in establishing chronologies. As in frequency seriation, the procedure is to sort the unordered rows – the assemblages – so that each historical type – each column – displays a continuous distribution. We can take the same data shown in Table 1 and reduce it to presence/absence data, as shown in Table 2. The order resulting from meeting the expectations of the seriation model is given in the lower half of Table 2. As in Table 1, the direction of time's arrow is unknown, so the ordering from top to bottom could be either "E, C, A, B, D/F" or "D/F, B, A, C, E." Note that in Table 2 assemblages D and F are identical in terms of the types they contain. They cannot be sorted and must, in this example, be considered contemporaneous.

Cross Dating

Geologists have long used fossils included in units of deposition to correlate those layers across

Chronological Systems, Establishment of, Table 2 An example of an occurrence-seriation procedure

	Historical type				
Assemblage	1	2	3	4	5
Unordered					
A	+		+	+	+
B			+	+	+
C	+		+		+
D			+	+	
E	+	+			+
F			+	+	
Ordered					
E	+	+			+
C	+		+		+
A	+		+	+	+
B			+	+	+
D/F			+	+	

Chronological Systems, Establishment of, Fig. 7 Three views of a Folsom point made of chert. Specimen is approximately 11 cm long

space, often vast amounts of space, and archaeologists have done the same, using *marker types*. The usefulness of marker types is tied to their geographic range – we might desire types that appear over a wide area – but also to their life span – we want types with limited chronological ranges. Not all archaeological types meet these criteria, and in fact, few do. Sidestepping the many complex issues that surround how types are created in the first place (O'Brien & Lyman 1999), suffice it to say that many types have too much variation built into them to serve as much more than gross chronological markers. All too often, when a sherd of a particular pottery type is found in one area, and the finder tries to match it up against a published type description of that type, the match is left than perfect, and the person is left wondering, "Is this or is this not a specimen of that type?"

Once in while, though, artifact types do fit the bill and become excellent marker types that can be used for cross dating. In North America, one such type is the Folsom point (Fig. 7), which was used to tip spears between about 8950 BCE and 8500 BCE. In the early decades of the twentieth century, purported finds of early tools in North America were invalidated on various grounds, but the breakthrough came in 1927 when workers from the Colorado Museum of Natural History recovered several small, fluted points in association with the remains of extinct bison (*Bison antiquus*) in an arroyo near Folsom, New Mexico. The stratigraphic association was in a geological context that lay near the temporal border between the late Pleistocene and the early Holocene epochs, or about 11,000 years ago. Even in the 1920s stratigraphers knew what the glacial-age boundary in the western United States looked like in terms of sediments and strata, and thus the age assessment of the bison-kill site was not a shot in the dark (Meltzer 1991). The 19 projectile points unearthed at Folsom were easily recognizable because of the fine flaking and the presence of channel scars, or flutes, on both faces that resulted from the removal of long flakes. It was impossible to confuse this kind of point with more-recent kinds, and it instantly became a chronological marker eventually referred to as the Folsom type. Whenever a Folsom point is discovered in the western United States, it is clear that early bison hunters were responsible for its manufacture.

Future Directions

There is a tendency in archaeology, like in many disciplines, to dismiss the work of decades earlier on that grounds that it is outdated and unsophisticated, and nowhere is that more prevalent than in discussions of chronological methods. One might suppose that the work of prehistorians such as Nelson, Kidder, and Petrie does not particularly matter anymore because radiometric dating has alleviated our chronological problems, thus rendering any consideration of seriation, stratigraphy, and marker types moot. Alternatively, one might argue that there are two reasons why knowledge of relative dating is key to successful archaeological research. First, absolute radiometric methods do not solve all chronological problems. One needs to evaluate and test the results obtained from the application of these methods, and relative-dating methods provide one source of test implications. Second, radiometric methods may not always be applicable, given the vagaries of the processes that formed and continue to form the archaeological record.

The chronological work that began in Europe in the nineteenth century, based on the principle of artifacts being used to mark the passage of time, reached a zenith in the American Southwest during the second decade of the twentieth century. Archaeologists can still take much away from the reports that emanated from that work.

Acknowledgments Portions of this essay are adapted from Lyman & O'Brien (1999), O'Brien & Lyman (1999) and O'Brien (2003).

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► Dating Techniques in Archaeological Science
► Stratigraphy in Archaeology: A Brief History

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Chronopolitics and Archaeology

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Introduction and Definition

C*hronopolitics* designate several fields of interest and endeavor that intersect with the pragmatics, production, and perpetual maintenance of particular temporalities. Because these fields oscillate paradoxically, and somewhat precariously, between those pasts that are remembered (ostensibly for present and future generations) and those pasts that are condemned to Lethe (the river of forgetfulness in Hades), they ignite an array of interests and passions, controversies and disputes, which are negotiated through debate and destruction, regulation and compromise. Here are not considered the chronopolitics of Paul Virilio (2000) that arise at the end of geography, where the geopolitics of three-dimensional space and the reality of distances are canceled out in a revolutionary shift to the politics of compressed time seen in the quasi-instantaneous exchanges of images and sounds, exemplified in the amplification of optical surveillance and advertising across the electronic ether (though the chronopolitics behind the assumption of a wholesale revolution are discussed below). Nor is this topic addressed in a way that would suggest that those pasts that are remembered are the byproducts of human-centered groups enacting their conscious and willful powers of selection. Before further elucidating and exemplifying these chronopolitics, it is important to bring to the reader's attention the old Greek meanings for the constituent words of chronopolitics, *chronos* and *politics*.

Chronos is, in its fullest sense, often translated as "time" and this is the conventional meaning associated with terms such as "chronometer" or "chronology." However, *chronos*, in a more specific sense, is the periodic, ordered, or arranged time; it is the time of classification and metrology. *Chronos* is time as separate from events. It is time as a kind of external parameter. *Chronos* as the ordering is often contrasted with what the Greeks term *kairos*, the time that is more contingent, even chaotic and weather-like (Witmore 2007).

As with *chronos*, politics is also considered here in a double sense. Politics centers upon issues raised in a public forum. Here one encounters the old Greek meaning of *ta politika*, which denotes "public matters" or "civic affairs." In a second sense, politics is connected to a kind of curious and probing attitude (Shanks 2004). Taking direction from critical theory (e.g., Leone et al. 1987; also Wilkie & Bartoy 2000), this is politics as a spirit of caution and concern set to expose assumptions and the taken-for-granted myths perpetuated to facilitate control and to extend power and, thereby, its inequities. Politics is not only a matter of worrying over what is best; it is also a matter of crafting "new weapons" (Deleuze 1995). As such, politics is tied to a sustained commitment to effect positive social change as a component of humanistic and scientific responsibility (McGuire 2008).

Key Issues/Current Debates/Future Directions/Examples

So, if politics turn around controversies, then chronopolitics follow such controversies through to their realization as temporalities. For want of

white space, many of the issues concerning *heritage politics* are left to Jonathan Walz's entry on chronopolitics in this encyclopedia. Here, chronopolitics are further defined with respect to a particular historicism and its ontological grounds. Admittedly, these *realpolitiks* will leave much of relevance to this field of interest to fall through the cracks.

The history of modernity centers on the common belief in an arrow of time whose line of flight advances continually from the past to future, thus leaving in its wake an irreversible succession of discrete moments, a line of instants. A common component of this temporal machinery, the timeline has served as a supposedly external parameter for sorting eras, periods, or epochs and thus ordering time with respect to a series of dates. Therefore, the timeline provides ground for the measure of the past. Consider, for example, the definition of "antiquity" in the 1922 *Palestine Mandate of the League of Nations* as "any construction or any product of human activity earlier than the year A.D. 1700." Or, take the recent proposal by the Department of Arts, Heritage & the Gaeltacht to delist post-1700 CE monuments in Ireland. Routinely measured with respect to distance from the present, such dates provide hooks from which to hang hierarchies of value. These dates also mask an underlying historicity – something reflected in historic quality, intensity, and prejudice. The Palestine Mandate excludes Late Ottoman Era monuments in the Palestine. The proposed delisting of post-1700 monuments rests upon the hard ground of economic bottom line – the burden of the past is just too expensive in the current economic climate.

There is, of course, considerable nuance to the *chronopolitics* associated with the production and maintenance of the arrow of time. Nietzsche, insofar as it was possible to draw a distinction between species of history, gave us three modalities or uses (1997). The monumental celebrated great achievements of the past as exemplary and worthy of imitation. The antiquarian sought out every scrap of the past as something to be preserved and revered. And the critical regarded the past is oppressive and condemned it to oblivion. Let us consider an example in more detail.

December 28, 2006, bulldozers plowed through several mud-brick houses in Gurna, Egypt. This was the last of a series of efforts by the Egyptian Government and the Luxor City Council (backed at various times by myriad politicians, archaeologists, heritage organizations, and development agencies) to relocate the residents of old Gurna and demolish the group of hamlets set amidst the rock-cut tombs and funerary temples known as the "Theban Necropolis" (Meskell 2005). Now, following Nietzsche, critical history underwrites the destruction of the "ramshackle" houses of a "shantytown" (it should be noted that the demolition of Old Gurna was tied to its "unsanitary" conditions, and this has provided a broad rationale for the redevelopment of Egyptian villages since the *gambiae* malaria epidemic of the 1930s and 40s (Mitchell 2002: 188)). Monumental history (read "heritage") resuscitates voids as tombs from the golden age of the Eighteenth Dynasty (1550 BCE). Locals, for their part, countered the arguments of government officials with an antiquarian history, which emphasized how Old Gurna's vernacular architecture of simple mud-brick houses, decorated with brightly painted scenes of daily life, animals, and Qur'anic verse, constituted their own unique forms of heritage. Drawing a line between the archaeological and non-archaeological, between one past and another taken to be a present intrusion, injects a historical partiality (which, in this case, is itself subservient to an economic agenda) that has no basis in the realities of the past. Each modality also enacts a very different kind of temporality, and thus, each is implicated in a different set of chronopolitics (consider Hamilakis & Anagnostopoulos 2009).

With monumental history one encounters a cyclical temporality seen in the rise and fall of great civilizations and a hierarchy of value impacted by distance measured in dates, relevance, and ultimately, tourism. With antiquarian history, one witnesses the cultivation of a continuous temporality (for Nietzsche the laws of fidelity blocked creativity (also

Foucault 1984)). With critical history the fabric of time is torn through disjuncture and revolution. Still, no matter which species of history and its associated temporality one embraces, for Nietzsche, all were in service of a peculiar affliction; namely, because moderns believe themselves to have definitively broken with the past, they attempt to preserve and date everything (Latour 1993).

These *chronopolitics* feed into a notion of time as linear, as unidirectional, with man at the center, for causality is rooted in historical events and those living in the present never cease to be on the cutting edge (Serres & Latour 1995; also Olivier 2011). Thus, the notion that time passes results in a complacent attitude toward the abolition of the past. This is evidenced, for example, in the dynamics of archaeological production. Gestures of elimination and revolution occur when scholars consign other intellectual platforms to the realm of the outmoded, the outdated. Thus, a time of transcendence and progression is achieved through contradiction. Such a passage temporality conflates vanities and quarrels (politics) with time.

This obstinate belief that the past is closed and finalized and therefore stands apart from the conditions through which it comes to be defined in the present provides a rationale for its organization; this organizing of the past relies on the removal of subsequent impurities, that is, the destruction of other pasts. Thus, one past advances at the expense of others. The destruction of Old Gurna, for example, relegates vernacular architectures to oblivion, and once Lethe lays complete claim to those things that hold the memory of these pasts, they are, as Laurent Olivier puts it, "capped." Their very existence becomes unimaginable, and "archaeology, whose fundamental practice is that of producing "material facts," finds itself directly involved in this perversion of history and [is] contaminated by it" (Olivier 2011: 22-3). Thus runs the basis for modernist chronopolitics, which hinge on this discrepancy between self-representation and practice seen in the substitution of involvements with detachments.

There is, of course, another, less dramatic, side to chronopolitics, which turns around questions of memory practice – what is remembered and how it is remembered – and which is tied to the intimacies and experiences of archaeology. Museum exhibitions, artifact displays, site reports, archives, catalogues, and site preservation; all these technologies and modes of engagement with the artifacts and vestiges of the past involve choices that are made about what matters, and this is of consequence in terms of what and how we remember. Such choices are always located and never neutral. This question of emphasis is of central concern for many archaeologists; so too are the stories we tell, both big and small. Michael Shanks and Chris Tilley, for example, saw that process of placing past societies within predefined typological sequences for the purpose of comparison as the politicization of time (1992: 53-4). This was because the time of the past was homogenized to facilitate interchangeability in cultural evolutionary terms.

Another species of *chronopolitics* locates archaeological materials in a flattened time of event and subsumes archaeology to history. The "positivist fallacy" is the label given by Anthony Snodgrass to the act of equating what is historically documented or archaeologically observable with is what is significant or was of importance in the past (1987). The "Pompeii premise" was the name given by Lewis Binford to the assumption that material vestiges speak to the moment of their deposition (1981). Ontologically speaking, archaeology actually deals less with what ancient times were like than with what becomes of what was (Shanks 2012), which is always caught in a perpetual process of transformation. Formational and taphonomic processes (Schiffer 1987), nonlinear dynamics (McGlade 1999), and time perspectivism (the latter refers to Geoff Bailey's (2007) notion that different timescales relate to different features of behavior) all have played a role in a shift from the past as it was to a past ongoing in its transformations, transformations which played to the tune of disparate temporal rhythms (Lucas 2005). While all these debates were of consequence for how archaeology conceived of time, a less acknowledged aspect, to be

sure, was how they revealed, whether directly or indirectly, the processes of selection, sorting, and serialization of things to be constitutive of particular temporalities.

What is more, because much archaeological work privileges *chronos* by placing emphasis upon particular episodes, the pluritemporal mixture looses out. Entropy and endurance are the bedfellows of time, witnessed in the intertwining of ephemerality and repetition, of perpetual perishing and incessant novelty, and of never-ending accumulation and duration. Thus, pasts endure as much as they transform. These are time's two arrows. To regard the past as gone, as irrecoverably behind us, not only denies the ways in which the past is still with us now, it also blinds us to those other pasts (things) that are rendered to oblivion (Olsen 2010). If there is no thing, then there can be no issue, no controversy, no politics, and no past. If there is no thing, then there are no grounds for the further production of time. Thus, we continue to forget to serve particular interests. These acts are repeated time and again, from Gurna to Ayodhya to Bamyan to Tara to Israel and Palestine.

Equally, accumulation and gathering leads to mixture and intertwining. Walk south along Via Appia through the Porta San Sebastiano in Rome and you will dodge buses, lorries, and cars whose movements are modified by a third-century CE gate and a road laid out in 312 BCE. Every square meter of the eternal city is a polychronic ensemble, drawing simultaneously from various times. As such, it can be argued on ontological grounds that the past is not behind us, but it both gathers and co-emerges with us in the present, for we are wrapped up with it. Here we now encounter a broad movement from a time as successive, as a series of replacements, to time as simultaneous, as coextensive (this argument concerns the spatialization of time, which is the exact inverse of Virilio's (2000) temporalization of space). Seen from this angle, time is not an external parameter, and the past is not a separate domain of reality, but both are the outcomes of myriad interactions. Let us now consider chronopolitics in light of a wholesale reorientation of the temporal machinery so central to modernity.

To assume the past is gone accords the things of archaeology the position of intermediaries rather than full-blown mediators (Olsen et al. 2012). Chronopolitics, to reiterate, should not be seen as the exclusive domain of human *being*; there is a self-realization in the ontogenesis of artifacts, monuments, remnants, vestiges, ruins, antiquities, and anything regarded as the material past. These things play just as much a role in their own formation as they contain human reality – indeed, these chronopolitics are more akin to what Bjørnar Olsen has described as unpredictable material trajectories that are "unrelated to human control and intervention" (2010: 110). Sites, monuments, artifacts, craft, and artworks, the things of the past are either weakened or strengthened depending on a diverse array of interests – legislation, labels of World Heritage, hydraulic cement, walls around sites, neglect, or admission costs. When drawn into assemblages with archaeologists, community stakeholders, government or nongovernment agencies, etc., things too can be said to have politics.

Controversies revolve around things, but these things are not indifferent to those vested in their lives. Returning to the example from Gurna, one might ask are the rock-cut voids tombs or the basements of contemporary houses? One cannot know in advance what the solid, indisputable, unquestionable reality *really is* like. And yet, this is precisely what the Egyptian Government and the Luxor City Council did; they embraced the New Kingdom "tombs" as the indisputable common world. Cavalier in conflating the past, reality, and certainty, Gurna is realized as tombs, not as the basement of houses, which have now been removed. These practices confuse the outcomes with the starting points in order to serve exclusive interests. Reality is damned through a ruse, and time is controlled by powers that eradicate long-term memory and thousand-year-old traditions in the name of national heritage, scientific knowledge, and economic gain.

Even under the best conditions, the excavations of Old Gurna, as with anywhere, put forth

one past to be experienced, felt, and engaged in its presence and others to be visualized, circulated, and read. And despite all the arduous care and meticulous detail, these things are evacuated of so much of their specificity. This is the trade-off, which archaeologists readily accept. And yet for any material past to live on, to endure, it must be constantly worked at. Memory is a struggle. So which pasts are carried forward? Once again we turn on a question that was at the root of Nietzsche's essay on history. How do we know what should be remembered? This has always been a moving target in archaeology. No matter how neutral or democratic the aspirations, the constitution of things, sites, and the stories around them will always have a political life of their own (Castañeda 1996).

For Nietzsche, history was always in service to life – so too is archaeology. Whereas the archaeologist was formerly a cultivator and curator of a detached past, she now enters onto the public stage as more of an active brewer of pasts coextensive within the present. This iterative, immanent, and kinetic experience is a remedy to living in the short term on the back of immediate reckonings by politics, economics, and mass media, and the things of the past are now pooled into an ever-present reservoir from which fresh alternatives may be crafted in the face of present dangers or perceived risks (González-Ruibal 2008; Dawdy 2009; Shanks & Witmore 2010), from which new weapons may be fashioned against inequities and falsehoods. Thus, we confront politics, following Randy McGuire (2008), as intervention and political action, from past struggles over labor rights in Colorado to exposing genocide in Argentina and Spain and Serbia and Iraq. With Yosef Yerushalmi (1996: 117), we continue to wonder whether or not the opposite of forgetting is justice. How much more rewarding and refreshing would it be to reopen *with* the material past rather than *against* it in defining a shared time? – this is *chronopolitics* in the sense of living together peacefully with the pluritemporal; this is to draw from the past in another way, a way that remains in service to life.

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- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Contemporary Past, Archaeology of the

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Church Monuments Society

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Basic Information

The Church Monuments Society is a charity founded in 1979 as a focus for all those interested in the "appreciation, study and conservation" of church monuments in the UK and abroad "of all types and periods." The Society organises biennial symposia, study tours and excursions for its members. Its website (www.churchmonumentssociety.org) includes a series of useful resources for scholars and enthusiasts, including a brief history of monument types, county-by-county guides, an illustrated glossary of forms, guide to symbolism and geology, and a bibliography. It also includes a section on newly-published works which are also reviewed regularly in its journal. The society can also be contacted c/o The Society of Antiquaries, Burlington House, Piccadilly, London W1V 0HS.

Major Impact

The Church Monuments Society is one of most well-respected, scholarly societies in the UK, with strong links to The Society for Medieval Archaeology, The British Archaeological Association and The Society of Antiquaries. Its major impact as a Society is evidenced by scholarly contributions its annual publication, *The Journal of The Church Monuments Society*. Since its first volume published in 1985, the journal has featured scholarly, peer-reviewed articles by the leading historians, art historians and archaeologists in the discipline, focused largely on the UK, and the period from the tenth to the nineteenth century. Articles include major overviews of the monumental brass and alabaster industries and workshops (Badham 1990), surveys of particular monument types, such as incised and cross slabs and burial vaults, particular iconographies, such as the Cadaver tomb (Oosterwijk 2005). Studies of individual monuments in both cathedrals (Harris 2010) and parish churches (Matich & Alexander 2010) provide important insights into the changing methodologies of monument studies. These often set individual studies in the much wider context of commemorative practice and Antiquarian scholarship.

In recent years, the journal has increasingly included international contributions from France, Germany, Italy, Spain, the Netherlands, Malta and Belize. It has also included a smaller number of studies of conservation works (Gittos et al. 1997), which feature more regularly in the twice-yearly Society newsletter and as the subject of its

regional study tours. Abstracts of all papers in back issues are published online, whilst the website also features a useful searchable index of journal content.

Cross-References

- ▶ Churchyard Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Society for Medieval Archaeology

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Churchyard Archaeology

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Brief Definition of the Topic

Churchyards, the external burial grounds associated with Christian places of worship, can inform a wide range of social, economic, religious, and demographic issues which are fundamental to historical archaeology. Historic churchyards are explored through three primary methods: churchyard survey, excavation of the burials themselves, and recording the monuments that mark burials (Rodwell 2005: 161).

Churchyard survey and planning often stand on their own as methods, revealing complex relationships between the burial ground, monuments, buildings, topographic features, and the wider landscape (Mytum 2000: 137). Planning is also the first stage of excavation or monument recording, and geophysical survey can either help target excavation or serve as an alternative (Kerns-Nocerito 2002). Due to the complex stratigraphy and the ethical considerations of disturbing comparatively recent graves, churchyard excavations are generally limited to redundant churches or rescue situations (e.g., Brickley 2006; Mays et al. 2007), underscoring the importance of nondestructive survey as a research tool.

Monument recording provides essential information about memorial production and consumption, burial location, churchyard development, and local populations. However, it is also a vital tool of preservation, as historic graveyards lack statutory protection, and monuments are under constant threat of decay, movement, and loss. The recording, classification, and interpretation of churchyard monuments was pioneered in North American historical archaeology (e.g., Deetz & Dethlefsen 1972), but the field has recently advanced substantially in both method and theory, such as in innovating and standardizing recording benchmarks (Mytum 2000, 2004), and in developing interpretations beyond status and economy, considering emotion, identity, and audience (Tarlow 1999).

Increasingly, projects integrating above- and below-ground archaeology have delivered the most noteworthy advancements in understanding historic burial practice (e.g., Mytum 2007; Tarlow 2011). Comprehensive nondestructive recording and survey is the standard

methodology in modern churchyard archaeology, but where judicious excavation is feasible and ethically justifiable, or previously excavated data can be reassessed, a combination of the three approaches offers considerable potential.

Cross-References

- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Mytum, Harold
- ▶ Social Identity in Historical Archaeology
- ▶ Tarlow, Sarah

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Basic Biographical Information

Altan Çilingiroğlu was born in Sürmene, Trabzon, in 1944. He studied archaeology at Istanbul University and received a state grant to complete his M.A. and Ph.D. at Manchester Victoria University in 1972. Following his return to Turkey in 1976, Dr. Çilingiroğlu assisted at Erzurum Atatürk University before he was promoted as assistant professor at Aegean University in 1982 and professor in 1988.

Major Accomplishments

As an undergraduate, Çilingiroğlu gained experience in significant excavations such as Can Hasan and Çavuştepe. After he was employed in the Aegean University, with the Division of Archaeology as a separate department in the faculty, he established the Protohistory and Near Eastern Archaeology Department. Together with management of excavations, he organized a series of symposiums, accredited internationally, in Iron Age content. In addition to this, he served on advisory committees of numerous institutions.

His expertise is mostly in ancient and prehistoric cultures of South Anatolia, Persia, Caucasus, and Urartian Kingdom. He conducted numerous seminars in Japan, Australia, Uzbekistan, and Germany and other countries. Çilingiroğlu has published more than 70 articles and 14 books about the Urartian Kingdom and its history, art, foreign policy, war, economics, beliefs, and Ulucak Hoyuk in İzmir.

Çilingiroğlu served as assistant dean from 1985 to 1989 and dean of the Faculty of Literature from 2000 to 2003. He is the former vice president and the member of the Turkish-American Association of Izmir, the principal

member of the Turkish Institute of Archaeology, lifetime member of Archaeological Institute of the USA. Çilingiroğlu was the invited speaker for Australia's the University of Melbourne in 1989, Germany's University of Tubingen in 1991, Israel's Tel Aviv University in 1992, and University of Florence, Italy, in 1994. He was given an award by the Aydın Doğan Foundation for his contributions to archaeology in Turkey. Çilingiroğlu is still busy conducting excavations in settlements at Ayanis (Van) and Ulucak Mound (Izmir).

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► Urbanism in the Ancient Near East

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Citrus Fruits: Origins and Development

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Basic Species Information

Citrus fruits (*Citrus* spp. Rutaceae) are subtropical to tropical perennial fruit trees, producing juicy segmented fruits with thick rinds (Fig. 1). There are numerous named cultigens, with perhaps at least nine widely recognized, including mandarin or tangerine (*C. reticulata* Blanco), orange (*C. x sinensis* L. Osbeck), Seville, bitter or sour orange (*C. x aurantium* L.), the pomelo or shaddock (*C. maxima* Burm.), citron (*Citrus medica* Ferr), lime (*C. aurantifolia* Christm. Swingle), lemon (*C. x limon* L. Burm. F.), and grapefruit (*C. paradisi* Macfad.). In addition, makrut lime and leech lime or papeda are of widespread local importance in tropical Asia. However, as many as 300 species have been described, and this group presents taxonomic challenges due to the fact that these species readily hybridize, self-pollinate, and produce parthenocarpic fruit (asexually, with cloned seeds or no seeds). In addition, individual trees can present mutations on particular branches, which can then be reproduced readily by grafting. Many of the well-known, as well as lesser known, cultivar varieties are the result of a complex history of reticulate evolution. The main commercial citrus are derived from three basic species: *C medica* (citron, limes, and lemons), *C. reticulata* (oranges), and *C. maxima* (pomelo) (Scora 1975; Roose et al. 1995), in addition to *C. hystrix*. The complex taxonomic situation in citrus fruits warrants caution in interpreting historical, linguistic, or archaeological evidence.

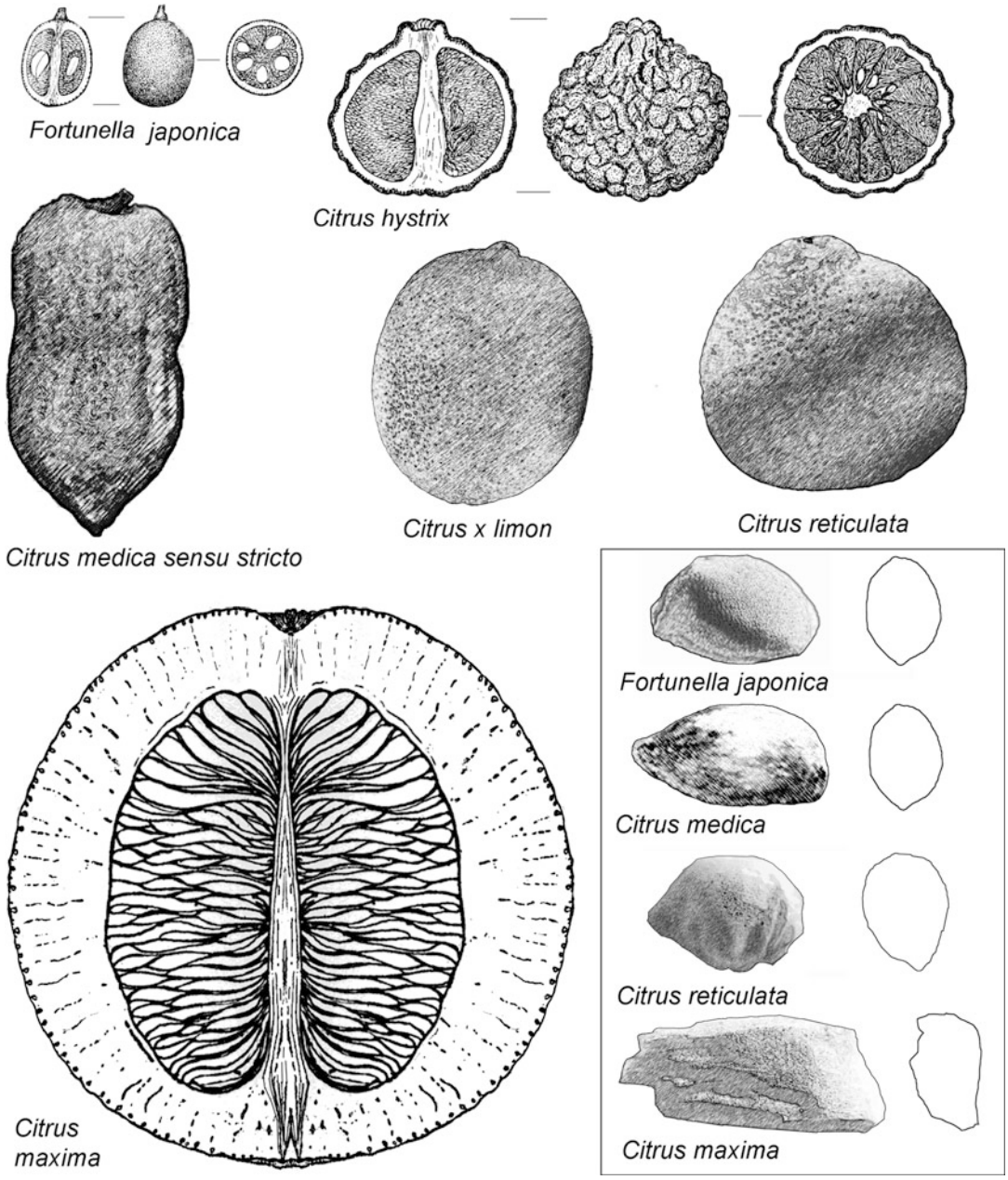

Citrus Fruits: Origins and Development, Fig. 1 Representative fruits of *Citrus* cultivars representing the three main superspecies as well as *Citrus hystrix* and the kumquat *Fortunella japonica*. *Inset* shows typical seeds

Linnaeus first combined *Aurantium* (orange), *Citreum* (citron), and *Limon* (lemon) under the name *Citrus*. While Romans knew citrons and probably lemons, other taxa came to the Mediterranean only later. The name orange comes from a possible Dravic or Tamil root (*nraga*) via Sanskrit *nāranga* and Persian *Nārang* to Arabic *nārandj* to the fourteenth-century Spanish *naranja* and Portuguese *Laranjab* (Mabberly 2004). In English, "an naranj" turned into orange, and became associated with the color. Many of the common names for citrus

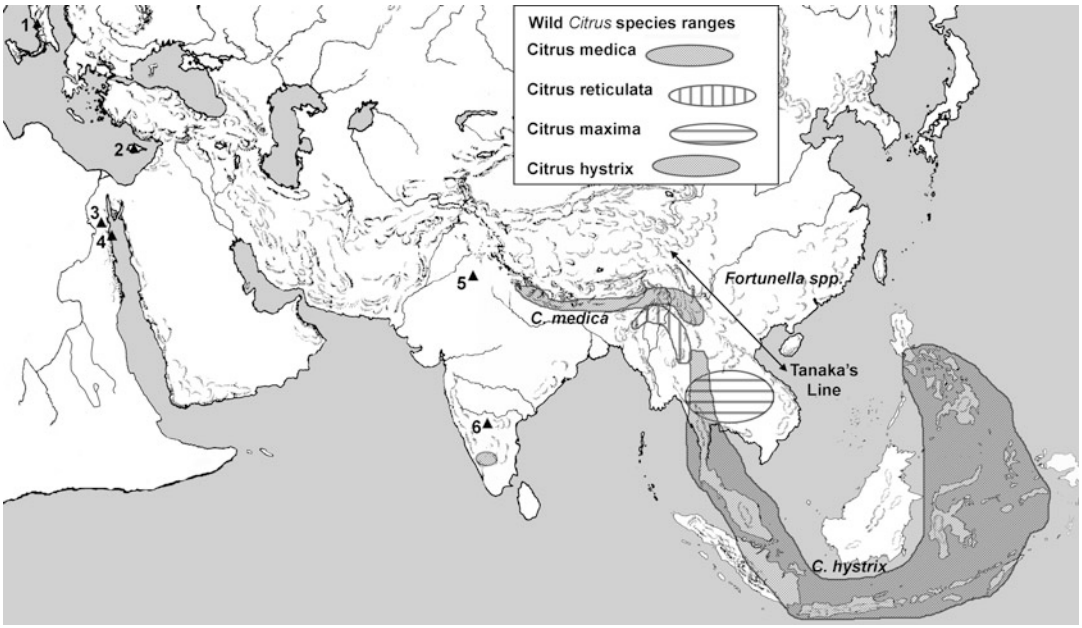

Citrus Fruits: Origins and Development, Fig. 2 Map of plausible centers of domestication of the original *Citrus* cultivars and the distribution of archaeobotanical evidence, sites numbered: *1*. Pompeii, *2*. Hala Sultan Tekke, *3*. Mon Claudianus and Mons Porphyrites, *4*. Quseir al-Qadim, *5*. Sanghol, *6*. Sanganakallu

cultivars are derived from Arabic reflecting the role the Muslims played in their introduction to Europe, following earlier diversification in India and tropical Asia (Ramon-Laca 2003).

Both the flowers and the fruit have economic value. The edible segments or carpels contain vesicles full of juice and are widely eaten or juiced. The flowers and seeds are the sources of neroli and petitgrain oils, the base of many perfumes. The skin or zest contains oils that have insecticidal value, and these have numerous medicinal applications. Citrus fruits are produced on large shrubs or small trees. They are susceptible to frost and sweetness cannot be achieved in cool areas. The color of the skin is dependent on the climate. In diurnal climates with a cool winter, the color changes, but in the tropics, the skin stays green.

Timing and Tracking Domestication

All these fruits are thought to have been domesticated somewhere in the area spanning from north eastern India to South China and Southeast Asia (Roose et al. 1995), but there is no firm evidence for precisely where or when (Fig. 2). Tanaka (1954) suggested a demarcation from the eastern Himalayas through Yunnan and north of Burma ending south of Hainan island, south of which he located the origins of the major citrus fruits, while minor related genera (*Poncirus* and *Fortunella*) might have had their origins to the north of this line, especially in southeast China. The origins of the citron (*C. medica*) may lie further west in South Asia, probably in the central Himalayan foothills, and the orange/mandarin (*C. aurantium*) group in Southernmost China/northern Indo-China. The pomelo is perhaps a later addition to the repertoire once sedentary cultivation and specialized arboriculture were established in mainland Southeast Asia. The leech lime (*C. hystrix*) must be native to the Island Southeast Asia, but probably also the Malay Peninsula, and is suggested to have been translocated with early Austronesian expansions (Blench 2005).

Citrus fruits are poorly represented in the available archaeobotanical record. One challenge is in distinguishing the main superspecies or cultivars from seed morphology. It is also the case that seed finds are exceedingly rare in archaeobotanical assemblages. Citron cultivation is likely to have begun in the second millennium BC and perhaps began in the Gangetic basin or Himalayan foothills in the western portion of its range. The only early archaeobotanical seed evidence for *Citrus* fruits in South Asia comes from the Late Harappan (Baran Phase) site of Sanghol in Punjab, in the early second millennium BCE (Saraswat & Chanchala 1997). Wood charcoal may track its arrival in South India in the late second millennium BCE. Although reported as lemon, this level of identification is not clearly established from the reported seed material. Citron is more likely, as this is the closest to wild forms and was the first of the *Citrus* fruits to reach the west, where it is described in Hellenistic sources and presumably by the Persians, based on historical references. The early literary references are found in Sanskrit literature, which probably refer to citrons and/or lemons as well as some oranges in the early first millennium BCE (Asouti & Fuller 2008). Citrons are also known from Chinese sources, including Chi Han's flora of Southeast Asia from the fourth century CE (Simoons 1991: 201).

The arrival of citrus fruits in the Mediterranean and Europe is still poorly documented. A single archaeological report for citron comes from Late Bronze Age Cyprus, c. 1200 BCE, but has not been confirmed by direct dating (Zohary et al. 2012). Citrus seeds are said to have been found at the Sumerian ruins in Nippur by Kellerman in 1916, although their identification and date are uncertain (Webber et al. 1967). In addition to the citron (*Citrus medica*), lemons (*C. limon*) may also have been available during the Roman period in the Mediterranean. A single mineralized seed (possibly of lemon) was found at Pompeii dating to the early second century CE along with some pollen grains (Coubray et al. 2010). Paintings depicting Citrus trees in fruit have also been found at Pompeii and on Roman mosaics (Mabberly 2004). In Roman Egypt, desiccated citron seeds were found at Mons Porphyrites and Mons Claudianus dating to first and second centuries CE and seeds and rind at Roman period Quseir al-Qadim (Van der Veen 2011). Other Citrus cultivars probably did not arrive in the west until Islamic times (Watson 1983; Zohary et al. 2012). Rind from lime (*C.* cf *aurantifolia*) has been recovered from Islamic (eleventh–thirteenth century) Quseir al-Qadim (Van der Veen 2011). Citrus was brought to the New World by Columbus on his second voyage in 1493 (Scora 1975), and somewhere in the Caribbean, grapefruits evolved from a cross between a pomelo and an orange (Barret & Rodes 1976).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Clark, John Desmond

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Basic Biographical Information

John Desmond Clark was born in London on 10 April 1916 and died on 14 February 2002 in Oakland, California. He was educated at Monkton Combe School and at the University of Cambridge, whence he graduated with First Class Honors in Archaeology and Anthropology in 1937. In 1938 he married Betty Cable Baume, whom he had met when she was studying modern languages at Cambridge. He was Curator and later Director of the Rhodes-Livingstone Museum in Northern Rhodesia (now Zambia) from 1937 until 1961 and built it into one of the finest museums of African ethnography and archaeology on the continent. During this time he became well acquainted with all the leading figures in African archaeology and was instrumental in encouraging regular professional interactions across Africa through the Pan-African Congresses on Prehistory held every four years in different countries in Africa, the third of which he organized in Livingstone in 1955 (Clark & Cole 1957).

During 1941–1946, he served in the British Army, initially as sergeant in the Seventh East African Field Ambulance Corps in Ethiopia, Somalia, and Madagascar. Even while on active service, his passion for prehistoric archaeology remained undiminished, and he collected artifacts wherever the vagaries of war conducted him, often under perilous conditions. Several pioneering papers were soon to appear in the South African Archaeological Bulletin describing various Later Stone Ages sites in Ethiopia.

During the war years, his wife Betty looked after the Museum in Livingstone, and she played a major personal and professional role throughout his life, helping with running the expeditions and commissariat, drawing artifacts, and assisting with the preparation of his scholarly manuscripts.

After officer training he became Civil Affairs Officer in the British Military Administration in Somalia until 1946, during which time he also seized every opportunity to carry out archaeological research. In 1948 he took a year's leave to be based at the University of Cambridge and was awarded a Ph.D. degree in 1951 for his research on the prehistoric cultures of the Zambezi Valley, Ethiopia, and Somalia. Part of this material was incorporated into his first book on the *Prehistoric Cultures of the Horn of Africa* (Clark 1954). The Zambezi Valley work was to continue for many years and was published as three substantial

volumes on *The Kalambo Falls Prehistoric Site* (Clark 1969, 1974, 2001).

In 1961 he became Professor of Anthropology at the University of California, Berkeley, where for 25 years he taught, spent up to three months each year excavating in Africa (Clark 1967, 1970, 1975, 1980; Clark & Bishop 1967) (and later in India and China), and researched and published major monographs and scholarly papers until his notional retirement as Professor Emeritus in 1986. While at Berkeley he developed a highly respected and very popular graduate program in African prehistory and paleoanthropology, assisted in later years by Glynn Isaac, who shared his profound love of Africa (Clark 2002). Many of the graduates from this program went on to occupy distinguished University positions throughout North America and were instrumental in deepening and extending Desmond Clark's pioneering work on African prehistory (Cooke et al. 1987).

Major Accomplishments

Professor Desmond Clark was by far the most eminent and productive scholar of African prehistory in the twentieth century and had an unrivalled knowledge of African ethnography, archaeology, and paleoanthropology derived from 60 years of sustained fieldwork throughout that continent. He was author of over 300 research articles and author/editor of some 30 books and monographs. He carried out major excavations in Northern Rhodesia/Zambia (Kalambo Falls) (Clark 1969, 1974, 2001), Ethiopia (Gadeb, Middle Awash) (Clark et al. 1984), Somalia, South Africa (Clark 1959), Angola, Malawi, Tanzania, Niger (Adrar Bous), and Sudan (White Nile Valley) (Clark 1980), as well as Syria (Latamne), India (Son Valley), and China (Nihewan Basin). This work spanned some of the earliest evidence of human butchery practices and use of fire through the increasingly complex development of stone tools and associated hunting and foraging strategies to the causes and consequences of early food production. A measure of the esteem in which he was held by his peers was the invitation to dig for two seasons in central India with Professor G.R. Sharma and for several seasons in the Nihewan Basin in China with Professor Jia Lanpo.

An enduring attribute of all his work was the strong emphasis he placed upon interdisciplinary teamwork (Clark et al. 1984; Cooke et al. 1987; Clark 2002) and upon placing archaeological data into an ecological and landscape context (Clark 1967; Clark & Brandt 1984). He always took great pains to place his own research into a wider environmental framework and was a past master at producing a scholarly synthesis (Clark 1970, 1975, 1980, 1982, 2001). One outstanding outcome arising from his network of professional friends and colleagues across Africa was the *Atlas of African Prehistory* (Clark 1967), which not only provided in easily accessible form distribution maps of all known prehistoric and fossil sites in Africa but had the added advantage that they could be superimposed upon maps showing geology, vegetation, and climate. Although superseded by new discoveries and easy access to satellite imagery, this atlas remains a useful introduction to African paleogeography.

His profound knowledge of African ethnography, much of it gained during long trips on foot across many parts of Africa, enabled him to weave his ethnographic insights into his interpretation of prehistoric practices and lifestyles (Clark 1980; Clark & Harris 1985). Desmond Clark also possessed a detailed knowledge of the entire temporal range of African prehistory, ranging from the Early Stone Age through to Iron Age. Another of his strengths was his willingness to make use of the latest technological breakthroughs in archaeological science, including new dating techniques and new methods of geochemical or paleoecologic analysis. Despite his formidable academic accomplishments and the many honors showered upon him, he remained humble, approachable, and helpful throughout his life. Many young archaeologists throughout the world have benefited from his encouragement and wise counsel.

Among the honors bestowed upon him were Commander of the Order of the British Empire (1960), Commandeur de l'Ordre national de

Sénégal (1967), the Huxley Medal of the Royal Anthropological Institute, London (1974), the Gold Medal of the Society of Antiquaries, London (1985), the Berkeley Citation from the University of California (1985), the Gold Medal of the Archaeological Institute of America (1989), and Honorary Doctor of Science degrees from the University of Witswatersrand, Johannesburg (1985), and the University of Cape Town, South Africa (1985).

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- ▶ Southern Africa: Origins and Development of Agriculture
- ▶ Southern and East African Middle Stone Age: Geography and Culture

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Clark, John Grahame Douglas

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Basic Biographical Information

Professor Sir John Grahame Douglas Clark, C.B.E., F.B.A., M.A., Sc.D., Ph.D. (28 July 1907–12 September 1995), was an eminent British archaeologist. He was arguably one of the most influential prehistorians of the twentieth century, particularly within the economic and ecological fields of Mesolithic archaeology. He was born in Bromley, then part of the English county of Kent, and attended Marlborough College in the early years of his education. He arrived at Cambridge University in 1926 where he read history, archaeology, and anthropology at Peterhouse College. He completed his dissertation on the British Mesolithic in 1930 and was awarded his Ph.D. in 1933 (Rowley-Conwy 2001).

Clark received a three-year Hugo de Balsham research fellowship in 1930. Two years later, he was awarded a Bye-Fellowship, elected a Fellow of the Society of Antiquaries of London (SAL), and became a founding member of the Fenland Research Committee (FRC), an organization

that investigated the evolution of Quaternary geology at Fenland in Cambridgeshire, England. He was appointed Faculty Assistant Lecturer at Cambridge and Honorary Editor of the Proceedings of the Prehistoric Society in 1935. He was also the society's President between 1958 and 1962 (Rowley-Conwy 1999).

During the Second World War, Clark assisted the Royal Air Force in interpreting aerial photographs. He helped establish the Council for British Archaeology in 1944. He was made a Lecturer at Cambridge in 1946 and Disney Professor of Archaeology in 1952. He was a member of the Ancient Monuments Board from 1954 to 1977 and the Royal Commission on Historic Monuments from 1957 to 1969. He also held office as Vice-President of the Society of Antiquaries of London from 1959 to 1962 and served as a trustee of the British Museum from 1975 to 1980. He retired from the Disney Chair in 1974 but remained in Cambridge as the Master of Peterhouse from 1973 to 1980.

Major Accomplishments

With an extraordinary career spanning seven decades, Clark was an early pioneer of a more scientific and anthropological form of archaeological theory and research. His work foreshadowed some of the central ideas and aspects of the New Archaeology movement during the 1960s, and his influence left a profound impact on generations of archaeologists across the world.

At the age of 25, Clark published his Ph.D. dissertation as *The Mesolithic Age in Britain* (1932), in which he identified and defined distinct Mesolithic artifactual assemblages through the detailed study of their spatial and chronological distributions in Britain (Clark 1932). Between 1933 and 1940, he published eight articles and site reports for the FRC which combined archaeological stratigraphy and typology with palynology and environmental reconstruction, thereby redefining archaeology from a parochial study of typologies and surface finds towards excavations and a stratigraphic-geological approach that archaeologists hold as convention today (Smith 1994). His partnership with botanist Sir Harry Godwin in particular allowed him to correlate ecological data derived from pollen analyses with variations between assemblages and prehistoric periods.

Clark also extended the study of the extinct Mesolithic landscape into the European mainland with *The Mesolithic Settlement of Northern Europe* (1936). His insights into the cultural adaptation of prehistoric humans to their environment were further developed in *Archaeology and Society* (1939) and *Prehistoric England* (1940). This, in turn, led him to analyze the intertwining relationships between climatic and environmental variables and prehistoric economies in *Prehistoric Europe: The Economic Basis* (1952).

Clark is most renowned for his work at the Maglemosian lakeside settlement site of Star Carr in Yorkshire, England. Published as *Excavations at Star Carr* (1954), it is still regarded as a seminal study of material culture and economy of a Mesolithic settlement within an ecological context. His work at Star Carr also produced a paper entitled *The Economic Approach to Prehistory* (1953), which contained a classic systems diagram depicting the complex interdependence of human culture with its environment that predated those of the New Archaeology by some 15 years (Rowley-Conwy 2002).

Clark's most important legacy lies perhaps with his students and protégés, many of whom became prominent scholars and archaeologists in their own rights, including Charles Higham, a leading authority of prehistoric Southeast Asia, and John Mulvaney, the "father of Australian archaeology." As Disney Professor, Clark was also responsible for employing Eric Higgs, the founder of the Cambridge Palaeoeconomy School, and David Clarke, who would become one of the principal proponents of the New Archaeology, thereby creating an exciting and vibrant learning environment for students at Cambridge University.

In recognition of his work and contributions in archaeology and prehistory, Clark was elected Fellow of the British Academy in 1951, appointed Commander of the Most Excellent

Order of the British Empire in 1971, and knighted in 1992. He also received the SAL Gold Medal in 1978 and the Erasmus Prize of the Netherland's Praemium Erasmianum Foundation in 1990.

Cross-References

- ▶ Cultural Ecology in Archaeology
- ▶ European Mesolithic: Geography and Culture
- ▶ Mulvaney, John

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Classical (Greek) Archaeology

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Introduction and Definition

Classical archaeology is often considered an archaeology apart. It is an archaeological tradition that has quite different priorities and interests than those of European prehistory of American "anthropological" archaeology. There are reasons for this sense of difference, that relate to classical archaeology's peculiar history (Alcock & Osborne 2007: 1-29).

Historical Background

The Beginnings of Classical (Greek) Archaeology

Classical Greek archaeology begins not in Greece but in Rome. From the Renaissance onward, rich Roman families such as the Borghese, Farnese, and Medici began to investigate the numerous Roman-era ruins of the city of Rome and its environs. They did this with a view to collecting art, particularly sculpture. Earlier Roman writers, in particular the elder Pliny, had listed many of the sculptures to be found around Rome, often referred to as "ars" (art or craft in Latin). Sculptures so classified however, though found in Rome, were often the work of Greek artists/craftsmen, and sometimes had Greek inscriptions to go with them. Indeed, one can argue that the peculiarity of the Latin term "ars" is that it refers

almost exclusively to sculpture and painting made not by Romans but by Greeks, and refers to work produced within a relatively narrow chronological range (circa 500–250 BCE). This local tradition of classical antiquarianism continued throughout the seventeenth century, by which time aristocrats from other European countries (such as the Earl of Arundel, whose collection of Greek sculpture forms the core collection of the Ashmolean museum in Oxford) had begun to join the game.

Classical archaeology proper, as a form of systematic study of antiquity, is however usually held to begin with J.J. Winckelmann, whose *Geschichte der Kunst der Altertums* [History of Art in Antiquity, 1764] is the first attempt to deal comprehensively with the material remains of Greece, Etruria, and Rome. Winckelmann's study remains primarily a study of objects, not contexts, and remained firmly centered in Rome. In addition to sculpture and painting, it involved the systematic treatment of architecture, gems, mosaics, coins, and "vases" (as painted pots with Greek inscriptions came to be called). It devised a pre-Darwinian evolutionary scheme for the development of Greek art, one where a style that is "straight and hard" is succeeded by another that is "grand and square"; this is turn is followed by a "beautiful and flowing" style that eventually falls from grace, and becomes imitative and decadent.

Winckelmman's evolutionary scheme, with is rhythm of rise and fall, is more influential than some archaeologists working in other traditions might acknowledge. I doubt, for example, if Mesoamerican archaeologists would have coined their threefold scheme of "Formative/pre-Classic," "Classic" and "Post-Classic" for the Maya civilization without the (possibly unconscious and unacknowledged) influence of classical archaeology in general and Winckelmann in particular. And Winckelmann's scheme (though not his terms) have proved remarkably tenacious. When western Europeans began collecting sculptures, not only from Italy but from Greece, at the beginning of the nineteenth century (with the acquisitions of the Parthenon Marbles/Elgin Marbles and the Bassai frieze by the British Museum and the Aphaia pediments by Munich's Glyptothek [sculpture museum]), they fitted their finds into Winckelmann's scheme. And when, from 1830, Greeks won their independence from the Ottoman Empire, they turned to German scholars (such as Ludwig Ross), who was steeped in Winckelmann, to organize their fledgling state archaeological service. Conscious of recent losses, the Greeks were determined that no more works of art (sculpture, vase painting) were to leave Greece for Western Europe. So, when in 1874, the newly founded German Archaeological Institute in Athens requested permission to excavate at the major panhellenic sanctuary site of Olympia (where the original Olympic Games were held), the Greek authorities accepted, on one condition: All the finds were to stay in Olympia itself (Marchand 1996).

Just as Winckelmann's is the first systematic exploration of Greek art, so the excavations at Olympia were the first major systematic excavation of a Greek site. As well as major works of sculpture (such as the Nike of Paionios of Mende, and the pedimental sculptures from the temple of Zeus), the German excavators (Adolf Furtwängler and Wilhelm Dörpfeld) also recorded, studied, and cataloged hundreds of minor finds. Though the excavators paid some attention to context, the finds were published by material and type (all bronze figurines, for example). Other foreign and Greek archaeologists were spurred on by the German example, the French beginning their "grand fouille" at the equally important panhellenic sanctuary of Delphi in 1892. Finds were now pouring in from numerous excavations. By 1889, the Greeks had constructed their own neoclassical National Archaeological Museum to house these new discoveries. But the museum is (or was until recently) adorned with copies of "Greek" sculptures (the Apollo Belvedere, the Doryphoros of Polykleitos) that were not, in fact, to be found at all in Greece, but in Rome. It is a National museum that deferred to foreigner's ideas of what "Greek," "classical," and "art" should be. A nation-building project, deeply entangled with archaeological practice (Hamilakis 2007), and dedicated to restoring the glories of ancient

Greece was equally indebted to a Roman concept that is not to be found at all in the literature of Homer, or in any of the Attic tragedians, comedians, or philosophers – namely art.

This German-inspired archaeology of objects is not however the only intellectual tradition within the archaeology of classical Greece. There is another, focused on topography, ethnography, and landscape, that has its origins in the tradition of travel writers, particularly active from 1800 to 1830. Figures such as William Gell, Edmund Dodwell, E.D. Clarke, and Captain William Martin Leake traveled around Greece, collecting finds, making observations about the identity of classical sites (compare Dodwell and Leake at the Argive Heraion) and often with an engraver or watercolorist in tow (Whitley 2001: 44-7). Observations about the Greek past were juxtaposed with observations about the then state of what is now Greece (then part of the Ottoman Empire). Some of these observations are simply derogatory; others had considerable ethnographic insight. After the British lost out in the late-nineteenth century scramble for classical sites to excavate, this tradition was renewed in the early twentieth century. The principal excavators of the Archaic and classical sanctuary site of Artemis Orthia, near Sparta, A.J.B. Wace and R.M. Dawkins, produced a site report that dealt with thousands of votive objects, after the example of Olympia. But they also had wider interests: Dawkins in the modern Greek language and Cretan prehistory, Wace in ancient topography, prehistory, and the ethnography of the nomads of Northern Greece. This practice of seeing ancient Greece through the lens of modern Greece continued in the work of J.D.S. Pendlebury on Crete, and later in the archaeological surveys that began in the 1960s. These large, multi-period fieldwalking surveys (such as the Boeotia survey led by Anthony Snodgrass and John Bintliff, or the Kythera Island Project led by Cyprian Broodbank and Vangelio Kiriatzi) owe much of their practice to the influence of Anglo-American "processual" archaeology in the 1960s and 1970s. But they also continue a tradition that goes back to the travelers of the early nineteenth century.

Classical archaeology in Greece has then not one, but two distinct intellectual traditions, with distinct affiliations. The older, German one is an archaeology of objects, and concentrates its attention on major sanctuary sites, where objects are still published by material and type. It focuses on periods that are clearly classical (that is the Archaic, classical, and Hellenistic periods, circa 800–30 BCE). The alternative, largely Anglophone tradition is not so much focused on objects and on the Greek landscape. It takes a more diachronic approach to the archaeology of Greece, and its interpretations are informed by quasi-ethnographic observations of contemporary Greece. Of course, one can find exceptions to this neat scheme: Dörpfeld famously trenched the whole of the southern plain of Lefkada in a vain search for Odysseus' palace, resulting in an exemplary piece of landscape study (see Snodgrass 1987: 18-24), and perhaps the most celebrated artifact specialist of all time was J.D. Beazley, who attributed thousands of Athenian black- and red-figure vases to particular painters (or hands). But Beazley (as he acknowledged) was working within a field dominated by German scholars; Dörpfeld's work was not followed up by any German scholar for at least half a century.

Key Issues and Current Debates

The Scope and Practice of Classical Greek Archaeology

What are the boundaries of the classical archaeology of Greece? Chronologically, classical archaeology is held to begin with the inception of the Iron Age around 1100 BCE, continuing through the Archaic (800–480), classical (479–323 BCE), and Hellenistic (322–30 BCE) periods. Once upon a time, Aegean Prehistory (or at least the Bronze Age) was considered a part of classical Archaeology, but nowadays, most scholars draw a thick line at the fall of the Mycenaean palaces around 1200 BCE (the line being the one where Aegean prehistory ends and classical archaeology begins). The status of the Roman period in Greece is ambiguous – the Greek Archaeological Service defines "classical"

as ending with the accession of the Roman Emperor Constantine, everything after that being considered "Byzantine." Geographically, classical Greek archaeology comprises everything within these chronological boundaries found within the modern Greek state; finds from "Greek colonies" in Sicily, Southern Italy, the Black Sea, Libya, and Egypt; finds from cities that once lay within the boundaries of the major Hellenistic kingdoms in Anatolia (e.g., Pergamon), Syria, Jordan, Israel/Palestine, Egypt, Iraq, Iran, Afghanistan (e.g., Ai Khanoum), and parts of Pakistan; and (more ambiguous this) finds which look Greek (such as Apulian red-figure pottery) but which have nothing, in an ethnic sense, to do with Greek speakers as such (see Carpenter 2009). Conversely, areas of the ancient world which, while full of Greek speakers, but which did not (before Hellenistic times) make much use of the Greek alphabet or have an obviously classical material culture, such as Cyprus, are also in an ambiguous position. In practice, the criteria usually applied are simply whether an item looks "Greek" in the eyes of museum professionals; and, from their point of view, red-figure (even if Apulian) is Greek, whereas Cypro-Geometric pottery from Kourion or Salamis on Cyprus is somehow slightly Oriental.

These ambiguous boundaries affect archaeological practice. Within Greece itself, the state Greek Archaeological Service is responsible for local museums, but concerns itself primarily with rescue (or salvage) excavations made in advance of development. So, for example, the widening of the railway line to the North of the city of Thebes has resulted in a full exploration of that city's North Cemetery. A perennial problem remains that of storing, let alone publishing, all the finds that turn up from such excavations. Summary reports from such studies appear annually in the *Archaiologikon Deltion*. Greek universities (seven of which have archaeology departments) also engage in research excavations. Foreign archaeologists are represented by the so-called archaeological schools (in order of foundation, French, German, American, British, Austrian, Italian, Swedish, Swiss, Belgian, Australian, Canadian, Dutch, Danish, Norwegian, Finnish, and Irish), which are allowed a maximum of three field projects (survey or excavation) per year, and three joint projects with the archaeological service (*synergasies)*. The vast amounts of information all these activities produce is summarized annually in "Archaeological Reports" (published by the British School) and "Chroniques des Fouilles en Grèce" (published by the French). Both of these publications are now (jointly) available online.

Outside Greece, Greek "classical" archaeology is practiced in museums and university departments. The (once) Great Powers of nineteenth- and twentieth-century Europe and America have built up great, imperial museums, such as the Louvre in Paris, the British Museum in London, the Pergamon museum in Berlin, and the Metropolitan Museum of Art in New York. At the heart of these museums, at their core, are collections of Greek and Roman material, in particular objects referred to as "Greek art," chiefly sculpture and painted pottery. Indeed, it is often in these museums that the major pieces of sculptural ornament of major Greek temples are to be found. Sometimes a particular museum manages to preserve the sculpture in its entirety, as at the Pergamon museum in Berlin; at others, various museums hold varying amounts of sculptural ornament. So the pediments, metopes, and frieze of the Parthenon are divided unequally between museums in London, Athens, Rome (Vatican), Paris, Palermo, and Copenhagen. But these museums also contain vast stores of unexhibited finds (which may not count as 'art') from earlier archaeological projects. Often, restudy of these finds yields new insights. So, for example, the finds from Flinders Petrie's excavations at the Greek "emporion" (trading town) of Naukratis in Egypt are now being comprehensively restudied by a team from the British Museum led by Alexandra Villing. The aim is not simply to produce a database, but to reinterpret in the light of new questions and theoretical concerns, using new methods (such as the advances in ceramic petrology achieved at the Fitch Laboratory of the British School at Athens). Restudying Naukratis can tell us much about interactions

between Greeks and Egyptians in the Iron Age, about ethnicity, and about the "connectivity" of the Mediterranean world in the Iron Age.

Equally, the actions of great museums are sometimes determined by their founding values. The Metropolitan Museum of Art in New York is pre-eminently an art museum. Unlike its neighbor, the American Museum of Natural History, on the other side of Central Park, objects in the museum are treated primarily as "works of art," that is, objects whose aesthetic value exists independent of any cultural, social, or historical context or interest, and are displayed as such (see Price 1989). The "object biography" of a Greek vase acquired by the museum in 1972 illustrates the point. This object was a late Archaic Athenian red-figured calyx krater potted by Euxitheos and painted by Euphronios, whose principal scene was two winged figures (Sleep and Death) taking away the body of the Trojan/Lykian hero Sarpedon (see *Iliad* 16. 476-507), killed by Patroklos. The justification for the acquisition of (and the price paid for) this vase was that it was a "work of art," in every sense comparable to woodcuts by Dürer or the painter of the Book of Hours (Watson & Todeschini 2006: x-xi). The seller was rather coy about its provenance, though there was a suggestion it might have been found in Beirut. Other scholars, who knew that other kraters painted by Euphronios had generally been found in Italy, with a large number coming from the Etruscan city of Caere (Cerveteri), were more suspicious. It later transpired that this vase too did indeed come from Cerverteri. It had been looted from an Etruscan tomb by *tombaroli* (tomb robbers), and broken in the process. It was moved via Switzerland and London to New York when (after being repaired) it appeared on the art market, and was then acquired by the Metropolitan Museum. After these facts came to light, it was subsequently returned to Italy, and is now to be found in the Villa Giulia in Rome.

There are two possible reactions to this story. One is, with James Cuno (2008) to lament that another of the prize specimens of one of the world's "universal" museums has been lost to the nationalist pressure of the Italian state, aided and abetted by UNESCO. This attitude was shared by a former Director of the Metropolitan Museum, who is on record as saying that all that is really significant about the Euphronios krater is "on the vase." I beg to differ. If we knew the precise context of this krater, if we knew what objects and persons were buried with it, and if we could determine their "object biographies," we would know a lot more about the Iron Age/Archaic Mediterranean world. We could begin to address such questions as: Why were the Etruscans so interested in Greek (particularly Athenian) painted pottery? Did they appreciate and understand the whole cycle of tales told about the Trojan War (especially relevant to the neighboring city of Caere, with its origin myth of Aineas, namely Rome)? Was this vase made for Italian consumers, or did it come to Caere "second hand"? This object, no less than the finds from Naukratis, is highly relevant to our understanding of Mediterranean connectivity (sensu Horden & Purcell 2000), and it is a pity that many museum curators and directors still do not seem to appreciate this simple point.

The point is perhaps easier to appreciate from a university's perspective. Archaeologists attached to universities, whether they are in departments of classics or art history (as is generally the case in the United States) or in departments of archaeology proper (as is the case in the United Kingdom), usually want to be involved in field projects, the only way in which to recover new information. Whether these projects are survey projects (involving fieldwalking) or excavation, the importance of locating finds in time and space, that is, in context, becomes second nature. It is also in universities that most of the debates about the nature of classical archaeology have taken place. Is classical archaeology just the archaeology of certain regions of the Mediterranean, whose methods and theories should differ little if at all from archaeology in general? What distinguishes classical archaeology from other archaeologies that deal with historical periods (such as medieval archaeology, or that species of historical archaeology that deals with the colonial period in the Eastern United States)? There are several possible answers to these questions.

As long ago as 1943, the distinguished (if classically educated) European prehistorian V. Gordon Childe argued strongly for the unity of archaeology, and suggested that the excavation and interpretation of classical houses at Olynthos in Northern Greece was no different in principle from the excavation and interpretation of the houses of the prehistoric (or "Pictish") village of Skara Brae in the Orkney islands (Childe 1943; see also Whitley 2001: 12-16). Both involved a considered approach to understanding domestic space, to defining the activities that took place in parts of the dwelling, and the importance of gender divisions within the household. Archaeologists who take a different view tend to emphasize one of two things: the unique standing of the classical Greek achievement, or the unique significance of its art.

These questions have gathered force and urgency as classical Greek archaeology has been affected by developments in other archaeologies. "New" or processual archaeology, as developed by anthropological archaeologists in North America or by prehistorians in Britain in the 1960s and 1970s, initially had little effect on the practice of classical archaeology. In the 1980s, however, a more scientific and quantitative classical archaeology began to emerge. Finds from sanctuaries that were once cataloged were now also counted, to reveal trends in depositional practices. These trends could be understood as processes, processes integral to the emergence of states [or at least *poleis*] in Archaic Greece (Snodgrass 1980). This processual and quantitative spirit informed the development of field survey during the 1980s, most especially in the Boeotia survey (see above). At about the same time, a number of French and German classical archaeologists had been applying structuralist approaches to the interpretation of images on sculpture and vases. These streams of thought come together in Francois de Polignac's *La Naissance de la cité grecque* [1984], which in some ways anticipated the "phenemenological" approaches that were to become fashionable in European prehistory after 1994. Social and contextual studies of Greek mortuary practices, and of the painted pottery found in graves, came to the fore by the end of the 1980s (Morris 1987; see also Whitley 2001: 55-7). This led to the expectation in some quarters (notably Shanks 1995) that classical archaeology would follow British prehistory in developing from a "traditional" through a "processual" and finally to a "post-processual" stage. This has not come to pass – traditional classical archaeologists have not been supplanted, but supplemented by other scholars with a range of theoretical interests, expressed with varying degrees of explicitness.

Classical Archaeology in Greece: Current Issues and Debates

The key practical debate relates to museums. Should the bulk of classical Greek material culture (and art) be held in "universal" museums (such as the British Museum), museums whose mission is to hold a representative part of the material remains of all civilizations? The argument for this is that greater intellectual and aesthetic insights will be gained through juxtaposing Greek and Roman with Assyrian and Phoenician (or even with ethnographic material from Polynesia) than will be gained if all material is simply held in the museums of nation states. Universal museums celebrate civilization as a whole, and act as an antidote for various nationalisms (in this case, Greek nationalism). Directors of these museums have certainly begun to make use of the rhetoric of object biography and of agency. But it has to be admitted that, as far as the Greek collections of the British Museum are concerned, the promise of the universal museum that makes arresting *comparisons* across time and space has yet to be realized. Trophies of captured Greek armor have not been juxtaposed with Congo nail fetishes, as "visible knot[s] which ties together an invisible skein of relations, fanning out into social space and social time" (Gell 1998: 62; cf Whitley 2011). Moreover, the rhetoric of the "universal museum" glosses over the fact that such museums were, in origin, imperial museums. As one early twentieth-century British politician noted, the British Museum's acquisition of major parts of the Mausoleum at Halikarnassos (one of the seven wonders of the ancient world) was aided by "a Company of

Royal Engineers and Sappers, and a British man-of-war lying at a handy distance in a convenient bay" (Asquith 1900: 136-7).

The recent completion of the new Acropolis museum in Athens has brought these issues to the fore. This museum is explicitly designed to house, and reunite, all the fragments of the Parthenon now held in several parts of the world. As such, it is designed to advance the argument that the architectural decoration of the Parthenon must, first and foremost, be seen in *context* – and it is this, and not nationalism, that is the issue. But it has to be said that it makes this argument very poorly. For the new museum, pre-eminently, represents the ideology of the Greek political class. And, like the Greek political class, the museum is ultramodern on the outside, and ultraconservative on the inside. The plaster casts of the Parthenon frieze (taken from originals in the British Museum and the Louvre) are not painted, to give some idea of how the polychrome originals might have looked. In deference to an outdated neoclassical sensibility, they remain white – indeed, ultrawhite, like teeth in advertisements for toothpaste. The Archaic votive sculptures from the Athenian Acropolis are not placed in context, or explained or displayed as votives, and linked to their inscriptions. They are not linked to debates about Archaic Athenian society. Instead, they are treated as individual works of art, that is, objects whose intrinsic aesthetic worth requires no contextualization (see again Price 1989).

Museums remain places where the impact of new ideas can often be seen. The new displays of Greek material at the Ashmolean museum in Oxford reflect, to some degree, the new interest in Mediterranean "connectivity" (Horden & Purcell 2000), and new debates about identity. "Greek" is no longer a self-evident category. The key debate in museums however remains the status of the objects displayed. Should Greek vases be seen as "artworks"? The new displays at the Ashmolean suggest not.

The debate on "Greek art" remains a lively one. On the one hand are scholars (such as myself) who, following Gell's (1998) recommendation of "methodological philistinism," see no reason to give sculpture and vase-painting special status. What is of interest is the agency of objects and the way they are entangled within social practices. So the importance of a *kore* with an inscribed base from the Athenian Acropolis is how its study contributes to debates about Athenian society, and whether that society was "aristocratic" (Duplouy 2006). Equally, the significance of the Nike of Paionios of Mende is not its aesthetic effect, but the way it negotiates the Scylla of *nike* and the Charybdis of *hybris* (Whitley 2011). On the other side are scholars such as Richard Neer, who insist that Greek sculpture can be understood in *aesthetic* terms, terms moreover which would have made sense to an ancient Greek (Neer 2010). This debate will run and run, as it goes to the heart of what classical archaeology is.

There are of course other major debates. One relates to identity and acculturation, and how processes such as the "Orientalizing" should be understood (Morris 2003). Another concerns the relationship between the various intellectual traditions that make up classical Archaeology – in particular, the German (Marchand 1996). There are developing connections between research themes. Both field survey and the debate about Mediterranean connectivity, for example, build on the work of the French historian Fernand Braudel, whose concept of the *longue durée* underpins the practice of diachronic, regional survey.

And yet, the skeptical prehistorian may ask, has classical archaeology in all this actually undergone anything like a paradigm shift? What has it contributed to archaeology as a whole? Some have answered the first of these questions in the affirmative (e.g., Snodgrass 1987, 2006: 78-104). As to the second, one could point to advances in field survey. But, in my view, the best example of a paradigm shift having taken place within classical archaeology, and of its wider (and beneficial) effects in the field of archaeology as a whole, is to be seen in the field of ceramic petrology. The establishment of the Fitch Laboratory at the British School at Athens in 1974 provided a place where scientists, trained in the natural sciences, could work closely with

archaeologists, whose background lay in the humanities. Through the vision of Hector Catling, and successive Fitch directors (Richard Jones, Ian Whitbread, and Vangelio Kiriatzi), C.P. Snow's "two cultures" could be bridged. Early expectations that the origin of painted pots could be determined by simple chemical tests proved only partially successful. It gradually became apparent that the production, distribution, and consumption of pottery, painted or coarse, involved a whole range of social as well as technological issues. Scientific advances (in the description of pottery fabrics, by Ian Whitbread) went hand-in-hand with discussion of the cultural dimensions of pottery production. The Fitch's methods combined field survey, ethnoarchaeological research into modern potters, archaeological experiments in replication of fabrics and various kinds of chemical and petrographic (thin section) analyses. The overall result is that archaeologists in Greece now approach pottery looking as much as the fabric (what it is made of, and how) as the surface decoration or shape. This is a genuine paradigm shift in the way we see pottery, and one which is having profound effects on other archaeologies.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Urban Planning in the Greek World
- ▶ Winckelmann, Johann Joachim

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Classical Greece, Archaeology of (c. 490–323 BCE)

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Introduction

The Classical period in Greece spans most of the fifth and fourth centuries BCE, an age that witnessed both the Persian and Peloponnesian wars, followed by the rise of Macedon and the conquest of Western and Central Asia by Alexander the Great. Athens is represented disproportionately in the scholarship on this era, particularly in studies of the fifth century. This situation is due in part to the reputation of fifth-century Athens as a cultural zenith in the ancient world, although the survival of important monumental architecture in Athens and the surrounding countryside – and particularly the buildings from the Periclean building program on the city's acropolis – has also contributed to the focus on that region. Classical Athens is thus sometimes treated as representative of most or all of Greece in this period, although this perception probably does not reflect the reality of the ancient situation. Some Greek states are known to have differed markedly from Athens in customs and material culture; the most dramatic example is Sparta, Athens' major political and cultural rival. Unfortunately, the material remains from Classical Sparta are relatively scant, and they seem not to reflect the importance of this state in antiquity (cf. *Thuc*. 1.10.2).

Definition

Scholars traditionally define the Greek Classical period as the years between the first Persian invasion in 490 BCE and the death of Alexander III of Macedon, or Alexander the Great, in 323 BCE. Because of the importance of these dates in political and military history, they provide convenient chronological bookends for the period, although it is important to recognize that they do not necessarily reflect the state of material culture at individual archaeological sites, which often show significant continuities with the Archaic or Hellenistic periods. Geographically, "Classical Greece" encompasses the mainland and surrounding islands, as well as the colonies in southern Italy and western Asia Minor. Despite certain differences in culture and political structures, Macedonia is often considered in conjunction with Greece in this period; this is especially true for the latter part of the fourth century, when Philip II brought the Greek *poleis* (city-states) under the control of Macedon, and indeed, the remains from Macedonian sites such as Pella and Vergina attest to familiarity with the religion, mythology, and language of the Greeks.

From its beginning, the archaeological study of Classical Greece has been closely tied to the study of its architecture and art (although it is important to note that the Greek language had no word that corresponds to our definition of "art"); consequently, these topics loom larger in the archaeological scholarship of this period and region than in scholarship focused on many other times and places. Painting (primarily on pottery) and sculpture (in both stone and bronze) constitute the majority of the art historical evidence from this period, and architectural evidence ranges from large public buildings in sanctuaries to the remains of houses at sites such as Olynthos. Epigraphy and numismatics, while subdisciplines of Classical studies in their own right, have contributed much to the archaeological study of the Classical Greek world; faunal, archaeobotanical, and osteological remains also add to our understanding of this period, although they have traditionally played a smaller role in the archaeology of Greece than in that of other reasons, in part because many important Greek sites were excavated before the use of scientific techniques in archaeological studies became common.

Historical Background

The beginning of the Classical period is marked by the invasion of Greece by Darius I in

490 BCE; his army was repelled that summer in the famous battle of Marathon, but 10 years later, the Persians invaded again, this time under the command of Darius' son Xerxes. The Greek forces again managed to defeat the invaders, but not before the Athenian acropolis was sacked and burned, an event that would be memorialized in the midcentury rebuilding of the sanctuary there. Following the Persian invasions, the Greek states began contributing funds to the "Delian League," the modern name given to the coalition led by Athens to defend against future invasions. As a result of Athens' management of the treasury, the middle and later decades of the fifth century saw mounting tensions among the Greek states, which culminated in the so-called Peloponnesian War of 431–404 BCE. During this long and bloody conflict, two coalitions of city-states faced off under the leadership of Athens and Sparta; although Sparta proved victorious, historians and archaeologists know far less about that state than about Athens, which remained highly visible in the material and literary record despite never returning to its former strength. The early fourth century saw Sparta, Athens, and Thebes jockeying for power in the Aegean; by the middle of the century, Macedon, under the leadership of Philip II, had also become an important player, and in 338 Philip's forces defeated the Greeks at the battle of Chaeronea, bringing the Greek cities under Macedonian control. Upon Philip's assassination in 336, his son Alexander III (Alexander the Great) assumed command, and he quickly moved into Asia, conquering large parts of the continent before dying in Babylon in 323. His death traditionally marks the end of the Classical period, and the years that followed were characterized by fragmentation of his empire and struggles for political and cultural supremacy among his successors.

The major archaeological sites of the Classical period include sanctuaries, towns, cemeteries, city centers, houses, and the industrial district of Thorikos in Attica. The sanctuary site that has attracted the most attention from scholars is the acropolis in Athens (Hurwit 1999), which included a sanctuary of Athena, as well as smaller ones devoted to other gods. The Athenian acropolis had already been an important site for centuries when the Persians sacked it in the early fifth century BCE, and the midcentury Periclean rebuilding program there contributed temples such as the Parthenon and the Erechtheion that are considered iconic even today. On the slopes of the acropolis sat the theater of Dionysus, where many of the ancient Greek comedies and tragedies that survive today were originally performed.

Temples and theaters were both frequently associated with Greek sanctuaries, although neither was required; in fact, the only necessary features of a sanctuary were the *temenos* (the plot of land reserved for the god) and altar, and some could be quite simple. Two of the most important sanctuaries, those at Delphi and Olympia, continued to be developed in the Classical period, although both had their origins in earlier periods. Both sanctuaries were Panhellenic (open to all Greeks) and were sites of athletic competitions as well as other sacred activities; Delphi was also known as an important oracular site. Other sanctuaries that were embellished during the Classical period include those at Eleusis, Brauron, and Epidaurus; this last site was home to the cult of the healing god Asklepios, and excavations there have recovered surgical tools, sleeping quarters for the sick, inscriptions detailing divine cures, and a variety of votive offerings left by pilgrims.

In addition to the public, sacred architecture of sanctuaries, archaeologists have excavated a number of houses that offer insights into facets of Classical domestic life (Nevett 1999, 2010). The so-called "Vari house" in the Attic countryside preserved a threshing floor and terracotta beehives, although most evidence for domestic life in the Classical periods comes from more urban areas, most notably the town of Olynthos on the Chalcidice peninsula in northeastern Greece. This city, which was destroyed by Philip II in 348 BCE, was excavated by an American team in the 1930s and remains one of the most important sites for the study of Greek domestic architecture. Its orthogonal plan was typical of cities built in the Classical period, and it includes blocks of modest houses with somewhat

repetitive – if not entirely uniform – floor plans. Unfortunately, Philip's forces destroyed all but the foundations of most of the houses, so crucial information about the upper stories that are known to have existed has been lost. Nevertheless, the site has yielded some important finds, including hundreds of terracotta loom weights; several houses also preserve pebble mosaic decorations on the floors of the *androne*s, men's dining rooms where drinking parties called symposia were held.

The central square of a Greek city was called an *agora*, several of which have been found throughout the Greek world. The *agora* that has received the most attention in modern times is the one in Athens, which is still undergoing excavation and which received several embellishments in the Classical period (Camp 1986). Athens is also known in modern times for its large extramural cemetery, the Kerameikos, where burials date back to Submycenaean times. By the Classical period, many of the private funerary monuments were stelae marking burials that were organized in plots, although one area of the Kerameikos, the Demosion Sema (Public Tomb), held burials of those who had died in war (Camp 2001).

A good deal of sculpture and painting survives from Classical Greece, and this along with the evidence just discussed forms the bulk of the material traditionally studied by archaeologists focused on this period (Stewart 1990; Boardman 2001), although the overwhelming focus on these types of evidence has been justly criticized (Lapatin 2003). Both sculpture and painting present scholars with a variety of difficulties, which in many cases result from the circumstances under which each type of material has been preserved. Most freestanding sculpture of the period was cast in bronze or constructed of other perishable materials (such as gold and ivory) and was thereafter melted down or otherwise destroyed (Mattusch 1988, 1996). Consequently, most Classical bronze sculptures are known only from literary accounts and the so-called Roman "copies," both of which present problems that are discussed below. Those that do survive – such as the Piraeus bronzes or the famous Riace warriors – tend to come to us from shipwrecks or warehouses, so scholars are unable to study them in the physical contexts for which they were intended.

Most of the sculpture that survives from the fifth and fourth centuries is stone architectural sculpture, frequently from temples; sanctuaries at Athens, Olympia, Bassae, and elsewhere have been especially useful to scholars concerned with sculptural trends in this period (Stewart 1990). To the extent that it is possible to generalize about sculptural styles of the Classical period, one can detect a move away from the rigid forms of the Archaic period, as well as an increasing interest in volume and movement rather than linear detail, although it is important to note that stylistic development was not completely uniform throughout the Greek world.

As with sculpture, the study of Greek painting is hampered by loss of important material; in fact, with a few exceptions, Classical Greek monumental painting is known mainly from literary accounts. We do, however, have thousands of pieces of painted pottery from Greece in this period, the bulk of which was produced in Athens in the fifth century and South Italy in the fourth (Boardman 2001). These objects, which were created for activities ranging from the symposium to the funeral, have furnished scholars with a tremendous amount of information about the mythology of the Greeks; there are also many scenes that have traditionally been thought to show daily life in Athens in elsewhere, although this interpretation is increasingly acknowledged as suspect (Ferrari 2003).

A few monumental paintings survive from this period; the earliest are the frescoes in the Tomb of the Diver at Paestum in Italy, which seem to date to c. 480–470 BCE. These paintings, which show a symposium and a diver, are consistent both stylistically and iconographically with the vase paintings that were being produced in Athens at the time; such similarities lend some credibility to scholarly efforts to understand lost monumental paintings from the evidence of painted pottery (Holloway 2006). Fourth-century Macedonia has also yielded a handful of monumental paintings; several tombs in a late-century royal tumulus at

Vergina bear painted decoration, and the themes (a mythological abduction and a hunt) have parallels in art from Athens and elsewhere (Andronikos 1984).

Key Issues/Current Debates

A number of current debates in Classical Greek archaeology involve questions about how to interpret the surviving visual evidence, although these questions have implications that extend well beyond art historical concerns. As noted above, most of the bronze sculpture from this period has been lost, and for many years scholars relied on a combination of literary texts (such as the *Natural History* of Pliny the Elder) and Roman statuary to reconstruct famous lost pieces; it was believed that Roman sculptors were interested in producing faithful stone replicas of earlier Greek bronzes. It is now understood that Roman sculptures cannot be reduced to a series of copies of earlier works (Ridgway 1984), but since the foundational histories of Greek sculpture were written at a time when the old assumptions were believed to be valid, the generally accepted history of sculptural styles and chronologies for the period will need to be updated. Closely tied to this issue is the question of how literary sources should be brought to bear on the interpretation of visual and other material evidence; although these sources frequently furnish archaeologists with indispensable information about the past, they also contain important nuances to which we have not always been sensitive.

How to interpret visual evidence is also a matter of concern for scholars who focus on painted pottery, particularly when it comes to images that have been traditionally classified as "scenes of daily life." These images have frequently been used to fill in gaps left by other forms of evidence, and our understanding of the ways in which Greek people in the Classical period ate, drank, worshipped, practiced athletics, had sex, and buried their dead depends to no small degree on the evidence of the painted pottery (Boardman 2001). Scholars have begun to recognize, however, that many of these images may actually depict subjects that have nothing to do with life in Classical Greece and thus that their status as evidence for life in this period needs to be reevaluated (Ferrari 2003).

International Perspectives

The territories that were part of the Greek world in the Classical period cover portions of modern Italy and Turkey as well as Greece, but several other nations in Europe and elsewhere have long histories of engagement with Greek archaeology; these include (but are not limited to) England, Germany, France, and the United States. In addition to establishing archaeological schools and conducting excavations in Greece, these countries hold many objects from the Classical world in their collections. The conditions under which those objects left their countries of origin are not always in line with modern ideas about ethical collecting practices, and calls for the return of objects to the countries in which they were excavated are becoming increasingly frequent. Perhaps the best-known case is that of the Parthenon sculptures (sometimes called the "Elgin Marbles") that reside in the British Museum; in addition to repeatedly requesting their return, Greece has gone so far as to build a new Athenian acropolis museum to hold the sculptures. Less glamorous artifacts have also been the focus of discussions about repatriation, however, and recent years have seen the return of pottery and other objects from museums such as the Metropolitan Museum of Art in New York and the J. Paul Getty Museum in Malibu, California. At the heart of all of these discussions is the question of who "owns" the Classical past and how it can best be displayed and preserved, and at this time there is no scholarly consensus on either question (Neils 2001; Cuno 2008).

Future Directions

This article has already noted a few of the questions and challenges that face archaeologists of

Classical Greece, but there are a number of others. One question that has occupied scholars for some time is how to understand the experiences of those members of society whose presence in the archaeological record is fleeting. For instance, fifth- and fourth-century Greek women are known to have spent much of their time spinning, weaving, and engaging in other tasks relating to the production of textiles, but much of the physical evidence related to these activities is extraordinarily difficult to detect and interpret. With rare exceptions, the textiles themselves have perished, and items such as the loom weights that were found in the houses at Olynthos can tell us only so much about who engaged in weaving, and where, and when. Although Classical texts sometimes refer to women's quarters in Greek houses (Lysias 1), such spaces have been difficult to detect in the archaeological record, and comparative evidence from sites such as Pompeii and Herculaneum suggests that such issues would be highly complex even if Greek domestic sites had been better preserved. Slaves are another group that is often difficult to detect in the archaeological record, although scholars are becoming increasingly aware of the need to attempt to do so (DuBois 2003).

A second challenge that archaeologists of the Classical period face is that of dealing with objects that do not have well-understood excavation histories, of which there are unfortunately far too many. The problem is especially acute for the study of Athenian pottery, much of which was exported to Etruria in antiquity, eventually to be buried in tombs at Vulci and other Etruscan sites (Boardman 2001). Although some of these objects were recovered in controlled excavations, many were excavated illegally before finding their way to the eighteenth-century European art market. Scholars who have attempted to understand both the pottery itself and the Etruscan tombs in which it was once buried are at a large disadvantage as a result of this lack of provenance, so one of the major challenges facing those who study such material is that of reconstructing, to the extent possible, the contexts in which the pottery would have been used and deposited in antiquity.

A third important task archaeologists have begun to undertake is that of reconstructing the ways in which people interacted with built spaces in Classical Greece. Sanctuaries such as those at Delphi and Olympia (Scott 2010), the sanctuary of the Great Gods at Samothrace (Samothrace 2012), and the acropolis at Athens (Ferrari 2002) have all lent themselves to this sort of investigation, and it is to be expected that such studies will become both more common and more refined as technologies for three-dimensional modeling continue to develop.

Cross-References

- ▶ Agora in the Greek World
- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Numismatics, Ancient Greek
- ▶ Religion, Greek, Archaeology of

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Clay Pipes in Historical Archaeology

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Introduction

In the late sixteenth century, a new class of artifact began to appear within the European archaeological record. This was a specially designed receptacle for smoking tobacco which consisted of a bowl in which the tobacco burned and a perforated tube through which the smoke was inhaled. To begin with, in England, clay pipes were made in iron-free, white-firing clays, made in one piece, in two-part molds and fired in specially designed kilns. This technology quickly spread through western Europe and to European overseas colonies, including those in North America from whence, arguably, the idea – though not the technology – had originally come.

By the early seventeenth century, a parallel development occurred within the Ottoman Empire where the earliest pipes – the *chibouk* – were mold-made in red-firing clays but consisted solely of bowls to which were added smoking stems made of wood or reed. They are often described as "stub-stemmed."

Both of these traditions were adopted in different parts of the world, often as the result of trading contacts with European countries. For example, in northern and western Africa, variations of the stub-stemmed tradition were developed. While in Japan, following contact with Dutch merchants, a local form – the *kiseru* – evolved, along with complex patterns of social interaction.

Key Issues

The Archaeological Record

Clay tobacco pipes have been regarded as essential elements in the study of post-medieval excavated assemblages since the 1960s. This is for four main reasons. First, they were mass produced, are brittle and short lived, have no resale value, and survive well in archaeological deposits. Secondly, they are ubiquitous from the early seventeenth until the late nineteenth centuries. Thirdly, they show chronological and spatial variations, making them an ideal type fossil, and finally, they can frequently be identified to maker.

Initially, with their rapidly changing forms and short lives, pipes were valued by archaeologists as a means of dating. In many cases,

especially in the period up to 1800, individual forms can be dated to within 20 or 30 years. Although a number of elaborate but still unconvincing statistical dating systems have been evolved, the majority of specialists rely more on formal and decorative detail, together with evidence provided by the marks and stamps of individual makers carried on the pipes.

Wider Interpretative Possibilities

More recently, the pipe evidence from excavations has been used for a number of additional avenues of site interpretation. First, given the large numbers often recovered, their chronological range can indicate the degrees of residuality or intrusion for individual contexts. Secondly, as patterns of regional production become more clearly defined, marketing networks on a local, regional, or international scale can be defined. Thirdly, as the contemporary value of pipes was determined by the amount of skill and labor involved in their production, it is possible to compare the socioeconomic status of individual sites by assessing the quality and complexity of the molds used in conjunction with the amount of care and time involved in finishing the pipes once they had been formed. Finally, pipe studies have increasingly focused on the decorative messages carried on them. Possession of a particular style of pipe represented a statement of individual identity. They carry a wide range of symbols of contemporary popular culture, from political slogans to popular song.

Research Issues

While the detail of regional and chronological development is well understood in countries such as the British Isles, the Netherlands, and the USA, a recent survey of 19 countries, from Norway to Australia and Japan to Argentina, demonstrates that for much of the world, the state of knowledge is very patchy (Davey 2009). A good example of what is still widely needed, that also demonstrates the potential of pipe studies for the understanding of socioeconomic and political issues, is the recently published account of the early pipe industry in Bavaria (Mehler 2010). Such regional studies are essential for the establishment of patterns of trade and influence. The information that they provide should then be brought to bear on the study of patterns of trade at specific sites. The detailed examination of the sizeable group of pipes discarded by sailors waiting in the Marseille offshore quarantine port demonstrates both the potential of clay pipes to contribute to wide socioeconomic studies, and also to the problems in doing so when the production centers in so many areas of the world remain to be defined (Gosse 2007). There is still a great deal to be done in order to release the interpretative potential of this diminutive artifact.

Cross-References

- ▶ Académie Internationale de la Pipe
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Chronological Systems, Establishment of
- ▶ Consumption, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Site Formation Processes

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Pijpelogische Kring Nederland
Post-Medieval Archaeology

Cleere, Henry

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Basic Biographical Information

Professor Henry Cleere was born in December 1926 in Croydon, UK. After military service in Italy, Egypt, and Palestine, he pursued a career in the iron and steel industry before becoming involved with archaeology in 1974, as director of the Council for British Archaeology. By then, he had also obtained his Ph.D. for a thesis on the iron industry of Roman Britain. The 1970s was the heyday of rescue archaeology in Europe, and he became involved in addressing some of the consequences for the profession. One development in the UK was the formation – formally started in 1979 – of what is currently the Institute for Archaeologists (IfA), a professional organization with a code of conduct. Cleere was one of those involved and who developed an interest in archaeological heritage management, from its principles and legal foundations to its organizational and practical applications.

Major Accomplishments

In 1979, he was awarded a Churchill Fellowship that enabled him to study the systems in a number of European countries and build a network in Europe. That led to a book he edited in 1984 called *Approaches to the Archaeological Heritage* (Cambridge), which became very influential. It presented for the first time the management of archaeological resources in a comparative international context. The book was instrumental in discussions in the heritage sector in Europe in the 1980s that in turn led to a decision by the Council of Europe to revise the existing rather obscure treaty on archaeological heritage into what became the Convention of Malta in 1992. By then, Cleere had already published a second important book, extending to many more countries, *Archaeological Heritage Management in the Modern World* (London 1989).

Between 1981 and 1990, Henry Cleere was a member of the Board of ICOMOS, the International Council on Monuments and Sites, and in 1984 established that organization's International Committee on Archaeological Heritage Management (ICAHM). He was a prime mover in the drafting of the 1990 ICOMOS Charter on Archaeological Heritage Management. This was the first time the aims and responsibilities of archaeological heritage management, which were later also echoed in the Malta Convention, were defined internationally.

After his retirement from the CBA in 1991, Cleere started a third career as World Heritage coordinator for ICOMOS in Paris. ICOMOS is the advisor on cultural heritage to the UNESCO World Heritage Committee, and for 10 years, he carried out evaluation and monitoring missions to many sites now on the World Heritage List. Given his experience in international organization and legislation, he was also asked to become involved in the founding committee of the European Association of Archaeologists (EAA) and in 1994 became its first secretary. He also led the working party that brought into being the "EAA Code of Practice" in 1997 and was editor of the newsletter *The European Archaeologist* until 2002.

In 1998 Henry Cleere became honorary professor at the Institute of Archaeology at UCL, and in 2002 he received the fourth European Heritage Prize in recognition of his work.

Cross-References

- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO's World Heritage List Process

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Clegg, John K.

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Basic Biographical Information

John Clegg was born on January 11th, 1935 in Nottingham, UK.

He grew up in Cambridge, England, where his mother was an academic. During World War II (aged 5–8), John and his sister were evacuated to stay with an aunt in Vancouver, Canada. During these early years began his lifelong interest in sculpture. Upon his return, John attended The Leys School in Cambridge. He graduated from Magdalene College, Cambridge, with a B.A. Honors and Certificate in Education in 1959. He received an M.A. Honors in 1962 from the same university. He had read Geography for two years before changing to Archaeology through which he went on several excavations and was influenced by both Eric Higgs and Charles McBurney. After working as a school teacher, he worked as a contract archaeologist between 1963 and 1964, excavating Coygan Cave in South Wales. He moved to Brisbane, Australia, in 1964, taking up a post in the Psychology Department (in which Archaeology was located), University of Queensland. He soon moved to Sydney, where while studying sculpture at what was later to become the National Art School, he held various positions at the Department of Anthropology and later in Classics and Archaeology at Sydney University. Over a 25-year period at Sydney University, he taught hundreds of students how to see, look at, and analyze rock art.

Major Accomplishments

John's Master's thesis (*Mathesis Words, Mathesis Pictures*, 1978), which analyzed the

Clegg, John K., Fig. 1 John Clegg recording rock art on large horizontal platforms with his monopod, Callan Park (2005) (Photo by Kate Sullivan)

Clegg, John K., Fig. 2 John Clegg helicopters in to view Aboriginal art sites in Wollemi National Park (2007). (Photo by Kate Sullivan)

Bare Hill rock art body located west of Cairns, was the first in Australia to explore the archaeological nature of rock art and earned him the University Medal. He was supervisor to Lesley Maynard (nee McMah) – whose Honors and Master's theses were similarly formative to the way that Australian scholars perceived and analyzed rock art, especially in the absence of a relevant ethnographic context (Maynard 1979).

In the 1980s and 1990s, John was instrumental in training and fostering the development of a number of rock art scholars and academics at Sydney University (Natalie Franklin, Tania Konecny, Jo McDonald, Laurajane Smith, Meredith Wilson), most of whom went on to undertake doctoral research in Australia and many of whom are at the forefront of rock art research and/or heritage today. His Sturts Meadows work in western NSW provided a fertile training ground for many other researchers practicing today, including ben (Robert) Gunn, who were stimulated by John's enthusiasm and quirky theoretical rigor (Fig. 1).

John was responsible for introducing the public to the fabulous rock art of the Sydney region with his very popular *Field Guide* (Stanbury & Clegg 1990) which provided locational and other information about Aboriginal rock engraving sites around the Sydney region. The Field Guide was produced at a time when there was no public interpretive strategy for this region's amazing rock art sites. He has produced approximately 60 monographs, reports, academic papers, and book chapters throughout his career, with a focus on methodology and theory in the teaching of rock art. His collaborations with Thomas Heyd on aesthetics have been formative in the development of this theoretical area of rock art discourse (Fig. 2).

John has also had major successes as a sculptor, having been exhibited regularly in the annual Hunter Valley *Sculpture in the Vineyards* and in the Blake Prize in 2010. His fascination for this medium, begun as a child in Canada, has inspired him to produce sculptures throughout his academic career and to undertake experimental work on sandstone in the Sydney region and to determine likely time frames required to produce the large engravings on the

Clegg, John K., Fig. 3 John Clegg seated with one of his sculptures at Cedar Creek winery, Wollombi NSW, during Sculpture in the Vineyards Exhibition, 2006 (Photo by Kate Sullivan)

open horizontal platforms. He conducted similar experiments with Dr. Dan Witter, exploring the making of Panaramitee-style engravings in western NSW. His interest in the techniques and technologies of rock art influenced the insights which he brought to his analysis of rock art (Fig. 3).

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Australian Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of

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Closet Chickens

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Introduction

The history of the "Closet Chickens" has been recounted by Atalay (2006: 269-71) and Echo-Hawk (2010a: 95-6) and will only be briefly

described here primarily as a means of creating a shared context for the group. There is no single origin of the group, but there are shared remembrances that seem to correlate with an agreed-upon history.

Definition

The nucleus of the "Closet Chickens" developed out of a conference held at Dartmouth College in May 2001 titled "On the Threshold: Native American-Archaeologist Relations in the Twenty-first Century." The conference, funded by the Wenner-Gren Anthropological Foundation with support from Dartmouth College and led by co-organizers Deborah Nichols and Joe Watkins, brought together a large number of archaeologists of Native American heritage in an attempt to evaluate the relationships not only between archaeologists and Native American communities. Holding the conference at Dartmouth seemed especially appropriate as the history of the College in broad respects shares with history of Native American-archaeology relations. Founded in 1769 to educate "youth of Indian tribes," few actually graduated from the College until it reaffirmed its commitment in the 1960s, nearly two hundred years later. In addition to the organizers, participants came from universities, museums, and tribal and federal agencies across North America and included Richard Begay (Navajo, Navajo Nation), Robert Begay (Navajo, Navajo Nation), Janine Bowechop (Makah, Makah Cultural and Research Center), Colin Calloway (Dartmouth), Roger Echo-Hawk (Pawnee, Nation of Oklahoma Denver Art Museum), Dorothy Lippert (Choctow, Smithsonian Institution), Desiree Renee Martinez (Gabrielino, Harvard), Deborah Nichols (Dartmouth), John Norder (Spirit Lake Dakota, Michigan State), Dean Suagee (Cherokee, Vermont Law School), and Dale Turner (Eme-Augama Anishnabai, Dartmouth). The conference also sought to look at the impact of the discipline on Native Americans who practiced archaeology and we hoped it would be a springboard for continuing dialogue, which it has in ways we could not have imagined. Continuing discussion of the issues raised at the conference on emails led to the establishment of a more formal group that began as a nameless Listserv aimed at expanding not only the discussion but also the parties involved in it.

The name "Closet Chickens" arose during email exchanges as the group sought a name for itself with chicken associated with a movie watched in the evening by conference participants in their hotel. Closet was subsequently added after an email exchange where one member offered room in a closest of a small apartment to others attending a professional meeting (Atalay 2006). The Closet Chickens are "birds of a feather" who do tend to flock together. Many of its members are American Indians who practice archaeologists, but there are non-Indian members. In general, it is an online support group that discusses various issues as they arise. Often comments relate to contemporary issues that impact the practice of archaeology by American Indians, but as often other threads of discussion relate to repatriation, ethics, decolonizing the discipline, Indigenous Archaeology, and many other issues. Many of the established archaeologists on the Listserv are mentors to the professionally younger archaeologists who participate.

Future Directions

The list serves as an email discussion forum where topics are often subjected to scrutiny. Occasionally discussions become heated, but more often than not such discussions end when the participants have seemingly discussed the issues to completion. It is a support system that has helped young archaeologists who often feel to be on the outside of a general archaeological trajectory. In addition, the Closet Chickens is important in terms of contemporary American archaeology in that it provides a semi-protected forum for archaeologists whose perspectives tend to mesh with Indigenous ideas concerning the colonialist practices of anthropology and archaeology and who work closely with tribes and First nations and tribal communities. This forum

allows members to openly discuss ideas and issues that might be too sensitive for discussion in a truly "public" forum. It also permits younger archaeologists to speak candidly about issues they have or are encountering in their readings, study, and early careers and discuss strategies to address them.

Secondly, and somewhat importantly, the Listserv allows for ease of mentoring between those who have been "in the business" for longer periods to help others who are in the early stages of their careers or education tenure. Professional advice, open reading of materials, sometimes controversial discussion on topics, and even internal disagreements help us understand not only what our own perspectives and viewpoints are, but also to understand how our ideas have grown and continue to grow. It also provides a protected space within which to relax.

Its primary focus is on continuing the conversation about the impact of archaeology globally on the heritage of Indigenous populations. Archaeology, once known as the handmaiden of colonialism, is continually challenged by Indigenous people to become accountable to the cultural groups whose heritage is under scrutiny. The Chicken network allows a safe area for discussion outside of the academic processes, where students can gamble with ideas and points and where established authors also can openly discuss ideas without fear of retribution or ridicule.

The group has expanded each year since its inception and we hope that over the course of the next decade, a larger group of younger archaeologists who are attentive to Indigenous concepts of culture will be able to contribute to a more rounded practice of anthropology and archaeology. Members "nominate" others who they feel would contribute to the discussions on the Listserv. We have non-Natives, Natives, Australians, Maori, and a generous mix of non-described individuals who contribute to the discussion in numerous ways. The group has had some in-depth discussions about individuals who were precluded from the "flock" after some intense and often heated deliberations. The more established archaeologists try to stay outside of discussions as much as possible (perhaps too much on occasion) as we generally believe the Closet Chickens is a place for younger people to test their wings, but we do chime in as necessary, especially to encourage debate and discussion.

Many of the members of the Closet Chickens may be what Roger Echo-Hawk decries as "stake-holding Indians—self-identified adherents to racial Indianhood– . . . wielding Ph.D.s and trowels as they circle the archaeological meta-narrative" (Echo-Hawk 2010b: 21). While it is true that many are on the cutting edge of attempting to increase the reach of Indigenous Archaeology as it hopes to "decolonize" the practice of archaeology, it is not a political group (although many of its members do have political perspectives relating to the practice of archaeology as a social science). It is not a racialist group, but allows that people with a base in American Indian cultural life creates a shared understanding of the impact of archaeology on cultural groups worldwide.

Cross-References

- ▶ Atalay, Sonya
- ▶ Cultural Heritage Management and Native Americans
- ▶ Echo-Hawk, Roger C.
- ▶ Hall, Robert Leonard
- ▶ Indigenous Archaeological Organizations
- ▶ Indigenous Archaeologies
- ▶ Indigenous Peoples, Working with and For
- ▶ Lippert, Dorothy T.
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Watkins, Joe (Indigenous Archaeology)

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Clovis and Folsom, Indigenous Occupation Prior to

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Introduction

The first modern human migrations to the Western Hemisphere (the Americas) are now discussed as being much earlier than previously thought. The historical Clovis-First model of initial human migrations to the Western Hemisphere (the Americas) was postulated on an entry route across the exposed land mass of Beringa no earlier than 11,000–12,000 years before present (YBP), an inland migration route through a narrow tree less ice-free corridor, and dating of Clovis tools found in association with extinct mammals near Clovis, New Mexico, in the 1920s (Dillehay 2000; Adovasio & Page 2002; Bird 2002). Archaeologists thought that the first people brought the Clovis tool technology with them when they walked across the Bering Land Bridge from Asia.

However, the tenets of the Clovis-First model of initial migrations to the Western Hemisphere (the Americas) have been critiqued as unproven. (Cann 2001). Archaeologists and scientists are still uncertain about the dates for initial migrations and the possible migration routes, but the majority of archaeologists agree that the Clovis-First model is not supported by archaeological, genetic, or linguistic evidence (Nicholas 1990; Cann 2001). The question now is how much earlier were people present in the Western Hemisphere (the Americas)? There are hundreds of archaeological sites distributed throughout North and South America which suggest a minimum possible date of 40,000 years before present for initial migrations (Steeves 2010b).

Definition

Pre-Clovis Sites: Archaeology sites in the Western Hemisphere (the Americas) which date to earlier than the known dates for Clovis or Folsom lithic technologies or that date earlier than 12,000–13,000 years before present.

Key Issues

To say the debate over the timing of initial migrations to the Western Hemisphere (the Americas) has been a contentious issue in American archaeology would be an obvious understatement. A small group of archaeological authorities defended the unproven Clovis-First model for many years, a stance which blocked the acceptance of or possibilities for earlier initial migrations. In recent years it has become clear to archaeologists and scientists that there has never been any solid archaeological evidence to support the tenets of Clovis-First model of initial late entry migrations to the Western Hemisphere (the Americas). However, there have been numerous sites published on in both North and South America which predate 13,000 years before present (YBP) (Steeves 2010a). There are hundreds of reported pre-Clovis sites, many of which have met or exceeded rigorous archaeological criteria for site legitimacy and others which have provided evidence which warrants further investigations and testing of the site. Archaeologists have begun to reevaluate previously reported pre-Clovis sites in both North and South America and to publish multidisciplinary research which discusses the possibilities for and evidence of earlier initial migrations to and habitations of both North and South America.

Archaeological criteria for site legitimacy have been met by a number of earlier sites including Coates Hinds, a mammoth kill site in Tennessee, which was nominated and accepted to the United States National Register of Historic Places (NRHP) in 2011. Monte Verde, an open-air site in Chili excavated by Tom Dillehay, has produced a vast body of evidence for earlier migrations and has supported the need to move beyond historical hypothesis of initial migrations and to begin to

openly discuss a much earlier human presence in the Americas.

Research from other fields such as linguistics and genetics has also produced evidence for earlier initial migrations. The great linguistic diversity of Indigenous peoples of the Western Hemisphere (the Americas) suggests that 20,000–50,000 years would have been required for such a high number of language families to have developed (Nichols 1990). Molecular research has suggested time frames for initial migrations as early as 40,000 YBP and as late as 22,000 YBP (Mann 2005). There are records of physiological and cultural diversity across the expanse of both North and South America at the end of the last glacial maximum. Therefore, to allow for such diversity to have developed across such distant areas, scientists have to consider the time required for geographical distance, environmental adaptations, and cultural developments across time and space prior to the end of the last glacial maximum.

Important to discussions on initial human migrations to the Western Hemisphere (the Americas) is the history of global intercontinental human and mammalian migrations. The Bering Land Bridge was present at many times throughout the Pleistocene, and an inland corridor was open as early as 75,000 years ago (Adovasio & Page 2002). Early humans had adapted to ecological niches in all areas of Africa, Asia, Europe, and Australia and reached islands such as Java and Crete thousands of years prior to 13,000 YBP, which is evidence that suggests early humans had the tools and technology to travel and to adapt to all environments for hundreds of thousands of years prior to the end of the last glacial maximum.

Current Debates

Current debates on initial migrations to the Western Hemisphere (the Americas) include competing models of possible migration routes and times. Kurt Fladmark (1979) and Jon Erlandson et al. (2007) have both discussed the possibilities of an ice-free coastal migration route along the Pacific; a North Atlantic ice-edge corridor migration route has been discussed by Dennis Stanford and Bruce Bradley (2004) who suggest that Clovis technology may have descended from the Solutrean technology found in areas of present-day France. Recent research on lithic technologies has also highlighted the possibilities of earlier than Clovis lithic technologies in the Western Hemisphere (the Americas) (Beck & Jones 2010), and the fact that lithic tools which are not definitively Clovis is often found in the same stratigraphic levels as Clovis technologies.

Examples

There are hundreds of published reports of pre-Clovis sites in both North and South America. The following list is a sample of some of the most discussed sites. Some of the sites included in this list are pre-13,000 YBP sites which are recognized as national or global heritage treasures and are listed on the United States, National Register of Historic Places (NRHP) and the United Nations Educational Scientific and Cultural Organization (UNESCO). Many pre-13,000 YBP sites in North and South America have been excavated, dated, and published by more than one archaeologists or group of archaeologists and scientists at different times (Figs. 1 and 2).

This list will provide the name and date of a main or recent publication on a site; however, there may be numerous site reports, critiques, and responses for each site mentioned which are not listed in the following table. Where a report has mentioned numerous possibly related sites in the region, the site name will be followed by the number of regional and or possibly affiliated sites mentioned. Where a range of dates or more than one date is listed, this represents numerous cultural levels within the site in a stratigraphic sequence, the following table does not necessarily list every date, earliest or latest's for each site (Table 1, Fig. 3).

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 1 Fort Rock site area (Photo: Gary Halverson, Oregon State Archives 2009. Photo No. lakDA0076. This figure is licensed under the Creative Commons Attribution 2.0 Generic license. http://commons.wikimedia.org/wiki/File:Fort_Rock_(Lake_County,_Oregon_scenic_images)_(lakDA0074a).jpg)

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 2 Meadowcroft site, Pennsylvania (Photo: Jbarta 2012. This figure is licensed under the Creative Commons Attribution 2.0 Generic license. http://commons.wikimedia.org/wiki/File:Meadowcroft_Rockshelter_13.jpg)

Future Directions

Future directions in the study of initial human migrations to the Western Hemisphere (the Americas) include the reevaluations of hundreds of sites which have dated deposits earlier than 13,000 YBP. As it is now accepted that humans entered the Western Hemisphere (the Americas) earlier than 13,000 YBP, research to locate areas of potential earlier habitation may expand to include testing of new areas of high probability or regional areas of known earlier habitation sites.

The understanding of possibly earlier than Clovis technologies has been the focus of recent publications such as the work of Charlotte Beck and George Jones (2010), who have argued that Western Stemmed points are earlier

Clovis and Folsom, Indigenous Occupation Prior to, Table 1 Selected pleistocene sites of the Western Hemisphere (the Americas)

Site name	Site dates	Site location	Site publication authors
Pedra Furada	30,000–50,000 BP	Brazil	Delibrias and N. Guidon (1985)
Pendejo Cave	55,000–350 BP	New Mexico	MacNeish and Libby (1996)
Wolly Mammoth	40,000 BP	California	Berger (1980)
Burnham	28,000–32,000 BP	Oklahoma	Wyckoff (1999)
El Cederal	37,694 + − 1963	Mexico	Lorenzo and Mirambell (1999)
Lewisville	37,000 BP	Texas	White and Smith (1957–1980)
Freisenhahn	37,000 BP	Texas	Sellards (1952)
El Bosque	35,000 BP	Nicaragua	Espinoza (1976)
Monte Verde	12,500 BP 33, 370 + − 530 (base of MV7)	Chile	T. Dillehay (1997, 2000)
San Luis Potosi	30,000 BP	Mexico	Mirambell (2000)
Jack Wade Creek	30,000 BP	Alaska	Cinq-Mars and Morlan (1983)
Tequendama J II	28,890 BP	Columbia	Urrego and Van der Hammer (1977)
Tlapacayo 18 sites	28,000 BP	Mexico	Lorenzo and Mirambell (1999)
Otavalo	26,000–36,000 BP	Ecuador	D. Davis Gonzalez and Lagigila (1973)
Gruta del Indio	22,250 BP	Argentina	
Lapa Vermelha IV	18,000–24,000 BP	Brazil	A. Prous (1980)
Pikimachay	11,000–20,200 BP	Peru	R. MacNeish (1980)
Cactus Hill	23,349 calbp	Virginia	McAvoy et al. (2000)
Alice Boer Site	14,200 + − 1,150	Brazil	Bryan and Beltrao (1978)
Meadowcroft Rockshelter NRHP	12,800 + − 870 31,400 + − 1200	Pennsylvania	J. Adovasio et al. (1990)
La Sena	18,440 + − 145 rcybp	Nebraska	S. Holen (2006)
Lovewell II	18,250 + − 90 rcybp	Kansas	S. Holen (2006)
Penas de la Trampas	19,610 BP	Argentina	R. MacNeish et al. (1971)
Petronila Creek	18,180 BP	Texas	Herrera et al. (1992)
Bridgewater Quadrangle	18,310 BP	California	Davis (1978)
Toca do Sitio do Meio	14,300 BP	Brazil	N. Guidon (1984)
Wenas Creek Mammoth	13,500–15,000 BP	Washington	Lubinski et al. (1985)
Muaco Falcon	16,375 BP	Venezuela	Broster et al. (1951)
Morro Fudaro	8,860–21,090 BP	Brazil	Kipnis (1988)
Lt Brazil 230 sites	13,660 BP	Brazil	Meggers and Miller (2003)
Chesrow 35 sites	12,520–13,470 BP	Ontario	Overstreet (1993)
Paisley Caves	14,150 BP	Oregon	D. Jenkins (2009)

than Clovis points in the intermountain west. Research on lithic technologies, cave painting, petroglyphs, archaeoethnography, molecular studies, residue analysis, geological studies, and linguistics is building a multidimensional understanding of the possibilities and evidence for initial migrations to the Western Hemisphere (the Americas). Future directions in archaeological studies of the first people of the Western Hemisphere (the Americas) include gaining new insights from old collections and Indigenous oral traditions and renewed excavations of previously recorded Pleistocene sites and areas.

Clovis and Folsom, Indigenous Occupation Prior to, Fig. 3 La Sena site area Nebraska (Photo: P. Steeves 2012)

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Erasure of the Past
- ▶ Meadowcroft: Geography and Culture
- ▶ Monte Verde, Archaeology of
- ▶ Pedra Furada, Archaeology of
- ▶ Peopling of the Americas
- ▶ US National Park Service and World Heritage

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Clubs and Societies Promoting Archaeology (National and Local)

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Introduction

There are opportunities to become involved in archaeology as an unpaid volunteer in numerous projects across the world. For example, high-profile excavations such as Çatalhöyük in Turkey (Çatal News 2010) and Quseir in Egypt (Tully 2007) involve local community participation. Other projects have involvement from international initiatives such as Earthwatch (www.earthwatch.org) that encourage volunteers to join different "expeditions," including archaeological and paleontological research projects, at a variety of locations across the world.

However, as well as projects led by paid archaeologists and trainers, there is also a wealth of voluntary groups, clubs, and societies, sometimes referred to as "amateur" or "avocational" organizations, many of whom carry out work independent of other projects. This section defines and discusses the range of activities, locations, and people that represent these groups.

Definition and Historical Background

Club, groups, and societies that promote archaeology, at both national and local levels, are primarily membership organizations, where an annual fee is usually required to join. In some rare cases, membership can be via invitation only, for example, if membership to the society in question, for example, the Society of Antiquaries of London (for which members are entitled to list the abbreviation "FSA" – Fellow of the Society of Antiquaries – after their name), is seen as an esteem indicator. However, the vast majority of groups do not have restrictions to their membership in this respect, and some offer concessionary fees, for example, for students, unemployed, or retired. In all cases, the groups consist of voluntary members (in other words unpaid), although a small number have some paid staff funded, for example, paid secretaries funded through membership fees to ensure administration takes place or project officers for specific grant-supported activities. This does not preclude people who work professionally as archaeologists from joining such groups (and indeed many archaeologists are members of local groups – e.g., the author of this entry was, at the time of writing, on the Committee for the Yorkshire Architectural and York Archaeological Society) along with members who may not have training in archaeology but nonetheless are interested in the subject. However, the key element of membership is that it is voluntary, rather than paid.

Groups, clubs, and societies vary in terms of their areas of interest, size of membership, and even level of activity. Hence, the organized groups which voluntarily interact with archaeology in the early twenty-first century are both vibrant and diverse. This is particularly the case in the United Kingdom, which has often been credited with having a particularly strong tradition of amateur and independent archaeology (e.g., Fry 2007: 21). Recent research shows that these groups seem to have grown in number in recent years, with there being more than 2,100 voluntary groups across the UK alone, compared to possibly just over 400 such groups in the 1980s (Thomas 2010: 12). Yet the origins of some of these groups go back to the nineteenth and eighteenth centuries, while others have formed in much more recent times. It is not only the age of groups that varies, as there is also a vast range of interests and also types of activities enjoyed by clubs and societies.

The oldest of groups involved with archaeology and related disciplines are often the

Antiquary Societies, which formed as learned antiquarian groups, often with an element of exclusivity maintained, for example, through restricted membership. The two biggest in the UK today are the Society of Antiquaries of London (founded in 1707) and the Society of Antiquaries of Scotland (founded in 1780). Both of these groups have nationwide interests (UK-wide in the case of the former, Scotland-wide for the latter) and take in disciplines beyond archaeology alone. Other antiquarian groups, such as the Society of Antiquaries of Newcastle-upon-Tyne (founded in 1813), have more of a regional focus to their interests. One of the oldest local antiquarian groups still in existence in the UK is the Spalding Gentleman's Society in Lincolnshire, which was founded in 1710. This group, until very recently, was exclusively male only in its membership. Activities vary in these groups, but lectures are a key component, as are publications and schemes for support for current scholarly research. In the case of the Spalding Gentleman's Society, there is also a private museum featuring an eclectic collection of antiquities and curios that are cared for by the society members (all volunteers), reflecting the antiquarian roots of the group.

County archaeological societies can be almost as old as the antiquarian groups, such as Berkshire Archaeological Society which was founded in 1871 or London and Middlesex Archaeological Society, founded in 1855. They can be found across the UK – reflecting in their areas of interest history, archaeology, and even architectural history connected with their chosen geographic area. County archaeological societies often have a standard range of activities that are offered, such as an annual lecture series, excursions, and a newsletter and/or journal. However, it is wrong to assume that these groups are not necessarily more active than this in their archaeological investigations, as several also carry out regular archaeological fieldwork or partner with other archaeological organizations, such as universities or archaeological contractors depending on the project, providing volunteers and other support. This can be seen, for example, with the Architectural and Archaeological Society of Durham and Northumberland, which is a partner alongside Durham University, Stanford University, and Durham County Council for excavations at the Roman site of Binchester in County Durham (see www.durham.gov.uk/pages/Service.aspx?ServiceId=6915).

There are other societies which cover more than just archaeology in their remit of interest that nonetheless get involved in archaeological work, such as field walking, excavation, or recording or graveyards, the last of which is often connected with family history research. Examples include natural history societies, such as the Belfast Natural History and Philosophical Society, that support "research and publications about Ireland and Ulster's cultural and material environment," including archaeology (http://belfastsociety.com/index.html). Similarly, La Societé Guernesiaise on Guernsey, a UK Crown Dependency in the Channel Islands, comprises several "sections," including botany, literature, and archaeology. Due to the lack of an archaeological contractor on the island, with just three archaeologists employed at the island's museum, Archaeology Section members have ample opportunity to participate in any archaeological fieldwork taking place. Therefore, local history societies, natural history societies, and even civic societies can cover archaeological research and activities in their range of interest. This is in part due to the holistic nature of archaeology, taking in as it does standing buildings, graveyards, field walking, archival research, as well as what are sometimes perceived as more "typical" activities such as excavation and geophysical survey. It is also a reflection on the diversity of interests that many voluntary groups have, for example, a civic society concerned with improving their local neighborhood may well take an interest in conserving the more historic aspects of their surroundings.

Some archaeological and heritage societies act as umbrella societies for smaller groups. In some ways this is the case with the Council for British Archaeology (CBA), as it has both individual membership and affiliate membership – with affiliates including both professional organizations such as university departments and

archaeological contractors but also voluntary groups. Furthermore, there are regional groups of the CBA – one covering Wales and 11 across England, all of which interact with and have membership from local groups within their regional coverage. There are also umbrella organizations that work on a regional level, such as the Federation of Ulster Local History Societies (Northern Ireland), Community Landscape Archaeology and Survey Project (comprising individual members and 12 local heritage groups in Northamptonshire), and less formal community heritage forums such as the recently established West Yorkshire Community Heritage Forum, through which local groups, practitioners, and other stakeholders share ideas and experiences and meet regularly to update each other on their recent activities.

One category of group that can cause controversy in the archaeological community, even though they frequently interact with archaeological material, is artifact hunting. Often also known as "treasure hunters," these are most often metal-detecting clubs and societies in the UK, a hobby that in previous decades has also been known as "coin spotting" or "coin shooting." Other forms of artifact hunting include pot hunting, as is common, but not always necessarily legal, in the USA (Hicks 2006: 140). There is often perceived to be a "grey area" between legal treasure hunting and illicit activity, such as nighthawking (as illegal metal detecting is known in the UK) or the activities of looters in countries such as Italy (known as *tombaroli* – Brodie 2006: 5) and Peru (known as *huaqeros* – Watson 1999; Skeates 2000: 56). However, as has been shown by the outreach work of organizations such as the Portable Antiquities Scheme (www.finds.org.uk), metal-detector users can and do make a meaningful contribution to archaeological knowledge when they share their finds information with the archaeological sector and follow good practice advice and guidance. Hence, while there are still some issues of discourse between the metal-detecting community and other groups that engage with archaeological heritage, it is important to maintain dialogue.

Self-identified community archaeology groups form another category of groups and societies promoting archaeology, while there is overlap with other voluntary groups, in the sense that they are generally made up of members of the local community wishing to engage with archaeological heritage in different ways. However, increasingly, groups are forming that deliberately self-identify as "community archaeology groups" (rather than, e.g., archaeological societies or local history/heritage groups). Many of these have formed only in recent years, in the case of the UK often triggered by the availability of funding from major voluntary sector grant streams such as the Heritage Lottery Fund (www.hlf.org.uk), which funds specific projects around different types of heritage activities, designed to engage with local audiences. As a result, many groups formed in order to access a grant for a project but then continued following the end of the grant. "Community archaeology" can also be seen as a term going beyond those already active in local groups, with many projects (not necessarily led by communities themselves but often led by heritage professionals such as museum archaeologists or archaeological contractors) designed specifically to attract new audiences to archaeology that may not become involved otherwise.

Key Issues and Current Debates

There are a number of issues connected currently with groups and societies involved with archaeology. A key issue in various countries is that of access and legality. For example, in most countries some or all sites of archaeological significance are legally protected from any invasive investigation without permission. This of course protects the sites in question (although it does not necessarily stop illegal excavations, illicit metal detecting or other activities), but it also provides a barrier to independent investigation by voluntary groups. For example, while many areas are open to archaeological investigation in England and Wales, provided that there is permission from the landowner and the site is not a Scheduled Monument or other protected area, in Northern

Ireland all excavation is strictly prohibited without the procurement of a license from the Northern Ireland Environment Agency. In practice, this is usually only granted to professional archaeological organizations, and as a result in recent years, there has seemingly been only one voluntary group that has managed to carry out its own excavations, which had to take place with the assistance of a professional archaeological contractor. In Europe, some 46 countries are signatories to the European Convention on the Protection of the Archaeological Heritage (revised) 1992, commonly known as the Valletta Convention (Council of Europe 2011). This convention emphasizes the professional side of archaeologists but has also led to concern by some that there is a risk of excluding public participation depending on how the convention is interpreted (e.g., The Archaeology Forum 2006). Hence, this may have an impact on the extent to which "amateur" archaeologists and others are able to engage with archaeological heritage independent of professional supervision.

Another important issue that causes concern not only to paid archaeologists but also to members of local groups and societies is that of training and standards. This has had two effects in particular. On the one hand, there is a perception among some paid archaeologists that work carried out by voluntary groups will be substandard, with poor and out-of-date methods used for archaeological fieldwork.

This has led to some from the voluntary sector accusing professional archaeologists of elitism and exclusivity in their attitudes towards archaeological heritage (e.g., Selkirk 1997: 9). Research into participation in archaeology in 2003 by the CBA suggested that some of the project's respondents "spoke of professional elitism and a closed shop; there was a feeling that archaeology is 'done by professionals for professionals' and that professionals are no longer willing to admit or impart a sense of excitement" (Farley 2003). This is also reflected in the concerns that members of the local community are rarely involved in commercial archaeological work, certainly in the UK, with few notable exceptions such as the Hungate excavation in York City Centre (Connelly 2011). There are often reasons why volunteers cannot be involved in commercial projects, such as health and safety restrictions, time limitations (it generally takes longer to carry out fieldwork when volunteers are involved due to the extra supervision and training needed), and even client confidentiality clauses. However, the emergence in England of the *Planning Policy Statement 5* in England (see www.communities.gov.uk/publications/planningandbuilding/pps5) suggests opportunities for greater community involvement in all aspects of archaeological heritage management in the planning process, from decision-making to active hands-on participation. This has been noted recently in recommendations to the archaeology sector in the UK (Southport Group 2011: 8, 10-13).

However, there are also genuine issues with regard to the activities of some voluntary groups in the negative effects that their work can have on the archaeological heritage. Perhaps one of the most obvious examples of this comes from the activities of artifact-hunting groups, such as metal-detector users and pot hunters, as their search for specific artifact types can lead to the destruction of the archaeological *context* surrounding that artifact, without the recording of associated artifacts and materials, and causes irreversible damage and loss of knowledge. However, this is also true of intrusive investigations such as field walking or excavation, which are, by definition, destructive. Some groups have acknowledged this, and there is a demand for training opportunities which is not always met due to the impact of the current global economic downturn and changes in priorities. For example, there are now significantly less continuing and adult education courses available through English universities than even a few years ago, courses which traditionally were a key source of training for voluntary groups (Lee 2009: 10). This lack of training is often compounded by the failure of many groups to inform local and national record keepers, such as (in England) the

Historic Environment Record Officer in their local authority area of work they have carried out and the results of that work. However, in some areas there are community archaeologists: paid archaeologists who facilitate, train, and support the voluntary sector in archaeology. In some cases, such as in Shropshire, Surrey, and Herefordshire, a community archaeologist has been in the employment of the Local Authority – although these positions have decreased in the past few years in the UK due to local government reductions. In other cases, independent charitable trusts such as York Archaeological Trust employ community archaeologists, demonstrating the need for archaeologists with an outward-facing, inclusive, and informative role within an organization. Recognizing the need for archaeologists with the so-called soft skills necessary to engage with a wide range of different people from diverse backgrounds and with varying abilities, the CBA recently started a three-year training program for future community archaeologists – the Community Archaeology Bursaries Project – with funding from the Heritage Lottery Fund, English Heritage, Cadw, and Historic Scotland (see www.britarch.ac.uk/community/bursaries). These trainees, 39 in total over the project's duration, will learn how to interact with the voluntary sector in archaeology, including gaining experience of organizing, delivering, and evaluating bespoke training sessions.

Another factor that may have an impact on archaeological activity at a global level is the effect of the economic downturn faced by many countries. Certainly in the UK, this has contributed to the loss of many archaeological jobs, with an estimated fall of 7.6 % from July 2010 to January 2011 (Aitchison 2011: 2). It is certainly feasible that over the next few years, there will be an increase in the activity of local groups and societies, as the activity of paid archaeologists recedes. Furthermore, many of these groups work for a long period on the same site or related sites, often in areas where commercial archaeology would be unlikely to operate, for example, in an area where no development is planned. The increased activity of voluntary groups and societies will depend too on the extent to which the countries in which groups are based have legal constraints affecting the access to archaeological sites and projects by volunteers.

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- ▶ Community Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Volunteers in Archaeology

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Côa Valley Rock Art Sites

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Introduction

The first engravings (Chalcolithic/Iron Age) were found in 1982 at Vale da Casa, a Douro terrace near the Côa River's mouth (Baptista 1983), the first site of the rock art complex of the Côa/Portuguese High Douro. The site was later submerged by the Pocinho dam.

In late 1994, during the construction of a new dam in lower Côa River, the first Paleolithic engravings were found at Canada do Inferno, which resulted in a political debate throughout 1995 that resulted in the abdication of the Côa dam.

In 1996, the Parque Arqueológico do Vale do Côa (Côa Valley Archaeological Park) was created to preserve the rock art complex, with an area of *c*. 49,500 acres. In December 1998, the complex was enlisted in UNESCO's World Heritage list, having its statute changed in 2010 through its extension to the Siega Verde complex. In the same year, the Côa Museum was opened.

The establishment of the Centro Nacional de Arte Rupestre (Rock Art National Centre) in 1997 allowed the continuous survey and study of regional rock art. Nowadays there are 72 known sites with 1,032 decorated rocks, of which 487 have Paleolithic art (45 sites), 50 have holocenic art (20 sites), 352 have Iron Age art (37 sites), 197 from historic periods (39 sites), and 113 rocks of undetermined chronology (23 sites). Of these, Paleolithic and Iron Age rock art have greater importance being the first world open-air rock art ensemble of the Paleolithic.

Key Issues/Current Debates/Future Directions/Examples

The Côa Valley rock art is mainly engraved (though some is painted) in vertical panels of outcropped schist in the margins of the Côa river and other tributaries until the Douro. The Paleolithic rock art spreads from the Gravettian to late Magdalenian (±26,000 to ± 12,000 BP). The earliest period features a profusion of deep engravings, some of them of great size, and generally superimposed. In the latest period pecking is generally absent, replaced by the almost exclusive use of simple or multiple incisions.

The theme (zoomorphism) is common to both periods, portraying common regional herbivores distributed by four species: Equidae (Fig. 1), Bovidae, Caprinae (Fig. 2), and Cervidae. Rare fish complete this bestiary, to which are added 17 anthropomorphic figures in three rocks, where the ithyphallic anthropomorph of Rock 2 of Piscos is the most known. All these anthropomorphic figures are Magdalenian (Baptista 2009).

The spacial arrangement of the engravings in these two periods differs. The five major sites of the earlier period (Penascosa, Quinta da Barca, Foz de Piscos, Fariseu, Canada do Inferno) are located in the wider areas of the last beaches in the Côa river, whereas the engravings of the later period are concentrated around the Côa river mouth in panels without the abundance of superimposition of the earlier period.

At Fariseu, a great panel (Rock 1) only with engravings of the earliest period (96) was covered with sediments whose deposition started *circa* 20,000 years ago. Absolute chronology demonstrates that the lower part of the panel was already covered *c*. 18,400 years, and a detached piece of the panel was found in this lower layer (Aubry 2009). This dating presents a *post quem* chronology to the engravings of the earliest period, which are stylistically Gravettian. Meanwhile, in this excavation were also

Côa Valley Rock Art Sites, Fig. 1 A horse pecked from rock n° 1 of Canada do Inferno (Hell's Canyon). Gravettian period

Côa Valley Rock Art Sites, Fig. 2 Male ibex (capra pyrenaica) with two heads from Quinta da Barca, rock n° 3

Côa Valley Rock Art Sites, Fig. 3 Portable art from the site of Fariseu, in Côa Valley, with late Magdalenian incisions of little animals

discovered 60 schist fragments with linear incision (portable art) (Fig. 3). These incised plaques with small-sized animals and multiple incisions contribute to establish the chronology of stylistically similar engravings found in panels along the Côa valley, since the plaques were found in deposition, most of them in Upper Magdalenian levels (Aubry 2009).

The Second Iron Age is another period of intense engraving, most of them on the Côa river's mouth. The typology of the engravings implies the presence of a hierarchical society, with an almost manorialist caste of warriors. The warriors are depicted on foot or in horseback, always with their metallic weaponry, spears and javelins, falcatas, and small round shields like those described by Strabo in Geografia da Lusitânia (Lusitania Geography).

There is still plenty of seventeenth- to twentieth-century rock art in the Côa Valley,

last remains of an engraving tradition that started at least two hundred fifty centuries ago.

Cross-References

▶ Art, Paleolithic
▶ Rock Art Sites: Management and Conservation

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Coben, Lawrence (Larry)

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Brief Biographical Information

Coben has a B.A. in Economics from Yale University, a J.D. from Harvard Law School, and a Ph.D. in Anthropology (Archaeology) from the University of Pennsylvania. He is a University of Pennsylvania–affiliated archaeologist. He is also a member of the Board of Directors of the Bolivian-American Chamber of Commerce and a former golf captain of the Saint Andrew's Golf Club. He served as president of the Board of Directors of New York Stage and Film, a not-for-profit theater company from 1995 to 2003.

Major Accomplishments

Coben's most recent archaeological work focuses on Inca imperial expansion and the role of spectacles, rituals, and theatricality in ancient societies. He coedited the seminal volume *Archaeology of Performance: Theaters of Power, Community, and Politics*, a study of the importance and use of theatrical performance at public events, rituals, and spectacles in ancient societies to create and govern states and empires. He has also written numerous articles on the Inka, sustainable preservation, empires, performance, and complex societies. He has directed or participated in projects in Bolivia, Peru, Guatemala, Ecuador, and Jordan.

Dr. Coben is the founder and executive director of the Sustainable Preservation Initiative ("SPI"). SPI seeks to preserve the world's cultural heritage by providing sustainable economic opportunities to poor communities where endangered archaeological sites are located. SPI believes the best way to preserve cultural heritage is creating or supporting locally owned businesses whose success is tied to that preservation. SPI's grants provide a "two for the price of one" benefit: They create transformative economic opportunities for the local residents while saving archaeological sites for future generations to study and enjoy. SPI is active throughout Latin America, particularly Peru, as well as in Jordan and other countries.

Coben is chairman of ICAHM's Nomination Assistance Committee and vice chairman of its Standards Committee. He was a member of the Governing Board of the Archaeological Institute of America and the first chairman of its Site Preservation Committee. Coben is also a member of the University of Pennsylvania Museum's Director's Council.

Cross-References

▶ Archaeological Stewardship
▶ Cultural Heritage in Times of Economic Crisis

▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
▶ Stakeholders and Community Participation
▶ Sustainability and Cultural Heritage

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Cognitive Archaeology

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Introduction and Definition

Cognitive archaeology, or the archaeology of mind, has been broadly defined by Colin Renfrew as the study of past *ways of thinking* through the material remains that have been unearthed (Renfrew 1982, 1993, 1994). Important to note at the outset is that cognitive archaeology does not attempt to identify *what* people thought, but rather *how* they carried out their thinking in interaction with others and the material world. In other words, the archaeology of mind is primarily interested in learning about the different situated processes of human thought as they emerge and take shape in the different cultural trajectories of our species.

The spectrum of abilities that archaeologists have delved into has been wide. Given the position of tools at the starting point of the archaeological record, the technological capacities that were required to manufacture and use them were among the first to be examined. However, it is later-emerging cognitive properties that have received most of the scholarly attention. Symbolism, generally defined as the uniquely human ability to create and manipulate representations, holds a highly prominent place in this context. Language, which is closely tied to symbolism, is yet another ability whose emergence is of the utmost importance for the epitome of the human species and has thus been especially investigated. Despite symbolism and language taking center stage, other capacities, such as abstract reasoning, theory of mind, and self-awareness, have also drawn considerable attention.

The cognitive archaeologist attempts to illuminate the cognitive functions of our ancestors through the construction of inferential frameworks on the basis of present-day evidence. The development of solid inferential steps is often founded on an interdisciplinary approach, within

which archaeology plays a vital role. As aptly put by Mithen (1996: 259): "if you wish to know about the mind, do not ask only psychologists and philosophers: make sure you also ask an archaeologist." Given that soft neural tissue does not fossilize, material evidence proves imperative in understanding our cognitive becoming, as it provides the "grounding" upon which the cross-disciplinary narrative can be built. Trying to reconstruct the prehistory of the mind, however, has proved a challenging task, due to the difficulty of establishing testable, empirical, but also culturally sensitive, and philosophically informed links between brain structure, cognitive function, and archaeologically observable behaviors.

Historical Background

In 1956, Vere Gordon Childe argued that an archaeologist must progress from the archaeological material record to behaviors, to thoughts. However, the proponents of the New Archaeology movement that emerged in the 1960s considered the ideational realm inaccessible. This tenet of archaeological thought, also known as "functional–processual archaeology," was characterized by the preoccupation with the *functional* variability of artifacts, rather than the possible thought processes and categories associated with them (e.g. Binford 1965). Accordingly, prominent figures of the processualist movement, like Lewis Binford (1965: 204), dismissed any exploration beyond the material, into the psyche of past peoples, as unproductive "paleopsychology."

Despite the initial skepticism, however, the first explicit steps towards the cognitive direction were made during the following decade. Colin Renfrew's study of the role of the "symbolic and projective" subsystems in the emergence of the Aegean civilization (1972) marks possibly the formation of cognitive archaeology (Renfrew 1993: 250). Meanwhile, other scholars had started to accentuate the cognitive capacities required for archaeological artifacts (e.g., Marshak 1972). In fact, according to Kent Flannery and Joyce Marcus (1993: 260), by the early 1970s, archaeologists such as John Fritz and Robert Hall had already listed "cognitive archaeology" among their research interests, in the American Anthropological Association's guide to anthropology departments. Thomas Wynn was the first to adopt a systematically cognitive methodology in studying stone tool use, drawing upon the work of developmental psychologist Jean Piaget. Focusing upon stone artifacts from the Isimila Prehistoric Site, Tanzania, he concluded that Acheulian hominids exhibited organizational abilities characteristic of operational intelligence similar to ours (Wynn 1979). In his 1982 inaugural lecture in Cambridge, entitled *Towards an Archaeology of Mind*, Colin Renfrew outlined the potential of a cognitive approach to the study of the archaeological material record. He argued that questions pertaining to human intelligence are key in describing and explaining the growth and diversity of human societies, which can be recognized as the central goal of archaeology (Renfrew 1982: 2).

In spite of such promising first steps, dubiousness still loomed over the field. As Ian Hodder (1993: 253) informs us, "The term 'cognitive archaeology' or 'the coggies' was used disparagingly in the late 1970s and early 1980s to refer to trends in the discipline which came to be called symbolic, structural, contextual, hermeneutic or interpretive." The tepid standpoint of the functional–processualists seems to have been mainly grounded on their perception that cognitive archaeology deals with the intangible and is preoccupied with mere epiphenomena, such as religion and ideology (Flannery & Marcus 1993: 260). Regardless of such reservations, however, cognitive archaeology continued to develop during the 1980s, admittedly lacking a collectively agreed upon identity and direction, veering off in a number of pathways.

One such line of research, contemporaneous to Anglo-American discourse, arose in France during the latter half of the 1980s, when prehistorians started employing the *chaîne opératoire* approach of André Leroi-Gourhan for the purpose of studying the lithic assemblage. They aimed to illuminate the technology and practical

skills (i.e., technique) of the knapper, by methodically interconnecting the lithic assemblage. On this premise, the approach had been used for both technoeconomic studies, which are concerned with the spatiotemporal dynamics of the lithic reduction process, and technopsychological studies, which are focused on conceptual and procedural dynamics. It is the second type of studies that was widely considered to have granted access to the knapper's mind (Bar-Yosef & Van Peer 2009).

In an attempt to establish some common ground, the first conference devoted exclusively to the discipline was organized by Colin Renfrew and Ezra Zubrow in April 1990 at Cambridge. According to Renfrew (1994: 3), the conference marked the passage from "functional–processual" to "cognitive–processual" archaeology; however, it did not appear to yield much consensus, as becomes apparent in the 1993 feature of the *Cambridge Archaeological Journal*, entitled What is cognitive archaeology?. The conference did, nonetheless, spark an increased interest in the cognitive that boomed during the 1990s, as reflected by the number of symposia held in the subsequent years.

The blossoming of the field proved particularly beneficial in attracting the interest of scholars from other disciplines, who drew upon the archaeological record. A beginning was made by cognitive neuroscientist Merlin Donald (1991), who suggested that the mind emerged in three stages: a mimetic skill allowed the transition from the "episodic" stage of the early hominids to the "mimetic" stage, a linguistic capacity subsequently permitted the transition into the "mythic" stage, and, lastly, writing conferred the transition into the "theoretic" stage. In this last stage, Donald identified a new way of "external symbolic storage." Whereas, up until that point, neural engrams had been relied upon for the purpose of storing memories, novel material media provided humans with the ability to store information that could be retrieved at a later date, thus instigating a radical change, not only in the capacity, but also in the operationalization of memory. The increasingly expanding list of such exograms has ranged from hieroglyphs and writing systems to diagrams and decorations. In this light, biologically molded human beings had been coupled with material culture in order to transition into a biocultural hybrid phase. Another noteworthy work by a scholar external to the field was authored by biological anthropologist Terrence Deacon (1997), who used a triptych of signification proposed by semiotician Charles Sanders Peirce (i.e., icons, indexes, and symbols) as a cornerstone, in order to put forth an account of the emergence of linguistic symboling. By constructing a nested hierarchy, with icons at the bottom and symbols at the top, he associated each level of reference with its own degree of consciousness and underlined that humans are the sole species possessing symbolic consciousness, for they moved from indexes, which are characterized by associative learning, to symbolism, based upon "a change in mnemonic strategy, a recoding" (Deacon 1997: 89).

The 1990s also saw the first cross-disciplinary collaborations, such as that between psychologist William Noble and archaeologist Iain Davidson, who advocated that it was the emergence of language that yielded the "modern" mind, for as they put it "'the mental' equates to language in human life" (1996: 226). Their view, in brief, is that pointing gestures would occasionally be captured in plastic media, such as mud, becoming thus signs vulnerable to further manipulation and open to arbitrariness, as any vocal accompaniments of the gestures would be transformed into linguistic symbols, therefore birthing a "modern" type of language.

The prospering of cognitive archaeology continued well into the new millennium, with a number of agendas, purporting to account for the emergence of "modernity," sprouting into existence.

For one of these schools of thought, the unearthed material evidence was the outcome of a genetic mutation. Paleoanthropologist Richard Klein (2009) has famously advocated in support of a fortuitous mutation in the executive brain, which he suggested granted humans a qualitative neural advance. He claims that prior to 50 kya, morphology and behavior appeared to have

evolved relatively slowly, whereas after this time, behavioral change accelerated rapidly, while morphology remained relatively stable (Klein 2009: 745). Along similar lines, anthropologist Thomas Wynn and psychologist Frederick Coolidge (2011) have identified an additive genetic mutation that enhanced our working memory capacity, as one of the final components of the "modern" mind. An increased ability to retain and process information in active attention is beneficial for a wide range of essential cognitive capacities, such as fluid and general intelligence, and linguistic comprehension, acquisition, and expression. Based on their interpretation of the archaeological record, they determine the mutation to have certainly been in place by 30 kya and perhaps as early as 77 kya.

In another account of mental evolution, Iain Davidson (2010) has supported a modular mental model based on a concept put forth by neuroscientist Philip Barnard, according to which information flows through a number of interacting cognitive subsystems. The framework purports that humans have evolved from species with fewer subsystems to possess a nine-subsystem model of cognitive function, with each system specialized in a specific type of representation.

Archaeologist Miriam Haidle (2012) attempted to delve into the cognitive lives of past peoples by developing and employing yet another distinct investigative technique. The essence of her approach rests in identifying the thought-and-action processes required for the manufacture and use of tools. This is done by coding the physical actions required for tool construction into a sequence of operational units depicted in a "cognigram."

A final contemporary doctrine was fathered by Colin Renfrew, who switched gears in 2001, by imbuing material culture with a more "active" role, at the expense of its, until that point, reduction to an epiphenomenal product of the mind. By highlighting the implications of human *engagement* with the material world, he set the foundations for a cardinal transition that transformed the discipline. He dismissed the mind/matter dichotomy, adopting a *hypostatic* approach, according to which the mind's symbolic capacity emerged via praxis in the material world (Renfrew 2001: 128-29). It is in the light of such a process of "substantialization" that symbolic concepts and their material manifestations arose in unison. Adopting these theoretical underpinnings, cognitive archaeologist Lambros Malafouris (2004) drew extensively from philosophy of mind, in order to illuminate the pitfalls of the commonly adopted Cartesian methodological individualism, and identified the cognitive system as embodied, mediated, distributed, and extended. Archaeologist Carl Knappett (2005) shared this notion of the mind and contextualized its realization in non-anthropocentric interactive networks whose nodes are constituted by inextricably tied brains, bodies, and artifacts. Bidirectionality of agency between the nodes is a pivotal principle characterizing the networks, for while it is action that creates and reshapes material forms, it is also action that is exerted by them. It is in precisely such a cognitive landscape that humans act and think through material culture (Knappett 2005), as well as create and reproduce their identities (Gamble 2007). In moving away from the exclusive preoccupation with the representational, what emerged is the ability of humans to self-engineer themselves through the physicality of their agency-bearing material worlds (Boivin 2008). However, one's cognitive and existential manifestation is shaped not only by material culture but also by neighboring embodied brains. Hence, to refer to this network-born entity, archaeologist Chris Gosden (2008: 2003) advanced the "notion of a social ontology, which holds that human life unfolds through an equal input from materials and from people."

But how does this discussion on the cognitive translate into biological terms? What is the relationship between the human neural apparatus and the unearthed material culture? In seeking answers to such questions, archaeologists turned for enlightenment to neuroscience – a field with visual access into the functioning brain,

permitted by recent advances in neuroimaging technology, such as functional magnetic resonance imaging (fMRI). Recognizing the benefits of incorporating such knowledge into the study of the past, Lambros Malafouris and Colin Renfrew (2008) were among the first to systematically bridge the fields of neuroscience and archaeology, yielding an integrated theoretical platform they termed "neuroarchaeology." It is encouraging to note that, at this time, cognitive archaeologists also started harvesting the potential of imaging techniques more directly by conducting neuroarchaeological experiments. For example, positron emission tomography (PET) was used to monitor the functional brain activation during the experimental manufacture of Oldowan and Acheulian tools by experts (Stout et al. 2008). Interestingly, the observed patterns of activation overlapped with the neural circuits employed by language, possibly suggesting mutually reinforcing coevolution.

In concluding this brief historical overview, it should be acknowledged that the cognitive capacities possessed by the Neanderthals have also received a moderate amount of attention in the past decade or so. For instance, Thomas Wynn and Frederick Coolidge (2004) argued that their working memory capacity was lower than that of their anatomically modern counterparts, granting them with a smaller phonological store, or a reduced attention capacity. While symbolic reference does not depend on working memory, the authors purported that the reduced capacity of the Neanderthals would have constrained the number of symbols they would have been able to process and that their language must thus have been more laconic compared to the richer version used by anatomically modern humans.

Key Issues/Current Debates

Questions concerning the origins of "modernity" have been at the forefront of paleoanthropology and cognitive archaeology ever since the publication, in 1989, of *The Human Revolution*, a volume edited by archaeologist Paul Mellars and anthropologist Chris Stringer. "Modern human behavior" is an ambiguous and much contested term (Shea 2011), which has nevertheless been widely established as referring to a "package" of behaviors considered to characterize the uniqueness of the "modern" human condition. Not surprisingly, symbolism and language are unambiguously considered the most important elements of this bundle. Nevertheless, despite agreement upon the behaviors of primary importance, the spatiotemporal scenarios that have been purported to explain the crossing of the Rubicon towards "behavioral modernity" remain much contested (for a good review, see McBrearty & Brooks 2000; d'Errico & Stringer 2011).

Similarly, a variety of mechanisms have thus far been considered as the instigators of the transition towards "modern human behavior." An overview of the literature will reveal that scholars are roughly divided into two broad and heterogeneous schools of thought. Some emphasize sociodemographic factors, such as the increasing population density, as the prime mover of behavioral change, due to its indubitable effect on chances of innovation. Others see the emergence of a "modern" mind as the prime mover of increasingly complex behavior. Their preoccupation with our cognitive evolution has indeed contributed much in demonstrating the primacy of the mind in explaining the origins of "behavioral modernity."

Dissonance among these scholars in their conceptualization of the directionality between human mind–material culture interactions requires a further dichotomization of agendas into representationalism and interactionism. Pondering along the lines of "the chicken or the egg" causality dilemma, did the brain mold the unearthed artifacts, did the latter mold the former, or is the relationship between them best seen as bidirectional? Answering this question primarily rests on an archaeologist's disposition of *where* the mental resides and *how* it unfolds – issues that dwell well within the territory of philosophy of mind.

According to the representational or internalist idiom, preexisting concepts were initially formed within the mind, before being

materialized in objects through action. This dualistic disposition is still much alive today with many scholars implicitly or explicitly subscribing to the computational view of a mind receiving and processing external sensory stimuli "trapped" within the cranial cavity.

A rejection of the representational view can perhaps be traced back to the mid-1990s, when William Noble and Iain Davidson (1996) argued in favor of what they termed a "social construct" model of the mind, which posits a conception of the mind as socially distributed. An implication of such view is that universal conclusions about past minds cannot be drawn, for as has been suggested by prominent post-processualist Ian Hodder (1993), if all aspects of cognition are partly social, then interpreting social meanings and contexts is the only way to study cognition with respect to particular societies. However, this emphasis on contextual interpretation was not entirely without problems. For instance, cognitive archaeologists, such as Kent Flannery and Joyce Marcus (1993) and Colin Renfrew (1993, 1994, 1998), failed to recognize the multi-faceted nature of cognition, largely equating the "cognitive" with the "symbolic" and therefore placing symbolic material culture at the forefront of the discipline. Such an extensive preoccupation with the symbolic, however, has been critiqued by Carl Knappett (2005) for disregarding non-symbolic forms of embodied intelligence, which should also be taken into consideration. Moreover, early studies in cognitive and symbolic archaeology failed to appropriately define symbolism (Knappett 2005; Preucel 2006). While acknowledging the fundamental role of symbolism for signification, they omitted recognizing that, along with symbolic action, it also required pragmatic action. Hence, although communication and signification can overlap, early scholars failed to comprehend that they are not required to do so.

At the turn of the millennium, however, cognitive archaeology apparently came of age with a variety of theoretical advances which challenged the consensus' view of the mind as an internal processor, by introducing an externalist perspective that highlighted the "active" role of material culture in bringing forth the mental (e.g., Renfrew 2001; Malafouris 2004, 2013; Knappett 2005; Boivin 2008; Gosden 2008). This enactive relational stance required the radical rethinking of both the material and the neural ends of the interaction – the plasticity of which allowed them to be concomitantly molded via a constitutive intertwining of brains, bodies, and things that enabled the cognitive to unfold, in real time and space, unhindered by cranium- or skin-delineated boundaries (see esp. Malafouris 2013). For cultural neuroscience has proved beyond doubt that cultural phenomena can lead to an extended structural and functional reorganization of our brain's architecture permitted by its extremely plastic nature. Thus, the cognizing neural apparatus of our anatomically modern human ancestors appears to have been in fact sculpted into a "modern" mind upon engagement with material culture – a conclusion which appears to account for what Colin Renfrew termed the "sapient paradox": "if the biological basis of our species has been established perhaps for as much as 200 000 years, then why have the novel behavioural aspects of our 'sapient' status taken so long to emerge?" (Renfrew et al. 2008: 1935).

Future Directions

Despite the fact that our cultural trajectories have been solidly described and are constantly enriched by additional discoveries, there is still much to be learned about the origins of our cognitive ontology. Hence, the emergent, at this point, question is: How should the cognitive sphere of past peoples be approached?

It must be recognized that the feasibility of the field's aspirations has much to gain from interdisciplinarity. Cognitive archaeology has been demonstrating remarkable progress, mainly due to transgressing the traditional borders that isolated it from other disciplines and incorporating their sagacity, yielding thus an interdisciplinary research program that aims at answering broader questions on the emergence of the human mind. As would be expected, the synergistic fusion of the composing disciplines required a point of

intersection that fell beyond archaeology itself, maintaining, in the meanwhile, the general analytic objective of cognitive–processual archaeology – namely, using archaeological material remains in order to understand past ways of thinking as they emerge and take shape in different evolutionary and cultural trajectories. Neuroarchaeology is a fine example of a collaborative synthesis whose yield has thus far been particularly fruitful, despite still being at an early stage. While it can offer invaluable insight for the pre-sapiens period of the evolutionary trajectory, its analytic potential can mainly be harvested by scholars examining the period following the so-called speciation phase, due to its implementation of findings made by disciplines focused on anatomically modern humans. Archaeologists have indeed learned much about the biological, social, and cultural foundations of the human mind by working with anthropologists, philosophers, neuroscientists, and social and cognitive scientists. Reciprocally, cognitive archaeology, probably more than any other field of cognitive research, has granted the material world with laudable value for its essential role in impelling and shaping the mental.

On this note, it is time we overcome, once and for all, the "representational fallacy" pervading much contemporary work, for material culture is much more than a mere epiphenomenal product of a brain-residing "ghost in the machine." Our Cartesian spectacles should be left behind, opting instead for a fluid view of a sapient mind emerging from the bidirectional coalitions between brains, bodies, and things (Malafouris & Renfrew 2010; Malafouris 2013). For as has been stated by Chris Gosden (2008: 2010): "The complex actions and interactions of brains, bodies and worlds are what make us human and historical." The introduction of such a radical, for the consensus, outlook in our attempt to trace our cognitive becoming will allow us to better comprehend the concomitant molding of both the neural and material components of this symbiotic triad. It is hence of paramount significance that we fully appreciate the process of redesigning ourselves through our embodied engagement with the scaffolding provided by material culture. By being committed to such a relational, rather than reductionist, view of the mind, we evade falling into the trap of neurocentrism and thus avoid mistaking the properties of the sociocultural system for the properties of the individual or the brain (Hutchins 1995). For we should constantly remind ourselves that disregarding the "active" role of material culture is a rather inexcusable error by the discipline that prides itself on studying things from the past.

Cross-References

- ▶ Behavioral Archaeology
- ▶ Practice Theory in Archaeology
- ▶ Pragmatism in Archaeological Theory
- ▶ Processualism in Archaeological Theory
- ▶ Renfrew, Colin

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Cognitive Evolution and Origins of Language and Speech

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Introduction

The archaeological study of cognitive evolution is closely related to the study of the origins of speech and language. The two issues are related as a result of (1) the general nature of any form of communication and (2) the special nature of human communication. First, in general, all communication has an emitter, a receiver, and a message. In most cases, the emitter and the receiver are tuned to each other's communications, and there is little problem in sending or receiving the message. In all organisms other than humans, there are questions about the intentional control of the messages that can be sent. Intentional communications require different cognition from those that arise without thought. Second, in the special case of humans, we have a peculiarly complex form of emitting sounds and an auditory system well tuned to hear those sounds. In almost all circumstances, humans are capable of controlling the information they communicate to another person, which can be called the meaning of the message. Control of such meanings is a cognitive difference between humans and most (if not all) other animals. The problem for the study of both issues is to relate them to the material record available to archaeology.

To those of us used to reading the written or printed version of such sounds, it seems straightforward that someone speaks words and that we hear them, but recognizing this message requires an unconscious separation of the sound stream into smaller units (corresponding to the gaps between words when written on the page). Such words can have different meanings for different people because they are determined among communities of speakers by convention and generally bear little relation to the things they refer to. Because of this property of "arbitrariness restricted by convention," all words are symbols.

This complex system is very different from the relatively restricted range of utterances by apes and the apparently limited range of things that they can communicate. The evolutionary emergence of these differences involved changes in the system for production of sounds, in the auditory complex that hears those sounds, and in cognition that relates sounds to meanings. In addition, uniquely among humans, the meanings that can be conveyed in speech can also be conveyed in sign languages based on manual gestures and, as you see, in the written word. Several scholars have argued that symbolic communication using manual gestures may have preceded spoken language.

Finally, humans appear to be unique in the capacity to combine individual utterances into combinations according to sets of rules, known as syntax, such that they can utter an infinite number of sentences composed of a smaller number of words. Except in circumstances of serious pathology (including deafness), or of extraordinary deprivation of exposure to language during the early years of life, the expectation is that humans are able to learn language and use it to communicate with others. Among deaf people, language can be transmitted using Sign

Languages (which differ from community to community as spoken languages do).

These complexities mean that there are many false pathways for investigating the evolution of cognition and the origins of language and relating to the relative importance of the different elements of speech, syntax, or the cognitive apparatus that supports them. These false pathways seem to offer understanding, but actually cause confusion.

Definition

Evolution

Evolution is a process by which the characteristics of populations change through the operation of natural selection on the inherited variable characteristics of individuals. It is important to remember that most of the variation arises by chance from one generation to the next, and most of the selection operates to eliminate variations. The logic of this formulation is that new characters within the variation should appear at low frequency within a population and subsequently become important due to selection.

The discussion of evolution is often undertaken with misleading metaphors that allow people to believe that there is either a direction to evolution or a force driving it. There is no direction (except seen from the present position) and no forces driving evolution.

Cognition

By a classic definition (Miller 1956), the aim of cognitive science is to: "discover the representational and computational capacities of the human mind and their structural and functional realization in the human brain." The evolution of cognition, therefore, must be studied through the evidence of changes in such representational and computational capacities and the limited evidence of the workings of the mind, first from the evidence of behavior (as is the practice of psychologists of the living) and second from the shadowy traces of the brains of human ancestors (for a summary of this process, see Davidson 2010a). Such evolutionary studies necessarily require the interpretation of the evidence of behavior from archaeological remains. Any inferences about cognition require well-constructed theory about the relationships between elements within the neurological system, the mental system, and the behavioral system as well as theory about the relationships between these different systems (Barnard 2010). Inferences about the evolution of cognition require all of these together with a clear argument about the relations between these elements and the archaeological record (see, e.g., Botha 2010).

The Brain of Humans and Their Ancestors

There are three relevant issues about the brain: (1) size, (2) localization of specific functions to specific areas of the brain, and (3) evidence from genomics about the genetics of brain function and its history.

The easiest is the size of the brain. Among modern humans, the size range is 1,000–1,700 ml (Lieberman 2011: 192–195). The fossil record shows that the cranial capacity (only an approximation for brain size) of the last common ancestor of about 400 ml was much closer to that of modern apes than to that of modern humans. There are substantial data on the increases in cranial capacity in two steps: one at about two million years ago to a maximum around 1,000 ml, accompanied by a change in body size, and the other between 0.4 and 0.2 million years that was not accompanied by significant change in body size. Each of these changes was followed by the extinction of the creatures with the lowest range of cranial capacity, first those below 700 ml and then those below 1,000 ml (see, e.g., Davidson 2007). The estimates of cranial capacity of fossils are rarely precise, and the relevant fossils often have uncertain dating. It has been argued that brain size is closely related to group size as a means of solving the problem of living in large, complex groupings (Dunbar & Shultz 2007), but some of the key elements of the argument have been shown to be unreliable (Davidson 1999).

As regards the specific functions of regions of the brain (there is an accessible discussion of the main features of this in Coolidge & Wynn 2009), language deficits caused by traumatic damage were the original source of understanding that Broca's area is associated with language production. Subsequent work showed similar associations with specific language features (e.g., Wernicke's area with language comprehension) or aspects of cognition (such as the loss of executive function following catastrophic injury to the frontal lobes). There is no doubt that in ordinary circumstances, particular regions of the brain are associated with particular functions, but the advent of brain imaging of various sorts has shown that functions are distributed more widely in the brain (see, e.g., many PET scan results in Deacon 1997: Chap 10). In addition, recovery of function following stroke or some other massive insult to the brain suggests that the brain is more plastic than sometimes suggested (e.g., Cramer 2008).

Other work has described changes in the morphology of the interior cavity of the skull as represented by the endocasts of the brain or by computed tomography (Bruner 2008). Notably, differences between the endocasts of Australopithecines and early *Homo* have been interpreted as indicating the earliest appearance of Broca's area (Falk 1983), but more recent comparisons with other primates make the interpretation of this more difficult (Schenker et al. 2009). A case can be made that there has been selection for regions such as the basal ganglia and the cerebellum, which are associated with procedural learning, and for hierarchization of the different regions of the brain (Gibson & Jessee 1999).

Language

Because in normal circumstances humans use language, it is easy to avoid definition of the concept – we know what we are doing when we use it, the argument goes. This is another cause of confusion in discussions of its evolution because people have different informal understandings of what is involved. When examining the archaeological record, the definition needs to be one that can be operationalized with nothing more than the fragmentary things found there. Without a definition of this kind, it is impossible to choose between hypotheses that are products of different theories about the nature of modern language. Nevertheless, most definitions recognize that the basic elements of language are symbols (see, e.g., the discussion in Crystal 1987: Sect. 64).

Some others restrict the definition of language by requiring rules about the combination of such symbols using syntax or grammar. For the purposes of archaeology, it is convenient to define language as communication using symbols (Noble & Davidson 1996) and consider as a separate issue how such symbolic communication came to have rules about combinations.

Speech

At the very beginning of serious study of linguistics, Saussure recognized that the relationship between speech and language was complex, since, in the ordinary course of events, speech does not exist separately from language, yet conceptually the two aspects of the single phenomenon are different (Saussure 1986). Speech can be defined as: "A set of audible sounds produced by disturbing the air through the integrated movements of certain groups of anatomical structures. Humans attach symbolic values to these sounds for communication" (http://www.answers.com/topic/speech downloaded 23 November 2012 10.35 am). Much of the bodily apparatus for producing these streams of air consists of soft tissue and is therefore difficult, but not impossible, to study through skeletal remains. Many examples have been shown not to reveal as much as was hoped about the emergence of speech production (summarized in Davidson 2003: Table 8.1), but more recent studies have claimed that skeletal evidence dated to about 0.5 Ma ago from Atapuerca, in Spain, demonstrates that the bones of the outer and middle ears allowed them sound power transmission into frequency ranges higher than those available to chimpanzees, but with upper limits lower than those of present-day people (Martínez et al. 2012).

The separateness of speech and language is important in the study of both cognitive evolution and language origins. First, as with other vocal utterances by primates, it is possible for hominins to have produced sounds without symbolic meanings attaching to them. Selection could have operated on variations in the anatomy for production of sounds and the concomitant anatomy for hearing without the meanings associated with those sounds being symbolic. Second, if we go by ape sound production, there were substantial cognitive changes required to go from what Burling (1993) called relatively involuntary "gesture calls" to the state where the hominin making the sounds had human-like control of the subtle ranges of sounds humans can make. Third, Saussure recognized that speech and language were inseparable in practice and that the study of linguistics involved the study of the signs involved in the meanings conveyed by language. While those meanings require a social community of speakers, they must also have been a novel product of the cognition of the individual speakers.

Semiotics

The study of signs is called semiotics. A sign was defined by Peirce (1986) as "something which stand[s] to somebody for something in some respect of capacity." To put Peirce's analysis simply, three classes of sign are fundamental: indexical signs, iconic signs, and symbolic signs. According to Peirce "an *Index* is a sign which refers to an Object that it denotes by virtue of being really affected by that Object." The standard example is smoke as an indexical sign of fire, but a less ephemeral example is the footprint left by a person walking on volcanic ash or mud (as at Laetoli or Lake Mungo). All pieces of archaeological evidence are indexical signs of past behavior. Indexical signs are overwhelmingly abundant, but interpreting them is not always obvious (or archaeologists would not need to be trained). Indexical sounds that may be related to the production of vocal communication are grunts in young children or "exclamatory words of high emotion" (Jackendoff 1999), although these are generally not as spontaneous as they seem (Davidson 2005).

Peirce's (1986) definition of iconic signs is: "A sign may be iconic, that is, may represent its object mainly by its similarity. . .." The concept is familiar through the generalized resemblance between the images in religious icons and a human figure; though this example illustrates that the similarity between icon and object may take many forms – the religious icon represents a generalized human being, but an iconic representation of recognizable individuals is a different sort of achievement. In vocal communication, onomatopoeic utterances are generally iconic, but, as with indexical utterance, they also are constrained by the conventions of the speaker's language. Iconic gestures are not unknown among apes. Burling (1999) has gone further and suggested that the sequential structuring of syntax has elements of iconicity to it. In sign languages, many utterances become conventionalized from iconic gestures and hence are symbols, but such utterances may also be indexical signs (Stokoe 2000).

Peirce discussed symbols in several different ways, but that which is formulated in a manner most similar to the standard "signs that are both arbitrary and conventional" seems to be that symbols are signs that "represent their objects, independently alike of any resemblance or any real connection, because dispositions or factitious habits of their interpreters insure their being so understood" (quoted in Nöth 2010). The importance of symbols for the archaeological study of language origins (and hence cognitive evolution) is that there is some chance that material objects may be identified as symbolic in the archaeological record, but care must be taken with the way in which that is done.

Learning

Language learning is social and there is absolutely no parallel in nonhumans. In all cases, language is the usual means of communication among humans and only present among other free-living animal species by stretching the definitions of language (see, e.g., extensive discussions in Davidson 1999).

Language is learned by very young infants at their mothers' breasts. In particular, small babies, carried in their mothers' arms in front of them, learn to attend to those things their mothers notice (see the argument in Noble & Davidson 1996). This provides the circumstances for selection for learning. The key trigger for infant carrying and hence the joint attention that promoted infant learning was the emergence of obligatory bipedal walking – present by 3.5 Ma ago, as shown by the Laetoli footprints – and hence front carrying.

The emergence of prolonged infant dependency and the life history pattern of modern humans were essential for humans to go through all of the stages of learning (for a general summary of life history variables and their relevance to archaeology, see Nowell in press). When compared with other primates, human infants have a much longer period after birth during which their brains continue to grow at the fetal rate, and they have to be carried for most of their first year of life. Learning and symbol use are not simply a product of brain changes, but of the social context (Noble & Davidson 1996).

Historical Background

Arguments about cognitive evolution and the origins of language and speech have historically depended on a few consistent lines of inquiry. Five such approaches derive from (1) knowledge of modern languages, (2) understanding communication among nonhumans, (3) the anatomical basis of speech production and reception, (4) archaeological evidence for symbol use, (5) and the recognition that language and human cognition can be understood in the context of evolutionary argument.

First, discussion about the origins of language depended on speculations about modern languages, to the extent that the Linguistics Society of Paris famously banned such discussions in 1866. More recently, Chomsky claimed that language was too complex to be explained by evolution. Much recent work has returned to the examination of languages, initially by looking at pidgins as examples of protolanguage (Bickerton 2007) (although pidgins only exist when full modern languages are in contact). More recently, progress has been made by considering meaning making in an evolutionary framework by careful assessment of the differences between human and animal conceptualization (Hurford 2007). Arguments based on modern languages are unlikely to reveal much about the initial conditions of language production except through such cognitive analysis.

Second, research has been undertaken into the communication of nonhumans, especially landmark studies of the so-called alarm calls of vervet monkeys in the wild (Cheney & Seyfarth 1990), extending to attempts to devise methods for two-way communication between humans and captive apes (Savage-Rumbaugh et al. 1998). The monkey work showed that the communications were relatively unlike language in the limited nature of the utterances and the very specific contexts in which they were used. The ape work showed that comprehension might exceed production, that learning might best be done spontaneously without instruction in a social context, and that language might best be considered not as something that the apes learned as individuals, but that language-like communication came to exist in specific ape-human interactions. Language was shown to be a property of the relationship not of the individuals involved. The most important conclusion from the study of nonhuman primates is that there are such cognitive differences between modern apes and humans that their last common ancestor seems likely to have been cognitively different from modern humans.

Third, in the hope of finding real evidence from the past, attention shifted to the anatomical correlates of speech production either in the throat (for a recent reassessment of work going back to the 1970s, see Lieberman 2007) or in the brain (for a similar reflective history, see Holloway 2008). The investigation of speech drew attention to the need to consider carefully the relationship between speech and language, as well as the question of what speech abilities

might have been a necessity for adequate use of language. New discoveries allowed the analysis of breathing control among extinct hominins (Maclarnon & Hewitt 2004) and of their hearing (Martinez et al. 2004). The brain studies led to a more careful consideration of the relations between speech production as a motor function (control of musculature) and as a mental phenomenon. Such studies show that there has been biological evolution of anatomical structures that make modern speech possible, and some of what those evolutionary changes were.

Fourth, archaeologists began to realize that they might have something to say on the matter (Dibble 1989), particularly when the emphasis in defining language shifted to symbols rather than syntax (Davidson & Noble 1989) and the recognition that the claims for early symbol use were less secure than it had seemed (Chase & Dibble 1987). Collaboration of archaeologists with psychologists and cognitive scientists demonstrated that much more subtle inferences were possible if appropriate theory was developed (Noble & Davidson 1996; Coolidge & Wynn 2005; Barnard et al. 2007). Archaeology remains one of the few sources of information about the past which can tie past behavior to particular times and places. Making inferences about cognition or language from such behavioral evidence requires the specification of theoretical links.

Finally, a key paper by psychologists argued strongly that language could be analyzed in an evolutionary framework, allowing linguists to contemplate its origins (Pinker & Bloom 1990). This ultimately led to Chomsky being involved in an attempt to look at evolutionary aspects of language and the claim that the most significant novelty of language was the capacity for recursion (Hauser et al. 2002). Depending how recursion is defined, there is some potential, largely unrealized, for the identification of recursion in the archaeological record (Coolidge et al. 2010).

The outcome has been an outpouring of research on language origins since 1989 taking advantage of all of these developments (for a wide ranging review of the literature see Johansson 2005). In addition, through the multidisciplinary interaction, there emerged a consensus that some of the avenues of inquiry did not relate closely to the concerns of linguists, except insofar as both required the emergence of particular cognitive abilities. In this way, evolution of cognition and origins of language became closely related in research programs.

Key Issues/Current Debates

There were two relatively early attempts to look at the archaeological evidence for cognitive evolution. The first (Holloway 1969) was a logical extension of the author's interest in brain processes and considered the content of knapping actions both in terms of their semiotic significance and in relation to the possibility that sequential actions in the production of finished artifacts had some parallel with syntax. The second was a sustained, and pioneering, effort by Wynn to apply to artifacts of the early stages of hominin evolution the spatial concepts Piaget discerned as defining the cognitive abilities emerging at different stages of human ontogeny (summarized in Wynn 1999). Wynn has subsequently moved beyond this analysis and, particularly, has worked with cognitive scientist, Coolidge, to show the role of Working Memory in Neandertals and modern humans (an accessible work that summarizes many papers and a book is Wynn & Coolidge 2012).

In addition, Wynn has revisited a comparison between the behaviors of chimpanzees and early hominins to conclude that chimpanzees seem more similar to a human ancestor, but at the same time, those human ancestors seem more like apes (Wynn et al. 2011). These coauthors identified that both apes and the earliest hominins lacked "curated tools intended for repeated future use; shape imposition and shared standards for shape; semiotic load, or the use of tools to communicate information about the tool user to other tool users; linguistic instruction for tool fabrication." All knapping produced indexical signs of the act (the flakes not removed from the site) and these undoubtedly provided the

opportunity for other hominins to notice novel signs of activity (Davidson & McGrew 2005). It is an unsolved question when hominins first identified that semiotic novelty. Such an argument is related to, but different from, suggestions that interaction between humans and external material culture was an important element of the expansion of human cognition (Donald 1991; Schiffer 1999).

The problem with both the use of Piaget and of Working Memory theory is that the viability of the interpretation depends on the way in which you interpret the archaeological record, and these cognitive theories do not offer much guidance. No one has seen a Working Memory, and whether it has a location in the brain is a matter of controversy. It is, rather, identified by a number of more fundamental behavioral features said to characterize it. In one analysis relating to the first colonization of Australia (which has only ever been populated by modern people), it proved far from straightforward that even basic markers of Working Memory could be identified (Davidson 2010d). More work will be needed to deal with this issue and to specify how the Working Memory model might need to be modified to be useful in describing the behavior of non-modern people.

Cognitive Novelties of Humans

Byrne (2004) compared the abilities of apes with those required to make early stone tools. He pointed out that to make stone tools requires "accurate aiming of powerful blows. . .bimanual role differentiation. . .regular and sequential plan. . .hierarchical organization. . .corrective guidance by anticipatory schema. . .high individual manual laterality and population right handedness." His conclusion was that, among the African apes, hierarchical organization had been observed among gorillas, but not unequivocally among chimpanzees (though this may be a problem of the research). Corrective guidance by a schema has not been observed in either species, and population right handedness has been observed in gorillas but not in chimpanzees (but individual handedness has). All other features can be identified in all species of African ape. On the other hand, cutting appears to be absent from apes in the wild but must have been a principal motivation for the deliberate production of stone flakes from the very beginning (Davidson & McGrew 2005).

Amati and Shallice (2007) listed a variety of cognitive capacities of modern humans that contrast with those of animals. These were the following: (1) language; (2) tools and instruments that go beyond those used by other primates; (3) signs, signals, and other homomorphic representations; (4) dynamic concepts; (5) aesthetic sense; (6) metarepresentation; (7) algorithmic capacity; (8) categorization and organization; (9) theory of mind; and (10) anticipatory planning. There are three important points about such a list. First, not all of the capacities are completely independent of each other: several probably depend on the prior emergence of language. Second, animal ethologists, particularly primatologists, would argue that there are hints of several of these capacities in one or other species of nonhuman or that there has just not been enough research on particular species to be definitive about the absence of such capacity (Boesch 2012). Third, expressed in these terms, some of these capacities are difficult to identify either in the archaeological record or by any other form of evidence or argument.

An earlier attempt to define the cognitive properties of modern human behavior identified complex information exchange, planning depth, and symbolic conceptualization (Noble & Davidson 1991) which could be operationalized in terms of a relatively small number of traits manifest in the archaeological record. Those traits, somewhat divorced from their cognitive context, were expanded and codified to show that cognitive change probably happened gradually and not exclusively in Europe (McBrearty & Brooks 2000). Further investigation has shown that not all of the elements of that list of traits need be present to identify the presence of modern human behavior (Davidson 2010d): the true mark of modern human cognition is flexibility.

Barnard and Byrne developed a theoretical model that could account for the evolutionary

changes in cognition. Barnard originally produced a model of present-day human cognition that has 9 subsystems as an elaboration to overcome deficiencies in the Working Memory model of human cognition (Barnard 1998). Capitalizing on Byrne's familiarity with ape cognition (e.g., Byrne 1995) and Barnard's model, it has been shown that ape cognition can be modelled with six of the nine subsystems, making it likely that there are or were creatures with seven and eight subsystems (Barnard et al. 2007), in all likelihood represented only by extinct hominins.

Among the six subsystems required to account for the known technical abilities of apes, complex hand-eye coordination evolved early in the sequence as a difference from the common ancestor with (5-subsystem cognition) monkeys. In keeping with the observations of Wynn and colleagues and of Byrne, this level of complexity probably characterized the earliest stone tool makers. Complex coordination of vocal utterances in response to visual stimuli would have emerged in the 8-subsystem framework. Language, involving reflective awareness and the expression of thoughts unrelated to external stimuli, emerged only with the emergence of the ninth subsystem.

One element of the argument is an appeal to linguistic theory about semantic roles as a way forward to identify the similarities and differences among humans, hominins, and apes (Byrne et al. 2004; Davidson & McGrew 2005). In this analysis, it is suggested that the statistical regularities of roles that are made salient by the persistence of the stone artifacts as material remains could have enhanced the perception of the semanticity of the actions of hominins. Something similar may apply in the case of mark making that became pictures, with the important difference that several of the supposed semantic roles require some mental processing which could only be done with the ninth subsystem in the Barnard model (Davidson 2012a) (see Table 1).

Cognitive Evolution and Origins of Language and Speech, Table 1 Semantic roles implied by chimpanzee behavior, stone tool making and by picture making

Semantic role	Chimpanzee semantic roles (from Byrne et al. 2004)	Stone tool making (Davidson and McGrew 2005)	Picture-making (Davidson in press)
Agent	Chimpanzee Mike climbs a tree	Lucy fetched the stone	Pablo fetched the ochre
Counter-agent	A chimpanzee strikes a fruit against a stone to open it	Lucy hit the stone with a rock	Pablo rubbed the ochre on a rock
Object	Chimpanzee Figan is now an alpha male	The stone breaks	The ochre marks the rock
Result	Chimpanzee makes a fishing probe	Lucy made a flake	Pablo made a mark
Instrument	Spherical stone used as a hammer to crack nuts	The flake cut the carcase	*The mark made me think of a camel*
Dative	Female chimpanzee Flora is being groomed	*I gave the meat to Lucy*	*Pablo told a story about a camel to me*
Experiencer	*Waa* barks show that Frodo is angry	*Lucy felt well-fed*	*Pablo and I knew some things about camels*
Locative	A group of chimpanzees goes to the group's periphery to look for intruders	Lucy walked away from the flake scatter	*Pablo remembered this as the place of the story of the picture of the camel*

One implication of this model is that it may be that premodern people were able to communicate with speech that did not use symbols but was nevertheless structured in complex ways similar to syntax. Under these circumstances, adults could have assisted the learning of their offspring by spoken utterances that were not yet language (Davidson 2009). The further implication is that the nature of the interactions involved in the production of symbolic objects implies the appearance of the ninth subsystem in the Barnard model – i.e., fully modern cognition. One of the future challenges for the study of cognitive

evolution is to relate the 7- and 8-subsystem models to the evidence from the archaeological record.

Related to the question of semantic roles is the whole question of whether the primitive elements of language were individual words or were more holistic (Wray 2002), an argument that is more persuasive given the abundant evidence from the earliest written language that the dominant process of language change has been simplification and trimming (Deutscher 2005). Even if the earliest elements of language were not individual words but holistic phrases, they would still have had symbolic meaning by convention and been arbitrarily related to their referents. So the issue remains: how can we identify the symbolic content of the archaeological record as a guide to cognition and language?

Symbols and Other Signs

Cultural artifacts acquired meaning first as indexical signs – they were consistently associated with particular situations or conditions. Thus, the debris left from flaking episodes could be seen by the knapper or by other hominins as a sign that knapping had taken place there previously (Davidson & McGrew 2005). Most artifacts have forms that resulted from the requirements of their production (Moore 2012) or their use. It is arguable that it has not been demonstrated that nonhumans even comprehend indexes they created and we do not know when hominins began to comprehend them.

Most early artifacts were constrained in their forms by the utilitarian mechanics of production or use. At some stage, people acquired the skill to vary the form of the artifacts to their perceptions of how an artifact should be – Mellars (1989) referred to this as "imposed form" without ever defining what that meant or how it could be recognized – such that by freeing the artifact from its utilitarian constraints, the form became arbitrary, but could be constrained by the convention associated with those perceptions. Thus, one possible definition is that "the form of an artefact can be seen to be imposed if their shape did not depend on any aspect of the mechanics of production or use, if the modified edge was not that used, and if the forms were standardized within a very narrow range of possible forms" (modified from Davidson 2002). Such artifacts could be seen to fit within the broad definition of symbols, given both arbitrariness and convention. But this definition is not straightforward since some archaeologists would see a deliberate intention to produce "handaxes" and so include early bifacially flaked cores from the Acheulean, and others would not (Davidson 2002).

One productive way to think of the cognitive complexity of artifact production is to document fully the steps required to produce them (Haidle 2010; Lombard & Haidle 2012). Moore (2010) stressed the importance of hierarchical sequences of knapping, while Davidson (2010c) emphasized that cognitive complexity could be identified from episodes of knapping that were unrelated to the target artifacts on the core. This displacement is reminiscent of the distraction tasks that are central to experiments in establishing Working Memory capacity (Conway et al. 2005). The event that is both the most indisputable example of modern human behavior and demonstrates this property of displacement unequivocally is the seafaring habits that must have underlain the several voyages between islands that took modern people to Australia around 50 thousand years ago (Davidson 2012b). It seems likely that further analyses along these lines will be productive in understanding cognitive evolution.

One example which seems to demonstrate early cognitive sophistication is the claim for heat treatment of stone prior to knapping at the site of Pinnacle Point in South Africa (Brown et al. 2009). If the dating is reliable, this example dates back to 162 ka, much earlier than anywhere else in the world.

Future Directions

Phylogenetic Theory

One of the confounding factors in studying the evolution of cognition and the origins of language

has been the apparent importance given to studies of the Neandertals, who were quite limited in their distribution (Europe and parts of western Asia), when many of the important evolutionary events took place in Africa and most of the modern people outside Africa are derived principally from movement out of Africa relatively shortly before Neandertals became extinct (Sankararaman et al. 2012). Models that do not acknowledge the branching nature of evolutionary trees are likely to be erroneous (Langbroek 2012). But, that said, there is a growing body of publications that claim increasingly complex behavior among Neandertals, such as hafting stone tools (Mazza et al. 2006), the use of feathers (Morin & Laroulandie 2012), the use of pigments (Roebroeks et al. 2012), and symbolic objects (Zilhão et al. 2010). All such claims need to be scrutinized carefully.

Similar claims, generally replicated at several sites, are also made for the most southern parts of Africa including the use of ochre in hafting (Wadley et al. 2009), use of pigments (Watts 2009), shells used in turning ochre into paint (Henshilwood et al. 2011), designs on ochre pieces (Mackay & Welz 2008), and shell beads (d'Errico et al. 2005), all earlier than the presence of modern humans in Europe, provided the chronology can be relied on. Given that the people who made these convincing markers of modernity were about as distant from Europe and Neandertals as it was possible to be, there is a puzzle that has not yet been solved to account for the apparent convergence on sometimes remarkably similar behaviors that seem to imply aspects of modern cognition. There are several possibilities: (1) evolution is actually directional and that hominins would all have evolved modern cognition given enough time; (2) some of the evidence in Europe has been over-interpreted, at least in part because of a desire by archaeologists to emulate findings outside Europe; (3) some of the evidence from one or other place was a response to contingencies that had little to do with modern cognition; (4) some of the evidence claimed to have been the product of Neandertal behavior was actually produced by modern humans; and (5) the hardware for cognitive modernity emerged before Neandertals separated from other hominins and took a long time to be expressed. All of these possibilities are very uncomfortable, but will need to be confronted in future research.

Genetics

In addition to the several suggestions made earlier, it is clear that the future will produce huge changes in our understanding of the past from the analysis of genetic sequences from modern people and from ancient DNA. But it cannot be stressed strongly enough that those inferences will only be as good as the theoretical framework in which they are conducted. Early hopes that the genes labelled FOXP2, or HAR1, or MCHP1, or ASPM might provide clear insight into the evolution of modern cognition or language have proved problematic (see reviews in Davidson 2010a, b). Apparently random claims that modern cognition resulted from an unspecified genetic change (e.g., Klein 2000) will presumably be a thing of the past and will be replaced by evidence-based studies of the genetics that affect brains or behavior.

Other areas in which future studies of molecular biology will enhance understanding of the evolution of cognition will be in understanding developmental plasticity (Moczek et al. 2011), but such studies will only be relevant in the context of well-constructed arguments about the role of learning in cognition more generally and in particular about language acquisition.

Cross-References

- ▶ African Stone Age
- ▶ Art, Paleolithic
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Bone Tools, Paleolithic
- ▶ Cognitive Archaeology
- ▶ Demographic Transitions
- ▶ Handaxes and Biface Technology
- ▶ Semiotics in Archaeological Theory

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Coimbra, Fernando Augusto

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Basic Biographical Information

Fernando Augusto Coimbra is a Portuguese archaeologist. He was born in Lisbon in 1956. At the age of ten, Coimbra moved, with his parents and sister, to Oporto, where he finished high school and graduated in Archaeology in 1985. After that, he began to collaborate with older archaeologists in several fieldwork projects and to participate intensively in international conferences. He started to direct his own archaeological excavations in 1991 in an Iron Age Hillfort in the north of Portugal. His interest regarding rock art started in 1994, after discovering new engravings on a previously published rock in the fifties. In 1997 he was invited to work at the Museum and Archaeological Site of Conimbriga, and one year later he became a collaborator of Dipartimento Valcamonica of Centro Camuno di Studi Preistorici (Italy). In 2003 he was invited to be a member of the Scientific Committee of the Hellenic Rock Art Centre (Philippi, Greece). He completed his Ph.D. in Prehistory and Archaeology, with extraordinary prize, at the University of Salamanca, in Spain (2007). After this, he was invited to teach in the Master in Prehistoric Archaeology and Rock Art, held at Mação, and to be an integrated researcher of the Quaternary and Prehistory Group of the Centre for Geosciences of the University of Coimbra. Since then he has supervised several Ph.D. and Master theses, being also a member of the jury of several Ph.D. and Master dissertations. In 2010 he completed postdoctoral research about Bronze Age and Iron Age Rock Art in the Portuguese Middle Tagus Basin (Centre for Geosciences of the University of Coimbra). In 2011 he started to collaborate intensively with *Centro Português de Geohistória e Pré-História* (Portuguese Centre of Geohistory and Prehistory). From 1991 to the present, he has given frequent lectures about archaeology and rock art, for the general public, with a heritage education perspective. Besides Portuguese, he speaks English, French, Italian, and Spanish. Recently, he started to learn modern Greek.

Major Accomplishments

Fernando Coimbra has been a member of several international projects regarding archaeology and rock art. He directed several fieldworks in rock art in Portugal, namely in the project "RUPTEJO – Rock Art of the Tagus Basin," and co-directed similar projects in Greece (2005, 2006, and 2010) and in Liguria, Italy (2008). At the XV IUPPS Congress in Lisbon, he co-coordinated and co-edited the proceedings of three *symposia*: *Cognitive Archaeology as Symbolic Archaeology* (with G. Dimitriadis), *Symbolism in Rock Art* (with L. Dubal), and *Rock Art Database, New Methods and Guidelines in Archiviation and Catalogue* (with R. Poggiani-Keller, G. Dimitriadis and others). In the XVI IUPPS Congress (Florianopolis, Brazil), he co-coordinated the session *The emergence of*

Coimbra, Fernando Augusto, Fig. 1 Fernando Coimbra speaking during the opening of the exhibition at Thessaloniki

warrior societies and associated economic, social, and environmental consequences among Old and New World peoples (with D. Delfino and D. Georghiu). He has coordinated other sessions in international and national conferences. He was the scientific coordinator of the itinerant exhibition about rock art – *Arte Rupestre do Pinhal Interior* (available at academia.edu) – and of the exhibition at the Museum of Conimbriga (*The Swastika, Since Its Origins till the Roman Period* (1999)). In 2010, after formal invitation, he edited the Portuguese version of the Rock Art Glossary, published by the International Federation of Rock Art Organizations. In 2012 he participated in the exhibition *Prehistoric and Contemporary Interventions in the Landscape. Rock Art & Land Art*, organized in the Folklife and Ethnological Museum of Macedonia, Thrace (Thessaloniki, Greece), presenting, in collaboration with Ivo Oosterbeek, a video entitled *Protohistoric Horse Riders beyond the Pillars of Heracles* (Fig. 1). In the same year he was invited to be a referee of the review *Memórias e Notícias* (University of Coimbra), being also a member of the organizing committee of the International Congress – *GeoCiências na CPLP* (University of Coimbra). He is a coordinator of the organizing committee of the International Congress – The horse and the bull in Prehistory and in History, Centro Português de Geohistória e Pré-História.

Cross-References

► Cognitive Archaeology
► Heritage and Higher Education
► Rock Art, Forms of
► Valcamonica Rock Art

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Cold War

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Introduction

The study of the physical legacies of the Cold War is self-evidently a new topic. It is also a specialized area within the broader field of contemporary archaeology. In common with the early development of other period studies, investigations of its military monuments have dominated over the last two decades. As memories fade of the East–west stand-off between the end of the Second World War and 1990, the archaeological study of its physical traces is able to bring new perspectives on the era. An extraordinary amount of documentation survives for the period, and more official material is likely to be released. Conversely, there is a steady loss of the physical traces of the Cold War and the generations with first-hand knowledge of the confrontation. In contrast to archaeological studies of the two world wars, which are generally encapsulated under the term "conflict archaeology," in the West, research into the Cold War is the investigation of the might have been. It was the world of the spy novel, and films, such as *Dr. Stangelove* and *On the Beach*, and the BBC TV drama *The War Game* that tried to imagine the unimaginable. Elsewhere, bloody proxy wars were all too real. The Cold War was also more than a military stand-off and to understand this multidimensional theme, archaeological methods will rarely be used alone.

Definition

The Cold War may be defined as the stand-off between the opposed economic systems of capitalism and communism, and their principal protagonists the United States and the Soviet Union. Chronologically, the seeds of the confrontation were sown in revolutionary Russia in the early twentieth century and came to a head in the redrawn European boundaries that followed the Second World War. Similarly, there was no neat end to this confrontation that started with economic strains in Eastern Europe in the 1980s, exacerbated by increased arms spending by the West, a mixed message that resulted in the opening of the Berlin Wall in November 1989, and finally the breakup of the Soviet Union in December 1991. In its wake followed the bloody civil war in former Yugoslavia, and massive political, social, and economic realignments.

The political and economic divisions of the Cold War were accompanied by a massive arms race. The militarism this engendered quickly spread into the civilian world and was reflected in state-funded science and technology programs, utopian visions that were played out in public housing schemes, and many other aspects of culture including, architecture, art, film, and literature. Although, "Cold War" may be a useful shorthand term to describe the period of East–west confrontation between about 1947 and 1990, the period may be defined by other criteria. In Eastern Europe, the material culture of this period might be more readily defined as "socialist" or "communist" (Buchli 1999). Elsewhere in Africa, South America, and parts of Asia, the effects of the Cold War took far longer to manifest themselves. In the West, and particularly among cultural commentators and architectural historians, the period is more usually referred to as "post-war."

Historical Background

The years following the end of the Second World War were characterized by many privations on either side of the Iron Curtain. In Britain, rationing continued and new domestic goods and clothing were produced to "utility" standards, designed to use the minimum amount of materials and labor in their production. In post-war Germany, people were largely reliant on salvaged goods, swords were beaten into

plowshares as helmets, and gasmask canisters were fashioned into enameled domestic utensils and containers.

In considering the material culture of the period, the picture we might reconstruct from purely archaeological sources might be seen to lag behind actual historical events. In the late 1940s, both sides were armed effectively with wartime equipment, but as new national identities and allegiances strengthened, the arms and uniforms of military and paramilitary forces often began to reflect those of the dominant Superpower. Similarly, there were huge numbers of surplus military and other state facilities and there was little need for new military building projects. Slowly either side began to design the equipment and facilities they required to compete in an increasingly technological stand-off, a confrontation that was dominated by newly emerging technologies, the atomic bomb, jet engines, long-range missiles, radar, all supported by increasingly sophisticated electronics. The technical artifacts of this era often betray complex genealogies, for example, rocket and missile projects in East and West often incorporated captured German technology with existing indigenous programs. Original objects, which may be recovered from archaeological contexts, can provide important information on variations in build qualities, differences in metallurgical competence, and contrasting national engineering styles.

In the United Kingdom, it was not until after the outbreak of the Korean War in 1950 that distinctive military facilities built to meet changed defense needs can be recognized. Nor was it not until the end of the decade that the country was fully equipped to meet the perceived threats of the Cold War, with airfields for jet fights and bombers, atomic bomb stores, new radar systems, and surface to air missile sites.

Elsewhere, different construction chronologies are found. In former East Germany, a legacy of heavily constructed wartime bunkers was available for adaptation by Soviet and later East German forces. Across Europe, in the aftermath of the Second World War, the physical expression of the agreed political demarcation line between western and eastern areas of influence was often no more than a barbed wire fence. Initially, its wooden watchtowers appeared more medieval than a product of the atomic age. As the political divide hardened, differences between the two blocs became manifest in messages displayed on billboards among the ruined cities.

Key Issues/Current Debates

The study of the aspects of the Cold War by the use of archaeological methods is part of the wider debate about the contribution that archaeology can make to our understanding of the recent past. Although the Cold War is still well within living memory, detailed information on specific places may be lost, destroyed, or inaccessible. In Eastern Europe, the early excesses of many of the post-war communist governments are poorly documented. Excavations at the former Nazi concentration camp at Sachsenhausen, Berlin, have revealed its post-war victims and associated artifacts. In situations such as this, the scientific archaeological records may be the only evidence to document these events (Theune 2010). In many countries overrun by the Soviet Union, armed resistance to their occupation continued for up to a decade after the end of the Second World War. In Estonia, the Forest Brothers waged a guerrilla war from small, often wooden forest hideaways (Rasmussen 2010: 34-5). Investigations, such as these that reveal lost places and objects, can create a powerful stimulus for the local community to recount little known or suppressed episodes of national history.

In the West, dissent to the Cold War system was most evident in the peace movements and in particular their opposition to nuclear weapons. Archaeologically, their presence is almost invisible. The most common artifact is the pin badge decorated with a now internationally recognized peace symbol or other slogan, but without supporting oral testimony, it is an essentially context-less object. At a number of locations in Europe and North America, campaigners established semipermanent protest

Cold War, Fig. 1 Nevada Test Site, United States of America, outside the test site, extensive and fragile remains of the 1980s peace camp may be traced. They include traces of shelters constructed from withies secured by small piles of stones. © W.D. Cocroft

camps outside or close to military installations. Conditions in the camps were primitive and accommodation was usually in commercial tents, or as at Greenham Common, England, in "benders" created from a frame of withies covered in plastic sheeting. In form they resembled a type of crude temporary shelter constructed by hunter-gathers. In the desert adjacent to the Nevada Test Site, North America, are the traces of a huge peace camp covering about 240 ha. Features within this area include cleared tent sites, hearths, gardens created by arrangements of stones around plants, and geoglyphs, symbols made from stones (Fig. 1). The techniques to document and interpret such sites are identical to the skills used by a prehistorian to understand the more distant past. It is possible to analyze the spatial relationships in the camp and also consider the symbolic relationships between these groups and the landscape. The investigation of such sites provides many opportunities for engagement with peace campaigners, artists, and, in the case of the Nevada peace camp, members of the Western Shoshone tribe (Beck et al. 2007: 297-320; Schofield 2009: 99-111).

Buildings Archaeology

Rapidly evolving military technology led to new types of military architecture and facilities, some were built to resist (as far as they were able) the effects of nuclear weapons, and others to accommodate complex electronic equipment and weapons systems. From the perspective of the early twenty-first century, the military structures of the Cold War appear to represent the swansong for heavily built defensive installations. Their design and construction techniques are of interest to building historians. In some instances, excellent documentation will survive, including detailed drawings. More commonly, documentation is partial. In these instances, the sites and structures provide a valuable record of past activity. Where no original documentation survives, routine architectural recording skills may be needed to produce drawings. In the United States, the Historic American Engineering Record has produced exemplary record drawings of some Cold War facilities. An archaeological approach to such work brings with it questions about construction phases and subsequent modifications, building techniques, the character of functional areas, and about how buildings and sites operated as social spaces.

On closure, most military sites are usually stripped to remove valuable equipment and, if left unsecured, fall prey to metal thieves and vandals. These may be seen as early taphonomic processes that lead to the creation of the archaeological remains we encounter. Within these now often empty spaces, official painted signs may

Cold War, Fig. 2 The Teufelsberg, Field Station Berlin, a mural in the crew room of the security police unit. Later graffiti is a record of the many urban explorers who have visited the site since its abandonment. © W.D. Cocroft

offer clues to former uses. Also encountered are wall paintings and murals that can offer insights into the cultures of the different armed forces, units, and sections within them (Cocroft et al. 2006). On many Soviet bases, rooms were set aside for the political education of the forces, decorated with slogans, and collages of images from newspapers and magazines. On western bases, large renditions of unit insignia are found, and in less frequented areas and semiprivate spaces, artwork may be used to personalize otherwise anonymous interiors (Fig. 2).

To date, where archaeological methods have been applied to the study of the physical remains of the Cold War, it has often been in the context of cultural resource management, in mitigation against loss, to assess monuments for legal protection, or to provide the necessary knowledge base prior to public display (Cocroft & Thomas 2003). In 2002–2003, Klausmeier and Schmidt (2004) produced an archaeological record of one of the most iconic Cold War structures, the city section of the Berlin Wall (Fig. 3). Although, in most sections of the city, the wall facing onto the west was removed in the early 1990s, a considerable amount of the in-depth border defenses to the east were still present. This survey added considerably to the understanding of how this familiar structure had developed, incorporated existing urban features into the barrier, and the operation of the linear border landscape. As the border was approached from the rear, painted red and white marks on walls delineated the border area, and closer still a knee-high fence left a would-be escapee with no defense that they had inadvertently strayed into the restricted area. The routines of the watchers were equally proscribed and painted stripes on lampposts marked the limits of the border troops patrol paths (Fig. 4).

In many instances, archaeologists employed in cultural resource management will be required to investigate Cold War sites where there is imperfect documentation. The overall context of a site may be well understood from historical studies, but detailed site drawings and information about the modifications carried out at individual sites are often lacking. One characteristic of the Cold War was the stationing of foreign forces, usually of the dominant superpower, in allied or friendly countries. On withdrawal, documentation was often destroyed, lost, or has become effectively inaccessible. In these instances, although the historical context of the site is known, the details of a site's development, use, and functions may be essentially ahistorical. In such a situation, archaeological methods of site and building analysis may be the only source of

Cold War, Fig. 3 Bernauer Strasse, Berlin, part of the "Contemporary History Information Mile" to the left is a surviving section of the Berlin Wall and steel bars marking a lost section. To the right are steel posts that indicate the line of the hinterland wall and a typical East German lamppost. © W.D. Cocroft

Cold War, Fig. 4 Bernauer Strasse, Berlin, painted stripes on a numbered lamppost marked the patrol limit for a border guard unit. © W.D. Cocroft

evidence. Beyond furthering academic knowledge, such studies may be a crucial part of wider environmental studies to determine past land use and present day land quality. This lack of knowledge is particularly evident in many former Soviet bases in Eastern Europe that operated as closed entities and where contacting past personnel is fraught with difficulties.

The deployment of archaeological methods to investigate complex modern technology is an issue that goes beyond military weapons systems. Generally, many of the earlier systems that were based on electromechanical technology have left a more robust archaeological footprint than the later systems (Fig. 5), which through the increasing use of microprocessors have shrunk in size, become more mobile, and are based around anonymous black-box technologies. As discussed, although this is an incredibly well-documented period, detailed information on individual facilities may be lost through changes in ownership, the withdrawal of foreign forces, or destruction of obsolete documentation. In doing so, people, places, and technology can become historically invisible. Through the investigation of their physical remains, they may be restored to the historical record.

Archaeology is also able to bring people into direct contact with the places directly associated with some of the most dramatic events of the Cold War. In 1962, the deployment of missiles by the Soviet Union in Cuba precipitated one of the most dangerous confrontations of the era. Aerial images of these sites are well-known

Cold War, Fig. 5 North Coates, Lincolnshire, England, the horizontal stratigraphy of this surface to air Bloodhound missile pad shows a cable channel for a later system that cut the line of the original 1950s cable conduit. © W.D. Cocroft

from contemporary United States' reconnaissance photographs. Recent fieldwork by a group of Swedish and Cuban archaeologists has located a number of the missile sites. The project also illustrates the communal value of such work: Local people were involved in the search for the sites, and recalled their memories of the arrival of the Russians, and the subsequent stripping of the sites for reusable materials (Burström et al. 2009, 2011). The work on Cuba also illustrates the global nature of the study of the archaeological remains of the Cold War. From Langelands Fort, Denmark, now preserved and open to the public, the passage of the ships carrying the missiles was monitored. In England, two of the Thor intermediate-range ballistic missile sites that were raised to alert during the October 1962 Missile Crisis are listed for their historic significance (Fig. 6). Archaeological studies may be able to answer questions about the fate of the contemporary United States missile sites in Italy and Turkey that were quietly dismantled after the resolution of the crisis.

Many techniques of documentation and remote sensing employed by archaeologists have their origins in methods used by military forces to depict terrain or gather information on their opponents. Aerial photography that was developed in the First World War was quickly applied to discovery of archaeological sites, and is an important source for the Cold War archaeologist. From the 1960s, imagery obtained from satellites was an increasingly important source for military intelligence. Since the end of the Cold War, growing amounts of satellite photography have been made publicly available. It is an important source of information for archaeologists, especially for more remote areas of the world. Using techniques analogous to the military analyst, it has been used to study the development of otherwise inaccessible Soviet missile sites (Fowler 2008, 2010). The Cold War's technological rivalries have also created an extraterrestrial legacy. Circling the earth are redundant spy satellites and their components, and on the moon traces of man's first visits. These sites have been remotely mapped and measures to ensure their survival promoted (Darrin & O'Leary 2009).

Just as artifacts reveal information about the past to archaeologists, they too are of interest to the military intelligence officer. Equipment of the opposing forces was eagerly sought after on the proxy battlefields of the Cold War. More akin to techniques of archaeology, western military missions in East Germany collected discarded documents and objects from Soviet rubbish tips (Geraghty 1997: 208-11). Some were even subject to scientific analysis to reveal their composition. It has taken nearly a century for the material culture of the First World War to be studied. Dumps such

Cold War, Fig. 6 North Luffenham, Rutland, England, mounting bolts for a Thor missile launch mounting. American supplied Thor intermediate-range ballistic missiles were operated by personnel from the British Royal Air Force and were raised to alert status throughout the Cuban missile crisis in October 1962. © W.D. Cocroft

as these, and ones associated with Cold War's battlefields, may in the future yield valuable information about various camp economies and the everyday life of the Cold War warrior. Military intelligence and archaeology also bear similarities in their limitations: Both are effective at locating and describing activities, but less successful in understanding motivations.

Another characteristic of twentieth century warfare was its insatiable appetite for land. The application of industrial methods to armaments production produced devastation on previously unknown scale. The military required large areas for training, testing new weapons, accommodation, munitions production sites, airfields, and border regions that became increasingly militarized and inaccessible to most civilians. Many of the areas already under military control continued in occupation during the Cold War. Airfields were remodeled to accept new jet aircraft and commonly cover a few hundred hectares. Weapon testing has created some of the most distinctive landscapes. At the Nevada Test Site, North America, its pock-marked surface attests to the awesome power of nuclear weapons, and many of the associated facilities have been documented by the Desert Research Institute, Las Vegas. In Albania, the communist regime headed by Enver Hoxha broke with its communist neighbors. The ensuing national paranoia about attack from the West and East is reflected by hundreds of thousand mushroom shaped bunkers, or pillboxes, dotted across the country, roughly equating to one for every four or five citizens (Galaty et al. 1999: 201). Since the 1990s, they have been appropriated for storage, beach bars, and modeled as tourist trinkets that have become a national icon.

International Perspectives

The Cold War was a global phenomenon. Archaeologically, the political and military allegiance and patronage was marked by the distribution of material goods from the two trading blocks. Allegiances were most visible in the supply of military equipment and the design of associated facilities. To date, the study of Cold War installations has been primarily motivated by cultural resource management studies. Over the last 20 years, these have vastly increased our understanding of places that a generation earlier were off-limits. Although, many Cold War era facilities are still in military hands and are at present unavailable for direct study. In the states of eastern Europe that were formerly under Soviet dominance, it is often sites that commemorate political repression that have been studied, given official recognition and opened to the

Cold War, Fig. 7
Falkenhagen, Brandenburg, Germany, raised rendition of the Kremlin in the cultural center of a Soviet military establishment. © W.D. Cocroft

public. Their military bases may remain in use, or the Soviet bases may represent a past, which people wish to forget and sweep away.

As each side consolidated their grip on Europe, globally they sought to extend their influence through the use of proxies. In its most cynical form, it appeared to be based on the policy that my enemy's enemy is my friend. The allegiance of these friendly states became readily recognizable as they were supplied with arms of western and eastern origin, although occasionally they would provide captured arms to disguise their true origin.

As the post-war divide in Europe hardened, in the Pacific region that had already witnessed the operational use of two atomic bombs, the United States prepared to test the effect of atomic weapons on an obsolete fleet of American vessels, a German battle cruiser, and captured Japanese battleships. The July 1946 Bikini Atoll tests in part represented the symbolic end of the enemy's naval power, but they were also a demonstration of the United States' supreme military might. The remains of these tests have been subject to archaeological analysis, including the underwater investigation of ships deliberately sunk as part of the experiments (Delgado 1996, 2009). These tests marked the beginning of numerous tests across the Pacific Micronesian islands by the United States, Great Britain, and France. They have left a physical legacy of damaged landscapes, in places the infrastructure built for the trials, but more disturbingly displaced communities, radioactive deposits, and uncertain health risks (Smith 2007: 51-72).

The needs of Cold War scientists and military forces also resulted in the creation of new places. Research establishments were often built in places now valued for their natural beauty or remoteness. In sparsely populated areas, new settlements were created. Some facilities were utilitarian bases for military personnel, while new settlements for research communities often followed contemporary urban planning considerations. At Woomera, Australia, a new town was created with chalet style bungalows and large communal facilities to serve the new long-range weapons project (Garnaut & Freestone 2007). In the West, the need to attract high-grade research staff often resulted in high-quality settlements. Behind the Iron Curtain settlements, serving large military facilities and research establishments became closed towns, but were nevertheless often provided with lavish cultural facilities (Fig. 7).

Future Directions

In most countries, the study of the physical legacy of the Cold War is still in its infancy. For the development of cultural resource management policies toward this heritage, inventories have yet to be compiled. Ironically, such information may survive within the classified archives of the Cold War targeteers who planned to destroy the places people may now seek to study and preserve.

Since the end of the Cold War, abandoned military sites have undergone a variety of taphonomic processes that is creating the archaeological record of the Cold War. In its most extreme form, this might be demolition to comply with treaty obligations or to free land for new uses. Where sites do survive, on closure, they have been subject to official stripping out, looting of saleable materials, and vandalism that has hastened their decay. Nature has also quickly weathered their exteriors and reclaimed deserted buildings. Some have had an afterlife inhabited by squatters or occupied by businesses that often operate on the margins of society, such as vehicle breaking and recycling centers.

Over the next decades, oral testimony has great potential to provide multiple narratives of places and artifacts, from people who worked within the system. Among civil communities who lived close to military, their experiences will differ greatly, some may have valued the direct and indirect employment opportunities brought to an area. While elsewhere there was resentment of the noise, social tensions, and access restrictions brought by a military presence. A feature of the Cold War was the stationing of foreign military personnel in the countries of their allies. The division of cultures represented by the military installation and foreign personnel, with the local, is likely to have left particularly strong memories.

Within this area a particular urgency is to investigate places, events, and artifacts associated with the early phases of the Cold War. With the passage of time, communities, military and civil, will disperse and it is increasingly difficult to find people associated with a particular place or event. Of particular significance are social aspects of the Cold War that may be absent from official histories and documentation. In Eastern Europe, this may include stories of resistance to communist rule. Across Europe, the opening years of the Cold War were also characterized by mass migration and the gradual restoration of civilian domestic life, albeit against the developing background of increasing East–West tensions. Investigations of immediate post-war adaptations to army camps, and perhaps associated rubbish tips, could reveal more of this history: as might the study of prison camps that housed many millions of captured German soldiers.

Each country has a unique assemblage of sites and artifacts reflecting its experience of the Cold War. The availability of primary documentation will also vary between countries and individual sites, and in many instances may not answer the questions we wish to ask. Different national, regional, and personal experiences and local heritage cultures will also frame the questions that might be asked of this material. In the West, to date, these have mainly been concerned with the physical legacy of former defense sites. Elsewhere, questions concerning occupation, resistance, and liberation are at the fore. In other parts of the world, the study of the contemporary past using archaeological methods is either in its infancy or at present little accepted. In all countries, researchers will also find restricted access to sites and documentation relating to the Cold War. Though, as discussed, new technology is able to remove some of these barriers. The complexity and multidimensional nature of the Cold War will require a multidisciplinary approach, archaeological methods will rarely be used alone, and most projects will combine elements of historical geography, buildings analysis, documentary research, and oral testimony.

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- ▶ Berlin Wall
- ▶ Contemporary Past, Archaeology of the
- ▶ Nevada Test Site
- ▶ Space Archaeology

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Collaborative for Cultural Heritage Management and Policy (CHAMP)

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Basic Information

CHAMP (Collaborative for Cultural Heritage Management and Policy) is a strategic research

center at the University of Illinois at Urbana–Champaign that is dedicated to the critical study of cultural heritage and museum practices on a worldwide scale in the context of globalization.

CHAMP's goals are to:

- Promote faculty research and dialogue across disciplines
- Train students in heritage and museum theory and practice
- Advocate sustainable and ethical cultural policies that are sensitive to competing stakeholder claims at heritage sites and museums
- Offer public dissemination of ideas generated through CHAMP's activities

CHAMP's interests are international and comparative in scope, especially in terms of the intersections among often conflicting local, regional, national, and international agendas in which cultural heritage issues intervene. CHAMP's integrative approach links critical inquiry to opportunities for problem-solving in the field. CHAMP's premise is that there must be engagement between theorists and heritage managers so as to achieve state-of-the-art practice.

CHAMP interrogates museums as heritage sites and as dynamic engines for economic development in their regions. Museums take many forms – from object collections contained within buildings to open-air historic sites to world's fairs and theme parks to reenactments and other kinds of performances. All of these are venues for the articulation of cultural identity – sites for cultural production, formation of social consciousness, and construction of history.

CHAMP recognizes "landscape" as the most visible locus where displays and contestations of identity, ownership, and ideology are inscribed and mediation takes place. This built environment necessarily includes its inhabitants. While heritage is an important component in the articulation of identity, unfortunately it is also a basis for conflict of various sorts. Out of this complicated situation arises an important opportunity for study and mitigation.

As countries develop, their cultural heritage sites often become prominent in national economic agendas. Under pressure from tourism, their integrity and sustainability may be endangered as are their associated living populations. CHAMP is necessarily interested in tourism as this is a major factor in cultural heritage promotion, cultural change, and economic development around the world – at sites (archaeological, historic, cultural), at museums, and among "traditional peoples" when these are scripted and commercialized as major travel destinations. CHAMP recognizes the manifold problems and challenges of multiple constituencies voicing heritage claims and investigates the kinds of policies that can play a positive role in social, political, and economic terms.

Major Impact

More than two dozen University of Illinois faculty from multiple academic departments housed in various colleges participate in CHAMP. They offer a broad range of courses and conduct projects around the world. Several CHAMP scholar-practitioners consult for governmental, intergovernmental, and nongovernmental agencies at various levels on issues such as historic preservation, sustainable tourism, economic development, and human rights. Graduate students pursue interdisciplinary minors in Heritage Studies and in Museum Studies en route toward their doctorates in particular academic fields. Through coursework and practicums, CHAMP faculty are training a new generation of heritage scholars, heritage managers, and museum professionals capable of dealing with complex realities and of articulating sound progressive policies to local and national governments and other agencies.

CHAMP's most important impact has been through its conferences and, especially, the edited volumes that have resulted from these. Thus far the conferences have yielded five edited volumes: *Cultural Heritage and Human Rights* (2007), *Intangible Heritage Embodied* (2009), *Contested Cultural Heritage* (2011), *On Location: Heritage Sites and Cities* (2012), and *Cultural Heritage Politics in China* (in press) – all with Springer Publishers. The volumes have attracted wide attention and stimulated productive dialogue.

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- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ World Heritage Education, Training, and Capacity Building

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Colonial Encounters, Archaeology of

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Introduction

This chapter provides an overview of the archaeology of colonial encounters. From the perspective of considering archaeological approaches to date, the vast majority of studies considered in this review highlight encounters between various European-descent societies and non-European indigenous "others." Here definitions of colonial contexts from the perspective of archaeology are considered initially. Key locations around the globe are described in terms of the form of encounters, the state of archaeological work, and the key studies. This contribution reviews the various explanatory approaches in archaeology and concludes with a consideration of the significant opportunities for archaeology to inform on the numerous one-on-one individual cross-cultural encounters and interactions within colonial settings that increasingly defined the last millennium of human history.

Definition and Historical Background

Colonialism has meant various things to archaeologists over time. Colonialism has characterized (1) places where the abrupt arrival of Europeans suggests a clear fault line in the historical sequence, (2) other locations where colonial relationships have longer and thus more complicated histories, (3) and historical settings that did not involve Europeans but other cultures in forms of colonial relationships.

1. When we consider the modern world, we think in global terms. Everywhere is somehow connected to elsewhere. Our economies are enmeshed in global systems of finance, objects and resources move around the planet, and the diffusion of domesticated plant and animal species has blurred the biological regionalism and comparative isolation that characterized the world of our earlier ancestors. Even the human species itself has – in many places – shifted to a more "global" animal, where long-separated ethnicities have shared their pathogens, DNA, and cultural practices. The global nature of the modern world is a subject of inquiry for many disciplines from economics to anthropology. Archaeologists have studied the multiple individual examples of how this world came about – some through local/regional studies such as the arrival of, say, European societies in various locations around the world (as explored below). Others have conducted ambitious comparative studies of colonialism. For example, historical archaeologist Charles Orser compared colonialism in Ireland, Brazil, and North America in attempt to define a "historical archaeology of the modern world" (Orser 1996). Comparative studies of colonial contexts follow in a comparative tradition in archaeology, as used to understand other

periods of human change such as the shift toward farming, urban life, and forms of social complexity.

Whatever the scale, for many archaeologists, the arrival of migrant colonists in a new region is a convenient definition of colonialism. The study of colonization has in the past been sometimes largely uninterested in the forms of cultural encounters that characterized these contexts. However, this has changed over time, as seen by the way in which James Deetz's early definition of historical archaeology as "the archaeology of the spread of European cultures throughout the world from the fifteenth century" was amended by him to add: "and their impact on and interaction with the cultures of indigenous peoples" (Deetz 1977: 5). The study of arrival of Europeans saw the development of the subdiscipline of historical archaeology, first in North America, then Australasia, and elsewhere. In Europe the fields of medieval, postmedieval, and industrial archaeology covered aspects of this time period. As such, the study of encounters in colonial settings by archaeologists occurs within and beyond the field of historical archaeology. In fact, the focus of historical archaeologists on time periods for which documentary evidence existed limited their ability to appropriately analyze those "people without history" (see Deagan 1988; Lightfoot 1995; Colley & Bickford 1996).

Outside of the Old World core, the tempo of colonization episodes by European societies increased dramatically across the second millennium CE. Some key *early* events include the colonization of the northern Atlantic islands by the Norse, arriving in North America by 1000 CE; the later discovery by various fishing experts, such as the Basque, of fish-rich waters off the North American Atlantic seaboard; the colonization of the western (Azores, Madeira, Canary, Cape Verde islands from the 1300s) and then the eastern Atlantic (beginning with the Caribbean archipelago in 1492 and followed by Mexico and South and North America); the exploration and colonization of Africa (key dates being the Portuguese capture of Cueta, Morocco, in 1415, then the successful navigation of the tip of Southern Africa by Vasco da Gama in 1498); the arrival of European merchants in East and South Asia following Vasco da Gama's entry into the Indian Ocean in direct competition to prevailing Islamic, African, and Asian trade systems; and the exploration of the Pacific and Australasia. These events were driven by different agendas; however, common to many was the demand for better access to known resources – notably the Asian goods moving through the "Spice Roads" arriving in Medieval Europe through intermediaries. This required the establishment of colonial outposts at key nodes to control and provision trade. In time some successful nodes grew from merchant outposts to more extensive forms of colonialism – such as seen in India, West Africa, Southern Africa, and Indonesia. In other locations, such as China, coastal outposts never successfully translated into more extensive permanent forms of colonialism at the level of the state. The discovery of new resources, such as the South American silver or Caribbean islands suited for plantations, also fueled colonial projects. Other colonies existed for geopolitical ambitions or to remove unwanted populace (as in the case of penal colonies such as Australia and Bermuda). Whatever the reason for their existence, colonies inevitably invoked competition with existing indigenous populations.

Key work detailing these events at a global level includes Immanuel Wallerstein's work in the Annales School on world systems particularly *The Modern World-System* volumes (e.g., Wallerstein 1974), Eric Wolf's (1982) *Europe and the People Without History*, Phillip Curtin's (1984) *Cross-Cultural Trade in World History*, and Alfred Crosby's (2003) *The Columbian Exchange: Biological and Cultural Consequences of 1492*. For archaeologists and historians, these studies track their intellectual efforts back to earlier work in the historical sciences such as Gordon Childe's (1943) *What Happened in History*.

Necessarily, the arrival of European outsiders and their entourage (such as African

slaves in the Americas) marked a distinct change. One culture's "colonization" was often another's "invasion," especially where a form of "conquest" was required. In locations where there was no indigenous written tradition, colonization has been perceived as the beginning of the "historic" period, before which there was a "prehistoric" period. Additionally, in North America the idea of a "protohistoric" period was popularly conceived, describing the period after the arrival of Europeans in 1492 before any local expression of permanent colonization (Rogers & Wilson 1993). More recently the concept of "historical" and "prehistoric" periods has been critiqued in some countries – such as Australia – as privileging European societies and their literate traditions over others (Deagan 1988; Lightfoot 1995; Colley & Bickford 1996; McNiven & Russell 2005). Put simply, prehistory is felt to imply "without history" rather than "before written sources." In many nonliterate societies, oral traditions maintained deep histories as counterpoints to European dominant histories. Kent Lightfoot argues that "the current separation of prehistoric and historical archaeology detracts greatly from the study of long-term culture change, especially in multiethnic contexts" (1995: 200).

Historically, narratives of colonial encounters have focused on the perceived abrupt shock that marked the arrival of outsiders in indigenous worlds. Sometimes initial encounters may have been truly unexpected. For the Maori of New Zealand, for example, new categories to describe outsiders (*pakeha*) and indeed themselves (Maori) were required. In only rare instances were societies truly isolated from others, for example, the Tasmanians' isolation from Australia had lasted at least 8,000 years following the creation of Bass Strait by rising seas. Most societies, however, were aware of the presence of new colonists in advance of their arrival as information circulated through social networks. For example, in Arnhem Land in the Northern Territory, Aboriginal people had been informed of the arrival of Europeans in island Southeast Asia during their seasonal encounters with Asian fishermen who maintained camps across the northern Australian coast. Thus, when the British arrived in (for them) remote and isolated Arnhem Land, they were recognizable as "Balanda" (from "Hollander"), an ethnic category acquired through preexisting cross-cultural encounters (Paterson 2011). Today white Australians in Arnhem Land are still called Balanda. In another example, in the Great Plains of North America, for over a century in advance of the direct presence of European colonists, Native American societies underwent dramatic changes that resulted from the introduction of horses and their ability to trade for guns.

2. The concept of modern or recent colonialism as discussed above is specific to the last millennium and the foundation of the so-called settler societies (such as the USA, Australia, Canada, New Zealand, and Argentina), in which the indigenous population is eventually outnumbered by the migrant-descent population. Thinking more broadly, others have demonstrated how more ancient forms of colonial relationships existed. The various colonial enterprises of the Greeks, Romans, Phoenicians, and other ancient states are well known (Lyons & Papadopoulos 2002). Christopher Gosden (2004) in *Archaeology and Colonialism: Cultural Contact from 5000 B.C. to the Present* takes a 7,000-year perspective on forms of colonialism – as defined by the establishment of colonies outside of one's own country and the various differential power relationships that may arise – beginning with ancient Mesopotamian city states of Uruk and the Aztecs in Mesoamerica. His approach highlights the important ways that material culture can reflect ancient power relationships that resemble colonialism. Importantly these too required forms of cross-cultural encounter and entanglement and were not confined to the involvement of Europeans.
3. When considering the fulcrum of Europe, Africa, and Asia over the length of time adopted by Gosden, the idea of relatively abrupt and bicultural encounters, such as that implied in James Deetz's definition (above) of historical archaeology, is replaced by a broader

recognition of "encounter" within colonial realms and one not requiring the presence of Europeans. While these have to date been less the focus of archaeological attention, one imagines that future work will explore these places and histories in detail. In Asia, the history of state societies and their influence over others through trade, religion, and warfare has often been the privilege of historians over archaeologists, at least for the various literate Asian states – in the Americas and for sub-Saharan Africa, the reverse has been true. Whether these always result in "colonial" relationships depends on ones' definition of colonialism – which ranges from Gosden's wide definition to a specific focus on modern (last 500 years) instances. What is clear is that a European-defined approach is restricted. To take an example, when the Portuguese finally entered the Indian Ocean in the late 1400s, it marked the end of over 2,000 years during which Europe was only able to access commodities from Asia (such as spices) through middlemen – via the ancient Silk Roads (one route across Central Asia, the other by sea). Islamic trade networks dominated the Indian Ocean, although other powers had been critical. The Chinese experiments with maritime colonial enterprises in the Indian Ocean at least had already ended by this time, as Admiral Zheng He's fleet had explored South Asia and East Africa in the early 1400s.

What is clear from the three characterizations of colonial contexts is that it is almost impossible to consider colonial contexts without taking into account culture contact. Stephen Silliman (2005) argues this effectively in his exploration of the usages of "culture contact" and "colonialism" in North American archaeology. The core issues are of power and the way power structures' relationships between different peoples in colonial circumstances. A key characteristic of colonial domains is the unequal relationship that underpinned dominant colonial actors over less powerful indigenous people. The provision of cheap food, labor, and knowledge by indigenous peoples made many colonial societies sustainable and economically rewarding for colonial powers. In materialist thinking, objects and built places (including the organization of colonial landscapes) provide direct evidence for colonial-era behaviors, not just of colonists but potentially of indigenous peoples too, and the ways that they interpreted, accepted, and resisted colonial behaviors.

Key Issues/Current Debates

Approaches to Encounters

A recent global review of the study of cross-cultural encounters globally over the last 1,000 years in the various regions reveals different archaeological concerns (Paterson 2011). Regardless, the study of colonial encounters wherever these occurred is essentially a study of *culture contact*. Historically, the term described the moments of "first contact"; however, increasingly within archaeological practice, the study of culture contact focuses on the processes of cultural entanglement following colonization and within colonial settings. Several distinctly different colonial settings have been defined and include, as illustrated by historian Phillip Curtin, (1) merchant diasporas, (2) territorial empires, (3) settlement empires, and (4) plantation complexes (Curtin 1984). Curtin was interested in the economic aspect of trade-driven European settlement. Each of the four types required different forms of colonization, settlement history, and use of power and capital – but all involved cross-cultural contact and various forms of unequal access to indigenous labor and land. The results have been described by archaeologists as requiring diffusion, invasion and conquest, contact and exchange, acculturation, and genocide.

Cultures in contact invoke change on each other – this is termed *acculturation*. This understanding is ancient: Plato argued in 348 BCE that contact should be minimized as the "intercourse of cities with one another is apt to create a confusion of manners." The potential influence of foreigners concerned states, for example, the rulers of Japan and China when encountering Europeans along

their coasts and waterways sought to keep them restricted to state-controlled ports, such as Canton. Not all societies were successful in their efforts, as demonstrated by Moctezuma's failure to control the destabilizing efforts of the Spanish conquistadors who allied with other Mesoamericans, which caused the collapse of the Aztec state in 1521. For non-state-level societies around the world, the ability to repel new colonists was inevitably doomed. Technology often played a critical role – in many settings European colonists tended to have superior military technology fueled by infantry with munitions, although older practices such as mounted cavalry underpinned Spanish warfare in the Americas against unmounted street fighters.

Another key element heralded by the arrival of colonists was demographic change. Various scholars have explored the scale of disease and resulting mortality that arose from the movement of pathogens around the world following the various European diasporas (Paterson 2011). Crosby (2003) described this as "The Columbian Exchange," although it also applied in various settings around the world and not just in the Americas. Certain diseases were particularly catastrophic, such as smallpox. There are debates about the size of indigenous populations prior to contact, something which archaeology attempts to address by studying past settlements. As diseases moved in advance of Europeans, the usefulness of historical accounts to determine precontact demography is often questionable. In many settings, significant demographic decline at first contact through disease and war is evident. Other contact-era processes acted upon societies, particularly in Africa where the demand for slaves for Islamic markets and then increasingly for the trans-Atlantic slave trade saw intercommunity warfare and population decline in areas well beyond the presence of colonial powers. Such dramatic processes probably fueled racist ideas of "fatal impact" whereby native peoples would inevitably decline following contact with superior whites and others.

There have been various theoretical models used to explain culture contact, with many key developments occurring in North American anthropology. The idea of acculturation has the longest pedigree, becoming popular in the nineteenth century. In the 1880s J. W. Powell, working for the Bureau of American Ethnology, used acculturation to describe psychological changes experienced during cross-cultural imitation, followed by colleague W. J. McGee, who like many of his time thought in social evolutionary terms and thus saw culture contact as a means for savage or barbaric societies to become civilized and enlightened. Such concepts underpinned many colonial endeavors of this era. In the 1930s acculturation was increasingly used as a tool to measure cultural change and thus became essential to social scientists in North America. In 1936 "A Memorandum for the Study of Acculturation" was published in *American Antiquity* (Redfield et al. 1936). While the definition described how change could occur to both cultures in contact, in reality the focus of most researchers was on Native American responses and not forms of European acculturation. Edward Spicer, working in Mexico and the Southwest, defined types of acculturation including incorporation, assimilation, fusion, and compartmentalization (Spicer 1961). He was interested in why certain societies maintained their cultural practices and compared these to Basque, Irish, and Welsh reactions to past oppressors. Acculturation theory tended to focus on "donor" and "recipient" groups whereby change tended to be experienced by the weaker recipients. The use of such approaches was based on the assumption that archaeologists could use changes in material culture as a proxy for social change. However, the potential nuances of how material culture may be used in colonial contexts were largely absent from these discussions.

By the 1970s, new explanatory models were being proposed to explain forms of cultural engagement. In North America, the five-hundredth anniversary of Columbus's voyage of 1492 inspired new research into the topic, as seen in the three *Columbian Consequences* volumes (edited by David Hurst Thomas [e.g., Thomas 1989]). The new thinking stressed that "Culture [is] change…neither one-sided nor solely governed by European intentions and strategies. Rather it is evident….that [indigenous peoples']

attitudes and actions. . .played a large part in determining the impact of contact" (Wilson & Rogers 1993: 3). To take one example, in the 1680s, Pueblo people of New Mexico revolted against the colonial Spaniards, successfully repelling them. Colonial settlements were abandoned, churches destroyed, and in the archaeological record people abandoned the once ubiquitous pre-Hispanic "Jemez Black-on-white" decorated ceramics as it had become associated with the Spanish, with Franciscan missionaries producing objects like candlesticks. The ware no longer just represented indigenous material practices, but also Spanish dominance (Liebmann 2008). A simple acculturation index would fail to detect the nuances of resistance and innovation and the shifting meanings of material culture in contested colonial settings.

As a result, various useful models exist, including theories related to acculturation and assimilation, resistance and dominance, forms of cultural accommodation, hybridity, subaltern practices, and agency. Others return to existing models, for example, exploring whether optimal foraging theory is useful for explaining how indigenous people dealt with new resources in colonial landscapes (Birmingham 2000). Another aspect of explanation concerns how instances relate to wider processes, notably frontier theory and core and periphery models. In colonial settings this is important as both, in part, explore how colonial centers related to colonial worlds.

In colonial settings, then, cultures have been long seen to be in flux. Conservatism, innovation, and creation are critical aspects of daily life for both colonists and various indigenous others. Sometimes concepts of "indigenous" become more blurred, as new forms of society developed. Key concepts such as ethnogenesis and creolization are used by archaeologists to document new forms of cultural practice that arose from the mixing pot of colonialism. A key archaeological proponent of creolization has been historical archaeologist Kathleen Deagan whose work has explored Spanish and American colonial communities in both Florida and the Caribbean archipelago (Deagan 1988; also Paterson 2011 for detail).

Future Directions

Long-Term Studies of Colonial Complexity

Some more successful archaeological studies have taken on the challenging potential of archaeological analyses and seen shifts from simple two-way cross-cultural processes to more complex explanatory models.

Colonial settings were not just simple binary contexts, but constituted of more complex relationships. Kent Lightfoot heralded a shift toward models that highlighted the complexity of ethnic interactions in colonial settings – his study (Lightfoot 1995) of the various ethnic communities at the early nineteenth-century Russian Fort Ross in northern California was described as pluralistic and marked a shift from an indigenous/colonizer paradigm to a more subtle focus on the material record of shifting ethnic behavior in a colonial outpost located in traditional lands of the Kashaya Pomo.

Archaeology provides a long-term approach within which to locate the colonial period. In the study of Guale life at St. Catherines Island off Georgia, which in the 1570s became a Spanish outpost of the La Florida colony, the American Museum of Natural History has documented 5,000 years of indigenous lifeways. Through a long-term approach, the ways in which the colonial period was reflected in indigenous practices were measured in the archaeological record, as indicated in chiefly power structures, gendered behavior, use of material culture, settlement patterns, health and mortality, work, trade networks, burial, and religiosity.

Colonial "frontiers" suggest to us regions that existed well beyond the formal presence of Europeans where however the impacts of change were still felt. This is perhaps best understood in Africa, where for centuries foreign outposts (such as in West Africa) and coastal communities (such as the medieval Swahili states in East Africa) had far reaching impacts on the interior of the continent through demand for traded commodities and slaves. In West Africa, the work of Ann Stahl in west central Ghana of the Banda is similar to that described for St. Catherines Island, by situating processes of cultural entanglement in a longer time frame. Banda sites were well inland

from European-African encounters along the coast, yet in this chieftaincy during the seventeenth and eighteenth centuries, preexisting power structures long associated with Saharan and Sudanic trade networks were disrupted by the shift toward Atlantic slave trading. In this "colonial frontier zone," the African Asante became dominant; then in the 1870s, British colonization occurred. Stahl's excavations reveal the continuities and shifts in communities and their practices over these centuries of change at the shifting edges of the colonial world.

The Materiality of Colonial Encounters

The archaeological study of colonial settings uses material evidence in addition to evidence from environmental and landscape records, historical sources, oral histories, and pictorial sources. The focus on material evidence poses serious challenges and opportunities. In colonial settings, the archaeological concept that objects and the way that they were used are equated with social identity is less solid. Instead, objects appear to shift in meaning depending on the user. The work of Nicholas Thomas (1991) highlights that in colonial contexts objects were used by colonized people to reject, embrace, and manipulate the intentions of colonizers. This suggests that simple material measures may miss nuances of the colonial world and indigenous processes of conservatism, experimentation, change, and even ethnogenesis where entirely new societies arise from colonial-era dynamics (i.e., the Metis in Canada).

Politics of the Past

The withdrawal of colonial powers in the twentieth century provides another set of historical "fault lines" that continue to reflect processes of cultural entanglement. Postcolonial settings have developed a set of political actions, literature, and theory. In archaeology, material culture has been used in novel ways to explore postcolonial historical cross-cultural processes, such as in Africa where the postcolonial settings are numerous and present legacies of direct relevance to Africans today (see Reid & Lane 2004 for African studies). The descendants of colonialism often claim rights to traditional lands (such as in Australia and North America), practices (such as hunting or social and religious practices), and material and ancestral remains held in colonial-era collections and for the right to actively participate and regulate the investigations of their past. These are shifting archaeological practice and the ethics of exploring the past in the present, be it postcolonial or not, and are likely to be key threads of future research on colonial encounters in "historical archaeology."

Cross-References

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- ▶ Atlantic World: Historical Archaeology
- ▶ Australasian Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Greek Colonialism, Archaeology of
- ▶ Lightfoot, Kent G.
- ▶ Mission Archaeology in North America
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Orser, Jr., Charles E.
- ▶ Postcolonial Archaeologies
- ▶ West and Central Africa: Historical Archaeology

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Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology

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Introduction

Archaeology as a modern discipline would have never developed without at least two contributions from Western thinking: a linear concept of time and collectionism. Christianity held a consecutive sense of space and time (Gould 1998; Arnold 2003: 32). In the Judeo-Christian tradition, as well as in Islam, linear chronology is the main metaphor: time moves in lapses separated by concrete events that emphasize its providential nature: God created the world at a specific moment and "He" did so in a defined number of days. "Creation" and the "Apocalypse" were markers between which other landmark events could be identified. For medieval people, history was morally useful because a life lived according to the Gospels helped to avoid mistakes. But it contained a revolutionary idea: the possibility of a past that stayed in the past and a future that lay ahead. Without this notion, the idea of an archaeological past could not have been developed.

Another notion important in this discussion is collectionism: the tradition that gave ancient objects the status of curiosities that were worth

collecting. The archaeological study of the past requires material objects. Without them, the idea of getting to know ancient societies through their material remains would be untenable.

Historical Background and Key Issues

From ancient times, the ruins of past "civilizations" served the purpose of enhancing new, and often usurping, lineages, and this was true of Sumer, as it was of the Mediterranean and the ancient Maya in Mexico. In medieval Europe, marbles and stone from ancient monuments were at times preserved as curiosities and evidence of the "original glory" of past civilizations, in particular the Roman civilization. Bishops and other members of the Church in Europe collected statues and were active in searching for relics. By the eleventh and twelfth centuries, the movement to return to antiquity occurred, particularly in southern Europe, and as a result of this phenomenon, collecting and deciphering inscriptions were seen as a valid historical pursuit. Ancient Rome came to be considered the "mirror, example and image of all virtue" (Schnapp 1996: 123). Outside the sphere of the former Roman Empire, a number of theologians and leading figures of the Church claimed precedence for their peoples, based on the idea that they belonged to the oldest "race" (Schnapp 1996: 156). Some ancient remains were used as sources of "objective" knowledge: for example, old ideas about Trojan ancestors from ruling houses were reconsidered in the light of past remains.

In the fifteenth century, collectionism was well established among the noble classes and scholars; furthermore, collections were more than mere treasures: they had a didactic function as they represented a medium through which to order and interpret the world. Collections were in fact a microcosm whose purpose was to unveil a macrocosm (Schnapp 1996: 167), and the aims of the collectors were not undertaken lightly. At that time, the world was not known in terms of casual connections but rather as a network of symbols or allegorical relationships expressed as manifestations or signs of the *ens creatum* or "Divine Creation." To know was equivalent to finding meaning and purpose, and therefore, it required creating classification systems based on similarities and mysticism. It was about unveiling the symbolic properties of things. The division of the Earth, the structure of the universe, and the division of time all had a meaning. Medieval people were curious, and *admiratio* was the means to both marvel and know. Archaeological objects were collected together with ethnographic objects, fossils, and mineralogical samples, and the first typological attempts were made, not in terms of history but in terms of meaning (Schnapp 1996: 167).

Collecting objects did not translate into historical interpretations of the past until the Renaissance. Part of the problem was that strange objects from the past were also testimonies of a period of time when people were not Christians. Objects could be admired and exhibited, but the creation of direct links that generated a sense of identity based on the objects was complicated. This was also true of the discovery of the New World. The Spanish conquistadors were faced with all kinds of wonders; in fact, finding the wonderful natural and social secrets of the "natives" to dazzle Europe with was one of the main purposes of the narratives left by Spaniards and other Europeans who wrote about the lands recently "discovered" (Valcárcel 1997: 147). Hernán Cortés, the conquistador of Mexico, was the first to propose the collection of objects that he considered worth preserving, and his opinion was ratified by Alberto Durero, who affirmed that he had found that the objects sent from Mexico were "more exquisite than any marvel" (Fagan 1984: 23). The oldest of the continent's chroniclers declared their astonishment at the wonders they found on their paths, including Mexican pyramids and Inca trails. Some Spanish conquistadors, such as Cieza de León, tried to speculate about how old ancient ruins in Peru and Mexico were and who had constructed them. Others did not hesitate to use Rome as a comparison to describe the Incas or the Aztecs, and when the opportunity presented itself, nothing stopped many of the conquistadors

from believing the ancient ruins were the work of the lost tribes of Israel. Frequently, some ruins were interpreted as evidence of Catholic preachers, who, as it was assumed, visited the New World before the Spanish conquest.

Towards the middle of the eighteenth century, Voltaire affirmed that in antiquity there had never been "a single philosopher or a single statesman who had said that he loved stones, marble, bronze or wood. However, testimonies of the opposite are countless: idol-worshipping countries are, well, like witches: they are spoken of, but they never existed" (Voltaire 1960: 38). It was not until the sixteenth century that the past began to free itself from its demonic association; consequently during the seventeenth century, in the New World, objects were collected that did not lead to suspicion, and trading antiquities began to grow in both the Old and the New World.

Inspired by the example set by Enlightenment, nobles and monarchs filled their offices with all sorts of marvelous and unusual objects that surprised visitors. At this time, significant portions of public funds were invested in seeking out objects worthy of royal collections, and often texts were written to describe them and to attempt to correlate them to historical accounts of the past. Antiquities occupied a central role in the interpretation of history, often undertaken by "specialists" in the field, known as antiquarians. Learned travelers ratified the importance of the fact that objects kept in royal museums were becoming central to what was beginning to become known as "science."

The European Enlightenment had established the concept of "civilization" as a process, equivalent to the modern concept of "progress" (Trigger 1989). The most obvious differences between human beings – color, shape, and behavior – served to establish a type of classification based on a prototype that had been deteriorated because of environmental factors (Duchet 1984: 213 y ss.). Intellectuals such as Joseph-Marie Degérando (1800/1969) highlighted the importance of antiquities in understanding the differences between "civilizations" and the influence of the climate and institutions. But above all, the Enlightenment exalted the importance of learning about "primitive" societies, because such knowledge would in turn shed light on the origins of "civilization." European scientists such as von Humboldt traveled the world looking for new objects that would reveal information about non-European "civilizations" and allow experts to speculate on why some nations seemed to be "more advanced" than others (Yudilevich 2004). In the case of America, one of the most common explanations concerning the lack of "civilization" among most indigenous societies was the lack of appropriate environment. Thus, *Natural History*, written by Buffon, pointed out the impossibility of "civilization" in a tropical environment. Against this, Europeans such as Humboldt and Americans such as José Domingo Duquesne argued in favor of indigenous civilizations that produced sophisticated calendars and other examples of science and arts.

In the middle of the nineteenth century, Romanticism emerged as an alternative to Enlightenment. A fundamental aspect of Romanticism was its conservatism in terms of history: it did not gratuitously go back to tradition and the autochthonous. In fact, the idea of going back to one's own history was to defend the collective from the changes most feared: the liberalization of society, its modernization, and democratization, not to mention the individualism that seemed to be threatening nationality (Berlin 2000). The past was to be seen as a lesson in morality that served as a warning and as a reference to the values that must be preserved. The most important thing, as expressed by Ernest Renan, was the recuperation of the spirit and of common memories, sacrifices, and glories (Renan 1987: 131). As part of this new spirit, collectionism was not so focused on scientific study of the past as it was on the recuperation of objects to foment a nationalistic spirit. The study of national origins promoted the spread of national museums – where the history and avatars of each nation could be displayed – to replace royal collections (Trigger 1989: 65).

It was not long after the glory of a nation was associated to its colonial expansion, and this was particularly true in the case of England, Germany, Russia, and, later, the United States.

The imperial vocation established a natural bridge that linked commerce, museums, and collectionism (Rodríguez 1991; Langebaek 2009). Ethnologists were frequently put at the service of empires and among the tasks of the many travelers through the colonies was that of collecting objects of interest for the enormous imperial museums in metropolitan cities. In time, the idea of collecting objects led to the imperial need to recuperate their context. The objects were understood in terms of their associations, which gave a sense of "nation" or "people" to a group of objects. For the newly born profession/s of anthropology and archaeology, this implied the development of longer field trips and the beginning of systematic excavations (Zimmerman 2001). At the same time, because objects in museums and private collections often lacked information about context, for the first time, the scientific notion of studying the past conflicted with collecting. The collections that had fueled archaeological study for centuries, from the majestic royal collections to the imperial and national museums, were suddenly seen as lacking scientific backing. Most of the objects lacked information about their context, and therefore, most collections began to be viewed as a way of promoting nonscientific excavations. Antique dealers had relied on treasure hunters, and many of them were collectors, and the states themselves had promoted such activities.

Future Directions

Most archaeologists have renounced the long association with collectionism and treasure hunting. There are undoubtedly good reasons for such a divorce. Contemporary collectionism is based on the destruction of archaeological sites and the illicit trading of objects, activities that clearly hinder the study of the past. However, collectionism is still alive, and today, it serves to produce images of the past for the public. Whatever the general public "knows" about the past, it has been to a large extent due to collectors, galleries, and other "outsiders" to science. Today, archaeological studies are the result of a very high level of specialization, and many research results are not easily understood by the general public, so it comes as no surprise that the public continues to feed itself with information offered by sources other than professional archaeologists. The future of archaeology will have to accept this challenge and learn to modestly appreciate a practice without which it would never have developed.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Second Modernity and the Second Phase of European Colonialism

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Colonial Williamsburg Foundation (CWF): Historical Archaeology

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Basic Information

The Colonial Williamsburg Foundation (CWF) is a not-for-profit educational organization dedicated to the preservation, interpretation, and presentation of Williamsburg, the restored eighteenth-century capital of Virginia. This town-sized (301-acre) living history museum tells the story of becoming American by way of historic house tours, trades demonstrations, and through Revolutionary City, an interactive street theater program that depicts life during the revolution as told by the residents of eighteenth-century Williamsburg. The Art Museums of Colonial Williamsburg and the DeWitt Wallace Decorative Arts Museum feature British and American furniture and art from 1670 to 1830, while the Abby Aldrich Rockefeller Folk Art Museum is home to the nation's premier collection of nineteenth- through twenty-first-century American folk art. Colonial Williamsburg is committed to expanding its thought-provoking programming through education outreach on-site and online.

Williamsburg is located in Virginia's Tidewater region within an hour's drive of Richmond and Norfolk and 150 miles south of Washington, DC (website: www.history.org).

Major Impact

Colonial Williamsburg has been central to the development of North American historical archaeology since the late 1920s. Starting with an inventory of 88 standing eighteenth-century structures, workmen and architects began the process of reconstruction by carefully uncovering belowground footings and foundations and recovering associated architectural elements with the purpose of re-creating, as closely as possible, Virginia's second colonial capital. An extensive campaign of architecturally focused excavations was continued through the 1950s by Colonial Williamsburg's Architecture Department. Whole blocks were "cross-trenched," a process involving regularly spaced, foot-wide trenches dug diagonally to the north–south Baroque grid pattern of the city. When a building footing or foundation was encountered, it was exposed, mapped, and photographed. By the late 1950s, an estimated 75 % of Williamsburg's historic area had been cross-trenched, and more than 300 buildings were ultimately reconstructed based on physical evidence found through that cross-trenching. While quite successful in locating structures for potential reconstruction, this type of architecturally based excavation shed little light on the lives of Williamsburg's residents.

In 1957 British archaeologist Ivor Noël Hume was hired as the foundation's first full-time historical archaeologist. Under his leadership, excavation was separated from the Resident Architect's Office and evolved into one of North America's first and most renowned programs in the emerging discipline of historical archaeology. Noël Hume was also very influential in the

establishment of the Society for Historical Archaeology and hosted its first meeting in Williamsburg in 1968. In addition to expanding the scope of archaeological research beyond the hunt for architectural remains, Noël Hume instituted two crucial changes to the excavation program: open-area excavation and the systematic retrieval of portable archaeological evidence including artifacts, faunal remains, and botanical material. Ivor Noël Hume and his wife Audrey skillfully combined the evidence recovered from the ground with the plethora of historical documentation surrounding Williamsburg, to create meaningful portrayals of life in the eighteenth-century capital.

In 1982 Dr. Marley R. Brown III followed Noël Hume as Colonial Williamsburg's Director of Archaeological Research. Under his leadership, CWF archaeology adopted a more anthropological approach and expanded its research to include a diachronic perspective to changes in the landscape. Research involving the creation of Williamsburg's urban environment, seventeenth-century settlement patterning, colonial foodways, the role of African Americans, intra-site spatial patterning, an international outlook toward comparative colonialism, and multidisciplinary approach to geophysical, faunal, and environmental analysis expanded the role of archaeological research considerably.

By the 1980s, the National Historic Preservation Act stimulated a wave of compliance-oriented investigations that both influenced and complemented the existing CWF program of research-based investigations. Important sites investigated included the Peyton Randolph Outbuilding Project, Shields Tavern, the Everard House, the St. George Tucker Garden, the Douglass Theater, the James Wray carpentry yard, the John Page manor house, and the seventeenth- and eighteenth-century components of Rich Neck Plantation to name a few. Excavations at seventeenth-century sites at Martin's Hundred were also continued shedding new light on the scale and scope of colonial settlements beyond Jamestown Island including indentured servitude and the early adoption of enslaved African labor on small colonial farms such as Atkinson site.

Another significant hallmark of this period was the partnership between Colonial Williamsburg and other heritage and academic institutions, both domestic and foreign, to explore the interrelationships between disparate British colonies. In particular, a cooperative agreement in the early 1990s with the National Park Service led to the Jamestown Archaeological Assessment culminating in a seven-volume report encompassing the archaeology, environment, history, geology, and the potential of the National Park Service's 60-year archaeological program on Jamestown Island as well as two important doctoral dissertations (Horning 1994; Wehner 2006). The CWF/NPS cooperative agreement also led to archaeological surveys and evaluations at George Washington Birthplace National Monument, Yorktown (Colonial National Historical Park), Appomattox Court House National Historical Park, City Point (Petersburg National Battlefield), and Shenandoah National Park.

Meanwhile, CWF archaeologists, working in partnership with the Bermuda National Trust and the Bermuda Maritime Museum, conducted excavations and documentary research at various sites in Bermuda. Also in the 1990s, archaeologists from CWF carried out work in Bridgetown, Barbados, in conjunction with the National Trust of Barbados. Architectural research in Bermuda and Jamaica has continued under the direction of architectural historian Edward A. Chappell (Chappell 2009).

A particularly enduring legacy of the archaeological program in the late twentieth century was the establishment of the annual field school in historical archaeology held in conjunction with the Department of Anthropology at the nearby College of William and Mary. Since 1984 thousands of undergraduate and graduate students, including some of today's best-known scholars, received their formative training in archaeological fieldwork while working alongside Colonial Williamsburg's professional staff.

In 2008, Colonial Williamsburg's archaeological research staff and the foundation's Architectural Research Department became a single department under the leadership of architectural

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 1 Archaeology of a late eighteenth-century dairy at Charlton's Coffeehouse

historian Edward A. Chappell. The consolidation reflected the increasingly interdisciplinary nature of archaeological work in the twenty-first century and the changing nature of CWF's public programming. The staff also works closely with archivists, curators, conservators, as well as media education specialists, digital historians, and cultural anthropologists (Fig. 1).

A detailed and updated description of recent archaeological projects can be found on the Colonial Williamsburg website: http://research.history.org/Archaeological_Research.cfm.

Current research areas:

- Colonial Williamsburg is committed to a program of public outreach that promotes a preservation ethic and conveys what archaeology is and what we have learned from its practice. Programs that communicate the stewardship of archaeological sites as "cultural heritage resources" and ones that focus on the central work of archaeologists as a multifaceted process of learning about the past are key models used in CWF public archaeology curricula. The foundation has developed hands-on "Discovering the Past" programs, aimed at school-aged groups that uses volunteers and regular staff to help children and young adults begin to think as archaeologists do about the past and their own surroundings. All programs have a central theme that attempts to accurately describe the work of archaeologists while maintaining the value of archaeological sites by avoiding the suggestion that anyone can dig without extensive training. Training of that nature is provided through the accredited field school in historical archaeology.
- Colonial Williamsburg's archaeological projects and resources on African Americans, generated from the excavations of mixed-racial and entirely African-American sites, are central to historical interpretation and reconstruction. From the late 1970s, research on eighteenth-century plantations like nearby Carter's Grove, Rich Neck, and Palace Lands (Fig. 2) and sites of later dates such as the Quarterpath Road and the Polly Valentine House have generated a wealth of information contributing to a firm database of resources to help the comprehensive study of the social, political, and economic diversity of Virginia during the colonial and even early modern periods. Work at multiracial sites in the historic area including the Ravenscroft lot and the Public Armory has sought to understand "cultural differences" relating to African Americans that can be addressed archaeologically. With a number of substantial, accredited studies, the archaeological program prioritizes research on key topics including slave living and working areas, faunal and botanical studies of foodways and medicine, master–slave relations, as well as factors that affected the acquisition, use, and disposal of certain material items (Edwards-Ingram 2005).
- Colonial Williamsburg and the College of William and Mary have collaborated on the Historical Archaeology of Native Americans.

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 2 Archaeological field school at an African-American slave quarter on the Palace Lands in Williamsburg

The College of William and Mary's intent to renovate the eighteenth-century Brafferton building, a structure used to house the college's eighteenth-century Indian school, led to an archaeological investigation of the site through the joint CWF/W&M archaeological field school in the summer of 2011. Significantly, the Brafferton represents the only documented location within the limits of eighteenth-century Williamsburg where Native Americans were the primary inhabitants, and the site's 2011 investigation indeed recovered intriguing material evidence on Native Americans living at the college. Also notable was the fact that the Brafferton represented a new level of community engagement for CWF's archaeological research staff, again reflecting recent trends within the broader discipline to engage stakeholders beyond the professional archaeological community. Building upon both community-based and indigenous archaeology models developed over the last decade, the Brafferton Legacy Group, an advisory body made up of William and Mary Native American alumni, offered guidance on how the excavations might provide an opportunity to reforge connections between the college and contemporary Native American tribes.

- Using multiple analytical scales, environmental archaeology draws on faunal remains, phytoliths, pollen, macrobotanicals, and parasites to reconstruct the colonial town's biotic and cultural landscape. CWF zooarchaeological researchers have amassed a large database of urban and rural sites from which they have reconstructed the provisioning system that fed urban populations. Through the lens of landscape ecology and animal behavior, they have reconstructed how colonists adopted native horticultural practices to produce the commercial crop tobacco and develop an open woodland husbandry system. Palynological and phytolith studies have produced evidence of forestation in the eighteenth century, followed by a decline in pine pollen and an increase in weedy plants associated with disturbed soils. On the household level, numerous faunal, pollen, macrobotanical, and parasite studies have identified household subsistence practices of all walks of life, the elite, enslaved, tradesperson, and more (Walsh et al. 1997; Mrozowski et al. 2008). Current work is continuing to expand our understanding of Williamsburg by reconstructing garden and other cultural landscape features in urban houselots and by identifying broad regional and neighborhood changes in the biotic landscape (Fig. 3).
- *Virtual Williamsburg*, an interactive 3D computer model of Williamsburg currently in development (Fig. 4), reflects the latest

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 3 Environmental sampling at George Washington Birthplace National Monument by Colonial Williamsburg archaeologists and environmental archaeologist Lisa Kealhofer

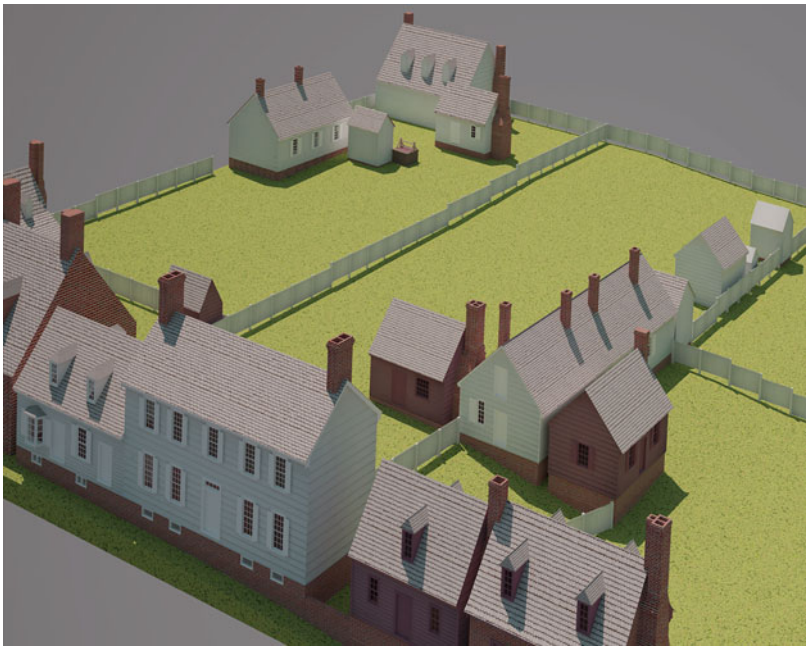

Colonial Williamsburg Foundation (CWF): Historical Archaeology, Fig. 4 Virtual view of the Public Armoury in Williamsburg, 1779

archaeological and architectural research. Virtual heritage is an increasingly important expression of a cultural heritage site's state of research and one that is also creating new paradigms for understanding the past (Kalay et al. 2008: 9). *Virtual Williamsburg*, which is being built neighborhood by neighborhood, will recreate the colonial cityscape of Williamsburg in 1776 on the eve of the American Revolution. The assimilation of multiple archaeological datasets to create the virtual reconstruction is providing new insights into the town's history and development. The model draws upon a range of material culture and archaeologically derived topographical and environmental data are being combined to reconstruct the eighteenth-century landscape virtually. The digital reconstruction will be used to create a range of educational media for exploring the town

during this important period in its history and to enhance the on-site guest experience. The first neighborhood being virtually reconstructed – the east end of town – includes significant buildings that have not been physically reconstructed, such as the second Capitol and the Douglass Theatre, and is being modeled in conjunction with the University of Virginia's Institute for Advanced Technology in the Humanities. Funding for *Virtual Williamsburg* and 3D modeling at Colonial Williamsburg has been provided by the Institute of Museum and Library Services, the National Endowment for the Humanities, and the Andrew W. Mellon Foundation.

Archaeology at Colonial Williamsburg in the twenty-first century continues as it has in the past, by taking an up-to-date interdisciplinary approach to the historical archaeology of the British Atlantic World and the Chesapeake Region.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archaeobotany
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Excavation Methods in Archaeology
- ▶ Field Schools, Archaeological
- ▶ Heritage Museums and the Public
- ▶ Landscape Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
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Colony of Avalon Archaeological Site

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Basic Information

Colony of Avalon, Ferryland, Newfoundland, Canada
www.colonyofavalon.ca

Major Impact

The Colony of Avalon archaeological site, nestled in the community of Ferryland, Newfoundland, Canada, and located on a major promontory along the eastern coast of the Avalon Peninsula roughly 80 km south of St. John's, represents one of the earliest attempts at English settlement in the New World.

The modern town of Ferryland has a history of occupation that extends backward in time more than 500 years. The first reference to the place is found on Giovanni Verrazano's 1529 map of the world, on which the familiar Newfoundland headland is labeled as "Farilham." The first notation by the English, in the 1590s, refers to the harbor as "Farillon." Either name can likely be traced as a corruption either of *farelhao*, the Portuguese nomenclature for steep rock or point, or of the French word *forillon*, meaning "cape, or "point."

The Colony of Avalon archaeological site provides us with a record of a long and rich cultural history. Early exploitation of the rich Newfoundland fishing grounds began in the early 1500s. The early fishery was a shore-based operation, whereby fishermen deployed to the sea in day-to-day expeditions from camps along the shore. The conspicuous Ferryland headland, jutting prominently into the North Atlantic, boasted a harbor with easy access to the fishing grounds, and extensive cobblestone beaches for drying catch.

Throughout the sixteenth and seventeenth century, Portuguese, Spanish, Basque, French, and West Country English fisherman are known to have been exploiting the resources of Newfoundland's waters. After 1565, English involvement in the Newfoundland fishery dramatically increased as European economic conflicts severely affected both the Spanish and Portuguese fisheries, and an economic shift in France's transatlantic fishery shifted much of its massive contingency to a "wet" offshore fishery. These two processes opened the way for England to officially dominate much of the inshore niche from the end of the sixteenth century onward (Matthews 1973; Pope 2004). By the 1600s, the English fishery was firmly established on the peninsula, and the first attempts at permanent settlement quite inevitable.

Intermingled with the residual fragments of migratory European fishermen, archaeologists have uncovered evidence of Newfoundland's now-extinct native Beothuk people at Ferryland, including bifaces, projectile points, stone tools, and Beothuk hearths. The Beothuk campsites have been found in association with sherds of early European ceramic wares, suggesting a concurrent exploitation of the resources at Ferryland during the sixteenth century, and attesting to the importance of the site at this time, although notably, archaeological evidence indicates a *terminus ante quem* for Beothuk presence at the site of no later than 1580 (Gaulton 2001).

The colony itself was variously referred to across time as Avalon, the Pool Plantation, and Ferryland. In 1620, George Calvert (later the first Lord Baltimore, whose heirs would come to settle St. Mary's City in modern Maryland, U.S.A.) purchased a tract of land between modern-day Calvert and the headland between Aquaforte and Fermeuse from Sir William Vaughan, whose earlier attempts to start a settlement in the area had been unsuccessful. Construction of the settlement of Avalon, as Calvert would come to call his colony, began on August 4, 1621, when Captain Edward Wynne, acting on behalf of Lord Baltimore, arrived in Newfoundland along with 11 other settlers and erected a series of buildings, including a 13.3 by 4.5 m dwelling with a semi-attached kitchen and parlor, as well as tenements, a forge, saltworks, a brewhouse, a hen house, a well, a wharf, and a defensive palisade, concentrated around a sheltered inner harbor referred to as "The Pool" (Gaulton & Tuck 2003; see also Gaulton & Miller 2009). These buildings established the site as a permanent settlement, one that would eventually become the predominant colony in Newfoundland throughout much of the seventeenth century.

The colony has an intriguing and interesting history. In the winter of 1622/23, thirty-two additional settlers arrived and by the middle of the decade, roughly 100 settlers inhabited the colony of Avalon, although Baltimore himself left

Ferryland and its "intolerable cold" within a year of his own arrival in 1627, leaving the colony in the hands of a trusted representative (Cell 1982; see also Miller et al. 2011). In 1637, a syndicate headed by Sir David Kirke was granted administrative proprietorship of Newfoundland through the close connections of its members with the court of Charles I. In 1638, Kirke, along with his wife Lady Sara, their three sons, and a group of about 100 new settlers, arrived in Ferryland to take advantage of this grant. Exploiting Lord Baltimore's absence from the settlement, Kirke evicted the Calvert's representative, Captain William Hill, and expropriated Ferryland. Kirke and his family took up residence in the mansion house, and Calvert's settlement came to be known as the Pool Plantation (Gaulton & Tuck 2003). A series of lawsuits ensued between the Calverts and the Kirkes as both parties pressed for ownership, and in 1651, Kirke was called to England for an official inquiry into the administration of Newfoundland and his activities there (for further context, see Pope 1998). Kirke lost proprietorship of Newfoundland and was forced to forfeit his lands and possessions to Cromwell's Commonwealth. In spite of this, and regardless of the government's appointment of a new commissioner of the colony in 1653, Lady Sara Kirke and her sons remained at the settlement and Lady Kirke eventually became one of the most successful fish merchants in the area until her death in the 1680s. Kirke himself died in prison in 1654.

The community is known to have thrived until the third quarter of the seventeenth century, when wars between the European countries spilled over into Newfoundland. Ferryland was subjected to an unopposed attack by four Dutch ships in 1673, and later to a more well-executed attack carried out by the French on September 21, 1696, as France competed with England to assert its own claims on Newfoundland and its fishery. When the inhabitants of Ferryland refused to swear allegiance to the French king, the colony was destroyed. Following several years of peace, France and England renewed their war in 1701, and the colony was attacked twice more by the French, in 1705 and 1708. In 1713, Queen Anne's War finally ended, culminating with the Treaty of Utrecht. The provisions of the treaty stipulated that France relinquish the Island of Newfoundland to the British. A long period of peace followed the signing of the treaty, and Ferryland's colonials remained safe from further collateral damage by the wars. Intriguing archaeological data from this period reflects the extent of the damage wrought during this era and provides us with an opportunity to explore how these events impacted and changed the social and economic context of life at the colony. While much of the archaeology at the site to date has focused on the Calvert and Kirke eras at the colony, research continues to expand our understanding of the development of the colony into the eighteenth century as well.

While the existence of the Colony was never lost from either history or from local memory, the actual location of the site was undetermined until the last two decades. Archaeology at Ferryland began in the late nineteenth century, when, based upon information gleaned from historical records, the antiquarian M.F. Howley unearthed several artifacts while attempting to pinpoint the coordinates of the original settlement. Limited excavations followed in 1937 by Carnegie Institute entomologist Stanley Brooks, in 1959 by Russell Harper on behalf of the Historic Sites and Monuments Board of Canada, in 1968 by the Memorial University Archaeology Unit, and in the 1970s by Robert Barakat. Intensive excavations at the site began in the mid-1980s by Memorial University and have continued on an ongoing basis since 1992 for up to 20 weeks each summer.

Archaeological assemblages have contained a remarkable collection of seventeenth and eighteenth century artifacts, and excavations have revealed the scale, as well as attested to the significance, of the site. Defensive works in the form of a 20-ft-wide ditch and 20-ft-wide rampart border the eastern side of the colony, with a large bastion at the south end of the fortification ideally placed to monitor ocean traffic and to support ordnance in defense of the colony

(Gaulton & Miller 2009). The colony features a large quay, a massive stone seawall, and an impressive stone storehouse with interior dimensions of 16 by 56 ft on a waterfront terrace immediately to the south of Ferryland's inner harbor. A well-built stone wall separates the waterfront terrace from a higher terrace to the south upon which a series of dwellings, including a group of interconnected structures which form the impressive "Mansion House," as well as tenements, outbuildings, a forge, and a brewhouse and bakery have been excavated. A cobblestone street, 13-ft wide and 400-ft long, spans the distance of the original colony's boundaries, and connects the structures of the upper terrace to those of the waterfront on the terrace below. Archaeologists have surmised that the colony in its entirety must have resembled one of the small port towns of the West Country with its layers of buildings and cobbled walkways, courtyards, and work areas (Gaulton et al. 2011).

The English colony of Avalon at Ferryland, Newfoundland, is a site extraordinarily rich both in history and in archaeological remains. The site continues to provide a rich archaeological heritage of the seventeenth and eighteenth century in Ferryland, and a window into one of the earliest settlements in the New World. Significant discoveries continue to occur today. Supported by the Colony of Avalon Foundation, the facility includes an interpretation center with guided onsite tours, a conservation laboratory, a collection storage area, a gift shop, a reproduction of a seventeenth century kitchen, and three heritage gardens.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Ceramics: Stonewares
- ▶ Clay Pipes in Historical Archaeology
- ▶ Historic St. Mary's City
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology

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Commingled Remains: Field Recovery and Laboratory Analysis

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Introduction and Definition

The term "commingling" refers to the intermixing of remains from more than one individual (Fig. 1) and, when present, is a challenging component of many anthropological analyses. The study of

Commingled Remains: Field Recovery and Laboratory Analysis, Fig. 1 Burial pit showing commingled human remains (Photograph courtesy of John Byrd)

commingled remains may pertain to an archaeological context or a forensic context. Within the archaeological context the focus of study could be faunal (i.e., nonhuman) remains or human remains. Within the forensic realm discussions of commingling usually refer to the intermixing of human remains, such as may occur from a mass disaster or in cases of mass graves resulting from periods of political, ethnic, or religious violence. Regardless of whether the context is archaeological or forensic, commingling will complicate every facet of the process from recovery to final disposition. The focus of this entry will be an overview of field recovery and laboratory analysis of commingled human remains, although there is clearly overlap with the recovery and analysis of faunal remains.

Historical Background

It is often the role of an anthropologist to document and attempt to resolve commingling. An early example of research into the forensic analysis of commingled remains is a 1948 article by Charles Snow who was the first physical anthropologist at the US Army's Central Identification Laboratory in Hawaii. In this publication, Snow outlined protocols used in the anthropological analysis of US war dead from World War II. Although there have been technological advances since that time, most of the methods used for dealing with commingled remains are still relevant today. More recent publications on commingled human remains include Ubelaker (2002), Adams and Byrd (2008), and Byrd and Adams (2009), all of which provide comprehensive lists of additional references on the topic.

Key Issues

The primary issues associated with commingled remains include field recovery and laboratory analysis. Field recovery deals with the documentation and collection of remains, while laboratory analysis primarily deals with sorting and quantification. As the number of commingled individuals increases, so does the complexity of the investigation and the skills and resources needed for case resolution. The analytical complexity is also tied to the condition of the remains. As the

state of preservation declines, the complexity of the recovery and/or analysis increases. The condition of the remains will vary depending on the circumstances associated with death, depositional context, and the amount of time elapsed between death and recovery. States of preservation may range from fleshed to skeletonized, and from intact to fragmentary. Taphonomic changes, such as thermal alteration and weathering, may further complicate the analysis of commingled remains (Warren & Schultz 2002). The degree of commingling can vary widely from situations that are relatively straightforward, such as intact remains and a small number of individuals, to those that are extremely challenging, such as a large number of individuals and/or extensive fragmentation.

It is possible to broadly categorize commingling scenarios into two types: small-scale and large-scale. Small-scale commingling exists when there are not many disassociated body portions and/or the overall number of individuals is small. Even if the overall number of individuals is large (such as a mass grave), the degree of commingling may still be considered to be small-scale if the skeletal elements are mostly articulated upon their recovery. Large-scale commingling involves large numbers of individuals whose body parts are intermixed, or it may represent scenarios with extreme fragmentation. For example, a plane crash with a relatively small number of individuals may become a large-scale incident if the body fragmentation is extensive since each separate fragment initially needs to be treated as potentially coming from a different individual. Large-scale commingling often necessitates a greater reliance on DNA analysis and presents numerous logistical challenges, such as data management and analytical space.

The September 11, 2001 terrorist attack on the World Trade Center (WTC) in New York City represents an example of an event that resulted in large-scale commingling. There are 2,753 known victims and over 21,000 human remains have been recovered to date. Anthropological methods have played an important role in the various aspects of recovery and analysis, but the high level of fragmentation necessitated a strong reliance on DNA for victim identification (Mundorff et al. 2008). At the Office of Chief Medical Examiner in New York City, the successful resolution of commingled WTC remains has been due to a collaborative effort between the Forensic Anthropology and Forensic Biology Departments.

Field Recovery

Familiarity with archaeological excavation and site-mapping techniques are important factors for the successful recovery of commingled human remains (Dirkmaat & Adovasio 1997; Haglund 2002; Schmitt 2002; Skinner et al. 2002). Documentation of the provenience (three-dimensional location) of the remains and associated artifacts can prove critical for the subsequent laboratory analyses. It is important to remember that once remains are collected from the field, this important spatial information will be lost unless maps, notes, and photographs are completed, while the remains are in situ (i.e., in their original position).

Laboratory Analysis

In the laboratory, the two primary objectives will be to sort the commingled remains into specific individuals and to quantify the overall number of dead. Within the forensic context, attempts will be made to identify the remains to a missing individual and return them to the next of kin. For situations with known or suspected commingling, all remains should initially be considered as coming from a separate individual unless they can be shown to be attached by soft tissue or to conjoin to another piece at a fracture site. As stated above, the context in which remains are found will often provide critical information in the sorting process, such as when body parts are found in correct anatomical position despite being disarticulated from the body.

The first step of the sorting process involves an inventory and determination of body part

representation. As part of this step, fragmentary remains should be conjoined to the greatest extent possible as this will assist in overall sorting process. When working with fragmentary, fleshed human remains it may be difficult to grossly recognize the full extent of commingling. Radiography can be a useful tool in the recognition of commingling depending on the type of incident and preservation of the bodies (Goodman & Edelson 2002; Viner 2008).

After an inventory of the skeletal elements is made and reconstruction completed, there are numerous anthropological sorting techniques that may be used in the resolution of commingling. In essence, these techniques are used to rebuild individuals. They include visual pair-matching (the association of homologous elements based on similarities in morphology), articulation (formation of a congruent joint or juncture with another element), process of elimination (determination that certain remains could originate from one, and only one, individual), osteometric comparison (use of statistical models to objectively compare size and shape relationships between elements based on measurements), and taphonomy (similarities and differences in postmortem preservation). Components of the biological profile (e.g., age, sex, and stature) may also be useful in the sorting process. The majority of these sorting procedures are not stand-alone techniques and they are most relevant for small-scale incidents. For best results, they should be used in conjunction with each other, as well as with the contextual scene information. Finally, anthropologists utilizing these techniques should have a strong background in skeletal anatomy, along with an understanding of bone morphology and human variation. Although not an anthropological technique, the comparison of postmortem DNA profiles also provides a powerful means of segregating remains, as mentioned above with the WTC example, and may be a primary means of sorting/re-association with large-scale and very fragmentary scenarios.

When working with commingled human remains, the goal of quantification is to estimate the total number of dead. Determination of the number of individuals usually occurs after the re-association process is complete (i.e., conjoining fragments and sorting into specific individuals). Components to consider when determining the appropriate quantification technique include bone preservation and scale of the incident. Probably the more important of the two is preservation since extremely fragmentary or poorly preserved remains may not be amenable to any accurate quantification technique.

For interpreting population size from a skeletal assemblage, the Minimum Number of Individuals (MNI) presents the minimum estimate of the number of individuals that contributed to the sample. Within anthropology, this technique is frequently used for estimating the number of individuals due to its ease of calculation. The most common variant of the MNI is simply calculated by sorting the bones by side and element and then taking the greatest number as the estimate. In order to deal with fragmentary remains, specific segments of an element (e.g., proximal humerus) can be used for the calculation of the MNI. Every fragment must share a specific landmark to ensure that fragments do not originate from the same skeletal element. The basic principle of an MNI estimate is to avoid counting the same individual twice.

Other quantification techniques are available for the analyst. One alternative method is the Most Likely Number of Individuals (MLNI), which is a variant of the Lincoln Index (Adams & Konigsberg 2004, 2008). This technique is used to estimate the actual number of individuals, as opposed to the minimum number. The MLNI is calculated based on the number of paired and unpaired bones (as opposed to the MNI which is usually not dependent on pair-matching). In addition, confidence intervals can be calculated for the MLNI estimates. For proper use of the MLNI, preservation must be good since it is critical that elements can be accurately pair matched. For situations where there has been random loss of body portions, the MLNI estimates should provide the most accurate estimates of the true population. The MNI estimates will accurately reflect the true number of individuals only if body part representation is 100 %.

Future Directions

Additional Considerations

For the anthropological analysis of commingled remains, it is imperative that appropriate methods are utilized during field recovery and laboratory analysis. Otherwise, important information may be lost. For forensic investigations, the resolution of commingling will be tied to personal identification of the decedents. Successful resolution of commingling will facilitate decedent identification and ensure that the greatest amount of remains possible will be returned to next of kin. Ethically challenging considerations pertaining to commingled remains will have to be determined within the forensic context. Many of these decisions will likely fall outside the purview of the anthropologist, such as the scope of the effort (i.e., will every fragment be analyzed for re-association or will there be a size parameter established for analysis) and the disposition of unidentified remains (i.e., the fate of common tissue which is not linked back to a specific decedent).

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Burned Remains in Forensic Contexts
- ▶ Cremation in Archaeological Contexts
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

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Communicating Archaeology: Education, Ethics, and Community Outreach in North America

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Introduction

Archaeology has always been a dynamic field, with amazing discoveries about the past being reported to the public. Eighteenth-century museums in North America, such as the Charleston Museum in South Carolina, displayed artifacts to a fascinated public. Over time there has been a transformation in communicating archaeology to the public from eighteenth-century museums as "cabinets of curiosities" to - twenty-first-century anthropology/archaeology and history museums. But museums are not the only way to present archaeology to the public – archaeologists give public lectures, have tours of their sites, write articles and pamphlets for the public, present programs for school-aged children, and undertake excavations with students and adult volunteers. In the diverse ways in which North American archaeologists engage the public, how do ethics and ethical behavior fit into the picture of public archaeology, especially in the realm of education? How do archaeologists incorporate community outreach into our educational programs? These two questions are the focus of this entry.

Historical Background

Archaeologists' acceptance of community outreach and willingness to engage the public reflected trends found throughout United States and Canadian society in the later part of the twentieth century. Educational efforts to reach out to the public were also taking place in affiliated fields such as museum studies and history, and these have affected our work. The 1960s and 1970s were the early years of the new social history. North American historians were starting to focus on women, African Americans, American Indians, various ethnic minorities, and the working class – the people often overlooked in traditional historical research. The goals were to enlarge our view of history and bring to life the forgotten history of people without power – to tell the history of all North Americans. With this interest in social history, archaeologists such as James Deetz became involved in bringing archaeology to the public through outdoor museums (Deetz & Deetz 2000). Deetz pioneered the idea of first-person interpretation at Plimoth Plantation in Massachusetts, which was later used at other living history museums.

Indoor museums were also trying to engage the public and promote more educational programs to a broader public. In the early 1970s, Thomas Hoving, then director of the Metropolitan Museum of Art in New York City, dismissed the idea of an art museum as a place for just the highly educated elite. Hoving argued for new types of exhibits that would be educational and would reach out to a wider public regardless of socioeconomic background, race, ethnicity, or religion. The first of his new "blockbuster" shows was the King Tut traveling exhibit in 1976. The King Tut exhibit discussed artifacts within their cultural context. Museum attendance rose dramatically with "blockbuster" exhibits. History and anthropology museums were also challenged to design exhibits with public outreach components and to provide better programs in museum education. Archaeologists became more involved with working with museum curators to produce exhibits about North American archaeology.

In the 1980s, agencies such as the National Park Service hired professional writers to take data from the technical records, such as field reports, and write archaeology articles and

books for the public especially for teachers (Jameson 2004). State agencies such as the Delaware Department of Transportation required Cultural Resource Management firms (CRM) to produce both technical reports and "popular" reports for the public. To encourage public education, professional organizations such as the Canadian Archaeological Association, the Society for American Archaeology, and the Society for Historical Archaeology created public archaeology committees and public archaeology columns in their professional newsletters and/or on their Web sites. The Society for American Archaeology's *Ethics in American Archaeology* (Lynott & Wylie 2000) stressed the need for public education. The Society for Historical Archaeology produced a book, *Unlocking the Past* (De Cunzo & Jameson 2005), to present an overview of North American archaeology for the public. In addition, there are a growing number of books on state, provincial, and city archaeology written for the educated public as the target audience.

By the 1980s national, state, and provincial parks in North America were providing the public with educational tours of archaeological sites. Opening up archaeological sites to the public was controversial. At first some archaeologists were alarmed because they had been trained in both undergraduate and graduate school to be wary of the public; they feared that the sites would be looted if anyone knew the location of the excavations. Looting of archaeological sites, especially in Mesoamerica and the American Southwest, has been a problem for decades (Messenger 1989). In fact, the looting of archaeological sites in third-world countries and the sale of artifacts on the black market are still an ongoing problem. In the 1980s, there were heated debates over site tours: would it be educational, would it protect the sites by creating public interest, or would it make the sites more susceptible to looting? The looting did not happen and the tours did create excitement and interest in the archaeology and the sites. By the 1990s site tours were becoming an accepted way of presenting archaeology to the public (Jameson 1997). At high-profile sites like Jamestown, Virginia, the public has been invited to visit the site through their many dig seasons.

Key Issues and Current Debates

Ethical Discussions

By the 1990s and into the twenty-first century, archaeologists have debated the merits of public outreach and public archaeology. How should we engage the public? What should be the composition of these educational programs? Initially these programs were based on what the archaeologists wanted to present to the public or thought that the public needed (Jameson 1997). Archaeologists started to discuss the values of working collaboratively with scholars in other professions, such as museum curators and museums educators. For archaeologists working on historic sites, especially heritage sites, the work involved collaborations with historians, historic preservationists, architectural historians, and landscape architects. This cooperative work enhanced both the quality of the public programs and the underlining interdisciplinary research (Merriman 2004; Jameson & Baugher 2007).

These early archaeological outreach efforts often involved archaeologists working in isolation from community groups. It was the archaeologists and the interdisciplinary team of scholars who decided, without substantive input from community members, what type of archaeological outreach and what messages the public needed and wanted. Questions such as who is the target audience and what questions do they want answered were often not on the archaeological radar screen. But, slowly, archaeologists started to move out of the isolation model and partner with community members in order to develop more meaningful public programming. The major shift in archaeological outreach was moving from presenting material for the public to working with the public. But in working with the public, there had to be a major shift in attitudes.

One of the key ethical issues of the late twentieth century and the early twenty-first century has been the question of who "controls the past." In 1990 in the United States, the passage

of the Native American Graves, Protection, and Repatriation Act (NAGPRA) altered the way archaeologists work. Native Americans have and continue to demand the right to protect their sacred sites and burial grounds and to repatriate both their ancestors' remains and objects of cultural patrimony. Native Americans and First Nations no longer want to be research subjects – they no longer want archaeologists to control the interpretations of the past. NAGPRA helped to stimulate collaborative work between archaeologists and Native Americans. By the late 1990s, two United States federally funded journals, *CRM* and *Common Ground* (formerly the *Federal Archaeologist*), and the Society for American Archaeology's newsletter published positive examples of the cooperation between Native communities and archaeologists. In *Native Americans and Archaeologists: Stepping Stones to Common Ground*, produced by the Society of American Archaeology, the articles provide detailed examples of cooperative efforts. *Working Together: Native Americans and Archaeologists* republished columns from the *SAA Bulletin* from 1993 to 1999. The edited book detailed both the cooperative efforts and tensions that still existed regarding the excavation of Native American sites and burial grounds.

One of the many positive results of NAGPRA is that it encouraged archaeologists to also evaluate the way they also worked with other non-Indian descendant communities. Archaeologists increasingly began to see community collaboration as positive (Derry & Malloy 2003). The highly publicized excavation of the African American Burial Ground in New York City highlighted the involvement of the African American community in decisions regarding the preservation, protection, and public presentation of this site (LaRoche & Blakey 1997). Archaeologists became more receptive to presenting a multivocal history, to studying minority history, to incorporating oral history into their research, and to discussing their research with members of the descendant community (Jameson 2004).

With the changing archaeological perspectives on outreach, community members were moving from the category of "research subjects" into "partners in outreach." Collaboration and partnership requires an ideological shift for archaeologists. The traditional academic or institutional hierarchy is gone – the "control" of the project is no longer solely in the hands of the archaeologists. In partnerships, colleagues work together and respect each other. Each side has something to bring to the table and the goals of the project are decided jointly. The archaeologists also quickly learn that there is not one unified voice for "the community" – there are multiple voices within the community and those individuals do not always agree on goals, procedures, and end products for a project. Successful collaboration means opening up a dialogue, truly listening to each other, and exchanging ideas. For archaeologists learning how to move away from a hierarchal model to a collaborative model was sometimes a slow and difficult process. As archaeologists experimented with collaboration, sometimes a project began without community input, but as the project evolved, the insights, commentary, and suggestions from community members helped it to change over time. For other archaeologists the projects started with community partnerships. During this time of experimentation, valuable lessons learned were learned from those partnerships and the end products were greater than the parts (Shackel & Chambers 2004; Jameson & Baugher 2007). Results and measures of success were expressed qualitatively rather than quantitatively. What type of feedback did they receive from the community? How did working with, rather than for, a community change their project? How did including "other voices" change the project planning and/or management? A growing number of archaeologists were becoming committed to community outreach.

Challenges of Archaeological Education and Outreach

Archaeologists are involved in educational outreach in museum education; in CRM projects that present findings to the public through tours, exhibits, and lectures; and in publications written for the public. They are also involved in innovative teaching approaches to outreach such

as (1) community service-learning classes for college-aged students; (2) archaeological summer camps and school programs for high school, middle school, and elementary students; and (3) noncredit adult education programs in archaeological field and laboratory work. All are educational, involve partnerships with professionals in other disciplines, and promote community participation.

Service Learning as Community Outreach

There has been a growing need in the profession for archaeologists to be trained in community service, public outreach, and ethics. With the passage of NAGPRA, archaeologists in the United States are required to address reburial and repatriation issues raised by federally recognized tribal governments. Because of NAGPRA, Native Americans were finally legally recognized as stakeholders in the protection and preservation of their sacred sites. High-profile projects such as the African American Burial Ground in New York City highlighted the benefits and challenges of collaborating with descendant communities (LaRoche & Blakey 1997). In addition, throughout the world indigenous communities have been raising the question of "whose culture is it?" Because of the numerous changes in the way archaeology is conducted, the Society for American Archaeology in their book, *Teaching Archaeology in the Twenty-First Century*, challenged archaeologists to rethink their approach to the teaching of archaeology and suggested the need to reform curriculum. Community service learning is one of the reforms in archaeological education.

Service learning is a North American higher education reform movement that combines community service with academic courses. It is fairly new to archaeology, but service learning as an educational pedagogy had its roots in social activism in America in the 1960s. In addition, the Civil Rights movement of the 1960s also motivated students toward community action and civic engagement. In the 1970s the students were involved in internship programs to help communities. By the 1980s a shift had taken place and college community service moved to a model where the work was connected to academic courses. In service-learning courses, students provide research, physical labor, educational and recreational leadership, and/or other activities that meet needs defined by the community in cooperation with a faculty member, and the work is within the context of a course, not as an internship or an independent study course. Students benefit from partnering with community members in research and practice because it provides new insights and perspectives to a project and the project becomes interdisciplinary. In addition, by working with community members students may be exposed to people from different ethnic, cultural, religious, and/or socioeconomic backgrounds.

Service-learning courses are offered in diverse departments, such as sociology, government, planning, and landscape architecture. For many years service learning was not a part of archaeology courses. However, over the last two decades, a momentum for combining the two has been established (Nassaney & Levine 2009). Community service-learning courses in archaeology address ethics, outreach, and community partnerships. Service learning teaches our students to become critical thinkers and encourages them to link theory with practice. Students in service-learning courses still learn traditional archaeological methods and theories, but they also learn something more because service learning provides an effective educational means to promote the values of public archaeology and civic engagement to the next generation.

Because of the involvement of numerous disciplines in the field of service learning, there has evolved diverse pedagogies and theories. Archaeologists can choose from a wide range of approaches. There is no one "right" methodology, and in the United States, archaeologists have employed diverse approaches to such courses. The following is a brief summary of some of the pedagogical, ideological, and pragmatic approaches to service learning.

Service learning can be the focus of an entire course or a component of a course. Incorporating service learning into a field school is one method used by archaeologists (Fig. 1). Some large

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Fig. 1 Undergraduate student Brant Venables discusses his part of the excavation with community members who are visiting the archaeological site on "open house" days in Robert H. Treman State Park, Ithaca, New York (Photo: Sherene Baugher)

multiyear fieldwork-based community projects also have service-learning components linked to other classes, such as museum classes, or even in introductory level classes. Some faculty members choose to have service learning as a component of a course either as a required component for all students or as an option (see articles in Nassaney & Levine 2009).

The successful community partnerships are often those that evolve over years. Even in a collaborative one-semester project, the students, faculty member, and community members may realize at the end of the semester what they could and perhaps should have done, yet they lack the time to implement those changes. In a one-semester project, the community may perceive themselves as a laboratory for students rather than participants in a collaborative effort, and the trust of the community needs to be built up over time. With a multiyear project, there is time to develop a deeper understanding of the community and its history, time for the academic-community partnership to reevaluate the original research questions, add new questions, revise the goals and the anticipated end products, and in the end accomplish a more detailed, mutually satisfying, community-based project (Baugher 2009).

With a close partnership, both community members and university teams can gain a greater understanding of each other. For example, for many decades there has been a tense relationship between Native Americans and archaeologists and slowly there have been efforts to build bridges. In this context, community-based projects and service-learning courses are one of the ways to create greater communication.

Participatory action research and creating a research partnership with non-archaeologists may in fact be the biggest barrier to some archaeologists becoming involved in service learning. After all, the discipline of archaeology has evolved so that it is essentially a hierarchical system with the director of the project deciding the research agenda with a clear separation between archaeologists and the people they are studying. However, archaeologists do not totally discard their own research questions when community members become involved in a project. When archaeologists become involved in a community dialogue, they find that community members may suggest research questions that were not the initial priority of the archaeologist but turn out to be important avenues of research (Baugher 2009). Community members can become involved in their own community history, assist in the research, and may come forward with information from family collections that provide unique additions to the research. Service-learning projects have generated

research valued by both the archaeologists and the community.

The major educational benefits are the way community service learning impacts the students. The students learn to communicate with people from diverse cultural and economic backgrounds. The students learn that trust takes line and that you have to "earn" respect. They learn how to become better "listeners" and how to engage in meaningful dialogue. Students may be faced with ethical issues. For example, some students are faced with the realization that as academics, they do not have the "right to know" everything about another culture. They may discover that while they may want to research a topic, such as a religious rite, the community may not want to discuss their religious practices with the student. With students working with Native American communities, the protection and preservation of burial grounds may become a very real issue, not an abstract scientific topic. Students who may have unconditionally supported the scientific excavation of cemeteries may come to support Native Americans right to protect their ancestors' remains. As result of their service-learning experience, students may become more socially conscious, more aware of ethical behavior in the field, and better collaborators.

Archaeological Programs for Children

Archaeologists in the United States and Canada have partnered with educators to create innovative programs for high school and elementary school-aged children. North American archaeologists have created training programs that educate and inspire youth, involve community partnerships, develop an appreciation for cultural diversity, teach work ethics, and perhaps create the next generation of preservationists. But this was not always the case. Traditional archaeological work with youth has involved only college-aged students. With processual archaeology and the emphasis on scientific fieldwork, the use of noncollege-aged youth was regarded by some archaeologists as weakening a project and introducing a greater potential for errors in fieldwork. Other archaeologists felt that work with teenagers and children was a waste of time and provides no benefit to the profession. In the 1970s, Stuart Struever, then a professor at Northwestern University in Chicago, was an early pioneer in archaeological training for high school and middle school children. The Center for American Archaeology in Kampsville, Illinois, was connected to Northwestern University, which has a long tradition of encouraging students to learn outside the classroom and to become involved in community outreach work. The research and training ground for archaeology students from middle school to graduate students took place at the Koster site, a large multicomponent site with 13 horizons from 7,500 BCE to CE 1,200 (Struever & Holton 1979: 207–221). The Koster site was located near Kampsville, Illinois. Struever's highly structured summer programs provided student training in the various components of field and lab work. Students were able to undertake laboratory work in ethnobotany, faunal analysis, palynology, lithics, and ceramics (Struever & Holton 1979: 81–136). An interdisciplinary team of professionals including educators designed programs that were age appropriate. This program brought the scientific rigor of what Louis Binford called the "New Archaeology" to the Koster excavation. In addition, Struever demonstrated that middle school and high school students could be trained in interdisciplinary, scientific archaeology. This program inspired other archaeologists to experiment with archaeology programs for school-aged children.

In the 1980s other programs focused on involving students in half-day or full-day programs including some one-week summer field programs. Examples of these early programs are the Archaeological Resource Center (A.R.C.) of Toronto funded by the Toronto Board of Education and Center for Archaeology in the Baltimore County Public Schools in Maryland (see Smartz in Jameson 1997 and Jeppson & Brauer in Jameson & Baugher 2007). Students participated in excavations, which could involve work on a mock dig, excavation through backfill, or excavation through the mid-to-late twentieth-century levels of a site. By the twenty-first century, many of the one-day youth training programs shifted

Communicating Archaeology: Education, Ethics, and Community Outreach in North America, Fig. 2 Excavating the base of a tea cup during the 2012 Adventures in Archaeology summer camp program at the Spadina Museum, Toronto (Photo credit: Ontario Heritage Trust)

emphasis away from fieldwork and now include laboratory and library work, experiential work such as flint knapping and making pottery, classroom lecture/discussions, and visiting sites (see articles in Jameson 1997 and Jameson & Baugher 2007). Fieldwork opportunities are often limited to highly supervised excavations, usually as one-week summer programs such as those run by Ontario Heritage Trust, a provincial agency in Ontario (see Doroszenko in Jameson & Baugher 2007) (Fig. 2). To ensure success, archaeologists partnered with educators to insure that the program was age appropriate and that the archaeological material fits into the education curriculum. While archaeology rarely appears in state or provincial educational requirements, archaeologists have partnered with educators to bring archaeology into the classroom. The Society for American Archaeology, the Canadian Archaeological Association, and the American Institute of Archaeology all have information on their Web sites on how to incorporate archaeology into lessons for the elementary school classroom. Short paperback books written specifically for middle school or high school students bring archaeological discoveries to a younger audience. In North American public schools, archaeology can fit into both the social studies curriculum and in science education with its inquiry-based instruction. Again, the successful programs work because archaeologists design the programs in collaboration with teachers. Programs are age appropriate and also meet government-mandated science and social studies curriculum requirements, such as the programs run by the Suffolk County Archaeological Association (SCAA) in Long Island, New York (see Stone in Jameson & Baugher 2007). Some programs increased the collaboration by incorporating teachers from art, communication, industrial arts, and social studies and exposed students from a variety of programs to archaeology, preservation, and local history. The successful programs taught concepts of stewardship and ethical behavior in the field and demonstrated the roles the students could play in protecting and interpreting community history (see articles in Jameson & Baugher 2007). Students from these programs remember that archaeology is exciting because a program for children can be both educational and enjoyable.

Excavation and Laboratory Programs for Adults

Teaching also involves innovative educational (non-course credit) programs for adults and may involve adults in field and laboratory work. These programs teach not only field and lab methods but also ethical practices. In the 1970s, some archaeologists were opposed to adult training programs because they feared that adults armed with a better understanding of archaeology would become looters. However, archaeologists directing adult training programs have found the opposite to be true – adult participants become grass roots preservationists *not* looters

(Cressey et al. in Derry & Mallory 2003; Versaggi in Jameson & Baugher 2007). In the 1970s, Stuart Struever with the Center for American Archaeology offered archaeology summer field and laboratory programs for adults. The Center for American Archaeology still offers noncredit adult archaeology programs (http://www.caa-archeology.org). In 1977, archaeologist Pamela Cressey, through the City Archaeology Program in Alexandria, Virginia, established a program to train adults in field and lab methods and incorporate the trained public in her urban excavations (see Cressey & Anderson 2006). The Alexandria Archaeology Program not only trains adults in archaeology but the archaeologists learn from these community members. The community members are from many different professional, economic, and ethnic backgrounds, and this interdisciplinary community team works in partnership with the archaeologists on excavations, exhibits, and the preservation of Alexandria's heritage (see Cressey et al. in Derry & Malloy 2003).

In 1996, the Public Archaeology Facility (PAF), a research center at Binghamton University (State University of New York), established the Community Archaeology Program (CAP). In the four-day CAP training program for adults, the participants include local teachers as well as interested community members. Some of the graduates of the CAP program return to volunteer on other PAF projects. The archaeologists have found that some CAP participants have become active preservationists who have lobbied to protect and preserve local sites (see Versaggi in Jameson & Baugher 2007).

More archaeological adult education training programs appear each year as archaeologists realize that an informed public will be the best partners for the preservation of heritage sites. Some state and provincial archaeological societies are engaging and training avocational archaeologists to work in partnership with professional archaeologists in both excavation projects and preservation efforts. Some nonprofit private organizations in both Canada and the United States provide field and lab training for adults, and some of the adults end up providing much needed volunteer labor on community excavations. Some examples of these collaborative projects are the Jamestown Rediscovery Project in Virginia; the Kingston Archaeology Program run by the Cataraqui Archaeological Research Foundation in Kingston, Ontario; and the program run by the cooperative nonprofit organization Artefactuel, in Quebec City, Quebec. Archaeologists have found that by involving community members in their own heritage, you help create grass roots preservationists. In addition, community members can bring to the project their knowledge of the community and contribute to the recording of local oral history.

Conclusions

The key component to a successful outreach project is working in partnership with a local community, and the ideal is to learn from community partners. For the students of all ages, community collaboration can promote cross-cultural learning where students are exposed to people of different socioeconomic and cultural backgrounds. Ethical issues are raised and discussed. Community partners can bring different perspectives to social and ethical issues such as repatriation and who controls the interpretation of a community's history. In working in collaboration with community partners, archaeologists combine their expectations, background, and professional skills with the skills and knowledge of their community collaborators to create a successful project. Successful outreach results whenever all parties are willing to learn from one another, where there is respect and dialogue, where ethics and ethical behavior is part of the project, and where there is a sharing of responsibility and shared control of the project – in other words, where there is an equal, ethical partnership.

Cross-References

- ▶ Canada: Cultural Heritage Management Education
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology

▶ Cultural Heritage and Communities
▶ Cultural Heritage and the Public
▶ Ethics in Archaeology
▶ Heritage and Higher Education
▶ Heritage Values and Education
▶ Public Education and Archaeology: Disciplining Through Education
▶ Service Learning and Public Archaeology

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Community and Archaeology

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Introduction

To have something in common and to share elements such as language, beliefs, social status, skin color, academic interests, geographic origin, and ethnic origin are elements that give us support for the formation of communities. For example, Anderson (1991) has theorized the formation of national communities as imagined communities; a concept that was later applied to small-scale communities. Archaeology has played an important role within the formation of imaginary communities (Kohl & Fawcett 1995; Meskell 1998; Gnecco & Piazzini 2003). The elements or features that define membership of a community are not properties intrinsic to the persons involved, but rather conditions produced according to certain sociohistorical contexts in which categories have been formed, defined in terms of identity and difference.

At present, the community is heard discussed within various diverse sectors: government, non-government, social movements, the business sector, academia, and so on. Community has become a necessity, while we currently lack a clear sense of where it belongs. For this reason it is promoted in all quarters. This uncritical promotion can easily turn into regulation and as such into a certain negation of autonomy and freedom. The last two decades of the twentieth century and the first of the twenty-first century have seen

a renewed interest in the subject of community, particularly in the humanities and social sciences. Two crucial aspects can be found in the proliferation of studies centered on this notion. The first concerns the sociopolitical transformations occurring in the world during the latter half of the twentieth century; and the second, related to the first, refers to the end of the great meta-narratives in the study of knowledge (Kyotard 1995). Derived from these two aspects, processes at the global level can be found which reclaim a sense of community that takes into account particular sociohistorical situations.

Definition

What is a community? The simplest way to answer this question is to say it is the whole collection of individuals that possess something in common. Turner (1974) characterized the *communitas* as a bond with an intense sense of belonging and intimacy given in a group of persons that might share a situation of liminality (transition), exclusion, or inferiority. In this way of thinking, the community is categorized as expressivist, according to González de Requena (2010); in the end community is that which "assumes that our individualization and the complete encounter with others, passes through exploring and articulating an interior impulse which links us deeply with our own nature and with others" (González de Requena 2010: 66).

This conception has a framework of expression in modern times, specifically in European Romanticism, which consecrated the human community as a suprapersonal force and an inner-worldly demiurge, which contributed a source of historical legitimacy and meaning, establishing itself in a secular reality that supplanted the transcendental God (González de Requena 2010: 68). The sense of community came, then, from an interior nature, something organic installed in our being. Owing to this, sociology, for example, at the end of the nineteenth century and for the better part of the twentieth century, regarded community as something distinct from society, even in opposition.

Another way of conceiving of community as different from an essential property was developed by philosophers such as Jean-Luc Nancy (2007) and Roberto Esposito (2003). For them, community is not something given, but something that is in permanent construction. This is a long way from a community essence, of a being in common. That is why community is neither an essence nor a substance and nor is it the economic, technical, or institutional work that is produced.

Rather, community confronts us with the opening up, the sharing, and the dislocation of the communal being, which enables appearance and interpellation between individuals, which are precisely those exposed by suspension of the community, in the spreading out and the exteriority of coexistence (González de Requena 2010: 82-3). The exposition of coexistence is not a natural tie, as one might think; rather it is an engagement which puts us one facing another, before whom we are indebted.

It is in this sense that Esposito (2003) reworks the conception of the *communitas*; for him, the community is oriented towards an obligation, a debt that commits us one with another in a way that puts us in the position of becoming something among others.

Key Issues and Current Debates

For decades now the agenda of archaeology has included themes that in years gone by were unacceptable in disciplinary discussion (e.g., Shanks & Tilley 1992; Ayala et al. 2003; Fforde et al. 2004; Curtoni 2007; Battle-Baptiste 2011). Participation of local communities in archaeology is due to a politicization of the disciplinary field and reconfiguration of the social space at the end of the twentieth century. In the field of archaeology, such a reconfiguration opened the doors to an archaeological practice and a version of the past that was more inclusive.

In this context, the debate about community has become a practice that can act as a counter-hegemonic strategy or as a spearhead for state and/or capitalist policies. Thus, both archaeology

and specific communities around the world have become involved in projects that attempt to expand the field of political and democratic representation and participation.

It is important to emphasize that work in the topic of archaeology and community is usually orientated towards citizen participation, the strengthening of democracies in different countries, and the self-determination of peoples. These are fit for a society that is more equitable and egalitarian, aligned with a practice that is critical, counter-hegemonic, and decolonizing. This situation has been expressed in a more important way in the cases in which archaeology works in territories of indigenous communities.

Archaeology in connection with local communities is aligned with proposals concerned with a decolonization of the discipline (Smith & Wobst 2005; Bruchac et al. 2010), a project that has involved important questioning at the roots of archaeological thought, in both its theoretical and methodological aspects (Smith 1999; Haber 2011). Likewise, it has generated transformations in how it perceives its connection to the archaeology.

Some interesting examples include developments in regions such as South America. Here, it has become increasingly explicit that archaeology, and the archaeologists, should transform with regard to a coexistence with the world, understanding that they form part of an extended community that interacts not only with its human equals but also with the nonhuman world (e.g., spirits, gods, and nature).

This fact implies an epistemological shift, at once political, that begins by modifying its condition of exteriority in the social ambit. We are no longer dealing with an *about*, but rather dealing with *from* (Haber 2010), not *about* a community but *from* a community.

Future Directions

Complaints about ownership of the denominated archaeological register stirred up a wide debate that has required archaeology to transform its practice and, what is more important, has on occasion led to a transformation of its epistemological premises.

It is within this context that we begin to see in the history of the discipline such a field as archaeology engaging with community. Following Marshall (2002: 211), it could be said that archaeology in the community has always been with us. However, it is really since the 80s that a constantly growing number of studies can be tracked, which touch upon the topic of community archaeology or archaeology and community to varying degrees. Some countries where important processes in this topic can be followed are United States, Australia, New Zealand, Argentina, Chile, and Colombia.

Some authors have already indicated the importance of communal or community archaeology; nonetheless, in the main, their implications are directed to the ambit of discipline, which plays down the importance of the fact that the articulation of communities with archaeology has overtones that are more political than academic or belonging to discipline. For example, Marshall (2002: 218) in the introduction to a volume dedicated to archaeology and community indicates the following:

> . . .community archaeology represents an opportunity. We need it, not because it is politically correct, but because it enriches our discipline. Community archaeology encourages us to ask questions of the past we would not otherwise consider, to see archaeological remains in new light and to think in new ways about how the past informs the present.

However, we do not just deal with new ways to interpret the past and to enrich the discipline, for all that these are very important; we also deal with critique that is proposed from the very foundations of the subordinated groups. In this way, the central theme is laid out with regard to the geopolitical conditions for producing knowledge and the organization of society. Thus, the connection between archaeology and community will be, in the future, something of a space for imagining possible and real forms of encounter with others and for living together.

Cross-References

- ▶ Archaeology and Politics
- ▶ Cultural Heritage and Communities
- ▶ Indigenous Archaeologies
- ▶ "Public" and Archaeology

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Community Archaeology

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Introduction

This entry will provide an overview of "community archaeology" as it is practiced at the date of this writing (2012). Before narrowing the discussion to that topic, however, it is necessary to situate it within a somewhat broader frame – that of "public archaeology." The terms do not mean the same thing, even though they are often conflated. Even though the term "public archaeology" is

discussed elsewhere in this volume, it needs to be touched on here in order to situate this entry. The position here is that public archaeology is a larger area of archaeological practice within which "community archaeology" operates (a particular variant of community archaeology that has emerged in the United Kingdom will be explored later in this entry).

In general terms, public archaeology can be seen as *any* endeavor in which archaeologists interact with the public *and* any research (theoretical or practical) that examines or analyses the public dimensions of doing archaeology. Therefore public archaeologists work in a variety of fields, including (but not limited to) heritage management, museums, education, curriculum development, the academy, journalism, tourism, commercial contract archaeology, and new technologies. Through both research and practice, they attempt to understand the political, social, and economic contexts in which archaeology is undertaken; the attitudes of disempowered and indigenous peoples toward archaeology; the educational and public roles of the discipline; the public perceptions of archaeology; how pasts are created and used; and the conflicts between academic and popular views of the past. In short, public archaeology is where information about the past, gathered by and sometimes for people in the present, is used by contemporary people for contemporary agendas and needs.

Definition

Community archaeology is, therefore, public archaeology situated in specific communities, populated by contemporary people within these communities. These communities are usually organized around a variety of overlapping and often fluid interests – family, descendant, ethnic, geographic, intellectual, political, cultural, and more. Therefore, community archaeologists attempt to understand these community interests and to incorporate them into their archaeological work in various ways. Not all public archaeologists are community archaeologists, but all community archaeologists do public archaeology.

Historical Background

The historical background of community archaeology emerged from the larger field of public archaeology so, again, needs to be described in that context. Within Americanist anthropological archaeology, the term "public archaeology" was, until the early 1990s, usually defined as the commercial field of Cultural Resource Management (CRM), although it also included governmental programs such as the Federal Archaeology Program. This definition originally sprang from the reality that CRM archaeological projects were (and are) funded by the public purse and/or mandated by public legislation. Therefore, public archaeology work during this period included archaeology practiced on public lands (such as national parks) as well as archaeology conducted on native (tribal) lands.

It is important to note that during the beginning days of CRM, despite the widespread use of the term "public archaeology," there was little "public" input into in the archaeological work *itself* (McGimsey 1972). Part of the reason why (obviously this discussion glosses things a great deal) was that archaeological practice was dominated by those who advocated scientific methods as the best, if not only, way to do archaeology. Much has been written about this, but the main point is that this view did not allow much in the way of indigenous (or descendant or community) input as archaeological sites were being interpreted. During this period, most work with publics, when it did happen, was overtly educational (e.g., Smardz 2000). In addition, its primary aim was to convince the non-archaeological public that saving archaeological sites was important – that is, it was aimed at "stewardship." It was not aimed at involving the public in making decisions about archaeological sites or at including stakeholder communities in the ways archaeological sites were scientifically (or publicly) interpreted.

Changes in this view, with respect to community/stakeholder input into archaeological research, began to be explored by many archaeologists in the 1980s/early 1990s (see "Further Reading" for several examples). The most

momentous early benchmark for discipline-wide change (in the United States) came in 1990, with the passage of NAGPRA (the Native American Graves Protection and Repatriation Act). This law gave indigenous Americans some measure of control over archaeological remains on tribal lands. The law was limited in many ways, but the key point here is that during this period the meaning of the word "public" in "public archaeology" began to shift and began to include living *publics* – and therefore living communities. Archaeologists working on native lands were, from that point, forced to take the opinions of descendant communities into account – and their methods and interpretations began, slowly, to reflect this. One major feature (some would say shortcoming) of NAGRA was the definition of "descendants" as documented, lineal descendants, and this limitation continues to create challenges for Indian groups which are unrecognized as such by the federal government (for one example, see Handsman & Richmond 1995). In addition, NAGPRA did not (and does not) apply to other descendant community contexts – such as historical archaeology on sites occupied by non-Indian, but also disempowered, cultural groups.

Even so, NAGPRA did drive important discipline-wide cultural changes, and the next major milestone in US public, and community, archaeology emerged within historical archaeology. This occurred in 1991 when, during a CRM archaeology project being conducted prior to the construction of a new federal office building in New York City, workers discovered the bones of more than 400 free and enslaved Africans and African Americans. The public uproar over these remains, and the public debate about how to excavate and interpret them, continued into the next decade and established new understandings of the words "descendant" and "community" within archaeology. Despite the lack of legislative mandate, the *cultural* descendants of those buried at what came to be called the African Burial Ground were successful in gaining control over how their ancestors' remains were excavated and interpreted (LaRoche & Blakey 1997). African American *communities* in New York City thus began key changes in historical archaeology, just as Indian groups had done the same thing in prehistoric archaeology.

There is still no NAGPRA for non-Indian lands, but the ethos that drove NAGPRA, and emerged from it, is now commonplace in many archaeology projects across the United States. There is, however, a major exception to this rather broad statement: most archaeology (about 80 %) is still done in a CRM context (Neumann & Sanford 2001), which is driven by commercial agendas and motivations. It remains to be seen how, or if, meaningful community input (and by that I mean what might be called grassroots input, not corporate input) into CRM archaeology can ever happen.

In any event, as this has been happening in the USA, similar shifts have been occurring elsewhere, and a variety of postcolonial and global justice movements have played important roles in how archaeology, and community archaeology, is framed today. A major milestone in the global arena was the 1986 founding of the World Archaeology Congress, in part as a response to apartheid. Over the last two decades, there have been key developments within governmental, nongovernmental, and scholarly arenas, all of which have been part of an ongoing global process of reimagining how archaeological work can, and should, intersect with community interests and needs.

Key Issues/Current Debates

A separate focus on communities as a *particular* arena for public archaeology began to emerge in the early 2000s, and these efforts slowly began to be referred to as "community archaeology" (Marshall 2002; Derry & Malloy 2003). Some archaeologists, also doing work with and for communities, did not frame their community-engaged work as "community archaeology" per se, but in a variety of other ways. One of the more recent frameworks would be "archaeological ethnography" (see Castaneda & Matthews 2008 and Mortensen & Hollowell 2009). Other frameworks include applied anthropology, heritage, activist or civically engaged archaeology, and

participatory action research (see "Further Reading" for references). Finally, some of this work has been framed as simply "public archaeology" (Skeates et al. 2011) although some of this was also seen as specifically political in nature (McDavid & Babson 1997). Many of the same writers appear in books which were organized under all of these different approaches, and there is a great deal of overlap and conflation of indentifying terms.

The following are some features that have emerged in many community archaeology projects over the last decade:

- It acknowledges the community as a unit of identity that exists – whether or not "outsiders" (like archaeologists) indentify or recognize it.
- It also acknowledges that sometimes communities are constructed *by* archaeology projects – new alliances are forged, which, over time, can extend well past the boundaries of one archaeology project to address larger issues, such as social justice and housing equity.
- It recognizes that the idea of "community" is flexible and fluid and that each community person (and each archaeologist) is likely to claim many different community identities at the same time. That is, multivocality exists, and people tend to move between different communities and affiliations as their own needs and agendas dictate.
- It builds on community strengths and resources to gather, interpret, and publicly present different kinds of knowledge and to enhance archaeological knowledge. Therefore it often relies on interviews, maps, oral histories, ethnographic information, and photographic and video archives in order to integrate these resources into formal research designs.
- There is a strong focus on communication, collaboration, and equitable partnership. Ideally, all collaborators should be involved in, and empowered in, all phases of the research. Even when this ideal is not feasible, the goal is always foremost.
- It is sensitive to (and, importantly, informed about) any social inequalities that may exist in any given community context.
- It fosters co-learning and capacity building among all partners, including the development of employment and training opportunities whenever possible.
- It attempts to provide mutual benefit for all partners, whether that benefit be intellectual, political, or monetary (such as merchandising).
- It is focused more on the relevance of the research to *local* community issues than to larger academic research questions, although these goals are not mutually exclusive. Ideally all partners respect and recognize the right of other partners to achieve personal goals as well as group goals within the context of any given project.
- It distributes research results to all partners and involves all partners in their wider distribution and public presentation.
- It recognizes that community work involves a long-term commitment by all participants. There is commitment to sustainability even as individual players may change over time.

The above criteria draw on writing by Moser et al. (2002) and Mayan and Allen (2010), as well as the other case studies referenced here. Although this sort of listing can be a helpful jumping-off point when attempting to operationalize community archaeology (how does one *do* it?), it is important to recognize a very important aspect of all community-oriented work: it is *not* "one size fits all." Strategies, goals, and methods that work in one geographical, political, economic, social, or cultural context may not – probably will not –work for another. Therefore, community archaeology projects which *start* with in-depth research about the *individual* community – what one might call "contemporary context" or sometimes "ethnographic" research – are often the most successful.

This is true whether "success" is measured in archaeological or community terms – although it should also be noted that *evaluation* of community archaeology projects (and public archaeology projects in general, for that matter) is an under-explored but potentially important area of research. Thus far, most evaluation efforts have been aimed at developing "do's and

don'ts" rather than examining the principles that underlie the development of any particular community or public project.

International Perspectives

These comments were written from the vantage point of practice in North America, although examples of community archaeology seen in this way have occurred all over the world. In the United Kingdom and Australia, however, the idea of "community archaeology" is slightly different and refers mostly to the practice of archaeology *by* communities. A good example of archaeology in this context would be Faulkner (2000). There is an active online listserv discussion group (http://www.britarch.ac.uk/caf/wikka.php?wakka=DiscussionList), as well as a long-standing journal, *British Archaeology*. Although the projects defined in this way are often (though not always) field-directed by a professional archaeologists, the overall direction and workforce is usually community- and/or amateur-driven. The main thrust is to involve local communities in archaeology and, as noted on the website of the Council for British Archaeology, to promote "the appreciation and care of the historic environment for the benefit of present and future generations" (http://www.britarch.ac.uk/). This echoes and supports the idea of "stewardship" mentioned above, but the work itself tends to be somewhat more "bottom-up" with respect to community involvement in various phases of archaeological research.

This idea is roughly equivalent to the idea of "avocational archaeology" in the United States, in which projects are conducted with large numbers of volunteers who have varying degrees of training. In many cases, avocational archaeologists are extremely skilled, especially with respect to field methods and material culture analysis (such as ceramics and glass). Avocational archaeology projects are very active across the United States, even when they are not necessarily referred to as community archaeology. Texas, for example, has the very active Texas Archeological Stewards Network (TASN, located at http://www.thc.state.tx.us/stewards/stwdefault.shtml) in which trained volunteer stewards find, record, and monitor archaeological sites; give talks to schools and preservation groups; assist professional archaeologists on digs and surveys; and many other activities. Field direction is provided by trained professionals in all cases, even if the labor includes volunteers.

Future Directions

One positive feature of the most recent writing about community archaeology, likely to extend into the future, is that it tends to cross the usual disciplinary lines (arguably more so than earlier writing, which tended to be situated within the typical geographic and temporal discourses such as prehistoric archaeology, classical archaeology, and historical archaeology). In the past, a typical historical archaeologist/community archaeologist, for example, might not be conversant with work done by an Africanist, or an Egyptologist, or a prehistoric archaeologist, simply because they go to different conferences, read different journals, and so on. As this trend has evolved, particular methods and approaches common to community work in general have begun to emerge, as noted above.

Regardless which specific approaches are used in any particular project, many archaeologists are also now questioning earlier taken-for-granted definitions of the word "community" (e.g., Agbe-Davies 2010, and the contributors to Matthews et al. 2011). Whereas a somewhat traditional notion of community (referring to the descendants of a site and/or the locale around it) is still commonplace, not all communities fall into this sort of easy category, and community archaeology research and practice are starting account for this. A related idea has also emerged in the more recent work – the idea of "stakeholders," with stakeholders being loosely defined as any entity (person or group) which *sees itself* as having a stake in any particular site or project.

Seen in this way, stakeholders and communities are not necessarily defined by either professional archaeology or even supporters of it. For example, commercial developers could be said to

have a stake in what they are allowed to build or not build on any given property. In some locales, developer "communities" have caused the destruction of many archaeological sites, even when neighborhood communities have emerged to resist this destruction – with varying success. In the same sense, antiquity dealers have a stake, as do "looters" (bearing in mind that this negative term sometimes includes descendants who regard archaeological remains as a legitimate cash crop which they have the moral right to exploit) (Velzen 1996; Hollowell 2006). In all of these self-defined and other-defined communities, context-specific tropes about power, property ownership, culture, and politics are at play. Therefore, the best community archaeology research (and practice) does not take any definition of community (or stakeholders or descendants) for granted. A critical, reflexive perspective is essential.

There is also a need to critically consider the desired results for community archaeology projects. Are they conducted so that archaeologists can better understand the communities they work with? Or are they meant mainly as a way to share archaeological research? Or are they a way for a community to better understand itself? In practice all of these sorts of understandings are developed, but not all are given priority in archaeological writing. Therefore one goal for future work would be to find better collaborative and open ways to write about the particular types of knowledge that emerge in community work.

Another goal would be to examine the reciprocal and long-term processes of both inclusion and exclusion. What does "inclusion" look like? Does it extend to offering communities the opportunity to review archaeological work? If someone from a community has a seat at the archaeological table, what are that person's responsibilities? By the same token, what are an archaeologist's responsibilities to a community which has, over years sometimes, acquired a stake in the work itself? Or in the archaeologist personally? Even though the last decade has seen a huge growth in community archaeology projects, few archaeologists have explored how this work plays out in the long run. Traditionally, archaeologists have tended to think of their work in terms of individual projects, which normally have a beginning, a middle, and an end. The work begins, community alliances and networks are built, and then what? What happens when a new project beckons?

Obviously the answers to this vary, but the point is that it is difficult for a community-engaged archaeologist to simply move on to the next project because both ethical and personal responsibilities need to be accounted for. These responsibilities are both to the communities involved and to the data itself. With regard to the data, once a project moves past the excavation/research stage, if the archaeologist remains connected to the community, his/her role usually shifts from "researcher" to one which is more concerned with public interpretation (museums, displays, etc.). How involved can or should the archaeologist continue to be? Can becoming less involved at that point allow more space for interpretations of data to change or be cast in ways that the archaeologist did not intend? When these public interpretations include mass media outlets, like television, non-archaeologists will be the ones who are reinterpreting, or reframing archaeological findings to suit other needs. Is this necessarily a bad thing? Some sites are, for good or ill, much more appealing than others to outside interests – whether those interests be Hollywood or a local public radio station. Can or should the archaeologist be concerned with how this plays out over time, for any particular project?

In terms of communities, things become complicated in part because *new* communities are often formed around the archaeological process. Friendships are formed and alliances are built, and often these alliances are aimed at solving community-wide concerns, not simply archaeological ones. This is especially true when archaeologists are working with communities which are disempowered for one reason or another – for example, when neighborhoods are fighting gentrification or when a community is endangered through a construction project of some sort. Even just considering "project-related" concerns, often there are fundraising and administrative duties

which the archaeologist is used to expediting, which a community sometimes finds difficult to take on after the archaeologist leaves. Often funding cannot be obtained to keep the post-excavation work going – the outreach, the oral history interviews, the kids' programs, the museum displays, etc. During research phases of the work, often this work is done by the archaeologist who is trying to generate interest and get local input and publicity (and gather data). Local community groups usually have few resources to fund this sort of activity as paid work, and if/when the archaeologist leaves, it is all too easy for the work itself to falter.

It is true, of course, that these concerns are sometimes more important to archaeologists than to communities themselves – like everything else, each context and situation are different. A useful framework to consider these issues, and how they play out on the ground, comes from the "participatory action research" literature (Stoecker 1999). The idea is that archaeologists take on different roles, which vary according to the project, the individual archaeologist, and the community being engaged with. One such role is that of the "initiator." When acting as "initiators," the archaeologist comes up with a research or project idea and invites the community to participate – and keeps the process going, as described above. Another potential role would be the "consultant," in which the community commissions the research and the academic is accountable to it. In some scenarios – perhaps the "ideal" ones – the archaeologist is positioned as a "collaborator." Here the *community* would be driving the research, including partnering to formulate research questions, analyzing results, *and* keeping the process moving.

Chip Colwell-Chanthaphonh and T. J. Ferguson described these processes slightly differently in their discussion of a "collaborative continuum" (Colwell-Chanthaphonh & Ferguson 2008a). The idea here is that all collaborative and community projects fall at one point or another on a continuum and a project's location on it can shift over time or as different players become involved. The questions that emerge in all of these scenarios could be:

- Do some public/community/collaborative efforts simply have a life cycle?
- To what extent should "capacity building" be a part of what archaeologists *do* – for some sorts of projects? If so, what would this look like – training, workshops, or something else?
- How do (or should) archaeologists devise ethical exit strategies from projects which have reached either a natural or unnatural end, or in which archaeological input work is no longer needed, or even just when the archaeologist reaches a point of wanting (or needing) to become less engaged?
- How do issues about "sustainability" play into the decisions that archaeologists and local communities make? How can projects sustain themselves in the face of contemporary financial challenges and the evolving interests and skillsets of individual professional and local collaborators?

Inclusive community-engaged projects are still not embraced by all archaeologists. Some still prefer to focus on purely academic agendas, and others resist mutually empowered scenarios which allow nonscientific views of the past equal standing. Even when an archaeologist is personally motivated to include community input (or, even, review) as part of her/his practice, there are often constraints which work against this – client restrictions, for example, are commonplace in contract, or commercial, archaeology.

It is also important to remember that archaeologists themselves are embedded in professional communities as well as academic, national, political, epistemological, and ontological communities of practice. The question in these contexts is not *whether* to engage; rather, it is to look at how engagement itself helps to define what archaeology is and what it accomplishes. Community archaeology, seen in this way, is not work that archaeologists choose to do, but is inherent to how archaeology is practiced.

Archaeologists are only beginning to competently understand and ethically engage with collaborating communities and to examine whether this engagement serves interests beyond those of archaeologists and related heritage professions. They are only starting to understand the roles that

community members play in collaborative archaeology projects – that is, who participates and who does not and who is excluded and who is not? How do these performed roles reflect (or not) the roles that collaborators play in their communities *outside* of their relationships with archaeologists? What is the potential for community archaeology to be actively dialogic? Can a deeper and more developed understanding of communities be deployed in the archaeological research performed so that archaeology is not only "in" and "with" communities but "about" them as well? Can archaeological community engagement reveal and address "community-building" issues otherwise obscured by acts of inclusion and exclusion? How, or do, the communities formed through archaeology projects create new knowledge that is relevant to archaeologists and communities alike? Do they add to an informed understanding of the archaeological past?

On a different scale, archaeologists are also starting to contextualize community archaeology within the influential national and global trends already in play. What external and internal forces and goals motivate community members to take an interest in archaeology? Do imagined and actual intersections between archaeology and communities speak to the relationships between community members and other outside interests such as nonprofits/NGOs, interests in education and business, or deeper social and cultural interests of national and global capitalism?

Community archaeology has come of age in the last decade as one important form of public archaeology. At its most basic, community archaeology is the practice of working in and with communities during the archaeological process. Although, in its original forms, this was an educational endeavor, as the subfield developed, communities for archaeology have become far more than passive recipients of archaeological knowledge and expertise. Instead, community archaeology projects are now at the vanguard of creating a multivocal, inclusive knowledge-building process in which archaeology as it is traditionally practiced is just one of many routes to knowing the past.

Cross-References

- ▶ Community and Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Multivocality and Archaeology
- ▶ "Public" and Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Stakeholders and Community Participation

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Community Engagement in Archaeology

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Introduction

For generations, archaeology has been conducted for, and shared among, a small group of scholars,

but now many archaeologists consider "community engagement" to be an important part of their work. Archaeologists may make special efforts to share their interpretations in ways that are more accessible to a wide audience than are scholarly publications or even traditional museum displays and documentary films. Archaeologists may wish to see their research benefit modern groups with ties to the site through, for example, increased heritage tourism to their area or the enhancement of their status by drawing attention to the group's past. Archaeologists may believe that they have an ethical or political obligation to ensure that their research is beneficial to these groups. Archaeologists may even find that encouraging members of these groups to participate in their research increases their understanding of a site or improves their access to important data. Although all of the above are important, community engagement in archaeology extends far beyond these measures.

Community engagement means that archaeologists think about nonprofessionals as potentially active participants in, not simply passive audiences for, their research. It means that community members can influence the goals and outcomes of a project. It means that as a result of their close collaboration, archaeologists might learn things that change the way they approach a particular site or, more significantly, the methods and theories that they use to understand the archaeological record and interpret past human actions. These ideas are not uncontroversial. Many archaeologists are unconvinced that we can continue to consider knowledge production to be "science" once its political or ideological underpinnings are revealed. Such questions have been raised with respect to the "public" or "applied" scholarship produced in one of archaeology's sister disciplines: anthropology (but see Mullins 2011).

This paradigm shift has occurred in multiple disciplines. In archaeology, specifically, postprocessual frameworks have developed research themes that inspire community-oriented work and also fostered the self-reflexivity that must underpin serious community engagement. But changes in media, communication, and travel also create structures which shape this relatively new way of approaching archaeological practice, as do contemporary heritage law and the global political economy. Thus, it seems that community engagement will be a feature of archaeological practice for some time to come.

Definition

Although many archaeologists initially became interested in community engagement through projects that connected them with the descendants of the people who created the sites they studied, researchers have come to realize that there are many types of communities for whom archaeology matters, who ought to be engaged. Certainly descendant communities have a special relationship to the sites and landscapes occupied by their ancestors, and their assertion of an authority on par with, or surpassing that of, archaeologists is increasingly supported by national and international law, as described below. However, other collectivities are considered by archaeologists to be legitimate stakeholders in the archaeological process. For example, people who live in the vicinity of archaeological sites form another kind of significant community – one that hews more closely to the traditional meanings of "community archaeology": the archaeological study of a past community, often defined by the proximity of its members or the scale of the group (larger than a household, smaller than a polity) (Canuto & Yaeger 2000).

The aim of community engagement in archaeology is to go beyond simply sharing the results of one's research with an audience with some claim to a site or social group in the past. Rather, archaeologists seek to produce scholarship that benefits that group, conceiving of them not as an "audience" but as a real constituency, one that has a very real stake in the outcome in an archaeological project. Furthermore, the aim of the archaeologist is to share power and responsibility with that group in the very act of research (see, e.g., Blakey 2010).

A good question to consider, then, is where does "public archaeology" end and "community engagement" begin? One useful distinction is the idea that public archaeology is any archaeological interaction with a public (i.e., non-archaeologists) and any scholarship analyzing these efforts. "Community archaeology" is public archaeology that creates the opportunity for all involved – community members and archaeologists – to reflect upon the ideas and interests that they share. It is furthermore less likely to be oriented toward scholarly interests than other forms of archaeological practice (McDavid 2009: 166). Some commentators emphasize the importance of community control over the archaeological project and in fact stress community engagement's transformative effect on scholarly research (see, e.g., Marshall 2002a; or Green et al. 2003). Indeed, archaeologists are growing increasingly self-reflexive in their discussions about what it means to do archaeology in the real world.

So here, "community engagement" should be taken to mean archaeology that responds to imperatives established by collectivities whose stake in the archaeological record is not professional but rather stems from some other connection. Perhaps the site was occupied by their ancestors, or they live in the site's vicinity, or they identify with the site's inhabitants because of some shared status or identity. Whatever the reason, these people have a social connection with people in the past, people who left material traces that are amenable to archaeological study. As a result, these present-day people are connected with one another. When the connection extends to encompass the archaeological project as well, when the ideas of these community members have a meaningful effect on the research, and when their values and ideas are considered alongside those of the discipline, then we are speaking of community engagement in archaeology.

Historical Background

Milestones in the development of archaeologies of community engagement may be marked by the development of influential research programs. Other important watersheds include publications which are either reports describing these programs or synthetic and analytical treatments of the challenges and rewards of engaged scholarship.

Two early examples of community engagement in archaeology come from the Chesapeake region of the USA, an area with a long tradition of historical archaeology. The first, Alexandria Archaeology http://alexandriava.gov/historic/archaeology/default.aspx?id=39146, grew out of a community initiative to protect archaeological sites threatened by development. In 1975, the city established the Alexandria Archaeology Commission, hiring city archaeologist Pamela Cressey 2 years later. The program's aims include excavating sites, curating and interpreting finds, and especially providing opportunities for volunteer participation in preservation activities. By way of contrast, the second example, Archaeology in Annapolis, has tended to emphasize visitor education, rather than public participation, as central to their strategy for community engagement. Since 1981, tourists have been able to visit ongoing archaeological excavations and discuss life in the city from the eighteenth century to the present, using strategies and themes grounded in the project's Marxist approach to archaeology (see Potter 1994).

Elsewhere in the USA, work began at Little Rapids in the early 1980s as a traditional research project. But several years into the study, principal investigator Janet Spector's strategy shifted. Feminist concerns about bias and exclusion in scientific practice led her to critically reflect on what it would mean to

> include Indian people in the production of archaeological knowledge about their histories and cultures. How will this affect the ways we set our research agendas, organize field projects, treat archaeological materials? How would their inclusion shape the ways we generate, express and present our understandings of the past or the audiences we write for? (Spector 1991: 389).

Similar concerns about the exclusion of indigenous people from the archaeological study of their ancestors – in addition to development

pressures – led the Navajo Nation to establish the Navajo Nation Archaeology Department, wherein the archaeological and ethnographic staff must adhere not only to US laws but also to the laws and policies established by the Navajo Nation. While this mandate upholds the authority of Navajo people over the archaeological sites within their reservation, it does not mean that all of the people performing day-to-day archaeology are necessarily tribal members (Thompson 2009). The authority of the Navajo Nation to compel engagement and control archaeologists' access to materials is buttressed by federal legislation such as the Native American Graves Protection and Repatriation Act (NAGPRA). At the African Burial Ground http://www.africanburialground.gov/ABG_Main.htm in Manhattan, on the other hand, existing laws only mandated mitigation of damage to the archaeological resources, not engagement with any communities. The well-publicized struggle by New Yorkers and concerned African Americans to participate in decisions about the study and disposition of the burials has marked a major watershed in how US federal agencies and archaeologists work with descendant communities (see, e.g., La Roche & Blakey 1997).

At the same time that marginalized communities in the USA were becoming increasingly assertive of their right to the materials that archaeologists study, archaeologists working in economically and politically marginalized nations were teaming up with local communities in efforts that some labeled "applied archaeology" (Erickson 1998) and others, "action archaeology." The latter term is used by Mayanist Jeremy A. Sabloff to indicate "*involvement or engagement with the problems facing the modern world through archaeology*. In other words, by 'action archaeology,' I mean archaeologists working *for* living communities, not just *in* or near them" (Sabloff 2008: 17, emphasis in the original). Over the years, examples have included identifying ancient land-use techniques that promote higher crop yields than prevailing agricultural practices (Erickson 1998), creatively engaging host communities in site protection, promoting development http://www.savethemoche.org/ or educational http://www.machiproject.org/en/index.php projects in host communities, and incorporating local perspectives into research agendas (see, e.g., Atalay 2007).

The Community Archaeology Project at Quseir has had an extraordinary influence on how archaeologists approach community engagement. Most significantly, the scholars responsible for that project put forth a general methodology for engaged archaeology rather than a set of instructions or a how-to program (Moser et al. 2002).

The archaeological programs described above, and many others, are represented in, and paralleled by, a series of key publications. Notable contributions include collections of essays about engagement between archaeologists and indigenous communities and between archaeologists and members of the African diaspora. The issue of *World Archaeology* edited by Yvonne Marshall continues to have a major impact, not least because of its broad global scope. A recent collection compiled by Barbara J. Little and Paul A. Shackel emphasizes the role of archaeology in enhancing civil society, specifically (see McDavid & Babson 1997; Swidler et al. 1997; Marshall 2002b; Shackel & Chambers 2004; Little & Shackel 2007; Colwell-Chanthaphonh & Ferguson 2008; Bruchac et al. 2010).

Key Issues/Current Debates

Ever since archaeologists have discussed explicitly what it means to engage with communities, there have been disagreements about whether and to what end this engagement ought to take place. Parker Potter took early practitioners of "plantation archaeology" (now treated as a subset of African American or African diaspora archaeology) to task for failing to come to terms with the needs and desires of a broad-based descendant community of African Americans and for, in some cases, producing scholarship inimical to those same needs and desires. Responses to this critique included the retort that archaeologists should question their relevance not only to

descendant audiences but also to scholars in other subfields who found archaeological studies of plantations to be arcane and irrelevant. Another dissenter rejected the idea that practitioners open the research process up to non-archaeologists or "that valid research questions and interpretations can be developed out of the contemporary agendas of groups on either side of the power line" (see Potter 1991; Farnsworth 1993; McKee 1994: 5).

While it might seem that a decision on the part of archaeologists to further engage with communities would be beneficial, or at worst, harmless, concerns have been raised, many of them centering on the idea of *which* communities merit engagement and on what terms. In a recent essay concerning the usefulness of archaeology, Shannon Lee Dawdy considered whether public archaeology and its related forms might be a stalking horse for a range of nationalist agendas. She sees this as a special danger in settings without a long history of (and therefore wariness about) nationalist archaeologies, or in settings in which archaeology is meant to be of use to a subaltern community. Though engagement is often meant to benefit the marginalized, archaeology can also serve powerful statist and extragovernmental interests, and Dawdy's essay asks that archaeologists critically reflect upon the distinction. Archaeologists from a variety of employment sectors and across the globe responded to this analysis by refining the distinction between "public" archaeology and "community" archaeology (as described in "Definition," above) and providing concrete examples in which archaeological practice benefited constituencies besides archaeologists or the structures (institutional, economic, and political) that underpin archaeology's existence (see Dawdy 2009).

Many of the practical advances archaeologists have made in engaging with communities have been in the exploitation of new media environments. Just as newspapers and novels, the new media of the early modern period, were instrumental in creating alternatives to a purely local "community," the new media of the new millennium have allowed archaeologists to connect with others in fruitful ways. Archaeologists easily grasped the potential for the Internet to multiply the number of individuals who could "experience" a site or to communicate interpretations to colleagues and other interested parties. However, some have realized the ways in which the Internet can be used to facilitate collaboration and dialogues – to support the process of engagement. An early pioneer in this effort is Carol McDavid, whose work at the Levi Jordan Plantation was both a product of and an engine driving the project website http://www.webarchaeology.com. Such endeavors have only grown with the introduction of Web 2.0 technologies and the ascendance of electronic social media.

Archaeological associations and university departments have begun to explore how best to incorporate community engagement into archaeological education generally and especially how to expose future archaeologists to ideas about community engagement. An educational movement that has gained considerable following in universities in the USA is "service learning" in which students' intellectual and civic education is enhanced by opportunities to apply the principles of a particular discipline. As Michael Nassaney observes, this form of pedagogical practice is ideally suited to a hands-on, experiential endeavor such as archaeology (Nassaney 2009).

In the Society for American Archaeology's volume *Teaching Archaeology in the Twenty-first Century*, community engagement is presented as one of several areas that need additional attention, as educators consider the skills needed by emerging practitioners. The toolkit for archaeologists who effectively engage communities includes respect for different points of view, intensive coursework in ethics, an appreciation for the heterogeneity of communities, and a strong sense of professionalism. These matters are so important because, as the authors of one contribution conclude, "it is hard to deny the proposition that the social context in which archaeological research unfolds influences directly both the quality and efficiency of fieldwork and the validity of the knowledge that it generates" (Watkins et al. 2000: 80–1). The transformative effect of community engagement on

archaeological knowledge is explored further below, under "Future Directions."

International Perspectives

Several observers have noted that the most prolific (English-language) writing about community engagement in archaeology comes from former settler societies – modern states with origins in colonialism and settlement by a foreign power, with continuing power imbalances between descendants of settlers and descendants of the indigenous inhabitants. It seems worthwhile, then, to consider community engagement as it relates to colonialism, postcoloniality, and indigenous archaeology.

Archaeology as a modern enterprise has been intimately linked with colonialism, with archaeologists from the metropole excavating sites located in nations in "the periphery." Like anthropology and many other scientific enterprises, archaeology served, whether deliberately or unintentionally, to provide ideological support for the domination of some nations by others (for a summary, see Lydon & Rizvi 2010). At times, this purpose could be served by the reification of social-evolutionary schema or the treatment of descendant groups as timeless and static, suitable analogues for archaeological data. Or the colonialist stance may even have acted to *dis*engage or alienate contemporary communities from the archaeological sites occupied by their ancestors or other predecessors, as is especially common when the story of an ancient civilization ends in "collapse" or "disappearance." However, the postcolonial critique has begun to influence the practice of archaeology, including archaeologies of community engagement.

Postcolonial archaeologies, like other forms of postcolonial critique, have "a fundamental ethical basis in examining oppression and inequality in the present. . .reconsider[ing] colonialism from the perspective of colonized people and their cultures" (Lydon & Rizvi 2010: 19). To the extent that community-engaged archaeology seeks to work "for" and "with," not "on" and "in," contemporary communities, there are significant parallels between the postcolonial and engagement agendas. While modern states with prior histories of colonial occupation and/or colonialist archaeology have in many cases managed to curtail the wholesale removal and exploitation of their archaeological patrimony by foreign researchers, new structures have not necessarily meant *local* community control or oversight. And indeed, much of the population may be as alienated as ever from the process of archaeology and the resulting discoveries (see examples described in Eze-Uzomaka 2000; Moser et al. 2002; Atalay 2007 or Chirikure et al. 2010).

Through sustained and vigorous effort, many indigenous groups the world over have gained authority over the sites occupied by their ancestors. Many of the strategies and concepts that undergird community engagement in archaeology have their roots in indigenous archaeology (Atalay 2007). The promulgation of ethical standards has certainly done much to persuade archaeologists of the legitimacy of indigenous claims to archaeological sites, artifacts, and ancestral remains. The World Archaeological Congress's First Code of Ethics asserts, among other points, "that the indigenous cultural heritage rightfully belongs to the indigenous descendants of that heritage" and urges archaeologists to "establish equitable partnerships and relationships between Members and indigenous peoples whose cultural heritage is being investigated" (World Archaeological Congress 1990). However, such appeals may have been ignored if it were not for laws mandating engagement with indigenous communities. NAGPRA – a US law – has already been mentioned above. In Australia, a federal law, the *Aboriginal and Torres Strait Islander Heritage Protection Amendment Act* (1987), picks up where a variety of state laws, such as the *Heritage Conservation Act* (1991) of the Northern Territory, leave off (see Colley 2002).

Evolving circumstances within settler societies – like the USA and Australia – as well as between former colonizers and former colonies, have compelled many archaeologists from the global North to engage with communities at

home and abroad. Similar efforts are underway among professionals around the world who recognize the importance of connecting with communities formerly alienated from archaeological research. Pamela Eze-Uzomaka notes, for example, that even a strategy as straightforward as using radio, newspapers, or television to inform people about archaeological discoveries and goals has been ineffective in Nigeria. Scholars from elsewhere in Africa suggest that the question is one of bringing community and scholar interests into alignment, as with some programs that have as a primary goal consultation and empowerment but also include poverty alleviation through employment or tourism (see Eze-Uzomaka 2000: 35; Chirikure et al. 2010).

Ajay Pratap observes that there is still an urban and majoritarian bias to history (and by extension, archaeology) in India. He describes tribal exhibits in museums that treat these people as a part of the nation's timeless "natural" history.

> The fact that the past of ethnic minorities, particularly tribes, is usually neglected, even sixty years after independence is not a very pleasing scenario. . .[It] is a serious lacuna in our curriculums that needs to be addressed and rectified. In a context when history writing in India is increasingly being identified as an exercise in postcoloniality, how can we possibly justify the deletion of the pasts of ethnic minorities? (Pratap 2009: 15).

What distinguishes Pratap's perspective from that of his colleagues in the West is that he views this as a problem to be solved using archaeological methods rather than policy.

If one were to characterize the "styles" of community engagement that appear to predominate in a range of international settings, the following patterns seem to emerge (see also Marshall 2002a: 212–4). Within the states that have emerged from the independence movements and revolutions of the twentieth century, "community engagement" is frequently described as necessary in order for archaeology to remain viable in tenuous economic or political environments (e.g., Eze-Uzomaka 2000) or in the face of looting (e.g., Qin 2004: 298). Furthermore, engagement becomes a management concern or a problem of definition – which communities should participate? How does an archaeologist build collaborations with resistant communities (e.g., Chirikure et al. 2010)? In the former colonial centers, "community engagement" often seems to entail community participation not only in establishing goals and research agendas but especially in the actual collection of archaeological data (e.g., Merriman 2004; Smith & Waterton 2009). Meanwhile, within the settler societies, "community engagement" tends to be oriented toward addressing imbalances and ameliorating the social and political hardships of subaltern groups. This tendency is also evident in the projects described by researchers with origins or training in the global North at work in the South (e.g., Green et al. 2003). All of which prompts one to consider to what extent these different international "styles" of community engagement have their roots in the power relationships within and among contemporary societies as well as modern concepts of "self" and "other."

Future Directions

Archaeologists often expect community engagement to bring (positive) change to a community. Sometimes, they expect it to reshape an archaeological project. Recent analyses suggest that community engagement has a transformative effect on the discipline more generally. Certainly, working with stakeholders also has led archaeologists to, for example, take oral history more seriously and consider the significance of nonscientific ways of knowing about the past. Archaeologists must also confront the real-world consequences of their research activities. These are no small matters in and of themselves, but community engagement can reach farther, even, than this.

Changes to archaeological practice may shape methods or techniques, for example, something as prosaic as identifying new kinds of sites or landscapes to examine. In one case, investigators were encouraged to think about their research problems spatially rather than temporally – a major methodological shift that helped them

to better understand how to tackle a complex regional history. The researchers also learned a great deal about local concepts of ethnic-group belonging that were grounded in theories of identity very different from those traditionally used by social scientists (Green et al. 2003). Multiple cases also demonstrate that engaging with communities permits archaeologists to envision an ethics that is situational without being relativist. These examples reinforce Yvonne Marshall's argument that "Community archaeology represents an opportunity. We need it, not because it is politically correct, but because it enriches our discipline." And furthermore, that examples such as those hinted at above should "change the perspective that community archaeology is simply a CRM [Cultural Resource Management] or heritage management issue and of little relevance for academic research" (Marshall 2002a: 218, 215).

One of the factors militating against the closer integration of academic researchers and communities is the structure of the academy itself. For although engaged scholarship can be intellectually complex, theoretically grounded, and rigorously executed, the standards for assessment are less obvious than with the traditional process of publication for peer review. Without metrics in place for evaluating the quality of community engagement projects in archaeology-or any other discipline – and thus the assurance that such work "counts," these endeavors can seem risky to scholars whose careers are not yet established. One reason to hope for change sooner rather than later is that many universities, while uncertain how to handle engaged scholarship on the part of their faculty and staff, aggressively promote its importance for students (though a casual examination suggests that this trend is more pronounced among institutions in the global North).

It may be that the imperative to provide quality training for the next generation of practitioners will have the unintended consequence of encouraging engaged scholarship at the research level. "Recent developments in archaeological practice [including openness to community engagement] have led to the recognition that training archaeology students poses new challenges as the discipline attempts to meet the diverse needs of the twenty-first century" (Nassaney 2009: 4).

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archaeological Stewardship
- ▶ Archaeology and Anthropology
- ▶ Community and Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage and Communities
- ▶ Ethnic Identity and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Historical Archaeology
- ▶ Indigenous Peoples, Working with and for
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Navajo Nation Archaeology Department
- ▶ Postcolonial Archaeologies
- ▶ Post-Processual Archaeology
- ▶ "Public" and Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Society for American Archaeology (SAA)
- ▶ Stakeholders and Community Participation
- ▶ World Archaeological Congress (WAC)

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Community Partnerships in Safeguarding World Cultural Heritage

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Introduction and Historical Background

The Interface Between Conservation and Development

Over the past four decades many, if not most, developing countries have experienced unprecedented economic prosperity brought about by strategies based on capital investment in infrastructure for industry, agro-business, urban renewal, and tourism. These strategies mirror those adopted by developed countries in previous decades. However, like in the developed economies, these strategies have exacted a heavy toll on environmental and cultural resources. The damage to environmental resources has for some time been recognized and is a matter of public concern and debate. More recently it has been recognized that there is also an alarming depletion of the common stock of cultural capital. Adding to the urgency of the situation are the accelerating forces of globalization which promote the homogenization of cultures and the degradation of the socioeconomic relevance of cultural heritage, both tangible and intangible. In spite of our emotional attachment to the past, our heritage resources are fast disappearing at a rate unprecedented in history.

Cultural resources – when they have been considered at all within the development paradigm – have typically, but incorrectly, been seen as permanent and, therefore, inexhaustible. This has been true especially of built culture heritage: archaeological sites, ancient monuments, and historic buildings are regarded as permanent fixtures of our cultural landscapes. Nothing could be further from the truth. Cultural resources, particularly the built cultural heritage, are nonrenewable resources, each a creation of a specific time and place, now past. These resources are under constant threat of degradation, dismemberment, disintegration, and disappearance.

In spite of the public's avowed devotion to our cultures, misuse and abuse culture heritage resources are rampant. This is obvious to anyone who has seen the graffiti, trash, and vandalism at an ancient monument. This is obvious to anyone who has been unable to experience the serenity of a mosque, church, or temple because of the noise pollution and uncontrolled crowds. Yet, when the overexploitation of a culture heritage resource becomes so unbearable it cannot be ignored, the most common response is to transfer responsibility for this situation to the local inhabitants by citing their somehow lax stewardship and to put severe restrictions on their use of the site and its resources. In the most extreme scenario, local populations have been relocated out of protected areas altogether. Historic districts have lost their traditional inhabitants and have been repopulated with more economically profitable tourists. This strategy, however, only hastens the deterioration of the heritage through the loss of traditional custodians and endogenous techniques for sustainable management of the heritage.

It is obvious that urgent, strategic, and comprehensive action is required to protect a community's and the world's culture heritage assets. In the early twenty-first century, we are operating with a new and much expanded understanding of what constitutes our heritage and so there is the need for a marked shift in the way we manage our cultural heritage resources. Culture heritage conservation must be integrated into strategies for sustainable development, taking into account the needs and aspirations of the communities where cultural assets are found.

Only through community stewardship of the heritage can it be ensured that the heritage will be protected everywhere, and that its protection will be sustained over the long term. Sustained, universal stewardship is prerequisite for the survival of cultural heritage.

Key Issues/Current Debates

Community-Based Conservation Requires a Systematic Approach

Sustainable heritage conservation depends upon the commitment and involvement of local communities. Conservation policies, if they are to be successful, need to promote local community stewardship of the heritage as well as provide socioeconomic benefits for local communities. Therefore, a direct link must be made between the safeguarding of the heritage and socioeconomic development.

Heritage conservation must be anchored in the institutions of the local community and local populations must be given a leading role in the development of conservation policy, as well as in the management of culture heritage sites. Unfortunately, because of the decoupling of heritage conservation with development, community action has become the weakest link in the chain of conservation.

Therefore, the development of the capacity of local government, community-based institutions, and nongovernmental institutions to successfully manage their heritage resources for both conservation and development is a global priority.

The basis of such a strategy to empower local communities in heritage conservation is to be found in a series of participatory and catalytic activities that spur local interest groups to assess the nature, characteristics, and economic potential of indigenous resources and then to develop these resources in ways that are both profitable and sustainable. In the process, local communities are empowered to take more active role in the management of their heritage and in the development of culture tourism-related industries that can alleviate poverty, finance the conservation of local heritage on which tourism is based, and enhance living conditions:

- The first objective of such a strategy is to empower individuals in and local communities as a whole to understand and advocate the long-term conservation of the heritage in their communities. For this purpose, traditional community leaders are mobilized and traditional consensus-building mechanisms are used within the community to arrive at a shared vision and a common goal.
- The second objective of empowerment is to enable the local communities to play a leading role in actual hands-on conservation and preservation work, such as monitoring the condition of the site or taking part in preventive conservation and ongoing maintenance and restoration projects.
- The third part of the empowerment equation is to develop the means through which local communities can benefit financially from the enhanced conservation of the heritage while at the same time maintaining their social and spiritual traditions intact. Activities here involve a wide variety of income-generating and self-employment opportunities, such as support to the expansion and mass marketing of traditional handicraft industries.

Project activities will differ from site to site, depending on site problematics and assessed needs. However, there is a common strategic ten-step sequence, which when followed, gradually leads to community participation and competence in the maintenance, management, and development of their heritage. This structural framework of activities provides a model which makes the experience sites replicable and transferable to other communities elsewhere in the region and, indeed, worldwide. The sequential activities are as follows:

Step 1 Activities which promote a stewardship ethic and community participation in historic conservation

Step 2 Hands-on training involving local town and neighborhood managers to develop gazetting, zoning, and environmental management plans for both preservation and development of historic sites

Step 3 Training and support activities to identify pilot projects within the community through community-based participatory research work

Step 4 Research, development, and training in low-cost, traditionally appropriate, and

historically accurate techniques for building maintenance and restoration

Step 5 Reviving the use of traditional building and associated trades necessary for the maintenance of historic buildings in an authentic manner

Step 6 Promotion and training to preserve artisan skills and other intangible cultural activities which have potential market appeal and can be developed into income-generating professions

Step 7 Training and promotion of community-based and community-controlled tourism industry-related occupations grounded in the accurate interpretation of the unique local culture, history, and environment

Step 8 Assistance in curriculum development for both formal and nonformal education in local history, heritage conservation, and small business management skills in the culture industries

Step 9 Assistance to avail of revolving soft loans and micro-credits for conservation, maintenance, and business development

Step 10 Creating networks for the exchange of technical information among site managers and town planners.

International Perspectives

Case Studies Provide the Management Prerequisites for Community-Based Conservation

To be successful, a community-based program for conservation must be people centered, focused on local community participation. Activities relative to heritage management and development should be carried out by the local stakeholders themselves at the village level and not by outside parties who siphon off much of the generated income that is meant for the heritage custodians. To ensure this, it is essential that individuals, informal groups, or people's organizations that play traditional roles in the maintenance of heritage sites should first be identified and then work with them, through them, and assist them build up their managerial and technical capabilities.

Given the lack of financial resources and support mechanisms in many countries, it is important that pilot sites have (1) strong private sector involvement in heritage conservation and management, (2) facility to provide micro-credit schemes, and (3) local policy makers are willing to set up required legal frameworks for heritage protection. Implementation strategies should aim at sustainability and replicability of activities that can result in multiplier-effect or spin-off projects in other target heritage sites.

To complete this strategic scenario, incentives and other forms of recognition should be put in place in order to encourage local community participation and to counteract the perceived negative effects of conservation vis-à-vis modernization and economic progress.

In the ten-step strategy outlined above, it is obvious that there will be growing demand for technical and managerial expertise at the grassroots level and management tools to implement this expertise in a practical way. Among these tools are the following.

Establishment of Information Networks

Fostering, facilitating, and strengthening the communication and lateral links between heritage site managers themselves and with other professionals in their field are one of the priority strategies. It is a goal of the program to provide and foster the means whereby site managers and communities can learn and share from each others' experiences.

Heritage Conservation Awards

The *UNESCO Awards for Culture Heritage Conservation* were established to recognize the achievement of individuals and organization within the private sector and public-private initiatives, in successfully restoring and adapting for viable reuse structures of heritage value in the region.

Promotion of Responsible Tourism

Resulting from many requests from site managers and tourism industry personnel for guidelines and real-life examples of sustainable tourism practices, case studies exploring issues of tourism

and culture preservation need to be undertaken and guidelines on cultural tourism for heritage managers, tourism industry personnel, and site visitors.

Heritage Homeowners' Manuals

Designed as a practical tool to guide individuals and families in the care, renovation, and possible adaptive reuse of their historic houses, *Heritage Homeowners Manuals* return responsibility for home (or shop, or temple) maintenance back into the hands of the owners of these buildings themselves.

The purpose of such manuals is not to turn every homeowner into a professional conservation architect but to guide building owners in accomplishing those tasks of routine maintenance and preventive conservation, which are clearly within their competence and responsibility. The *Heritage Homeowners' Manuals* provide the technical guidelines necessary for owners to carry out the necessary work in a manner that preserves the historic authenticity of the structure.

Future Directions

UNESCO-ICCROM Academy for Culture and Heritage Management

There is a rapidly increasing demand for improved professional management of both tangible and intangible culture heritage resources and the institutions that safeguard and foster them. The recently established UNESCO-ICCROM Academy for Heritage Management is the response to meet this need in a professional, systematic, sustainable, and cost-effective way. The Academy is not a physical structure. Instead it is a network of institutes of higher learning that are engaged in the research and teaching of some aspect of heritage conservation and/or culture resource management. The specific focus of the Academy is on management training, but within that focus, the range of institutional members is wide and the management training they offer is broad covering all aspects of culture protection, development, and management. Included in the Academy are institutions that teach culture protection and intellectual property law, culture industry management, culture institution management (museums, theaters, art galleries, dance companies, music groups, etc.), human settlement planning, architecture and architecture conservation, archaeological and protected site management, and tourism, to name but a few of the many aspects of culture management covered by the Academy.

For many members of the network, the high local demand for heritage site managers has been the entry point into the field. However, the Academy pointedly and actively promotes a holistic approach to culture resource and institution management, which emphasizes legal protection for both tangible and intangible cultural expressions, as well as the integrated management of the entire scope and diversity of cultural resources with a view to their role in the paradigm of sustainable development.

The main activities offered by the Academy consist of (a) formal postgraduate training, leading to M.A. degrees in management; (b) short certificate courses in specific management skills; (c) joint field schools where the different fields of culture resource management are brought together; (d) seminars and workshops for in-service professionals to renew and update their professional knowledge; (e) collaborative research and publication; (f) accreditation and licensing; and (g) distance-learning (Web-based) extramural diploma courses for mid-career professionals.

The Academy network organizes field schools that offer in-service professionals, advanced students, and staff from institutional members the opportunity to study heritage conservation in real-life situations with the guidance of leading experts in this field. The field schools also facilitate exchange between members and serves as a platform to discuss current professional issues in the field of conservation management of the region's cultural heritage. Field schools include flagship field school, which are co-organized and cohosted by local institutional members, UNESCO and ICCROM, and focus on issues directly related to integrated management.

Institutional members also organize affiliated field schools which focus on training about a specific topic. The Academy Field Schools and affiliated field schools are planned within a coordinated framework in order for diverse field schools to complement each other and to address needs within the existing regular program curricula offered in the region.

Hoi An Protocols for Best Conservation Practice

Experts in conservation from and/or working in the developing work specialized in the various fields of archaeology, architecture, urban planning, and site management met in Hoi An, Vietnam, in early 2001. The conservation experts convened to discuss the establishment and promulgation of regional standards of best conservation practice which will assure that the values inherent in the heritage sites are safeguarded and that their authenticity is preserved and truthfully explicated during the process of conservation, restoration, rehabilitation, and subsequent use and maintenance. The workshop resulted in the development of the Hoi An Protocols for Best Conservation Practice. The types of heritage sites explicated in the Hoi An Protocols include archaeological sites, both excavated and unexcavated; monuments and other standing structures, whether ruined or intact; buildings and other structures of historic or other cultural, social, economic, political, or ideological significance; architectural ensembles, historic urban areas, and townscapes; landscapes and environments of historical, cultural, and/or socioeconomic significance; and underwater cultural heritage sites.

The Hoi An Protocols provide site-specific methodologies for assessing five categories of heritage sites: (a) cultural landscapes; (b) archaeological sites; (c) historic urban sites and heritage groups; (d) building, monuments, and structures; and (e) underwater cultural heritage sites. The Hoi An protocols incorporate guidelines for (a) inventorying of tangible and intangible cultural resources; (b) identification of threats to cultural authenticity; (c) establishment of indicators, measurement, and modeling of impact; (d) use of professional mitigation tools and negotiation procedures/strategies; and (e) community-based evaluation.

Cultural Impact Assessments

The majority of legal regulations which exist focus on protecting the cultural heritage, through the designation of landmark status, restricting alterations to the property, and limiting the involvement of the property owners or managers in deference to government conservation professionals. While this process highlights the significance of the property, it restricts the ability of owners or managers to flexibly maintain or adapt the properties to more viable or sustainable uses. This may negatively detract from the ability to conserve the property sustainably. At the same, it restricts the ability to develop the property or its surrounding area.

Introducing a system of cultural impact assessment will allow for a more balanced approach to ensuring proper conservation while at the same time accommodating development. Over the past 30 years, environmental impact assessments have gradually been incorporated into the project feasibility and loan evaluation process of multilateral and domestic project financing. There exists a similar need to evaluate the potential impacts of investment and implementation, particularly of large projects, on both tangible and intangible cultural resources. Through the development and testing of cultural impact assessments, the goal of sustainable development can be extended from the ecological realm to the broader societal milieu, incorporating the existing built heritage, living traditions, and socioeconomic needs of local communities and sites.

With the cooperation of the World Bank, the regional development banks, and other international and national financing partners, systematic undertaking of cultural impact assessments can be mainstreamed into standard procedure for evaluating the impact of large infrastructure development projects at culturally sensitive and/or vulnerable sites.

Conclusion

The preservation of the heritage is an undertaking of such scope and long-term commitment that it can only be successful if there is active participation by local communities everywhere. By focusing on local ownership of heritage and local control over its preservation and future use, heritage conservation can claim its rightful place at the center of human development.

The purpose of community-based heritage conservation is not to encourage people to return to some nostalgic past, but rather to use heritage as the divining rod for determining the direction each community wishes to take in its future development. This will help to ensure that the end result of development efforts will be acceptable and appropriate to each community's economic needs and respectful of each community's social and cultural values.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Management: Project Management
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ World Heritage Education, Training, and Capacity Building

Further Reading

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Complex Hunter-Gatherers

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Introduction

Complex hunter-gatherers are hunter-gatherers whose cultures and societies have cultural, social, and economic traits that anthropologists and other scholars had long assumed required agriculture for them to develop. Permanent inequality is the trait that has attracted the most attention among archaeologists, but others include large, dense populations; large, relatively permanent settlements; and intensive economies among other characteristics. First widely recognized by archaeologists in the late 1970s, they have been a focus of major research efforts since. This research has been a testing ground for many theories about the origins and evolution of social complexity, especially of the origins and development of permanent inequality in small-scale societies.

Definition

At the most fundamental level, complex hunter-gatherers are hunter-gatherers who do not fit Richard B. Lee and Irven DeVore's characterization of hunter-gatherers in the 1968 seminal volume *Man the Hunter*, "We make two basic assumptions about hunters and gatherers: (1) they live in small groups and (2) they move around a lot" (Lee & DeVore 1968: 11). They go on to list five additional characteristics of

hunter-gatherers: first, because of mobility, the amount of personal property is kept low; second, the resource base keeps group size very small, below 50; third, local groups do not "maintain exclusive rights to territory" (i.e., do not control property); fourth, food surpluses are small to nonexistent; and fifth, groups are not strongly attached to "any single area." An additional characteristic not listed by Lee and DeVore here is that these small social groups are strongly egalitarian. These hunter-gatherers approximate stereotypes of hunter-gatherers that were widely held by scholars and others during the past several centuries. These stereotypes began to break down in the 1960s and 1970s as the great diversity among hunter-gatherer societies became clearer as a consequence of archaeological research. However, the *Man the Hunter* characterization does accurately describe some hunter-gatherer groups; those are labeled "generalized hunter-gatherers" in Table 1. Current definitions of complex hunter-gatherers often focus on trait lists of how they contrast with generalized hunter-gatherers (Table 1).

Certain attributes of complex hunter-gatherers are more central to our understanding of them than are others.

Complex Hunter-Gatherers, Table 1 Generalized and complex hunter-gatherer traits (Modified from Kelly 1985)

	Generalized	Complex
Environment	Unpredictable or variable	Highly predictable or less variable
Diet	Terrestrial game	Marine or plant foods
Mobility	Residential	Logistical
Settlement size	Small	Large
Demography	Low population density relative to food	High population density relative to food
Food storage	Little to no dependence	Medium to high dependence
Social organization	No corporate groups	Corporate descent groups (lineages)
Political organization	Egalitarian	Hierarchical; classes based on wealth or descent
Occupational specialization	Only for older persons	Common
Territoriality	Social-boundary defense	Perimeter defense
Warfare	Rare	Common
Slavery	Absent	Frequent
Ethic of competition	Not tolerated	Encouraged
Exchange	Generalized reciprocity	Wealth objects, competitive feasts

Demography and Group Size

Complex hunter-gatherer societies tend to have larger populations than do generalized hunter-gatherers. They also have higher population densities and larger communities. The significance here is that there are more people in daily face-to-face contact.

Corporate Groups

Generalized hunter-gatherer social groups beyond the nuclear family tend to be very fluid in their membership. Complex hunter-gatherers generally have stable, long-lived corporate groups, often in the form of households.

Residential and Mobility Patterns

Complex hunter-gatherers tend to be partially to fully sedentary. Mobility across and exploitation of the landscape tends to be logistical, a pattern in which long-term residential bases are established and task groups harvest and process resources at some distance from the base and return with the processed material. Generalized hunter-gatherers, in contrast, shift their residential bases as needed to position them close to available resources.

Property, Wealth, and Inheritance

Generalized hunter-gatherers usually consume resources as they are harvested, and while individuals may own objects they make or acquire, accumulation of property is usually repressed by social means. Among complex hunter-gatherers, consumption or use of harvested resources may be delayed through storage, and corporate groups and individuals own property which is transferred from one generation to the next. Recent research distinguishes among three forms of wealth: embodied (health, knowledge, skills), relational

(social networks and ties), and material (things, beings) (Bowles et al. 2010). Among generalized hunter-gatherers, wealth is generally embodied or relational (Smith et al. 2010); among complex hunter-gatherers, wealth is also manifested through material wealth.

Subsistence and Economy

Subsistence economies are likely to be "broad spectrum," that is, harvesting a diverse array of resources, some of which are highly productive but require significant amounts of labor to realize their potential (e.g., seeds). The high levels of labor can be invested in harvesting and/or in processing. Within the subsistence economy, there may be a few "keystone" resources which are fundamental to long-term economic success. Thus, while a group may harvest a wide diversity of plants, over the long run, they are most heavily dependent on just one or two species. Complex hunter-gatherer economies tend to rely most heavily on aquatic resources (marine, lacustrine, riverine) and/or plants.

Social Organization and Economy

Complex hunter-gatherers are generally characterized by formal, permanent social inequality in the form of ranking or stratification. The systems of inequality are supported and reinforced by political economies which manage the creation and movement of material wealth through the society.

Some definitions of complex hunter-gatherers focus primarily on population size (e.g., Koyama & Thomas 1981). Another label for complex hunter-gatherers, "affluent foragers" as originally defined, emphasized their larger populations. Yet other definitions exclude all characteristics except permanent inequality (Arnold 1996), restricting the term "complex hunter-gatherers" to only those hunter-gatherer societies with permanent inequality and elite control over non-kin labor (i.e., the political economy extends beyond the corporate or kin group). Arnold (2001) proposes applying "affluent forager" to those groups displaying many of these traits, but lacking permanent inequality. Whichever definition or set of traits individual scholars prefer, most research focuses on the development and maintenance of permanent inequality.

As an alternative to trait-based definitions, some researchers (e.g., Price 1981; Binford 2001) define hunter-gatherer complexity in terms of systems' complexity, that is, as cultural systems with many subsystems and many links among subsystems. This carries the implication that the subsystems are heterogeneous, that is, different from each other. The nature of this heterogeneity is often unspecified. Implicit to this definition is the notion that generalized hunter-gatherer cultural systems lack internal differentiation (subsystems) and are consequently homogeneous.

Historical Background

Lee and DeVore's description of hunter-gatherers essentially crystallized a view of hunter-gatherers that was several centuries old of small, simple, and egalitarian societies. Anthropologists, historians, and others took for granted that these societies represented the pristine human condition and that the appearance and subsequent development of complex societies required agriculture. A few ethnographically documented hunter-gatherer societies displayed traits thought to require agriculture. The classic example was the hunter-gatherer-fisher peoples of the Northwest Coast of North America (coastal northern California, Oregon, Washington, British Columbia, and southeast Alaska). They had dense populations, large communities, and an incipient class system among other things. They were explained away as the consequence of an unusually rich environment: the abundance of the natural environment substituted for the abundance produced by farming. Other exceptions were explained away as a consequence of contact with Europeans or other complexly organized peoples. Hunting and gathering was viewed as a very ancient lifeway that had persisted unchanged for millennia, at least since the appearance of the first modern humans if not their ancestors. The *Man the Hunter Conference*, in fact, grew out of a famous Harvard University

project that conducted research among hunter-gatherers in South Africa's Kalahari Desert that was based on the assumption that these people were behaviorally the closest modern analogues to that ancestral state.

The *Man the Hunter* conference was held at the University of Chicago in 1966. By the late 1970s–early 1980s, the picture of hunter-gatherers presented at the conference had become obsolete. As a consequence of a global expansion of archaeological research and knowledge, it was clear that many ancient hunter-gatherer societies were far more diverse and complex than anticipated in 1966. The concepts of "affluent foragers" and "complex hunter-gatherers" were developed in part to encompass and describe this newly discovered diversity. Three international conferences were crucial. The first of these was held in 1979 in Osaka, Japan, with the original purpose of comparing the ancient foraging economies of Japan and California (Koyama & Thomas 1981). It was at this conference that the notion of "affluent foragers" was formalized. As noted above, central to that idea was high population densities supported by rich environments, which required subsistence economies capable of supporting those densities. The second conference was held in Amsterdam in 1980, and its topic was Archaeological Approaches to Complexity (van der Leeuw 1981). Price (1981) presented a paper in which he coined the term "complex hunter-gatherers" and developed the first set of characteristics distinguishing them from generalized hunter-gatherers. His list was based upon comparisons among Japanese, California, and Mesolithic European hunter-gatherers. Thus, two of his three examples were archaeological. He also presented the systems theory definition of complexity. The third conference again was a major international conference held in Vancouver, British Columbia, in 1983 (Price & Brown 1985). It established the concept of complex hunter-gatherers and laid out the agenda for much of the research on hunter-gatherer complexity over the next two decades. This agenda focused on the causal relationships among population growth, subsistence and economic intensification (including storage), mobility patterns, and permanent inequality. At the same time, the importance of corporate groups (Hayden & Cannon 1982) and the domestic mode of production (Ames 1985) to the development of hunter-gatherer complexity was recognized. This was both a crucial theoretical and methodological step, since much subsequent research on hunter-gatherer complexity was framed within household archaeology (e.g., Coupland 1985).

The initial interest in complex hunter-gatherers stemmed from three sources: first, they were a range of societies poorly represented in the modern ethnographic sample, and neither how common they were in the past nor their time depth was known. Research on complex hunter-gatherers was also research on the diversity of human cultures. Secondly, they represented routes to complexity, particularly to permanent inequality, not dependent on agriculture; they were in a sense an independent set of cultural evolutionary experiments in the evolution of complexity. Investigating them might clarify how and why permanent inequality and other aspects of complexity arose from small, egalitarian societies. Thirdly, they were implicated in the domestication of plants and animals. Research in the 1960s and 1970s suggested that the preliminary steps toward domestication were taken by what became known as complex hunter-gatherers. The origins of civilization – complex societies – and of agriculture were major disciplinary issues globally beginning in the 1950s and were the subjects of intensive research. Research on complex hunter-gatherers could provide insights into both issues. Their presumed role in domestication is now far less clear. They still represent a diverse set of experiments in cultural evolution, and research has tended to focus on the hows and whys of the development of permanent inequality.

This research has investigated key case studies. In North America, these include the Northwest Coast, the Fraser-Thompson Plateau of interior British Columbia, the Santa Barbara Bight of southern California, and western Florida. In these instances, complex societies developed within the last 2,000 years or so, although

on the Northwest Coast they may have evolved as much as a millennium or two earlier. In these cases, archaeologists have access to both the archaeological record and to ethnographic and ethnohistoric records which can be used as parallel lines of evidence in investigating complexity. Thus, we know, for example, that permanent inequality existed in southern California and on the Northwest Coast based on the ethnographies. Recently, archaeologists in the southeastern United States have explored a record of fluctuating levels of hunter-gatherer complexity between about 5,500 and 3,000 years ago. Here, complexity is marked by extensive systems of earthen mounds, plazas, and in some places large rings constructed of marine and freshwater mollusk shells – for example, monumental architecture. There is no ethnographic record for these hunter-gatherers.

Globally, among the key case studies are the Jomon hunter-gatherers of Japan, the Natufian peoples of the Levant, and the Upper Paleolithic and Mesolithic peoples of western Europe. These ancient societies illustrate the difficulties and ambiguities of investigating complex hunter-gatherers known only from the archaeological record. It has proven very difficult, for example, to demonstrate the presence of permanent inequality in any of these cases. In fact, Price, who used the Mesolithic in his original formulation of the complex hunter-gatherer concept, has subsequently decided Mesolithic societies were not complex given the ambiguity of the available evidence (Price 1995).

Key Issues/Current Debates

Current debates revolve around the causes of permanent inequality in these small societies (as opposed to the causes of permanent inequality in large societies, such as the Aztec or Incan Empires), although there are other "key" unresolved issues, including the subject matter itself. "Hunter-gatherer" as a category of human society and subsistence has proven difficult to define or at least to draw boundaries around. There are some scholars who argue that the entire concept of hunter-gatherers needs to be abandoned. Similar suggestions have been made for the notion of complex hunter-gatherer, perhaps substituting less economically specific phrases like "middle range society" or "transegalitarian" society. Part of the difficulty arises from preconceptions about hunter-gatherers. A particularly powerful preconception is that they have no significant environmental impact. They harvest wild foods but do not "produce" foods or create "anthropogenic" environments (anthropos – human; genic, genesis as in created, human created or modified environments). It is now clear that all environments in which humans live are anthropogenic to one degree or another, even those occupied by the most "pristine" generalized hunter-gatherers. However, most complex hunter-gatherers actively modify their environments, acting to increase productivity and predictability through practices such as regular burning or firing the environment, selective harvesting, tilling, pruning, transplanting, and landscape engineering. Such practices are difficult to reconcile with the notion of hunter-gatherers as environmentally passive. Should people who do these things even be considered hunter-gatherers?

Setting that issue aside, a second is whether hunter-gather complexity can be sustained for long periods of time. T. Douglas Price (1995) has suggested that most instances of hunter-gatherer complexity are actually the result of contact with farmers and that hunter-gatherer complexity in any case is relatively ephemeral – that is, it does not last long because hunter-gatherer economies are not capable of the sustained economic production complexity requires. Price may be correct, in long archaeological sequences; complexity among hunter-gatherers does seem to come, go, and sometimes come again in a different form, or not at all. Once complexity develops, it is not necessarily permanent, in some cases disappearing after a few centuries and in other cases persisting for millennia.

A third issue is the notion of egalitarianism. One definition of egalitarianism is that egalitarian societies are those with as many positions of high prestige as their people to fill them and that there

is equal access to resources (of all sorts) necessary for life in the particular culture. Many small-scale societies practice what might be termed "formal egalitarianism" in which egalitarianism is highly valued and morally reinforced and anti-egalitarian behavior repressed. It is thought that egalitarianism was essential for small group survival during the Pleistocene with its extreme and rapid environmental shifts. The balanced or reciprocal social ties that formal egalitarianism reinforces provided a crucial safety net when local resources failed. Recently, the whole notion of egalitarianism has been critiqued by anthropologists and others, and this "formal egalitarianism" rethought as a form of reverse dominance hierarchy in which alliances among subdominants restrain and repress dominance. The issue then is whether egalitarian societies as once conceived ever existed. If not, it would suggest that permanent inequality is not, in itself, an attribute of social complexity but rather an attribute of the human condition (Ames 2010).

A fourth issue is the trait-based definitions of complex hunter-gatherers and affluent foragers. It is argued, correctly, that the lists bundle together attributes of complexity, causes of complexity, and the consequences of complexity (Arnold 1996). For example, looking at Table 1, high populations, food storage, and logistical mobility are all attributes of complexity, but perhaps, as Binford (2001) argues, logistical mobility is a consequence of increased population density. If that is so, is population density a trait of complexity or a cause (or perhaps both)? Distinguishing causes and consequences and teasing out their relationships are in part epistemological questions, but they are also methodological. In many instances, our chronological controls are simply not refined enough to know what comes first.

However, current debates focus primarily on the origins and causes of permanent inequality among egalitarian peoples. Prior to about 1990, most explanations invoked general demographic, social, or economic causal processes or circumstances. These included population growth, sedentism, storage, property, and economic intensification (increased production per capita, per unit time, or per unit land). Theoretical work in the 1990s recognized these processes not as causes but either as consequences or catalysts of the development of complexity. The search for causation shifted to human agency, seeing permanent inequality as emerging from the actions of individuals in particular historical circumstances. Some theories (e.g., Hayden 2001) invoke the existence of prestige-seeking individuals or aggrandizers (AAA personalities). Aggrandizers forcefully act or compete to advance their own interests and those of their near kin at the expense of others. Formal egalitarian societies actively repress the actions of aggrandizers since they would disrupt the reciprocal social ties necessary for group survival. The emergence of inequality requires that repression to end, allowing aggrandizers to pursue their own ends. Why does the repression of aggrandizers end?

Answers differ and engender considerable debate. Maschner (1991) argues that aggrandizers will act whenever the opportunity presents itself. In contrast, Brian Hayden posits that repressing aggrandizers is costly in time and energy and therefore erodes or ends when the local environment becomes productive and stable enough to meet everyone's basic needs. This can be the result of environmental or technological changes. When people's needs are met and when reciprocal ties are no longer central to survival, people stop enforcing the rules against aggrandizer behavior, and aggrandizers are free to manipulate their way to social prestige and power. Other scholars (e.g., Fitzhugh 2003) think that inequality develops during times of stress, which provide aggrandizers opportunities for self advancement. Others do not invoke human personality types, suggesting instead that times of stress facilitate the development of inequality from the normal jostling and friction of human social relationships. Yet other explanations look not to human personalities or material conditions but to changing ideologies and control of symbolic resources (e.g., Sassaman 2004).

Research on the evolution of inequality among hunter-gatherers is part of a broader inquiry into why permanent social inequality is a common feature of most human societies, regardless of

subsistence economy or size. Recent work suggests that a common thread among all societies with permanent inequality is the intergenerational transfer (inheritance) of wealth from one generation to the next (Smith et al. 2010). Importantly, this work reconceives wealth to include three forms: material wealth (what we normally think of when we think of wealth, i.e., property, control of material resources, structures), embodied wealth (physical health, skills, knowledge), and relational wealth (exchange partners, social networks, etc.). It appears that inherited differences in embodied and relational wealth occur among modern egalitarian hunter-gatherers. However, such differences may be very difficult to observe and measure among living peoples and even more elusive among ancient ones known only archaeologically. It also appears to be the case that strong systems of inequality are based on material wealth. Archaeologists usually assume that a lack of evidence for material differences in wealth or prestige indicates an ancient society is egalitarian. That assumption can no longer be made. However, more to the point here, this research suggests a rethinking of the general approach to the origins and evolution of social inequality is in order – the key question becomes "under what circumstances does material wealth develop so that inequality becomes both archaeologically visible and stronger?"

Complex hunter-gatherer archaeology has been strongly materialist since its beginnings in the 1970s. Research has emphasized either material causes (e.g., demography, subsistence, economy, ecology, environmental change) or those with relatively clear material consequences (e.g., corporate groups). This research was also comparative (searching for cross-cultural regularities). However, for most of that time, there has been a strong minority among archaeologists taking an idealist stance, arguing for the primacy of ideological systems (e.g., spirituality, belief systems, ethical systems) in shaping hunter-gatherer (and all human) behavior. This scholarship has also tended to focus on the importance of local, contingent (non-repeating, unique) events in shaping cultural history (e.g., Cannon 2011). This division is not restricted of course to complex hunter-gatherer studies. The tension between these approaches raises persistent issues.

International Perspectives

Although the literature may seem dominated by a few case studies (e.g., southern California, Northwest Coast, Plateau, Japan) and a few theorists (e.g., Hayden, Arnold), research on complex hunter-gatherers has been strongly international and intellectually diverse since its inception. Thus, while the Koyama and Thomas' (1981) volume emphasized the North Pacific Rim, the Price and Brown volume drew its examples broadly from North America, Eurasia, the Levant, and Australia and temporarily from the late Pleistocene through the Holocene. A recent volume (Grier et al. 2006) includes papers from East Africa, Australia, Central and South America, and Korea as well as Jomon Japan and the Northwest Coast. What is new is that while the original literature was written almost exclusively by Anglophone (American and British Commonwealth) scholars, that is no longer the case. The papers are now still primarily in English, but the authorship is much more truly international.

This is a reflection of the expansion of both archaeology as a profession and of the known archaeological record of the past two or three decades. It is obvious that ancient societies were far too diverse to be easily accommodated either by the old stereotypes that all hunter-gatherers were similar to modern generalized hunter-gatherers, and all more or less complex societies were agricultural. The difficulties increase as the variability among human subsistence economies and the degree to which people have modified the environment in the past are more evident. The concepts of "complex hunter-gatherers" or "affluent foragers" provide intellectual and methodological frameworks with which to approach that diversity. While the trait lists (e.g., Table 1) may be problematic in terms of mixing causes and consequences, they provide useful comparative frameworks for conceiving research and dimensions of variability along which that

research can be conducted (e.g., Grier et al. 2006). There are three significant elements of this research: it is being conducted within the frameworks of local research traditions but to address questions of global interest, it is interested in testing the basic assumptions and hypotheses of the Anglophone literature, and it is strongly comparative, conducting its tests using multiple case studies.

Future Directions

Several trends seem likely. At a very general level, debate will continue over the ontological status of hunter-gatherers and complex hunter-gatherers: are they real or figments of the anthropological/archaeological imagination. To that extent, this debate is useful; it will either sharpen our understanding of these concepts or help our understanding of the limits of their usefulness. For example, it may be that Arnold is right and that "complexity" is best restricted to hereditary inequality coupled with control of non-kin labor or that Price is correct and complexity is most usefully conceived as a description of a heterogeneous system. Debate will also continue over whether the past is best investigated from a materialist or an idealist epistemology. At some level, these are mutually exclusive, but at less exalted levels, they can be seen as complimentary, and archaeologists will work to build bridges between. Thus, for example, while the sudden appearance of earthen mounds in the southeastern USA may indeed reflect an equally sudden ideological shift, their construction had material consequences in how labor was organized, fed, etc. that also needs to be understood.

The construction of case studies will continue. To my mind, the most useful will be those that endeavor to cover very long periods of time, such as the entire Holocene. Most research tends to focus on particular examples within relatively limited time frames. Thus, in coastal southern California, strong social inequality developed after 1,200 cal BP. Consequently, research on the evolution of complexity has tended to focus most heavily only on the last 2,000 years. However, an examination of the entire 12,000 year sequence for this region from the perspective of social complexity would be useful. It would facilitate comparisons with other regions and times, and it would help to elucidate the dynamics at work. It is possible, for example, that some aspects of "complexity" came and went over the last several thousand years there. Taking a different example, logistical mobility is widely seen as a crucial causal element in hunter-gather complexity. In south central British Columbia, it appears or develops sometime just after 4,000 cal BP, but permanent inequality does not develop until 1,200 cal BP. There is a similar temporal lag between the development of logistical mobility and inequality in southern California. Thus, while logistical mobility may be necessary for the development of other aspects of hunter-gatherer complexity, its presence does not seem to trigger rapid social change. Long sequences will also answer questions such as whether hunter-gatherer complexity is inevitably of short duration, always comes and goes, or if in some cases it is quite durable, and if so, why? At present, almost all well-documented examples of complex hunter-gatherers are Holocene in age. An important question is whether such societies existed earlier. A related question is how, given the difficulties of the Pleistocene archaeological record, we can find them. As part of developing lengthy sequences, archaeologists need improved, finer-grained chronological controls which can only come from improved, finer-grained excavations, use of new field techniques, larger samples of radiocarbon dates (e.g., Prentiss et al. 2007), and alternative methods of independent dating not subject to the problems of radiocarbon dating.

The purpose of long sequences and their comparison, the purpose of any empirical work, is not only establishing patterns in the past but the testing of explanatory hypothesis and the building of theories. Research on complex hunter-gatherers has been one the most significant areas of research into the origins of inequality in human societies since World War II, and most of the theories and hypotheses have been proposed and tested by archaeologists. This will continue.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

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Conferences on Hunting and Gathering Societies (CHAGS)

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Basic Information and Major Impact

Over five decades, a series of spontaneously organized conferences brought together a global array of specialists on hunting and gathering societies

and became known as CHAGS. The series has assembled in roughly equal measure, archaeologists, social anthropologists, human evolutionists, and activists concerned about the fate and future of foraging peoples.

The ultimate origin of the CHAGS series of conferences dates to the mid 1960s when Irven DeVore and Richard Lee organized the 1966 "Man the Hunter" conference at the University of Chicago, resulting in the 1968 book of the same name (Lee & DeVore 1968). The book was successful in launching an era of renewed interest in the anthropology of hunters and gatherers. Despite the title, a major thesis of the book was to emphasize the vital and hitherto underestimated importance of women's work in hunter-gatherer societies and in human evolution overall, the ethnographic evidence for which amplifies and augments the archaeological record.

Man the Hunter had been intended as a one-off event, but a decade later in 1978, Maurice Godelier convened a follow-up meeting on hunters and gatherers in Paris (Leacock & Lee 1982). The gathering, which brought together scholars from six continents and both sides of the Cold War, was highlighted by an address by the dean of the University of Yakutia, himself a member of the Yakut ethnic group. The Paris conference's success indicated that there was a serious demand for conclaves about hunting and gathering peoples, heightened no doubt by the speed with which the remaining viable foragers were being absorbed into regional and global markets and nation-states.

Laval University hosted the next conference, convened in historic Quebec City, Canada in 1980 chaired by Bernard Saladin d'Anglure and Bernard Arcand. It was at Laval that the term CHAGS was coined to provide a shorthand for what was becoming an ongoing enterprise.

CHAGS III unlike the two previous was a by-invitation affair, convened in 1983 at Bad Homburg, Germany, under the auspices of Prof. I. Eibl-Eibesfeldt. Participants were drawn largely from supporters of the "revisionist" side of the emerging debate on the historical status of hunter-gatherers, particularly the Kalahari San (Schrire 1984).

There was a general consensus that if CHAGS was to have long-term viability, it was important for there to be an open invitation, extended to all who demonstrated an interest in the subject, who had research to report, and were self-financed. This open-door policy was to set the tone for the two next decades of CHAGS gatherings.

CHAGS IV was held in 1986 at the London School of Economics and was convened by a UK-based committee that included Alan Barnard, Barbara Bender, Tim Ingold, Brian Morris, David Riches, and James Woodburn and resulted in two excellent publications (Ingold et al. 1988a, b).

The pace of convening CHAGS accelerated. After a two-year interval, CHAGS V convened in Darwin, Australia, in 1988, organized by the late Les Hiatt, and an active cohort of Australian-based anthropologists.

Only two years after Darwin, CHAGS VI was convened in Fairbanks Alaska in June 1990. Organized by the late Linda Ellanna, the Fairbanks meetings, like those in Darwin, attracted a wide range of spokespersons from aboriginal communities and attracted a large contingent of Soviet anthropologists and archaeologists, who made the short flight from Provedinya in the Russian Far East to Nome, Alaska (Burch & Ellanna 1994).

Given the enthusiasm of the Russian delegation, there was a consensus that CHAGS VII would convene in Russia. Under the leadership of Valery Tischkov and Victor Schnirelman, one of the largest CHAGS ever opened in Moscow in August 1993. Delegates from 15 countries experienced the excitement of perestroika, as Russians experimented with new political formations (Biesele et al. 1999).

CHAGS VIII was convened at the famous Japanese National Museum of Ethnology ("Minpaku") in Osaka in October 1998. Chaired by Drs. Shuzo Koyama and Jiro Tanaka, it brought together over 200 scholars from many countries and resulted in an important series of five volumes (see entries for Senri Ethnological Studies, below).

The next CHAGS (IX) was held in Edinburgh, Scotland, in 2003, chaired by Dr. Alan Barnard (Barnard 2004). And CHAGS X convened in Liverpool, UK, June 25–28, 2013, chaired by Dr. Larry Barham (chags@liv.ac.uk).

A wide range of themes have characterized the papers presented at CHAGS, with archaeology sharing time with papers on social anthropology and increasingly papers on indigenous rights and political struggles. CHAGS I through IX have left a permanent legacy in the form of substantial volumes of collected papers listed below.

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Ethnoarchaeology
- ▶ Hunter-Gatherers, Archaeology of
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Confinement and Detention in Political and Social Archaeology

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Introduction

Confinement and detention played a central role in many of the most infamous episodes in modern history, including the use of civilian concentration camps in the Boer War, the internment of Japanese-Americans in the Second World War, the Soviet Gulags, and the secret prisons of the Argentinian Junta. The Holocaust of European Jews largely took place within a vast infrastructure of slave labor camps, transit camps, concentration camps, and extermination camps. The material traces of this event at Auschwitz-Birkenau and elsewhere remain among the most iconic modern heritage sites. Penitentiaries and jails – holding people accused or convicted of behavior deviant of social norms – though usually out of everyday view, are of course quotidian features of almost any every society.

Confinement and Detention in Political and Social Archaeology, Fig. 1 A sweater with bullet holes, excavated evidence of the murderous regime of the Argentinian dictatorship (1976–1983) (Courtesy of Melisa Salerno)

The archaeology of confinement and detention is part of a growing field studying the material remains of modern power and structural violence on a global scale. Studies of sites, artifacts, and other traces of confinement reflect many archaeologists' desire to engage with processes of commemoration, truth and reconciliation, education, and heritage management in societies often coming to terms with historical narratives of oppression and social control. Recent work in the archaeology of confinement demonstrates the extent to which it is living up to the heavy responsibility imposed by this historical background. Worldwide, archaeologists are intervening on sites of internment to create and recreate historical narratives. In Argentina and Poland excavators are unearthing sites that the perpetrators of violence had tried to erase (Fig. 1). In the United States and South Africa, former prisoners have participated in the transformation of detention sites into heritage sites, adding their memories to the historical record. These types of projects work to provide a foundation and a platform for the voices of the imprisoned.

Definition

The archaeology of confinement and detention has emerged as an interdisciplinary initiative within the larger and more established fields of historical archaeology, conflict archaeology, and the archaeology of the modern world. The question of scope is often raised, as terms such as confinement, detention, internment, imprisonment, incarceration, and captivity are problematic to define. Broad definitions encourage boundary-pushing work and lively intellectual discourse, and the authors have previously stated:

> Incarceration or internment might be described as the practice of organizing material culture and space to control and restrict the movement of a person or a group of people. Sites of internment can range in scale from a single room or building to entire landmasses (Myers & Moshenska 2011: 2).

Thus, a common sense definition of the archaeology of confinement and detention might be *any study where archaeological approaches are used to interpret the material remains of confinement*.

Historical Background

An early example of the archaeology of confinement took place in Berlin in 1985, when prison cells beneath the ruins of the former Gestapo headquarters were subjected to an unofficial "guerrilla excavation" by a community history group, the *Active Museum against Fascism and*

for Resistance in Berlin (Baker 1990). The excavation was largely symbolic, aimed at drawing attention to the official neglect of the site and the perceived failure to adequately memorialize the victims of the Gestapo. The excavators included former prisoners held in the cells on the site, as well as relatives of those who did not make it out alive. The dig was a vivid reminder of the power of archaeology to literally and figuratively uncover hidden histories of oppression and control.

The Berlin Gestapo site has since been more fully excavated and is now open to the public as a striking and unique archaeological museum: the *Topography of Terror* (Hesse et al. 1989). Through their action the diggers sent a message that archaeology can and should be used to study recent violent pasts. Twenty-five years on this maxim has been embraced by archaeologists studying incarceration and internment, and the expansion of this field of study is due in part to the energy and enthusiasm of grassroots community and human rights groups seeking information about people and events, exposure of injustices, healing of wounds, and reconciliation between erstwhile adversaries.

Key Issues

Control and Surveillance

Spaces of confinement and detention are chosen or constructed primarily to control their inmates; among the most distinctive material manifestations are boundaries and other material restrictions on movement. Some of these boundaries are constructed: the concrete walls of a prison, the barbed wire fence of a prison camp. Other, apparently ephemeral boundaries rely on a known threat: step across the line and you will be shot. Another common mechanism of control is the natural boundary: many sites of detention are islands or parts of islands such as Robben Island in South Africa, Ai Stratis in Greece, and Alcatraz in the United States. Other geographical boundaries include deserts and wildernesses – where survival in the landscape is impossible and physical boundaries are unnecessary. For these reasons Second World War Prisoner of War (PoW) camps were often located in remote areas such as Finnish Lapland, the Australian outback, central Canada, and the mountains of southern Arizona. The remote locations of these sites are an advantage to the archaeologist, as they are considerably less likely than other sites to have been destroyed or damaged by development or other human activities.

Alongside physical control, surveillance is an important element of confinement and detention, the most noted example of which is Bentham's Panopticon, in which large numbers of prisoners could be observed from a central location (Bentham 1791). Surveillance appears in the archaeological record in the watchtowers of prison camps, in the spy holes in prison doors, and in the CCTV and other electronic monitoring systems employed in more recent periods. Traces of these and other elements of surveillance have been studied and recorded in abandoned prisons and prison camps such as Long Kesh/Maze in Northern Ireland. González-Ruibal (2011) has shown how, during and after the Spanish Civil War, certain sites were used for internment due to their symbolism: schools and monasteries represented the authority and order to be imposed on the prisoners. Control takes many forms, many but by no means all of which can be traced in the material remains.

A key component of control and surveillance in institutions – and one that is often exposed through the material remains of sites of internment – is repetition in materials and structures. This trend is patent both in portable material culture (e.g., identical ceramic dishes for all prisoners) and in architecture (e.g., row upon row of matching barracks). The repetition of small materials, and their close regulation, contributes to the institutional goals of social conformity and the elimination individuality and of more easily identifying prohibited items (Fig. 2). Repetition in architecture and the broader penal landscape facilitates surveillance by maintaining long and linear lines of sight, and by eliminating interior variability which could be used to deceive the captors (Fig. 3). The cult of repetition, of course, is not limited to material culture. In reforming

REGULATIONS FOR INMATES
U.S.P., ALCATRAZ
PAGE 8

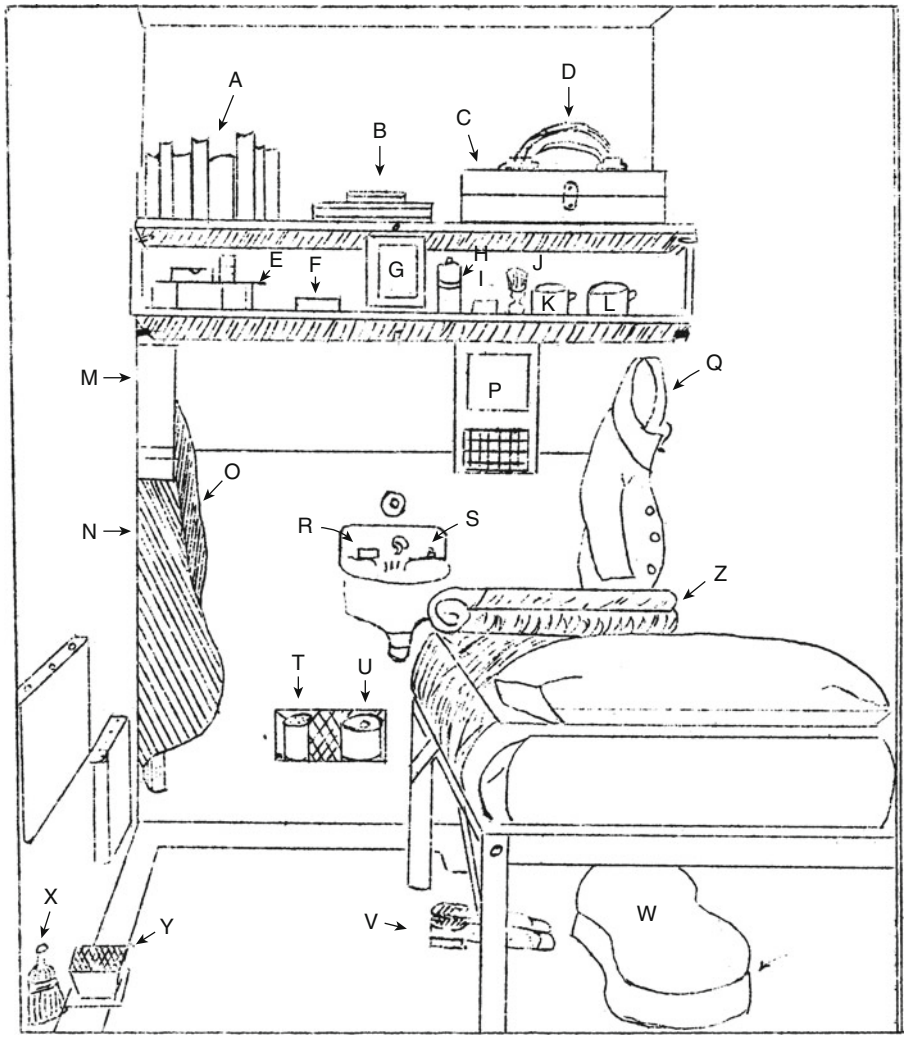

A – 12 Books (Maximum)
B – Personal Papers
C – Paint Box etc.
D – Radio Headphones
E – Ash Tray & Tobacco
F – Extra Soap
G – Mirror
H – Toothpowder
I – Razor & Blades
J – Shaving Brush
K – Shaving Mug
L – Drinking Cup
M – Face Towell
N – Bathrobe
O – Raincoat
P – Calendar
Q – Coat & Cap
R – Soap
S – Sink Stopper
T – Cleaning Powder
U – Toilet Tissue
V – Extra Shoes & Slippers
W – Musical Instrument/Case
X – Broom
Y – Trash Basket
Z – Extra Blankets

Confinement and Detention in Political and Social Archaeology, Fig. 2 Instructional graphic depicting proper placement of approved personal items at the United States Penitentiary Alcatraz, California (Reproduced from Madigan 1956)

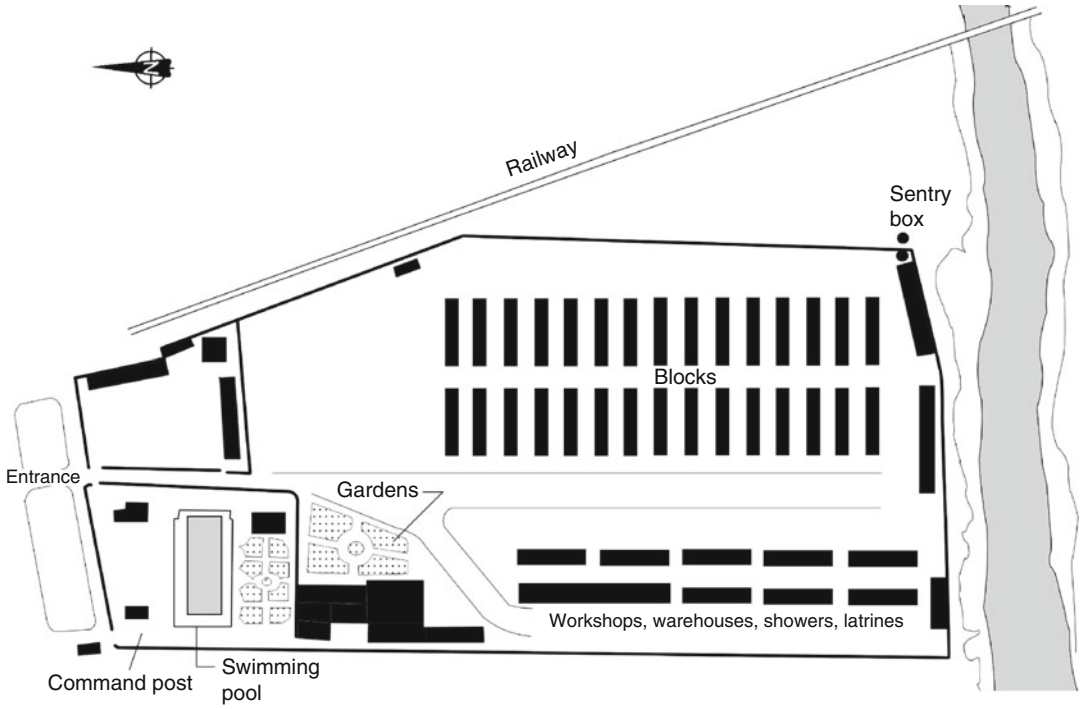

Confinement and Detention in Political and Social Archaeology, Fig. 3 Plan view of Miranda de Ebro concentration camp, Spain. Regularized pattern of building arrangement facilitates surveillance and prisoner management (Courtesy of Alfredo González-Ruibal)

institutions at least, repetition encompasses the human body through physical and moral training and adherence to time discipline regimes.

Domination, Resistance, and Cooperation

The experience of internment is one of coercion, oppression, domination, and surveillance. From the perspective of the jailer internment serves numerous purposes but is most commonly used to remove a perceived threat, whether by containment, reform, or annihilation. Almost by necessity, confinement will include domination by the captor and resistance by the captive. Resistance to captivity can take a number of forms, many of them visible in the archaeological record of the internment site. Internment sites are often governed by sets of rules to control the behavior of internees: these include curfews, uniform codes, restrictions on association and communication between prisoners, and the prohibition of trading with guards and outsiders.

The violations of some of these rules can be regarded as acts of resistance to internment, albeit frequently petty and self-defeating ones if they lead to repercussions on the rule breaker or other prisoners. Steve McQueen's character in the film *The Great Escape* is the quintessential internee rebelling petulantly against his captors. The solitary confinement cells at *Stalag Luft III* are testament to the occurrence of this sort of behavior. From an archaeological perspective the most obvious evidences of rule breaking are the remains of contraband goods such as nonuniform clothing (Casella 2000), foodstuffs (Myers 2008), and personal hygiene and grooming products (Pringle et al. 2007).

Perhaps the most direct form of resistance to internment is escape, either by absconding or, where necessary, overcoming the physical barriers. In PoW camps the escape options were summarized as "over the wire" (usually under cover of darkness), "under the wire" (tunneling),

or "out the front door" (in disguise). Tunneling is the most archaeologically visible and enduring of these, and the archaeological investigation of escape tunnels using geophysical and excavation techniques has been successfully conducted at *Stalag Luft III* in Zagan, Poland (Pringle et al. 2007).

Attempting to damage, destroy, or "improve" the prison site is also a form of resistance, often symbolic but in some cases practical. Wall art and graffiti such as that recorded at Long Kesh/Maze served to stamp the internees ideology and identities on an institutional space and may well have served to intimidate outsiders and guards. These artworks were also an act of cultural resistance, a more common theme in internment, often demonstrated in the nostalgic or defiant craftworks and artworks produced by civilian or military detainees and often curated into the present. Such seemingly petty symbols of cultural resistance can maintain the morale of prisoners, and often remained entirely unnoticed by the captors. On a more practical level, many internment sites show traces of the consumption of alcohol and other intoxicants, both as evidence of contraband and a form of temporary escape from the oppression of internment.

González-Ruibal (2011) criticizes overemphasis of resistance in studies of internment, particularly the abstracted formulations of internment that stress the agency of the oppressed and neglect the brutal real-world manifestations of the "discourse" of power. In studying the archaeology of internment there is a risk of becoming too enamored with the glamour of resistance and failing to take into account the constraints, threats of violence and psychological effects of long-term incarceration. To do so would be a betrayal of the victims of the historical crimes we study. In turn, the hierarchical "domination/resistance" paradigm itself, as a whole, has come under increasing scrutiny. Often in cases of internment evidence points to multiple layers and directions of control and surveillance – for example, the notion that prisoners can watch the guards, just as the guards watch the prisoners – which has led some to move towards analyses of *heterarchy* rather than *hierarchy* (e.g. Casella 2011). Heterarchical approaches leave open the possibility of cooperation between guard and prisoner.

Things in Stories/Stories in Things

The experience of incarceration in all its forms has inspired works of literature, philosophy and scholarship for centuries, from Boethius, Cervantes and de Sade to Hitler, Pound and Gramsci. Diaries, autobiographies and accounts of 'life inside' are also a consistently popular genre, particularly those that describe escape attempts. Accounts of internment are potentially of interest to archaeologists as ethno-historical source materials which can provide valuable information for the archaeologist about the layout of sites, the functions of structures, and the material possessions of prisoners, as well as providing color to reports and publications. The use of such textual sources must, of course, take into consideration the vagaries of memory and artistic license in their creation.

Another use of these accounts focuses on the material culture of internment from a biographical rather than purely descriptive point of view, drawing on theories of the social lives of objects developed in the 1980s. In this model objects are considered in terms of their "life histories" from creation through use, reuse or consumption, disposal, and deposition. The plethora of accounts of internment, particularly for certain periods and events including the Second World War, Apartheid, and the Holocaust, encourages us to consider some of the ways in which we can use these texts to study the material culture of those periods. This is particularly salient in the case of internment sites for which we have multiple accounts by different authors, such as Colditz Castle where the same site, structure and even some objects such as articles of escape equipment are described at different times by different authors.

Throughout history Prisoners of War and internees have passed the time by making craft objects and artworks for use, for sale or as gifts. Dusselier (2008) has shown how Japanese-American internees in the Second World War used handicrafts to domesticate the spaces they

found themselves in, to reassert their national and ethnic identities, and to provide themselves and others with emotional support. Studies of British civilian internees in Second World War Germany show a similar phenomenon, including an emphasis on patriotic symbolism. Following the end of periods of detention many of these objects were curated as souvenirs or family heirlooms, often serving as material repositories for stories or memories.

Prison Economies

In every case of confinement, smuggling and trading of both allowable and forbidden goods takes place. This maxim remains true even in situations of extreme material depravity, such as at the death camps of the Holocaust. Secret trading was in fact an integral component even of the mass executions at Birkenau, since the food and valuables found on the bodies of the deceased by the *Sonderkommando* forced laborers were redirected to sustain those not yet sentenced to the gas chamber (Myers 2007). Intriguingly, smuggling often goes "both ways" – goods and services pass from outside the camp or prison to the inside and, in turn, from the inside to the outside. This might happen when, counter intuitively, a prisoner has access to goods not available to neighboring civilian communities, such as the case of Allied PoWs in Europe who received Red Cross care packages filled with items long unavailable under Nazi wartime rationing.

In many cases smuggling and trading are used to supplement grossly inadequate caloric intake, such as at the Nazi death camps in Europe and Japanese camps holding Allied PoWs in Asia during the Second World War. But once basic sustenance is achieved (and sometimes even where it is not), smuggling and trading serve other purposes, such as rediscovering small comforts of home, protecting the body against the natural elements, or preparing for an escape attempt. In some cases, astute black marketing by the confined leads to the accumulation of great wealth and power. Perhaps the most colorful example of this is described by James Clavell (1963), in his historical novel *King Rat*.

Popular culture has often well represented the historical reality that in many situations of confinement the cigarette becomes the base unit of currency. From the PoW camps of the Second World War to present-day penitentiaries in the Unites States, the relative values of all other goods and services are usually measured in cigarettes (Radford 1945; Lankenau 2001; Reed 2007). In some cases, extremely complex prison economies develop which include phenomena such as base currencies (e.g., cigarettes or prisoner-developed paper currencies), offering of services by small business entrepreneurs (such as laundering, cooking, and prostitution), notice boards with classified advertisements, monopolies, price fixing and price gouging, price falls and price rallies, inflation and deflation, and even stock-exchange style traders and speculators working on "futures markets" (Radford 1945).

Trading and smuggling might be seen as a form of resistance, since usually the action is forbidden by institutional regulations. But trading is also often a form of cooperation or even collaboration, since trade networks incorporate guards and other staff. Thus, the prison black market is an example of a social aspect of confinement that challenges the duality of the "domination/resistance" paradigm by showing how guards and prisoners sometime work together for mutual benefit.

Gender

The theme of gender is vital to our understanding of internment from historical, sociological, and archaeological perspectives, as demonstrated by Casella's ground-breaking studies of a nineteenth-century prison in Tasmania (e.g., Casella 2001a, 2007). The practice of internment has often been explicitly gendered in cases where only the military-age males of a population have been interned, or where the families of men involved in insurgencies have been interned to isolate, demoralize and blackmail the combatants – as in South Africa during the Boer War. In most internment sites where both men and women were held there was physical segregation of the sexes, and women were sometimes held in

accommodations considered more comfortable, secure or private than that of the men. This separation is a common pattern that might be recoverable in the archaeological analysis of internment camp sites. Most of the cases where male and female internees were treated without differentiation are those where murder or genocide was the ultimate aim of the internment.

There is a need for more studies in the visibility of gender in the archaeology of internment. As Casella has argued, even acknowledging the existence of women in these sites genders the history and archaeology of internment, an important stage in the evolution of the discipline, albeit one we might hope by now to have superseded (Casella 2001b: 68). Future studies in the archaeology of gender in internment might consider the construction and interpretation of gendered material culture assemblages, gendered representations and commemorations of internment, and forge links with studies of sexuality and sexual and reproductive health in internment and incarceration. One of the most important outcomes of a gendered archaeology of internment will be a critique of the widespread view of female internees as vulnerable, helpless victims. The archaeological evidence, as Casella has demonstrated, is likely to tell a very different story.

Sexuality

Though all forms and expressions of sexuality that exist outside of confinement can also plausibly occur within prisons and prison camps, sexual activity, like all other activities, is constrained and changed under conditions of confinement. Institutions usually aim to control sexuality and sexual reproduction, and perhaps the most obvious attempt at this is through the common practice of separating women prisoners from men prisoners, and both of these from non-prisoners of any gender. This obstruction of heterosexual relationships is of course often challenged through prohibited access to buildings or wards (possibly facilitated by bribes), permanent or temporary escapes, assignment to work details or billeting outside of the prison, and in some contexts sanctioned conjugal visits. In addition to separation of the sexes, working against all sexual activity in prisons and prison camps are two further forces of institutional control: the unfailing lack of privacy and the reduction of caloric intake, which has the side effect of reducing sex drive.

Where prisoners are housed in open areas or have access to each other – which is the case in most situations of confinement – same-sex relationships are maintained with comparative ease. This trend came under the scrutiny of military doctors after the Second World War when anecdotal evidence suggested that some formerly heterosexual Allied PoWs "turned" to homosexuality when faced with many years in camps populated exclusively by men (Cochrane 1946; Jackson 2004).

Both consensual and non-consensual sexual relations take place under conditions of confinement, and sexual abuse, sexual slavery, forced prostitution, and rape and mass rape are consistent aspects of institutional confinements. In some cases in the Nazi concentration camps, female prisoners were selected by the guards for housing in the camp brothels, which both guards and wealthy prisoners could pay to visit.

Stakeholder Communities

There is a recurrent theme in the archaeology of the modern world in general, and of the archaeology of internment in particular, of surviving participants of the events under investigation becoming involved in the research process (Moshenska 2009) (Fig. 4). This trend has theoretical, methodological, and ethical dimensions which future archaeologists studying internment sites will need to take into account. A central aspect of community involvement in archaeologies of internment is the value of individual memories in reconstructing the material and social formations of the site. Many internment sites teeter on the edge of living memory, and oral historical research can reveal an enormous amount of information of use to the archaeologist.

The most important consideration in community archaeologies of internment is the recognition of the multiple, overlapping and

Confinement and Detention in Political and Social Archaeology, Fig. 4 Project archaeologist (*right*) looking at finds in the laboratory with Mario Villani (*left*), a survivor of an Argentinian torture prison (Courtesy of Andres Zarankin)

often violently antagonistic communities involved. These include victim, perpetrator, and bystander communities; exiled or diaspora communities; and current residents on or near the site who may be associated with some or none of these (Cappelletto 2005). Planning for the engagement or involvement of these multiple communities may make the archaeology of internment a more difficult task, but the ethical and practical implications of ignoring them are far greater.

Future Directions

Today the sites of some of the most infamous prisons and concentration camps of the twentieth century are forest. Within a few decades – the blink of an eye in archaeological terms – vast settlements carved and built from the forests of central Europe, for example, have been reabsorbed by their natural environment. What are the mnemonic and archaeological implications if one can walk for miles across the sites of Treblinka or *Stalag Luft III*, once home to tens of thousands of prisoners, without realizing it? One of the most common and striking characteristics of internment sites, and from an archaeological perspective one of the most troubling, is physical ephemerality (Fig. 5). This is particularly the case with internment camps; indeed, the very term "camp" implies a temporary residence.

This ephemerality has been repeatedly exploited by the perpetrators of internment – from Nazi Germany to Pinochet's Chile – to erase the traces of camps and other internment sites from the earth and thereby from history. Combined with the absence or destruction of documentary evidence and the murder, silencing, or shaming of prisoners and witnesses, it is terrifyingly feasible that a substantial episode of internment can be erased and subsequently denied. Against this backdrop of physical and historical ephemerality, devastating c-transforms and powerful n-transforms, the responsibility of the archaeologist grows: to diligently collect what meager traces remain, and to bear witness legally or historically. The term "forensic archaeology" is usually taken to refer to studies of human remains. Its literal meaning is archaeology carried out as part of the judicial process, and it is in this sense of the term that archaeologists might want to approach sites of internment: as crime scenes where the gathering and interpretation of evidence must be carefully conducted,

Confinement and Detention in Political and Social Archaeology, Fig. 5 Ruins of Auschwitz-II Birkenau. The site was razed by the fleeing Nazis, and vast fields are all that remain of large sections of the concentration camp (Courtesy of Adrian Myers)

documented, and maintained for future use. Archaeologists are uniquely skilled to collect and store these fragile forms of data.

This appeal to careful examination is not meant to disparage or belittle the more descriptive or interpretive archaeological work conducted on internment sites, nor to suggest that archiving a site totally fulfills our moral responsibility to the past. Many internment sites are well recorded or well preserved and will survive as heritage sites or sites of memory for the foreseeable future. Yet to these as much as to faint traces of barracks beneath a forest floor archaeologists arguably have a duty of stewardship.

It is heartening to note, however, that countering this fact of ephemerality and trend towards erasure is the growing interest of archaeologists. With increasing temporal distance from the two World Wars, for example, we are beginning to see increasing archaeological research on internment camps from these most devastating and influential eras. Clearly, however, there are presently major gaps in the archaeological study of prisons and prison camps, and archaeologists need to expand their interest to outside of North America, Europe, and Australia.

Cross-References

- ▶ Internment and Prisoners of War in Historical Archaeology
- ▶ Nationalism and Archaeology
- ▶ Nationalism and Archaeology: Overview

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Conkey, Margaret Wright

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Basic Biographical Information

Margaret (Meg) Conkey (Fig. 1) is one of the leaders in archaeological method and theory, gender and feminist archaeology, and Paleolithic art. She received her B.A. in Ancient History and Art from Mount Holyoke College in 1965, and an M.A. (1969) and Ph.D. (1978) in Anthropology from the University of Chicago. Conkey taught at San Jose State University (1970–1976), University of California, Santa Cruz (1979–1980), and SUNY Binghamton (1982–1986), where she also served as codirector of Women's Studies. She joined the faculty of the University of California at Berkeley as an Associate Professor in 1987, received the Class of 1960 endowed chair in 1997, and became an Emerita Professor in 2011. Conkey also served as Director of the Archaeological Research Facility (1994–2007).

Conkey has held numerous professional administrative positions and been honored by many awards. She was the Chairperson of the Committee on the Status of Women in Archaeology of the American Anthropological Association (1975), and served as President of the Association for Feminist Archaeology of the

Conkey, Margaret Wright, Fig. 1 Margaret (Meg) Conkey

American Anthropological Association (1997–1999) and President of the Society for American Archaeology (2009–2011). At Berkeley, Conkey received the Distinguished Teaching Award of the Division of Social Sciences in 1996, the Educational Initiatives Award in 2001, and the Chancellor's Award for Advancing Institutional Excellence in 2009. She was awarded an honorary degree from her alma mater, Mount Holyoke College, in 1995. Conkey is an elected Fellow of the California Academy of Sciences (1998) and serves on the board of the Center for Advanced Studies in the Behavioral Sciences at Stanford University. *Discover Magazine* named Conkey one of the "Fifty Most Important Women in Science" in 2002.

Major Accomplishments

Conkey's contributions can be divided into three interrelated arenas: (1) Paleolithic, or Ice Age art (though Conkey prefers the term "visual imagery"); (2) the archaeology of gender; (3) a feminist approach to archaeological method and theory.

Conkey's 1978 dissertation was the first structural analysis of portable Paleolithic art pursued at an American university. In the mid-1970s, the University of Chicago was at the forefront of the "New" or Processual Archaeology, which emphasized the relationships between the natural environment and culture. This perspective did not consider Ice Age art a legitimate topic of scientific inquiry because at the time no one could imagine imagery painted on cave walls or carved into bone, antler, and ivory as having any adaptive value.

Conkey was the first to apply a culture-as-adaptation perspective to the question of Ice Age visual imagery. But she merged this "Americanist" focus with the structuralist work of French archaeologist André Leroi-Gourhan. Conkey demonstrated that seemingly inconsequential portable artifacts "decorated" with patterned lines, hatch marks, half-circles, and the like had an adaptive function in promoting hunter-gatherer aggregation activities during the Upper Paleolithic (specifically Magdalenian) (Conkey 1980, 1984, 1989). Importantly, Conkey was not trying to decipher what the images meant. Rather, she was analyzing how their patterning would have been adaptive for those making and seeing them. Conkey has long stressed the important distinction between trying to get at the meaning-content of prehistoric visual imagery (an unverifiable orientation open to speculation) and the more anthropological (and also testable) concern with understanding how such imagery was full of meaning for the makers, users, and viewers.

Conkey's research on Paleolithic visual imagery has advanced archaeological method and theory in at least two important ways. First, it demonstrates that Paleolithic art is a valid scientific topic amenable to hypothesis testing. Second, her work has also paved the way for understanding ancient visual imagery from an adaptive perspective. In this, Conkey has shown how ancient visual imagery was as central and necessary to ancient cultural survival as were stone tools or fire.

Conkey's second major contribution to the discipline concerns the archaeology of gender. Prior to her path breaking article with Janet Spector "Archaeology and the Study of Gender" (1984), the activities of ancient women and men were taken for granted. It was assumed, uncritically, that in the past men made and used the hard tools (that conveniently survive in the archaeological record) to hunt, to dominate

nature and thus ensure cultural survival, while ancient women were assumed to have pursued the "less important" activities (with perishable tools) such as gathering and childcare. Conkey was among the first to call into question such unfounded assumptions. Importantly, she went further by suggesting that ancient gender relations (much like Paleolithic visual imagery) mattered substantially to how cultures functioned in the past (Gero & Conkey 1991; Conkey 2008). In this regard, Conkey helped make gender both a necessary and legitimate topic of archaeological inquiry.

Conkey's third major contribution is also her most ambitious: developing a feminist-inspired alternative to mainstream archaeological research. Her focus on "doing archaeology as a feminist" is an extension of her work uncovering gender bias in the everyday practice of archaeology (Conkey & Tringham 1995; Conkey & Gero 1997; Conkey 2003). Among other revelations, Conkey has demonstrated the extent to which New Archaeology's systems-theory definition of ancient culture was shaped by insidious gender biases producing sterile understandings of the past. As a result, Conkey's feminist insights have stimulated archaeologists around the world to rethink their categories of data, the analytical scales deemed appropriate for particular research questions, and even to reassess which empirical patterns are relevant (e.g., du Cros & Smith 1993). In feminist theory, this is known as the "receding horizon," whereby an initial challenge to mainstream thought or practice raises additional concerns that, over time, lead to more fundamental epistemological, ontological, and philosophical questions. In archaeology, Conkey's initial concern with how mainstream archaeology undertheorized ancient gender has led to far more substantial concerns with archaeological research and theory building.

Influence on the Discipline

Conkey's perspective on Ice Age visual imagery is important not only for having introduced English readers to the structuralist theories of Leroi-Gourhan. She also vastly improved this perspective by infusing it with an anthropological concern with ecology, function, and adaptation. Conkey is directly responsible for elevating Paleolithic "art" to a legitimate topic of scientific inquiry, exemplified by the widely popular "art-as-information" school of thought. She also radically transformed our understanding of gender in prehistory, arguing through her own research, that gender was a process central to both social reproduction and to culture change. As a result, gender is now a theoretically informed and empirically grounded topic pursued by archaeologists studying practically every time and place in the world's past. Her work has also raised awareness of the extent to which gender bias shapes every facet of the discipline, in turn leading to a significant amount of retrospection and reformulation (Conkey 2003). Finally, Conkey has been an articulate, tireless, and passionate advocate for a feminist (and more generally, a humanistic) approach to prehistory. In the field and in the classroom, Conkey has substantially reshaped the everyday practice of contemporary archaeology. Through her innovative blending of French and American perspectives, the sciences and the humanities, and feminism, few twentieth-century archaeologists have influenced so many different aspects of the discipline.

Cross-References

- ▶ Art, Paleolithic
- ▶ Europe: Paleolithic Art
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ Semiotics in Archaeological Theory
- ▶ Structural Archaeology

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Connah, Graham

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Basic Biographical Information

Professor Graham Edward Connah is an archaeologist of both Africa and Australia. His particular expertise is archaeological field research, including excavation, in tropical Africa and in Australia. He is a noted author and editor, particularly of archaeological syntheses. He has excavated and conducted archaeological fieldwork in Britain, Nigeria, Egypt, Uganda, and Australia. He was born in 1934 and grew up in northern England. He received a B.A. in 1959 and an M.A. in 1964 from Cambridge University. He received a Doctor of Letters degree from the University of New England in 1984 on the basis of his two books *The Archaeology of Benin* (Connah 1975) and *Three Thousand Years in Africa* (Connah 1981). He is a Member of the Order of Australia, awarded in 2000, "For service to the promotion and enhancement of the profile of Australian historical archaeology through the University of New England, as a researcher and author, and to African archaeological research."

Professor Connah joined the University of New England in NSW, Australia, as a Lecturer in 1971 and was appointed Emeritus Professor upon his retirement in 1995. Professor Connah continues to take an active role in both national and international archaeology since his retirement, always ably assisted by his wife Beryl. Professor Connah has been a Fellow of the Royal Anthropological Institute of Great Britain and Ireland since 1966 and a Fellow of the Society of Antiquaries of London since 1968. He was elected a Fellow of the Academy of the Humanities in 1988 and was Chairperson of the Academy's Archaeology and Prehistory Electoral Committee in 1993. He was elected President of the Australasian Society for Historical Archaeology (ASHA) in 1992, and has had a long-standing involvement with ASHA as committee member, President, and founding editor of what became *Australasian Historical Archaeology*. He continues as a member of the Editorial Board.

Major Accomplishments

Professor Connah is an active and respected member of the national and international research communities. He has presented papers at conferences across the world, from Los Angeles, Mombasa, Cambridge, Adelaide, Harare, to Canberra and Minneapolis. Professor Connah is a passionate advocate of the importance of publishing archaeological results, and he has not only provided outlets for others to do so, but has published conscientiously himself. His most influential publications are: *Of the Hut I Builded: Archaeology of Australia's History* (1988), revised as *Archaeology of Australia's History* (Connah 1993) and *African Civilizations. Precolonial Cities and States in Tropical Africa: An Archaeological Perspective* (Connah 1987, second edition 2001). Some of his other important Africanist books are *The Archaeology of Benin* (Connah 1975), *Three Thousand Years in Africa* (Connah 1981), and *Kibiro* (Connah 1996). In 2004, he published a general book on the archaeology of Africa entitled *Forgotten Africa* (Connah 2004), which has since been translated into German (2006), French (2008), and Italian (2009). His book *The Same Under a Different Sky? A Country Estate in Nineteenth-Century New South Wales* (Connah 2007), is about his work at Lake Innes in northern NSW. He recently completed a book on archaeological writing for Cambridge University Press, *Writing About Archaeology* (Connah 2010). The impact and breadth of Professor Connah's research is shown by three of his volumes becoming standard texts in their subject areas: *Australian Field Archaeology: A Guide to Techniques* (Connah 1983a) in courses on archaeological field methods; *Archaeology of Australia's History* (Connah 1993) in the area of Australian historical archaeology; and *African Civilizations* (Connah 1987) in the study of precolonial cities and states in Africa.

Professor Connah's career has had a profound impact on the discipline of archaeology in three principal ways. In 1971, Professor Connah joined the (then) Department of Classics and Ancient History at the University of New England. He was a founder of historical archaeology as a subdiscipline of Australian archaeology (Connah 1998, 2003); he has been a major player in the development of archaeological studies of Africa and within African countries; and he established one of the most successful archaeology university departments in Australia. Originally (and still) an Africanist, he turned his focus to historical archaeology when he came to the University of New England and wanted to provide students with more diverse field experiences. So he trained many students over the years at historic Australian sites such as Saumarez Station, Winterbourne, Bagot's Mill, and Regentville (Connah 1976, 2003) as well as carrying out field archaeological investigations of Aboriginal sites (Connah et al. 1977; Horton & Connah 1981; Connah & Jones 1983). He has been instrumental in providing pathways to higher education, for example, in 1993, he helped to organize and teach a series of seminars for postgraduate students at the University of Nairobi, Kenya, which was funded by the Swedish government as part of an overseas aid program.

In 1986, Professor Connah began teaching one of the first historical archaeology courses at an Australian university. This tapped into the heritage interests of the Australian public, which have since burgeoned. Historical archaeology is now taught at many Australian universities, including the Australian National University, Charles Darwin University, Flinders University, James Cook University, La Trobe University, Sydney University, the University of Queensland, University of Tasmania, and the University of Western Australia. He was appointed as Head and sole staff member of the newly established Department of Prehistory and Archaeology in 1974. When he retired in 1995, the (renamed) Department of Archaeology and Palaeoanthropology had a staff of 13, including 8 academic appointments, an ARC Fellow, a professional officer, and a technical officer. The Archaeology and Palaeoanthropology teaching unit at UNE has not been as large, either before or since 1995. In 1995, it had an undergraduate enrolment of 600, comprising about 50 % distance education students, and Professor Connah attracted a contingent of high-quality postgraduate students. The expansion of this Department during this period was largely due to his extended efforts (Connah 1983b, 1997, 1998).

Currently, he is a Visiting Fellow in the School of Archaeology and Anthropology at the Australian National University, Canberra. His main interest remains the archaeology of tropical Africa, particularly the last 4,000 years.

Cross-References

- ▶ Australasian Historical Archaeology
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Colonial Encounters, Archaeology of
- ▶ East Africa: Historical Archaeology
- ▶ Kirkman, James
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- ▶ Southern Africa: Historical Archaeology
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Conservation and Management of Archaeological Sites

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Brief Definition of the Topic

International peer reviewed journal. Published four times a year by Maney Publishing.

Address: Maney Publishing, Suite 1C, Joseph's Well, Hanover Walk, Leeds LS3 1AB, UK or Maney Publishing, 875 Massachusetts Avenue, 7th Floor, Cambridge MA 02139, USA.

Founding editor: Nicholas Stanley-Price (1995–2006).

Current editor: Tim Williams (2007 onwards).

The peer-reviewed journal *Conservation and Management of Archaeological Sites* (CMAS) is a primary reference in the field of archaeological site management both for active professionals and for the academic community. Launched in 1995, the journal covers both theoretical and practical issues in archaeological site management and conservation. Peer-reviewed papers from around the world report on new thinking and best practice in site management and conservation. CMAS also publishes short comments, conference reports, book, and website reviews and lists forthcoming conferences and meetings.

Topics covered have included cultural, social, ethical, and theoretical issues in archaeological site management and conservation; documentation and condition reporting; site deterioration and environmental monitoring; preventative conservation, including reburial and protective sheltering of sites; perseveration in situ; building materials analysis and treatment; restoration and reconstruction of buildings; visitor management; sustainable tourism; site interpretation and education; and national and international legislation and charters.

Special issues have included the following: 2002 *Shelters on Archaeological Sites*, 5(1–2); 2004 *Reburial of Archaeological Sites*, 6(3/4); 2008 *Archaeological Sites and Education*, 10(1); 2009 *Conserving Marine Cultural Heritage*, 11(1); 2009 *Archaeology and Conflict*, 11(3–4); 2011 *Managing Archaeological Sites in Sub-Saharan Africa*, 13(2–3). Forthcoming special issues include *Archaeological Site Management in China*, *Rock Art Management* and *Conservation, and Heritage Protection in Central Asia*.

Cross-References

▶ Archaeological Stewardship
▶ Authenticity in Archaeological Conservation and Preservation
▶ Conservation and Management of Archaeological Sites
▶ Cultural Heritage Management and Armed Conflict
▶ Cultural Heritage Management and Submerged Sites
▶ Cultural Heritage Management: International Practice and Regional Applications
▶ Cultural Landscapes: Conservation and Preservation
▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
▶ Field Stabilization of Immovable Heritage
▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
▶ Heritage Values and Education

▶ Heritage Values, Communication of
▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
▶ International Heritage Conservation Principles: Historical Overview
▶ Preservation Paradigm in Heritage Management
▶ Sacred Site Conservation and Preservation
▶ Site Stewardship Programs
▶ Site Visitation and Interpretation: Management
▶ Underwater Sites in Archaeological Conservation and Preservation
▶ Urban Heritage

Further Reading

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Conservation and Preservation in Archaeology in the Twenty-First Century

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Introduction

For the past half century, the focus of conservation and preservation in archaeology has been moving away from an overriding concern with developing and applying treatments (the chemical and physical means by which arrest deterioration or prepare an object or structure for display) toward a focus on the holistic management of archaeological sites and landscapes (Getty Conservation Institute 2003). While treatments remain essential, this new approach emphasizes the need to inventory and evaluate archaeological sites systematically, to assess and prioritize conservation and preservation needs with reference to the context provided by evaluation, and to acquire the resources by which to protect sites though careful presentation of them to the public. The ideal is acknowledged to be protection of archaeological materials in situ and to do this by utilizing nonintrusive research methods as much as possible. The challenge now is to balance the ideal of preservation with the need to garner the resources required for preservation through engagement with the public at archaeological sites and through the responsible use of media. This requires constant negotiation with all parties having an interest in archaeological sites. Outcomes have proven to be favorable when archaeologists, material conservationists, and architectural conservationists work together to advocate and plan for the preservation of archaeological material and context.

Definition

Conservation Versus Preservation

The terms conservation and preservation have been used in reference to archaeological sites in ways that they are not used in other fields. Environmental management is closely allied to archaeological heritage management, yet environmentalists draw a clear distinction between conservation and preservation: Conservation is seen as the proper use of nature, while preservation is regarded as the protection of nature from improper use. The primary concern of environmentalists is conservation, not preservation. Populations of plants and animals are renewable, despite the removal of individuals within populations through harvesting or environmental change. Conservation goals allow for change within acceptable limits. Those *limits of acceptable change*, a term that has become central to the practice of natural resource conservation, ensure that new individuals will take the place of those

lost. Preservation, from the standpoint of natural resource management, is short sighted. It seeks to protect individuals within the population, the population as a whole, and the environment from change. Given that ecologies are dynamic, the application of preservation principles to environmental management has proven to be ecologically unsound.

In contrast, archaeological materials are finite, nonrenewable, and irreplaceable. To preserve what these might contribute to scientific and historical knowledge requires that we safeguard not only the materials themselves but also the context in which they occur, that is, they must preserved in situ. Therefore, to an archaeologist, preservation must be the ideal. The concept of "limits of acceptable change" does not fit well with this ideal.

Preservation in the field of architectural conservation has a different but not altogether unrelated meaning, which is to stabilize a structure by preventing further deterioration and to leave it in its current form (United States National Park Service 1968: 21). The present form of a structure might contain elements from different time periods. Whatever is present when the structure is found is stabilized.

Nonetheless, as they are commonly used by archaeologists, the terms conservation and preservation are largely interchangeable. The manner in which the term conservation has been historically been used is reflected and has been further propagated by the Venice Charter. Article 5 of that document says, for example, that "The conservation of monuments is always facilitated by making use of them for some socially useful purpose. Such use is therefore desirable but it must not change the lay-out or decoration of the building. It is within these limits only that modifications demanded by a change of function should be envisaged and may be permitted" (ICOMOS 1964). Similarly, conservation treatments of archaeological sites and materials are usually done in an effort to make them available to some social useful purpose, and often this is to present archaeological materials on-site or in museums.

Stabilization

Stabilization has been defined as the effort to minimize the deterioration of a structure, as a means to the end of preservation as defined just above, thereby accomplishing the objective of preservation. It was so defined, for example, in the United States Secretary of the Interior's Standards and Guidelines, but in the revised guidelines issued in 1995, the term itself was removed.

Restoration

According to the Venice Charter (1964: Article 9), restoration "must stop at the point where conjecture begins, and in this case moreover any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp." The latter part of this statement is widely interpreted to mean that any new materials must be distinguishable from original fabric. The further statement is made that "The restoration in any case must be preceded and followed by an archaeological and historical study of the monument."

Reconstruction

Reconstruction is widely regarded as problematic but is acceptable under certain conditions according to most of the relevant published standards. The document that probably carries the most far-reaching influence in the field of conservation and preservation is *the Convention Concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention)* (UNESCO 1972). *The Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO 2012) have this to say: "In relation to authenticity, the reconstruction of archaeological remains or historic buildings or districts is justifiable only in exceptional circumstances. Reconstruction is acceptable only on the basis of complete and detailed documentation and to no extent on conjecture." As Stanley-Price points out (2009), the World Heritage Convention is the only document that pertains to conservation and preservation issues that have a legal basis. Signatories to the World Heritage Convention become States Parties and are bound

in that way. It is especially notable that more countries have signed the World Heritage Convention than any other international treaty.

Among other organizations that have stewardship responsibilities for archaeological sites and a well-developed policy for cultural resource management is the United States National Park Service. The Cultural Resource Management Guidelines for the National Park Service (NPS-28) describe the circumstances under which restoration can be conducted, which include "Archeological, documentary, or physical evidence is available to permit accurate reconstruction with minimal conjecture, and such reconstruction is essential to public understanding of the cultural associations of a park established for that purpose" (United States National Park Service 1998: 128).

Authenticity

The need for authenticity is related to the application of the Venice Charter to instances of restoration and reconstruction. As the Nara Document on Authenticity (1994: Paragraph 10) puts it:

> Authenticity, considered in this way and affirmed in the Charter of Venice, appears as the essential qualifying factor concerning values. The understanding of authenticity plays a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning, as well as within the inscription procedures used for the World Heritage Convention and other cultural heritage inventories.

This would appear to directly address the reservations about reconstructions and restoration that are evident in the Venice Charter and the World Heritage Convention, as well as many other conservation and preservation guidelines. These include those published by the United States National Park Service (1998: 129–31), which, despite a cautious approach, also allow for restoration given adequate archaeologically derived evidence or documentary evidence.

Heritage Versus History

David Lowenthal (1996: 102) draws a distinction between heritage and history. He sees heritage as a commemoration of people and places that produces a sense of personal and community associations. Heritage is an "exalted legacy," one so seductive that it can threaten the study of "history," which attempts to study the past with as much objectivity as possible. Heritage can be "popularized, commoditized, and politicized" (Lowenthal 1996: 87). It can also become an economic asset. This is perhaps more true than ever before, as transportation networks have greatly expanded and travel has become less expensive.

The economic use of archaeological sites can generate widespread support from business, communities, and governments. It can also provide the funding necessary to safeguard archaeological sites from damage by looting, conflict, or natural forces such as erosion. Because economic values often override all others in practice, the distinction between conservation and preservation becomes more crucial. The latter is essential if archaeology is to serve history while managing the market demands of heritage.

Historical Background

For many years, archaeologists, especially those employed by academic institutions and museums, have been engaged in the conservation and restoration of structures and the acquisition of aesthetically pleasing artifacts for display at museums, in addition to undertaking research. The practice of archaeology, in this role as handmaiden to monument conservation and restoration, was guided by the Athens (Le Corbusier 1933) and Venice Charters (ICOMOS 1964), which promoted the idea of minimum intervention, reversibility, and anastylosis (the recomposition of existing architectural members) as the only acceptable form of reconstruction. It also focused upon material authenticity. Anastylosis was conducted at many sites across the globe, in part as a means through which archaeologists could secure both political and financial support, which enabled countries with an architecturally rich heritage to develop destinations for tourism. These sites also became potent forces for the construction of national identities and as a foundation for the "imagined community"

(see Anderson 1983) needed to secure a place in global politics.

The emphasis was on excavation as the means by which to advance such goals, and this was inherently problematic because excavation is an unavoidably destructive process. Conservators were often not on site when vulnerable materials were exposed. As funds and energies became exhausted at the end of field sessions, the stabilization and protection of the exposed site was, in some cases, overlooked. More than 100 years after Schliemann excavated Troy, artifacts from the site were being treated for conservation. Artifacts from sites of lesser renown would never benefit from such sustained attention. Clearly, a more comprehensive and realistic approach to discharging the responsibilities that archaeologist must accept when excavating ancient materials and structures was required.

Today, archaeology is intertwined with archaeological heritage management. A benchmark in this was a session organized by the Getty Conservation Institute at the Fifth World Archaeological Congress (WAC-5) in 2003, held in Washington, DC. The introduction to the resulting publication stated, "Foremost among the directions in which archaeological conservation has moved are methodological that provided the cultural foundation for the constitutional state, which is site management planning and implementation and support for the increasing participation of indigenous peoples and communities and other stakeholders. . ."(Getty Conservation Institute 2003: 2). It is has become generally acknowledged that holistic planning and establishing capacity for comprehensive and effective site management are prerequisites for effective conservation and preservation. Without these, benefit realized from any treatment is temporary, and the site and component materials will continue to deteriorate and ultimately be lost.

Key Issues/Current Debates

It is likely that the most vigorous and important debates regarding the conservation and preservation of archaeological sites revolve around the issue of how to balance preservation in the archaeological sense – preservation of material as discovered in the context in which it was discovered – with the necessity to gather the economic and political support needed to ensure preservation. Tourism, which powerfully attracts political and popular support for preservation of archaeological sites and landscapes, carries with it a cost in terms of loss of material culture unless it is carefully managed, and too often this is not the case (see Comer 2012).Yet without the support that tourism generates, many sites would be damaged or destroyed by natural processes or by looting.

Archaeology must also look to its ethical standards. Frank Matero and others have been critical of archaeologists for not observing what they see as basic conservation principles. Matero (2008: 2) has said that "The practices of archaeology and conservation appear by their very nature to be oppositional". It can also be said that many treatments done in the name of conservation have, ironically, proven to be destructive of the very materials that were to have been conserved. Both archaeological research and the conservation of archaeological sites and materials have and can be conducted in ways that prioritize economic benefit over scientific and historic knowledge. The standing structures fashioned by anastylosis by archaeologists and conservators working together create not only a didactic device but also a tourism asset. Artifacts are prepared for display in museums to attract visitors, sometimes in ways that destroy material that with analysis in the future might be informative.

An approach that minimized the need for both intrusive archaeological excavation and conservation treatments would amount to a preservation approach and one consistent with the objectives of archaeological heritage management. Archaeological heritage management by its nature must take the long-term view to be effective. From that perspective, the first priority is protecting archaeological sites and materials from destruction or damage. Effective archaeological heritage management directs research and controls the

marketing of heritage in ways that preserve archaeological materials. Yet the long view also must accommodate economic and political realities until the day when nondestructive technologies and fully developed management capacities become commonplace.

Future Directions

Minimizing and Mitigating Archaeological Intrusion

Archaeologists today utilize many methods, technologies, and approaches that are intended to minimize excavation and maximize information retrieved from archaeological materials. Archaeological guidelines and standards that are now common in most parts of the world stipulate that materials recovered by means of excavation be carefully catalogued and analyzed in ways that become part of the permanent record. Excavation records are typically subject to examination and review by a variety of administrative authorities at the national, regional, and local levels. Given such capacities and this obligation, it is only practical nowadays to limit excavation and the numbers of artifacts recovered to that which is absolutely necessary to accomplish carefully formulated excavation objectives. Recordation of findings mitigates to some degree the destruction and removal from context of archaeological remains.

Further, the availability and use of remote sensing and the analysis of data collected by digital technologies make it possible to extract information from archaeological sites and landscapes in ways that demand much less excavation. Geophysical technologies, such as ground-penetrating radar, magnetometry, electrical resistivity, and the electrical conductivity can be used to conduct a nondestructive, subsurface inventory. Aerial and satellite remote sensing can provide information about subsurface remains given optimal conditions but, more importantly, can be used to reconstruct environmental context and suggest relationships between archaeological sites and the environment, and among archaeological sites themselves, which enrich interpretation of what is retrieved via archaeological excavation. Such relationships can be further revealed and tested through the use of spatial analyses. Among spatial analyses of particular promise are space syntax analysis, least cost analysis, and others that can highlight relationships among terrain, environmental attributes, and human settlement and regional use patterns (Comer & Harrower 2013).

It might be said, therefore, that the ultimate objective of both archaeological research and heritage management has always been preservation but that the proximate objectives, often driven by institutions that provide finding for archaeological research, have included the necessary use of destructive methods. The destruction that has been necessary is quickly being minimized.

A Unified Approach to Preservation of Nonrenewable Resources: From Treatments to Strategy

Materials taken from the ground are confronted with a very different environment than that from which they were removed, and often deteriorative processes accelerate in this new environment. It is the responsibility of the archaeologist to stabilize these materials in ways that allow and do not impede analysis of them. Conservators also are tasked with preparing materials for display or for long-term storage from which they can be retrieved for future study or display. In addition, conservators address the means employed to stabilize and maintain standing structures. As noted previously, treatments have been the focus of conservators for many years, and many improvements to treatments will be seen in preservation and conservation entries found within this encyclopedia. A unified approach to archaeological site management includes prioritization of conservation and preservation needs; identifying the facilities, human resources, and funding needed to satisfy those needs; and protecting archaeological sites from the degradation that accompanies

poorly managed visitor flow and unregulated development on and around archaeological sites. This unified approach can be given forms by means of planning documents that go by a variety of names: Management plans, general management plans, operating planes, and sometimes conservation plans. The plans themselves do not ensure either conservation or preservation of archaeological sites and materials, of course, and often building capacity to implement plans takes many years.

Nonetheless, capacity to conserve and preserve begins with a plan. Given the ever-present threats to archaeological sites and landscapes because of widespread global development, rapidly increasing exploitation of natural resources over broad landscapes and the international tourism industry, we can only expect that preservation planning will grow in importance.

It has become apparent that that environmental change can produce damage to cultural as well as natural resources. Where burgeoning agricultural, industrial, and tourism economies have produced drastic environmental change, especially hydrological, vegetative, and land cover change, the damage to archaeological sites has been severe. For example, development associated with tourism creates impervious surfaces as hotels, restaurants, roads, and parking are built. At sites such as Petra, this has produced damaging floods as rainwater accumulates on impervious surfaces and runs, ultimately in torrents, downslope. Floods not only erode subsurface archaeological resources but also carry minerals, such as salts, which are destructive to the stone from which tombs and standing structures are formed. At sites such as Angkor, hydrological changes associated with development are equally destructive. Here, so much water is pumped from aquifers for use in hotels and restaurants that the foundations of ancient structures are undermined.

Preservation of archaeological sites requires a broad landscape approach, one that plans for sustainable development. This landscape approach also would provide the means by which to structure and control visitor flow away from sensitive archaeological resources and into already developed areas. These developed areas are places where small businesses owned by members of the local community are located. They can also be locations for museums and other interpretive facilities. Thus, visitor flow through the landscape will be directed in ways that generate community benefit and remove pressure on vulnerable archaeological sites.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Heritage Conservation Principles: Historical Overview

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Conservation in Archaeological Practice

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Introduction

Archaeology, in itself a scientific discipline, often requires the expertise of other disciplines to help in the process of reconstructing past ways of life. According to ICOMOS's Charter for Archaeological Heritage (1990) "Archaeological heritage constitutes the basic record of past human activities. The protection of this heritage cannot be based upon the application of archaeological techniques alone (and) should be based on an effective collaboration between specialists from many different disciplines."

Whether dealing with recent history or prehistory, the contribution of related sciences such as biology, geology, geomorphology, metallurgy, and material science, to name only a few, needs no further proof. The archaeologist draws on all these disciplines to produce an overview that enhances the understanding of the history and evolution of a site. But despite this interdisciplinary approach, even today, conservators complain about the lack of integration of conservation in archaeological practice (Bergeron 1994). However, the potential of conservation for archaeology remains: whether it be for the discovery of new information, preserving transient information, or rescuing fragile elements of material culture, the conservator can provide new data to the archaeologist's approach.

For example, careful examination of the surface of objects may sometimes enable the conservator, with the help of special lighting, to discover a pattern invisible to the naked eye, to provide an analysis of surface coating which will reveal to the archaeologist valuable information on the use of the object, to understand the structure or assemblage of a composite object from fragments, and to suggest a hypothesis of

reconstruction. The conservator can equally note the presence of transient elements such as impressions of plants or shells, which are lost during the stabilization treatment, or the release of the surface. The conservator's training encourages a subtle understanding of material culture: determining the structure and composition of the object is essential to adequately treat it and preserve it.

The presence of the conservator is not always necessary on many field sites, but the environmental context of certain sites demands the presence of a conservator. The consultation of a conservation specialist helps the archaeologist to plan a strategy for preservation as well as appropriate conservation measures to meet the demands of the excavation. A level sealed with clay, flooded by groundwater, or a site with permafrost constitutes environments conducive to the preservation of organic materials. The intervention of a conservator on site greatly facilitates the acclimatization of these objects, which after having come into equilibrium with their environment for hundreds, even thousands of years, are suddenly subjected to new environmental constraints.

Definition

Conservation: Any action to safeguard a cultural property in the long term. The goal of conservation is to study, to document, to preserve, and to restore the essential features present in the physical and chemical structure of cultural property, minimizing intervention as much as possible. Conservation involves examination, documentation, preventive conservation, preservation, treatment, restoration, and reconstitution (ACCR/CAC 2000).

The conservator is a person who has the training, knowledge, professional skills, and experience necessary to formulate and undertake conservation activities, in accordance with a code of ethics. Conservators are usually designated according to their domain of specialization, for example, furniture, textiles, or paintings conservators; the conservator specialized in archaeological conservation thus possesses the requisite knowledge and experience to work in collaboration with an archaeologist and their team. This conservator is competent to undertake restoration, stabilization, and preventive conservation of artifacts and structures discovered during archaeological intervention.

Historical Background

A Question of Perspective

Since its beginning, the human species has produced tangible goods whose attributes are determined in part by what is intangible in human experience: the beliefs, language, value system, and representation of the world. This immaterial heritage, which leaves no trace in the soil, influences all the production of material culture. The archaeologist concentrates their research on the portion of goods that are preserved in various states according to their immediate environment and burial conditions. The differential preservation of materials in the soil thus constitutes a limited sample that is more or less representative of the past.

Figure 1 illustrates the evolution of cultural archaeological property from some time in the past, entitled Time 0, until today:

- Circle 1 illustrates the overall production of culture at a given time. The cone emerging from the center represents material culture, and the rest corresponds to intangible production: language, belief, and value system.
- Circle 2 represents human activities that leave material traces.
- Circle 3 indicates that only a part of these traces traverses time, the others disappear, and the archaeologist only knows a small part at the moment of discovery.
- Circle 4 represents the beginning of the excavation: only one part of identified traces survives materially; the others disappear by the very fact of being uncovered.
- Circle 5 shows that only part of the traces which survive the dig are spontaneously preserved; the rest disappears or is profoundly altered without appropriate measures taken. An even tinier part receives restoration treatment, sometimes years after the dig.

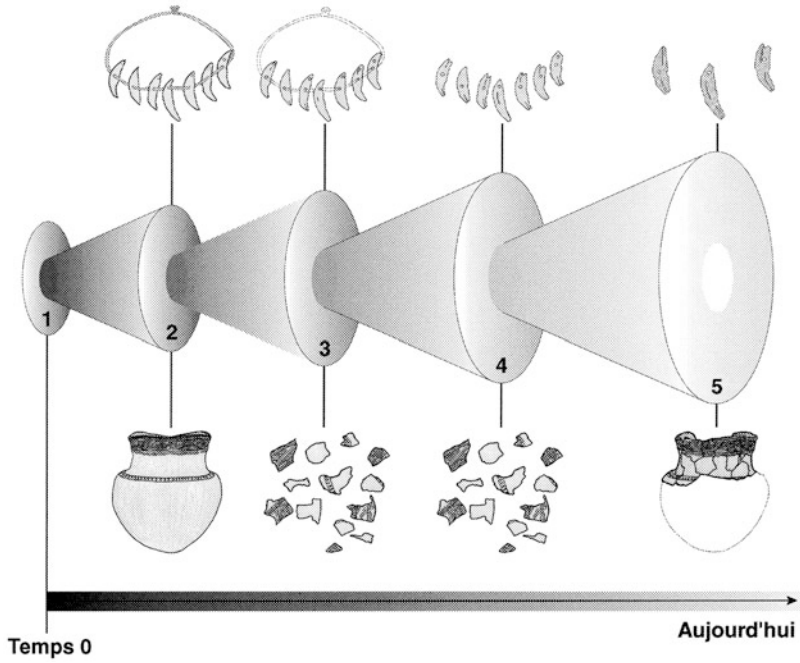

Conservation in Archaeological Practice, Fig. 1 Sequence of successive reductions established by Berducou (1990: 16-8)

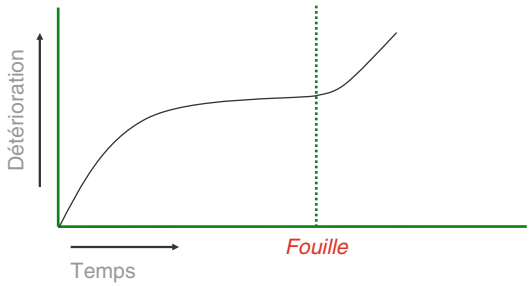

Conservation in Archaeological Practice, Fig. 2 The Hodges diagram expresses the relationship which exists between the deterioration of material culture and time (Extract from Dowman 1970)

This narrow sample of the past indicates great responsibility of the archaeological team, as their intervention will break an equilibrium that has sometimes occurred over very long periods of time. This is what is illustrated in Hodges diagram in Fig. 2.

A Balance To Be Achieved

After abandonment, many objects will suffer some degradation according to the climate, the type of soil, the context of burial, and the speed of this burial. For some material, this degradation is rapid and inevitably leads to loss, while for others, it will sometimes slow down or even stabilize. It is thus said that the object has entered into equilibrium with its environment. The Hodges diagram is a tool that allows us to establish the relationship between the deterioration of material culture over time.

The intervention of the archaeologist upsets this balance and provokes a resurgence of the deterioration of objects, which must acclimatize to new environmental conditions. At this point, the common goal of the archaeologist and conservator is to minimize the damage by the adoption of appropriate conservation measures, whether environmental or through direct intervention on the material.

An object that loses its wholeness because of an alteration to its physical-chemical properties sees its potential for study and research diminishes. Often, the resulting loss of legibility will also limit its potential for exhibition. Conversely, the adoption of conservation strategies applied in the field improves the preservation of collections, which facilitates their study and promotes their development. The responsibility for preservation is here shared between the archaeologist and the conservator, who must have agreed, before the

beginning of the dig, on the sharing of tasks as well as the strategies to be implemented in order to optimize the preservation of the uncovered objects.

Key Issues/Current Debates

The Intervention of the Conservator

Although human beings have always repaired objects that they used, conservation as a discipline cannot be understood without considering the development of art history and archaeology in the nineteenth century together with the appearance of the museum as an institution of knowledge. In itself, conservation is not a scientific discipline, nor an artistic undertaking, even if the two aspects play an important role. Its practice is located at the confluence of several fields of knowledge, particularly chemistry, physics, biology, material science, environmental sciences, anthropology, and the history of art, to cite only a few.

The conservator borrows from the chemist their workplace, namely, the laboratory, as well as the rigor of scientific research; from the historian, their capacity for interpretation; from the surgeon, the scalpel and great dexterity; and from the artist, his brushes and sensitivity. Before any intervention, the ethics of the conservator always requires a dialogue with the person responsible for the object or the collection, which may also involve the archaeologist who is responsible for the discovery. Consensus is essential to the activity of the conservator who, like the archaeologist, must constantly keep up to date with new scientific breakthroughs.

Like the archaeologist, the conservator remains on the lookout for new elements of information that could be revealed by the analysis and study of objects. An interesting example is the treatment of a bandolier discovered on the wreck of the Elizabeth and Mary (1690). Since its discovery in 1996 (Fig. 3), this object has been examined by a conservator and specialists in material culture to try and understand its structure. Several hypotheses were proposed, but none was completely satisfactory. For some time, the best hypothesis to describe the object

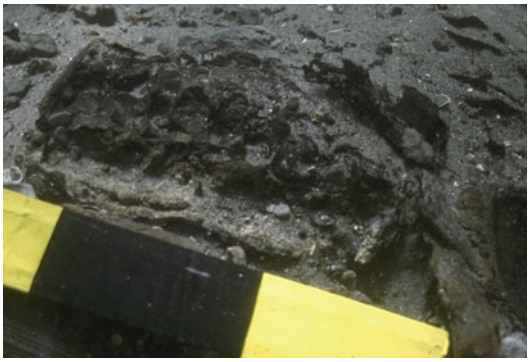

Conservation in Archaeological Practice, Fig. 3 View of the bandolier 12N2-61 in situ (Photography: Parks Canada)

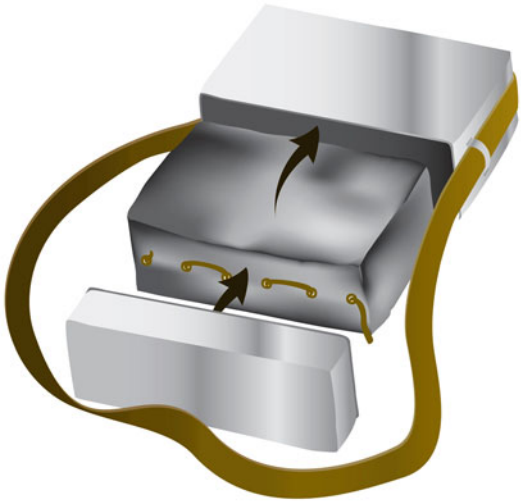

Conservation in Archaeological Practice, Fig. 4 The second hypothesis of the reconstruction of the bandolier 12N2-61, developed from field data, test results, and the conservator's observations

suggested that the paper cartridges each equipped with two lead bullets may have been wrapped in paper. An analysis suggested that the wrapping was in fact a thin layer of tin (Fig. 4), but still then, the specialists in material culture were not completely convinced. A review of all the available information this time has shown that the paper cartridges were placed in tinplate box with stiff openings. This box served to protect the cartridges during transport to the battlefield. Never used, its contents were dismantled during the excavation. It was only after many hours of

observation and examination spread over 15 years that the structure of this object, its likeness never before seen in museum collections, could be specified.

Today, the conservator has become in some ways like a doctor for objects. Their intervention requires an understanding of the materials and their process of decomposition. Each object is in this way documented, measured, and photographed, and all the information is recorded in a condition report. The beginning of treatment is only performed after discussion and agreement with the manager of the collection. Then, all the materials used, added, or subtracted as well as the results and the procedure of intervention are recorded in a conservation report, which becomes the memory of the transformation of the object over time. This documentation will prove invaluable if further interventions become necessary (Fig. 5).

Figure 6 is a good example of the choices that the conservator is regularly faced with: to intervene or not to intervene. This archaeological discovery, a cannonball colliding with a wooden structure, involves two materials requiring treatment and different environments for optimal preservation. However, it is by keeping them together that the significance of their message emerges; to separate them would greatly diminish their potential. In this case, as in many others, the question of the degree of intervention and of the need for long-term stabilization of the archaeological object becomes a priority for the conservator.

International Perspectives

A Different Context in the Marine Environment

Maritime heritage is a nonrenewable resource that is threatened not only by natural elements but also by ignorance and sometimes, unfortunately, looters' greed. Due to its inherent characteristics, including the difficulty of access and usually fragmentary state, its preservation requires special awareness and an important public education effort. As is the case for other types of archaeological heritage, the preservation of maritime heritage, rather than being a technical issue, is often a cultural issue.

> If this fact is not constantly kept in mind, public opinion, being reassured by the techniques used by specialists, inevitably feels it can be relieved of all responsibility, while the technical process, left to itself and lacking the means to act in the cultural context, is easily reduced to the automatic application of recipes, and even risks of losing sight of the purpose that justifies it (Philipot 1986: 2).

At a marine site, the interest of the archaeologist for questions related to conservation is crucial to optimize the preservation of material culture that is uncovered. The archaeologist also has the responsibility to convince and explain to local groups (history societies and divers) the significance of his/her project as well as the limits of archaeological intervention in the absence of conservation measures. It is also the archaeologist who must meet the goals of adequate preservation, as what is optional for terrestrial sites becomes mandatory for marine sites; all the materials must receive treatment, sometimes complex, which can take several years. As Pearson recalls (1977) "in the marine domain, an excavation carried out without conservation is tantamount to vandalism." In the marine environment, it is recognized that one month of intensive excavation requires one year of conservation treatment in the workshop (Pearson 1980: 147-50). This estimation should, however, be regarded as a minimum which in certain cases can double, even triple. Figure 7 illustrates the precautions to take when retrieving a gun. To use a protective support when exiting the water ensures that the fragile object has the best chances of preservation; archaeological information conveyed by the gun can bring new data useful for research, the foundation of any archaeological approach.

If the excavation of an underwater site regularly constitutes a complex and onerous undertaking, the preservation of associated

Centre de conservation Québec

AE-2010-25-01

PROPOSITION DE RESTAURATION

DEMANDEUR			
Nom:	Laboratoire et Réserve d'archéologie du Québec	**Représentante :**	Claudine Giroux
Adresse:	1825, rue Semple, Québec (Québec) G1N 4B7	**Téléphone :**	
		Télécopieur :	
Propriétaire: (si différent du demandeur)		**Courriel :**	

-Stabilisation et lisibilité des objets

CONSTAT D'ÉTAT

Désignation	**Clé en fer forgé**	**CeEt-28-1A7-113** **AE-2010-25-01**	
Description	Objet plein constitué d'une seule pièce, sans assemblage, en fer forgé. Des produits de corrosion volumineux (sédiments, éléments allogènes, concrétions) empêchent de visualiser le panneton de la clé.		
Décor	Il ne semble pas y avoir de décor.		
Matériaux et techniques	Fer forgé		
État mécanique	Objet complet apparemment, et d'une bonne tenue mécanique pour la partie hors concrétion. Celle-ci ne permet pas de visualiser l'état de l'extrémité de la clé sous jacent, mais la présence de produits de corrosion indique que le fer est corrodé, et probablement en moins bon état que le fer appartenant au reste de la clé.		
Description de la corrosion	L'artefact semble avoir subi un traitement partiel: effet lustré et noir sur la tige et l'anneau, révélant sans doute que cette partie a fait l'objet non seulement d'un dégagement, mais aussi d'un traitement à l'acide tannique ou d'un convertisseur de rouille, suivi d'une application de cire micro cristalline. Aspect: la corrosion est localisée exclusivement à l'extrémité de la clé sous forme de concrétion volumineuse ; localement le long de la tige, le métal a une apparence fibreuse reflétant la structure métallurgique d'originedu fer forgé. Forme: très reconnaissable pour ce quiest de l'anneau et de la tige, mais le pannetonest non visible.		

Conservation in Archaeological Practice, Fig. 5 (continued)

État physique du métal	Présence d'un noyau métallique apparemment sain, hormis sous la concrétion: le fer semble s'être solubilisé presqu'entièrement. La surface ne révèle aucune fissure ni soulèvement dans la partie hors concrétion.	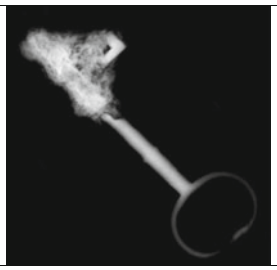

Importance de la corrosion	Sous la concrétion, la radiographie permet de visualiser que le fer à l'état métallique a presqu'entièrement disparu. Hors concrétion, la corrosion est très peu développée et quasiment nulle.	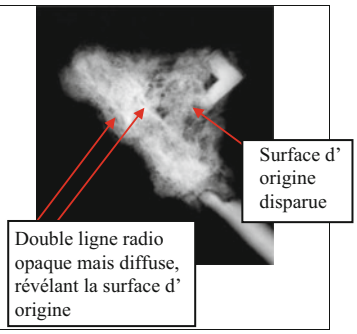
Surface d'origine	Très lisible, hormis sous la concrétion: une double ligne plus radio opaque (blanche), mais diffuse et irrégulière permet de penser que la surface d'origine est au moins en partie conservée au niveau de la tige, mais celle-ci est peut être déplacée de son niveau d'origine. Une partie de la matière supportant cette surface a disparu au niveau du panneton.	

DIAGNOSTIC

La clé a vraisemblablement déjà fait l'objet d'un traitement qui a stoppé le processus de corrosion et modifié son aspect post fouille, en dehors de la partie en concrétion (panneton). L'objet est donc stable en l'état, hormis dans cette zone. Il est néanmoins difficile de définir comment était l'objet avant traitement. Mais, àpartir de l'état actuel, on peut avancer le diagnostic suivant:

Période d'enfouissement:

-Partie hors concrétion: Le métal a une apparence fibreuse qui reflète sa structure métallurgique d'origine. Cette aspect est significatif de la corrosion qui se produit avec les fers forgés en milieu anaérobie. Il est vraisemblable que l'objet était situé dans un milieu d'enfouissement anaérobie, probablement gorgé d'eau, favorisant une altération biologique par les bactéries sulfato-réductrices (BSR) du cycle du soufre. Durant leur métabolisme, ces bactéries libèrent dans le milieu des ions qui précipitent les ions métalliques. Ce milieu est favorable à la formation de concrétion qui forme une gangue autour du métal qui parallèlement se solubilise. Une fois recouvert de concrétion, le fer forgé se corrode préférentiellement le long des inclusions qui sont orientées selon le sens de forgeage. A l'interface métal/produits de corrosion, il en résulte une forme de corrosion particulièrequi rappelle l'apparence du grain du bois, tel que constaté sur la clé. L'état physique visible laisse donc penser que la clé était initialement recouverte complètement de concrétion.
-Partie sous la concrétion: le métal est très corrodée. Il semble avoir été presque complètement solubilisé. Cette zonepeut être ou a pu être le siège d'une corrosion active mais aussi d'une corrosion à caractère évolutif, reliée à la présence des bactéries sulfato-réductrices.

Nouvelle exposition aux conditions atmosphériques:

La partie déjà traitée est stable.
Le panneton est plus à risque en raison de la poursuite de l'activité supposée des bactéries anaérobies (corrosion évolutive), car même en condition aérobie, la concrétion fait une barrière aux échanges limitant l'apport d'oxygène sous la concrétion.
La poursuite de la corrosion active se poursuit tant qu'il subsiste un noyau métallique. Une de ses manifestations est l'apparition de gouttelettes à la surface de l'objet. Les autres manifestations sont la présence de gonflements, délitements, éclatements et fissures. Elle peut entraîner la fragilisation de la zone du panneton et possiblement sa ruine.

Blandine Daux — 8 septembre 2010
Signature du restaurateur ou de la restauratrice — **Date**

Conservation in Archaeological Practice, Fig. 5 (continued)

Proposal for Restoration

APPLICANT			
Name:	Laboratoire et Réserve d'archéologie du Québec	**Representative:**	Claudine Giroux
Address:	1825, rue Semple, Québec (Québec) G1N 4B7	**Telephone:**	
		Fax:	
Owner: (if different from the requester)		**email:**	

SUBJECT OF APPLICATION
-Stabilization and readability of objects

STATE OF OBJECT			
Designation	**Wrought iron key**	**CeEt-28-1A7-113 AE-2010-25-01**	
Description	Complete object comprised of one piece, without assembly, in wrought iron. Products resulting from extensive corrosion (sediments, foreign elements, concretions) impede visualization of the blade part of the key.		
Setting	The object does not seem to have any ornamenttion.		
Materials and Techniques	Wrought iron.		
Mechanical state	The object appears complete with good mechanical strength for the part that is not corroded. This does not allow for visualization of the blade part of the key, but the presence of corrosion on the blade indicates that the iron on this part of the key is probably in a worse condition than the iron belonging to the bow component of the key.		
Description of the corrosion	The artifact seems to have undergone partial treatment since it has a glossy, black effect on the bow and ring sections, revealing that these parts were not only subject to clearance, but also to a tannic acid treatment or a rust converter, followed by the application of microcrystalline wax. Appearance: the corrosion is localized exclusively at the blade end of the key as a large concretion; locally along the rod, the metal has a fibrous appearance reflecting the original metallurgical structure of the wrought iron. Form: very recognizable in terms of the ring and bow components, but the blade component is not visible.		
Physical state of metal	Presence of an apparently healthy metal core, except under the corrosion: the iron seems to have almost completely dissolved. The surface shows no cracks or swellings in those parts that are outside the main area of corrosion.		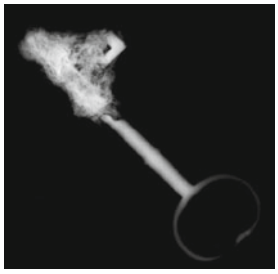

Conservation in Archaeological Practice, Fig. 5 (continued)

Importance of the corrosion	Under the corrosion, the radiography makes it possible to see that the iron in the metallic state has almost entirely disappeared. Outside of the corroded section, the corrosion is largely under-developed and almost nil.	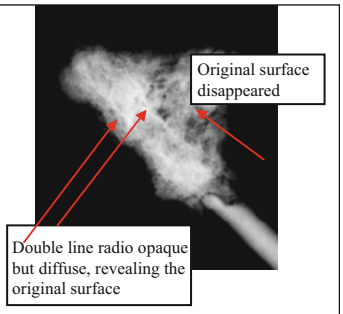
Original surface	Very readable, except under the corrosion: a double line more radio opaque (white), but diffuse and irregular suggests that the original surface is at least partially preserved at the level of the stem, but it may have moved from its original level. Part of the material supporting the surface has disappeared at the blade end of the key.	

DIAGNOSTIC

The key has probably already been the subject of treatment to stop the corrosion process. It is likely to have changed its post excavation aspect, apart from the part that is subject to corrosion.Thus, the object is in a stable state, except for the corroded area. Nonetheless, it is difficult to be certain of the condition of the object before treatment. However, from its current state, we can advance the following diagnosis:

Period of burial:

- Part outside the concretion.The metal has a fibrous appearance that reflects its original metallurgical structure. This is typical of the corrosion that occurs with forged iron in anaerobic environments. It is likely that the object was situated in an anaerobic burial environment, probably waterlogged, which promoted biological damage by sulfate-reducing bacteria. During metabolism, these bacteria release in the milieu ions that precipitate metal ions. This environment is favorable to the formation of concretion that forms a matrix around the metal that dissolves in parallel. Once covered in the concretion, the wrought iron corrodes preferentially along the inclusions that are oriented along the direction in which it was forged. At the interface of the metal/products of corrosion, this produces a particular form of corrosion that recalls the look of wood grain, such as is observed on the key. The visible physical condition therefore suggests that the key was originally completely covered in concretion.
- Part under the concretion. The metal is very corroded. It seems to have been almost completely dissolved. This area could be or may have been the seat of an active corrosion but could also be due to a natural corrosion related to the presence of sulfate-reducing bacteria.

New exposure to atmospheric conditions:
The part already treated is stable.

The blade section of the keyis more at risk due to the continued activity of assumed anaerobic bacteria (active corrosion). This is because even under aerobic conditions, the concretion is a barrier to exchanges that limit the oxygen supply under the concretion. The corrosion continues as long as there exists a metal core. One of its manifestations is the appearance of droplets on the surface of the object. Other manifestations include the presence of swelling, disintegrations, cracks and splits. These can cause brittleness of the bit zone and possibly its ruin.

Blandine Daux	8 September 2010
Signature of the restorer	**Date**

Conservation in Archaeological Practice, Fig. 5 A condition report produced for an archaeological object coming from the collections secured by the Ministry of Culture and Communications

remains is equally important. In addition to the conservation of materials that are preserved for hundreds, sometimes thousands of years due to the presence of water, the question arises of the level of intervention and its objectives. Moreover, marine sites can sometimes lead to the discovery of marine concretions which trap in their gangue numerous objects or structures carrying information. The subtle excavation of these concretions by a conservator involves some delegation of archaeological intervention, as the archaeologist is not usually equipped to combine the excavation of these shapeless masses and the preservation of objects trapped

inside. Figure 8 illustrates the complex work and equipment necessary to treat a marine concretion, a task that corresponds more or less to in-laboratory excavation.

Here again, it is the dialogue and regular interaction between stakeholders that allow the achievement of a common goal. Each professional is guided by his/her own code of ethics, and every difference in the perception and interpretation of the respective roles must take place in a climate open to different practices.

Conservation in Archaeological Practice, Fig. 6 Cannonball embedded in a piece of wood (Collections from Québec City, Îlot Hunt. Photography: Centre de conservation du Québec, André Bergeron)

The actions of the conservator, with a view to optimizing the preservation of archaeological information, must coordinate with those of the archaeologist.

Future Directions

The preservation of archaeological collections is a complex question, possessing multiple complementary facets. The main international charters provide multiple tags to guide the relations between archaeology and conservation, but they do not contain all the answers. The ultimate responsibility in the interaction between these two disciplines which study, preserve, and highlight archaeological heritage must be addressed on the basis of broad principles which generate a consensus among the disciplines that compels individual professionals to engage and participate. Every stakeholder, within their field of competence, must strive to achieve the highest of standards, whether they are practical or theoretical. The preservation of cultural heritage stemming from archaeology constitutes a delicate issue, and it is essential to address it for the benefit of future generations.

Conservation in Archaeological Practice, Fig. 7 Two underwater archaeologists at work when excavating a gun found on the wreck of the Elizabeth and Mary (Photography: Peter Waddel, Parks Canada)

Conservation in Archaeological Practice, Fig. 8 A conservator at work during the excavation of a concretion found on the wreck of the Elizabeth and Mary (Photography: Centre de conservation du Québec, Michel Élie)

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Excavation Methods in Archaeology
- ▶ Freshwater Archaeology
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Heritage and Archaeology
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Waterlogged Finds: Conservation
- ▶ Wood: Conservation and Preservation

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Conservation in Museums

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Introduction

The conservation of museum collections is a vital endeavor in the recovery, protection, and advocacy of the past. The protection of items that are removed from their primary context, and the information associated with that context, is part of the museum's role as a guardian of the past. Recording and preserving the past for future generations and displaying it for the enjoyment and

enlightenment of present day communities all lend to the successful management of museum collections. The constantly evolving nature of museum collections necessitates that conservators and collection managers maintain longstanding collections while continuing to collect and serve institutional missions. While a myriad of factors contribute to the shape that museum collections take, standards for conservation must be applied equitably to the care of the various objects that give museums their substance.

Definition

The primary goal of conservation is to preserve the item, in both the physical and intangible sense. Though the precise methodologies employed to undertake this effort might have changed over the years, the goals of conservators have largely remained the same. The value of an item in a museum collection is not tied only to the physical integrity of the piece. Rather, in the contemporary practice of archaeology, value is no longer bound solely to the artifact as an object, but as a manifestation of cultural adaptations to the world. Conservation is not only about protecting the object from damage or deterioration. It is about preserving the meaning and knowledge that are derived from the object and making sure that both tangible and intangible aspects of archaeological museum collections are accessible and equipped to persist into the future (Grattan & Moses 2006). On a more scientific level, the goal of conservation is to ascertain the causes and preventative measures relating to the deterioration of museum assets.

Conservators must deal with the management of collections on two levels. Conservation measures geared towards preservation and stabilization are necessary in all collection storage settings. While preventative measures deal with researching the potential harms that may come to a collection, stabilization is an issue of discovering what is causing harm to an object and how to arrest this process. Preventative procedures may include the development of appropriate storage and display areas, installation of climate control mechanisms, careful and routine analysis of materials present in the museum environment, and regular evaluations of the integrity of objects in the collection (Bradley 2005).

Key Issues/Current Debates/Future Directions/Examples

Over the past few decades, both the number and extent of museums and their collections have grown (Keene 2002). As museum collections grow and expand, so do many of the issues associated with the conservation of items in that collection. Issues of space, visibility, and staffing resources are all tied to how the growth and management of museum collections are handled and are all linked to the well being of the items in that collection. The rate at which collections are growing has been especially problematic in the case of storage. The curation crisis – the lack of space to store ever-growing museum collections – not only prohibits objects from being stored in a safe, well-managed environment, but can also limit the amount of engagement communities have with the objects in a museum's collection.

One aspect of museum-based conservation efforts is the protection and storage of the physical object. However, the preservation of the intangible knowledge associated with that object is equally essential. Without interaction in the form of display or study, the object loses its voice and its ability to open a window to the past (Grattan & Moses 2006). A careful assessment of objects up for accessioning, a renewed emphasis on research with museum collections, and the careful planning of long-term care for newly excavated objects are steps that must be taken in order to diminish issues of storage and visibility. Furthermore, an increased drive to digitize collections and provide alternative forms of access is a strategy that can address the issue of visibility. Maintaining public and scholarly avenues of access lends to the preservation of the object's integrity as part of a collection that serves the museum's mission and community.

Digitizing collections not only allows for objects to be made accessible for research and

public interest via websites, but it also opens the door for greater connectivity within the museum. Digital clouds and smartphone applications have developed in a way that large amounts of information can be distributed with the touch of a screen, allowing for objects in storage to be related to those on display. Digitizing fragile items in particular can make them accessible to the public in a way that their condition would typically not allow (Forde 2006). The fragile nature of the object and its irreplaceability are often factors that drive preservation and conservation over use and demonstration. Digitization can act as an avenue for the access to these items that is frequently desired by the museum going public (Keene 2002; Forde 2006). In the case of human remains, digitization can aid in analysis and condition monitoring in ways that photographs and visual inspections may not be able to accomplish without a risk of damage or loss (Kuzminsky & Gardiner 2012).

The conservation of material objects becomes uniquely complex when a local community has a vested interest in the life course of the collection. Some groups may wish that an object associated with their history be cared for in a way that does not adhere to traditional conservationist practices. For some, spiritual and other culturally sanctioned methods of conservation take precedence over standard practice (Grattan & Moses 2006). With the development of legislation protecting the indigenous ancestral remains of groups in the United States and Australia, the role of the conservator in handling these remains in a museum setting has become increasingly vital. Not only is it necessary to know how to effectively preserve these materials – and do so in a way that does not violate agreements made as to how human remains and funerary items must be cared for – but the history of the treatment of those items must also be carefully evaluated. In some cases, ceremonial objects that are eligible for repatriation may not be ready to reenter use safely without further conservation initiatives. In this case, the conservator's role would not only include caring for the physical remains but assuring that the treatment of those remains over the years was not in fact detrimental to the integrity of the object (Cassman & Odegaard 2004). Moreover, the job of assuring that physical and material cultural remains are treated in a respectful manner, as well as the preservation of the integrity, humanity, and, in some cases, spiritual elements associated with human remains, must also fall within the purview of conservation efforts (Cassman & Odegaard 2004).

Available personnel and funding also contribute to conservation issues (Forde 2006). Although the scientific aspect of conservation – in terms of how things deteriorate and how to arrest this process – has come a long way, it is not always possible to have a professional conservator on staff. In order to combat this issue, conservators are frequently contracted on an as needed basis and may serve a region rather than a single institution, or their duties may be rolled into those of collections managers and registrars. In many cases, like those of Canada, the United Kingdom, Australia, and the Netherlands, government or national institutions were developed to oversee and assist with the conservation of museum collections. The International Council of Museums Conservation Committee drives the professional and scientific development of conservation research on the international level (Keene 2002). In the coming decades, the digitization of collections and the sociocultural implications of collection-based legislation will continue to alter the way that conservation practices in museums must be approached.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Archaeological Stewardship
- ▶ Australia: Indigenous Cultural Property Return
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Bones: Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation Laboratory Design
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Historic Building Conservation: Current Approaches
- ▶ Human Remains in Museums
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Intangible Cultural Heritage
- ▶ International Council of Museums (ICOM)
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Mosaics: Conservation and Preservation
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ North America (USA and Canada): Museums
- ▶ Preservation Paradigm in Heritage Management
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Stewardship, Concept of
- ▶ Tangible Heritage in Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Conservation Laboratory Design

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Introduction

This entry presents guidelines for consideration when designing and planning the construction of

Conservation Laboratory Design, Fig. 1 General view of conservation lab at the Japanese Institute of Anatolian Archaeology at Kaman-Kalehöyük, Turkey (Photo courtesy of the Japanese Institute of Anatolian Archaeology)

a permanent archaeological conservation facility. It is hoped that this information will provide practical ideas and recommendations for archaeological projects and organizations that are considering this undertaking. The authors of this entry are mindful of the financial constraints within the fields of archaeology and cultural heritage worldwide. While recognizing the need for substantial resources to fund the construction of a permanent conservation facility, it is hoped that these guidelines may prove helpful for any size lab or project.

Whether a laboratory is designed to support a particular project for a limited period of time or is intended to become a multi-program facility, a brick and mortar conservation laboratory differs widely in scope and cost from a temporary field lab. Essential questions to be addressed prior to planning, regardless of the cost and size of the new facility, include: the purpose and need for the laboratory; whether there is an existing facility nationally or internationally that could serve as a template for the design and construction; how to ensure that the design and layout of the lab makes full use of the space to reduce operating costs and make the facility economically and environmentally sustainable in the long term.

Definition

Archaeological artifacts can be extremely vulnerable when freshly excavated, and can deteriorate rapidly once removed from their context. The conservation and long-term preservation of excavated finds, whether terrestrial, waterlogged, or wet, requires specific processes and equipment that are quite different from those employed in other conservation specialties, for example, those used in fine or decorative art conservation.

The construction of a new conservation laboratory usually occurs within the context of a complex cultural, political, and economic environment. The impetus can come from a major discovery such as a shipwreck or a well-established long-term need in a particular region (King 1999; Seifert 2000; Mardikian 2004; King 2008). While this is not always the case, conservation labs are sometimes integrated into a facility that encompasses the study, conservation, curation, storage, and possibly also the display of the excavated artifacts (see Fig. 1 and Fig. 2). These activities involve different spatial organization within a lab, depending on the types of artifacts and the research and/or display goals.

Conservation Laboratory Design, Fig. 2 View of large conservation area at the Maryland Archaeological Conservation Laboratory (MAC Lab). St Leonard Maryland, USA (Photo courtesy of the MAC Lab)

Key Issues/Current Debates/Future Directions/Examples

Collaborative Planning

Effective planning for conservation depends on collaboration and a mutual understanding of archaeology and conservation's shared goals in developing an integrated approach to preservation (McCarthy 1989). The design and construction of a conservation laboratory, or the retrofit of an existing building or laboratory, also requires a multidisciplinary approach, with the conservator playing a pivotal role. One of the keys to creating a functional conservation lab is to involve experienced conservators as early as possible in the entire process from initial design development, review of construction drawings, through to final construction. This will ensure that the lab is well suited to all planned conservation activities, is safe for personnel and artifacts, and is functional and not aesthetically pleasing.

A complicated layout with poor access to essential needs, such as power, water, ventilation, and adequate light, can severely compromise a lab's functionality. Good communication with the architect, mechanical engineers, contractors, and other stakeholders will ensure that these objectives are met. If possible, visits to other conservation laboratories that have a similar scope of work are recommended.

Flexible Design and Layout

The type of archaeological site or sites to be excavated, whether wet, dry, or both, and the archaeological research goals of the project will directly influence planning for the construction of a new lab, as well as the internal layout and equipment needed for the lab. It is essential that the lab is flexible in its design and layout to accommodate different phases of an excavation, or different excavation teams, if needed. An important requirement of lab design is to limit the functional conservation space to one level. Heavy, oversize, and extremely fragile objects are easier to deal with without the need for elevators or overhead cranes.

Most terrestrial archaeological sites typically yield small- to medium-sized objects, sometimes in very large quantities, generally with relatively straightforward handling and storage requirements. Conversely, wet or waterlogged sites, and particularly marine sites, can involve large quantities of extremely fragile, wet materials such as wood, ceramic or metal artifacts. These materials have immediate stability problems

Conservation Laboratory Design, Fig. 3 View of the *H.L Hunley* excavation tank at the Warren Lasch Conservation Center in Charleston, South Carolina, USA (Photo courtesy of Friends of the Hunley Inc)

following excavation, can be extremely fragile, heavy, difficult to transport and move, and require wet storage before and during treatment.

Underwater excavations that produce oversize artifacts present additional challenges when designing a conservation lab. The layout of the lab must address the need for extra space to accommodate suitable lifting equipment such as overhead cranes or forklifts, and have an easy approach and entrance to the lab with appropriate door size for large artifacts. Large tanks for the impregnation of oversized waterlogged timbers or entire shipwrecks with polyethylene glycol (PEG), or for the desalination of large iron artifacts in caustic solutions, require a large amount of floor space and adequate drainage. Additional storage tanks may be required for temporary storage of chemical solutions or effluents prior to safe discharge.

In exceptional cases, the artifact itself is a self-contained archaeological site requiring a very specific environment. An example is the recovery and excavation of the American Civil War era submarine *H.L Hunley* (1864) (Mardikian 2004). The excavation of the *Hunley* took place in a controlled environment within a specially constructed conservation laboratory (see Fig. 3). Following recovery, the submarine was placed in a 340 cubic meter (90,000 US gallon) tank containing refrigerated fresh water. An impressed current protection system was used to minimize the corrosion of the iron hull without having to use corrosion inhibitors that could have damaged the organic materials found on the submarine, particularly the degraded human remains and textiles. During the multiyear excavation, the tank was drained on a daily basis and refilled at the end of each day using an automated system. Exterior tanks were used for temporary storage of tank water during excavation of the vessel.

The excavation of human, animal, and other organic remains can require additional lab space for examination, treatment, or rehousing, especially if multiple burials are excavated. If excavated from waterlogged, wet, or frozen sites, these finds can present further challenges in lab design and layout. Conservation of these materials may require specialized equipment such as large walk-in cold storage, freeze dryers, and filtrated baths. Conservation of human, animal, or organic remains from terrestrial sites is also challenging due to the fragility of the material, and, in arid environments, the extreme desiccation of the finds.

Task-Specific Lab Spaces and Lab Environment

Another important aspect to consider in the design of a conservation lab is the need for separate lab spaces to deal with "wet", "dirty," and

"clean" tasks. Wet areas of the lab can be useful for dealing with waterlogged material or wet tasks such as desalination of artifacts affected by soluble salts like glass or ceramics. Certain conservation activities can generate a large amount of dirt and dust that should, ideally, be separated from processes such as documentation, photography, packing, and rehousing that require a relatively clean, dust-free space. Areas of the lab for dirty work should be easily cleaned and floors coated with hardwearing, chemical-resistant materials. If possible, all electrical cables, water, and compressed air hoses should be mounted to the walls or ceilings on heavy-duty, extra-long retractable reels, allowing easy access from different parts of the lab, as well as outside the lab if needed.

Tasks such as the cleaning of waterlogged artifacts, especially large marine concretions, and excavated block lifts from terrestrial sites can be particularly messy. One option when planning these tasks is to designate an area outside and adjacent to the lab where such activities can take place. If exterior spaces are sheltered, they may also be used as additional space for the treatment of artifacts or chemical storage. Areas of the lab where heavy pneumatic or electric tools are used, for example, grinding and abrasive equipment for cleaning metal artifacts, should be as isolated as possible to prevent excessive noise and impact on the air quality in the rest of the lab.

All areas of the lab where heavy equipment is used should be fitted with adequate fume, dust, and particle extraction units. Hard ducted hoods or portable units with proper filters should be planned into the lab's design, with at least one chemical proof fume hood, as shown in Fig. 4. This particular fume hood includes an oversized stainless steel sink, access to hot, cold, and deionized water, as well as compressed air. It also allows sufficient leg space for conservators to work comfortably in a seated position.

Control of the environment in a conservation lab may be extremely difficult depending on the construction materials used and the physical location of the lab. The temperature and relative humidity in the lab should be as stable as possible for the personnel but also to the level that is required by the materials being treated. The method by which the environment is controlled may vary throughout the lab. Very precise control achieved via complex mechanical systems may be necessary in discreet areas of the lab, particularly for areas where artifacts like damp or wet organic materials, metal, or salt-laden ceramics are housed and treated. However, more passive means of control, for example, by use of a desiccating agent, may be a more cost-effective way to achieve localized control for unstable objects. Air movement is also important, particularly in hot and humid countries where strict environmental control is not feasible. The installation of ceiling fans will help with air circulation. Cross-ventilation, a high ceiling, and adequate insulation will also help to buffer and stabilize the internal environment.

Conservation Laboratory Design, Fig. 4 Custom-made fume hood with stainless steel sink specifically designed for the Hunley Project at the Warren Lasch Conservation Center in Charleston, South Carolina, USA (Photo courtesy of Friends of the Hunley Inc)

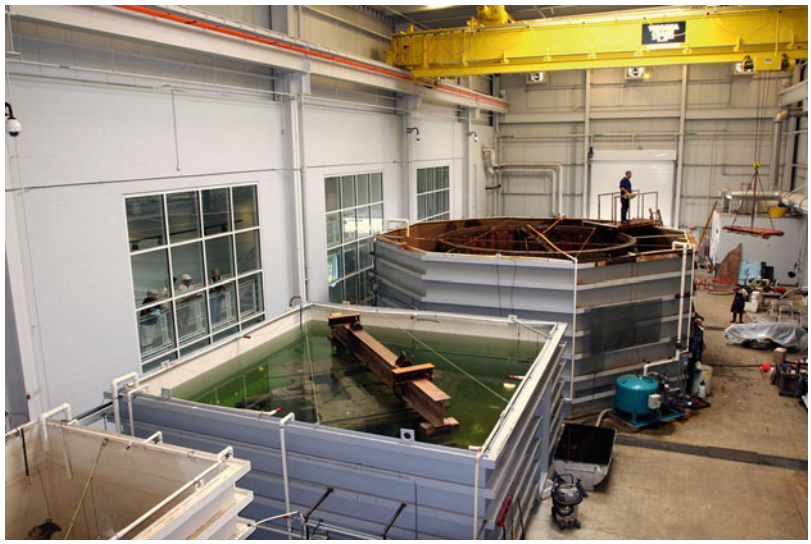

Conservation Laboratory Design, Fig. 5 General lab view showing ongoing conservation work on the USS *Monitor* Project and public viewing through lab window. Norfolk News, Virginia, USA (Photo courtesy of the Monitor Project)

Transportation, handling, and storage of excavated artifacts from the excavation site to the laboratory are often challenging, particularly of large, fragile material. To avoid damage, it is imperative to plan ahead of time for artifact movement with a continuous, obstacle-free path available from the excavation site to the conservation lab, and within the lab. Smooth floor surfaces are essential when transporting fragile or heavy artifacts. Likewise, adequate planning for artifact storage before and during treatment is necessary, with consideration of the environment that the artifacts will require during different stages of the conservation process, as well as allowing access to the materials for research. If a conservation lab must also function as a storage facility, the design and layout of the lab must contain adequate space to store finds before and after conservation, in addition to the space that is needed while conservation is underway. Long-term artifact storage requires the installation of appropriate storage furniture, for example, shelving units suitable for the volume and weight of the excavated finds.

Another consideration is whether conservation activities should be on view to the public. Access should refrain from direct disturbance of the daily activities of the lab, particularly when large tour groups are involved. One option is to plan for large bay windows overlooking the conservation area. This allows direct and safe viewing of the conservators at work, particularly when working on large artifacts, as shown in Fig. 5.

Laboratory Equipment and Furniture

Outfitting a conservation lab with expensive analytical and optical equipment will depend on the scope of the lab and its conservation activities, and whether the lab will undertake research. An example is the use of digital radiography, which may be a practical tool for conservators to use on a daily basis, and a purchase that is financially justifiable in the long term. Large equipment such as a scanning electron microscope with energy dispersive capabilities (SEM-EDS) usually requires a dedicated technician to operate the equipment, and adequate space. The operational cost of large analytical equipment is often too high for a conservation lab to justify. In most cases, it is preferable to contract these services through local universities or private research laboratories.

Industrial X-ray machines are often required to penetrate large and complex archaeological artifacts, concretions, and block lifts. These machines differ widely from X-ray units used in the medical field. Their operation requires the use of shielded cabinets or rooms in order to protect personnel from harmful ionizing radiation.

The need for these shielded enclosures can restrict the size of the artifacts that can be X-rayed. Another approach is to use a portable X-ray tube that can be used either inside a lead cabinet or a shielded room, or remotely on large objects. This option offers more flexibility but also requires stringent radiation safety requirements and trained operators. These factors can weigh considerably on the budget of a laboratory and require careful planning with the architect. It may be preferable in the long term to invest in a computed radiography (CR) or direct radiography (DR) X-ray system rather than a conventional system using photographic film and wet processing facilities. In computed radiography, an imaging plate is used to create the digital image, which is then transferred to computer, while direct radiography captures the image directly on a panel detector. Use of these systems enables fast processing of images and eliminates the chemicals used for developing film. As these chemicals are considered as hazardous waste and require special disposal, CR and DR are far more environmentally friendly and sustainable in the long term than conventional film radiography.

If local tap water is unsuitable for the desalination of artifacts due to the presence of excess chlorine or mineral salts, a reverse osmosis unit or a deionized water column may be needed. These two systems can also be combined to produce very pure water if required. Water treatment systems should be scaled to the size of the laboratory and nature of the activity, particularly when dealing with artifacts affected by soluble salts absorbed from the burial context. When feasible, rainwater may be collected for use in treatment, provided that it is filtered and stored in the dark to help avoid biological growth.

The purchase of lab furniture also requires a flexible approach. Conventional, built-in furniture, such as bench tops permanently attached to the walls, may not be appropriate for a multipurpose space, with the exception of sinks. Sinks should preferably be made of stainless steel, be wide and shallow, and have direct access to hot, cold, and deionized water. A heavy-duty sink sprayer is useful for cleaning the sink and filling portable containers. When dealing with artifacts from a marine environment, it is preferable to use a grade 316 stainless steel which is much more resistant to pitting corrosion from chloride ions released during deconcretion. Modular or custom-designed furniture and storage will allow more flexibility to adjust to the specific conservation requirements of individual artifacts. For example, the use of adjustable height heavy-duty stainless steel tables mounted on locking casters is recommended to create mobile work surfaces. Adequate lighting is critical for conservation work and good general lighting should be available in the lab. In addition, task-specific lighting from portable lights is suitable for a large space and allows greater flexibility.

Cross-References

- ▶ Bones: Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Glass: Conservation and Preservation
- ▶ Metals: Preservation and Conservation
- ▶ Mosaics: Conservation and Preservation
- ▶ Stone: Preservation and Conservation
- ▶ Textiles and Fabrics: Conservation and Preservation
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Conservation, Restoration, and Preservation in Classical Archaeology

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Introduction

A common terminology developed for the conservation of cultural heritage, adopted at the 2008 ICOM-CC (International Council of Museum Committee for Conservation conference, New Delhi), has removed ambiguity and helped conservation and restoration specialists to communicate more clearly and accurately. Museum managers, art historians, conservators, archaeologists, the public, and the media use the ICOM-CC definitions in order to preserve archaeological and cultural sites and artifacts more effectively than they were able to do previously by relying on encyclopedias and dictionaries. Different cultures and languages – including the Anglo-Saxon languages and Latin in particular – assigned different meanings to terms, which created confusion and led to misunderstanding about how preservation should be carried out.

Definition

The ICOM-CC terminology was developed during a decade of consultation among conservation and restoration specialists.

Conservation – all measures and actions aimed at safeguarding tangible cultural heritage while ensuring its accessibility to both present and future generations. Conservation embraces preventive conservation, remedial conservation, and restoration. All measures and actions should respect the significance and the physical properties of the cultural heritage item.

Preventive conservation – all measures and actions aimed at avoiding and minimizing future deterioration or loss. These are carried out within the context or on the surroundings of an item, but more often a group of items, whatever their age and condition might be. These measures and actions are indirect – they do not interfere with the materials and structures of the items. These methods do not modify their appearance. Examples of preventive conservation are appropriate measures and actions for registration, storage, handling, packing and transportation, security, environmental management (light, humidity and pollution, and pest control), emergency planning, education of staff, public awareness, and legal compliance.

Remedial conservation – all actions directly applied to an item or a group of items aimed at arresting current damaging processes or reinforcing their structure. These actions are only carried out when the items are in such a fragile condition or deteriorating at such a rate that they could be lost in a relatively short time. These actions sometimes modify the appearance of the items. Examples of remedial conservation are disinfestation of textiles, desalination of

ceramics, deacidification of paper, dehydration of wet archaeological materials, stabilization of corroded metals, consolidation of mural paintings, and removing weeds from mosaics.

Restoration – all actions directly applied to a single and stable item aimed at facilitating its appreciation, understanding, and use. These actions are only carried out when the item has lost part of its significance or function through past alteration or deterioration. They are based on respect for the original material. Most often, such actions modify the appearance of the item. Examples of restoration are retouching a painting, reassembling a broken sculpture, reshaping a basket, and filling losses on a glass vessel.

Key Issues/Current Debates/Future Directions/Examples

Conservation measures and actions can sometimes have more than one purpose. For instance, varnish removal, the application of protective coatings, and the reburial of mosaics can be both preventive and remedial conservation. Conservation is complex and demands the collaboration of qualified professionals. In particular, any project involving direct actions over cultural heritage requires a conservator/ restorer.

The word "conservation" embraces in its present definition three different disciplines that indicate different activities linked by a common aim represented by the preservation of tangible heritage and of the cultural message embedded in archaeological assets. These disciplines have a very distinct history that, in some respects, goes back to ancient times; however, they can now be interpreted as a unified whole.

Traces of restoration have been found on monuments and items brought to light by means of archaeological fieldwork. Such traces show us that people always have had an impulse to repair materials that constitutes today's cultural heritage (Cagiano De Azavedo 1952). Damage occurred during the execution of art works, for example, the breaking down of sculpted elements of the monumental funerary art. Damage also occurred by accident due to robberies, wars, or by the prolonged use of objects and surfaces. We often encounter simple repairs such as those to damaged parts of mosaic floors, which were fixed with new *tesserae* without paying attention to the motifs, the welding of broken vases with bronze staples, or the mimetic replacement of lost or broken marble elements to recover the functionality and aesthetic of sculptures or monumental architecture also constitute examples of ancient repairs.

The Roman town of Pompeii itself, for example, was undergoing a series of restorations at the moment of the fatal eruption of Mt. Vesuvius in 79 BCE. These repairs were part of a plan to recover from the earthquake of c. 62 BCE. Even ancient sources describe restoration as a habitual activity.

In ancient literary sources, we can find names of restorers and examples of restoration, such as the one mentioned by Pliny on the statue of Janus in the Roman Forum (Plin. *HN* 34.33). The hand of Janus had been reconstructed; his fingers indicated the number of days in a year after the calendar reform promulgated by Caesar in 46 BCE (Pliny). All of these works were characterized by the will to restore either the function of the artwork, its aesthetic appearance, or both, all the while erasing the damage.

In ancient times, together with the activities defined as restoration, great care was taken to lengthen the durability of art work through constant maintenance, an activity that today we would call "remedial conservation." As maintenance, the surfaces were cleaned and the most appropriate kind of protective films were applied according to the material of the artwork. It is now taken for granted that lime was used on Roman monuments with a protective function; painted surfaces of marble sculptures were periodically replaced and protected with waxes, while oils and bituminous resins were applied to the damaged gilding of bronzes. During the Middle Ages, the attitude toward ancient art is one of reutilization, recycling the materials in order to build modern artworks instead of restoring the lost function of the works of art (Rossi Pinelli 1986). This attitude was already present in

the ancient world; parts of sculptures and monuments were modified or replaced according to ideological aims. For instance, the *damnatio memoriae* led to the modification of the bronze statue from Cape Misenum in order to transform the face of Domitian into that of Nerva; the statue is on exhibit at Naples' Museo Nazionale today; heads of heroic statues have been replaced to glorify the virtues of Roman emperors. Sculptural elements have been reused or reprocessed to build monuments and artworks of high symbolic value.

The main archaeological discoveries during the Italian Renaissance led to a series of activities that we can define as "restoration": the increasing requests of art works by collectors and enthusiasts of the ancient led sculptures and artists to "embellish" and "complete" archaeological remains; special care was dedicated to the statues through reconstructions and mimetic integrations of mutilated parts. Concerning the repairs of Palazzo della Valle's court conducted in 1520 by the Tuscan sculptor Lorenzo Lotti (known as Lorenzetto) in Rome, Vasari himself wrote:

> *E nel vero hanno molta più grazia queste anticaglie in questa maniera restaurate che non hanno que' tronchi imperfetti e le membra senza capo o in altro modo difettose e tronche* (These antiquities restored in this way have more grace compared to those imperfect trunks and bodies with no head or with other imperfections) (Vasari 1568).

Many artists and architects were engaged in prestigious restorations in this period such as the Antonine Column in Rome, where the works were directed by Domenico Fontana and commissioned by Pope Sixtus V. The Laocoön statue group, discovered on Rome's Esquiline hill in 1506, was restored first by Baccio Bandinelli and then by Giovanni Angelo Montorsoli. The reconstructive intent of the restorations combined the willingness to maintain philological rigor in respecting the ancient with the aim to reconstruct the original appearance of the artworks. To achieve this final goal, people involved in restorations emulated the technical methodology used to create the artworks in the first place. The profession of the restorer started to emerge when integrative restoration became common in the seventeenth century; being a restorer was previously considered not as important as artistic activity. Benvenuto Cellini was a sixteenth century artist who restored the sculpture collection of Cosimo de Medici in Florence. He defined restoration as *occupazione di artista mediocre, onde egli adattossi a condurre un restauro solo per far cosa grata al suo Principe* ("an occupation for a mediocre artist, often done just to please his Prince") (Cellini 1985).

It was the century of the restoration of the collection of Ludovisi's sculptures with Gian Domenico Bernini, Ippolito Buzzi, and Alessandro Algardi all involved in the works. The first specialist treatises on the topic emerge in this period, a first effort to systematize and standardize from the technical point of view the interventions on artworks. Orfeo Boselli, sculptor and restorer, wrote his *Osservazioni sulla scultura antica* between 1642 and 1663 and dedicated the thirteenth chapter to restoration. The chapter has become a precious source of documentation on methodology of integration, techniques, and material used at the time of the sculpture's restoration (Boselli 1978). The restorer's profile had a slow evolution until a proper recognition in the 1700 s. Large numbers of travelers visited archaeological and art sites at that time during their Grand Tour, fostering a new blooming antiques market. During this century, the antiquarian discipline evolved into archaeological science, thanks to the work of the German scholar Johann Joachim Winckelmann. His theories led to a new concept of restoration; this development incurred with the encounter of Bartolomeo Cavaceppi, sculptor and restorer engaged with the restoration of the Albani collection. Winckelmann, being an expert, was in charge of his training as requested by the Cardinal. Antiquities started to be seen as original documents that needed to be studied in order to be fully appreciated for their historic and literary values. Restoration according to Winckelmann had become a cognitive experience, requiring careful study and knowledge of the ancient work before an intervention; this meant that

professionals had to renounce any creative personal interpretation.

The professional relationship between Winckelmann and Cavaceppi led to the development of the discipline as an autonomous activity with respect to artistic disciplines, anticipating today's interaction between the art historian, the archaeologist, and the restorer – a fundamental combination of expertise to complete the conservation cycle. Cavaceppi dedicated a long chapter to restoration in his work published between 1768 and 1772. He gives technical indications together with indications of theoretical and methodological nature such as *Non per altro si restaura che per apprendervi* ("We restore to learn"), marking a turning point in the emerging profession of the restorer (Cavaceppi 1772).

The emergence of the discipline of Classical archaeology in the 1800 s assisted in the development of a trend against the uncontrollable reconstructive restorations conducted to satisfy a flourishing market for ancient art, the new trend that would promote respect of the integrity of the original artwork and of the historical message carried by it. This school of thought spread among the field of monumental architecture. John Ruskin and William Morris founded the Anti-Restoration Movement and the Society for the Protection of Ancient Buildings with the aim of protecting monuments from "restoration in style," and progressively, the movement included sculpture and artworks in general. The culture of "the beauty of a ruin" and the taste for fragments developed and consequently the basis for a different theoretical model of restoration emerged. Antonio Canova refused Lord Elgin's commission to work on the Parthenon marbles; he instead preferred to leave them as fragments and he promoted some de-restorations when he was curator of restoration for the Vatican Museums. The distinction between the word "restoration" and "conservation" started in this period; "restoration" acquired a negative meaning being associated with a concept of reconstruction and consequently falsity, while "conservation" was interpreted as protection of the original material (Melucco 1998).

Many schools of thought emerged between hundreds of interventions of restoration from the end of the 1800s to the first decades of the 1900s. Cesare Brandi came up with a conclusive concept stating that each technical-scientific data, concerning the artifact's material object of the intervention, had to be object of critical aesthetical and historical reflection itself. Cesare Brandi's theories were published as "Teoria del Restauro" in 1963, more than two decades after the author started working on the book in the 1940s. This work constituted the methodological starting point for the operative activities of the Istituto Centrale del Restauro (ICR); Brandi founded the institute in 1939 and directed it until 1959. In his book, Brandi defines restoration as:

> *un momento metodologico del riconoscimento dell'opera d'arte, nella sua consistenza fisica e nella sua duplice polarità estetica e storica, in vista della sua trasmissione al futuro* (a methodological moment of recognition of the artwork, in his material consistence and double aesthetical and historical polarity, before his transmission to future generations) (Brandi 1963).

In his *Teoria*, the author clarified that *si restaura solo la materia dell'opera d'arte* ("only the material of the artwork is restored") and that

> *il restauro deve mirare al ristabilimento dell'unità potenziale dell'opera d'arte nella sua consistenza fisica, purché sia possibile raggiungere ciò senza commettere un falso artistico o un falso storico, e senza cancellare ogni traccia del passaggio dell'opera d'arte nel tempo* (the aim of the restoration is to recover the physical consistency of the artwork; it should be done without committing artistic or historic falsity and without erasing any signs of the artwork's history).

In Brandi's *Teoria* are collected all elements that would lead to the development of conservation as we conceive it today: reversibility and identification of the interventions, status quo's conservation, and principles of what the author calls *restauro preventivo* ("preventive restoration"); an entire chapter is dedicated to this last concept.

Brandi's theories of respect for the artworks and identification of the interventions have been fully applied through the high-level technical interventions for the large, postwar restorations of the 1950s. In this period, restoration became an essential instrument for the study and publication of historical and technical instances that were previously ignored. In the following years, we progressed toward a further evolution brought by Giovanni Urbani, an important figure in the restoration scene in the 1980s. Urbani saw the limits of a discipline that intervenes directly on a single monument at the time, with often long and expensive operations; the efficiency of those operations was compromised by the absence of "structural" intervention over the context that originated the damage restored.

It is the beginning of the evolution from restoration to conservation, development, and change of scale that would lead to this evolution at the end of the 1970s. Urbani, director of the ICR from 1973 to 1983, promoted the analysis of the causes of artwork damage in order to start working on the causes and prevent the damage, the value of the restoration and conservation benefit of the contribution of various professionals: chemists, biologist, geologist, physics that work together with specialists in restoration and conservation supporting them in understanding the microscopic scale of degrading mechanisms, materials' reactions, and efficiency of operational techniques. On the other hand, Urbani, according to Brandi's indications on preventive restoration, promotes the concept of "planned conservation" as an activity of preservation and protection of heritage on a large scale, characterized by prevention of environmental hazards and routine maintenance (Urbani & Zanardi 2000).

More and more accurate techniques of documentation emerge in this period (Nardi 1992): what was previously the occasional activity of an operator, it slowly become a systematized practice both in language and procedures; public administrations report these kind of activities in their balance sheets. Examples of application of these techniques are the identification and recorded evidence of the working process in the interpretation of marks left by historical events

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 1 Arch of Septimius Severus in the Roman Forum, 1983. Table of stone's deterioration mechanisms. The documentation regarding the state of conservation of monuments has slowly become a fundamental instrument for the curator/restorer. (Pictures Nardi, Copyright CCA)

(Rockwell 1989), the identification of old restorations, mistakes and second thoughts, the interpretation of monuments' vertical surfaces (Nardi 1987). The documentation became the main instrument to record activities carried on during the interventions. It constituted a precious instrument to record the state of conservation of monuments and artworks, instrumental to the study of deterioration to prevent corrective measures, preservation, and protection activities (Figs. 1 and 2).

With the contribution of Gael de Guichen (ICCROM, the International Centre for the Study of the Preservation and Restoration of Cultural Property in Rome), we progress to the birth of the state of art of the discipline 30 years later: preventive conservation. During the last few decades, parallel to the methodological evolution of restoration into conservation followed by the evolution of conservation into preventive conservation, the restoration changes operational scale: the interest in a single coating developed into interest for its building, from the repairs of

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 2 Arch of Septimius Severus in the Roman Forum, 1995. The ordinary maintenance of marble surfaces is an integral part of the preventive conservation process of the monuments. (Pictures Nardi, Copyright CCA)

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 3 Zippori, Israel, 1994. The conservation in situ is the result of the encounter between archaeologist, art historian, architect, restorer/curator: their contribution is essential to bring together technical operative choices to the original nature of the monument and express its historical message. (Pictures Nardi, Copyright CCA)

a single object to entire collection, from the intervention on a monument to its site, from the single restorer to multidisciplinary groups. The archaeologist, the art historian, and the architect more and more often work side by side with the curator/restorer adding a fundamental humanistic contribution to connect operational technical choices to the original nature of the monument – its historical message. Examples of this interaction are the definition of the conservation principle in situ and the use, in current restorations, of materials and techniques belonging to original practices. In the past, restoration privileged the aesthetic appearance of the artwork, often destroying the context of its origin and historical message such as the destruction of monuments and sites to remove frescos and mosaics – the aim of the conservation in situ is to promote a different scenario (Fig. 3).

In the same way when it comes to materials and techniques to use in present interventions, the contribution of humanistic literature is of fundamental importance since it has led to the technical-conservative debate. For instance, in the choice of materials based on original formulas (such as the use of lime-based mortars instead

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 4 Ostia Antica, 1989. The reburial of delicate archaeological surfaces, such as mosaics, represents a very efficient measure of preventive conservation. (Picture Nardi, Copyright CCA)

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 5 Musei Capitolini, 2000. The project "Aperto per Restauro" has allowed thousands of visitors to the museum to see the works of conservation and restoration of the Centaurs from the Villa of Hadrian at Tivoli. (Picture Costanzi Cobau, Copyright CCA)

of synthetic industrial products) and similar techniques to the original techniques of construction with the result of diminish the impact of invasive operation in favor of practices closer to routine and emergency maintenance rather than restoration or reconstruction (Fig. 4).

The principle of conservation led to a new approach adopted by some institutions in the 1980s. The old Istituto Centrale del Restauro, called Istituto Superiore per la Conservazione del Restauro nowadays, conducted mainly technical courses, while the ICCROM first followed by the CCI (Canadian Conservation Institute) in Ottawa, the Université Paris-Sorbonne (Paris IV) in France, the Getty Conservation Institute in Los Angeles, and the Institute of Archaeology of University College London took the distances from the purely technical field of restoration and started new multidisciplinary courses about control of context of exhibition of artworks and study of deterioration mechanisms according to the latest methodological indications. The need to preserve, enhance, and pass on the cultural message of archaeological heritage has become an important part of the recent evolution of the

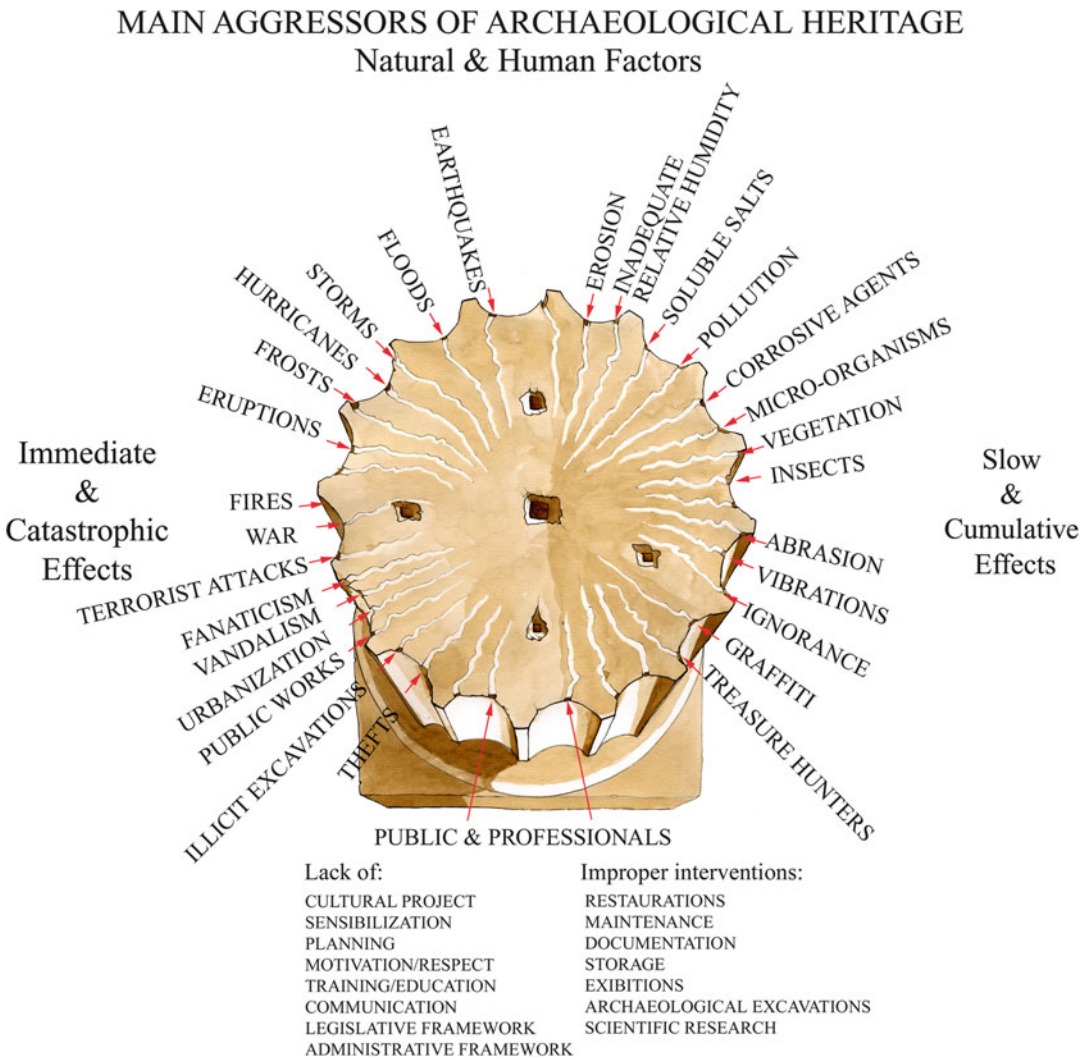

Conservation, Restoration, and Preservation in Classical Archaeology, Fig. 6 Table of the aggressors. It collects and divides by categories the possible agent of deterioration of cultural heritage (Gael de Guichen). (Copyright CCA)

profession. For example, several interventions of conservation and restoration have been conducted with free access for the public, with specific initiatives that have transformed technical intervention in cultural operations of great success (Nardi 1999) (Fig. 5). The contribution of de Guichen in supporting preventive conservation, the public acknowledgement of his ideas, and the application of his methodologies have played an important role in the modern development of the field (Fig. 6).

Conclusion

Despite the general acceptance of all this, supported by literature on the subject and various didactic programs, a lot of work needs to be done in order to spread the concept of preventive conservation among administrators and technicians, public administrations, and the daily life of monuments and sites. Doubtless, this is the path that we all should follow as curators, archaeologists, architects, art historians, and administrators, for we all

have to move forward in the interest of archaeological heritage that is both unique and nonrenewable.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Art Studies: Normative Approaches
- ▶ British Museum
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Archaeological Practice
- ▶ Mosaics: Conservation and Preservation
- ▶ Parchment: Preservation and Conservation

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Constructivism in Archaeology Education

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Introduction

Archaeological remains in themselves are silent. They do not speak to us in the same way as documents or oral testimony. We have to ask questions of the evidence and judge between different interpretations. The meaning of the evidence has to be constructed by the archaeologist. In a similar way, modern teaching methods involve students learning to ask questions, to construct their own understanding of the topic being taught. This is empowering students to be active learners. Modern constructivist educational theory in the west thus has a great deal in common with archaeological theory as developed in the UK, Scandinavia, and the USA, what is broadly known as a post-processual approach in archaeology. This reinforces the utility of using archaeology for educational purposes.

Definition

Constructivism is an approach to epistemology which sees all knowledge of the world we live in as constructed by the individual. This includes scientific knowledge and knowledge gained through subjects like archaeology. Constructivism has much in common with postmodern habits of thought. If our knowledge of the world is constructed by us, then there can be no commonly accepted single interpretation of that world. Instead there is a diversity of understandings.

Within education, constructivism accepts that pupils are actively constructing their understanding of the world and are not merely empty vessels being filled with knowledge imparted by the teacher. Every child will do this through active engagement with teaching materials and the application of their own preexisting knowledge, attitudes, and beliefs. Much constructivist education is based around problem solving, group work, and setting school subjects within a practical real-world context.

Historical Background

Among educators in the west, it was John Dewey (1867–1949) in the USA who began the constructivist revolution through his ideas about hands-on learning and matching learning to the experiences of the student (Dewey 1916). He advocated that child-centered learning is the key to good education. The three people most commonly referred to as the fathers of modern constructivist theory are Jean Piaget (1896–1980), Lev Vygotsky (1896–1934), and Jerome Bruner (b. 1915).

Piaget was concerned to discover the stages through which a child progressed during its mental development (Piaget 1950). He identified certain key points at which a child's thinking moved upwards into more complex intellectual reasoning about his or her environment. Before c .18 months, a child is dominated by a purely sensorimotor relationship to the external world. Until the age of c .7, children are preoperational, that is, they learn by doing rather than by applying logic to work things out. From 7 to 11, children are concrete operational where they can begin to think about things before they do them and can apply logic to what they observe. At the age of c. 11, pupils develop formal operational skills where they can think logically about abstract propositions and can form hypotheses about future actions. For Piaget, there was no point in trying to teach a child something it was not intellectually equipped to understand and so teaching had to differ according the stage reached, that is, the age of the child.

Vygotsky emphasized the social interaction of children with each other and teachers as an important part of learning (Vygotsky 1962). While accepting that children of different ages had different learning capabilities, he held that

social interaction could help raise a child's capability above what it could achieve on its own. Interaction involves language and the language used must be appropriate for the interaction to take place. Intelligence is therefore not so much innate as a product of social and cultural interaction.

Piaget and Vygotsky laid the foundations for an approach to education that centered on understanding how children learn. It is upon that foundation that constructivism was built. The main architect of constructivism was Jerome Bruner, who resembled Dewey in his emphasis on learning as an active process in which students or children build upon their own experience and current knowledge to construct new ideas or knowledge for themselves (Bruner 1966). Teaching is thus an active dialogue between teacher and learner, and learners needed to be keen and willing to learn (motivated) for effective teaching to take place. Forms of teaching should thus be structured to provide a relevance for their learning and carefully fit in with what children can understand. Good teachers should encourage their students' thinking to go beyond what they are being presented with. Pupils need to be enabled to construct their own learning from the materials and guidance provided by the teacher.

The overall nature of constructivist learning is that learners should be involved and empowered through communication appropriate to their level of mental development. Pupils, and adults, need to be enthused about what they are asked to learn and to feel that they are actively engaged in learning. Teachers need to learn to speak and structure what they say so that the learner can follow and understand what they are learning.

The most recent adaptation of constructivist education is by Howard Gardner, who has developed the idea that there are multiple intelligences (Gardner 1999). What he means by this is that we cannot measure intelligence in only one way. Different people will have different ways of understanding the world around them and turning that understanding into something we can measure as intelligence. It might be better to think of his multiple intelligences as multiple skills or ways of reasoning.

Gardner's intelligences are:

Linguistic – good at understanding and using words, highly developed in writers and poets

Logical – good with number and problem solving, found in scientists, engineers, computer programmers

Spatial – good at visualizing abstract notions or designs, found in architects, designers, chess players

Musical – identifying sound, pitch, and rhythm, developed in musicians, sound engineers, mechanics

Kinesthetic – good balance, coordination, and body skills, useful for sports, dancing, etc.

Naturalist – good at observing, recognizing patterns, and classifying the world around them, found in farmers, astronomers, etc.

Interpersonal – people who are good with other people, good social skills, for example, teachers, counselors

Intrapersonal – self-awareness, for example, spiritual and expressive people

Other models of constructivist learning exist and are used by teachers and educators, such as those of Benjamin Bloom and David Kolb.

Benjamin Bloom described three "domains of learning": cognitive, affective, and psychomotor (Bloom et al. 1964). The cognitive domain involves the acquisition and intellectual manipulation of knowledge. The affective domain covers our emotional responses, how we feel about things, what motivates us, and what we value. The psychomotor domain involves our use of physical movement and coordination to achieve tasks and how we develop these physical skills. Each domain needs teaching in a different way and with different levels of attainment. Some students will respond more readily within one domain than another.

David Kolb developed four "learning styles" based on how we perceive the world – by thinking or feeling and how we interact with the world – by doing or by watching (Kolb 1984). The interaction of these four poles of behavior produces four kinds of learner. The reflective observer who watches an activity or

a presentation, the abstract conceptualizer who likes to think about an issue or problem, the active experimenter who likes to learn by physically doing an activity, and the concrete experiencer who likes to reflect on their emotional experience of an event. The learning cycle involves moving between each form of learning as a progression, one from the other, although any one learner may have a dominant style.

Key Issues/Current Debates

This idea of multiple intelligences is now being used in the UK to devise appropriate learning styles for different pupils and is the basis of the *Inspiring Learning for All* website produced by the former Museums, Libraries and Archives Council. Archaeology is perfectly placed to provide educational opportunities aimed at most of these kinds of learning ability, for example:

- Linguistic – writing site reports and interpretation panels
- Logical – devising excavation strategy and analyzing evidence
- Spatial – piecing together the stratigraphy of a site or a building
- Kinesthetic – the processes of fieldwork and artifact analysis
- Naturalist – recording and surveying landscapes, analyzing classes of evidence
- Interpersonal – the teamwork involved in excavation
- Intrapersonal – reflecting on our own interpretations of the past

Archaeology can therefore engage the interests of a wide variety of learners, many of whom are disengaged from traditional classroom learning. It is a common feature of school visits to museums for a school teacher to be surprised at the enthusiasm and ability of a child in the class whom they normally think of as less able when that child is given tasks to do that are better matched to its intelligences than traditional school work.

Why is archaeology such a good tool for constructivist learning? Archaeology is a set of processes applied to physical remains in the real world. It therefore provides an immediately relevant real-world context for the application of abstract skills like numeracy and literacy. The application of skills in relevant situations is a key part of constructivist methodologies. However, it is also the processes of archaeology themselves which match well with constructivist learning. We can think of archaeological processes as forming a sequence from finding remains, recovering, recording, analyzing them, and then producing a synthesis of results as an interpretation of the past. Finding remains is more than an act of discovery. To find is also to identify and categorize remains as worth seeking out. We construct the category of archaeological site or artifact as an object of study. For many, the public image of archaeology is that of the patient and meticulous craftsman toiling away in the ground to recover and record remains during excavation. While the technical processes of excavation and survey are the bedrock of the discipline, they are only part of archaeology. Sites and finds in themselves are mute. They have to be analyzed to reveal their secrets, and this process of analysis is deeply permeated by constructed methodologies, purposes, and assumptions. We construct categories of artifact. We design research strategies to accomplish a constructed goal. Analysis is more than mere measurement. It is an attempt to understand the form and occurrence of the remains. We cannot help but construct our analysis. Likewise, taking the results of analysis and turning them into a narrative of the past is a highly constructivist task. Constructivism permeates archaeology.

Constructivism has not gone unchallenged. Many academic writers have characterized constructivism as letting children find their own understandings through unstructured inquiry-based learning. Constructivists themselves often seem averse to any idea that there is a necessary body of knowledge that needs to be imparted to pupils. Debate between the two sides usually, and unhelpfully, can often be polarized between an advocacy of acquiring knowledge and a counter-advocacy of developing skills. The center ground of the debate is concerned with

the idea of scaffolding, that is, providing the necessary information to the learner to help them make sense of what they see and with which they can construct an understanding of the object of study. Skills can only be developed from a knowledge of what something is or how it works. Knowledge and skills work together to produce learning. Archaeology has knowledge in abundance: sites, artifacts, and data of all kinds. It also has many skills of analysis that help us make sense of this data and construct meanings out of the past.

Furthermore, learning theories are often criticized as not having proper experimental verification and being constructs in the minds of their advocates rather than models derived from isolation of variables, observation, and verification. The whole point of constructivism of course is that it consciously does not recognize the positivist view of knowledge creation and testability. Its relative lack of experimental verification has not stopped it being used by educators in practice.

In an important critique of the instructivist versus constructivist debate, Duffy (2009) suggested that the key difference between the two was the recognition by constructivists that learning is easier and more successful when the learner relates what they are learning to a reason for the activity of learning – that what they learn can be put to a relevant or practical use in their world. This presents a problem for archaeology. For some people it is enough that the past is a fascinating unknown world to be explored or that archaeology is a process of detection and discovery. These in themselves provide enough motivation to learn. But for many, the past is a dead place with little relevance in the present, and its investigation by archaeologists is a hobby with little practical purpose. Indeed, many archaeologists find it hard to articulate a reason for their own discipline beyond mere curiosity or conservation for the sake of it. Good constructivist learning using archaeology must involve an understanding of why we do archaeology in the first place and its importance for people in society today. Organizations like the World Archaeological Congress show how archaeology is practiced in a real and contentious world and have a key role in helping archaeologists understand their current, real-world utility and purpose.

Good constructivist teaching needs teachers to have high levels of instructional skills using problem-solving methodologies and high amounts of subject-based knowledge. Good professional development is therefore key to getting teachers to use constructivist methods. This is especially true for teaching involving archaeology as most teachers have little expert knowledge in the subject. Archaeologist educators will therefore need to engage in teacher training and professional development as much as dealing directly with schoolchildren themselves.

One further issue that needs to be addressed derives from the relationship constructivism has to postmodernist modes of thought. If understanding of the world around us is constructed by each individual according to their own intelligences and experiences, then does this mean that all interpretations of the world are equally valid? Does a constructivist approach to learning allow the student to construct whatever meaning they wish about a topic? Such ultra-relativist positions are held by some, but most would accept that there are limits to interpretation that are based on ethics or factual knowledge. The past is a fruitful source of debate for postmodernist scholars since we can never fully know all the facts, and interpretation of the past is highly contingent rather than positivist. Archaeologists and historians construct their understandings of the past. However, to treat the past as source of ideas for the telling of literary tales ignores the factual basis of past lives and events. As the historian Richard Evans has written (Evans 1997: 124), "Auschwitz was not a discourse. It trivializes mass murder to see it as a text. The gas chambers were not a piece of rhetoric." There are necessary limits to using constructivism in education. The construction of understandings by students has to be guided and constrained by the factual nature of the day-to-day lived world of human experience.

Future Directions

The major development in education over recent years has been the introduction of computing technologies into the learning experience. Teaching is no longer the monopoly of school. Children, and adults, learn in a variety of ways in different arenas through the medium of their television, their computer (PC, laptop, tablet, etc.), their smartphone, and their experiences at places they visit with their friends or parents. The computing revolution provides an unparalleled access to vast amounts of knowledge. The task for archaeologist educators is to enable their audiences to navigate this knowledge and construct meaningful, accurate (a contentious but important word) understandings of the past. This need not be through their work with schools but through their websites, smartphone, tablet apps, etc.

This is not to say that schools can be ignored. Schools and teachers will continue to play a role in the raising of children. Archaeologists now have the capability to provide resources for teachers more widely than before through the distributed media of digital technologies. These technologies also allow more experts than before to enter the classroom through the interactive whiteboard and platforms such as Skype. We will have ever more opportunities to engage in a true dialogue with learners, helping them construct their understandings of the past. Pupils already have the ability to engage in online inquiry for themselves. The school is no longer the main source of information about subjects like archaeology. The presence of archaeology on TV has a long history in some countries (such as the UK), and its presence on screen and in other media play a key role in raising interest and directing inquiry. Our role as educators may well become that of guiding students in how to navigate multiple sources of knowledge and evaluate their value. Teachers may no longer act as sources of knowledge, but as coaches and mentors in skills of evaluating and applying information. The constructing of understanding by learners is entering a new and potentially empowering phase.

Cross-References

- ▶ Avocational Archaeology
- ▶ Formal Education up to Age 18, Archaeology in
- ▶ Heritage Values and Education
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Material Culture and Education in Archaeology
- ▶ Narrative and Storytelling for Archaeological Education
- ▶ Public Education and Archaeology: Disciplining Through Education

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Consumption, Archaeology of

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Introduction

A tremendous range of archaeological studies could be construed as consumption studies because of their focus on the ways people use material goods to confirm, display, accent, mask, and imagine who they are and wish to be. Most archaeological analyses of consumption focus on mass consumption in complex societies, but a picture of consumption that examines how people make and use goods for self-definition and collective identification could be applied to virtually any archaeological context. Expanding consumption is most closely associated with the industrial revolution and the development of a global market economy in the last half millennium, but the roots of such consumption reached well into the medieval world and could contribute to an interpretive framework for nearly any archaeological study. We focus here on archaeological research that examines the agency of consumers and acknowledges that structural and localized processes alike shape the way goods assume meaning.

Definition

Archaeological scholarship on consumption emerged in the 1970s, but much of that research examines consumption as a largely reflective process that instrumentally displays social identity, ethnicity, or status or otherwise confirms some essential identities. Archaeologists have typically focused on consumption as an act of exchange, expression of self, or a moment otherwise isolable in the "life" of a good. Consumption is basically approached from two main directions in the archaeological research. Many scholars see consumption as a patterned reflection of structural constraints or people's identities that determine the sorts of goods a consumer acquires and the meanings they give to those things. The other approach considers consumption in terms of personal agency, viewing consumption as a social process in which people construct their individual, social, and cultural identities.

Consumption scholarship has most closely studied commodities, understood here as items produced specifically for exchange (Orser 1996: 191-3). During the emergence of consumer society, the stereotypical self-sufficient family economy was rearranged to a producer–distributor–acquirer chain model. Things and services became commodities defined primarily by their exchange value (Kopytoff 1986: 68), and the people who used and needed them became consumers who acquired commodities by exchange. Commoditization separated the production, distribution, and use of things from each other.

Key Issues/Current Debates/Future Directions/Examples

Since the late 1970s, North American historical archaeologists have extensively studied the correlation between social and economic relations, aspiring to establish relationships between material consumption patterns and social and economic standing. This sort of scholarship tends to focus on how market constraints, supply, costs, and social status shape material consumption. The most influential of these early studies was John Solomon Otto's (1984) groundbreaking work at Cannon's Point Plantation in Georgia, which argued that archaeological analysis could establish patterns specific to consumers who shared the same social and economic positions. At Cannon's Point, Otto identified three social groups living alongside each other: the planter household that owned the plantation, White overseers who managed its everyday operation, and African-American captives. Otto identified clear distinctions in material culture from the three

groups, ranging from distinctions in ceramic decorative types to architectural differences, concluding that the groups' consumption was a reflection of how access to goods was dictated by socioeconomic standing.

Such work on socioeconomic status and material consumption was significantly expanded in the 1980s by George Miller's (1980) study of English ceramic prices. Miller's research on English ceramic price-fixing agreements underscored that late eighteenth- through nineteenth-century English ceramics were priced primarily by decorative type. The Staffordshire price-fixing agreements revealed that undecorated cream-colored ware (known to potters as CC) was universally the most inexpensive ware available. Establishing cream-colored wares as a "baseline" against which all other ceramic prices could be measured, Miller outlined "index values" for most of the price-fixing agreements that survived between the late eighteenth and late nineteenth centuries. Using Miller's index value tables, an archaeologist can quantify the value of an assemblage and compare it to other assemblages from the same period, providing a methodological mechanism to compare ceramic consumption patterns.

Numerous North American historical archaeologists spent the 1980s calculating ceramic index values, though much of this scholarship on "socioeconomic status" ignored contextually distinct influences on consumption. Nevertheless, Miller's contributions led to a flourishing discussion of consumer behavior and consumer choice studies among North American scholars. Many of these socioeconomic status studies were included in the 1987 Suzanne Spencer-Wood edited volume Consumer Choice in Historical Archaeology. Spencer-Wood aspired to use methods like Miller's ceramic scaling indices to forge a systematic definition of socioeconomic status including factors such as market availability, ethnicity, and family size. However, she considered "income or wealth, usually determined by occupation, as the major factor limiting consumer choices" (Spencer-Wood 1987: 325).

The consumer choice approach sought to evaluate social and economic relations on the basis of choices that people make in acquiring commodities (Spencer-Wood 1987: 9-12), but such models are not especially good frameworks for interpreting consumption outside the nineteenth-century urban United States. For example, Christina Rosén's (1999: 16-7) study of Scandinavian consumption of ceramics argues that external "status display" expressions were not necessarily typical of northern Europeans. Ann Smart Martin (1996) raised much the same point in her comparison of urban and rural consumption in the colonial Chesapeake, pointing to very distinct social patterns in cities and countryside that shaped consumption patterns. Archaeological research into commodity consumption has reached outside North America since the 1980s, often contemplating the concept of socioeconomic status. The European adaptations, however, have revealed a number of problems concerning the theoretical framework of socioeconomic status and consumer choice. Paul Courtney (1997) and Frans Verhaege (1997) highlighted the problem of adopting the traditional Marxian model of a direct transition from feudal to capitalist society in Europe, arguing that the model seriously underestimates the impact of mercantile ideology and economy on the development of modern Europe from the late medieval period to the eighteenth century (Gaimster 2009: 528). Likewise, North American consumer theory models tend to be based on conceptions of symbolic and economic value that are distinctive to urban American bourgeois, assuming public displays of stylish and costly wares in competitive status hierarchies. However, these models do not work especially well in many other contexts or early modern periods, and they may in fact be somewhat problematic even in American urban settings. People in places like northern Europe, for instance, were consuming mass-produced goods from the eighteenth century onward, but they imposed their own values, meanings, and uses based on local material and cultural practice. Northern European redware consumption patterns reflect persistent use of local ceramics for functional tasks including dining across class groups, with extensive recycling and reuse that contrasts with the urban bourgeois model of

consuming cyclically stylish goods in public displays of "cost status."

Risto Nurmi's (2011) dissertation on consumption in Tornio in northern Finland in the two centuries between roughly 1600 and 1800 demonstrates that many mass-produced products were imported and traded to the town and acquired by local customers. However, Nurmi found that these goods had exceptionally long use-lives and included numerous vessels with evidence of repair, including relatively inexpensive redwares. Nurmi suggests that Tornio consumers viewed material things in quite different ways than urban bourgeois consumers who acquired cyclically stylish goods in public displays of "cost status." Market constraints did deliver a relatively homogenous range of commodities to these northern European markets, and the aesthetic homogeneity of the material assemblages from Tornio reflects quite different local rules for curation, functional use, and display of goods.

Archaeologists studying consumption initially reduced mass-produced goods to markers of "acculturation," but archaeologies of colonial encounter increasingly focus on indigenous agency. For example, Michael Dietler's (2005: 61-2) study of the early Iron Age Western Mediterranean examines how indigenous consumers influenced colonizers. Dietler argues that indigenous peoples routinely accepted some colonizers' mass-produced goods and turned others into points of resistance that complicate the picture of colonialism. Dietler indicates that early Iron Age European communities were peopled by discriminating consumers who embraced some goods of Greek colonizers, consuming massive quantities of wine and drinking material goods but rejecting many other goods. Dietler (2005: 57) suggests that the indigenous demand for imported Mediterranean trade goods was quite regionally distinctive, a conclusion that underscores the shortcomings of mechanistic models of colonization that distinguish between cores and peripheries and hazard, ignoring all of the cultural and historical contingencies of colonization. Dietler argues that archaeologies of consumption should focus on four fundamental elements: archaeological and cultural context, patterns of association, relative quantitative representation within sites and across regions, and spatial distribution of specific goods.

Like Dietler, many scholars have focused on consumer agency as a mechanism to avoid deterministic pictures of consumption dictated by market supply, advertising, and similar structural conditions. For instance, Christina Hodge's (2007) study of a c. 1720–1775 site in Newport, Rhode Island examines how "middling" households selectively appropriated genteel material practices. Hodge recovered a colorfully decorated tin-glazed earthenware assemblage that was apparently used alongside pewter, which breaks with Georgian dining styles favoring individual matching vessels (Hodge 2007: 438). Yet the household consumed other Georgian forms, including punch and tea drinking vessels that suggest a favor for "fashionable drinking" over formal dining. Hodge argues that this piecemeal adoption of dominant practices illustrates consumer agency that did not simply reproduce gentry materialism.

Some archaeologists have examined consumption as agency that is wielded tactically (if not strategically) against domination. In about 1892, for instance, an African-American household in Annapolis, Maryland filled a cellar with household refuse that included 79 bottles, and nearly all were from nationally advertised brands and did not include any local marketer (Mullins 1999). Rather than interpret this simply as assimilation to the mass market, some African-American households were probably consuming brand goods to circumvent local racism. Local White marketers who bottled their own goods persistently provided poor quality or adulterated goods for their Black customers and sold such goods at less competitive prices than those offered to many of their White neighbors, but nationally produced and priced goods evaded such racist tactics. Some African-American brand allegiance certainly revealed that African Americans sought some measure of genteel standing, and an 1875 probate inventory from the Annapolis home confirmed that the home included stylish decorative furnishings

such as mahogany chairs in a room decorated with chromolithographs and figurines (Mullins 1999: 29).

Nearly any archaeological study could cast itself as a consumption study, so the question revolves around specifically how archaeology's picture of everyday materiality reveals the ways people negotiate, accept, and resist goods' meanings within specific contexts. Rather than reduce all consumption simply to a reflection of market determinism or inflate the agency within all material consumption, the most interesting scholarship focuses on the persistent tensions between structural and localized processes. This casts consumption as a study of dominant marketing, state, and social conditions even as it acknowledges that consumers acquire things to confirm, mask, and imagine who we are and who we wish to be. The dual influences of structural factors and consumer agency provide a rich framework for interpreting material consumption in a vast breadth of archaeological studies.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Modern Material Culture Studies
- ▶ Scandinavia/Northern Europe: Historical Archaeology

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Contemporary Past, Archaeology of the

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Introduction

The archaeology of the contemporary past is a new and interdisciplinary field of research that

intersects with heritage studies, art, ethnography, and modern history. This kind of archaeology, as it is practiced today, was born in the late 1990s. However, its intellectual roots go further back (Harrison 2011: 144-9). While *archaeology* literally means the study of ancient things, archaeologists have always been concerned with the present, although in very different ways. During the nineteenth century, there was no clear-cut division between present and past, archaeology and anthropology, and prehistory books regularly included living societies (but always nonindustrial). This perspective soon fell into disrepute due to its inherent racism and simplistic evolutionism. From the late 1950s onward, archaeologists renewed their interest in the contemporary world through a new method – ethnoarchaeology – and a new theory: processualism. As in the previous century, it was traditional groups that were targeted: other societies were not studied. This is because ethnoarchaeology was conducted for the sake of developing analogies to understand the past, not as an end in itself to understand the present.

Definition

The proliferation of archaeologies of the recent past has produced a diversity of definitions for the subfield. One of the main issues is time. In the United Kingdom, the archaeology of the contemporary past tends to focus on the last 50 years (Harrison & Schofield 2010). From this point of view, the goal of the archaeology of the contemporary would be the study of our present society in the strict sense, following one of the definitions of *contemporary* as that which exists synchronically. It also fits a period that has been characterized as postmodern or high modern. For the study of a longer period, the term *archaeology of the recent past* is preferred. The problem with this approach is that, on the one hand, it privileges a period defined by theorists and culture critics which is not necessarily relevant archaeologically. On the other hand, the division may hamper an adequate comprehension of the present day within longer historical trends. There are two ways in which this problem has been dealt with: some archaeologists prefer to dissolve the uniqueness of late modernity and of modernity in general (Dawdy 2010), whereas others have tried to characterize the late modern phase archaeologically within the trajectories of modernity (González-Ruibal 2008; Olivier 2008). In the latter case, the move implies an extension of the boundaries of the contemporary past beyond what is strictly contemporary. With this definition, another meaning of *contemporary* is privileged – what belongs to the same period of time. From this perspective, we can say that we are contemporaries of First World War soldiers, even if no one is alive anymore, because we live in the same historical phase. In a similar vein, some archaeologists project the contemporary even further back in time to the mid-nineteenth century, for both historical and methodological reasons. This might be helpful for filling the gap left by historical archaeology, which tends to focus primarily on the period before the late nineteenth century while simultaneously forces us to see connections between present processes and those of the recent past. Other authors explicitly reject the phase approach and instead consider the archaeology of the contemporary past as the study of all relations between past and present (Holtorf & Piccini 2009). In any case, all authors agree that in approaching the most recent past from an archaeological point of view forces us to rethink modernist temporalities and transgress the well-ordered time frames of conventional archaeology (González-Ruibal 2008; Olivier 2008; Holtorf & Piccini 2009; Harrison 2011).

A lingering problem with the definition of the archaeology of the contemporary past is its equation with the *archaeology of us* (Gould & Schiffer 1981), this *us* being equated to *Western*. It is true that late modern societies present problems of their own and deserve to be studied specifically. Yet this should not lead us to reduce the archaeology of the contemporary past to one kind of societies only (reversing the discrimination of ethnoarchaeologists). Although some practitioners have worked in both Western and non-Western contexts, there is still an important

unbalance with the geographic scope of the subdiscipline, and the amount of non-Western archaeologists working on the recent past is still limited. What do not seem to have limits are the topics explored by this archaeology: a few of them will be described in the following sections.

Historical Background

Despite their overt lack of concern for contemporary communities, processual archaeologists, like Lewis Binford, paved the way for an archaeological study of the present. On the one hand, unlike culture-historical archaeologists, processualists were not concerned with particular periods and cultures, but with understanding human behavior and social processes in general – and this could include the present. On the other hand, processual archaeologists who decided to do ethnographic work with living communities did so because many issues in which they were interested were usually overlooked by ethnographers (garbage, abandonment, recycling, settlement patterns, technology, etc.). With their detailed archaeological documentation, ethnoarchaeologists did prove the relevance of archaeological method to see the present differently.

There was only one further step to be taken: to study the present for its own sake. This occurred in the mid-1970s in the United States. Instead of looking at non-modern communities, a group of archaeologists decided to focus on their own culture and in this way inaugurated a new field: the *archaeology of us*. Its leading proponents were William Rathje, Richard Gould, and Michael Schiffer (Gould & Schiffer 1981), who went on to produce influential work on garbage, modern technology, and contemporary disasters. Despite this promising start, archaeological studies of the present did not take root. A similar interest in modern material culture developed in the early 1980s in the United Kingdom, with the emergent post-processual archaeology. Although some archaeologists engaged with contemporary things, the field was mostly taken over by anthropologists and lost much of its archaeological edge.

It can be argued that the archaeology of the contemporary past was reborn again in 2001 when the seminal book *Archaeologies of the Contemporary Past* (Buchli & Lucas 2001a) was published. The introductory chapters by the editors provided, for the first time, a strong theoretical background to the archaeological study of the recent past, which still grounds in one way or the other the large majority of the research. Other events in the United Kingdom explain the consolidation of the subdiscipline: the establishment of the Contemporary and Historical Archaeology in Theory (CHAT) annual conferences in 2003; the work of English Heritage, which has been faced with the task of managing the unwieldy remnants of the twentieth century; and the publication of the first handbook on the archaeology of the contemporary past (Harrison & Schofield 2010). The archaeology of the contemporary past, however, has not only developed in the Anglo-Saxon world. Often simultaneously, archaeologies of the present time have emerged in Argentina, Chile, Iran, Spain, France, and the Scandinavian countries.

Key Issues/Current Debates

Everyday Life

Everyday life is the main concern of what could be called the British school of archaeology of the contemporary past which revolves around CHAT. Archaeologists associated with this school have cast their archaeological gaze on the world that surrounds them and have investigated furniture, graffiti, highways, malls, zoos, and even virtual worlds, to mention but a few things (cf. Holtorf & Piccini 2009; Harrison & Schofield 2010). One of the most controversial projects in this line was the archaeological excavation of a van from 1991 that had been used by an archaeological team for about 15 years. The evidence was analyzed through a combination of customary archaeometric methods (Bailey et al. 2009) and an object-biography approach, which has been consistently applied to prehistoric and ancient contexts over the last two decades (http://www.archaeologychannel.org/content/film/

Contemporary Past, Archaeology of the, Fig. 1 A house abandoned in Galicia (Spain) during the 1960s

festival2008/InTransit.htm). As it happens with much of this kind of work, the conclusions were not precisely counterintuitive, but this was probably not the point. What the van excavation and similar projects do is to encourage us to look at our world (and archaeology) in a different way. It is more a creative engagement with ordinary materiality than an interpretative work (cf. Harrison 2011).

However, archaeology can also allow us to go deeper and in more detail into other people's lives and reveal something of them. This is the case with abandoned houses where everything has been left behind. The objects that have been abandoned following a catastrophic event can tell intimate stories about ordinary women and men. Thus, Dezhamkhooy and Papoli Yazdi (2010) excavated several houses in Bam (Iran) that collapsed following a major earthquake in 2003. In their powerful work, they introduce us to six Iranian families through the objects left in their destroyed homes. In this way, archaeology manages to keep alive something of those persons and becomes a poetical memory practice. A similar investigation was undertaken by Buchli and Lucas (2001b) in a council house in the UK that had been recently abandoned by its occupiers: a young unmarried woman and her two children. The study documented many intimate details of the woman's sad life story: the archaeologists suggest that the house was abandoned in the wake of a relationship breakdown with a heroin-addict partner. Similar intimate stories can be documented in the rural houses that were abandoned during the second half of the twentieth century in Galicia (Spain) (González-Ruibal 2005). Due to a desire to break with a peasant past that was perceived as shameful, the owners of many of these houses decided never to return to them and often abandoned many personal objects behind, such as photographs and letters, which allow us to piece together personal stories, often tragic (Fig. 1). This kind of work confronts the archaeologist with an ethical dilemma: is it legitimate to break into other people's life? Although the identity of the people is not revealed, we get to know too much about them, things that the subjects would probably not like to be disclosed. It can be argued, however, that archaeology can become a sort of memory work for the people without history and, in fact, most of the situations studied by archaeologists have to do with anonymous, often humble, people that rarely make it into history books.

Indeed, a concern with the less gentle side of everyday life has characterized the archaeology

of the contemporary. This includes analyses of the *microphysics of power*, such as the studies carried out on school and domestic architecture or on the destructive operations that sustain consumption in the Western world. The asymmetries and inequalities within the West are also being addressed by archaeologists interested in homelessness. Some projects in the UK and the USA are conducted as community archaeology, with an active involvement of homeless people. Other subaltern groups have attracted the attention of archaeologists, too, such as migrant laborers and miners in the United States.

Conflict

The archaeological study of modern conflict has grown exponentially in recent years. Starting from battlefield archaeology, archaeologists of modern conflict are now covering wider ground (cf. Schofield et al. 2002). The archaeology of the First World War has been relevant in the development of the subfield. Archaeologists and amateurs, as in other areas, have worked closely together, and they have mostly focused on the experiences of common soldiers fighting in the trenches of the Western Front. Researchers have also studied memorials, graffiti, and trench-art. More recently, the field has expanded geographically and thematically, to include other scenarios and topics, such as the Great Arab Revolt and POW camps. Comparatively, the other major conflict of the twentieth century, the Second World War, has received little attention. An important part of the work conducted so far has been carried out as part of heritage management programs (CRM). Interestingly, archaeological research on the Second World War is far from being centered on conventional battlefields. The British Home Front and the Blitz, for instance, have been thoroughly studied by Gabriel Moshenska (e.g., 2009), who has looked at air-raid shelters, shrapnel collecting by children, and bombed out civilian houses. He has excavated the latter in the context of innovative projects of community archaeology. Something that characterizes twentieth-century conflicts is precisely the blurring between combatants and noncombatants. This can be seen materially in the destruction of cities (Fig. 2) but also in concentration camps: similar technologies of repression were used to control civilians and military personnel – see examples in Myers and Moshenska (2011). Another aspect of the war to which archaeology can contribute is its impact on non-Western societies: in places like Ethiopia, some indigenous groups were first exposed to modernity through the war machinery of Italy and the Allies.

Contemporary Past, Archaeology of the, Fig. 2 The facade of a civilian building in Sarajevo riddled with bullet holes during the Bosnian War (1992–1995)

Paradoxically, more archaeological work has been produced on the Cold War than on the other conflicts, despite being a more recent conflict and not having many proper battlefields. Again, research has often been driven by heritage concerns. Most endeavors have focused on the UK and the USA, where nuclear silos, military factories, and bases have been catalogued, studied, and, sometimes, opened to the public. The material effects of the Cold War in communist countries have been less studied (with the exception of East Germany), but some initiatives have already been undertaken, in places like Cuba and

Ethiopia. Countries in Africa and Asia often suffered the hottest side of the Cold War, and their lands became the testing grounds of war machinery, which was then left to rust. This provides a significant area of research for archaeologists.

The last global war, the so-called War on Terror, is also being scrutinized by archaeologists. They have been working on detention camps, the destructive effects of terrorism in New York, and its memorialization. Finally, the archaeology of local (or rather glocal) wars is also contributing to the wider debate. This is the case with the Spanish Civil War. Although mass graves have been the main goal of researchers and grassroots associations, other initiatives have aimed at landscapes of conflict more generally, including battlefields, concentration camps, and prisons.

Dictatorship and Human Rights Violations

One of the phenomena that have characterized the last 100 years of global history is dictatorship. The study of this political phenomenon could be considered part of conflict archaeology, but in fact it goes well beyond it and intersects with other areas of study, such as everyday life and industry. Archaeological work on this issue has a triple purpose: throwing light on the material strategies that made those regimes work (and fail), providing incriminating evidence for the courts (such as the ICC), and helping the mourning process of victims and relatives. The archaeology of human rights violations is usually associated with the exhumation of mass graves. Archaeologists have participated in the recovery of bodies of victims of political cleansing in almost every continent, and the recovered evidence has often played an important role in incriminating perpetrators. One of the problems with this work is that since it is used in court, as in the former Yugoslavia, it is confidential and cannot be published. This is not a problem when perpetrators will not be taken to justice, as in Spain.

The archaeology of dictatorship cannot be reduced to mass graves, though. Researchers also investigate strategies of social engineering, control, and punishment. One of the most promising fields of research is the archaeology of concentration camps (Myers & Moshenska 2011). It is there where the horror of totalitarianism can be better grasped, by revealing the work of repressive technologies and recovering the traces of the individual lives that were shattered. The personal objects housed in the Museum of Auschwitz are a well-known testimony to Nazi barbarity. Similar evidence has been recovered during excavations at other camps and provides a unique corpus of data on the Jewish communities of Central Europe before their extermination.

Nevertheless, dictatorships cannot be based on systematic terror alone. They also rely on the seduction of the masses. Practices aimed at attaining hegemony are often material: architecture and landscape are two of the areas where totalitarianism strove to impress the people (Fig. 3).

Archaeologists, however, have paid more attention to openly repressive practices than to the construction of totalitarian order. An exception is the study of the Bükeberg arena, where the Nazis celebrated a Harvest Festival which summoned hundreds of thousands of people every year. The scenario was cleverly devised to cause the highest impact on the masses: a 600-m-long alley (*Führerweg*) flanked by flagpoles was laid out for Hitler to "walk through the people" before reaching the tribune (Burström & Gelderblom 2011). Fascist Italian colonialism used space to imprint in the local population the idea of the colonizers' racial superiority, and Soviet urbanism resorted to large avenues and plazas to create dramatic scenarios of power (Andreassen et al. 2010). Apart from studying how these strategies work, archaeology can also explore the ways in which people survived totalitarianism. In the Soviet town of Pyramiden, Andreassen et al. (2010) have documented the *customization* of domestic space, but they found no open criticisms to the regime, in the shape of graffiti, vandalism, or similar. Due to its rigidity and disregard for actual human needs, totalitarian dreams often fail. The abandoned farms planned by Mussolini's regime in Sicily are proof of fascism's inability to adapt to local necessities.

Contemporary Past, Archaeology of the, Fig. 3 Seducing the masses: a communist-period mural in Berlin

While social repression and violence are immediately associated with dictatorship, democratic regimes can also employ them. During the first third of the twentieth century, for instance, the labor movement suffered bloody attacks at the hands of liberal governments. Archaeologists have excavated the remains of the mining camp of Ludlow (Colorado), where striking miners and their families were killed by the US Army (Larkin & McGuire 2009). Another case of a totalitarian strategy deployed by a democratic regime is that of Delta Camp in Guantanamo, where prisoners of war are held in contravention of international treaties.

Industry

Industrial archaeology was one of the first archaeologies of the recent past to appear and is now a well-established field in itself. The industrial ruins of the last 100 years, however, have received less attention than older ones. Efforts have been devoted recently to document the changing industrial landscape of the United Kingdom: new phenomena such as nuclear power, renewable energy, and shopping malls have substantially changed the cultural landscape here. Apart from chronology, there is another bias in industrial archaeology that has to be overcome: its focus on Euro-American countries. The effects of industrialization in other continents have been less studied, although there is a plethora of themes worth exploring: development projects in the Third World (Fig. 4), outsourcing, and industrialization in former communist nations. Regarding industrialization beyond the West, an interesting case is Flora Vilches' study of the nitrate mining town of Chacabuco (Chile) (Vilches 2011). After mining stopped in 1938, the place was abandoned only to be reoccupied as an internment camp during the Pinochet regime. Vilches shows the connections and continuities between a regimented working space under a liberal government and a disciplinary surveillance space under dictatorship. An example of communist industrialization is the aforementioned study conducted by Andreassen et al. (2010) in the ruins of the Soviet mining town of Pyramiden. The place was not vacated until 1998, and everything was left in place then, a phenomenon that allowed the researchers to have a glimpse into a vanished era. While archaeologists have been much concerned with the archaeology of industry, they have been less interested in processes of deindustrialization, despite the many ruins that they leave behind.

Contemporary Past, Archaeology of the, Fig. 4 An abandoned gas station belonging to a ruined industrial complex from the late 1980s, Metekel (Ethiopia)

A kind of industry that is specific of the last half century is the one related to space technology. Archaeologists have explored issues related to space junk, rocket ranges, landing sites, and the way in which this particular heritage is managed, appropriated, and contested.

Ruins and Garbage

Modern ruins and garbage are both the raw material and a theme of study for the archaeologists of the recent past. The interest in ruination is shared with scholars from other disciplines. In fact, archaeologists have discovered paradoxically late that ruins are an interesting phenomenon per se (Fig. 5), not just a medium to obtain other information (cf. González-Ruibal 2005; Andreassen et al. 2010; Dawdy 2010). Geographers, anthropologists, and cultural historians have also offered important insights which are relevant for archaeology. Ruination itself is the focus of Andreassen et al. (2010), who have combined both art and archaeology to produce a powerful account of Pyramiden. It is at the same time an intimate exploration of the abandoned settlement and a reflection on the nature of ruins.

Modern ruins produce a fascination that goes well beyond the limits of academia, as shown by the proliferation of coffee-table books with impressive photographs of abandoned places and derelict buildings and the emergence of a singular phenomenon: urban exploration. Archaeologists have yet to engage in a dialogue with these new participants. Their explorations and the often extraordinary documentation that they produce also challenge professionals: in which sense is an archaeological take on ruins different from that of amateurs? What can archaeologists add? The same questions are pertinent for the relationship between archaeological research and that conducted by scholars from other disciplines. It can be argued, on the one hand, that archaeologists have a unique methodology, which allows them to produce richly textured narratives. On the other hand, as social scientists, we can contextualize the phenomenon of ruination within long-term material processes and combine the micro-history of particular ruins with the macro-history of modernity.

Regarding garbage, its *discovery* was partly due to the New Archaeology's concern with formation processes: discard, recycling, and refuse

Contemporary Past, Archaeology of the, Fig. 5 Ruins of an unfinished resort on the island of Corisco (Equatorial Guinea), early twenty-first century

were central concepts in ethnoarchaeology and behavioral archaeology. William Rathje went a step forward when he decided to study garbage in an industrial society as a means to understand social issues related to that society, not in an analogical way (Rathje & Murphy 1992). Rathje proved that discarded objects can tell a story wildly different from the one reported by consumers. Apart from the sociological interest, garbology has had an important practical role in raising awareness among Americans of the importance of recycling and the repercussions of unbridled consumerism.

Future Directions

The archaeology of the contemporary past has progressed much during the last decade. Although it is true that the subdiscipline – as Harrison (2011) has argued – has been more welcomed than criticized by other archaeologists, the truth is that it runs the risk of becoming ghettoized, as another area of expertise within the wider discipline. This would be regrettable because the archaeology of the contemporary world is in a privileged position to address in novel ways crucial archaeological concerns, such as rhetoric, materiality, politics, and memory (González-Ruibal 2008). It can also actively contribute to problematize concepts of heritage and time (Olivier 2008; Harrison & Schofield 2010; Harrison 2011). In addition, due to its hybrid character and its focus on issues of current relevance, this archaeology can be a way of starting fruitful dialogues with other disciplines, not in a subordinate role, as has often been the case, but in equal terms. Finally, the archaeology of recent phenomena easily engages a wide public and allows people to rethink critically their own society. To avoid turning it into a scholarly exercise, archaeologists have to keep imagining ways in which their work can be relevant for other archaeologists, other researchers, and society as a whole.

In fact, there are some promising areas of research that may help establish bridges with other disciplines and with society: as it has been pointed out, there is a disproportion of studies between the West (and particularly the Anglo-Saxon world) and the rest. Besides, those that have worked in non-Western contexts have often emphasized poverty and violence. While this is a fundamental part of life for many people in Africa, Asia, or Latin America, there are many aspects of daily life that would benefit from an archaeological approach, such as the construction and use of domestic space or the appropriation of

foreign technologies. In fact, the material creativity of shanty towns that is so important for the social life of their inhabitants has been largely disregarded: an archaeological gaze has much to offer.

Perhaps the most important challenge for an archaeology of the contemporary past, however, lies in producing ambitious works. So far, this subfield has been mostly concerned with offering commentary on contemporary life. It has engaged in micronarratives, often forgetting the larger picture. Along with micronarratives and creative interventions, the archaeology of the contemporary past should also construct elaborate accounts of complex issues – with an archaeological perspective: some themes that deserve monographic treatment are the postindustrial metropolis, urban poverty, political resistance and revolution, decolonization, global economic crises, the effects of climate change, and migration, to mention but a few. The idea is to not just engage in specific case studies but, as archaeologists of other periods do, develop coherent, synthetic approaches to those large-scale phenomena. Starting from essentially archaeological topics such as materiality, ruins, fragmentation, and time, archaeology should be able to craft rich, alternative visions to those proposed by history, sociology, or anthropology.

Cross-References

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- ▶ Chronopolitics and Archaeology
- ▶ Consumption, Archaeology of
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Critical Historical Archaeology
- ▶ Gould, Richard A.
- ▶ Historical Archaeology
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- ▶ Internment and Prisoners of War in Historical Archaeology
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Contemporary and Historical Archaeology in Theory (CHAT)

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Brief Definition of the Topic

CHAT – Contemporary and Historical Archaeology in Theory – is a conference group focused on the study of the archaeology of the postmedieval and contemporary world. The group was set up by Dan Hicks and Angela Piccini (then teaching the MA programs in Historical Archaeology and Archaeology for Screen Media at the University of Bristol) in February 2003. Hicks and Piccini formed a standing committee – including Mary Beaudry, Sarah Tarlow, Tadhg O'Keeffe, Eleanor Casella, and David Austin – and organized the first meeting at Bristol in November 2003, with keynote papers given by Mary Beaudry and Victor Buchli. The first meeting comprised four sessions – on the themes of "the archaeology of colonial and postcolonial worlds," "archaeology and popular culture," "connection and evocation: beyond explanation in archaeology," and "archaeology as political action."

The purpose of the establishment of the group was, in part, to develop a new, informal forum for the development of approaches and exchanges in the archaeological study of the recent past – distinct from those then offered by the meetings of the Society for Post-Medieval Archaeology, the Association for Industrial Archaeology, or the Society for Historical Archaeology. But its main aim was to bring together the archaeological study of the early modern, modern, and contemporary worlds: connecting modern archaeology with material culture studies rather than purely with economic and social history.

The format for the conference – a full schedule of short papers in plenary, themed sessions – has been retained at the annual meetings of the group

that have been held since 2003: at the University of Leicester (2004), University College Dublin (2005), University of Bristol (2006), University of Sheffield (2007), University College London (2008), the University of Oxford (2009), University of Aberdeen (2010), Boston University (2011), and the University of York (2012). The founding standing committee was committed to ensuring that their composition would change over time, and many stood down in 2008 to allow CHAT contributors to take the group in new directions. Through the energy of new standing committee members including Sefryn Penrose, Rodney Harrison, Jeff Oliver, Krysta Ryzewski, James Symonds, Laura McAtackney, Sarah May, and James Dixon, the CHAT group has retained the atmosphere of the first meetings.

A series of publications have developed from the meetings, including the contributions to the "Studies in Contemporary and Historical Archaeology" series, several of which are based on the proceedings of CHAT meetings. However, the principal outcomes of the group have been new connections between archaeological researchers interested in working at the temporal boundaries between anthropology and archaeology, and it is by the vibrancy of these exchanges and collaborations that the ongoing success of the group continues to be judged.

Cross-References

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Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)

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Introduction

The Convention for the Protection of Cultural Property in the Event of Armed Conflict, in regard to the place and year of its adoption also known as the "1954 Hague Convention", is an international treaty adopted on May 14, 1954, in The Hague, Netherlands. It is aimed at the protection of cultural property against destruction or damage, as well as theft, looting, or other forms of unlawful seizure but also military use during periods of armed conflict. The Convention contains 40 articles in the main text and 21 articles in separately drafted Regulations for its execution, which include specific requirements for the monitoring of the Convention and the so-called Special Protection regime. The provisions of the Convention were supplemented and specified in two protocols, the First Protocol of May 14, 1954, and the Second Protocol of March 26, 1999, both likewise adopted in The Hague. The First Protocol contains 15 paragraphs delivering provisions to prevent the export of cultural property by a Party to the Convention from the occupied territory of another Party and regulates the return

of illegally exported cultural property. With 47 articles, the Second Protocol serves the extension and amendment of the provisions of the Convention and its revision in those areas, where their implementation over the decades had proven to be inadequate, in particular introducing the Enhanced Protection regime. All three agreements are part of International Humanitarian Law (formerly also Law of Armed Conflict). UNESCO is primarily responsible for monitoring compliance with the Convention; in this regard it is partly supported by the UNESCO-affiliated NGO network of the Blue Shield, consisting of the International Committee of the Blue Shield (in Paris) and various national committees primarily in countries Party to the Convention, which form together the Association of National Committees of the Blue Shield (in The Hague).

Historical Background

The idea that cultural property should be protected in armed conflicts is relatively young; the thought was unknown in ancient to medieval periods, if one disregards the principle of asylum of sanctuaries. Regulations by the Austrian Empress Maria Theresa and the claim of the Vienna Congress in 1814 (in response to the looting of cultural property in the course of the Napoleonic campaigns), the General Order № 100 of U.S. President Abraham Lincoln to the Union troops during the American Civil War (Lieber Code of 1863) as well as the regulations of the Brussels Declaration of 1874, not to destroy works of art during war and not to remove them from their place of origin, constitute the important steps towards the protection of cultural property in wartime.

The first international treaty, which contained provisions for the protection of cultural property during war, was the 1899 adopted and in 1907 slightly modified Hague Convention. Article 27 requires the attacking Party to spare (as much as possible) historical sites, educational institutions, and institutions with religious, charitable, scientific, or artistic importance in sieges and bombardments. The attacked Party is required to identify appropriate buildings, whereby the type of marking was not suggested or even specified. In addition, Article 56 contains a generally worded prohibition of confiscation, destruction, or damage of such facilities.

The first international treaty that dealt exclusively with the protection of cultural property in the event of war was the Treaty on Protection of Artistic and Scientific Institutions and Historic Monuments signed in 1935 by the American States, in regard to the place of its adoption also known as the Washington Treaty or more commonly after its initiator – the Russian lawyer, painter, writer, philosopher, and archaeologist Nicholas Roerich – the Roerich Pact. It contains eight articles and includes several significant innovations compared with the general provisions of the Articles 27 and 56 respectively of the Hague Conventions. The treaty established the neutral status of historic monuments, museums, scientific and artistic institutions, as well as educational and cultural facilities – comparable to the neutral status of medical personnel and facilities. The Parties to the treaty were required to submit lists of the monuments and facilities, for which they request protection in accordance with the treaty, to the Pan American Union, which should then pass these lists to all State Parties.

After the 2nd World War – and in light of the massive looting and destruction of cultural property during this war – the Convention for the Protection of Cultural Property in the Event of Armed Conflict emerged within UNESCO on the initiative of the Netherlands.

Key Issues

Legal Validity

The Convention and the First Protocol generally entered into force on August 7, 1956, in accordance with Article 33 and the Second Protocol on March 9, 2004, in accordance with Article 43. The Convention and the Protocols *"enter into force, for each High Contracting Party, three months after the deposit of its instrument of ratification or accession"* according to Article 33 paragraph 3. As of April 1, 2013, 126 states are

parties to the Convention; 102 states have signed the First Protocol, and the Second Protocol was signed by 64 states.

According to Article 18, the Convention applies to every armed conflict between two or more Contracting Parties and in the case of the occupation of the territory of a Contracting Party. In non-international armed conflicts on the territory of a Contracting Party, all parties in the conflict are obliged to at least comply with and apply the provisions of the Convention to respect cultural property.

In states which have not signed the Convention, it is not in force and therefore not generally applicable, provided that this is not otherwise regulated in the Convention. Thus, Article 18, paragraph 3, states that *"if one of the Powers in conflict is not a Party to the present Convention, the Powers which are Parties thereto shall nevertheless remain bound by it in their mutual relations. They shall furthermore be bound by the Convention, in relation to the said Power, if the latter has declared, that it accepts the provisions thereof and so long as it applies them."*

Under Article 37, a Contracting Party may denounce the Convention, although the provisions of the Convention do not lose their effectiveness until 1 year after termination.

Definitions of Key Terms in Accordance with the Convention

According to Article 1, the term "cultural property" is defined as:

(a) movable or immovable property of great importance to the cultural heritage of every people, such as monuments of architecture, art or history, whether religious or secular; archaeological sites; groups of buildings which, as a whole, are of historical or artistic interest; works of art; manuscripts, books and other objects of artistic, historical or archaeological interest; as well as scientific collections and important collections of books or archives or of reproductions of the property defined above;
(b) buildings whose main and effective purpose is to preserve or exhibit the movable cultural property defined in sub-paragraph (a) such as museums, large libraries and depositories of archives, and refuges intended to shelter, in the event of armed conflict, the movable cultural property defined in sub-paragraph (a);
(c) centers containing a large amount of cultural property as defined in sub-paragraphs (a) and (b), to be known as 'centers containing monuments.'

Archaeological sites and archaeological objects are here explicitly mentioned as "cultural property" as defined by the Convention and thus every time implicitly referred to when the Convention speaks of "cultural property."

In Article 2, the term "protection" of cultural property is defined as *"the safeguarding of and respect for such property."* The concept of *"safeguarding"* is defined in Article 3 and the concept of *"respect"* is defined in Article 4. Measures of "safeguarding" are basically those that are undertaken *"in time of peace"* for *"cultural property situated within their own territory against the foreseeable effects of an armed conflict"*; how these measures have to be designed remains the responsibility of the national states as Contracting Parties. The respect for cultural property, however, concerns all measures in the event of an armed conflict. Article 4, paragraph 1, requires the Contracting Parties to *"respect cultural property situated within their own territory as well as within the territory of other High Contracting Parties by refraining from any use of the property and its immediate surroundings or of the appliances in use for its protection for purposes which are likely to expose it to destruction or damage in the event of armed conflict; and by refraining from any act of hostility, directed against such property."* And paragraph 3 requires the Contracting Parties *"to prohibit, prevent and, if necessary, put a stop to any form of theft, pillage or misappropriation of, and any acts of vandalism directed against, cultural property."* And *"They shall refrain from requisitioning movable cultural property situated in the territory of another High Contracting Party."*

As late as Article 18, the term "armed conflict" is, in the scope of the Convention, defined as:

1. . . . the event of declared war or of any other armed conflict which may arise between two or more of the High Contracting Parties, even if

the state of war is not recognized by, one or more of them.

2. . . . all cases of partial or total occupation of the territory of a High Contracting Party, even if the said occupation meets with no armed resistance.

With Article 19 the area of application is extended to include *"the event of an armed conflict not of an international character*." With Article 5 additional provisions in the event of an occupation – as a special form of armed conflict – are elaborated on.

Key Provisions of the 1954 Hague Convention

In Article 4, paragraph 2, the exemption of *"military necessity"* is introduced in the principles of the Convention, thereby not further defining what the term *"necessity"* actually means. Based on this, this exemption is with Article 11 transferred to the provisions of the special security and allowing a waiver of that status during an armed conflict under certain circumstances, including, for example, an *"unavoidable military necessity*," the term *"unavoidable"* not being further defined. The issue of *"military necessity"* is dealt with in more detail in the Second Protocol (see below).

Article 5 deals with the case of occupation and generally states that the occupying force *"shall as far as possible support the competent national authorities of the occupied country in safeguarding and preserving its cultural property."* Beyond this obligation it shall *"take measures to preserve cultural property situated in occupied territory and damaged by military operations"* if the competent national authorities are unable to do so. Beyond these basic provisions, the Convention does not contain further obligations or restrictions to the occupying force, e.g., no prohibition of handling cultural property in any way and also no prohibition of archaeological excavation. The whole problematic issue is dealt with in some more detail in the Second Protocol (see below).

With Article 6 the "distinctive emblem" of the Convention is introduced: *"In accordance with the provisions of Article 16, cultural property may bear a distinctive emblem so as to facilitate its recognition."* This is the Blue Shield, the design of which is described in Article 16 as *"a shield, pointed below*, *persaltire blue and white (a shield consisting of a royal-blue square, one of the angles of which forms the point of the shield, and of a royal-blue triangle above the square, the space on either side being taken up by a white triangle)."* Its use is specified in Article 17, whereas paragraph 4 generally states: *"The distinctive emblem may not be placed on any immovable cultural property unless at the same time there is displayed an authorization duly dated and signed by the competent authority of the High Contracting Party."* According to Article 20 of the Regulations, the marking of cultural property with the Blue Shield is not a requirement but just an option. In fact, many Contracting Parties have so far omitted use of the emblem.

Article 7 describes the basic military measures, to which the Contracting Parties are already committed in time of peace, namely, *"to introduce in time of peace into their military regulations or instructions such provisions as may ensure observance of the present Convention, and to foster in the members of their armed forces a spirit of respect for the culture and cultural property of all peoples"* and *"to plan or establish in peace-time, within their armed forces, services or specialist personnel whose purpose will be to secure respect for cultural property and to co-operate with the civilian authorities responsible for safeguarding it."* Although Article 7 has a military key function for an effective protection of cultural property, only a few Contracting Parties have implemented these provisions in a comprehensive and sustainable manner. Thus, the idea of the protection of cultural property is in most nation states already missing at the political level of national security and defense doctrines. Therefore, there is hardly any national armed force that has adopted its own guidelines for the military protection of cultural property, and therefore, the issue of cultural property protection has hardly found entry into any rules of engagement of those military units that are also actually deployed onto missions. There are only very few national armed forces that consistently educate expert officers

(e.g., liaison officers) for the protection of cultural property. And cultural property protection is in most nation states barely or not at all anchored in the curricula of its military personnel, for commissioned as well as noncommissioned officers. This has as a consequence, among others, that even commanders in the field fail to recognize cultural property, which is particularly true of archaeological sites and other archaeological structures of a non-monumental character.

Articles 8 to 11 regulate the issue of Special Protection for certain cultural property. According to Article 8 this includes *"a limited number of refuges intended to shelter movable cultural property in the event of armed conflict, of centers containing monuments and other immovable cultural property of very great importance."* Requirement for the granting of special protection is that the relevant objects *"are situated at an adequate distance from any large industrial center or from any important military objective constituting a vulnerable point"* (subparagraph 1a) and *"are not used for military purposes"* (subparagraph 1b), whereas the guarding of cultural property by, e.g., police, is not viewed as military use (paragraph 4). The granting of special protection furthermore requires the registration in the International Register of Cultural Property under Special Protection (paragraph 6). Cultural property under Special Protection counts as inviolable (Article 9). According to Article 17 the emblem of the Convention is to be used in triplicate for cultural property under Special Protection, as well as in single copy for all other cultural property to be protected, for the staff responsible for the protection of personnel, and for appropriate identity cards. This important issue is dealt with under the term Enhanced Protection in the Second Protocol (see below).

Articles 12 to 14 regulate the transport of cultural property. Thus, transport relocating cultural property can also be placed under Special Protection (Article 12). According to Article 14, transported cultural property is granted *"immunity from seizure, placing in prize, or capture,"* which does not limit the *"right of visit and search."* Article 15 obliges Contracting Parties to respect the personnel protecting the cultural property, and in case of capture, the staff may not be prevented from carrying out their work.

Articles 20 to 28 contain the provisions for the execution of the Convention. They, among others, specify the role of protecting powers (Art. 21 and 22), as well as of UNESCO (23). In addition, Article 25 includes an obligation to disperse the agreement in peacetime and during conflict, for example, through training in the military and civilian sectors. According to Article 28, the parties are required to prosecute violations of the agreement in penal or disciplinary terms.

The final provisions in Articles 29 to 40 regulate, among other things, the signature, the ratification, the accession, the entry into force, the amendment, and the termination of the Convention. In Article 36 the relationship of the Convention to previous conventions is regulated and established and states that the Convention supplements the provisions of the Hague Conventions of 1899 and 1907 respectively as well as the Roerich Pact of 1935, given the Contracting Parties are bound to these previous conventions.

Important Provisions of the Second Protocol of 1999

Articles 5 to 9 supplement the general provisions of the Convention regarding protection. Article 5 covers the safeguarding of cultural property and defines, as minimum security measures in peacetime, *"the preparation of inventories, the planning of emergency measures for protection against fire or structural collapse, the preparation for the removal of movable cultural property or the provision for adequate* in situ *protection of such property, and the designation of competent authorities responsible for the safeguarding of cultural property."* Article 6 increases the provisions for respecting cultural property. Thus, as subparagraph (a) points out, hostile acts directed against cultural property that are carried out on the basis of an *"imperative* (sic!) *military necessity"* must be limited to the duration *"i. that cultural property has, by its function, been made into a military objective; and ii. there is no feasible alternative available to obtain a similar military advantage to that offered by directing an act of hostility against that objective."* Similar

restrictions apply to the military use of cultural property through which it is exposed to the risk of destruction or damage. On the basis of this provision, each attack must be preceded by an effective warning. In Article 7 precautions during military operations are defined, through which damage to the cultural property protected is to be prevented as much as possible. Article 8 analogously commits the conflict parties to remove cultural property from the vicinity of military targets or otherwise to protect and prevent the installation of military targets in the vicinity of cultural heritage.

Article 9 specifies the provisions in case of occupation and establishes the rule that an occupying power in the occupied territory must prohibit and prevent:

1. (a) any illicit export, other removal or transfer of ownership of cultural property;
   (b) any archaeological excavation, save where this is strictly required to safeguard, record or preserve cultural property;
   (c) any alteration to, or change of use of, cultural property which is intended to conceal or destroy cultural, historical or scientific evidence.
2. Any archaeological excavation of, alteration to, or change of use of, cultural property in occupied territory shall, unless circumstances do not permit, be carried out in close co-operation with the competent national authorities of the occupied territory.

Therefore, Article 9 explicitly addresses the conduct of archaeological excavation, limits it in occupied territory to rescue excavation in paragraph 1b, and demands the cooperation with competent national authorities in paragraph 2.

Articles 10 to 14 contain the provisions for "enhanced protection," which represent an alternative to the "special protection" of the Convention that has in part been experienced as insufficient. According to Article 10, cultural property may be placed under enhanced protection if:

(a) it is cultural heritage of the greatest importance for humanity;
(b) it is protected by adequate domestic legal and administrative measures recognising its exceptional cultural and historic value and ensuring the highest level of protection;
(c) it is not used for military purposes or to shield military sites and a declaration has been made by the Party which has control over the cultural property, confirming that it will not be so used.

Article 11 regulates the granting of "enhanced protection" by an appropriate committee of UNESCO (i.e., the Committee, which is constituted with Articles 24 to 27) involving the Contracting Parties and *"non-governmental organizations with relevant expertise"* (Art. 11, paragraph 3), such as *expressis verbis* the International Committee of Blue Shield. According to Article 12, inviolability applies to cultural property under enhanced protection comparable with the special protection of the Convention. Articles 13 and 14 regulate the loss as well as the suspension and cancellation of enhanced protection.

Articles 15 to 21 contain provisions on the "criminal responsibility and jurisdiction." These therefore represent, in addition to the system of enhanced protection, the main innovation of the Second Protocol and a fundamental improvement in regard to the Convention. Article 15, paragraph 1, defines five serious violations of the protection of cultural property during armed conflict:

(a) making cultural property under enhanced protection the object of attack;
(b) using cultural property under enhanced protection or its immediate surroundings in support of military action;
(c) extensive destruction or appropriation of cultural property protected under the Convention and this Protocol;
(d) making cultural property protected under the Convention and this Protocol the object of attack;
(e) theft, pillage or misappropriation of, or acts of vandalism directed against cultural property protected under the Convention.

The Contracting Parties are, according to the Second Protocol and also according to their respective national legislation, required to place these offences under penalty. The other articles regulate this in respect to jurisdiction (16), criminal prosecution (17), extradition (18), and mutual legal assistance (19–20) and furthermore also measure to prevent violations of the other

provisions of the Convention and the Second Protocol (21).

Article 22 basically provides, parallel to Article 19 of the Convention, the applicability of the Second Protocol in conflicts of non-international character (paragraph 1) but introduces five limitations of the applicability (paragraph 2–6), essentially addressing the issue of *"internal disturbances and tensions, such as riots, isolated and sporadic acts of violence and other acts of a similar nature,"* and finally suggests – as already in the case of the Convention – UNESCO as a mediator in these conflicts (paragraph 7).

In Articles 20 to 29 institutional issues are dealt with, such as meetings of the Contracting Parties (Article 23) and the establishment of a Committee for the Protection of Cultural Property during armed conflict in Articles 24 to 28. With Article 27, paragraph 3, the importance of the participation of *"non-governmental organizations having objectives similar to those of the Convention, its First Protocol and this Protocol"* (cf. also Article 11, paragraph 3) is again highlighted in relation to the Committee; expressis verbis *"the International Committee of the Blue Shield (ICBS) and its constituent bodies"* as well as ICCROM and ICRC are mentioned. With Article 29, a Fund for the Protection of Cultural Property in the Event of Armed Conflict is established.

The provisions of Articles 30 to 33 relate to the dissemination of the Second Protocol to which the parties are committed, as well as the international cooperation and support, also by UNESCO. In Article 30, it is explicitly stated that the armed forces of a Contracting Party have to *"incorporate guidelines and instructions on the protection of cultural property in their military regulations"* (paragraph 3a) and their distribution among members of the armed forces which is one of the main desiderata with many armed forces in reality (cf. above).

Articles 34 to 38 contain the rules for the execution of the Second Protocol, thus in Article 34 the function of the Protecting Powers, and in Articles 35 and 36 arbitrations in conflicts of opinion concerning the interpretation of the Second Protocol. The final provisions for signature and ratification, accession and entry into force, and termination are contained in Articles 39 to 47.

Relation Between the Convention and the Geneva Additional Protocols I and II

Before the provisions of the Convention were extended and refined by the Second Protocol, the first two of the now three Additional Geneva Protocols were implemented in 1977, whose primary objective is to increase the effectiveness of the protection of the Geneva Convention of 1949. These Additional Geneva Protocols thereby address – unlike the Geneva Convention itself – the protection of cultural property.

The Additional Protocol to the Geneva Convention of August 12, 1949, on the Protection of Victims of International Armed Conflicts (Protocol I), adopted in Geneva on June 8, 1977, explicates in Article 53, on the "Protection of cultural objects and of places of worship":

> Without prejudice to the provisions of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict of 14 May 1954, and of other relevant international instruments, it is prohibited:
> (a) to commit any acts of hostility directed against the historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples;
> (b) to use such objects in support of the military effort;
> (c) to make such objects the object of reprisals.

The Additional Protocol to the Geneva Convention of August 12, 1949, on the Protection of Victims of Non-International Armed Conflicts (Protocol II), adopted in Geneva on June 8, 1977, explicates in Article 16, on the "Protection of cultural objects and of places of worship":

> Without prejudice to the provisions of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict of 14 May 1954, it is prohibited to commit any acts of hostility directed against historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples, and to use them in support of the military effort.

With these two Additional Geneva Protocols, the basic principles of the Hague Convention of

1954 are incorporated into the Geneva Convention and thus binding for those states that have not signed the Hague Convention of 1954 but are party to the Geneva Convention of 1949 and the two Additional Protocols. With the two Additional Geneva Protocols, the central role of the Red Cross, respectively the International Committee of the Red Cross (ICRC), in the protection of cultural property during armed conflict is justified, which it still holds today, in cooperation with the International Committee of the Blue Shield.

Archaeology

Archaeological sites and archaeological objects are explicitly mentioned in Article 1 of the Convention as "cultural property" as defined by the Convention and thus every time implicitly referred to when the Convention speaks of "cultural property." The mentioning of archaeological sites as cultural property was not included in the preliminary drafts of the Convention text and was upon an Israeli proposal added to the list of immovable cultural property at the Hague Diplomatic Conference in May 1954, as the Israeli delegate noted "*that it was absurd to protect museums and allow their sources, which were the sources of history itself, to be exposed to the ravages of war.*" The proposal was finally adopted by the Hague Conference by 30 votes to 1, with 5 abstentions. Accordingly, archaeological objects were explicitly included in the list of movable cultural property. In the following articles, archaeological property is no longer explicitly mentioned and the provisions of the Convention remain unspecific in this regard. This leaves the issue untouched of how the conduct of an archaeological excavation relates to the measures required in the Convention to protect cultural property in general and in regard to rescue excavation.

Archaeological excavation was subsequently also the subject of discussion on the protection of cultural property in occupied territory. Greece proposed the following addition to Article 5 of the Convention: *"The Occupying Power shall refrain from excavations or other action for the discovery of unknown cultural property save with the consent and participation of the competent national authorities of the occupied territory."* The proposal was only submitted orally at the closing stage of the last session of the Hague Conference and lost on the vote 9 votes to 8, with 22 abstentions. Thus, Article 5 of the Convention for the Protection of Cultural Property in Occupied Territory is phrased rather generally and does not refer to archaeological excavation at all.

The First Protocol does not explicitly mention archaeological sites, objects, or excavation.

The discussion on archaeological excavation in the occupied territory was, however, resumed at the 9th UNESCO General Assembly in December 1956 in New Delhi. The Conference finally passed the *Recommendation on International Principles Applicable to Archaeological Excavations*, whereby these principles had been pre-drafted by a Committee of Governmental Experts at an expert meeting in Palermo in May of that year. Article 32, the last but one, concretely refers to archaeological excavation in occupied territory: *"In the event of armed conflict, any Member State occupying the territory of another State should refrain from carrying out archaeological excavations in the occupied territory. In the event of chance finds being made, particularly during military works, the occupying Power should take all possible measures to protect these finds, which should be handed over, on the termination of hostilities, to the competent authorities of the territory previously occupied, together with all documentation relating thereto."* Nevertheless, this text does not imply the quality of a legally binding document in the sense of international humanitarian law (cf. the classification of official UNESCO texts – convention, recommendation, declaration). Therefore, experts, particularly the participants of the conference, requested that the principle expressed in Article 32 should be upgraded as an annex to the Hague Convention of 1954 aimed at an appropriate international legally binding character and a relevant revision of the Convention. A driving force behind the discussion was Jordan that expressed criticism of Israeli policy and suspected an attempt to twist historical facts behind the archaeological excavations in the – according to the then

existing status based on the UN partition plan of 1947 – occupied territory of Palestine.

Consequently, specific considerations concerning archaeology in the discussions on the Second Protocol were primarily focused on the issue of the protection of cultural property in occupied territory. Yet, the revised Lauswolt Document, as a result of the Lauswolt expert conference in 1997, did not contain any definite relation to archaeological excavation. But the draft text of the Second Protocol did state as a result of the Vienna expert conference of 1998 (in Article 3, paragraph 3, in the preliminary draft and) in Article 10, paragraph 1, in the final draft the sentence: *"Any form of theft, pillage or misappropriation of any archaeological excavation, any act of vandalism directed against any illicit purchase, or any other breach of integrity [or: authenticity] or any transformation of cultural property is prohibited."*

At the Hague Diplomatic Conference in March 1999, the issue of the protection of cultural property in occupied territory and therefore the issue of archaeological excavation in occupied territory were controversially discussed. The United States and others rejected the wording "*any archaeological excavation*" as being too comprehensive and proposed to exempt such excavation from the prohibition, which would be necessary for the preservation and protection of cultural property (in terms of rescue excavation). Israel viewed that the proposed wording by far exceeded the provisions of the original Convention. Lebanon suggested, as a compromise, to draft the provisions relating to theft and looting of archaeological sites and of archaeological excavation in two separate paragraphs, but insisted on the absolute prohibition of archaeological excavation in occupied territory. The UK rejected a total ban as being potentially counterproductive in practice. The working group "Chapter 2" under Austrian management eventually prepared the final wording of the prohibition: *"any archaeological excavation, save where this is strictly required to safeguard, record or preserve cultural property*." This phrasing took into account all concerns as far as possible. On the one hand, it explicitly prohibits archaeological excavation in occupied territory in general as it had been repeatedly demanded since the 9th UNESCO General Assembly in 1956. On the other hand, it explicitly allows archaeological excavation if it is absolutely necessary for the purpose of conservation and protection of the archaeological property. The latter corresponds to the objections raised during the Hague Diplomatic Conference regarding a possible practical necessity of such excavation, e.g., in the course of the construction of buildings and roads, in occupied territory, as well as those concluding that an absolute prohibition of archaeological excavation in occupied territory was basically contradicting the Convention's requirement to protect cultural property in occupied territory.

Cross-References

- ▶ Blue Shield
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Military Personnel Training in Archaeology

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Convention for the Safeguarding of Intangible Cultural Heritage (2003)

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Introduction

UNESCO's Convention for the Safeguarding of Intangible Cultural Heritage was adopted in October 2003 at its 31st General Conference and entered into force on 20 April 2006. With the ratification of Kazakhstan on 28 December 2011, it now has 142 States Parties representative of all regions of the world. For some States, particularly in Africa, oral and traditional culture represents a major form of cultural heritage and intangible heritage makes a significant contribution to the social and economic development of such societies and the well-being of their populations (Blake 2001). This was an important factor in giving the impetus to strengthen international safeguarding of this heritage and to give it more prominence. Moreover, the international community has recognized the importance of intangible cultural heritage as a basis for cultural diversity (an important value given recognition in UNESCO's Universal Declaration on Cultural Diversity of 2001) and the major role it can play in fostering truly sustainable development (UNESCO 2002).

Previous to the adoption of this Convention, the 1989 Recommendation on Safeguarding Traditional Culture and Folklore was the only international instrument addressing this question, although it had originally been proposed that intangible cultural heritage should be included as a subject matter of the 1972 Convention on the Protection of the World Cultural and Natural Heritage of UNESCO (Aikawa 2004). Two operational programs of UNESCO have also played an important part in normative development in this field: First, the Living Human Treasures program (1993) (UNESCO 1998) which was aimed at giving recognition to those individuals who are the living exponents of traditional culture and who ensure the transmission of their ICH to future generations by transmitting their skills, techniques, and knowledge. The second, entitled Masterpieces of the Oral and Intangible Heritage of Humanity (1998) (UNESCO 2002), had the aim of raising awareness of the importance of ICH among Member States and people at large through international proclamations of outstanding examples of such heritage.

In considering the model for a Convention on ICH, it was felt that one based broadly on the principles and mechanisms of the 1972 Convention would be the most appropriate, given the importance of raising awareness of this heritage and the great success of that older treaty (Bedjaoui 2004). However, it needed to be substantially adapted to the needs of intangible cultural heritage and the communities that create and maintain it (Kuruk 2004). In particular, it was important to give recognition to representative examples of ICH rather than "outstanding" ones (i.e., to avoid creating a hierarchy of items of ICH) and to avoid the "fossilization" of this living and evolving heritage that the use of a listing mechanism might risk (Kurin 2004). Another important consideration in developing this

Convention was to make a clear separation from intellectual property approaches to protection (although very valuable in themselves) and for UNESCO to develop a purely cultural approach.

Definition

The Convention in Brief

The Convention is divided into nine parts as follows. Part I (Articles 1 to 3) sets out the purposes of the Convention, definitions of key terms, and its relationship with other international instruments. Part II (Articles 4 to 10) is concerned with the organs of the Convention as described above, and Part III (Articles 11 to 15) is devoted to measures to be taken at national level to ensure the safeguarding of intangible cultural heritage, especially that which is not inscribed on either international List. Part IV (Articles 15 to 18) which deals with safeguarding ICH at the international level establishes the two aforementioned international Lists (the Representative List and the Urgent List). Provisions relating to international cooperation and assistance are set out in Part V (Articles 19 to 24), and the establishment and operation of the Intangible Heritage Fund are placed in Part VI (Articles 25 to 28). Part VII (Articles 29 to 30) establishes a reporting system, and Part VIII (Article 31) comprises a transitional clause allowing for "Masterpieces" proclaimed under the 1998 program to be incorporated into the Representative List before the entry into force of the Convention. The final clauses are set out in Part IX (Articles 32 to 38).

The purposes of the Convention as set out in Article 1 are: (a) to safeguard ICH; (b) to ensure respect for ICH; (c) to raise awareness at local, national, and international levels of the importance of ICH and thus to ensure a mutual appreciation of it; and (d) to provide for international cooperation and assistance. "Intangible cultural heritage" is defined in Article 2(1) as comprising "practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith" recognized by communities as their own, a source of identity and continuity for them, subject to intergenerational transmission and compatible with international human rights standards, mutual respect among communities sustainability. Paragraph 2 of this article then describes some of the main domains in which this heritage is manifested: (a) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage; (b) performing arts; (c) social practices, rituals, and festive events; (d) knowledge and practices concerning nature and the universe; (e) traditional craftsmanship (van Zanten 2004). The term "safeguarding" is also defined in paragraph 3 and this understanding of safeguarding is a central motif that runs throughout the whole of the Convention text. It comprises "measures aimed at ensuring the viability of the intangible cultural heritage" that include the identification, documentation, research, preservation, protection, promotion, enhancement, transmission (particularly through formal and non-formal education) of it as well as revitalization of various aspects of it.

In terms of institutional mechanisms, the 2003 UNESCO Convention establishes two main organs, namely, a General Assembly of the States Parties that is its sovereign body and an Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage (henceforth "ICH Committee") whose task is to oversee the implementation of the Convention, especially those provisions relating to the listing of ICH (selection criteria, amendments to the lists, etc.) and international assistance. Two international lists are also established (in Part IV) – the Representative List of the Intangible Cultural Heritage of Humanity and the List of Intangible Cultural Heritage in Need of Urgent Safeguarding – on which ICH is inscribed according to criteria to set out in the Operational Directives adopted by the General Assembly to the Convention in 2008. These are designed, respectively, to raise awareness of the ICH (both internationally and locally) and to respond urgently in cases where ICH is in immediate danger of disappearance or serious distortion. For example, the requirement under Article 12 of the Convention that Parties draw up one or more inventories of ICH present in their territories, which is closely tied to the

international listing system and represents a crucial aspect of national safeguarding policies. The Convention also provides for a system of international assistance and cooperation to address the fact that the safeguarding of ICH is a matter of common concern to humanity and requires international solidarity to be achieved. In recognition of the fact that many of the States richest in ICH are also some of the world's least developed, an Intangible Heritage Fund is set up to support Parties in their safeguarding activities and the overall implementation of the Convention. In parallel with the establishment of these two international Lists, a general duty is placed on Parties to take the necessary measures for the national safeguarding of ICH present on their territories. This means that the international dimension of the Convention – the international lists, assistance, and cooperation and the Fund – is to be fully complemented by safeguarding of all ICH whether listed or not at national level (Blake 2006). A fundamental step in this is the identification and definition of such heritage which should be undertaken with participation of communities, groups, and relevant nongovernmental organizations. This should also be strengthened by the drawing up of one or more inventories of ICH; interestingly, the selection criteria for inscription on the two Lists require that any item of ICH proposed for inscription should already have been entered on such an inventory through a participatory process. Other national safeguarding measures should include: promoting the function of ICH in society and taking account of it in planning programs; designating (or establishing) one or more competent bodies for safeguarding national ICH; encouraging study of the ICH and development of new research methodologies; adopting appropriate legal, technical, administrative, and financial measures that encourage training in ICH and its transmission; ensuring access to ICH while respecting customary practices governing this; and setting up institutions for the documentation of ICH. Education, awareness-raising and capacity-building are also given prominence as national part of a national safeguarding strategy, with an emphasis on young people and the communities and groups related to this heritage, non-formal means of education and building management and research capacities within communities. A notable provision is Article 15 that requires Parties to seek the widest possible participation of communities, groups, and (where appropriate) individuals "that create, maintain, and transmit" ICH in safeguarding activities and their active involvement in its management. This is an innovative approach for a cultural heritage instrument and poses important challenges to many States that operate a top-down, state-centered approach to cultural heritage management.

The implementation of the Convention's provisions is overseen by the Intangible Heritage Committee and governed by the Operational Directives adopted by the General Assembly of States Parties in 2008. This first set of Directives cover such matters as: criteria for inscription on the Urgent Safeguarding and Representative Lists; incorporation of items proclaimed "Masterpieces of the Oral and Intangible Heritage of Humanity" into the Representative List; criteria for selecting programs, projects, and activities that best reflect the principles and objectives of the Convention; the use of the ICH Fund established by the Convention; the purposes and forms of international assistance; participation of communities, groups, and, where applicable, individuals, as well as experts, centers of expertise, and research institutes in the operation of the Convention; and the role of nongovernmental organizations. No doubt, these Directives will evolve over time with experience of implementing the Convention as well as new scientific knowledge, just as the Operational Guidelines to the 1972 World Heritage Convention have over the past 40 years. The ICH Committee has recently established on an experimental basis a Consultative Body composed of six accredited NGOs and six independent experts for the purpose of examining nominations in 2012 for inscription on the Urgent Safeguarding List, proposals to the Register of Best Safeguarding Practices, and requests for international assistance greater than US

$25,000. This body, therefore, has a role similar to that of ICOMOS and IUCN for the World Heritage Committee of the 1972 Convention. It has also established a Subsidiary Body for evaluation of nominations for inscription on the Representative List in 2012.

The List of ICH in Need of Urgent Safeguarding contained 27 items as of January 2012. This List comprises elements of intangible heritage that require urgent measures to keep them alive as judged by the States Parties and concerned communities and, by inscribing an element on this List, international cooperation and assistance for stakeholders to undertake appropriate safeguarding measures can be mobilized. Examples of inscribed elements include: the Yaokwa popular ritual for maintaining the social and cosmic order (Brazil); traditional Lenj boat building and sailing skills (Iran); wooden movable-type printing (China); the Mongol Tuuli epic (Mongolia); the Sanké mon collective fishing rite (Mali); and the Suiti cultural space (Latvia). The Representative List of the ICH of Humanity contains practices and expressions of ICH that demonstrate the diversity of this heritage and raise awareness about its importance. Unlike inscriptions on the World Heritage List, these items may be fairly mundane in themselves but are significant for their representative character. In 2008, the ICH Committee incorporated items that had formerly been proclaimed as Masterpieces (under the terms of Article 31 of the Convention). By January 2012, there were 232 elements inscribed on this List with the addition of 76 elements in 2009, 47 in 2010, and 19 in 2011. The range of elements on this List is broad-ranging, and includes: an annual carnival bell ringers' pageant (Croatia); irrigators' tribunals of the Mediterranean coast (Spain); the sociocultural space of the Candome (Uruguay); an ethnic Korean farmers' dance (China); the art of falconry (a joint nomination from the UAE, Belgium, the Czech Republic, France, Republic of Korea, Mongolia, Morocco, Qatar, Saudi Arabia, Spain, Syrian Arab Republic); the gastronomic meal (France); and a customary normative system (Colombia).

Key Issues

During the Convention's operation, certain key issues will have to be addressed and the response of the Parties (as expressed in the ICH Committee and the General Assembly) will be refined. Although it is relatively early still for much experience to have been gathered, we can identify certain aspects of its implementation that require further development. For example, the approach of this Convention toward the role of the wider community (especially those communities and groups that have a special relationship with a certain ICH) sets it apart from other cultural heritage Conventions. Although such a participatory approach may be found in Conventions dealing with sustainable environmental protection, for example, it is the first time that the central role of the community in safeguarding and managing cultural heritage has been explicitly recognized in a legal instrument. In a similar vein, the notion of "safeguarding" under this Convention is a comprehensive one that not only includes classic "protection" actions such as identification and inventorying of the ICH but also extends to providing the conditions within which it can continue to be created, maintained, and transmitted. This, in turn, implies the continued capability of the cultural communities themselves to do this – i.e., the community itself is the vital context for the existence of ICH and is placed at the center of this Convention rather than the heritage itself. In this way, the safeguarding of ICH is a more context-dependent approach that takes account of the wider human, social, and cultural contexts in which the enactment of ICH occurs.

Another significant conceptual departure from previous cultural heritage treaties, in particular, the 1972 Convention on which it was largely modeled, has been the removal of any reference to the notion of "outstanding" or "exceptional" value as a criterion for selection. The intention behind this is to avoid any suggestion of creating a hierarchy of ICH and emphasizing that it is the representative nature of the ICH being celebrated and safeguarded (Blake 2006). Again, this is

intended as a community-centered approach to valuing the heritage where the significance of this heritage to a specific community is recognized (Deacon & Beazley 2007). This involves a major paradigm shift in the approach both of national cultural heritage bodies and the international community. The implications of both of these developments are still to be fully understood.

The system for international cooperation and assistance for safeguarding ICH is another central feature of the Convention, and an important innovation here is the provision for joint requests for inscription by two or more States Parties in recognition of the fact that much ICH is transfrontier in character and will therefore often have more than one State Party with a territorial interest in its safeguarding. Again, this introduces a new understanding of cultural heritage protection and management that accepts that cultural and geopolitical "frontiers" are frequently not coterminous and one that will have important effects on how States cooperate for the safeguarding of ICH. Moreover, the main purposes for which international assistance may be granted now include support for programs, projects, and activities for safeguarding ICH on national, subregional, and regional levels.

This Convention also raises important questions concerning the relationship between tangible and intangible cultural heritage and how to integrate safeguarding approaches to both these aspects of heritage. Earlier UNESCO cultural heritage treaties had been explicitly designed to protect and preserve the material (or "tangible") heritage, even if the associated intangible elements may also have been implicitly recognized. This, in effect, creates an artificial and arbitrary distinction between the "tangible" and "intangible" aspects of cultural heritage that is meaningless, for example, to many indigenous cultures since it fails to reflect their holistic view of heritage (Daes 1997 at para. 25). In many ways, this is the result of an historical evolution in cultural heritage law-making, but it has created an interesting "gray area" between the 1972 and 2003 Conventions where the same element may be subject to international protection and safeguarding under both treaties. A clear example of this is the Rice Terraces of the Philippine Cordilleras which were inscribed on the World Heritage List in 1995 as the first "organic evolving cultural landscape." In 2001, the Hudhud Chants of the Ifugao, songs of the women working on the Rice Terraces as part of the special ritual of rice planting, were recognized as Masterpieces of the Oral and Intangible Heritage of the World in 2001 (and subsequently incorporated into the Representative List of Intangible Heritage of the 2003 Convention). This overlap between the tangible and intangible aspects of heritage will require further consideration and the development of new approaches to implementation to resolve.

Given the youth of safeguarding measures for ICH in many countries, questions regarding such issues as establishing national ICH inventories (their scope, the criteria for inventorying, the ownership of inventoried items, etc.), ensuring community participation, capacity-building in both national bodies and communities, and dealing with secret and sacred heritage will increasingly be confronted. For this reason, it will be important for best practices from around the world to be gathered, shared, and evaluated so that the national safeguarding of ICH can reach the same level of expertise as that for the material cultural heritage. To take this further, it can also be said that improving the safeguarding of ICH will also address gaps in protecting "tangible" cultural heritage since they have such a close and intimate relationship with each other.

Cross-References

- ▶ Intangible Cultural Heritage
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO World Heritage Convention (1972)

▶ UNESCO's World Heritage List Process
▶ World Heritage List: Criteria, Inscription, and Representation

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Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)

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Introduction

The Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970) is an attempt to control the movement of cultural property from one State to another where this is against the laws of one or both. The property may be stolen from its owner or the movement itself may be prohibited such as when an object is smuggled from one state into another. As of 28 January 2012, there were 120 States Parties to the Convention.

Definition

Cultural property for the purposes of the Convention is defined in Article 1. To qualify, the property must be "specifically designated by each State as being of importance for archaeology, prehistory, history, literature, art or science." In addition, it must belong to 1 of 11 categories of objects set out in the Article. These include the products of archaeological excavations (including regular or clandestine) and antiquities more than 100 years old.

The meaning of "specifically designated" has been contested over the years. However, it is now widely accepted that each State has the right to decide what objects are important for its own cultural heritage. There is wide variation in how States do this. Some have a list of individually

named items that are prohibited from export. Others have what is called a control list – there is a description of general categories, for example, archaeological objects, which is then broken down into by criteria based on significance, age, and representation in local collections. Only that material is subject to export control.

Key Issues

The Convention can only be directly utilized by States. Individuals have no right to take any action under this instrument. For example, an archaeologist who knows objects are being clandestinely excavated and smuggled out of the country cannot directly rely on this Convention to do anything about it. He or she would have to go to the authorities and make a complaint. It is then up to those authorities to take what action they consider desirable in accordance with local law, the Convention and, particularly, political considerations. They may conclude that other factors outweigh any benefits to be taken by pursuing the smugglers.

Like other UNESCO Conventions, the 1970 Convention was drafted at a diplomatic conference attended by representatives of States interested in the issue. During these conferences compromises are often made among the delegates. In 1970, the conference was presented with a draft convention prepared by a working group established by UNESCO. The United States of America, having taken no part in the negotiation of this document, produced its own draft. In order to encourage the United States' participation, two articles from its draft were incorporated in the UNESCO draft. These now appear as Articles 7 and 9 of the Convention.

The view has been taken by the United States and some other countries that these articles are the heart of the Convention. Article 7 deals with offers to museums of illegally exported cultural property and theft from museums and other public institutions. Article 9 provides for concerted international efforts, including the control of exports and imports, when "cultural patrimony is in jeopardy from pillage of archaeological or ethnological material." Concentration on these two articles gives the Convention a very narrow application.

Those who want a broader interpretation rely on Article 3: "The import, export or transfer of ownership of cultural property effected contrary to the provisions adopted under this Convention by the States Parties thereto, shall be illicit." They regard Article 3 as the overall governing provision of the Convention and Articles 7 and 9 as specific applications (O'Keefe 2007).

While these interpretations indeed represent different philosophies regarding the trade in cultural property, the issue is exacerbated by different approaches to legal drafting. The United States draft was prepared by Common Law lawyers who are accustomed to working with very precise and defined legal documents. The UNESCO draft came from the Civil Law tradition where legislation is expressed in terms of general principle which is then applied to specific situations by officials or the courts. These different approaches can be seen in Articles 3, 7, and 9.

When States become party to a Convention, they are required to comply with any obligations it imposes. But how this is done depends very much on the State concerned. For example, under its Constitution, the Convention may automatically become part of the local law when the State ratifies, and its meaning would then have to be interpreted by the national courts. In other States, if the Convention affects the rights of citizens, legislation must be passed to implement it.

These different views of the Convention influence how States implement it to control imports of cultural property that is alleged to have been illegally exported. For example, Australia takes a broad view. It considers as an illegal import all cultural property that another State regards as illegally exported under a law concerning cultural property. It does not matter when the object was illegally exported provided it was imported into Australia after the date the Australian implementing legislation came into force, that is, 1 July 1987. Nor does Australia require the other State to be party to the

Convention. Forfeiture of such cultural property is not automatic. There must first be a request from the government of the country concerned to the Australian government for its return.

The United States does not implement the provisions of this Convention on foreign export controls directly but only through further bilateral agreements with individual States to restrict imports of defined archaeological and ethnological material. The foreign State has to prove to a Cultural Property Advisory Committee that there is an emergency condition regarding the defined material. If the argument is accepted, and an agreement is entered into, any such material entering the United States is subject to seizure and forfeiture carried out under normal Customs procedures. As of 1 February 2012, there were 14 such agreements or Memoranda of Understanding as the United States calls them. Countries involved include China, Cyprus, Greece, and Italy (full details of this system are available at http://exchanges.state.gov/culprop). The other State to the bilateral agreement may also accept obligations. For example, Italy agreed to continue its efforts to:

- Ensure the prompt prosecution of looters
- Stop the illicit use of metal detectors in archaeological areas
- Enhance training for the Carabinieri Special Unit for the Protection of Artistic Patrimony
- Create and pursue innovative and effective ways to detect and stop the looting of archaeological sites

Switzerland has followed the United States in demanding bilateral agreements for implementation of the foreign export controls. As of 24 August 2011, it had such agreements with Columbia, Egypt, Greece, Italy, and Peru (http://www.bak.admin.ch/kulturerbe/04371/04377/index.html?lang=en).

While limited, the method of enforcement adopted by the United States and Switzerland is much more effective than that of Japan which took a very narrow interpretation of the Convention and narrowed it further by administrative arrangements that can apply only in a few instances. Objects from clandestine excavations and unlawful exports from foreign countries into Japan are not covered. Only cultural property stolen from a museum or other institution under Article 7(b)(i) of the Convention after 9 December 2002 and which is on an inventory supplied to the Japanese Government can be considered for return if found in Japan (Kono & Kani 2003).

Some States that are listed as party to the Convention have had their status questioned in other States. For example, France is listed as having ratified the Convention, but in an English case – *Iran v. Berend* [2007] EWHC 132 – the judge took the view that the Convention was not "yet part of the law of France." France had assumed that its existing law was sufficient to implement the Convention. Either the English judge was wrong as to the effect of French law or France needs to effectively implement it.

This complicated situation may cause despair in the hearts of some. However, if they are seeking the return of an object, it is the law of the State where the object is located that must be considered, preferably by an expert legal advisor. If the law of that country incorporates the 1970 Convention, then there is a greater chance of being successful.

Even if that State is not a party to the Convention, the latter can still have influence. Its courts may be prepared to consider the Convention as representing public policy that they should follow. There was a well-known case in Germany in 1972 – Allgemeine Versicherungsgesellschaft v. E.K. (BGHZ 59 at 83) – where the court found that the Convention represented emerging international public policy. A German company had insured a consignment of African masks and statues sent by a Nigerian company from Port Harcourt in Nigeria to Hamburg. Six bronze statues disappeared and the Nigerian company sought to recover their value under the insurance contract. The statues had been exported contrary to Nigerian law. The court held that, even though Germany was not a party to the Convention, the contract was unenforceable in Germany as it was against public policy including emerging international public policy.

The Convention has also heavily influenced codes of ethics adopted by museums and other

public bodies. For example, the International Council of Museums (ICOM) has a Code of Ethics (http://icom.museum/who-we-are/the-vision/code-of-ethics.html) which lists the Convention as "international legislation that is taken as a standard in interpreting" the Code. It further states that museum policy should acknowledge this. Thus, the Convention, through the Code, applies not only to member museums but also to the conduct of individual members of the museum profession as they need to be "conversant with relevant international, national and local legislation"(Paragraph 8.1) and they "should not support the illicit traffic or market in natural and cultural property, directly or indirectly" (Paragraph 8.5).

Independently of the ICOM Code, many collecting institutions have used the date the UNESCO General Conference adopted the Convention, that is, 1970, as a watershed in their collecting policies. For example, the British Museum states that it "will normally only acquire those archaeological and heritage objects that have documentation to show a legal history back to November 14th 1970 (the date of the UNESCO Convention) and this policy will apply to all objects of major importance" (http://www.britishmuseum.org/pdf/Acquisitions.pdf). The J. Paul Getty Museum took 1970 "as the key date for determining whether an ancient work of art or archaeological material can be considered for acquisition" (http://www.getty.edu/news/press/center/revised_acquisition_policy_release_102606.html). Many other museums have adopted the same approach which illustrates the significance of the 1970 Convention outside its purely legal role.

There are other provisions of the Convention that attempt to control illicit traffic in cultural property. For example, dealers play a major part in the transmission of such property. The Convention does have a provision intended to regulate dealing in cultural property. Article 10 requires dealers to have a register recording the origin of each item, the name and address of the person they acquired it from, and the price and description of each item sold. This should allow objects to be traced more easily. However, the Convention stated that registration would be "as appropriate for each country." Once again, there are major variations in how States implement this provision. Some have very detailed rules which are enforced by regular visits from the police. Others have relied on the information they collect in connection with value added tax. For example, the United Kingdom maintains that what dealers have to report for this purpose gives up the same information as Article 10 requires. However, being in a different context means that the information is not as obvious nor as readily available as it would be if collected in the context of enforcing the Convention.

Since its inception, UNESCO has been concerned with protection of cultural property in time of armed conflict. It has a Convention with two Protocols concerned with this. One significant aspect of such protection is the control of movement of cultural property during the conflict. The Protocol to the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict 1954 is entirely devoted to this issue, and Article 9 of the Second Protocol 1999 is also relevant. Article 11 of the 1970 Convention should also be applied although it seems to have been largely ignored. There are significant questions concerning its implementation. For example, the Article refers only to export and transfer of ownership. If either of these is done "under compulsion," arising from the occupation of a country, the transaction is to be regarded as "illicit." What this means is not clear. Perhaps the transaction should be regarded as void and ineffective as contrary to public policy. At the very least, it should not be allowed to stand, and the position prior to the occupation should be reinstated.

Future Directions

The 1970 Convention now has 120 States Parties, but the geographical distribution of these States is very uneven. There are few States Party from the Pacific area, and in Africa, significant States

such as Ghana, Kenya, Malawi, Mozambique, Namibia, and Uganda are not party. In Europe, the past decade has seen that major art market countries such as Belgium, Denmark, Germany, the Netherlands, and the United Kingdom become party but not yet States such as Austria, Ireland, and Malta. UNESCO is seeking to increase the number of States Parties through targeted national information campaigns directed to parliamentarians and other people at the political level to explain "how far action developed internationally can help reinforce the legal and operational framework of States for the protection of their cultural heritage" (UNESCO Doc. 184/EX 20). UNESCO has recently (2006) decided that the 1970 Convention would be given priority for monitoring.

Some consider the Convention to be outdated after 42 years. They argue that it should be replaced by one more attuned to current conditions, for example, that there should be a greater emphasis on penal aspects of the fight against illicit traffic. But any attempt to change the Convention is fraught with difficulties. First, there would be a problem in obtaining agreement among States on the content of such a Convention. We have seen the different ways in which States implemented the present Convention. Reaching agreement on a new text would be a long and controversial undertaking. The second point is related to this. Negotiating a convention that affects the rights of States and their citizens is a lengthy and costly project. For example, the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001 took 10 years from the time the Member States of UNESCO were presented with a draft text by the International Law Association and involved four major negotiating meetings in Paris as well as numerous subsidiary ones. These meetings are costly to run both for the States sending delegates and for UNESCO which has to provide the facilities including simultaneous interpretation in a number of languages. Finally, if a new Convention were to be adopted, would it require States becoming party to denounce the 1970 Convention? If so, there would be a period when some States were party to the new Convention and some to the old. For a long time, protection would be diminished till the former gained sufficient adherents to make it workable. If States were not required to denounce the 1970 Convention, there would be a situation where some States were party to the new Convention, some to the 1970 Convention, and some to both.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Convention on the Protection of the Underwater Cultural Heritage (2001)

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Introduction

The Convention on the Protection of the Underwater Cultural Heritage was adopted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2001. It entered into force internationally on 2 January 2009, 3 months after the date of deposit of the twentieth instrument of ratification. As of 20 June 2011, the Convention had been ratified by 37 states. The genesis of the Convention was in 1988, and it was therefore the product of 13 years of drafting work and negotiations.

The Convention is an international treaty which is designed to create a comprehensive and uniform legal framework to regulate human interference with underwater cultural heritage (UCH) in order to ensure that such heritage is preserved for the benefit of humanity. For the most part, its provisions are aimed at regulating activities which are "directed at" UCH, in other words, activities conducted with an intention to physically disturb UCH. Therefore, while the Convention is primarily aimed at controlling the activities of treasure hunters and souvenir seekers, its regulations apply with equal force to activities of archaeologists as well. The Convention is not designed to prohibit deliberate interference but instead to ensure that any such interference is regulated in accordance with internationally accepted archaeological standards. Those standards are enshrined in Rules set out in an Annex to the Convention, and they form an integral part of the Convention. The Rules are based on the Charter on the Protection and Management of Underwater Cultural Heritage 1996, a set of guidelines produced by the International Council for Monuments and Sites (ICOMOS).

Definition

UCH is defined by the Convention to mean "all traces of human existence having a cultural, historical or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years" (Art. 1(1)(a)). A non-exhaustive list of examples of such "traces" provided by the Convention makes it clear that the definition extends to three categories of remains: (i) sites, structures, buildings, artifacts, and human remains, together with their archaeological and natural context; (ii) vessels, aircraft, other vehicles, or any part thereof, their cargo or other contents, together with their archaeological and natural context; and (iii) objects of prehistoric character. Controversially, there is no significance criterion. Instead, the key limiting factor is that the material must have been underwater for at least 100 years. This means that it will be some time before the material remains of much of the twentieth century, including those connected to the two World Wars, fall within the scope of the Convention. The reason that a time limit of this sort is necessary in the context of material found in the sea is that there needs to be some way of distinguishing between material that is subject to ordinary commercial laws, including the law of salvage, and that which falls within the preserve of heritage law. The Convention follows the approach of some national underwater heritage legislation in adopting 100 years as the point of division.

At the heart of the Convention lie a number of core principles and objectives. Preservation in situ must be considered as the first option in determining a management plan for any site, and interference will be permitted only where justified for scientific or protective purposes. In circumstances where recovery of UCH is permitted, the recovered material must be deposited, conserved, and managed in a manner that ensures its long-term preservation. Among other things, UCH must not be commercially exploited and, subject to two limited provisos, this means that it must not be "traded, sold, bought or bartered as commercial goods" (Annex, Rule 2). While the law of salvage is not explicitly excluded from

applying to UCH falling within the scope of the Convention, the circumstances in which it can apply are so restricted that its application is very unlikely in practice. Responsible nonintrusive access to observe or document in situ UCH is encouraged except where incompatible with its protection and management. The cornerstone of the Convention is the broad general principle that States Parties must cooperate in the protection of UCH. This principle underlies many of its protective mechanisms and is one of the Convention's most valuable features.

Although some provision is made for all maritime waters, including the territorial sea, the focus of attention of the drafters was on creating a viable regulatory framework for UCH lying in international waters, in other words beyond the 12-mile territorial limit. The need for such a framework has arisen over the last 30 years, during which time there has been a revolution in marine technology. As a result, humans aided by submersible vehicles now have direct physical access to 98 % of the ocean floor (O'Hara 2000). Although operations on the deep seabed (at depths of thousands of meters) are likely to remain relatively few and far between, the continental shelf is now highly accessible, and UCH in this sometimes extensive geological area is under growing threat. The threat comes not only from well-funded commercial treasure salvage companies equipped with the latest technologies but also from individual divers using specialized mixed gases which permit access to waters well in excess of 100 m. Prior to the introduction of the Convention, the only international laws providing specific protection for UCH were two short articles of the 1982 UN Convention on the Law of the Sea, and, significantly, these articles provide no specific means of controlling activities directed at UCH on the continental shelf. The provision the 2001 Convention makes for this maritime zone is therefore a crucial component of its regime.

While the majority of the Convention's provisions are aimed at creating a regulatory framework for activities "directed at" UCH, some useful provision is also included for activities "incidentally affecting" UCH. By this is meant activities which may inadvertently, rather than deliberately, disturb or damage UCH. Activities such as trawling by fishermen, dredging for marine aggregates, pipeline and cable laying, and construction of wind farms and oil and gas rigs all clearly fall into this category. Among other things, each State Party is required to use the best practicable means at its disposal to prevent or mitigate any adverse effects that might arise from such activities. Furthermore, there is provision for the reporting of UCH finds by such operators working on the continental shelf and on the deep seabed.

The meat of the Convention is made up of technical legal provisions facilitating the control of activities affecting UCH, as well as the standard-setting principles and Rules in respect of such activities. However, the Convention also includes many other useful provisions that supplement the regulatory regime. Of particular note is the framework it establishes for cooperation, information sharing, and mutual assistance by States Parties. The Convention clearly envisages that the states that participate in its regime will develop broad-ranging collaborative efforts on a whole host of matters including investigation, excavation, documentation, conservation, study and preservation of UCH (Art. 19), and training (Art. 21). In the longer term, the benefits that could be derived from such collaboration could be very significant.

Current Debates

UNESCO's intention was to create an international legal framework for UCH that would be capable of achieving global acceptance. Throughout the negotiation process, considerable efforts were made to try to ensure that the final text would be adopted by consensus. Unfortunately, this aim was not fulfilled. Although the general principles and objectives of the Convention, including the Rules in the Annex, do appear to have achieved universal support, a small but significant minority of the negotiating states were unable to fully support the final text. Among these were a handful of major maritime states,

all of which had the same, or similar, objections. This group included the United States, the Russian Federation, the Netherlands, France, Germany, Norway, and the United Kingdom. The failure to achieve the support of these particular states is important because they are the states whose nationals and flag vessels have the capability to undertake deep-water search and recovery work. The nature of the regulatory mechanisms in the Convention is such that unless they participate in its regulatory regime, it cannot be fully effective.

There are two main areas of difficulty for these states. The first is that they regard some of the technical provisions of the Convention, particularly its articles with respect to the continental shelf, as being incompatible with the 1982 Convention on the Law of the Sea. These states (and many others) regard the 1982 treaty as having a preeminent status along the lines of a "Constitution for the Oceans." As such, they believe that subsequent treaties dealing with maritime activities should not interfere with the framework it sets out. The second area of difficulty relates to the treatment the 2001 Convention affords to sunken warships and other state vessels and aircraft, which form a major component of UCH. The maritime states insist that such vessels and aircraft, even when they have been lying on the seabed for many years or even centuries, are subject to sovereign immunity and can only be interfered with under the express authority of the flag state. While the Convention takes this position into account, some of its technical provisions (which envisage States Parties cooperating in the management of sites) are regarded as prejudicial to the immunity principle. It is frustrating for those whose sole interest is the preservation of UCH that the main difficulties with the Convention relate to matters completely unconnected with its central heritage objectives. Nonetheless, they represent substantial obstacles to its overall success.

Future Directions

Despite these, and other, areas of difficulty for some states, the ratification process has been gradually gaining momentum, and the Convention looks set to achieve considerable support around the world in the years to come. The present States Parties are currently engaged in the process of establishing exactly how they will put the complex provisions of the Convention into practice. Before long, state practice under the Convention will start to develop. Unfortunately, for the foreseeable future, it seems likely that most of the major maritime states listed above and a number of other significant states, including Greece, Turkey, and Venezuela, will remain outside the regime. However, that position may change as the broad benefits of the Convention become evident.

Cross-References

- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Copley, Vincent

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Basic Biographical Information

Vincent (Vince) Copley is an elder of the Ngadjuri people of South Australia. He has made important contributions to the reclamation and protection of Australian Indigenous cultural heritage, especially by revitalizing the fragmented cultural identity of the Ngadjuri people. He is also an important figure in Australian sporting history.

Copley was born in 1936 in Point Pearce, South Australia. At a young age, he moved to live at St Francis' Anglican Home in Adelaide, where he came into contact with Charlie Perkins, John Moriarty, Gordon Briscoe, and others who went on to become important campaigners for Indigenous rights.

Copley was an eager sportsman and won several sporting awards including the Port Adelaide Football Club's Best and Fairest in 1954. He went on to coach the Curramulka Football Club for over a decade during the 1950s and worked for the Aboriginal and Torres Strait Islander Commission as sports officer from 1982 to 1993. Copley was also a keen cricketer, and the Vince Copley Medal now recognizes the "most outstanding cricketer" at the annual Lord Taverner's Statewide Indigenous Carnival. Copley was appointed cochair to the National Indigenous Cricket Advisory Council in 2000, in tandem with Dr. John Bannon, ex-premier of South Australia. In this role, Copley organized various national and international programs for Indigenous cricketers including the 1988 tour of England, which commemorated the first ever Australian tour of 1868.

While Copley's sporting successes helped him to find recognition in Australian society, his influence extends beyond the sports field and into political affairs. Throughout the 1970s, Copley directed the first Aboriginal community center in Adelaide, significant for offering Indigenous health and education services outside of state services. He was also involved in the establishment of South Australian legal aid for Indigenous people and worked as Executive Officer and later Regional Manager for Aboriginal Hostels Ltd. until the 1980s. Copley played a key role in organizing the 2012 reunion of the "St Francis boys" and their families.

Major Accomplishments

Vincent Copley's major accomplishments in the field of archaeology have been reconstructing, protecting, and promoting Ngadjuri identity and heritage. Much of Ngadjuri cultural knowledge was lost during the nineteenth and twentieth centuries as a result of land dispossession and the relocation of Ngadjuri people to the Point Pearce Mission.

In the late 1990s, Copley led Ngadjuri people in a concerted plan to repossess Ngadjuri cultural knowledge. After several years as chair of the Ngadjuri Walpa Juri Land and Heritage Association Inc., Copley became chair of Ngadjuri Elders Heritage and Land Care Council. As leader of the Ngadjuri Heritage Project, Copley was instrumental in bringing descendants of the Ngadjuri "back to country" and helping them to reclaim a sense of their Indigenous identity by rediscovering important sites on their traditional lands. This project developed the Ngadjuri nation's capacity to manage cultural heritage places on Ngadjuri lands and served as a model for other Indigenous groups.

Copley has placed an emphasis on close and ongoing cooperation between Indigenous and non-Indigenous partners, working with archaeologists and students to research rediscovered sites significant to the Ngadjuri. This has resulted in the establishment of a research partnership between

the Ngadjuri people and Flinders University, fostering the documentation of rock art and archival research projects investigating early Ngadjuri anthropological work. Copley's efforts have encouraged greater cooperation between Indigenous and non-Indigenous landowners in matters of land use. After being approached by the Regional Council of Goyder, Copley initiated the excavation, study, and reburial of human skeletal remains at Red Banks Conservation Park.

Copley has stressed the importance of recognizing mixed Indigenous heritage; while much of his work has focused on the Ngadjuri, he also has family links to the Narangga, Ngarrindjeri, and Kaurna people and has worked towards Native Title claims with the Narangga and Kaurna groups.

Copley has encouraged cooperation between Indigenous peoples internationally, organizing a delegation of Aboriginal storytellers, artists, and dancers between 1974 and 1977 for the Festival of African Culture in Nigeria. From 1993 to 1995, he worked independently as a consultant in cultural awareness for schools and colleges. He was also involved in the organization of the 2006 Indigenous Cultural Heritage Symposium held in Burra, South Australia, which saw Indigenous contributors from all over the world.

Copley's grandfather Barney Warria was a friend and important source for the anthropologist Ronald Berndt. Upon Berndt's death in 1990, an embargo was placed on his field notes for a period of 30 years. Copley debated the legality of this embargo on the grounds that it deprived Ngadjuri people of an important source of knowledge about their cultural heritage. Copley demonstrated that this information was intellectual property shared between Warria and Berndt. Copley's challenge successfully lifted the embargo, making Berndt's field notes available to a number of Indigenous groups whose histories and knowledge had been recorded in them.

Cross-References

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- ▶ Indigenous Archaeologies: Australian Perspective

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Corning Museum of Glass

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Basic Information

The Corning Museum of Glass, located in Corning, New York, opened on May 19, 1951. It was founded by Corning Glass Works (now Corning Incorporated) to celebrate the 100th anniversary of the Houghton family's involvement with glassmaking. Amory Houghton had helped to start the Union Glass Works in Somerville, Massachusetts, in 1851, and he purchased the Brooklyn Flint Glass Works in Brooklyn, New York, in 1864. Four years later, he moved that firm's equipment and employees to "the foot of Walnut Street" in Corning, where Corning Incorporated continues to have its headquarters today.

Major Impact

The museum was initially part of the Corning Glass Center, which also housed the Steuben Glass factory and shop, a municipal auditorium,

a recreation area for Corning Glass Works employees, and a gallery demonstrating the science of glass. Chartered by the Board of Regents of the University of the State of New York, the museum is a not-for-profit educational institution. From a modest beginning, with nearly 2,000 glass objects from around the world, the museum has assembled a collection that now has more than 47,000 objects spanning 3,500 years of glassmaking history. The mission of the museum – to tell the world about glass and its history – has not changed, however.

The museum's Rakow Research Library is the library of record for the art and history of glass, and it seeks to acquire every publication in every format in this field. It also houses a collection of rare books and incunabula, as well as several hundred prints that illustrate glass factories, glassmaking, glass advertisements, and the use of glass from the seventeenth to twenty-first centuries.

During its 60-year history, the museum has presented more than 90 exhibitions. Some of these shows have been drawn exclusively from its own collection, but others have included substantial numbers of loans from other museums and private collections in the United States and abroad. Illustrated catalogs have been published to document more than two dozen of these exhibitions. Seven collection catalogs have also been issued, as well as more than two dozen books on other glass-related subjects. Since 1959, the museum has published the *Journal of Glass Studies*, which contains articles of new research in glass history from antiquity to the early twentieth century. It also produces *New Glass Review*, another annual publication, which focuses on contemporary glass.

On June 23, 1972, flooding caused by Tropical Storm Agnes left five feet of water in the museum's galleries and library. It was the worst natural disaster to strike an American museum up to that time. The museum reopened on August 1, even though much of the collection was still covered with mud. A new museum building, designed by Gunnar Birkerts, opened in June 1980, with all of the collection housed above the 1972 flood level. The Birkerts building is attached to the original Harrison and Abramovitz Glass Center building. Between 1998 and 2001, the Glass Center collections became part of the museum, which substantially expanded again. The Studio, which opened in 1996, offers instruction in glassmaking to students at all levels of expertise throughout the year. In addition to daily demonstrations of glassblowing and flame working at the museum, the museum sponsors the Hot Glass Show which involves demonstrations in a variety of locations including celebrity cruise ships.

The museum has welcomed about 28 million visitors in its 60 years of operation.

Cross-References

- ▶ Association Internationale pour l'Histoire du Verre (AIHV)
- ▶ Consumption, Archaeology of

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Cornwall, Ian Wolfram

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Basic Biographical Information

Ian Cornwall (1909–1994) was an important figure in the early development of what became environmental archaeology and in particular in the study of animal bones from archaeological deposits. Although his background was in the arts, Cornwall was strongly influenced by the pioneering geochronologist Frederick Zeuner (1905–1963), and he became reader in Human Environment at the Institute of Archaeology,

University of London, by the time of his retirement in 1974.

Major Accomplishments

Cornwall's reputation rests on a series of textbooks that he produced in the 1950s and 1960s. *Bones for the Archaeologist* (1956; revised 2nd ed. 1974) aimed to put a working knowledge of skeletal anatomy within the reach of archaeologists and Quaternary scientists. The book's structure resembles Flowers' classic text *Osteology of the Mammalia* (1885) and is notable for its anatomical precision, verging on pedantry. The style, however, is highly accessible and *Bones for the Archaeologist* became one of the first successful enterprises in archaeological science. Cornwall followed this in 1958 with *Soils for the Archaeologist*, which attempted to do the same for soils and sediments. Although described at the time as "a pioneer undertaking," *Soils* did not have quite the impact of *Bones*, possibly because of its less intrinsically fascinating subject matter.

Bones and *Soils* established Cornwall's reputation as a communicator of archaeological science. His subsequent books built on that initial success by offering more synthetic views of the human past. *The Making of Man* (1960) was a radical undertaking for its day: an informative and quite detailed account of the fossil evidence for human evolution written for children. *The Making of Man* was awarded the Carnegie Medal for 1960, putting Cornwall in the company of C.S. Lewis, Walter de la Mare, and Rosemary Sutcliff. It also marked Cornwall's first collaboration with the illustrator Marjorie Maitland Howard. Her lively illustrations graced Cornwall's *The World of Ancient Man* (1964) and *Prehistoric Animals and Their Hunters* (1968). The latter book includes a chapter "Ecology, Biotopes and Faunal Communities" that was exceptionally integrative for its day and still reads well. Cornwall returned to a more geomorphological topic in 1970 with *Ice Ages: Their Nature and Effects*. One other Cornwall volume of note is the novel *Hunter's Half-Moon* (1967), set in a fully realized and, for its day, highly credible upper Paleolithic world. Mrs. Maitland Howard provided mammoths for the dust jacket. Taken in sum, Cornwall's books reflect his wish to understand past human lives in their full environmental context and to communicate that knowledge to a wide audience. His intellectual reach was broader than that of many academics today, and his published output was not constrained by the pressures of modern academia.

Apart from the sole-authored books, Cornwall appears in the literature mainly as a coauthor or contributor to many and diverse archaeological publications. He contributed studies of bones or sediments to a wide range of major excavations, including the 1957–1960 campaigns at Knossos, Pre-Pottery Neolithic human burials at Jericho, and Ramm's investigations into Roman York. An early contribution to *Proceedings of the Prehistoric Society* in 1953 discussed sedimentation events at Bronze Age sites in southern England, prefiguring John Evans' influential account of the same topic in *PPS* in 1990. Cornwall was a member of the Experimental Earthwork Committee that set up the Overton Down experiment, and coauthored (with Paul Ashbee) the first report of that experiment in *Antiquity* (1961). He also experimented with thin-section studies of Neolithic pottery, working with Henry Hodges, and was an early advocate of soil micromorphology in archaeology. Later in his career, Cornwall developed a strong interest in human settlement in Mexico, the subject of his 1970 Henry Stopes lecture to the Geologists' Association.

Aside from his published work, Ian Cornwall was an inspiring and memorable teacher. He looked like an academic, his slight build supporting a shapeless corduroy jacket from which protruded a well-used pipe, not necessarily fully extinguished. Precise but good-humored, he engaged well with students, albeit more so with men than with women, encouraging the enthusiastic ones and gently coaxing the others. Cornwall had a remarkable knack for making archaeological science memorable, whether that was rolling up a sleeve to demonstrate the workings of skeletal articulations on his own boney frame or using a metal teaspoon and cigarette

lighter to demonstrate loss on ignition with a pinch of sediment. His contributions to archaeology were those of an amiable and broad-minded bridge between "digging" archaeology and the rapidly developing specialisms of archaeological science and of an exceptionally gifted communicator who could inform and enthuse academic and lay audiences alike.

Cross-References

- ▶ Geoarchaeology
- ▶ Zeuner, Frederick Everard
- ▶ Zooarchaeology

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Council for British Archaeology (CBA)

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Basic Information

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Major Impact

The Council for British Archaeology (CBA) is a UK-wide organization which works to promote "archaeology for all." It was originally established in 1944 by a consortium of county archaeological societies which were concerned at the archaeological implications of the redevelopment that would be needed at the end of the Second World War.

Since 1944, the CBA's work has expanded and increased in scale, with funding provided initially from the UK Government via the British Academy, and in more recent years, the Academy funding stream has been supplemented by funds from other national heritage agencies across the UK, particularly English Heritage, and other sources.

Initially, the CBA's membership consisted of a range of institutions at national, county/district, and local levels. In 1993, the membership offer was extended to individuals, and the CBA also took over the Young Archaeologists' Club (YAC) for young people under 17. Within 15 years, the CBA's membership expanded to some 10,000 members and subscribers of all ages, together with c 600 institutional members. The membership offers links with membership of a UK-wide network of similar charitable organizations at national and regional scale, including Archaeology Scotland, CBA Wales/Cymru, and 11 English CBA Regional Groups.

In recent years, the CBA's activities have been structured into four areas: participation, discovery, advocacy, and, more recently, sustainability. The CBA has been a strong advocate for public participation in UK archaeology, originally via its *Calendar of Excavations* and most recently via support for "community archaeology." The CBA not only works to encourage others to involve the public in archaeology but has also run its own activities, such as the Defence of Britain project looking at twentieth-century anti-invasion defenses across the UK. Large numbers of volunteers are also involved in delivering hands-on archaeology to young people through YAC branches across the UK (http://www.yac-uk.org).

The CBA's advocacy work relates to all forms of archaeological evidence, including historic

buildings, archaeological sites and landscapes, and portable antiquities. The CBA is one of the National Amenity Societies which is notified about proposed demolitions to listed buildings in England and Wales and works with a network of volunteers to make informed responses. The CBA also works with partners through The Archaeology Forum (http://www.britarch.ac.uk/archforum), The Heritage Alliance (http://www.theheritagealliance.org.uk), and Wildlife & Countryside Link (http://www.wcl.org.uk) to provide a strong voice for archaeology across the UK, as well as supporting the All Party Parliamentary Archaeology Group at Westminster (http://www.appag.org.uk). Some of the key issues in which the CBA has been involved as an advocate in recent years include the heritage protection legislation, the definitions of treasure and illicit trade in antiquities, the heritage crime, the impact of climate change on the historic environment, the value of local authority-based archaeology services and their Historic Environment Records, and the protection and presentation of World Heritage Sites, such as Stonehenge.

The CBA is an active and innovative publisher with over 200 monographs either in print or available electronically free of charge via the Archaeology Data Service (http://archaeologydataservice.ac.uk). Two regular magazines, *British Archaeology* and *Young Archaeologist*, bring the latest news and thinking on archaeology to CBA and YAC members. An electronic journal, *Internet Archaeology* (http://intarch.ac.uk), has been published since 1995, allowing online multimedia content to be made widely available. The CBA supports research, participation, and training through a range of online services, such as the British & Irish Archaeological Bibliography (http://www.biab.ac.uk), which builds on earlier CBA printed publication lists and summaries, and the Training Online Resource Centre (http://www.torc.org.uk).

The CBA is a charity registered in England and Wales and also registered independently as a charity in Scotland. The charity is overseen by an elected group of 15 trustees on behalf of CBA members. The CBA's UK headquarters and most of the CBA's staff are located in York.

Cross-References

- ▶ Archaeology Data Service (ADS)
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Avocational Archaeology
- ▶ Cleere, Henry
- ▶ Clubs and Societies Promoting Archaeology (National and Local)
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Heritage and Public Policy
- ▶ Heritage & Society
- ▶ Heritage Values and Education
- ▶ Heritage: Public Perceptions
- ▶ Industrial Archaeology
- ▶ Institute for Archaeologists (IfA)
- ▶ Metal Detecting in Archaeology
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Underwater Archaeology
- ▶ United Kingdom: Cultural Heritage Management Education
- ▶ Urban Archaeology
- ▶ Volunteers in Archaeology

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Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)

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Introduction

The Council of Europe Framework Convention on the Value of Cultural Heritage for Society

(Council of Europe 2005a), known as the Faro Convention after the city in which it was signed, was opened for signature on 27 October 2005. Following ratification by ten member states, it came into force on 1 June 2011. At the time of writing (June 2011), it has been ratified by 11 of the Member States of the Council of Europe (Bosnia and Herzegovina, Croatia, Georgia, Latvia, Luxembourg, Moldova, Montenegro, Norway, Portugal, Serbia, and Slovenia).

This is a Framework Convention, which sets out principles and broad areas for action which have been agreed by States Party. None of its provisions can convey rights to individuals solely through national ratification without legislative action by individual States.

Key Issues/Current Debates/Future Directions/Examples

Aims and Origins of the Convention

The Convention arose from the desire of the Committee of Ministers to provide a framework of reference for heritage policies in the context of rights and responsibilities in this area and the positive benefits to be drawn from the use of the heritage as cultural capital, with a view to underpinning existing CoE instruments concerning more specific aspects of cultural heritage. These were judged not to affirm the growing importance of the cultural heritage relative to sustainable development, globalization, and awareness of the cultural identity dimension in conflicts. The possibility of drawing up an additional protocol to existing conventions was explored but was rejected as unsatisfactory, and so in 2003, a select committee of experts responsible to the Steering Committee for the Cultural Heritage (CDPAT) was appointed in order to draw up a draft framework convention. Among its aims were:

- Reaching agreement on an enlarged and cross-disciplinary approach to the cultural heritage and the concept of a common European heritage
- Establishing the principle of fair treatment for heritages that represent the various cultural traditions that coexist in Europe
- Committing States to introducing heritage policies and educational initiatives to promote dialogue and mutual understanding, with a view to preventing conflicts
- Establishing a pan-European context for the cooperative preparation of criteria for sustainable development in the use of knowledge and skills as a development resource
- Committing States to the use of management approaches based on participation by all players in society

The Convention was drafted at a series of meetings in 2003 and 2004, which took account of suggestions made by other related committees, and it was adopted by the Ministers' Deputies on 13 October 2005.

The Text of the Convention

The Faro Convention consists of a preamble followed by 20 articles, divided into five sections, as follows:

Section I Aims, definitions, and principles
- Article 1 Aims of the Convention
- Article 2 Definitions
- Article 3 The common heritage of Europe
- Article 4 Rights and responsibilities relating to cultural heritage
- Article 5 Cultural heritage law and policies
- Article 6 Effects of the Convention

Section II Contribution of cultural heritage to society and human development
- Article 7 Cultural heritage and dialogue
- Article 8 Environment, heritage, and quality of life
- Article 9 Sustainable use of the cultural heritage
- Article 10 Cultural heritage and economic activity

Section III Shared responsibility for cultural heritage and public participation
- Article 11 The organization of public responsibilities for cultural heritage
- Article 12 Access to cultural heritage and democratic participation
- Article 13 Cultural heritage and knowledge

Article 14 Cultural heritage and the information society
Section IV Monitoring and cooperation
Article 15 Undertakings of the Parties
Article 16 Monitoring mechanism
Article 17 Cooperation in follow-up activities
Section V Final clauses
Article 18 Signature and entry into force
Article 19 Accession
Article 20 Territorial application

Explanatory Report

Simultaneously with the approval of the Convention in 2005, the Council of Europe issued an Explanatory Report (Council of Europe 2005b). This document puts professional flesh on the legislative bones of the Convention proper, and is essential reading for planners, administrators, and others concerned with the protection of those elements of the European cultural heritage located within the frontiers of their own countries.

It begins by commenting that the approach adopted in the Convention is consistent with the specificity of the Council of Europe while at the same time being innovative. For example, in accordance with the concept of the "common heritage of Europe," constituted essentially through shared experience and commitment to human rights and democratic principles, the Convention deals with heritage as an object of individual rights which give it meaning. This avoids the uncertainty of changing definitions of heritages, by referring to their foundation in human rights and liberties (Article 4 exactly follows the logic of interpretation of the European Convention on Human Rights). In the present Convention, heritage is treated both as "source" (Preamble, paragraph 1) and as "resource" for the exercise of freedoms (Preamble, paragraph 3 and Article 2).

The text also addresses the right to cultural heritage (Article 4), which it expresses as a dimension of the right to participate in the cultural life of the community (Article 1) and the right to education (Preamble, paragraph 4, citing Article 27 of the Universal Declaration of Human Rights, and Articles 13 and 15 of the International Covenant on Economic, Social and Cultural Rights). In this way, all reference to cultures and to heritages as concrete entities is avoided.

The text develops the idea of a "common heritage of Europe" (Article 3) in which the cultural heritage shared by Europeans interacts with the agreed democratic, political, and social ideals of Europe to generate the idea of a common European responsibility toward cultural heritage. This corresponds with the distinctive character of the European heritage that has resulted from its depth and rich historical stratification, its diversity of regions, and its shared cultural phenomena, the products of the interaction of diverse cultures over the centuries.

Thus defined, the European cultural heritage is a primary resource for democratic engagement in support of cultural diversity and sustainable development; it is also a source of prosperity and unity for the diverse communities present in Europe. Europe's cultural heritage is treated in this Convention as the "cultural capital" from which, through the investment of human ingenuity and effort, have originated the rich and varied cultures of modern Europe. Conservation of this cultural capital is essential, both for its intrinsic value and for its potential as an investment from which future development (cultural, social, and economic) may be generated.

The Faro Convention is consistent with new trends which underline the growing importance of cultural values in the environment, territorial identity, the character of landscape, and the environmental dimensions of cultural heritage. This specificity clearly distinguishes the Convention from earlier international instruments of the Council of Europe and from those launched by UNESCO. It provides the basis for the concept of a "cultural environment."

The idea of the common heritage of Europe allows an approach to the notion of "heritage communities," for there can be no cultural life without a community (Article 27 of the Universal Declaration of Human Rights). A heritage community is defined here as a variable geometry (Article 2b), avoiding reference to ethnicity or other rigid communities.

"Heritage communities" here are therefore a very different concept from "the heritage community," the term sometimes used to encompass all professionals engaged in heritage-related activities. This Convention concentrates upon the benefits of developing cooperation between the diverse heritage communities that occur within Europe.

This is an area which, more than any other, requires international and transnational cooperation to bring together the community of peoples represented in the Council of Europe. Consequently, the Convention is distinct from the work of UNESCO, in respect of:

- *Cultural diversity*: The field has been expanded by the Universal Declaration of UNESCO on Cultural Diversity (2001). The present Convention, while recognizing the important synergy between cultural heritage and cultural diversity, concentrates primarily upon how the cultural heritage can be used sustainably to create economic and social conditions favorable to the survival of diverse communities. The maintenance of cultural diversity in the face of globalization is the objective of international effort.
- *Tangible elements of the heritage*: UNESCO's work on a global scale continues to operate using a sectoral approach, establishing lists of major assets regarded as world heritage, whereas the present Convention deals with cultural heritages as ensembles.
- *Intangible aspects of cultural heritage*: Here is where the present Convention focuses primarily on ascribed values rather than on the material or immaterial elements which combine to constitute heritages, thus taking an approach which is distinct from UNESCO's Convention for the Safeguarding of the Intangible Cultural Heritage (2003).

This is a Convention which, without excluding the exceptional, particularly embraces the commonplace heritage of all people.

Cross-References

► Convention for the Safeguarding of Intangible Cultural Heritage (2003)

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Crannog Investigations in Scotland

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Introduction and Definition

Crannogs are types of artificial islands, made or significantly modified by human agency, which, with the exception of one example in Wales, are found only in Scotland or Ireland. The majority of dated examples were built in the first millennium BC but they continued to be built and used episodically until the early modern period. They generally take the form of a foundation of organic materials and stone carrying a platform of timber logs or planks raised above water-level (Fig. 1). The island may be connected to the shore by a timber causeway. On top of the timber platform, buildings were erected made of timber, and in later periods, of stone. The great archaeological asset of the crannog is that organic materials such as structural timbers, wooden artifacts, textiles, and food debris discarded in the lake are preserved in cold anaerobic conditions.

Most known crannogs survive as islands surrounded by water, but some are completely submerged and others are now drying out in drained agricultural land. *Site formation* is critical to understanding and interpreting crannogs (see SWAP 2007 for discussion) but is not easy to resolve without large-scale intervention. Although most excavated examples appear to have been constructed by dumping material into the loch to form a mound (known as a *Packwerk* construction), a pile dwelling construction has

Crannog Investigations in Scotland, Fig. 1 Crannog in Loch Nell, Argyll. The majority of crannogs survive as vegetation-covered mounds projecting just above the water

been proposed for other sites. This clearly has implications for the interpretation of materials found in the core of the mound: do they represent occupation debris which has built up under the pile dwelling or do they represent relict material used in the construction of the mound which predates the occupation of the crannog? Soil micromorphological studies, such as those carried out on some Swiss lake villages (Wallace 2000) and Lithuanian lake dwellings (Menotti et al. 2005), might resolve these issues, but coring through stony mounds has not yet proved possible.

Key Issues/Current Debates/Future Directions/Examples

Scottish lochs are particularly cold and murky, and extensive *underwater excavations* have only been carried out in the larger (clearer) Highland lochs, at Oakbank crannog in Loch Tay (e.g., Dixon 2004) and Ederline crannog in Loch Awe (Cavers & Henderson 2005). At both sites, a basket of techniques adapted from shipwreck excavation and the investigation of continental lake villages was employed, with removal of silt carried out using a Venturi system water dredge (see Dean et al. 1992). Although Scottish lochs present a challenging environment in which to excavate, crannogs are generally located in water less than 6-m deep, allowing divers to work for long periods of time using surface-supplied air (Fig. 2).

Buiston, in Ayrshire (Crone 2000), is an example of an excavated "dryland site," which had been drained in the nineteenth century and now lay within a boggy but accessible field. Coring demonstrated that, despite the drainage, significant organic deposits survived (Fig. 3). The site was initially treated as a *box excavation* with small trenches separated by baulks. Water management soon became a crucial issue and a deep trench was subsequently cut across the site which served as a sump from which the water could be pumped. The trench had another advantage in that the substructure could be fully investigated and it provided greater stratigraphic control; dark organic deposits are much more clearly seen in section than in plan. Water levels were also an issue at Cults Loch and Whitefield Loch, both in SW Scotland, restricting the areas that could be excavated in plan. The Cults Loch crannog is a promontory extending out into the loch, while

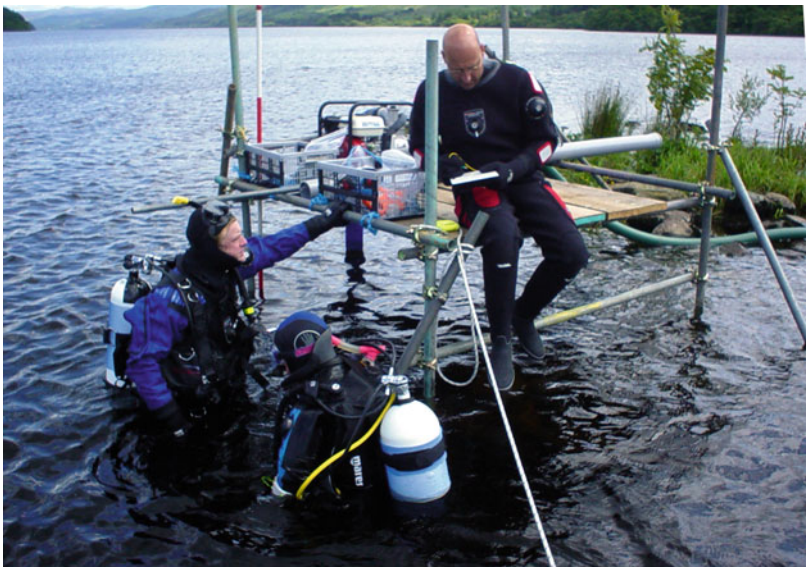

Crannog Investigations in Scotland, Fig. 2 Underwater excavations at Ederline crannog, Loch Awe. Divers excavating below water are supported by a safety supervisor based on a scaffolding platform above the site

Crannog Investigations in Scotland, Fig. 3 Excavation underway on the seventh century CE "dryland" crannog at Buiston, Ayrshire. The stone hearth and wooden flooring of a round house lie to the left of the photograph while on the *right*, the palisaded walkway, which formed the defensive perimeter of the crannog, curves around

Dorman's Island, in Whitefield Loch, survives as a tree-covered island which had to be reached by boat. In both cases, narrow, "sacrificial" trenches were dug around the edges of each trench to act as sumps and keep the central area of the trench relatively dry.

Placing crannogs in their contemporary physical and social landscapes is now recognized as key to their understanding and is central to the research agenda of the Scottish Wetland Archaeology Programme (SWAP 2007). The crannogs in Whitefield Loch and Cults Loch were selected for investigation following a systematic review of the evidence and subsequent field assessment, which identified the rich later prehistoric landscape within which they both sit

(Cavers & Crone 2010; Cavers et al. 2011). Reconstruction of the contemporary landscapes, including excavation of neighboring cropmark sites, formed part of the program.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Site Formation Processes
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Cremation in Archaeological Contexts

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Introduction

The earliest recorded use of ceremonial burning in the disposal of the dead comes from Australia and dates to c. 24000 BCE (Lange et al. 1987: 17). Cremation appears to become a major mortuary ritual from around c. 8000 BCE (Davies & Mates 2005: 455–573) and its use has varied temporally and geographically. In the British Isles, for example, cremation formed the predominant rite within the periods c. 2400–1100 BCE, CE 43–150 and 410–650. A similar temporal pattern existed in much of Europe but with regional variations, including a persistence of the rite in the northern provinces of the Roman Empire (third to fifth centuries CE) and Late Iron Age/Norse Scandinavia (eighth to eleventh centuries CE). Following the adoption of the middle-eastern practice of inhumation by the Romans, particularly after Emperor Constantine embraced Christianity (CE 313), cremation became a minority rite in Europe and other areas where that faith was followed until the late nineteenth century when it was revived for largely practical reasons. It remained common elsewhere, however, notably in parts of Asia.

Irrespective of the time and place, the mortuary rite of cremation has always formed a complex and multi-faceted mode of disposal of the dead. Expensive in terms of time and effort, the rite has the potential to generate a variety of archaeological deposits and features. The primary rite of cremation transformed the corpse from one state to another, and was viewed in some cultures to free the spirit/soul, rendering it "inert" and transportable. Secondary rites could include a diversity of actions and uses to which the cremated remains were put,

but predominantly it is evidence of the burial which is encountered archaeologically.

The rite can be studied via two inextricably linked archaeological sources – the cremated remains (human bone, pyre goods, and pyre debris) and the contexts in which they are found. The latter chiefly relate to the secondary part(s) of the rite, but much pertaining to the cremation itself may be deduced from the archaeological components recovered within deposits. Inevitably, not all aspects of the rite are likely to be represented or easily accessible archaeologically, but other sources of data – historical, cultural (contemporaneous poetry and art), ethnographic, and anthropological – may enable some of the missing components to be illustrated or further deduced.

Definition

Cremation is a process of dehydration and oxidation effected by the interaction between three basic requirements: sufficient temperature to ensure the corpse will burn; adequate air supply creating oxidizing conditions; and enough time to allow the organic components of the body to oxidize. In modern cremators, these requirements are monitored by computer-linked sensors and are automatically adjusted where necessary. The operating temperature fluctuates during the process (c. 800–1,000 °C) which generally takes c. 1.5 h to complete. Comparable temperatures are routinely observed in experimental pyre cremations; however, a number of variables, some more or less controllable than others, could affect the efficiency of pyre cremation, for example, quantity of fuel, weather, size of the deceased, and materials (such as furs/leather) muffling all or parts of the body from the full effects of the pyre.

Materials

Cremated bone is variously described as "burnt," "oxidized," or "calcined." The latter two are both expressions of one of the two major chemical changes which occur in cremation leaving only the mineral component of the bone (hydroxyapatite, a calcium phosphate) in its fully oxidized state. Although much of the cremated bone recovered archaeologically can accurately be described in these terms, such is not always the case. Full oxidation of the organic components of the body is a requisite of modern Western cremation, but this is not a ubiquitous requirement within other contemporary cultures and may not have been so in the past. Similarly, not all burnt bone would have undergone the mortuary rite of cremation; consequently, the interpretive term "cremated bone" indicates that the mortuary rite has been followed. Ashes are the inorganic remains surviving oxidation of the organic components of a material. The term is not restricted to specific particle size or material type (e.g., bone ash or fuel ash).

Materials cremated and/or buried with the dead allude to beliefs in the nature of and entry point to the afterworld. Material types generally fall into two main categories: personal items "worn" by the deceased ("intrinsic"), linked to dress and display (e.g., jewelry, clothes fastenings, items contained in pouches/bags suspended from the neck or waist); and separate items ("extrinsic"), for example, food offerings and other practical or "personal" items (including "pet" or status animals) the deceased might require for their journey to and/or in the afterworld. Other goods might have represented gifts or mementos from friends or relatives, or ritual offerings not pertaining directly to the deceased.

Pyre and grave goods relate to different parts of the mortuary rite. The former were cremated with the deceased, and parts/all of these items may have been included in the burial but some are often recovered from other forms of deposit, such as redeposited pyre debris, their differentiated distribution sometimes appearing deliberate. Grave goods are unburnt materials (e.g., ceramic table wear in graves of Roman date, Fig. 1) added only during placement within the burial container or grave; some may even have been added as later offerings to the revisited grave. Organic materials would also have featured at both stages but

Cremation in Archaeological Contexts, Fig. 1 Late Iron Age (0–50 CE) cremation grave Kent, England, containing the remains of an unurned burial (*center-left*) with ceramic grave goods. (© Oxford Wessex Archaeology)

confirmation of these items rarely survives. The archaeologist sees only the minimum, but further evidence is accessible via contemporaneous written and visual sources.

Pyre debris represents all the burnt material remaining after cremation following the removal of the bone and pyre goods intended for burial. The major component usually comprises charred wood (remains of fuel) covering a range of particle size (dust-sized particles to lumps of charred log), with variable quantities of cremated bone (not collected for burial) and sometimes pyre goods, and occasionally (dependent on the underlying soil type) burnt flint/clay and fuel ash slag (general hearth slag formed on highly siliceous soils). Other forms of fuel ash may be represented in some geographic areas, for example, peat or (rarely) coal.

Contexts

The deposit types outlined are not comprehensive, but serve to illustrate the range that may be encountered archaeologically. The remains from a pyre might be distributed between a variety of features/deposits within the funerary landscape, having been included in a formal burial, left within the pyre debris (in situ or redeposited), scattered, and/or packaged for curation or distribution to mourners. Some forms of feature/deposit are more frequently encountered than others (graves), more easily recognized (urned burials, burials with grave goods), have better survival rates (e.g., graves under mounds, grüben*busta* – pits over which pyres were constructed, into which the remains fell and which eventually formed the place of burial), or are easier to define. Scatters of cremated bone, for example, may be observed but it can be difficult to deduce if they are accidental (disturbance), incidental, or deliberate deposits. Some disposal mechanisms, such as deposition of some/all the cremated remains in water (as still occurs in modern India), would leave little/no trace in the archaeological record.

The majority of pyre sites formed discrete features, but in some urban environments, where many cremations were undertaken within a designated area (e.g., the Roman *ustrina*), individual pyre sites might not be discernable among a mass of pyre debris. Most pyre sites were probably constructed directly on the ground surface, the necessary up-draught being provided by the structure of the pyre itself. In many soils (clays, silty clays, chalk), clear evidence of in situ burning will be apparent via soil discoloration (Fig. 2), but elsewhere, such as in calcareous

Cremation in Archaeological Contexts, Fig. 2 Reconstruction of a grüben*bustum* (combined pyre site and grave) showing discolouration of the soil, the fall of the fuel ash into the pit and the cremated bone lying on top of the debris

sands or humic/garden soils, there may be no surviving evidence. The visual effects of in situ burning do not penetrate far into the soil (c. 50–100 mm) and all traces could be easily removed by later disturbance, such as ploughing. Associated features, for example, stone surrounds or platforms, may offer greater protection and accessibility. Cut features include under-pyre draught pits or scoops, and deeper pits which may also form the grave (grüben*busta* – see Fig. 2). Pyre sites might have been cleared of debris after use or left with some in situ which could include cremated bone.

The most frequently recorded archaeological cremation-related deposit is the remains of the cremation burial: the cremated bone recovered from the pyre site for formal deposition in a grave. The burial may have been made in an urn (ceramic, glass, or metal). Most vessels were probably sealed, though organic lids are lost during decomposition and even ceramic or stone lids are often destroyed through disturbance (Fig. 3). Unurned burials generally seem to have been made in some form of organic container, evident from concentrated deposits of cremated bone toward or at the base of the grave (see Fig. 1). Even where grüben*busta* were employed as the place of burial, a proportion of the bone was often

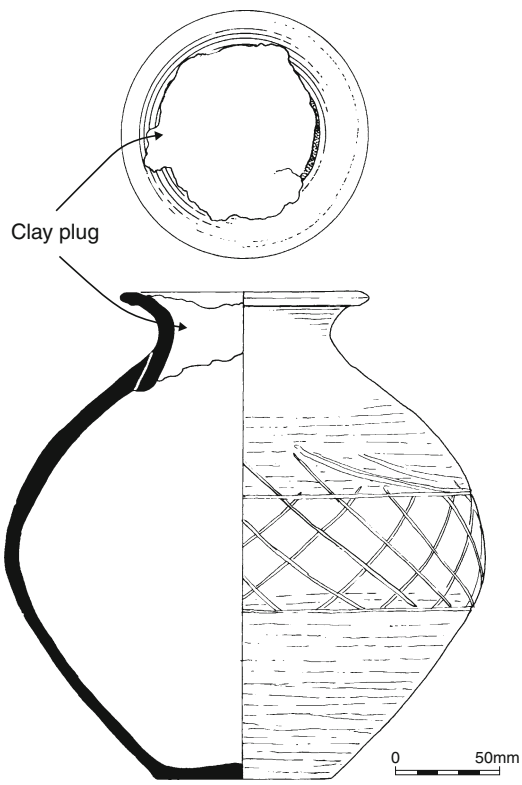

Cremation in Archaeological Contexts, Fig. 3 Late Romano-British (late third-fourth century CE) burial urn from Dorset, England, showing rare survival of the clay plug used to seal the vessel. (Copyright Wessex Archaeology)

Cremation in Archaeological Contexts, Fig. 4 Early Bronze Age (2200–1600 BCE) urned burial, made in an inverted vessel from Anglesey, Wales

collected and placed in an urn or some other form of container before being replaced among the pyre debris: NB not all grüben*busta*-style pyre sites also functioned as the grave. Examples of wholly uncontained deposits have also been recovered with the bone spread across the base of the grave (generally stone-lined cists in UK examples). Most burials probably occurred shortly after cremation, however, the portability of cremated remains means this would not always have been the case, particularly where an individual died away from their home (e.g., some Roman military and Norse warriors).

This secondary part of the rite commonly did not require collection and deposition of all the cremated bone. Although a variety of taphonomic factors may affect the quantity of bone surviving in cremation burials (form of burial, disturbance, soil/geology), and some minor temporal and geographic variations have been observed, the average weight of bone included in adult burials from the British Isles, for example, falls within the 600–900g range (c. 38–50 % of the average expected from an adult cremation (fragments >2 mm).

Most cremation burials would have been made in an earth-cut grave but some cultures utilized communal mausolea/monumental structures in which, for example, urns were deposited in niches in the floor and/or walls. The size and form of earth-cut graves varies from small pits just big enough to accommodate an urn (Fig. 4) to relatively large (occasionally substantial) circular or rectilinear features which would hold an array of grave goods in addition to the cremated material (see Fig. 1).

Most graves contained the remains of a single individual but there are variations, some more common than others and some which seem to have been specific to certain periods. A grave might contain:

- A dual/multiple cremation and burial i.e., the remains of two or occasionally more individuals cremated and buried together in a single deposit (adult plus child most common combination)
- A dual/multiple burial i.e., the remains of two or occasionally more individuals cremated separately but buried contemporaneously in individual urns/containers (Fig. 5)
- The remains of one cremated individual buried in more than one vessel ("accessory" burial) or split between an urned and an unurned deposit ("combined" burials)
- An "animal accessory" burial; a human and an entire animal cremated and buried together as largely separated deposits, either both urned or with the human urned and the animal remains unurned. Currently in the British Isles these deposits appear restricted to the earliest part of the Anglo-Saxon period (CE 410–530) and the

Cremation in Archaeological Contexts, Fig. 5 Early Anglo-Saxon (mid fourth-fifth century CE) grave showing pair of vessels (adult male and adult female) buried contemporaneously (Norfolk, England). © Norfolk Museums and Archaeological Service (McKinley 1994)

Cremation in Archaeological Contexts, Fig. 6 Group of 20 Early Anglo-Saxon urned burials made within two/three adjacent re-used graves (Norfolk, England). © Norfolk Museums and Archaeological Service (McKinley 1994)

species featured are generally "status" animals such as horse or dog.

– The remains of more than one burial (separate cremations and burial events: Fig. 6)

Cenotaphs are features which have the characteristic appearance of graves, often including pyre goods, pyre debris, and even grave goods, but which are either devoid of or contain very little cremated bone (often less than 10g). Toynbee (1996: 54) noted the Roman's use of cenotaphs "if a person's body was not available for burial" or "for some person whose remains were buried elsewhere." Numerous examples have been recorded from Romano-British (CE 43–410) sites and elsewhere in Europe (including France and Sweden), and the practice

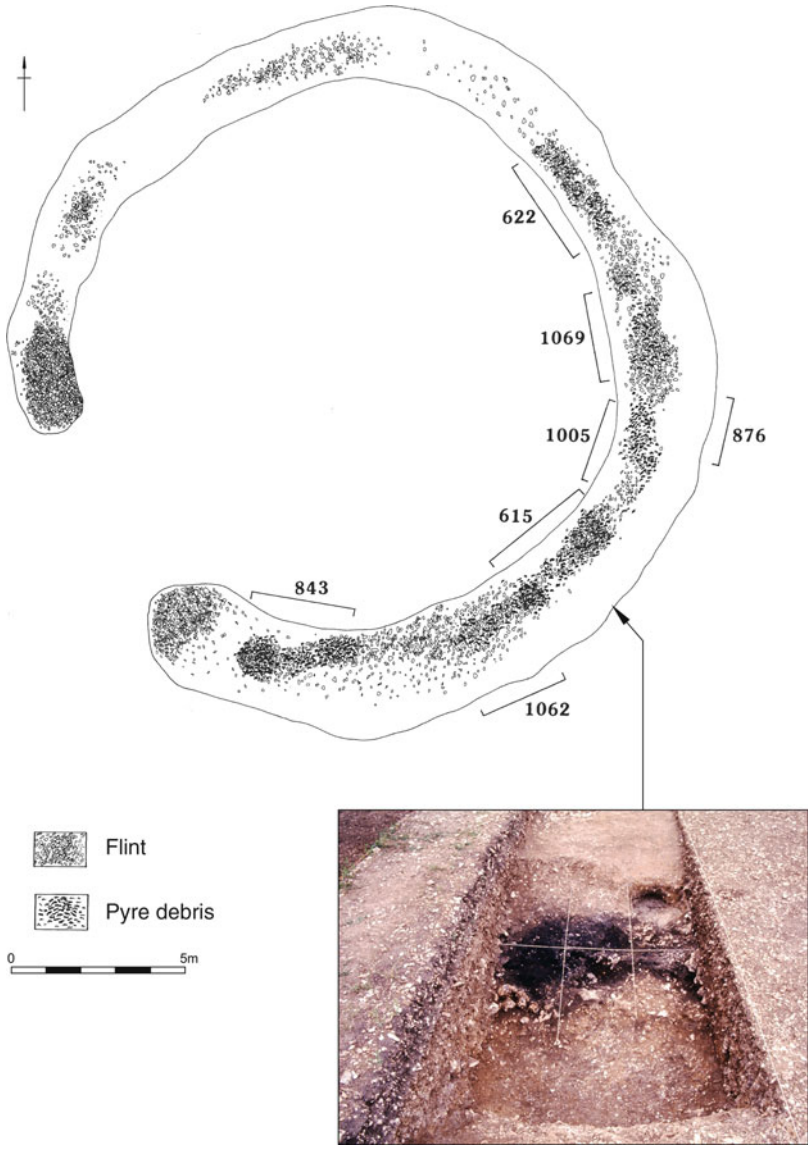

Cremation in Archaeological Contexts, Fig. 7 Early-Middle Bronze Age (2200–1100 BCE) ring ditch (Hampshire, England) showing deposits of pyre debris made from within the confines of the ditch. Context 615 contained debris from a minimum of six pyres. (© Wessex Archaeology)

is likely to have been fairly widespread if relatively infrequent.

Pyre debris may be found in situ at pyre sites, where the distribution of skeletal elements and other materials can reveal vital details about the formation process of the deposit. However, pyre debris is most frequently encountered redeposited as a more-or-less homogeneous mix of archaeological components. It is a common component within cremation graves but is also found in: pre-existent features (Fig. 7) specifically excavated features (i.e., formal deposits of pyre debris); and as surface spreads (particularly within Roman *ustrina*). Its presence suggests that the pyre site was in the vicinity of the deposit and, if not from a cremation grave it will often signify the close proximity of the "burial" to which it relates. Depositions of this type clearly formed a deliberate and significant part of the mortuary rite, and study of the materials within such deposits have revealed significant information pertaining to funerary practices.

The word "token," variously defined as "symbolic," "nominal" or a "memento" has been used to describe burials where only small quantities of bone (<100g; see above) are recovered. The use of "token" in respect to cremation is slightly problematic, as some of the deposits referred to as "token burial" might better be interpreted as "cenotaphs." Others may have formed small, symbolic amounts of bone retained by the deceased's friends or relatives as, for example, the mementoes distributed in eighteenth century Aboriginal Australia (Hiatt 1969). Such deposits might eventually have been buried, perhaps at a much later date, together with the remains of another individual, and there are possible examples of such deposits from Anglo-Saxon (sixth-seventh century CE) inhumation graves. Another potential form of *memento mori* deposit could be represented by the deliberate incorporation of one or two bone fragments from a second individual amongst the cremated burial remains of another.

Osteological Analysis

Osteological analysis illustrates many aspects of the mortuary rite (e.g., McKinley 1994, 2000) Pyre temperature and efficiency of oxidation (demonstrated via thermally induced color variations, shrinkage and warping, and microscopically from the crystal structure); the quantity of bone included in the burial; degree of fragmentation; skeletal elements represented and their distribution; and the form and location of pyre goods can all give insights into the pre-cremation treatment of the corpse and post-cremation manipulation of the remains as well as the pyre technology employed. Outside the various taphonomic factors which may effect many of these attributes, variations have been observed demonstrating the diversity operating within the rite on both a temporal and geographical basis.

Historical Background

Many early Antiquarians dismissed cremated remains as valueless. Improvements in the nineteenth and early twentieth century saw some archaeologists presenting good descriptions of graves and potential pyre sites, but recording was erratic and details of the formation processes, and particularly the relevance of the cremated bone itself, were often overlooked or misunderstood.

As late as the early 1960s in Britain cremated remains were being discarded on some sites and neither they nor the context were being considered in detail, with a tendency to describe all deposits as "cremations." Elsewhere in Europe, particularly in Germany, Poland, and Sweden, cremated remains from sites were being routinely examined from an earlier date, analytical techniques were being developed and the nature of cremated bone was being explored both in Europe and the USA (associated with the development of forensic anthropology).

Over the last two decades of the twentieth century there was a growing interest in the mortuary rite and recognition of its complexity. Observations in modern crematoria, experimental work in laboratories, and numerous experimental pyre cremations have enhanced the understanding of how cremation works and what may be expected to survive at the end of the process. This information has fed-back into the contextual data and enabled a wider appreciation of the various parts of the rite which continues to be explored, together with the potential symbolic relevance of what was being undertaken at different stages. The development at Groningen University (Netherlands) of a dating method for use on cremated bone provided, for the first time, the ability to place unaccompanied burial remains in their correct temporal context.

Key Issues and Future Directions

Archaeologists undertaking the excavation of cremation-related features/deposits have to appreciate that they are dealing with the physical remains of a multifaceted rite from which much can be deduced. Thorough excavation and recovery of the primary archaeological data enables details of the formation processes to be deduced and is essential for future exploration of the rite. Adoption, by both excavators and osteologist, of a common (or at least commensurate) form of

reference, excavation methodology, and analytical methods, will allow comparison of cremation data across broader geographic and temporal areas.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Burned Remains in Forensic Contexts
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

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Crete, Archaeology of

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Introduction

The archaeological remains of Crete first reached a wide audience through the accounts and drawings of Renaissance era travellers, such as the Italian Cristoforo Buondelmonti. Later explorations built upon these works with, for example, Robert Pashley, Capt. Thomas Spratt, and Victor Raulin writing about the island's botany, geology, peoples, and ancient ruins in the eighteenth and nineteenth centuries. The large-scale excavations of the English archaeologist Sir Arthur Evans at the site of Knossos early in the twentieth century propelled Cretan archaeology into European, if not global, consciousness. Since then, over a century of continuous fieldwork has resulted in Crete becoming one of the best-explored islands in the Aegean region. Although it is most famous for the Bronze Age "Minoan" civilization, named by Evans for the mythical

king Minos who ruled from Knossos, the island has a long history of settlement, conquest, occupation, and resistance, leading to numerous chronological and material specializations within Cretan archaeology.

Definition

The island of Crete is the southernmost and largest of the Greek islands, 245 km long but only 50 km across at its widest, with a total area c. 8,200 km^2 (Fig. 1). Situated at the collision point of two tectonic plates, the landscape is dominated by mountain ranges (some, such as the western White Mountains, over 2,000 m.a.s.l.) and dramatic deep gorges (Fig. 2). Unsurprisingly, seismic activity has affected the island and its inhabitants: earthquakes have caused occasional serious disruption, and coastline levels have changed. Geologically, limestones and the phyllite-quartzite family predominate (Rackham & Moody 1996: 15). Settlement has usually focused along the coastal zones or cross-island communication routes, as well as near fertile land. Upland plateaus like the Lasithi and coastal plains such as the southern Mesara provide good soils for agriculture, while the mountainsides have been terraced since antiquity to extend the cultivable land. The varied Cretan landscape gives rise to a range of ecological niches, encouraging a diversity of botanical and animal life, and the island is home to over 100 endemic plants (Rackham & Moody 1996: 53-73). The current Mediterranean climate of hot, dry summers and mild, wet winters has not always persisted, and data from deep sea, ice, and pollen cores as well as flood deposits sheds light on Crete's climate throughout the Holocene (Rackham & Moody 1996: 33-40; Moody 2005). Agriculture has long been the dominant industry, with olives, viticulture, and sheep rearing especially important, and the related food products remain primary exports. Its strategic location on cross-Mediterranean shipping routes has led to a recurrent role in trade networks and military strategy. Tourism is now of great economic importance too. Knossos is the second most visited site in Greece after the Athenian Acropolis, and archaeology must strike a balance between supporting this industry, monitoring development, and ensuring best-practice site preservation.

Historical Background

Archaeological survey results from the Plakias region in the south of the island suggest Lower Paleolithic (c. 130,000 BP) and Mesolithic (c. 11,000–9000 BP) occupation on Crete (Strasser et al. 2010), contradicting the long-held belief that human activity only began there early in the Neolithic period. The exact nature of this Pleistocene and Early Holocene activity remains unclear however, and for evidence of more permanent occupation, the earliest Neolithic (c. 7000 BCE) must still be the starting point. These first settlers on the island are thought to have come from Anatolia in a deliberate colonization movement, bringing with them animals and crops typical of the Neolithic lifestyle further east. An initial aceramic phase at Knossos was the beginning of 4,000 years of Neolithic activity there, creating a tell site. Few other sites on the island show such long sequences of early human activity, but Knossos was by no means the only inhabited place. Late Neolithic sites included caves and open-air settlements like Gerani and Sphoungaras, while in the Final Neolithic, site numbers and types increased and included upland defensible locations such as Monastiraki Katalimata (Fig. 2) (Tomkins 2008).

The transition to the Bronze Age is placed around 3000 BCE, and during the following millennium, settlement numbers continued to rise, accompanied by changes in material culture. It seems likely that these social transformations were driven partly by newcomers from overseas, with the Cyclades, the Dodecanese, and Anatolia potential points of origin (Betancourt 2008: 93-94). Sizeable villages grew up in association with fertile land and natural communication routes (e.g., Vasiliki, Myrtos Fournou Korifi). Distinctive Early Bronze Age ceramics, such as Vasiliki Ware and Fine Gray Ware, and divergent

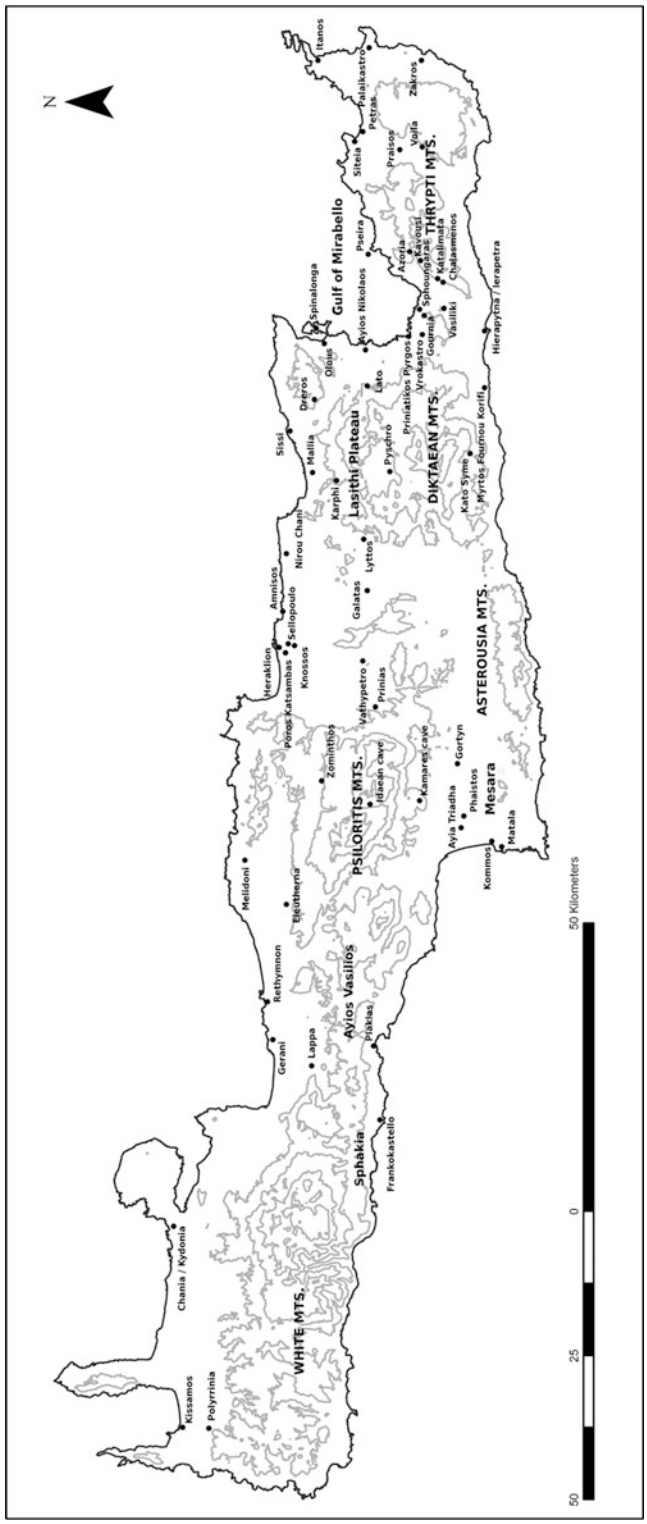

Crete, Archaeology of, Fig. 1 Map of Crete with sites mentioned in text

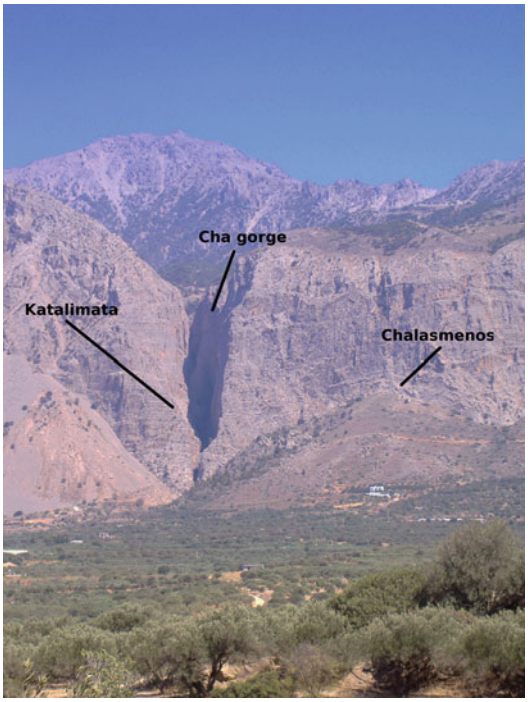

Crete, Archaeology of, Fig. 2 The Cha gorge in eastern Crete

Crete, Archaeology of, Fig. 3 Storage magazine at Knossos

burial practices suggest strong local identities, despite the evidence for interregional movement of goods.

The Middle and Late Bronze Age (or Middle and Late Minoan periods) was the time of the so-called palaces, most famously Knossos, Malia, Phaistos, and Zakros. These complex structures were initially considered to be royal residences, but archaeologists now believe that they were multifunctional. Extending around a central court, they provided a place for ritual and commensal events. Areas were also dedicated to storage and craft manufacture (Fig. 3). Two main phases of development, necessitated by an earthquake c. 1700 BCE, have been suggested, leading to the terms Protopalatial and Neopalatial for the First (c. 1900–1700 BCE) and Second (c. 1700–1450 BCE) Palace periods (Tables 1 and 2). Thriving towns emerged, some adjacent to "palaces" (e.g., Knossos, Malia), others as separate settlements (e.g., Gournia, Palaikastro) (Fig. 4). Neopalatial "villa" sites like Vathypetro, Nirou Chani, and Ayia Triadha shared certain palatial architectural features (pier-and-door partitions that allow control over the light and air entering rooms, well-carved blocks of ashlar masonry) and were probably also associated with the elite. An administrative system is evidenced by two undeciphered scripts, Cretan Hieroglyphic and Linear A, which occur mainly on clay tablets and sealings. High-quality ceramics, frescoes, faience, metalwork, and ivory and stone carving proliferated, aided by technological developments like the potter's wheel and a wide-ranging network of overseas contacts (see Shelmerdine 2008 for numerous papers on Minoan Crete).

Towards the end of the Late Bronze Age, the island may have experienced a period of control by the Mycenaeans of mainland Greece. Certainly Linear B tablets from Knossos and Chania were written in the same language (an early form of Greek) and suggest a similar administrative system to that which occurred contemporaneously on the mainland at places like Pylos and Mycenae. Other mainland-style artifacts and

Crete, Archaeology of, Table 1 Chronology of main archaeological periods on Crete (All prehistoric dates are approximate)

Neolithic	7000–3200
Bronze Age	3200–1200
Postpalatial	1200–1050
Iron Age	1050–700
Archaic	700–480
Classical	480–323
Hellenistic	323–67
Roman	67 BCE–400 CE
First Byzantine	400–828
Arab	828–961
Second Byzantine	961–1210
Venetian	1210–1669
Ottoman	1669–1898

Crete, Archaeology of, Table 2 Bronze Age chronology. Minoan chronology is still much debated, and the dates used here follow Dickinson (1994). All dates are approximate and are BCE

3200–1900	Early Minoan I–Middle Minoan IA	Prepalatial
1900–1700	Middle Minoan IB–Middle Minoan IIIA	Protopalatial
1700–1450	Middle Minoan IIIB–Late Minoan IB	Neopalatial
1450–1200	Late Minoan II–Late Minoan IIIB	Final Palatial (also known as Third Palace period)
1200–1050	Late Minoan IIIC	Postpalatial

symbols replaced or merged with Minoan ones, but this adoption of new practices and things was not necessarily the result of military conquest and could also indicate the movement of people and ideas.

Like other complex societies of the eastern Mediterranean, Crete experienced major upheavals around 1200 BCE, the causes of which are uncertain but may include natural catastrophes, raiders, systems collapse, or internal strife. The society that emerged in the Early Iron Age (c. 1050–700 BCE) was very different from its predecessor. Many sites were abandoned or destroyed, and settlement withdrew from coastal zones to upland, relatively inaccessible locations in the twelfth and eleventh centuries BCE. Excavations at Vrokastro, Karphi, Kavousi Kastro, and Kavousi Vronda, for example, show stone-built agglomerative housing; social differentiation is perhaps recognizable in certain features (monumental thresholds) or house size (e.g., Great House at Karphi) (Wallace 2010) (Fig. 5). Other characteristics such as the disappearance of writing, the development of Geometric-style pottery, and the rise in cremation are shared across the wider Aegean world during these "Dark Ages" (Wallace 2010: 23). Growing complexity is evident once again from the tenth century as trade with the east increased, later leading to the "Orientalizing" style in the arts (Wallace 2010: 213).

Nucleation and expansion of some settlements and corresponding abandonment of others characterized the Archaic period (700–480 BCE) and laid the foundations for the emergence of the city state (the *polis*; pl. *poleis*), often with a harbor town (e.g., Lato and its port at Lato Pros Kamara, modern Ayios Nikolaos) (Fig. 6). Many communities seem to have had close links with Egypt, attested by Egyptianizing dedications in sanctuaries and tombs, as well as with the Phoenicians for whom Crete served as a stopping point on voyages to their western colonies (Erickson 2005: 625; Wallace 2010: 219). A proposed period of decline (the "sixth century gap") based on the lack of textual and archaeological information has been contradicted by recent work at thriving sixth century settlements such as Azoria and Eleutherna. Public display of law codes on civic buildings, most famously at Gortyn, is a tangible reflection of social organization and suggests an oligarchic society (Perlman 2004: 181-2).

Crete did not play an important role in the major conflicts of the fifth-century BCE Greek world, the Persian and Peloponnesian wars, and has often been considered somewhat isolated from the commercial, intellectual, political, and military developments of mainland Greece (Erickson 2005: 622). The island was, however, an important node in pan-Mediterranean trade

Crete, Archaeology of, Fig. 4 Minoan town of Gournia

Crete, Archaeology of, Fig. 5 View across saddle of Karphi

networks at this time. Coinage using a common standard was first issued by prominent city-states in 470 BCE (Wallace 2010: 361), and ceramic imports from the Peloponnese, in particular, confound the impression of inactivity.

Classical and later Hellenistic times saw increasing conflict on the island, as city-states tried to expand their territory. Larger states like Knossos, Gortyn, and Hierapytna swallowed up smaller *poleis*, occasionally leading to total destruction, such as that which befell Lyttos when it resisted Knossian conquest c. 220 BCE. Transport amphorae indicate Hellenistic trade with the Dodecanese, Egypt, and the Black Sea (Vogeikoff-Brogan 2004), and many Cretan mercenaries served overseas at this time (Chaniotis 1999: 183).

Crete had been sporadically involved in Roman affairs since the second century BCE, but it was fully incorporated into the Roman world after 67 BCE, when it was conquered by Metellus. Initially united with Cyrene as a province, its capital at Gortyn acquired the trappings of a Roman city; theaters, temples, baths, a circus, and an amphitheater can still be seen across the 200 ha. site today (Fig. 7). In the early Roman era, settlement expanded into the countryside through small farms and villages, while the cities of Asia Minor influenced its art and architecture (Sanders 1982: 30, 135). The rise of Christianity led to the construction of basilica churches across the island, and large country villas appeared later in the fifth and sixth centuries CE, a time of prosperity and peace.

Arab expansion around the Mediterranean in the seventh century CE caused increased military activity, and eventually Crete was conquered in

Crete, Archaeology of, Fig. 6 Civic center of Lato

Crete, Archaeology of, Fig. 7 Aqueduct at Gortyn

the ninth century, bringing an end to the First Byzantine period (c. 400–828 CE). Little is known about the ensuing Arab rule, and apart from pottery and coins, only one building has thus far been attributed to this phase (Warren & Miles 1972). The island soon returned to the Byzantine Empire following the capture of the stronghold at Khandax (now Heraklion) by general Nikephoros Phokas, commencing the Second Byzantine period (961–1210 CE). Close ties with Constantinople characterize this prosperous era when Crete became a "theme" (province) with its

Crete, Archaeology of, Fig. 8 Venetian fortress in Heraklion harbor

own governor, although urban settlements were outnumbered by small rural villages (Tsougarakis 1988: 136).

Following the sack of Constantinople by crusaders in 1204, Crete became the property of Genoa, briefly, and then Venice in 1210. The Venetians faced a strong local resistance as harsh taxation funded military exploits, while the settlers from Venice received many privileges. Another unpopular move was the restriction on Orthodox Christianity, which was seen as a uniting force for the native Cretans. Venetian remains are some of the most impressive to be seen on Crete today and include fortresses (e.g., Rethymnon, Ierapetra, Frankokastello) (Fig. 8), shipsheds or *arsenali* (Heraklion), Latin churches (e.g., St. Francis in Chania, now the city's archaeological museum), and deserted villages (e.g., Voila). A gradual blending of Cretan and Venetian cultures fostered a distinct artistic environment by the sixteenth and seventeenth centuries, which included skilled fresco and icon painting (El Greco was a Cretan) and literature, most famously the verse romance *Erotokritos* (Detorakis 1990: 207-25).

The island remained under the control of La Serenissima (Most Serene Republic of Venice) until 1669 when, with the exception of a few strongholds like Spinalonga, it was finally conquered by the Ottoman Empire following a lengthy siege at Candia (Heraklion). The subsequent *Tourkokratia* (period of Ottoman rule) lasted over two hundred years, but the only remains visible of this era today are occasional fountains and mosques. Numerous rebellions during this period sought to gain Cretan freedom, most famously those of 1770 led by Daskaloyiannis, of 1821–1830 triggered by the Greek War of Independence, and the Cretan Revolt of 1866–1869 (Detorakis trans. 1994: 278-346).

It was not until 1898 that Crete finally became autonomous, aided by the Great Powers of Europe. The next goal was *enosis*, or union with Greece, which was achieved in 1913. Crete's history from this point onwards is closely intertwined with that of the rest of Greece. The forced removal of Cretan Muslims in a population exchange with Turkey in the early 1920s was a traumatic event for the island (Koufopoulou 2003). During World War II, Allied-controlled Crete was subject to an airborne invasion by Nazi Germany in May 1941, the "Battle of Crete." Despite the bravery of the

Cretans and Allies alike (including archaeologists like J. D. S. Pendlebury whose detailed knowledge of the island was put to strategic use), the defending troops were evacuated, leaving the island occupied by German forces. The resistance movement fought on until the end of the war, and exploits such as the kidnapping of General Kreipe meant that the Germans enacted brutal reprisals on the civilian population.

Key Issues/Current Debates

The results of over a century of intensive archaeological fieldwork on Crete and paradigmatic shifts within the discipline are impressive: detailed information is available on artifact typologies, settlement patterns, site types, chronology, and diachronic changes in society. Bronze Age archaeology has emerged from the shadow of Classical archaeology, to be recognized and practiced as the study of a distinctive prehistoric society. This is tied to a change in emphasis more generally within the archaeology of the ancient Mediterranean, now a field less focused on iconography (as exemplified by studies of Classical figural pottery) and more on social and ideological processes. In the 1980s, archaeologists on Crete embraced advances in archaeobotany, faunal studies, survey methodology, and sampling strategies. The influence of postprocessual thinking is also evident, albeit mainly within Bronze Age archaeology, as issues like gender, commensality, and ritual practice are considered. As archaeology becomes more reflexive, past and present research agendas are being reevaluated. For example, the term "Minoan" has been problematized as a modern construct, laden with the baggage of Evans's Edwardian worldview (see various papers in Hamilakis 2002). Similarly, periods outside the Bronze Age that for so long were eclipsed by Minoan-centric studies are now receiving attention. Crete's rich Byzantine heritage, its Venetian cultural mix, and the Archaic-Classical periods are becoming clearer. Five current issues that cross temporal boundaries are outlined below.

Origins

The recent discovery of Paleolithic and Mesolithic artifacts on the island has renewed interest in the question of when Crete was first settled, as well as in the wider implications of such occupation. Crete had a distinctive Pleistocene fauna, including dwarf hippos and elephants, which did not survive into Neolithic times (Rackham & Moody 1996: 47-8). Can their extinction be linked to these first peoples? Moreover, if Paleolithic people arrived on Crete by boat from Africa, as the research suggests, this is of great significance in understanding the capabilities of early humans for seaborne travel and for hominin arrival in Europe (Strasser et al. 2010).

Neolithic and Early Bronze Age studies have also been revitalized. Cretan Neolithic chronology has been revised to bring terminology into line with that used for the Greek mainland (Tomkins 2008). The Knossos-centric approach to the island's first farming communities is diminishing in the face of emerging evidence for widespread Neolithic occupation. These were not isolated communities; the distribution of nonlocal materials such as ceramics and stone tells of interaction from earliest times (Tomkins 2008: 28). The ensuing Early Minoan period is no longer viewed simply as an uneventful predecessor of the palatial periods but as a millennium worthy of study for the emerging complexity demonstrated by technological, social, and economic changes (Betancourt 2008). The origins of Minoan "palaces" continue to fascinate. It now seems that these complexes did not first appear on Crete c. 1900 BCE (perhaps inspired by overseas contacts) but may have roots in the indigenous, large structures of the Early Bronze Age (e.g., at Malia) or even at Neolithic Knossos (Schoep 2012).

Crete has hosted continual waves of newcomers, each leaving distinctive marks not only in the archaeological record but also in the islanders' identities. Whether the use of Linear B to write Greek indicates a mainland Greek identity or origin for at least some of the islanders during Late Minoan IIIA–IIIB remains debated. Conversely, Archaic inscriptions from east Cretan *poleis* are written in Greek script but the

language is not Greek. This language has been linked to the Eteocretans ("true Cretans" – perhaps descendants of the Bronze Age populations), who were associated with the Praisos region in Classical literature (Whitley 1998). The mingling of Latin and Greek peoples and cultures that occurred during Venetian rule (McKee 2000) and the deserted Muslim villages serve as reminders of just how mutable island society has been.

Palaces, Polities, and Poleis

The varying nature of regional and island control throughout Crete's settlement history is another key research theme. It has long been thought that the Minoan "palaces" functioned as regional administrative centers, although the extent of their ritual, economic, political, or ideological dominance is unclear. This interpretation is based on the Mycenaean system and hence may have limited applicability to earlier times. Other ways of understanding the complexity of palatial era society without using an anachronistic or top-down approach have been sought (e.g., peer polity interaction). The "palaces" still demand explanation, and it is not only their function(s) that remains uncertain but so too the very definition of what exactly is, or was, a "palace." Recently discovered court-centered complexes at Galatas and Petras, for example, add to the growing number of sites given this appellation, and debate continues about the Gournia "palace" also. It is becoming clearer that "palaces" had varying construction and occupation histories and that exact parallels in function between Protopalatial and Neopalatial complexes are unlikely (Shelmerdine 2008).

Crete was referred to by ancient sources as being a land of 100 *poleis* (Chaniotis 1999: 182). Archaeological exploration of these early city-states permits consideration of the development of urban centers, the links between these centers and their hinterland, and the political economy of the island during Archaic times (Haggis et al. 2004: 345). Unlike the tyrannies that emerged elsewhere in Greece, in Cretan *poleis*, power rested in the hands of councils (*kosmoi* and *gerontes*) made up from elite clans (Wallace 2010: 358). Planned urban development at Archaic sites such as Azoria and Dreros included city walls and public buildings with ritual and political functions, revealing cities as materializations of their civic identity (Haggis et al. 2004: 393).

Knowledge of administration of the island in Byzantine, Venetian, and Ottoman times is based primarily on textual information, but combining literary sources with archaeological remains for greater resolution of these periods is commencing: for example, the online database *The Ottoman Centuries* by Rethymnon-based FORTH Institute for Mediterranean Studies (http://digitalcrete.ims.forth.gr/index.php?l=1).

Trade, Economy, and Overseas Interaction

Thanks to its location between North Africa, Europe, and the Near East, the island has been an important transshipment point on sea voyages, as well as a destination in its own right. Archaeology and textual sources combine to identify harbors around the coast, such as the Bronze Age sites of Kommos and Poros-Katsambas, or Hellenistic Lato Pros Kamara. Roman prosperity in particular encouraged the growth of coastal towns at the expense of those inland – e.g., Polyrrinia dwindled while its port at Kissamos flourished (Sanders 1982: 31).

Crete and the Cycladic islands to its north have had a close relationship since the Neolithic, when finds of obsidian attest to links with Melos. During the Bronze Age, Cretan elites participated in an eastern Mediterranean exchange network of prestige goods such as ostrich eggs, copper ingots, faience, perfume, and spices. The nature of this interaction is unclear: to what extent was the movement of goods due to gift exchange or trade, and what was the role of travelling craftworkers or iconographic and ideological transfer in the spread of material culture? Certainly the theory that a Minoan thalassocracy, or sea empire, was responsible for the Minoan-style material culture at places like Akrotiri on Santorini, Ayia Irini on Keos, and as far afield as Tell el-Dab'a in the Egyptian Delta has been replaced by more nuanced levels of interaction (Shelmerdine 2008).

The location of Crete's main overseas partners changed after the Bronze Age. Some communities developed close ties to Cyprus and Phoenicia, and eastern imports like bronzes and ivories increased during the Iron Age. Unlike many mainland Greek states, Cretan *poleis* had no colonies to form natural trading partners, and the sixth century saw a decline in Orientalizing motifs and a swing towards relations with the west. It is thought that the eastern and western ends of the island now favored trade with different parts of Greece; the west formed links with the Peloponnese, as attested by finds of Laconian and Argive pottery at Eleutherna, Lappa, and Kydonia, while the east looked to the Cyclades, as indicated by finds at Olous, Azoria, and Itanos (Erickson 2005: 630-631). The lack of imported ceramics dating from 460 to 400 BCE is puzzling and may reflect a cessation of overseas trade, perhaps caused by Athenian pressure during the Peloponnesian War (Erickson 2005: 656.) From Classical through Roman times, the island exported agricultural produce including wine, oil, wood, fish (evidenced by rock-cut coastal fish tanks, e.g., at Siteia), and murex. The southern ports became important stopping points on the grain route from Egypt to Rome. In return, imports from around the Roman Empire flowed into the island, such as granites from Egypt and later ceramics like Phocaean Red Slip Ware (Sanders 1982: 31-4).

Ritual Practices and Places

Today the Cretan countryside is dotted with small chapels, but the close link between ritual practice and landscape goes back millennia. The use of caves for rituals probably dates to Neolithic times and is a more plausible explanation of the earliest skeletal and ceramic finds than their use as dwellings, stores, or refuges. In the Bronze Age, subterranean deposition of bronze figurines and fine ceramics occurred (e.g., Kamares and Psychro caves). Some caves continued to be visited for ritual purposes into historic times; the Idaean cave, high in the Psiloritis range, has produced offerings including seventh century BCE bronze shields. The dedication of such goods in sanctuaries enhanced the prestige of the giver and was a common practice across Greece at this time. Cave chapels can still be found; some of these, such as Melidoni (the site of a siege between Ottomans and Cretans in 1823), should be linked to their prior use as places of refuge.

Minoan era communities worshipped at mountain shrines (peak sanctuaries) also, leaving votives of human and animal figurines and making offerings of food or feasting there. Architectural features of the "palaces" like lustral basins and pillar crypts suggest that rituals were carried out there too. Despite a wealth of iconographic and material remains, the actual deities worshipped and beliefs held by the Bronze Age Cretans are unknown. Linear B includes the names of Mycenaean divinities (e.g., Poseidon, Zeus), but whether there was any similarity with the Classical gods beyond a shared name is unclear (Shelmerdine 2008).

Extra-urban sanctuaries such as that of Hermes and Aphrodite at Kato Syme were used in later periods. By Archaic times, however, worship in Crete mainly occurred in the temples familiar from the wider Greek world. The small eighth century temple at Dreros is one of the earliest free-standing temples in the Greek world, while seventh century Temple A at Prinias is the earliest such building with sculptural decoration. A contemporary potential Phoenician tripillar shrine at Kommos suggests that foreign traders may have worshipped at this port town (Shaw 1989). Epigraphic, numismatic, and literary sources show that Roman Imperial cult came to Crete, but of greater significance for archaeology of religion was the emergence of Christianity. Following the appointment of Titus as the first bishop of Crete by St. Paul during the first century CE, early Christian basilicas replaced temples to the Olympian deities. Excavations of these buildings are rare but surviving examples dating mainly from the fifth and sixth centuries suggest that simple three-aisled structures with a nave and narthex were customary (Sanders 1982: 89).

The Early Minoan stone tholoi of the Mesara are among the most impressive tombs on the island. These monuments for communal burial would perhaps have served as markers of territory

and identity, while the periodic cleaning events brought kin-groups or communities together. Fewer burials of palatial Minoan society have been discovered, although chamber tombs, some with weapons among the grave goods, were in use by Late Minoan IIIA, indicating a change in beliefs (e.g., Sellopoulo). Christian inhumation practices were diverse and include rock-cut *loculi* tombs at Matala (inhabited by hippies in the 1960s) and Lappa (Sanders 1982: 40).

Consuming and Remembering

Recent archaeological engagement with food consumption is reflected in the studies of the diachronic social roles of feasting. Faunal assemblages and sets of elaborate drinking and serving vessels from throughout the Bronze Age indicate the importance of eating and drinking events, arguably as venues for negotiating social position. In the Early Iron Age, communal dining is again suggested by archaeology, ranging from large tripod cooking pots at Chalasmenos (Fig. 2) to sizeable buildings such as Kavousi Vronda's "Big House," which perhaps hosted communal events. Ancient texts describe the Archaic and Classical *syssition*, a combination of a shared meal and political institution, as a distinctive feature of Cretan *poleis*. These daily meals for the urban elite, financed by taxes and personal contributions, occurred in large, purpose-built structures, or *andreion* (e.g., at Azoria) (Haggis et al. 2004: 387-90). Distinguishing between *andreion* and early temples can be problematic, and undoubtedly overlap existed between the social, religious, and political functions of these buildings. More easily identifiable is the later *prytaneion* at Lato, where city officials dined (Fig. 6, *prytaneion* at the top of the central staircase).

The continued occupation and rebuilding at certain Cretan sites such as Knossos has been interpreted as fostering a deliberate link between past and present, perhaps at key cosmological centers or seats of power. Ruins of older structures would have been visible at such palimpsestic sites and in some cases received special attention. For example, Early Iron Age cult was practiced at older Bronze Age remains at numerous sites (e.g., Knossos, Phaistos, Amnisos, Palaikastro), while ninth-century BCE Knossians imitated and reused large Bronze Age chamber tombs (Prent 2003). These conscious attempts to associate themselves with the past were perhaps integral to legitimizing the authority of a rising aristocracy (Prent 2003: 91). The curation of heirloom objects may be another manifestation of this interest in memory across different periods, while Classical era coins from Knossos bore a labyrinth, stressing the long, mythical past of the site. Feasts, rituals, and funerary ceremonies have all been reconsidered in terms of the creation and manipulation of sensory, bodily experiences in ancient Crete to create embodied memories with political and social relevance.

International Perspectives

Archaeologists from many countries have played an important role in uncovering Crete's past, working under permits issued to the foreign archaeological institutes based in Greece and closely cooperating with their counterparts in the *ephoreia*, or departments of the General Directorate of Antiquities and Cultural Heritage. The somewhat colonial division of Cretan fieldwork by region and nationality (e.g., American projects in the east of the island, Italians in the Mesara, British at Knossos) so prominent during the twentieth century is changing in the new millennium. International collaboration between scholars is now standard, although the permit system means that officially projects will continue to run under the auspices of specific foreign schools. Smaller foreign institutes are now also organizing Cretan projects: Sissi is a Belgian expedition, while Priniatikos Pyrgos is Irish-led. The process of excavation is changing too, moving from the once predominant Wheeler box-grid system to the single context, open-area excavation methods developed in contract archaeology and espoused on recent projects like Priniatikos Pyrgos and Azoria.

This international aspect means that research on Crete is subject to the influences of different

academic traditions. The claim that Greek archaeologists adhere firmly to Classical training and reject modern methodological and theoretical changes (Kardulias 1994: 375) may still be applicable to an older generation of scholars. However, current thinking is generally reflected in contemporary fieldwork, research goals, and team membership. It could be suggested that European scholars adopt a more interpretive approach, while their North American colleagues remain more firmly wedded to traditional and processual modes of doing archaeology. The extent to which funding bodies are (indirectly) responsible for project methods and results must also be considered. Year-round rescue excavations remain the preserve of Greek-managed projects.

Internationally, archaeology on Crete punches above its weight thanks to the heavy burden that the Minoan culture bears as the first "European" society. Features like flushing toilets and Art Deco-style frescoes contribute to making this strange past into something familiar, and myths of the labyrinth and minotaur are deeply embedded in western society. It is no coincidence that the emergence of archaeology proper on Crete correlated with the aim of union with Greece in the late nineteenth century – the antiquities demonstrating that Crete too could play a role in the imagination as home of western civilization. Political exploitation of the past is not restricted to Crete, but for an island with multiple, complex narratives of occupation, archaeologists and nonacademic Cretans alike have been highly selective in the past they choose to prioritize.

Future Directions

The archaeological fieldwork carried out on Crete traditionally has focused on only a few areas, in particular Knossos and its environs, the Mesara, and the Gulf of Mirabello. This has been dictated primarily by the investigation of Minoan "palaces," towns, and hinterlands. While work continues in these regions, it is to be expected that future field projects will turn to other areas of the island and that the under-explored western, southeastern, and upland regions will see increased activity (e.g., as has occurred with the Sphakia survey and Zominthos excavation). Crete has already hosted many field surveys (e.g., Vrokastro, Kavousi, Gournia, Knossos, western Mesara, Ayios Vasilios, Lasithi, and Chania), which provide a valuable picture of the island's settlement, and, as well as listing artifactual finds, include detailed studies of geology, geomorphology, environment, ancient literary references, and ethnoarchaeological enquiries. Survey in the future may turn to shorter, focused projects, such as targeted searches for further Mesolithic and earlier activity, as well as seeing specialists in periods other than prehistory organize these projects (Cunningham & Driessen 2004: 101, 110).

Since Evans's excavations, the Cretan Bronze Age has been privileged above other periods. This emphasis on all things Minoan is changing, thanks primarily to the diachronic information produced by surveys. It is crucial that survey results are augmented by the excavation of multi-period urban centers, such as Priniatikos Pyrgos, to provide tighter chronologies and clearer ceramic sequences. Archaic, Classical, Hellenistic, Byzantine, Arab, and Venetian Crete remain understudied, at least from archaeological perspectives, while the relatively fresh memories of Ottoman rule may have prejudiced against this period. The rapidly disappearing material traces of the World War II invasion and resistance belong to a recent past that deserves systematic investigation also. In general, international scholars are practitioners of Bronze Age archaeology, while later periods, especially Byzantine Crete, are almost totally dominated by Greek scholars. The years ahead will perhaps bring a change from this extreme position to see Medieval Cretan archaeology embraced by overseas researchers and a closer dialogue between archaeologists of all periods.

Future research agendas will build upon recent work that has stressed the regional diversity of the island and its communities, rather than seeking explanations that operate on

a pan-Cretan scale. The links between urban centers and their hinterland will continue to be explored, with concomitant emphasis on ordinary people rather than solely on elites, "palaces," and civic centers. Coastal and undersea exploration may increase, following the latest discoveries of a Minoan shipwreck at Pseira and Minoan harbor facilities at Gournia (Watrous 2012). It might also be expected that as the modern world comes to terms with climate change and its environmental ramifications, archaeologists increasingly will draw upon the results of scientific studies to incorporate changes in the island's past climate and landscape into interpretations of social change (e.g., Moody 2005). From a technological perspective, the wider application of GIS in Cretan archaeology is to be expected (similar to the Digital Archaeological Atlas by FORTH: http://digitalcrete.ims.forth.gr/index.php?l=1). Ceramic studies have already benefitted from petrographic sampling programs investigating the intra- and extra-island movement of pottery; the Bronze Age is especially well covered, but later material requires more work, in tandem with excavations of well-stratified sites of these periods. On site, the instant digitization of recording processes via handheld devices may become standard procedure.

In common with archaeology more generally, a change in the way information is disseminated is to be expected. While many of the earlier Cretan projects remain unpublished, or in preliminary format, the Hellenic Ministry of Education and Religious Affairs, Culture and Sports now monitors publication before granting a permit for a new project. Today most archaeological projects have sophisticated websites, and the Internet is increasingly becoming a viable forum for publishing results. This provides opportunities to share primary data rather than (or as well as) presenting a totalizing narrative, opens the way for easy collaboration between specialists, and offers the possibility of multiple interpretations. For now, the multivolume monograph remains the ultimate aspiration of most projects, but increasing costs and the rise of digital media anticipate a probable change. Online portals also bring the possibility of making raw data from unpublished projects available to scholars, via scans of notebooks and images of finds, although a corresponding revolution in academic feelings of "ownership" of material would also be required. The cooperation of the Greek and international scholarly community in making results and material available in this manner would help ensure that archaeology on Crete has a vibrant future.

Cross-References

- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ Architecture, Roman
- ▶ British School at Athens
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Consumption, Archaeology of
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cyprus, Archaeology of
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Economy, Roman
- ▶ Epigraphy, Greek
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Greece: Cultural Heritage Management
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Imperial Cult, Roman
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Polis
- ▶ Processualism in Archaeological Theory
- ▶ Religion, Greek, Archaeology of
- ▶ Romanization
- ▶ Schliemann, Heinrich

▶ Social Memory in Archaeological Theory
▶ Survey Archaeology in the Greek Aegean World
▶ Trade and Transport in the Ancient Mediterranean
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Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition

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Introduction

For a long time, data regarding the Late Middle Paleolithic-Early Upper Paleolithic (hereafter LMP and EUP) transition was too poor to obtain a real understanding of cultural processes during this period. On one hand, the absence of reliable absolute dates for Middle Paleolithic sites prevented identification of true LMP industries in Crimea. On the other hand, EUP data is limited to only the 1920s excavations of the lower and middle layers at Siuren I rockshelter, generally interpreted by Soviet colleagues as unclear Aurignacoid assemblages situated during the Last Glacial Maximum. Although the presence of some Middle Paleolithic artifacts among the Upper Paleolithic artifacts in the lower layer led to speculation regarding either local or intrusive origin of EUP humans with "Aurignacoid"/ "Aurignacian-like" assemblages in Crimea, it was not possible to propose a well-grounded hypothesis on the subject. As a result, Crimea remained on the "side of the road" for Middle to Upper Paleolithic research in Europe from the 1950s to the early 1990s.

Key Issues/Current Debates

The 2000s Concept of the LMP-EUP Transition

The situation changed dramatically in the 1990s and the early 2000s after new excavations of both known and newly discovered Middle Paleolithic and Upper Paleolithic sites in Crimea, a significant number of absolute dating results and data obtained from the natural sciences related to LMP-EUP transition. For the EUP, excavations took place at Siuren I rockshelter in 1994–1997 and at a new site, Buran-Kaya III grotto, between 1990 and 2001, although both sites also contain LMP components. For the LMP, new excavations at Kabazi II and V, and new dates for Zaskalnaya V and VI, Prolom I and II, and Kiik-Koba, allowed Victor Chabai to identify a set of Late Levallois-Mousterian/Western Crimean Mousterian and Late Micoquian assemblages in Crimea. It was then possible to propose a hypothesis for the LMP-EUP transition that also corresponded to most LMP and EUP data for the East European record (Chabai 2004). Additional data were later added to the 2004 concept (Chabai 2008; Demidenko 2008).

The LMP-EUP transition is proposed to be viewed as a rather lengthy period (7–8,000 years)

of coexistence of LMP and EUP complexes and is subdivided into two stages.

The *first transitional stage (Les Cottes/Huneborg Interstadial and Huneborg Stadial: c. 36–32 ky uncal BP)* precedes the Arcy Interstadial, and apart from the coexistence of LMP and EUP industries, is also characterized by the absence of Aurignacian industries in Crimea. The LMP is represented by the Levallois-Mousterian/Western Crimean Mousterian and Crimean Micoquian Tradition. The Late Levallois-Mousterian is known from Kabazi II, levels II/7 to II/1 and Kabazi V, levels III/3-3A to III/3-1 in western Crimea. The Late Micoquian is known from more sites, in both western and eastern Crimea, and at least two types of the industry relate to the stage: Kiik-Koba type (Kiik-Koba, upper layer; Prolom I) and Ak-Kaya type (Zaskalnaya V, layer II; Zaskalnaya VI, layers IIIa–II; Kabazi V, levels III/2A and III/2). On the other hand, the first EUP industry, the "Eastern Szeletian," appeared in Crimea at Buran-Kaya III, level C, during the stage's second stadial phase – Huneborg. The "Eastern Szeletian" is characterized by bifacial "biconvex" leaf points, bifacial trapezes, end-scrapers, and a series of worked bone tubes (see in Chabai et al. 2004). Thus, two LMP industries and one EUP industry have been connected to the first transitional stage.

The *second transitional stage (Arcy Interstadial: c. 32–28 ky uncal BP)* features not only further coexistence of the two LMP industries and the absence (!) of the "Eastern Szeletian" but also the appearance of Aurignacian industries in Crimea. The Levallois-Mousterian persists at Kabazi II, levels II/1A to A4 in western Crimea. Again, Crimean Micoquian Tradition sites are known in both western and eastern Crimea and all three variants are present: Ak-Kaya, Kiik-Koba, and Starosele. The latest Micoquian of Ak-Kaya type has been identified at Kabazi V, levels II/7 and II/4A in western Crimea. The latest Micoquian of Kiik-Koba type has been proposed for Buran-Kaya III, layer B and Micoquian finds at Siuren I 1920s lower layer/1990s Units H and G in both eastern and western Crimea. The latest Micoquian of Starosele type is proposed at Zaskalnaya V, layer I and Prolom II, layer II in eastern Crimea, and Kabazi V, levels III/1A and III/1 in western Crimea. Finally, Aurignacian industries emerged in Crimea – the Proto-Aurignacian with Dufour bladelets at Siuren I, 1920s lower layer/1990s Units H and G, and the Evolved Aurignacian with Roc de Combe microblades at Siuren I, 1920s middle layer/1990s Unit F.

By region, only the Latest Micoquian occurs in both western and eastern Crimea. The Late Levallois-Mousterian is known with late dates only in western Crimea, although some levels at eastern Crimean sites could also belong to the LMP-EUP transition. "Eastern Szeletian" and Aurignacian complexes are found at single sites (Buran-Kaya III and Siuren I), the former in eastern Crimea and the latter in western Crimea. At the same time, it is worth noting the occurrence of all four Crimean LMP and EUP industries at some sites in the Lower Don river region and/or Northwestern Caucasus (Chabai 2004; Demidenko 2008). These two regions, along with Crimea and the territories between the Lower Dniester and Lower Dnieper rivers, form the Great North Black Sea region in the south of Eastern Europe. Accordingly, the 2000s concept of the LMP-EUP transition with two stages appears to correspond well to the whole south of Eastern Europe region.

The following archaeological data are characteristic of the LMP-EUP transition. First, the Aurignacian was not the chronologically first EUP industry. The often assumed role of the Aurignacian in acculturation processes leading to local origins of the EUP following interaction between Middle Paleolithic Neanderthals and Aurignacian *Homo sapiens* is therefore more than doubtful for this region. Rather, the coexistence of several LMP and EUP industries in the Great North Black Sea region must be postulated. This very probably did not take the form of a literally synchronous co-occurrence of LMP and EUP humans in the same area but would have occurred in the form of alternating and discrete occupations. Such a situation is

demonstrated by a series of intermittent visits to Siuren I by Aurignacian *Homo sapiens* and Micoquian Neanderthals during rapid deposition forming the 1920s lower layer/1990s Units H and G (Demidenko 2000). Furthermore, the Micoquian layer B and the "Eastern Szeletian" level C at Buran-Kaya III are even more suggestive in this sense since here the EUP level is stratigraphically situated *below* the Middle Paleolithic level. This model is also supported by the absence of any features in the lithic industries suggesting mutual influence between contemporary LMP and EUP industries. Indeed, there is no evidence of borrowing of any traits or elements between industries. That is, no EUP (either Szeletian or Aurignacian) trait/element can be observed within the Micoquian and Levallois-Mousterian industries and vice versa. Therefore, the term "geochronological coexistence" of LMP and EUP industries at best reflects the situation for the transition, where Buran-Kaya III and Siuren I show movement of human groups that made it highly unlikely that different hominins encountered one another, especially given the absence of archaeological evidence for such contact.

Thus, Crimea is seen as a "melting pot" of various LMP and EUP hominins between c. 36 and 28 ky BP. Moreover, the south of Eastern Europe acted as a crossroads for migration routes of LMP and EUP hominins and provided the setting for their geochronologically independent and mutually exclusive existence. As a result, the transitional period represents a mosaic, in which local LMP hominins with Micoquian (made by Neanderthals) and Levallois-Mousterian industries continued to survive, while contemporaneous EUP technologies (made by *Homo sapiens* for the Aurignacian) were imported by "immigrants" from other regions, Eastern Europe for the "Eastern Szeletian," and Central Europe and possibly Levant and Middle East for the Aurignacian (Demidenko 2008, 2011a, b). Accordingly, the Late Crimean Neanderthals do not represent one of their last pure refuge "islands" but are rather found in a context of complex Paleolithic human history.

The Early 2010s Challenges to the 2000s Concept

New data has, however, been obtained in the last few years that challenges in part this seemingly perfectly substantiated industrial-chronological structure of the LMP-EUP transition in the Great North Black Sea region.

Two key sites for Crimea (Siuren I and Buran-Kaya III) and Mezmaiskaya Cave in Northwestern Caucasus have provided new information that necessitates revisions to the geochronology and/or industrial status of the LMP and EUP levels at these sites.

Siuren I

Systematic AMS dating of 25 ungulate bone samples from Units H, G, and F was carried out at Oxford (partially with pretreatment at the Max Planck Institute for Evolutionary Anthropology in Leipzig), Groningen and BETA (Florida) labs in 2009–2011. These results were combined with eight additional bone samples from the 1990s excavations selected for AMS dating at Oxford. In total then, 33 bone samples were selected to attempt to obtain AMS dates for the site's middle (Unit F with Late/Evolved Aurignacian finds) and lower (Units H and G with both Proto-Aurignacian and Micoquian finds) levels (Demidenko et al. 2012; Demidenko et al. in press).

Of these, only 11 AMS dates fall within the Aurignacian sensu stricto time span. These are as follows (uncalibrated): Unit H (two dates), c. 30.5 and 28.4 ky BP; Unit G (two dates), c. 28.2 and 28.0 ky BP; and Unit F (two dates), c. 30.9 and 26.6 ky BP. These dates, like the three AMS dates obtained in the 1990s for Unit H and level Ga, both c. 28 ky BP, and level Fb1-Fb2 c. 29 ky BP, indicate rapid deposition for the three units as the dates are nearly statistically identical. Since all dates for Units H and G were obtained only on ungulate bone (with collagen problems for bone artifacts), it is reasonable to exclude the younger dates on three bone artifacts from Unit F dating to c. 28.2–26.6 ky BP. In this case, Unit F dates are within the narrower interval of c. 30.9–29.4 ky BP, and the dates for the three units become indeed identical.

Yet the "collagen presence/absence" issue for bone samples used for the Siuren dating should be discussed. Grouping data by unit from the 33 submitted samples provides a "dating success" rate for each unit. Only 2 out of 9 samples from Unit F had collagen problems (22.2 %). Unit G had 16 out of 18 samples with either collagen problems or dates considered too young (88.9 %). Unit H had four out of six samples with either collagen problems or too young dates (66.7 %). Combined data for Units G and H are 20 out of 24 (83.3 %).

Thus, while a few samples had collagen problems in Unit F, only a few samples were suitable for dating in Units G and H. It is thus clear that bone content was affected within Units G and H causing most of them to have problems with chemical content. Moreover, having a few Aurignacian-like dates between c. 30.5 and 28.0 ky BP for Units H and G that are the same as dates from stratigraphically higher Unit F (c. 30.9–29.4 ky BP for ungulate bone samples), it is proposed that the four Aurignacian-like dates c. 30.5–28.0 ky BP do not represent any true age either, being also too young as no Aurignacian-like dates exist between 22 and 13 ky BP.

Following this line of reasoning, we come to uncalibrated AMS dates in Europe for the Proto-Aurignacian with Dufour bladelets and the Late/Evolved Aurignacian with Roc de Combe bladelets (c. 37–36 to 34–33 ky BP and c. 32–28 ky BP, respectively), recalling that the Siuren I Aurignacian complexes entirely correspond to these two European Aurignacian industries (see artifact illustrations in Figs. 5 and 6 of the present author's "Siuren I rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic in Crimea" this volume). It is certain that the AMS dates from Siuren I Unit F absolutely correspond to the analogous European industry. However, the AMS dates from Units H and G do not fit into the European Proto-Aurignacian chronology. Given that they should correspond, the probability of problems with chemical content increases.

In sum, it is now seen that the existing AMS dates for Siuren I Units H and G are too young for their real uncalibrated C14 age, which should be older than 31 ky BP. Taking into consideration not only the AMS dates but also fauna and microfauna results (see in Demidenko et al. 2012), the following geochronology for the Siuren I Aurignacian complexes is proposed:

- Proto-Aurignacian and Micoquian: Stadial between Hengelo and Les Cottes/Huneborg Interstadials (Siuren I, Unit H) and Les Cottes/Huneborg Interstadial (Siuren I, Unit G);
- Late/Evolved Aurignacian: Arcy Interstadial (Siuren I, levels Fc and Fb1-Fb2 of Unit F) and Maisières Interstadial (levels Fa3 and Fa1-Fa2).

Siuren I Proto-Aurignacian can thus be connected with the European Proto-Aurignacian thorough chronological parameters.

Buran-Kaya III

The partially collapsed grotto was discovered by A.A. Yanevich in 1990 and has been investigated by him since then with colleagues from Ukraine, Japan, Belgium, the USA, and France.

The following sequence of Middle and Upper Paleolithic levels was established for the site in the 2000s (Chabai 2004; Chabai et al. 2004; Yanevich et al. 2009) with AMS dates obtained in the late 1990s at Oxford on ungulate bone samples and interstadial/stadial determinations based on pollen data (from bottom to top) (Fig. 1):

- Level E (archaeologically unclear, either Middle or Upper Paleolithic due to rarity of diagnostic artifacts) – Hengelo Interstadial, no absolute dates
- Level D (archaeologically unclear, Middle Paleolithic due to a few diagnostic artifacts) – Stadial after Hengelo, no absolute dates
- Level C ("Eastern Szeletian," EUP) – also Stadial after Hengelo, one date c. 36.7 ky BP and two dates c. 32.3 and 32.2 ky BP
- Layer B with lower level B1 and upper level B (Micoquian of Kiik-Koba type, LMP) – Arcy Interstadial, 2 dates c. 28.8 and 28.5 ky BP for level B1
- Levels 6-5, 6-4, and 6-3 (Late Aurignacian, according to Yanevich, or Gravettian, according to Otte and Noiret) – Stadial of Late Pleniglacial c. 27–18 ky BP but with

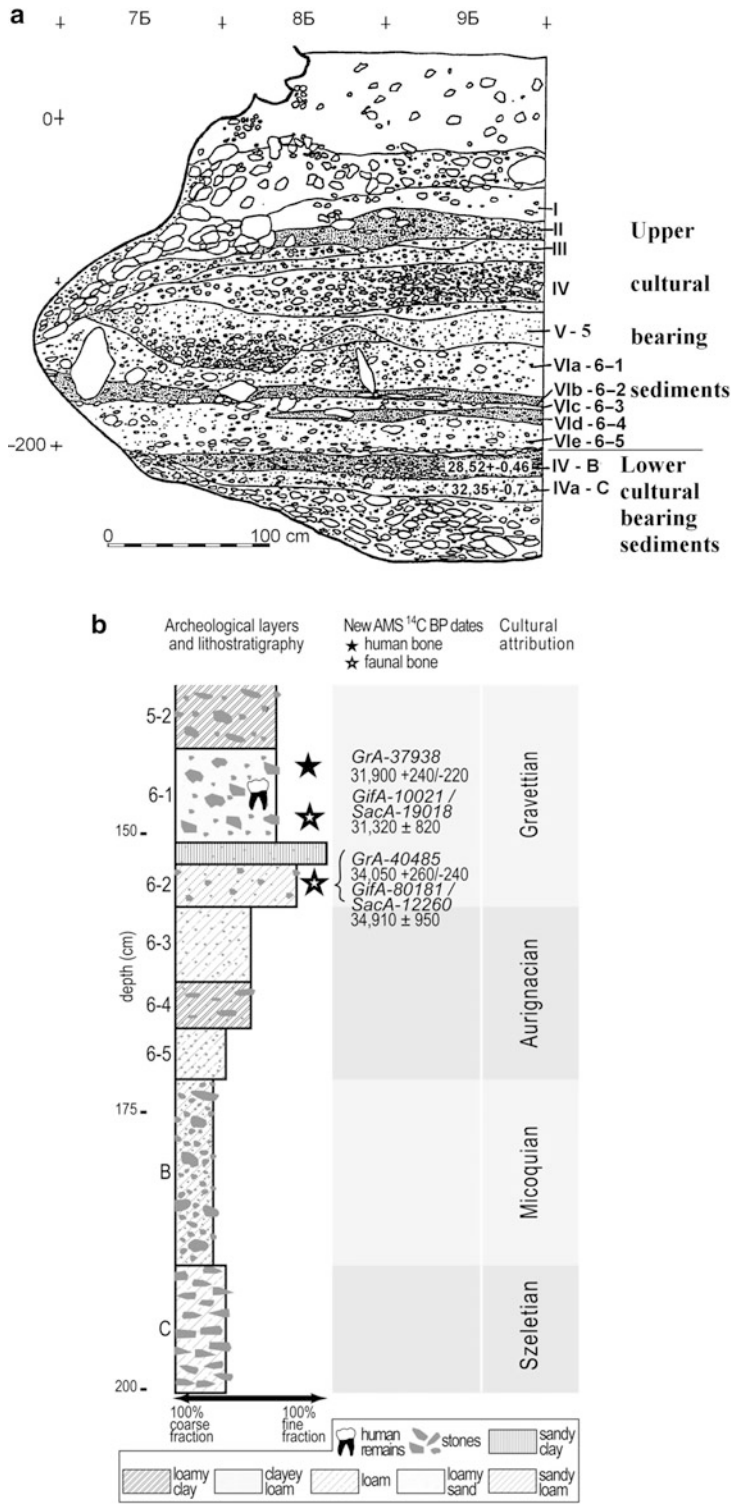

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 1 Buran-Kaya III. Combined stratigraphy for Middle and Upper Paleolithic levels (**a** After Chabai 2004; Yanevich et al. 2009; **b** after Prat et al. 2011)

inconsistent order of dates: level 6-5 – c. 34.4 and 28.7 ky BP; level 6-4 – c. 11.9 ky BP; and level 6-3 – c. 11.9 ky BP

- Levels 6-2, 6-1 and 5-2 (Epigravettian) – Stadials of Late Pleniglacial for levels 6-2 and 5-2 and upper part of level 6-1, and Lascaux Interstadial of Late Pleniglacial for lower part of level 6-1 c. 18–13 ky BP, but with a single date c. 30.7 ky BP for level 6-2 only

This archaeological sequence at Buran-Kaya III has been interpreted as follows by Chabai. The lower part of the sequence (levels E through B), with a total thickness of c. 1 m in the inner part of the grotto close to the drip-line, is considered to be correctly archaeologically and geochronologically attributed. The upper part of the sequence (levels 6-5 through 5-2), c. 0.7 m thick, with Epigravettian levels at the top, is considered as having been deposited very slowly, especially adding levels C and B. The "mess" with the AMS dates for levels 6-5 to 6-2 has been explained both by slope sediments near the grotto's drip-line and horizontal "artificial level" excavations of levels 6-5 to 5-2 by Yanevich in the 1990s, such that incorrect bone samples were selected for AMS dating due to possible mixing of layers. There is now general agreement among colleagues on Chabai's interpretation for the Buran-Kaya III Middle and Upper Paleolithic industrial-chronological sequence.

Yanevich also grouped materials from levels 6-2 and 6-1 (level 5-2 was not always mentioned by him as Epigravettian– see Yanevich 2000, but see Yanevich et al. 2009) (Fig. 2), Siuren I 1920s upper layer and Adzhi-Koba, 1920s upper layer materials into the "Buran-Kaya culture of Crimean Gravettian," or Epigravettian (Yanevich 2000). Moreover, the Epigravettian culture had its origin within Buran-Kaya III, levels 6-5 to 6-3, which contain Aurignacian materials with micro-Gravette points already present. The materials from Buran-Kaya III, levels 6-5 to 6-1/5-2 were of crucial importance for the Crimean Paleolithic for Yanevich. Yanevich's Epigravettian attribution was accepted by the author, as well as Ukrainian and American colleagues, for levels 6-2 and 6-1, although the absence of microliths with thick backed lateral edge was notable, considering, at the same time, levels 6-5 to 6-3 as belonging to the same Epigravettian industry. The differences between the two sets of levels were explained by a rather sparse number of artifacts in the lower sublevels of level 6 as due to ephemeral human occupations, while upper sublevels of level 6 were certainly remains of intensive short-term human occupations with numerous finds (Demidenko 2003).

The Buran-Kaya III Epigravettian became more important and enigmatic when a new series of four AMS uncalibrated dates on three ungulate bones and a human parietal fragment after well-controlled excavations in 2001 were obtained at the Groningen and Gif-sur-Yvette labs for levels 6-2 (c. 34 and 34.9 ky BP) and 6-1 (c. 31.3 and 31.9 ky BP), although the levels were still considered as belonging to the "Gravettian tradition" (Prat et al. 2011) (Fig. 1b). The new dates, however, certainly call for revision of the previous interpretation for the site's sequence from level C to level 6-1/5-2 since they are either identical or even older than the dates obtained in the 1990s for underlying levels C and B.

The present author proposes a new interpretation of the level C to level 6-1/5-2 sequence based on additional and/or reconsidered data.

1. *Archaeological data*. The archaeological attribution of levels 6-5 through 6-1/5-2 needs to be discussed. Given the near absence or minor role of true backed bladelets and the dominance of finely retouched microblades with not only lateral, but often bilateral, dorsal retouch (Yanevich et al. 2009; Prat et al. 2011), it appears clear that assemblages from these levels do not belong to either Gravettian or Epigravettian. New AMS dates of c. 31 and 35 ky BP cannot represent any Gravettian tradition *sensu lato*. The levels are also not Aurignacian. This industry is thus not comparable to any Upper Paleolithic industry in either Crimea or Eastern Europe. The present author's search for comparable EUP assemblages, however, identified a very similar industry in Northwestern Caucasus (Mezmaiskaya Cave, levels 1C, 1B, and 1A, AMS dates between 33 and 28 ky uncal BP) (Fig. 3) and Southern Caucasus (Dzudzuana

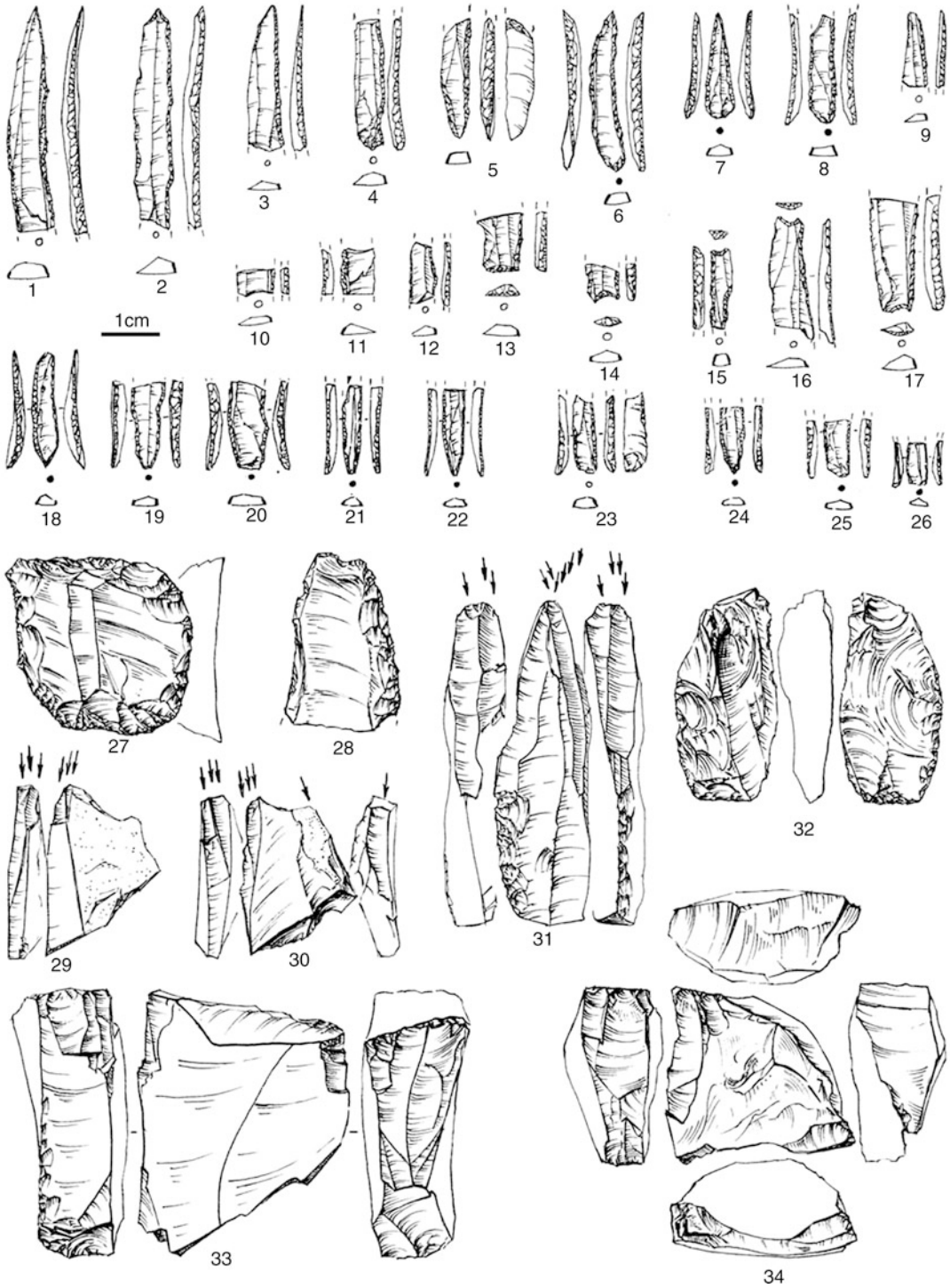

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 2 Buran-Kaya III, level 6-1. Flint artifacts (After Prat et al. 2011)

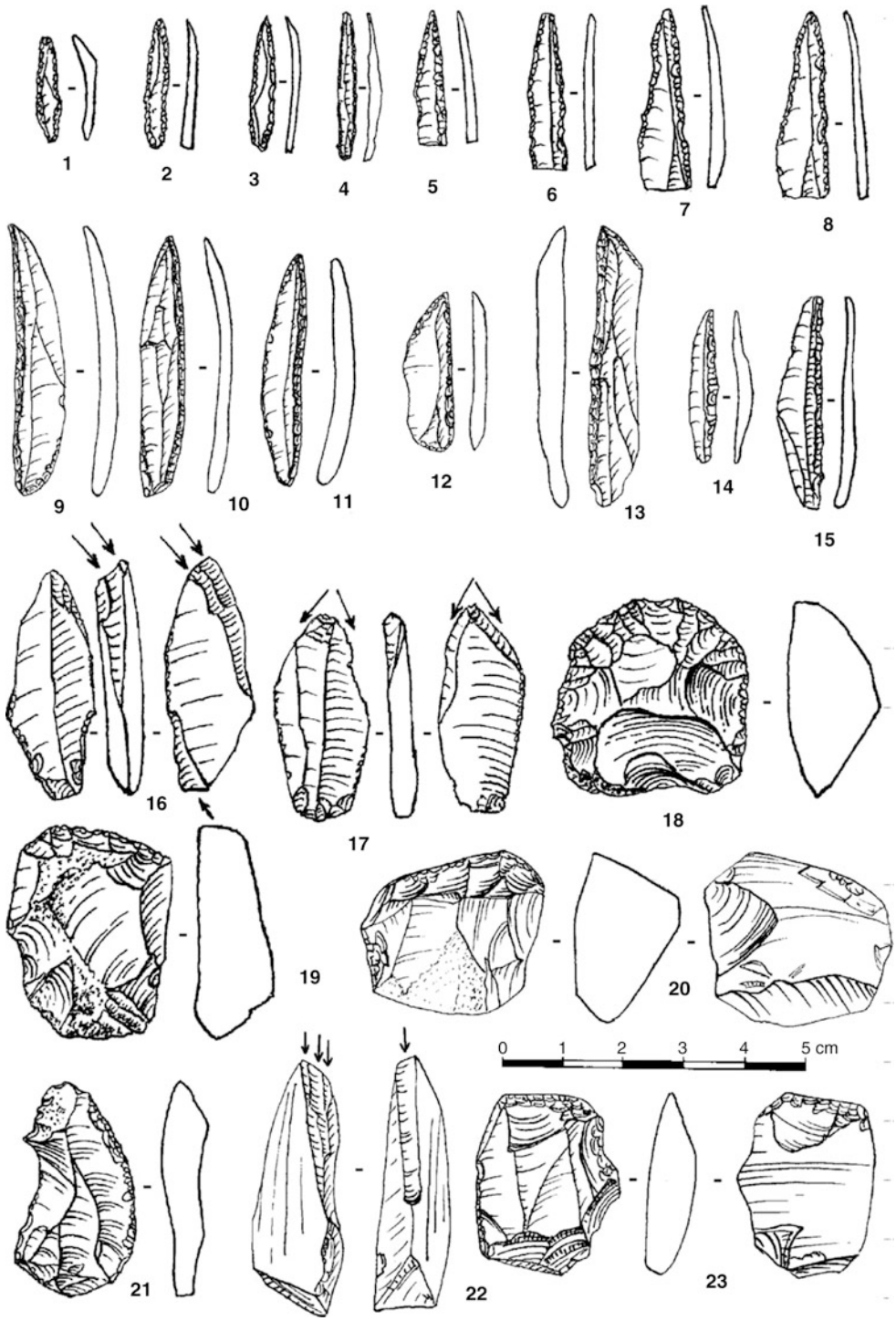

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 3 Mezmaiskaya cave, level 1C. Flint artifacts (After Golovanova et al. 2010b)

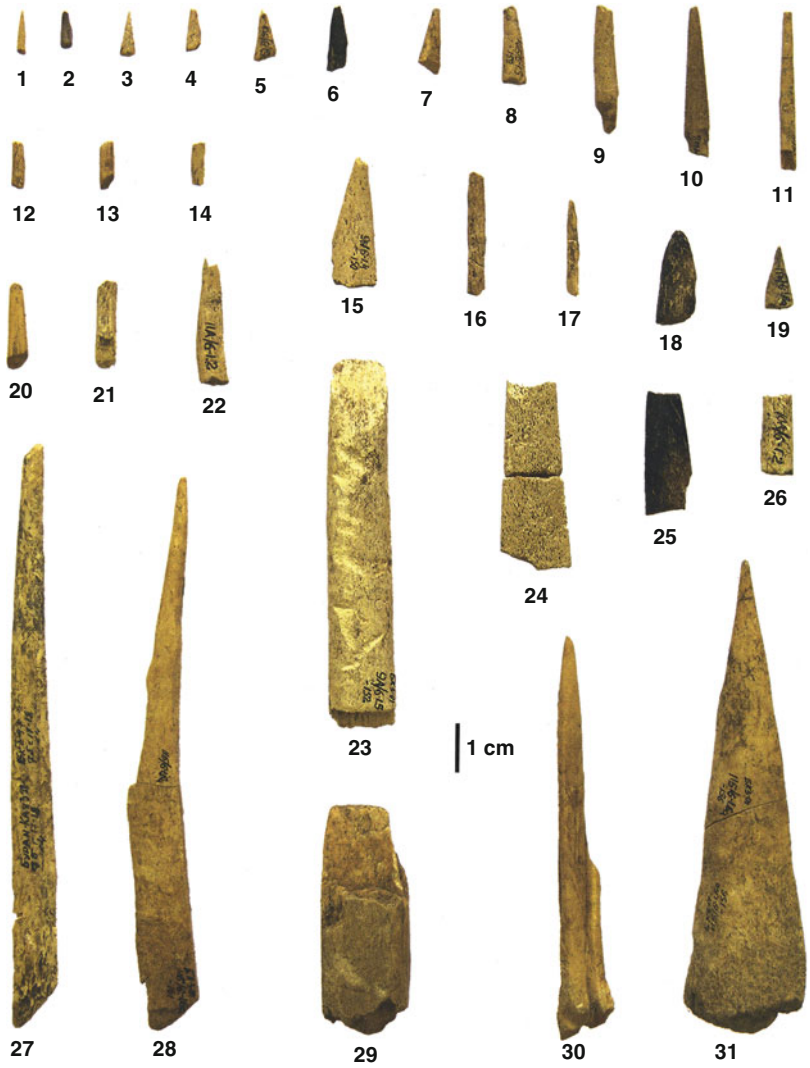

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 4 Buran-Kaya III, levels 5-2, 6-1, and 6-2. Bone tools (After Yanevich et al. 2009)

cave, layer D, AMS dates between 32 and 27 ky uncal BP; Ortvala Klde rockshelter, layers 4d and 4c, AMS dates between c. 38–34 and 30 ky uncal BP) (Meshveliani et al. 2004; Golovanova et al. 2006, 2010a, b; Adler et al. 2008). In addition to similarities between the lithic assemblages, the EUP materials of the four sites (especially from Buran-Kaya III and Mezmaiskaya) also include numerous bone tools (points and awls) (Figs. 4 and 5) and personal ornaments (perforated shells, mammal teeth, and even mammoth ivory beads) (Figs. 6 and 7). Thus, the proposed origin of the Buran-Kaya III EUP industry is in Southern Caucasus via Northwestern Caucasus.

In addition, based on the pollen data for Buran-Kaya III, it is now possible to suggest the Arcy Interstadial for level 6-1 and the Huneborg Stadial for levels 6-2 to 6-5 at Buran-Kaya III.

2. *The 1990s uncalibrated AMS dates*. With new AMS dates for levels 6-1 and 6-2, the 1990s AMS dates can now be reevalauted. The 1990s dates for level 6-5 (c. 34.4 and 28.7 ky uncal BP) are analogous to both the 1990s dates for levels C and B1 and the new dates for levels 6-1 and 6-2. The two 1990s dates for levels 6-4

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition,
Fig. 5 Mezmaiskaya cave, levels 1C, 1B, and 1A. Bone tools (After Golovanova et al. 2010a)

and 6-3 (c. 11.9 ky BP) relate to level 5-1 of the Final Paleolithic Shan-Koba occupation at the site and certainly indicate slope deposition processes near the grotto's drip-line where the Final Paleolithic bone samples were recovered during horizontal excavations, being at levels 6-4 and 6-3 "pseudo-elevation" there. Finally, the single 1990s date for levels 6-2 to 5-2, c. 30.7 ky BP for level 6-2, is not different from new dates between c. 31 and 35 ky BP for levels 6-1 and 6-2. As a result, the new look at the 1990s dates, instead of rejecting all of them, indicates a series of not ordered dates between c. 36 and 28 ky BP for all Middle and Upper Paleolithic levels C through 6-1 at Buran-Kaya III.

3. *Interfacing of the 1990s and 2011 uncalibrated AMS dates and new interpretation for the Buran-Kaya III LMP and EUP sequence*. Some younger C14 ages for the 1990s levels B1 and C dates in comparison to the 2011 dates for level 6-2 and/or 6-1 can be due to the following reasons. First, the 1990s dates in Oxford were obtained without the ultrafiltration protocol for bone samples from Buran-Kaya III, making them younger in comparison to the new dates. Second, the younger age of 28 ky BP for level B1 may be similar to

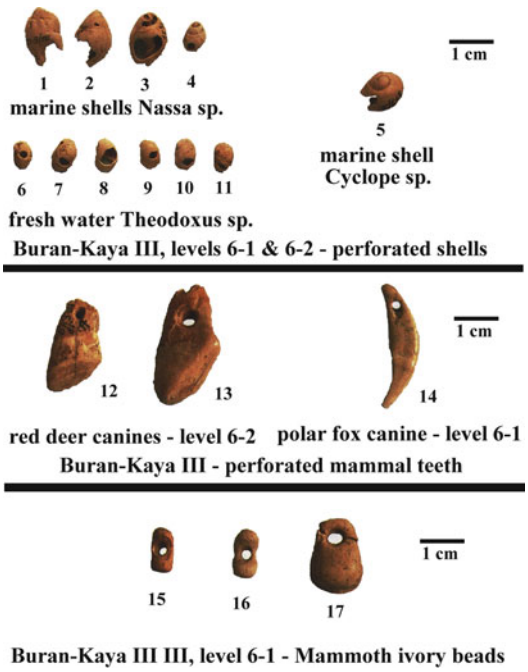

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 6 Buran-Kaya III, levels 6-1 and 6-2. Personal ornaments (After Yanevich et al. 2009)

the situation for Siuren I, Units H and G where collagen problems played a crucial role. The Micoquian layer B may actually be older than 30 ky BP and would fit well between the extreme dates for level C (c. 36.7 ky BP) and levels 6-2 and 6-1 (c. 31 ky BP). The same also relates to the date of c. 28.7 ky BP for level 6-5, while the date of c. 34.4 ky BP for the same level could be close to its real age. Thus, the entire LMP and EUP sequence from level C to level 6-1/5-2 (an overall thickness c. 1 m), dated to around c. 36–31 ky BP, can be characterized by a high deposition rate, contrary to the previously proposed low sedimentation rate.

Using the 2004 pollen data, the following order for the Buran-Kaya III sequence can be proposed: level C, Stadial after Hengelo Interstadial; layer B, Les Cottes/Huneborg Interstadial; and levels 6-5 to 6-2, Huneborg Stadial and Arcy Interstadial for level 6-1.

The EUP sequence rapidly ends with a hiatus between levels 5-2 and 5-1 as the latter level is attributed to the Final Paleolithic Shan-Koba with two uncalibrated C14 dates from the Kiev lab, c. 11.4 and 10.9 ky BP (Allerød Interstadial), followed then by another Final Paleolithic, but this time Swiderian occupation in level 4 with two uncalibrated C14 dates from the Kiev lab, c. 10.7 and 10.5 ky BP (Younger Dryas).

Mezmaiskaya Cave

Recently published new AMS dates from different labs for the LMP (Micoquian) layers and Upper Paleolithic layers at Mezmaiskaya Cave, complemented by pollen data (Golovanova et al. 2006; 2010a & b; Pinhasi et al. 2011), also allow the present author to reconsider the previous position of our Crimean team (Chabai 2004; Demidenko 2008) on this cave's sequence, in which the Huneborg Stadial (c. 36–32 ky BP) was proposed for the LMP layers and rejection of EUP status for levels 1C to 1A. Now, as shown above, the assemblages from levels 1C to 1A (c. 33–28 ky BP) are acknowledged as belonging to the South Caucasus EUP industry, along with Buran-Kaya III, levels 6-5 to 6-1/5-2. Below archaeologically sterile level 1D, the youngest LMP level 2 is dated between c. 44–36 ky BP, including an AMS date of c. 39.7 ky BP for a bone from the Mezmaiskaya 2 human infant. Accordingly, the last LMP occupations at Mezmaiskaya Cave occurred c. 36 ky BP or c. 39 ky calibrated BP. From the Crimean geochronological positions, it is also possible to propose relating Mezmaiskaya EUP to Huneborg Stadial (levels 1C-1B) and Arcy Interstadial (1A), while the cave's LMP seems to be no younger than the Les Cottes/Huneborg Interstadial.

New Geochronological Suggestions for the LMP-EUP Transition

In comparison to the 2000s proposal, the two key Crimean sites with both LMP and EUP components (Buran-Kaya III and Siuren I), keeping also in mind similar data for Mezmaiskaya Cave in Northwestern Caucasus, make older the geochronological borders for the Aurignacian and newly defined EUP complexes and the upper geochronological border of LMP in Crimea.

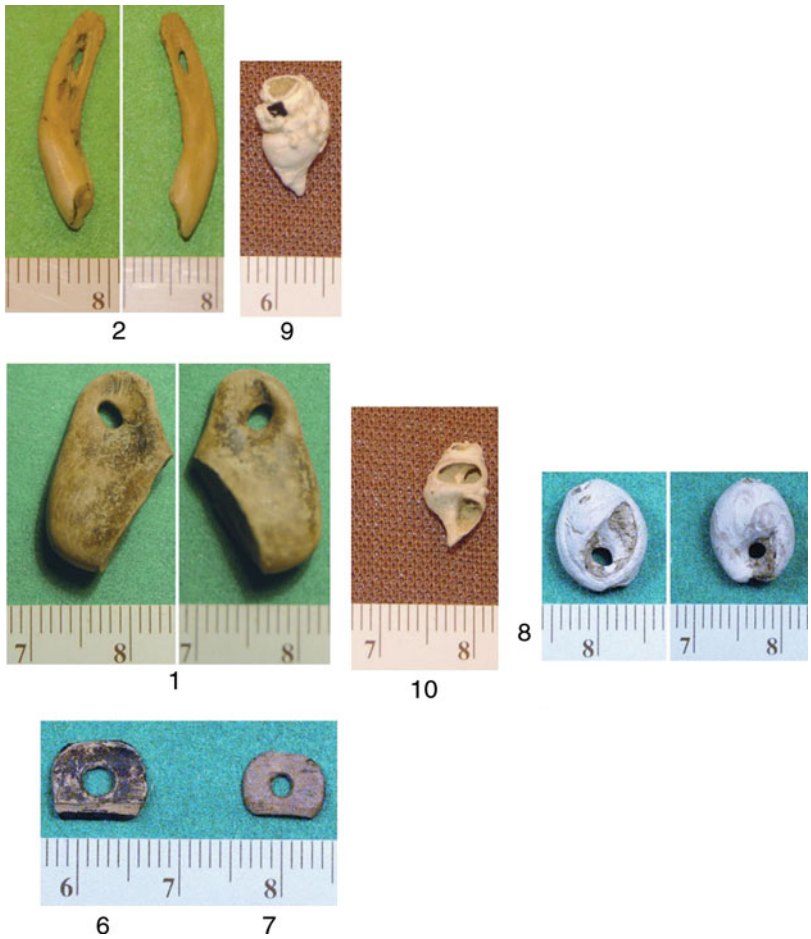

Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition, Fig. 7 Mezmaiskaya cave, levels 1C, 1B, and 1A. Bone tools (After Golovanova et al. 2010a)

Taking solely data from the two Crimean sites, the EUP geochronology can be viewed as follows:

- "Eastern Szeletian" (Buran-Kaya III, level C): Stadial between Hengelo and Les Cottes/Huneborg Interstadials
- Proto-Aurignacian: Stadial between Hengelo and Les Cottes/Huneborg Interstadials (Siuren I, Unit H) and Les Cottes/Huneborg Interstadial (Siuren I, Unit G)
- EUP industry of Southern Caucasus (Buran-Kaya III, levels 6-5 to 6-1/5-2): Huneborg Stadial (Buran-Kaya III, levels 6-5 to 6-2) and Arcy Interstadial (Buran-Kaya III, levels 6-1 to 5-2)
- Late/Evolved Aurignacian: Arcy Interstadial (Siuren I, levels Fc and Fb1-Fb2 of Unit F) and Maisières Interstadial (levels Fa3 and Fa1-Fa2)

The LMP (Micoquian of Kiik-Koba type) levels and/or separate finds at the two sites can be geochronologically connected to the Stadial between the Hengelo and Les Cottes/Huneborg Interstadials (Siuren I, Unit H) and the Les Cottes/Huneborg Interstadial (Siuren I, Unit G; Buran-Kaya III, layer B).

Following the EUP and LMP geochronology for Buran-Kaya III and Siuren I, it can be seen that the Late Micoquian can be no younger than the Les Cottes/Huneborg Interstadial (c. 36 ky BP), coexisting with both "Eastern Szeletian" and Proto-Aurignacian industries, while the EUP industry of the Southern Caucasus and the Late/Evolved Aurignacian did not coexist with

the Micoquian. The latter possible situation corresponds well to the Northwestern Caucasus Mezmaiskaya Cave sequence in which the Micoquian sequence seems end during the Les Cottes/Huneborg Interstadial.

If the new geochronological version for the LMP-EUP interface at two key Crimean sites for the transitional period is correct, then the 2000s concept should be significantly altered. First, both "Eastern Szeletian" and Proto-Aurignacian appeared in Crimea at about the same time and there is even a possibility that Proto-Aurignacian groups of Siuren I, Unit H came to Crimea before the Szeletians. Second, Late Micoquian Neanderthals coexisted with unknown, yet Szeletian, humans, and Proto-Aurignacian *Homo sapiens* and people of the three industries did not survive in western (Siuren I) and eastern (Buran-Kaya III) Crimea until the appearance of the Late/Evolved Aurignacian and the EUP industry of Southern Caucasus.

At the same time, no archaeological level at the two sites contained Levallois-Mousterian, also absent in Northern Caucasus, which is why their persistence in Crimea during the subsequent Huneborg Stadial and Arcy Interstadial cannot be excluded, according to the 2000s concept. On the other hand, the 2000s concept suggesting the presence of Late Micoquian Neanderthals at other Crimean sites during the Huneborg Stadial and Arcy Interstadial should be verified. The indicative case with Siuren I, Units H and G AMS dating with too young results c. 31–28 ky BP because of collagen problems may also occur at other Crimean sites that have been dated by AMS.

For example, the geochronological position of the Kiik-Koba, Micoquian upper layer was proposed on the basis of lithological and pollen data to be related to either the Stadial between the Moershoofd and Hengelo Interstadials or to the Stadial preceding the Arcy Interstadial (Demidenko 2004). A C14 date of c. 32.3 ky BP obtained on an ungulate bone by the Kiev lab served to support the late variant of the proposed geochronology – Huneborg Stadial (Demidenko 2008). But the new Oxford AMS-dating attempt casts some doubts on this. Within the frame of the 2000s reanalyses of the Kiik-Koba materials, two ungulate bones were selected for AMS dating. One sample failed. The second was of *Bos/Bison* and dated to c. 25.7 ky BP (with $\delta 13C = -20.1$). The determination was <1 % wt. collagen, which is below the usual threshold (comment to Th. Uthmeier from D. Baker 27.02.2007). This, and the fact that the first sample failed, strongly suggests that this very young date be treated with caution, as well as the c. 32.3 ky BP date, given the lack of information on the bone sample characteristics from the Kiev lab.

All in all, new data from the 2010s and new considerations have "opened the door" for a new geochronology and industrial structure for LMP-EUP transition, although further work is needed.

Cross-References

▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea

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Crimean Middle Paleolithic

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Introduction

Geographical Setting

The Crimean peninsula (Fig. 1) is located in the southeastern corner of the European continent, on the northern coast of the Black Sea in southern Ukraine. Moreover, except during the Last Interglacial period (c. 128–116 year BP, MIS 5e) when Crimea was an island, present-day Crimea was not a peninsula but rather the southernmost edge of a continuous land belt from the Eastern Balkans to Northwestern Caucasus in Eastern Europe during most of the Upper Pleistocene. Occupying such a transitional geographical position between different European and Asian regions, Crimea is quite important for Western Eurasian Paleolithic studies.

Crimea, (see Ferring in Marks & Chabai 1998), 300 km wide and 180 km from north to south with a total area of about 26,000 km^2 centered on 45° N, 34° 30′ E, is subdivided into two main regions by its physiography. The steppe is located in the north and the mountainous areas in the south. All of the known in situ Paleolithic sites are situated in the latter. The Crimean Mountains, with three ridges, stretches 160 km

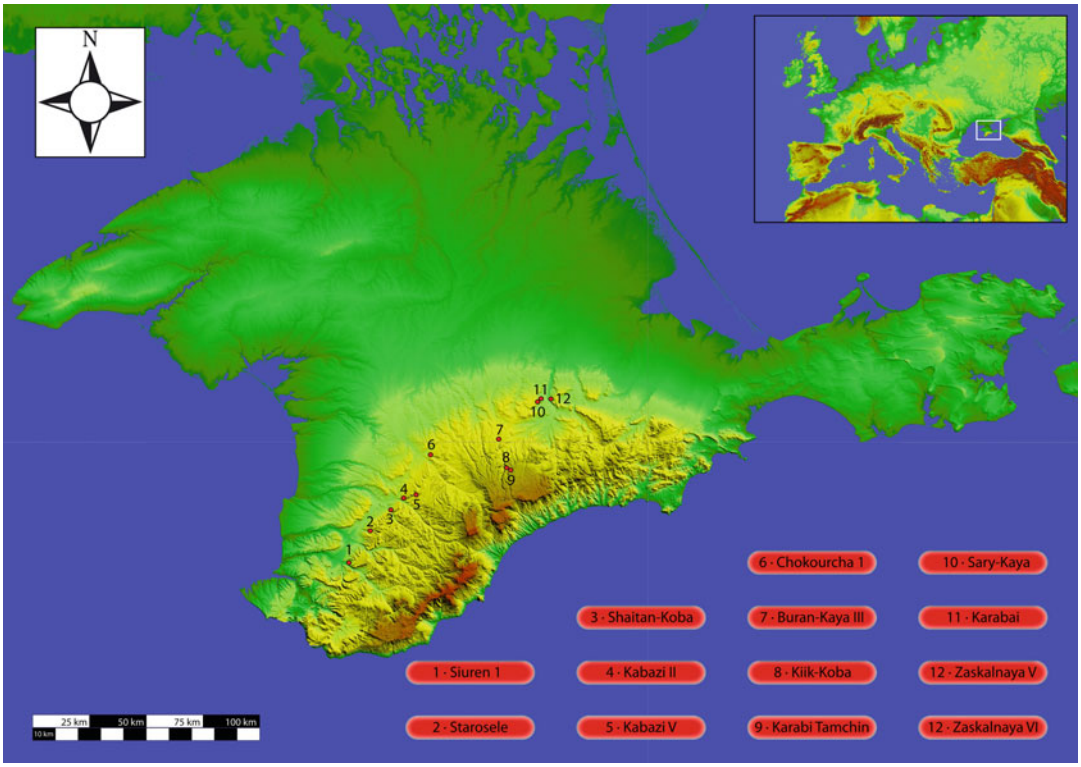

Crimean Middle Paleolithic, Fig. 1 Map of the Crimea with Middle Paleolithic site locations (Map prepared by Dr. G. Bataille, Cologne University)

west–east and 50 km north–south. The ridges are composed of limestone, sandstone, sedimentary rock, chalk, marl, and conglomerates, often added including karstic terrain. A number of natural sheltered places (caves/grottos/rockshelters) and primary and secondary high-quality flint outcrops are known along various cuestas and cliffs. These two key components for the survival Paleolithic human groups certainly attracted them to this region. In addition, it was possible to hunt different ungulates (*Equus hidruntinus*, *Saiga tatarica*, *Bovinae*) near steppe plateaus located above limestone cuestas and cliffs adjacent to river valleys. Such resources made the Crimean mountainous region indeed an attractive region for occupation over the last 100,000 years, by different hominin groups with different cultures and industries, some of whom stayed for a long time, while others simply passed through the region during long distance migrations.

At the same time, the majority of Crimea, its northern steppe zone, from a geological point of view, usually features many-meter-thick loess deposits with no rocky cuestas or cliffs with caves/grottos/rockshelters. Only a few archaeological surveys have been attempted to find Paleolithic sites in this region, but very few Mesolithic and Neolithic sites have been found in Holocene deposits and not a single Paleolithic site. Systematic survey is needed for to discover open-air Paleolithic sites in the Crimean steppe region. Before such sites are found, present knowledge of the Crimean Paleolithic is based only on in situ sites in the southern mountainous region, which while important, is still but a part of the entire Crimean territory. Future discoveries of sites in both the northern steppe zone and the southernmost sea coastal shore, zones lacking high-quality flint outcrops, in addition to the very few surface flint artifacts found, will make

the picture of Crimea and its Middle Paleolithic much more mosaic.

Historical Background

History of Middle Paleolithic Studies in the Crimea

Another Paleolithic feature of the Crimea should be noted. Despite some suggestions for the presence of the Acheulian or Lower Paleolithic in Crimea, there are neither in situ sites nor clearly identifiable artifacts for such industries as yet (Chabai et al. 2000). The oldest Crimean Paleolithic is therefore represented by the Middle Paleolithic, the subject of this entry.

The first Middle Paleolithic site (Volchiy Grotto, eastern Crimea) and surface flints (Kabazi Mountain, western Crimea) were discovered by the pioneer of Crimean Paleolithic archaeology, Konstantin S. Merejkowski (St. Petersburg) in 1879–1880. These Middle Paleolithic finds in the Crimea were also the first for the entire Russian Empire at that time. These important discoveries, however, were not followed up and actually forgotten, despite the fact that G. de Mortillet (France), the most authorized Paleolithic Age archaeologist in the last quarter of the nineteenth century, confirmed the Mousterian Age of the Volchiy Grotto finds in 1900. Only with the real rediscovery of the Crimean Paleolithic by Gleb A. Bonch-Osmolowski (Leningrad) during fieldwork from 1924 to 1932 was Crimea recognized as a region rich in Paleolithic sites in Eastern Europe. Bonch-Osmolowski excavated three Middle Paleolithic sites in Crimea in the 1920s: Kiik-Koba grotto with two Neanderthal burials, Shaitan-Koba grotto and Adzhi-Koba cave. The Kiik-Koba deposits contained two Paleolithic layers, the lower of which was considered to be "*an amorphous stage of the Pre-Chelleen*," also comparable to the "*Old Clactonian*," "*Tayacien*," and the upper "*Late Micoquian*" connected to "*the end of the Acheulian or . . .to the transition from Acheulian to Mousterian*" (Bonch-Osmolowski 1940). The lower layer of Adzhi-Koba was similar to the upper layer of Kiik-Koba "*Late Micoquian*" artifacts, but the lithic assemblage was limited (Bonch-Osmolowski 1940). These two sites, with assemblages characterized by a near absence of core reduction and the presence of bifacial "plano-convex" tool production, a term introduced by Bonch-Osmolowski, were the first Paleolithic sites for both Middle and Upper Paleolithic (the upper layer at Adzhi-Koba contained, in modern Paleolithic terms, an Epigravettian assemblage) in the first ridge areas of Crimean Mountains in eastern Crimea. Shaitain-Koba grotto with two Middle Paleolithic layers, on the other hand, was characterized by many Levallois and blade cores and very rare bifacial tools. The Shaitan-Koba assemblages were considered to be "*Late Mousterian*," perhaps even transitional to the Upper Paleolithic (Bonch-Osmolowski 1940). Two other "*Late Micoquian*" assemblages were excavated in the 1930s by O.N. Bader (Moscow) at Volchiy Grotto and N.L. Ernst (Simferopol, Crimea) at Chokurcha cave. On the basis of these Crimean Middle Paleolithic sites, Bonch-Osmolowski (1940) laid the foundations of Crimean Middle Paleolithic studies, proposing a unilinear Middle Paleolithic evolutionary sequence in Crimea containing the amorphous "*Pre-Chelleen*," "*Late Micoquian*," and "*Late Mousterian*" stages.

Moreover, looking at this database today, we clearly see that assemblages from all three of the now defined Middle Paleolithic industries in Crimea were already known in the 1930s: Denticulate Mousterian of Kiik-Koba, lower layer; Crimean Micoquian Tradition with bifacial "plano-convex" tools; and Western Crimean Mousterian/Levallois-Mousterian. The latter two industries were supplemented in the late 1930s and the 1950s by new assemblages from sites excavated by D.A. Krainov and A.A. Formozov (Moscow): Bakchisaraiskaya, Kholodnaya Balka grotto, Kabazi I buried grotto, and Starosele. Here it should be noted that the 1950s marks the end of systematic Crimean Paleolithic fieldwork by Russian archaeologists from Leningrad and Moscow because in February 1954 Crimea passed

from Russia to Ukraine. Subsequently, Ukrainian archaeologists were actively involved in Crimean Paleolithic studies.

Yuri G. Kolosov (Kiev) was the leader of Crimean Paleolithic archaeology studies from the 1960s to the early 1990s. Regarding the Middle Paleolithic, he discovered and excavated Prolom I and II grottos and, most importantly, several buried rockshelters at Ak-Kaya and Zaskalnaya and the open-air site of Krasnaya Balka in Red Valley behind the Ak-Kaya Cretaceous and Eocene limestone and marl rocky massif, more than 100 m above the surrounding steppe areas in eastern Crimea. Excavations of Zaskalnaya V and VI multilevel buried rockshelters led to the recovery of abundant flint assemblages, fauna, and even Neanderthal remains. Moreover, several repeated and probably chronologically successive collective child burials with eight individuals in layers III and IIIa at Zaskalnaya VI were found. On the basis of Zaskalnaya, Kolosov identified another Mousterian culture with bifacial tools – Ak-Kaya – in addition to the Kiik-Koba, upper layer and Starosele cultures. In the mid-1980s, Kolosov began new excavations in western Crimea and several new important Middle Paleolithic sites were found (notably among them, Kabazi II and Kabazi V) (Kolosov et al. 1993).

New and ongoing fieldwork for the Crimean Middle Paleolithic was initiated in 1992 after the collapse of the Soviet Union, when it became possible to collaborate with Western colleagues. Such studies in Crimea were realized by Crimean archaeologists headed by Victor P. Chabai (Kiev-Simferopol, one of Kolosov's students) with archaeologists from the USA (A.E. Marks), Belgium (M. Otte) and Germany (J. Richter and Th. Uthmeier) and their associates and students, as well as many natural science specialists from Ukraine, Russia, Moldova, the USA, Canada, France, and England. Between 1993 and 2006, these groups of researchers excavated the following stratified Middle Paleolithic sites and multi-period Paleolithic and/or prehistoric sites with Middle Paleolithic level(s), both already known and newly discovered: Kabazi II, Kabazi V, Starosele, Siuren I, Chokurcha I, Buran-Kaya III, Karabi Tamchin, Karabai I, Sary-Kaya I, and Karabai II. The analysis of new materials from these ten sites and reanalysis of old collections, a great number of articles, and eleven books have been published (Marks & Chabai 1998; Chabai & Monigal 1999; Chabai et al. 2000; Chabai 2004; Chabai et al. 2004; Demidenko 2004; Chabai et al. 2005, 2006, 2007, 2008; Demidenko et al. 2012), plus two more volumes in press. These present the results from new approaches, multi-complex studies and absolute dates for the Crimean Middle Paleolithic.

Key Issues/Current Debates

Geochronology of the Crimean Middle Paleolithic

Prior to the collapse of Soviet Union, no absolute dates had been obtained for the Crimean Middle Paleolithic, excluding two radiocarbon dates older than 45,000 BP for Zaskalnaya VI, layer II (Kiev lab), and older than 50,000 BP for Zaskalnaya V, layer II (Novosibirsk lab), and attempts to obtain U-series dates for Kabazi I (31–33,000 BP) and Starosele (31,000 BP, 41,000 BP, and 110,000 BP) by the founder of the method, V.V. Cherdyntsev in the late 1950s. Pollen data was analyzed only for sediments at Kiik-Koba in the 1960s and Zaskanaya V in the 1980s. Geological studies were very general and did not allow specialists to propose real internal sediment geochronology for the Crimean sites, or such proposals were completely wrong, such as the Last Glacial Maximum for the Proto-Aurignacian/Micoquian of Kiik-Koba-type industry and the Evolved Aurignacian at Siuren I.

The situation for determining Middle Paleolithic geochronology in Crimea has changed dramatically over the last two decades. Well more than 100 absolute dates using AMS/C14, ESR, U-series and TL-dating methods have been obtained. Geological, pollen, fauna, small mammal, and malacofauna studies have also added significant results for determination of Crimean Middle Paleolithic and Early Upper

Paleolithic geochronology. All such geochronological data were analyzed and synthesized by Chabai in the mid-2000s and the most recent version (Chabai et al. 2008) is presented in Table 1. The three Crimean Middle Paleolithic industries are viewed as only geochronologically dated to the Upper Pleistocene: MIS 5-3, c. 120–30,000 BP. The Denticulate Mousterian in the Kiik-Koba, lower layer is dated only to the Lower Pleniglacial/MIS 4 (c. 70–60,000 BP) on the basis of geochronological data from Starosele, particularly level 3. The only Middle Paleolithic industry that covers the whole period between c. 120 and 30,000 BP is the Crimean Micoquian Tradition with three industry types–Ak-Kaya, Starosele, and Kiik-Koba. Moreover, not counting the possibly brief "Denticulate Mousterian episode" during the Lower Pleniglacial in Crimea, the Micoquian, beginning in the Last Interglacial and ending during the Hosselo Stadial before the Hengelo Interstadial, was the only representative of Middle Paleolithic industries in Crimea. It was only around 45,000 BP, during the Hosselo Stadial that, in addition to the Micoquian, the Levallois-Mousterian appeared in Crimea. Both of these industries apparently survived until the Denekamp Interstadial (c. 30–28,000 BP) when Early Upper Paleolithic industries appeared in Crimea.

New dating results and/or industrial attributions for the EUP industries at Siuren I and Buran-Kaya III allow the present author to propose an older time period for the last Middle Paleolithic industries in Crimea (see the entry on ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition in this encyclopedia).

Crimean Middle Paleolithic Industrial Variability

The presence of three Middle Paleolithic industries in Crimea – Denticulate Mousterian, Micoquian, and Levallois-Mousterian – has been addressed through the application of two different approaches: cultural and noncultural. In general, the Denticulate Mousterian and Levallois-Mousterian and their very basic interpretations do not vary much between the two approaches. However, interpretations of the Micoquian industry are too different, depending on the approach, and will be discussed below.

The *Crimean Denticulate Mousterian* (Kiik-Koba grotto, lower layer and Starosele site, level 3) can be described as follows (Demidenko 2003-2004; see also artifact illustrations in Fig. 2 of Demidenko's entry on ▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, and in Fig. 3 of Demidenko's entry on ▶ Starosele Middle Paleolithic Site with Hominin Remains in this encyclopedia. Technologically, primary flaking processes are based on reduction of both unsystematic globular multiplatform and primitive parallel single-platform cores with transverse, shortened metric proportions, with almost no striking platform preparation. Most of the products are small shortened pieces with massive thick butts usually with a very pronounced cone and bulb indicating hard hammer percussion. Blades are fairly uncommon and are usually, like most of the flakes, very irregular in shape and dorsal scar patterns, indicating their removal from the same cores with no specific blade production. The tool kit is characterized by the absence of bifacial tools, dominance (more than half of all formal tools) of both pieces with marginal and/or irregular retouch and denticulates and notched pieces, and a very low representation of points. The very minor presence of convergent forms among side-scrapers, a combination of simple side-scrapers with either retouched notched pieces or "Clactonian" ones, and the presence of side-scrapers and denticulates with ventral and/or alternate retouch are also worth noting. Many denticulates and notched pieces are set apart by one feature: a "Clactonian notch" was first created and then a single-blow notch was additionally retouched. Very specific is the occurrence of "combined tools" as side-scrapers + denticulates-notches and end-scrapers or perforators + denticulates-notches. Since the 1970s (Gladilin 1976), similarities between the Kiik-Koba lower layer assemblage and "Tayacian" complexes in Moldova have been noted. Such a relationship is still considered as probable (Demidenko 2003-2004).

The *Crimean Levallois-Mousterian*, often also termed the Western Crimean Mousterian after the

Crimean Middle Paleolithic, Table 1 Geochronology of the Crimean Middle Paleolithic and Early Upper Paleolithic (After Chabai in Chabai et al. 2008: Tables 18-2 & 18-3)

MIS	Geochronology	Vegetation	Sites, levels	AMS/C^{14}	ESR	U-series	Industries, types
Stage 3	Vytachiv, vt_{3b}, (Denekamp Int.)	South-boreal forest-steppe	Buran Kaya III, B	OxA-6674, 28.52 ± 0.46			Micoquian, Kiik-Koba type
				OxA-6673, 28.84 ± 0.46			
			Siuren I, Fb2	OxA-5155, 29.95 ± 0.7			Evolved Aurignacian
			Siuren I, Ga	OxA-5154, 28.45 ± 0.6			Proto-Aurignacian/
			Siuren I, H	OxA-8249, 28.2 ± 0.44			Micoquian, Kiik-Koba type
			Kabazi V, II/4A & II/7				Micoquian, Ak-Kaya type
			Prolom II, II	Ki-10617, 28.1 ± 0.35			Micoquian, Starosele type
			Zaskalnaya V, I	Ki-10891, 28.85 ± 0.4			
				Ki-10744, 30.08 ± 0.35			
			Kabazi V, III/1		30.0–26.0		
			Kabazi V, III/1A	OxA-X-2134-45, 30.98 ± 0.22	<41.0		
			Kabazi II, A3A, A3B, A3C, A4				Levallois-Mousterian/ WCM
			Kabazi II, II/1A		30 ± 2		
	Vytachiv, vt_2, (Huneborg Stadial)	Boreal xeric grassland	Zaskalnaya VI, II	OxA-4131, 30.11 ± 0.63			Micoquian, Ak-Kaya type
				Ki-10893, 30.70 ± 0.45			
				Ki-10607, 30.22 ± 0.4			
			Zaskalnaya V, II	Ki-10743, 31.60 ± 0.35			
			Kabazi V, III/2 & III/2A				
			Prolom I, upper layer	GrA-13917, 30.51 ± 0.58/0.53			Micoquian, Kiik-Koba type
				GrA-13919, 31.3 ± 0.63/ 0.58			
			Kiik-Koba, upper layer	Ki-8163, 32.3 ± 0.3			Micoquian, Kiik-Koba type

(*continued*)

Crimean Middle Paleolithic, Table 1 (continued)

MIS	Geochronology	Vegetation	Sites, levels	AMS/C^{14}	ESR	U-series	Industries, types
			Buran Kaya III, C	OxA-6869, 32.2 ± 0.65			Eastern Szeletian
				OxA-6672, 32.35 ± 0.7			
				OxA-6868, 36.70 ± 1.5			
			Kabazi II, II/1	OxA-4770, 31.55 ± 0.6			Levallois-Mousterian/WCM
			Kabazi II, II/2	OxA-4771, 35.1 ± 0.85			
			Kabazi II, II/3				
			Kabazi II, II/4	OxA-4858, 32.2 ± 0.9			
			Kabazi II, II/5	OxA-4859, 33.4 ± 1			
			Kabazi V, III/3-1–III/3-3A				
	Vytachiv, vt_{1c}, (Huneborg/Les Cottes Int.)	South-boreal forest-steppe	Prolom I, lower layer	Ki-10615, 33.5 ± 0.4			Micoquian, Kiik-Koba type
				Ki-10616, 35.2 ± 0.45			
			Zaskalnaya VI, III	OxA-4772, 35.25 ± 0.9			Micoquian, Ak-Kaya type
				Ki-10609, 38.2 ± 0.4			
				Ki-10894, 36.4 ± 0.45			
			Kabazi II, II/6				Levallois-Mousterian/WCM
			Kabazi II, II/7				
			Zaskalnaya VI, IIIa	OxA-4132, 30.76 ± 0.69			Micoquian, Ak-Kaya type
				OxA-4773, 39.1 ± 1.5			
				Ki-10610, 39.4 ± 0.48			
	Vytachiv, vt_{1b2}, (Hengelo Int.)	South-boreal forest-steppe	Kabazi V, III/5-3B2	OxA-14726, 38.78 ± 0.36			Micoquian, Starosele type
			Starosele, 1	OxA-4775, 41.2 ± 1.8	41.2 ± 3.6		
				OxA-4887, 42.5 ± 3.6			
			Starosele, 2		38.0 ± 5.0	60.0	
			Kabazi II, II/7AB		36.0 ± 3.0		Levallois-Mousterian/WCM

(*continued*)

Crimean Middle Paleolithic, Table 1 (continued)

MIS	Geochronology	Vegetation	Sites, levels	AMS/C^{14}	ESR	U-series	Industries, types
			Kabazi II, II/7C, II/7D, II/7E				
			Kabazi II, II/8		44.0 ± 5.0	45.0 ± 7.0	
			Kabazi II, II/8C, IIA/1				
	Vytachiv, vt_{1b2-b1}, (Hosselo Stadial)	Boreal xeric forest-steppe	Kabazi V, IV/1-IV/3				
			Kabazi II, IIA/2				
			Chokurcha I, IV-I, IV-M				Micoquian, Ak-Kaya type
			Chokurcha I, IV-O	OxA-10877, >45.4			Micoquian, Starosele type
			Zaskalnaya V, IV	GrA-13916, >46.0			
			Zaskalnaya VI, IV	Ki-10611, >47.0			
	Vytachiv, vt_{1b1}, (Moershoofd Int.)	South-boreal forest-steppe	Kabazi II, IIA/4B – IIA/4				Micoquian, Ak-Kaya type
Stage 4	Uday,ud, Pryluki, pl_3, (Ognon Stad. & Int.)	Boreal forest-steppe	Kabazi II, III/1A–III/1			73.3 ± 6.0	
			Starosele, 3			67.5	Denticulate Mousterian
Sub-stage 5a	Pryluki, pl_{1b2}, (Rederstall Stadial)	South-boreal forest-steppe	Starosele, 4			>80.0	Micoquian, type?
			Kabazi II, III/2		74.0–85.0	54.0 ± 3.0	
Sub-stage 5b	Pryluki, pl_{1b2-b1}, (Rederstall Stadial)	Boreal/ south-boreal forest-steppe	Kabazi II, III/2A				
			Kabazi II, III/3		82.0 ± 10.0		Micoquian, Ak-Kaya type
Sub-stage 5c	Pryluki, pl_{1b1}, (Brörup Int.)	South-boreal forest-steppe	Zaskalnaya V, V–VI				
Sub-stage 5d	Tyasmin, ts, (Herning Stadial)	???					
	Kaydaky, kd_{3b2+c}, (Eemian Intergl.)	South-boreal forest/forest-steppe	Kabazi II, V/3-VI/17				

location of its most typical assemblages in that part of Crimea, is best represented by finds from Kabazi II, Units II and IIA; Kabazi V, Subunit III/3 and Unit IV; Karabi Tamchin, layers II/2 and III; and Shaitan-Koba grotto (see in Marks & Chabai 1998; Chabai 2004; Chabai et al. 2008). According to Chabai, the Crimean Levallois-Mousterian is subdivided into two stages – early (Hosselo Stadial-Huneborg Interstadial) and late (Huneborg

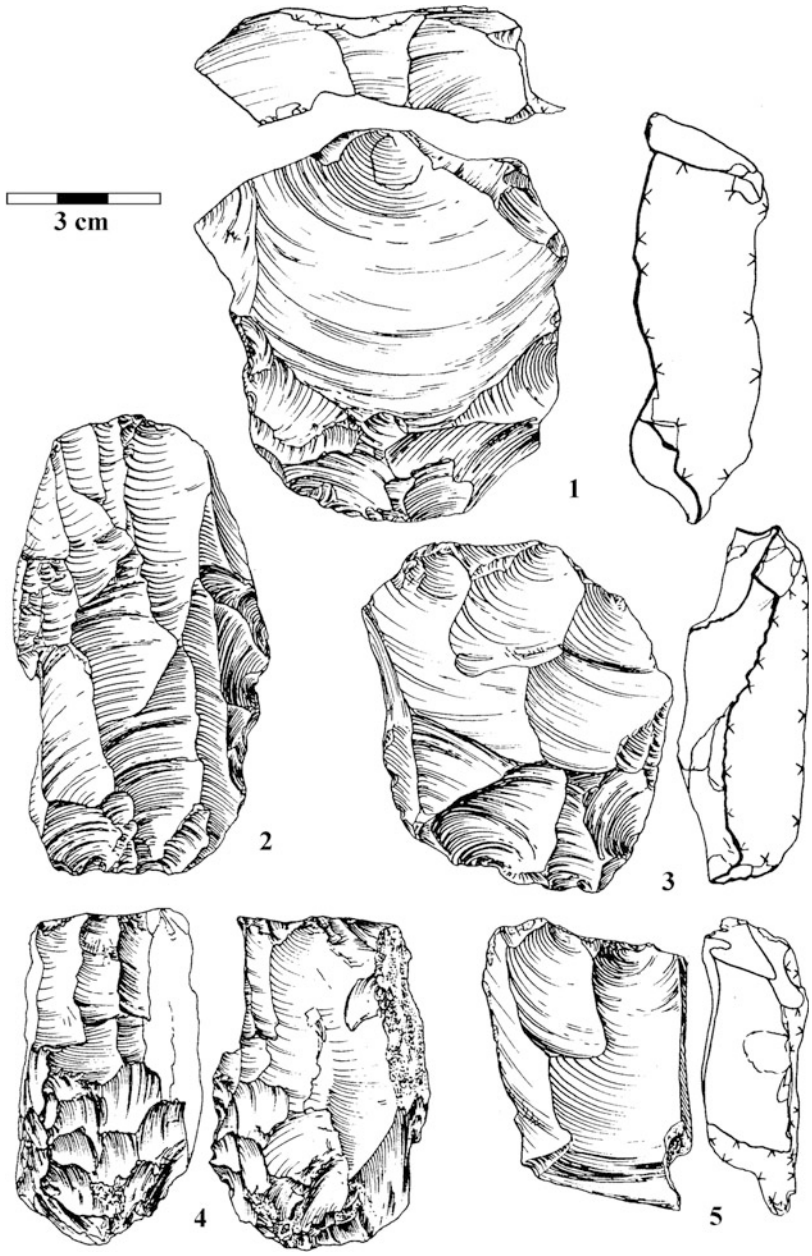

Crimean Middle Paleolithic, Fig. 2 Crimean Levallois-Mousterian/Western Crimean Mousterian industry from Unit II of Kabazi II site. Flint artifacts: *1* Levallois core; *2–3* bidirectional cores with finely prepared striking platforms; *4–5* cores of parallel volumetric method (Modified after Chabai 2004)

Stadial-Denekamp Interstadial) – based on technological changes through time. The stages are best represented by assemblages from Kabazi II, the key Middle Paleolithic site for Eastern Europe as a whole, where the early stage is represented by levels IIA/2 to II/7 and the late stage by levels II/6 to II/1A. The early stage features technological coexistence of Levallois reduction with finely prepared main and lateral supplementary core striking platforms (Fig. 2: 1–3), and parallel volumetric method (Fig. 2: 4–5), while the late stage is characterized only by the parallel volumetric method. The early stage assemblages thus contain both Levallois and laminar products, and the late stage shows a dominance of blades. Blades commonly form

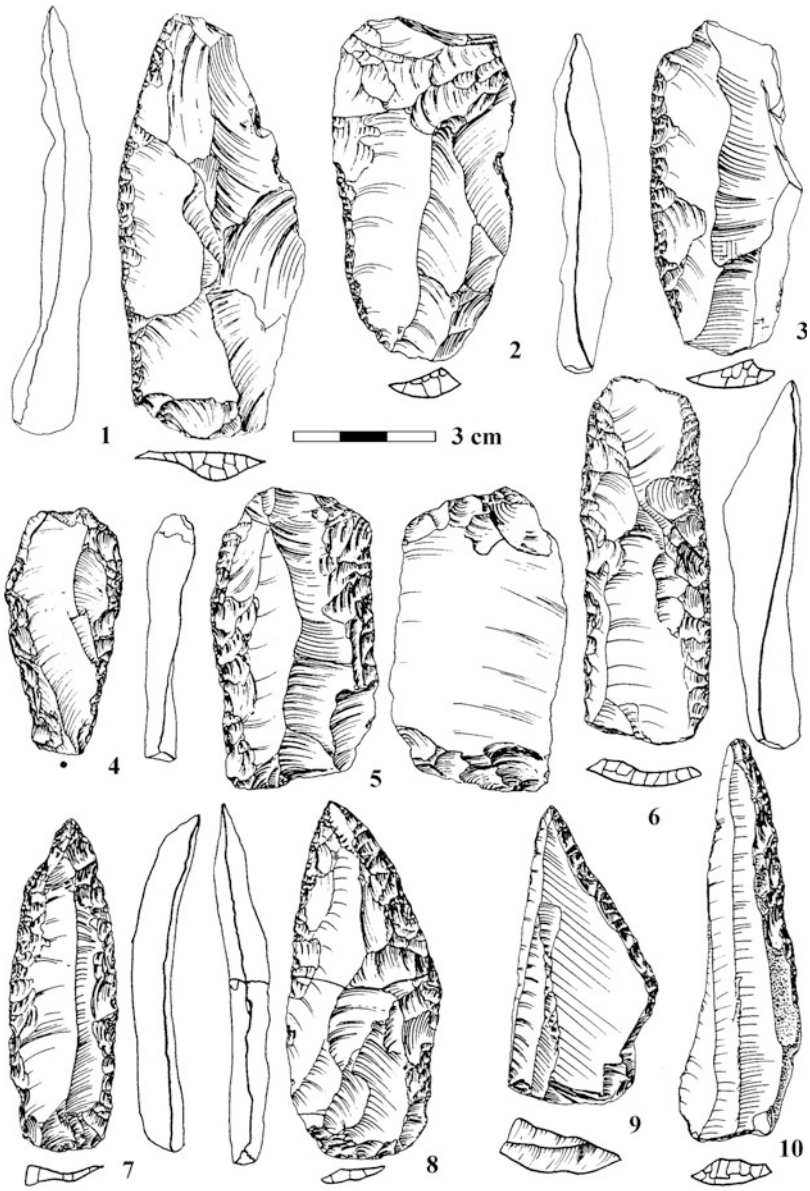

Crimean Middle Paleolithic,
Fig. 3 Crimean Levallois-Mousterian/Western Crimean Mousterian industry from Unit II of Kabazi II site. Flint artifacts: *1–2* simple lateral side-scrapers on Levallois flakes; *3* simple lateral side-scraper on a blade; *4*, *6* double side-scrapers on blades; *5* double side-scrapers, bi-truncated faceted; *7–8* points; *9–10* obliquely backed blades (Modified after Chabai 2004)

a high percentage in both stages (15–35 % within debitage products). Typologically, both early and late stages of the Levallois-Mousterian are rather similar given the absence of bifacial tools and dominance of simple (Fig. 3: 1–3) and double (Fig. 3: 4–6) side-scrapers (together they generally account for more than 50 % of formal tools) and about equal percentages of convergent side-scrapers and points (Fig. 3: 7–8) most of which were produced on elongated flakes and blades. The only significant typological difference between the two stages is the presence of obliquely backed blades (Fig. 3: 9–10). At the same time, the technological evolution of Levallois-Mousterian almost toward the Upper Paleolithic reduction method was not accompanied by typological changes, such that Upper Paleolithic tool types did not appear during the late stage of the Levallois-Mousterian in Crimea (Chabai 2004). Thus, the Crimean

Levallois-Mousterian did not evolve into a typologically Initial Upper Paleolithic industry but remained in the framework of the Middle Paleolithic.

Yu.G. Kolosov (1972), after studies of Bonch-Osmolowski's 1920s materials from Shaitan-Koba, suggested movement of Levallois-Mousterian groups from the Balkans into Crimea. Today, the commonly accepted hypothesis is to see the appearance of Levallois-Mousterian groups in Crimea as a result of migration from the Dniester River region in Western Ukraine and Moldova (Molodova I & V sites, Buteshty grotto) (Chabai 2004; see in Chabai et al. 2006). Recently, significant technological similarities have been shown between the latest Levantine Mousterian assemblages in the Near East and early stage assemblages of the Crimean Levallois-Mousterian (Demidenko 2011). Moreover, the timing of the disappearance of latest Levantine Mousterian assemblages in the Near East fully coincides with the appearance of the first Levallois-Mousterian assemblages in Crimea around 45,000 BP. Kolosov's (early 1970s) hypothesis of a Balkan origin thus deserves more attention and reexamination, keeping in mind the possibility for Near Eastern Latest Neanderthal migrations to the south of Eastern Europe via the Balkans.

The *Crimean Micoquian* assemblages, or Middle Paleolithic assemblages with bifacial "plano-convex" tools, are the most well-known Crimean Middle Paleolithic industry for both ex-Soviet Union and foreign Paleolithic archaeologists. Their fame is connected to both abundant tools including nicely produced bifacial ones and Neanderthal bone remains found at Kiik-Koba grotto, Zaskalnaya VI buried rockshelter, and below Zaskalnaya V buried rockshelter. The cultural approach was first applied to Crimean Middle Paleolithic assemblages with bifacial tools in the 1970s by V.N. Gladilin (1976). After all the Middle Paleolithic culture identifications in Crimea in the 1970s–1980s, three cultures with bifacial tools were identified: Ak-Kaya (sites of Ak-Kaya III; Zaskalnaya III, V, and VI; Sary-Kaya I; Krasnaya Balka; Prolom II), Kiik-Koba (Kiik-Koba, upper layer; Prolom I), and Starosele (Starosele, the 1950s excavation finds; Kabazi V, 1980s Units I–III; GABO, Kabazi II, the 1980s excavation Units I and III) (Kolosov et al. 1993). The three cultures are technologically similar with use of a combination of radial, discoidal, multiplatform, and parallel reduction techniques but no Levallois methods, and no careful main and/or lateral supplementary core platform preparation. Faceting indices are thus either low or medium, less than 45 % for the IFl index and less than 30 % for the IFst index. Blade indices are also not particularly high, varying between 5 % and 20 %, with the highest rates for the Starosele culture, in which, however, blades are mainly the result of bifacial tool reduction. There are some typological differences between the three cultures. The Ak-Kaya industry type/culture contains a high percentage of bifacial tools (c. 20–30 %) with many and various so-called backed knives, a medium range of convergent types among unifacial tools, mainly side-scrapers, relatively rare points among unifacial tools, and a considerable number of simple side-scraper types (from c. 40 %) (Figs. 4–7). The Kiik-Koba industry type/culture shows a medium amount of bifacial tools (around 15 %) with a rarity of backed knives among them, an abundance of points among unifacial (c. 40 %) and bifacial (c. 50 %) tools, a rather low frequency of simple side-scraper types (c. 20–30 %) among unifacial tools, as well as mostly small (less than 5 cm long) bifacial and unifacial tools; this industry is often related to the Micro-Mousterian (see artifact illustrations in Fig. 3 of Demidenko's entry on ▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union). The Starosele industry type/culture was thought to be distinguished by a low presence of bifacial tools (c. 5–10 %) with the almost exclusive occurrence of leaf-shaped and crescent points among them, a medium to high frequency of points (c. 20 %) and convergent side-scrapers (c. 40 %) within unifacial tools, while simple side-scraper types are subordinate (see artifact illustrations in Fig. 4 of Demidenko's entry on ▶ Starosele Middle Paleolithic Site with Hominin Remains). So-called Upper Paleolithic tools and denticulates/notches occur irregularly in insignificant numbers in these

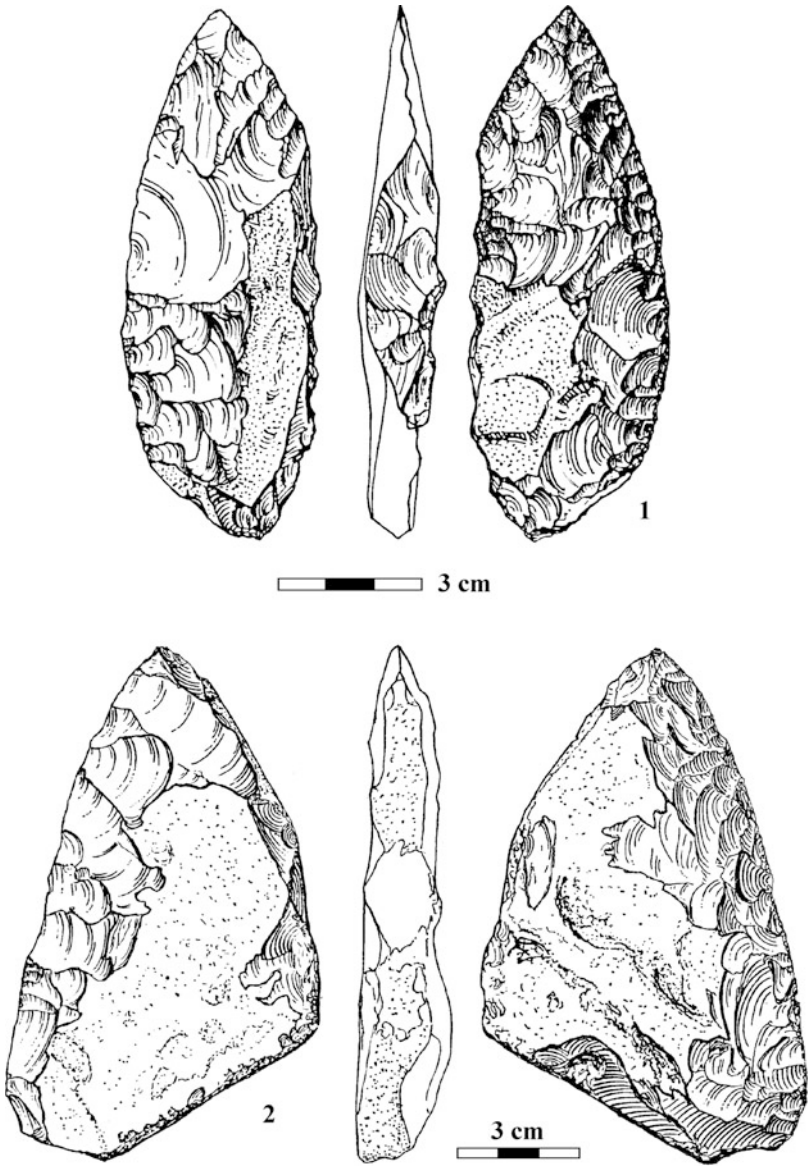

Crimean Middle Paleolithic, Fig. 4 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: *1* bifacial leaf point; *2* bifacial side-scraper. *1–2* Zaskalnaya V buried rockshelter (Modified after Chabai 2004)

industry types. So, the typological variations for the three industries served to isolate the three distinct Middle Paleolithic cultures in the Crimea and are still in use by some East European colleagues.

However, when the new stage of Crimean Paleolithic studies began in the early 1990s, the basic typological uniqueness of the three cultures together was well established; when one ignores differences in typological indices, the cultures all have principally the same tool types. After a complex synthesis of various anthropogenic and natural factors to understand and interpret the sites, all Crimean Middle Paleolithic industries with bifacial tools are now considered within the framework of the Crimean Micoquian Tradition (Chabai et al. 2000). The tradition envelopes the three known industries (Ak-Kaya "*étalon* like," Kiik-Koba, and Starosele) through a "uniformity in diversity" methodological approach. Along with this, the industrial variability of the Crimean Micoquian Tradition is not limited to these three industry types. At least two more typologically transitional industry types are also included: so-called Ak-Kaya-"genuine"

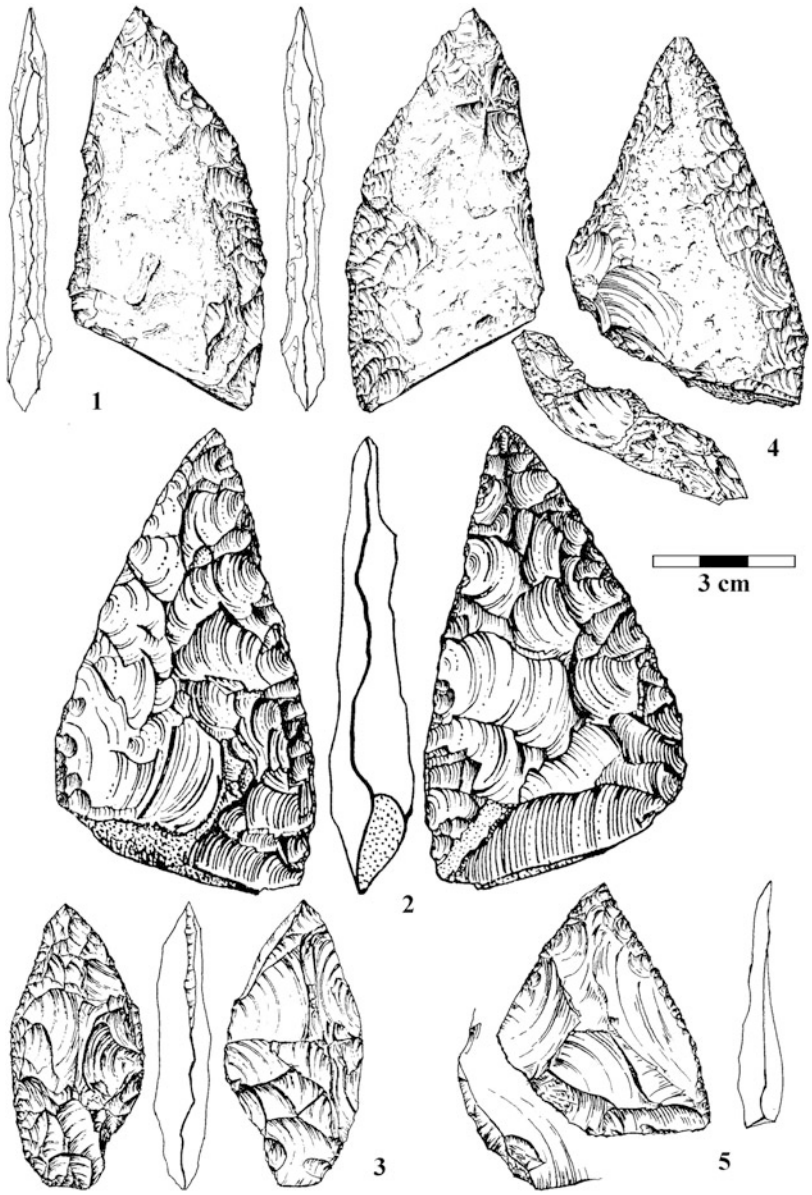

Crimean Middle Paleolithic, Fig. 5 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: 1–2 bifacial semi- and sub-crescent points; 3 bifacial leaf point; 4 subtriangular point; 5 semi-trapezoidal point. 1, 3–5 Chokurcha I site; 2 Zaskalnaya V buried rockshelter (modified after Chabai 2004)

and Ak-Kaya-Starosele based on Chabai's analyses of Zaskalnaya V and VI, and Prolom II (Chabai et al. 2000). The 1990s–2000s research indeed showed a very mosaic typological variability of the Crimean Micoquian Tradition and its Neanderthal site system that "erases" typological "index borders" between the traditionally defined cultures. Instead, a large group of assemblages with more or less "smooth and continual" typological variation and their site complex and variable settlement types appears. Also, although proposed by "culture archaeologists" (e.g., Stepanchuk in Kolosov et al. 1993), a strict subdivision of Crimean territory into the western region with Starosele culture and the eastern region with Ak-Kaya and Kiik-Koba cultures is no longer supported after identification of the all three industry types in both regions (Chabai et al. 2000; Demidenko 2000). An important method for analysis of Crimean Micoquian

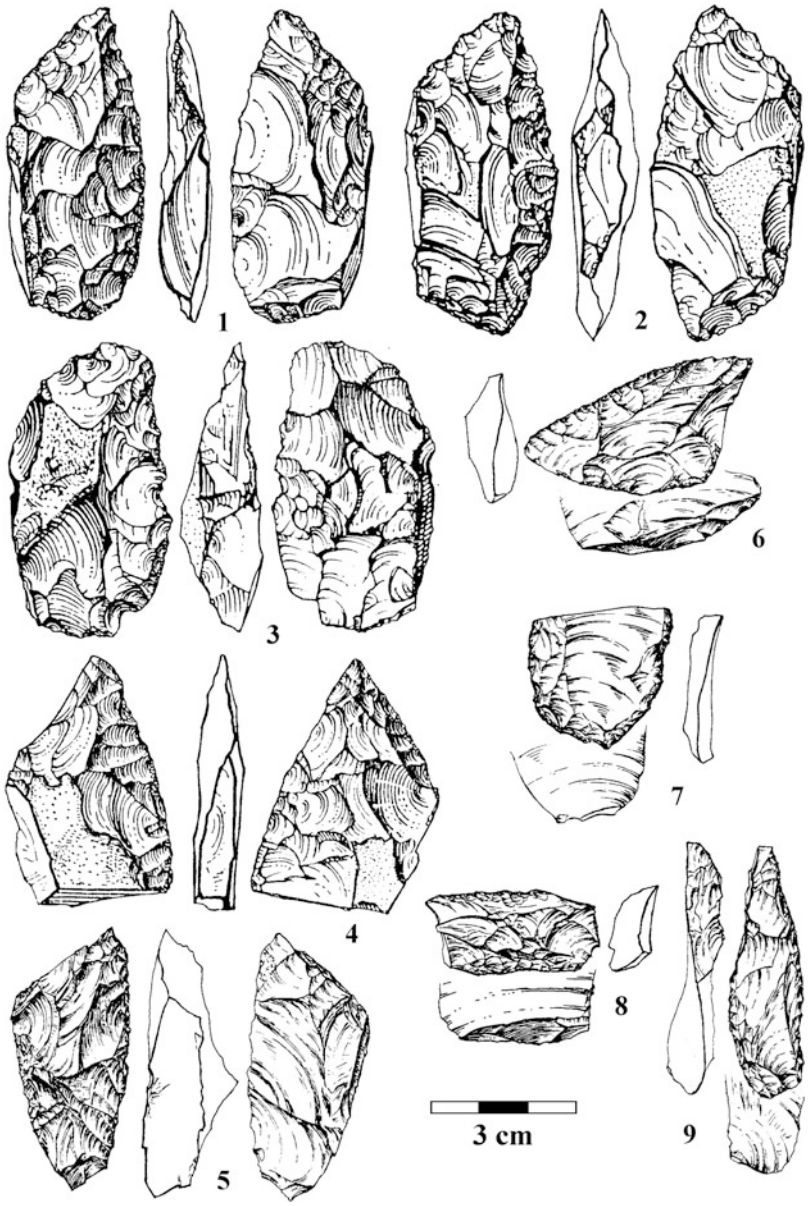

Crimean Middle Paleolithic, Fig. 6 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: *1–5* bifacial side-scrapers; *6* transversal oblique side-scraper; *7*, *9* double side-scrapers; 8 transversal side-scraper (*6–9* side-scrapers on bifacial tool debitage pieces). *1–4* Zaskalnaya V buried rockshelter; *5*, *7–9* Chokurcha I site; *6* Kabazi II site (Modified after Chabai 2004)

typological variability was introduced by Chabai when he proposed to subdivide tools into three broad groups: (1) simple types of unifacial tools – simple, transverse, and double side-scrapers; (2) convergent types of unifacial tools – convergent side-scrapers and points; and (3) identifiable bifacial tools (Chabai et al. 2000: Table 10). The reason for such a method for typological structure was that the tool classes and types both constitute the main body of any Crimean Micoquian tool-kit and can be readily identified by any archaeologist; old collections can also be analyzed in this way using old publications. As a result, five industry types are structured as follows (Chabai et al. 2000: Table 10). Ak-Kaya "*étalon*-like"-type indices are as follows: simple unifacial tools – 52.5–58 %; convergent unifacial tools – 21.3–23.8 %; and bifacial tools – 23.6–28.7 %. Ak-Kaya-"genuine"-type indices are characterized as follows:

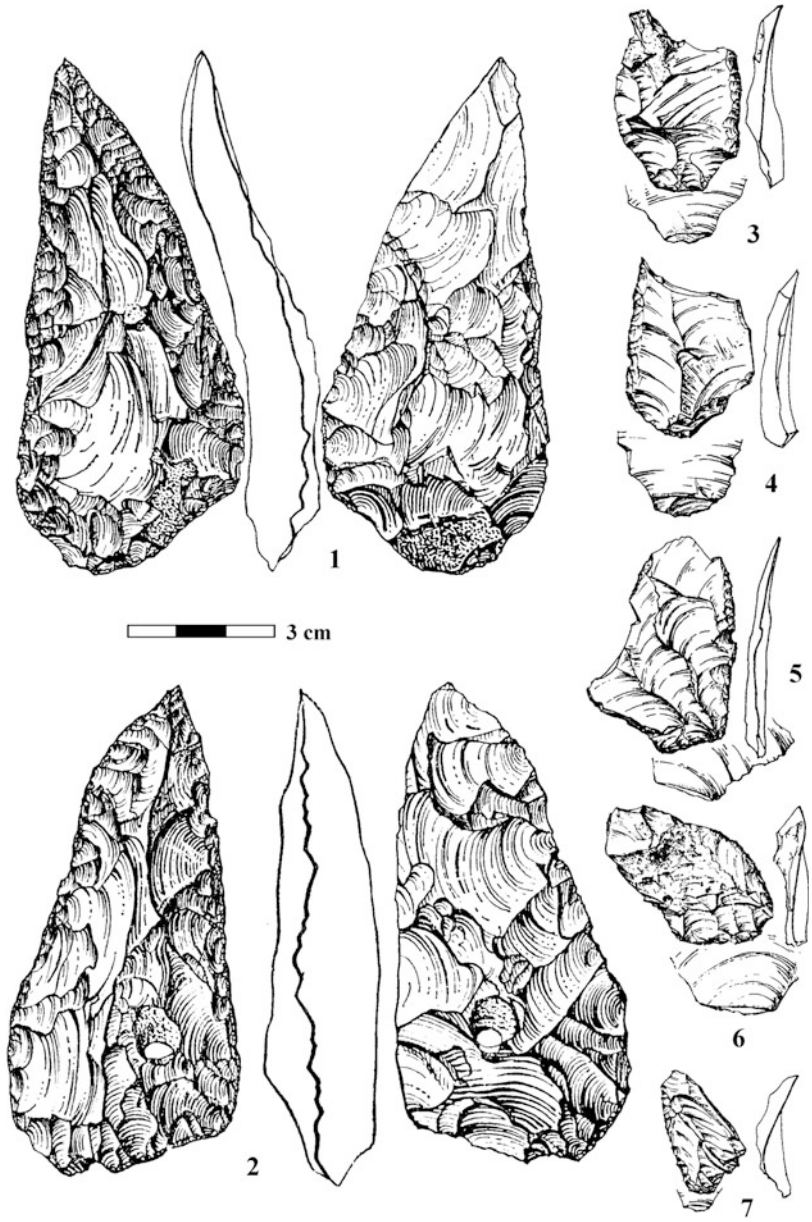

Crimean Middle Paleolithic, Fig. 7 Crimean Micoquian Tradition industry of Ak-Kaya type. Flint artifacts: *1–2* bifacial sub-crescent points; *3–5* simple lateral side-scrapers on bifacial tool treatment flakes; *6–7* retouched pieces on bifacial tool treatment flakes. *1–2* Zaskalnaya V buried rockshelter; *3–7* Chokurcha I site (Modified after Chabai 2004)

simple unifacial tools – 41–57.5 %; convergent unifacial tools – 16–35 %; and bifacial tools – 16–27 %. The Ak-kaya-Starosele type has the following indices: simple unifacial tools – 43–52 %; convergent unifacial tools – 37–43 %; and bifacial tools – 9–17 %. Starosele-type indices have the following indices: simple unifacial tools – 44.3–48.1 %; convergent unifacial tools – 38.9–43.4 %; and bifacial tools – 12.2–13.3 %. The Kiik-Koba type has the following indices: simple unifacial tools – 21.5–37 %; convergent unifacial tools – 51.9–56.2 %; bifacial tools – 11.1–14.3 %. These index variations show certain index overlap between the industry types. Adding new assemblages (e.g., Kiik-Koba-type assemblages from Siuren I and Buran-Kaya III – Demidenko 2000, 2004; Chabai 2004; see in Chabai et al. 2004), typological variability in the Crimean Micoquian Tradition becomes more evident as variations of the three tool groups have

the following index deviations: simple unifacial tools – 21.5–58 %; convergent unifacial tools – 16–63.8 %; and bifacial tools – 9–28.7 %. Extreme ranges of the three tool groups vary within intervals between 2.7 and 4 times. Such high Crimean Micoquian Tradition typological variability is caused by diversity in site function related to use of different flint reduction methods and primary and secondary fauna exploitation (see in Chabai & Monigal 1999; Chabai et al. 2000; Chabai 2004; see in Chabai et al. 2006).

The Crimean Micoquian Tradition industrial flint treatment (Demidenko 2003: 130-1) was based on systematical and intensive production and reuse of bifacial tools through typical Micoquian "plano-convex" technique (Figs. 4; 5: 1–3; 6: 1–5; 7: 1–2). Primary flaking processes are characterized by a significant prevalence of bifacial tool treatment debitage over core reduction debitage in any given assemblage. Thus, one of the most typical Crimean Micoquian Tradition technological features is a minor role of core reduction. As a result, most of debitage blanks for unifacial tool production were products of bifacial tool reduction and multiple rejuvenations (Figs. 6: 6–9; 7: 3–7). Unifacial tools (usually produced on short flakes that are very different from Crimean Levallois-Mousterian unifacial tools) are characterized by various convergent forms with many points among them (Fig. 5: 4–5). The Crimean Micoquian Tradition third characteristic feature is almost exclusive use of high quality flints for flint treatment processes and shares of low quality flints or cherts are usually extraordinarily rare. Namely, the three fundamental parameters of the Crimean Micoquian make it distinct from other East European Micoquian industries (see Gladilin 1976) why its assemblages have been grouped under the name of Crimean Micoquian Tradition (Chabai et al. 2000; Demidenko 2003).

Another feature of the Crimean Micoquian Tradition is its chronology, which covers the entire Middle Paleolithic Upper Pleistocene period (c. 120,000 to c. 30–28,000 BP). Taken together, chronological and industrial aspects show that the Crimean Micoquian Tradition, lasting for 90,000 years, preserved its industrial parameters with no change. Such persistence is significant. First, the tradition's lithic technology was very conservative but also capable of meeting needs in the changing Crimean Upper Pleistocene paleoenvironments. Also, according to natural science and especially pollen data for Crimean sites (see in Chabai & Monigal 1999; Chabai et al. 2005), Crimean Micoquian Neanderthals were living in variable landscapes forming two basic groups during this long period. The Last Interglacial and different interstadials are characterized by varying south-boreal forests/forest-steppes. On the other hand, stadials are known through boreal/south-boreal forest-steppe, a boreal forest-steppe, a boreal xeric forest-steppe, and boreal xeric grassland. It should also be remembered that the ungulate species hunted remained about the same during this period: *Equus hidruntinus* and *Saiga tatarica*. Second, the conservative nature of the Crimean Micoquian Tradition is shown by the fact that no techno-typological changes occurred even when the tradition coexisted with other industries, whether Middle Paleolithic (Levallois-Mousterian) or Early Upper Paleolithic ("Eastern Szeletian" and Proto-Aurignacian) in Crimea (Chabai 2004; Demidenko 2000, 2004, 2008). Indeed, there is no evidence for Micoquian borrowing of any traits from other industries. Thus, it is possible to postulate universal characteristics of the Crimean Micoquian Tradition enabling Neanderthal survival for 90,000 years in Crimea.

Further studies of the Crimean Middle Paleolithic industrial and chronological variability will certainly bring to light new and new interesting aspects.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union
- ▶ Starosele Middle Paleolithic Site with Hominin Remains

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Crimean Upper Paleolithic

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Introduction

The first Crimean Upper Paleolithic (UP) sites in situ and stratified rockshelters of Siuren I and Kachinski (second ridge of the Crimean Mountains, western Crimea) were discovered and excavated by Konstantin S. Merejkowski in 1879–1880. Both Middle and Upper Paleolithic sites were first discovered in the late nineteenth century in the Crimea, but today they differ in numbers of sites and find spots (around 30 for the UP and more than 100 for the MP) (Kolosov et al. 1990a, b; Chabai 2004). The key difference in these sites, however, is relative amount of relevant data at these different sites and their scientific value for the analysis of variability in Crimean Paleolithic industries and chronology. The MP is thus represented by about 30 stratified sites with abundant lithic artifacts and fauna,

while the UP record has less than five such stratified sites. Yet despite this paucity, data is still sufficient to interpret the Crimean UP.

Historical Background

History of Crimean Upper Paleolithic Studies and Some Conceptual Interpretations

After the Bonch-Osmolowski's 1920s excavations at Siuren I, this site with three UP layers identified at the time became the key site for the Crimean UP. Bonch-Osmolowski (1934) considered these layers as "corresponding to three different developmental stages of Aurignacian culture." However, attribution to the Aurignacian alone was not accepted in ex-Soviet Paleolithic archaeology. Since the 1950s, the dominant opinion of Soviet archeologists was that the Siuren I sequence covers the entire Upper Paleolithic. The clearest position was expressed by E.A. Vekilova (1957). In her view, the Siuren I finds are "dated" to "Aurignacian"-"Solutrean periods and possibly the beginning of the Magdalenian"-"time of Late Magdalenian and Early Azilian" and the finds "testify to the continuity of human society development in the Crimean peninsula" during the UP. Vekilova also compared the Siuren I middle layer ("Solutrean – beginning of Magdalenian") with redeposited UP flints from the early 1930s Bonch-Osmolowski and Trusova's excavations at Adji-Koba cave (First Ridge of the Crimean Mountains, eastern Crimea), although they noted a similarity between this site and the Siuren I upper layer.

Since the Crimean UP record was limited to materials from only Siuren I and Adji-Koba until the second half of the 1980s, some hypotheses were proposed to explain the surprising rarity of UP sites in Crimea. Bonch-Osmolowski (1934) early on suggested that UP humans moved to the southernmost areas of Crimea during cold periods of the Last Glacial and that their sites did not survive due to significant erosion and the karst topography. Another hypothesis proposed human migrations outside the Crimea during the UP to the Eastern European Plain (Bibikov & Lyubin 1978). A critical analysis of these hypotheses (Kolosov et al. 1990a) rejected both, arguing that the problem is rather related to developing suitable survey strategies to locate new UP sites in Crimea.

The number of UP sites has slowly increased, primarily due to the fieldwork of Yuri G. Kolosov, Vadim N. Stepanchuk, Victor P. Chabai, and Alexander A. Yanevich in the late 1980s. At that time, apart from excavations at the well-known MP sites near Ak-Kaya and Sary-Kaya rocky cliffs (second ridge of the Crimean Mountains, eastern Crimea), Kolosov's team also conducted intensive surveys along the first fluvial terrace of the Biyuk-Karasu river in that area. As a result, Late UP surface finds (e.g., Biyuk-Karasu XIII and XIV) and sites with in situ level(s) (e.g., Biyuk-Karasu III, VI, and IX, Vishennoe II) were discovered (Kolosov et al. 1990a; Yanevich 1992). A few Late UP flints were also found in the upper deposits at Zaskalnaya IX cave in the Red Valley behind Ak-Kaya (Kolosov et al. 1990a). These surveys in eastern Crimea were also complemented by surveys in western Crimea in the Bodrak river valley (second ridge of the Crimean Mountains) where Kolosov's team discovered in situ Late UP levels at Skalistyi grotto and the open-air site of Skalistoe (Kolosov et al. 1990a; Cohen et al. 1996). Thus, these investigations increased the Crimean UP database, adding, however, only Late UP and Epigravettian, sites.

Major advances in Crimean UP studies occurred when Yanevich discovered and began to excavate the multilevel site of Buran-Kaya III (second ridge of the Crimean Mountains, eastern Crimea) in 1990 and when new 1994–1997 excavations at Siuren I were conducted (see Cross-References). At the same time as the Siuren I excavations, a new stratified Late UP site was also found and partially excavated in 1996 in the Bodrak river valley (Veselskiy 2003-2004).

As a result, the 1990s investigations not only significantly added to but also much changed our understanding of the Crimean UP. Before presenting the new chronological sequence of the UP industries, the Crimean UP sites and their contribution to scientific debates will be discussed.

Key Issues/Current Debates

The Crimean UP Database

The Crimean UP sites can be structured as follows (Fig. 1). There are only two in situ and multilevel sites in rockshelters/grottos with abundant lithic artifacts and fauna: Siuren I and Buran-Kaya III. A single multilevel open-air Late UP site with diagnostic artifacts, including tools, is known: Vishennoe II. Two sites have been found in caves, with a few redeposited but industrially uniform and diagnostic flint artifacts: Adji-Koba and Zaskalnaya IX. Finally, some in situ workshops have been found at flint outcrops, however lacking diagnostic tools: Biyuk-Karasu III, VI, and IX; Skalistoe I; Bodrak; and Skalistyi grotto, as well as separate finds of nondiagnostic flints at Krasnyi grotto, a hyena den based on the faunal remains. These 12 sites comprise the entire Upper Paleolithic database in Crimea.

The other known so-called UP sites (see Kolosov et al. 1990a, b) are find spots with a few UP surface flints (e.g., Biyuk-Karasu XIII and XIV), sites with industrially heterogeneous and redeposited finds (e.g., Shaitan-Koba II Big grotto), and even find spots with ambiguous flints for which period cannot be attributed (e.g., Vitina stoyanka, Kacha, Kochkin domik, Kapselskaya bukhta, Subotkhan). Regarding the famous Kachinski rockshelter excavated by Merejkowski in the nineteenth century, the site remains a "thing in itself" because of the loss of finds, the unclear stratigraphy, and the impossibility of undertaking any new excavations there.

There are thus only a few UP sites in Crimea which can be considered as having significant scientific value. The other sites are variably informative and with different functions. Siuren I, Buran-Kaya III, and Vishennoe II will thus be used for the analysis of different research issues and to potentially connect them with the other sites.

Industrial Variability and Geochronological Context of the Crimean Upper Paleolithic

The available data enable the present author to propose the following geochronological sequence for the following seven industries of the Crimean UP: "Eastern Szeletian," Proto-Aurignacian, Southern Caucasus EUP, Late/Evolved Aurignacian, Late Gravettian, Epigravettian, and Final Epigravettian.

The "Eastern Szeletian" at Buran-Kaya III, level C (situated in the stadial between the Hengelo and Les Cottes/Huneborg interstadials, no younger than 36 kyr uncal BP), is characterized as follows (Figs. 2, 3): bifacial leaf "biconvex" points, bifacial trapezes mostly

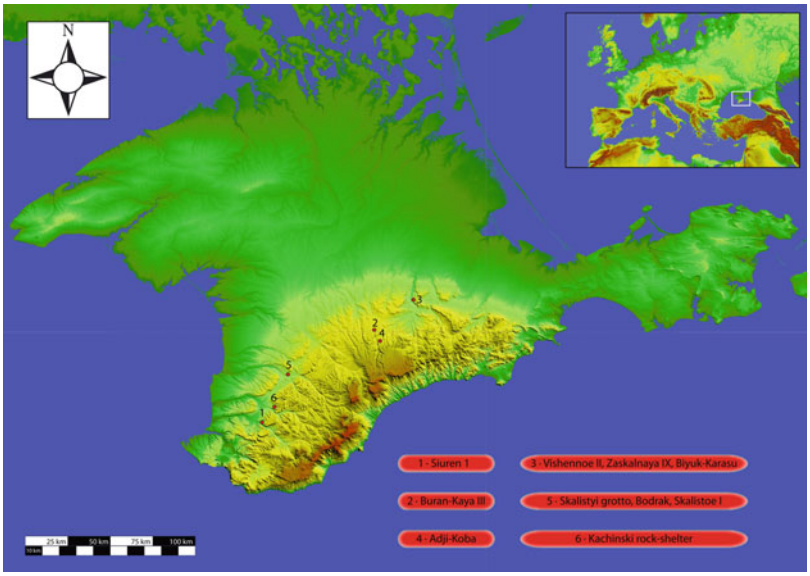

Crimean Upper Paleolithic, Fig. 1 Map of the Crimea showing Upper Paleolithic site locations (Map created by Dr. G. Bataille, Cologne University)

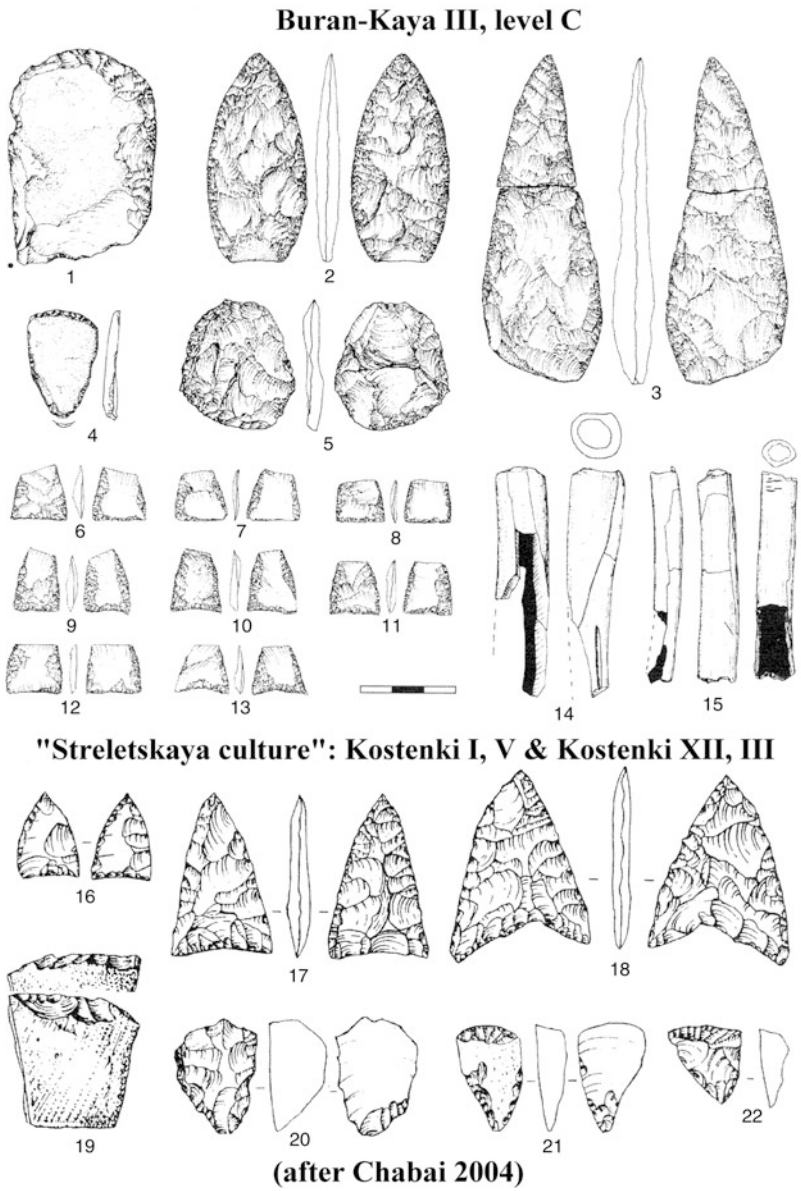

Crimean Upper Paleolithic, Fig. 2 Buran-Kaya III, level C; "Eastern Szeletian"; and "Kostenki-Streletskaya culture," diagnostic artifact types (After Chabai 2004)

made on small flakes and chips produced during bifacial point production and rejuvenation, and end scrapers, including fan-shaped and a series of worked bone tubes (see in Chabai 2004; Chabai et al. 2004). The Crimean "Eastern Szeletian" is very similar in technology and typology to another Szeletian sensu lato industry in Eastern Europe, "Kostenki-Streletskaya culture," well known at sites northeast of Crimea in the Middle and Lower Don River areas (Kostenki XII, layer 3, Kostenki VI, Kostenki I, layer 1; Biryuchiya Balka sites) (Anikovich et al. 2007). The only formal differences between the two East European Szeletian industries are the lack of triangular bifacial "biconvex" points with a concave base in the Crimean industry and the lack of bifacial trapezes in the Don industry. At the same time, the Don small-sized triangular bifacial "biconvex" points with a concave base can be also considered a variant of the Crimean bifacial trapezes with

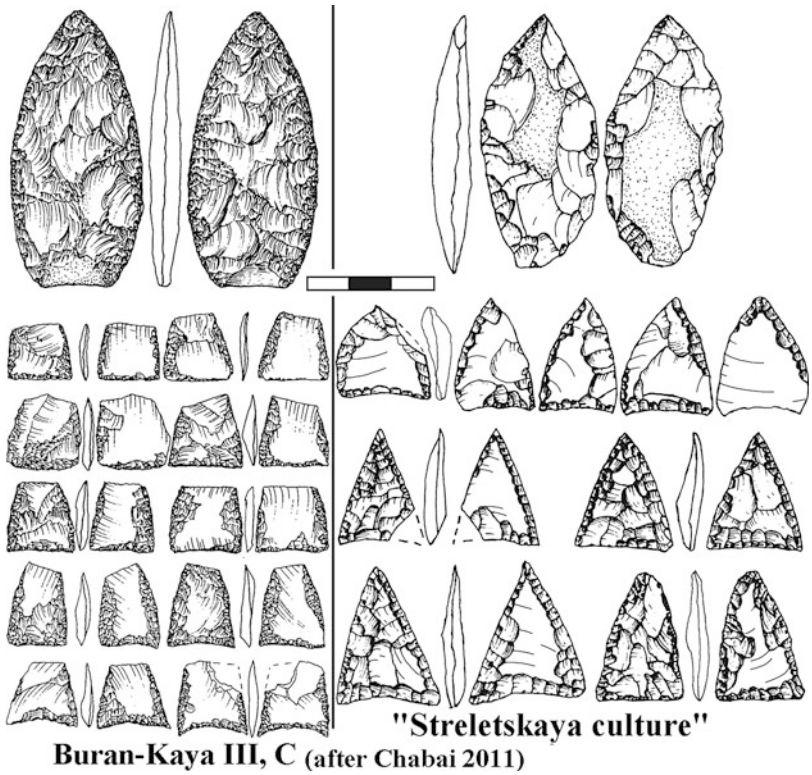

Crimean Upper Paleolithic, Fig. 3 Buran-Kaya III, level C; "Eastern Szeletian"; and "Kostenki-Streletskaya culture," bifacial points and trapezes (After Chabai 2011)

a concave base. Accordingly, the two industries can be considered as "industrial cousins" within the East European Szeletian sensu lato. The hypothesis of the appearance of the "Eastern Szeletian" in Crimea from the north as a result of population movement of the "Kostenki-Streletskaya culture" (Chabai 2004) following the Don river valley deserves much attention and should be considered the most probable in the present state of the East European Szeletian research (see also Demidenko 2008).

The Proto-Aurignacian is present at Siuren I, Units H and G (situated in the stadial between the Hengelo and Les Cottes/Huneborg interstadials and Les Cottes/Huneborg interstadial, older than 31 kyr uncal BP) (see Demidenko, "▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea" entry, Fig. 5; also see in Demidenko et al. 2012). It is characterized technologically by the dominance of bladelet production via the reduction of "regular" and "carinated" bladelet cores to produce mostly on-axis and flat/incurvate blanks. Typologically it is represented by retouched microliths where alternate Dufour bladelets of Dufour subtype account for almost 70 %, as well as some Font-Yves/Krems points; the presence of carinated and thick shouldered/nosed end scrapers and simple end scrapers on blades; a dominance of angle and truncation burin types, while dihedral type are subordinate; a rare presence of Aurignacian blades; and a minor presence of scaled tools, truncations, and perforators. The Siuren I Proto-Aurignacian has direct comparisons within the European Proto-Aurignacian with Dufour bladelets of Dufour subtype, in territories west of Crimea: in Western Europe (e.g., Fumane, levels A3–A1 and Riparo Mochi, layer G in Italy; Le Piage, level K in France; Cueva Morin, levels 9–8 in Spain) and Central Europe (Krems-Hundssteig in Austria; Tincova, Romanesti-Doumbravita, and Cosava in Romania; Kozarnika cave, layer VII in Bulgaria; Beregovo I in the Ukrainian Transcarpathians). It is thus suggested by the present author that the Crimean Proto-Aurignacian is

the result of population migrations from the west into the south of Eastern Europe via the "Lower Danube Corridor".

The "Southern Caucasus EUP" at Buran-Kaya III levels 6–5 to 6–1/5–2 (Huneborg stadial and Arcy interstadial, c. 35–31 kyr uncal BP) (see Demidenko's entry ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition in this volume, Fig. 2, 4, 6; Yanevich 2000; Yanevich et al. 2009; Prat et al. 2011) features, technologically, predominant reduction of both exhausted narrow-flaked bladelet cores on plaquettes and multifaceted (not carinated) burins producing very numerous incurvate and twisted narrow bladelets and microblades, and, typologically, a dominance of "non-geometric microliths" with fine backed dorsal retouch (nearly 75 % of all formal tools) where unusually around half are represented by points, particularly those with bilateral fine retouch. Based on the lithic assemblage structure, as well as numerous bone tools and personal ornaments, the Buran-Kaya III industry finds direct comparisons in the east (Mezmaiskaya cave, levels 1C–1A, Northwestern Caucasus) and south (Ortvale Klde rockshelter, layers 4d & 4c; Dzudzuana cave, layer D, western part of Southern Caucasus). The present author thus proposes that the origin of Buran-Kaya III, levels 6–5 to 6–1/5–2, is the result of the population movement from the Southern Caucasus into both Northwestern Caucasus and Crimea.

The Late/Evolved Aurignacian at Siuren I, Unit F (Arcy and Maisières interstadials, c. 30.9–29 kyr uncal BP on ungulate bone samples and c. 28.2–26.6 kyr uncal BP on bone artifact samples) (see Demidenko ▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 6, also see in Demidenko et al. 2012), is defined by the primary reduction of mainly off-axis and twisted microblades produced on both "regular" and "carinated" bladelet cores, and carinated tools (end scrapers and notably burins). The tool kits include carinated and thick end scrapers and also flat shouldered/nosed end scrapers, dominance of dihedral and carinated burins, and typically Roc de Combe subtype ventral bladelets and alternate Dufour bladelets (c. 45 % of all microliths) as well as pseudo-Dufour dorsal bladelets (c. 40 % of all microliths) with marginal abrasion retouch. The Siuren I Late/Evolved Aurignacian finds archeological similarities in the west, within the West European Aurignacian II–IV with Dufour bladelets of Roc de Combe subtype (e.g., Roc de Combe, levels 6–5 and Abri Pataud, levels 8–7 in France; Cova Beneito, levels B8–B9 in Spain) and Late/Evolved Aurignacian complexes such as at Mitoc-Malu Galben (Romania) in Eastern Europe. Therefore, the author proposes a European western vector of migration into Crimea.

The Late Gravettian at Siuren I, 1920s third "artificial excavation level" of the upper layer and 1990s Unit D (Upper Pleniglacial of the Last Glacial, probably c. 24–23 to 20 kyr uncal BP) (see Demidenko ▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea" entry, Fig. 7, also see in Demidenko et al. 2012), is represented by a few but industrially diagnostic cores and tools: elongated bidirectional blade and bladelet cores, an elongated Gravette point with truncated base, a truncated blade, a truncated bladelet, a "microsaw" with one backed lateral edge, two *pièces à cran* on a blade and a bladelet, and two bidirectional fragmented bladelets with a backed lateral edge. Such artifacts have no comparisons within the Crimean and North Black Sea region Epigravettian assemblages and may indicate population movement from the East European Plain to the south during the onset of the Last Glacial Maximum.

Finally, the last two UP industries are related to Epigravettian occupation in Crimea. Given the much higher number of sites and variability in site function, the Epigravettian sites are the most representative UP sites in Crimea. Based on stratigraphy, lithic assemblage, and fauna, the Epigravettian reference site is Siuren I, 1920s second "artificial excavation level" of upper layer/1990s Unit A, along with some flints found in humus. The Siuren I Epigravettian complex can be joined by another site, but Final

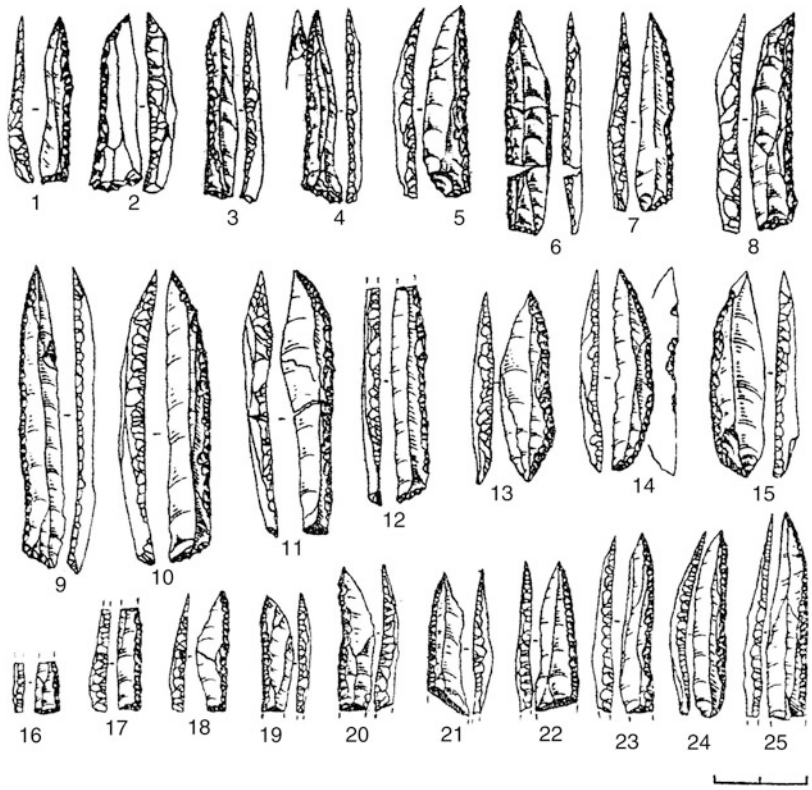

Crimean Upper Paleolithic, Fig. 4 Vishennoe II, level Б, Final Epigravettian. *1–12*, *16–25*: triangles with oblique or straight retouched base; *13–15*: crescents (After Yanevich 1992)

Epigravettian, Vishennoe II, which, however, lacks fauna (Yanevich 1992). These two reference sites are complemented by other less informative Epigravettian sites: upper layers at Adji-Koba and Zaskalnaya IX caves; Biyuk-Karasu III, VI, and IX; Skalistyi grotto; and the open-air sites of Bodrak and Skalistoe I. Thus, the Crimean Epigravettian is represented by ten sites with both in situ and redeposited but still homogeneous assemblages.

The Epigravettian and Final Epigravettian complexes can be differentiated by technology and typology. The Siuren I Epigravettian can be characterized as follows.

Technologically, it is based on intensive reduction of short single-platform and double-platform bidirectional bladelet cores (c. 3–4 cm long) in about equal percentages. Typologically, end scrapers and burins are fairly rare, whereas backed bladelets and microblades with thick abrupt retouch are much more common and also include a few "microgravettes" and a "rectangular" piece (see Demidenko, "▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea," Fig. 8a, see in Demidenko et al. 2012). The Vishennoe II Final Epigravettian, defined by Yanevich (2000) as a separate Final Epigravettian type from the "first half of the Final Paleolithic" and by data from Vishennoe II, level Б, can be characterized by single-platform and double-platform bidirectional narrow-flaked blade cores and a special microlith set – "triangles with oblique or straight retouched base," "low crescents of varying shape" (Fig. 4), and "rectangles with two retouched narrow ends and a lateral edge" (Yanevich 1992). No absolute dates are available for the Epigravettian and Final Epigravettian sites, but some hypotheses have been proposed. The present author is inclined to situate the Epigravettian from Siuren I and Adji-Koba to the period 19–18 to 15,000 uncal BP (see in Demidenko et al. 2012). It is also assumed that

the Crimean Epigravettian is connected to Epigravettian complexes located west of Crimea, in the eastern Carpathians in Romania. Yanevich (1992) considers the Vishennoe II Final Epigravettian to fall within the "final stages of the Pleistocene: Dryas II, Allerød, and Dryas III," 12–10 kyr uncal BP. He also connects the appearance of the Final Epigravettian in Crimea with "immigrants of the Late Moldova culture from the Dniester river areas" (Yanevich 2000).

The other Crimean Epigravettian sensu lato sites could be connected to the above-discussed Epigravettian and Final Epigravettian as follows. Workshops at Biyuk-Karasu III, VI, and IX and Vishennoe II, levels A, A1, Б1, Б2, Б3, and B, based primary reduction data (Kolosov et al. 1990a; Yanevich 1992), are similar to the Vishennoe II Final Epigravettian. However, located near these sites, Zaskalnaya IX cave with five backed points and bladelets is typologically similar to the backed tools from the Siuren I and Adji-Koba Epigravettian assemblages. An attribution of the workshops at Skalistyi grotto and the open-air sites of Bodrak and Skalistoe I in western Crimea is much less clear. Their assemblages, which lack diagnostic tool types, could be either Epigravettian or Final Epigravettian. Only very hypothetically can they be compared to the Siuren I and Adji-Koba Epigravettian based on the fact that sites like the Vishennoe II Final Epigravettian are as yet unknown in western Crimea, while Siuren I is 15 km south of these workshops.

Concluding Remarks

Data is now available to support strong arguments in favor of a complex multi-industrial Upper Paleolithic sequence in Crimea, from the "Eastern Szeletian" and Proto-Aurignacian (older than c. 31 kyr uncal BP) to the Final Epigravettian (c. 12–10 kyr uncal BP). This sequence, albeit with some hiatuses, covers the entire Upper Paleolithic period of the Last Glacial. The most poorly represented period is the Late Gravettian in Crimea, suggesting a possible temporary hiatus in human occupations in Crimea during 28–27 to 19–18 kyr uncal BP, which also corresponds well to a similar hiatus for the entire Great North Black Sea region during c. 28–27 to 22 kyr uncal BP (see in Demidenko 2008). On the other hand, industries and occupational episodes of "Eastern Szeletian," Proto-Aurignacian, Late/Evolved Aurignacian, and Southern Caucasus EUP, while represented by impressive assemblages, fauna, and paleoenvironmental data, are only known from single sites – Buran-Kaya III in eastern Crimea and Siuren I in western Crimea. It is indeed urgent to "develop more flesh" on the Crimean Upper Paleolithic "skeleton" through the discovery of new sites in different areas of the peninsula. Only then will it be possible to investigate models of changes in landscape use by the different UP human groups and their modes of survival. These questions can now be addressed for the Epigravettian and Final Epigravettian, which are represented by base camps, short-term sites, and workshops at flint outcrops; although incomplete, these are known in both piedmont and mountainous Crimean areas.

Finally, the question of possible generic links between the different Crimean UP industries and their subsequent "historical fates" should also be addressed. In this regard, the lack of any industrial successions and "evolutionary links" between the Crimean UP industries should be strongly stressed. All of the seven known UP industries should be regarded as being transported to Crimea rather than reflecting local continuity and change through time. Migration from the west is represented by humans bringing the Proto-Aurignacian, Late/Evolved Aurignacian, and Epigravettian. Migration from the north is connected to humans with "Eastern Szeletian," Late Gravettian, and Final Epigravettian industries. Migration from the south is associated with the Southern Caucasus EUP. Such an absence of local Upper Paleolithic human groups is not very surprising when one considers that the present-day Crimean peninsula was the southernmost terrestrial area of the Great North Black Sea region's rather continuous belt of land in the south of Eastern Europe, extending from the eastern Balkans in the west to Northwestern Caucasus in the east, during most of the Upper Paleolithic. As a result, the Crimea was

open to human migrations into its territories from any direction. Moreover, the absence of any evolutionary trends within the Crimean UP also testifies to rather short-term stays of these different UP human groups in Crimea; they ought to be considered as temporary visitors and not actual long-term residents in Crimea. It is indeed quite reasonable to search for comparable UP industries outside Crimea.

Concluding this overview of the Crimean Upper Paleolithic, it is also of interest to note the so-called Crimean UP "echo and epigone": the "Shpanskaya Mesolithic culture" during the Boreal and start of the Atlantic periods in the Holocene, c. 9–7 kyr uncal BP (Yanevich 1993) that is part of the European Early Holocene Epi-Tardigravettian (Kozlowski & Kozlowski 1979; Demidenko 2000). These industries show the clear Epigravettian characteristic of numerous non-geometric microliths, suggesting the "formation of the Shpanskaya culture on the basis of local Epigravettian Final Paleolithic industries of North Black Sea region and Crimea" (Yanevich 1993) and thus population continuity.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea

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Critical Historical Archaeology

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Introduction and Definition

The subject of this entry, critical historical archaeology, can mean several different things. One common reading would be as Critical Theory as applied in historical archaeology. This obviously directs our attention to the copious work of Mark Leone and his students. Another meaning would emphasize the role of critique in historical archaeology. This perspective includes critical theory, but broadens the focus to include other aspects not strictly under its purview. Both of these meanings will be explored in this entry. In its most basic form, critical archaeology can be defined as using the skills and craft of archaeology to understand the structures of inequality and oppression in the world. Therefore, a Critical Historical Archaeology directly confronts and challenges the history, nature, and structure of inequalities in capitalism. A critical historical archaeology explicitly uses the activities of archaeological projects and knowledge about the past to engage in political struggles in the present.

Archaeologists have used many different terms to capture these ideas: critical theory, praxis, pragmatism, public scholarship, public archaeology, activist archaeology, action archaeology, and civic engagement. A survey of how archaeologists have approached these issues demonstrates that our activities occur at several different scales: larger scale issues that confront the very structures and ideologies of the capitalist system itself, to smaller, local scales that deal with the inequalities and concerns of local contexts and communities. Each of these perspectives takes as axiomatic that archaeology is as much about the present as it is the past, and seeks ways to make our work socially relevant to political concerns of the modern world (Little 2007; Little & Shackel 2007; McGuire 2008; Sabloff 2008; Stottman 2010).

Historical Background

Critical historical archaeology in its various guises can trace its roots to Marxism. Marx expended a great deal of energy studying capitalism, the same topic that defines our subdiscipline. Rather than a quest for abstract knowledge, Marx undertook these exhaustive empirical investigations in order to transform the capitalist system based on exploitative social relations. Marx and Engels (1970: 123) famous quote "the philosophers have only *interpreted* the world, in various ways; the point is to *change* it," indicates the political nature of their scholarship. All Marxists would agree that there is real oppression and exploitation in the capitalist world and that a vital part of any scholarship is challenging these wrongs. In this way, Marxism is inherently political and subversive of modern capitalist society. A Marxist archaeologist must always ask "scholarship for whom?" and question whether their scholarship challenges or reinforces the power relations of the social world (McGuire et al. 2005: 368). For archaeologists, this means recognizing that our knowledge of the past is created in and influenced by modern social and political conditions that derive from a capitalist system defined by relations of power and inequality that are unjust.

A Critical Historical Archaeology is most clearly associated with the work of Mark Leone and his students. Leone's work was inspired by Marxist scholars of the Frankfort School, Lukacs, and the French Structural Marxism of Louis Althusser, in particular Althusser's notion that

a dominant ideology creates a false consciousness for all members of society. Leone began with this problem of ideology and wondered why our taken-for-granted assumptions of the world permeate every aspect of daily life, and work so effectively to uphold dominant interests while making true knowledge of class interests difficult. The driving force of Leone's work was to uncover and critique the workings of ideology in modern Capitalist society. Once armed with this knowledge, people could work to overcome it: "ideology serves to reproduce society intact; knowledge, or consciousness of ideology, may lead to illumination or emancipation" (Leone et al. 1987: 284). Leone and his students focused their research on many aspects of everyday life, such as eating utensils, type face, clocks, town planning, and objects related to personal hygiene, as well as the way that historical knowledge is presented to people through museum exhibits. The dominant theme was to demonstrate that our notions of segmentation, standardization, and individualism were intimately connected to the dominant ideology and thus capitalism (Leone et al. 1987). Once aware of how ideology masks the structures of capitalism, people could struggle to change it.

To promote consciousness and change, the Annapolis' public education program introduced visitors to the contradictions and social inequalities of the capitalist system evident in landscape, architecture, and material culture in order to illuminate "elements of daily life that are normally concealed" (Leone et al. 1987: 291). The project organizers sought to create a participatory experience that would engage the tourists in a critical reflection of the colonial history of the United States. They sought to challenge the dominant ideology by demonstrating to the tourists that the historic Annapolis that they were presented with had been constructed to support dominant class interests. In the end, this challenge to the standard ideological history of Annapolis failed to overcome the official history and the cultural and social relations that produced it (Leone 2010). The public generally responded by reinterpreting the alternative vision in terms of their preconceptions derived directly from the ideology being critiqued. These responses should not have been surprising given the background of the tourists who visit Annapolis and the types of historical interpretations that they were already exposed to. The fact that Annapolis is a high-end tourist destination only amplifies this trend. Clearly, in Annapolis, the privileged classes of US society did not question the dominant history even when presented with alternatives.

The archaeological literature has been peppered with critiques of Leone's Critical Theory approach, but few more damming than his own recent retrospective (Leone 2010). Leone's account presents his frustration and recognition that piercing the ideology alone could not lead to the kind of social transformation that he hoped for. He argues not that Althusser was wrong, but that because he was right, his ideas are too unsettling and could never be accepted since they foreclose any hope for change except through violence (Leone 2010: 182). As a result of this realization, Leone (2010) adopted instead Habermas' notion of communicative action. He recognized that the people who would be the most open to alternative histories were those who had been most directly and negatively affected by the contradictions, inequalities, and exploitation in society, a position more in keeping with Marx's idea that the working classes, because of their position in the productive relations of capitalism, are better positioned to achieve true class consciousness. Leone's research has thus shifted focus to an African-American community in Annapolis and to a project that actively incorporates members of that community. This shift makes it difficult for archaeologists to assume they know the interests of the masses like some intellectual vanguard. Instead they must actively work with the community to develop an alternative historical discourse that meets the interests of both parties. The current program of the Annapolis Project confronts both the practice of the archaeologist and the racial and class realities of modern Maryland (Palus et al. 2006), and shifts the focus of a critical historical archaeology toward a collaborative approach that is discussed below.

Other scholars have approached a critical historical archaeology through the Marxist concept of praxis. Praxis refers to the uniquely human ability to knowingly and creatively make and change both the world and, in the process, ourselves. Marxist praxis implies a dialectical relationship between gaining knowledge of the world, critiquing the world, and taking action in the world (McGuire et al. 2005). As archaeologists, we gain knowledge through the empirical study of the past. This knowledge is trivial if it is not linked to a critique of the world; the knowledge we generate gains relevance from how it informs, challenges, or reinforces the Marxist critique of capitalism, including ideas of dominant ideologies that so engaged the Critical Theorists. Critique also includes the critical self-examination of the role of scholars in the world and of how their scholarship reinforces or questions the inequalities in society. Without accurate knowledge, action can lead to unintended and often pernicious consequences. In the absence of self-critique, this can result in self-delusion, the idea that archaeologists are involved in positive or progressive change when they may not be.

Like the Critical Theory of Mark Leone, Historical Archaeologists using this concept of praxis recognize that inequality and exploitation characterize the structures of capitalism, but rather than beginning with ideology, they use class as their entry point into the analysis of these social relations (Wurst 2006; McGuire 2008; Gadsby & Barnes 2010). The goal entails building knowledge about the class structure, combining this knowledge with a critique of inequality and exploitation in capitalism, and using this awareness to foster action to make our world a more humane one (McGuire 2010).

Randall McGuire and his colleagues of the Ludlow Collective have used this approach to build an archaeology of political action in their study of Colorado's 1913–1914 Coalfield Strike and the Ludlow Massacre Site (Saitta 2007 McGuire 2010). The project has focused on the massacre site as well as a nearby company town to gain a richer and more systematic understanding of the everyday lived experience of the Colorado miners and their families. The excavations themselves are a form of political action since they focus attention on the events of 1913–1914, making them news again, and raise public awareness of the class basis of American history. The project has also worked directly with the United Mine Workers to build educational programs that include interpretive displays at the site, teacher's institutes to educate public school teachers, a traveling display, public talks, and web sites. The strikers have assisted the project's excavations as the archaeologists try to assist them by educating the general public about labor's struggles in the United States.

In this case, the knowledge derived from the excavations of the Ludlow Massacre Site is combined with a critique of the class structure and exploitative labor practices in order to build an archaeology of political action to transform the world (McGuire 2010: 223). As McGuire (2010: 231) states, "an emancipatory praxis can exist only within real contexts of social relations, struggles, interests, institutions, and agents." Praxis can only be realized through collective action, and this requires us to work in and with real communities.

Key Issues/Current Debates

In recent years, archaeologists have seriously confronted the class structure of archaeology as a middle class practice connected to modern capitalism. Challenges posed globally by indigenous peoples and descendant communities have forced archaeologists to face a larger network of social relations in the context of their research. US archaeologists have certainly risen to the challenge since NAGPRA was passed in 1990 and the African Burial Ground galvanized descendant communities in New York in 1991. Since then, archaeologists have scrambled to engage various descendant communities in a dialogue that seeks to move beyond archaeology's colonial heritage and instead engage in community or collaborative work. As noted above, working with descendant communities (however defined) has become key to both Critical Theory and praxis approaches to a critical historical archaeology. Collaborating

with descendant communities is rapidly becoming the norm in Historical Archaeology. Notable examples of this kind of public, collaborative project include Carol McDavid's (2002, 2010) work at the Levi Jordan Plantation, the New Philadelphia Community Archaeology Project (Shackel 2011), and, of course, the African Burial Ground (LaRoche & Blakey 1997).

While these are exciting developments, archaeologists need to be aware that simply being aware of multiple interests in the past and collaborating with community groups does not necessarily result in a critical historical archaeology the way it has been defined here– that is, one based on critique of the structures of capitalism and geared toward political action to change them. Stottman (2010: 8) contrasts public and applied archaeology which collaborates and considers the public as stakeholders with an activist archaeology. In his view, "archaeologists can do more than collaborate with communities and the public, they can use archaeology to *affect change within an activist agenda*." (Stottman 2010: 8, emphasis in original). A great deal of public, engaged, or collaborative archaeology runs the risk of falling into the trap of sentimentality when dealing with communities (Little 2010: 158). The question that archaeologists often fail to answer is what the ultimate goal is: archaeology or collaboration for what end? While historical archaeologists have become more comfortable with the idea that our work is always political, we have not been as clear in defining what that political agenda is or should be. Phrased another way, if the goal of praxis or an activist approach is to affect change, we have seldom articulated just what kind of change we mean. One notable example is the work of Larry Zimmerman and his colleagues on the materiality of homelessness. Zimmerman et al. (2010) argue that this work must be political and geared toward translating our archaeological knowledge into practical applications to solve real problems of social relevance (Zimmerman et al. 2010: 445). Their research has increased visibility of the problems of homelessness and has provided valuable data that can help to develop better ways to provide aid that homeless people can actually use. As Little (2010: 158) makes clear, "we must be vigilant and continually self-critical and questioning about the types of changes we advocate." And this reminds us that without a clear political agenda, our best intentioned activist archaeologies can easily descend into sentimentality and the self-delusion that we are engaged in change while accomplishing little more than supporting the status quo.

Future Directions

All of the approaches discussed here reject the possibility that archaeologists objectively recreate the past. Once any truth claims are laid to rest, the next question must deal with what archaeology is for. Most answers revolve around some utility for the present. All of these approaches entail a dialectic interweaving of past and present and embrace the fact that archaeology is always imbricated in politics. The differences in these approaches are all minor and can largely be characterized by starting point. Critical theorists frame their work around exposing aspects of the dominant ideology that serves capitalism while a praxis approach uses class as the entry point to analysis of capitalist social relations. Collaborative approaches and work with descendant communities is an important aspect of both.

Given that these approaches are all framed in the rejection of objective truth, it is interesting that there seems to be a quest for the "right" way to do this. Instead of an either/or, best/worst approach to engaging in a critical historical archaeology, it is important that archaeologists think much more critically about notions of scale in this work. Leone's early work has been instrumental in making us realize the ideological structures of the larger capitalist system. There is real value in the critique of capitalism's taken-for-granted ideas that are the hallmark of Leone's Critical Archaeology. Since few topics have

elicited as profound "ah ha" moments for students, it is hard to agree with his recent statements that "Critical Theory doesn't work" (Leone 2010: 152). However, it is equally true that this "consciousness" alone cannot change the gross inequities that define our world. The smaller scale or local level may be a more effective and satisfying scale for our critical historical archaeologies, but it is imperative that archaeologists be just as cautious about work with descendant communities. The danger is that by turning to work only with local communities, the political nature of critical historical archaeology is often lost, as is any larger sense of what the struggle is against and for.

Cross-References

- ▶ Activism and Archaeology
- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Critical Theory in Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Pragmatism in Archaeological Theory
- ▶ "Public" and Archaeology

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Further Reading

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Critical Theory in Archaeology

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Introduction

Critical theory calls on scholars to view the past and the present as locations of nuanced ideological negotiation. Critical theory, as used by archaeologists, explores the relationship between our knowledge of the past and the context of its production. It urges scholars to question who they are working for and the ways in which their interpretations can be used in the present. One of the major concerns in critical archaeology is the way that conflict and contradiction has been hidden or masked through the ideology of those who are producing the knowledge. A critical archaeology calls for extricating or recontextualizing interpretations of the materiality of past social worlds from cultural to ideological capacities. Foundational to this is the recognition that power permeates nearly every aspect of social and material life ranging from broader hierarchical structures to intimate everyday practices (O'Donovan 2002). The relationship between power and ideology is invested in social practices, and these exist along with a material world endowed with the power to produce, reproduce, and maintain them. These relationships have material correlates and can be examined archaeologically. Critical theory also involves exploring the point of view from which interpretation is constructed (Leone et al. 1987: 284).

The manipulation of the past has been documented in many studies over the past several decades. It is clear that representations of the past are not inconsequential and that they shape peoples' identities and perceptions of others. Critical archaeology recognizes that the meaning of archaeological materials is not natural or immediate and that the social relationships between people and things give objects their meaning. Through exploration of the ways in which archaeological materials come to be associated with particular meanings, critical theory urges archaeologists to question common sense claims or traditional interpretations that have been made about the human experience in the past. Critical theory in archaeology also urges the examination of fundamental beliefs and guiding structures in the contemporary world and present practice of archaeology. Archaeological materials, through the framework of critical archaeology, can be considered to represent ideologies that are invested with power because they are embedded in particular historical constructions. Interpretations of history have salience to present conditions because they can help to justify exploitative relationships and naturalize them, thereby supporting the maintenance of the status quo. Archaeological interpretation of history is therefore a battleground for political life and ideology in the present. A critical archaeology questions the relationships between objects, social relations, and meanings by historicizing the process of history and meaning making, challenging its immutability, or offering or illuminating alternatives.

Definition

Critical archaeologists have demonstrated that present ideologies play a significant role in the process of interpreting the archaeological remains of the past. Artifacts and other archaeological materials are open to multiple readings, each of which is based on ideologies related to what they mean, what meaning is, and how the world works. Everyone carries these implicit beliefs, and the goal of a critical archaeology is to expose these ideologies and question them. Althusser (1971) describes ideologies as the taken-for-granted things, the things that go without saying, and the naturals for a given society. Through study of the functions of ideology, scholars have attempted to show that unequal social relationships are integral to the reproduction of social order and sustain systematic inequality, sexism, and racism. Critical archaeologists

examine the ways in which the practice of contemporary archaeology has contributed to the reproduction of the social order and aim to develop an archaeological perspective that is conscious of the power of archaeology to contemporary life. They seek to identify and demystify contemporary ideologies and work with the recipients of archaeological knowledge to build greater social consciousness.

Conceived as an emancipatory project, critical archaeology aims to bring an understanding of ideology in order to foster new understandings of, challenges to, and a reimagining of present society. Since critical archaeologists question the ideologies that stem from noncritical readings of history, the relevance of archaeology toward the general critical inquiry becomes clear. Archaeology can do more than describe past lifeways; it can also show that the roots of modern society are arbitrary and not inevitable. From the perspective that archaeology can use history to critique our modern world (Leone et al. 1995), it can be understood how the taken-for-granted notions in a society came to be that way. The focus of most work has been on modern capitalist societies and investigations that reveal how life was before the definition of the modern individual, time discipline, wage labor, and advanced capitalism.

Historical Background

Critical theory is most commonly associated with the work of the Frankfurt School of Social Research, established in 1923. The development of critical theory, and its retooling of classical Marxist thought, is associated with two social currents of the early and mid-twentieth-century Europe. First, in the wake of World War I, capitalism's goal of building a modern, rational society, with economic, scientific, and technological advancement at its foundation, was being called into question. Second, Marxist theory had been circulating in Europe for decades but had failed to bring into existence the sweeping revolutions and socialist republics that the central premises of Marxism were based upon (Kellner 1989). Critical theorists departed from the classical vocabulary and conceptual core of Marxism while remaining committed to work within the Marxist tradition by identifying with many of its approaches and analytic premises. Scholars of the Frankfurt School including Adorno, Horkheimer, and Habermas, along with other European scholars including Benjamin, Lukacs, and Althusser, turned their attention toward the functions of ideology and culture and the roles they play in perpetuating the status quo. These European scholars, while diverse and sometimes divergent in their ideas, established an influential program of Marxist-oriented, interdisciplinary social research, known as the critical theory. Their thought emphasizes the role of ideology and culture, not the economic base of social organization, as fundamental to the creation and maintenance of exploitive social relations. In the early twentieth century, they turned Marxist attention toward consumerist commodity culture (Kellner 1989).

Critical theory emerged in archaeology in the 1980s, along with other forms of postmodern thought that challenged claims to objectivity in interpretations of the past. Its use in archaeology was initially influenced by ethnographic studies of historical museums (e.g., Wallace 1981), which pointed to the fact that the distinction between past and present was being blurred in these presentations. They suggested that the role of the curator in the presentation of history was removed, depicting prehistory and history as evolving unattended into an improved present. In contrast, the critical effort examines how knowledgeable social actors exist in and move through their past and present social contexts. At this time, critical ethnographers began to generally examine taken-for-granted realities and look at the way that cultural mechanisms assure social harmony and conformity through the employment of organizational rules, norms of interaction, institutional practices, and ideological concepts. They suggested a reflexive approach, which was concerned with what was communicated as researchers worked from the present to the past, instead of asking how we got from the past to the present. Critical theory came

to the consciousness of archaeologists due to a variety of factors including a recognition that archaeology was being used to serve political aims. This came out of a growing controversy in archaeology over ownership of cultural artifacts and human remains and control over the preservation and interpretation of the past (Leone et al. 1987: 284). As processual archaeology gained popularity in North America, many of the supporters of the New Archaeology began to express concern for the social relevance of archaeology through the nationalization of historical sites. This is exemplified in the work of Russell G. Handsman and the American Indian Archaeological Institute (1981), which analyzed the formation of nucleated villages as part of the rise of urbanization and capitalism in New England. Handsman brought attention to the ways in which ideas – including the ideas of the individual, wealth, and the relationships between people and objects – that have distinct historical origins within distinct social structures and processes come to be taken as part of the natural social and physical landscapes by historians. Handsman argued that modern historians were projecting modern categories onto the past and conflating modern people with past people. Alison Wylie (1985) also examined the ideological role that reconstructions of the past based on archaeological evidence played in everyday life. Leone, Potter, and Shackel (1987) set out the goals for a critical archaeology in which research was explicitly designed to have political impacts in the present (Palus et al. 2006).

Through its attempt to historicize facets of contemporary ideology, critical archaeology helps to question naturalized connections between the events, structures, and processes of the past with the present. At the same time that critical archaeology was being developed through historical archaeology in the United States, a reaction against processualism that espoused similar but more radical principles regarding the epistemological foundations of the discipline was being developed in England, particularly through the work of Shanks and Tilley (1987, 1991). Shanks and Tilley called attention to archaeology as a political practice and urged archaeologists to acknowledge that they are working in the present, for the purposes of the present (Palus et al. 2006). Archaeology has an interesting dual nature in that its data, before interpretation, is vulnerable to very different ways of application, either through the incorporation and perpetuation of racist, sexist, and nationalist agendas or to counter popular mythologies and support critical reexamination of these agendas.

Key Issues/Current Debates

As a reflexive approach with a goal of emancipation from coercion – including that which is self-imposed – critical theory has been successfully applied in the fields of law, history, the decorative arts, literature, geography, museum studies, and the philosophy of science, among others. Critical theory applied to archaeology – critical archaeology – is based on ideas from Althusser and Lukacs. From Althusser (1971), archaeologists understand that ideology can be discovered and that it is tied to the material correlates of past societies. And when ideology is made visible through critical analysis, Lukacs (1971) suggests that we attempt to write the history of ideology or the history of bias, identifying the mystifying relations behind modern ideologies. By giving a history to contemporary ideology, critical archaeology helps to disassociate the events, structures, and processes of the past from their naturalized connection with the present. According to Russell Handsman (1981), a critical archaeology writes histories that show and explain structural continuities and cultural discontinuities and interrogates the relationship between the present and the past. Critical archaeologists argue that modern ideologies can be challenged as arbitrary and contingent on specific circumstances of social relations. This can be done by contextualizing the origins, or history, of these practices in discrete social forms and exploitative circumstances as these existed in the past. Since its introduction to the field, critical archaeology has expanded these ideas to

study the relational negotiations of class, race, sexuality, age, ethnicity, and gender. Much of this work has been influenced by Giddens and Foucault, and critical archaeologists have focused on shifting social relationships and behaviors instead of relying on static, essentialist categories.

The goal of critical archaeological work is to avoid creating self-justifying or ex post facto metanarratives by conducting careful analyses of archaeological materials using inclusionary, local histories (Schmidt & Walz 2007). The point is to understand the relationship of these identifying factors as tied to ideology as well as in relation to one another without mistakenly overemphasizing any one as causational or isolated. To study the negotiations of these identities in the past is to study inequalities and the genealogy of ideology which created and sustained them. Because of this, critical archaeology is concerned with memory and representation. Memory is argued to be necessary to understand society and control the future. Therefore, as an archaeologist, knowing the past and having the power to create a genealogy or speak to origins equates to the power to control. Genealogy is a political necessity and serves as an enduring form of polemical discourse (Shklar 1971), so critical archaeology becomes a tool to subvert ideologies by using material culture to make criticisms concrete, understandable, and testable. Critical archaeology is a way to make the memory of the past multivocal as well as alter popular and scholarly discourse of those who have been historically misrepresented. Critical archaeology recognizes that structural inequalities are created and reproduced through ideological narratives of the past. This ideology consists of illusions, seemingly natural, timeless, and placeless, that mystify exploitive conditions that are ultimately local and particularistic. In every locality, the past serves as a site of ideological struggle. Furthermore, while the subjects of critical archaeology are material (including objects, architecture, and landscapes) and ethnographic (including constructions such as race, class, gender, ethnicity, nation, and family), fundamentally its activities are social and political. Critical archaeology recognizes that its public activities, like all scholarly endeavor, operate as socially constituted agents with claims to authority over knowledge of the past (Castañeda & Matthews 2008). The responsibility of this position has resulted in an effort to form a praxis that mitigates, or maximizes, the effect of political critique in the present. This effort has theoretically been guided by the work of Lukács and Habermas. The work of Georg Lukács (1971) identifies the central importance for every critical scholarly endeavor to create an emancipatory consciousness among its audience. He does not, however, offer a model for how to proceed with this.

The work of Jürgen Habermas (1984) enables a way of imagining what the actualized goals of a critical archaeology might look like. Habermas emphasizes the significance of standard speech acts and dialogues where the voices of subordinate groups are unheard in the practice of everyday life. An ideal dialogue for Habermas exists where the voices of all parties are heard equally without being filtered by social inequalities so that a more equal negotiation can occur. In archaeology, this is especially crucial because competing interests frequently concern meanings assigned to the past. One of the key contributions of critical archaeology has been to introduce archaeology into public arenas (the media, museum exhibits, and interpretive programs) in new ways and to consider a responsibility to public audiences as a constituency for archaeological studies.

Public archaeology is probably the most accepted implication of the integration of critical thought into archaeological theory (Palus et al. 2006: 92). Publically oriented, community-based, and collaborative archaeology projects have functioned as experimental approaches to linking critical thought to archaeological practice. While methods vary, at their core, these approaches embrace political activism as a primary goal. All attempt to use interaction with the public to enhance this role. Many focus on minority communities with histories that have been excluded from broad historical narratives. Working with communities with histories of

ideological struggle illustrates one way ideology can be subverted or resisted in the present. In the process, they challenge monolithic, sanitized, or homogenized histories with the possibility of alternatives (Leone et al. 1995). Many scholars collaborate with politically and socially disfranchised communities to define research that maximizes its benefits (Colwell-Chanthaphonh & Ferguson 2008). Others use ethnographic techniques to understand past and present social groups in an effort to enhance the effectiveness of making connections to contemporary inequalities (Shackel & Chambers 2004). Most of these efforts use archaeology as the basis of community generation or empowerment (McDavid 2011). All these approaches vary as to the degree or type of accommodation or intellectual engagement scholars take with the diversity of groups that make up the "public" audience of archaeological work. Centrally, it is recognized that an unrelenting political activism coupled with self-reflexivity defines research that sustains an effective social critique. Notwithstanding the positive directions of this movement, however, it can be questioned whether it has brought the intended level of social commentary or analysis. The aim of linking the past with the present is seldom fulfilled, and there has not been the development among archaeological audiences of a historical consciousness, as Lukács intended, about the origins of present-day contradictory, unequal circumstances (Palus et al. 2006). Nonetheless, the application of critical thought implies a central importance for archaeology to make contributions to public political and social consciousness through its research activities. Exploring these modes of interaction reinforces and enhances the recognition of these social roles as central to archaeology among both the public and researchers.

International Perspectives

Globally, critical archaeology confronts political and economic power relationships – historical and contemporary, local and global – that have determined or guided our present understanding of archaeological pasts. Archaeology has operated globally for nearly a century now, embedded within the structures of political discourse. Critical perspectives in archaeology have only recently appeared as challenges to political hegemonies enunciated through understandings of the past. Undoubtedly, recognizing the complexity of this dialectic has vast implications for the study of fundamental subjects of archaeological research including identity, ethnicity, and nationality. Archaeology arose as a science alongside other aspects of enlightenment philosophy including the study of natural and cultural history. As such, it is entangled and embedded within the growth and spread of modernist ideologies including capitalism, colonialism, scientific racism or Eurocentrism, and nationalism. In fact, the global spread and local integration of these "haunts" has become, as Charles Orser (1996) suggests, the primary research interest of the historical branch of the discipline. As a symptom of this global modernism, archaeology shares a common genealogy with other perspectives that examine and represent the past. Archaeologist Bruce Trigger suggests that globally, the discipline must be understood as situated within the specific political and social circumstances of each country, such that there are many separate archaeologies present in the world today. As an effort to promote and explore a self-reflexive, politically conscious exploration of the uses of the past, critical approaches can be seen as an effort to disentangle these complex relationships. Recently, archaeologists across the globe have begun to investigate the implications of a relationship between the project of archaeological knowledge making and the development of individual nationalist histories. Philip Kohl (1998) suggests this recent awareness results from ethnic and religious tension and violence arising out of a postcolonial and post-Soviet political world, particularly in situations where archaeology has served a symbolic focus such as the Ayodhya temple in India and in the Israeli-Palestinian conflict. Critical work on the rise of nationalism by scholars such as Benedict Anderson and Eric Hobsbawm identified the central

role of constructed histories, mythologies, and the merging or diverging of ethnic identity employed by elites in the construction and maintenance of national ideologies. Archaeological material is particularly susceptible to political manipulation because of the way it can be appropriated and reproductively employed for political purposes as heritage, patrimony, and consumerist destination. In its history of functioning within governmental structures, archaeological research has served to facilitate the selective remembering, forgetting, or construction of historical traditions. With its power to influence or challenge written historical accounts with novel material evidence, archaeological evidence has proven invaluable in this capacity, establishing the authority of competing or conquering groups by shaping continuity or discontinuity with a particular historical era or movement. The appropriation and preservation of archaeological sites can serve to invent or subvert heritage in ways advantageous to dominant groups, excluding those on the margin. In such cases the formalization and governmentalization of historic preservation can serve to promote, diffuse, and maintain the authority of a nationalist ideology. In rejection of archaeology as reinforcement or confirmation of ideological integrity, recent critical traditions in archaeology worldwide have focused on suppressed or forgotten aspects of social, political, and economic history, bringing attention to the contradictions of modernist progress: capitalist excess, violence, and political inequality (González-Ruibal 2008). Much of this research is focused on recent history, rather than distant mythologized pasts, as a more appropriate or poignant parable for the present, challenging the distance society places between comfortable remote pasts and the ambiguously detemporalized present. Subjects such as battlefields, ruins, environmental disasters, mass graves, and concentration camps help archaeologists point to absences in memory and accounting that make up the present. Such archaeologies serve to dismantle the ideological mediation of political extremism it once served to promote throughout the violence of the twentieth century.

Future Directions

Classic Marxist theory has consistently focused on praxis, or the ways in which people transform themselves and the world (McGuire 2006). Through the integration of social theory and praxis in the form of critical theory, archaeologists had the theoretical tools and the opportunity to change their scholarship. The attempts to do this are exemplified in the resulting work of many public archaeology projects. Upon reevaluation of these community-based or collaborative efforts, many scholars in the past decade have pointed out that challenges to standard and current ideologies were failing and that the intended archaeological praxis had still not been achieved. One reason for this was noted by Leone (1995) in his assessment of the effectiveness of the Archaeology in Annapolis project. Because the vast majority of people who visited and inhabited Annapolis were mostly of a certain class, alternative histories beyond that of the dominant narrative were simply not accepted as legitimate. As residents of the historic district and as tourists of Annapolis, these groups already belonged to a privileged class. Therefore, the acceptable history for this group of people would inevitably resonate with the dominant ideology already present. Understanding this, the idea of communicative action taken from Habermas was incorporated. For archaeology, this meant that cooperative action aimed at creating alternative narratives and denaturalizing current ideologies would only be taken if and when people had been collectively subordinated through inequality, exploitation, or societal contradictions (McGuire 2006: 132-3). Beyond addressing this issue with critical archaeological praxis, there remains one major aspect of a critical theoretical approach which has been consistently rejected – the dominant ideology thesis.

In the past several decades since critical theory was first introduced to archaeology, many scholars have abandoned a totalizing version of Marxism; their critiques were mainly based on the use of strong formulations of ideology drawn from the work of Althusser. In the work of

Althusser (1971), dominant ideologies are so pervasive and unavoidable that those not of the dominant class are unable to see the realities of their own oppression. This oppression is hidden in a false consciousness which naturalizes class-based inequalities. The dominant ideology model or the top-down approach has been variously criticized as not problematizing the terms ideology, capitalism, or class; for reifying capitalist ideology; and for personifying ideology as something that is beyond human control. Critics have highlighted how this approach ignores the complex relationships between individuals and society. Many scholars also became dissatisfied with how this model prevented archaeologists from studying the ways that individuals could engage in social agency. The passivity of individuals in critical archaeological interpretations was criticized as yielding nothing more than victims of elite or upper-class ideologies and structure. In this way, critical archaeologists were accused of recreating the very capitalist ideologies which they had hoped to challenge (Wilkie & Bartoy 2000). While these are all valid criticisms, bringing much needed debate to the table, we argue that a complete rejection of dominant ideology does not take into account the ways in which individual agency is limited in class-based societies today as it has been in the past (Palus et al. 2006). Beyond disagreements concerning the place of a dominant ideology model, today many of the fundamental principles of critical theory are much less controversial in the discipline of archaeology and in other disciplines of the social sciences and humanities.

These ideas have resulted generally in the widespread practice of questioning and innovation within disciplinary methodologies. First is the rejection of the idea that the past is simply in the ground waiting to be discovered by archaeologists. Second is the principle that accepts that the past is created by the conditions of the present and that it can be a powerful political tool for those living in the present. Third is the promotion of archaeology as a form of political activism, one version of which can be practiced through community-based projects. Often, these key contributions of critical theory are utilized in archaeological projects, though scholars do not explicitly cite critical theorists or call the projects critical archaeology. One reason can be explained through the acknowledgement that critical and Marxist projects join feminist, post-processual, and indigenous critiques of archaeology by calling attention to many of the same key issues. Some of these include skepticism toward the way the past has been interpreted, a reflexive perspective about the research and the position of the archaeologist, and a striving for social or political change in the current world. The goals of many of these approaches complement and frequently overlap with those of critical archaeologists. Another reason for avoiding explicit adherence to critical archaeology in archaeological projects and literature may be the aversion to strong formulations of dominant ideology, which have been previously mentioned. While many of the key ideas and critiques of critical archaeology are widely accepted and incorporated into research regimes, many are reluctant to explicitly employ the approach because of the critiques against one of its foundational principles. Scholars therefore tend to move away from explicitly acknowledging the employment of critical theory, opting rather for indicating the use of a more temperate version of the approach. Frequently this appears as work which states the use of a critical approach, a critical perspective, or that is critically informed. This general evasion of an explicit theoretical approach has led to recent critiques of archaeologists having anti-theoretical tendencies (Meskell 2002: 279). We argue that frequently, these researchers are indeed employing critical theory, albeit adapting it to their own projects.

Ultimately a critical archaeology is an anthropological effort exploring and hoping to affect the social consciousness of actors in the present and our relations to the past. It recognizes the variability in access to understanding the past and acceptance that multiple versions of the events of the past are likely to coexist. A critical archaeology hopes to confront these differing understandings by making people aware of this multiplicity with the assumption that each

version is an intact, valid, and internally coherent perspective. Such an approach works with descendent communities, retrieving histories from within their own perspectives. It can also be a way to confront these different perspectives without destroying them.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Historical Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Leone, Mark P. (Theory)
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Practice Theory in Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Reflexive Approaches in Archaeology, Development of
- ▶ Reflexivity in Archaeology

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Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories

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Introduction

The Greeks were a mobile people who regularly interacted with a host of non-Greek populations near and far, from the Bronze Age through the historical periods. In particular, a strong maritime orientation facilitated contact with distant people and places. These interactions were both direct and indirect; peaceful and violent; purposeful and incidental; ephemeral and profoundly influential; short-lived and enduring. This entry attempts to characterize current issues and debates surrounding the archaeology of cross-cultural contact from the Bronze Age to the end of the Classical period (Figs. 1 and 2). Once Alexander and his successors initiated the Hellenistic world, an entirely new set of issues concerning Greek identity and culture came into play, which for reasons of length are not included here.

Definition

The simplest way to envision cross-cultural interaction is in terms of the movement of people from one culture area to another, but the reality is much more complex. Cohabitation with non-Greek populations at home and especially in colonies abroad provided the greatest cultural impact, but is only one of several dimensions of cross-cultural interaction. Profound innovations in language, art, and technology were initiated indirectly through the activities of a small number of merchants, craftsmen, and other travelers. We learn about these contacts through ancient texts (including prose histories; verse epics, odes, tragedies, and comedies; and inscriptions) and from the archaeological record. Durable archaeological objects are a minimal residue standing in for a diverse array of perishable and non-material products, including foodstuffs, raw material, technologies, aesthetic tastes, and cult practices. These may be passed directly from one people to another, or they may travel indirectly through a series of intermediaries. Objects and ideas are commonly transformed in function and meaning as they are transferred from one cultural system to another. To cite one example, in the Archaic period, *kouros* and *kore* statues derived from Egyptian statuary (Fig. 3) were adapted to the project of aristocratic self-definition in Greece, as dedications at sanctuaries and prominent markers on elite graves. In these and similar cases, foreign objects and ideas could assume new roles, often as elements of social contestation, once they were "domesticated," i.e., integrated into intelligible codes or systems of meaning in Greek society.

Cross-cultural interaction can be characterized along several dimensions: (1) the occasions, or *modes*, of cross-cultural contact; (2) the instigator(s) of and participants in the contact; (3) the location of the contact; (4) the material and intellectual products (goods and ideas) moved and exchanged through the contact; and (5) the ramifications and effects of cross-cultural contact. The usual modes of contact include exploration, trade, colonization, diplomacy, military action, and communal activity (such as religious pilgrimage). These categories obviously overlap in multipurpose travels and interactions. Exploration and trade relations for the purpose of gaining access to supplies of raw materials, particularly precious metals in which Greece is poor such as copper, tin, and gold, began at least as early as the Bronze Age and continued through the historical periods. Colin Renfrew's "modes of exchange" (Renfrew 1975: 41–3) are still useful models for the myriad locations and relationships through which trade was carried out (Fig. 4). Exploration was also directed toward the foundation of

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 1 (**a**) Map of the Mediterranean with sites mentioned in the text; (**b**) Detail map of the Aegean with sites mentioned in the text. Base maps ©Daniel Dalet

colonies, ranging from coastal footholds to secure access to trade items, to permanent agricultural settlements. "Protocolonial" activity can be recognized already among the Minoans and Mycenaeans of the Bronze Age, a prelude to the massive experiment in cross-cultural interaction that was the great colonizing period (c. 800–500 BCE). Although the Greeks were intrepid

Conventional period name	Approximate calendar dates (B.C.)	Key events
Early Bronze Age	3100–2100	Early Cretan contacts with Egypt
Middle Bronze Age	2100–1600	Minoan palaces on Crete
Late Bronze Age	1600–1150	Mycenaean palaces on Greek mainland
Iron Age	1150–700	"Dark Age" c. 1150–850; "Eighth Century Renaissance"
Submycenaean	1150–1050	Nadir of Greek overseas contacts
Protogeometric	1050–900	Prominence of Lefkandi on Euboea island
Early Geometric	900–850	Phoenicians re-engage with Aegean
Middle Geometric	850–750	Pithekoussai settled; alphabet adopted from Phoenicians
Late Geometric	750–700	Great age of colonization underway
Archaic	700–490	Colonies reach from Spain to Black Sea
Classical	490–323	Persian Wars conclude in Greek victory, 479 B.C.

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 2 Basic chronological chart for later prehistory and early history

explorers, contact was also initiated from outside, with Phoenician westward expansion making the most enduring contribution in the form of the adaptation of the West Semitic alphabet to the Greek language. Greeks and Phoenicians encountered one another in their respective homelands as a result of the impulse to trade, and subsequently in the central Mediterranean where they were both active in establishing coastal settlements and trading posts. Across the Mediterranean, networks of interaction resulted in widespread sharing of material culture, technology, and customs. While the Greeks transmitted an appreciation for their fine painted pottery and cultural practices such as wine-drinking and sympotic feasting, they absorbed iron-making technology, the decorative motifs and aesthetics of the "Orientalizing" style, and the Phoenician alphabet. Further, the crucible of colonial interaction was partially responsible for the formation of a collective, "Hellenic," identity in the Archaic and Classical periods (Mitchell 2007; Malkin 2011). In recent years, archaeologists have shown intense interest in exploring each of these dimensions, through a combination of archaeological fieldwork, laboratory analysis, and theoretical modeling.

Historical Background

In the Bronze Age, two complex, palace-based societies arose in the Aegean – the Minoans on Crete and the Mycenaeans on the Greek mainland. Both are thought to have emerged under some influence from an already established state. In the years just before the first palaces appeared on Crete, Minoan contacts with Egypt and the Near East increased dramatically, embracing not only exchanges of material culture such as scarab seals and stone vessels, but also transfer of technologies of metal and faience working, as well as the sail. Some of the structural changes in Cretan society that paved the way for the first palaces, including urbanization and administration using hieroglyphic writing and seals, may have been inspired by these contacts. The presence of Cretan craftsmen in the East is implied by Aegean-style wall paintings at Tel Kabri in Israel, Alalakh and Qatna in Syria, and Tell el-Dab'a in Egypt, ranging from the late seventeenth to the fifteenth century BCE (Cline et al. 2011). Egyptian New Kingdom tomb paintings appear to depict Cretans, described as "Keftiu," presenting gifts to the pharaoh (Panagiotopoulos 2001).

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 3 The Kroisos kouros, from Anavyssos (Attica). National Archaeological Museum, Athens. http://upload.wikimedia.org/wikipedia/commons/e/ea/Kouros_anavissos.jpg

The rich Shaft Graves of Mycenae, which represent the first stirring of complex society on the mainland, betray strong influence from Neopalatial Crete in iconography, ceramic forms and styles, metalworking, and funerary architecture. It is often suggested that a "special relationship" with one or more Minoan palaces gave nascent elites at centers like Mycenae access to exotic materials and artisans. The influx of Minoan goods and ideas destabilized the egalitarian social structures of Middle Helladic Greece and created opportunities for social differentiation, setting into motion a gradual trajectory toward the Mycenaean palaces (Voutaski 2010).

The discovery of Mycenaean fine painted pottery at hundreds of sites from the Near East to the central Mediterranean shows the extent to which the palaces participated in cross-cultural trade networks, but the nature of those relationships is not so easy to ascertain. It is still uncertain whether Mycenaean merchants or palatial representatives actually visited all of the coastal areas where the pottery appears, rather than relying on middlemen such as Cypriots to transship Mycenaean products (Bass 1998). In Egypt, there are no certain visual representations of Mycenaeans comparable to the Keftiu depictions. At Tell el-Amarna (ancient Akhetaten, the capital of the heretic pharaoh Akhenaten), thousands of sherds of Mycenaean pottery have been recovered, but this impressive corpus is not matched by a single mention of Mycenaeans in the contemporary Amarna archives (see Hankey 1981). On the other hand, two artifacts offer tantalizing but controversial evidence for more significant relations. The so-called Aegean List inscribed on the back of one of five statue bases at the mortuary temple complex of Amenhotep III (reign c. 1390–1352 BCE) mentions more than a dozen places in the Aegean, and has been interpreted by some as the itinerary of a royal diplomatic mission. The second artifact, a papyrus fragment from Amarna dated to the mid-fourteenth century BCE, bears a painted scene in which a group of Mycenaean-looking soldiers appears to fight alongside Egyptian comrades. If this interpretation is correct, it suggests that the later tradition of Greek mercenary activity around the Mediterranean has a Bronze Age antecedent.

The poverty of Greece in a host of raw materials, particularly metals, compelled the Mycenaean palaces to tap into eastern Mediterranean networks in which copper, tin, and other metals circulated, and may have encouraged early exploration of Sicily and southern Italy. The concentration of precious metal objects in tombs and the careful control over supplies of raw metals implied in the Linear B tablet archive at Pylos demonstrate how essential they were to the Mycenaean palatial elite. The Uluburun ship, which sank off the coast of southwestern Turkey

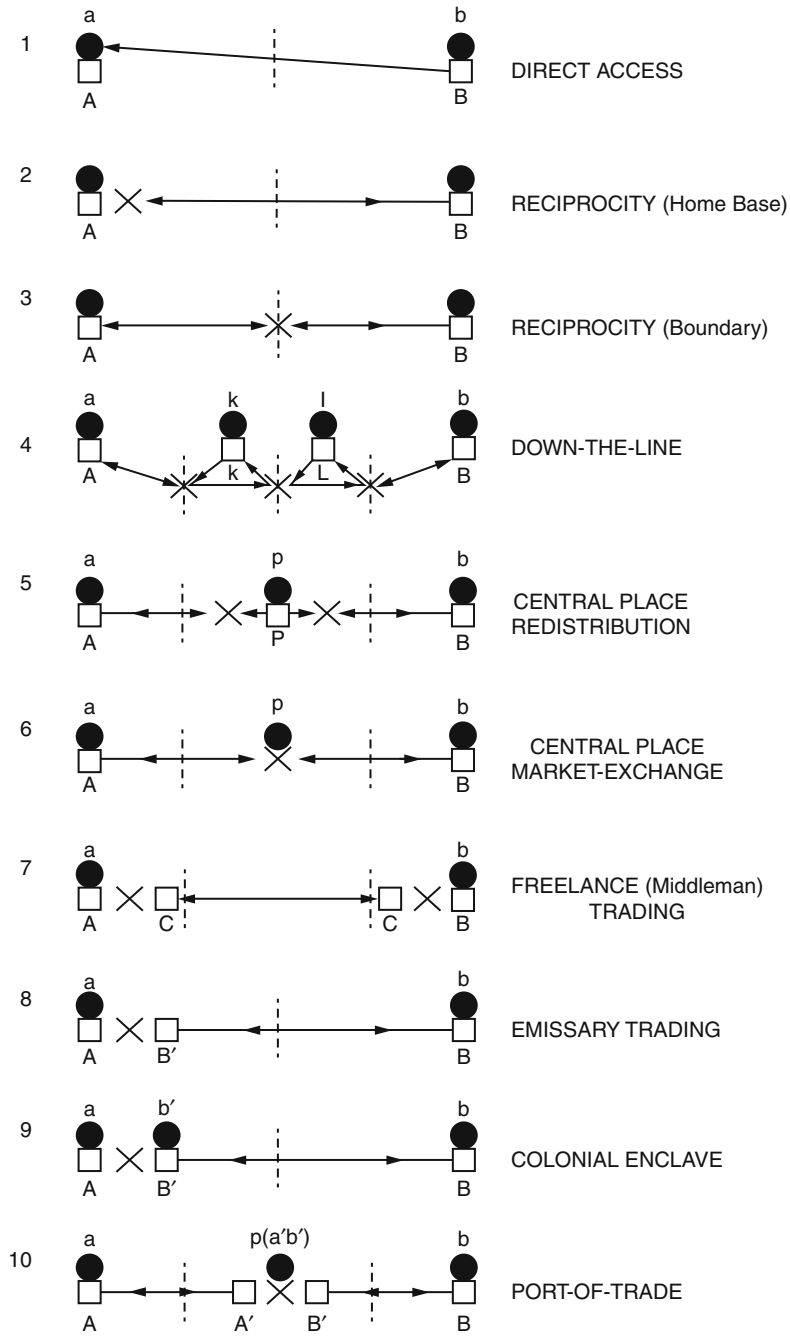

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 4 Graphic representation of Colin Renfrew's modes of exchange (Renfrew 1975: 42, Fig. 10)

c. 1300 BCE with a primary cargo of 10 t of copper and 1 t of tin, may have been sailing toward one of the Mycenaean palaces (Pulak 2005). Few finished objects of foreign origin have been found in Mycenaean Greece, however, and the pattern of their distribution suggests that palaces had rather specific relationships, e.g., Mycenae with Egypt and Tiryns with Cyprus. Further, the Linear B tablets contain virtually no explicit references to long-distance trade, with the result that scholars must resort to reading ethnic identifiers ("Cypriot" persons or products;

"Women of Asia" taken as slaves) or exotic commodities (sesame, gold) to reconstruct cross-cultural contact of any kind (Chadwick 1976).

The Minoans and Mycenaeans established contacts and later colonies in the Aegean islands and on the Aegean coast of Asia Minor at Miletus; the Mycenaeans pushed west into the central Mediterranean. Their extra-Aegean interventions and trading activities may have had little cultural impact, however. A contextual analysis of the Mycenaean pottery at the *emporium* (trade outpost) at Ugarit on the Syrian coast revealed that these fineware vessels were neither restricted in their circulation nor held in particularly high esteem (van Wijngaarden 1999). The Mycenaean colony at Miletus is a special exception since most scholars now accept that the *Ahhiyawa* in Hittite New Kingdom records refer to Mycenaeans, who possessed a foothold at *Millawanda*, or Miletus. The Ahhiyawa were an irritant on the western flank of the Hittite Empire, but at least for a time, the Hittites accorded the king of the Ahhiyawa the status of Great King, equivalent to other Near Eastern monarchs. This short-lived diplomatic status ended before the Mycenaean settlement at Miletus was finally destroyed in the later thirteenth century BCE (Niemeier 2003).

The Mycenaean world experienced various disturbances in the second half of the thirteenth century BCE, culminating in the final collapse and disappearance of the palatial system shortly after 1200 BCE. The causes of the collapse are largely speculative, but a complex mix of universal and locally specific, environmental and social/cultural, factors cannot be doubted (see Middleton 2010). Disruption of long-distance trade routes supplying raw materials, linked with widespread disturbances in the eastern Mediterranean, may have been one contributing factor that undermined the capacity of the Mycenaean palaces to reward loyal elites with status goods and to produce weapons and armor.

It was long assumed that the collapse of the palace system ushered in a Dark Age of some 400 years duration, but recent research has challenged the characterization of the period 1200–800 BCE as a time of grinding poverty and isolation. There was no complete break in cross-cultural communication; in the twelfth century BCE, Tiryns maintained contacts with Cyprus and Crete, and small objects from Syria, Egypt, Mesopotamia, and Cyprus were deposited in the chamber tomb cemetery at Perati on the east-facing Attic coast. Maritime activity was especially vigorous on both sides of the Euboean Gulf, where depictions of galleys were painted onto pottery (Crieelard 2006; Dakoronia 2006). At Lefkandi on Euboea's western coast, Cypriot, Egyptian, and Syro-Palestinian objects were placed in graves in the mid-eleventh century BCE. Iron technology was transmitted to Greece from Cyprus during this period, perhaps by the descendants of Greeks who fled the palatial collapse. Other descendants of Greek refugees may have formed the Aegean cultural element that is strongly expressed in the Philistine cities of the southern Levant. In the depths of the Dark Age, c. 950 BCE, Lefkandi produced a remarkable apsidal building measuring 45 × 10 m with mud-brick walls on a stone socle and an exterior peristyle of wooden posts. Near the center of the building's interior were two graves, one containing the cremation burial of a male and the inhumation of a female, and the other four sacrificed horses. The bronze vessel holding the man's remains and some of the woman's jewelry were Bronze Age heirlooms from Cyprus and the Near East. Subsequent burials in the adjacent Toumba cemetery (c. 950–825 BCE) contained many examples of bronze and faience vessels of Egyptian or Syro-Phoenician origin (Thomas & Conant 2003: 85–102). In the postpalatial period, the Cypriots pursued an active and independent overseas agenda with ties in the Levant, the Aegean, and the central Mediterranean; it is conceivable that Greeks accessed Near Eastern materials through Cypriot intermediaries. Nevertheless, sites with international contacts were exceptional and despite more positive assessments and new light shed on the Dark Age, the view from Greece was still one of attenuated contacts with the outside world by comparison with Mycenaean palatial times, and much diminished indicators of social, political, and economic complexity. A general model that sees palatial collapse and a subsequent twilight of Mycenaean

culture from 1200 to 1000 BCE, followed by rupture and depression between 1000 and 800 BCE, and finally regeneration of complex society after 800 BCE, has many adherents (Morris 2006).

The explanations for regeneration in the so-called Eighth-Century Renaissance are varied. Population growth, perhaps linked to a favorable shift to a wetter, cooler climate in the Mediterranean, is reflected in significant increases in site numbers and burials (see Morris 2009). Phoenician commercial expansion westward, driven at least in part by pressure from the Neo-Assyrian Empire, began in the ninth century BCE and soon impacted Greece. It is possible to trace early Phoenician routes and entrepôts in the archaeological record. The Tyrians established a colony on Cyprus at Kition in the second half of the ninth century BCE, followed by enclaves at a number of indigenous coastal settlements well situated to exploit copper resources and as transshipment nodes. En route to the west, the Aegean was integrated into Phoenician maritime networks, and some places became important stopovers. On a direct sea lane to the central Mediterranean lay Rhodes and Crete. After sporadic traces of contact in the ninth century, during the eighth century BCE, Rhodes imported Phoenician luxury goods (ivory, shell, gold, and silver jewelry), and workshops on the island produced imitations of Phoenician and Cypriot pottery and faience (see Markoe 2000). Crete too was visited fairly regularly by the ninth century. At the port of Kommos on Crete's southern coast, a Phoenician-style tri-pillar shrine founded c. 800 BCE, associated with Phoenician pottery of the ninth and eighth centuries, gives witness to mariners' worship and ritual banqueting (Shaw 1989). From Rhodes and Crete, the Phoenicians established other sea lanes through the Cyclades and via Kythera to the Greek mainland. These forays activated Euboean interest and initiated Greek-Phoenician entanglements that would take on increasing frequency and significance over the next few centuries. The Euboeans became prominent partners in east–west maritime trade. Al Mina, a harbor founded on the north Syrian coast c. 800 BCE, produced for the first time a large quantity and wide range of Greek ceramics, well in excess of the amounts known from contemporary sites of the Levant. To some, this distinction suggests a Greek settlement or a Greek-Phoenician foundation, but on archaeological grounds, this is unlikely, since indigenous pottery is at least as abundant as Greek, and elements of Greek domestic life, notably a kitchen assemblage, are conspicuously absent. More plausible is that Al Mina was an emporium frequented by Greek traders, who perhaps resided there on a seasonal basis. The initial exposure of Greeks to the Phoenician alphabet must have occurred in a setting of intensive interaction, either at an eastern emporium such as Al Mina or Kition, or aboard merchant ships carrying multinational crews (Woodard 1997).

Greek colonization around the Mediterranean, falling mainly c. 800–500 BCE, was the most important development in cross-cultural interaction prior to the military conquests of the Hellenistic period. The so-called Aeolian and Ionian migrations of Greeks to Anatolia's Aegean coast as early as the eleventh to tenth centuries BCE are largely the creation of retrospective traditions that served the needs of Greeks of the Persian War era and later for civic propaganda and to justify hegemonic claims, such as Athenian leadership of the Delian League (see Rose 2008). Archaeological evidence for the organized establishment of Greek colonies abroad is scant before the eighth century, but once underway, the proliferation of colonies was rapid and spread from Spain to the Black Sea.

The motivations for planting settlements beyond the Aegean must have been diverse. The perennial search for metals, focused increasingly on iron ores, encouraged early exploration, but to a great extent, Greek colonists sought new agricultural territories. Population growth may have put some pressure on land by the eighth century, but it is more accurate to say that common farmers were incrementally disenfranchised by a burgeoning aristocracy that appropriated the best agricultural land. Joining these unfortunates must have been victims of intra-elite conflict, sons shut out of inheritance, and miscellaneous adventurers, though in later stages, colonists were

formally conscripted and some method must always have been in place to ensure that the party had the necessary blend of numbers and skills to survive. Some colonial migrations occurred under threat: In the late seventh and sixth centuries BCE, the Milesians and Phocaians sent out many colonies to the central Mediterranean and the Black Sea under pressure from the Achaemenid Empire. Traditions about colonial foundations and their affairs were recorded in literature and inscriptions in the Classical period and beyond (for examples, see Dillon & Garland 2010). Many colonial forays, about which we know little or nothing, failed.

Pithekoussai, the modern island of Ischia in the Bay of Naples, is usually thought to be the site of the earliest Greek colonial foundation c. 775 BCE. The original impetus for the settlement may have been to secure access to Italian metal ores, perhaps following along with the Phoenicians, who were exploiting sources in Spain, Sardinia, and North Africa. Yet, within a generation, the population reached 5,000–10,000, according to cemetery evidence, possibly contributing to the foundation by c. 730 BCE of Cumae, a colony on the Italian mainland with far more space for agricultural expansion. Although Pithekoussai was held by tradition to have been a Euboean foundation, archaeological evidence indicates a mixed population of Euboeans, East Greeks, Phoenicians, and indigenous people (Ridgway 2000). This cosmopolitan milieu is vividly evoked by the late eighth century cremation burial of a 10-year-old boy, furnished with Protocorintian and Phoenician style pottery and the famous "Cup of Nestor," a Late Geometric Rhodian kotyle inscribed with a whimsical graffito in accomplished Euboean script: "I am the cup of Nestor, good to drink from. Whoever drinks from this cup, may desire of fair-crowned Aphrodite seize him" (Osborne 2009: 109). The reference to Nestor seems a deliberate allusion to a story in the *Iliad* (11.632–637) about a golden cup that only the old Pylian king could lift.

The western episodes in Homer's *Odyssey* are often read as metaphors for early colonizing expeditions, and can be understood in light of cross-cultural encounters. Once the action moves from the Aegean and eastern Mediterranean into the central Mediterranean, places and characters shift from the real and identifiable (e.g., Pylos, Sparta, the Nile River) to an unreal world of monsters, goddesses, and the realm of the dead. Some of the sea-tales in the *Odyssey* might reflect the imperfect knowledge of these new worlds, and fears of hostile indigenous people. Odysseus and his men repeatedly encounter natives living in incomprehensible ways, from the Cyclopes living in isolation from one another and failing to recognize the rich agro-pastoral and maritime potential of their offshore island (*Odyssey* 9.116–139), to the cannibalism of Scylla, the Cyclopes, and the Lystraegonians. False or exaggerated representations of the "other" in seafaring lore served to underscore the dangers of incipient contacts in the absence of a common language or customs.

Once colonial expansion opened up distant worlds, the effect on the Greek mainland was dramatic. New trading opportunities in the West prompted Corinth to found colonies such as Corcyra and Syracuse, and to export its distinctive painted fineware, which dominated western markets between c. 725 and 575 BCE until superseded by Athenian black-figure and red-figure production. Etruscan elites, from whom Greek merchants sought metals, became consumers of Greek pottery, aesthetics, and the alphabet. In the East, the mobility of Greek colonists, merchants, craftsmen, and mercenaries during the eighth and seventh centuries resulted in the introduction of a range of craft skills and artistic influences from Anatolia, the Levant, and Egypt to Greece. Among these were techniques in bronze working and textile manufacture, and the striking "Orientalizing" style in pottery, characterized by a new range of decorative motifs, most prominently griffins, lions, sphinxes, lotuses, rosettes, and palmettes, arranged in horizontal friezes across the body of the vessel (Fig. 5). The growth of Panhellenic sanctuaries in Greece, particularly at Delphi and Olympia, was bolstered by colonial dedications and the efforts of colonials to proclaim their Greek identity by participating in mainland communities of cult. By Classical times, general prosperity and population growth

Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories, Fig. 5 Orientalizing motifs on a Protocorinthian olpe c. 640–630 BCE, from Corinth. Louvre Museum, Paris. http://upload.wikimedia.org/wikipedia/commons/c/cc/Olpe_sphinx_Louvre_Cp10475.jpg

in partly urbanized city-states sometimes strained agricultural resources. Athens relied to some degree on imports of Black Sea grain, and one inscription records that Cyrene, a prosperous Greek colony in North Africa, distributed a gift of 50,000 t of grain to 41 cities on the Greek mainland and islands in response to a general famine in 330–326 BCE (Tod 1948: #196). These examples merely scratch the surface of the free flow of goods and influences in all directions, but they illustrate the profound effects of cross-cultural interaction and the central role of colonization in shaping Greek history.

Warfare, and the diplomatic interactions surrounding it, introduced violent cultural encounters, and the Persian Wars were particularly pivotal in helping to define a Greek identity in opposition to a caricature of Eastern culture. Greek mercenary activity, so familiar to us from Xenophon's *Anabasis*, was a fixture of the Archaic and Classical periods (Trundle 2004).

Key Issues/Current Debates

Current discourse concerning cross-cultural contact in the ancient Greek world is best understood in the context of a postcolonial scholarly milieu. There is a pronounced movement away from Helleno-centric perspectives, including notions such as "Hellenization," toward investigating cross-cultural interactions as diverse and locally contingent encounters in which indigenous communities are active agents who, more often than not in the period under consideration, were able to selectively adopt or reject elements of Greek culture, and who negotiated their relationship with colonists. There is also a realization that in these increasingly nuanced and situational scenarios, the "Greek–native" binary is both untenable and archaeologically problematic. Much attention has been directed to deconstructing notions of identity and ethnicity, and to exploring archaeological approaches that may result in meaningful insights on cross-cultural interaction. The encounters of Greeks with non-Greeks around the Mediterranean have been examined across multiple scales, from microregions to world systems, using the language of connectivity and network analysis.

A number of theoretical perspectives begin from the premise that ancient societies did not exist in isolation, but tended naturally to interact across geographic and cultural boundaries. The late nineteenth and early twentieth century CE witnessed the final phases of European colonialism around the world; the virtual enslavement of entire nations was justified by various means, including explicit comparison with Greek colonization or the imperial expansion of Rome. V. Gordon Childe's diffusionist models of *ex oriente lux* seemed to fit the archaeological record and support the notion that human advances emanated from certain centers of enlightenment and diffused outward over time. The radiocarbon revolution of the post-World War II years appeared to

confirm a pattern of the gradual spread of agricultural and metalworking technologies from the Near/Middle East westward.

These ideas can be characterized as *hierarchical* and *generalizing*, in that they assume relationships of inequality between dominant and acquiescent partners, and they tend to work at broad geographical and temporal scales in which entire corporate entities – societies or social systems – are the actors. A natural outgrowth of hierarchical models of cross-cultural interaction was a focus, beginning in the 1970s, on *cores* and *peripheries*. A typical scenario might involve a powerful center or core seeking raw materials from a distant and comparatively underdeveloped periphery. A coherent framework for these ideas was found in the *world systems theory* (WST) of Immanuel Wallerstein (1974), which sought to explain the global emergence of modern capitalism in terms of European core states siphoning off raw materials from politically and technologically underdeveloped Third World nations. Using superior political organization and technology, these cores exploited the periphery with seeming impunity by exercising control over production, transportation, and communication. In spite of Wallerstein's own objections, WST in some form has been applied to the ancient world in the Near East, the Mediterranean, Mesoamerica, the American Midwest, and elsewhere. Whether such world systems of dominant cores exploiting distant peripheries existed in the ancient world – indeed, whether WST has a useful application in archaeology – has been sharply debated for decades. Applied to the Greek world, the existence of a proliferation of small, independent political units from prehistory to the end of the Classical period makes it difficult to speak of a powerful core able to dominate a distant periphery. A dubious holdover from Wallerstein's original formulation is the absence of agency in the periphery. The more plausible reality is that neither the foreign party, separated from its center of power, nor the indigenous community, less developed politically and economically, could impose its will forcibly; thus, some form of accommodation had to be negotiated. As a consequence, each encounter was unique and contingent upon specific local and historical process, and generalizing perspectives such as WST have been criticized as unable to capture the diversity of these cross-cultural encounters (see Stein 1999).

On the other hand, critics often fail to acknowledge that WST has been modified to better fit the circumstances of the ancient world. Nick Kardulias (2009: 54) recommends the name *world systems analysis* (WSA) to emphasize the multiplicity of theoretical approaches now assembled under the world systems umbrella, and to make a clear distinction between current applications and Wallerstein's original model. Among the refinements is the realization that "complete domination of a peripheral zone was technologically and politically impossible" (Kardulias 2009: 58); accordingly, relations are described not in terms of domination or hierarchy but as differentiation of roles in interregional economic networks. Agency is accorded to communities who are able to negotiate the terms of their peripherality. By accommodating valid critiques and riding contemporary interest in globalization, WSA emerges as potentially complementary to the study of cross-cultural interaction at the local or regional level.

Current research on cross-cultural interaction is profoundly influenced by the postcolonial critique of European colonization, which seeks explicitly to restore agency to colonized societies by examining their responses, which might include various forms of resistance to, or selective adoption of, colonial culture (Lyons & Papadopoulos 2002). Furthermore, the general concern of postmodern studies to deconstruct and fragment conventional categories has caused notions of Hellenization, in which indigenous people are passive recipients of Greek knowledge and culture, to fall out of favor as has "Romanization" for the Roman world. Curiously, however, the postcolonial critique as a modern literary and political movement is not particularly well suited to describing or analyzing Greek colonization around the Mediterranean, because it focuses primarily on the specific conditions of modern European imperial oppression and the

efforts of colonized people to regain agency for their own histories. As a result, this point of view tends to perpetuate the assumption of relationships of dominance and dependence, of static and monolithic entities embedded in asymmetric and mutually antagonistic relations, replicating Wallerstein's colonial world of cores and peripheries. Yet Greek colonization of the eighth to sixth century BCE was nothing like the British Empire, or even the Roman Empire. A few obvious differences were the absence of a nation-state, the lack of a coherent imperial strategy or "civilizing" mission, and the essential independence of the colony from the mother city (claims to the contrary were usually pressed only at times when crucial strategic imperatives were at stake, or when some advantage was to be had from a successful colony, as in the famous case of Thera from Cyrene; see Osborne 2009: 8–17). It is highly debatable whether Greek colonists of the Late Geometric to Archaic periods were ever able to dominate indigenous peoples any more than Minoan or Mycenaean colonists had before them.

An important, and vigorously debated, question is whether cross-cultural interaction in colonial settings helped to forge collective Greek identities – a sense of common "Greekness" or "Hellenicity" based on shared traits and practices in contrast to those of indigenous people. Ethnicity, or ethnic identity, has attracted the most attention, but shared age, gender, cult practice, and geographical territory are alternative criteria for the formation of collective identities. Identities are constructed, rather than inherent, self-definitions, and as such are deployed situationally and change over time. Multiple identities can and do exist for an individual or community at any given time; a Greek inhabitant of Syracuse might think of himself simultaneously as a citizen of the Syracusan polis, a colonist from Corinth, a Dorian, a Greek, and a *Sikeliote* (Greek living in Sicily) (Malkin 2011: 18–9). These cross-cutting and sometimes competing identities could be invoked strategically to fit the situation: In 424 BCE, Hermocrates the Syracusan urged representatives of the Sicilian Greek cities to place their common interests as Sikeliotai, neighbors sharing an island home, ahead of their civic and ethnic (Dorian, Ionian) identities in order to meet the Athenian threat (*Thucydides* 4.61).

Ethnicity as a special form of collective identity has been foregrounded because of Jonathan Hall's provocative thesis on ethnogenesis in Greek society (Hall 1997, 2002). Hall challenged the prevailing notion, most explicitly expressed by anthropologist Frederik Barth, that "core ethnicities" do not exist; rather, ethnic groups and their boundaries are defined *oppositionally* against the traits and practices of others (Barth 1969). According to structuralists like Lévi-Strauss, humans are mentally predisposed to this sort of binary thinking. By this definition, colonial encounters would *prima facie* be ideal crucibles of ethnogenesis as Greeks recognized their stark differences with natives and at the same time all that they shared with Greeks wherever stationed. Hall proposed, however, that in the Archaic period, a common Hellenic identity was achieved by *aggregative* means through the creation of mythical genealogies by which the traditional "subethnicities" (Dorian, Ionian, Aeolian, Achaean, etc.) were subsumed under a common, fictive set of Panhellenic kinship relationships. Only later at the time of the Persian Wars did the need to unite the Greeks against a barbarian Other result in recourse to an oppositional sense of common identity composed on cultural rather than ethnic grounds: Herodotus (8.144.2) famously has an Athenian envoy appeal to multiple dimensions of a collective Greek identity on the eve of the Persian invasion of Athens: "Again there is the Greek nation—the community of blood and language, temples and ritual; our common way of life…" (transl. Aubrey de Sélincourt). Hall denied that colonization made a significant contribution to a common Hellenic identity, because the cross-cultural experience of difference forged only civic or regional, not Hellenic, concepts of identity.

Hall's specific criteria for ethnicity and ethnogenesis – common descent and place of origin – in the Archaic period have been generally criticized as too narrow (Antonaccio 2001; Malkin 2001; Mitchell 2005). Lynette Mitchell

emphasizes the role of cult in ethnogenesis: In the Iron Age, when regional authority was weak or absent, communities of cult served as aggregative centers of identity formation, and certain sanctuaries grew to regional and finally Panhellenic prominence as at Olympia and Delphi, contributing heavily to a common Hellenic identity. In at least one case, an oppositional sense of Hellenic identity was fostered in a colonial setting in the sixth century BCE. At Naukratis in the Nile Delta, a common Greek sanctuary known as the Hellenion was established on land set aside for the Greeks to build altars and temples to their gods (*Herodotus* 2.178). The genealogical construction of identity was in fact far from universally inclusive or accepted; some ethnic groups with key claims on mythic traditions were marginal or excluded, and Hall is dismissive of alternative origin myths, particularly claims of autochthony by Athenians, Arcadians, and others. Further, mythological genealogies can be seen as one of the "tools of exclusion" by which emerging aristocracies monopolized power (Tandy 1997: 141–65); just how pervasive this Hellenic identity was among the lower registers of society is questionable. Cult, language, and material culture may therefore have had broader implications for ethnogenesis than Hall allows. To another view, a collective Hellenic identity emerged in the Archaic period from the interaction of the aggregative forces of cult and kinship with the gradual process of finding difference among people who did not share Greek language and practices (Mitchell 2005: 416).

Literary sources tend to be privileged over archaeological data in discussions of identity in cross-cultural contact scenarios, but as they rarely originate from the "front lines" and are often much later than the events they describe, they require a good deal of source criticism and interpretive effort. Because the archaeological record can be equally ambiguous, there is an especial need to develop archaeological concepts and methods to explore cross-cultural contact in situ. Such a contextual approach can be applied to the study of interaction in colonial situations, or to assess the meaning and impact of imported objects and ideas, by working from the local and particular to the global and general. Several archaeologists have taken up this challenge specifically in the colonial realm. Interactions between Greeks and indigenous communities in Sicily and southern Italy have been extensively evaluated and can serve as a good representation of the contextual approach. Carla Antonaccio (2001) suggests that we contextualize each situation by examining precolonial, colonial, and postcolonial levels, with the aim of recognizing the essential features of indigenous culture before contact, the changes that occurred to both parties during the colonial phase, and how lasting these changes were. Tamar Hodos (2006) analyzed the Greek–native relationship using several material culture categories – architecture, burial customs, religious practices, consumption patterns, artistic styles, and language and writing – as proxies. Certain salient patterns emerged. Native Sicilians absorbed Greek culture, but they did so selectively. Although there are broad regional patterns in preferences for particular forms and styles, the adoption of Greek culture was not uniform either in the elements adopted or the rate of adoption – even neighboring communities showed divergent preferences. There is little evidence that they were forced to adopt any Greek practice or material; rather, they adapted Greek forms and practices to existing cultural codes of consumption. An example is the popularity across Sicily of Greek sympotic pottery, implying the adoption of wine-drinking rituals using oinochoai and drinking cups. In the late eighth and seventh centuries BCE, these were integrated into existing feasting practices and served as markers of status. By the sixth century, however, such vessels became part of funerary sets and were often locally made.

The mixing of people and cultural elements in colonial settings confounds efforts to flesh out Greek–native interaction by reference to the material correlates of distinct identities. Scholars have long sought to identify markers of identity or ethnicity, often with the implicit assumption that these are immutable and carried with a person in perpetuity. Such a "pots equal people" mentality has characterized approaches to the question of intermarriage among Greek males and indigenous females; specifically, grave

forms and artifacts such as metal fibulae deposited in burials at colonial sites have been used to infer the presence of indigenous females in Greek communities. Gillian Shepherd's (2005) meticulous analysis of grave forms, burial practices, and grave goods across Sicily prompted the conclusion that cemeteries in the Western colonies are not useful for detecting indigenous females, or more generally for determining the ethnic composition of living populations. Practices were not sufficiently universal or consistent within indigenous societies to be reliable baselines, and cultural markers, particularly material culture but also customs and practices, were simply too transferable to be stable indicia. Shepherd found that colonial communities sought to forge new cultural identities, adopting from the start practices distinct from their mother cities, but also converging over time with indigenous influences into novel cultural foundations that resist characterization in binary terms.

In these environments of intensive interaction, it has been useful to speak in terms of hybrid cultural forms in order to acknowledge the dynamism of the process and the agency of both Greeks and natives, although in some cases, hybridity does not account for cultural creations as entirely new phenomena, rather than simply as chimeras of existing traits drawn from both parties. The Sikeliote identity of Greek colonists in Sicily was a novel creation formed both by opposition – interaction with indigenous communities – and aggregation, possibly focused on the sanctuary of Apollo Archegetes at Naxos, where Greeks first landed to colonize Sicily in 734 BCE, as a common place of origin (Malkin 2011: 97–118). Unlike the process unfolding in Greece, this regional identity was defined not by ethnicity or cult, but primarily by shared geography and enacted through interaction with both natives and other colonies. When Sicilian Greeks participated in cult and games at Olympia or Delphi, their Sikeliote identity was expressed as competitive emulation with other Sikeliotai and simultaneously subsumed to a Panhellenic identity.

The colonial milieu has often been described as a "middle ground," a term coined by Richard White (1991) to designate the negotiated physical and social space, as well as the process, in which Europeans and Native Americans learned to coexist in the Great Lakes region of North America in the seventeenth to nineteenth centuries CE. A middle ground allows two participants to negotiate the terms of a mutually comprehensible world where neither can impose its will by brute force. Important to this concept are "creative misunderstandings" that arise as each side seeks to define the other in terms that it can understand, and on this basis attempts to engage in terms that the other will expect. This process allows for cooperation and adaptation while still retaining one's essential culture; an individual or group can choose to display an adopted practice when it is strategic to do so. A "mediating culture" emerges that over time may develop as hybrid or essentially novel cultural forms shared by the two parties. A community may participate in multiple middle grounds at different scales. Sikeliote Greeks interacted in middle grounds with natives in spaces connecting the coasts with the island's interior, with the other colonies in coastal regions and at Panhellenic sanctuaries, and in the latter space also with mainland Greeks. In Italy, Campania witnessed the emergence of a middle ground where Greeks, Etruscans, and local elites interacted in a nonthreatening environment to negotiate the terms of coexistence and cultural exchange. Greek mythic frameworks were disseminated, transformed, and appropriated by Etruscans and Italians, and a mixture of traditions in burial, pottery styles, and other elements of culture prevailed (see Malkin 2002).

Cross-cultural contact with all that it implies in terms of the exchange of material goods, the movement of ideas, and the formation of identity, occurs at multiple scales. Seeking a way to integrate local with regional and Mediterranean-wide dynamics, archaeologists have been drawn to the two powerful concepts of *connectivity* and *networks*. The idea of connectivity, popularized by Peregrine Horden and Nicholas Purcell's *The Corrupting Sea* (2000), explicitly aims to show that intensive local connections forming *microregions* are linked "...both internally and also one with another—in aggregates that may range in size from small clusters to something

approaching the entire Mediterranean" (Horden & Purcell 2000: 123). Archaeologists have explored network analysis as a means to operationalize the concept of connectivity by mapping the nodes (settlements), ties (connections), and flows (content of goods and ideas) that connected Greeks with each other and with the societies they encountered around the Mediterranean and Black Seas. Network analysis, drawn from physics and sociology, models the ways in which connectivity is created and elaborated, how local and regional clusters of dense connections form, and how key nodes preferentially attract ties to become network centers. Connectivity is not purely dependent on geographical proximity or even ease of travel; relatively distant centers may forge "shortcuts" bypassing nodes and clusters. Multiple networks coexist and overlap in time and space; trade networks with local, regional, and long-distance manifestations coexist with networks of kinship, cult, and so forth.

Prehistorians made initial forays into network analysis for the Aegean world with investigations of Bronze Age maritime networks in the Cycladic islands (Broodbank 2000) and in the entire Aegean Sea (Knappett et al. 2008). Malkin (2011) is the first to apply a pan-Mediterranean network approach, with the explicit proposal that the connectivity established by Greek settlements on the shores of the Mediterranean and Black Sea in the Archaic period played a fundamental role in the formation of Classical Greek civilization. Far from being peripheral or epiphenomenal (in an instrumental sense), Greek colonies facilitated the multidirectional connections through which commodities and ideas flowed, allowing Greece to prosper. The lack of a central organizing authority or logic to the Greek diaspora underscores the agency of the colonies in producing a decentralized, "self-organizing" system. Malkin (2011: 54–5) asserts that distance, not proximity, led Greeks to heightened awareness of their shared characteristics, creating the notion of a Greek Mediterranean around which Hellenic identity converged. This identity was always weak, however, due precisely to the political and geographical decentralization of the Greek world (Mitchell 2005: 418).

Future Directions

Greeks came into contact with many and diverse foreign cultures between the Bronze Age and the Classical period. These contacts, both direct and indirect, expanded the horizons of the Greek world and made a central contribution to the emergence of civilization in the Bronze Age and its reemergence in the Iron Age. Greek intervention abroad was limited mainly to coastal zones; even the larger colonies rarely expanded very far inland to annex agricultural land, suggesting that maritime orientation remained important and that indigenous people had a say in the matter. Socrates observed pithily that Greeks lived "like ants or frogs around a pond" (Plato, *Phaedo* 109a–b). Already in the Bronze Age, a distinction is apparent between contacts with the highly developed civilizations of Egypt and the Near East, and those with societies of lesser complexity in the central Mediterranean (and later the Black Sea). In the former areas, the Greeks colonized rarely but traded vigorously and borrowed ideas; in the latter regions, most Greek colonies were founded and the transmission of Greek ideas and material culture had a greater and more lasting impact. Many indigenous communities became Hellenized to one degree or another, particularly in places like Sicily, where Greek presence was widespread and prolonged. Morgantina in the interior of eastern Sicily is often held up as an example; even there, many indigenous cultural forms and practices survived, into which Greek objects and customs were adapted (Tsakirgis 1995). There were cases of genuine fusion yielding hybrid or entirely novel cultural forms; the so-called Greco-Scythian art form – if not a culture – is one instance (Jacobsen 1993). In spite of the current scholarly emphasis on indigenous agency and negotiation in middle grounds, violence did occur where Greeks forcibly seized territory or where their colonies were destroyed.

The current rethinking of colonial interaction, aimed at recovering the indigenous community and placing more emphasis on negotiation and accommodation, is a salutary trend. But work is needed to ensure that our archaeological methods and research designs are up to the new questions

we hope to address. In dynamic interaction scenarios, reconstructing identities through material culture remains problematic. Antonaccio's appeal for a diachronic, contextual approach outlines the best way forward, though we must not confuse our etic (externally defined) categories with emic (internally defined) self-identifications. The latter may only be accessible through texts, which represent however only a narrow, typically elite-oriented sample. A goal of archaeological research should be to identify middle grounds in locations where interaction activates mutual changes in the material record, and to explore their physical, symbolic, and processual dimensions.

Network approaches promise new insights into connectivity at all spatial and temporal scales, but at present, there is work to do to find a better fit between theoretical models of network behavior and the actual patterns of connectivity in the past, since human choices and rationales may be unrecoverable or seem counterintuitive to us. Geographical distance may not be essential to "small world" connections in network theory, but in human experience, real travel times, measured by distance but modified by currents, winds, safe harbors, and existing relationships, do matter. The use of Geographic Information Systems (GIS) has facilitated the visualization of countless complex and overlapping network ties, particularly because it is just as easy to map symbolic connections as actual maritime or terrestrial routes. GIS models have been used to portray realistic travel times by texturing the sea with winds and currents (Leidwanger 2011). Approaches that employ complex mathematical models to construct networks (e.g., Knappett et al. 2008) suffer from a high degree of subjectivity in the assignment of value to variables, and particularly to those that are difficult to quantify: For example, how does one arrive at the "costs" and "benefits" of maintaining links when key data such as site size, population, and carrying capacity are missing, and how are symbolic factors added to economic rationality?

Cross-cultural interaction in diverse settings around the Mediterranean played a key role in the creation and constant renewal of Greek society. There is great interest in targeting those relationships for reassessment based on newer interpretive frameworks such as postcolonial critique or social network theory. In the future, these increasingly nuanced approaches can be harmonized with traditional practices of archaeological excavation, survey, and artifact analysis to produce narratives that embrace the complex reality in which diverse individuals and communities met, interacted, negotiated, transmitted, and borrowed, and thereby changed the world of the ancient Greeks.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Ceramics, Ancient Greek
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology
- ▶ Crete, Archaeology of
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Culture in Archaeology
- ▶ Cyprus, Archaeology of
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Emporion
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Ethnoarchaeology
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Middle-Range Theory in Archaeology
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Panhellenism
- ▶ Polis
- ▶ Race in Archaeology

▶ Religion, Greek, Archaeology of
▶ Renfrew, Colin
▶ Romanization
▶ Sicily and Magna Graecia, Archaeology of
▶ Style: Its Role in the Archaeology of Art
▶ Trade and Transport in the Ancient Mediterranean
▶ Visualizing Mediterranean Archaeology
▶ World-Systems Analysis

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Cross-Cultural Interaction Theories in Classical Archaeology

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Introduction

The Greek world of the first millennium BCE was one of social and cultural change, stimulated by population movement and long-distance trade that brought Greek populations into direct contact with new cultures, materials, and ideologies. In a changing, fluid world identities were negotiated and forged in reaction to new stimuli and articulated in often extended periods of cross-cultural contact. Greek colonial activity from the eighth century BCE and the emergence of various forms of overseas settlements, including the later development of the Greek *polis* as city and citizen state, brought direct interaction with a non-Greek *other* that often had divergent social and cultural norms. In turn, Greek/non-Greek and Greek/Greek interaction contributed to a growing sense of self-identity at both individual settlement and, increasingly, a broader *Hellenic* level, particularly in opposition to a neighboring Persian Empire.

Interest in the nature of these interactions and their effects on Greek culture has been a prominent theme in classical archaeology. While the central role of the Greek world has often been highlighted, academic research since the 1980s has demonstrated the nuanced nature of these interactions and the key roles played by all parties. This has produced an extensive and healthy debate focused not only on the intricacies of interaction, although these remain important, but significantly on the theoretical basis by which they may be explored. Influenced by emergent *postcolonial* discourse, the focus in recent years has been on the role of the individual and the material in the formation of Greek cultural identity.

Definition

Cross-cultural interaction defines the way in which people interact. It recognizes that no population group or their cultural traditions were *pure* or *original* nor that they were isolated from internal or external change. Rather, it extends beyond simplistic identifications of cultural provenance to focus on the social practice behind which dynamic and interrelated cultural identities are continually transformed by the experiences of those involved in culture contact.

At a microlevel, the individual has agency in these interactions through their reactions, conscious or otherwise, to new influences, often visible overtly through resistance, coercion, or mutual accommodation. Equally, objects may play an active role in the creation and transformation of culture and cultural identity. At a broader scale, cross-cultural interaction may have implications that extend far beyond the daily experiences of the individual to transcend social and cultural boundaries. Specifically, this relates to the presence of long-distance trade routes and migrant or colonial activity that enabled the transfer of ideas and technology.

Within the Greek world, cross-cultural interactions are evident in colonial contact with neighboring populations, particularly following the spread of diaspora and later interactions with the Persian Empire. While the lack of an integrated political or social *Greek* world is recognized by current scholarship, increasing appreciation of the multilayered nature of Greek culture has enabled the identification of cultural interaction at home and overseas within a broader framework of emergent *Hellenic* identity. Greek culture can thus be viewed as a permeable, complex system of interaction subject to constant renegotiation and redefinition and visible through similarity or difference between disparate cultural groups.

Historical Background

Studies of cross-cultural exchange developed contiguously with the emergence of classical archaeology as a discipline. This was rooted in the intellectual awakenings of eighteenth- and nineteenth-century Europe and against a backdrop of growing Western nationalism, nationhood, and imperialism that brought with it increasing perceptions of Western cultural superiority. Early studies viewed the Greek world as a unique, self-contained culture that became synonymous with cultural enlightenment and as progenitor of modern Europe (Trigger 2010: 61). The emphasis was on the recovery and identification of artistic, literary, and material remains associated with the Greek world and a preoccupation with their classificatory study. Evolutionary approaches stressed difference and inequality between divergent population groups and sought to demonstrate continual, linear progress in both biological and cultural terms. This was encapsulated in the search for the cultural origins of the classical world through the detailed analysis of material remains, their seriation, and interpretation as distinct stages of cultural development. The stimulus for cultural change was regarded as external and emphasized population movement and cultural diffusion from cores to their peripheries, as expounded by the likes of Oscar Montelius (1843–1921). By stressing a direct lineage to a perceived culturally superior classical world, the West was placed as preeminent and Western imperialism was thus legitimized (Hodos 2010: 5-6; Trigger 2010: 61–4, 215).

Growing emphasis on racial determinism and correlations between cultural and ethnic continuity led, by the end of the nineteenth century, to the emergence of a culture-historical archaeology encapsulated in the work of Gustaf Kossinna (1858–1931). This sought to identify discrete material assemblages that were perceived as ethnic markers for individual populations or *cultures*. Vast typological analyses, such as J. D. Beazley's studies of Greek vase painting, were integral, and, while focused on classification as an aim in its own right, they enabled comment on the development and distribution of artifact types in varied geographical and chronological contexts (Knapp & van Dommelen 2010: 4; Trigger 2010; Hodos 2010: 7). Yet, this approach also brought with it dangerous political or nationalist agendas that sought to create direct links to the classical past, most disastrously evident in World War II Germany.

Drawing on both evolutionist and culture-historical frameworks, the concept of *culture* was encapsulated by V. Gordon Childe (1892–1957) (Fig. 1) who first explicitly employed the term to define those shared attributes that formed the essence of a population group, its nature, and outward appearance. In Childe's model, each culture had specific traits that differentiated it from another and,

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 1 V. Gordon Childe, 1892–1957 (Photograph: Swan Watson, Andrew. Portrait of V. Gordon Childe, c. 1930s. nla.pic-an23815428, National Library of Australia; Reproduced courtesy of the National Library of Australia and the Evatt Collection, Flinders University Library, Australia)

by consequence, had a specific ethnic identity, resulting in a complex vision of European prehistory formed of myriad cultures. But this went beyond simple outward definition of culture. Change was stimulated by external factors such as migration and diffusion, while those local, *ethnic* traits defining each culture, such as burial practice, would remain less receptive to change (Trigger 2010: 246; Hodos 2010: 7–8).

Childe's culture-historical approach remained influential until the latter half of the twentieth century. Classical archaeology in this period remained conservative and engaged in the study of the cultural remains to the detriment of understanding the cultural contexts that produced them (Trigger 2010: 498–502). Encapsulated in examinations of Greek colonial interaction by the likes of T. J. Dunbabin (1911–1955) and John Boardman (1927–), analysis of the Greek world for much of the twentieth century often assumed colonialist or philhellenic tones. Interaction with non-Greek populations focused on core-periphery models that stressed an exploitative, impermeable, and *civilizing* Greek core actively involved in the acculturation of a *barbarian* periphery and articulated by the term *Hellenization*. Typically this was explored at an elite social level that emphasized prestige or gift exchange and the correlation with historical events or figures. In Greek interaction with the East, this was inextricably bound with the notion of an *Orientalizing* phenomenon. This acknowledged the selective adoption of Eastern artistic and ideological elements by Greek populations during the formative periods of the Iron Age while stressing the active Greek role in this interaction.

While the emphasis on culture process and systems highlighted by *processualism* in European prehistory impacted little on classical archaeology, calls by the likes of Anthony Snodgrass (1934–) and Colin Renfrew (1937–) for greater theoretical focus did stimulate some development. Renfrew's theory of *peer-polity interaction* (1986) (Fig. 2) sought to remove the top-down diffusionist trends of core-periphery models (Fig. 3) by viewing interaction between communities within part of a broader network of exchange engendering competition and competitive emulation. An alternative approach employing similar ideas adapts Immanuel Wallerstein's *world-systems theory* to explore the ancient Mediterranean economy. Overseas contact and long-distance trade brought with it a range of interactions traditionally interpreted in terms of diffusionism from the East; the *Orientalizing* phenomenon. Contrastingly, the *world-systems* model posits a politically and economically dominant core with a periphery producing raw materials for the core. Within this, an interregional merchant class stimulates societal development and, by actively responding to economic stimuli, creates links between diverse populations while enabling the transmission of materials and ideas within the wider world system (Hodos 2006: 6; Trigger 2010: 438).

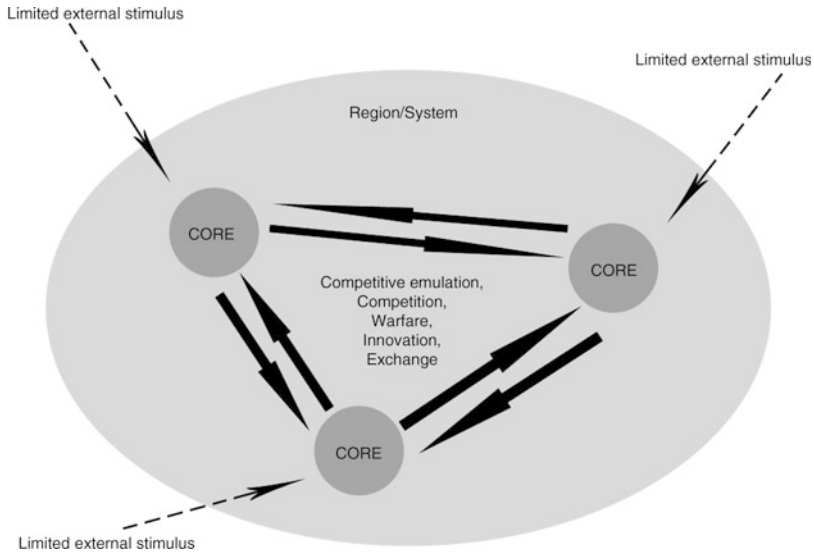

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 2 Peer-polity interaction: Exchange and competitive emulation between similar communities (*cores*) within a broader network of exchange and with little external stimulus

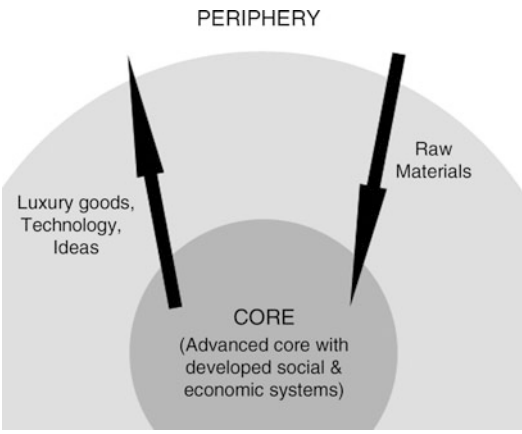

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 3 Core-periphery model demonstrating exploitative core with exploited periphery

Criticism of the model highlights its economic focus, which may not have been applicable to the ancient Greek world, as well as the difficulties in defining the *core* given the lack of a unified *Greece*. It has furthermore been suggested that *world-systems theory* overlooks the social context of interaction, potentially oversimplifying complex exchanges (Morris 1999: 68).

This change in focus by the 1980s coincided with increasing interest in Greek colonial interaction and the *polis*. Closer examination of *polis* development, both at home and overseas, demonstrated the Greek world to be far from a monolithic, closed system but one that influenced and was influenced by those it came into contact with. No longer could Greek colonies be regarded solely as *homes away from home* (*apoikia*) or exploitative trading *emporia* nor could those traditionally perceived archetypical *Greek* cultural elements be seen solely as markers of ethnicity or population movement. Instead, scholarship focused on their formation and roles or functions in cultural interaction with, potentially hostile, non-Greek populations. While analysis of migration received limited attention (although see Knapp 2008: 47–53), the multicultural nature of the Greek world was explored through its interactions with Egypt and the Near East. Thus, Martin Bernal's *Black Athena* (1987) emphasized the cultural debt owed by Greece to Egypt but also maintained a rigid dichotomy that obscured the complexities of cultural interaction and arguably presented a reversal of *Hellenization*, the Greek world serving as cultural vacuum to be filled by Eastern culture (Dougherty & Kurke 2003: 2–4). It was only at the end of the twentieth century with the implementation of *post-processualist* frameworks that the theoretical debate fully engaged.

Influenced by the likes of Ian Morris (1960–), the *post-processual* approach stressed the social meanings behind and interpretative potential of

material sources as cultural representations (Hodos 2010: 9). An emphasis on agency, the individual and the social context of interactions often brought direct conflict with the broader generalizations of *processualism* but, at the same time, shifted the focus from traditional colonialist and diffusionist models. This is most clearly demonstrated in *postcolonial* critique emergent following the postwar dismantlement of Western empire. Encapsulated in Edward Said's seminal text *Orientalism* (1978), *postcolonial* debate challenged traditional perceptions of Hellenic cultural dominance and stressed the complexities of cross-cultural exchanges (Knapp & van Dommelen 2010: 1). At a theoretical and interpretative level, this has generated a range of social and cultural frameworks aimed at understanding the structures, practices, and processes behind cultural change and the active role of the individual in defining changing identities. It is this approach that continues to inform academic debate.

Key Issues/Current Debates

Where analysis of cultural interaction had traditionally presented a static, monolithic depiction of something definably and intrinsically *Greek*, often in opposition to equally functionalist perceptions of static *others* (e.g., the Persian Empire), current scholarship takes a more nuanced approach to culture contact, exploring the social aspects and processes behind its formation. At the heart of the debate has been the deconstruction of traditional notions of *Greek culture* and the creation of an expansive theoretical discourse that explores the mechanisms of cross-cultural exchange and role(s) of the individual in their interplay. Much of the focus has been on the colonial Greek world through the implementation of *postcolonial* discourse.

Criticism of the *culture-historical* model emphasizes its search for simplistic and material representations of an *original* Greek culture (Dougherty & Kurke 2003: 1-2; Hales & Hodos 2010; Knapp & van Dommelen 2010). The approach taken by the likes of Bernal has met with similar disfavor due to what is seen as a lack of theorization and an essentializing nature (Dougherty & Kurke 2003: 2–3). Equally, the traditional focus of classical archaeology, emphasizing the *civilizing* nature of a dominant Greek culture over a passive *other*, has also met with disagreement (Hodos 2006: 10; Knapp 2008: 55–6). This is encapsulated in the abandonment of *Hellenization* as a concept, since it is argued that it lacks analytical power due to the assumption of Greek cultural dominance, unidirectional influence, and implied subjugation of the *other* (Dougherty & Kurke 2003: 3; Hodos 2006: 10, 15; Knapp 2008: 55–6). Instead, current scholarship expands beyond simple cultural identification to highlight the multifaceted, dynamic nature of interaction and the active role of both individual and material in defining it (Canepa 2010). However, it has been noted that this shift often maintains stereotypical, dualist perceptions of opposition (*us* vs. *them*), with the continued use of the term *colonization* rather than *colonialism* to define the Greek colonial encounter evidence of a reluctance to engage in cross-cultural analysis (Knapp & van Dommelen 2010: 3; although see Hodos 2006: 13–8).

It is argued that material culture is demonstrative of the social *practices* behind cross-cultural interaction, since it is through the process of interaction that objects can be modified or modify to suit the specific needs of all parties involved (Dougherty & Kurke 2003: 1; Langin-Hooper 2007). Material cultures may be interpreted as socially constructed representations of culture, each bringing with them distinct cultural, social, and even ethnic meaning or identity and dependent upon the context and time in which they form (Dougherty & Kurke 2003; Hodos 2010: 9). This need not necessarily be representative of cultural identity but rather demonstrates selective adoption and adaptation by the *recipient* population within a specific cultural context. Culture is thus seen as a permeable, complex system subject to constant renegotiation, collaboration, and conflict (Dougherty & Kurke 2003; Hodos 2006, 2010: 14–19). While material culture is regarded as a representative and constructive facet of conscious self-identification, a focus on ethnicity and

ethnic identity within a multilayered *Hellenic* world has furthered debate.

By employing an *emic* approach (one produced from within, and meaningful to, the culture under study) that combines textual and archaeological data, this focus on ethnicity has been considered in the context of emergent *Hellenic* and *polis* identity and has removed essentializing approaches that assume unchanged ethnic identity based on racial and biological lines: the notion that all Greeks are *Greek* (Hall 2002; Dougherty & Kurke 2003: 3–4; Antonaccio 2010). Instead, ethnicity is viewed as a fluid representation of society defined by its cultural, historical, and political experiences through which a sense of self-identity and perceived similarity or difference with others is formed (Hodos 2010: 11). Thus, the maintenance of Carian onomastics into the fourth century BCE or the perception by *both* Lydian and Greek populations throughout the Archaic period that Lydian culture was distinct from that of the Greek world demonstrates that despite Greek influence cultural interaction was more complex than simple domination by one monolithic entity over another (Hall 2002: 104–11). This approach furthermore recognizes individual settlement or *polis* identity within a broader *Hellenic* diaspora but with commonalities articulated in different ways (Hall 2002; Hodos 2010; Antonaccio 2010). Cultural interaction between subcultures was facilitated at key geographical locations, such as the panhellenic sanctuaries at Delphi and Olympia, which acted as *internal contact zones* for the cross-fertilization of ideas (Dougherty & Kurke 2003). This may have been reflexive and manifest materially at a range of social levels. Within this interpretation, population movement through trade and migrant activity has been regarded as indicative of a culture receptive to interaction. While this is often viewed in terms of an elite-level exchange, examination of broader social and cultural divisions, in conjunction with the removal of *Orientalizing* and *Hellenizing* concepts, indicates this may not have been representative of the Greek world (Hall 2002; Gosden 2004; Antonaccio 2010). Recontextualizing cultural elements in this *emic* approach has brought recognition of new identities resultant from cross-cultural interactions, as has been suggested in Sicily, for example, in the mixed cult practices at Sabucina or the divergent burial practices at sites like Syracuse and Gela (Hall 2002; although see Gosden 2004).

Emphasis on ethnicity has not been without its detractors or difficulties. It is argued that it is a modern fascination which is unhelpful in identifying cultural interaction and identities (Antonaccio 2010: 43). Equally, as a socially constructed facet of culture, it is not only difficult to define but, in reality, may have played little role in culture contact other than to simplify interaction (Dougherty & Kurke 2003: 6). But, it is also maintained that ethnicity is more than a static reflection of shared cultural similarity or difference and, while not equating to cultural identity per se, may be indicated materially (Hodos 2006: 17–8; Antonaccio 2010: 33–4).

A central theme in current discourse is the notion of identity, both outwardly created in antiquity or interpreted from the *etic* perspective of modern scholarship, that is, from the objective perspective of the observer external to the culture under analysis. Key to exploring this has been the notion of hybridity (Fig. 4) (Antonaccio 2003). This concept argues for the creation of new identities in reaction to the cross-cultural amalgamation of *new* and preexisting populations. Arguments against the usefulness of hybridity highlight that simple mixing of diverse aspects of material culture or ideologies does little to reveal the social or human aspects of interaction (Knapp 2008: 59). Equally, it presupposes the presence of identifiable and bounded cultural entities, which in the long term may be difficult to identify archaeologically as any *hybrid* identity gradually becomes what is perceived to be *local* (Gosden 2004; Antonaccio 2010: 48). However, proponents of the model argue that hybridity can be seen as the mixing of social, cultural, and material elements that stimulate the creation of entirely new identities (Knapp 2008: 53, 58–9). In colonial contexts, this often reflects the reinterpretation of meanings attached to individual objects or ideas, demonstrable materially through the appearance of new assemblages that

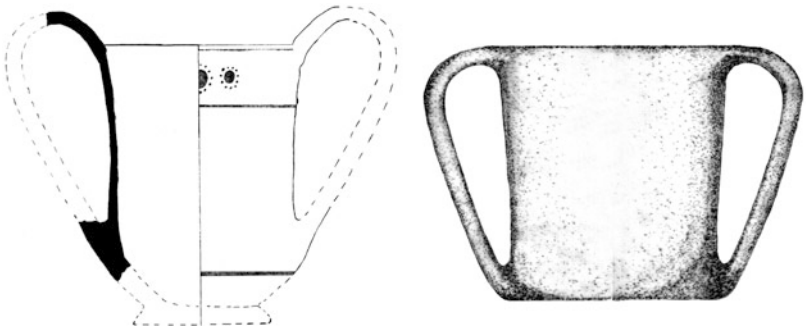

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 4 Possible evidence for hybridity in material culture: G2–3 ware kantharos (*left*) and grayware karchesion cup (*right*) from the island of Samothrace. The combination of Greek artistic with local cultural elements and their apparent function in specific cultural roles has been interpreted as evidence for the emergence of hybrid Greek/non-Greek identity on the island by the Archaic period (Ilieva 2010: Figs 4–5; Reproduced courtesy of P. Ilieva)

combine differing cultural elements with social meaning specific to their context, for example, through the adoption and adaptation of ceramic form or decoration to reflect local social practice or meaning, rather than simply in imitation of new cultural traditions.

In defining where hybridity operates, *postcolonial* discourse has adopted the notion of the *Middle Ground* as an alternative to other core-periphery frameworks (Antonaccio 2010: 44–5) (Fig. 5). The *Middle Ground* is regarded as both an intellectual and physical space, with such physical contexts arguably identified in North Syria, Sicily, and North Africa. It serves as a neutral ground where all participants have agency but, through mutual accommodation, redefine meaning and value, often creating new hybrid identities. In this respect, the *Middle Ground* serves as both core *and* periphery within which divergent material culture, ideas, and ideologies engage (Hodos 2006: 7).

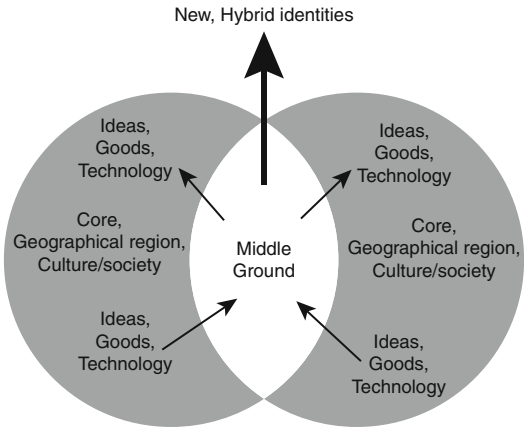

Cross-Cultural Interaction Theories in Classical Archaeology, Fig. 5 The Middle Ground: A physical and ideological melting pot where ideas and material may combine to produce distinct new *hybrid* identities

An important conceptual tool has been the role of *agency*. This draws on Pierre Bourdieu's (1930–2002) notion of *habitus*, which refers to the learned and experiential practices perpetuated through everyday life that inform the conscious or subconscious reactions by an individual, an *agent*, to any given situation. *Agency* is seen as a means of identifying the individual and their capacity for choice in cross-cultural exchanges, although there has been little consensus with regard to how it might be recognized or indeed its implications (e.g., Dobres & Robb 2000). In colonial settings, the importance of the concept lies in the ability to identify the spread and reinterpretation of imported items in tandem with the cultural codes of local or hybrid populations (Douglas & Isherwood 1996; Hodos 2006: 8–9). Thus, it is argued that the choice to adopt a particular form of imported material culture and reinterpret it so that it has both social and cultural meaning also ascribed to it a certain

value, whether intrinsic or societal (Appadurai 2008). This may result in it becoming integral to that social or societal context. For example, while the presence of hoplite armor in Sicily might initially suggest *Hellenization* of the region, it is only through an understanding of its context that it is realized that it performed a differing, elite function specific to its colonial context as armor for mounted warriors (Hall 2002: 109).

Related to agency and hybridity has been the introduction of *performativity* as a means of defining the way in which identity is produced. In this framework, material culture is seen as constructing and constructed by cultural interaction through the meanings and ideas that embody it. An intentional, *performative*, act by an individual might reinforce or alter cultural identity through the selective consumption of specific items that have distinct cultural codes (Douglas & Isherwood 1996; Hodos 2010: 18–9). While objects can transcend cultural boundaries, the transmission of culture itself is dependent on recognition by those involved of the ideologies or meanings behind such objects. However, it is also stressed that recognition of *performativity* is dependent on sociohistorical understanding of their context and that changes may occur between each *performance* or be read at multiple social or cultural levels (Hodos 2010: 18).

The need for an approach that explores the impact and involvement of localized interactions within broader cultural systems has also been recognized by recent scholarship (Knapp & van Dommelen 2010: 3). The *diffusionist* model has met with criticism, but the reconciliation of the local and global into a more encompassing narrative has produced something of a dichotomy. Critics of the *post-processual* approach highlight that the social focus has been both too narrow and geographically localized. Indeed, supporters of *world-systems theory* argue that it is only through broader, global perspectives that the context of localized exchange can be understood (Morris 1999: 68). In contrast, detractors to the *world-systems* approach point to the generalizations and oversimplifications of core-periphery models, with the *Middle Ground* highlighted as a potential alternative. However, it is the notion of *connectivity* that has generated renewed discourse. This stresses the interaction and interconnectedness of divergent Mediterranean micro-regions facilitated by diverse micro-ecologies that interact through a sea conducive to communication (Horden & Purcell 2000). Thus, production, risk, and redistribution stimulate mobility of objects and people, forging coherence and *connectivity* between micro-regions. An emphasis on wider Mediterranean interactions is apparent, but the model also highlights the dynamic role of local interaction internal to each micro-region and, at the same time, shifts the focus away from that of core-periphery approaches to view urban centers as larger units within a more complex, interrelated system (Horden & Purcell 2000: 123). Within this framework, consumer demand can also drive production and is reflected in the attachment of both intrinsic and social value or meaning to specific objects through the mechanisms of the *habitus* (Hodos 2006: 8–9; Hodos 2010: 20). In this regard, cross-cultural interaction may initially occur at an elite or prestige level until the cultural codes of the objects themselves are more widely understood and lose their exclusivity, with *agency* enabling the transmission of technology and ideas (Douglas & Isherwood 1996; Hodos 2006: 8–9). In colonial interactions, this may reveal the reasons behind the adoption of specific objects and further draws on the notion of *materiality*, whereby the cultural identities of those involved in interaction shape and are shaped by the material world around them (Knapp & van Dommelen 2010: 2-8).

Developing from notions of *connectivity*, there has been increasing emphasis on *Mediterraneanization* and *globalization* within the Greek world. The *globalization* model posits the presence of an overriding *global* culture that transgresses localized cultural identity, within which intensified interaction reinforces local diversity (Hodos 2010: 23–24). This stresses the particularities within the broader cultural framework, often leading to overt assertions of self-identity in opposition to others (e.g., Ilieva 2010).

Mediterraneanization draws on both *globalization* and *connectivity* to suggest a broader network of interaction that emphasizes the active process of connectedness within the Mediterranean region (Hodos 2006: 9). While both approaches offer broader perspectives with respect to cross-cultural interactions, the danger of replacing simple ethnic markers with regional labels, and thereby conflating ethnic and cultural distinctiveness, has also been highlighted (Isayev 2010: 224).

International Perspectives

The current focus of British academia is twofold. At a social level, *postcolonial* studies have had a significant and lasting impact on scholarship, with emphasis on the nuances of interaction and the removal of traditional colonialist approaches. The individual and the role of agency continue to inform debate, and recent studies have focused specifically on the mechanics behind the creation and redefinitions of identity both within the Greek world and in their interactions overseas (e.g., Hales & Hodos 2010; Knapp & van Dommelen 2010). These studies view Greek culture as changing and dynamic, exploring the many sociocultural facets subject to potential change.

The connectivity of the Mediterranean region has become an increasing area of discourse (e.g., Horden & Purcell 2000), and this relates in part to the second focus of research into the wider systems within which the individual, *local* exchanges took place. Notions of *Hellenization* have largely been dropped from academic debate, while attention has returned to the question of how ideas, technologies, and *culture* were transmitted within and around the Greek world. Critique of traditional *diffusionist* models is apparent, and, with the implementation of frameworks such as *globalization* or *Mediterraneanization*, the beginnings of a more holistic approach incorporating elements of wider world systems with the minutiae of localized culture contact are emerging.

Future Directions

While current discourse has produced an active and scholarly debate, particularly surrounding notions of identity and materiality, aspects of the discussion provide scope for future research. There remains a problem of theorization within classical archaeology, which has been slow to adopt new direction and frameworks of analysis. Furthermore, there is a maintained tendency of *hyper-specialization* and localized or regional research that lacks an interregional scope (Knapp & van Dommelen 2010: 3; Mattingly 2010: 284). A sociohistorical approach that draws together material, social, and textual data may well provide the basis for a framework that incorporates local and global interactions while avoiding generalizations (e.g., Knapp & van Dommelen 2010; Mattingly 2010: 287). This may be facilitated by renewed focus on migratory processes and the role of material culture in cross-cultural interactions.

While scholarship has begun to shift from traditional paradigms, the incorporation of new theoretical directions has in some areas met with reluctance and reticence. To fully understand the nature of cross-cultural exchanges at local, regional, or global levels requires that the archaeological and textual remains produced through academic research are engaged in theoretical frameworks that allow for their full potential to be understood.

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- ▶ Adaptation in Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ Beazley, Sir John Davidson
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Ceramics, Ancient Greek

- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Childe, Vere Gordon (Theory)
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Culture in Archaeology
- ▶ Emporion
- ▶ Ethnic Identity and Archaeology
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
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- ▶ Histories of the Archaeological Discipline: Issues to Consider
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- ▶ Materiality in Archaeological Theory
- ▶ Middle-Range Theory in Archaeology
- ▶ Montelius, Oscar
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Panhellenism
- ▶ Polis
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
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- ▶ Renfrew, Colin
- ▶ Romanization
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Crossland, Leonard Brighton

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Basic Biographical Information

Mr Leonard Brighton Crossland, a Ghanaian archaeologist, was born on November 10, 1941, in Accra, Ghana. He attended the Wesley Grammer School, Accra (1958–1962), and the Ghana National School, Cape Coast (1962–1964) before proceeding to the University of Ghana (1969–1971) for his Bachelor of Arts (B.A.) degree in Archaeology and Ancient History. He obtained his Master of Arts (M.A) in African Archaeology from the University of Ghana in 1971, and was a Junior Fulbright-Hays Fellow at the Arizona State University, Tempe, USA, from 1977 to 1978.

Mr Crossland began his archaeology career as a Teaching Assistant at the Department of Archaeology University of Ghana, Legon (1971–72), then as Assistant Lecturer (1973–1975), and Lecturer (1975–1991) at the same department. He was promoted to the position of Senior Lecturer in 1991 and served in that capacity until his final exit from active teaching service from the University of Ghana in 2010 after serving nine years of post-retirement contract (2002–2010). His areas of specialization include Museums Conservation, Archaeological Field and Laboratory Methods, Technological Traditions of Ghana, and Analysis of seventeenth to nineteenth century European imports (particularly ceramics and glassware) in West Africa.

At the University of Ghana, Mr. Crossland held several positions, including Head, Department of Archaeology (1993–2001), and Acting Director of the West African Trade Project (1974–1975). He served on several Boards of the University of Ghana such as Board of Faculty of Social Studies (1997–2001), Board of Faculty of Arts (1992–1996), Board of Graduate Studies (1993–2006), Academic Board (1990–2001) Admissions Board (1990–2001), and Examiners Board (1993–2001). Mr. Crossland has been a member of the following national and international associations: the Old Accra Conservation and Development Association, Ghana Bead Society, World Archaeological Congress, and the West African Museums Programme (WAMP). He was a member of the Board of Examiners for University of London Diploma in Conservation and Management of Museums in Sub-Saharan Africa from 1995 to 1996.

Major Accomplishments

Mr. Crossland has taught and mentored several students of the Department of Archaeology, University of Ghana, including the majority of current faculty members of the department. Following the exit in the early 1980s of most of the expatriates who helped to create the department, and the exodus of the few Ghanaian archaeologists to Nigeria and elsewhere, Mr. Crossland was one of the key Ghanaian archaeologists among a skeletal teaching staff (comprised of John Sutton, Joan Dombrowski, and James Anquandah) that worked assiduously to ensure that the department survived. He had to abandon his doctoral program at the Arizona State University, Tempe, USA, and rush home to strengthen the teaching faculty of the department.

His involvement in the West African Trade Project directed by Merrick Posnansky led to the publication of one of the key reference books for the analysis of local ceramics in particular (Crossland 1989) and important articles on the ancient trade and urban site of Begho, Ghana,

in general (Crossland 1975, 1976; Crossland & Posnansky 1978). Mr. Crossland has in-depth knowledge of European trade materials in West Africa and provides expert analysis of these materials to students and faculty of the Department of Archaeology and Heritage Studies. His display of samples of these materials at the Museum of Archaeology, University of Ghana, from 2008 to date under the theme "Researching Ghana's Heritage" is most illuminating.

Mr. Crossland was advisor to a committee that mounted a highly successful exhibition on textiles to commemorate the 50th independence anniversary of Ghana in 2007. The exhibition dubbed "Fabric of a Nation: Textiles and Identity in Modern Ghana" was mounted concurrently at the Museum of Archaeology, University of Ghana, and the British Museum in London, UK. He was also a subcommittee member that successfully upgraded the permanent museum at the Kwame Nkrumah Memorial Park, Accra, also in connection with Ghana's 50th anniversary celebrations. He was a member of Ghana's National Committee for the Return and Restitution of Cultural Property from April to June 1985.

Mr. Crossland successfully mounted a bead exhibition at the VIP Lounge of the Kwame Nkrumah Mausoleum, Accra, in 2008. This was part of a collaborative research between the Italian Embassy in Accra and the Centre for African Studies, University of Milan, Italy, dubbed "A Study of Trade Beads from Venice to the Gold Coast." His immense knowledge of beads also led to the publication of a useful chapter (Crossland 2003), based on his bead exhibition at the Department of Archaeology Museum, University of Ghana.

Apart from the academia, Mr. Crossland has been very successful in the world of private business in Ghana.

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Crumlin-Pedersen, Ole

Joe Flatman
English Heritage, London, UK

Basic Biographical Information

Born in 1935 and dying in 2011, Ole Crumlin-Pedersen was constantly active in the field of maritime archaeology from 1957 onward, when he first worked at the Skuldelev site that he is most famously connected to. For the majority of his career, he was effectively in charge of Denmark's maritime heritage, serving as Curator of Maritime Archaeology at the National Museum of Denmark between 1962 and 2003.

Between 1998 and 2003, he also served as Visiting Professor at the Institute of Medieval Archaeology, Aarhus University. Following his retirement, from 2003 onward, he continued to work as a researcher at the Viking Ship Museum in Roskilde that he helped found. Crumlin-Pedersen had initially studied naval architecture at the Technical University of Denmark (1957–60), before serving in the Royal Danish Navy (1960–62), returning to Skuldelev for its final excavation in 1962. He was at the forefront of maritime archaeology and ethnology from 1962 onward, focusing on Denmark but with an international research profile. He was central to the development of maritime archaeology as a formal academic discipline, including the public understanding of this specialism.

Major Accomplishments

Crumlin-Pedersen came to prominence through his involvement in the survey, excavation, and recovery of what eventually turned out to be five Viking Age ships deliberately sunk as part of a barrage at Skuldelev, in Roskilde Fjord some 20 km north of the medieval town of Roskilde somewhere between c. 1070 and 1090 CE. This work led to the first of numerous publications on the vessels recovered, commencing in 1958 (see Crumlin-Pedersen & Olsen 1958). The full publication of this site continues, following most recently from the first of a series of final publications (Crumlin-Pedersen & Olsen 2002). The remainder of Crumlin-Pedersen's career after 1962 was spent in the study of these vessels and their related materials, but this process of discovery led to a diverse career examining many aspects of maritime archaeology in northwest Europe from prehistory to the Middle Ages, including a significant leadership and educational role, both within the museum sector and also in the then-burgeoning academic specialism of maritime archaeology. Not for nothing is his British contemporary Seán McGrail said to have responded "to become the British Crumlin-Pedersen" when asked at an interview for the new position of maritime archaeologist at the National Maritime Museum in Greenwich what his intentions were.

Crumlin-Pedersen's long career and research interests are neatly summed up in two books, one by him and one by his friends. In 1995, in celebration of his 60th birthday, his friends and colleagues published a book of essays in his honor entitled "Shipshape" (see Olsen et al. 1995). In 2010, Crumlin-Pedersen himself then published his "Rhind" lectures of 2008, a book that explains both his activities and his philosophy over his career (see Crumlin-Pedersen 2010). In particular, Crumlin-Pedersen was instrumental in the development of three interrelated fields of study in maritime archaeology: firstly, the study of medieval (especially Viking Age) ship technology and shipbuilding traditions (see in particular Crumlin-Pedersen 1991); secondly, the study of related prehistoric and medieval maritime cultures, especially the symbolism of these communities (see in particular Crumlin-Pedersen & Munch Thye 1995); and thirdly, the use of experimental archaeology in maritime archaeology, especially the construction and sailing of full-scale reconstructions of Viking age ships (see in particular Crumlin-Pedersen & Vinner 1986). It is the latter in particular, which resulted in the series of dramatic replicas of the Skuldelev ships sailed around the waters of Europe and in some cases even further afield that brought Crumlin-Pedersen to widespread public attention. The largest of these reconstructions, of the Skuldelev 2 "longship," was built in the experimental shipyard at the Viking Ship Museum in Roskilde between 2000 and 2004, and famously made a return journey to Dublin and back in the summer of 2007, the likely construction location of the original ship in c. 1042 CE (see Viking Ship Museum 2007). It is this long-term leadership role in museum development and public education that as much as anything marks out the significance of Crumlin-Pedersen's career in archaeology. The fame of and respect for the Viking Ship Museum that he was so instrumental in creating and promoted helped advance the cause of maritime archaeology around the world from the 1960s onward.

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▶ Experimental Maritime Archaeology
▶ Ship Archaeology

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Cuba: Archaeological Heritage Rescue and Management

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Introduction

Rescue, conservation, and management of the archaeological heritage of the island of Cuba are closely linked to the development of archaeology in the country. Since 1847, when Spanish Miguel Rodríguez Ferrer performed the first explorations and collections of archaeological evidence in the island, discussions began about how to conserve and use the archaeological wealth that collecting of those times exposed (Rodriguez Ferrer 1876).

This would be a constant discussion within the scientific and intellectual circles of the country related to inquiries about archaeology. Reflecting this debate and concerns of scholars and others interested in these issues, the formula of encouraging private collections was shaped by the same scholars. Private collecting was a response of the archaeologists of these times to cope with the deficiency of state structures that paid little attention to these issues. Within these private collections, Eduardo García from Holguín, R. L. O'Fallon and Bacardi from Santiago de Cuba, and Pedro García Valdés from Pinar del Rio stand out.

These collections as well as some others of less territorial representativeness were always available to scholars and people interested in archaeological studies. Scholars included Mark R. Harrington from the Museum of the American Indian, who worked in Cuba between 1915 and 1921; European Sven Loven who worked in 1930; and Irving Rouse from Yale University in 1941. These collections presented a significant amount of information about indigenous cultures that inhabited the territory and were available to scientists from other countries over the years; many of these collections became part of important museums and are treasured heritage of our country.

Key Issues/Current Debates/Future Directions/Examples

During those years, and as a result of the interest promoted by archaeological research, collecting, and naturalistic studies, some museums were promoted and over the years they became paradigms of conservation of the archaeological heritage of the country, such as the case of the Anthropological Museum Montane in La

Habana, Bacardi Museum in Santiago de Cuba, Natural Sciences Museum in Pinar del Río, and Oscar María de Rojas Museum in Cárdenas.

At the same time, during the 1920s, 1930s, and 1940s, there was some progress in recognizing heritage values of colonial buildings, and this was reflected in Republican legislation aimed at protecting and safeguarding colonial sites or sites linked to important events of colonial history. The 24 July 1928 Law authorized the President to perform such functions.

Advances in legal aspects to safeguard locations and buildings considered as National Heritage helped to create a favorable environment to historical and archaeological studies related to major events of national history. The declaration of national monuments applied to the Cathedral of Havana and town of Mantua in Pinar del Rio (3 September 1935), the City of Bayamo (30 December 1935), Santa Ifigenia Cemetery in Santiago de Cuba (7 September 1937), Paula Church in Havana (5 August 1944), José Martí's birthplace (5 February 1949), and Aldama Palace (22 April 1949), and the National Commission for Archaeology was created in August 1937. All this impacted positively on the development of a new archaeological discipline in the country: historical archaeology (La Rosa 2000).

It was with the birth of the Academy of Sciences of Cuba under the protection of the 1011 Act 20 February 1962 and the creation of an Institute of Anthropology that archaeological studies in Cuba reached certain levels of significance and along with it the existence of a coherent and systemic state policy aimed at the rescue, preservation, and management of the archaeological wealth of the country.

From that moment, and for the first time, a group of professional archaeologists would enjoy legal, institutional, and economic support to transform archaeology into their main activity. This enabled work in a national scope to be organized and systematized so that the task of rescuing and studying history's most remote past on superior bases related to technical resources and theoretical approaches could be connected with universities and related institutions. Substantial support to archaeological research with heritage purposes was given by historians and architects who had been working in the field of colonial buildings (Prat Puig 1996; Weiss 2002; Soraluce & Lopez 2005).

Historical archaeology, as the latest of the disciplines of the field, emerged in those years in the country and continued opening up its way and gaining a space. Thus, F. Boytel Jambu conducted archaeological research and restoration of a plantation of French settlers in the Sierra Maestra in eastern Cuba and published the results in a title that would serve as a guideline in this field (Boytel 1962). It is not the mere study of a building, but one of the first examples in the specialized historiography of archaeological research directly concerned with the rescue and restoration of an architectural and spatial complex and its touristic exploitation. In short, Boytel Jambú's work demonstrated, in the context of the period in which archaeology of Cuba acquired institutional character, the great potential of the so-called historical archaeology, not only at the level of rescue by colonial history and heritage values but also at the economic benefits of such work, as it was implemented at the service of tourism.

The procedures used for field work and restoration of archaeological evidence and its social and economic implications turned this work into a new starting point for rescue and restoration tasks that have later developed in the country. In that work, the genesis of the current rescue and coffee heritage management of the eastern region of the island is found, with the location and safeguarding of 171 ruins of such plantations in the eastern mountains. These have been declared as World Heritage by UNESCO.

The institutional system that supports this rescue and management policy has been perfected over the years, in the same way as the laws that protect such policy. In August 1977, Law number 1 on the Natural and Cultural Heritage Protection was passed. Law number 2 also defined and upheld the declaration of local and national monuments, under whose protection Material and Immaterial Cultural heritage is defined, and the National Monument Commission was created as the highest Institution responsible for its fulfillment, ascribed to the National Council of Cultural Heritage of the Republic of Cuba.

Cuba: Archaeological Heritage Rescue and Management, Fig. 1 La Habana in 1851. (Engraving published in 1851 in London by Smith Brothers)

Cuba: Archaeological Heritage Rescue and Management, Fig. 2 San Francisco Square and Convent, Habana Vieja, World Heritage (Photo: G.L.R.)

The main objectives of the National Council of Cultural Heritage are protection, rescue, conservation, restoration, exhibition, research and dissemination of cultural and natural heritage, and the training of professionals in the field. It performs its tasks at a national level, through the Provincial Cultural Heritage Centers ascribed to museums, Monument Technical Teams and Provincial Cultural Property Records.

This policy has been particularly concerned with the necessary measures to ensure the enjoyment of heritage goods by the general population and tourism and protection.

The national network of Municipal Museums of Culture, Provincial Museums, and Museums offering a particular thematic line based on historical events of cultural significance in the territories are linked to general education programs and cultural and commemorative activities.

Work has been done in the rescue of important archaeological and cultural sites, involving archaeologists, architects, and historians. This work has resulted in solid archival and field research and has led to the restoration and enjoyment of the people visiting the major historic centers of the first villages founded during the conquest and colonization (Figs. 1–4) (Dominguez 1984, 2005; Gómez & Gomora 1986; La Rosa 2003; Leal 2003; Garcia 2004, 2008; Office of the Curator 2005).

The largest of the Antilles has a National Registry of Cultural Property that is constantly updated with the declaration and management of sites declared National Monuments and numerous enclaves. Some are "world cultural heritage" recognized by UNESCO, of which Cuba is signatory to the Convention.

Cuba's World Heritage sites are:

- Urban Historic Centre, Old City of Havana and its Fortifications, 1982. Cultural Asset
- Urban Historic Centre of the City of Trinidad and the Valle de los Ingenios, 1988. Cultural Asset
- Castillo de San Pedro de la Roca, Santiago de Cuba, 1997. Cultural Asset
- Landing of Granma National Park, 1999. Natural Asset
- Viñales Valley, 1999. Natural Asset
- Archaeological Landscape of the First Coffee Plantations in the Southeast of Cuba, 2000
- Alejandro de Humboldt National Park, 2001. Natural Asset
- Historic City of Cienfuegos, 2005. Cultural Asset
- Historic Centre of Camaguey City, 2008. Cultural Asset

Cuba: Archaeological Heritage Rescue and Management, Fig. 3 368 San Ignacio House in Plaza Vieja during its restoration (Photo: City Historian Office)

Cuba: Archaeological Heritage Rescue and Management, Fig. 4 Plaza Vieja restored. At the end of the street, to the right, 368 San Ignacio House (Photo: G.L.R.)

Cuba: Archaeological Heritage Rescue and Management, Fig. 5 Wooden anthropomorphic idol from Buchillones, Ciego de Ávila (Photo courtesy of J. Calvera)

- The Tumba Francesa, 2008. Masterpiece of Oral and Immaterial Heritage

At a national level, there are a number of teams of archaeologists, architects, engineers, builders, and historians who are engaged in the rescue and preservation of archaeological heritage of the island. In recent years, the work that Dr. J. M. Guarch began in the 1980s, in a large aboriginal cemetery on the site Chorro de Maita, Banes, Holguin Province, has come to life again. There is an open museum that reproduces a village where aboriginal potters and farmers worked and lived in the mid-sixteenth century. Replicas of 108 exhumed burial sites and the accompanying grave goods are shown there (Fig. 5).

Similarly, we indicate the Buchilones site, located in the wetlands of the northern province of Ciego de Avila, from which hundreds of archaeological wood pieces have been exhumed, including canoes, idols, and remains of houses, with a chronological range between CE 1220 and 1640. The work carried out with the cooperation of specialists from the University of London permitted that the most valuable pieces could be treated. In that place a Museum to display and preserve this valuable Aboriginal heritage is being finished (Fig. 6).

Cuba: Archaeological Heritage Rescue and Management, Fig. 6 Open Museum at Taíno Chorro de Maíta Cemetery, Banes, Holguín. (Photo courtesy of D. Torres)

Cuba: Archaeological Heritage Rescue and Management, Fig. 7 San Pedro coffee plantation ruins in Sierra del Rosario at the moment salvage works began (Photo: G.L.R.)

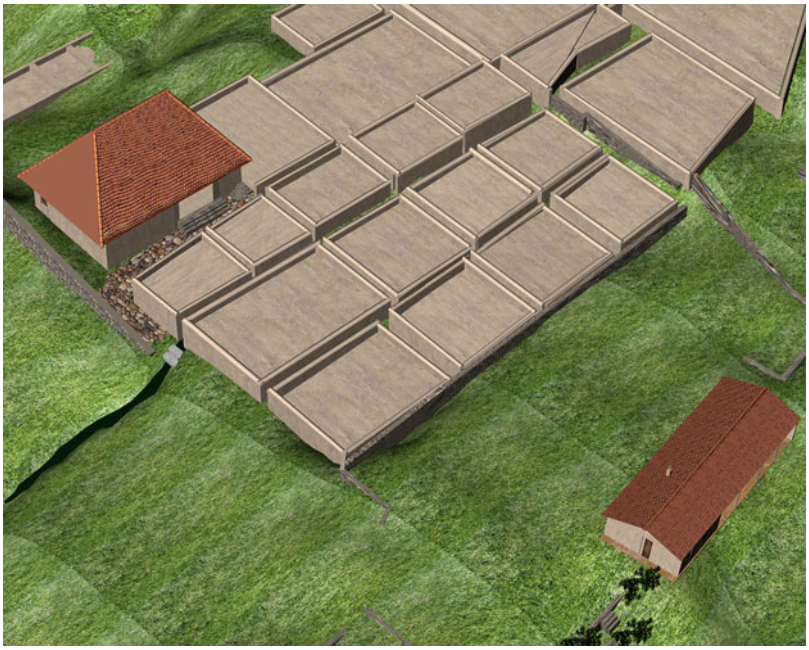

Cuba: Archaeological Heritage Rescue and Management, Fig. 8 Virtual reconstruction of San Pedro coffee plantation, carried out as part of the study, salvage and information dissemination about these archaeological sites. To the *right*, is the domestic area; in the *middle* and to the *left*, is the production area, with the driers and the coffee benefit house (elaborated by the authors)

The authors of this work also advise on the rescue of the French coffee plantation ruins in Sierra del Rosario, west of Havana, where almost one hundred of these important coffee plantation remains are found. They are examples of the architecture of French influence in Cuba and technological development of the mid-nineteenth century (Figs. 7, 8). This task is part of the work of Las Terrazas Resort and its sustainable development project through the ecological use of heritage and trail tourism.

In 1985, UNESCO declared the existence of 25,000 ha of forest in the Sierra del Rosario, as a Biosphere Reserve.

Old Havana, declared a Monument of Humanity in 1982, has been archaeologically worked since the 1960s, with a systematic study based on the suggestions of the UNESCO Venice Charter 1964. This study has examined remains underground and also on the surface, under the direction of the Archaeology Cabinet of the Havana City Historian Office and its Master Plan.

The treatment given to the first Havana City is a real testimony to the efforts of generations that have offered their expertise to this endeavor from the systematic policy of heritage work that has been carried out there.

Cross-References

- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ UNESCO World Heritage Convention (1972)

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Cueva de las Manos, Río Pinturas Cave Art

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Introduction

Cueva de las Manos is an archaeological site with rock art located on the rocky walls of the extraordinary Río Pinturas canyon, northwest of the province of Santa Cruz, Argentina. The site includes a cave and several surfaces of open air cliffs decorated with magnificent pictographs and is surrounded by a unique natural habitat. Cueva de las Manos undoubtedly possesses outstanding universal value which justifies its inclusion on the UNESCO World Heritage List in 1999 (Fig. 1).

Definition

Rock art, as one component of the archaeological record, gives us important information about the material and spiritual past of humans. This type of site is subject to constant natural and cultural deterioration. For this reason, the scientific community has become aware of the importance of its preservation.

Since 1995 the National Institute of Anthropology and Latin American Thought (INAPL) has initiated a program to prevent the destruction of rock art sites and to encourage their

Cueva de las Manos, Río Pinturas Cave Art, Fig. 1 Site location

Cueva de las Manos, Río Pinturas Cave Art, Fig. 2 Río Pinturas canyon

preservation. Conservation priority has been given to Cueva de las Manos, with concrete conservation actions that are still implemented today.

Key Issues

The paintings in the cave, overhangs, and cliffs of the Alto Río Pinturas are impressive because of their location on the deep ravine wall surrounded by a lovely setting and because of its artistic composition, the polychrome design, and beauty. Cueva de las Manos stands out not only for the beautiful natural environment but also for the countless cave paintings and art forms represented along the cliffs and rocky overhangs that line the river. There is a profusion of pictorial motifs made in different shades and countless superimpositions that have occurred throughout eight millennia of art production. The combination of these factors provides a unique aesthetic experience for the visitor (Figs. 2 and 3).

Outstanding universal values of the site are fully contained both in the core and in the buffer zone. The habitat surrounding the archaeological site remains intact and contains the same zoological species represented from 10,000 years ago in the rock art (Fig. 4).

This is a particular environment, unique and atypical, both at the provincial and regional levels, with great value for the conservation of natural systems in Argentina. The same can be said about the rock art, which despite the inevitable but very slow natural decay suffered for ten millennia and the damage caused by human action, it is in outstandingly good condition.

Cueva de las Manos, Río Pinturas Cave Art, Fig. 3 Rock art details

Moreover, research broadly corroborates the authenticity of Cueva de las Manos as a unique evidence of one of the first groups of hunter-gatherers that inhabited the South American region in the early Holocene.

Scientific excavations coordinated by C. J. Gradin together with C. A. Aschero and A. M. Aguerre demonstrated the link between the rock

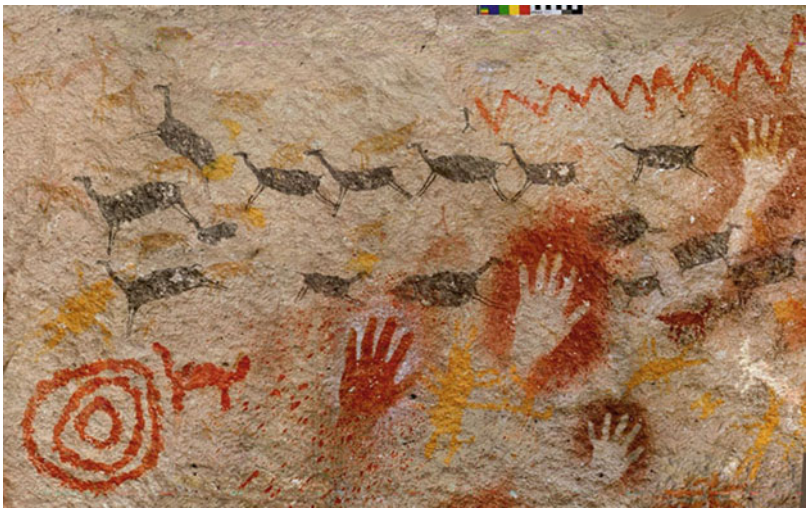

Cueva de las Manos, Río Pinturas Cave Art, Fig. 4 Scenes panel

Cueva de las Manos, Río Pinturas Cave Art, Fig. 5 Painted hand superimposed to painted guanaco

art with groups that inhabited the region ten millennia ago. Evidence from excavations in the cave area allowed for contextual associations between cultural levels and paintings, based on a detailed study of the overlays, the differential use of tones, the different degree of conservation, and the location of representations in different sectors. This relationship between the different cultural levels of the site is based on evidence showing a direct association between mineral pigments or painted-fragment remains detached from the wall, found during excavations, and the radiocarbon dates (Gradin et al. 1976, 1979; Gradin & Aguerre 1994) (Fig. 5).

The main product of the hunt was the guanaco (camelid), which was the main food support of these groups, providing meat, skin, fat, bones, and tendons. Naturalistic representations of this animal in a variety of attitudes were painted on the rocks.

The most outstanding scenes are those with high anecdotal value in which the animals are chased and surrounded by hunters, trapped, and killed using their throwing weapons or spears and stone balls. There are hunting scenes showing several hunters with lances attacking a herd of 20 guanacos.

Hand stencils (negative handprints) are a constant artistic expression at the site from its earliest days. There are concentrations of various sizes and colors, including red, purple, white, black, yellow, orange, ochre, and a few green. Studies revealed interesting findings about this tradition that has lasted for nine millennia.

Then guanacos appear in isolated sets of static attitude and bulging belly, with no connection between man and the prey.

The next phase is characterized by increasingly schematic art including drawings of lizards (or matuastos), negative hands, stylized human figures, and guanacos crudely executed, besides "rosettes" or circles surrounded by dots, a three-toed bird print similar to choique (a rhea, a large flightless bird).

The final phase in the artistic sequence is characterized by outlining and the use of an intense

red color for predominantly geometric figures such as zigzags, straight lines and angles, pinpoint, and circles. The human figure is produced with linear strokes. It also includes schematic representations of hands and negative hands, some executed on a prepared base in another color.

Protection and Management

INAPL undertake rock art documentation and study the natural and cultural damage to the site, as well as providing for the transfer of knowledge and community empowerment. It has also developed a management plan for the overall management of the site and work on the dossier for entry onto the UNESCO World Heritage List (Onetto 1998). Since 1997 the National Architecture Office carried out infrastructure works proposed in the plan. It also conducted an analysis of the stability of the slope, which included the study of mobility in soils and potential risks by a geologist (Zárate 2005).

The management plan for the site has been praised because it meets the conservation requirements of World Heritage properties (UNESCO 1999). This plan proposed several concrete actions, which have been fulfilled over 10 years of management: permanent custody of the place; strict control of entry of visitors, tour guides trained for that purpose, set schedules for visits, and times for guided tours; bounded groups of 15 people; and prohibition to enter without a guide, facilities for guide accommodation, interpretative posters, and high-resistance wooden walkways in the circuit of the paintings (Onetto et al. 2010).

In 2008, the Agencia Española de Cooperación Internacional para el Desarrollo (AECID) provided a project grant for "Conservation and Sustainable Management of Cultural Heritage. Hands Cave: 10,000 Years of History in Patagonia," based on the INAPL and coordinated by Maria Onetto. This has allowed a new phase of research and public use of the site, adding María Luz Funes and Andrea Murgo to the team, with a proposal that directly involves the community. The overall objective of the project is education and raising community awareness for the safeguarding of traditional knowledge (Podesta & Onetto 2004).

An interpretation center was opened in the reception room on the site, we worked on the edition of a handbook for schools of the province of Santa Cruz and the project of the Museum Carlos Gradin in the town of Perito Moreno was implemented, for the exhibition of archaeological material and laboratory researchers (Onetto et al. 2010).

Fieldwork was completed, monitoring of the condition of the art. A photographic survey to make a digital archive that will provide a complete record of art was also made.

The tasks of management, monitoring, and research on the site by the National Institute of Anthropology and Latin American Thought continue ensuring ongoing maintenance of the integrity of its outstanding universal values.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Heritage and Archaeology
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Values, Communication of
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art Sites: Management and Conservation
- ▶ Site Visitation and Interpretation: Management
- ▶ South American Rock Art

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Cult Stones of the Ancient Eastern Mediterranean

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Introduction

Aniconic stones feature in the cultic traditions of several cultures of the ancient eastern Mediterranean. In the Bronze Age Aegean they are called baetyls and, based on their representation in Minoan glyptic iconography, are associated with ecstatic ritual evoking divine epiphany (Evans 1901; Warren 1990; Crooks In press). Early religio-historical sources support the ascription of cultic significance to standing stones in the Levant, where they are called *masseboth* (singular: *massebah*), known primarily from Bronze and Iron Age sites (Moore 1903; Graesser 1972; Mettinger 1995; Avner 2001; Zevit 2001). Phoenician expansion across the Mediterranean during the Iron Age sees the increased incidence of stone cult in the region (Mettinger 1995), including in Cyprus where cult stones are known from the late Neolithic (Crooks 2012).

Definition

Cult stones in the ancient eastern Mediterranean are naturally formed or modified stones of varying appearance and use. They are associated with cult, particularly in the Levant, Cyprus, and Crete during the Bronze and Iron Ages. Ranging in shape and size from small water-worn ovoid stones as little as 20 cm in diameter in Cyprus to large roughly hewn standing stones up to 2 m in height in the Levant, they are typically of igneous rock or limestone and may be arranged singly or in groups. While the appearance and function of cult stones varies regionally, the unifying quality of such stones is their cultic significance, discernible through context.

Key Issues/Current Debates/Future Directions/Examples

In the ancient Near East, the veneration of stones is particularly well attested in the Levant (Moore 1903; Graesser 1972; Mettinger 1995; Avner 2001; Zevit 2001). The book of *Genesis* describes the story of *Jacob's Dream at Bethel* where Jacob "took the stone that he had put under his head and set it up for a pillar and poured oil on the top of it. He called that place Bethel. . .. Then Jacob made a vow, saying, 'If God will be with me. . . this stone, which I have set up for a pillar, shall be God's house. . .'" (Genesis 28: 18–22). Jacob's *massebah* is characteristically *set up*, acting as a mnemonic marker commemorating

a covenant. The sacred stone is also the house of god, "Beth-el" – the dwelling place of the supernatural spirit or power. Levantine masseboth may serve as cult idols located within a holy-of-holy, as boundary markers or mnemonic devices memorializing territorial control, or as liminal markers situated in proximity to city entryways.

In the Aegean, aniconic stones feature in the cultic tradition of the Minoan Bronze Age, where they are called baetyls, a term suggestive of an etymological link with the Hebrew "beth-el" (Evans 1901: 132–3, Moore 1903; Rutkowksi 1986; Marinatos 2009). Best known from their depiction in Neopalatial glyptic iconography, baetyls commonly appear as waist-high ovoid stones which are hugged or leant upon by an anthropomorphic figure, sometimes in association with the shaking of a sacred tree. Such scenes are thought to represent ecstatic ritual evoking enacted or embodied epiphany, the immanence of the divinity or spirit resident within the stone thought to be represented by flying creatures, such as insects or birds, or by floating anthropomorphic figures. Minoan baetyls may have served as aniconic cult objects or as the animistic dwelling places of divinities or spirits (Warren 1990; Crooks In press).

Phallic cult stones are known from as early as the Ceramic Neolithic in Cyprus (Crooks 2012), however, the use of stones in Cypriot cult is most commonly attested from the Iron Age, following increased exposure to Phoenician and Aegean cultural influence. While not typically phallic in appearance, Cypriot cult stones are nonetheless most frequently associated with fertility cults (Karageorghis 1992: 212), reflecting the influence of Frazerian seasonal-allegory theory which posits a preoccupation with fertility as a feature common to all early agricultural societies (Frazer 1890: IV).

Cultural evolutionism has often informed the interpretation of ancient cult stones, so-called "primitive" cultures thought to employ aniconic cult images as precursors to the more sophisticated anthropomorphic images utilized by more highly evolved groups. This is demonstrably inaccurate, aniconic cult stones commonly occurring alongside anthropomorphic cult images. Similarly, it is often held that theistic religions evolve out of ancestor cult, manifest in the idea that grave stones, a common point of focus in rituals commemorating the dead, may over time come to be perceived as the physical abodes of the spirit of the deceased. Finally, the concept of animism expounded by the Victorian comparative ethnologists (Tylor 1871; Smith 1889; Frazer 1890) is enduringly influential in interpretations of ancient cult stones, asserting that primitive humans believed every part of the natural world could be inhabited by supernatural spirits (Tylor 1871: vol. 2). Thus, natural phenomena such as falling meteorites, equipped with the power of motion, might be seen to be animated by spirits residing within.

The ambivalence or ambiguous quality inherent in aniconic cult stones poses significant challenges to their identification and interpretation archaeologically. However, their multivocality is central to their ritual value, through their accommodation of multiple individual ritual experiences in the context of shared ritual action; a single stone may evoke one or many divinities or spirits, and multiple aspects or manifestations of a single supernatural power, during a single moment and through time, rendering them useful in strategies of social cohesion.

Cross-References

- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Crete, Archaeology of
- ▶ Cyprus, Archaeology of
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Multivocality and Archaeology
- ▶ Religion, Greek, Archaeology of

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Cultural Ecology in Archaeology

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Introduction

From its very beginnings, anthropology has shown a marked concern for the environmental components that affect what anthropologists have deemed, at one time or another, to be the object of their investigations. This has given rise to countless proposals. Some of these identify factors in nature that limit the development of communities; others highlight the stimulus generated in societies by the same adverse environmental conditions they must confront. Some anthropologists have approached the environment-culture debate by evaluating the capacity of communities to adjust to their surroundings. In this way, they have identified social practices that help regulate the relationship between the environment and society – an emphasis that doubtlessly contributed to the development of the detailed examinations of current ethnography data that explained the functioning of those systems and a focus that ignored the history that set the stage for the present day. It is therefore not surprising that since the close of the twentieth century, the search for this history would take on an unusual relevance. The work of some anthropologists has gone beyond these perspectives, questioning the separation between nature and culture. A dissection that seemed artificial, on the one hand, and ethnocentric, on the other, in contrast with those standpoints arrived at under other conceptualizations. It was possible that nature did not exist, at least not in the way that had been assumed for so long in the west. This idea allowed a questioning of the perception and analysis carried out within the Judeo-Christian tradition, the fundamental pivot that gave form to the modern world.

It is clear that the studies advanced by those anthropologists created disparate, contrasting perspectives. The very nature of these discrepancies is found in the views and the emphases that we have developed, in one time or another, to perceive these realities; no less important is the data that corroborate or refute these constructions. Under titles such as "Cultural Ecology," "Human Ecology," "Cognitive Anthropology," "Historical Ecology," and "Ethno-Science," to name just a few of those reference points, the field has advanced little by little in examining the world and its inhabitants, a process that feeds more and more on other areas and incorporates other disciplines.

Definition

This entry is written from a viewpoint that considered the complex relationship between environment and culture as part of a long history, which includes the dialectic transformative processes generated from the mutual relationship between humans and their surroundings (Crumley 2006). This relationship has not only contributed to the "intervention" of nature and the transformation of culture but opens up a space to reflect on the character of these relationships where explanations can be found – including the anthropological – that give form to the behaviors developed in one or other historical period.

Historical Background

In the New World, anthropology arose amidst reflection on the forms in which human societies developed in the geographical space they occupied. Its founder, a scholar with training in physics and geography, tried to understand cultures from a historical perspective, despite being aware of the importance of the geography they occupied. Thus, a theory was born – later known as historical particularism – in the writings of Franz Boas (1848–1942). Boas instilled in his students, among many other ideas, the concept of cultural relativism as well as a marked skepticism of the scope of the generalizations they can make. Despite this, it was under the guidance of Boas that one of his students – Alfred Louis Kroeber (1876–1960) – would concern himself with outlining guidelines that would be used to understand the relationship between cultures and the geographical spaces they occupied. In fact, this was the central theme of his book "Cultural and Natural Areas of Native North America," published in 1939. In this way, the concept of cultural areas was formulated, a concept that linked geographical zones with characteristic cultural forms and in which cultural change was explained as part of a continuous process of diffusion. Although this was not a new idea, the same had been expounded and extended from ethnographic data obtained by anthropologists such as Wissler (1870–1947) in the United States; at each recurrence, it became more attractive. In this way, a map was developed that "naturalized" cultures by linking them with specific geographical spaces.

This correlation between cultures and geographical spaces was revolutionized when the idea of adaptation was inserted. Julian Steward (1902–1972) proposed that the similarities observed between different cultures could be explained as convergences created by evolutionary processes. In these, the adaptations that came about would play a fundamental role. Possibly the most familiar example of the adaptation processes that Steward tried to highlight is found in his texts on the *Patrilineal Band* (Steward 1973). For Steward, this constituted a social type whose principal characteristics – patrilineality, patrilocality, exogamy, territorial appropriation, and the composition of lineages – are defined by the narrow limit of possibilities generated by the interaction of a simple technology and specific ecological conditions (Steward 1973). In an atmosphere in which the key resource is found to be made up of nonmigratory prey widely distributed, it proves advantageous for groups to remain in the territory where individual members were born and to maintain a low population density. This was particularly true if the freight and transport systems were limited by simple human effort. The bond between the idea of evolution, which Boas saw as irrelevant in his time, and the concept of adaptation, bearing in mind the community structure in the light of its composition and the behaviors of its members, meant Steward's "Cultural Ecology" a powerful tool for understanding cultural change. After all, this theory had been designed to determine if the different adaptations to the environment generated transformations of an evolutionary character in society. However, the legacy of Steward was not limited to these ideas; Steward left us a clear methodology for embarking on the study of cultural change in which ecology was a central component (Steward 1977).

Steward was not the only researcher concerned with cultural evolution and its

relationship with the environment, in the mid-twentieth century. Leslie White's (1900–1975) interest in this led him to design a model in which human societies were abstracted from three components – the techno-economic, the socioeconomic, and the ideological. White (1949) emphasized the first of these components, particularly the human capacity to develop technologies that allowed societies to "harvest" a progressive quantity of energy. For White, the energy extracted from the environment, multiplied by the efficiency of the technologies employed, would determine the level of cultural development reached. In this way, it was possible to organize human societies in an evolutionary continuum that implied a progression from the simple to the complex. This singular emphasis on technology contributed to the relegation of the ecological components to second place or, in the worst cases, to being viewed as constants. This vision reinforced the development of some environmental determinism. One of the most outstanding examples of this approach was carried out by Betty Meggers (1957) in her interpretation of Amazon prehistory. In this context culture was examined exclusively in function of its environmental productive capabilities. This interpretation was severely criticized. The oversimplification of the proposed models and the nature of the evidence supporting them placed in doubt the results presented.

Anthropology in the second half of the last century faced new challenges. Social problems and their correlation with ecological factors were evident. Pollution, desertification, and even the possible scarcity of freshwater began to take up more and more discussion space. Thus, the study of interrelationships between the domain of nature and that of culture took on an unprecedented importance. Undoubtedly, this contributed to the proliferation of proposals by anthropologists; the publications of the time reveal an explosion of approaches on this theme. Toward the 1960s, a new vision emerged. The work of Roy A. Rappaport (1926–1997) and Andrew Vayda explored ecosystems, in which humans were a fundamental part, from a perspective that viewed culture as an adaptive strategy. This approach was based on the general theory of systems, from which it was possible to insert human populations as one more element in the complex relationship between the biotic and non-biotic elements of an ecosystem. Cultural practices were, then, considered to be mechanisms whose purpose was to maximize adaptation, at the same time contributing to the conservation of ecosystems (Rappaport 1967). In fact, Rappaport's analysis of Tsembaga rituals indicated that they did not solely serve to validate and intensify the relationships that contribute to the integration of society, or to symbolically present the links societies forged with nature, but that they were also important regulatory systems of the relationship between human populations and the ecosystems these populations occupied. As Rappaport showed, many of these rituals helped maintain a balance between the populations and the resources used (Rappaport 1967, 1996). In the same period that Vayda and Rappaport carried out their work, Marvin Harris (1927–2001) published a study of the management and valuation of cattle in India. Harris (1966) saw in these practices an adaptive process that had influenced Hinduism. For this author, the sanctification of the cattle and the abolition of its sacrifice for human consumption generated benefits that had been ignored by previous studies. Among those were found milk production, the use of dung as cooking fuel, and the use of the animals for hauling and agricultural labor. In short, Harris interpreted the behaviors from a point of view external to the values of the society in question, seeking to understand their possible adaptive function.

The approach of Harris, as well as the proposal of Rappaport and Vayda, was criticized for excessive functionalism; additionally, the work of the last two authors leads discussion toward the delimitation of terminology and the viability of quantifying its logical consequences in empirical form. Concepts such as population, homeostasis, equilibrium, dynamic equilibrium, retro-alimentation, resilience, and charge capacity had empirical implications and forced their verification in the field, which was difficult to carry out

given the type of information required and the problems inherent in the definitions applied (Friedman 1974).

As these discussions were taking place, on the ground, ethnographers were busy qualifying and quantifying the dietary composition of natives' societies. In this way, they hoped to assess actual consumption as well as the practices of appropriation and production used by small communities. Two themes complemented this work. On the one hand, an acute interest was developed in the ways decisions were made (i.e., Hames & Vickers 1982). This led to the construction of mathematical models that weighed up the investment and risk of success or failure in light of the results obtained from different production activities, a subject which proved especially revealing in the analysis of hunting.

On the other hand, attention was being drawn to the way the cosmologies of the premodern societies contributed to reinforcing practices that preserve the dynamic equilibrium of the ecosystems they occupied. A good example of this treatment is found in the article that Gerardo Reichel-Dolmatoff would publish in 1976 about cosmology as an ecological analysis.

The beginning of the 1990s saw a deepening of the study of ecological factors and adaptive behaviors. From "evolutionary ecology" (see Durham 1992), "human behavioral ecology" was developed (see Irons & Cronk 2000). This theoretical trend centered on the study of rules that define human decisions and the conditions in which these operate.

Basically, researchers were asking what ecological forces result from one behavioral alternative being selected above others. Unlike previous studies, they intended to study these practices in a broad context that included the whole of society. In another vein, they sought to generate models that could be corroborated empirically; simultaneously attempts were being made to formulate predictions about the future selection of behaviors.

Other theorists took a different route. By the early 1950s, the influence of Claude Lévi-Strauss (1908–2009) on anthropology had become patently obvious. Due to this, new subject matters took on an exceptional importance. In North America, this influence encouraged the development of orientations such as cognitive anthropology. This school of anthropological thought, arising from the study of languages, centered on the rational aspects of culture. It was accepted that marked, strong semantic categories across linguistic forms were related to meaningful cultural categories. This study hoped to improve understanding of how societies perceive, organize, and use culture. These anthropologists asserted that culture could not be seen as a material phenomenon, but is a form of knowledge that organizes the material forms (Tyler 1996).

One obvious consequence of this line of thought was the need to undertake a detailed inventory of the categories used for different societies and comparing them with those used in the west. An important example in this sense is the article that Harold C. Conklin published in 1955 about the definition and use of colors by the Hanunóo. From these reflections areas emerged that would gradually gain importance such as ethnoscience, ethnobotany, and ethnoecology; this last is understood to be the transcultural study of societies' manipulation of their environment.

The models generated by anthropologists up till then had dealt with "small-scale" societies that were seen as units isolated from the overwhelming movement of the West, a fiction of anthropological thinking that was difficult to maintain in the latter half of the twentieth century. The limits to resources being utilized to fulfill the needs of national societies and international markets obligated reconsideration of the levels of resolution that should be utilized, as well as the very nature of the problems.

Toward the 1980s, Eric Wolf (1923–1999) demonstrated the absurdity of maintaining a viewpoint that refused to recognize the history of some populations while omitting the impact of dominant societies (1982). "Traditional cultures" had their own history; a history that intersected with that of the West, a history on which the West had had a great impact; and a point of view that led to the revision of the anthropologists' daily

tasks; three decades later, some anthropologists are still delving into this topic (Godelier 2009).

By the beginning of the 1990s, a remarkable quantity of data had been compiled. The point of view of the natives, and their knowledge accompanying the results presented by anthropologists, not only offered a new horizon for studies but revealed problems of appropriation of that knowledge. In the west, the avid traders of learning and matter began a process of legal appropriation of anything that offered the possibility of enrichment. After all, the research in some areas, such as ethnobotany, had been financed in part by companies that now tried to patent the results. In response, a strong activism arose among social and political groups. These movements gave greater meaning to the results of research that dealt with relationships between culture and environment. A second consequence of this environmental activism was to highlight the importance of certain geographical regions. Due to this, it is not surprising that the tropical regions – for example, the Amazon – have become the space where confrontation occurred between those concerned about the present and future of the populations and those who saw the exploitation of resources as a logical process for sustaining and increasing the inequitable economic growth that characterized the twentieth century.

The press was filled with images of those who participated in these conflicts; new leaders personified the social drama arising from the conflict generated by the diverse forms of resource use. The world stopped to watch and listen to what the poor country folk, such as Chico Mendes, had to say. The discussions between academics, despite being on a continuum, became polarized: some, principally biologists, saw indigenous or rural occupation of the areas they were trying to protect or conserve as a problem; others accepted that conservation was impossible without the participation of those same communities (Balée 1985; Redford & Sanderson 2000). A revised version of the notion of the "noble savage" returned to academic discussion. In parallel, studies moved away from a way of thinking that would view stability and balance as the nature of the systems studied. These new directions were documented utilizing new technologies, among which was found more and better satellite-generated images (such as Brondizio et al. 1994).

The growing polarization around environmental conflicts established a new alternative in anthropology: a politico-ecological anthropology opened a path that helped reinforce links to other fields such as ecology, biology, and geography; at the same time, it developed a strong critique to the implemented policies using terms such as "environmental rights," "resource ownership," and "territorial rights." The anthropologists' viewpoint enriched the debate with empirical data and new theoretical contributions and opened a discussion that cut across a good number of knowledge fields.

Key Issues/Current Debates

Since the turn of the century and in the first decade of the twenty-first century, three fundamental changes in anthropologists' work have become clear.

First, the examination of "the world" in some non-western societies reveals a more varied range of representations than what westerners included in dominion over nature. Complex cosmos organized under rules of kinship, affinity, and opposition structure the relationship of universes that conceive "nature" as a continuum that can be described using the forms taken by social relationships. One conclusion has become clear: nature is society and society is nature. Thus, it becomes manifest that the vision that separated nature and culture was following the western historical development: an ethnocentric vision. This discovery led to the evaluation of the concepts underpinning the vision of the world on which the West had built a philosophical and economic system (Pattberg 2007). In another vein, this perspective enabled the comparative study of forms in which relationships are identified, qualified, and understood – the relationships between different forms of presenting the whole and the biases that define the cultures and their worlds.

Clearly the premises employed in these constructions establish different relationship forms, affecting the interactions generated between the different dominions (e.g., Descola 1996). This orientation not only influences the vision of the worlds built by natives but impacts the form in which the west has conceived its surroundings and has interacted with itself.

The environmental conflicts constitute a second topic of importance. During the 1980s arose, in an almost natural way, an alliance between local communities – indigenous and rural – and conservation groups.

The political plan of some, and the revindications that others were seeking, allowed them to identify common objectives. This alliance meant a figurative broadening, at the local and international levels, of the actions they wanted to carry out. Nonetheless, there was a contradiction between the two groups. At the international level, the conservationist wanted to use the local image to support their arguments; this implied the decontextualization and transformation of the localities. At the local level, the communities tried to reinforce and capitalize on the action with outside help, which forced changes to objectives, thus creating confusion among participants. The distance arising from these processes led to them growing apart and failing to understand the role that each played. The consequences did not take long to be felt. Possibly the clearest example of this lack of understanding is the assassination of Chico Méndez. In brief, there arose oppositions and contradictions that joined in with the already complex environmental conflicts. This situation was further compounded, on the conservationists' side, by their use of categories whose scientific application was, to say the least, incomplete but offered novel arguments valuable to the discourse. For example, terms such as biodiversity are part of a complex that goes beyond science, given that you are not trying to identify the composition and structure of "nature," but seeking to highlight the functional value of its present and future uses. In this sense, the category itself transcends science by placing the discussion in a form that relates it with the environment (Escobar 2005). In short, the critical analysis of the proposed discourse, and the activism on the part of anthropology sectors that advocate for an anthropology positioned face-to-face with the problems, constitutes an extremely important aspect in the present day.

Finally, work carried out since the 1980s demonstrated that the idea of worlds being untouchable, isolated, and free from human influence was nothing more than fantasy, an illusion built by a science that separated humans from the world they inhabited. More and more data corroborated the impact that human societies have had on the planet throughout history. Even those sites that not so long ago would have been considered untouchable have been affected and were in part the result of human activities. These observations were evidence of the magnitude of human influence on the planet. The loss of the ozone layer, attributed by many to recent human activities, or aspects of global warming are new phenomena; these are just two among the great impacts generated by humans throughout history. Without a doubt, a global history is emerging in which it is impossible to separate the human history of ecology from the ecology of history. The characteristics of the problems these approaches were tackling make it imperative to reconsider the resolution levels and the scales that must be employed.

One response to these necessities has been the development of historical ecology. This in itself comes as part of a multidisciplinary approach that utilizes information such as the reconstruction of paleoclimates, as well as ethnographic, ethnohistorical, and archaeological data. One example would be the incorporation of geographical models to understand humans and their activities as an integral part of the planet on which they live. Highlighted in this approach is the human and ecological past viewed as a whole. It is now recognized that the environmental dynamic does not run parallel with human activities, but rather the two are as one, indivisible. In short, the proposition of historical archaeology is to understand the formation of present and past societies through an analysis of the complex relationships between humans and their surroundings in the light of the consequences of their interactions (Balée 1998, 2006). Landscape is a fundamental focus of analysis in these studies; it is seen as

a point of interaction, with a temporal dimension both historical and cultural, at the center of evolution. It allows researchers to decode the interactions between humans and the environment during clearly defined periods. Nonetheless, investigators see how the landscape is in a continua state of physical and cognitive transformation.

Historical ecology currently faces several challenges. On the one hand, recognition of the cultural-ecological unity means combining approaches of different kinds. Models generated from the natural sciences tend to be deductive, while those created in the humanities are inductive; despite this, the two do try to give an account of the self-same reality.

It is necessary, then, to create and refine concepts, such as that of the landscape, in order to articulate these views, a job that is advancing with care (Crumley 2006). A second challenge lies in the resolution levels and spatial-temporal scales. The nature of the different data used, as well as their limitations, creates gaps and inconsistencies in the spatial-temporal scales of analyses. In this way, in some cases, the data contributes to an excessive extrapolation of the information which creates an illusion that detracts from the reality being studied. Finally, it is necessary to make note of one of the greatest advantages of historical ecology – its capacity to integrate diverse fields – which can lead to the use of categories under multiple definitions that are not always congruous. For example, the concept of history appears to have different connotations in the writings of ethnographers, archaeologists, and geographers (see Little 1999).

Future Directions

Far from the apocalyptic dreams presented by the communication media, humanity has before it some important challenges, but also opportunities. A growing number of people aspire to enjoy the same standards of living reached by the wealthiest countries. However, that well-being has been founded on an accelerated race to use and appropriate resources, on a global scale, which has contributed to inequities in other sectors. At the same time, a large proportion of the planet's inhabitants live in conditions of extreme poverty. The economic models used, as well as the premises on which the twentieth century is built, appear to be teetering.

At this crossroads, an anthropology interested in the environment should offer theoretical alternatives, while it continues its meticulous studies. This same anthropology should continue being critical and committed. If it is not capable of growing in this direction itself, it runs the risk of remaining condemned to live inhabit the world of sophists. Still, the recent literature suggests that anthropology has accepted the challenge.

Cross-References

► Historical Ecology and Environmental Archaeology
► Historical Ecology in Archaeology

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Cultural Heritage and Communities

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Introduction

Cultural heritage is inevitably implicated in the creation of a sense of community (Howard 2003: 147-85; Byrne 2008: 170-1), and the management of cultural heritage has consequences for those communities and their heritage. Communities can be defined from the "outside" or can be self-defining. The concept of "community" is therefore never a straightforward identification of "others" with whom archaeologists engage: heritage professionals too are a community among other communities, each with a claim on particular pasts and particular versions of those pasts. The role of the heritage professional can be a varied one, depending on context and the vision of the purpose of archaeology the professional espouses.

Definition

This section will explicitly avoid predefining its objects, on the grounds that what is at issue in the field of cultural heritage studies is precisely what the terms "cultural heritage" and "community" mean in any particular context, how they are applied, and to what they are applied (see, e.g., Tunbridge & Ashworth 1996; Carman 2002; Fairclough et al. 2008; Sørensen & Carman 2009).

Key Issues and Current Debates

Recent debates in the field of public archaeology have turned on two related issues:

- A recognition that the concept of "community" which is applied in the heritage field is one open to challenge and that communities themselves are at once varied and complex phenomena.
- The different forms of engagement that are at once possible and desirable (see, e.g., Carman 2005; Smith & Waterton 2009; Matthews et al. 2011).

Beyond this, there are questions concerning the role that heritage professionals play in their relations with communities.

Smith and Waterton (2009: 24-5) accuse heritage professionals generally of assuming that the communities with which they deal share particular characteristics, especially:

- Homogeneity
- A lack of internal conflict
- Locality
- Small scale

There is also a tendency to assume:

- That a community will preexist the arrival of the professional
- That such communities have an established sense of identity
- Grounded in what they perceive as their past as represented by certain kinds of material (Carman 2011).

However, and while they challenge this vision of community very effectively, Smith and Waterton (2009) and others (e.g., Agbe-Davies 2011) emphasize that the idea of "community" has a history, and the idea of what constitutes a community has changed over time. Moreover, how communities identify themselves – and indeed if a group of people choose to identify themselves as a community – is to be understood as much as a strategic and contingent decision as a statement of established identity (Agbe-Davies 2011). Smith and Waterton (2009: 25-7) emphasize how recent an arrival "community" is in archaeological concerns, at least in the UK: they date the first major period of interest to the 1970s and trace its gradual adoption in heritage policy until recent years has seen the concept used as a justification for official support for archaeology.

Types of Communities

Yvonne Marshall (2002: 216) suggests that in general archaeologists encounter two kinds of human community: one defined by geographical proximity to a heritage site is the "local" and the other defined by affiliation is the "descendant." These are not mutually exclusive categories: a "local" community may also be "descendant" (and vice versa). On the other hand, there is no reason for a "descendant" community to have any geographical connection.

The Indigenous community is a particular example of the descendant community (Smith 2004) and frequently taken as the model for archaeological consideration (see, e.g., Smith & Waterton 2009). There are, however, other kinds of descendant community (see, e.g., Funari & Carvalho 2011; Davidson & Brandon 2012). Diasporan communities may also claim affiliation with culture quite distant from them in space, such as communities who claim links with the culture of a place of origin: examples include African-Americans adopting specifically African aspects of dress and hairstyle, expatriate Irish who celebrate St. Patrick's Day, and others who retain the language, traditions, and dress of a distant or lost "homeland." However, descendant communities need not make heritage claims on the basis of direct or provable biological or cultural descent: modern British Pagans, for instance, may claim an association with prehistoric sites such as Stonehenge despite the lack of any demonstrated historical continuity between them and the builders of prehistoric stone circles; similarly, modern battle reenactors who name themselves for historic regiments can claim affiliation to sites where the historic regiment fought despite the lack of any historical continuity (Carman 2010: 197-8).

As Smith and Waterton (2009: 138) emphasize, however, heritage professionals such as archaeologists also constitute a community: they come together at conferences, through publication, and in other ways such as via digital technology (Smith & Waterton 2009: 119-37).

They share a common set of understandings of what they do and why, which although subject to contestation between themselves (see, e.g., Hodder et al. 1995: 220-4, 228-9) necessarily excludes others (Hodder et al. 1995: 30-231). Increasingly, the languages in which archaeology is published have become fewer over the years (Kristiansen 2012), and archaeology is becoming increasingly professionalized across the world (Darvill 2012). As a result heritage professionals cannot be considered to be disinterested observers or managers, but rather to represent a particular set of interests.

Types of Engagement

Any kind of community may be involved in an emerging community archaeology project. The issue is primarily, however, not one of who is involved, but the nature of the involvement. In this connection, Stephanie Moser and her colleagues in Egypt (Moser et al. 2002: 221-3) note that there is a standard hierarchy of types of collaboration:

- "Outreach" represents a one-way process of communication and education.
- Beyond this is a willingness to recognize the contribution to knowledge and information others can make.
- Beyond this is an active process of consultation, most evident with Indigenous and descendant communities.

In going further, the project at Al-Quseir in Egypt involved a series of additional steps:

- Fostering social relationships with the local community
- Maintaining a presence in the community between fieldwork seasons
- Employing locals as part of the project
- Using locals as the means of outreach programs
- Ensuring the retention of remains retrieved locally in the local area (Moser et al. 2002: 223).

Similar ideas emerge from the work of Judith Field and her colleagues with the Aboriginal community at Cuddie Springs in Australia (Field et al. 2000: 43-4). Here, it was important to the community:

- That the archaeologists establish their integrity
- That they engendered trust
- That they encouraged active participation in the project, especially by employing members of the community in the work
- That they maintained a constant presence in the area
- That they conveyed information to the community members in ways to which they could respond
- As in Egypt, that locally found archaeological material remained in the area.

In both these cases, these factors contributed to a sense among the local community of the project as something of direct relevance to them and in which they had a direct stake, both emotional and economic. It also engendered trust among them of the archaeological team, who arrived as strangers. In both cases, however, the community was involved after the researchers had established the grounds for the project.

A similar kind of project in Fiji (Crosby 2002) aimed to go a little beyond this by listing the requirements for a "true" community archaeology project, which are said to be:

- Initiation of the project by the local community
- A basis in local ideology and attitudes, linked to concerns for sustainable resource use
- The provision of expert advice from outside the community
- External (in this case, government) funding.

Here, the community calls upon others to undertake the work, which is then organized and financed from outside. Although dependent upon the willingness of professional experts to place themselves at the service of untrained locals and of government agencies to provide full financial support, which may be exceptional and peculiar to the Fijian context, there is nevertheless an indication here of a shift of power between the professional advisor and the community whereby it is the community that leads rather than the archaeologist.

"Democratic" archaeology projects take a similar approach. At Sedgeford in England, a local committee of trustees had control over the project as well as employing – indeed relying

heavily upon – local labor, while hierarchical structures were minimal (Faulkner 2000: 31-2). In other cases, more formal structures serve to support community control. At the Levi Jordan Plantation site in Brazoria, Texas, USA (McDavid 2000), control over archaeological research and its public interpretation was in the hands of a board of trustees drawn from descendants of former owners of the plantation and those they enslaved and their representatives, the aim of archaeologists being to collaborate with members of local descendant communities in reciprocal, nonhierarchical, mutually empowering ways (McDavid 2000: 222). It is also clear, however, that any particular initiative required the permission of the trustees and that committee members were involved in every stage of the project and were seen as the "bosses" who directed the archaeologists; these were then concerned both to involve committee members and to be "involved in [committee members'] own agendas, according to. . . mutual needs" (McDavid 2000: 222). Nevertheless, McDavid admits that the committee members perceived her as the project leader, a role she both claimed and does not attempt to disguise (McDavid 2000: 222).

Carol McDavid takes an explicit approach to her work with African-American descendant communities, grounded in American pragmatist philosophy, which entails the establishment of a continuing "conversation" about issues at the site (McDavid 2000: 229, 2002: 305, 2009). In her work she emphasizes the diversity of backgrounds of committee members and of attitudes toward the site, both white and African-American, and draws upon the pragmatist approach as a way to accommodate this without closing the conversation. First, she notes how involving herself as one actor in a conversation among many serves to enhance her standing in the community, rather than diminish it: effectively by denying her own "expert" status as an archaeologist she is able to emerge as the community's expert (McDavid 2000: 230). Second, she sees how the abandonment of scholarly authority allows her to engage more closely with the more contingent and contextual interpretations of others' lives by those others (McDavid 2000: 230-1). Third, a pragmatic approach is about keeping the conversation going, not about winning arguments: accordingly, disagreements between actors become not problems to be overcome but opportunities to engage more deeply with colleagues (McDavid 2000: 231). The outcome is an approach grounded in four principles: reflexivity, multivocality, interactivity, and contextuality (McDavid 2002: 307-10), designed to maintain the conversation and by doing so to build trust with the community whose project it is.

Creating Communities

A function and opportunity frequently ignored is the capacity of the professional to construct communities through their work. In a series of case studies, Boyd et al. (2005: 98-107) indicate the processes by which professional interest in sites in Australia engendered the development of local interests and values built around differing attributes. Accordingly, they show how local aboriginal interests mostly focussed upon sites representing Indigenous and traditional attitudes to land and environment, or to the history of their engagement with incoming colonizers. European Australians also recognized such claims and sometimes the spiritual dimension these indicate. Others however were more concerned with current social and economic uses – as tourist sites, recreational space, or thoroughfares – although not all of these conflicted with Aboriginal conceptions: the attitude of skateboarders to a rock-art site, for instance, could be seen as another example of significance to a particular subculture (Boyd et al. 2005: 107). However, these values did not attach to the site until it became the focus of attention by researchers: it was by raising questions about such places that values were ascribed and which marked their importance to inhabitants of the locality and beyond.

The same set of processes was evident at the Hilton of Cadboll site in Scotland (Jones 2004). Here, excavation of the lower portion of an inscribed Pictish stone and its reconstruction ignited controversy over the ownership and

placement of the reunited object, which was claimed both by the national museum in Edinburgh and the locality. Investigation of the contexts within which contemporary meanings for the stone are created identified a complex set of interlocking values. Academic and intellectual values included those of archaeology, art history, folklore, and oral history (Jones 2004: 27-33). In parallel to these, there was a more symbolic sense of its identity, as a living part of the community, and as an object "born" into the locality (Jones 2004: 33-7). As such it at once belongs to the community, is part of it, and is also constitutive of it: "as well as being conceived of as a living member of the community, the monument is also simultaneously an icon for the [community] as a whole" (Jones 2004: 37). This extends into the monument's role in the construction of a sense of place, and indeed of reforging a "lost" sense of community cohesion (Jones 2004: 39) that could be "healed" (at least symbolically) by reuniting the two original pieces of the monument.

A third instance is in the case of the commemoration of the 300th anniversary of the Battle of Oudenaarde in Belgium (Carman 2012). Here, a disinterested local population – many of whom who lived on the land where this internationally and historically important event took place – had to be transformed into a community of interest. A combination of public meetings and press stories, involvement of scholars from several countries, and active research on the battlefield all contributed to the emergence of a community who made a connection to both the place as a location of historical significance and to the memory of the event it signified. The result was the successful organization of a major commemorative event including a museum exhibition, a reenactment weekend, and an international academic conference. The sense of community interest thus created has since allowed ongoing research on the battlefield and encouraged the Flemish authorities to develop an inventory of historic conflict sites for purposes of heritage management.

In these cases "community" interest did not preexist scholarly attention to a particular site or monument. It was the presence and interest of scholars that incited such interest.

Activist Archaeologies

Questions as to the role of the professional with the communities with which or for whom they work inevitably embrace the degree to which professionals engage with the particular agendas of those communities. Some (e.g., LaRoche 2011; Levin 2011; Davidson & Brandon 2012) become involved in community projects in order to allow that community to reclaim part of its past and thereby to emphasize present inequalities; others (e.g., Saitta 2007; McDavid 2009) are more concerned to use the study of the past as a means to engage directly with issues of inequality in the present. For the former, the past matters in itself as a means to empowerment, while for the latter the past is a mechanism to address current concerns. This kind of work has been called "civic engagement [which calls for] a commitment far beyond that of" conventional engagement with communities (Little 2007: 162).

Such agendas raise issues about how archaeologists can contribute to political, social, and economic change. One is to use archaeological interpretation to challenge conventional and expected understandings of current norms. Others take a different line – by directly involving non-archaeologists in the process of archaeological work. Whether you call this "community archaeology," "collaborative archaeology," or "democratic archaeology" (Carman 2005: 86-90), it works to challenge the idea that professionally trained archaeologists are the sole providers of archaeological interpretations and the only people qualified to undertake archaeological investigation. It involves abrogating some or all professional authority and putting professional skills and knowledge at the service of others who direct the project. Not only does this provide them with access to what is – after all – their past but also serves to undermine in a very direct and manifest way the structures of authority and power that are part of the modern order and in part invested in academic

disciplines and agencies (such as those employing archaeologists) operating under the authority of law and government.

Conclusion

The topic of "cultural heritage and communities" is much larger than can be conveniently covered in the space allotted here. While heritage can be considered constitutive of community, the reverse is also true. The choices groups make as to what constitutes their heritage will define them as a community: while at the same time anything classed as heritage will serve to define the community to which it is deemed to be affiliated. In considering how communities relate to heritage and vice versa, it becomes necessary to make a decision as to the direction of the constitutive link. This then raises the question of the role of the heritage professional: in defining something as "heritage," the professional may also be defining a particular community of interest which may not otherwise be recognized by its members. In their activities professionals may also create communities of interest that did not previously exist – either by choice (as at Oudenaarde) or by other processes (as recorded in Boyd et al. 2005) – which must then not be identified as preexisting. Others go beyond this by adopting the agendas of the communities with which they work, becoming at once part of the community and serving it.

The result is a complex set of relationships that are impossible to analyze in an entirely disinterested manner, since the researcher is inevitably implicated in the process of community construction and maintenance. As we increasingly come to recognize this, the processes of archaeology in the public arena become the subject of research in their own right.

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- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
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- ▶ Heritage Museums and the Public
- ▶ Heritage: History and Context
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Cultural Heritage and the Public

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Introduction

Few communities have enjoyed as long and productive a relationship with their archaeological

heritage as has the City of Alexandria, Virginia. For more than 50 years, beginning with the archaeological investigation and restoration of Fort Ward in 1961, archaeology has played a major role in shaping the city's identity. In the mid-1960s, residents forged an innovative partnership with the Smithsonian that linked Urban Renewal to archaeology – while other cities were losing their past, Alexandrians were rediscovering theirs. Again with resident impetus, in 1975, the City formed its own archaeological commission to guide the direction of archaeology with nonprofessional volunteers, and 2 years later, it hired its first professional archaeologist. Volunteers carrying out a variety of tasks – studying documents, processing artifacts, excavating sites, commission members, artists, educators, students, museum visitors, descendants of those buried in cemeteries, developers and other supporters – have helped to define the character of archaeology in Alexandria, both how it is carried out and how archaeological information reenters the modern world. The City and developers have created parks, reconstructions, preserves, trails, memorial spaces, and interpretive signs on archaeological sites from all eras; public art has been commissioned to commemorate historical events and to honor the lives of earlier generations of Alexandrians whose stories have been pushed to the margins of history. In short, Alexandria provides a great example of what can happen when a community embraces its archaeological heritage.

Definition

Archaeology in Alexandria brings together the resources and authority of local government, the skills of professional archaeologists, and perhaps most importantly, the interest and enthusiasm of residents to form a unique environment in which the community decides how archaeological information reappears on the modern stage. With the management of the City's archaeologists, this arrangement allows Alexandria's archaeological record to be discovered, preserved, and protected using professional standards and current best practices. This process is conducted in such a fashion that the identification, interpretation, and long-term use of archaeological sites are carried out in accordance with the values and priorities of the local community. As a result, the public is able to take archaeology in directions that may be completely unexpected by archaeologists, and which are more likely to draw the interest and continued support of city residents.

In the United States, the legal protection offered to archaeological resources located on private land is almost nonexistent. While Section 106 of the National Historic Preservation Act requires an evaluation of how proposed projects may impact historic resources on federal land, or how federally funded or permitted projects may impact privately owned historic resources, private development on private land almost never includes this process for archaeological resources. Since private land use regulation is generally carried out by local government, the only way in which archaeological protection can occur is if the thousands of city and county governments in the United States adopt their own regulations. While many communities control actions on historic structures, only a handful regulate archaeological resources. Alexandria, fortunately, is part of this select group.

Alexandria's progressive approach to the management of its archaeological heritage is in many ways a result of the city's citizen-led advisory body, the Alexandria Archaeological Commission (AAC). The AAC recommends actions to City Council regarding Alexandria's archaeological heritage. It was established after the Urban Renewal projects of the1960s exposed the vast, rich, and significant archaeological materials buried underground. Its citizen members are not required to have archaeological training. The major assets of AAC members through the years have proven to be their willingness to fight for the preservation and contemporary use of the city's buried past, and their insider's perspective on the possibilities of using archaeology within their own community. The Alexandria Archaeological Protection

Code (AAPC) offers an example of how these traits have combined to better protect the city's 13,000-year heritage.

The AAPC was first conceptualized by members of the AAC even though the City archaeologists did not consider a local code a possibility. The AAC members met for years to consider methods of regulating development so that archaeological resources were not unconsciously destroyed. Given their commitment to the concept that developers should share with the City in the responsibility to search, study, and share the past, an interesting partnership emerged. Development attorneys helped craft a code which outlined a specific process to be conducted before site construction, thereby reducing what their clients feared most – surprises, delays, and unbudgeted costs. A strong AAC chairman, the support of local archaeology enthusiasts, a long history of community preservation, and goodwill generated by the City's archaeological activities assisted in producing the unanimous City Council vote in September 1989.

The Alexandria Archaeological Protection Code mandates that archaeological review become part of the private land development process. New developments that require a site plan (this includes nearly all new projects proposing the construction of more than two housing units) also require archaeological review. Approved preliminary and final site plans contain conditions to ensure archaeological assessment, evaluation, preservation, long-term care of collections, and public interpretation.

Key Issues/Current Debates/Future Directions/Examples

A key management tool in Alexandria is the staff's access to a large quantity of historical data organized spatially for reviewing site plans, as well as projects going through the Board of Architectural Review and building/demolition permits. Volunteers, students, and staff have collected this information on thematic maps and files, as well as developed GIS overlays using historical maps. In the first step of the City's review process, staff consults all the data for the site plan location to assess whether there is a possibility that archaeological resources can be damaged by the proposed project. If this is the case, conditions are written to require the developer to hire professionals to prepare an Archaeological Evaluation Report and a Resource Management Plan, outlining the results of documentary research and field investigations, stating site significance and recommending a treatment plan to protect some resources and/or recover those that would be lost. The City archaeologists write scopes of work for these products, and review and approve the work to assure consistency with professional standards, accuracy, and contribution to the public's knowledge. The plans may call for the excavation of portions of the site and preparation of a report, or they may find other appropriate methods for protecting and possibly interpreting the site's archaeology for the public.

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- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Public Involvement in the Preservation and Conservation of Archaeology

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Cultural Heritage in the Digital Age

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Introduction

We are living now in the twenty-first century, at the height of the new era of *Information Technology*. Behind us, we have a rich, inherited, human culture that goes back over five millennia. With the technologies we have in our hands today, we can really preserve this heritage of the past and showcase it to future generations in an unprecedented way. In this entry, we are going to investigate the evolution of *documentation technology* from ancient times up until today. And, at the same time, we will also investigate the different aspects of this cultural and natural heritage, and finally explore how we are using these developed technologies to preserve our heritage. To conclude, we will investigate the prospects for the future and how we will view our heritage.

Key Issues

Technology: From Hieroglyphs to Cyberspace

Human beings started, about 20,000 years ago, to draw rock art on the walls of caves. Five thousand years ago, man started to engrave his hieroglyphs on stone walls in Egypt, and to inscribe mud tablets with what is known as cuneiform in Mesopotamia.

Five hundred years later, Egyptians began to use papyrus as a wonderful medium for writing. Papyrus is made out of the stem of the papyrus plant, which is about 2-cm wide. This stem is cut into long strips. These strips are then laid down beside each other and covered with another layer of strips perpendicular to them. The two layers are then pressed together to get rid of the moisture, before being left to dry. We are finally left with a sheet which is a little bigger than the A4-size sheets that we use today. Several of these papyrus sheets were stuck together to form a scroll that could be as long as a few meters.

About 1500 BCE, Egyptians began to use a third medium. This medium was *ostraka*, fragments of broken pottery. About CE 1000, another medium appeared, known as "paper," a word derived from the word "papyrus." In addition to this, Egyptians started binding sheets together to create what was known as a codex, which we all refer to today as a "book."

They also started using another new material – parchment – which competed with paper and papyrus. Parchment is made from the skin of certain animals.

In the fifteenth century, Gutenberg made a real leap in the progress of humanity by inventing his printing machine.

Humanity continued reading books for more than 500 years till a new medium was invented – the digital computer. The first digital computer was introduced in 1945. It was, physically, a very big machine and owned by organizations rather than individuals.

Personal computers first became available in the early 1980s. In the 1990s, computers became far more sophisticated, starting to employ different media such as sound, images, and videos – what is known as multimedia.

In the mid-1990s, small computers started to possess the capability to handle maps, with what is known as the *Geographic information system* (GIS). GIS allows information to be positioned on maps, according to longitude and latitude.

Of course, the really big breakthrough in the 1990s was the advent of the *Internet*. The Internet has taken the world to another dimension, in which all information is shared between subscribers around the world, in what is now known as cyberspace.

In cyberspace, people are connected. Information can be stored in a computer server anywhere in the world and accessed by many people around the world. Compare this with a book that you keep on a shelf in your home and that can only be accessed by yourself.

In cyberspace, you can communicate with someone or many people at the same time, without having to resort to the postal service or a telephone. In cyberspace, you can access an unlimited number of books and publications without having them physically with you in your home or office.

In cyberspace, you can download any video or soundtrack you want to have. In cyberspace, you can share your albums of photos and videos with other people on what is known as YouTube.

In cyberspace, you can have your own space with multiple applications that you can share with your selected friends. Cyberspace has created a cyber social network, in which people from different parts of the world can communicate live in an unprecedented, spontaneous way.

At the moment, we can say the physical books live side by side with digital space. But for how long this state of affairs might continue, nobody knows. Each medium has its own merits.

Remember that in the old seaport of Alexandria, a few years ago, divers found some blocks of stones on the seabed that were thousands of years old. Experts carefully cleaned them and then deciphered the ancient hieroglyphic inscriptions on them. Now imagine immersing your computer in a bucket of water for a few seconds. You would not dare do it, as all the information you had patiently stored on it would probably be destroyed, along with the computer itself.

With the increase in the storage capacity of computers and the speed of processing, it has become possible to handle not only flat images, but also three-dimensional objects, such as museum exhibits. This is normally achieved by a technique that involves a combination of both the photographic and laser scanning techniques.

To perform this 3D dimensional scanning, we normally put the object we want to scan on a turntable and then scan it while it is revolving. The product is normally a 3D picture that you can rotate on your screen when viewing it. You can also look at it in 3D with special stereoscopic eyeglasses.

The scanners we use for such operations are classified as small-scale scanners. For the purpose of creating a 3D visualization for large spaces, such as halls, buildings, or ancient temples, we usually use bigger devices classified as medium-scale scanners.

Normally, when such places are scanned, we end up with a *virtual reality* visualization, allowing the user to navigate virtually inside a building, for example, looking inside the different rooms and their contents at his leisure.

Another advanced level of virtual reality is the virtual addition of a missing part to the existing virtual space.

Let us take as an example the Temple of Luxor in Upper Egypt. This temple used to have two obelisks in front of its entrance wall or pylon. During the nineteenth century, one of the obelisks was transferred to the main square in Paris, the Place de la Concorde.

So today, using this *Augmented Virtual Reality* technique, we can show a 3D virtual model of the temple with one of the two obelisks missing. Then we can insert the missing one, which is now in the Place de la Concorde, allowing the viewer to see how it looked when it was still standing in its original place. The result is like looking into the far-distant past.

Heritage: From Folklore to Monuments

Now let us examine a new dimension of the problem, namely, the *thematic dimension of heritage*.

Some years ago, UNESCO divided Heritage into two main categories, Cultural and Natural. The difference between them is that *Cultural Heritage* refers to manmade heritage, while *Natural Heritage* refers, of course, to the heritage we find in the nature around us.

It is vital to preserve both sorts of heritage, which is why UNESCO, along with many governments, organizations, associations, and centers, including the Center for Documentation of Cultural and Natural Heritage in Egypt, is investing a lot of effort in this domain.

To help satisfy his religious needs, man erected temples to show his reverence for the gods. And for shelter, he built houses. Because he also felt the urge to record the diverse shapes and colors that impressed him, he did paintings and sculptures. To express the heavenly rhythms

and sounds in the depth of his soul, man composed music.

All of these fall into the category of Cultural Heritage. On the other hand, protectorates, national parks, wild animals, birds, vegetation, all types of biodiversity, natural formations like geological masses, sand dunes, and landscapes are all examples of Natural Heritage.

UNESCO then subdivided Cultural Heritage into two types: Tangible and Intangible, or, as they are sometimes called, Materialistic and Non-Materialistic Heritage.

Tangible Heritage is heritage that we can touch with our hands, including movable objects like the coins, statues, and other treasures we find in museums, as well as immovable objects like ancient tombs, temples, and pyramids, or structures like buildings and bridges or even towns.

For this Tangible Heritage, UNESCO has created a center called the World Heritage Center (WHC). One of the activities of this center is the creation of a World Heritage List (WHL), to which member states have added monuments and sites that are of universal value and interest.

Intangible and *Oral Heritage* is, meanwhile, the heritage that we cannot touch. We can grasp it only through seeing, hearing, smelling, tasting, and feeling. Examples of this are music, folk epics, traditional stories, oral literature, and food.

We must take into consideration the fact that there is a gray, overlapping area between Tangible and Intangible Heritage, especially in the area of folklore. Paintings, for example, are considered intangible, though we can touch them.

Intangible Heritage is in general much more fragile and more vulnerable to loss than Tangible Heritage. That is why the issue of documenting and preserving Intangible Heritage is very delicate and requires special skills in terms of dealing with the ravages of time and fragility.

UNESCO has therefore created a special register for the Oral and Intangible Heritage of Humanity.

UNESCO also has another category: *Documentary Heritage*. This includes archives and books in libraries, as well as collections of manuscripts. *Archival Heritage* is, of course, treated in a different way. Again a special program has been developed by UNESCO especially for that purpose, known as Memory of the World (MOW) program.

Concluding Remarks

During the past few decades, with the introduction of *Information and Communication Technology* (*ICT*), we have started to handle the various categories of heritage in a systematic way, using the different available technologies, such as databases, multimedia, GIS, 3D imaging, virtual reality, and augmented reality.

Now different institutes have started building huge information systems. These days, with systems such as Kindle, IPad, and others, you can download hundreds of books at the click of a button.

Meanwhile, an international project under the title of the World Digital Library, coordinated by the Library of the Congress, is trying to digitize different media such as books, images, sound, videos, maps, and manuscripts from different parts of the world, and linking them together.

Now we can easily imagine gathering the artifacts from a certain historical period, that are scattered in different museums across the world, into one digital system, just as if they were in one museum.

A very good example of this application is the website www.globalegyptianmuseum.org which contains Egyptian artifacts from 13 European museums, in addition to three Egyptian museums. This website is in eight different languages. The reader is also encouraged to visit these websites:

www.cultnat.org
www.bibalex.org
www.eternalegypt.org
www.egyptmemory.com

As for the field of imaging and cinematography, new technologies are under development that will allow three-dimensional viewing on both the television screen and the silver screen. To start with, viewers will have to use special eyeglasses and then, later, they would not even need glasses at all.

We can imagine the amazing effect that this will have on the photographing and visualizing of

different monuments and buildings. A virtual reality application using such technology will be very impressive.

Another thing that we can expect to see in the future is a huge increase in storage capacity that will probably allow us, within a couple of decades, to store everything that humanity has been able to produce throughout the course of its evolution.

Finally, within a few decades, we will probably have every museum, library, archive, and archeological site round the globe digitized and available at our fingertips.

Cross-References

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- ▶ Experiencing Cultural Heritage
- ▶ Heritage and Archaeology
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Cultural Heritage in Times of Economic Crisis

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Introduction and Definition

Applied archaeological practice, as a means of investigating and protecting archaeological sites, landscapes, and material, is a young profession which emerged across the world during the twentieth century. As a practice that has become increasingly linked to land-use change and development expenditure, it has been impacted upon by all of the crises that the global economy has gone through in the twentieth and twenty-first centuries.

Key Issues/Current Debates/Future Directions/Examples

Since the early 1970s, there have been four international waves of financial crises, and each of these waves has been followed by recession, with the fourth wave, which began in 2007 and was followed by recession from 2008, being the most severe and the most global since the Great Depression of the 1930s (Kindleberger & Aliber 2011: 1). The Great Depression led to the first examples of archaeological practice being affected by an economic crisis. The recovery plans of Roosevelt's New Deal involved federal investment in capital projects, some of which funded archaeological work, specifically via the Tennessee Valley Authority's dam building program where extensive excavations were funded – providing an income to otherwise unemployed laborers – ahead of dam construction and subsequent reservoir flooding (Jameson 2004).

Patterson (1999) considers that the emergence of commercial archaeological practice in the United States (as part of cultural resource management) was a consequence of legislative changes that coincided with a transition from Keynesian to monetarist policies in response to the global economic crisis of the 1970s. This crisis had followed the enormous costs to the US government of the Vietnam War and the rapid rise in oil prices following the Arab-Israeli War of 1973.

From that point on, the commercialization of archaeology in the USA became the norm, and this model has been subsequently adopted or adapted in many states around the world. This means that the political response to that economic situation which then shaped how archaeology is

undertaken has been the most significant effect that an economic crisis has ever had upon archaeological practice.

In the United Kingdom, recession at the start of the 1980s led to a lengthy period of mass unemployment. The Community Programme of the Manpower Services Commission (MSC), a governmental agency established to introduce unemployment relief measures, funded a very significant number of archaeological projects. These initiatives – like those of the Tennessee Valley Authority 50 years before – aimed to provide work for long-term unemployed individuals and tended to be labor-intensive excavation and post-excavation processing projects.

British archaeology then became significantly reliant upon MSC funding, and by 1986–1987, the majority of individuals working in UK applied archaeology were employed on MSC projects (Aitchison 2009a).

Following recovery led by developer funding and the end of the MSC program, during another period of recession in 1990–1991, approximately 300 staff were made redundant by the Museum of London (Young & O'Sullivan 1991).

There were also state programs to reduce unemployment in Germany in the 1970s and 1980s, the most significant of which for archaeology was the ABM (Arbeitsbeschaffungsmaßnahmen); this was continued post-1989 in the Länder of former East Germany. Across central and eastern Europe, the years of transition from 1989 to 1996 (the year in which Poland's GDP surpassed its 1989 level) were marked by significant reductions in the education and culture budgets which had previously funded archaeology (Lozny 2011: 27), but following the transition the polluter-pays principle was enthusiastically adopted, removing archaeology's reliance on state funding, but in turn exposing archaeological practice to the risks of market engagement.

The Asian Financial Crisis affected east and southeast Asian countries from mid-1997, with the most significant impact on archaeological practice being in Japan where a system of predevelopment archaeological intervention had developed in response to economic growth rather than through legislative direction (Okamura & Matsuda 2010). The annual number of preconstruction excavations in Japan peaked in 1996, with a decline following the onset of the crisis, but then stabilizing at around 75 % of the 1996 level from 2000 onwards (Ikawa-Smith 2011: 696; Okamura 2011: 78). There has been a decline in the number of individual archaeologists working in Japanese archaeology from 1997, but this has not been dramatic – what economic stagnation has done is to reduce worker mobility (90 % of Japanese archaeologists work for local government or semipublic foundations, Okamura 2011: 77) and to reduce opportunities for new entrants – only 3 % of "field" archaeologists were aged in their 20s in 2008 (Okamura 2011: 85).

An economic crisis in Russia in 1998 had little immediate impact upon archaeology, but 2 years later the effects of recession on the building industry then led to a significant reduction in the amount of archaeological work being undertaken (Engovatova 2010: 100). Subsequent recovery was again threatened from 2008, but investment in infrastructure projects protected the sector from immediate effects (Engovatova 2010: 101-2; Kradin 2011: 248).

The scale of the global financial crisis of 2008 and subsequent investment by national governments is vastly greater than any of the previous crises. John Lanchester suggests that it has cost the US taxpayer $7.76trn, which is more "than the cost of the Marshall Plan, the Louisiana Purchase, the 1980s savings and loans crisis, the Korean war, the New Deal, the invasion of Iraq, the Vietnam war and the total cost of NASA including the moon landings, all added together [and adjusted upwards for inflation]" (Lanchester 2010).

The impact on archaeological practice has, accordingly, been considerable. Different approaches to market engagement have been central to the visibility of the effects of the economic crisis on archaeological practice in different countries around the world, with impact being most immediately visible where archaeology is most commercialized and relying primarily on private sources of funding.

Altschul and Patterson (2010) estimated that approximately 11,350 people worked as professional archaeologists in the United States in 2008, with spending on cultural resource management between US$600 m and $1bn at that time, which was just as the crisis was beginning to break. While US federal expenditure on archaeology remained roughly constant in the short term through the indirect benefits of federal economic stimulus legislation (*The American Recovery and Reinvestment Act* (ARRA) was signed into law by President Obama in February 2009), private sector spending on cultural resource management dropped significantly in 2009 and ARRA funding was slow to come on stream (Altschul 2010: 104-5).

Archaeological work in the UK is very closely linked to land-use change and property development, with 93 % of all archaeological projects in 2007 being initiated through the land-use planning system (Aitchison 2009a). The volume of housebuilding began to decline from 2007 and effectively halted in the autumn of 2008, with applied archaeology being seriously and rapidly affected (10 % of all jobs in archaeology were lost in the 6 months to April 2009, and spending by developers on archaeology falling by 12 % between 2007–2008 and 2009–2010 (Aitchison 2010: 26)).

State funding for national and local government archaeological agencies in the UK then began to fall considerably from 2010, with numerous individual archaeological advisers losing their jobs and the effective levels of protection for archaeological sites and landscapes being compromised (Aitchison 2011).

In Ireland, the effects of the economic crisis were even more extreme. Irish archaeology grew at a remarkable rate in the early twenty-first century, funded by infrastructure projects that were then able to access European Union support and by a private housing boom, with the numbers of individual archaeologists in employment increasing from 650 in 2002 to 1,709 in 2007 (McDermott & La Piscopia 2008: 5). When the crisis led to the end of the building boom, "between July 2008 and January 2009 there was a 52 % reduction in the total number of archaeological staff employed in Ireland…an 82 % reduction in contract [commercial] archaeologists employed in the same period" (Eogan & Sullivan 2009), and by early 2011 it was estimated that only 350 people were still working in the sector (Heritage Council 2011).

By contrast with some of the countries discussed here, Australian archaeology has been only slightly affected by the effects of the economic crisis, as archaeological practice in that country is significantly funded by the minerals industry, which has continued to supply a high level of demand (largely from China) (Aitchison 2009b: 663). Applied archaeological practice in the countries that joined the European Union in 2004 and 2007, including ten central European states, has been partly cushioned by European Union structural funding investment in infrastructure projects which have led to significant amounts of archaeological work (Aitchison 2009b: 663).

Commercial archaeology has been described as an economic "canary" (Schlanger 2010), considered vulnerable to rapid changes and one of the first sectors to suffer the impacts of economic crisis. Because archaeology has received funding in times of crisis from capital expenditure programs (and unemployment reduction initiatives), some mistakenly believe that crises have a positive effect on archaeology (such arguments are referred to by Altschul 2010: 104 and are presented by Merrony & Eisenburg 2009). The amounts that have been spent on archaeological practice through these measures since 2008 are insignificant when compared with the sums that were being invested by developers and other funders pre-crisis. All of the crises discussed here have had significant and long-lasting effects on the delivery of archaeological practice and the careers and livelihoods of individual archaeologists, and thus upon the protection of the material remains of the human past.

Cross-References

- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Cultural Heritage Management: Project Management

▶ Cultural Heritage Protection: The Legal Sphere
▶ Heritage Valuation: Paradigm Shifts
▶ Japan: Cultural Heritage Management
▶ United States: Cultural Heritage Management

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Cultural Heritage Management and Armed Conflict

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Introduction

Cultural heritage and armed conflict are two domains that sit uncomfortably side by side and yet are irrevocably linked. In the violent and

volatile circumstances that characterize armed conflict, cultural heritage is often caught in the cross fire: deliberately targeted, looted, vandalized, its ownership contested, and its meanings reinterpreted by confronted sides. Recent conflicts have also shown how cultural heritage can be instrumentalized in order to drive cleavages between communities. Cultural heritage sites have been taken hostage, employed as bargaining chips, or their destruction used to send intimidating messages. It is not surprising then that the management of cultural heritage during armed conflicts poses a considerable challenge.

Definition

Armed conflict critically impacts on cultural heritage in all its variety of forms and manifestations; in the process, heritage is managed and mismanaged, protected and neglected, and used and abused. The contact begins already before the first shots are fired when propaganda battles are ignited, redrawing lines of belonging, of "us" and "them." The violence against cultural heritage escalates during actual periods of combat as a further dimension, that of material destruction, becomes a demolishing force. And, in the aftermath, with a transformed landscape as a base, the conscious construction of a new vision begins with its selective regard toward the remains of the past.

Key Issues/Current Debates/Examples

Prevention and Preparedness

In this complex arena, the actions that have been most developed thus far are those of prevention and preparedness. Efforts to prevent the destruction of cultural heritage in the event of armed conflict have evolved along two main lines. The first, and most important in terms of the volume of work accomplished, is the legislative. Attempts to control the wartime destruction and plunder of cultural property go back to the 1500s (O'Keefe 2006), yet the Lieber Code of 1863, prepared during the American Civil War (1861–1865), is often cited as the first stage in this process of codification (Schindler & Toman 1988). This code was also a precursor to the first attempt to codify customary international rules regulating this kind of action with the 1907 Hague Rules (Hladik 2001; O'Keefe 2006). Today, the Convention for the Protection of Cultural Property in the Event of Armed Conflict (Hague 1954) and its subsequent protocols (1999) are the principle instruments. Furthermore, many of the basic principles concerning respect for cultural property present in the convention have become part of customary international law (Toman 1996). It is important to note that the two key moments in the drafting of this convention were wars in which the destruction of cultural heritage became an important bellicose act, the Second World War and the wars of the 1990s in the former Yugoslavia, respectively. One weakness inherent in the existing legal instruments is that they legislate for the protection of cultural *property*. The broader concept of cultural *heritage*, while gleaning affirmative strength from the relative concreteness of the first term, is far more complex and is overlooked due to the emphasis placed on the physical property aspect of the problem. The second prevention line involves training and sensitization programs directed at heritage professionals and military personnel. Here the International Committee of the Blue Shield and UNESCO have taken important steps. The Blue Shield is a protective emblem created by the 1954 Hague Convention and intended to function as the cultural equivalent of the Red Cross. The International Committee of the Blue Shield, established in 1996, comprises representatives of the five NGOs working in the field: International Council on Archives (ICA), International Council of Museums (ICOM), International Council on Monuments and Sites (ICOMOS), International Federation of Library Associations (IFLA), and Co-ordinating Council of Audiovisual Archives Associations (CCAAA).

Preparedness involves a combination of analysis and planning; aside from practical technical measures, it essentially takes the form of training programs and the establishment of

emergency protocols, and it is an area in which the professional bodies have assumed a great deal of leadership. For instance, the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) offers an annual course entitled "First Aid to Cultural Heritage in Times of Conflict" aimed at training heritage professionals to be able to assess risks, identify key stakeholders, establish networks, and apply international legal instruments. Another example is the publication edited by ICOM entitled "Cultural Heritage, Disaster Preparedness and Response" (2003).

Several intergovernmental and professional organizations as well as numerous NGOs do considerable work more or less explicitly directed at preventing the destruction of cultural heritage during armed conflicts by establishing professional networks, offering training, communicating information about existing protocols and legal instruments, administering exchange programs, and developing sensitization campaigns around the issues. In the wake of the destruction of the Buddhas of Bamiyan, UNESCO's General Conference approved a declaration concerning the Intentional Destruction of Cultural Heritage in 2003. To improve current protection measures, three areas of cultural heritage management require improvement (see Curtis 2011: 56–75). First, it would be important for more states to ratify the Hague Convention and for the Blue Shield to become a more substantial institution. Second, consultation mechanisms between government and military authorities on the one hand and heritage experts on the other need to be established in order that consultation can be constant – occurring before, during, and after conflicts – and are not just sporadic responses to emergency situations. Finally, greater international coordination of efforts is required among all those involved in protecting cultural heritage in war zones, including those between heritage professional bodies, military, police departments and border guards, and international organizations.

Destruction

Once an armed conflict begins, the management of cultural heritage of course becomes very complicated. One measure put forth in the existing literature is response, defined as "the action taken during the period of an actual emergency to minimize its effect on both life and property" (Boylan 2003: 66). Behind the modestly calm appearance of this phrase, however, lies the chaos and confusion of war, in the face of which even heroic efforts are often frustrated. A moving, literally blow-by-blow, account of the struggles faced by the museum's staff and some of its civilian neighbors to safeguard the National Museum of Baghdad during the 2003 invasion has been documented by Donny George (2008: 97–107).

The dangers to which cultural heritage is exposed during armed conflict come in a myriad of ways; there are those that have to do with human resources such as weakened governments, disrupted professional activities, collapsed rule of law, and personnel denied access to the heritage sites and the collections under their care. Then there are the dangers posed to the material integrity of heritage sites: collateral damage, misuse (as defined by the 1954 Hague Convention), looting, vandalism, and deliberate targeting – expressed not only by the destruction of monuments and objects but also the persecution of particular cultural groups, artists, intellectuals, crafts persons, and religious leaders. And there are also the dangers related to the instrumentalization of the symbolic meanings associated with cultural heritage whereby "ownership" is reassigned – i.e., this represents "us" and that represents "them" – and conflicts are pitted as black-and-white scenarios that forcefully categorize differences into two opposed factions, leaving no room for the nuances and hybrid alternatives more true to life. It is in this third area that the most work has yet to be done, for the current understanding of the complex nature of cultural heritage, with all of its multifaceted ramifications, has yet to be mirrored by an equally substantial appreciation of how it fares in situations of armed conflict.

While the development of a typology might seem a futile exercise when trying to pin down actions carried out in highly volatile conditions, mired by a web of political, social, and cultural

Cultural Heritage Management and Armed Conflict, Table 1 Destruction of cultural heritage during armed conflicts: a typological exercise (Viejo-Rose 2007: 104)

Destructive act	Object targeted
Looting and pillaging	Museum and/or collection
Deliberate targeting	Heritage site
Deliberate misuse/reuse	Archaeological site
Neglect	Library
Vandalism	Archive
Collateral damage	Historical monument/site
Military reasons	Religious building/objects
Iconoclasm	Cemetery
Targeting artists, artisans, intellectuals Failure to safeguard	Memorial
	Government building
Symbolic violence	Public art
Negative propaganda	Architecture and civil engineering (bridges)
	Natural heritage site
	Tourist infrastructure

subcurrents, it can at least help to bring out precisely that complexity of interactions. Table 1 indicates two elements in developing a typology of destruction, the violent action itself, and the object targeted. Depending on which combination is made when linking the act with the object targeted, a different story emerges. For instance, the purposeful neglect of a piece of public art suggests different motivations and expected outcomes than the deliberate targeting of an archive. A further indicative element to take into account is the type of armed conflict and its contextual specificity. Armed conflicts come in a variety of forms, and most recently, there have been confused conglomerates of different types: declared wars and international armed conflicts, occupations, noninternational armed conflicts (which can easily become a fuzzy category if a third state, or multinational force, becomes involved, or if the conflict spreads across a border as soldiers and refugees move), and finally there is the nebulous category of terrorism and counterterrorism (i.e., the "war on terror"). Thus, understanding the nature of the destruction of cultural heritage during armed conflicts – getting at the underlying motivations, dynamics, and impacts – cannot be approached as a uniform, blanket action. Developing a typology of the destruction of cultural heritage can be a useful tool to this end as long as the dynamics of particular historical and social contexts are not taken out of the picture (Gamboni 2007: 22–4).

Reconstruction and Recovery

In the aftermath of armed conflict, cultural heritage can be used to serve a number of functions acting simultaneously as receptor, container, and reflector of meaning and emotions. Whether it is rebuilt, restored, ignored, or preserved in a ruined state, each action will be presented and interpreted as part of the construction of the new, postconflict society. Considering the points made above, concerning how conflict not only destroys but also transforms cultural heritage by adding and altering meanings and how the intangible dimensions are also targeted, it is then possible to appreciate that postconflict management of cultural heritage occurs on the basis of a transformed symbolic landscape and that the intangible matters. In emerging from the chaos of war, societies often aspire to create order. With regard to cultural heritage, this can translate into policies that often lie between two extremes, that of "tabula rasa," of clearing the ruins and starting anew, or that of trying to restore and recover what has been destroyed. Neither of these options is exclusively realizable. Instead, postconflict reconstruction processes combine what often seem to be contradicting aspirations. On the one hand, they contain projects to build a new landscape of monuments and symbolic markers that will reflect the emerging society, and they take advantage of some of the destruction to modernize urban plans and infrastructures. On the other hand, there is an affective drive to recover some of what has been lost, to retrieve it, and to recover the roots of society by looking to its past and selecting key defining moments to carry forth into the present and the future.

Another issue in the postconflict management of cultural heritage is that of how the conflict itself is to be remembered. This emerges in the memorial processes and policies as revealed by the decisions that are made about what anniversaries to commemorate officially and what sights

of traumatic events to mark with monuments. It is frequently reiterated that memorials have an aspiration to remind, so that the errors of the past are not repeated. If so, then they would have a dual mission of public recognition of loss on the one hand and peace on the other. Yet one of the trends that can be observed in the aftermath of recent armed conflicts is a competition over victimhood by which each side uses memorial gestures not only as a vehicle for mourning but also as a means of planting a sign of contention and, occasionally, provocation. The messages evoked then become those of reminding of "our" suffering at "their" hands; "we will not forget" in this context is far from having a peaceful intention.

It is important to realize that cultural heritage can be managed in such a way as to divide and exclude as much as to unite and include. This is not only true in a context of armed conflict, but these extreme moments do make such uses more explicit. Cultural heritage can be a richly textured tool to engage in bringing a variety of groups together, to discuss, share stories, and collaborate in activities that will help define them as a community. Achieving access to and education about this heritage is essential, for without them there will be no sense of individual and group "ownership" of cultural heritage and it is precisely that alienation which ultimately fuels destruction both inside and outside of armed conflicts.

Future Directions

In addition to the need for deepening our understanding of these processes, there are two further avenues that require further exploration. The first is the imperative of developing a greater critical awareness of exactly when cultural heritage is being instrumentalized symbolically and rhetorically at different stages in armed conflicts – run-up, fighting, negotiations, and postconflict reconstruction. The second is the need to fully appreciate the implications of the realization that armed conflict not only destroys cultural heritage it also has deep transformative effects on it as sites are interfered with and reinterpreted or become the location of critical events in the fighting. Guernica, Coventry, Dresden, and Hiroshima are but a few examples; all of these cities became signifiers for new sets of meanings after their respective bombings.

In sum, a great deal of work remains to be carried out in this field, but it is encouraging to examine an overview of efforts made thus far and evaluate the extent to which legislation and awareness has evolved in the field (O'Keefe 2006: 1–3). The challenge remains to match approaches to the management of cultural heritage during conflict with the ever-expanding appreciation of what constitutes cultural heritage.

Cross-References

- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage: History and Context
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Somaliland: Cultural Heritage Management
- ▶ Tangible Heritage in Archaeology
- ▶ UNESCO (1972) and Malta (1992) Conventions

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Cultural Heritage Management and Gender

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Introduction

Since the seminal article by Conkey and Spector in 1984, calling for an archaeology of gender, the theory and literature on archaeology and gender have developed rapidly through the work of many authors, including Gero & Conkey (1991); Claassen (1994); Wright (1996); Pyburn (2004); Nelson (2006); Hamilton et al. (2007); Bolger (2010); and others. Writing and theorizing that focuses explicitly on the intersection of gender and cultural heritage management, however, is not yet as well-articulated and is often expressed indirectly in terms of diversity, multivocality, egalitarian methodology, and community participation, all themes that figure prominently in discussions of gender and archaeology.

Definition

Cultural heritage management (CHM, also called "cultural resource management," "heritage stewardship," or "archaeological resource management") is the process of undertaking activities to "care for such heritage assets as heritage places, sites, artefacts, cultural property, and other tangible heritage items in a society," according to Lee et al. (2007: 1). In assessing the maturity of heritage conservation in countries around the world, these authors note that "while CHM is a global phenomenon, its practitioners have no real sense of being a part of it." Instead, they say, many practitioners (called variously "cultural resource managers," "preservationists," or "historic building conservationists") focus on disciplinary and thematic issues, while wrestling with similar sets of issues related to management and stakeholder issues, including creating

definitions and shared understandings of heritage. Some key issues that surface in the way cultural heritage assets are described in CHM literature are power, quality of life, specialist knowledge, community involvement, and a pluralistic narrative approach. As CHM practices evolve, according to Lee et al., a wide array of stakeholders emerges, and more attention is paid to community interests and consultations, to the point of considering community members "as legitimate managers and co-managers of assets" with a "goal of achieving a consensus approach to management" (pp. 13–4).

Gender, according to Sørenson (2000: 52),

> is best understood as a set of values that assign gendered meaning to behaviour and affect that behaviour. Through such meaning, culturally specific notions of femininity and masculinity. . .are constructed.

Moreover, "engendered individuals are social agents and their actions form society" (p. 8). At the same time, she argues, we should not lose sight of the distinctions between "gender identity and gender ideology" that contribute to our understanding of the "interaction between self and society which lies behind normative behaviour." Sørenson discusses the importance of gender as a necessary part of theorizing about social relations, especially in archaeology, and the need for further analysis of gender "as a social construct that uses materiality" (p. 11) and "about how society relates to and constructs cultural categories from the differences that always exist amongst its members" (p. 72). These categories of gender identities and relations of past and present societies are of particular interest and relevance to archaeologists and heritage managers in a variety of ways, as discussed below.

Historical Background

While the origins of heritage management are not the subject of this entry, it is worth noting that, until quite recently, there has been a strong bias toward preserving, interpreting, and managing sites and events generally considered to have a masculine connotation. For example, in the United States, cultural resource management has its roots in historic preservation, which was based on efforts to commemorate the American Revolution and the Civil War and men "(and they were largely men)" who were the heroes of those and other wars (Davis 2010: 188). A century of legislation related to preservation, including laws designed to include Native American tribes and local governments and citizens in decision making, has slowly moved the pendulum toward more inclusive representations of whose heritage is being preserved.

The development of feminist theory and the role of gender in archaeology, gender in postcolonial and postprocessual archaeologies, and the relationship of cultural practices and gender have been discussed by many authors, including Claassen (1994); Gero (1996); Wright (1996); Nelson (1997); Kehoe & Emmerichs (1999); Hamilton et al. (2007); and Ströbeck (2010). Gero discusses the gendered nature of what is considered acceptable fieldwork techniques and argues that "the organization of gendered personnel in the field insinuates itself in the creation of archaeological fact" (1996: 250). Ströbeck (2010) summarizes the trajectory of feminist theory and gender issues in archaeology, particularly in relation to indigenous communities, and makes connections to choices that are made today. She argues that feminist work has revealed inherent gender biases in archaeological work, showing how feminist perspectives in archaeology have been marginalized (2010: 331-2). Furthermore, these biases have been reflected in heritage management, and challenges have been made to counteract androcentric constructions of the past, which in past decades would have been presented as uncontested truth in interpretations of the past at heritage sites and codified through decisions related to heritage management. Instead, according to Ströbeck (2010), Franklin and Paynter (2002), Jackson and Smith (2005), and Robles García and Corbett (2010), among others, relationships between colonists and colonized/indigenous subjects are being reframed at the intersections of race, class, and gender.

Key Issues

Examples from archaeological practice, discussed here and elsewhere, use similar sets of descriptors to discuss issues related to gender, whether it be research, fieldwork, or public engagement. This language describing aspects of communication and professional practice also applies to heritage management more broadly and can help us understand the relationship between cultural heritage management and gender.

Gero (1996: 275) discusses the gendered aspects of archaeological practice, including work relationships, divisions of labor, and specializations. She argues that values of the scholarly community are reflected in how and what work is carried out, providing a case study of how cultural politics work on the ground. She argues for a theorizing of gender that crosscuts race and class in order "to recognize and embrace a wide range of cognitive styles." Wright (1996: 15) notes that many authors who address gender issues illustrate an "open-ended and relational style of discourse that promotes productive and fruitful exchange." These authors do not suggest that these styles of discourse "are possessed exclusively by females," she says, but that "feminist pedagogy argues against built-in, innate, natural states of gender constructs."

Democratizing strategies help to validate diverse ways of knowing the past and expand the voices heard in interpretation and management strategies. Franklin and Paynter (2010: 111-2), for example, discuss how feminist archaeologists use multivocality, multilinear narratives, and active engagement and collaboration to decenter archaeologists' knowledge claims and open space for community-based management frameworks. At the same time, they argue that "we can't compartmentalize gender inequality in the profession and theorizing about gender in the past as if they are separate projects." Hamilton (2007: 143) describes archaeology as still largely "a 'macho' craft", which "continues to pertain even while archaeological theory and practice have moved on to issues of reflexivity, multiplicity, and subjectivity, alongside considerations of the creative nature of fieldwork and its contribution to the building of knowledge." She calls for a "greater recognition and incorporation of female-gendered practice and approaches" in order to keep the craft dynamic and enrich the way forward.

Gender is reflected in research questions, fieldwork strategies, and interpretation of data, as discussed by numerous authors, including Dobres (2006), Nelson (2006: 1-27), and Smith and O'Donnell (2007). The gender of field researchers shapes the kinds of questions asked, who their informants are, and even what is considered to be important information. According to Jackson and Smith (2005: 337–8), many scholarly discussions about informants in field-based research fail to "recognize the intrinsic power that individuals and social structures within the research community may have over the choice of colleagues." Describing their own experiences in Australia, they suggest that "the areas of interest of individual researchers and their specific position in society (in terms of age, gender, marital status) predetermine them to work with individuals of comparable interests and status" which is helped along by informants steering researchers to "the appropriate people with whom we might/should work." The categories of data gathered, the networks developed, and the resulting interpretations also affect management decisions, and the role and influence of gender, age, and other variables should be acknowledged and taken into account. As Jackson and Smith describe it,

> This means that different data sets and different archaeological stories can be produced from the same community at the same time, according to the specific social relationships of individual researchers (p. 339).

According to Robles García and Corbett (2010: 115), the contemporary framework of archaeological resource management implies managing in multiple ways, including education as well as protecting, studying, and "conserving elements of heritage in socially defined contexts." They discuss the challenges of moving away from traditional styles of thinking and action, which may be top-down, authoritarian, and not allowing for flexible, participatory

self-management. They describe the management plan for Monte Albán in Mexico as an alternative within the national plan, protecting the "social integrity of the archaeological site," while creating a "horizontal network among a complex array of social actors" (p. 118). The plan builds relations with local communities and stakeholders using a collaborative, sociological framework and a discourse "more sensitive to conservation, problem solving, and flexibility" (p. 120).

A discussion of CHM and gender must also address issues of gender inequity in education, research, and employment opportunities. The number of women in archaeology and related fields has steadily increased in the last 30 years, yet many disparities still persist. A special report to the Society for American Archaeology on the status of women in archaeology (Rizvi & Berg 2008) describes significant improvements in many areas affecting women and families but also cautions that progress still needs to be made to reach full gender equity. According to Altschul and Patterson (2010: 306), "The shape of the discipline in the academy still reflects demographic trends set in motion in the 1940s". For example, the practice of steering female archaeologists away from fieldwork and into museums and labs, which persisted into the last decades of the twentieth century, is discussed by the authors in Classen (1994), Kehoe and Emmerichs (1999), and other biographers of women in the field. Smith and O'Donnell (2007) discuss the pattern that persists in Australian universities of greater numbers of women in research positions than in professorships. Franklin and Paynter (2010: 113) summarize key sources for discussion of gender disparities in employment and placement, citation practices, the marginalization of gender and feminist theory, training of studies, and other practices.

Future Directions

Debates about feminist theories in archaeology and their relationship to processual, postprocessual, and postcolonial archaeology continue today and will no doubt expand to more fully encompass cultural heritage management and its diverse sets of stakeholders. These debates and scholarly work in this area will contribute to our understanding of the role of gender in heritage management; a theory of cultural heritage management and gender should be more thoroughly developed. A welcome contribution to the literature in this area would be case studies that show the impact of gender considerations on heritage management programs and policies. Similarly, more study of social identity formation at the crossroads of race, class, and gender and its relationship to issues in cultural heritage management should be carried out.

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Cultural Heritage Management and Images of the Past

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Introduction

There are many sensory experiences that mingle as we apprehend and interpret our world, but one

sense, sight, enjoys prominence in the documentation and mediation of the past. The power of sight and of viewing images does not lie in an inherent dominance of the sense of sight over any other senses. Rather, as John Berger (1972) argued in *Ways of Seeing*, sight and seeing is the earliest communicative medium in human development. It comes before words, and thus, it has a fundamental role in the understanding of our orientation to the world around us.

For the study of the past, sight has long been a sense by which knowledge was discerned, interpreted, and shared. For example, the recording of sites and monuments by the second century CE Greek writer Pausanias were founded upon the use of sight and seeing to correctly identify places, sites, and buildings and orient oneself in the world. At the outset of Book 1 of his *Description of Greece*, Pausanias (1918) begins what will be a recurring method of using sight to orient the reader towards places being described.

> On the Greek mainland facing the Cyclades Islands and the Aegean Sea the Sunium promontory stands out from the Attic land. When you have rounded the promontory you see a harbor and a temple to Athena of Sunium on the peak of the promontory (*Description of Greece* 1.1.1).

Pausanias' writings have a professed intention to orient people visually to the appearance of the world. This is a tradition of writing that continues today in the genre of travel writing, but it is Pausanias's visual descriptions that are of particular relevance to a consideration of archaeology and cultural heritage. They form a clear effort to share a visualization of place over time – an image of the past.

Key Issues

The Antiquarian Image

The value of the image of the past, as was apprehended by Pausanias as well as by artists and antiquarians throughout the centuries, is its mobility. Whether recorded in narrative, drawing, or painting, the image of the past allowed for the transportation and communication of visual experiences of places and sites both over distances and over time. Following in the geographic tradition of Pausanias, William Martin Leake (1777–1860), a geographer for the British military in Greece, pioneered the use of ancient texts to make connections to contemporary geography (see Witmore 2004). Leake is credited with being one of the earliest antiquarians to utilize advanced surveying techniques in order to fix the "images of the past" from these ancient sources in order to generate more precise and quantifiable images of the ancient landscape.

With the advent of the printed book and printmaking, the image of the past gained an additional value. Modern antiquarian studies advanced some of the earliest extensive use of printed illustrations as part of their texts. Antiquarian texts, such as Thomas Wright's *Louthiana* (1758), utilized abstracted schematic drawings of sites and places such as earthworks to create sets of images that could be used for comparative analysis of form and method of construction. For the first time, visualizations of structures, sites, and places separated by great distances could be compared alongside each other, and these comparisons could be printed and shared widely throughout the world through the libraries of learned societies.

The proto-scientific value of these illustrations and visualizations of the past quickly led to the incorporation of image making as a central aspect of antiquarian practice. In the nineteenth century, these efforts became part of broad efforts to survey and codify the state and condition of extant ancient sites throughout the landscapes of Europe. For example in Ireland, artist and antiquarian George Victor Du Noyer (1817–1869) was employed as part of the Irish Ordnance Survey to produce drawings and watercolors of sites being recorded as part of the vast cartographic endeavor. Du Noyer's drawings and watercolors formed a critical component of the survey, but given his reputation as an artist in his own right, they were also appreciated aesthetically as art. Similarly the so-called father of Irish archaeology, George Petrie (1790–1866), who also worked as part of the Ordnance Survey, was a famed painter. His subject was often Romantic views of the Irish landscape. Beyond his painting

and his leadership of the antiquities committee of the Royal Irish Academy, he contributed illustrations to many of the earliest tourist guide books to the Irish countryside.

This situation illustrates a fundamental tension in the relationship of the image of the past to archaeological and heritage work. On the one hand, images and technologies of image making were adopted as a means of documenting faithful representations of sites, structures, artifacts, and places. However, Du Noyer's drawings and Petrie's paintings and illustrations, like other antiquarians illustrations of their time, were their own artistic interpretations of their visual encounters. They were their own images, but they were consumed simultaneously by burgeoning archaeological science as objective representations and by the wider public as subjective interpretations.

The Archaeological Image

As the discipline of archaeology was established at the end of the nineteenth century, a rift grew between objective and subjective appreciations of images of the past. The development of the discipline relied on the ability of practitioners to visually observe and objectively document the changing colors of soil deposits, recognize the stylistic and compositional similarities between artifacts and sites, and visualize the architectural form of buildings long since destroyed. In order to render a visual archaeological record to sustain the objective comparative analysis required by the nascent science, the drawing and visualization of the objects and sites of the past became a fundamental part of the skill set of a professional archaeologist. Archaeological students were trained in the practice of technical drawing as a means of rendering objective, scientific documentations of objects, structures, and sites, and over the twentieth century, as new methods and technologies of visualization presented themselves (such as photography), they were incorporated as extensions of the endeavor to render an objective, visual archaeological record of the past. Especially after the acceptance of positivism as a central epistemological orientation for the discipline in the mid-twentieth century, archaeologists pursued and incorporated these image-making tools (e.g., laser scanning) as progressive steps in the endeavor to truthfully represent the exact condition of the traces of the past for the purpose of documentation and preservation.

Parallel to this growth in visual positivism, there remained, however, a steady use of illustration for the purposes of communicating the image of the past to the wider public. Archaeological illustrators were commissioned by archaeologists to respond to data and narrative interpretations of data to create artistic interpretations of objects, structures, places, and at times, whole communities and societies (e.g., the Greek and Roman archaeological illustrator Peter Connolly). Continuing in the somewhat more subjective or interpretive aspect of antiquarian images, these illustrations facilitated the imagining of the past through the enjoyment of a skilled artist's interpretation of objective archaeological science.

The Representation of Heritage

Eighteenth- and nineteenth-century antiquarianism and early archaeological science significantly impacted the representation of heritage in the modern era. Images of the past being produced by antiquarians and prehistorians received increasingly wider audiences as their images and illustrations began to be consumed by wider society as representations of burgeoning national identities. A growing interest and concern over the representation of distinct and glorious national identities spread throughout Europe as more and more unique "ancient" objects and sites were "discovered," documented, and illustrated. In some countries, archaeological objects themselves became nationalistic symbols. For example, the membership card of the National Repeal Association in Ireland (a political group determined to repeal the Act of Union between Ireland and Great Britain) featured images of many artifact types that were being discovered throughout Ireland – socketed axes, Bronze Age shields, medieval brooches, and Iron Age torcs. These appropriations of images of the past for the purpose of distinct, unique, indigenous national and cultural symbols that established a tradition of

cultural representation were not restricted to Europe and expanded and persisted throughout the twentieth century to our contemporary moment. Extreme examples from the twentieth century include the use of archaeological research, distribution maps, and design motifs derived from Germanic runes and pottery by the national socialist regime in Germany in the 1930s and 1940s to articulate and represent a distinct ethno-nationalist identity. A more common example would be the use of archaeological objects and ancient sites on currency and coinage by nations throughout the globe as a way of expressing unique visual identities. The significance of this for cultural heritage work is that these national cultural identities in many respects have become the primary product and experience that is marketed by states as part of tourism and development initiatives. Thus, the objects and sites with which we work are often charged with social and cultural expectation to be materializations and representations of core national identities which may limit the possibilities for subjective reinterpretations and, in the extreme, displace subaltern and minority identities, articulating a singular representation rather than allowing for diverse and multivocal images of the past.

Current Debates

The Image of the Past as Popular Culture

The image of the past has tremendous power and value in modern society. Heritage and archaeology are not simply academic pursuits but are also important parts of popular culture (see Holtorf 2002). As the popularity of cultural tourism has grown in the later half of the twentieth century, so too has interest in cultural heritage. Cultivating and stewarding interest in the past and promoting a broad "archaeo-appeal" of various experiences, heritage practitioners are both the initiators and the subjects of creative mediations of the data and experience of the past in the modern world. Beyond the enjoyment of heritage sites and museum exhibitions as touristic experiences, cultural heritage and also archaeology have been themes in popular media and entertainment in the twentieth century. For example, the cinematic image of the past has been a source of creative collaboration for archaeologists and historians with filmmakers either hoping to recreate plausible scenarios for dramatic narratives or dramatizing the character of the archaeologist or historian themselves (e.g., Indiana Jones) (see Schablintsky 2007). In the first decade of the twenty-first century, the use of the cinematic image of the past has expanded beyond the cinema. With the boom of "reality" television, historical enthusiasts, historians, archaeologists, and heritage professionals have seized the new genre as an opportunity to move beyond the objects of archaeological and historical enquiry and mediate the experience of discovery itself (e.g., Time Team) (see Piccini 2010). Not always an altruistic act, the presentation of the past within modern media is also a means to brand, market, and sell the past (and identities associated with it) to modern society, with many stakeholders from small businesses to national tourism industries (see Holtorf 2007). As part of the expanding marketplace of identities, images of the past rendered through cultural heritage provide potent visual identities for the experiences and products being marketed to people throughout the globe.

New and Emerging Media

Responding to technological progress, there has also been an increasing use of digital and web-based technologies to render visualizations and visual experiences of the past. In the early part of the twenty-first century, scholars at University of California, Berkeley, and Stanford University (i.e., the Metamedia Lab) established substantive initiatives to explore and interrogate the role of digital media in the visualization of archaeology. Of particular note is Ruth Tringham's work with students and colleagues to apply multimedia to the interpretation of the site of Çatalhöyük in Turkey. In 2007, they began the use of the online, three-dimensional social media site Second Life (secondlife.com) as a tool for interpreting and sharing a virtual visual experience of the site.

A major step in the engagement of new and emerging multimedia (digital, visual, and social) for the experience of the image of the past, it can be seen to be within a tradition of digital illustration simultaneously being developed and adopted by more traditional archaeological illustrators.

Engaging these emerging trends, the recent Visualisation in Archaeology project undertaken at the University of Southampton (viarch.org.uk) was an important effort to discuss the history of and the contemporary role of visualization in archaeological practice. Bringing together archaeologists, artists, illustrators, and art historians, the project followed on from important work by scholars such as Brian L. Molyneaux (*The Cultural Life of Images* (1997)) and Stephanie Moser and Sam Smiles (*Envisioning the Past* (2005)) in opening up a critical discussion into the ways human beings view archaeology and view objects which they interpret as having archaeological authority. These scholarly efforts also mark an important step in reflexively critiquing not only the role of the image in archaeological practice but also the exhibition of archaeological materials.

Future Directions

Recently, there has also been a move towards a deeper engagement between archaeological image making and the discourses of art history and contemporary art practice. Broadly dissatisfied with the approach to the image as a purely objective representation of the past, scholars and practitioners such as Colin Renfrew (1999, 2005 also see Renfrew et al. 2004), Michael Shanks (1991; also see Shanks & Pearson 2001), or Doug Bailey (2005, 2008) have undertaken substantive endeavors to sustain critical, interdisciplinary initiatives in the exploration of the image of the past through both archaeological and artistic practices. Their work is inspiring shifts in the next generation of archaeological thinkers and practitioners challenging the objective representational image of archaeological practice (e.g., Cochrane & Russell 2007). What is resulting is a diverse range of projects ranging from artist-in-residence projects at archaeological sites (e.g., the Stonehenge Riverside Project) to curatorial projects such as the *Ábhar agus Meon* exhibition series from the Sixth World Archaeological Congress to *avant-garde* practices by artist-archaeologists such as Fotis Ifantidis, Michael Jasmin, or Christine Finn.

Another important shift in more recent archaeological and heritage work is balancing the sense of sight by exploring other senses' ability to explore the past. Work by scholar-practitioners such as Aaron Watson (2006) on archaeoacoustics highlights the possibility of sound and of hearing to reveal compelling archaeological interpretations of sites. Similarly, new research is currently being undertaken in Istanbul, Turkey, by scholars at Koç University engaging with artist and smell expert Sissel Tolaas on an exploration of the role of smell in the understanding of the past and heritage of the city. These initiatives are part of a widening effort within archaeology and heritage practice to have a more holistic approach to human experience, apprehension, and interpretation of the past. Building on the long tradition of creating images of the past, these new modes of archaeological practice are a reminder that the image of the past is not fixed but is a continually renewed expression of how humans see the world, interpret it, and imagine its meanings.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Intangible Cultural Heritage
- ▶ Marketing Heritage
- ▶ Public Humanities and Cultural Heritage
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Cultural Heritage Management and Maritime Law

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Introduction

The management of submerged cultural heritage is not only difficult because of the nature of the marine environment but especially so because this environment is subject to a very different regulatory regime to that applicable on land. It is subject to maritime law. In a broad sense, maritime law is composed of two separate bodies of law: admiralty law (largely of a private law nature) and the law of the sea (public law). These bodies of law, together with a third body of law – cultural heritage law – intersect below the low water mark. All three bodies of law are underpinned by an international law framework, though this is interpreted, implemented, and supplemented by differing national perspectives, making the management of underwater cultural heritage particularly challenging. While each country has a unique regulatory regime, common, though debated, themes exist.

Definition

Cultural heritage law is an emerging area of international law underpinned by a number of international conventions adopted under the auspices of the United Nations Educational, Social and Cultural Organization (UNESCO) (see the entry on "► UNESCO (1972) and Malta (1992) Conventions" in this encyclopedia), including the Convention for the Protection of the World Cultural and Natural Heritage, the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export

and Transfer of Ownership of Cultural Property, and the Convention on the Protection of the Underwater Cultural Heritage. Fundamentally, these conventions attempt to structure a regulatory regime which "protects" cultural heritage by ensuring its physical integrity, recognizing its social context, and emphasizing its contextual importance (see the entry on "▶ Cultural Heritage Management and Submerged Sites" in this encyclopedia).

How countries can give effect to these cultural heritage conventions below the low water mark is dependent on the jurisdictional capacity of each country. This is governed by the international law of the sea; concretized in the 1984 United Nations Convention on the Law of the Sea (UNCLOS). It replaced four earlier separate conventions adopted at Geneva in 1958. Not all countries, however, are party to UNCLOS, and the earlier conventions may still apply to some. The conventions are supplemented by the customary international law of the sea, being rules of law derived from the consistent legal conduct of countries. To a large extent, UNCLOS codified the customary international law, and while it continues to develop, it effectively embodies the contemporary international law that governs the sea. Its most important function is to allocate rights and duties to countries through the creation of six maritime zones: internal waters, territorial sea, contiguous zone, the exclusive economic zone, the continental shelf, and the high seas and deep seabed. Within these zones, a balance is struck between the interests of the coastal countries and those of other countries, especially with "maritime countries," being those with significant merchant fleets or reliance on maritime trade. As each zone is situated further away from the coast, the interests of the coastal country wane and give way to the interests of maritime countries and the broader international community. The management of underwater cultural heritage is therefore entirely dependent on where it is situated.

While the international law of the sea defines the rights and duties of countries, a body of admiralty law has developed which regulates the conduct between individuals that relate to ships and shipping. It addresses, for example, issues relating to liability for collisions between vessels, liability for pollution, and other hazards emanating from ships and rewarding those that have saved ships and their cargo from the perils of the sea. Since much of the underwater cultural heritage is sunken ships, this admiralty law may play an important part in determining the regulatory and protective environment for this heritage. While underpinned by international customary law and a number of international conventions which seek uniformity across countries' laws, this admiralty law is essentially that of each country, applying to the maritime zones over which it exercises jurisdiction, as well as to its nationals and to those ships that are registered there and said to fly that country's flag.

Key Issues

The management of underwater cultural heritage is entirely dependent on the regulatory jurisdiction of countries and their sub-entities, such as provinces, states, territories, and local councils. While the extent of the jurisdictional capacities of these sub-entities is entirely dependent on the constitutional and legal structure of each country, the jurisdictional capacities of the country itself are subject to the international law of the sea. When UNCLOS was negotiated, underwater cultural heritage was not particularly high in the order of priorities and therefore did not receive the consideration that was necessary to establish a strong protective regime in many of the maritime zones. Furthermore, a number of issues were left open for differing interpretation and country implementation, including the exact geographical extent of each zone. These legal problems are compounded in their practical application by the fact that, while most underwater cultural heritage lies in internal waters and territorial sea, advancement in diving technology has

opened up the other maritime zones to exploration and exploitation. An appreciation for the possible scope of the coastal country's jurisdiction and the geographical extent of each zone becomes the framework for the management of the underwater cultural heritage.

Since UNCLOS applies where the land ends and the sea begins, it is from this point that each maritime zone is measured. This is never constant given the ebb and flow of the tides and indentations caused by bays, estuaries, ports, and rivers. The solution provided in UNCLOS is for each country to measure this "baseline" at the low water mark and have this represented on appropriate nautical charts. Exactly how this is done is left to each country. Some may use the lowest astronomical tide, while others might use a nominal point which might exist some way out to sea given changing sea levels and shifting coastlines. The baseline does not necessarily always follow the low water mark around the coast and may be drawn across river mouths, bays, harbors, and along islands or sandbanks that appear at low tide. The baseline does not, therefore, necessarily reflect its geographical descriptor.

The maritime zones in which the coastal country has absolute sovereignty is its internal waters, and refers to those waters which lie on the landward side of the baseline, and usually includes waters in harbors, ports, bays, and tidal rivers. The coastal country can regulate all activities in this zone. The sovereignty of a coastal country extends beyond its internal waters to an adjacent belt of sea measuring up to 12 nm from the baseline, described as the territorial sea. This sovereignty is subject to the convention, which provides for the innocent passage of foreign ships through this zone. Any activity directed at cultural heritage in the territorial sea would not, however, constitute innocent passage, and the coastal country has the exclusive right to enact laws that protect cultural heritage in that zone.

Beyond the territorial sea, the jurisdictional capacity of the coastal country is less clear and subject to some international disagreement. This is particularly the case in relation to the exact jurisdictional capacity of the coastal country in the contiguous zone. This zone is an area adjacent to the territorial sea, measured 24 nm from the baseline, in which the coastal country has limited control to prevent or punish infringements of its custom, fiscal, sanitary, or immigration laws. A number of countries, including France, Denmark, Spain, South Africa, and Australia, have extended their national legislation to take into account underwater cultural heritage in this zone.

Whether the coastal country has any jurisdiction over underwater cultural heritage on the continental shelf is also subject to disagreement. The continental shelf extends from the shallows of the territorial seas down to the deep seabed and may extend up to 350 nm from the baseline. Each coastal country is given the exclusive right to explore and exploit the natural resources of this area. Underwater cultural heritage was not, however, included in the definition of "natural resources," though Article 303 of UNCLOS requires countries to "protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose." A number of countries have interpreted this as allowing for an extension of their jurisdiction so as to regulate underwater cultural heritage on their continental shelves. These include Australia, Ireland, Seychelles, Cyprus, Spain, Portugal, Norway, and China. These are contentious claims, and while other countries, such as the United States, have indicated a contrary interpretation, no formal objection has been made to these possible extensions of jurisdiction.

A further complication in this zone, and in the exclusive economic zone, is the contextual relationship between the underwater cultural heritage and the marine environment. In these zones, the coastal country has rights with respect to the marine environment and its natural resources. Cultural heritage, such as historic shipwrecks, may quickly become part of the marine environment through the concretization of marine flora and use by marine fauna and subject to coastal country environmental protection regimes (such as the wreck of the *USS Monitor* on the continental shelf of the

United States). This invokes the considerable body of international and national environmental law, compounding the complexity of the regulatory regime.

Beyond the continental shelf lies the deep seabed and high seas, in which countries have the right to search for, survey, and excavate underwater cultural heritage and can authorize their nationals and vessels flying their flag to do so. While UNCLOS, in Article 149, urges countries to protect underwater cultural heritage in this zone, the provision is too vague and imprecise to provide a basis for any regulatory regime.

While the extent of the coastal country's jurisdiction beyond the territorial sea is debatable, and therefore impacts on its ability to regulate activities by foreign registered ships and nationals, it does not hinder the ability of the country to regulate its own nationals and registered ships. A country can therefore adopt laws regulating the conduct of its registered ships and nationals in any international maritime zone, including in relation to underwater cultural heritage found in that zone. The agreement between France, the United Kingdom, Canada, and United Countries in relation to the activities directed at the *RMS Titanic*, for example, is based upon this jurisdictional capacity.

Within this jurisdictional context, countries may regulate underwater cultural heritage. It is here that cultural heritage law principles and admiralty law principles intersect. This intersection is fraught with tension as the two bodies of law are underpinned by fundamentally different principles. Cultural heritage law is fundamentally of a public law nature, seeking to preserve and protect the physical manifestations of our past for the benefit of society as a whole. This, for example, ensures that through the science of archaeology, pictures of past cultures and societies and their ways of life can be constructed through interpretation of scientifically gathered evidence. Increasingly, this protection of underwater cultural heritage is achieved while preserving the cultural heritage in situ. This body of law is underpinned by notions of collective interests, possibly even ownership, and non-commercialization.

Admiralty law is fundamentally of a private law nature, regulating the manner in which private individuals interact in shipping activities. An ancient principle of admiralty law, for example, is the right of a person who has saved, or salved, another's property from the dangers of the sea to a reward from the owner of that property. This salvage principle is underpinned by notions of private ownership and commerce.

Countries have attempted to reconcile these two bodies of law, with their fundamentally different principles, on the international law plane. The 1989 International Salvage Convention seeks to achieve uniformity in the way countries implement salvage principles and fundamentally encourages individuals to voluntarily save lives and property at sea and to return such saved property to its owner and back into the stream of commerce. This, however, may be inconsistent with notions of protection in situ where the property is, for example, a sunken ship of archaeological importance. Whether salvage principles ought to apply in such a situation was the subject of much debate during the negotiation of the Salvage Convention and required a compromise. The compromise was essentially to leave this decision to each country, allowing the country the right not to apply to convention "when the property involved is maritime cultural property of prehistoric, archaeological, or historic interest and is situated on the seabed." While some countries such as Australia, China, France, Norway, Netherlands, Sweden, and Spain entered such a reservation, the majority of countries have not. That does not, however, necessarily mean that these countries apply salvage law to underwater cultural heritage as, despite not entering a reservation to the convention, they may nevertheless not allow for the provision of salvage law in their national legal systems.

A second attempt at addressing this conflict between cultural heritage law principles and admiralty law principles was made through UNESCO with the adoption of the Convention on the Protection of the Underwater Cultural Heritage. While the Convention was prompted

by this conflict and the need to ensure that any activity directed at underwater cultural heritage was undertaken in accordance with appropriate scientific methods, it also sought to address the international law of the sea uncertainties in the jurisdictional capacities of countries to regulate underwater cultural heritage beyond the territorial sea. Both objectives were controversial and required compromise. The result was the partial extension of coastal countries' rights to regulate underwater cultural heritage on the continental shelf, requiring that country to cooperate with the country or countries with which the cultural heritage as some cultural or legal connection; and a restriction on the application of salvage law to underwater cultural heritage to those instances where prior authorization for disturbance has been given.

This attempt at reconciling these two bodies of law has only been partially successful, not only because of the compromise inherent in the text, but because only a small number of countries have ratified the convention. Those countries, such as the United States and the United Kingdom, which have traditionally favored the application of salvage law to underwater cultural heritage, have failed to become a party, as have a great many developing countries that have yet to address this conflict in their waters. The countries that have ratified the convention have tended to be those that have favored a cultural heritage context to the management of the cultural heritage and have largely excluded the application of traditional admiralty law. A number have taken such an approach, including Greece, Turkey, Spain, and Portugal. Nevertheless, for many, whether party to the convention or not, their regulatory regimes evince an attempt at reconciling these two bodies of law without completely excluding either. Usually, this compromise is underpinned by a system which allows private individuals to engage with the underwater cultural heritage but within a country's regulated system. Ordinarily, this is underpinned by a system of authorization such that a license is needed prior to, variously, searching for, disturbing or excavating underwater cultural heritage. In some cases, such as the United Kingdom, elements of salvage law persist such that the private individual may benefit financially from the sale of some of the recovered heritage. In other cases, such as Australia and South Africa, while private individuals may be involved in activities directed at underwater cultural heritage, no commercialization is permitted. In a number of countries, such as China, Greece, and Turkey, only the State, and not individuals, may engage in activities directed at underwater cultural heritage. Some though, such as Indonesia, appear to do so for commercial gain.

The scope of such regulatory system differs remarkably between countries. Some, such as the United Countries and the United Kingdom, while largely maintaining an admiralty law system, have excluded a small number of historic wrecks from this system. Only those specifically deemed to be of importance are excluded. Many other countries take a broad approach, excluding not only historic wreck of a certain age but also underwater cultural heritage other than historic wreck, such as submerged landscapes and settlements. What qualifies as a historic wreck is also subject to a number of different approaches. In South Africa, for example, it is wreck that has been underwater for more than 50 years, in Australia, 75 years, and in Ireland, 100 years.

Whether a country's regulatory regime is fundamentally based upon admiralty principles or embraces a publically orientated cultural heritage framework, questions of ownership of underwater cultural heritage may still persist. Notions of continuing private ownership of underwater cultural heritage, most notably sunken ships, are entirely consistent with admiralty law principles, and indeed underpin the very basis of salvage law. While problems may arise in establishing ownership, or determining whether ownership has been abandoned, either expressly or impliedly, the notion of ownership prevails. So much so that in some countries, such as the United States, a finder of abandoned property becomes the owner, including property of cultural or historical importance. In most countries, however, such abandoned property will vest in the State. At the

other end of the spectrum, a number of countries, such as Greece, Turkey, and South Africa, vest ownership of all cultural heritage, whether abandoned or not, in the State. This vesting of ownership in the State may be problematic when a private owner exists, as it effectively becomes a form of nationalization or confiscation, invoking human rights issues.

Given that a large number of historic ships are warships, and therefore State owned, a further problem in the regulatory regime is dealing with foreign State-owned cultural heritage within maritime zones over which the coastal country exerts jurisdiction. For example, the wreck of the *CSS Alabama*, sunk in 1864 off the coast of Cherbourg, France, was claimed by the United States, while France has claimed ownership of the *La Belle*, which sank in 1686 off the coast of Matagorda Bay, Texas. This is particularly problematic in the territorial sea and internal waters when the regulatory regime of the coastal country does not give effect to the ownership rights as perceived and exerted by the owning country.

Future Directions

Given its geographical location, the management of underwater cultural heritage is at times compromised by the need to address maritime law issues. The extent to which maritime law impacts on this management is entirely dependent on the particular national legal system. The extent of this impact can only be managed globally through the development of agreed regulatory regimes, such as the 2001 Convention, which bring certainty and predictability to what is increasingly an international management issue.

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- ► Cultural Heritage Management and Submerged Sites
- ► UNESCO (1972) and Malta (1992) Conventions

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Cultural Heritage Management and Native Americans

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Introduction

The involvement of Native American groups in the field of cultural/heritage resource management

is in some ways antithetical to the history of the discipline in the United States. A brief review of the historic preservation movement in the United States makes it clear that early historic preservation efforts were based primarily on upper-class values applied to concepts of history practiced by nationalist-focused groups. This nationalist focus has had implications for tribal groups who often get caught up in the conflict between "anthropology" as the study of allegedly simpler people and "history" as the study of groups which have evolved into civilizations. Such a conflict is also implicit in the term "historic preservation," since it seems to focus on saving those things whose purpose was fulfilled primarily in the past. For example, when tourists visit places like New Mexico's Taos Pueblo, they see a cramped, dusty, five-story structure that Americans have come to know as a pueblo. However, they are often disappointed when they encounter the Pueblo's inhabitants operating motor vehicles while talking on a cell phone in perfect English.

Historical Background

The first piece of legislation that related to the preservation of heritage resources in the United States – the Antiquities Act of 1906 – directly impacted the Native American heritage. The law extended governmental protection to historic and prehistoric remains on public lands; it established criminal sanctions for the unauthorized destruction or appropriation of antiquities owned or controlled by the federal government; it authorized a permit system for the scientific investigation of antiquities on federal land; and, peripheral to this discussion, it established a process whereby the President could set aside areas of "importance" for National monuments. In this manner, the law established a national principle relating to heritage – that cultural resources, regardless of origin, were an important fabric of the cultural history of the United States and were worthy of protection.

This attempt at protecting the cultural heritage of "all" Americans carried with it an unintended complication. The permit system which was established privileged the scientific community in that "the examinations, excavations, and gatherings are undertaken for the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions, with a view to increasing the knowledge of such objects, and that the gatherings shall be made for permanent preservation in public museums." Thus, early on in the historic preservation legislation, American Indians were denied any consideration of any interests they might have had in protecting their own unwritten history and material culture from appropriation by those "reputable museums, universities, colleges, or other recognized scientific or educational institutions." While the federal government deemed it was important to protect the material evidence of the American Indian cultures that had gone before, the fact that the contemporary tribal groups did not rate a mention in the law perhaps illustrates the amount of consideration that living American Indians rated at the time.

The cultural context of the time of the passage of the Antiquities Act is telling as well, especially as it related to those American Indian groups and their participation in federal legislation related to heritage preservation. 1906 was during the second decade of the federal government's grand experiment to "de-Indianize" the Indian by turning them from nomads into farmers and from communal land ownership/stewardship in individual "owners" of land. The Dawes Commission (1893–1907) and the Jerome Commission (1889–1893) turned millions of acres of American Indian tribally owned land into small allotments owned by individual Indians, with the "excess" land made available to homesteaders and non-Indian settlers. In this way, the land within and upon which Native American heritage rested was removed from American Indian control.

It was not until the passage of the Archaeological Resources Protection Act (ARPA) in 1979 that Native Americans were formally incorporated into historic preservation legislation, being given the right to participate in the granting of permits for archaeological excavations on Indian land. Still, while the uniform regulations developed to carry out ARPA required consultation

with tribal groups who owned the land upon which the archaeological resources were located, the intent of these regulations was more to govern the issuance of permits than to involve American Indian groups. Additionally, as demonstrated by the inclusion of human skeletal material as "cultural resources" within the definitional section of the Act, Native American sensibilities were far removed from any underlying intentions of the Act.

While these two laws have had strong influences on the extent to which Native Americans have become involved in cultural heritage management, the most far-reaching law has been the National Historic Preservation Act (NHPA) of 1966, but only after the passage of later amendments.

The NHPA requires federal agencies to identify and mitigate the impacts of federal actions on historic properties within the scope of the federal project. These agencies conduct or contract for cultural resources surveys to find the historic properties that might be affected by the project, find the most appropriate ways of protecting the information within those properties, and then documenting the information so that the American public derives a benefit from the entire process.

As one aspect of this process, federal agencies consult with Native American groups in order to determine the extent to which American Indian heritage issues are impacted. Consultation (defined in the federal regulations that govern the NHPA as "the process of seeking, discussing, and considering the views of other participants, and where feasible, seeking agreement with them regarding matters" arising in the compliance process (King 1998: 94)) is required at various stages in the historic preservation compliance process. In the United States, the status of land ownership or the level of federal involvement in a project determines which (or even whether) cultural resources protection laws apply. Federal laws apply to projects that occur on federal or tribal land, if there is federal funding involved in a project, or if a federal permit of any kind is required for the project to occur. Privately funded projects on private land are not required to follow federal laws regarding cultural resources *unless* a federal permit is required for the project to occur.

In addition to the consultation requirements of the NHPA, amendments to the act passed in 1992 enhanced the role of tribes in the national preservation program. The amendments also strengthened the protection to places of cultural significance to Indians and Native Hawaiian organizations. Specifically, the amendments allowed for the creation of tribal historic preservation programs and funding mechanisms, allowed for the creation of a competitive grant program to fund tribal initiatives in this regard, and required that one presidentially appointed member of the Advisory Council on Historic Preservation will be a Native American or Native Hawaiian.

In 1996, as a result of the 1992 amendments, the National Park Service of the United States Department of the Interior approved the applications of 12 American Indian tribes to assume the responsibilities of the State Historic Preservation Officer to carry out compliance activities on tribal lands. By assuming these functions, the tribes agreed to be responsible for conducting (or causing to be conducted) historic property surveys within the areas under their jurisdiction, preparing and maintaining permanent inventories of historic properties within the lands under their jurisdiction, nominating properties to the National Register of Historic Places, and reviewing Federal agency undertakings pursuant to Section 106 of the Act. As of June 2011, 118 tribes have been formally recognized as qualified to take over SHPO responsibilities on their lands.

Under the NHPA, Tribal Historic Preservation Officers are officially designated by a federally recognized Indian tribe to direct a program approved by the National Park Service. In addition, the THPO must have assumed some or all of the functions of State Historic Preservation Officers on the lands under the tribe's jurisdiction. In this manner, it is the tribe, and not the particular state (or states) within whose borders the tribe lies, that has the final say regarding the effects to cultural resources.

Key Issues and Current Debates

Limitations on Tribal Heritage Management Programs

The status of land ownership is the primary factor taken under consideration in regards to implementing federal historic preservation programs. As noted above, federal laws apply only to projects that occur on federal or tribal land, if there is federal funding involved in a project, or if a federal permit of any kind is required for the project to occur. Privately funded projects on private land are not required to follow federal laws regarding cultural resources *unless* a federal permit is required for the project to occur.

In this regard, some tribal groups are geographically removed from their aboriginal lands as a result of federal removal policies of the 1800s which forced tribal groups to give up land in the eastern United States and move to areas hundreds of miles away. Some groups still occupy large tracts of land within traditional or aboriginal lands within reservations originally defined in the 1800s. In other areas such as Oklahoma, land ownership has been interrupted because of the actions of the Dawes and Jerome Commissions during the latter part of the nineteenth century that divided up reservation lands into individually owned allotments. This land tenure issue is doubly important, however, when one takes into consideration the fact that the cultural heritage of Native American tribes is so closely tied to the lands where their cultures originated, developed, and flourished – lands that, in the majority of cases, are no longer under the jurisdiction or control of its original occupants.

Additionally, because of the vast number of different tribal groups (more than 560 as of October 1, 2010), land issues, relationships with local and the federal governments, financial conditions, size of population, and other issues vary by tribe. For some tribes like the Navajo Nation, it is economically and geographically feasible to undertake a heritage protection program, while, for others such as the Berry Creek Rancheria of Maidu Indians of California, finances and small population numbers preclude the need for such action.

Balancing scientific values required under federal laws with tribal values associated with heritage protection is a difficult and challenging task for tribal groups involved in heritage management programs. Because of the importance of oral tradition within tribal culture, many tribal historic preservation plans emphasize the importance of ongoing consultation with tribal elders and spiritual leaders with special knowledge of the tribe's traditions. Tribal groups also have given emphasis to the importance of protecting "traditional cultural properties," places that are eligible for inclusion on the National Register of Historic Places. These places are not important merely because of any archaeological or historical reasons, but because of their association with cultural practices and beliefs that are rooted in the history of the community. They are important in maintaining the continuity of the community's traditional beliefs and practices, and are links between past and contemporary cultures.

There are, however, many tribal programs that successfully managed to incorporate the best of tribal and scientific values (Swidler et al. 1997; Dongoske et al. 2000). For many years, the Society for American Archaeology published a "Working Together" column in the *SAA Bulletin* (http://www.anth.ucsb.edu/projects/saa/) that explored these issues. The Society's current venue, the Archaeological Record (http://www.saa.org/Publications/thesaaarchrec/index.html), continues to offer examples of ways that tribes work in these fields. These projects provide models for how archaeologists and indigenous peoples can work together to attain goals that are mutually beneficial to all heritage management parties involved.

Examples of Tribal Heritage Management Programs

The Navajo Nation exists within the largest reservation in the United States, covering about 25,000 mile^2 (about 65,000 km^2). The development of the Navajo cultural resources management program should be seen as a watershed event in the history of American Indian heritage

management. The establishment of the Navajo Tribal Museum in 1956 was the beginning of tribal involvement in an archaeological and historical research program. In January 1972, the Navajo Tribal Council passed a resolution enacting an antiquities preservation law for the Navajo Reservation which acknowledged the existence of the many ruins and artifacts on the Navajo Reservation. It also noted that the sites and objects were irreplaceable and invaluable in the study of the history and preservation of the cultural background of the Navajo Nation. It went on to set up procedures for permitting archaeological studies, punishment of law-breakers, and protection of the resources. This resolution was one of the first attempts to extend tribal protection over cultural resources on tribal lands.

In 1977, the Navajo Nation established its own Cultural Resource Management Program to combine Navajo customary knowledge with professional anthropological expertise. Today it maintains several programs relating to protecting and preserving Diné (Navajo) culture in the Arizona, New Mexico, Colorado, and Utah region of the American Southwest, including its Chaco Sites Protection Program, its Cultural Resources Compliance Section, Facilities Management, its Forestry/Natural Resources Program, a Roads Planning Program, and its Traditional Culture Program. The overall program is not a tribally operated copy of the dominant scientific culture; however, the Navajo use traditional religious practitioners in the identification of project impacts on sacred sites, shrines, and other localities of importance to the Navajo quite apart from any other archaeological or ethnographic professionals.

The Zuni, another tribe in the American Southwest, have been involved in cultural preservation programs since the formal establishment of the Zuni Archaeology Program in 1978, and formed the Zuni Cultural Resource Enterprise in 1982. In 1994, the tribe preplaced the Zuni Archaeology Program with the Zuni Heritage and Historic Preservation Office, which is charged with the development and implementation of tribal policies to preserve the cultural and historic heritage of the Zuni people. This new organization now operates with a staff separate from that of the Zuni Cultural Resource Enterprise.

Since then, the tribe has been able to protect its cultural resources in the manner it wishes, without relying on outsiders to implement what might be perceived to be alien policies and procedures. The Zuni government recognizes the need for protecting their heritage as well as the benefits of cultural resources management. They play an active role in the federal cultural resources management compliance process in a way that provides an interface between the historic preservation bureaucracy and the tribal structure in a way that helps to alleviate conflict between the tribe and outside interests. Additionally, the formulation of the Cultural Resources Advisory Team of the Pueblo of Zuni in 1991 added another process by which cultural resources are protected by the Pueblo.

In the state of Oregon in the American Northwest, the Cultural Resources Protection Program of the Confederated Tribes of the Umatilla Indian Reservation has been in existence since 1987, and was one of the first 20 tribes to take over the function of the state historic preservation officer in 1996. It utilizes a combination of educational programs including cultural sensitivity, tribal cultural resources management perspectives, and other areas relative to heritage management. It also incorporates traditional cultural knowledge into its program as a means of further customizing its approach to the management of heritage resources important to the tribe and its members. Through these processes, the Umatilla have managed to modify the federal program into one that meets the needs of the tribal communities rather than only those of the anthropological or archaeological community.

As a result of treaties between the Choctaw and the United States, the Choctaw left their homeland in Alabama and Mississippi and trudged more than 400 miles westward to new lands in Oklahoma. This resulted in two things: The archaeological and historical manifestations of Choctaw heritage were no longer under tribal control, and the archaeological heritage of the

Caddo and Wichita was placed under control of the Choctaw as new landowners.

After the jointly held tribal land was divided among individual Indians during the allotment period, and after the excess land was opened to homesteading by non-Indians, the tribe had only minor control over cultural heritage that existed on non-Indian owned lands. Currently, however, the Choctaw Nation of Oklahoma maintains a tribal historic preservation office as a means of protecting not only the historic culture of its own tribal members, but it also works in conjunction with the Caddo Nation of Oklahoma and the Wichita and Affiliated Tribes of Oklahoma through intergovernmental agreements and procedures to ensure that the heritage of all groups is protected in ways each tribe wishes them to be protected.

These examples are a glimpse at ways that tribal organizations are involved in heritage management and heritage protection. They are committed to protecting the manifestations of heritage on the landscapes over which they maintain control. More importantly, however, many tribal groups see cultural and heritage preservation as more than the protection of the archaeological or historic sites that more often are the focus of archaeologists. Some tribes focus on the interrelationships between land and people rather than on the single manifestations of human habitation on the landscape; others include botanical and other resources among items of heritage and provide mapping to prevent destruction of places of traditional gathering places of wild resources; still others utilize state-of-the-art geophysical techniques to identify and protect areas that contain tribal grave locations.

The National Association of Tribal Historic Preservation Officers (NATHPO)

In 1998, the National Association of Tribal Historic Preservation Officers was formed to "support the preservation, maintenance, and revitalization of the culture and traditions of Native peoples of the United States." It does this through its support of tribal officials who undertake the role of the tribal historic preservation officer through training programs, lobbying for improved historic preservation funding, and by providing an interface between federal agencies and the tribes. It also serves as a clearinghouse for tribal issues related to historic preservation, repatriation, and other cultural issues deemed important to the continuation of tribal sovereignty.

As is apparent in the previous discussion, American Indian tribes have chosen to participate within the United States' cultural resources management and preservation programs. Many of the tribes operate programs that mirror those of the federal government as a means of protecting tribal historic resources from impacts to the physical manifestations of tribal history; many others have extended the definition of "cultural resources" to cover other aspects of heritage such as language, places where traditional plants were gathered, sacred locations, and other traditional cultural properties.

In this manner, Native American tribal programs have adapted federal programs to fulfill the needs of their membership in ways that strengthen ongoing concepts of tribal identity, contribute to the education of young tribal members, and protect one of the more important pieces of the fabric of American Indian life.

Cross-References

- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Heritage and Archaeology
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Local Populations and Global Heritage
- ▶ Stakeholders and Community Participation
- ▶ Uses of Heritage

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Cultural Heritage Management and Poverty

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Introduction

For most of the time that cultural heritage management has been a discipline of study and practice, the impoverished members of society have been overlooked. Their contributions to the world's tangible and intangible heritage have been undervalued, and their role in the management of their own heritage has been minimized. In recent decades, this has changed to a considerable degree, but the process of bringing the poor from the periphery to (or closer to) the center of heritage management has been a complex one.

Definition

This entry considers the evolution of cultural heritage management from the perspective of the less advantaged members of society. It considers "poverty" as an evolving subject of study within cultural heritage management, while also considering the ways in which the material culture of the poor (including the gentrified poorer quarters of cities) are now drivers for heritage town planning and sympathetic urban redevelopment. It considers the involvement of "the poor" in community-based heritage planning and the role of heritage in the empowerment of Indigenous communities (which are commonly the most disadvantaged members of society).

Key Issues/Current Debates/Future Directions/Examples

Moving the Poor from the Periphery to the Core of Cultural Heritage Management

In the eighteenth and nineteenth centuries, "cultural heritage" (including the disciplines of archaeology, art history, and architecture) was commonly the preserve of the wealthy. The "Grand Tour," as often as not, involved elites visiting the aging villas and ancient palaces of other elites. Most archaeologists (even those that did not necessarily come from wealthy backgrounds themselves) concentrated their efforts on the lavish tombs and palaces of Egyptian pharaohs and Mycenaean warrior-kings, while architects and art historians tended towards the study of grand monuments and masterpieces at the expense of the modest dwellings and art forms of the poor. As a result, a one-dimensional history of the world began to emerge, in which the history of past cultures became a history of the wealthy and powerful. The "other 98 %" of society featured less commonly in these histories.

This phenomenon was reflected in the management of cultural heritage at the time. Typically, heritage management was governed by the principle of property ownership, which excluded less wealthy members of society from the process. To use the UK as an example, the *Ancient Monuments Protection Act 1882* was controversial (only narrowly being voted by parliament into law and only after a number of attempts) because it placed responsibility for the conservation of ancient monuments in the hands of government, thereby taking control of items of national heritage out of the hands of private (and almost invariably wealthy) land owners. There was, and still is, a clear philosophical divide between those who assert that property rights should prevail over the rights of the community to conserve and appreciate the nation's heritage, on the one hand, and those who argue

that the community's views and interests should prevail over those of individual property owners, on the other hand. In the nineteenth century, when government became involved in the management of the national estate at all, it was typical to impose its own view of order on the populace and rarely took account of the heritage of its poorer citizens. For example, Haussmann's rebuilding of large parts of Paris (1853–1870), which resulted in the fine boulevards that characterize the city today, was carried out at the expense of large swathes of the medieval city, which were demolished en masse, despite the objections of the city's poorer residents.

This period was not entirely without proponents of a different approach to cultural heritage. The nineteenth-century essayist and art critic, John Ruskin, argued strongly for the conservation (rather than restoration) of cultural heritage places, which to Ruskin included the works of humble artisans and craftspeople. While Ruskin's political philosophy inspired early Christian Socialists and the creators of the welfare state, his philosophy in relation to art and architecture, which emphasized the "dignity of labor," underpinned the "Arts and Crafts" movement – a movement that drew inspiration from the tastes and skills of the poorer classes.

At around the same time, people began to appreciate the importance of good housing for the working classes. While European industrialization was at its height, some wealthy industrialists made a point of constructing "model villages" for their workers, drawing on sentimental perceptions of the rural idyll as inspiration for their housing schemes. These model villages provided a mental template for what the "true" historic English village looked like and became somewhat kitsch heritage goals to aspire to. Some of these model villages (e.g., Saltaire in Yorkshire) are today cultural heritage places in their own right. However, it took some time for the profession of town planning to truly appreciate the importance of a city's older quarters to its character and sense of self. It was not until after the Second World War, when inner-city gentrification became fashionable in western society, that the principles of town planning and urban design were augmented to reflect this concept. Sites that had hitherto not generally been thought of as heritage places, including the former residences and work places of the down-at-heel (rows of Victorian terrace houses and the chimney stacks of defunct factories), began to be listed on heritage registers and to receive legislative protections.

Such places are now commonly protected by legislation that makes no distinction between the heritage places of the rich and poor. For example, the Burra Charter, which provides guidelines for the assessment and management of heritage places, makes no distinction on the grounds of the economic circumstances of the place's construction. In fact, the criteria that the Burra Charter provides for the assessment of heritage places are entirely neutral on this subject.

The Poor as an Object of Study

In the first half of the twentieth century, there was a slow shift away from the academic focus on the history and material culture of the rich and powerful. This has seen a concomitant expansion of the concept of cultural heritage and an embrace by many of the heritage of "slums," "the working class," and "the humble abode." Marxist theorists in particular began to ask very different questions of material culture in the early decades of the twentieth century, reorienting the emphasis of study towards the lives of the urban and rural poor. The "archaeology of poverty" has become a productive field of research for historians and archaeologists, particularly as inner-city development commonly occurs on the sites of the earliest-settled parts of cities (e.g., New York's "Five Points" and Melbourne's "Little Lon" District). Related to this are fields of research such as "the archaeology of capitalism," "the archaeology of inequality," and "the archaeology of slavery." Similarly, archaeologists began to expand their interests beyond the classical cultures of Greece and Rome to include prehistoric and "noncomplex" cultures where the badges of rank and status were less clear and possibly less relevant. Archaeological sites, characterized by little more than scatters of stone artifacts or rudimentary mud-brick dwellings, appeared

more commonly in both the academic and nonspecialist literature.

These shifts in the archaeological literature were reflected in the broader fields of cultural heritage. A new discipline – industrial archaeology – began to emerge in the 1970s and 1980s. "Industrial archaeology" does not necessarily involve material culture excavated from below the ground. Rather, it is a fast-expanding field of cultural heritage that concerns itself with the technologies, machinery, and work places of past cultures. In other words, it deals with the kinds of material culture that were traditionally the domain of the working classes and the poor.

Town planners have also been responsive to the desire of many people to reinhabit the houses and streets of the historically poorer parts of cities. The "gentrification" of parts of the world's great cities has been accompanied by new fields of research in architecture and design. Today, instead of the demolition of old buildings, we are more likely to see their retention and adaptive reuse. This trend has seen the emergence of a new kind of architect who specializes in the creative introduction of contemporary design into historical built forms.

Similarly, heritage interpretation has shown a willingness to embrace the stories of the urban and rural poor. Plaques, heritage trails, and public art now commonly reconnect us to the lives and living conditions of the poorest members of past societies.

The Poor as Participants in, and Proponents of, Cultural Heritage Management

In 1963, the monumental and iconic New York landmark Pennsylvania Station (or "Penn Station") was demolished in the face of international outcry. Many have pointed to the demolition of this heritage building as the birth of the modern architectural preservation movement. The demolition of Penn Station formed part of a program of "urban renewal" which was resisted by representatives of all sections of New York society on the grounds that it failed to appreciate the importance of historic built forms and ways of life. The 1950s and 1960s were characterized by many such urban renewal initiatives across the world. They typically entailed the wholesale demolition of the older parts of cities, those usually inhabited by the urban poor, and the construction of "modern" high-density residential structures in their place. This often pitted town planners and architects (who commonly held a single-minded commitment to the principles of "modernism" and to Le Corbusier's objection to the "disorder" of working class living places) against residents and others who recognized the value that the older parts of town (often places characterized by existing or recent poverty) lend to the character of a city as a whole. As a result, the latter decades of the twentieth century saw a movement towards the recognition of the rights of *all* residents (including the poor) to be consulted in relation to the redevelopment of their living places. Today, legal processes in most developed countries provide everybody, including the poor, with access to the courts in order to object to development that they find offensive.

In Australia, a modernist-inspired movement to demolish some of the country's oldest homes in the inner-city Sydney suburb of "The Rocks" resulted in widespread resistance from both the local residents and the union movement, which imposed the so-called "green bans" on heritage places earmarked for demolition. Their resistance saved numerous heritage homes from the wrecking ball and resulted in the retention of social housing in this part of the city.

Similar battles are now being fought outside of the western world. Recent decades have seen an increased appreciation of the rights of Indigenous cultures to conserve both their tangible and intangible heritage. Indigenous cultures are commonly the most marginalized and economically disadvantaged members of society and their opposition to mining and development activities that threaten their cultural heritage often occurs at great personal and financial risk. The management of the impacts of such things as rampant tourism on the tangible and intangible heritage of Indigenous cultures (e.g., at Angkor in Cambodia and Machu Picchu in Peru) is a common challenge, recognized by UNESCO through

international conventions such as the *Convention for the Safeguarding of the Intangible Cultural Heritage 2003*, which makes no distinction between the living heritage of the rich and poor. Equally, there are many who now recognize that cultural heritage can actually provide a means of poverty alleviation by providing developing countries with opportunities for sustainable development.

Today, all sections of society are heavily involved in cultural heritage practice. For example, community archaeological excavations regularly invite participation from volunteers, many of whom ask the legitimate question: "well, whose heritage is it anyway?" Meanwhile, in the inner-city suburbs of our metropolises, the gentrification of once down-at-heel places has seen a renewed appreciation of the houses and technical skills of yesteryear's poor. In most developed countries, all members of a community have the right, through heritage legislation, to be consulted about the form that their part of their cities may take and to object to offensive development in the courts.

Cross-References

- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Outreach
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Indigenous Archaeologies
- ▶ Labor Archaeology
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ "Public" and Archaeology
- ▶ Social Archaeology

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Cultural Heritage Management and Submerged Sites

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Introduction

Submerged cultural heritage encompasses everything from shallow, freshwater environments, through the coastal zone, down into the waters of the continental shelves, and ultimately into the abyssal depths of the oceans. Unfortunately, national inventories for such sites are still in their infancy, well behind equivalent inventories for cultural heritage sites on land. Meanwhile, international, collaborative inventories of submerged cultural heritage are virtually nonexistent. But hundreds of thousands of historically known wrecks have been mapped around the world, alongside countless other single find-spots of cultural materials identified by archaeologists, divers, fishermen, and other marine-zone users. There are thus potentially millions of such sites in existence, including everything from single find-spots up to complicated multiperiod submerged "landscapes." Technological advances now mean that there is no

corner of the worlds' oceans that is not accessible to humans, although the logistics and costs of such access remain considerable, particularly in the deep ocean (Ballard 2009).

Submerged cultural heritage site types can be split into four main groups:

1. Wreck sites that are the result of accidental or deliberate loss (including sea, air and spacecraft debris, also land vehicles like tanks lost during amphibious warfare or transport)
2. Submerged settlement sites, especially prehistoric sites, that have been inundated over the long term through natural processes of climate change
3. Coastal industrial and settlement sites submerged due to medium- to short-term processes of flooding and erosion, both naturally and culturally driven
4. Inland and coastal freshwater and wetland sites, including lakes and rivers

The latter include both sites that have been lost to natural processes of coastal flooding and erosion and also through *cultural* processes of large-scale environmental management, particularly water management schemes that flood cultural sites, a contentious practice that has regularly been challenged by resident, especially Indigenous, communities. The US National Reservoir Inundation Study undertaken between 1976 and 1980 was one of the first and remains one of the best examples of the analysis of the impact of such practices on cultural remains (Lenihan et al. 1981).

There are particular issues of the public understanding of and engagement with submerged cultural heritage, including problems of understanding from within government. The scale and invisibility of many such sites encourage an "out of sight, out of mind" mentality among many communities. Related to this are issues of the lack of clear responsibility for site management, with a large number of sites lying in international waters outside of the direct control of any one nation, representing legally ambiguous sites with no management analogies to sites on land. The extreme depths of some sites, and thus the technical problems (also costs) of site access, exasperate these management problems. Even within the territorial waters of individual nations, cultural heritage management on submerged sites is regularly confused by an overly complicated management and planning regime. In general, most nations manage their marine cultural and natural assets, and also their terrestrial and marine environments, via different planning policies, environmental protection, and management laws. Different departments within a single government are in turn usually responsible for these different policies and laws. Such policies and laws operate within a broader management framework – including specific national cultural heritage laws, for which again there is often further variation in application and extent between the land and sea zones. Exasperating this complicated management regime, many governments also fail to maintain overlapping terrestrial and marine zone datasets and inventories. Overall, such fragmented management and data regimes prevent a "seamless" understanding of these different environments and thus make effective cultural and natural heritage management extremely difficult. Such dedicated marine cultural resource management teams as different governments maintain – if any – are also usually under-resourced and overcommitted. One of the best known and most experienced of these is the US National Park Service's Submerged Resources Center (formerly the Submerged Cultural Resources Unit) founded in 1980 (Lenihan 2002).

Definition

The term "underwater cultural heritage" is most often used to define submerged heritage sites, including in legal terms. UNESCO defines underwater cultural heritage as meaning "all traces of human existence having a cultural, historical or archaeological character that have been partially or totally under water, periodically or continuously, for at least 100 years" (UNESCO 2001: article 1, point 1(a)).

Recognizing the urgent need to preserve and protect such heritage, UNESCO developed the *Convention on the Protection of the Underwater Cultural Heritage* in 2001 (UNESCO 2001) in order to promote international collaboration in the field of submerged cultural heritage.

In January 2009, this convention came into force with respect to the first 20 States that had deposited their instruments prior to October 2008. As of September 2011, 40 nations had ratified or accepted the convention (Dromgoole 2006). However, many nations with major marine industrial or commercial commitments have so far failed to ratify the convention, variously citing (a) concerns about "creeping coastal state jurisdiction" (e.g., additional legal responsibilities stemming from ratification, which could upset the international jurisdictional balance achieved under the United Nations *Convention on the Law of the Sea* (UNCLoS) (1982) – see below), (b) concerns about the possible dilution of the principle of Sovereign Immunity by the convention (see below), and (c) the convention's "blanket" application to all underwater cultural heritage irrespective of relative archaeological or historical significance. Many nations also voice broader concerns as regards the costs of management and enforceability of the principles laid out in the convention.

In terms of definition, it is important to also clarify the basic relevant legal principles for the international marine zone as agreed under the United Nations *Convention on the Law of the Sea* (UNCLoS) (1982) (United Nations 2011):

- Article 3: Coastal States exercise sovereignty over their territorial sea, which they have the right to establish to a limit not to exceed 12 nautical miles.
- Article 49: Archipelagic States (made up of a group or groups of closely related islands and interconnecting waters) have sovereignty over a sea area enclosed by straight lines drawn between the outermost points of the islands.
- Article 57: Coastal States have sovereign rights in a 200-nautical mile "exclusive economic zone" (EEZ) with respect to natural resources and certain economic activities and exercise jurisdiction over marine science research and environmental protection in this zone.
- Article 76: Coastal States have sovereign rights over the continental shelf (the national area of the seabed) for exploring and exploiting it; from the shore, the shelf can extend at least 200 nautical miles or more under specified circumstances.

Of related relevance is also the principle of "Sovereign Immunity" (as agreed under Article 236 of UNCLoS (1982)). This relates to the wreck of any warship, naval auxiliary, and other vessels or aircraft owned or operated by a State and used only on government noncommercial service. Such wrecks are deemed to remain – irrespective of their location – under the control and ownership of their nation-states, unless lost by capture or sinking during battle, by international agreement, or by an express act of abandonment, gift, or sale by the sovereign. Examples of such historic vessels protected under this principle include the CSS *Alabama* (lost 1864) (US ownership in French waters), HMS *Birkenhead* (lost 1852) (British ownership in South African waters), and HMS *Spartan* (lost 1944) (British ownership in Italian waters). Many nations also protect the remains of warships or aircraft (both on land and underwater) that are war graves through domestic legislation, for example, the US Sunken Military Craft Act (2005) or the UK's Protection of Military Remains Act (1986). Such laws operate over and above various nations' dedicated cultural heritage management laws.

Historical Background

The formal practice of cultural heritage management on submerged sites arose in the 1950s with the advent of commercially available technologies to access the marine zone regularly and reliably. To this end, cultural heritage management on submerged sites is a part of the wider global development of cultural heritage management as a practice and theoretical discipline following from World War II. Many of the approaches and philosophies of underwater cultural heritage management were consequently first developed on terrestrial sites. In the twenty-first century, there are increasing efforts being made to interlink terrestrial and submerged cultural heritage management practices and philosophies, such as through the use of "seamless" GIS datasets running across the coastline to allow the

Cultural Heritage Management and Submerged Sites, Fig. 1 A World War II US Sherman tank in Saipan's lagoon (Photo by Jennifer McKinnon, courtesy and copyright of Ships of Discovery)

holistic management of contiguous terrestrial and marine cultural zones. An example of such seamless management are former island battlefield and/or military testing sites in the Pacific associated to World War II and the Cold War, such as at Chuuk Atoll (part of the Federated States of Micronesia), which was a major Japanese military base subject to assault by the US military in 1944 (Rainbird 2000), and Bikini Atoll (part of the Republic of the Marshall Islands), which was a US military atomic test site between 1946 and 1958 (Delgado et al. 1991) (Fig. 1).

Through the 1950s and 1960s, the rise of "sports" (e.g., amateur) (and to a lesser extent "commercial," e.g., professional) diving led to growing concerns with the looting of submerged heritage sites, initially of classical era wreck sites in the Mediterranean (UNESCO 1972) and later in more inaccessible areas, notably of historic wreck sites associated to the Spanish Armada around the western and northern coasts of Ireland and Scotland (Martin 1975), and also of Dutch East India Company (VOC) wreck sites around the Indian Ocean, especially the western coast of Australia (Parthesius 2009). Concerns about such activities were instrumental in the development of the formal academic discipline of "maritime archaeology" and also of the emergence of "avocational" groups dedicated to promoting public understanding and training. Notable among such organizations is the charitable Nautical Archaeology Society (NAS) (founded in 1986), which has its origins in the Council for Nautical Archaeology founded in the UK in 1964. The avocational training scheme of the NAS has been taught around the world and is a central component of ongoing efforts to ensure consistent submerged cultural heritage management (Bowens 2008). Growing international concern about the extent of looting of submerged cultural heritage subsequently led to increasingly strenuous lobbying of governments around the world in the 1960s and 1970s, demanding that legal protection be given to submerged heritage sites commensurate to that already in existence on land. Such legal protection is now in force among many other nations around the world, although there remains a considerable disjuncture between and even within different nation's approaches in this respect. Many nations of the world also have yet to enforce any legal protection of their underwater cultural heritage. Since the 1980s, the problem of site-specific looting of historic wrecks has largely moved out of the sphere of individuals and into the growing international concern with what is sometimes erroneously termed "commercial maritime archaeology." This involves multimillion dollar organizations undertaking the wholesale looting of entire wreck sites to recover cargoes for resale, often in partnership with or on behalf of governments. Such salvage has been a particular problem in southeast Asian waters, with the recovery of materials – with limited archaeological analysis at best – of numerous sixteenth-, seventeenth-, and eighteenth-century CE China cargo ships. The recovered cargoes of such vessels have ended up at auction, their contents dispersed around the world and thus unavailable for

comparative study. Such salvage is also undertaken in increasingly deep, often international waters of the continental shelves. Archaeologists criticize the recovery of materials from such sites for profit as being contrary to the ethical principles underlying archaeology (counter, in particular, to the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage*, especially the convention's Annex, Rule 2). Archaeologists also criticize such projects as being of limited scientific merit, with scant consideration of wider research objectives in the selection of sites to explore and recover materials from and with little attention being paid to the survey or recovery of nonprofitable but culturally important materials such as the hulls of vessels. In reply, proponents of such activities counter that the UNESCO convention is an unenforceable political and bureaucratic quagmire and that the concept of "preservation in situ" does not work (see discussion below).

The 1990s onward witnessed an expansion of interest in submerged cultural heritage management beyond the traditional concern of the protection of historic wreck sites. In particular, there has been growing global interest in the identification, exploration, analysis, and management of "submerged prehistoric landscapes." These are land surfaces that have been flooded after the end of the Last Glacial Maximum from c. 20000 BCE onward (Benjamin et al. 2011). Such interest has increasingly been undertaken in relation to industry, especially marine extractive industries such as oil and gas companies and aggregates extractors (Flatman 2012). Although the existence of such sites had been acknowledged since the early twentieth century, and their general extent hypothesized from the 1960s onward, it was only in the 1990s that the full extent and cultural significance of such sites began to be fully recognized, and formalized programs of cultural heritage management put in place (Fig. 2).

In particular, the Aggregates Levy Sustainability Fund (ALSF), a British government management initiative that ran between 2002 and 2011, funded millions of pounds of collaborative research between academia, commercial archaeology, and the marine aggregates industry exploring the extent of the submerged prehistoric landscapes of the southern North Sea within the UK's Exclusive Economic Zone (Gaffney et al. 2009). The ALSF also funded much other work relating to the prioritization of different marine cultural site types (especially different types of wreck site) and thus the development of refined types of exclusion zone around wrecks, as well as contributing greatly to the UK's dataset and mapping of such materials (Archaeological Data Service 2011). Similar initiatives to map, prioritize, and manage marine cultural assets have also been implemented in other locations around the world, notably in US territorial waters by the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) through their management of federally controlled marine zones (BOEMRE 2011).

The later 2000s has witnessed an expansion of not the type of heritage site impacted by industrial developments, but rather of these types of industrial development themselves. In particular, there has been a growth of marine zone renewable energy infrastructure that has been recognized to have considerable potential impacts on submerged cultural heritage. This mainly comprises offshore and onshore wind farms, and to a lesser extent tidal energy barrages (Wessex Archaeology 2007). The later 2000s has also witnessed growing concern about other marine zone industries impacts upon submerged cultural heritage, including commercial fishing. Meanwhile, new marine industrial areas are coming into increasing commercial use for which the full potential of the cultural heritage has only just begun to be considered, especially the High Arctic.

In a different sphere, the 2000s witnessed a growing concern with the place of cultural heritage management in land and underwater "Integrated Coastal Zone Management" (ICZM). Such management aims to reconcile the overlapping demands of different coastal zone industries with broader cultural values – including the protection of heritage – alongside medium-term environmental management regimes. In particular, this process has witnessed

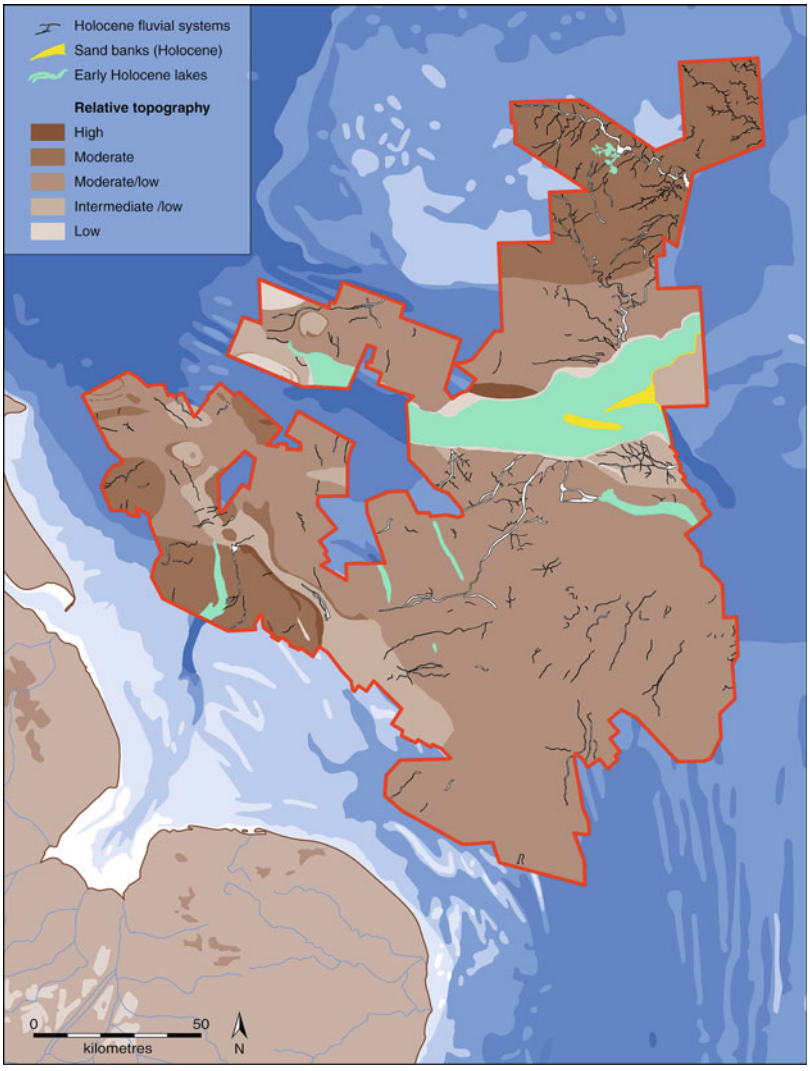

Cultural Heritage Management and Submerged Sites, Fig. 2 General distribution map of features analyzed by the North Sea Palaeolandscapes Project, from Gaffney et al. (2009: 83, Fig. 3.17) (Courtesy and copyright of the Institute of Archaeology and Antiquity, University of Birmingham, UK)

the recording of historic coastal sites felt at particular risk from coastal flooding and erosion and also from coastal management such as "hard rock" defenses as well as "soft" responses like "managed retreat" through the restoration of coastal salt marshes. The development of ICZM strategies has in turn led to specific types of related marine archaeological survey, most notably Rapid Coastal Zone Assessment Surveys (RCZAS). This is a distinctive form of rapid evaluation of coastal heritage assets that was first developed and implemented in England during the 1990s by English Heritage.

Key Issues

The current key issue in the field of submerged cultural heritage management is that of the legal status of such management, and stemming from this the effectiveness of existing management strategies. International cultural heritage management of submerged sites is currently enforced legally at a national level through various national laws (both specific heritage management laws and also broader planning and development laws and also policies). The majority of these laws and policies are ill equipped to deal with

Cultural Heritage Management and Submerged Sites, Fig. 3 Offshore wind farm near the Isle of Thanet, UK, with the turbines between 7.1 and 10.8 miles distant (Photo by David Ball, courtesy and copyright of the US Bureau of Ocean Energy Management, Regulation and Enforcement)

the scale, extent, and subtlety of submerged sites that do not conform to the normal expectations of cultural heritage sites found on land. In addition, international cooperation on cultural sites in transnational and international waters is still in its infancy. There are serious ongoing debates as regards the effectiveness of existing management strategies. In particular, this involves the question of the principle of in situ preservation as the preferred option for submerged archaeological sites. This is a principle common on terrestrial cultural heritage sites and is enshrined as a key principle in the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage*. However, the principle has been subject to sustained criticism in the marine zone, both the accusation that it is a form of "laissez faire" government (i.e., an excuse for minimal low-cost institutional intervention in submerged cultural sites on the grounds of a spurious preservation philosophy) and also that it neither protects sites effectively nor allows opportunities for archaeologists to excavate sites in order to gain new knowledge or learn how to properly execute such fieldwork and thus train the next generation of site managers. Leaving aside the published hyperbole on this issue – much of it self-servingly written by communities such as treasure hunters who have the most to gain by the public criticism of all forms of marine zone cultural heritage management – the concept of in situ preservation is a sound one with well-established practical and theoretical principles. However, there has been a lack of critical analysis of this principle's formal application in submerged contexts, given both the distinctive nature of submerged cultural sites (e.g., issues of their extent and survival) and also the nature of marine zone impacts on submerged archaeological sites in comparison to terrestrial sites (e.g., that terrestrial archaeological sites in many nations are required to be explored, including excavated, under law, even where remains will be left in situ, which is not true of most marine archaeological sites). Until marine archaeological sites are required under different nations' laws to be explored to the same extent as terrestrial sites in advance of development, this disjuncture between the protection and understanding of submerged cultural sites is likely to remain. This relationship is evolving – witness the increasing requirements of development-led marine archaeological intervention in relation to offshore renewable energy (Wessex Archaeology 2007) – but is still nowhere near the scale of development-led in situ site management witnessed on land (Fig. 3).

The principle of in situ preservation is based on a terrestrial heritage resource management model. This model has problems of compatibility in the marine zone on two fronts. Firstly, the terrestrial model assumes much lower levels of preservation and much lesser physical extent of sites than is commonly witnessed in the marine zone. This means that archaeological intervention in such sites on land can be relatively small scale and thus faster, easier, and cheaper. Secondly, the terrestrial model assumes generally precise, immovable locations of sites of the types hard to ensure and accurately measure in the shifting seabed of some marine areas. This means that it is much easier to leave some or all of a site in situ on land in comparison to at sea. These management problems are exasperated by the relative lack of data on the scale and extent of marine cultural heritage, which makes site prioritization hard to achieve – that is, the relative significance of different types or ages of site are difficult to judge. This means that modern terrestrial management principles on the basis of judgments of things like relative "significance," "setting," and so on are difficult to formulate for marine cultural heritage.

Barring a few high-profile discoveries, usually of historic ships – for example, the *Mary Rose*, the *Vasa*, the *Hunley* – most marine archaeological sites remain invisible to the general population, and even when in such cases they are visible, this is normally as a consequence of costly recovery efforts rather than in situ site management. Such public mentalities are hard to shift. Partly, this is an issue of influencing public perception. The marine natural environment lobby has worked hard over the past decades to foster a sense of communal responsibility for the seas and oceans of the world, of the need to respect and protect as communities marine biodiversity. These efforts have paid considerable dividends – concern about marine ecology is now on the "radar" of politicians. But many of the same threats to marine biodiversity also threaten marine cultural heritage. The problem is one of perception and recognition; these threats are not generally understood to be to cultural as well as natural heritage. Combined cultural and natural heritage site management regimes are in their infancy in this respect and require considerably greater political will, as much as anything in many cases forcing different responsible government departments for cultural and natural heritage to work more closely together in their shared interest. In some cases this even means the management of marine cultural heritage sites that represent a threat to the natural environment, for example, World War II era vessels leaking oil, such as the example of the wreck of the USS *Arizona* in Pearl Harbor, Hawaii, that is subject to ongoing monitoring by the US National Park Service (Murphy 2010) (Fig. 4).

Cultural Heritage Management and Submerged Sites, Fig. 4 NPS archaeologist Matthew Russell conducting precision GPS survey on USS *Arizona* (Photo by Brett Seymour, courtesy and copyright of the US National Park Service)

Management regimes also need to be developed to better deal with the sheer extent of submerged cultural heritage. Current management models are still generally tied to the principle of

"spot finds" of individual wrecks in precise locations, but this is not an effective form of management of many types of marine cultural heritage, in particular large, overlapping and complicated marine heritage sites such as prehistoric submerged landscapes on the one hand or World War I and World War II marine and coastal battle sites (covered with wrecked ships, aircraft, and other battle debris) on the other hand. What is needed in such circumstances are developments of the types of marine-protected zone or reserve commonly used to identify locations of marine natural environment significance, but which are exceptionally unusual in the case of marine heritage (a rare example being the USS *Monitor* National Marine Sanctuary off the eastern seaboard of the USA).

International Perspectives

As noted above, there are particular issues in UK waters as regards the management of submerged prehistoric sites in relation to industry. The example of the ALSF serves as a model for other nations to follow in which the key is close working relationships between archaeologists and industry. Overlapping EEZ management in the southern North Sea involving the UK and neighboring nations has also been attempted, reaching beyond the British national territorial sea remit of the ALSF, with governments working together to overcome the legal challenges to conjoined cultural heritage management and submerged sites (Peeters et al. 2009). What is most notable over the long term is the key place of the "public" in cultural heritage management of submerged sites. Around the world, there is a long and admirable history of public engagement helping to actively manage such submerged sites for the common good. Many of the most famous investigations of submerged heritage sites began as, and in some cases remained throughout, entirely "voluntary sector" activities with little or no government, academic, or other "professional" involvement – from shipwreck sites like the *Mary Rose* in England to the submerged prehistoric settlement of Tybrind Vig in Denmark. Thanks to initiatives like the Nautical Archaeology Society's (NAS) international training scheme, there are standards of good practice in place for the thousands of volunteers who yearly commit extraordinary amounts of time, effort, and money to the management of submerged sites, without reliance upon the often-insecure government or industry support.

Future Directions

Submerged cultural heritage management is likely to become a growing concern of the international heritage community in the mid-twenty-first century. This is due to issues of increased access, thanks to advanced marine survey/sensing technologies (especially remotely and autonomously operated underwater vehicles) alongside an increased scale and intensity of marine resource development. As the growing global population makes ever-increasing demands for resources and as existing terrestrial supplies of many resources dwindle, the marine zone is an appealing source for such resources, both "traditional" resources such as oil and gas, minerals and metals as well as "alternative" resources such as renewable energy, alongside new developments such as large-scale marine zone farming for fish and nutrients. The marine zone is also increasingly being looked to as a locale for new developments such as deep ocean storage of CO_2 as forms of "carbon offsetting."

Industrial developments are particularly likely in areas of the world traditionally underexploited for marine resources but close to expanding industrial markets, such as the marine zones of Southern America, the Indian Ocean, and the South China Sea. Such locations have a limited history of formalized cultural heritage management, with little catalogued documentary and archaeological data to help judge the extent and significance of cultural resources in such areas. Meanwhile, speculators are increasingly also looking to the High Arctic as a potential new industrial and also shipping zone, anthropogenic

climate change making these areas more accessible to oil and has exploration and cargo ships alike. The potential for cultural discoveries, especially submerged prehistoric remains, in all of these areas is significant, as is the likelihood of conflict with existing Indigenous Communities in these areas over the control of such industrial and also cultural resources. Such communities claims of ownership of submerged industrial resources on the basis of identified ancestral remains may become the great legal challenge of cultural heritage management in the twenty-first century, akin to the land ownership battles on the basis of cultural patrimony of the Americas and Australia in the 1980s and 1990s.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ China: Cultural Heritage Management
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: Project Management
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: Public Perceptions
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ United States: Cultural Heritage Management

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Cultural Heritage Management and the Colonial Culture

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Introduction

In the wake of Columbus' voyages of "discovery" of the Americas in the late fifteenth century, Europeans began aggressive colonial settlement of what became known as the New World regions of North and South America. Continuing European maritime explorations of the world in the sixteenth, seventeenth, and eighteenth centuries resulted in the establishment of colonies in Africa, southern Asia, Australia, and Oceania. While the history of colonial impact in these various places differed in form and scale, in all cases it involved the European appropriation of indigenous lands and seas. In settler-colonial contexts such as Australia and the USA, such appropriation frequently involved removal of indigenous peoples from their lands, often through murder. Left behind were landscapes materially rich with cultural sites and places representing the cumulative products of millennia of complex and intimate cultural engagements by countless generations of indigenous peoples. The ensuing history and fate of these cultural sites and places parallel in many respects the ways local indigenous peoples were subsequently treated by colonial regimes. Equally important, such history entails not only colonial disassociation of indigenous people from their cultural sites but also colonial appropriation of these sites by European colonizers in the name of science, heritage, and nation building. Reversing the colonial processes of disassociation and appropriation has been challenging tasks for indigenous communities seeking to regain control of their pasts and cultural sites within the broader context of redefining and attaining social, political, economic, and cultural autonomy within nation states (Nicholas & Andrews 1997; McNiven & Russell 2005; Smith & Wobst 2005; Liebmann & Rizvi 2008; Lydon & Rizvi 2010). The settler-colonial contexts of the USA and Australia provide well-documented and instructive examples of these anticolonial dynamics.

Definition

The process of colonization of indigenous peoples and their lands is complex and varied, and subtle and catastrophic. The intensity of impact was broadly correlated with the intensity of colonial settlement, with major urban regions

seeing the most extreme examples of usurpation and destruction of indigenous cultural sites. In more remote regions, colonial impact was marginal, with indigenous peoples often maintaining strong traditional relationships with their lands, seas, and cultural sites. Yet in all settler-colonial settings such as the USA and Australia, erasure of indigenous sites was seen to be as important to the success of colonial settlement as removal of the peoples themselves. Erasure was both literal and symbolic. Literal erasure was the most obvious strategy and involved physical removal or destruction of cultural sites and objects. Expanding settlements with roads and railway lines, deforestation, and plowing of topsoil to make fields literally obliterated millions of indigenous sites and objects across the Americas and Australia. A more symbolic and in many ways more insidious and pervasive form of erasure was redefinition and appropriation of indigenous cultural sites and objects as nonindigenous. Such symbolic appropriation was underwritten by Eurocentrism and the denial of history and inventiveness to indigenous peoples located far from the self-proclaimed cultural hearth of Europe (Blaut 1993). While literal (physical) erasure has at its heart the process of forgetting, symbolic erasure also acts to undermine the legitimacy of indigenous occupation and connections to place (Trigger 1989; Kehoe 1998; McNiven & Russell 2005; Díaz-Andreu 2007). The legacy of this history of erasure and appropriation underpins and defines the colonial culture of contemporary practices of cultural heritage management.

Examples

Earthen mounds in the USA and Kimberley rock art of Australia provide celebrated examples of symbolic erasure. The monumental earthen mound sites of southeastern USA gave rise to the myth of the Mound Builders as archaeologists in the nineteenth century delved into their supposedly mysterious origins. Marginalizing sixteenth- and seventeenth-century European observations of Native American ritual use of these mounds, a colonial narrative was created such that the mounds were ascribed a nonindigenous origin, with possible ancestral links to the barrow cultures of ancient Europe. Native Americans were subsequently presented as usurpers of the Mound Builder race. This ideologically driven interpretation represented Native Americans as violent and savage destroyers of a sophisticated society and unworthy of respect. Such views were part of a broader ideology which attempted to delegitimize Native American connections to land and cultural sites and to present European colonization as righteous, legitimate, and indeed worthy (Silverberg 1968; Kehoe 1998; Mann 2002).

The Kimberley region of northern Western Australia is renowned for two major styles of rock paintings – recent Wandjina figures with large radiant heads and much older Gwion Gwion ("Bradshaw") figures with slender bodies and elaborate adornments (Fig. 1). Since these paintings came to the attention of Europeans in the nineteenth century, their complexity and aesthetic virtuosity were seen to indicate a nonindigenous origin. In short, the European representation of Aboriginal Australians as primitive "savages" precluded ascribing elaborate Kimberley rock art an indigenous origin. As with the Mound Builders myth, Aboriginal Australians were seen as recent interlopers who, unlike Europeans, were not legitimate and worthy inheritors of the Australian landscape and its complex human past (McNiven & Russell 2005; McNiven 2011).

Key Issues

With the professionalization of archaeology as a formal discipline in the late nineteenth and early twentieth centuries, colonialist narratives of indigenous pasts in the USA and Australia were increasingly replaced by more scientific approaches to the past. As a result, ancient human sites and objects and associated "prehistoric" cultures were seen to be of indigenous origin. As more resources were directed

Cultural Heritage Management and the Colonial Culture, Fig. 1 George Grey's colonialist recording of a Wandjina following his 1838 observations (From Grey 1841, 1: plate opp. p. 214)

toward archaeological research in the USA and Australia, understandings of the deep chronology and historical and cultural complexity of indigenous occupation of both landmasses grew dramatically. In the USA in particular, this resourcing of archaeological research took place in the context of the development of museums which became storehouses for millions of Native American objects and the skeletal remains of hundreds of thousands of Native Americans (Thomas 2000). In Australia, archaeology developed more slowly, with large museum collections of Aboriginal artifacts and ancestral remains developing within the second half of the twentieth century.

The pace of development of archaeological research in both the USA and Australia was matched by the enactment of laws to protect indigenous archaeological sites. In the USA, the *Antiquities Act* of 1906 was aimed inter alia at protecting and preserving Native American archaeological sites from the ravages of "pot hunters." The scope of this protection was expanded considerably with the *Archeological and Historic Preservation Act* of 1974 which made it an offense to destroy Native American archaeological sites without prior assessment during projects either funded or endorsed by a federal agency. In Australia, the move to legally protect indigenous archaeological sites came much later with most states introducing "relics" legislation during the 1960s and 1970s. Examples include Queensland's *Aboriginal Relics Preservation Act* of 1967 and Victoria's the *Archaeological and Aboriginal Relics Preservation Act* 1972. While in the USA the *Antiquities Act* only applied to sites on federal lands, "relics" legislation in Australia applied to both public and private lands, with all archaeological sites and objects considered property of the Crown. The most obvious spin-off of the new legislation was the efflorescence of the cultural resource management (CRM) industry in the 1970s. CRM brought into sharp focus the view that the significance of archaeological sites was based primarily on notions of representativeness and archaeological research value in terms of sites as repositories of prehistoric data. Most archaeologists agreed that CRM was a positive move for site preservation (Smith 2004).

For many Native Americans and Aboriginal Australians, development of the CRM industry brought to a head the sense of marginalization created by archaeology's legislative and scholarly advances during the twentieth century. Such marginalization, as a further dimension of colonial disassociation and appropriation, was expressed on four fronts. First, legal protection and excavation of sites were aimed at creating a cultural history for the benefit of White America. Second, indigenous people had little or no say in the processes of archaeological research on their ancestral remains and little or no rights to veto what they considered to be inappropriate research. Third, couching cultural sites in terms of archaeological sites and relics was limited as

not only it ignored other types of cultural sites (e.g., places of spiritual significance without archaeological remains) but it also implied that real indigenous culture belonged to a dead past. Fourth, indigenous people considered it inappropriate that the cultural heritage significance of indigenous sites identified through the CRM process was assessed simply on scientific grounds without consideration of indigenous cultural values. Many Native Americans and Aboriginal Australians felt that nonindigenous control and management of these cultural sites was based not on cultural right but on colonial might. The message was clear – archaeologists rather than indigenous peoples were the appropriate stewards of the indigenous past (Nicholas & Hollowell 2007).

Issues of marginalization and appropriation came to a head in the 1970s with debates over "who controls the past?" and "who owns the past?" (McBryde 1985). Many indigenous communities in the USA and Australia demanded the return of ancestral remains and sacred objects held by museums as a counter-hegemonic and anticolonial strategy to reassert ownership and control of their past and heritage. The repatriation debate resulted in much soul-searching among archaeological and museum communities. Initially, indigenous calls for ownership and control of ancestral sites and remains met with considerable resistance from archaeologists. Many archaeologists felt that the scientific integrity of their research would be jeopardized if indigenous peoples dictated and censored research agendas and research results.

A watershed in the evolving debate over Australian Aboriginal control of archaeological sites and research arrived at the 1982 annual meeting and conference of the Australian Archaeological Association Inc. (AAA) held in Hobart, Tasmania. Present was Ros Langford, who on behalf of the Tasmanian Aboriginal community delivered a paradigm-challenging paper with a blunt message: "We say that it is our past, our culture and heritage, and forms part of our present life. As such it is ours to control and it is ours to share on our terms. That is the Central Issue of the debate." After considerable discussion, AAA passed a motion declaring that "This conference acknowledges Aboriginal ownership of their heritage. Accordingly, this conference calls on all archaeologists to obtain permission from Aboriginal owners prior to any research or excavation of Aboriginal sites." While during the 1980s most Australian archaeologists and CRM consultants took indigenous permission as a given, it was not until the early 1990s that such values were enshrined in the AAA Code of Ethics. Similarly, the Canadian Archaeological Association's Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples of 1996 fully acknowledges the need for meaningful engagement and involvement of First Nations peoples in archaeological research (McNiven & Russell 2005: Chap 6). In contrast, the Society for American Archaeology (SAA) eight Principles of Archaeological Ethics in 1996 make no mention of Native American ownership of archaeological sites.

For many indigenous peoples in settler-colonial contexts such as the USA and Australia, security in controlling the destiny and management of their cultural heritage sites and objects is assured only after it becomes legislatively mandated. In the USA, among the legislative turning points were the *American Indian Religious Freedom Act* of 1978 and the *Native American Graves Protection and Repatriation Act* of 1990 (NAGPRA). The upshot of this legislation was that Native American tribes were to be given back human remains and associated funerary objects and other sacred objects held by federally funded institutions. In the case of ancestral remains returned for reburial, repatriation was linked directly to land and cultural site management. In a related sense, the *Tribal Self-Governance Act* of 1994 provided opportunities for Native American communities to compel federal agencies to enter into comanagement arrangements for federally owned public lands as a dimension of self determination. Thus, the issues of Native Americans regaining religious freedom and control of cultural objects immediately reframed cultural heritage management as a dimension of land management. In short, the indigenous cultural value and significance of objects and sites (including archaeological sites)

could only be realized when set within their appropriate landscape context (Swidler et al. 1997; Watkins 2000).

In Australia, the legislative push that gave indigenous peoples greater say in the management and protection of their cultural heritage sites and places similarly came from the federal government. The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* provided a process whereby indigenous people could apply to the Australian government to protect threatened sites and places of traditional significance irrespective of whether or not they exhibited archaeological evidence or were located on public or private land. A decade later, the passing of the historic *Native Title Act* of 1993 created a situation where government agencies and land developers (particularly mining companies) are obliged to negotiate with local indigenous communities to determine mutually agreeable strategies to manage indigenous cultural heritage sites and places on public (Crown) land (Lilley 2007).

Thus, one of the more important outcomes of federal legislation in Australia and the USA has been an expanded understanding of indigenous cultural heritage sites and places as a dimension of a more holistic approach to landscape and environmental management. Important consequences of these changes for government authorities were that indigenous cultural site protection and management not only required a broadened landscape perspective but also necessitated the employment of indigenous peoples in cultural heritage and environmental management agencies. In short, indigenous cultural sites could no longer simply be seen as geographical isolates and repositories of scientifically important (archaeological) data. Rather, the cultural importance of such sites centered on their capacity to define and help conceptualize the geographical and spiritual word and landscape of living indigenous communities. Thus, archaeological sites reconceptualized as cultural heritage places beseeched the meaningful incorporation of indigenous landscape management values and practices (Swidler et al. 1997; Ucko & Layton 1999).

Current Debates

Reconceptualizing archaeological sites as cultural heritage places represented an important anticolonial step whereby indigenous peoples regained better control of their lives. In a practical sense, this development has provided opportunities for indigenous communities to be considered as stakeholders in cultural site and land management practices. In Australia, the stakeholder model has seen Aboriginal communities become senior advisors and comanagers of numerous national parks and World Heritage areas such as Mungo National Park, Kakadu National Park, and Uluru-Kata Tjuta National Park. In other contexts where indigenous communities own lands and seas, the Australian government has provided support and funding for the establishment of Indigenous Protected Areas whereby protection of cultural and natural places, including archaeological sites, centers on indigenous values managed by indigenous rangers. In the USA, similar examples of comanagement of national parks well known for archaeological sites include Canyon de Chelly National Monument in Arizona. In other cases, parks fall within tribally owned lands and are managed by Native American communities. Examples include Monument Valley Navajo Tribal Park in Arizona and Utah and the Santa Clara Pueblo and the Puye Cliff Dwellings in New Mexico.

Comanagement of World Heritage Areas introduces a number of broader philosophical issues beyond those associated with equitable power-sharing arrangements. For a site or place to be included on the World Heritage list, it must be of "outstanding universal value" and meet at least one out of ten selection criteria. Some indigenous communities believe that the notion of world significance is part of a colonial metanarrative whereby indigenous cultural sites and places are appropriated and ranked into a universal human history of Western construction. Such issues came to a head in Australia in the 1990s when scientific arguments for the world significance of certain Aboriginal cultural remains and artifacts attempted (unsuccessfully) to override local Aboriginal cultural values.

Examples include the repatriation of the Kow Swamp Pleistocene human remains held by the Museum of Victoria to the Yorta Yorta Aboriginal community and the return of rare Pleistocene occupation deposits from southwest Tasmania held by La Trobe University to the Tasmanian Aboriginal community (Smith 2004; McNiven & Russell 2005: Chap 7). Yet in 2011 the Gunditjmara people of western Victoria commenced negotiations with state and federal government agencies to have the Budj Bim cultural heritage landscape which contains complex eel aquaculture structures dating back many thousands of years nominated for World Heritage listing. Clearly, different indigenous communities see different values and opportunities with the World Heritage convention and the notions of world significance. Arguably the critical point of difference in acceptance or nonacceptance is whether the engagement process is proactive or reactive, respectively.

Future Directions

Many indigenous communities see comanagement of lands and cultural sites as simply a step toward the larger goal of cultural heritage autonomy. While the past century has seen indigenous peoples make important anticolonial advances in regaining control and ownership of their cultural heritage sites and places, it is equally true that economic problems and poor resourcing often limit the potential of advances to be realized and put into practice. Lack of economic independence ensures that the degree of control many indigenous communities have over their cultural sites and places is conditional on government funding. Clearly, cultural heritage autonomy for indigenous communities is closely linked to economic independence. The postcolonial challenge for settler-colonial nation states such as the USA and Australia will be accommodating indigenous cultural heritage autonomy and replacing the colonial fantasy of a single national heritage with plural and polyvocal heritages featuring cultural sites, places, and objects that are shared and not shared.

Cross-References

- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage Ethics, Cultural Base of
- ▶ Intangible Cultural Heritage
- ▶ Local Populations and Global Heritage
- ▶ United States: Cultural Heritage Management

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Cultural Heritage Management Quality Control and Assurance

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Introduction

This entry briefly summarizes how quality control (QC) and quality assurance (QA) protocols and procedures came to be implemented in archaeology as a means of managing cultural heritage resources. This entry reviews how laws protecting cultural heritage resources led to the development of commercial archaeology in the 1970s and 1980s. With the advent of commercial archaeology, leading practitioners established best practices standards that were designed to ensure that archaeological sites were investigated and documented by qualified archaeologists. An integral component of best practices in archaeology is the implementation of QC/QA on all aspects of a project.

Definition

QC refers to the process implemented by a company or organization to ensure that standards are in place to ensure production of a quality project or service: This includes providing training for management and staff, providing software programs and equipment that facilitate provision of quality products and services, and establishing a culture of quality service within the organization. QA refers to programs that are established by companies or organizations to conduct systematic monitoring and evaluation of processes that are undertaken to complete a project, or provide a service, to ensure that their standards of quality are being attained.

Key Issues/Current Debates/Future Directions/Examples

Professional archaeologists have always been concerned about the quality of their work and the accuracy of their interpretations of the material remains left by past civilizations. With the advent of commercial archaeology in the 1970s to 1980s, however, archaeological investigations started being undertaken for profit and a new breed of archaeologists was born (Willems & van den Dries 2007a). In some instances, the desire to make a profit outshined the desire to perform quality research and archaeological resources suffered (Willems & van den Dries 2007a). Oddly, commercial archaeology started being practiced in many countries following the establishment of laws that required infrastructure and development projects to consider the potential impact of their project on cultural heritage resources. These same laws, though designed to protect cultural heritage resources, in many instances resulted in a poor level of work being performed because either no professional

standards were required (Willems & van den Dries 2007a, b), or if they were required, they were not enforced (Willems & van den Dries 2007a, b).

Laws to protect archaeology sites from impacts associated with development were first established in the United States, but other countries soon followed suit (Willems & van den Dries 2007a). Although the agencies that established these laws promulgated standards (i.e., 36 CFR Section 61 of the National Historic Preservation Act of 1966, 16; U.S.C. 470 et. seq., as amended; and Council of Europe 1969), it soon became apparent to the archaeology community that there was a need to establish a system of accountability among archaeologists practicing Cultural Resource Management (CRM) (Archaeological Institute of America 1994, as amended; Lyons et al. 1996; Lynott 1997; Adams 1997; European Association of Archaeologists 1998; Willems & van den Dries 2007a, b; Willems 2008).

In many countries, professional archaeologists banded together and created professional organizations that detailed educational and performance standards that must be met by its members (Table 1). Table 1 lists professional archaeology organizations that stipulate a code of ethics, minimum standards of education, training, and work performance to which their members must comply. These member organizations provide a valuable service to CRM by requiring members to apply professional standards in commercial archaeological investigations. In the United States, federal agencies require archaeologists who supervise archaeology work on federal lands, or federally funded projects, to be registered with the Register of Professional Archaeologists (RPA). The RPA reviews the work of registered archaeologists if they are reported as performing work that does not meet the standards of the RPA – in essence providing QC/QA of the work performed by its members. Nonetheless, it is difficult for a professional organization to ensure that its members conduct CRM at a level that meets the standards stipulated by the organization. One means of ensuring that CRM companies are performing work at the standards outlined by professional member organizations is to encourage companies to become accredited in International Standardization Organization (ISO) 90001 QC/QA management systems.

Cultural Heritage Management Quality Control and Assurance, Table 1 Archaeology organizations with professional standards and a code of ethics

Acronym	Organization
ACRA	American Cultural Resources Association
AIA	Archaeological Institute of America
AAA	Australian Archaeological Association
ASAPA	Association for Southern African Professional Archaeologists
CAA	Canadian Archaeological Association
EAA	European Association of Archaeologists
IAFA	Irish Association of Professional Archaeologists
IAI	Institute of Archaeologists of Ireland
ICOMOS	International Council on Monuments and Sites
ICOMOS/ICAHM	ICOMOS/International Scientific Committee on Archaeological Heritage Management (ICAHM)
IFA	Institute for Archaeologists
RPA	Register of Professional Archaeologists
SAA	Society for American Archaeology
SAFA	Society of Africanist Archaeologists

Adopting ISO Standards in Archaeology

The ISO became established during World War II out of a need for ensuring an acceptable level of quality in the mass production of equipment and materials needed for war. Since 1947, the ISO has developed several programs to help organizations establish management systems and operations that help ensure provision of quality services and products. If an organization is ISO certified, it is recognized by other organizations and agencies as providing QC/QA on the work it performs. According to ISO 9001:2000, an organization meets the specific requirements for a quality management system by:

- Demonstrating its ability to consistently provide product that meets customer and applicable regulatory requirements

- Enhancing customer satisfaction through the effective application of the system, including processes for continual improvement of the system through auditing and adjusting the system to eliminate or minimize problem areas
- The assurance of conformity to customer and applicable regulatory requirements

By adopting the ISO 9001 QC/QA management system, an archaeology compliance company would ensure that the work it performed met national and international performance standards (i.e., Valletta Convention 1992). By integrating ISO 90001 QC/QA systems in all phases of an archaeological project, consultants can assure agencies, clients, and the public that the cultural heritage resources they are investigating are managed with the highest standard of care.

Integrated QC/QA in CRM

The information derived from archaeological investigations is largely dependent upon the questions posed during the proposal writing, or scoping phase of a project. Expertise is required to formulate the right questions to determine the scope of work required for a project. Accordingly, a system of QC/QA should be employed during the scoping phase. One or more archaeologists with considerable experience working in the geographic region where a project is proposed should critique the scope of work before it is submitted to a client or agency for consideration. This experience is needed to determine:

- What information should be reviewed (archives, maps, literature) to learn as much about the cultural history and archaeology of the project area as possible before field work is conducted
- The appropriate survey methods to be implemented (e.g., systematic transects versus shovel probes)
- How to document artifacts and features identified on the survey
- Mapping techniques to use
- Whether buried archaeological resources might be present

  If buried archaeological resources are present:
- How to conduct test excavations, trenching, and stripping of the ground surface to expose buried cultural features
- How to sample an archaeological site through excavations to optimize the information that can be derived from these excavations
- The types of analysis that may be required (lithics, ceramics, fauna, flora, etc.)
- How to establish a date for the periods of occupation at the site
- How to reconstruct the environment that existed when the site was occupied
- What stakeholders and community members should be consulted

Another integral part of the scoping phase is determining who should conduct the investigations (from archival research, to specialists such as geomorphologists). Additionally, understanding the project needs facilitates developing an accurate schedule and budget for a project. A good way of assuring your project will stay on time and on budget as well as meet national/international best practices is by having a qualified archaeologist peer-review the proposal – a critical first step in implementing a successful QC/QA management system.

Beyond Project Scoping

Correctly scoping and costing a project can be critical to project success, but several other steps are also required in an integrated QC/QA management system. Whenever feasible, one or more senior qualified archaeologists should provide oversight of all stages of a commercial archaeological project. Independent peer review of the project proposal, work plans, and deliverables by one or more professional archaeologists provides a further step in achieving good QC/QA practices in archaeology.

Other important elements for ensuring quality performance on a project include consultation with stakeholders, including groups or individuals who may have some knowledge of the historical occupation of a site, or have traditional ties to the site or to the landscape, and using a good database, project management software, and cost-tracking software.

Stakeholder Consultation

Inadequate consultation with stakeholders can result in the failure of a project. Stakeholders

often have political and/or social power and can influence whether a project moves forward or is shut down. Correspondingly, establishing policies, protocols, and procedures for conducting stakeholder consultation is important for the success of archaeological investigations. The Warkworth Sands Excavation Project (WSE), undertaken in Australia by Rio Tinto Coal, Scarp Archaeology, and the Upper Hunter Valley Aboriginal Cultural Heritage Working Group (CHWG), provides an excellent example of a good stakeholder consultation program. Rio Tinto Coal has a suite of comprehensive Aboriginal cultural heritage management policies, protocols, and procedures (Godwin 2010). Since 2005, Rio Tinto has been working with the CHWG to obtain their input on archaeological investigations undertaken in the Upper Hunter Valley. The WSE was a large-scale and technically complex project that was successfully planned and implemented in the heart of an operational mine. The excavation of four 25 m^2 test pits up to 3 m in depth was undertaken by hand over an 8-week period. Although Rio Tinto archaeologists supervised the excavations, the CHWG actually performed the excavations, supported by a wide variety of technical specialists (e.g., ground-penetrating radar and geomorphology). By following their stakeholder consultation policies, Rio Tinto successfully completed the project on time and on budget, and helped train Aborigines in archaeological best practices, which has contributed to maintaining a good working relationship with the CHWG (Klar 2008).

Database Programs

Accurately tracking the provenience of cultural horizons and associated artifacts, fauna, and other samples collected during archaeological investigations is important for ensuring reliable interpretation of these data. To help ensure the accurate tracking of this information, it is critical to employ a good relational database and stringent QC/QA on data entry. How to set up a database is beyond the scope of this section. However, it is important to note that a qualified archaeologist should be involved in the database design to ensure the right variables are entered to enable statistical analyses. Data entry should be cross-checked and verified frequently to help minimize key-stroke errors, or miss-entry in specific data fields. Microsoft Access is one of the most common databases used in archaeology.

Improving the capabilities of a database is an iterative process that requires reviewing input variables to determine their adequacy for the types of analyses needed for a project, or for a future project. By continually refining a database, archaeologists can continue to improve their interpretations of the cultural resources being investigated.

Management Software

Microsoft Project, Quitiq, and Attask are scheduling software programs that facilitate tracking project tasks, milestone due dates, and meetings, and help identify whether additional staff is needed for a specific task or additional equipment needs to be purchased (Fig. 1). Utilizing these types of software programs makes it easier for project managers to identify potential problems meeting the project schedule. By identifying scheduling problems early, managers can either juggle tasks to meet the schedule requirements, or inform the client that a due date cannot be met and request an extension. Closely managing a project schedule can help minimize missing important meetings and due dates, and providing clients with an early warning of problems meeting the schedule can enhance consultant-client relationships. This process can also help managers develop more realistic schedules for future projects.

Cost-Tracking Software

Accurately costing a project during the scoping phase is extremely important for completing a project within the approved budget. Equally important is the need to track a project budget during all phases of the work that is being performed. Typically, on any archaeology project, several people can be involved in performing the work. Although each of these individuals may be assigned a certain number of hours to perform a task, individuals may go over

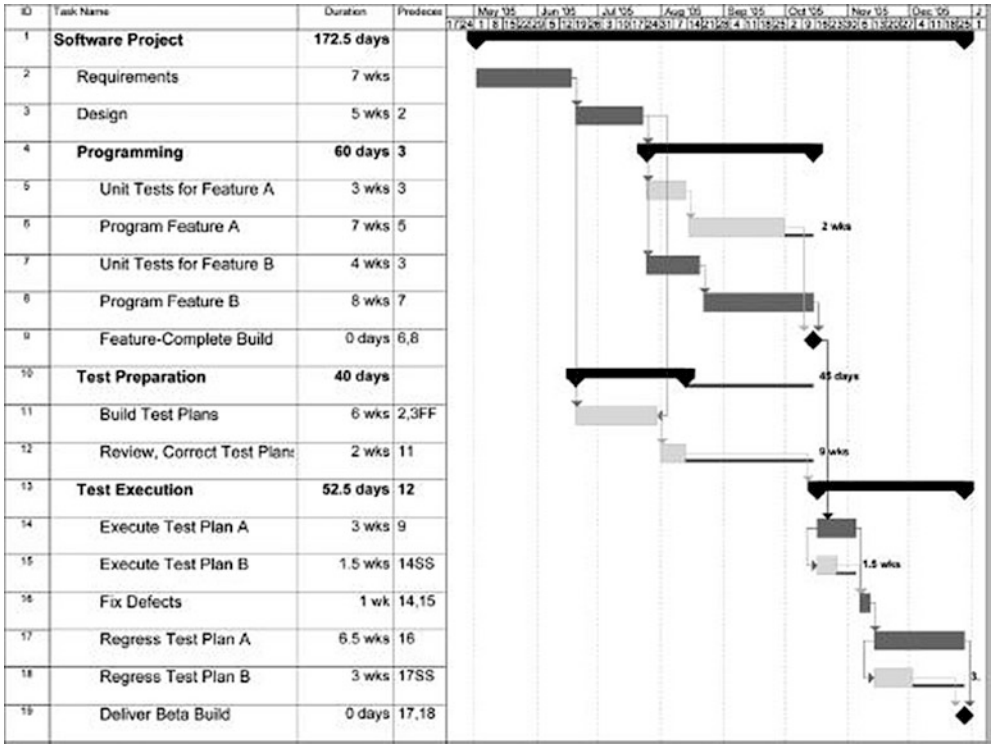

ID	Task Name	Duration	Predecessors
1	**Software Project**	**172.5 days**	
2	Requirements	7 wks	
3	Design	5 wks	2
4	**Programming**	**60 days**	**3**
5	Unit Tests for Feature A	3 wks	3
6	Program Feature A	7 wks	5
7	Unit Tests for Feature B	4 wks	3
8	Program Feature B	8 wks	7
9	Feature-Complete Build	0 days	6,8
10	**Test Preparation**	**40 days**	
11	Build Test Plans	6 wks	2,3FF
12	Review, Correct Test Plans	2 wks	11
13	**Test Execution**	**52.5 days**	**12**
14	Execute Test Plan A	3 wks	9
15	Execute Test Plan B	1.5 wks	14SS
16	Fix Defects	1 wk	14,15
17	Regress Test Plan A	6.5 wks	16
18	Regress Test Plan B	3 wks	17SS
19	Deliver Beta Build	0 days	17,18

Cultural Heritage Management Quality Control and Assurance, Fig. 1 A sample schedule for tracking tasks and resources for a project

their approved hours without informing the project manager.

To circumvent potentially going overbudget as a result of individuals charging too much time to a project, cost-tracking software should be utilized. These programs are utilized for tracking the number of hours each person charges on a weekly basis, and provides an analysis of the percent complete (hours charged relative to the number of hours assigned for a particular task). Weekly analysis of a project budget can help managers determine whether a specific task is nearly overbudget. This provides the manager with an opportunity to determine whether an adjustment needs to be made to the level of effort undertaken to complete a particular task or request additional funding from the client. As with scheduling, providing clients with an early warning of problems can enhance consultant-client relationships. The budget review process can also help managers develop more accurate budgets on future projects.

Cost-tracking software can be proprietary or purchased. Common cost-tracking programs include: Attask, EcoSys – Enterprise, Kronos, and Replicon. In addition to provide a means of tracking hours, these software programs can track project expenses and provide up-to-date summaries of budget status.

Bringing It All Together

An example of how a comprehensive QC/QA management system works in CRM can best be illustrated by a brief summary of the QC/QA management system practiced by Statistical Research Inc. (SRI). SRI is one of the largest heritage management companies in the world and has an outstanding reputation with its clients and agencies for the quality of work it performs. This reputation by and large can be attributed to the company's implementation of an integrated QC/QA management system, from the point of careful hiring and training of staff in SRI procedures, to the submittal of reports to clients and

agencies. Senior archaeologists (Ph.D. plus 15 or more years of experience) provide internal review during all project phases, from scoping and costing a project, to analysis and report writing. Quality control is further facilitated through use of SRI's proprietary database (SRID) and budget-tracking software (NAVISION).

An example of how SRI's integrated QC/QA management system results in high-quality archaeological investigations and project reports is exemplified in the Joint Courts Complex Archaeological Project (JCC Project). The JCC Project was undertaken in Tucson, Arizona, and entailed the excavation of a 4.3-acre parcel located in the downtown area of the city that contained a large historical-period cemetery dating from the 1860s to 1881. Nearly 1,400 individuals were recovered, and these remains and associated burial objects were either repatriated or reburied in a specially designated area in a local cemetery. The project required mitigation of all prehistoric and historical-period cultural resources within the land parcel, including Middle and Late Archaic features, Formative period artifact scatters, and a large late-nineteenth- and twentieth-century urban residential and commercial components. The JCC Project was undertaken by SRI from 2006 to 2010, and required the work of qualified specialists that included historians, historical archaeologists, geoarchaeologists, GIS experts, osteologists, 3-D scanning specialists, and public outreach and public relations consultants. The work performed by these specialists was overseen by a QC/QA team that routinely reviewed all work being performed in the field, as well as analysis and report writing. The QC/QA team also provided support for the extensive stakeholder consultation performed for the project. Consultation was undertaken with various groups who had ties to the site, including claimants for the historical-period human remains that were excavated. All project data and non-burial-associated artifacts and samples were curated at an approved facility in Tucson, Arizona.

SRI used Microsoft Project to track the progress of the project over its 4-year duration, and Navision data allowed detailed analysis of staff time expended by task. SRID was used to track all excavations including individual grave excavations, to provide the client, Pima County, with weekly completion reports and a dynamic map of the project area that reflected progress. SRID links multiple data categories – discovery units, features, proveniences, artifact collections, osteological remains, and on-site storage locations – in a single database that manages data from discovery to final curation. This was essential for QC/QA at JCC, where SRI recovered 37,000 different artifact collections from 30,000 proveniences and 1,900 features. The budget for the project was approximately 15 million USD (included fee for demolition contractors), and the work was completed on time and on budget. The project was reported in 2010 in a four-volume report series (Gray & Swope 2010; Hall et al. 2010; Heilen & Gray 2010). SRI QC/QA procedures were used during all phases of the project, ensuring the work was performed at the highest standard of professionalism and the reports provide an accurate interpretation of this time period in Tucson's history.

Conclusion

Implementing a QC/QA management system in CRM can circumvent multiple types of problems that can otherwise occur, ranging from budget and schedule overruns, to misinterpreting important elements of a cultural heritage resource site. By implementing a management system that replicates ISO 9001, such as the system employed by SRI, or by becoming ISO accredited, CRM companies can better assure that they are recognized as providing a quality service. Further, the general reputation of CRM could be improved among academic archaeologists. More CRM companies would be accepted as professionals making an important contribution to the archaeological literature and to the public understanding of the past.

Cross-References

► Canada: Cultural Heritage Management
► Cultural Heritage and Communities

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Project Management
- ▶ Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK)
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Heritage Research and Visitor Planning
- ▶ Netherlands: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management
- ▶ World Heritage Education, Training, and Capacity Building

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Cultural Heritage Management Technology and Training

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Introduction

Understanding and applying appropriate technologies to the preservation and treatment of cultural heritage has been a hallmark of good resource management since the earliest days of the conservation and preservation movements. It is important to know the traditional technologies or trade practices used to create a site, structure, or object in order to understand the integrity of the resource and the mechanics of its deterioration over time. Understanding modern technologies as they are applied to cultural heritage is critical as well, for it is impossible to make responsible decisions regarding evaluation and treatment until the immediate and long-term effects of the proposed technology are understood and accounted for. Technology is itself a critical component of the scrape/anti-scrape debate which arose early in the modern preservation movement, since some technologies, e.g., nondestructive evaluation techniques, are inherently more suitable to the preservation of the original fabric of the resource than others. The rise of the modern conservation/preservation ethic in the late eighteenth and nineteenth centuries coincided with the rise of the industrial revolution in Europe and then the rest of the world, so that the technologies available to create heritage resources were constantly shifting, as were the techniques available to study and treat them. Even in the field of archaeology, where most of the resources arguably already existed by this time, the growth of technologies to identify, unearth, and treat artifacts continued to shift constantly.

Key Issues/Current Debates

Those with an avid interest in the past have naturally been more interested in traditional technologies than in modern ones, but as the modern preservation movement "grew up" in the twentieth century almost every ministry of culture or other national conservation organization around the globe included a laboratory for the study of historic materials and modern treatment alternatives. The deepening interest in scientific and technical solutions was one driver behind an international meeting of "architects and technicians of historic monuments" held in 1931 in Athens. Their resolutions, which became known as the *Athens Charter*, recommended in part that "architects and curators of monuments should collaborate with specialists in the physical, chemical, and natural sciences with a view to determining the methods to be adopted in specific cases" (Athens Charter 1931). In the wake of two World Wars that devastated resources around the globe, an increasing awareness grew among those that were responsible for cultural heritage management that more needed to be done to share knowledge and expertise, both in the approaches

to and the technology of preservation. In 1956, the Ninth General Conference of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) (see the entry on UNESCO-ICOMOS-ICAHM and Other Relevant Scientific Committees in this encyclopedia) recommended the creation of "an intergovernmental center for the study and improvement of methods of restoration," resulting in the founding of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) in 1959 in Rome (ICCROM 2005). ICCROM included a strong technical bent from its founding, as well as a commitment to training practitioners from around the globe. For more than 50 years, it has brought together, among others, experts in the technologies of preservation and conservation and has helped to build the technical capacities of agencies and organizations worldwide.

As international interest in cultural heritage continued to grow, a congress of architects and historic building specialists (which, like the meeting in Athens three decades earlier, included leading field and academic archaeologists) was held in Venice in 1964. It adopted a number of resolutions, the first of which came to be known as the *Venice Charter*. The *Charter's* second article stated that "[t]he conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of the architectural heritage" (Venice Charter 1964), recognizing the importance of technologies new and old to the preservation of historic resources. The congress also adopted a number of other recommendations, including one put forward by UNESCO that recommended the creation of the International Council on Monuments and Sites (ICOMOS) as a nongovernmental institution within UNESCO, supported by a network of national committees in participating nations (ICOMOS 2011). ICOMOS was founded immediately and headquartered in Paris, and had among its goals the research and dissemination of techniques for preserving buildings and sites, and the training of specialists to undertake such work (ICOMOS Statutes 1978).

The passage of the Venice Charter and the call for the creation of ICOMOS inspired additional attention to preservation around the world and with it an emphasis on understanding and applying appropriate technologies to preservation problems. In the USA, James Marston Fitch established the first masters level program in historic preservation at Columbia University in 1964, with an emphasis on materials analysis and traditional technologies that was shared by only a few of the collegiate programs that blossomed in the USA in the ensuing years. The passage of the National Historic Preservation Act in the USA in 1966 (NHPA as amended 1966) established a broad federal preservation program and created overnight a market for contract archaeology to clear federally funded projects for development. The demand for additional tools to quickly identify the presence of archeological resources stimulated research into the application and efficacy of various prospection or remote sensing techniques and the search for new technologies for nondestructive evaluation of archeological sites.

The perceived need for a better understanding of the technologies involved in preservation practice in North America led to the establishment of the Association for Preservation Technology International (APT) in Canada in 1968 (APT 2012). APT began and operated for many years as a joint US/Canadian professional organization dedicated to the cross-disciplinary exploration of the technologies involved in preserving cultural heritage. In recent years, APT has added chapters in several other countries and has become more truly international in scope. While APT tended to focus on the built environment, conservators in the USA who dealt primarily with museum collections and other cultural objects founded the American Institute for Conservation of Historic and Artistic Works (AIC) in 1972 (AIC 2012). Over the last 40 years, AIC has established specialty groups (10 in all) dedicated to topics from architecture to painting to wooden artifacts. Annual meetings of both APT and AIC have become internationally recognized sources for the latest research on cultural heritage technology and training and frequently attract papers and

sessions from experts around the world. Other significant organizations devoted to objects and collection conservation were also created at this time, including the Smithsonian's Conservation Research Laboratory (now the Museum Conservation Institute) in 1963 (MCI n.d.) and the Canadian Conservation Institute in 1972 (CCI 2011).

UNESCO stepped back onto the world stage of cultural heritage technology and training with the establishment of the World Heritage Convention in 1972. While the primary thrust of the convention was to encourage signatory states to identify and protect their own heritage resources and to recognize the value to all humanity of the premier resources in other countries, it also addressed technology and training needs. Article 5.3 of the convention encourages the State parties "to develop scientific and technical studies and research and to work out such operating methods as will make the State capable of counteracting the dangers that threaten its cultural or natural heritage," while Article 5.5 suggests that they "...foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field" (UNESCO 1972). Many countries responded by incorporating an emphasis on scientific and technical research and training into their national heritage agencies. In the USA, the National Park Service (USNPS) created a Technical Preservation Services unit within its Office of Archaeology & Historic Preservation about this time, headed first by W. Brown Morton (author of the Secretary of the Interior's Standards for Rehabilitation) and shortly thereafter by Lee H. Nelson, who had overseen the restoration of Independence Hall in Philadelphia. TPS became the US government's loci of technical expertise in preservation and led the establishment of preservation standards for many types of heritage resources.

Over the next decade, the number of US universities offering graduate and undergraduate degrees in historic preservation ballooned, leading to the creation in 1985 of the National Council for Preservation Education. NCPE, as it became known, established the first national standards for preservation programs in the USA and specifically required that programs instruct students on the technological issues affecting historic building materials and systems (NCPE n.d.). That same year, the Getty Conservation Institute (GCI) was founded in Los Angeles, bringing together the financial resources of the Getty Trust and technical experts assembled from around the globe. GCI in the ensuing years has researched new and traditional technologies and supervised the restoration and documentation of world-renowned heritage resources in countries throughout the world. GCI, like APT and AIC, publishes original research on technical issues and produces training materials for heritage resource managers (GCI 2009).

By 1986, the burgeoning interest in the technologies of heritage management and the perceived need for specialized training found its way into the halls of the US congress. Congress had requested that its Office of Technology Assessment (OTA), which advised the relevant committees on science and technology issues in many areas (including space and nuclear policy), examine the US historic preservation program and make recommendations for improving the management of heritage resources in the USA. OTA responded by holding a series of expert panels around the country focused on different disciplines within the field (e.g., archaeology, historic landscapes, historic structures, etc.). Its conclusions and recommendations were presented to congress in a 1986 report, *Technologies for Prehistoric and Historic Preservation*. Though the report made a number of suggestions for improving the federal preservation estate, one was of special interest to NPS: that congress establish a research and training center specifically devoted to the transfer of technology from other fields into heritage management. It further recommended that the new center be established within the Department of the Interior (parent agency of NPS) or as an independent entity managed by a consortium of universities (OTA 1986). Although the OTA report languished for several years after submittal to congress, NPS actively studied possible locations for it within NPS and eventually found a sponsor in J. Bennett Johnston,

the senior senator from Louisiana. Johnston had a strong interest in preservation and proposed amendments to the National Historic Preservation Act that essentially created a hybrid of the two recommendations – a center that was part of the NPS but located at a University in Johnston's home district. With the passage of this legislation in 1992 (NHPA as amended 1966), the National Center for Preservation Technology and Training (NCPTT) was established in the USA on the campus of Northwestern State University in Natchitoches, LA, as a program of the National Park Service. Since that time, it has awarded over US $8 million in grants and funded research and training in most of the disciplines within heritage management.

While NCPTT remains somewhat singular in its dedication to technology and training in the heritage management field, government-sponsored and private cultural institutions around the globe have strengthened their expertise and commitment to technology issues in heritage management by establishing research laboratories and supporting research. English Heritage, Historic Scotland, and national agencies in France and Germany have joined multiple organizations in Italy (including ICCROM, which is still active in Rome) to strengthen understanding of heritage management technologies in Europe. Public and private groups in Australia, China, and India have also taken an interest, and organizations such as the World Monuments Fund, while not themselves focused on technology, have helped to bring technology experts to cultural crisis spots all over the world.

Future Directions

At the dawn of the twenty-first century, technology in the service of cultural heritage management is a blossoming field, and training programs that help to transfer technology to heritage managers are springing up everywhere. While traditional technologies, such as lime mortars and washes, lead and calcimine paint systems, and prehistoric ceramics continue to garner research interest and produce useful results, it is the technologies transferred from science, engineering, and medicine that are changing the face of cultural heritage management. Nondestructive evaluation techniques have been keenly sought for many years, since any excavation technique has the potential to damage the resourced. Many modern tools are available now to specialists and are increasingly becoming available to generalists. In archaeology, geophysical prospection technologies help locate subsurface cultural features. Magnetometry uses magnetic fields to detect changes in soil composition caused by human occupation; electrical resistivity and conductivity can detect changes in soil type and strata; ground penetrating radar (GPR) detects the echo of radio waves bouncing off buried features; and gradiometry uses a pair of magnetometers to measure minute differences in local magnetic fields and the earth's gravity. These instruments are becoming increasingly sophisticated in sensitivity and simpler in application, so that they are more and more available to practicing archeologists. Laboratory techniques such as X-ray fluorescence (XRF) and reflectance transform imaging (RTI) are now portable enough to take into the field, where they can help identify the elemental composition of metals and ceramics or discern images that are not visible to the naked eye. Infrared thermal cameras are used, particularly from the air, to detect the presence of buried wall foundations and other features that store and release heat at a different rate than the surrounding soil.

Historic buildings and structures also benefit from a variety of nondestructive inspection techniques. Some of the technologies are simple, like fiber optic boroscopes that can peek inside wall cavities or moisture meters to check the water content of building materials. Some are borrowed from the archaeology toolbox; GPR, for example, is now used to find voids inside masonry walls or hidden changes in construction materials. Infrared thermography uses thermal cameras to pinpoint heat losses during energy audits of historic buildings or to identify moisture hidden inside walls

because liquid water has a different thermal signature than surrounding dry materials. Resistance drilling can spot deterioration inside wood structural members by charting the change in resistance as a drill bit passes through softer, rotted wood. Radioactive sources and film have been used for many years to create X-ray images of hidden structural members and fasteners. More recently, digital radioscopy has been used to achieve the same ends by using electrically-induced X-rays and an image capture system to produce data in real time.

Materials conservators use many of these same technologies to look through object layers or capture views of hidden surfaces. Laboratory or portable XRF (pXRF) is used to identify the composition of substrates and surface deposits. Additional tools include Fourier transform infrared spectroscopy (FTIR) and Raman spectroscopy, which use infrared and laser light, respectively, to excite molecules and capture the elemental signatures that can help to identify unknown materials. Eddy current testing, borrowed from heavy industry, can be used to measure the microns-thin gilding of an antique bronze or to recover the lost hallmark on a well-polished teapot. Acoustic resonance technologies use sound to characterize materials; acoustic resonance microscopy, for example, can also be used to recover lost hallmarks.

Every technology used in other industries to characterize materials or look beneath the surface has the potential to be applied to the management of heritage resources. Cultural scientists continually search for new applications for old technologies and for new technologies to transfer from other areas of science, medicine, and industry. In the USA, NCPTT, APT, AIC, and other professional organizations continue to research and train heritage professionals in the application of these technologies. Worldwide, ICOMOS encourages collaborative research and information sharing across international boundaries through its expert committee system, and national ICOMOS organizations (such as USICOMOS) promote the sharing of data and exchanges between countries. In a world where technological innovation drives the economy and continually shapes culture, cultural heritage management will always be engaged in understanding new technologies and how they can best be used to preserve heritage.

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► International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

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Cultural Heritage Management: Building Bridges

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Introduction

It is summer solstice 2009 at Yupqöyvi, the Hopi name for Chaco Culture National Historic Park in New Mexico, U.S.A. Just before the sun rises at around 5:30 AM, a group of Hopi youth and elders are already up and running to greet the sun so that the sun will not be burdened to carry them throughout the day. The group is visiting Yupqöyvi to learn from the traditions of their ancestors, the Hisatsinom, who left their *footprints* or archaeological sites to teach all Hopi generations the way to live. The trip is part of the *Footprints of the Ancestors* program, an intergenerational cultural preservation project designed to connect Hopi youth with their past. The elders teach the youth their language, values, and traditions. Archaeologists teach them how land use patterns change over time, specific types of artifacts that are associated with particular ancestral places, and regional cultural timelines. This program was developed collaboratively between the Hopi Tribe's Cultural Preservation Office and Northern Arizona University's Anthropology Department in response to a growing crisis of language and culture loss among Hopi youth. The *Footprints of the Ancestors* program is an example of building a bridge between indigenous communities and archaeologists to create cultural heritage education programs that allows youth to interact with elders, educators, archaeologists, and other professionals in meaningful ways in order to better understand and integrate their cultural heritage with their modern-day lives and future selves.

The initial idea for the *Footprints of the Ancestors* program was to teach archaeology, a scientific discipline, to Hopi youth. It was soon clear in collaborative community conversations that this one-way bridge would not work. A shared vision, respect, and understanding for the past from both Hopi cultural perspectives and scientific processes were needed. This goal of building true multiple-pathway bridges with communities for a common purpose is shared by many cultural heritage managers and educators.

Definition

Literally, a bridge is a structure that spans across some obstacle allowing for easier access and transport. In communication, a bridge often means the creation of shared understanding between individuals. For cultural heritage managers and educators, building bridges refers to the establishment of intentional structures (i.e., management policies, program designs, or advisory groups) and processes (i.e., collaborative meetings where dialogue occurs) between researchers, other professionals, and communities that allow for an exchange of ideas, cultural understanding, resources, and respect. In this way, archaeologists can learn about specific cultural heritage values and issues important to community groups and communities can learn how archaeologists study the past and how their research complements (or not) community heritage values.

Some fundamental principles for building bridges are that they must be:

- Collaborative among all parties involved
- Respectful of community heritage values
- Reflective of quality research and best professional practices
- Comprehensive, integrative, and flexible

Because the "past" is a concept constructed by individuals who make meaning from objects and events, it is important to recognize that reconstructing the past is an academic, social, and cultural endeavor. For some, the past is meticulously and empirically analyzed and interpreted. For others, the past is intrinsically linked to both the present and the future. It cannot

be separated and considered distinctly. Groups of people often place personal/emotional, scientific, economic, and cultural values on heritage places and the objects and stories related to them. Paying attention to community values, concerns, and needs has been part of public archaeology and education efforts for decades. However, when initiating or designing collaborative archaeology projects, it is critical to determine: How is heritage defined?; Whose heritage is being studied?; How is heritage being studied?; How is heritage being presented?; Who makes heritage decisions in various contexts (community level, academia, schools, museums, etc.)?; Are all heritage values included?

Examples

In the United States, the journey for building bridges in the context of education came from the Society for American Archaeology Public Education Committee (SAA/PEC). In 1995, SAA/PEC established a Native American Education Task Group whose charge was to build collaborative relationships with American Indian communities through educator workshops. The intent was to "build bridges" between archaeology (and archaeologists) and American Indians through classroom education. In order to do this, the group needed to demonstrate to indigenous educators how they could use archaeology education materials to develop and enhance their school curricula. The Task Group held workshops, professional development planning sessions, and retreats over the course of 7 years to help achieve their goal. The work of the SAA/PEC met with initial success. Teacher participants in the workshops discovered professional archaeologists were approaching their work with new attitudes that included not only studying archaeology using scientific methods, but also including interpretations from descendants' cultural stories and beliefs. After several years of conducting workshops, the SAA/PEC reassessed the strategy and concluded that the workshops were effective up to a certain point. Because of the national audience, the content tended to be focus on the locale where the workshop was held. Teachers were asking for materials and instruction that were tied to their own specific, local contexts. The group concluded that local context, cultural relevance, language, and community were integral to the success of any indigenous heritage education effort. The group changed focus to building two-way educational bridges with specific indigenous communities to better address local cultural issues and needs. The Hopi Footprints project is one example of this effort.

Another example is the revision of the curriculum materials and professional development used in the initial Native American Education Task Group workshops. The workshop materials were a set of archaeology lessons designed for students aged 9–13 from the Bureau of Land Management, Project Archaeology program. These materials, *Intrigue of the Past: Investigating Archaeology* (Smith et al. 1996), included American Indian perspectives in teaching archaeology. Although these materials are still widely used and effective, the Project Archaeology program decided to build new inquiry-based curricular materials. In the process, Project Archaeology staff invited American Indian educators help draft and review and new lessons. The American Indian educators suggested that a descendant be included in the curriculum to introduce his or her own culture and to provide an oral history and contemporary cultural significance. This direct inclusion of native voices in educational materials represents a significant leap from using ethnographic resources written by nonnative scholars to using primary sources to present American Indian heritage values. In the new curriculum, *Project Archaeology: Investigating Shelter*, the combination of oral histories and accurate archaeological data allows students to draw their own conclusions about the meaning of the archaeological record, the heritage values it represents, and its significance in contemporary life.

In both examples, community partners share in the dialogue and are equal givers of knowledge in these cultural knowledge exchanges. This shift in the paradigm of how archaeology

professionals and indigenous community members work together to build bridges provides opportunities for learning and teaching culturally relevant, scientifically accurate heritage histories.

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- ▶ Community Engagement in Archaeology
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Cultural Heritage Management: Business Aspects

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Introduction

Cultural heritage can be understood within a business context, in terms of an industrial sector comprising organizations working to supply products or services associated with the understanding, protection, and promotion of objects, sites, monuments, and other forms of tangible and intangible cultural heritage. The business side of cultural heritage management can also be articulated within a service and experience economy as well as a policy context through activities such as tourism, where value may be understood in terms of market share, or as a sector which can have sets of values assigned to it.

Definition

Cultural heritage is recognized in many forms as having value, and the accordingly immediately implies a proposition of a particular type of value. Work in the first decade of the twenty-first century built on earlier work of David Throsby in cultural economics (updated in Throsby 2010),

and a UK-based articulation of a threefold set of values in heritage, namely: intrinsic, instrumental and institutional, was seminal (Clark 2006). Cultural heritage therefore can be seen to have a set of intangible and tangible qualities that can be inherently appreciated; heritage can also do something within society; and heritage is articulated, marshaled, and treated in particular ways by organizations. This theoretical typology of value proposition allows for the objectification of something which we consider as heritage, and placing of it within a matrix of relationships and external pressures on it. Cultural heritage as object thus can only assert a value through identification of its proposition, and as such, it can be considered in its physicality as object, place, or commodity; historical reference point or evidence; or social identifier. The value proposition reinforces what the heritage is, how it should be perceived, and how forces can either act on it, or bestow the ability of actor for it. Any particular value proposition for heritage is laden with facets and symbolic meaning, and these may be both co- and multi-variant simultaneously through agency action. The very process of articulation of value is reliant on a set of management processes which categorize, compare, value, and position the heritage against a product or environmental set of circumstances. The business side of heritage management is therefore already implicit in any consideration of it, but may be considered in its explicit form also. A cultural heritage site can, for example, therefore be both sacred and commercial at the same time – a cathedral is a good example of this. The site may be operated commercially for tourists and as a center for religious practice and spirituality at the same time and by the same managing agency, using different functional and operative teams. The work of Dallen Timothy here, considering heritage tourism, is of particular importance (Timothy & Boyd 2002; Timothy 2011).

In following this argument therefore, the variance of action surrounding cultural heritage, the articulation of proposition for cultural heritage, and the functional operation of cultural heritage within different circumstances, means that the notion of agency itself must be considered. Agency can be most usefully understood in the context of thinking about cultural heritage management as business – whereby the business of managing cultural heritage creates value through a proposition which may have a monetary or nonmonetary facet for both input and output. The context for the value proposition influences the type and level of investment required and return on investment in managing cultural heritage in a particular way. Cultural heritage may have money invested in it, but the return on that investment may be aesthetic improvement and welfare or higher educational attainment, rather than a quantifiable financial outturn – recent thinking by organizations, such as the New Economics Foundation and Demos (UK-based think tanks), ally this to a "Social Return on Investment" (SROI), and there are a number of techniques for analysis of this. Equally, an investment of volunteer time at a cultural heritage site may allow it to operate as a visitor attraction, and produce a direct financial return on a nonfinancial investment. Consideration of cultural heritage agency has both benefits and disbenefits, and it is important therefore to distinguish between an understanding of heritage as a business and the business of managing heritage. Cultural heritage as a business means that the organizational form that forms the agent needs to be identified: Often for cultural heritage these are charitable organizations such as a National Trust or heritage/preservation foundation, or public/tax-payer-funded organizations such as Governmental cultural ministries and conservancies, national parks, and heritage services. There are also a group of commercial cultural heritage organizations, which may be private or share-holder governed enterprises, instrumentally using heritage as a positive economic generator in the service sector – often there are covariant commercial interests at play here forcing an interdependence between the preservation of the cultural heritage and that intrinsic value acting as a possible return on investment – and property investment companies are a good example of these where maintenance of a historic building through renovation can make it an attractive office rental proposition.

Key Issues/Current Debates/Future Directions/Examples

Cultural heritage as business requires the organizational structure such as those defined above to operate or act in a particular way, and in a particular business environment. The way of acting, and the environment in which agency occurs influence a cultural heritage organization's products, services, and by consequence benefits and customers as stakeholders in that benefit. The requirements of the cultural heritage sector produce a business environment large enough to sustain a wide variety of heritage "businesses" operating at a range of scales (economic and geographic). The business of managing cultural heritage should be understood through analysis of business and management operations – i.e., the actions and processes which contribute to the creation of the value proposition. Traditional management tools can be deployed to do this, such as environmental analysis using PESTEL technique (identifying political, economic, social, technological, environmental, and legal environments in which an organization is operating), strategic planning, and SWOT (strengths, weaknesses, opportunities, and threats) analysis of organizational capabilities. General strategic management texts, such as that by Johnson, Whittington, and Scholes (2010), introduce the major concepts which can be readily identified as contributing to the business of managing cultural heritage. Detailed aspects of management draw on the established field of operations management, the most developed form of which is seen in the applied management of heritage visitor attractions and the work of Swarbrooke (2001). Subject-specific academic studies of management and operations have been limited in number however, which is surprising given the organizational structures and capabilities for cultural heritage management agencies are so important, and for many organizations is a large and expensive operation in its own right. Most studies of this have been undertaken internally within the central administration of the organizations, to support the corporate and business planning function, and large organizations in the USA, such as the US National Parks Service, and the United Kingdom's National Trust (charity) and governmental heritage agencies have developed sophisticated internal mechanisms for setting strategic goals, deploying and generating resources. Many cultural heritage organizations throughout the world suffer from a management deficit however, and effective strategic planning and understanding of the role of management is underdeveloped. This is in part due to the inevitable tension between the perception of what management is and what effective management is trying to do, and against a global economic downturn, it remains unfortunate that the academic community has yet to engage fully with the intricacies of business operations in cultural heritage in as a sophisticated way as has happened with arts or museum organizations, where particular business functions (such as marketing) have an established stream of literature apart from the internal policy documentation. Good examples of these are seen in the works of Rentschler and Hede (2007) and Lord and Lord (2009). Where texts have been produced on heritage, (such as Waterton 2010, or Harrison 2012) they have tended to focus attention on policy issues associated with the application of management at sites, and may be considered as policy development critique and subject theoretical underpinning rather than a proper engagement with the business of heritage.

Where effective processes which an organization uses within the business planning function provide feedback, in turn they help form the future shape of the organization and its internal (and external) dynamic in order to produce effective "product" (conservation of the cultural heritage resource), develop a consumer or customer base (be it visitors or supporters of cultural heritage protection), and sustainability of both the resource and the managing agency responsible for it. This level of sophistication in business planning paves the way for organizations to engage in scenario planning or "futures" thinking, which is an important capability for dealing

with "product" (i.e., cultural heritage resources) which are being preserved and potentially managed for an indeterminate period of time into the future. Scenario-based thinking is at an early stage of development within the cultural heritage sector generally, although development is being seen in Australia, Scandinavia, and the United Kingdom, where long-range planning within organizations is helping to determine new organizational forms and ways of thinking about internal organizational business structure and how it can support the wider mission to conserve the cultural heritage resource. The United Kingdom's largest conservation charity, the National Trust, for example, undertook a large-scale restructure between 2009 and 2011 to create internal business planning and consultancy units, aimed at driving efficiency within a large and complex structure. The creation of internal specialized consultancy capability provides individual conservation actions to be treated as projects where a cost-benefit analysis can be undertaken. The required resources feeding through to quantifiable outputs and benefits of a project can be tracked transparently, where the functional management process is clearly mapped. A caveat for such a "back-office" process and concentration on management technique is that it is often not well communicated or understood outside the organization, and can lead to negative perception about the business oriented culture of the organization. Such perception may be reinforced due to the lack of wider appreciation of the role of the process of management within the realm of cultural heritage management, and efforts must be made to promote the understanding of the business function of heritage internally and externally to a cultural heritage organization and how it positively contributes to that conservation effort.

It is worth noting that in an international business context, the management of cultural heritage resonates with current business preoccupations associated with social development and cultural capital development, issues of corporate social responsibility, and environmental sustainability. These large-scale themes are in many respects at the heart of good cultural heritage management, and therefore, the interplay of the business of cultural heritage is likely to be of growing interest in the coming years, beyond the focus to date on the basic enterprise of cultural heritage management, tending to focus on the enterprise of heritage tourism.

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- ▶ Heritage Tourism and the Marketplace
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Cultural Heritage Management: Cost and Benefit of Change

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Introduction

Cultural heritage management (CHM) has changed a great deal since it first became a recognized field of practice. Some changes have been restrictive and regulatory, while others have been democratic and emancipatory. In either case, change – and reflection on the causes and consequences of change – is critical for improving practice and generating better ways of engaging with the power relations and legacies of colonialism that still pervade many heritage management schemes. This entry looks at areas where significant change has taken place and some of the costs and benefits associated with those changes.

Key Issues/Current Debates/Future Directions/Examples

The Rise of CHM as a Profession

The rise of CHM as a distinct, vital field of archaeological practice in so many parts of the world is undoubtedly one of the most significant changes in archaeology over the last century. Nation-states have long been aware of the salience of connections between heritage sites and cultural identity. The initial mandate of the nascent field of cultural heritage management was managing, maintaining, and preserving sites of "significance" to the nation-state. During the second half of the nineteenth century, in many places, the role of a cultural heritage manager also came to focus on salvage and mitigation of damage to sites that were targeted for development or otherwise endangered, whether by roads, dams, airstrips, looting, or urbanization. As cultural heritage managers turned toward safeguarding sites from development and looting, they faced practical and ethical quandaries raised by considering the costs and benefits of preservation versus development.

A Conservation Ethic

In many places, the idea of a "conservation ethic" became a hallmark of CHM (Lipe 1974). Site preservation was the primary goal, with the destructive processes of excavation reserved for sites that are endangered. Benefits of such an approach have included recognition of the importance of in situ preservation and a more holistic, less object-centered perspective on sites and landscapes. On the other hand, conservation approaches offer less opportunity for hands-on training in excavation methods and techniques and generate less archaeological data.

Standardization

Another change accompanying the rise of CHM has been the passage of legislation and the promulgation of government regulations mandating specific standards and practices, at least for projects where government agencies or funds were involved. With this change, archaeology found itself entrenched within government agencies, where it became codified and bureaucratized, subject to government oversight and decisions about what was significant or worth preserving. Once heritage management procedures became standardized, making a change of any kind was more difficult to accomplish. Much of this legislation did bring heritage management into the development planning process, albeit in a very limited way, and it also showed growing recognition of the importance of preserving culturally significant sites. As a result, a significant

percentage of archaeological work shifted from being research driven to regulation driven. Changes in government-level funding have also greatly influenced priorities and how things get done.

The Business of CHM

The rise of heritage management as a business, often called "contract archaeology," has been one of the most far-reaching changes in the field of CHM. In many places, both private and public sector firms act as contractors and service providers for government-mandated heritage work. An obvious benefit is that today the majority of aspiring archaeologists find employment (and training) in contract archaeology or a related field. One of the resulting costs has been a split between research-oriented archaeology, based in the academy, and contract archaeology, based in government or the private sector. Until recently, the results of work done in the context of contract archaeology tended to remain in the gray literature, difficult to access and so without much influence on research and theory. This has gradually been changing, both because of increased recognition of contract archaeology's contributions to research and the increase in peer-reviewed journals and other publications that embrace topics in heritage management and applied archaeology.

Professionalization

Another important change, motivated in part by the steady growth of the field of CHM, relates to professionalization of the discipline. The establishment of professional archaeological organizations (such as the Register of Professional Archaeologists in the USA), the adoption of standards and codes of conduct and training, and the development of certification programs are all aspects of professionalization that help assure employers. Professionalization has created a cadre of practitioners with many shared principles, challenges, and experiences. On the other hand, professionalization comes at the cost of drawing boundaries that exclude those who don't have the proper credentials, whether amateur archaeologists or traditional culture bearers. Codes of conduct tend to reinforce these boundaries at the risk of becoming rigid unchanging rules rather than principles to aspire to or guidelines for more inclusive practice. While professionalization adds value to the role and position of practicing heritage managers, it can also distance them from the people they serve.

Increased specialization is yet another area of change within archaeology that has incurred both costs and benefits. Specialized knowledge brings added depth of knowledge and skills to a particular problem, but among the costs is the need for a larger, more interdisciplinary team to make sure that particular skill sets and knowledge areas are covered.

Anticommercialization

One outgrowth of professionalization has been a move to denounce the commercialization of objects and the excavation of sites for the purpose of locating objects to exploit their commercial value. In general, the field of CHM has championed the ethic of anticommercialization as a step toward preventing site destruction and preserving the value of sites and the stories they tell for a state and its many publics. No longer are excavations sponsored by wealthy patrons who have first pick of objects for their personal collections. No longer are antiquities dealers welcome to sell their wares to museum curators. Many museums today are skeptical of acquiring archaeological objects that were purchased on the market. While CHM has taken a clear stance against looting, many ethical contradictions still exist when it comes to entanglements with commercialization. Consider the growing involvement that cultural heritage managers have with for-profit tourism or the role they play in evaluating site significance so that for-profit development or resource extraction can go ahead.

Archaeology for the Public

With the development of CHM as a distinct field has come a heightened sense of accountability among practitioners – a sense of responsibility that stretches beyond simply being a good scholar, scientist, or steward of the

archaeological record. Archaeology was no longer just about dead people and what they left behind. Public outreach became an obligatory aspect of ethical archaeological practice. This spawned a branch of archaeology often known as "public archaeology," which is essentially synonymous with public sector CHM. This change brought a mandate to educate and involve the public, which meant having to negotiate among multiple values, agendas, and perspectives. There were many publics and stakeholders, each with different (and potentially conflicting) ways of valuing of the past (McManamon 1991).

These public outreach programs typically were established as part of state and federal programs, whose objectives are to educate the public about the value of site preservation.Heritage managers were initially trained to see themselves as having the authority to serve as stewards of a nation's heritage in the name of the public trust. Cultural heritage managers also reached out to groups and individuals with connections to sites and objects, sometimes in the course of gathering information about the history of a site for a report or exhibition. Many received training in ethnography or oral history as ways to obtain more holistic and informed understandings of sites and their meanings from multiple perspectives.

Greater democratization has been another important benefit of the focus on public archaeology. On the other hand, consultation and outreach are time-consuming and unpredictable. In some contexts, these changes have resulted in increased restrictions on access to information or objects once considered public. For example, some Aboriginal groups prohibit certain objects held by museums from public view or require permission for researchers to work with particular collections or cultural materials.

Curation

The field of CHM has also encountered changing attitudes about curation and collections management over the past generation. Once the lack of adequate storage for collections reached crisis proportions, this forced a reevaluation of curation standards and guidelines and encouraged new perspectives on accessions and deaccessions. This has meant making some hard choices about what to keep – choices that could even prove wrong in hindsight. It's now common practice to perceive curation as beginning in the field, with decisions about what to collect and what to discard. (In the United States, current regulations do not allow federally funded repositories to deaccession archaeological materials. This legislation needs changing, but the process is difficult and painfully slow.) One positive outcome of the curation crisis is that heritage managers, collections curators, and source communities are beginning to work together. Culturally sensitive and appropriate curation practices have added a new dimension of understanding to collections and the meanings of objects. The new relationships that are built in these contexts reflect the changing role of museums and archives, from colonialist institutions to places of access that serve as keeping places for the treasures of particular groups. The curation crisis has also caused people to reflect on the ethics of digging things up and keeping them – for whom? For what?

New Contexts for CHM

Other major changes for the field of CHM have come from the expanding roles that archaeology and heritage management now have in the contexts of urban renewal, community revitalization, or Indigenous rights. Cultural heritage management now plays a major role in community development and revitalization, a change that parallels increasing interest in historic preservation in both public and private sectors. Some of this has been in conjunction with the adaptive reuse of historic sites – lighthouses, warehouses, former government installations – by nonprofit or for-profit public and private enterprises. Nearly 50 % of all building renovation or construction in European cities today is related to heritage preservation (Cassar 2006: 1). As Cassar (2006) notes, the renovation of historic city centers offers benefits of numerous kinds – from better transportation and less pollution to social revitalization of communities and neighborhoods, increased wellness, conviviality, and a sense of

common identity and aspiration. Costs include the consequences of revitalization for already marginalized groups, such as homeless individuals or low-income families, who tend to become displaced as a result of urban development.

Cultural heritage management also plays an important role in tribal and Aboriginal self-governance, where strong connections are recognized between heritage management and sovereignty (see Welch et al. 2006). Many groups have their own heritage management programs that deal with issues of land claims, resource rights, comanagement agreements with state agencies, research permissions, repatriation, youth education, development decisions, and a host of other things.

Working with Development Agencies

Those who work in cultural heritage management today may also find themselves working with projects led by multilateral development banks or transnational corporations (TNCs). Rio Tinto, the World Bank, UNESCO, and other transnational entities have come to recognize the importance of "culture" to the success of their plans and operations (see Bradshaw et al. 2011) and so have taken a strong interest in the "economics of culture" (see World Bank 2000; Throsby 2001), particularly how cultural factors affect their costs and benefits. Connections between the sustainability and appropriateness of development with cultural heritage have been demonstrated over and over and now are generally accepted. Development agencies are interested in identifying changes in value that result from a proposed project, and it turns out that many of these changes are tied to culture, not simply economics. Many development agencies and TNCs have turned to CHM to help them assess local values or develop strategies for interfacing with local communities that are at risk or otherwise affected by their projects, often as a way to mitigate negative social and cultural effects. In Canada, Australia, South America, and elsewhere, cultural heritage managers are being hired by mining interests and other for-profit resource development companies to map areas of traditional resource use, train development workers in community relations, and more. While collaborations with major development firms may help mitigate some forms of cultural and environmental harm, the costs can also be great and difficult to predict. Some of the conflicts that arise are in part because developers neglect to integrate heritage management into the early stages of the planning process. Often local communities end up having little or no share in substantive decisions or profits. The large power imbalances and the nature of what is at stake for substantial numbers of people necessitate that the costs and benefits of these kinds of collaborations be carefully considered and negotiated. Cultural heritage managers may find themselves in situations that demand a full review of ethical implications and potential consequences. In any case, working with development initiatives at all different scales (from local to transnational) is likely to be an increasingly important aspect of cultural heritage management in the years ahead.

Cost-Benefit Analysis

Cultural heritage managers today often use value-based approaches to evaluate the significance of sites and inform management decisions (see de la Torre 2002). Although some have advocated using a modified version of cost-benefit analysis to inform CHM decisions, there are many problems with such an approach. Many of the cultural costs of development are difficult to identify and even more difficult to quantify, and they often have unintended and unforeseen consequences. Moreover, these decisions typically involve someone else's heritage and may reflect values or potentials that are not obvious or straightforward, especially to cultural outsiders. Cost-benefit analysis has also been criticized as a discourse that tends to distance management decisions from actual people and their concerns and instead objectify and predict based on "the public good." The general conclusion is that cost-benefit analysis is not a useful tool at the scale that most CHM decisions are made, since local governments or small businesses are usually the ones involved. Some are exploring ways to make CBA more culturally appropriate and relevant, given that it

could present ideas and information in terms that developers and others understand.

War and Civil Unrest

The field of CHM has also been affected by the increased recognition of the role that cultural heritage sites and objects play during times of war and civil unrest. The costs are great in that the most meaningful cultural sites are those at greatest risk of becoming targets because of their high symbolic value (see the entry on ▶ Somaliland: Cultural Heritage Management in this encyclopedia). In times of war and civil unrest, looting, site destruction, and smuggling escalate. People who have lost their livelihoods are tempted to turn to commercial exploitation of portable antiquities. The global antiquities market feeds on this instability. Military occupation of sites is another form of physical and symbolic violence.

It's likely that the cultural value of sites will continue to have great salience in times of struggle and in global identity politics. Many countries recognize cultural heritage as a potent aspect of international diplomacy and national identity. Global attention to these issues has also increased awareness of the significance and fragility of cultural sites.

Other Global Flows

The past generation has witnessed an explosion in the global circulation of people, ideas, and information surrounding tangible and intangible heritage. Today, archaeologists and heritage managers often find themselves working on shifting global terrains that involve international conventions, world heritage sites, the international circulation of cultural property, digital access to information, and cultural tourism development.

The globalization of CHM is evident in the rise of international charters, conventions, and programs covering a range of cultural heritage management concerns, from protection for underwater heritage resources, safeguarding intangible heritage, protecting the built environment, or the development of World Heritage Sites. Today, most countries have an administrative framework that gives heritage management a high profile, and many have passed legislation protecting heritage sites and cultural properties. International bodies such as UNESCO and ICOMOS have promulgated conventions and charters that address global and regional concerns. To be enforceable, these documents must be ratified and then developed into legislation by individual nation-states. In most instances, cultural heritage managers will be the ones to implement and oversee these agreements.

Global attention to heritage and its many values is gradually changing people's perceptions about the antiquities trade, damage to heritage sites, and in general has created a resurgence of national and local interest in safeguarding tangible and intangible heritage. Today, more and more countries, especially those "archaeologically rich" nations that have watched their cultural goods drain onto the antiquities market, are focusing cultural heritage management efforts on the protection and restitution of movable and immovable cultural property, seeking the return of objects that have left their borders under questionable circumstances, and protecting those that remain. While these policies can reinforce nationalistic ties to heritage objects, they also bring growing attention to the problematic nature of the antiquities market.

The move to digital records and collections has brought significant changes, especially for museums and source communities. Digital information sharing facilitates access to collections, wherever the technology exists. There are many benefits, but digital sharing of cultural information also brings new costs and considerations about ownership, copyright, appropriate use, and the sustainability of digital media. Cultural groups are becoming more and more concerned about uncontrolled sharing of cultural knowledge and the consequences of releasing certain kinds of information into the public domain. For some source nations or communities, the "digital return" of objects, images, and information constitutes a significant form of restitution.

Cultural heritage managers have an important role to play in how local and national histories are interpreted and whether these narratives and their

production take a more exclusive or more democratized approach. In situations where nationalistic views of a homogenized past have become state doctrine, cultural revitalization can potentially work to exacerbate ethnic tensions or it can foster respect for multiple, alternative histories. One problem is that players in the field of international cultural heritage often seem out of touch with local realities. The world heritage sector has tended to focus on global or state-level needs and relationships, instead of benefits for local people.

Cultural Tourism

Another international realm where CHM has become increasingly important is cultural tourism, also called "heritage tourism." Cultural tourism is big business. Study after study indicates that tourists are looking for "authentic" cultural experiences. Archaeological sites, historic places, and cultural attractions all over the world are being developed for tourism by public and private investors. In most cases, the potential for economic benefits is the driving force. While cultural tourism can indeed generate local pride and profits, potential costs include an economic dependency on tourism and the unforeseen social changes wrought by mass infusions of people and money. Sometimes, profits go directly to the care and management of sites or to support local artisans, but in many situations, the benefits of turning cultural capital into economic capital are not so clear. As Amalia Perez-Juez notes (this volume), "It is becoming very clear that incorporating archaeological sites in a tourist itinerary can generate benefits for the region, but only sustainable management of these sites will lead to local development." In too many cases, tourist dollars are diverted to nonlocal channels, bypassing local beneficiaries. The danger is that heritage is being managed and manipulated not in the best interests of people living near or with cultural connections to sites, but as a form of international cultural capital, to draw tourists or enhance nationalist narratives. Cultural heritage managers are likely to play an integral role in tourism development and in identifying costs and benefits in terms of local values, authority, and potential for good or harm.

Collaborative and Community-Based Heritage Management

One very positive change in the field of CHM in recent decades has been the proliferation of truly collaborative approaches to heritage management. Today, cultural heritage managers often work at the interfaces between source communities, cultural institutions, and the public, developing partnerships and sharing management decisions, in spite of the significant costs in time and effort this can entail. Making sure that source communities are involved in decisions that affect them or their cultural resources is a significant part of the role of a cultural heritage manager today. In a growing number of situations, cultural heritage managers work with and for local communities on projects and initiatives designed to meet community needs. These transformative CHM practices render many benefits from richer understandings of culture and heritage to more meaningful and just relationships with those who have their own connections to pasts and places.

Community-based management challenges heritage managers in numerous ways. There are costs in terms of the time and patience it takes to build authentic, trusting relationships, especially for heritage managers who are ever more stretched by the expanding responsibilities that come with involvement in community development. Community-based approaches require a shift in control and authority that can be challenging for heritage managers who have been trained to act in the name of "the archaeological record," the state, or an elusive "public trust." In general, it has been shown that the costs of giving up control and listening to the voices of those who have the most at stake are well worth it. The relationships created in the process are opportunities to learn a great deal about sites and objects and their agency in the past and present.

Another less tangible, but equally significant, benefit is that democratized, community-based approaches offer some excellent examples of good practice and innovation in heritage management that move toward decolonializing CHM. There are times when the democratization of

CHM – the inclusion of the voices and opinions of those who have the most at stake – may result in decisions to limit access to specific sites or heritage performances for cultural reasons, or to restrict the circulation of certain information or images, or to require special permits from researchers seeking to work with particular objects or collections. Cultural heritage management has also been the subject of ethnographic critiques that explore topics such as relationships between people and sites, strategic deployment of cultural symbols for various ends, and the potential for heritage to divide people or to bring them together. These critiques help us reflect on the direction that the field of CHM might be heading or has been (see Edgeworth 2006; Hamilakis & Duke 2007).

Training

Finally, the field of CHM is faced with the challenge of developing training programs that keep up with the many changes its practitioners are experiencing. Are future heritage managers being adequately prepared to make decisions about the many contradictory and ethically challenging topics that they will face? Are those already in CHM positions receiving training that supports the new roles they will take on in their positions? UNESCO, for example, has been conducting regional training programs for cultural heritage managers, covering topics such as standards for maritime archaeology, how to ensure sustainable benefits for source communities, and how to build local and regional capacity. Such programs create a cohort of people who work in the same region and face similar challenges in translating global directives into beneficial and sustainable local initiatives. In this way, they provide heritage managers with much-needed networks and support.

Conclusion

As a practice and a profession, heritage management must remain open to change. Change has many costs. It is risky and time-consuming. It requires defining new roles and building new relationships. It can mean having to give up control, face painful memories, or withstand criticism. But the costs of not changing, and of not reflecting critically on where CHM has been and where it is heading, are far greater. Since Henry Cleere's seminal volume in 1984, many others have described and compared approaches to CHM from all over the world. This breadth and awareness transformed CHM from a nationalistic enterprise into a globally significant endeavor, operating at a range of scales, ever more involved with transnational forces but also ultimately concerned with how these integrate with local goals and aspirations. Willingness to reflect on the cost and benefits of change can only lead to better understandings about what constitutes good practice and will continue to enrich the ever-changing field of CHM.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ China: Cultural Heritage Management
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Somaliland: Cultural Heritage Management
- ▶ Spain: Archaeological Heritage Management
- ▶ Zimbabwe: Cultural Heritage Management

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Cultural Heritage Management: International Practice and Regional Applications

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Introduction

A select group of countries now have guidelines to underpin approaches to conserving and managing cultural heritage resources. The monuments and sites oriented Venice Charter has been superseded by new charters and documents and rethinking in the late 1980s and early 1990s on different values systems. In an international perspective, the adoption of three cultural landscape categories for World Heritage recognition in 1992 was a major milestone reflective of this philosophical shift in attitude. Additionally, there are available international conventions and guidelines laying down best practice by organizations such as UNESCO and ICOMOS. Inevitably in looking at international standards, often based on Western conservation canons, the fundamental question arises: "Whose values are we addressing and whose heritage is it?" While acknowledging the importance of establishing professional standards of practice for protection of the world's cultural heritage, it is imperative

that universality of practice and adoption of standards do not overwhelm local values. Charters and conventions aim to assist in defining the critical notion of significance which must address intangible values as well as the tangible. Here integrity of heritage places and their continuing authenticity are fundamental concerns, particularly as the notion of heritage embraces traditional communities and everyday places as well as national icons. This entry reviews the history of current interest in cultural heritage protection and the various charters available to assess significance and to offer comment on them with reference to the need in university courses to teach the imperative of understanding regional values and applications and whose values we are trying to protect through the process of heritage management. Examples are drawn from the author's academic and professional experience in Southeast Asia.

Historical Background

Post-1945 Overview: Internationalism and Globalized Cultural Heritage Initiatives

A notable social advance of the post-World War II era has been a concern for the world's cultural heritage with associated efforts to mobilize professional global agencies and initiatives to protect it. Initially with the advent in 1964 of *The ICOMOS International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter)*, heritage was seen to reside predominantly and physically in great monuments and sites – and substantively monuments and sites of the Classical (Old) World – as works of art. The UNESCO World Heritage Convention of 1972 firmly placed cultural heritage (and natural heritage) conservation on the world stage, and certainly early inscriptions on the World Heritage List focused on famous monuments and sites, sometimes referred to as the separate dots on a map syndrome (Taylor & Altenburg 2006). As the management of cultural heritage resources developed professionally and philosophically, a challenge emerged in the late 1980s/early1990s to the 1960s and 1970s concept

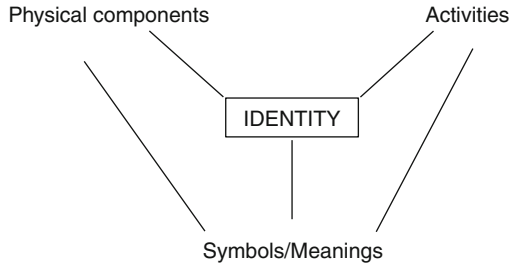

Cultural Heritage Management: International Practice and Regional Applications, Fig. 1 Place identity and its components adapted from Relph (1979)

of heritage focusing on noble monuments and archaeological locations, famous architectural ensembles, or historic sites with connections to the rich and famous. Here was the inception of an enlarged value system embracing such issues as cultural landscapes and settings, living history and heritage, intangible values, vernacular heritage, and community involvement. It was the beginning of the shift from concentrating wholly on what Engelhardt (2007) pithily calls the three "Ps" of Princes, Priests, and Politicians to include People.

Critical to this view of cultural heritage was and remains an appreciation of the interrelationships through time between people, events, and places involving not only tangible values but also associated intangible cultural heritage values. Intangible cultural heritage is "the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage" (UNESCO 2003). Here heritage is inextricably linked to notions of identity and continuity to private and public memories, to sense of place (*genius loci*). *Identity* as Relph (1979) posits is a key word crucial to sense of place where the tangible (physical features and functions) and intangible (meaning or symbols) coalesce (see Fig. 1). Notions of intangible cultural heritage have increasingly suffused the thinking of international organizations involved in setting standards for a shifting global approach to cultural heritage protection.

The growth of global thinking and practice in cultural heritage management emerged from the twentieth-century modernist movement – modernism – originating as a Western cultural phenomenon. Modernism started in the late nineteenth century in various arts such as poetry, architecture, and painting and continued to influence twentieth-century ideas (Bullock & Stallybrass 1977). It invoked a break with tradition to create new forms as, for example, in architecture and planning. It was a rationalist view of an ideal world that could be applied universally. It informed the cultural globalization movement paralleling economic globalization (Logan 2001). Coincidental has been mounting concern that the thrust of global thinking has the potential to overwhelm non-Western local and regional traditional cultures; commensurate with this is "a considerable body of literature over the past 10 years [that] has criticized cultural globalisation" (Taylor 2004).

National legal frameworks for the protection of cultural heritage emerged in the nineteenth century. The League of Nations, established after World War I, saw its work continued and developed in 1945 when the United Nations was formed; in 1926 the International Museums Office (IMO) had been established in Paris with the aim of promoting the activities of the museums and public collections of every country by organizing joint work and research. The IMO organized a number of key events that set the scene for the development of an international movement for cultural heritage conservation. Notable was the First International Congress of Architects and Technicians of Historic Monuments, Athens 1931, from which came the *Athens Charter for the Restoration of Historic Monuments* (the Athens Charter). It stands as the first truly international statement on general principles and doctrines relating to the protection of historic monuments. As a result, the League of Nations established an International Commission on Historic Monuments to deal with conservation education, legal and technical issues, and documentation.

In early1945 the Charter of the United Nations was drafted, followed by the creation of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in November 1945. The Constitution of UNESCO (November 1946) mandates the organization to ensure the conservation and protection of the world's inheritance of books, works of art, and monuments of history and science (UNESCO 2007). Here was established the firming of globalized thinking on cultural heritage protection in the modernist tradition of "ideas and practices that could be applied around the world regardless of differences in local cultures" (Logan 2001).

In the early UNESCO years, various missions were organized to advise Member States on the conservation of heritage sites. Later these developed into international campaigns, of which the first was launched in 1959 on the Temples of Abu Simbel, Egypt, threatened by the construction of the Aswan Dam. Among its early tasks, UNESCO also collaborated in the organization of meetings of experts in the preservation of heritage resources. These included a conference on the preservation of monuments held in Venice in 1964, which adopted the *International Charter for the Conservation and Restoration of Monuments and Sites* (*The Venice Charter*).

In 1972 at a UN conference on the human environment in Stockholm, it was recommended that a UNESCO convention on World Heritage should be adopted, resulting in *The Convention Concerning the Protection of the World Cultural and Natural Heritage* (16 November 1972). Generally known as The World Heritage Convention, it has achieved a great deal during its existence. "Today, it is among the foremost international tools of conservation, and certainly among the best known" (Bandarin 2007: 18). In 1992 the World Heritage Centre was established and is the focal point and coordinator within UNESCO for all matters related to World Heritage including management of the convention, organizing annual World Heritage Committee meetings, providing advice to States Parties in the preparation of nominations, coordinating the reporting on the condition of sites, and the emergency action undertaken when a site is threatened. The center also organizes technical seminars and workshops, updates the World Heritage List and

database, develops teaching materials to raise awareness among young people of the need for heritage preservation, and keeps the public informed of World Heritage issues. Its global initiatives are assisted by various regional offices throughout the world, and increasingly attention has been given to regional cultures and needs (see http://whc.unesco.org/en/134). UNESCO was instrumental in setting up key international organizations – ICOMOS, ICCROM, and IUCN – that have become official advisory bodies to the World Heritage Centre (UNESCO 2007).

ICOMOS (International Council on Monuments and Sites), a nongovernmental organization with headquarters in Paris, was established in 1965. It is dedicated to the conservation of the world's historic monuments and sites and provides a forum for professional dialogue and a vehicle for the collection, evaluation, and dissemination of information on conservation principles, techniques, and policies. It also advises UNESCO on World Heritage cultural matters. ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property) based in Rome was established in 1956 by UNESCO. It has a worldwide mandate to promote the conservation of all types of cultural heritage, movable and immovable, with the aim of improving the quality of conservation practices and raising awareness about the importance of preserving cultural heritage through training, cooperation, research, information, and awareness. IUCN (International Union for the Conservation of Nature) advises on natural heritage matters.

Key Issues

Protecting Whose Values? Imperialism or Relativism

Laying down global frameworks for protecting cultural heritage underpinned by methodical approaches to identification and assessment of heritage resources, analysis of significance, and evaluation of proposals has led to an internationally accepted modus operandi. It represents a modern bureaucratic system where heritage resources are itemized through categories and entered in registers and lists. While we need to apply such tools anchored in a systematic and demonstrable way of working, they, and associated charters, do show their Western cultural origins (Byrne 1991) and, one may add, Western values, although these may well be values shared by other cultures. Nevertheless, the question is how far such universal approaches based on Western methodologies and thinking adequately address regional cultural values and differences across the world?

The concept of cultural imperialism – imposition of a foreign viewpoint or culture over another country – emerged in the 1960s. Terms such as first world (developed) and third world (developing) may be seen by some observers as representative of an imperial attitude. Edward Said in discussion of the way British writers have historically seen "abroad" or the exotic other out there as strange, "ours" to control, posits that this imperial manner of thinking became "a main element in the consolidated vision, or departmental cultural view, of the globe" (Said 1994: 74). Said proposes the notion of a social and political "*centre* and a series of overseas territories connected to it at the *periphery*" (Said 1994: 74). Such critiques gel with the alternative notion of cultural relativism acknowledging cultural diversity and attempts to understand and judge the behavior of another culture in terms of its standards rather than one's own (Eller 2009).

Can the globalized tenets of cultural heritage management processes of the twentieth century be seen as a reflection of a culturally imperial view? Or alternatively are they part of a systematic approach to guide protection processes capable of being sensitively adjusted to reflect differing cultural contexts?

In considering such matters, there is a fundamental question: "Whose values and whose heritage are we addressing?" This can be tendentious as, for example, in the context of the World Heritage (WH) Convention's threshold of Outstanding Universal Value (OUV) for a property to be listed: "cultural [and/or natural] significance which is so exceptional as to transcend national boundaries and to be of common

importance for present and future generations of all humanity" (UNESCO 2008: para. 49). Here international and local values which can be in contestation may have to be reconciled. What is valued locally may not be appreciated internationally and vice versa. A recent Chinese perspective (Fengqi 2007) discussing heritage as a global industry reflects that "the application of Eurocentric heritage philosophy and approaches is problematic. As a consequence, the need for formalizing approaches. . .appropriate to various cultural contexts is becoming increasingly acute." Thus, for guidance in establishing OUV, the WH Convention lists applicable assessment criteria, specifies that properties must meet conditions of authenticity expressed through a variety of attributes, and must meet conditions of integrity. It also requires comparison with similar properties regionally and internationally to inform commentary on the level of representativeness of a type of nominated property and how/why the property stands out. In this way, the convention does have positive universal application if applied with sensitivity to the plurality of cultural contexts, a topic to which I return later. Implicit also in this process is ensuring that the human rights of local people are not overwhelmed by a competing discourse of international practice.

The globalizing practice tendency of international organizations such as UNESCO, ICOMOS, ICOM, and ICCROM is compelling. While they lay "down international standards for professional practice – "world best practice" – in the cultural heritage field as well as influencing thinking in those fields in less direct ways," they can be said "to be imposing a common stamp on culture across the world and their policies creating a logic of global cultural uniformity [by seeking] to impose standards of 'good behaviour' onto Member States and other states" (Logan 2001). A cogent alternative view is acknowledgement of the fact that they have established a shared way of working that is apparent and understandable, is replicable, so that its validity is testable, and one that allows comparative evaluation of findings and management recommendations. One may also add that these methods must then be applied in ways that are appropriate to the country and culture in which you are working, that is, adapting them to be sympathetic to specific cultural contexts. To effect this also needs national and local laws to be in place to ensure international practice is statutorily grounded.

The Culture-Nature Dilemma

As I have discussed elsewhere (Taylor 2009a), a cogent example of divergent Western and Eastern views is that of the concept of nature. Until the late 1980s, there was some tension between cultural and natural heritage conservation. Culture and nature were uneasy, sometimes suspicious, companions. Reflective of this, cultural and natural criteria for assessment of properties of OUV for World Heritage nomination and listing were separate until 2005 when they were sensibly combined into one set of ten criteria in Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO 2008: para. 77). The separation was originally based on a hegemony of Western values where cultural heritage resided mainly in great monuments and sites and natural heritage in scientific ideas of nature and wilderness as something separate from people. The latter was an ideal espoused particularly in the USA. Said labels it the "Puritan errand into the wilderness" (Said 1994: 63). An American PBS television program shown in Australia in 2010 "*The National Parks. America's Best Idea*" eulogized the grandness of American wilderness and nature virtually as a national symbol and exemplar reflective of Roderick Nash's (1967) critical analysis of the American concept of wilderness. Nash posits its adoption was grounded in the idea of something distinctively American and superior to anything in the Old World: the sublime versus the antique. He refers to the wilderness idea as critical to a unique American white *identity* [my emphasis] mimetic of what Said (1994: 67), in reference to a British text on Africa, calls "politicized [and] ideologically saturated."

We may ask, therefore, what is the *identity* and history of occupation of US national park areas by native Americans before being ousted and

their cultural landscape turned into someone else's "wilderness"? That page of history is fuzzy in the heroic wilderness narrative, being as opaque as it was in the environmental ethics debate on natural values during the 1970s and 1980s, in particular that of whether nature has instrumental value or intrinsic value. Feng Han's (2006) discussion on these values is instructive: Instrumental value is assigned because of the usefulness of something; in contrast, intrinsic value relates to values of things as ends in themselves. A further complication is the question of the origin of intrinsic value: Is it subjective, created by human thought and value systems? Alternatively is it objective where value is endemic in its own right, simply waiting to be recognized objectively as the deep ecology movement stridently claimed? Is nature valued as purely an object without any human interest or spiritual attachment? Where do traditional owners and societies with their knowledge systems fit into this (imperial core?) image of nature?

Examination of the World Heritage List for Asian countries shows some properties included under natural criteria where local community associations with these places are omitted or, worse, obliterated. In contrast to this approach ought to be recognition of the value systems that traditional communities associate deeply with so-called natural areas as part of their cultural beliefs. Added to this is the fact that many traditional communities live in or visit these places as part of their life systems and have done so for millennia, prompting the question of what do we mean by nature? Is it the 1960s American model enshrined in the Wilderness Act with its connections to Protestant Christian, colonial, and postcolonial cultural associations from the English-speaking Western world? Or ought it to be the concept of nature and culture not as opposites but where nature is part of the human condition? In this connection is J.B. Jackson's (1984: 156) view that landscape "is never simply a natural space, a feature of the natural environment. . .every landscape is the place where we establish our own human organization of space and time."

Jackson's aphorism has particular import in Asia where links between culture and nature are traditional. People are part of nature within a humanistic philosophy of the world. Here is a holistic approach to the human-nature relationship as opposed to the idea of human detachment from nature. In this vein in March 2004, the *Natchitoches Declaration on Heritage Landscapes* was adopted at an ICOMOS International Symposium. This declaration focuses on cultural landscapes in terms of the "interaction of people and nature over time," stressing the culture-nature link. Of note in this culture-nature and tangible-intangible relationships is the mounting appreciation of links between cultural and biological diversity and traditional sustainable land use. A landmark UNESCO-IUCN international symposium in 2005 explored the culture-nature diversity links; in an eloquent paper, Lhakpa N Sherpa (2005) shows how *beyul*, the cultural phenomenon of sacred hidden valleys in the Nepalese Himalaya, traditionally supports biodiversity conservation. But he also shows how Western-influenced initiatives are targeting *beyul* for establishing protected areas without proper recognition of the symbiotic relationship between local communities and environmental conservation: The message is that modern development, education, globalization, and tourism are not supporting traditional stewardship.

In contrast and connecting with Feng Han's (2006) view is the Thai example of Doi Suthep-Pui National Park, Chiang Mai. Here culture and nature coexist in terms of traditional Hmong communities allowed to remain living in the park and where interpretative presentation acknowledges the immutable relationship between people and nature. This is seen also in the value placed on the temples in the park, as with the venerable Phra That Doi Suthep Temple:

> Despite all the stunning natural beauty, the main reason many visitors come . . . is to visit Phra That Doi Suthep Temple. For Thais, this site is a must for the visit, as it is a sacred place to pay homage to the Lord Buddha's relic, . . . [it is] one of the most holy Buddhist sites in Thailand (Nantawan & Lieorungruang 2006).

Tourism: Positive or Negative Force

Understandably the application of global initiatives in conservation methodologies and management plans, not least through the World Heritage program, has resulted in raising the professional and political profile of cultural heritage protection worldwide. Accompanying this has been the raising of the profile within signatory countries (States Parties) to the World Heritage Convention of the meaning and values of heritage protection and importance of national policies. Nevertheless, the universality of attention to cultural heritage places can be, and is, a double-edged sword, not least through impacts of services and infrastructure demands of tourism. The sheer impact of the numbers of people at places like Angkor or Venice or Ayutthaya or Borobudur is overwhelming. It raises the specter of having to rethink management organization on numbers of visitors allowed into such places at any one time and how to plan and handle schedules. How long can we tolerate people clambering over archaeological remains at Asian sites? When do we start to control unfettered access into what for a Western tourist might seem to be a dead 1,000-year archaeological relict as with the temples at Angkor when in fact many are still used every day by local people as part of continuing living history? We would not countenance tourists walking through and over the altar at Notre Dame de Paris cathedral, so why in a Buddhist temple at Angkor?

Nevertheless, tourism and heritage are linked, not least economically for developing countries, begging the question of how places and monuments and objects are presented to tourists. Colonial Williamsburg in the USA is substantially a re-creation popular with tourists, but this does not detract from its potential to inform people on history and develop heritage values. Muang Boran, an artificial historic park in Bangkok developed as a vignette of all aspects of Thai lifestyles and settlements, is a theme park but has the potential to be informative and provoke the imagination. Focusing on Asia as a noncore example, what is needed is a synergy between heritage protection and tourism with improved modes of interpretation and presentation of sites to cater for a range of tourists from the informed to the novice. Management involving locals as well as professionals and management informed by tourist experience of the site are critical factors. Equally there is the need for management practices and machinery geared to local conditions and technology. Sullivan (1997) describes such an approach with successful outcomes for conservation management based on workshop discussions involving a range of stakeholders at Yungang Caves in China: managers, local people, visitors, and government officials.

It may be that tourism can play a role in protecting heritage values and significance in rural and urban centers – for example, Hoi An, Vietnam – where lifestyle, traditions, and fabric are supported by tourist spending and, as the ICOMOS Cultural Tourism Charter (2002) recommends, involvement of host and indigenous communities. Conversely, claims for spurious tourist developments based on notions of beautifying a place can be culturally destructive and lead to an impoverished visitor experience. In an ongoing case in the old city area of Rattanakosin, Bangkok, a local government plan first promulgated in 2003 to create a tourist park surrounded by various monuments will involve clearing of traditional shop houses and a local group of people, the Mahakan Fort community. They objected and found support from the UN Committee on Economic, Social and Cultural Rights, which Thailand joined in 1999, and from local NGOs. This was to no avail; the unnecessary tourist park is to proceed, and tourists lose the opportunity to experience a local traditional lifestyle that enriches the experience of Bangkok. It also raises a critical question: How can and should government authorities factor in the need for a comprehensive assessment of the area and its varied heritage resources, including all stakeholder values such as local community values? In Thailand, there is a deeply held and rich national consciousness of the country's vast and varied cultural heritage but one that is not always appreciated or understood by municipal authorities, including planning departments.

Overview: Charters and Principles, Authenticity and Integrity

ICOMOS (www.international.icomos.org) lists 12 charters adopted by its General Assembly, 6 resolutions and declarations, and 8 charters adopted by various ICOMOS affiliated countries. The fundamental role of charters is to offer statements or principles and guidelines for the conservation and management of places of cultural significance where conservation is regarded as an integral part of the management of these places. Charters may therefore be seen to have a professional ethics role in guiding the conduct of cultural heritage conservation practice. Fundamental to the process is the notion of *significance*. It is a difficult word to elucidate readily. A dictionary definition is "concealed or real meaning." But this suggests more ambiguity because, in heritage management, we are invariably dealing with concealed meanings. These must be unraveled through subjective assessment and analysis of objective data and cultural traditions that govern the way people have done things to shape their surroundings, creating the cultural places and landscapes we attempt to assess. It is essentially a values – human values – based approach.

The Venice Charter of 1964 was the first post-World War II document marking the internationalization of heritage codes of practice. Its focus is Eurocentric, high art/high aesthetic monuments and buildings from the past, reflecting the somewhat narrow scope of conservation in the 1960s, although it must be acknowledged that the charter recognizes that such monuments reflect age-old traditions and human values. Emphasis is on physical fabric rather than social meanings, but *The Venice Charter* is the forerunner of other documents and marks an increasing concern for conserving the past for the present and future. Its universality, however, is no longer a tenable viewpoint. It has increasingly been regarded as outdated in parts of the world – for example, Asia, Australia, Canada – outside the old core. The *Burra Charter* (Australia ICOMOS 1999) first adopted in 1979 was the first national charter (and outside the European core) to challenge the validity of The Venice Charter's narrow edifice construct. Three important aspects of the Burra Charter are the following: (a) use of the term "place" to define cultural heritage resources underpinning the concept of place as a cornerstone of Australian heritage practice. Place means site, area, land, landscape, building or other work, and group of buildings or other works and may include components, contents, spaces, and views. Critical to this is the notion that place involves human activity and associated cultural traditions that have guided the activity/activities and its/their outcome. The term "place," with associated cultural context and meaning, links components together and puts them into context with their cultural and intellectual background of which they are a product; (b) introduction of the tenet of significance and associated values – historic, social, aesthetic, scientific—in heritage assessment with a cogent definition of significance; and (c) development of conservation management plans. The Burra Charter also saw a move from a focus entirely on fabric to embrace ideas of spiritual value.

The *China Principles* (China ICOMOS 2000) were promulgated by China's State Administration for Cultural Heritage (SACH) in cooperation with the Australian Heritage Commission and the Getty Conservation Institute (California). Taking the Burra Charter approach of identification and conservation of values and American experience to create a set of guidelines for conservation and management of immoveable cultural heritage in China, they meet the needs of an Asian culture. Of particular note is that the Chinese document is presented as professional guidelines that sit firmly within the existing framework of laws and regulations relating to the conservation of heritage sites. They provide guidance for conservation practice as well as the main criteria for evaluating results and, like the Burra Charter, place highest priority on assessment of significance. Notably, they emphasize the link between conservation, site management, and site planning through master plans. Two words expressing inherent fundamental cultural heritage values are *"authenticity"* and *"setting*." In particular, authenticity may have different nuances in Asian cultures to Western cultures, hence its

notable inclusion in the Chinese principles. In the glossary, authentic/authenticity literally means true + fact/real. A synonym for setting is landscape and presumably embraces the notion of cultural landscape reflecting how and why people have shaped their surrounds according to their ideologies (Taylor 2009a). Article 24 directs that the setting – reflecting significant events and activities – of a heritage site must be conserved. Here there are comparisons with the Burra Charter, where setting means the area around a place and may include the visual catchment. The import of *authenticity* connects with the Asian approach to renewal of physical fabric. This is where replacement of fabric is acceptable because the significance of the place resides primarily in its continued spiritual meaning and symbolic value related to everyday use rather than preeminence of the fabric itself. It is expressed by Wei and Aass (1989) in the following commentary:

> Consequently, in the field of conservation of monuments such as Qufu, the Forbidden City or Cheng De, the allowing of continuous repairs or even rebuilding all respect this concentration on the spirit of the original monument. Although the physical form may change, the spirit and purpose of the original is not only preserved as a continuity, but can be enhanced through contributions of succeeding generations.

In recognition of the significance of authenticity in cultural heritage management, the drafting by ICOMOS in 1994 of *The Nara Document on Authenticity* aimed to challenge conventional thinking in conservation. It acknowledges the framework provided by the World Heritage Committee's desire to apply the test of authenticity for cultural properties proposed for the World Heritage List but in ways that accord full respect to the social and cultural values of all societies. The Nara Document is a tacit acknowledgement of the plurality of approaches to the issue of authenticity and that it does not reside primarily in Western notions of intact fabric. It is an attempt to explore an ethos that acknowledges local traditions and intangible values. Logan (2001) suggests rightly that the Nara Document was "a powerful voice from the periphery, a veritable watershed." It acknowledges the need to respect cultural diversity and all aspects of belief systems. It proposes that authenticity judgements may be linked to a variety of information sources: *form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling*. The document points out that use of these sources permits elaboration of specific artistic, historic, social, and scientific dimensions of a cultural heritage place. Nevertheless, it has been misused within Asia to suit nationalist ideals (which are just as imperial as earlier Eurocentric or Americanized ones), possibly because of its generalized nature. It made a virtue of being nonspecific.

The *Hoi An Protocols. Professional guidelines for assuring and preserving the authenticity of heritage sites in the context of the cultures of Asia* (UNESCO Bangkok 2009) is an innovative statement of the recognition of diverse and enduring cultural identities in Asian countries. The protocols recognize the impact of tourism in Asia and effects on restoration and presentation of heritage places for tourism purposes. Listed is a series of definitions that draw considerably on the Burra Charter. The inclusion of specifics on Asian Issues is welcome, particularly in the mention of indigenous and minority cultures and the need to find ways of interpreting sites within an appropriate context as a way of engaging visitors. The protocols are an attempt to "underscore the inter-relatedness of practices for the conservation of the physical heritage sites, the intangible heritage and cultural landscapes" (UNESCO Bangkok 2009: 2).

In reviewing a periphery perspective – for example, from Asia – on heritage values, significance, and protection, it is instructive to look at the issue through the lens of *authenticity* and *integrity*, characteristics from *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO 2008), where the spirit of place resides as much in the meaning and symbolism of places and their setting – intangible values – as it does in tangible physical fabric. *Authenticity* (para. 80 of the guidelines) concerns "the ability to understand the value attributed to the heritage depending on the degree to which information sources about this value may be understood as credible or truthful."

Dimensions of Authenticity				
Aspects	Location and Setting	Form and Design	Use and Function	Immaterial Qualities
	■ Place ■ Setting ■ "Sense of Place" ■ Environmental niches ■ Landforms and vistas ■ Environs ■ Living elements ■ Degree of dependence on locale	■ Spatial layout ■ Design ■ Materials ■ Crafts ■ Building techniques ■ Engineering ■ Stratigraphy ■ Linkages with other properties or sites	■ Use(s) ■ User(s) ■ Associations ■ Changes in use over time ■ Spatial distribution of usage ■ Impacts of use ■ Use as a response to environment ■ Use as a response to historical context	■ Artistic expression ■ Values ■ Spirit ■ Emotional impact ■ Religious context ■ Historical associations ■ Sounds, smells and tastes ■ Creative process

Cultural Heritage Management: International Practice and Regional Applications, Fig. 2 Dimensions of authenticity (*Hoi An Protocols* 2009: 8)

We may see authenticity therefore as ability of a place to represent accurately/truthfully what it purports to be. Figure 2 from the *Hoi An Protocols* (UNESCO 2009: 8) illustrates the importance of authenticity within an Asian context.

Integrity is a measure of the wholeness and intactness of the cultural heritage and its attributes. Examining the conditions of integrity, therefore, requires assessing the extent to which the property (a) includes all elements necessary to express its OUV, (b) is of adequate size to ensure the complete representation of the features and processes which convey the property's significance, and (c) suffers from adverse effects of development and/or neglect. In relation to (c), I would add that judgement will be required when the whole might lack sense of integrity, yet some parts or remnants possess it. The decision on overall integrity then will depend on how the parts with integrity are able to be read and interpreted to give an overall sense of continuity.

What Should Be the Aims and Responsibilities of Universities Within the Framework of Global Issues?

A number of points occur to me as central for university research and training centers in cultural heritage:

- Teach and research within the global perspective while ensuring that a move to uniformity is challenged, stimulating students to think regionally/locally as well as being aware of global trends and practice. It is critical that local heritage conservation philosophies taking account of traditional knowledge systems and skills are developed and that respect for ethnic groups and minorities and their beliefs and sense of place is fostered. Establish firm theoretical foundations that underpin practice.
- Articulate the values-based approach to heritage thinking and practice where not just tangible aspects of *what* has happened, *where*, and *when* are addressed but *why* have things happened and *who* has been involved. What are the associated intangible human values?
- Heritage is about People and human values and human rights noting therefore that changes over time will occur. Past human values may be different than present day, and we need practitioners and researchers who can accommodate such thinking. We are interested in the present and the living, not just the dead.
- Understanding and empathy with plurality and cultural diversity in recognition of the 2001 UNESCO Declaration on Cultural Diversity must be critical to our thinking and teaching.

- Need to bridge the culture-nature divide with enhanced understanding of how biodiversity and cultural diversity in traditional land-use systems often coexist.
- Inclusion of courses in cultural landscape study and significance of human layers through time inherent in the cultural landscape construct as a way of seeing and understanding historiographically the human world. This will help foster appreciation of landscape as a document of social history in which human values inhere.
- Appreciate methods of mapping the interaction between places and/or cultural landscapes and people as, for example, through the technique of cultural mapping whereby tangible and intangible elements are identified and documented in order to understand local distinctiveness.
- Education of people capable of capacity building through explicit, jargon-free communication for support of heritage protection with politicians, government agencies, ordinary people, NGOs, and media, that is, increasing awareness.
- Understand how to devise charters that are not simply a set of rules but documents that embrace spiritual view of what is valuable, capable of expressing historical legibility, and conservation of living traditions.
- Understanding how to work with tourist agencies, managers, and promoters to extend understanding of significance of heritage beyond the national and international icons to include vernacular cultural landscapes and local vernacular heritage.
- Be aware of where gaps occur in knowledge and practice as, for example, UNESCO (2007) suggestions for:
  (a) Thematic and geographic gaps for a World Heritage global strategy (human settlements, human interaction; spirituality, and creative expression).
  (b) Thematic studies in cultural landscapes to provide frameworks to guide the WH Committee.
  (c) Need to rectify geographically unbalanced representation (out of approximately 80 WH listed cultural landscapes only 34 are outside the Europe/N America region). ICOMOS (2005) identifies areas of human achievement underrepresented on the WH List, for example, Buddhist, Hindu, and Islamic heritage. ICOMOS (2004) also stresses that urgent consideration needs to be given to vernacular buildings and settlements, suggesting thematic studies might be conducted. This particularly applies to the Asia-Pacific region, noted by UNESCO as lacking representation thereby not reflecting the region's cultural diversity. The dilemma here is that countries seem to be attracted to nominating national icons/famous sites because of their international tourism attraction and ignoring the urban vernacular with notable exceptions such as Georgetown, Penang, or various heritage areas and trails in Singapore (Yuen 2005; Taylor 2009b).
- Press the message that the vernacular is a significant scholarly *and* professional area of study and practice where we are dealing with social and political meaning as well as physical form, what Hayden (1995) perceptively calls *power of place*. Acknowledge and disseminate the fact that the urban vernacular cultural landscapes – historic urban areas – are rich resources for public history and public culture and that urban landscape history can be engaged "as a unifying framework for urban preservation" (Hayden 1995: 45).
- Last but not least, cultural heritage is above all a multidisciplinary pursuit, not the domain of narrowly entrenched disciplinary ideas. The whole area of cultural heritage management offers a richly rewarding and challenging opportunity for cross-cultural study and research and bringing better understanding across culturally diverse global regions.

Cross-References

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▶ Canada: World Heritage

▶ Heritage and Public Policy
▶ Heritage Landscapes
▶ Heritage Values and Education
▶ Urban Heritage

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Cultural Heritage Management: Project Management

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Introduction

Cultural heritage management (CHM) projects differ significantly from traditional academic research on cultural heritage (CH) subjects. They require a management strategy that focuses on client-consultant expectations and schedules, stakeholder concerns, and adherence to laws and regulations, in addition to completing project research objectives.

Definition

The primary difference between studying cultural heritage through an academic as opposed to a CHM project is that academic research is driven by the initiator's own topical and geographic research interests, whereas a CHM project is conducted in response to a proposed development project that triggers the project sponsor to comply with laws and regulations protecting CH resources. In addition, the former is generally funded through grants, endowments, or other funds dedicated to the advancement of research and administered through a university. The host institution is responsible for managing research endeavors and generally has a well-established administrative infrastructure that supports research throughout the institution. CHM projects are funded through a polluter-pays model, in which the developer (whether they are a private company or a government agency) is responsible for mitigating the harm caused to CH resources by their project. Because the developer is paying, CHM is driven by their specific needs. Project management is less about realizing the best research outcome than it is about producing needed CHM information to meet legal requirements in the most efficient manner possible. As a consequence, CHM projects require a very different management structure.

Historical Background

Whereas nearly all countries recognize the importance of CH, the development of CHM in any particular country is closely related to its historical, political, legal, social, and cultural context. Countries with strong legal requirements for the protection of heritage at various government levels (national, provincial, state, county, etc.) are generally the ones where a more mature CH industry has emerged over time. More detail on CHM around the world can be found in country-specific entries in this encyclopedia.

Key Issues/Current Debates

To manage a CHM project successfully, the CH consultant must understand the sponsor's (client's) objectives. These objectives are generally outlined in a document termed a scope of work (SOW), performance work statement (PWS), or terms of reference (TOR). This initial document describes the technical tasks to be completed, a schedule to be met, and a host of other requirements that the consultant must meet (e.g., qualifications and experience of CH professionals proposed to conduct the work, insurance requirements, health-and-safety plans, and often complex logistical protocols). In an open-competition scenario, consultants are asked to respond to a request for proposals (RFP), which commonly presents specific instructions on how the proposals are to be prepared and how they will be evaluated. In some countries, providers of CHM services are limited to government agencies. In these cases, the agency works closely with the

project sponsor to scope the CHM project to meet compliance needs. Once agreed to by both the agency and the sponsor, the bid focuses primarily on the price and schedule.

Although legal requirements vary considerably by country, and laws and regulations are often supplemented by international conventions (Willems & van den Dries 2007), there are three basic types of CHM services. As a first step, the sponsor must identify CH resources that could be impacted by their project. Often termed an inventory, this step can in turn be subdivided between physical resources, such as archaeological sites and historic buildings, and intangible resources, such as songs, poems, and language. (Some countries, such as the United States, limit protection to sites with physical manifestations; however, these countries do protect traditional sites and use areas.) Once resources are discovered during inventory, the second step required of the sponsor is to distinguish between CH resources that merit protection from those that do not (termed evaluation). Those resources that merit protection move on to the third step (termed treatment), which attempts to minimize impacts to important tangible or intangible resources or to capture those values that make the resources important through a variety of activities, including scientific studies, public education, museum exhibits, festivals, oral history programs, technical reports, and popular books and articles.

At its most basic level, CHM is a service business. Depending on the requested services, a private consultancy or government agency determines the mix of expertise that will be required, the amount of time that will be needed by each position to complete each task (level of effort), and the schedule for the project team to complete the service(s). Each CHM service described earlier utilizes similar management techniques but with a slightly different project management focus. Inventory, for example, requires an assumption about how much area can be covered by a field crew in a day, how many sites will be discovered, and how long it will take to record each site. In the field, project management of inventories is all about logistics: ensuring that field crews have access to the project area; have sufficient vehicles, mapping equipment (e.g., not only that crews have Global Positioning System [GPS] units that meet the specifications required in the scope of work but also have Internet access to differentially correct locational data at night), and other equipment; and have lodging and meals close to the project area to minimize travel time. Evaluation and treatment, or mitigation, projects also have field logistical requirements but in addition require substantial management of analytical and curatorial services that are performed once fieldwork is completed.

Many analytical services are provided by subcontractors, such as research laboratories (e.g., radiocarbon, palynology) or material culture analysts (e.g., ceramicists, lithicists, faunal analysts), who first must be placed under contract. Subcontracts require the consultant to prepare a separate SOW/PWS/TOR for each analytical service, ensuring that all conditions of the master contract between the project sponsor and the consultant are enforced. A bid (or tender) process may ensue with one or more vendors. Managing subcontracts is different than managing internal staff in that the consultant has no direct control over the manner in which the services are provided. Management of subcontractors, often composed of specialists spread around the world, requires ensuring that schedules are maintained and that the research focus of the overall project is adhered to as opposed to the interests of the individual specialist.

Regardless of project size, the proper tools to define the project work flow and monitor progress must be implemented from the outset. These are often outlined in the contractor's response to the original SOW/PWS/TOR and developed further after notice is given to proceed with work. It is critical that the sponsor as well as the entire project team understands the chain of command; who is responsible for what and who reports to whom. These relationships as well as the projected work flow are commonly outlined in a project organizational chart; Fig. 1 is a generic example of such a chart.

The first step in the management of any CHM project is the development of a work plan during

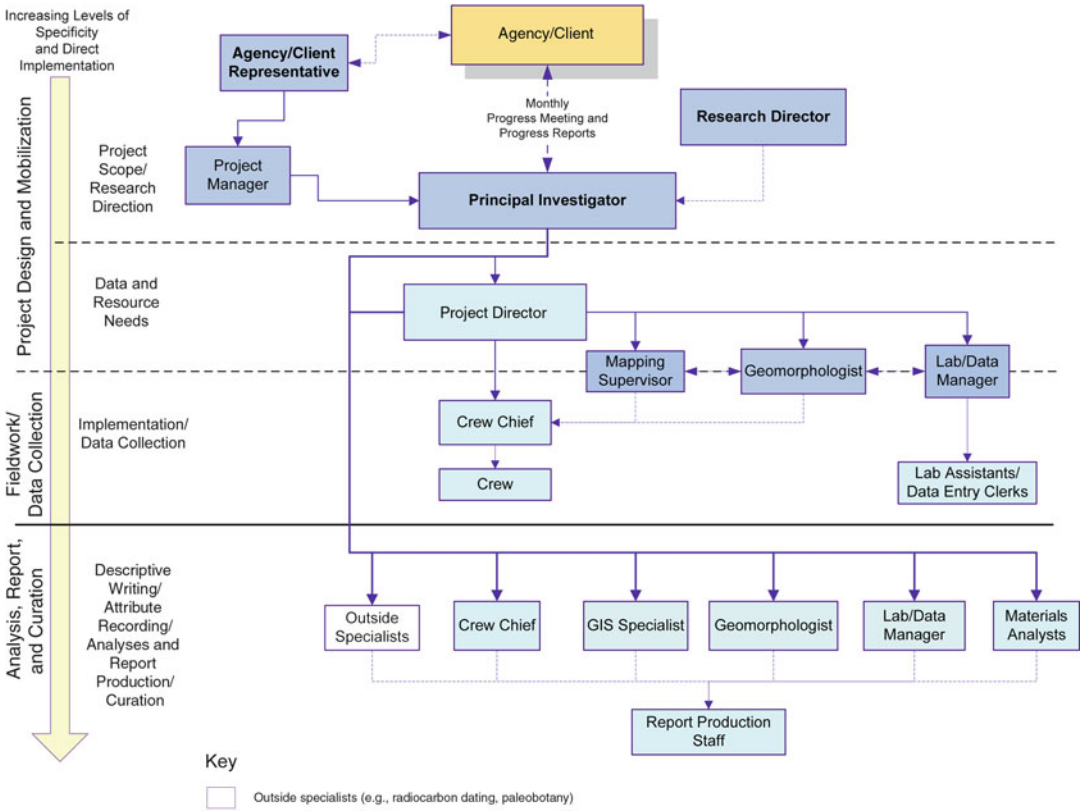

Cultural Heritage Management: Project Management, Fig. 1 Generic example of a staff organizational chart by project phase

the project design and mobilization phase. This plan can be informal or formal but should contain the consultant's understanding of the project; listing of project participants and their roles and responsibilities; discussion of project tasks and how they are related and sequenced and the field and analytic methods to be used; definition of the progress-reporting process and format; statement of deliverables and schedule/milestones (for both client and consultant); administrative and financial procedures (e.g., communication protocols, budget and budget tracking, invoicing requirements); and reporting and curation requirements (including standard forms and formats to be used, number of iterations of report[s], metadata content and format, etc.). Gantt charts are a common management tool used to illustrate how the schedule, deliverable, and milestones will be achieved (Fig. 2). They also can be portrayed in a way that illustrates the "iterative" or "critical path" nature of tasks on a project. Gantt charts can also be updated as the project unfolds. Many project management software packages have a function that allows the creation of a Gantt chart. The generic example in Fig. 2 was produced using Microsoft Visio software.

CHM projects end well when the client and consultant establish similar expectations at the outset, often through a project initiation meeting where all elements of the work plan can be discussed and refined, as necessary. This step helps avoid any future conflicts or differences of opinion between the parties. Similar meetings should be held among internal team members (and any specialists or subcontractors providing services to the project) at project initiation and when key milestones are met (e.g., when fieldwork is complete and analysis and reporting are about to begin). These meetings provide the opportunity to discuss project roles, schedule,

ID	Example Project Schedule Referencing the Performance Work Statement (PWS)	Start	Finish	Days
1	Award	9/21/2011	9/21/2011	0d
2	Draft Work Plan (PWS Section 5.3.)	9/21/2011	9/30/2011	10d
3	Kickoff Meeting (PWS Section 5.2.)	10/7/2011	10/7/2011	0d
4	Kickoff Meeting Minutes (PWS Section 2.4. and 5.2.)	10/18/2011	10/18/2011	0d
5	Quality Control Plan (PWS Section 2.6.)	10/20/2011	10/20/2011	0d
6	Final Work Plan (PWS Section 5.3.)	10/27/2011	10/27/2011	0d
7	Safety and Health Plan (PWS Section 2.9.)	10/21/2011	10/21/2011	0d
8	Task 1 Records Review (4,000 acre survey, PWS Section 5.4.)	10/31/2011	11/14/2011	15d
9	Task 1 Fieldwork (4,000 acre survey, PWS Section 5.9.2.1.)	11/15/2011	2/12/2012	90d
10	Task 2 Fieldwork (Evaluation of 35 sites, PWS Section 5.10.2.1.)	11/15/2011	1/13/2012	60d
11	Task 3 Archival and Fieldwork (Building Inventory, PWS 5.11.2.1.)	11/15/2011	1/13/2012	60d
12	Task 2 Draft Report Writing (Evaluation of 35 sites)	1/14/2012	4/12/2012	90d
13	Task 2 Draft Report Due (Evaluation of 35 sites, PWS Section 5.10.2.2.1.)	4/13/2012	4/13/2012	0d
14	Task 3 Draft Report Writing (Building Inventory)	1/14/2012	4/12/2012	90d
15	Task 3 Draft Report Due (Building Inventory, PWS 5.11.2.2.1.)	4/13/2012	4/13/2012	0d
16	Government Review of Draft Reports (Tasks 2 and 3)	4/13/2012	5/27/2012	45d
17	Task 1 Draft Report Writing (4,000 Acre Survey)	2/13/2012	5/12/2012	90d
18	Task 1 Draft Report Due (4,000 Acre Survey, PWS Section 5.9.2.2.1.)	5/13/2012	5/13/2012	0d
19	Government Review of Draft Report (Task 1)	5/13/2012	6/26/2012	45d
20	Address Comments and Prepare Final Report and Deliverables (Tasks 2 and 3); prepare artifacts and records for curation as part of final deliverables	5/28/2012	6/10/2012	14d
21	Final Report and Deliverables (Tasks 2 and 3, PWS Sections 5.10.2.2. and 5.11.2.2. respectively)	6/11/2012	6/11/2012	0d
22	Address Comments and Prepare Final Report and Deliverables (Task 1); prepare artifacts and records for curation as part of final deliverables	6/27/2012	7/10/2012	14d
23	Final Report and Deliverables (Task 1, PWS Sections 5.9.2.2)	7/11/2012	7/11/2012	0d

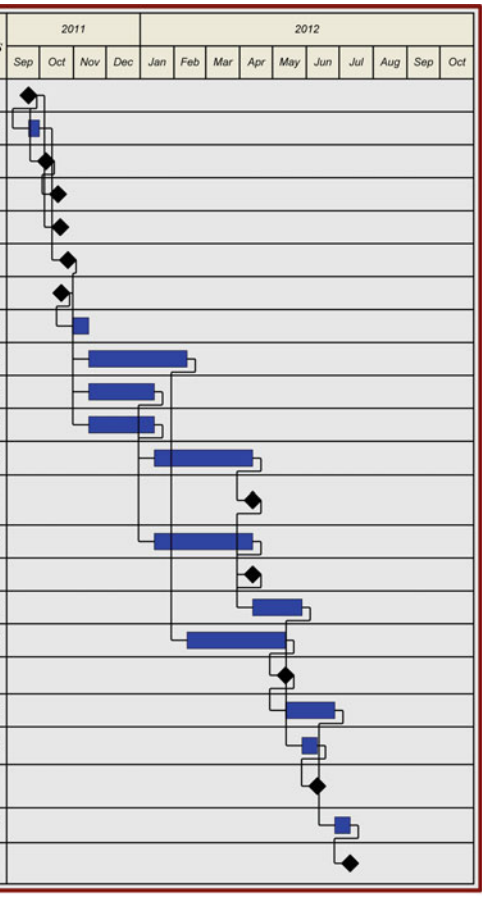

NOTES: A monthly progress report is due on the 5th business day of each month (PWS Section 5.7.)
A quarterly report is due the 1st business day of each quarter based on the agency fiscal year (PWS Section 5.6)

Cultural Heritage Management: Project Management, Fig. 2 Generic example of a Gantt chart, a commonly used management tool for illustrating project schedule, deliverables, and milestones

and level of effort (amount of time allotted to each person to complete their tasks and how their work relates to the larger project goals and deliverables). For nonemployee specialists or subcontractors, contracts are prepared that spell out and formalize expectations.

Most clients minimally require monthly progress reports, and they often follow specified formats (e.g., task-monitoring basis or percentage analysis) and are tied to invoicing for completed work. The progress report also allows the consultant to identify problems and issues that might affect project schedule, budget, and deliverables and bring them to the client's attention. Internally, robust accounting software is necessary to track the hours spent by employees on a particular project. These data can be used to generate management charts that provide detailed information on where a project stands on a monthly or weekly basis. These data can also be captured in a task-monitoring spreadsheet using standard software such as Microsoft Excel. Numerous project management software solutions are commercially available, and the most useful include modules for managing collaborative tasks, issue tracking, scheduling, project budget, resources (e.g., available employees, vehicles), documents, work flow, and reporting and analyses. The trend is toward web-based management, and although there are a few "open-source" tools, most are proprietary and require payment for licensing fees, upgrades, and maintenance.

In addition to tracking project schedule, budget, and deliverables, it is important to monitor project quality (see the entry on ▶ Cultural Heritage Management Quality Control and Assurance). Most if not all of the worldwide organizations, associations, and societies focusing on cultural heritage have adopted standards that set out what a research project must achieve and define the resulting products. Many of the standards have lengthy sections on the processes that must be followed to achieve the desired results. Hinton and Jennings (2007: 102) note that these standards form the basis for a tripartite "quality management" approach, where the suitability of work is assessed and regulated by process, product, and person. A primary challenge of CHM work is balancing the traditional academic meaning of quality as "degree of excellence" (Merriam-Webster Dictionary) with more commercial meanings such as "meeting customer requirements," "satisfying the customer," or as stated in ISO 9000 from the International Organization for Standardization (ISO), "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs" (Hinton & Jennings 2007: 101). Around the world, heritage organizations, associations, societies, and government agencies have defined the appropriate qualifications required by professionals in the various CHM roles ("person") and have created standards for the products of CHM investigations ("product"). Increasingly, commercial firms worldwide are adopting the ISO 9000 family, or series, of standards – an international consensus on good quality management practices – to address the "process" aspect of the quality management approach. According to ISO 9000 Essentials (n.d.), ISO 9001:2008 is the standard that provides a set of standardized requirements for a quality management system, regardless of what the user organization does, its size, or whether it is in the private or public sector. It is the only standard in the family against which organizations can be certified, although certification is not a compulsory requirement of the standard. The other standards in the family cover specific aspects such as fundamentals and vocabulary, performance improvements, documentation, training, and financial and economic aspects.

Although the appropriate management of CH resources is the foremost goal of CHM, conducting innovative research is an important component, especially when resources will be damaged or destroyed by a proposed development and cannot be preserved. In this regard, CHM has led to a surprising number of new and important scientific and cultural discoveries because it forces CH specialists to investigate areas often shunned by their academic counterparts. But for these discoveries to be recognized by the scientific community, they must be documented well and published in peer-reviewed academic journals, books, and monographs. When performing CHM work under contract,

however, some clients claim intellectual ownership of the "products," because they have purchased them. This situation obviously presents a challenge from a knowledge-dissemination perspective. Gowen (2007: 32) notes that CHM clients often have little or no perception of the need for quality in the end product of the work. As a result, it is often left to the "company culture" to govern and influence the commitment to quality.

As indicated earlier, CHM research differs markedly from typical academic research in its breadth and scope. The latter, usually constrained by small budgets and limited resources, tends to focus on one or more specific research issues and small-scale sampling using teams of student or volunteer labor that are deployed on the researcher's schedule. Impacts to CH resources may be minimal. By contrast, where CH resources are endangered by a proposed development, CHM is tasked with recovering as much important information as possible and in a rapid fashion with professional teams working on the developer's schedule. To obtain the best results, CHM data recovery or mitigation projects are done within a framework that supports a broad range of research issues that can be investigated with the type of information expected to be provided by the affected CH resources. Similarly, excavation methods must be geared to intensive sampling or even complete exposure or controlled destruction of the CH resource, while a diversity of analytical methods must be applied to a broad set of archaeological materials and specialized analyses. Finally, detailed and comprehensive reporting of all excavation and analytical methods, results, and interpretations must be completed in a timely fashion rather than be disseminated in a few journal articles as usually required in academic research.

Development of a CHM research framework also requires a solid grounding in the cultural historical background (cultural context) of the region and a good understanding of the type of CH resources that will be impacted by the development and the important information that they might contain. In countries with a well-developed archaeological and historical record, this cultural context and related research issues can be assembled from a review of existing literature. In some cases, land-managing agencies with extensive experience in managing CH resources have developed their own research frameworks based on previous research on their lands or in the adjacent regions. CHM researchers must adapt their research for a particular development project to the research issues and, in some cases, methods outlined in these preexisting frameworks. The opposite situation holds true in countries lacking a well-documented archaeological and historical record. In these situations, CHM researchers must turn to other countries or regions with similar cultural historical settings or similar CH resources to develop their research frameworks from scratch. These, in turn, are often works in progress that must be refined as the research proceeds.

The larger and more complex scale of CHM investigations also creates a greater need for managing teams with numerous researchers, research services, and their products. In academic research, the PI also often serves as the project (field) director (PD), whereas in CHM PIs generally are responsible for all nonadministrative aspects of the project and are aided by one or more PDs, who are charged with implementing the fieldwork portion of the work plan and for postfield reporting tasks. The role of project manager (PM) also is key on small and large CHM projects alike. PMs are responsible for handling most if not all of the administrative tasks and for monitoring the project budget and schedule, freeing the PIs and PDs to focus on nonadministrative tasks.

The broad scope of research and great diversity of specialized analyses in many CHM projects, however, often exceed the capabilities of even the most experienced PIs and PDs. Outside peer reviewers are commonly hired as subconsultants on large CHM projects to provide additional expertise in advising project researchers and providing quality assurance and independent evaluations of their work to project sponsors, government regulators, and other stakeholders. Peer reviewers usually come from academic backgrounds, and their work schedules and professional responsibilities often conflict with CHM project schedules. Thus, as with

other subcontractors, it can be difficult to obtain these services within the schedule set by the project sponsor, and the quality of their input often depends on the individual peer reviewer's level of interest in the project. Many of the larger CHM consulting companies maintain teams of highly experienced analysts (often these are staff positions) to conduct a variety of materials analyses, which allows for better management of these services and better control of the research product. To respond to the research needs and possibilities of CHM projects, large CHM consultancies, such as US-based Statistical Research, Inc., have instituted the position of research director (see Fig. 1), staffed by the firm's most experienced senior archaeologists, to advise both PIs and analysts, to provide timely internal peer review as well as to coordinate more lengthy independent peer review for large CHM projects, and to ensure that project research goals are being met. Although there is still an important role for outside peer reviewers, research directors have a better understanding of the unique requirements and short-time frames of CHM projects and are better integrated into the project team.

The goal of progress reporting is to show both the client and the consultants performing the work where a project stands vis-à-vis the schedule and budget. If the project cannot be completed on schedule and within budget, the consultant must make up for overages by readjusting the internal work flow. There will be times when situations arise that the client and the consultant together could not reasonably anticipate. In these situations, it may be necessary to modify the project SOW/PWS/TOR and possibly the project budget and/or schedule.

The type of contract executed between a consultant and client also influences project management (Klein & Majewski 2012). Basic contract types include (1) fixed price or lump sum and (2) time and materials and related variants. A fixed-price project is completed for a sum not subject to any adjustment. The firm receives the predetermined amount regardless of what occurs in the execution of the contract (with some exceptions for unanticipated changes of condition or scope). Fixed-price contracts provide a great incentive for a consultant to control costs and be efficient but are best suited to projects where the parameters are well known. The time-and-materials contract establishes hourly rates for specific labor categories to be used by a consultant, in addition to direct costs such as vehicle mileage reimbursement, travel, specialist services, equipment rental, field and laboratory supplies, document reproduction, and curation. This form of contract is generally used when project scope, duration, and cost cannot be estimated accurately, although initial ceilings for tasks or entire projects are generally established. Time-and-materials contracts require considerably more administrative time than do fixed-price contracts and are often phased (e.g., inventory, evaluation, and data recovery), with separate work plans and budgets developed for each phase.

Once final project deliverables have been submitted, a close-out review should be conducted for each project. This process identifies and documents both successes and problems encountered during the execution of the original schedule, budget, and deliverables. The results of the project close out can serve as the foundation for improving future performance and enhancing future project outcomes.

International Perspectives

Much of the previous discussion pertains to CHM conducted in countries with a well-established CHM framework and bureaucracy. In these cases, there are specified government agencies that are charged with the responsibility for regulating CHM services and ensuring that laws protecting CH are enforced. Many developing countries, however, lack a legal framework and a CHM infrastructure. As importantly, these countries often have few, if any, trained CH specialists. Yet, many of these countries are state parties to UNESCO conventions, which require them to protect important tangible and intangible cultural heritage. Also, in response to major infrastructure projects, such as the Three Gorges Dam in China or the Namibian Lower Hydropower project in Angola, where significant cultural

properties were damaged and/or destroyed, international lenders, such as the World Bank and the International Finance Corporation (IFC), now require countries to protect their tangible and intangible heritage in order to receive funds for development projects (Fleming 2010).

To meet these regulations and conventions, sponsors of development projects, such as mining companies, are requesting CHM consultancies from industrial countries to partner with in-country CHM institutions (see Gunchinseren et al. 2011a; Rio Tinto 2011). Institutions in developing countries that are delegated CH responsibilities generally are either government agencies with scientific missions, such as Institutes of Archaeology, or universities with archaeology or anthropology departments. Members of these institutions may be well trained, but commonly have only performed their research as part of academic projects. Project sponsors expect foreign CH specialists to help make the transition from academic research to CHM by building CHM capacity in the host country so that in the future, in-country CH specialists can be called on to perform and regulate CHM services. In-country specialists need to understand the role of consultants as "honest brokers" of CH information and that their recommendations take into account the goals of not just the client but all CH stakeholders (e.g., government officials, regulators, local communities, elders' groups, nongovernmental organizations [NGOs]).

The goal of foreign-domestic partnerships is to create a sustainable cultural heritage infrastructure in the developing country (see, e.g., Gunchinseren et al. 2011b). One key is to enshrine a form of the polluter-pays model to fund CH programs in laws and regulations. To ensure that CH policies reflect public concerns, CH fees from development projects need to be sufficient not only to cover the costs of compliance projects but also to sustain community involvement, heritage education, museum maintenance and repair, and cultural festivals and activities. Additionally, the CH infrastructure must be staffed with trained specialists. Some of these specialists will be professionals in CH fields, such as archaeology, anthropology, heritage tourism, education, history, or architecture. The majority, however, will be nonprofessionals, such as staff in local museums, teachers, and heritage tour guides. Training programs need to include scholarships for advanced training in CH; most such programs are at universities in industrial countries. In addition, short training courses for nonprofessionals need to be developed and funds need to be secured to ensure that these programs are continually available throughout the country.

Contracts for foreign-domestic partnerships in developing countries are likely to include a variety of services, including training and performing fundamental CHM services (e.g., conducting of a systematic, intensive archaeological survey), assisting in the development of a CH framework to regulate CHM services, and building CHM capacity. Because the in-country partners in many developing countries have little CHM experience, sponsors need to be realistic in their expectations. It is likely, for example, that inventory and evaluation tasks will take longer and be performed in a less-efficient manner than they would in a developed country. Also, establishing government offices with enforcement authority may require legal changes; almost certainly, it will necessitate training government personnel. In these endeavors, the consultant must walk a fine line, for these projects are rife with potential conflicts of interest. The project sponsor's objective is to receive permission to proceed on a development project and is relying on the foreign-domestic partnership to achieve this end; the in-country partner institution, with little if any CHM experience, must produce, with the aid of the foreign specialists, a technical study meeting international standards, while a government agency, coached by the foreign specialists, must independently evaluate the study.

To be successful, these foreign-domestic CHM partnerships require strong project management. The transition from working on projects with minimal funding and essentially no deadlines to fully funded projects on very short time lines can be extremely difficult for in-country institutions with little experience with contract work and few, if any, financial cost-control mechanisms. Also, in-country institutions are generally not in a position to pay employees, acquire equipment

and tools, or fund per diem and travel expenses without advanced payment. Often, the project sponsor expects the foreign consultancy to advance its in-country partner funds to meet these obligations. In addition, projects in developing countries can take place in remote regions, some of which are politically unstable. Foreign consultancies will need forms of insurance not commonly required in industrial countries, such as health policies with medivac provisions and kidnap and ransom ("extraction") insurance. All risks – economic, political, and social – need to be considered when negotiating overhead and profit fees. In addition, the management of these projects needs to include provisions for monitoring not only the technical aspects of the CHM services but also the sociopolitical climate and the economic performance of its in-country partner.

One of the keys to success in foreign-domestic CHM partnerships is to establish lines of communications at three levels: (1) between the project team and the sponsor, (2) between the foreign and domestic PIs and PMs, and (3) between foreign technical specialists and their domestic counterparts. We have found that the best way to achieve these objectives is to divide large and complex CHM projects into smaller, easily achievable tasks. Project team meetings (including translators as needed), often facilitated by internet communication mechanisms, such as Skype, should be held at least every other week and if there is a large amount of project activity underway, more frequently. Difficulties in meeting project objectives or milestones need to be discussed as they are encountered with the project sponsor and, if necessary, with government regulators, local communities, and international lenders so that reasonable decisions about how to meet the sponsor's project specific objectives and the larger CHM goals of the other stakeholders can be reached.

Future Directions

Successful CHM project management requires managers with strong leadership, problem-solving, and personnel skills, and the ability to direct and influence staff to complete tasks on schedule and on budget, and to implement efficiencies at all project stages, from project planning to eventual curation of the records and materials generated by the work. Until quite recently, traditional academic training for CHM professionals included little if any practical training in project management. This is changing, however, with some institutions offering summer schools/institutes or degree programs in heritage management or "practicing" archaeology. The latter programs often require internships with commercial firms or other practical experience. In the early days of CHM in any country, archaeologically trained staff performed the majority of required tasks, whether or not they were proficient in all of those tasks, including project management. As the field matures, project management becomes singled out as a particular specialty that is essential for a consultancy to be successful. Many CHM firms in the United States, for example, regardless of size, are now hiring accountants, editors, graphic artists, and experts in cartography and geospatial technology and information technology to support traditional CHM staff and free them up to focus on the CHM aspects of projects. Senior staff members in some firms are acquiring advanced degrees in business administration to make themselves more competitive and to take firms in new directions in terms of marketing and project management.

Above all, CHM, whether in developing or industrial countries, requires flexibility. Development plans change as do the needs and desires of local communities and other CH stakeholders. Good project management is about more than just ensuring that a project is completed within budget and on time. Management is essential to performing quality work. All too often, projects expend too much effort on field and analytical studies, leaving little time to interpret the results. Yet, the latter is essential for a CHM project to have the greatest possible scientific and public benefits (see Altschul 1997).

Cross-References

► Cultural Heritage Management Quality Control and Assurance

- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK)
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ United States: Cultural Heritage Management
- ▶ United States: Cultural Heritage Management Education
- ▶ Willems, Willem J.H.

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Cultural Heritage Objects and Their Contexts

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Introduction

This entry considers cultural heritage objects and their sociocultural, political, and legal contexts, and examines the implications of those contexts for understanding the past and the present.

Definition

What marks out a cultural object from an ordinary object is its "cultural worth." Cultural worth is a multifaceted concept, meaning that individual objects can be valued for different reasons by different cultures – on account of their artistic merit, their spiritual or religious significance, their historical importance, or their scientific interest (Lipe 1984). Cultural objects range in type from paintings or other recently produced works of art at one extreme, through to natural objects with no human modification at the other. It is the cultural context that affords value, the broader system of beliefs and practices enfolding the object, not the object itself. A pair of Zuni Ahayu:da (War Gods) in the context of their outdoor shrine speak of one belief system; the same pieces removed from their shrine and displayed in a museum vitrine speak of another belief system. The change of context imparts new values to the objects, which come to instantiate a larger cultural whole. Sometimes the "objects" have been forcibly removed from a larger architectural context, in which case they are really spolia. The Parthenon Marbles are an obvious case in point. Created in fifth century BCE Athens as decorative sculpture for the Parthenon temple, they are now exhibited as art objects in the British Museum. The different and sometimes competing valuations that are placed on cultural objects can impart monetary worth, and also give rise to conflicting ownership claims.

The removal of a cultural object from one context and its placement in another can cause irreparable damage to the cultural whole of which it was originally a part, while at the same time altering the value and significance of the object itself. For archaeologists, this process is of immediate concern when objects are looted from archaeological sites and sold on the art market. The archaeological context, which is necessary for their correct interpretation, is damaged or destroyed, thus constraining archaeological research and limiting what is knowable about the past. The insertion of archaeological objects into new contexts might also encourage an erroneous view of the past. The sixth century BCE "Euphronios" krater, for example, bought by the Metropolitan Museum of Art in 1972 for $1 million, is now regarded as an artistic masterpiece and a high-priced commodity, which has encouraged a view that it was similarly so regarded in antiquity. But is that interpretation correct? (Vickers & Gill 1994).

Many though not all cultural objects have archaeological value, but episodes of recontextualization may have sociocultural and political implications that go far beyond the archaeological. In the first place, they might undermine collective memory. Collective memory is an important component of ethnic and other cultural identities, and when the recontextualization of cultural objects helps to eradicate a material reminder of history, or disrupt long-established practices or beliefs, it can cause a weakening or refashioning of those identities. This process has been particularly grievous for colonized or occupied peoples, when the theft or forced sale of cultural objects has been an active or passive accompaniment of assimilation policies aimed at eradicating their identities (Vrdoljak 2006). In 1897, for example, when the British invaded and occupied of Benin ahead of creating the colony of Nigeria, they seized approximately 3,000 bronze and ivory artifacts. Many of these artifacts had comprised a visual archive, recording Benin history as far back as the twelfth century, and their removal compromised the identity of the Benin people (Coombs 1994). Subsequently sold to defray the invasion's expenses, the Benin bronzes and ivories are now displayed in museums around the world as "art," stripped of their historical connotations and effectively depoliticized.

Like the Benin bronzes and ivories, many cultural objects that are removed from their original contexts become commodities for a time, to the financial benefit of the art market, and once curated in private collections or museums, they become capital assets, able to generate long-term income streams through visitor revenue, sale of image rights, and rent of museum space for corporate and private events. None of these benefits

filter back to the countries or communities from which the objects were taken, and so, their removal can constitute a real, long-term economic loss (Brodie 2010).

Key Issues/Current Debates/Future Directions/Examples

Property Protection

The cultural and economic worth of cultural heritage objects has caused them to be placed in new sets of legal and ethical contexts, which have been developed to ensure that cultural objects remain in the possession and control of their rightful owners, whether private or public. While ostensibly protecting the rights of owners, the rationale is ultimately to protect the objects and their contexts. If objects are kept with their rightful owners, the incidence of theft is diminished and contextual damage is minimized.

There are national and international laws. On a national level, trade controls on cultural objects were first introduced in the seventeenth century by Italian city-states such as Rome and Florence, a reflection of the growing cultural prestige and economic importance of visual art at that time. By the end of the twentieth century, most countries had placed cultural objects under some kind of legislative control, ranging from weak regulation intended to prevent the export of particularly important objects, through to strong regulation that might prohibit the export of all privately owned objects and take undiscovered (archaeological) objects into public ownership (Prott & O'Keefe 1990). These national laws are usually criminal ones, and although they are intended to exert a cooling effect on would-be traders and collectors, implementing a policy of protection through deterrence, they are not merely for show. In 2005, for example, US antiquities dealer Robert Hecht and museum curator Marion True were placed on trial in Italy for conspiring to receive art stolen in contravention of Italian law (Watson & Todeschini 2007). The case against True was dismissed in 2010 without a verdict being reached. Sometimes these heritage laws can be used in conjunction with standard criminal law to prosecute cases of international smuggling. In 2003, for example, US antiquities dealer Frederick Schultz was convicted after appeal under the United States National Stolen Property Act for conspiring to deal in antiquities stolen from Egypt (Gerstenblith 2009). Customs laws can also be used to intercept traded objects. In 1997, a third century BCE gold phiale illegally exported from Italy was seized by US Customs from the home of US collector Michael Steinhardt because of false declarations on import documents, which recorded Switzerland, rather than Italy, as the country of origin. In 1999, a US court ordered that the phiale should be returned to Italy (Lyons 2002).

The international interest in protecting cultural objects can be traced back to eighteenth century concerns about the damaging effects of war on civilian life and property. In 1815, Wellington, who together with Blucher had finally vanquished Napoleon at Waterloo, declared that Napoleon's plunder of cultural objects from museums and collections around Europe had been "contrary to the practice of civilized warfare" (Miles 2008: 332). A series of military codes and international agreements followed, establishing the principle that cultural objects should not be looted or destroyed in wartime, culminating in 1954 with the Hague Convention on the Protection of Cultural Property in the Event of Armed Conflict and its First Protocol, with a Second Protocol added in 1999. The main body of the 1954 Hague Convention is concerned to protect cultural sites and monuments from damage during wartime. The First Protocol, however, places obligations on occupying powers to prevent the export of cultural objects from occupied territory and to seize any exported material for return after the close of hostilities. It states specifically that cultural objects cannot be retained by occupying powers as war reparations. The Second Protocol establishes that any violation of these requirements should be prosecuted as a criminal offense. However, the obligations contained in the Convention and its Protocols are binding only on states that are party to them. At the time of the Coalition invasion of Iraq in 2003, for example, neither the United States nor the

United Kingdom had ratified the 1954 Hague Convention or either of its two Protocols, and so were not bound to take action against the trade in looted archaeological and other cultural objects from Iraq that flourished during the invasion and its immediate aftermath. (The United States subsequently ratified the Convention but neither of its two Protocols in 2009).

The 1954 Hague Convention was drafted in light of the widespread theft and misappropriation of cultural objects by the Nazis in occupied Europe during the Second World War. By the 1960s, however, it was evident that a large and growing peacetime market in cultural objects was causing the plunder of cultural sites on a global scale. Thus, in 1970, UNESCO adopted the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Among other things, the 1970 UNESCO Convention places obligations on state parties to prohibit the import of stolen or illegally traded cultural objects from other state parties, and to recover and return such material when requested by the dispossessed state. Again, the reciprocal obligations imposed by this Convention only exist between states that are party to it. The United States has implemented Articles 7b and 9 of the 1970 Convention by the 1983 Convention on Cultural Property Implementation Act. This Act enables the United States to enter into bilateral agreements with other state parties to place import restrictions on declared categories of cultural objects shown to be in jeopardy of plunder and illegal trade (Kouroupas 2009). The 1970 UNESCO Convention was augmented in 1995 by the UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects which is designed to harmonize international differences in limitation periods and "good faith" acquisitions that were not addressed in the 1970 Convention.

The continuing creation and extension of laws aimed at defining and protecting cultural heritage objects have in turn created further problems and inequalities. First, there is the issue of unequal recognition and enforcement. Typically, the trade in cultural objects proceeds from poorer countries at source to richer countries at destination. Source country laws are routinely broken, in part, because in destination countries, they are either not enforced by police and customs agencies, ignored by individual or institutional collectors, or not recognized by the judiciary. This failure of destination countries to respect or enforce source country laws may be due more to resource shortfalls than policy, but nevertheless violates source country sovereignty, and might suggest that source countries are not regarded as fully equal members of the international community. Secondly, there is the issue of broader criminalization. Outlawing the trade in cultural objects makes criminals of those who do the buying and selling, and opens it up to further criminal penetration. Thus, it is suspected that the trade might on occasion be implicated in other organized criminal activities such as fraud and money laundering. Links with drug smuggling have been demonstrated in Latin America, and it has been shown in Afghanistan that money derived from the trade goes to support armed groups. In view of these potentially broader criminal associations, the UN is considering placing the trade under the purview of its 2000 Convention against Transnational Organized Crime (Manacorda 2011).

The fact that illicit trade of cultural objects persists in the face of statutory regulation, which in turn creates its own criminal problems, emphasizes the importance of non-legislative approaches to protection. Most commercial and professional organizations that engage with cultural objects now have codes of ethics or practice that are intended to provide a normative guide for their members and minimize activities that are likely to have damaging consequences. Again, like laws, these codes vary in the strength of their requirements, the nature of their enforcement, and the degree to which they are respected. For example, the Association of Art Museum Directors (AAMD), which is the professional organization representing most art museums in the United States, had for decades required a much weaker standard as regards the acquisition of cultural objects than the International Council of Museums, to which many AAMD members were also affiliated. It was not until the Italian authorities threatened criminal

prosecution of some museum staff suspected of malpractice that the AAMD adopted a much stronger code in 2008.

Human Rights Protection

The national and international laws and ethical codes discussed so far that are intended to prevent the illegal movement of cultural objects create and/or protect a property right, and in so doing defend the status quo. They are not retroactive in effect, meaning that their sanctions apply only to acts committed after the time of their implementation. Thus, although Greece would have recourse under the 1970 UNESCO Convention to claim the return from a another state party of any object removed from Greece illegally after the date of Greece's accession (1981) and that of the state concerned, it cannot claim any object that was moved out of Greece before those dates. It cannot claim, for example, the return of the Parthenon Marbles, which were removed from Greece in the early nineteenth century, many decades before the UNESCO Convention was even thought about. This non-retroactivity of laws designed to protect cultural objects is aggravating for communities or states that were dispossessed of objects in the past, as it protects the ownership of those that have come into possession of the objects while offering no opportunity for restitution or repatriation. The Parthenon marbles are again a case in point – while Greece has no claim for repatriation under the 1970 UNESCO Convention, paradoxically the same Convention actually protects the ownership of the British Museum. The most contentious ownership circumstances of this sort hold over from nineteenth and early twentieth century episodes of colonial occupation or settlement. Cultural objects were often collected by missionaries or military personnel and later anthropologists for study and display in universities and museums. Whether intentionally or not, the removal of these objects from their original contexts compromised traditional identities and belief systems, thus diminishing political cohesion and facilitating the construction and imposition of colonial or settler society by the occupying powers. The case of Benin has already been mentioned. Their continuing alienation of these cultural objects is a source of grievance, symbolic of the act of colonization itself and constituting a real cultural and economic loss.

By the late twentieth century, Indigenous communities were expressing their dissatisfaction at this inequity of the established legal regime, which from their perspective did little more than legitimize their dispossession. They began to articulate a new type of argument around the idea of restorative justice, whereby in this instance the return of cultural objects would offer some redress for injustices suffered during the period of colonial settlement and help reconstruct Indigenous identities and societies. Typical of this new approach is the 1990 Native American Graves Protection and Repatriation Act (NAGPRA), which applies to human remains and cultural objects. As regards cultural objects, it vests ownership of objects found on federal land with the appropriate Native American tribe, and makes provision for the restitution of previously taken objects from the possession of federal or federally funded institutions. In that NAGPRA restores to Native Americans some fundamental civil liberties, such as freedom of religion and cultural expression, it has been characterized as human rights legislation, in contrast to the emphasis on property rights of previous legislation (Nafziger 2009). In other countries without specially drafted legislation, a similar end is sought through negotiation and sympathetic interpretations of already established laws.

NAGPRA instrumentalizes the principle of self-determination, restoring in part to Native Americans the right to pursue their own sociocultural (though not fully sovereign) development. Recognition of this principle has been extended internationally by the 2007 UN Declaration on the Rights of Indigenous Peoples. It is noticeable, however, that while the protection and repatriation of cultural objects is seen to be fundamental to the sociocultural self-determination of Indigenous peoples, no similar recognition has been afforded to postcolonial states. Despite an impassioned plea by the then Director-General of UNESCO in 1978, in which he observed that "The power of the *fait accompli* is a survival of barbaric times and a source of resentment and

discord which prejudices the establishment of lasting peace and harmony between nations" (M'Bow 1978), UNESCO has so far failed to provide an appropriate convention (Prott 2009). Thus, while many postcolonial states have achieved political autonomy, without full socio-cultural self-determination of the type increasingly being won by Indigenous peoples, in an international context, they cannot be said to have achieved full political equality.

Conclusion

The idea of the cultural heritage object is a recent one, gathering together within a single term and concept types of object that in the past would have been considered and treated differently. The idea, for example, that the Mona Lisa, painted in the sixteenth century by Leonardo da Vinci, and the Willamette Meteorite, sacred to the Grande Ronde Confederation of Oregon, have much in common would have seemed outlandish, which is why the Mona Lisa is on display in an art museum (the Louvre) while the Meteorite can be seen in a science museum (the American Museum of Natural History). What these objects have in common, however, is their cultural worth. Their value is not intrinsic, it is culturally constructed. The idea of the cultural object reflects a growing dissatisfaction with taxonomies of "the other" established in Europe during the centuries following the Renaissance. Once thought to be absolute, these taxonomies are now recognized as political as much as rational constructs, and the ongoing debates over the significance and ownership of cultural objects are at the end of the day a symptom of this recognition.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
- ▶ SAFE/Saving Antiquities for Everyone
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions

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Cultural Heritage Outreach

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Introduction and Definition

Cultural heritage outreach is an active, context-specific, and multilateral process in which practitioners and stakeholders work together to define and develop both tangible and intangible aspects of an area's heritage. This is an organic process that involves intersections between research, education, and dialogue. Within the field of archaeology, context-specific cultural heritage outreach permits relationships to develop in conventional locations of site-based archaeological research but also in locations that are well beyond the traditional domain of archaeological fieldwork, including virtual spaces, prisons, and post-disaster settings. A primary goal of cultural heritage outreach within archaeology is to encourage accountability on the part of archaeologists, particularly in engaging the multiple voices within stakeholder communities through regular discussion, debate, and strategizing. As Jameson (1994) notes, cultural heritage outreach is an imperative to archaeological practice; it is the foundation for sustainable archaeological practice and the vehicle through which non-archaeologists can participate in crafting the visions of their cultural heritage, past and present.

Key Issues

Background

Over the past two decades, the growing literature on community archaeology has advocated for recognition of the plurality of publics in cultural heritage outreach efforts and a concomitant need for increased multiplicity in approaches for studying and interpreting the past (McManamon 2005). No longer is it desirable or appropriate for archaeologists to design top-down, structured engagements that maintain an authoritative distance between practitioners and nonspecialists.

Notable early efforts to involve stakeholder communities in the design and interpretation of archaeological projects were in place as early as 1966 during the excavations of the Ozette site in northwestern Washington, when archaeologists and the local Makah Indians worked together in developing recovery, interpretation, and outreach strategies. During the 1970s, archaeologist James Deetz established a precedent for outreach-based practice, when, during the excavations of Parting Ways, he worked in close collaboration with the African American community in Massachusetts, some of whom were descended from the site's historical inhabitants (Deetz 1996).

The 1990s was the turning point for the integration of cultural heritage outreach into the design of archaeological research initiatives. Following the passage of NAGPRA in 1990, issues of collaborative practice, outreach, and accountability became frequent topics of discussion and, more gradually, essential components of professional training within the discipline. In the United States, early discussions about heritage outreach initially took the form of short commentaries

featured in the "Working Together" column of the Society for American Archaeology's newsletter publication, *The SAA Bulletin* (now called *The Archaeological Record*). Many of these commentaries are now recognized as pioneering steps toward the development of collaborative archaeological practice within the USA (e.g., McManamon 1991; Jameson 1994).

Academic training in cultural heritage or archaeological heritage management in US universities was slower to develop than in the United Kingdom, which witnessed a fluorescence of archaeological heritage programs during the 1990s at the University of York, University College London, and the University of Cambridge, among others. As these programs grew into larger research entities, such as the Centre for Applied Heritage Studies at York, positions toward and training in heritage outreach practices became more integrated with archaeological practice internationally.

In the United States, the integration of cultural heritage outreach into archaeological practice was due in no small part to the enactment of the Society for American Archaeology's Code of Ethics in 1996. Public outreach was Principle 4 of the Code of Ethics. It advised that all professional archaeologists should "reach out to and participate in cooperative efforts with others interested in the archaeological record with the aim of improving the preservation, protection, and interpretation of the record" (SAA 1996). In raising the expectations for engaged archaeological practice, the SAA Code of Ethics outreach principle encouraged the development of heritage outreach strategies of varying scale and duration along what Colwell-Chanthaphonh and Ferguson call the "collaborative continuum" of archaeological practice (2008: 1).

As evidenced in the development of academic programs, new approaches in cultural resource management, modified museum policies, and cultural heritage outreach initiatives have proliferated over the past decade and have certainly changed how archaeology is both taught and practiced. Through a series of publications including *Common Ground, CRM Journal, and Heritage News*, the National Parks Service Public Outreach Program implements communication strategies to promote cultural resource awareness and preservation across a range of professional and lay audiences. Similarly, UNESCO's Movable Heritage Outreach Program promotes the proper preservation, handling, and documentation of tangible heritage objects through a series of bilingual comic strip books called "Cultural Heritage Protection Handbooks".

Since 2000, several major centers for heritage studies have been established in the United States in which archaeology and outreach are integral components. These include the Center for Heritage Resource Studies at the University of Maryland (2000), the Center for Heritage and Archaeological Studies at Montclair State University in New Jersey (2007), The Penn Cultural Heritage Center at the University of Pennsylvania (2008), and the Center for Heritage and Society at the University of Massachusetts, Amherst (2009).

Within this new climate, where archaeological training, research, and heritage outreach are increasingly inseparable, researchers are building strategies for outreach and participating in collaborative practice from the inception of their archaeological fieldwork. Two successful examples include Carol McDavid's decade-long work at the Levi-Jordan plantation and the plantation's descendant communities in Texas (2011). McDavid's work underscores the importance of long-term involvement in the community that archaeologists must undertake in implementing certain types of productive outreach strategies. This level of commitment has proven integral to McDavid's success in building mutual respect among the Levi-Jordan stakeholders, in understanding local knowledge, and in balancing the multiple voices and difference in promoting an inclusive view of the past. Extending the use of outreach as an archaeological methodology, Sonya Atalay has implemented what she calls community-based participatory research (CBPR) at Çatalhöyükin Turkey (Atalay 2010). Atalay involved local communities in the management, care, and development of the site by developing an internship program in which archaeologists and the community members engaged in a mutually beneficial and reciprocal

training process, one that shared power while integrating local knowledge into applied research. The primary advantage of these two (and similar) outreach designs is that they pay attention to contemporary concerns within the historical context of their research (McDavid 2011).

Today it is not desirable or appropriate for archaeologists to design top-down, structured outreach engagements that maintain an authoritative distance between practitioners and nonspecialists. Instead, cultural heritage outreach is increasingly based on the development of context-specific initiatives that are interactive, mutually beneficial strategies for fostering collaborative practice and sustainable archaeological stewardship.

Examples

Cultural heritage outreach exists in many forms and scales within archaeological practice; it can be experiential, overtly political, or descriptive; a one-time occasion; or a long-term initiative. Examples can include participation in or open days at excavations, school visits, town hall meetings, radio or TV interviews, coauthorship on reports or articles, internships, collaborative project design, exhibit development, or the creation of educational curricula. There is no prescribed method or set of steps that archaeologists are expected to follow in proceeding with heritage outreach. By necessity, this is a flexible process of engagement because, as Pyburn (2010) notes, communities are complex and fluid, with people belonging to multiple communities simultaneously.

As the following examples illustrate, context-specific cultural heritage outreach permits communication and collaborative relationships to develop in conventional locations of site-based archaeological investigations but also in scenarios where such outreach activities remain less well-established or involved: occasions where archaeological research is less fixed (e.g., survey projects), where archaeology is conducted and presented in highly visible public places (e.g., urban settings, university campuses, or on the internet), when archaeology is differentially accepted by local stakeholders (e.g., political situations), or when archaeological work intersects with highly sensitive, emotional circumstances (e.g., in the wake of mass disasters).

The Maya Area Cultural Heritage Initiative (MACHI), developed in 2006 by Patricia McAnany of the University of North Carolina at Chapel Hill and directed by Shoshaunna Parks of UNC-Chapel Hill, exemplifies the potential benefits of the multilateral nature of outreach activities. MACHI has created seven separate educational programs focused on mapping places of local heritage in the Maya region of Mesoamerica. These heritage maps are created as local community members identify heritage places and community boundaries, and then chart their location using icon-driven GPS software (Parks et al. 2006). In addition to identifying over a hundred types of heritage and archaeological sites, MACHI's outreach activities have resulted in the creation of a youth radio program in Belize focused on Maya heritage and have integrated local involvement into the planning processes for future development projects in the Maya region.

Cultural heritage outreach is also a valuable tool for engaging with seemingly more familiar places and pasts in high-visibility venues. For example, a recent increase in campus-based archaeology projects, as chronicled in *Beneath the Ivory Tower: The Archaeology of Academia* (Skowronek & Lewis 2010), demonstrates how well small-scale excavations of archaeological sites on university campuses connect with the students and alumni in the university community, many of whom feel lasting ties to the place where they spent 3 or 4 years of study. Although many of the campus archaeology finds tend to predate current student or recent alumni communities, these projects are a form of outreach that illustrates how particular places reinforce the collective identity that comes with the membership of a university's community or culture. One additional advantage of campus archaeology projects is that they are often taught as a field methods course or field school, during which students are trained in archaeological methods of excavation,

recovery, and interpretation. Although the majority of student participants do not pursue careers in archaeology, this engagement is a type of outreach that trains students to become informed advocates for the archaeological process.

Digital modes of engagement offer even higher-visibility platforms for outreach initiatives. Examples range from the documentation of individual excavation projects to databases of classroom resources for teachers. One innovative form of cyber engagement is the virtual reconstruction of Çatalhöyük in 3D and on Second Life, developed by Ruth Tringham, Colleen Morgan, Daniel Wei, and Mark Moglenat the University of California Berkeley (Morgan 2009). The Remixing Çatalhöyük website is part of the Open Knowledge and Public Interest (OKAPI) Scholar's Box, an open access digital collection designed to facilitate sharing between academic institutions, libraries, museums, and K-12 students. In addition to experimental and high-tech uses of digital media in outreach activities, archaeologists have developed countless easily accessible blogs and websites as means of initiating collaborations and discussing recent finds; examples include the African Diaspora Newsletter (http://www.diaspora.uiuc.edu/newsletter.html) and Archaeology (www.archaeolog.org). Open access to digital media enables rapid dissemination of information and the possibilities for interactive discussion forums, making digital media an indispensible mode of outreach.

Cultural heritage outreach in archaeology often conjures images of welcoming, progressive, and participatory collaborations. But outreach is also a means of engaging with and addressing more sensitive, painful issues that shape communities' cultural heritage. Engaging with these issues can involve encountering those who do not want to participate in the process, those who are not yet ready (or present) to participate, or those who have been excluded by other members of the community. The history of the African Burial Ground excavations beginning in the late 1990s vividly details such tensions as the project transitioned (at the community's urging) to a focus that involved the creation of knowledge about the archaeological and cultural heritage of the Burial Ground in the service of the community (Perry 1999). A result of the outreach collaborations is that the recently opened African Burial Ground Museum is supported by an Office for Public Education and Interpretation, whose remit is to develop and continue heritage outreach initiatives. Additional examples of outreach in more challenging contexts include work in sensitive political situations and in the process of post-disaster recovery. In her contemporary archaeological research of the Long Kesh/Maze prison in Northern Ireland, Laura McAtackney collected oral histories from both former Republican and Loyalists prisoners in order to understand the experiences of the prison in connection with different groups and to inform how heritage professionals might approach the interpretation of contentious sites in general (McAtackney 2008). Heritage outreach also has an important role to play in the processes of coping, recovery, and memory in post-disaster situations. Two settings are Shannon Dawdy's (2006) work with the communities and destruction of the built environment in post-Katrina New Orleans, and Krysta Ryzewski and John F. Cherry's (2012) collaboration on the Caribbean island of Montserrat with the Montserrat National Trust in the identification protection of archaeological and heritage sites the wake of ongoing volcanic eruptions.

Future Directions

Cultural heritage outreach is now inseparable from most archaeological projects, but it is not a constrained set of practices or even a single, established methodology. Outreach is a context-specific form of practice, and, to operate well, it demands flexibility. As Paul Shackel reminds archaeologists, the results of outreach are neither automatic nor guaranteed (2011: 1). At any moment, an archaeologist working within an engaged community can be called upon to become involved at a number of different levels – as an academic expert, as a liaison

between the community and larger issues, or as a commentator on larger issues beyond the discipline (see McDavid 2011). In accordance with ethical principles of professional archaeological practice, archaeologists are responsible for recognizing and responding to the many publics who exist for archaeology by implementing effective strategies of outreach (SAA 1996). The process of practicing socially responsible and transparent modes of engagement is critical for establishing and maintaining the relationships that make for successful and productive outreach initiatives between archaeological practitioners and non-archaeologist stakeholders.

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Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK)

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Introduction

This entry discusses adaptive use of "Project Management Body of Knowledge (PMBOK)" as an alternative approach for heritage sites management, so that managers of heritage sites conservation projects may utilize project management approach to cover their requirement. Comparing the PMBOK guidelines with traditional "heritage sites management" practice for conservation, PMBOK Guide may not only accommodate the traditional management responsibilities for a cultural heritage site but also may have more to suggest for a more complete management scheme. The guide arranges a systematic procedure for management of any

kind of projects, with relevant methods, techniques, and tools for a successful management.

Definition

PMI: The "Project Management Institute" is a professional institute in USA, expert in "project management," which has published books and guides regarding project management.

PMBOK Guide: "*P*roject *M*anagement *B*ody *O*f *K*nowledge" Guide is a procedure for project management developed by the "Project Management Institute (PMI)."

Project: A temporary endeavor undertaken to create a unique product, service, or result. Temporary means that every project has a definite beginning and definite end but has lasting outcome. Temporary does not necessarily mean short in duration, many projects last for several years. Projects also may often have intended and unintended social, economic, and environmental impacts that far outlast the projects themselves. Projects have progressive elaboration that accompanies the concepts of temporary and unique, meaning that it develops in steps, for example, the project scope will be broadly described early and become more explicit and detailed as project develops. (PMBOK Guide 2004).

Stakeholders: Persons or organizations (e.g., customers, sponsors, the performing organization, or the public) who are actively involved in the project or whose interests may be positively or negatively affected by the performance or completion of the project. Stakeholders may also exert influence over the project, its deliverables, and the project team members. Project stakeholders of a cultural heritage site may be client, government authorities, final users, sponsors, internal and external owners and investors, ICOMOS, environmental preservation organizations, researching institutes, universities, specialists, consultants, contractors, suppliers, workers, local people in the site and around the site, tourists and tourism agencies, site manager, performing organization, management team, public, people not directly related to the acquisition, but have influence, positively or negatively, and society.

Project Charter: A document that formally authorizes a project or a phase and documenting initial requirements that satisfy the stakeholder's needs and expectations.

Project Scope Statement: A document that describes in detail the project's deliverables and the work required to create those deliverables. The project scope statement also provides a common understanding of the project scope among project stakeholders. It may contain explicit scope exclusions that can assist managing stakeholder expectations. It enables the project team to perform more detailed planning, guides the project team's work during execution, and provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries.

Project Management Plan: Document describing the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans for the site management.

C.H.: Cultural heritage

Key Issues

> World heritage sites . . . must be managed in such a way that they are preserved for future generations and at the same time presently made accessible to the public for its education and enjoyment. Finding the proper balance between these two demands is the difficult and important task of the World heritage site managers (Colombo ICOMOS 1993a).
> Only in a few cases around the world is there sufficient national money allocated for educating and hiring staff for the professional care, maintenance, and presentation of these great places (Colombo ICOMOS 1993b).
> They have cultural values and accordingly merit special protection from the chance of erosion (Feilden & Jokilehto 1993).

The common practice for management of cultural heritage is developed and documented as *site management*; the main references used for it in this entry are "*Tourism at World Heritage Cultural Sites: The Site Manager's Handbook*, by ICOMOS International Scientific Committee,

1993, and *Management Guideline for World Cultural Heritage Sites*, 1993, by Feilden and Jokilehto.

> Organizations perform work to achieve a set of objectives. Generally work can be categorized as either projects or operations, although the two sometimes overlap. They share the characteristics of being performed by manpower, constrained by limited resources, and also must be planned, executed, and controlled. Projects and operations differ primarily in that operations are ongoing and repetitive, while projects are temporary and unique (PMBOK Guide 2004).

Current Debates

Adapting Two Management Approaches

ICOMOS Scientific Committee (Colombo ICOMOS 1993) and also Feilden and Jokilehto suggest some guidelines for management of a cultural heritage site (Feilden & Jokilehto 1993). Summing up the guidelines suggested for cultural heritage management in the above references and comparing the mentioned responsibilities with project management areas of knowledge, it is observed that an adaptation may be recognizable. In other words, we see that most activities of the cultural heritage site management may be accommodated within some areas of project management knowledge (Hajialikhani 2006).

Defining Structure of Management Scheme

As per PMBOK Guide, the structure for cultural heritage (C.H.) site conservation projects is proposed, consisting of the below sections:

C.H. Site Integration Management shall include:

- Developing C.H. site Charter, which accommodates activities like establishing a management philosophy, determining the conservation and cost control policy, determining executing organization, collection of legal documents and regulations, defining objectives and short- and long-term goals, defining relation between visitors and local population, and improving local economic relations.
- Developing C.H. Site Scope Statement, which accommodates activities like determining method of managing the site from organizational point of view and professionals required, collection of basic data, reports about present situation, determining minimum required conservation measures by considering values and priorities, submission of suggestion with least loss, noting limits and obstacles, and conservation and protection of cultural resources as a priority.
- Developing C.H. Site Management Plan, which includes activities like developing site management plan, documentation, and listing procedure for all the monuments, buildings, and their appurtenances and site views; categorizing and evaluating resources; determining priorities for future measures; studying relation between visitors and local population; determining the communication management policy; developing research and study plan; scheduling the major activities; reporting investigations; researching and studying previous measures; submission of management plan for approval; reporting about planning and implementation documents; and developing yearly plans.
- Directing the C.H. Site Execution, which includes basic measures, and execution according to management plan, and documentation of carried works.
- Monitoring and Controlling C.H. Site Works, which accommodates reporting during execution (short- and long-term reporting).
- Integrated Change Control, which accommodates reviewing the plan, future planning, and developing and updating management plan.
- C.H. Site Activities Closing, which has not been discussed in the cultural heritage site management. It may be due to the reason that normally no end is considered for conservation of cultural heritage sites, but if the site is to be conserved for the purpose of adaptive use or any other economical

utilization by private sector, an end shall be defined for the project type activities.

C.H. Site Scope Management includes site description and scope definition; defining works boundary, land use plan, conservation plan, utilities and service plan, community development plan, and tourism plan its coordination with of conservation; primarily estimate of the site; identifying, taking an inventory and evaluation of existing resources; documenting and listing all the monuments, buildings, and their appurtenances and site views; determining minimum required conservation measures; considering values, priorities, and suggestion with least loss; and identifying limits and obstacles of the project.

C.H. Site Time Management schedules by identifying the problems and priorities for urgent, medium-term, and long-term works.

C.H. Site Cost Management covers cost estimating and approving cost plan, cost budgeting according to similar previous works, and cost control.

C.H. Site Quality Management includes implementing conservation policy; collection of the latest technical and conservational regulations; and considering values, priorities, and giving suggestion with least loss.

C.H. Site Human Resource Management accommodates activities like planning the existing staff, determining staff responsibilities, staffing the human resources, studying management success, and determining consulting methods and the consulting team.

C.H. Site Communication Management may cover proper documentation of the resource, assuring accessibility of the documents, and keeping copy of the documents in a safe place; communicating with universities and research institutes; communicating with international organization concerned with conservation of cultural heritage sites (like ICOMOS), documentation and reporting, and storing information and documents.

C.H. Site Risk Management covers activities like reporting the potential risks that may be encountered in future, developing accident and fire protecting plan, determining the responsible person and his substitute, and studying reasons of possible failure of regulations.

C.H. Site Procurement Management is not discussed in the cultural heritage site management guidelines, although procurement of material and services shall be surely required for execution of conservation works.

C.H. Site Safety Management covers activities such as developing accident and fire protection plan, determining the responsible person and his substitute, and establishing management policy according to security and insurance considerations.

C.H. Site Environmental Management covers processes such as studying local economic relations, studying relation between visitors and local population, and applying national and local master plans and industrial zoning.

C.H. Site Financial Management accommodates activities of income budgeting, reporting the requests for financial and technical supports, improving local economic relations, and management of visitors' related activities (image and marketing, recording and analyzing visitors, moving travelers to and from the sites, welcoming visitors, providing services to visitors, and interpretation of the site to visitors.)

C.H. Site Claim Management is not discussed in cultural heritage site management guides. It shall be noted that conservation of C.H. sites is often accompanied with excavation, exploring, removal of debris, and communicating with local inhabitants that may be relocate from the site and other uncertainties and risks which may affect the work procedure and progress. Therefore, there is always potential of raising claims by the client, financers, local people, contractors, etc. Thus, claim management may be helpful for the cultural heritage site management.

Future Directions

Proposed Management Scheme

The main documents, which enlighten the management procedure, are proposed by adding the

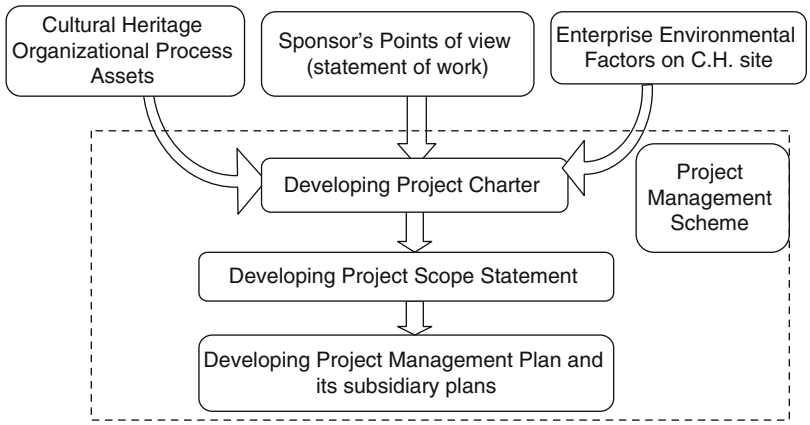

Cultural Heritage Project Management Based on Project Management Body of Knowledge (PMBOK),
Fig. 1 Preparing management scheme

guidelines for project management and cultural heritage site management. Due to space limitation, they are presented very briefly in this entry. There are three major documents described within the PMBOK Guide and each has a specific purpose (PMBOK Guide 2004):

C.H. Site Charter formally authorizes the project and provides the project manager with the authority to apply organizational resources to project activities. Project charter needs 3 major inputs (see Fig. 1).

C.H. Site Scope Statement states what work is to be accomplished and what deliverables need to be produced.

C.H. Site Management Plan states how the work will be performed and consists of subsidiary plans (Scope Management Plan, Schedule M. P., Cost M.P., Quality M.P., Staffing M.P., Communication M.P., Risk M.P., Procurement M.P., Safety M.P., Environmental M.P., and Financial M.P.)

Therefore, in order to develop a cultural heritage conservation project scheme, we shall collect main inputs of:

- Cultural Heritage Organizational Process Assets, which have been prepared or practiced before in the organization, such as quality assets (ICOMOS and other national and international charters, standards and regulations), standards, guidelines, templates, cost and accounting control regulation, countries laws and regulations, documentation and communication requirements, etc.
- Statement of Work (SOW), which is a narrative description of products or services to be supplied by the project. It may be submitted by the project sponsor, including items such as product scope description, business need, project stakeholders, and organization strategic plan
- Enterprise Environmental Factors, which are environmental factors and systems that surround and influence the project's success, such as organizational culture and structure, governmental or industry standards (tourism standards, product standards, quality standards, and workmanship standards), available site infrastructure (existing human resources, marketplace conditions), stakeholder risk tolerances, commercial databases, and environmental data (climate, soil, geotechnical, tectonic, culture of surrounding people, etc.)

And the output shall be the project management scheme consisting of the below items. Due to lack of space, just a few headings are mentioned:

Project Charter

This document shall address items such as requirements that satisfy sponsor and other stakeholder needs and expectations, establishing management philosophy, determining the conservation policy, collection of legal documents and regulations, defining objectives and short- and long-term goals, summary of milestone schedule, defining relation between visitors

and local population, improving local economic relations, defining business needs and high-level project description, determining product requirements and project purpose, assigning project manager and authority level, determining executing organization, determining project stakeholders and their influences (also their functional organizations and their participation), organizational and environmental assumptions and constraints, business case justifying the project (including return on investment), and summary budget (determining cost control policy).

Project Scope Statement

This document shall address items such as project and product objectives, product or service requirements and characteristics, product acceptance criteria, project boundaries, project requirements and deliverables, project constraints, project assumptions, initial defined risks, schedule milestones (such as investigation periods, considering weather, or tourist season), initial WBS, project configuration management requirements, approval requirements, collection of basic data, reports about present situation, determining minimum required conservation measures by considering values and priorities, submission of suggestion with least loss, noting limits and obstacles, and conservation and protection of cultural resources as a priority.

Developing Project Management Plan

This document shall address items such as the project management processes selected by management team and level of implementation, how the selected processes will be used to manage the specific project (including the dependencies and interactions among those processes and the essential inputs and outputs), descriptions of the tools and techniques to be used for accomplishing those processes, how work will be executed to accomplish the project objectives, how changes will be monitored and controlled, how integrity of the performance measurement baselines will be maintained and used, the need and techniques for communication among stakeholders, developing research and study plan, studying relation between visitors and local population, reporting investigations, studying previous measures, the selected project life cycle (and for multiphase projects, the associated project phases), key management reviews for content (also extent and timing to facilitate addressing open issues and pending decisions), documentation of procedure for all monuments and buildings and their appurtenances and site views, categorizing and evaluating resources, scheduling the major activities, determine priorities for future measures, developing yearly plans, submission of management plan for approval, reporting about planning and implementation documents, risk register (including probable risks, their possible influences, probability of occurrence, possible response to them, etc.), project management plan, and other components such as milestone list, resource calendar, schedule baseline, cost baseline, and quality baseline.

Project management plan itself may be composed of subsidiary plans and other components:

- Project scope management plan: describes how the project scope (and boundary) will be defined, verified and controlled, and how the work breakdown structure will be defined
- Schedule management plan: describes how to developing and controlling the project schedule (timing)
- Cost management plan: how cost estimate, control and budgeting shall be done
- Quality management plan: how implement the performing organization's quality policy
- Staffing management plan: how and when project team members will be acquired and released, and addresses to identification of training needs, plans for recognition and rewards, compliance considerations, safety issues, and impact on the organization
- Communication management plan: describes communications needs and expectations for the project, how and in what format information will be communicated, when and where each communication will be made, and who is responsible for each type of communication
- Risk management plan: how to schedule, plan, identify, analyze, and respond to risks
- Procurement management plan: how the procurement processes will be managed

- Project safety plan: guides and recommend how to perform the work to reduce accidents, protect workers, public and properties from probable damages
- Environmental Management plan: describes how to assess environmental conditions and impacts of project on surrounding environment and vice versa, which environmental standards and concepts shall be satisfy and how to be satisfied
- Financial management plan: defining financial status, economic conditions, source of funds, possible incomes and their probable time, visitor's management, etc.

With the help of the above structure, it is expected to have an alternative systematic method for management of a cultural heritage site.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Cultural Heritage Management: Project Management
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Heritage Areas
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ International Organization for Quality Management of Cultural Heritage (HERITY©)
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

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Cultural Heritage Protection: The Legal Sphere

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Introduction

In an overview, cultural heritage may be seen as the material remains of the past, created by human endeavor, and held preserved by nations or subset political bodies, which are the domain of the cultural group within which they are

created. The cultural group puts the items into context and imparts the meaning by which they are regarded. The political unit establishes the rules for compliance, enforcement, and resolution of claims for control or return of cultural items. The meaning and importance attached to places and items of cultural heritage are in part a product of the custom and use of the cultural group. When items are held within a group, the local understanding and cultural ethic will constrain improper use or transfer. Such internal rules are often referred to as common law. In times of war or other international actions, such as development or exploration, outside actors may not be imbued with the same ethic. Graffiti on historic sites and removal of items from sites by those for whom the site does not hold revered interest creates a need for local protection ordinances.

Definition

The legal sphere in protecting cultural heritage has at its core the ethics of the cultural group within which the items were created, have meaning and use, and intrinsic value; this exists within the context of the political units that set compliance ordinances for use, access, and transfer; enforcement actions for harmful acts; and tangible and intangible property rights protections.

Key Issues/Current Debates/Future Directions/Examples

Private Cultural Heritage and Internal Rules – The Common Law: The rules of the creating cultural group determines individual or group control, the allowable scope of internal or external knowledge dispersal, maintenance and consumption of heritage items, or their release from use, and the availability for private or public use in what is known as the marketplace. Privately held items, not made for or considered for public consumption and trade, are thus not typically brought under trademark, trade-name, or copyright protections. Those are tools for protection of property rights in the marketplace.

Within the group, there is an orderly nature of the protection and use of cultural heritage that has developed over time as the common law. The common law is that of organized, civilized, cultural groups of homogeneous thought. The common law is the rules of the group, which are so well understood, that they are not and need not be written in texts. Over time, external impacts, such as war, migration, cultural infusion, and assimilation, bring into play competing interests in property. Conflicts may arise between groups, to be resolved by those of superior ability to control. These notions play out over time and nations. The common law is assumed within the legacy of group knowledge and may be insufficient to resolve property protection issues when competing doctrines of control, or imposition of self-interest over the group, are present. It is then the role of legal code, which is statutory law, to impart order into competition for control of property.

Statutory imperatives: There are compliance laws and enforcement laws, which regulate access and use of and protection of cultural heritage, respectively. There are also laws of restitution, repatriation, and compensation, which sort out the effects of takings by war, superior imposition of action without property right, or other conflict over time.

Compliance

Compliance laws establish legal requirements for care of sites prior to infrastructure development, for prior notice to potential owners or cultural groups with an interest in a site or objects, and for permission to excavate or for other actions which will impact heritage sites or monuments. Examples of such statutes in the United States are the National Historic Preservation Act, which establishes a National Register of Historic Places for sites of significance and which together with the National Environmental Policy Act requires consideration of impact to heritage sites prior to invasive and possibly harmful action. There are also laws in the United States, France, and other countries which allow funds expended to

rehabilitate or restore historic properties to be used as income tax credits for the private owners. Typically compliance laws exist at the national level, to be effective on actions within that nation.

There are zoning laws throughout the world in countries which indicate the uses for real estate in certain areas to protect historic districts and to maintain the character of heritage sites. Even in liberal democracies, there is an ability of government to establish an aesthetic environment, using the police power of government, to regulate how a local area will be maintained. When private property is controlled willingly by the private property owner to maintain an historic façade in an historic district, the private property owner may give the permission or be compensated. Zoning most often occurs at the local level, such as locally designated historic districts.

There are also laws that enable scientific data retrieval or other extractive activities on public heritage lands for the benefit of society in addition to scientific and historical knowledge. The permits given to investigations at heritage sites confer access and/or use, but do not change ownership of heritage sites and items. Permits may be issued by a local or national authority, for lands within local or national control.

These examples are all laws to protect cultural heritage, sensitive to market demands, evolving use of land, and desires to preserve heritage. The political unit establishes the laws, but the land manager will utilize the laws as tools to regulate access and use of heritage sites, as well as to establish heritage monuments and districts on public and private lands.

Enforcement

There are enforcement laws which prohibit consumptive use of heritage assets for self-interest, damage without authority of a permit, or theft. These laws establish prosecution and punishment of wrongdoing. Punishment may include incarceration and/or a fine. An example of such a law in the United States is the Archaeological Resources Protection Act (ARPA), which established permits for lawful data retrieval and also penalties for theft, destruction, or sale of heritage items without permission. Local laws may establish fines, but laws such as ARPA are national in scope.

Enforcement of civil laws, where money damages are the issue, can be brought in court by the land manager. When the punishment includes incarceration, the action is criminal and is actually a matter assumed by the state or national court. The land manager is then a witness, an expert on the nature of the object and its heritage value, and stands in for society as the aggrieved party.

Restitution/Repatriation/Compensation

There are also laws for the resolution of competing claims to cultural heritage. If the possessor is determined not to hold a lawful ownership interest, a court may require the item be restituted to the proper owners. When there is an inability to return items, resolving owner interests may include compensation. Repatriation is the act of returning items to a cultural group. In the United States and Australia, laws require repatriation of items to indigenous people that were previously removed without permission from the indigenous group or tribe. These laws have international implications when the out-of-country rightful owner seeks to enforce their rights in the nation in which the object is held.

Examples of these laws include statutes allowing restitution for Nazi confiscated art, repatriation of cultural items by dominant society to indigenous culture, such as the Native American Graves Protection and Repatriation Act in the United States, and return of looted or conscripted items recognized by nations as protected items and listed under UNESCO Conventions for return of looted items in international commerce. Laws can also include monetary damages, when the item has been destroyed or lost. Each nation must recognize the rights of the nonnational when foreign owners pursue their rights in objects held in other nations, or nations seek restitution.

Conclusion

The concepts of community norms for cultural heritage preservation and protection through compliance and enforcement laws can be seen across nations and across time. In multicultural

society, where common law or moral law notions are mixed or disregarded by individuals, the codified law can afford some protection and assign responsibility to deter destructive action and provide some punishment and restitution, or repatriation, to resolve the interests of the victim. Good heritage management begins with knowing the extent of the heritage resource and taking steps to deter and prevent harm with barriers, signs, and public education. When reasonable means fail to protect heritage resources, and voluntary steps are not forthcoming, then the law provides incremental tools to establish protections, limit or regulate access and use, and if the need arises, to punish destructive acts.

Cross-References

- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ UNESCO (1972) and Malta (1992) Conventions

Further Reading

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Cultural Heritage Site Damage Assessment

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Introduction

Cultural heritage sites throughout the world are harmed on a regular basis by unauthorized damage. This damage may be accidental or intentional and may occur in association with other authorized acts or as a result of looting or vandalism of cultural heritage sites. Inadvertent unauthorized damage from authorized activities, for example, timber harvesting, occurs when these activities exceed the scope of their allowable impacts, such as operating in areas where they are not permitted. Looting involves the theft of artifacts and other cultural materials from cultural heritage sites. This causes damage to the context of the sites through the removal of these items and the activities associated with their removal, such as unauthorized excavation. Vandalism is damage to cultural heritage sites, resulting from malicious acts, the purpose of which is to leave the perpetrator's mark on the site or to harm it solely to cause injury.

Because cultural heritage sites must be protected in order to effectively manage them now and for the future, actions to attempt to prevent unauthorized damage to them are an essential component of cultural heritage management. These actions fall into two basic categories. The first is investigation and criminal or civil prosecution of those involved the unauthorized damage. The second is education of the general public to inform them about this problem and the need to protect cultural heritage sites. Assessment of the damage to cultural heritage sites is a necessary step in investigation and prosecution actions. It is a forensic process akin to the job of the medical examiner or forensic pathologist in a homicide case.

In the United States, there are legal and professional standards for assessing damage to cultural heritage sites caused by unauthorized damage. The legal standards derive from the Archaeological Resources Protection Act (ARPA), a statue enacted by the United States Congress in 1979 (16 United States Code Section 470aa-mm). The provisions of this statute are enhanced by implementing regulations, the ARPA Uniform Regulations, that were adopted in 1984 by the four major departments of the United States government that manage cultural heritage sites. The professional standards are based on a damage assessment methodology that has been developed over

the past 34 years by the author (McAllister 1981) and other archaeologists involved in this effort. Since 2000, the author's firm has presented a five-day class for archaeologists on archaeological damage assessment that has also helped to develop professional standards. In 2003, the Society for American Archaeology (SAA), the organization that represents the majority of professional archaeologists in the United States, adopted professional standards for the determination of archaeological value, one critical component of the measures of the harm resulting from unauthorized damage (see below). Also, the United States National Park Service has published a technical brief entitled, *Archeological Resource Damage Assessment: Legal Basis and Methods* (McAllister 2007). These legal and professional standards are the basis for the discussion which follows.

This damage assessment methodology has been developed specifically for use in the United States. As will be discussed further later, it could be employed in other countries, presuming that comparable legal and professional standards for damage assessment exist in these countries.

Definition

Assessing unauthorized damage to cultural heritage sites is the process of determining the severity of harm to these sites caused by the effects of the damage. It is part of the investigation of the damage, and its results are used in the effort to prosecute those who are responsible.

Three steps are involved in the damage assessment process. The first is on-site examination and documentation of the damage. Second, the severity of harm is determined using measures accepted in the legal system. Third, a damage assessment report is prepared that describes and explains the procedures and findings of the first two steps.

Procedures

On-Site Examination and Documentation of Damage

Four operations must be accomplished in the on-site examination and documentation of unauthorized damage to cultural heritage sites, all of which involve standard archaeological data collection methods. These operations have been described as follows:

1. Identification of the … [cultural heritage] resource damage locations:
   a. Identify all damage locations.
   b. Attempt to distinguish new damage locations from old damage locations, if the latter are present.
2. Identification of the … [cultural heritage] resources damaged and the damage to them:
   a. Identify … [legally protected cultural heritage resources].
   b. Identify the damage to these resources in terms of … [prohibited] acts.
3. Measurement of the amount of … [cultural heritage] resource damage:
   a. Make accurate tape measurements of the amount of damage, unless other, more sophisticated quantification methods are available (see 3b.). To meet forensic standards of documentation, make as complete a series of measurements as possible given the time available. Either metric or English standard measurements (e.g., inches, feet, yards) may be used … Note that if the damage has extended below the surface of a site, depth measurements are important. Sufficient measurements should be made to calculate the volume of damage.
   b. Use other more sophisticated methods to quantify the amount of damage, such as total station or 3D laser scanning. More detailed measures such as these may be employed to complete an assessment, following the initial use of tape measurements.
4. Documentation of findings:
   a. Take accurate and complete notes on all aspects of the field damage assessment process.
   b. Photograph the damage locations, the … [cultural heritage] resources damaged and the damage to them.
   c. Map the damage locations.
   d. Documentation should be as detailed and objective as possible (McAllister 2007: 8-9).

Determination of Severity of Harm

In cases of unauthorized damage prosecuted under the federal law in the United States, the severity of harm is determined using two of three measures identified in the ARPA statute, commercial value, archaeological value, and cost of restoration and repair. Criminal charges or civil penalties are based on the total monetary amount of either commercial value and cost of restoration and repair or archaeological value and cost of restoration and repair. Definitions of these values and costs are established by Section __.14 of the ARPA Uniform Regulations:

> Archaeological value. For purposes of this part, the archaeological value of any archaeological resource involved in a violation of the prohibitions in § __.4 of this part or conditions of a permit issued pursuant to this part shall be the value of the information associated with the archaeological resource. This value shall be appraised in terms of the costs of the retrieval of the scientific information which would have been obtainable prior to the violation. These costs may include, but need not be limited to, the cost of preparing a research design, conducting field work, carrying out laboratory analysis, and preparing reports as would be necessary to realize the information potential (Section __.14(a)).
>
> Commercial value. For the purposes of this part, the commercial value of any archaeological resource involved in a violation of the prohibitions in § __.4 of this part or conditions of a permit issued pursuant to this part shall be its fair market value. Where the violation has resulted in damage to the archaeological resource, the fair market value should be determined using the condition of the archaeological resource prior to the violation, to the extent that its prior condition can be ascertained (Section __.14(b)).
>
> Cost of restoration and repair. For purposes of this part, the cost of restoration and repair of archaeological resources damaged as a result of a violation of prohibitions or conditions pursuant to this part shall be the sum of the costs already incurred for emergency restoration or repair work, plus those costs projected to be necessary to complete restoration and repair, which may include, but need not be limited to, the costs of the following:
>
> 1. Reconstruction of the archaeological resource
> 2. Stabilization of the archaeological resource
> 3. Ground contour reconstruction and surface stabilization
> 4. Research necessary to carry out reconstruction or stabilization
> 5. Physical barriers or other protective devices, necessitated by the disturbance of the archaeological resource, to protect it from further disturbance
> 6. Examination and analysis of the archaeological resource including recording remaining archaeological information, where necessitated by disturbance, in order to salvage remaining values which cannot be otherwise conserved
> 7. Reinterment of human remains in accordance with religious custom and state, local, or tribal law, where appropriate, as determined by the Federal land manager
> 8. Preparation of reports relating to any of the above activities (Section __.14(c))

The combination of archaeological value and cost of restoration and repair provides the most accurate measure of harm to the behavioral context of cultural heritage sites resulting from unauthorized damage. Commercial value is used primarily for artifact trafficking cases.

National Park Service Technical Brief 20 includes a step-by-step methodology for making each of these determinations and that for archaeological value is based on the SAA professional standards for this determination. These professional standards also are presented and used in the 5-day class on archaeological damage assessment offered by the author's firm. Their use in cases involving unauthorized damage to cultural heritage sites in the United States is highly recommended to archaeologists who will conduct the damage assessments.

Damage Assessment Report Preparation

Damage assessment reports for unauthorized damage to cultural heritage resources in the United States typically include the following sections:

1. Introduction
2. [Cultural Heritage] . . . Resource Description
3. Field Damage Assessment Procedures
4. [Cultural Heritage] . . . Resource Damage
5. Value and Cost Determinations
6. Conclusions
7. Summary (McAllister 2007: 22)

Information on the location of the resource may be included as part of its description or as a separate section.

Statutes prohibiting unauthorized damage to cultural heritage sites will have legal elements that must be proven for a successful criminal or

civil prosecution. For example, if the statute has a definition of a cultural heritage site or resource, it will have to be shown that this definition is met. The goal of a damage assessment report is to describe and explain the procedures and findings of the examination and documentation of the damage and the determination of the severity of harm so that there is convincing proof that these legal elements are met.

Evaluation of the Damage Assessment Methodology

When used properly, the methodology for assessing unauthorized damage to cultural heritage sites developed in the United States has worked well in cases that have been charged and prosecuted under ARPA. The methodology also has been used in cases brought under other statutes of the United States that can be used to protect these sites, either in addition to or in place of the ARPA statute, such as the theft and injury of government property statutes (18 United States Code Section 641; 18 United States Code Section 1361). In addition, this methodology has been adopted for use in two relatively new United States' statutes that protect submerged cultural resource sites and paleontological resource sites, the Sunken Military Craft Act of 2004 (10 United States Code Section 113, 1401–1408) and the Paleontological Resources Preservation Act of 2009 (16 United States Code Section 470aaa-1-11). Also, it has now been codified in a new cultural heritage protection statute of the State of California (California Public Resources Code Section 5097.5-5097.993).

In a recent article, an amendment to the ARPA statute has been proposed that would extend its jurisdiction to protect submerged cultural heritage sites on the Outer Continental Shelf:

> This amendment does not state that the United States has fee title to the Outer Continental Shelf but does assert our nation's sovereign rights and exclusive jurisdiction over activities controlled by ARPA that occur there. As a result, this proposed amendment would appropriately extend ARPA jurisdiction to the Outer Continental Shelf and would improve and expand protection of the extensive underwater cultural heritage located there (McAllister et al. 2011).

This would provide a firm legal basis for the use of the damage assessment methodology for unauthorized damage to these sites.

Clearly, this methodology has been shown to have broad applicability in the United States, even when the ARPA statute does not apply for definitional or jurisdictional reasons. The components of this methodology involving on-site examination and documentation of damage and preparation of a damage assessment report are standard operations that would be applicable in any legal context. Although the legal definitions of the measures of the severity of harm come directly from the ARPA Uniform Regulations, they are based on common sense or archaeological concepts that are not strictly tied to the legal system of the United States. They can be restated in simple, nonlegal terms as follows:

- Commercial value: What is the current monetary worth of an object removed from cultural heritage site without authorization?
- Archaeological value: What would have been the cost of an archaeological project to scientifically investigate the damaged portion of a cultural heritage site before the unauthorized damage occurred?
- Cost of restoration and repair: What amount of money has been or would be expended to attempt to restore the damaged portion of a cultural heritage site to the condition it was in prior to when the unauthorized damage occurred?

Therefore, it is reasonable to assume that this damage assessment methodology could be used effectively in criminal or civil prosecution of those involved in unauthorized damage of cultural heritage sites in other countries.

Key Issues

Obviously, the damage assessment methodology developed in the United States can only be employed when statutes exist that prohibit unauthorized damage to cultural heritage sites

and make such actions subject to criminal penalties, civil penalties, or both. The use of the damage assessment methodology in other countries would be viable presuming that statutes of this type have been or could be enacted. It cannot be employed in legal jurisdictions in which such statutes do not exist or do not apply because there are then no legal standards for the use of the methodology.

In addition to this basic issue, there are five others that will affect the use of the damage assessment methodology in any legal jurisdiction where there are statutes prohibiting and penalizing unauthorized damage to cultural heritage sites. The first two relate specifically to the practice of damage assessment while the other three are broader and affect whether or not there will be a need for damage assessment. These issues can be summarized as follows:

- A lack of professional standards for assessing damage to cultural heritage sites
- Failure by archaeologists to adhere to legal and professional standards when assessing damage to cultural heritage sites and resulting prosecutorial problems
- A lack of support from land managers for investigation and prosecution of cases of unauthorized damage to cultural heritage sites
- The failure of law enforcement officers to detect and properly investigate such cases
- A lack of interest from prosecuting attorneys in pursuing cases of unauthorized damage to cultural heritage sites which they see as a "victimless" and, therefore, less serious type of crime

Future Directions

All of the issues identified above need to be addressed in future efforts to better protect cultural heritage sites. Clearly, statutes prohibiting and penalizing unauthorized damage to these sites should be enacted in legal jurisdictions where they not exist currently. Also, existing statutes, even the venerable ARPA statute of the United States, can potentially be amended to improve their protective measures. The lack of professional standards for assessing damage to cultural heritage sites and the failure of archaeologists to follow both legal and professional standards in conducting these assessments must be addressed and acted on by the professional archaeological community in the legal jurisdiction where the sites are located. The existence of these standards and adherence to them by archaeologists should help convince land managers, law enforcement officers, and prosecuting attorneys that professionally credible and legally sustainable assessments of damages will be produced. A more difficult task is increasing the commitment of land managers, law enforcement officers, and prosecuting attorneys to the detection, investigation, and prosecution of cases of unauthorized damage to cultural heritage sites. It will require the combined efforts of descendant groups, the professional archaeological community, and supporters among the general public using a wide array of consciousness-raising strategies to convince these government officials that cultural heritage sites are irreplaceable resources that must be protected not only through public education but also through enforcement.

Summary and Conclusions

In the United States, there are legal and professional standards for assessing damage to cultural heritage sites caused by unauthorized damage. The legal standards derive from the ARPA statute and the act's Uniform Regulations. The professional standards have been formulated in conjunction with the development and use of an archaeological damage assessment methodology. The purpose of this methodology is to determine the severity of harm to these sites caused by the effects of the damage. Three steps are involved in the methodology; on-site examination and documentation of the damage, determination of the severity of harm from the damage, and preparation of a damage assessment report. What are referred to as commercial value, archaeological value, and cost of restoration and repair are the legally established measures of harm. This damage assessment methodology is applicable not

only to criminal and civil violations of the ARPA statute but also to violations of other federal or state laws that prohibit and penalize unauthorized damage to cultural heritage sites and also may be extended to damage to sites on the Outer Continental Shelf. Although there are legal and professional issues that can affect the use of the archaeological damage assessment methodology that has been developed in the United States, it certainly could be used in criminal or civil prosecution of those involved in unauthorized damage of cultural heritage sites in other countries.

Based on over 30 years of experience with this archaeological damage assessment methodology in the United States, it is known that it can be highly effective in determining the severity of harm to cultural heritage sites from unauthorized damage. Therefore, other countries should consider adopting it for use in conjunction with their existing statutes or those that may be enacted protect these sites.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage and Public Policy
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: History and Context
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ United States: Cultural Heritage Management Education

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Cultural Landscapes: Conservation and Preservation

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Introduction

Cultural landscapes offer a way of understanding how societies interact with their environment. Built features and land modifications combined with the natural landscape are the cultural landscape expression that holds records of how communities live in time and space within a landscape. Records of human activities may extend back in time for thousands of years to tell the story of the economic organization of a long past society such as the "Kuk Early Agricultural Site", Papua New Guinea, and "Schokland and Surroundings", the Netherlands, that is land reclaimed from the sea containing vestiges of historic and prehistoric human habitation. More extensive cultural landscapes, such as the "Incense Route and Desert Cities in the Negev", Israel, combine associated fortresses and agricultural landscapes in the Negev desert with the relics of their sophisticated irrigation systems, urban constructions, forts, and caravanserai (examples from UNESCO World Heritage List 2012).

The introduction of new concepts during the twentieth century such as new ecological ideas, innovative trends in the study of geography, anthropology, and other disciplines, provided a new consideration of the landscape, especially from a cultural point of view. The long process that changed the concept of landscape resulted in the consideration of landscapes as complex living beings having physical structure, as well as immaterial, intangible values that give meaning. In the recent decades, cultural landscapes have been referred to as "historic landscapes" or "vernacular landscapes" to describe areas evidencing features constructed in the traditional style of a cultural group. The United States Park Service provides definitions of the historic and vernacular landscapes as well as ethnographic landscapes and notes that they fall under the umbrella of cultural landscapes (Birnbaun 1994).

The concept of cultural landscape that incorporated the spatial dimension along with the temporal and intangible qualities was mirrored in archaeology but in reverse. Where the important temporal and macrogeographical factors had been of importance, the local spatial dimension and intangible qualities became of increasing significance. Landscape archaeology, ideally as a multidisciplinary study, focuses on the interaction of the natural environment with human-induced processes through time. It is argued that all archaeology is landscape archaeology. Archaeologists use the term "archaeological landscape" to describe landscape areas that are interpreted from scientific studies such as for the World Heritage inscription of the "Petroglyphs within the Archaeological Landscape of Tamgaly," Kazakhstan; "Gobustan Rock Art Cultural landscape," Azerbaijan (UNESCO World Heritage List); and "Kuk Early Agricultural Site" where archaeological research established human agricultural practices dating to over 6,000 years BP (Denham et al. 2004: 853) (Fig. 1).

Precedents for the term "cultural landscape" can be found in works by German and French historians and geographers, but the geographer Carl Sauer is widely cited and given credit for introducing the term in his work "Morphology of Landscape," published in 1925, where he described cultural landscapes as "culture is the agent, the natural area is the medium, the cultural landscape is the result" (Shein 2004: 13-4). Later J. Brinckerhoff Jackson in his work "Discovering the Vernacular Landscape" (1984) claimed that all landscapes are inherently cultural, so that "cultural landscape" is a pleonasm.

Cultural Landscapes: Conservation and Preservation, Fig. 1 An archaeological agricultural mound of the "Kuk Early Agricultural Site", Papua New Guinea (Courtesy of The Kuk archive, Australian National University)

Since 1992 when the United Nations, Educational, Scientific and Cultural Organization (UNESCO) adopted "cultural landscapes" for describing and valuing heritage, the term has become increasingly popular. However, despite the increasing appreciation of cultural landscapes as heritage properties, in the twenty-first century, their management and conservation remains challenging.

Definition

As the term "landscape" relates to several different disciplines such as geography, anthropology, archaeology, architecture, urban planning, and regional planning, all of which offer different views and definitions, the meaning of "landscape" can be ambiguous. However, the various disciplines hold in common the understanding that landscape is an entity based on perception. The European Landscape Convention Article 1 (2000) defines landscape as "an area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". The definition adds a human perception to the classic definition of landscape, regarding landscape as a dynamic event (Zoido 2010: 207). All landscapes thus reflect the interaction between people and the environment through time and space, and therefore it can be understood that every landscape is a cultural landscape, "because humans modify the landscapes in which they live, and because they attach names, myths and affective value to features of the territory they inhabit" (Lipe 1984: 1). The landscape, therefore, can be interpreted as a dynamic code of symbols that tells us about the culture of its past, its present, and its future that may become an outstanding heritage property to be conserved for future generations. People identify with the landscape they inhabit, and therefore, the role of landscape is fundamental in the construction and consolidation of a national or regional identity.

In the 1990s and in the twenty-first century, heritage sites shifted from a predominance of monumental architecture to include landscapes of high value to communities for their spiritual and economic sustainability. To fill gaps in global heritage, the World Heritage Convention gave status to the term "cultural landscape" by introducing cultural landscapes as a category of sites within the Convention's 1992 Operational Guidelines. In 1993, "Tongariro," New Zealand, became the first cultural landscape under the Convention to be given World Heritage protection. To provide direction for identification and management, the World Heritage Convention added to their basic definition of cultural landscapes – representing the "combined works of nature and of man" – by delineating three categories of cultural landscape in the 1999 Operational Guidelines: the "clearly defined," the "organically evolved" (relict or continuing), and the "associative" (UNESCO 1999: 9-10).

Cultural Landscapes: Conservation and Preservation, Fig. 2 Segment of the Subak rice terraces, Bali Province, Indonesia

Clearly defined landscapes are those designed and created intentionally by man and are usually highly modified to incorporate style ideals or planned economic exploitation such as the "Garden Kingdom of Dessau-Wörlitz," Germany; "Aranjuez Cultural Landscape", Spain; and the "Royal Botanic Gardens", Kew, United Kingdom. Pastoral or agrarian landscapes that may have developed over many years would be within the "continuing evolved" category. Some of the continuing evolved landscapes that retain a traditional land use practice have little modification such as the "Orkhon Valley Cultural Landscape," Mongolia, while other rural productive landscapes may express extensive surface modification that have sustained communities for generations such as the "Rice Terraces of the Philippine Cordilleras" and "the Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana Philosophy" (Fig. 2). Numerous evolved landscapes are now relict such as the "Archaeological Landscape of the First Coffee Plantations", Cuba. Cultural landscapes in the associative category are generally minimally modified natural landscapes that have been utilized traditionally for hunting and gathering or, in other cases, valued for aesthetic and spiritual importance such as "Uluru-Kata Tjuta National Park," Australia; "Sacred Sites and Pilgrimage Routes in the Kii Mountain Range," Japan; and the "Koutammakou, the land of the Batammariba," Togo. (All examples are from UNESCO World Heritage List.)

The World Heritage definition and categories for cultural landscapes identify multiple points of view for consideration that bring cultural landscape close to archaeology. Cultural landscapes contain human history. They are a living memory and witnesses of past human settlements and their cultural influences, and they are currently considered as an important category of cultural heritage that is a product of the time and place of those who have created it and continue to shape it (Ashword & Tunbridge 2000: 10).

Key Issues/Current Debates/Future Directions/Examples

A fundamental problem is that the concept of a cultural landscape is still unknown in some regions, but building up an understanding of the importance of valuing cultural landscapes is increasing. The identification and description of a cultural landscape must have the full involvement and support of the local community and their traditional knowledge, particularly for describing tangible and intangible elements. Identification of heritage values must also be conducted through multidisciplinary studies.

The cultural landscape of "Kuk Early Agricultural Site" notes the involvement of the Kawelka people but also how multidisciplinary archaeological, archaeobotanical, and palaeoecological research revealed a phenomenal time depth of the agricultural practice and ancient plant domestication (discussed in detail by Tim Denham and colleagues 2004).

Management plans are a necessity for the conservation of cultural landscapes. Initiatives for special landscape management, that considered a property as having a heritage value, arose in the United States. Subsequently, similar management to that of natural parks developed, but with an added sociocultural component while offering an opportunity for local development. The basic premise for management plans is that cultural landscapes have dense significance that keep and convey information, and therefore, thorough research of it is an essential initial step. Detailed descriptions (inventory) of all features that form part of the heritage landscape are required and may include structures, watercourses, trees, landform features, archaeological sites, viewscapes and landscape areas, as well as their connections and interrelationships. Intangible aspects require documenting spiritual and other associative value, access to places of special meaning, past as well as current social structures, land use activities, and the linkages of these aspects with the landscape. The associative value of "Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana" demonstrates a traditional and disciplined social organization that has developed over a millennium for economic sustainable production. Importantly, it is a system of people and landscape that pays homage to spiritual life forces in a series of rituals that are an integrated component of the cultural system (UNESCO World Heritage List 2012, report 1194).

Delineating a suitable boundary for cultural landscapes, but particularly those in the evolved and associative categories, requires an understanding of societies that live or have lived in the area, determining the catchment of their economic land use as well as intangible associations and relationships of communities to the surface and subsurface features. The delineated cultural landscape must contain representation of significant land use activities, cultural life, and important symbolism. Boundaries may reflect a contiguous landscape or may need to include distant-related components to capture the full heritage importance. The heritage area of "Mount Wutai," China, consists of an extensive landscape area and a distant component area, while the "Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana" has five component landscape areas.

The harmonious relationships between people and their environment must be safeguarded in a management plan, and a wide range of different sectorial policies integrating traditional knowledge of local communities are needed. Management plans must respond to the needs and interests of the people and be owned by them. Communities associated with the landscape have an ongoing role in heritage management as well as ensuring that local knowledge and skills are passed on. Every case must consider how sustainable development can be adapted to specific local conditions. The Uluru-Kata Tjuta cultural landscape is a perfect example where nature and man act according to ancient rituals and customs, to a sacred law. It is the result of centuries of traditional management through *Tjukurpa*, a social code that governs the behavior of men, animals, and places for 5,000 years. The aboriginal Anangu are deeply involved in the management that includes a traditional regime of controlled fires while water sources are carefully tended, assuring the characteristic plant community. The "Richtersveld Botanical and Cultural Landscape", South Africa is owned and managed communally by the Nama people, a seminomadic population that assure the conservation of the seasonal patterns that may have persisted for as much as two millennia in southern Africa.

Defining acceptable changes with a predicted optimum outcome is a consideration for cultural landscape management planning. Conservation must also take account of distant factors essential to the health of the landscape, such as damming an upstream river that may alter the water table or water quality of the landscape. Management for

natural disasters is required along with measures to moderate possible threats that can damage heritage integrity such as excessive tourism and looting of heritage objects in open landscape areas. There are numerous other issues with regard to the conservation and protection of cultural landscapes, and the publication *Managing Cultural Landscapes* discusses many of the challenges under the chapter "Prospects and challenges for cultural landscape management" (Taylor & Lennon 2012: 345-64).

Protecting the cultural landscape can be resolved through legal measures relating to cultural heritage, such as natural heritage, town planning, territorial planning, protection of agricultural land, and protection of archaeological sites and objects. It is necessary to coordinate the various existing laws, the different administrations involved at all territorial levels, as well as the traditional governance of customary laws. Management plans require statutory ratification, while legal mandatory requirements for social value and archaeological research should be built into major development works. Other essential aspects are public awareness and specific training for the management of cultural landscapes.

Not all countries have legal measures in place. Legal framework varies in a very wide range, but not always national legislation includes specific and strong traditional land management practices that must be coupled with adequate funding to support conservation of cultural landscapes. As an example, a legal framework for conservation protection measures of the "Kuk Early Agricultural Site" is the *Organic Law on Provincial and Local Level Governments (1995/1997)* used by local communities and provincial governments to declare and protect significant traditional sites independent of the central government (http://whc.unesco.org/uploads/nominations/887.pdf).

In 2007, the UNESCO World Heritage Centre published *World Heritage – Challenges for the Millennium* in which a chapter on cultural landscapes (Labadi 2007: 112-117) highlighted the concern over the imbalance of the listed cultural landscapes with over 70 % located in Europe and which reflected only positive interpretations of human practices in cultural landscapes. The listing of "Bikini Atoll," in the Marshall Islands, demonstrates a change in cultural landscape perception. The Bikini Atoll landscape exemplifies the violence exerted on the natural, geophysical, and living elements by nuclear weapons demonstrated by the damaged ecosystems and the terrestrial, marine, and underwater landscapes of Bikini Atoll. The nuclear tests changed the history of Bikini Atoll and the Marshall Islands, through the displacement of inhabitants and the human irradiation and contamination (World Heritage List 2010: report 1339).

Although the World Heritage List has inscribed many cultural landscapes, there are important unlisted cultural landscapes throughout the world that embody values of national or local importance, need protection, and are subject to similar issues as faced by World Heritage cultural landscapes. Such landscapes, often regarded as "ordinary", are vulnerable to damaging development. In many countries, the resources of cultural landscapes are being exploited to produce green energy to counter the effects of climate change and energy demands. Farming landscapes are being invaded by an ever-increasing number of industrial installations such as wind farms, electricity stanchions, natural gas infrastructure, and production of biofuels. Undertaking national or regional thematic research and preparing inventories of cultural landscapes including their subsurface layers are desirable to safeguard landscapes of heritage importance. Building a balanced heritage list of cultural landscapes globally and nationally is an ongoing challenge particularly, as many countries do not have the resources for such research.

Cross-References

- ▶ Intangible Cultural Heritage
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)

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Cultural Property, Trade, and Trafficking: Introduction

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Introduction

Over the course of the past 50 years, the appetite for cultural property by individuals wanting to own a piece of the past has become voracious, resulting in damage to and destruction of countless archaeological sites, monuments, and communities. While some of the objects currently on the market have undoubtedly been in circulation before legislation was enacted to protect heritage material, the routine absence of substantial collecting histories has made it easy for recently looted artifacts to contaminate the licit trade.

Consequently, the illicitly acquired material has become so intermingled with the licit, as to be indistinguishable from it.

Definition

Despite the fact that cultural heritage has become accepted as terminology that more adequately reflects the values placed on manifestations of the past, in the context of trade, cultural property better reflects the commodification that tangible remains undergo when treated as merchandise. Definitions of cultural property are provided in Article 1 of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict and Article 1 of the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property.

Dishonest trading is implied more often than not in the use of the term trafficking.

Key Issues/Current Debates/Future Directions/Examples

It is self-evident that dealers exist to satisfy demand. Demand is hyped by advertising and skilful marketing of wares (Fig. 1). Transparency about sources of stock is largely absent. However, given the demonstrable destruction of sites and monuments, such secrecy leads to suspicion that objects on the market without provenience and verifiable collecting histories are likely to be the product of looting.

The ongoing trade in the cultural heritage of indigenous peoples, who have suffered egregious losses of their material heritage historically, damages communities and violates their cultural rights.

Many art-rich countries have national patrimony laws vesting ownership of their cultural heritage in the state. Its misappropriation is thus theft. Arguments by dealers and collectors that these states should patrol sites and control their borders more effectively are used to justify purchasing such artifacts. In addition, claims are made that without a market, metal artifacts would be melted down for bullion, and chance finds would be destroyed to avoid complications that might arise if they were to be reported to the authorities. The excellence of curation by wealthy individuals and museums is contrasted with neglect by the originating state. The corruption of officials is also cited as a reason for disregarding national laws. Archaeologists are variously decried as a self-protecting, self-seeking group more destructive than looters in failing to publish the results of their excavations. The laws themselves are criticized as retentionist, nationalistic instruments that run counter to the universal value of the cultural property for all humankind. The fact that the legislation is tied to the borders of modern nation-states is also used to question the entitlement of their current populations to the remains of the past.

Heritage professionals have challenged these arguments as imperialistic, fostering an unwillingness to acknowledge the academic and social impact of the destruction of context. Without context, the ultimate goal of scientific excavation, any potential to interpret the past is grossly diminished as associated materials, structures, environments, and so forth are sacrificed in recovering the saleable object. Scientific excavation entails documentation of the process through field records including plans, sections, site notebooks, and photographs. Summaries of excavation seasons often appear promptly, and significant finds are often exhibited shortly after discovery prior to the final publication.

Political and economic instability coupled with conflict makes for extreme vulnerability of cultural property generally with devastating consequences. This has been evident in the Sumerian city sites of southern Iraq, in the Bactrian areas of Afghanistan and Pakistan, in Syria, and in many eastern European countries such as Romania and Bulgaria, to cite but a few examples (Fig. 2).

The advocates for the trade and collectors stand in stark opposition to advocates for archaeology. Evidence that connects an individual

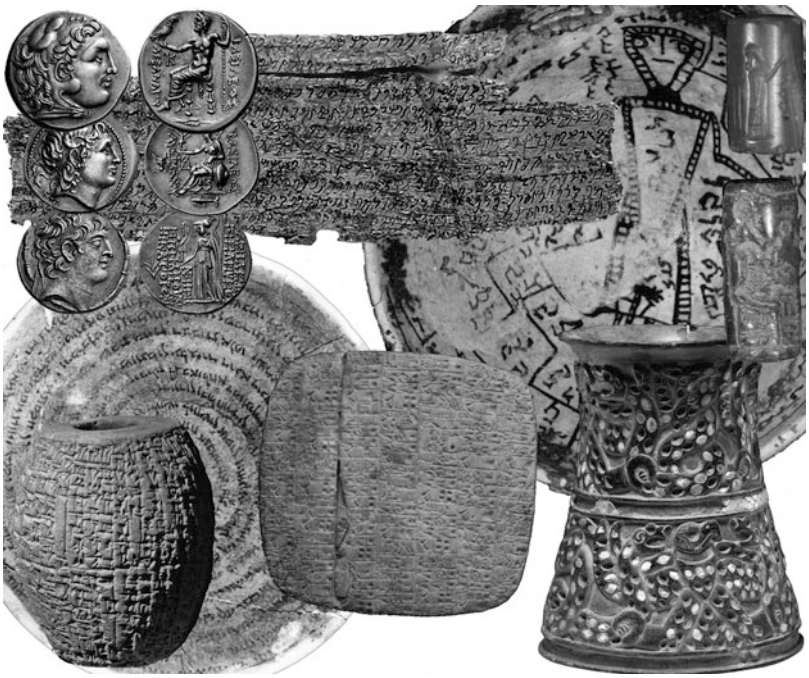

Cultural Property, Trade, and Trafficking: Introduction, Fig. 1 Compilation of marketed artifacts from areas in the Middle East that have been extensively looted (Courtesy of Stuart Laidlaw)

Cultural Property, Trade, and Trafficking: Introduction, Fig. 2 Aerial view of the Sumerian city-state of Isin, southern Iraq, devastated by looting, January 2004 (Courtesy of John Russell)

object to a hole in the ground is usually unobtainable. This makes detection of illicitly traded material and prosecution for trafficking very unlikely. It is in the interests of the illicit trade to obscure the origins of an artifact, and this laundering is facilitated by rapid turnover preferably across national borders multiple times, a process facilitated by the Internet. This lack of information also facilitates contamination of the market with forgeries.

Until recently, concern expressed by archaeologists and heritage professionals that dealers and collectors were fuelling the destruction of archaeological sites was rebutted as anecdotal accusation without foundation.

Scholars such as Ricardo Elia (Apulian red-figure vases, 2001), Vinnie Nørstok (Greek vases, 2002), and David Gill and Christopher Chippindale (e.g., collections and exhibitions of Classical artifacts, 2000) among others have conducted research in response.

Of wider effect has been the exposure of a trafficking ring by the Carabinieri Tutela Patrimoniale Culturale (Watson and Todeschini 2006). Their investigation resulted in the recovery of hard evidence that has resulted in the recovery by Italy and Greece of large numbers of extremely rare and valuable artifacts from museums such as the Metropolitan Museum of Art in New York and the J. Paul Getty Museum in Malibu, California (Felch and Frammolino 2011). Here the sequence of transactions from looting an object out of the ground to its acquisition and display in illustrious establishments has been clearly and indisputably demonstrated.

Nevertheless, because of the clandestine nature of the illicit trade, it has been a difficult area to research, resulting in insufficient data being available to pronounce definitively on the scale and value of the material being exchanged. In recognition of this, the European Research Council has awarded a very substantial grant for a team of investigators from the Scottish Centre for Crime and Justice Research, University of Glasgow, to research in this area with the aim of developing strategies to enhance the protection of cultural heritage (http://www.gla.ac.uk/research/researchfeatures/headline_219877_en.html).

ICOM, the International Council of Museums, has also announced its intention to create a new entity called the International Observatory on Illicit Traffic in Cultural Goods, pending approval of funding from the European Commission (http://worldnews.nbcnews.com/_news/2012/11/14/14944606-new-intelligence-body-set-to-fight-illicit-trade-in-worlds-priceless-treasures?lite).

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- ▶ International Council of Museums (ICOM): Code of Ethics
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Culture in Archaeology

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Introduction

With this entry I want to present some general ideas about the meaning of culture and how it has been used in the field of archaeology. As this tool of analysis has undergone changes throughout the history of the discipline, this entry provides a commentary on such changes and briefly introduces what constitutes the current debate regarding archaeological research objects.

Definition

It was with Emile Durkheim's work *Rules of the Sociological Method* ([1895]1994) that the systematization of the tools of analysis that enabled the investigation of society began. It is well known that within such systematization, Durkheim coined the term "social fact" to refer to the series of elements that laid the foundation of the subjects' behavior and that were exterior to the individual. The social fact had an independent existence from the subject, and thus, it was possible to investigate it scientifically or in other words sociologically. Durkheim suggested a methodological principle which would mark social and cultural research. In order to appreciate a social fact, Durkheim emphasized that it was sufficient to examine the force such facts would typically manifest when certain individuals did not respect a preestablished rule or agreement. Durkheim also argued that the study of the social facts was not related to the study of individual trajectories, a field kept for psychology; in this field, it was indeed legitimate to investigate why subjects refused to follow preliminary agreements. This individual refusal, Durkheim believed, did not detract from the fact of an agreement taken by the group as a larger whole and that this occurrence justified sociological inquiry with methods taken from the natural sciences.

The concept of shared agreements that are independent of individual subjectivity was the concept that enabled the emergence of the field of investigation in non-modern societies. This is called anthropology. In the first anthropological systematizations, such as those of British anthropologist A.R. Radcliffe-Brown (1986?), the object of anthropological investigation was defined as the relationship between subjects that does not vary even when they are absent. In Radcliffe-Brown's aforementioned work, a series of systematizations of kinship relations on a global level stand out, which proved the notion that the blood and non-blood relationships among subjects formed an organized framework independently from people. Radcliffe-Brown called this phenomena social structure.

In a further account, social structure exteriority, according to Radcliffe-Brown, enabled anthropology to be a science which would not be distinguished from physics or chemistry as its object of inquiry was not limited to subjective caprice. In this sense, Radcliffe-Brown established a methodological difference between anthropology and history, in which the first was charged with identifying recurrent phenomenon that, independently of the subjects, regulated social life; the second was charged with recording specific trajectories related to literature and biography.

In the American tradition, the object of anthropological investigation was not, in fact, social structure, although some starting points such as the extrasomatic nature of culture (White 1959) were shared. It should be noted that it is in the use of the notions of culture in American anthropology where one of the most important definitions of culture comes from. It was in the 1960s that Lewis Binford published an article (Binford 1962) in which it is pointed out that archaeology is anthropology. In this text, which became mythical within the discipline's history, Binford turned to Neo-Evolutionary proposals (White 1959) pointing out that culture is an extrasomatic complex in which there are symmetric relationships between political and economic systems. That is, to a determined economic system, there is, in turn, a determined political system. However, the most interesting point in Binford's proposal was his suggestion that it was possible to think in archaeological markers of economic and even political systems; thus, it was possible to inquire about the sequences of the social change. It should be mentioned that from that perspective, social change was understood as a way to make political and economic systems complex. The approach holding that culture was an extrasomatic means of adaptation in constant evolution was called processualism.

Besides the currents which focus on the way economic systems determine political relationships, not only in archaeology but also in anthropology, there are other strands favoring subjects' active roles in social and cultural change process. Culture, from this perspective, more than being just a tool, is a kind of script, where subjects can build their histories in accordance with their individual trajectories. This tradition that considers culture as a text is more related to hermeneutics (Hodder & Hutson 2003) and privileges the closeness of archaeology to history (Hodder 1987).

In terms of definitions, it may be possible to distinguish two significant conceptualizations of culture in archaeology: one that considers culture as an extrasomatic means of adaptation and another that considers it as a text that can be used to address the process of social change (Hodder 1989). The first could summarize what is considered processualism and the other what is referred to as post-processualism (Hodder 1985).

Besides metropolitan definitions of culture, in recent years, there has been an emerging movement of non-central peripheral theory that has stressed how the traditional definitions of culture, especially those of the British and American academy, have overemphasized stability while ignoring tension and conflicts, especially those that are emerging and have emerged from colonization (Trouillot 1992). Besides the terms and methodological principles for identifying culture already mentioned, there were others that considered culture as a mechanism of political answer before colonization processes (Leone 1995). As it is stated by the hermeneutic approach, this perspective suggests moving forward from an apparent local autonomy, focusing on the effects that the colonial politics produced on local communities. These definitions of culture have interesting names such as the notion of "colonial wound" made popular by Walter Mignolo's work (Mignolo 2005). As suggested by this notion, social investigation cannot ignore the fact that there are effects produced by the attempt to erase local communities on the pretext that those communities were obstacles to development. It has to be mentioned that in these inquiries what it is studied is not the other's culture but the hegemonic processes exerted on certain communities with the excuse of civilization or development.

Current Debates

At the end of the nineteenth century, as can be appreciated in Durkheim's work, there was a concern to demarcate a discipline which would address societal issues, understanding "society" as the set of subjects inhabiting a state (Anderson 1993). The purpose was to study the complexities of a social organization that, as the state, was thought of as a natural formation, inherent to civilization's developmental stages. What could not be perceived in the nineteenth century was that the state had been a construct that had enabled the development of all components of a commercially based, manufactured, and capitalist society (Patterson 2011).

As Renato Rosaldo (1991) suggested some years ago, this view which considers culture as an agreed-upon system of ideas that exist independently of the subject, as Durkheim's vision suggests, had the same definition of the state that Thomas Hobbes had proposed in 1651. To Hobbes, it was necessary that society would follow the path of progress, and in order for that to happen, he thought that there had to be a secular God, as a Leviathan, that brought together a series of agreements which, in turn, would enable the flow of all processes and mechanisms of a society which was, at that moment, beginning to globalize capitalism. Hobbes supposed that a society without a state, that is, an institution in charge of enforcing the series of agreements intended to safeguard individual autonomy, was in a "state of nature," which was worse since it was not possible that any institution would guarantee any kind of right. With this vision, Hobbes described a dichotomy which had been being woven throughout several centuries when nature was thought to be at one side and culture on another. Hence, Hobbes established an idea which is almost natural today, that society needs the state to go out from nature that is a place reserved only to savages (de la Cadena 2010).

From the moment the notion of culture emerged as a subsidiary concept stemming from the broader ideologies legitimating modernity (as the only way of possible social and cultural organization), such a notion of culture has been falling into disuse because when it is staged, as a category of analysis, it naturalizes the state. Culture is not necessarily a way of adapting to an environment where the political conflict harassing most of the tribal nations is absent. Neither is it a script that is designed and redesigned in a political vacuum. In current debates, it is more important to consider culture as the device that, for example, enables, locally, the detection of global practices (Gibson-Graham 1996), the resistance of social insertion, or the denunciation of collective rights violations. In the case of Latin America, archaeology, hand in hand with ethnic social movements, has given a way to question how the state and church banned and made local practices invisible (Gnecco & Hernández 2008). In this sense, archaeology has been a tool, among multiple tools, to the epistemological decolonization process (Haber et al. 2010).

Future Directions

Nowadays, there is a movement within social sciences that disposes of Durkheim's inherited view regarding what should be the object of investigation. For this reason, there is an increasing tendency to critique and dispose of the view of culture as a normative device which imposes itself on subjects. As Bruno Latour suggests (Latour 2008), nowadays, it is not about investigating social phenomena, but investigating how the social is a product of a series of associations taking place between human and nonhuman subjects. This discussion regarding the participation of nonhumans in the conformation of the social has returned the view to phenomena such as in animism, which were gradually ignored in anthropological investigation (Haber 2009).

Considering the nonhuman aspects of this discussion, it is possible to include the landscape. There exists an increasing tendency to understand the landscape as a subject that participates in the human symbolic constructions. This approach, known as the "phenomenological view," has interesting connection with another tendency exploring how, in social analysis, humans not only generate representations but also build

a world to inhabit (Inglod 2000). With this approach, the Western Cartesian idea "I think, therefore I am" has even been questioned, with the surrounding world increasingly construed within the terms of "inhabiting." Considering landscape and nonhuman actors, the sentence "I think, therefore I am" could be changed into "I inhabit, therefore I am." As can be noted in this reflection, it is more productive not to consider thinking as something completely abstract, but as something that requires being in a specific place in a series of concrete relationships with human and nonhuman actors. Undoubtedly, this is the direction in which the theoretical discussion will be orientated in archaeology in the following decades.

As with the previous concepts, given the increasing generation of local autonomies, especially in communities subordinated in the past, the notions of culture used in archaeology will have to take into account the decolonization project. This is happening around different parts of the world (Gnecco & Hernández 2008). Due to this tendency, it is most likely that archaeology will take alternate routes that will carry it away from being a science that only studies past behavior.

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- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Second Modernity and the Second Phase of European Colonialism

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Cuneiform and Cuneiform Artifacts

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Introduction

Cuneiform is a writing system of the ancient Near East, which was impressed into clay tablets, of which approximately 600,000 are known, or inscribed or stamped on to other types of media: seals made of precious stones, monumental stones, bricks, clay prisms, wall reliefs in monumental architecture. Objects inscribed with cuneiform records are studied as texts (i.e., for philological, linguistic, or historical information), but can also be studied as archaeological artifacts.

Definition

Cuneiform generally refers to a writing system used to express a variety of ancient Near Eastern languages. Specifically, cuneiform means "wedge shaped" and refers to wedge-shaped signs impressed in clay tablets to represent words, morphemes, syllables, or semantic indicators. Use of the writing system in the ancient Near East spanned more than three millennia, with invention occurring in the last centuries of the fourth millennium BCE in southern Mesopotamia and the last attestation dating to 75 CE. Over this time span, scribes adapted the writing system for different languages, administrative needs, or local traditions. The earliest cuneiform signs are curvilinear and pictographic, but signs gradually became more abstract. Correspondingly the earliest versions of cuneiform pictograms conveyed little phonological or grammatical information, but use of the system was repeatedly expanded or adapted to specific languages including Sumerian, Akkadian (and its linguistic relatives Babylonian and Assyrian), Elamite, Hittite, Hurrian, and a variety of other specific dialects such as Eblaite and West Peripheral Akkadian. In several eras, cuneiform was used to express languages after they were no longer spoken, preserving dead languages and archaic scribal conventions for archival or liturgical conventions.

The expansion of cuneiform also corresponded to developments in how writing was used. The earliest cuneiform records from the city of Uruk in southern Mesopotamia indicate the system was developed as a by-product of urban bureaucracy. Thus, the earliest texts generally involve economic and administrative information. Even though the majority of cuneiform tablets from the ensuing millennia are also concerned with economic and administrative information, the uses of writing expanded to other genres: literature, letters, law, magic and medicine, religious works such as hymns, monumental and royal inscriptions for kings, and even school texts pertaining to the study of cuneiform and cuneiform textual traditions. Because the media of cuneiform is clay or stone, inscribed objects survived historical turmoil and were even better preserved by city sackings, fires, demolitions, and construction projects in urban centers. Scribes throughout ancient Near Eastern history could actively engage in the compilation and study of older written traditions and works.

Key Issues

Since the first decipherments of cuneiform in the mid-nineteenth century, much scholarly energy was devoted to philology and reading inscribed

objects as texts, but scholars have also recognized the value of studying these objects as artifacts with a context, provenience, and social and material life. Technology-aided initiatives now enable study of both aspects of cuneiform records.

Events in both modern and ancient history complicated efforts to determine the context and lives of cuneiform records, particularly tablets, seals, and seal impressions, and objects inscribed to serve as building dedications. It is understood that most tablets from the Near East were at some time organized either in state or "public" archives (within temple or palace institutions), or private archives (in households of entrepreneurs, local leaders, or families with important stakes in urban political and economic life). At the time of recovery, tablets may have been located near an original archival context, or they may have been discarded and separated into a secondary context as trash or as the result of historical circumstances such as a city destruction or regime change. Construction and renovation projects, integral to the performance of Near Eastern kingship, also disrupted temple and palace archives, displacing inscribed objects of earlier generations.

In more recent history, information about archaeological context was lost during excavation and looting and the consequences of two World Wars interrupting excavations and the transport of finds. Many of the recovered cuneiform artifacts are housed in European and North American museums and university collections. Of the catalogued cuneiform documents in these collections, most were recovered by excavations during the nineteenth and early twentieth centuries or purchased in bulk from looters. During this time, texts were often viewed as non-archaeological material and removed without attention to context or record of find spot. The era of Western imperialism following the collapse of the Ottoman Empire and World War I witnessed more formal excavations and expeditions under the auspices of Western universities and societies and the introduction of new methods of expertise. However, sloppy extraction and sale of tablets and inscribed objects continued. After the US-led invasion of Iraq in 2003, a new phase of looting and illegal distribution of cuneiform texts resulted in the proliferation of more documents, many finding their way into Western collections. Questions about the nature and legality of acquisition remain a source of intense controversy among scholars and government officials.

Regardless of individual positions on the ethical debates about acquisitions, the complexities of tablet proveniences and archaeological contexts have prompted philologists, historians, and archaeologists of the Near East to develop innovative methods for reconstructing lost information. Because the cuneiform writing system evolved over time and entails numerous local traditions, philologists have been able to determine provenience using paleography and clues provided in date formulae, information in colophons, or other overt or implicit indicators about filing systems or purpose. To understand the probable find spots of tablets excavated during the nineteenth and early twentieth centuries, archaeologists analyzed excavation reports, continually using new technologies such as GIS or digital reconstructions of buildings.

To postulate the original archival context of a tablet, scholars have also developed the concept of "artificial archives" of tablets using clues provided by these methods. Artificial archives may consist of tablets hypothetically comprising of one original archive that was dispersed in later ancient or modern historical circumstances, such as looting or excavations in the nineteenth century. Some methods of reconstructing archives also include integrating other types of inscribed items or bureaucracy technologies, such as seal impressions or seals that bear the names of officials cited in economic and administrative transactions.

Combined, these methods not only shed new light on individual tablets and how they were used, but also on the general purpose of written records and record keeping in Near Eastern societies.

In the last two decades, a number of digital archives emerged to compile cuneiform artifacts, providing not only transcriptions of cuneiform texts, but also high quality images of the objects

and databases of information pertaining to provenience and history of recovery. Additionally, digital archives include means for visualizing the artifacts, such as 3-D image capture. Examples of these archives are the Cuneiform Digital Library Initiative (CDLI) from UCLA and the Digital Hammurabi from Johns Hopkins University. The collaboration of databases virtually reunites the cuneiform record into one globally accessible corpus of evidence from which scholars can reconstruct archives. These technologies also allow researchers to study individual objects and their inscriptions, identifying signatures that place the objects in archival, temporal, and geographic contexts.

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Cyprus, Archaeology of

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Introduction

Located in the northeastern Mediterranean Sea, the island of Cyprus has played an important, if often overlooked, role in the development and spread of cultural innovation in this region, serving as a major point of contact between the western and central Mediterranean and the Near East. Emphasizing the island's Prehistoric and Protohistoric periods, this entry outlines some of the significant social, political, and economic changes that took place on Cyprus from its earliest evidence for human occupation to its incorporation into the Roman Empire. The discussion highlights important debates, including the entanglement of the past in the politics of the present, as well as new discoveries and approaches that are changing the way we understand and interpret the Cypriot past. Cyprus serves as a compelling case study for those interested in a number of fundamental issues in archaeological research and practice, including colonization and colonial legacies, islands and human-environment relationships, the origins of agriculture and development of complex societies, identity formation, hybridization, and the politics of archaeology.

Definition

Settlement and communication within Cyprus and the island's connections with the mainland have always been influenced by its physical geography. It is the third largest island in the Mediterranean with an area of 9,251 km^2 and is located nearly 70 km from the southern coast of Anatolia and just over 100 km from Syria (Fig. 1). Even at the last glacial maximum (c. 25,000–18,000 BP), when sea levels were

Cyprus, Archaeology of, Fig. 1 Map of Cyprus showing locations of sites mentioned in text. *Shaded area* = land above 300 m (Drawn by Kevin Fisher)

130–120 m lower than today, Cyprus was still c. 40 km from the Levantine coast (Knapp 2010: 92). The island's most prominent landform is the Troodos massif in the southwest, a centralized mountain range rising as high as 1,951 m asl (at Mt. Olympos). It consists mainly of igneous rocks surrounded by a ring of pillow lavas, which are significant as the source of sulfide ores, particularly the rich copper deposits for which Cyprus became famous beginning in the Bronze Age. The Kyrenia mountain range consists mainly of sedimentary rock and runs in a roughly east-west line following the island's north coast, forming a narrow coastal plain. Between the Troodos and the Kyrenia mountains lies the Mesaoria, a plain cut by a number of seasonal rivers that is currently used largely for grain production, but was heavily forested in antiquity (see Strabo *Geography* 14.6.5).

The traditional chronological sequence for Cyprus is adapted from Greek archaeology and based mainly on ceramic sequences from tombs (Table 1). The oft-noted lack of long-term continuity in Cypriot settlements has resulted in a dearth of long ceramic sequences that could be used to help produce more refined chronologies. The traditional chronology was largely developed by the Swedish Cyprus Expedition, which

Cyprus, Archaeology of, Table 1 Chronology for ancient Cyprus

Period	Alternative name	Dates
Akrotiri phase	Late Epipalaeolithic	11,000–10,000 calibrated BCE
Cypro-Pre-Pottery Peolithic A (PPNA)		9,100–8,500 cal. BCE
Cypro-PPNB	Early to Middle Aceramic Neolithic	8,500–7,000 cal. BCE
Khirokitia Culture	Late Aceramic Neolithic	7,000–5,500 cal. BCE
Sotira Culture	Ceramic Neolithic	5,500–3,900 BCE
Erimi Culture	Early Chalcolithic	3,900–3,400 BCE
	Middle Chalcolithic	3,400–2,800 BCE
	Late Chalcolithic	2,800–2,400 BCE
Philia phase/facies	Prehistoric Bronze Age 1	2,500–2,400/2,350 BCE
Early Cypriot (EC) I–II		2,400/2,350–2,000 BCE
Early Cypriot III to Middle Cypriot (MC) I–II	Prehistoric Bronze Age 2	2,000–1,700/1,650 BCE
Middle Cypriot III to Late Cypriot (LC) I	Protohistoric Bronze Age 1	1,700/1,650–1,450 BCE
Late Cypriot IIA–IIB	Protohistoric Bronze Age 2	1,450–1,340/1,315 BCE
Late Cypriot IIC–IIIA	Protohistoric Bronze Age 3	1,340/1,315–1,100 BCE
Protogeometric (Late Cypriot IIIB)	Early Iron Age	1,100–1,050 BCE
Cypro-Geometric (CG)		1,050–700 BCE
Cypro-Archaic (CA)		700–400 BCE
Cypro-Classical (CC)		400–325 BCE
Hellenistic		325–50 BCE
Roman		50 BC to fourth century CE

excavated a range of Neolithic through Roman sites between 1927 and 1931, marking the first effort to systematically collect data in order to reconstruct Cypriot culture history (e.g., Gjerstad et al. 1934). The chronology has since been refined in light of new discoveries and through the use of radiocarbon dating. An alternative chronology for the Bronze Age has also been proposed based on sociopolitical change rather than ceramic sequences (see Knapp 2008: Table 1) and is used here.

Historical Background

Colonization and Early Prehistory

Recent discoveries have completely revolutionized what is known about the initial colonization of Cyprus and its earliest prehistory (see Knapp 2010 for a review). The site of Akrotiri-*Aetokremnos* (Cypriot sites are typically known by both the name of their municipality and an italicized local toponym) currently has the earliest securely dated remains of human presence on the island. This collapsed rockshelter produced deposits of burnt pygmy hippopotamus bones as well as chipped stone tools and other cultural material dating to the eleventh through early tenth millennia cal. (calibrated) BCE (see Further Reading: Simmons 1999). Debate continues, however, over the excavator's interpretation of *Aetokremnos* as a pygmy hippo processing site used by hunter-gatherers who hunted these "mini-megafauna" to extinction. Recent work at both Nissi Beach and Akamas-*Aspros* has produced flake-based lithic assemblages similar to that from *Aetokremnos*, but not yet securely dated. Nevertheless, we might see *Aetokremnos* and the Nissi Beach and Akamas sites as locations of periodic, short-term visitation by fisher-foragers from the Levant, forced by the shrinking coastal plains and the cooler, more arid climate of the Younger Dryas event (10,800–9,600 BCE) to seek subsistence opportunities further afield (Knapp 2010).

The lacuna that once existed between Akrotiri-*Aetokremnos* and the Late Aceramic Neolithic sites of the seventh to eighth millennia

Cyprus, Archaeology of, Fig. 2 PPNA artifacts from Ayia Varvara-*Asprokremnos*; (*left*) baked clay human figurine fragment; (*right*) shaft-straightener fragment (Courtesy of the Elaborating Early Neolithic Cyprus Project)

cal. BCE, such as Khirokitia, is also vanishing in light of new discoveries. Ongoing excavations at Ayia Varvara-*Asprokremnos* have revealed the earliest Neolithic site on the island, dated to 9,141–8,569 cal. BCE, which places it within the date range of the late Pre-Pottery Neolithic A (PPNA) and early PPNB of the Levant (Manning et al. 2010). The site yielded evidence for blade-based lithic production as well as a possible semi-subterranean structure. Other significant finds include two ground stone shaft-straighteners of a type well known from the Natufian and early Neolithic Levant as well as a fragment of a baked clay figurine – the earliest representation of a human on Cyprus (Fig. 2). The recovered lithics, combined with a faunal assemblage dominated by wild pig, suggest subsistence based on hunting and foraging, rather than the nascent farming apparent elsewhere in the Near East during the PPNA (Manning et al. 2010).

These new discoveries place Cyprus within the mainstream of a wide-ranging Eastern Mediterranean-Near Eastern interaction sphere during the transition from the Epipalaeolithic to Pre-Pottery Neolithic B (PPNB), and the island therefore takes on greater significance in discussions on the origins, timing, and directionality of early seafaring, colonization, and the spread of farming in the region. While some groups chose foraging lifeways that would continue on the coasts of Cyprus into the Cypro-PPNB, other groups brought to the island a lifeway based on agropastoralism. These early farmers carried with them wild and (semi-?) domesticated plants and animals that served as the subsistence basis for the island's first permanent settlements during the Cypro-PPNB.

Excavations at sites such as Parekklisha-*Shillourokambos*, Kissonerga-*Mylouthkia*, and Kalavasos-*Tenta* (Periods 2–5) reveal early Cypro-PPNB architectural features carved into bedrock such as wells (some of which were reused for secondary burials), pits, and postholes and linear trenches that may have defined animal pens. These were later replaced by circular structures with stone foundations that may have been houses. Remains of domesticated wheat and barley, along with a lithic industry that included blades with gloss characteristic of use in harvesting grains and ground stone querns and pounders, attest to the growing dietary importance of cereals. Faunal assemblages indicate the presence of several introduced species that were important for subsistence including fallow deer, as well as "predomestic" or managed caprids (sheep and goats) and cattle, and domesticated pigs. Thus, by the late ninth millennium cal. BCE, the island was inhabited by food producers – a surprisingly early date, which suggests that Cyprus was part of the initial developments in the origins and spread of resource production, rather than a late and peripheral participant. The motivations behind this initial colonization, though likely driven in part by the loss of coastal territories, might also be seen in social terms, perhaps prompted by a colonizing ethos or the desire of some to turn their backs on the "Neolithic Revolution" (see Peltenburg & Wasse 2004).

The subsequent Late Aceramic Neolithic (LAN) witnessed the growing differentiation of

Cyprus, Archaeology of, Fig. 3 Photo of Kalavasos-*Tenta*, Late Aceramic Neolithic (Courtesy of Ian Todd)

Cypriot Neolithic groups from their mainland counterparts. The known sites share a common material culture, although it is unclear whether this signals the existence of a common group identity. Settlements were typically small villages (e.g., 1.5 ha for Khirokitia) founded on higher ground and both Khirokitia and Kalavasos-*Tenta* show evidence for outer settlement walls of stone or pisé (rammed earth) with stone facing (Fig. 3). Within were a number of closely packed circular structures, typically 2–5 m in diameter, with stone foundations and pisé or mudbrick superstructures. We know little about the social structure of these villages. It is likely that a group of structures around an open space served as the residence of a single household. The construction of settlement walls suggests at least some supra-household coordination, and singularly large and complex structures, such as the Structure 14 complex at *Tenta*, may have been the residence of a village leader, although there are no finds to indicate differential status for its occupants. These appear to have been largely egalitarian communities, and the evidence from burials, while indicating differential treatment based on gender, does not suggest overt displays of wealth. Individuals were often buried in a contracted position in pits below the floors of houses, although at *Tenta* a number were also interred in the rubbish that accumulated between buildings. Representational art consists mainly of figurines, carved of volcanic stone or modeled in clay, which show the human form with varying degrees of abstraction. The sex is usually ambiguous, although some appear phallic in nature (Steel 2004: 58-9). The general lack of overtly female imagery, the continued use of circular rather than rectilinear architecture, and the relative scarcity of obsidian (imported from Anatolia during the Cypro-PPNB) are among the many phenomena that point to the divergence of the LAN from its mainland roots and the island's growing insularity. This seems to have been a deliberate choice, perhaps in an effort to forge a distinct identity, as it is unlikely that the island's inhabitants were unable to retain contact with the mainland.

The island's inhabitants would continue along their own trajectory in the subsequent Ceramic Neolithic, although the apparent gap in the archaeological record of several centuries between the end of the LAN and the Ceramic Neolithic (or Sotira Culture) has yet to be adequately explained (Steel 2004: 63-5). The most significant innovation is pottery, which appears fully developed, leading to suggestions by some scholars of a new colonization from the mainland. The recent illumination of other such "gaps" in the archaeological record, combined with continuities in elements of Cypriot Neolithic culture and significant differences from developments on the mainland, suggests at least some degree of local initiative. As seen at Sotira-*Teppes* and Ayios Epiktitos-*Vrysi*, settlement in small villages continued to be the norm, although houses were now usually sub-rectilinear in form. Peltenburg (1993: 10-2) has argued that *Vrysi* shows a division of the settlement into two social groups, based on the higher concentration of artifacts, evidence for ritual activity, and craft production in the older, northern part of the settlement. The burial record for this period is sparse but, in contrast, shows little evidence of social differentiation. The abandonment of the Late Neolithic sites and the transition to the Chalcolithic period that followed are poorly understood.

The Chalcolithic Period

New settlement patterns characterize the Early Chalcolithic, including the first known settlement of the southwestern part of the island, and sites with ephemeral timber architecture and pits of various sizes that might indicate communal storage. Other important innovations include the production of the first metal artifacts – tools hammered from native copper – and the growing importance of the production and consumption of artifacts made of picrolite, a light- to olive-green, soft stone originating on Mt. Olympos but found as river pebbles in the Kouris and Karyotis River beds.

Increases in both settlement and population numbers mark the Middle Chalcolithic, which is best known from the sites of Ermi-*Bamboula*, Lemba-*Lakkous*, and Kissonerga-*Mosphilia* in southwest Cyprus (e.g., Peltenburg et al. 1998). Some villages, such as *Mosphilia*, were quite large (c. 10 ha) suggesting the possibility of some form of site hierarchy. These villages consisted of an agglomerative arrangement of mainly circular structures, usually much larger than typical Neolithic buildings (up to 16 m in diameter), built with stone foundations and pisé or mudbrick superstructures. In the open spaces among these structures were numerous pits, some of which were used for burials as well as storage and waste disposal. As during the LAN, a cluster of structures might represent the living space of single household, and Peltenburg has argued that some houses on the upper terrace at *Mosphilia* were arranged in pairs and associated with discrete burial groups that indicate the emergence of property rights (Peltenburg et al. 1998: 242-3). Larger buildings often have a raised central platform hearth and well-delineated activity areas for work, storage, and living/sleeping. In contrast to the Early Chalcolithic, production and storage appear to take place at the household level, although a possible pendant workshop at *Mosphilia* suggests some degree of craft specialization (Peltenburg et al. 1998: 190-2).

The Middle Chalcolithic is remarkable for the elaboration of symbolic behavior. Much of this activity focused on symbolically-charged figurines and objects of personal adornment made from picrolite. While the finished products were likely locally made by nonspecialists, the distribution of picrolite in raw form appears to have been tightly controlled and linked to emerging inequalities on the island (Peltenburg 1993: 14). Human representation (usually female) took on many forms in stone and painted clay, with picrolite cruciform figurines being one of the hallmarks of the period (see Steel 2004: 99-103). They are often found as grave offerings but also appear in other contexts, and many were undoubtedly worn on necklaces or otherwise used in daily practice and reproductive rituals. At *Mosphilia*, Peltenburg identified a ceremonial area with large, well-built versions of domestic structures that were set apart from the rest of the settlement and entered through a formal approach (Peltenburg 1993: 13-4). Ceremonial feasting events may have been staged in an adjoining open area, evinced by the nearby concentration of ovens and serving bowls. It was in this area that a spectacular deposit of birthing figurines and other ritual paraphernalia was found inside a Red on White ceramic house model (Fig. 4). Mortuary rituals also became more elaborate and differentiated during the Middle Chalcolithic. While children tended to be buried in pit graves outside of houses, adult burials now appear in the first known extramural cemeteries. The cemetery at Souskiou-*Vathyrkakas* consists of shaft graves and other funerary structures with evidence for multiple burials, both primary and secondary inhumations, and long-term reuse (see Bolger 2003: 153-8).

Both Lemba-*Lakkous* and Kissonerga-*Mosphilia* were abandoned at the end of the Middle Chalcolithic, only to be reoccupied after a hiatus of some two centuries. The Late Chalcolithic, however, brought a number of innovations as the relative insularity of the previous four millennia gave way to renewed contacts with the mainland. Cultural influences from southeast Anatolia include the appearance of more technologically advanced ceramics and new vessel forms. At the same time, changes in spatial organization, the decreasing use of figural art, and the introduction of chamber tombs point to changes in social and ideological

Cyprus, Archaeology of, Fig. 4 Deposit of figurines and other ritual paraphernalia from Kissonerga-*Mosphilia*, Middle Chalcolithic; (*left*) in situ; (*right*) detail of ceramic building model (Courtesy of the Lemba Archaeological Project)

practices (Peltenburg et al. 1998: 70-2; Steel 2004: 107-8). The period also witnessed incipient attempts by some individuals and groups to accumulate power through control over productive labor. This is seen in the Pithos House at *Mosphilia*, a large structure with evidence for the large-scale processing, storage, and possible redistribution of foodstuffs, perhaps including olive oil, and craft production in the form copper metallurgy and shell pendants (Peltenburg et al. 1998: 252-4). Peltenburg (1993) suggests that its (purposeful) destruction indicates that such attempts at aggrandizement and private accumulation of resources were actively resisted as part of a wider strategy of settlement discontinuity and fissioning that prevented the concentration and institutionalization of power. This would change dramatically in the Bronze Age that followed.

The Prehistoric Bronze Age

A suite of cultural innovations resulting from growing international contacts, particularly with southern Anatolia, as well as more intensive exploitation of the island's mineral resources, and the localized emergence of elites, are among the interrelated developments that define the Prehistoric Bronze Age (PreBA). It begins with the short-lived and still poorly understood Philia phase (c. 2,500–2,400/2,300 BCE), distinguished by a number of new cultural developments including Red Polished ceramics, mold-made copper artifacts, new architectural forms, and the reintroduction of cattle, which had disappeared from the faunal record by the Ceramic Neolithic (for detailed accounts of the PreBA, see Steel 2004: 119-48; Knapp 2008: 68-130). While the Anatolian roots of these innovations are now unquestioned, there is debate among scholars regarding the degree to which these changes reflect local developments, spurred by emerging elites who were able to control both the internal distribution of prestige goods and long-distance exchange of copper with Anatolia (e.g., Manning 1993), or rather were the result of the arrival of Anatolian settlers (e.g., Webb & Frankel 1999). Knapp (2008: 114-30) has recently explained EC culture as the product of the hybridization of native Cypriot and intrusive Anatolian cultural elements through the copresence of these groups during the Late Chalcolithic and Philia phase.

Certainly some of the most significant developments are associated with what has been termed the secondary products revolution, which includes the use of animals (especially newly reintroduced cattle) for traction and products other than their meat. Use of the ox-drawn plow brought new areas under cultivation and underpinned a more efficient agropastoral system with surpluses that could be mobilized by emerging elites in strategies of wealth and status enhancement (Manning 1993). Combined with differential access to copper resources and metallurgical technology, these elites were able to take advantage of increased foreign demand for Cypriot copper, resulting in growing economic and social inequalities among households and

extended family groups (Knapp 2008: 79), a process borne out in the EC cemeteries of Lapithos-*Vrysi tou Barba* and Bellapais-*Vounous* on the island's north coast. There, chamber tombs reused over generations exhibit evidence of elaborate burial rituals involving feasting, as well as large quantities of grave goods, particularly copper tools, weapons, and items of personal adornment. Whether these represent the emergence of hereditary elite lineages (Manning 1993) or more negotiable prestige distinctions, it seems that such pronounced inequalities were largely localized to the north coast. Nevertheless, funerary ritual at extramural cemeteries became the primary arena for intracommunity interaction and identity formation, as well as social competition and status display at this time (Keswani 2004: 37-83). The establishment of corporate burial areas affirmed connections between the living, their ancestors and the land in which they were buried, and the territory to which the wider community laid claim in the context of growing land scarcity (Keswani 2004: 41).

The settlements associated with the *Vrysi tou Barba* and *Vounous* cemeteries have not been found, but the available evidence suggests that a relatively egalitarian social organization persisted elsewhere. The new agricultural practices precipitated by the secondary products revolution brought other social changes, however, including a shift from communal and kin-based production to a household-based system with a more complex division of labor along gender lines (Bolger 2003: 38-41). This is reflected in new types of domestic architecture seen at sites such as Sotira-*Kaminoudhia*, Alambra-*Mouttes*, and Marki-*Alonia* – villages with rectilinear, multiroom dwellings arranged in accretive forms. Marki has the longest continuous habitation sequence (Philia through MC II), in which the typical rectilinear compound or house consisted of two or more covered rooms at the back of a larger courtyard, an "idealized concept" that remained in place throughout the life of the settlement (Frankel & Webb 2006; Fig. 5). The segmentation and more specialized use of domestic space reflect the increasing task differentiation among household members during the PreBA. These trends would intensify in the Protohistoric Bronze Age that followed.

The Protohistoric Bronze Age

It is no exaggeration to say that the Protohistoric Bronze Age (ProBA) brought revolutionary changes to nearly every aspect of Cypriot society. While highly complex, state-level societies had emerged in Mesopotamia and Egypt during the fourth millennium BCE and by the early third millennium in Anatolia and the Levant, Cyprus had remained a largely egalitarian, insular, and village-based society until the transition to the Late Bronze Age. We then see the rapid development of social stratification, population growth and agricultural intensification, elite control over specialized systems of production and exchange, the appearance of the first cities and monumental architecture, and the development of the as yet undeciphered Cypro-Minoan script (Knapp 2008: 131-280; for further reading see Karageorghis 2002).

Not all of these transformations occurred immediately, and it is possible to distinguish a Proto-urban phase lasting until the fourteenth century BCE. This period is characterized by the appearance of a series of forts at sites such as Ayios Sozomenos and Enkomi, which were the first monumental buildings on the island and likely constructed to control the nascent copper industry, including transportation routes from the copper mines in the foothills of the Troodos to newly emerging coastal centers in the north and east. In a distinct break from centuries of burial in extramural cemeteries, we also see the placement of chamber tombs in the open spaces between buildings at Proto-urban Enkomi. The visibility and continued reuse of these tombs throughout this period indicates that they were the primary means of status display among competing groups (Keswani 2004) and used in the negotiation and demarcation of both physical and social boundaries between them.

This was followed by a fully urban phase (LC IIC–IIIA periods) that witnessed the (re) construction or urbanization of a number of settlements, particularly in the southern coastal

Cyprus, Archaeology of, Fig. 5 Plan of Marki-*Alonia*, Phase G, MC I–II (Courtesy of David Frankel and Jennifer Webb)

region. While sites such as Enkomi and Kalavasos-*Ayios Dhimitrios* show clear evidence of urban planning with contiguously placed buildings on street systems that followed an orthogonal grid (Fig. 6), others, such as Maroni, may have had a lower-density urban form dispersed over multiple nuclei. New types of houses were woven into this ProBA urban fabric, which were rectilinear, but, in contrast to their PreBA predecessors, tended to have more standardized forms (often court-centered or L-shaped) and were much larger with many more individual spaces. The new houses both produced and reflected an intensification of more specialized divisions of labor that began in the PreBA based on gender, age, and other factors. While the household continued to be an important unit of social and economic production, its members became enmeshed in a multiplicity of supra-household social networks at various scales, from neighborhoods to various levels of community, which they drew on in the formation of individual and group identities (Fisher in press).

In these new urban environments, monumental buildings constructed using ashlar (cut stone) masonry provided venues for competitive feasting and other ritual activities during which statuses and identities were displayed and negotiated, replacing the funerary realm as the primary social arena (Fisher 2009). At Kalavasos-*Ayios Dhimitrios*, Maroni-*Vournes*, and Alassa-*Palaeotaverna*, monumental court-centered buildings with evidence for large-scale production and storage (especially of olive oil) appear to have been the administrative foci of their respective regions (Fig. 7). By contrast, no obvious single administrative focus has been recovered at Enkomi and a more heterarchical power structure may have existed there, as also suggested by the site's mortuary record (Keswani 2004).

The new cities stood at the top of multi-tier, regional settlement hierarchies and were primary nodes for both interregional trade within Cyprus and long-distance trade with its neighbors (Knapp 2008: 134-44). They were centers for the production and redistribution of a variety of specialized craft products, yet, it was copper that was the vital commodity in Cyprus's overseas exchanges. Control over its production underpinned the economic power of ProBA elites and was legitimized through ideological means (Knapp 2008: 182) – a strategy materialized in the bronze "Ingot God" statue found at Enkomi in the sanctuary that bears its name. Cypriot copper was typically shipped in the form of standardized four-handle "oxhide" ingots (usually c. 25–28 kg in weight), 34 examples of which were part of the impressive cargo aboard the Uluburun

Cyprus, Archaeology of, Fig. 6 Plan of Enkomi, c. 1,200 BCE (Drawn by Kevin Fisher)

shipwreck, a late-fourteenth-century BCE vessel, possibly of Cypriot origin, which foundered off the island's north coast (Pulak 2010).

These exchanges marked Cyprus's growing engagement in an emerging LBA system that linked the island to other LBA polities in a complex web of economic and political relations. Such relations were undoubtedly a significant factor in the rapid development of (ostensibly) state-level sociopolitical organization in the ProBA, but questions remain as to whether this took the form of an island-wide polity or series of regional polities. Cyprus was undoubtedly the territory of *Alašiya* referred to in a number of Late Bronze Age textual sources, although it is uncertain if this refers to the whole island or only a particular city or region. The language used in official diplomatic correspondences of the period, such as the mid-fourteenth-century BCE Amarna Letters, makes

Cyprus, Archaeology of, Fig. 7 The Pithos Hall in Building X, Kalavasos-*Ayios Dhimitrios* (LC IIC). Each stone base supported a large storage jar, likely containing olive oil, with a combined capacity of over 33,000 liters (Photo by Kevin Fisher)

it clear that the King of *Alašiya* was among the great kings of the period. These letters and the status they imply are central to arguments that favor Cyprus being ruled as a unified, centralized state during much of the Late Bronze Age (or at least during the fourteenth to thirteenth centuries BCE). Yet the archaeological record on the island, despite some cogent attempts to interpret it otherwise (e.g., Knapp 2008: 298-340), does not convincingly support such a view. Rather, a more decentralized system, characterized by a heterarchical or corporate distribution of power in which the king was something of a "first among equals" representing the island's elite in international affairs, seems a more likely scenario (e.g., Peltenburg 2012).

The LBA system collapsed around 1,200 BCE, a period of upheaval marked by the destruction and abandonment of a number of major centers and the disintegration of nearly all palace-based states in the region. Based on the presence of locally made Mycenaean-style ceramics (particularly Mycenaean IIIC:1b) and certain "Aegean" architectural features (e.g., large halls with central hearths), and bolstered by foundation legends associated with Homeric heroes, some scholars argue that there was an initial influx of colonists or refugees on Cyprus at this time, who left the Aegean region in the wake of the collapse of the Mycenaean palace system (e.g., Karageorghis 2000). These settlers are typically equated with the enigmatic Sea Peoples, who are thought to have played a key role in the disruptions and population movements in the region, including those that mark the LC IIC to IIIA transition on Cyprus. Proponents of the colonization model suggest that these events mark the beginning of the Hellenization of the island as the Greek settlers came to dominate the island culturally, if not politically, by the Early Iron Age, perhaps even earlier. While a number of scholars have taken issue with this model on archaeological grounds, arguing against simplistic pots = people concepts of ethnicity, some have also criticized its role in a broader Hellenocentric narrative aimed at legitimizing present-day political claims (e.g., Leriou 2007). While not discounting the likely presence of some Mycenaeans on the island, a far stronger case can be made for viewing Aegean influences in ProBA material culture as the product of the hybridization of Aegean with native Cypriot and Levantine elements in the context of growing socioeconomic interaction (e.g., Knapp 2008: 264-80).

Iron Age City Kingdoms

By the start of the Iron Age, a period known as the Protogeometric (or LC IIIB), most of the Late Bronze Age centers were destroyed or abandoned (see Drews 1993). Yet the disruptions of the period were short lived as the ProBA

system was replaced with a new sociopolitical landscape. While occupation continued at Kition, Palaepaphos, and Idalion (although much changed), a number of new centers were founded at sites such as Salamis, Soloi, Lapithos, and Marion – settlements that would all later become the centers of Iron Age kingdoms. Most evidence from this period comes from the burial record, however, as extramural cemeteries with family-oriented tombs once more became the norm. The cultural, social, and political developments of the Early Iron Age have typically been explained in terms of the presence and influence of new ethnic groups. For proponents of the aforementioned Aegean colonization model, the Greek population, bolstered by additional immigration at this time, became culturally dominant in the Cypro-Geometric (CG) period, reflected in Aegean-inspired pottery, tomb types, and the introduction of Greek language and political institutions. The Phoenicians also arrive on the island, perhaps as early as the eleventh century BCE, eventually establishing a colony at Kition from which they too were able to exert economic and cultural influence. These foreign cultures (particularly the Greek) are seen to absorb a less complex and gradually acculturated native "Eteocypriot" culture, while providing the impetus for state formation (see Janes 2010: 128-30 for a more detailed discussion).

New approaches to understanding the sociopolitical developments of this period have moved away from discussions of the ethnicity of material culture and focus instead on the complex external and intraisland interactions of these and other groups that created the hybridity seen in the mortuary record, iconography, and built environment for this period (Knapp 2008: 281-97; Counts 2010; Janes 2010). Although often cited as evidence for Greek colonization and sociopolitical preeminence, the bronze *obelos* (skewer) inscribed with the Greek name "Opheltas" found in Tomb 49 at Palaepaphos-*Skales* embodies the hybrid nature of Iron Age material culture on the island. Not only is the act of inscribing one's name on an object a Levantine and Cypriot practice, but the artifact is a distinctly Cypriot type and the Greek name is written in the Cypro-syllabic script used on the island throughout much of the Iron Age (Sherratt 2003).

Janes (2010) argues that burial practices at each of the major CG centers reflect different strategies of social organization and interaction by which they became kingdom centers. While the placement of tombs around Palaepaphos was intended to project the community's identity to the outside world, the first burials among the "Royal" Tombs at Salamis during the late CG announced the emergence of a ruling lineage to the local population, a process facilitated by successful competition for both island resources (particularly copper and timber) and control of increasingly lucrative trade links with the Eastern Mediterranean. These various processes saw the emergence of a number of city kingdoms throughout the island by the Cypro-Archaic Period (700–400 BCE). From this point forward, a wider range of historical and epigraphic sources are available to help elucidate the picture provided by archaeology.

The Cypriot kingdoms are attested in textual sources from the (Neo-) Assyrians, the first of the great Iron Age Near Eastern empires to exert some form of nominal control over the island. A stele from Kition commemorates the 707 BCE submission of seven unnamed kings of Cyprus to Sargon II, while the Prism of Esarhaddon (613/612 BCE) lists ten cities and their rulers, including Idalion, Chytroi, Qarthadast (likely Kition), Palaepaphos, Kourion, Tamassos, Ledroi, and two others that are likely Salamis and Soloi (Karageorghis 1982: 129). The island was largely Greek speaking by this time, although hybridity continued to be a characteristic trait of its material culture – a combination of local creation and foreign stimuli that arrived through growing trade and outside political control. The Cypriotes adapted such influences to local tastes and sociopolitical uses, resulting in the emergence of various regional styles in ceramic decoration and sculpture as the island became an important node for the transition of innovations between the Greek and Near Eastern worlds (Tatton-Brown 1982: 87-91).

The kingdoms were typically characterized by a fortified urban center and surrounding hinterland. Urban and extramural sanctuaries

dedicated to local gods and Cypriot variants of Greek and Near Eastern deities were also important elements of the Iron Age landscape, playing an active role in the organization of political space and negotiation of social relationships (Counts 2010). Some, like the Sanctuary of Aphrodite at Palaepaphos, became internationally famous. Based on the archaeological and textual records, rulers likely held wide-ranging political, military, socioeconomic, and perhaps religious control over their territories (Counts 2010: 141-3). While most people were buried in rock-cut chamber tombs, ruling dynasts and other high-ranking elites often built impressive tombs incorporating ashlar masonry. This is epitomized by Tomb 79 of the "Royal" Tombs at Salamis, with its evidence for elaborate funerary ritual and conspicuous consumption staged in its wide, sloped *dromos* (entry way), including the sacrifice of horses in full harness with their chariots and the interment of ivory furniture and bronze cauldrons (Karageorghis 1982: 130-136).

Interrelations among the Cypriot kingdoms were rarely amicable, and their political ambitions and rivalries were occasionally resolved militarily as seen in the annexation of Idalion by Kition in 470 BCE. During the late Cypro-Archaic and Cypro-Classical periods, the kingdoms became directly embroiled in the wider struggles between the Greeks and the Persian Empire. Following a brief period of Egyptian rule, the Cypriot kingdoms submitted to the Persians in 545 BCE. In 499 BCE all except Amathus joined the Greek side in the Ionian revolt and were defeated by a Persian force who laid siege to several cities. As the conflict between Persia and Greece continued, allegiances were divided as some Cypriot rulers resisted the Persians, while others took a pro-Persian stance. The Greeks, under the leadership of Athens, made a number of unsuccessful attempts to liberate the island, and in spite of the efforts of Evagoras I of Salamis to gain control of the island with Athenian help in the early fourth century BCE, it remained under Persian control until the conquests of Alexander the Great (see Isocrates *Evagoras*).

Age of Empires: Hellenistic and Roman Cyprus

Alexander's rule brought an end to the era of independent city kingdoms on the island, symbolized by the replacement of coinage minted by local dynasts with imperial Macedonian coinage (Tatton-Brown 1982: 325). After Alexander's death in 323 BCE, his generals fought for control of his short-lived empire. Cyprus, highly desired for its strategic location, rich copper resources, and timber for ship building, eventually fell to Ptolemy I who formally annexed the island in 294 BCE. The Ptolemies installed a *strategos* (governor-general) who was a member of the royal court in Alexandria and ruled the island from Salamis (Karageorghis 1982: 172-3). Little public or domestic architecture from the Hellenistic period has survived, much of it having been obscured by later Roman construction or destroyed by the severe earthquakes of the first centuries BCE and CE. The capital was moved to Nea Paphos in the second century BCE. Excavations there suggest that, from its founding in the fourth century, the town was built on an orthogonal plan with well-defined commercial and residential areas (Daszewski 1985). While rock-cut chamber tombs continued to be the norm for many nonelite Cypriotes, the impressive "Tombs of the Kings" cemetery at Nea Paphos demonstrates how local elites drew on Alexandrian exemplars in the construction of a monumental funerary landscape. The most impressive examples of these subterranean, rock-cut tombs include the use of a peristyle court with Doric-style columns (Fig. 8).

The eastward expansion of the Romans in the first century BCE, coupled with the declining power of the Ptolemies, led to the annexation of Cyprus by Rome in 58 BCE. Following the battle of Actium, Julius Caesar's heir Octavian (soon to be given the title *Augustus*) was left the sole ruler of Rome's vast empire. Cyprus was initially added to the province of Syria, under Augustus's direct control, but was soon made a senatorial province governed by a senate-appointed proconsul. Nea Paphos initially continued as the island's capital and excavations have revealed a number

Cyprus, Archaeology of, Fig. 8 Tomb 3 peristyle with Doric columns; Tombs of the Kings, Nea Paphos; Hellenistic, third century BCE (Photo by Kevin Fisher)

of Roman elite dwellings with impressive mosaic floors, including the massive second-century CE Villa of Theseus, which was likely the proconsul's official residence (Daszewski 1985). The island flourished under the so-called *Pax Romana* and cities like Nea Paphos benefitted from imperial patronage. The Roman civic and domestic architecture still visible at Kourion, Nea Paphos, and Salamis remains some of the island's most impressive archaeological monuments and is testament to its relative prosperity during the early empire (see Karageorghis 1982: 177-89).

The island would not truly regain its independence until 1960 as its strategic position ensured its incorporation into an almost unbroken succession of empires and colonial powers, each of which left its own traces on the Cypriot landscape. Yet, this was not a process of passive reception on the part of the island's inhabitants. Rather, as the foregoing account demonstrates, the Cypriotes actively shaped these encounters, adapting foreign influences to local circumstances and creating a vibrant and fascinating culture in the process.

Key Issues/Current Debates

This account also raises a number of significant issues that continue to spark debate and influence the direction and scope of archaeological research on Cyprus. The origins and timing of the island's first episodes of visitation and colonization and the interactions of its first inhabitants with the mainland during the Neolithic period are undoubtedly some of the key questions archaeologists are now trying to address. The interplay of indigenous developments and foreign influences at several key transformations in the Cypriot past (e.g., the Chalcolithic to Early Bronze Age, the origins of the Late Bronze Age, and the transition to the Early Iron Age) and their implications for identity formation are vital areas of research and debate. While initially slow to take hold in Cypriot archaeology, the adoption of post-processual approaches by some scholars has seen critical examinations of the role of modern politics and colonial legacies in the interpretation of the island's archaeological record (e.g., Knapp & Antoniadou 1998; Leriou 2007). Indeed, one cannot discuss the archaeology of

Cyprus without a consideration of its current political situation, which continues to have a profound effect on our understanding of the island's past. Growing tensions between Greek and Turkish Cypriotes following independence culminated in 1974 with a short-lived *coup d'etat* by pro-*Enosis* (union with Greece) forces and an invasion of the northern part of the island by Turkey. In the wake of these events, Cyprus became partitioned along ethnic lines. The government of the largely Greek south (the Republic of Cyprus) is recognized by the international community as the island's legitimate regime, while the self-declared Turkish Republic of Northern Cyprus is recognized only by Turkey, who maintains a substantial military presence in this territory. The result has been a cessation of "officially sanctioned" archaeological work in the north since 1974, and the work that has taken place there is not well reported. Perhaps more worrisome is the fact that some cultural objects and sites in the north have been subject to neglect, theft, and, in some cases, purposeful damage and destruction (Knapp & Antoniadou 1998: 24-9). Consequently, there are now significant gaps in our knowledge of this important region, which has been largely disengaged from mainstream archaeology and the systematic application of advancements in archaeological method and theory seen on the rest of the island over the last few decades.

Future Directions

The future scope of archaeological inquiry will obviously depend on whether a solution can be found to the "Cyprus Problem." Regardless of the outcome of this thorny issue, increasing pressures of development, spurred in no small part by the tourism industry, will present a difficult challenge for archaeologists working on the island and particularly for the Department of Antiquities, the government body charged with protecting the island's cultural heritage. In response to this situation and current trends in archaeological data collection, scientific methods for detection, recording, and analysis will need to play an increasingly important role in the investigation and conservation of Cyprus's archaeological record. Growing engagement with the critical perspectives of post-processual archaeology, which has been spurring fruitful research on issues of gender, identity, agency, power, and materiality, will undoubtedly continue (e.g., Bolger 2003; Knapp 2008; Fisher 2009; Janes 2010) – as will introspection on the practice of Cypriot archaeology itself and its political entanglement in the past and present. Archaeology will unquestionably play a vital role in Cyprus as it grapples with issues of heritage and identity thrown into relief not only by its current division but also by its accession to the European Union and the growing pressures of development and immigration.

Cross-References

- ▶ Classical (Greek) Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Cyprus: Cultural Heritage Management
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Frankel, David
- ▶ Greek Colonialism, Archaeology of
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Middle East: Epipaleolithic
- ▶ Nationalism and Archaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Numismatics, Ancient Greek
- ▶ Post-Processualism, Development of
- ▶ Post-Processual Archaeology
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Planning in the Greek World

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Cyprus: Cultural Heritage Management

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Introduction

The factors that have affected the Cypriot culture diachronically are the island's strategic geographical position in the eastern Mediterranean, its central role in the interactions and exchanges taking place in the broader region, and its natural prosperity. These specifications have made the island a place where cultural traits from different civilizations are encountered. Based on archaeological evidence, it is believed that these interactions, together with endogenous factors, lead to the emergence of Neolithic settlements and the development of complex social structures already from the Bronze Age. The island's rich natural resources and centrality in the eastern Mediterranean basin continued to determine its history in the following periods, evidenced in the variability characterizing the material culture, as developed within each period's sociopolitical, economic, and ideological framework. As evidenced in the archaeological record, due to its island-specific traits, and as a crossroad between the eastern and western Mediterranean, Cyprus played a crucial role in the diachronic exchange of ideas and the transfer of information among diverse civilizations. Continuous occupation from prehistoric times resulted in the existence of numerous archaeological sites throughout the island and the need to provide protection and promotion of cultural heritage.

The character of Cultural Heritage Management in Cyprus is strongly linked to the modern history of the island and the establishment of the Department of Antiquities in 1935. Given the significant historical and archaeological background of Cyprus, extending from the Paleolithic to the Ottoman period, and its rich folk heritage, Cultural Heritage Management developed into a vital sector of the Republic of Cyprus, established in 1960. Most importantly, it became a milestone in the promotion of tourism, economic development, and the reinforcement of cultural identity. Nevertheless, Cultural Heritage Management only involves the south area of the island, as a result of the Turkish invasion of 1974 and the loss of control over many important monuments and archaeological sites, situated in the occupied northern area. This section aims at giving a brief account of the definition of Cultural Heritage Management in Cyprus and the broader factors that affected its development. It will also focus on the key issues governing the structured actions in order to understand its scope and the underlying factors.

Definition

Cultural Heritage Management on Cyprus, practiced by the Department of Antiquities, primarily involves the protection, restoration, conservation, and promotion of classified sites, monuments, and artefacts, such as mosaics, frescoes and icons. It also involves the establishment, management, and operation of archaeological museums and the control of private collections. Its operation falls within the realm of the two sectors (Ephorates) of the Department of Antiquities: the sector responsible for the Ancient Monuments and the sector responsible for the operation of Archaeological Museums. It also encompasses the government's efforts against the looting of the island's cultural heritage primarily, as a result of the Turkish occupation of the northern area of the island.

As portrayed in the Antiquities Law (Cap. 31),

> antiquity means any object, whether movable or part of immovable property which is a work of architecture, sculpture, graphic art, painting or

> generally any form of art which has through human effort been produced, sculptured, inscribed, or painted or generally made in Cyprus earlier than the year 1850A.D. in any manner whatsoever and from any material and which has been found, discovered or excavated in Cyprus or recovered from the sea within the territorial waters of Cyprus and includes any such object or part thereof which has at a later date been added, reconstructed, readjusted or replaced subsequently.

According to this legal statement, Cultural Heritage Management on Cyprus is particularly engaged with the protection of the antiquities falling within the above categories.

Cultural Heritage Management on Cyprus is tightly affiliated with its modern history, and in particular with the British Colonial period (1878–1960) of the island. In fact, the establishment of the Cyprus Museum in 1882 was the result of the reaction of locals against the illicit excavations and the smuggling of antiquities from the island. According to the Ottoman Law on Antiquities of 1874, one third of the excavated antiquities belonged to the Government, one third to the owner of the land, and the remaining third to the excavator. It is worth noting that the British maintained this law for over 20 years, while many excavators, taking advantage of the legal status and the poverty prevailing on the island, bought the land in order to posses the two thirds of the excavated antiquities. The Antiquities Law was enacted in 1905, during the British Colonial period, with an amendment in 1927, regarding the exportation of antiquities. The enactment of the new Antiquities Law in 1935 coincides with the establishment of the Department of Antiquities as a governmental organization, and the abolition of the previous Museum Committee.

The establishment of the Department of Antiquities is associated with the conduct of large-scale systematic excavations, which were to increase following the independence of the island in 1960. It is the intensification of excavations which largely determined the development of management of archaeological sites, reflected in the Antiquities Law of 1935 and the subsequent amendments. The establishment of the management of cultural heritage, however, was significantly triggered by the severe destruction of archaeological sites and antiquities caused by the Turkish invasion in 1974. Archaeological research on the occupied northern area of the island ceased, and archaeological sites and monuments, including churches and museums, remained neglected, or suffered violations. These new circumstances imposed the adoption of new strategies regarding the protection of Cypriot cultural heritage. Yet, Cyprus still became a central focus for international archaeological research, resulting in the great increase of excavations undertaken by foreign missions in the non-occupied area. The economic recovery of Cyprus following the disaster of 1974 and the role of tourism in the economic development bestowed a new role to the Cultural Heritage Management of the island.

In essence, it is the totality of the aforementioned circumstances that affected and eventually formed the character of Cultural Heritage Management on Cyprus, envisaged in the efforts for revealing, protecting, and promoting the remains of the island's important ancient past. The mechanisms employed for the management of cultural heritage can be traced in the Antiquities Law of 1935. Together with the subsequent amendments, the Antiquities Law, alongside the Regulations, still regulates the Cultural Heritage Management in Cyprus.

Key Issues

The key issues of Cultural Heritage Management, encompassed in the Antiquities Law of Capital 31, are summarized into owning property in antiquities, the accidental discovery or disposal of antiquities, aspects relating to the Ancient Monuments, including the declaration of Ancient Monuments and compensation, and the legal status of the conduct of excavations. Further issues involve the control and management of museums and advisory bodies, the antiquities to be held in them, rent control, and tax exemptions. The broader category of Miscellanea (Part VIII) includes crucial aspects, such as the licensing of dealers, the export of antiquities, loans of antiquities outside the Republic of Cyprus, immunity

from criminal liability, disposal of forfeitures, extension of criminal jurisdiction of criminal court, regulations, and saving of license.

The emphasis put on classified monuments in the island's Cultural Heritage Management is reflected in the extensive legislation governing their regulation in the Antiquities Law. In particular, monuments are classified as "Ancient Monuments" and are distinguished into the so-called First and the Second Schedule of the Antiquities Law. Ancient Monuments in the First Schedule refer to plots belonging to ancient sites, therefore encompassing antiquities, and their surrounding area. In these cases, the land is expropriated and the owners are compensated, as it comes under the ownership of the Republic of Cyprus. This mechanism constitutes the basic tool for the protection and promotion of archaeological sites, as it defines their boundaries, therefore preventing any actions inhibiting their potential destruction or endangerment.

Ancient Monuments in the Second Schedule of the Antiquities Law involve plots that are controlled by the Republic of Cyprus but are, nevertheless, under the possession of the legal private owners. A plot may be declared into the Second Schedule, once there is surface evidence or it is suspected, based on contextual evidence, that it may encompass antiquities, or if the plot is in proximity with an archaeological site. Following the declaration of a plot into the Second Schedule, the owner is obliged to have the permission of the Department of Antiquities to proceed with any kind of activity within the plot. In these cases, activities are supervised by the Department of Antiquities. In the cases in which ancient remains are found, the Department of Antiquities commands the cessation of the work and proceeds with the expropriation of the plot, which is thereafter declared into the First Schedule. Ancient monuments in the Second Schedule of the Antiquities Law also encompass religious monuments, which are excluded from expropriation.

To an extent, Cultural Heritage Management on the island is determined by the conventions signed by the Republic of Cyprus, which place it within a wider, European or international, framework sharing common objectives and structures. The signing of the European Cultural Convention of 1954 has set the principles toward the management and protection of a common European heritage and culture. Certain signed conventions and international binding treaties, such as the Hague convention of 1954 (Article 9 of the second Protocol for the protection of Cultural Property in the Event of Armed Conflict), stemmed from the current political situation on the island and the need to secure the safety of cultural heritage. Other signed conventions include the Granada Convention of 1985, the Valetta European Convention of 1992, the Paris conventions of 1972 and 2003, the Rome Convention of 1995, the Statutes of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), and the charters for the Protection and Management of the Archaeological Heritage (Lausanne 1990) and for the Conservation of Historic Towns and Urban Areas (Washington 1987). The Memorandum of Understanding between the Government of the United States of America and the Government of the Republic of Cyprus, concerning the imposition of import restrictions on preclassical and classical archaeological objects, and Byzantine period ecclesiastical and ritual ethnological material aims at impeding the looting of cultural heritage occurring on the island. More recently, Memorandum of Understandings concerning the protection of cultural heritage, have also been signed with the government of the People's Republic of China (2008), the Russian Federation (2010), and the Palestinian National Authority (2011), while a Bilateral Agreement exists with Switzerland (2011) and a Memorandum of Cooperation with the Government of the State of Israel (2011).

Furthermore, the inclusion of certain sites in the UNESCO World Heritage list has formed the basis for the introduction of measures for the protection of archaeological sites and the establishment of management plans and reporting systems on the state of their conservation. The fact that the archaeological site of Paphos was included in the UNESCO World Heritage list in 1980 (Karageorghis 2002), the Medieval painted

churches of the Troodos region in 1985, and the prehistoric site of Choirokoitia in 1998 best demonstrates that the establishment of management strategies is a fairly recent development. The recent management plans of Choirokoitia are part of the Participation Programme of UNESCO, 2011.

The national committees of UNESCO and the International Council on Monuments and Sites (ICOMOS) in Cyprus act as recommendatory boards. The actions and decisions, nevertheless, concerning the management of archaeological sites, and the strategies that should be employed in their conservation and presentation to the public, remain with the Department of Antiquities.

A decisive factor affecting the management of cultural heritage in Cyprus is recent building expansion, which is the result of economic development. The present-day situation on the island imposes the need to secure the surroundings of archaeological sites and monuments through the inclusion of plots into the First and Second Schedule of the Antiquities Law. These pressures also often lead to incomplete excavations resulting in the loss of important information. Furthermore, the problem becomes even greater when large-scale systematic excavations are conducted in urban centers, and especially in sites that belong to development projects. The archaeological sites on the Hill of Agios Georgios (PA.SY.D.Y.) and at the so-called Palaion Demarcheion, both in the island's capital, Nicosia, constitute such examples.

The first site, proposed to house the new House of Representatives, is the ancient predecessor of Nicosia. As such, it provides evidence on the character of successive periods, from the Archaic to the Hellenistic, previously lacking from the city's history, although phases from other periods are also apparent. The latter site, destined to house the new town hall, is also important as it elucidates hitherto obscured aspects of the Byzantine period, including town planning, architecture, and everyday life. It covers a period from the eleventh to the nineteenth century. It is the only large-scale excavation in the city's historical center, within the medieval walls. In both cases, the delays in the final decision-making concerning the plans and the future of the sites, severely put the ancient remains at risk as they are exposed in the elements, despite the efforts of the Department of Antiquities to proved annual conservation. Both archaeological sites have been included in the ICOMOS World Report 2006/2007 (Petzet & Ziesemer 2006/2007), following intense efforts on behalf of the Department of Antiquities.

The Department of Antiquities, in an attempt to develop further the management of archaeological sites, has established collaborations with prestigious organizations from abroad, such as the Courtauld Institute. Such endeavors are also reflected in an older collaboration with the Getty Conservation Institute (1987–1991), involving the conservation of the mosaics of the archaeological site of Paphos.

Further key issues involve the destructive consequences of the cultural heritage of the northern area of the island, following the Turkish invasion of 1974 (Jansen 2005). Apart from the destruction of archaeological sites and monuments, including churches (Papageorghiou 2010), an unknown number of antiquities, including items of Byzantine art, were illegally exported from the island, while museums were also looted. The recent interactions between the Turkish-occupied area and the area controlled by the Republic of Cyprus, following developments in the political sphere, have resulted in a new trend concerning illicit trafficking, as looted antiquities are illegally transferred throughout the island to be sold. The Department of Antiquities makes great efforts to control and reverse this situation, through the international binding treaties and conventions for the protection of cultural heritage in events of armed conflict and military invasion. It also follows the world trade of antiquities in an attempt to imbed the illicit trade of looted artifacts. Toward this objective, the Department of Antiquities has included special references on its official website, in order to notify the world regarding the destruction of cultural heritage and the sites or museums involved. Furthermore, the policy of the Ministry of Foreign Affairs of the Republic of Cyprus, and of Cypriot embassies abroad, encompasses the dissemination of the

grave problem of heritage destruction in the occupied territories. In relation to this issue, the Church of Cyprus has contributed immensely in the protection of monuments in the occupied part of the island and the repatriation of objects of cultural heritage, as has the A.G. Leventis Foundation, through the retrieval and purchase of looted objects in international auctions.

The Department of Antiquities also works in collaboration with foreign museums and particularly with UNESCO, as well as the Council of Europe, ICOM, ICOMOS, and Europa Nostra, in order to address this problem. The return in 1983 of the mosaic medallions depicting Apostles that were looted in 1979 from the church of Panagia Kanakaria in the occupied village of Lythrangomi, via Germany, constitutes an example of the important, but, nevertheless, sparse circumstances in which the resilient efforts against the destruction of cultural heritage through looting were fruitful. Further pieces from these mosaics were retrieved and returned to Cyprus in 1991 and 1997, respectively. Other attempts to raise public awareness and promote the need to protect the occupied archaeological sites include the publication of a book by ICOMOS Cyprus National Committee regarding the destruction and the illicit excavations currently conducted on the important occupied archaeological site of Salamis. Salamis was an archaic and classical kingdom, which also thrived in the Hellenistic and Roman period and became the capital of the island in the early Christian period.

For the dissemination of knowledge regarding Cypriot antiquity, a digital catalogue (CADIP) is currently being developed by the Department of Antiquities that will manage information, ranging from the finds excavated in various sites to excavation and survey data, including maps, and archival information. Moreover, the first web-page concerning archaeological finds, stored in the Cyprus Museum, has recently been established, enabling students and researchers to examine an important part of the material culture of a site situated in the occupied area of the island. It involves the archaeological finds from the tombs in Enkomi, excavated by the British Museum at the end of the nineteenth century. The innovations inaugurated with this project have set the basis for the digital unification of archaeological assemblages, part of which has in the past been transported to museums abroad.

Current Debates

The Need to Further Develop Cultural Heritage Management

Despite the efforts of the Department of Antiquities to adequately manage cultural heritage on the island, the operation of this governmental body is based on the structures set during the British Colonial period, or at the genesis of the Republic of Cyprus. This is enough evidence for the changes that must occur in order to be in pace with the modern conditions prevailing on the island and in the broader region, as well as with current scientific developments. It is vital to adopt a more dynamic approach that will be based on a solid theoretical and methodological framework, following the principles of the discipline of Cultural Heritage Management. On this basis, the future agenda should also encompass the Intangible Cultural Heritage (Μπακιρτζής 2006). Furthermore, it is equally vital to incorporate approaches associated with "red-zones"; with the prospect of a solution being reached between the Greek and Turkish Cypriot communities, a new and more complex situation will arise, which must be taken into consideration.

The salience of this issue and the necessity to establish an infrastructure for an adequate supervision of Cultural Heritage Management have led the Department of Antiquities to propose changes in its administrative and management framework, through reconsidering the sectors in which it operates. On this basis, it is setting new directions for achieving radical modifications in order to adjust with the current circumstances and address the overwhelming pressures imposed upon the management of cultural heritage by the increasing estate development.

To this end, it is pertinent to increase the scientific staff of the Department of Antiquities with scientists specializing on different fields of cultural heritage, including architecture,

conservation, and museum studies. It is also important to employ archaeologists specializing on particular areas of archaeology, in order to enhance the ability to evaluate the increasing archaeological evidence within the context in which they were produced, circulated, and used or consumed. Given the increasing construction development and the international economic crisis, this simple, albeit crucial, mechanism will enable the establishment of specialized boards responsible for the evaluation process of the plots that need to be expropriated due to their archaeological importance. As a result, this measure will reinforce the protection of urban and rural archaeological sites, and their surrounding areas, as modern conditions increasingly coerce the Department of Antiquities to redefine their boundaries in order to adjust with regional economic development and growth. It is also essential to increase the technical staff, and to develop further the use of technology for cataloguing and promoting cultural heritage. A step toward this direction has been achieved through collaborations between the Department of Antiquities, on one hand, and the Cyprus University of Technology, the University of Cyprus, and the Cyprus Institute, on the other.

Another important step to further secure the protection of cultural heritage is to proceed with concrete amendments of the Antiquities Law and its Regulations that would be in accordance with the legislation of the European Union. Such amendments would provide a solid basis against the illicit trafficking and looting of all antiquities, and not solely of those produced on the island. The definition of the existing law stems from past interpretations of the archaeological record; it therefore ignores recent scientific advances relating to the importance of trade and interactions throughout antiquity that result in the identification of ancient artifacts in areas other than their origins.

The line followed by the Department of Antiquities for the promotion of the Cypriot cultural heritage also involves the establishment of new premises for the Cyprus Museum and the upgrading of Provincial Archaeological Museums. A new building for the Cyprus Museum would enable the reassessment of Cypriot antiquity as evidenced in newly identified archaeological assemblages. It would also enable the display of archaeological finds based on recent approaches advocated by the discipline of Museum studies. Despite the inherent difficulties for a swift achievement of this objective, the Department of Antiquities, in an attempt to advance Cultural Heritage Management on the island, based on recent principles of the discipline, has established thematic museums. Such museums include the museum of the Mycenaean colonization of Cyprus, the Ethnological Museum in Nicosia, the Folk Art Museum at Geroskipou, the Rural Museum at Fikardou, and the Museum of Traditional Embroidery and Silver-Smith work at Lefkara. Furthermore, thematic exhibitions are occasionally organized in Cyprus and abroad for the promotion of particular fields of the Cypriot cultural heritage. The educational programs introduced in recent years, in collaboration with the Ministry of Education and Culture, aim at tutoring the civilians at a young age concerning the importance of cultural heritage and thus encourage its preservation and protection. Toward this objective, free tours are organized to monuments and provincial museums. Yet, it is commonly agreed that for the effectiveness of the above activities it is pivotal to employ archaeologists specializing in particular fields.

Cross-References

- ▶ Archaeological Informatics
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Heritage and Higher Education
- ▶ Heritage and Public Policy
- ▶ Heritage Landscapes

▶ Heritage Museums and the Public
▶ Heritage Tourism and the Marketplace
▶ Heritage, Changing Views of: A Legal Perspective
▶ Intangible Cultural Heritage
▶ Tangible Heritage in Archaeology
▶ Urban Heritage
▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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D

Dali, Archaeology of

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Introduction

The site was found by a geologist during a geological survey. It was located in a small gully, named Tianshuigou, near Jiefang Village, Dali County, Shaanxi Province in northwestern part of China. The human cranium was embedded in the brown grayish gravels in the third terrace of the Luohe River. It is a rather complete cranium, but the supero-posterior part of the skull-cap, some part of the zygomatic arches, and the pterygoid processes are missing. The lower part of the face was deformed by the upward depression of the alveolar process which is not intact and without dentition. The robustness of the cranium indicates it belongs to a male. Most of the cranial sutures are clear, except that part between the greater wing of the sphenoid and the temporal squama which was obliterated. This suggests that the cranium probably belonged to an individual of an age in lower thirties.

Key Issues/Current Debates/Future Directions/Examples

The maximum cranial length of the Dali cranium is 206.5 mm. Its maximum cranial breadth is 149.5 mm and across the supramastoid crest. This position of the maximum breadth and the height of the vault are intermediate between those of *Homo erectus* and *Homo sapiens*. The Dali cranium is closer to *Homo sapiens* than to many other Middle Pleistocene humans (MPH) in some measurements such as the overall size of the cranium, sagittal curvature, ratio of height to breadth of occipital, frontal angle, and degree of postorbital constriction. The Dali cranium is within the variation range of MPH of both eastern and western Eurasia in some measurements such as various length of the cranium, breadth of cranial base, bi-asterionic breadth, horizontal circumference, and transverse arc. The Dali cranium possessed many measurements closer to MPH of China than to those of Europe, such as in the occipital angle, depth of facial cranium, anterior interorbital breadth, minimum cheek height, degree of transverse flatness of upper face, and ratio of bregmatic height to maximum cranial length. It seems that the Dali cranium is closer to MPH of Europe than to *Homo erectus* of China, in maximum frontal breadth; total sagittal arc; its curvature; sagittal curvatures of frontal, parietal, and occipital bones; length of posterior margin of parietal; length of lower occipital scale;

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profile angle of frontal bone; bregmatic angle; transverse frontoparietal index; difference between g-op and g-i; and degree of postorbital constriction. The length-height index and upper facial index of the Dali cranium seem to be intermediate between MPH of China and Europe/Africa.

Many nonmetrical features of the Dali cranium are similar to those of other Pleistocene crania in China. These are a median sagittal ridge at the lower part of frontal squama; the fronto-nasal and fronto-maxillary sutures constitute a more or less horizontal curve; the most protruding point of median sagittal profile of frontal bone is located at its lower half; nearly vertical nasal profile; the anterolateral surface of the fronto-sphenoidal process of zygomatic bone faces more forward; blunt orbital margin; and curved lower margin of zygomatic process of maxilla. A top view of the cranium shows the broadest part of the vault is at the posterior part of middle third of the cranial length.

Some non-metric features of Dali cranium are worthy to be specially noticed. The thickest part of the brow ridge is at its middle part. This is similar to that of Bodo, Kabwe, and Petralona while in most other fossils from China it is at the medial portion of the brow ridge. There is a bulge between the pyriform aperture and the orbit. This feature is close to that in Bodo, Kabwe, and Petralona, as well as Neanderthals, and has never been seen in any other Pleistocene specimens from China. A short sagittal ridge found behind the middle part of the brow ridge of the Dali cranium has also never been seen in other Pleistocene specimens from China, but it appears in a few specimens attributed to *Homo heidelbergensis*.

The cranial wall of Dali is as thick as that of the hominin from Locality 1 at Zhoukoudian. Brow ridges of the Dali cranium are much thicker than that of other early *Homo sapiens* in China such as that from Jinniushan and Maba. A lateral view of the cranium shows the frontal squama is rather flat. The upper border of temporal squama is curved. Angular torus exists on the outer cranial surface but does not appear on the inner surface. The transition between the occipital and nuchal planes is angular instead of being rounded turn.

The Dali cranium is also associated with stone artifacts, vertebrate and molluscan fossils, and carbon particles. Most of the stone tools are scrapers, others include points, burins, and a stone awl. Most tools were made by hammering, and the manufacture is simple and rough, the technique belongs to Mode I.

The fauna associated with the human fossil includes beaver, elephant, wooly rhinoceros, thick jaw bone deer, water buffalo, gazelle, ostrich, and others. The environment might be warmer with more trees than present.

The U-series (^{231}Pa/^{230}Th) date of an ox tooth associated with the human cranium is 209 ± 23 ka (Chen et al. 1984); and IRSL date on the paleosol located ~13 m above the human cranium is earlier than 247 ka; ^{230}Th dates for enamel and dentine of the rhinoceros associated with the human cranium are 258 +34/−26 ka and 349 + 53/−38 ka, respectively; ESR date of the associated Lamprotula is 297– ~ 210 ka. All of these suggest a date between 300 and 260 ka (Yin et al. 2002). The ESR/U-series date for animal teeth is around 280 ka (Yin et al. 2011).

Comprehensive analysis on the morphology of human fossil and archaeology suggests that the Dali individual was most probably one of the descendants of early Middle Pleistocene humans of eastern Eurasia with assimilation of genes from western Eurasia. Alternative opinion is that Dali represented the East Asian member of *Homo heidelbergensis*.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ Zhoukoudian, Archaeology of

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Dampier Archipelago Petroglyphs

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Introduction

The Dampier Archipelago, located off the northwest coast of Australia, latitude 20°35′ south, comprises 42 islands and rocky outcrops which extend over some 1,925 km^2 (~743 sqmiles) (see Fig. 1). It is an area rich in archaeological sites, but it is most famous for the large number (estimated one million) of engraved rock art (petroglyphs) images and the enormous variety in subject and style displayed. This region was added to Australia's National Heritage List in 2007 (McDonald & Veth 2009). The high density of petroglyphs and great stylistic diversity are among the reasons for this style province's addition to the NHL (JMcD CHM 2005, 2006; http://www.environment.gov.au/heritage/places/national/dampier-archipelago/). It has also been recommended that this art province be added to the UNESCO World Heritage List (JMcD CHM 2011).

The Dampier Archipelago also houses one of Australia's largest bulk export ports, shipping iron ore and liquefied natural gas. The geological structure of these islands formed as remnants of Archaean igneous rocks, comprising gabbro and granophyre (~2,725 Ma), younger dolerite and basalt, these all overlying granites associated with the Dampier Granitoid Complex (~2,990 Ma). A more recent limestone development forms some of the northern outer islands. The harder, intrusive rock types have provided a useful resource for stone tools as well as support for the rock art and a truly unique landscape.

Definition

This area contains one of the largest concentrations of petroglyphs in the world, set among an inspiring landscape containing many other archaeological features. So far very little research has been undertaken into this important cultural asset, and what has taken place largely focused on the shell middens and specific sites (e.g., Lorblanchet & Jones 1979; Lorblanchet 1992; Vinnicombe 2002; Clune & Harrison 2009). While the majority of archaeological surveys have been conducted only in industrial lands prior to their development, a few surveys have been done for inventory and management purposes (Veth et al. 1993; JMcD CHM 2009). While there has been no direct dating of the province's petroglyphs, it is believed this rock art corpus spans some 25–30,000 years, documenting the changing ecological conditions of the Last Glacial Maximum, through the Holocene marine transgression and the creation of the area as islands some 7,000 years ago, to the present (Mulvaney 2013). The earliest date signifying human presence within the Dampier Archipelago is 21,000 BP (cal), obtained from a large seashell (*Syrinx aruanus*) found among the rocky slopes on the southern Burrup (Lorblanchet 1992). At this time, the coast was over 160 km distance. Baler and trumpet shells were valued as containers for carrying water and food.

The images also reflect the cultural practices and social values of the people that produced them. There are at least five distinct artistic phases or traditions, the last continuing until the practice ceased with the coming of European settlement to the region (Mulvaney 2011).

Dampier Archipelago Petroglyphs, Fig. 1 Location map of the Dampier Archipelago showing main islands and the adjacent mainland

Key Issues/Current Debates/Future Directions/Examples

The Dampier Archipelago is a drowned landmass, a former undulating plain now converted to subtidal reefs, shoals, and channels, while the higher hills and ridges form the islands. The largest island, some 118 km^2, is the focus of both industrial development and archaeological investigation. Dampier Island was officially named Burrup Peninsula in 1979. It became linked to the mainland in the 1960s, when Hamersley Iron constructed a rail and road access causeway to the island and the intervening mangrove-fringed tidal mudflats became evaporative salt fields.

The Dampier archaeological record maps people in a landscape, how they interacted with, and were affected by, their environment and habitat. Some of this relates to the subsistence activities of the people; other aspects reflect their spiritual beliefs and practice. In addition to containing the largest concentration of petroglyphs in the world, the area also includes thousands of campsites, quarries, and other stone-working areas, shell middens, and stone structures. Much of the rock art and stone features are intertwined with the spiritual beliefs and ceremonial practices of the local Aboriginal people.

Traditional ownership of the islands of the Archipelago is recorded as held by the *Yaburara* people; however, two events effectively brought to an end the Aboriginal occupation and production of rock art in the islands. A consequence of European settlement and exploitation of the region, the first was a smallpox epidemic which spread through the area in 1866. The second action, which became known as the Flying Foam Massacre (Gara 1983), occurred in February 1868, and this resulted in the slaughter of a large number of *Yaburara*. Today the *Mardudenera* and *Ngarluma* people have responsibility as custodians for the traditions and sites of the area. With the declaration of the Murujuga National Park in January 2013, a new management regime came into effect, with a jointly

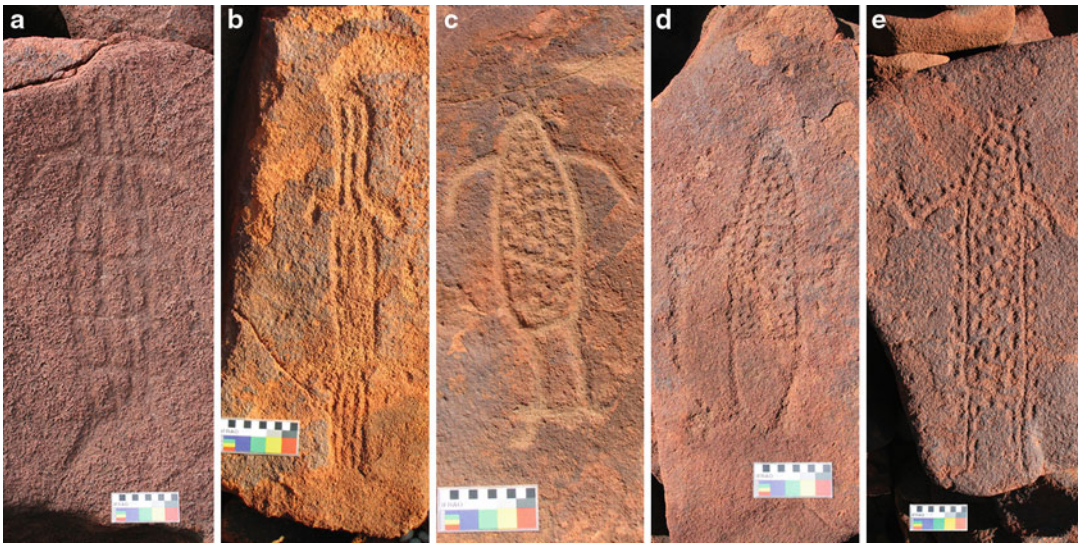

Dampier Archipelago Petroglyphs, Fig. 2 Examples of the distinctive decorated torso anthropomorph, pertaining to the early artistic phase

Dampier Archipelago Petroglyphs, Fig. 3 Example of two large outline macropods, style associated with the second artistic phase; motif at left has been re-abraded in subsequent time

managed National Park and the development of the Murujuga Aboriginal Corporation, with responsibility for management decisions made in this National Park.

For the Dampier Archipelago, there are at least five distinct artistic phases spanning some 25,000 (Mulvaney 2013), possibly as much as 30,000 years (Figs. 2, 3, and 4). Some motifs continue to be produced through successive phases, such as concentric circles. Other motifs, like the distinctive decorated torso anthropomorph, are particular to single artistic phase (Fig. 2). Weathering patterns have been used to provide an indication of the relative age of the art, for there are no scientific techniques available able to give an accurate date for the age of petroglyphs. Images of extinct fauna, particularly the Thylacine (Tasmanian tiger), which became extinct on mainland Australia some 3,500 years ago, and changes in the style of terrestrial and marine fauna depictions assist with the formulation of the sequence.

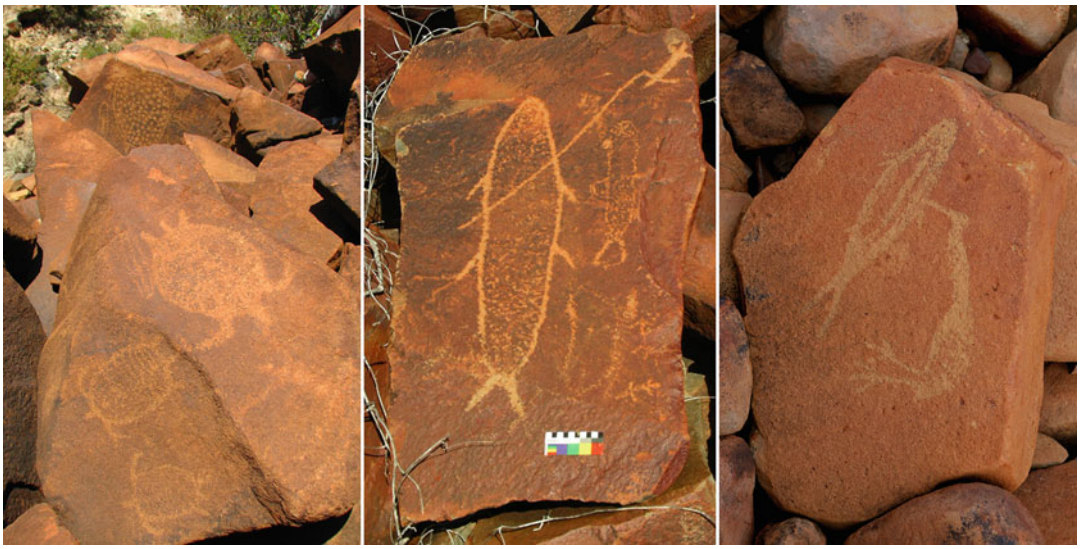

Dampier Archipelago Petroglyphs, Fig. 4 Examples of petroglyphs relating to the marine period phase 4 artistic tradition of the Dampier Archipelago rock art

Despite this wealth of cultural heritage, the area is still zoned for additional industrial development. There are no economic minerals or large population resource present in the Dampier Archipelago: Industry is here simply as a consequence of planning decisions made half a century ago. Grandiose plans for the development and peopling of the region took no account of the indigenous population nor of their significant cultural heritage. In addition to direct industry impacts on the rock art, there are concerns over emissions, vandalism, and graffito and visitor impacts. The nonindustrial lands are easily accessible by vehicle and boats; with an increasing population attracted by commercial work, vehicle and pedestrian traffic is inadvertently exacerbating impact. There is an urgent need for a proper management plan and a strategy to regulate access, and to this end a ranger training program has been developed for the local Aboriginal people.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art, Paleolithic
- ▶ Australian Paleoart
- ▶ Australian Rock Art
- ▶ Australia's Archaeological Heritage
- ▶ Burrup Peninsula
- ▶ Heritage Landscapes
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Kakadu National Park: Rock Art
- ▶ Rock Art, Forms of
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Submerged Prehistoric Landscapes
- ▶ Techniques of Paleolithic Art
- ▶ UNESCO World Heritage Convention (1972)

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Dart, Raymond Arthur

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Basic Biographical Information

Raymond Arthur Dart (anthropologist, anatomist, and academic) was born 4 February 1893 in Brisbane, Australia, and died 22 November 1988 in Johannesburg, South Africa. He was raised in a devout Methodist and Baptist environment by parents Samuel and Eliza. He attended Ipswich Grammar School. Dart had the desire to attend medical school at the University of Sydney and become a medical missionary. However, he was granted a scholarship to the University of Queensland and graduated in 1914 with a Bachelor of Science (Hons). In 1914, Dart obtained a scholarship to study medicine at the University of Sydney. During this time, he was also enlisted to the rank of Captain serving in the Australian Imperial Forces.

After his service, Dart took a post at University College, London, working under (Sir) Grafton Elliot Smith. Between 1920 and 1921, he spent time at Washington University, St Louis, Missouri, under a Rockefeller Foundation Fellowship. It was also in 1921 that he married anatomy instructor Dora Tyree, whom he later divorced. He returned to the University College, London, before being offered a post, much to Dart's initial annoyance, as a professor of anatomy at the University of Witwatersrand, Johannesburg. Dart would transform this fledgling medical school. He started a specimen collection which is now known as the Raymond Dart Collection of Human Skeletons which remains a testament of his legacy in modern-day understanding of human origins. In 1936, he married Marjorie Gordon Frew in Johannesburg and had two children with, a daughter, Dr. Diana Graham, and a son, Galen Dart. He retired from Witwatersrand in 1958 spending 36 years there and 18 as Dean of the

Faculty of Medicine. Although retired, Raymond Dart became the first occupant of the United Steel Workers Chair of Anthropology of the Institutes for the Achievement of Human Potential and continued to share his knowledge with academic and scientific communities.

Major Accomplishments

Dart is credited with groundbreaking research in paleoanthropology, revolutionizing the concepts of human origins. However, he was also involved in a variety of scientific projects and interests. Dart caused international scientific debate on human origins when he announced the discovery of an early human fossil, popularly known as "Taung child" from the African continent. The exact date of discovery of the fossil is unknown; however, from accounts at the time, the specimen had been blasted from limestone by M. de Bruyn, a lime worker.

Dart painstakingly extracted the fossil to reveal a skull that almost had a complete face. Within the features of this skull, Dart identified both human- and apelike characteristics. A cast of the braincase played a pivotal role towards Dart's claim. Dart identified the lunate sulcus as being located in the posterior, the same as humans, rather than anterior as with apes. Other features Dart identified included an upright spinal column and small canine teeth which are comparable to modern humans.

The controversy stemmed from the widely held scientific belief that human origins would be found in Asia. However, this skull, the "missing link," was found near Taung, South Africa. Dart named this new species *Australopithecus africanus* (the first of four Australopithecus species). The announcement came 3 months after he freed a skull embedded in rock that had been specially delivered to him.

The scientific community was skeptical over the claim that the "missing link" between humans and apes had been found on the basis of one fossil. Arguments ranged from Dart being inexperienced to disliking the name Australopithecus. A significant point for many was the small braincase. At the time, it was thought that brain size had expanded early in hominin development, and the indication that this skull was that of a child and claims upon brain size could not be inferred. It was not until after World War II, over 20 years later, when Louis Leakey made a succession of significant fossil finds that supported Dart's assertion of the early origins of humans.

After World War II, Dart led multiple expeditions, the most significant being Makapansgat, where fossilized remains of baboons were located. Dart became intrigued by thousands of antelope bones that had been broken and fossilized. Dart proposed the theory that early humans, in particular australopithecines, had utilized bones as tools prior to developing the use of stone. He termed this technology *Osteodontokeratic Culture* where *Australopithecus Prometheus* deliberately shaped and used bone to kill animals for subsistence. While this hypothesis has been rejected, Dart's theory spurred interest in understanding what happens to bone after death of the animal and impacts upon the bones. It could be argued that Dart's theory was the catalyst for the development of a new field of research that is known as taphonomy. Prior to Dart's osteodontokeratic culture theory, minimal was known about the processes that affect bone once deposited. Multiple studies were developed specifically to study various impacts on bone.

Dart also had an interest in primate studies and established a baboon colony within the Anatomy Department at the University of Witwatersrand. A number of studies relating to endocrinology and behavioral studies were conducted by other researchers.

Although some of Raymond Dart's views challenged conventional paradigms of the time, he revolutionized modern perceptions on human evolution and provided a foundation for scientific inquiry surrounding taphonomy.

Raymond Dart authored numerous publications on his research and wrote an autobiography with Dennis Craig.

Cross-References

► Australopithecines
► Leakey Family

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Basic Biographical Information

Charles Robert Darwin (1809–1882), an English naturalist, is preeminently known for his theory of evolution by natural selection although he contributed an extensive body of work to the field of life sciences. Almost 150 years later, Darwin remains personified in modern scientific research and the exploration for new knowledge about life on earth.

Charles Darwin was born on February 12, 1809, in Shrewsbury, England, the son of Robert Waring Darwin, a doctor, and Susannah Darwin nee Wedgwood (Darwin 1887). In 1825, Darwin enrolled in the University of Edinburgh Medical School and withdrew before completion the same year. In 1828, Darwin enrolls in a general bachelor degree at Christ's College, University of Cambridge, and it is here that he develops an interest for the study of beetles. The following year, Darwin travels through Wales collecting samples with entomologist Frederick William Hope, and in the same year, Darwin's name first appears in Stephen's Illustrations of British Entomology. Darwin qualifies his self-educated observations of nature by attending Professor John Stephen Henslow's botany classes at Cambridge.

In 1831, Darwin graduates tenth in his class from Cambridge, and Henslow requests that he join the 5-year surveying voyage aboard the *Beagle*. At the age of 22, Darwin embarks with Captain Robert FitzRoy and his crew on an expedition that would become the cornerstone of Darwin's body of work. Upon his return to England in 1836, Darwin began a torrent of scientific publication. Amidst this success in his academic career, Darwin's personal life also flourished, and in 1839 he married his first cousin Emma Wedgwood who would later bear him 10 children, 7 of whom would reach adulthood. Darwin spent the remainder of his life at his home in Down House, Kent, where he continued to revise his theory of evolution by natural selection, and also pursued the correlation between his theories and what is now known as Mendelian genetics.

Major Accomplishments

The height of Darwin's academic career was undoubtedly the publication of *Evolution by Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. His ideas were controversial and generated intense debate that continued throughout his life. Both Darwin and Wallace independently defined natural selection as a concept whereby if a heritable trait improves the survival or reproduction of an organism, then those organisms exhibiting the selected trait would slowly outnumber those without it, leading to changes in the organism over time; Darwin termed this as "descent with modification" (Ladiges et al. 2010). The concepts are now without repudiation; however, this is not where Darwin's contribution to science began. During his first notable expedition, the *Beagle* Voyage in 1831, Darwin observed many of his publishable findings.

The *Beagle* set sail on December 27, 1831, and made its first landing at St. Jago, Cape Verde Islands, on January 16, 1832 (Barlow 1933). While on board, the *Beagle* Darwin spent much of his time writing about the samples of marine invertebrates collected at sea (Barlow 1933). After surveying the east and west coasts of

South America, the *Beagle* departed Lima in September 1835 and made for the Galapagos Archipelago, where Darwin spent 2 months exploring these islands, as well as Tahiti and New Zealand (Barlow 1933). Darwin's field notes from this period reveal his growing interest in geology and taphonomy; the pages abound with descriptions of the landscape and geology of each region, the fossilized assemblages they yielded, and meticulous records of barnacles and early life forms (Barlow 1933). Correspondence between Darwin and Professor Henslow during the *Beagle* voyage was publically read (without Darwin's knowledge) at a meeting of the Cambridge Philosophical Society on November 16, 1836 (Darwin 1887). In the same year, these letters were published in *Entomological Magazine*, and further extracts appeared in *Magazine of Natural History*, constituting the first published review of Darwin's observations.

In 1836, the *Beagle* anchored in Sydney, while Darwin recorded geological descriptions of the Blue Mountains and collected samples of the native flora and fauna. Furthermore, while in Van Diemen's Land, Darwin makes sociological observations of the Indigenous people he encountered (Barlow 1933). In 1839, Darwin published an account of the voyage, *Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle*.

Upon the *Beagle*'s return from 1836 until 1858, Darwin authored a number of publications spanning a wide variety of subjects, describing the geology, fossil record, insects, and native flora of the places he visited while sailing on the *Beagle* (Darwin 1887). He also published *The Zoology of the Voyage of the Beagle*, to which a number of experts contributed. During this time, Darwin befriended geologist Charles Lyell, and before 1940 his attention was drawn to concepts of human variation, population, and extinct species of human (Barlow 1958). In this decade, Darwin also completes his *Notebook of the Transmutation of Species* (Barlow 1958).

However, it was not until 1856 that Darwin was advised by Charles Lyell to begin consolidating his ideas into a working theory on "natural selection" (Barlow 1958). Over two years, Darwin drafts his *Origin of the Species* but is astonished to receive a letter from Alfred Russel Wallace whom, while on the other side of the earth, had independently reached the same theoretical concept of evolution, which bore a striking resemblance to Darwin's own abstract of evolution by natural selection. Though both authors presented a joint review of their theories, Darwin was the first to publish his book *The Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* in November of 1859 (Ladiges et al. 2010). Several editions are reprinted and expanded upon over the remainder of Darwin's life.

While *The Origin of Species* would rightly be considered the pinnacle of Darwin's career, he continues to publish material discussing the variations of plant and animal species. In 1871 he released *The Descent of Man, and Selection in Relation to Sex*. The advent of this book prompted heated debate between Darwin and St. George Mivart. As a result, Darwin supplemented the *Origin of Species*, then in its 6th edition, with an additional chapter to counter many of Mivart's arguments. However, the height of Mivart's criticism was fuelled by what Darwin later recognized in his own theory as "deficiencies in his argument" through lack of comprehension for the mechanisms of inheritance published by Gregor Mendel in 1875 (Ladiges et al. 2010). Arguably, if Darwin had known about Mendel's laws of inheritance at the time of publishing *Origin of the Species*, the criticisms he received may have been far less antagonistic (Ladiges et al. 2010).

Though Darwin cannot claim sole credit for the theory of evolution by natural selection, his body of work until his death at the age of 73 comprised the most comprehensive, judicious evaluations of life on earth at the forefront of science during his time. His selection of influential books and papers are still referenced in contemporary scientific research.

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► Human Evolution: Theory and Progress

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Date Palm: Origins and Development

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Basic Species Information

The date palm, *Phoenix dactylifera* L., is one of fifteen species in the genus *Phoenix* of the palm family (Arecaceae, previously Palmae) distributed in the subtropics and tropics of the Old World (Henderson 2009: 140-3). Traditionally cultivated in the arid regions of the Middle East and North Africa, the date palm has been introduced into other parts of the world, for example, to California, Peru, and Australia. The species thrives in hot conditions and can stand a certain degree of soil salinity as long as the roots receive a regular supply of water, most often provided by irrigation. *Phoenix dactylifera* has a solitary or sparsely clustering growth habit with erect stems that can reach up to 30 m tall (Fig. 1). The large pinnate leaves are 3–5 m long and composed of 50–130 leaflets on each side of a ligneous midrib. The date palm is a dioecious species with female and male inflorescences borne on separate individuals. The fruits, called dates, are fleshy berries containing one lignified seed.

Date Palm: Origins and Development, Fig. 1 Date palm (*Phoenix dactylifera* L.), Makran, Pakistan (Photograph by M. Tengberg)

The dates, rich in sugar (up to 80 % in dry fruits), dietary fibers, and certain essential vitamins and minerals, constitute an important food source in the desert regions where the date palm is cultivated. They can be consumed fresh, more or less dried, or as a sweetening ingredient in various food preparations. Both fruits and seeds are traditionally used as a complementary fodder for livestock, the latter most often after boiling and/or crushing. Besides being important in local diets, the date palm has multiple other uses. The stem and the woody midribs of the leaves can be used for construction works and fuel. Whole palm fronds are employed for covering roofs or the construction of huts. The leaflets are transformed into basketry, matting, and cordage, and the rough fibers surrounding the leaf bases (*fibrillum*) are useful for making ropes and baskets as well as for packaging

and padding. Finally, the date palm constitutes the main species and structural element in traditional date palm gardens, agrosystems perfectly adapted to the specific constraints of arid environments, in which a wide array of useful plants can be grown in the shade of the palm fronds.

Timing and Tracking Domestication

The earliest examples of the use of date palm come from two Neolithic sites in the Persian Gulf region: Dalma on an island off the coast of Abu Dhabi (United Arab Emirates) and H3 near Sabiyah in Kuwait. There, date seeds preserved by carbonization have been dated by C14 to the late sixth–early fifth millennia BCE (Beech 2003). It is unclear though if those early finds relate to already domesticated date palms or if the fruits had been collected from wild trees. As for several other fruit species, for example, grape and fig, the distinction between the seed remains from wild and cultivated individuals is problematic. This is to a large extent due to the predominant use of vegetative reproduction techniques that has little impact on the genetic composition, and subsequently on the phenotypic characters, of the offspring. As a consequence there is relatively little difference between a cultivated variety of date palm and its wild ancestor that was chosen for cloning one or several generations earlier. Nevertheless, methods using geometric morphometry on modern date seeds have been successful in distinguishing between cultivated varieties and wild-growing date palms and seem promising for the determining of archaeological samples too (Terral et al. 2012).

A supplementary difficulty in retracing the domestication of date palm is that its wild ancestor is still to be identified. In the absence of a definite candidate, different hypotheses have been advanced, for example, that the cultivated date palm would result from either the domestication of another *Phoenix* species or from the hybridization of several different species within this genus (Barrow 1998). Recent genetic analyses show however that *Phoenix dactylifera* possesses a high number of private alleles, suggesting that it stems from wild populations belonging to the same species (Pintaud et al. 2010). No such original populations of *Phoenix dactylifera* are known today, as millennia of cultivation in the putative areas of origin have blurred the limits between feral and "authentically" wild palm trees. While the earliest archaeological date remains are found in the Middle East, several independent domestication events in different regions cannot be excluded as suggested by genetic studies placing present African and Asian cultivars in separate genotypic groups (Arabnezhad et al. 2012).

Date Palm: Origins and Development, Fig. 2 Carbonized date seeds and fruits from Iron Age (1st millennium BCE) Muweilah, United Arab Emirates (Photograph by M. Tengberg)

While the status (wild or cultivated) of the earliest date remains is still uncertain, cultivation of date palm seems irrefutable from the late fourth and early third millennia BCE as archaeobotanical evidence multiplies on archaeological sites around the Persian Gulf as well as in the Levant (Fig. 2) (Tengberg 2012). Date palm cultivation seems to appear somewhat later in North Africa, for example, in Egypt where finds are rather sporadic until the New Kingdom (c. 1540–1070 BCE) when cultivation can be confirmed by literary, iconographic, and botanical evidence.

Date Palm: Origins and Development, Fig. 3 Artificial pollination of a female date palm, Makran, Pakistan (Photograph by M. Tengberg)

One of the main differences between spontaneously growing date palms and their cultivated counterparts concerns the fruits. While small and hardly palatable in the former, the fleshy fruit wall of the latter (*pericarp*) is usually more developed and sweeter, even though diversity in fruit quality does exist between the numerous cultivars. Under cultivation date palms are propagated by cloning, achieved by the cutting off and planting of offshoots that form naturally around the base of the stem. Sexual reproduction is rarely practiced, as the result especially in terms of fruit quality is unpredictable. Individuals grown from seeds are however taken into cultivation occasionally and thus enhance the genetic diversity of traditional palm groves. Another practice associated with date palm cultivation is that of artificial pollination, known from Mesopotamian textual sources since the third millennium BCE. In date palm gardens, fruit-bearing female trees are preferred to pollen-producing male trees that are reduced to a strict minimum. In order to compensate for deficient wind pollination, pollen from male inflorescences is applied artificially to the female flowers by climbing the trees one by one (Fig. 3).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Figs: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Grapes: Origins and Development
- ▶ Olives: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Dating Methods (Absolute and Relative) in Archaeology of Art

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Introduction

Chronology of rock art, ranging from Paleolithic to present times, is a key aspect of the archaeology of art and one of the most controversial. It was based for decades in nonscientific methods that used stylistic analysis of imagery to establish one-way evolutionary schemes. Application of scientific methods, also called absolute dating, started to be used in the 1980s and since then has increased more and more its significance, as judged by the large number of papers published in the last two decades on this subject (Rowe 2012).

Definition

Absolute and relative dating methods have been used to establish tentative chronologies for rock art. Relative dating refers to non-chronometric methodologies that produce seriation based on stylistic comparison and stratigraphic assumptions. On the other hand, absolute dating methods are based on scientific techniques that yield a chronometric age for a phenomenon in direct or indirect physical relation to rock art (same age, older, or younger). Dating of some binders in pictographs or the alterations of surfaces by petroglyphs are examples of direct ages related to rock art production. However, it is controversial to consider these dates as "absolute" as they merely reflect experimental propositions, which often lack independent verification (Bednarik 2007; Pettitt & Pike 2007). Most scientific dating methods are indirect because they produce constraining ages for imagery, and the age obtained is of a phenomenon related to but not the actual time of manufacture of the art. If these indirect ages are in a stratigraphic relation to rock art (older or younger), then they produce minimum/maximum direct dates for related imagery (Bednarik 2007; Morwood et al. 2010; Ruiz et al. 2012).

Rock art research has been treated for years as a minor aspect of archaeology. Lack of reliable methods to date ancient imagery, both pictographs and petroglyphs on open-air sites or inside of deep caves, kept it outside of mainstream archaeology. This began to change with the introduction of scientific dating approaches, and there are reasons to feel optimistic about dating rock art at this time. Several dating groups are currently working on this around the world, and it is now possible to hope for interlaboratory comparison tests to help evaluate the reliability and accuracy of the techniques.

Key Issues/Current Debates/Future Directions/Examples

Archaeological studies of rock art demand a temporal framework in which a particular imagery was produced, as it is the only way to relate decontextualized imagery to archaeological cultures. The earlier traditional methods to establish chronologies of rock art sites and imagery were based on assumptions made on iconography, style, and comparison with excavation evidence and technical analysis. For example, Paleolithic mobiliary art from excavated sites in Europe was used as a base for stylistic comparison with cave imagery. These evidences, supported by superimposition analyses, produced the great stylistic schemes for Paleolithic art in Western Europe, which defended a one-way evolution from simple to complex figures, expanding from Aurignacian to Magdalenian times (Pettitt & Pike 2007). These systems lack enough resolution to produce an accurate temporal frame for rock art, above all for styles without consensus on their mobiliary parallels.

Weaknesses of these stylistic paradigms were pointed out (see (Bednarik 2007; Pettitt & Pike 2007) for recent reviews of them), but it is

important to recognize that they are still useful for rock art chronology because it is obviously impossible to date every figure in a site and every site all over the world. A well-defined proxy with stylistic, technical, and chemical composition data would be very helpful as a complement to scientific dating. A date archaeologically decontextualized is of little value, so it must be stressed that any dating should be included in archaeological hypotheses.

The first radiocarbon dating on rock paintings was carried out on a charcoal pictograph in South Africa in the late 1980s quickly followed by others in 1990 in Australia, the USA, and Europe, which added to pioneer research on engravings dating. A few years later, a broader conscience about these new possibilities dictated that scientific dating of the passage of time became an alternative to stylistic paradigms (Lorblanchet & Bahn 1993). However, debates on very old AMS ^{14}C dates from Chauvet Cave (France) and very young ones on open-air engravings dated by several methods in Foz Côa (Portugal) showed that style and scientific dates were still necessary for archaeology of art.

The most common technique for dating rock paintings worldwide is the radiocarbon dating of the charcoal pigments often used to construct the drawings. A large number of publications have been collected in the bibliography composed by Rowe (2012). Dating charcoal has been well honed by the radiocarbon community, and the results can be considered to be generally reliable. The main disadvantage to radiocarbon dating charcoal pigments is that the date measured is *NOT* that of the time of execution of the painting. Rather it dates the pigment and there are two caveats that accompany any date of charcoal: old wood and old charcoal (Steelman & Rowe 2012). Old wood phenomena are situations, usually encountered in desert areas where wood decays slowly, in which the wood burned to make charcoal may be up to centuries old. Old charcoal may occur when freshly hewn wood is burned, but not used to construct a painting until much later. Both these caveats should be kept in mind at all times when interpreting charcoal pigment radiocarbon dates.

Dating of charcoal pictographs has been broadly used in French and Spanish Paleolithic caves (Alcolea & Balbín 2007; Steelman & Rowe 2012), but also in North America and Australia, and other regions of the world. The largest part of the charcoal pigment dates is considered reliable but, for example, in Chauvet Cave, dates are controversial because they are unusually old and conflict with stylistic paradigm. Several authors claimed for a likely contamination of datings of Chauvet, as the dates from different samples of one single figure in Peña de Candamo (Asturias, Spain) showed that results by Geochron Lab (USA) were 15,000 years younger than those produced by LSCE (France), responsible of all Chauvet dates (Pettitt & Pike 2007). This situation reflects pitfalls of the method that could be accompanied by contamination of unknown origin, possible repainting for younger dates, mistakes in laboratory treatment of samples, and the presence of carbon of different origin, for example, incomplete dissolution of calcium oxalates. An improved specific protocol to remove contamination produced by calcium oxalates from charcoal paintings has recently been developed (Bonneau et al. 2011).

It is indispensable to follow a strict protocol to collect samples during fieldwork. The protocol described in literature tries to avoid contaminations using sterile latex gloves and surgical masks. Samples are removed from walls with a sterile surgical blade, which is changed and discarded after each sample. They are put inside of a sheet of folded sterile aluminum foil and placed inside of a labeled plastic bag. The exact position where samples were removed should be recorded with photographs. Extreme care ought to be observed on the selection of the sampling points to avoid major visual impact or harm to the pictographs, for example, selecting flakes that appear likely to spall from the walls naturally. The size of samples required is uncertain but around 2 cm^2 is generally used for pictographs with inorganic pigments and much less for charcoal-pigmented paintings, as for AMS ^{14}C dating only 50–100 μg of carbon is needed for an accurate date. For pictographs with inorganic pigments, e.g., iron ochre or

manganese oxides, it is essential to take an unpainted rock sample as near to the sample taken as is feasible. That background rock sample should be processed identically to the pictograph sample. A more detailed report on sampling protocol, reporting of radiocarbon results and laboratory pretreatment of samples, has been just published (Steelman & Rowe 2012).

AMS ^{14}C has been used to date any other kind of carbon-bearing substances related to pictographs or petroglyphs (Aubert 2012). The presence of binders has been used to produce direct radiocarbon dates of beeswax paintings in Australia (Morwood et al. 2010). Vegetal resins and wax are binders of these paints. It is considered that wax would have been fresh when applied on walls to construct the drawings, so it should be ambient source of carbon to date rock art. In the Australian Kimberley area, a range of dates from 3,780 ± 60 BP to present times were obtained (Morwood et al. 2010). Rowe and coworkers have dated non-charcoal paintings in several sites in North and South America (Rowe & Steelman 2003; Steelman & Rowe 2012). These pictographs were made with inorganic pigments, mainly iron oxides, so it is assumed that some organic binder must be present in them. Replicate measurements on samples of the same pictograph yield an uncertainty of ±250 years suggesting results are reliable (Steelman & Rowe 2012).

Indirect dating by AMS ^{14}C has been widely used to date carbon-bearing accretionary crusts (like calcium oxalate skins) or organic matter inclusions in mineral coatings (amorphous silica skins). Calcium oxalate dating is a procedure to set a temporal frame on the age of a pictograph or a petroglyph. Calcium oxalate coatings appear naturally on walls in two mineral forms: whewellite and weddellite. The exact process of formation of these accretionary crusts is still unknown, but there is a broad consensus that they form from ambient carbon dioxide and that they are deposited on external faces of rocks after metabolic activity of lichens, microbes, and bacteria. This method was first used in Australia in the early 1990s, and since then it has been used in sites all over the world (see review by Ruiz et al. 2012). It has been shown to be useful to get minimum ages for petroglyphs and minimum/maximum ages for pictographs. On certain locations, researchers has bracketed dates for rock paintings between two oxalate skins, producing a temporal frame for pictographs in agreement with archaeological expectations (Ruiz et al. 2012).

Sample removal procedure is similar to that described for radiocarbon dating (Cole & Watchman 2005). Sample sizes range from 25 mm^2 to 1 cm^2, depending on oxalate content. Oxalate dating demands microstratigraphic analysis and micro-excavation techniques to avoid contamination between upper and lower layers of calcium oxalate. Mechanical procedures and laser ablation have been used so far for this purpose (Watchman 2000). There are two main drawbacks for oxalate dates: (1) radiocarbon age of any calcium oxalate crust is a weighted "average" of oxalate deposited for long periods of time, even into modern times, so (2) they always yield minimum ages, and in consequence the archaeological significance of them is limited by our ignorance of time lapse among rock art creation and formation of the oxalate crust (Fig. 1).

A similar approach can be used with silica skins. These accretionary crusts are formed during evaporation of runoff water solutions containing monomeric silicic acid that after dehydration forms a hard noncrystalline film on the surface of rocks (Watchman 2000). Organic matter like diatoms and other algal has been found inside of finely laminated silica crusts overlying pictographs in Australia, for example, giving a minimum age for related Bradshaw-style figures. The same procedure has been described to date a silicate accreted paint layer.

Calcium carbonate coatings interstratified with pictographs or engravings can be used to obtain constrains on their time of manufacture. U-Th series disequilibrium method is applied to date the formation time of calcite coatings. They are formed from the redeposition of dissolved calcium carbonate from saturated solutions of water that flow across the surfaces of rocks and eventually deposit over rock art. In these flowstone crusts are contained small quantities of

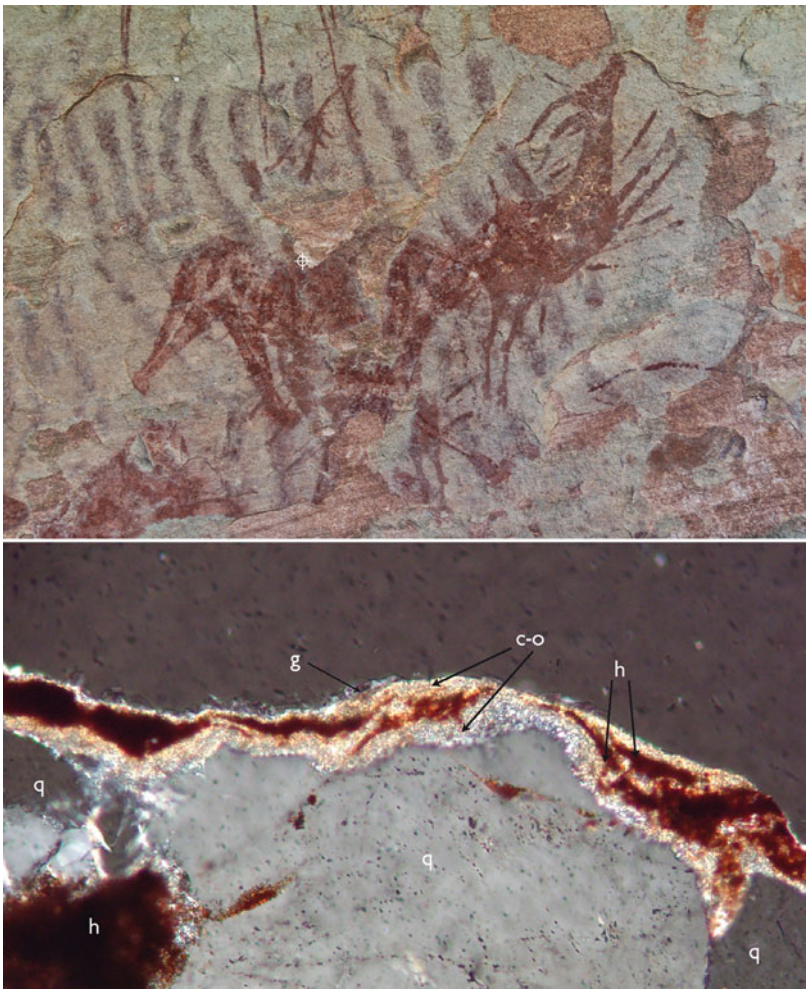

Dating Methods (Absolute and Relative) in Archaeology of Art, Fig. 1 Group of zigzags and Levantine zoomorphs from Cueva del Tío Modesto (Henarejos, Cuenca, Spain). A microsample was collected from point indicated in upper picture. Cross section shows two painting events interstratified with calcium oxalate layers (*down*). Two ^{14}C AMS dates were obtained related to this microstratigraphic packet (*q* quartz, *h* hematite, *g* gypsum, *c-o* calcium oxalate)

uranium (U), an element soluble in water, while they are relatively free of thorium (Th), an insoluble chemical element. The method is based on the radioactive decay chain from parent ^{238}U into the intermediary isotope ^{234}U and finally to daughter ^{230}Th. Relative measurement between these three isotopes in calcium carbonate crusts allows calculation of the age of the carbonate host as the decay rate is known. Detrital materials, such as aeolian dust or silts and clays dissolved into water, incorporated into calcite layers are a potential contaminant that could distort the results producing overestimated ages (Taçon et al. 2012). Low $^{230}Th/^{232}Th$ ratios are indicative of detrital contamination. This concern can be corrected by measuring the activity of another isotope, ^{232}Th, which can be detected in elevated levels in detritus.

Samples could be extracted by scraping with a surgical blade or with an electric drill. They could be very small (10–150 mg) and very thin (0.5–2 mm), depending on uranium content. Submillimeter-thick laminations can be accurately dated by this method. Two lab treatments are described in literature, an acid wash (Taçon et al. 2012) and a micromill preparation (Hoffmann et al. 2009), after which laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) is used to isotopic ratio measurements.

U-Th dating was first used in South Australia to give an estimation of the age of two

petroglyphs concealed by speleothems (Bednarik 1999). The result yielded a minimum age for these cupules of 28,000 ± 2,000 years BP. At least two research groups are currently working with this method, one in Australia and Asia (Taçon et al. 2012) and the other one in Europe (Pike et al. 2012). A large-scale U-series dating program has recently been carried out in several Paleolithic caves of northern Spain (Pike et al. 2012); the extremely old results of some of these dates (a red disk in El Castillo has a minimum age of 41,400 ± 570 years BP) are controversial, because the older of these dates are very near to the time when modern humans appeared in that region. (Pike et al. 2012). On the other hand, since we know that modern humans did art and were present in this same time span, there is little reason to introduce Neanderthals as the artists of this art. In southern China, U-Th dating has yielded minimum/maximum ages for naturalistic pictographs in an open-air shelter, and they have been compared with ^{14}C AMS dating of plant debris and microorganisms trapped inside of calcite crust, after an estimation of the contribution of geological carbon in calcium carbonate (Taçon et al. 2012).

OSL (optically stimulated luminescence) dating has been used by several groups. The method is based on an estimation of the time since grains of quartz or feldspar were last exposed to daylight. Stimulating samples with laser produces luminescence signals whose intensity varies depending on the radiation absorbed before last light exposition. Obviously, samples should be collected in absolute darkness. Pioneering work with this method was on quartz grains on mud-wasp nests overlying pictographs in Northern Australia (Aubert 2012). The resultant ages range from present time to 1,530 ± 220 years old but yielded three very old dates between 17,000 years and 24,000 years. These extremely old dates have been criticized as it is very difficult to believe that those fragile structures have survived many millennia (Bednarik 2007). Additional concerns have been expressed by Bednarik (2007) and Aubert (2012). OSL dating has been applied to date petroglyphs in Qurta sites (Nile valley, Egypt). A part of panel QII.4.2 was concealed by aeolian sediment accumulations that yielded dates from 10,000 ± 1,000 years at the top to 16,000 ± 2,000 years at the base of the sequence. This is considered as evidence of Pleistocene age rock art in Egypt (Huyge et al. 2011). Future directions for this technique could try to date individual quartz grains underlying paintings, but many uncertainties have to be resolved first.

At least three techniques are being currently used to date petroglyphs. The older of the more commonly used techniques is that of "*microerosion analysis*" developed by Bednarik who has published widely on the subject (see bibliography Rowe 2012 for references through 2011). The method is based on direct microscopic observations on fractures of crystals in rock surfaces produced by petroglyphs. Newly broken or abraded rock surfaces are very sharp, but over time they become progressively more rounded. Two major advantages of the technique are (1) that it is nondestructive and (2) it measures the date of the targeted event, i.e., the manufacture of the petroglyph. A perceived problem, one shared by all the described dating techniques, is that it has not been independently verified by any other laboratory. Its dependence on calibration from rock surfaces of known age and on weathering assumptions has been criticized.

The other two techniques are as follows: (1) *microlamination analysis* of desert varnish developed by Liu and coworkers (see bibliography Rowe 2012 for Liu et al. complete references through 2011). This has been applied specifically to rock art in only one recent instance (Tratebas & Dorn 2012). Although destructive, only a small sample is needed for the analysis for a date. The method is fairly straightforward for archaeologists and geologists. It is based on stratigraphy of desert varnish formation over a fresh rock surface. Once a rock surface is removed, desert varnish begins to form, but not uniformly in depth. Rather it is varied depending on the climatic conditions that change over time. A situation develops that may be viewed in analogy to tree rings, except that with microlamination that it has far less resolution, changing discernibly on centuries rather than years. Obviously calibration is needed, using studies of rock surfaces dated with independent methods to construct the necessary curve.

The method, developed by Dr. Tanzhuo Liu (see references his geochemical applications in Rowe 2012), has been blind tested and replicated and hence can be viewed with promise for dating petroglyphs. (2) Determining the *buildup of manganese in desert varnish* as it forms over newly exposed petroglyphs over time is the basis for a technique developed by Lytle et al. (Rogers 2010). This technique is also nondestructive; measurements can be carried out on site. It requires construction of a calibration curve. The principle of the method is quite straightforward. In a newly constructed petroglyph, the removed surface exposes fresh rock, usually very low in manganese. As the petroglyph weathers over time, manganese content steadily builds up as a component of the desert varnish that forms over the previously exposed surface over time. Manganese measurements can be performed in a few minutes with pXRF devices without sample removal. Using the calibration curve, the time of formation of the petroglyph is directly measured. Only Lytle's group has measured petroglyph construction dates using the technique. At present, the method claims an uncertainty of $\sim \pm 30\ \%$.

In our opinion, the time has come for the three groups conducting petroglyph dates to compare the methods, one against the other. If all agree, petroglyph dating would at that point be considered viable by all techniques, a very important verification, and a giant step forward in petroglyph dating.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Australian Rock Art
- ▶ Bednarik, Robert G.
- ▶ Chronological Systems, Establishment of
- ▶ Côa Valley Rock Art Sites
- ▶ Dating Techniques in Archaeological Science
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ North American Rock Art
- ▶ Organic Residue Analysis in Archaeology
- ▶ Pigment Analysis in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ South American Rock Art
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Techniques of Paleolithic Art
- ▶ Unilinear Evolution and Lineal Time: A Critique

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Dating Methods in Historical Archaeology

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Introduction and Definition

Dating methods in historical archaeology differ little from the methods of archaeology in general. Both absolute and relative dating approaches are employed. However, historical archaeology has

tended to de-emphasize archaeometric analyses because of the availability of a documentary record.

Key Issues/Current Debates/Examples

Absolute dating methods that rely on specialized laboratory analyses such as dendrochronology, radiocarbon, and luminescence measurements are available to historical archaeologists. Radiocarbon dating generally is not reliable for samples postdating c. CE 1650 (Holdaway 2006: 128) but has been used successfully for earlier historic sites. The method may also help rule out prehistoric origin, for example, of dugout canoes (Porter 2009). Dendrochronology is used widely and may offer precise cutting dates for timbers harvested as recently as the twentieth century and offers added benefits for clues to past environment and climate as well as to behaviors relating to construction and the harvesting and storage of timber (Towner & Clary 2001). Intra-site tree-ring sequences may help with relative dating even if precise dates are not obtainable (Pringle et al. 2000). Optical stimulating luminescence (OSL) helped date a feature to the sixteenth–seventeenth centuries in New Mexico (Ramenofsky et al. 2008). Thermoluminescence (TL) dating has been applied to protohistoric and historic ceramics, providing dates as recent as the later nineteenth century (Feathers 2003). Although dendrochronological dates can offer an accuracy of ± 1 year, not all attempts to date timbers achieve such precision, and radiocarbon, OSL, and TL dates present statistical uncertainties. These methods are not used often because historical archaeologists are comfortable with the dates offered by historical sources and perhaps because of the expense of the laboratory analyses.

Artifacts and sites can be dated in a number of ways through documentary sources. Some artifacts, like coins and gravestones, bear dates (but see Mytum [2002] for cautions regarding gravestones). For others, manufacturing records may pinpoint initial and final production dates. Dates for the initial and final occupations of sites may also be found in or closely estimated from various records, dating both the sites and the artifact assemblages found in them. Although Noël Hume's (1969: 13) famous dictum that "This kind of [dating] information is all written down somewhere" is too absolute for strict truth, many kinds of artifacts and artifact typologies are well dated historically, and archaeologists have assiduously pursued such information (e.g., Noël Hume 1974; Miller et al. 2000). Collectors' literature is a great resource as well, and in contrast to prehistorians' concerns about looted artifacts, most collectors discuss antiques which never entered the archaeological record as opposed to antiquities which all too often have been removed from archaeological contexts.

Future Directions

One of the contributions of historical archaeology to archaeology in general is the empirical demonstration that artifact frequencies wax and wane through time, thus supporting the concept of seriation (Dethlefsen & Deetz 1966). Binford (1961) took Harrington's (1954) historically dated assemblages of British pipestems, which reflected a diminishing bore diameter through the seventeenth and eighteenth centuries, and derived a linear algebraic formula which translated the mean bore diameter of an assemblage to a date which he could employ as a proxy for the median date of occupation of the deposit represented by the assemblage. South (1971) applied the concept to ceramics, using historic manufacture periods for various ceramic types to create the mean ceramic dating formula (MCD). South further argued that the close match between the MCD and the historic median occupation of his test sites indicated that manufacture-to-deposition time lag is minimal.

Reservations about this generalization have been expressed, but the pipestem and MCD formulas have become fixtures in historical archaeology, leading to similar formulas for window glass, pipe bowls, and even prehistoric ceramics. Wesler (in press) argues that the statistical properties of these formulas have been poorly

explored, that calculated uncertainty levels can approach those of radiocarbon dates, and that formula dates should be reported with their standard deviations for full evaluation of their significance and accuracy.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Clay Pipes in Historical Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ Radiocarbon Dating in Archaeology
- ▶ South, Stanley A.

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Dating Techniques in Archaeological Science

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Introduction

Dating in archaeology is the process of assigning a chronological value to an event in the past. Philosophers differ on how an event is defined, but for cultural history, it can be taken as a change in some entity: the addition, subtraction, or transformation of parts. Events can be considered at two scales. At the scale of individual object, the event is either manufacture (which, e.g., is additive and transformative for ceramics, but subtractive for lithics) or some sort of attrition (either use or natural wear). At the scale of more than one object, often called an assemblage, the event is

usually the deposition of those objects at a single place. Such an event, if human caused, is often called an occupation. All events have duration. It can be trivially short for many manufactures, but it can last over several centuries for some occupations. The two scales can overlap, as for example with monumental architecture, where the manufacture might be considered as a series of depositional events.

Chronological value can also be considered at different scales. Ordinal scale, often called relative, specifies older or younger but not the distance between events. Interval or ratio scales specify the distance, the difference between them being whether or not a zero point is designated. At an ordinal scale, one can say the Washington Monument was completed before the Lincoln Memorial. At an interval scale, one can add the distance of 38 years between the two events. At a ratio scale, one can say the Washington Monument was completed in 1884, while the Lincoln Memorial was completed in 1922.

Ordinal scale dating has been the mainstay of archaeology: either seriation and its variants or stratigraphy. Seriation orders manufacturing events by changes in style, based on the mathematical probability of diffusion of traits having neutral selective value. Given a more or less constant rate of innovation, neutral traits form the familiar battleship curves which for several stylistic types can be ordered, under certain conditions, to reflect time (Lipo et al. 1997). Stratigraphy orders depositional events by the principle of superposition. It only orders depositional events, not the manufacturing events of the objects being deposited – a distinction which sometimes gets confused (Dunnell & Readhead 1988).

This entry deals mainly with interval/ratio scale chronological methods. All of these chronometric methods were developed in the physical or biological sciences and can only be applied in archaeology with a clear understanding of what event is being dated and how that event relates to the archaeological record (Dunnell 2000). Dean (1978) made the important distinction between dating event (the event that is actually being dated) and target event (the event which is of archaeological interest). Where the two do not coincide, bridging arguments are required to associate the two.

Historical Background

The earliest chronometric methods developed were based on cyclical variations in temperature or other climatic variables. Gerard de Geer first began measuring varves in lake sediments in southern Sweden in the first decade of the twentieth century. About the same time, an American astronomer, A. E. Douglas, began measuring tree-rings near his home in Flagstaff, Arizona. He first realized the ability to cross-reference among trees in 1904 and by 1921 had developed a method for dating archaeological remains. Recording changes in marine oxygen isotopes from cores did not begin until the 1950s, although Milankovitch and followers made chronological predictions of insolation variations from astronomical data in the 1940s. Radiometric methods have their origins in the appreciation of radioactive decay products in the 1930s. Radiocarbon was developed by W. F. Libby and collaborators in the 1940s and 1950s, at about the same time that research was beginning in potassium-argon and uranium series dating. All the radiometric methods got a boost with the development of mass spectrometers in the 1950s, although it was not until the 1980s that accelerated mass spectrometry (AMS) became routinely used for radiocarbon. The physics behind trapped-charge dating was formalized in the 1940s and suggestions for use in dating were made in the 1950s. Luminescence dating in the context of dating pottery was developed by the Oxford laboratory under Martin Aitkin and the Risø (Denmark) laboratory under Vahn Mejdahl in the 1960s. Sediment dating and later optically stimulated luminescence (OSL) dating was introduced in the 1980s by Canadian David Huntley. ESR dating was also first developed in the 1960s by Motoji Ikeya in Japan and Gerd Hennig in Germany. Obsidian hydration got its start in the 1950s with the discovery of hydration rims, followed by the first proposal for dating in 1960

by Friedman and Smith of the USGS. Philip Abelson of the Carnegie Institution first recognized the long-term preservation of amino acids in the 1950s and worked out a racemization dating method in the 1960s with Ed Hare. Geophysicists have long known about geomagnetism, but it was not until the French geophysicist Emile Thellier first coupled secular changes in the geomagnetic field with thermoremanent magnetism in the 1950s that paleomagnetism and archaeomagnetism were applied in dating.

In sum, most of the chronometric methods have been around for at least 50 years, some for a 100 years. In the years since, impressive technological and methodological advances have been made in all of them, the details of which are beyond the scope of this entry.

Key Issues

Radiocarbon Dating

The most commonly used chronometric method is radiocarbon dating. The details of the method are described in another section of the encyclopedia. Here it need only be pointed out that the event addressed by radiocarbon is the removal of carbon from the carbon cycle, usually by the death of some organism. Unless the organic matter is itself of archaeological interest, bridging arguments are required to relate the organics to the target events, arguments that are usually based on spatial association and therefore a stratigraphic issue. The caveat is that an assumption is required that objects deposited together are the same age in terms of their origin (manufacture), an assumption that is often innocuous but not always so.

Trapped-Charge Dating

The second most common chronometric method in archaeology is trapped-charge dating, a method that includes both luminescence dating and electron spin resonance (ESR), the former having many more applications than the latter (Rink 1997; Duller 2008; Wintle 2008). The method is based on the buildup of stored energy in crystalline materials through interaction with natural radiation. In the most simple terms, when radiation impinges on a material, electrons are excited from their ground state to a higher energy level where they can move around. If they (or their opposite, electron vacancies called holes) encounter a locus of opposite charge, they become attracted and thus "trapped." These traps are associated with defects in the crystals which cause localized charge deficiencies. It takes additional energy to get the electron (or hole) out of the trap whence it can recombine with its counterpart (at another defect called a recombination center) and return to the ground state. The recombination results in the release of the previously trapped energy, some of which takes the form of light, or luminescence. Traps have different energy depths, and the deeper ones retain their trapped charge more or less indefinitely at ambient temperatures, which allows their use for dating. Heat or light is the main natural energy source for removing charge from the traps. Luminescence dating releases the charge either by applying heat (thermoluminescence, TL) or light (optically stimulated luminescence, OSL) and measures the intensity of the resulting luminescence. ESR uses magnetic resonance with microwave radiation to measure the amount of charge in the traps, and so is nondestructive in the sense that the traps do not have to be emptied for measurement.

Both luminescence and ESR measurements can be related to time because the rate at which materials absorb radiation is in most cases constant through time, because of the long half-lives of the principal components (^{232}Th, ^{238}U, and ^{40}K). Thus, the rate of buildup of the trapped charge is more or less constant. If one measures the luminescence or ESR signal, determines how much radiation is required to produce this signal (a value called paleodose or equivalent dose), and determines the natural radiation dose rate, one can determine the age by dividing the equivalent dose by the dose rate.

The age determined is the last time the material was emptied of its trapped charge, usually an event of sufficient heating or exposure to light. Crystal formation also removes any trapped charge, so another datable event, mainly relevant

for ESR, can also be the formation of bone or shell. Dating these events has some important advantages in archaeology. Dating a last heating event is often of archaeological interest, e.g., the manufacture of a ceramic or the last use of a hearth. The need for bridging arguments is thus reduced. Last exposure to light is a depositional event, so luminescence has the potential to date directly an occupation event or, in some cases, monumental construction. ESR has been applied to heating or last light exposure, but has most commonly been applied to dating teeth and shell formation.

Trapped-charge dating has a principal disadvantage in that the methods are complicated and require the estimation of a number of variables. Whereas radiocarbon dating involves a global variable, the production of carbon in the atmosphere, and thus involves, in the simplest case, one measurement (quantity of ^{14}C), luminescence and ESR involve strictly local variables because the nature of the trap structure and the nature of the radioactivity vary from case to case. This means that radiocarbon often has much greater precision than a luminescence or an ESR date, even if the trapped-charge methods, particularly luminescence, have better accuracy because bridging arguments are less essential. An exception to the better precision of radiocarbon are periods of time when the radiocarbon calibration curve is rather flat, resulting in multiple intercepts. (Radiocarbon does not produce calendar ages and requires calibration, but trapped-charge methods do.) During the late prehistoric, for example, luminescence often has better precision.

The trapped-charge methods also have much wider range than radiocarbon, allowing dating for events as old as 500,000 (up to 2 million years for ESR dating of tooth enamel) or as young as a few decades. They are often the only available methods for Middle Paleolithic and Middle Stone Age sites, as well as sites less than 500 years old, where radiocarbon is not very precise because of a flat calibration curve. The main two minerals used in luminescence dating are quartz and feldspar. Quartz has a limited range because of saturation effects, not extending too much further than 100,000 years and sometimes less. Feldspar has a much wider range, but suffers from a malady called anomalous fading, a quantum tunneling effect that results in age underestimation, if not corrected. Correction procedures have been developed, but they work less well for older samples. Recent research has suggested that high temperature stimulations may circumvent fading.

Luminescence also has the ability to date single grains. This has the advantage, among others, of being able to assess stratigraphic integrity, whether all grains in the deposit are of the same age or represent different ages due to post-depositional mixing.

Other Methods Based on Radioactivity

Uranium series dating and potassium-argon dating are based on the accumulation of isotopes from radioactive decay. Both date depositional events. Their main use in archaeology is in bracketing of archaeological deposits (Walker 2005).

Uranium series dating is based on disequilibrium in natural radioactive decay chains and the time it takes to restore equilibrium. Parent radioisotopes ^{238}U and the less common ^{235}U decay into a sequence of daughter isotopes which have much shorter lifetimes than the parent. Where radioactive decay is the only process affecting the abundance of these isotopes, the parent and the daughters will decay at the same rate, a condition known as secular equilibrium. But if geological processes intervene, the decay chains can be out of equilibrium. A common cause of disequilibrium is differential solubility. Uranium (the parent ^{238}U and its daughter near the top of the decay series ^{234}U, or the parent ^{235}U) can occur in a soluble form, but the immediate Th or Pa daughters are insoluble. Materials precipitated by water can have an excess of U and a deficiency of Th or Pa, allowing dating by the extent of accumulation of the daughters up to the point where equilibrium is restored. U-series dating works best where the daughters are completely absent at the time of precipitation, although correction for detrital Th can be made by measuring the contents of ^{232}Th, a long-lived

radioisotope that is not part of the U chains. Dating can also work where the daughter is in excess and decays away until equilibrium with the parent is restored. Two conditions required for dating is that the initial fractionation between parents and daughters occurs over a short time period relative to the half-life of the daughter and that after precipitation, the system remains closed to other geological processes that might cause further fractionation. U-series dating has been most commonly applied to speleothems, travertines, and corals, and less frequently to caliche and marls. It is less useful for bones and teeth which are not closed systems and often experience U uptake during their histories. The upper dating limit is constrained by the half-life of the daughters. It has generally been applied to Pleistocene age deposits, up to about 500,000 years, but use of thermal ionization mass spectroscopy (TIMS) for measurement has allowed dating deposits as young as a few hundred years.

Potassium-argon dating is based on the decay of ^{40}K into ^{40}Ar and dates a degassing event where Ar is removed. A volcanic eruption is such an event, where the heat liberates trapped radiogenic Ar in the sample and brings it into equilibrium with the atmosphere. Upon cooling, ^{40}Ar begins to re-accumulate from decay of ^{40}K and is not removed because the large size of the atom becomes trapped in the solid crystal lattice. Atmospheric ^{40}Ar also becomes trapped during cooling and must be subtracted. Its concentration relative to radiogenic ^{40}Ar puts a limit on youngest ages obtainable of about 100,000 years, although in special cases, ages as young as a few thousand years have been achieved. The upper limit is the age of universe. Conventional measurements require two aliquots, one to measure the Ar by mass spectrometry and one to measure the K by atomic absorption. More recently, neutron bombardment to convert ^{40}K to ^{39}Ar has been employed. This allows measurement of both Ar isotopes by mass spectrometry on a single aliquot and is called $^{40}Ar/^{39}Ar$ dating. Because only a ratio, not absolute abundance, is required, more sensitive measurements can be made and does allow dating younger samples. Lasers have been used to date single grains, allowing assessment of heterogeneity in samples that may be contaminated by older grains.

Cosmogenic nuclide dating is also mentioned here, because it is based on accumulation of isotopes, although not always involving radioactivity. Cosmic radiation produces high-energy neutrons that interact with nuclides in surface sediments and rocks, causing them to break apart and form new nuclides. The accumulation of these new nuclides is directly related to the time the surface has been exposed. The nuclides include stable ones such as ^{3}He and ^{21}Ne as well as radioactive ones such as ^{10}Be, ^{14}C, ^{26}Al, and ^{36}Cl, the latter requiring adjustment due to loss from radioactive decay. Cosmogenic nuclide dating has seen little use in archaeology, but it might have potential for dating the age of surfaces of structural elements such as stone blocks if they were newly exposed during construction, constraining the upper age of rock art on exposed surfaces, and determining erosion rates in site formation studies.

Methods Based on Cyclical Variation in Temperature or Other Climatic Variables

Nature produces cyclical records of climatic variation and these have long been used for dating. They are the earliest chronometric methods developed, dating to the early twentieth century. The earliest developed was varve dating, based on the annual horizontal depositional bedding in lakes and other basins. Best known are those from glacial lakes where annual bands of alternating coarse-grain and fine-grain deposits reflect spring and summer runoffs, respectively. They provide one-year resolution and because of differential thickness from year to year, they can be cross-referenced from lake to lake, allowing construction of a lengthy and detailed chronology. They can only be indirectly tied to archaeological deposits through environmental reconstructions.

More recently developed are chronological records of changes in oxygen isotope ratios from ocean sediment cores and ice cores. The vapor phase in the atmosphere (and thus rain and snow) is isotopically lighter than the ocean phase. During glacial periods, lighter water is tied up in glaciers, so that the ocean is isotopically

heavier than during non-glacial periods. The oxygen isotopes are recorded in ocean sediments from the shells of foraminifera. The ocean sediments are anchored in time at a coarse scale by records of paleomagnetic reversals, but finer resolution has been obtained by aligning the ratios with Malenkovich cycles on the assumption that minor periodic changes in the earth's orbit, the timing of which are known quite accurately, are responsible for the amount of sunlight reaching high latitudes and thus causing ice-age cycles. The match between orbital changes and climatic response is not perfect, however, and precision is only on the order of 5,000 years. Ice cores, however, provide much better resolution because annual layering in the ice can be discerned up to about 100,000 years, although there are problems with missing layers and deformation (Vinther et al. 2006). Again, oxygen isotope ratios can be related to archaeological deposits only indirectly.

More directly related to the archaeological record is dendrochronology, which was also developed in the early twentieth century. Dendrochronology is based on the annual growth rings in trees, light colored bands of early season growth alternating with dark colored bands of late season growth (Baillie 1995). The width, density, and other properties of the rings are a function of annual temperature and precipitation. The pattern of width and density variations can be correlated from tree to tree, and such cross-references from modern to ancient trees permit construction of a chronological master curve, which has been extended to as much as 10,000–12,000 years on both American Southwest conifers and European northern oaks. Although these two sequences are the best known, shorter curves have been constructed on other trees from many parts of the world. Dendrochronology has 1-year resolution, but somewhat limited applicability. To be used in archaeology, the region where the artifacts are found must have sensitive trees which cross-date and the wood must have been used prehistorically and be preserved, all rather stringent requirements. Structural wood in Southwest buildings is an ideal circumstance, but even here, it must be remembered that the event dated is the cutting of the tree, not necessarily its use. Use of old wood in initial construction or young wood to repair an old structure can lead to misleading interpretations. The age of a building is also not necessarily the age of its contents. Lack of preservation of the outer rings is another problem and allows only maximum possible ages. Usually many tree-ring dates from a single occupation are required to discern patterns that can be interpreted chronologically. Where all these difficulties can be surmounted, the 1-year resolution of dendrochronology can provide resolution in cultural changes (whether occupations are episodic or continuous, for example) that few other dating methods can match.

Dendrochronology is also used in paleoenvironmental reconstructions, not only of climatic patterns but even of single-year events like large volcanic eruptions (evidence of frost damage and narrow rings associated with dust veils), forest fires, droughts, and hurricanes (large number of felled trees). Cultural changes have been correlated with evidence of such disasters. Lack of cutting dates for some periods has also been correlated with cultural dynamics. For example, the lack of construction during the Black Plague has been documented in Europe.

Methods Based on Weathering

A number of dating methods are based on the extent of weathering. These methods tend to be problematic because they depend on environmental variables, but many of them have the distinct advantage of dating an event that is of interest to archaeology.

Obsidian hydration dating is the most well known of these (Liritzis & Laskaris 2011). It is based on the development of a rind on the surface of freshly cut obsidian through the absorption of water. The thicker the rind, the more time has passed since the surface was fresh. This method has been popular because it directly dates the event of flaking on obsidian. The rate of rind growth depends on composition, temperature, burial depth, and other variables. Determining the hydration rate has been done in two ways. The first is an empirical approach, either by measuring the rind thickness of an independently dated piece from the same area or by measuring

it directly through short-term experiments and extrapolating to the long term. The second is intrinsic, where an attempt is made to measure the various variables that go into the equation. Both methods have their difficulties, compounded by the fact that there is a little agreement among practitioners on how to measure the rind, what the proper equation is, and how to measure the various parameters in the equation. The rind was originally measured visually using an optical microscope, on the assumption the boundary of rind is sharp, but experiments using secondary ion mass spectroscopy (SIMS) have suggested the boundary is not sharp, such appearance being an optical illusion. The original equation, following Fick's laws, is based mainly on temperature and composition, but recent evidence suggests that concentration also has to be taken into account so that the rate changes with time. Some have suggested the rate of growth of a saturated layer (to be determined by SIMS) does not change with time and can be used for dating. While some accurate results have been obtained combining empirical and intrinsic approaches, until consensus is reached on the fundamentals of the method, its highest utility at present may be as an ordinal measure at given sites or within restricted regions.

A similar method involving water absorption has been recently applied to ceramics (Wilson et al. 2009). When clays are fired, structurally bound hydroxyl ions are released. After cooling, ceramics subject to even modest moisture levels will gradually regain the hydroxyl ions, a process called rehydroxylation. It has been shown that rehydroxylation follows a power law, mainly dependent on temperature. Very recent work has suggested the rate can be measured in laboratory times and be extrapolated. The method has promise but requires more experimental work to see if it applies to conditions beyond the original experiment. If successful, the method will be a quick and inexpensive dating of the last time the ceramic was fired – usually what the archaeologist wants to know.

Amino acid racemization is a dating method based on the diagenesis of amino acids in bone and shell (Miller 2007). Most amino acids contain an asymmetrical central carbon atom (called chiral carbon) to which four different side atoms or groups of atoms are linked. The chemical groups linked to this atom can be arranged in two different ways, resulting in L-amino acids and D-amino acids. In all amino acids in living organisms, only the L-amino acid arrangement is obtained. Upon death, L-amino acids spontaneously change to D-amino acids and vice versa until some equilibrium is reached. The conversion process is called racemization, and if there is more than one chiral carbon but conversion happens on just one, it is called epimerization. The rate of reaction depends on a number of environmental variables, but chiefly temperature. The time dependence of the L- and D-amino acid ratio is the basis for dating, with an age range from 50 ka to 1 Ma. Usually, only an empirical procedure, using rates from known aged samples in the same area, is employed, as intrinsic estimations are too complicated. The method was originally applied to bone, but bone proved unsatisfactory because it is an open system and subject to rate changes. It is now almost exclusively applied to shell, particularly egg shell of ratite birds. Shell is much more stable, although the rates can be badly affected by fire. Where eggshell was used prehistorically (both Africa and Australia), the method has some important applications, assuming the shell was fresh when used. But it has limited applicability elsewhere.

Other methods include fluorine dating, based on the uptake of fluorine in newly deposited bone, which is mainly used as an ordinal method, and lichenometry, based on the growth of lichens on newly exposed rocks, which has some applications for stone structures at high altitudes. Both have fairly limited applicability.

Archaeomagnetism

Certain materials retain a temporal record of changes in the earth's magnetic field. If the history of these changes is known, then such remanent magnetization can be used for dating (Sternberg 2008). Records of polarity reversals are global in extent but have limited applicability in archaeology except for older artifacts. More

commonly used in archaeology are localized changes in intensity and direction, called secular variation. Mainly used is thermoremanence, which is acquired during heating of ceramics, rocks, or earth. Less often used is detritral remanents, acquired by clastic materials during deposition. The main advantage of measuring thermoremanence is that it relates directly to a heating event, which is often of archaeological interest. Archaeomagnetism is a derivative method. A master curve of changes in secular variation is required against which archaeological samples are compared.

A magnetic field can be described at any moment at any place by its deviation from geographic north (called declination), its angle of dip (or inclination), and its intensity. Archaeomagnetism involves ferromagnetic materials, where magnetic domains within the crystal structure align with an external magnetic field and retain that alignment when the external magnetic field is removed. The domains are characterized by coupling of unpaired electron spins between adjacent atoms. Above a certain temperature (called the Curie temperature), the coupling breaks down and the material becomes paramagnetic, where the internal magnetism of the material aligns with the external field but does not retain this alignment when the field is removed. When materials are heated above the Curie temperature, any remanent magnetism is removed and the material acts paramagnetically, aligning with the current magnetic field. As the material cools below the Curie temperature, magnetic domains develop with the same alignment. At a slightly lower temperature (called blocking temperature), these alignments become effectively fixed. Relaxation times, how long it takes to align with the external field, become very long, although over archaeological time, there may be some realignment, called viscous remanent magnetization, which must be removed for dating.

For fixed features like hearths, kilns, or brick walls, where the sample material is in the same orientation as the original construction of the feature, thermoremanent dating uses both declination and inclination, as well as intensity. For portable artifacts, like pottery, where the original orientation is not known, only intensity can be used. Most work has been done with fixed features because of the advantage of having two measures instead of one. Common practice is to use virtual geomagnetic poles (VGPs) to represent both declination and inclination. Dating requires construction of a master VGP curve to which the sample is compared. The master curve is constructed using a large number of independently dated samples, in order to map the changes in VGP through time. Various statistical techniques are used to smooth the curves and provide error margins. A major problem is multiple intercepts, where the curve crosses over itself and a sample might correspond to two different ages. Measures of intensity can be used to tease these apart. A separate curve is required for every region (about 1,000 km in extent). Aside from providing ratio scale dates, the method has been extensively used for intrasite chronologies and for assessing the contemporaneity of different sites.

International Perspectives

Research into chronometric dating has always had an international flavor to it. Different methods were developed in different countries. Although much of the early research was done in Europe and North America, centers for innovation are moving, so that countries such as China and India are now playing as important roles as the traditional centers. Current research, often presented at regularly scheduled international meetings, reflects a community of scholars from around the world. For example, the last international meeting, held in Turin, Poland, of luminescence and ESR specialists (a relatively small community compared to radiocarbon) attracted scholars from 33 countries.

Future Directions

Current research for all these methods are aimed at expanding age ranges, using smaller sample sizes, increasing the kinds of materials that can be dated, extending applications in novel directions, and improving both accuracy and precision. It is

beyond the scope of this entry to describe these developments. Rather I wish to emphasize the directions I think archaeologists need to take in order to best take advantage of them. Archaeologists have too often treated chronometric methods as a black box, somewhere to send a sample and get back a date without any evaluation of how the date was obtained and what event it might refer to.

First, archaeologists need to invest more time in understanding the dates they obtain, and in particular what event is being dated. Even though many of the methods are based in the physical sciences, and therefore sometimes difficult for archaeologists to understand, the application of the methods is strictly an archaeological issue. A physicist may be able to produce a date, but s/he cannot explain what it means. Only the archaeologist can do that, so it behooves archaeologists to learn as much as they can about the physical nature of the dates, that is, understand what event is being dated at what resolution, so that they can evaluate their utility and plan dating strategies. The difference between dating events and target events, and the bridging arguments that link them, is always important.

Second, it is always recommended to consider use of multiple methods, and not just put all one's money in radiocarbon, for example. Practitioners of different dating methods may like to say that their dates are "independent," that is, not reliant on additional information for their determination or evaluation. But the use of the dates is never independent. All dates produced for archaeology are evaluated against other dating information, including stratigraphy and artifact style (Ahlstrom 2008; Bronk Ramsey 2008). Archaeologists, in fact, have a rather bad habit of throwing out dates that do not agree with this other information, even if they have no other reason to do so. A much less arbitrary procedure for dealing with conflicting dating information has been developed in radiocarbon dating but is applicable for other methods as well. This is the application of Bayesian probability theory, which has mainly been used to constrain error terms, but which could potentially be applied to assess the probability of a particular date being right given prior information. Archaeologists must cease treating chronometric dates as just numbers obtained from a lab. Rather archaeologists need to understand that a date is only an estimate relevant to only a narrow window of the past. A radiocarbon date, an archaeomagnetic date, a tree-ring date, and a luminescence date may all be obtained from a single hearth. If the estimated dates do not agree, this does not mean that any of them are wrong; they might be dating different events or subject to different assumptions. This is where archaeologists need to understand how the estimates are obtained, what events they address, and how they can be applied to the archaeological record. The old joke, "happy is the archaeologist with only one radiocarbon date," underscores the complexity that archaeologists face when multiple dates of different kinds reveal not necessarily convergence but the fact that everything on the site, even a "single component" site, is not of the same age. Sorting that out, understanding formation processes, is I think the challenge of the future, one in which chronometric dating methods will play an essential role, but archaeologists must take the lead. Understanding the multiple strands that lead into an archaeological site will undercut old one-dimensional chronological schemes, typified by static "phases," and allow a more nuanced, dynamic view of the past.

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- ▶ Aitken, Martin
- ▶ Chronological Systems, Establishment of
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Methods in Historical Archaeology
- ▶ Radiocarbon Dating in Archaeology

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Davidson, Iain

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Basic Biographical Information

Professor Iain Davidson studied archaeology at the University of Cambridge under Eric Higgs and David Clarke. Between 1963 and 1973, he was involved with and/or directed excavations in the region between Britain and Jordan, including Aşvan in Turkey, Rakafet Cave in Israel, and Cueva del Niño in Spain. From 1970 to 1973, he analyzed material from Parpalló in Spain for his Ph.D. and has subsequently argued for the significance of this material in understanding the emergence and change of rock art in Western Europe (Davidson 1989). In 1974, Iain was appointed to the then recently formed Department of Prehistory and Archaeology at the University of New England (UNE), Australia. Iain would spend the majority of his career here and evolved with it (to Emeritus Professor) as it became the Department of Archaeology and Palaeoanthropology. From 1993 to 1998, Iain was head of the department and of its later incarnation, the School of Human and Environmental Studies from 1998 to 2000. Over this period, he supervised 18 Ph.D. students and produced over 140 publications including 7 books.

On arriving at UNE, Iain compiled one of the first Australian mammal skeletal archaeological reference collections and established research projects at Coonabarabran (NSW with Wendy Beck) and in the Selwyn Ranges (Queensland). The latter project also spawned Iain's involvement with archaeological consultancy, with major projects conducted with students in the Hunter Valley (NSW) and western Queensland. Later he became involved with Aboriginal plant resources in northern NSW. These projects led him to form long term relationships with Aboriginal communities, particularly the Wangkamadla, Kalkadoon/Yulluna, Wonarua, Gamilaray, and Yindjibarndi. Extending from these relationships was Iain's drive to establish a code of ethics for the Australian Archaeological Association while he was its president from 1990 to 1991 (cf. Davidson 1991). He is a Fellow of the Australian Academy of Humanities, was Visiting Chair in Australian Studies, Harvard University, and in 2010 was awarded the Rhys Jones Medal of the Australian Archaeological Association (its highest award) for "outstanding contribution to Australian archaeology." In retirement, Iain continues an interest in cultural heritage management and rock art, recently completing a consultancy in the Burrup Peninsula of Western Australia.

Major Accomplishments

Iain's career has tracked along several interrelated themes. These extend from his research interests in rock art, stone tools, human cognition, the colonization of Australia, and heritage. Mid-career, Iain's work in the Selwyn Ranges led him to realize the importance of integrating all lines of evidence (Davidson et al. 2005). For Australia, Iain has argued this concerns how Aboriginal archaeology is understood through its diversity rather than its uniformity (Davidson 1999). In rock art, he has argued it means exploring more than archaeological context and interpretation but extends to symbolic conventions and by consequence the concerns of the origins of language (Davidson 1997). By extension, Iain has also demonstrated how the evolution of symbolic behavior in humans has critical implications for the colonization of Australia (Davidson 2008) and interpretations of human evolution (Davidson 2007). For stone tools, he has shown that it involves our interpretation of form versus function and ultimately how these change to reveal aspects of the evolution of human cognition (Davidson & McGrew 2005). Collectively, these lines of argument are testimony to Davidson's intellectual diversity and theoretical contribution to the discipline.

Stringing together these quite diverse themes in Iain's career has been a concern about what we recognize as heritage and the role archaeology plays in it. As he states:

> Who really cares about the past? This line of questioning evokes [a] statement from my first years in the discipline that really got us talking about the value of archaeology. . .Is the material I have been talking about only a 'brain-game for the more intellectual members of the meritocracy'?. . . I think we should discuss it, for without doing so, archaeology can come to be no more than the source of authentic imagery for computer games, movies or theme parks (Davidson 2008: 134).

Iain has consistently kept an eye on the role of archaeology to broader society throughout his career. At his inaugural public lecture at UNE in 1999, he outlined his hope that an education in archaeology is not just for future archaeologists but also provides a unique perspective on human affairs by emphasizing our collective histories and how we came to be the people we are today. For Iain, such sentiments are the crux what archaeology contributes to our understanding of heritage:

> . . .analysis and interpretation lie at the core of the importance of cultural heritage still surviving from those remote pasts. The beauty or the traditional values are important aspects of the materials of cultural heritage, but faced with conflict with alternative land uses and real choices about financial impacts of decisions, those may not be enough. . . .as David Clarke and Gordon Childe saw so clearly, what is important is the use to which the information is put and the stories that we tell (Davidson 2008: 137).

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- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Dampier Archipelago Petroglyphs
- ▶ Ethics in Archaeology
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- ▶ First Australians: Origins
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Davis, Hester

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Basic Biographical Information

Hester Ashmead Davis was an active participant in the development of cultural resources management legislation and programs in the United States. Born June 4, 1930, in Ayer, Massachusetts, she took an unconventional route to a career in archaeology at a time when few opportunities existed for women.

Major Accomplishments

After receiving a B.A. in history from Rollins College in 1955, an M.A. in Social and Technical Assistance from Haverford College in 1955, and an M.A. in Anthropology from the University of North Carolina in 1957, Hester became preparator at the University of Arkansas Museum in 1959. This began a lifelong association with archaeology in Arkansas, first at the museum until 1967 and then as state archaeologist with the Arkansas Archeological Survey from 1967 to 1999, when she retired.

At Arkansas, Hester became associated with Charles R. McGimsey III, and they were both involved for more than a decade in CRM issues and activities. She participated in the foundational Airlie House Seminars and coedited the subsequent report in 1977. She was a founding member of the National Association of State Archaeologists, the American Society for Conservation Archaeology, and the Society of Professional Archaeologists and served in numerous committee and officer positions, including president in the latter two organizations.

In Arkansas, Hester extended her role in public archaeology and CRM through several organizations. She was a member of the Arkansas State Review Board on Historic Preservation from 1969 to 2000 and served terms as vice chair and chair. She taught a public archaeology course that included CRM at the University of Arkansas between 1974 and 1991. She was a founding member of the Arkansas Archeological Society and served in several officer positions including 20 years as editor of the bulletin and 40 years as editor of the newsletter.

On the regional level, she was a longtime member of numerous organizations, including the Southeastern Archaeological Conference and the Southeastern Museums Conference, serving as president of both. Nationally, she was a member of the Society for American Archaeology, the Society for Historical Archaeology, the Coordinating Council of National Archaeological Societies, the Archaeological Institute of America, and the Association for Field Archaeology and served on boards and committees in all

of them. She was a consultant for several federal agencies, including the National Park Service and Bureau of Land Management, and was a CRM program reviewer and/or consultant to a long list of agencies and universities.

On the international level, Hester was a member of the US Committee, International Council on Monuments and Sites. She was appointed by President Clinton to the Cultural Properties Advisory Committee of the US Information Agency.

As testimony to her long and dedicated service to CRM, Hester has received many awards and honors, including Certificate of Honor from the American Society for Conservation Archaeology, Distinguished Service Awards from the Society of Professional Archaeologists and the Society for American Archaeology, the Seiberling Award for Public Service from the Society of Professional Archaeologists, and Doctors of Humane Letters from both Rollins College and Lyon College. The Register of Professional Archaeologists awarded her both a Distinguished Service Award in 2003 and the Charles R. McGimsey III-Hester A. Davis Distinguished Service Award two years later in 2005. And, hanging outside her office door is her "Best Damn State Archaeologist Award" given by the National Association of State Archaeologists on the occasion of her retirement.

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Basic Biographical Information

Kathleen A. Deagan (b. 1947) is the eldest of three children born to a career US Navy family. As a child of the Cold War, Deagan's family was repeatedly reassigned to naval bases around the world. Guam, in Micronesia, was one of these assignments. Her life-long interest in the processes underlying the development of the Spanish cultural legacy would be conceived on this distant island, for it was there in what once was a remote corner of the Spanish Empire that she saw the remnants of colonial-era missions, fortifications, and towns. In 1966 the family was transferred to Jacksonville, Florida, and Deagan matriculated at the University of Florida in Gainesville. Eight years later, under the tutelage of Charles Fairbanks, she earned her doctorate in anthropology based on research conducted on eighteenth-century Spanish colonial St. Augustine, Florida, a site she continues to study.

Immediately following graduation, Deagan joined the faculty at Florida State University. There, for the next eight years, she continued research in St. Augustine expanding her study era back into the sixteenth century. Her presence

at Florida State reinvigorated the archaeology program there and inspired dozens of undergraduate and graduate students to continue into anthropology, archaeology, historical preservation, and other related fields.

In 1982 Deagan returned to Gainesville where she served on the faculty of the Florida Museum of Natural History and in the Department of Anthropology at the University of Florida until her retirement in 2010. During these 28 years, her international field research focused on Spanish fifteenth- and sixteenth-century settlements in the Dominican Republic and Haiti at such sites as La Isabela (Deagan & Cruxent 2002a) and Puerto Real (Deagan 1995). This was in addition to fieldwork in St. Augustine and collections research in the circum-Caribbean basin and Europe.

Major Accomplishments

A dominant theme in Deagan's research is identity and culture change. Using the processual approach to consider adaptation and acculturation and the pattern recognition method developed by Stanley South, she found distinct differences between eighteenth-century British and Spanish colonial sites. Deagan explained these differences in terms of gendered spheres of influence with the indigenous female spouses of creole and mestizo soldiers and settlers leaving their marks in the less visible private aspects of food, food preparation, and foodways while males were associated with "higher-status" European objects associated with the public sphere of activities (Deagan 1973, 1983, 1985). This biological and cultural *mestizaje* created a new form of culture combined elements of both the colonizing and colonized group.

Kathleen Deagan is the author or editor of a dozen books and monographs, 50 articles, more than two dozen book chapters, and over a hundred papers and presentations. Two of the books published by the Smithsonian Institution provide an in-depth study of ceramics, glassware, and other portable Spanish sixteenth- through eighteenth-century material culture (Deagan 1987, 2002). She has received major research grants from the National Science Foundation, National Endowment for the Humanities, and National Geographic Society and other funds from a number of Florida-based endowments and state agencies. A consultant with the SmithsonianInstitution, Organization of American States, and UNESCO, she has also worked with the National Park Service and other international and national organizations.

Over the decades Deagan has served on National Review Panels for the NSF and NEH and other prestigious organizations as well as on the editorial advisory boards including *Antiquity*, *Journal of Field Archaeology*, *International Journal of Historical Archaeology*, and *Historical Archaeology*.

Deagan has been repeatedly recognized for her outstanding contributions to the fields of anthropology, archaeology, and history. These include book awards from the Florida Historical Society (Deagan & McMahon 1995) and Society for American Archaeology (Deagan & Cruxent 2002b) and lifetime achievement awards from the Florida Anthropological Society, the Florida Department of State, the Society for American Archaeology, and the J. C. Harrington Award for Distinguished Lifetime Contributions to Historical Archaeology from the Society for Historical Archaeology (McEwan 2004).

Today, Deagan is Distinguished Research Curator Emerita, Florida Museum of Natural History, University of Florida, where she is also the Lockwood Professor of Florida and Caribbean Archaeology.

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Death, Burial, and Commemoration in Historical Archaeology

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Introduction

The study of death, burial, and commemoration in the historic period has been a multidisciplinary interest, with cultural historians, anthropologists, art historians, folk life scholars, and architectural historians all with their own particular modes of enquiry and emphasis on their own forms of data. Most research has concentrated on the monuments of the elite, though some disciplines have been more wide-ranging. Archaeological concerns have focused on the one hand on excavating human remains and the cultural features of coffins and graves and on the other on the study of the more mundane commemorative memorials of the majority. While cultural values limit research on burials largely to opportunities linked to development, memorials are easily accessible, and in most communities archaeologists are able to record and study these. As monuments can be studied nonintrusively and relatively rapidly with limited resources, they are popular subjects for student and community volunteer projects. Burial grounds may be forgotten, but those still in use carry much emotional significance to local and descendant communities; this provides both opportunities but also sometimes challenges in practice and interpretation. Nevertheless, mortuary archaeology of the historic period is now a dynamic and influential part of the discipline. A particular strength is that most monuments, and many coffins, provide details of names and dates for the deceased, allowing not only the establishment of tight chronologies but also links to many documentary sources. This allows complex, subtle, and contextualized research questions to be asked not only about death, burial, and commemoration but wider cultural and social issues relevant across the whole discipline.

Definition

All communities in the recent past have developed clear cultural and legal frameworks for dealing with the deceased, often with accompanying documentary materials such as burial registers and death certificates. The material evidence for burial and commemoration can be found at a range of scales: the grave and its contents, the plot, the burial ground, and the landscape. The first is below ground, and the remainder can often be largely investigated from surface remains, including study of memorials.

Until the late nineteenth century, all burial in European and European colonial contexts was

inhumation, with cremation only becoming significant from the later twentieth century. Inhumation always required formal disposal, and there were several options, though not all were available at all times and in all cultural contexts. Early historic burials could be in wooden or lead coffins for the elite, but most people were wrapped on cloth shrouds held in place by shroud pins. By the later eighteenth century, the use of wooden coffins became the norm (Fig. 1), often with fittings (coffin furniture); some coffins were made of several layers (shells) including some of lead. By this stage the funeral industry developed, and specialist producers of both coffin fittings and memorials emerged. In North America, cast iron coffins were also popular in the nineteenth century, as were those with glass windows through which the deceased could be viewed. European coffins tended to be hexagonal, single-break coffins widest at the shoulders. In North America the rectangular casket became most popular from the nineteenth century onwards, though this also is found elsewhere from that time.

Death, Burial, and Commemoration in Historical Archaeology, Fig. 1 Wooden coffin with fittings in a brick-lined shaft (Kellington, North Yorkshire, UK)

The most frequent mode of interment was in an earth grave dug directly in the ground, which could be for one or several interments in a short space of time, with a grave shaft lined with brick or stone as a more complex form. Built structures for family or community use include a crypt or vault below a church, a completely or partially subterranean vault or tomb within the burial ground, or an upstanding mausoleum on private land. In Mediterranean countries and parts of the American South, aboveground structures provided individual or family chambers, *loculi*, in which coffins could be placed (Fig. 2). Cremated remains (ashes in UK, cremains in North America) were only sometimes formally deposited, though these could be interred in the ground or in *columbaria*, similar to *loculi* but for caskets.

Apart from some deaths at sea and in isolated frontier locations, death and burial have been certificated and recorded, with specific burial locations available. In Europe, ecclesiastically controlled burial in churchyards (also called graveyards) was the norm and often in land surrounding a church. Burial within the church (intramural burial) was also common until the nineteenth century for the more wealthy or influential. Burial was frequent, and the disturbance of earlier interments was routine. In European colonies there was less burial within churches, some communities established burial grounds apart from religious structures, and in many places there was also a strong rural tradition of family burial grounds near farmhouses. Within historical archaeology, the term cemetery has been largely limited to formal cemeteries developed outside ecclesiastical control from the late eighteenth century onwards, this becoming the major form of urban burial location across the globe in the nineteenth century. Cemeteries tend to be highly planned, regulated, and densely used, though without routine disturbance of interments; they often also have significant landscape characteristics and architectural features and may belong to particular design or management traditions, such

Death, Burial, and Commemoration in Historical Archaeology, Fig. 2 Aboveground *loculi* (*right*) and mausoleums (*left*) (Granada, Spain) (Author's photograph)

Death, Burial, and Commemoration in Historical Archaeology, Fig. 3 Garden and lawn cemeteries. *Left*: Mount Auburn, Boston, USA. *Right*: Forest Lawn, Los Angeles, USA (Author's photograph)

as the garden or the lawn cemetery movements (Fig. 3). Many cemeteries are spatially divided by denomination or may be open to only one denomination. They are often also structured by cost of plots which affects the type of monuments allowed, plot size, and burial density.

Memorials come in a wide range of forms over time, space, and cultural context (Mytum 2000, 2004). While most are of stone, use of wood, cast iron, terracotta, and concrete is also common in some contexts. Memorials usually carry text giving details of the deceased and may have further information including familial relationships, place of residence, occupation, and an epitaph. Some memorials commemorate many people, often formed over time in a series of inscriptional events (Mytum 2002). Decorative features include the form of the monument itself but can also be added in the form of religious symbols, markers of identity (including portraits), or elements generally derived from contemporary architectural styles.

Historical Background

The interest in historic memorials began with antiquarians fascinated by genealogy, and

heraldry, followed by a phase of collecting amusing and instructional epitaphs for publication in popular books in the nineteenth century. Modern academic studies began in the UK with Burgess (1963) and in the US with Forbes (1927). These and many subsequent important regional studies continued their largely art-historical framework but have provided the basis for much recent work using more overtly archaeological approaches. These were first developed in North America by Dethlefsen and Deetz in a series of papers (most notably 1966, see Bell 1994 for other references). In the UK, efforts in the 1970s aimed at encouraging graveyard recording did not lead to published analysis, but subsequent recording protocols (Mytum 2000) have been more effective. Output derived from doctoral research (Cannon 1989; Tarlow 1999) revealed the potential of memorials, and in North America the major bibliography by Bell (1994) sets a significant benchmark. While most studies remain at a regional, state, or national level (Willsher & Hunter 1978; Veit & Nonesteid 2006), it has now become possible to consider wider synthetic treatment of the subject (Mytum 2004).

Studies of historic burials were largely limited in the UK because they were rarely threatened or seen as important, and ethical concerns prevented research excavation in burial grounds still in use. Landmark UK projects were Spitalfields, London, where a large crypt was investigated before clearance and where both cultural (Reeve & Adams 1993) and demographic and pathological dimensions were considered (Molleson & Cox 1993). Bell's (1990) study of coffin hardware initiated serious interest in the material culture of North American coffins, where many government infrastructure projects have uncovered burial grounds, including many of African-American communities. The unexpected discovery and subsequent excavation of the African-American burial ground in New York, with inappropriate levels of consultation with descendant communities, led to significant public protest. This resulted in a fuller investigation than is normally the case for urban excavations and a permanent memorial at the site, as well as greater awareness among the profession of the cultural significance of burials among descendant groups (Mack & Blakey 2004). Following lessons learnt from this experience, the skeletal and cultural aspects of these types of sites are now routinely investigated as part of development projects, with community engagement before appropriately celebrated reburial. Large-scale developer-funded projects have now also become more frequent in the UK (Emery & Wooldridge 2011) but are still rare elsewhere, where most excavation has been of small numbers of burials in any one project. The major difficulty for analysts is that most of the reports on excavations remain only locally published or in "gray" literature in archives.

Key Issues/Current Debates

There are now standard recording procedures for both monuments (Mytum 2000) and human remains, though those for coffin fittings are still at an earlier stage of development. Nevertheless, there is now sufficient data for many forms of analysis to be carried out, even as further data collection continues apace, aided by digital storage. However, there are still some methodological concerns regarding commemorative practices. One is the proportion of the population represented by upstanding monuments. This issue has thus far been mainly examined in the UK, with universally low proportions for earlier periods but highly variable percentages of the community with surviving memorials from the nineteenth century onwards in regional studies. Skewed samples are also being investigated within coffin furniture, as some soils or particular burial conditions such as crypts differentially favor survival of cultural material. In some cases these are taphonomic postdepositional processes(certain materials for monuments decay, coffin furniture rarely survives in acidic soils) but also linked to class (a certain affluence is required to commission a permanent memorial; thus middle-class urban crypt burials survive intact while earth burials have been heavily disturbed). In both below- and aboveground evidence, the biases need to be understood before

Death, Burial, and Commemoration in Historical Archaeology, Fig. 4 New England memorials demonstrating the shift from death's heads to cherubs and then urns and willows (Kingston, MA, USA) (Author's photograph)

Death, Burial, and Commemoration in Historical Archaeology, Fig. 5 Indications of sentimentality on memorials (Toxteth, Liverpool, UK) (Author's photograph)

some of the wide-ranging cultural questions can be addressed with confidence. Nevertheless, there are some important current debates that can develop despite these concerns.

Archaeological study of historic mortuary remains has concentrated first on issues such as large-scale cultural change and status and more recently on identity and attitudes to the body. Dethlefsen and Deetz (1966) attempted the identification of broad cultural changes and proposed ideological causes (Fig. 4); the trends had already long been recognized by others (Forbes 1927), and indeed art historians proposed more nuanced, though still far from agreed, interpretations. Ideology is still a key theme but now more subtly investigated by archaeologists who have considered a wide range of evidence to probe into the burial and commemorative practices of the recent past. While functional factors such as dealing with increased population densities affected practice, archaeologists also now see the changing attitudes to the body, as much as concerns over health issues, as relevant. There are trends in iconography and inscriptions showing changes form an emphasis on mortality through salvation to sentimentality (Fig. 5). Nevertheless, different scholars place the emphasis on diverse factors; all are undoubtedly relevant, though their relative importance no doubt varied over time and space; one of the current challenges is to evaluate these in particular contexts. In the post-Reformation period, the anxieties released by abandoning Catholic interpretations of purgatory were worked through over generations (Tarlow 2011), eventually leading to a greater emphasis on emotion (Tarlow 1999). Parallel with these changes, however, there was a growing materialism where ownership and

display of goods, and the desire to place named people within an inscribed history formed in linear time, created other pressures on mortuary practice (Mytum 2006, 2007).

Identity linked to large diasporic groups such as the Ukrainian, Czech, or Mexican communities in North America has been identified (Meyer 1993), and this is now being explored in many other contexts. Religious identity, which forms part of the above, is also relevant in recent studies, while others have taken a Marxist exegesis examining class structures. Relatively few studies have had a dominant focus on gender or the family, though it is often an element in many analyses; there is some debate regarding both the relative frequency of child commemoration and the attitudes to childhood mortality in the past (Mytum 2004).

Artifact biography offers significant opportunities in historic mortuary analysis. There has been a long tradition of studying production, of both coffin fittings and monuments, and in the case of the latter, many individual carvers and workshops have been identified. While there is still much opportunity to expand this, there is also increasing recognition of the role of the consumer in the location and form of burial and choice of form and content of memorials. The repeated inscribing, and even intra-site movement, of memorials in some regions creates complex artifact histories (Mytum 2002). Burial ground histories, seen either through excavated interments dated by coffin fittings or by spatial patterning of memorials, allow examination of issues of control and management, sometimes under extreme pressures of demand (Emery & Wooldridge 2011). Other issues of family, ethnic and religious identity, changes in the managerial control of burial location and monument choice, and issues of competition between families for visibility and elaboration of plots and burial markers are all current concerns (Mytum 2004).

International Perspectives

The evidence to date suggests a remarkable similarity in overall material reactions to death, burial, and commemoration in the historic period across the English-speaking world (Mytum 2004). Although there are significant changes over time, and both regional and national traits that are noticeable and important, the broad patterns remain similar. Simple, largely locally made memorials are replaced in the later eighteenth and nineteenth centuries by products of more standard forms, often of materials imported into the region (such as marble and granite). Large cemeteries emerge as a dominant burial form in the nineteenth century to deal with large demands caused by urban population densities and allow the removal of the dead from closed proximity of the living for both public health and private grieving reasons. Such new landscapes of death also allowed denominational, religious, and class distinctions to be materially elaborated, within broadly similar designed landscapes that were adapted to physical, vegetational, and cultural conditions as far apart as Australia, Europe, or North America.

The only significant distinctive variations noted thus far are the Mediterranean-inspired traditions of family mausoleums and use of *loculi* and the North American cemetery style of plot with a large founder memorial surrounded by very small markers for other family members (Mytum 2004). Denominational differences in body treatment and disposal, burial ground organization, and types of commemoration are often important, however. While archaeological evidence demonstrates that practice did not always conform to stated theological and liturgical conventions (Stock 1998), generally the cultural codes that accompanied the beliefs of a particular religion, and indeed denomination or sect within that religion, could be significant. As denomination was often a significant cultural marker for diasporic communities, it can be a valuable indicator of ethnicity and identity (Meyer 1993). Forms of body disposal and commemoration in developing colonial contexts suggest use of isolated, temporarily marked burial and unregulated small settlement-based burial grounds. The treatment of and reactions by indigenous and slave groups within these contexts have received some consideration

but are still a relatively undeveloped field, and most attention has been directed to issues of cultural survival.

Future Directions

In many regions, broad cultural trends are now identified, but most of the cultural choices have not been explained, and variation and change has merely been identified. While concepts such as emotion or attitudes to ownership or the body have been proposed to explain the rise in commemorative practices and its forms, exploring these themes is still in its infancy. The rich diversity of text, form, and symbol on many memorials (and indeed some coffin furniture), combined with many documentary sources from burial registers, cemetery company records, coffin hardware pattern books and personal diaries, allows development of studies from highly contextualized examination of particular sites (Reeve & Adams 1993) to wide-ranging studies of issues such as ethnicity and class (Cannon 1989).

A major concern linking ethics, religious beliefs, and archaeological practice is the accessibility of human remains for future research. Descendant communities and religious groups have very different views regarding reburial or what reburial can mean. For example, some Christian sects such as the Quakers have no concerns regarding retention of human remains in museums, while Anglican churches require placing in consecrated spaces; in some cases, however, these can be made accessible for further research if permission is granted, by being stored in a crypt, for example. Other groups demand immediate reburial. Archaeologists need to be sympathetically active within a constantly changing set of attitudes and relationships between living communities and their dead. In addition, further research and development of already existing protocols for the recording and study of human and cultural remains in the short window of opportunity between excavation and reburial will greatly increase information available for archaeologists and communities, the latter often extremely interested in the findings.

Much of the research to date has been within the English-speaking world and thus has had an emphasis towards communities with dominantly Protestant and northern or western European cultural traditions. The development of new research in other religious traditions, notably those originating from southern and eastern Europe and Asia, will be particularly important.

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- ▶ Church Monuments Society
- ▶ Churchyard Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Ethics and Human Remains
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Mytum, Harold
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Tarlow, Sarah

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DeBlasis, Paulo

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Basic Biographical Information

Paulo DeBlasis, born in 1954, is a Brazilian archaeologist from the Museum of Archaeology and Ethnology of the University of São Paulo (MAE-USP), Brazil. After graduating in history, he started studying hunter-gatherer societies from southern Brazil and specialized in lithic and spatial analysis, getting a Master's degree in social anthropology and his Ph.D. in archaeology in 1996. Another early subject of his interest is the diverse art rock styles across central Brazil. During the 1990s he has turned his research focus towards the shell mounds (*sambaquis*), investigating the emergence of complexity among these preceramic coastal societies that occur along the southern and southeastern shores of Brazil. He currently teaches at the University of São Paulo and advises students from all over the country in many subjects ranging from rock art to heritage management, ceramist societies, funerary rituals and art, settlement patterns, lithic industries, and hunter-gatherer societies. He has taken part on international boards such as the Committee of the Americas of the Society for American Archaeology and is currently member of several editorial boards, including the International Advisory Board of *the Encyclopedia of Global Archaeology* (Fig. 1).

Major Accomplishments

Professor DeBlasis has conducted seminal research on hunter-gatherer societies from the Southern Brazilian Plateau, helping to establish the low mobility settlement pattern and diversified technological spectrum that characterizes their adaptation to tropical and subtropical rainforest environments from middle Holocene onwards. From the 1990s on, he turned to the shell

DeBlasis, Paulo, Fig. 1 Paulo DeBlasis

mound-building (*sambaqui*) societies, both riverine and coastal, that occur along the Southern shores of Brazil, maintaining a long-term research project in Santa Catarina's coast for more than a decade. Together with partners like Madu Gaspar, he has helped to change the views towards these coastal cultures, highlighting the emergent social complexity displayed by shell mound architecture and its long duration as coastal adapted culture, a research theme that lasts to this day.

Throughout his career, Professor DeBlasis has advocated the fundamental importance of spatial and regional analyses in archaeology in an effort to integrate territorial approaches with landscape studies. He has successfully integrated cross-disciplinary methods and researchers from different areas, such as geology and geophysics, into his research in order to increase the knowledge about the monumental sambaquis from the Santa Catarina's coast.

Besides these academic accomplishments, Dr. DeBlasis has also worked with contract archaeology, advocating the use of high output scientific standards within this practice and the inception of archaeology as an integrative agency towards a better symmetry between large and ecologically blind global enterprening initiatives and local, ecologically set but usually voiceless, native societies and their often overseen knowledge.

Professor DeBlasis has made a major contribution to archaeology in Brazil through his teaching and research supervision. His projects have sponsored many students in their careers while covering diverse aspects of mound building and hunter-gatherer societies. His advice on such a wide variety of subjects and areas has given many students opportunities to pursue their own careers in archaeology. Many of these students are now professors carrying on archaeological practice throughout the country.

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Decapolis, Archaeology of

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Introduction/Definition

The Decapolis ("ten cities") was a group of Greco-Roman cities in the southern Levant, in

today's Jordan, Syria, and Israel. Several cities are attributed to the Decapolis, among them Damascus, Canatha, Dion, Adraa, Gadara, Hippos, Abila, Capitolias, Gerasa, Philadelphia, Pella, and Nysa-Scythopolis. The number of cities belonging to the Decapolis varied. One list of cities of the Decapolis is provided by Pliny (NH 5.16.74).

The Decapolis first is mentioned in the New Testament (Mk 5:20; Mk 7:31; Mt 4:25). In the Hellenistic period, the cities were supported by Ptolemaic and Seleucid rulers and received civic status. With the Roman conquest of Syria by Pompey in 64 BCE, the cities were attached to the new provincia Syria and were backed by Rome.

Probably in this time the term "Decapolis" was created and several cities counted back their civic eras to Pompey's conquest. The cities did not form a territorial unit and they also were not connected directly with other territories of the provincia Syria. Between them and the northern and coastal parts of the province, tribal and less-Hellenized political entities were positioned (e.g., Judaea, Nabataea, Ituraea), and it was probably due to the Decapolis' Greek orientation that its cities were supported by Hellenistic rulers and later by Rome.

The Hellenized profile of the Decapolis probably resulted from pre-Hellenistic and early Hellenistic Greek influence conveyed from the Phoenician coast.

Key Issues/Current Debates

Some of the Decapolis' cities have yielded rich Bronze and Iron Age finds (such as, e.g., Philadelphia and Scythopolis), and according to literary sources, Damascus was an important Achaemenid settlement. However, a direct continuity to the Hellenistic and Roman periods is difficult to establish. Although from literary sources we are well informed about the importance of the cities already in the Hellenistic period, little archaeological evidence for Hellenistic settlements is available yet.

Mainly Gerasa (Camp Hill and Sanctuary of Zeus), Gadara (acropolis), and Nysa-Scythopolis (Tell Istabba) have provided some Hellenistic finds. These finds predominantly stem from the second century BCE, and they seem to be related to Seleucid activities. At that time, many cities received Seleucid dynastic names (Seleucia, Antioch), and the cult of Zeus Olympios, the protector deity of Antiochos IV, was introduced.

Only under the Pax Romana can a thorough urbanization be observed and traced in the archaeological record. Starting in the late first century BCE, the cities expanded and erected civic monuments typical for Greco-Roman cities. Several temples, theaters, baths, hippodromes, colonnaded streets, nymphaea, city gates, etc., were built, and the cities had the urban fabric of typical Greco-Roman cities. Especially the Antonine age, starting with the visit of the emperor Hadrian to the Decapolis, was a period of urban blossom, and cities like Gerasa experienced large-scale building projects such as the monumental complex of the Artemision with terracing, forecourts, and several propylaia.

The cities were decorated with imported marble sculptures, and the language of the inscriptions mainly was Greek with only some Latin exceptions. The cities issued coins. Damascus was already a mint under the Seleucids, and civic bronze coins were given out in some of the cities starting in the first century BCE and ending in the third century CE.

Most of the cities only minted coins in the Antonine/Severan period. The coins are a prime source for the reconstruction of the civic life in the Roman period as they display local deities and myths as well as civic buildings. We learn from them that, in the second and third centuries CE, the cities emphasized their Greek and Roman descent, although at the same time, it is obvious that some of their cults and deities are of Semitic origin and only superficially Hellenized. This however is not a contradiction, but it fits well into the civic culture in the Greek East under Roman rule: the cities propagated their Greek origins and their local specifics.

Such a cultural orientation is of interest as it demonstrates that the cities were not simply Greco-Roman cities as opposed to indigenous settlements, but they themselves were clearly embedded into the Semitic environment, being Hellenized and Romanized. Local sculpture in the Decapolis was dependent on the stone material available. Especially limestone and basalt were used for local production. There is a rich corpus of tombstones with portraits (e.g., Gadara), and there are several local productions of limestone sarcophagi (e.g., Gerasa). In some cities of the Decapolis, Roman underground chamber tombs with arcosolia and sometimes loculi were found.

In Abila and Capitolias, many of the tombs were lavishly decorated with paintings. The hinterlands (chorai) of the cities of the Decapolis have been only little investigated yet. Some of the cities had large territories with extra-urban sanctuaries and smaller rural settlements with agricultural installations. The mostly semiarid environment of the transition zone of the Arabian Desert and the Mediterranean climate belt was suitable for agriculture. In today's northwestern Jordan, sophisticated water supply systems, dating to the Roman period, have been uncovered.

In late antiquity, many churches were built in the cities of the Decapolis, such as, e.g., in Gerasa, Gadara, Abila, and Philadelphia. These churches were extensively decorated with polychrome mosaics. Pagan temples went into decay or were transformed and reused by Christians. In Gerasa, the classical city was transformed, and urban spaces were used by churches and ecclesiastical buildings. This period in general is a period of urban growth, concentration, and extension of civic and rural settlements. The settlement intensity in this period reaches its peak. Glass and imitations of fine wares ("Jerash bowls") were produced locally in the Byzantine period. With the Muslim conquest of the Levant in CE 636/640, the Byzantine period ends, but the material culture (e.g., pottery) changed only very slowly in the Umayyad period, and the transition is difficult to identify.

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Decolonization in Archaeological Theory

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Introduction

Decolonizing approaches in archaeology emerged as a means to counter the dominance of colonial ideologies and improve the accuracy of Indigenous representations. Historically, the routines of mainstream archaeological practice have been shaped by Western (primarily elite Euro-American) beliefs and categories. Although Indigenous people have long been used as informants, Western scientists have exerted control over Indigenous property, and Indigenous knowledges and concerns have been pushed to the margins. Decolonizing has both political and practical effects; it alters power relations among scientists and subjects while also expanding the volume and accuracy of available Indigenous data.

Decolonization as archaeological theory has been influenced by other critical research approaches, including feminist theory, critical race theory, postcolonial political theory, and gender studies (e.g., Denzin et al. 2008; Messenger & Smith 2010). Although Indigenous people have been the most visible proponents and beneficiaries of decolonization, decolonizing methods can be applied to virtually any research population. One might, for example, examine ethnic minorities, homeless people, diasporic groups, or others whose perspectives and histories have been imperfectly represented by mainstream archaeology. Increased communication with knowledge-bearers from formerly colonized communities improves the ethical component of archaeological practice. It can also improve the identification of collections, the educational content of exhibitions, and the relevance of archaeology to Indigenous and ethnic minorities (Merryman 2006; Nicholas 2010).

Definition

Decolonizing archaeologists seek to untangle colonial influences by encouraging greater collaboration with Indigenous peoples, reconsidering foundational knowledges, and paying closer attention to the ethics of handling other peoples' heritage. Decolonizing approaches are explicitly intended to recover materials and knowledges that were lost or made invisible during generations of living under colonial domination. In political contexts, decolonizing efforts have enabled formerly dependent or colonized Indigenous peoples, ethnic communities, and small nations to gain independence and local control (Smith 1999; Maybury-Lewis 2002). In archaeological contexts, decolonizing similarly shifts the power balance by liberating collections and interpretations from the presumed exclusivity of colonial control (Wobst 2005). This is accomplished, in part, by encouraging better collaborations with communities impacted by colonization (e.g., Smith & Wobst 2005; Bruchac et al. 2010; Nicholas 2010). Key strategies for decolonizing include critical analysis of social and political relations, collaborative consultation and research design, reclamation of cultural property, restoration of cultural landscapes and heritage sites, repatriation of human remains, co-curation of archaeological collections, and devising more culturally accurate museum representations. For examples of decolonizing projects and practitioners in different regions of the

world, see Atalay (2012), Bruchac et al. (2010), Nicholas (2010), and Smith and Wobst (2005).

Research pursued from a decolonizing perspective typically focuses not only on potentially important scientific finds but also on the power dynamics and impact of practicing science among a particular research population. The emphasis on collaboration makes this an inherently activist and applied approach to practicing science. Members of descent communities and local stakeholders can be enlisted as partners in collecting material and data concerning the past and in crafting visions for the sustainable use of significant heritage sites in the future (Colwell-Chanthaphonh & Ferguson 2008; Atalay 2012). Community members can provide diverse streams of evidence that crosscut disciplines, using such techniques as ethnographic interviews and linguistic analysis. Archaeological data is also typically embedded in oral traditions, ritual activities, and place names that evoke evidence of older human interactions with the landscape over time (Schmidt & Patterson 1995; Watkins 2000). Decolonizing archaeologists can build collaboration directly into their research plans via a process identified as community-based participatory research (CBPR). The working principles of CBPR emphasize a participatory, "community-based, partnership process" that builds "community capacity," encourages "a spirit of reciprocity," and recognizes contributions from "multiple knowledge systems" (Atalay 2012: 63).

Decolonization is an essential aspect of Indigenous archaeology, broadly defined as archaeological practice directed by, in collaboration with, representative of, and relevant to Indigenous people and Indigenous goals (Nicholas 2010: 11). The term Indigenous is used here, not just as a descriptive, but as a proper noun, to emphasize the sovereignty and agency of Indigenous peoples vis-à-vis the colonial states that have long attempted to dominate them (e.g., Watkins 2000; Wobst 2005; Nicholas 2010). Indigenous groups largely trace their identities and attachments to land through historical continuities with societies that predate colonization; they often maintain unique systems of cultural and political organization. Historically, Indigenous knowledge-bearers have long participated as scientific informants, gatekeepers, and field workers. These site monitors and informants have improved the identification of material in the field and inspired new modes of curation and interpretation in the museum (Oland et al. 2012). More recently, some Indigenous people have become professional archaeologists (see examples in Nicholas 2010); their inclusion in the discipline has stimulated more culturally complex understandings of material and ephemeral relations over time (Smith & Wobst 2005).

Indigenous communities living in the aftermath of (or still influenced by) colonization are sometimes hesitant, if not opposed, to the conduct of scientific research in ancestral sites. Applied sciences are never neutral; scientific discoveries can provoke or complicate understandings of the complex intersections among identity, nationalism, and social justice. Archaeologists may be placed in positions where they are expected to construct and interpret Indigenous identities and relationships, with or without the presence and consent of those communities (Bruchac et al. 2010: 55). Decolonizing archaeologists, regardless of their personal origins, have thus found it necessary to consider the political impacts of their own social relations, in the discipline and in the field. They pay particularly close attention to the relations between present and past populations and to the impacts of their research. By carefully weighing ethics and relations with the communities they study, they hope to replace colonial habits of appropriating knowledge with more culturally sensitive means of recovering knowledge. Indigenous people who choose to practice archaeology typically express a double consciousness that recognizes their unique (and sometimes fraught) positions as both scientific archaeologists and Indigenous activists (see, e.g., the individual contributors to Nicholas 2010).

Historical Background

Colonialism – which can be defined as the forced occupation by large nation-states of lands

belonging to smaller state and non-state societies – has constituted a relatively limited but influential era within the long stream of human history. Colonialism is not a single process, but a "series of policies, processes, and relations that exploited people and resources in diverse ways and locales," for widely varying reasons and lengths of time (Oland et al. 2012: 2). Indigenous peoples have been particularly hard-hit by colonization; they are routinely defined as being "dominated by the states that claim jurisdiction over them" (Maybury-Lewis 2002: 7). In North and South America, colonization by multiple European nations resulted in steadily increasing losses of Indigenous land and sovereignty over the course of 500 years. In Australia and New Zealand, English colonial dominance over aboriginal territory was effected within only a few generations (Smith 1999). In many regions of the world, Indigenous communities are still colonized and still struggling to reassert control over their lands and histories (Maybury-Lewis 2002; Bruchac et al. 2010). Many of the peoples impacted by colonization have been in existence for millennia; colonial occupation is only a small part of their history.

Colonialist thought and nationalist ideologies have long been intertwined with the politics and practice of scientific archaeology (Schmidt & Patterson 1995). During the emergence of the discipline, anthropologists exerted almost unquestioned power over the ownership of sites and collections, without regard for the cultural concerns and property rights of Indigenous peoples, ethnic minorities, or other marginalized groups; archaeology was often a "strategy in support of the state" (Wobst 2005: 28). Since the seminal proponents and practitioners of anthropology were privileged white male scientists with roots in white settler populations, inequities of gender and class were also in play. Until quite recently, few Indigenous people benefitted directly from archaeological research conducted in their midst (Smith & Wobst 2005; Nicholas 2010).

During the nineteenth and early twentieth centuries, salvage archaeologists engaged in the widespread collection of material objects, cultural heritage, and human remains belonging to colonized subjects, operating under the assumption that many of these populations were near extinction (Swidler et al. 1997; Mihesuah 2000). Scientists from Euro-American nations (predominantly England and America) mounted grand expeditions seeking evidence of past civilizations and collecting materials for museums. They routinely disturbed and destroyed heritage sites and collected thousands of human remains and items of cultural patrimony for scientific study, display, and sale (Merryman 2006). This research inspired the production of classifications, typologies, exhibitions, and educational materials that supported the historical dominance of European social classes and belief systems and the political marginalization of Indigenous people (Smith 1999; Wobst 2005). In museums and in print, the archaeological records of state societies were promoted as evidence of successful development, and the records of non-state societies were distorted to stand as failures (Wobst 2005: 28).

Mainstream archaeologists promoted these distortions by theoretically dividing time and geography, with colonial nations located at the "core" and Indigenous nations located at the "periphery" of knowledge and development (Smith 1999; Habu et al. 2008). Western academics also mined Indigenous knowledges and claimed possession of Indigenous property, while conceptualizing modern Indigenous peoples as philosophically disconnected from their premodern forebears (Smith 1999). Scientific research conducted from a universalist and positivist perspective can, even inadvertently, tend to legitimize and reinforce these misrepresentations.

During the mid-twentieth century, as the cannibalistic nature of the salvage enterprise became increasingly apparent, Indigenous people demanded the recovery of sacred objects, communal property, and human remains disturbed by archaeologists (Mihesuah 2000). The emerging repatriation movement provoked serious contests over the ownership and appropriate disposition of archaeological collections and Indigenous cultural material. As regional and ethnic

communities around the world have increasingly asserted their distinct identities in resistance to forces of colonialism and globalization (Maybury-Lewis 2002), they have also sought control over the archaeological sites and materials that locate and validate these identities (Bruchac et al. 2010). Around the world, nation-states have been forced to contend with Indigenous peoples who demand, "tribal recognition, national sovereignty, cultural revitalization, economic independence, and control over heritage matters" (Nicholas 2010: 11).

Key Issues/Current Debates

Professional archaeologists have long claimed nearly exclusive ownership of materials from the past. During the twentieth century, they moved to police the profession by implementing guidelines (e.g., the American Antiquities Act of 1906 and the Archaeological Resources Protection Act of 1979) that prohibited illicit looting and trading by amateurs. During this same era, ancient heritage sites located in regions claimed by colonial states were set aside for protection and preservation under the control of the state (e.g., the National Historic Preservation Act of 1966). The ethos of preservation embodied in these actions did not essentially change conceptions of privileged ownership by scientists. State control is, in essence, a paternalistic extension of colonial control. For Indigenous and ethnic communities around the world, the reclamation of Indigenous rights to property and culture is key to recovering from colonial domination. Assertions of claims to ancestral remains in archaeological collections have, however, provoked fierce debates (e.g., Mihesuah 2000; Merryman 2006). Some of the most heated of these are rooted in differing constructions of property rights.

Decolonizing archaeologists have been especially influential in encouraging the repatriation of human remains and items of cultural patrimony to affiliated communities and descendants (Mihesuah 2000; Smith & Wobst 2005). Claims have also been lodged for the recovery of archaeological and artistic items removed from classical European sites (Merryman 2006). Opponents to repatriation have argued that repatriation threatens the integrity of significant museum collections. Arguments like these are losing ground in light of increasing protections for Indigenous intellectual and cultural property and increasing world recognition of the nationalist dimensions of cultural heritage (Mihesuah 2000; Merryman 2006). Archaeologists and museums can no longer claim undisputed ownership of their collections, and they have been compelled by state laws and statutes (such as the United States' Native American Graves Protection and Repatriation Act of 1990) to recognize the validity of many of these claims. As a result, museums of anthropology, natural history, art, and science around the world now routinely engage in decolonizing activities that include consulting with descent communities, inventorying Indigenous remains and artifacts housed in museum collections, supporting protection for heritage landscapes, establishing cultural affiliations and tribal identities, and otherwise contextualizing material and ephemeral relations in the past. Given the sheer volume of archaeological materials resting in museum collections, and the number of Indigenous sites under exploration, these debates are likely to continue for some time.

From a practical level, colonial perspectives can cloak on-the-ground data; Indigenous perspectives may be visible, but overlooked, in site contexts (Watkins 2000). For example, archaeologists have long used standardized types and categories to suggest that human society and materiality can be separated into clear-cut divisions. The same evidence, however, when considered from a decolonizing perspective, suggests that human geographies, relationships, and materialities are far more fluid and flexible than popular boundaries and categories imply (Wobst 2005). By shifting Indigenous knowledges from the periphery to the center, one can better recognize and envision alternatives to colonialist constructions of time, place, and narrative (Smith 1999).

At the most basic level of analysis, decolonizing questions the relevance of binary

choices that have long been used to categorize and classify archaeological finds. Eurocentric constructions of societal development have employed paired terms like savage/civilized and primitive/developed to located Indigenous peoples in a state of imagined opposition to European nations and modernity (Schmidt & Patterson 1995; Wobst 2005). Archaeological dichotomies have typically judged non-state sites and societies as prehistoric (compared to historic) and undeveloped (compared to European models of development). Yet, archaeological evidence is rarely this clear-cut. A more effective way of envisioning past lives would be the use of conceptual "transitions" that suggest both continuity and change (Oland et al. 2012: 3). The postmodern concept of multivocality, a visioning process that devises multiple possible narratives for underrepresented groups, can also be a useful method for exploring alternative interpretations (Habu et al. 2008).

Collaborations among Indigenous scholars and archaeologists have inspired reconsideration of many of the routine assumptions that underlie archaeological practices (Smith & Wobst 2005; Nicholas 2010). Decolonizing archaeologists (e.g., Wobst 2005) have called attention to the historical distortions caused by extending modern and colonialist theories into the distant pasts of precolonial societies (see case studies from multiple venues in Schmidt & Patterson 1995). They suggest that colonial approaches to scientific study should be recast as a body of situational theory and practice emerging from colonial expansion rather than as a universal framework for interpreting all human societies over time. Feminist theorists have leveled similar critiques, arguing that positivist research, which aims to predict outcomes based on scientific thoughts and evidence, is, in itself, a form of colonialism (Smith 1999; Mihesuah 2000). Post-positivist research, which recognizes the importance of phenomenological, naturalistic, relational, and praxis-oriented perspectives and values, can enable intellectual emancipation from colonization (Smith 1999: 167).

By questioning the notion of a universal science, and drawing attention to human rights issues, decolonizing archaeologists trend toward social activism. They consider how worldviews, nationalist agendas, conceptions of social justice, human rights, and territorial boundaries are likely to be affected by scientific research. Efforts to include multiple voices and perspectives can reveal deep philosophical differences over the relative veracity of different modes for recording knowledge. For example, mainstream archaeologists may consider traditional Indigenous beliefs and modern scientific opinions to be polar opposites, as though one is unverifiable folklore and one is unquestionable hard data. Yet, oral traditions and written traditions both constitute strategies for recording and transmitting narratives and knowledges. When revisited from a decolonizing perspective, these strategies can be employed and interwoven in multiple ways to generate increased understanding. More holistic interpretations can allow for greater variability and flexibility in reconstructing past populations and can inspire more accurate representations of the past (Smith 1999; Smith & Wobst 2005; Wobst 2005).

International Perspectives

During the salvage era of archaeology, scientists collected and transported materials into museums around the world, with little regard for Indigenous property rights, but the ethics of the practice have shifted. Scientists can no longer assume exclusive control of their collections, and some foundational assumptions – most notably, that scientific excavation is a service to the common good and that archaeological sites around the world are common property – have been called into question (Smith & Wobst 2005; Merryman 2006). Indigenous and ethnic communities have asserted their rights to lands, to history, and to archaeological finds housed in museums around the world. Contests over the ownership of cultural property, the repatriation of human remains, and the protection of cultural landscapes now have national and international implications (Merryman 2006).

Decolonizing efforts in various parts of the world reflect the particular histories of colonization and the complexities of defining indigeneity. In Africa, for example, although Indigenous peoples constitute the dominant populations, there are serious struggles over control of ancestral territories, and some Indigenous groups are subjugated or marginalized by others (Maybury-Lewis 2002). Archaeological research in Africa has also been influenced by the search for ancient evidence of human origins, conducted by Western scientists who have treated the entire continent as a research site (Bruchac et al. 2010: 241). These inequities of access and representation can be addressed through decolonizing methods that make archaeology more representative of, and relevant to, local concerns.

Archaeological research in Mesoamerica and South America, conducted in the wake of Spanish colonization, has been shaped by an emphasis on monumental architecture, high-value objects, and pre-Columbian state formation. Decolonizing efforts in this region have focused on the reclamation and reappropriation of Indigenous heritage sites, materials, and histories subsumed by colonialist interpretations (Bruchac et al. 2010: 201).

Across Asia, in the region stretching from Palestine to Japan, archaeology has been a largely nationalist endeavor serving the interests of powerful nation-states (e.g., China and Israel). Here, as in Africa, some Indigenous populations dominate others. Disempowered nations (e.g., Tibet and Palestine) have been physically forced out of their traditional territories. Decolonizing approaches in this region must grapple with questions of power, privilege, and resources in the effort to secure protections for the cultural heritage of these disenfranchised populations (Bruchac et al. 2010: 290).

Europe is an interesting locale for decolonizing archaeology, given its history of driving colonizing research among Indigenous peoples around the world. Decolonizing archaeologies in Europe are being shaped by the resurgence of Indigenous identities (e.g., Basque, Saami, Scots) and by efforts to reclaim representations of cultural heritage in museums (Bruchac et al. 2010: 323). The British Museum, for example, currently holds the Elgin Marbles taken from Greece, antiquities from Babylon and Assyria, and the Pergamon Altar from Turkey (Merryman 2006: 1). Some museums have resisted returning these great works of antiquity, arguing that they are safest and most accessible to an international public in the museum (Merryman 2006: 13). Each of these cases requires international negotiations and reexaminations of older archaeological practices.

In Australia and New Zealand, Aboriginal people have been imagined as outliers in the production of human history and have struggled to overcome colonial European perceptions that identified their traditional territory as "terra nullius" (an uninhabited "no-man's land") (Bruchac et al. 2010: 109). In recent years, some Aboriginal communities in Oceania have embraced archaeology as a tool that can support self-determination by providing "a material basis for the reclaiming of Indigenous cultural identity" (Smith & Wobst 2005: 13). The Australian Archaeological Association's Code of Ethics requires archaeologists to protect community claims to cultural heritage, recognize the importance of repatriation, and "acknowledge the special importance to Indigenous peoples of ancestral remains and objects and sites associated with such remains" (Australian Archaeological Association 1994). The 1995 ICOMOS New Zealand charter for the conservation of cultural heritage (called, in Maori, *Te Pumanawa o ICOMOS o Aotearoa Hei Tiaki I Nga Taonga Whenua Heke Iho o Nehe*) takes a similar approach by encouraging the identification, preservation, maintenance, and restoration of Indigenous cultural heritage places. The ICOMOS guidelines have been adopted by the Historic Places Trust/*Pouhere Taonga*, the Ministry of Culture and Heritage, and the Department of Conservation and have also been used in reckoning deeds that restore traditional lands (ICOMOS New Zealand 1995).

Around the world, state and institutional regulations and protocols have emerged that explicitly address the rights of Indigenous peoples vis-à-vis archaeologists. In 1991, for

example, the World Archaeological Congress disseminated a new code of ethics that acknowledges Indigenous peoples as stakeholders by unambiguously stating that, "indigenous cultural heritage rightfully belongs to the descendants of that heritage" (World Archaeological Congress 1991). Articles in the United Nations' *Declaration on the Rights of Indigenous Peoples*, adopted by the General Assembly on September 13, 2007, similarly and explicitly assert Indigenous rights to identity, culture, and property.

Future Directions

Decolonizing approaches have already proven influential in world archaeology, by encouraging collaboration with Indigenous and local communities to improve the identification and understanding of significant traditional heritage sites. Legal protections for cultural heritage and resource management policies have evolved to address the practical protocols and the social dimensions of practicing Indigenous archaeology; as a result, heritage organizations are producing less colonial and more culturally nuanced interpretations of the past (Messenger & Smith 2010). Decolonizing archaeologists have also worked to avoid reproducing the inequities inherent in colonial practices in the field. In Australia and New Zealand, for example, archaeologists are increasingly expected to negotiate with Indigenous communities before, during, and after excavating cultural heritage sites (Australian Archaeological Association 1994). In some regions, these negotiations have recovered evidence of older cultural practices that can be repurposed to ensure the conservation and regeneration of local flora and fauna over time (e.g., Colwell-Chanthaphonh & Ferguson 2008; Atalay 2012). Meetings facilitated by the World Archaeological Congress and other organizations have brought together archaeologists from disparate locales to share common cause and form global alliances focused on decolonizing (Smith & Wobst 2005: 13).

Future students of archaeology can learn from and build upon these strides to uncover new intersections among past and present identities and cultures. They will find that Euro-colonial concepts of race, kin, and identity do not easily mesh with non-Western visions of modernity. Decolonization must be viewed as a "long-term process involving the bureaucratic, cultural, linguistic, and psychological divesting of colonial power" (Smith 1999: 98). Archaeologists have found it necessary to renegotiate and redefine terms (e.g., post-racial, intercultural, transnational) that attempt to define complex expressions of Indigenous and ethnic identities in the postcolonial, postmodern world (Smith & Wobst 2005; Bruchac et al. 2010). Standardized terms and approaches (e.g., processual and post-processual, distinct temporal eras, social evolution) may no longer be universally applicable. Even the terms "postmodern" and "postcolonial" are problematic since these perpetuate the illusion that colonial domination of the Indigenous has ended.

Just as there is no single colonial model that encompasses all of colonialism, there is no single Indigenous model and no single decolonizing approach. The inclusion of non-scientists as research partners has revealed cultural and procedural differences that are not always easy to bridge. By engaging with living communities, archaeologists have improved popular understandings of Indigenous peoples and local communities in the present-day, postcolonial modern world. Processes of consultation and collaboration have been transformative, but they have also been difficult, given the inherent power imbalances among scientists (as apparent agents of colonial nation-states) and archaeological subjects (as recovering victims of colonization). Indigenous peoples and other colonized communities have expressed needs that do not always match with archaeological goals, categories, and routines. Better attention must be paid to the handling of tangible and intangible cultural heritage, with consideration for the spiritual, ephemeral, and experiential relations of Indigenous peoples with the natural world (Atalay 2012). These interactions will require careful, patient communication.

Future efforts in decolonizing archaeology will require situationally specific, carefully negotiated approaches that attend to social contingencies as well as scientific concerns (Bruchac et al. 2010; Messenger & Smith 2010). Many Indigenous communities (in common with other marginalized peoples) still suffer from the impacts of colonization, including persistent poverty and political marginalization. Teams of stakeholders – including archaeologists, museum staff, descent communities, traditional knowledge-bearers, developers, and representatives of state societies – can decolonize their own social relations and share common cause by coming together to protect locales that house unique histories (Messenger & Smith 2010).

The environmental effects of colonialism are most obvious in patterns of land use and development that resulted in the wholesale extraction of natural resources and destruction of cultural landscapes. Decolonizing projects that explicitly involve and empower Indigenous and local communities are likely to have an impact on long-term land use. Some archaeologists have sought to preserve endangered cultural heritage sites by including both site preservation and social justice as a desired goal (e.g., Smith & Wobst 2005; Bruchac et al. 2010; Messenger & Smith 2010; Oland et al. 2012). Collaborations with Indigenous knowledge-bearers can inspire projects that draw upon traditional knowledges to shape new approaches. Rather than subject their lands and ecosystems to commercial development and resource extraction, formerly colonized communities might explore forms of sustainable development (such as heritage tourism and seasonal hunting) that can generate income and encourage site preservation. Archaeologists can assist in these efforts by conceptualizing and implementing projects that dovetail scientific research with historical preservation and community needs. International organizations (e.g., the United Nations, UNESCO, and the World Archaeological Congress) can support such initiatives by continuing to promote protocols that explicitly link cultural preservation with sustainability.

Cross-References

- ▶ Community Engagement in Archaeology
- ▶ Ethics in Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Multicultural Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Stakeholders and Community Participation
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

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DeCorse, Christopher

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Basic Biographical Information

Professor Christopher R. DeCorse was born in New York in 1956 but grew up in New Hampshire. As an undergraduate at the University of New Hampshire, he worked on a number of historic period sites and published papers dealing with glass analysis (DeCorse 1984). After graduating with a B.A. in Anthropology in 1978, he joined the Peace Corps where he worked with the Sierra Leone Ministry of Agriculture and Forestry for two years. While in Sierra Leone, he conducted an archaeological survey of and excavations at defensive sites in the Koinadugu District in the northeastern part of the country

(DeCorse 1989, 2012). Subsequently, he enrolled in the relatively new Interdepartmental Program in Archaeology at the University of California, Los Angeles (UCLA) to work with Merrick Posnansky. He completed his master's degree on the Sierra Leonean sites in 1983 and a Ph.D. on the coastal townsite of Elmina, Ghana, in 1989. He was a lecturer in the Department of Archaeology at the University of Ghana, Legon, from 1985 to 1987 before returning to the United States where he initially worked in cultural resource management in Pennsylvania before joining the anthropology faculty at the Indiana University of Pennsylvania. He moved to the Department of Anthropology, Syracuse University, in 1992 where he became a full professor in 2006, serving as Department Chair from 2005 to 2012. DeCorse has maintained an active field program in Ghana's Central Region since the 1980s and has also returned to Sierra Leone (in 2006) where he is directing ongoing research at the Bunce Island slave-trading post.

Major Accomplishments

DeCorse has made a major contribution to West African archaeology, not only by his work in Sierra Leone, a country that has received fairly little archaeological attention due to the civil conflict that has prevailed there, but particularly by his substantive work on culture contact along the Gold Coast and on West Africa during the era of the slave trade (2001b). His research has primarily focused on African settlements, rather than the European outposts that were the nodes of early trade relations. He has advocated a broad perspective of historical archaeology that extends beyond definitions that focus more narrowly on European records, source material, and expansion (DeCorse 2008).

DeCorse's work on the African town of Elmina, which grew up around Elmina Castle during the time of the gold and slave trade, helped to shift the focus of historical archaeology studies in West Africa from the architectural study of the monumental nature of European trading forts to the nature and scope of how local people experienced such interactions. Adopting a cognitive, poststructuralist perspective, DeCorse demonstrated through material culture that, while a great many new types of artifacts may have been introduced at this time, there was still a great deal of continuity in the way in which such material culture was used in terms of architecture, foodways, and ritual practices (DeCorse 2001a).

From 1993, DeCorse has broadened the chronological and geographical focus of his coastal research in Ghana (DeCorse 2005), initiating the "Central Region Project" in 1998. In addition to providing data for his own work, this project also provided a platform for student research, including the first underwater archaeological survey and subsequent excavation off the coast of Ghana (DeCorse et al. 2000). He has done much to develop the archaeology of West Africa, not only through his own work but through that of his students, supervising projects in both coastal and northern Ghana as well as elsewhere in the West African subcontinent such as The Gambia, Senegal, and Sierra Leone.

DeCorse is well known for his expertise in bead identification and other classes of material culture dating to the Atlantic trade era (DeCorse et al. 2003). He has authored or coauthored a number of textbooks on general anthropology and archaeology.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Modern World: Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Posnansky, Merrick
- ▶ West and Central Africa: Historical Archaeology

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Deep-Water Archaeology

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Introduction

Several factors compel archaeologists to explore the deep for shipwrecks. Compared to shallow sites, deep wrecks are not affected by salvage, looting, or postdepositional damage from wave action and therefore may offer more complete information. Deep water may hold different types of vessels and cargoes than those that plied coastal routes, presenting entirely new archaeological data. Wrecks deeper than 1,000 m lie beyond the present limits of trawl fishing, which destroys archaeological sites on shallower sea floors. Physical and chemical conditions in the deep sea are stable and conducive to the preservation of fragile remains, including DNA of original cargo elements. Finally, in certain special areas such as the Black Sea, the deep waters are anoxic and therefore preserve organic material including wooden hulls and superstructures, perishable cargo, and possibly even remains of passengers, crew, and livestock.

Definition

"Deep-water archaeology" is a term commonly used to describe investigations beyond normal diving depths, generally accepted to be deeper than 50 m. The average depth of the world's oceans is 4,000 m, most of the Mediterranean Sea floor is 3,500 m deep, and the abyssal depths of the Black Sea exceed 2,500 m. Access to these vast expanses and the countless shipwrecks they contain represents one of archaeology's frontiers.

Despite its name, deep-water archaeology is defined more by the techniques and technologies employed than by water depth. Archaeologists working in the deep sea must adapt methods and technical systems drawn from other ocean

sciences, commercial activities, and military applications. Archaeological exploration in the deep sea relies on a variety of technologies, including robotic remotely operated vehicles (ROV) and autonomous underwater vehicles (AUV), human-occupied vehicles, sonar, acoustic navigation sensors, and the global positioning system. As in all archaeology, professional standards require comprehensive pre-disturbance mapping of sites, careful documentation of features, proper conservation of artifacts, and publication of results in peer-reviewed journals.

Key Issues/Current Debates/Future Directions/Examples

In the 1970s, ocean engineer Willard Bascom drew attention to the archaeological potential of the deep sea. Bascom envisioned modifying oil drilling equipment to lift ancient shipwrecks from the sea floor in one piece. While this may seem bizarre, the United States' intelligence services took exactly that approach in Project Azorian, recovering a portion of the sunken Soviet submarine K-129 from 5,000 m depth in the Pacific Ocean. However, Project Azorian's cost was staggering, estimated at over $500 million. Bascom's idea was not economically feasible for archaeological projects.

A different strategy for deep submersion investigations employs submersible robotic technology. In the late 1980s, deep-water archaeology took its first steps with robots. In 1988, Dr. Robert Ballard led a team of Woods Hole Oceanographic Institution oceanographers and engineers to Skerki Bank in the Mediterranean Sea, searching the sea floor with the *Argo* towed camera sled. The search revealed a fourth-century-CE wreck at 800 m depth. The following year, Ballard's team, including archaeologists, returned to the site with the *Jason/Medea* ROV system. They surveyed the wreck and adjacent sea floor, produced a photomosaic of the site and recovered artifacts.

Skerki Bank became deep-water archaeology's laboratory, as projects continued in 1995 with the US Navy nuclear research submarine *NR-1* surveying the deep-sea floor and locating three more wrecks. In 1997, the *Jason/Medea* team documented those wrecks, and *NR-1* extended the search area. The effort revealed four additional wrecks and two linear features dubbed "amphora alleys," apparently jettisoned cargo. In 2003, Ballard led a team back to Skerki Bank to reassess the wreck sites, determining that no observable changes had occurred in the intervening years.

NR-1 continued its archaeological survey activity in the eastern Mediterranean in late 1997, and discovered two eighth-century-BCE Phoenician shipwrecks at 400 m depth. These wrecks were investigated by the *Jason/Medea* ROV team in 1999. In 2000, researchers fulfilled another of Bascom's visions by locating intact and perfectly preserved shipwrecks in the deep anoxic layers of the Black Sea. One of these wrecks was partially excavated in 2003 by an ROV, revealing a complete hull and even wax sealing on the ship's amphora cargo. Elsewhere, a specially designed ROV with a robotic excavation system was deployed in 2005 by a Norwegian team to investigate a historic-era shipwreck at a depth of 200 m.

Archaeologists also have adapted autonomous underwater vehicles for site-specific and wide-area surveys. In 2005, the Hellenic Ephorate of Underwater Antiquities cooperated with Woods Hole Oceanographic Institution to document a fourth-century-BCE wreck in Greece. Using an AUV, in 1 day, the team precisely mapped the wreck and the surrounding sea floor at depths exceeding 70 m. Upon conclusion of the AUV survey, the team's ROV recovered artifacts from the site. From those artifacts, the team collected trace DNA samples to reveal the vessel's cargo. Elements of that international team continue to survey the Aegean and Mediterranean Sea floor with AUVs.

Autonomous robots present new opportunities for archaeology. In the future, cost-effective squadrons of robots may operate in unison in the deep sea, surveying thousands of square kilometers of sea floor regardless of depth while rapidly and precisely documenting the shipwrecks they discover. Since robots excel at

repetitive tasks such as mapping and site photography, it is likely that shallow-water archaeologists will soon delegate these time-consuming chores to robots, while humans perform more interesting and appropriate activities such as delicate excavation. Deep-water archaeology as a special subfield may someday disappear as its methods and technologies are embraced by practitioners working anywhere in the marine environment.

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Deetz, James (Historical Archaeology)

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Basic Biographical Information

Born (1930) and raised in Cumberland, Maryland, James Deetz took all of his degrees in anthropology at Harvard University (B.A. *cum laude* 1957, M.A. 1959, and Ph.D. 1960), where his principal mentor was J.O. Brew. Like most of his contemporaries, he learned his craft through the Smithsonian Institution's River Basin Survey program, and began his experience on historic-period sites by working at the early home sites of Pilgrims at the invitation of fellow Harvard anthropology major, Henry Hornblower II. Hornblower, a stock broker by profession, had himself worked on some of the same sites as an undergraduate before the Second World War, and the Hornblower family donated the land and initial funding to create what became Plimoth Plantation. Deetz's work on sites in and around Plymouth, Massachusetts was followed by an important early excavation at a Spanish mission outside of Santa Barbara (La Purisima), and the discovery, along with colleague Edwin Dethlefsen, of early New England gravestones as a source for experimental archaeology.

Those interested in his biography and accomplishments should see the section on Tributes to

James Deetz at the online archive of James Deetz's work (www.histarch.uiuc.edu/plymouth/index.html).

Major Accomplishments

The year 1967 was an auspicious one for the field of historical archaeology; the Society for Historical Archaeology and its counterpart on the other side of the Atlantic, the Society for Postmedieval Archaeology, were both founded. James Deetz (1967) not only published his brilliant introductory text *Invitation to Archaeology*, in which he illustrated many important points with what are now considered classic examples of analyses of historic-period artifacts and sites, but he decided to leave the University of California at Santa Barbara, his first full-time teaching post, for a job in the Anthropology Department at Brown University, one that he split with a new position as Assistant Director of Plimoth Plantation, an outdoor living history museum dedicated to the Pilgrim settlement as it was thought to be in the year 1627.

The next year Deetz (1968) published the first of many essays alerting his colleagues in prehistory to the fact that another kind of anthropological archaeology had arrived on the scene. "Late Man in North America: Archaeology of European Americans" included in a volume *Anthropological Archaeology in the Americas*, edited by Smithsonian curator Betty J. Meggers, made the case for an explicitly comparative approach to different regions of early colonial settlement in the New World, using New England and the Chesapeake as his examples. This was precedent for the thematic approach that would structure his most important publication in historical archaeology (and arguably the most important publication ever in historical archaeology) *In Small Things Forgotten* (1977).

Deetz's move to Brown attracted a number of graduate students over several years and turned many undergraduates there into historical archaeologists as they pursued their graduate careers. One of the most successful of his students during this period is Mary Beaudry. More importantly to the development of historical archaeology, Deetz's decade-long tenure at Brown, and at Plimoth Plantation, established historical archaeology on a solid and theoretically eclectic anthropological footing (see the companion essay on Deetz's larger contribution to archaeological theory). Deetz himself went on record as being his own archaeologist in terms of larger intellectual trends, and indeed he was (1989). He clearly admired Walter Taylor, a fellow Harvard product (Deetz 1988), whose ideas, like Deetz's, were also heavily influenced by the social anthropologist Clyde Kluckhohn, a scholar with strong opinions about what archaeologists should be able to contribute to anthropology, but rarely did (Kluckhohn 1940).

In 1969, Deetz was formally introduced to folklorist Henry Glassie, and the latter's provocative analyses of vernacular buildings and folk material culture more generally marked an important turning point in the development of Deetz's scholarship and teaching, culminating in the publication of *In Small Things Forgotten* in 1977. After leaving Brown for the University of California at Berkeley in 1978, Deetz shifted his interests to the Tidewater Virginia settlement known as Flowerdew Hundred, where he trained another generation of doctoral students in historical archaeology, running an annual summer field school there for over a decade. He also began a long-standing relationship with archaeologists in South Africa, beginning with a semester as visiting professor at the University of Capetown in the fall of 1984. Deetz collaborated with several South African archaeologists, most notably Martin Hall and Carmel Schrire (e.g., Schrire et al. 1990), and trained both American and South African doctoral students on several projects, particularly in the Eastern Cape.

The year that the University Press of Virginia published Deetz's synthesis of what he and other archaeologists had found at Flowerdew Hundred, 1993 (Deetz 1993), was the same year he was offered an endowed chair at the same institution. Jefferson's University became Deetz's final academic home but after ending his fieldwork at Flowerdew Hundred in 1995, Deetz returned to the sites where he began his career in historical archaeology, sponsoring field schools outside of

Plymouth during the summers of 1998 and 1999. Results from these projects were incorporated into Deetz's last book, *The Times of Their Lives: Life, Love, and Death in Plymouth Colony* published in 2000 (Deetz & Scott Deetz 2000), the same year he died.

In the four decades of his active academic career (e.g., Brown 2004), James Deetz helped establish historical archaeology as a truly anthropological pursuit concerned with colonialism and its consequences for dispossessed indigenous peoples and captive Africans alike. But like many of the field's founders, Deetz was most interested in what became of those who settled the colonized places. Through his work in Massachusetts, Virginia, and South Africa, Deetz helped pioneer a comparative colonial archaeology of settler societies, and make the interdisciplinary approach, in which documents and artifacts from above and beneath the ground are productively integrated, a foundational one in contemporary historical archaeology. Like Walter Taylor who inspired his understanding of the relationship between history and anthropology, Deetz fashioned his own distinctive "conjunctive approach," which he was able to illustrate in case studies from Santa Barbara, California, to Grahamstown, South Africa. Even though it was revised and expanded more than 15 years ago, Deetz's book *In Small Things Forgotten* (1996) still introduces thousands of undergraduates to the field of historical archaeology and remains an especially useful point of departure to investigating contemporary and more politically-charged perspectives on the archaeology of colonialism.

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Deetz, James (Theory)

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Basic Biographical Information

James Deetz is one of the most influential historical archaeologists of his generation. Born in 1930 in Cumberland, Maryland, he took all of his academic degrees at Harvard University (B.A. *cum laude* 1957, M.A. 1959, and Ph.D. 1960). Originally meant to graduate Harvard College in 1952, Deetz took a year off to work with Don Lehmer on the River Basin Survey behind the Oahe Dam on the Missouri River in South Dakota. Drafted when the Korean War broke out, Deetz enlisted in the United States Air Force for a 4 year term. By the time he returned to Harvard, Deetz and his first wife Joanne had three children and Deetz finished his anthropology studies from Bachelor's degree to doctorate in only 4 years, receiving the latter in 1960. He took up his first teaching job at the University of California at Santa Barbara the next year, and was promoted to full professor there in 1966. In 1967, he left to become professor of anthropology at Brown University. After 11 years at Brown, Deetz moved to the University of California in the fall of 1978, and finally ended his teaching career as the Harrison Professor of Historical Archaeology at the University of Virginia, a position he held from 1994 until his death in 2000.

Major Accomplishments

In a plenary address to the First Joint Archaeological Congress held in Baltimore, Maryland in 1989, James Deetz insightfully remarked that over a 30 year career at that point he had been called a culture historian, a new archaeologist, a structuralist, and a post-structuralist but, in his view he had not changed his interpretive approach at all since the 1960s. Instead, his position in the discipline at any particular moment was entirely the result of the perception of his work by others (Deetz 1989: 435). Although an important moment of self-reflection, Deetz should have said that, in fact, he was at once all of these kinds of archaeologist, and a few more he failed to mention. Although the categories of culture history and processual and post-processual archaeology seem fixed within the histories of archaeological theory, they do not do justice to the career of Deetz and his place as an archaeological theorist. His research and scholarly contributions simply do not fit these trends or phases, as his contributions to a range of subjects and interpretive frameworks unfolded simultaneously.

Deetz's debut was an impressive one, a 1960 dissertation entitled *An Anthropological Approach to Kinship Change in Eighteenth-Century Arikara Culture*. This document strongly influenced by Clyde Kluckhohn, firmly established the "archaeology as anthropology" movement (the use of archaeological data to track changes in social organization employing the ethnographic categories then favored by cultural anthropologists like Kluckhohn) (Deetz 1965). That same year, Deetz also published his first two articles in historical archaeology on his excavations at the Joseph Howland site in Kingston, Massachusetts, which displayed his ability to use statistical dating of pipe stems as a surrogate measure for site occupation spans. Later, Deetz would use this same approach, calculating "Harrington Histograms," to discover the boom-bust cycle of the international tobacco trade as it effected settlement dynamics at Flowerdew Hundred (Deetz 1993).

The decade of the 1960s was a time when Deetz demonstrated the range of his interests, as well as his eclecticism in terms of theoretical perspective and subject matter. He published two books, a monograph based on his dissertation and his classic introduction to archaeology, *Invitation to Archaeology*, brought out by Doubleday in 1967. In 1968 he published his essay "Late Man in North America," which announced the potential of historical archaeology as a new dimension of American anthropological archaeology (Deetz 1968). During this same

decade Deetz also began to publish the results of his gravestone studies, undertaken with colleague Edwin Dethlefsen, demonstrating the validity of seriation as a relative dating technique, and establishing the field of experimental historical archaeology (Deetz & Dethlefson 1967). Finally, Deetz (1969) published his first revisionist piece on heritage interpretation, "The Reality of the Pilgrim Fathers," in *Natural History*.

Contained in his prolific 1960s output are all the larger theoretical trends in archaeology with which Deetz has been associated; culture history, processualism, and post-processualism. In fact, his introduction to archaeology reveals the complexity and multi-faceted nature of his research and interpretive gifts, ranging from his discovery of a gender-based division of labor in the mission housing at La Purisima, through the implications of both ceramic and gravestone stylistic change for understanding social and cultural change, to what he argued was an homologous relation between the production of sound in human language and the manufacture of artifacts (Deetz 1967: 87). The latter is seen as "the first steps towards structuralist archaeology" (Preucel 2006: 101). Interestingly, Deetz's use of linguistic models prompted a recent history of American archaeology to suggest that Deetz did, indeed, interpret archaeological data "in a postprocessual manner," and, further, that "with hindsight one can almost see it coming in his writings of the 1960s" (O'Brien et al. 2005: 224–5).

With his move to Brown University, Deetz took up a shared post, part-time professor of anthropology at Brown, and part-time museum administrator at Plimoth Plantation, the organization that sponsored his first fieldwork in historical archaeology. He also met the folklorist Henry Glassie in 1969, and their intellectual collaboration produced the study of American material culture as an important impetus for material culture studies more generally. Deetz advocated for the "science of material culture," one that abandoned the categories of the ethnographer in favor of an entirely new set of concepts and terminology. His prior research on gravestones, together with a new found interest in vernacular architecture and folk material culture more generally derived from Glassie's influence, resulted in an important series of papers that made the larger argument that archaeology and material culture studies were essentially the same pursuit, a perspective that culminated in his masterpiece on historical archaeology and material culture studies *In Small Things Forgotten: The Archaeology of Early American Life* (1977).

The major concept to come out of Deetz's introductory work on historical archaeology is the "Georgian mind-set," which was simply a historically situated and substantiated version of the concept of "mental template," which was so crucial to the interpretive framework of *Invitation to Archaeology* of a decade before. An idea that Deetz had worked out for himself in terms of ceramic assemblages and how they changed over two centuries in the Plymouth, Massachusetts area, the idea of the Georgian mind-set soon became, in the hands of Mark Leone, "the Georgian Order," and even though Deetz himself certainly understood the importance of economic factors in the changes that came to be described as "georgianization," it was the work of Leone and his students who grounded this process and framed it in terms of neo-Marxist theory, thereby transforming Deetz's important insight into what is often referred to as critical theory in archaeology. Subsequent treatments of the archaeology of European colonialism have incorporated this interpretation to some extent, and many studies take Deetz's model of change, as a point of departure for discussion in recognition of the influence of what Chris Gosden describes as the enduring influence of "the Georgian-order thesis" (Gosden 2004: 127–9).

Deetz was an important synthesizer of historical archaeology and the field of archaeology more generally. At the invitation of the editors of *Science*, he published an influential review of the present state of American historical archaeology. In it Deetz previewed many of the most important insights derived from his last major research project, the exploration of Flowerdew Hundred, an early seventeenth-century settlement in Virginia. Deetz first came to Flowerdew while a distinguished visiting

professor at the College of William and Mary in 1977. He conducted over ten seasons of summer fieldwork there while a professor at Berkeley and at the University of Virginia. Deetz's book on Flowerdew Hundred, published in 1993, elaborates upon the major interpretive points of his *Science* essay; the proper relationship between documentary and archaeological evidence, the relationship of settlement dynamics to broader economic processes, and the manner in which formal variation in material culture (vernacular buildings and locally made ceramics) revealed the social and cultural changes occurring in the early Chesapeake. In the last chapter of this book, Deetz summarizes what his career as an historical archaeologist taught him, most notably that historical archaeology should be international in scope and international in comparative method (1993: 163–6).

In 1996 Deetz produced a major revision of his 1977 introduction to historical archaeology, with a new chapter on the archaeology of the African Diaspora. Here, Deetz brings his thinking on this important subject in line with the new scholarship, highlighting his ideas about how the material lives of enslaved Africans, and those newly free, were influenced by both traditional West African practices and beliefs and the circumstances of the new societies of which they were a part.. In a substantial way, this revised version of *In Small Things Forgotten* delivers on what Deetz saw to be the immense promise of historical archaeology almost 30 years before in his essay on "Late Man in North America." He illustrates the value of rigorous comparison of different regions of early America, and demonstrates the interpretive advantage of a variety of theoretical approaches to making sense of the patterns he saw in his archaeological and other material evidence. This book will continue to be an important introduction to the field of historical archaeology for many years to come.

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Deflation Archaeology

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Introduction

Deflation occurs when fine grained material is blown away leaving the larger objects (clasts in geological terminology) grouped together on a lagged surface. If artifacts belonging to stratigraphically discrete occupations occur in a matrix of fine sediments, then deflation can potentially erode these artifacts onto a common surface creating a "mixed" assemblage. This may lead to artifacts distinctive of particular periods being found together (for instance, artifacts belonging to the Pleistocene and Holocene, see the case studies below). While mixing of artifacts may create problems for assemblage interpretation, erosion by deflation can also be beneficial in the sense that it exposes deposits that would otherwise be covered. As Goldberg and Macphail (2006: 129) describe it, this provides windows into former landscapes and sites.

Key Issues/Current Debates/Future Directions/Examples

Archaeological sites in deflated contexts are known from a number of areas of the world, with well-studied examples from the desert areas of the Americas, northern and southern Africa, southwest Asia, and Australia. Depending on the location, deflated deposits can vary considerably in age. In the Egyptian high desert near Abydos, for instance, Olsezewski et al. (2005) report on a survey that revealed large numbers of Paleolithic artifacts on desert pavement (a stable deflated surface). Compared to the adjacent Nile Valley, visibility in the high desert is very good since the artifacts are not covered by Holocene sediments. This enables studies of how artifacts were transported and deposited at a landscape scale during the Middle Paleolithic and Epipaleolithic. At Nabta Playa, in the Egyptian western desert close to the Sudanese border, numerous archaeological sites are found in the deflated deposits from ephemeral lakes and ponds (Wendorf & Schild 1998). During the early Holocene, the northward movement of the summer tropical monsoon produced a savannah-like environment in contrast to the hyperarid desert of today. Deflation has revealed extensive artifact scatters that relate to this period. As is the case with the Egyptian high desert, the region today is hyperarid desert. Deflation provides extensive exposure of deposit that would otherwise be difficult to find. This provides archaeologists with the ability to understand large-scale landscape use.

My own work in Egypt also involves investigating a deflated landscape (Holdaway et al. 2010) (Fig. 1). The Fayum region of Upper Egypt was initially investigated by Caton-Thompson and Gardner during the 1920s who identified Neolithic artifact scatters along the edge of ancient Lake Qarun. During the mid-Holocene, the lake was considerably higher than today and Neolithic artifacts were deposited north of the ancient lake shore. Today these deposits rest on deflated surfaces. However, unlike some deflated deposits, the Neolithic deposits in the Fayum are spatially distinct from earlier Epipaleolithic deposits that probably relate to lower lake levels. Therefore, in this case, deflation has not mixed artifacts belonging to separate occupations. Like the studies cited above, deflation in the Fayum is an advantage because it has exposed artifacts scattered across many thousands of square meters. It permits my research team to understand landscape use across the whole of the northeastern shore of ancient Lake Qarun investigating areas that are orders of magnitude larger than those that could be

Deflation Archaeology, Fig. 1 A deflated deposit from the Fayum, Egypt. An area of Aeolian sand is surrounded by stone artifacts from deflated occupation deposits

exposed using conventional excavation. An important part of our investigation involves understanding how deflation has affected the artifacts that are exposed today. As with other projects working in arid, deflated areas, it is important to use geoarchaeological techniques and consider artifacts as a type of sediment that may be transported by a variety of processes.

The application of geoarchaeology to study deflated deposits is well illustrated by the example from the Geelbek Dunes in the Western Cape Province of South Africa (Kandel et al. 2003; Fuchs et al. 2008). Here deflation hollows in mobile sand dunes have revealed both stone artifacts and mammalian fossils across surface exposures in excess of 500 m^2. The investigation of 22 deflation hollows revealed more than 30,000 finds that can be related to three distinct deposits. The oldest is a calcrete substrate with multiple layers that has ages ranging from 200 to 20 ka BP. This deposit has Middle Stone Age artifacts and fauna. Above this layer is a consolidated sand that has deposits from the pre-pottery Later Stone Age while the uppermost layer is a yellow sand with artifacts belonging to the Later Stone Age with pottery dates to the last 2,000 years. The extensive nature of the deposit allowed landscape use to be considered. For example, the Middle Stone Age deposits lack evidence for stone artifact reduction. Instead, flakes cores and tools were transported to Geelbeck and deposited as low-density scatters, suggesting minimal activity. The faunal remains indicate some human modification (via impact fractures) but many of the bones show carnivore, rodent, and insect damage. In contrast, artifacts belonging to the Late Stone Age are more common. Faunal remains show cut marks indicating butchering. In one example, the remains of a butchered eland are associated with 30 backed microliths and the remains of ostrich eggshell water containers. Assemblages associated with the Late Stone Age with pottery suggest the presence of domestic camps with evidence for ostrich eggshell bead manufacture and marine shell refuse. The extensive nature of the deflation deposits permits the changing use of landscape from the Middle Stone Age until the present to be understood but can only by understanding the processes that have led to exposure.

Surovell and colleagues (2005) report on the types of geoarchaeological techniques used to study shallow sites that have been subject to periods of both deflation erosion and deposition over long periods at a buried Folsom site in Middle Park, Colorado. The authors consider vertical artifact distributions and dispersal, stratigraphy, and radiocarbon dating. Their analyses indicate

that a Folsom occupation occurred around 10,450 C^{14} BP. During the subsequent 1,000 C^{14} years, erosion exposed Folsom artifacts as a deflated lag deposit. After 9,400 C^{14} BP deposition resumed and the deposit was buried only to be eroded again sometime after 7,000 C^{14} BP when the upper part of the deposit was removed and a secondary lag of artifacts created. Finally the deposit was once again buried. This sequence of events was not apparent as the site was excavated but was constructed after analyzing the locational, stratigraphic, and dating results. The study emphasizes that deflation is a geomorphic process that may affect archaeological sites in a number of contexts. Surface deflated deposits may be the most apparent form but buried deposits may also have been deflated in the past. Deflated deposits expose artifacts and therefore may be very useful for archaeologists but only when the geoarchaeological contexts of these deposits are carefully studied.

Cross-References

► Geoarchaeology
► Landscape Archaeology

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Delfino, Davide

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Basic Biographical Information

Davide Delfino was born in Genoa in 1976 (Fig. 1). In 2003, after a classical training at the Lyceum "Giuseppe Mazzini" in Genoa, he was awarded a degree in the conservation of cultural heritage from the University of Genoa. He specialized in prehistoric and protohistoric archaeology at the Statal University of Milan in 2007 and obtained a Ph.D. from the Universidade de Trás-os-Montes e Alto Douro (UTAD.) in 2011. Between 2001 and 2007 Delfino was a freelance consultant for the Archaeological Superintendence of Liguria (Italy) and various enterprises in rescue archaeology. Between 2007 and 2010 he was a researcher for the Estrada Foundation within the project "Iberic Museum of Art and Archaeology" (MIAA). He has been an invited Associate Professor with the Instituto Politécnico de Tomar since 2011, teaching about pottery and protohistory in the master's degree "Prehistoric Archaeology and Rock Art" and in "Quaternary: Materials and Cultures" of UTAD. He became a researcher with the Instituto Terra e Memória in 2011, working on the project "Contact Archaeology in Protohistory of Middle Portuguese Tagus." Since 2010 Delfino has been a member of the Quaternary and Prehistory Group of the Geoscience Center at Coimbra University. Today, he is archaeological advisor to the Abrantes Municipality (Portugal) for the project "Iberic

Museum of Art and Archaeology," a member of the Commission for Protohistory with the IUPPS (International Union of Prehistoric and Protohistoric Sciences), and associated with the Association Pour la Recherche sur l' Age du Bronze.

Delfino, Davide, Fig. 1 Davide Delfino

Major Accomplishments

Delfino specializes in the study and interpretation of the Bronze Age through two major classes of materials: ceramics and metals (Fig. 2). He applies his knowledge of the Bronze Age in the Northwestern Italy, to a methodology and interpretation model at Portuguese territory in the middle valley of the Tagus. He developed a model called "techno-typological" for the study of ceramic material, deriving from his academic training and research experience working on metallic and ceramic materials with archaeometrists.

In 2007 Delfino began to concentrate on scientific and teaching activities in archaeological objects from private collections, with no known archaeological context. His experience with the Estrada collection helped him to take full advantage of all the information that can be obtained through observing an artifact and contextualizing its period of cultural history to make up for the lack of archaeological context. In addition, he concentrated on strategies to inform the public about cultural projects and building exhibition themes around a variety of archaeological objects. Delfino's international experience includes being a teacher in the Erasmus Mundus Master in "Prehistoric

Delfino, Davide, Fig. 2 Davide Delfino during fieldwork in the Bronze Age walled hilltop settlement of Castelo Velho da Zimbreira (Mação-Portugal) in 2012, with students

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Deloria, Jr., Vine

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Basic Biographical Information

Vine Victor Deloria Jr. (1933–2005) was born in Martin, South Dakota, on March 26, 1933, the first of three children of Vine V. Deloria Sr. and Barbara S. Eastburn Deloria. Vine Jr. was an American Indian scholar, political scientist, author, and human rights activist. Vine Jr. descended from a long line of Native American leaders and scholars. His grandfather, Rev. Philip J Deloria, was an Episcopal priest and leader of the Yankton band of the Dakota Nation. Deloria's parents were and Vine Victor Deloria, Sr. and Barbara Eastburn. His father became an Episcopal archdeacon and a missionary on the Standing Rock Indian Reservation. Ella Deloria, a renowned Native American anthropologist and ethnographer, was Vine Deloria Jr.'s aunt.

Vine Deloria Jr. graduated from Kent School, an Episcopalian college preparatory school in Connecticut in 1951. He served in the Marine Corps from 1954 to 1956, and then earned a B. S. in general science at Iowa State University in 1958. While a student at Iowa State University, Vine Jr. met his future wife Barbara Jeanne Nystrom, they were married for almost 50 years and had three children. Vine Jr. went on to the Lutheran School of Theology in Chicago where he graduated with a Master's degree in Sacred Theology in 1963. In 1964, he was unexpectedly elected as the executive director of the National Congress of American Indians (NCAI), a position he held from 1964 to 1967. Deloria entered the University of Colorado Law School in 1968 and was awarded a J.D. in 1970.

Deloria was a lecturer at Western Washington State College (1970–1972) in the division of ethnic studies. He taught at the University of California at Los Angeles (1972–1974) and was a Professor of Law and Political Science at the

University of Arizona (1978–1990), where he established the first master's degree program in American Indian Studies in the United States. In 1990, he moved to the University of Colorado in Boulder where he held appointments in history, law, religious studies, and political science. He retired in 2000 but remained actively involved in supporting Native American human rights, politics, and education of Native Americans and the general population.

Major Accomplishments

Vine Deloria Jr. served on numerous leadership positions including the Indian Rights Association, the Council on Indian Affairs, the National Office for the Rights of the Indigent, the Institute for the Development of Indian Law, the National Museum of the American Indian, and the Citizens Crusade against Poverty. He founded the Institute for the Development of Indian Law a public interest law firm in Washington, DC, in 1971 and served as its chairman until 1976. He also served as a board member of the Oglala Sioux legal Rights Foundation (1971–1974).

In the 1950s, Deloria's father Vine Deloria Sr. spoke out against the federal government's plans to terminate tribal governments and force Indians to assimilate into the general population of the United States. Born in Indian Country and raised among the Sioux people, Vine Deloria Jr. wrote from an informed understanding of the lived experiences of oppression faced by Native American tribal groups as fourth world communities within North America. With clarity and a biting yet honest humor, he highlighted historical and ongoing Neocolonialism that negatively impacted North American Indian communities. He argued that anthropology which studied Indians but excluded them from the processes of knowledge production and decision-making regarding their heritage should become relevant to Native Americans. In his work to force open the academic gates of anthropology and archaeology to Native Americans, he laid the foundations for what is now known as Indigenous archaeology.

Deloria provided a much needed mirror of self-reflection in American academia, one that many anthropologists had historically conveniently avoided in their work of creating the histories of the first people of North America. His scholarship inspired many anthropologists to reflect on the impacts of their work on contemporary Indigenous peoples. Deloria's critiques of academic knowledge production forced anthropologists to acknowledge that their craft was not a neutral pursuit based on a solid science. Deloria's voice worked to rebuild bridges between Indian Country and the general population of the United States, bridges which had long been burned through historical processes of archaeological myth making and exclusion. He brought attention to human rights concerns of Native Americans and supported the Native American civil rights movement, acting as legal defense for Indians in federal trials that resulted from the takeover of Alcatraz in 1969, and the 71-day standoff between the Federal Bureau of Investigations (FBI) and the American Indian Movement (AIM) at Pine Ridge reservation in 1973.

In 1969, Vine Deloria Jr. published the first of more than 20 influential books, *Custer Died for Your Sins: An Indian Manifesto* (Deloria 1969), in which he critiques the US government's treatment of Indians. In *We Talk, You Listen: New Tribes, New Turf* (Deloria 1970), he discusses the need for a return to traditional ways of respectful relationship among people, land, and religion. In *Red Earth: White Lies* (Deloria 1995), he highlights the pseudoscientific assumptions of anthropologists regarding the now disproven Bering Land Bridge model of late initial migrations. A model which has been embedded in general discourse and knowledge production as scientific fact without the benefit of proof.

Vine Deloria Jr. inspired a tsunami of moral and political conscience in the USA and globally. He lived to see the successful implementation of many of the causes he supported, including the passing of the Native American Graves Repatriation and Protection Act of 1990; tribal regeneration witnessed in groups that had historically been terminated by the Federal Government,

which have now regained their federal Indian status; and the recognition of fishing rights, based on treaties. Vine Deloria Jr.'s legacy continues to ripple across numerous nations, and is seen today in the intellectual accomplishments of thousands of Native American, First Nations, and Indigenous Ph.D. scholars across diverse fields of academia, government and private business.

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Demographic Transitions

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Introduction

A demographic transition can be defined as a quantitative leap in the self-regulated flow of population inputs and outputs which is determined by a qualitative change in the causal mechanisms underlying this regulation. This entry briefly describes the two demographic transitions which occurred during the Holocene, the Neolithic Demographic Transition (NDT) and the Contemporary Demographic Transition (CDT), and their underlying biodemographic mechanisms – the demographic, epidemiological, psychosociological, and cultural consequences – are set out in parallel and discussed from the perspective of human evolution over time.

The Neolithic Demographic Transition (NDT)

The quantity of archaeological remains is roughly proportional to the size of the population which produced them (Parts of this article concerning the Neolithic Demographic Transition are taken from Bocquet-Appel (2011)). In general, very small populations leave few remains, while large populations leave a great many. In world archaeological sequences, the emergence of agriculture coincides with a considerable increase in archaeological remains, which was interpreted for a long time as indicating a spurt in demographic growth (Childe 1936; Kuijt 2008). But archaeological remains do not directly express demography. However, skeletons in cemeteries and their age distributions do reflect demography, as long as they are not disturbed by poor bone preservation in the soil or by cultural burial rites, which is most often the case. A signal of a major demographic shift can be observed in world archaeological sequences of cemetery data in the northern hemisphere. This signal is characterized by a relatively abrupt increase in the

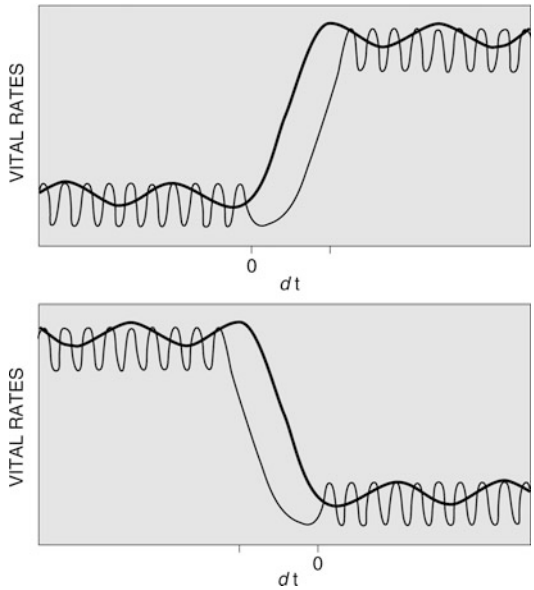

Demographic Transitions, Fig. 1 *Top*: Model of the Neolithic Demographic Transition. *Bottom*: Diagram of the Contemporary Demographic Transition. In *black*: birth rate; in *gray*: mortality rate

proportion of 5–19-year-old juveniles in cemeteries during the economic transition from foraging to farming (Fig. 1). This proportion (called $_{15}p_5$ in demographic notation) leveled off 1,000 years after the advent of the farming system locally (dt = 1,000 years). This indicator $_{15}p_5$ expresses the input parameters in the living population (birth, growth, and fertility rates) and not, counterintuitively, mortality (Sattenspiel & Harpending 1983; Johansson & Horowitz 1986; McCaa 2002). When the value of $_{15}p_5$ rises, then the shape of the population pyramid tends to form the obtuse angle indicating increasingly young population, determined by a high birth (and fertility) rate; when the value of $_{15}p_5$ decreases, then the population pyramid tends to form the tower shape indicating an aging population, with a low birth (and fertility) rate. In Fig. 1,during the middle of the forager period ($_{15}p_5 \times 100 = 22$ %) and up to the first leveling-off in the farming period ($_{15}p_5 \times 100 = 28$ %) at $dt = 1{,}000$ years, an estimated average of 5.9 and 7.3 children per woman have been estimated, respectively. Also noticeable is the weak pre-NDT depression, where the proportion of immature individuals decreases (as well as the birth rate and fertility), which suggests a population experiencing hardship. This signal is interpreted as the signature of a major demographic shift in human history and is known as the Neolithic Demographic Transition (NDT) (Bocquet-Appel 2002) or, synonymously, the Agricultural Demographic Transition.

The NDT is detectable from a signal representing a shift toward higher fertility values, but the mortality part of the signal is missing and must be inferred. To do so, we have taken the universal density-dependent demographic model used in population ecology (also called the "Malthusian" model in social demography, or the homeostatic model). Unless we assume a demographic growth rate that would rapidly reach a cosmic number, the most likely scenario is that an increase in the birth rate was closely followed in time by an increase in mortality, producing the historical growth rate typical of preindustrial farming populations (0.2–0.1 % per year), with their high birth and mortality rates.

What, in the agricultural economy, had the impact on human biology that ultimately determined the growth of the population? Increased natural maternal fertility, via a reduction in the birth interval, is mainly determined by the energy balance and the relative metabolic load (Valeggia & Ellison 2004). It implies the return of a positive postpartum energy balance, which occurred earlier in farming than in foraging societies, due to the energy gain from the high-calorie diet of sedentary farmers (wheat, lentils, peas, maize, rice, and millet) compared to the low-calorie diet of mobile foragers (mainly game), coupled with a decrease in the energy expenditure of carrying infants in sedentary populations. With the emergence of agriculture and its impact on the energy balance, a kind of epidemic of hyper-fertility in females appeared and spread among farming populations, rather like today's global epidemic of obesity. This will occur in any period, whether prehistoric or historical, when a mobile forager economy shifts to a sedentary farming economy.

Theoretically, the NDT was accompanied by the first epidemiological transition (Armelagos & Harper 2005). With the appearance of sedentary village life and the corresponding growth in local population density, mortality rates inherited from the foragers rose rapidly, particularly in children under 5 years of age. Causes of increased infant mortality would include a lack of clean drinking water, contamination by feces and the absence of latrines, and reduced breastfeeding as maternal fertility increased. Candidate infectious diseases, by epidemiological inference from current preindustrialized areas, would include those associated with diarrhea (*Rotavirus* and *Coronavirus*) as the main killers of children under 5 years of age. Zoonoses could have had an impact on the population with the introduction of significant animal domestication in the core areas of agriculture invention, whether at the same time as plant domestication (pigs, water buffalo, and probably chickens in China; guinea pigs, llamas, and alpacas in the Andean highlands) or later (goats, sheep, and subsequently cattle and pigs in the Levant). But while paleopathological data from skeletons seem consistent with the NDT epidemiological transition (Cohen & Armelagos 1984; Bocquet-Appel et al. 2008), the results based on ancient DNA (measles, severe form of smallpox, tuberculosis) are less consistent and require closer investigation.

Depending on the level and speed of population growth, what is to be expected in terms of population structure, age distribution and the distribution and structure of families and households? During the NDT, with the tempo at $dt = 1{,}000$ years, although fertility increased considerably (estimated TFR increasing from around 5 to 7 children per woman), the average family size increased only moderately (4.3–4.7 people) because of the increase in mortality; the size of households including one of the two surviving grandparents over 60 years old rose from 5 to 5.2 people. At the onset of the NDT, life expectancy at birth could have been about 24 years for males and 25 years for females, but it then rises to 33.6 and 34.1 years, respectively, at age 20. By the end of the NDT, due to the transition to higher mortality figures, life expectancy at birth was about 18 years in both sexes, but 28 years for males and 29.5 years for females at age 20. Fifty-five percent of the population would have been under 20 years old, with a median age of 17. These figures should be taken as orders of magnitude indicating a trend during the NDT, rather than as exact statistics.

As demographic density increased appreciably in the core zones of agricultural invention, the NDT triggered a major geographical redistribution of populations, with colonization or invasion by early farming populations bringing in their technologies, lifestyles and languages, which in some cases reached the continental scale, thus supporting Ammerman and Cavalli-Sforza's (1971) model of demic expansion (see Haak et al. 2010 for farmers in central and northern Europe) and Bellwood and Renfrew's "farming/language dispersal" hypothesis (2002). The speed of demographic expansion (and therefore linguistic expansion also) depended on the capacity for adaptation of agricultural packages (cereals, vegetables, tree crops, tubers, and domestic animals) to the various ecological areas colonized, in terms of yields and nutritional value (Harris 2002).

World archaeological sequences show that the first sedentary villagers emerged in large numbers from the NDT. They were faced with entirely new social, economic, and ecological challenges. In comparison with a forager culture that lasted for 200,000 years during the short chronology of anatomically modern humans, and with nearly three million years in the long chronology of the genus *Homo's* existence, the NDT, in just a few hundred years or two or three millennia at most, caused humans to "*domesticate themselves in villages*" (Bandy & Fox 2010). What psychosociological consequences should we expect from this very young population in terms of political institutions? With the demographic concentration from village to proto-city, the sphere of political institutions that became established was constrained by the population pyramid of the NDT. The top of this pyramid is formed by a very small proportion of individuals aged 60 and over (<5 % as against 24 % in Europe in 2011), the custodians of experience and social memory, while the bottom spreads

out as a large proportion of 15–30 year-olds (>25 % as against 8.8 % in Europe in 2011), the holders of physical strength and youthful radicalism. Such a population pyramid supported the emergence of autocratic patriarchal powers, from big man to chiefdom (Drennan & Peterson 2006), but their longevity and the transmission of their status were jeopardized by the destabilizing impact of high mortality.

The observed signature of the NDT makes it possible to answer a recurrent question in cultural anthropology: was demographic pressure the cause (Boserup) or rather the effect (Malthus) of the cultural change? The graph in Fig. 1 in fact represents the demographic and economic transition (relative to the farming system at $dt = 0$) in a common chronological framework. It is the position of the two transitions, one relatively to the other, which makes it possible to provide an empirical answer to the question of the causes of the cultural change in the context of the shift to agriculture. A visual analysis of Fig. 1 shows that the demographic reaction neither precedes nor succeeds the economic change, but coincides with it. Thus, the population was simultaneously the cause and the effect of the cultural shift. The NDT was a self-catalyzing process capable of rapidly increasing the growth rate, locally or regionally (Bocquet-Appel & Naji 2006; Bocquet-Appel 2008), and it is this which, starting from the centers of agricultural invention, triggered the processes of geographical expansion (individuals, nuclear families, demic, and linguistic). This conforms to the predictions of the Malthus-Boserup demographic model (Wood 1998). The NDT is one of the structuring processes that has shaped the course of human history. The question of its initial directional impact on the economic, social, and cultural spheres during its rapid growth phase needs to be raised when reconstructing the social evolution over the long term.

The Contemporary Demographic Transition (CDT)

In the second half of the eighteenth century in Western Europe, the annual number of deaths began to decrease, indicating emerging control over mortality. This had an effect on children especially, whose contribution to mortality was considerable at that time, since nearly half of all children died before the age of five. From the 1790s in France (Dupâquier 1998: 13; Perrenoud & Bourdelais 1998: 64) and Sweden (Sköld 2002: 71), mortality and fertility began to decline simultaneously. During the nineteenth century, the pattern of a typically demographic process appears as it spreads geographically across Europe (Fig. 1 bottom). In the first phase, control over mortality occurs, bringing a continuous decline in mortality from 40–30 per thousand to 15–10 per thousand within 150 years, while the birth rate remained unchanged. During this period, the rate of natural increase leapt to 1–2.5 % per year (Maddison 2001), as against 0.1–0.2 % previously. This caused a significant increase in the European population, from 140 to 450 million between 1750 and 1914 (Dupâquier 1998: 10). During the second phase of this process, the birth (and fertility) rate declined in turn, eventually to the same low level as mortality. This double decline constitutes what is called the Demographic Transition, apparently detected by several authors independently (Thompson 1929; Landry 1934, Notestein 1945: for a review see Kirk 1996) and called here the Contemporary Demographic Transition (CDT) to distinguish it from the NDT. The CDT (also called the Contemporary Historical Demographic Transition: Dyson: 2010) emerged in Western Europe in a natural way, that is to say as a societal process. It then spread rapidly in countries under strong European influence (especially Australia, USA, and New Zealand). In the second half of the twentieth century, in the rest of the world, the CDT was established through voluntarist campaigns designed to bring down the size of populations, particularly in the then developing countries. For example, the World Health Organization (WHO) has meshed a birth control policy with its public health policies (vaccinations and dispensaries, see Weisz & Olszynko-Gryn 2009), which were expected to produce a combined effect on the frequency of births and deaths. Yet despite these consistently combined policies, mortality began to decline a few decades

before the drop in fertility (Dyson 2010). With the CDT, the world's population rose from 0.77 to 7 billion inhabitants between 1750 (Biraben 1979) and 2011, thus multiplying by 9 in the space of 260 years, with a forecast of 9.2 billion by 2050.

The declining trend in mortality emerged in Europe at the end of the Enlightenment, when the idea of conscious human action on the world began to take precedence over the acceptance of Divine Providence. The American and French Revolutions happened at around the same time, as did Jenner's introduction of vaccination in England (1796). But as seen above, the decline in mortality, with the high NDT fertility rate remaining unchanged, caused a rapid increase in population. This had two effects: (1) an increase in population density from national to family scale, and (2) an unprecedented acceleration of urbanization, after millennia of near stagnation or almost imperceptible growth. While the tempo of the CDT varied from one country to another, it was slower and smaller in scale in the countries where it occurred naturally than in the rest of the world where it was triggered deliberately. In the former, the birth rate fell 100–150 years after the drop in mortality and growth rates to around 1–1.5 %, while in the latter, birth rates fell 35–50 years after mortality rates, with growth rates of 2–3.5 % (Dyson 2010).

As family density (i.e., size) increased, fertility began to drop due to the use of contraceptive techniques. The emergence of contraception during the CDT can be seen as a specifically human part of the density-dependent regulatory mechanisms of ecological models (Malthusian in the sociology of demographics, see above). Its effect was to restore the smaller average size of families – around 4 people – that prevailed in the older pre-CDT demographic regime due to the impact of high mortality, especially among children (Reher 2004). But unlike the mechanisms of what Malthus described as "preventive checks" to limit the size of a population, which are indirect (age at marriage) and unconscious (mortality), contraception is a means of control which is both direct and conscious. If we look at human demography from an evolutionary perspective, humans are one of the five hominoid species of great apes without tails. Until the CDT, the existence of human individuals, like that of the other great apes, revolved around natural routines over which control was unthinkable, such as feeding oneself (several times a day), sleeping, defecating, or menstruating. Mating and reproduction are among these natural regularly occurring routines. Birth control, which separated reproduction from mating, was the unprecedented qualitative change that influenced fertility during the CDT. Contraception is a direct result of the Enlightenment's impact on mortality.

In areas where the Contemporary Historical Demographic Transition occurred, the aging population and medical and social control over mortality resulted, after the NDT, in a second epidemiological transition. This began with a reduction in major infectious diseases and their virtual disappearance in the twentieth century (vaccines, antimicrobial drugs). At the same time, chronic and degenerative diseases began to emerge. From the 1980s, with globalization and demographic densification across the planet, new infectious diseases appeared, mainly zoonoses (HIV, Ebola, SARS) while others reappeared (Tuberculosis, Malaria) (Morens et al. 2004).

In the regions of the Contemporary Historical Demographic Transition, from 1750 to 1914, the European population multiplied by 3, from 140 to 450 million, with some 50 million people migrating (Dupâquier 1998: 10-11) as entire continents of hunter-gatherers and/or subsistence farmers in North America, Australia, and Africa were invaded or colonized. By historical analogy, the current phase of the CDT, by causing significantly higher continental population increases than during the Historical CDT (China ×4, India ×5, Africa ×7), has had, and should continue to have, a significant impact on international migration.

In two centuries, in the regions where the Historical CDT occurred in Western Europe, farmers have decreased from 90 % to less than 5 % of the population, which has thus become almost entirely urban, or urban in lifestyle. The proportion of individuals aged 60 or more has increased dramatically, while the trend for

15–30-year-olds is in the opposite direction. The strong sexual division of labor in agricultural societies has disappeared. Women tend to have the same occupations as men, from the ideological elite to the armed forces. With a population pyramid made up of 25 % of old and fragile people at the top and only 9 % of young people, with their health and vitality, at the bottom, the psychosocial consequences on political institutions are those that favor compromise rather than conflict. With the CDT, representative democracy has emerged (Dyson 2010), despite limited previous experience in Antiquity and in the past and present totalitarian regimes of Europe and Asia.

Key Issues and Future Directions

The NDT and CDT are mirror images of each other. In the NDT, *increased fertility* was followed by increased mortality, but in the CDT, the *decline in mortality* was followed by a decline in fertility. The NDT was the springboard for world population growth; the CDT is acting as a brake. In both cases, however, the time lag between the two stages produced an interval in which fertility exceeded mortality and resulted in a rapid increase in the population with its many consequences in terms of invasion/colonization in the nineteenth and twentieth centuries, and migration since then.

From the perspective of human evolution, the NDT and CDT can be seen as the two extremities of a single demographic phenomenon. On the NDT side, relatively to the system of hunter-gatherers with its very low level of demographic saturation, the agricultural system simultaneously determined: (1) a level of potential saturation of about (population density per square kilometers: 50–80 farmers, divided by 0.01–0.001 hunter-gatherers =), 50,000 times higher than with the preceding hunter-gatherer system, and (2) hyper-fertility in females due to the maternal energy balance in farming communities. On the CDT side, as a result of control over mortality and declining mortality rates, the extraordinary historical increase in family demographic density triggered a conscious reaction to the hyper-fertility of the NDT, in the form of population-wide use of contraception. While technical progress has been extremely slow in the long chronology of the genus *Homo*, it accelerated at the same time as the increase in the metapopulation between the two transitions. During the period of 11,000 years when the metapopulation is forecast to increase from 6 million individuals (Biraben 1979) to 9.3 billion (average prediction) by 2050 – an increase equivalent to adding a population the size of the two most populous countries of the world, China plus India – the massive increase in demographic density is causing artificialization of natural ecological niches and the construction of an artificial and specifically human niche, in which an ever-growing proportion of the metapopulation has no connection with any activities relating directly to food production.

This demographic mega-schism from the hunter-gatherer regime, whose boundaries are, at one end, the accidental emergence of NDT fertility, and at the other end the conscious curbing of the population of the post-Enlightenment CDT, could be called the Holocene Demographic Transition (HDT).

There is a strong physical difference in general form (height and weight) between male and female hominoids. For example, male gorillas are about 50 % larger and heavier than females; in chimpanzees the difference is 20 % and in humans 10 %. In zoology, this difference in form is called sexual dimorphism. Following Darwin's work (1871), we have known that this dimorphism appeared in the course of evolution through sexual selection: the propensity among females to mate, by preference, with males who are more robust than themselves, in order to ensure fitness and protection from predators and other males. The post-HDT biological consequence of an older and more peaceful world could be the end of sexual dimorphism.

Cross-References

► Age Estimation
► Archaeology and Anthropology

▶ Children in Bioarchaeology and Forensic Anthropology
▶ Farming-Language Dispersals: Principles
▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
▶ Near East (Including Anatolia): Origins and Development of Agriculture
▶ Sex Assessment
▶ Social Archaeology

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Demography of the Ancient Roman World

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Introduction and Historical Background

During the last half century, historical demography has become one of the central subdisciplines within the field of economic and social history. It is precisely in demography that some of the differences between the modern world and the preindustrial past are most prominently visible. We now live much longer than our ancestors, and there are also far more of us than there ever were. The change occurred during the so-called demographic transition, that began in Europe and North America in the nineteenth century, and subsequently also reached the rest of the world, though not yet completely. This demographic transition involved the change from a society with high mortality and high natality to a society with much lower mortality, and much lower natality. As a result, people in advanced modern economies now live on average two or even three times longer than their ancestors. Since mortality had begun to decline well before natality, population also started to grow at an unprecedented rate. This often slowed down once fewer children were being born, but even so, in many countries, populations have continued to grow at rates never seen before. The result has been that the world now has many times the number of inhabitants it had only two centuries ago.

For classical economists such as Thomas Malthus, population growth always was a nightmare scenario because they believed production would never keep up, with a declining standard of living as a result. This in turn would bring about the positive checks such as famine and disease that would once again reduce population to a smaller size. Only sexual restraint could ever bring about prosperity. Similarly in a more modern marginal utility analysis, with land in almost fixed supply, more labor working on that same land would suffer from declining marginal returns, and thus from lower wages. Before the Industrial Revolution population and wages thus indeed mostly moved in opposite directions, with periods of growing populations and declining standards of living alternating with periods of the demographic decline and rising prosperity. This all changed in the aftermath of the Industrial Revolution, when not only population and aggregate production started to grow enormously, but also *per capita* production. The Malthusian ceiling was finally breached.

Thus, demography intersects with economic performance in two different ways. The first is that of population structure. When a long and healthy life is the ultimate scarce good, the failure of preindustrial societies to provide such happiness to as many people as possible is indeed the ultimate sign of their economic failure. The second intersection is at the aggregate level of trends in population size and total output, and in the resulting *per capita* production and

consumption. The pessimistic Malthusian model is indeed one scenario for this, but it is not the only one. Demand from a growing population can also in and of itself encourage economic innovation and productivity growth. This is the model proposed by Ester Boserup (Boserup 1965). Finally, population growth can be the product of improved economic or environmental conditions such as technical change, market integration, or climate change. Rising prosperity may make people more optimistic about their future and that of their offspring, and lead them to decide to have more children.

The big difference between modern populations and their pre-transition ancestors is in mortality levels. In modern populations, the majority of people live into old age. People can expect to live many years from birth (this is called life expectancy at birth, e_0, typically more than 70 years in modern populations) and only few people die before old age: ages at death are closely clustered in old age. In pre-transition populations, this is altogether different, with life expectancies in the range $e_0 = 20$ to $e_0 = 35$. Moreover, this low average also hides a far greater variation around the mean, with many infants and children dying at a very early age: in such populations, it is not unusual for about half of newly born children to die before the age of five. Even after this devastating infant mortality, mortality at later ages remained higher than in modern populations. Some, however, lived well beyond the average life expectancy, or even into old age. Thus, in such populations, there simply is much more variation around the mean life expectancy. For the composition of these populations, this implies that they have many children, rather fewer young adults, and very few old people. The population pyramid has a wide base and a slender top.

Key Issues and Current Debates

There can be little doubt that Roman population structure roughly conformed to this model of a pre-transition population, for the simple reason that all documented preindustrial societies conform to the pattern. The problem in the Roman case is that there is little actual evidence of the kind that is used in modern demographic analysis to document that. This was shown brilliantly in a seminal article by Keith Hopkins (Hopkins 1966), in which he argued that contrary to what was common practice at the time, the ages at death as recorded on Roman tombstones could not be used for a demographic reconstruction. He took a large sample of such data, and produced a modern scientific demographic reconstruction. Once he had done this, it was obvious, he argued, that such a population could never have existed in reality. That judgment was based on a comparison with modern model life tables for high mortality societies (originally he used the United Nations model life tables, and later the improved Princeton model life tables – Coale & Demeny 1983). Such model life tables are a standardized representation of the age-specific incidence of death for various levels of mortality. They are based on the best available modern data, even if these are admittedly often not very good for societies with low levels of life expectancy. So even if these model life tables have their limitations, they are the best comparative yardstick that we have. Hopkins therefore compared his demographic reconstruction from Roman funerary inscriptions with the patterns in the model life tables, and concluded that the tombstones produced demographically impossible results. The reason for this is quite simple, once you think of it: Not Everyone had an equal chance to be commemorated. For example, very young children were only rarely commemorated (Carroll 2011). Thus, the pattern of ages at death on tombstones is interesting, but as an indicator of cultural practices around commemoration, and not as demographic evidence.

This is not to say that Roman society did not keep census records (it did), but apart from a few exceptions, these have not survived. We have some for a few Egyptian towns and villages, and we have (hard to interpret) aggregate numbers for the late Republican period. These Egyptian data have survived because the unique climatic conditions have preserved the papyri that were used here (but also elsewhere) as writing material. Elsewhere in the Empire, these data have not survived, and all we have for those regions are a few actuarial life tables, and the regulations and

rates of a funeral association with an implied life table (*Corpus Inscriptionum Latinarum* 14.2112).

The Egyptian census data and tax records have been the subject of a brilliant critical analysis in Bagnall & Frier (1994), and some subsequent elaboration and criticism (Scheidel 2001a; Tacoma 2006). These studies have carefully pushed the data to their limit, and the result is that we can indeed say with some confidence that the demographic structure of Roman Egypt roughly conformed to the traditional demographic model of high mortality, high natality, and low life expectancy. In fact, Bagnall and Frier (1994) concluded that the life expectancy that they reconstructed was so low (around $e_0 = 20$) that it was at the very low end of what was still demographically possible if Egyptian society was to reproduce itself demographically. Extrapolation of the Egyptian data to the rest of the Empire is thus not necessarily unproblematic, since the specific and unfavorable conditions in the Egyptian countryside with its high population densities, high temperatures, and irrigation agriculture did not pertain elsewhere.

Comparative historical research does indeed show that there could be quite a bit of variation in preindustrial life expectancies, depending on conditions. Sparsely populated districts at higher elevations could be significantly more salubrious, just as densely populated urban regions may well have had mortality levels that were so low that populations could not maintain themselves without immigration (Wrigley 1978; Scheidel 2001b; Jongman 2003).

Skeletal data are a potential but controversial alternative data type for the reconstruction of demographic structure. The controversy concerns the reliability of ages at death from adult skeletons. Unlike skeletons of children and adolescents, those of adults do not show big changes, so aging them is far less precise. A recent alternative has been to look particularly at diseases that only occur in older age. Lazer (2009) has done so for the skeletal material from Pompeii and Herculaneum, and concludes that these diseases of old age were quite frequent, and that, therefore, there must have been rather more people who had survived into old age. This is all the more important because the Campanian region was one of high population density, and thus presumably of a high incidence of infectious disease. It suggests that earlier reconstructions of Roman life expectancy may have been a bit too pessimistic, even if, of course, Roman life expectancy never achieved modern levels.

The main cause of the pattern of high mortality and low life expectancy was infectious disease, and among infants and children in particular. Some diseases, like malaria (endemic in, e.g., the city of Rome), originate from contacts with disease-carrying animals. Many other infectious diseases are transmitted by humans, either through airborne transmission, or through polluted water supplies and inadequate drainage of human waste. Here, large parts of the Roman world were particularly vulnerable, due to high levels of population density and urbanization, combined with a high level of administrative and economic integration. People were moving around much more than they had done previously, along Roman roads, rivers, and from sea port to sea port. The cities were the nodes of this system of communication and transportation. Thus, Rome had not only created the first integrated economic and political system, but also the first integrated disease regime. All this was aggravated by an almost complete lack of understanding of the causes of infectious disease and mortality.

Roman levels of urbanization were indeed very high by comparative historical standards, and not just in Campania. Administratively early imperial Italy had 431 cities (apart from Rome), and the Empire at large counted at least 2,000 cities, but probably more (Scheidel 2007 – embarrassingly there is as yet no complete list). At the top of the rank size distribution were four very large cities: Rome, with perhaps one million inhabitants in the early imperial period, and Roman Carthage, Alexandria, and Antioch on the Orontes, with a joint population of perhaps another one million. Below that there were a score of cities above 100,000 inhabitants, and even more in the 50,000–100,000 range. The implication of such large cities is that although

most cities were rather smaller, the majority of the Empire's perhaps six million urban dwellers (but there could be more – we do not know until the research has been done) were living in large cities of perhaps 50,000 or more inhabitants. Thus, culturally and economically, the Roman urban experience was one of living in cities of a size that was both unprecedented and unmatched for a long time to come.

Demographically, that is obviously important in and of itself. However, it is also important because historically large preindustrial cities have rarely if ever succeeded to maintain their populations without massive immigration: they were so insalubrious that mortality levels far exceeded potential natality, and more so, the larger the size of the city. For the small early modern European cities, mortality typically exceeded natality by 5 per 1,000, and for a city like London, it was more like 10 per 1,000 (Wrigley 1978; De Vries 1984). The same almost certainly applied to the cities of antiquity, with massive rural to urban migration as an unavoidable consequence if cities were to maintain their size (Jongman 2003). In densely populated regions like Italy, the urban demand for warm bodies must have exceeded the rural surplus. Without immigration from further afield, such cities and rural districts could not have maintained their populations. Migration is indeed attested in both the written sources and from modern skeletal analysis, from neighboring rural districts and from the provinces. Contrary to traditional push arguments for the migration to Rome such as in the literary tradition (the late Republican story of the impoverished small Italian farmers and their desperate migration to Rome and other cities where they came to increase the numbers of a landless and jobless proletariat), the best explanation for rural to urban migration is thus the structural demographic and economic pull of the big cities. This is not to say that these migrants came voluntarily: many immigrants were slaves imported to work in urban industries or as domestic staff in the increasingly wealthy urban households of the Roman elite. Often, they lacked resistance to their new urban disease regime (and to malaria in particular), with even higher mortality as a sad consequence. Thus also, as soon as the pull of urban life weakened and fewer people migrated to the cities, cities would begin to shrink.

This brings us to the much discussed subject of aggregate population figures, and of population trends. Thus far, the debate on population totals has been focused on the Republican census data for Roman Italy. Every 5 years (the *lustrum*), two top ranking magistrates were elected to hold *inter alia* a census of all adult male citizens who were of military age, and of the value of their property so that they could be included in the right property class in the popular assembly (the richer you were, the more your vote counted in the *comitia centuriata*). So we should realize that in their origin, these are figures of free Roman citizens rather than all inhabitants of Italy that would also include the free Italians who did not have Roman citizenship, or slaves (Brunt 1971 for the most comprehensive modern study). And they are for adult males. We have the numbers for about half of the census years between 225 BCE and 28 BCE. This series shows some remarkable changes, and that has created a controversy that has now lasted for more than a century (Beloch 1886; Brunt 1971; Hopkins 1978; Lo Cascio 2001). The series shows quite a steady increase, and two major jumps, first in the censuses of 86/5 BCE (probably) and 70/69 BCE when the number roughly doubles compared to 125/4 BCE (there are no intervening data), and second in the Augustan census of 28 BCE where the number more than quadruples compared to 70/69 BCE (again, there are no data for intervening years).

The steady increase in the census figures is not that hard to explain, as the number of (ex)slaves and of Italians who gained Roman citizenship steadily increased over time. Similarly, the doubling of the figure in probably 86/5 and certainly 70/69 can be explained by the grant of citizenship to Rome's allies after the so-called Social War (Rome's war with its Italian allies – *socii*) of 91–88 BCE. Rome had won that war, but had to give the allies what they wanted: citizenship. Suddenly, there were far more citizens. The jump in 28 BCE was harder to explain, and explanations have remained more controversial.

Beloch 1886 argued that such a jump was demographically implausible, and that the jump must have been the product of a change in the census procedure: he hypothesized that women and some children were now also included.

Thus, we have two competing reconstructions of Italian population history: A low count that starts with a free and slave population in 225 BCE of 3.5–5 million, and a population in 28 BCE of perhaps 5–6 million, and a high count of the free population in 225 BCE of 4 million (plus some slaves) rising to a free population in 28 BCE of some 10 million (plus perhaps 4 million slaves). Population at the starting point in 225 BCE is roughly the same in the two models, but the end of the story in 28 BCE is totally different. A century of scholarly ingenuity has failed to solve this dilemma. A middle ground is hard to imagine, and the literary sources are not and will probably never be decisive. Yet, the historical implications are enormous: Was Roman Italy's population stagnant or even in decline during the two centuries that it successfully built its enormous empire? If we are to believe pessimistic traditional literary histories of Rome in this period, the Italian countryside did indeed suffer dramatically, and became depopulated, thanks to the growth of large slave estates and the migration of impoverished citizens to the growing cities populated by an idle and landless proletariat (Hopkins 1978). The alternative high count interpretation can take the census figures at face value, but the implication of a booming economy is rather at odds with the pessimistic literary tradition of rural poverty and social conflict.

The pessimistic reconstruction of Italian agricultural history has been undermined in recent years by the results of the archaeological field surveys in Italy beginning with the South Etruria Survey in the 1950s and later. Almost all of these surveys show a consistent pattern of increasing settlement density from the late fourth or early third century BCE and a continuity of small farms (Fentress 2009; Attema & De Haas 2011). The new villas are indeed visible in the landscape, but did not replace the small farms. Archaeologically, we see something that is completely at variance with the depopulated fields in the literary accounts. To be sure these are data on site numbers and site size, and not directly on population. The population estimates based on these data attach numbers of people to particular site categories, and then aggregate the result. Admittedly, that is an obviously error-prone procedure if we only look at absolute numbers. However, far less insecure than such absolute estimates of population is a reconstruction of the trend of relative change over time. I think we can confidently say that the trend was up rather than stagnant or even down, even if we cannot on the basis of these data say with a great deal of confidence that Italy had a population of 14 million rather than 6 million in the age of Augustus. However, that bipolar impasse vanishes if we are prepared to abandon the primacy of a literary tradition that is probably irrecoverable anyway.

Numbers of urban rather than rural inhabitants in Italy have been much harder to estimate with any confidence. We have an estimate for the city of Rome of close to one million inhabitants in the age of Augustus. The basis for this estimate is the number of roughly 200,000 adult male recipients of the imperial corn dole in the city (but in the early years of the *frumentationes* that number varied pretty wildly). If the number of 200,000 recipients is indeed roughly correct, and if Rome was a city of more than just adult male inhabitants, the number of free inhabitants must have been about 700,000. To this we should add a large number of slaves. Well-to-do Roman households included many domestic slaves, and slaves were also highly prominent in urban crafts. This is reflected in the prominence of slaves and freedmen in the urban funerary inscriptions, and in their prominence in associations of urban craftsmen. A remaining problem is that of the high incidence of manumission. Many (if not most) urban slaves were manumitted, and thus, slaves and free were as much age categories as they were social categories. Between them, these arguments imply that the one million inhabitants for Rome may be a conservative estimate.

The most common estimate of the joint population of Italy's other 431 towns is another one million or so (Hopkins 1978). Unfortunately, there

is no real evidence for this claim. I think its origin is in what scholars felt to be a maximum plausible urbanization rate for Roman Italy of about 30 %, assuming an Italian population of some 6 million. However, the estimate implies an average urban population of only about 2,000 people per city, and that is very low indeed, and all the more so since there were a number of cities that had considerably more inhabitants. Pompeii, for example, may have had 8,000 inhabitants at the lowest estimate, but more likely some 10–15,000 people. However, as soon as we allow for more urban inhabitants, the urbanization rate rises to some 50 %, which is really very high. The only way out seems to be to allow for an Italian population in this period that was considerably larger than the 5–7 million of the low count.

These estimates for early imperial urban population are not only insecure, but become even more problematic once we go back in time. Keith Hopkins has estimated urban population in 225 BCE as perhaps 600,000, but that estimate is ultimately based on its compatibility with the low count estimates for Italy's total population (Hopkins 1978: 68). As with rural field surveys, the only empirical way forward would be to study changes over time in urban archaeology, including changes in the size of the built area. That research is only just beginning, but there is no doubt that cities were growing – considerably.

Data for other regions of the Empire are even harder to find. Beloch (1886) had concluded that the Empire as a whole had some 55 million inhabitants in the Augustan age, and some have argued that higher counts than Beloch's for Italy imply considerably larger figures for the Empire at large, up to 90–100 million people. Such estimates are intellectually ingenious, but the empirical basis for any of them is extremely tenuous. Here too, the future of research probably lies in field surveys and aggregate analysis of urban archaeology in order to at least ascertain trends. The only serious exception has been Roman Egypt, where the vast quantity of papyri has circumscribed the limits between highest and lowest possible estimates (5–8+ million). Archaeologically, the best evidence comes from the Rhineland, where Roman populations have been estimated at 10.8–17.9 people per sq km, or about ten times larger than in the preceding Iron Age, and some 15 times larger than in the subsequent Merovingian period (Wendt et al. 2010: 320).

By the later first century BCE and the early first century CE, the upward trend of growing rural populations and expanding cities reached its peak, with sometimes very dense settlement and high estimated population densities that seem more in tune with the high count reconstruction than with the pessimistic low count. Yet, the early Principate also seems to represent some ceiling, after which the trend turned sometime in the second century CE, when for the first time, small farms did indeed suffer decline, and when both rural and urban populations began to shrink for the first time. The best explanation is probably the impact of the so-called Antonine Plague, a (likely) small pox epidemic that ravaged the Empire from the mid-160s CE, with apparently quite dramatic effect, not only in Italy, but everywhere (Jongman 2012). The Antonine Plague continued to ravage the Empire for another two decades, and notwithstanding the concerted efforts of Severan emperors, it inaugurated an even deeper political and military crisis (the "crisis of the third century"), from which the Empire only partially recovered. In Italy and the Latin West, late antique populations were dramatically lower than they had been, judging by the results of field archaeology and the signs of urban abandonment and decay. The Roman East witnessed an altogether different trajectory, however. It too suffered in the third century, but it recovered quite dramatically in the fourth century, and in some regions even reached levels of population density and urbanization never seen before. Here, the Justinianic Plague (*Yersinia pestis*) of 541–2 CE marked a turning point from which there was no return.

Future Directions

For a long time, research on ancient demography has progressed without much intellectual input from modern (historical) demography.

Hopkins (1966) clearly exposed the dangers of such conceptual isolationism, but ancient historians and classical archaeologists still have some way to go. And in the end, it is only through comparison with other regions and periods that we can weigh the Roman experience. On the data side, there are two areas of great potential. The first is that of the scientific archaeology of human remains and the molecular biology of disease. These have the potential to inform us far better on actual disease and its impact, and thus on the causes and incidence of mortality. Here, the new era has only just begun. The second area is that of demographic analysis of field surveys. For Roman Italy, we already have a multitude of excellent surveys. What is lacking is on the one hand systematic aggregate (statistical) analysis of these surveys, and on the other hand an extension of this research into other areas of the Empire.

Cross-References

- ▶ Bioarchaeology in the Roman Empire
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Economy, Roman

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Dental Anthropology

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Introduction

In some respects, the dentition is a battleground. For organisms that use teeth to process food, tooth loss is directly related to survival – lose your teeth, lose your life (Lucas 2004). Cultural buffering during the later stages of human evolution removed this dramatic relationship, but dental conditions are nonetheless dictated by long-term evolution, not recent cultural advances. For that reason, human teeth, along with the teeth of all vertebrates, were formed under the influence of natural selection. For animals that eat meat, the dentition has slicing, dicing, and piercing elements with minimal emphasis on crushing and grinding teeth. Conversely, browsers and grazers process large quantities of plant foods and thereby have teeth devoted primarily to crushing and grinding, with little need for slicing and dicing. For omnivores, including most primates, the dentition processes a more varied assortment of foods so the teeth are not as specialized as those of carnivores or herbivores (Ungar 2010).

Teeth are comprised of four different tissues: enamel, dentine, cementum, and pulp. Enamel covers the dentine which in turn covers the pulp chamber that contains blood vessels and nerves. Cementum anchors the tooth roots in the sockets of the upper and lower jaws. Enamel, the hardest substance in the human body (97 % inorganic), interfaces directly with the external environment. This basic observation has many ramifications. For example, teeth are used to process food so their shape and size are strongly influenced by diet. Because teeth come together while masticating food objects, the enamel eventually wears down, exposing the dentine, and finally the pulp. If wear is not too rapid, secondary dentine forms to protect the pulp from exposure to environmental variables, including oral microbiota that lead to infection. Another plus to the hardness of enamel is preservability. Teeth are often the most abundant remnant of the skeletal system in the archaeological and fossil record.

Because tooth size and shape are linked to diet and survival, the dentition is under strong genetic control. Minor variations are tolerated, such as accessory cusps, styles, ridges, and roots (Fig. 1), but pronounced changes are pruned by the shears of natural selection. Still, minor changes that accrue over broad spans of time ultimately lead to major changes, providing a classic example of the relationship between microevolution and macroevolution emphasized by the modern synthetic theory of evolution. While dramatic changes occur over millions of years, as seen for example in the dentition of horses as they shifted from browsing to grazing (Peyer 1968), other changes are remarkably conservative. For example, the adaptive zone of felids is defined broadly by the elements of hunting strategy (ambush and pursuit), activity period (nocturnal), and sociality (solitary), but the subdivision of this zone by prey size resulted in a wide variation in felid body size (4 kg to over 200 kg). Despite variation in body size, including tooth size, the teeth of a small cat are basically identical to those of a lion or tiger from a morphological standpoint. One can see the same pattern in canids where body and tooth size vary considerably but tooth number and morphology are identical in most respects (Hillson 2005). The point is this: if you maintain the same diet (e.g., meat eating) but vary that diet by prey size (e.g., mice to water buffaloes), your teeth ultimately change in size but not in shape or morphological details.

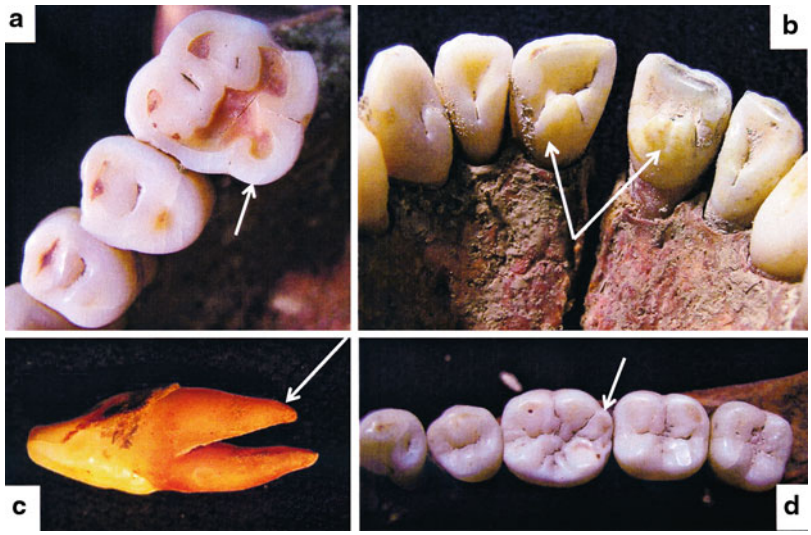

Dental Anthropology, Fig. 1 Examples of minor variants of human tooth crowns and roots. (**a**) Large Carabelli's cusp with dentine involvement; (**b**) large dental tubercles on upper central incisors, with moderate shoveling; (**c**) two-rooted lower canine; (**d**) five-cusped lower first molar and four-cusped lower second and third molars

Human teeth are remarkably similar throughout the world. A dentist who works on "normal human teeth" could ply his trade in Australia, Asia, Europe, Africa, or the Americas. With few exceptions, humans have the same number of deciduous teeth (20) and adult teeth (32) and the same types of teeth (incisors, canines, premolars, molars), along with many commonalities in morphological details. Beyond that, human teeth are very similar to hominoid teeth, making it obvious that the great apes are our closest biological relatives (Swindler 2002). However, human teeth can be distinguished from hominoid teeth in several ways. The most important difference is in the size of the canines. The general primate dental pattern includes large, projecting canines that are primarily used in male-male competition for access to valued resources. These canines form a shearing complex with the lower first premolar which assumes a sectorial shape (elongated front to back, or mesiodistally). For proper articulation of the two jaws, there is a space, or diastema, between the upper lateral incisors and canines to accommodate the lower canine. Paleoanthropologists often note canine reduction, homomorphic lower premolars, and lack of a diastema as hallmarks of early hominids. All of these traits are linked to a single trait – canine size.

Hominoids and many other primates also differ from hominins in the form and relative size of the incisors. Humans have relatively small anterior teeth (incisors and canines) that are vertically implanted in the jaws. Monkeys and apes, by contrast, have broad, spatulate incisors that are disproportionately large compared to the cheek teeth (premolars, molars), and these are set obliquely in the jaw rather than vertically (Agrawal et al. 2008). This difference revolves around the degree to which different organisms manipulate food with their anterior teeth. Animals who emphasize incisal preparation of foodstuffs have broad incisors that jut out from the upper jaw at an angle. Hominoids also show variation in enamel thickness on individual cusps, along with better developed cingula; orangs and some chimps also exhibit many crenulations (small ridges) on the premolars and molars. Despite differences, the overall similarity in morphology is striking.

Definition

Dental anthropology is a subdiscipline of physical anthropology that focuses on the use of teeth to resolve anthropological problems. Teeth exhibit a wide array of variables, ranging from those largely controlled by genes to those largely dictated by environment. Dental variables under genetic control include crown and root

morphology and size, along with tooth number (i.e., missing and extra teeth, or hypodontia and hyperodontia). Dental variables that reflect environmental factors include tooth crown wear and chipping, caries, abscesses, periodontal disease, calculus, and linear enamel hypoplasia. Anthropological questions focusing on teeth include issues of population origins and relationships (tooth morphology, size, number), diet and behavior (attrition, crown chipping, tooth-tool use), health (caries, abscesses, periodontal disease, calculus), and developmental stress (hypoplasia, asymmetry). Fields that involve significant elements of dental anthropology include bioarchaeology, forensic anthropology, human biology, paleoanthropology, and primate paleontology.

Key Issues

Population History

For the past 100 years, dental researchers have been aware of the fact that human populations from different geographic regions varied in tooth size, crown and root morphology, and tooth number. By 1960, we knew that Australian aboriginals had the largest teeth in the world while Bushmen and Lapps had the smallest. For morphology, Asian and Asian-derived groups were characterized by shovel-shaped incisors while Europeans were distinguished by Carabelli's cusp. After 1970, the number of papers using dental characters to assess population affinity grew exponentially. With the advent of computers, distance statistics, and new scoring standards, researchers started to examine many populations for multiple traits and worldwide patterns of variation emerged (Scott & Turner 1997). C.G. Turner II developed many of the ranked standards for making observations (Turner et al. 1991). He also examined thousands of Asian and Asian-derived samples to develop the Sinodont-Sundadont dichotomy in Asia and the three wave migration model for the peopling of the Americas from a northeast Asian Sinodont ancestor (Greenberg et al. 1986). Other researchers are using dental morphology to address issues ranging from regional microdifferentiation to global patterns of variation.

Genetics and Development

For teeth to be useful in the evaluation of phylogeny and population relationships, dental variables should be under strong genetic control. Although normal dental variation cannot be reduced to gene frequencies, twin and family studies have shown that traits defined by size or morphology are highly heritable (Fig. 2). The environment can contribute to dental development but genes play a stronger role. Morphological traits, which are present or absent with variable degrees of expression when present, are quasicontinuous variants with polygenic modes of inheritance. Missing third molars, at one time thought to be a simple Mendelian trait, are also quasicontinuous. Over the course of the past two decades, research in evo-devo (evolution and development) has advanced our understanding of the genetic-developmental basis of tooth size and shape. Going beyond the identification of individual variables associated with tooth size and shape, Jernvall and Jung (2000) describe four types of characters based on developmental principles; that is, characters of initiation, termination, cusp shape, and configuration. These different developmental patterns are tied provisionally to size and presence of the hypocone and short cusps along with crown diameters, crown relief, and relative cusp size, etc. To tie different crown and root traits to regulatory genes will advance the analysis of tooth characters in both hominid fossils and recent human populations.

Diet and Behavior

Because teeth are used to process food, dental variables can provide several types of information on the diet of earlier human populations. With use, teeth wear down. Patterns of wear can be used to infer both diet and dietary behavior. Hunter-gatherers often use their anterior teeth to process hides, so the incisors in particular wear down more rapidly than the molars and premolars. This is less evident in early agriculturalists that show less wear on the anterior teeth but more wear on the cheek teeth because of abrasives

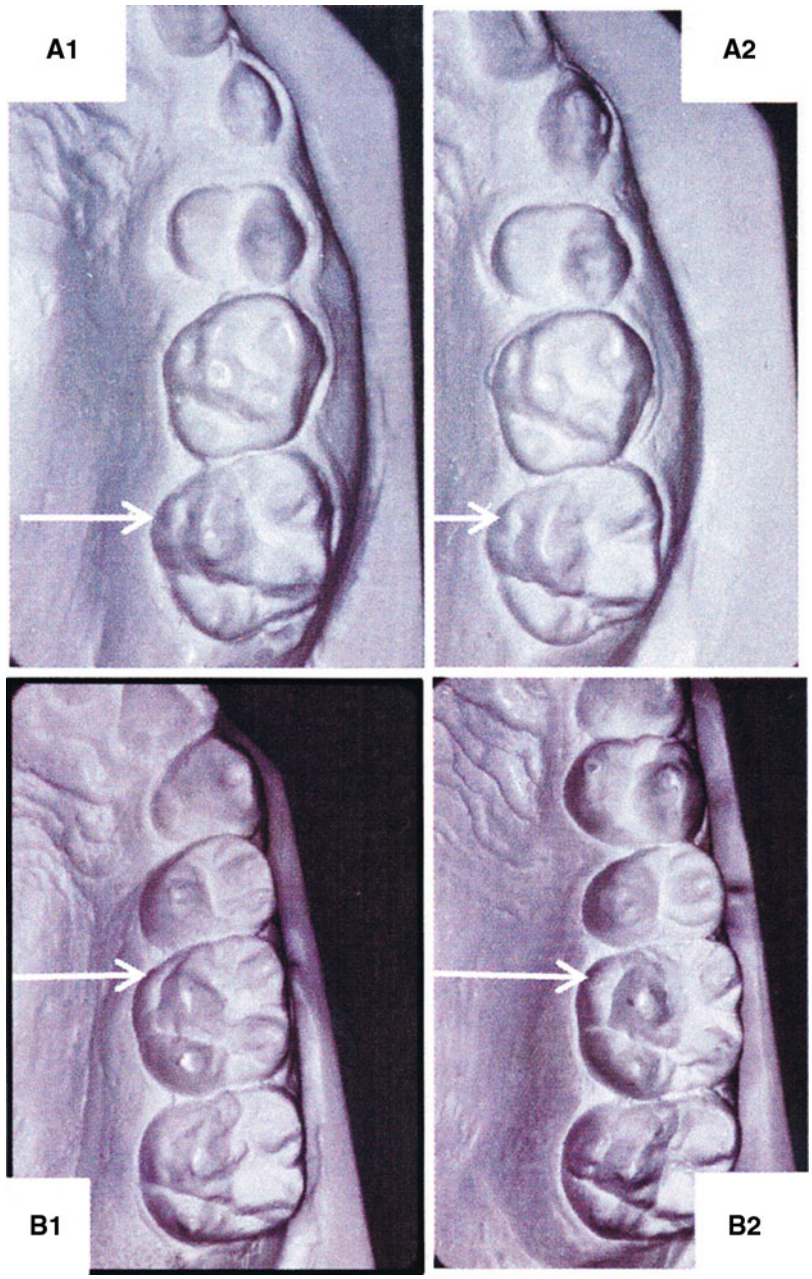

Dental Anthropology, Fig. 2 Two pairs of monozygotic twin dentitions with emphasis on upper left cheek teeth. Note symmetry of expression of Carabelli's cusp for A1-A2 twins but contrast between this cusp on B1-B2 twins

introduced by grinding stones in processing grains. Agriculturalists also exhibit a steeper wear plane on the cheek teeth compared to hunter-gatherers, a pattern that may reflect a reduction in food toughness tied to the use of grinding stones and cooking (Smith 1984).

In addition to attrition and abrasion which are characterized by incremental change and a smooth polished surface, teeth can also fracture. As a brittle material with limited plasticity, enamel can be chipped when subjected to excessive force. Such chipping is common in Inuit populations where individuals generate powerful vertical occlusal forces and consume a diet of frozen or dried flesh that is often contaminated with grit (Turner & Cadien 1969). However, all

Dental Anthropology, Fig. 3 Carious lesions noted by arrows. (**a**) Coronal; (**b**) interstitial

populations chip their teeth to some degree, and this may be patterned relative to tooth-tool use and dietary behavior (Scott & Winn 2011).

Oral Health

Some of the most common diseases in earlier human populations were those that impacted the oral cavity. The most widely studied of these pathologies is dental caries (Fig. 3). Because carious lesions are closely linked to the consumption of refined sugars, they were not common in earlier hominin populations who consumed protein and fat along with complex carbohydrates, including foliage and tubers. One exception is Kabwe (Rhodesian Man) who suffered from multiple carious lesions and associated abscesses well over 100,000 years ago. Caries remained in relatively low frequencies in recent hunting/gathering populations, partially attributable to the rapid and pronounced tooth wear that eliminated the pits and fissures that served as safe harbors for oral bacteria. Even during medieval times in Europe, caries occurred primarily between the teeth (interstitial) rather than on the crown surfaces (coronal). With the spread of refined sugars after CE 1500, caries became a major health scourge. Recent studies have shown that females usually exceed males in caries rates, perhaps due to male-female differences in snacking habits but also to differences in the oral environment of the two sexes influenced by female hormones associated with reproduction (Lukacs & Largaespada 2006).

Another oral pathology that crosscuts all geographic areas and subsistence practices is dental abscessing, or periapical osteitis. An abscess almost invariably develops at the root apex when the pulp chamber is exposed to the oral environment. This exposure can be the result of extremely rapid crown wear, coronal or interstitial caries, significant crown fractures, or periodontal disease. When oral bacteria invade the bloodstream, an individual is subject to a generalized infection. Many individuals in the archaeological record had active abscesses at death. To what extent such abscesses can be implicated in mortality is difficult to assess. Caries and abscesses can both lead to antemortem tooth loss. Individuals who retain their teeth throughout life live at least a decade longer than those who lose one or more teeth.

Developmental Stress

Teeth are the calcified end product of an original protein template. As environmental and genetic exigencies can impact the calcification of this template, there are markers that leave an imprint on teeth that researchers use to evaluate stress-related growth disturbances. The most commonly used marker is linear enamel hypoplasia (LEH) that takes the form of circumferential lines around a tooth (Fig. 4). Although all teeth can exhibit LEH, the anterior teeth show it most clearly. Hypoplastic lines can vary in degree of expression and number. Because teeth develop within relatively limited time periods, some authors evaluate timing in terms of the biological age of the subjects. In Midwest Native Americans, these lines often occurred between the ages of two and four, leading

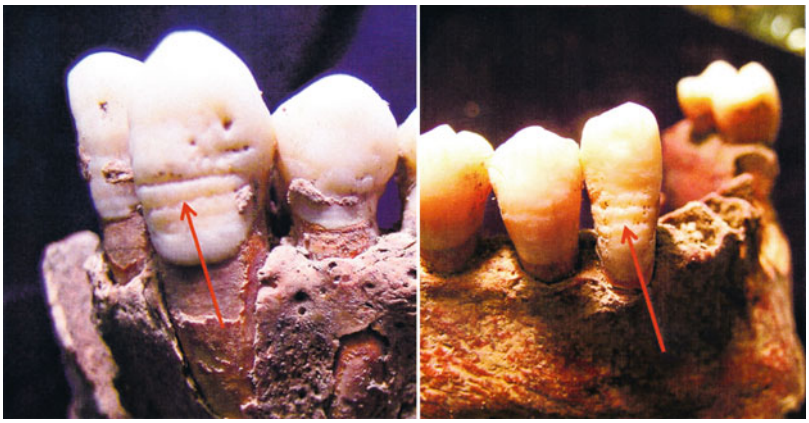

Dental Anthropology, Fig. 4 Well developed linear enamel hypoplasia on upper and lower anterior teeth

researchers to conclude they were coincident with weaning infants off breast milk and transitioning them to a maize gruel lacking essential proteins (Goodman et al. 1984). As the major triggers for LEH are nutritional deprivation or disease, interpretation of the lines always depends on context. Populations can exhibit the same frequency and severity of lines but for altogether different reasons. In northern hunting populations, living in small, scattered communities with few endemic diseases, the trigger for LEH development is primarily seasonal food shortage. By contrast, in agricultural communities, periodic food shortages are less of an issue than diseases associated with crowding, including cholera, diphtheria, and typhus.

Forensic Odontology

One branch of forensic science involves teeth. Focus is primarily on bite marks left on the skin of victims of violent crimes. Most bite mark experts come from the field of dentistry, not anthropology. Dental anthropologists nonetheless have much to contribute in forensic contexts. With isolated teeth, one can estimate minimum number of individuals and provide a reasonable estimate of age. Although tooth size is not a sensitive indicator of ancestry, tooth crown and root morphology exhibit sufficient differences among the major groups of humankind to allow discrimination at the level of European, African, and Asian, and derived populations (Scott & Turner 1997). Individual identification can sometimes be made on the basis of unusual if not unique patterns of occlusion, especially those evident on the anterior teeth.

Cross-References

- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Plant Domestication and Cultivation in Archaeology

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Derevianko, Anatoly P.

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Basic Biographical Information

Anatoly Panteleevich Derevianko (Fig. 1) was born in 1943. He is a Soviet and Russian historian, archaeologist, and an organizer of science and education who specializes in the archaeology and prehistory of Northern, Central, and East Asia. He was born in Kozmo-Demianovka village in the Amur Region and educated at the Blagoveshchensk State Pedagogical Institute.

From 1965 to 1976, A.P. Derevianko worked as associate scientist, curator, and Deputy Director of the Institute of History, Philology and Philosophy of the Siberian Branch of the USSR Academy of Sciences. In 1972, he received his doctorate degree in history. He was appointed as Chancellor of the Novosibirsk State University in 1980 and held that position until 1982. In 1981, Derevianko became a member of the Presidium of Siberian Branch of the USSR Academy of Sciences. In 1982, he became Professor and Head of the Department of History at the Novosibirsk State University. In 1983, he was elected Chairman of the United Scientific Council on Humanities of the USSR Academy of Sciences/the Russian Academy of Sciences. From 1983 to 1991, he was a Director of the Institute of History, Philology and Philosophy of the Siberian Branch of the USSR Academy of Sciences. From 1983 to 91, he was chief editor

Derevianko, Anatoly P., Fig. 1 Anatoly Panteleevich Derevianko

of the journal *Izvestiya SO AN SSSR. Seriya istorii, filologii i filosofii* (*Proceedings of Siberian Branch of the USSR Academy of Sciences. Series of History, Philology and Philosophy*).

Since 1991, A.P. Derevianko has held the position of Director of the Institute of Archaeology and Ethnography of Siberian Branch of the Russian Academy of Sciences. He was elected a full member of the Academy of Science of the USSR in 1987, and in 1998, he became an Academic of the Mongolian Academy of Science. Since 2002, he has been the Academic Secretary of the Department of History and Philology of the Russian Academy of Sciences and a member of the Presidium of the Russian Academy of Sciences. He has been a corresponding member of the German Archaeological Institute since 1984 and is an honorable Professor at a number of foreign and national universities.

Major Accomplishments

A.P. Derevianko discovered and studied numerous archaeological sites which were recognized as type-sites for various ages and cultures, ranging across a wide time span from the Paleolithic to the Iron Age. He is an initiator and director of a multidisciplinary research program to study of Paleolithic cave sites in Southern Siberia and Central Asia. He has also made a major contribution to archaeological studies through his ideas around a new spatiotemporal version of early migration routes into Asia, and he developed the periodization, chronology, and dynamics of the Paleolithic in the region. He is editor-in-chief of the international scientific journal *Archaeology, Ethnology and Anthropology of Eurasia*.

A.P. Derevianko has been awarded state prizes and decorations from the USSR and Russia, as well as foreign countries.

Cross-References

► Northern and Central Asia: Culture During the Lower Paleolithic Era

Further Reading

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Descendant Communities in French Guiana: Amerindians

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Introduction

French Guiana contains many minority groups who, from a cultural, political, and economic

perspective, are administered by the state and the department controlled by Metropolitains (French coming from Metropolitain France), Guianese Creoles, the Chinese, and Lebanese. These minorities include six Amerindian nations and four Bushinengé groups (Maroons or descendents of runaway slaves), all considered indigenous, as well as diverse Creole communities (from Saint Lucia, Martinique, Haiti, etc.) and some more recent immigrants such as the Hmong, Peruvians, Colombians, and of course Brazilians, Surinamese, and Guyanese from neighboring nations. Here, we will only focus on Amerindian communities, even if Bushinengés and Creole communities, who represent more than half of the population living in French Guiana today, should have earned their place in this encyclopedia.

For diverse groups of ethnic Amerindians (current population of about 10,000), whom have varied ancestral histories, languages, and relationships with the past, their relationships with heritage, memories, and history are complex and contrasted. We will attempt to present them in a comprehensible and concise way, by first mapping the history of each of the six populations in French Guiana, then explaining their position relative to their archaeological heritage, and describing their attempts at reclaiming their past over the last few years.

Current Debates

The Lokono and the Palikur peoples, who speak languages affiliated to the Arawak group, have experienced very different histories in recent centuries. While the Lokonos' presence in what is now called French Guiana can be confirmed by historical documents dating to the sixteenth century, that of the Palikur, who also live there, is recent; in fact, some groups emigrated from Brazil in the 1950s and more precisely from the neighboring state of Amapa.

In recent decades, the Lokono of Sainte-Rose-de-Lima in Matoury, and Balaté in Saint-Laurent-du-Maroni, settled on lands which are not their ancestral lands. Nevertheless, the Lokono community of Balaté, led by its traditional chief Brigitte Wyngaarde, showed great interest in the land adjacent to their village during the preventative archaeology excavations that took place in 2007 and 2008.

Visits to the excavation were set up by archaeologists from INRAP (Institut national de recherches en archéologie préventive), who were responsible for the site, and a presentation of the results in the meeting hall of the village was produced for the Lokono community by one of the persons in charge along with the regional curator for archaeology. Admittedly, the entire population could not attend the meeting where the preliminary findings were presented, but those present showed a real interest in the history of this ancient pre-Colombian Amerindian site, which the community claimed as its own even while not knowing whether it was Arawak or not. And one really knows to this day. The excavations revealed an ancient Amerindian presence dating to the pre-Colombian era, which brings support to the community for land claims, whether they are for those close to the Balaté village or for those whose usage rights have been recognized by the community, through a 1987 decree, but were not respected.

Over the last 40 years in other Palikur and Lokono villages, an awareness of an Amerindian past is less acute, but members of these communities have approached the regional archaeology service either to report incidental Amerindian or colonial archaeological finds or to demand information about sites near their current dwellings. They also inquire about the support of the Department of Archaeology in the revitalization of their "traditions" in the broadest sense of the term.

The Kali'nas, who have been settled for centuries on the coast and were named in historical documents since European contact, as well as the Wayana, speak languages belonging to the Carib group. The Kali'nas were increasing in number at the time of contact and pushed back European settlement for over a century. It is accepted that they were at war or at least in competition with the Arawaks, who were considered the oldest inhabitants of Guiana. In fact, before contact, there is no scientific proof of the name of the population.

The Kali'nas are the largest "Indian nations," with more than 2,000 members, and are the most aware and assertive in promoting their indigenous rights. Since 1981, they have been the leaders of the "Association des Amérindiens de Guyane Francaise" and it was Felix Tiouka, a Kali'na, who gave on December 9, 1984, in the Aoura village, his famous address to the government and people of France: "We want to gain recognition of our aboriginal rights, that is to say, the recognition of our land rights, of our right to remain Amerindians and to develop our own institutions and culture" (Tiouka 1985).

They also created the Federation of Amerindian Organizations in Guiana in 1991. It is therefore not surprising to see the creation of the municipality of Awala-Yalimapo in 1989, as a separation from the mostly Creole town of Mana, as a sophisticated gesture of accounting for the history and heritage of their communal territory, and beyond. It should be noted that, along with Camopi, this is one of the only two municipalities with an Amerindian majority in French Guiana.

The participatory heritage inventory, initiated by several young Kali'nas of the township, under the guidance of local elected officials, elders, and a scientific committee, is one of the most remarkable aspects of this group. The creation of a Council of Culture, which brings together all the township's stakeholders, is another one.

Finally, the Department of Archaeology regularly intervenes to study remains which are unearthed by chance or during construction work; a comprehensive study of funerary urns has been implemented in this way and resulted in an exhibition since 2012 at the Awala-Yalimapo community center.

Key Issues

Other Kali'na communities also take into account this historical continuity in their claims and their actions. Thus, the "new" residents of Couachi, on the edge of Mana township, have reoccupied in the last few years the site of their former village, previously abandoned for 30 years. On these traditional lands, they have use rights but not property ownership rights; as a result, an association is legitimately trying to get the handover of these lands, but the French government is reluctant to cede land to a collective group. Communal land does exist in Metropolitain France. Why does the government not want land to belong to this or that association? Because the French nation is considered as one and indivisible, and these associations are ethnically very homogeneous.

Similarly, the Yaou (Bellevue) community in Iracoubo asked the Department of Archaeology to protect its traditional cemetery (dating from the nineteenth to twentieth centuries) which was threatened by quarry projects. They succeeded in 2011, setting a precedent for the protection of other Amerindian and Bushinengés cultural sites such as cemeteries, sacred forests, and altars and certain ancient villages which are also considered sacred or taboo by indigenous peoples of French Guiana.

Let us also consider the Kali'na community of Kourou who appreciated the attitude and the work done by INRAP archaeologists, who excavated in 2006–2007, one of the sites linked to the construction of the Soyuz Launch Complex. After discovering an ancient site with eight graves dated to the mid-nineteenth century called "White Hill" by elders and on documents, the archaeologists left, before the completion of their studies and surveys of the graves, so that the Kali'na community could pay tribute to its dead via the customary chief and shaman of Kourou. Then, a meeting was held so that the community could reclaim its past in this particularly painful case. Based on strong evidence, it is believed that it was from this village that the Kali'nas were taken to be "shown" at the Jardin d'Acclimatation in Paris in 1882 and endured a tragic fate. From this ancient Kali'na village, like the neighboring Creole village of Malmanoury, not much remains after the heavy earthworks associated with the construction of the Ariane and Soyuz launch pads. The inhabitants of these two villages were displaced in the 1960s and 1970s to "modern" villages specially made for them in the new city of Kourou.

The situation for the Wayanas is much more difficult. Indeed, "Wayana country" only exists for anthropologists and not for the administration. For the 1,500 Wayanas, it is a country that is real, mythical, and historical all at once. The Wayanas of the upper Maroni region form part of the Maripasoula township, populated mostly by Bushinengés, Creoles, and "Metropolitains." As with the Tekos and the Wayãpis, the fact that they are also inhabitants of the "French Guiana Amazonian Park," created in 2007, should be taken into account. Is this an opportunity or is it rather a misfortune to be an Amerindian in a national park? For instance, how will traditional rights (and regulations, according to the 1987 decree) of hunting, fishing, gathering, and farming be incorporated into the park's future charter? And what will be their application? For the Wayanas, the inselbergs and the elevations of Tumuc-Humac are above all also sacred sites, where the current Wayana nation was forged, led by its Promethean hero, Kailawa.

The Department of Archaeology has been involved in several studies of archaeological sites in the area, always accompanied as they are by Wayana guides and conducted with the agreement of the Gran Man and the chiefs of Wayana villages. The archaeological remains found in the shelters of inselbergs in Tumuc-Humac are older than the epic of Kailawa, which seems to have taken place in the seventeenth century, according to research by Chapuis and Rivière (2003).

But, just as for the Kali'nas, the interests of leaders and many Wayanas for the ancient Amerindian past of the region extend beyond ethnic contingencies. They all feel that they are the descendants of those who made axes and pottery, who carved and painted rock walls, and who left many remains in the Earth for those who know or want to see them; the fixed polishing stones being only the remains easily visible to nonspecialists. The case is similar for the two other peoples living in the hinterland that we will now consider.

The Wayapi and the Teko (formerly called the Emerillons), who are currently living on the upper Oyapock, are representatives of the immense Tupi-Guarani language group. Camopi township, created in 1969, brings together the majority of the 1,500 people from these two groups connected by numerous family, social, cultural, and historical relations. The city council has developed numerous initiatives to raise awareness of traditional heritage, such as basketry workshops, enabling the younger generations to hear and see the work of the elders. Similarly, through a photography workshop organized by the cultural association of the village, young people were able to capture their village with their own eyes and reveal, through their photographs, their own representations of Camopi and its people.

Concerning archaeological heritage, an ongoing project at a secondary school should enable the collection of data on sites, as has already been done spontaneously with artifacts formerly collected, in order to create the first participatory inventory of the archaeological heritage in the township. This would be similar to that implemented in Awala-Yalimapo.

Future Directions

Our analysis has shown that to be master of one's own territory is fundamental for reclaiming the heritage and history of one's past. The Kali'nas on the one hand, the Wayapi and the Teko on the other, can project themselves in space and also in time, as a result of the creation of their two townships. By contrast, the situation is critical for the Wayanas, given the current tensions with the French government. Their claim for a territory, within the confines of the laws of the Republic of France, has little chance of success. But changes will need to take place and take place quickly because these four communities have legitimate rights to the lands that they believe, as do we, belong to their Amerindian ancestors, even if they recognize that archaeologists cannot and will perhaps never be able to prove this kinship.

Cross-References

- ▶ Cultural Heritage Management and Native Americans
- ▶ Decolonization in Archaeological Theory

- ▶ French Guiana: Archaeology and Indigenous Peoples
- ▶ Historical Archaeology in Latin America
- ▶ Indigenous Archaeologies
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ South American Archaeology: Postcolonial Perspectives
- ▶ The Guianas: Pre-Columbian Heritage
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

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Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)

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Basic Information

The German association of medieval archaeologists known as the *Arbeitsgemeinschaft für Archäologie des Mittelalters* was founded in 1975. Following developments in the field, and in related research areas, the association was enlarged 15 years later and its focus extended to include "modern times" (*Neuzeit*). In 2001, the name of the association was changed to its current form, and its chronological remit formally expanded to reflect coverage of the archaeology of early modern times. The primary role of the association is to promote the exchange of research results, but it also promotes the teaching and practice of medieval and modern times archaeology and provides a forum for scientific exchange on these topics between all interested parties. Interdisciplinary is a key feature, and the association brings together researchers from all of the related disciplines and subfields of medieval archaeology such as art history, buildings research, European ethnology, medieval history, geography, and even Classics and provincial Roman archaeology. In this way, all sources concerning the history of people in the Middle Ages are considered.

At the time of writing (September 2012), the post of President is held by Dr. Manfred Schneider, Lübeck, Department of Culture, that of Vice-president by Prof. Dr. Matthias Untermann, Institute for European History of Art, University of Heidelberg, and the association's Secretary is Prof. Dr. Matthias Wemhoff, Berlin State Museums. The association currently has about 380 members.

Major Impact

The society holds a conference at the annual congress of German associations and societies concerned with the ancient world. Each year, a special theme in either current medieval or post-medieval archaeology provides the focus of the meeting. Coverage tends to focus mainly on new research in German-speaking countries and the adjacent regions, but further European cross-correlations are also discussed, such as excavations in these areas, or the research results of young scientists, or those of larger research projects. The topics reviewed at the 2011 meeting included timber constructions, religiosity, interpretation of archaeological features and structural reconstructions, water construction, transportation of goods, technology transfer, among others. A selection of papers presented at the conference

is published the following year in the *Mitteilungen der Deutschen Gesellschaft für Archäologie des Mittelalters und der Neuzeit*. These are available for order via the association's website (www.dgamn.de).

The website also provides information about the latest developments in Europe and other conferences related to the medieval and post-medieval/modern times archaeology.

Cross-References

- ▶ Historische Archäologie
- ▶ Österreichische Gesellschaft für Mittelalterarchäologie
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology

Deutsches Archäologisches Institut (DAI), Rome Department

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Basic Information

The Deutsches Archäologisches Institut, today situated at Via Curtatone, 4d, 00185 Rome, Italy, dates back to the "Instituto di corrispondenza archeologica." This archaeological institution was founded in Rome in 1829 by a group of scientists and interested amateurs from different countries of Europe. Its first seat was in the Prussian Embassy on the Capitoline Hill at Rome (Palazzo Caffarelli) and from 1837 onwards in a newly constructed building nearby.

Major Impact

After Johann Joachim Winckelmann (1717–1768), its declared mission was to increase knowledge of the antique periods of the Mediterranean and to work out an established history of art and culture. To this aim a library was built, gathering collections of antiquities and documentation. The results of research work were presented in weekly conferences and published in the *Annali* or the *Bulletin* (ceased in 1886) together with illustrations in the *Monumenti Inediti*.

Research work from this period is characterized by large corpora bringing together important materials such as Etruscan urns and the bronze mirrors decorated with mythological scenes, later the *Corpus Inscriptionum Latinarum* (*CIL*) and Roman sarcophagi.

These projects received financial support from the Prussian kings, and consequently, after the German-French War, the institute was transformed into a part of the larger institution of the Deutsches Archäologisches Institut (DAI) of the newly founded Deutsches Reich. In 1874 the institute was moved to a new building on the Capitoline Hill and for the remaining publications the *Bulletino* was edited in a new style (*Mitteilungen des DAI, Römische Abteilung*, starting in 1886) and published increasingly in German.

The situation in Italy has changed since the host nation became an independent nation state. However, compared with other centers of the Institute (e.g., in Athens or Cairo), which were involved from the beginning in extended fieldwork such as the excavation at Olympia in Greece, the situation in Rome did not change greatly. The scientific resources, mainly the library, have been continuously expanded and curated. One of the current major interests was the extended Italian excavations such as those at Rome or Pompeii which are discussed and presented to a larger scientific public. Further work includes the publication of large corpora or catalogues such as those of the Vatican collections.

After the First World War, the building on the Capitoline Hill was expropriated, and after lengthy negotiations, the Institute was reopened in the former parish house of the Lutheran church in Via Sardegna. Despite serious financial

problems, the library continued to grow and in 1928 the core of a photographic archive was established. The spectrum of sciences represented at the Institute was further enlarged with the addition of Christian archaeology, the research of ancient architecture (Bauforschung) and under the regime of National Socialism with the early history (Frühgeschichte).

After the Second World War, the allies attempted to place the Institute under the administration of an international committee, but after long treatises it was returned to the Federal Republic of Germany, which constructed the new building in Via Sardegna opened in 1964. Today the DAI is an institution of the Ministry of Foreign Affairs.

Because of its long tradition, and also thanks to private donations, the Institute boasts a library of worldwide renown and also an extensive reference collection for academic research. The latter includes the well-established archives and the archaeological bibliography (Realkatalog). It also boasts one of the largest specialized photograph collections in Italy, which allows for a search of relevant publications. Specifically, the collection focuses on Italian and North African archaeology from the prehistorical to the medieval period. It is increasingly possible to gain access and consult material electronically and online.

The publications of greater collections, building complexes, and corpora of material are still the center of interest, but the activities of the Institute have expanded to include fieldwork in Etruria and Campania, mainly at Pompeii. In Southern Italy and Sicily (*Magna Graecia*), the study of various temples such as at Paestum dates back to the scholarly tradition of the nineteenth century. These studies have been expanded to projects of Greek urbanity. This has recently included relations with the indigenous Greek population and the processes of cross-cultural exchange.

The fieldwork in North Africa started in the 1960s and had a different origin. There the main interest was in the ancient yellow marble quarries (Giallo Antico) of Simitthus as part of a larger project on quarries in the Mediterranean area. Research then extended to the Hellenistic phase with cultural testimony of the Numidians and also the international program for rescue work at Carthage.

Another center of interest lies in the testimonies of the early Christian period, e.g., the center of pilgrimage in Thebessa (Algeria). In recent years, excavations in Albania (Apollonia) have been started for research on similar questions concerning the relationship between the Greek city and the Illyrian hinterland.

To this day the DAI is the only foreign institute in Rome dedicated solely to different research areas in the sciences of antiquity. This research work embraces a period ranging from prehistory to the Middle Ages, and the importance of the institute lies in the depth and complexity in which the various branches of archaeology and ancient history are represented.

The research center currently houses evidence of the urban cultures of the Greeks and Phoenicians and exchange between local cultures, the urban way of life during imperial times, and self-representation of Roman emperors in their art and architecture. Besides the library and photography archives, the Institute is a center for international scientific dialogue and exchange; it offers courses and scholarships for the younger generation and tries to mediate the results of research work through courses and guided tours for the wider public (so-called Pompeikurs for German teachers, Italienkurs für German students). The publications have different series: the "Sonderschriften," the "Palilia," and the annual journal the "Römische Mitteilungen."

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Archaeology: The World at 1800–1850
- ▶ Classical (Greek) Archaeology
- ▶ Epigraphy, Imperial Latin
- ▶ Statues and Monumental Art in Archaeology
- ▶ Style: Its Role in the Archaeology of Art

▶ Tombs, Etruscan
▶ Topography of Rome
▶ Winckelmann, Johann Joachim

Further Reading

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Dhavalikar, Madhukar Keshav

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Dhavalikar, Madhukar Keshav, Fig. 1 Madhukar Keshav Dhavalikar

Basic Biographical Information

Madhukar Keshav Dhavalikar (Fig. 1) was born on May 16, 1930, at Patas (Maharashtra). He received his B.A. in second class in Economics and Political Science in 1952, M.A. in 1958 in first class, and Ph.D. degree in Archaeology in 1964 from University of Poona (Pune) in ancient Indian Culture and Archaeology. He was awarded the University prize for standing first in M.A. exam. He served in the Archaeological Survey of India as Technical Assistant from 1953 to 1965. He was a lecturer in Ancient Indian History and Archaeology at the Nagpur University from 1965 to 1967 and later Deccan College, Pune, as Reader in Ancient Indian History Culture and Archaeology from 1967 to 1980 and as Professor from 1982 to 1990 in Deccan College Post-Graduate Research Institute (now Deemed University), Pune. He held the position of Joint-Director from 1982 to 1985 and Director from 1985 to 1990.

He was President, Indian Archaeology Society, 1986; Secretary, Indian Archaeological Society (Protohistory), 1970–78; Vice-President, Indo-Greek Society, Varanasi, 1975–78; and is President, Indian history Congress, 1990. He is the member of Indian Archaeological Society, Indian Society of Art History and World Archaeological congress, member Culture group, Planning Commission, Government of India, member Advisory committee, American Institute of Indian Studies, New Delhi, 1988–1999.

Major Accomplishments

Dr. Dhavalikar excavated a number of archaeological sites in India, especially Protohistoric, in Central India, Western India, and the Deccan. Among these excavations, the most noteworthy is that at Inamgaon (Maharashtra) which has been acclaimed for its methodology and interpretation of data, and also at kuntasi, a port settlement of the Indus Civilization in Gujarat. He participated in national and international conferences and seminars on Indian Art and Archaeology, presented papers, and chaired sessions. Some are International Conference on Radiocarbon and Archaeology, TIFR, Bombay, 1972; International Seminar on Indus Civilization, Srinagar, 1979; Indo-Pacific Seminar on Prehistory, Pune, 1979; first World Archaeological Congress, Southamptom, UK, 1986; South Asian Archaeology Conference, Paris, 1989, etc.

He was awarded the fellowship of the Bombay Branch of the Royal Asiatic Society in 2010 and the Ravindranath Tagore Fellowship in Cultural research by the Ministry of Culture, Government

of India, in 2010. He received Indian's fourth highest civilian award, "Padma Shri" (2011). He was awarded the Sharda Sahakari Bank award for research in Indology, 2008; Srimant Nanasahib Peshwa award research, 2010; and Gold Medal and felicitated by the Prime Minister, 2012, and Dr. Wakankar Puruskar award by M.P. Government in 2012.

Dr. Dhavalikar was deputed by Government of India to participate in the excavations at Pella (Alexander's Capital in Greece) in 1962. Later he carried out excavations at quite a few sites in India, among which the most noteworthy are most at Inamgaon (Maharashtra), Prabhas Patan, and Kuntasi (Gujarat). Inamgaon was a settlement of an early farming community (1700–900 BCE) and the report, published in three volumes, is supposed to be a model of "Total" archaeology. The excavation was specially exhibited at Festival of India in London in 1982. The excavation at Prabhas Patgan brought to light a warehouse of the second millennium BC and a Harappan industrial estate was discovered at Kuntasi. A unique human-shaped Kshetrapala shrine (10th century CE) was uncovered at Kandhar (Maharashtra) which was the capital of the Rashtrakutras.

Dr. Dhavalikar has authored a number of books which include *Cultural Imperialism: Indus Civilization in Western India* (1994), *Indian Protohistory* (1997), *Historical Archaeology of India* (1997), *Environment and Culture: A Historical Perspective* (2002), *The Aryans: Myth and Archaeological* (2006), besides excavation reports. His *Encyclopaedia of Indian Archaeology*, Vol. 3, is being published by Indian Council of Historical Research. His numerous research papers have been published in journals of international repute.

Dr. Dhavalikar was Visiting Professor to Havana (Cuba) 1982, Marathwada (1981A), Nagpur (1987), and Allahabad (1994) Universities. He has participated in many national and international conferences and was President of Indian Archaeological Society (1986) and Indian History Congress (1999). He was Senior Fellow of Indian Council of Historical Research (1991–93; 1994–96), Honorary Fellow, Asiatic Society, Mumbai, and Tagore Fellow (2011–13).

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Di Giovine, Michael A.

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Basic Biographical Information

Michael Di Giovine is an anthropologist whose research in Europe (Italy) and Southeast Asia (Cambodia and Vietnam) focuses primarily on heritage discourses and practices, global mobility studies (tourism/pilgrimage/diaspora), religious movements and cults, development and revitalization, and foodways. He earned his Ph.D.

from the Department of Anthropology at the University of Chicago in 2012, with a dissertation examining the emergence and development of the cult of the immensely popular twentieth-century Catholic stigmatic and saint Padre Pio of Pietrelcina, and the ways in which diverse forms of devotion, pilgrimage, and heritage notions associated with the saint have served as revitalizing forces in the sociocultural, economic, religious, and political spheres during the turbulent twentieth and early twenty-first centuries. He has (co-)edited several volumes and thematic journal issues that examine the intersection between cultural heritage and touristic mobilites, particularly as they relate to food systems, religion and devotion, and the seductive qualities of alterity. He is Assistant Professor at the University of West Chester Pennsylvania, and an Honorary Fellow in the Department of Anthropology at the University of Wisconsin-Madison. He has previously taught at the University of Chicago and in the Department of Liberal Arts at the School of the Art Institute of Chicago.

Major Accomplishments

A former tour operator and consultant for museums and heritage sites in the United States and abroad, he is the author of the heralded volume, *The Heritage-scape: UNESCO, World Heritage, and Tourism* (2009), which thoroughly examines the ways in which the World Heritage Convention both contributes to and complicates UNESCO's broad peacemaking objectives. In addition, his work has appeared in journals such as *Curator*, *Critical Inquiry*, *Museum Anthropology Review*, *Food and Foodways*, *Tourism*, *Journeys*, *The International Journal of Tourism Anthropology*, *Anthropologies*, and *Anthropology News*.

In 2012, Michael helped found The Anthropology of Tourism Interest Group within the American Anthropological Association, and currently serves on its Steering Committee. He is also a founding member and trustee of the Tourism-Contact-Culture Research Network. He sits on the academic board of *The Journal of Tourism and Cultural Change* and is the book reviews editor for *Journeys: The International Journal of Travel and Travel Writing*.

Cross-References

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- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Vietnam's Archaeological World Heritage Sites
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

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Digital Archaeological Data: Ensuring Access, Use, and Preservation

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Introduction

Archaeology is awash with data. Unfortunately, individual archaeologists, institutions responsible for the preservation of this historical and scientific information, and others who would be interested in various aspects of these data often cannot find them easily and lack straightforward ways to make use of the data when they can be located. Archaeological data exist in paper and digital formats. Increasingly, digital records are more common and older paper records are being scanned and transferred to digital formats. The access to and preservation of paper records is an important topic (e.g., Fowler & Givens 1995; Drew 2004, 2010); however, this entry focuses on the curation of digital archaeological data, not paper records.

Definition

The term "digital archaeological data" refers to documents created as digital files or scanned to create digital versions of documents (e.g., pdf, Word, rtf), data sets (e.g., Excel spreadsheets and Access databases), images (e.g., jpeg, tiff, and other standard image file formats), and other kinds of digital files that result from contemporary archaeological investigations and research. Some of the new digital files have paper versions, many are primarily or exclusively in digital formats. Despite legal and policy mandates requiring preservation and access to digital data, many of them are difficult or impossible to access and will not be preserved in the formats in which they currently reside. Digital repositories, such as the Archaeology Data Service digital repository in the UK and the Digital Archaeological Record (tDAR), are needed to provide wide and easy access to digital archaeological data and information and ensure that these data are preserved in the long run (Eiteljorg 2004; Richards 2008; Kintigh & Altschul 2010; McManamon & Kintigh 2010; McManamon et al. 2010; Richards et al. 2010).

Key Issues

Archaeological data, produced by field, laboratory, collections, and library research since systematic archaeological investigations began, exist in technical, often lengthy, limited-distribution reports scattered in offices across the world. Some of the data (e.g., analytical and descriptive data sets, images, GIS and GPS files, etc.) are encoded and stored on computer cards, magnetic tapes, CDs, flash and hard drives, and other digital media. Typically, these media are degrading, slowly but surely, in archives, museums, and collections repositories, on bookshelves and in file cabinets and desk drawers. Meanwhile, the technology and software necessary to retrieve the information and data and the human knowledge to make them meaningful rapidly disappears (Michener et al. 1997; Eiteljorg 2004). Unfortunately, rather than systematically archiving computerized information so that it can remain accessible and useable, individual archaeologists, museums, offices responsible for maintaining site inventory systems, and other repositories typically treat the media on which the data are recorded as artifacts – storing them in various ways, but not making them easily

accessible or ensuring their long-term preservation. The most common current preservation treatment preserves the media on which the digital data files are stored, but leaves the data on the media actually inaccessible (Eiteljorg 2004: 72-3; McManamon & Kintigh 2010: 37; McManamon et al. 2010; Watts 2011). This physical curation is an inadequate long-term preservation approach, which neither takes account of computer software and hardware change, nor of the gradually, but inevitably deterioration of the magnetic or optical media on which the digital data are stored (ADS/DA 2011a: The Project Archive, Storage and Dissemination).

Over 15 years ago, Fowler and Givens (1995) wrote about the importance of archaeological records and summarized the variety of documentation that, along with artifacts and other physical recoveries from investigations, is a part of the archaeological record:

- Provenience documentation: Field records, including notes, forms, drawings, photos, etc., and accession and catalog records
- Analytical documentation: Records of physical analyses and qualitative and quantitative analyses (e.g., statistical studies), etc.
- Administrative documentation: Project background records, research designs, proposals, scopes of work, related correspondence, etc.
- Project reports: Descriptive and analytical texts reporting on investigation or projects and their findings (Fowler & Givens 1995: 2-4)

Fowler and Givens were referring to paper records. Since their original text was drafted in the early 1990s, digital records have become common in all these categories of documentation. Digital data of sorts that were rare or nonexistent in 1995 are now common, for example, GIS and GPS files and digital files of scanned artifacts and site areas.

Professional ethics, in the USA and other countries, public laws, and regulations require that archaeological collections and associated records, including digital data, documents, notes, images, and other kinds of files, be preserved and made available for scientific, educational, and other purposes (McManamon & Kintigh 2010: 37–8; Cultural Heritage Partners 2012). These digital files, like the physical remains and paper records, must be preserved if they are to be of use in the future. The importance of preserving existing digital data should be obvious. It is inefficient and wasteful to collect the same or similar information repeatedly because already collected information has not been preserved in a manner that allows it to be accessed.

Caring for and Using Digital Archaeological Data

Guidelines and Expert Organizations

Information in digital formats has the advantage of being easily copied and shared. Digital data can be queried in automated ways that make certain kinds of research much easier than when using paper records. Some new kinds of research, for example, querying, integrating, and analyzing large data sets, are possible with digital data that cannot be carried out with paper records. However, digital data also requires special administrative and technical procedures to ensure that it is properly accessed, preserved, and used.

Technologically, digital files are easily duplicated and shared. They can be accessed and distributed widely if they are in a digital repository that allows users to discover and use the information the files contain. Depending upon the content of the files, there may be administrative hurdles to be overcome for such easy sharing and distribution to be realized. Some data or information may be required to remain confidential with limited access. Proprietary or copyrighted information may have restrictions on its potential uses that must be worked out with the owner or copyright holder. There also are challenges in funding for the maintenance and preservation of files in any public digital repository (e.g., see Kintigh & Altschul 2010; Richards et al. 2010).

The preservation of digital files presents its own challenges. These files cannot be preserved, nor are they easily accessible, if they are curated as objects. That is, stored on digital media (e.g., computer tapes, CDs, jump drives, etc.) that are curated in the same manner as physical collections and paper records. Digital files must be

stored on computer servers where they can be accessed, managed, and preserved. Effective long-term curation of digital files requires procedures that periodically assesses the condition of the digital files to ensure their integrity, and over the long term provides for the "migration" of these files to new formats that are capable of being read and used by future versions of software.

The Digital Curation Centre (DCC), the national authority on the subject in the United Kingdom, describes digital curation as "maintaining, preserving, and adding value to digital research data" (DCC 2010). The management activities that digital curation involves aim to reduce the threats to the value of data over the long term and to overcome the hurdles of digital obsolescence. For effective digital curation, the DCC advises that repositories conceive of data as having a digital life cycle with various curatorial activities associated with different phases of the cycle. The DCC cycle includes a number of steps (DCC 2010).

The Archaeology Data Service, at the University of York, which operates a trusted digital archaeological repository in the UK, and the Center for Digital Antiquity, which maintains the Digital Archaeological Record (tDAR), an international digital archaeological repository, provides a set of useful guidelines and steps also based on a concept of the life cycle of digital archaeological data. These steps run from planning for the development of digital records that can be archived easily and effectively, to the deposit of the digital records in a repository, to the long-term preservation and use of the records. These *Guides to Good Practice* (ADS/DA 2011b) also describe general standards for archaeological digital repositories and specific guidelines for various kinds of digital files.

Best Practices

The process of digital archiving for archaeological data can be divided into two general sections. The first includes activities to be taken by the individual(s) or organization(s) that create the digital data, documents, image, or other digital file information, referred to here as "digital objects." The second set of activities includes those undertaken by the digital repository where the digital objects are deposited for long-term care.

Actions by digital data creators include the following:

- Plan for the creation and subsequent management of the digital resources as part of a research or scholarly activity.
- Produce the digital resources as part of the project, creating administrative, substantive, and technical descriptions of the digital objects, commonly referred to as "metadata."
- Provide the means for users to access and make use of the digital objects.
- As part of the project that created the digital objects, evaluate their likely continuing importance and select those objects that merit long-term preservation.
- Dispose of the digital objects not selected for long-term preservation.
- Deposit in a trusted digital repository the digital objects selected for long-term preservation.

A trusted digital repository is one established and operated for the express purpose of providing access to and long-term preservation of digital data. Such a repository is organized so that it can be sustained and function in its curation role indefinitely. Actions by trusted digital repositories include the following:

- Upon deposit of the digital objects, test the objects to ensure that they have the characteristics described by the creators and can be adequately preserved in the repository.
- Undertake actions, e.g., regular check for file stability and retention of integrity; regular and frequent backups and storage in multiple locations for security and safety of files; etc., to ensure preservation of the digital objects in the repository.
- Keep the digital objects stored in a secure manner.
- Provide the means for access and use of the digital objects, within any constraints placed on use by the depositors.
- Ensure that new digital objects, produced from the originals, are created when it becomes

necessary to migrate the digital objects to new file types or in order to conform to new hardware and/or software standards.

The Developing Practice of Digital Curation

A recent report (Watts 2011) about a national survey of archaeological repositories provides some insights into how digital data are currently being curated. The survey contacted 208 archaeological repositories throughout the United States. Responses were obtained from individuals at 70 of the institutions. Nearly half of the respondents listed the care of digital data (e.g., providing for preservation of and access to these data) as an important mission of their repository (Watts 2011: Question 4). Yet, nearly half of the respondents also reported that their repositories lacked guidelines for the submission of digital data for curation and only a quarter felt that their institution has the means to provide access and long-term preservation of digital data effectively and efficiently (Watts 2011: 6-9). So, the need for digital archaeological curation is well recognized. The means and procedures to ensure that the challenges are met effectively need to be developed.

For two centuries, those who investigated archaeological sites systematically have realized that the information about the context of objects recovered from archaeological deposits tells more about the past than individual objects recovered by excavation or survey. The intense attention to context and the records that describe it are one of the characteristics that set professional archaeologists apart from casual collectors, commercial salvers, and looters. So, it is no surprise that archaeological concern extends to the care and future uses of the information derived from archaeological investigations. This information is expressed in documents, data sets, images, or other kinds of records. Archaeologists and others responsible for the management and preservation of archaeological information must be as concerned about the records of description and analysis as they are about how the artifacts and other recoveries from field studies are treated after they have been collected or excavated.

Furthermore, much of the archaeological record now exists only as collections and data from investigations undertaken prior to the destruction of in situ sites or portions of sites. Access to and preservation of these archival parts of the archaeological record is especially important since there is no alternative source of information. The ability to access already collected information is key to advancing understanding through new research and scholarship and imperative for both effectiveness and efficiency.

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▶ Archaeological Informatics
▶ Cultural Heritage Management Technology and Training

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Dimbleby, Geoffrey W.

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Basic Biographical Information

Professor Geoffrey Dimbleby (1917–2000) was a pioneer in the research and development of soil pollen analysis and sediment from archaeologically related features.

Born in Newcastle upon Tyne, he trained as a botanist at Magdalen College, Oxford obtaining a B.A. and a B.Sc. He became demonstrator in Forest Ecology in 1947 where he obtained his D.Phil. (1950) entitled *The Ecology of Some British Podzol Formations*. This work examined soil formation in relation to vegetation history and pioneered the study of pollen preserved in soils underlying prehistoric funerary monuments and field banks of North East Yorkshire and the New Forest.

After joining the Oxford Forestry Commission, he published his work on vegetation change and soil genesis in *The Development of British Heathlands and Their Soils* (1962). In this seminal work, he demonstrated from his numerous examinations of the well-preserved pollen in acid soils: the transition from woodland to heathland due to human activity and consequent soil degeneration on sandy substrates. As a corollary to this work, he also examined the taphonomy of pollen in soils (1961a, 1961b) and the possibility of soil regeneration of podzolic soils (1962). These studies led him to become one of the pioneers in the field of Environmental Archaeology and subsequently he became Professor of Environmental Archaeology in a newly created post at The Institute of Archaeology, now part of University College, London (1964–1979). The University of St. Andrews awarded him an honorary D.Sc. in 1977.

During his tenure, he continued with his research in soil pollen analysis, producing copious pollen studies of soils and other archaeological contexts for archaeologists. Much of this data remains unpublished. His earlier book publications include *Plants and Archaeology* (1978) and *Ecology and Archaeology* (1977). Subsequently he produced *The Palynology of Archaeological Sites* (1985). *The Domestication and Exploitation of Plants and Animals* (Ucko & Dimbleby 1969) resulted from one of the first conferences in the early acceptance of environmental archaeology as a significant discipline. He edited the first conference volume of the Association for Environmental Archaeology *The Archaeology of Coasts and Islands* (Brothwell & Dimbleby 1980) and *The Environment of Man: the Iron Age to the Anglo-Saxon Period* (Jones & Dimbleby 1981).

Major Accomplishments

As a part of his continued research, he was central to the study of contemporary soil processes and preservation of environmental remains on archaeological sites. He was a founder member of the Experimental Earthworks Committee (chairman from 1959 to 1972) studying taphonomy at the contrasting sites of Overton Down, Wiltshire, on calcareous soils (Jewell & Dimbleby 1966) and Wareham Dorset on acid heathland (Evans & Limbrey 1974).

As a lifetime Christian, he was active in the Congregational Church. However, as an academic, he questioned the doctrines and various inconsistencies of the church. In his final, privately produced book (1997), he discussed the tenet of man as the pinnacle of evolution drawing on his years of research in archaeology and past environments.

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- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Silbury Hill: Environmental Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

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Dinsmoor, Sr., William Bell

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Basic Biographical Information

A native of New Hampshire, Dinsmoor (1886–1973) graduated from Harvard in 1906 with a B.Sc. in Architecture. After two years working in an architectural firm, he began his long association with the American School of Classical Studies at Athens in 1908, when he became the second holder of School's Fellowship in Architecture. This was followed in 1912 by his appointment as Architect of the School, a position he held until his commission as lieutenant in the United States Army in 1918. Dinsmoor was hired by Columbia University in 1920, where he taught until his retirement in 1963, becoming professor of archaeology in 1935. He served as president of the Archaeological Institute of America from 1936 to 1945, during which time he chaired the Committee for the Protection of Cultural Treasures in War Areas.

In 1969, Dinsmoor was awarded the Archaeological Institute of America's Gold Medal Award for Distinguished Archaeological Achievement, an honor he shared with Oscar Broneer and Rhys Carpenter.

Major Accomplishments

Dinsmoor's chief scholarly focus was the architecture of the Athenian Acropolis, in particular the Propylaea and the several temples of Athena. Throughout the 1930s and into the 1940s, he published a series of fundamental articles reviewing all sources of evidence for the topography of the Athenian Acropolis. His interpretation of the Archaic Acropolis, which places the so-called Hekatompedon on the site of the later Parthenon, engaged him in an ongoing debate with the German models championed by Wilhelm Dörpfeld (1853–1940) and W. H. Plommer. The discovery of an inscribed archon list during his investigations of the Propylaea led Dinsmoor to publish a massive study which clarified Hellenistic Athenian chronology, *The Archons of Athens in the Hellenistic Age* (1931), which, however, kept him from his Propylaea research. Between 1920 and 1931, Dinsmoor also served as design consultant for the concrete replica of the Parthenon erected in Nashville, Tennessee.

Off the Acropolis, Dinsmoor attributed the design of four fifth-century-BCE Attic temples to a single individual, whom he named the "Theseum Architect." He also worked on the problem of the order of the sculpted frieze blocks from the Temple of Apollo at Bassae. Dinsmoor's most influential publication was his revision of Anderson and Spiers' 1906 *The Architecture of Ancient Greece* (1927; revised 1950), which amounted to a complete reworking and became the definitive work on the subject for over a generation.

His son William Bell Dinsmoor, Jr. (1923–1988) was also an accomplished ancient architectural historian in his own right and continued his father's study of the Propylaea. Their combined work on the Classical structure was collected and edited by the younger Dinsmoor's widow, Anastasia Norre Dinsmoor, and published in 2004.

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- ▶ Archaeological Institute of America (AIA)
- ▶ Classical (Greek) Archaeology

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Disaster Response Planning: Earthquakes

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Introduction

Earthquakes can cause instantaneous destruction without warning, producing extensive and often irreparable damage to cultural heritage (Erturk 2004: 243). This poses a major threat to cultural institutions and their cultural heritage collections, as earthquakes cannot be prevented, and magnitudes are completely unpredictable, resulting in major loss or damage. Developing an emergency response plan with a particular focus on

earthquake preparation and response measures can mitigate the impact of earthquakes and reduce the risk of damage to buildings and cultural heritage.

Definition

Earthquake damage can be catastrophic, resulting in severe damage and loss. Some risks include the structural collapse, shift or damage of buildings, the breaking or displacement of cultural heritage collections, and the destruction of municipal and transport infrastructures, which can potentially impair the implementation of emergency response procedures. Earthquakes can also affect a building's stability and resistance to future shocks (Stovel 1998: 57).

Key Issues/Current Debates/Future Directions/Examples

Earthquakes cannot be prevented or controlled, for this reason, it is particularly important that earthquake protection strategies focus on preparation, response, and recovery measures. These measures should aim to reduce risk, enhance earthquake resistance, improve earthquake detection systems, and develop an effective response plan (Stovel 1998: 59). Steps to consider when developing an emergency response plan are:

- Establishing a committee to develop and enforce an emergency response plan: It is important that the responsibility for an institution's earthquake protection be permanently assigned to a committee that can continuously review and upgrade earthquake-related provisions. The committee should work closely with municipal and state officials when devising an earthquake emergency response plan for the property, its occupants, its cultural heritage contents, and its heritage values (Stovel 1998: 59). The committee appoints all emergency response team leaders, who are responsible for implementing and managing the emergency response plan during an emergency, and organizing personnel and volunteers to assist in recovery procedures.
- Conducting a risk assessment of the facilities and collections to identify threats: Risk assessments are conducted to identify any risks – both internal and external – posed to an institution and its collection, and to understand what effect these impacts would have in an emergency situation. A clear understanding should follow regarding those risks that pose the greatest threat and those with least likelihood of occurring (Soderlund Consulting 2000). Reviewing the effects of past earthquakes, for example, areas most affected, magnitudes, and so forth, can play a significant role in assessing future risks. When conducting a risk assessment, it is important to consider the building's construction, any existing policies and procedures, legal responsibilities, and insurance coverage. It is also important to identify hazards that can cause secondary damage, such as fire or flooding from ruptured service supplies, or damage to heritage collections like crushing, from the collapse of building components or heavy items that have been displaced during the shock (Stovel 1998: 57).
- Reducing risks: Stovel (1998) argues that the best way to reduce the impact of earthquakes is to ensure that properties are systematically maintained; that sources with the potential to cause secondary damage are reduced, such as electrical, gas, or water supply systems; that building areas regarded as high-risk zones are used appropriately; and that earthquake detection and monitoring systems are used to provide early warning (Stovel 1998: 60).
- Conducting collection inventories: Once threats have been identified, it is important to conduct an inventory of all cultural heritage collections, including equipment and data, and prioritizing them in order of importance. Prioritizing the collection identifies which items must be recovered immediately after an emergency.

- Insurance and funding: It is vital that institutions and their cultural contents are insured and that emergency response committees receive adequate financial resources to implement earthquake protection measures. Some institutions may not have the financial capacity to implement protection measures. Investigating external methods of funding, such as local council or government grants, may help institutions fulfill protection plans.
- Developing preparation, response, and recovery procedures: Despite the fact that the occurrence of earthquakes cannot be prevented, preparation, response, and recovery methods can reduce the likelihood of loss or damage.

1. *Preparation*: Preparing buildings and cultural heritage collections for earthquake emergencies can reduce the likelihood of damage. Preparing for an earthquake involves regular maintenance efforts of all facilities, including building structures; regular inspection of the state of electrical and water systems to limit the risk of secondary damage (Stovel 1998: 62); ensuring free-standing items are secured (if possible) to avoid displacement – consider items on display and in storage; supplies must be regularly checked and restocked, for example, first aid kits or condition assessment kits (camera, torch, batteries, recording sheets, and pens etc.), in preparation for an emergency; and all personnel must be adequately trained in all response and recovery procedures, including first aid. Preparation for an effective response plan will require the full involvement and collaboration of the institution's board and committees and earthquake response professionals (Stovel 1998: 65).
2. *Response*: The effectiveness of an earthquake response relies heavily on the adequacy of advance planning. Unlike fire or flood emergencies, earthquake response strategies will occur after the earthquake event. Please note the possibility of aftershocks and the dangers these present (Stovel 1998: 66). To ensure that personnel are prepared for an emergency response, consider the following:
   - Has an up-to-date emergency response plan been prepared for the site?
   - Has the plan been effectively communicated to personnel, emergency response team members, and emergency service departments?
   - Are emergency response team members and personnel aware of their responsibilities in the event of an earthquake?
   - Are emergency response team members and personnel familiar, trained, and prepared to implement emergency plan provisions?
   - Is the earthquake response plan at hand for immediate use and consultation during an emergency (Stovel 1998: 67)?

   In the event of an earthquake, it is important to adhere to protection procedures, such as *Drop, Cover, and Hold On*. Once the initial shock is over, but bearing in mind the likelihood of aftershocks, the following response procedures should be carried out: calling emergency services; turning of electrical, water, and gas supplies; and accounting for all personnel. Although evacuating from a building may be an initial response, it is important to stay within the building until all internal and external factors have been assessed.
3. *Recovery*: In the early phases of recovery, attention must be paid to the likelihood of seismic aftershocks. While these may be less severe than the initial earthquake, they may intensify post-disaster conditions and impair recovery plans (Stovel 1998: 67). As soon as possible, a condition assessment should be conducted in order to plan for urgently needed stabilization, repair, rebuilding, or further study. It is important to document all damage, using the condition assessment kit, paying particular attention to the condition of significant objects as identified in the collection inventory, the condition and stability of structural elements and foundations, the condition of the building's systems and services, availability of qualified professionals to carry out repairs and restorations, and expert supervision to repair and upgrade facilities to ensure future resilience (Stovel 1998: 68). Structures should be stabilized as soon as possible to protect the public and prevent further damage. Once the building is stable, recovery teams

can conduct salvage operations and assessments (Stovel 1998: 68). Security and fire alarms and on-site fire equipment should be installed and activated once the building is stable (Stovel 1998: 68).

Clearing debris and salvaging architectural elements from outside the building will enable safe access for emergency services and recovery teams. Recruiting community members, conservation and preservation experts, and emergency service workers to help during recovery procedures is beneficial, depending on the scale of impact (Grupp 2004: 215).

Issues

When consulting experts to develop an emergency response plan, it is important to consider the legal implications involved. The recent decision by an Italian court to convict six scientists and one government official of manslaughter for failing to predict the magnitude of a devastating earthquake in L'Aquila, in central Italy, in 2009, is an issue institutions must seriously consider when seeking expert advice. Scientists, policy makers, and practitioners at all levels need to be aware of the legal implications around disaster preparedness (McGowan 2012). For this reason, it is vital that committees seek advice from various organizations, scientific, government, or emergency services, when developing earthquake emergency response plans, and understand that extreme conditions may overcome well-planned emergency procedures (Stovel 1998: 75).

Earthquakes can have a disastrous effect on cultural institutions and their cultural heritage collections. Earthquakes cannot be prevented, but implementing an emergency response plan that has a particular focus on earthquake preparation and response measures can mitigate impacts and reduce the risk of damage to buildings and cultural heritage.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Flood
- ▶ Disaster Response Planning: Tsunamis

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Disaster Response Planning: Fire

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Introduction

Disaster response planning or disaster preparedness for fire is a procedure designed to reduce the risks of fire to property and cultural heritage. Fire prevention and response strategies to protect institutions and collections are becoming increasingly common in cultural heritage management practices as awareness of the potential risks and impact on cultural institutions and communities become more widely understood.

Definition

Fire damage includes the full or partial damage of property and cultural heritage collections by direct burning; damage from smoke; damage caused by heat and combustion by-products; water damage resulting from fire-fighting efforts; and damage to infrastructure systems such as electrical or natural gas systems (Stovel 1998: 43).

Key Issues/Current Debates/Future Directions/Examples

In the 1990s, a new approach to cultural heritage management emerged in response to the impact of natural disasters on cultural heritage institutions around the world. The aim of this approach was to minimize the impact that disasters had on the cultural heritage collections housed by implementing step-by-step practices to guide institutions through the prevention, preparation, response, and recovery processes. Organizations such as the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) and the International Committee of the Blue Shield (ICBS) have been active in facilitating international responses to threats and emergencies. Through initiatives such as ICCROM's *Risk Preparedness: A Management Manual for World Cultural Heritage* and the Getty Conservation Institute's *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions*, organizations around the world are implementing disaster response plans to protect their cultural heritage collections and to prepare for future disasters.

One of the major concerns cultural institutions face today is how to protect their collections against fire damage. Fire damage can occur as a result of a natural disaster; however, in most cases, fire damage is caused by human error or negligence: for example, poor electrical wiring, the use of extension cords and multiple outlets, or carelessly disposing of cigarette butts. All institutions have a fire evacuation policy to protect individuals and help them to safety. However, until recently, few institutions had a policy that outlined measures to protect their cultural heritage contents. The key to fire damage prevention is establishing a team-based emergency preparedness and response plan to mitigate the potential effects of a disaster (Dorge & Jones 1999).

Developing a Fire Prevention and Emergency Response Plan

The development of fire prevention and emergency response plans has proven to reduce the impact of fire damage to institutions and their cultural heritage collections. Emergency response plans must comply with the fire response and evacuation procedures of the institution and in accordance with state emergency services regulations. The key aspects of developing an effective plan include:

- Establishing a committee to develop and enforce an emergency response plan: The committee is responsible for developing an emergency response plan according to their facilities and collections, and ensures that the plan is tested, modified and that all personnel are trained in all emergency procedures for successful implementation. The committee appoints all emergency response team leaders, who are responsible for implementing and managing the emergency response plan during an emergency.
- Conducting a risk assessment of the facilities and collections to identify threats and solutions: Risk assessments are an important aspect of the emergency response plan as they identify areas of vulnerability within the facilities and collections by identifying threats and providing solutions to reduce the risk of damage. There are three major categories of threats that need to be recognized: (1) threats that may prevent evacuation procedures, such as objects that block emergency fire exits; (2) threats that can cause fire, such as gas bottles stored on site or faulty electrical wiring; and (3) threats that increase the potential for damage, such as no fire extinguishers or fire sprinklers in the building.

- Conducting collection inventories and establishing an emergency priority list: Once the threats have been identified, it is important to conduct an inventory of all cultural heritage collections, including equipment and data, and prioritizing them in order of importance. Prioritizing the collection identifies which items must be recovered immediately after an emergency and may include valuable or extremely vulnerable items.
- Insurance and funding: It is vital that institutions and their cultural contents are insured accordingly and that emergency response committees receive adequate financial resources to implement fire prevention measures.
- Developing prevention, preparation, response, and recovery procedures (Dorge & Jones 1999):
  1. *Prevention:* Preventative procedures can eliminate or reduce the potential effects of fire on personnel, archaeological collections, and property. Reducing the likelihood of ignition, strengthening resistance against fire, and fire detection and monitoring systems are essential preventative measures that must be considered (Stovel 1998: 46). For example, using fire-retardant materials in buildings to reduce the spread of fire between spaces and buildings (Stovel 1998: 46), or ensuring electrical installations meet the appropriate regulations and standards through regular maintenance (Dorge & Jones 1999; Dargye 2003: 114).
  2. *Preparation:* Preparing personnel and cultural heritage collections or sites for an emergency can reduce the effects of fire damage. Preparation includes ensuring all personnel are familiar and practiced in the emergency response procedure including evacuation procedures, ensuring personnel are trained in the use of emergency equipment, e.g., fire extinguishers, ensuring emergency equipment is replenished and readily available, ensuring emergency numbers and response/recovery team member contact details are known or easily accessible (Dorge & Jones 1999).
  3. *Response:* Effectively responding to an emergency can prevent injury and limit the detrimental impacts on collections and properties. Responses may vary depending on the scale of the emergency and may include contacting emergency services, turning off the power supply, extinguishing small fires, evacuating, and accounting for all personnel. It is the responsibility of the team leaders to evaluate the situation carefully, initiate the emergency response, and to ensure that communication with emergency services and team members is clear and succinct (Dorge & Jones 1999).
  4. *Recovery:* Preparing and training staff to effectively carry out emergency recovery procedures on items that are damaged and/or may require treatment is critical, especially for items that are irreplaceable. Using the emergency priority list during the recovery process will ensure that available or vulnerable items are recovered as soon as possible (Dorge & Jones 1999).

Emergency response plans are essential to effective cultural heritage management practices, as they mitigate the potential effects of disasters. Many step-by-step manuals, such as *Risk Preparedness: A Management Manual for World Cultural Heritage and Buildings* and *an Emergency Plan: A Guide for Museums and Other Cultural Institutions*, have been published to help organizations construct their own emergency response plans. It is important to note that in order for an emergency plan to be effective, it requires adequate funding to implement fire prevention measures. Engaging the local community to advocate disaster preparedness and emergency response plans is a good way to raise awareness about the potential risks of fire damage and to gain support for fire prevention and protection efforts.

Cross-References

▶ Cultural Heritage Site Damage Assessment
▶ Cultural Landscapes: Conservation and Preservation

▶ Disaster Response Planning: Earthquakes
▶ Disaster Response Planning: Flood
▶ Disaster Response Planning: Tsunamis

References

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Disaster Response Planning: Flood

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Introduction

Flooding can have catastrophic impacts on property, cultural landscapes, and cultural heritage collections. Emergencies can arise from natural disasters or from incidents such as burst water pipes or leaky roofs. Flood prevention and emergency response plans have proven to reduce damage to property, cultural sites, and cultural heritage collections by implementing strategies that address prevention, preparation, response, and recovery measures. It is important to note however, that extreme conditions may overcome well-planned emergency procedures (Stovel 1998: 75).

Definition

Flood damage is caused by the sheer force of water flow, which can lead to the dislodgment of structures and unsecured items, and the subsequent redepositing of such flood debris. Buildings and cultural heritage collections are also susceptible to moisture damage, which can lead to the weakening or disintegration of structures and artifacts (Stovel 1998: 74). Floods can also cause significant damage to infrastructure systems such as power supplies, natural gas systems, and even water supplies.

Key Issues/Current Debates/Future Directions/Examples

We all know that disasters can strike anytime any place. Despite this, we have a tendency to believe that when they do, they will happen elsewhere. It is this mindset that prevents cultural institutions from developing well-thought-out and up-to-date emergency response plans (Williams 2004: 119). Recent disasters across the globe, such as the 2002 flooding of the Municipal Library of Prague which housed many of the Czech Republic's most important cultural collections, have highlighted the dangers of such beliefs and have drawn attention to the need to develop plans that can prevent flooding or reduce its impact. Entire communities can be devastated by floods (Stovel 1998: 75). For this reason, it is important to incorporate community-wide approaches to flood prevention and protection. Community members, local councils, emergency service organizations, and weather bureaus should be consulted when developing an emergency response plan.

Developing an Emergency Response Plan

Developing emergency response plans have proven to reduce the impact of flood damage to institutions and their cultural heritage collections. Emergency response plans must comply with flood response and evacuation procedures enacted by the institution, local emergency services, and city councils. The following should be considered when developing a plan:

- Establishing a team to develop and enforce an emergency response plan: Stovel (1998) recommends that the responsibility for the protection of institutions or cultural heritage collections be permanently assigned to an individual or team that can continuously review and upgrade flood protection provisions

(Stovel 1998: 76). Together the team can develop an emergency response plan according to the needs of the facilities and collections, and can ensure that all personnel are trained in emergency procedures. The team appoints all emergency response team leaders, who are responsible for managing the emergency response efforts during an emergency.

- Conducting a risk assessment: Risk assessments are an important aspect of the emergency response plan as they identify potential flood risks pertaining to the area, and areas of vulnerability within the facilities and collections in hopes to find appropriate solutions to reduce the risk of damage. It is important to recognize threats that may prevent evacuation procedures and threats that may hinder response and recovery procedures, which can increase the potential for damage.
- Conducting collection inventories and establishing an emergency priority list: Once the threats have been identified, it is important to conduct an inventory of all cultural heritage collections, including equipment and data, and prioritizing them in order of importance. Prioritizing the collection identifies which items must be recovered immediately after an emergency and may include valuable or extremely vulnerable items.
- Insurance and funding: The importance of appropriately insuring facilities and collections cannot be understated, as insurance plays a vital role in the recovery process. It is also important that emergency response committees receive adequate financial resources to implement flood prevention measures.
- Developing prevention, preparation, response, and recovery procedures: These procedures should address the following areas:
  - Enhancing flood resistance
  - Improving flood detection and monitoring
  - Developing appropriate response methods (Stovel 1998: 76)

1. *Prevention*: The key to flood preparedness and emergency response planning is identifying the potential flood risks pertaining to the area in order to develop prevention and protection strategies. Questions to consider are: Is the area prone to heavy rainfall? Are there river systems close by that present a flood risk? Have levees been constructed to protect against rising water levels? Is the area close to any major pipelines or underground water systems? Has the institution's internal plumbing been checked recently?

   To protect property and cultural heritage collections, precautions also need to be taken to reduce the risk of water damage and the impact of flood debris. Such precautions may include: fastening furniture to prevent dislodging, storing artifacts in water-resistant containers, ensuring facilities or artifacts are not located in basements, ensuring important items and artifacts are stored above ground level.
2. *Preparation*: Preparing personnel and cultural heritage collections or sites for an emergency can reduce the effects of flood damage. Preparation includes ensuring all personnel are adequately trained and practiced in the emergency response procedure, including evacuation procedures and salvage procedures, and ensuring emergency numbers and response/recovery team member contact details are known or readily available.
3. *Response:* Response strategies are implemented during an emergency. Response strategies may include: evacuation, calling emergency services, turning off electricity, water and gas supplies, arranging and placing sand bags, or removing cultural heritage collections to prevent water damage.
4. *Recovery:* Recovery strategies are implemented after the emergency event has occurred and may include: recovering unsecured items that have been dislodged and redeposited, removing cultural heritage collections and relocating them to a safe area to begin conservation. Conservation methods may include freezing items, wet cleaning, and hanging items to dry (Ellis 2000: 119).

Flood prevention and emergency response plans mitigate the disastrous effects of flooding on property, cultural landscapes, and cultural heritage collections. It is important to establish an emergency response plan that incorporates prevention, preparation, response, and recovery strategies to reduce the likelihood of damage.

Flood prevention and protection plans must adopt a community-based approach. It is vital that community members, local councils, emergency service organizations, and weather bureaus are consulted when developing a plan to ensure that all safety and legal responsibilities are fulfilled.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Tsunamis

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Disaster Response Planning: Tsunamis

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Introduction

Tsunamis are the result of a very large ocean wave caused by an underwater earthquake or volcanic eruption and are hazards that pose a great threat to life, property, and cultural heritage in coastal regions. As natural disasters cannot be prevented, emergency response plans must focus on preparation, response, and recovery measures to mitigate potential risks at a community-wide level. It is important to note that extreme conditions can overcome even well-planned emergency procedures (Stovel 1998: 75).

Definition

The impacts of tsunami can vary greatly. A small tsunami may result in unusual tides or currents that can be dangerous for swimmers and can cause damage to boats. A large tsunami can cause widespread flooding and destruction to communities and can create strong rips and currents in oceans around the world (Victoria State Emergency Service 2010). Buildings and collections become susceptible to moisture damage, which can weaken and disintegrate structures and cultural heritage. Flood debris – structures, plant life, transport vehicles, etc. that have been swept by the current – can cause serious damage and loss of life.

Key Issues/Current Debates/Future Directions/Examples

A tsunami warning will be issued by state or national emergency services once a threat has been confirmed; this warning will outline the areas under direct threat and the actions that should be taken by the community (Victoria State Emergency Service 2010). Two categories of threat exist:

- Marine environment threat – The tsunami is expected to mainly affect the marine environment for specified coastal areas. Warning of potential dangerous waves and strong ocean currents will be issued. Although major land flooding is not expected, there may be local amplification of the tsunami in some areas leading to flooding in limited low-lying coastal areas (Victoria State Emergency Service 2010).

- Land inundation threat – These threats include: warnings for low-lying coastal areas of major land flooding, dangerous waves, and strong ocean currents; significant overtopping of foreshore dunes and sea walls, with areas of flooding beyond the immediate foreshore; extreme danger extending beyond the water to low-lying coastal areas; probable extensive damage to ports, marina, and small boats; potential damage to buildings and infrastructure near the shore; and extremely dangerous effects in the water continuing for many hours and even days. Tsunami warnings can be canceled if the situation is reassessed as having no threat (Victoria State Emergency Service 2010).

Developing an Emergency Response Plan

The development of tsunami emergency response plans has proven to reduce the impact of tsunami damage to institutions and their cultural heritage collections. Emergency response plans must comply with regional and state tsunami response and evacuation procedures enacted by the institution, local emergency services, city councils, and in conjunction with the relevant legislation. The key aspects to developing a tsunami emergency response plan are:

- Establishing a committee to develop and enforce an emergency response plan: Stovel (1998) recommends that the responsibility for the protection of institutions or cultural heritage collections should be permanently assigned to a committee who can continuously review and upgrade tsunami protection provisions (Stovel 1998: 76). Together the committee can develop a community-based emergency response plan according to the needs of the facilities and collections. Committees should consult experts to develop a plan that meets all legal and safety responsibilities and to ensure that all personnel are trained and aware of such responsibilities during an emergency. The committee appoints all emergency response team leaders, who are responsible for managing the emergency response efforts during an emergency.
- Conducting a risk assessment: Risk assessments are a critical aspect of the emergency response plan as they identify the potential tsunami risks, identify high-impact zones and areas of vulnerability within facilities and collections, in the hope of finding appropriate solutions to reduce the risk of damage. It is important to recognize threats that may prevent evacuation procedures and threats that may hinder response and recovery procedures, which can increase the potential for damage. Researching the effects of past events may help determine risk areas and give some insight into the extent of the disasters.
- Reduce risks to property: Reducing the risks of damage will help prevent loss or damage to property. When developing a plan, experts should provide advice on how best to protect buildings and infrastructure from tsunami damage.
- Conducting collection inventories and prioritizing collections: It is necessary to conduct an inventory of all cultural heritage collections, including equipment and data, and record the current condition of the item, and prioritizing them in order of importance or value. This will help in the recovery process and help establish the impact the emergency has had on the collections. Establishing priorities is never a simple task, but it is necessary to identify important collections before a disaster occurs so that they can be protected or removed safely during or after a disaster (CLRC Preservation Committee 2002).
- Insurance and funding: The importance of appropriately insuring facilities and collections cannot be understated, as insurance plays a vital role in the recovery process. It is also important that emergency response committees receive adequate financial resources to implement tsunami prevention measures.
- Developing preparation, response, and recovery procedures: Stovel (1998) advises that tsunami disaster planning should take the following into account:
  - The probability of tsunamis occurring in the area or in nearby locations which may affect the area.

- The probability of the tsunami height and run-up (inland penetration). Maps should be produced to illustrate areas of high impact.
- The sensitivity of the region's cultural heritage to tsunami emergencies (Stovel 1998: 94).

1. *Preparation*: Preparation measures are essential to preventing damage to property and cultural heritage collections. The key to tsunami preparedness and emergency response planning is identifying the potential tsunami risks in order to develop protection strategies. Questions to consider are: What is the likelihood of a tsunami event? What provisions have been out in place to reduce tsunami run-up (inland penetration)? Is the building able to withstand a tsunami event? Should cultural heritage collections be removed to a safer location until there are no further threats?

   To protect property and cultural heritage collections, precautions also need to be taken to reduce the risk of water damage and the impact of flood debris. Such precautions may include: fastening furniture to prevent dislodging, storing artifacts in water-resistant containers, ensuring facilities or artifacts are not located in basements or at ground level, ensuring all personnel are adequately trained and practiced in the emergency response procedure, including evacuation procedures, first aid procedures and salvage procedures, and ensuring emergency numbers and response/recovery team member contact details are known and readily available.
2. *Response*: Response strategies are implemented when the emergency occurs. Response strategies may include: ensuring all personnel are accounted for and safe from injury; calling emergency services; turning off electricity, water, and gas supplies; arranging and placing sand bags; and removing cultural heritage collections to prevent water damage. Care must be taken when considering evacuation strategies. Tsunami emergency services will issue evacuations if there is a high risk of loss or damage. When developing building evacuation procedures, please contact emergency services for advice and training.
3. *Recovery*: Recovery strategies are implemented after the emergency event has occurred. Immediately after a tsunami, an impact assessment should be conducted to assess the extent of loss and damage to the property and to all cultural heritage collections and to begin stabilization, repair, and rebuilding procedures. It is important to document all damage, paying particular attention to the condition of significant objects as identified in the collection inventory, the condition and stability of structural elements and foundations, and the condition of the building's systems and services. Structures should be stabilized as soon as possible to prevent further damage (Stovel 1998: 68). Recovery procedures for collections may include recovering unsecured items that have been displaced and redeposited and removing cultural heritage collections and relocating them to a safe area to begin conservation. Conservation methods may include freezing items, wet cleaning, and hanging items to dry (Ellis 2000: 119).

Tsunamis pose a great threat to coastal regions, as they can be extremely destructive. Developing a community-based emergency response plan that emphasizes preparation, response, and recovery procedures can reduce the potential impacts of an emergency and prevent loss. Tsunami protection provisions must be regularly revised and updated in order for plans to be effective. It is important that expert consultation is received when developing emergency response plans, to ensure that all safety and legal responsibilities are fulfilled.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Flood

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Disease Introduction to America: Cultures in Crisis

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Introduction

Cross-disciplinary research has been evolving as a major approach to study the development of human culture in a global and regional context, with a central topic of complex health (physical, mental, social and cultural). In the twentieth century, the historiography's message was that European diseases were catastrophic for Native Americans from the sixteenth to the nineteenth century (e.g. Boyd 1999). This paradigm still continues to be followed by some authors (e.g., Kelton 2007), with new insights and arguments.

In contrast, a critical multidirectional approach began to dominate in early twenty-first century, to reveal a more complex and multilayered picture of evolution of the Native American population, in the context of European migrants. More attention is given to arguments based on solid facts, and on increasing of the diachronic and cross-cultural knowledge, not only of Native Americans, but also of the society as a dynamically changing culture, and on the methodology and theory of science, with proper application in the different specific fields (e.g., Verano & Ubelaker 1992; Steckel & Rose 2002; Alchon 2003; Carlos & Lewis 2011).

It should be stressed that archaeological records and research are of primary importance for the research of demography and health status of the Native Americans in the pre-contact period (e.g., Steckel & Rose 2002; Ramenofsky et al. 2003; Milner & Chaplin 2010). Today, this is considered one of the least researched segments of the complex records on the topic.

Last but not least, cultures in crisis is a theme of the complex transformation of the Native American cultures into a new multicultural context that includes transformation of values, social response, strategies and general understanding of the social life and communication between different cultures.

From resistance to acculturation, Native American history from the sixteenth to nineteenth century (see e.g., Salisbury 1982; Waldman 2009 and the section of further readings) is a mosaic of drama, hope, successful adaptation, innovation, preservation of traditions and integration with the new political system to keep the traditions and authentic ethnicity of the numerous Native American tribes.

Definition

There are two theoretical models regarding the introduction of European diseases to Native Americans: (1) As a rule, any contact of the Native Americans with people of European descent created disaster for the Native Americans on the continent, despite the time, region and historical background (Model 1); and (2) European diseases are part of a complex system of social–cultural factors that have impacted the destiny of Native Americans, including historical background of the tribes, region, reasons for contact and the mechanism of contact (Model 2). Both models attempt to explain the diachronic change in the direction of development of original cultures; in particular, of the

multicomponent health status of the native population from the perspective of the interrelation between pathogen, population and ecological–cultural context.

Historical Background

The introduction of European diseases to Native Americans is considered as one of the most striking cases of using viruses, even purposefully, for decimating Native Americans in order to decrease resistance to the European conquest of North America. It is believed, for instance, that variola virus was used in 1763 as the first known example of biological warfare, and that British forces in America had blankets contaminated with scabs from smallpox victims, and distributed them to American Indians. However, the spread of European diseases on the North American continent is not very well articulated in the literature, since there is a diachronic process of first contacts of the Native Americans with Europeans in the different parts, with different contexts, mechanisms and consequences. Also, the complex health status of the original population depended on a system of factors in which traditions dominated, while the contacts with Europeans caused adoption of innovations that gradually began to have a crucial impact on the lifestyle of native people. The historic development and increase of the impact of immigrants-colonists–created crises of native culture have to transform in the new contexts.

Within several centuries, Native American cultures had to evolve from being the only cultures on the American continent, into one category of different ethnical cultures that gradually became a minority. Additionally, the reinvention of slavery complicated the cultural and demographic problems in Native American communities, which obviously felt stronger keeping themselves in isolation from the new European culture environment, although they lived at risk of being treated as an inferior component of multicultural America. Then, Native Americans experienced a critical cultural situation that prevented the development of a network of relationships and strategies of preventive health that would have saved many communities in the eighteenth and nineteenth centuries from European diseases, which began to demographically damage some tribal groups in the 1600s. Most devastating was smallpox disease. Similarly to Eurasia and South America, successful preventive health strategies were missing, and this resulted in a series of deadly epidemics (Boyd 1999; Robertson 2001; Hackett 2002; Halverson 2007; Kelton 2007; Agnew 2010; Hodge 2010; Riley 2010; Carlos & Lewis 2011) that were not prevented, although by the late seventeenth century, Native Americans recognized that the cause of disease was contact with Europeans.

The smallpox epidemic of 1781–1782 in the Hudson Bay region caused mortality of at least 50 % of the population. Four major epidemics in the Northwest (1781–1782, 1836–1837, 1852–1853 and 1862) were recorded by James Mooney. R. Boyd (1999) added a fifth epidemic to these statistics (1801–1802), as well as a possible outbreak in the winter of 1824–1825.

A smallpox epidemic killed off almost half the Pawnee tribe in 1831. Six years later, stolen blankets from a steamboat caused a severe epidemic among the Indians of the Great Plain.

Beyond smallpox, European diseases carried by traders and colonizers included influenza, measles, whooping cough, etc.

Between the sixteenth and eighteenth centuries, Native Americans used treatments that were unsuccessful for infectious diseases, similar to the rest of the world. They believed, as professionals did, that noxious air caused the disaster, and they tried to reduce contact with it, together with treating the patient with cool water, quarantining, burning infected sites and rituals (e.g., Smallpox Dance) in attempts to decrease the mortality rate.

Key Issues and Current Debates

The current key issue is reevaluating the different components of the controversial cultural processes of interrelation between Europeans and Native Americans from the end of fifteenth century

through the nineteenth century that support or contradict the two theoretical models listed above.

It is a problem to estimate the size of the population in pre-contact America and compare it with data from before the first Censuses, which give low figures for Native Americans. The demography of both periods – pre-colonization and early colonization – is based on hypotheses with challenging data. Milner and Chaplin (2010) suggest a population range of 1.2 million to 6.1 million for the eastern half of North America just prior to contact. They used the spatial distribution of archaeological remains to generate and site densities and regional population. Boyd believes that the Northwest population decreased from 180,000 to 40,000–35,000 in the later 1700s to late 1800, after beginning contact with people of Euro-American descent. He describes a dramatic picture: "After a century of Euro-American contact . . . these cultures were shattered: populations had plummeted, some groups had become extinct, and others were shadows of their former selves" (Boyd 1999: 3) (cf. Jones & DeWitte 2012).

There are a few diachronic and cross-cultural issues: prior to contact, how did Native Americans react to epidemics and diseases on the continent that were known to be carried by potential disease vectors, such as lice and anopheline mosquitoes? How was the knowledge about the smallpox disease distributed between the Native Americans from the first years of European presence on the continent until the later eighteenth century, when devastating epidemics were documented? How was preventative health information communicated among the Native Americans?

Model 1 (Monofactor Model): Conflicting Arguments

The evaluation of the impact of diseases brought by the first Europeans and their animals on Native Americans is considered as crucial issue for drawing conclusions with regard to the role of Europeans on Native American population destiny on the North American continent. The focus is especially on wide spread epidemics (with high mortality rate), although the general health status of individuals is also of interest, due to the complex understanding of health and the role of the changing environment of the lives of people. The data have been considered as a basis for the widely distributed conclusion that infectious European diseases caused the greatest loss of Native American population after contact began.

This widely distributed thesis has two main pitfalls: (1) The record base for demographic statistical conclusions is fragmented and incomplete. (2) The history of Native American tribes during the sixteenth to nineteenth centuries developed a context of population decreasing below one million.

Model 2 (Multifactor Model): Problems

The complexity of historical processes that caused the graduate decrease of Native American population from the sixteenth to nineteenth century becomes the main model of explanation for understanding their culture and destiny before and after the beginning of contact with European colonizers and Americans of European descent. Infectious diseases were just one of many factors with dynamic interrelations and impacts on demography and cultural destiny; others include changing style of life, including declining birth rate, wars (with Europeans/Americans of European descent and inter-tribe) and massacres; emigration to Canada and Mexico; acculturation/assimilation, including conversions to Christianity; slavery; malnutrition; alcoholism; etc. The economic background was destruction of the traditional subsistence systems, together with political disruption in the context of gradually increasing influence by the newly arrived cultural values. The role of this last factor varies by regions and time.

To draw sound conclusions, more research is needed to analyze the interrelations of different factors that impacted the cultural processes in the sixteenth to nineteenth centuries within Native American tribes, as well as to compare the regional characteristics and peculiarities.

Important facts within the debate are the long period of searching for a cure from smallpox in Eurasia. It was not until the discovery of vaccine by Edward Jenner (1749–1823) in 1796 that Europe began to free itself of the deadly disease.

Then, when smallpox reached America in the seventeenth and eighteenth centuries, it was still a danger for Eurasia, despite of the knowledge of variolation, which had limited results and also caused fatalities. Also, the deadly epidemics in the Northwest from 1770 to the 1780s were extensions of the epidemics in the American army and in cities like Boston. In other words, the usual measures were taken against smallpox (quarantine and inoculation were known on the American continent), although, as in Eurasia and Mexico, they were not very effective until the discovery of vaccinating.

DNA analyses of pre-contact skeletons include natural selection in response to the smallpox epidemics as one of the possible reasons for the reduced genetic diversity in extant Native Americans, together with the role of the founder effect and a genetic drift associated with the historical population decline (Halverson & Bolnik 2008).

International Perspectives

The topic of introduction of European diseases to America is both global and regional, since it studies the interaction between distant-by-origin cultures as a complex phenomenon and regional variability. In particular, the global perspectives of European–Native American interactions in the sixteenth to nineteenth centuries include cultural comparative analyses of typologically similar case studies (Alchon 2003).

The issue of the role of European diseases for decreasing of the population of Native Americans is really essential for scientific conclusions, since the size of population is of primary importance for the way compact groups would react to the invaders. In other words, was it possible for the Native Americans to be a predominant population in North America if they had vaccine against European diseases? A current, more detailed research of the evidence (see e.g., Carlos & Lewis 2011), and the theoretical consideration of the generally small density of the population in North America before Europeans discovered the continent, both allow us to infer that it was impossible for Native Americans to become the dominant ethnical component. However, preservation of the Native American culture by creating zones of monocultures on one side, and gradual development of the ideology of American multicultural society both have been stimulating reproduction of Native American cultural traditions. This unique co-existence and the unique interaction between the politics of monoculturalism (reservations) and multiculturalism (usually urban environment) is an extraordinary American experience that calls for international attention as a case study of how culture has been developing and evolving as a rich multi-culture by segmentation and reintegration of core cultures.

Future Directions

The future direction of research of the problem of impact of European disease on Native American cultures should be a more detailed examination of the evidence, and reevaluation of this impact regionally and as a whole on Native American culture and demography. It is also possible to obtain new scholarly results by complex comparisons with other similar historical situations, such as the compact European migration and colonization of Latin America and Australia, for instance, or the way the Balkan population responded to the Turkish occupation of the Balkan Peninsula in the fifteenth century. The advance of research on specific topics, such as health as a social, cultural and religious problem in Native American culture in the pre-contact period, may also influence the conclusions for later periods.

It is important to apply the most current research on infectious disease in Eurasia and the Americas in the sixteenth to nineteenth centuries, which indicates that Native had similar problems to the Americans and the majority of the global community. In other words, not until the end of eighteenth century when the real causes of infectious diseases were discovered was the world able to adequately response to the spread of viruses diseases including smallpox. A search for new possible diseases that might have impacted Native Americans,

especially in the early contact period in the seventeenth century (e.g., Marr & Cathey 2010), would probably result in important updates.

There are specific historical problems regarding the distribution of infectious diseases among the Native Americans. For instance, it is still unclear whether smallpox was distributed to the West Coast by the Shoshones following native trade networks down the Columbia River to the sea, or the pox arrived by sea, carried by Spanish voyages cruises.

Increasing the archaeological research of available pre-contact and early contact osteological data from burials (Jackes 1983) may help to specify some of the issues regarding the general health status of population, and how the demography changed as a result of diseases, changing diet and possible malnutrition.

During the nineteenth century, a system of preventative health was gradually developed from measures in both Eurasia and North America (Nikolova 2012) that resulted in the population's improved health status; this included Native Americans on the reservations and in the cities.

Cross-References

- ▶ North America (USA): Historical Archaeology
- ▶ Paleoindians

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Dmanisi Hominins and Archaeology

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Introduction

Perched atop a forested promontory, in the foothills of the Caucasus Mountains in the Republic of Georgia, lies the paleolithic site of Dmanisi. The 1.8 Ma fossil site lies buried beneath the ruins of a medieval city, overlooking the modern farming village of Patara Dmanisi. Archaeological excavations at the medieval site serendipitously unearthed the first fossils, opening the site to paleontological excavation beginning in 1983 and the first archaeological discoveries in 1984. Dmanisi rose to prominence with hominin fossil discoveries in the 1990s and 2000s, becoming one of the richest sites for early *Homo erectus*.

The Dmanisi hominins (Fig. 1) are among the oldest specimens of *Homo erectus* yet recovered, contemporary with the oldest material from Africa. Stone tools (Fig. 2) there have been found in sediments directly overlying the Mashavera basalt, dated by argon-argon methods to 1.85 Ma; the fossil material and other lithics have been recovered from a subsequent layer dated to c. 1.77 Ma (Ferring et al. 2011).

Dmanisi Hominins and Archaeology, Fig. 1 The skeletal remains of several individuals were discovered at Dmanisi including (**a**) the subadult skull D2700 and (**b**) mandibles of large individuals (on the *left*, D2600) and much smaller (on the *right*, D211) individuals

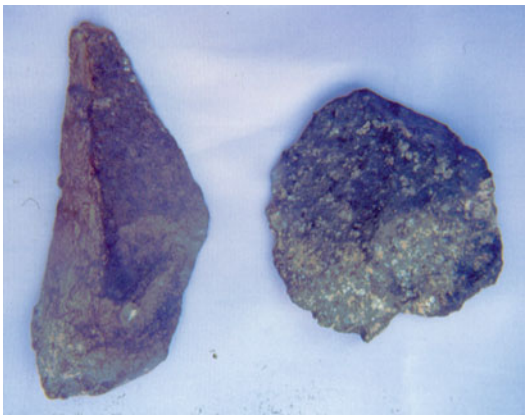

Dmanisi Hominins and Archaeology, Fig. 2 The stone tool assemblages at the site are similar in technology to so-called Mode 1 assemblages such as those from Olduvai Gorge, Tanzania

Key Issues/Current Debates/Future Directions/Examples

The Hominins, Site, and Behavior

The Dmanisi hominins are notable for their small size and primitive features. Four complete or largely complete crania have been published, three with associated mandibles. Cranial capacities are low, between 600 and 775 cc (Gabunia et al. 2000a; Vekua et al. 2002; Lordkipanidze et al. 2007). The face is as prognathic as Asian *Homo erectus* and evinces a strong nasal pillar and short nasal clivus. Other cranial traits are less pronounced; given the small size of the crania, the supraorbital tori are relatively small for *H. erectus*, and the occiput is more rounded and lacks a strong transverse torus (Rightmire et al. 2006). Other aspects of the cranium, including their shape in posterior (heptangular) and side (angular and elongated) view, the presence of cranial superstructures and parietal deflation, and specifics of cranial base architecture, place the Dmanisi material firmly within *Homo erectus* in both metric and nonmetric analyses (Rightmire et al. 2006; Baab 2008). Similarly, the dental morphology shows a mixture of primitive traits typically found in *Homo habilis* and earlier hominins with derived features typical of *Homo erectus* (Martinón-Torres et al. 2008). Of the four mandibles published to date, one is considerably larger than the others, suggesting a degree of sexual dimorphism similar to that of *Australopithecus* (Skinner et al. 2006), which is not atypical of *H. erectus* (Antón & Snodgrass 2012). While inclusion of the fossils in *H. erectus* seems likely, a separate species, *H. georgicus*, has been proposed as well (Gabunia et al. 2002).

Two partial skeletons and other postcranial remains indicate that the Dmanisi hominins were small in stature but functionally similar to later hominins (Lordkipanidze et al. 2007; Pontzer et al. 2010). Body mass is estimated at 40–50 kg and stature at 145–166 cm. The ratios of femur to humerus length, and hind limb length to

body mass, both fall within the range of *Homo sapiens*, and Dmanisi metatarsal morphology suggests the presence of a stiff plantar arch. These traits, and the presence of a humanlike talus, suggest that the hind limb mechanics and terrestrial locomotion of Dmanisi hominins were functionally similar to those of modern humans (Pontzer et al. 2010). Nonetheless, the shoulder exhibits a lack of humeral torsion and a cranially oriented glenoid fossa similar to australopiths and also KNM-WT 15000 (Larson 2009), and the lack of tibial torsion and pattern of metatarsal robusticity are also primitive.

The wealth of lithic and fossil material, including a large and diverse faunal and paleobotanical assemblage, makes it possible to begin reconstructing the ecology of the Dmanisi hominins. At the time of occupation, the site was near a lake shore that formed when the Masavera lava flow dammed the Masavera and Pinasaouri rivers. The Villafranchian fauna at the site includes several large carnivores, bovids, an equid, and other open steppe and gallery forest taxa (Gabunia et al. 2000b). Dmanisi stone tools were relatively simple cores and flakes, similar to contemporary Mode 1 from Olduvai Gorge (Ferring et al. 2011). While primitive, these tools helped make the Dmanisi hominins formidable competitors; cut marks on herbivore long bones indicate that the Dmanisi hominins were gaining early access to large game, either through hunting or power scavenging (Lordkipanidze et al. 2007). Microwear analysis of the Dmanisi dentition suggests their diet was broad, unlike that of *H. habilis* and as seen in later *Homo erectus* specimens (Pontzer et al. 2011).

The position of Dmanisi hominins within the expansion and dispersal of *Homo erectus* has been a focus of debate ever since their discovery. Given the antiquity of *Homo erectus* material from East Africa, it has generally been accepted that the species evolved there (likely from *Homo habilis*) before expanding its range across Eurasia. From this perspective, the Dmanisi hominins represent an early wave of migration, and their primitive features reflect their age as well as adaptation to their local environment (Antón 2003). An alternative hypothesis has emerged more recently, suggesting that *Homo erectus* evolved in Eurasia and expanded throughout Asia as well as (back) into Africa (Lordkipanidze et al. 2007; Martinón-Torres et al. 2008; Ferring et al. 2011). While this interpretation implies an earlier – and currently undocumented – hominin expansion from Africa into Eurasia, it is consistent with the primitive features and relative antiquity of the Dmanisi material. Additional material from older sediments in Eurasia and Africa will be needed to improve the resolution of hominin evolution and dispersal in the early Pleistocene.

Cross-References

► *Homo erectus*
► *Homo ergaster*

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DNA and Skeletal Analysis in Bioarchaeology and Human Osteology

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Introduction

Molecular analysis of skeletal material became possible in the mid-1990s with the advent of sensitive molecular techniques that allowed just a few molecules to be analyzed. Since this time the use of genetic analysis to address problems in forensic, archaeological, and evolutionary contexts, all of which rely on genetic material that is preserved in skeletal material, has burgeoned. The questions that can be addressed using molecular genetics depend on the context: in forensic analysis the primary interest is usually the identification of the human remains. In archaeological studies, several aspects may lend themselves to genetic analysis, such as kinship analysis when a population of potentially related remains have been recovered, establishing the sex of skeletal remains, and species identification. Many evolutionary questions have also been addressed using molecular techniques: in some cases by direct analysis of skeletal material and at other times by looking at extant populations.

Definition

For the purpose of this entry, bioarchaeology is taken to be the study of human remains, although much of what applies to human remains can also apply to animal and plant material. Whether samples are being studied to address forensic, archaeological, or anthropological questions may influence the choice of DNA marker to analyze and the methodology employed to evaluate the data. The term ancient DNA (aDNA) is often used to describe these samples, regardless of their actual age as they

typically share the quality of having a small amount of degraded and sometimes chemically modified DNA.

Key Issues/Current Debates/Future Directions/Examples

Persistence of DNA

It has been demonstrated through numerous independent research projects that DNA can be preserved for tens of thousands of years in certain environments. DNA has been preserved in different types of biological material such as skin, hair, feathers, and coprolites; however, hard tissues are the most common source of aDNA, acting as a harbor for DNA as the soft tissues decompose. The physical properties of bones and teeth offer some protection to the DNA from the activity of microorganisms, and apatite, hydroxyapatite, and collagen may stabilize the DNA, protecting it from the effects of degrading enzymes (Lindahl 1993). The environment plays a critical role in slowing down the rate of DNA degradation – material recovered from cold, dry, oxygen-poor environments holds the greatest probability of yielding endogenous DNA, with cold temperatures the most important variable in DNA preservation (Smith et al. 2003). Even under optimum conditions, there are limits to the survival of DNA with the upper limits in the tens rather than hundreds of thousands of years (Lindahl 1993).

Methodology for the Analysis of aDNA

The process of undertaking genetic analysis on skeletal material is similar regardless of the application. Following recovery and cleaning of the material, a portion of the sample is removed and powdered – typically by grinding under liquid nitrogen. DNA is then extracted from the sample using one of several established methods, often phenol chloroform or silica based (Rohland & Hofreiter 2007). Chemical inhibitors, such as humic acids that are often co-extracted with the DNA, also present a challenge as these can prevent further analysis.

There are several milestones that mark the evolution of molecular biology, but from a forensic/archaeological viewpoint, the critical advance was the development of the polymerase chain reaction (PCR) in 1983. This allowed targeted regions of DNA to be amplified using a cyclic enzymatic process where, in principle, one starting molecule can be amplified over one billion-fold using 32 cycles of amplification. In practice this translates to the potential to analyze DNA starting with as few as 10–20 starting (template) molecules. The sensitivity of the PCR is critical as the amount of aDNA recovered is typically very small and highly degraded.

Following amplification the target DNA is typically either analyzed to determine the length of the amplified fragment (i.e., when looking at length polymorphisms) or sequenced to determine the base-by-base composition of a region of DNA (Fig. 1). To date most sequencing has utilized Sanger sequencing; however, developments in sequencing technology, referred to as next-generation sequencing (NGS), offer an alternative approach that can potentially unlock the information contained in the whole genome and allow new problems to be addressed in bioarchaeology (Shendure & Hanlee 2008).

The genetic data, once collected, need to be evaluated, and the approach taken depends very much on the problem being considered. In some cases, such as sex determination, the process of evaluation is relatively straightforward, whereas with other types of data, complex statistical or/and phylogenetic methods may be required.

Authentication of aDNA

The sensitivity of PCR, as well as its greatest asset, is also its biggest limitation as the process does not distinguish between endogenous and exogenous (i.e., contaminating) DNA – indeed, chemical modifications such as the spontaneous loss of bases and base modification through hydrolysis and oxidation make endogenous DNA more difficult to amplify than contaminating exogenous DNA (which is usually from a contemporary source). Before the potential for contamination with exogenous DNA was fully understood, several reports published in

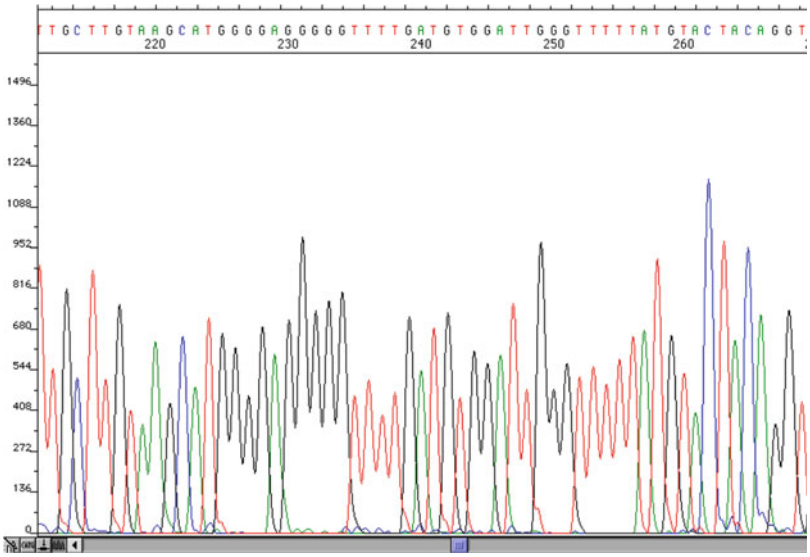

DNA and Skeletal Analysis in Bioarchaeology and Human Osteology, Fig. 1 Sequence data from mtDNA generated by Sanger sequencing. The sequencing software interprets the sequence data and "calls" the bases; this information is provided above the sequencing peaks (Amended from Goodwin et al. 2011)

high-impact journals erroneously claimed to have isolated DNA from specimens that were millions of years old, most infamously from a Cretaceous dinosaur. The contamination issue undermined the credibility of aDNA studies for several years, and establishing stringent criteria for the authentication of aDNA became of paramount importance; these included measures such as using clean rooms that are dedicated to aDNA work and, where possible, duplicating the analysis in separate facilities (Cooper & Poinar 2000; Green et al. 2009). Even following stringent anti-contamination procedures does not remove the possibility of introducing exogenous DNA – the problem was again highlighted in 2005 when two studies that were attempting to sequence a Neandertal genome produced inconsistent results even though the same bone sample was used. The differences were attributed to contamination during analysis after the initial extraction and highlighted the requirement for rigorous analysis of genetic data to assess for possible contamination (Green et al. 2009).

Genetic Polymorphisms

A species' genome can be defined as the full haploid complement of DNA; in humans it comprises approximately 3.1 billion base pairs. The variability between individuals is also part of the description of the species' genome. The vast majority of a cell's DNA resides in the nuclear genome (the DNA that is located in the nucleus); however, eukaryotes also contain extranuclear DNA in their mitochondria. While this is proportionally very small (the mitochondrial DNA (mtDNA) of humans is just over 16.5 thousand base pairs compared to the 3.1 billion base pairs in the nuclear genome), there are three features of mtDNA that make it valuable when analyzing highly degraded DNA: the mtDNA genome is present in multiple copies, with cells having thousands of copies in contrast to nuclear DNA, which in animals is diploid (two copies); the mtDNA is haploid in nature, and while there are multiple copies, they are, in most cases, identical; and the rate of mutation of mtDNA in specific regions is much higher than in the nuclear genome, which leads to higher levels of diversity between populations.

All species contain a large number of variable sites (polymorphisms) within their genome. Not surprisingly humans are the best studied eukaryote species, with the full genome being decoded by 2001, and since then 100s of genomes are being sequenced (The 1000 Genomes Project Consortium 2010), allowing millions of polymorphisms to be identified and characterized. There are several different classes of polymorphism – in

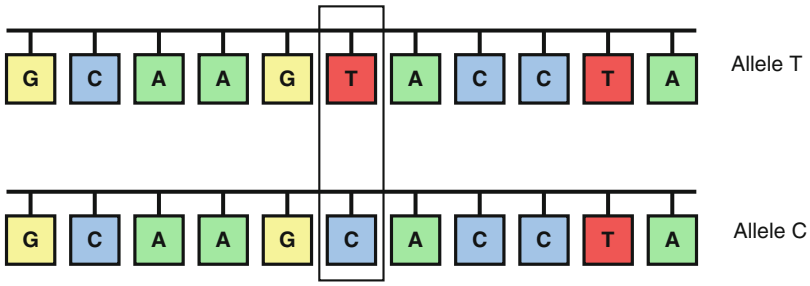

DNA and Skeletal Analysis in Bioarchaeology and Human Osteology, Fig. 2 Structure of single nucleotide polymorphisms (SNPs). SNPs are created when the DNA replication enzymes make a mistake as they copy the cell's DNA in the germ line cells. The enzyme incorporates the wrong nucleotide approximately once every 10^8 bases. In the vast majority of cases, SNPs are biallelic (having only two different alleles). In the example shown above, the thymine nucleotide (T) has been replaced by a cytosine (C) (Amended from Goodwin et al. 2011)

forensic and archaeology/anthropology studies, the most commonly utilized polymorphisms are single nucleotide polymorphisms (SNPs) and short tandem repeats (STRs). SNPs are caused by variation in the sequence of DNA (Fig. 2) and account for around 85 % of the variability between individuals; less common but more variable on a marker-by-marker basis are STRs, which are a class of tandem repeats, with variable numbers of blocks of sequence repeated. Until recently analysis of SNPs was limited to those contained within the mtDNA where a series of SNP polymorphisms are concentrated in hypervariable regions (Fig. 3). However, with the advent of next-generation sequencing, aDNA studies can now access genome-wide SNP polymorphisms from aDNA, opening up new possibilities for the application of aDNA analysis.

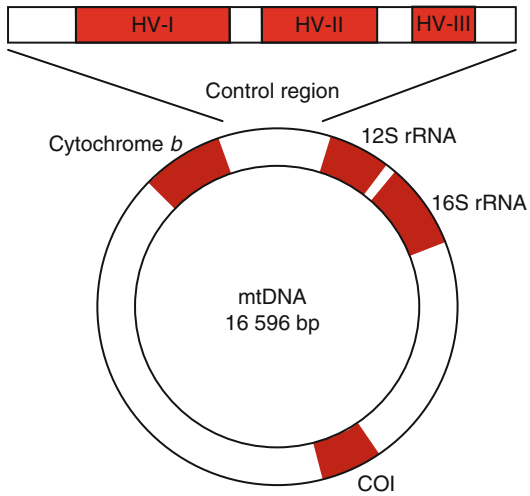

DNA and Skeletal Analysis in Bioarchaeology and Human Osteology, Fig. 3 Schematic representation of the mitochondrial genome. The human mitochondrial genome is circular and approximately 16,569 bp long. It encodes for 13 proteins, 22 transfer RNAs, and two ribosomal RNAs. The polymorphic hypervariable regions I, II, and III (HVI, HVII, and HVIII) are located within the control region. Other regions of the genome that are utilized in forensic casework for species identification are the coding regions for cytochrome *c* oxidase 1 (*COI*) 12S and 16S ribosomal RNAs and cytochrome *b* (Amended from Goodwin et al. 2011)

Applications

The examples selected to illustrate the possibilities of aDNA studies are drawn from both contemporary (relatively speaking) forensic cases to the molecular analysis of ancient hominins and pathogens.

Forensic Genetics

Molecular genetics is used in forensic casework involving skeletal remains primarily for the purpose of establishing the identification of the human remains, although there are cases where skeletal remains of known individuals are used to assist in kinship cases, typically involving inheritance claims. The first DNA profile that could be used in forensic casework was generated by Alec Jeffreys in 1984. However, early methodology did not incorporate PCR and so was limited in

its sensitivity and so was not very useful for the identification of skeletal material; it was not until 1991 that the first successful identification of skeletal material was reported.

As DNA technology has been adopted worldwide, it has been applied to more cases involving human identification, ranging from the identification of individual bodies to large-scale identification projects following transport disasters, such as airplane crashes (that can result in thousands of fragmented remains from hundreds of individuals), to the identification of thousands of people following conflict and natural disasters. Large-scale projects that stand out as exemplars include forensic genetics contribution to the identification of over 1,600 victims of the 2001 World Trade Center attack in New York (Budimlija et al. 2003) and the identification of victims of conflict in the Balkans (1995–1999), where over 15,000 individuals have been identified through a DNA-led approach established by the International Commission on Missing Persons (ICMP) (Huffine et al. 2001). DNA analysis has also been used extensively to identify victims of the South Pacific tsunami of 2004, particularly in Thailand where there were over 5,000 victims. In all cases the process involved generating an STR profile, typically containing at least 15 different STR markers, and making comparisons with profiles generated from relatives of the missing persons or biological artifacts from the missing person (such as cellular material from toothbrushes or razors). In most cases high statistical significance can be given to the identification. mtDNA can also be used to assist with identification (Holland et al. 1993), but caution has to be taken not to give too much weight to matching mtDNA profiles as they are not unique and will often be shared by many people in a given population.

Bioarchaeology

Numerous publications have reported on the use of aDNA to shed light on different aspects of bioarchaeology. In this section examples will be given from two areas of research: firstly, the contribution of aDNA analysis to understanding the relationship between archaic hominins, in particular the Neandertals, and modern humans and, secondly, the use of aDNA to identify and analyze the genomes of pathogens recovered from skeletal material.

Neandertals and Modern Humans

The genetic relationship between archaic and modern humans is ongoing. Analysis of extant populations points to a recent origin for the modern human gene pool in Africa, with little contribution from archaic populations. However, with the Neandertals and early modern humans potentially coinhabiting the same geographical areas in parts of Europe and the Levant over tens of thousands of years, there has been interest in detecting evidence of gene flow. Early genetic studies focused on the hypervariable regions of mtDNA and have been followed by projects that have sequenced the mtDNA genome of several specimens (Briggs et al. 2009). These studies all found that the mtDNA pool of modern humans and Neandertals was distinct and therefore provided no evidence for admixture, but were limited in that they only examined one genetic locus. To address the question of admixture more rigorously, it was necessary to examine the nuclear genomes. Early attempts to sequence a Neandertal genome were complicated because of contamination with modern exogenous DNA (Green et al. 2009): however, a later study by Green et al. 2010 appears to have been more successful in presenting a draft version of the Neandertal genome. Comparisons of the sequence to extant genomes showed that the Neandertal genome is more similar to Eurasian than African genomes and approximately 1–4 % of the modern Eurasian gene pool could have come from Neandertals. Perhaps even more remarkable than the analysis of Neandertal DNA is the work carried out on a bone fragment found in Denisova Cave in southern Siberia dated at between 50,000 and 30,000 years ago. mtDNA analysis showed that the sequence was quite different from either Neandertals or modern humans, diverging from the lineage that led to Neandertals and modern humans around one million years ago (Krause et al. 2010). Analysis of the draft genome indicates that this group of archaic hominins, termed the Denisovans,

contributed 4–6 % of its gene pool to present-day Melanesians (Reich et al. 2010). Care has to be taken not to over-interpret the results, but the data generated to date provides a useful platform for the genomic analysis of archaic hominins, which will no doubt be added to over the coming years, both in terms of additional samples being analyzed and improved data analysis. In addition to examining the relationship between archaic hominins and modern humans, it may also be possible to identify regions of the extant human genome that have experienced strong selective pressures, thereby shedding light on the evolution of the modern human gene pool.

Paleopathology

Many pathogens, such as *Yersinia pestis* (that caused the plague otherwise known as "Black Death") and *Mycobacterium tuberculosis*, do not always leave unambiguous skeletal pathology to provide a definitive diagnosis. Early studies on identifying pathogen DNA using PCR-based methods have had to deal with the problem of differentiating between pathogen DNA and the DNA of related microorganisms; for example, *Y. pestis* has recently evolved from the soil-dwelling *Y. pseudotuberculosis* and they are highly similar over much of their genomes; the situation is even more complex when identifying tuberculosis, with over 100 species in the genus *Mycobacterium*, most of which are soil dwelling and many of which would give a positive reaction with a clinical-based test (Wilbur et al. 2009).

As with other areas of bioarchaeology, the advent of next-generation sequencing has enabled a genome-based approach to paleopathology. A seminal study by Bos et al. 2011 not only detected the presence of *Y. Pestis* from skeletal remains recovered from a cemetery in East Smithfield, London (the cemetery was established specifically for victims of the Black Death in 1348/1349), but also sequenced the ancient *Y. pestis* genome. With this level of information, it is possible to address questions around the biology of the pathogen, such as why are there differences in the symptoms and epidemiology between ancient and modern strains of *Y. pestis*, which may illuminate risk factors for future pandemics. Sequence comparison between the ancient and extant strains of *Y. pestis* has found that the genome has evolved little over the last 660 years indicating that the differences in the pathogens behavior may be due to the health status of the people living toward the end of the Middle Ages, rather than changes in the biology of the pathogen; however, more work has to be undertaken to understand subtle changes in the organization of the genome that may impact on its biology (Bos et al. 2011).

Future Directions

The development of next-generation sequencing allows the potential for a new era of paleogenomics. As the technology becomes more affordable and bioinformatics tools make the analysis of vast amounts of data easier, the approach may be used in more contexts. Regardless of the advances in sequencing technology, analysis of aDNA is technically challenging, and constant care must be taken to minimize and monitor for the presence of contamination.

Cross-References

- ▶ Ancestry Assessment
- ▶ Archaic *Homo sapiens*
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ DNA Interpretation Constraints in Archaeology
- ▶ *Homo neanderthalensis*
- ▶ Ethics and Human Remains
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Genetic Bottlenecks in Archaeology

▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Human Evolution: Molecular Timescale
▶ Human Migration: Bioarchaeological Approaches
▶ Human Remains Recovery: Archaeological and Forensic Perspectives
▶ Neanderthals and Their Contemporaries
▶ Out-of-Africa Origins
▶ Pathological Conditions and Anomalies in Archaeological Investigations
▶ Pathological Conditions and Anomalies in Forensic Contexts

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DNA Interpretation Constraints in Archaeology

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Introduction

Genetic data are playing an increasingly important role in the study of human evolution. The availability of genetic data has been growing at

a phenomenal rate, largely due to significant methodological advances such as high-throughput DNA sequencing. The latest technologies allow entire genomes to be sequenced within a day.

The scope of genetic study includes samples from contemporary individuals as well as archaeological remains, which are accessible through the use of ancient DNA techniques (Pääbo et al. 2004). Limitations on the number of well-preserved samples from archaeological contexts, however, have so far restricted the size of high-resolution ancient DNA data sets. Consequently, population-level data are usually derived from modern samples.

Molecular data can come in several forms, including DNA sequences, microsatellites, and single-nucleotide polymorphisms. These have varying degrees of resolution at different levels, making them useful for different purposes. Owing to their rapid rate of change, microsatellites can vary substantially among individuals and are often used for studying populations. However, these markers can quickly become saturated because old mutations are masked by newer ones. For this reason, more slowly evolving DNA sequences are typically used in analyses of different populations and species.

Studies of DNA data can complement archaeological and paleoanthropological investigations into the origins of modern humans in a number of ways. Genetic analysis can be useful in characterizing gene functions, identifying remains (bone, hair, or soft tissue), inferring the demographic history of different populations, and estimating the timescale of evolution and migration. In the context of global archaeology, population genetics can elucidate the relationships and interactions among individuals and between populations (Rosenberg et al. 2002). Molecular clocks can offer an independent estimate of the timescale over which humans evolved and dispersed throughout the world (Endicott et al. 2009).

The analysis of genetic data often involves the use of statistical models that are intended to capture the most important features of the underlying molecular evolutionary and demographic processes (Nielsen & Beaumont 2009). As with all models, simplifying assumptions are invoked in order to permit analytical and computational tractability. Many methods for population-genetic analyses are based on coalescent theory, which provides a statistical framework describing the relationship between genealogies and populations. Within the coalescent framework, typical assumptions include random mating among individuals, neutrally evolving DNA sequences, and a constant rate of molecular evolution among lineages. Some methods also make strong assumptions about the nature and magnitude of genetic exchange between populations.

When interpreting inferences drawn from DNA data, it is important to take into account the inherent methodological limitations associated with any particular mode of genetic analysis. Many of the assumptions made in current genetic models are unlikely to be satisfied fully by real DNA sequence data. Furthermore, there are numerous sources of error that can contribute to the uncertainty associated with the estimates produced using genetic methods.

Definition

Population Genetics

The study of human population genetics involves the analysis of molecular data to quantify and characterize genetic variation through time and space. Early studies aimed to describe the patterns of polymorphism in populations across the globe. These showed evidence of geographic structure in the genetic markers, with distinctions apparent between different continents and cultures.

In practice, evolutionary analysis of population genetics usually involves estimation of parameters such as population size (modern and ancestral), population growth rate, migration rate, degree of population structure, time to a most recent common ancestor, and the DNA

mutation rate. Estimation of these parameters is performed using statistical methods such as maximum likelihood and Bayesian inference. The results of such analyses can provide insights into how natural selection and demographic processes have shaped our species over time.

Molecular Clocks

The "molecular clock" hypothesis posits that the evolutionary rate at the DNA level is relatively constant over time and among lineages, although rates vary among genes. Originally proposed by Zuckerkandl and Pauling (1962), the molecular clock provides a useful tool for estimating evolutionary timescales. If the mutation rate is known for a given genetic marker, it is possible to estimate the timing of divergences among lineages and among populations. For example, the molecular clock can be used to date the divergences among human populations or to estimate the timing of dispersal events.

When estimating evolutionary timescales, the most important consideration is calibration of the molecular clock. Usually, the mutation rate of a given stretch of DNA is not known a priori and must be estimated. In many studies of hominin evolution and human dispersal, the rate of DNA mutation is calibrated with reference to the divergence between humans and chimpanzees, which is thought to have occurred around 6 Ma ago. Some studies have used calibrations based on the estimated timing of human dispersal and colonization events.

Key Issues and Current Debates

Population Genetics

Until recently, population-genetic analysis typically relied on DNA from the mitochondrial genome or the Y chromosome. These markers are distinctive because they are uniparentally inherited in humans and other mammals. In general, the mitochondrial genome is only inherited maternally, whereas the Y chromosome is only passed from father to son. However, using such a limited number of markers is problematic because of the risk of incomplete lineage sorting, whereby the relationships inferred from the DNA data do not match the actual relationships among populations or between species (Nichols 2001; Nielsen & Beaumont 2009). This error occurs stochastically and is more probable when ancestral population sizes are large.

Analyses of single markers can be particularly misleading; for example, mitochondrial studies placed a low likelihood on interbreeding having taken place between Neanderthals and modern humans (e.g., Ovchinnikov et al. 2000). Yet, genomic analyses of ancient hominins suggest more complex patterns of interspecies genetic exchange (Reich et al. 2010), evidence of which is not preserved in contemporary human mitochondrial diversity. In contrast, mitochondrial estimates of the timing of divergence between humans and Neanderthals and for divergences within the human tree (Endicott et al. 2009) are broadly supported by dates inferred from whole-genome nuclear DNA (Reich et al. 2010; Gronau et al. 2011).

Given these considerations, it is clearly preferable to analyze multiple markers from the nuclear genome for the reliable estimation of demographic parameters (Balloux 2010). This is routinely done for the analysis of population structure using microsatellites, but the modelling of evolution with these markers presents different challenges (Sainudiin et al. 2004). For this reason, together with the ready availability of mitochondrial DNA data, studies of uniparental markers are still routine (Soares et al. 2010).

There is a growing focus on analyses of complete nuclear genomes. Dozens of human genomes have been sequenced, along with those of several ancient hominins. These have provided some remarkable insights into human evolution, including the genetic contributions of Neanderthals and Denisovans to modern humans (Reich et al. 2010). Researchers are struggling to cope with the rapid pace of data generation, and there is much work that remains to be done even with the genome sequences that are already available.

Molecular Clocks

Molecular-clock analysis makes it possible to estimate DNA mutation rates and evolutionary timescales. However, the results of such analyses need to be interpreted cautiously because there are a number of important confounding factors that can affect the accuracy and precision of date estimates.

First, estimates from the molecular clock reflect the timing of genetic divergences, not the divergences of populations or species. Generally, genetic divergence precedes species or population divergence. In particular, there can be a substantial disparity between genetic and population splits (Edwards & Beerli 2000). Failure to take this into account can lead to overestimation of the time since populations diverged.

Mutation rates are normally calibrated using paleontological or archaeological information, but these are not always reliable because they do not necessarily coincide with genetic events. Therefore, there is invariably some amount of uncertainty associated with calibrations for the molecular clock. Calibrations based on estimated colonization times carry a number of significant risks and considerable uncertainty, which are not always taken into account.

Most analyses of human evolutionary timescales have been estimated with reference to a human-chimpanzee calibration. However, this is a problem because there is wide variation in estimates of the timing of the human-chimpanzee divergence (Bradley 2008). Moreover, the evolutionary process at the species level differs from that occurring within populations, largely because of the substantial difference in the timescale (Stoneking et al. 1992). Over long periods of time, detrimental mutations are removed by natural selection. On short timescales, such mutations tend to be present in high numbers. As a consequence, calibration using the human-chimpanzee divergence (6 Ma ago) can lead to underestimates of the rate of DNA mutation within human populations (Endicott et al. 2009). It is likely that many DNA-based studies of the timing of human evolution and migration have produced overestimates.

Some efforts are now being made to account for the confounding impact of purifying selection on date estimates. For example, some researchers have chosen to limit their analyses to neutral markers, while others have proposed methods to model the effects of selection. New approaches will also need to be developed in order to estimate timescales using large numbers of complete genomes.

Future Directions

The growing availability of complete genomic data will play a significant role in shaping our understanding of human evolution and dispersal. Analytical methods will need to be developed to accommodate this increase in the sheer quantity of data. These will need to take account of a range of evolutionary and demographic influences relating to its usage, such as variations in mutation rate and recombination. Analyzing the time scale of human evolution will, however, always depend on calibration of the molecular clock. Total genomic data from subfossils are likely to play an important role in calibration of the molecular clock by providing time-stamped genomes within the human genealogy. It is paramount to exercise care when interpreting the results of population-genetic and molecular-clock analyses of these data.

Cross-References

- ▶ Genetic Bottlenecks in Archaeology
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ *Homo neanderthalensis*
- ▶ Human Evolution: Molecular Timescale
- ▶ Human Evolution: Multiregional Origins
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies

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Documentation of Treatment and Intervention in Archaeological Conservation and Preservation

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Introduction

Recording is a fundamental component of the conservation process, including initial examination of a cultural resource, through to its treatment, maintenance, and monitoring. Documentation of treatment and intervention is engrained within the code of ethics of many cultural organizations, such as the International Council of Museums (ICOM), the European Confederation of Conservator-Restorers (ECCO), and the American Institute for Conservation (AIC).

Definition

Documentation of conservation treatment and intervention consists of an appraisal of condition of a cultural resource, the treatment administered to it (including materials and methods), and recommendations for future care. This is normally in both written and graphic forms. It is complementary to the process of archaeological recording. Examination before treatment contributes additional understanding of its material culture.

Key Issues/Current Debates/Future Directions/Examples

Effective conservation of an ancient or historic structure or artifact requires an objective understanding of its condition and the processes of deterioration affecting it. Most cultural resources have been subject to treatments and interventions in the past, and these may be responsible for current forms of degradation. Understanding causes of deterioration due to previous treatment is,

therefore, essential. Some interventions are obvious, such as the addition of different materials to provide structural support, but concealed support is also common. The detection of surface coatings or chemical consolidants can also be elusive.

Objectives of Documentation

The objectives of documentation of new treatments or intervention are as follows:

- To establish a datum of condition, before and after treatment, to facilitate assessment of its efficacy over time
- To provide conservation professionals in the future the means to understand condition with respect to previous treatments, in order to make informed decisions for new treatments
- To communicate the rationale for a chosen treatment or intervention
- To record and share information of archaeological interest revealed during the course of investigations

Information Requirements

The type of information recorded varies according to the nature and context of the object or structure, including its ownership. There is no universal recording system. Some may form part of a recording protocol specific to an institution or national inventory.

Records of treatment and intervention should provide a clear description of:

- Reference information: owner, name of responsible institution name, structure/object name and number, location (museum or site, GIS coordinate as appropriate), names of individuals involved (curators and conservators), and dates of treatment
- Description: materials, composition, and dimensions and evidence or records of previous treatments or interventions
- Condition of the artifact/structure prior to treatment and probable causes of deterioration/damage
- Specialist investigations that were required to identify materials or understand deterioration processes
- Articulation of the requirements to address structural instability and aesthetic integrity
- An options appraisal of materials and methods to meet these requirements (risk assessment of performance and properties), including alternative approaches
- Any treatment trials carried out or exemplars that were produced
- The materials and methods ultimately chosen, how these were applied (including ambient conditions, as appropriate), the specific locations of application, and the response to treatment
- Supporting documents (e.g., the reports of any previous treatments or new diagnostic investigations)
- Recommendations for handling, storage (if appropriate), maintenance, and monitoring

Forms of Documentation

The basis of documentation consists of written records complemented by graphic and photographic ones.

Written Records

For the written record, standardized forms are essential in documenting condition and treatment. They ensure that information fields are completed consistently with a reference glossary. This helps to reduce ambiguity of a written description, facilitating the comprehension for future users of the record. Such glossaries can be adopted from existing ones or designed specifically for a new recording system.

Graphic and Photographic Records

These can consist of photographs, sketches, or *metric survey* (measured survey drawings, rectified photography, photogrammetric images, or laser scanning). These serve to document the object or structure prior, during, and after treatment, including the specific treatments administered to its constituent parts. In particular, they can form the base for a *condition map* to record specific problems and their location (with a descriptive key of reference) and an associated *treatment map*.

Conventional records provide a two-dimensional description. In cases of exceptional cultural significance, a precise three-dimensional record may be necessary; this enables change to be measured (the rate of deterioration in a given environment); it also creates a precise topographical record in the event of irreversible deterioration and facilitates eventual replication. The most common three-dimensional technique for structures is photogrammetry. Of great interest is the development of laser scanning, which can generate topographical models of a large surface, or of a small object, to an accuracy of several millimeters.

Materials and Treatments

Description of materials employed may be relatively simple or more difficult when dealing with proprietary products subject to commercial confidentially. In the very least, the manufacturers' data sheets should always be appended to the treatment report to provide the maximum amount of information available at the time. Where materials conform to national or international standards, the current standard should also be included, as these are frequently revised and may be difficult to obtain retrospectively. Retention of raw material samples for the documentation archive is sometimes advisable, as this will allow future analysis if required.

Specialist Investigations

Intervention is frequently preceded by specialist investigations (ambient environmental conditions, material analysis, diagnostic investigations). Reports should be appended to the treatment file.

Documentation Archives

In a digital age, there is compelling pressure to exclude the production of hard copy documents altogether. The soundness of this policy depends on the robustness of information technology of a given institution and its future ability to transfer digital records into new formats. Backup electronic copies should always be retained on CD ROMS or on an external hard drive, which should be upgraded with any migration of IT systems. Otherwise, paper copies should be retained, all the more so by small conservation contractors and individual clients. Outside major institutions, reports for very important works of art or buildings should be deposited in local archives, or regional/national Sites and Monuments Records, as appropriate. This helps to ensure access of information to future researchers. Whatever their format, duplicate copies of reports should always be created and stored in separate locations.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ International Council of Museums (ICOM): Code of Ethics

Further Reading

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Dog: Domestication

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Basic Species Information

Dog domestication research is often controversial, but one point that is universally agreed upon by all parties is the identity of the direct ancestor of all domestic dogs: the gray wolf (*Canis lupus*). Since 1993, the domestic dog has been taxonomically classified as *Canis lupus familiaris*, though *Canis familiaris* is still commonly used. This genetic similarity to the gray wolf is equivalent for all dog breeds from Chihuahua to Great Dane (Vila et al. 1997). Within the taxonomic subfamily of *Caninae*, domestic dogs are grouped with the "wolf-life canids" (Fig. 1) also including gray wolf (*Canis lupus*), coyote (*Canis latrans*), golden jackal (*Canis aureus*), black-backed jackal (*Canis mesomelas*), and cape hunting dog (*Lycaon pictus*) (Wayne & Ostrander 2007). While evidence for prehistoric dog remains becomes ambiguous beyond about 15,000 years ago, fossil wolf remains have been found in association with human contexts from at least 100,000 years ago.

Although genetic material makes it clear that the gray wolf is the ancestor of the dog, it is not clear which or how many subspecies of *Canis lupus* were involved in the domestication process, though both the medium-sized Eurasian wolf (*Canis lupus lupus*) and the smaller Arabian wolf (*Canis lupus arabs*) are often mentioned. Although the details of dog domestication are debated (wolf subspecies involved, geographic location, intentional taming of wolf pups vs. "self-domestication"), it is agreed that humans played an important role in the path of the domestic dog. While some genetic researchers suggest the divergence between wolves and dogs may have taken place up to 135,000 years ago (Vila et al. 1997), the archaeological evidence suggests that dog domestication did not begin before 15,000 years ago, though there may have incomplete domestication processes around 33,000 years ago. Due to the genetic similarity between wolves and dogs, the determination between dog and wolf in early archaeological specimens often relies on examining the skeletal remains for a set of morphological traits that generally distinguish the two canids from one another.

Two of the primary questions in dog domestication research focus on whether dog domestication took place in a single or multiple locations and whether significant domestication happened once or multiple times. Conclusions from archaeological and genetic information are thus far unclear for both of these questions. Some researchers suggest the initial domestication of dogs may have happened in East Asia, specifically the Yangtze River area of China. They have suggested that a large founding population of wolves (probably several hundred) were intentionally domesticated here as part of a sustained cultural practice (Pang et al. 2009). Other researchers argue that genetic evidence points to the Middle East as the location of the most genetic diversity and thus the likely origin of dog domestication (vonHoldt et al. 2010). A high level of genetic diversity in native dog population has also been found in Africa, suggesting the model of Eurasian dog domestication may need to be reconsidered (Boyko et al. 2009). Genetic testing shows that the oldest groups of dogs with the most genetic diversity

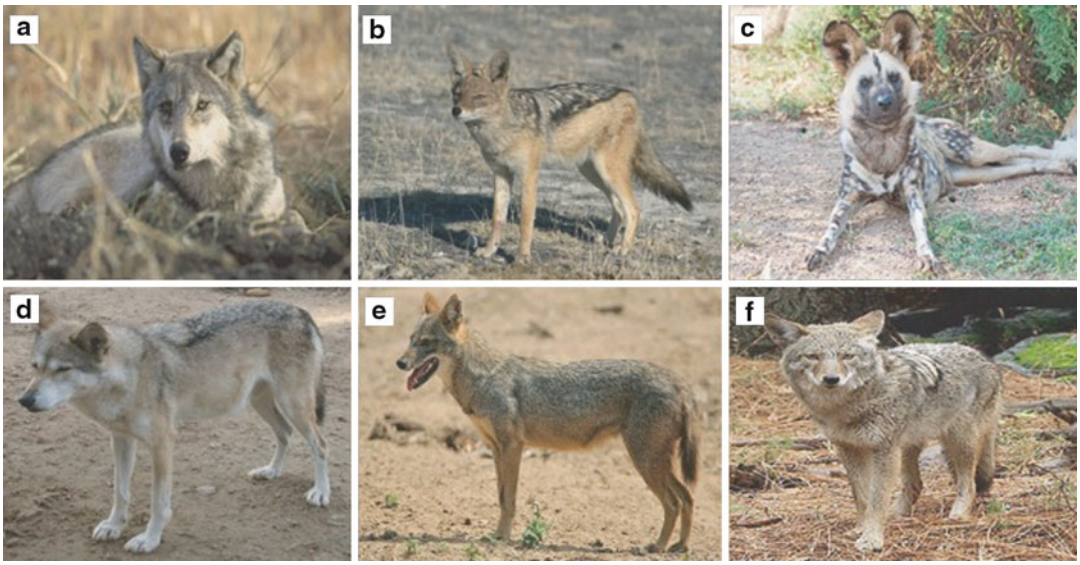

Dog: Domestication, Fig. 1 Wild members of the *Caninae* subfamily: (**a**) Eurasian wolf (*Canis lupus lupus*), (**b**) black-backed jackal (*Canis mesomelas*), (**c**) cape hunting dog (*Lycaon pictus*), (**d**) Arabian wolf (*Canis lupus arabs*), (**e**) golden jackal (*Canis aureus*), (**f**) coyote (*Canis latrans*)

(and which are most genetically similar to wolves) are primarily Asian and African in origin, including the Akita and Basenji. Many dogs which were thought to be ancient in origin, like the Irish Wolfhound and American Eskimo, are actually recently created breeds (Larson et al. 2012).

Like the genetic evidence, the archaeological data has also been interpreted in many different ways. The morphological traits which point to domestic dog in archaeological evidence earlier than about 15,000 are obscure and highly debated. Like all domesticated animals, the domestication of the gray wolf created distinct physical changes over time. These changes assist archaeologists and biologists in distinguishing between the two in fossil specimens. These changes include a general reduction in overall body size, a reduced muzzle length with crowding of the teeth, and the development of a distinctly stepped forehead or "stop" as opposed to the more sloped angle of the wolf face (Fig. 2). Due to the morphological similarities between wolves and early dogs, for many fossil specimens it is unclear whether they represent small wolves, large dogs, dog-wolf hybrids, or some sort of "in-between" species

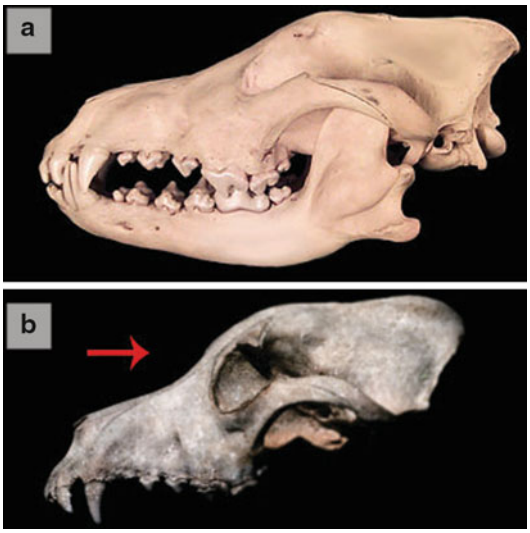

Dog: Domestication, Fig. 2 The sloped snout of a wild grey wolf (**a**) as compared to the distinctive 'stop gap' of a domesticated dog (**b**)

of wolves in transition to morphologically becoming domesticated dogs. The oldest uncontested archaeological dog remains from each geographic area are those from Bonn-Oberkassel (Germany; 14,708–13,874 cal. BP (before present)),

Dog: Domestication, Fig. 3 Modern dog (*Canis lupus familiaris*) breeds: (**a**) Komondor, (**b**) Chinese Crested, (**c**) Pug, (**d**) Akita, (**e**) West Highland White Terrier, (**f**) Australian Dingo

Palegawra Cave (Iraq; 13,000 cal. BP), Ushki I (Russia; 12,900–12,600 cal. BP), Nanguanli (Taiwan; 4,800 cal. BP), Merimde Beni-Salame (Egypt; 6,800–6,520 cal. BP), Danger Cave (United States, 10,000–9,000 cal. BP), and Rosamachay (Peru, 5,620–5,150 cal. BP) (Larson et al. 2012).

In addition to these remains, there are also many for which a final determination between wolf and dog is more controversial. A fossil canid skull from Goyet Cave in Belgium, which had been excavated in the mid-nineteenth century, was reexamined and radiocarbon dated to 31,700 cal. BP. Some argue that the morphological traits of the skull are more suggestive of dog than wolf, which would make the Goyet specimen one of the oldest dog remains even found. Others question the determination of the skull as a domestic dog. Similar potential early domesticated dog finds have been cited in Chauvet Cave (France; ~ 26,000 BP), Predmostí Cave (Czech Republic; 27,000–24,000 BP), and Razboinichya Cave (Russia; 33,500–33,000 BP), but all have had the identification of their remains as dog challenged.

While the exact timing and location of dog domestication is still debated, the modern dog has spread throughout the world and now inhabits every continent aside from Antarctica. Through discerning breeding by humans, dogs now exist in an array of size, shapes, colors, and demeanors (Fig. 3). Their vast breadth of behavioral and morphological traits makes them the most adaptable land mammal on the planet.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Domestic Archaeology: Textiles of Northern Mediterranean

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Introduction

Throughout classical antiquity, textile manufacture was practiced on all levels of society and was one of the most labor-intensive of all occupations. As such, it was an industry of great cultural and social importance, playing an integral part in local and regional economies as well as local, regional, and long-distance exchange. The social significance of textile production in the northern Mediterranean was expressed in funerary ritual through the inclusion of textile implements among the burial goods, as well as in religious activities, through the deposition of textile tools in votive deposits and special ritual cloth production in sanctuaries.

Textiles were used for a variety of purposes, the most obvious of which was clothing. Like today, clothing in ancient times had multipurpose aspects, not least of which was expressing the identity of an individual or a group of peoples by symbolizing gender, age, family, social class, occupation, religion, or ethnic affiliation. Clothing and thereby textiles had an important communicative function since they combine both technological achievements and aesthetic values of any society. In addition to clothing, however, textiles were used for a variety of utilitarian purposes. Colorful bed covers, cushions, curtains, and other textiles are frequently represented by the Greek, Etruscan, and Roman iconographic sources. Another important use of textiles was for sails and ship rigging. The extravagant awnings for theaters and fora were made of textiles. Textiles were also used for military tents, cart covers, *vela* hung between temples' columns and *centones*, special fabrics used for extinguishing fires. A rather unique use of textiles known in the Etruscan sphere was for books. Called *libri lintei* by the Romans, they were made of linen and used for recording religious rituals.

Among the various sources that provide evidence for the study of textile production in the ancient northern Mediterranean, archaeological material is the most direct as it documents the productive activities through tools, installations, raw materials, and finished products. With the help of other, secondary sources of information, namely, the iconographic and written evidence, it is then possible to reconstruct the sequence of production processes involved in textile manufacture.

Although textiles surviving in their original form are relatively rare finds in northern Mediterranean archaeological sites, almost all conditions of preservation can be found in this vast and geologically and climatically diverse region. The largest corpus consists of linen textile fragments found in various Neolithic and Bronze Age sites in the north of the Apennine peninsula (Bazzanella et al. 2003), where they have been preserved by the basic conditions of the Alpine lakes. Wool textile fragments, on the other hand,

Domestic Archaeology: Textiles of Northern Mediterranean, Fig. 1 Mineralized textile from Poggio Aguzzo, Murlo, Italy, seventh century BCE (Photo: M. Gleba)

have been recovered primarily from burials, where they were conserved in waterlogged and/or acidic environments. Among these, the almost complete garments found in the Villanovan burials at Verucchio in northeast Italy are significant. A few Iron Age clothing articles were recovered from the Alpine glaciers (Bazzanella et al. 2005). Charred or carbonized textiles were preserved as a result of the eruptions of Thera in Greece and Vesuvius in Italy (D'Orazio et al. 2000). The vast majority of textiles in the northern Mediterranean, however, have been preserved in association with metal objects and survive in the shape of minute mineralized traces (Fig. 1).

Definition

A textile is a flexible, two-dimensional material produced by interconnecting fibers, which have generally been twisted into a yarn (Emery 1966; Seiler-Baldinger 1994). Fiber is a basic unit of raw material having suitable length, pliability, and strength for conversion into yarns and fabrics.

In the ancient Mediterranean, two basic fiber groups, divided on the basis of their origin into plant and animal, were used for textile manufacture. Plant fibers are derived from the inner bark or bast of plants, such as flax (*Linum usitatissimum* L.), hemp (*Cannabis sativa* L.), nettle (*Urtica dioica* L.), Spanish broom (*Spartium junceum* L.), esparto (*Stipa tenacissima* L.), and trees, such as linden (*Tilia* sp.), oak (*Quercus* sp.), and willow (*Salix* sp.). Tree bast was more important in prehistoric times, but it occasionally turns up during the Roman period as well, particularly in the rigging found in shipwrecks. Besides these locally available plant fibers, cotton was imported to Europe from the East by Roman times, although it was never economically important.

The major animal fiber was sheep's wool, with occasional use of goat hair and other, more unusual fibers, such as horse and camel hair. The other important animal fiber, silk, was imported from the Near and Far East and remained a relatively rare and luxury material throughout antiquity. Another animal fiber, byssos or sea-silk, derived from the secretion of a marine mollusk, was also used to make precious textiles, although there is no direct evidence for its use before the late Roman period. Asbestos, a textile fiber derived from a mineral amphibole, has a unique quality of withstanding extremely high temperatures – a trait that was noticed and used in antiquity when producing funerary shrouds. Last but not least, gold sheet was cut into thin strips and wound around an organic core to create gold thread used at least since Hellenistic times for the most sumptuous textiles, often in combination with silk fiber and shellfish purple dye.

While plant fibers resulted in uniformly colored shades of gray-white, wool came in a variety of natural shades and could be dyed easily in a multitude of bright colors. Dyeing is probably no less ancient than the weaving of textiles themselves, as humans strove to improve their aesthetic quality. A number of plants and animals could have been used for dyeing, including woad and indigo for blue, madder and kermes for red, and weld and saffron for yellow (Cardon 2007). The most famous dye of antiquity was shellfish or Tyrian purple, which was obtained from a variety of marine mollusks of the muricid family.

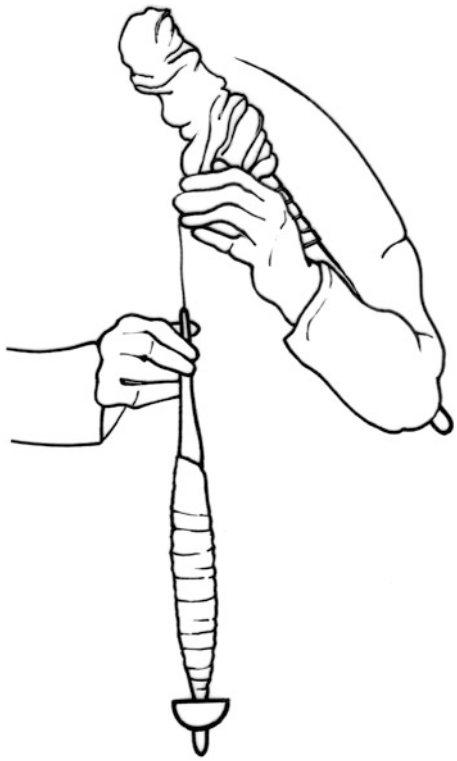

Domestic Archaeology: Textiles of Northern Mediterranean, Fig. 2 Spinning with drop spindle and hand-held distaff (Courtesy of Eva Andersson Strand)

To create a textile, raw material had to be transformed by means of a series of processes (Barber 1991). Every type of fiber had to be subjected to a preparation process, after which it could be spun or twisted into yarn using a drop spindle (Fig. 2). Once the fibers were spun, they could be woven into a two-dimensional structure (Seiler-Baldinger 1994). The woven textile is constructed by interlacing two thread systems at right angles. The static system is generally called warp, while the perpendicular movable system is known as weft. The simplest form of weaving, tabby or plain weave, is produced by weft threads passing over and under alternate warps. In the more complex, twill weave, weft threads pass over and under two or more warps in a regular staggered pattern, each row being stepped to one side of the row above, which creates a diagonal effect. Extra wefts may be worked into the basic weave to produce a brocade, thereby allowing the creation of complex patterns. Pattern, however, was not always dependent on a complex weave structure, but could be formed using yarns of different colors.

Weaving was generally accomplished on a special frame known as loom (Fig. 3; Barber 1991). The loom used in the northern

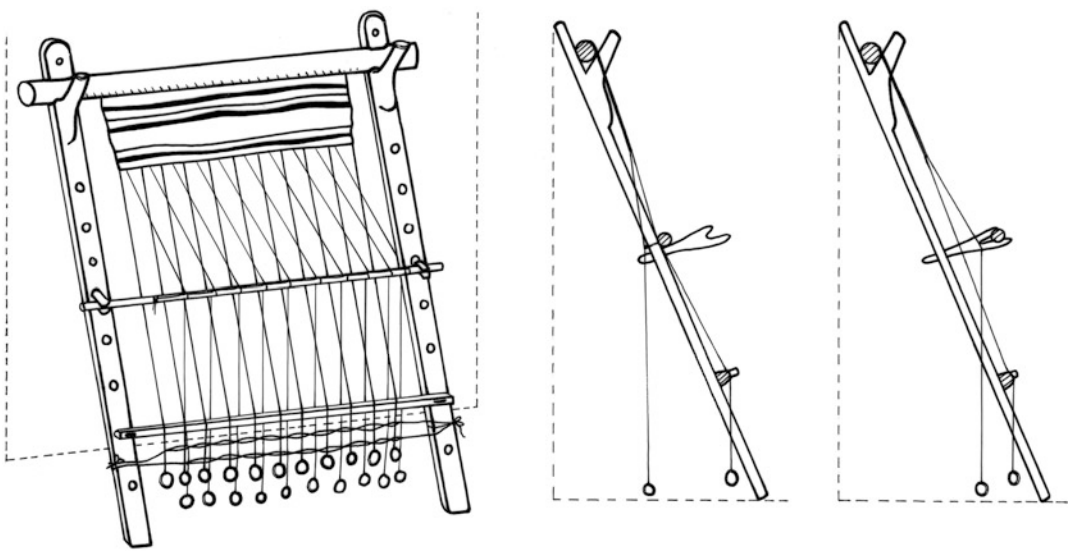

Domestic Archaeology: Textiles of Northern Mediterranean, Fig. 3 Warp-weighted loom (Drawing: Annika Jepsson)

Mediterranean until the first century CE was of the warp-weighted type in which the warp threads were held under tension by weights attached to their bottom ends. Loom weights found on archaeological sites represent the tangible evidence of textile-making. During the Roman Empire, the warp-weighted loom was gradually replaced with the two-beam vertical loom in which the warp was stretched between two horizontal beams.

Textiles could also be constructed by other means (Seiler-Baldinger 1994). Tablet weaving was a common technique to make braids but was also popular for making decorative borders. Sprang was created by twisting adjacent warps on a frame without the use of weft yarn and resulted in extremely flexible fabrics, which were used for headgear and bags but possibly also for leggings. Other techniques include lacing, braiding, and netting. Many of these techniques do not require any specialized tools. The fibers could also be entangled without forming a yarn, resulting in non-woven fabrics, such as felts.

After a textile had been created, it could be subjected to a variety of finishing processes. Fibers on the surface of a textile could be matted together by fulling carried out in *fullonicae*, some of which have been excavated in Pompeii. The cloth could be brushed and then shorn to produce a smooth napped surface – as in the case of the Roman toga. These treatments were generally applied to wool, while linen could be beaten to soften it or rubbed with a special stone to give it a more lustrous surface. Textiles could also be subjected to elaborate pleating. A textile could be cut and sewn into a garment, although the majority of Greek and Roman textiles were used straight off the loom, that is, they were wrapped around and fixed on the body using devices such as pins and belts. In fact, looms were usually set up to produce a specific garment. Finally, decoration could be physically applied by a variety of techniques. One of these was embroidery, which included a variety of stitches. Shells, seeds, beads, and metal appliques could also be attached to the fabric to create a decorative effect.

The various stages of textile production are depicted in several ancient iconographic documents, including a late seventh-century BCE Etruscan bronze *tintinnabulum*, found in tomb 5 of the Arsenale Militare necropolis of Bologna (Fig. 4), and the Archaic Greek lekythos by Amasis (550–530 BCE), now in the Metropolitan Museum of Art.

Both of these objects illustrate the tools used in various textile production processes. Unlike the textiles themselves, textile implements are ubiquitous on the Mediterranean archaeological sites and can be used to study the craft and its technological and economic aspects (Fig. 5). Spinning and weaving implements constitute the single most important and plentiful type of evidence for the assessment of the scale of production and the technology of this industry in the Mediterranean. Furthermore, many textile tools have been found in burial and votive contexts, providing another interpretative framework. The abundance of textile tools on settlements and in burials from the Early Iron Age onward demonstrates that textile production was one of the main economic activities and sources of wealth.

Historical Background

Textiles represent a category of archaeological material little known to general archaeological audience. While textiles were recovered in earliest archaeological excavations and much of the pioneering publications date to the early twentieth century, they began to be studied extensively as a part of the cultural record only recently. Over the last few decades, textile studies have developed into an important new field of archaeology (Good 2001; Andersson Strand et al. 2010). The accumulation of data and the constant development of analytical techniques are permitting more precise fiber and dye identifications. The proliferation of technical studies is finally permitting a more synthetic approach to the history of textile technology, demonstrating how much we can learn about the culture, society, technology, and economy of the ancient

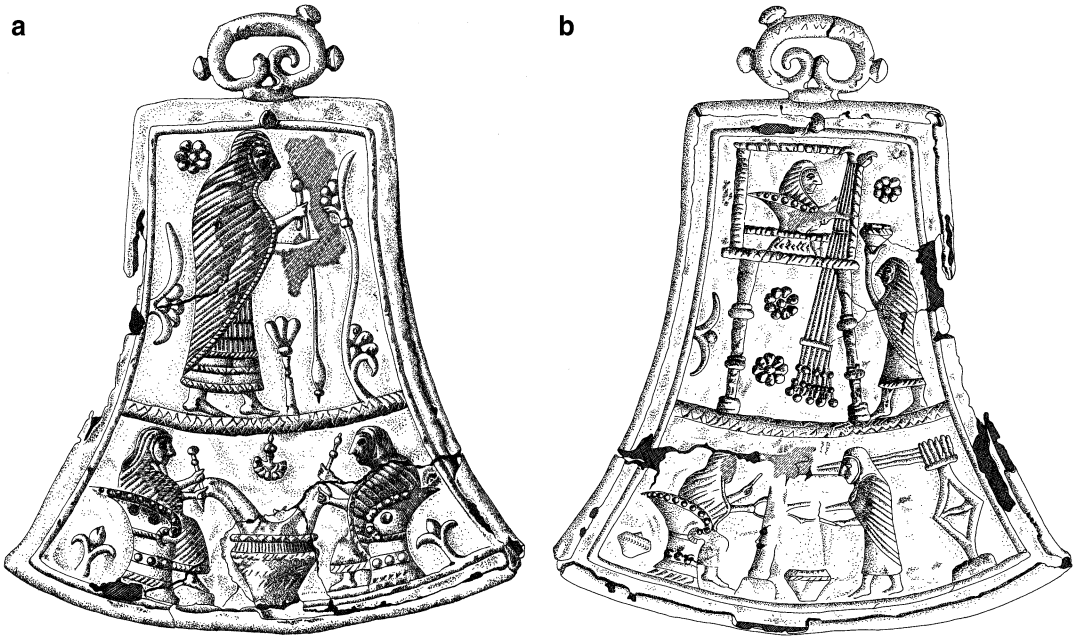

Domestic Archaeology: Textiles of Northern Mediterranean, Fig. 4 *Tintinnabulum* from Bologna, Arsenale Militare, Tomba degli Ori, Italy, bronze, late seventh century BCE: (**a**) side A, with scenes of spinning (*top*) and dressing the distaffs (*bottom*); (**b**) side B, with scenes of weaving (*top*) and warping (*bottom*) (© Bologna Museo Civico Archeologico)

world through textiles (Barber 1991, 1994; Gleba & Mannering 2012).

Because the environmental conditions in the northern Mediterranean are generally not conducive to the survival of organic material, the study of ancient textiles of this region has progressed much more slowly, in comparison to the situation in central and northern Europe. Thus, although the investigation of archaeological textiles of Greece goes back to the 1950s, a period when many textiles were being discovered and studied, scientific research did not truly begin until only 2000 (Spantidaki & Moulhérat 2012). In Italy, too, scientific publications of archaeological textiles started to appear on a more regular basis only in the 1980s and the 1990s. The most comprehensive work on the subject to date is M. Gleba's *Textile Production in Pre-Roman Italy* (2008), which includes a catalogue of published archaeological textiles and an extensive study on textile tools and their various contexts. Archaeological textiles of Spain have been investigated over the last 25 years, but the majority of published scholarship concerns textile tools (Alfaro 2012).

The vast majority of archaeological textiles recovered throughout the northern Mediterranean region, however, survive as minute mineralized traces on metal grave goods, such as bronze and iron weapons, personal accessories, and vessels. In the past, they were often removed as part of the conservation process. Recently, more attention is being paid to these textile traces, which provide important and detailed data on ancient textiles.

Textiles have been studied through indirect sources. An array of ancient texts contains information on textile materials, technologies, uses, and trade and includes "conventional classical literature," "technical handbooks," and "public and private documents" consisting of tablet archives, epigraphic sources, and papyri (Wild 2000: 210). These diverse sources have been used with varied success by modern scholars to reconstruct different aspects of textile production in ancient times. Epigraphic evidence has been a useful source for the identification of

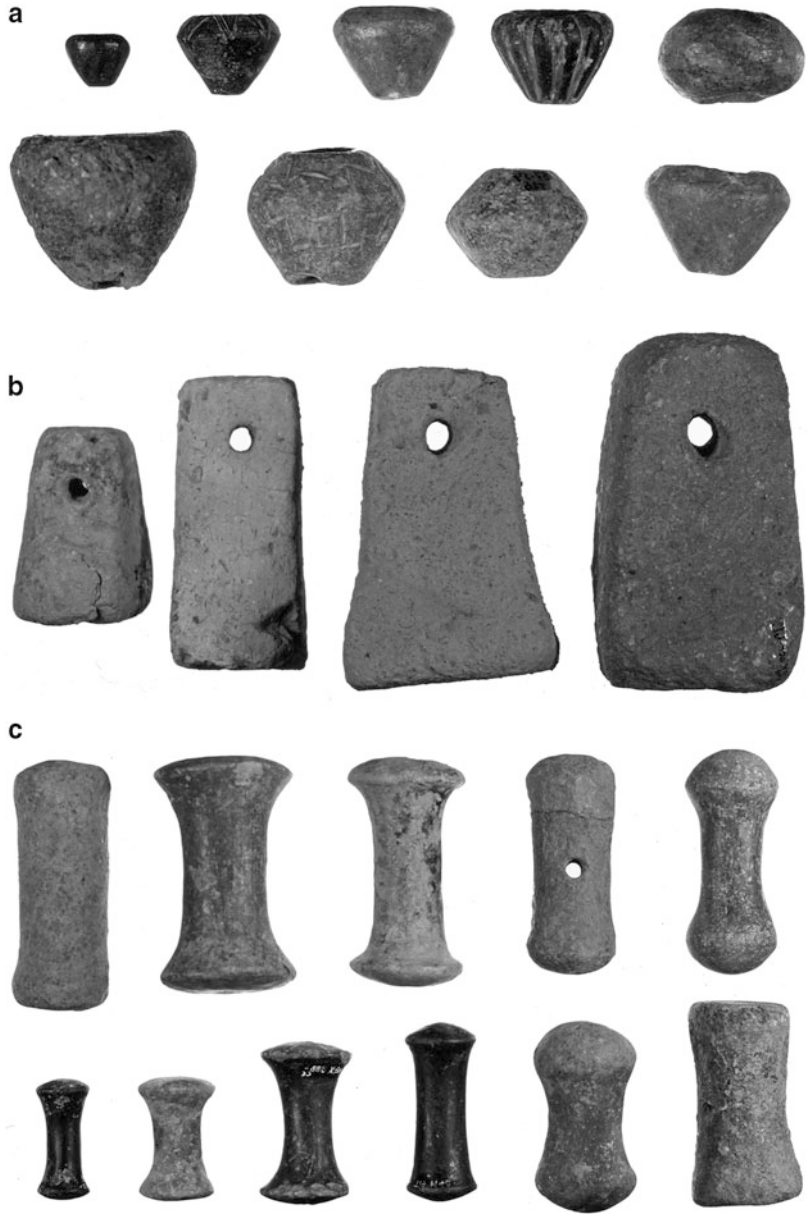

Domestic Archaeology: Textiles of Northern Mediterranean, Fig. 5 (**a**) Ceramic spindle whorls, Poggio Civitate di Murlo, Italy, seventh–sixth century BCE (Courtesy of Anthony Tuck). (**b**) Terracotta loom weights, Poggio Civitate di Murlo, seventh–sixth century BCE (Courtesy of Anthony Tuck). (**c**) Ceramic spools, Poggio Civitate di Murlo, seventh–sixth century BCE (Courtesy of Anthony Tuck)

textile professions (Larsson Lovén 1998), while mythological characters, such as Penelope, Kirke, Arachne, and the Fates, have provided social and religious context for ancient textile activities (Scheid & Svenbro 1996).

Iconographic material has been probably the most frequently cited source of information on ancient textiles. Mediterranean art encompasses one of the most interesting and informative collections of visual material in the ancient world. The proliferation of textiles in the painted tombs, vase painting, statuary, and other media has been scrutinized by numerous scholars, particularly in studies of ancient dress. Etruscan clothing depicted on figurines, statues, vases, and tomb paintings has been studied extensively by Larissa Bonfante (2003). Greek and Roman dress has attracted attention since the antiquarian days (Cleland et al. 2007).

Key Issues/Current Debates

Textile production was both a domestic and a commercial activity in ancient northern Mediterranean. Spinning and weaving were carried out by the women of every household (Barber 1994). Already at the end of the Bronze Age, the deposition of spindle whorls, distaffs, and spools in female funerary assemblages testifies to women's contribution to the communities as textile workers, and indicates that the textile craft became a symbol of the female sphere. While the regional significance of textile tools in burials is a matter of debate, most scholars agree that women on their own or with the help of household slaves produced most of the household textiles needed.

During the Orientalizing and Archaic periods there is a significant increase in the scale of textile production, indicated by the large number and standardization of tools on settlement sites. In some cases, textile implements are concentrated in specific areas where other kinds of production, such as ceramic or metal, have been documented, suggesting a household or even workshop mode of manufacture and the existence of at least part-time specialist craftspeople. Cloth was likely produced for commercial purposes, and textile trade has been tied to salt, amber, slaves, and other commodities. Textile trade seems to be indicated indirectly by the spread of fashion, for example from Greece to Etruria and from Etruria to Central Europe (Hallstatt culture). By Roman times, textiles were also produced for the market by professional male and female workers in large specialized factories (Liu 2009). Diocletian's Edict of prices reflects the complexity reached by the textile production and trade by CE 301. Our understanding of the organizational aspects of the Mediterranean textile production and trade is, however, far from complete, requiring detailed regional studies.

Textiles produced by the women also formed an important part of public rituals. The ritual weaving of garments for cult statues was a well-documented phenomenon in Archaic and Classical Greece. The best known example is the robe or *peplos* of the Athena Polias in Athens woven every year by the young girls called Arrhephoroi who were assisted by Ergastinai. The *peplos* was dedicated and placed on the statue of Athena during the Panathenaic festival (Barber 1992). The presence of textile tools in sanctuaries traditionally tied to votive activities needs to be re-evaluated in the light of possible existence of sanctuary textile workshops.

Future Directions

Studies of textiles and textile production in the ancient northern Mediterranean are still in their infancy and the field has much potential to develop further in the near future. Investigation of the individual finds is constantly increasing the corpus of textile material. Statistical analysis of their technical data is finally permitting to define chronologically and geographically specific characteristics of the textile material. Over the last 20 years, the field of textile archaeology has been enriched by a series of new scientific methods including isotopic tracing, radiocarbon dating, dye analysis, scanning electron microscopy, X-ray spectroscopy, CAT-scanning, and DNA analysis (Good 2001; Andersson et al. 2010). Their systematic application to the archaeological textile finds of the northern Mediterranean will generate valuable data on textile technology, chronology, provenance, and preservation.

In addition to (or in the absence of) textiles, a study of number, distribution, and morphology of tools, based on statistical analyses of their physical parameters of preservation, size, weight, and use wear, can provide valuable information about technology, scale of production, and the importance of textile manufacture for a particular site. Functional typologies of tools, combined with analysis of the contexts in which they were found and their distribution patterns, allow inferences about changes and development of textile production in and between different sites and regions. This will make it possible to address issues such as the spread and use of technology, the mobility of craftspeople, communication patterns, and chronological changes in production.

An understanding of the development of textile production in the northern Mediterranean is crucial to any attempt to set textile technology in its social and economic context and to provide a more comprehensive view of textile production as an important and integral part of the ancient economy, placing it among other crafts, such as metal and pottery manufacture. The issue of textile production is also important for the investigation of craft specialization, workshop production, labor division, and gender, as well as the geographical and chronological variations in textile work as evidenced by differences in textile implements and how these technologies were transmitted between different geographical areas.

Cross-References

- ▶ Iconography, Etruscan
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Sheep: Domestication
- ▶ Textiles and Fabrics: Conservation and Preservation

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Domestic Architecture, Roman

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Introduction

The archaeological remains of Roman houses constitute one of the world's most common types of archaeological monument. Thousands of cities, each full of houses, were drawn together in a Mediterranean empire that stretched from northern Britain to Mesopotamia. These towns and their territories created a dense architectural landscape of palaces, town-houses, shops, villas, and farms. The remains of this architecture form a rich archaeological resource that continues to excite a wide public interest. As a consequence, the excavation, research, and management of Roman houses represent a major undertaking in those parts of the world that fell within the orbit of Rome (including much of Europe, North Africa, and Western Asia).

Although most domestic buildings in the Roman world were the modest homes of subsistence farmers, built following local vernacular traditions, elite residences were fashioned to provide an impressive setting for the conduct of familial, social, and commercial life. This involved a lavish investment in architectural magnificence: both in the scale of private residences as well as in luxurious display through features such as mosaics, wall paintings, sculptures, fountains, private baths, and gardens. There is considerable variety to this material, since each dwelling place was an individual artifact, built and rebuilt to serve the changing needs of different generations of owners and occupants. There are consequently many different types of Roman house, just as there were many different ways of being Roman.

Different regional identities and common world-views were represented in the layout and decoration of Roman houses. Elements of meaningful design include the way in which space was organized, encouraging the study of issues such as household organization and changing approaches to privacy and public life, as well as the intentionally vocal elements of art and design in both house and garden. The study of domestic architecture also draws us into the study of the building industry, both as an economic activity and as part of the history of technology, including specialist domains such as Roman carpentry (Ulrich 2006), tile roofing (Wikander 1988), earthen architecture (Lasfargues 1985), wall painting (Leach 2004), and stonemasonry (Adam 2003).

Definition

The Roman Atrium House

The study of the Roman house (Latin *domus*) has long been dominated by the spectacular remains of Pompeii and Herculaneum, interpreted through the lens provided by the writings of Roman authors, in particular Vitruvius. In its archetypal form (illustrated by the House of Pansa at Pompeii, Fig. 1) the Pompeiian house was characterized by an emphasis on visual lines of axial symmetry. The original focus of household activity was the central hall or atrium around which other rooms were arranged. Although Vitruvius describes a variety of arrangements, the atrium was usually covered by a roof which sloped down to a central opening (*compluvium*) beneath which a rectangular basin (*impluvium*) was placed to catch rainwater. The ideal atrium was reached by a narrow entrance from the street (*fauces*) facing a principal reception room (*tablinum*), and flanked by wings (*alae*) and small rooms (*cubicula*) (Vitruvius *de Architectura* 6; Granger 1931-4). By the time of eruption of Vesuvius in 79 CE, the main reception rooms of larger Pompeiian houses had been transferred to colonnaded gardens (peristyles) toward the rear of the house, where the principal dining room (*triclinium*) was located. These buildings offer invaluable information in understanding how Roman society functioned (Wallace-Hadrill 1994), but are not the whole story. The houses buried at Pompeii were the product of the social arrangements of a particular time and place, and

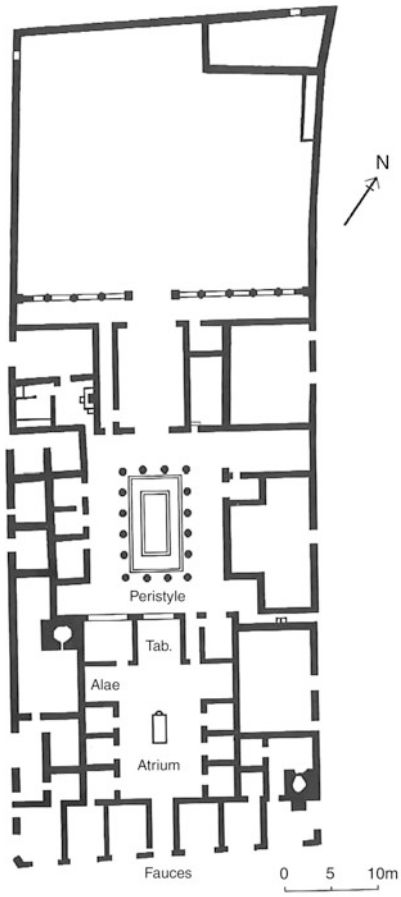

Domestic Architecture, Roman, Fig. 1 Plan of the House of Pansa, Pompeii

this architecture is not necessarily representative of what was happening elsewhere in the Roman world.

The Roman Courtyard House

Rome grew to power within a Mediterranean world already dominated by complex urban societies in which private houses played a key role. Some of the most influential developments in domestic architecture accompanied the political changes of fifth century BCE Greece (Nevett 2010). Several local varieties of urban courtyard house were evident at this time, following standardized plans suggestive of democratic equality. Most houses included rooms intended for ritualized dinner parties (*symposion*) where men came together in wine-lubricated debate that helped build political bonds. The design of these buildings drew on ideas of wider currency, inspired in part by earlier architectural developments in Syria and the Near East, and may have provided a model for subsequent developments in Italian domestic architecture. Recent excavations have uncovered evidence of an early form of Pompeiian house ("row-house") built around open central courtyards rather than the roofed atria familiar from later periods (Wallace-Hadrill 1997). Similar buildings have been found in colonies such as Cosa, where the earliest examples also date to the third century BCE (Sewell 2010). This early type of house appears to have been modeled on the Greek courtyard house, but also shows a clear affinity with atrium houses. In other words, the distinction drawn between Roman and Greek domestic architecture has been exaggerated, following the interest of authors such as Vitruvius in establishing rhetorical contrasts to emphasize Roman virtues (Hales 2003).

The Roman Peristyle House

The dialogue of architectural influence between Greece and Rome has been given particular attention in studies of the use of peristyle courtyards in Roman houses. In Roman Italy, the introduction of the peristyle to the atrium house is generally dated to the second century BCE, where these colonnaded porticoes were initially associated with gardens toward the rear of the house rather than being surrounded by reception rooms. This has occasioned the suggestion that they were inspired by the public architecture of the *gymnasia* (Dickmann 1997), although it is likely that these borrowings from public architecture first took place in Hellenistic palaces (Nielson 1999).

While columned porches were a feature of most types of courtyard house, the full peristyle – involving columned galleries surrounding all four sides of central inner courtyard – came to prominence in the late fourth century BCE Macedonian palace at Vergina. This building not only inspired the elite residences of the Hellenistic kingdoms, but influenced the design of early Imperial palaces built on the Palatine hill in

Rome from the time of Nero's Golden House (*Domus Aurea*) onwards (Ball 2003). The design of these buildings gave emphasis to audience rooms and the public display of luxury, using a wide range of references drawn from Hellenistic art and architecture. It was this form of Hellenistic architecture, laid out around central peristyle courtyards, which eventually characterized the domestic architecture of the Roman provinces. This is strikingly evident in the design and layout of the late first century CE Roman villa at Fishbourne in Britain: this most Roman of buildings drew clear inspiration from Macedonian palatial architecture but lacked many of the features of the Italian atrium house. Even in Italy itself, the atrium house fell from fashion, to be replaced by the central courtyard peristyle house, in a process that started in the late first century CE (Baldini Lippolis 2002).

The Roman *Medianum* Apartment

Another much-studied type of domestic architecture is evidenced by the multistoried apartment blocks of Rome and Ostia known as *insulae* (Barton 1996: 3). This form of residential architecture was probably developed in response to increased population densities in Rome in the first century BCE, and given further impetus by developments in concrete construction in the first century CE. These apartments provided rented accommodation to a range of tenants. A typical layout involved three sides arranged around a central rectangular room, known as the *medianum* (DeLaine 2004). This space had large windows opening toward a street or courtyard providing the main source of light. The principal rooms, sometimes with mosaics and painted walls, were located at the ends of buildings. Interior design suggests that the paintings came with the building, and were not commissioned by the individuals who took occupancy, suggesting that those who rented such accommodation – even if from an aristocratic background – did not use interior design to draw attention to individual achievement.

The Roman Provincial House

Although the establishment of the Roman empire, and the adoption of common approaches to elite architecture based on the peristyle house, fuelled homogenizing tendencies in Mediterranean architecture, it is important to stress the abiding importance of different local traditions. Social competition depended on a common language of design, which provided universal terms of reference for the conduct of polite social behavior, but also encouraged a creative engagement with that language. Architectural arguments within the different corners of the Roman empire referred to Rome, but were essentially local. It is consequently the case that the houses of Roman Silchester were visibly and recognizably different to the houses of the neighboring Verulamium – although both housed facilities that were designed and arranged in ways that were distinctly Roman (Perring 2002). For this reason, the double-tower houses (*Oikia dipurgia*) of Roman Egypt were very different from the winged-corridor villas of the Roman northwestern provinces: although in both cases, the defining feature of the building type was an interest in establishing an impressive and symmetrical house façade. Archaeological classifications give us many dozens of different types of buildings that can all be called Roman houses. There is no space here to examine the full range of types and influences, but in addition to the themes already alluded to here, it is also important to note the export of urban ideas to the countryside represented by the Roman villa, where the influences of late Hellenistic design were particularly strong. The different circumstances of country living encouraged the development of new forms of architecture, that in turn contributed to how wealth and status came to be displayed in town (as also evidenced by the architecture of Nero's Golden House). In frontier provinces, the houses built within Roman forts also provided an important model in regional approaches to house design (Barton 1996).

Historical Background

Modern study of the architecture of Roman houses builds on the scholarly rediscovery of the writings of Vitruvius, published in the

fifteenth century, and explorations at Pompeii from the mid eighteenth century onward. Large-scale investigations of other Roman towns and villas became a feature of nineteenth century antiquarianism, and generated a large body of excavation reports that has grown substantially with the results from more recent rescue excavations. These reports have been supplemented by specialist studies of decorations, in particular mosaics and wall paintings, and most recently by detailed typological studies of different aspects of building fabric (e.g., ceramic building materials, carpentry, etc.). The scale and range of this body of material makes synthesis difficult (although see de Albentiis 1990; Gros 2001; Ellis 2002). Most of the published material describes the decoration and layout of excavated Roman buildings, with a particular emphasis on typological development.

Scholarship has developed apace since 1990, encouraged in part by the quality of the new descriptive detail available from excavation and survey, by a greater willingness of both ancient historians and archaeologists to critically explore the relationship between text and material culture, and – in particular – by an increasing awareness of the value of spatial theory to the study of social change. Roman domestic space was designed to provide a setting for structured social encounters, and thereby helped to produce and reproduce social relationships. Recent work has concentrated on connections between specific spatial configurations, modes of behavior, and their associated ideologies. Houses were built to carry messages, and it has become fashionable to treat them as texts to be read. In this way, contemporary study of Roman domestic architecture contributes to research into the formations of Roman power both within the household, in civic life and in economic relations.

Key Issues/Current Debates

Architecture, Text, and Material Culture

It remains the case, however, that our reading of the evidence is shaped by the expectations that we bring to the exercise. For instance, it has recently been shown that pioneering studies of the architecture of late antiquity owed most to assumptions about the increasingly hierarchical nature of late antique society derived from ancient sources, thereby failing to give adequate attention to the evidence of peer competition which showed continuity with the earlier Roman period (Bowes 2010).

A principal concern of recent research is the relationship between the architectural remains, and the ancient texts that describe buildings and the activities that they housed. Excavation reports are littered with terms drawn from ancient sources, used first to identify and then give meaning to different types of feature, room, and building type. This modern use of these ancient terms is frequently confused, often anachronistic and has occasionally encouraged an over-static view of how ancient houses worked. Vitruvius was not writing to help archaeologists understand ancient houses, but to set out his own views on how houses should be built and why. His views were not necessarily those of the Pompeiian aristocrats whose houses we can visit, or of those who used these buildings and contributed to their design. It has consequently been suggested that we should renounce biased textual evidence as a means to understanding how Roman space functioned, relying instead on the quantifiable attributes of finds distributions supplemented by the evidence of fixtures and fittings within the house (Allison 2004). These data illustrate how the front halls of Pompeiian houses, normally identified as atria, were put to different and sometimes contradictory uses. It is probable that such rooms had different uses at different times, operating to different cycles and involving different casts of players.

There are two problems to this approach. In the first instance, finds distributions within Roman houses are poor indicators of how such buildings were used. Most of the rubbish deriving from daily use would have been swept away in routine household cleaning. The archaeological finds made during the excavation of Roman buildings usually derive from construction deposits, where broken pottery from various sources could be recycled as the foundation of

new floors. Destruction horizons are more likely to include objects lost in situ, but the circumstances of abandonment and destruction are far from typical. Secondly, the evidence of the written sources offers unique insight into contemporary perceptions of the purpose and meaning of domestic space. The study of domestic architecture benefits from differently constituted primary sources, all of which are valuable to research (Stewart 2008). These include spatial analysis, finds distributions, textual sources, and interior design. Mosaic pavements, wall-paintings, and sculptures help describe – at least allusively – the cultural identity and cosmological views of their patrons. Our reading of this evidence finds added meaning in the narrative dialogue offered by the sequencing, location, and intervisibility of different images. Further social and economic data – sometimes less consciously deployed than other aspects of design – are embedded in building fabric, as in the different traditions in roof design and carpentry, and the use of particular types of concrete construction (such as *opus africanum* and *opus reticulatum*).

The Construction Industry and Building Technology

The ancient world was transformed by changing approaches to construction techniques. In most traditional societies, houses are comparatively short-lived structures, intended to serve the needs of a single generation of use before being replaced. There is consequently an emphasis on timber and earthen constructions, based on low-cost locally available materials that are easily recycled. The use of property in the support of political power, and as a basis for taxation and rent, helped to change attitudes to property and contributed to the commodification of domestic buildings. The importance of managing buildings as property, and of resolving conflicts over basic resources such as water and light, is illustrated by the attention given to these subjects in late antique legislation – which forms an important body of evidence for the study of Roman domestic architecture (Saliou 1994). In the north-west provinces, changes in the perceived value of domestic property can be seen in the way in which the ephemeral timber constructions that characterized the earliest urban settlements came to be replaced by more permanent houses of brick and stone. Short-lived timber houses, some involving sophisticated carpentry and expensive interior decoration, required replacement every decade or so. The architects of these houses were perfectly capable of designing more durable structures, but did not see the need to do so. The subsequent decision to invest in more durable materials and structures reflects on the growing importance of real estate as a means of accumulating wealth and representing power. In the towns of Roman Britain, the pattern of development involved a shift from timber architecture (involving timber framing), to earthen architecture based on Gallo-Roman tradition, to masonry and concrete constructions.

This investment in structural permanence permitted and encouraged more elaborate spatial designs. Developments in concrete construction allowed for innovative and experimental approaches, as pioneered in the imperial architecture of Rome, and reinforced the trend toward more complex forms of building design – as in the use of apsidal and curved spaces, and of vaults and multistoried buildings.

The Origins of the Atrium House

Considerable attention has been given to the subject of where and when the atrium house first emerged (Wallace-Hadrill 1997). This is part of the continuing debate over the relative importance of imported (Greek) and local (Italic) contributions to Roman domestic design. Studies have given undue significance to the presence of the *compluviate* roofed court around which other rooms were arranged. The key feature, from an archaeological point of view, is the *impluvium* (water basin) at the center of the room. This was not simply a decorative feature but an important part of water management. One of the benefits of building houses around central courtyards is the way in which the inwardly sloping roof arrangements captured and funneled all of the available rainfall, which could then be channeled toward underground cisterns. Prior to the introduction of aqueduct-fed water supply, rare in most cities

before the first and second centuries CE, this was how households obtained their drinking water. The *compluviate* roof managed water supply in the same way but with even greater efficiency, and also allowed for the central area to be covered.

The standard evolutionary account, following Roman authors such as Vitruvius and Varro, has the *impluviate* central space as the original Italic characteristic. Archaeologists have found supporting evidence in the layout of houses in the fifth century Etruscan colony at Marzabotto, which had cruciform plans reminiscent of the atrium-*tablinum-alae* design. It seems likely that Roman houses were, indeed, influenced by these earlier Etruscan houses. What is not so certain is that this is where the *compluviate* atrium was first elaborated. Wallace-Hadrill (1997) draws our attention to three key features within the available evidence: firstly, the *impluvium* basin was a water-management feature that could be as useful in an open court as in a room with a *compluviate* roof; secondly, the evidence of "row-houses" at Pompeii and Cosa (summarized above) shows that many houses previously thought to have had covered central halls (known from Vitruvius as *displuviate* atria) were actually courtyard houses; and thirdly, changes to the drainage arrangements show that some Pompeiian atria started life as open central courtyards before the addition of *compluviate* roofs. The emerging model is one in which the *compluviate* atrium seems likely to have been an elaboration of the central courtyard that gained prominence in the course of the fourth/third century BCE as Rome and its allies developed new styles of housing in the formation of new models of Roman urbanization (Sewell 2010). This new architecture also found its place in the countryside. Excavations at the Auditorium site outside Rome have shown that the farm here was completely rebuilt in the late third century as an atrium villa. Here the introduction of the atrium was not the product of gradual evolution, but represented the imposition of an entirely new concept.

The House and Social Life

We now turn our attention from the house as artifact, subject to typological classification, to the social meanings that can be read from architectural design. A recurring theme in recent research has been the pivotal role of the private house in public life (e.g., Wallace-Hadrill 1994; Cooper 2007). Modern distinctions between private and public do not easily transfer to the ancient world, where public affairs were also private matters. The main focus of recent scholarship has been the role of the house as a setting for the ritualized social encounters from which political and economic life was built. The development of more complicated house-types was a product of the social complexity that came with the foundation of cities and formation of states. The Roman Empire depended on cities as vehicles of taxation and control, and as fora for the networks of patronage and dependency that sustained authority. Power in such places was mediated through individuals and therefore centered on the *domus*, which was designed to enhance the status and authority of the head of the household.

Roman authors describe two particular social events that routinely took place in the Roman house: the morning *salutatio*, when clients attended the head of the household, and the evening banquet when friends and colleagues were entertained in dining rooms. Domestic architecture was fashioned around these reception activities. Audience rooms found nearer to the entrance to the house – such as the atrium and *tablinum* – were used as formal settings for the morning *salutatio*. In contrast, dining rooms were usually set toward the rear of the property where they were arranged to best exploit available light, sometimes commanding views over formal gardens or the wider landscape. These dining rooms were commonly found in relatively low-status buildings, and were as much a feature of the commercial premises ("strip buildings") of Roman London as of the atrium-peristyle houses of Pompeii. Decorated porticoes and corridors guided privileged guests toward these more intimate parts of the house, in a processional approach to space that became even more pronounced in the houses of late antiquity. Private bath houses were also a feature of the reception space of later Roman houses, and

especially of country villas. These facilities were often placed on the opposite and more public side of the house to the rooms most likely to have housed the supper parties. Colonnades and porticoes were used to link these opposed and contrasting reception areas, in a form of spatial dialectic. The importance of these different reception facilities – audience halls, dining rooms, porticoes and peristyles, and bath houses – is illustrated by the disproportionate amount of space that they took up within the house, by the expense of their decoration, and by the fact that these were the rooms most likely to be extended and improved during the life of a property.

In all parts of the Roman world, and at a range of different dates, one of the most common forms of architectural alteration involved the addition of a peristyle or portico: such features were added to internal courtyards, to form new building façades, or to create garden colonnades (Perring 2005). These colonnades drew inspiration from the public architecture of the *gymnasia* and were usually built in association with dining rooms. The portico mediated between human and natural domains: a metaphorical opening from the house into the natural and therefore divine. The garden was important symbolic space, with fountains and ponds located to command the views that obtained from the dining room. The design of this part of the house was perhaps modeled on the dialectical contrasts that could be drawn between the rational debate of the *gymnasium* (in the peristyle) and the irrational discourse of the wine-fuelled supper party (in the dining room). In many houses, a square room – sometimes containing water features – was placed opposite the dining room projecting into the garden beyond. Although differently designed, this was a feature of many different provincial traditions (from North Africa to Britain). Dickmann (1997) has identified the Pompeian version of this space with the *exedra*: a place for meetings, readings, debate, and study. The spatial arrangement adds emphasis to the relationship between dining room, colonnade, and garden. The room identified as an exedra allowed for a form of synthesis between the contrasts posed between rational space (colonnade) and irrational space (dining room), and between human and natural worlds (house and garden). The presence of fountains and other water features in some such rooms reinforces the sense that this space straddled a conceptual boundary between human and divine.

Above all else houses can be read as statements of cultural affiliation. Different layers of meaning can be obtained from the ideas made explicit in the cultural references used in interior design, and implied by uses of space that reflected on particularities of family and household structure. While much recent research in Italy and the eastern Mediterranean has been concerned with the dialogue between Roman and Greek identities, work in the western provinces has been dominated by a concern with the way in which conquered provinces and provinces came to adopt Roman fashion. Roman aristocrats drew on a range of values intended to reinforce their prestige among their clients, friends, and peers. These values were likely to include those of Roman imperial authority, rooted in Roman history but influenced by the Augustan interpretation of hellenistic models, as well as those more directly derived from Greek philosophy. These values were developed through local competition, and were consequently expressed in local idiom. Roman identity was negotiated, and part of a plurality of coexisting identities (Hales 2003).

A core topic of recent research is the nature and structure of the Roman household, where the evidence of domestic architecture has been drawn upon to reconstruct social arrangements (Rawson 2011). It is difficult, however, to recognize the family as a social unit in the plans of Roman domestic buildings. Indeed, it usually requires a considerable degree of speculative reconstruction to find boundaries between properties and households within the Roman housing block, since the only intervention needed to create two separately tenanted units from one former property is a lock on a door. Archaeology cannot usually tell us which thresholds were barriers and which were portals.

The common pattern of urban living involved a mixed distribution of the houses, apartments,

and shops. We know from inscriptions at Pompeii that the owners of property could let out residential accommodation on upper floors, and in shops along street frontages. In most cities, the rich lived surrounded by their dependants: by slaves and freedmen, clients, and tenants. This community was the source of both social and economic power. As patrons and investors, urban aristocrats were actively involved in most aspects of the urban economy. This economy involved a significant degree of workshop production, and there was no clear distinction between industrial and domestic premises.

Several groups could be placed under one roof forming a "houseful" of potentially unrelated individuals such as friends, lodgers, servants, or slaves. Women and children are notoriously difficult to find in the spatial data. Attempts have been made to find the echo of gender distinctions in Roman houses, represented in the different pathways that might have helped limit and control encounters between outsiders and family members (Nevett 2010). These are not entirely convincing, since different access arrangements might equally have accommodated the different needs of important guests gaining honored entry through the front door, and those of slaves and tradesmen making a less conspicuous entry. Household slaves are equally difficult to locate within the archaeology of the house. We assume that these invisible communities made use of attics and work-rooms, sleeping at the foot of a master's bed or in the kitchen. The duplication of residential-suites in some buildings, notably in the villas of the western provinces, might illustrate the provision of separate quarters of near equal status for both lord (*dominus*) and lady (*domina*) of the household.

The End of the Roman House

The houses of late Antiquity have also become the focus of recent research (Lavan et al. 2007; Bowes 2010), with a particular focus on the introduction and development of more lavish and specialized reception facilities. The proliferation of such houses in the fourth and fifth centuries followed the expansion of imperial bureaucracy in the economic and social reforms of Diocletian and Constantine. This investment reflected on an intense aristocratic competition, given impetus by new avenues for advantage obtained through imperial honors and service. The growing importance of Christianity within the households of the later Roman empire, and the consequent emergence of Christian types of houses (including Episcopal houses), is a related theme of current academic interest. The early development of Christian architecture drew on the architecture of the private dining in the later Roman aristocratic house, which is the likely source of inspiration for the design of the apsidal-ended Christian basilica.

In the western empire, Roman styles of housing ceased to have social and political relevance with the failure of Roman administrations and the decline of Roman cities. In the eastern Mediterranean, patterns of use were also changing, and by the late sixth century, many grand houses had been subdivided and redesigned against a different form of occupancy. Despite such changes, Byzantine and early Islamic houses continued to be built in ways that would have been familiar to Roman aristocrats.

Future Directions

Academic research is well served by the large body of excavated data already available, and will continue to benefit from rescue excavations in modern cities built over the sites of Roman ones. This will allow for further refinements in understanding chronologies of change, and in defining particularly local features of design that shed light on regional and civic identities. There is most scope for such work in those areas of the Roman world that were neither particularly Italian nor Greek. We can anticipate wider interest among students of Roman domestic architecture in the contribution made by the provinces formed within the former territories of the Achaemenid empire, within the Phoenician states, and in Punic North Africa. There is also a considerable scope

for more advanced study into the building industry as a sector of the ancient economy, based on the quantitative data that can be obtained from the fabric of individual buildings.

The greatest challenges, however, are those that attach to the conservation needs of Roman buildings. The collapse of the house of the Gladiators in Pompeii in 2010 drew worldwide attention to the vulnerability of these buildings. Conservation issues will absorb an ever-increasing share of the available funding, and this will in turn inspire new areas of research.

Cross-References

- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Romanization
- ▶ Symposion
- ▶ Urban Planning, Roman
- ▶ Vicus
- ▶ Villas and Farms in the Mediterranean World

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Domestication Syndrome in Plants

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Introduction

The evolution of domesticated forms of plants involved the selection of traits that were suited to the human rather than the wild environment. The types of traits that are selected have been similar across different species plants giving rise to the concept of the domestication syndrome. Some controversy still persists about the nature of selection of such traits and the degree of human consciousness involved, although the majority of the field accepts that most traits were probably subject to unconscious selection. It has become apparent in recent years that understanding the nature of the plurality of processes underlying the domestication syndrome is key to understanding the origins of domestication.

Definition

The domestication syndrome can be defined as the characteristic collection of phenotypic traits associated with the genetic change to a domesticated form of an organism from a wild progenitor form. The term "adaptation syndrome" as applied to traits automatically selected through a harvesting regime of cereals was first coined by Harlan (Harlan et al. 1973), and the phrase "domestication syndrome" was first coined by Hammer (Hammer 1984) a decade later. Typical syndrome traits include the loss of shattering (the ability for a plant to abscise and drop its seeds), changes in seed size, loss of photoperiod sensitivity, and changes in plant physiology and architecture. The concept was developed very much with cereals in mind but has been extended to other plant types as well, usually with traits that had already been recognized in cereals. For instance, tree species have often undergone a thinning of the pericarp under domestication, and pulse and tuber-forming species have reduced toxin content.

Key Issues/Current Debates/Future Directions/Examples

Understanding how the domestication syndrome traits arose has become key to understanding the origins of domestication itself. There are several reasons for this. Firstly, archaeological evidence in recent years has demonstrated a staggered appearance of traits (Fuller 2007) rather than the previous perception of an effectively synchronous rapid arrival of traits. In the case of cereals and pulses, seed size increases are seen some time before the loss of shattering for instance. This has served to emphasize the plurality of processes involved; different traits are selected by different particular pressures. Secondly, in parallel, in the genomic era of biology, the genetic mechanisms underlying traits are steadily being unraveled (Fuller & Allaby 2009). In some cases, traits are more or less monogenically controlled, such is the loss of shattering, and in other cases, there is polygenic control, such as in the case of seed size, often with pleiotropic effects of genes – genes being involved in more than one function in the plant. In particular, the network of genetic interactions within which a causative genetic locus sits is being better understood, such as the loss of an important component of the circadian clock (the molecular clock that measures day length that most plants and animals require) to achieve insensitivity to day length and so grow in new latitudes (Jones et al. 2008). In short, there is a growing appreciation of the interdependence of the genetic causes of the domestication syndrome, particularly with background genome function.

The drawn-out nature of the arrival of domestication syndrome traits has reopened the debate regarding the role of human agency. In particular, efforts are underway to explore the different human behaviors that give rise to the fixation of various traits (Fuller et al. 2010). Models are therefore being discussed which actively try to explore the coevolution of humans, both in terms of behavior

and in physicality, and plants together. Naturally, this reopens the door to the debate about consciousness of selection, since it has been argued that while some less obvious traits may be unconsciously selected for, more obvious traits may be part of a different, conscious selection (Abbo et al. 2010). Either way, it is clear that the rise of the domestication syndrome involves both the evolution of plants and humans. This latter has been brought into sharp relief by recent studies on the increase in human alpha-amylase copy number believed to be an adaptation to an increased starch-based diet introduced by agriculture (Perry et al. 2007).

The problems of balancing the plurality and commonality of the causes of the rise of the domestication syndrome have been further highlighted by attempts to measure the strength of selection of very different traits directly from the archaeological record (Purugganan & Fuller 2011). We understand much more about the genetic basis for traits such as seed size (a complex polygenic-controlled trait) and loss of shattering (a simple monogenic trait) and have models about the different selection pressures that most likely drove their fixation (sowing and harvesting practices, respectively), which serves to underline the plurality of the system. However, surprising signs of commonality are also evident in that both traits appear to have been subject to very similar strengths of selection that are very low compared to what may have been previously supposed about the strength of artificial selection and in fact in the range found in instances of "normal" natural selection.

The future challenge is one of integration of quite complex but interdependent factors, outlined in brief here. It remains to be seen whether the domestication syndrome includes pluralities that can be truly separated out and applied in parallel across plant species or whether there are pluralities that have dependence on each other that can only move together.

Cross-References

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- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
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- ▶ Bananas: Origins and Development
- ▶ Barley: Origins and Development
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- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Grapes: Origins and Development
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Maize: Origins and Development
- ▶ Manioc: Origins and Development
- ▶ Millets: Origins and Development
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Potato: Origins and Development
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Domestication: Definition and Overview

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Introduction

The domestication of plants and animals represents a key turning point in human history. This first foray into genetic engineering created new varieties of plants and animals that could be grown around the world – most often at the expense of other species that remained outside a domestic partnership with humans. The development of agricultural economies based on domesticates is arguably the central factor in the loss of global biodiversity. It transformed earth's landscapes and its atmosphere. It fueled a population explosion of agro-pastoralists and has been a cornerstone of increasingly complex societies around the world. Understanding when, where, how, and, above all, why humans and certain plant and animal species began on their journeys into domestication remains an enduring and rewarding area of inquiry of archaeological research.

Answering these central questions requires a solid understanding of just what domestication is – and here there is a decided lack of consensus. Domestication at its heart represents a nexus between the biological world and the cultural. As such it has been a focus of inquiry for biologists, as well as archaeologists and anthropologists, who all bring different perspectives of how to define domestication. Recent advances in our ability to both detect and date the ongoing process of domestication and to trace its impact in both the genotype and phenotype of domesticates point the way to how the cultural and the biological components of this process can be reconciled and brought together in the construction of a definition of domestication that can more effectively guide the pursuit of questions of how, when, where, and why it developed.

Definition

Domestication is defined here as a sustained multi-generational mutualistic relationship in which humans assume some significant level of control over the reproduction and care of a plant/animal in order to secure a more predictable supply of a resource of interest and through which the plant/animal is able to increase its reproductive success over individuals not participating in this relationship (Zeder 2012a).

There are two other terms that require definition here: Agriculture, defined as a subsistence economy based primarily on resources garnered through the propagation and tending of domesticates, and Management, defined as the manipulation of the breeding and/or

conditions of growth of a plant or animal, or the environment that sustains it, in order to increase its yield or predictability.

Historical Background

The definition of domestication adopted here represents an attempt to reconcile the different approaches to defining domestication offered by researchers coming at the subject from different perspectives. All definitions, however grounded, recognize that domestication involves a relationship between humans and target plant/animal populations (Zeder 2006). They differ in the degree of emphasis placed on either the human or the animal side of the equation and the degree to which they portray domestication as a culturally driven process or a biological one.

Some approaches, especially those adopted by researchers focusing on animal domestication, cast humans as the dominant partner in a relationship in which humans, deliberately and with forethought, assume complete control over the domesticate's movement, supply of nutrients, its protection, its distribution, and, above all, its reproduction in order to achieve specific clearly identified goals that service the human community (Clutton-Brock 1994). Many working within this perspective emphasize the degree to which the domesticate becomes incorporated into the socioeconomic dimensions of human societies, either as productive capital (Meadow 1989), or as objects of ownership and vehicles for social relations between human individuals and households (Ingold 1984).

Other approaches, in contrast, define domestication as a symbiotic or mutualistic relationship in which both partners, humans and domesticates, reap benefits. This approach seems to be most common among researchers focusing on plant domestication (Blumler & Byrne 1991), although researchers primarily concerned with animal domesticates have also embraced it (O'Connor 1997). Perhaps the most extreme version of this approach can be found in the work of the late David Rindos (1984), who argued that the mutualism that lies at the heart of the relationship between humans and domesticates is no different from other mutualistic relationships in nature (i.e., that between social insects and a variety of other plants and animals). In fact, Rindos goes so far as to place the balance of power in this mutualism in the hands of the domesticate. According to this view, the domestic relationship confers great evolutionary advantage on the domesticate by raising its evolutionary potential far above other plants and animals outside of a mutualistic relationship with humans. Humans, on the other hand, do not fare as well because they become increasingly dependent on domesticates which offer lower energetic and nutritional returns at higher production and processing costs. This definitional approach, moreover, denies the role of any deliberate or directional intent on the part of humans who become ensnared in a coevolutionary dance with domesticates that effectively lowers their selective fitness.

An effective argument against this more extreme position comes, paradoxically perhaps, from entomologists drawing parallels between attine ant-fungal mutualisms and the relationships between humans and domesticates (Schultz et al. 2005). While these researchers highlight many features of the sustained multigenerational coevolutionary relationship between ants and their fungal gardens that resemble those between human farmers and their crops, they also identify a basic, essential difference that distinguishes the human/domesticate partnership from other mutualistic relationships found in nature. Mutualisms in nature, they note, are shaped by selection operating on random mutations in *both* partners that are passed on, through sexual reproduction, to their immediate descendants. Humans, on the other hand, have the ability to spontaneously invent and adopt new behaviors, or modify old ones, to meet consciously conceived goals. Humans, through social learning, are also able to pass on those innovations judged effective not only to their own offspring but also to others in their immediate group and beyond. The human ability to spontaneously, and with deliberate intent, invent new behaviors to meet consciously conceived goals and to pass these behaviors on

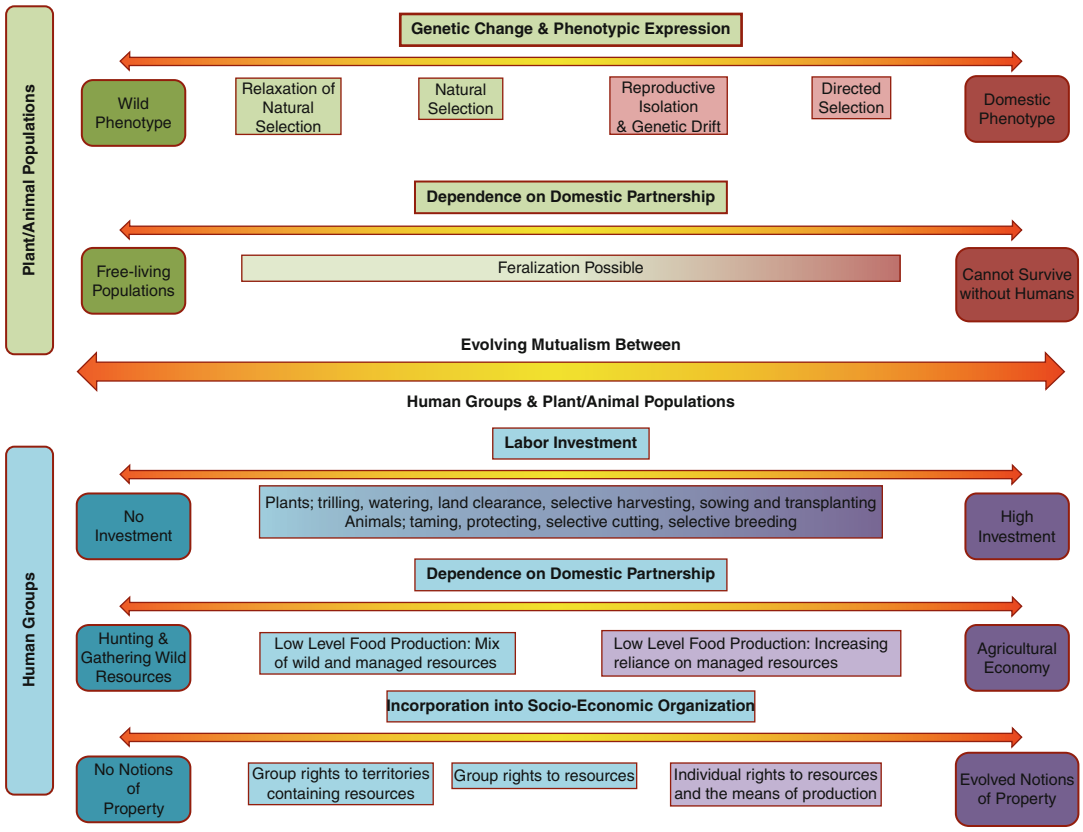

Domestication: Definition and Overview, Fig. 1 Multiple axes of domestication

through cultural transmission quickly shifts the balance of power in the developing mutualism between humans and developing domesticates far beyond the slowly evolving, balanced mutualisms between ants and fungus, as well as those found within other coevolutionary relationships in the natural world.

The definition offered here recognizes domestication as a form of symbiotic mutualism that, quite aside from questions of the quality of life of either partner, enhances the fitness of both. At the same time it acknowledges the role of intent-driven human behavior at the heart of the process, making this an essentially asymmetrical form of mutualism in which humans become the dominant partner. Humans may not have foreseen the adaptive responses of target plants and animals to their efforts at promoting the biotic potential of economically useful species, nor could they have envisioned the development of agricultural economies based on the genetically modified varieties of plants and animals that developed as a result of these efforts. But they could, consciously and with intent, decide to influence the distribution, feeding, and reproductive cycle of these species in order to achieve consciously perceived proximate goals of enhancing the supply and, above all, the predictability of these important resources. And it is this driving element of purposeful human behavior that is a central distinguishing feature of domestication.

Portraying domestication as a sustained multigenerational mutualism between humans and target plants and animals shaped by both biological and cultural components requires that we think of domestication as a process that operates on multiple axes on both the plant/animal and the human side of the equation (Fig. 1). On the plant/animal side, a sustained relationship with humans results in genetic

changes and their phenotypic expression that take the plant or animal from its wild phenotype and transform it into its domestic one. While directed, or artificial, selection for specific traits is most often thought of here as the major vector of genetic change in domesticates, other less directed factors probably played a greater role in moving plants and animals along this axis. Specifically, both the relaxation of pressures that operated on the free-living plant or animal and the introduction of a whole new range of selective pressures as it came into closer association with humans are likely major shaping factors during the earliest stages of the process. Reproductive isolation and genetic drift also play major roles in moving the target species along this axis as humans prevent the plants and animals under their care from interbreeding with free-living populations, often by moving these managed resources away from the natural habitats of their progenitors. As the target domesticate precedes along this axis, it may also progress along another axis, moving from a free-living state to one in which some degree of feralization is possible should it leave the domestication relationship, to a plant or animal that is entirely dependent on humans for its reproduction and development.

On the human side of the equation lies an axis that involves the increasing investment of labor in the propagation and care of the target species as humans engage in progressively more intensive activities directed at increasing the yield or predictability of the species. These activities can be classified under the general rubric of *management*, as defined above. The degree of dependence on these managed resources forms another axis on the human side of the relationship as the human group moves from utilizing only free-living resources to the increasing incorporation of managed/domesticated resources into their subsistence economy, culminating in the adoption of an *agricultural economy*, also defined earlier. Another possible axis on the human side of the relationship might involve the degree to which the target species becomes woven into the socioeconomic fabric of the group, here moving from a state in which there are no notions of individual, or group, ownership over a resource or resource territory, to increasingly more defined and individualized notions of rights over resources and the means of producing them.

It is important to recognize that all of these axes are in play during the process of domestication and that the pace and direction that humans and their plant/animal partners progress along any of them varies from case to case. Movement along these axes is shaped by the biological potential and constraints of the target species, the cultural context in which the process takes place, and even accidental happenstance that brings potential domesticates together with receptive human groups at particular times and places. Arrival at all, or even any, of the endpoints of these various axes is not inevitable. In fact, human management of resources most often does not result in the development of phenotypically new varieties (or species) unable to survive outside the domestication relationship. Sustained management of certain resources may not, in fact, result in any genetically driven changes in behavior or morphology that, by some definitions, would qualify the resource as a domesticate. Management activities may remain stable at fairly low levels, without intensifying, for hundreds, if not thousands, of years. There are also many examples of long-lived low-level food-producing economies that are reliant on a diverse range of resources – free living, managed, and fully domesticated – in which domesticates remain minor components, serving more as buffers against leaner times than as major subsistence staples. These economies may persist for millennia without ever becoming full-fledged agricultural economies (Smith 2001). This approach, then, views resource management, domestication, and agriculture as three independent, though related, phenomena that are not linked in a unidirectional way of inevitable progression from one to another. All domesticated resources are managed, but not all managed resources become domesticates. By the same token, agricultural economies by definition focus primarily on the production of domesticated resources, but not all subsistence economies that utilize domesticates become agricultural economies.

When, then, can a managed resource be considered a domesticated one? Is there a clear threshold or line of demarcation that separates the wild from the domestic? Some researchers reserve the mantel of domesticate for those plants and animals which, over successive generations under human management, have undergone changes in their genetic makeup that preclude them from being able to survive and reproduce outside of the domestic relationship with humans (De Wet & Harlen 1975; Blumler & Byrne 1991). Strict adherence to such a hard-line position would, as most would admit, exclude many clearly domesticated plants and animals that, although they do not revert to the pre-domestic form or behaviors, can survive apart from humans as feral escapes from domestication. Others take a slightly softer line, but still require the domesticate to have undergone genetically driven changes in either morphology or behavior (Meadow 1989) and that it be genetically isolated from populations of its wild relatives (Uerpmann 1996).

Researchers who focus more on the cultural side of the equation are generally less concerned with the genetic or phenotypic impacts on the plant or animal or with defining threshold where wild becomes domestic, emphasizing instead a continuum in human relationships with plants and animals that range from collecting to farming and from hunting to herding (Ingold 1984). Some have argued that the term domestication should be done away with altogether and replaced by a less biologically deterministic one like "cultural control" (Hecker 1982) or by defining a species as domesticated "whenever another species knows how to harvest it" (Terrell et al. 2003).

Once again the definition offered here seeks to chart a middle path through these contrasting approaches. It explicitly does not specify the degree of genetic and phenotypic change required for a managed plant or animal to qualify as a domesticate, nor does it indicate the degree of human investment in the management of the resource, its importance in the subsistence economy, or the extent to which it becomes an object of proprietary ownership needed for a resource to be classified as a domesticate. At the same time it acknowledges domestication as a unique form of human-driven mutualism. By spotlighting the sustained multigeneration relationship between humans and target domesticates, it distinguishes domestication from more casual episodic human-plant/animal interactions, like taming, periodic transplanting or sowing, or harvesting, that do not lead to the long-term coevolutionary relationship that defines domestication. By focusing on this process, rather than any particular threshold or defining criteria that separates the wild from the domestic, it directs attention to the full span of the evolving relationship on both the plant/animal and the human side of the equation and requires that all the different axes of change involved in this process be taken into consideration when trying to trace the course of domestication in any particular instance.

Key Issues/Current Debates

Always a major focus of archaeological inquiry, research on the domestication of plants and animals has seen a special resurgence in recent years thanks to the development of new analytical tools that provide a much more detailed understanding of when, where, and how different plant and animal species were taken into domestication. The development of markers (both biological and cultural) capable of tracing the domestication process is a particularly active area of current research and debate. In part as a result of the more robust understanding of the trajectory and timing of the domestication of different species in different parts of the world gained by the development of these markers, there has also been renewed energy directed toward answering the question of why people and target plants and animals set out on these various pathways to domestication.

Documenting Domestication

Some of the most exciting advances in documenting domestication have come in the form of genetic analyses of both modern and archaeological plants and animals (see Zeder et al. 2006 for a summary and extensive

references). Phylogenetic analyses of neutral or noncoding genes have been widely used to (1) determine the wild progenitor species of a current day domesticates, and (2) identify the likely place (or places) of initial domestication. One of the more interesting outcomes of this work is the discovery that for almost all animal domesticates, and many domestic plants, more than one lineage of its wild progenitor was brought under domestication. There are, for example, six domestic lineages of domestic goats, five to six in cattle, and as many as five or more in pigs. The degree to which these different "domestication events" are truly independent of one another, geographically and culturally, is unclear (Dobney & Larson 2006), but this discovery clearly shows that the process of domestication was more widespread and less centralized than originally thought. Much of this work has been done using modern representatives of domestic crops and livestock and their wild progenitors, where as much as 10,000 years or more of movement, directed breeding, hybridization, and introgression between wild and domestic forms may obscure the picture of the initial process of domestication. Increasingly, however, successful extraction of ancient DNA from archaeological plant and animal remains is allowing more direct insight into the history of domestication for a number of different plants and animals (e.g., Larson et al. 2007).

Especially with the advent of next generation genomic techniques, the specific genes and coding loci that control individual domestic traits are being discovered, giving new insight into the genetic responses of domesticates to human manipulation. These discoveries have been especially impressive in plants where the loci responsible for domestication traits such as the development of the non-shattering rachis in cereals like wheat, barley, and rice, or branching architecture in maize have now been identified. Progress in this direction has been slower in animals, perhaps because identification of genes responsible for the behavioral attributes most involved in animal domestication has proven more elusive, though there has been some progress in this area as well. Moreover, genetic studies of archaeological plant remains are beginning to be able to trace the timing and the trajectory of the development of these domestication traits in crops like maize (Jaenicke-Després et al. 2003), signaling a very promising area for future research.

There have also been significant advances in the development of archaeobiological markers of domestication. Until relatively recently, archaeologists looked to a few archaeologically detectable morphological changes in plant and animal remains as gold standard markers of initial domestication (see Zeder et al. 2006 for discussion and references). We now know that many of these markers may not, in fact, be leading edge indicators of domestication. The appearance of a few cereal grains from non-shattering seed heads can no longer be interpreted as evidence of domestication, since this trait has been documented to occur, in low levels, in wild stands. The dominance of non-shattering cereal rachis in archaeobotanical assemblages, moreover, may reflect a change in harvesting practices that may occur hundreds of years after people began actively sowing harvest seeds from cultivated fields (Tanno & Wilcox 2006). The reduction in overall body size once thought to be an almost instantaneous artifact of animal management has been shown instead to be attributable to a shift in the demographics of prey populations reflecting the different harvest strategies of hunters and herders. In fact, we now know that archaeologically detectable changes in the morphology of domesticated animals may only manifest themselves hundreds of years, or more, after humans begin active management of an animal species. There is increasing awareness that significant genetic changes in both plants and animals under human management (i.e., lowering of seed dormancy rates or changes in the timing of maturation, selection for reduced wariness, or changes in coat color in animals) may not manifest themselves in ways that are detectable in the archaeological record. As a result, archaeobiologists are actively looking for new markers capable of detecting these crucial initial stages of the process – changes in the demographics of harvested animals mentioned above,

changes in feeding patterns of managed animals detectable through isotopic analysis, epigenetic changes in bones and teeth reflective of reproductive isolation of managed animals, architectural evidence for the keeping of animals or storage of crops, artifacts or residues that point to the use of animal products, the presence of diagnostic plant microfossils (phytoliths and starches) in soils and on artifacts, modifications of landscape to accommodate the needs of transplanted crops, weed assemblages characteristic of cultivated fields, and plastic responses of seeds and other plant structures to artificial watering.

As promising as these new developments are in the genetic, archaeobiological, and archaeological documentation of domestication, it is crucial that those developing and employing these new approaches be able to explicitly link the marker they are using to some aspect of the process of domestication and to explain why the marker in question is an artifact of this evolving mutualism between human and a plant/animal species. There are plenty of examples of markers that have been linked to domestication in a *post hoc* way after they were observed in the archaeological record in assemblages thought to represent initial domestication, only to be discovered later to be attributable to entirely different factors unrelated to domestication (i.e., overall body size reduction in animals). There is still a tendency to engage in this kind of after the fact rationalization of how something observed in the archaeological, or genetic, record might be an artifact of domestication. Continuing development of these promising biological and archaeological techniques for documenting domestication can only make headway if there is an active dialectic that allows us to link our understanding of the process of domestication to the markers we use to trace this process.

Explaining Domestication

The more robust record of domestication produced by these advances in our methodological ability to document transformations in animal and plant species has energized efforts at answering the key question of why humans and plants and animals embarked on these various pathways to domestication (see Zeder & Smith 2009 for summary and references). Recent years have seen a resurgence of models featuring climate change as a major driving force behind plant and animal domestication, either as a response to climate deterioration during the Younger Dryas or as a response to the amelioration and stabilization of climate that followed. Models have been offered that feature the role of domesticates in promoting the ambitions of individuals who seek social promotion, that spotlight religion as key motivating force behind domestication, or that see the seeds of domestication as deeply buried within human cognitive abilities and their use of symbols to navigate and transform the world around them.

Perhaps the most prominent explanatory models offered in recent years are those that characterize domestication as a response to resource depression, usually caused by human demographic expansion, but sometimes due to environmental change. Framed within the precepts of optimal foraging theory, which was originally developed to account for the foraging behavior of animals, the adoption of plant and animal domesticates, with their purportedly lower energetic yields, higher processing costs, and delayed returns, can only be considered less than optimal, lower ranked resources resorted to only when higher yield, more optimal resources are no longer available. This resource depression model has been applied globally to account for the adoption of domesticates and the diversification of the resource base that often precedes it in early and middle Holocene context around the world (see Zeder 2012b for discussion and references).

Recently, however, archaeologists have begun to turn to another school of thought in evolutionary biology, niche construction theory, for an alternative explanatory model for the origins of plant and animal domestication (Smith in press; Zeder 2012b). This model emphasizes the role of humans in manipulating environments and resources within them to increase overall biotic potential. To many it is a better fit with an increasingly better-resolved archaeological

record, in which resource diversification and follow-on domestication of certain plant and animal species seem to occur more often in the context of resource abundance and low population levels than in the context of resource depression and population packing.

Regardless of which model proves in the long run to be more useful in accounting for this transition, the richer empirical understanding of how domestication came about in different areas of the world makes it increasingly difficult to posit single lever, prime mover explanatory scenarios for initial domestication. Instead, it is becoming increasingly clear that multiple interacting factors – environmental, demographic, social, and biological – are responsible for driving this process and shaping its trajectory as it played out in different areas of the world with different plants and animals and human societies.

International Perspectives

Twenty years ago, the prevailing view was that domestication and agricultural economies based on them arose only in a handful centers around the world. The majority of work on origins of domestication and agricultural emergence focused primarily on two world areas – the Near East, primarily in the eastern and western arms of the Fertile Crescent region that stretches from southern Israel to southern Iran; and in Mesoamerica, primarily based on the small soundings in a handful of caves central and southern Mexico. In recent years the number of documented centers of independent domestication has skyrocketed (Fig. 2). Evidence of independent domestication has been documented on essentially every continent, save Antarctica, and the variety of domesticates under study has exploded from a handful of

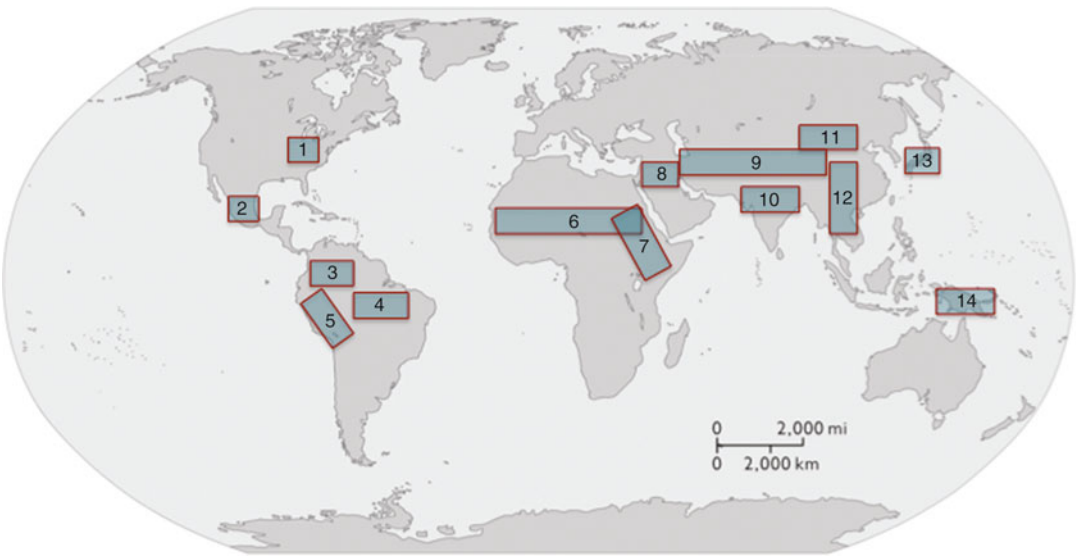

Domestication: Definition and Overview, Fig. 2 Currently recognized areas of domestication of plants and animals with some examples of plants and animals domesticated in each center. (*1*) Eastern North America: chenopodia, squash, sunflower, and maygrass; (*2*) Mesoamerica: maize, squash, beans, and turkeys; (*3*) northern Peru/Ecuador: squash and lima beans; (*4*) Amazonia: manioc, yams, peanuts, and Muscovy duck; (*5*) Andes: oca, potato, quinoa, amaranth, llama, alpaca, and guinea pigs; (*6*) sub-Saharan Africa: pearl millet, sorghum, and African rice; (*7*) Horn of Africa/Nile Valley: asses, taurine cattle?; (*8*) the Near East: wheat, barley, lentils, peas, sheep, goats, taurine cattle, and pigs; (*9*) Central Asia: horses; (*10*) South Asia: browntop millet, water buffalo, and zebu cattle; (*11*) North China: foxtail millet; (*12*) South China/Southeast Asia: rice and chickens; (*13*) Japan: barnyard millet, mung bean, burdock; and (*14*) New Guinea: bananas, yams, and taro. *Note: list of domesticates and areas identified not exhaustive* (Base map courtesy of the National Geographic Society)

annual crop plants (wheat, barley, corn, rice, pulses) and livestock species (sheep, goat, cattle, pigs) to include a rich array of perennials, tree crops, tubers, mammals, birds, and even fish and shellfish. Moreover, the more fluid understanding of the process of domestication and the role of deliberate human manipulation of plants and animals and their environments has further broadened the global reach of domestication studies to all areas, terrestrial, coastal, and perhaps even marine, where humans and plants and animals have engaged in sustained, multigenerational interactions of the kind that, in the case of certain species, results in their domestication.

Future Directions

Clearly this expansion in the geographical and taxonomic reach of domestication studies signals a bright future for the study of plant and animal domestication. Moreover, the subsequent dispersal of domesticates and the knowledge of how to manage domestic species represents an additional future research frontier, as we try to better understand the rates and vehicles of transmission and the responses of indigenous people to this new technology.

Principle gains in domestication research are most likely to come in the area of documenting domestication as researchers continue to develop analytical methods capable of tracing the unfolding coevolutionary relationship between humans and target plant and animal species that defines domestication. The greatest advances in genetics will most likely come in the ability to extract and amplify DNA from archaeological plant and animal remains. Success in obtaining ancient DNA will vastly clarify the phylogenies of early domesticates, helping further pinpoint the timing, number, and the geographic and cultural contexts of initial domestication. Even more significant will be the ability to trace the evolution of loci responsible for the morphological, physiological, and behavioral responses that plants and animals made to human manipulation as they embarked on their various pathways to domestication.

We can also expect significant advances in the development of archaeobiological and archaeological methods for tracing these pathways. Thus far, much of the initial work in this area has concentrated on developing markers for annual crop plants and a handful of domesticated mammals. Future work will likely expand these efforts to more difficult challenges of discovering markers for the domestication of crop plants which are vegetatively reproduced or to tracking the responses that long-living crops – like tree crops – make to human manipulation. Advances can also be expected in discovering ways to monitor anthropogenic modifications of landscapes as humans try to influence the biotic productivity of local environments. Documenting the domestication of certain animal species that have thus far proven difficult to trace using archaeobiological and archaeological evidence may become possible with an enhanced attention to the likely pathways that these animals and their human partners took into domestication (Zeder 2012b). Expanding the markers of domestication for these species from a limited set of morphological, or even demographic, markers to a wider array of plastic responses and cultural indicators of their care and exploitation may point the way to a clearer understanding of their domestication.

Expanding the geographical scope of archaeological investigations into the origins of plant and animal domestication, coupled with the enhanced tools for documenting domestication, will provide a much needed empirical foundation for the assessment of various explanatory scenarios offered for why humans and their plant and animal partners started down the road to domestication. By being able to construct fine-grained accounts of the trajectory of a wide range of different types of domesticates in different cultural, environmental, and temporal settings, archaeologists will be able look for commonalities and differences in these trajectories, to isolate driving forces that cut across different instances of domestication from more localized factors that shape domestication trajectories in individual cases. This will make it infinitely harder to propose simple, single-lever, one-size-fits-all explanatory frameworks for the origins of plant and animal domestication and will result in a significantly richer, more robust, and more nuanced understanding of this transformative process.

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Dry/Desert Conditions: Preservation and Conservation

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Introduction

In hot, arid, and semiarid environments, often referred to as dryland environments, the absence of significant water can provide excellent conditions for preservation. However, once artifacts and structures are exposed to new environmental conditions upon excavation, they can rapidly decay if preservation measures are not employed. Archaeological excavation breaks the equilibrium

achieved by artifacts during burial, and steps must be taken to stabilize the materials and equilibrate them to the new, post-excavation environment. As a result, it is critical to involve professional conservators from the first stages of planning for excavation and to make sure that preservation concerns are well integrated with archaeological research projects.

The level of preservation will vary depending on the kind of burial environment being excavated, the agents of deterioration prevalent in that environment, and the type of material being excavated. Familiar agents of deterioration such as water, oxygen, bacteria, and the level of acidity or alkalinity of the soil affect all burial environments to some degree. The presence or absence of these and other deterioration mechanisms can profoundly affect the degree of preservation, and extreme environmental conditions such as desert, underwater, and anoxic waterlogged environments, or very cold climates can preserve materials that might have decayed in other burial contexts.

Definition

Preservation and conservation in dry/desert conditions can refer to the physical state of artifacts found in such environments and the degree to which they are preserved, but it also encompasses a wide range of conservation activities and concerns specific to both movable and immovable heritage from dry/desert sites.

Key Issues/Current Debates/Future Directions/Examples

Dry Environments and Preservation

In dry, desert environments, relative humidity is typically extremely low. In general, this type of environment is good for preservation. However, conservators and archaeologists should be aware that such sites may have been affected by water at various points in the past, and that material found at such sites can have a variety of condition problems. The type of archaeological deposit and the depth of burial will also affect the degree of preservation. For example, artifacts found in a tomb, where the environment is usually more stable, are less prone to disturbance by human, animal, or insect activity and to deterioration from environmental conditions.

Preservation of organic materials in dry/desert conditions is often very good, and materials like wood, leather, textile, skin and gut materials, plant materials such as basketry, and bone are often well preserved (Peacock 1987: Johansson 1987). Inorganic materials such as metal, ceramic, glass, and stone also survive well in dry deposits. Metal artifacts may have little or no corrosion when excavated other than a protective oxide layer, although this will depend on localized moisture in the soil. Porous materials like ceramic and stone are usually also stable unless affected by soluble salts absorbed from the soil.

Conversely, extremely dry conditions usually introduce new conservation challenges resulting from desiccation, shrinkage, distortion, and embrittlement of organic materials. For these reasons, it can be challenging to excavate, lift, handle, and store artifacts excavated from dry environments. Other causes of deterioration in arid climates include biodeterioration, caused by the action of bacteria and microorganisms, and insect activity. Both are limited to those species that can survive the harsh climate (Blanchette et al. 1991; Blanchette 1998, 2003).

Immovable cultural heritage can also be well preserved in dry climates. Architectural structures composed of materials such as stone, mud brick, wood, and decorated plaster typically tolerate dry conditions well, but environmental variables such as extremely low humidity, strong wind, and the topography of the site can influence the degree of preservation (French 1987; Spriggs 1987). Wind is a major cause of erosion, carrying abrasive dust and soil particles and causing weathering of exposed archaeological material. Desert climates also experience large temperature changes between day and night, resulting in fluctuating relative humidity. This can cause repeated expansion and contraction of exposed architectural structures and may result in

mechanical damage to stone and other rigid materials. This cycle is made worse by the presence of moisture, which can exacerbate dimensional changes. Structures remaining in situ can also be adversely affected by biodeterioration.

Lifting Archaeological Finds

One of the most difficult tasks for archaeologists and conservators working in arid environments is the retrieval or lifting of artifacts from the ground. Excavating desiccated artifacts can be problematic due to the extreme fragility of the material. The removal of supporting soil or sand from around the artifact leaves it vulnerable. Lifting from sand, sandy or very dry soils can be more challenging because of the difficulty in isolating the object from its burial context and ensuring that fragile and fragmented artifacts stay together. If possible, surrounding sand or adhering soil should be left attached and the artifact lifted as a block. Handling should be reduced to a minimum and a support used to immobilize the artifact as much as possible during lifting. The area being excavated can also add significant challenges, for example, if the deposit is in a deep shaft grave with restricted access.

Several approaches can be taken when lifting fragile, desiccated material, and the most suitable technique depends on many factors. The simplest method, if the artifact is robust enough, is to lift it directly onto an adjacent, suitably padded support. If the soil is compact enough, the artifact and its surrounding soil can be isolated and lifted in a block, with the surrounding soil acting as a support. The isolated block containing the artifact can be further strengthened by wrapping it with bandages prior to lifting. However, this may be challenging if the artifact is extremely fragmented or is large in size, such as human remains with associated clothing or jewelry. Another simple method is to insert a rigid support underneath the artifact to support it during lifting. For artifacts that cannot be handled without loss, providing a protective cover and cushioning around the artifact can be helpful.

Supports, like cloth impregnated with adhesive, that directly adhere to the surface can be applied to artifacts that are strong enough to withstand the adhesion and from which the support can easily be removed. Types of material that may be suitable for lifting by this method include mosaics and wall paintings, or stone and ceramic artifacts with very fragile surfaces. Temporary supports like this can be removed later in the conservation laboratory.

When artifacts are too fragile to be lifted without breakage or loss, as is often the case with severely embrittled organic material, consolidation in situ may be necessary. In this method, a consolidant is dripped directly onto the artifact to strengthen it before lifting. A range of reversible synthetic consolidants have been used successfully by conservators for this purpose. Examples include acrylic resins and substances such as cyclododecane, a hard wax-like volatile hydrocarbon which will sublime at room temperature, without leaving behind any visible trace (Balachandran 2010).

Transportation

Transporting fragile, desiccated archaeological artifacts can be challenging, particularly if the material must travel long distance over uneven surfaces. Well-padded containers, trays, or other rigid materials can be used to prevent damage during transport. Consolidation may also be necessary to strengthen the material prior to transportation, even if the material has been lifted successfully without consolidation. Well-padded enclosures are essential for long-distance travel and artifacts should be placed in rigid, lidded containers that are well secured in the vehicle and protected from the elements.

Work Areas

Conservation and study areas at an excavation site, whether indoors or outdoors, can create risks for fragile artifacts that have just been lifted from the ground. Pests such as insects, mice, snakes, cats, dogs, and birds can seriously damage artifacts that are not adequately protected and housed. Further handling of fragile finds can increase the risk of damage, especially prior to conservation treatment. The use of storage enclosures, such as rigid, lidded containers, will help to safeguard the materials and buffer them from the environment during storage and study.

Outside work areas have extra risks; exposure to temperature extremes and wind can pose a serious problem for fragile, fragmentary material. Again, the use of rigid, lidded, storage containers will help to reduce these risks. If a temporary consolidant such as cyclododecane has been used for lifting, the treated artifact may require storage in a tightly sealed container until the artifact can be conserved, to prevent the wax from subliming.

Conservation Condition Issues and Treatment

Materials from dry sites can suffer from a variety of condition problems. As previously noted, these are likely to include desiccation, loss of structural integrity, biodeterioration, and water-soluble salts absorbed during burial. In general, principles of minimal intervention and reversibility should be followed when mitigating these issues, and consolidation and other conservation treatments should only be undertaken by an experienced conservator. Treatment for artifacts and structures excavated in dry/desert conditions depends on the material and its condition issues as well as on the archaeological project's goals.

Storage

In ideal circumstances, storage areas should be well organized, with ample room and a stable climate. Extremes of temperature and relative humidity should be avoided. Individual enclosures for artifacts should be protective, while still allowing easy access for research. Although these conditions are not the norm for most archaeological projects, planning and working toward better storage is a worthy goal. Substandard storage conditions can substantially detract from the long-term preservation and study of artifacts, particularly fragile material.

It is critical that extremely desiccated and fragmentary organic materials like textile, cartonnage, human remains, skin and gut products, and papyrus be well supported in storage. Rigid, lidded, padded containers are preferable to help prevent possible structural collapse, disassociation, and loss of loose and fragmentary material, and to prevent damage that may occur during handling or study. Protective enclosures also help buffer artifacts from deterioration due to fluctuating environmental conditions. In general, fragile finds should be stored in containers made from nonperishable materials such as metal or plastic, with individual, custom-fitted housing for particularly fragile artifacts. Wood boxes or crates can provide good physical support, but if possible, an attempt should be made to source acid-free, chemically stable packaging materials for long-term storage. Polyethylene or polypropylene plastic tubs and trays are good choices. These containers can be custom-fitted with interior support and padding. Suitable materials include acid-free tissue, washed unbleached muslin, cotton padding, and inert conservation-grade foam such as Ethafoam. If possible, polystyrene and polyurethane foams should be avoided since they will disintegrate within a few years.

Storage facilities may also have pest problems. The risk to artifacts can be lessened by storing finds in nonperishable containers as described above. This also helps prevent dirt and dust from accumulating. Large artifacts that cannot be housed in storage containers can be covered for further protection. These artifacts should be stored off the ground (i.e., on pallets or shelving) whenever possible.

Overcrowding of storage areas is a common problem on many archaeological projects and can result in damage and excess handling of excavated materials. Advance planning can address this problem and outfitting the storage area with floor to ceiling shelving, or designing custom storage configurations to meet specific needs, can help maximize storage space. Clear labeling and an accurate inventory of excavated finds is also extremely important to avoid unnecessary handling. In addition, conservators can provide written guidelines for handling extremely fragile finds. These guidelines can then be stored with the artifact or permanently recorded on the storage enclosure.

Artifacts Remaining In Situ

Immovable archaeological finds exposed during excavation, such as architectural features like

walls, mosaic floors, and other structures, may require protection from the environment to prevent further deterioration. Their exposure also creates new challenges for short- and long-term maintenance. This is especially important if the exposed material is decorated, for example, with painted plaster, or if the fabric itself is fragile, like mud brick. If previous conservation interventions have been carried out on the exposed features, this will also impact the type of protection needed. Desert environments experience large temperature changes from day to night, which can accelerate deterioration. Extremes of temperature, humidity, and wind, as well as freeze/thaw cycles can cause irreversible damage to fragile surfaces, and even structural collapse.

Reburial of exposed features following excavation is one strategy for preserving immoveable finds, and it should be considered if there are no resources to provide stabilization and/or long-term maintenance. However, reburial after a prolonged period of exposure can create problems if the materials have equilibrated to their exposed environment. If conservation was undertaken on the structure prior to its reburial, reburial may affect the longevity of the treatment. Adding a protective barrier between the archaeological feature and the soil or sand, such as a geotextile, can provide protection and prevent localized biodeterioration. If security on the site is adequate, temporary reburial may also be used to preserve artifacts. However, in some cases, these solutions can exacerbate deterioration if they are not employed correctly or if they are not appropriate for the material being protected.

Alternative methods such as the construction of protective shelters, enclosures, or covers for exposed archaeological remains are possible and have been successfully employed. For example, such shelters have been used at Copan, Honduras, and Paphos, Cyprus. These methods can be controversial because of the visual impact they have on the archaeological site, particularly if the site is open for visitation. Balancing conservation and presentation is essential in the management of archaeological sites. Ideally this is a collaborative process that supports archaeological research and site preservation while also taking into account the needs and desires of stakeholder communities.

Cross-References

- ▶ Bones: Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Ethics and Human Remains
- ▶ Field Stabilization of Immovable Heritage
- ▶ Field Stabilization of Movable Heritage
- ▶ Glass: Conservation and Preservation
- ▶ Leather, Archaeological: Conservation and Preservation
- ▶ Metals: Preservation and Conservation
- ▶ Mosaics: Conservation and Preservation
- ▶ Seeds: Conservation and Preservation
- ▶ Stone Treatments in Archaeological Conservation and Preservation
- ▶ Stone: Preservation and Conservation
- ▶ Textiles and Fabrics: Conservation and Preservation

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Du Cros, Hilary

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Basic Biographical Information

Hilary du Cros earned her B.A. from the University of Sydney and her Ph.D. from Monash University in Melbourne. From 2005 to 2010, Dr. du Cros was a professor at the Institute for Tourism Studies in Macao, and from 2005 to 2009, she was a lecturer at the University of Hong Kong. Currently, she is an associate professor in the Department of Cultural and Creative Arts at the Hong Kong Institute of Education, a position she has held since 2010. Her research interests include cultural heritage management and tourism, specifically as it relates to Asia.

Major Accomplishments

She is currently an expert member of the ICOMOS International Scientific Cultural Tourism Committee (ISCTC) (1999–present), a HKIEd representative to the UNESCO and ICCROM-sponsored Asian Academy Heritage Management Network (2005–present).

Her most recent publications include the coauthored books *Cultural Heritage Management in China: Preserving the Pearl River Delta Cities* (du Cros & Lee 2007) and *Cultural Tourism: The Partnership between Tourism and Cultural Heritage Management* (McKercher & du Cros 2002). She serves as an editor for the *Journal of Heritage Tourism Management* (2005–present) and *Tourism, Culture, and Communication* (2001–present).

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▶ China: Cultural Heritage Preservation and World Heritage
▶ Sustainable Cultural Tourism Policies: Overview

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Duarte, Paulo

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Basic Biographical Information

Paulo Duarte (São Paulo, 1899–1984) (Fig. 1) was a lawyer, poet, journalist, and professor at the Universidade de São Paulo (USP) and a pioneer on the development of a framework for academic research and teaching as well as the legal protection of Brazilian archeological heritage. He had a special research interest on the coastal shell mounds of southern Brazil, which were mined for lime since the beginning of European colonization. Duarte's struggle to protect these sites eventually led to the consolidation of current Brazil´s legislation to protect archaeological heritage. Duarte created several public institutions, participated in the instruction of cultural heritage laws, and formalized archaeological research at the Universidade de São Paulo.

Duarte, Paulo, Fig. 1 Joseph Emperaire, Paulo Duarte, and Paul Rivet at the Maratuá shellmound, São Paulo, Brazil, 1963

Duarte did not receive formal training in archaeology. As was common at the time, he had a law degree but never practiced law. Duarte was active in the group of intellectuals and artists associated with the so-called Brazilian avant-garde modernism movement, that helped change the arts and intellectual production of the country in the 1920s. He was also deeply involved with the group of intellectuals and politicians that worked together to create the Universidade de São Paulo in 1934, which is today Brazil's largest University (Hayashi 2001: 17). In 1935, working with the likes of Mario de Andrade and Claude

Lévi-Strauss (then a French expatriate teaching at São Paulo), Duarte created the Department of Culture of São Paulo county (Alcântara 2007). Due to his political activities, Duarte was twice exiled to Europe in the 1930s, where he met and started collaborating with Paul Rivet at the Museé de l'Homme in Paris. In 1940, with the impending occupation of France by the Nazis, Duarte went again to exile, this time to New York, where he met once more his old friend Lévi-Strauss and befriended, among others, Spanish film-maker Luís Buñuel. With the end of the war, Duarte returned to France and to the Museé de l'Homme until his final return to Brazil in 1950.

Major Accomplishments

In 1952, Duarte created the Commission of Prehistory of the State of São Paulo. This was a low time for archaeology in Brazil, with research restricted basically to four museums spread around the vast country. Together with the Commission, he pushed, in 1953, for the creation of the first state law that aimed to protect the archaeological heritage (Mendes 1994; Alcântara 2007). In 1954, Duarte had a key role in organizing the 31st International Congress of Americanists in São Paulo. Rivet, then a leading figure in the anthropology of the Americas, participated in the Congress, which included field trips to the shell mounds outside of São Paulo. These events established a landmark in Duarte's battle for the protection of these sites. In 1957, answering a call from then Brazil´s President Juscelino Kubitschek (1956–1960), Duarte created a federal commission to write the proposal for a law for the protection of Brazil's archaeological heritage. Law n° 3.924 was approved 5 years later, in 1961, and still stands as the main legal instruction to protect national archaeological resources (Anhembi 1958: 545, 1961: 133). In 1959, Duarte founded a civil association dedicated to archaeological and anthropological research, the Instituto de Prehistória e Etnologia. Two years later, the Commission and the Institute merged and were incorporated into the Universityof São Paulo, under the name of the Instituto de Pré-História. This was a turning point in institutionalization of the archaeological field in Brazil, despite the initial financial difficulties: The first years of research of the new institute were financed by the income Duarte received for directing it (Alcântara 2007: 264).

Duarte's plans for the new Institute included the development of associated graduate and undergraduate programs. However, his plans were frustrated by the right-wing military coup of 1964, and subsequent interventions in public institutions and universities resulting from it. Within this context, Duarte, in keeping with his combative and humanist spirit, began a series of public critics against the University's conservative establishment. This put him under further pressure.

Duarte's high profile as a public intellectual sustained him as director of the IPH-USP until 1969, when he was compulsorily retired (Mendes 1994), just after the declaration of the infamous *Institutional Act n°5* which closed the Brazilian National Congress for nearly 1 year and transferred absolute power to the President of the Republic. Until his death in 1984, Duarte was never allowed back to the University he helped to create.

Duarte was a remarkable figure who was persecuted by two dictatorships and who was paid for his struggles with exile and compulsory retirement. Although he did not have a diploma in archaeology, he promoted archaeological knowledge as well as heritage education throughout his life. Because of cultural resource management, Brazilian archaeology has been growing exponentially in the last decade. Today, several thousand Brazilians make their living from archaeological work. It is ironic that the man who helped to create the Federal law that organizes their practice had to pay from his own pocket to fund his research.

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- ▶ Brazil: Historical Archaeology
- ▶ Sambaquis Shell Mounds, Archaeology of

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Dubois, Eugène

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Basic Biographical Information

Eugène Dubois (full name: Marie Eugène François Thomas Dubois), born January 28, 1858, Eijsden, Netherlands, died December 16, 1940, estate "De Bedelaer," Netherlands. Dutch anatomist and geologist, discoverer of the first-known fossils of *Homo erectus* ("Java Man") on the island of Java in the Dutch East Indies (Fig. 1).

Dubois, Eugène, Fig. 1 Dubois at about 40 years old (From: Albers & De Vos 2010)

Major Accomplishments

Dubois was born one year before *The Origin of Species* of Charles Darwin was published. He grew up in a period when the theory of evolution and its implications for human ancestry were widely discussed. Dubois studied medicine at the University of Amsterdam and became a reader in anatomy there in 1886. Influenced by Darwin and other contemporaneous scholars such as Wallace, Haeckel, and Lydekker, Dubois did a remarkable thing: He gave up his position at the university and joined the colonial army of the Dutch East Indies in order to fulfill his plan, searching for the "missing link" and finding proof for human evolution in the Dutch East Indies. As a military surgeon, he arrived in Padang on West Sumatra in December 1987, where the following year he started excavations in limestone caves. He was soon released from his army duties and obtained permission from the colonial government to dedicate himself full time to his search. Realizing that the fossils he excavated near Padang were too young, he asked for permission to be transferred to Java, where in

1888 a fossilized human skull had been unearthed in a cave near the village of Wajak. Towards the end of 1890, after initially having focused his attention on cave sites, he started looking for fossil vertebrates at open sites with the help of two military engineers and 25–50 convicts and soon found the first fossil of *Homo erectus* (then still unnamed): a mandible fragment of the right side with two premolars. During the second year in Java, he directed large-scale excavations along the banks of the Solo River near the village of Trinil and soon found a primate molar and skull cap among the large number of vertebrate fossils, followed by a femur the next year. The discovery of these fossils would reward him with international fame.

Dubois attributed the three Trinil fossils to a single individual that possessed a combination of human and apelike characteristics (Fig. 2). The humanlike femur indicated that this individual must have walked upright, whereas the skull cap, initially designated as a chimpanzee, appeared to be more humanlike than any anthropoid. In 1894, he published the finds in German under the title "*Pithecanthropus erectus*, eine menschenaehnliche Uebergangsform aus Java," thereby concluding that his finds belonged to an intermediary form between humans and apes, more humanlike than apelike. The colloquial name under which his finds became known was "Java man." After visiting the Siwalik Hills on the Indian subcontinent, Dubois returned to the Netherlands in 1895, where he was to become a professor of geology at the University of Amsterdam in 1899. His fossil finds were initially widely exposed and publicized but met with variable criticism and controversy, and eventually, Dubois withdrew the specimens from further examination. It would take several decades before additional evidence turned up from Java and China. The fossils are nowadays regarded as *Homo erectus*. The original fossils are housed at the Naturalis Biodiversity Center in Leiden, together with thousands of other fossils that were collected by Dubois and his assistants at Trinil and other fossil sites. Because there has been a wealth of documentation preserved besides the fossils, the Dubois Collection remains a major source of information on the natural history of SE Asia.

Dubois, Eugène, Fig. 2 Life-sized reconstruction of *Pithecanthropus erectus* made by Dubois for the 1900 World Exhibition in Paris (Negative in Collection Geological Museum Artis, Amsterdam)

The vertebrate species from Trinil were named by Dubois in two short publications that came out in 1907 and 1908, giving his taxon names priority over the results from the Selenka Expedition carried out at Trinil in 1907–1908. But Dubois never seemed to have had the patience to provide detailed descriptions of his finds, and a serious scientific analysis of the fossils, apart from the *Pithecanthropus* remains, was never published. Instead, Dubois was easily distracted by other projects. Some of these projects were the experimenting with self-made cameras in order to reduce optical distortions, nature conservation, but also research on the subsurface hydrology of the Netherlands. His name is also firmly attached to a collection of fossil flora and fauna originating from a number of clay quarries near Tegelen, the type locality of the geological Super-Stage "Tiglian," which is often used in

Northwest Europe to designate the earliest part of the Pleistocene Series. The Tegelen fossil collection is housed in Teylers Museum at Haarlem, where Dubois was curator.

Cross-References

- ▶ Darwin, Charles R.
- ▶ *Homo erectus*
- ▶ Human Evolution: Theory and Progress
- ▶ Java Man

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Duck: Domestication

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Basic Species Information

There are two species of domestic duck, the common duck, domesticated from the wild mallard (*Anas platyrhynchos*), and the muscovy duck (*Cairina moschata*). Both are members of the Anatinae. In both species, the same scientific binomial is used for the domestic and the wild forms. Farmers sometimes interbreed the two species, but their offsprings are infertile. The name "muscovy" duck does not come from Russia but is thought either to be a corruption of "musk" duck, from its musky smell (Darwin 1868), or of "miskito" duck, after the Mosquito coast of South America where the invading Spanish first encountered the duck. Both species of domestic duck produce eggs and down as well as meat and both are valuable on farms and smallholdings for reducing pests (Serjeantson 2009: 302-4).

The natural distribution of the mallard is across temperate Eurasia and North America. It has a wide ecological tolerance. The male mallard in breeding plumage has a gray body, green head, and purple speculum. The female is mottled brown. The weight ranges from 750 to 1,450 g, with females in general slightly smaller than males (Snow & Perrins 1998). Genetics has shown that the common duck is derived almost exclusively from the mallard but some South Asian breeds also have some spot-billed duck (*Anas zonorhyncha*) in their genetic makeup (Li et al. 2010).

The muscovy duck is a native of neotropical South America with a range from southern Mexico to Peru and northern Argentina. Its habitat preference is for swamps and riverbanks flanked with trees. Both sexes are black with white wing patches. The male has a knob at the base of the bill and reddish skin on the face, while the face of the female is feathered. Muscovy ducks are strongly dimorphic: Their weight in the wild ranges from 4,100 g to 1,100 g.

Once domesticated, there were changes in plumage, size, and behavior in both. At least 20 distinct breeds of common duck have evolved with varied plumage and gait and a wide range of sizes (Luff 2000). Wild mallards can readily be raised in captivity, so it is likely that mallards were commensals before becoming fully domestic. White feathers start to appear within a few generations (Darwin 1868) and many

colors can now be found. White is favored in birds bred for eating. Ducks became larger, with most modern breeds now too heavy to fly, a change that is visible in the skeleton. The largest modern breeds are the Aylesbury and the Pekin, both of which can reach 5.5 kg (12 lbs). Ducklings naturally fatten quickly and can be eaten from the age of 6 weeks (Luff 2000). Despite the fact that the anatomy of ducks is adapted to swimming rather than walking, at least one breed, the Indian Runner, has developed an erect posture, which is reflected in changes to the femur and tarsometatarsus (Darwin 1868). One theory is that this adaptation took place in Indonesia, and was a response to being driven long distances to market. More significant are the changes in breeding behavior. The normally monogamous wild mallard has adapted to polygamy: The usual ratio is one drake to four to six ducks. The number of eggs laid has increased from up to 12 in the wild to as many as 240 eggs in a year.

Historical evidence for domestic ducks is thin and archaeological evidence even thinner. The mallard was domesticated in Eurasia, but there is no certainty about where and when. There are many different breeds of domestic duck in Southeast Asia, which points to the likelihood of domestication there. The process may have taken independently and later in Europe. Figurines in China dating from the fifth century BCE may be the earliest historical evidence for domestic ducks. Ducks were reared in captivity in both Ancient Egypt and Classical Rome but were not necessarily domestic, even in Rome (Albarella 2005). The earliest mention of domestic ducks in Europe is in the writing of St Hildegard of Bingen in the twelfth century. A few domestic ducks have been identified from sites in Europe based on numbers, age at death, or their larger size (Serjeantson 2006). As the main center of mallard domestication was likely in Southeast Asia, the earliest archaeological evidence for domestic ducks may one day be found there.

The muscovy duck has become larger under domestication, the color of the feathers has become more variable, and the number of eggs laid per year has increased. Though it was difficult to identify domesticated muscovy ducks in archaeological contexts because the natural size difference between male and female mask size changes, Stahl (2005) has identified domestic ducks on precontact sites in Ecuador. Muscovy ducks are depicted on pots in the Moche and Chimu cultures and their feathers were used in Chimu featherwork, so domestication may predate CE 1000.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Dugouts, Archaeology of

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Introduction

Underground housing was a common and expedient choice during European colonization in the United States, Canada, and Australia and is still used in the mining town of Coober Pedy in South Australia. This was not something new but a continuation of a long tradition.

Dugouts have been recorded across the world in North Africa, Europe, Australia, and Asia as well as in North and South America. In Northern China, dugouts were used for at least 4,000 years and remained home to 30–40 million people in the late 1990s (Long 1999). In Cappadocia, Turkey, there are at least 40 underground cities, with occupation peaking between the sixth and sixteenth centuries but likely predating this (Cappadocia Turkey n.d.; Ayhan 2004). In England, the Nottingham Caves Survey has recorded more than 450 caves dug out under the city and used for a variety of purposes since at least 1250 (Strange-Walker et. al. n.d.).

Definition

Dugouts are fully or partially subterranean structures used as dwellings, excavated into the ground, with additional structure added as needs and resources allowed. Dugouts can include natural caves that have been enhanced and enlarged by people for various reasons but does not include rockshelters and caves used for shelter that are substantially unmodified. Terminology for underground housing is varied, sometimes interchangeable and often locally specific. Dugout, pit house, sunken feature building, earth lodge, cave house, rock house, and earth shelter are commonly used, along with local terms such as Badger Hut in Wisconsin (Strange-Walker et. al. n.d.; Potosi Badger Hut Site n.d.; Willets 2010: 10).

Gilman (1987: 552) in discussing pit structures in the American Southwest noted that climate, linked to "biseasonal settlement pattern, and dependence on stored food," are the main determining factors for traditional societies using subsurface structures. For historic periods, climate and environment remained key factors for dugout residents, but subsistence concerns were less influential.

Dugouts require a suitable location to dig into – usually hillsides, gullies, creek banks or cliff faces, and soil or rock that is relatively easy to excavate and structurally sound. This was the case in Cappadocia, Nottingham, and Kinver Edge, all of which had suitable sites and easily excavated soil or rock, such as sandstone (Strange-Walker et. al. n.d.; Ayhan 2004: 33; Willets 2010: 13). In Burra, South Australia, the clay banks of the Burra Creek provided easy excavation and sound dugouts but was vulnerable to flash flooding, which compromised structural integrity and effectively ended dugout use in this area (Birt 2004: 157).

Burra's dugouts are an example of subterranean structures, excavated horizontally into high creek banks, with floors, walls, and roofs formed from the red clay of the creek banks (Fig. 1, Birt 2004: 160, 2012). Cappadocia, Northern China, Nottingham, and Kinver Edge provide examples of more long-used subterranean dugouts (Strange-Walker et. al. n.d.; Long 1999; Ayhan 2004; Willets 2010: 20). Partially dugout structures or pit houses are probably more common historically and geographically, with an excavated pit topped by walls and roof of various materials (see Hardesty 1988: 86; Linebaugh 2003: 84; Brooks 2005: 14).

In December 1847, a visitor to the Burra Mine in South Australia noted that "the miners have also, for want of houses, excavated little caverns, divided into apartments, into the steep banks of the creek" (*The South Australian* 1847). By 1851, there were literally hundreds of dugouts in the creek, housing 1,800 of Burra's population of 4,400 and providing an unusual and much noted aspect of colonial settlement at this site (Birt 2004: 156). It was the scale of dugout use in early Burra that was unusual, not the underground housing itself.

Dugouts, Archaeology of, Fig. 1 A Burra dugout reconstructed in the 1970s as a tourist attraction. The original dugouts were usually whitewashed inside and sometimes outside

Modern perceptions may see dugout homes as at best expedient and temporary, but evidence from China, the United Kingdom, and Cappadocia contradicts this, with the large-scale use of dugouts over long periods of time (Strange-Walker et. al. n.d.; Long 1999; Ayhan 2004; Willets 2010). Even where dugout use is more transitory, considerable effort could be put into making the homes comfortable. Burra's dugouts had whitewashed walls, ceilings and floors, and sometimes exteriors, while fireplaces, with chimneys cut to the surface, were standard. Windows, doors, verandas, lean-tos, and other improvements were common (Birt 2004: 160-1, 2012).

Key Issues, Current Debates, and Future Directions

The questions a researcher might bring to the analysis of dugout homes in Northern China used for thousands of years and potentially still occupied (Long 1999) will be different to those posed by a dugout built by nineteenth-century Scandinavian immigrants to Minnesota (Linebaugh 2003). Common questions would revolve around environment, climate, topography, proximity to other settlements and industry, and social and cultural factors, seeking to answer why dugouts were built in preference to other structures and how long they were used.

Gilman (1987: 560) discussed the change from belowground structures to pueblos in the American Southwest, finding that increasing population linked to "subsistence intensification" was the main reason for change and suggesting lines of inquiry for other regions. In Cappadocia, climate environment and defensive advantages were cited as the main reasons for going underground, but cultural proclivities were not discounted (Ayhan 2004: 30-3).

Nineteenth-century American, Canadian, and Australian dugout sites can contribute evidence to the big questions in historical archaeology. The Burra Creek dugouts, for example, are direct evidence, albeit from the bottom up, of an international capitalism, driving European colonization, in an industrial company town, by working class mining families who left little record of their lives (Birt 2004: 162, 2012).

One of the strengths of archaeology is in providing evidence of people who may be largely missing from history (Leone 2010). In Nottingham and Kinver Edge, the underground homes were associated with the poor (Strange-Walker et. al. n.d.; Willets 2010: 27); in Burra, the dugouts were mainly home to working class miners (Birt 2012); while in both Minnesota and Saskatchewan, dugouts were home to European migrants from Norway and Russia, respectively (Linebaugh 2003; Brooks 2005: 5). These are all groups who may have left little evidence of their passing.

Dugouts generate continued community interest, and in Cappadocia, Burra, Nottingham, Kinver Edge, and Saskatchewan are part of local cultural heritage tourism (Cappadocia Turkey n.d.; Strange-Walker et. al. n.d.; Birt 2004; Brooks 2005: 1434-145; Willets 2010: 22). Dugouts are not usually forgotten, but they are sometimes misunderstood.

Cross-References

- ▶ American Pioneers and Traditions
- ▶ Australasian Historical Archaeology
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Buildings Archaeology
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Dura-Europos, Archaeology of

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Introduction

Dura-Europos provides an excellent illustration of the potential of archaeology for the study of the human past. The detailed, vivid, and dramatic story of the life and violent death of this 2000-year-old Middle Eastern city has been told almost entirely through archaeological evidence and writings recovered in excavation; it was virtually unknown to conventional text-based history (Fig. 1).

The city's ruins stand on the edge of a plateau in eastern Syria, where cliffs, overlooking Mesopotamia, form the south side of the Middle Euphrates valley. This classical-era site has been regarded as a caravan city of the Syrian Desert like Palmyra, and called "the Pompeii of the East." Actually it was not in desert at all, but on dry steppe averaging c. 100 mm rain a year and exploited the rich Euphrates valley. Nor was

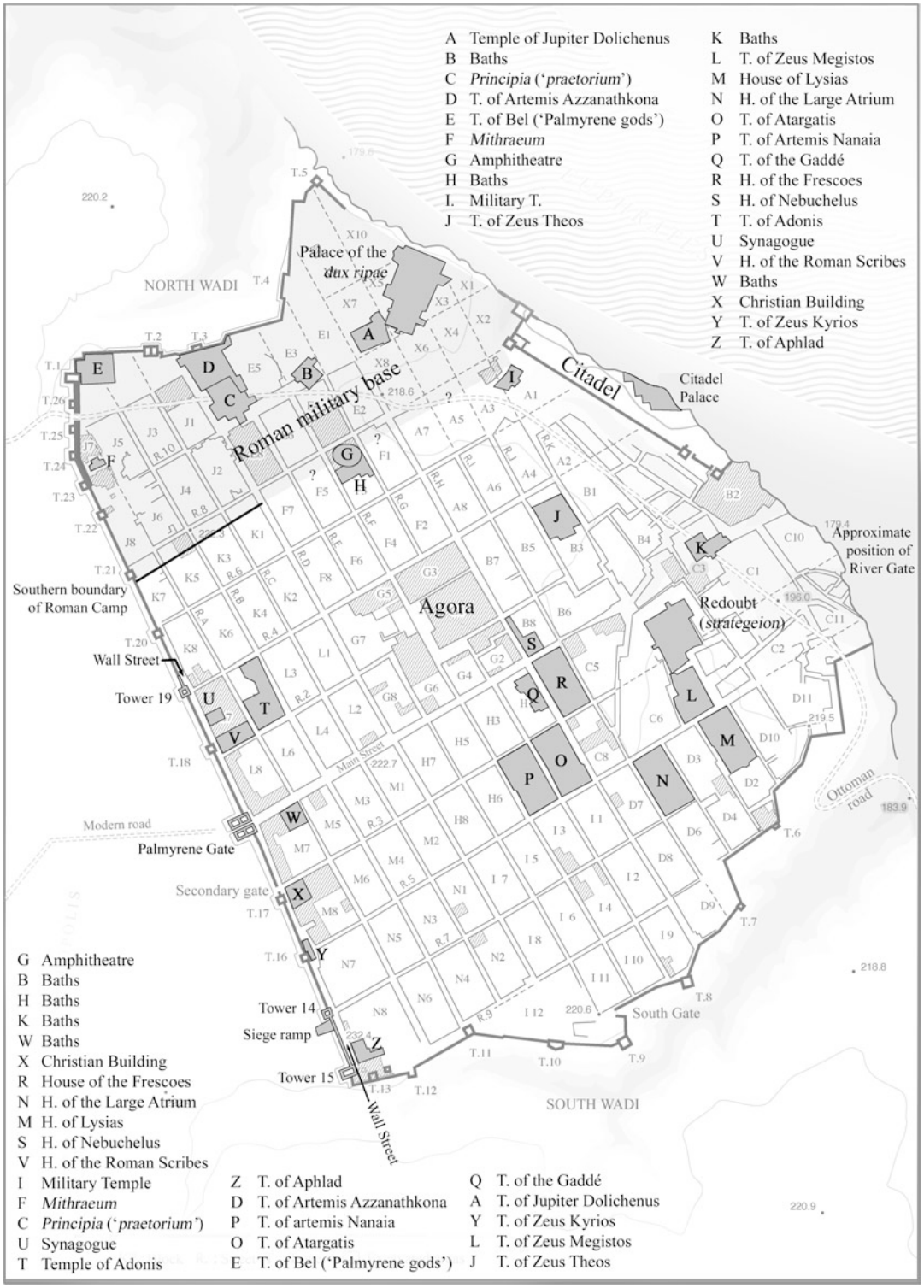

Dura-Europos, Archaeology of, Fig. 1 A plan of Dura-Europos, showing the principal identified features of the city. (Credit: Simon James after MFSED)

it ever called Dura-Europos, but always one name or the other, and, unlike Pompeii, was destroyed by war, not natural disaster. Yet the Pompeii analogy does convey something of the nature of the site and of the discoveries made there. For Dura also met a sudden death in circumstances which preserved remarkable remains of daily life in classical antiquity, down to graffiti on the walls, and including things like textiles and papyri rarely found outside Egypt. And like Pompeii, Dura was never rebuilt as most other towns were, deeply burying such early phases. Again like Pompeii, Dura was actually not an especially large or important city of its time, but a medium-sized town which, through the accidents of burial and of discovery, gives us an unparalleled window on life in its region and its time. The treasures discovered there, above all, its painted synagogue (Kraeling 1956) and very early Christian church/baptistery (Baur 1934; Hopkins 1934), made the site famous.

Definition

Known locally as Salhiyeh, the ruins were identified in 1920 during the Allied occupation of Mesopotamia following World War I and were briefly studied by James Henry Breasted (Breasted 1924). The first major excavations were conducted by Franz Cumont in 1922–1923 (Cumont 1926), followed by the great ten-season project conducted by Yale and the French Academy, masterminded by Mikhail Rostovtzeff (Rostovtzeff 1932, 1938; Hopkins 1979). At an early stage, the twin ancient names of the city were identified, and the familiar modern compound "Dura-Europos" coined, and made famous in the series of *Preliminary Reports* and *Final Reports*. However, both series remain incomplete, largely due to the disruption of the Second World War, and the incapacitation of Rostovtzeff (for an overview of the Yale project, see: Hopkins 1979; for the unpublished tenth season: Matheson 1992; for a recent bibliography: Leriche et al. 2004: 249–65).

In 1998, Fergus Millar praised the achievements of the early excavators but also called for fresh study of the evidence and critique of their often overhasty interpretation (Millar 1998). Dura itself remained virtually untouched until the 1980s when a new Franco-Syrian Mission was inaugurated, inspired by Pierre Leriche, which has been conducting exactly the kind of program Millar called for. It continued work until 2011, When growing civil unrest in Syria enforced a hiatus in fieldwork. The Mission had been studying and conserving what was laid bare by the early excavators, and using modern methods to greatly extend and refine our understanding of the site (Leriche et al. 2004; Leriche et al. 2011). Leriche argues that the Greek identity of the city should be prioritized and refers to it as "Europos-Dura," the form now encapsulated in the project's revised name, *la Mission Archéologique Franco-Syrienne d'Europos-Doura* (MFSED) (Leriche et al. 2011: 33). It remains, however, commonly called "Dura" for short.

Historical Background

Before foundation of the town, the spot was already called Dura, local Semitic dialect for "stronghold," referring to a peninsula of plateau left between the river and a tributary wadi. In 303 BCE, after Alexander's empire was divided by his generals (Leriche et al. 2011: 19), a Macedonian military colony was founded at this spot halfway between the twin capitals of the new Seleucid kingdom: Antioch on the Orontes and Seleucia on the Tigris, with the dominating promontory being fortified as the citadel of the new settlement of Europos (Fig. 2). A nascent town developed in the bottom of the adjacent wadi, dominated by the residence of the ruling *strategos* of Europos on one side, and another palace inside the citadel representing royal power on the other.

The town expanded up onto the plateau under Seleucid rule, acquiring its street grid and beginning to build a wall circuit, c. 150 BCE. From c. 113 BCE, it fell under Arsacid Parthian rule, but this was unintrusive; the city retained its

Dura-Europos, Archaeology of, Fig. 2 The later Hellenistic citadel of Dura-Europos from the northeast, rebuilt as the early Seleucid military colony blossomed into a city with Greek constitution, and largely Syrian-Mesopotamian culture. This inner fortification was later taken over by the Roman garrison, who established a training ground and temples on the wadi floor beneath its walls (*center*). (Credit: © Simon James)

Greek constitution, remaining dominated by families with Macedonian names, worshipping Hellenic deities. However, the Macedonian colonists had married local women, making the city a cultural hybrid from the start. By 100 CE, Dura was a substantial town – almost all of the street grid had been densely built up with houses, shops, and temples. Dura had ties to other cities inside the Parthian empire, like Hatra to its northeast, and also outside, notably Palmyra, already in Rome's orbit, and apparently a major market for the produce of the rich valley lands ruled from Dura. The city attracted enclaves of people from other villages and cities, not least Palmyrenes.

It was a busy town full of people living cheek by jowl with their many gods. Excavation has revealed houses great and small, built of mortared rubble and mud brick, plastered, single storey and flat-roofed, and arranged around an inner court in the Mesopotamian style. Stairs led to the roof which provided additional living, working, and sleeping space in fine weather. Despite its Greek civic constitution, the city's temples were also of Semitic rather than Classical form, comprising a shrine room with stepped altar in front, in an enclosed court around which might be multiple feasting rooms. They were dedicated to various manifestations of Zeus and to other deities with both Greek and Semitic names like Artemis-Azzanathkona. These, too, were quite modestly built in plastered rubble and mud brick, although boasting colored wall paintings.

On the western fringe of the Parthian empire, Dura lay on the Euphrates invasion route available to Roman emperors who dreamed of emulating Alexander by conquering what are now Iraq and Iran. During Trajan's invasion of Mesopotamia, Roman troops briefly occupied Dura (c. 115–117 CE) before being withdrawn and Parthian suzerainty restored. A powerful earthquake struck Dura in 160 CE, soon followed by permanent Roman annexation (c. 165).

Under Rome, the city retained its Hellenistic visage and was treated by the Romans, then at the height of the fashion for all things Greek known as the Second Sophistic, as "liberated" rather than conquered. However, it became in practice even more cosmopolitan, with the establishment of Jewish and Christian communities, and the largest "alien enclave" of all: an imperial Roman garrison (Fig. 3).

By c. 210, the entire northern part of the city had been taken over as an urban military base,

home to soldiers of Rome's Syrian army and their dependants, probably totaling several thousand people. The newcomers adapted blocks of civilian housing to military needs and built a headquarters, baths, and an amphitheater. The city walls were now shared by two autonomous social communities: the old civic population still ruled by families with Macedonian names and the "extended military community" of soldiers and their dependants.

Even with new forward bases like Dura, repeated Roman military aggressions failed to conquer the Parthian empire; instead, they had catastrophic unanticipated consequences, for Rome and especially for Dura. Repeated attacks undermined the Arsacid regime, which fell to revolt by Persian vassals. Parthia was replaced by Sasanian Iran, a far more aggressive and militarily effective empire. From the 230s, Rome was on the defensive, and Dura suddenly switched from forward invasion base to exposed target for Sasanian attack.

For Dura, the crisis came in the 250s. In 254, anticipating a Sasanian siege, the garrison set about turning the city into a fortress to be held at all costs. The Roman garrison massively reinforced the city's defenses, especially along the vulnerable western wall undefended by wadis or river. This received a sloping glacis in front and an enormous rampart behind, engulfing all the buildings near the defenses, filling them with any available material, and entombing wall paintings, textiles, papyri, and much else. These measures, and the ensuing siege, led to deposition of the spectacular archaeological remains elucidated since 1920.

The Sasanians did indeed besiege the city, probably in 256 CE. Remarkably well-preserved siegeworks attest a sustained and ferocious attack. A vast assault ramp and elaborate undermining operations suggest the siege lasted weeks or months, before the Sasanians broke in to sack and partially burn the town. Depopulated and abandoned, Dura thereafter lay in "no man's land" between the rival empires, preventing reoccupation and rebuilding – but ensuring survival of the remarkable remains of the life and violent death of the city.

Key Issues/Current Debates

Was Dura a "Caravan City?"

Dura's trading partner Palmyra famously drew its wealth from the long-distance caravan trade in luxury goods between the Roman Empire and the East, and Dura was long thought to be similar (Rostovtzeff 1932, 1938). However, it is now clear that this was not so. Rather, under successive empires, Dura was a center of regional government and administration and of marketing and manufacture of ceramics and other goods, for a substantial stretch of the rich, densely settled "linear oasis" formed by the Middle Euphrates valley. Its economy was focused on regional rather than long-distance trade (Dirven 1999: 38–45).

Dura and "Parthian Art"

Dura became famous initially because of its artistic riches – especially polychrome wall paintings from temples and houses (Rostovtzeff 1938; Perkins 1973). While located in the third-century Middle East, these have received recognition as sources of inspiration for Byzantine and medieval European figurative art (notably "frontality": static figures gazing directly at the viewer) (Breasted 1924). Durene paintings have also been used in debates on how far there was identifiably "Parthian art" (as opposed to artistic traditions within the Parthian empire) (Fig. 3).

Dura as a "Frontier Town"

Dura is often represented as peripheral, lying on the "edge of empires" (e.g., Chi & Heath 2011). While the city spent its last days as an exposed outpost of Roman imperialism, for most of its history, culturally and politically, it was far from peripheral, lying in the interior of the Seleucid and then Parthian empires. The arms deposited during the siege, including "Parthian"-style horse armor in Roman use and "Roman" iron mail on a Sasanian helmet, underline that even violently contested frontiers can be zones of intensive cultural interaction. Dura is, then, better characterized as a "cultural crossroads" (Brody & Hoffman 2011).

Dura-Europos, Archaeology of, Fig. 3 The Twentieth (Palmyrene) Cohort of the Roman provincial army of Syria assembled for a regimental sacrifice, conducted by their tribune Terentius during the 230s CE, in a wall painting from the Temple of Bel at Dura-Europos. One of the first discoveries in 1920, this painting helped identify the site: the city fortune figures bottom left are labeled "Palmyra" and "Dura." Note the "frontality" of the figures, a characteristic of Durene art (Credit: after Cumont 1923, digitally amended by Simon James)

The Christians and Jews

The Christians and Jews of Dura left remains equally startling in different ways. The spectacular figural paintings of the synagogue attest the wealth, sophistication, and cultural connections (Iranian, Mesopotamian, and Greco-Roman as well as Hebraic) of Dura's Jewish community, as well as its strikingly relaxed attitude to biblical injunctions against graven images. A few blocks to the south, a small Christian community left exceptionally early relics which underline the fascinating but still enigmatic dynamics of life in Roman-ruled Dura. For at a time when, according to received wisdom, Christian communities were being persecuted by the imperial authorities, a house-church-cum-baptistery existed in a town swarming with Roman soldiers. And it was hardly clandestine: it lay right under a wall tower occupied by men of the imperial garrison, the largest and most powerful alien enclave of all. However, arguably, overfocus on the Jewish and Christian enclaves at Dura, which only existed late in the city's history and were apparently small and peripheral, has been at the expense of a balanced appreciation of the social and cultural dynamics of the city and offers a good example of how modern cultural preoccupations risk distorting our readings of the past.

Impact of the Roman Garrison

Rostovtzeff believed the presence of a Roman garrison was catastrophic for Dura, its oppressions and exactions so severe that they destroyed the existing "Macedonian" social structure, leaving the city "dying before the Sasanians killed it" (Rostovtzeff 1938: 31). Others echoed his gloomy assessment, while more recently Pollard has suggested at least virtual "*Apartheid*" between Dura's soldiers and civilians (Pollard 2000: 53, 166). The old Macedonian names do vanish from the record in Dura's last decades, but on the other hand, the town boasts indications of Roman provincial-style aggrandizement in the form of arches and colonnades, while Sommer has postulated a military-induced "economic boom" (Sommer 2005: 313). The city was clearly transforming radically under Roman rule, but the dynamics of the change, especially the role of the military, remain to be clarified.

Did the Sasanians Take Dura Twice?

There are a number of indications which appear to suggest that the Sasanian siege of c. 256 represented the second Iranian capture of the city. Texts written on the synagogue murals and a parchment document, all buried within the rampart raised in advance of the final siege, appear to attest the presence of Sasanians inside Dura (Grenet 1988). These probably represent a brief occupation around 252–253, when the Sasanians overran Roman Syria, before the Romans restored control, including Dura, by 254. This remains controversial (Leriche et al. 2011: 21), but the evidence is hard to explain away. The question is also critically important, because two Sasanian occupations would imply that, e.g., patterns of finds made in the buildings of the city likely belong to a final period of political and military chaos and so may tell us little of the life of Dura before its last few traumatic years.

Was Dura Typical or Exceptional?

A recurrent concern is how far we can use the testimony of Dura to understand other sites of the era: was it in any sense typical? There are reasons to think that the extent of its cosmopolitanism was unusual (Palmyra and Hatra were culturally less heterogeneous), but the difficulty remains that no other site has yet produced comparably rich and diverse evidence. Whether it is anyway meaningful to think of "a typical town" is a moot point, since each had a unique history.

The Early Excavations as a Colonial Project?

The history of Dura might be seen as the story of one western colonial implantation in Syria (the Macedonian military colonists and their still-dominant descendants) being, in the last century of the city's life, increasingly displaced by another (Roman soldiers). After being rediscovered by Indian troops of the British Empire in 1920, over the next two decades, it was explored by scholars representing the newly established regional colonial power (France) and the rising American superpower. The interwar exploration of the city could, then, be seen as a further episode of colonialism at the site, with its concentration on Macedonian and Roman power projection in the Middle East prefiguring modern western exploitation for oil, focus on the Jewish and Christian antiquities similarly reflecting Euro-American values, and the attention paid to "Semitic" and "Parthian" aspects being mere Orientalism. However, while the interwar excavations, and the interpretations placed upon them, can only be understood in the context of their times, such an extreme stance would be as misguided as assuming early Dura scholarship was entirely objective and unbiased. The pioneering scholars of Dura threw brilliant light onto the forgotten past of a region which contributed profoundly to the subsequent shared history of Western and Middle Eastern peoples, which new research, on the basis of more equal relations between Western and indigenous researchers, can examine from new perspectives.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Palmyra, Archaeology of
- ▶ Religion, Greek, Archaeology of
- ▶ Sasanian Empire, Archaeology of the
- ▶ Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

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Basic Biographical Information

Refik Duru was born in Kadıköy, İstanbul, in 1958. He graduated from Istanbul University's Prehistory Department in 1958. In 1960, he was employed as an assistant in the Ancient Near Eastern languages and Cultures Department. He was promoted as Assistant Professor in 1972 and as Professor in 1978. Duru served as head of the Protohistory and Near Eastern Archaeology Department at Istanbul University until his retirement in 1999.

Major Accomplishments

Refik Duru participated in studies such as the survey research project of Islahiye region, and in the Yesemek, Tilmen, Gedikli, Çatalhöyük excavations as a board member of the research teams. In 1973, he conducted the Değirmen Tepe excavations as a part of the Keban Project. Within the content of Burdur Antalya Regional Research studies, he led the Kuruçay Höyük and Höyücek excavations, beginning from 1976. His studies mostly focused on the neolithization of the Lake District and in this context, he conducted the Hacılar excavation that shed new light on the sequence of the Neolithic in the region. He also directed important excavations at Bademağacı.

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Earle, Timothy

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Basic Biographical Information

Timothy Earle (Fig. 1) is an anthropological archaeologist whose interests center on the political economies of intermediate societies (chiefdoms) and archaic states. Earle received a B.A. from Harvard College (1969) and a Ph.D. from the University of Michigan (1973). He was Professor of Anthropology at the University of California, Los Angeles, from 1973 to 1995 and Director of UCLA's Institute of Archaeology from 1987 to 1992. He spent a year at the University of Cambridge (1986–1987). In 1995, he joined Northwestern University as Chair of the Department of Anthropology and became Professor Emeritus in 2011. He was elected to the Executive Board of the Society for Economic Anthropology (2002–), the Editorial Board of the Society for Evolutionary Anthropology (2007–2011), and the Executive Committee of the Human Relations Area File (2008–2011). He served as President of the Archaeology Division of the American Anthropological Association (1993–1997). In 2002, he delivered the Archaeology Division's annual distinguished lecture (Earle 2004).

Major Accomplishments

Strongly evolutionary in its orientation, Earle's research is grounded in materialist approaches. Focused initially on the economic foundations of leadership, his interests widened to encompass ideology, culture, and agency, as well as exploring corporate forms of sociopolitical organization. The broad comparative sweep of his thinking is best reflected in *The Evolution of Human Societies* (first ed., 1987, second ed., 2000), coauthored with Allen Johnson. Unparalleled as a contribution to multi-linear social evolutionary theory, the book investigates the causes, mechanisms, and patterns of change through nineteen ethnographic and archaeological case studies. Subsistence intensification, political integration, and social stratification are characterized as interdependent processes that unfold in varied environments – at distinct societal scales – across the globe.

Earle's archaeological field projects, in Polynesia, the Andes, and Europe, have incorporated rigorous testing of economic questions alongside innovative methods. As a doctoral student investigating irrigation, he mapped engineered landscapes in Hawaii as part of Marshall Sahlins' Hawaiian Social Morphology and Economy project (1971–1972). Demonstrating that land tenure translated into political control, Earle argued that redistribution mobilized surpluses predominantly to finance elite domination rather than to even out access to resources.

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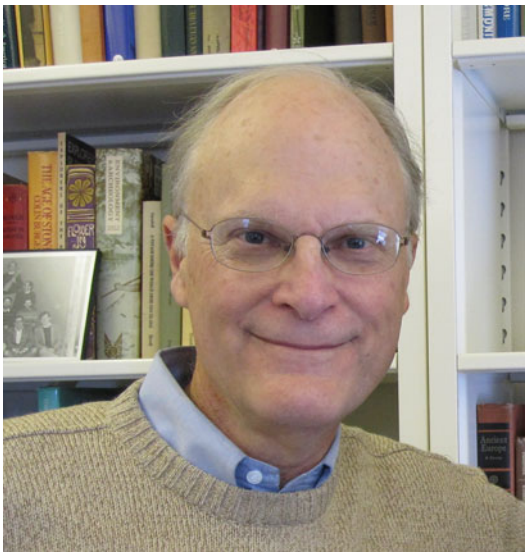

Earle, Timothy, Fig. 1 Tim Earle. Photo: Kristian Kristiansen

Before the word *agency* entered common parlance, Earle recognized that leaders can – and do – influence trajectories of sociopolitical change. He then elaborated upon his economic approach in a series of publications with Jonathon Ericson and Andrew Christenson designed to examine exchange relationships and introduce formal economic modeling to archaeology (Earle & Ericson 1977; Earle & Christenson 1980; Ericson & Earle 1982).

Earle then established the Upper Mantaro Archaeological Project in Peru (1977–1986, with T. D'Altroy, C. Hastorf, and C. Scott) to investigate how the political and social upheavals of the Inka conquest affected the local economy (particularly craft specialization and exchange). Excavations in centers and villages allowed comparison of households of different statuses, occupied before and after the conquest. Densities of ceramic wasters, spindle whorls, and lithic debris were calculated, as well as ratios of finished goods to tools and debris. Detailed comparisons of diet, craft production, and consumption revealed that the local economy saw the intensification of surplus production but little change in craft production or exchange. Instead, wealth goods controlled by the Inkas largely replaced local prestige goods for status legitimation and became less concentrated in elite compounds (Costin & Earle 1989).

In a collaborative publication with Terence D'Altroy, (D'Altroy & Earle 1985), Earle highlighted staple finance and wealth finance as contrasting strategies, with implications for both ideologies and institutions of control. He edited a subsequent volume with Elizabeth Brumfiel (Brumfiel & Earle 1987) in which contributors investigated craft specialization in emergent political economies, making a distinction between *attached* and *independent* specialists. Acknowledging diverse local circumstances, contributors agreed that specialist craft activity was often organized by elites to strengthen their existing positions; specialization was therefore more a *consequence* than a *cause* of complexity.

In the mid-1990s, Earle turned his attention to the material basis of ideology. He argued that effective leadership depended not only upon economic control but also upon coercive force as well as ideologies that instituted and structured power relations. In discussions with Elizabeth DeMarrais and Luis Jaime Castillo, ideas about the materialization of ideology were developed to explain how messages about power became widespread and visible in past societies. Part of a special section of *Current Anthropology* in 1996, this entry appeared with two companion articles that jointly focused attention on the agency of leaders and on ideology as a source of power.

Political instability in Peru led Earle to turn his attention toward Europe, where he established a highly successful collaboration with Kristian Kristiansen. The Thy Archaeological Project (1990–1997, co-directed with K. Kristiansen and M. Rowlands) investigated Neolithic and Bronze Age landscapes. Innovations in field methods united the paleoenvironmental reconstruction studies of Danish researchers with techniques including settlement survey and field excavations accompanied by full screening. Plow soil sampling (developed with J. Steinberg) facilitated identification and description of occupations in disturbed contexts, allowing detailed diachronic reconstruction of landscapes and settlement. Results showed that control of prestige goods

(particularly bronze), as well as the creation of property rights through construction of monuments, underpinned the emergence of regional elites and hierarchical sociopolitical structures. As part of a subsequent three-region comparison of Bronze Age societies (Earle & Kristiansen 2010), Earle has recently explored specialist production and the appearance of exchange networks along the Danube.

Throughout his career, Earle's enthusiasm for anthropology led him to develop and to promote a four-field, integrated vision for the discipline. At UCLA, he was at the center of a dynamic group of researchers (including Jim Hill and Merrick Posnansky); many of his graduate students went on to develop innovative approaches to political economy. At Northwestern, Earle helped to create a distinguished four-field program that provides a model for other universities. Energetic and deeply committed to supporting colleagues, Earle maintains collaborations and friendships with former students, many now in posts in leading research universities. Through his own substantial publication record, as well as through mentoring of doctoral students, Earle has been among the most influential archaeologists of his generation.

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Early Excavations Around The Globe

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State of Knowledge and Current Debates

Introduction

For many people, the history of archaeology is synonymous with the history of excavation. In the public imagination the two are barely separable, yet this very strong association is a comparatively recent phenomenon, and one that can be

unhelpful in defining a discipline. By the same token, development in archaeological method consists of more than the refinement of techniques in the field; again, a focus on excavation can be limiting and deceptive. The early history of excavation is best treated as one aspect of the broader methodological and intellectual history that helps us to understand archaeology's emergence as a discipline, and so in this brief summary aims to relate early excavations to these other developments.

Excavation is not synonymous with archaeology, but it is the central and most prominent tool of the modern discipline. Why? Fundamentally, excavation has developed as a research tool in response to changing perceptions – in general, increasingly positive over time – of the scope of the material remains of the past to reveal information about past lives and societies. The early history of excavation is in part the story of that developing sense of possibility in the physical exploration of ancient sites. It is a process rooted in European intellectual history, and hence the history of early excavations, even at a global level, is one dominated by European antiquarians and excavators (among other biases: an overwhelming majority of early excavators were male, and a large proportion were amateurs of independent means and high social rank). In its origins and as a human impulse, however, the exploration of the material remains of the past can be seen as a global phenomenon.

Precursors

There are many ancient examples of antiquarianism. The interest shown by ancient Mesopotamian kings in the monuments and inscriptions of their predecessors is well documented. Ancient sites and artifacts in the classical world might acquire associations with the Homeric past, while several accounts exist of Roman building work leading to the discovery of ancient ceramics and bronzes, even to looting of tombs and a trade in antiquities. In China, the collection and cataloguing of ancient jades and bronzes was an established elite activity from at least the tenth century CE.

In medieval Europe, historical work was focused heavily on texts. Perhaps the strongest interest in the material remains of the past came through the value of saints' relics. Excavations such as those of Helena of Constantinople to discover the remains of the True Cross had pious rather than historical motives. There was an ambivalence toward pagan remains but also little apparent sense that the material remains of the past could provide much useful information. This could certainly not be said of the Italian Renaissance, in which ancient classical art and architecture were seen as enormously useful – though not so much as a source of information about the past as a source of instruction for the artists and architects of the present.

The crucial changes that underpin the modern discipline of archaeology are specifically those of the Enlightenment. The philosophical turn toward empiricism and a greatly increased confidence in the explanatory power of observation and experiment that characterizes eighteenth-century European intellectual culture enabled material that was always visible to be seen in a new light, and for the investigation of questions about the ancient past to take new forms. These momentous changes reveal themselves first in the interpretation of discoveries and subsequently in the methods used to pursue questions about the past.

Italy

Eighteenth-century discoveries near Naples, in the shadow of Mount Vesuvius, were to demonstrate vividly the capacity of excavation to reveal past lives. In 1709, the chance discovery of marble blocks in an area southwest of the volcano led the Austrian Prince D'Elbeuf, Emmanuel de Lorraine, to buy the land and begin excavations, not for the sake of antiquities but for marble as a building material for his own villa. What his workmen found was a wealth of classical statuary; though no one realized the fact at the time, they had been fortunate enough to dig down to the stage of the theater of ancient Herculaneum, strewn with statuary from the theater's destruction by the eruption of Vesuvius in CE 79.

Herculaneum had been buried below many meters of lava, and finds were tunneled from the rock in a largely haphazard fashion until 1716.

Twenty years later, the Prince D'Elbeuf's house became the home of Charles of Bourbon, King of Naples and Sicily (later Charles III of Spain), and of his queen-consort Maria Amalia of Saxony, who is reputed to have persuaded her husband to reopen the excavations. Charles placed these excavations under the charge of an engineer, Rocco Gioacchino de Alcubierre, who continued the earlier laborious (and destructive) practice of tunneling. In 1748, however, Alcubierre became aware of another nearby site where statues had been discovered. This site proved far easier to excavate than Herculaneum: although both had been destroyed by Vesuvius, the new site had been buried by ash rather than lava. In 1763, an inscription would reveal the site to be the city of Pompeii.

How to understand the sculptures and frescoes that emerged at Herculaneum and Pompeii? The answer was provided almost entirely by the German art historian Johann Joachim Winckelmann. After initial scholarly successes in Germany, Winckelmann moved to Rome in 1755 and from 1758 was employed by the antiquities collector Cardinal Albani. From 1763, he was supervisor of antiquities for Rome and its surrounding area, and as such, he visited both Herculaneum and Pompeii, where he was aghast at the brutal excavation techniques being used. Winckelmann saw a direct connection between social and political conditions and artistic production, arguing that the finest works of art depended on political freedom. He did not apply the principle consistently, but the idea stuck, in part because of the sheer brilliance of his prose: his *History of the Art of Antiquity* (1764) was uniquely influential, shaping European attitudes to ancient art and ensuring a special reverence for classical art. The subsequent (nineteenth century) enshrining of the Parthenon sculptures of democratic classical Athens as the highest artistic achievement of antiquity therefore represented both an aesthetic and a political judgment. The sculptures have become a potent symbol in the modern world, and the removal of many of them from the Parthenon and their shipment to London by Thomas Bruce, Earl of Elgin, at the beginning of the nineteenth century has provoked one of archaeology's most enduring controversies.

Northern Europe: Antiquarianism to Archaeology

In 1533, Henry VIII appointed John Leland to the new post of king's antiquary. His work included a survey of the monuments of England and Wales, built on by William Camden, who in 1586 published the first general account of Britain's ancient monuments. Activities of this kind were soon taking place across northern Europe, as ancient monuments became incorporated into a broader interest in national identity and heritage and the development of national pasts peopled by vaguely but romantically imagined Celts, Gauls, and druids. In Britain, antiquarians such as John Aubrey in the seventeenth century and William Stukeley in the eighteenth combined increasingly methodical recording of ancient monuments with the construction of fantasies around them: Aubrey was the first to connect the druids with Stonehenge. The problem lay in a lack of historical sources and chronology: the earliest accounts of Britons were those of Julius Caesar, and it was his description of a land gripped by druids and mysticism that Aubrey and Stukeley elaborated and applied to most ancient remains.

For much of the eighteenth century, the excavation of ancient mounds remained a hobby. Richard Colt Hoare and William Cunnington had higher ambitions than most "barrow diggers," seeking patterns in the many mounds they excavated, but the real developments in excavation methods came toward the end of the century with Augustus Henry Lane-Fox Pitt Rivers. A British general, Pitt Rivers' retirement from the army in 1880 allowed him to concentrate on his antiquarian interests, focusing on his own large estate of Cranborne Chase in southern England. His work represented a revolution in method and recording, based on a simple principle that still governs archaeological excavation

today: that since excavation itself is destructive and excavators cannot know what information will be useful in the future, they should set out to record as much detail as possible, whether or not it seems important to them personally at the time.

By the end of the nineteenth century, work on chronology was having a major impact. The German historian Johann von Eckart had first proposed a three-age principle (a stone age succeeded by ages of bronze and iron) in the early eighteenth century, but it was not until the early nineteenth and Christian Thomsen's work in the new Danish National Museum, attempting to classify its collections, that the idea was applied and developed into a usable tool. Thomsen's student Jens Worsaae took the system into the field, identifying the recurring characteristics of Stone, Bronze, and Iron Age burial mounds in Denmark and demonstrating the potential interpretive power of Thomsen's approach.

These dating methods were relative, capable of establishing the order of material in a sequence but not of applying absolute dates. In this field, the pioneer was the Swedish archaeologist Gustav Oscar Montelius, who through careful classification was able both to establish more detailed regional sequences and to identify where they intersected. Montelius used imports and mixtures of material in the border areas between regions to synchronize their chronologies, ultimately linking them through Greece to Egypt, where a historical chronology was known and fixed to absolute dates through hieroglyphic inscriptions including astronomical observations. In this way, by 1910, at least some of Europe's Bronze and Iron Age prehistory could be tied to an absolute as well as a relative chronology.

Northern Europe: Human Antiquity

Northern Europe was also the key region in the establishment of a long prehistory for humanity. Until the middle of the nineteenth century, the vast majority Europeans believed the history of the world and of humanity's existence to have been relatively brief. The primary source of information on human antiquity was the Bible. Since the Middle Ages, most scholars had placed the world's creation somewhere between 3500 and 4000 BCE; Archbishop James Ussher's chronology produced in the seventeenth century and based on a creation in 4004 BCE became perhaps the most influential in modern times. Revising the chronology required not only the right empirical research, but also the cultural changes that allowed for its conclusions to find recognition. In the mid-seventeenth century, the French protestant Isaac La Peyrère's *Men Before Adam* had been treated as heresy by the Inquisition and its author arrested. The years 1830–1833 saw the publication of Charles Lyell's *Principles of Geology*, a convincing argument for the principle of uniformitarianism in geology, i.e. the assumption that past geological processes were the same as those of the present. To accept this view was to allow an immense time span for the existence of the earth, though Lyell himself took a further thirty years to become convinced of a long prehistory for humanity. By this time Darwin had identified a mechanism, natural selection, capable of explaining the long-term processes of change scholars now saw in the fossil record, while other developments shed light on human prehistory. The mid-nineteenth-century discoveries of Boucher de Perthes in Picardy showed the existence of worked stone tools in contexts associated with the bones of extinct animals such as the mammoth. What is special about Boucher de Perthes is not what he found – in this he had several predecessors: John Frere had tried to convince the Royal Society of the same conclusions as early as 1797 – but that his discoveries were the first to achieve wide acceptance. This came in 1859, following careful inspection of his own and other sites by scholars including Lyell.

The mid-nineteenth century also witnessed the first discoveries of Paleolithic art. In 1860, Eduard Lartet discovered the first certain example of Ice Age art, an engraved bone depicting a bear's head, at Massat in the French Pyrenees. Further examples followed, and 1879 saw the discovery of spectacular cave paintings at

Altamira by Don Marcelino Sanz de Sautuola (or more accurately, his young daughter Maria, who looked at the cave's ceiling while he had been focused on the search for stone tools at the floor). Sadly, de Sautuola's discoveries were dismissed as a fraud in his own lifetime; shortly after his death, discoveries at other sites were to vindicate him completely. Émile Cartailhac, professor of prehistory at Toulouse, published a full retraction of his earlier attacks on de Sautuola and visited Maria to apologize in person for the harm he had done to her father's reputation.

Egypt

Nowhere was Anglo-French imperial competition mirrored by competition over antiquities so closely as in Egypt. In 1798, Napoleon invaded Egypt, bringing with him not only soldiers and engineers but also a Commission of Sciences and Arts, consisting of more than 150 scholars, whose role was to study the country, including its ancient monuments. Napoleon's hold on Egypt was short-lived, but the *savants* and their studies were to have an enormous impact. Produced over the next twenty years and involving hundreds more artists and technicians, the monumental *Description de l'Égypte* provided one starting point for the modern study of Egypt's ancient past. The other, also as a result of the Napoleonic invasion, was the Rosetta Stone, discovered in 1799 at Fort Julien, near Rashid (French "Rosette," English "Rosetta"). The name of its excavator, a French soldier, is unknown, though it was his commanding officer, one Bouchard, who shipped the stone to Cairo. The potential value of its long trilingual inscription for decipherment was immediately recognized: that one of the languages was Greek and could therefore be read easily gave a strong starting point. The British seized the stone itself, but it was a French scholar, the extraordinarily gifted linguist Jean-François Champollion, who was ultimately to decipher the hieroglyphic script.

Champollion's success was widely celebrated, but not all things ancient Egyptian were seen to have value. With none of the modern restrictions on excavation or export, collectors such as Richard Lepsius, Henry Salt, and the larger-than-life Giovanni Belzoni succeeded in removing colossal Egyptian sculptures to Europe, but their entry into the British Museum, in particular, proved controversial, with Egyptian sculpture denigrated as inferior to the art of classical Greece. Auguste Mariette, too, excavated and exported sculptures, though he also came to recognize the catastrophic damage uncontrolled excavation was doing in the country and was the first to take serious steps toward limiting both this and the flow of antiquities to Europe, introducing some controls and establishing the national museum in Cairo.

A revolution in method came with the work of William Matthew Flinders Petrie. Petrie's work was remarkable from the beginning: his first project in Egypt, in 1881–1883, was to produce the first accurate, detailed survey of the three great pyramids at Giza. He was to spend the next 40 years excavating throughout Egypt, setting new standards in excavation techniques, recording, and publishing as he went. Where his predecessors had focused on the grand and monumental, Petrie recognized the importance of ceramics and small finds. He pioneered seriation, using close study and comparison of ceramic typologies to establish chronological sequences for the material he excavated. This involved a significant element of statistical analysis, now an integral part of archaeological research but novel at the time, and allowed Petrie to create the first sequences for predynastic remains.

If Petrie's achievements are among the most important in the history of archaeology, Howard Carter's discovery of the tomb of Tutankhamun in 1922 is surely the most celebrated. Much of the modern close identification of archaeology with excavation can be explained by the enormous public reaction to this discovery, to the romance of opening a room sealed for thousands of years and Carter's first amazed glimpse of the "wonderful things" within. The accident of discovery and the glitter of treasure may not be the images archaeologists would most like associated with their work, but the hold on the popular imagination of Tutankhamun has an enormous positive aspect that cannot be overlooked: Carter's discovery remains

probably the greatest single spur to public interest in archaeology and the ancient past.

The Near East

Since the Middle Ages, European travelers in Mesopotamia (the lands of the Tigris and Euphrates, incorporating all of Iraq as well as parts of Turkey and Syria) had described great ancient mounds, attached sometimes to biblical locations and narratives. Unlike the monuments of Egypt, however, these ruins were entirely nondescript: artificial hills (known in different areas by the terms tell, tepe and höyük) offering no hint as to the original appearance of their contents. In the disappearance of Babylon and Nineveh, it was easy to see the fulfillment of biblical prophecy. At the beginning of the nineteenth century, the East India Company agent Claudius James Rich produced invaluable surveys of both, considering the mounds around Mosul (i.e. ancient Nineveh) and Hillah (Babylon) in light of classical accounts, but it was not until mid-century that large-scale excavation provided a fuller picture.

The excavations of Paul-Émile Botta and Austen Henry Layard at Assyrian sites in the 1840 s brought forth a new and unfamiliar material culture. Each believed they had uncovered biblical Nineveh – Layard eventually did, though the site of Nimrud, the subject of his famous *Nineveh and its Remains*, was actually another Assyrian capital, Kalhu, while Botta's main work at Khorsabad revealed yet another, ancient Dur-Sharrukin. In large-scale excavations based on open trenches and tunneling, they uncovered vast palaces whose walls were lined with stone bas-reliefs. Excavation concentrated simply on the removal of these, cutting them away for transport to London and Paris. The imagery these reliefs contained was entirely new to the modern world: before Botta's excavations began in 1842, the few Mesopotamian antiquities known gave little hint of what lay beneath the mounds around Mosul. Assyria's kings and courtiers, wars and hunts were displayed in intricate detail, though art historians of the day gave little credit to what they saw as a crude and barbarous form of sculpture.

The Assyrian excavations also recovered vast quantities of cuneiform texts, including the great library of the seventh century BCE king Ashurbanipal at Nineveh. As decipherment proceeded apace through the mid-nineteenth century and a distinct field of study, Assyriology, developed around these texts, so excavations, particularly in southern Iraq in the late nineteenth century, came to focus heavily on their recovery, often with little or no recording of context.

More systematic excavation did not come until the close of the nineteenth century, with the formation of the German Oriental Society and the beginning of major excavations at Babylon, from 1899, and Ashur, from 1903. These excavations were of a very different character to their predecessors, focusing on the tracing and recording of architecture. At Babylon, Robert Koldewey uncovered the palaces and temples of Nebuchadnezzar's capital, as well as the vivid glazed-brick reliefs of the Ishtar Gate, later to be reconstructed in Berlin. The excavations at Babylon and Ashur were recorded in far greater detail than their predecessors, and at Ashur, Walter Andrae's sounding at the Ishtar temple is generally considered the first stratigraphic excavation in Mesopotamian archaeology.

In Palestine, Flinders Petrie applied the same attention to detail that had brought him success in Egypt; his work at Tell el-Hesi in 1890 established pottery sequences and a chronological framework for excavation in the region. Even more important in this respect was the work of the American William Foxwell Albright, who through his own excavations in the 1920s and 1930s and study of material from others established the ceramic chronology for Syria-Palestine. Albright is regarded as the founding figure in biblical archaeology, and his work has exerted an enormous influence on the discipline's development.

Aegean Prehistory

The history of archaeology is rich in romantic stories, but surely none can equal that of Heinrich Schliemann's discovery of Troy. Obsessed with Homer as a child, Schliemann had a highly successful business career and ultimately achieved

great wealth. At the same time, he discovered a prodigious talent for languages. When he returned to the Iliad, he did so armed with this expertise, a fortune to spend, and above all, an unshakeable faith in the literal truth of Homer's account. His approach, seen at the time and since as shockingly naive, was to follow as closely as possible every detail of geographical description in the Iliad and thus to arrive at the walls of Troy itself. He quickly rejected the site favored by most authorities – judging it impossible that Achilles and Hector could have fought for three laps around it – eventually settling on the mound of Hisarlik (a site that had been previously suggested by Frank Calvert), where in the face of his successes, scholars' mockery was forced to give way to amazed disbelief. Better still, Schliemann was discovering something of tell formation, realizing that the mound he excavated had layers like an onion and that he was effectively digging through not one but many cities. The level of the mound he believed to represent Homeric Troy, and where he discovered the hoard of gold that will now be known forever as Priam's, was eventually found to be much later than the Bronze Age world of which the Iliad sings. In truth, the relationships of that world itself to its Homeric portrayal, of the siege of Troy to a historical event, or of any settlement at Hisarlik to the Ilium it describes remain distant. It is hard to begrudge Schliemann his prize, however: in the eyes of his contemporaries, he had done the seemingly impossible, and in the process opened up new worlds. As if this were not enough, he went on to excavate the royal tombs of Mycenae, here discovering a golden funerary mask he believed to have belonged to Agamemnon himself.

More methodical, though hardly mundane, were the excavations of Sir Arthur Evans at Knossos. Schliemann himself had wished to dig at Knossos, believing Crete to be the key to an early culture spanning the Aegean. Over 25 years of work on Crete, beginning in 1900, Evans was able to explore the potential Schliemann had glimpsed. And as Schliemann surely would have done, he saw in his discoveries at Knossos the palace of King Minos and the Labyrinth, the world of Theseus, Ariadne, and the Minotaur. Much of what Evans found was spectacular, most famously the colored wall paintings that survived in parts of the palace. Moreover, his discoveries confirmed not only interaction across the Aegean but also relationships more distant: Near Eastern imports and influence abounded. The Bronze Age world of which Knossos formed a part was a very large one, and the dynamics of travel, trade, and cultural interaction within it remain a major preoccupation of scholarship today.

The Americas

Antiquarianism and early excavation in the New World took a different path. The pre-Columbian Americas did not bear on European cultural history in the same way as the ancient Aegean or Near East. In Central and South America, whole empires were destroyed by European armies and diseases and subsequently all but forgotten, to the point that in the late eighteenth and nineteenth centuries it is accurate to speak of their "rediscovery" by scholars. In 1786, the ruins of Palenque were discovered, overgrown, and forgotten in the Guatemalan rainforest, though it was not until the mid-nineteenth century and the expedition of the American John Lloyd Stephens that these and other Mayan sites would be fully explored and brought to the world's attention. In South America, it was Alexander von Humboldt, primarily a naturalist, who produced the first drawings and descriptions of Inca roads and architecture. Further descriptions followed, but no excavation took place until 1862, when Ephraim George Squire, originally sent to Lima to represent the United States in a diplomatic dispute, spent 18 months surveying and digging in Peru and Bolivia, in the process coming to recognize that the remains he was observing were not only Inca but also those of other, earlier societies.

Seeing cities and monumental architecture as marks of civilization, the eighteenth- and nineteenth-century commentators generally avoided associating the discoveries with the indigenous populations of the present, with alternative candidates including ancient European colonists, Phoenicians, Egyptians, Lost Tribes of Israel,

and even a lost civilization of Atlantis. There were exceptions, including Stephens himself, but their views were unpopular and very slow to find general acceptance.

In North America too indigenous populations suffered greatly as European settlement expanded, though here, the most prominent sites were already ancient. Famously it was Thomas Jefferson who made the first systematic study of one of the great ancient mounds, near his home in Monticello, Virginia, in 1784. Following initial investigations near the surface, he cut a section through the mound, describing in order the strata of stones, earth, and bones contained within. Jefferson attributed the mounds to earlier Indian populations, though both this conclusion and the practice of systematically investigating the monuments came a full century ahead of their time. Again, an association of large-scale monuments with civilization and a racist reluctance to ascribe this to Indians led in the eighteenth and nineteenth centuries to alternative theories involving Phoenician, Egyptian, or Israelite settlers.

Throughout the Americas, the late nineteenth century saw the beginning of more systematic excavations. In Peru, Max Uhle's excavations at Pachacamac enabled the construction of pottery sequences and relative chronologies for the first time, and helped to distinguish between the remains of the several distinct cultures whose remains the archaeologists encountered. This was crucial work, though more spectacular was Hiram Bingham's 1911 discovery of incredible Inca ruins at Machu Picchu, high in the Andes. In Central America, too, excavation helped to establish typologies and relative chronologies, Manuel Gamio's work in the early twentieth century providing sequences and clarifying chronological relationships. In North America, the study of ancient mounds became far more systematic in the 1880s, with Cyrus Thomas leading a program of survey, mapping, and excavation on behalf of the Smithsonian Institution's newly established Bureau of American Ethnology – and coming to agree with Jefferson's earlier view that the mounds were indeed the work of Indians. Meanwhile, scientific excavations were conducted at several mounds, including the Great Serpent Mound, Ohio, by Frederick Ward Putnam of Harvard's Peabody Museum.

Africa

As in the Americas, the early history of archaeology in Africa was profoundly and negatively shaped by racial theories. For much of the nineteenth century, sub-Saharan Africa was imagined to be an ahistorical wilderness, not only inaccessible to archaeologists but also certain to contain nothing of note. The eighteenth- and nineteenth-century European engagement with Africa was characterized by an enormous sense of cultural superiority on the part of the Europeans, whose own technologies gave them military superiority and reinforced the idea that the people they encountered were primitive and backward. Some textual evidence did exist of ancient civilizations, in awareness in classical texts of the undefined region called by Greeks, Ethiopia, in the works of medieval Arab geographers and in the sixteenth-century account of Leo Africanus, one of the few Europeans at that date to have traveled extensively in the African interior. In the late eighteenth century James Bruce, a Scot searching for the source of the Nile, encountered a substantial kingdom whose army contained what to European eyes appeared a clear African parallel to medieval knights: cavalry wearing mail armor and using lances, swords, and shields. At the time his account was generally disbelieved. Meanwhile the antiquities of Sudan, the focus of considerable nineteenth-century scholarly attention, were seen as part of the ancient Egyptian world, and therefore spectacular discoveries at the Kushite capital Meroë did little to affect the perception of "black Africa" as a wilderness.

Even early discoveries in Southern Africa had little effect. The ruins known as Great Zimbabwe, apparently referred to as an inhabited site in sixteenth-century Portuguese accounts but rediscovered as a ruin by Karl Mauch in 1871, were generally identified with the Ophir to which King Solomon sent an expedition and recovered huge quantities of gold. Mauch himself felt that the identification solved a problem: since in his view the huge walls of Great Zimbabwe could not

have been the work of Africans, it made sense to look to the possibility of Israelite or Phoenician builders. This was the general pattern of thought on the ruins for the rest of the nineteenth century, and although competing models emerged, all invoked foreign colonists or a now-vanished white indigenous population. Perhaps what is most noteworthy about this situation is that further excavation during this period *did* produce many artifacts with strong and obvious relationships to some still in use in the area, but even these did not in themselves change people's minds. Instead the obviously African artifacts were disregarded as later deposits, and it was not until the systematic excavations of David Randall-MacIver in 1905 revealed such material in context that a strong case was made for African builders. Even then, the identification was disputed for decades: in 1931, it was still necessary for Gertrude Caton-Thompson to argue forcibly that the ruins were of African construction.

India and East Asia

In India, the early focus was on description of standing monuments and the study of languages and literature, most prominently William Jones' work on Sanskrit. Throughout the nineteenth century the study of Sanskrit, its several scripts and vast literature remained of prime importance. Excavation was rare, although many sculptures and architectural elements were removed to collections, and some sent to Europe, including the remains of the Amaravati Stupa, now in the British Museum. Though many early descriptions exist – Robert Knox's enticing late seventeenth-century account of the ruins of Anuradhapura in Ceylon (Sri Lanka) coming as early as 1681 – more systematic study of monuments and sites only began with Alexander Cunningham, from 1861 the head of the newly formed Archaeological Survey of India. The Survey reported, mapped, and described ancient sites in northern and central India. Among Cunningham's discoveries was the site of Harappa, where he found a seal carrying an unknown script. Excavations at Harappa and Mohenjo-daro during the 1920s revealed an entire, previously unknown civilization based around the Indus and its tributaries, dating to the third millennium BCE and thus contemporary with the world of early Mesopotamian city states and the pyramid-building pharaohs of Old Kingdom Egypt. The script found on the Indus Valley seals remains undeciphered.

Where in India European, and particularly British, familiarity increased through settlement, trade, and the development of empire, East Asia was less well known, with China and Japan in particular extremely difficult for foreigners to access. It was not until the second half of the nineteenth century that Japan became at all accessible for foreigners. The first archaeological excavations to be conducted in the country were those of Edward Morse, working on Neolithic remains at Omori, in 1877. In China, the introduction of archaeology, alien to the country's own strong scholarly historical and antiquarian traditions, came even later. In the early twentieth century Aurel Stein explored remote parts of Central Asia, recording sites, sometimes excavating, and – controversially – collecting artifacts and manuscripts. In 1920, Johan Gunnar Andersson was appointed by the Chinese government to investigate prehistoric remains, and in 1928, the Academia Sinica added an archaeological section to its Institute of History and Philology under the leadership of Li Chi, a US-trained anthropologist.

One early Chinese discovery of particular note was that of an unusual tooth, made by Andersson in 1920. He later found another, and a further example had been purchased by a doctor in 1899. Andersson gave the teeth he had found to Davidson Black of the Peking Union Medical College for study. Black concluded that they represented an extinct species closely related to modern humans, which he named *Sinanthropus pekinensis* – Peking Man. Subsequent excavations yielded many more specimens and vindicated the identification, and the species, further examples of which have been discovered across Africa, Europe, and Asia (including Eugene Dubois' late-nineteenth-century discovery, then known as Java Man), is now known as *Homo erectus*.

Perhaps the most spectacular nineteenth-century discoveries in East Asia were the ruins

of Angkor in Cambodia. In fact earlier accounts of the ruins did exist, but it was the 1864 description of Henri Mouhot that sparked more intensive interest. Crucially this interest included photographs and drawings, the former produced by J. Thompson and the latter by Louis Delaporte, through which images of these remote remains were disseminated around the world.

Oceania

As in the Americas, in Oceania archaeology developed in tandem with anthropology. The earliest excavations in Australia, however, resemble antiquarianism in Britain: explorations of mounds by Phillip in 1788 and Oxley in 1817. Perhaps more representative are early ethnographic efforts to record an Aboriginal culture that in the late nineteenth century was presumed to be on the verge of extinction, since by mid-century the impact of European colonization had decimated Aboriginal populations and disrupted social structures to a huge extent in many areas. This process included the collection of material culture, some remaining in Australia but much traveling to European collections. Some of the early collectors, such as Dermot Casey and H. M. Cooper, also located and recorded archaeological sites.

If the influence of European archaeology remained weak, this was in part due to a perception that its methodologies and focus, geared to identifying and categorizing long-term change in material culture, were inappropriate for the study of a culture seen as timeless: most Europeans considered Aboriginal societies as unchanging and locked in an early stage of human cultural development. Indeed, this was a major factor in nineteenth-century ethnographic interest, with Aboriginal societies being studied as literally Stone Age survivals by anthropologists such as Baldwin Spencer. The major work toward changing this view took place in the twentieth century, as the work of Norman Tindale and Herbert Hale at Ngaut Ngaut (then known as Devon Downs: as at a number of sites in Australia, the local community has more recently made efforts to see the site's traditional name reinstated in the literature) and Fred McCarthy at rockshelters near Sydney began to identify changing patterns in material culture over time in the manner of contemporary European and American work. All the practitioners of this period were amateurs, although Tindale and McCarthy both worked in association with state museums and their work was methodologically far more sophisticated than that of most of their peers.

Across Oceania, archaeology was secondary to ethnography, as Europeans attempted to record the living societies they encountered and to collect examples of their material culture. Some nineteenth-century research did relate to origins: Tasmanians were regarded as more "primitive" even than Australian Aborigines, primarily on the basis of tool types. In New Zealand, Walter Mantell's excavation at Awamoa in North Otago in 1852 revealed evidence of people who had hunted the moa, extinct by the time of European colonization. The moa's extinction and the latest of these remains were in fact of relatively recent origin, but the discovery sparked a debate throughout the late nineteenth century on the ancestors of the Maori and a much longer prehistory.

An interesting aspect of the search for origins, though one whose significance was not much discussed at the time, was the fact that, despite land claims to the contrary, European colonizers virtually never met with true *terra incognita*. At earlier stages, human beings had colonized almost every part of the planet, however remote. The great statues of Easter Island were first seen by a Dutch sailor, Jacob Roggeven, in 1722. The first excavations and surveys were conducted by German and American teams in the 1880s, and more detailed survey and study was conducted by Katherine Routledge in 1914–1915. Easter Island lies 3,500 km from the South American coast, and perhaps it is appropriate to finish this brief survey with the study of a location so distant from the world of the earliest antiquaries and excavators. European in its origins, archaeological investigation had come to span the globe.

Conclusion

By the early twentieth century, archaeological excavations were taking place all over the world. The practitioners remained largely European, however, and in order for this to change a further process of globalization was required. The twentieth century would see the development in many countries of strong national traditions of archaeological research and excavation, a change that would also come to affect the political resonances of major excavation projects. For much of the nineteenth and early twentieth centuries archaeology's political connections had most often taken the form of cultural and territorial competition between European empires. As the twentieth century progressed, by contrast, excavations and ancient monuments would play a growing role in nationalist politics and the construction of national pasts. The excavation of ancient sites has enormous political utility, being by nature highly visible, strongly tied to a particular location, and able to address the distant, often prehistoric past in which national mythologies are frequently rooted. Beyond this, theories on culture, race, and ethnicity prevalent in the early and middle parts of the twentieth century would add another, at times sinister, facet to excavation's role in the construction of modern identities. At the same time, however, the global distribution of archaeological research and excavation projects had other, more cosmopolitan consequences. A wealth of new data and an international community of scholars facilitated the study of ancient connections and relationships that constantly crossed modern borders, demonstrating the impossibility of understanding any area's past in isolation. Associated developments include the emergence of broadly shared methodologies and theoretical frameworks for research, neither homogenous nor imposed by any single authority, but established and constantly debated as the result of a strengthening global academic (and increasingly also public) discourse. Ultimately, the worldwide spread of excavation over the course of the nineteenth and early twentieth centuries would create the conditions for what has since become perhaps the dominant conception of archaeology: as a collective, worldwide endeavor aiming to better understand humanity's interconnected, global past.

Cross-References

- ▶ Archaeology: The World at 1800–1850
- ▶ Global Archaeology
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Nationalism and Archaeology: Overview

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Early Iron Age Greece (c. 1150–700 BCE)

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State of Knowledge and Current Debates

The Chronological Framework

The period that extends from the Late Bronze Age until the Classical period, namely, from the middle of the eleventh to the early fifth century, is divided into subperiods: the so-called Protogeometric (1050–900 BCE), the Geometric (900–700 BCE), and the Archaic (700–480 BCE). The last phase of the Late Bronze Age – the twelfth century – which saw the destruction of the Mycenaean world is classified as Late Helladic III C (LH IIIC) and Late Minoan in Crete (LM IIIC). In some areas the ceramic production reveals a short period between LH IIIC and PG, known as Submycenaean (or Subminoan in Crete).

The Protogeometric Period (Eleventh and Tenth Centuries BCE)

The destruction of the Mycenaean palaces and the collapse of the Mycenaean civilization were followed by a period of great unrest. Extensive population movements on the Greek mainland, the islands, and the coast of Asia Minor gradually led to the formation of the geopolitical map of the historical era. The distribution of the Greek dialects is to some extent associated with these population movements.

The two centuries extending from 1125/1075 until 900 BCE are often termed "Dark Ages," on one hand due to the few extant archaeological remains and on the other because the period is characterized by the population decline, poor life standards, and the loss of literacy. Nowadays, this term, based on the current archaeological data, does not correspond to reality.

The fall of the Mycenaean palaces led to the loss of monumentality in architecture and the appearance of the apsidal huts and the disappearance of the palatial art (wall painting, use of precious metals and semiprecious stones, fine-decorated pottery) as well as of the Linear B script, since they did not have to serve the developed Mycenaean system of bureaucracy any longer. During the same period, new burial customs appear, while iron became the dominant material. The reasons that led to the replacement of copper with iron are not fully understood, although one of them may have been the shortage of available resources.

The continuity or discontinuity from the Bronze to the Iron Age constitutes a major scholarly issue. Only in Crete is a continuity in cult obvious from one period to the other, while in mainland Greece such cases are few and mostly isolated (for instance, at Ay. Irini on Keos or at Kalapodi in Phocis) (LEMOS 2002).

Settlements and Sanctuaries: Society, Economy, Religion

Building Materials and Techniques

The domestic architecture of Early Iron Age Greece (1100–700 BCE) is characterized by detached buildings of various plans (apsidal, oval, round, and rectangular), built of ephemeral materials with the exception of the base of the wall that was usually formed of stones (see Drerup 1969; Fagerström 1988; Mazarakis Ainian 1997). In some areas, however, houses were built entirely of stone and each unit usually consisted of two or more chambers. The use of mud brick for the superstructure of the walls was common, although pisé or wattle and daub was occasionally applied, too. Archaeological excavation has amply

demonstrated the widespread use of timber in the architecture of the period. Pitched roofs projecting over the sides and sometimes supported by a stoa of vertical posts protected the exterior sides of the walls from the weather conditions and secured the roof. The contemporary small building models allow us to gain a fairly good idea of the external appearance of the buildings. In regions where timber and/or mud brick was not available or, on the contrary, in lands where stones were easily at hand, as, for example, in the Cyclades and on Crete, curvilinear plans do not occur often. It is not a coincidence that in these places flat roofs dominated. There, as well as in northern Greece, the settlements were densely nucleated, presumably because the space was limited due either to the presence of a circuit or defensive wall or to the topography of the site. The compact arrangement may have also been conditioned by the need for defense: when the settlement was unfortified, the exterior walls of the houses on the periphery of the village provided an elementary line of defense. The need for protection from the fierce winds which blow in the Aegean and from the high summer temperatures must have also constituted a factor which conditioned the densely packed form of settlements throughout the centuries as well as the small dimensions of the windows.

Society and the Form of Houses

In general, within settlements and inhabited areas, the dwellings of ordinary people can be distinguished from those of the wealthier or ruling members of the society. From an architectural point of view, the dimensions and the complexity of design are the distinguishing features. During the Protogeometric period, these differences are more pronounced but they become less evident throughout time. The political organization and the social stratification of the Early Iron Age communities are therefore reflected in this differentiation. But what can we infer about the political organization of the period between c. 1100 and 700 BCE?

What Kind of Leaders?

Soon after the destruction or decline of the Mycenaean administrative centers, Greece was segmented into petty kingdoms. It is generally believed that the *qa-si-re-u* (*basileus*) mentioned in the Linear B tablets was a rather unimportant official, perhaps the chief of a semi-independent provincial town or village who, following the collapse of central authority, succeeded the *wanax* and managed to consolidate his power. These local rulers, who may have also held priestly duties, would have gained their independence after the upheavals of the end of the Late Bronze Age and therefore assumed the leadership of self-sustained communities from local governors.

In the Homeric epics *basileis* are mentioned, but it is not clear whether they should be regarded as highborn leaders who held the right to rule on a hereditary basis or whether they held power due to their competence and personal wealth ("Big Man" system). A third alternative could be the so-called "chiefdom" model that stands in between the two, since power is vested in the chief on a hereditary basis but he is constantly challenged by peers. Gradually, however, especially from the middle of the eighth century BCE onwards, these leaders would have "given way to a system of collegial rule by a land-owning nobility," to use Walter Donlan's words (Donlan 1985). This transition would have occurred peacefully in some places, while in others following civil strife.

The So-Called "Dark Ages" or the "Age of Heroes"?

The Homeric *oikos*, according to Donlan, is "the basic kinship, residential, and economic unit, comprising both the house (dwelling, land, animals) and the household. The household consists of the family (often an extended family of three generations) plus servants and adopted members" (Donlan 1985).

The evidence so far recovered suggests that in the beginning of the first millennium BCE, communities lived in nucleated settlements or in loosely organized villages, a pattern which does not contradict the Homeric scheme. Nevertheless, the large mid-tenth century BCE apsidal building at Toumba-Lefkandi, in Euboea, stands out as an exception to this general rule, since it lies outside the actual settlement, which was situated on the plateau of Xeropolis (Coulton et al. 1993). This unparalleled monumental

edifice, measuring c. 45 by 10 m, is among the few structures of the period divided into more than three compartments. It was built of stone up to a height of 1 m, while the rest of the superstructure was of mud bricks. The shallow porch was followed by a roughly square compartment divided into two parts by a row of posts. Next came a spacious room, doubtless the main hall of the unit; at one corner there was a staircase leading to an attic beneath the pitched roof. This main room, which was also provided with a side doorway, communicated through a central corridor on either side of which there were two roughly square small chambers with the rear apsidal storage compartment (numerous cavities to receive pithoi were found). The edifice was covered by a high-pitched roof composed of perishable materials and supported by an axial wooden colonnade and a series of wooden posts set against the walls as well as a veranda of wooden posts (a "peristyle"). In the center of the main compartment, an exceptionally rich couple had been buried according to a "Homeric" manner: the warrior was cremated and his ashes placed in a bronze amphora, accompanied with his weapons; his female consort was buried next to him, adorned with precious jewels; in an adjacent pit lay the four horses of the warrior. It is probable that this was the "royal" couple of Lefkandi, buried within their "anaktoron." Alternatively, this may have been a funerary monument, a large-scale replica of their actual residence, which may have been situated elsewhere, perhaps on the neighboring promontory of Xeropolis occupied during the period of use of the Toumba building (a comparable though smaller "megaron," roughly of the same period, was excavated recently on Xeropolis). If the former hypothesis is retained, it could be argued that the ruler and the members of his entourage, during the mid-tenth century BCE, lived apart from the rest of the community. The fact that the Toumba building was used for one generation only and the area henceforth served as a rich burial ground of their descendents could favor in this specific case, James Whitley's model of "unstable settlement system," i.e., places occupied for a relatively short period due to the fact that authority is unstable (Whitley 1991). The building itself is a reflection of a chiefdom-based organization of the society, in which the ruler wishes to manifest his right to rule.

The other dwellings of the nobility of the Protogeometric period are not so impressive, but the differences in scale and design regarding the dwellings of the common people are fairly clear (in general see Mazarakis Ainian 1997). Not a few exceed 15 m in length and they are often divided into several compartments in a row, the one behind the other. It seems that the social, economic, and religious duties of the ruler dictated the basic prerequisites of the dwellings of the governing elite. There exists no exact parallel to the Lefkandi building in Early Iron Age architecture; the closest, although loose analogies may be drawn to, are Megaron B at Thermon, in Aetolia, and certain apsidal buildings from central and northern Greece. At Mitrou in East Locris, an apsidal building, contemporary to the one from Lefkandi, must have been the residence of an important family. At Halos in Thessaly several storage pithoi were found in situ in the apse of the edifice there. The large apsidal unit unearthed at Toumba (Thessaloniki) consisted of four (and subsequently five) rooms one behind the other and comprised numerous dependencies. Contemporary apsidal buildings such as Unit IV-1 at Nichoria, Unit 74L-M at Asine, and Building A at Koukounaries (Paros) or rectangular Building T at Tiryns, dated to the twelfth century BCE, as well as several Cretan examples could be also identified as houses of the governing elite. Most of these dwellings were occupied for several generations, suggesting either some kind of hereditary leadership, although a long-lasting chiefdom model cannot be excluded. The Nichoria building, in the southwestern Peloponnese, is among the most interesting: it yielded rather rich metallic finds and presents a complex architectural layout, a pit hearth and a raised round platform in the main room, and significant storage facilities in the apse, something which has been taken as evidence that the house served communal, religious, and economic functions as well.

Normal houses of the same period were as a rule rather humble structures, provided with

one single room and occasionally a porch and a back chamber. The basic daily indoor activities of the household were presumably concentrated in the same space. As typical examples one may mention some curvilinear huts at Nichoria and Asine and an oval hut at Old Smyrna.

Cult Buildings

The older cult buildings of the Early Iron Age have been found in suburban or extra-urban sanctuaries. At Ay. Irini on Keos, cult activities continue uninterrupted within the partly reused Late Bronze Age cult building. A clay head from a prehistoric statue was reused as a cult image of Dionysus in the eighth century BCE and was positioned on a cylindrical clay base. An impressive succession of cult buildings from the Late Bronze to the Early Iron Age is currently unearthed at Kalapodi in Phocis. Such uninterrupted cult continuity is widespread on Crete, especially in sacred caves and rural sanctuaries, while one of the earliest temples has been found at Kommos (temple A); it was in use from the late eleventh century up to the ninth century BCE, when it was replaced by a similar temple, B. The temple housed ritual meals. Likewise, a very early apsidal cult building, associated with burnt sacrifices, was excavated at Poseidi in the Chalkidike peninsula, which later became the suburban sanctuary of the Eretrian colony of Mende.

Burial Customs

Burial customs (Morris 1987; Whitley 1991; Lemos 2002) differ from area to area. Single burials and cremations represent common characteristics, while tumuli, bronze urns, and tomb markers are only found in specific areas. The practice of cremation might have been introduced from the East. It was firstly established in Attica, Crete, Rhodes, and the Cyclades (Naxos) and only later spread throughout the Greek world.

The Submycenaean Period (1200–1050 BCE)

During the Submycenaean period (Desborough 1964), single inhumations in cist graves appear in Athens, unlike the multiple burials in chamber and tholos "family" tombs which characterized the previous Mycenaean era. The *necropoleis* of the Kerameikos and Salamis are the most important for the period. The reuse of chamber and tholos tombs is detected in central Greece, the Peloponnese, and Crete.

The deceased were placed inside the grave either in an extended or in a contracted position. In exceptional cases, the dead are cremated and the ash remains placed inside an urn. Rectangular shaft graves appear towards the end of the period. Earthen tumuli could cover single burials in Epirus, Thessaly, and Euboea. The grave offerings are most often poor, consisting of clay vessels and occasionally bronze jewelry, while weapons are absent. Grave markers are not known, but low mounds cover some graves in the Kerameikos. The tumuli, known from north and northwestern Greece, appear also in the south towards the end of the twelfth century BCE.

The Protogeometric Period (1050–900 BCE)

The cremation employed for the adult population was adopted in Attica during the tenth century BCE and remained the dominant practice for the next 300 years, even though inhumations were not completely absent. The reuse of Mycenaean chamber and tholos tombs or the continuation of erecting such tombs is attested in Thessaly, Achaea, Messene, and Crete.

The richest burial evidence for the period comes from Athens. The cremation took place outside the grave and the ash and bone remains were placed inside an urn. Neck-handled amphorae were usually used for men and belly-handled amphorae for women. During the early tenth century, mounds covered the burials, while during its second half, an unworked rectangular stone or another vessel was used as the marker. Iron objects and weapons were now also included among the grave offerings.

Art

Pottery

The Submycenaean period saw the production of basic types of storage (amphorae and lekythoi) or table vessels (skyphoi, cups, oinochoes), decorated with simple linear patterns. The few figural scenes come from Crete and Cyprus. The use of the multiple brush might be placed in this era. The most numerous ceramic finds come from Athens, Salamis, and Lefkandi.

Around the middle of the eleventh century, the emergence of the Protogeometric style reflects the potters' and painters' will to apply a mathematical balance between shape and decoration. Basic geometric motives are applied with the multiple brush and the compass. The burials of the Kerameikos in Athens were rich in Protogeometric finds. Amphorae, oinochoes, jugs, kraters, skyphoi, kantharoi, kalathoi, and pyxides form the shape repertoire of this period. Wavy lines and zigzags, concentric circles, and semicircles are the basic decorative motives. Isolated horses are the only exceptional figures occurring on vases. Due to trade contacts, Cypriot influences can be traced.

One of the most important settlements of the Protogeometric period is Lefkandi in Euboea. Around the middle of the tenth century BCE, deep skyphoi decorated with pairs of pendent concentric semicircles will become the trademark of the Euboean presence especially in the eastern Mediterranean. The type is found in Thessaly and Macedonia, where the Euboeans later established colonies (e.g., Methone, Mende, Torone). It is still found in the middle of the eighth century reflecting a prolonged PG stylistic phase that is contemporary with the Attic Early and Middle Geometric. The Attic Protogeometric style is also found in the Peloponnese as well as in the eastern Aegean. Crete retains older shapes, often decorated with figured scenes.

The PG style which was retained in the Corinthia until 875 BCE and in Thessaly and the North Cyclades until the middle of the ninth century or in Euboea, Achaea, Elis, Messenia, Laconia, Phocis, and Locris until 750 BCE is known as "sub-Protogeometric" (in general see Lemos 2002).

Sculpture

Figurines of humans, horses, and bovines are dedicated at major sanctuaries during this period, such as at Olympia and Samos. Two of the most important examples in terracotta come from burials: a deer from the Kerameikos and a centaur from Lefkandi. Both have wheel-made cylindrical bodies and rich linear decoration.

The Geometric Period (Ninth and Eighth Centuries BCE)

The ninth and eighth centuries BCE mark a period of important developments and changes, which become more obvious after the middle of the eighth century, which is often referred to as a period of "Renaissance." According to a widespread opinion, that century saw a kind of "revolution" with the overthrow of the old aristocratic model and its replacement by the "isonomy" of the polis. From a cultural perspective, this century is associated with the reintroduction of images or other artistic developments which have been forgotten since the fall of the Mycenaean palaces.

A demographic rise followed by the amelioration of life conditions, the development of agriculture and farming, a boost in pottery and metal production, and the rise of a class of traders which will allow the exit from the isolation and the renewal of contacts with the Mediterranean world with the foundation of colonies in the Northern Aegean, in South Italy, and Sicily can be placed in this era. The eighth century BCE also saw the development of monumental architecture and the intensification of cult activities at sanctuaries. The introduction of the alphabet and the spread of the Homeric epics belong here too. All these developments led to the birth of the polis.

Settlements and Sanctuaries: Society, Economy, Religion

The Geometric Period (900–700 BCE): From the Age of the Heroes to the Rise of the Polis

During the following two centuries (ninth–eighth centuries BCE), as the power and wealth of the lower and especially the middle classes rose, the flagrant differences between houses of members of the elite and those of the common people gradually fade out. Differences in the houses of the governing and nongoverning elite cannot be traced. The case of the settlement of Zagora on Andros is characteristic. There the dwellings of the elite, situated in the central part of the settlement, are all equivalent in size and design, with the exception of Unit H19 and its dependencies which are slightly better furnished with a more prominent location; next is the central open space of the settlement in close proximity to

the hypaethral sanctuary of the community. On the other hand, there still exists a dividing line between the houses of the elite and the middle classes, though this difference is not very pronounced (i.e., Quarter D-H as opposed to J). In other Aegean settlements, the social stratification is more difficult to discern. Nevertheless, in most places, it is still possible to spot a possible ruler's dwelling as at Emporio on Chios (the so-called Megaron Hall which lies alone inside the fortified acropolis, while the houses occupy the slopes of the hill), at Koukounaries (Building C), at Nichoria (Unit IV-5), or at Lathouriza (Unit I-IV).

Usually, aristocratic dwellings of the ninth and eighth centuries BCE were fairly long and narrow buildings of apsidal or rectangular plan which comprised at least a porch and a main room. Oval buildings were as a rule more modest structures unfit to serve as residences of the elite and therefore reserved for dwellings of the middle and lower classes as well as for workshops. Some buildings of this category, however, were more spacious and divided into two or three rooms (Building Θ at Oropos, Building A at Viglatouri in Euboea, Building IV at Antissa on Mytilene). The finds usually attest that in the latter cases we are also dealing with houses of wealthier individuals or with cult buildings. On the other hand, round buildings were apparently not considered fit to serve as dwellings; they usually have small dimensions and were reserved either for storage (i.e., Old Smyrna, Xeropolis-Lefkandi) or for industrial activities (i.e., Oropos) and exceptionally for cult activities (i.e., Oropos and Lathouriza).

One of the best-explored settlements of the Geometric period is Oropos, in northeast Attica, which may be identified with Homeric Graia (*Il.* 2, 498). Buildings of all types have been identified. Most of them belong to the Late Geometric period. The finds in the Central Quarter of the settlement attest that one of the main activities of the community was metalworking. The largest buildings there, Θ, which underwent three remodelings (oval–apsidal–oval), and perhaps oval building B, were presumably dwellings of members of the elite, who were managing these activities. The former presumably served communal needs as well and seems to have housed certain religious activities too. Various enclosure walls divide the architectural units into sectors. These *periboloi* probably served to define the limits of semiautonomous households within the community. From the evidence at hand, it is likely that the community here was organized according to well-defined family units, which may be compared to the Homeric *oikos* such as that of Odysseus. Each *oikos* unit would have consisted of a number of buildings surrounded by an enclosure wall (Homer's *erkos*, *Il.* 9.476; *Od.* 22.442). A family unit would have consisted of one or more dwellings, workshops, storage facilities, animal pens, and occasionally a household shrine. Analogies can be drawn with the Homeric Megaron, the *erkos* which is built around it, the dung heaps inside the courtyard due to the fact that animals were kept within it (*Il.* 24.163; *Od.* 17.297), the altar of Zeus within the *erkos* (*Od.* 22.334-335), associated perhaps with the practice of libations (*Il.* 16. 231; 24. 306), the enigmatic *tholos* (*Od.* 22.442-474), the chambers (*thalamoi*) which do not form part of the main megaron (2.6.242-250; *Od.* 1.425; 4.718, 802; 23.192), and the *laure* (*Od.* 22.136-138, 162-166) which could represent the narrow corridors formed between the various architectural units and the *periboloi*.

Thanks to the Oropos discoveries, it is today possible to reassess the evidence from a number of sites. The pattern, i.e., clusters of curvilinear buildings surrounded by enclosure walls, may be observed in other contemporary settlements, especially within the Euboean milieu. At Eretria, for instance, which lies opposite Oropos, as a rule, curvilinear buildings were also enclosed within *periboloi*. This remark is applicable to the area of the sanctuary of Apollo Daphnephoros as well. Some of these served to protect the buildings from the surrounding river and torrents. Others, on the other hand, seem to have delimited spaces and properties. This, in relation to the absence of clear votive offerings associated with these earlier structures, could lead one to suggest that the area of the sanctuary of Apollo was originally an aristocratic habitation quarter, which later on became the seat of the poliad

divinity. The phenomenon of sanctuaries encroaching upon old residential areas was fairly common in antiquity.

A similar organization may be observed in the eighth century BCE at Viglatouri, in East Euboea (perhaps to be identified with Euboean Kymi), Xeropolis-Lefkandi, Old Smyrna, and elsewhere. It could be even argued that Athens (e.g., the evidence deriving from the area of the future Agora) was organized in a similar manner during the Geometric period. It should be noted that in several of the above mentioned sites, we observe the custom of burying infants and children in close proximity to the *oikos*, outside the enclosed space.

Thanks to the architectural layout of the compounds described above, the separation of individuals and their activities would have thus become possible. On the basis of the archaeological evidence, one could suggest that each household under consideration had a significant degree of economic autonomy and probably in some instances going beyond self-sufficiency.

Building Θ at Oropos as well as certain buildings at Eretria and a large oval building at Viglatouri may have served for "Homeric" symposia and for the entertaining of guests, or even for other social occasions, which could be clearly separated from normal everyday activities. As argued earlier, cult activities would have been also performed within the *oikos*. Some were directed towards venerable ancestors. Certain cults were later on appropriated by the *polis*, for instance, that of the heroon by the West Gate at Eretria or even that of Apollo Daphnephoros, while others fell into oblivion together with the families which performed these cults, as at Oropos.

From the House of the Heroes to the House of the Citizens

It is usually argued that until the mid-eighth century, families in central Greece would have often lived in one-room houses that could not have afforded much privacy. This, however, presupposes that each house consisted of a single architectural unit, something not always obvious. In the earlier Dark Ages, restricted space would have allowed neither the separation of various activities nor the physical separation of the members of the *oikos*, although we can point out notable exceptions, such as the so-called "heroon" at Toumba-Lefkandi and to a lesser degree Unit IV-1 at Nichoria, which present complex plans and secondary entrances. In such buildings, during the tenth century, several functions (political, economic, religious) appear to have been gathered under the same roof. By the eighth century, the same functions were concealed within the same enclosed space, although each activity or group of activities was performed in a separate building or area.

The model of *oikoi* surrounded by *periboloi* was seemingly associated with curvilinear buildings or single-roomed structures. However, one can also detect a similar social organization in areas where rectangular forms prevailed. For instance, at Megara Hyblaia the *periboloi*, as well as streets, presumably delimitated the *cleroi* from the public space. In areas where agglutinative units were the norm, the social organization may not have differed significantly. For example, the houses at Zagora originally consisted of one main room and a porch, serving a variety of functions and developed later on into multi-roomed courtyard houses, with differentiated functions. We may witness here the beginnings of the process which led to the control over social contact, which characterizes the Classical period onwards. Multi-roomed houses were not necessarily of the courtyard type. At the Early Archaic settlement of Lathouriza in Attica, for instance, several chambers belonging to the same important unit (Unit I-IV, perhaps a leader's dwelling) have separate doorways and do not communicate with one another.

It is a fact that towards the end of the eighth century BCE, more complex rectangular house plans, consisting of several rooms clustered around a courtyard, as at Zagora, or opening onto a common corridor or courtyard, as at Eleusis and Thorikos in Attica, Corinth, and Dreros (Crete), appear. These buildings, predecessors of the courtyard or *pastas* houses of the Archaic period, mark a decisive step forward in house planning. Indeed, the amelioration of living

standards, the social behavior of the head of the house, the position of the woman in the household, the presence of servants and the need of intimacy, as well as the diversification of the household activities led, towards the end of the eighth century, to the construction of more complex houses, which comprised more rooms, each of which had a specific function. The older tradition of rooms set one behind the other was gradually abandoned both due to the unpractical nature of the design (one has to cross a number of rooms in order to reach the back of the house) and the social constraints of the new era. Thus, it was now essential that each house should possess a separate dining room (the future *andron*), a kitchen and a room, which sometimes may have been the same which was designed for the preparation of food, where women would pass most of their time. In continental Greece, the "long house," the origins of which may be sought in the technical limitations faced by the earlier architects, was finally replaced by the "wide house," which was more practical, comfortable, and better aerated. Moreover, the more square form of the new type of house was doubtless more appropriate for town planning. This design reached continental and east Greece later than the areas where dense construction had been the norm throughout the centuries, as in Crete or the Cyclades, and was applied from the beginning in the western colonies (with the exception of the earliest, Pithekoussai), where social and emotional restrictions were easier to surpass.

In conclusion, from the single elongated house of the Protogeometric period, composed of one or more rooms set the one behind the other, which afforded limited privacy, we pass to the complex *oikos* formed by several freestanding structures organized within an enclosed space and finally, from the early seventh century onwards, to the multi-roomed house articulated around a central courtyard or of the *pastas* type. The reasons for the gradual disappearance of curvilinear plans are varied: among these already mentioned and related to social, economic, religious, and political changes, one could add the technical advances of the builders (including the reinvention of roof tiles) and the rise of the *polis* which resulted in population growth within urban centers and inevitably led to a new management of space. The huts of the Age of the Heroes were practically everywhere replaced by rectangular multi-roomed houses but were sometimes preserved as relics of the past which were remembered down to Roman times (Vitr. *Arch.* 2.1.5).

The Birth of the Panhellenic Sanctuaries and the Ancient Greek Temple

Until the middle of the eighth century BCE, "rural" sanctuaries were in the open-air, while the cult buildings of the extra-urban sanctuaries seem to have been of small dimensions. The Panhellenic sanctuaries of Olympia (*Il.* 2.519; *Od.* 8.79-81, 11.581, 697-701), Delos (O*d.* 6.162-167), and Dodona (*Il.* 16.233-235; *Od.* 14.327-328, 19.296-297) are echoed in the epics. The ash altar of Zeus in Olympia formed the center of cult activity (Paus. 5.13.8-11). The sanctuaries, which have been founded in neutral areas, such as Delphi, Delos, and Dodona, were mostly visited by the contemporary elites that employed them as arenas of competition and ostentation. The traditional date of the first Olympiad (776 BCE) can partly reflect the reality of the official establishment of the games. The first temple of Apollo on Delos is considered a simple rectangular building, similar to others which came to light in smaller sanctuaries of the Geometric era, like the Heraion of Perachora or the sanctuary of Athena Alea at Tegea, and must have served for the protection of valuable offerings to the cult statue of the deity. At Kommos on Crete, the presence of hearths and the numbers of animal bones, mollusks, drinking and eating vessels, as well as iron spits from the interior and the exterior of the temple indicate the organization of banquets.

The first monumental temples appear towards the end of the eighth century BCE. A Late Geometric monumental temple was detected in the extra-urban sanctuary of Iria on Naxos. Its interior is divided into four naves by three rows of wooden columns. The presence of a hearth and benches along the side walls, as well as the burnt and unburned animal bones, attests to sacrifices and ritual banquets taking place inside the temple.

The first "hekatompedon" (meaning 100-ft long) temples appear towards the end of the

eighth century. In the Heraion of Samos, a series of altars has been detected, the earlier of which has been placed to the end of the ninth century, while the first hekatompedon was constructed one century later. A stone base for the cult statue is found inside the temple. In the rural sanctuary of Artemis in Rakita (Ano Mazaraki) of Achaea, a Late Geometric apsidal hekatompedon temple with an unusual apsidal peristasis was found, where the wooden columns did not rest on the stylobate. The temple of Apollo at Corinth was built with dressed blocks and was covered with terracotta roof tiles. The fist securely identified peripteral Corinthian temple was constructed one generation later in Isthmia at the sanctuary of Poseidon. The peripteral temple of the Argive Heraion is based on a terrace, founded on a strong terrace wall, which, according to its pseudo-cyclopean masonry, can be dated to c. 700 BCE. The chosen masonry might reflect the will of the Argive people to emphasize their own heroic ancestry.

The peristasis becomes one of the main characteristics of the Greek temple. The question is whether it first appeared in the northeastern Peloponnese or in Ionia or whether its origin can be related to some common source. It seems that it was not a homogeneous phenomenon. The origin of the Ionian peristasis should be sought in the East, while that of the northern Peloponnesian in Egypt, which could have also provided the inspiration for the Doric order of architecture. Indeed, beneath the temple of Artemis at Ephesus, built by Croesus, the remains of an older peripteral temple of the Early Archaic period have come to light. The interior columns, as well as those of the peristasis, were made prior to the temple walls, suggesting that they might have aimed at its protection from the weather conditions. The peristasis of the heroon at Lefkandi, dating two centuries earlier, might have had a purely functional role. The above examples prove that the peristasis has its roots in domestic architecture. How and why this functional element of Greek monumental architecture acquired a symbolic character that limited its use to temples remains an open question.

Burial Customs

Athens and Attica

Early Geometric, Middle Geometric I (Ninth Century BCE) During the ninth century BCE, burial customs do not present serious differences from those of the Protogeometric era. The *necropoleis* are small and there are many isolated burials. Cremation continues to characterize adult burials. Rectangular, roughly worked slabs, often coexisting with large amphorae and kraters with their undersides having been pierced for offering libations, are used as grave markers. The ninth century saw an increase in the quantity of jewelry placed inside the graves as well as of objects denoting contacts with the Near East. The social status is determined by the quality and not the quantity of the objects. Child burials are almost absent. The few Early Geometric I examples were, however, very richly furnished. This phenomenon cannot be associated with the reduced mortality rate, but with the exclusion of children from the mortuary record (Morris 1987). It has been rightly claimed that the core of the Athenian aristocracy is a product of this century.

Middle Geometric II and Late Geometric Periods (Eighth Century BCE)

(a) *MG II and LG I Periods (800–735 BCE):* During the second quarter of the eighth century, adult inhumation reappears, although cremation was not abandoned. Adults and adolescents were now buried in shaft or cist graves, while infants and small children were deposited inside vessels. Cremation was preferred for adult males and the ash remains tended to be placed in an amphora or a bronze cauldron (lebes). Markers were set over both inhumation and cremation tombs. Rich female burials are a characteristic feature of this period.

(b) *LG II Period (735–700 BCE.):* Practically all burials were inhumations in shaft graves. Cremations were few and in the majority of the cases, the ash remains were placed inside a bronze cauldron (lebes). The number of the burials increases sharply, while child burials are reintroduced. No grave markers are known. Large vessels are now placed inside

the grave as offerings, while metal offerings are absent. At this time the first offering trenches appear in the Kerameikos, where ashes, burnt, and broken vases have been found.

The Other Areas of Greece

Outside Attica, inhumation in general prevails. The same *necropoleis* have been used continuously since the Protogeometric period. The Mycenaean tradition of inhumation in family tholoi, or more rarely in chamber tombs, continues in Thessaly, Achaea, and Messenia. In Halos (Thessaly), primary cremations, covered by soil mounds, are common. Mounds of this type cover individual burials elsewhere, too (Vergina in Macedonia, Vranezi in Boeotia). In some areas of the Argolid, pithoi are used for adult burials. In Corinth organized cemeteries appear c. 770 BCE. During the Late Geometric period, cist graves gradually replace shaft graves.

A great variety in mortuary practices may be observed in the Cyclades. On Thera, a few metal urns are known as well as two eighth century BCE tripods. Two stone *stelae* with figural decoration in relief dating to c. 700 BCE are known from Paros and Kimolos. In Crete the cremation inside family chamber, or more rarely tholos, tombs remains the predominant practice. The ashes are placed inside a clay urn. In Eastern Crete, inhumations inside tholos tombs or even in caves prevail. Some of the Cretan tombs contain spits, a tradition also attested in the Argolid and Cyprus.

"Homeric" Burials and Hero Cults

Under the term "Homeric Burials," we consider the various funerary practices which seem to follow closely the Homeric descriptions (for instance, *Il.* books 18 and 23 and *Il.* 7.417-432; *Od.* 11.218-222 & 12.11-15) regarding the exceptional honors offered during the burial ceremony towards important individuals, leaders, or warriors. "Homeric" burials are known from Euboea (Lefkandi, Eretria), Crete (Eleftherna), Pithekoussai, and Cuma in the West and Salamis in Cyprus. The customs include the cremation of the dead and the placement of their ashes inside a metal urn, the sacrifices of horses, dogs, and occasionally servants, as well as the tumulus (*sema*). The case of the so-called heroon at Toumba/Lefkandi stands out. There, in the first half of the tenth century BCE, a powerful individual had achieved prominence during his lifetime and was remembered by the living for more than a century after his death: his descendents buried him, together with his female consort, in the middle of his *anaktoron* and subsequently raised a mound over his ruined dwelling, and they chose as a burial ground the area in front of the former entrance of the house. Yet, neither sacrifices nor ritual offerings were made in honor of the deceased. A huge krater that was found in the central room, next to the burial shafts, appears to have been a cultic vase, but it was presumably used only for the funerary ceremony and afterwards left behind and buried beneath the tumulus. An oversized bronze tripod by the entrance of the building, of which only the traces in the rock for the placement of its feet have been preserved, may have been positioned there after the burial ceremony, but presumably as a status symbol, rather than a cultic utensil for the performance of rituals. It seems, therefore, that the Homeric burial customs preceded by several centuries the recording of the epics.

The phenomenon of Hero Cult appears during the second half of the eighth century BCE. Such cults can be divided into three broad categories: (1) tomb cults at prehistoric tombs (mainly Mycenaean chamber and tholos tombs); (2) cults in the honor of recently heroized deceased (including hero-founders of new settlements and colonies); and (3) cults of eponymous heroes from the epic and mythic cycles.

The first category concerns chamber and tholos tombs of the Mycenaean period which were opened during the eighth century BCE in order to offer some cult in honor of the deceased. Characteristic examples are the cults at the tholos and chamber tombs at Georgiko (Thessaly), Orchomenos and Thebes (Boeotia), Menidi and Thorikos (Attica), Solygeia, Mycenae, Argos, and all over Messenia in the Peloponnese. At Eleusis an enclosure wall constructed in the Geometric period over a group of Middle Helladic burials was identified as a *temenos* of the Seven against Thebes mentioned by Pausanias (1.39.2).

In the second category, we may include sites such as Lefkandi, Grotta (Naxos), Paros, Eretria, and Eleusis. In all these cases, we witness the offering of exceptional honors at the graves of prominent individuals.

Lastly, during the eighth century BCE, we witness the foundation of sanctuaries dedicated to the worship of heroes from the epic or mythic cycles, such as the shrines of Odysseus in the Polis cave in Ithaca (*Od*. 8.390-391 και 13, 13-14), of Agamemnon at Mycenae, of Menelaus at Therapne near Sparta, of Phrontis at Sounion, of Pelops at Olympia, and of Herakles in Thebes.

Long ago, it was suggested that the rise of hero cults in the Late Geometric period was partly due to the spread of the Homeric epics (J.N. Coldstream). It has been also argued that hero cults preceded the circulation of the Homeric epics and functioned independently. Since it is today widely accepted that the Homeric epics were not conceived in the eighth century, but were transmitted orally from generation to generation throughout the Dark Ages, it is more likely that the rise of hero cults is not an unrelated phenomenon. By Late Geometric times, a period during which the epics would have reached a wider audience, their impact in the shaping of these cults would have been even more significant. However, the rise of hero cults towards the end of the eighth century BCE has received numerous other explanations, too. According to one opinion, they could be regarded as one of the consequences of the shift from a pastoral into an agricultural economy: the small but free landowners who were threatened by the new elite were trying to establish connections with their estates through tracing their ownership of land to legendary ancestors (A. Snodgrass). Alternatively, competition for landownership as a cause for the rise of hero cults may be viewed through another prism: the landowners could have been the aristocrats themselves who felt that their estates were threatened by the lower social classes (J. Whitley). Hero cults may also be explained as one of the means through which the expanding body of the leading aristocracy managed to contain the reaction of the previous governing elite in order to enable a peaceful transition of the institutions of the rising polis (C. Bérard).

Art

Pottery

The Attic Geometric pottery production is divided into three periods: early (EG I: 900–875, EG II: 875–850 BCE.), middle (MG I: 850–800, MG II: 800–760 BCE), and late (LG I: 760–735, LG II: 735–700 BCE). The decoration includes a variety of Geometric motifs, while the shapes are now symmetrical. The vertical axis of the vases is emphasized, while the glazed areas are limited and followed by the inclusion of decorative motifs on the entire surface. The circular motives of the Protogeometric era yield their place to Geometric motifs, like the meander. Horse figurines also appear. New shapes are now introduced. The Middle Geometric period saw the introduction of the cylindrical pyxis with its handle being formed by horse figurines. In addition to horses, more animals and birds also enter the repertoire at this stage. Towards the end of the period, the first figural scenes appear. *Prothesis* (the laying out of the deceased), *ekphora* (the funeral procession from house to tomb), and battles on land and sea are the main subjects (Haug 2012). This period forms the peak of the Geometric expression: symmetrical Geometric motives and figural scenes and accuracy in the decoration are all hallmarks of the artistry of the period.

During the Late Geometric period, prosperity is reflected in the ceramic production, which tends to express monumentality. The known vases that come from Attic *necropoleis* were either placed inside the grave or used as markers. For the first time, the vases can be assigned to particular painters or workshops, which are given conventional names. The Dipylon Painter is considered the main artistic personality of the Late Geometric period. He has been ascribed a number of monumental shapes used as grave markers.

The second phase of the Late Geometric period is characterized by the decline of the style with the Geometric motifs being carelessly applied. Large shapes are no longer produced; the shapes are slimmer and plastic snakes occur on the rim, the shoulder, and the handles. Outline appears along with silhouette. The repertory of scenes is now enriched: chariot processions,

riders, warriors, mourners, dance scenes, battles, hunting, and ritual scenes appear as well as scenes which have been considered as the earliest mythological representations. The presence of heraldically placed animals and monsters is announcing the Orientalizing character of seventh century BCE vase painting.

The Geometric style is a Panhellenic artistic expression which has been undoubtedly based on the Attic Geometric production. Euboea, with Eretria, Chalcis, and Lefkandi, forms a prominent center. The Corinthian shapes are the first that travel in the Western Mediterranean. The Early proto-Corinthian production coincides with the Attic Late Geometric II and it is mostly composed of small perfume containers decorated with Orientalizing motifs (in general, see Coldstream 2008).

Sculpture

The small-scale sculpture follows the Geometric structure, while the repertory is enriched. The main axis of the figurines is emphasized. The development of their features is clear in the series of Attic clay horses from Early to Late Geometric with their volume gradually declining and their parts becoming more clearly defined. The human figurines follow the same development. Clay chariots, wheels, and pomegranates are known from this period, too.

Bronze figurines follow the same lines of development. Bronze horses are common, either being made individually or set on a perforated base or as attachments of tripod handles. The Argive, Corinthian, and Laconian workshops are the most prominent. Bulls, dogs, deer, and birds are also made. The Attic, Argive, and Corinthian workshops produce a good number of bronze human figurines as well. Warriors, flute or lyre players, archers, as well as groups, such as dogs attacking a deer, charioteers, and men with centaurs, are included in the eighth century production.

Objects of more precious materials are rare. The ivory female figurines from the Kerameikos are unique and point to Eastern prototypes, which can be sought in the Syrian representations of Astarte.

Metalworking

The introduction and the widespread use of iron characterize the early historical period. Weapons and tools are made of iron, while bronze is still widely used for objects, like jewelry, tripods, and weapons, which are also offered in the great sanctuaries after a victory. The knowledge of metalworking technology came from the East and was adopted by the peoples of the Aegean area. Bronze objects were cast in appropriately shaped casts and hammered, while details were formed by incision.

The origin of objects destined to support bronze vessels can be sought in the East and Cyprus. The freestanding rod-tripods consisted of a cast rim to which three legs were attached. They appear in the Greek world during the Protogeometric period (Crete) and continue to be produced during the Geometric (Crete, Athens, Thera). A second type of stand was formed by a square part attached to four legs, which often had wheels and a richly decorated rim. Most of the known examples come from Cyprus and Crete, although they also come from Delphi and Rhodes. A third related item is the bronze cauldron (lebes) with three attached legs and two disc-handles vertically attached to the rim. In the Late Geometric period, horses and charioteers are attached to the handles, while the legs bear linear decoration or figural scenes. These vessels have been known since the Mycenaean era as household equipment but later acquired a ritual use until they served as highly esteemed votives in the Greek sanctuaries or were offered as contest prizes during the Geometric period. The movable bronze cauldrons with animal protome attachments are of an eastern origin and they are hammered and made of a thin bronze sheet. The earliest date to the eighth century BCE.

Jewelry and Dress Ornaments

Diadems, made of thin golden electrum or silver strips, bearing incised or impressed linear or figural decoration are prominent during the Geometric era. They served as grave offerings. Examples come from Attica, Euboea, Skyros, Crete, and Rhodes.

Golden spirals have formed the most widespread type of earrings since the Protogeometric period. During the first half of the ninth century, new techniques and decorative themes are imported from the Near East. The earrings from the grave of the "Rich Athenian Lady" of the Areopagus are excellent examples of craftsmanship, possibly made by an eastern artist working in Athens (Smithson 1968). Geometric earrings are known from Attica, Patras, Delos, Boeotia, Corinth, Euboea, Lemnos, and Crete. Necklaces often of faience beads, rings, and bracelets are common.

Pins are the main types of dress ornaments. Their emergence is related to the new Doric *peplos*. Attica, Argos, and Corinth are the main centers of production. The earliest fibulae can be traced back to the Mycenaean period, but they were widely used during the historic era. The plaque of the fibulae was often decorated with incised geometric motifs or figural scenes. During the end of the eighth and the seventh centuries, Boeotia is the most important production center of fibulae. The type of the spectacle fibula, possibly of northern origin, is found in a number of areas until the sixth century.

Weapons

The widespread use of iron during the Early Iron Age is obvious in the construction of weapons, since the material was now stronger and lighter. The sword and the spear are the main types of offensive weapons. The main type of sword (Naue II) appears around the end of the Mycenaean period and is retained until the Orientalizing period. The metal heads of the spears have been made of iron since the eleventh century. Yet, the finds from the main sanctuaries (Olympia, Delphi, Lindos on Rhodes) indicate that bronze spearheads continued to be produced during the Geometric period. The defensive equipment included the shield, the helmet, the cuirass, and the greaves. Round shields prevail, often with a central hump or an animal protome. The most characteristic examples come from Crete and date to the eighth century. A Late Geometric grave from Argos preserved the complete equipment of a warrior: the helmet and the cuirass are the only complete examples of this period. The earliest examples of greaves come from Crete and belong to the end of the eighth century BCE.

Mythological and Epic Scenes in Geometric Art

With its figural decoration, the Dipylon amphora marks a new era for Greek art, since for the first time in Attica after the fall of the Mycenaean palaces, human and animal figures coexist with linear motifs. Thereafter dynamic figural scenes enter the pottery repertoire while also decorating other objects, like tripods and fibulae.

Since 730 BCE, a number of figural scenes have been related to mythological or epic scenes, while individual persons have been identified as particular heroes (Snodgrass 1998). The Siamese twins, Actoriones or Moliones, mentioned by Homer and Hesiod, have been recognized on a number of Late Geometric vase scenes. Herakles killing the Stymphalian birds or struggling with the Nemean lion appears on Boeotian fibulae and an Athenian clay support. On the leg of a bronze tripod of the last quarter of the eighth century, two men are fighting over a tripod, a scene suggesting the struggle of Herakles with Apollo for the possession of the Delphic tripod. Individual centaurs have been interpreted as Typheus, Chiron, or Nessos. Ariadne and Theseus is one of the suggestions for the male and female figure depicted on an Attic louterion today in the British Museum, shown ready to embark on a boat. The scene on an Attic oenochoe, today in Munich, might point to Odysseus' wreck.

The poems of the Epic Cycle include all the incidents that took place before and after the Trojan War. Scenes referring to these epics appear around 700 BCE. The scene of a male figure ready to kill an Amazon on a clay shield from Tiryns has been interpreted as the struggle of Achilles and Penthesilea known from the *Aithiopis*. The Trojan horse is depicted on a Boeotian fibula of 700 BCE, while the most detailed and well-known representation of the fall of Troy decorates the neck of a monumental relief pithos from the Cyclades dating to 675 BCE.

The epic or mythological interpretation of these scenes is ambiguous and it remains a matter of scholarly debate. The scenes have

a general character and they do not closely follow the preserved versions of the myths and epics. Time and space are not denoted, while the way that the figures are depicted – lacking any inscriptions – does not allow for their secure identification. The best artists of this period, however, seem to have been influenced by their contemporary developments and attempted to portray the narratives known to them with the available media. During the next century, mythical scenes can be more easily recognized with the aid of inscriptions, too.

The emergence of mythological scenes can be associated with the developments taking place during the second half of the eighth century. At that time, seafarers and traders actively participate in the colonization of the western Mediterranean, and Panhellenic sanctuaries are established, the alphabet comes into use, epic poems acquire their written form, and the polis rises. The elites associated themselves with the glorious epic past and the epic heroes. The intensification of contacts with the East must have seriously contributed to the development of the narrative scenes. Imported precious objects, the adoption of new subjects and techniques, brought a new era to the Geometric repertoire, preparing the grounds for the Orientalizing phenomenon of the seventh century BCE.

Conclusion

The Birth of the Alphabet It is generally accepted that the Greek borrowed their alphabet (Powell 1991) from the Phoenicians and modified it in order to include vocalic sounds (Herodotus refers to the *phoinikeia grammata*, "Phoenician letters" [5.58.1-2]). Although the introduction of the alphabet has been firstly placed between c. 1100 and 750 BCE, today most scholars, based on older inscriptions and the comparison of the letters' forms with their Phoenician counterparts, do not accept a date much earlier than c. 800 BCE.

From the almost 100 Greek inscriptions which date before 650 BCE, one half belong securely to the second half of the eighth century, while only very few can be dated prior to 775 BCE. The earliest and most abundant examples of Greek script come from geographical areas with a Euboean presence, like Lefkandi, Eretria, Oropos, Methone, the Cyclades (Zagora on Andros, Grotta on Naxos), Al Mina in Syria (Euboean emporion of the ninth century), Italian Cumae, and Pithekoussai. The two oldest inscriptions come from Italy. The first was inscribed on a local vase, coming from the grave of a local woman in the cemetery of Osteria dell'Osa near Gabii in Latium, Italy (c. 800–775 BCE), and it includes five Greek letters (EYΛIN) which cannot be interpreted (Eileithyia, the protector of parturition and childbirth is characterized as Εὔλινος, weaving well by Pausanias 8.21.3) (Watkins 1995). Two Greek letters (A, X) were inscribed on a funerary urn from Bologna, dating to the first half of the eighth century. The inscribers might have been Greek visitors, Euboean pre-colonists.

Other inscriptions dating to the second half of the eighth century and the early seventh come from the sanctuary of Zeus Ombrios on Mt. Hymettos, the Acropolis of Athens, the Athenian Agora, Aegina, Boeotia, Kalapodi, Delphi, Corinth, Epidaurus, Kleonai, Thera, Amorgos, Anaphi, Syros, Rhodes, Kalymnos, Samos, Old Smyrna, Phaistos, Syracuse, and Selinus.

An inscription in dactylic hexameter is found on an oinochoe from the Dipylon cemetery in Athens. It dates to c. 740 BCE and reads:

hος νυν ορχεστων παντων αταλωτατα παιζει τοτοδε κ(μ)μ(ν;)ν. . .
(who, among the dancers, who dances most gracefully. . .)

An interesting three-verse inscription comes from Pithekoussai from the cremation of a young boy of c. 12–14 years of age. It is inscribed on a Rhodian kotyle of c. 720 BCE. The alphabet is Euboean, and the last two verses are in dactylic hexameter:

Νεστορος : ε[ιμ]ι : ευποτ[ον] : ποτεριον
hος δ αν τοδε πιεσι : ποτεριι[ο] : αυτικα κενον
hιμερος αιρεσει : καλιστε[φα]νο : Αφροδιτες
(Nestor's cup I am, good to drink from.
Whoever drinks this cup empty, straightaway
the desire of beautiful-crowned Aphrodite will
seize)

Both texts must have been created during a symposion. It was a common practice for its partakers to recite a verse each, which led finally

to the creation of a sarcastic or funny poem. Whether the father of the boy was named Nestor or the inscription points to the famous cup of the Homeric king remains an open question (cf. *Il.* 11.632-635).

The harmonious coexistence of Greeks and Phoenicians and their common aims suggests that the adoption of the alphabet must have taken place at a place where they both met. It has been suggested that mixed marriages might have led to the development of bilingual families that led to the invention of the alphabet. In the Greek world, there are Aramaic, Neo-Hittite, Phoenician, and Cypriot inscriptions. An inscribed bronze phiale from a tomb of c. 900 BCE from Knossos and a fragment of 800 BCE from Eretria preserve the earliest evidence. Other examples of the eighth century were found at Pithekoussai, Eretria, Kisamos on Crete, and Tragana (ancient Opountian Locroi).

Where can the adoption of the alphabet be placed? The idea that it took place along the Syro-Palestinian coast, possibly at the *emporion* of Al Mina, where a Euboean community has existed since the end of the ninth century, remains credible. Cyprus must have played an important role in the spread of the alphabet, where indigenous populations were living together with Phoenicians and Greeks. This assumption however can be supported only with difficulty, since Greek inscriptions appear much later on the island. Moreover, although part of the population has used Greek language since the eleventh century, they employed a different script, the Cypro-syllabic. The supporters of the theory of the spread of the alphabet from the Doric islands (Crete, Thera, Rhodes) accept that the alphabet went through different stages of evolution before acquiring its final form, and therefore they suggest that the letters φ, χ, and ψ were firstly missing, as shown from inscriptions from Phaistos and Thera. Attica belongs to the candidates that adopted the alphabet since close contacts with the Phoenicians can already be traced from the ninth century. Euboea remains the strongest possibility, since not only the majority but also the earliest inscriptions come from areas where Euboean communities existed. The recent discovery of a large number of graffiti at the Euboean colony of Methoni, in the Thermaic gulf, where Phoenician pottery has been noted as well, will doubtless lead towards a better understanding of the birth of the alphabet. The assumption that the alphabet first appeared in Boeotia and from there spread to the West has been recently strengthened by the finds from Oropos. The date of the establishment of Pithekoussai in 775 BCE suggests that the alphabet did not move from the East to West but that it must have been brought by the Euboeans from the West.

The adoption of the alphabet by the Greeks has been mostly related to the financial-trading needs in a private and public level. In contrast to the complicated Mycenaean script, only known among the scribes, none of the first texts of the historical era belong to the category of state archives or financial texts. On the other hand, it is worth noting that most of the early inscriptions on vases denote their owner. Therefore it has been claimed that the adoption of the script is closely related to the need to state ownership. However, philologists claim that the reason lies to the need to record oral poetry in dactylic hexameter. Except for the above mentioned examples, inscriptions of this kind dating to the second half of the eighth and the first quarter of the seventh come from Aetos on Ithaca, the Athenian Acropolis, the sanctuary of Zeus on Mt. Hymettos, Eretria, Corinth, Amorgos, Phaistos, and elsewhere. The known inscriptions verify that the Greeks have known how to read and write since the latter part of the eighth century BCE.

Trade and Colonization

Even though the fall of the Mycenaean civilization led to the decline of the contacts with the neighboring cultures, the maritime routes were not forgotten (Boardman 1980; Ridgway 1984; Tandy 1997). In some areas these contacts remained active during the eleventh and tenth centuries. These intensified from the ninth century onwards due to the general improvement of living conditions. All transactions have been further supported by the use of the

alphabet since the first half of the eighth century. The Phoenicians are mentioned by Homer as «ναυσίκλυτοι» traders who circulated «αθύρματα», valuable objects. Until the middle of the ninth century, the Greek exports to the coast of the eastern Mediterranean littoral are exclusively Euboeans and remain strong until the end of the eighth century, when Greeks of different areas appear, too. The contacts with the Near Eastern world were reciprocal, as indicated by the gift exchange between Greeks (mainly Euboeans) with the Eastern cultures. Many of these objects were finally dedicated at the Greek sanctuaries.

The Phoenician expansion in the Mediterranean begins with the establishment of Kition on Cyprus around the middle of the ninth century and theoretically reaches its end with the foundation of Carthage towards the end of the century. Phoenician smiths, goldsmiths, perfume-makers settled on Crete, the Dodecanese, Attica, and Euboea. The Euboeans followed parallel paths with the Phoenicians to the West, and a small group of Easterners, maybe Phoenician, mingled with the Euboean community of Pithekoussai. Recent discoveries attest to the presence of Phoenician pottery in the Northern Aegean as well, namely, at the Eretrian colony of Methone.

Finds from Sant'Imbenia in Sardinia testify to the cooperation of Euboeans and Phoenicians around 800 BCE. The mix of traders and artisans with the local populations had an important impact on the cultural developments of the early first millennium BCE. The colonization and the maritime explorations served as a source of inspiration for the *Odyssey* of Homer. The adventures of Odysseus are not simply a narration of an heroic sea voyage, but a mix of various incidents of different periods.

Warfare

If the Trojan War can be considered as the final war of the Bronze Age, the famous Lelantine war, which historians and archaeologists place in the eighth century or the early seventh century BCE, is the most crucial war of the period under examination. Chalcidians faced the Eretrians with many Greek cities taking the part of the one or the other polis. The discovery of a "polyandrion" at Parikia on Paros, dated at the end of the eighth century BCE and containing the funerary urns of c. 160 young males, cremated and buried at the same time together, could reflect an episode of this war. The prince of grave 6 of Eretria might have been killed during one of the battles, like Amphidamas from Chalcis. The fact that Hesiod participated in a poetic competition during the burial of the latter and he was actually awarded a tripod provides a safe dating of the war around 700 BCE (*Works and Days* 65ff.). The destruction of Lefkandi slightly earlier than the end of the eighth century and the discovery of a Late Geometric cup filled with gold buried beneath the floor of a house at Eretria have been considered as overtones of this war. The narration of the achievements of the Trojan heroes can be placed within the frame of the aristocratic competition among Chalcidians and Eretrians, the *hippeis* (cavalry) and the *hippobotai* (horse owners), respectively. The first Messenian war, which concerned the effort of the Spartans to occupy Messenia, can be also placed in the eighth century. The settlement of Nichoria was destroyed by fire in the middle of the eighth century and subsequently abandoned. This catastrophe might be relevant to this war.

Sociopolitical Organization

The "Transitional" period saw the rearrangement of the social and political power in the wider Greek world as well as the establishment of a new class of rulers which seem to have embodied the characteristics of the Big Men or chiefs of the primitive societies (see above). The importance of the symposion as a manner of social behavior in the Classical era is well known. The Homeric epics, as well as the excavation results, indicate that the origin of the symposion should be sought in the period under examination.

The Birth of the Polis

According to Thucydides, the citizens constitute the polis (7.77.7), while for Aristotle, the polis is a community of people characterized by political

organization (*Pol.* 1252β 30, 1280β 33). The polis consists of public and private buildings as well as the land and the people. The polis is a state that is named after its citizens' ethnic identity (e.g., not "Athens" but "the polis of the Athenians"). The agora, the public buildings, and the urban temple dedicated to the protector deity are some of the basic characteristics of the polis. In the *Iliad*, the notion of the polis does not seem widespread. In contrast, temples, *agorai*, and public buildings are mentioned in the *Odyssey*. The combination of all these characteristics can be detected only in a few excavated settlements, although this may be due to the partial investigation of most sites.

The presence of a temple dedicated to the worship of the protector deity is conceived as one of the main characteristics of the polis of the historical period. The first urban temples dating to the eighth century are often adjacent to aristocratic dwellings, where the members of the local elite participated in meals offered by the local ruler (Mazarakis Ainian 1997). At the same time, suburban sanctuaries are found in close or larger proximity to settlements, some of which gradually acquired Panhellenic prestige, like Olympia, Delphi, and Delos. There were also rural sanctuaries, which attracted the inhabitants of a wider area without being connected with a specific settlement. The oldest cult buildings belong to the extra-urban or rural sanctuaries, which often seem to have served for the organization of ritual dinners. The settlements which did not acquire urban temples did not develop into autonomous poleis. At that time, many settlements were abandoned, maybe due to the phenomenon of *synoikismos* (Snodgrass 1971).

The foundation of urban or suburban hekatompedon temples, as well as the construction of fortifications, was the result of communal decisions rather than individual initiatives. Towards the end of the Geometric period, the temples acquire a different architectural form, while at the same time various buildings, like the treasuries and the *hestiatoria* (dining rooms), are erected, in order to satisfy the different purposes that the temples no longer served. Hero cults were spreading from the middle of the eighth century BCE, a phenomenon linked, as already mentioned with the birth of the polis (Antonaccio 1995).

Although not necessary, a main feature of the ancient Greek polis was its fortification wall. After the fall of the Mycenaean civilization and until around 800 BCE, with very few exceptions, the settlements of the Greek mainland were unfortified or loosely organized villages. The fortified settlements reappear in the early eighth century but do not constitute the norm before the end of it. This is due to the fact that in many settlements the earlier walls of the Late Bronze Age were still in use. In north Greece and Crete fortified settlements are common, while other social groups settled in naturally protected sites.

The hoplite revolution, the formation of the hoplites into a phalanx, marked the birth of the polis. Every hoplite does not behave as an individual, since with his shield he protects the hoplite that stood to his left. The hoplites act as a single "person". The hoplite equipment that was found in a grave at Argos (730–720 BCE) offers a *terminus post quem* for the chronology of the new tactic. A well-known passage from the *Iliad* indicates that Homer understood the tactics of the phalanx (*Il.* 13.130-133).

The spread of the Homeric epics since the second half of the eighth century combined with the tendency towards the redefinition of the identity of the new social groups led to a number of innovations, such as the reintroduction of the narrative scenes in vase painting or novel behaviors, like the phenomenon of the hero cults or the aristocratic burials of Homeric type (Snodgrass 1998; Langdon 2008).

The seventh century is a period of social restructuring during which the lower social classes of traders and seafarers acquired wealth. This led to the reevaluation of the political and social organization and the codification of the laws, thus strengthening the institutions of the polis. At the same time, the communal sense of competition as well as of individuality were developed, as indicated by the development of monumental architecture and sculpture, lyric poetry, ownership inscriptions, regional variations of the Greek alphabet, and local workshops.

Cross-References

- ▶ Agora in the Greek World
- ▶ Andron
- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Crete, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cyprus, Archaeology of
- ▶ Emporion
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Houses, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Oral Tradition: Ancient Greece
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Panhellenism
- ▶ Religion, Greek, Archaeology of
- ▶ Stoa
- ▶ Tombs, Greek (Iron Age)

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Early Regional Centers: Evolution and Organization

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Introduction

The shift from autonomous, egalitarian societies to complex societies having significant social inequalities is an historical phenomenon that occurred across the globe. To understand in part how this occurred, archaeologists have focused their research upon the evolution and organization of early regional centers (Fig. 1). Much has been learned about the development of these ancient settlements, and recent studies utilizing more detailed data are providing rich understandings of the role of early regional centers in human history.

Archaeologists know that regional centers were more than a type of settlement, or merely a place where people lived. Early regional centers were the loci of new configurations of social processes, human choices, and relationships. Three analytical problems have emerged from the comparative study of these types of settlements. These are the following:

1. The institutionalization of asymmetrical social relationships between people and between communities
2. The emergence of new forms of social integration and frameworks of organization
3. The evolution of these along different historical trajectories dependent on geographic, temporal, and historical context

Definition

Early regional centers were human settlements with a permanent and sedentary residential population. But they were more than just a permanent spot on the map; they were involved with ushering in new kinds of regional relationships. What set a regional center apart from a network of villages was the daily operation of an asymmetrical regional social network, with the central settlement being most prominent. While interactions between villages within any region would take place on relatively equal grounds, regional centers created imbalanced relationships among communities. The regional asymmetry, however, was not just demographic in nature. It was often operationalized across one or more key dimensions, including (1) economy, (2) politics, or (3) ideology. As such, early regional centers could assume regional prominence when social groups living there utilized their standing as key economic, political, or ideological players to organize other regional populations.

Historical Background

Throughout much of the early twentieth century and with the advent of large-scale regional surveys, a series of checklist traits were established

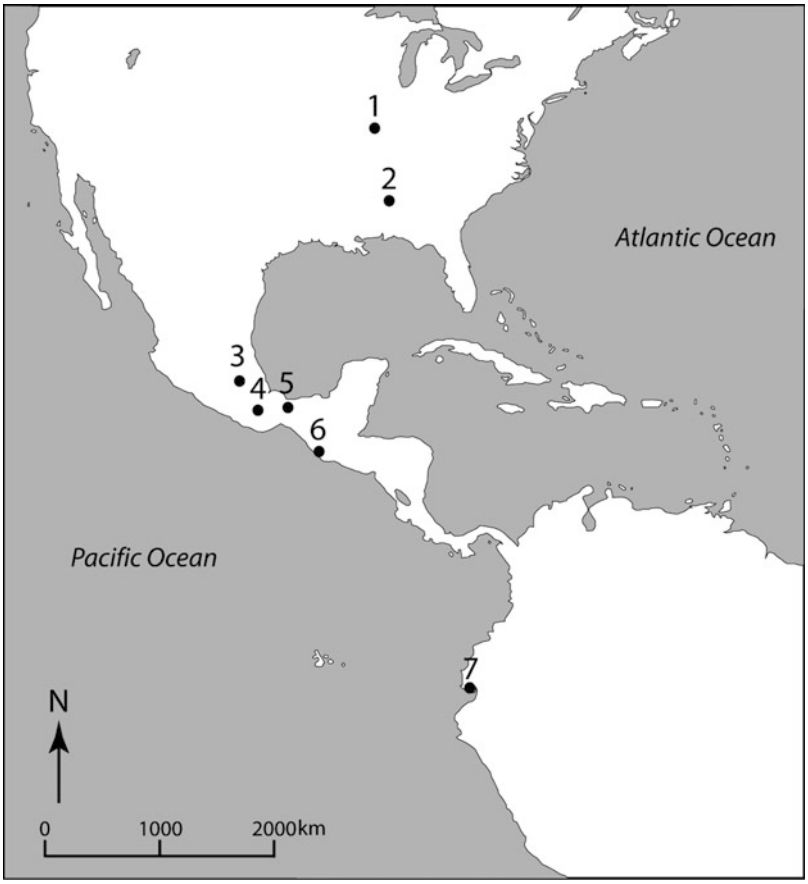

Early Regional Centers: Evolution and Organization, Fig. 1 Map of several sites in the Americas mentioned in the text, including: (1) Cahokia, (2) Moundville, (3) Tlapacoya, (4) San José Mogote, (5) San Lorenzo, (6) Paso de la Amada, and (7) Real Alto

that allowed for the typological classification of known archaeological sites. Regional centers were identified when evidence recovered from a site matched a series of expected features, including certain presumed population and settlement sizes, the presence of central and public spaces, the occurrence of specialized buildings, recognition that the settlement served as a nexus for regional trade, or indications that a segment of individuals living there were specialists who made unique and important craft goods. These traits allowed archaeologists to quickly distinguish probable regional centers from smaller scale villages, larger urban centers, or other settlement types.

The development of processual archaeology in the 1960s and 1970s saw a shift in focus towards understanding the organization and operation of human social systems, with the objective to develop and assess models to describe the evolution of those systems. Regional centers were often the central settlement of a regional polity, consisting of a group of villages that found themselves under the authority of a more dominant settlement. This kind of network, resulting from the loss of village autonomy to a politically dominant group, is commonly referred to as a chiefdom (Carneiro 1981). Whereas chiefly rulers who lived at regional centers were sometimes assumed to direct the organization of not only politics, but also economic and ritual-ideological life, already by the early 1970s, many archaeologists were aware that smaller human settlements often contained facilities for local ritual affairs (cf. Flannery 1976).

More recently, archaeologists have begun to decouple the study of human groups, and their settlements and social practices, from research objectives that more generally study the

evolution of human culture and social organizational formations (Flannery & Marcus 1983; Yoffee et al. 1999). Mirroring advancements researchers have made when using anthropological concepts like the chiefdom or state, the analytical focus on the place of early regional centers in human history is being directed towards tracking and understanding the dynamic social processes that were occurring within these central settlements and between people residing in centers and those residing in smaller villages, hamlets, or with people engaging a mobile lifestyle.

New approaches recognize that greater diversity exists in the ways humans organize, and that an analytical focus upon any number of historical trajectories can provide important information about social change through time. Thus, a focus on the development of regional centers and the kinds of activities that they embodied is a significant research objective in its own right. Importantly, this allows archaeologists to better understand the conditions under which regional centers and social complexity emerged, and it also positions researchers to ask questions about why many of these settlements suffered drop-offs in regional prominence or were abandoned outright.

Key Issues

Archaeologists studying early regional centers have identified several key issues involved with their emergence and organization. Four primary issues considered here are the following:

1. The human institutions that developed to take advantage of the new opportunities and the challenges of living in regional centers
2. The structural organization of early regional centers that resulted from the intersection of these institutions and how regional groups were centralized (i.e., through economic, political, or ideological dimensions)
3. The dynamics of local and regional institutions and the trajectories of their emergence, persistence, growth, and collapse
4. The tempos of variable trajectories

Local and Regional Institutions

Early regional centers presented new opportunities and challenges for the people living in and around them. In response to these novel conditions, new institutions – the socially mediated and communally accepted sets of rules for interaction and conduct – developed as means to organize economic, political, or ideological aspects of life. Commonly, archaeologists have focused on those institutions that structured the flows of people, resources, and ideas within a region. These include chiefly political offices, religious beliefs and practices, and institutions involved with kinship or identity. Within a chiefdom, for example, the institution of a regional chiefly political office is one way that decisions affecting people throughout a region are carried out. While chiefdoms are normally thought of as hierarchically structured political polities, the decisions of chiefly personae often deal with regional economic matters as well as major aspects of ideology.

Other forms of institutional arrangements associated with early regional centers are less hierarchical in nature, but nonetheless place important decision-making responsibilities into the hands of certain groups. For instance, sodalities, which are organizations whose members come from several kinship groups, perform or organize important tasks associated with ritual, key portions of the economy, or political matters. In the southeastern United States (Fig. 2), for example, the Mississippian settlement of Moundville was constructed around a very large plaza, ringed by several monumental earthen mounds, the summits of which were spaces where elite sodalities or representatives from distinct kin groups carried out tasks that ranged from the crafting of ritual items to processing of ancestral human remains (Blitz 2008; Knight 2010). Assuming important ceremonial roles, these groups fueled religious and productive cycles that demanded access to surplus foods, labor for building monuments and ceremonial architecture, and acquisition of the prized materials that specialists crafted into ritually charged items. Situated around those mounds and extending out to a wooden palisade and perhaps beyond

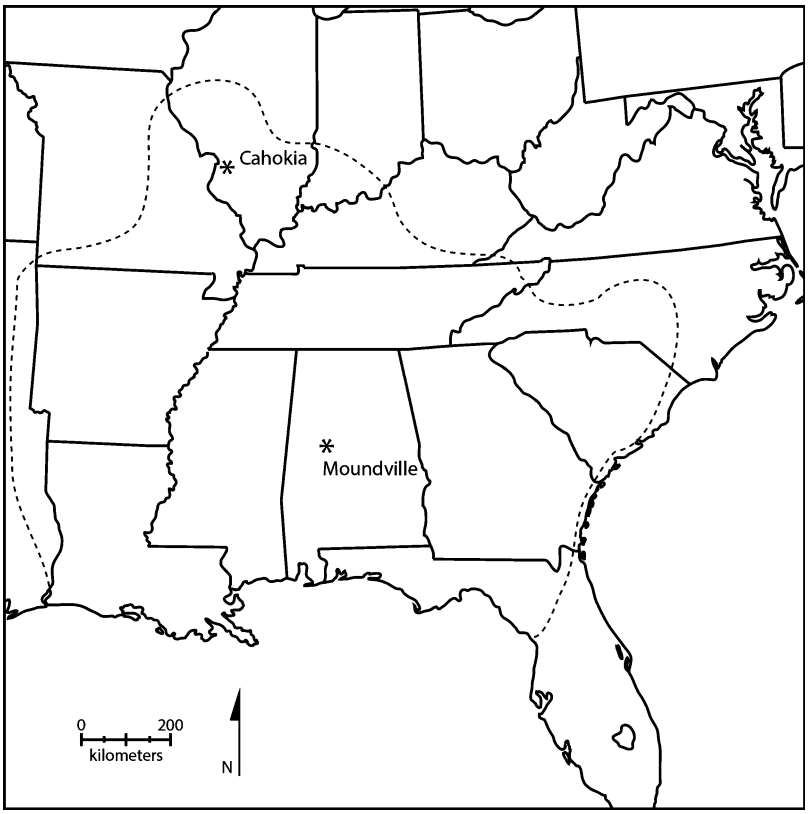

Early Regional Centers: Evolution and Organization, Fig. 2 Map showing geographic extent of the Mississippian world, with Moundville and Cahokia highlighted

were several spatially discrete residential neighborhoods housing large kin groups that may have immigrated from different areas or sought to maintain distinct group identities. These kin groups, likely responsible for constructing and performing the important ritual and economic tasks on adjacent mounds, presumably joined together to construct two of the largest monuments at the site – Mound A in the plaza center and Mound B at its northern end. Kinship and sodality institutions operating within Moundville's larger regional society may have been one way that a more politically focused and hierarchical chiefly institution was organized. The most successful kin groups may have also taken on roles overseeing important ceremonies associated with death and the afterlife, and attendant mortuary practices.

The development of widespread ideologies and the practice of rituals, ceremonies, and religious activities in centers and their regional networks allowed numerous social groups, each tasked with much of their own subsistence, ritual, or political responsibilities, to overcome the new problems associated with living in close quarters. In many developed regional centers, archaeologists have recovered evidence for social institutions that operated to maintain a sense of commonality among the various groups that resided at the site. Ideology was important at the Terminal Formative settlement of Tetimpa in Central Mexico (Plunket & Uruñuela 2002). Early on in its history, families would mark their distinctive household compounds with burials to venerate their ancestors. During subsequent phases of growth, more recently arrived families constructed their domestic compounds following the standardized architectural pattern of several domestic rooms around a central courtyard space. Because these new arrivals did not have founding leaders to commemorate, these groups marked their central courtyards with

shrines that displayed serpent and feline imagery associated with more widespread and commonly recognized worldviews.

Security and defense were important factors in the development of some regional centers. A village in a defensible location or protected by a strong leader may attract new residents, especially in situations where competition over resources was increasing between multiple villages, or when sedentary groups were seeking protection from ethnically distinct neighbors or in frontier situations. Political leadership institutions may develop when an individual or group is able to effectively mitigate the negative effects of increasing warfare either through overseeing a larger group of warriors or through managing the construction and maintenance of defensive structures like palisades or other fortifications (Earle 1997). Globally, it has been recognized that warfare intensified alongside the demographic, economic, and institutional changes associated with increased sedentism and the adoption of agriculture (Haas 2001). The ability of leaders or institutions to funnel surpluses into channels for protection, but also to plan and carry out their own raids and acquire new lands, would attract scattered groups from across a region to these new centers. Strength in numbers, defensive structures, and public symbols of success in battle or social violence can also lend a source of ideological power to the groups most associated with success (Earle 1997).

The range and qualities of institutional arrangements associated with early regional centers varied depending on the histories of specific regions. Understanding the conditions influencing regional center development comes from recognition that new institutions represented, in some way, novel solutions to extant social problems. But institutions also struggled to deal with new problems associated with these changing social conditions. When archaeologists track a settlement's growth with attention to how populations were relationally organized, they are better equipped to understand the subsequent dynamics and trajectories of particular local and regional histories.

Structure and Organization of Early Regional Centers

It is important to note that regional centers are part of human social systems that consists of several interrelated networks organized at multiple social and geographic scales. In fact, the development of regional centers is necessarily linked to the emergence of new scales of human organization. As a result, the structure and makeup of these settlements from households, to the sites themselves, to their regional settings, requires multi-scalar investigations by archaeologists. Researchers have been quick to note that studying the emergence of regional centers requires an evaluation of the scale at which different organizing processes occur and how organization at one level does or does not alter organization at other levels (Arnold 1996). Two spatial scales, those being the site and regional levels, are discussed here.

Intra-Site Scale. Regional centers are locations where some of the earliest forms of public meeting spaces and monumental constructions within permanent settlements were constructed (Fig. 3). Since people no longer live solely among their relatives, large plazas, temples, earthen mounds, and pyramids, to mention a few examples, provided spaces for ceremonies and economic transactions to occur. New forms of architecture, like buildings that served specialized ritual or political functions, are evidence that institutions necessary for community and regional integration existed. Likewise, the amounts of work required to construct large monuments and clear spaces for public plazas demonstrate that several families or regional populations provided labor at a central site.

Often, regional centers will have distinct residential sectors made up of multiple families who may have relocated from different settlements across the region. Sometimes, differences between these neighborhoods are recognizable, as when archaeologists discover variation in house sizes or the uneven distribution of materials like special foods, exotic goods, or craft items. When patterned differences along these lines are documented, archaeologists usually associate those neighborhoods with elite

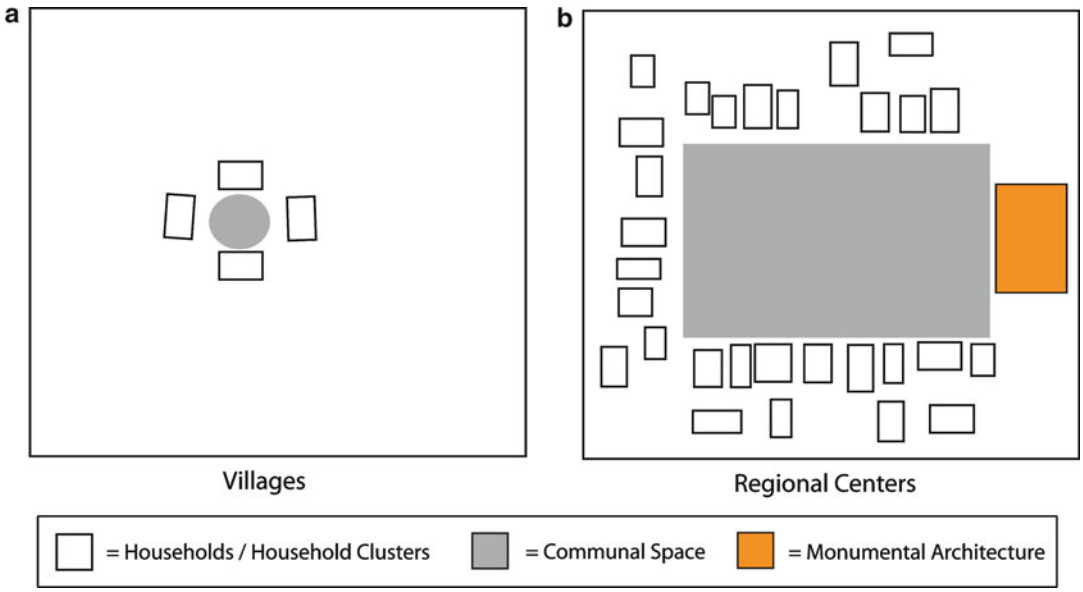

Early Regional Centers: Evolution and Organization, Fig. 3 Idealized schematic of intra-site organization and interaction in (**a**) villages and (**b**) early regional centers. Population growth, large communal space, and monumental architecture are important characteristics of most early regional centers

individuals. Elite leadership roles normally develop when regional-level economic, political, or ideological institutions form.

The intra-site configurations of human activity can vary significantly both within and between cultural contexts. For example, the layout of settlement sites in the US Southwest varies a great deal across the region. At Anasazi pueblos, public architecture is often in the form of large kivas, great houses, and plazas (Fish & Scarry 1999). In contrast, Hohokam settlements display ballcourts, platform mounds, and, at Paquime, nonresidential effigy mounds. Similarly, there is variability among residential architecture. While Puebloan settlements have highly nucleated room blocks, Hohokam settlements are dispersed with spaces between and within residential compounds.

Regional Scale. At a regional level, these settlements are the central settlement in an asymmetric interaction network involving surrounding settlements and the groups of people residing in those spaces (Fig. 4). Because this centrality can take on economic, ideological, or political qualities, regional scale organization can vary significantly.

Prominent settlements that organized key portions of the economy will show material evidence of their elevated economic standing. This could include signs that people in regional centers had greater or privileged access to exotic goods and craft items, or maintained storage facilities for surplus foods shipped in from outlying settlements. Regional centers can also assume prominence through ideological means and thus become centralized settlements that structure the flow of people and ideas through ritual and religious networks. Archaeologists see evidence for this type of situation when centers contain spaces for ritual performances, buildings for housing ritual specialists and ceremonies, and relatively greater amounts of ritual paraphernalia.

Commonly, central settlements assumed their position through political means. Archaeologists have shown that regional centers are often the seat of elite personnel that asserted political authority region-wide. In a politically centralized system, outlying villages lose autonomy when decision-making power is co-opted by or transferred to a prominent leader, a process that has been linked to the emergence of chiefdoms (Marcus & Flannery 1996). Interestingly, studies

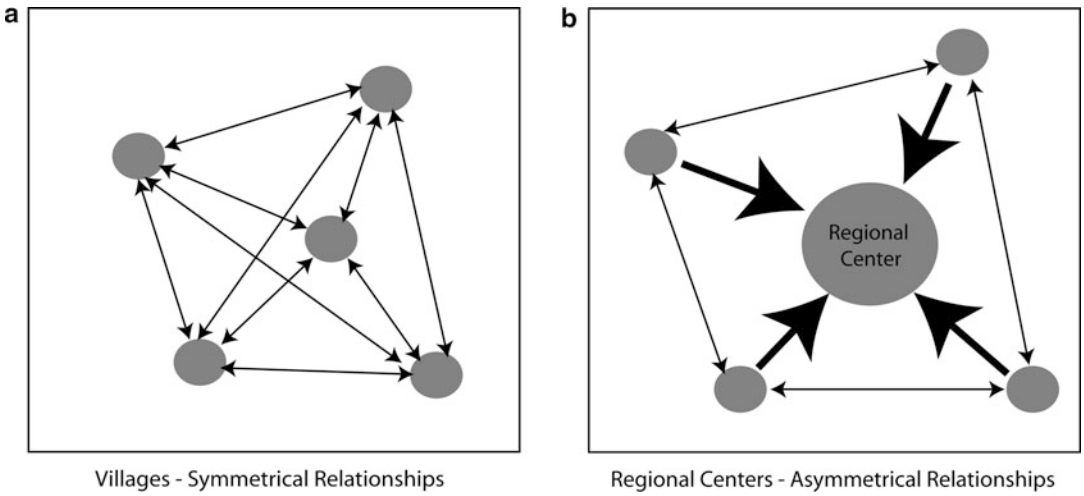

Early Regional Centers: Evolution and Organization, Fig. 4 Idealized schematic of regional organization and interaction in (**a**) village level societies and (**b**) contexts where early regional centers develop. A primary characteristic in the emergence of early regional centers is the development and expansion of asymmetric regional interactions

of chiefdoms from around the world have demonstrated that substantial variation existed even within this type of politically centralized network. This highlights the importance of understanding a settlement system on a regional scale, because knowledge of how polities are structured allows archaeologists to better understand how political centralization developed and changed through time.

As people became attracted to a regional center's prominence, whether because of primarily economic, political, or ideological reasons, these emerging settlements would grow at the expense of neighboring settlements (Clark et al. 2010). The positive feedback between continued population growth and the regional importance of a center persists until these settlements and their regional networks decline and break apart, or take on new lives as even bigger regional centers. Thus, tracking regional demographic shifts is a necessary component within studies of regional center development.

Once regional centers emerge, it is often the case that important leaders develop interaction networks with leaders in centers from neighboring regions. In Mexico, for example, the early centers of San Lorenzo, San José Mogote, and Tlapacoya appear to have engaged in an exchange network of prestige goods including obsidian, marine shell, iron ore mirrors, turtle shell, and several types of fineware ceramics (Flannery & Marcus 2000). These elite-centric prestige economies may have played a key role in negotiating elite identities across regions as well as the relationships between elite and the nonelite within the respective settlements themselves.

Trajectories and Dynamics of Early Regional Centers

A major analytical problem to be confronted in the study of early regional centers concerns the dynamics and trajectories of the social organizational formations associated with the operation of regional asymmetrical networks. What is becoming clearer to archaeologists is that these central settlements emerged out of constellations of various local and regional institutions, and that their rates of development and subsequent histories followed a series of different paths, marked by distinct patterns of emergence and change.

Although much of this discussion has focused on the emergence and organization of centers, archaeologists have shown that these settlements and their regional networks changed over time. After a few generations, most experienced significant declines in population, were taken over by

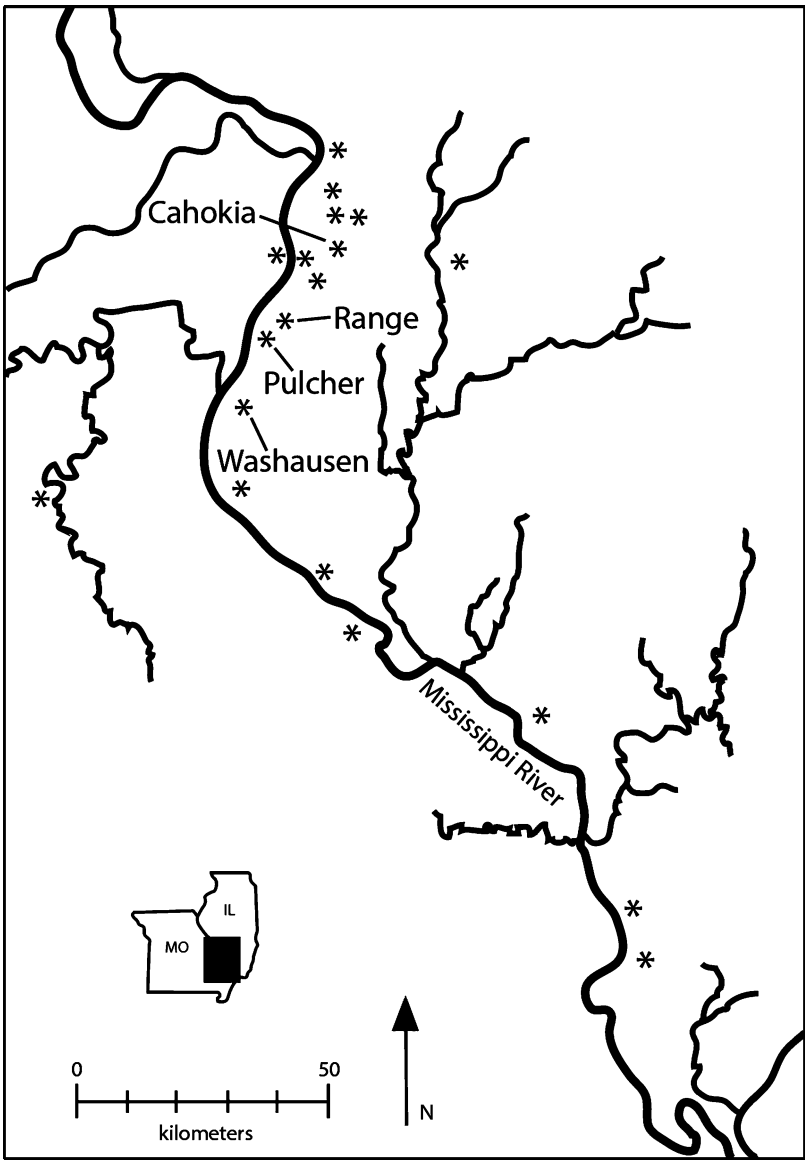

Early Regional Centers: Evolution and Organization, Fig. 5 Map of the greater American Bottom region showing location of several Mississippian period settlements, with sites mentioned in text highlighted

other emerging centers, or were abandoned outright. Not always were new institutions able to outpace problems arising from how they were structured. For example, the social evolutionary changes associated with early regional centers rarely led to the development of social organizational forms like the state. Thus, it may be that the various forms of institutional life that developed with early regional centers often led to other and divergent evolutionary paths (Yoffee et al. 1999).

The prehistoric Mississippian period of the southeastern United States provides numerous examples of regional center growth and decline (Fig. 2). Across this macroregion from about CE 1000 and up through European contact in the sixteenth century, several dozens to hundreds of settlements emerged as central nodes that organized regional populations through various means. Some of the earliest developed in the American Bottom portion of the Mississippi River Valley, near the modern-day US city of St. Louis, Missouri (Fig. 5). By CE 900, a few local villages showed signs of growth as several small family groups moved to these settlements.

Although each family group built their houses around small courtyards, it was not until sometime in the tenth century that there is evidence for centralizing public spaces and specialized buildings more indicative of larger and more integrative institutions. The best excavated example of this type of settlement is the Range site (Kelly 1990). At Range, distinct families constructed their own house-courtyard groups around two, small central plazas and a handful of specialized buildings and ritual features. Archaeologists are unsure of the exact mechanisms of integration at this time, but the kinds of buildings, features, and artifacts recovered through excavations hint at the importance of ideological institutions involving new forms of religious symbolism and ritual adherence.

Growth at Range was not sustained, however, as archaeologists have documented a decline in population by sometime in the early eleventh century (Kelly 1990). This population decline appears to have resulted from the fissioning of several individual family groups that ushered in a reorganization of the settlement focused upon only one central plaza. Concurrently, a series of other local settlements appear to have experienced rates of growth and changes unseen at Range. Sites like Cahokia, Pulcher, Washausen, and a few others have evidence of new, larger-scale integrative social institutions (Milner 1998). It is at these settlements during the eleventh century that people in the region first began constructing monumental earthen mounds around large open plazas. Data show that by CE 1050, these nucleated settlements served to integrate outlying populations scattered throughout the region living in smaller villages and farmsteads. Again, archaeologists are still weighing evidence to see exactly what kinds of integrative mechanisms were active, but asymmetrical regional networks were in place that served to organize agricultural production and bring together regional populations at centers for large ceremonies and rituals.

By the end of the late eleventh century, however, some of these centers were abandoned, others saw continued growth, and even newer regional centers were founded. What is particularly interesting about this example of multiple center growth and decline is that throughout each transformative case of aggregation and dispersal, a more protracted process of larger-scale integration accrued. In fact, the settlement at Cahokia grew so large that it may have been something more akin to an urban center (Pauketat 2009). The institutions structuring Cahokian society took on a political nature not previously witnessed regionally. Residential neighborhoods at Cahokia were now larger, maintained their own institutional facilities and plazas, and were perhaps aligned according to a settlement-wide grid. The dominating feature of Cahokia was the largest prehistoric monument constructed north of Central Mexico, an earthen mound (named Monks Mound) that eventually stood around 100 ft in height. An extremely large open space marked the central point of the settlement (aptly called the Grand Plaza by archaeologists) that was ringed by smaller mound-and-plaza complexes. However, despite the fact that Cahokia outpaced neighboring settlements to become the de facto regional center, by CE 1200, signs of stress are evident as competition between population segments at Cahokia and throughout the region emerged. By the end of the CE 1300s, the Cahokia site and much of the American Bottom region were abandoned.

What this regional case demonstrates is (1) that early regional centers can be centralized along one or more dimensions (in the case of Range, it may have been a form of ideological centralization), (2) that the institutions for integration were often insufficient for long-term and sustained success, (3) that the direct evolutionary development into larger and more regionally integrative centers may not often occur, and (4) that the cultural knowledge of successful and failed institutional arrangements may make it possible for later regional centralization processes to spur the development of more complex organizational formations.

International Perspectives

Archaeologists cannot sufficiently understand the evolution of early regional centers without

placing them in their broader social and historical milieu. What is required in their study is to recognize the significance of novel scales of human integration at regional levels and how this integration is enacted at the local scale and modified by human agents. Contextualizing and identifying the organizational mechanisms, institutions, and tempos by which they emerged and changed through time allows archaeologists to better understand context-specific trajectories. The benefit of developing these context-specific trajectories is that they can be used in comparative research that informs global anthropological perspectives of early regional centers and new scales of human social integration. One key issue that these comparative international perspectives can elucidate is the tempo of changes associated with the emergence of early regional centers.

Tempo of Early Regional Center Development

Regardless of the constellation of mechanisms that provide the foundation for new institutional arrangements, the tempo of change can provide further nuance into understanding specific trajectories and individual decision-making in the past. Archaeological research on the emergence of novel forms of social organization has placed renewed emphasis on the importance of chronology, timing, and tempo of human action and systemic change (Prentiss et al. 2009). The study of early regional centers in the Americas is an ideal context for highlighting the diversity in tempos of continuity and change in human social systems. Among the numerous ways central settlements can (and do) emerge, two alternative models for the tempo and social context of their emergence are highlighted. These models, linked with specific case studies, underscore the importance of analytical approaches to trajectories of human social organization that are nonlinear, dynamic, and embedded within both human agency and system-level perspectives.

Model 1: Regional Centers Emerge Slowly: A Consideration of Paso de la Amada. In this model, one existing village among many interacting villages gradually assumes a more central role within the regional network. Economic, political, and ideological institutions emerge separately, over a period of time, as the village grows (Lesure & Blake 2002). In Chiapas, Mexico, archaeologists working at Paso de la Amada have suggested this type of development. The village at Paso de la Amada was founded by 1900–1700 BCE. Within the early village, ceramic evidence suggests special purpose vessels were used for drinking either corn beer or chocolate during festive occasions, and there is evidence that nonlocal obsidian was imported into the site (Clark & Blake 1994; Clark et al. 2010). It was not until almost 300 years after the initial founding of the site that some of the institutional changes in settlement, such as the presence of public architecture in the form of elevated platform mounds and plazas, were seen. Other evidence, from variability in settlement size within the region to differences in domestic house size, location, and complexity, suggests that Paso de la Amada became a regional political center, with some form of inequality. In this case, Paso de la Amada existed for a period of time, with some evidence of centralization emerging throughout the development of the village. Finally, by 1700–1500 BCE, the role of Paso de la Amada within the region had resulted in a qualitative change in its relationship to other villages in the area.

Model 2: Regional Centers Transformed Rapidly: A Consideration of Real Alto. In this model, one existing village within a regional network undergoes significant and rapid changes in economic, ideological, and/or political organization. Human agents play a vital role in the shift, as an institutional "package" associated with regional centralization is adopted. In this scenario, a more rapid demographic reorganization at the site and regional levels plays an important role in both necessitating and precipitating changes in the institutional mechanisms by which people and communities become integrated. This tempo of development and centralization can be seen at the site of Real Alto along the Pacific coast in southern Ecuador. Real Alto was initially settled as a small village around 4400 BCE, but it was not

until c. 2900 BCE, when a reorganization of the site layout, regional economy, and demographic distribution quickly changed, that the settlement was transformed (Clark et al. 2010). The emergence of Real Alto as a regional center coincided with a quadrupling in site size, as much as a doubling of on-site population, the construction of a central ceremonial precinct, and diversity in residential structures suggesting the presence of status differences.

Future Directions

Future research into early regional centers will benefit from an investment in three directions:

1. *Theoretical advancements*. Archaeologists can develop additional and more complex models for the emergence and development of early regional centers. These include integrating agency and system-level perspectives and designing research that can better identify and measure processes of institutionalization and interaction.
2. *Methodological advancements*. The study of early regional centers will continue to require a wide range of methodologies. An understanding of the regional context of these types of settlements will be advanced as more data and instruments become widely available and utilized, including the integration of satellite data (such as ASTER) and LIDAR imagery alongside more traditional survey approaches. Geophysical survey, including the use of magnetometry, resistivity, and ground-penetrating radar, may provide minimally invasive and cost-effective methods for understanding the layouts of large settlements and the makeup of regional settlement patterns. The integration of new methodological approaches to artifact studies, including the sourcing of materials through XRF and pXRF, can provide comparative data at both intra-site and regional scales. Perhaps most importantly, techniques for generating highly refined chronologies, including more accurate dating techniques, are needed to both ensure synchronic comparisons are warranted and to track diachronic changes in central settlements and their regional networks.
3. *More case studies and comparative frameworks*. New case studies of early regional center emergence and evolution, designed to integrate multiple scales (from houses to macroregions), are needed. Differing historical trajectories identified with new case studies can be integrated into comparative global frameworks. Comparative projects will allow researchers to discuss early regional centers as a general phenomenon, perhaps with some modal organizational attributes, without requiring that early regional centers all looked the same or were the result of homogeneous social processes.

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- ▶ Archaeological Theory: Paradigm Shift
- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Chaco Canyon, Archaeology of
- ▶ Culture in Archaeology
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- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
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- ▶ North American Rock Art
- ▶ Processualism in Archaeological Theory
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ Spatial Analysis in Field Archaeology
- ▶ Surface Survey: Method and Strategies

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Earthen Architecture in Archaeological Conservation and Preservation

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Introduction

Earth has been used a building material for at least the last twelve millennia with the earliest evidence for earth as a building material coming from sites within Western Asia. Later, structures were built using both hand-shaped mud blocks and rammed earth, for example, at Çatalhöyük (Turkey) and Carchemish (Turkey). However, earthen architecture is not restricted to hot, desert climates, and archaeologically and historically, it is distributed throughout the world. From the characteristic "tell" sites comprised of the multiple and varied stratigraphies of abandoned and rebuilt earth structures, through to vernacular, secular, religious, and monumental buildings in urban and rural settings, and earthworks in temperate climates. As such the distribution and variety of earthen architecture and construction spans both continents and millennia with evidence within archaeological contexts, extant structures, alongside still-used earth structures throughout the world.

Definition

The term *earthen architecture* is loosely used to refer to a broad range of structures found in archaeological contexts including earthworks (Fig. 1) and those structures comprised of earth (subsoil) dug from the ground and shaped by hand or machine and used in a number of different ways – most commonly mudbricks (adobe) (Fig. 2), rammed earth (pise), placed earth (cob), alongside earthen mortars, plasters, and the use of earth within timber-frame structures.

Key Issues/Current Debates/Future Directions/Examples

The identification and excavation of earthen architecture is complex with much anecdotal evidence of archaeologists "missing" earth structures as the material of construction is so very similar to surrounding nonstructural archaeological strata. The failure to identify earth structures during their excavation alongside the poor interpretation of archaeological evidence has a net result that the scale and complexity of excavated earth structures has probably been hopelessly underrepresented.

The identification of earth structures in archaeological contexts has improved with better knowledge of earth as a building material, alongside the application of allied disciplines of remote sensing (aerial photography and geophysical surveying) and ground-based observations (Fig. 3). Moreover, the growing awareness of earth structures in living contexts throughout the world has increased knowledge and understanding of earth as a building material across different disciplines, with archaeologists working alongside anthropologists and engineers (amongst many others) to better understand performance and significance of earthen architecture.

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 1 Earth-built field monument (Silbury Hill, Avebury, UK) (Photo: D. Powlesland)

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 2 Mudbricks (Adobe) (Nisa, Turkmenistan) (Photo: L. Cooke)

The longevity of earth structures is dependent on their maintenance through the annual reapplication of protective earth plasters – this occurs most famously at the iconic Great Mosque in Djenne, Mali, where an annual festival involves teams of local masons competing to complete the replastering of the exterior of the mosque. More commonplace everyday maintenance alongside annual repair of earth structures comprises reapplication of surface plasters and recompacting of floors and roofs.

When earth buildings fall out of use, they are no longer subject to maintenance and can rapidly fall into disrepair and subsequently erode, initiating the formation and deformation processes creating the archaeological record. Today, there are many social-economic, cultural, and legal reasons for the abandonment of traditional practices of earthen architecture, often in favor of those perceived to embody development and modernity and fit within an industrialized and commercial building industry. The loss of the

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 3 Earth walls exposed through differential drying (Hili 17, Al Ain, UAE) (Photo: D. Powlesland)

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 4 Earth-built monument with characteristic erosion at the wall base (Great Kyz Kala, Merv, Turkmenistan) (Photo: L. Cooke)

intangible heritage (rituals, traditions, and local knowledge and practice) of building with earth is one of the greatest challenges for earthen architecture in conservation and preservation. This is particularly as local knowledge, such as sourcing of local soils, is vital for conservation and maintenance in both historical and archaeological contexts.

The material properties of earth-building materials mean that once they are abandoned or exposed through archaeological excavation, the greatest threat is their erosion as a result of exposure to the damaging effects of weather. Damage as a result of falling water, rising water, and (among many others) freeze-thaw results in the characteristic erosion patterns found on most archaeological examples of earthen architecture. The combined effect of moisture on earthen architecture is erosion to the surface, base, and walls. Rising water, alongside salt crystallization, results in erosion to wall bases, and surface erosion at wall tops results in the characteristic "upside-down carrot" appearance of upstanding walls (Figs. 4 and 5).

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 5 Characteristic appearance of excavated and exposed earthen architecture (Hili 14, Al Ain, UAE) (Photo: D. Powlesland)

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 6 Earthen architecture conserved through shelter structures (El Brujo, Peru) (Photo: L. Cooke)

Erosion is also caused by vegetation, animal, insects and birds, and human-induced loss such as agricultural damage, theft, inappropriate development, and a failure to valorize (and thus protect) local vernacular heritage. Given contemporary geopolitical tensions, earth structures have also been damaged as a result of human conflict in Mali, Iraq, and Syria.

Debate is still ongoing as to the best means of conserving, presenting, and managing earth structures. Given the material qualities of earthen architecture, the essential conservation in situ can be complex, and a number of approaches for protection from the damaging effects of weather have been used.

In those contexts where conservation "as found" is preferred (and "seeing" original archaeological and historical earth structures is stressed), numerous materials for consolidation have been used. In other cases, the use of shelter

Earthen Architecture in Archaeological Conservation and Preservation, Fig. 7 Conservation backfilling of excavated earth structure (Merv, Turkmenistan) (Photo: L. Cooke)

structures to protect exposed earthen architecture from the damaging effects of weather (primarily falling water and wind damage) is preferred (Fig. 6). In other cases, original archaeological and historical earth structures can be backfilled using appropriate separation layers to ensure the protection of the original fabric in situ (Fig. 7). Other approaches to conservation of earthen architecture can include reconstruction and restoration. As such, the approaches adopted for conservation of earthen architecture can pose significant practical, ethical, and philosophical challenges.

Many of the approaches to conservation of earth structures have been developed since the 1960s, initiated by projects in the Middle East under the auspices of ICCROM and the universities of Turin and Pennsylvania (among many others). These approaches are largely consolidated within the proceedings of the series of conferences organized by ICOMOS and now known as ISCEAH (International Scientific Committee on Earthen Architectural Heritage). The most recent in the series of conferences, Terra 2012, the 11th International Conference on the Study and Conservation of Earthen Architectural Heritage, was held in Lima, Peru. There are numerous individuals and institutions involved in research into the various different aspects of earthen architecture around the world.

Since the 1970s, significant emphasis has been placed on better understanding of the seismic performance of earth structures, with lessons learned from structural engineering for new buildings with earth transferred to historical buildings and earthen architecture in archaeological contexts, alongside understanding of empirical ancient systems and techniques. The development of better knowledge and practices appropriate for earthen architecture for retrofitting in advance of, and repair in response to, seismic events has been prompted by damage to earth structures following earthquakes in Bam (Iran) and in Peru, Turkey, China (Sichuan), and the USA.

Currently, there is a growing awareness of the needs to better understand and respond to the complex effects of climate and potential changes as a result of climate change. For example, more frequent extreme weather events such as flooding or extreme diurnal and annual temperature and humidity fluctuations will have a significant negative impact on the survival of earthen architecture.

The interplay between heritage and sustainability is well demonstrated by current research into earthen architecture. Significant research is being undertaken to understand and promote the use of earth as a low-carbon (and environmentally friendly and responsive) building material. This is important as raising awareness and

increasing the profile and status of earth as a building material is widely acknowledged as the best way in which earthen architecture can be retained in different contexts around the world. As such, the research undertaken in new-build contexts is important in influencing the retention of both tangible and intangible heritage of earthen architecture around the world.

The conservation and preservation of earthen architecture have proved itself to be immensely complex. There is evidence of repair and maintenance from archaeological contexts from the early uses of earth structures. Today, the ongoing development of multidisciplinary approaches to the material will significantly aid our understanding and response to complexities faced throughout the twenty-first century.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Bam: Archaeological and Social Investigations after the Earthquake
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture

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East Africa: Historical Archaeology

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Introduction

For almost four decades, Africanist archaeologists have expressed dissatisfaction with the more dominant definitions of historical archaeology – as either the study of time periods and events for which written sources are available and of societies that have developed a literate tradition (e.g., Deetz 1977) or the era of European expansion and exploration from the fifteenth century onwards (e.g., Hall 1993) or even of the emergence of the modern world (e.g., Orser 1996). Their primary objection to these alternative definitions, most of which originally developed in North America, has been that from the perspective of the African continent, these offer only a partial indication of the potential scope of "historical archaeology," given the existence of a rich legacy of diverse oral sources and the activities of a range of non-European yet external actors at different times both prior to and after CE 1500. Aside from the often Eurocentric bias of several of the more prominent definitions of historical archaeology, concern has also been expressed over the legitimacy and need for the distinction between "historical" and "prehistoric" archaeology, with some scholars arguing for complete abandonment of these terms and the division of intellectual labor they promote. One consequence of this dissatisfaction is that it has generated a rather diverse range of approaches to and definitions of historical archaeology in different parts of the continent and among different scholars, underlining Hall and Silliman's observation that "historical archaeology means different things to different people" (2006: 1). This entry reviews some of these issues and illustrates the changes in approach and theoretical frameworks that have shaped historical archaeology in eastern Africa since the 1950s.

Historical Background

Initially, the practice of historical archaeology in East Africa, as was the case for most parts of the continent, followed the textual model. Publication by Freeman-Grenville (1962) of documents dating from the first to early nineteenth century CE concerning the east coast of Africa made these sources more accessible to archaeologists. However, it is the work of James Kirkman (1959) and Neville Chittick (1974) on East African coastal sites that is more usually considered as representative of the first examples of historical archaeological study in the region. Kirkman, in particular, was one of the first scholars working in the region to explicitly define his investigation of coastal Islamic sites such as Gedi and Ungwana in Kenya, as "historical archaeology," largely because these initial investigations were guided by existing Classical and early Islamic textual sources. The former include the first- to second-century CE Greco-Roman texts, the *Periplus of the Erythrean Sea* (~CE 100) and Ptolemy's *Geography* (~CE 150), while the latter comprise diverse geographies such as Al-Ma'sudi's reports in the tenth century and that by Ibn Battuta, based on his travels on the continent during the fourteenth century. The various Swahili Chronicles are another much used set of historical texts. These are locally written documents that record the history of Swahili towns from their foundation to the beginning of the Portuguese period but which were penned much later. There are also a number of relevant Chinese textual accounts from the early second millennium CE, some of which may be based on firsthand observations and are currently guiding efforts to locate possible shipwrecks off the north Kenya coast.

Like many of the first generation of historical archaeologists in North America, Kirkman and Chittick paid more attention to the most visible monumental ruins such as forts and large stone-built towns, rather than on the less obvious archaeological remains, thereby prioritizing the sites that they assumed were associated with "outsiders." In doing so, Kirkman (1959), for example, associated all of the Swahili stone towns as having been founded by Arab "invaders" that he believed once settled along the coast of East Africa. Likewise, Chittick's excavations at Kilwa and Manda relied heavily on the Swahili Chronicles to inform his research. Like Kirkman, Chittick (1974) tended to associate the origins of Swahili coastal stone towns with Arab immigrants, who likely began arriving from the eighth to ninth century.

This tendency to focus more on visible monuments rather than on less obvious archaeological remains, as well as overreliance on written texts, not only excluded indigenous Africans from their own history but also distorted the historical facts. Since the mid-1980s, however, archaeologists working on these Swahili period sites have typically downplayed the "foreign" element to their formation, emphasizing instead local dynamics and contributions. More recently, several research projects undertaken by African archaeologists (e.g., Chami 1999) at Kilwa Kisiwani and other coastal sites including Mafia, Kwale, and Koma and in the Rufiji Delta have overturned most of the original models proposed by Chittick and Kirkman. In particular, these later studies have revealed that at many of these sites there is evidence of pre-Islamic settlements dating as far back as the Stone Age periods. These findings thus contrast with those of scholars who asserted on the basis of written records and a specific focus on the visible archaeological remains that the ninth century was the date for the beginning of settlements along the East African coast, these being established by Arab-Persian immigrants.

As the subdiscipline of historical archaeology has continued to grow and expand geographically, scholars working in sub-Saharan Africa (e.g., Reid & Lane 2004; Schmidt 2006) have criticized the narrow focus on "the spread of European culture, practices and peoples to other parts of the world" that characterized the historical archaeology in its earlier, largely North American phase. Schmidt (2006: 4), in particular, has argued forcefully that such an understanding needs "repair" because its Eurocentric focus excludes other research areas of significant interest to non-European communities. Methodologically, earlier definitions of historical archaeology have also been criticized for considering the presence of written records as central to the practice of

historical archaeology, a perception that implies an absence of any historical processes and events in the non-Western/nonliterate world prior to the advent of a literary tradition. Reid and Lane (2004: 7) argue that this approach obscures the study of extended periods of the past in areas where literacy appeared relatively late, as was typically the case for much of sub-Saharan Africa and many other parts of the world. Schmidt (2006), meanwhile, has highlighted the potential offered by oral sources to access much "deeper" time periods well before a European presence and which are more conventionally understood to be the realm of prehistorians.

Additionally, the earlier definitions of historical archaeology failed to recognize the existence of "other" non-Western written texts that were produced well before the era of European expansion (Reid & Lane 2004). In Africa, for example, these include ancient Egyptian, Arabic, Chinese, and Amharic texts, all of which recorded the history of indigenous Africans, and in some cases these texts predate the advent of Western literacy. Finally, the temporal range of more dominant definitions is another major problem. Specifically, the onset of European expansion into other parts of the world (from 1498 – when Christopher Columbus first sailed to the Americas) has often been regarded as the date for the beginning of historical archaeology. This seems to imply that there cannot be anything termed as "historical archaeology" prior to the late fifteenth century. Contrary to this idea, however, there have been several studies termed as historical archaeology, particularly along the coast of East Africa, that have extended beyond this temporal boundary, due to their use of both textual and material sources. In short, the older definitions of historical archaeology seem to imply that non-European communities only began making their histories with the arrival of Western writing traditions, something that is manifestly untrue.

Key Issues

Definitions and Methods

Responding to calls to refine earlier definitions and perceptions of historical archaeology, Africanist archaeologists (e.g., Reid & Lane 2004; Pikirayi 2006; Schmidt 2006) have found it more helpful to define their field on the basis of methods used rather than the period and subject of study. Pikirayi (1993: 36), for example, has proposed that historical archaeology in Africa is essentially "the study of sites which can be interpreted with the aid of historical sources such as written documents, oral traditions and historically datable artefacts." His approach is thus one in which the material record is used to test written or oral records to reveal changes within communities who have not necessarily been represented in recorded history. Pikirayi goes on to identify two categories of historical sources that can be integrated in historical archaeology studies, namely, "external" and "internal" sources (2006: 230-32). The former are those produced by "outsiders as direct observers, transcribers (for the case of Africa), and copiers of verbal accounts provided by various visitors to foreign lands" (Pikirayi 2006: 230). Thus, the published firsthand accounts by Europeans in Africa since c. 1500 CE onwards fall within what Pikirayi calls "external sources," as would late first millennium CE and early second millennium accounts compiled by Arab geographers and the early first millennium Classical texts such as the *Periplus*.

On the other hand, internal sources include a range of broadly historical accounts produced by different African societies, such as "oral tradition and histories, myths and personal anecdotes transcribed by professional historians and anthropologists" (Pikirayi 2006: 232). Regardless of which definition is preferred, there is general consensus among Africanist archaeologists that historical archaeology should seek to integrate and interrogate archaeological types of sources such as artifactual, ecofactual, structural, and architectural remains and their contextual, spatial, and temporal associations and characteristics, with other non-archaeological sources that can broadly be defined as "historical."

Escaping Ethnocentrism: Alternatives in Non-Western Settings

The realization of the potential of non-written sources in historical scholarship began in the

1960s, notably through the use of oral traditions to document the histories of those Africans (who constituted the majority of the continent's population) whose histories had never been textually documented. Oral information has been utilized in many ways by archaeologists working in the region, including, for example, for locating and interpreting archaeological sites and materials, in aiding an understanding of potting techniques and functional categories, and in explaining the techniques and symbolism associated with iron production. More generally, archaeologists working in east Africa and elsewhere on the continent began to integrate non-written sources into their works in a range of contexts as part of a broader goal aimed at rewriting the histories of African people.

Initially, much of this work aimed at either verifying or "fleshing out" the oral sources. During the 1950s–1960s, for instance, various archaeological campaigns were undertaken to locate archaeological sites in Uganda, such as Bigo, Munsa, Kibengo, and Kasonko, mentioned in the oral traditions concerning an elite known as the Bacwezi, so as to get a better idea of their function and date of construction. This lead to the proposal by Posnansky (1969) that Bigo was the capital of the pastoral Bacwezi kingdom and that the other sites were part of the same political system. More recent field investigations by Robertshaw (1999) at Munsa and Kibengo, however, suggest that rather than there having been a single mega-state, there were a number of smaller polities each administered from a capital encircled by a complex of ditched earthworks.

Schmidt (1978) also drew on the oral sources concerning the Bacwezi to develop an alternative, structural approach to the study of the region's historical traditions and to extend their application to consideration of a deeper time depth. In particular, he brought together archaeological methods and oral traditions to explain the development and flux of African Iron Age culture from its earliest beginnings (around 500 BCE) in the Buhaya region of Tanzania to contemporary times. Through oral traditions, Schmidt explored several aspects of Haya culture, ranging from the economic systems of iron working and agriculture, to mythology and local spirit mediums, in order to inform his archaeological interpretations. Interestingly, Schmidt found that the Bahaya's conceptualizations of the past clearly related to the patterns and distribution of material remains left by Iron Age peoples some 2500–2000 years ago. A similar study by Mapunda (1995) is another excellent case demonstrating the value of oral tradition and ethnography in archaeological research. In his research on iron-smelting practices and symbolism in the southern highlands along the shore of Lake Tanganyika in Tanzania, Mapunda engaged with the oral tradition and histories of people in the region to identify and locate iron-smelting sites, where he found the remains of bowl furnaces (*Katukutu*) that are, in most cases, invisible on the ground surface.

More recently, the incorporation of non-written sources such as oral traditions and ethnographic information in archaeological studies has gone even further by helping to challenge elements of "received wisdom" concerning the causes of contemporary problems, much of which originated from the "colonial library." One case to demonstrate this concerns the alleged impacts of precolonial African subsistence strategies on the environment. A study by Lane and his colleagues on soil erosion in the Haubi Basin, north central Tanzania, for example, aimed at delineating the link between soil erosion, iron smelting, and human settlement in the area (e.g., Mapunda 2003; Lane 2009) from the perspective of historical ecology. Colonial and postcolonial narratives had pointed to local iron-smelting practices in the region as the main cause of soil erosion, assuming that this practice involved the mass harvesting of fuel wood that led to deforestation. Contrary to this idea, oral traditions and ethnographic data collected by Mapunda, coupled with the results of archaeological survey and excavation (Lane 2009) and metallurgical analysis of iron-smelting remains (Mapunda 2003), revealed that the smelting technology practiced in the area was fuel efficient and was unlikely to be the primary cause of deforestation since smelters used only three to four tree species of hardwoods for charcoal and these made up

only a fraction of local forests that existed prior to soil erosion (cf. Schmidt 1997).

A more recent historical archaeology study by Biginagwa (2012) examined aspects of the animal economies practiced by local communities inhabiting the Lower Pangani River Basin in Tanzania, to discern whether any changes to these economies could be plausibly linked to the expansion of the caravan trade in the nineteenth century. The study aimed at recovering archaeological evidence from a sample of settlements known to have been involved in the nineteenth-century caravan trade. Analysis of the faunal remains sought to determine whether herd management strategies and culling practices had been modified so as to generate a surplus supply of meat that could be sold to the passing caravans. The study relied on multiple sources of information, including written and cartographic nineteenth-century European sources, oral traditions and histories, and archaeological data encompassing artifactual, structural, stratigraphic, and faunal remains, in order to address those objectives. The existing archaeological records and written and oral historical accounts were used to help locate settlements that had *direct* contact with trading caravans, while oral information and ethnographic studies were used to help explain some of the patterning in the zooarchaeological record – such as the high presence of rodents in the faunal assemblages – and also to help identify different fishing practices. Artifactual evidence recovered from these settlements was cross-referenced and analyzed, and as with the faunal remains, oral traditions were used to aid interpretation of cultural materials and to help understand local practices surrounding those materials.

By cross-referencing oral historical and archaeological data, it became clear, for example, that many of the primary and secondary written sources either underestimated or overestimated (and in some cases overlooked completely) important aspects of the trade and social lives of the community under study. For example, hunting is not given much attention in the historical texts, yet the zooarchaeological data obtained by this study indicates that hunting of wild animal species formed an important aspect of the subsistence strategies of nineteenth-century Zigua communities in the Lower Pangani. Additionally, while the dominance of smaller mammals such as rodents and elephant shrews in the faunal assemblage could be misinterpreted (based on the Prey Choice Model derived from Foraging Theory) as an indicator of subsistence stress, the Zigua oral traditions consistently claimed that inclusion of smaller mammals in the diet was due to their palatability, and not because of shortages of meat supply. Another example concerns the misperception of the Zigua island settlements. These have long been regarded in the primary historical sources as having originated in the nineteenth century as refuges, built in response to the increasing threat of cattle raiding by neighboring pastoralists, which is known to have intensified during this period. On the contrary, both absolute and relative dates from these sites indicate that these settlements predate the nineteenth century (Biginagwa 2012), suggesting that some other cause lay behind their creation. Generally, it can be said that most of the written texts consulted for this study tended to lack sufficient spatiotemporal specificity of historical events against which the archaeological data could be tested and cross-referenced, making it even more critical to also incorporate the oral evidence.

International Perspectives

Current historical archaeological research is well placed to contribute to ongoing debates on the framing of capitalist global relations, which is currently receiving considerable scholarly attention. Specifically, research findings from several studies in the region help assessments of the place and status of indigenous Africans within the nineteenth-century world economic system that ringed the Indian Ocean. For example, given the evidence for localized selectivity in the type of imported trade goods found on nineteenth-century sites in different areas and used to procure ivory and other key raw materials, it can be argued that local consumers were not simply passive receivers of "trinkets." Instead, as argued

by Croucher (2011), these commodities were actively desired by nineteenth-century East African consumers and like any fashionable commodity were highly subject to shifting fashions and cultural recontextualization.

For example, in her work on nineteenth-century Zanzibar clove plantations, Croucher notes the dominance of mass-produced European ceramics on such plantations, which contrasts with their virtual absence on settlements outside the plantations. In interpreting these in the context of the development of consumer culture and identity during the nineteenth century, Croucher argues that the imported wares had social functions, such as for reinforcing social bonds between groups of plantation residents and bridging the gap between plantation owners, enslaved laborers, and others living upon plantation sites. She further argues that neighborliness, which was a crucial part of Zanzibari plantation society, was cemented through reciprocal obligations of lending goods that had acquired social value (including those mass-produced imported ceramics) to those in need. After all, residents on plantations shared a common cultural understanding that such dishes were to be used at particular social occasions. Thus, Croucher (2011: 180) is of the view that the social norms of reciprocity not only worked to cement social unity and community cohesion but also served to highlight wealth disparities and unequal relations between those who had and those who did not have such socially valued goods.

Moreover, as Croucher (2011: 184) argues, acceptance or rejection of European manufactured goods was likely predicated on preexisting patterns of taste in the new markets to which these goods were taken by the passing caravans. Along the Lower Pangani River (northern Tanzania), for example, the use of pre-European contact shell beads (obtained from the coast) would have helped to shape the variety of beads desirable in local markets during European contact period, such that changing densities of beads of a particular color and/or shape in particular assemblages better reflect the manner in which commodity exchange was incorporated into local cultural contexts than shifts in the direction or scale of international bead supply. Thus, for example, at former settlements along the nineteenth-century northern caravan route in the Pangani Basin, cylindrical white glass beads dominate the imported glass bead assemblage throughout their occupation, which ended in the early twentieth century. Despite other shapes and colors of beads being readily available, oral histories indicate that the local Zigua occupants chose white beads because of the significance of the color white in a variety of cultural practices. For instance, the beads were used as charms to protect children from being seen by witches. They were also worn by young men when wooing women, by all participants in clan rituals, and by those attending cultural ceremonies to enshrine someone to a traditional title like chieftainship. Even though these beads were cheap and easy to acquire, so were other types, and the archaeological evidence suggests that Wazigua were highly selective in their consumer choices, even when presented with a wide range of global commodities. Contemporary historical sources support this and suggest that bead manufacturers in Europe adjusted their production strategies to take into account such variations in "taste" and cultural preference (Palaver 2009), underlining Croucher's observation that "capitalist forms and processes are continually made and unmade" (2011: 186).

Future Directions

Recent archaeological work undertaken in East Africa serves to demonstrate how historical archaeology studies can and should be designed with a view to interrogating multiple sources, both written and non-written. In doing so, such studies will serve to supplement, cross-reference, and/or correct oral and written sources, thus bringing a new understanding of the society under study. It was through a combination of multiple sources, for instance, that the Lower Pangani historical archaeology study discussed above was able to develop new understanding of

several issues pertaining to the status and general lives of Africans as they were steadily integrated into the global nineteenth-century economic system. Other studies are now starting to explore the nature of the colonial encounters that followed and in particular how European powers used space and architecture to exert and express their authority. Others still have begun to explore the changes in the nature of slavery and especially the shift from a "domestic"-oriented system with a limited export component to one dominated by larger-scale export coupled with the growth of local plantation-based chattel slavery. There is also growing interest in the underwater heritage of the coastal zone, both in terms of shipwrecks and the extraction of marine resources.

There are many gaps, however, partly because it is in only recent decades that the archaeology of the last c. 500 years has become a legitimate field of study. Topics that would warrant further investigation include investigating responses by African societies to the opportunities and constraints introduced by the arrival of non-African groups, and subsequent repercussions of these in creation or destruction of ethnic identities; research on the perceptions, valuation, and processes of integration and consumption by African groups of a variety of exotic imported commodities in the region; and the nature of land use, subsistence base, and settlement pattern of African groups prior to, during, and after contacts with non-African groups.

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- ▶ Colonial Encounters, Archaeology of
- ▶ Connah, Graham
- ▶ Kirkman, James
- ▶ Oral Sources and Oral History
- ▶ Posnansky, Merrick
- ▶ Schmidt, Peter R.
- ▶ Southern Africa: Historical Archaeology
- ▶ Trade Beads in Historical Archaeology
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East Africa: Museums

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Introduction and Historical Background

The first East African museums, like other early museums in Africa, were introduced during colonial times. They were started either by amateurs or professionals interested in particular scientific disciplines such as earth sciences, botany and zoology, archaeology and paleontology, and ethnography or by colonial governments as places of study, collecting and exhibiting nature, and/or local people's cultural heritage.

The museums in East Africa were at the beginning all located in the big capital cities notably Nairobi in Kenya, Dar es Salaam in Tanzania, and Kampala in Uganda. These often took the form of natural history museums with strong ethnographic component to depict "the natives and their cultures," the geology and land forms, and nature in "its raw form" of animals and plants. This was mostly for the colonialist administration and settler communities' consumption and enjoyment.

The museum was seen as a mirror of local traditional society and nature. To Africans, their culture, and their imaginary natural environment he coexisted with that was portrayed as a "unique jungle" with its "Big Five". The museum also provided an excellent research space and a facility for international partnerships in many scientific disciplines for amateurs, and enthusiasts, as well as well-established researchers of European and North American extraction of whom many were from the elite families of colonial-settler background.

Until the early 1980s, East African museums were therefore nongovernmental organizations that provided entry points to the unlimited research opportunities within East African countries. They attracted partnerships with Western researchers eager to establish a foothold in the continent, renowned for its rich heritage, including evidence of human origins. This made the museums in East Africa an exclusive property of the privileged white elite, who even after independence continued to ensure that their interests remained intact through ensuring powerful patronage structures both at local/political and international levels.

The museums in this context were therefore divorced from the common person, the African majority who were part of the objects on display. More so, the museums they were located in areas where Africans were rarely allowed to venture during the colonial periods except as servants. When they were, it was within very specific days and times. School children were transported in and out by buses. Like Western museums, most remained places of curiosities with little to do with national identity and community ownership.

With independence and the subsequent development of African heritage professionals, who began to question the status quo, changes came slowly but steadily. Kenya, in particular, with the interest and energy of the renowned Leakey family who collectively ran its museums for over 30 years, and who used their name and

international contacts to promote the museum, developed a complex and elaborate museum system with strong research capabilities comparable to any major museum in the world.

Key Issues

The National Museums of Kenya, the name the museum came to adopt at the independence in 1963, grew to become possibly the most complex, most diversified, and most research-endowed museum institution in the whole of Africa up to the present. Today, the National Museums of Kenya (NMK) is the government custodian of cultural heritage with a chain of regional museums all over the country. It hosts the East African Herbarium, the nation's Centre for Biodiversity, and world-class centers of paleontology, archaeology, and entomology, among others. The museum is also a host to the world-re-known Institute of Primate Research, a World Health Organization affiliate that carries out research on malaria and HIV pandemic, among others.

The National Museums of Kenya had the upper hand in sourcing funding, developing networks of international partnerships, and creating up-to-date research and museological facilities that up to now are incomparable with the other East African museums. Thus, as much as Dar es Salaam was reasonably developed because of the interest of the Leakeys in the study of human origins and the role of Olduvai Gorge and the Laetoli footprints, it appears that there was a conscious decision on their part to ensure Nairobi remained the center of excellence in East Africa.

This is explained by the fact that all the important finds from the Tanzanian sites including the human-origin-related materials were all kept at the National Museums of Kenya. This was possibly due to Tanzanian's socialist approach to governance and the authorities' nationalistic tendencies as opposed to Kenya that embraced the Western capitalist system with people in authority willing to provide patronage to the dominant white elites within the museum and their international partners; it was perceived as a safer ground to invest and carry out research compared to other East African museums.

Uganda, on the other hand, seemed to have not prioritized the role of the museum despite the museum having been established there in a custom-built modern architectural structure of the 1950s. Thus, coupled with its early history of turmoil and coups, Uganda Museums stagnated for a long time partly because they were part of the underprivileged departments of the government. This was demonstrated as recently as 2011 when the government contemplated demolishing the museum, building a commercial complex, and then allocating the Uganda Museums a few rooms to operate from.

With the Africanization of the museums from the 1990s, the East African museums have come to play crucial roles within their communities. The National Museums of Kenya and the National Museums of Tanzania have significantly restructured and reformed incorporating in their programs the needs of the various communities, listening to and admitting many voices into their spaces and therefore becoming places of dialogue.

Today the museums can be said to be an embodiment of the cultures of people in their respective countries, the representation of the identity or identities of the nations and their achievements. The museums have become forums for dialogue and critical thinking and at times even providing spiritual spaces where communities rally around shared heritage. The village museum in Dar es Salaam, for example, brings the villages of Tanzania with their architecture, cuisine, art and music, rhythms, smells, and sounds to the city by providing opportunities for the various ethnic groups to reenact their cultural heritage in the city setting including in building construction, culinary, and other artistic activities.

These early and major East African museums have today moved away from the confines of their grand walls as houses of wonder, collections of the "rare," and fortifications of the untouched, depicting "traditional peoples in their natural

environment" to open friendly spaces of memories, shared experiences, cultural activities, and representation of many voices, that are included in the thinking and production of the heritage.

This development of the East African museums can be categorized into roughly four phases:

Phase one was the colonial-built monumental natural history museums with a rich ethnographic component depicting the "innocent traditional African" and his material culture in his natural environment. These were the "do not touch and curator knows it all" type of museums similar to many in the West. They had a selected community of viewers who were otherwise nonparticipants in the making of the museum or their exhibitions. However, they also had a strong and heavily patronized community of elite researchers who ensured its status quo. They were therefore more elitist institutions with interests in research and the provision of platforms for international researchers to work in East Africa, in addition to their resident community.

Phase two came with independence and saw the slow opening up of these museums to others, mostly locals, who for years were not considered stakeholders, hand in hand with the training and absorption of African heritage professionals into positions of responsibility. It was a phase that lasted from the 1960s to the beginning of the 1990s. It also saw the expansion of the museums from the capital cities to the regions to try to diversify museum benefits. However, even at this stage, the initiative to have the museums in the regions still emanated from the top down, from the big city museums to the regions. It is a period that saw the construction of a number of museums in provinces and the slow involvement of communities.

Phase three was from the 1990s to the beginning of the 2000s. This saw a conscious effort on the part of the museums administration to restructure and meet some of the needs of their communities, by involving the communities much more in museum activities. It saw the mushrooming of museums including the involvement of communities in the development of some exhibits. The museum went into partnerships with communities and other bodies including the private sector and NGOs, to create programs beneficial to their communities' well-being. It saw a relationship developing between museums and communities. Training centers for young people in craft as part of saving the heritage as well as to economically empower communities developed in places like Fort Jesus, Mombasa; Gede in Malindi; and Lamu Museums in Kenya. It is also a period that saw communities seeking East African museums' support for the establishment of museums and other cultural institutions in local areas starting a bottom-up approach in heritage relations.

Phase four saw the continuation of phase three but also the introduction of community museums. The community museums are developed either in partnerships with the mainstream government museums, with other NGOs, or purely through community initiatives. There are some however that have been collectively started by the three bodies. The phase has also seen the introduction of *culture houses* that possibly respond to community needs that have not been addressed by mainstream museums in the past.

This latest phase has also seen some governments start to vigorously establish museums dealing with issues of politics and memory. Rwanda, for example, where genocide had taken place during this time has not only started memorial museums for the victims in various parts of the country but also the Presidential Palace Museum shows political atrocities of the past regime. It has planned a Liberation Museum to showcase the role of the liberating army at the time of the genocide. This however is not uncommon in the region as in 1977 the government of Tanzania established the Arusha Declaration Museum that celebrated the country's new socialist political vision.

Both Rwanda and Burundi have joined the regional body, the East African Community, and as such could be considered under this regional survey. There are also other countries

within the Eastern African region with museums that could also be considered and that have had museums within their boundaries. These include Ethiopia and Eritrea. There are also some that have either lost museums through wars such as Somalia or which have no museums such as South Sudan or have little documentation on the same such as Djibouti. The countries and their respective museums are summarized below.

Kenya

National Museum of Kenya

Founded in 1910 as a Natural History Museum, it was later named the Coryndon Museum after Sir Robert Coryndon and moved to its present location where it was officially opened on 22 September 1930. It was renamed the National Museum of Kenya after independence in 1963 and today is called National Museums of Kenya, Nairobi Museum, after the restructuring in the 2000s.

Fort Jesus Museum

Built by the Portuguese in 1593, it became one of the most important military positions on the western Indian Ocean. It changed hands many times in its 400-year history becoming a museum just at independence. It is both a monument and a museum. Today, Fort Jesus is a world heritage site, one of the six currently found in Kenya.

Lamu Museum

Lamu Museums are located in the Lamu Archipelago, in the historic Swahili town with the same name. Founded in the 1970s, the Lamu Museum is one of the most important museums depicting the Swahili heritage and its rich history. There are also the Swahili House Museum, the German Post Office, and the Lamu Fort, all of which together with the old Lamu stone town comprise the Lamu World Heritage property. Lamu is well known for its architecture, the Maulidi religious festival, and the Lamu cultural festival, in which all of which the Lamu Museums are involved.

Kitale Museum

This was the first of the inland museum to be developed in Kenya, and its initial acquisitions were comprised of collections of insects, other animals, and books collected by Col. Hugh Stoneham (1894–1966). The museum has a rich ethnographic collection from surrounding ethnic groups and is also known for its environmental conservation.

Kisumu Museum

Opened in 1980, this lakeside museum mostly houses cultural and scientific material exhibits on issues on western Kenya. It comes together with a complete Luo homestead and a snake park.

Meru Museum

Located close to the foothill of Mt. Kenya, the Meru Museum was created to conserve the cultures and traditional practices of the local Meru-speaking people. The museum was founded in 1974 in an old historic building and today, among other activities, carries out educational programs mostly for schools.

Karen Blixen Museum

This is the former house of Danish author Karen Blixen, whose life story was made into a movie that became the Oscar award–winning film *Out of Africa*. Built in 1910, it was later donated by the Danish Government to the then newly independent Kenya in the 1960s. It was made a museum in the 1980s.

Kapenguria Museum

Located in the Rift Valley of Kenya, this is the prison in which the six Kenyan freedom fighters deemed most dangerous, including Mzee Jomo Kenyatta, the first president of Kenya, were detained at the beginning of the 1950s. It was opened in 1993 to preserve the memories of these influential leaders in their role in the struggle for independence. The museum houses books and documents in a memorial library.

Other museum sites include:

Hyrax Prehistoric Site and Museum

This is an archaeological site of the Late Iron Age/Late Stone Age in which a small museum was established in 1965. This was further expanded in 2000.

Desert Museum
The Desert Museum is cultural museum opened in 2008 on the shore of Lake Turkana and dedicated to the unique culture of this region.

Kariandusi Museum
This museum is located in the Rift Valley near Nakuru where an archaeological site with the first discoveries of Lower Paleolithic sites in East Africa were first found.

Narok Museum
Located in Narok town, the museum preserves the beauty and rich traditional culture of the Maasai and other speakers of the Maa language.

Rabai Museum
Founded by the first missionaries to Kenya and built in 1846, the Krapf Memorial Museum was founded in 1994 to provide formal and perpetual reminder of monumental events during the advent of early missionaries. It was built with the permission and good will of the local community elders who continued to practice their traditional religion including maintaining their old Kaya settlements and cultures, now listed under two world heritage conventions, the 1972 and the 2003.

Wajir Museum
Located on the dry northeastern part of Kenya, the museum was opened in 2011 to give visitors a glimpse of the rich cultural, historical, and natural heritage of northeastern Kenya. Northeastern Kenya is a dry land with mostly pastoralist Somali whose territories expand to cover a major part of northeastern Kenya and southeastern Ethiopia.

Tambach Museum
This museum is located in the Rift Valley in Tambach, one of the oldest towns in the interior of Kenya established in the 1920s as a British colonial center of administration. Opened in 2011 to safeguard the Tambach heritage and the culture of the Keiyo and Marakwet, it is located in the unique mountainous landscape of the rift valley.

Malindi Museum
This is an ethnographic museum which showcases the Mijikenda cultures of the coastal and the immediate hinterland of Kenya.

Gede Museum
Locate about 16 km from Malindi, Gede is one of the most important old Swahili settlements. Founded around the eleventh century, it reached its Golden Age in the nineteenth century. Today it is represented by monumental structures in a forest setting. A museum to exhibit this rich Swahili heritage was funded by the European Union in the 2000s. Gede is also the host of a butterfly exhibition as well as a very successful museum/community joint project on butterfly farming and bee keeping.

Tanzania
Dar es Salaam National Museum
One of the first museums to be founded in East Africa, it was established in 1934 and open to the public since 1940. It was originally conceived as a memorial museum dedicated to King George V but with independence changed to articulate the history of Tanzania. It houses some of the findings by the Leakeys from Olduvai Gorge as well as the site of Kilwa. Recently it went through a restructuring and rebuilding period supported by the Swedish government and today hosts what has been referred as the House of Culture.

Village Museum
This is a unique open-air museum that was established in 1996 in Dar es Salaam and showcases among other activities traditional architecture from various peoples and various parts of Tanzania. Its activities include dances, food and food preparation, poetry and oral tradition, art, and craft. It brings together Tanzanians of all cultures, ages, and upbringing and offers opportunities to experience home away from home for many Tanzanians with rural backgrounds in Dar es Salaam.

Natural History Museum
This museum was opened in 1987 and is dedicated to human evolution and entomology.

Arusha Declaration Museum

Arusha Declaration is one of the most important episodes in the history of Tanzania as a country. It was the time that the founding father of the country, Mwalimu Julius Kambarage Nyerere, and his colleagues decided that Tanzania would become socialist. Referred to as Ujamaa, or family/community, the declaration that took place in the town of Arusha changed the course of Tanzania. It became a socialist in a manner referred to as African socialism. To remember this, a museum was constructed and opened in 1977. It exhibits among others documents of the colonial history of Tanzania, the fight for independence, and the Arusha declaration where Julius Nyerere outlined his political vision.

Nyerere Museum

This museum commemorates the life and contribution of the first president of Tanzania, Mwalimu Julius Kambarage Nyerere. Established in 1999, it is located in Butiama, the birth place of Mwalimu Nyerere. On exhibition are items related to Nyerere's personal and political life. Like the other heritage places of memory and politics, this is one of the spaces that speak to the people in the voice of struggle, liberation, and independence, something the museums have come to be closely associated with in postcolonial Africa.

Uganda

Uganda Museum

Uganda Museum is one of the oldest in East Africa and yet one of the most challenged. Founded in 1908, it still pretty much retains its twentieth-century atmosphere with artifacts that include musical instruments, hunting equipment, weaponry, and archaeological and entomological materials. As noted above, the museum is fully government controlled, giving it little leeway to innovate and move forward as the other East African museums.

There are other private as well as community museums in Uganda including one that commemorates the death of so many in the north of the country due to the rebel army called the Lord's Resistance Army.

Burundi

There is little information concerning the Burundi museums. This is a country that has also undergone wars over the years although now there is relative peace. Burundi has three recorded museums, namely, Burundi Geological Museum, Burundi Museum of Life, and Burundi National Museum.

Burundi Geological Museum

Located in Bujumbura, the capital of the country and as the name suggests was founded to showcase the geology of the country.

Burundi Museum of Life

The Burundi Museum of Life is located in the city of Gitega.

Burundi National Museum

The National Museum of Burundi like the Burundi Life Museum is located in the city of Gitega and not the capital Bujumbura. It was founded in 1955 and showcases the country's heritage.

Rwanda

Rwanda, despite its relatively small size, has many museums. The museums are organized under a centralized system called the Institute of Rwanda Museums. This country that underwent political turmoil and genocide has recovered to put in place museums of memory that are meant to remind people of these unfortunate events with a view to avoid repeating them. Here many museums have been put up as remembrance as well as healing spaces. It shows how museums can play roles that traditional museum practice never envisaged.

The current president of Rwanda, Paul Kagame, has a particular interest in museums and while officiating at the launch of the Liberation Museum in Mulindi, Rwanda, was quoted as telling the residents that "we must know where we come from to know where we are going and what we must do to get there. Today it is your responsibility to work hard to ensure the seed sown by the liberation struggle continues to

benefit all Rwandans. I am confident that building on our history, we will accomplish even more in the coming years." He further stated that "this museum becomes part of other museums in the country that have a lot to teach us when it comes to Rwandan history. It will always be a memorial for RPF liberation struggle."

Ethnographic Museum

This museum is located in Huye and was built in 1987. It houses ethnographic, historical, artistic, and archaeological collections.

National Art Gallery

The National Art Gallery is located in Nyanza District and originally was built as a palace for King Mutara III Rudahigwa. It displays contemporary artwork that Rwanda is so well known for and has exhibition on traditional life style and national history.

Kings Palace Museum

This is located in Nyanza Residence of King Mutara III Rudahigwa that was restored to its nineteenth-century state.

Presidential Palace Museum

The Presidential Palace Museum is located in Kigali and served as the home to the former Presidents Juvenal Habyarimana who served before the genocide and Pasteur Bizimungu who served after the genocide period ranging from the 1970s till late 1990s. It provides a glimpse how the former lived.

National History Museum

This museum was dedicated to Dr. Richard Kandt, a German doctor and explorer who embarked on an exploration of Rwanda in 1897, searching for the source of the Nile River. The National History Museum aims to explain the richness of Rwanda's nature.

The Environment Museum

Being built currently in Karongi, this museum may be the only museum of the environment in Africa. Thus, while there are environmental exhibitions in most natural history museums in the continent, there is none that is dedicated totally to the subject of environment alone.

Liberation Museum

This is the most recent museum in Rwanda, and the foundation stone was laid in December 2012 in Mulindi, Rwanda, on which occasion President Kagame stated that the Liberation Museum will serve as a memorial for the 1990–1994 liberation struggle mainly for Mulindi residents and for Rwandans in general. He further observed that the museum will always tell the liberation story and explain to younger generations the role it played toward achieving the developments that are currently taking place in the country.

Ethiopia

Ethiopia is a large country with extremely rich history and rich heritage founded in its long Christian, Islamic, as well as traditional cultures. There are numerous museums, but most of these are church run and owned. Thus, in every region where there are the orthodox churches, one finds a collection of church materials organized in museum form that include textiles, manuscripts, musical instruments, and even past royal regalia. These church museums are found in Addis Ababa, Aksum, Gondar, Lalibela and many other places where the church has had a strong foothold and constructed cathedrals.

Ethiopia however is also known for its hominid finds and has contributed immensely to the understanding of human origins study and debate. In addition to this, Ethiopia was for centuries a great empire with centralized governments that left their marks behind in terms of material culture. It is a diversified country with a population of over 85 million people and tens of ethnic groups, each with their material culture. These are displayed mainly in two museums: the National Museums of Ethiopia and the Ethnographic Museum in Addis Ababa University.

National Museum of Ethiopia

The National Museum of Ethiopia was founded in 1958 to promote and facilitate archaeological

research mission in the northern part of Ethiopia by French archaeologists.

The museum started its activities by exhibiting objects from these excavation missions. With the establishment of the Ethiopian Cultural Heritage Administration in 1976, the idea to open a national museum was mooted and supported by the government. Today, there is a well-established museum with exhibition of various kinds including the numerous hominid finds that Ethiopia is so rich in.

The Ethnographic Museum

Ethiopia's imperial past is very rich and the country was ruled until the mid-1970s by emperors who had immense power and wealth in a feudal system of government. Emperor Haile Selassie, the last in a long line of emperors, donated most of the imperial items exhibited in the museum. The museum is located within Addis Ababa University and also acts as a teaching museum.

The Red Terror Museum

This museum is located in the city of Addis Ababa in the Bole area. It represents the period commonly referred to as the Red Terror, during the administration of the military or the Dergue. It was a period of oppression, jailing, and killings, and the museum depicts the excesses of this particular period.

Eritrea

Located on the Red Sea, the country of Eritrea was a gateway to the northeastern part of Africa. Both the mega sites of Quito and the seaport of Adulis are located here. The country has a rich heritage but was colonized by the Italians, the British, and the Ethiopians, all of whom left some mark in its history. It shares the great depression of Afar with Ethiopia, an area that has produced early hominid evidence in both countries.

Eritrea has two major museums under the National Museums of Eritrea, namely, the National Museum of Eritrea in Asmara and the one in the port city of Massawa.

National Museum of Eritrea, Asmara

This museum was inaugurated in 1992 at the governor's palace in the capital Asmara. It was however moved to its present location at the former Comboni Sisters School for Women in 1997. Its main functions are to promote Eritrean history both within the country and abroad, to investigate new archaeological sites, and to explore and exhibit the history of Eritrea.

The National Museum of Eritrea, Massawa

This museum, located in the port city of Massawa, is rich in archaeological, ethnographic, and historical materials that are well exhibited. As a port city museum, it has in its exhibition a rich representation of marine life, particularly on the marine life of the very long coastal area of Eritrea. The museum is however well known for its exhibition of the war of independence from Ethiopia that demonstrates the life, tribulations, and successes of the freedom fighters against the Ethiopian army. It has a huge collection of weapons some captured from the enemy side and then reworked to create different types of weaponry. It also shows the struggle of life in the trenches where everything was made by the fighters ranging from guns and shoes to medical equipment.

Djibouti

There is no known museum at the moment in Djibouti although it is an interesting little country on the western seaboard of the Indian Ocean and popular with military. There are many foreign military bases there. There is a plan through the presidency to start a museum that will showcase the people and heritage of Djibouti.

Somalia

Somalia had a national museum with rich collections of ethnographical, archaeological, and other materials, but all these were looted and some destroyed during the overthrow of the dictator Siad Barre in the early 1990s. Since then, Somalia has remained without a working government and has no museum. The breakaway Somaliland that is also very rich in heritage including rock art has no functioning museum but has within its Ministry of Culture a Department of Museums and Sites.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Museums and Memory Experiences
- ▶ Museums and the Distortion of Archaeology for Political Purposes

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East and Southern African Neolithic: Geography and Overview

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State of Knowledge and Current Debates

The Neolithic period of eastern and southern Africa involved forms of niche fulfillment when viewed within the context of its origins and distribution. In Africa, Neolithic cultures include those groups who herd domesticated animals, use stone tools and ceramics as part of their subsistence package. Climatic and demographic pressures after 6,000 BP pushed Neolithic pastoralists living in the Nile River Valley southward, and the savanna habitats of eastern and southern Africa that these migrants encountered were attractive ecosystems rife for herding. The early Neolithic pastoralists in eastern Africa tended to be less mobile and had a broad-based subsistence compared to later pastoral groups, who colonized southern Africa after 2,000 BP. When placed within the larger paleoenvironmental and cultural backdrop, pastoralists adapted their subsistence to specific ecosystems based on the potential of the land to provide adequate sustenance for themselves and their livestock, but there are constant demographic pressures facing pastoralists who have low productive yields per unit of land compared to sedentary farmers.

In this entry, the Neolithic period in eastern and southern Africa will be reviewed from the perspective of how animal herders occupy distinct niches on a landscape. The current state of archaeological evidence for early pastoral cultures in the subcontinent will be summarized to examine how prehistoric people may have opportunistically exploited specific ecological niches in the landscape. The present-day mosaic of genetic and linguistic groups across the subcontinent is used to fill in the gaps of knowledge

where archaeological data is insufficient to chronicle the demographic and subsistence shifts throughout the late Holocene. The arrival of Iron Age agro-pastoralists in southern Africa will also be explored in order to attempt a clarification what the Neolithic entailed in this specific context. African Neolithic contexts are not a uniform culture or subsistence adaptation, and people have remained flexible in the ways they procure food, water, and shelter from the land into the modern era.

The Neolithic in Eastern and Southern Africa

It is easier to define the beginnings of the Neolithic period of eastern and southern Africa than the end. Traditionally, archaeologists ascribe the term "Neolithic" to the time period when food production techniques begin in an area where hunting and gathering had been exclusively practiced in the past. In eastern and southern Africa, domesticated animals are the hallmarks of the Neolithic as opposed to plant cultivation, which followed centuries later (Marshall & Hildebrand 2002). In this section, the origins of domesticated animals in Africa and the demic routes of introgression into eastern and southern Africa will be explored from their northern African homelands. The components of the Early Iron Age of southern Africa will also be discussed due to the near simultaneous arrival of Neolithic and Iron Age cultures into the region. Stone tool-using herding (Neolithic) cultures survived side-by-side with foragers and Iron Age farmers into modern times. This entry will explore the data for shifting subsistence, interactions, and settlement patterns during the middle to late Holocene in eastern and southern Africa. In order to understand the roots of the eastern and southern African Neolithic, the evidence for the origins of pastoralism in northern Africa will be briefly reviewed.

North Africa

The roots of animal herding cultures of eastern and southern Africa are found in the now desiccated landscape of the eastern Sahara (Fig. 1). Genetic data supports the notion that a rapid demographic expansion of the genetic forebears of the Niger-Kordofanian (Bantu), Nilo-Saharan (Nilotic) and Afro-Asiatic (Cushitic) language families (broadly falling in the L2 mtDNA haplotype) occurred at the end of the Younger Dryas between 10,000 and 12,000 years BP (Atkinson et al. 2009). It was during this period that experimentations with domesticating cattle are thought to have occurred in the eastern Sahara (Wendorf et al. 1987). The motor of population expansion was likely facilitated by the onset of a pluvial period in which lakes and rivers were filling with water following the arid conditions of the LGM. Pan-African distributions of "wavy line" and "dotted wavy line" ceramics in conjunction with bone harpoons and evidence for high predation on fish and riparian resources is evidence for a transcontinental movement of people during the early Holocene.

By 8,000 years BP, the Sahara was a very different ecosystem than it was during the previous stadial period or what it is like today, and the distribution of wild fauna across the landscape was also very different. At the zenith of the so-called Mid Holocene Climatic Optimum (MHCO), the Sahara was a vast network of lakes and swamps that hosted hippos, crocodiles, a wide array of bovids, and communities of hunter-gatherers who lived adjacent to the water bodies and had broad-based subsistence patterns. It is likely that during this period, certain animals, such as aurochs (*Bos primigenius*), the progenitor of modern-day cattle (Grigson 2000), became increasingly accustomed to close interactions with human beings. At sites in Nabta Playa in the western Egyptian Sahara, animals and people were tethered to the same resources and, over time, there is evidence that humans corralled aurochs and began to interfere with the reproductive cycles to make the animals smaller and, presumably, less aggressive (Gautier 2001). Over the next several thousand years, the relationship between humans and these animals transformed into one of codependency. As lakes began to dry up, humans needed a dependable food source and cattle had been bred to the point where their natural foraging instincts had disappeared.

Cattle were not the only domesticated animals present in northern Africa at the end of the MHCO.

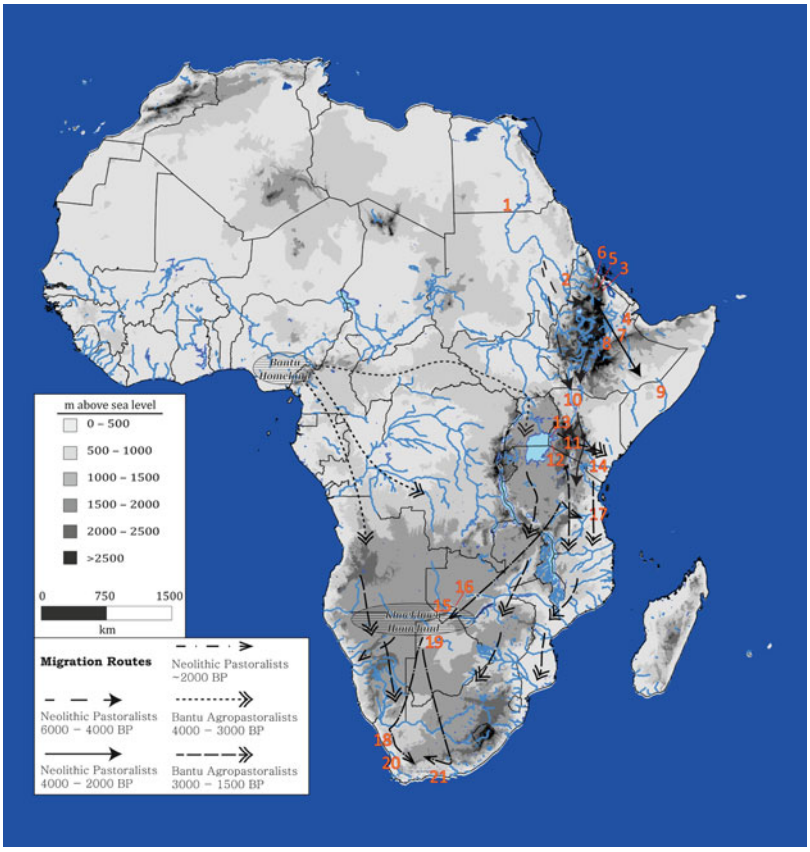

East and Southern African Neolithic: Geography and Overview, Fig. 1 Digital Elevation Map (http://www.ngdc.noaa.gov/mgg/global/global.html) of Africa showing routes of demic migration and archaeological sites mentioned in the text. *1* Nabta Playa, *2* Western Gash River, *3* Quiha, *4* AsaKoma, *5* DaneiKawlos, *6* Gobedra, *7* LagaOda, *8* Lake Besaka, *9* GogoshiisQabe Rockshelter, *10* Lake Turkana, *11* Enkapuneya Muto, *12* Gogo Falls, *13* Usenge 3, *14* Kahinju, *15* Kunyengenya, Galumano, Luso, *16* Situmpa, *17* Rufiji River Delta, *18* Spoegrivier Cave, *19* Toteng, *20* Kasteelberg, Elands Bay, *21* Robberg Peninsula

Other domesticated animals, such as goats (*Capra hircus*) and fat-tailed sheep (*Ovis aries*), were domesticated in southwest Asia and brought to Africa by 7,000 years BP (Fernández et al. 2006; Pereira et al. 2009). Donkeys (*Equus asinus*) were domesticated in the Red Sea region by 6,000 years BP (Rossel et al. 2008). The early domesticates were probably part of an integrated exchange system spanning the Sahara and Nile River Basin in which complex foragers/pastoralists maintained close technological and cultural networks over vast territories. These networks involved seasonal mobility in which riparian areas were utilized extensively during the dry season and grasslands were exploited in the rainy season. As riparian woodlands turned into grasslands by 6,000 years BP and grasslands turned into sand by 4,000 years BP, settlement in the eastern Sahara was abandoned and the extensive exchange network collapsed (Hoelzmann et al. 2001).

Prior to the introduction of domesticated animals, the primary (archaeologically visible) subsistence strategy in the eastern Sahara and Nile Basin was fishing using bone harpoons, but modes of subsistence began to change during the middle Holocene. Archaeological sites in the Nile Basin have increasing numbers of domesticated animals represented in their faunal assemblages between 6,000 and 4,000 years BP, indicating the importance that livestock was gaining as a resource that was depended upon (Sadig 2010). Settlements with evidence for uses of aquatic, wild terrestrial, and domesticated resources also appear along the Gash River at the western foot of the Ethiopian Highlands around 5,000 years BP (Gautier & Van Neer 2006). Cultivation of sorghum along the banks of the Nile River also began at this time (Haaland 1995) and may have further enticed people to intensify settlement within riparian regions. Cultivated food was only one component of a very broad

subsistence strategy practiced in the riparian regions of northeastern Africa, and long-distance exchange networks were maintained with foragers living in the Ethiopian Highlands (Fernández et al. 2007) and Turkana Basin (Barthelme 1985).

East Africa and the Horn

By 4,000 years BP, Neolithic pastoralists reached the Ethiopian Highlands and the Turkana Basin. In the Koobi Fora region on the northeastern shore of Lake Turkana, harpoon fishing and riparian foraging was replaced with livestock husbandry and intensive riparian foraging. Stylistic commonalities between Nderit tradition (Turkana) and Shaheinab tradition (Sudanese Nile) ceramics (Barthelme 1985), similar subsistence patterns (Marshall et al. 1984), and linguistic reconstructions (Ehret 1998) have been used to argue that there was a middle Holocene migration of Sudanese (Afro-Asiatic/Cushitic) pastoralists into the Lake Turkana region. This marks the beginning of the "Pastoral Neolithic" (PN) period in eastern Africa, which is defined as animal herding cultures who used ceramics and Later Stone Age (LSA) tools (Bower et al. 1977).

However, the arrows of pastoral diffusion are difficult to untangle during the middle Holocene. Teeth of domesticated cattle have been unearthed from Quiha in northeastern Ethiopia with a stratigraphic date of ~5,000–6,000 years BP (Barnett 1999). Domesticated animals are found at other sites such as Asa Koma in Djibouti (Lesur 2004), Danei Kawlos (Marshall & Negash 2002) and Gobedra Rockshelter in northern Ethiopia (Phillipson 1977), and Laga Oda (Clark & Prince 1978) and Lake Besaka (Brandt 1984) in the northeastern Rift Valley. At the Gogoshiis Qabe Rockshelter in southern Somalia, domesticated goats and cattle were recovered from pre-3,500 year BP contexts (Brandt 1986). There is virtually no evidence to suggest a stylistic replacement of indigenous ceramic or lithic traditions in the Horn of Africa such as what is presumed to have occurred in the Turkana Basin (Lesur 2004).

For approximately 1,000 years, occurrences of livestock in eastern Africa remain restricted primarily to the Turkana Basin and the Horn with limited diffusion southward. Recent analyses of obsidians from the Turkana Basin suggest that once pastoralism was established in the region, exchange networks were intense but localized (Nash et al. 2011). There were only small "trickles" of pastoralists south of 3°N prior to 3,000 years BP (Bower 1991). There are four published archaeological site locations with domesticated animals south of Lake Turkana prior to 3,000 years BP: Enkapune ya Muto in the central Rift Valley (Ambrose 1998), Gogo Falls (Karega-Mũnene 2002) and Usenge 3 (Lane, et al. 2007) near Lake Victoria, and Kahinju in the Kenyan Coastal Plains (Wright 2007). All of these sites have evidence for minimal reliance on domesticated animals, but instead show foraging-based adaptations in which domesticated animals became one (relatively minor) subsistence component.

It is likely that the recorded drops in lake levels and increases in xeric plant species documented across equatorial Africa between 4,000 and 3,000 years BP impeded the spread of transhumant pastoralists beyond predictable resource bases. The environments in which domesticated animals are found during this time period are areas with high topographic relief or are close to permanent water bodies. Furthermore, domesticated animals are found in very low numbers relative to wild taxa during this period from sites outside the Turkana Basin and Horn. It is a distinct possibility that livestock in these settings were rustled from established herds elsewhere and not kept for extensive periods prior to slaughtering (Marshall 2000). In that case, the presence of domesticated animals in equatorial Africa prior to 3,000 years BP represented an additional resource within the broad-based foraging complex of those who possessed them and was neither culturally transformative nor even necessarily permanent.

From 3,000 to 2,000 years BP, a drastic shift in the relationship between humans and domesticated animals occurred among people living in the grasslands of eastern Africa and in the Rift Valley. The number of known PN sites from this period grows to several dozen and there are

enough pastoralists on the landscape to form patterned cultural differences between different site types.

- *Eburran 5* sites are those where there is evidence for a limited acquisition of domesticated stock, used ceramics, but maintained the same general stone tool traditions (long, narrow blades and microliths, narrow endscrapers, sidescrapers, and microburins) and maintained a broad-spectrum foraging patterns (Ambrose 1984). These sites are located on savanna and forest ecotones and are mostly known from the Central Rift Valley.
- Most *Kansyore* sites are restricted to the areas adjacent to fluvial systems and Lake Victoria and are delayed-return hunter-fishers-gatherers who adopted domesticated animals by as early as 4,500 years BP (Prendergast 2010b). The Kansyore ceramic tradition dates to as early as 6,000 years BP and includes hemispherical bowls that are highly decorated with circular bands of rocker stamp and punctate impressions (Dale & Ashley 2010). The lithic traditions are not uniform, which reflects the LSA traditions of each locale rather than being a widely distributed cultural entity (Seitsonen 2010). Domesticated animals were incorporated into an indigenous foraging economy that involved seasonal residential mobility to exploit aquatic resources and access wild terrestrial game available at different times of the year.
- *Elmenteitan* sites were first described by Louis Leakey (1931) and are found in more closed habitat locations along the western Rift Valley above 1,900 m. These sites have a higher percentage of ovicaprids compared to cattle and have a distinct lithic industry comprised of large, backed blades, long endscrapers, and large sidescrapers (Ambrose 1984). Elementeitan sites are also characterized as having a distinct pottery style (globular vessels with vertical lugged handles) and using stone bowls as mortuary artifacts.
- *Savanna Pastoral Neolithic (SPN)* sites are distributed throughout eastern Africa and were predominantly cattle pastoralists who supplemented their diets with plains game or, in the case of Lake Turkana, fish (Ambrose 1984). This archaeological entity has also been called "Wilton" (Leakey 1931) referring to the short, broad blades and convex endscrapers that characterize the lithic industry. However, there is considerable diversity in the lithic technologies used, which have stylistic continuity from LSA traditions predating pastoralism. Four named ceramic traditions called Nderit, Narosura, Akira, and Maringishu have been described from SPN sites as well as a distinct herringbone-motif decorated vessel. Stone bowls and other ground stones are commonly found on these sites.

The period from 3,000 to 2,000 years BP is known as the so-called splash of pastoralism into equatorial eastern Africa (Bower 1991). This has also been conceptualized as the period when pastoralism incubated in the whole of eastern Africa, as opposed to the preceding frontier phase when pioneers ventured into uncharted territories to search for new pastures or escape demographic pressures in their ancestral lands (Lane 2004). During "consolidation phases" of human frontier expansion, intensification and specialization of agricultural production techniques occurs (Alexander 1980; Lane 2004). Indeed, many archaeological sites with high proportions (>90 %) of domesticated animals in faunal assemblages are found in the central Rift Valley and portions of the savannas of Kenya and northern Tanzania from this time period. However, many contemporaneous archaeological sites across eastern Africa have evidence that people were nonspecialists, maintaining small herds of animals that supplemented their diets which primarily revolved around foraging, of which Eburran and Kansyore forager-(fisher)-pastoralists are good examples. In the case of the inhabitants along the Galana River in the Kenyan Coastal Plains, there is little evidence of significant changes in settlement or technology from 6,000 to 1,300 years BP (Wright 2007).

Available climatic data for East Africa during the period spanning 3,000 to 2,000 years BP indicates that ENSO was likely a significant

driver of precipitation and there were episodic intervals of low and high rainfall (Cohen et al. 2006). The Galana River, which drains the 70,000 km^2 of the East African Highlands, was generally aggrading throughout this period within a broad floodplain with brief periods of soil formation (landform stability) followed by cut-and-fill flooding (Wright et al. 2007). This depositional pattern is consistent with punctuated dry and pluvial periods within the catchment, which controls vegetation growth and soil formation. Sediment cores from Rift Valley lakes show oscillating precipitation patterns as well (Gasse 2000). In general, rainfall patterns in the late Holocene have been unpredictable on the decadal scale (Plisnier et al. 2000), which appears to have pushed people toward exploiting a more predictable resource base.

Y-chromosome and mtDNA genetic markers are used in southern Africa to disentangle the history of population movements over the last several thousand years (see discussion below). However, using these tools is a much more difficult task in eastern Africa where genetic admixture has been more thorough despite the retention of four language families and over 200 self-identified ethnic groups. One example of this is the Luo ethnic group from western Kenya who speak a Nilo-Saharan language but have predominantly Kordofanian/Bantu ancestry (Scheinfeldt et al. 2010). A classic ethnographic analysis tracing the movements of material culture items and marriage partners across ethnic boundaries in the Lake Baringo region of Kenya illustrates that ethnically diverse landscapes necessitate the presence of strong cooperative networks in order to function well (Hodder 1977). Cohesive social networks built on complex social values, kinship, and exchange patterns are crucial components of niche fulfillment in precarious ecological settings and have deep roots in African prehistory.

Demic Routes of the Neolithic to Southern Africa

The most commonly accepted demic route of the first livestock into southern Africa holds that a small group of migrants left the Great Lakes region of Uganda around 2,000 years BP and settled in Okavango River Basin of what is now northern Botswana and the Caprivi Strip of Namibia (Fig. 1). From there, the agro-pastoralists came into contact with Khoe-Kwadi-speaking hunter-gatherers, some of whom rapidly adopted a pastoral lifestyle themselves, and went on to colonize vast tracts of southern Africa by 1,800 years BP (The linguistic distinction of the Khoe-Kwadi language family(-ies) is the subject of some debate among linguists (Ehret 2008; Güldemann 2008; Mitchell 2010). One common heuristic device, though not linguistically or biologically accurate, is to refer to pastoral communities of southern Africa as "Khoe" and the hunter-gatherers as "San" (Soodyall et al. 2008; Scheinfeldt et al. 2010). Separate migrations of Bantu-speaking agro-pastoralists occurred down the Atlantic and Indian Ocean coasts between 1,800 and 1,600 years BP.

There are many potential memes that remain undefined in this explanation of livestock diffusion. It is clear that the spread of domesticated animals did not occur as a coherent population expansion of one culture group from eastern to southern Africa. However, there is considerable debate regarding the degree to which livestock herding techniques were adopted by indigenous foragers or whether pastoral people who entered southern Africa settled alongside foragers and there was a gradual melding of subsistence and culture systems via intermarriage and intercommunity trade. The picture is further complicated by the fact that Bantu-speaking agro-pastoralists entered southern Africa within 200 years of the non-Bantu-speaking populations ("Khoekhoen"). In the end, there are three primary lines of evidence that can be used to retrace the spread of pastoralism out of eastern Africa: archaeology, genetics, and linguistics. In this section, these data sets (that are not always in total agreement with one another) will be reviewed to evaluate the current state of knowledge surrounding the origins of Neolithic pastoral economies in southern Africa.

The lack of evidence for a southward expansion of Neolithic pastoralists from 3,000 to 2,000 years BP into the areas that now include southern Tanzania, northern Malawi, northern

Mozambique, and eastern Zambia may be as a result of the dearth of well-dated archaeological assemblages from this time period. Early Iron Age settlement of the region adjacent to the Zambezi and Machili Rivers in southwestern Zambia has been reported during the time period when Neolithic pastoralists had likely reached points south of the Zambezi. The sites of Kunyengenya, Salumano, Lusu, and Situmpa have Iron Age ceramic assemblages, evidence for domesticated sheep, and radiocarbon ages clustering around 2,200 years BP (Katanekwa 1978; Phillipson 1989). The so-called Situmpa Ware is documented across Zambia and Zimbabwe and has radiocarbon ages dating to around 2,000 years BP (Clark & Fagan 1965). Unfortunately, evidence of Neolithic pastoralists have yet to be located in this region from this time period, so other forms of data must be explored to identify the routes by which the Neolithic moved from eastern into southern Africa.

Y-chromosomal genetic evidence shows that pastoralists from East Africa en route to southern Africa passed through Tanzania estimated at c. 2,000 years BP (Henn et al. 2008). The majority of archaeological finds in the Rufiji River Delta and surrounding areas unearthed by Felix Chami (Chami & Kweksason 2003) most likely date to after 3,000 years BP rather than before, as the authors suggest. The artifacts, including numerous Narosura ceramic tradition sherds, broad blades, and groundstones, are all suggestive of a well-developed SPN demic expansion from 3,000 to 2,000 years BP. Direct dating of archaeological materials from this region is scant and DNA evidence has a large range of associated error in its clock, so there is much room for speculation regarding who the first pastoralists were, the routes they took to pass into southern Africa, and when it occurred.

Linguistic analyses provide an interpretive framework for understanding the migration of pastoralists and farmers into southern Africa. Early Neolithic groups from southern Africa spoke Khoe-Kwadi languages, which originated from Okavango River Basin. However, Khoe-Kwadi languages also have eastern African links to root words like "year," which have similar cognates in Cushitic and eastern Bantu languages (Güldemann 2008). More tellingly, overlaps of cognates between East African languages associated with Sandawe hunter-gatherers (northern Khoe family) and Khoe-Kwadi are numerous (Ehret 2008; Güldemann 2008). The genetic divergence dates of click-speaking populations in Tanzania (e.g., Sandawe, Hadzabe) from southern Khoe-San populations are estimated to be older than 35,000 years (Tishkoff et al. 2007), so one should expect that proto-Khoe-Kwadi-speaking migrants to southern Africa were conversant with animal husbandry as well as foraging subsistence prior to their exodus. When the immigrant northern Khoe speakers reached southern Africa, both genetic and linguistic analyses indicate that the proto-Khoe-Kwadi language family diversified enormously as intercommunity exchange networks developed (Salas et al. 2002; Güldemann 2008; Soodyall et al. 2008). As will be demonstrated in the following section, the archaeological evidence reflects the diversity of subsistence adaptations that accompanied the movement of people and technological ideas after 2,000 years BP.

Southern African Neolithic?

Insofar as it is understood, the southern African Neolithic consists of two facies: herders who hunted and gathered and hunter-gatherers who kept small amounts of livestock (Sadr 2003). As during the pioneer phases of agricultural expansion in many other places in Africa, pastoralism entered South Africa after 2,000 years BP as an experimental concept that indigenous hunter-gatherers integrated into their subsistence economies. In the years that succeeded the introduction of Neolithic and Iron Age lifeways into southern Africa, the ecology of the landscape was impacted by the demographics of settlement and non-anthropogenic changes to the climate, which pushed people into narrower subsistence niches.

The earliest securely dated archaeological finds of domesticated animals in southern Africa include sheep remains at Spoegrivier Cave in Namaqualand dated to 2,105 $\pm$ 65 ^{14}C years BP (1,990–2,300 cal. years BP; Sealy & Yates 1994).

In archaeological sites studied across Namaqualand, there is no discernible material culture distinction between archaeological assemblages prior to and immediately following 2,000 years BP, suggesting that pastoralism in this region was not introduced by a separate, immigrant pastoral group (Webley 2007). Following the introduction of ceramic technology into the region after 1,900 years BP, incremental changes to lithic assemblages and ostrich eggshell bead production could represent the evolution of a "herder-forager" culture, distinct from those groups who did not adopt domesticated animals (Sadr 2003).

Sheep and cattle are found at Toteng in northern Botswana directly dated with radiocarbon ages of 2,020 ± 40 and 2,070 ± 40 ^{14}C years BP (1,900–2,040 cal. years BP and 1,990–2,110 cal. years BP, respectively; Robbins et al. 2005). In both cases, the vast majority of the faunal remains were from wild animals, with domesticated stock comprising <5 % of the total diagnostic NISP assemblage (Robbins et al. 2008). Archaeological artifacts recovered from the Toteng sites demonstrate that the inhabitants were engaged in aquatic- and endoaquatic-based subsistence strategies at the same time that Lake Ngami had high water levels (Robbins et al. 2008). Occupation of the site throughout the late Holocene conforms to the hunters-who-kept-livestock model advanced by Sadr (2003).

The first livestock economies to enter southern Africa are argued to have preferred sheep as opposed to cattle (Smith 1992). However, Thomas Huffman (2001, 2007) argues that archaeofaunal assemblages from the southern African Iron Age underrepresent the numbers of cattle people actually kept because African pastoralists usually use cattle by-products (milk, blood) and rarely eat their cattle. He calls this the "Central Cattle Pattern," which is documented in numerous ethnographic examples from across the continent. Subsequent analysis of Early Iron Age phytolith assemblages from dung deposits in southern Africa reflects taxa consumed by small stock and not cattle, confirming the hypothesis that early Neolithic pastoralism was centered on tending small stock (Badenhorst 2009). Middle and Late Iron Age agro-pastoralists were more reliant on cattle, or at least slaughtered them in higher frequencies, and the faunal assemblages from across the region reflect this trend.

Using linguistics, the earliest cattle herding cultures of southern Africa are thought to have been Khoe-Kwadi speakers who settled in the Limpopo Valley approximately 2,000 years ago (Ehret 2008; Güldemann 2008). Tom Güldemann (2008) sets the homelands for the Khoe-Kwadi language family in the northeastern Kalahari along what is today the northern borders of Namibia and Botswana. However, the archaeological association between Khoe speakers and pastoralism between 2,000 and 1,000 years BP is shaky (Sadr 2008b). Khoekhoen people were known as highly mobile, lugged-ceramic-using pastoralists living in the western Cape of South Africa (Sadr 2003). However, none of the antecedent material culture features associated with ethnographic accounts of Khoekhoen pastoralists (Bollong et al. 1997) are apparent from archaeological sites prior to 1,000 years BP. When lugged ceramics first appear in the archaeological record at Kasteelberg in the southern Cape after 1,000 years BP, residue analysis from the vessels indicates that they were used to process seal blubber, not milk as would be expected from people who were highly dependent on livestock (Patrick et al. 1985).

Neolithic pastoralists arrived in the western Cape approximately 2,000 years BP and the eastern Cape and western coast regions of South Africa by 1,800 years BP and shared the low-altitude plains with hunter-gatherers through the late Holocene (Lewis 2002). The site of Kasteelberg has been interpreted as supporting two types of populations: mobile herder-foragers who subsisted on inland resources and another population of semisedentary herder-foragers who exploited coastal ecosystems (Sadr et al. 2003). Small-stock herding at the site is dated to prior to c. 2,000 years BP and shows continuity in the overall archaeological assemblage with previous non-livestock tending occupations of the site (Sadr et al. 2003).

After the arrival of pastoralism in the Elands Bay region, hunter-gatherers appear to have

continued to practice a highly-mobile, flexible, opportunistic foraging strategy, which suggests noncompetitive interactions between groups with different subsistence practices (Jerardino et al. 2009). Stable isotope analysis performed on human skeletal materials from the southwestern Cape indicates that the diets of coastal inhabitants had $\delta^{13}C$ values that strongly indicate a very limited mobility range and focus on marine resources (Sealy & Merwe 1988). The persistence of hunter-gatherers into the late Holocene at sites in the southern Natal (Cable 1984) and the northern Cape (Parsons 2003) further confirms variability in the settlement patterns along ecological gradients between highland, fluvial riparian, and coastal lowland settings.

Bone chemistry of two contemporaneous burial sites located within 13 km of one another in the Robberg Peninsula along the southern Cape coast shows that there is strong differentiation of dietary patterns between the two populations (Sealy 2006). Individuals buried at Plettenberg Bay show consumption of high trophic marine animals, whereas individuals from Matjes River had a much more broad-based diet with lower trophic marine and terrestrial resources (Sealy 2006). Combined with other archaeological data, the implication of this finding is that there was clear differentiation of subsistence strategies, territories, and cultural practices among late Holocene hunter-gatherers of southern Africa. Therefore, as Neolithic pastoralism spread along the coasts and hinterlands of southern Africa, the perceived usefulness of the resource appears to have varied among the indigenous inhabitants of the region.

The timing and degree of exogenous genetic introgression into indigenous southern African preagricultural populations would be helped by detailed genetic studies of living populations across the southern Cone. Unfortunately, most genetic analyses of hunter-gatherer and agricultural populations of southern Africa have been restricted to the geographic outskirts of the region. Y-chromosome and mtDNA analysis of modern Khoe-San populations shows deep ancestral links to the L0 haplotype (There are six primary haplotypes on the African continent: L0, L1, L2, L3, L4, L5, and L6. The L0 haplotype is traced as the genetic baseline of the modern human population dating to 146,400 ± 25,100 years BP (Gonder et al. 2007) due to intermarriage of the Khoekhoen with indigenous hunter-gatherer populations after 2,000 years BP, but there is no genetic discrimination between ethnic groups presently designated as "Khoe" (Khoe-Kwadi language family) and "San" (Ju-ǂHõa language family) (Soodyall et al. 2008). In contrast, Bantu-speaking populations bear distinct mutations that separate their lineages from the Khoe-San clade and haplotypes (Gonder et al. 2007; Henn et al. 2008; Tishkoff et al. 2009), but these are generalizations to which one cannot ascribe a tight chronology. Linguistically, the same basic relationships bear out unevenly as there is significant linguistic borrowing between the language families although distinct language families can be discriminated between Khoe, Bantu, and other non-Khoe speakers (Hammond-Tooke 2004; Güldemann 2008).

The combined archaeological, genetic, and linguistic evidence from southern Africa supports the notion that exploitation of ecological niches diversified following the introduction of domesticated stock. There is continuation of the LSA Wilton lithic traditions from the early Holocene into the historic period (100 years BP) with only modest changes in tool frequencies and morphology alongside communities heavily dependent on using copper, tin and iron (Duncan 2002; Mitchell 2005). The evolution of the Smithfield LSA large endstruck scrapers and distinct pottery tradition of the eastern Karoo after 800 years BP shows evolution of formalized stone tool production techniques despite the presence of iron throughout the region (Mitchell 2005). Due to the high amount of regional subsistence diversity, the separation of Neolithic from Iron Age settlements is not straightforward in southern Africa. The overlap of timing and material cultures of the two archaeologically distinguished groups is the result of similar demographic and ecological pressures, but differences in the migration and settlement patterns are worth noting to contextualize modes of early food production in Africa.

Iron Age Pastoralism. Previous models advanced in linguistics supported the notion of a "bow-wave" expansion of Bantu-speaking, iron-using agro-pastoralists originating from the West Africa via western Lake Victoria who territorially replaced indigenous hunting (Khoekhoen) and pastoral (Nilo-Saharan and Afro-Asiatic) populations (e.g., Vansina 1995). This model has been replaced with a nuanced view of incremental movements and intermixing of members of the Kordofanian/Bantu language family as they migrated across the subcontinent (Eggert 2005). Although studies of the distribution of African genetic markers clearly demonstrate the migration of two separate, Bantu clades into southern Africa approximately 2,000 years ago, the lineages are hybridized, as is the archaeological evidence of stone- vs. iron-using and hunting vs. pastoral vs. farming subsistence patterns (Mitchell 2010).

Gross analyses of ceramic assemblages from southern Africa offer a complex view of culture change in the South African Neolithic period. After 2,300 years BP, a few thick-walled ceramics (e.g., Situmpa, mentioned above) and thin-walled variants appear within LSA sites associated with mixed foraging-herding economies for about 600 years (Sadr 2008a). The archaeological site of Bambata and toponymically derived ceramic tradition known from western Zimbabwe is argued to have the earliest occurrence of cattle on the Zimbabwe Plateau and is argued to have predated Iron Age settlement of the area (Walker 1983). However, the clear association between domesticated animals and the 2,100 years BP radiocarbon date has been questioned because an older radiocarbon date comes from above the Bambata lens (Huffman 2005). Thomas Huffman (2005) also places thin-walled Bambata pottery within the Kalundu ceramic tradition, which is a subvariant of the Chifumbaze Complex, and associated with Bantu-speaking populations. The other subvariant of the Chifumbaze Complex is recognized as Urewe ceramic tradition, which is an East African Early Iron Age ware from western Lake Victoria occurring after 2,500 years BP and spread down the Indian Ocean coast after 2,000 years BP in a modified form called "Kwale Ware" or "Early Iron Ware." In Huffman's (2005) analysis, Bambata pottery was first produced by Iron Age farmers in Angola and transported by (Khoe-speaking) foragers (who probably kept some domestic stock) into southeastern Africa around 1,750 years BP. The style was later adopted by Bantu-speaking agro-pastoralists of eastern Botswana and western Zimbabwe around 1,600 years BP (Huffman 2005).

Settlement data indicates that village-dwelling Iron Age agro-pastoralists who farmed yams and millet entered southern Africa between 1,800 and 1,400 years BP (Vogel & Fuls 1999). Phytoliths recovered from one of the earliest occupied of such sites, Broederstroom, include wetland species of sedges and herbaceous grasses, indicating wetter-than-present conditions (Huffman 1996). The immigrating Iron Age people were clearly attracted to southern Africa because of its agricultural potential. Pulses of expansion of Iron Age agro-pastoralists into new niches in southern Africa generally correlate with wetter and warmer conditions than are presently found (Huffman 1996). The presence of the newcomers would have presented a source of resource competition for pastoral populations. However, the linguistic evidence indicates that Khoekhoe-speaking pastoralists remained in northern and northeastern South Africa for at least 1,000 years after the arrival of Bantu-speaking populations (Ehret 2008).

Early Iron Age farmers who settled in southern Africa after 1,800 years BP appear to have kept sheep, but there is only limited evidence for cattle and goat husbandry. Throughout the Iron Age, farming communities on the Zimbabwe Plateau grew increasingly invested in participating in the trans-Indian Ocean exchange networks, and their settlements were located near stone-walled enclosures that grew into loosely organized states. Between 1,400 and 1,000 years BP, the distribution of Bambata Ware and other thin-walled ceramics becomes increasingly restricted and thick-walled vessels associated with crop-raising/iron-producing communities are widely distributed throughout southern Africa (Sadr 2008a). Butchering cattle became increasingly important to these farming communities by the

Late Iron Age (c. 700–200 years BP), which has been attributed to the arrival of Nguni and Sotho-Tswana speakers from northeastern South Africa (Badenhorst 2010).

Successive waves of Bantu-speaking migrants into southern Africa during the Middle and Late Iron Ages (Hammond-Tooke 2004) as well as indigenous changes in niche fulfillment strategies resulted in a complex cultural mosaic at the time of European colonization. Over the last 1,000 years, rainfall in eastern and southern African has been antiphasing, meaning that as rainfall decreased in eastern Africa, it was simultaneously increasing in southern Africa, and vice versa (Tyson et al. 2002; Holmgren & Öberg 2006). Such climatic factors have catalyzed interregional migrations of agro-pastoral people throughout the late Holocene, seeking good pasture and farmland. With the immigration of new populations into southern Africa, subsistence and settlement patterns of indigenous Khoekhoen changed – in some cases moving toward a foraging-intensive exploitation pattern (Wilmsen 1994) or, in other cases, they moved to a livestock-intensive exploitation pattern (Kinahan 1991).

Discussion of the Evidence

Neolithic pastoralists entering East Africa were likely pushed into the new niche by desiccating conditions in their homelands. It is probable that pastoralists entered the Ethiopian Highlands for the same reasons at approximately the same time, but they are less archaeologically visible than in Lake Turkana. Pastoralism took shallow roots south of Lake Turkana as a seemingly minor complement to indigenous foraging systems. Marshall (2000) has suggested that raiding of herds may have been the mechanism in which livestock appear in new niches. In any event, the evidence is relatively clear that early pastoralism had little effect on indigenous settlement and subsistence practices. Livestock were incorporated as just one more resource within a broad-based subsistence regime.

Given the evidence for antiphasing climates between eastern and southern Africa in the late Holocene, livestock husbandry in southern Africa may have arisen from small populations of environmental refugees leaving East Africa around 2,000 years ago and settling in the greener pastures of southern Africa (Scott et al. 2012). The low archaeological visibility of these migrants is typical of itinerant pastoralists, who tend to leave few traces on the landscape due to the fact that having copious amounts of material culture is antithetical to a mobile lifestyle (Shahack-Gross et al. 2003). As in the pioneer phases of livestock introgression in eastern Africa, some southern African foragers recognized the newcomers as bringing an innovation that could be useful if resources became scarce.

Changing environmental and cultural practices in eastern and southern Africa during the late Holocene incubated livestock husbandry until it began to assume an ever-more important role in dictating settlement and subsistence practices. In the savanna plains and Rift Valley, there is strong evidence for the development of a "cattle-first" economy after 3,000 BP. However, there remained many foraging-first communities across eastern and southern Africa interacting with their agricultural and pastoral neighbors into modern times. From a cultural ecology perspective, the degree to which people relied on domesticated and wild resources will vary by geography and time, depending on the ability of different communities to feed themselves from the land or subsist through trade with their neighbors.

In East Africa, late Holocene economies of the Highlands and Coastal Plains continue to practice the broad-based subsistence regimes inherited from middle Holocene foraging-herders. Elmenteitan communities in the Highlands were vertically transhumant, but had a broad subsistence base. In the Coastal Plains and Lake Victoria region, pastoralists were tethered to resource-rich fluvial catchments, but little is known of how they lived in the immediate coastal hinterlands. Evidence from Kahinju on the banks of the Galana River in southeastern Kenya and the Lower Rufiji River in Tanzania shows that there are cultural connections to livestock-dependent pastoralists living in the interior, but the indigenous subsistence economy and lithic traditions remain

constant throughout the Later Stone Age Neolithic period. A similar pattern is followed among Kansyore sites in the Lake Victoria region, albeit with varying degrees of integration of PN subsistence and tool production techniques (Prendergast 2010a). In these lacustrine and fluvial settings, domesticated animals were integrated into riparian foraging strategies, which included hunting, fishing, and collecting edible plants and invertebrates that grew in aggrading floodplains.

Immigration of Bantu-speaking populations who raised yams and millet and introduced iron production represented a new subsistence niche, which may have clashed with transhumant pastoralism. Until recently, most scholars believed that shortly before 2,000 years BP, a unified Bantu cultural complex immigrated to the northern Lake Victoria region from western Africa bringing Urewe tradition ceramics, iron working, and sedentary farming with them (Vansina 1995). However, well-dated archaeological data sets from Lake Victoria (Lane et al. 2007) and revised linguistic analyses (Ehret 1998) indicate that the introduction of these cultural features was asynchronous. Regardless, the overall effect of these new cultural features realigned subsistence practices in the region with some pastoral groups eschewing cultivation altogether, while others (particularly in the Lake Victoria Basin, Highlands and Coastal Plains of the Indian Ocean) adopted plant cultivation as yet another resource that could be utilized as needed.

The impact of agricultural/grazing practices and iron production significantly altered the distribution of woody and grassy taxa across eastern Africa after 5,000 years BP. David Schoenbrun (1994) argues that reductions in medium-altitude and valley bottom forests reflected in lake cores throughout the region reflect the impact of pastoral and agricultural land management practices. After 2,000 years BP, significant shifts in the distribution of grasslands at the expense of primary-growth forests found in lakes all across the western Rift Valley are evidence of increasing proprietorship of land. Intensive management of patches of land would result in circumscription of territories that was not necessarily beneficial to unrestricted movement of transhumant pastoralists. In this case, the indigenous populations were forced to adopt aspects of the new economy, move to a new area, or attempt to maintain a transhumant pastoral lifestyle in an increasingly territorially circumscribed landscape.

Some groups clearly remained rooted in the Neolithic pattern practicing transhumant pastoralism as evidenced by sites dating to after 3,000 years BP on the Mara Plains and Laikipia Plateau of the Central Rift Valley and in the East African Highlands. It is likely that these pastoralists traded animal products and by-products with their farmer/forager neighbors, but there were also likely clashes over access to land in which different cultural groups competed for resources. Such clashes were commonly documented in the ethnographic record beginning in the nineteenth century. Maa-speaking pastoralists frequently fought with Kikuyu and Luo groups in an attempt to gain pasture in the fertile Central Highlands and Lake Victoria Basin, respectively (Galaty 1993). During the nineteenth century, the highly fatal cattle disease rinderpest had devastated Maasai herds and severely stressed intergroup relations in the form of rampant livestock raiding (Sobania 1993). A further climatic stress is also possible occurring during the end of the Little Ice Age (CE 1,300–1,850) in which wetter precipitation regimes gave way to much more arid conditions than had been witnessed in several hundred years (Verschuren 2001). A cultural antipathy developed among the Maa for their neighbors, and vice versa in which neither group viewed the others as humans (Berntsen 1979). Such a cultural proclivity is common among groups who compete for a common resource pool. For the purposes of the present discussion, it is significant to the extent that niche fulfillment under mutually symbiotic conditions can quickly be thrown off-balance when resource bases become strained.

The move of pastoralism across the Zimbabwe Plateau into southeastern Africa was rapid and features of the Bantu expansion can be interpreted as a having immigrated as a "package." When viewed through the lens of John Alexander's (1980) and Paul Lane's (2004)

analyses of Neolithic frontiers, the colonization of this broad area occurred so rapidly that the "settling in" phase of frontier expansion had little time to occur. In this sense, the moving frontiers of incipient East African pastoralism (c. 4,000–3,000 years BP), eastern equatorial Africa (3,000–2,000 years BP), and southern African pastoralism (2,000–1,500 years BP) shared some common aspects (Sadr 2003). The initial spread of domesticated animals into eastern equatorial Africa between 4,000 and 3,000 years BP has many of the characteristics of Sadr's (2003) "foragers who herd." There is no evidence for radical changes in indigenous tool technologies, and hunting and gathering seems to persist in much the same way that it did before livestock was introduced. After a period of incubation in the Turkana Basin, pastoral occupation of eastern equatorial Africa after 3,000 years BP diversifies into a range of niche fulfillment specialists, which adapted further after the arrival of Bantu agro-pastoralists after 2,000 years BP. Likewise, after incubating in eastern equatorial Africa from 3,000 to 2,000 years BP, the spread of pastoralism into southern Africa was initially limited, but diversified over time as niches filled and complex exchange networks evolved.

New demographic and environmental pressures faced after sedentary farmers circumscribed access to pasture lands encouraged some of these pastoral communities to look for new pastures elsewhere. The expansion southward represented the only possible route for expansion, given the dense stands of rainforest located to the west, established and entrenched pastoral communities to the north, and ocean to the east. By 1,600 years BP, pastoralism had reached the southern tips of Africa, but the migrations left little obvious archaeological footprint on the landscape that would separate them from the indigenous economies. In this regard, despite genetic and linguistic evidence for a demic expansion of Khoekhoen at the same approximate time that small domestic stock begin appearing at a few sites in southern Africa, the overall subsistence economy remained weighted toward hunting and gathering for several hundred years until the arrival of the Bantu-speaking agro-pastoralists. As in the East African case, the abundance of wild resources in the wetter-than-present southern Africa at around 2,000 years BP provided many subsistence options, and keeping and culling numerous quantities of domesticated animals does not appear to have been culturally preferred.

Within 200 years of the initial appearance of livestock in southern Africa, farming communities expanded into the region. This migration further filled the ecological niches on the African subcontinent, so new relationships between pastoral, farming, and foraging communities were forged. As Andrew Smith (1992) states, there were three choices left for indigenous hunter-gatherers who were in southern Africa as pastoralists filled their niches: (1) adopt a pastoral lifestyle themselves, (2) enter into a subservient patronage relationship with food producers, or (3) move into marginal environments and exploit lower-ranked resources. Based on the archaeological evidence, it seems that there was a combination of all three factors among the populations of eastern and southern Africa between 2,000 and 1,600 years BP.

In many other regions of the world, the Neolithic was a transformative event in which agriculture permanently, so radically, changed the landscape that foraging was no longer possible. However, this was not the scenario in eastern and southern Africa. The subsistence practices of individual communities were and remain fluid to this day. The !Kung of the Central Namib Desert have shifted between foraging- and pastoral-dependent economic strategies for hundreds of years (Kinahan 1991). Domesticated animals in eastern and southern Africa represented just one more subsistence choice in a quiver holding many arrows.

Conclusion

The eastern and southern African Neolithic is diverse and has evolved throughout the Holocene to incorporate many different subsistence and settlement practices. Early pastoral communities in eastern Africa from 4,000 to 3,000 BP had broad-based subsistence strategies and remained tethered to localized resource bases. After 3,000 BP, pastoralists on the grassland plateaus and Rift

Valley were seasonally mobile and appear to have restricted their diets to meat, animal by-products, and probably other foods, which do not leave traces in the archaeological record. Pastoralists living in the East African Highlands and Coastal Plains of the Indian Ocean continued to subsist on a wide array of wild products, and continued to use domesticated animals as a secondary food source.

Experimentation with small-scale horticulture is possible prior to the emergence of intensive yam and millet cultivation after 2,000 BP. It is likely that demographic pressures placed restricted access on transhumance after sedentary farming took hold in the fertile regions of East Africa. Mobile pastoralists chose to migrate south into the Zimbabwe Plateau, Miombo Woodlands, Mozambiquan Coastal Plains, and southern African Highveld, filling most of the viable pastoral niches within 400 years subsequent to leaving East Africa. The archaeological invisibility of the Neolithic (Khoekhoen) herders suggests that the pastoralists who entered southern Africa were highly mobile – carrying only the bare essentials, which would have left a small footprint on the landscape. The southern African Neolithic manifested in the form of foragers who kept some domesticated animals, and, as Bantu-speaking Iron Age agro-pastoralists entered the region, limited plant cultivation was practiced as well.

The beginning of the Iron Age in southern Africa after 2,000 years BP reconfigured niche fulfillments and subsistence choices, but the ethnic legacies of these migrations endure genetically and linguistically into the present day. The persistence of foraging and herding subsistence strategies across eastern and southern Africa into modern times as well as the continued use of stone tools despite the presence of metal technologies attests to the success of these adaptations in these settings. To this extent, the end of the Neolithic is diffuse and cannot be ascribed on the basis of the beginning of the Iron Age. Iron Age and Neolithic lifeways were operating in tandem throughout the late Holocene with people shifting subsistence strategies regularly, entering into new exchange relationships, or fighting for land with other communities based on what they needed to do to survive that particular year.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview

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East Asia: Early *Homo* Fossil Records

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Introduction

Early *Homo* fossil records of East Asia are attributed to those within the Early Pleistocene, represented by the following specimens found in China only. Those are identified as Asian *Homo erectus*; thus, their physical characteristics and geocultural context are described below.

Key Issues/Current Debates/Examples

Yuanmou

The human fossils were found in 1965 in brown clay of fluvial deposits between Shangnabang and Danawu Villages, Yuanmou County, Yunnan Province, in southwestern China. The fossils are represented by left and right upper median incisors. The incisors are large, indicative of a male individual. The teeth are moderately worn (Fig. 1a, b). The crown is rather thick and swollen. On the upper part of the lingual surface, there is a prominent basal tubercle. Three fingerlike processes diverge from the lower margin of this tubercle. The middle process is the thickest and longest of the three; it extends almost to the biting edge of the crown. Prominent ridges appear along the medial and lateral borders of the lingual surface of the crown. The lateral one is more prominent. The lower part of the root of left incisor was preserved. Its cross section is ellipsoid and slightly flattened anteroposteriorly. The site has yielded mammalian fossils of Early Pleistocene. The paleomagnetic date of the stratum yielding the human fossils is around 1.7 mya. The ESR date recommended by the chronologists is earlier than 1.1 mya and later than 1.6 mya.

Gongwangling

Homo fossils were found in 1964 and include a few cranial fragments based on which Wu Rukang made a reconstruction. The fossils are embedded in light yellow loess-like silty clay with many concretions at north slope of a hill named Gongwangling near Gongwang Village, about 17 km east of Lantian City, Shaanxi Province, Central China. The supraorbital torus is very robust. Its medial part is thicker than the lateral part (Fig. 2a, b). Trace of frontal notch exists on each side. The glabella region is very robust. The postorbital constriction is much exaggerated. There is no posttoral groove; this is similar to that from Trinil, Java. Trace of midsagittal ridge and bregmatic eminence could be seen on the eroded external surface of frontal. X-ray shows no frontal sinus. Temporal line appears as a prominent ridge. Both anterior and posterior surfaces of the pyramid are steeper than that in *H. erectus* from Zhoukoudian; the upper border of the pyramid is more acute than the latter. The arcuate eminence of Gongwangling temporal is more similar to that in modern humans than to Zhoukoudian *H. erectus*. A small facet on the posterior surface of the pyramid lateral to the internal auditory meatus is more similar to the latter specimen than to modern humans. Frontonasal and frontomaxillary sutures of both sides form a slightly curved line. The central part of this line is slightly convex upward. The upper part of nasal bones is broader than that of modern humans. The nasal saddle is flatter than that in modern Mongoloids. Nasion region is not

East Asia: Early *Homo* Fossil Records, Fig. 1 Two *Homo erectus* teeth of Yuanmou (**a**) back view and (**b**) frontal view

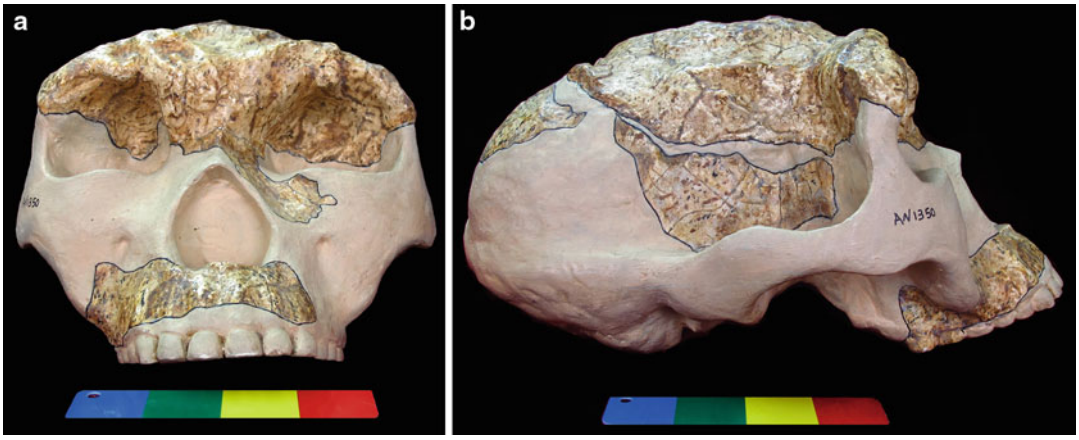

East Asia: Early *Homo* Fossil Records, Fig. 2 Gongwangling cranial reconstructions (**a**) frontal view and (**b**) side view

depressed. The orbital roof is flat. The median sagittal contour of maxilla is convex as in modern apes and shows alveolar prognathism. This contour forms almost a right angle with the floor of nasal cavity, with an obvious demarcation in between. A small but distinct anterior nasal spine exists clearly. A fairly marked canine jugum could be seen on right maxilla. The lower border of the zygomatic process of maxilla is not curved. The point where it joins the maxillary body is close to alveolar border. Exposed maxillary sinus extends between the levels of the canine and the anterior surface of third molar. Its medial border corresponds to the lateral border of the palate instead of protruding into the palatal process of maxilla.

The right third upper molar has much smaller crown length than that of second one. Its occlusal surface is nearly triangular. The root of this molar has three branches as shown in second upper molar, but the bifurcation angle between the buccal and lingual branches is smaller than that of the upper second molar. The length between the point of bifurcation and the neckline is shorter in the root of third upper molar than that in the second one. The size and attrition of teeth and condition of sutures suggest the individual belonging to a female around 30 years old.

A few artifacts have been found at the site. Paleomagnetic date is 1.15 mya or 800–750 ka. Associated mammalian fauna corresponds to

that of Early Pleistocene and included tropical and subtropical species, indicating that the environment was warmer than today.

Quyuanhekou Yunxian

Human fossils were found on a small hill named Xuetang Liangzi at the mouth of Quyuan River near Mituosi Village of Yunxian County, Hubei Province, Central China. Different names affiliated with these fossils have been once used in various articles. Two human crania had been heavily deformed and damaged in certain degree by pressing in the stratum of grayish yellow clay layer and/or grayish white sand layer of the fourth terrace of Hanjiang River. Judging from the closure of sutures both skulls may represent middle-aged individuals.

Skull EV9001

The vault is low and flat with receding frontal. The supraorbital tori are thick. There is trace of metopic suture on the glabellar torus. The supraorbital groove is shallow and wide. There is no distinct median sagittal ridge. Postorbital constriction is obvious. There is an occipital torus. The superior temporal line of the left side is distinct. The preserved part of the root of the mastoid process suggests a large mastoid process. The tympanic plate is concave; its long axis is transversely oriented. The mandibular fossa is deep. The nasion is deeply indented below the glabella. The orbit is quadrangular with the inferolateral margin somewhat blunt. The anterolateral surface of the sphenofrontal process of zygomatic bone faces more forward. The lower border of the zygomatic process of maxilla is curved. The point where it joins the maxillary body is above the point between the first and second molars, with a long distance from the alveolar margin. Reconstructed zygomatic arch is below the level of Frankfurt plane. A buccal exostosis exists between the positions corresponding to first and second molars. There is no canine jugum. The midsagittal contour of the anterior surface of the alveolar process is convex. The palatal vault is much longer and deeper than that in modern humans. Large part of the dental arch is preserved; it is close to U shape. The teeth are robust especially for the buccolingual diameter. The size of the molars increases from anterior to posterior. The contour of the occlusal surface of left third molar is nearly pear-shaped. A large cusp exists at the distobuccal part of the crown.

Skull EV9002

Top view of this cranium is ovoid with an obvious postorbital constriction. The glabellar torus is slightly depressed and with trace of a metopic suture. The supratoral groove is distinct and the frontal squama is flat. Parietal tuberosities of both sides are distinct. An atypical angular torus seems to be present. The superior and anterior margins of the temporal squama are curved and straight, respectively. The parietal notch between the squamosal and mastoid portions of the temporal is rather deep. The external auditory orifice is deeply located; the distance from it to the sagittal plane passing the auriculare is 17.2 mm on the left side which is deeper than those in *Homo erectus* specimens from Hexian and Zhoukoudian. The mastoid process is large. The mandibular fossa is wide and shallow. The postglenoid process is low. The tympanic plate is thick and concave; its long axis is oriented in transverse direction. The angle formed by this axis and the sagittal plane is much larger than that in modern humans. The occipital torus is well developed, with the central part thicker, and attenuates toward both lateral ends. It fails to continue with the supramastoid crest. The torus marks an angular turn from the occipital to nuchal plane of the occipital bone. A short and distinct supratoral groove exists above the central part of the occipital torus. Orbit is rectangular with rounded angles. The inferolateral margin of the left orbit is blunt instead of being sharp. Infraorbital foramen of both sides is distinct. Reconstructed pyriform aperture is higher and narrower than that of Skull EV9001. The root of the zygomatic process of the maxilla is highly located. The canine fossa is shallow. A prominent canine jugum exists in the right side. There are buccal exostoses at the position corresponding to M2 and P2 on left and right sides, respectively. A lingual exostosis exists at

the position corresponding to right M1–M2. The palatal vault is much longer and deeper than that in modern humans. There is a palatine torus and a deep palatine sulcus as well as an anterior palatine foramen. The dental arch is close to a parabolic curve. The dentition is incomplete, but all preserved teeth are in their original position. The second molar is obviously larger than the first one. The crown of left third molar is very small and was worn with exposure of the dentine. The thickness of the vault is close to that of *Homo erectus* from Zhoukoudian.

The human fossils are in association with a lot of mammalian fossils of Early Pleistocene and stone artifacts. The site was dated by Paleomagnetism to 870–830 ka and by ESR date on the mammalian fossils to 565 ka.

Meipu, Yunxian

Human left upper incisor, found at Meipu of Yunxian County, Central China, is almost complete and slightly worn. It is shovel-shaped, with a prominent basal tubercle and fingerlike process not well developed near the cutting edge. The length of the crown is close to the average for *Homo erectus* from Zhoukoudian. The left lower incisor is heavily worn. There is the basal tubercle appearing as a smooth eminence. The cervix is not constricted. The left upper second premolar is complete and slightly worn; the root is lost. The buccal half of the crown is slightly wider than the lingual half. The buccal cusp is larger and higher than the lingual one. A trace of the cingulum appears as a triangular eminence at the basal part of the buccal surface and as two small ridges on both sides. The left upper first molar is rather complete and slightly worn. The distolingual angle is more rounded than the mesiobuccal one. The protocone and paracone are slightly higher than the distal two cusps. The protocone is the largest cusp, and the hypocone is the smallest. Each cusp possesses several fine ridges. There is no Carabelli cusp, but there is a very small fovea on the lingual surface near the marginal ridge. A trace of a cingulum can be discerned. The lingual branch of the root does not bifurcate. A longitudinal deep groove exists toward the middle of the lingual surface. The buccal branches are lost.

From the deposits transported by the farmers from the cave to the outside, a pebble nucleus showing traces of striking by a stone hammer has been reported. Associated mammalian fossils belong to *Ailuropoda-Stegodon* fauna, probably of Early Pleistocene.

Jianshi

The human fossils, recovered from the excavation of Longgudong Cave, near Gaoping Town, Jianshi County of Hubei Province, are identified as three lower (second?) molars found in 1970 and a premolar, an upper molar, and a lower molar in 1999–2000. Besides, a right first lower molar was found from a drug store of Badong City about 42 km northeast of the Longgudong site in 1968. Two of the three molars found in 1970 are from right side; one is from left. Occlusal surface of one specimen is elliptical; two are nearly quadrangular. Well-developed protoconid cingula exist in two specimens; that in another molar is less developed. All three molars have tuberculum sextum, which deviates slightly to the lingual side from the median line of the occlusal surface in two of them; this small cusp locates on the median line in another specimen. Main furrows on occlusal surface of two molars arrange in a reverse T pattern instead of a Y or plus pattern. The following three teeth are found in 1999–2000 excavations:

PA1278

Right upper first premolar is complete and has two roots. The mesiodistal and buccolingual diameters are within the range of those in *Homo erectus* from Zhoukoudian and *Australopithecus africanus*. But the length-breadth index and morphological details are different from those in the latter. There is no cingulum and molar tubercle. It is considered that this premolar is close to S-4 from Java in morphology, but slightly longer in mesiodistal diameter.

PA1279

Left upper third molar is complete and much worn. The occlusal surface is nearly square. A cingulum exists at buccal and mesial surfaces. The three branches of the root do not show inclination toward combination. The mesiodistal and buccolingual diameters are much larger than

that of *Homo erectus* from Zhoukoudian and larger than that of specimens S-17 and S-4 from Java; it is within the range of *Homo habilis* in these diameters, but is different from the latter in morphology. Longgudong specimen is within the range of *Australopithecus* in size and length-breadth index, but is different from the latter in morphology.

PA1277
Right lower first molar is well preserved and much worn. A cingulum exists on the buccal surface. The root has two branches. Mesial branch has two tips; distal branch has only one tip. The size and length-breadth index of the crown is well within the range of *Homo erectus* from Zhoukoudian, *Australopithecus africanus*, *and A. robustus*. Size of Longgudong specimen is close to *Meganthropus* (S-6).

The lower molar collected from the drug store has protoconid cingulum on buccal surface. The furrows on occlusal surface arrange as a "plus pattern". A small cusp corresponding to tuberculum sextum appears in the middle of distal margin.

Guojiabao

This site is about 250 m south of Shangnabang Yuanmou site (see above). The human fossil is a fragment of mid-shaft of the tibia. This fragment is 227 mm long and rather gracile, without any robust ridges. At what is assumed to be the middle point of the shaft, the circumference, transverse, and longest sagittal diameters are 78 mm, 17 mm, and 29 mm, respectively. The bone wall is thick. The anterior border of the fragment is rounded at the upper part and becomes thinner at the middle part and more rounded at the lower segment. The S-shaped curve of the anterior border is weaker than that in modern humans. Reconstructed stature of this individual is 130.4–123.6 cm. The provenance of this fragment is in doubt. It was first described as being found in the bottom layer of slope materials which include deep brown silty clay and stones of different size. These overlie a layer of brownish-red silty clay. However, the tibia was later described as coming from the superficial part of the brownish-red silty clay layer. The slope material was estimated to be correlated with the 26th layer of fourth member of the Yuanmou Formation, so to consider the tibia to be in the late Early Pleistocene, and in excess of 1 mya.

Cross-References

- ▶ East Asia: Paleolithic
- ▶ *Homo erectus*
- ▶ Wu, Rukang
- ▶ Yuanmou
- ▶ Zhoukoudian, Archaeology of

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East Asia: Paleolithic

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Introduction

East Asia conventionally refers to the countries of China, Japan, and Korea; but in a broad

geo-cultural sense, the region includes all types of landscapes in today's Mainland China, Mongolia, islands of Taiwan, Japanese Archipelago, Korean Peninsula and its associate islands, as well as the Russian Far East in the north end and the northern part of Indochina Peninsula in the south end.

Our current understanding of the Paleolithic in East Asia has been based on isolated fossils and lithic data separately from China, Japan, and Korea. Until recently primary interpretations of Paleolithic technology and hominid behaviors have been built upon Chinese data with some from Japanese materials. Only during the last decade have collaborative efforts been made to consolidate the data from the three countries plus Russia via the annual meetings of the Asian Palaeolithic Association (APA) and their proceedings; however, only few thematic syntheses in East Asia have been available in Western literature. This introduction is an update on the current research progress in this region, with focus on lithic technological comparisons across these countries. We will try not to place heavy emphasis on Chinese materials, as studies of such are available in recent publications (Shen 2007, 2011). By no means is this introduction meant to present a comprehensive view of Paleolithic research in these three countries during the past decades; however, we will provide balanced interpretations and overviews of current issues and debates in Paleolithic cultures within the entire region.

Definition

In general the lithic industries of the East Asian Paleolithic, represented by accumulated data from thousands of sites, do not present their regional and temporal variations as much as those in the west side of the Old World. Only after roughly 40,000 years ago, dramatic changes occurred, and lithic technologies became diversified and complicated when modern humans occupied most landscapes of East Asian including the Japanese Archipelago. Therefore, many East Asian scholars have abandoned the three divisions of Paleolithic – Early, Middle, and Late – that are commonly used in other regions. Instead two divisions of both Early Paleolithic and Late Paleolithic were proposed to uniquely represent the technological development of East Asian lithic industries during an approximate 1.7 Ma time span (e.g., Gao & Norton 2002). In some publications, the defined "Middle Paleolithic" sites, which are few and mostly in China, are clearly indistinctive from those of the Early Paleolithic in terms of raw material procurement, core reduction, tool blanks, retouch techniques, etc. The transition to Late Paleolithic around 50,000–40,000 BP is obvious in Mainland China, but natures of such transition were still unclear due to a lack of solid data and sites during this time frame. The fact is that after 40,000 BP, a dramatic increase of Late Paleolithic occupations occurred in both Japan Archipelago and the Korean Peninsula. The emergence of modern humans and their associated behaviors may be largely attributed to these cross-ocean migrations in East Asia.

In most cases, a common way to place Paleolithic lithic industries in East Asia into a time frame is to refer to their distinctive geological chronology. The unique East Asian loess stratigraphic formations can reliably place dates of a site or sites into Lower, Middle, and Upper Pleistocene brackets in the mainland, verified with various absolute dating methods for remote ages. Japanese sites were referred temporally with sequences of marine isotope stage (MIS) as well as tephra-stratigraphy.

Loess is a very fine-grained silt or clay, created from grinding by glaciers, that accumulate in layers of distinctive colors and textures evenly spread out across the landscape. These layers are deposited by winds during different Pleistocene epochs from areas of land covered by glaciers and from desert surfaces. They are quite unique and therefore can form the references to geological time frames for East Asian Paleolithic sites.

Marin isotope stage (MIS), or oxygen isotope stage (OIS), is a timescale sequence deduced from oxygen isotope data from coring samples from deep sea, which would reflect changes in

temperatures – dividing periods of alternating warm and cool periods of the Earth paleoclimate. The MIS timescale, starting backward from MIS 1 and representing between the present time and 11,000 BP, was developed to mark the dating in the quaternary period (around 2.6 million), which would give a relatively fine scale with each epoch of Pleistocene period when Paleolithic sites were identified.

Tephra, unique to Japanese Archipelago but also having an impact on coastal lines of the continent, is a layer of air-fall materials produced by a volcanic eruption, events of which can set an absolute time indicator for sites beneath or above the layer. One of the most famous Japanese tephra – Aira-Tanzawa, resulting from a massive eruption that occurred between 26,000 and 29,000 BP at the island of Kyushu – has become the reliable time marker for dating Late Paleolithic sites in East Asia.

Early Paleolithic refers to cultural remains of archaeological sites falling within periods between the Lower Pleistocene to the Early Upper Pleistocene, or timescale MIS 62–MIS 3, from c. 1.7 Ma ago to 40,000 BP. The Early Paleolithic of East Asia is primarily represented by lithic industries in China, which consists of pebble-core tools from South China and flake tools from North China (Shen 2007). A few sites of the Middle Pleistocene yielded Acheulean-type large cutting tools (e.g., hand axe) or biface tools both in China and in Korea (see below). In China, approximately a thousand sites of the Early Paleolithic are recorded, spreading out temporally through the Lower Pleistocene (65), Middle Pleistocene (655), and Early Upper Pleistocene (230) (Xu 2012). Only a handful of assemblages of Early Paleolithic sites in Korea and Japanese are dated to the Middle Pleistocene. Pebble-core tools and flake tools were homogenously predominant in this period.

Late Paleolithic refers to cultural reminds of archaeological sites roughly dated younger than 50,000 years ago in China, slightly later in time for those assemblages in Korea and even younger in Japan. The sites are associated with modern human occupations and migrations representing a variety of new lithic technologies on the continent, which include blade technology, bifacial technology, and microblade technology (Shen 2011). Numbers of Late Upper Pleistocene sites in China increased to near one thousand. Over 5000 Late Paleolithic assemblages are registered in Japan and more than 100 known sites in Korea (Ikawa-Smith 2007; Bae 2010a). Japanese Late Paleolithic can be further divided into Late Paleolithic I (35,000–28,000 BP), Late Paleolithic II (28,000–20,000 BP), and Late Paleolithic III (younger than 20,000 BP).

Historical Background

When Eugene Dubois (1858–1940) discovered a skull fossil in 1891 on the banks of the Solo River in East Java, Indonesia, one of the first known specimens of *Homo erectus*, academic world had turned their interests to East Asia searching for fossils of remote linkages to modern human beings. Shortly after another famous skull fossil of the Peking Man (*Homo erectus or Sinanthropus pekinensis*) was found in 1929 by Davidson Black and his team at Zhoukoudian (aka Choukoutien). Following the discovery of the Shuidonggou and Salawusu sites in Northwest China, the lithic industry at Zhoukoudian was recognized by Henri Breuil (1877–1961) in 1931. The continuous excavation at Zhoukoudian in the subsequent years until 1937 yielded one of the richest lithic assemblages in East Asia. The early knowledge about the East Asian Paleolithic based on the "Peking Man" site was disseminated among students and scholars in Western universities. Hallam Movius (1907–1987) from Harvard was the first scholar who attempted a comparison between East Asian and European Paleolithic lithic technologies and later proposed the famous "Movius Line" in the 1940s, which is still an influential theory in the study of East Asian Paleolithic today (see the entries on ▶ Movius Line and ▶ Movius, Jr., Hallam L. in this encyclopedia).

While newly excavated Paleolithic data from China was not accessible to scholars outside of

China until the mid-1980s, the search for Paleolithic culture in Japan started in 1949, when the Iwajuku site (about 90 km north of Tokyo) was excavated. The accumulation of Paleolithic data increased rapidly: nearly 100 sites were identified in 10 years after the discovery of Iwajuku and jumped up over 5,000 sites in the archipelago over half a century. There was a series of reports in 1970s–1990s on the discoveries of Japanese Early Paleolithic sites in Japan, which turned out to be a scandal of human falsehood. It is in general agreement among Japanese scholars that reports on these Early Paleolithic sites in publications should be dismissed, except those identified prior to 1973 should be counted for.

Similar to what happened in China between the 1950s–1980s, Paleolithic data from North Korea is very limited and incomplete. The first Paleolithic site was excavated at Donggwanjin along the Duman River during 1933–1935, and only 12 Paleolithic sites including those in North Korea were reported before the 1960s. Today, there are about 200 Paleolithic sites throughout the Korean Peninsula, but only 30 sites are being systematically investigated (Choi 2004).

During the past three decades, thousands of Paleolithic sites and assemblages have been identified in the countries of China, Japan, and Korea and placed within the Pleistocene time frame based on Loess formation sequences or marine isotope stage, separately according to their own paradigms (e.g., Wu & Oslen 1985). Except Japan, whose data were made well known in Western languages in earlier days, only recently the accumulated and integrated data from China, Japan, and Korea have been summarized and interpreted in English or other foreign languages (Shen & Keates 2003; Kuzmin et al. 2007; Shen 2007, 2011; Norton & Braun 2010).

Key Issues/Current Debates

Earliest Hominid Occupations and Migrations

The earliest hominid occupations in East Asian are known to be Nihewan in northern China. Nihewan is referred to here as a cluster of Early Pleistocene lithic industries represented by flake tools, which were located in the Nihewan Basin, Hubei province (Fig. 1). Over three decades of investigations, sites such as Goudi (aka Majuangou III), Xiaochangliang, and Donggutuo, among more than a dozen of others, all within 2 km radiation, yielded rich lithic assemblages and fossil remains embedded with the Early Pleistocene loess stratified formations in the Basin. Unfortunately no hominid fossils have been found yet. The analyses of lithic refitting and lithic use-wear demonstrate clear evidence of hominid behaviors involving procurement and modification of local raw materials (Gao et al. 2005; Shen et al. 2010). The Goudi site was dated to 1.7–1.6 mya by the paleomagnetic method, and recent investigation could reveal even earlier Nihewan sites such as Hetugou. It remains a strong interest to find paleobiological evidences to suggest who (*Homo habilis, Homo erectus*, or *unknown?*) were the creators of the Nihewan industries and how they arrived in East Asia.

It should be noted that other locations in South China have yielded *Homo erectus* fossils from the Early Pleistocene, such as Yuanmou, Gongwangling, Quyuankekou, and Meipu. Yuanmou *Homo erectus* are regarded as the earliest fossil record in East Asia, with paleomagnetic dates pointing to as early as 1.7 mya. However, the dates associated with the teeth discovered in 1965 are weak in connection with hominid behavioral evidence, as their original context was not clear when the teeth were removed. There are similar debates on the discovery of Renzidong in South China and Xihoudu in North China, both dated to the range of 2.0–1.7 mya, but the natures of lithic assemblages are not accepted as hominid modification; thus, their roles to be one of the earliest hominid occupations paralleling to those sites in the Nihewan Basin are still under debate (Shen 2011).

One of the earliest well-known sites in Korea is Chongokni (aka Jeongikri), dated to 350–300 kya. Recent studies suggest that other sites such as Komunmoru, Sokchangni, and Keum cave could be earlier than Chongokni; thus, it may

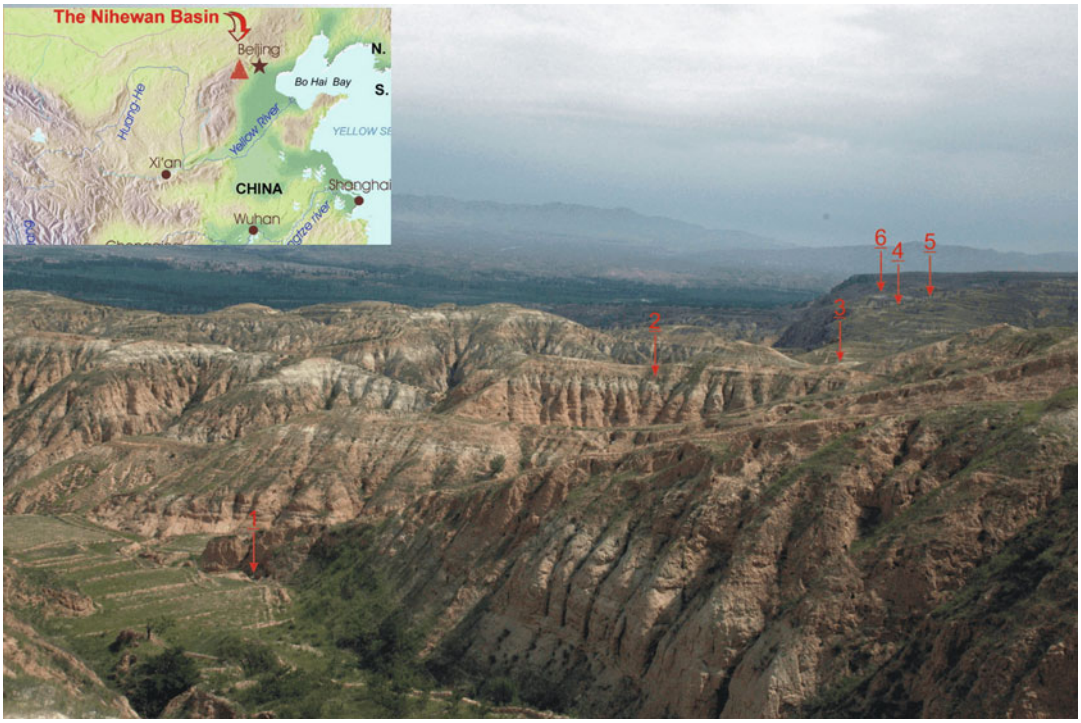

East Asia: Paleolithic, Fig. 1 The Nihewan Basin of North China showing some of Early Pleistocene sites. 1. Hetugou, 2. Dachangliang, 3. Xiaochangliang, 4. Putaoyuan, 5. Madigou, 6. Feiliang

push back the first appearance of hominid occupations as early as 400 kya in the Peninsula (Bae 2010b). The natures of site formation and cultural context of the latter sites are still poorly understood, leaving Chongokni lithic assemblages to be the best representation of Middle Pleistocene occupations so far. The Chongokni industry is dominated by flake-core assemblages with presences of Acheulean-like hand axe. Early hominid fossils, including molars and incomplete fragments of skulls, come from Dokchon, Daehyundong in Pyongyang, and Ryonggok cave. Researchers tend to assign these Middle-to-Upper Pleistocene fossils into the category of archaic form of *Homo sapiens*, but cannot be confirmed before more substantial fossils come to light.

The earliest hominid occupations appeared in Japanese Archipelago much later, around the Middle Upper Pleistocene. No hominid fossil older than 35 kya were identified. The majority of hominid fossils are found in the islands of Ryukyu, but without the association of stone tools. The Ryukyu fossils are identified as modern human forms of *Homo sapiens sapiens*, dated within the range of 33,000–14,000 BP (Matsufuji 2010). The oldest stone industry in Japan so far is known from Layer IV of Kanedori, dated to 80 kya by tephrochronology, one of the most reliable methods in Paleolithic archaeology. The Kanedori IV lithic industry was represented by large flakes with irregular bifaces, which are superimposed by small flakes and large bifaces of Kanedori III dated to 67 kya. Matsufuji argued that, even though the dates of the oldest Japanese occupations known so far fall within MIS 5 (127–71 kya), there is no evidence that the hominids could have had the capacity of ocean-crossings during this warm period. Instead, he suggests that East Asian hominids would have migrated to Japanese islands through the last land bridge during MIS 6 (186–127 kya), implying even older hominids evidence is yet to be found. A common use of hornfels for making

flake tools, similar to that at Kanedori IV, was found at Xianrendong in Northeast China's Jilin province, adjacent to the Korean Peninsula. The uranium-series date of Xianrendong is 160 kya, which suggests the possibility for Northeast China origins of Kanedori IV occupations.

Flake Tools Versus Pebble-Core Tools

The prolonged periods of Early Paleolithic in East Asia are represented by two main lithic technologies as evidence of hominid's adaptive behaviors: flake tools in northern and southwestern China and pebble-core tools in southern China. As previously mentioned few Early Paleolithic sites are present in Japan and Korea; however, their technological presences are also either flake tool industries or pebble-core tools or a combination of both industries. Flake tools were produced by direct percussion or bipolar percussion through amorphous core reduction, no standard core platform preparation has been detected so far. Predominant flake blanks were modified into scrapers, notches, and burins. Raw materials mainly consisted of poor-quality quartz and quartzite, which were common locally available resources. Good-quality cherts were also selected during the later period at some sites. One of the most important Middle Pleistocene sites is the Zhoukoudian Locality 1 cave near Beijing. Studies of the lithic industries at Zhoukoudian Locality 1 and Early Upper Pleistocene Locality 15 demonstrate systematic strategy in the making and use of flake tools. Gao (2000) noted that the majority of tool types are scrapers of different types, including the straight sidescraper, convex sidescraper, concave sidescraper, end scrapers, thumbnail scraper, double-edged scrapers, and multi-edged scraper, which all together account for 93 % of the 1,283 total tool assemblage. Although in general the tool kits are similar to those found at Locality 1, retouched tools at Locality 15 are more elaborate. Some specimens exhibit well-controlled fine retouch. At Nihewan, making and use of flake tools continued from that of the Lower Pleistocene sites in the region. A study of Maliang lithic artifacts, recovered from 1984 excavation season, suggests that Maliang hominids had developed more skilful tool-making capacities than their predecessors, for example, the increased sophistication of multidirectional core reduction. Flake tools were modified into standard shapes of scrapers and noteches, not seen in other earlier assemblages (Fig. 2). Use-wear analysis indicates that tools used at Maliang probably emphasized bone scraping/shaving functions (Fig. 3) (Shen & Wei 2004). Fine-made flake tools were employed continuously into the terminal Pleistocene period in North China.

Pebble-core tools were made bifacially or unifacially on cores or on large flakes attached from nodules, often found by riverbeds. The pebble-core tool industries in East Asia continued in most of southern regions throughout the Pleistocene until the end of Last Glacial Maximum (LGM) around 20,000 BP. The tool types include large cutting implements – like choppers, large points, or other heavy-duty tools (e.g., spheroids). The earliest known pebble-core tool industry is from Quyuanheko in Yunxian country of the Middle Changjiang (aka Yangtze) river valley, dated to 1.2–1.1 million ago (Fig. 4). One of the best examples of the pebble-core industry in the later Upper Pleistocene is the Jigongshan site, where the trend of pebble-core tools being replaced by flake tools was present. During the Upper Pleistocene, sites in the middle of the Changjiang Valley had a clear shift from predominantly pebble-core tools to flake tools. This could be an implication of possible cultural interactions or a southward movement from the north populations with flake tool traditions. A similar line of evidences was also found in Zhijidong near Zhengzhou City, during 50,000–35,000 BP. The shift may also be related to the dreadful cold and dry climate change in North China.

Industries of Hand Axes

Hand axes, thinned bifacially and symmetrically into a triangular-shaped point, were regarded as diagnostic large cutting tools for the Lower to Middle Pleistocene lithic industries named Acheulea in Africa and Europe. For a long time, scholars followed the "Movius Line" theory for interpretation of cultural manifestations in the

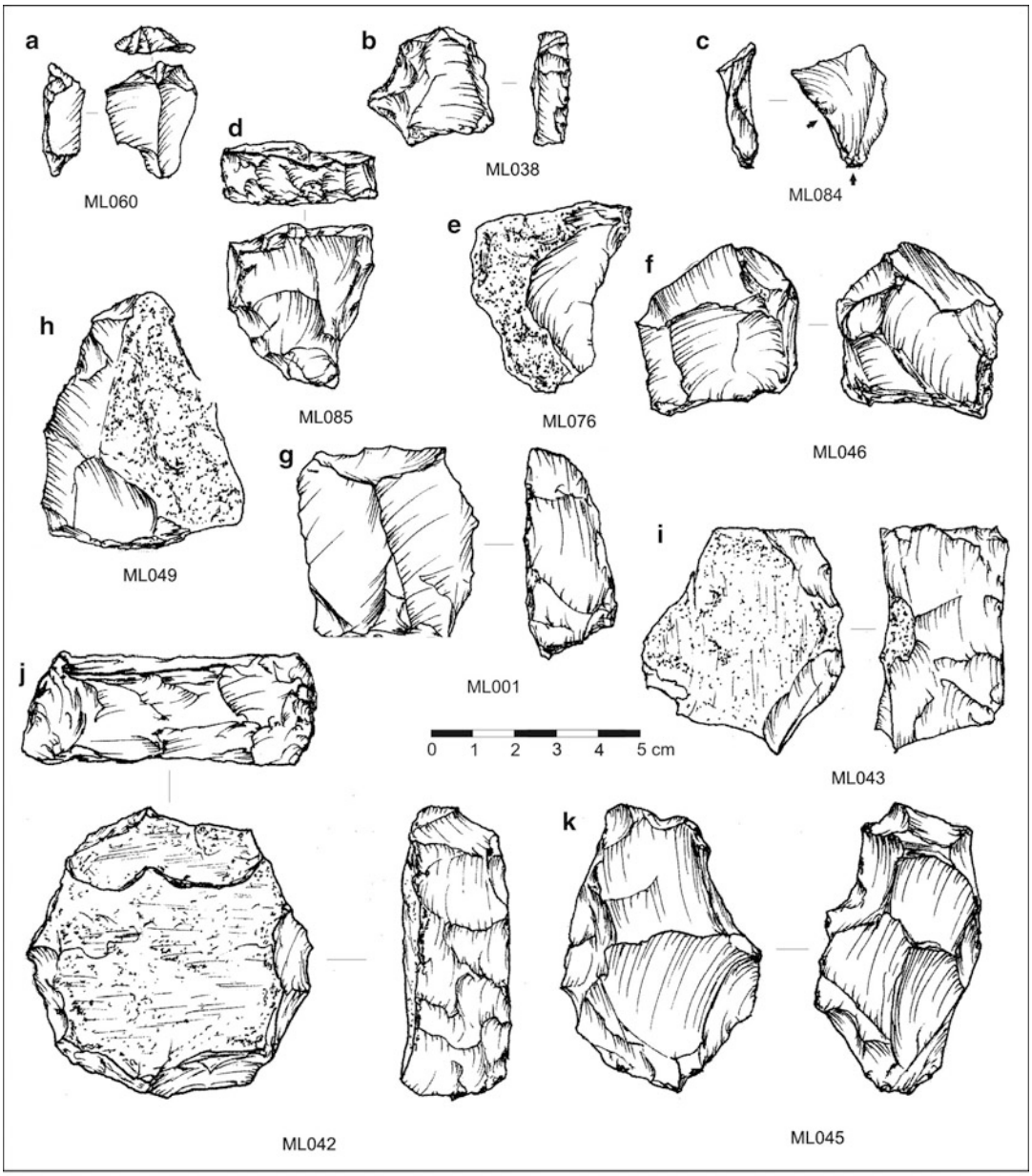

East Asia: Paleolithic, Fig. 2 Lithic artifacts recovered from the Maliang site, representing the flake tool industries at the Nihewan Basin, North China

East Asia where there were no Acheulean-like hand axe but chopper-chopping tools instead. Only in the recent two decades have extensive surveys and field investigations revealed evidence for the existence of hand axe technology which has quickly changed many perceptions. The first recognitions of hand axe were spotty specimens in North China, most without

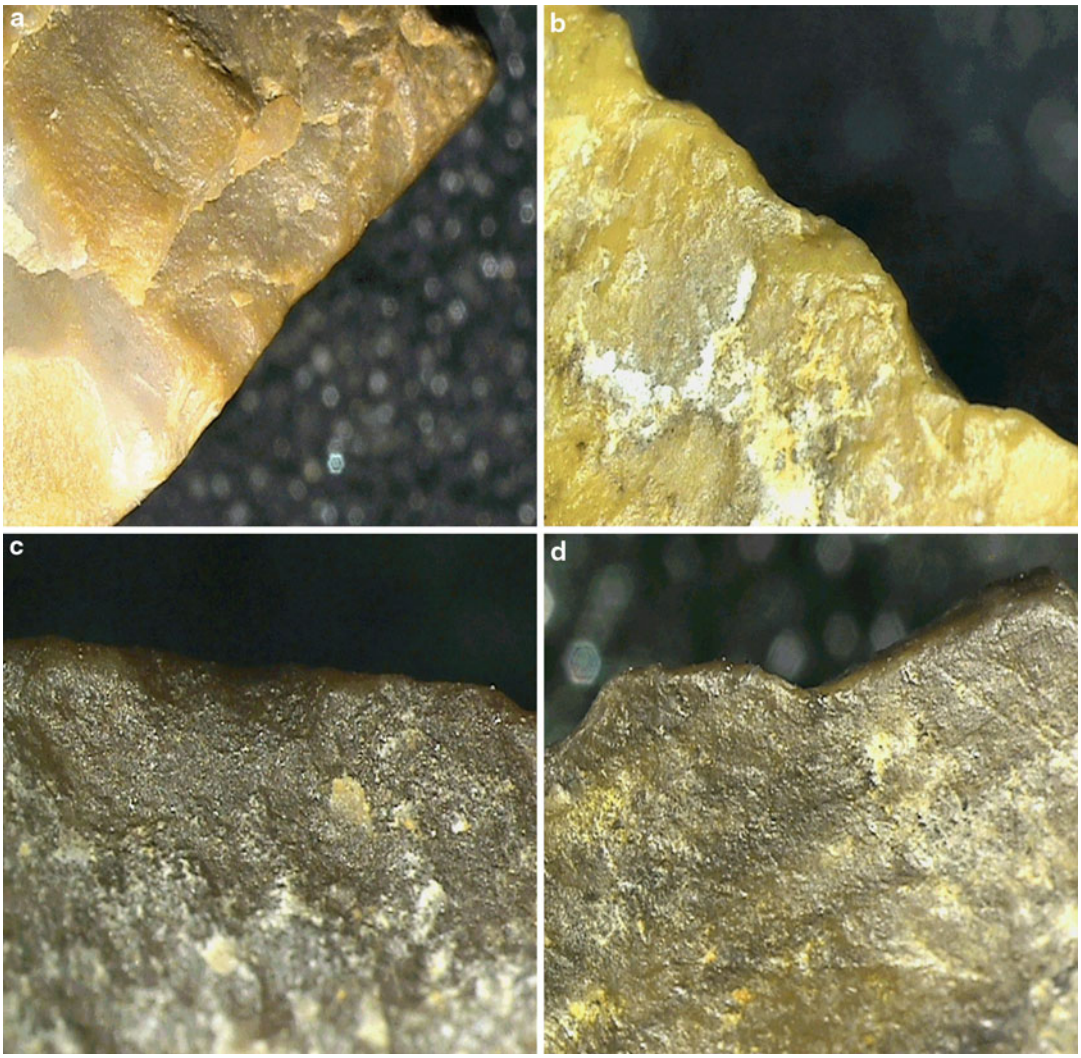

East Asia: Paleolithic, Fig. 3 Flake tools with evidence of use-wears from Maliang site, the Nihewan Basin (**a**). ML085,14x. heavily rounded edge with use polish along the working edge, scatted scars are moderate to large in size with stepped and hinged termination,unifacially distributed on the dorsal surface. The wear type is indicative of scarping hard bone. (**b**). ML001, 28x. moderate to large scars bifacially distributed along the edgeof 10-15 mm. Scars are directional but most are vertical to the edge, heavy rounding and rare polish. Interpreted as cutting/sawing hard bones use-wear. (**c**). ML060, dorsal side, 56x. small to moderator sized feathered or hinged scars, unifacially distributed along the edge on dorsal side. (**d**). ML060, ventral side, 28x. heavy rounding and polish along ventral sided working edge (as opposite to that in previous photo). A few striation parallel or perpendicular to the edge are noted. The combination of wear patterns are suggestive of scarping wood use-wear.

clear chronological data and substantial cultural contexts. The discovery of the Chongokni site in Korea in 1978 with hand axe did not make its data available until recently. In the mid-1990s, a surfaced collection of hand axe from the Early Middle Pleistocene formation at Baise (aka Bose) was reported. In the following years, over 200 hand axe were recovered in the Luonan base, yielding the largest clusters of hand axe in China. Today, hand axe are excavated with chronological data and contextual association from Baise, Luonan and Danjiangkou reservoir areas. A few

East Asia: Paleolithic, Fig. 4 A pebble-core chopping tool recovered from the Quyuanhekou site, Yuanxiang County, Hubei province

samples of Luonan hand axe have been studied, showing that they were distributed over a wide space in different altitudes (2nd to 6rd terrace) and time (from 800 to 100 kya). Without detailed study, functions and social cultural implications of the hand axe from the Luonan Basin are yet to be understood; the same holds true for the other two regions, as the initial research on hand axe has been just unfolded.

It is suggested that both the Luonan and Baise hand axe exhibit diagnostic traits of the Acheulean technology from western Eurasia/Africa, although regional variations are also strongly present (Fig. 5). These hand axe were made on pebble cores, bifacially chipped to straighten the working edge toward the tip but leaving cortex and rough working surface near the proximal (butt) end. It is also evident that hand axe with similar morphological traits have been found at the Chongokni site in the Hantan river valley, South Korea, assigned to the Middle Pleistocene. Compared to the Mousterian classic Acheulean hand axe in the West, these East Asian versions seem to be crudely made prototypes; however, from the overall technological point of view, they share attributes of human modification similar to the Western hand axe. The difference in their appearance might be due to different raw materials and possibly to different functions as a result of adaptive behaviors to the East Asian environment. These observations led to some scholars who advocate local development of the bifacial technology (Gao 2012).

The discovery of hand axe has always stirred sensational discussions focusing on the concept of the "Movius Line" that drew developmental differences between elaborate hand axe culture in the West and crude chopper-chopping culture in the east. Since the first identification of hand axe from the Dingcun site, southern Shanxi province, in 1954, Chinese scholars have claimed that eastern Paleolithic cultures were not cultural backwaters as implied by H. Movius' syntheses. Today, it is clear that East Asia hominids produced cultures quite different from their counterparts in Europe and Africa. Regardless of whether the large cutting tools (including hand axe, cleavers, and picks) are similar or dissimilar to those in the West in term of measurements or attributes, the reasons why hand axe in such shapes appeared in the East Asia will be of interest to Paleolithic studies for years to come. For example, archaeologists working on the Baise assemblages believe that production of hand axe could be a behavioral adaptation to an episode of woody plants burning and widespread forest destruction that resulted in local cobble outcrops becoming available due to tektite events. According to Korean archaeologist Choi (2004: 49), botanical evidence from Chongokni also points to a relatively warm climatic period, possibly in the interglacial Riss-Würm I–II.

Blade Technology

One of the first two Paleolithic sites known in the 1920s is a Late Paleolithic Shuidonggou (SDG), located in the southwestern Ordos region, about 18 km east of the Yellow River. The site was first excavated by French paleontologists E. Licent and P. Teilhard de Chardin, who reported five

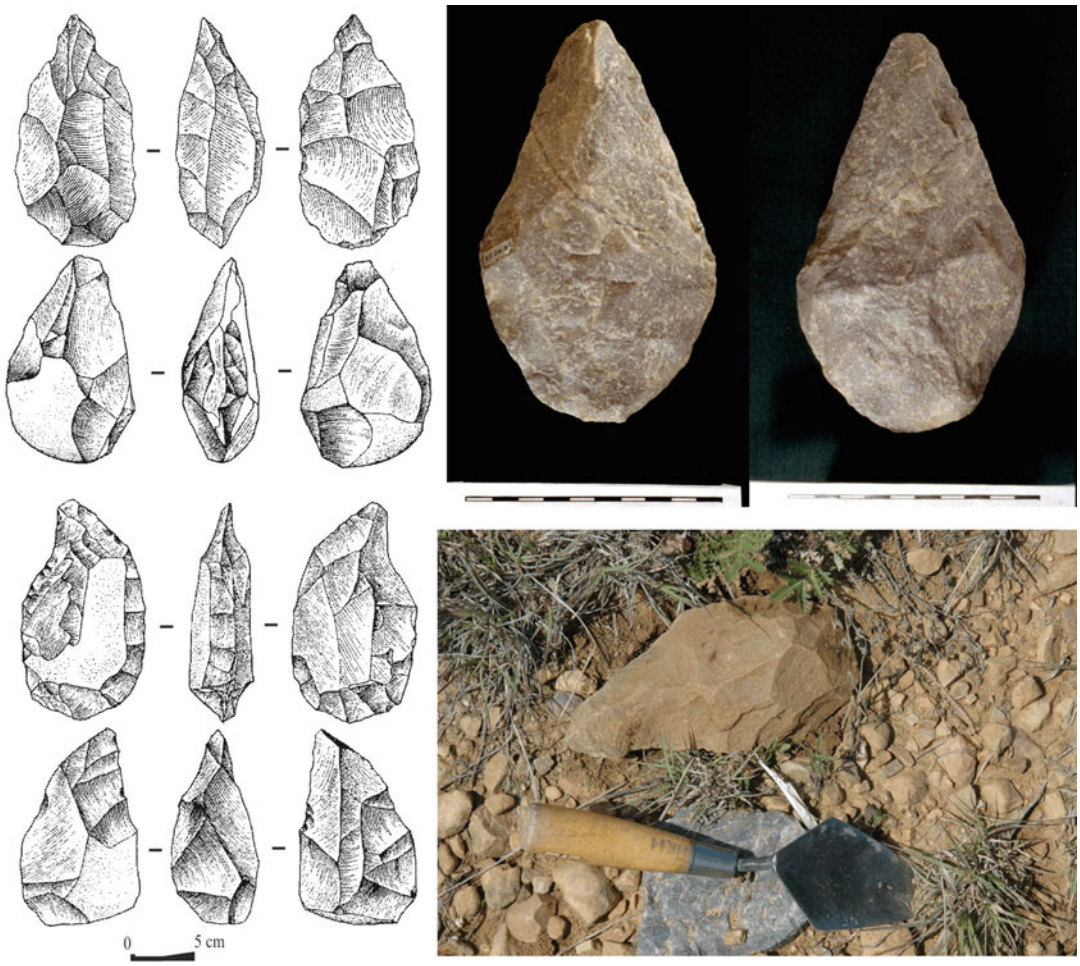

East Asia: Paleolithic, Fig. 5 Hand axe collected the surveys in the Luonan Basin, Shaanxi province

localities (Loc. 1–5) near Yingchuan (Ningxia province). Their investigations identified blade industries that were immediately assumed to have Western origins. Later on, the site had become the focus of study in 1960, 1963, and 1980 and ongoing investigations since 2003. The Shuidonggou lithic assemblage is dominated by blade cores and blades, made on local cherts and quartzite. Core platforms were well prepared before blade removal, indicating standard reduction procedures. Notably, 21.9 % of cores recovered from the 1980 excavation season were classified as Levallois cores, more were also found from other excavation seasons.

A geological study at Shuidonggou suggests most occupations were situated on the second terrace of the Biangou River, and their cultural remains were buried within fluvial-shallow lake-alluvial sediment. Samples of U-series dating and conventional C^{14} dating indicate the age of Shuidonggou falls between 38,000 and 15,000 BP; however, recent AMS C^{14}dating suggests a narrower range of between 29,000 and 24,000 BP. According to faunal analysis, pollen, and sediment studies, Shuidonggou was part of a cool and dry semi-steppe and prairie environment during this time; thus, the site might have served as a base camp for specialized hunters.

The recent field investigations, which produced surprising new data, allow us to reconsider our previous perception of the Shuidonggou complex. First, they have disclosed a highly

East Asia: Paleolithic, Fig. 6 Blade technology from the Shuidonggou site, Northwest China

populated occupation of the valley, lasting from the end of the Pleistocene to the beginning of the Holocene. Second, the sites yield many fired-clay floors and ash deposits indicative of purposeful fire use and/or areas of on-site activities. Third, and most importantly, a large number of finely perforated and polished ostrich eggshell ornaments (small beads) were recovered at SDG02, SDG07, and SDG08. The presence of such standardized craftsmanship indicates some level of organizational production in acquiring raw materials as well as in production itself. In addition, purposefully carved and decorated bones were identified at SDG02, possibly suggesting that the objects might have been used in relation to special functions or elite activities.

Shuidonggou blade technology seemed to remain the sole manifestation in China of its kind until the middle of 1980s, when the Youfang site was excavated (Fig. 6). Youfang is located in the east side of the Nihewan Basin and is slightly later in age than Shuidonggou. Youfang blade technology coexisted with microblade technology; however, most of the flake tools were made on classic blade blanks. Single platform cores display parallel long- and narrow-blade flaking scars, some with evidences of direct percussion. The discovery of the Youfang lithic industry suggests that this blade technology continued to spread eastward in northern China at the end of Pleistocene.

Data from Korea suggest that the appearance of blade technology could have been as early as 35,000 BP. The Sokchangni site, excavated in 1963, was the first site where blade technology was observed and the site was dated by radiocarbon C14 to 30,690 BP (Bae 2010a). These dates suggest Korean blade technology being parallel in timescale with Shuidonggou in China. According to Bae, blade technology was introduced to the Korean Peninsula via Shuidonggou from Siberia where blade industries, such as Ust-Karakol 1 and Kara-Bom in the Altai region dated to older than 40,000 BP, are predominant. This hypothesis may be also applied to explaining the emergence of blade

technology to Japanese Archipelago, as the route of migration would continue from the Peninsula to islands during the cool and dry periods over land bridges. In Japan, blade industries appeared rapidly and blade-using populations might have migrated into the region after a massive volcanic eruption at the southern end of Kyushu at around 28,000 BP settled down (Ikawa-Smith 2007a). It was suggested that Late Paleolithic II in Japan is represented by blade technology, associated with a number of other technological variations including flake-core tools. The increase in the site numbers and the diversity of lithic technologies may be due in part to the population shift out of continental Northeast Asia.

Microblade Technology

Microblades, small bladelets as a truly compositional tool type, appeared as a result of sudden technological innovation and/or adaptation. The last stage of Late Paleolithic in East Asia has interestingly been homogenous technologically, represented by microblade industries. Although in China microblade sites appeared frequently compared to that of blades, numbers of microblade sites (about 50) and distributions are still limited (mostly to North-central China) in the context of Chinese Late Paleolithic materials. Even though the data of Chinese microblades are accumulated and summarized, detailed studies pertaining to their technological attributes and social-economic contexts are still lacking. On the other side, studies on Japanese wedge-shaped microblade technology have a long precedent, producing a number of publications in the English language. And precise accounts on microblade assemblages in Japan are amazingly recorded and worth noting: as of 2003, the 50 year investigation after the first discovery at the Yadegawa site, the total of 1792 microblade sites yield 83,137 microblades and 8,225 microblade cores (Sato & Tsutsumi 2007). The oldest microblade sites appeared in Hokkaido as early as 20,000 BP at the Kashiwadai 1 site. The date marks the onset of Japanese Late Paleolithic III. In Korea most lithic assemblages dating to the terminal Pleistocene are associated with microblade technology. At present, the record of microblade sites in Korea counts to 17 sites, with the earliest dated site at Jangheungni with a C14 date of 24,000 +/− 600 BP. Seong (2007) further divided the Korea microblade sites into two phases: earlier sites between 24,000 and 17,000 BP contain both tanged points (a diagnostic Late Paleolithic projectile points common in Japan and Korea) and microblade, and later sites younger than 17,000 are dominated by microblade without tanged points.

Chinese examples of microblade technology have been discussed with sites from Nihewan, Xiachuan, Xueguan, and Shizhitan. Both Dingcun 77:01 and Xiachuan sites were regarded as the earliest examples of microblade technology, dating to around 26,000 BP and 24,000–16,000 BP, roughly parallel with those earliest dated sites in both Korea and Japan. The Xiachuan lithic assemblage is represented by finely categorized flake tools made on fine black cherts. The tool types include burins, backed bladelets, projectile points, drills, and end scrapers, which were not common in the Early Paleolithic sites in North China. Recent studies on microblade industries in the Shandong Peninsula of East China suggests there were more regional variations indicative of high frequency of cultural interventions in North China (Fig. 7).

However, the reason for the sudden emergence of such technological-complicated microblade tools is still unclear. As far as the origin and spread of microblades in northern China are concerned, most Chinese scholars tend to support a "North China origin" model. Some suggest an eastward spread of microblade technology that originated at Xiachuan, through northern and southern routes into the Korean Peninsula, and proposed that boat-shaped microblade industries (China west) developed from wedge-shaped microblade industries (China east and Korea), but this hypothesis is not yet tested. However, data from other newly excavated sites in northern China – like Shizitan, Youfang, Jiqitan, and especially Qingfengqing and Fenghuangling in Shandong province – might challenge traditional views on the local development of microblade technology in China. On the Japanese Archipelago, scholars tend to agree that the appearance of microblade

East Asia: Paleolithic, Fig. 7 Microblade artifacts from Shandong Peninsula, China, (**a**) and (**b**) microblades, (**c**) and (**d**) microblade cores

technology was associated with migrations or diffusion from the mainland in two routes: north at Sakhalin-Hokkaido and south at Kyushu via Korea. Korean scholars do not claim the indigenous origins of microblade industries in Korea either.

Recent collective efforts on the study of origins and spread of microblade technology in Northeast Asia demonstrate that data from the region clearly indicates technological similarities among assemblages of northern China, Japan, Korea, eastern Siberia, and even to those from northwestern North America (Kuzmin et al. 2007). These studies reveal chronological data suggesting that the earliest use of microblade tools occurred in Central Asia, especially in Altai mountain regions. Microblade assemblages at Ust-Karakol 1, layers 10 and 9c, are dated to about 35,000–30,000, predated any sites with microblade in China, Korea, and Japan. As Ikawa-Smith correctly noted: "the Gorny Altai area, then, is more likely to be part of the general area in Eurasia where blade-based technologies developed, rather than the direct ancestral homeland of the microblade industries of Northeast Asia and northern North America" (Ikawa-Smith 2007b: 191). It is worth noting that based on new comparative studies, some scholars in China have started to hypothesize that microblade technology might have first emerged in Siberia and later spread southward into northern China.

Future Directions

With data becoming more accessible, in-depth research on the Paleolithic of East Asia is just unfolded. One of the current pressing issues in Paleolithic technology in this region is, as demonstrated above, the Acheulean industries in East Asia. Whenever studies are involved in the discoveries of hand axe, interpretations always center on the "Movius Line" theory known for more than half a century ago. This exemplifies a problem, that is, the research of East Asian Paleolithic needs to further develop its own paradigms based on what unique data this region can offer and how the data can first contribute to our understanding of its own remote cultural manifestations. Comparative studies are necessary, but data from the East Asian Paleolithic should not be treated as supplementary to arguments on prevailing theories that are of interests to the West. It cannot be denied that some Western scholars are only interested in the data that favors the theories and model-building that they advocate, especially regarding human evolution, resulting in the biased applications of out-of-context materials. Thus, it is of the foremost urgency to evaluate in full measures the East Asia data, which of course are still far from completed. Only with reliable time-scaled data can our future studies be truly placed into the syntheses of theory-buildings for distributions, migrations, and origins of technologies and human adaptations in East Asia.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Archaic *Homo sapiens*
- ▶ Asian Paleolithic Association (APA)
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Handaxes and Biface Technology
- ▶ *Homo erectus*
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Lithic Technology, Paleolithic
- ▶ Movius Line
- ▶ Movius, Jr., Hallam L.
- ▶ Siberia: Paleolithic
- ▶ South Asia: Paleolithic
- ▶ West Asia: Paleolithic
- ▶ Yuanmou
- ▶ Zhoukoudian, Archaeology of

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Eastern North America: An Independent Center of Agricultural Origins

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Introduction

As early as the 1930s, a group of native seed-bearing plants excavated from dry rockshelter sites in Kentucky and the Ozarks of Arkansas, and Missouri presented themselves as candidates for a possible indigenous eastern North American crop complex. Not until fairly recently, however, have archaeological and genetic techniques – especially AMS radiocarbon dating, scanning electron microscopy, flotation recovery of charred plant remains, and analysis of both modern and ancient DNA – convinced all researchers that eastern North America is a legitimate, independent center of plant domestication. Peter Bellwood (2005: 158) described this discovery as "one of the major recent achievements of U.S. archaeological research. . .."

Domestication in this region contrasts with agricultural origins in some other parts of the world. Selection for useful crops took place after the early Holocene Neolithic time frame of southwestern and eastern Asia, for example, and it does not appear to have been motivated by climatic stress, regional population pressure, or the desires of aggrandizing elites for surplus or luxury foods. Still, the pre-maize Eastern Agricultural Complex (EAC) of North America became a widespread and entrenched economic system concurrent with increasingly long-term occupation of rich riverine zones and with an upswing in long-distance trade among groups who practiced elaborate rituals that probably included feasting and seed exchange.

Key Issues/Current Debates/Future Directions/Examples

The Indigenous Eastern Crops

Eastern Squash/Gourd (*Cucurbita pepo* ssp. *ovifera*)

A native subspecies closely related to the Mesoamerican pumpkin (*Cucurbita pepo* ssp. *pepo*), the eastern *ovifera* squash/gourd was cultivated as early as 7,000 years ago in Illinois and 1,000 to 2,000 years later in Pennsylvania, Maine, and probably many other places. By 2500 BCE, selection for larger fruits and seeds and thicker rind can be detected archaeologically, establishing this species as one of the earliest domesticates of the Eastern Woodlands. The seeds and flowers would have been valued for food, and the hard-shelled fruits had multiple uses: containers, rattles, and fishnet floats, among others (Asch & Asch 1985; Fritz 1999). Varieties with non-bitter

Eastern North America: An Independent Center of Agricultural Origins, Fig. 1 Domesticated sumpweed (*Iva annua* var. *macrocarpa*) specimens from Alum Cave, Arkansas Ozarks

flesh were also bred during this process. Molecular biologists have determined that modern commercial cultivars including yellow crooknecks, pattypans, and acorn squashes – as well as many of the seasonally popular ornamental gourds – are descended from this lineage now known to have been domesticated in eastern North America (Decker-Walters 1990).

Sunflower *(Helianthus annuus* var. *macrocarpus)*

Sunflowers were grown by indigenous eastern North American farmers at the time of European contact and therefore accepted by scholars as having been a native domesticate long before other members of the EAC joined them in that category (Heiser 1955). The earliest domesticated seeds and fruits – those that are larger than their wild counterparts – come from the Hayes site in eastern Tennessee, dating to 2300 BCE in the Late Archaic period (Crites 1991). Selection for larger and larger seeds and for monocephalic plants (those having a single large flower head rather than many smaller side branches) continued during subsequent millennia, although in some regions such as the Iroquoian area of the Northeast, relatively small-sized seeds were favored, perhaps due to high-quality oil. Sunflower seeds were eaten in porridges, stews, and breads, and the seed oil was used cosmetically.

Sumpweed *(Iva annua* var. *macrocarpa)*

Sumpweed or marshelder (Fig. 1), which is closely related to sunflower, was also domesticated during the Late Archaic period (3000–1000 BCE), with the earliest larger-than-wild-sized specimens coming from the Napoleon Hollow site in west central Illinois and also, like sunflower, dating to 2300 BCE (Asch & Asch 1985). Human paleofeces from Salts and Mammoth Caves in Kentucky, left by cavers between 2,000 and 2,500 years ago, contain irrefutable evidence that people ate the unshelled kernels of sumpweed along with sunflower and other native crops, but because sumpweed had disappeared as a cultigen before Europeans described its uses in writing, we have no recipes or descriptions of how it was cooked.

Chenopod or Goosefoot *(Chenopodium berlandieri* ssp. *jonesianum)*

One of the most important native North American crops was a close relative of the now-popular Andean grain called quinoa (*Chenopodium quinoa*), and it shared quinoa's high protein composition and other advantages such as prolific productivity. Rather than having been bred for larger seeds, cultigen chenopod seed coats became thinner and smoother, resulting in at least one variety with very thin, black seed coats and another variety similar to modern quinoa that

Eastern North America: An Independent Center of Agricultural Origins, Fig. 2 Dark-seeded cultigen chenopod (*Chenopodium berlandieri* ssp. *jonesianum*) specimen from Edens Bluff, Arkansas Ozarks

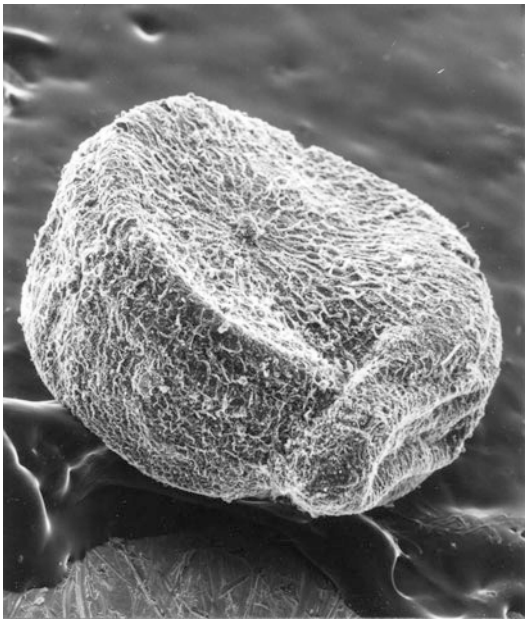

Eastern North America: An Independent Center of Agricultural Origins, Fig. 3 Pale-seeded cultigen chenopod specimen from Whitney Bluff, Arkansas

had pale-colored seeds. Both of these crop types were found at the Riverton site in southern Indiana, dating to 1800 BCE, along with squash rind and domestic-sized sunflower and sumpweed seeds (Figs. 2 and 3). Riverton is currently the earliest site at which most EAC crops have been found together (Smith & Yarnell 2009).

Erect Knotweed (*Polygonum erectum*)

A member of the same family as buckwheat (*Fagopyrum esculentum*, a Eurasian crop), erect knotweed was clearly a member of the EAC by 500 BCE. It was stored along with the known domesticates in rockshelter sites and caches (Fig. 4). This species did not initially change dramatically in size or shape from its wild ancestral form and therefore is referred to as "cultivated," meaning intentionally propagated but not necessarily fully dependant on farmers for its survival. By CE 1000, however, a few sites in Arkansas and Illinois held concentrations of knotweed specimens slightly larger and with smoother fruit coats than any known wild populations (Fritz 1990). Stands of erect knotweed are rare today, so insufficient comparative research has been carried out, and more measurements and detailed scrutiny are needed.

Maygrass (*Phalaris caroliniana*) and Little Barley (*Hordeum pusillum*)

Two small-seeded native grasses are frequently found in depositional contexts along with other crops, although they, like erect knotweed, are usually classified as "cultivated" rather than domesticated due to doubts about the degree to which they were altered genetically or phenotypically. Maygrass has been recovered from sites well outside its modern geographical range, as far north as southern Wisconsin (Fritz in press). Today, wild maygrass (Fig. 5) does not grow in the Mississippi River Valley north of the Missouri Bootheel. Numerous bundles of maygrass seed heads from storage contexts in Ozark rockshelters and thousands upon thousands of maygrass seeds recovered by flotation from pits dating between CE 100 and CE 1300 in Illinois, Missouri, Arkansas, and Tennessee constitute strong evidence that this species was highly valued across the Midwest Riverine area.

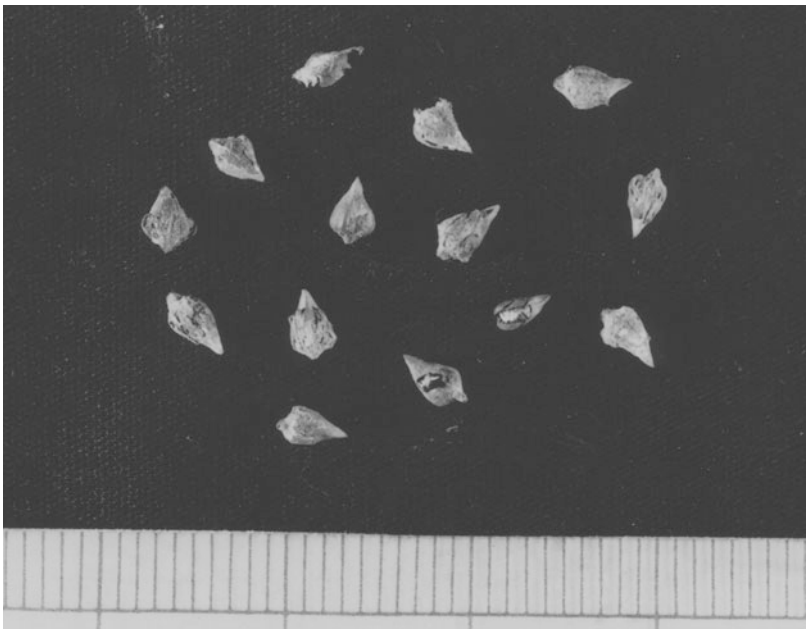

Eastern North America: An Independent Center of Agricultural Origins, Fig. 4 *Polygonum erectum* from stored seed cache found at Whitney Bluff, Arkansas

Eastern North America: An Independent Center of Agricultural Origins, Fig. 5 Modern maygrass (*Phalaris caroliniana*) growing in Bolivar County, Mississippi

Like little barley, maygrass ripens in the early summer, a time when stored grains are depleted and other crops are not yet producing seeds. Concentrations of maygrass seeds occur in association with unusually high numbers of tobacco seeds at sites in Missouri, Alabama, and Illinois, including Cahokia Mounds (Fritz in press). In Wisconsin, maygrass was found at sites where Mississippian colonists from the Cahokia region apparently carried it with them when they moved north (Egan-Bruhy 2003). This raises the possibility that as a first fruit, maygrass held a special status in rituals or that it was a key component of identity associated with ancient foodways before maize became the dominant staple.

Unlike maygrass, little barley's natural range today corresponds to its archaeological range, and little barley has not been found stored in sheaves in dry rockshelters or in special contexts. Still, very high frequencies of little barley seeds are commonly found in pits and middens along with the other EAC crops, especially in Illinois, Missouri, and eastern Arkansas, and morphological hints of selection for free-threshing grains have been described (Hunter 1992).

Discussion: Pre-maize Eastern Agriculture

Cultivation and domestication of squash and seed plants in eastern North America was initially conducted by members of social groups who were adapting to stabilization of floodplain regimes and becoming increasingly effective managers of temperate forest resources. A combination of factors can be implicated in the process. Conscious human selection entailed the isolation of types of plants with particular traits by planting seeds in new places and choosing seeds from the most desirable plants to serve as future seed stock. At the same time, unconscious selection operated when the seeds best adapted to enhanced competition outgrew their neighbors in plots where humans had disturbed the soil, fertilized it organically, and opened it up to sunlight through clearing. This evolutionary advantage favored larger-than-average seeds and those with thinner coats that promoted early germination.

By the end of the first millennium BCE, the suite of crops discussed above was widely grown across the Midwest Riverine area. Paleofecal studies at Salts and Mammoth Caves, Kentucky, demonstrate that up to two-thirds of observable dietary remnants were contributed by these native seed crops between 200 and 500 BCE (Yarnell 1974). However, the diet of Early Woodland cavers, who spent many hours deep underground in pursuit of minerals, might not represent the typical subsistence economy. Flotation recovery of charred plant remains has yielded great numbers of EAC seed types from settlements dating to the first millennium CE (Middle and Late Woodland periods) across this same zone. Opinions differ as to how large a part of the diet came from native agricultural products as opposed to wild plants and animals, and it is likely that the amount of time and effort devoted to farming varied considerably from place to place and perhaps even from year to year. Researchers such as Bruce Smith (2001) describe these groups as low-level food producers for whom domesticates constituted less than 50 % of the caloric intake but who nevertheless depended heavily and successfully on the native crops over an extended time period.

Addition of Maize and Other Mesoamerican Crops

Maize (*Zea mays* ssp. *mays*) was domesticated before 4300 BCE in Mexico, and it spread into the US Southwest by 2100 BCE (Browman et al. 2009). The earliest evidence so far for maize in eastern North America dates to 350 BCE, based on phytoliths extracted from charred cooking residues on pots from New York and Michigan (Hart et al. 2012). Genetic studies of modern maize indicate that eastern North American varieties of maize have their roots in the Southwest (Matsuoka et al. 2002), so maize seems to have spread eastward across the plains during the Early Woodland period (1000–100 BCE). Archaeological visibility in the east remains very low until approximately CE 800, when the abundance of charred cob and kernel fragments increased dramatically in the central Mississippi River Valley (Simon & Parker 2006). During the next few centuries, maize was fully incorporated into farming systems based on the indigenous seed crops, and it was also adopted to the south, east, and north of the Midwest and Midsouth zones where the EAC had flourished for more than 1,000 years and in places for more than 2,000 years.

A satisfactory explanation is still being sought for why it took so long for maize to become a staple rather than minor food source even though most modern Americans view it as clearly superior to the "weedy" EAC crops. Suggestions involve its possibly restricted use early on to ceremonial occasions or its hypothetical lack of productivity until varieties that were bred were well adapted to eastern environments (Hart 1999). The scanty and fragmentary evidence for maize cobs or kernels predating CE 800 makes this mystery extremely

difficult to solve. Eventually, of course, maize was grown successfully in large quantities, and many different methods for preparing and serving it became central to the foodways of Native eastern North American societies, as did its role in harvest rituals and world view in general.

By CE 1000, a species of Mesoamerican squash – the green striped cushaw (*Cucurbita argyrosperma* ssp. *argyrosperma*) – had also been carried across the plains, joining the native *ovifera* pepo squash. Common beans (*Phaseolus vulgaris*) were the last pre-Columbian addition to eastern farming systems, arriving perhaps no earlier than CE 1200 (Hart & Scarry 1999).

The indigenous crops were not immediately replaced by maize, although only sunflower and the eastern squash were still grown when Europeans began recording their observations of Native American farming systems. As a group, chenopod, maygrass, erect knotweed, and little barley outnumber maize fragments in many Emergent and Early Mississippian (CE 800–1200) pit features in the Central Mississippi Valley (Simon & Parker 2006). The native cultigens contributed in a key way to agricultural strategies in the fertile American Bottom area surrounding Cahokia Mounds, the largest population center north of Mesoamerica, where together with maize, they afforded biodiversity, stability, and resilience.

Conclusion

Agricultural fields in eastern North America came to be dominated by corn, beans, and squash, but the system based on these "Three Sisters" developed only a few hundred years before European colonists arrived. Across the interior of the Eastern Woodlands, maize-based farming was preceded by a long tradition of indigenous crop production that persisted and was even intensified in some regions after maize became a major food item. All of the native crops except sunflower and *ovifera* squash, however, were either no longer planted after CE 1500 or had become too casually cultivated to be documented securely in historical archives. Because their wild relatives are viewed by Americans today as weeds, pre-maize agriculture was slow to receive the recognition it deserves. It now stands as a fascinating example of a productive and seemingly sustainable component – together with hunting, fishing, and wild plant harvesting – of a mixed and flexible economic strategy that nourished generations of Native Americans including complex mound builders and their neighbors.

Cross-References

- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
- ▶ Paleoethnobotany
- ▶ Phillips Spring: Agriculture and Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Quinoa: Origins and Development
- ▶ Squash: Origins and Development
- ▶ Woodland and Mississippian Cultures of the North American Heartland

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Eastern Provinces of the Roman Empire, Archaeology of the

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Introduction

The eastern provinces of the Roman Empire were those situated in the regions of Asia Minor, Mesopotamia, Syria and Palestine, Northwest Arabia, and Egypt. This large swathe of territory had long been contested by past empires (Egyptian, Neo-Babylonian, Neo-Assyrian, Hittite, Persian, Macedonian) and fragmented into a number of rival kingdoms during the Hellenistic period. The Roman East is a study in diversity; the landscapes, ethnicities, cultural norms, and historical traditions vary widely. Much recent work in Roman archaeology explores the interaction between Rome and her subject populations, measuring how Roman power and culture were experienced and expressed in local contexts. Given its multicultural and multiethnic composition, the eastern provinces offer a number of compelling case studies relevant not only to the study of Roman archaeology but archaeology as a global discipline.

Definition

Description of the Provinces

The boundaries and administrative designations of the provinces changed several times during the course of the empire, which is broadly defined as the period beginning in 31 BCE (Octavian's victory at Actium) and ending, at least as a viable entity in the East, with the decisive Muslim victory at the Battle of Yarmouk in 636 CE. In the High Empire of the second century CE, there were 13 provinces in the East: *Bithynia et Pontus*, *Asia*, *Galatia*, *Cappadocia*, *Cilicia*, *Lycia et Pamphylia*, *Armenia*, *Assyria*, *Mesopotamia*, *Syria*, *Iudaea*, *Arabia Petraea*, and *Aegyptus* (Fig. 1). In the Late Empire, the number increased dramatically; for example, the province of Palestina (itself a subdivision of Syria) was split into *Palestina Prima*, *Palestina Secunda*, and *Palestina Tertia*. For description of the administration of the provinces and their historical developments, see Sipilä (2009).

Historical Background

The Roman history of the Eastern Mediterranean really begins with Alexander the Great (r. 336–323 BCE), whose policy of veteran settlement drastically transformed the political and cultural

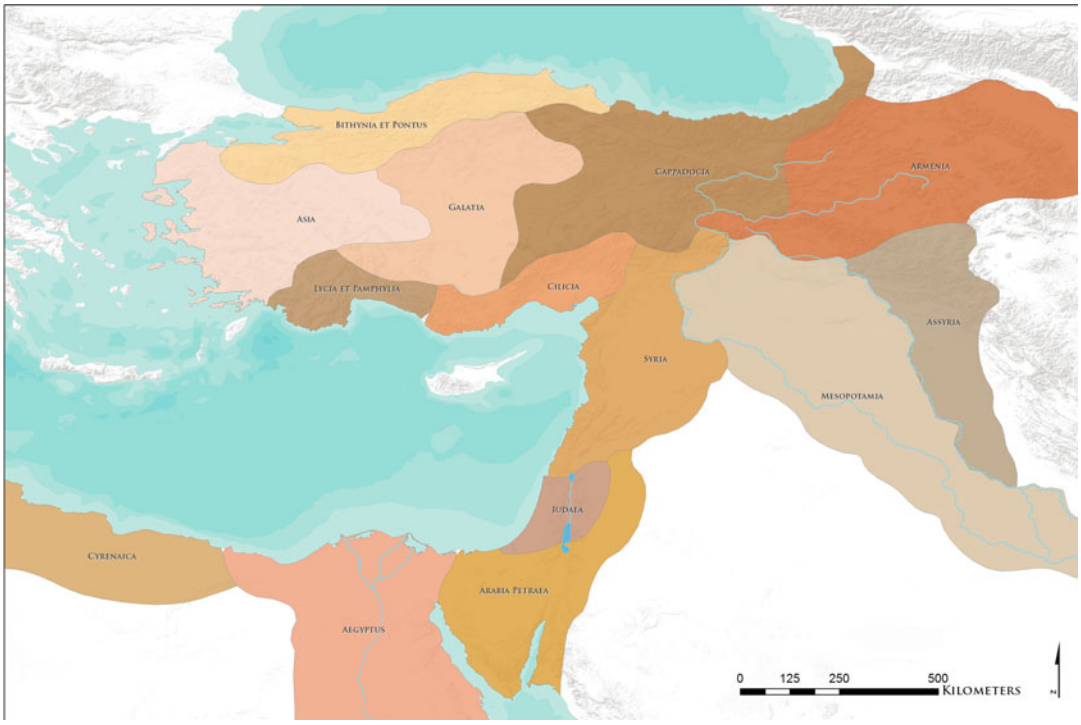

Eastern Provinces of the Roman Empire, Archaeology of the, Fig. 1 The Eastern Provinces in the 2nd c. CE (approximate boundaries)

landscape of the region. Cities were founded or resettled throughout Asia Minor, the Near East, and Egypt and were invested with Greek infrastructure including theaters, temples, and administrative centers. Veterans were given land grants and encouraged to marry into the local population. During the Hellenistic period, the entire Eastern Mediterranean was subjected to a continuous negotiation of cultural reassessment; the populations ultimately encountered by Rome were inconsistent and diverse.

In the late third century BCE, Rome's eastward expansion began in earnest. Following victories over Philip V in the Macedonian Wars (214–148 BCE), Rome pushed into Syria, conclusively defeating Antiochus III. Under the terms of the Treaty of Apamea in 188 BCE, Rome was awarded control of Asia Minor. The new territories were temporarily ceded to the client kingdom of Pergamon, but following the death of Attalos III, all Pergamene holdings were transferred again to direct Roman administration. Confrontations with Mithridates VI of Pontus proved a temporary setback, but following his defeat at the hands of Pompey the Great, Roman hegemony in Asia Minor was never again seriously questioned. Pompey's campaign in the East struck at Syria and Judea as well. In short order, Pompey absorbed the remainders of the now-fragmentary Seleucid Empire, also adding Judea and Armenia as client states. By 63 BCE, Roman hegemony in the East was well established; only Parthia, Arabia, and Egypt lay outside Rome's control (Ball 2000: 8-19).

In the middle of the first century BCE, Rome's civil wars drew in the entire Mediterranean. The conflict between Cleopatra VII, Marc Antony, and Octavian culminated in the Battle of Actium (31 BCE), marking a final and conclusive victory for Rome over Egypt. Soon after, Egypt was added as a personal possession of the young *princeps*. In 25 BCE, Aelius Gallus conducted a campaign in Arabia that was, according to Strabo, a near-total disaster; nevertheless, Rome claimed victory. Throughout the first century CE,

Rome was content to allow the kingdom of Nabataea, centered at Petra in Jordan, relative autonomy in Arabia, but in 106 the region was formally annexed as *Arabia Petraea*.

Over the duration of the empire, the wealth and large population of the Eastern Mediterranean made it the consistent center of attention. Numerous wars were fought in the East, either against external threats, such as the Parthians, or internal rebellions – the Jewish revolt (66–73 CE) among the most significant. The number of Roman soldiers stationed in Syria meant that generals there had considerable power, and some mustered the support of these troops in order to lay claim to the imperial mantle. For this reason, the provinces of the Near East were subdivided by Septimius Severus; this was part of a long-running tradition of imperial redistricting in the East.

Parthia, a rival of Rome since the Republic, was finally and completely subjugated by Severus. The Sassanians, the next major Iranian dynasty, continued to wage war with Rome during the troubled third century CE, culminating in the capture and apparent execution of Valerian in 260 CE. Zenobia of Palmyra revolted against Rome in 269, briefly seizing control of most of the Eastern Mediterranean. Rome's grip on the East was weakening, and it was partially for this reason that Diocletian's political reforms shifted the seat of power to Nicomedia in Turkey. This change in focus was affirmed by Constantine's relocation of the imperial court to Constantinople. Despite these moves, however, the growing Sassanian Empire continued to absorb Roman holdings in the East. The Byzantine Empire maintained a presence in the Middle East until the Muslim conquests of the seventh century CE. Constantinople itself would not fall until the fifteenth century, but for all intents and purposes, the Rashidun and Umayyad conquests brought an end to the last remnants of the Roman Empire in the Middle East and Egypt.

Key Issues/Current Debates

Archaeology in the Eastern Provinces

The Fertile Crescent and the Nile Valley are among of the most important archaeological contexts for the rise of civilization, and unsurprisingly Roman archaeology has often been overshadowed by investigations into the ample and dazzling remains of Pharaonic Egypt or the great city-states and empires of Mesopotamia. Leonard Wooley's excavations at the Royal Cemetery of Ur and Howard Carter's discovery of Tutankhamen's tomb captured the public imagination in a way that the familiar colonnades and temples of Roman cities never could.

Even so, the remains of Roman cities are among the most iconic symbols of the region. The great cities of Mesopotamia and Egypt, built largely out of mudbrick and in the proximity of rivers, are largely gone. Roman cities, on the other hand, were substantial stone constructions and remain visible across the landscape to this day. Powerful earthquakes leveled the urban infrastructure of much of the region in the late Byzantine Empire, which led to widespread urban abandonment. As a result, major sites are preserved in often spectacular condition. The allure of these cities (Palmyra and Ephesos but two representative examples) attracted the attention of European explorers and travelers in the seventeenth–nineteenth centuries, and unsurprisingly the bulk of early archaeological work in the region was focused on these major urban centers.

Given the breadth of Rome's eastern provinces, it is impossible to offer any sort of comprehensive catalogue of archaeological work. What follows is a brief synopsis of some major sites in the region; the list is meant to be representative rather than comprehensive (Fig. 2).

Asia Minor

Aphrodisias: Excavations in Aphrodisias in Caria have revealed a prosperous city centered around the Temple of Aphrodite, including a number of civic buildings and a well-preserved theater. Most notable is the *Sebasteion*, a large temple complex dedicated simultaneously to Aphrodite and the Roman emperors. Numerous sculptural fragments have been recovered from the porticoes flanking the processional way, which depict both mythological figures, heroizing portraits of the Julio-Claudian emperors, and personifications of the various ethne of the empire.

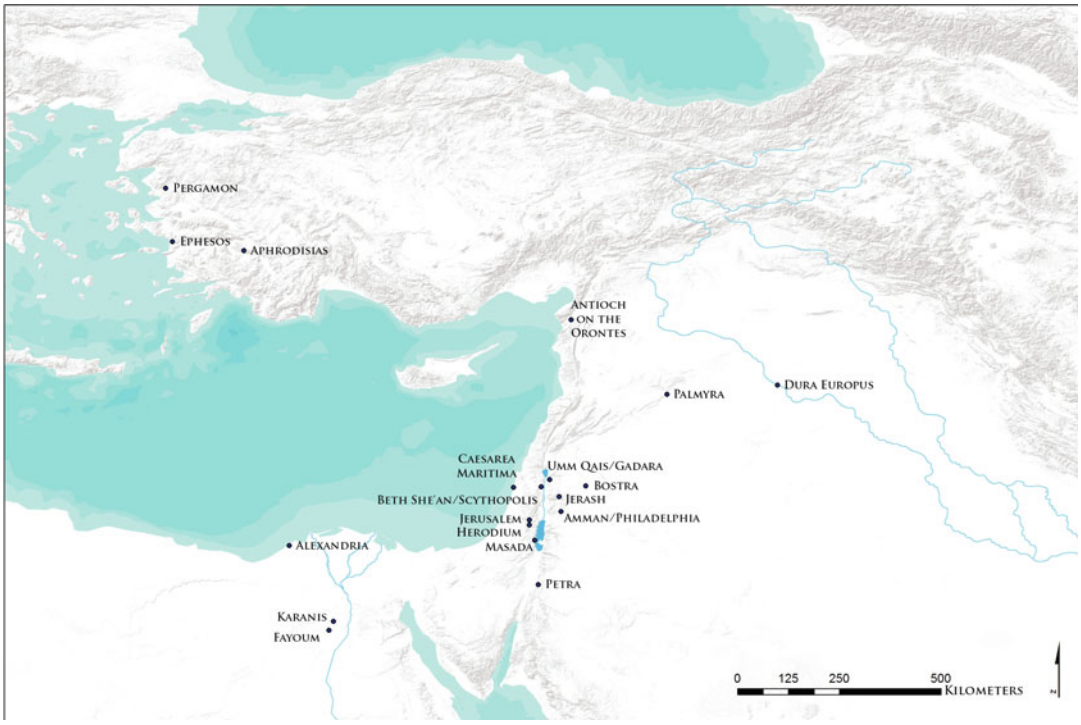

Eastern Provinces of the Roman Empire, Archaeology of the, Fig. 2 Sites referenced in the text

As such, it is an essential document for the study of the nature and impact of the imperial cult (Smith 1987).

Ephesos: Ephesos was one of the largest cities of the Roman world, famed for its storied Temple of Artemis. Little remains of the temple today, but the ruins of the Roman town are extensive. Typical of major cities in the East, Ephesos boasted multiple temples (one dedicated to Domitian and another to Hadrian), fountains, colonnaded streets, a theater, a stadium, and at least one agora. The Library of Celsus, constructed from 114 to 135 CE, with a façade resembling a theater's *skene*, was decorated in a Hellenistic-Baroque revival style and adorned with numerous statues.

Pergamon: The center of power for the Attalid dynasty, Pergamon was gifted to the Romans in 138 BCE. An excellent example of the development of Hellenistic architecture, Pergamon retained the majority of its structural character during the Roman period. Notable additions to the city include the Temple of Trajan and infrastructure such as baths and aqueducts. The theater was also remodeled in the Roman period.

Syria/Palestine

Antioch on the Orontes: Antioch is known to us primarily from literary sources and little remains of the ancient city. Sartre (2005: 163-5) lists no less than 25 imperial building projects in the city, including numerous baths, temples (some to the imperial cult), theaters, stadia, aqueducts, and arches. It was an extremely important city in terms of Roman administration of the East, serving as the capital of the province of Syria. Like Ephesos, it boasted a population estimated at 250,000 and later became an important center of the emerging Christian church.

Dura-Europos: Less monumental than Antioch, Dura-Europos was located on the eastern frontier of Syria. The Romans seized it from the Parthians in 165 CE, but in 265 the Parthian king Shapur I besieged the city and drove out the Romans. It was subsequently abandoned, and for this reason, it has become immensely

significant archaeologically. Excavations have revealed a number of public and private buildings in the city, none more important than the preserved church, synagogue, and mithraeum. All three structures, located in close proximity, were adorned with figured frescoes and offer important insight into the character of these three religions in the third century CE. The synagogue frescoes are particularly fine and anticipate many developments later seen in Late Antique and Byzantine painting and sculpture (Dirven 1999; Chi & Heath 2011).

The Decapolis: A loose grouping of cities clustered near the modern confluence of Syria, Jordan, and Israel, the Decapolis figures prominently in the gospels. Included in the ancient designation were the excellently preserved cities of Beth Shean/Scythopolis, Gadara, Gerasa, Bostra, Amman/Philadelphia, and several others. These cities, which had majority Greek populations, were affiliated culturally rather than politically. Indeed, they seem to have competed with one another for imperial attention, and their massive building programs intensified in anticipation of Hadrian's tour of the provinces. Consistent features in these cities include monumental colonnaded streets, agoras, theaters, hippodromes, nymphaea, and gateways, and indeed they have a certain uniformity about them (Segal 1997).

Herod's Judea: Herod the Great (74/3–4 BCE), one of the more complex figures from the Roman period, initiated a number of monumental building projects throughout Judea. These were intensely political structures, as Herod sought to placate his Jewish subjects while simultaneously currying favor with Augustus. On the one hand, he rebuilt the Temple of Solomon in Jerusalem in grand, lavish style. On the other, he constructed a monumental harbor named Sebaste (Greek for "Caesar") at Caesarea Maritima and built temples of Roma and Augustus throughout the region. He also built a number of remote palaces that integrated an architectural bravado with the best Roman engineering. The palace at Masada was built on the side of a cliff that at Caesarea projected out into the sea, and at Herodium, Herod built an artificial mountain that completely enclosed his palace. All of this was surely intended to create a positive impression among the Romans (Netzer & Laureys-Chachy 2008).

Palmyra: The best-preserved Roman city in the East is doubtless Palmyra, which became the major center of Roman trade in the second century CE. The seat of Zenobia's revolt in 269 CE, Palmyra was an extremely wealthy city and had an architectural program to match. It boasts the same typical features as other large Roman cities in the East, including colonnaded streets, an agora, a theater, a nymphaeum, baths, and a number of civic buildings (Browning 1979). All of these were lavishly constructed and decorated. What sets Palmyra apart from similar cities in the Decapolis is the nature of its religious buildings. There are three major temples that have been excavated at Palmyra, and all three evidence a clear fusion of Hellenistic/Roman and Semitic sacred architecture. Peristyle colonnades and Corinthian columns are combined with crenelations, rooftop shrines, and raised adyta. Several hundred funerary busts, both of men and women, also survive from Palmyra, grounded in the fashion of Roman funerary busts but with distinctive local characteristics (Heyn 2010). The art and architecture of Palmyra, like that at Baalbek, is therefore important to the consideration of religious syncretism and cultural integration in Rome's eastern provinces.

Petra: Capital of the Arabian kingdom of the Nabataeans, Petra was the major hub for the overland transport of the luxury aromatics frankincense and myrrh. Petra is most famous for the several hundred rock-cut tombs that adorn the cliff walls that surround the city center but also boasts several temples, a theater, a nymphaeum, an arch to Trajan, and a building (the Great Temple) that probably appropriated both religious and civic functions (Weber & Wenning 1997; Joukowsky 2009). Hillside mansions were decorated with wall paintings in Pompeian style. As is the case at Palmyra, Petra's architectural and artistic inconsistencies are evidence of the ongoing negotiations of identity that occurred during the Roman period. Ostensibly an independent kingdom until Trajan's annexation in 106 CE, the architecture of temples and tombs is characterized

by the inconsistent coexistence of Hellenistic/Roman and Near Eastern elements. Depictions of the gods vary as well, with numerous aniconic betyls balanced by full busts of Greek deities.

Egypt

Alexandria: Second in size only to Rome, with an estimated population in the vicinity of 500,000 inhabitants in the Roman period, Alexandria was of critical importance to the Roman economy and administration of Egypt (Greene 1986: 28-30). Captured by Octavian following the Battle of Actium, the fabled city of Alexander was already a major economic, political, and scholastic center. Most of its antiquities have been destroyed, including the library and the lighthouse, but the Roman catacombs (Kom al-Shoqafa) are well preserved and offer insight into Romano-Egyptian funerary practices. A 30-m honorific column dating to the reign of Diocletian still stands today, as does the theater. Although free-standing architecture in the city is otherwise lost, McKenzie (1990, 2007) has suggested that the wall paintings from Pompeii and certain tomb façades from Petra are representative of a particular Alexandrian style, characterized by heavy baroque embellishment.

The Fayoum: Augustus settled a large number of veterans in the Fayoum, a fertile area surrounding Lake Moeris, and a series of Romano-Egyptian towns sprung up there as result. Excavations at Karanis have revealed a large number of artifacts tied to daily life, as well as a wealth of documentary papyri. Studies of this material have allowed for detailed demographic studies on the population of Roman Egypt (Bagnall & Frier 1994). Numerous painted mummy portraits have also been recovered from the Fayoum (ancient *Crocodilopolis*); these serve as significant examples of ancient painted funerary portraiture. Whether they are generic or specific remains an open question (Riggs 2002).

Not everyone lived in large urban centers, of course. The landscape was dotted with smaller towns, villages, and farms, and the rural economy was of critical importance. Indeed, Rome herself relied on shipments of Egyptian grain. Regional surveys, hinterland studies, and excavations of small settlements have become increasingly common in recent years. Major research themes in these studies include the relationship between major urban centers and their surrounding hinterlands; the nature of frontiers, marginal zones, and rural economies; and the ethnic and cultural diversity of the region (see, e.g., Barker et al. 2007; Smith 2010).

The geographical and temporal extent of Rome's eastern provinces, coupled with the number of cultures and ethnicities it encompassed, has engendered several important academic debates. There is a series of general theoretical issues that arise from the intersection of cultures and of which the Roman East provides a number of excellent case studies. In addition, there are historical questions that tie specifically to the nature and development and maintenance of the Roman Empire. Finally, there are issues concerning the contemporary management and deployment of archaeological sites.

Theoretical Issues and Debates

Orientalism/Colonialism

Edward Said's 1978 monograph *Orientalism* gave voice to a growing discontent in scholarship regarding the remnants of colonialism in scholarly approaches to the Near East. Though not specifically directed at Roman archaeology, his points certainly exposed a widespread tendency to view the East from a decidedly Eurocentric perspective. The heavy-handed European involvement in the Middle East, especially during the first half of the twentieth century, reinforced ideas of Western political and ideological supremacy. New archaeology and processualist thinking contributed to this mode of thinking, as large states and empires were characterized as more evolved and civilized than "primitive" formations like nomadic tribal confederacies or chiefdoms. The very idea of the Roman East is problematic, as it reifies the region in Roman terms and through Roman eyes. Scholarship from the last three decades has labored to undo the legacies of colonialist thinking in regard to the Roman provinces, with more and more attention being paid to local contexts, cultures, and perspectives.

Biblical Archaeology

A major factor shaping the development of Roman archaeology in the eastern provinces is the entanglement of Rome with Jewish and Christian history. Herod the Great was a client king of Rome, and his monumental building projects resulted directly from his engagement with Antony and Augustus. The nativity of Christ is dated to the final year of Herod's life (4 BCE), and his ministry, trial, and crucifixion took place under the administration of the famous procurator Pontius Pilate. The First and Second Jewish Revolts pitted Jewish partisans and Zealots against Roman troops, and the archaeological evidence for the wars is plentiful. In the fourth century CE, Constantine the Great, the first Christian Roman emperor, established a series of monumental churches in Palestine, developing the Holy Land as part of campaign to increase the visibility and stature of Christianity (Parker 1999). Indeed, Biblical archaeology can be said to begin with the explorations of Constantine's mother, Saint Helena (patron saint of archaeologists), who journeyed to Palestine and discovered the relics of the True Cross.

As much early, Greek archaeology was tied to elucidating the historical background of Homer, so too has the history of archaeological research in Palestine been tied to sites, events, and people of the Bible. Many of the early archaeologists working in the Holy Land were devoutly religious and saw archaeology as an opportunity to illuminate, if not validate, the historicity of the Bible. W.F. Albright's legacy is emblematic; on the one hand, he is rightly praised for his groundbreaking work in clarifying stratigraphy and ceramic typologies, for applying rigorous scientific criteria, and for generally and substantially improving the professionalism of archaeological practice in the Near East, but on the other hand, his positivism, empiricism, and objectivity have all been called into question (Dever 1990, 1993).

Beginning in the 1960s and 1970s, Biblical archaeology proved divisive in academic circles, as several scholars attacked what they considered a methodology driven by ideology (Thompson 1974; Finkelstein 2007). It should be observed, however, that the majority of criticism against Biblical archaeology has been directed toward studies of early Israel and the narratives of the Old Testament. The Roman period is much better attested, both historically and archaeologically, and, with the exception of Masada (see below), also less entangled in narratives of the formation of Jewish identity and religion. Indeed, Roman-era Biblical archaeology has had a positive impact on the discipline of Roman archaeology, for the search for Jesus' historical context resulted in an emphasis on daily life in the countryside and greater consideration of everyday objects.

The huge popular interest in the archaeology of the Biblical world creates an appetite for sensationalism, and finds of debated pedigree (e.g., the Jesus Family Tomb, the James ossuary) are promoted with huge fanfare. Such media events tend to be surrounded by scholarly backlash and claims of fabrication.

Romanization

"Romanization" has been an important issue in Roman studies for two decades now, and several studies have illustrated that the spread of Roman imperialism did not elicit a wholesale adoption of Roman cultural practices (Woolf 1998; Webster 2001). To be sure, there is an observable general trend of incorporating Roman behavior and ideology, clearly demonstrable in the archaeological record via the widespread construction of baths, theaters, and temples dedicated to the imperial cult. At the same time, however, indications of the intentional maintenance of indigenous cultural practices are also evident, especially in areas of religion, art, and language (Millar 1987). The debate, therefore, centers on how best to understand the interaction between the powerful push of Roman culture and the deeply rooted traditions of Asia Minor, the Near East, and Egypt. Social stratification plays an especially important role in this regard, as the priorities and identities of the elite class often differed widely from those of the middle and lower classes. This interplay between subject and ruler is of paramount importance throughout Roman provincial archaeology, and the Roman East has provided a number of fruitful case studies.

Cultural Identity

Hellenistic and Roman expansion into the East resulted in dramatic political, cultural, and demographic changes. Cultural identities, both individual and collective, were necessarily called into question as new alignments and opportunities presented themselves. Intermarriages changed the ethnic makeup of the region, integration of new cults shifted traditional religious expressions, and provincial organization altered access to power and status. As a result, cultural identity was constantly negotiated and contested. Recent scholarship (Gruen 2011) explores the nuances of these shifting conceptions of self and group throughout the ancient Mediterranean; the multicultural character of the Roman East affords several excellent case studies.

Imitation/Acculturation

This intersection of cultures had a major impact on art and architecture. Long-standing traditions of visual expression, based largely on Mesopotamian, Persian, and Egyptian precedents, came under revision through exposure to Hellenistic and Roman forms and motifs. In many cases, the general Semitic avoidance of graven images was relaxed; at Petra busts of gods began to appear alongside aniconic betyls, and Palmyrene gods were depicted in the garb of Roman soldiers. Roman architecture, indebted as it was to Hellenistic predecessors, dominated the urban landscape. Through triumphal arches, theaters, fountains, colonnaded streets, temples, statuary mosaics, etc., Rome left a lasting imprint on the visual culture of the East. The penetration of Roman art is seen throughout the region, and even small towns and villages often boasted imperial statue busts or colonnaded buildings. Nevertheless, scholars have taken pains to point out that this was not a simple case of imitation or assimilation, arguing rather that it resulted from a dynamic dialogue of incorporation and adaptation. Many Near Eastern motifs and expressions were often retained alongside Roman ones, and Egypt maintained an especially strong tie to its artistic heritage even as it drew on Roman forms.

Religious Syncretism The impact of Roman expansion is especially measurable in the environment of cult practice. Local or regional deities such as Baal or Dushares were regularly conflated with Greek and Roman gods like Zeus and Dionysus. Imperial patronage promoted the construction of sanctuaries dedicated to these divine pairings. The great complex at Baalbek, Lebanon, is the most expansive and well known of these cult centers, and the main temple was dedicated to the god Jupiter-Hadad. Architecturally, many temples in the East incorporate features from both Roman and Semitic practice; examples of the latter include stairs to rooftop platforms, enormous temenos courtyards, and raised lateral adyta. In Nabataean Arabia, several temples preserve raised central platforms that accommodate circumambulation, and the plan of these temples is distinctly non-Roman. At the sanctuary of Khirbet Tannur in Jordan, temples of this type were decorated with a sculpted zodiac frieze and reliefs of deities such as Helios and Tyche, illustrative of the much wider phenomenon. Zodiacs also found favor in synagogues of the fifth and sixth century CE, although the interpretation of these zodiacs in a Jewish context is much disputed (Magness 2005).

Key Historical Issues

Roman Imperial Strategy

The impetus for Roman expansion in the East and the character of its subsequent spread has sparked lively debate. The central issue is whether Roman expansion was essentially an ad hoc process, spurred by immediate fiscal and political concerns, or whether there was in fact a broader, far-reaching plan in effect. Using Roman Arabia as a case study, Freeman (1996) argued that wars, annexations, and the defining of provincial boundaries were essentially reactionary acts undertaken by an emperor under political or economic duress. Sipilä (2009) has countered in favor of a more logical, if not planned, approach to provincial administration, using qualitative comparison models to identify particular factors that played a key role in determining the outcome of imperial decision-making.

Roman Frontiers

Udruh, Lejjun, and Qasr Bshir are but a few of the large number of well-preserved Roman forts and watchtowers that dot the deserts of Syria, Jordan, and Saudi Arabia (Kennedy 2004). The forts were situated to the east of the main north/south artery in Transjordan, the Via *Traiana Nova*, and seem to have formed a loose but interconnected line. Known as the *limes Arabicus*, it is clear that the forts at very least marked the eastward extend of Roman expansion (Parker 1987). Some are large legionary fortresses; others are smaller *castra*. The function, administration, and organization of the forts changed through the empire; Diocletian invested especially heavily in the expansion and strengthening of the fortification system.

The question raised by these forts is whether they, like Hadrian's Wall, represented an actual boundary or border. Their practicality in suppressing raids has been disputed, given the distance of their spacing and the difficulty Roman soldiers would face in pursing nomads into the desert. The forts may have been as symbolic as they were functional, showing that Rome ruled even into the empty desolation of the desert.

Other Key Issues

Conservation and Cultural Heritage Management

The number of archaeological sites in the eastern provinces of the Roman Empire is staggering. As such, conservation is a critical issue in the region. Several important sites lie in the middle of large cities (e.g., Beirut, Jerusalem), and urban expansion places significant pressure on them. A far greater proportion of sites lie in remote areas, exposed with little protection from the elements. Looting is a major problem, especially in zones of economic and political turbulence. The resources and infrastructure required to oversee and manage sites are substantial, often exceeding government capabilities. Sustained international investment in heritage management is of critical importance.

In several regional countries, Departments of Antiquities are associated with or overseen by Ministries of Tourism. When the priorities of these agencies come into conflict, touristic development often has the upper hand. Given the economic importance of tourism, conservation emphasis continues to be placed on well-known sites that occupy typical tourist itineraries. In Jordan, for example, Jerash is the focus of considerable development, including a handicraft bazaar at the entrance to the site, reenacted gladiator fights, and chariot races. However, sites off the major tourist routes are not afforded the same degree of investment nor protection. This problem is not confined to Jordan, of course – the same can be seen in every country in the region (Brodie et al. 2006).

One area of recent progress in cultural heritage management is the development of national databases and registries for archaeological sites. The Getty Conservation Institute and the World Monuments Fund recently sponsored the creation of the Middle East Geodatabase for Antiquities, or MEGA. Intended for use throughout the Middle East, it is currently being piloted in Jordan. The geodatabase tracks sites across the country, their preservation status, and threat levels. The Israel Antiquities Authority has a similar in-house system, and others are in use or in development in other regional countries.

Politics and Archaeology

The archaeology of Rome's eastern provinces is deeply entangled in national and regional political discourses. The picturesque ruins draw large numbers of visitors, and the economies of several Middle Eastern countries depend heavily on tourism. Roman period remains tend to survive better than those from earlier periods, thanks to the widespread use of monumental stone architecture. As a result, it is the colonnades and crumbling façades of the temples, aqueducts, and for a that leave their stamp on the public imagination. Antiquity is a regular part of political discourse, as the monumental legacy of the past is stirred to legitimize current policies or rulers (Meskell 1998). Saddam Hussein and the Shah of Iran actively promoted themselves as heirs to the great empires of the past, and such linkages are also seen in several current contexts. It is very common, for example, for images of archaeological sites to grace coins and paper bills, often in conjunction with the face of the king or president. Utilizing past glories to promote current dynasties is nothing new nor is it

isolated to the Eastern Mediterranean (cf. Mussolini and the Roman Empire, for example), but it is nevertheless widespread in the region.

Israel, Palestine, and Roman Archaeology

The most politically charged arena for the use and abuse of Roman archaeology is doubtless Israel and Palestine. Laying claim to heritage and ancestry is of critical importance to all parties contesting ownership of the land. Sites that give evidence of past presence and past legitimacy are taken as justification for current claims. Both Israeli and Palestinian politicians deploy antiquity as justification in their discourse, although Palestinians lean more toward either Bronze and Iron Age sites (Canaanite and Philistine) or Islamic sites. Roman sites, especially those tied to the First and Second Jewish Revolts against Rome, are more often used to illustrate Israeli rights and prerogatives.

The First Jewish Revolt of 66–73 CE was a bloody and protracted war. The Roman army, under the leadership of Titus and Vespasian, was heavy-handed in its suppression of the rebellion. According to Josephus' account, Roman soldiers killed at least one million Jews during the course of the conflict. Josephus records some particularly gruesome sieges; the inhabitants of Yodfat, Gamla, and Jerusalem were said to have been executed en masse when their defenses finally fell. Most famous is the legend of the siege of Masada, the hilltop fortress built a century before by Herod the Great, which was the final rebel stronghold. As Flavius Josephus (*Bell. Iud.* 7.389-406) recounts, when the Romans finally broke through the defenses of the citadel, 960 of the 967 inhabitants had put one another to the sword, preferring death at their own hands to execution or enslavement by the Romans. Whatever the truth behind the text, the legacy of these sites has become embedded in the ideology of Israeli statehood and nationalism. The slogan "Masada shall not fall again," sworn by new soldiers in a ceremony at the site, has become synonymous with Israeli independence. Masada has become a symbol of defiance, resistance, and determination, even a pilgrimage site of sorts. Of all the Roman archaeological sites in the Middle East, Masada has the greatest political significance (Elon 1997). By creating such narratives of national identity, archaeology is inextricably entangled in the Israeli-Palestinian conflict, as it is a powerful way to legitimize ancestral claims to contested spaces (Abu el-Haj 2001; de Vries 2010). In addition, the current (2012) "Price Tag" campaign has had a direct impact on the archaeological record, as ultranationalist groups within Israel have vandalized several sites in retribution for government dismantling of illegal settlement outposts.

International Perspectives

Scholarly interest in the archaeology of the eastern provinces of the Roman Empire has increased dramatically in the United States and Europe in the past two decades. Work on the Roman East is becoming more and more common, and the wealth of material and visual culture in the East is transforming Roman studies. The multicultural nature of the region has raised the importance of cross-cultural analyses, as well as explorations of the mechanics of identity, the reception of Roman visual and material culture, and the administration of empire. Even as the East has become accepted as a mainstream part of Roman studies, however, it retains something of a foreign quality within the discipline. Even now, many of the large and well-preserved Roman sites in the Middle East, places like Umm Qais (Gadara), Umm el-Jimal, or even Herodium, are still relatively unknown by Romanists who do not work in the East. This likely owes to the different languages, religious practices, and cultural or artistic traditions of the inhabitants of the eastern provinces, which pose a barrier of entry for many scholars.

Future Directions

The most pressing archaeological needs in the eastern provinces are conservation and publication. Excavations remain important, of course, but given the number of sites under threat of

looting or destruction, preservation should take precedence. Public information and education sources, especially ones that cross modern political boundaries, are also needed. Coordinated databases and websites will do much to make the massive swathe of the eastern provinces more manageable and accessible. Finally, the need to make archaeological sites meaningful and relevant to local inhabitants has been recognized as a critical priority.

Cross-References

- ▶ Aphrodisias, Archaeology of
- ▶ Dura-Europos, Archaeology of
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Post-Second Temple Judaism Archaeology
- ▶ Western Roman Provinces, Archaeology of the

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Basic Biographical Information

Historian, writer, and artist Roger Clay Echo-Hawk entered this world in Pawnee, Oklahoma, on September 15, 1954. Born to US Air Force boom operator Walter R. Echo-Hawk, Sr. and housewife Ruby J. Echo-Hawk, he is the youngest of four children. A citizen of the Pawnee Nation, his indigenous American ancestors include three of the four autonomous Pawnee bands (Chaui, Kitkahahki, Skidi) and Buffalo Clan Otoe, while other ancestors came from England, France, Germany, Spain, and Switzerland. His youth was spent on Air Force bases throughout Missouri, Nebraska, North Dakota, and Puerto Rico, during which time he came to identify strongly with the ideals of the hippie movement. Writing, and poetry

specifically, emerged as his primary interests in the late 1960s, with Richard Brautigan, Lord Dunsany, and J. R. R. Tolkien being especially influential. He took courses at the University of New Mexico but in 1973 moved to Boulder and attended the University of Colorado (CU) at the urging of his eldest brother, Walter, Jr. In 1975 he entered the new Creative Writing Program at CU but left a year later. Upon receiving training as a heliarc welder, he worked for Beech Aircraft from 1978 to 1985. Echo-Hawk served for 11 years (1981–1992) as Correspondent on Native American Affairs for the cultural and literary journal *Rolling Stock*, which was then edited by renowned poet and CU faculty member Ed Dorn. In 1989 he married software engineer Linda J. Ross, originally of Kansas City, Missouri, by which point he had returned to CU to study anthropology and history. He earned his Bachelor's in History in 1990. Echo-Hawk's study of Pawnee history, focusing initially on the Echo-Hawk family, began in earnest in 1979 and resulted in his pursuing graduate work under Vine Deloria, Jr., Patricia Limerick, and Douglas Bamforth at CU. Echo-Hawk ultimately received his Master's degree in History with an emphasis on ancient Indian history from CU under Philip J. Deloria in 1994. During the late 1980s, Echo-Hawk was affiliated with the Native American Rights Fund (NARF) through his brother Walter, Jr., and in his capacity as tribal historian, Echo-Hawk assisted his brother and served as a consultant on repatriation-related issues for NARF until 1995. These efforts resulted in the repatriation and reburial of many Pawnee ancestors held by the Nebraska State Historical Society and Smithsonian Institution, as well as the passage of Nebraska bill LB 340, a precursor to the NAGPRA (Echo-Hawk & Echo-Hawk 1994). In the early 1990s Echo-Hawk also worked occasionally as an archaeological survey crew member and site monitor. From 1995 to 2001 he served as Repatriation Coordinator for the Colorado Historical Society and the Denver Art Museum and was Assistant Curator in the Native Arts Department at the latter institution from 2001 to 2003. Echo-Hawk's extended reflection on repatriation (2002) precipitated his critique of race and racialism, the idea of race put into daily practice, and in 1998 he gave up his racial Indian identity entirely. Frequently contributing to the Closet Chickens online group, he is known as "Sweet and Sour Chicken," which is an apt metaphor for his prosodic missives that provide support for its members and incisive critique of the flock's use of race. A passionate thinker, generous and kind of heart, Echo-Hawk today works as a writer and artist from his home in Longmont, Colorado, where he continues to interrogate dreams and challenge us to reject the racial status quo (Fig. 1).

Echo-Hawk, Roger C., Fig. 1 Roger Echo-Hawk, at home on the far western edge of the ancient Pawnee homeland, north of the Mountain That Touches the Sky (Photo by Linda Echo-Hawk, May 2008)

Major Accomplishments

Echo-Hawk's most significant contributions are his writings on the value of oral tradition to archaeology and critiques of race. His Master's thesis took an innovative approach to deep history by exploring connections between Pawnee

oral tradition, ancestral populations, and archaeological data. The published version (2000) remains influential for presenting a method for treating oral traditions as evidentiary according to the NAGPRA. Stimulated by this and his work on repatriation, his focus shifted to race (2002, 2012), culminating in his most recent book-length treatments (2010, 2011). Reading Echo-Hawk is always rewarding but often challenging owing to the positions that he takes and a tendency for his terms and references to be highly recursive. Likely an intentional literary device, this style forces a close reading with attentiveness to word meaning and context, but it can be frustrating for casual readers. His writings, which are often very personal, underscore the lived experience of race and are sometimes presented in the form of Socratic debate in which he adopts different personae (Echo-Hawk & Zimmerman 2006; Dongoske & Zimmerman 2010). Echo-Hawk's (2010) account of his graduate training highlights academics' general unwillingness to support young scholars interested in developing innovative methodologies to bridge archaeology and oral tradition, specifically, and more generally to ask different questions with value to readers beyond the profession. He thus exemplifies the structural problem that persists today for many Indians studying history, anthropology, and archaeology.

His ruminations on race make several key points: (1) race is a discredited pseudoscientific concept that should be wholly rejected, (2) ethnicity should replace race because it is grounded in culture and abandons illusions of race as justification for oppression, and (3) race is too rarely addressed in archaeological discourse and academics have a responsibility to rethink race studies more broadly. From his discussions we learn that understanding race as a cultural invention is not simply about fighting racism but altogether abandoning race as a concept and investigating the behaviors that perpetuate it at an individual, subjective level. To do so requires analysis of intersecting and overlapping social identity markers such as ethnicity and nationality.

Echo-Hawk's critics variously point to a lack of empirical data to support some of his assertions and argue that he conflates race, culture, and ethnicity. Substituting ethnicity for race, for example, runs the risk of neglecting race as a central social, political, and historical category with direct links to contemporary inequalities and also sidesteps the fact that many Indians are binational. Indian nations, like all nations, deploy intersecting racial and ethnic ideologies with homogenizing effects. While it is debatable whether Echo-Hawk truly conflates race and ethnicity, it is clear that both concepts lack specificity in public discourse, which only complicates one's ability to understand the rationale or position that an individual is speaking from when they invoke a multivalent label such as "Indian." Because not everyone self-identifies with a racial or ethnic identity, it is often difficult to be sure whether someone is deploying one or the other. Notably, critics of indigenous and decolonized archaeologies often misread his criticism of race as a mainstay of these programs as opposition. However, close reading shows that he supports their goals but prefers that they develop strategies that do not rely on explicit or implicit assumptions of dehumanizing racial ideologies. Echo-Hawk's overarching goal is to "spark communal discourse on the problem of race, rather than unilaterally craft solutions, believing that solutions should follow most naturally from social dialog" (*pers. comm.* 1/10/2012).

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Closet Chickens
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Indigenous Archaeologies
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Oral Sources and Oral History
- ▶ Race in Archaeology
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice

▶ Repatriation Acts: The Politics of Repatriation in North America
▶ Repatriation and Race in Indigenous Archaeology
▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)

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École française de Rome

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Basic Information

The École française de Rome, founded in 1873, is an offshoot of the École française d'Athènes (founded in 1846), which became fully independent in 1875. It is a research institution, located in Rome's Palazzo Farnese, that devotes its work to history, archaeology, and the social sciences. The school is administered by a director (currently Professor Catherine Virlouvet) and three research supervisors, respectively in charge of Antiquity (currently Stéphane Bourdin), the Middle Ages (currently Stéphane Gioanni), and the modern and contemporary periods (currently François Dumasy). It hosts 18 members, doctoral or post-doctoral students, for a period of 3 years, as well as research associates and scholarship holders, for a fixed period, and has an archaeology laboratory on the grounds of the *Crypta Balbi* in Rome. The field of operation of the school includes Italy, the Maghreb, and the countries bordering the Adriatic Sea (including Croatia and Albania). Its research findings are published in three scientific reviews (*Mélanges de l'École française de Rome – Antiquité/Moyen Âge/Epoque moderne et contemporaine*), as well as in the form of monographs in several collections (including *Bibliothèque des Écoles françaises d'Athènes et de Rome*). The school also maintains a rich library collection with more than 180,000 volumes, including 2,000 periodicals for consultation.

Major Impact

Since its early years, under the leadership of its director Auguste Geffroy (1820–1895), members of l'École française de Rome have dedicated themselves to the reassembling of inscriptions in Central Italy and to the study of archaeological sites and remains. Emmanuel Fernique was thus one of the first to gather inscriptions from the territory of the Marsi (an Italic people centered at Marruvium on the Fucine Lake), to study the Capua's museum collections (1874), the remains of Praeneste (1880), and finally to conduct surveys in the Praenestine countryside. Right after him, René de La Blanchère dedicated himself to the study of remains in Terracina and the Pontine Marshes, while in 1889, Stéphane Gsell (1864–1932) excavated a portion of the Etruscan necropolis of Vulci on the estate of the Torlonia family. Soon after, Albert Grenier (1878–1961) dedicated himself to a large study of Villanovan and Etruscan cultures in Bologna.

After the establishment of the French protectorate over Tunisia in 1881, the members of the École française de Rome began to shift their archaeological activity toward North Africa. La Blanchère inaugurated the Department of Antiquities of Tunisia and opened the Bardo Museum in Tunis in 1888. In 1890–1891, Jacques Toutain dedicated his work to the worship of Saturn and Auguste Audollent (1864–1943) gathered inscriptions from the region of Constantine in Algeria. In 1893, Henri Graillot discovered some unprecedented monuments in the vicinity of Timgad and Khenchela, before Stéphane Gsell devoted himself to the study of the region and wrote his monumental book (Gsell 1893). In addition to these historical and epigraphic studies, the members of the EFR conducted research operations in North Africa, such as in 1897 Maurice Besnier in the Lambèse camp, Léon Homo and Alfred Merlin in Dougga from 1899, Jacques Zeiller in Thignica in 1906, and Jacques Heurgon and Jean Lassus in Tipaza. This activity in North Africa has continued to this day, especially with the excavations of the hill of Byrsa in Carthage, of Sufetula, of Bulla Regia, of Cherchell, of Volubilis, of the necropolis of Pupput (Ben Abed-Ben Khader & Griesheimer 2004), of the thermal complex and monumental hill of Jebel Oust, and of the settlement of Sidi Jdidi (Ben Abed-Ben Khader et al. 2004; Fixot et al. 2011).

In Italy itself, it was after the Second World War that the archaeological activity conducted by foreign institutes resumed. From 1946, Raymond Bloch (1914–1997) directed the excavation of the city of Bolsena, which led to the discovery of the forum and adjacent dwellings (Bloch 1972). From 1949, under the direction of François Villard and Georges Vallet, the excavation of the Megarian colony of Megara Hyblaea began, on the eastern coast of Sicily, which lasted up until 1992 (Vallet et al. 1983-); the excavation resumed in 2006 under the direction of Henri Tréziny. In subsequent years, the EFR launched numerous research projects in Italy. These included excavations at Rome on the Pincian hill (1982–2005) and the Palatine hill (1985–1998), a resumed excavation of the river port of Aquileia (1991–2005), and excavation of the Lucanian site of Civita di Tricarico in Basilicata and of the Greek and Lucanian city of Poseidonia/Paestum. In Etruria the EFR has investigated Musarna, a purported colony of the city of Tarquinia, and its necropolis. The EFR has also participated in the excavation of the Celto-Etruscan necropolis of Monterenzio Vecchio (2000–2005), as well as in projects in the Balkans (Sirmium, Salone, Caričin Grad).

Currently, the École française de Rome is continuing its archaeological activity in Italy. This includes work on pre-Roman populations, for example excavation and survey at the fortified settlements of the Vestini and Paelignians in the Abruzzo region. The EFR is also carrying out projects focused on the Roman period, including study of the remains of the Domitianic stadium known as the *Circus Agonalis* (the present Piazza Navona in Rome) and excavations of the Loron villa in Croatia, of the township of Kouass in Morocco, of the catacombs of Saints Peter and Marcellinus in Rome, and of the Vigna Barberini on the Palatine hill in Rome (Villedieu 1997–2007). Additional fieldwork has been carried out at Pompeii with the investigation of ancient bakeries and geophysical and paleoenvironmental studies at Portus with the collection of core samples and the study of the warehouses of Trajan. Medieval archaeology has been investigated at Sabra al-Mansuriya in Tunisia, in the baths of Cefalà Diana in Sicily, and at the cemetery and dwelling of Lezha in Albania. In a collaboration with the EFA, L'École française de Rome is also involved in the excavation of the Greek city of Apollonia in Illyria (Albania).

The Jean Bérard Center in Naples (http://www.centre-jean-berard.cnrs.fr/), which is involved in joint research with the CNRS and the École française de Rome, is also organizing archaeological research, particularly in the necropolis of Cumae, at Pompeii and Herculaneum in Campania, and in Laos, in Calabria.

Thus, for nearly 140 years, the École française de Rome has been a major player in archaeological research in the western Mediterranean region. Currently, it aims to strengthen its partnerships with international teams and to be ever more open to the contribution of archaeometry

and related disciplines, with the aim to enhance over the long term (from prehistory to the end of the Middle Ages) an understanding of ancient societies of the Mediterranean basin, while contributing to the research training of young archaeologists and widely disseminating its findings in publications or on its website (www.efrome.it).

Cross-References

- ▶ American Academy in Rome
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- ▶ Architecture, Roman
- ▶ Archival Research and Historical Archaeology
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- ▶ Ceramics, Ancient Greek
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Deutsches Archäologisches Institut (DAI), Rome Department
- ▶ Economy, Roman
- ▶ Epigraphy, Imperial Latin
- ▶ Epigraphy, Latin: Early Through Late Republican
- ▶ Italy: Medieval Archaeology
- ▶ Latium Vetus, Latium Adjectum
- ▶ North Africa, Roman
- ▶ North Africa: Historical Archaeology
- ▶ Numismatics, Roman Imperial
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Economy, Roman

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Introduction and Definition

The Roman economy was the economic system created by the geographical expansion of the political power of Rome over the Mediterranean and Europe between the third-century BCE and the first-century CE and maintained during the first centuries of our era until its gradual decline in late antiquity. The Roman economy can be seen as the acme of a long period of technological development and economic growth in the Mediterranean, which began in the early first millennium BCE and led to population increase, intensification of land use, economic and political integration, and urbanization. Its decline in late antiquity marks the beginning of a long period of transformation and urban regression in Europe as well as in large parts of the Mediterranean.

Historical Background

Academic History

The history, structure, and performance of the Roman economy have been hotly debated issues since the late nineteenth century. Debate about the Roman economy has long been characterized by a strong emphasis on the differences or similarities between the Roman economy and the

economy of the industrializing world and by an opposition between optimists, who are inclined to emphasize Roman achievement, and pessimists, who are inclined to emphasize Roman shortcomings.

The debate originated in late nineteenth-century Europe, with a big controversy between Karl Bücher and Eduard Meyer being a first major milestone. Bücher argued that the ancient economy was a household economy characterized by self-sufficiency. Meyer attacked this view and maintained that the Roman Empire saw the growth of "big business" and a full development of capitalism.

In the core decades of the twentieth century, a "modernist" paradigm dominated the field. It was most forcefully articulated by Mikhael Rostovtzeff, who argued that the Roman economy was structurally similar to the modern economy but only differed in that it operated on a much smaller scale. Romans had well-developed entrepreneurial mentalities, there was considerable long-distance trade, and the economic fate of cities depended on the degree to which they were able to develop large-scale, export-oriented production.

The 1970s saw a true paradigm shift, basically caused by the work of Moses Finley, who was strongly influenced by both the work of Max Weber and Karl Polanyi and who argued that the ancient economy was, in general, a primitive affair. Long-distance trade was restricted to luxury goods, while bulk demand was satisfied through locally produced wares. Moreover, cultural and societal structures impeded large-scale elite investment in manufacturing and held back economic growth. Cities were centers of consumption (Weberian "consumer cities") and display whose economic fate depended on the presence of a landowning elite, and not on market-oriented export production.

Finley's work proved highly provocative and was subsequently refined, adapted, and contested. Especially in the 1980s and 1990s, Finley's ideas were at the center of a fierce academic debate between "modernists" and "primitivists" – with archaeologists generally opting for the modernist side of the debate. Key issues in the debate were the economic role of cities, the existence of long-distance trade, and the presence or absence of technological development.

After the turn of the millennium, the debate moved beyond the Finleyan paradigm and has begun to explore the relative position of the Roman economy compared to other preindustrial economies, particularly Medieval and Early Modern Europe. In the debate, there is an increasing emphasis on historical change and, particularly, economic growth, issues that had traditionally been absent from both primitivist and modernist accounts of the Roman economy.

Evidence

Debates about the Roman economy are based on a variety of datasets that can be divided into two groups: texts and material remains. There are three groups of textual sources: literary texts, inscriptions, and documentary texts. Roman literary texts (including the law codes) provide snippets of information about economic practice, though they are strongly biased towards the elite point of view and are not necessarily reliable when it comes to understanding the details of everyday economic processes – particularly if these took place beyond the world of the literary and political elites. Secondly, inscriptions incidentally reveal information about urban economic life, particularly in Italy and Asia Minor, and particularly about the social dynamics that surrounded urban manufacturing and commerce. Epigraphically preserved government decrees incidentally shed light on the impact of local and supra-local governments on economic life. Thirdly, documentary texts, including papyri and writing tablets, provide detailed information about all kinds of transactions, including loans, tax payments, sales, and orders, though they are only available for a limited number of areas and sites (e.g., Egypt, Pompeii, Vindolanda).

Archaeological evidence used in the Roman economy debate includes remains of infrastructure and buildings, transport containers, products, coins, and iconographic representations of economic processes. Remains of port and road infrastructure give clear indications about not only the geography of trade routes but also

the investment involved in constructing and maintaining the trade network. Similar information can be derived from the remains of commercial facilities and manufacturing establishments. Transport containers, particularly amphorae, can generally be provenanced and tend to give an indication of the products they contained. Finished products themselves reveal information about provenance and production technology, and through the emerging practice of "stamping", they inform scholars about their makers as well. Coins and coin hoards allow scholars to discuss monetization and coin circulation, which is fundamental to understanding the dynamics of trade and transactions. Iconography plays key roles in debates about the technology of production processes, showing depictions of work equipment that has not been preserved archaeologically. However, archaeological data are biased and unequally divided over the Roman world, both in time and space, and their interpretation is often complicated by their inaccessibility and by varying standards of publication.

While the Roman economy debate until the late 1970s was characterized by an overwhelming emphasis on textual evidence, and particularly on literature, the 1980s and 1990s saw a clear increase in the use of material remains in discussing economic issues. Quantitative analyses of dated Mediterranean shipwrecks and of the geographical spread of terra sigillata pottery from the imperial period had a deep impact on the debate, as had the results of field survey projects. An increased focus on urban production facilities in the late 1990s changed the dynamics of the debate about urban economies. After the turn of the millennium, archaeologists increasingly started to explore the possibilities of scientific analysis, including isotopic and DNA analysis on organic remains, which is now enabling to include material categories into the debate that hitherto had little to offer, such as animal bones and human remains.

Historical Context

The emergence of Rome as a local power in the seventh and sixth centuries BCE was related to its proximity to the major crossing of the Tiber and, thus, to the flow of people and goods between Etruria and southern Latium and Campania. As a consequence, trade and transport were at the heart of the Roman economy right from the start, and the subsequent expansion of Rome, from early on, was characterized not only by the spread of political power but also by the emergence of a tightly knit network of economic connections – partially created by government policy and partially emerging through market interaction. Politics and the economy were closely related: economic integration in many cases preceded and/or fostered political integration, which would then further enhance economic integration. Where this was not the case, Romans sometimes appear to have had clear economic motives for expansion, such as the presence of metal ores that could be mined (e.g., Spain, Dacia).

The city of Rome emerged as the center of gravity of this economic network early on, and the volume of demand generated by the city would become a defining feature of the Roman economy as it developed from a regional center into a metropolis of hitherto unknown proportions. From the middle republic to late antiquity, metropolitan demand was a key driving force behind the Roman economy and, to a certain extent, behind the Roman political system. The Roman metropolis is a feature that sets the Roman economy clearly apart from all its Mediterranean predecessors and separates it from most of the preindustrial economies of Medieval and Early Modern Europe.

The historical development of the Roman economy was closely related to and to a considerable extent conditioned by developments in the Mediterranean of the first millennium BCE. These include, firstly, the colonization of the western Mediterranean by the Greeks and the Phoenicians from the early eighth-century BCE onwards and the subsequent increase in contacts between Etruscans, Italians, and Greeks, which transformed the economic landscape of central Italy and the Tyrrhenian Sea and created long-distance trade routes between Latium and the Eastern Mediterranean.

Secondly, an intensification of Aegean and Eastern Mediterranean trade in the second half of the first millennium BCE, and the Hellenization of the East and Egypt after Alexander, created an intensive trade network that the Romans could easily tap into. A similar network was created by Carthaginian expansion in North Africa and Spain, though this was initially less readily accessible to the Romans. These developments were basic requirements for the much more far-reaching economic integration of the Mediterranean which took place under Roman leadership from the last centuries BCE onwards.

Yet besides economically integrating the Mediterranean to an extent hitherto unseen, the Roman economy also integrated, unlike Greek and Hellenistic economies had done, the European continent into Mediterranean networks of trade and exchange and saw the development of intensive trade and exchange with regions beyond the political boundaries of the Roman world, including Europe and Scandinavia, the Near East, and, particularly, India, which developed a trade connection with Roman Egypt through the desert, the Red Sea, and the Indian Ocean. Further, there were indirect trading connections with China, probably both over land, via the Silk Route, and by sea, via India.

Key Issues/Current Debates

Integration

A key aspect of the Roman economy was the integration of an enormous area into what was, essentially, one economic system – even though the extent of regional fragmentation is not to be underestimated. Economic integration was based on the political unity of the Roman world, which brought advanced, often state-sponsored, transport infrastructure; unity in laws and currency; and the spread, throughout the empire, of large groups of people with good long-distance connections and of two languages that together sufficed to conduct business throughout large parts of the Roman world. All these phenomena were unique, and had not been seen before on this scale and over such a large area. Together, they brought about a dramatic decrease in transaction costs which made long-distance transport and trade more feasible than ever before.

Fundamental to the integration of the Roman economy was the large network of roads, which was created and maintained by the state and which connected inland regions with each other and with the sea. There is debate as to whether these roads were specifically created to foster land transport, but there is no debate about the fact that they dramatically lowered its costs. Though land transport still was much more expensive than river or sea transport, the vast road network allowed traders to penetrate areas that hitherto had been inaccessible at a relatively low cost. Comparable investment is visible in port facilities in the Mediterranean, which became more numerous and also larger.

The establishment of colonies and the settlement of Romans throughout the Roman world, but particularly in Roman Europe, also contributed to the integration of the Roman economy, as Roman communities retained close contact with Italy and the Mediterranean. As a result, much more accurate information about faraway markets would have been available throughout the empire. The spread of Mediterranean culture and consumptive patterns over Roman Europe created considerable markets for Mediterranean products, including wine, olive oil, and fish sauce, that were not available locally. Integration of taste also fostered standardization. Especially in the imperial period, certain products (e.g., shoes) were standardized to an extent that empire-wide trends in design can be perceived.

Agriculture

Agriculture was the basis of the Roman economy and occupied, probably, over 80 % of the population. Key crops included the traditional Mediterranean triad of olives, grapes, and cereals. While evidence for agricultural practice is extremely scarce, it is usually assumed that there was relative technological stability in farming methods. Yet Mediterranean farming methods and plant species did disseminate over a large area, including Europe, and there were

major developments in the organization of rural space, particularly around colonies. The rationalized organization of the countryside resulting from centuriation lowered overhead costs by improving the accessibility of land and making the organization and planning of agriculture easier. In general, there is a clear increase in the total area used for intensive agriculture, with intensification being particularly remarkable in the Latin-speaking west. In Roman Africa, field survey has shown an increased use of even rather marginal lands for oleiculture.

While in many parts of the Roman world the small- to medium-sized farmstead was the standard unit in agriculture, there is a clear emergence of farms operating on a much larger scale, including large *villae rusticae* owned by the elite, which came to control significant parts of the countryside (e.g., Settefinestre). There also appears to be an accumulation of estates (*latifundia*) in the hand of increasingly wealthy landowners, some of whom would own a rich portfolio of estates in various parts of the Roman world. It is assumed that this large-scale landowning also fostered new agricultural strategies, including monoculture, and large-scale clusters for processing. Nevertheless, mixed agriculture remained the norm on most farmsteads and *villae*.

The Roman world also saw a clear increase in the amounts of agricultural yields that were consumed at long distances from the place of production. Metropolitan and army demand fostered agriculture throughout the empire, as is attested by literary sources and by the amphora remains from the Monte Testaccio, which show that, especially in the Imperial period, an overwhelming amount of the olive oil consumed in Rome came from Southern Spain. A defining element of the Roman cereal economy was the *annona*, through which the emperor divided grain among the population of the Roman metropolis. Most of this grain came from Egypt and Africa. Other large cities in the empire seem to have had similar vast areas from which they drew their basic foodstuffs, though their economic hinterland is less well studied. Large-scale fish processing and garum production on the coast of Roman Africa and Spain, particularly around the Straits of Gibraltar, was similarly aimed at a vast imperial market.

Raw Materials

As far as the non-food economy is concerned, it is important to distinguish extraction from manufacturing. Raw materials for which there was large-scale and empire-wide demand include a wide range of metals (gold, silver, tin, lead, copper, iron, zinc), stone and marbles, wood, clay, wool, and flax. The availability of these materials differed – some, such as wool, iron, clay, and wood, were widely available, but others, particularly coin metals and marbles, were only found in specific regions or places.

In the case of coin metals, high-quality marbles, and colored stone, there seems to be a direct involvement of the government in extraction: large mines and quarries were generally owned and run by the state, and especially in the case of the important mining regions of Dacia and Spain, the presence of mineable gold and silver seems to have played an important role in conquest. In mining, Romans used advanced hydraulic technologies to get out the metal ores in large quantities, which also involved large-scale investment in aqueducts. They also used Archimedes' screws and water wheels to drain underground mines, so that they were able reach a much greater depth than in earlier periods. Ores were smelted on or near the mining site and then turned into bars or ingots, which were stamped and transported throughout the Roman world. When the imperial government was not directly involved, the evidence suggests more locally oriented extraction through traditional methods and on a much smaller scale. This goes for mining as well as quarrying.

There is clear evidence that materials were transported and traded in more or less raw form over long distances. This included wood, raw wool, flax fibers, stone, and all metals, though trade was much less intensive when materials were widely available. The only real exception is clay, which was generally turned into its final product in a location close to the pit. Glass, dependent on the availability of *natron*,

was produced in a limited number of locations – particularly in the Near East – and then transported in raw form to the place where it was turned into a final product, as is indicated by the discovery of raw glass in several shipwrecks. Trade in raw wool and linen was probably limited to the finer qualities from certain regions and to some bulk trade for the metropolitan market of large cities, including Rome itself. Nevertheless, the general picture suggests intensification and integration compared to earlier periods.

Processing and Manufacturing

In processing materials and foodstuffs, and in manufacturing consumer goods, small-scale establishments remained the norm. The typical workshop was situated in one or two small rooms and operated by a small work group organized around a (male) skilled artisan. Investment in production facilities in such workshops was low, and while the workspace was well-organized, the success of the workshop mainly depended on the artisanal and organizational skills of the work group and, particularly, its leader. In an urban context, workshops would be situated in or attached to a house, and members of the (family) household would form the core of the work group. Most of this production also seems to have been directly oriented towards private customers rather than traders and thus towards local consumption: many workshops had a shop or were situated in one, and iconographic representations of craftsmen show their interaction with customers as well as their work on the products.

Yet alongside this traditional, small-scale manufacturing world, there also is an emergence of manufacturing or processing establishments operating on a much larger scale. More often than not, these also were related to long-distance trade. Imperial period fish-salting establishments in North Africa and Southern Spain could reach vast dimensions, and their products were consumed throughout the empire. High-quality tableware pottery (terra sigillata) was produced in a limited number of production sites where kilns and workshops would operate on a large scale, such as at La Graufesenque or Scoppietto. Fulling factories at Ostia and Rome employed up to 100 people and stood at the end of long-distance clothing trade catering for the metropolitan market. Large-scale workshops could be highly rationalized and use a strict division of labor and rudimentary materials handling. Literary texts further suggest the existence of cities producing large amounts of textiles, though here, individual production units may have remained small.

Commerce

Roman cities were centers of consumption-oriented commerce, and commercial facilities played a highly visible role in the urban landscape. Streets, especially in and around city centers, tended to be lined with shops. These had wide openings on the street that fostered interaction between retailers and passersby. This is a big development from the Greek and Hellenistic world, in which shops were much less common and had less wide openings. Here, commerce was more focused on the agora and private houses. There is a clear change in the commercial articulation of cities in the Roman world, particularly, but not exclusively, in Roman Italy.

Most shops were related to houses. Medium-sized atrium houses in Italy would have one or two shops next to their main entrance; larger houses could have up to ten. The strip buildings dominating the cities of Roman Europe also often would have a shop in front. Besides these privately managed commercial facilities, there also is a spectacular proliferation of market facilities, such as *macella* and *fora*, and other buildings with a (partially) commercial function, such as *basilicae*. Most of this was the result of either state-sponsored initiatives or, more frequently, euergetism or investment by members of local elites. In cities with larger consumer markets, purpose-built shop complexes emerge, as happened in Pompeii from the second c. BCE onwards; the exceptional consumer market of Rome saw the construction of true shopping malls, such as, most dramatically, Trajan's Markets.

This formalization of commercial space occurred, however, against a background in which informal commerce also played a key role. There is considerable evidence for street sellers and itinerant merchants, who operated on the street rather than in shops or visited their customers in their homes. Epigraphic evidence points to the existence, in many cities, of periodic markets taking place on fixed days and following a fixed schedule within a certain region. This also emphasizes the economic role of cities as central places where people from the surrounding countryside could go to get goods and products that were not available in or around their villa or village.

Technology

Technological innovation is a hotly debated issue among scholars. It is uncontroversial that the spread of the Roman economic network over Europe brought a spread of established, more advanced Mediterranean technology over a large area that technologically had been less well developed and that this had some economic effect. Yet, beyond that basic tenet, opinions diverge sharply: some argue in favor of significant technological advance, while others argue in favor of technological stagnation. There is, in fact, something to say for both sides.

In general, stability was the norm, and production processes technologically tend not to differ radically from earlier periods. A key example is textile production: spinning and weaving were done with traditional instruments like the spindle and the warp-weighted loom. While there is evidence for the emergence of the more advanced horizontal loom in late antiquity, it does not seem to have become widespread very quickly. A similar picture emerges from blacksmithing and bronze working. While pottery production saw a clear increase in the use of molds for high-quality tableware, this must be seen as a change of strategy rather than as technological innovation: the technology had been around as early as the Bronze Age and was widely used already before the Roman period.

This is not however the whole story of Roman technological progress: there are several key technologies that found their first widespread application in the Roman world. Important is the material revolution caused by the spread of glassblowing in the first-century AD: glass vessels quickly began to compete with their terracotta and metal equivalents, transforming the dynamics of the tableware and storage ware economies. The invention of the screw press, presumably in the late first-century BCE, had an impact on olive and wine production as well as on the textile economy.

Yet the technological development that is most radical and most hotly debated is the application of water power in several manufacturing processes in the imperial period. While few scholars doubt that the principles of mechanical water power were understood in elite circles, it was long disputed to which extent these principles actually were applied in everyday economic life; however, archaeological work has now confirmed that water power was not only much more common than was assumed in the past but also was a clear development of the Roman imperial period. Attested are water-powered installations for milling flour (e.g., at Barbegal and in Rome) but also to saw stone (e.g., at Ephesos).

Growth

Since the turn of the millennium, the Roman economy debate has developed a strong focus on understanding the scale and nature of economic growth. Most scholars now believe that there was at least some form of aggregate growth in the Roman economy in the late republic and the early empire. It is believed that maritime transport reached a high peak in this period and that this is somehow reflected in the chronological spread of Mediterranean shipwrecks, which shows a clear peak between 100 BCE and 100 CE. Several other datasets have been thought to show similar peaks, including air pollution levels as recorded in the Greenland ice cap. All these data are, however, controversial, so while the general picture of growth is not in doubt, it has not yet been possible to map its precise chronological development or its geographical dimensions.

However, the issue at stake is not so much the occurrence of economic growth in itself but rather the relation between growth and demographic expansion: if the economy grew faster than the population, GDP per capita would rise, and living standards would increase. If this was not the case, GDP per capita would be stable or decline and so would living standards. The question thus is to what degree the Roman economy was able to improve average living standards. The way to do this would be through technological innovation and lower transaction costs, which would enhance productivity. While it is acknowledged that Roman economic integration lowered transaction costs and that there was innovation in some sectors of the economy, it is controversial as to whether these developments really led to sustained per capita growth. Some scholars have embraced the Malthusian model of economic growth, which predicts that, in preindustrial economies, the improved living standards generated by per capita growth directly lead to population increase, which eats away the positive effect, so that living standards will have remained approximately at the same low level. Other scholars point to the boom in investment in public monuments and urban leisure facilities such as baths, theaters, and amphitheaters and to the increasingly wide diffusion of luxury goods and domestic decoration throughout the Roman world, both of which suggest that average living standards were raised to considerably above subsistence level in the early empire. However, this was not necessarily reflected in health and life expectancy, both of which, as analyses of skeletal remains and epigraphy suggest, seem to have remained at levels that are roughly typical for the preindustrial world.

Decline

The strong focus on late republican and early imperial growth in the scholarly debate has not yet been matched by an equally strong focus on the economic history of the Roman world after the second century, when growth evidently came to a halt, and the empire and its economy ran into trouble. Traditional accounts saw the late second century as the beginning of a sharp decline that in the end inevitably led to the collapse of the Roman economic system. Current views are more nuanced and emphasize the dynamic and unpredictable nature of developments and the different fates of different regions, with the Eastern Mediterranean enjoying sustained stability for much longer than the rest of the Empire and economic changes in the Latin-speaking part of the Roman world not only starting earlier but also being more drastic. While for the Eastern Mediterranean it is, in certain ways, possible to speak of a "transition," for the western half of the empire and specifically Europe, "decline" seems a more appropriate term.

The symptoms of decline become first visible towards the end of the second century. The large-scale imperial mines and quarries are deserted in the last quarter of the second century, which is followed by a strong debasement of fine metal in coinage. Investment in large-scale processing and manufacturing plants is severely reduced, with few new constructions, and some going out of use or continuing on a smaller scale. There also seem to be maintenance difficulties in the road network; silting problems in harbors are less rigorously tackled than had been done before, with some notable exceptions. This points to a decline in long-distance trade, which also may be reflected in the decrease in shipwrecks from this period (though this also may be related to a partial replacement of amphorae by barrels). Monumental construction – both imperial and euergetic – declines strongly, especially after the Severan period, taking away one of the motors of early imperial Roman urban economies. Price inflation and state attempts to control the market under Diocletian point to a perception of serious economic turmoil by the imperial elite.

As to what caused the changes after the second century, there is a range of possible causes. They can, roughly, be divided into external causes and internal ones. External causes contributing to economic turmoil include several epidemics that hit the empire in the late second and third centuries, including the devastating Antonine Plague, which raged for 20 years and caused a significant decrease in population. Moreover, the third century brought intensive

warfare at the frontier and several massive invasions from non-Roman Europe. Some scholars have also suggested that the early imperial economy was brought into trouble by climate change. Internal factors contributing to decline may include political unrest and the long political crisis of the mid-third century. Further, a fallout in investment may have led to consumer economies coming to a standstill, while increasing economic inequality caused more and more wealth to be concentrated in the hands of the elite, which has been thought to affect the buying power of the rest of the population. Some have argued that early imperial economic prosperity simply was not sustainable, so that part of the process taking place in the third century would be a natural correction. Yet, it is sometimes hard to distinguish causes from effects, and in reality, many of the abovementioned factors may have contributed to decline and transformation; the debate on this issue has not yet produced a dominant theory.

Cross-References

- ► Infrastructure in the Roman World: Roads and Aqueducts
- ► Trade and Transport in the Ancient Mediterranean
- ► Villas and Farms in the Mediterranean World

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El Miron Cave: Geography and Culture

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Introduction

El Mirón is a large cave that dominates a stretch of the upper Asón River valley at the eastern end

of the province of Cantabria in northern Atlantic Spain, near the border of the Basque Country. Discovered at the same time in 1903 and by the same amateur archaeologists (Hermilio Alcalde del Río and Lorenzo Sierra) as the adjacent and stylistically identical cave art sites of Covalanas and La Haza, El Mirón is at the center of a major cluster of Upper Paleolithic art and living sites that also includes such loci as Venta LaPerra and other caves along the Carranza Gorge, El Horno, La Luz, and Cullalvera. The famous Magdelenian and Azilian site of El Valle, excavated by Sierra, H. Breuil, J. Bouyssonie, and H. Obermaier in 1909–1911, is about 5 km downstream. Despite its obvious potential, El Mirón was largely forgotten and was not systematically excavated until 1996, when the authors of this entry began research in the cave. The excavations have continued ever since, revealing one of the longest cultural sequences in or near the Cantabrian region, rivaled only by sites such as El Castillo (three valleys to the west in Cantabria) or Isturitz (in the French Basque Country) (Straus & González Morales 2012a).

Definition

Located at c. 260 m above present sea level and c. 100 m above the Asón at the town of Ramales, El Mirón is only 20 km from the Holocene shore (and c. 25 km from the LGM shore), but is surrounded by peaks and ridges of the second chain of the Cantabrian Cordillera that reach or exceed 1,000 m. It is near strategic natural avenues of communication between Cantabria and the Basque County (via the Carranza valley) and between Cantabria and the *meseta* of Old Castile (via the low [920 m] Los Tornos Pass). Access to the central sector of Cantabria, with its concentration of Upper Paleolithic sites on the coastal plain near Santander (e.g., Morín, El Pendo, El Juyo, La Garma) and in adjacent montane valleys (e.g., El Rascaño, El Salitre, Monte Castillo), is also relatively easy via 675 m Alisas Pass between the Asón and Miera valleys – visible from El Mirón. There is a cluster of Upper Paleolithic and Mesolithic sites near the present mouth of the Asón: El Otero, La Chora, Cobrante, El Perro and La Fragua, plus several sites (notably Cofresnedo, Cubio Redondo, Patatal, and Los Emboscados) in the polje of Matienzo that lies not far inland. El Mirón faces due west and looks out from a steep cliff side at the pyramid-shaped San Vicente Peak (reminiscent of Monte Castillo, which contains the cave sites of El Castillo, La Pasiega, Las Chimeneas, Las Monedas, and La Flecha). The accessible part of this simple, straight, single-chamber cave is some 130 m deep. Although there are archaeological remains (including Magdalenian evidence) in the dark inner cave, the excavations have concentrated on the rich deposits in the sun-lit vestibule, which measures 30 m deep × 8–10 m wide and 12–13 m high (with the outer mouth being 19 m high and 16 m wide). The sedimentary in-filling (up to 9 m deep according to ground-penetrating radar and other remote sensing methods and coring) records a very long sequence of depositional agencies and late Pleistocene climate changes (Courty & Vallverdu 2001; Ellwood et al. 2001; Straus et al. 2001).

Key Issues

González Morales and Straus have conducted excavations in El Mirón since 1996, mainly in the vestibule (although they also found traces of early Magdalenian occupations in the dark cave interior and in the narrow ramp gallery that connects it with the vestibule). The vestibule excavations have consisted of two 9–10 m^2 block excavations (the outer vestibule Cabin and inner vestibule Corral areas) connected by a 9 × 1 m trench with a deep 1 × 1 m *sondage* at its midpoint, plus a 4 × 1 m trench dug below the base of a looters' crater at the base of the ramp at the vestibule rear that is connected to the NE corner of the Corral area, and a 2.5 m^2 pit that is connected to the SE corner of the Corral area between a huge decorated block and the rear wall of the cave vestibule. There are now 78 radiocarbon dates (AMS and conventional) from the site (Straus & González Morales 2003, 2007a, 2010).

The composite cultural sequence revealed by these excavations in various sectors of the cave and dated by radiocarbon is as follows:

Late Mousterian, 41,280±1,120 BP (all dates, uncalibrated): Ramp Base

Gravettian, 27,580±210 BP: Ramp Base

Solutrean, 19,230-18,390 BP: Corral and Ramp Base

Initial Magdalenian, 17,400-16,080 BP: Ramp, Corral, Mid-Vestibule, Cabin

Lower Magdalenian, 15,700-14,600 BP: Inner Cave, Corral, Behind-Block, Mid-Vestibule, Cabin

Middle Magdalenian, 14,850-13,490 BP: Corral, Behind-Block, Mid-Vestibule, Cabin

Upper Magdalenian, 12,970-12,460 BP: Corral, Mid-Vestibule, Cabin

Final Magdalenian/Early Azilian, 11,950-11,205 BP: Corral, Mid-Vestibule, Cabin

Azilian, 10,740-10,270 BP: Ramp, Mid-Vestibule, Cabin

Mesolithic, 9,550–8,380 BP: Corral, Mid-Vestibule, Cabin

Neolithic, 5,790–4,680 BP: Mid-Vestbule, Cabin

Chalcolithic, 4,120–3,820 BP: Cabin

Early Bronze Age: 3,700–3,230 BP: Inner Cave, Cabin

In addition, there are traces (torches) of Medieval visits to the cave (CE 1100–1400), as well as ample evidence of recent occupations by humans and/or their livestock up until the time the excavation began.

The Mousterian and Gravettian are attested by very small numbers of scattered, banal lithic artifacts (flakes and a few notches/denticulates in the former; flakes and blades – including a few retouched ones – in the latter), together with dispersed charcoal fragments and faunal remains (essentially red deer and ibex, plus lion in the Gravettian according to preliminary identification by A.B. Marín). Hominin visits to the cave (or at least to the vestibule rear) were ephemeral.

The cold, dry conditions that developed during the course of the Gravettian-age deposit (evidenced by pollen analyzed by M.J. Iriarte (Straus et al. 2011b) and rodents studied by G. Cuenca-Bescós (Cuenca-Bescós et al. 2008) continued into the overlying Solutrean sequence, with open landscapes dotted only with some pine trees. Humidity increased in the later Solutrean levels with the addition of birch and more heaths, grasses, and ferns. The light colored clayey/sandy silt Solutrean levels, banked up against the base of the colluvial-alluvial erosional ramp that leads up to the inner cave, show some increase in the intensity of use of the cave by humans, but probably for very limited purposes. The density of artifacts and bones is low, and there are no hearths or other features in the 4–5 m^2 in which the Solutrean has been excavated. There are relatively few lithic debris (especially cores and other primary débitage items, although micro-débitage is abundant), limited numbers of retouched tools (notably continuously retouched pieces, denticulates/notches, sidescrapers, simple angle burins, and backed bladelets), but relatively many Solutrean points (almost all broken) of various types and made on diverse raw materials, some rather colorful and from nonlocal sources probably near the Vizcayan and/or Santanderine shores. Alongside the points (shouldered, laurel, and willow leaf, unifacial, and concave base), there are consistently perforated objects, especially marine shells, but also teeth (red deer canines) and bones. A few *sagaies* have been found, including one with a long bevel or tip decorated by numerous, fine, oblique engraved lines. In addition to remains of red deer and ibex, there are also fish bones and a few unperforated mollusk shells. A plausible hypothesis is that the cave was used for repeated hunting expeditions in the montane zone under still-rigorous, though attenuating climatic conditions apparently right before, during, and right after Greenland Interstadial 2 within the Last Glacial Maximum *in sensu lato* (Straus & González Morales 2009; Straus et al. 2011b).

The transition to the Initial Magdalenian occurred sometime around 17,000 BP (uncal.) during early Dryas I (Straus & Gonzalez Morales 2012b). The most notable change within the context of El Mirón is the fact that these dark gray-brown silty loam levels (richest by far at the foot of the ramp) now lie relatively flat and are dense in lithic and osseous artifacts of many kinds,

faunal remains, remnants of hearths (abundant charcoal, burnt flints and bones, actual fire pits, fire-cracked rocks), thin patches of pigment. *Sagaies* are numerous and include a wide range of sizes and sections. The lithic assemblages include both large flakes and flake tools (scrapers, denticulates, notches) on local raw materials (quartzite, mudstone, limestone) and smaller implements (including backed bladelets) made on good-quality flint, apparently from nonlocal, coastal sources. Assemblages characterized by macroliths on non-flint materials have been found in other early Magdalenian (and Solutrean) contexts in Cantabria and Asturias. Classic diagnostic "fossil director" artifacts of the French Badegoulian are very rare or absent. Remains of red deer, ibex, and salmon are abundant. The basal Initial Magdalenian level yielded a broken (unfinished?) pendant with a fine engraving of a horse head on a slate-like rock of possibly local provenance.

The classic Lower Cantabrian Magdalenian is extremely well represented in El Mirón. The cave seems to have been entirely and intensively used by humans during repeated, relatively long-term, multifunctional occupations, possibly during the warm season. The deposit is a veritable horizon of dark chocolate brown color, rich in charcoal and other organic matter, hearths with fire-cracked rocks (attesting to stone-boiling and probably bone grease extraction as part of hearth-centered activities; Straus & González Morales 2007b; Nakazawa et al. 2009), vast quantities of red deer, ibex, and salmon remains (Consuegra et al. 2002; Cuenca-Bescos et al. 2012), lithic debris and retouched tools, antler *sagaies* (round, quadrangular, oval, centrally flattened sections, single bevel-base, sometimes geometrically decorated), bone needles, perforated animal teeth and shells, etc. The lithic tools are heavily dominated by backed bladelets (presumed projectile weapon elements), but there are also many nucleiform endscrapers (bladelet cores that may have been used as scrapers), and the usual retouched blades, notches, denticulates, and sidescrapers, plus smaller numbers of perforators and burins (Straus et al. 2008). High-quality flint from probable Upper Cretaceous flysch sources along the present shore near Bilbao and Santander dominate the lithic assemblages and attest to visits, stays, and/or social contacts at the coast. Together with several engraved fragmentary pieces, an essentially whole, large red deer stag scapula with the striated engraving of a red deer hind head and neck followed by the engraved outline of a possible bovine was found in this horizon (Gonzalez Morales et al. 2007). It is almost identical to other such pieces that have been found since 1902 (first by Alcalde del Rio) at other Lower Magdalenian sites in Cantabria and eastern Asturias (notably at El Castillo, Altamira, and El Juyo). As first noted by Breuil, these images bear strong technical and stylistic similarities to striated engravings (especially of hinds) on the cave walls of caves such as Altamira, El Castillo, Llonín, etc. The Lower Magdalenian horizon also yielded an iron oxide pebble with a fine reticulate engraved design and *Homalopoma sanguineum* shells from the Mediterranean, as well as relatively numerous shells from the Cantabrian Sea. Despite the presence of regional territorial stylistic markers (the engraved scapulae), this horizon yielded another possible piece of evidence of participation in long-distance social contacts: a distinctive, thin spearthrower that is almost identical in its size, shape, and proportions to three others of similar age from the sites of Le Placard and Roc de Marcamps in west-central France (González Morales & Straus 2005, 2009).

It was near the beginning of this period that a very large block fell from the ceiling of the vestibule rear, landing with its eroded outer surface atop Level 110. The flat, sheared-off inner surface, oriented toward the cave mouth and hence the sunlight, was engraved soon thereafter with two series of (apparently nonrepresentational) lines (deep and wide, shallow, and narrow). (There are other fine engravings – including one of a horse – on the rear wall of the vestibule, probably also dating to the Lower-Middle Magdalenian; García et al. 2012.) Behind this block, in the c. 1 m space between it and the rear cave wall, partly atop a bedrock ledge that had been hit by the fallen block and partly in a pit dug into a preexisting Lower Magdalenian level, the

remains of a partial human skeleton (notably lacking its cranium) were buried. The bones (including a complete mandible with teeth) are stained with red ocher, the back (eastern) face of the block adjacent to the burial is also so stained, and the level in which the human remains are buried is also stained red and speckled with hematite crystals of nonlocal origin (R. Seva, *pers. comm.*) The burial level is under- and overlain by fire lenses. Clearly this burial – the first one of Magdalenian age to be found on the Iberian Peninsula – was a secondary interment done in a highly ritualized context, as manifested notably by the engraved and painted block (Straus et al. 2011a).

The Lower Magdalenian levels grade rather imperceptibly into layers that are dated to the Middle Magdalenian time range. The lithic and osseous artifact assemblages are generally similar, but there are markers of neither the Cantabrian Lower Magdalenian nor the classic Pyrenean Middle Magdalenian (notably *contours découpés* or perforated bone disks) which have been appearing with increasing frequency in recent excavations of Cantabrian sites (e.g., Las Caldas, La Viña, Llonín, Tito Bustillo, El Juyo, El Linar, La Garma, Ekain). Somehow El Mirón (or at least the small part of the site that has been excavated) failed to receive such "calling cards" from the wider Magdalenian world at this time. People repeatedly and intensively occupied the cave (as before) during the warm months, hunting red deer and ibex (according to analyses by A.B. Marín [2010]) and fishing salmon. The artifact assemblages contain abundant backed bladelets and *sagaies*. Periods of abandonment are suggested by rodent and raptor activity.

The Upper Magdalenian represents a significant break in the nature of human use of El Mirón. The levels are thinner, poorer, and discontinuous. The red deer- and ibex-dominated faunal assemblages attest warm season visits to the cave, now without the abundant hearths of the earlier Magdalenian levels. The artifacts continue to include many backed bladelets and backed micropoints, as well as *sagaies*. There is one fragment of a unilaterally barbed antler harpoon closely associated with charcoal dated to 12,970±70 BP (uncal.). During the terminal Late Glacial, human settlement in the Upper Asón seems to have been concentrated in caves at the base of this valley and that of its Río Calera tributary immediately east of El Mirón: El Valle, Cullalvera, and El Horno, all with Upper Magdalenian and/or Azilian materials.

The following Upper Paleolithic levels are difficult to assign to either the Terminal Magdalenian or Azilian. They date between 11,950 and 11,650 BP, but with some incoherency. True "fossil directors" are absent from the small assemblages, but there are curved backed "Azilian" points, thumbnail endscrapers, and an elongated pebble stained with red ocher. The levels are thin and discontinuous, with evidence of warm season hunting of red deer and ibex according to A.B. Marín (2009, 2010). Levels with unambiguously Azilian-age dates are unfortunately even less well defined in terms of artifacts, although lithic Azilian points and thumbnail endscrapers are also present. The presence of c. 10,500 BP dates in a small remnant of breccia (with only a few visible flakes and bones) under a travertine adhering to the cave wall at the top of the ramp suggests that there may have been a more extensive Azilian occupation at the western edge of the inner cave that was lost to erosion (possibly including the movement of humans and livestock) during the Holocene. This Azilian episode seems to have been followed by virtual abandonment of the cave, with only occasional, ephemeral visits by humans who left scattered flakes and faunal remains during the course of the Preboreal. Mesolithic occupation of the region was highly concentrated along the shore as this essentially reached its present position. El Mirón only became a significant human residence again in the Early Cantabrian Neolithic, c. 5,700 BP (Peña-Chocarro et al. 2005).

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art

▶ *Homo sapiens*
▶ Europe: Mesolithic-Neolithic Transition
▶ Europe: Paleolithic Art
▶ Europe: Prehistoric Rock Art
▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
▶ Geoarchaeology
▶ Human Evolution: Use of Fire
▶ Hunter-Gatherer Settlement and Mobility
▶ Hunter-Gatherers, Archaeology of
▶ Iberian Mediterranean Basin: Rock Art
▶ La Riera Cave: Geography and Culture
▶ Lithic Technology, Paleolithic
▶ Radiocarbon Dating in Archaeology

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Electron Spin Resonance (ESR) Dating in Archaeology

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Introduction

Electron spin resonance (ESR) has been used for absolute dating of archaeological materials such as quartz, flints, carbonate crystals, and fossil remains for nearly 50 years. The technique is based on the fact that certain crystal behaves as natural dosimeters. This means that electrons and holes are accumulated over time in the crystal lattice induced by surrounding radiation. The age is obtained by calculating the dose received compared to the dose rate generated by the surrounding environment, mainly radioisotopes K, U, and Th. The dating range is dependent on the nature and state of conservation of the sample and the surrounding environment but is between a few thousands and a couple of million years. Since, ESR dating is best and most commonly applied to tooth enamel in archaeology, this paper predominantly focuses on its direct application to fossil remains.

Definition

ESR Basic Principle

In solid-state physics, trapped electrons and holes can be represented with the band model, where electrons are localized by pair of opposite spins on the bands and define the possible energy level they can reach (Fig. 1). The difference between the valence and the conduction band is the energy needed to break a bond in the crystal.

When a bond is broken, the electron has absorbed enough energy to leave the valence band and to be transferred into the conduction band. Near the valence band remain positively charge holes; most of the time electrons will recombine with the holes, returning the crystal back to an electrically neutral state. Crystals, such as hydroxyapatite, which forms tooth enamel crystal, for example, contain defect sites (vacancies, impurities, interstitial atoms) where electrons and holes can be trapped (e.g., Grün 2006).

In Fig. 1 we can see that the amount of trapped electrons and holes is linked to the amount of radiation received by the crystal. The activation energy E_a characterizes the traps and its stability and represents the required energy to free the electron from the trap. At the same time, ionizing radiation can split molecular bonds, leading to the formation of free radicals (e.g., CO_2^- radical in the hydroxyapatite crystal in tooth enamel, Callens et al. 1987).

The stability (or life expectancy) of traps or radicals is proportional to the value of the activation energy E_a, the thermal stability increases with the E_a. The life expectancy τ_e of an electron trapped or of an unpaired electron associated with an organic radical can be estimated using the Arrhenius equation:

$$\frac{1}{\tau_e} = \nu_0 . e^{\left(\frac{E_a}{KT}\right)} \quad (1.1)$$

where k is the Boltzmann constant, T the temperature, ν_o the frequency, and E_a the activation energy.

The life expectancy of an electron trapped in a crystal can vary greatly from a few seconds to a few million years, depending on the material, the trap, and environmental conditions. ESR dating consists of measuring the amount of paramagnetic centers created by natural or laboratory irradiation. The intensity measured is proportional to the amount of radioactivity

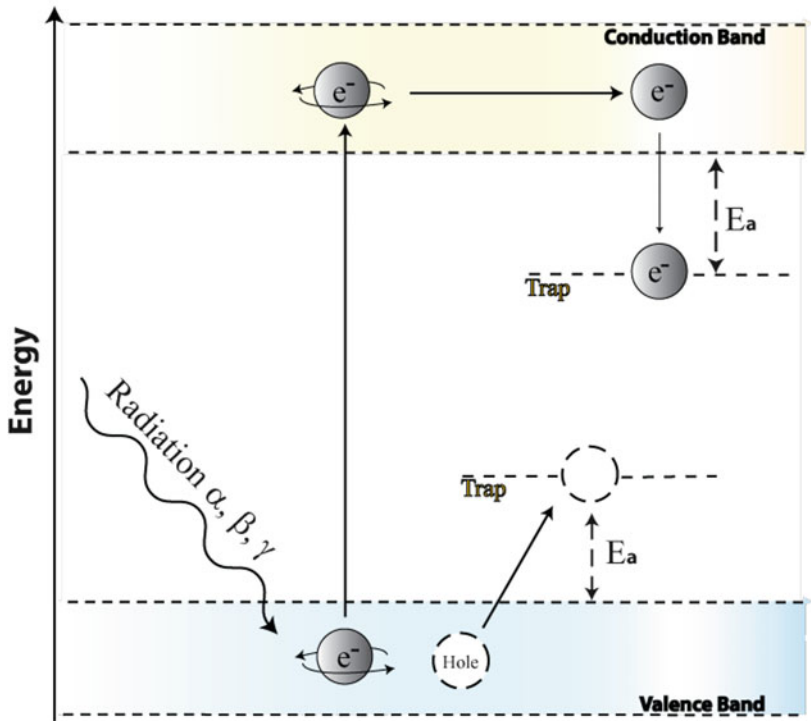

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 1 Band model of trapping charges processes under radiation (Adapted from Ikeya 1993)

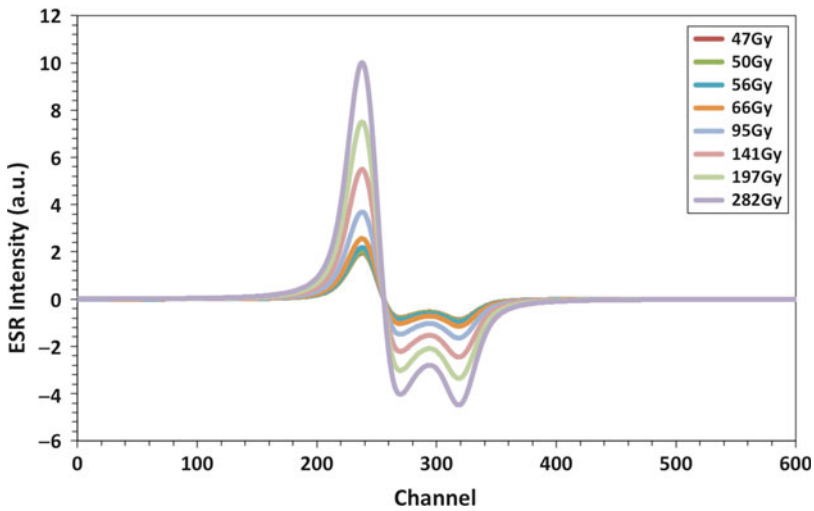

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 2 Influence of laboratory γ-irradiation on the ESR signal of fossil tooth enamel. ESR spectra of fossil tooth enamel are increasing with irradiation; however, the signal remains qualitatively the same

received by the material over time, the amount of traps or radicals available (sensitivity), and the exposition time (age of the material).

Assessing the Dose

ESR dating is only possible when materials behave as a natural dosimeter, meaning that the sample records radiation over time (Fig. 2). The palaeodose corresponds to the dose that the sample has received over time and is directly related to the age. The common method for determining the palaeodose is the additive dose system, where the sample is successively irradiated with incrementing dose and then the

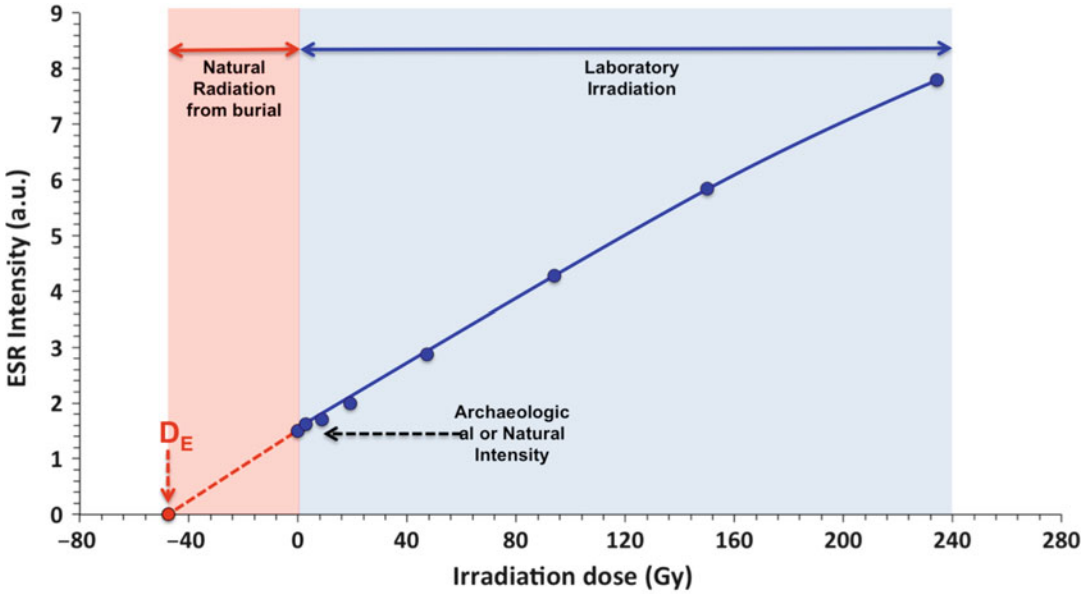

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 3 Determination of the equivalent dose D_E. Dose–response curve of the ESR intensity (au) signal against the dose received. The De is obtained by extrapolation of the curve to cross the x-axis

intensity measured is plotted versus the irradiation steps (Fig. 3). The dose–response curve, by extrapolation, will indicate the D_E (equivalent dose), which corresponds to the dose the sample has received over time. The dose is described as *equivalent* since it is determined using laboratory gamma irradiation, while the actual dose received in nature is the sum of all radiations from multi-energetic emissions α, β, γ, and cosmic rays.

To obtain a dose–response curve, intensities measured are plotted against a laboratory irradiation dose. The estimated dose–response curve can be best fitted with an exponential curve or single saturating function. The trapping is constrained by the limited number of traps available in the crystal, as well as an ability to trap more electrons, which is inversely proportional to the number of electron already trapped. Exponential fitting is more accurate than a linear fitting; however, it may only be an approximation of the curve that actually occurs. Grün (1989) defined six basic properties that the ESR measurement must satisfy to provide reliable D_E estimation and to avoid large systematic errors: (i) the initial signal (at t_0) is either zero or can be experimentally determined; (ii) the signal intensity grows proportionally to the dose received; (iii) the signals must have a thermal stability, which is at least one order of magnitude higher than the age of the sample; (iv) the number of traps is constant (Recrystallization, crystal growth, or phase transitions must not have occurred.); (v) the signals should not show anomalous fading; and (vi) the signals are not influenced by sample preparation (grinding, exposure to laboratory light, etc.).

The dose that has been absorbed by the sample during the burial time is the D_E and can be written as

$$D_e = \int_{t=0}^{t=T} D(t)dt \qquad (1.2)$$

where D is the dose rate and T the time of exposure, which correspond to the age of the sample.

The dose rate $D(t)$ corresponds to the amount of radiation received by the sample. If we assume that the dose rate is constant, the age of the sample will be

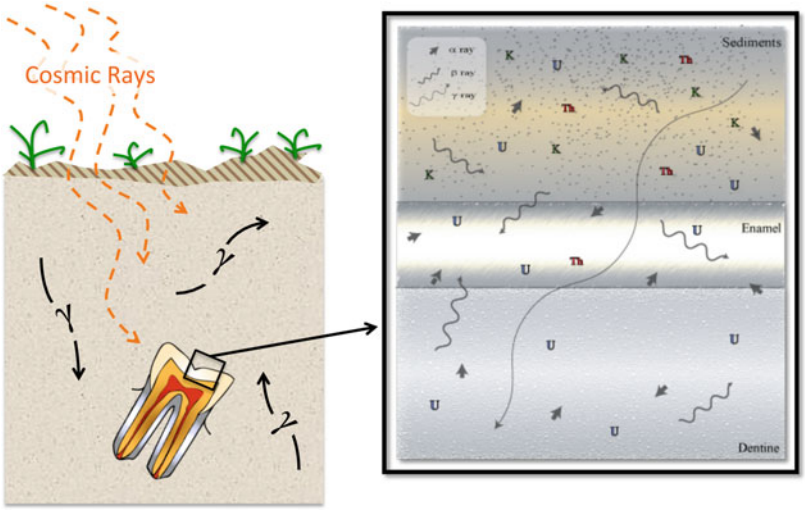

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 4 Schematic representation of the surrounding environment of a fossil tooth in an archaeological site. (*Left*) Cosmic ray influences vary depending of the depth of the sample and the nature of the sediment layers. Gamma rays from surrounding elements and sediment layers for up to 30 cm away from the sample can still potentially reach the fossil. (*Right*) Detail of the immediate external dose and the internal dose contribution

$$T = \frac{D_E}{D}. \tag{1.3}$$

where T is the age of the sample and D is the dose rate.

Internal and External Dose

The external dose is derived from the environment surrounding the sample, including from cosmic rays (Fig. 4). Radioelements taken into account in the calculation of the external dose rate are thorium, uranium, and potassium. Different techniques can be used to identify the concentration of these elements, either by counting the number of particles emitted (e.g., spectrometry α) or by measuring directly the isotopic concentration (e.g., mass spectrometry).

The external dose is expressed by the following equation:

$$d_{(external)} = (kd\alpha_{ext} + d\beta_{ext} + d\gamma_{ext} + d_{\cos})t \tag{1.4}$$

where $kd\alpha_{ext}$ is the alpha dose rate and k the α-efficiency; $d\beta_{ext}$, beta dose rate; $d\gamma_{ext}$, gamma dose rate; and d_{cos}, the cosmic ray dose rate.

The internal dose is expressed by the following equation:

$$d_{(internal)} = (kd\alpha_{\text{int}} + d\beta_{\text{int}})t \tag{1.5}$$

where $kd\alpha_{\text{int}}$ is the alpha dose rate and k, the α-efficiency and $d\beta_{ext}$, beta dose rate.

The internal dose rate is calculated from the radioelement emission of α and β particles within the sample (1.5) (Fig. 4). In the case of fossil remains, tooth enamel is usually free of K and Th; therefore, only U-isotopes have to be considered. The internal dose rate adds further complexity, as the amount of U-isotopes in the tooth may vary through time. Therefore, the uranium uptake history plays an important role in the calculation of the average dose rate. In the past, uranium uptake was often assumed, and conventionally two models were used: the early uptake and the linear uptake. In the first model, uranium was modelled as being incorporated within the tooth after a short time; in the second model, uranium uptake was modelled as being continuously diffused during burial at a linear rate. The differences in these models may cause extremely large uncertainties (Grün et al. 2006).

The alpha efficiency corresponds to the ability of alpha particles to create an ESR signal. Because alpha particles have an important ionization energy, a significant local saturation can be observed, inducing fewer paramagnetic centers to be created. The k factor in front of $d\alpha_{ext}$ in the equation is calculated in order to correct for the attenuation of alpha source within the material. The factor varies depending on the material. For example, the alpha efficiency was estimated at 0.13 ±0.2 in fossil tooth enamel (Grün & Katzenberger-Apel 1994).

The annual dose, which corresponds to the dose that the sample has received over a year, can be written:

$$D_{annual} = d_{(external)} + d_{(\mathrm{internal})} \tag{1.6}$$

The external α contribution in the total dose rate is only a few percent and can often be negligible. In contrast to α particles, the influence of β and γ rays in the electron trapping process is significant. The external β dose rate must be calculated from sediments directly surrounding the sample being dated. The external dose is derived from the chemical analysis of U, Th, and K of the sediment. The water surrounding the sample has to also be included in the calculation of the β and γ dose rates. γ rays are usually measured in situ, when possible; otherwise the external γ dose rate is derived from the chemical analysis of sediments. The amount of cosmic rays received by the sample will depend on the altitude, latitude, and the depth of the sample within the sediment, as well as the nature of sediment.

Errors and Uncertainties

The ESR dose estimation error is estimated with the equation described by Yokoyama (Yokoyama et al. 1985):

$$\Delta T = T\sqrt{\left(\frac{\Delta D_E}{D_E}\right)^2 + \left(\frac{\Delta D}{D}\right)^2}. \tag{1.7}$$

Random error is considered to be in the range of 5–7 %. In ESR dating, systematic errors are usually unknown and therefore cannot be corrected. The systematic calibration errors can be sometimes as high as 5 %. The largest error in ESR dating of tooth enamel is usually associated with the unknown U uptake. When using parametric models, such as early or late uptake, errors in the 50 % range are often found. A common mistake is the negligence of errors. However, this should be considered as important as the dose calculation itself.

Key Issues/Current Debates/Future Directions/Examples

ESR dating is most commonly applied to fossil remains from animal or human. Nevertheless, other materials have been dated by ESR with different level of success.

Carbonate crystal, such as corals, speleothems, calcites, travertine, and mollusc shells, can be dated by ESR; however, the complexity of the signal and doses calculation constrained severely the accuracy. U-series dating and radiocarbon dating are usually the preferred methods, especially for corals and speleothems.

Cherts and quartz are other materials that give a datable signal by ESR. Nonetheless, other techniques such as TL and OSL, respectively, are generally more reliable.

The main advantage of ESR dating remains its ability to date directly the sample, especially fossils. Unfortunately, bones are not suitable for age assessments by ESR dating. This is because complex diagenetic processes occur during burial, leading to the destruction of some bone structures. Only fossil enamel appears to be suitable for direct dating with ESR.

Far too many studies have been carried on tooth enamel to be reported in this entry, but the successful application on archaeological and paleoanthropological sites has been reported for fossils ranging from a few thousands (e.g., Grün et al. 1996) to about a million years (e.g., Han et al. 2012) and exceptionally to a few millions of years (Curnoe et al. 2001). A strong limitation lies in the destructive nature of ESR dating of fossil remains. Commonly, fossil enamel was

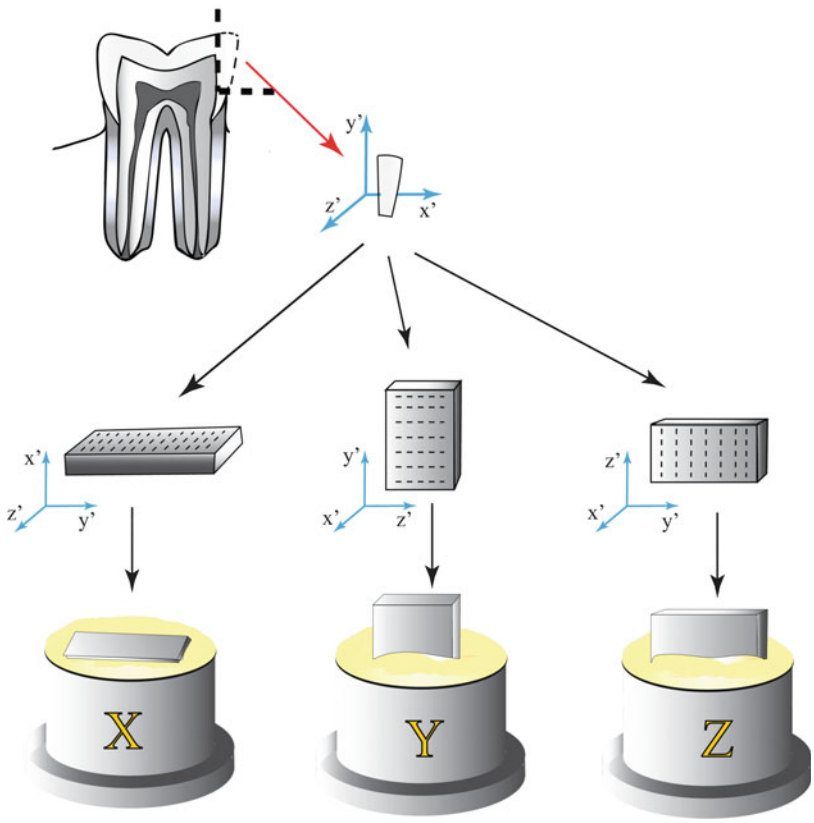

Electron Spin Resonance (ESR) Dating in Archaeology, Fig. 5 Measurements configuration for nondestructive analyses of fossil tooth enamel fragments. The holders are inserted in an ESR spectrometer fitted with a goniometer to allow the rotation of the fragment over 360°

crushed into powder; nevertheless, recent advance in ESR dating (Joannes-Boyau & Grun, 2009; 2011a, b; Joannes-Boyau et al. 2010a, b) allows now the direct nondestructive dating of fossil enamel fragment. The initial step of sample preparation requires a fragment to be removed from the tooth. The use of natural cracks in the enamel offers the best opportunity to separate the fragment, causing minimal damage to the remaining tooth. Small fractures frequently occur on fossil tooth enamel caused by environmental processes during burial. When all experimentation has been completed, the fragment can be reattached to the tooth, with little visible damage. As the impact on the fragment itself is minimal, this protocol is considered to be virtually nondestructive. The tooth is then measured in all configurations to simulate powder analyses (Fig. 5). ESR dating of fragment not only permitted a nondestructive approach but also highlighted errors and underestimation of powder dating (Joannes-Boyau & Grün 2011a, b), enhancing the accuracy and precision of direct dating.

Cross-References

- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science

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Elgin, Lord Thomas Bruce

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Basic Biographical Information

The name of Lord Elgin (1766–1841), Scottish peer and British diplomat, 7th Earl of Elgin and 11th Earl of Kincardine, will forever be linked to the classical sculptures he removed from the Parthenon and Acropolis in Athens and to the cultural property controversy that his actions spawned. The fate of the "Elgin Marbles," sold by Elgin to the British Museum in 1816, continues to spark discussion and debate. Those who believe the museum should retain the marbles view Elgin as the man who rescued them from likely vandalism and destruction. Proponents who seek the return of the marbles to Greece regard Elgin as a plunderer (Byron's "worst, dull spoiler") who abused his political authority to mutilate and cart off one of the world's greatest cultural treasures.

In late 1798, after serving in diplomat postings to Vienna, Brussels, and Berlin, Elgin was named Ambassador Extraordinary and Minister Plenipotentiary to the Sublime Porte of the Turkish Sultan at Constantinople. Elgin's appointment to the Ottoman court followed hard upon Napoleon's invasion of Egypt earlier in the year. The new ambassador's mission was to develop an alliance with Turkey in order to expel the French from Egypt, which was nominally under Turkish rule, and to consolidate British interests in the region.

Major Accomplishments

Before setting out for Constantinople, Elgin decided to undertake an ambitious project to draw, record, and model the sculptural and architectural monuments of classical Athens with the goal of improving the arts in Britain. At this stage of the endeavor, there was apparently no intention of collecting original antiquities; Elgin's interest, typical of his era, was to provide exemplars of classical masterworks for imitation by contemporary artists, for which measured drawings, plans, and plaster molds would suffice. Elgin requested, and was refused, a government subvention for his project, but he persevered using his own funds. After setting out in September 1799 to take up his embassy, Elgin assembled his team for Athens, including the artist Giovanni Battista Lusieri, recommended

by that famous collector of ancient pottery, Sir William Hamilton, the British minister at Naples; and a group of draftsmen, architects, and modelers, hired in Italy by Elgin's private secretary, William Richard Hamilton (Smith 1916: 164–77; St. Clair 1998: 6–10, 20–7).

Lord Elgin arrived in Constantinople in November 1799. His artistic team did not arrive in Athens until July 1800. There they encountered a series of difficulties that stymied their efforts. Ottoman political authority was divided between the local governor and the military commander, and the Acropolis was a fortress and occupied by the commander, his garrison, and their families. Elgin's men had to pay a fee each time it entered the Acropolis, and access to the upper reaches of the Parthenon was strictly forbidden. It was clear to Philip Hunt, Elgin's staff chaplain and diplomatic agent, who visited Athens in May 1801, that a written authorization (*firman*) from Constantinople was necessary, and he drafted a memorandum requesting permission not only to draw and model but also to erect scaffolding, dig the foundations, and to take away sculptures or inscriptions that were not part of the fortifications (St. Clair 1998: 65–7, 86–8). Fortunately for Elgin, at this very time British forces in Egypt had thoroughly defeated the French and were on their way to expelling them from the country. Cairo capitulated on 17 June 1801, and Elgin's *firman* was signed on 6 July (Williams 2009: 67). The connection between the two events cannot be doubted, as Elgin himself testified in 1816, "the whole system of Turkish feeling met with a revolution, in the first place, from the invasion by the French, and afterwards by our conquest;" and "about the middle of the summer of 1801 all difficulties were removed" (Michaelis 1871: 348, 350)

The 1801 *firman*, preserved only in an Italian translation, granted the rights requested in Hunt's earlier recommendation, including access to draw and model the remains, to dig the foundations to obtain inscriptions, and to take away "some pieces" of stone with inscriptions and figures. Now began a wholesale campaign of removals. Elgin's men collected inscriptions, cleared foundations, recovered fallen sculptures, and even convinced the Ottoman governor to allow the dismantling of several metopes that were still attached to the Parthenon, which even Hunt acknowledged was an extension of the terms of the *firman*. Lusieri and his workers also removed large, in situ sections of the Parthenon's continuous Ionic frieze. Marble was sawn away from sculpted blocks to lighten their weight for transport or to take away small pieces as exemplars. A Caryatid was removed from the Erechtheion and replaced by a column of bricks (St. Clair 1998: 92–110, 135).

Elgin thoroughly approved of this work and later testified that he was motivated to collect by the rampant destruction of antiquities that was going on all around him: Wanton vandalism by the Turks, destruction of statuary for making lime, and even the random pickings of foreign tourists were all causing a steady attrition of the ancient monuments. Other contemporaries deprecated Elgin's actions, including English visitors such as Edward Dodwell and Edward Daniel Clarke, who witnessed the heavy-handed dismantling of the fabric of the Parthenon in 1801. Byron's invectives in *Childe Harold's Pilgrimage* intensified (and personalized) contemporary criticism of Elgin and continue to provide poetic fodder for his critics (St. Clair 1998: 96, 102–3).

With the bulk of removals completed by the end of 1802, the difficult task of transporting Elgin's marbles back to England began. Between 1800 and 1825, more than two dozen ships, including both privately contracted carriers and British naval vessels, ferried Elgin's collections home. One ship, the *Mentor*, carrying Elgin's agent William Richard Hamilton and ten crates of sculptures and molds from the Parthenon, was wrecked off the island of Kythera in 1802; Hamilton spent months on the scene and was eventually able to recover most of the sunken antiquities (Smith 1916: 197–8, 231–52).

Lord Elgin left Constantinople for home in January 1803 but was imprisoned by the French when war broke out with England while he was in France; he did not return to England until June 1806. He spent much of his time during the next 10 years assembling his collection, making it

accessible for viewing, and trying to persuade the British government to purchase it. He first installed the marbles in a house in Park Lane, London, in 1807, later moving them to a shed at Burlington House in 1811. He suffered from the debts he had incurred in Athens, which he estimated in excess of 62,000 £. In 1816 a select committee of the House of Commons considered the question of purchasing the Elgin collection, and after hearing testimony by Elgin and his associates, as well as by artists, sculptors, and connoisseurs, the committee upheld both Elgin's authority to acquire the marbles and their outstanding value as artistic masterpieces. After a lively debate, the House of Commons voted to purchase the collection for the nation for the sum of 35,000 £, far below Elgin's stated expenses, and by a vote of Parliament, the collection, to be known as "The Elgin Collection," was vested in perpetuity to the trustees of the British Museum (Smith 1916: 294–351; St. Clair 1998: 245–60). The collection includes, from the Parthenon, 15 of 92 metopes, 17 pedimental figures, and 247 ft of the original 524 ft of the Ionic frieze; from the Erechtheion, a Caryatid, a column, and other architectural pieces; four slabs of the frieze of the Temple of Athena Nike; and architectural pieces from the same temple and from the Propylaia (British Museum Website n.d.).

Lord Elgin never escaped the pressures of the debts he incurred acquiring his famous collection. He died in France in 1841, leaving a substantial family debt, a remarkable collection of classical Greek art in London, and an ongoing controversy that has become the quintessential cultural property debate: Was Elgin a rescuer or plunderer? Did he overstep his authority? Should the celebrated marbles remain in the British Museum or return to Greece?

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology

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Empire in the Ancient Near East, Archaeology of

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Introduction

The ancient Near East was home to the world's earliest empires emanating from the great centers of civilization in Egypt, Mesopotamia, and Anatolia. The earliest empires date to the end of the third millennium BCE when Sargon of Akkad and his dynasty (c. 2350–2193 BCE), and later the kings from the Third Dynasty of Ur (2111–2004 BCE), integrated large parts of Mesopotamia and projected their influence even further. The second millennium BCE saw the rise and fall of a number of smaller empires that were often vying for political, military, and economic advantage. The Late Bronze Age (c. 1550–1200 BCE) in particular saw continuous competition for territory and power between the Hittites, Assyrians, Babylonians, Mittani, and Egypt. The collapse of the economic and political system at the end of the Late Bronze Age brought a period of economic and political reshuffling that would eventually give way to the classic "world empires" of the first millennium BCE: the Neo-Assyrian (744–612 BCE),

Neo-Babylonian (612–539 BCE), and Achaemenid Persian (538–331 BCE) empires. These three empires were highly complex and incorporated vast areas of the modern countries of Iran, Iraq, Turkey, Syria, Lebanon, Israel, Jordan, and at times Egypt. Given the political, military, economic, and cultural power of the empires of the ancient Near East, archaeological investigation has the potential to illuminate human life and society on several levels, from the major monuments and treasures of imperial capitals to life in lands that were incorporated into these empires.

Definition

An empire is a large conquest state that incorporates various geographical regions and sociopolitical groups under its control (Sinopoli 1994: 160, 2001: 444). The Archaeology of Empire is a broad approach to the archaeological record that seeks to understand the processes involved in the creation, consolidation, and decline of empires as well as their impact on the physical and human landscapes of the territories under their control. The large geographical spread of empires means that archaeological study must combine a variety of theoretical perspectives and methodologies and also be in conversation with other relevant disciplines such as history and epigraphy that provide data not available from archaeology (Sinopoli 1994, 2001). As a subset of the broader investigation of empires, the Archaeology of Empire in the ancient Near East attempts to understand the particular ways that empire left its mark on the lands and peoples of the ancient Near East.

Key Issues/Current Debates/Future Directions/Examples

World Systems

One approach to the Archaeology of Empire adapts the concept of core and periphery from Wallerstein's world-system theory for use in precapitalist societies (Chase-Dunn & Hall 1991; Sinopoli 1994: 161). The concept of core and periphery includes the spatial relationship as well as the differences in political, military, and economic power between the imperial core and lands outside the imperial core designated as peripheries. The domination found in the relationship between core and periphery is what Chase-Dunn and Hall call "core/periphery hierarchy" (Chase-Dunn & Hall 1991: 36). While the domination of an empire over a periphery is often massive, the response of the periphery to imperial forces often affects the strategies the empire chooses in its efforts to dominate. Thus, attention to the relationship between the core and the periphery is crucial for understanding the course of the empire.

The Imperial Core

At the center of ancient Near Eastern empires stood one or more major cities that served as loci of political, economic, military, and ideological power. Land surrounding the cities provided agricultural goods and other resources. Sites such as Hattusa in central Anatolia; Nimrud, Nineveh, Assur, and Khorsabad in northern Mesopotamia; Babylon and Ur in southern Mesopotamia; and Susa and Persepolis in southern Iran come to mind when speaking of imperial cores. Each new ruler built or rebuilt capital cities including palaces, gardens, temples, massive fortifications, irrigation systems, roads, and in some cases libraries such as the famed library of the Assyrian king Assurbanipal (668–627 BCE) uncovered at Nineveh. Along with military conquests, building projects played a major role in the communication of the king's splendor in his royal annals. Some of the palaces, such as those at Nineveh from Sennacherib (704–681 BCE) and Khorsabad from Sargon II (721–705 BCE), had orthostats carved with military and hunting scenes and inscribed with texts repeating the grandeur of the king. The palaces established visually the power of the king to the court as well as to visiting foreign dignitaries (Winter 1997). Beyond building projects, the economic reach of these imperial centers can be detected in the nonlocal luxury objects and materials found in them. For example, excavations at the site of Nimrud, an Assyrian city in northern

Mesopotamia, uncovered a large collection of engraved ivories (Mallowan 1978). Many of these ivories were imported or brought to Nimrud on other terms. In either case, they illustrate the interest in luxury goods and the access to the nonlocal natural resource (elephant ivory) and artistic skill needed to turn the raw material into a finished product. Excavations at the site of Nimrud have also proved valuable because they have provided a relatively full view of an imperial capital (Oates & Oates 2001). While the elite and public aspects of imperial centers (fortifications, palaces, temples) have been explored reasonably well, the nonelite areas of imperial capitals have not been explored extensively and may in the future reveal more about daily life in these major centers (Matthews 2003: 142).

The Imperial Periphery

The imperial periphery is the area outside the core over which the empire maintains some level of control, typically related to the extraction of wealth. Ancient Near Eastern empires incorporated different lands along a continuum of control from direct rule (provincialization) to little or no rule ([buffer states/zones] Parker 2001: 249–50). The archaeological manifestation of imperial control varies widely depending on where the control falls on this continuum and what the extractive goals were for any particular area. For example, in areas close to the core of the Neo-Assyrian Empire, provinces with provincial capitals were created to administer these areas effectively. In areas further out, the use of local rulers was common as was the threat or actual application of military force. Destruction layers and sites where the Assyrians had direct control materialize important aspects of imperial practice. Imperial texts recovered in excavations in the periphery also aid in understanding the role of imperial officials and administrative techniques throughout the empire. Monumental inscriptions left by empires in places they have conquered or subjugated, such as the Nabonidus' as-Silaʿ rock inscription in southern Jordan (Dalley & Goguel 1997), make imperial ideology and military domination visible to the dominated.

Areas incorporated into an empire may experience a variety of interconnected changes depending on an array of contextual factors. These can include economic, technological, social, political, religious, dietary, and material cultural changes among others. Some changes may result directly from imperial practices, while others may be the by-products of two-way interactions between local and "global" or imperial traditions (Sinopoli 2001: 445). Tracing and explaining such changes in the imperial periphery is an important emerging area of research. The three most prominent areas of change in the periphery are settlement intensification and complexity, economy, and social and political complexity.

Changes in settlement and subsistence patterns related to the economy are one important type of change that may occur with the onset of imperial control. These may include changes in the location and nature of settlement, type of crops cultivated, land management and reclamation practices, land tenure, intensification and standardization of craft production, storage practices, and specialization (Matthews 2003: 143–5). Parker describes a striking example of such changes along the upper Tigris River in southeastern Turkey. There, in an area under direct Neo-Assyrian control, the settlement system and pottery traditions underwent relatively rapid changes between the ninth and seventh centuries BCE as a result of an Assyrian program of resettlement and development (Parker 2001: 266–70). To some extent, these changes were an extension of similar changes visible around the major cities of the Neo-Assyrian imperial core (Wilkinson et al. 2005). Shifts in settlement patterns are also apparent in areas further from imperial cores. Such is the case for much of the southern Levant where increased settlement intensity and complexity peak under the Neo-Assyrian, Neo-Babylonian, Roman, and Byzantine empires.

Economic changes in peripheral regions can be related to the demand for tribute and other material support by the empire (Sinopoli 2001: 456). They can also be related to the expansion of international trade along old and new trade routes

and the development of specific resource areas such as the development of mining. Tribute lists in Neo-Assyrian texts highlight the kinds of materials that were exchanged in the ancient Near East. Prominent are metals (bronze, tin, copper, iron, gold, and silver), dyed wool, camels, horses, and other animals. While archaeological remains rarely uncover large caches of metals or other exotic items, finds of luxury items in tombs and other contexts reveal an expanded economy during periods of imperial power (e.g., Tyson 2011: 82–90).

The kinds of social and economic changes mentioned here are also often associated with increased social ranking, the creation or expansion of a local elite, and the creation of new polities or secondary states (Sinopoli 2001: 454). The appearance of the state of Urartu in the ninth and eighth centuries BCE is explicable as a direct result of pressure from the emerging Neo-Assyrian Empire (Zimansky 1985: 3). The patchwork of small polities covering the Levant during the rule of the Neo-Assyrian Empire fits a similar pattern (Joffe 2002). Damascus, Israel, Judah, Ammon, Moab, Edom, and the cities along the coast of the Eastern Mediterranean all found themselves under military and economic pressure from the Neo-Assyrian Empire. In this situation, the local elites capitalized on their associations with the empire to enhance their local prestige and power. This becomes visible in the material culture through the appearance of imported luxury goods, as well as architecture, iconography, and other items that emulate imperial styles (Matthews 2003: 143–4; Tyson 2011: 319–22). Emulating imperial styles in order to articulate local power is a common pattern. In her discussion of locally made Neo-Assyrian-style cylinder seals at the site of Hasanlu in northwestern Iran, Marcus argues that the seals were probably not used for sealing, but solely as ornamentation that identified the status and power of the owner (Marcus 1996: 49–50). The spread of Mesopotamian-style open court architecture to many places in the Neo-Assyrian Empire is another example of such dynamics and highlights how local elites sought to enhance their own position by association with international styles.

Beyond the Periphery

Other areas lay beyond the control of empires but were influenced by their development nonetheless because of opportunities for trade. Cyprus (ancient Alashiya) was an important supplier of copper to the ancient Near East in the Bronze Age and benefitted from the markets available for their goods. The Late Bronze Age Uluburun shipwreck off the coast of Turkey demonstrates the quantities of metal and other precious goods that were traded by sea during the Late Bronze Age and highlights the demand for such metals driven by the Hittite and Egyptian empires. In a similar way, demand for spices and aromatics during the Neo-Assyrian and Neo-Babylonian periods spurred the development of trade with the Arabian Peninsula. In these cases, it was not direct or indirect imperial control that spurred developments, but the economic demand that provided opportunities for distant lands.

Future Directions

As a multidisciplinary area of research, the Archaeology of Empire in the ancient Near East will benefit as archaeologists and historians increasingly work together to understand the patterns left behind by vast imperial systems. While some of the main sites in the imperial cores and in the imperial periphery shed light on local cultures and histories, efforts at understanding the relationships between them will illuminate more precisely the ways that empires dominated their worlds and how the cultures and societies that they dominated responded. One area of research that has not yet made a significant impact on ancient Near Eastern archaeology or history is that of postcolonial studies. Postcolonial approaches to the archaeological record have been applied in other areas (e.g., Dietler 2010) and will undoubtedly be applied to cases from the ancient Near East as scholars seek to explain the encounter between empires and local cultures.

Cross-References

- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Mediterranean Sea: Maritime Archaeology

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Emporion

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Introduction

An emporion, usually translated into English as a commercial settlement, trading post, or port of trade, was a location where commercial exchange took place. Archaic and classical sources name 24 Greek emporia, and Hellenistic and Roman sources mention over 100 different sites that they call emporia. The sites can be found throughout the Mediterranean basin and the Black Sea region. Ancient sources do not provide a great deal of information on what emporia were, and few known emporia have been excavated extensively. Consequently, it has been difficult to define the term "emporion."

Definition

The most comprehensive analysis thus far compares the language ancient sources used to describe emporia with what we know about these settlements from other literary, epigraphic, and archaeological sources (Hansen 2006). This interdisciplinary approach has shown that an emporion was a coastal location where commercial exchange took place in self-governing *poleis* (city-states). When located in the non-Greek world, these self-governing *poleis* were usually dependent on another authority.

When located in the Greek peninsula, these *poleis* were autonomous. It is also generally accepted that emporia were multiethnic settlements (Demetriou 2011, 2012).

Key Issues and Current Debates

Emporia have been typically discussed in two different fields. At first, they appeared in discussions on the ancient economy because of their role in long-distance trade. These studies were influenced by the work of Karl Polanyi (1886–1964), who identified ancient Greek emporia with an ideal model of an economic institution called "port of trade" (Polanyi 1963). Ports of trade were defined as coastal or riverine locations, situated at a neutral checkpoint or interface of two groups with differing economic organizations. This model has been criticized successfully by pointing out that emporia were neither neutral nor marginal and that the trading partners' economic systems were similar (Figueira 1984).

Scholars who study ancient Greek colonization and the establishment of new settlements also discuss emporia. The traditional narrative of Greek colonization opposes an emporion and an *apoikia* (colony). According to these accounts, *apoikiai* were political foundations established as agrarian colonies that slowly acquired a territory in the hinterland, which they exploited for the production of agricultural products. One such example would be the colony of Syracuse, whose foundation is traditionally dated to 734 BCE (Thucydides 6.3). In contrast, emporia were established with a commercial purpose in mind and neither developed extensive relations with the hinterland nor exercised control over a territory (Gwynn 1918; Lepore 1968; Vallet 1968). In this scheme, emporia were not political entities and were smaller in area than *apoikiai*. The most frequently cited examples of commercial colonies without a hinterland are several foundations, attributed to Phokaia (Strabo 4.1.5), along the Gulf of Lion on the coast of France and Spain, such as Olbia, founded in the fourth century BCE; Agathe (Agde), a sixth-century establishment; and Emporion, also founded in the sixth century BCE (e.g., Vallet 1968). These assumptions about the distinction between emporia and *apoikiai* have further led to discussions about whether specific settlements were political or commercial in nature. For example, what is usually called the first Greek settlement in the western Mediterranean, Pithekoussai, has suffered especially from this question (Ridgway 1984; Greco 1994).

Recent work has questioned the validity of the false dichotomy between agrarian colonies with a hinterland and commercial colonies without one. On the one hand, archaeological and cadastral studies on the topography of several emporia, typically considered to have been small in size and to have had no relations with the surrounding territory, such as Agathe, Olbia, and Emporion, have shown that the extent of their hinterland and the degree of interaction between the settlement and the territories surrounding it have been vastly underestimated (e.g., Nickels 1982; Clavel-Lévêque 1983; Benoit 1985; Plana-Mallart 1994; Guy 1999. See Demetriou 2011 for a discussion and full bibliography). Studies of sites usually called *apoikiai*, such as Megara Hyblaia, on the other hand, suggest that it is likely that agriculture and trade were complementary rather than mutually exclusive (De Angelis 2002).

Questions about the political nature of emporia have also dominated the scholarship because, on the surface, ancient sources seem to make a distinction between communities that were emporia and communities that had an emporion. For example, Athens (e.g., Demosthenes, *Against Apatourios, Against Phormio, Against Lakritos, Against Dionysodoros*), Corinth (Thucydides 1.13), and Byzantion (Theopompos *FGrH* 115 F62) are said to have had an emporion, whereas Borysthenes on the Black Sea (Herodotus 4.17), Emporion in Spain (ps. Skylax 2), and Naukratis in Egypt (Herodotus 2.178-9) are called emporia. Based on this superficial distinction in the ancient sources, scholars have presented various models to describe emporia. Bresson (1993) understood an emporion to be

either an administered part of a *polis* where commerce took place – e.g., Peiraieus in Athens – or a polity that was dedicated to commercial exchange, such as Naukratis. Wilson (1997) argued that emporia developed over time: in the Archaic period, any community involved in commerce was an emporion but did not necessarily have a political character until the Classical period (e.g., Naukratis), and by the Late Classical and Hellenistic periods, an emporion was a geographically distinct community with its own administrators and judicial apparatus, as in the case of Peiraieus, the fifth-century emporion of Athens. Based on his examination of settlements on the Black Sea littoral, Petropoulos (2005) instead saw an emporion as an intermediate stage in the development of an *apoikia*, namely, a settlement founded with the ultimate purpose of becoming a proper *polis*. A closer examination of the literary sources cited above, however, shows that ancient authors use the term emporion to describe self-governing *poleis* when these are located in non-Greek lands – e.g., Borysthenes on the Black Sea, Emporion in Spain, and Naukratis in Egypt – whereas they say that *poleis* had an emporion when they were located in the Greek peninsula or Asia Minor, as in the case of Athens, Corinth, and Byzantion (Hansen 2006). The ancient sources, therefore, do not make a distinction between two types of emporia. Rather, they reflect the development of the Greek world: they called emporia newer settlements founded on the Black Sea coast and the western Mediterranean whose most important function was commercial, whereas when referring to the older Greek world of the Aegean circle, they called an emporion the space in a *polis* dedicated to commercial exchange (Demetriou 2011).

Emporia had various sophisticated political, administrative, and judicial mechanisms put in place in order to facilitate commerce in emporia (Bresson 2008). Although most of the evidence comes from Peiraieus, the emporion of Attica (Wilson 1997; Garland 2001), there also exist epigraphic and literary sources that are informative about other emporia (Vélissaropoulos 1977; Mossé 1983). From these sources, it emerges, first, that an emporion typically had some degree of autonomy, even when it was dependent on another authority. Second, emporia had their own administrators and other officers who ran commercial operations. For example, both Naukratis (Herodotus 2.178), from the sixth century BCE, and Peiraieus, from the fifth century BCE onward (e.g., *IG* II^2 1607, 1609, 1611, 1622, 2336), had *prostatai* (guardians) or *epimeletai* (curators), who were probably in charge of the administration of the emporion. Peiraieus, the best-known Greek emporion, had an *agora* (marketplace) supervised by five *agoranomoi* (market officials), who regulated commerce (*IG* I^2 896; ps.-Aristotle, *Athenian Constitution* 51.1), as well as several other officers, such as the *metronomoi*, who were in charge of weights and measures (ps.-Aristotle, *Athenian Constitution* 51.2); the *sitophylakes*, who regulated the export and import of grain (ps.-Aristotle, *Athenian Constitution* 51.3); the *dokimastes* (examiner), who tested silver currency (*Agora Inventory* I 7180); the *neoroi* (dockyard officials), who supervised the docks (*IG* I^3 73, *IG* II^2 1, 1607, 1609, 1611, 1622, 1623, 1627, 1628, 1631); supervisors of the harbor (*IG* II^2 1012, 1013, 2336); and the *pentekostologoi*, who were responsible for collecting the 2 % tax on all imports (Demosthenes, *Against Midias* 133 and *Against Phormio* 34.6). Third, commercial trials were instituted in emporia to expedite procedures that involved traders (Mossé 1983; Bresson 2008). A further development in emporia of the Late Classical and Hellenistic periods was the appearance of associations of traders, which had political, social, economic, and religious functions. These were usually grouped according to the traders' *polis* of origin and centered on the worship of a divinity. Examples of these clubs are known especially from Delos and Athens but are also attested in other emporia (Vélissaropoulos 1977; Trümper 2006; Kloppenborg & Ascough 2011).

Future Directions

With few exceptions, emporia have not attracted as many excavations as other *poleis*. The sites that

have been excavated extensively are emporia that are relatively well known in ancient sources, such as Naukratis in Egypt (Möller 2000), Emporion in Iberia (see the Monografies Emporitanes series published by the Museu d'Arqueologia de Catalunya, Empúries), Peiraieus in Athens (Garland 2001; Lovén 2011; Lovén & Schaldemose 2011), Corinth (see the Corinth monograph series published by the American School of Classical Studies in Athens), and Delos (see the Exploration Archéologique de Délos series, published by the École Française d'Athènes). Given that the main function of an emporion was to facilitate trade, it is not surprising that what are often detected in the archaeological record of an emporion are an excellent harbor, a greater variety in the provenance of pottery, a high volume of transport amphorae, a multiethnic population, and religious sanctuaries. Still, there exists no systematic overview of the archaeology of emporia as a category. Further studies could create a model out of the existing archaeological record based on a variety of criteria: quantity and diversity of imports, evidence of mixed cohabitation, presence and extent of relations with the hinterland, etc. Such an exercise will allow scholars to identify emporia in the archaeological record, especially when no other evidence, written or epigraphic, exists for them. For example, the site of Gravisca in Tarquinia, with an excellent harbor, a mixed population, and ceramic evidence of a high volume of trade, can safely be called an emporion, even though no ancient source uses that term to describe it (Torelli 1988; Hansen 2006). Since emporia developed in different geographical and historical contexts, a useful comparison will be one that takes into consideration the sites located in a single region and the relations among them and then extending the study to take into account the whole Mediterranean and Black Sea regions.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Polis
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Trade and Transport in the Ancient Mediterranean

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Encyclopedic Museum

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Introduction

The concept of the "encyclopedic" or, as it is sometimes known, "universal" museum has been around for a long time, certainly since the sixteenth and seventeenth centuries, and it provided a reference point for much museum collecting subsequently, especially in the nineteenth century. The concept came to renewed prominence in 2003 with the "Declaration on the Importance and Value of Universal Museums" by the directors of a self-selected group of big European and US museums (The Art Institute of Chicago et al. 2003). This Declaration was fairly explicitly represented by the directors as the views of the "international museum community." Actually, this is far from the truth, and there has been intense debate about the concept and the Declaration ever since.

Key Issues/Current Debates/Future Directions/Examples

The Declaration, actually, did not use the term "universal museum," except in its title. Instead, the terms "major museums" and "museums whose collections are diverse and multifaceted" were used. Nonetheless, it is clear that the intention of the 18 signatories was to define such museums (especially, though presumably not exclusively, those run by themselves) as "universal museums." The term "universal museum" appears to have been abandoned somewhat later, after a number of attacks were made upon the concept, and today the museums that were signatories of the Declaration seem to prefer the term "encyclopedic museum."

It is worth noting that the Western world actually has very many "encyclopedic" museums, far more than the 18 which signed the

Declaration, even if few are comparable in scale and quality to the 18 Declaration signatories. Virtually every sizable municipal museum service in the UK, for example, is encyclopedic in scope. These museums usually have their origins in the nineteenth century, and at that time, they collected everything they found of interest. What they found of interest was virtually anything antique, British or foreign, as well as art, science, material from "exotic" cultures, and the natural world. As it happened, this period of collecting coincided with the great age of the British Empire, so the opportunities for British museums to amass material culture from around the world were plentiful. Other European museums had similar opportunities.

Somewhat later, American economic power meant that many American museums were able to build collections to match those of the great European museums, sourced from different countries around the world: a form of commercial imperialism rather than military, but collecting based on an imbalance of power all the same. The trouble is these imbalances may be long term, but they are always temporary. The time comes, inevitably, that redress is sought for what can be seen as the plundering by a strong nation of a weaker nation's culture.

Encyclopedic museums therefore contain a wide variety of material; as Cuno puts it, "they comprise collections meant to represent the world's diversity" (Cuno 2008: 140). He goes so far as to differentiate between encyclopedic museums and national museums, which, he says, are merely "of local interest. They direct attention to a local culture," whereas encyclopedic museums "direct attention to distant cultures, asking visitors to respect the values of others and seek connections between cultures." The argument, as promulgated by all supporters of the encyclopedic concept, is that only by assembling encyclopedic collections in one place (the encyclopedic museum) can their full importance be revealed, through their allowing comparisons to made, and global contexts to be explained.

The Declaration on the Importance and Value of Universal Museums arose out of a meeting of the "Bizot Group" of museums in October 2002, which had been convened to discuss the growing "problem" of requests for the "repatriation" of items being made to some European and American museums. While many claims for repatriation come from outside the Western world, often from parts of the world that were exploited by European imperial powers, the meeting and subsequent Declaration seem to have been preoccupied with the movement to repatriate or reunite the Parthenon (or "Elgin") marbles in Athens. This is demonstrated by the use of the example within the Declaration of "the sculpture of classical Greece" as to why the artifacts of "ancient civilizations" should be "widely available to an international public in major museums."

The Declaration therefore demonstrates a close link between the encyclopedic museum notion and resistance on the part of some Western museums to repatriation claims. It might be suggested that the Declaration was in reality little more than a fairly crude attempt to justify the refusal by some big European and American museums to repatriate items acquired through imperialistic and colonial or other questionable means.

What arguments have been deployed by the self-styled universal or encyclopedic museums to justify their resistance to repatriation?

Many arguments have their origin in the eighteenth-century Enlightenment era thinking about the necessity of an encyclopedic approach to understanding – and in the case of museums, representation – of the world. Importantly for these arguments, the notion of encyclopedic museums predates the growth of nationalistic thought in the nineteenth century, and some of these museums predate the modern nation-states that find themselves in the position of making repatriation claims, either on their own behalf or on behalf of indigenous groups within their nations. The global dimension of encyclopedic museums is crucial; nationalistic perspectives, the kind that gives rise to modern requests for the repatriation of museum collections, are narrow and proprietorial. Indeed, there is more than a whiff of contempt towards claims made by

modern governments – Egyptian, Greek, and whoever – because, the argument goes, they are motivated merely by political perspectives, which are transcended by scholastic or archaeological perspectives. Moreover, the nations of these modern governments did not exist when the collections in question were taken into Western encyclopedic museums – so how can the collections possibly belong to these nations? National claims on antiquities "serve the purpose of the modern, claiming nation," as though the purpose of a modern nation, as expressed through its government, is of little consequence (Cuno 2008: 11).

There are a number of justifications for the encyclopedic museum:

- Museums provide a "valid and valuable context for objects that were long ago displaced from their original source" (The Art Institute of Chicago et al. 2003).
- The presence of objects from a civilization, such as the sculpture of classical Greece (in a universal museum), marks its "significance... for mankind as a whole and its enduring value for the contemporary world" (The Art Institute of Chicago et al. 2003).
- The aesthetic of works, such as the sculpture of classical Greece, "appears all the more strongly as the result of their being seen and studied in direct proximity to products of other great civilizations" (The Art Institute of Chicago et al. 2003).
- "...museums serve not just the citizens of one nation but the people of every nation. Museums are agents in the development of culture, whose mission is to foster knowledge by a continuous process of reinterpretation. Each object contributes to that process. To narrow the focus of museums whose collections are diverse and multifaceted would therefore be a disservice to all visitors" (The Art Institute of Chicago et al. 2003).
- Universal museums play a role in "cultivating a better comprehension of different civilisations and in promoting respect among them" (Schuster 2004).
- Universal museums allow cultures to be compared. They "offer us the chance to forge the arguments that can hope to defeat the simplifying brutalities of politics all round the world." They have a "worldwide civic purpose" and show the world that "it is one" (McGregor 2004). They can promote tolerance.
- Encyclopedic museums offer access for all, in big centers of population, whereas if collections were to be repatriated to source nations, fewer people would be able to "access" them.

According to these arguments, the importance of visitors being able to compare and contrast cultural items in encyclopedic museums outweighs all other considerations.

Then there are the legal justifications: what was once acquired by a museum legally cannot now be challenged legally. So, Cuno argues that because permission to remove sculptures from the Parthenon in Athens was granted to the Earl of Elgin by the (then) governing Ottoman authorities, "no legal case can be made against Britain's ownership of the (Parthenon) marbles" by the modern government of Greece or, indeed, by anyone else (Cuno 2008: ix).

The conclusion we can draw from these arguments is that proponents of encyclopedic museums reject any notion that their collections should be subject to any reassessment in the light of modern political perspectives. What these museums have, they will continue to hold, and they will resist any claims for repatriation. These museums carry their own authority, and they refuse to recognize the legitimacy of any attempts to challenge this authority, no matter who makes them.

Among the arguments that have been deployed against the view that encyclopedic museums should be allowed to keep all their collections regardless of repatriation claims are these:

- Ideas originating in the Enlightenment cannot be reconciled with scholarship in the fields of postmodernism and postcolonial theory and are too inflexible to accommodate claims on

modern museums by modern, diverse communities, socially inclusive practices, and democratic impulses (Flynn 2003).

- Items are ripped from their context, and some should be returned to that context, depending upon the resulting cultural benefits (which include an increase in knowledge and understanding).
- This approach is culturally insensitive, selfish, and arrogant.
- There is no evidence that the encyclopedic museums actually do attempt to show the world that it is one that they engage with contemporary politics or generate tolerance and understanding (O'Neill 2007).
- Encyclopedic museums tend to emphasize the distinctiveness and separateness of cultures rather than the universal. They minimize the impact of interactions between peoples and change. They have usually communicated messages of imperial, white, male, and national superiority, in a world ruled (appropriately) by the West (O'Neill 2007).
- Encyclopedic museums tend to be detached, academic, decontextualized, and hierarchical, privileging a Western aesthetic. They have fed the rationale for colonial domination (O'Neill 2007).
- Museums in Africa and other parts of the world from which material culture was removed by Western nations when they were in a position, militarily or economically, to do so, should be able to represent their own culture, and they do not require the job to be done on their behalf by encyclopedic museums in Western countries. Indeed, many people in source nations are grossly offended by how the culture of their nation is represented in encyclopedic museums.
- It is nonsense to claim that collections are more accessible in big European or American cities than elsewhere – they may be more accessible to some, but obviously not to others.

It has to be remembered that all museums remove items from their context (except in a few cases when an item has been specially commissioned for the museum context), so arguments that universal museums are guilty of removing items from their context are by themselves unconvincing. The issue, surely, is what should happen when the possession of an item is *contested*. Dispute might arise for any number of reasons: because the item was stolen from its rightful owner, because it was trafficked illicitly, and because it is important in terms of identity, national, or otherwise.

As far as encyclopedic museums are concerned, though, all arguments in favor of repatriation are subservient to the argument that encyclopedic museums enable the comparison of cultures from around the world.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Museums and the Distortion of Archaeology for Political Purposes
- ▶ Nationalism and Archaeology

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Engendered Archaeologies

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Introduction

Feminist principles made a formal entry into archaeology in the late 1970s, as scholars – the majority of whom were women – began to draw attention to the androcentric biases implicit in archaeological interpretations of the past. Further, these writers noted the degree to which similar patriarchal biases shaped the political economy of the discipline itself, to the general disadvantage of women. In the years to come, these early sociopolitical concerns would be expanded upon by subsequent feminist and queer archaeologists, who in addition identified heterosexist biases in the discipline. These authors called for a better representation of women, men, and others in the past (which had its own political implications in the present) and a commitment to improving the presence of women and sexual minorities among the practitioners of archaeology. This "double politics of representation" has often been acknowledged as the main – or even the only – contribution of these archaeologies. Yet, without downplaying the importance of representation, it should be noted that engendered archaeologies have significantly improved archaeology in general through the provision of alternative historical interpretations, the promotion of self-criticism and reflexivity within the discipline, and the development of new practices and fields of inquiry.

Definition

The term "engendered archaeologies" designates all those archaeologies that explicitly problematize sex, gender, and/or sexuality in interpretations of the past and/or in the practice of the discipline itself. This term, therefore, encompasses the complex spectra of feminist, gender, and queer archaeologies. Although these archaeologies may overlap frequently in terms of theory, practice, and/or politics, it would be wrong to think that they always do so, as will be discussed below.

Historical Background

The Development of Feminist Archaeologies

During the final years of the 1970s, a significant number of archaeologists entered into the debate on discrimination against women, and programs were developed to provide a better representation of women, both in the past and in the discipline itself. These developments were associated with the near-simultaneous arrival of "second-wave" feminism in the archaeological communities of Norway, Britain, and the United States, and its rapid spread to other areas of the globe. In Europe, the Norwegian workshop "Were they all men?" (convened in 1979, though only published in 1987 [Bertelsen et al. 1987]), the journal and network K.A.N., and the TAG session "Feminist Perspectives on the Past," celebrated in 1982, were among the first avenues for such objectives. In the United States, the authors of the "Woman the gatherer" movement in anthropology, in direct response to the success of the landmark 1966 "Man the hunter" conference and later book of the same name, identified sexist biases behind scientific production and pioneered the study of the female role in the history of humankind.

In the 1970s, it was salient to recognize that prevailing conceptions of the past reflected particular researchers' perspectives, disfavored women, and legitimated hegemonic gender ideologies. Following the emergence of feminist women's studies, many archaeological works aimed to make women visible, a logical effort to reestablish balance after several decades of neglect and stereotyping of women in the past. But also from the outset – at the height of

processualism and with culture history as a predominant background – the critique of patriarchal bias brought to the fore the "science question" in our discipline, initiating a debate that would find its full force from the 1980s onward in the heterogeneous perspectives of postprocessual archaeology.

Gender as a Concept in Archaeology

Fundamental to the advancement of feminist archaeologies was the incorporation of gender as an analytical category for the study of the past. Strongly rooted in feminist gender and women's studies in 1970s sociocultural anthropology, the concept of gender first entered archaeology in the 1980s, both in the United States (Conkey & Spector 1984) and the United Kingdom (see 1988 volume 7 (2) of the *Archaeological Review from Cambridge*). In previous years, gender had provided a term to disentangle the biological from the sociocultural, allowing one to refer explicitly to the interpretation – cultural, historical, and constructed – of sexual difference, which was seen as natural, fixed, and inevitable. On one hand, the study of women was released from essentialist background assumptions about "human nature." On the other hand, since gender was not biological and invariable, it offered a proper subject for archaeological research.

When archaeologists first began to discuss gender, the general goal was to engender the discipline (Conkey & Spector 1984). The critique of sexism and androcentrism continued, widening paths opened in previous years. Equity issues and gender roles in professional archaeology came to occupy positions of prominence on the research agenda (Gero 1983) and have continued to be highly relevant since (see, for instance, Díaz-Andreu & Sørensen 1998). Likewise, additional male biases in archaeological interpretation and presentation – verbal and nonverbal – were scrutinized (e.g., Gifford-González 1993). As a result, women have been portrayed as active agents in many domains previously considered exclusively male. By the same token, traditional female activities have come to be considered fundamental to understandings of historical dynamics (Brumfiel 1991; Montón-Subías & Sánchez-Romero 2008). Also important from the outset, early gender archaeologists recognized that reflection on what the concept of gender might mean for archaeological interpretation was a prerequisite to any progress, as were questions concerning epistemology and the production of archaeological knowledge (Spector 1991; Wylie 1992).

Following the precedent set by the 1979 Norwegian conference, the 1980s and early 1990s witnessed the first gender- and/or woman-focused meetings in several different countries. In England, following TAG sessions in 1982, 1985, and 1987, the Cambridge Feminist Archaeology Workshops took place in 1987–1988. The conference "Women and Production in Prehistory" – foundation for the groundbreaking volume Engendering Archaeology (Gero & Conkey 1991) – took place in the United States in 1988. The German Tübingen seminar was convened in the same year. These early meetings were followed in 1989 by the XXII Chacmool Conference in Canada, in 1991 by "Women in Archaeology" in Australia, and in 1992 by a R.A.T. session on "Archaeology and Women" in Spain. Although contextually situated in specific and substantially different academic environments, all of these meetings originated from the experience of being female in archaeology and confronted dominant archaeologies. They acted as "standpoints," where scrutiny and reflection on androcentrism was transferred from individuals and local groups to wider national and/or international communities. They were often the first among a series of meetings, providing much-needed reference – both within the countries where the sessions convened and around the world – for many women archaeologists who had personal experience of sexism.

Since the 1980s, numerous authors have illustrated, revised, and put forward increasingly more nuanced views of gender in archaeology. Some of these scholars have been significantly influenced by developments in American third-wave feminism and have built substantially upon earlier themes, often related to the shifting and intersecting elements of personal identity in the

past. Among these elements is sexuality and one of the major contributions of third-wave feminism to archaeology has been a critique of heterosexism, another form of patriarchal bias.

Archaeologies of Sexuality and Queer Archaeologies

Issues of sexuality have long been on the feminist agenda. Important events of the 1960s – from the near-simultaneous approval of oral contraceptives for use in the United States, the United Kingdom, and West Germany in 1960–1961 to the police raid of New York's Stonewall Inn in late-June 1969 – thrust sexual desire and practice (both heterosexual and homosexual) to the forefront of public debate. Yet, while some authors of the 1970s, like Kate Millet, Carla Lonzi, Gail Rubin, and Michel Foucault, among others, did address issues of sexuality, sustained discourse on the topic would not develop within academic feminism until the 1980s.

Within the discipline of archaeology, sexuality has always been implicitly programmed into interpretations of the past and most archaeologists recognize sexual activity as an essential feature of past societies. Despite its importance to the reproduction of both bodies and cultures, sexuality has been largely absent from archaeological discourse until recently. In the introduction to *Archaeologies of Sexuality*, Schmidt and Voss (2000, following Rubin 1984) identified several factors that have significantly impeded sexuality research within archaeology. These include the assumptions that sexual behavior is biological and, as such, both invariable and ahistorical; that discussions of sex are bad or inappropriate; that monogamous, heterosexual sex is more legitimate than other forms of sex; and that the sexual mores of past cultures were identical to those of the researcher's own culture. Unspoken behind these assumptions is the notion that sexual activity in the past was always primarily procreative; that it was, therefore, above all else – heterosexual.

In the 1960s and 1970s – closely paralleling broader debates about homosexuality initiated by the Stonewall Riots – Classical scholars in philology and history began to address culturally sanctioned male homosexual relations, a common feature of ancient Greek and Roman societies about which they had remained relatively silent for more than a century. Yet, despite the potential of Classical and other material culture to support an "archaeology of homosexuality" which might challenge the heterosexism implicit in mainstream archaeology, early attempts to do so often fell into the trap of reinforcing contemporary Western sexual politics, either associating past homosexuality with deviance or searching too hard to demonstrate a long history for the existence of homosexual identities similar to those of today.

Recognizing the degree to which attempts at an archaeology of homosexuality naturalize contemporary Western social values, a number of scholars (e.g., Dowson 1998) have called for the development of a "queer archaeology", that aims to break away from the essentialist and normative heterosexist constructions employed in traditional archaeological interpretations and from normative structures that guide the discipline itself.

Key Issues/Current Debates

During the 1980s and 1990s, gender archaeologists generally accepted the sex-gender dichotomy. Studies aimed at investigating how gender systems were constructed and organized and how gender acted in structuring societies. Separate case studies highlighted the different – though interrelated – aspects of multifaceted gender systems: from gender relations (gendered roles and activities) to gender identity, through gender symbolism and ideology. The interest in such topics has continued and even grown since that time.

In light of ethnographic and ethnohistoric data, including studies of Native North American two-spirits, Indian hijras, and eunuchs, archaeologists have noticed that societies may have existed in the past with more than two gender identities (for recent coverage, see Hollimon in Nelson 2006). The focus on gender identity has also fostered insights into the intersection of

gender with other types of social ascription, mainly age, race, class, ethnicity, faction, and sexuality (Meskell 2002; Wilkie & Howlett Hayes 2006: 248-50). An incipient concern with intersectionality in archaeology gained greater attention in response to developments outside the discipline, as third-wave black feminists in the United States claimed that gender needed to be analyzed alongside other forms of identity (see Franklin 2001 for archaeology). Of these, studies of age – particularly of childhood – have been especially common in archaeology. The early feminist agenda to include "small issues" in archaeology, and so individual human beings, already embraced the study of children in the past (see Lillehammer in Bertelsen et al. 1987). Since that time, numerous works have followed, even leading to the development of an independent field of inquiry – sometimes without reference to feminism or gender – with an organization of its own: The Society for the Study of Childhood in the Past (http://www.sscip.org.uk/).

Over time, reflexivity about gender identity has also come to include explicit reflections on the construction of the masculine self. More and more men have discovered that they also have gender. They have manifested an open discomfort with – and even an active rejection of – the gender roles attributed to them by contemporary patriarchal hegemonic masculinity. In response to this development, and with the inspiration of sociologists like R.W. Connell and V. Seidler, discussions of masculinity have appeared in archaeology (Knapp 1998; Spencer-Wood 2006: 319-21). Some authors have focused on how specific forms of dominant masculinity – usually associated with violence and warfare – were constructed in the past, while others have questioned the very existence of these forms of masculinity in light of archaeological data (see Alberti in Nelson 2006 for a recent coverage). Such cases provide increasing evidence of how contemporary gender assumptions are read onto the past, impacting not only our understandings of women but also of men and of the broader societies in which they both participated. With each new study, it becomes clearer that the condition deplored by the first feminist archaeologists is pervasive, with more far-reaching effects than originally imagined.

Since the mid-1990s, scholars have started to reevaluate the sex-gender dichotomy. While many continue to accept the distinction as originally formulated, some archaeologists have begun to complicate the sex-gender dyad. Such efforts are guided mainly by the biomedical critique of binary sexual systems provided by Fausto-Sterling and by the notion – advanced by scholars like Laqueur, Wittig, and Butler – that there is no distinction between sex and gender, given that Western notions of sex and sexual difference are also socially constructed and contextually dependent. It is important to distinguish these treatments of sex and gender from another tendency that remains common in archaeology as well as in other disciplines: to use the terms "sex" and "gender" interchangeably while leaving the relationship between the two undertheorized. Here, gender becomes a proxy for the traditional notion of woman (and sometimes also of man).

The influence of poststructural theory on archaeology is perhaps best seen in studies questioning the idea that a stable gender is constructed upon a stable sex and highlighting the remarkable variation in human sex-gender systems (Yates 1993). Many of these studies have further introduced a theoretical interest in the body, embodiment, and sexual identity (see Joyce 2005 for a recent coverage) and have yielded alternative interpretations, as is particularly evident in the study of iconography.

As might be expected, archaeologists hoping "to queer" the discipline have also demonstrated marked interests in the body, embodiment, and sexual identity and have reexamined a number of traditional topics. For example, in the issue of *World Archaeology* (32[2]) dedicated exclusively to queer archaeology (published in October 2000 with Thomas Dowson as guest editor), contributors discussed homophobia within the practice of archaeology itself; new ways of seeing, reading, and/or experiencing the iconography of past cultures (especially with regard to understanding sexuality in the past) and of presenting such alternative readings and

experiences to the broader public; the possibilities of identifying past sexual relationships from nonrepresentational artifactual material; and the relationship between archaeology and other disciplines that take an interest in the materiality of the human body (e.g., biotechnology and genetic engineering). What became clear from many of these papers – mirroring earlier feminist critiques – is that the physical body of the archaeologist is often as important to his/her interpretations of the past as are the bodies of the long-dead people he/she studies. Subsequent work, both published and presented at major conferences (including those of the Society for American Archaeology, the American Anthropological Association, and the European Association of Archaeologists), has kept the contemporary politics of the discipline in focus and continued to advance "alternative ways of seeing" iconographic and artifactual material. In addition, queer archaeologies have expanded to include critical examinations of subjects as diverse as relations between the living and the dead, the gendered division of labor in the past, and consequent impacts on the use of the landscape by individuals of different genders (as can be seen in *World Archaeology* 37 (4)). Notably, the destabilization of the polarity between biology and culture (provided by both gender and queer archaeologies) has stimulated important reflection in bioarchaeology. For example, Geller (2009) has drawn attention to the degree to which the practice of sex determination – whether from the gross examination of skeletal remains or, more recently, from studies of ancient DNA – has tended to read cultural meaning onto past biological difference, effectively conflating "sex" with "gender" and generally reinforcing the dominant sexist and heteronormative discourses of the present.

The 1979 Norwegian workshop called for an individual-inclusive archaeology in contradistinction to dominant archaeologies that were either artifactualist or focused mainly on abstract social categories and broad processes (Bertelsen et al. 1987). Subsequent feminist inquiry in archaeology has continued to emphasize the importance of human agency and other variables to understandings of historical dynamics in the past (Dobres & Robb 2000). These other variables are best viewed at the local scale, often through a focus on daily life and quotidian activities (Brumfiel 1991; Spencer-Wood 2006: 307-10; Wilkie & Howlett Hayes 2006: 250-1). Spanish feminist archaeologists, for example, have put forward the concept of "maintenance activities" to conceptualize this realm of human action, namely, the basic tasks of daily life that regulate and stabilize social life (Montón-Subías & Sánchez-Romero 2008). These activities have been analyzed in a framework that articulates long-term cultural sequences with a focus on the structures of daily maintenance, thus intending to fill the mismatch between the level of macrosocial, economical, political, and ideological structures and that of specific agency. In 2000, volume 31, 3 of *World Archaeology* also proposed the study of the human life cycle to redress this mismatch.

The spotlight placed on human agency, quotidian activities, and the local scale also fostered interest in the analysis of those spaces considered to be the stage upon which everyday life was enacted in the past. Initially, this research was mainly driven by a renewed interest in the study of households. Unlike previous processual treatments of the topic, this new research saw households as pivotal to understandings of historical dynamics, rather than as neutral spaces that simply reflected the changes occurring simultaneously in other social spaces. Through time, this revised household archaeology has come to incorporate many of the concerns raised in the broader theoretical discourse of engendered archaeologies, such as relationality and intersectionality (for a discussion, see Hendon in Nelson 2006; Spencer-Wood 2006: 312-4; Wilkie & Howlett Hayes 2006: 250-2), and has even expanded its mandate to include other similarly delimited and intimate social spaces including brothels, plantations, and farmsteads (Wilkie & Howlett Hayes 2006: 251-2). Queer archaeologies have expanded this research further through a focus on homosocial spaces, pioneered in 1994 by Roberta Gilchrist's study of medieval convents. Critical to these latter studies is the

understanding that archaeologists need not necessarily – and, in fact, should not – assume that all households in the past were spaces in which social reproduction and sexual reproduction intertwined in the context of heterosexual family life.

The advancement of the themes addressed above has sparked debate about the explicit political commitment appropriate to archaeology. "Engendered archaeologies" is an eclectic term that includes feminist, gender, and queer studies in archaeology. Feminist and queer archaeologies should not simply be understood as theoretical currents within a single, bounded discipline, but rather as movements that question the situation of women and sexual minorities in the broader context of contemporary society. The pursuit of an end to patriarchy – which often finds legitimation in the images of the past created by archaeology – has been a driving force in the history of these movements. This is not necessarily the case with gender archaeologies that may be disengaged from feminism, aiming instead to provide another theoretical corpus from which to gain knowledge about the past and, thus, having very different potential implications.

Although gender archaeology was born out of feminist reflections on the discipline and continues to be driven forward by feminist archaeologists, from the moment that gender became a concept in archaeology, some authors have sought to disconnect gender archaeology from feminism. The reasoning behind this disconnection has been both scientific (expressing a belief that science has to be unbiased) and strategic (in line with a belief that gender separated from feminism is less controversial and will more easily enter the disciplinary mainstream). But, ironically, those features of feminist archaeologies that these authors have held up as flawed and/or controversial might also be counted among the most important contributions of these archaeologies to the broader discipline, significantly enriching its scientific debate. An engagement with feminism has forwarded reflection on precisely what "doing archaeology as a feminist" means, following the lead proposed by Alison Wylie in the introductory article of a *Journal of Archaeological Method and Theory* (2007) special issue dedicated to the topic. The work of feminist philosophers like Sandra Harding, Helen Longino, Nancy Hartsock, Donna Haraway, and – of course – Alison Wylie has provided inspiration to a generation of researchers who seek to address interpretation in archaeology and has in turn sparked a number of important epistemological reflections on the production and transmission of knowledge in the discipline.

Some authors, for example, have explored alternative textual forms for conveying archaeological knowledge. Concerns about writing archaeology as a feminist have included more personalized ways of writing about the past, including archaeobiographies (especially in historical archaeology) and storytelling (for an overview, see Wilkie & Howlett Hayes 2006: 252). Of these, storytelling, in particular, offers suitable means to narrate the past, allowing for both the transmission of archaeological (i.e., "scientific") knowledge and the more humanistic "peopling of the past." Janet Spector's "*What This Awl Means,*" published in 1993, is among the most commonly cited examples of this genre, not only because Spector adopts an autobiographical tone in her narration but also because her work initiates an involvement with descendant communities (a concern also raised by indigenous archaeologies). Elsewhere, an emphasis on multivocality has led other practitioners of engendered archaeology to explore the possibilities of writing with hypertext (Joyce & Tringham 2007) and of working with nonprofessional communities who, nonetheless, have interests in archaeological production (e.g., Bender 1998). In the future, it seems likely that engendered archaeology will explore these possibilities further and continue to test the boundaries of knowledge production and transmission within the discipline.

As suggested previously, the relationship between engendered archaeologies and the academic mainstream is complex and nuanced (Engelstad 2007). While some desire engendered archaeologies to be part of the mainstream and others do not (see below), such archaeologies are nonetheless subject to the perceptions and

opinions of the whole archaeological community. Part of this community seems to be disinterested in engendered archaeologies. Contrary to the expectations of some gender archaeologists, obscuring ties to political feminism has done little to ameliorate this disinterest and may result in undertheorized uses of "gender" in which the concept loses its critical nature and becomes shorthand for "women." Trying to "do" gender archaeology, while stripping the term of its original theoretical and political influences, runs the risk of drawing on the same interpretive paradigms against which engendered archaeologies initially reacted.

For many practitioners of engendered archaeologies, what is fundamental is that these approaches were conceived to change the mainstream, not to be part of it. The discussion is not so much how they might be brought into the mainstream, but how they might continue to change the mainstream. Many engendered archaeologies were developed with a desire to permeate the archaeological community as much as possible, altering the mainstream and building a new disciplinary culture. In this, engendered archaeologies share common goals with other archaeological movements, including Marxist Latin American Social Archaeology and postcolonial and indigenous archaeologies.

International Perspectives

Engendered archaeologies, especially archaeologies of gender, have steadily gained recognition since the 1970s. In the process, the first gender-focused archaeology textbooks have been published (Gilchrist 1999; Sørensen 2000), ISI journals have devoted complete issues to the subject (for instance, *Historical Archaeology* (1991) 25; *World Archaeology* (2000) 32(2); *J Archaeol Method Theory* (2007) 14 (3); *Archaeologies* (2011) 7(1)), and key papers have been compiled into readers (Hays-Gilpin & Whitley 1998). Publications have covered broad geographic and temporal spectra (see part IV in Nelson 2006).

The extent to which engendered archaeologies have been adopted into local academies, however, is still restricted in terms of global geography. Differences in content and degree of acceptance vary with factors like national history, the position of feminism, and/or movement to recognize sexual minorities in society, local histories of archaeology and its dominant paradigms, academic structures, the nature of research teams, and, importantly, the efforts of individual scholars to introduce engendered perspectives into the discipline. Thus, in some regions, engendered archaeologies have already established themselves firmly, while in others they remain marginalized or simply do not exist. Having been recognized as major topics in Canada, the United States, Australia, and a few European countries (e.g., Germany, Spain, Sweden, Norway, and England), in most other places, engendered archaeologies retain a novel status and/or have not as-yet made a solid impact. In many European countries, for instance, engendered archaeologies are now becoming more common (see Dommasnes & Montón-Subías 2012). But even this observation requires qualification as queer archaeologies – among the most recent forms of engendered archaeology – continue to be isolated primarily to the Anglophone and Scandinavian academies. Outside of Europe, despite early contributions in the 1990s, engendered archaeologies have not yet gained a position of prominence in South and Central America. The number of gender-related contributions is increasing, however, in the local archaeological academies of countries as diverse as Venezuela, Mexico, Argentina, Ecuador, and Colombia, among others (Navarrete 2010). Aside from South Africa, engendering archaeology has not been a priority in Africa (Folorunso 2007: 358) and, although Asian scholars are working on gender archaeology in universities in North America and the United Kingdom (see Chapter 19 and 20 in Nelson 2006), its presence is much more restricted in the local academies of Asia (for instance, Dezhamkhooy 2011).

Future Directions

Engendered archaeologies have profoundly scrutinized the epistemological, methodological,

and ontological foundations of archaeology and confronted sociopolitics in the discipline. In so doing, they have promoted new professional practices and offered alternative interpretations of the past based on previously neglected material culture and on new readings of well-known materials (such as art and iconography). To date, however, these archaeologies have unevenly impacted specific local academies and traditions. Consequently, engendered archaeologies face unequal challenges in the different parts of the world, and the "future directions" taken by these perspectives will vary markedly depending on the different academic contexts where they have appeared or are appearing.

The promotion of multilateral, international contacts is one avenue that might make engendered archaeologies richer in different parts of the world. Such contacts could lead to a better knowledge of and access to this kind of work at the regional level. For instance, the predominance of Anglophone voices in the international discourse could lead to the wrong impression that, after the 1980s, all feminist archaeology has used gender as an analytical category. An examination of some perspectives with less global "visibility" demonstrates that this has not always been the case. For instance, Marxist feminist archaeologies have followed an alternative and independent path in Spain, drawing primarily on French and Italian feminist conceptions of sexual difference. In much of the world, discussions with the Anglophone archaeological community have been the norm, often to the exclusion of connections with other active academies. Despite the geographical proximity of Spain and Germany, for example, Spanish and German gender scholars have long fostered contact with their colleagues in the UK and North America but remained mutually ignorant of one another. With this history in mind, it is important to recognize that efforts are being made to promote multilateral contacts between the practitioners of engendered archaeologies. One such effort is the Archaeology and Gender in Europe (AGE) working party of the European Association of Archaeologists (http://www.upf.edu/materials/fhuma/age/). While AGE is primarily focused on drawing together members of the European archaeological community, it should be noted that in many areas, locally developed engendered archaeologies are now ripe enough to substantially augment intercontinental networks as well as to benefit from them.

One of the main challenges that engendered archaeologies will continue to face is in finding ways to further deepen the implications of politically committed positions and scholarship within the practice of archaeology. At the beginning of the twenty-first century, the dominant sex-gender system in most parts of the world is still characterized by heterosexism and androcentrism. In archaeology, the term "gender" has been adopted with much less reluctance in some circles than the terms "feminist" and "queer." Such reluctance stands as a self-evident example of how patriarchal biases continue to operate, presenting feminism and sexual identity movements as paranoid, unfashionable, no longer necessary, radical, and aggressive. Feminist and queer archaeologists know these perceptions quite well, and many decide to avoid such terms for strategic motives in grant requests, job applications, promotion-related self-evaluations, and even in their scholarly writing. In response to continued (if not always explicit) pressure, many practitioners of engendered archaeology significantly downplay the relationship of their own work to feminist studies. That so many feminist and queer scholars should feel obliged to dissimulate in this manner demonstrates the continued influence of androcentrism and heterosexism on the academy and suggests that engendered archaeologies will be necessary for the foreseeable future.

Cross-References

- ▶ Engendering Historical Archaeology
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: Spanish Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective

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Engendering Historical Archaeology

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Introduction

To say that gendered social relations are complex would be to profoundly understate the dynamism of the human experience (Rotman 2009). The ways in which individuals understand their roles as gendered beings and their relationships to other gendered beings is constantly pushed and pulled by forces both internal and external to the individual and the family/social/economic unit to which they belong at multiple scales from the household to the community to the nation. Identity, sexuality, cultural prescriptions for social roles, socioeconomic class, ethnic heritage, life cycle, and other dimensions of the cultural world create tensions between societal structures, gender ideals, and individual choices that require continual negotiation, interpretation, and implementation.

Although challenging for scholars who seek to understand these social relations, these complexities are precisely why gender is an endlessly fascinating subject for study. Through time and across space, the material world (objects, structures, and other artifacts) has been utilized to both convey and contest gender ideals, providing a rich lens through which historical archaeologists explore gendered human experience.

Definition

Defining Gender

What exactly is gender? Gender is the cultural interpretation of perceived biological differences. Many cultural systems, particularly those of Western origin, construct male and female (i.e., gender) based on observable differences in genitalia (i.e., biological sex). At birth, babies undergo genital inspection and, based upon the presence or absence of a penis, children are assigned a gender as either girl/feminine or boy/masculine. Although given primacy in making these determinations, biology is linked directly to gender and sexuality. The absence of a penis is assigned as female, for example, and that cultural category is accompanied by specific expectations for the clothes that child will wear (including color), the toys with which she will play, how she will behave, and her range of occupational choices, among many other things. There are also often clear cultural prescriptions that all men and women will marry heterosexually and have children. In this rigid binary system, biological sex (female/male), cultural gender (feminine/masculine), and sexuality are all inextricably linked together.

Arguably, however, having only two gender categories does not fully capture the range of human variation. Not all children are born with clear genitalia nor does the presence or absence of a penis assure that one will self-identify according to the gender category to which she/he was assigned at birth (Fausto-Sterling 2000). Furthermore, we do not engage in continuous genital inspection as the foundation of gendered social relations, so "why are physical genitals necessary for identification? Surely attributes more visible (such as height, build, and eye color) and less visible (fingerprints and DNA profiles) would be of greater use" (Fausto-Sterling 2000: 111). A biological basis for a binary gender system belies the diversity of both the human species as well as human experience.

While many Western cultures give primacy to biology and the outward appearance of genitalia, other societies use different means of assigning

Engendering Historical Archaeology, Fig. 1 Bugis bissu dressed for a ritual performance (Photograph courtesy of Sharyn Graham Davies, Auckland University of Technology)

gender. In her cross-cultural study of the Bugis in Indonesia, Davies (2007: 19-20) observed that "numerous factors go into constituting an individual's gendered identity." Biological sex is certainly one of those factors, but so too are notions of spirituality, role in sexual relationships, the work one performs, and how one dresses – all of which "foster a system where gender multiplicity is accommodated" (Davies 2007: 29). Indeed, Bugis culture includes five possible genders, including feminine females and masculine males similar to that of many Western societies. Yet three additional genders are also recognized – biological males who perform culturally as women (*calabai*), biological females who perform culturally as men (*calalai*), and androgynous individuals who perform spiritual functions (*bissu*) (Fig. 1). In this way, Bugis culture acknowledges a wider range of human biological and cultural variations as well as allows for a broader spectrum of gendered performance.

The social categories that human agents occupy also vary tremendously and traverse other structural forces. It is not enough to say that someone is a woman, since "woman" does not represent a universal experience. Rather, being a woman is shaped at the intersection of many social, economic, and cultural relationships. Lived experiences differ according to ethnic heritage, age, birth order, education, reproductive history, employment status, and other variables. Therefore, it is not only important for historical archaeologists to be clear how they define gender in their analyses, but also to recognize that a range of variation may exist within those categories.

Why is gender important? For most of humanity, cultural expectations for gender begin immediately at birth with genital inspection. Whether we perform our prescribed gender in normative or nonnormative ways, our gender shapes our relationships to other people (including kinship, marriage, and reproduction) as well as our access to

economic resources and social power, among many other things. Consequently, gender is absolutely fundamental to shaping human experience through our gendered social roles and relationships. As such, it is a critical arena of study and worthy of concerted attention in scholarship.

Historical Background

Two recent essays eloquently frame the history of gender analyses in historical archaeology. Gellar (2009) and Spencer-Wood (2012) examined the evolution of inquiries into gendered human experience as well as the ways in which different waves of feminist thought in the present have shaped the questions posed about gendered experience in the past.

Early attempts to counter male-focused (androcentric) interpretations of gender, for example, sought to be more inclusive of women by actively seeking female presences at the sites under investigation. Often the results of these analyses, however, were ultimately too female-focused (gynocentric) and, therefore, as biased as androcentric ones. Similarly, initial efforts to understand gendered lives frequently utilized outdated feminist ideals, such as "reductive duality, conflations of gender and sex, [and] stereotypical representations" (Gellar 2009: 67).

More recent studies have been influenced by third wave feminist diversity theory. These analyses emphasize that gender, class, and race are inextricably linked. Notably, "gendered inequalities and poverty have for a very long time been structurally caused by the patriarchy that underwrites capitalism" (Spencer-Wood 2012: 183). Consequently, we must also interrogate patriarchy, the capitalist mode of production, colonialism, and all other social, ideological, economic, and political forces that have shaped gender through time and across space.

Key Issues

Given that gender is so integral to virtually every human experience, there are many themes in historical archaeology that have emerged around the study of gender. A few of those foci are presented here, including the consumption of material goods, the influence of ideology on gender roles within and outside of the home, and the ways in which gender roles and relations have been shaped by colonialism and capitalism. By necessity, given the brevity of this encyclopedia entry, the case studies presented here are but a tiny fraction of the fascinating gender research being undertaken in historical archaeology. These examples have been chosen because of their critical analysis of gender and nuanced interpretations of human experience as complex negotiations of the social worlds in which gendered beings have lived.

Material Culture (Artifacts) and the Social World

The basic premise of archaeology is that human agents use objects and space in nonrandom, symbolic ways. That is, the choices we make with regard to the clothes we wear, the houses we live in, the cars we drive, the dishes that adorn our dinner tables, and so on are embedded in and expressions of the social, political, economic, and cultural milieus to which we belong as well as the ideological systems – such as gender– of which we are a part. Such symbolic material goods were (and still are) central to constructing daily life and frequent foci of historical and archaeological analyses of gender.

The emergence of modern consumer behavior was facilitated by Romanticism in the late eighteenth and early nineteenth centuries. Furthermore, "since women's roles were increasingly being redesigned into that of domestic engineers, especially in the middle classes, women became the proponents of this new Romantic consumerism" (Shackel 1996: 23). Importantly, "the family unit no longer served as a productive unit, but primarily as a consumer of goods. Household goods and foods prepared for family consumption became symbols of domesticity" (Shackel 1996: 24). These domestic ideals reinforced the cultural prescriptions that "a woman's place is in the home," an ideology known as the cult of domesticity (Rotman 2009).

By the late nineteenth century, consumption was linked to the emergence of an industrial democracy and the spread of mass production, which made conspicuous consumption possible for a larger segment of the socioeconomic spectrum. Rather than representing simply an ideological shift, the material conditions of the working class were also transformed through shorter work days, more leisure time, higher pay, and the extension of credit – all of which facilitated increased consumption by working-class laborers.

This rising consumerism was rooted in white racial privilege (Mullins 2011). The material disparities of America's consumer culture "were minimized, ignored, and legitimized by pervasive discourses on affluence that trumpeted the accessibility of consumer goods, hyperbolized consumer culture's ever-expanding capacity to provide goods and services, and brazenly heralded the civil and moral benefits of prosaic commodities" (Mullins 1999: 3). Meanwhile, another ideology was simultaneously emerging. Social Darwinism stressed that "hard work, thrift, intelligence, sobriety, cleanliness, and a little luck guaranteed success, while failure resulted from the lack of these characteristics, or, more importantly, from their opposites – laziness, extravagance, stupidity, slovenliness, and drunkness" (McGuire 1988: 460). Consequently, consumption by the marginalized – women, people of color, working-class individuals, and families – may have been a form of empowerment and a means for actively participating in the larger cultural milieu (Mullins 2011).

Ceramic tea and table wares were one of the many consumer items available for consumption in the mid-eighteenth through early twentieth centuries. The decorations and patterns that adorned ceramic tea and table wares were highly symbolic, culturally significant, and relevant to understanding gender roles and relations. Modifications to the decorative motifs on ceramics changed over time (Wall 2000). The evolution of styles used to embellish tablewares corresponded to changes in the social meaning of the meals in which vessels were used. Specifically, these transformations were linked to emerging ideals regarding gender roles and relations, particularly those of domesticity.

In addition to an increased number of courses and the ritualization of the serving itself, the ceramics used at the dinner table underwent a transformation, becoming symbols of ritual dining (Rotman 2009). The busy chinoiserie decorations in the decades surrounding the turn of the nineteenth century had overshadowed the importance of the food and covered almost every available space of the vessels they adorned. In fact, serving dishes were often covered with a lid, so that it was the vessel rather than the food that was initially visible to diners (Wall 2000). Importantly, this intensification in decoration expressed the changes in the meaning of a meal. Dining was no longer simply a matter of nourishment, but had become a symbolically-charged social ritual.

By the 1840s, the trend of busy ceramic decoration was reversing itself. Already beginning in the 1830s with the emergence of social changes associated with Gothic Revival architectural styles, ceramics used for family meals became predominately white (Wall 2000). A particular vessel pattern, referred to as "Gothic" or "Gothic paneled," was the preferred style (Fig. 2). These white-toned Gothic-style dishes correlated with the sanctity and community of Gothic churches and were intended to contrast with the competitive capitalist marketplace of the external world (Wall 2000). The use of this pattern symbolically reinforced a woman's moral authority within her home (Rotman 2009).

Ceramic assemblages from middle-class households in New York City were analyzed to understand how these objects were used to construct domestic worlds in the mid-nineteenth century. Decorative patterns, types of ware, and the number and kinds of specialized serving pieces were of particular interest. These vessels "were used in two different domestic arenas: tea, where non-family members were entertained, and family meals, where participation was usually limited to family members [or those individuals who were perceived as being like family]" (Wall 1991: 75). Women at the poorer and wealthier ends of the middle-class spectrum used ceramic tablewares (large plates and intermediate-sized plates, known as twifflers) and teawares (cups and saucers) differently. Approximately half of

Engendering Historical Archaeology, Fig. 2 Gothic-paneled ironstone plate recovered during excavations in Deerfield, Massachusetts (Photograph courtesy of the author)

the tablewares from each household in the study of New York households were of the Gothic pattern, that is, white granite ironstone with paneled rims. These vessels were used solely within the ritual of family meals and enhanced the sacred aspect of women's domestic roles under the ideology of domesticity.

Poorer families also used Gothic-paneled dishes for serving tea, whereas wealthier families used decorative wares, such as gilded and pedestaled porcelains. These differences in ceramics indicated a difference in the purpose of afternoon tea (Wall 2000). For wealthy families, this social ritual exhibited family status and the dishes were used as part of a competitive display by the mistress of the house "designed to impress her friends and acquaintances with the refined gentility of her family" (Wall 1991: 79). For poorer families, however, only those equated with family and community would have been invited for tea. Thus, social competition in this arena was unnecessary. Gothic teawares "may have served to elicit the almost sacred values of community and mutual help – values which could be very useful for those at the lower end of the middle-class spectrum – among the women who were gathering together for tea" (Wall 1991: 79). Clearly, the ceramic teawares and tablewares recovered from the sites in this study were used to create very different domestic worlds for families of varying economic standing in the mid-nineteenth century New York City (Wall 1991, 2000).

Analyses of ceramics elucidated how changes in decorative motifs were associated with changes in the meaning of meals. These alterations were simultaneously linked to the transformation of gender ideologies at the intersection of class and status.

Domestic Spaces and Gender Ideals

Examinations of gender relations have often focused upon domestic spaces. Residential architecture and the landscapes of homelots have been given particular attention in the scholarly literature. These settings were also transformed over time as ideologies of gender relations shaped and reshaped the organization and utilization of interior and exterior spaces (Rotman 2009). Furthermore, the enculturation of children into their roles as gendered beings occurs within the home. Therefore, domestic space is an important arena for studying gendered experience.

The cult of domesticity included a prescriptive separation of gender roles during the Victorian era in America and idealized domestic spaces as a "woman's sphere." The household was codified as a private locus for raising children, a space for the production of goods for family use, and a place that served as a cultural counterpoint to the public economic sphere of men (Wall 2000). Distinctions between public and private spaces did exist, but these separations were rarely as complete as social prescriptions advocated. At least until the mid-nineteenth century, rural women produced farm products for public markets, from eggs, butter, and cheese to textiles.

The idealized form of domesticity could only be fully operationalized, however, when both women and men were present in the household, since gender roles were defined in opposition to one another (Rotman 2009). In Deerfield,

Engendering Historical Archaeology, Fig. 3 Pocumtuck basketmakers on the porch of Madeline Yale Wynne and Annie Putnam, Deerfield, Massachusetts, 1901 (Photograph courtesy of the Pocumtuck Valley Memorial Association, Memorial Hall Museum, Deerfield, Massachusetts)

Massachusetts, in the decades surrounding the turn of the twentieth century, the demography of the village had been shaped by Civil War fatalities and significant out-migration by men as the result of a declining agricultural economy. The population of the village was predominantly female and, consequently, a rigid separation under the ideals of domesticity for public/men and private/women activities and spaces could not be attained.

Archaeological and historical investigations in the village revealed that the Arts and Crafts Movement and heritage tourism played a critical role in not only the economic revitalization of the village in the waning decades of the nineteenth century, but also in transforming gendered social relations within it. Women in particular engaged in craft production as a means for generating an income for their households (Rotman 2009). For those who participated in craft work, their homes were no longer only private domestic spaces but also loci of production and distribution in the public economic realm.

Similarly, crafts were not produced in exclusively public spaces. Work was undertaken individually in homes as well as collectively in centralized locations. Some worked on embroidery or quilts in their parlors or bedrooms converted for part-time craft production. Two particularly influential women in the village, Madeline Yale Wynne and Annie Putnam, made their porch available to the Pocumtuck Basket Makers for communal production of their wares (Fig. 3). In this way, Wynne and Putnam empowered other women in the village toward economic self-sufficiency and autonomy. (Their ability to do so was no doubt facilitated by their status as wealthy women.) Furthermore, the sole or communal production of wares may have been grounded less in an ideology of separating public and private activity then in the technicalities of the crafts being undertaken. Metalsmithing was an individualized pursuit, for example, while basket making was more conducive to collective involvement.

In the absence of men to fill public and economic roles, women in Deerfield village were not as constrained by the cult of domesticity as their female counterparts elsewhere in the United States at the same time. Rather, they differentially adopted aspects of prevailing gender ideologies according to their unique personal circumstances and the demography of the household (e.g., the presence of young sons who would assume culturally defined masculine roles as adults).

In addition, while gender relations are often defined as public versus private, production

versus consumption, active versus passive, culture versus nature, and men versus women, that view distorts social reality. Such binary oppositions belie the fact that an artifact can be an aspect of production *and* consumption, public *and* private, or male *and* female (Wurst 2003: 227). Rejecting a rigid binary structure "allows us to conceptualize more than two genders and to see age, marital status, class, and race as key aspects of gendered social relations" (Wurst 2003: 230).

The intersection of class and ethnicity was profoundly important in shaping gendered human experience at the W.E.B. DuBois site in Great Barrington, Massachusetts (Battle-Baptiste 2011). The domestic and work lives of recently emancipated African-Americans were very different from those of the Anglo-European families in nearby Deerfield in the waning decades of the nineteenth century. The ideals of a "woman's place in the home" was problematic, for instance, since the legacy of enslavement had largely limited women's labor to domestic and institutional service or arduous manual labor outside of their homes. In addition, "the inability of captive African men to actively pursue their patriarchal destiny was controlled in very dehumanizing ways by plantation owners and overseers" (Battle-Baptiste 2011: 40-1). Cultural constructions of black womanhood and motherhood, therefore, were not simply in opposition to Euro-American models of domesticity, but rather occurred at the multifaceted intersection of domestic ideals, post-emancipation oppression, emerging class distinctions within African-American communities, and other social, political, economic, and ideological forces of the time.

W.E.B. DuBois, the African-American writer and civil rights activist, spent his boyhood in Great Barrington embedded in the significant maternal kinship of the Burghardts (Fig. 4). Through property ownership and other economic transactions, the Burghardt women wielded uncommon power for the time and created a *homeplace* through their interactions with family and community, the labor they undertook to support themselves, and the goods they purchased for consumption (Battle-Baptiste 2011). In a myriad of ways, the Burghardt women were at the epicenter of navigating the complex social worlds in which they lived and the forging of identities for themselves, their children, and their grandchildren in the post-emancipation period. A Black Feminist approach to the archaeological and historical analyses of the site revealed their nuanced and hidden stories as well as elucidated the ways in which their experiences as gendered beings were significantly shaped at the intersection of race and class.

Engendering Historical Archaeology, Fig. 4 Mary Burghardt DuBois and W.E.B. DuBois as an infant (c. 1868) (Photograph courtesy of the Department of Special Collections and University Archives, W.E.B. DuBois Library, University of Massachusetts Amherst)

Identity Under Colonialism

Identity is both personal and collective. It is derived from who we think we are (internal) and who others think we are (external). Identity is shaped by

policies, daily practices, and institutional structures that "are continually enacted, reproduced, and transformed in social life" (Voss 2008: 18). People are inextricably bound together with other people, places, and things. Therefore, identities – including gendered identities – are forged through interactions with others at multiple scales. The Presidio of San Francisco provides an interesting case study for the process of ethnogenesis (the forging of new cultural identities).

The Presidio was founded by Spain during the colonization of California's coast in the late eighteenth century. The identities of occupants of the Presidio quickly transformed from military settlers to that of Californios through several interrelated phenomena (Voss 2008). The emergence of a ranchero culture, a system of land grants, facilitated the accumulation of enormous landholdings in the form of cattle ranches that concentrated wealth, property, and power among a relatively few military families. This in turn facilitated the exploitation of native Californians as labor for managing large herds and converting cattle into marketable hides and tallow. Attendant with the ranchero culture was the emergence of a seigniorial society that placed greater emphasis on relationships than individualism and created a complex web of obligations and authority that extended across the entire community. A white or European racial identity also became increasingly important as a means of claiming social power, wealth, and privilege at the Presidio. In these complex ways, Californios simultaneously forged new identities while also naturalizing their dominance over Native Californians.

This ethnogenesis was observable through changes to the landscape, architecture, ceramics, and clothing, among other classes of material culture. Several interrelated trends were observable in the material record. A collective colonial identity emerged and the once diverse society of the Presidio became more homogeneous, particularly in terms of internal representation. In addition, there was an increasing distinction between the homogeneity of colonial society and Native Californians. This "othering" was accompanied by the rejection of colonial settlers of their own indigenous and African ancestries.

Gendered social relations were at the center of daily life at this military colonial outpost. The Presidio Quadrangle was a particularly important gendered space (Voss 2008). Adobe became the preferred building material and form as the residents of the Presidio articulated a shared colonial identity in the decades surrounding the eighteenth century (Fig. 5). This architectural style materialized a very clear distinction between military settlement and the local indigenous peoples. The quadrangle may have also been related to increased regulation of women's sexuality during of period of increased contact with Europeans and rising concerns about ethnic propriety and respectability.

The landscape surrounding the colonial outpost was also gendered and sexualized. Colonial women rarely traveled outside the securely colonized area of the Presidio. Therefore, in their absence, "the eastern inland areas were masculinized through colonial men's military expeditions and sexualized through interethnic sexual violence perpetrated by some colonial men on Native Californians" (Voss 2008: 289). Identities, including gendered identities, at the Presidio were shaped and negotiated at the intersection of class, ethnicity, race, and sexuality. Ethnogenesis at the Presidio can be traced through changes to "material and spatial practices that occurred during the shift from a pluralistic, multiracial, colonial population to one defined by its common status as colonizers and by a regional and ethnic Californio identity" (Voss 2008: 115).

Native men and women in seventeenth-century Southern New England also confronted colonialism (Nassaney 2004). As they struggled, resisted, and adjusted to changing economic, demographic, and social circumstances, new roles for men and women were negotiated and reconfigured. Traditionally, male and female roles were highly interdependent and more flexible than European gender systems. Under colonialism, however, inequities between Native men and women became increasingly pronounced.

The uncertainty of the changing social world was expressed through material objects. Pestles were cylindrical-shaped stones used with wooden mortars for grinding corn and other grains as part

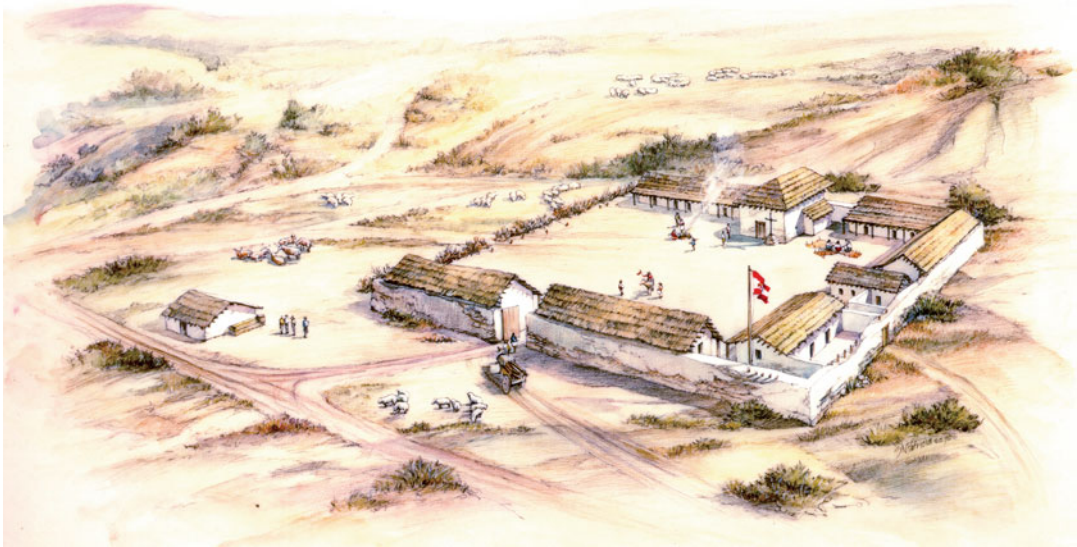

Engendering Historical Archaeology, Fig. 5 Artist's conception of El Presidio de San Francisco as it may have appeared in 1792 (Photograph courtesy of Golden Gate National Recreation Area, National Park Service)

of food preparation. Some pestles from the region were carved with effigies that depicted mythological beings (Fig. 6). Largely associated with women, these effigy pestles were no longer simply utilitarian items, but symbols through which to communicate with the spirit world. Importantly, in the unsettling conditions under colonialism, "women sought to re-establish the predictability of an earlier social and political order and regain control over their lives and their communities by resisting subordination and connecting to known supernatural life forces in new Ways" (Nassaney 2004: 358). Effigy pestles became a symbol of biological and cultural survival as well as indicators of women's central roles in the negotiations of a new social order.

Engendering Historical Archaeology, Fig. 6 Bear effigy pestle of gray slate from Burr's Hill, Warren, Rhode Island (Image drawn by Pamela Rups and provided courtesy of Michael S. Nassaney)

Engendering Historical Archaeology

Gender is fundamental to the human experience and has been enacted through the material world (object, structures, and other artifacts) through time and across space. The case studies presented here represent only a tiny portion of dynamic contexts in which gender has been examined. There are many additional settings that have been studied to understand gendered experiences – institutions, such as schools and brothels; loci of production, including factories and lumber camps; communities, like utopian and maroon societies; among many others.

By adopting gender as an explicit conceptual and analytical category, women, men, and other gendered beings "are brought into view as active producers, innovators, and contextualizers of the very material world by which we know the past" (Gero & Conkey 1991: 23). Importantly, gendered interpretations of the human experience are not an end in themselves, but are part of a broader project of studying "personhood" archaeologically (Wilkie 2003).

International Perspectives

Historical archaeology as it is practiced at the beginning of the twenty-first century is very

global in its orientation. Gender research frequently focuses on the experiences of immigrant, displaced, and diasporic people. Consequently, such studies highlight the complex negotiations that constitute the process of forging new identities often with reference to both the world people currently inhabit as well as the worlds they left behind. Therefore, regardless of whether an archaeological site is excavated in New York or New Delhi, analyses of gender explore global phenomena and the movements of people, material goods, and ideas around the world.

Future Directions

Analyses in historical archaeology are concerned with the intersection of gendered social relations with those of class and ethnicity. More recently, scholars have paid greater attention to sexuality, embodied experiences, and childhood as a part of gender research. Importantly, these studies and others expand, our understanding of gender, and challenge us to embrace the diversity of experience that is part of being human.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Engendered Archaeologies
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: Spanish Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Global Archaeology
- ▶ Historical Archaeology
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
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- ▶ Social Archaeology
- ▶ Social Identity in Historical Archaeology

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Environmental Archaeological Evidence: Preservation

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Introduction

Evidence for the nature of past environments can take many forms and occur in many different situations. For archaeological timescales, such evidence is generally plant or animal material identified to some level (usually genus or species), and the environmental conditions suitable for a similar modern population are then assumed to have pertained at the time of preservation. As with any archaeological find, some form of dating or stratification is essential to provide a temporal context.

If one component of an assemblage is better preserved than another, a false picture could be built up of the past conditions. Awareness of the preservation trajectory since burial is,

therefore, essential for an understanding of the material's true environmental significance. This entry is intended to summarize the characteristics of the main materials used for environmental reconstruction as well as the burial environments in which they are preserved or destroyed.

Key Issues

Types of Biological Materials

The fairly limited range of materials used by plants and animals to build their bodies makes it possible to derive a simple classification.

Polysaccharides

Cellulose, starches, and many sugars are polysaccharides, which simply means sugar units bonded together in different ways. Most plant matter is formed of cellulose. This is a polysaccharide made up of glucose units whose linkage makes them indigestible to higher animals. Cellulose is abundant in nature and only broken down by lower organisms such as bacteria, fungi, protozoans, and amoebae (Bear 1964).

Starches, on the other hand, are easily broken down by animal digestion and would, therefore, be expected to break down quickly in the soil. However, they are preserved in some archaeological situations as a result either of physical protection within artifacts or by soil aggregates, by chemical protection, or even by simple weight of numbers (see Haslam 2004).

Many insect parts are formed of chitin which is structurally a polysaccharide, although taphonomically it is more like a protein.

Proteins

Two main protein groups, collagen and keratin, form the basis of most biological constructions. Collagen is the structural framework of bone and tooth matrix. Keratin is a fibrous protein, forming skin, horn, hoof, hair, and nail.

Miscellaneous Biopolymers

Sporopollenin forms the outer coating of the pollen grain and is, therefore, highly significant to environmental archaeology. It is a biopolymer of very high preservation potential isolated as a residue after repeated chemical dissolution. The structure is unknown.

Lignin's structure is also poorly understood, but its function is well known. Older and stronger plant matter is often impregnated by lignin, rendering it more refractory. Lignin derivatives have even been recorded from 200-My-old silicified wood (Sigleo 1978).

Biominerals

Calcium Phosphate Calcium phosphate in different forms (typically Ca_3PO_4, with variable hydrogen, fluorine, carbonate, and/or H_2O bonded) is the mineral basis of bone and tooth. This makes it probably the most important biomineral for environmental archaeology as these remains are found on so many sites, and the evidence that can be derived from the assemblages is so large and diverse (Davis 1987).

Calcium Carbonate Calcium carbonate ($CaCO_3$) is the main mineral component in mollusc shells, ostracods, and many foraminiferans (Brasier 1980).

Silica Silica (SiO_2), in an amorphous form, is the basis of diatoms, phytoliths, and some foraminiferans.

Combinations of Materials

It is common for whole biological structures to be formed out of more than one material, combining properties in a similar way to industrial laminates or fiberglass moldings. Most plant remains, for example, consist of cellulose fibers which provide the tensile strength, with the spaces taken up by lignin acting as a filler. The lignin is extremely resistant (see above) but would be brittle if it occurred on its own.

The majority of mineralized animal body parts consist of calcified keratin or chitin, with the organic component forming variable proportions of the final material. In many cases, it is a tiny percentage. Thus, for example, eggshell and mollusc shell protein contents are commonly 0.03 % (Addadi et al. 1991), while earthworm

calcium carbonate granules are 0.2 % (Canti 2007). In some other materials, the percentage is higher, conferring greater flexibility. In bone, for example, the percentage of collagen is as high as 35 %.

The preservation characteristics of these mixed materials have variable trajectories, with different stratigraphic situations promoting preservation of different components. In many cases, the protein content is too small to be of analytical significance. However, some systems will leave visibly different remains in different types of stratigraphy. Probably the best-known example of this phenomenon is the two-part structure of bone, based on collagen and calcium phosphate. Under neutral and alkaline conditions, preservation is mineral rich and sometimes described as "chalky" whereas under acidic conditions, the mineral material largely disappears and the preserved protein structure is sometimes referred to as "jelly bone".

Taphonomic Factors

Kinetic Factors

Although many of the materials described above have theoretically predictable decay pathways in a defined burial environment, the reality of assemblage preservation is often more messy and difficult to explain. A major reason for this disparity must arise from the events occurring during the latter parts of life, immediately on death, and at the time of burial. Did plant material accumulate by floating, or was it deposited in waste dumps? Were animal parts scavenged for a period at the surface, or deeply buried with soft tissue still attached? The precise individual details of these factors significantly affect the later preservation morphology of some classes of environmental remains.

Some pre-burial effects are of major importance to the preservation of environmental evidence. Soft plant material will decay rapidly in moist soils, but if it is charred and buried without damage, it can be retained in archaeological stratigraphy for very long periods of time. Charred plant remains are a mainstay of environmental archaeology.

Equilibrium Factors

Once buried, and assuming a stable stratigraphy, the decay of most materials will conform more to the established trends. The burial environment may not be suitable for biological or dissolution processes due to freezing or to drying. In both situations, degradation can be held up almost indefinitely (see, e.g., Spindler 2001). However, these circumstances either are rare or tend to contain relatively few environmental remains. The large part of our knowledge of past environments comes from moist stratigraphy at temperatures between about 0° and 30° centigrade, where biological and dissolution processes can be highly effective.

Among the mineral materials, the pH of the burial stratigraphy (which is really the pH of the interstitial water) is probably the main indicator of likely preservation in leaching environments. For calcium carbonates, the equilibrium pH is 8.4 (Rowell 1994), so dissolution will be negligible above that value but occur faster as the pH decreases. Calcium phosphates are more complex because of the different species and also the fact that their solubility increases in both the acid and alkaline directions (see Fig. 1).

Amorphous silica dissolution is pH dependent, being more soluble under alkaline than acidic conditions. However, the extent of that solubility variation across the pH range is not really significant below about pH 10 (see Fig. 2), which means that silica in most leached stratigraphy will not be affected.

The pH of stratigraphy is a bulk measure, representing a useful shorthand for the likely concentrations of common ions in the interstitial solution. It is not, however, a precise universal indicator applicable equally across the globe. The actual dissolving power of the liquid surrounding a particular material is dependent on the concentration (in solution) of the target material's component ions. Calcium is the commonest cation in temperate climate (leached) stratigraphy and the commonest soluble element of biomaterials. As a result, pH is at its most useful in these types of stratigraphy. Nearer to the equator, particularly in more arid regions,

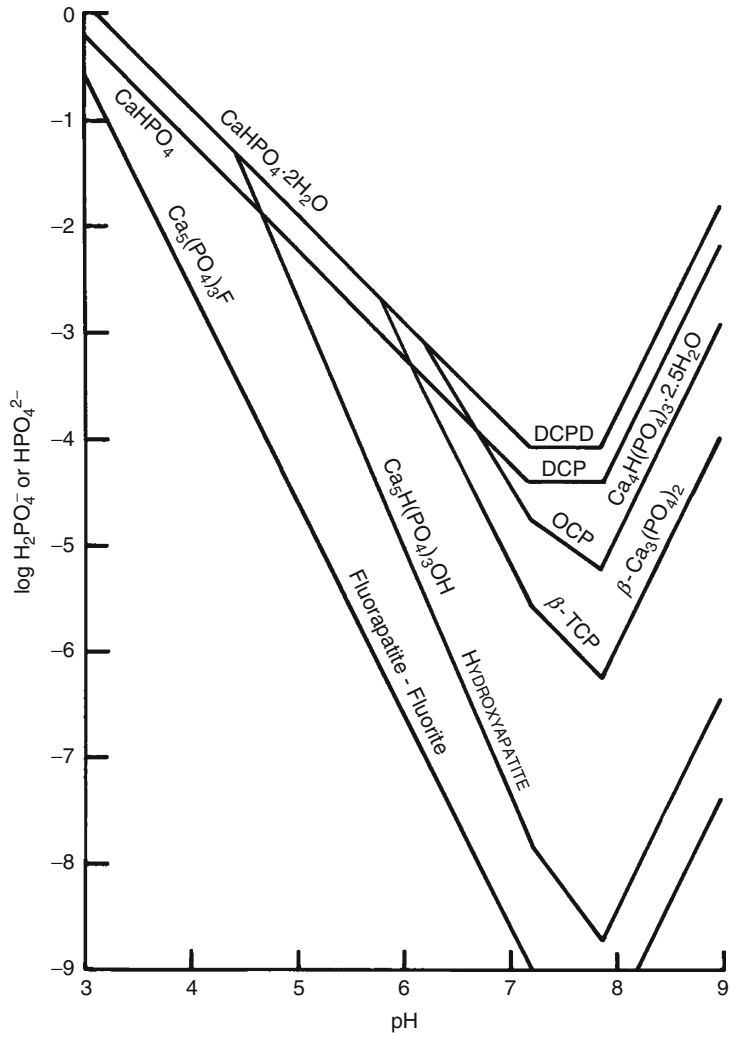

Environmental Archaeological Evidence: Preservation, Fig. 1 Solubility diagram of some calcium phosphates in soils (Adapted from Lindsay et al. 1989 © Soil Science Society of America)

some of the more soluble ions such as sodium and potassium start to become more significant, and the pH will be influenced by these non-calcium ions.

The pH is also only one measurement within the dissolution dynamic. The rate at which the interstitial water passes over and around the target material is also highly significant. Remains constantly washed through by underground water, for example, in floodplain gravels, will be far more rapidly dissolved than if they were trapped in dense clays or deposited in topographic low points where groundwater movement is sluggish. This is due simply to the nature of dissolution. As described above, dissolution potential is governed by the concentration of the target ions in solution. If the recently dissolved ions are taken away rapidly, their concentration in the contact solution remains low; if the groundwater only moves slowly, however, a gradient of concentrations can develop around the target, such that the contact solution is almost saturated and can therefore dissolve it only slowly.

For the organic materials, dissolution is not the major destruction process. Instead, biological breakdown plays the large role, consisting essentially of the microbiological oxidation of

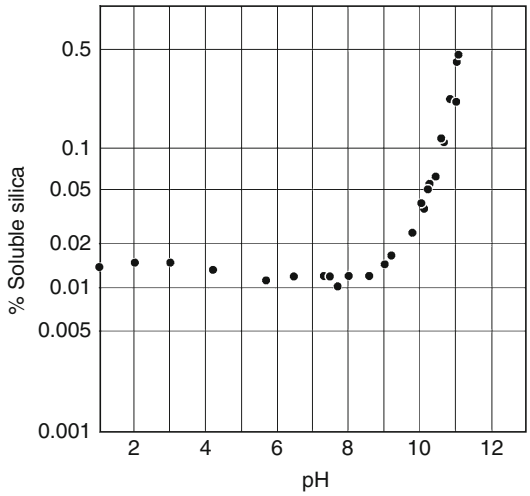

Environmental Archaeological Evidence: Preservation, Fig. 2 Solubility diagram of amorphous silica. Based on a series of experiments dissolving silica in water buffered to different pH values for a fixed time period and then measuring the concentration (Adapted from Alexander et al. 1954 © American Chemical Society)

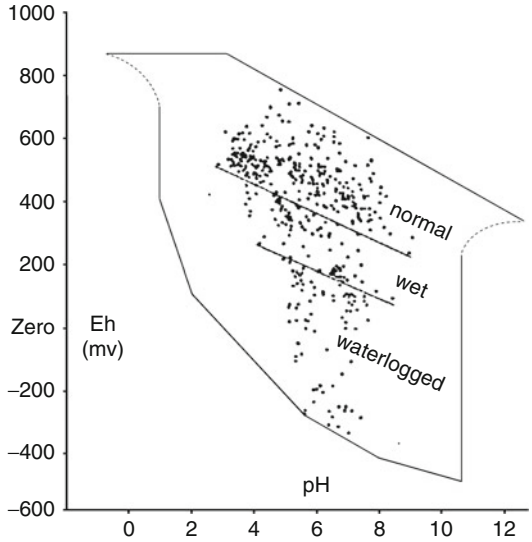

Environmental Archaeological Evidence: Preservation, Fig. 3 Measurements of Eh and pH in 414 soils from around the world. The envelope is the limits of the natural environment (Adapted from Baas-Becking et al. 1960 © University of Chicago Press)

carbon and hydrogen (in the polysaccharides, proteins, and biopolymers discussed above) to produce energy, carbon dioxide, and water. As with most biological processes, this can only take place where water and oxygen are available and where the product carbon dioxide can escape to prevent a toxic buildup. At one end of the moisture scale, therefore, completely dry organic materials, although perhaps rendered brittle (and certainly rendered difficult to identify due to desiccation), do not actually break down. In the middle of the scale, moist, porous stratigraphy promotes rapid breakdown processes, and few materials can last any length of time. At the wettest end of the scale, where moisture is extreme, the requirement for good gaseous exchange is increasingly not met, and reducing conditions start to pertain (Canti 2003).

The importance of reducing conditions for preservation of organic remains in archaeology cannot be overstated. They are the basis of all the waterlogged wood discoveries such as the Swiss lake villages and the UK trackways; they are the main reason for the existence of the north European bog bodies. In these and many other examples, the associated wood remains, pollen, and plant macrofossils have provided a wealth of evidence for environmental reconstruction (Godwin 1960; Glob 1969; Coles & Orme 1986).

Reduction is often referred to as "anoxia" or "anoxic conditions". It occurs wherever oxygen can be only slowly replenished on being used up by microbiological action. This could as much be in a sealed plastic bag as in the more classical situation of dense waterlogged sediments; the same process is at work, because oxygen diffuses through water about 10,000 times slower than through air. As the free oxygen moves into shorter and shorter supply, microorganisms generating methane start to become dominant, producing one of the characteristic smells of reducing conditions. Under this type of regime, the decay rate of the polysaccharides, proteins, and biopolymers is greatly lowered.

One of the best-known archaeological examples of reduction-based preservation is the

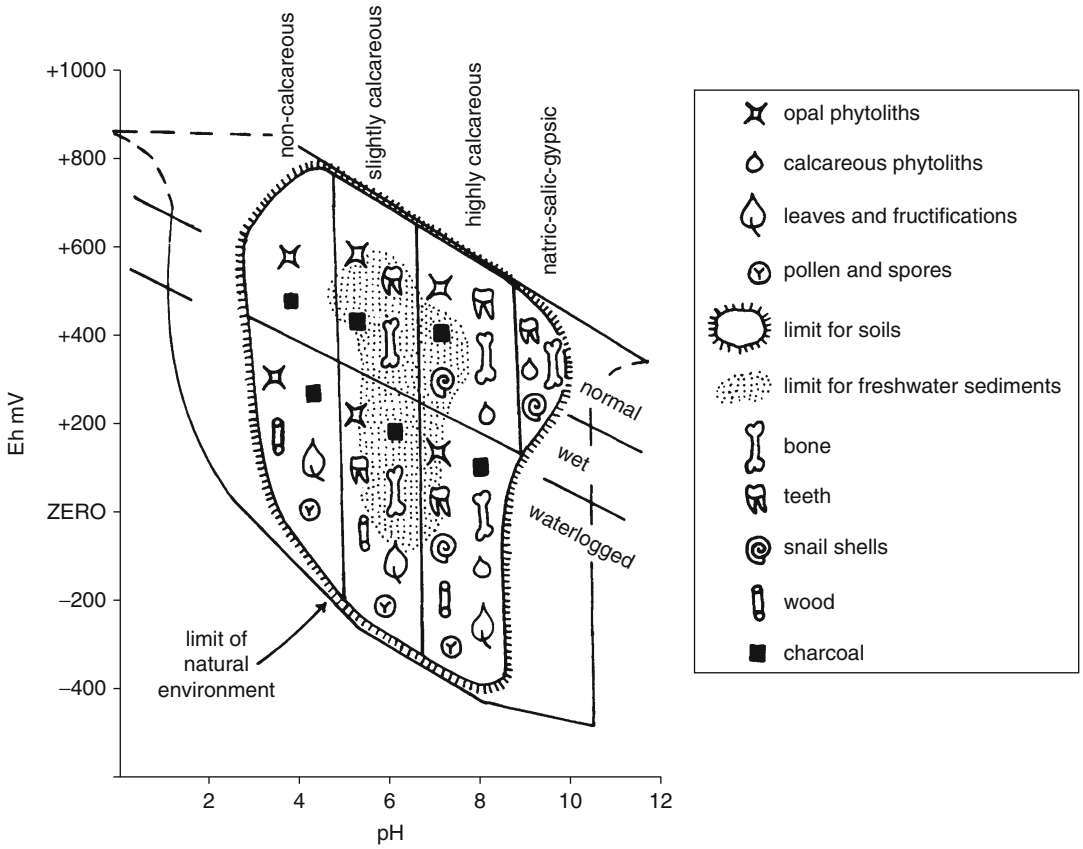

Environmental Archaeological Evidence: Preservation, Fig. 4 Retallack's (1984) Eh-pH stability fields for microfossils found in paleosols (Modified from Retallack 1984 © The Palaeontological Society)

South Scandinavian barrows with still-intact Early Bronze Age oak coffins maintained by reducing conditions resulting from water trapped by a thick impermeable iron pan. The coffins contained well-preserved organic remains including textiles, skin, and hair (Holst et al. 2001). A research program was instigated to understand the detail of how reduction started. The work showed that anoxic conditions rapidly built up where turf was laid over modern oak coffins containing animal bodies, which could thus be preserved for months or even years (Breuning-Madsen et al. 2001).

Reducing conditions can, however, have some unexpected detrimental side effects. If sulfate (SO_4) is present in the interstitial water, specialized bacteria will strip out the oxygen (4 atoms of which are available for each sulfur atom) and use it for respiration. This leaves a sulfur atom free to bond with the hydrogen from water to make hydrogen sulfide (H_2S or rotten eggs) – another well-known smell of reduced stratigraphy. The sulfur will also form pyrite or marcasite (Fe_2S) with free iron in the stratigraphy, crystallizing in tiny spheres (framboids) made up of numerous minute individual crystals. These can encrust organic remains to the point where they become fossilized. Because seawater is sulfate rich, this pyritization process is most commonly found in estuarine or marine wetland stratigraphy (Berner 1985), but it sometimes occurs inland as well.

From the preservational point of view, pyrite is less of a problem, while the conditions remain

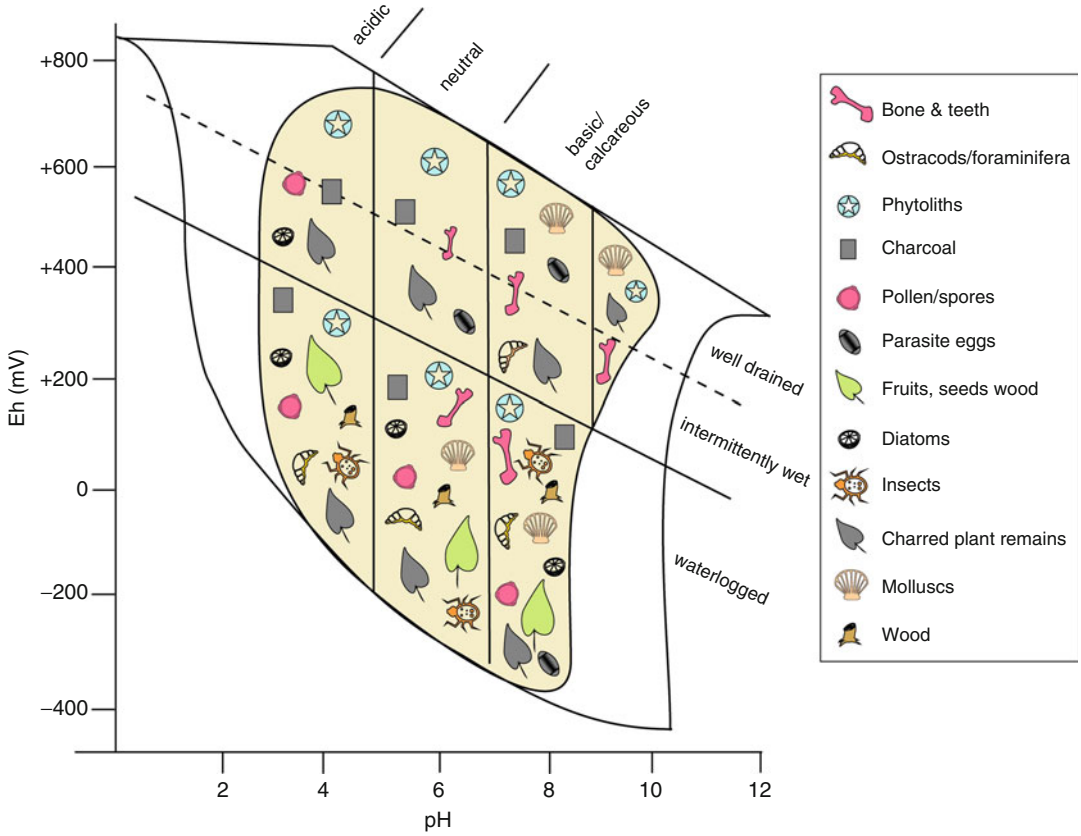

Environmental Archaeological Evidence: Preservation, Fig. 5 Modified Eh-pH stability fields for microfossils found in UK stratigraphy (From English Heritage 2011, figure 2. © English Heritage)

waterlogged; the real damage occurs if the site, after many years of pyrite accumulation, then becomes free draining again. On oxidation, the Fe_2S rapidly decays into a mass of free iron oxides and sulfuric acid:

$$Fe_2S + H_2O = Fe(OH)_3 + H_2SO_4$$

encrusting artifacts and ecofacts with red iron ochre and making it possible for the stratigraphic acidity to reach as low as pH 2, with extremely detrimental effects on many biominerals (Canti 2000; Boreham et al. 2011).

Unified Preservation Diagram

The numerous factors affecting preservation of environmental materials across different parts of the globe make a unified theory, taking in all of the variables, impossibly complex. Multidimensional graph axes would be required to draw up an all-inclusive environmental envelope. Many of the kinetic factors described above are episodic rather than scalable and can operate in nonlinear combinations that defy analysis. Furthermore, even setting kinetic factors aside, the value of an all-inclusive model is debatable. Some environmental factors are so rare that they can be considered as one-offs, for example, the toxicity introduced by copper artifacts or the biocidal effects of salt which has produced such extraordinary preservation in the Hallstatt mines (Grömer 2005).

A generalized diagram for the most widespread preservation conditions (i.e., non-arid, nonfrozen, nontoxic stratigraphy) is, nevertheless, valuable at least as a conceptual

aide-memoire, but also to provide some basis for planning programs of environmental archaeology in the commonest geochemical situations. A two-dimensional reduction vs. pH diagram was fully explored for a range of environmental conditions by Baas-Becking et al. (1960). Their method was to collate measurements made from numerous different investigations in order to set limits for the reduction (on the Eh scale, measured in millivolts) and pH fields in all natural environments, including peat bogs, freshwater sediments, marine sediments, and evaporites. Figure 3 shows their summary of world soils (which, although not a perfect match, is strongly equated with world archaeological stratigraphy).

Baas-Becking et al.'s (1960) diagram was adapted by Retallack (1984) to produce a conceptual basis for consideration of a range of common environmental indicators. It should be emphasized that Retallack's diagram was developed for paleopedological investigations, rather than archaeological stratigraphy; the inclusion of calcareous phytoliths is not normally relevant to archaeological investigations, and the absence of insects is notable from a temperate-zone stratigraphic perspective (Fig. 4).

A further version of this diagram has been produced for UK conditions (English Heritage 2011), including insect remains as well as some less common additions, namely, parasite eggs, diatoms, ostracods, and forams (Fig. 5). It probably represents the most complete attempt to date on this type of simplification and would need little modification to be used in other moist climate situations.

Future Directions

Dissolution processes have been researched in considerable detail, so the mineralogical end of the preservation spectrum is well enough understood for all practical archaeological purposes. However, the microbiological element of preservation dynamics is still an area of some uncertainty, for example, the importance of water circulation for bacterial decay (Huisman & Klaasen 2009) and the fundamental tolerance levels of chemical parameters such as Eh, pH, H_2S, and ethylene among the fungi (Holden et al. 2006). This additional level of precision will be needed in the future for the refinement of heritage protection priorities and preservation in situ methodologies. In particular, general agricultural drainage, quarry dewatering, and water abstraction programs will have to be set against the need for preservation of environmental remains. Detailed plans for the various types of development cannot be argued through without having a complete understanding of the microbiological dynamics, even allowing for the unpredictabilities inherent in complex systems.

Cross-References

- ▶ Bones: Preservation and Conservation
- ▶ Charcoal: Preservation and Conservation
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Phytolith Studies in Archaeology
- ▶ Submerged Prehistoric Landscapes
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Environmental Archaeology and Conservation

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Introduction

Archaeology has an established role in heritage management, focusing on the built environment and monuments and, increasingly, on the management of archaeological landscapes, but contributions from environmental archaeology to conservation are less well established in conservation policy and practice. Growing awareness of intensified human impacts on Earth's resources and ecosystems has created increased impetus to understand the interactions between society and

environmental processes in order to anticipate future system responses (Dearing et al. 2010). Many of these ecosystem responses emerge over decades and centuries, well beyond the scope of most ecological records and misconceptions about the drivers underpinning ecosystem function and conservation values can result in misguided and ineffectual management practices and policies. Historical effects are embedded in the structure, biodiversity and function of ecosystems (Foster et al. 2003). Paleoecology and environmental archaeology therefore have relevance beyond the study of past ecosystem dynamics or past human-environmental interactions: they can contribute important insights into the complex interactions between natural and anthropogenic drivers and their impacts on long-term ecosystem dynamics (Willis et al. 2010). This is essential for understanding what shapes current landscapes and conservation values and making management decisions that support the ecological processes on which we depend within a changing environment.

Definition

This entry focuses on the main contributions of environmental archaeology to the management and conservation of ecosystem processes, biodiversity, and cultural landscapes. This includes the implications of land-use legacies for current management and predicting species responses to future environmental change. The role of the past in conservation is more often associated with paleoecology than with environmental archaeology since sediment archives are often "off-site," that is, not directly associated with archaeology, and additional drivers to human agency, such as climatic and other disturbance factors (e.g., disease), are also relevant. However, understanding long-term relations between culture and conservation and between management and ecology – which form the basis for environmental archaeology – is vital for improving our ability to manage cultural landscapes and habitats and to adapt management in response to changing climatic and anthropogenic pressures (Foster et al. 2003).

Key Issues and Current Debates

The strongest contributions of environmental archaeology to conservation are in understanding the extent to which existing ecosystems have been affected by long-term changes in human activities, establishing management baselines for restoration and management implications for maintaining cultural values, restoring ecosystem function, and supporting biodiversity and ecosystem processes.

The most common and best-established contribution from paleoecology and environmental archaeology to conservation is to provide baselines for management and restoration. Often this involves defining conditions predating significant human impact to create more "natural" ecological conditions. This is best established in the European Union Water Framework Directive, where CE 1850 has been selected as a representative baseline for managers seeking to restoring "good ecological quality" to freshwater bodies. This date marks the onset of large-scale industrialization, agricultural intensification, and atmospheric pollution which caused water acidification and deterioration in ecological and hydrological status in many catchments, as recorded in a range of proxies, including diatoms, aquatic plant macrofossils, and chironomids (e.g., Bennion & Battarbee 2007). A single reference baseline is not wholly adequate or representative, as "pre-impact" dates and conditions will vary with ecology and history, but defining a common target provides a measureable and cost-effective baseline for lake restoration that recognizes land-use legacies and allows records of past human impacts to suggest management activities that may provide conditions that allow the recovery of particular species (Froyd & Willis 2008).

Conservation planning decisions have often tended to emphasize "naturalness," as indicated in the example above. However, environmental archaeology and paleoecology reveal that many "pristine" and "ancient" habitats in tropical and temperate biomes have in fact been modified by humans over substantial time periods. Paleoecological and archaeological studies

demonstrate that human impacts on "virgin" rainforest may be more extensive than has been thought, and this has significant implications for understanding ecosystem resilience and rates of recovery from human disturbance (Willis et al. 2004). These impacts can have persistent legacies: most fertile species-rich lowland rainforests in central Amazonia occur on anthropogenic "terra preta" soils which originated from agriculture and burning around 2,500 years ago, for example. The high species diversity of these soils has led to increased interest in indigenous practices to reduce the rate of deforestation and find more sustainable land-use practices.

Misconceptions over the extent and role of human impacts may lead to inappropriate management being applied, particularly in cultural landscapes where biodiversity values are a legacy of historic management. Attempts to restore "natural" habitats may lead to the attrition of biodiversity by misunderstanding formative processes. Examples include policy-driven efforts to reduce the fragmentation of woodland at the expense of the more diverse landscapes created by historic nonindustrial farming in Tuscany (Agnoletti 2007) and habitat losses in high conservation value coastal habitats in NE America due to scrub invasion following a decline in the agricultural management which has largely been responsible for creating and maintaining these species-rich communities (Foster & Motzkin 2003). Increasing recognition among ecologists that current biodiversity patterns often reflect past land use more strongly than recent management may provide opportunities for greater application of environmental histories in management.

Knowledge of long-term interactions between natural variability and cultural impacts can indicate the range of appropriate management options, define an envelope of "acceptable" variability for monitoring ecological change, and test ecological assumptions (Froyd & Willis 2008). Heathland communities are often recognized as cultural landscapes, particularly in Europe, where the dominance of grasses is considered to be an indicator of degradation. Pollen and macrofossil analyses from several English moors suggest that grass dominance is a relatively recent and unprecedented trend, but grasses were present as part of cyclical heather-grass dynamics over the last 1,000 years, and heather-dominated moors are similarly uncharacteristic in the long term (Chambers et al. 1999). Grasses should therefore be considered a "natural" part of the ecosystem rather than purely an indicator of degradation, and a preference for restoring heather-dominated communities should also be tempered by knowledge that these also have no long history. By identifying the range of "normal" variability and indicating which characteristics are long-standing and which are atypical, the results provide a wider range of restoration options than often envisaged for heather moorland.

Environmental archaeology and paleoecology can make important contributions to conservation by assessing the interplay between human and natural drivers of ecological change, both of which need to be understood to predict and manage future population resilience. For instance, Hughes et al. (2008) use pollen, plant macrofossil, and geochemical data to document the decline and localized extinction over the last 2000 years of *Sphagnum austinii*, a key peat former on many raised bogs in NW Europe. By establishing critical thresholds of atmospheric nitrogen for the growth of this moss, they conclude that although it was able to reestablish itself during periods of reduced human activity in the past, contemporary levels of atmospheric pollution mean that this is unlikely to occur in the near future. Climate controlled the broad-scale dynamics of many European tree populations, but human activity has introduced considerable regional and temporal variability. For example, intensified land use over recent centuries has led to significant reductions in the abundance of oak and beech in Scandinavia and silver fir in the Carpathians. As a result, changes in current management will be needed to ensure that human activities do not override the resilience of these species to predicted future climatic shifts (Feurdean & Willis 2008; Lindbladh & Foster 2010). Environmental archaeology provides many additional examples that human

activities and a preference for conserving idealized "natural" habitats in culturally shaped woodlands (Grant & Edwards 2008) are threatening the ability of many species to cope with climate change.

The history of species introductions by humans provides another example of the contribution of environmental archaeology to conservation. The introduction of alien or nonnative species poses a significant threat to conservation values and ecological resilience in many ecosystems, particularly on islands where geographical isolation over evolutionary timescales has resulted in high levels of endemism and adaptation among the indigenous flora and fauna. Paleoecological and archaeological data, including rat bones and gnawing marks on seeds, suggest that rats arriving with sailors and settlers contributed to the dramatic decline of lowland forests in Hawaii (Athens 2009), thus providing data to inform ecosystem restoration. The long duration of human influence may make it difficult for ecologists to differentiate between native and nonnative plant species. In the Galápagos, pollen and plant macrofossil evidence has identified that several plants considered "doubtful native" or introduced are actually part of the native flora (van Leeuwen et al. 2008). Such information can be used to manage nonnative species by indicating the ecological effects of long-established introductions on local ecosystems and revealing how climate and management affect susceptibility to invasion (Willis & Birks 2006). This knowledge can, however, pose additional challenges for conservation, particularly where presumed native species which are valued as part of "traditional" arable biodiversity, for example, are discovered to be "archaeophytes," that is, plants that were introduced by humans over 500 years ago.

Future Directions

Paleoecological contributions to conservation have increasingly framed long-term messages around current issues in ecology and conservation management, notably climate change, biodiversity, and resilience. The increasing emphasis in policy and ecology on a more integrated ecosystem approach to management provides opportunities for paleoecologists and environmental archaeologists to draw on additional archival sources in order to consider socioeconomic as well as environmental dimensions of conservation. Environmental archaeology and paleoecology can provide a long-term understanding of how economic development affects the regulating services which underpin ecological resilience (Dearing et al. 2012). For instance, Hanley et al. (2008) found a negative relationship between historical livestock prices and pollen diversity from farming areas in upland Scotland over the last 400 years. This not only indicates the importance of grazing for biodiversity management but also highlights the enduring influence of economic drivers and incentives on local land manager decisions. In cultural landscapes, biodiversity and ecosystem services have been shaped by a long and complex history of settlement and land use. Environmental archaeology can make strong contributions to understanding processes and values involved in cultural ecosystem services provision. For example, the inclusion of a review of the current state of knowledge regarding the historic environment (Gearey et al. 2010) as part of the recent International Union for Conservation of Nature inquiry into the state of UK peatlands illustrates the potential for environmental archaeology to form part of an integrated approach to ecosystem management and restoration. An ecosystem service framework could allow more explicit consideration of the impacts of management on the in situ preservation of environmental and archaeological records and thus address the lack of protection afforded to many sedimentary archives.

To build on these opportunities and increase the relevance of environmental archaeology to conservation, achieving closer interdisciplinary working will remain a key goal for long-term researchers (Froyd & Willis 2008). The development of socio-ecological frameworks may aid the integration of long-term and social

dimensions of environmental change with ecology and conservation management (e.g., Dearing et al. 2010). Identifying common questions that need to be addressed to improve the relevance of research to environmental management practice and policy can also improve the effectiveness of long-term contributions to conservation by engaging more with strategic and applied aspects of conservation management. This has recently become an established practice in ecology and conservation (e.g., Sutherland et al. 2011) but has yet to include long-term environmental insights.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Historical Ecology and Environmental Archaeology
- ▶ People as Agents of Environmental Change

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Environmental Archaeology in the Commercial Context

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Introduction

Environmental archaeology is the study of past human environments, using earth and life sciences to examine the archaeological record. Like many areas of archaeological science, environmental archaeology developed in the 1960s and 1970s as North American and western European archaeologists embraced ecological principles in their work, with the analysis of environmental remains now recognized as an important constituent of archaeological investigations. Environmental archaeology covers a wide range of topics often based on the subdivisions within earth and life sciences, with archaeobotanists, geoarchaeologists, osteoarchaeologists, paleoentomologists, palynologists, and zooarchaeologists all existing within the wider sphere of environmental archaeology. As commercial archaeological organizations have developed in certain countries in response to historic environment legislation, a market for environmental archaeological work has developed, with resulting growth and expansion of the discipline, creation of new datasets, and emergence of new problems.

Definition

Environmental archaeology is a subdiscipline of archaeology, involving the study of environmental remains – for example, pollen, seeds, insects, and animal bone – recovered during archaeological excavation to elucidate a wide range of archaeological topics and themes. Like other archaeological subdisciplines, environmental archaeology has expanded and developed through the commercialization of archaeology in certain countries. This has resulted in a market for environmental archaeological analysis, in which a large proportion of environmental archaeologists are now employed.

Key Issues

Environmental archaeology, like other subdisciplines, is greatly affected by changes and trends that affect archaeology in general. One such trend has been the commercialization of archaeology in certain countries, which has occurred due to public pressure regarding the protection of archaeological heritage, resulting in government legislation. Within Europe this has essentially developed into two different approaches: a "socialist" model in which it is the central or local government's responsibility to protect and excavate threatened archaeological heritage and a "capitalist" model in which it is left to a free market to carry out excavations and heritage work (Willems & van den Dries 2007; Kristiansen 2009). The first model could be seen

to operate in France and Denmark, for example, whereas the United Kingdom and the United States of America operate a free market model, although Carver (2007) has noted there are degrees of variation, with "unregulated," "regulated," and "deregulated" practices. Environmental archaeology, therefore, takes place within these larger systems of archaeological practice.

In the "free market" countries, this has led to a rise in the number of archaeological and, consequentially, the number of environmental archaeological positions. This has been well studied in the United Kingdom with the number of archaeologists rising from 1,614 in 1979 to 4,425 by 1998, and peaking at 6,865 in 2007 (Aitchison & Edwards 2008). This corresponded with the creation of a market-driven developer-funded structure through government legislation, the Town and Country Planning Act and associated guidance, primarily Planning Policy Guidance 16 (PPG16) (Department of the Environment 1990), resulting in commercial archaeological organizations accounting for 89 % of archaeological investigations between 1990 and 1999 (Darvill & Russell 2002). Although data is limited to a small number of surveys, there appears to have been a corresponding rise in the number of environmental archaeologists, for example, at least 50 commercially active zooarchaeologists were identified in a 2009 survey of the United Kingdom (Morris 2010), the majority based either within commercial organizations or as self-employed freelance specialists.

Countries with a "market-driven" commercial archaeology structure have further developed an internal market for environmental archaeological analysis, with the development of self-employed freelance specialists. Commercial organizations without an in-house specialist may therefore place work out for tender, with different specialists bidding for a specific piece of work. However, reciprocal relationships will often be formed between organizations and individual specialists. Within the United Kingdom freelance specialists are now important agents in the creation of new datasets. Morris's (2010) survey of zooarchaeologists indicates that a minimum of 506 zooarchaeological projects resulting from commercial developments were undertaken within the United Kingdom in 2009, with freelance specialists accounting for 30 % of the projects and commercial in-house specialists 64 %. In comparison, university-based specialists conducted only 5 % of the projects.

One of the problematic factors associated with the increase in commercial environmental work is a lack of dissemination, which is an issue affecting archaeology as a whole. Within the United Kingdom reports are usually produced by commercial units to allow their client (often a developer) to discharge a planning condition. These are unpublished and are often referred to as "grey literature." Bradley (2006) and Fulford (2011) have shown how this literature has great potential for expanding archaeological knowledge but requires synthesis. Organizations such as the Archaeology Data Service in the United Kingdom and Digital Antiquity in the United States have started to disseminate such information. However, the environmental archaeology sections in many "gray literature" reports have often been summarized with the detailed datasets only available from specific archives or the original author. In part this is a specific problem with market-driven archaeology where the emphasis is often on pricing and documentation rather than research quality and interpretation (Kristiansen 2009).

The rise in the amount of environmental archaeological work has also resulted in an emphasis on assessment rather than complete analysis. In the United Kingdom, this developed from English Heritage's guidelines "Management of Archaeological Projects 2" which was superseded by Management of Research Projects in the Historic Environment (MoRPHE) (English Heritage 2006). The principles of assessment are for an assemblage to be quickly scanned by the specialist to ascertain the potential for further work, based on the local, regional, and national significance of the assemblage. This often results in assemblages of a perceived "lower" significance not being fully analyzed or only part of an assemblage being subject to further work. The emphasis on assessment within a commercially tender-driven background could also result in

poor-quality work being undertaken by inexperienced environmental archaeologists. However, this problem has been recognized by a number of quasi-governmental bodies and specialist associations. Within the United Kingdom, for example, English Heritage has released a number of guidance notes covering aspects of environmental archaeology for specialists and archaeologists who commission specialist work (English Heritage 2011), and it has also supported the setting up of working groups to support individuals within a commercial context (e.g., the Professional Zooarchaeology Group). The Association of Environmental Archaeologists, International Council of Archaeozoologists, and British Association for Biological Anthropology and Osteoarchaeology have also all published guidance notes to their members; however, there is still little or no peer review of commercial environmental archaeological reports in most countries. The development of guidance documents and procedure has resulted in a certain standardization of aspects of environmental archaeology, such as sample sizes and specialist procedures, by commercial organizations. Although this could be argued to stifle creativity within projects, it may in the long term be conducive to data synthesis.

In summary, environmental archaeology as a subdiscipline within archaeology is subjected to the same outside forces that affect archaeology as a whole. The commercialization of archaeological practices in some countries has resulted in a market for environmental archaeological work, resulting in an increase in new datasets, greater employment opportunities, and an expansion of the discipline. However, in such a situation, archaeology and environmental archaeology are not immune to general economic trends; therefore, a downturn in economic conditions in a country where archaeological work is governed by "capitalist" free market principles often results in a downturn in environmental archaeological work and a loss of positions and subsequently skills. However, countries where the state maintains control appear to be less affected (Aitchison 2009). The separation of processes within a commercial context can also make the integration of archaeological results from different material specialists harder to achieve, although this is an issue that effects all environmental archaeologists. Finally, within a free market system often based on price, standards must be considered to be an issue: organizations are working to maintain and improve standards of environmental archaeology, but in a market economy, this is also reliant on environmental archaeologists continuing to raise the profile and importance of such work to the consumer (other archaeologists and archaeological organizations).

Cross-References

- ▶ Archaeology Data Service (ADS)
- ▶ Association for Environmental Archaeology (AEA)
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data

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Environmental Assessment in Cultural Heritage Management

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Brief Definition of the Topic

An environmental assessment (EA) is an important, though preliminary, part of the planning process for proposed developments that may directly or indirectly affect the environment. In application, the "environment" of a project area is broadly defined. It includes not only natural resources, such as plant and animal species native to the area of potential effect, but also the immediate and long-term social and economic consequences that a proposed undertaking may have upon people living in or near the development zone. Moreover, the likely impacts on any significant archaeological and historic architectural resources or cultural landscapes that might be present in the project area also will be taken into account. Consequently, an EA is a critical element in conducting responsible cultural heritage management in the public interest.

Evaluations of this kind began to be used some 40 years ago and were first formalized in the United States under the National Environmental Policy Act (NEPA) of 1969. Since that time, many nations around the globe have adopted similar laws, regulations, and governmental policies to help inform decision makers about the results, both positive (e.g., local economic stimulus or transportation system enhancement) and negative (e.g., degradation of a wetland ecosystem or destruction of a significant archaeological site), that would likely be obtained if a proposed action were to be implemented.

A formal EA report is prepared to document the study, and public input is generally solicited as part of the planning process. Such a study first identifies the perceived need for a proposed undertaking and outlines what is to be accomplished. Often several alternative approaches to solving the perceived problem are enumerated, and for each alternative, the potential detrimental or beneficial consequences are identified. A thorough EA typically includes a so-called no-action alternative, defining the likely outcomes that would result if nothing were to be done.

Analysis usually arrives at the elimination of certain alternatives from further consideration, and frequently a preferred alternative will be identified in the report. The study may issue a Finding of No Significant Impact (FONSI) for the preferred alternative, in which case the project may proceed toward realization if that finding is upheld. The FONSI may also stipulate certain actions that parties to the proposed action have agreed to follow while implementing the project in order to ensure that environmental impacts are kept below a minimum level.

On the other hand, perhaps one EA out of ten will determine that a more detailed Environmental Impact Statement (EIS) is necessary before proceeding further with project planning. An EIS centers on location and design specifications of the viable alternative(s), and it generally requires intensive investigation of the project area by teams of subject-matter experts. Cultural resources in the Area of Potential Effect (APE) are among the many environmental elements studied in depth as part of the EIS process. Accordingly, this highly focused by-product of

an EA provides the baseline inventory data and evaluations of significance that are essential to informed cultural heritage management.

It should be noted, in conclusion, that the completion of an environmental assessment does not ensure a particular outcome, such as the preservation of an important archaeological site, nor does it guarantee that all concerns about the probable effects of a proposed undertaking will be resolved before the development can proceed. Rather, the EA process aims to make certain that decision makers will be reasonably knowledgeable about the full range of environmental consequences associated with a proposed action in order to weigh the relative costs and benefits of the undertaking in question from an informed basis. Its purpose is to ensure that decision makers take into consideration cultural resources, among the many other environmental factors studied, when deciding how best to achieve a desired end. The principal objectives of cultural heritage management are thus served.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: Project Management
- ▶ Heritage Areas
- ▶ Heritage and Public Policy
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ United States: Cultural Heritage Management

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Environmental Reconstruction in Archaeological Science

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Introduction

Environments are the totality of biological and physical variables that impinge upon an organism. Most archaeological research requires some knowledge of the environmental contexts in which humans or our ancestors made decisions, performed activities, and engaged with each other and their surrounding world. Therefore, many, if not most, archaeologists require some knowledge of past environments to address questions about past societies.

Whether driven by climate, population dynamics, disturbances, or other agents, environments are constantly changing, thereby altering organism-environment relationships. Humans and other organisms may alter properties of their environments through their decisions, movements, consumption, and other behaviors. Such alterations can have long-term evolutionary legacies (Odling-Smee et al. 2003). To disentangle these relationships and understand their consequences, archaeologists must take advantage of environmental reconstructions.

Definition

Archaeologists cannot directly observe past environments. Rather, they must reconstruct

properties of past environments on the basis of indirect evidence or proxy data. *Environmental reconstruction* is the process through which archaeologists assemble relevant evidence from biological, geological, historical, or archaeological sources to infer properties of past environments. These reconstructions can be qualitative or quantitative and are constructed from archaeological and non-archaeological records. Reconstructions often emphasize properties of the local or regional biological communities but may also focus on inferring properties of past climates.

There are diverse strategies for reconstructing paleoenvironments in archaeological research. Projects might include environmental archaeologists or paleoenvironmental specialists as part of the research team or utilize a wealth of paleoecological reconstructions that have been produced by other scientists. For example, publicly available paleoclimate datasets can be accessed through the National Oceanic and Atmospheric Administration's Climate Data Center (www.ncdc.noaa.gov/paleo/paleo.html). Within the NOAA web portal, climate reconstructions as well as databases for charcoal, pollen, speleothems, and other proxy records are available. Regardless of the particular research strategy, all interpretations of past environmental data rely on the strength of stratigraphic and chronological control over the contexts from which the material has been collected and on uniformitarian assumptions that provide environmental meaning for biogeophysical data.

Biological Sources of Environmental Information

Biological proxy data used to reconstruct past environments broadly conforms to one of three types: (1) indicator taxa, (2) assemblage analysis, and (3) biophysical responses. Indicator taxa are used to reconstruct particular environmental properties – usually microclimatic properties – on the basis of the presence or absence of particular taxon that has a narrow range of suitable habitat conditions. Insect remains (e.g., *Coleoptera* or beetle remains) have proven extremely useful in reconstructing rapid, microclimate changes (Lowe & Walker 1997; Egan & Howell 2001). In other cases, indicator taxa may be used to identify the timing of human impacts, particularly in island environments (Redman 1999), based on the presence of translocated species.

Plant, animal, and palynomorph assemblages are used qualitatively to identify particular ecological communities by comparison to modern analogs. Paleoecological assemblage analysis can be used to reconstruct the structure and composition of biotic communities, or it can be used for climatic inferences. For example, the movement of biotic communities identified in pollen assemblages is a proxy for climatic shifts by using their modern climatic tolerances as a basis for analogy. Quantitative reconstructions convert the proportions of taxa represented in the paleoecological assemblage to proportions of those taxa within the ancient environment. The taphonomy of these assemblages means that this process is never straightforward (see "Key Issues" below). However, when one can control for taphonomic processes, quantitative algorithms or *transfer functions* convert quantitative paleoecological assemblage data for quantitative paleoenvironmental reconstructions.

In addition to looking at the presence or absence of a particular taxon, or the proportions of associated taxa in an assemblage, paleoecologists also measure the biophysical responses of individual organisms. Perhaps the best-known technique for analyzing biophysical responses in environmental reconstruction is dendrochronology – the study of precisely dated annual growth structures in woody plants (Speer 2010). The principle behind biophysical response analysis is that organism growth is affected by the most limiting factor in the environment. For example, in semiarid environments, moisture is the key growth-limiting factor. Therefore, patterns of standardized ring widths from trees growing in such environments can be used to quantitatively reconstruct past moisture patterns.

Geological Sources of Environmental Information

Sediments and soils are geological archives from which biological proxies may be collected, but they also serve as proxy records themselves. Geological proxy data are derived from the

stratigraphy, morphology, mineralogy, and chemistry of landforms, soils, and sediments. Soils are the dynamic products of physical, chemical, and biological processes that alter sediments at and near the surface of the earth (Holliday 2004). Distinctive features of soils are reflective of the environments under which they formed. Specifically, soils are a product of the (1) climate, (2) biota that live in and on them, (3) topography, (4) the bedrock or sediment that is the parent material for soil formation, and (5) the time over which the other factors have been allowed to operate. These processes are not static. As a result, soils are often *palimpsests* of the processes that have acted upon them during the course of their formation.

Soils that retain properties from ancient but no longer active soil-forming factors are *paleosols*. Paleosols may be *buried soils* if they are no longer a part of active soil-forming processes due to subsequent burial. They may also be *relict soils* if they have been exhumed by subsequent erosion or were never buried. Properties of paleoenvironments may be inferred from soil chemistry (e.g., macronutrients, isotope composition), mineralogy, (macro-) morphology, and micromorphology (Holliday 2004; Goldberg & Macphail 2006).

In addition to serving as contexts for the accumulation of biological materials (see above) and as parent materials upon which soils may form, sediments may also be used to generate environmental proxy data. For example, the thickness of rhythmic variations in lake deposits (i.e., *varves*) can be used as a proxy for winter precipitation in some environments (Lowe & Walker 1997). Chemical sediments are minerals that are formed when ions precipitate out of solution. Chemical sedimentary proxies include evaporite minerals in paleolakes, laminated carbonates in speleothems, and biogenic carbonates in corals. Speleothems have become particularly attractive for paleoclimatic reconstructions, wherein the width of laminated bands and their isotopic composition appear to record varying amounts and sources of precipitation. Some speleothems may preserve annual or quasi-annual banding and can often be dated directly using the uranium decay series (Lowe & Walker 1997).

Geomorphology, the study of landforms and their origin, is one of the oldest approaches to reconstructing past environments. Certain landforms only develop as a consequence of particular sedimentary processes that occur under certain climatic conditions (e.g., moraines will only form along the margins of an active glacier). Anachronistic landforms indicate paleoenvironmental conditions that contrast with contemporary ones. Stratigraphic relationships between landforms also preserve evidence of environmental changes and their relative chronology (Goldberg & Macphail 2006).

Historical Sources of Environmental Information

Historical records are a valuable source of paleoenvironmental information for certain times and certain places. Like other records, historical documents are subject to varying forms of bias in their formation. Unlike biological, geological, and archaeological biases, which are taphonomic (see "Key Issues" below), biases in historical documents originate with the author of the documents. Recorder reliability, motivation, and conflicts of interest must always be taken into consideration when interpreting historical documents. However, historical observations can yield invaluable clues to the structure and composition of past environments (Russell 1997). Seemingly mundane, economic observations of planting and harvesting dates, for example, have been used to reconstruct paleotemperature changes (Egan & Howell 2001). Visual depictions of past landscapes and biota, which include rock art, landscape paintings, and early photographs, and ancient maps are also sources of information on past environments. Maps and written records of historical property surveys, for example, are samples of past forest composition that have been used for semiquantitative reconstructions of species changes in recent centuries (Russell 1997; Eggan & Howell 2001).

Archaeological Sources of Environmental Information

Archaeological sites are archives for biological and geological proxies linked directly to

human-related environmental contexts. Care is required in the use of these records because the unique formation processes of paleobiological assemblages at archaeological sites affects the relevance of archaeological proxy data for landscape reconstructions (Dincauze 2000). Archaeological deposits are particularly valuable for paleoenvironmental reconstructions because they provide opportunities for age control through archaeological cross dating. Archaeological deposits are also locations of anthropogenic sedimentation that may bury paleobiological remains that might not otherwise be preserved (Lyman & Cannon 2004).

Historical Background

By the middle of the nineteenth century, Charles Lyell and Louis Agassiz demonstrated that the Earth had great antiquity. Their writings also indicated that the Earth had experienced climates and biota that were extinct or were no longer representative of contemporary environments. Ultimately, it was the stratigraphic relationship between Paleolithic artifacts and Ice Age deposits, landforms, and biota that unequivocally demonstrated the antiquity of human cultures in Europe and North America (Meltzer 2009).

The late nineteenth and early twentieth century was a period of methodological development in the study of ancient environments. Much of this initial work was dedicated to chronology, including Gerard De Geer's pioneering varve chronology that estimated the duration of the Holocene epoch and the development of dendrochronology by A. E. Douglass (Speer 2010). The study of pollen assemblages extracted from the varves described by De Geer was used to generate the first four-part environmental subdivision of the Holocene, now known as the Blytt-Sernander periodization (Lowe & Walker 1997). Although Douglass recognized that variability in ring width was related to past climates, it was not until the 1960s that the potential of tree rings as quantitative proxies for annually resolved paleoclimate reconstructions was developed (Speer 2010).

In 1937, American anthropologist Julian Steward advocated that archaeologists understand each culture – and culture change over time – in its ecological context. This position ultimately became influential for the generation of "new" archaeologists in the 1960s and 1970s. In the late 1940s and early 1950s, the pioneering excavations of Grahame Clark at the Mesolithic site of Star Carr contributed to the changing perspectives of Anglophone archaeologists from an emphasis on culture history and artifact taxonomy to the ecological and economic study of past societies. The Star Carr project, as well as the research of Robert Braidwood in Iraq, demonstrated the value of interdisciplinary collaborations in both fieldwork and analysis that produced environmental reconstructions at appropriate scales and resolutions for addressing human-environment research questions (Fagan 2001).

By the 1970s, quantitative analysis of pollen assemblages was being used to track the geographic patterns of dispersal and migration of plant taxa after deglaciation as well as to identify paleoenvironments that have no modern analog (Lowe & Walker 1997; Egan & Howell 2001). By this time, quantitative methods were developed to transform tree-ring width measurements and statistically calibrate them to historic climate observations to retrodict annual climate properties over multiple centuries or longer (Speer 2010). In recent decades, techniques for collecting starch grains and plant opal phytoliths from soils and sediments and the increasing accessibility of mass spectrometers have improved the range of independent proxies for environmental reconstruction. Analyses of light isotopes (carbon, nitrogen, and oxygen) from bones and shells to reconstruct paleoenvironments and paleodiets have also become more commonplace (Dincauze 2000).

Key Issues

All environmental reconstructions rely on the interpretation of proxy records. Therefore, it is critical that all paleoenvironmental studies are

conducted with explicit concern for (1) how the proxy records form or the *taphonomy* of the proxies and (2) the nature of the space-time relationships between proxies and their related environmental variables. Mismatches in spatiotemporal scale can undermine comparative analyses. Variance in the spatiotemporal scales and resolutions of archaeological and environmental records will become increasingly salient as global-, hemispheric-, and continental-scale environmental records are used by archaeologists to understand their local or regional archaeological records.

- *Taphonomy, Spatiotemporal Scale and Resolution, and Lagged Responses*
  All biophysical and geological proxies must be interpreted with an understanding of how the record formed. Some biological remains, particularly some wind-borne pollen grains, can be transported great distances before they are deposited. Others, such as microfaunal remains from archaeological contexts (Dean 2005), are unlikely to move far from where they lived. In the case of palynological analyses, the nature of the sedimentary basin has implications for the spatial scale at which the assemblage is representative. Large lakes trap airborne pollen from a larger area than small lakes (Lowe & Walker 1997). Pollen from alluvial deposits originates primarily from the alluvial watershed but may be also contain pollen reworked from older deposits and wind-borne pollen from wider areas. Pollen of some taxa travels further than others and postdepositional weathering may add further bias by differentially degrading pollen (Egan & Howell 2001).

  Similar issues are pertinent for the *temporal* scale and resolution of sedimentary proxies. Discontinuous sampling of sediments for analysis can affect the inferred timing of paleoenvironmental changes. In the case of episodic records (e.g., sedimentary charcoal records), discontinuous sampling may entirely miss key events. Additionally, the size of the sampling interval in continuous samples limits the temporal resolution of the resulting record in ways that vary based on the rate of sediment accumulation. Bioturbation and pedoturbation may homogenize materials of different ages, further reducing the precision and resolution of proxies derived from such records.

  The issue of scale and relevance is important for paleobiological records from archaeological sites, as well. Whether they represent food remains or not, small mammals are less likely to be transported long distances from their habitat by ancient hunters than large mammals, thereby making them more reliable proxies for local paleoenvironments (Dean 2005). Cultural formation processes further complicate the interpretation of paleobiological archives from archaeological deposits (Schiffer 1996). Because of differentiation in taphonomy, scale, and resolution, care must be taken when comparing environmental reconstructions using different proxies from different contexts.

  Finally, different biota will respond to paleoclimate changes at different rates, related to their mobility and lifespan. Mobile and short-lived insect populations respond much more quickly to climate changes (see the entry on ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology in this encyclopedia) than long-lived and immobile tree species that must rely on seed dispersal to "migrate" to new environments (Lowe & Walker 1997). The nature of the temporal response to environmental stimuli is the *lagged response* for a particular proxy. Lagged responses affect the temporal resolution and precision of paleoecological proxies and must be considered in the course of building environmental reconstructions.
- *Human Impacts on Ancient Environments*
  Beyond descriptive accounts of past environments, scientists reconstruct paleoenvironments to identify causes of environmental changes. Testing causal explanations involves chronological comparisons of hypothetical cause and response variables. Demonstrations of correlation are not sufficient to infer causation, however. It is necessary to demonstrate that (1) changes in the causal factor precede

the response and (2) to specify the mechanisms by which the hypothesized causal factor would drive the observed changes. The causal mechanism should be amenable to testing with additional paleoenvironmental or archaeological data.

Human impacts on ancient environments have long been controversial, but they have never been more visible in the academic literature than they are today (Redman 1999). Scientists recognize that humans, like all organisms (Odling-Smee et al. 2003), impact their environments (Redman 1999; Dincauze 2000) and that the likelihood of ancient human impacts is high, albeit variable in space and time. This does not necessitate that all environmental changes on human timescales were caused by ancient societies, however. Attribution of anthropogenic causes to environmental degradation in the past is particularly challenging because it is often used for political purposes. In light of the far-reaching implications and visibility of some human-environment impact narratives, archaeologists should be particularly careful to be rigorous, explicit, and precise in their use of paleoenvironmental, paleoclimatic, and archaeological evidence.

The interpretive challenges and political pitfalls of human-impacts research are well illustrated by the decades-old debate concerning the mass extinctions in the Late Pleistocene. The apparent chronological correlation between the colonization of North America and Australia and the extinction of most large terrestrial fauna has been used to implicate human predation or "overkill" as the cause of the extinctions. Beyond poorly resolved chronologies (Grayson 2007), however, there is very little direct evidence to support direct predation or "overkill" as a mechanism. Alternative explanations of climate-driven or human-induced habitat changes are also plagued by poor chronological resolution and poorly supported evidence for the causal mechanisms.

A novel study by Gill et al. (2009) demonstrates the value of using multiple, independent proxies at appropriate temporal and spatial scales to identify the relationships between key processes and test alternative hypotheses of "overkill" and climate change as causes of the extinction. Gill et al. (2009) estimated mega-herbivore biomass through a palynological proxy (the dung fungus *Sporormiella*), infer past vegetation communities through pollen assemblages, and use micro-charcoal as a proxy for biomass burning. By measuring each proxy from the same samples, the authors built robust estimates of the temporal associations between proxies for key response and causal variables. These records indicate that herbivore populations began declining 1,000 years before major changes in fire activity and vegetation occurred. Therefore, climate-driven habitat change and fire-driven habitat change can be excluded as causal factors because both vegetation and fire activity postdate the decline in herbivore populations. Even with the uncertainty of the radiocarbon chronology for these cores, the relative relationship of events is securely known because of the stratigraphic relationships between the samples. In the absolute chronologies, the decline in herbivore populations precedes the archaeological evidence for local human populations, thus rejecting the "overkill hypothesis" (Meltzer 2009).

- *Scale Mismatches in Environmental Analysis*
  The abundance of paleoclimatic reconstructions at the continental to hemispheric scales offers a wealth of analytical opportunities for reconstructing human-environment relationships. Careless comparisons of coarse-grained archaeological chronologies with hemispheric climate reconstructions, however, can lead to spurious conclusions. Given chronological uncertainties in archaeological datasets, one can find a reconstructed climate change that will roughly correlate with the culture change of interest. If the large-scale climatic phenomenon cannot be demonstrated to have local environmental impacts that affected the lives of human

residents, however, such correlations are meaningless. For example, the Younger Dryas Chronozone was a period when many, but not all, Northern Hemisphere paleoclimate records indicate rapid cooling before the onset of the Holocene. It has been suggested that environmental changes during the Younger Dryas transformed Paleoindian cultures across North America, although given environmental variability across the continent, it is unlikely that it could have done so uniformly (Meltzer & Holliday 2010).

Mismatches in scale must be carefully considered in large-scale *meta-analyses* that combine local records into regional- or continental-scale aggregates to identify emergent properties. Such meta-analyses reduce variance between records, thus enhancing the shared signal between them, presumably because of shared causal factors acting at the same spatial scale. With few exceptions, human activities are time transgressive and variable in space. Any influence that human activities may have had on local records would likely be removed from records aggregated in this way. Although archaeological records could be similarly aggregated at a large spatial scale, mismatches in the representativeness of meta-records from archaeology and paleoecology could lead to spurious conclusions.

A recent effort to compare meta-analyses of charcoal records and radiocarbon-dated archaeological sites in the Australasian region illustrates the problems of mismatched scales and resolutions. Although both the aggregated fire history and archaeological datasets cover overlapping areas, the ecological zones represented by each dataset are not precisely the same (e.g., the western semiarid interior is well represented in the archaeological record and poorly represented in the fire record). When both datasets are aggregated, the lack of apparent correlation between the records led the authors to suggest that aboriginal Australians must have had no impact on past fires (Mooney et al. 2011). This conclusion is inconsistent with historical, ethnographic, and other paleoecological observations and is not warranted by the analytical methods because the datasets are mismatched in spatiotemporal scale. Such meta-analyses are likely to become more common in the future. Collaboration with archaeologists that includes appropriate scalar relationships between the datasets and their relevance to particular research questions will improve the quality of such endeavors.

Future Directions

Increasingly, environmental reconstructions are central components of archaeological research programs. These efforts improve our understanding of past societies, their legacies on their surroundings, and their responses to environmental changes. Environmental archaeology has an important role to play in addressing outstanding questions of human impacts on environments that have had evolutionary consequences for humans and other organisms. Recent hypotheses about the role of ancient land use affecting Holocene climates will also require archaeological testing. These are not exclusively academic endeavors. Environmental archaeology has begun to contribute to discussions about solving modern social-environmental problems. Progress on these fronts will likely continue in the foreseeable future.

- *Human Contributions to Ancient Climate Change*
  Human agency in global warming since the industrial era is not in dispute among scientists. Paleoclimatologist William Ruddiman (2005), however, has provocatively suggested that human impacts on Earth's climate system long predate the industrial era. Ruddiman suggests (1) that deforestation for agriculture in temperate forests altered global carbon cycling beginning 8,000 years ago and (2) that the development of paddy rice agriculture increased tropical methane releases

over the last 5,500 years. These greenhouse gas emissions stabilized Holocene climates and delayed the start of the next glacial period. From an atmospheric perspective, these hypotheses explain the anomalous relationships between carbon dioxide and methane concentrations in the Holocene relative to previous interglacial periods. At present, however, these hypotheses lack sufficient archaeological support. Archaeologists will play a key role in testing the Ruddiman hypotheses in the future with important implications for contemporary policy discussions regarding global warming.

- *Niche Construction and Human Biological and Cultural Evolution*
  Evolutionary biologists are increasingly turning their attention to the role of niche construction as an evolutionary process. *Niche construction* is the process by which organisms alter the selective pressures on themselves, their descendants, and other organisms in their environment (Odling-Smee et al. 2003). All organisms affect their environments, but humans are quintessential niche constructors. Explicit study of the evolutionary legacies of human behaviors and their environmental impacts is lacking, however. In the future, archaeologists and paleoenvironmental specialists will begin to untangle the role of niche construction in hominin evolutionary history.
- *Applied Research for Biodiversity Conservation or Ecological Restoration*
  Modern environments are a product of their history. Land managers and conservation biologists increasingly recognize the need to understand the history of a particular landscape to ensure its sustainability in an ever-changing world. Data about the variability in structure, composition, and key ecological processes of past environments are key to this type of management known as *applied historical ecology* (Swetnam et al. 1999). Archaeologists have been late to recognize their importance to this field but increasingly recognize that applied historical ecology needs archaeology to understand how humans contributed to past ecological structures, compositions, and dynamics (van der Leeuw & Redman 2002). Zooarchaeologists have spearheaded archaeological research that is relevant for contemporary environmental problems (Lyman & Cannon 2004), but other environmental archaeologists are poised to contribute as well. Archaeological contributions to applied historical ecology will require increased collaboration with non-archaeologists and, in most cases, will require research designs that are driven by non-anthropocentric questions and goals. This may be an uncomfortable future for archaeologists from anthropological traditions, but by emphasizing the social dimensions that are necessary to understand social-ecological sustainability, it is distinctly anthropological. Perhaps, in the future, environmental archaeology will be recognized as a cornerstone field within applied anthropology.

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- ▶ Clark, John Grahame Douglas
- ▶ Dating Techniques in Archaeological Science
- ▶ Molluscs (Isotopes): Analyses in Environmental Archaeology
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ North American Terminal Pleistocene Extinctions: Current Views
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Phytolith Studies in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Star Carr: Environmental Archaeology

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Environmental Sampling in Mediterranean Archaeology

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Introduction

The Mediterranean region today possesses a large number of heterogeneous microenvironments. Hot, dry summers and wet, cool winters are common, but by no means invariable, while a high degree of variation in lithology, surface geology, and topographic relief produces fragmented vegetation zones ranging from desert to alpine, with abundant interfaces between zones. Overall, there is a pronounced altitudinal climate gradient, with upland regions often cooler and wetter. There is good reason to believe that environmental parameters had a strong influence on where ancient people chose to settle, the strategies they pursued in their management of crops and domestic animals, and the long-term success of these symbiotic human/plant/animal communities.

By definition, the process of environmental sampling involves taking samples, characterizing them according to certain parameters (size, age, species), and extrapolating from them to a larger population, in order to permit the identification of variation on scales commensurate with archaeological data and questions, for example, the identification of wet and dry phases within the Holocene or a change in the relative representation of pine and oak pollen over the course of a site's occupation. Important variables such as temperature and rainfall may be

attempted to be measured indirectly, through the use of *proxy variables* thought to have a predictable relationship to them. Since global climate also necessarily has an effect on local and regional environments, research into ancient environments also involves the use of data derived from ice cores and from marine and lacustrine sediments worldwide.

Definition

Environmental sampling in the Mediterranean world encompasses a wide range of techniques for recovering and characterizing physical evidence that may yield information about the ancient environment at multiple scales, temporal and spatial. Categories of evidence routinely sampled include sediments, either derived directly from archaeological contexts or having the potential to give information about conditions in the past, and the physical remains of plants, animals, and humans. Since, as with other categories of evidence, it is impossible to recover all the material that was deposited, it is necessary to take samples that can be used to characterize the population from which they were drawn. This allows archaeologists to place ancient people's behavior and strategies in context and to better understand the complex, mutual relations between human communities and the environment.

Historical Background

The investigation of ancient environments in the Mediterranean is nearly as old as the study of antiquity. A number of ancient authors recorded information about weather conditions, vegetation, and human interactions with the environment, for example, the presence of great forests in areas no longer wooded and summer rainfall in places which now seldom receive rain in summer. For a long time, classical historians and archaeologists tended to accept the testimony of these ancient authors uncritically, inferring that the landscapes they observed had "deteriorated" since antiquity due to deforestation, erosion, and grazing (Grove & Rackham 2003). However, in contrast to narratives of the destruction of stable climactic vegetation regimes, erosion, and accelerated aridification, recent literature tends to characterize local environments as responsive to human action but also complex, robust, and naturally dynamic.

In the late nineteenth century, archaeologists undertaking large-scale excavations at major classical sites observed evidence of significant geomorphological changes. At the sanctuary site of Olympia in the Greek Peloponnese, buildings were found to be buried under up to 8 m of silt. This fill has traditionally been identified as alluvial deposits from the Kladeos river, though more recently it has been suggested that high-energy sediments support catastrophic flooding caused by the ingression of seawater from tsunami waves striking the coast (Vött 2011). Elsewhere, as at the Roman ports of Ostia and Portus, topographers and archaeologists found that coastlines had eroded or insilted. Occasionally, changes in sedimentary geology cast light on important historical events, such as the Battle of Thermopylae (Kraft et al. 1987). In part because the sedimentary geology of archaeological sites was essential for understanding cultural sequences and historical events, the geomorphology of ancient sites and regions developed into an important area of study (for general sources see Rapp & Hill 1998; Stein & Farrand 2001).

The mid-twentieth century saw increasing interest in environmental questions in Mediterranean archaeology, particularly in the archaeology of prehistoric periods. This can be attributed to a combination of factors including the notable success of environmental research in adjacent disciplines, a host of new or newly refined scientific techniques; the rise of interdisciplinary projects focusing on landscape use at the regional level, rather than sites; and, on the historical side, the influence of the Annales school, which dealt with long-term history, of human/environment interactions, among other subjects. In the Near East, research on the origins of agriculture pointed to the importance of post-Pleistocene climate change. The British School at Rome,

the Minnesota Messenia project in the eastern Peloponnese of Greece, and the Department of Antiquities in Cyprus all undertook major archaeological surveys and inventories of archaeological sites, and in 1949 Fernand Braudel published his enormously influential history of the Mediterranean in the reign of Philip II, which included long sections on geography and environment as they figured in human history of the region. All of these turned scholarly attention to landscapes as dynamic and fitting subjects of study within archaeology.

In 1969, the geographer Claudio Vita-Finzi proposed that the sedimentary geology of the Holocene had been radically altered by human action in the Late Holocene. In particular, erosion in the aftermath of deforestation and land clearances laid down a "Younger Fill". While he was not the first to propose that the Mediterranean landscape had been degraded (see Grove & Rackham 2003; Butzer 2005), his model gained widespread attention. Though few would now endorse it, it had an enduring legacy in encouraging classical archaeologists to pay attention to local geomorphological histories. Subsequent work by Paepe et al. (1980), John Bintliff (1992), and many others problematized Vita-Finzi's model and, in encouraging regional approaches to sedimentary geology, led to the production a much higher-resolution picture of stability and change in the surface geology of the circum-Mediterranean. Nearly all excavations and regional projects now devote at least some attention to local sedimentary geology.

With Willard Libby's pioneering work on radiocarbon in the late 1940s and 1950s, organic materials could be assigned absolute dates (albeit initially within wide ranges of error), a milestone as much for environmental science as for archaeology. The utility of the technique was subsequently improved through the construction of calibration curves which allowed researchers to correct for different proportions of the isotopes of carbon in the atmosphere at different times in the past. Meanwhile, the principles of dendrochronology and dendroclimatology had been articulated by A.E. Douglass in the 1920s and refined by Harold Fritts in the 1950s. The science developed along with radiocarbon as dendrochronological data was used to construct calibration curves for the correction of radiocarbon determinations, with synergetic improvement in the resolution of both methods. Dendrochronology is not only a dating method with exceptionally high precision under good conditions but one of the most useful sources of evidence for environmental change in the ancient Mediterranean world. The dendrochronological record is uneven, however, both in space and time, with some regions and periods represented by hundreds of samples and others virtually undocumented. Glacial ice and foraminifera data sets are not only used to calibrate radiocarbon determinations but major sources of information in their own right regarding atmospheric conditions and therefore global temperatures in the past, against which locally derived vegetation sequences and sedimentary geology can be interpreted.

In the decades after the middle of the twentieth century, the identification of seeds and animal bones began to be considered an important category of archaeological evidence in the Mediterranean world. The identification of both botanical and faunal remains was made possible with recourse to large comparative collections assembled in the nineteenth century. The application of statistical methods, pioneered in the Near East by investigators working on animal management and domestication, made the study of faunal remains a far more rigorous and informative discipline. Age/sex mortality curves allowed faunal specialists to adduce hunting and herd management strategies (Payne 1973), and the general approach of using taphonomy to track human relationships with animal populations has been more widely applied. Some scholars, for example, have been able to track episodes of stress through careful attention to the size of small game taken by early agriculturalists (Munro 2003). A shift in the proportional representation of domestic animal species corresponding with other indicators of local environmental change has been used to argue for human adaptation to changing local environments (e.g., Wasse 2007).

Turning to paleobotany, an equally important development came with experiments in water

sieving. Early pioneers of the technique in the late 1960s and early 1970s included Kent Flannery, George Willcox, and Gordon Hillman, all of whom were concerned with the origins of agriculture. As flotation came to be applied more widely, it quickly developed from a procedure that could be performed by "an illiterate with a bucket" (Flannery 2009 (1976)) into a sophisticated technique for the separation of light and heavy fractions of the microarchaeological record from the sedimentary matrix. Despite issues of selective deposition and preservation, paleobotany remains a critical and underutilized source of information. Especially where large volumes of excavated sediments are tested, paleobotany can interface with faunal data to provide a remarkably detailed picture of ancient environments, human strategies and lifeways, and their change over time.

Palynology, the study of preserved airborne spores and particles (not pollen exclusively), was initially developed in Scandinavia and Northern Europe, where lake sediments preserved long records of stratified arboreal pollen, permitting the identification of changes in the relative abundance of different species. Pioneering work by Gunnar Erdtman in the early to mid-twentieth century led to the wider application of the science and refinement of its methods; radiometric dating permitted pollen cores more readily to be placed within an absolute chronological framework and compared with other sources of evidence. In the Mediterranean region, lacustrine deposits have provided critical information about regional vegetation histories in the Quaternary (Bottema et al. 1990; Jalut et al. 2009). It is also possible to recover pollen from dry and non-lacustrine sediments, including archaeological deposits. In Cyprus, for example, important Neolithic sites such as Khirokitia-*Vouni* have yielded long pollen sequences documenting local vegetation change over the course of their occupation (Renault-Miskovsky 1985). One of the most important challenges workers face in the interpretation of pollen data is to come to an assessment of how well the recovered sample reflects the plant population that produced it. Since not all kinds of vegetation and not all areas in the vicinity of the sampled site will be equally well represented, it is desirable to model pollen transport.

Anthracology, the specialist study of wood charcoal, involves the identification of different woody taxa preserved by burning. Charcoal in archaeological contexts, charcoal does not usually represent a random sample of trees existing in the environment, but rather reflects human choices and action at every stage from collection of wood to deposition of charcoal. That said, it is highly informative about people's use of available resources, especially where it can be compared against other lines of evidence.

The above are by no means the only available sources of information about ancient Mediterranean environments, and the development and application of a wider range of environmental studies can be expected to expand the tool kit still further. The use of geographic information systems and computer modeling deserve mention, however brief, as technologies which have enhanced the management, analysis, and presentation of data and which will be indispensable to future research. Meanwhile, new sources of environmental information continue to be developed. For example, phytoliths, distinctive silicaceous, or other residues produced in plant tissue, and which survive the death and decay of the plant (Piperno 2006), are as yet understudied in Mediterranean archaeological contexts but have the potential to make significant contributions to the reconstruction of ancient environments (Tsartsidou et al. 2007).

Key Issues and Current Debates

Current work on environmental sampling in Mediterranean archaeology includes not only the continued application of all the techniques reviewed above in collaborative archaeological and environmental research but attempts at large-scale synthesis and comparison. Two key questions for every researcher and end user of environmental data are how well samples reflect the populations from which they were drawn and how far the results are to be extrapolated in space

and time. Different categories of evidence reflect processes at different scales, from global (e.g., climate change) to regional (e.g., geomorphological changes related to widespread erosion), to site level (e.g., agricultural intensification), and to household level (increased storage), and these are not always easily distinguished. In an important paper, Robinson et al. (2006) concluded that different lines of proxy evidence for paleoclimate in the Eastern Mediterranean including Dead Sea levels and pollen cores generally agreed with evidence from northern Europe on the timing of major changes in paleoclimate. Similarly, Jalut et al. (2009) argued that local vegetation changes throughout the circum-Mediterranean and over the course of the Holocene can be shown to reflect global climate. They distinguish three phases: the lower Holocene (11,500–7,000 BP), a long wet phase interrupted by several arid intervals, followed by an intermediate phase in which changes in global atmospheric circulation assumed new importance, succeeded by a phase (5,500 BP–present) characterized by increasing aridification (Jalut et al. 2009).

Such large-scale changes had different effects in different regions, however. Present-day Mediterranean landscapes can exhibit marked variation in the quantity and timing of rainfall, both from year to year and from place to place. Since seasonality and risk of harvest failure or resource shortage in bad years are likely to have been critically important for all past societies, better understanding of these environmental parameters is essential (Halstead & O'Shea 1989). Changes in the ancient environment were also subject to the effects of human action on the landscape: the distribution of settlement, use of different agricultural and pastoral strategies, resource procurement (logging, mining), as well as actions taken to retard or offset the local effects of environmental change – agricultural terracing to counteract the effects of erosion, irrigation to offset drought, dredging to combat the insiltation of watercourses, and deliberate burning to encourage the production of browse for animals. At a larger scale, successful human systems necessarily adapt to a more or less predictable range of environmental variation.

It is not possible to provide here a systematic overview of large-scale Quaternary climate affecting the Mediterranean area, human/environment interactions, and anthropogenic landscape modification (see suggested further reading below for general sources). The following is therefore a very general but current outline of large-scale environmental and human changes within which more specific environmental investigations are situated. Late Pleistocene postglacial warming and the retreat of sheet ice in northern Europe beginning c. 15 k cal BP fundamentally altered the landscapes of the Mediterranean littoral on a scale not seen since. Where previously this change was generally viewed as a gradual process, in the last 10 or 15 years a combination of higher-resolution climate data and sophisticated modeling have been used to suggest that past changes in climate may have been sudden, even abrupt, on a decadal scale. The rise in global temperatures manifests itself in dramatic change in sea level, fauna, sedimentary geology, and vegetation regimes across the entire Mediterranean region. The effects on human foragers were dramatic. Both "push" and "pull" effects operated as humans expanded into newly habitable areas. In contrast to the warmer conditions of the Bølling-Allerød interval, the Younger Dryas, between about 12,800 and 11,600 cal BP, represents a late glacial reversion, a return of cold and dry conditions. Significantly, some human groups in the Levant increased their exploitation of the wild ancestors of wheat, barley, and rye, suids, ovicaprines, and bovines, as well as other species which proved less susceptible to selection for the modified behaviors that resulted in domestication (Bar Yosef & Belfer-Cohen 2002). The Early Holocene Wet Phase (EHWP) 10,000–7,000 kcal BP coincides with the Neolithic in much of the Mediterranean basin. A return to wetter conditions after the Younger Dryas, it provided favorable conditions for the dispersal of these newly domestic species to areas outside their original range. The period 7,000–5,000 cal BP witnessed a remarkable range of adaptations to mid-Holocene environments. After c. 5,000 cal BP, human action had ever more potent effects on local landscapes in

the Mediterranean. Karl Butzer has proposed (2005) three sustained episodes of intensification of anthropogenic landscape modification: around 3000 BCE, 1300 BCE, and 100 CE, corresponding respectively with the widespread adoption of Mediterranean polyculture and a range of associated agricultural strategies partially offsetting more arid conditions in many parts of the Eastern Mediterranean, the flourishing of redistributive palace economies and long-distance trade in the Late Bronze Age, and Roman imperial expansion, coinciding with the second half of a climatic optimum, a wetter period from ca 500 BCE to 500 CE.

This is obviously a very general framework, and the histories of individual regions vary considerably. The nature and causes of that variation at different scales, spatial and temporal, continue to be subjects for research and debate.

International Perspectives and Future Directions

Both paleoecology and Mediterranean archaeology are inherently international and collaborative disciplines in which knowledge production has tended to follow the model of the hard sciences (collaborative research, multiple authorship, publication in specialist journals). Most of the scientific literature is in English, German, and French. Archaeologists working in earlier periods (i.e., prehistory) have been the most avid consumers of environmental data, while those dealing with the first millennium BCE and later have tended to disregard environmental components of the archaeological record. This appears to be changing, however, and if Mediterranean archaeologists working in historical periods come to take more of an interest in human/environment interactions, it could open a major avenue of collaborative research.

It is difficult to forecast any direction for such a diverse group of scientific fields and techniques. However, it may be observed that the collection of different kinds of environmental data, and the continuing refinement of analytical methods within each of these subfields, not only makes invaluable contributions to understanding individual archaeological sites and regions but adds to a growing data set for the ancient environment writ large. As understandings of the various categories of environmental record improve, so will researchers' ability to design sampling strategies and interpret rich, high-resolution data. At the same time, the integration and comparison of disparate data sets will become correspondingly important for understanding human responses to, and anthropogenic impacts on, the environment. Particularly important are changes in the structure of variation – the understanding of "normal parameters" on which all human subsistence strategies are based.

Many archaeologists have been able to identify cases of anthropogenic landscape alteration through evidence of erosion, changes in representation of important plant species, aridification, and other indicators of stress. These cases are an important part of the record, but it is equally important for archaeologists to seek to understand how people managed Mediterranean environments to support big increases in human and domestic animal populations, vast accumulations of stored surplus, and the extraction of resources. As work progresses, explanations of the relationship between people and the environment may be seen as shifting from a search for simplistic, straightforward cause/effect relationships to integrative and complex models using a systems perspective to examine a number of data sets.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Cultural Ecology in Archaeology
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Paleoethnobotany
- ▶ People as Agents of Environmental Change
- ▶ Radiocarbon Dating in Archaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Epigraphy, Greek

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Introduction

Scholars of the ancient world are often frustrated in their endeavors by the vast amount of material which has been lost due to the passage of time. One area of ancient scholarship in which the amount of available sources continues to increase is in the field of epigraphy, or the study of inscriptions. For this and other reasons, epigraphic analysis is proving to be of increasing value in the study of virtually all aspects of the ancient world, including social issues, religious aspects, political and economic decision-making, and social connections between groups or individuals.

Definition

Greek epigraphy is generally defined as the study of writings in the Greek alphabet which are inscribed upon durable artifacts. The materials on which the inscriptions are placed include not only stone (although the majority of epigraphic documents are indeed inscribed on stone) but also bronze, pottery, and other objects. Inscriptions may be movable, such as those on pottery, gems, weights and measures, tesserae, bricks, and tiles, or they may be immovable, such as graffiti and other inscriptions found on walls. Inscriptions on coins are properly the domain of numismatists, while texts on less durable materials belong to the field of papyrology; paleographists study ancient handwriting. The length of an epigraphic text may vary from a single grapheme to an extensive document, such as laws, oaths, or catalogues.

Even in antiquity there was interest in studying and collecting inscriptions. As early as the third century BCE, Krateros, the brother of the Macedonian king Antigonos Gonatas, published a collection of decrees relating to the history of Attica, known as the Ψηφισμάτων συναγωγή. Although this work is lost, it is regularly referred to by later authors including Harpokration. In later periods, a long series of travelers, including Cyriac of Ancona, included inscriptions in their descriptions of ancient sites.

Key Issues and Current Debates

Epigraphy is generally considered an auxiliary science and increasingly has become an important tool for archaeologists and historians of the ancient world. However, the study of inscriptions can be a difficult skill to master, due both to the presence of some complicated technical conventions observed within the discipline as well as organizational issues in the publication and dissemination of inscriptional evidence.

Most inscriptions from antiquity which have survived are damaged in one manner or another, either from the simple passage of time and exposure to the elements or through other methods including accidental breakage, vandalism, or wear arising from the reuse of ancient blocks as construction materials. Many inscriptions are found in the course of systematic excavations of important ancient sites, but many others come to

light by accident, through rescue excavations or through the demolition of older buildings and modern construction work which may uncover ancient remains.

After the discovery and cleaning of an inscription, the task of the editor is to decipher what remains and, in the case of damaged or broken texts, to estimate, as closely as possible, how much of the original inscription has been preserved and to make an attempt to restore what has been lost. Greek inscriptions are engraved in unbroken lines of capital letters, without spaces and with virtually no punctuation to indicate the beginnings and ends of words; the lack of spaces and punctuation, combined with the damage or wear on most inscriptions, complicates the task of the epigraphist, who must produce a text in which word divisions, punctuation, and diacritical marks are present. In deciphering an inscription, therefore, it is often helpful to use such tools as photographs taken in various degrees and at various angles of light or through the production of a squeeze, which generates a reversed, three-dimensional copy of the text. Increasingly, advances in technology are allowing epigraphists to recover lost portions of text from very damaged areas of inscriptions; such tools include the use of three-dimensional white light scanners and infrared light to reveal letter traces that cannot be seen with the naked eye.

In addition to the difficulties presented by the manner in which inscriptions were carved and the damage wrought by the passage of time to many of the texts, the study of Greek epigraphy is complicated by the fact that the inscriptions display specific characteristics which directly relate to the area and era in which they were originally produced and erected. Regional differences in dialect and alphabets abound; the orthography, language, use of abbreviations, and other aspects of inscriptional texts also vary depending upon the region in which the inscription was produced and the historical circumstances of the time period in question.

The earliest Greek inscriptions date to the early Archaic period (eighth and seventh centuries BCE). The Greek script had Semitic origins, and early inscriptions often are written from right to left, in imitation of the manner of writing common in areas using Semitic scripts; different Greek communities also began to develop their own sets of letters, known as epichoric alphabets. Some early inscriptions also demonstrate a style of writing known as boustrophedon, or "ox-turning"; in boustrophedon inscriptions, alternating lines of text read from right to left and then left to right, often with the letter forms in each alternate line also being reversed. As time went on, increasingly a more general alphabet began to be used, and the orientation of the script settled into a left to right direction. In the sixth century BCE, the stoichedon style of inscription developed; in stoichedon inscriptions, the letters are aligned in rows both vertically and horizontally, as if on a grid. In the fifth and fourth centuries BCE, stoichedon inscriptions were the dominant form of official documents in Attica and were also widely used in other areas of the Greek world. The use of the stoichedon style began to decline in the third century BCE, and it was virtually abandoned by the end of the century. It was replaced with a more naturalistic style in which the letters are proportionately spaced rather than each letter being assigned a space of the same height and width regardless of its size; later inscriptions also have a tendency to observe syllabic or word distinctions, so that lines often begin or end with complete words or syllables.

Letter forms also developed over time, and more experienced epigraphists can often offer an estimated date for an inscription simply by examining the stylistic characteristics of the text. Epichoric alphabets had virtually died out by the fourth century BCE; an Athenian decree of 403/2 BCE made the use of the Ionian alphabet compulsory in all official Athenian inscriptions, and other states followed Athens in adopting the Ionian alphabet, so that it became the standard script of Greek inscriptions in the Hellenistic and Roman eras. However, there was a wide variety of variability in the Ionic script, and over the centuries the letter forms evolved in certain ways; it will suffice here to point to the development of broken-bar alpha; the development of lunate sigma and epsilon; the replacement of the

letter pi, written with unequal hastae during the Classical period, with a pi in which the hastae are equal; and the addition of apices as decoration on the ends of letters. Some scholars, most notably S. V. Tracy, have been able to trace the hands of various letter cutters by closely analyzing the style of the letters in various inscriptions, and this has allowed epigraphists to date numerous inscriptions which were fragmentary and therefore undatable by other means.

The restoration of missing portions of epigraphic texts must be carried out with reference to the reconstruction of the proportions of the original monument, since the physical dimensions of the surface on which the inscription was engraved has a direct bearing upon any proposed textual restorations. Restorations of illegible passages in Greek inscriptions are often offered on the basis of textual parallels from other similar inscriptions in which the missing portion of text is preserved. Early epigraphists used a variety of methods for restoring texts and a variety of editorial indications to point out places in the document where restorations or other editorial interpolations had been made. The Leiden system of editorial conventions was introduced in 1931 in an attempt to introduce a uniform system of *sigla* to the editing process of ancient texts, and the Leiden editorial conventions have been widely, if not completely universally, adopted by epigraphists since.

Access to the ever-increasing number of Greek inscriptions is complicated by the complex nature of the organization and publication of the texts. The first systematic attempt to publish Greek inscriptions took place in Berlin between 1828 and 1877, under the direction of A. Boeckh, J. Franz, E. Curtius, and A. Kirchhoff. The result was the publication of the *Corpus Inscriptionum Graecarum*, a four-volume attempt to publish all of the Greek inscriptions from the entire geographic spread of the ancient world. *CIG* arranged inscriptions by geographical area and within each region through the application of general categories, including public decrees, epitaphs, dedications, and religious texts. Unfortunately, even before *CIG* was completed, it was already out of date; the continuous discovery of more and more epigraphic texts meant that the stated goal of publishing all known Greek texts from the ancient world in these volumes could not be achieved.

The main source for Greek inscriptions is now the *Inscriptiones Graecae*, on which work began at the beginning of the twentieth century. *Inscriptiones Graecae* is geographically much less ambitious than *CIG* and focuses on Greece, the Black Sea littoral, and the Aegean islands. Although originally 15 volumes were planned in the series, some never appeared. *IG* suffers from the same difficulty as *CIG*; the continuous discovery of inscriptions has ensured that *IG* is not a complete collection, and many volumes are woefully out of date.

Collections such as *Inscriptiones Graecae* have been supplemented by regional corpora of inscriptions, often published by individual excavators or archaeological schools. For example, the French excavations at Delphi and Delos have produced the volumes of the *Inscriptiones de Delos*, the *Fouilles de Delphes*, and the *Corpus des Inscriptions de Delphes*, while the excavations at Rhamnous, in Attica, under the direction of V. Petrakos have produced their own volumes of inscriptional evidence not contained in *IG*. Some thematic corpora, such as F. Sokolowski's *Lois Sacrées des cités Grecques*, have also been produced to supplement the existing collections in *CIG* and *IG*.

Other efforts to fill in the gaps in publication in the main epigraphic corpora include the *Bulletin Epigraphique* and the *Supplementum Epigraphicum Graecum.* The *Bulletin Epigraphique* publishes the new inscriptions discovered in a given year geographically; while the material is discussed briefly, the texts themselves are not presented in a complete manner. The *Supplementum Epigraphicum Graecum* varies from the *BE* in that it presents the complete texts of all new epigraphic discoveries, including an *apparatus criticus* and brief editorial remarks on the inscriptions. In earlier volumes of the *SEG* series, the editorial language used was Latin, but more recent volumes appear in English. The *SEG* is particularly useful in that it presents complete texts of the epigraphic discoveries of a given

year, new readings or restorations that have been suggested in that year for previously known inscriptions, and bibliographical references to new works published by scholars of the ancient world that are concerned with epigraphic materials, as well as useful indexes. Unfortunately, the increasing number of epigraphic finds, and the time necessary to produce the volumes of *SEG*, means that the editors of *SEG* are now several years behind in publishing.

Digital and electronic collections of epigraphic materials are now beginning to be more widely produced and increasingly provide a useful tool for scholars. The Centre for the Study of Ancient Documents (CSAD) at Oxford University is in the process of building an online database of images of its vast squeeze collection of Greek inscriptions. The Packard Humanities Institute (PHI), a nonprofit foundation dedicated to archaeology, music, film preservation, historic conservation, and early education, is developing an online database of searchable Greek inscriptions. This site includes the volumes of *IG* (although the apparatus criticus for each inscription has not been included, only the text of the inscription itself), as well as texts contained in regional and site corpora (e.g., the Athenian Agora inscription volumes); miscellaneous books and collections useful to epigraphists, such as Reinmuth's work on late fourth-century BCE ephebic inscriptions; and links to inscriptions published in scholarly journals and *SEG*. A useful concordance for the inscriptions contained within *IG* and *SEG* has been developed by the Berlin-Brandenburgische Akademie der Wissenschaften and the Seminar für Alte Geschichte at Münster University. Dr. Jürgen Malitz at the Katholische Universität Eichstätt developed the *Inscriptiones Graecae Eystettenses*, a CD-ROM database for the inscriptions of Asia Minor, one region not covered by the volumes of *IG*. The Center for Epigraphical and Paleographical Studies at the Ohio State University has posted an impressive collection of digital images from their collection of squeezes. The U.S. Epigraphy Project aims to gather and distribute information about ancient inscriptions collected in the United States, and the American Society of Greek and Latin Epigraphy maintains a page with numerous useful links for scholars.

Epigraphy is a valuable tool for scholars of the ancient world because of the vast number and type of inscriptions that exist for study. There is virtually no facet of life in antiquity on which epigraphic documents have no bearing, although they are particularly valuable for shedding light on the social history of the ancient world. Although the content of Greek inscriptions is extremely variable, even very short inscriptions can provide valuable insights when studied as part of a larger group or in conjunction with other types of source materials. Epigraphic materials are especially useful for the study of areas in which the surviving literary sources provide little to no detail. For example, the distribution of funerary inscriptions provides scholars with some insights into patterns of settlement and habitation, while religious texts make available information about the observance of cultic activities and even the existence of smaller, local religious associations or cults unattested by our surviving Greek sources. In recent years, increasing attention has been paid to other facets of ancient Greek life on which epigraphy has some bearing, including the relationship between the vast number of inscriptions and ancient literacy and the connection between an epigraphic text and its place of erection in the physical fabric of a city.

The bibliography concerning Greek epigraphy is far too vast to be adequately covered here, and the sources provided below should be viewed as little more than a convenient starting point. References are provided below to some general works and corpora, to some useful works on specific issues in epigraphic studies, and to other resources mentioned above.

Cross-References

- ► American School of Classical Studies at Athens (ASCSA)
- ► Archaeological Record

▶ Archaeology and the Emergence of Fields: Historical and Classical
▶ Classical (Greek) Archaeology
▶ Papyrology in the Greco-Roman World

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Epigraphy, Imperial Latin

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Introduction

Inscriptions are a vital source of information for the politics, society, culture, and religion of the Roman world. This entry examines Latin epigraphy in the age of imperial Rome, from the reign of Augustus (31 BCE–CE 14) to the fall of the empire in western Europe (CE 476).

Definition

The study of Latin epigraphy encompasses a range of different types of inscriptions, such as marble statue bases, milestones, bronze military discharge certificates, brick stamps, and engraved household objects. The one common factor is that

they were all inscribed, etched, carved, or painted with some sort of text, whether it was a personal name, a dedication, a letter, or a law. This act of inscribing has been dubbed the "epigraphic habit" (MacMullen 1982). Some 250,000 Latin inscriptions have been published to date, with more examples discovered each year. Approximately half of these inscriptions are included in the monumental *Corpus Inscriptionum Latinarum* (*CIL*), a project initiated in the late nineteenth century by Theodor Mommsen. The majority of new inscriptions are published in scholarly journals, such as *Zeitschrift für Papyrologie und Epigraphik* (*ZPE*), but are collected together for ease of reference each year in *L'Année épigraphique* (*AE*).

Historical Background

The age of Augustus (r. 27 BCE–CE 14), the first emperor, witnessed a dramatic increase in the number of inscriptions throughout the Roman world (Bodel 2001: 7-8). This was undoubtedly prompted by Augustus' own transformation of the city of Rome through the construction of new temples and public amenities built with marble imported from North Italy. Many of the new monuments were inscribed with texts in honor of Augustus or members of his family. When Augustus was awarded the title of "father of the fatherland" (*pater patriae*) in 2 BCE, the honor was inscribed in no less than three locations in Rome: the entrance to Augustus' house on the Palatine Hill, the senate house (*Curia senatus*), and on the podium of the emperor's statue in his new forum (*Res Gestae* 35.1). As the emperor made his mark on the city's public spaces, there were fewer opportunities for senatorial aristocrats to be honored in Rome. All public statues in honor of senators, equestrians, or other officials had to be officially authorized lest any private citizen be seen to rival the emperor (Eck 1984). The situation was quite different outside Rome itself: in towns and cities throughout the empire, prominent nobles and patrons were honored with statues and inscriptions proclaiming their virtues and achievements.

Emperors and elites were not the only individuals commemorated with inscriptions in the Roman imperial period. Just over two-thirds of all extant Latin inscriptions are epitaphs, many of which were erected for freedmen, slaves, or ordinary citizens. The texts themselves were carved on tombs, sarcophagi, and funerary urns on the orders of family and friends and often paid tribute to the personal qualities of the deceased. This form of funerary commemoration has been used to explain why the number of inscriptions in the Roman world rose steadily throughout the first and second centuries CE before peaking in the early third century. Meyer (1990) proposed that the relatives of the deceased wanted to record that their loved ones were Roman citizens. This theory helps to explain why there was a dramatic decline in the number of inscriptions after Roman citizenship was granted to all free inhabitants of the empire in CE 212. The crucial concept here is that inscriptions were used as a way of expressing one's status and identity to the outside world. Mouritsen's (2005) study of epitaphs in Ostia and Pompeii has demonstrated how freedmen continued to be honored with funerary monuments even as members of the local town councils abandoned the practice. This peculiarity of the epigraphic habit seems to have been the result of the freedmen wishing to commemorate their emancipation from servile status.

Yet funerary commemoration cannot be the only reason for the rise of the epigraphic habit in the Roman world. We need to consider other forms of inscriptions, such as texts carved on honorific statue bases, milestones, military camps, and public amenities such as baths (Woolf 1996). In particular, it is important to think about the ways in which inscriptions were used to express power. Milestones attesting the construction or repair of roads were inscribed with the extravagant titulature of the emperor and his family members, as a way of marking distances and demonstrating the personal interest of the imperial administration in a specific region (Keppie 1991: 65–9). On a much larger scale, imperial edicts or senatorial decrees were often inscribed on stone or bronze in public places such as military camps or on the walls of temples.

These documents were usually first posted in temporary form on a whiteboard, but they could be engraved on the order of the issuing authority or as a result of a decision by provincial communities. The most famous examples of these included "The Achievements of the Divine Augustus" (*Res Gestae divi Augusti*), several copies of which have been found in Asia Minor; "The Decree of the Senate concerning Gnaeus Piso the elder" (*Senatus consultum de Cn. Pisone patre*), known from several bronze copies from the province of Baetica; and Diocletian's "Edict of Maximum Prices" (*Edictum de pretiis rerum venalium*), which was publicly displayed in Egypt, Greece, and Asia Minor. Self-governing communities throughout the empire could likewise order that their decrees be erected in public spaces. This naturally raises questions of literacy, given that it is unlikely that more than 10 % of Romans could actually read these texts (Bodel 2001: 15–6). But it is important to emphasize that the act of inscribing decrees and laws in public places served as a powerful reminder of government authority. The visual impact formed part of the message.

The distribution of Latin inscriptions was not spread evenly throughout the empire: each region had its own epigraphic culture. In Spain, inscriptions were concentrated in the southern region of Baetica and the coastal regions of Hispania Citerior, though there were pockets of epigraphic activity in the cities of central Spain (Kulikowski 2004: 34–48). There is also a marked difference in the spread of inscriptions in Britain, with greater numbers being found in the northwest regions, compared to the southeast. This can be explained by factors such as the types of stone suitable for building and carving and the concentration of soldiers along areas such as Hadrian's Wall (Mann 1985). In Gaul, the epigraphic habit was particularly strong in major towns and cities and in regions closest to Italy, such as *Gallia Narbonensis*. Detailed analysis of distribution patterns has shown that settlements on major road networks or those closely connected with the military featured higher rates of epigraphic commemoration than more isolated communities (Woolf 1998: 82–91). These geographic trends show that although the precise distribution of inscriptions was determined by a number of factors, the epigraphic habit was closely connected to the spread of Roman culture by institutions such as the army.

After the early third century CE, there is a sharp decline in the number of inscriptions, a change which may at least partially be the result of the economic and political crises which plagued the empire in this period, though this view has been nuanced in recent years. There was something of a revival in the fourth century CE, with approximately 50,000 Latin inscriptions dated to the period of Late Antiquity (Trout 2009). The majority of these are Christian epitaphs from the city of Rome, illustrating the way in which the renewal of the epigraphic habit mirrored the formation of new religious communities. However, the number of honorific and building inscriptions declined throughout the Latin west, and many were reused for statue bases or as building materials.

Key Issues/Current Debates

Inscriptions serve as a primary source of evidence for the government of the Roman Empire, as they provide information concerning the administrative posts held by senators, equestrians, freedmen, and slaves. Tabulation and analysis of these positions has enabled scholars to trace changes in the Roman government hierarchy throughout the imperial period. Recent work has shown how inscriptions recording the careers of these officials can serve as valuable sources of evidence for the self-representation of Roman elites (Eck 1997). Scholars have also devoted attention to establishing the reasons for the public display of imperial letters, laws, and edicts in monumental form. The language of these documents, especially the series of edicts surviving from the Tetrarchic period (CE 284–324), can provide important information about the relationship between government policies and imperial ideology (Corcoran 2000: 205–33).

Latin inscriptions have opened up new avenues in the social history of the Roman world, particularly in the study of marginalized groups such as

women, children, and slaves (Saller 2001). For example, large-scale statistical analysis of epitaphs has demonstrated the cohesiveness of the nuclear family unit in the imperial period (Saller & Shaw 1984). There are methodological problems in using the ages recorded on Latin tombstones to reconstruct the age profile of the Roman population, given doubts about the accuracy of the figures. The majority of demographic historians now prefer to use model life tables and papyrological evidence in preference to inscriptions. However, epigraphic records can still serve some statistical purposes, as in the case of military diplomas (bronze discharge certificates issued to veterans from the praetorian guard, auxiliaries, and the fleet). These documents have proved useful in determining changes in the ethnic composition of Roman army units throughout the imperial period (Roxan & Holder 1978–2006).

Detailed studies of the text and language of inscriptions can yield valuable insights for social historians. The fragmentary inscription known as the *Laudatio Turiae* (*CIL* 6.41062) preserves the funeral oration delivered in honor of an aristocratic woman (called "Turia," though her real name is a mystery) who lived during the civil wars of the late first century BCE. The eulogy provides important information on marriage and women's inheritance rights. The virtues such as chastity and modesty, for which "Turia" is praised, also feature prominently in epitaphs and honorific inscriptions for other Roman women at all social levels. Given their formulaic nature, the inscriptions do not provide any real insights into the character of the individuals, but they are useful for examining the social expectations placed on women (Riess 2012). Inscriptions on children's tombstones are also often predictable in the way in which they describe the deceased as "sweetest" or "dearest." But the artistic representations of childhood life that accompany the inscriptions can tell us much about the Romans' views of their children and their place in society (Rawson 2003: 336–63).

There are a wide range of Latin inscriptions that illuminate the religions of the empire and its inhabitants. These include a series of inscribed calendars from Italy, such as the *Fasti Praenestini* (*Inscriptiones Italiae* 13.2: 107–145), which mark the dates of festivals and sacred days; the majority of these are dated to the Augustan and Julio-Claudian period. The workings of a senatorial priesthood, the Arval Brethren (*Fratres Arvales*), are revealed by a series of inscriptions detailing their activities at their sacred grove just outside of Rome. The spread of emperor worship throughout the western provinces of the empire can also be traced through inscriptions, such as monuments in honor of the *Augustales*, freedmen who served as official priests of the state cult. In recent years, epigraphic evidence, including votive dedications and curse tablets, has been used to demonstrate the vitality and variety of religious life in the Roman world (Haensch 2007). This has encouraged scholars to consider the significance of rituals in people's lives rather than dismissing religion, especially state religion, as an empty gesture.

Finally, epigraphic material is one of the most valuable sources of evidence for the development of the Latin language itself, especially when used in conjunction with literary texts such as poems and plays. For example, Adams (2007: 624–83) has analyzed the misspellings in inscriptions to show that the Latin spoken and written in Africa, Rome, and southern Italy was quite different from that in Gaul. Curse tablets discovered at Bath (*Aquae Sulis*) in southwest England reveal the idiosyncrasies of British Latin; they help to demonstrate that the language in the island province was not especially archaic, as once thought. New finds of writing tablets from the fort at Vindolanda near Hadrian's Wall have also shed light on the use of Latin in military contexts (Bowman 1994). One of the most celebrated documents in this collection is a letter sent by the wife of a cavalry officer, Claudia Severa, inviting a friend to her birthday party (*Tab. Vind.* II.291) (http://vto2.classics.ox.ac.uk/index.php/tablets/search-for-tablets?tablet=291).

International Perspectives

There are a number of international projects devoted to collecting and publishing Latin and

Greek inscriptions online. The *Electronic Archive of Greek and Latin Epigraphy* (EAGLE) project (http://www.edr-edr.it/Italiano/index_it.php) has several constituent databases, including the *Epigraphische Datenbank Heidelberg* (http://www.uni-heidelberg.de/institute/sonst/adw/edh/). This currently contains some 65,000 inscriptions from the provinces of Dacia, Dalmatia, Macedonia, Moesia Inferior, Moesia Superior, and Thrace, with further regions in progress. A team of researchers at King's College London has created new online editions of *The Inscriptions of Aphrodisias* (http://insaph.kcl.ac.uk/index.html) and *The Inscriptions of Roman Tripolitania* (http://irt.kcl.ac.uk/irt2009/), with *The Inscriptions of Roman Cyrenaica* (http://ircyr.kcl.ac.uk/) currently under development. These online resources have been prepared using EpiDoc Extensible Markup Language (XML) to ensure that epigraphic conventions are accurately represented on the web (http://epidoc.sourceforge.net/). Online resources have also been developed to make specific regional collections available to the public. Images and texts of inscriptions from Spain originally published in *CIL* II can be found at the Universidad de Alcalá website (http://www2.uah.es/imagines_cilii/). The US Epigraphy Project (http://usepigraphy.brown.edu/) contains over 1,500 Latin inscriptions in universities, museums, and other collections throughout the United States. A second, online edition of the Vindolanda Tablets (VTO II) has been developed using EpiDoc XML and features a new word search engine, APELLO (http://vto2.classics.ox.ac.uk/).

Future Directions

The continued development of online databases for the study of inscriptions, featuring images, texts, translations, and commentaries, remains an imperative. Such initiatives will provide scholars worldwide with open access to information on these monuments and their archaeological context. They will be vital in conducting large-scale statistical analyses of the material in order to trace changes in the epigraphic habit over time and its use by different social groups. There is especially wide scope for developing these approaches in the period of Late Antiquity, in which there have been several important developments in recent years. These include the publication of a major work on epitaphs in early medieval Gaul and Spain (Handley 2003), a conference on epigraphic "cultures" held in 2009 (http://www.h-net.org/reviews/showrev.php?id=27361), and the Oxford-based "Last Statues of Antiquity" project, which examines the decline of the statue habit from c. 280 CE (http://www.ocla.ox.ac.uk/statues/).

Cross-References

- ▶ Aphrodisias, Archaeology of
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Epigraphy, Greek
- ▶ Epigraphy, Latin: Early Through Late Republican

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Further Reading

The best general introduction to the field of ancient epigraphy is Bodel (2001), which contains a number of thematic essays on both Greek and Latin inscriptions written by leading experts in the field. Keppie (1991) focuses on the Roman period, with particularly helpful sections on the carving of inscriptions and the process of reading, interpreting, and dating epigraphic texts. For Late Antiquity, Trout (2009) provides an authoritative summary of recent work.

Epigraphy, Latin: Early Through Late Republican

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Introduction

Roughly in the same period when the last king was expelled from Rome, the Latin epigraphic habit lost its strict dependence on the Etruscan one, which had fostered its development in the preceding centuries. During those same decades, Etruscan epigraphy itself was undergoing major changes, mainly propelled by scribal schools linked with the great sanctuaries, which precisely at this time began to play a crucial role in Etruscan civic life. Latin epigraphy was far from uniform in this early period, with almost every center boasting its own epigraphic habit as part of a strictly local identity. The city of Tibur, which shared many cultural features with the Italic world (although characterizing itself unequivocally as a Latin city), even introduced the typically middle-Italic letter-rotations. The preeminence of Rome in Latin epigraphic culture was a relatively late phenomenon, clearly accelerated by the suppression of the Latin League in 338 BCE, which led to outright Roman hegemony in all the Latin-speaking region.

Only Praeneste showed a remarkable independence in its epigraphic habit, down to its destruction by Sulla in 82 BCE. Praenestine epigraphy had a distinct late-Etruscan flavor, consisting as it did mainly of captions on bronze mirrors (and less extensively on bronze *cistae*) and of funerary inscriptions on *cippi*. Both epigraphic classes had no parallels in Rome and the other Latin towns (where funerary inscriptions remained highly uncommon until around 100 BCE) but were on the contrary commonplace

in most Etruscan cities. The century of the Roman Republic witnessed major changes in the Latin epigraphic habit; numbers increased dramatically, leading to a mass epigraphic production, which was one of the most outstanding features of late Republican Roman culture. Inscriptions emanating from any sort of public institution (the central government in Rome, local governments, magistrates on duty, any kind of commission or body of officials with political as well as religious purposes, etc.) multiplied in a period of unprecedented political struggle (punctuated by at least four outright civil wars), which went alongside an increased competition for power between elites and emerging social groups (and between individuals within each of these groups), an overall strong economic growth, and a general increase in literacy.

Inscriptions became one of the most important media of political propaganda and a product of highly specialized workshops. At the same time, these entirely new conditions fostered the emergence of private epigraphy, almost nonexistent in previous centuries, with the only exception of few votive texts: a feature that sharply distinguished the epigraphic culture of Rome and most of Latium from habits prevailing elsewhere in Italy, especially in the Etruscan world (actually, it was the huge number of private – mainly funerary – inscriptions that made the Etruscan epigraphic corpus one of the largest in the entire Mediterranean area in the first millennium BCE).

In the last decades of the Republican period, almost all features that will be characteristic of Latin epigraphic culture in the Imperial period were already in place; inscriptions belonging to this period are largely undistinguishable from slightly later ones, in their outlook as well as in their content. This is why, in absence of independent dating elements, many chronological uncertainties will inevitably persist, and it is often impossible to tell apart late Republican inscriptions from early imperial ones.

Definition

Epigraphy is by no means a necessary and immediate consequence of the acquisition of writing skills; its development follows the establishment of a set of shared forms of expression which we call *epigraphic habit*.

Messages delivered by inscriptions are only understandable combining text content and material aspects, like the kind of object on which the text itself is inscribed, its shape, dimensions, the context into which it was placed, and so on. An epigraphic culture is the result of a series of choices and can change through time. Latin Republican epigraphic culture was elaborated from the final decades of the fourth century BCE onwards; before that date, less than 50 inscriptions are known (with the exclusion of isolated letters), most of them brief texts scratched on vases.

The birth of this new epigraphic culture is marked by a significant change in quality, rather than in numbers. Even if a significant group of the about 50 inscriptions dated between the end of the fourth and the beginning of the third century are captions on Praenestine mirrors and cistae (more than half of the total number of 28, dated about 380–250 BCE), a couple of dozen inscriptions on stone (only four of them from the city of Rome itself) show almost all the features that will be typical of Latin inscriptions in the centuries to come.

At the beginning of the third century, a major reform in writing took place, showing the involvement of public authorities in matters of written expression that clearly matches the contemporary emergence of epigraphy; the letter Z was suppressed (to be reintroduced around the end of the Republican period in Latin transcriptions of Greek words), and its place was occupied by the G, a C with a diacritical mark. Alteration of alphabetical sequences is a very uncommon choice and shows the high degree of sophistication Roman culture had reached in this period.

In the third century BCE, inscriptions were made either on behalf of individuals, more often

than not for religious purposes, or by the state or its magistrates, mostly commemorating public works; the total number of inscriptions on stone belonging into this century barely surpasses the 300, including a great number of Praenestine *cippi* (in fact, about two thirds of the 347 funerary inscriptions on *cippi* from Praeneste seem to belong to the third century; this peculiar local tradition does not survive beyond the second century BCE; Franchi De Bellis 1997). The period immediately following the end of the Second Punic War was another major turning point; in the following two centuries, numbers increased tenfold.

Although the best part of them belong to the period after 120/110 BCE, second-century inscriptions are consistently more frequent than third-century ones. A wide variety of people began to use inscriptions as a media for political or personal propaganda: Roman magistrates are now outnumbered by municipal ones, alongside a number of magistrates of lesser administrative units, officials of cultural associations, private individuals, freedmen and freedwomen, and even slaves.

At least two thirds of the about 3,200 inscriptions on stone dated between 200 and 40 BCE belong into the first century. The epigraphic habit remained mostly the same, although some changes did occur. The main reason for the steep increase in epigraphic production was the introduction of funerary inscriptions (almost nonexistent outside Praeneste until the end of the second century) which opened stonecutters' workshops to a wide range of customers.

Historical Background

Until the very end of the fourth century BCE, Latin inscriptions are found almost only in Rome and Latium. In the last decades of the century, Roman colonization began to create Latin-speaking communities in territories inhabited by peoples who spoke a variety of different languages; Latin epigraphy spread consequently, following not only the foundation of Roman or Latin coloniae (either as entirely new cities or inside already existing ones, like at Poseidonia-Paestum) but also the settling of Roman colonists in conquered territories which took place independently from a colonial foundation.

The impact of Latin epigraphy was very different from place to place. In some regions of Italy, local epigraphic cultures were significantly stronger than the Latin one and remained long unaffected, even when confronted with official documents from the Roman state. This is the case especially of Etruria, but also of the Oscan-speaking word, and of the most relevant cities of Venetia. In Etruria, outside Roman and Latin colonies and territories, Etruscan was the only language used in inscriptions until 90 BCE, the few Latin texts being convincingly attributed to immigrants; somewhere it was used even later, as in inner northern Etruria, where a robust tradition of funerary epigraphy persisted until around 50 BCE, with some documents dating as late as the age of Augustus (a bilingual inscription from Arretium, dated to c. 15–30 CE, provides the latest evidence for epigraphic use of Etruscan).

Nevertheless, the influence of Latin epigraphy became evident in Etruria from the beginning of the second century BCE, through a series of public inscriptions which, though always written in Etruscan language, depended plainly upon Latin models. Etruscan public inscriptions are as good as nonexistent, before this late reception of Roman habits: there was no local tradition which could be referred to. In Venetia, although Latin inscriptions reporting the decrees of Roman magistrates arbitrating about the boundaries between the allied cities of Ateste, Patavium, and Vicetia reveal the intrusive presence of Latin epigraphy (and the Roman state) already in the second half of the second century BCE, funerary inscriptions, especially in Ateste, follow local traditions until the Imperial age (with a use of the Venetic language until at least the end of the first century BCE); this resulted in a massive epigraphic overrepresentation of colonists settled in the city by Augustus, whose funerary inscriptions on stone monuments greatly outranked the graffiti on cinerary ollae long preferred by the local aristocracy.

In the Oscan-speaking world, a robust local tradition of public epigraphy successfully resisted

the pressure of Roman models; it was not the same for funerary inscriptions, completely lacking in Oscan epigraphy until a very late period (100–90 BCE), when they finally appeared following a genuinely Roman fashion. Other regions of Italy behaved differently. In the middle-Italic area, where local populations spoke a mosaic of closely related albeit different languages, the use of Latin in inscriptions spread quickly, independently from the political status the various communities enjoyed. Umbria adopted Latin in public inscriptions before its cities became Roman *municipia*, and the peoples of the Abruzzi were even more ready to accept the language of Rome for their private inscriptions as well (although in a strongly dialectal variety, interspersed with occasional words from the local languages), lacking as they did an epigraphical tradition, after the end of the South Picene experience in the late Archaic period.

From the second century onwards, Latin inscriptions appear even in areas of Italy where other languages were commonly spoken or written. Latin was not only the language of the state of Rome; it had also become the common language which allowed all inhabitants of Italy to understand each other. Outside Italy, on the contrary, Latin inscriptions in the Republican period appear almost only in towns and cities housing Latin-speaking communities (or, at least, groups of individuals, large or small alike) or as markers of the active presence of the Roman state (decrees concerning foreign communities or individuals, milestones, etc.).

In some areas, like the regions of northern Spain inhabited by Celts (the so-called Celtiberians), the development of an epigraphic culture employing the Latin alphabet to write down the local language is a clear consequence of contact with the Romans and knowledge of Roman epigraphic habit.

Key Issues

Legal Documents

One of the most characteristic features of Roman epigraphy is the use of bronze tablets for legal documents of various types (*leges*, *senatus consulta*, *decreta*, *edicta*, *foedera*, etc.). The public inscription of laws and decrees is a typical behavior of democracies first introduced by Greek *poleis* in the Classical period; in the Greek world, however, bronze is very rarely used (and inscriptions on bronze are mostly votive ones, on goods presented to gods in sanctuaries), the most frequent medium for legal documents being stone stelae or cippi (or, sometimes, the very walls of public buildings).

The Roman Republic follows the Greek experience in requiring a public display of acts from the government and the people (although literary tradition records a public display on leather-covered wooden shields even of decrees from the kings). We do not know exactly on what kind of media documents of the first century of the Republic were inscribed, whose existence is attested by ancient historians (like the treaties between Rome and Carthage or the laws of the 12 Tables); actually, the most ancient Roman legal documents on bronze tablets so far known are a decree by a proconsul of Spain (189 BCE; *CIL* I^2, 614) and the *senatus consultum de Bacchanalibus* (186 BCE; *CIL* I^2, 581).

Inscriptions on bronze tablets in other languages of Italy can be older than the Latin ones; although the evidence refers mostly to the religious or the private sphere (as is the case of the Greek records of loans from the sanctuary of Zeus to the city of Locri or the Marrucinian inscription from Rapino, the Oscan one from Agnone, the Umbrian *tabulae Iguvinae*, the Etruscan *tabula Cortonensis*, which seems to witness a private negotium, even if a public magistrate of the city is named), at least the Osco-Lucanian tablet from Roccagloriosa, dated between the fourth and the third centuries BCE, seems a legal document very similar to the Roman ones. The use of bronze tablets, as a consequence, is probably to be viewed as a product of the wider Italic culture of the fourth and the third centuries BCE rather than a purely Roman invention.

At present, 36 Republican period legal documents on 32 bronze tablets are known (four of

them being inscribed on both sides); half of them are preserved only in a small portion (few lines, or even few words, enough only to understand that the text concerned is a law, or a decree, or something related to the legal sphere). Reemployment of bronze tablets is attested six times: in two of these cases, one of the inscriptions is in a language different from Latin (the *tabula Bantina*, *CIL* I^2, 197, carrying a legal document in Oscan language, later than the Latin one, and the *fragmenta Clusina*, *CIL* I^2, 597, with a list of names in Etruscan).

Only a small part of these documents (7, plus 3 of unconfirmed provenance) have been found in the city of Rome; the majority of them came to light in Italian towns and in Spain. Sometimes (especially if a text is preserved extensively enough), it is possible to appreciate a connection between a legal document and the place where it has been found: this is the case, for example,

- The *lex municipi Tarentini* (*CIL* I^2, 590, found in Taranto)
- The *lex de Gallia Cisalpina* (*CIL* I^2, 592, from Veleia)
- The *lex coloniae Genetivae Iuliae seu Ursonensis* (*CIL* I^2, 594 cf. I^2, 1022, from Osuna)
- The *senatus consultum de Tiburtibus* (*CIL* I^2, 586, from Tivoli)
- The *sententia Minuciorum* (*CIL* I^2, 584, from Serra Riccò)
- The two documents concerning political relations between Rome and some peoples of Spain (the *tabula Alcantarensis*, *AE* 1984, 45, and the decretum proconsulis of 189 BCE from Alcalá de los Gazules)
- And others

It is likely that local communities (and sometimes individuals) cared for the inscription of documents which suited their own interest; this is also the case, for example, of Roman legal documents translated into Greek and inscribed in Greek cities (on stone, as local tradition required: in the Greek-speaking world, even legal documents in Latin were inscribed on stone, as is the case – for example – of the *lex Gabinia Calpurnia de insula Delo*, *CIL* I^2, 2500, or the *foedus Callatinum*, *CIL* I^2, 2676).

In other cases, the inscription on bronze was required by the Roman state itself; the public display of laws and decrees on bronze tablets is repeatedly referred to as normal practice in Roman legal sources of the Republican period, even if never explicitly stated on the tablets themselves, as far as our evidence goes.

Other Inscriptions Emanating from Public Authorities

A great number of different categories of Latin inscriptions were put up on behalf of public authorities and were intended as permanent markers of political action.

The Roman state in particular had a huge epigraphic visibility, which dramatically increased though time; its expressions were manifold. Milestones are one particularly striking example of this wide group, their presence ubiquitous in everyday life of many citizens. Although only few of them survive from the Republican period (dating from the third century BCE onwards), as public roads were continuously restored, evidence is enough to understand that they marked every mile, making the travelers remember the author(s) of the enterprise. Since road building had a very deep impact on Italy and the wider Roman(ized) world, the propaganda effect milestones could deploy and can be hardly overestimated. Another category of public inscriptions which had a deep impact in everyday life of people directly involved were boundary markers, for example, those referring to allotment of public land to colonists (land often obtained through expropriation from conquered communities).

Other kinds of boundaries defined by the Roman state were, for instance, those between allied cities (probably following a request for arbitration; see *CIL* I^2, 633–4 and 2501, between Ateste and Patavium of 141 or 116 BCE, and *CIL* I^2, 636, between Ateste and Vicetia, 135 BCE), the limits of public land not to be built up (e.g., *CIL* I^2, 2516, from the colony of Ostia), the pomerium of Rome where burials were not allowed (*CIL* I^2, 838–9), or the area around the

Tiber to be kept clear (*CIL* I^2, 766). Local authorities followed the Roman example in making their presence being felt in similar circumstances.

Votive Inscriptions

The proportion of votive inscriptions in Latin epigraphy of the Republican period (c. 15 %) is consistently higher than in the imperial age (4 %). The bare percentage conceals the fact that their incidence is even higher in the first two centuries of regular epigraphic production, from the end of the fourth to the last decades of the second centuries BCE, especially when Praenestine cippi (which are a strictly local phenomenon) are excluded from the general count. Religion appears to have been crucial in the development of Latin epigraphy from its very beginnings: the largest inscriptions on stone of the first centuries, from the lapis niger cippus (*CIL* I^2, 1) to the altars or bases from Tivoli (*CIL* I^2, 2658) and Corcolle (*CIL* I^2, 2833a; a recently discovered early inscription from Gabii is too poorly preserved to allow for an understanding of its significance; Fortson and Potter 2011), are all understandable as *leges sacrae* or *leges arae*: a type of epigraphic text which is found almost continuously throughout the Republican period and later.

The most outstanding examples of republican age leges sacrae are two almost identical cippi from Spoletium and Trevi (*CIL* I^2, 366 and 2872), a very ancient one from Luceria (*CIL* I^2, 401), the two later but more extensive inscriptions from Furfo and Tarentum, respectively (*CIL* I^2, 756 and 590, first century BCE), and the short but equally significant fragment from Amiternum (*CIL* I^2, 2545).

Leges sacrae very similar to the Roman ones are found also in Republican age inscriptions in other languages of central and southern Italy, like the Oscan *cippus* from Abella, a Volscian inscription on a tiny bronze tablet (originally nailed on some stone monument, maybe an altar) from Velletri or its surroundings, and the largest bronze tablets cited above. A characteristic feature of the most ancient period (fourth/third centuries BCE) are the series of *cippi* dedicated to various gods and inscribed with texts often reduced to the bare theonym. The most famous examples are the four cippi from Tor Tignosa (*CIL* I^2, 2843–6, end of the fourth – beginning of the third century BCE), the 14 from Pisaurum (*CIL* I^2, 368–81, end of the third century), the six from Veii, sanctuary of Macchia Grande (*CIL* I^2, 2628–32, plus one newly discovered inscription; end of the third or second century BCE), and other less preserved series.

It is possible that six small bronze tablets recently come to light (and said to have been found near Posta di Mesa, in southern Latium), bearing simple dedications to gods and goddesses, were originally set on stone bases of the same kind. Simultaneous dedications of groups of altars to one or more gods are well documented from archaeological as well as epigraphical evidence: this is why it is now thought that these stone cippi could best be interpreted as altars.

The use of inscribing votive texts on small bronze tablets is relatively common between the third and second centuries BCE, in Rome (see, e.g., *CIL* I^2, 34, 361, 973, 2675b–c, 2991), Latium (*CIL* I^2, 40, 42, 47, 60, 359–62, 2864, 2847) and other regions (*CIL* I^2, 364, 383, 385, 397, 2764, 2874). Equally almost confined to the period before the first century BCE are votive inscriptions on bronze vases, statuettes, or implements of various types, an epigraphic tradition shared with other cultures of Italy, especially the Etruscan one. It is probably no accident that some of the most ancient Latin inscriptions from outside Latium belong to this type, from the much discussed dedication by the soldier Caso Cantovio (on a plaque cut out from a bronze belt and found in the area of the Lake Fucino, *CIL* I^2, 5) to *CIL* I^2, 580, said to have been found at Cortona, and 546, from Volsinii (a cosmopolitan city, which attracted significant numbers of immigrants after its refoundation in a new locality, specially chosen for its unique position across crucial communication routes, following the destruction of the ancient Volsinii by the Roman army in 264 BCE).

It is certainly of some interest that the votive inscription from Capena *CIL* I^2, 2435

(cf. *AE* 2008, 520), on a late third-century bronze oinochoe, was actually found inside a tomb: a circumstance unparalleled in Latin epigraphy (it has been supposed that the vase had been originally dedicated in the nearby sanctuary of Lucus Feroniae, pillaged by Carthaginian troops in 211 BCE) but well known in the Etruscan one. Etruscan epigraphic habit did survive Latinization, as is clearly shown by some oddities, like the inscription on a bronze tablet from a Volsinian tomb reporting a gift between individuals (*CIL* I^2, 1998). One of the latest instances of a dedication inscribed directly on a bronze object is found on the so-called Magdalensberg youth (actually, a life-size statue dated into the first half of the first century BCE: *CIL* I^2, 3467), a lavish gift to a deity identified only through its initial letter (*M*) by a group comprising one slave, three freedmen, and one noncitizen: a unique association, probably connected with the exploitation of the iron mines of the area (the Noricum, at that time an independent kingdom allied with the Roman state) and with trade between that region and Aquileia.

From the second century onwards, votive texts are inscribed almost only on stone: most usually altars, bases (which could emphasize the gift placed upon themselves or refer either to immaterial gifts such as public meals, ceremonies, sums of money, or construction or restoration activities paid for by the dedicant), and architectonical elements (columns, lintels, etc.). Dedicatory inscriptions on mosaic floors of temples and cult places form a small but conspicuous group belonging in these same centuries.

About one third of the c. 600 Republican period votive inscriptions so far known to us refer to the dedication of architectonical structures (temples, altars, columns, etc.) or furnishings (statues, bases, thesauri, etc.) in temples and sanctuaries: this is a consequence of the intermingling of this category with the following one, typical of the period after c. 200 BCE.

Inscriptions Recording Acts of Munificence

These inscriptions are one of the most characteristic features of Roman epigraphy, their number following the increased level of competition of the later republic: while only about 10 % of the evidence refers to the third century, 40 % belongs into the II and about 50 % to the first six decades of the first century BCE. About 400 texts, out of the total number of slightly more than 500, record explicitly what had been done by the benefactor(s) – or, alternatively, the object (s) of their action can be deduced by other, material aspects of the inscriptions themselves (e.g., statue bases, lintels, columns).

Although stemming from the Hellenistic tradition of euergetism, Roman-style munificence was conspicuously different, as people involved were mostly magistrates of the central or local governments; private individuals appear later (and in a far lesser scale until the imperial age), often as members or representatives of associations, the most of them involved in cultural practices. Little more than half of the acts of munificence were constructions or restorations of temples or other buildings devoted to cult activities or dedications of statues, altars, or other furnishings or implements inside sanctuaries: this can hardly be a surprise, since pious foundations and dedications were for many centuries the only way to bypass the severe restrictions Roman law and custom imposed on personal propaganda.

This behavior imposes itself especially after the Second Punic War, as a consequence of the increased number of individuals struggling for public visibility; the few oldest inscriptions belonging into this wider category seem in fact more concerned with other kinds of public works. The most ancient one is possibly *CIL* I^2, 1710, recording the construction of the city walls of the colony of Luceria by (at least) three praefects; unfortunately, the inscription itself is lost, and its dating at precisely the time of the colonial foundation (315/4 BCE) cannot be taken for granted; around the middle of the third century, it is dated *CIL* I^2, 3152, from Paestum, the first of a series of inscriptions commemorating some of the works which reshaped the ancient Greek (and later Lucanian) city into a Roman one (actually, a Latin colony since 273 BCE).

CIL I^2, 2836, referring to a gift by the consul M. Fulvius Flaccus in the sanctuary of Fortuna and Mater Matuta in Rome's Forum Boarium after the capture of Volsinii (264 BCE) is the first epigraphical evidence of the well-documented Roman custom of offering to the gods a share of the booty, either as such (e.g., statues) or by employing the money resulting from the sale of the plundered goods. Later examples of this practice abound, the perceived recipients of the munificence acts shifting gradually from the gods to the citizens attending sanctuaries, until an outright public space (e.g., the forum) was finally preferred for display of booty.

The increasing scale of Rome's wars and the wider participation of allies promoted an equally wider circulation of dedications from war booty by Roman commanders; the most striking example is the series set up by Lucius Mummius after the siege of Corinth in 146 BCE, which encompassed the city of Rome, other communities of Roman citizens, and even allied communities (*CIL* I^2 626–30, plus an inscription in Oscan language from Pompeii). Even if Mummius cared for his dedications throughout the Romano/Italic world as a censor, in 142 BCE, in all inscriptions, he appears as consul. Censors, though formally in charge of the most important public works, are conspicuously absent from inscriptions recording acts of munificence. Magistrates of any level, from the consuls in Rome to the lesser, local *magistri vici*, form by far the greatest part of the donors; priests are equally well documented.

Private individuals are far less common; the presence of women is limited only to the latest period, and some of them (like the *Octavia M. f. Gamalai* [sc. *uxor*] of *CIL* I^2, 3025, from Ostia) owe their role to a particularly prominent position of their husbands or families. Freedmen and male slaves appear most commonly as members of religious associations (while, at present, freedwomen and female slaves are never attested as donors) and only very rarely can act as individuals: one particularly striking example is the Faustus Versenni P. s(ervus) who concluded his dedication of a temple to Priapus (*CIL* I^2, 3391) with the astonishing formula *d(e) s(uo) pecul(io) f(aciendum) c(uravit)*, directly borrowed from the monumental dedications of public works by prominent magnates, who never missed to remember readers that they paid for them from their own pocket (*de sua pecunia*).

Funerary Inscriptions

Apart from the Praenestine *cippi* and other sparse evidence from outside Rome (e.g., Tusculum: *CIL* I^2, 50–8, 2848–54), the only Latin funerary inscriptions so far known belonging to the period up to the very end of the second century BCE are the epitaphs from the two tombs of the Cornelii Scipiones at Rome (*CIL* I^2, 6–16, 2660, p. 718, 739, 831, 859–60; *CIL* I^2, 2834–5). These tombs are in many ways exceptional, in their architectural setting, in the shape of the sarcophagi within them, and in the inscriptions carved on their front sides and lids. Some of these inscriptions are limited to the bare name of the deceased, but the most famous ones are the large poetic texts reporting the deeds of the most prominent men deposed into the larger of the two tombs and conveniently referred to as *elogia Scipionum*. In fact, given the lack of any tradition in Latin funerary epigraphy, these inscriptions (probably carved all at the same time, some decades after the death of some of the personalities involved) were conceived like public elogia.

Some elements in the name formulae are also very similar to the ones sometimes employed in magniloquent funerary inscriptions celebrating contemporary Etruscan aristocrats. Roman tombs of the early and middle Republican periods were usually simple pits or trenches, sometimes containing sarcophagi or cinerary urns; the less common chamber tombs, probably owned by the most prominent families, could sometimes be decorated by paintings: anyway, every kind of decoration was limited to the interior of the tomb itself. We do not know what kind of markers were put on the ground to signal the existence of these tombs, but they should not have had a monumental appearance, since no traces of them survive. There should be no surprise, therefore, that funerary epigraphy emerges in connection with a wide

reception of east-Mediterranean funerary monuments in the late second century BCE (in Campania, where these architectural types appeared earlier, slightly older Latin funerary inscriptions are known, e.g., *CIL* I^2, 2874b, from Cales).

In the same decades, land plots surrounded by walls and employed for underground burials (ash urns, *fossa* tombs, etc.) began to be marked by inscribed *cippi* with the name of the families who owned them. In some regions of Italy (most notably, in northeastern Etruria) some local forms of funerary epigraphic culture persisted until the early Imperial period; it is actually thanks to the huge number of funerary inscriptions from Chiusi and Perugia (which follow the local tradition requiring an extensive use of epitaphs, especially on cinerary urns) that Etruria boasts one the largest Latin epigraphic corpora in Italy in the second and first centuries BCE (almost 500 inscriptions, about the same number as in Latium – with the exclusion of the approximately 750 inscriptions from the city of Rome, sharply outdistancing all other regions).

Instrumentum

This category encompasses all inscriptions put on objects of current use in everyday life, like vases, pottery or metal implements, bricks, and tiles; it can be broadly divided into two subcategories: inscriptions directly related with production or trade of goods (e.g., stamps on pottery, amphorae, and tiles) and graffiti scratched on these objects, often referring to their owners.

The latter may be interesting for the reconstruction of a vulgar language; the former, on the contrary, can provide plentiful information about production and trade of many goods. The most ancient stamps appear on black-gloss vases; some workshops from Cales producing a unique series of relief-decorated vases, signed them with unconcealed proud. Stamps disappear when, in the second century BCE, mass production of black-gloss wares leads to a significant decrease in their quality; they will only reappear later. The most significant series of stamps of the Republican period is that found on amphorae; their huge number (several hundred, mostly dated from the late second century onwards) and diffusion give an insight in the world of production and trade of common goods, like wine and olive oil.

Names of slaves appearing on stamps provide plentiful information about the organization of kilns; names of landowners, traders, and entrepreneurs on stamps and other categories of inscriptions on amphorae (the so-called *tituli picti*, painted on the neck and shoulder, or the stamps on pozzolana seals) allow to reconstruct a complex network of relations between landed aristocracy, long-distance traders, and kiln owners. Some kilns are involved at the same time in amphorae, brick and tile production. In international perspectives, Latin epigraphy is a consistently international field of research; this is especially true for Republican period epigraphy, whose diffusion, limited almost entirely to Italy, does not allow the regional studies typical of the evidence from the Imperial period. There are no significant discrepancies in methodological approach between scholars from different countries; the only (lesser) distinction between Italian and non-Italian studies can be recognized in the focus on the archaeological and topographical context of inscriptions, for Italian scholars are often more directly involved in discoveries in the field or in specific studies about history of single ancient towns, but the overall approaches are consistent all over the world.

Future Directions

The 1990s have witnessed a renewal of interest about Republican Latin inscriptions; the state of knowledge in this field of study has changed significantly. The last decade has been devoted mostly to studies aimed at refining chronologically, geographically, or thematically defined topics, and at present, it is highly likely that this will be the case for at least the next few years.

Cross-References

▶ Epigraphy, Greek
▶ Epigraphy, Imperial Latin

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Erasure of the Past

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Introduction

Functional societies, like functional individuals, engage in a selective winnowing of past events in the creation of their identities. They do this by both remembering and forgetting, partly out of necessity in order to manage an overwhelming amount of information and partly to minimize or mitigate traumatic experiences. At the group level, this process takes place in two ways: selective editing of the past in the form of preservation of only some parts of the archaeological or textual record (what in German is referred to as "Totschweigen," literally to kill by silencing) and selective destruction of heritage. The preservation of the past is a form of selective editing at several levels – not all sites are chosen for excavation and only a small number of those that are excavated are highlighted in publications, heritage tourism, or museum exhibits, for example – while the destruction of the past literally erases sites or evidence and thereby ensures that it will not be available in physical form for study or symbolic manipulation by potentially hostile interest groups.

Definition

Erasure of the past takes many different forms, but the oldest, best preserved and most visible is the

selective destruction of monuments, cultural artifacts, or inscriptions. This activity may be primarily religious or primarily political in nature; often it is both (Flood 2002: 642; Sauer 2003: 46). In the former case, it is referred to as iconoclasm, defined as the destruction of images, from the Greek eikon (image) + klan (to break); in the latter case, it depends on the context, but the Romans referred to it as "damnatio memoriae," or damning the memory of a person or group by erasing all traces of their names and/or images from public monuments and documents (Sauer 2003). Even in cases where religious motivations can be assumed to have been the primary reason for the destruction, it is not always possible to determine this with certainty. Eberhard Sauer's complex list of criteria for defining particular instances of cultural heritage destruction as religious iconoclasm makes this clear:

1. Exceptionally laborious and thorough modes of destruction without any obvious practical purpose like reuse of stone
2. Cases where pagan images appear to have been targeted but other artwork spared
3. Cases where naked deities were more thoroughly destroyed than their modestly dressed counterparts
4. Temples in which items of value, notably coins or other metal items, were deliberately left behind
5. Iconoclasm in temples which soon thereafter were consecrated as churches or built over by churches (Sauer 2003: 38)

Sauer notes that hostility toward certain kinds of images characterizes all three of the major monotheistic religions (Christianity, Islam and Judaism), so it is not surprising that acts of destruction focused on religious images of polytheistic traditions constitute a significant percentage of known examples of iconoclasm (2003: 161). Flood points out that the iconoclastic practice of deanimating images by depriving them of a soul often involves rendering them powerless by targeting the parts of the body that were perceived to be the most potent, especially the face and sensory organs (2002: 648). Pollini and Flood both note the apparent contradiction inherent in the mutilation of images belonging to alien religious traditions: by attempting to render such representations harmless, the iconoclasts imbue them with potency (Flood 2002: 647–8; Pollini 2006: 590). Significantly, the toppling and destruction of statues of deposed rulers, an apparently political act, follows virtually identical patterns of mutilation and desecration, further blurring the line between religious and political iconoclasm.

Recent manifestations of erasure of the past include the targeted bombing of culturally significant monuments such as the bridge at Mostar during the Balkan conflict (Cameron 2008) as well as the repatriation and reburial of human remains and cultural artifacts, even though destruction through reburial may be motivated by indigenous groups in contemporary societies for whom it represents a way of regaining control of their past. For the purposes of this definition, motivations are secondary; what matters is that the action permanently removes material traces of past peoples or cultures from future contemplation, study, or manipulation. This may extend to the representation of past cultures in written form or in museum contexts; what no longer exists cannot be displayed and by simply not including any mention of a particular group or culture in a national museum, as in the case of the Saami people in some parts of Scandinavia (Levy 2006), they can be effectively erased from the official record. Sauer notes that secular iconoclasm, such as that accompanying the French revolution, used image destruction in order to "break off the people's link with the past" (2003: 162); this is the common denominator in all forms of erasure of the material remains of past traditions, whether through Totschweigen, as in the case of the non-representation of the Saami people in Scandinavian national museums, or through active destruction of culturally significant monuments, as in the case of the Mostar bridge.

Historical Background

Not all examples of the erasure of the past involve active destruction, as the Saami example illustrates. The cooption or transmutation of sites or

traditions is a universal phenomenon that is rarely mentioned in discussions of more obviously negative examples of heritage destruction, perhaps because the objects or monuments themselves survive, although in an altered state. Places that are imbued with special significance are often subjected to this kind of successive erasure, as later structures are built on top of earlier ones in order to appropriate the potency of these places. While this phenomenon can be found worldwide, in Europe, it is exemplified by the many Celtic temples that are found under Roman temples which in their turn were built over by early Christian churches in a kind of architectural palimpsest that preserved the significance of the location while largely destroying the physical remains of previous cultural and religious traditions. The recutting of a marble bust of the Emperor Nero into a portrait of Vespasian (Pollini 1984) and the transformation of the church of Hagia Sofia in Christian Constantinople into a mosque in Muslim Istanbul are both examples of this type of transformative repurposing. Other examples involve more permanent destruction, as in the case of the recent erasure of the largest and most important Muslim cemetery in Palestine by the construction of a Museum of Tolerance in Jerusalem, dedicated (rather ironically) to promoting the principles of mutual respect and social responsibility in the face of a "rising crescendo of ethnic tensions" (Makdisi 2010: 519). The message in these otherwise disparate cases is simple and brutal: When it comes to the selective erasure of the past, the agendas of the living invariably trump those of the dead and those in power decide whose past is preserved or enshrined and whose will be destroyed or denied expression.

The process of transmutation of one past into another occurs in oral and written traditions as well, as exemplified by the repurposing of pagan mythology in northern European fairy tales transcribed and translated by the Brothers Grimm and by the pre-Christian epics of the Irish and Welsh oral traditions that were selectively edited by the monks in their monastic scriptoria. The fictional and pseudo-historical depictions of the English king Richard III as a hunch-backed monster are another example of this phenomenon; Sir Thomas More and Shakespeare between them did such a good job of character assassination on this historical figure that most people are unaware that alternative interpretations exist or that contemporaries would have had a very different impression of this much maligned monarch. All cultures are continually recycling, repurposing, and stitching together fragments of collective memories; physical manifestations of those memories have special significance as mnemonic devices because they are more tangible and have a permanence that makes them valuable in identity politics. This is also why they are often the target of destructive acts that strike at the heart of a group's sense of itself (Adams 1993). More than 2,000 people died in the riots following the destruction of the Babri Masjid Mosque in Ayodhya, India, in 1992. Many Hindus believe that the mosque was built in 1528 over the tomb of the god Rama and the archaeological excavations carried out at the site subsequent to the destruction of the mosque became a flashpoint for Muslims and Hindus with international repercussions (Ratnagar 2004). Clearly, such sites have a symbolic power that goes well beyond their physical remains.

So why is cultural heritage, especially its material remains, so contested? Sites, monuments, artifacts, and texts are the functional equivalent, at the group level, of individual memory and identity; just as individuals cannot function without memory, group identity is also bound up in the tangible as well as intangible artifacts and expressions of its past. This is why both history and archaeology have been subject to such intense pressure by various interest groups ever since emerging as distinct disciplines and it is also why it is so important for those fields of research to maintain some degree of political autonomy (Arnold 1999). Archaeology in particular has been the target of political manipulation, by nation-states and other interest groups, largely because it provides a greater time depth than written records and so can be appealed to in claims to territory and/or sovereignty (Arnold 2002).

Acts of erasure in more recent times have occurred under the corrosive combined influences of colonialism and racism. Examples include the case of the North American Mound Builder cultures whose native origins were denied by European colonists until mounting evidence of continuity with living Indian groups led to the official recognition of the construction of impressive sites like Cahokia in Illinois by indigenous peoples (Arnold 2002: 106–7). In the parallel case of Great Zimbabwe, where massive stone enclosures and structures were attributed to non-African groups by the white colonizers of Zimbabwe, virtually all archaeological traces of indigenous African activity at the site were removed in order to preserve the myth of white superiority. As a result, later excavators were left with only trace evidence of the artifacts that once abounded at the site, the capitol city of a vibrant culture that flourished between 1290 and 1450 CE (Hall & Steffof 2006).

Politically and religiously motivated iconoclasm in the ancient world has a long history, from the selective excision of the names and faces of pharaohs such as Akhenaten, also known as the Heretic King, at Amarna in the fourteenth century BCE (Sauer 2003: 46; Varner 2004: 13–4), to the destruction by Greek Christians of idolatrous images on the Parthenon. Roman portrait busts were frequently recut, partly to save on the costs of acquiring new marble but most often to erase the image of an individual who had suffered *damnatio memoriae*; the infamous Roman emperor Nero is a good example (Pollini 1984). Historically, religious hatred and iconoclasm are well documented, from the Puritan destruction of Catholic statues and stained glass windows in seventeenth century England and Ireland to the bombing of the famous bridge (built by the Turkish engineer Hajrudin for the Ottoman Emperor Süleyman I in 1566) across the Neretva River in Mostar's Stari-grad (Old Town) in 1993 during the war in Bosnia (Adams 1993). The Bosnian conflict was unusual in its relentless and comprehensive targeting of architecture, as if, as Adams eloquently puts it, "the protagonists, unable to strangle the last living representatives of an alien culture. . .think that with the destruction of place, an architectural cleansing, as it were, they can eradicate the people who inhabit that place" (1993: 389). Such destruction casts long shadows, as exemplified by a 19th century headstone in the church-yard of the Friary of Murrisk in Co. Mayo, destroyed in the seventeenth century by English Puritans, or "heretics," as a nearby plaque erected in 1942 proclaims. Someone, in a retaliatory act of erasure at least two centuries after the destruction of the friary, chiseled out the name of HRH Queen Victoria on George Patrick O'Malley's headstone, during whose reign he had served in the British Army (Fig. 1a and b). Even such apparently clear-cut examples of destruction and erasure in religious contexts (mosques, churches, temples) are often accompanied by a political or economic subtext, however. For example, while the Babri mosque was being demolished by mobs in 1992, the houses of hundreds of poor Muslim residents of Ayodhya also were destroyed; as Ratnagar notes, we should not overlook the appropriations of real estate, the business rivalries, and the electoral calculations that typically accompany such events (2004: 242).

The destruction in 2001 of two enormous Buddhist statues cut out of the living rock in the Bamiyan Valley in Afghanistan is an especially good illustration of the ambiguity of so-called religious iconoclasm. Images of the explosions set off by the Taliban in the valley flashed around the globe and the destruction was decried in the Western media as an example of the medieval mindset of fundamentalist Islam (Flood 2002: 641). The fact that the two statues, classic examples of sixth century CE Gandhara style sculpture, 120' and 180' high (Fig. 2), had survived since the ninth century CE, when Buddhism was supplanted by Islam in the region, suggests that something else must have motivated the timing of the destruction. A closer examination of the events leading up to the edict issued by the Islamic State of Afghanistan on February 26, 2001, which ordered the destruction of all such idols, suggests that "their obliteration indexed not a timeless response to figuration but a calculated

Erasure of the Past, Fig. 1 (**a**) Headstone of George Patrick O'Malley at Murrisk Friary, Co. Mayo, Ireland (Photo: Author). (**b**) Plaque at Murrisk Friary, Co. Mayo, Ireland (Photo: Author)

Erasure of the Past, Fig. 2 Large Buddha at Bamiyan, Afghanistan (Photo: Courtesy of ARTstor, ACSAA_MICHIGAN_1039425966)

engagement with a culturally specific discourse of images at a particular historical moment" (Flood 2002: 642). The intended audience of the message sent by the Taliban was more global than local, an act that referenced archaic rhetoric but was carried out according to contemporary motivations and targeted the Buddhas less as religious than as cultural icons of particular value to the West (Flood 2002: 651).

Politically expedient erasure of the past often takes the form of selective representation motivated by nationalism, exaggerating or even fabricating evidence that is perceived as positive and downplaying or denying evidence that is not seen as supportive of the political regime or special interest groups with political influence. In Nazi Germany, this involved a range of selective erasures, from destroying archaeological deposits of "non-Germanic" occupations of settlements to focus on those of interest to the state to using material culture evidence to justify territorial expansion by military occupation (Arnold 1999). In Washington, DC, in 1995, a controversial exhibit intended to commemorate the fiftieth anniversary of the end of World War II, was replaced by a display of the *Enola Gay*, the plane that dropped the atomic bombs on

Hiroshima and Nagasaki; this was due to the pressure put on the museum by politicians and veteran's groups more concerned with image than with accuracy (Nobile 1995; Goldberg 1999). What makes the manipulation of the past in Nazi Germany and the 1995 Enola Gay exhibit at the Smithsonian's Air and Space Museum comparable to one another is their politically expedient treatment of historical facts. The parallels can be found in the emphasis placed on a usable past, by which governments or special interest groups generally mean a past that is useful to them; the phrase "a past that the (American/German) people can be proud of" appears in the press releases of Newt Gingrich in connection with the Enola Gay exhibit as well as in the speeches of Heinrich Himmler on archaeology in the service of the state (Arnold 1999: 1).

Key Issues/Current Debates

Identity politics, often presented as a positive force, can be a major factor in the creation of the kind of divisive climate in which the erasure of the past becomes justifiable: The moment a monument, site, or other category of material culture is singled out as culturally important for one group, it becomes a potential target for destruction by another (Adams 1993). Cultural relativism and political correctness, both of which appear initially to be about inclusiveness, have the potential to create deep divisions when conflicting value systems are involved in a struggle for hegemony. Shrinking funding for heritage preservation is another major challenge; paradoxically, as the archaeological past has become less politically useful to nation-states in areas like the EU, state support for site protection and maintenance has also dwindled. Military conflict continues to cause both direct and indirect damage to cultural heritage around the globe, as the massive losses in the Middle East in the wake of the two Iraq wars have clearly demonstrated; in addition to the destruction of sites through military installations and conflict-related damage, looting of unprotected archaeological sites has permanently affected Iraq's ability to reconstruct its own past (Rothfeld 2008).

International Perspectives and Future Directions

The most important take-home message related to the topic of the erasure of the past is the recognition that it is not a culturally specific phenomenon and cannot be associated with any particular area of the world, religious tradition, or period of time. Education is one of the best ways to combat the increasingly powerful forces of cultural polarization, especially education focused on celebrating difference rather than demonizing it; fostering in the young a willingness to engage in honest confrontation of all aspects of the past, even those that may not cast our particular in-group in a wholly positive light, is another. We should also recognize that the erasure of the past can be a creative force as well as a destructive one and that it is an inevitable part of the many densely layered human experiences that have been inscribed on the landscape in the form of monuments, structures, and artifacts over many generations.

Definitions of authenticity also may need to be redefined in light of new criteria. It is telling that the International Council on Monuments and Sites (ICOMOS) determined the authenticity of the reconstructed Old Bridge at Mostar on the grounds that it is a "place of memory" even if the original fabric of the monument has been destroyed. The 2005 World Heritage inscription citation for the Mostar bridge sends the message that destroying the physical remains of cultural heritage does not destroy the cultural memory with which the place itself is imbued, citing its symbolic power and meaning as an exceptional and universal symbol of coexistence of communities from diverse cultural, ethnic, and religions backgrounds as the basis for the listing (Cameron 2008: 23).

We would do well, however, to remember that heritage preservation and the presentation

of the past are processes that erase the past just as surely as warfare, looting, or development do. Providing support, both financial and in terms of preservation expertise, to developing nations facing unprecedented destruction of cultural heritage must be part of the equation. Deciding which cultural monuments or artifacts to preserve or display and which not inevitably leads to the exclusion, and possibly destruction, of those not chosen. The goal must be to ensure that such selective erasure, while it may be unavoidable, is at least mindful and based on some degree of consensus among stakeholders. Even in the interests of inclusiveness, however, bowing to the majority opinion is not necessarily always the best approach to take when making culturally sensitive decisions about interpreting the past. As Goldberg notes in the wake of the Enola Gay debacle, "While objectivity cannot be a matter of political will and discipline, it can be attained through a social process – one which requires forums for the free flow and exchange of ideas for its successful implementation" (1999: 181). Scholarly expertise is a valuable commodity that has come under attack of late, especially in the United States; we should put more trust in the voices whose authority is derived from such sources rather than privileging those that are motivated by political expedience. On January 30, 1995, with the Smithsonian's announcement of the withdrawal of the controversial exhibit on the bombings of Hiroshima and Nagasaki, political expedience won the day. Perhaps by the time of the next major anniversary of the end of World War II, the United States will have matured enough as a nation to face its own past squarely and will not need to engage in such acts of selective erasure.

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeological Stewardship
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Bamiyan Buddhas
- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Contemporary Past, Archaeology of the
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Legislation, the Introduction of: Disciplining Through Law
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Kosova: Archaeological Heritage
- ▶ Landmarks Foundation: Protecting Sacred Sites Globally
- ▶ Lawyers' Committee for Cultural Heritage Preservation (LCCHP)
- ▶ Local Populations and Global Heritage
- ▶ Military Activity in Islamic Archaeology
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value

▶ Nationalism and Archaeology
▶ Organization of World Heritage Cities (OWHC)
▶ Preserving Heritage: The Role of the Media
▶ Public Involvement in the Preservation and Conservation of Archaeology
▶ SAFE/Saving Antiquities for Everyone
▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)
▶ Stakeholders and Community Participation
▶ Statues and Monumental Art in Archaeology
▶ Sustainability and Cultural Heritage
▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past
▶ World Heritage Education, Training, and Capacity Building
▶ World Heritage List: Criteria, Inscription, and Representation
▶ World Heritage Objectives and Outcomes

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Basic Biographical Information

Kenan Tevfik Erim was born in 1929 in İstanbul. He started his education in Sweden, and in 1948 continued in the USA at New York University. After graduating from the Classical Archaeology Department of New York University, he received his M.A. and Ph.D. at Princeton University. He served as assistant to Professor Karl Erik Sjoquist during the excavations of Morgantina, Sicily.

Major Accomplishments

Kenan Tevfik Erim's name is associated with excavation of the ancient Aphrodisias settlement, located in Geyre, Aydın. The ancient city of Aphrodisias was a magnificent city which displays evidence of ancient Greek and Roman

occupation in Turkey. The city has seen continuous habitation which has contributed to its importance of establishing the developmental sequence of the period. Besides the nearby marble quarries, the settlement was noted for a local sculptural tradition which eventually spread all over the Mediterranean.

Erim, who visited the site in 1959 for the first time, decided to reveal this remarkable settlement after seeing the remains of the city. In 1961, Erim raised funds from several private foundations and New York University, and obtained permits to begin excavations in Aphrodisias.

He continued to serve as a professor in the Classical Archaeology Department in New York University, and as head of the excavations in Aphrodisias until his death. He provided the largest contribution by publishing articles and conducting seminars all around to world in order to create an international reputation for Aphrodisias and raised funds, especially from US foundations. He set up associations for Aphrodisias in New York, Paris, London, Izmir, and Istanbul.

Kenan Erim was awarded the Liberty Medal of New York City in 1986, the Commendatore Merit of Italy in 1987, and the National Geographic Society Centennial Medal in 1988. He passed away in 1990. His grave, which is in Aphrodisias City, is located on the south side of the monumental ceremonial gate. Excavations are still continuing in Aphrodisias.

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► Aphrodisias, Archaeology of
► Classical (Greek) Archaeology

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Basic Biographical Information

Hayat Erkanal was born in 1959 in İzmir, Turkey. He completed his education, which he started in the Protohistory and Near Eastern Archaeology Department and Faculty of Languages, History and Geography, of Ankara University, in 1959, with his undergraduate thesis entitled *Goddess Ea on Babylonian Cylinder Seals* in 1964.

After serving in several roles in the Ankara Museum of Anatolian Civilizations from 1963 to 1964, Erkanal went to Germany to undertake his Ph.D. studies in 1966. He was lectured by professors including Kurt Bittel, Einer von Schuler and Barthel Hrouda. After receiving his Ph.D. for his dissertation entitled *Central*

Anatolian Metal Weapons in the Second Millennium, he returned to Turkey in 1973.

Afterward, Erkanal worked as a specialist in the archaeology museums of İstanbul and in the same year, he was appointed in Erzurum Ataturk University as assistant until 1976. Later he continued as an assistant in the Faculty of Languages, History and Geography of Ankara University and with the approval of his thesis entitled *Cutting Tools in Anatolia During Bronze Ages*, Erkanal became assistant professor in 1979 and professor in 1988.

Major Accomplishments

Beginning as an undergraduate, Erkanal constantly attended excavations such as Kültepe, Altıntepe, Maşathöyük, and Samsat until 1979. From 1980, he started to conduct projects mostly about survey studies and excavation content. The excavations that he carried out in Girnavaz–Mardin resulted in a better understanding of the effects and distribution of Mesopotamian culture over Anatolia.

Erkanal served as assistant dean of the faculty from 1986 to 1990 and lectured at Munich Ludwig Maximilian's University on southeast Anatolian archaeology for a semester. Starting in1992, he conducted the Liman Tepe excavation which is a part of the Klazomenai ancient site in Urla, İzmir. In 1992, while examining the aerial photos of the site taken for a municipal plan, he noticed some traces related to the coastal plain and identified that the part of the settlement was underwater. This was the beginning of the first underwater excavation of Turkey. Initially, because of the lack of equipment and experience, the excavation was started with the cooperation of Israel's Haifa University. Then Erkanal and his team took over and carried out the studies. Erkanal, to ensure the smooth progress of the excavation, learned to scuba dive after the age of 60 and led the studies.

With his work, he effectively exposed the cultural and chronological development of Western Anatolia related with Aegean world and Levant. This work paved way for the understanding of the early cultural history of Western Anatoliaon on a large scale. By establishing the Research and Application Centre of Underwater Archaeology, hosted by Ankara University, he opened a new field for students and researchers.

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- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Esin, Ufuk

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Basic Biographical Information

Ufuk Esin was born in 1933 in İzmir, Turkey. She went to Arnavutkoy fifth Elementary School, Bosphorus High School, and the Austrian High School. In her youth, she was interested in pursuing a career as an amateur actor. She also undertook administrative duties in plays. In 1954, she commenced her studies with the Archaeology Department, Istanbul University, which had Halet Çambel and Kurt Bittel as lecturers at that time.

She participated in the excavations of Boğazköy ve Fikirtepe during 1952–1954. She went to USA in 1961 under Fullbright scholarship and completed her dissertation by novel methods alien to the world of archaeology in 1966.

Major Accomplishments

The construction of dams as a part of the economic development of Turkey in the 1960s and 1970s prompted the need for salvage excavations in order to document settlements that were likely to be submerged. Ufuk Esin conducted important work this context. She began to excavate Tepecik in 1968, Tülintepe in 1971–1974, and Değirmentepe in 1978–1986. She became the head of Archaeology Department at Istanbul University in 1984.

Ufuk Esin pioneered establishment of the Archaeometry Unit which combines natural sciences and archaeology in TÜBİTAK (The Scientific and Technological Research Council of Turkey). Furthermore, even though Turkey was not accustomed to interdisciplinary team work culture consisting of scientists and specialists from different work fields at that point of time, she led the integration of this approach, by using all of the facilities available in the Archaeology Department during her tenure as Head as well as through the Aşıklı Höyük salvage excavations that she started in 1989. She was one of the founder members of TÜBA (Turkey Academy of Sciences), which was constituted in 1993. She retired in 2000 but continued with her scientific activities in TÜBA. Under the title of the "Culture Sector of Turkey," she executed a quite comprehensive inventory study that includes both written and oral history. This provided a major contribution to establishment of the concept of cultural heritage in a holistic manner.

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► Archaeometry: Definition
► Çambel, Halet

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Estate Landscapes in Historical Archaeology

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Brief Definition of the Topic

The structure and impact of land ownership on the character of the European postmedieval landscape and its colonial territories have been relatively neglected compared to the emphasis placed upon comparable structures in earlier periods, such as the medieval manor. The landed estate – an extensive and largely contiguous block of land under the private ownership of an individual – is a product of the modern era following the decline of absolute monarchies and the Church from the sixteenth century. The extent to which the landscape was owned by a relatively small group of wealthy owners remained largely obscure until the eighteenth and nineteenth centuries, when waves of radical opposition questioned the power of the traditional elites.

Landed estates are made up of recognizable and recurrent features. At their core is the substantial house surrounded by an ornamental designed landscape. Both of these features have been well studied by art historians and the biographies of key artists, architects, and landscape designers, and the chronologies of style are well documented. Water features, such as large artificial lakes, and a "home farm" supplying the victuals needed by the owner's household were also core features. The surrounding landscape of farmland, woodland, villages, and farmsteads was an important foundation from which the owners drew income and exercised a considerable degree of social and political control. The architecture of the farm buildings, farm houses, and domestic houses in villages was an important idiom through which the extent of the estate and the social identity of the owners were expressed.

The size and distribution of estates have been a matter of considerable debate among historians as well as contemporary observers. From the late-nineteenth century, when reliable statistics become available in the UK, the most common division, was between the "great landowners" who owned over 10,000 acres and were nationally significant and the local gentry who might own between 1,000 and 10,000 acres and whose influence was more regionally defined. The situation elsewhere is less clear, particularly in Continental Europe, while in colonial contexts, where income from cash crops such as sugar was far higher per acre, and labor was enslaved, the units of landownership were initially on a much smaller scale. The distribution of estates tends to be biased toward areas of poor light soils where smaller owners found it difficult to sustain a living, and so estates tended to grow more extensive and hold a greater proportion of the total agricultural land.

The archaeological study of estates is in its infancy but has potential to provide a greater understanding of the form, typology, and extent of estates as well as their impact on the landscape character from the sixteenth century to the present day. As centers of private wealth and symbols of political and social power, landed estates created a distinct form of cultural landscape that was integral to the globalization of the modern era.

Cross-References

▶ Agrarian Landscapes of the Historic Period
▶ Capitalism: Historical Archaeology
▶ Caribbean Historical Archaeology
▶ Landscape Archaeology
▶ Post-Medieval Archaeology

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Ethics and Human Remains

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> . . . due dignity and respect should be afforded in the recovery, storage, investigation and reburial of human remains regardless of their context (Hunter et al. 2001: 176).

Introduction

Most professions adhere to an agreed code of conduct, commonly referred to as a "code of ethics," with the intention being that all practitioners should undertake "best practice." In reality, however, definitions of "best practice" vary because different cultures, societies, and groups have diverse set of value systems, namely, their own definitions of what is considered right (*appropriate*) and wrong (Walker 2000: 20). Because of the emotive nature of death, the treatment of human remains is often contentious and poses many ethical dilemmas.

Definition

Ethics is a branch of philosophy concerned with the evaluation of the principles and standards of human conduct that govern the behavior of individuals and groups (Bottorff 2005).

Key Issues/Current Debates

Locating and Recovering Human Remains: Digging up the Dead

While human remains may be located accidentally (e.g., washed up on a beach, eroded out of a riverbed, etc.), there are a number of situations where human remains are intentionally recovered. Human remains may, for example, be excavated as part of a planned university archaeology research project investigating subjects such as past burial practices or changes in diet. It has been argued that the antiquity and lack of personal identification of the individuals justifies this endeavor.

Increasingly, the need for land in urban areas with expanding populations (e.g., in the UK or Portugal) results in the exhumation of known burials and cemeteries (Sayer 2010). In some instances, building continues over the cemetery (e.g., a car park was constructed over some 9,000 burials at the Queen Victoria Markets, Australia – Cooper 2011). In other cases, funding is provided for a salvage recovery of the remains prior to development (e.g., the recovery, analysis, and relocation of the remains of some 260 children buried in a cemetery at the former Randwick Children's Asylum – Sydney, Australia, prior to development of a new hospital facility – Anon 1997). The ethical questions that arise from deciding whether or not to salvage human remains include why, in some instances, should human remains be left in situ and built over while in other cases, the remains are exhumed, curated, and stored as part of a salvage operation. Should the antiquity of the remains or whether the individuals are identified play a part in the decision to salvage human remains?

There are situations where communities have argued they have ancestral links to the human remains (see below for further discussion) and either demand to be included in the excavation to appease the spirits of the dead, or object to the excavation and analysis of remains altogether (see examples cited in Sayer 2010: 70-4).

The location and recovery of human remains may also be undertaken as part of forensic

investigations either to provide evidence for courts in prosecuting, for example, genocide and/or crimes against humanity, or to identify individuals to return the remains to their families. One of the ethical quandaries is why evidence in the form of human remains is collected for identification (usually undertaken as part of a humanitarian investigation) and becomes secondary to evidence collected for formal prosecution (e.g., Fondebrider 2002: 889). While resemblance is enough for some (e.g., Kadhim 2006), positive identification is given to others (e.g., Budimlija et al. 2003).

Each scenario raises questions about the ethics of digging up the dead. Such questions pose ethical dilemmas for those involved in the recovery and analysis of human remains.

Analyzing Human Remains

While death is biological, it is also an inherently social process, particularly given the proposition that the dead still have human rights. It is the dichotomy between human remains as utilitarian objects of scientific interest and human remains important for their cultural, symbolic, and spiritual value that raises many ethical questions for those studying or working with human remains, whether from archaeological or forensic contexts.

Sociocultural attitudes toward the dead should be considered by practitioners dealing with the deceased. While the living body is usually regarded as a person, it has sometimes been argued that after death, the body becomes merely an object. In the forensic context, the body (object) is regarded at one level as empirically unchallengeable evidence. This is particularly relevant to those dealing with human skeletal remains.

An anecdotal survey of forensic and biological anthropology students' attitudes to human skeletal remains showed that only half of the cohort (n = 16) who had excavated human skeletal remains identified with them as once being a living person (Blau 2009: 458). Such views, however, contradict the fundamental ethical principle for modern research in the biomedical and social sciences: respect for human dignity based on "the belief that it is unacceptable to treat remains solely as . . . objects or things" (Walker 2000: 20).

Depending on the context of the location and recovery of human remains, a number of different types of analyses are possible. Attitudes toward studying (and displaying and storing – see below) human remains are greatly influenced by attitudes of the living toward the dead. In some cases, the political and religious beliefs of communities result in rulings to prevent archaeologists and anthropologists from studying human remains (e.g., the case of Jewbury in York, UK – Sayer 2010: 79-82).

Osteologists and forensic anthropologists perform a range of analyses that may include determining whether the material is actually osseous; the bone is human or nonhuman; and/or the human remains are of forensic significance. Analyses may also include describing the condition and preservation of skeletal remains; developing an inventory of recovered remains; determining the ancestry, sex, age, and stature of the individual; describing any individualizing characteristics, and any pathological and/or traumatic injuries. Each of these specific practices, including the formation of the final report, has associated ethical considerations.

In the analysis of skeletal trauma, for example, how invasive should a forensic anthropologist be? In the case of a 35-year-old female homicide victim who exhibited extreme peri-mortem soft tissue trauma to the head and neck, how much more information will be gained from decapitating the head, macerating and cleaning the remains (e.g., Marks et al. 1999: 263)? Is it necessary to have a code of practice which stipulates the extent to which the practitioner can be invasive or "is it just better to let the . . . anthropologist work to their conscience on the principle of 'best practice'" (Hunter & Cox 2005: 220)?

Much has been written about the politics associated with indigenous human remains (e.g., Hubert 1992). It is important that people dealing with human remains, particularly in countries with a colonial history, be aware of the potential social and political concerns and debates surrounding indigenous remains. It is important to

appreciate that the results of, for example, an ancestry determination may have serious political, social, and ultimately economic implications.

Undertaking Research Using Collections of Human Remains

Some argue that undertaking research using collections of human remains is vital. For those undertaking research on archaeological remains, it provides the opportunity to gain a detailed understanding of past human lifestyles and activities. Consideration, however, must be given to the ethics surrounding research using human remains.

Consider, for example, the analyses of the human skeletal remains recovered from Spitalfields, the site of a former medieval priory and hospital in London. The individuals recovered were of known age and sex and often had living relatives (Molleson & Cox 1993). In such cases, who authorizes whether or not the remains should be studied?

Is it appropriate for practitioners to base their research on collections of human skeletal remains curated in museums, particularly when such collections are viewed as a violation of fundamental human rights by some indigenous groups (Walker 2000: 19)? Many indigenous groups promote reburial of what they perceive as ancestral remains. When the remains are archaeological and are of some antiquity, researchers argue that the ancestral links of living groups who promote reburial of the remains are tenuous (e.g., Afrasiabi 1997): How does one group of people prove a long ancestral relationship with ancient skeletal remains? (Donlon 1994). Even if/when a link can be established, the question remains about whose past it is anyway – who "owns" the past?

The majority of techniques used by osteologists and forensic anthropologists today were developed using descriptions and measurements collected either from archaeological collections where age and sex were unknown (e.g., Molleson & Cox 1993), or from anatomical samples (e.g., The Huntington, Terry, and Hamann-Todd Collections) where independent records of these biological attributes exist. It has been argued the research on contemporary human remains is important because of the need to improve population-specific techniques with which to analyze forensic cases.

Given the sensitive nature of the material archaeologists and forensic anthropologists examine, and to avoid notions that practitioners can undertake any research they feel is appropriate, all research or publication using skeletal material must be undertaken with the appropriate ethics research committee approval. It is not, however, enough to "do the paperwork": The broad ethical implications must be considered during and beyond the lifespan of the project.

Is it appropriate to undertake research based on human remains exhumed for evidence in war crime trials? If it is considered appropriate, has consent from the relatives of victims been sought and given (Hunter & Cox 2005: 215)? While assessment of the utility of forensic anthropology methodologies as applied to specific populations certainly has a place in terms of addressing the relevance of standards (e.g., Schaefer & Black 2005), exactly how data are collected to develop population-specific standards must be scrutinized (e.g., examples cited in Hunter & Cox 2005: 215). Consider research aimed at using cranial morphology to differentiate between a Croatian and a Bosnian (Griffis 2001). Does such research take into account the complicated politics resulting in the 1992–1995 Bosnian war? Such questions raise the importance of the need for cultural and ethical awareness and invite the larger question: What limits should one put on the expert's right to information.

Is it ethical to undertake research but never publish the findings? For example, one of the issues raised by some Australian Aboriginal groups in discussions about the return of a prominent skeletal collection was the fact that despite the museum in question having held the remains for over 70 years, the researchers had published relatively little on their findings (Associate Professor Chris Briggs, The University of Melbourne, personal communication 2005; see also Hubert 1992: 116). What benefits, therefore, could be gained from the continued curation of these remains?

Displaying and Storing Human Remains

Differences in attitudes to death, the deceased, and human skeletal remains have a significant impact on ethical issues related to the display and storage of human remains. In many contemporary Western societies, there is a lack of familiarity with the dead (e.g., Walker 2000: 5): Death is seen as a clinical process and physical contact with the deceased is rejected as events surrounding death and dying are often suppressed. In contrast, in other cultures, families choose to have physical contact with their dead relatives as part of the grieving process. While some societies actively and openly display human remains, as in the case of the All Saints Cemetery Chapel in the Czech Republic, other cultures are highly offended by the display of their ancestors, as with some Indigenous Australian and Maori communities from New Zealand (for further discussion on the different values placed on human skeletal remains, see Hubert 1992: 117-8; Walker 2000: 12-8).

Repatriation and Reburial

There are strong differences of opinion between indigenous groups and professionals involved in dealing with human skeletal remains about repatriation and reburial. The process of repatriation and reburial is seen by many indigenous groups as a vital part of their cultural traditions and/or religious beliefs requiring the spirits of their ancestors to be laid to rest through respectful burial. Other groups, typically associated with universities, museums, and professional organizations, argue that reburial results in the loss of important scientific knowledge and is the death of bioarchaeology (e.g., Donlon 1994). While many osteologists have been critical of repatriation and reburial, some practitioners from the United States argued that the passing of the 1990 Native American Graves Protection and Repatriation Act (NAGPRA) actually increased the number of skeletons studied and funds required for the analyses (Rose et al. 1996).

In 1995, skeletal remains of a teenage girl dated to the Roman period were discovered in the city of London during commercial development. The remains were housed at the Museum of London for 12 years and following a Christian church service in 2007, the remains were reinterred near the original place of discovery (Anon 2007). Questions that then arose included the following: Why, of all the individuals recovered in the city of London, were the remains of this one individual chosen to be reburied? Was it appropriate to have a Church of England ceremony for this individual? Such questions clearly illustrate the complex politics of the dead.

There are numerous important questions to be addressed in the process of deciding whether or not to repatriate and rebury human remains; how are human skeletal remains attributed an affiliation to a living human group; does the antiquity of the human skeletal remains effect the rigor of claims of affiliation?; at what point do oral traditions support affiliation; are oral traditions or physical evidence more important in "proving" affiliation and, "more important" to whom? What happens in situations where human skeletal remains cannot be attributed an affiliation?

The recovery, analysis, and storage of human skeletal remains raise a number of complex questions. Practitioners dealing with human remains have an ethical responsibility to be aware of the myriad of different responses to such questions.

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- ► Forensic Anthropology: Definition
- ► Human Remains Recovery: Archaeological and Forensic Perspectives
- ► Repatriation: Overview

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Ethics in Archaeology

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Introduction

Regardless of location, specialty, rank, heritage, gender, or age, ethics is an important part of the practice of every archaeologist. Archaeologists learn about, apply, and debate ethics in formal and informal contexts: college classrooms, staff meetings, publications, field-research sites, and at the bar (or metaphorical watercooler) during professional meetings. Long ago, the discipline of archaeology abandoned the idea that archaeologists practice in isolation a value-free science, free from interactions with modern peoples. Ethnic conflict, colonialism (and post-colonialism), globalization, structural inequalities, illicit markets, development, nationalism, imperialism, and terrorism – these realities of the world are all directly or indirectly connected to the global practice of archaeology.

Archaeology is the systematic study of past cultures and peoples based on analysis of recovered material evidence. Archaeologists reveal, interpret, and preserve parts of our global past – but, as noted by Pyburn and Wilk (2000: 83): "If archaeology is to survive. . .its practitioners must forfeit the luxury of burying themselves in the past." In performing their duties, archaeologists frequently confront ethical decisions and responsibilities concerning interactions with various publics, the collection, use, curation, or disposal of material evidence and responsibilities within the profession regarding safety, publication, or other professional standards. Archaeologists may be asked to determine the significance of someone else's history, test the validity of an Indigenous group's land claim, teach about evolution and human origins, or provide locations of cultural heritage sites to military during times of armed conflict. More frequently, narratives archaeologists write are used to guide development initiatives, influence public policy concerning preservation of "significant" historical properties, and instruct the public on the diversity of human practices in an increasingly globalized world. Thus, archaeologists play many roles and hold many responsibilities. Archaeology, therefore, is a relevant and applied science in the modern world, one that makes real impacts on living people and, thus, one that requires professional ethics.

Above all, ethics in archaeology is about the relationships that define the scientific discipline – relationships with colleagues, students, governments, Indigenous people, local communities, the general public, and people and objects of the past – the principles that guide actions, and the methods of ethical decision-making when relationships, principles, and practices are not in harmony. Below, definitions and histories of ethics in archaeology are provided, along with a summary of major ethical issues and debates in global archaeology today. This entry will conclude by looking forward and speculating on the future of ethics in archaeology.

Definition

What Is Ethics?

Ethics is the study of standards or ideals that guide everyday behaviors, as well as the

Ethics in Archaeology, Fig. 1 Word cloud generated from definitions of "ethics"

behaviors themselves. Ethics also refers to the standards, principles, and concepts of right and wrong behavior that are derived from moral reasoning and debate and are often discussed as rights, obligations, responsibilities, virtues, and/or benefits to others (Fig. 1). Many people confuse personal feelings and values, religious teachings, laws, and cultures (i.e., learned behaviors that are found to be "acceptable" in society) with ethics – none of these, in fact, are studies of standards that guide behavior. For example, laws may be based in ethical reasoning, but may be found to be unethical, such as former apartheid laws in South Africa. Laws also may not exist for some ethical principles such as honesty in reporting archaeological finds. Ethics is also not the same as religion because religious people are not the only ones with ethics. And, religious teachings, like cultural behaviors, are context dependent, meaning what is acceptable behavior in one religion/society at one time may not be acceptable in another (e.g., the practice of cannibalism or the imprisonment of Jewish people in Nazi Germany). However, personal feelings, religions, laws, and culture each have some bearing on the development of ethical behavior and ethical principles, demonstrating the complicated multifaceted process of studying ethics.

What Are Archaeological Ethics?

Archaeological ethics is composed of standards and principles that guide archaeologists and is used to judge the professional behavior of archaeologists (Fig. 2). Wylie (2003: 4) defines archaeological ethics as "a set of ideals that can give us leverage in judging existing practices as well as in making decisions about how to go on when conflicts arise or conventions are problematic" (see Table 1 for other recent statements on archaeological ethics). Simply stated, archaeological ethics is the study and discussion of how archaeologists *ought* to behave to meet professional and societal goals and exceed "typical behavior." Professional archaeological ethics is different than personal values and society's moral code, which prescribes "good" behavior of citizens, as some responsibilities of archaeologists are unique to members of the profession. For example, preservation and publication of research records are considered ethical tenets of archaeology, but few societies would argue it is unethical to destroy or refuse to publicly publish personal tax or citizenship documents.

Archaeologists interested in studying ethics, or who are facing ethical dilemmas, may approach the subject by a variety of means, including laws, schools of moral philosophy, professional societies' statements, and social conventions. For example, an archaeologist questioning "good behavior" related to publishing archaeological data may discover that (a) no laws exist requiring the publication of scientific data; (b) statements of professional societies argue sharing data with colleagues and the public is ethical, based on moral reasoning related to public responsibility and beneficence; (c) the same statements dictate that site locations should not be published and data derived from non-archaeological excavations (i.e., "looted" data)

Ethics in Archaeology, Fig. 2 Word cloud of 100 frequently occurring words in archaeological ethics codes

Ethics in Archaeology, Table 1 Recent statements on archaeological ethics

"Today, ethical questions and dilemmas are more about relations among people than about things"	McGuire (2003: vi)
"Ethics are guidelines to assist professionals in meeting the specialized goals of their profession within the more complex circumstances of the greater society in which they live and work."	Lynott (2003: 25)
"Ethics in archaeology. . .are historically contingent and based on moral arguments, world views, and goals founded in certain ways of relating to the past that may or may not have a sound foundation or be shared by everyone"	Colwell-Chanthaphonh et al. (2008: 4)
"Archaeologists should be seeking to realise the highest gods of their profession, whatever these may be. Deciding what they are is one important part of archaeological ethics; determining how they may *legitimately* be achieved is another."	Scarre and Scarre (2006: 3)
"Ethics principles and codes of conduct should be treated as works in progress; they are never final, never written in stone. . .It is only through such a process of active, reflective debate that archaeologists can be accountable for their practice."	Wylie (2003: 13)
"In order for this discussion of [archaeological] ethics to be meaningful to everyone, we must look beyond archaeology as only a series of methods driven by a set of theories. . .the ethical practice of science must involve a thorough examination of the relationship between [scientists] and those with claims on the information so carefully sought by the scientist. In the case of archaeology, it is imperative for archaeologists to be aware that American Indians are one of the primary stakeholders in a complex and multifaceted past owned by no one but controlled by many."	Watkins (2003: 129)

should not be used, based on professional valuing of preservation of archaeological sites and the assumed connection between these actions and increased commercialization of the past; and (d) a social convention exists among archaeologists not to share certain research data until it has been published by the discover/analyst.

Many local and national laws and international conventions apply to the ethical practice of global archaeology, including those centered on historic preservation, the prohibition of illicit trafficking of antiquities, and Indigenous peoples' rights (for further reading on cultural heritage laws, see Gerstenblith 2008; King 2008). For an excellent summary of the "schools" of moral philosophy and of applied professional ethics, see Rachels 1998 or, for archaeological examples, see Colwell-Chanthaphonh et al. 2008. Finally, Wylie (1997) has identified different types and purposes of professional statements on archaeological ethics, including professional standards of conduct, general statements of goals, and special statements outlining responsibilities to Indigenous or other local peoples. Colwell-Chanthaphonh

et al. (2008: 133-186) provide a compilation of 12 professional statements on archaeological ethics, many of which are also available online. While many common themes persist in such statements (e.g., the preservation of the "archaeological record"), there are no universally held ethics in archaeology. Each professional organization's statements reflect its positionality in the world, its history and place in time, and the core ethical values of its members.

Historical Background

> Ethics used to be simple in archaeology. . .Ethical questions were all about things: Did the person use up-to-date scientific methods to dig things up and adequately document the process? . . . Did the things end up in a museum and not for sale at Sotheby's? . . .Did the archaeologist publish what he learned? . . . However, at the dawn of the twenty-first century ethics in archaeology are not simple. They are very complex, conflicted, and confusing. Today, ethical questions and dilemmas are more about relations among people than about things (McGuire 2003: vii).

Ethics in archaeology has been, and forever will be, context dependent and the subject of great debates, both within the profession and society. New methodologies, scientific instruments, societal perspectives on "science," and stakeholders have led to reexaminations of what archaeologists *ought* to do. Though some early principles of archaeological ethics have persisted over time (e.g., the importance of discovering and documenting new cultural traditions), archaeological ethics is not now and never has been universally held. Though the first codified statements on ethics in archaeology were not written until the mid-twentieth century, by examining theoretical and methodological practices of past archaeologists, ethical values and principles may be inferred. For a summary of the history of ethics in global archaeology, see Colwell-Chanthaphonh et al. 2008 (especially Table 1.1, p. 19).

Early Ethics in Archaeology

Archaeology began as antiquarianism in most areas of the world, when scholar-adventurers sought to discover and collect relics from ancient "lost" civilizations. Over time, antiquarianism developed into material culture analysis, leading to the fields of Classical Studies, Egyptology, Assyriology, and archaeology (for more details, see Trigger 1989). Often working as part of the colonial structure in occupied places like Egypt, Cambodia, India, and the Americas, many early archaeologists felt little ethical responsibility to local people; their ethical obligations were instead focused on an assumed universal ethos relating to the discovery, collection, and display of archaeological objects.

As the scientific methodology of archaeology developed, new ethics arose, including the documentation of contextual information from in situ excavation and the preservation of archaeological sites. These changes led to the development of professional standards, including ethics of scholarship and professional accountability. In the United States, as early as 1906, legislation was passed that recognized damage done to sites of national cultural heritage by unscientific excavation and established the authority of archaeologists as professionals charged with protecting and studying evidence of the past (Harmon et al. 2006). The growth of archaeology programs in universities, codification of further laws defining archaeologists' roles to the past, and the creation of professional archaeological societies all acted to further separate scientific archaeologists from the public and define professional archaeological ethics. Early ethical statements of societies (e.g., Champe et al. 1961; see Colwell-Chanthaphonh 2008: 180-181) included principles such as sharing and publishing data, refraining from the buying and selling of artifacts, receiving proper training, and protecting archaeological sites and data. As mentioned in the opening quote by McGuire, early archaeological ethics was primarily object centered.

"Modern Era" Ethics in Archaeology

In the last 50 years, a number of pressing issues have elevated ethics into a prominent part of global archaeological practices. Beginning in the 1960s, and stemming from recognition of the destructive nature of development projects

and archaeological excavation, archaeologists argued for a professional conservation ethic. Mitigation and minimally intrusive excavation became standard practices to address research questions, especially in the newly created private sector of archaeology, often called cultural resource management (CRM). The quick growth of CRM inspired calls to define professional standards in archaeology that outlined traditional ethics of conservation and scientific practice but also new responsibilities to clients, employees, employers, competing and cooperating businesses, and the public (now a funder of archaeology through taxes) (Register of Professional Archaeologists 2012).

As CRM was booming, the global antiquities market (fueled by illicitly acquired "looted" objects) was burgeoning. Archaeologists called for international protections of archaeological sites and objects (i.e., "cultural property" or "cultural heritage"), arguing that ethos of "stewardship" and "appreciation of the past" were universal, as the past belonged to humankind. In an attempt to stem the looting of archaeological sites, archaeologists reiterated an anticommercialization ethic, stating archaeologists should not participate in monetary valuation of the archaeological record. Additionally, archaeologists called for an ethic of public outreach and education, both to fulfill a previously defined ethic of data sharing and to solicit help in "saving the past for the future."

As archaeology became increasingly diverse in the modern era, globally and locally, new people introduced new perspectives, again changing archaeological ethics. This diversity, with influences from the postmodern reflexive "turn" in anthropology and international Indigenous rights movements, questioned the primacy and subjectivity of Western science and encouraged alternative epistemologies, which in turn has inspired ethics of collaboration, reciprocity, and stakeholder dialogue in modern archaeology (as discussed below) and led to greater acknowledgement of the inseparability of politics from scientific practice. Armed with greater knowledge of the modern social contexts of archaeological research, archaeologists have begun to transform their ethics to increasingly focus on people, rather than objects. This transformation has been noted in statements and codes of ethics of professional archaeological societies, such as the World Archaeological Congress (WAC n.d.).

Key Issues/Current Debates

As discussed above, archaeological ethics used to play a minor role in the practices of archaeologists as well as the archaeological literature. Once focused on rules governing the collection and analysis of artifacts, ethics in archaeology is now a major focus of the discipline. Local, national, and international archaeological societies are seeking to engage their members in discussions of ethics, and numerous books have been written on the subject (e.g., Lynott & Wylie 2000; Zimmerman et al. 2003; Scarre & Scarre 2006; Vitelli & Colwell-Chanthaphonh 2006; Colwell-Chanthaphonh et al. 2008).

In this section, key issues and current debates in ethics of archaeology will be presented, organized into a "trinity of responsibilities" first proposed by McGuire (2003:xiii): accountability to the material evidence of the past, to various publics associated with archaeological practice, and to the discipline and colleagues. Quotes from professional archaeological organizations on these responsibilities are provided in Tables 2–4.

These responsibilities are not mutually exclusive (see Fig. 3) – they intersect in some of the most crucial modern archaeology debates, including the collection, analysis, and preservation of human remains, the ownership and control of cultural heritage, and the struggle to make archaeology applicable in the twenty-first century and beyond.

Responsibilities to the Past

Because archaeological research depends on the availability of archaeological sites and artifacts, and archaeologists believe they make positive contributions to society through their work, archaeologists have long felt an obligation to preserve cultural heritage. Threats to cultural heritage come in many forms, including natural

Ethics in Archaeology, Table 2 Responsibilities to the archaeological record

Archaeological Institute of America	"As primary stewards of the archaeological record, [archaeologists] should work actively to preserve that record in all its dimensions and for the long term."
Australian Archaeological Association	"Members will advocate the conservation, curation and preservation of archaeological sites, assemblages, collections and archival records. . . [Members] support and advocate the necessity to properly manage archaeological materials in accordance with agreements with communities of concern."
Canadian Archaeological Association	"We expect [members] will exercise respect for archaeological remains and for those who share in interest in these irreplaceable and nonrenewable resources now and in the future."
European Association of Archaeologists	"It is the duty of every archaeologist to ensure the preservation of the archaeological heritage by every legal means."
Japanese Archaeological Association	"Members recognize that the sites, features, and artifacts which archaeology takes as its objects of study are the precious heritage of human history and culture, and strive to preserve and utilize these materials"
Society for American Archaeology	"It is the responsibility of all archaeologists to work for the long-term conservation and protection of the archaeological record by practicing and promoting stewardship of the archaeological record."
World Archaeological Congress	"[Members] acknowledge the importance of protecting indigenous cultural heritage to the well-being of indigenous peoples."

Ethics in Archaeology, Table 3 Responsibilities to associated publics

Archaeological Institute of America	"It is the responsibility of professional archaeologists to communicate with the general public about the nature of archaeological research. . .Archaeologists should be sensitive to cultural mores and attitudes, and aware of the impact research and fieldwork may have on a local population, both during and after the work."
Australian Archaeological Association	"Members will negotiate and make every reasonable effort to obtain the informed consent of representatives of the communities of concern who cultural heritage is the subject of investigation. Members cannot assume that there is no community of concern."
Canadian Archaeological Association	"[Members] acknowledge that Aboriginal people have a fundamental interest in the protection and management of the archaeological record, its interpretation and presentation."
European Association of Archaeologists	"Archaeologists will whenever possible. . .carry out prior evaluations of the ecological and social implications of their work for local communities."
Japanese Archaeological Association	"In the conduct of investigation and research, JAA members respect the local history, culture, and natural environment, and give consideration to their relations with the local community"
Society for American Archaeology	"Responsible archaeological research. . .requires an acknowledgement of public accountability and a commitment to make every reasonable effort, in good faith, to consult actively with affected group(s)."
World Archaeological Congress	"Members agree that they have obligations to indigenous peoples and that they shall. . .acknowledge the importance of indigenous cultural heritage. . .to the survival of indigenous cultures"

and human forces, such as erosion, flooding, development efforts, armed conflict, and tourism. Most archaeological organizations have statements supporting the protection of the past (Table 2). The Society for American Archaeology (SAA) (Lynott & Wylie 2000: 30, 35) notes that "Stewardship" is the "central principle of archaeological ethics," "from which all the other ethical principles are derived."

Responsibilities to the past include a number of key issues and debates. First, increasing numbers of international archaeological projects have led to escalating numbers of sites and objects in

Ethics in Archaeology, Table 4 Responsibilities to colleagues and the discipline

Archaeological Institute of America	"Professional archaeologists owe consideration to colleagues, striving at all times to be fair, never plagiarize, and give credit where due."
Australian Archaeological Association	"Members will treat each other in a professional manner. . .[and] disseminate the results of their work as widely as possible."
Canadian Archaeological Association	"[Members] must keep abreast of developments in their specializations; possess adequate training. . .produce an adequate document. . .respect colleagues and cooperate with them"
European Association of Archaeologists	"Archaeologists will carry out their work to the highest standards recognized by their professional peers."
Japanese Archaeological Association	"[Members] strive to advance their professional capabilities. . .and to conduct their work to the best of their abilities. . .members take every measure to assure safety and hygiene, and respect human rights."
Society for American Archaeology	"Archaeologists must ensure that they have adequate training, experience, facilities, and other support necessary to conduct any program of research. . .consistent with. . .contemporary standards of professional practice."

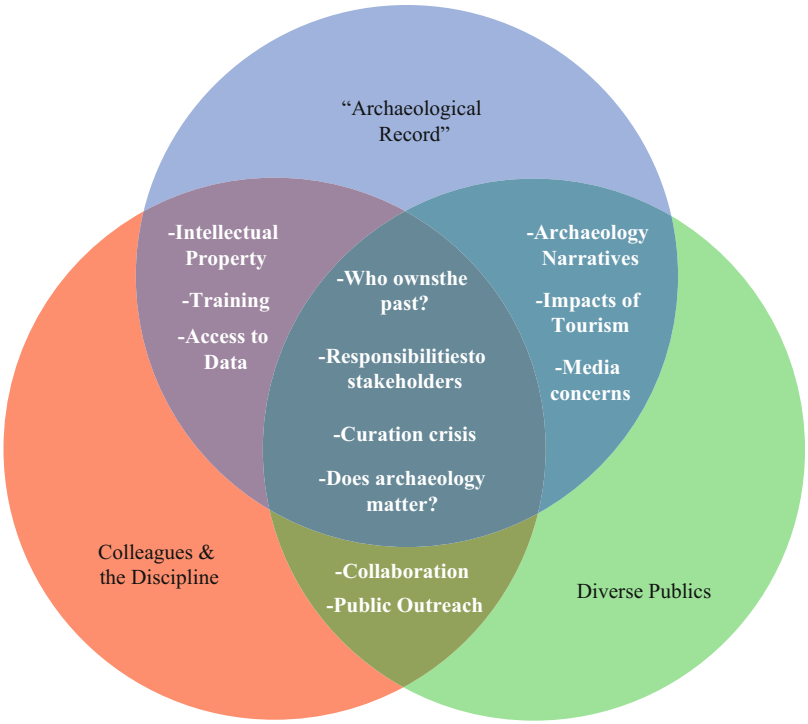

Ethics in Archaeology, Fig. 3 The "trinity of responsibilities" of archaeologists, with intersecting issues

need of conservation. This fact has led to a "curation crisis," as infinite space and resources are not available to fulfill this ethical obligation. What should be done to resolve this issue? The continuing responsibilities and behaviors of archaeologists towards currently curated objects also invoke debate. What are the best practices for preserving objects and other forms of data? Who has the right to own or control cultural heritage? When should cultural heritage be removed from museum conservation and repatriated to descendant or other communities? These questions have led to significant debates over whether the primary ethical obligations of

archaeologists should be to objects or people and if all people in the world share an ethic of stewardship defined as preservation of the past. Recent case studies suggest that Indigenous and other communities do not value archaeological sites and objects the same as archaeologists. For example, Zuni Ahayu: da (also called "war gods"), once objects of archaeological and art fascination and study, are meant to decay naturally and not be preserved according to the Zuni – here, the ethical responsibility felt by archaeologists to preserve objects is in direct violation of the wishes of a local affected community.

Responsibilities to Associated Publics

Archaeology is of interest to, and itself affects, a diverse range of publics, including government officials, educators, developers (as employers), Indigenous communities, local communities, and the public (Table 3). Since early in the discipline's history, archaeologists have felt an obligation to share their findings and interpretations with the public, following Santayana's (1905) adage: "Those who cannot remember the past are condemned to repeat it." Indeed, Watkins et al. (2000: 40) go as far as to say that "the products of our research belong to the public." These recognitions have inspired archaeologists not only to publish their findings in a timely manner but also to write for broad audiences. The content of publications and even museum displays is also a subject of archaeological ethics, as archaeological interpretations may have unintended consequences (such as denying the origin story of an ethnic group).

As the Zuni Ahayu: da example above shows, the actions and ethos of archaeologists are not always shared by all publics. Over the last 20 years, archaeologists have increasingly recognized, and themselves studied, the ways archaeology and cultural heritage affect people spiritually, economically, politically, socially, etc. Archaeology today is often as much a process of ensuring and actively creating open dialogue and collaborative engagements with communities as it is excavating and interpreting ancient objects. Collaboration and public accountability are especially central to archaeologists' responsibilities towards Indigenous, minority, and descendant communities. Watkins et al. (2000: 41) note:

> It should not be up to the people we study to ask us to consult with them. Rather, it should be a part of our everyday procedures and pre-research checklist to see to it that we approach those affected groups.

Responsibilities to Colleagues and the Discipline

> Archaeology is a profession, and the privilege of professional practice requires professional morality and professional responsibility, as well as professional competence, on the part of each practitioner. Register of Professional Archaeologists Code of Conduct (2012)

Like any profession, archaeology includes a diverse range of practitioners, as well as complicated issues relating to the definition of professional practice (Table 4). Today, there are recognized standards and behaviors related to being a professional archaeologist and working with colleagues. These include responsibilities to acknowledge the work of others (i.e., do not plagiarize); make findings and data accessible to colleagues in a timely manner (no data hoarding); study and comply with local, national, and international laws; ensure the safety and well-being of colleagues (especially students in field-research contexts); and be properly trained and informed. Part of proper training includes recognition of what resources are necessary to ethically complete an archaeological project (e.g., curation space). The dramatic increase in the number of archaeologists practicing in the private sector has led to new efforts to ensure these ethical obligations are met and to provide professional competency training and oversight.

Adding to the complexity of ethical responsibilities to colleagues and the discipline is the increased diversity of archaeological practitioners in the world today. Many archaeologists feel a responsibility to make the discipline more diverse and to ensure there is no discrimination in hiring practices, work environments, or educational scholarships. Archaeology is performed on six continents by tens of thousands of people, each with personal value systems and visions of

what archaeology's disciplinary foci and ethics should be. New cultural identities, ontologies, and epistemologies in the discipline add depth and complexity to ethical issues.

International Perspectives

> If archaeologists—of all people—can draw some lessons from the past, perhaps we can rediscover a more human side to our science and come to value once again the importance of face-to-face relationships with those whose ancestors we wish to study (Thomas 2000: 276).

Much of the archaeological literature on ethics is written by, or discusses examples from ethical issues including, North American archaeologists. These individuals are not inherently more ethical than archaeologists elsewhere in the world. Rather, as noted by Colwell-Chanthaphonh et al. (2008: 54-55): "Our ethically turbulent present is the result of a history of practice that often ignored – or mistreated – stakeholders, participated in colonial enterprises, and assumed control and ownership of cultural properties."

Ethical issues in American archaeology reflect those in global archaeological practice. Reviewing current news articles and statements of archaeological organizations shows the ubiquity of ethics. Archaeologists responding to looting of and damage to the Baghdad Museum and Iraqi archaeological sites during the recent Iraq War, trying to stop the destruction of the sixth-century Bamiyan Buddhas by the Taliban government of Afghanistan in 2001, testifying before governments to argue for stronger laws to protect and mitigate damage to archaeological sites, rushing to save archaeological sites to be submerged by the Three Gorges Dam in China, and writing letters to protest the sale of human remains and other archaeological objects on online auction websites are all examples of archaeologists enacting their perceived ethical responsibilities to the past and to the people.

Perhaps no ethical case study in American archaeology is more well known than that of Kennewick Man (or "the ancient one") and the related US legislation, the 1990 Native American Graves Protection and Repatriation Act (NAGPRA). Kennewick Man is the name given to a set of approximately 9,000-year-old human remains discovered in Kennewick, Washington, USA, in 1996 (for a detailed history, see Thomas 2000). The discovery of Kennewick Man led to a nearly decade-long legal battle involving many stakeholders, including a coalition of Native American tribes, archaeologists, anthropologists, government officials, local communities, and the general public. The battle centered over whom (if anyone) should have the right and obligation to control Kennewick Man and similar individuals and associated objects from the past. Kennewick Man also fomented extant divisions with American archaeology concerning ethical principles, especially accountability to affected publics and definitions of terms such as "artifact" and "stewardship." Kennewick Man currently resides in the University of Washington's Burke Museum of Natural History and Culture. For some, this result was seen as a victory; others stated that more was lost in the struggle to control Kennewick Man than could have ever been gained through scientific study. Both NAGPRA and Kennewick Man were signs of changing ethos, theories, and practices, among archaeologists, Indigenous communities, and the American public.

North American archaeology has changed dramatically since the passing of NAGPRA. While before, American archaeology was suffering from a myopic focus on stewardship and preservation of the "archaeological record" (an object-based epistemology), today, due to NAGPRA and cases like Kennewick Man, ethos in American archaeology are increasingly people-centered. Kennewick Man reminded archaeologists that many "archaeologies" exist in the world and that the past has real impacts on people's lives in the present. Discussions concerning stakeholders and these impacts have led to many new principles and spirits in American archaeology, including collaboration, social justice, and reciprocity.

Naturally, there are many other ethical issues and debates about proper practices American archaeology. For example, in February 2012,

three archaeological organizations based in the United States joined in writing letters to protest two new television shows ("Diggers" and "American Diggers") that showed excavation as treasure hunting and violated a long-standing archaeological ethic of noncommercialization by discussing the monetary values of excavated "finds." The organizations worried that the television shows would promote looting of archaeological sites, rather than instill an ethic of preservation and stewardship in the viewing public. The "Diggers" shows also reflect ongoing concern amidst American archaeologists for how accurately the media portray scientific archaeology and people of the past.

Future Directions

> The ability to sustain an ongoing process of critical reflection on difficult and ever-changing ethics issues is crucial to the future of archaeology as a profession (Lynott & Wylie 2000: 10).

New trends in archaeological ethics can already be seen by observing the practices of archaeologists in various global contexts. Collaboration with local communities is more frequent today than it has ever been in the past. At professional meetings in the United States, archaeologists often acknowledge the traditional Indigenous people of the land where the meeting takes place and offer warnings before human remains are displayed in presentations. Curators and directors of archaeological laboratories and museums are adapting to include nontraditional and Indigenous curation practices. Archaeological publications increasingly include statements of gratitude to local communities for their support and are beginning to be seen in open-source formats rather than traditional print journals. These are all small signs of what may come in archaeological ethics.

In the future, archaeological ethics is likely to be framed such that archaeologists practice in accordance to societal norms, such as honesty, fidelity, and respectfulness, to the best of their abilities, and to work towards both beneficence ("do good") and nonmaleficence ("do no harm"). In other words, archaeology, like all sciences, should benefit people in the world. The teleological goal of beneficence is likely already shared by all archaeologists. It can be seen in existing ethical norms requiring public reporting of data and interpretations and public outreach. Nonmaleficence is a goal not currently stated in many archaeological principles or ethical codes. Nonmaleficence can only be practiced when one understands the consequences of archaeological courses of actions on all those living today.

In deciding how beneficence and nonmaleficence are reached, archaeologists should recognize that scientific practices, cultural heritage, and ethics are all contextually dependent. Thus, to do good and prevent harm, archaeologists must be aware of the stakeholders affected by their work and recognize that aspects of cultural heritage (including tangible and intangible elements) are ends in themselves and not means to an archaeological end. Many objects and sites have agency – they are ancestors, or signs of ancestors, or they are a part of living people. Their meanings are not defined by archaeologists alone. Also, archaeologists should recognize that existing ethics such as the preservation of sites and objects may not be universally held. While preservation helps ensure future archaeological investigation and knowledge production, if ever people are in some way harmed by "archaeological" preservation methods, preservation would be found to be unethical. Perhaps, then, the focus of archaeological ethics should be an appreciation of an argument for the view that it is important and valuable to modern society to learn about (and from) the past, in all its versions, using any methods deemed appropriate by those involved (Zimmermann 2006).

Inevitably, there will be ongoing conflicts and disagreements over how "best" to practice archaeology in the future. As the quote above suggests, ethics is mutable and will change. Thus, ethical practice of archaeology requires ongoing discussion, debate, and compromise among all those who participate in global archaeology.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Management and Native Americans
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Field Method in Archaeology: Overview
- ▶ Kennewick Man Case: Scientific Studies and Legal Issues
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Sacred Site Conservation and Preservation
- ▶ Sacred Sites in Indigenous Archaeology

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Ethics of Collecting Cultural Heritage

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Introduction

Perspectives on rights and responsibilities related to studying, collecting, and owning cultural artifacts, or objects of cultural heritage, are at the heart of many debates among scholars, collectors, descendant communities, institutions, and governments. The loss of cultural heritage due to looting, war, development, and other destructive forces has led to a body of laws, international conventions, and other protective measures, particularly since the mid-twentieth century, and has helped shape the codes of ethics that inform how archaeologists, museum professionals, and heritage managers do their work (Lynott 2003).

Definition

Cultural objects from the past are variously referred to as "antiquities," "cultural property," "cultural resources," and "cultural heritage," with usage changing over time and often weighted with political and social subtext. These terms reflect different understandings of ownership, value, and meaning. They suggest whether we think first of preservation or ownership, culture or aesthetics, science or humanism. These concepts, and their relationship to archaeology and the ethics of collecting artifacts representing past times and – usually – the "other," are discussed by many scholars, including Vitelli (1996), Messenger (1999), Hoffman (2006), and Robson et al. (2006).

The term "antiquities" refers to objects or relics dating from ancient times, originally thought of as preceding the Middle Ages. These were generally the things that antiquarians studied, collected, and dealt in. Over time, the terms for both the objects and the people who study them have become more nuanced as specialized fields of study, including archaeology and art history, have developed.

The term "cultural property," widely used in legal and political discussions, is generally considered to include objects of an archaeological, ethnological, and artistic nature, with cultural or historical significance. Use of the term "property" suggests a Western perspective that ownership can be established, either as favoring a particular "source" nation, such as Mexico, Peru, or Cambodia, or the entity best suited to conserve an object for humanity, often – at least until recently – a "market" nation, such as the United States, the United Kingdom, or Japan. This is often referred to as the cultural nationalism versus the cultural internationalism argument. Numerous authors, including Merryman (2005), Carducci (2006), Gerstenblith (2007), Bauer (2010), and Forrest (2010), present legal perspectives on the debate, including discussions of the interplay between national and international laws. Carman (2005) and Renfrew (2000), among others, discuss the intersection of value, ownership, property, and archaeological categories.

The term "cultural resources" has been used commonly since the 1970s, especially in the United States, in the context of the management of archaeological sites. The field of cultural resource management, or CRM, grew out of the specialized practices developed to comply with national laws designed to protect archaeological and historic sites. The term "cultural heritage," introduced in the 1972 UNESCO World Heritage Convention, has gained favor as a broader and more inclusive term that seeks to avoid connotations of exploitation and extraction, as discussed by Burke & Smith (2010). This term is also used increasingly in the texts of international conventions and agreements. The more neutral term, "cultural objects," has also been used to emphasize the ability of objects to be physically possessed, moved, and returned, as discussed by Vrdoljak (2006: 7-8).

The way we identify the trail of possession of an object is also weighted with meaning. The art

world typically uses the term "provenance" to document the authenticity and ownership chain of a work of art from the point of creation or discovery to acquisition by a museum or collector, whereas archaeologists use the term and its variant, "provenience," to emphasize the object's original context, which is an essential component of the archaeological record. Robson et al. (2006) discuss this issue from multiple perspectives.

When we consider the "ethics" of collecting, we think in terms of a set of moral principles or values that guide our actions. Wylie (2003) describes the ideas and processes underlying the development of ethical standards, in contrast to legal standards. An ethic articulates a set of ideas that allow us to judge existing practices, usually to even tighter standards than a law might do. Because ethical principles and codes of ethics are based on ethical intuitions and moral judgments, Wylie argues they must be seen as works in progress that involve active, ongoing reflective debate.

Historical Background

History of Collecting and the Development of Laws

Objects that are made or used by a particular cultural group become part of a collection when someone – often from a different cultural group – makes subjective choices about acquiring and sorting them and gives them value and meaning beyond their original intention. Thomason (2005) discusses the theoretical underpinnings and definitions of collecting, which she places at the intersection of archaeology and material culture studies. The human impulse to collect objects from other cultures, and even to exhibit them in a sort of museum, goes as far back as ancient Mesopotamia, some five millennia ago, she argues. Other cultures, from the Greeks to the Aztecs, also left evidence of their fascination with past cultures in their own caches and collections of venerated objects from the ancestors.

Hoffman suggests that Western origins of the idea of art and cultural heritage preservation as a matter of public concern can be traced back at least to late-eighteenth-century France when the revolutionary government wrestled over whether to destroy all traces of Latin inscriptions on monuments and other "tainted art" (Hoffman 2006: 1). Asked to create the argument for preservation, Abbe Gregoire identified the existence of a "national patrimony" that was represented in part by artifacts and monuments of antiquity as examples of the genius and talents of their creators. With this focus more on the creators than on the patrons of the time, he argued that these works should be preserved – not destroyed or sold abroad. Hoffman brings this argument that "culture matters" to the concept of "common interests" that are widely shared globally.

Many countries have developed laws protecting their national heritage. In the United States, the 1906 Antiquities Act was the first federal policy to preserve historic and prehistoric sites on federal lands. Soderland (2010) provides an overview of the first century of US laws to protect archaeological and historic sites, including the 1966 National Historic Preservation Act, the Archaeological Resources Protection Act of 1979, and the 1990 Native American Graves Protection and Repatriation Act (see also Messenger 1999; Zimmerman et al. 2003). US regulations also address international cultural resources, such as the National Stolen Property Act, and regulations on smuggling or transporting stolen goods into the country, all of which have been used to prosecute cases involving movable archaeological materials. Other countries have similar sets of laws and regulations that have grown out of particular political, cultural, and intellectual traditions, as discussed by Brodie et al. (2001), Hoffman (2006), and Messenger and Smith (2010).

During the nineteenth and early twentieth centuries, museums became the repositories of the ancient objects that represented earlier human achievement, both utilitarian and artistic, as discussed by Vrdoljak (2006: 47-72) and Roberts (2006). Early archaeologists, probably as much the antiquarian and collector as anyone else, pored over glass cases of objects seeking to develop typologies that would show the gradual

and systematic development of human civilization. From the 1930s to 1960s, archaeology was in transition from a largely amateur pastime, in which famous archaeologists such as Graham Clark found themselves drawn to the archaeological study of the past as "passionate connoisseurs" of objects, into a highly specialized scientific discipline (Fagan 2001: 1). The first two-thirds of the twentieth century saw major expeditions and excavations of sites by universities and museums, often with the backing of wealthy donors, in such places as Angkor Wat, the Maya lowlands, and Machu Picchu. There was a strong emphasis on building the collections of major museums as repositories of world heritage, as discussed by Forrest (2010) and others.

After World War II, as the field of archaeology developed into a scientific discipline, the emphasis shifted away from expeditionary artifact collecting to the systematic study of sites and contexts. With a myriad of interdisciplinary research strategies at hand, archaeologists increasingly realized the promise of using the archaeological record to reconstruct the story of the past – learning about diet, climate, trade, migrations, and much more, through residues in pots; soils in the matrix around artifacts; the context of objects and buildings, in particular, landscapes; and chemical analysis of bones and teeth, in addition to the systematic analysis of artistic styles and inscriptions. Being able to carry out archaeological research in a given country depended on a complex network of governmental permits and support from universities and foundations as well as the ability to prove competency through research reports and publications in an increasingly professionalized field.

As this potential for expanded scientific analysis grew, the levels of site destruction, looting, and the international trade in antiquities were reaching crisis proportions around the world, despite the existence of many national laws designed to protect sites and artifacts. The damage to cultural heritage as a result of looting is discussed by Elia (1996) and Brodie et al. (2001).

The emergence of UNESCO in the 1950s as a forum for international cooperation through its social and cultural programs provided new opportunities for addressing these concerns, according to Long and Labadi (2010), especially through the five conventions focused on protecting world heritage. The 1954 Hague Convention established recognition of the universal importance of cultural heritage (Forrest 2010: 406). The 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property established a protocol for international cooperation to address this crisis. As individual nations ratified the 1970 convention, they could request assistance from other States Parties. The United States ratified the convention in 1983 with the US Convention on Cultural Property Implementation Act, which provides mechanisms for bilateral agreements to restrict the import of endangered cultural materials from other countries. With the subsequent ratification by other countries considered to be major destinations for international art and objects of cultural heritage, the 1970 UNESCO Convention now has considerably more potential to be effective. Other conventions, laws, and agreements have been developed to further clarify and strengthen the legal protections available, as discussed by Robson et al. (2006) and others. The 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage established the World Heritage List, along with the protocols and procedures for selecting, preserving, and protecting cultural and natural sites considered to have outstanding universal value. It is one of the most widely accepted conventions with 186 States Parties supporting it, in part for the opportunity to promote nationalist agendas at sites designated as World Heritage Sites. By 2011, there were more than 900 sites on the list, with many more nominations being developed at the regional and national levels. The concept of a shared world heritage that led to the World Heritage List and that is at the core of the argument for universal museums is critiqued by Scarre and Scarre (2006), Labadi and Long (2010), and Forrest (2010).

The UNESCO cultural heritage conventions are important within their spheres of influence,

yet are limited by uneven acceptance by individual States Parties and by differing interpretations and enforcement of their norms. Nevertheless, as Forrest concludes (2010: 422-423), their emphasis on education and international cooperation has made significant contributions to the protection of cultural heritage through development of international laws and the increased diffusion of knowledge about our shared world heritage.

Codes of Ethics

It is not surprising that codes of professional ethics for archaeologists have undergone significant revisions and updates in order to address issues related to the ethics of collecting, including stewardship of cultural heritage, the commercialization of objects, the need for more extensive communication, and closer scrutiny of ethical issues in research and publication, including guidelines regarding the use of unprovenienced objects. Archaeology as a profession needed a new set of normative principles that clearly laid out what archaeologists' responsibilities should be to the archaeological record, to diverse publics, and to colleagues, employees, and students, as discussed by Lynott and Wylie (2000) and Zimmerman et al. (2003: xiii-xvi). Examples of codes of ethics revised in the 1990s and early 2000s as the result of long consultative processes can be found on the websites of the Society for American Archaeology, the Archaeological Institute of America, and the European Archaeological Society, among others. And as Wylie has discussed, they will continue to evolve as professional practices related to objects of heritage change and mature.

Current Debates and Future Directions

While laws and conventions provide legal frameworks for protection and ownership of objects, the ethical debates continue, addressing issues related to multiple stakeholders, including indigenous and descendant communities, the use and treatment of objects and control over them, repatriation of human remains and sacred objects, changing authority over objects in museums and collections, and economic issues ranging from subsistence digging to curation to valuation of cultural objects. Professional archaeologists continue to debate ethical issues related to the use of undocumented and unprovenienced objects in their research, and museum curators wrestle with making ethical choices related to acquisitions and possible restitution of objects to their country or culture of origin.

Professional organizations and international bodies are working to find new models to address ethical issues beyond the scope of laws. The International Council of Museums (ICOM), for example, in its 2007 general assembly passed resolutions, including Resolution No. 4, "Preventing Illicit Traffic and Promoting the Physical Return, Repatriation and Restitution of Cultural Property." This resolution urged all countries to make the fight against the increasing illicit traffic of cultural and natural resources a priority. The International Council on Monuments and Sites (ICOMOS), one of three nongovernmental organizations that serve as advisors for the UNESCO conventions, plays an ongoing role in monitoring sites on the World Heritage List and reviewing requests for assistance among States Parties to the conventions. ICOMOS also promotes discussions of emerging issues, such as the protection of intangible heritage in addition to tangible heritage.

Another perspective on the seemingly unresolvable differences related to collecting and owning objects of cultural heritage came from C. Brian Rose, president of the Archaeological Institute of America, in a 2007 letter published in *Archaeology Magazine*. Acknowledging the different perspectives that many in the museum community have from many archaeologists relative to the purchase or analysis of undocumented artifacts, he called for finding, if not a common course of action, then consensus on programs aimed at preventing the plundering of artifacts and their illegal removal from the countries of origin.

Perhaps collaborative work on such programs might lead to an ethical standard that all could agree on.

Cross-References

- ▶ Cambodia: Cultural Heritage Management
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Ethics in Archaeology
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ International Conventions Pertaining to Heritage Policy: Introduction
- ▶ United States: Cultural Heritage Management
- ▶ Vandalism and Looting (Ethics)

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Further Reading

Archaeology Magazine for discussions of recent court cases and examples of restitution of cultural objects.

Codes of ethics on websites of professional archaeological organizations (including Society for American Archaeology, Archaeological Institute of America), and international organizations, such as the International Council of Museums (ICOM) and the International Council on Monuments and Sites (ICOMOS).

International Journal of Cultural Property

Journal of Field Archaeology

Publication series, including Duckworth Debates in Archaeology; Perspectives on Collecting, Ashgate Publishing Co.; Key Issues in Cultural Heritage, Routledge; Research in Museum Studies, Routledge; One World Archaeology Series; World Archaeological Congress Research Handbooks in Archaeology.

Websites for UNESCO conventions on cultural property, tangible and intangible heritage.

Website of U.S. Department of State Cultural Property Advisory Committee and corresponding governmental agencies of other countries.

Writings of foundational leaders in the field, including Henry Cleere, Clemency Coggins, David Lowenthal, Patrick O'Keefe, Lyndel Prott, Colin Renfrew.

Ethics of Commercial Archaeology: Australia

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Introduction

Having recently returned to full-time employment in commercial archaeology after a period of seven years in academia, the ethics of commercial archaeology is a subject at the forefront of my mind. A lot has been written about the ethical issues involved in indigenous heritage especially the scenario where non-indigenous practitioners and regulators are making decisions regarding the heritage of indigenous people (e.g., Langford 1983; Byrne 1993, 1996; Smith 2004). The ethical dilemmas are obvious in that context; however, while this entry touches on this area, it focusses more broadly on a range of ethical issues including those relevant to the often less-critiqued area of non-indigenous heritage also referred to as historical heritage or the heritage of settler societies. In such fields the archaeologist is often of the same cultural (or a derivative) background as the people who created the heritage. They therefore have a privileged role in studying the cultural remains as insiders, but to some extent since archaeologists are dealing with the heritage of past societies, are we not always at a fundamental level "outsiders"? This entry adopts a consciously provocative stance in highlighting many of the issues that face those working in commercial archaeology in Australia; while doing this I acknowledge that there are archaeologists in Australia who are conscious of many if not all of the issues raised and who attempt to address these in their daily practice, and I also acknowledge that we are all to a greater or lesser extent constrained by the economic and regulatory framework in which the industry operates.

Definition

Commercial archaeology is not a term widely used in the Australian context. It is used here to encompass all areas of archaeology with a commercial basis. By extension this includes the consultant archaeologists, the archaeologists employed by the regulating government authorities whose work is now in most states largely to service the development driven consulting field, and those archaeologists employed directly by companies, agencies, and government corporations that have a development focus. I have further extended it to include the parts of the academy that are increasingly constraining their academic offerings to those which are commercially popular and defining their degree content to provide fodder for the consulting industry.

Key Issues/Current Debates/Future Directions/Examples

In Australia the ethical dilemmas for commercial archaeologists have been discussed since the emergence of the consulting field in the early

1980s (Smith 2004). However, the industry itself, largely via the Australian Association of Consulting Archaeologists Inc., has been from the start highly self-reflective with debates about ethics and standards, especially throughout the 1980s and 1990s through an active program of lively debates at occasional meetings and a regular newsletter. However, the late 1990s and the first decade of the 2000s have seen a rapid increase in the number of archaeologists in Australia largely linked to the development boom. Most of these have not joined the professional association established specifically for consulting archaeologists and while there are other relevant associations such as the International Council for Monuments and Sites (Australia ICOMOS), the Australian Archaeological Association (AAA), most have not joined these either. Where then are these practitioners finding the mental space to appraise their practice let alone opportunities to engage in the big ethical debates?

In the Australian context the big ethical debates have been largely sidelined in favor of recipe-driven methodologies and business-like expediency. This is generally true throughout Australia despite the variation in heritage legislation across the states. Several questions need to be constantly addressed by archaeologists working in the commercial area. The first big ethical question is still: *What's it all about Alfie*? (Bacharach & Hal 1965). What is the purpose of archaeology in Australia? Are we here to attempt to answer (or contribute to answering) the big questions about our past, and the settlement of the continent, or is our purpose to collect data and compile large collections of gray literature reports about places that we have helped destroy? This leads to the second big question for archaeologists in Australia: *Do we ever save anything anymore*? Around 85 % of all the places that are excavated and recorded by commercial archaeologists are subsequently destroyed, the destruction sanctioned by the very government agencies charged with the protection of heritage in each state. While this then means that around 15 % are "saved," it is not necessarily clear that these are the most significant sites rather than just the ones that the developer did not need to destroy. Perhaps archaeology graduates spill out of the academic floodgates understanding that their rightful place is as a cog in the wheel of the planning and development process, but for some of us this is a question that weighs heavily on our minds. The third big question has existed in Australia since the emergence of the discipline and is not restricted to the area of commercial archaeology: *How is the information that we generate used*, *by whom is it used*, *and to what end*? This has long been a concern of Aboriginal Australians and advocates who have argued that Aboriginal people need to retain control over archaeological information relating to their past (Langford 1983; Byrne 1996). However, it is increasingly obvious that it is not only Aboriginal Australians whose history is at risk of manipulation (Ireland 2003). Whoever controls information can "construct" the past of their choosing. The idea in Australia of a government-sanctioned past has in recent years gained notoriety with the Australian "History Wars" reported widely in the media. Combatants in these wars have included past Prime Ministers Howard and Keating and a range of historians and prominent public figures.

Backpacker Archaeology

Over the past decade a subfield of archaeologist has emerged in Australia consisting of archaeologically trained personnel who refer to themselves as "diggers." In the past working on other people's large excavations was something one did partially for the experience of working on a large site but also to gain experience with the idea that one might one day be responsible for such an excavation. However, now there are large pools of people who eschew the responsibility of running any archaeological projects and move from dig to dig like itinerant fruit pickers. This seems to have developed from European models especially the United Kingdom and Ireland, from where some archaeologists emigrated when the development boom began to slow there. Of course in itself this is not necessarily an ethical problem, but it does give rise to several questions of ethics that need further thought. What responsibility do individual archaeologists bear for the

conservation of heritage places in this scenario? And what mechanisms are in place to ensure that we are not all unconsciously working to maintain an industry that serves no higher purpose for society. Is there a shared "archaeological ethic" across this archaeological workforce? Perhaps employers and those who control permits should make membership of one or more of the major associations mandatory to ensure that archaeologists commit to a relevant code of ethics.

The idea of pool of archaeological "diggers" is made plausible by the belief that archaeology can be reduced to a technical science model (see the discussion below regarding processual archaeology). The ultimate extension of this is the abandonment of the requirement for university degrees and the development of technical short-course qualifications. Unfortunately, this would mean that the complex research questions and philosophical frameworks that archaeological research can contribute to would ultimately be ignored.

A Fourth "Voice": The Voice for Archaeological/Heritage Places

An archaeologist working in the commercial archaeology field can often find themselves adopting a stance (or being accused of doing so) that aligns them with one or other of the sides of the development and heritage triangle, i.e., the developer or the regulator and – in case of indigenous heritage – the Aboriginal community. In 1985, Isabel McBryde edited a collection of papers under the title, *Who Owns the Past*? 27 years later a Google search of that term reveals that this question is still being asked of archaeologists and by them. In regard to Australian Aboriginal archaeological sites, it is a question that has often been answered by acknowledging that Aboriginal people should own and control the relics of their past. In the case of our more recent colonial past, where the question is asked at all, the assumption is often that the heritage agencies represent the interests of the community and therefore can legitimately speak for these sites. In reality where they have the opportunity to express opinion this is often contested by local communities or interest groups.

I fear we have taken an easy road. Who speaks for the dead and their legacy to our society? Surely archaeologist should represent a fourth "voice" and speak for the relic, the site, and the legacy. This is not necessarily to say that this voice would have any primacy over the others, and certainly it should not be equated with some outdated notion of antiquarian ownership, but it should be voice that is projected loud and clear and a voice for research and conservation. It is the voice that is largely silent in Australian archaeology subjugated beneath the weight of economic rationalism and ultraconservatism. As resources are progressively withdrawn from heritage agencies and fewer staff are retained to struggle with large regulation-based workloads, there is little time and few opportunities for staff archaeologists to sit back and think about different approaches. It is therefore especially important that all archaeologists involved in commercial archaeology resist and challenge the new orthodoxy – the guidelines, standards, and proformas that are developed to improve archaeological outcomes across a broad range of circumstances but over time often stagnate and stifle creative new methodologies and options for research and conservation. It is essential that this resistance and challenge is a positive process and that it generates new, improved solutions, ideas, and outcomes.

The Stagnation of Community-Based Approaches

In 1996 Greer developed the concept of community-based archaeology. Over the next decade Australia became something of a leader in this area (Marshall 2002), but we now have to ask ourselves, has the application of this approach stagnated into a recipe of public open days on excavations and the routine production of brochures and websites? Edwards-Ingram (1997: 27), although speaking in the US context, comments on the public's misunderstanding of what archaeologists do but nevertheless describes the relationship between archaeologists and the public as "interactive and increasingly reflexive." Fifteen years on, archaeologists in Australia as elsewhere are still complaining that the public

does not understand them, laying the blame at the feet of romantic sensational portrayals of archaeologists via Hollywood figures such as Indiana Jones. If the discipline had embraced the community-based approach, then the "community" would be a partner in the archaeological enterprise. As recently as 2002 (Greer et al.) I, along with colleagues, espoused a positive view of the future of community-based approaches, although we carefully differentiated such approaches from "consent-based" community involvement in archaeology. Today, however, little progress in this area is evident.

The Dominance of Processual Theory and Practice in Commercial Archaeology

The ethical dilemmas inherent in the unthinking adoption of a processual archaeological framework are myriad (see Smith 2004). Firstly, the adoption of the processual approach would not in itself be problematic if archaeologists at least understood that this was what they were doing and were aware that other theoretical frameworks exist which merited consideration. However, most practitioners cannot even articulate this theory (or any alternative theoretical framework). The blame for this I lay squarely at the feet of our academic institutions and their conscious or unconscious alignment with commercial archaeology which has led many of them down the path of feeding the current system.

The dominance of this theory which embraces positivist logic and an unthinking adoption of scientific (like) methods has led to some alarming decrees. For example, NSW Requirement 16 of the Archaeological "Code of Practice" developed by the Office of Environment and Heritage (DECCW 2012) specifies the use of 50 × 50 cm squares for test pits for all Aboriginal heritage test excavations. Further, it specifies that these have to be placed on a systematic grid across the landscape or site and that any test excavation point must be separated from another by at least 5 m. No explanation is provided as to how this promotes a good outcome for the archaeological site or why it has merit over other testing methodologies. Many years ago Mulvaney (1981: 25) cited the even older source (Collingwood 1944: 85) as an illustration that "the problem of research design is not a new one," and he went on to say that "It is encouraging that problems have been recognized so early in the development of public archaeology in our region" (p. 26). The issue of research design in commercial archaeology remains problematic with regulatory control ranging between Australian states from absolutely no control to overly restrictive limitations that obstruct scholarly practice.

The Role of Universities

In the past the academe has been one of the places where the philosophy and history of the discipline have been reflected on and discussed. In the past two decades, it has developed into another branch of commercial archaeology, one where students are increasingly seen as consumers (Colley 2005) or customers that need to be "satisfied." This is response to increasing pressure on departments to attract more students to maintain basic funding levels as well as demonstrating direct connectivity between courses offered and post-university employment. One of the outcomes of this is that one can no longer assume that critical scholarship within the academe will generate the theoretical and philosophical debates that can inform the development of an ethical industry. Some would argue that the concept of the academe as a place where ideas can be developed, debated, and challenged is outdated and has been replaced by "Edutainment" where students determine what they want and can buy it off the shelf. The ethical issues embedded in a higher education system that focusses on the commercial and devalues the humanities and social sciences are a major discussion outside the scope of this entry.

Most archaeologists working in Australia today are "commercial" archaeologists in the sense that their work, opportunities, and funding area are somehow dependent on a paying clientele and subject to market forces. This is true of archaeologists working in consulting companies, heritage agencies, corporations, and those teaching in universities. Archaeologists with full-time research positions are increasingly rare. To date

the development of commercial archaeology sector in Australia has not resolved any of the major ethical dilemmas that it faced at its inception. To some extent resolving them may not be as important as the practicing of reflection, recognition, and debate through which we try to resolve them – a disciplinary state of "mindfulness" (cf. the Buddhist principle). The question is do we still have an environment in Australia that is conducive to such reflective practice?

Cross-References

- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Ethics of Commercial Archaeology: Nigeria
- ▶ Ethics of Commercial Archaeology: Southern Africa
- ▶ Ethics of Commercial Archaeology: USA

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Ethics of Commercial Archaeology: Brazil

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Introduction

There are two distinct speeches in Brazilian archaeology, an official discourse and an unofficial discourse. In the official discourse, spoken at conferences, in publications, and in classrooms, everything is fine. There are jobs for everyone, archaeological work is being performed, and cultural heritage is protected. Unofficial discourse, comprised of informal

conversations that take place in the corridors of Congress, outside the classroom, during the fieldwork, says just the opposite, i.e., that chaos is installed in Brazilian archaeology. The chaos in this case has a name, Contract Archaeology or Commercial Archaeology.

As happened in many other countries, the growth of commercial archaeology in Brazil also resulted in a change in archaeological practice; the difference is that in the Brazilian case, the change was radical. The numbers are impressive. It is estimated that commercial archaeology in Brazil represents about 90 % of all archaeology practiced in the country, handling more than 70 million dollars per year and using more than 3,000 professionals, directly or indirectly (Zanettini 2009). We talk about continental numbers in a continental country. To understand the gravity of the problem of commercial archaeology in Brazil. Just think that while about 30 permits for archaeological research were issued per year in the 1990s, in 2011, more than 900 permits for archaeological research were granted. And the numbers tend to increase, especially with the works associated with the Economic Acceleration Plan of the Federal Government, with the World Cup in 2014, and with the 2016 Olympics.

But despite all this growth, most archaeologists in Brazil have given little attention to discussions of the ethics associated with archaeological practice. To understand this apparent disinterest, we first need to understand that what motivated this significant increase in archaeological research was not an awareness of the importance of archaeological heritage, but changes in environmental legislation, which since the late 1980s have forced entrepreneurs to license works that will potentially modify the environment. In a country like Brazil that is in the process of economic growth, with infrastructure works scattered throughout the national territory, forcing entrepreneurs to conduct archaeological licensing so that they might obtain authorization for the installation and operation of projects resulted in an explosion in the amount of archaeological work. Was Brazilian archaeology prepared for this radical change? The answer is no, it was not. The problem is that the change in environmental legislation that forces developers to perform archaeological licensing was done without serious consideration of three basic aspects: regulation of the profession of archaeologist; minimum criteria required for each stage of licensing archaeological work; and infrastructure of government agencies to oversee the archaeological work and law enforcement.

Key Issues and Current Debates

A detailed analysis of the structure of Brazilian archaeology shows us that the government agencies responsible for management of the archaeological heritage, in this case the Institute of National Historical and Artistic Heritage (IPHAN), was not and is still not prepared for the growing amount of research. The lack of Federal Government support has led to the IPHAN failing to meet its obligations, especially with regard to the monitoring and preservation of archaeological heritage. There is an insufficient number of professionals to analyze research projects, a lack of professionals to oversee the implementation of the work, missing cars, and even a lack of gasoline. Given the lack of resources and IPHAN omission of the Federal Government, many archaeological sites throughout the country are being destroyed. The fact that many entrepreneurs are still disrespecting legislation is precisely due to this lack of infrastructure of the Federal Government. The Government created the archaeological licensing law, but forgot to provide IPHAN with conditions to monitor compliance of the law.

At the same time, archaeology as a profession is not regulated in Brazil. This is due not only to the large bureaucracy involved in the process, but also to the lack of organization and interest of archaeologists at many moments. As there is no regulation, we don't know who is or isn't an archaeologist in Brazil. Thus, any Brazilian citizen may apply for a permit for archaeological research. Often we see lawyers and businessmen asking for permission to search. Evidently, the IPHAN tries to prevent this practice by requiring

minimal academic background, but in principle, the law guarantees equality to all citizens. At the same time, the lack of regulation of the profession allows large archaeological companies to hire archaeologists while paying ever lower wages and submitting them to increasingly stressful work schemes.

Another problem is the lack of minimum criteria for the execution of the work and archaeological research. In Brazil, there is not a minimum code of conduct that could be used to guide the research. So every archaeologist does what he wants when he wants, in the name of scientific freedom. As there are no basic rules for archaeological procedures in commercial archaeology, the market that dictates the rules, and the rule of the market is clear: cost versus benefit. Thus, fieldwork practices are reduced to simple collection, and laboratory practices are reduced to analysis on the production line. Most archaeological companies pay for each shovel test in the field and for each artifact in the laboratory. Part of this problem is associated with a patrimonial vision of archaeology, and in particular, Brazilian archaeology that focuses on material remains above community and knowledge. If we think that the record itself does not exist, that material remains of fragmented social practices of the past are re-appropriated and re-assigned significance, we see traces of the past that have no intrinsic value, but a value that is built through the practice of archaeological science, social practices, and cultural policies of the present. As emphasized Hamilakis (1999), we should be more concerned with the remnants of the social memory of humanity and with respect for those who are gone, than with the physical trace itself. Considering the physical preservation of remains to be most important, above accountability to the present and the communities at present, is quite problematic. We must not forget that as archaeologists, we are producers of culture and have contributed directly to the establishment of "systems of absolute truths." Truths are buildings that meet a specific purpose or interest. Since many archaeologists today believe that the record is not a truth that is given (Edgeworth 2003), or something pre-existing that is just waiting to be discovered (Lucas 2001; Tilley 2004), but is something constructed through the practices of science and discourses of identity and power, we recognize that our responsibility goes beyond the physical safeguarding of material evidence (Hamilakis 1999). This patrimonialist vision of archaeology also features the Brazilian IPHAN, which works more like a notary than as a managing agency of archaeological heritage. For IPHAN, a way to certify the quality of a work is to verify the numbers: the numbers of soil surveys and interventions that were carried out in a survey, the number of material remains collected from an excavation, the amount of archaeological remains analyzed, etc. At the end, the numbers and not the quality of interpretation assign credibility to the work.

This concern with the quantitative aspect of research resulted in the development of a very specific literature: research reports. Chadwick (2003) and Bradley (2006) have discussed how the practice of contract archaeology led to the creation, both in England and in the United States, of a very specific literature with its own rules, called project reports. This is a reality that also applies in Brazil. In the reports, detailed narratives and interpretive constructs were replaced by summary descriptions. The narrative takes the position in the third person, not by a stylistic issue, but a by legal one, since the third-person discourse prevents the assigning of ethical and legal responsibilities. There is no correlation between the data. There is no attempt to build knowledge. On the other hand, there are numbers, lots of numbers.

Part of the problem with commercial archaeology may be associated with the formation of professionals in archaeology. In many countries, much attention is given to teaching techniques and practical field knowledge, while little attention is paid to discussions on the ethical responsibilities of this practice (Beaudry 2009). In Brazil, the situation is more problematic, since the vast majority of undergraduate courses in archaeology were created precisely to meet market demands. The teaching of ethics in archaeology in Brazil gets diluted in the different subjects, according to the willingness of different teachers.

In undergraduate courses, fieldwork learning is often impaired by the lack of structure of the courses. In Brazil, the vast majority of graduate students in archaeology learn archaeological practice within the commercial archaeology taking place at the school's archaeological sites. Thus, a practice that is based on cost-benefit ratios, standardization and widespread indiscriminate collection perpetuated. There are profound ethical issues in this relationship between universities and businesses contracts. Firstly, because it ensures supply of trained manpower to the archaeological companies, and at the same time, companies pay cheaper salaries to the students, and so have more profit. Students are trained by the companies, since most universities do not have funds for fieldwork for academic training, and do not question the practice of commercial archaeology, considering this natural. So there is not much space for discussion and criticism of the responsibilities and ethics associated with this practice.

In Brazil, too little is said about the fact that about 70 % of all commercial archaeology contracts are concentrated in the hands of only four archaeological companies, some of which do not have archaeologists as owners. By having a greater economic capital, these companies can manipulate the market by controlling and even preventing access and growth of other archaeological companies. At the same time, to be able to compete with large companies, small companies lower the cost of projects, thus impairing performance of the work. The creation of a code of conduct could solve this problem, but unfortunately the Code of Conduct following debate still has not been implemented (Lima 2002). The only reference Brazilian archaeology has for the ethics of archaeological practice is the Code of Ethics of the Brazilian Society of Archaeology, but this does not specifically mention the work of commercial archaeology.

Future Directions

Two aspects need further discussion: public involvement in archaeological research and the ethical commitment of the archaeologists involved in the work of commercial archaeology.

As evidenced by Funari et al. (2008), in the Brazilian case, one of the major ethical issues is related to the inclusion of the public in archaeological practice. Cutting costs and tighter times resulted in the exclusion of researchers, local communities and volunteers in archaeological projects (Bradley 2006). Activities with the cooperation of local communities, alternative sectors of society and other researchers are usually the first cut during the rationalization of financial costs of projects (Chadwick 2003). Society cannot be seen as a passive agent; the public is not just waiting for our theoretical knowledge about its historical and socio-political situation. These things are directly intertwined in his the public's own critical reformulation ofin political negotiation and in its formulation of theories and interpretations. Thus, exclusion of formation processes of knowledge is especially damaging to archaeological practice. At the same time, how can we expect knowledge to be passed to the public, if the archaeological community does not have access to reports produced within commercial archaeology?

One final question remains. To what extent do the archaeologists involved with commercial archaeology have autonomy and the right to criticize the projects they are working on? Does any archaeologist feel free and able to prevent the installation of an enterprise? This question arises from a simple observation: while the archaeologists involved with commercial archaeology are defending the cultural and archaeological heritage, they are paid to defend the interests of the different companies seeking environmental licenses to carry forward their ventures. At the same time, to accept the terms of market competition, most archaeologists are subject to practices that they recognize themselves recognize as unfit. To what extent should we submit to market practices? Moreover, is the concentration of many contract projects in the hands of a few not damaging to knowledge? Does anyone really believe that a company that manages 20, 30, or 50 archaeology projects per year is actually doing science? Obviously, there are serious research projects in

commercial archaeology in Brazil, but these are not yet the majority.

Today, we are living in a period of transition. In the governmental sphere, creation of the National Centre of Archaeology aims to facilitate the monitoring and surveillance of archaeological research. At the same time, conferences and forums have recently been created to discuss the regulation of the profession of archaeologist, as well as the practice of commercial archaeology in Brazil. This shows that there is a light at the end of the tunnel.

Cross-References

- ▶ Archaeological Licenses
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Indigenous Peoples, Working with and for
- ▶ Public Archaeology, The Move Towards

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Ethics of Commercial Archaeology: Japan

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Introduction

At present, Japan, a country inhabited by 128 million people, has over 440,000 registered archaeological sites (Agency for Cultural Affairs 2001: 36). The growth of archaeological survey in Japan was underpinned by postwar economic development and a national imperative for salvage excavations. Since the economic slowdown in the mid-1990s, many critical questions about Archaeological Heritage Management (AHM) and public archaeology have emerged. The subsequent long-term economic slump and expanding neoliberalism in politics have further complicated the situation, and as a result Japanese archaeology today seems to be at a stalemate.

Definition

There are no terms in Japanese equivalent to "commercial archaeology" or "contract archaeology" as used in the UK, the USA, and other countries. Perhaps many Japanese archaeologists, who are accustom to a "socialist" model in contract archaeology (Kristiansen 2009: 643) and a notion of heritage as the preservation and use of buried cultural properties, would frown upon those terms as well as heritage "industry," as ones associated with the marketing of archaeology

found in countries where private land ownership is strong. However, "commercial archaeology," as it is meant in other countries, does actually exist in Japan and has become influential in Japanese archaeological heritage management. It is often examined within the administrative heritage sectors but is rarely discussed as an archaeological agenda.

Key Issues/Current Debates/Future Directions/Examples

In Japan, it is conventionally accepted that the cost of archaeological investigation prior to construction of private homes is borne by the state. However, when rescue excavation takes place as a result of construction work for commercial purposes, the cost is paid by the "polluter," namely, the developer, be it a public or private body. The principle of "polluter pays" was first adopted in 1958, when rescue excavation required in advance of the construction of the Meishin Expressway was financed by the developer: the Japan Highway Public Corporation. The same principle was repeated in protocols the Agency for Cultural Affairs exchanged with other bodies in charge of public works, such as Japan Housing Corporation and Japan Railway Construction Public Corporation. Thereafter, the principle came to be applied, conventionally, to private development companies as well.

In 1965, there were only eight experienced field archaeologists employed by regional boards of education (Tsuboi 1992: 3). As archaeologists were increasingly employed and positioned at the local government level, an administrative system for managing buried cultural properties and conducting rescue excavations was gradually established, first at prefectural and then municipal levels, under the national government's supervision. Local authorities began setting up their own units to look after cultural properties and, in some cases, instituted "semipublic" (nonprofitable) self-governing foundations specializing in archaeological investigation. The number of specialists in charge of buried cultural properties employed in local governments or semipublic foundations rose to a maximum of 7,111 in 1997 (Seino 2009: 41). Today, even during a recession, approximately 8,000 rescue excavations are still carried out yearly across the country. These rescue excavations account for approximately 95 % of all archaeological excavations conducted in Japan. All 47 of prefectural governments and over 65 % of municipal governments (1,192 out of 1,834) employ archaeologists in charge of buried cultural properties. On the prefectural level, 1,120 archaeologists work for local governments and 1,122 for semipublic foundations. At the municipal level, 3,095 archaeologists work for local governments and 918 for semipublic foundations (Seino 2009: 41–4). These figures attest to the nationwide AHM operation today.

How has AHM been able to develop so rapidly in Japan? An important factor is the "polluter pays" principle that originated in the period when the Japanese economy was growing fast. Although the polluter pays principle has not been clearly stipulated in the Law for the Protection of Cultural Properties (Tanaka 1984: 84), it has guaranteed a source of financial support for AHM in Japan and has fundamentally helped its development. It is interesting to note that the notion of buried cultural properties as the "common property of the nation," as defined by the Law for the Protection of Cultural Properties, has been adopted by both the government and the developers in their cooperation in rescue excavations. For the government, it has been important to preserve archaeological materials – albeit mostly by record only – on the grounds that they are legally relevant to us, namely, all Japanese. The developers, on the other hand, have been funding rescue excavations not only for the promotion of a socially committed corporate image of themselves but also because of the need to understand and respect the past and our ancestors. Financially supported by the polluter pays principle and technically aided by state-of-the-art techniques of excavation, such as the use of conveyer belts and aerial survey, AHM in Japan has developed into a system of prompt and efficient excavations; it has produced a massive amount of archaeological data, including up to some thousand site reports a year.

The Impact of "Privatization"

The biggest challenge the current AHM system is faced with is the growth and expansion of private archaeological units. Private archaeological units have already been in operation for a few decades, particularly in the Kanto region (including Tokyo and Yokohama), but most of them were small in size and led by professional archaeologists. In contrast, newly emergent private units are established at the initiative of, and more significantly, "within," building or engineering companies and are now mainly large enterprises. These units gained momentum for expansion particularly under the Koizumi cabinet (2001–2006), which pursued privatization and budget cuts in various aspects of public works under slogans such as "From public, to private" and "What the private can do must be entrusted to the private." Private units waged lobbying campaigns for privatization of salvage excavations and, to further pursue this objective, established in 2005 their own business association Nihon Bunkazaihogo Kyoukai, in which about 70 units participate.

This association started administering their own qualification examinations, particularly in archaeological technical field, which prompted serious discussions on the issues of quality assurance and standardization in contract archaeology. They have been successful in increasing the number of excavations they undertake and are today aiming to further expand their areas of activity, including active trials to increasingly involve themselves in rescue archaeological practices in the area affected by the Great Eastern Japan Earthquake of 2011. It should be noted that major construction companies such as Obayashi Corporation, Kajima Corporation, and Shimizu Corporation are "supporting members" of Nihon Bunkazaihogo Kyoukai. This means that for these construction companies – private developers – rescue excavations present a new attractive business market for profit, particularly to counteract the effect of the recent recession in the construction industry. Naturally, the developer tends to be far less interested in the quality of excavation than effective management. It is feared that the partnership between developers and private archaeological units might lead to the deterioration of the quality of excavation, publication of its results, and succession of archaeological heritage to local communities. As a result, the geographical gaps in AHM are likely to expand. Privatization of rescue excavations would only contribute to further widening of these gaps, as larger private archaeological units, usually based in big cities in economically powerful prefectures, would be able to undertake rescue excavation in other prefectures and regions. At worst, it is feared that archaeology might come to be dominated by a limited number of large private units, thus weakening the activity of smaller and more locally based archaeological units.

When contract archaeology prior to development for public works and private house is funded by public money (tax), ethical issues, such as who benefits from the excavation, are not so serious as long as research standards are maintained. However, when it comes to development by private companies for commercial purposes, the asymmetrical relationship between the fund payer (the individual) and reward/benefit (shared by the public, including the individual) will give rise to a sense of unfairness. This will cause ethical dilemmas for heritage managers too. The only way to discourage this change in situation is through speedy (i.e., inexpensive) excavations.

Commercial archaeology need not cause serious problems if heritage managers hold enough power to check and control the research of commercial units and are capable of appreciating and presenting their results. In practical, however, it is not easy to ensure such conditions. The quicker research is done, the more profitable commercial units are. They might avoid taking enough time to research complicated features and fragile finds in time critical (e.g., urban) sites or difficult (e.g., wetland) sites. It could be difficult to ensure that all units behave in good conscience. Particularly, it is probable that units originating from the building or engineering companies (unique and characteristic of Japanese commercial archaeology) to shake hands with developers under the table. In terms of benefits for local communities, compared to experienced and engaged local units which are familiar with the past of the area, large-scale private units with no particular regional

background tend to be insufficient at interpreting and appreciating their finds. This lack of contextual information for finds would lead to a poor presentation of the past.

So far, I have deliberately focused on the negative aspects of commercial archaeology, but when we compare the results from experienced professional units with those of inexperienced heritage managers, the former will undoubtedly get more information from a site. It is also true that those units provide both jobs and good training to inexperienced young archaeologists. However, generally speaking, this matter of an increasing number of inexperienced heritage managers and/or the retirement of experienced archaeologists needs to be examined first in terms of the sustainable handing down of local heritage. In the long run, the commercialization of archaeology in Japan will increasingly go against the public interest. Quality excavation and the preparation of reports are crucial but are even more valuable when available for use in presenting the past and education. Neoliberalism involves anything in a field of competition. But, the world of archaeological heritage often never fit to calculative and and/or dichotomized way of thinking. Commercialization in archaeology is a global issue. Archaeologists, across the country, should become involved in this discussion in order to explore the public benefit of archaeology and heritage management.

Cross-References

► Cultural Heritage and Communities
► Ethics in Archaeology

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Ethics of Commercial Archaeology: Nigeria

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Introduction

The discussion of ethics in archaeology has assumed a contentious dimension with different segments within the discipline waging intellectual war on who is ethically correct or wrong. It has been observed that though archaeology may be dealing with lifeless, static, materials of the past, it still requires adopting certain cultural standards to maintain suitable ethics that would include a number of important moral issues (Johnston). The issue of ethics in archaeology is not new, what is new is the frequency and necessary passion of ethical discussions. In the past two decades, archaeology has changed so much that it seems like a new discipline. Many past

archaeological works lacked sound ethical considerations such that they are today regarded as little more than tomb-robbing debacles. In the United States, it has been observed that "the most dramatic ethical vacillations are a result of the emergence of contract and conservation archaeology." These developments "have delivered archaeologists from their insular academic world to a broad spectrum of professional and political communities" (Joukowsky 1991).

Definition

The Webster's dictionary defines ethics both as a system of moral values governing a profession and an individual's moral code. Archaeological ethics are prescribed guidelines in which archaeologists are to conduct each phase of their responsibilities. Archaeologists are bound by a code of conduct that includes observing intellectual property rights, scientific credibility, and territorial legal obligations. Archaeologists are required to preserve and manage the archaeological record with all due diligence to include treating human remains with dignity and permitting the local authorities to manage their preservation in an appropriate manner. The principles of Archaeological Ethics adopted in 1996 by the Society for American Archaeology "outlined stewardship, accountability, commercialization as well as public reporting and preservation" (Stambaugh 2012).

Commercial Archaeology may have two meanings, the first being the archaeology concerned with the material culture aspects of commerce and transportation. It refers to the study of structures and artifacts created in connection with popular commercial activity, such as diners, motels, gasoline stations, and signs, and also focuses on the effects of a market economy on cultures and the use of space (Hirst 2012). In the United States, the Society for Commercial Archaeology is a national organization devoted to the buildings, artifacts, structures, signs, and symbols of the twentieth-century commercial landscape. The second meaning of Commercial Archaeology is what concerns we have and it is sometimes called contract archaeology, rescue archaeology, salvage archaeology, or preventive archaeology which is archaeological survey and excavation carried out in areas threatened by, or revealed by, construction or other land development. These could be the case in highway projects, major construction, and the flood plain of a proposed dam and the laying of oil pipelines. In essence, Commercial Archaeology is conservation archaeology and it is included in the broader category of cultural resource management, and unlike traditional survey and excavation, it is undertaken at speed. In terms of the definition of research and selection of site, conservation is problematic as sites are not selected or excavated to answer particular research questions, but they are excavated because of their location in threatened areas. Conservation archaeology like all archaeology destroys sites, and in the situation where the highest research standards are lacking, the site is lost forever (Joukowsky 1991).

Key Issues/Current Debates/Future Directions/Examples

The practice of Commercial Archaeology, rescue archaeology or whatever terminology, is largely restricted to North America, South America, Western Europe, and East Asia, especially United states, Canada, the United Kingdom, Korea, and Japan (Rescue archaeology-Wikipedia). The passage of environmental protection laws in the United States in the 1970s led to the growth of this kind of archaeology which could also be termed "business archaeology- in which archaeology is ordered by private consulting firms working for profit under contract to developers or governmental agencies who are required to conduct archaeological research in compliance with environmental protection laws" (Joukowsky 1991). In the United Kingdom, RESCUE: The British Archaeological Trust was formed in 1971 to address the problem of the destruction of archaeological resources occasioned by the widespread redevelopment of historic towns and cities which had started in the 1950s running

through the 1960s. A priority for RESCUE was the need to get Government subsidies to support archaeological rescue work ahead of large-scale development projects (Everill 2012). In the text of the European Archaeological Association's Principles of Conduct for archaeologists involved in contract archaeological work, an earlier phrase "commercial archaeological work" was replaced with "contract archaeological work" before it was approved in 1998. This reflects the view that archaeology is not a commercial activity though it is often carried out under various kinds of contracts (European Archaeological Association).

Commercial Archaeology as elucidated above does not exist in Nigeria and it is paradoxical that the history of the practice of archaeology in Nigeria is traceable to salvage archaeological works. Archaeological finds of terracotta objects in the tin mines on the Jos Plateau in 1928, and of bronze objects in Benin, Ife, and Igbo Ukwu in 1938 through activities such as digging foundations for houses and public buildings marked the beginning of conscious efforts to document and preserve archaeological resources in Nigeria. The Nigerian Department of Antiquities was established in 1943 and archaeologists were engaged to investigate sites where there had been accidental discovery of archaeological materials and also monitor where public works were being undertaken. When the Kainji Dam was conceived, the Department of Antiquities commissioned an archaeological survey of the area to be flooded and preliminary survey work was done in 1962–63 and was followed by limited uncoordinated salvage work in 1968 few months before the area was flooded. Since then, rescue archaeology had been in the cooler despite the high incidence of construction works that involved urban renewal, development of a new capital city, and facilities development (see Folorunso 2008).

It has been noted that "the emergence of contract and conservation archaeology have delivered archaeologists from their insular academic world to a broad spectrum of professional and political communities" and that the traditional academic values of archaeology "are brought to clash with the less supportive, more profit-oriented ethics of the business world" (Joukowsky 1991). The archaeologists had ceased to be a part of a small community with homogenous values and now work with heterogeneous value systems, faced with people and institutions with discordant agenda with that of the academy and deal with value systems inherent in business, government, and the nonacademic public. Archaeologists now deal with the business ethic as well as the traditional academic value system. They are responsible to the public, their profession, and their own clients (Joukowsky 1991).

One important issue that seems to occupy discussions on contract archaeology has centered on the question of who controls the process of archaeological investigations. Agencies and developers typically would want to spend minimally when it comes to archaeology, and this usually has great consequence on the quantum and quality of the archaeological work that is done. It has been noted that a "client can be unwilling to protect sites from collectors or can threaten to sue the archaeologists if excavation inhibits heavy machinery." The clients may also fail to promptly notify archaeologists of subsurface destruction for the archaeologist to react, such that the archaeologists sometimes cannot even fulfill their own contracts. They are then left to decide if responsibility is to the client, the actual resource, the public, or the regulatory agency that ordered the work in the first place (Joukowsky 1991). In the end, even the most ethical archaeologist cannot contend against the power of the state governments and archaeological morality often would suffer at the hand of economic development or national ideologies. An obvious example was the London rail link for the Channel Tunnel, where important human remains at St Pancras cemetery were hastily dug up and mistreated in order to maintain the schedule of the infrastructure project (Johnston 2012).

In Nigeria, contract archaeology is not mandatory and when a semblance of contract archaeology is envisaged, it is within the confines of Environmental Impact Assessment (EIA)

required for projects financed by the World Bank as formulated in 1999 and revised in 2011.

> The World Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sustainable, and thus to improve decision making. EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and transboundary and global environmental aspects. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The Bank favors preventive measures over mitigatory or compensatory measures, whenever feasible (World Bank 2012).

The policy further elaborates on what concerns archaeology under physical cultural resources which became operational in 2006 and updated in 2007:

> This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances (World Bank 2012).

In the implementation of the EIA requirements, the developers control the process as they commission consultants who are mainly biological and physical scientists to conduct impact assessment studies. The archaeological aspects of the studies are usually ignored and where they are included, the individual archaeologists selected by the main consultants are made to write reports just to make the assignment of the consultants to look somehow complete. No single serious archaeological survey or rescue/salvage work is known to have been done through the numerous EIA studies that had been executed in the country. The process can therefore be judged to lack transparency and fraught with corruption.

Contract archaeology and contract archaeologists have come under strong criticism on the issues of ethics. For example, in Ireland, headlines such as "Archaeology needs to recover its core principles and ethics" have appeared in some print media as archaeology has been described to be currently in the throes of growing commercialization, and it is being ill served by corrupt semi-state/technocrat archaeologists, conspiring with under-scrutinized consultants to undermine and cajole staff into underplaying the significance or importance of the archaeological resource encountered on national road schemes and other developments to ensure that the proposed developments proceed as required by government (Moore Group 2008). Critics have also defined contract archaeology differently, as the way the discipline of archaeology engages capitalist expansion, sacrificing its critical stance. Archaeologists are said to be mass-produced by laying emphasis on technical training within shorter periods to meet the contractual needs arising from the aggressive capitalist expansions in transport infrastructure and mining. Contract archaeologists are accused of abandoning any possible intervention in contemporary issues in order to dance to the rhythm of money and have turned the past into a commodity.

Another ethical issue with contract archaeology which is also applicable to Nigeria has to do with dissemination of findings. It is known that within the accepted archaeological ethic, it is considered wrong to excavate and not disseminate information through publication. This is denying the public the right to know as many business organizations who order the excavations consider the resulting work their own property, and thus, archaeologists are barred from publishing the results (Joukowsky 1991). This negates the Stewardship principle which is current in archaeology today and which sees archaeologists as caretakers of and advocates of the recording of archaeological data, and that archaeologists must use the knowledge they gain from sites in order to promote public understanding and support.

Frustration had been expressed with contract archaeology as to how the archaeological community as a whole has no means of knowing of or accessing a contractor's work results. It seems to be part of the contract that there should be no publication and no report. It has been noted that the inability for the contractor's archaeological work to see the light of day seems to be in direct disagreement with the principle of stewardship. It has therefore become pertinent to ask the questions of how beneficial are the projects, "if archaeologists are restricted by their reporting methods and if their actual reports are not released to the public or the archaeological community in some researchable system"? (Stambaugh 2012).

The criticism of contract archaeology should not imply jettisoning it but how to make it more transparent and more ethical. Some critics may however imply that the ethical considerations of archaeology are not compatible with commercial ethics; they have not proffered solutions or alternatives than to do away with the capitalist's incursion. There is more destruction of archaeological resources and more unethical practices in heritages issues in countries like Nigeria where contract archaeology is not being practiced than in the countries where it is practiced. At least the infractions on ethics are been raised, discussed, and debated as in the case of the M3 highway in Ireland. The reports of contract archaeologists, where they have been accessed by academics, have contributed to the production of archaeological knowledge. Therefore, the debate should go on to make contract archaeology more transparent and ethical as the alternative may be non-engagement which takes archaeology back to the era of helplessness in the face of wanton destruction in the process of land modification.

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- ▶ Archaeological Stewardship
- ▶ Australian Association of Consulting Archaeologists Inc. (AACAI)
- ▶ Battlefield Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Environmental Archaeology in the Commercial Context
- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Ethics of Commercial Archaeology: Australia
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Ethics of Commercial Archaeology: Southern Africa
- ▶ Ethics of Commercial Archaeology: USA
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Heritage Values, Communication of
- ▶ Repatriation: Overview
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Vandalism and Looting (Ethics)

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Ethics of Commercial Archaeology: Southern Africa

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Introduction

As far as the discipline of archaeology is concerned, few areas evoke mixed responses as much as the issue of ethics in the subfield of commercial archaeology. To some in southern Africa, as in other places around the globe, commercial archaeology is an opportunity for archaeology to contribute to job creation, policy interventions, and sustainable heritage stewardship (Hall 1989), while to others, it sides with developers in destroying other people's irreplaceable heritage. Not surprisingly, the rise of commercial archaeology has raised a number of ethical dilemmas – the Hamlet's to be or not to be moments. Pro-commercial archaeology moral arguments stress the fact that commercial archaeology represents the last opportunity to save archaeological heritage in record before it is destroyed (Deacon 1992; Goudswaard et al. 2012). If archaeologists do not do it, then the heritage will be lost. This is a very appealing moral argument. However, often the very poor-quality commercial archaeology reports which are supposed to achieve preservation by record spectacularly fail to accomplish this goal. Furthermore, commercial archaeology is difficult to police and regulate in terms of quality. Heritage agencies in southern Africa such as the National Museums and Monuments of Zimbabwe and the South African Heritage Resources Agency lack the capacity and resources to verify the truth of the recommendations of archaeologists on the ground. This means that a lot is now depending on the ethical position of archaeologists involved.

To make matters worse, commercial archaeologists, particularly in southern Africa, are increasingly arguing that they are in business and have to earn a living while being competitive. Fair enough, the only problem is that recently, there has been a rise in the use of proprietary tools, resulting in the copyrighting of commercial archaeology reports. This has placed restrictions on use. Therefore, commercial archaeology in southern Africa is now more of a compliance requirement than a real method of salvaging an accessible past. Furthermore, in southern Africa, local communities have always played a peripheral role in the discipline of archaeology (Chirikure et al. 2010). Often, commercial archaeology does not give anything back to the community through corporate social responsibility programs. This creates one of the most important unforeseen moral dilemmas of commercial archaeology – it exploits other people's heritage and yet fails to plow back into communities like what other businesses do. Commercial archaeologists therefore cannot have their pie and enjoy it alone. The only impediment, however, maybe that often, the fees charged are not high enough to allow generous investments in communities like what big mining corporations such as Rio Tinto and BHP Billiton can manage. This requires a rethinking of the philosophical

basis of what commercial archaeology is and what it must do. Otherwise, it risks becoming one of those unwanted evils that neither preserves the past nor benefits communities but only feeds the pockets of a few.

Background to Southern African Commercial Archaeology

Southern African archaeology is now just over a century old. As in most former colonized regions, the discipline has a western ancestry (Chirikure & Pwiti 2008). It was transplanted to the region in the late nineteenth century by early travelers, missionaries, geologists, and other peripatetic scholars who were enchanted with the past of the newly colonized territories. The colonial legacy of the discipline of archaeology in southern Africa dictated that archaeology emerged as a western affair without much involvement of the locals. Colonial legislation such as the archaic Rhodesian (Zimbabwe) 1902 and the South African Bushmen Relics Ordinance of 1912 had no regard for local communities just as their successors, respectively, the National Museums and Monuments Act of 1972 and the National Monuments Act of 1969 (Pwiti 1996).

The roots of commercial archaeology in southern Africa can be traced infamously to the notorious Ancient Ruins Company formed by Cecil John Rhodes to explore for gold in the ruined monuments of Rhodesia (Hall 1990). Richard N. Hall was employed as the "excavator" of Great Zimbabwe where he looted an unknown number of gold and other objects. The atrocious methods of Hall and his denial of an African authorship for Great Zimbabwe raised ethical considerations and led the British Association for the Advancement of Science to dispatch a professional archaeologist Randall MacIver (1906), who was a professionally trained archaeologist, to excavate at Great Zimbabwe. MacIver concluded that Great Zimbabwe was local in origin but he could not sway established settler opinion. Throughout the colonial period in southern Africa, archaeology neither had a place for local communities nor how the same communities felt about the desecration of their heritage (Chirikure et al. 2010).

Not surprisingly, by the time commercial archaeology emerged in the late 1980s and early 1990s, it emerged of a background of alienation of local communities (Shepherd 2006). As such, it inherited the ethical dilemmas of the discipline of archaeology which had no place for local communities. The legislation empowered archaeologists to desecrate sacred places against local people's wishes under the name of science. Commercial archaeology in southern Africa started sporadically from the 1960s. The proposed construction of the Kariba Dam in the 1950s prompted an impact assessment of the area to be flooded, and after that a number of dam projects witnessed archaeological impact assessments. In South Africa, commercial archaeology *sensu stricto* began in 1989 with the establishment of the National Environmental Act which called for pre-development impact assessments to be carried out (Deacon 1992). In 1999 when South Africa had obtained independence, the new National Heritage Resources Act borrowed from international best practice and local needs. It made archaeological impact assessments mandatory resulting in an upsurge of contract archaeology. Nowadays, there are many archaeologists employed as contract archaeologists, a development which is very positive for the discipline. Although legislation in other southern African countries varies in terms of degrees of effectiveness, commercial archaeology is now strong in Botswana, Mozambique, Namibia, Zimbabwe, and other places. This has been precipitated by the fact that IMF- and World Bank-funded projects require environmental and heritage impact assessments to be carried out. There is no doubt that commercial archaeology represents a step in the right direction for archaeology. It has opened up job opportunities beyond the traditional university and museum openings. However, because the field is relatively new, it is often confronted by a number of ethical challenges such as quality control, significance assessment, and even the recommendations by archaeologists themselves (Scarre & Scarre 2006). All these challenges put spotlight on the question of ethics and make commercial archaeology a necessary but uncontrolled evil in the eyes of some people.

Definition

From a generalist point of view, ethics are partly an individual belief system that consists of making distinctions between the right and the wrong (Kintigh 1996; Wylie 1996) and partly an ability to analyze decisions, beliefs, and actions. Ethics are concerned with the critical appraisal of human conduct and character (In 1992; Scarre & Scarre 2006). Therefore, ethical issues vary from discipline to discipline and context to context. In commercial archaeology, ethics refer to morality issues that are raised by the business of salvaging the past in the face of development (Dunnell 1984; Hall 1989). Within the commercial context, businesses are expected to have good ethical values and to act in a socially responsible way. Commercial archaeology thrives on making profit out of "priceless" objects and commodifies a resource known as the past. This presents a moral dilemma because an individual's pursuit of fortune through exploiting the past must be done in a way that is responsible to the archaeological record and its multiple stakeholders. Therefore, commercial archaeologists run businesses but retrieve invaluable data to preserve the past by record. They also make decisions on the future of heritage recommending no go for development in the case of sites with high significance and recommending mitigation in cases where significance is low. This requires good ethics from individuals concerned. Where they exist as in the case of the Unites States, professional associations require that their members adhere to good ethics (Kintigh 1996). The Association of Southern African Professional Archaeologists has a code of ethics and conduct for commercial archaeologists. However, there are no sanctions for those who breach ethics. Also, because the body is not a legal entity, membership of ASAPA is not necessary for one to practice commercial archaeology. Furthermore, ASAPA is strong in South Africa and weak in other southern African countries. A lot of bad practices are carried out without impunity. Commercial archaeologists must embrace the duty of care principle which obliges them to treat the archaeological record and the host communities with respect. Yes, they are in the business to make money but they must not do so at the expense of the archaeological record.

Key Issues/Current Debates/Future Directions/Examples

Commercial archaeology occupies an important interstitial space between studying the past through material remains and the need for people to earn a living. In fact, most other disciplines such as psychology and economics, among others, now also have commercial arms (Wylie 1996). However, strong ethics are needed to steer commercial archaeology into the future. Bad ethics will alienate stakeholders and are thus unwelcome. There are a number of key areas where strong ethics are needed in southern African archaeology. The first and perhaps most important one is that archaeologists have a primary responsibility for the past on behalf of society. As such, their actions must be guided by the need to preserve and communicate the past. All businesses need to make profit but they must not lose sight of core values. By affirming their allegiance to the archaeological record for present and future generations, commercial archaeologists must make professional and informed recommendations that result in the protection of significant heritage while allowing development to proceed. There are archaeologists who are known for not finding any significant sites. Commercial archaeology must improve standards of fieldwork and data collection to ensure that it creates a usable archive for others. Current attempts to copyright information from reports while making business sense ultimately mean that new protocols must be developed to access information for studying the past. Heritage Western Cape, the provincial arm of the South African Heritage Resources Agency, has in the last few years encountered situations where the issue of copyright was debated. The heritage authority recognized the

rights of authors of reports but also determined that it must be able to use part of the reports to fulfill its legislative mandate. One way to solve this copyright issue is for archaeologists to publish their reports to make them publicly accessible. There are some commercial archaeologists who believe that commercial archaeology is all about data gathering. However, it is not clear what the data will be used for since often the quality is not good some of the time. This means that the data from commercial archaeology is not usable defeating the whole purpose of conserving by record. In countries such as Australia and the Netherlands, commercial archaeologists publish works based on their experience which also helps in the evolution of the discipline. This is not yet the case in southern Africa where the belief that commercial archaeology is either a business or all about data gathering is strong. Intellectual property issues relating to data ownership are not yet resolved. It is the archaeologist who would have produced the report, but having been paid by the developer to fulfill a legal requirement, the issue gets convoluted if the archaeologist also subcontracts another archaeologist. Therefore, there is an urgent requirement to consider these ethical issues to create a more usable commercial archaeology outcome.

The other ethical issue of strong relevance is the need to regulate commercial archaeologists. Most of them operate independent small companies that are registered with the registrar of companies. However, it is difficult to enforce standards and accountability because administrative organizations are short staffed. While the South African Heritage Resources Agency has always complained about poor-quality reports, nobody has been sanctioned for poor work. Equally, the Association of Professional Archaeologists has no penalties for members who produce substandard reports. Thus, a code of practice without consequences becomes gatekeeping another morally undesirable thing (Hall 2005). Thus, while commercial archaeologists are making money out of studying the past, their responsibility to the archaeological record is often suspected. Strong ethics are needed to ensure that it is not just the archaeologists who benefit but also the past.

The other issue requiring ethical consideration is the issue of how local communities are often sidelined in commercial archaeology. Very few legal instruments in southern Africa have a provision for community consultation in archaeology. As such, archaeologists make decisions about insignificance and significance of other people's heritage based on their expert training. If ethics are adhered to, there is no problem. However, there are cases in which ancestral graves have been forcibly relocated against the wishes of local communities. Even in South Africa where the legislation calls for community participation, the consultation is often left till the end of the projects when all the major decisions would have been made. Perhaps, this ethical dilemma would be less of a problem if commercial archaeologists invest in the local communities through corporate social responsibility programs. However, the funds are often very small and do not allow generous investments by archaeologists into the communities. One way of solving this problem would be for the archaeologists to make their clients uplift communities. For example, the South African Department of Environmental is insisting that companies operating around the Mapungubwe World Heritage site must devise public beneficiation programs. The archaeologists who carry out the impact assessments are supposed to come up with suggestions. While it is still early days, it is hoped such an intervention may result in more communities benefitting from their heritage.

Finally, commercial archaeology seems to be enjoying the best from two worlds. In the first instance it is still archaeology which is about a people's legacy and all the responsibilities that come with that. In the second one, it is a business and yet does not adhere to ethics in the business world. The corporate environment has strong and established ethics. For example, the Institute of Directors of South Africa came up with the King's Code II for corporate

governance and social responsibility. It would be good for commercial archaeologists to implement accountability standards enshrined in this document. This will ensure that they are fully commercial and regulated by the stronger ethics that govern the business world.

In summary, the opportunities associated with commercial archaeology are massive. Commercial archaeology occupies an important interstitial space between archaeology and what society needs. However, strong ethics must be adhered to for society fully benefit. There is need for systems of quality control and accountability to ensure that the profit motive does not disadvantage the past. Also, commercial archaeology must be regulated to ensure that data quality is high. Intellectual property issues must also be resolved to ensure access to information for all. Commercial archaeologists have a duty to communicate the results of their work beyond the mandatory reports. It is simply not enough to state that commercial archaeology is all about data gathering when the data is not usable and the quality of reports leaves a lot to be desired. Furthermore, multiple voices must be heard in the decision-making processes associated with commercial archaeology (Hodder 2002). Lastly, archaeologists in southern Africa must take the issue seriously if they are to make good contribution to society and to shake off the colonial baggage of the discipline.

Cross-References

- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Ethics of Commercial Archaeology: Australia
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Ethics of Commercial Archaeology: Nigeria
- ▶ Ethics of Commercial Archaeology: USA
- ▶ Ethnic Identity and Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Vandalism and Looting (Ethics)

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Ethics of Commercial Archaeology: USA

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Introduction

Once upon a time, most archaeologists were employed by academic institutions and museums. Today in the United States and other countries, most archaeologists – and many historians, architectural historians, historical architects, and a few cultural anthropologists and geographers – are employed by profit-making commercial companies engaged in work on behalf of government agencies and private development interests. Working in this context can present ethical challenges for which many archaeologists (among others) are ill prepared.

Definition

As used here, "commercial archaeology" means archaeology conducted by profit-making commercial entities such as consulting firms. Some such firms are purely archaeological in character; others work more broadly with "heritage" or "cultural resources," variously defined. Others are more generalized still, engaging in broad-scoped environmental impact assessment (EIA) or supporting the design, construction, and operation of dams and reservoirs, pipelines, energy-production schemes, irrigation and agriculture, mineral extraction, logging, protected area management, urban development, military base management, and other rearrangements of the earth's surface to accommodate perceived human needs. A few specialize in the recovery of commercially valuable objects from shipwrecks and similar contexts. "Ethics" refers to the moral principles governing or guiding an individual or group – in this case the groups of archaeologists who practice in commercial contexts.

Key Issues/Current Debates/Future Directions/Examples

Although there have been commercial aspects to archaeology since the field's inception (see, e.g., the wheeling and dealing in early Egyptology documented by Noel Hume (2011)), the development of a self-consciously commercial archaeology sector began in the 1970s, at least in the United States. This sector arose in response to the enactment of laws requiring EIA (notably the National Environmental Policy Act of 1969) and providing for special attention to be paid to historic places including archaeological sites (notably Section 106 of the National Historic Preservation Act of 1966). Agencies of the US government, and by extension those seeking financial assistance or permits from such agencies, now had to ascertain what impacts their planned actions might have on archaeological sites (among other aspects of the environment), and they often had to do things – like excavation of such sites – to mitigate project impacts. These requirements created a market for archaeological survey and excavation that quickly became too big for the universities and museums to satisfy. Moreover, agency planning schedules could not easily accommodate the traditionally leisurely pace of academic/museum-based archaeological research and often required that attention be paid to places and research problems in which academic and museum-based archaeologists were not especially interested, so the traditional archaeological institutions tended (and tend) to disdain commercial work. The commercial archaeology sector arose to fill the gap.

In 1979, a debate between James Fitting and Albert Goodyear in the *Journal of Field Archaeology* highlighted the central ethical issue that confronts commercial archaeologists: whose interests are they to serve? Fitting, an early lion in the field, argued that the commercial archaeologist's primary obligations are to his or her client. Commercial archaeology, he said, must be "client oriented," and is incompatible with the academic model of archaeology as knowledge production. Goodyear, based in an academic

research institute, warned that client-oriented archaeology tempts archaeologists to "write off" sites that are in a client's way, as "a profit-maximizing strategy that minimizes the costs of field work, analysis, and writing, and...can engender a good business relationship with clients" (Fitting & Goodyear 1979: 355).

As commercial archaeology has developed, Fitting's model has been implicitly accepted by virtually everyone. Like it or not, commercial archaeology is not directed toward learning about the past for its own sake, or for the sake of scientific and humanistic research, or even for the sake of enlightening and entertaining the public. Rather, it is directed toward compliance with laws and regulations that government agencies enforce with widely varying degrees of rigor and intelligence, and that clients typically regard as costly nuisances. Archaeologists and their historical, architectural, anthropological, and geographic colleagues must perforce orient their work with reference to their clients' interests and needs.

This results in a range of common ethical dilemmas. For instance, what is the ethical course of action for an archaeologist in each of the following cases?

1. The client's project will destroy a number of archaeological sites. The archaeologist is charged with evaluating them. If she evaluates them as significant, it will be costly for the client, who will be expected by government regulators to protect them or subject them to expensive, time-consuming excavation. The client may well fire the archaeologist and hire another who will say the sites are not significant. How should she evaluate the sites?
2. The client needs for surveys of potentially threatened sites to be done quickly, in order to meet project planning and financing schedules. The client also wants the work to be done as inexpensively as possible. The archaeologist thinks that the nature of the area and its sites demand more time-consuming and costly studies. The archaeologist stands to gain financially from conducting such studies. What should she propose, and how?
3. The client's project will destroy places – maybe archaeological sites, maybe not – to which a local community ascribes cultural or spiritual significance. The community is not skilled in interpreting the environmental and historic preservation laws. The client feels no obligation to attend to the community's interests and expects his or her archaeologist to concern himself or herself only with places that she or he, the archaeologist, thinks have research value. What should the archaeologist do?
4. The client's project will destroy places – maybe archaeological sites, maybe indigenous spiritual places, maybe historic buildings, landscapes, or whole communities – in whose evaluation and management the archaeologist has no expertise. The client expects the archaeologist, as his or her cultural heritage expert, to help him or her solve whatever problems these places present for his or her project, despite the archaeologist's lack of qualifications to do so. How should the archaeologist respond?
5. The client's project will destroy archaeological sites that could be preserved in place for perpetuity, but excavating them will simplify the client's development. The client is willing to pay well for the excavation, which itself will destroy the sites. Should the archaeologist agree to excavate the sites, or argue for their preservation?
6. The client funds an expensive excavation that produces a large collection of objects and records. No nearby institution is equipped to care for this collection in perpetuity. The client plans to sell the collection after analysis and reportage is complete. Assume that no law forbids this. How should the archaeologist respond to the client's plan?
7. Or the client negotiates an arrangement with the putative descendants of a 4,000-year-old site's residents to rebury everything excavated, without analysis and reportage. Again, assume that no law forbids this. Should the archaeologist, who will be paid well to do so, excavate the site?

These are only a few simplified examples of the ethical conundrums that commercial

archaeologists routinely face; there are many others and many permutations on each. There are often no obviously right or wrong answers.

Many such conundrums arise simply from the economic relationship between the client and the commercial archaeologist. As long as clients hire, and hence can fire, commercial archaeologists, it will be difficult if not impossible for archaeologists to adhere to ethical standards that do not very powerfully take the client's priorities into account. Some (like Fitting) argue that the commercial archaeologist is ethically obligated to accept and seek to advance the client's interests, as a member of the client's team. Others (like Goodyear) propose that the commercial archaeologist's core ethical obligation is to archaeological resources themselves – to sites, to their contents, and to the information they contain. Still others hold that one's primary obligation is to the descendant communities, where they exist, or more generally to the public interest, which may have many facets and internal contradictions. Ethical codes promulgated by archaeological organizations (cf. Register of Professional Archaeologists n.d.) provide only generalized guidance and affect only archaeologists willing to accept them; they have no effect on clients. In the end, he who pays the piper calls the tune, and in commercial archaeology, it is the client who pays the piper. Some question whether this is a good model for archaeological – or more broadly for cultural or environmental – resource management (cf. King 2009), but as of 2013, it is the model with which commercial archaeologists work.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Ethics in Archaeology
- ▶ Ethics of Commercial Archaeology: Australia
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ Ethics of Commercial Archaeology: Nigeria
- ▶ United States Domestic Archaeological Heritage Law
- ▶ United States: Cultural Heritage Management
- ▶ Stakeholders and Community Participation

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Ethics of the Archaeological Record

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Introduction

Why Digging Could Be Seen as a Problem in Archaeology

"Archaeologists dig; whatever the variation in methodology, at least archaeology involves digging." Ian Hodder already objected to this notion because of the complexity of the digging process (Hodder 1999: 18). That process is indeed complex on its own, and within the present day situation of it being subdued to the context of heritage management, we pose the question: Why dig at all? What is the goal of archaeology, and are we reaching it by digging?

Some scholars have already stated that digging is not necessarily synonymous with archaeology (Lucas 2001: 2). However, the daily reality is different as it is also reflected in how staff and students view the role of fieldwork in their academic curricula (Croucher et al. 2008). Archaeologists are intervening more, being more present during fieldwork, preserving more in situ, and digging "better" (according to the current logic of professionalization and of standardization of procedures), and this has become a generally accepted guarantee for the quality of archaeologists' work. As such, digging has been presented as a positive development for archaeology, cultural heritage management (CRM), and for the protection and understanding of the past in general.

In many cases, this assertion was and is true, and some archaeological sites were and are excavated, preserved, and studied in a really efficient and productive way (Demoule 2004; Bradley 2006). Over the past four decades, national and international regulations (including charts, codes, and treaties such as the Malta Convention in Europe (European Convention on the Protection of the Archaeological Heritage 1992)) have encouraged archaeological activities. This has included two different functions:

1. Preserving heritage in situ, when this did not compromise development
2. Digging and removing the remains of the past to save them before destruction

As Pearson or Shanks highlighted, "[from the 1970s] after a flush of enthusiasm for digging, I was left profoundly disappointed by a discipline that seemed simply obsessed with a set of techniques (and not particularly good ones) for supposedly recovering the past" (Pearson & Shanks 2001: 6). Thus, what could be seen now as obvious practices for archaeology – digging or preserving – still requires further scrutiny and challenge.

Archaeologists do not necessarily support these current practices, but they do defend them, or participate in their application because this is the only activity understood and recognized by authorities, developers, and often the public (Lipe 1996: 26; Zorzin 2010: 189). This activity also guarantees the very existence of archaeology and defends archaeologists' career opportunities and salaries (Shanks & McGuire 1996: 79). Moreover, it was and is what archaeologists identify themselves with. Digging up artifacts was the core business of the first archaeologist, and it still forms a major attraction for (potential) students (Croucher et al. 2008: 29-30).

In our opinion, these developments need to be regarded as problematic. Because of the absence of an interpretative stage and a dissemination phase in the archaeological process (Lipe 1996: 24; Cumberpatch & Blinkhorn 2001: 39; Bradley 2006: 8; Willems 2009: 91), accumulation of artifacts and of data is what is now the present day reality expected from archaeologists. It should also be noted that archaeologists

too have contributed to this expectation and therefore should take their own responsibility in this matter. Within this logic, archaeologists are technicians of the past. The reality is, however, that archaeological activities are mostly based on an accumulation process that primarily serves the interests of a client by removing the problematic remains/structures as quickly and as cheaply as possible (Everill 2009: 2; Demoule 2010: 13-14). As such, we want to argue that nobody is benefitting from the accumulation of data and artifacts.

Furthermore, the world has been experiencing an economic crisis since 2007–2008 and it is likely that this will affect all sectors of archaeological practice (Schlanger & Aitchison 2010: 10), another reason for challenging current practices.

Archaeology matters, as Sabloff (2008) pointed out, and we do not wish to debate the importance of archaeology within present day society. On the contrary, we would like to state that by marginalizing the role of archaeological digging, we can actually focus on the production of knowledge rather than data and *improve* our contribution to society.

It is our belief that reflexive thinking should generate new questions about the nature of archaeological practice, its products, and its public, and these questions deserve to be formulated within the frame of ethics, because no ethical decisions can be made about archaeology without a critical approach to its aims and practices. We think an ethical archaeological practice should not be framed and limited by codes and regulations but on the contrary, permanently evolve and adapt to every situation and location where archaeologists are active.

Now, the question is, is digging in itself an ethical action? Does it answer the aims we have set ourselves?

Definition

Commercial Archaeology: Commercial archaeology, referred to as "developer-funded" archaeology, mostly developed in the western world, since the end of the 1970s, and defined as a service to a client. Most commercial archaeological activity relates to a specific area threatened by or uncovered by construction or development, and as such often equates with salvage archaeology. Commercial archaeology operates as a preservation device by record.

Archaeological Heritage Management: Policies of systematic protection of the past (Lowenthal 1998) have been transposed into the world we are living in – that is, in a capitalist organizational structure – through various legal tools and management concepts, from one of which is particularly active and gaining in popularity: Cultural Resource Management or Archaeological Heritage Management (CRM & AHM). In archaeology, CRM or AHM could be defined as a process consisting of the protection and the management of a large range of cultural heritage material, aiming to give the past some importance in the present and particularly in the present where urban growth and fast development are putting more and more pressure on material heritage.

Neoliberalism: This theory of political economic practices proposes that "human well-being can best be advanced by liberating individual entrepreneurial freedoms and skills within an institutional framework characterized by strong private property rights, free markets, and free trade" (Harvey 2005: 2).

Since the 1970s, during a long period of elaboration of laws and regulations concerning archaeology, a process proper to neoliberal ideology affected the way archaeology was conceived and organized (Zorzin 2011).

Public Archaeology: A term that has been extensively debated over the last decade because of its wide-ranging consequences for the archaeological practice and its multidisciplinary approach. We argue that it is much more than a tool to achieve the goal of bringing the past to the public; it is also about democratizing the past through research and social action.

Historical Background

The nature of archaeological practice has been very much centered around the focus on digging

up material remains; a large factor in the development of archaeology as a science (Lucas 2001: Introduction; Dyson 2006). As shown in many studies, within the framework of capitalistic thinking, this has led to a commodification of these material remains (Hamilakis & Duke 2007). According to this logic, material remains were not only our main source of information, but they also became our "capital." As such, it was natural that the more we saved of it, the better. Digging them up, saving them from destruction or oblivion, studying them, and protecting them, are all acts that we perform as archaeologists. We study the relationship between human beings and objects in the past while developing our very own relationship with these objects in the present, going as far as acting as though we possess them (Fouseki 2009). We would like to argue that recovering material remains has changed from being a professionalized hobby to a form of sacred mission ("saving our capital," as a goal per se), under the present day circumstances.

Over the past 50 years, archaeology in the western world has slowly been enforced in developers' planning processes (Willems 2009: 89). Activities were framed by laws and regulations and accompanied by self-regulatory codes of ethics and guidance for good practice created by archaeologists themselves (e.g., Society for American Archaeology – USA 1996, World Archaeological Congress – USA 1990, The Institute for Archaeologists – UK 2010 (revised), European Association of Archaeologists 2009). During this period, archaeologists struggled to impose the intervention of archaeologists every time the past was threatened (Lipe 1996), and it was generally agreed that the survival of the past depended on digging and/or preserving, and accumulating records (Lynott 1997: 593). Soon, these developments were perceived as potentially problematic, especially the concept that presented archaeologists as "stewards of the record" (Hamilakis 2003: 107; Hamilakis & Aitchison 2009 April 4th, on Radio 4 - UK, online; Carver 2010: 935). This was because, in commercial archaeology, the saving of the "record" involves using most exclusively a technically formatted report (Bradley 2006: 6).

Now, to explain and justify their activities to the public, archaeologists have often claimed that they preserve the material remains of the past for the common good and for future generations (King 2005: 28; Global Heritage Fund 2010: 11-12; Carver 2010: 935). This is a clear and simple objective, which defines a logical mission for professional archaeologists that can be understood by all.

As such, definitions of archaeological heritage management (or CRM) seem to describe a universal protective mission for archaeology, dedicated entirely to the salvation of the remains of the past.

As argued by Ferris and Cannon:

> the rise of CRM archaeology [in Ontario (Canada), is] borne of an urgency to document and recover – accumulate – the archaeological record threatened by the largely unintentional destructive forces of land use development and resource extraction [. . .] (Ferris & Cannon 2009: 2).

In commercial archaeology, this mission had been widely accepted because it simply makes sense on the daily basis, and it gives jobs and incomes to many archaeologists (Dries 2010: 57). Even if jobs are precarious and even if they involve difficult living and work conditions, archaeologists still do archaeology because they believe in this mission that often consists uniquely of saving what can be saved (Everill 2009: 159-61; Zorzin 2010: 4,157,161-2).

Yet, behind this positive and virtuous frontage which gives an obvious role in society to archaeology, CRM is also a highly political device which translates the dominant preoccupations, ideologies, and thoughts of the present into the choices made for and of a past. CRM is also involved in the interpretations of a selected past (McManamon et al. 2008: 17), while it might occasionally reinforce identity and enrich the present in various ways (Holtorf 2005a: 1-15). In doing so, the individuals involved in CRM are in fact "setting the agenda" for archaeology and for national communities by facilitating or denying access to archaeological products – products standardized in various ways to echo the expectations of different clients/publics/scientists.

An Accumulative Archaeological Practice, Born Out of Capitalist Logic

According to King: "Salvage [archaeology is made] to save information for future use" (2005: 28), but this often commonly accepted goal for archaeology seems nowadays unsatisfying.

It does so because this process of accumulation allows the postponement or the discharge from all other implications that the digging can and should involve, which also entails postponing or avoiding costs. It could be emphasized here that, in terms of costs, archaeology represents a very small part of developers' budgets (Zorzin 2010: 104). The real cost of archaeology for developers is the unplanned loss of time, which might provoke an increase in costs due to material and workforce standby. In the end, because of this time and money pressure exerted by developers, it might also and simply prevent archaeology to be performed in accordance with the basics standards of archaeological or preservation practices.

This process of accumulation was created under the pressure of various cultural politics – the intermediary between the neoliberal economic logic and the practice of archaeology; archaeological activities resulted in the application of the following concepts as the right thing to do or "common sense" (Harvey 2005: 68): (1) fragmentation, (2) standardization of actions, and, most of all, (3) demonstration of profitability and quantifiability. In the short term, this resulted in a major increase in the quality and traceability of archaeological work (Bradley 2006; Willems 2009: 90), but it also came with major unexpected and long-term complications.

First, archaeological products were fragmented into different actions, by different people or organizations. Specializations appeared in archaeology, and new professions emerged with more and more specific skills, often focused on scientific data collection, analyses, and preservation (involving physics, biology, chemistry, geophysics, and computer sciences). This process resulted in a fantastic increase in the accumulation of data and artifacts, (Ferris & Cannon 2009). Moreover, fragmentation of the discipline has also led to fragmented and highly specialized knowledge that fewer people are interested in or want to pay for (Hodder 1999: 17). As a matter of fact, specialization could be seen in this case as a form of professional fetishism or as "commodity fetishism" (Marx 1867: Chapter 1 section 4). This means that a value has been given to this fragmented knowledge and recognized by all (including archaeologists) through its objective and materialistic characteristics. As such, the pieces of the puzzle (which is the past) have been multiplied but not always by keeping in mind why they were used, which questions they were intended to answer, and what problematic they hoped to resolve. As an example, many costly technologies have been introduced into commercial archaeology, such as topographical technology, which provides high accuracy in plan making, drawings, and the localization of artifacts. However, what is the point of such an accumulation of precise data without a larger theoretical questioning or simply a more global framework for archaeology? In this sense, we regard fragmentation within archaeology as a potentially fetishist feature, or as self-indulgency within the archaeologist community, to simply multiply jobs in a sector without ensuring career prospects.

Second, archaeology was standardized under more and more complex ethics codes and charts of practice, precisely defining and framing every archaeological act into a "systematic" (to use a biochemical term, which refers to a repetitive operation that has to be performed in exactly the same way every time it is done). This "systematization" accumulated all sorts of data from sites, without any differentiation between periods, material, time frame, budgets, and most of all, without any consideration of a problematic. The virtue of such an approach is of course to avoid missing any data and preserve potential unknown data for the future... but it also generated a massive flow of data that we are not able to deal with and unable to hierarchize in the bigger picture.

Finally, archaeology was asked to provide quantifiable results (i.e., measurable results, numbers of m^2 excavated or protected, numbers of pits, numbers of pictures and drawings) that could justify its costs to the clients and/or to the

citizens. Through this rigorous process developed in the last decades, archaeology succeeded in demonstrating its value and ability to adjust to an organization of work based on capital. CRM, clients, developers, and (sometimes simultaneously) funders were able to see and understand what archaeologists were doing. Thus, archaeologists finally gained the professional and social recognition they had been seeking since the beginning of professionalization in the 1970s. Nevertheless, this development came with a dark side. By accepting the rules of the neoliberal economy, archaeologists ended up compulsively collecting archaeological records. The result has been a routinization of work with obligations of immediate and quantifiable results, which are in fact disappointing in serving archaeology and archaeologists' interests.

Current Debates

What is the Product, Who is the Client?

The CRM agenda tended to convert archaeological production, initially conceived for the scientific community, for the state (by law), and in the end for the public, into an archaeological product made for developers. It should also be noted that these products are increasingly produced by private units and in smaller and decreasing proportions by universities and public services of the state (Willems 2009: 90-1).

McManamon et al. also focus on another opposed phenomenon defined by the term "community archaeology," which is characterized by an emphasis on how archaeology impacts upon people (2008: 19). This opposition between professionalization and "community archaeology" resulted in a dichotomy within archaeology. This dichotomy is problematic in archaeology caused by the impossibility for archaeologists to define a stable client for their product (as the market economy suggests). This situation leaves archaeologists torn between their own scientific interests – supporting the interests and needs of specific corporate clients or supporting the interests of the public and specific communities, interests which are often in opposition to each other. In the end, this results in archaeologists serving neither their own needs nor the ones of other clients. In all cases, it brings little satisfaction to all.

When the client/developer is paying for the archaeological act, the combination between archaeological units and clients' requirements seems incompatible. This is the case because the relationship between the two actors is unbalanced and archaeology is not in position to impose an ethic work and the highest standards of practice when the interests of the clients are in complete contrast to this. As an example, in Australia in 2011, a journalist from a *The Sydney Morning Herald* wrote: "An archaeologist claims she deleted key sections of a survey of Aboriginal heritage sites commissioned by *Fortescue Metals Group* (FMGL) [A corporation essentially extracting iron] because she feared she would not be paid for the work if she did not" (Mayman 2011).

Because of this unbalanced relation between the client and the archaeological firm, the possibility of financial pressure exists, and this is problematic enough to be emphasized. Also, in these conditions, the results of the digging process only seem to serve client interests, which are "cleaning the soil" (Demoule 2010: 14) and going against the basic objectives and codes of ethics and practice of archaeology.

This rather pessimistic situation is being countered by an initiative that was taken up some two years ago by a Dutch commercial archaeological company, who labeled it "Reverse Archaeology" and whose aim is to create a win-win situation for all the parties involved – the developer, the archaeological company, the public, and local government. The idea is that archaeological practice and products could be seen as an important additional "value" to landscape and spatial planning (within the CRM logic that we referred to before), but to achieve this, one needs to reverse the archaeological process. That is, thinking about a favorable outcome before the shovel hits the soil. The idea is that the attention should be shifted from fieldwork to research goals, and one of the major key points of reverse archaeology is that we should not dig for the sake of digging alone. Location is a key factor in this process, since the outcome is connected to

specific local needs – histories, communities, and economy. Because of this, in theory useful outcome, the process, could be described as "capitalizing the past," in the sense that it makes the past economically and socially "profitable" and valuable (Goudswaard et al. 2010).

Owning the Past

So far, Dutch academic archaeology has been neglecting or even mocking this initiative and accusing archaeological units of "selling out the agenda of scientific archaeology" (Holtorf 2010: 26). Academics seem to have difficulties with these ways of making the past "profitable," neglecting the fact that they are also making a living out of archaeology themselves. Besides, are academic archaeologists acting any differently? Do they not contribute in their own ways to the capitalization of the past by accumulating archaeological data and sometimes jealously withholding it from others by stacking it away in depots, turning the archaeological objects into highly wanted and valuable goods for collectors and museums?

> What is the psychology of collecting? What is it that impels people to transform their fascination with the past into a lust to own it? (Fagan 1996: 241).

Who owns the past and its remains (Gibbon 2005)? This is a subject that has been debated by many scholars lately (Cartman 2005; Duineveld 2006; Hamilakis 2007) and that has to some extent been aroused (at least in some countries) by the Faro convention of 2005 (Council of Europe Convention on the Value of Cultural Heritage for Society 2005; Article 2-*definitions* and article 12 – *Access to cultural heritage and democratic participation*). According to this convention, which has been ratified by several European countries, the past belongs to everybody and *everybody* should have some say in what (archaeological) heritage is and what we should do with it. As mentioned earlier, in the present situation, the public does not benefit directly from archaeology. Numerous material remains never make it out of the depots to be put on display for the public and for analyses, and research is not elaborated (Ferris & Cannon 2009) or often specifically produced for peer reviewing (Holtorf 2005b: 546).

So it has been suggested lately that the (research) agenda might be defined by the public, or by archaeologists in collaboration with the public, and with specific communities (Holtorf 2005b). Archaeology should adapt research agendas to a bigger public and connect to a larger public in order to be "in" the society while adopting a more pro-"geschictscultur" (Holtorf 2010: 26). Archaeology should have a social relevance, and this can be economic and scientific, but it should be, above all, about giving meaning to the past of *everybody*.

Future Directions

What Should Be Done to Change This Situation?

By summing up the situation in Ontario, Canada, Ferris and Cannon have actually said it all:

> In short, given the scale of CRM and scale of material accumulation, the degree of degradation to existing collections occurring now, and the inability for that accumulated material to be accessed, let alone facilitate research, the status quo is simply not sustainable (Ferris & Cannon 2009: 10).

We would like to take this discourse one step further and ask the question: What would happen if we stop digging altogether? Let us pause for a second and reflect on this possibility. As archaeologists, we have been drawn into the Archaeological Heritage Discourse (Waterton & Smith 2009) by being appointed as stewards of the remains of the past, thus *creators* of heritage. This has led us to a point where we believe that what lies beneath the soil is *potentially* valuable and thus worth conserving. Because of this, we dig. But our attachment to this materiality may lead to an unnecessary preservation and overvaluing of these "goods," producing, in the end, nothing more than a commodity (Hamilakis 2007: 16-18) while trying to cope with the effects of these objects and heritage sites on present day society. Waterton and Smith made a good point when they stated that archaeology as a discipline does not have all the answers when it comes to issues of heritage (Waterton & Smith 2009: 10). Moreover,

it may actually have hindered the intellectual growth of the discipline (Waterton & Smith 2009: 5).

If archaeologists stop digging, much potential information would be lost, and we would seriously jeopardize our carefully constructed authority. The risk would be that others would take over this task without possessing the proper training-background or even affinity with the past. Needless to say, many jobs would be lost. Another risk could be that we would withdraw into our depots and libraries to dust off our previously acquired goods in order to play the role of antiquarians once again, producing specialized knowledge for the elite.

Alternatively we could maintain our presence in society and invest more time, money, and efforts in regional mapping (land-use planning, with archaeological expectations defined on a detailed level) or in preventive archaeology (by considering archaeology in a very early stage of the planning process). This would save resources on the long run and responds to one important goal of the Malta Convention: Conservation of archaeological remains in situ (Verslag 2011: 1; Reijden et al. 2011: 9-12). The present day situation of digging overly has passed by this important element of heritage management, which could be considered as an extreme form of protection. The retrieval of data and the protection "ex situ" has up to now been the cheaper solution (Verslag 2011: 9). However, it should be noted that with space being scarce in, for example, the Netherlands, the value of material remains in the soil will be viewed very critically, so records might be lost forever. Working with and for the public could make a difference in our lobby, but it may also present the possibility that some remains will be lost because the general public simply does not pay attention or is not well informed. Are we ready to accept this possibility? Especially after all our struggles preceding the Malta treaty? Is all that has been gained then lost (Newman 2009)? This is worth debating and preferably not solely in the form of a scientific and theoretical discourse but rather *within* society.

Leaving to one side for a moment our responsibility as agents of archaeological heritage, what would it mean for scientific research if we did not dig anymore? Certainly with what we've dug up so far, we could proceed for quite some time with the production of lots of interesting new facts or "old facts" updated with new knowledge. As Lucas showed, many advantages were gained in the past by those who studied material that was collected by others (Lucas 2001: 3-5). Advantages will be for example:

1. To stop or drastically reduce digging will force us to come up with new methods of producing knowledge.
2. It will stimulate more creativity in communicating knowledge to a larger public.
3. It will force us to cooperate on a global level with data comparison and data sharing.
4. It will create new scientific crossovers and stimulate interdisciplinary research projects with multiple research goals.
5. Other ways of producing science that is more community based will develop.
6. It will produce more efficient and innovative methods of storing and protecting our archaeological data.
7. It will produce new methods of more efficient data analysis.

An important additional benefit will be that by digging less, we are acting in a more sustainable way, taking thus our responsibility in a society that is increasingly troubled by environmental and financial crises that strain all our resources. A sustainable archaeology would mean:

- Exploring and publishing already dug up material that is now lying unused in numerous depots
- Giving this back to the public, who financed it in previous years
- Letting the public determine new research questions
- Developing prospects for a collaborative archaeology between archaeologists and communities
- Stepping away from the logic of the commodification of the past by a redefinition of the concepts of values in heritage, redirecting this notion towards knowledge production,

and social involvement instead of data and artifacts accumulation

Now, according to our arguments, the performance of an ethical archaeology could be accomplished by the following general agenda – an agenda only conceivable by taking some distance from the present economic corporate model. This agenda can be presented as follows:

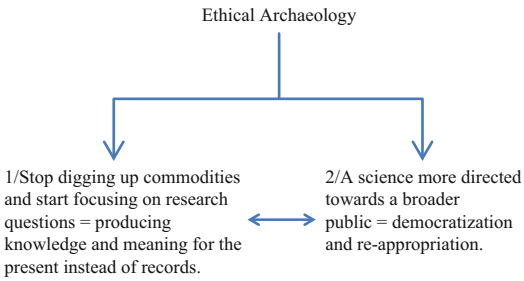

In the end, to the question "is digging in itself an ethical action today?," the answer seems to be that archaeology is not in a position to create an ethical product, given the organizational or ideological constraints it has to deal with nowadays. Economic market and competitive tendering seem to have redirected and focused the interests of archaeologists on the process of digging while we argue that, nowadays, in the interests of all, digging should be limited or avoided in the long term, in order to readdress archaeological activities towards public interests.

In this entry we made an attempt to start the debate about one of the *core* activities of archaeologists. As we have tried to show, there are other archaeological activities that can be practiced as satisfying alternatives. The option of *not* digging should be sometime seriously considered by commercial archaeological companies as well as by the academic world.

Cross-References

- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Archaeological Stewardship
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Avocational Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Ethics of Commercial Archaeology: Australia
- ▶ Global Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: Public Perceptions
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ Materiality in Archaeological Theory
- ▶ Media and Archaeology
- ▶ Multivocality and Archaeology
- ▶ Nationalism and Archaeology
- ▶ Netherlands: Cultural Heritage Management
- ▶ Pragmatism in Archaeological Theory
- ▶ "Public" and Archaeology
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation

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Ethnic Identity and Archaeology

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Introduction

Of all forms of identity, ethnicity is possibly the one that has received attention in archaeology for the longest time. In fact, from its inception as an academic discipline in the late nineteenth century, one of the main goals of archaeology was the identification of ethnic groups in the past. In Gustaf Kossinna's words, "sharply defined archaeological cultures correspond unquestionably with the areas of particular peoples or tribes" (Kossinna 1911: 3). Many advocates of the archaeological approach to the past known as culture-history still adhere to those principles. In doing so, they turn the search for ethnic identities in the past into the primary goal of archaeology, to the point that some would now argue that to abandon the search for ethnicity is tantamount to denying archaeology its quality of a historical discipline (Bierbrauer 2008: 6). By contrast, proponents of the processualist approach to the past associated with the New Archaeology had little interest in ethnic (or any other form of) identity, as their goal was to move archaeology away from history and to bring it closer to science. Instead of answering the normative question "What do cultures relate to?," processualist archaeologists of the 1960s and 1970s concentrated on the adaptive role of the components of cultural systems, even if they still continued to accept the idea that some bounded archaeological distributions (if only in the domain of stylistic variation) correlated with past ethnic groups. A revival of interest in ethnic identity coincides with post-processualist concerns with context, symbols, agency, and history (Hodder 1982; Jones 1997). However, because in Central and Eastern Europe the culture-historical approach is still predominant, some have adopted

a completely agnostic approach, according to which ethnicity in the past is beyond the reach of archaeology, because the meaning initially attached to material culture symbols used for building ethnic boundaries will forever remain unknown (Brather 2004). Archaeologists should refrain from doing any research on ethnicity, and in the meantime focus on what they can really do, namely, study economic and social structures, social rank, religious behavior, and the like. At the root of this skepticism verging on nihilism seems to be a theoretical malaise and a profound misunderstanding of what ethnic identity is and how it works.

Definition

In the early twenty-first century, ethnicity has become the politicization of culture, a decision people take to depict themselves or others symbolically as bearers of a certain cultural identity. In the 1960s and 1970s, the debate was between those who argued that ethnicity was a matter of primordial attachments (primordialists) and those who regarded it as a means of political mobilization (instrumentalists). Today, very few would disagree with Max Weber's definition of ethnic groups as "human groups that entertain a subjective belief in their common descent because of similarities of physical type or of customs or of both, or because of memories of colonization and migration; conversely, it does not matter whether or not an objective blood relationship exists" (Weber 1922: 219). Ethnicity is not innate, but individuals are born with it; it is not biologically reproduced, but individuals are linked to it through cultural constructions of biology; it is certainly not just cultural difference, but no ethnic identity can be sustained without reference to an inventory of cultural traits. As the Norwegian anthropologist Thomas Hylland Eriksen put it, ethnicity must be regarded as the "collective enaction of socially differentiating signs" (Eriksen 1991: 141). Such an approach is largely due to the extraordinary influence of another Norwegian anthropologist – Fredrik Barth. He shed a new light on subjective criteria (ethnic boundaries) around which the feeling of ethnic identity of the member of the group is framed (Barth 1969). He also emphasized the transactional nature of ethnicity, for in the practical accomplishment of identity, two mutually interdependent social processes are normally at work – internal and external definition (the latter also known as categorization). Barth's approach embraced a predominantly social interactionist perspective derived from the work of the American social psychologist Erving Goffman. Objective cultural difference was thus viewed as epiphenomenal, subordinate to, and largely to be explained with reference to, social interaction. Studies of ethnic identity inspired by Barth thus suggest that an ethnic group is more an idea than a thing. It is not as much the group that endures as the *idea* of the group. It has been noted that cultural traits by which an ethnic group defines itself never comprise the totality of the observable culture, but are only a combination of some characteristics that the actors ascribe to themselves and consider relevant. People identifying themselves as an ethnic group may in fact identify their group in a primarily prototypic manner, with some recognizable members sharing some but not all the traits, and different traits being weighted differently in people's minds. How is this specific configuration structured and what mechanisms are responsible for its reproduction?

Attempts to answer this question resurrected the idea that ethnic groups are bounded social entities internally generated with reference more to commonality than to difference. Such an approach draws heavily from the French sociologist Pierre Bourdieu's theory of *habitus*, a system of durable, transposable dispositions, "structured structures predisposed to function as structuring structures" (Bourdieu 1990: 53). According to Bourdieu, those durable dispositions are inculcated into an individual's sense of self at an early age and can be transposed from one context to another. Ethnic identity is therefore the result of the intersection of one's habitual dispositions and the social conditions in existence within a particular historical context. That is why,

once in action, an ethnic group operates as a type of status group, the existence of which is represented through primordial attachments. In practice, ethnicity results from multiple transient realizations of ethnic difference in particular contexts of production and consumption of distinctive styles of material culture. Ethnic identity cannot be conceived without the manipulation of material culture. Ethnicity can be, and truly is, represented by such things as dress elements, speech forms, lifestyles, food ways, and the like. However, the ethnic group is not made up of the symbols used to mark it as distinct from others. Selecting symbols to mark ethnic boundaries is a political strategy in the same way that choosing a certain dress style may be for the construction of social status. Material culture with symbolic meaning is therefore an integral part of power relations, as symbols of ethnic identity appear primarily in contexts of collective rituals and other social activities aimed at group mobilization. Paul Brass even defined ethnic identities as "creations of elites who draw upon, distort, and sometimes fabricate materials from the cultures of the groups they wish to represent, in order to protect their well being or existence, or to gain political and economic advantage for their groups and for themselves" (Brass 1993: 111). Material culture is therefore not a passive reflection of ethnic identity, but an active element in its negotiation.

Historical Background and Key Issues

This idea is in fact in direct contradiction with the basic tenets of the culture-historical approach. Leaving aside the primordialist understanding of the ethnic group (to which Kossinna and his followers constantly referred as *Volk*), much more problematic from a strictly archaeological point of view is the understanding of material culture. To be sure, attempts to identify ethnic groups in material culture date back to early nineteenth-century Romanticist obsessions with finding primordial languages and homelands. Because of the Romantic concept of culture as reflecting the national soul (*Volksgeist*) in every one of its elements, Kossinna's idea was to bring to light one of those elements – the material culture – bearing the "imprint" of the ethnic group responsible for its production. Like many others in the early twentieth century, he defined (material) culture in monothetic terms on the basis of the presence or absence of a list of traits or types, which he had previously and intuitively considered as the most appropriate attributes for the definition of the culture. He stressed the use of maps for distinguishing between trait distribution patterns, which he typically viewed as highly homogeneous and sharply bounded cultural provinces. He then equated those cultural provinces with ethnic groups known from historical sources. Kossinna and his followers regarded archaeological cultures as actors on the historical stage, playing the role for prehistory which known individuals or group have in documentary history. Archaeological cultures were thus equated to ethnic groups, for they were viewed as legitimizing claims of modern groups to territory and influence. Because culture was regarded as a homogeneous, bounded whole, a direct consequence of the culture-historical approach to ethnic identity was the idea that "diagnostic" types were in fact ethnic badges. Ethnic groups could be recognized in the archaeological record by their specific *Volksgeist*, particles of which had been turned into particular types of pottery, tools, brooches, or houses. Searching for ethnic groups was thus reduced to typology, under the assumption that the classifications introduced by archaeologists approximated the categories producers and consumers in the past had in their minds. Because culture was understood as normative, wherever they would go, bearers of a certain (archaeological) culture will almost unknowingly reveal their ethnic identity to others (as well as to the archaeologist discovering their remains) by means of using specific brooches, axes, or types of pottery. Ethnicity, in other words, was all about culture, and culture operated from "behind the backs" of the people in the past (Veit 1989).

The first critique of the idea that archaeological cultures represent ethnic groups came from within the framework of culture-history, and

consisted of cautionary tales, which often attributed difficulties either to the complexity or to the incomplete character of the archaeological record (Wahle 1941). Meanwhile, by the late 1920s, the very concept of "archaeological culture" was banned from Soviet archaeology, along with "migration" and "typology." Marxism in its Stalinist version was brutally introduced in archaeology and, because of being so closely associated with nationalism, the culture-historical paradigm was replaced with internationalism that required scholars to study only global universal regularities that confirmed the inevitability of socialist revolutions outside Russia. However, following the introduction of Stalinist nationalist policies in the late 1930s, an interest in the ethnic interpretation of the archaeological record was revived, and the concept of "archaeological culture" was rehabilitated. Like Kossinna, Soviet archaeologists of the 1950s and 1960s believed that archaeological cultures reflected groups of related tribes in their specific historical development. Some even claimed that ethnic identity remained unchanged through historical change (Curta 2002).

Nor was the culture-historical approach fundamentally changed in Central and Western Europe at the end of the World War II, despite the grotesque abuses of Kossinna's theories under the Nazi regime. "Archaeological cultures" were now employed as a quasi-ideology-free substitute for "ethnic groups," without calling into question the key assumption of an intrinsic link between artifacts and groups. Barth's ideas had very little impact on the archaeological understanding of ethnicity, because his social interaction model was based on the assumption that stylistic characteristics would diffuse or be shared among social entities to an extent directly proportional to the frequency of interactions between those entities, such as intermarriage, trade, or other forms of face-to-face communication (the so-called Deetz-Longacre hypothesis). In other words, the closer two ethnic groups are to each other, the greater the probability of them sharing the same culture, without any ethnic boundaries, and thus slowly becoming one, single ethnic group. In order to verify that assumption, Ian Hodder undertook an ethnoarchaeological study in the Baringo district of Kenya, in order to understand how spatial patterning of artifacts could relate to ethnic boundaries (Hodder 1982). He found that, despite proximity and intense cultural interaction, clear material culture distinctions were maintained in a wide range of artifact categories. In his view, distinct material culture boundaries were foci of interaction, not barriers. In fact, material culture distinctions between neighboring groups were maintained in order to justify between-group competition and negative reciprocity, which considerably increased in times of economic stress. However, boundaries did not restrict the movement of cultural traits, and the diffusion of cultural styles was at times be used to disrupt ethnic distinctions. Hodder thus suggested that the use of material culture in distinguishing between self-conscious ethnic groups would lead to discontinuities in material culture distributions, which at least in theory may enable the archaeologist to recognize such groups. Moreover, the form of intergroup relations is usually related to the internal organization of social relationships within the group. Between-group differentiation and hostility may be linked to the internal differentiation of age sets and the domination of women and young men by older men (Larick 1991). Different groups may thus manipulate material culture boundaries in different ways depending upon the social context, the economic strategies chosen, the particular history of the socioeconomic relations, and the particular history of the cultural traits which are chosen to mark the ethnic boundaries.

This conclusion has been at the center of the "style debate" of the 1980s, in which a number of archaeologists argued over the communicative role of material culture. The traditional approach borrowed from art history held that each (ethnic) group had its own style, which it had preserved through history, given that cultures were assumed to be extremely conservative. In their criticism of this culture-historical approach, processualist archaeologists argued that style was a "residue," i.e., properties of material culture not accounted for in functional terms. They also argued that material culture is primarily practical and only

secondarily expressive (Wobst 1977). However, style and function are not distinct, self-contained, mutually exclusive realms of form in themselves, but complementary dimensions or aspects of variation which coexist within one and the same form. If both style and function are simultaneously present in the artifactual form, then how can one tell when, and to what extent, the observed makeup of an assemblage reflects ethnicity, and when, and to what extent, it reflects activity? James Sackett attempted to make a radical break with the residual view of style by invoking "isochrestic variation," which he defined as the practical or utilitarian variation in objective properties of material culture things that makes no functional mediation difference (Sackett 1977). To Sackett, style was an intrinsic, not added-on, or adjunct, function. As an intrinsic function of artifacts, the isochrestic variation was to be found in all aspects of social and cultural life, an idea remarkably similar to the notion of *Volksgeist* which had inspired the culture-historical approach. The isochrestic variation was the attribute of material culture through which members of an ethnic group expressed their mutual identity, coordinated their actions, and bound themselves together. Polly Wiessner argued that style was a form of nonverbal communication through doing something in a certain way that communicated about relative identity. In identity displays, efficiency of message is not a major concern. On the contrary, identity displays are often extravagant, the resources and effort expended being an index of ability and worth. Moreover, style is an intentional, structured system of selecting certain dimensions of form, process or principle, function, significance and affect from among known, alternate, possibilities to create variability. When style has a distinct referent and transmits a clear message to a defined target population, it is "emblemic style," not isochrestic variation. Given that emblemic styles are supposed to carry distinct messages, they must be consistently uniform and clear in order to make recognition and understanding possible. Since they are typically used to mark and maintain boundaries of group membership, they should be therefore relatively easy to recognize in the archaeological record (Wiessner 1983). Emblemic styles often appear at critical junctures in the regional political economy, namely, at times of changing social relations, which call for stronger or broader displays of group identity. Emblemic styles are typically associated with attempts to mobilize members of an ethnic group in situations of competition for resources with members of other groups.

Material culture is therefore fundamentally social, and artifacts are rendered "appropriate" for use only in social context. Decisions about the use of artifacts are embodied in the artifacts in terms of conventions of culture. Artifacts are not properties of a society, but part of the life of that society. They cannot and should not be treated as "phenotypic" expressions of some preformed identity. In other words, what should concern archaeologists is not so much what people do, what kind of pots or brooches they make, what shape of houses they build, but the way they go about it.

International Perspectives and Future Directions

The second decade of the twenty-first century finds the archaeological research on ethnic identity in good shape. Ethnicity in the past has frequently mobilized and divided scholarly opinion. Despite a phase of devastating post-war and more recent critique, and the reticence on the part of some archaeologists, as to whether ethnicity can be recognized in the archaeological record, the topic experienced a remarkable comeback in recent years. This may be in part because scholars can now distinguish between the archaeological study of ethnicity in the past and the historiographic study of the uses and abuses of ethnicity in more recent times. While much has been written on the influence of nationalist ideologies on the development of the discipline, there has been comparatively less preoccupation with how archaeologists participate in the production of the nationalist discourse. After all, land, when imbued with symbols, intensifies ethnic identification by means of the reclamation of

archaeological sites and the repatriation of ancestral remains. The debates in the United States surrounding the Native American Graves Protection and Repatriation Act and its application in the case of the Kennewick Man have shed a new light on issues of legitimacy associated with scientific research. Yannis Hamilakis and Eleana Yalouri have applied Bourdieu's concept of "symbolic capital" to the treatment of antiquities in modern Greece (Hamilakis & Yalouri 1996). Maintaining that the acquisition of undocumented antiquities by museums encourages the looting of archaeological sites, countries such as Italy, Greece, Turkey, Egypt, Peru, and China have claimed ancient artifacts as state (or even national) property, while calling for their return from museums all around the globe. Meanwhile, the deliberate destruction of historical monuments and archaeological sites during the military conflicts in former Yugoslavia or under the fundamentalist regime of the Taliban in Afghanistan has brought the issue of cultural heritage to the center of the archaeological debates surrounding ethnicity. In such cases, it is not only a question of global cultural heritage, but also a matter of the meaning of "other" attached to those monuments and sites by the perpetrators of destruction, who perceive them as different in ethnic terms without or with very little consideration for the distance in time separating them from past populations on that same territory (Stone 2011). Conversely, there is so far very little research on the relatively widespread phenomenon of inventing archaeological cultures to serve the nationalist propaganda, although several cases have been now recorded in Eastern Europe, Central Asia, and Latin America. The transfer of ethnic meaning from artifacts in a (national) museum to architectural monuments and archaeological sites raises the equally unexplored issue of how ethnicity participates in shows of "staged authenticity" – contrived presentation of sites as if they were authentic – which are the substance of heritage tourism. It has been noted, for example, that tourists visiting the Jorvík Viking Center in York do not contrast the staging of authenticity against direct experience of the original, but rather with a mental template of the past, which is largely shaped by mediating influences. Very little is known about the contribution of archaeology to those mediating influences.

After dwelling for years upon the mistakes of the past, especially the tendency in mortuary archaeology to "read" in ethnic terms what could otherwise be interpreted as symbols of gender identity, scholars are now beginning to realize that just as in the modern world, women in the past often symbolized ethnic collectives and were regularly regarded as biological reproducers of ethnic groups, since the ethnic group's culture is commonly structured around gendered institutions such as marriage, family, and sexuality. As ethnic identity remains a topic associated more often with research on cemetery, not settlement sites, new studies have pointed out that emblemic styles appear more often with the funerary dress of women of marriageable age. This has recently prompted a shift in research emphasis to burial assemblages which stand out from their local and regional context by cultural elements – pottery or dress accessories – apparently signaling a different ethnic background. In principle, if emblemic styles may be identified on the basis of their repetitive nature at the level of the site, then anomalies may equally be interpreted as stylistic variation in sharp contrast to the uniform background of the majority. Finally, it has become clear that the most appropriate perspective for understanding how ethnicity worked in the past is the (micro-) region (Hakenbeck 2011). By working at a local level, and with complex tools for teasing out discrete differences in material culture items which may signal emblemic styles and ethnic boundaries, and for mapping distribution patterns within and between sites, archaeologists have begun to identify the contexts of social action in which ethnic identities in the past may have been created through everyday practices.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeology and Anthropology
- ▶ Authenticity and the Manufacture of Heritage

▶ China: Domestic Archaeological Heritage Management Law
▶ Cultural Heritage Management and Native Americans
▶ Greece: Cultural Heritage Management
▶ Histories of the Archaeological Discipline: Issues to Consider
▶ Hodder, Ian (Modern World)
▶ Jorvik Viking Centre
▶ Kennewick Man Case: Scientific Studies and Legal Issues
▶ Nationalism and Archaeology
▶ Style: Its Role in the Archaeology of Art
▶ Wobst, H. Martin

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Ethnicity and Identity in the Ancient Mediterranean World

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Introduction

Ethnicity and identity are important fields of research within the study of the ancient Mediterranean world. They are crucial social issues within the modern world, and it seems that they were also vital in Classical antiquity. Many different types of identity are evident in the ancient Mediterranean world – gender, age, religion, rank status, legal status, professional, regional, ethnic and cultural identities being perhaps the most notable. This entry will focus on the last two forms of identity in this list, ethnic and cultural. Ethnic and cultural identities are closely linked, and it is easy to get them confused. Yet they are distinct from each other, and constitute two separate types of social categorization.

Definition

Ethnicity is generally understood as a form of large-scale social group identity, where it is believed that group members share a common descent or ancestry (Emberling 1997: 307; Hall 1997: 19-33). It is important to note that it is *belief* in a shared ancestry that is important, rather than the facts of genetic descent. Ethnicity is a social rather than a biological phenomenon, and this distinguishes it from the concept of race. Distinctions drawn along racial lines are often made with reference to biological phenomena, including physiognomic features such as skin color, physical build, and structure of facial features. Ethnicity, in contrast, is concerned with the socially meaningful distinctions between identity groups. The determining factor is not so much whether people share a genetic link, but rather whether they think of themselves as a collective and believe that they have a shared history. For example, there are relatively few biological distinctions to be made between the various Iban peoples of Borneo. However, groups such as the Undup, the Balau, and the Ulu Ai consider themselves to be ethnically distinct, and these separate ethnic identities translate into practical and political distinctions within society. Ethnicity, then, is about the differences between identity groups recognized on a social level, rather than the differences that might be detected on a biological one. Indeed, people may ascribe to an ethnic identity (or have it ascribed to them) without any accurate knowledge about their own genetic origins.

The belief about a common descent is the crucial factor distinguishing ethnicity from other forms of group identity, and it is the essential criterion that defines an ethnic identity. Other forms of group identity can also offer a basis for collective belonging, such as local village identity, professional identity, and identity associated

with supporting a particular sports team. It is the concept of a shared ancestry and history that makes ethnicity distinct from these other types of group identity. It has sometimes been suggested that other factors (such as language, customs, religion, physical features, homeland, etc.) should also be considered as a part of ethnic identity. However, while these factors do often coincide with ethnicity and can be used to express and negotiate ethnicity, they do not define it. They are secondary aspects of ethnicity, and will be discussed in more detail in the following paragraph.

Cultural identity frequently overlaps with ethnicity, and in many cases, an ethnic group will develop a shared set of traditions and cultural traits that become closely associated with their ethnicity. These might include: speaking a particular language or dialect; wearing certain types of clothing or bodily adornment; engaging in specific types of ritual or cult practice; cooking and eating particular types of food; organizing families or the household in a certain way; and using particular objects or specific forms of material culture. Although not exhaustive, this list suggests a range of different cultural factors that may become associated with group identity. These cultural factors are indeed often linked to ethnicity, and can be used as outward signs expressing or indicating ethnicity. For example, an individual living in twenty-first century France, who cooks and eats French food, speaks French, and follows in a characteristically French lifestyle, may well indeed be French in ethnicity as well. However, while these cultural factors can indeed sometimes express ethnicity, they do not always align with ethnic identity. The same individual in twenty-first century France may, for example, be ethnically Chinese, Polish, or Pakistani. The figure of Tiberius Claudius Cogidubnus presents a good ancient example of the same principle. Cogidubnus was a king of the Regnenses tribe in Britain in the late first century BCE. Cogidubnus was described by Tacitus as an especially loyal client ruler (*Agricola* 14), and a contemporary inscription from Chichester suggests that he also adopted several Roman customs (*RIB* 91). Not only did he assume three names in the Roman style, but he also dedicated a temple to the Roman gods Neptune and Minerva, and engaged in the Roman practice of erecting public inscriptions in Latin. Cogidubnus, then, seems to have embraced a Roman cultural identity in many respects, making certain Roman lifestyle choices. It seems likely however that he retained a British ethnicity, linked to his tribe, the Regnenses.

Ethnicity and cultural identity are therefore connected but distinct. Cultural factors can contribute to a sense of ethnicity, and are often an important way that ethnicity is communicated and negotiated. But they do not constitute ethnicity. Instead, the crucial factor underpinning ethnic identity is the belief in a common origin or ancestry. Although racial and biological distinctions are also often invoked as a way of articulating ethnicity, these need not have any grounding in actual fact for an ethnic identity to have social meaning.

Historical Background

Ethnicity and cultural identity are relatively new areas of study for both the Classical disciplines and mainstream archaeology. In the early and mid-twentieth century, it was generally assumed that ethnic and cultural groups were equivalent to each other, and were also straightforwardly determined by actual biological origins and race. For example, it was thought that the "Greeks" were a racially distinct population, bound together not only by blood but also by shared cultural features such as language, religion, and social norms. Certain types of object, styles of material culture, and social practices were categorized as being "Greek." For example, the Wild Goat and Fikellura styles of ceramic decoration produced in Archaic period western Anatolia are widely referred to as "East Greek" pottery styles (e.g., Cook & Dupont 1998). It was assumed that since these styles were produced in the Greek-speaking cities of the Anatolian coast, they should be understood as an eastern regional version of "Greek" ceramic types. Ethnic labels

were attached to artifacts on the assumption that language, material culture, and ethnicity necessarily came together in a neat package. When applied in contexts such as this, the term "Greek" is being used as a category in a rigid system of cultural classification.

In adopting this positivist approach to identity, the Classical disciplines were in line with contemporary practice in other areas of archaeology. The Culture Historical school dominated archaeology, and the concept of discrete and bounded "cultures" was also important in anthropology (Trigger 1989: 148-206). The idea of "cultures" fell out of favor with the rise of the Processual school of archaeology in the mid-twentieth century, and there was relatively little interest in either ethnicity or cultural identity for some decades.

It was not until the late twentieth century that scholars began to reconsider the issue of ethnicity in antiquity. In both archaeology (e.g., Emberling 1997; Jones 1997) and Classical studies (e.g., Hall 1997; Mattingly 1997), new approaches were developed for studying ethnicity and cultural identity which avoided the pitfalls and atheoretical assumptions of the Culture History school. Recent developments in anthropology and social theory have contributed to this, and the work of postmodern thinkers such as Bourdieu (e.g., 1977) and postcolonial scholars such as Said (e.g., 1978) has had a major impact on archaeologists and classicists. It was recognized that ethnicity and cultural identity were indeed distinct from each other, and the often cited equation between pots and people was broken down. It was no longer assumed, for example, that the presence of Greek and Etruscan amphorae and drinking vessels in Iron Age Gaul implied the presence of Greeks or Etruscans. Instead, scholars considered how indigenous groups could adapt both objects and social practices for their own specific ends (Yntema 2000), and new insights have been gained into the power dynamics fuelled by imported goods and social drinking in Iron Age Gaul (Dietler 1990). The distinction between ethnicity and cultural traits began to be explored. Around the same time, it was recognized that both ethnicity and culture were different from race. The notion of racial purity within ethnic or cultural groups was discredited, as increasing evidence was found for intercultural marriages and social mobility. Overall, in the late twentieth century, classicists and archaeologists came to understand ethnicity, culture, and identity in a completely new way. Ethnicity is no longer thought of as being determined by either externally visible cultural traits, or the facts of biology. Instead, it is now understood as a form of social identity, constrained by biology but not defined by it, and actively constructed using cultural traits but not predetermined by them.

These new insights resulted in a renaissance in the study of ancient ethnicity, and a widespread reevaluation of how identities in the ancient Mediterranean are conceptualized. To return to the example of "East Greek" pottery styles, these ceramics are now increasingly viewed in their local context. Stylistic relationships with inland Anatolian pottery from Lydia and Phrygia are now recognized, and the ceramic styles are now considered to be the unique products of a hybridized local "East Aegean" ceramic tradition that includes the "indigenous" areas of Lydia and Caria as well as the "Greek" regions of Ionia, Doria and Aeolis (Kerschner & Schlotzhauer 2005: 4). Similar reevaluations have been undertaken of numerous other artifact types, regions, time periods, sites, and population groups. These new ideas about ethnicity and cultural identity have allowed scholars to open up new fields of research, as well as to shed new light on old questions.

Key Issues/Current Debates

While applicable in a wide range of ancient and Classical contexts, the study of ethnicity and cultural identity has made a particularly significant impact in some specific areas of study within Classical archaeology: colonization and imperialism; cultural exchange and contact; and political rhetoric and diplomacy. Each of these areas will be discussed briefly in the following section.

The phenomenon of Phoenician, Greek, and Etruscan colonization in the Iron Age has attracted considerable academic attention in recent decades. Postcolonial approaches and the new disciplinary insights into ethnicity and cultural identity have been crucial in this. Attempts have been made to theorize the various colonization movements of the Iron Age, identifying different motivations for migration and settlement by different groups in different contexts. Colonization is rarely now thought of as a deliberate strategy on the part of mother territories for the expansion of commercial networks or the easing population pressure. It is now more frequently explained as the consequence of innumerable independent decisions made by individuals and families for personal reasons. These could include a search for private betterment and profit; disenfranchisement following political restructuring in the mother territories; or even simply wanderlust. Relationships between migrants and indigenous groups have also been rethought. They are no longer considered to have followed the strictly asymmetrical patterns of modern European colonialism, with the colonizer dominating the colonized and imposing their culture on them. Instead, it is recognized that these relationships were often more complex than has been initially thought, with cultural influences working in both directions and new hybrid cultural forms being created from the mixing and interaction (e.g., van Dommelen 1998, 2012; Yntema 2000; Malkin 2004; Hurst & Owen 2005; Hodos 2006; Tsetskhladze 2008). Similar ideas are emerging in the context of ancient imperialism, especially with respect to the Roman and Achaemenid Empires (e.g., Mattingly 1997; Briant 2002 for Roman and Achaemenid imperialism respectively). For example, scholars no longer believe in the straightforward "Romanization" of subject populations in the Roman Empire. It is no longer thought that subject groups passively adopted Roman customs and practices, becoming "more civilized" as they did so. Rather, it is recognized that different social practices were used by different groups for different reasons, that cultural influences once more worked in both directions, and that the concept of Roman identity is in itself complex and disputed (Dench 2005; Wallace-Hadrill 2008). Unlike in the case of Iron Age colonization, the existence of asymmetrical power relations is significant, and it is recognized that subaltern experiences and resistance also offer us important perspectives on ancient imperialism (Woolf 1998; Revell 2008; Mattingly 2011). Colonization, migration, and imperialism are therefore one important area of current research.

Cultural exchange and cultural contact is another area where the study of ancient ethnicity and cultural identity has yielded especially exciting results (e.g., Riva & Vella 2006; Ulf 2008; Hales & Hales 2009; Knapp & van Dommelen 2010). We now recognize that cultural traits do not "belong" to discrete cultures or ethnicities. Rather, they are merely objects, styles, and practices which can be used and modified to suit different social functions and different historical contexts. The presence of one particular cultural trait in an unexpected social context is no longer interpreted as evidence for one population group dominating or imposing their culture on another. For example, the presence of large amounts of Classical Athenian painted pottery in Etruria is not taken to imply the "Hellenization" of the Etruscans. Instead, we now acknowledge that the exchange of objects and ideas was often accompanied by a shift in social meaning, and that ancient cultural contact was less about the passive reception of influences and more about the active appropriation of ideas and dynamic innovations. In the Etruscan example, we now realize that the preference for Athenian decorated ceramics can tell us more about political strategies among the Etruscan elites than it can about Athenian expansionism. Using these advances in theory, it has become possible to understand phenomena such as religious syncretism or the development of creole dialects in much greater detail. For example, we have learnt much about the development of the cult of Magna Mater at Rome by understanding the processes of cultural interaction and exchange which introduced the

Phrygian goddess Cybele into a Greco-Roman cultural milieu (e.g., Roller 1999). Connected to this is the question of individual identities in Classical antiquity. Individuals such as the second century CE writer Lucian of Samosata defy categorization by more traditional ethnic typologies. A Syrian by birth, Lucian was also a Roman citizen and an accomplished sophist, writing in polished Classical Greek (Mestre & Gómez 2010). In the figure of Lucian, we can see that cultural traits associated with "Greekness" and "Romanness" do not necessarily imply Greek or Roman ethnicity. Using the Greek language, engaging in Greek *paideia* (education/culture), living a Roman lifestyle, and becoming involved in Roman political debate – none of these choices prevented Lucian from claiming a Syrian ethnicity and Syrian ancestry. By unyoking cultural identity from ethnicity, and by gaining a better understanding of the relationship between the two, we have been able to take important steps forward in the study of ancient cultural contact and cultural exchange. Mixed and multiple identities, like that of Lucian, appear to be far more common than we once thought (for a variety of examples, see Goldhill 2007; Knapp & van Dommelen 2008; Derks & Roymans 2009; Gruen 2011a). Cultural exchange and the fluidity of individual identities are therefore another key theme in recent research.

Another important area is the issue of political rhetoric and diplomacy in Classical antiquity. The recent theorizations of ethnicity and cultural identity have generated important new insights into ancient politics and political history. In the past, scholars tended to assume that wars and alliances were conducted along ethno-cultural lines. The Persian Wars, for example, were often characterized as a "clash of civilization" between the Asian barbarian despots of the Achaemenid Empire and the freedom-loving European Greeks. However, as we now know that ethnicity is socially constructed, it is generally recognized that the conflict was far more complex than this. We have been able to identify the deliberate strategy on the part of the Athenians in particular of using ethnic ideology and rhetoric to create an image of the stereotypical Barbarian. Art, literature, and political discourse were all employed to promote this ideology of ethnic essentialism and opposition (Hall 1987; Lissarrague 2002). This ideology was part of an Athenian strategy for maintaining their own hegemony over other Greek *poleis* (city-states) through the Delian League, as they could argue that the cities should stay inside the League and submit to Athenian leadership in the face of the Persian threat. This anti-barbarian rhetoric, however, can be revealed as just that – rhetoric – given the evidence for real engagement with Persian culture on a practical level (Miller 1997). Ethnicity, we have realized, was not something essential and inborn, but rather something that can be manipulated for strategic and political ends. Important work has been done on the way that ethnic rhetoric has been used and abused in the ancient world in the pursuit of political ends. Good examples of this can be found in the use of foundation myths in kinship diplomacy. Individual cities used stories about their foundation to create links between themselves and other cities, paving the way for political alliances. During the first two centuries BCE, for example, many independent *poleis* in Anatolia claimed an ancient kinship with the Romans, on account of Rome's Trojan ancestry (Erskine 2001: 168). At the time, Rome was in the political ascendancy, and its power in the eastern Mediterranean was increasing. There were therefore many political advantages of aligning oneself with Rome, and myths of shared ancestry were a good way of achieving this. The political and strategic uses of cultural and ethnic identities, therefore, are yet another key area of current research.

There are many areas within Classical archaeology and ancient history, then, where the re-theorization of ethnicity and cultural identity has brought real changes in the way we understand the ancient world. This section has considered only a few of the most important and intensively researched of these. Many more areas are currently opening up for future research, and these will be discussed below.

International Perspectives

The study of ancient ethnicity and cultural identity is undoubtedly a vital area within the Classical disciplines. However, it has been pursued differently in different scholarly traditions. Scholars of all nationalities working in Britain, the USA, and Canada have been most active in the area to date, and have produced much of the theoretical works on the subject. This is perhaps linked to contemporary political issues in these countries, as multiculturalism, ethnicity, and identity have constituted an important part of the political discourse in these countries for some decades. Scholars working elsewhere have, of course, also contributed greatly to the study of ancient ethnicity. French scholarship, for example, has been especially important in highlighting the use of literary and visual representation in the construction of ethnicity, and for highlighting the potential for anthropological approaches to shed light on antiquity (e.g., Hartog 1980; Detienne 1990; Lissarrague 2002).

In recent years, there has been something of a reaction against the high profile of ethnicity and cultural identity within archaeology and the Classics. Some scholars have voiced the opinion that we may be in danger of overemphasizing the strategic aspect of identity, and that while identities can indeed be manipulated and created, it is also often true that they can command considerable emotional attachment and popular belief (e.g., Kerschner 2006; Zurbach 2012). In other words, although ethnicity may not be essential and inborn, people often feel as though it is. This critique parallels discussions that have also been happening in other social sciences such as anthropology and sociology, and archaeologists and Classical scholars are increasingly taking belief and emotional attachment into account when considering ancient ethnicity.

Another critique of the study of ancient ethnicity has recently emerged, warning against the tendency to view all group identities in the past as necessarily being ethnic. The study of ancient ethnicity has been so successful, and our modern interest in ethnicity has been such a significant factor, that we perhaps assume ethnicity is important in situations where it was not. It has already long been recognized that group identities can take many different forms, and that cultural identities are distinct from ethnicity. Despite our enthusiasm to make use of the valuable new theories we have developed therefore, we should avoid the temptation to assume that all group identities are ethnic. Instead, it has been argued that other forms of group identity need to be more carefully theorized, such as local community identity (Mac Sweeney 2011).

A third major critique concerns the current tendency to conceptualize ancient ethnicity and cultural identities in terms of binary opposites, such as Greek and barbarian, Roman and barbarian, and Roman and Greek. The current established approaches to ancient identities (for which, see above) tend to privilege the view that identities were polarized into categories of "Self" and "Other." The reasons for this, it is argued, can largely be found in the historiographical and anthropological trends of the 1970s and 1980s. Specifically, structuralist approaches based on anthropology were particularly influential. It is suggested that the study of ancient identities has been overly constrained by such structuralist approaches, and that it may instead be fruitful to conceptualize identity beyond merely the opposite of the "Other" (Gruen 2011b).

These three major critiques of the study of ancient ethnicity have most often been made by scholars based outside the Anglophone academy. However, this is no longer the case, and scholars working in British and North American universities have increasingly taken up these comments, incorporating them into new models and approaches. The study of ancient ethnicity and cultural identities is a discourse which moves back and forth and where scholars of all background and nationalities are making valuable contributions (for examples, see the suggestions listed under "Further Reading," in particular, the papers in Derks & Roymans 2009, and Gruen 2011a).

Future Directions

As mentioned in the section above, three major critiques have been made of the study of ethnicity and cultural identity in Classical antiquity. This has meant that in the last few years, new directions are emerging and new research questions are being asked. Three of these new directions will be discussed here, each stemming from one of the critiques identified above: the relationship between popular and elite perceptions of identity; the interaction between ethnic and other forms of identity; and post-structuralist conceptions of identity.

Many of the Classical sources that we have for ancient ethnicity were produced by social elites. Literary texts, official inscriptions, and public iconography are the most common ancient sources used by scholars to establish as basis for an ethnic identity. These sources are most usually produced by elites, either for an elite audience or to communicate an elite viewpoint to a non-elite audience. They cannot, therefore, be taken as evidence for the views of the general populace about ethnicity or identity. For example, a Hellenistic inscription from Magnesia on the Maeander commemorated the establishment of an alliance with Phocis on the basis on ancestral kinship (Patterson 2010: 131). This inscription would have been set up in a public space, and the alliance negotiations would have been conducted by the *polis* authorities. It is not possible to be sure, therefore, what the inhabitants of Magnesia would have thought about this. Did they believe they were ethnically linked to Phocis? Did they see the alliance as a cynical manipulation of myth for political ends? Did they consider a Phocian connection to be a plausible way of explaining their international relations? Increasingly, scholars are beginning to consider how we can explore popular ideas about ethnicity, rather than just focusing on the perspectives of elites. Necessarily, archaeological evidence has an important part to play. Archaeological material allows us to consider social practices which go unmentioned in texts and which have little impact on the public discourse. The remains of cult activities are potentially a fruitful area of investigation in this respect. Popular engagement with certain cults, and the manner of that engagement, might indicate a sense of ethnic affiliation. Exactly how this might happen, and other avenues for identifying popular conceptions of ethnicity are important new directions for future research. In order to tackle this new research direction, however, we will need to address the question of how far archaeological evidence can be used to infer ethnicity in the absence of any textual source material whatsoever. In Classical antiquity, this question is of less immediate import than in other areas of archaeology. However, it is nonetheless still a vital issue which remains to be resolved. If the essential criterion for ethnicity is the belief in shared ancestry and origins, how can this be manifested in the material record? Can the material record only show us the cultural expressions of identities, and not internalized identities themselves? Is archaeological evidence better suited for the study of cultural identity rather than ethnicity? These questions are hotly debated, with strong arguments made on both sides.

Arguing that archaeological evidence cannot illuminate ancient ethnicity in the absence of texts is not, it should be noted, a criticism of archaeology itself. Rather, this ties into the second new direction of research highlighted here. As has been already mentioned, ethnicity is one among many different types of group identity. Different types of identity come to the fore at different historical moments for different social reasons. We cannot, therefore, assume that ethnicity is always the most important type of identity. We cannot even assume it is always important at all – there may have been many situations in the ancient world where ethnicity was simply not relevant. For example, in the context of military occupation on the Roman frontier, the various collective military identities binding the soldiers together in different configurations may have been more important that any ethnic distinctions between them (Gardner 2007). Given the conditioning of contemporary society, where ethnicity and identity are burning social

issues, and given the expectations we might have from textual sources, we may be tempted to assume that ethnicity is salient in contexts where it is not. Archaeological evidence, then, potentially offers scholars of ancient identities the opportunity to approach identity in an especially open way, and to investigate the way different types of identities might interact. A particularly interesting avenue for future research is this interaction between different types of identities, and the idea of slippage in the meanings of an identity. For example, a Roman identity may at different times convey ideas about ethnicity, legal citizen status, moral standing and cultural norms, or geographical location. The interplay between these various aspects of identity – the ethnic, the geographic, the legal, and the cultural – is relatively under-theorized and ill-understood.

A third new direction for future research is the reconceptualization of ancient identities in a way which does not depend so strongly on the binary opposition of Self and Other. Instead of viewing identity in terms of structuralist models of polar opposites, we will hopefully develop more complex and nuanced ideas about ancient identities, where plurality and ambiguity take the place of rigidly defined binary categories. While such ideas are generally accepted as being desirable however, it remains to be seen how new frameworks and models for conceptualizing ancient identities will be developed. Overall therefore, while we have a good understanding of the basics of ethnicity and cultural identity in the ancient Mediterranean world, we still need to move forward with more research to gain a more complex and nuanced view.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology as Anthropology
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Ceramics, Ancient Greek
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Community and Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Culture in Archaeology
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Emporion
- ▶ Ethnic Identity and Archaeology
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (Excluding Crete), Archaeology of
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Iconography in the Roman World
- ▶ Lydia, Archaeology of
- ▶ Multicultural Archaeology
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Processualism in Archaeological Theory
- ▶ Race in Archaeology
- ▶ Romanization
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Visualizing Mediterranean Archaeology

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Ethnoarchaeology

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Introduction

Ethnoarchaeology is a subdiscipline of anthropology placed in what Binford called actualistic studies (see also the entry on "▶ Taphonomy: Definition"). Ethnoarchaeology is differentiated from other actualistic studies in that it includes the systematic observation of living societies and from other types of ethnography through its explicit focus on the intention to identify the archaeological – material – implications of human behavior. During the last 40 years, archaeologists have carried out fieldwork in traditional societies to help answer certain questions regarding the interpretation of the archaeological record and to develop and refine analogies. This research strategy has been labeled as ethnoarchaeology, and it transformed in one of the main sources of analogies. Analogy can be broadly defined as the transferal of information from one object or phenomenon to another based on certain relations of compatibility between them. Although the use of analogical reasoning in archaeology has been subject of debates, it is a current consensus that it is necessary in every step of the investigation (for a reborn debate about this subject, see Ravn 2011). In the framework of analogical argumentation, ethnoarchaeology provided information from a source better known as the living societies in order to transfer this information to another less known subject – the extinct societies.

Definition

There are many definitions of the subdiscipline of ethnoarchaeology, but it can simply and basically be summarized as the acquisition of original ethnographic data to help the archaeological interpretation. There are a wide range of synonyms such as "action archaeology," "living archaeology," "archaeoethnography," and "ethnographic archaeology." It can also be defined as the study of the relationship between human behavior and its archaeological consequences in the present; it is concern with the investigation of material culture and the built environment among living people in relation with the process which effect and affect their conversion to archaeological context (Lane 2006: 402). Among the variety of definitions and characteristics of ethnoarchaeology, one of the most comprehensive is the one provided by B. Sillar, "the study of how material culture is produced, used and deposited by contemporary societies in relation to the wider social, ideological, economic, environmental and/or technical aspects of the society concerned, and with specific reference to the problems of interpreting archaeological material" (Sillar 2000: 6). The use and application to the archaeological record of published ethnographic data (what is usually called ethnographic parallels) is not considered ethnoarchaeology, neither is the study of ethnographic collection from Museum took on for archaeological interpretations in mind (David & Kramer 2001: 11).

Ethnoarchaeology has been looked upon with a degree of mistrust due to the difficulties that exist in extrapolating from contemporary information to past societies, starting with the fact that the epistemological bases of how to conduct such extrapolations are not sufficiently developed. This has generated doubts and criticism of analogical reasoning. Currently, in despite certain inherent and difficult-to-resolve problem, the great majority of archaeologists recognize the usefulness of analogical arguments in the process of interpretation or explanation of the archaeological record and consider them as indispensable tools (David & Kramer 2001; Ravn 2011).

Another point that has generated mistrust is that to a greater or lesser degree, present-day indigenous societies – the source of analogies – have all had contact with western society and are integrated in one form or another into the process of "globalization." It has been proposed, consequently, that present-day societies cannot serve as analogical references for past societies because most – if not all – of them are a product of the postcolonial impact (for the Pacific archaeology, see critics in Spriggs 2008). This criticism, however, is unjustified and basically refers to the bad use of analogy rather to the analogy as way of approaching the study of the past societies. Ethnoarchaeological research operates under the principles of analogical reasoning, and therefore the two elements of analogy (the source and the subject) need not be the same (in the contrary case analogical reasoning would not be necessary), but rather there should be certain conditions of comparability between terms. Analogy's strength does not lie in the degree of similarity between source (in this case, the present-day society) and subject (the past society as perceived through the archaeological record), but rather in the logical structure of the argument and the similarity between the terms of the relation. Obviously, the greater the similarity between source and subject, the greater the potential of the analogical argument, but the degree of similarity alone in no way guarantees the strength of the argument or the veracity of the statements. Moreover, it is recognized that the power of a given analogy does not depend upon the delimitation of which traditional or "pristine" group is the source of the analogy, but rather upon its logical structure and the conditions of comparability.

As such, the subdiscipline attempts to formulate models that permit the better understanding of the cultural patterns of human societies, both in the present and the past. Essentially, ethnoarchaeology is a form of ethnography that takes into consideration aspects and relationships not approached in detail by traditional ethnographies; in some way, it is a look of contemporary societies with archaeological eyes and with archaeological questions in mind.

Historical Background

The attempt to use ethnographic information to interpret the archaeological record is neither new nor the exclusive domain of ethnoarchaeology. In the past, this use was named "ethnographic parallel," a method of using already existing ethnographic data, without defining criterion and limitation for this use and projecting or imposing it into a given archaeological case. What was new was that ethnoarchaeological information has been obtained by archaeologists themselves with the central objective of aiding comprehension of the archaeological record. At the same time, it was a great effort to make explicit the observed variables and the context of these observations. These facts make the analogical reasoning more viable and the results more accurate.

Although the term ethnoarchaeology was used for the first time in the 1900 by Jesse Fewkes in relation with the use of local knowledge of the North American Indians (David & Kramer 2001: 6), it was in the 1960s, upon the advent of processual archaeology, that archaeologists became interested in ethnographic analogy in a systematic way, realizing at the same time that ethnographers were not given proper attention to the study of material culture. In these early years, archaeologists such M. R. Kleindiest and Patty Jo Watson among the Pueblo Indians in the 1950s, Robert Asher among the Seri Indian of Mexico, and Peter White in the Highlands of New Guinea (Fig. 1)

Ethnoarchaeology, Fig. 1 J. Peter White taking notes during pioneer ethnoarchaeological research in 1964 when he was a graduate student working in Legaiyu village, Asaro Valley, Eastern Highlands of New Guinea. The people would identify themselves as Gahuku-Gama. In the picture, bamboo arrows are being made (Photo courtesy of J. Peter White)

Ethnoarchaeology, Fig. 2 Lewis Binford and research team during field work among the Nunamiut (Photo from the 1971 field season at Tulugak Lake, Alaska). *Left to right*: Richard Workman, Charles Amsden, Don Campbell, and Lewis Binford. On the back of the original, there is a more recent note in Binford's writing identifying it as Tulugak Lake Alaska 1971, "It snowed for 26 days" (Photo courtesy of Amber Johnson)

generated the first ethnographic set of data obtained with the specific purpose to aid the interpretation of the archaeological record.

Subsequently, Lewis Binford developed his ethnoarchaeological approach theoretically and conceptually in *Nunamiut Ethnoarchaeology* (Binford 1978), based on his research among the Nunamiut people in Alaska (Fig. 2). These contributions, together with Richard Gould (1980), who also performed pioneer work in the Western Desert in Australia, and John Yellen (1977) among the Kalahari Kung, established the foundations of ethnoarchaeology within the processual paradigm and transformed the subdiscipline into one of the most important producers of the models to interpret the archaeological record of the past societies.

Contemporary ethnoarchaeology emerged as a direct result of developing actualistic studies and optimism generated by the potential for such studies to explain the archaeological record everywhere. It was also an outcome of the need to construct middle-range theory in order to bridge the gap between the dynamics of the living

systems and the static of the archaeological record. Consequently, from the late 1970s, and especially during the 1980s, specific studies of living traditional societies by archaeologists were carried on in several parts of the world, such as Western Iran, Tanzania, the Kalahari Desert, India, and the Andes. Among them, some long-term, multistage enterprises, such as the Kalinga Project in the Philippines directed by William Longacre, the Coxoh Ethnoarchaeological Project in the Maya Highlands in Mexico conducted by Brian Hyden, the Mandara Project in Cameroon and Nigeria headed by Nicholas David, and the research carried by Valentine Roux and collaborators in Uttam Nagar and Haryana in India, deserved mention. As such, a new approach was developed – the search for general principles that connected human behavior to material culture and the obtaining of conclusions that did not depend exclusively on sociocultural anthropological theory.

The initial optimism of processual archaeology in the belief that human behavior was subject to laws (more or less similar to those of biology) pervaded ethnoarchaeology and oriented its conceptual development in the 1970s. During these early years, there was also an underlying conviction that universal laws could be generated that related human behavior to material remains. In fact, archaeologist Michael Schiffer presumed that, together with experimental archaeology, ethnoarchaeology would be the principal source for the production of these laws. Consequently, between the mid-1960s and the mid-1980s, a great attention was given to indentify and describe the process that contributes to the formation of the archaeological deposits (i.e., bone breaking and discard, use of domestic space, camp construction, and abandonment) and in the mechanisms and the physical procedures related to the production of different kind of artifacts (specially pottery and lithic tools) (Lane 2006). The research done by Susan Kent (1984) in the USA and of James O'Connell (1987) in Australia are good examples of the mainstream of ethnoarchaeology in those times. In this period, a few local archaeologists, such as Irmhld Wüst or Tom Miller Jr., started ethnoarchaeological projects in South America (Politis 2004), although their opened research has been overlooked.

In the 1980s and 1990s, ethnoarchaeology broadened its focus and began to be included within a post-processual agenda as well. The leader of this renovation was Ian Hodder, who, after his vital ethnoarchaeological experience in the late 1970s in Kenya in the Lake Baringo area, developed a new theoretical approach (Hodder 1982). The new paradigm emphasized reflexivity and hermeneutics and was based in Bourdieu's theory of practice, all of which permeated the post-processual ethnoarchaeology fieldwork, and data collection took a more emic character (as opposite of the externalism and quantitative methodology which characterized the processual ethnoarchaeology) and resulted in a greater effort to know the *meaning* of the material culture. From within post-processualism, the range of interests that ethnoarchaeology incorporated was expanded, especially as it widened its focus beyond techno-economic aspects – which dominated the previous years – to understanding greater levels of complexity, attempting to discern material correlates of the social and ideational. Principally, this new current reconceptualized material culture, seeking to determine the multiple dimensions in which it operates. In this sense, certain aspects are emphasized that were barely touched upon in previous research, such as symbolism and the study of non-utilitarian dimensions of material culture within society. Ethnicity, gender, style, power, resistance, and so on are among the new themes boarded by this new trend.

In parallel with these main trends, basically from Anglo-Saxon origins, there is a Francophone ethnoarchaeology which has its antecedents in the classic French ethnographic studies in material culture (Gonzalez Ruibal 2003: 21-22). This trend is oriented toward the identification of technological procedure (pottery, metallurgy, etc.) paying attention to the broader social context and to the learning processes.

Pioneer research in this trend was made by Allan Gallay and E. Huysecom (1989) in West Africa in relation to pottery technology.

Ethnoarchaeology, Fig. 3 The research team directed by Victor Fernandez Martinez is interviewing some Mao people (slash agriculturalists of Ethiopia). In the picture, Alfredo Gonzalez Ruibal and Derrib Worku are sitting on the fiber mat talking with the Mao in 2007 (Photo courtesy of Álvaro Falquina Aparicio)

Pierre Lemonier and Olivier Gosselain, both representants of the *technique et culture* school, have made significant contributions, specially the former who described and contributed to understand the *chaine operatoire*. Also, Valentine Roux (2007), with a more positivist and nomothetical approach (which is in accord with the French logicism), has been studying ceramic and bead production in India giving special attention to the learning and specialization process. She and Daniela Corbetta, a cognitive psychologist, have established transcultural standards in terms of how a particular kind of specialization can be defined and relating these standards to material signatures (David & Kramer 2001: 230). The ethnoarchaeological studies of Anne-Marie and Pierre Petrequin have also made significant contributions; their research has been done in relation to village construction around the Lake Nokoué in Benin and later on in East and Central Irina Jaya (Indonesia) where they studied, among other relevant themes, the *chaine operatoire* of two ancient traditions of ground-polished stone tools.

Finally, an emergent ethnoarchaeological Spanish tradition should be mentioned, although it does not have yet the impact of the previous ones. This tradition is formed by several different lines. One is developed by the team directed by Victor Fernandez Martínez in Ethiopia (Fig. 3), which is framed in the critical theory; the research on the abandoned rural housed in Galicia done by González Ruibal (2003) could be included in this line. The ethnoarchaeological project carried out by Almudena Hernando among the Q´eqchí in Guatemala is also part of this tradition although following an original poststructuralist approach (see below).

Current Debates and Future Directions

Currently, ethnoarchaeological studies had multiplied and encompassed the analysis of all types of societies, and in all the major regions of the world, long-term ethnoarchaeological projects were initiated. In recent years, ethnoarchaeological studies have been carried out among all kinds of societies in the Americas, Africa, Asia and Oceania and in some cases by non-western researcher (specially by Africans). Furthermore, these studies have not been limited to indigenous groups but have also included Creole peoples, peasants, and western urban societies. For some authors, such as Alfredo Gonzalez Ruibal, the study of western societies

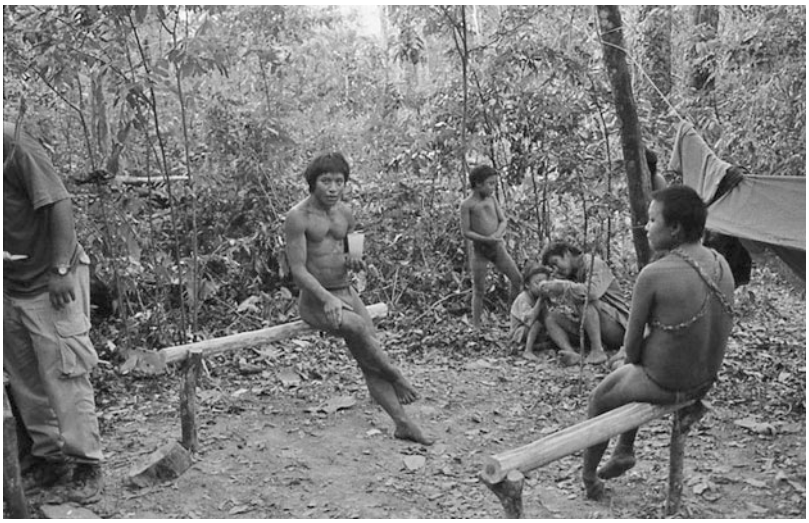

Ethnoarchaeology, Fig. 4 A couple of Hotï Indians visiting the ethnoarchaeologists' camp and drinking their beverages. High Parucito River, Estado Amazonas, Venezuela, 2002 fieldwork (Photo by Gustavo Politis)

should include among other subdiscipline – detached from ethnoarchaeology – named "archaeology of the present."

During the 1990s and especially in the 2000s, ethnoarchaeology began to be developed by local researchers in many regions of the world. This includes Latin America, where since the 1990s several ethnoarchaeological projects, basically by Brazilians and Argentineans, are in process (see review in Politis 2004) (Fig. 4). Main areas of interest in the Andes (following the work of George Miller) are pastoralist societies and ceramic production, while in the tropical lowlands, the two main subjects are hunter-gatherers (Fig. 5) and riverine village horticulturalists, such as the Guaraní.

Hunter-gatherers have been an important focus from the beginning of systematic ethnoarchaeological research (Yellen 1977; Binford 1978; Gould 1980). More recently, these societies have been approached from a variety of theoretical frameworks, from those linked with behavioral ecology (see recent review in Bird & O'Connell (2006)) to others related to historical ecology (i.e., Politis 2007) or to nonmaterialistic issues such as gender and symbolic power (i.e., Hernando et al. 2011, see also review in Lane 2006) (Fig. 6). Paradoxically, as

Ethnoarchaeology, Fig. 5 A Hotï hunter displaying his weapons (blowpipes, darts, and spears) to be recorded by an ethnoarchaeologists. High Parucito River, Estado Amazonas, Venezuela, 2002 fieldwork (Photo by Gustavo Politis)

Ethnoarchaeology, Fig. 6 Alfredo González Ruibal taking notes during an Awá night ritual in the 2008 fieldwork. Jurití village, Brazil (Photo courtesy of Almudena Hernando)

interest grows in these studies and their contributions are valued as means of archaeological inference, "traditional" societies are diminishing, especially and dramatically hunter-gatherers, and the range of variation of analogous referents is consequently reduced. Consequently, the westernization of indigenous societies notably diminishes the availability of contemporary analogous referents that reflect some of the conditions of past societies or that are comparable in some way.

Ethnoarchaeology has been active in the more general anthropological goal of understanding and exploring other forms of thought or cosmologies, which is of great importance also to archaeology (Fig. 6). Within this field, patterns of rationality and logical structures are looked for that differs from western patterns. This kind of research, basically proposed by Spanish archaeologist Almudena Hernando, is framed within post-structuralism. In this use of ethnoarchaeology, the correlation with material culture is secondary to the attempt to understand alternative cosmovisions and different logics independently of their material correlates. Obviously, one is not attempting to understand in depth extinct norms of thought, but rather detect keys to its functioning and discern how and which ideological and social factors (as well as techno-economic) acted on the configuration of the material record, where this is possible.

In spite of same pessimist forecasts and against the argument that ethnoarchaeology has little impact on "real archaeology" (see discussion in Skibo 2009), the subdiscipline is increasingly influencing the archaeological reasoning. More and more, archaeologists are using the results of ethnoarchaeological research to generate hypothesis and to test the validity of their assumptions. The reduction of traditional societies, and/or modes of life, is compensated with the redirection of the ethnoarchaeological study toward segments or subgroups of contemporary western societies. However, the methodological procedure to integrate this new set of results into the interpretation of the archaeological record still needs to be properly developed. There is methodological gap in the analogical reasoning that needs to be covered.

As a corollary, it should be noted that one of the main contributions of ethnoarchaeology is the mitigation of the ethnocentrism that permeates the archaeological view of the people in the past and the interpretation of the long-term human processes. Ethnoarchaeology, with it particular look upon contemporary societies, both traditional and western, is making a great input not only in the understanding of human behavior but also in archaeological theory building.

Cross-References

► Binford, Lewis R. (Theory)
► Ethnoarchaeology: Approaches to Fieldwork

▶ Ethnoarchaeology: Building Frames of Reference for Research
▶ Hodder, Ian (Theory)
▶ Hunter-Gatherers, Archaeology of
▶ Hypothesis Testing in Archaeological Theory
▶ Indigenous Knowledge and Traditional Knowledge
▶ Middle-Range Theory in Archaeology
▶ Post-Processual Archaeology
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Ethnoarchaeology: Approaches to Fieldwork

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Introduction

Field methods of ethnoarchaeology are based on those of ethnography, but because of the type of information that is sought, there are some record types that are more specific to archaeology. In other words, fieldwork in ethnoarchaeology is also based on participant observation in living societies, with an attitude of minimal interference in the community under study and a clear research design. However, little has been written and reflected on ethnoarchaeological fieldwork (for exceptions see David & Kramer 2001: 63-90), and in general it is not clearly specified in the reports. There are three defining elements of ethnoarchaeology that have implications in their field methods: *the study of a living culture*, with reference to the *material derivatives of human behavior*, and (when it is in traditional society) the *postcolonial context*.

Ethnoarchaeology: Approaches to Fieldwork, Fig. 1 J. Peter White in 1964 in the Legaiyu village, Asaro Valley Eastern Highlands, New Guinea: ethnicity is identified as Gahuku-Gama. White had asked the Indians to carve some nucleus to make some observations controlling some variables (Photo courtesy of J. Peter White)

Key Issues/Current Debates/Future Directions/Examples

The ethnoarchaeological fieldwork has some peculiarities. First, the overall goals are more limited than those of classical ethnography, since they are usually related to material culture, with the settlement and with the exploitation of the environment and landscape changes. This makes ethnoarchaeological work generally more specific and shorter than those of classical ethnography (although there are exceptions like the works of John Yellen (1977) among the Kung or those of Russell Greaves (2006) among the Pumé). Although post-processual ethnoarchaeology – more hermeneutic – has looked for understanding the cultural context of production of material culture and has paid more attention to emic category, this has not resulted in a substantial increase in the duration of fieldwork campaigns.

Since ethnoarchaeologists study living cultures with archaeological eyes, they record data such as places for garbage disposal, marks and breaks on a bone and its dispersion in domestic spaces and in the landscape, operational chains and sequence of artifact production, plant, and location of households and villages (Fig. 1). Thus, ethnoarchaeologists draw plans, analyze bones, record artifacts, and make maps with the skills that are specific to archaeology. Ethnoarchaeological work often includes the collection of objects and debris, such as faunal remains, the debris of a sequence of stone flaking, or broken pottery sherds, for further study in the laboratory, following analytical techniques from archaeology or taphonomy (see, e.g., Lupo & O'Connell 1987, 2002). Likewise, information is often quantified, especially in terms of size, distance, weight, and time (see, e.g., the study of Bird et al., 2009, on daily foraging trips and hunting strategies of the Martu). With the advent of post-processual ethnoarchaeology, there has been a greater emphasis on understanding the context of material cultural. The article on pottery decoration by David et al. (1988) is a good example of this trend. Moreover, from post-processualism onwards, a more emic perspective has been developed, and efforts have been put into trying to understand how the same people conceptualized and thought about their objects and their behavior and to understand its causes and motivations.

To simplify something much more complex, it is important to differentiate ethnoarchaeological observations from ethnoarchaeological projects. The former generally occur during a campaign of archaeological fieldwork. Observations made on these occasions are very useful in interpreting a specific context, but cannot always elucidate

more complex systems or generate more general models. These observations are also frequent producers of "cautionary tales," which help mitigate the ethnocentrism of archaeologists and overthrow assumptions based solely on common sense. Furthermore, ethnoarchaeological projects have an agenda and specific designs and seek to transcend the regional application; generally they seek to create general models which allow for the connection between human behavior and material culture (the classic studies of Binford, 1978, on Nunamiut are a good example of this; see also discussion in Roux 2007) or for understanding the meaning of material production within its social and cultural context (see, e.g., Gosselain 2000).

There are two main types of ethnoarchaeological projects. Those incorporated within archaeological projects, and those undertaken on their own account, without direct links to local archaeological research (although these may have originally served as inspiration). Carol Kramer's study (1982) on a vernacular architecture of Iran and Warren DeBoer work (1974) on the pottery from Peru Conibo are classic examples of the former. Ethnoarchaeological studies on Pumé conducted by Greaves (2006) or Kelly (2006) and collaborators of Mikea of Madagascar exemplify the second type. Although less frequent, ethnoarchaeological research can also be conducted within the framework of ethnographic/social anthropology projects. The famous work of John Yellen among the Kung is one of the exceptions, as it was done as part of the Harvard University Bushman Studies project, led by Richard Lee and Irven DeVore.

In general the methods and techniques of data record in ethnoarchaeology have three variants. The first is the record of the activities as they happen, with special attention to the materials derived from them and the social and ideational framework within which they occur (see, e.g., Politis 2007). This is the ideal case and should be the most successful for generating analog models. The second variant is when the ethnoarchaeologist requests the execution of specific activities in order to obtain certain types of information. This variant may allow for a better control of observation, as in experimental archaeology, with the difference that the one holding the experiment is the cultural "other." This situation is common, for example, when the researcher wants to record the making of some artifacts that are no longer made or that were not made during the period of fieldwork. The weakness of this second strategy is that it is more difficult to frame the phenomenon in its original cultural context (and so understand its causes and motivations), since induction is applied by the researcher. In both variants, ethnoarchaeologists are making increasingly frequent use of film in addition to graphic and sound recording (Fig. 2), especially taking advantage of digital cameras (Fig. 3).

The third variant uses previous knowledge about the societies to make broader ethnoarchaeological models, spatially and temporally. In this case the ethnoarchaeologist does not "observe" anything but receives oral information about some aspects of the behavior of people in the past and their material implications. Models of residential mobility among Nunamiut made by Binford (1978) are good examples of this third strategy as it incorporates the memory of traditional territories of this people. In practice, two or three of these variants are combined in the field. In all three variants, key informants are also used (Fig. 4).

Despite the relatively widespread belief that ethnoarchaeologists also dig sites, this happens rarely now. In general, ethnoarchaeologists generate the models that serve as analogies for human behavior, but are not primarily interested in recovering what is left after a place was abandoned. The generation of "archaeological record" is usually observed in real time during the fieldwork and is the interface between the living culture dynamic and static registration, which focuses the ethnoarchaeologists. Thus, the excavation of a site where observations of the living culture have been made does not have much relevance for ethnoarchaeology; the study of differential preservation of the remains belongs to the field of taphonomy and the study of the natural processes of site formation.

Ethnoarchaeology: Approaches to Fieldwork, Fig. 2 J. Peter White in 1973 in Horaile parish, near Lake Kopiago, and the local people are Duna speakers. Picture taken while they were making the film (Photo courtesy of J. Peter White)

Ethnoarchaeology: Approaches to Fieldwork, Fig. 3 Young Awa browsing the digital film machine, during night filming of a Juriti village ritual (Brazil), 2008 (Photo courtesy of Almudena Hernando and Alfredo Gonzalez Ruibal)

The ethical aspect of fieldwork is crucial (Hodder 1982: 39; Fewster 2001; Davis & Kramer 2001: 84-90). The governing ethical standards and good practice applied to general anthropological research have first priority: this includes full respect for the community and its customs, minimal interference, and informed consent. This last is sometimes difficult to obtain in its entirety, due to both linguistic and cultural differences. It is often difficult to explain the ethnoarchaeologists' passion for systematically recording (sometimes obsessively) everyday behaviors and conserving what the people studied consider junk. This is of course related to the degree of "Westernization" of the ethnic group in question, but for many traditional societies, the activities carried out by ethnoarchaeologists remain incomprehensible: why pick up and put in bags a lot of dirty bones which do not have any meat? Why draw and map the sherds of broken pottery? Full and real informed consent can be obtained quite easily in some cases, but it is unrealistic, for example, in the case of more recently contacted communities such as the

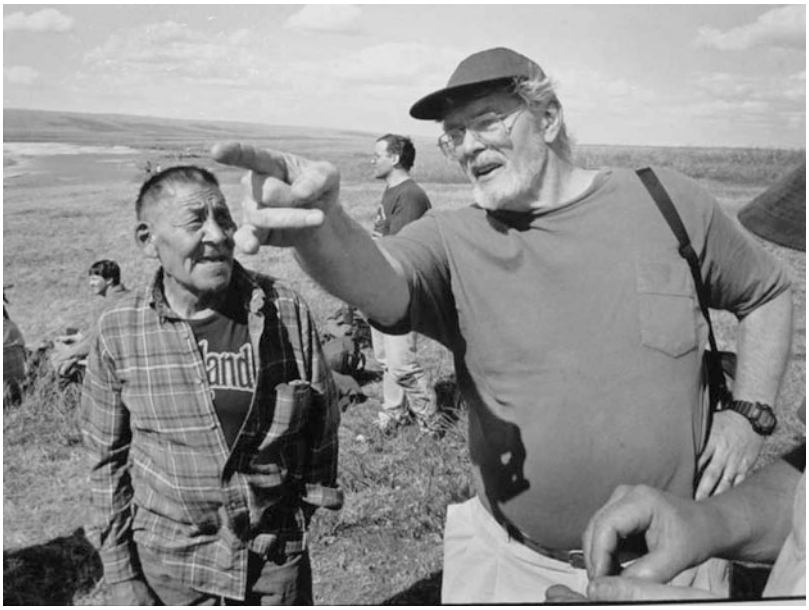

Ethnoarchaeology: Approaches to Fieldwork, Fig. 4 Lewis Binford visiting Anaktuvuk Pass in 1999. He is talking to Johnny Rulland who was his "brother" and one of his primary informants (Photo taken by Grant Spearman. Courtesy of Amber Johnson)

Colombian Amazon Nukak or the Upper Orinoco Hotï. What it is obtained is the agreement for the ethnoarchaeologist to accompany, join, and "observe" in a particular way some people in their everyday activities, but this by no means implies that the observed are fully aware of what the ethnoarchaeological research in question means. This is an ethical dilemma that is hard to solve.

Finally, the continual disruption of traditional or preindustrial lifestyles, the growing processes of ethnogenesis, and the steady advance of globalization are leading to the demise of practices which help observers interpret the past. Within this orbit, ethnoarchaeology is reorienting its strategies and objects of study, and some variants of this new trend are turning to what has been called the archaeology of the present (González Ruibal 2009). This has led to a redesign of the field methods that are closer to those of ethnography, sociology, or what is known as studies of material culture.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Ethnoarchaeology

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Ethnoarchaeology: Building Frames of Reference for Research

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Introduction and Definition

Ethnoarchaeology is a powerful strategy for structuring archaeological research questions that uses ethnographic information to make inferences about the material residues of past human activities. Ethnoarchaeology is not a theoretical approach per se, so it can investigate research questions generated from a wide variety of theoretical perspectives. Ethnoarchaeological scopes and scales of research are expanding rapidly in geography, chronology, method, and theoretical stance, from variables conditioning the manufacture of traditional technology to the evolution of symbolic expression and ritual behaviors.

Ethnoarchaeologists are uniquely positioned to construct frames of reference to aid archaeological inquiry. In this entry, "frame of reference" is defined as a *research strategy that makes projections from a better-known domain of knowledge to a less-well-known domain*. Ethnoarchaeologists examine variation in characteristics of an independent, related body of knowledge (ethnographic data) to generate frames of reference for testing and refining research about less well-known phenomena (the ways that human activities are expressed in the archaeological record and implications of the archaeological record for past activities).

Ethnoarchaeology has been described as a subset of actualistic archaeology, but unlike experimental archaeology, which is conducted under acultural, controlled laboratory conditions, ethnoarchaeology documents and analyzes behaviors that are observed or described in ethnographic settings. Unlike ethnographic analogy, which identifies similarities and infers similar causal mechanisms, and the direct historical approach, which imposes traits of present-day material culture directly onto the archaeological record, ethnoarchaeology usually takes the intermediate step of developing frames of reference to investigate the archaeological record. Human behavioral ecology and biosocial anthropology also employ real-time observations of human societies as means to structure research problems but are more narrowly concerned with biologically expressed evolutionary aspects of human behavior (Fig. 1).

There is some overlap between ethnoarchaeology and actualistic research strategies, but ethnoarchaeology does have important characteristics that define it as a separate subdiscipline of archaeology: the most significant being the conceptual linkage between the two domains of ethnography and archaeology. This entry begins with a summary of the history of ethnoarchaeology (for a more detailed review, see David & Kramer 2001) and moves on to describe functions of ethnoarchaeology in various arenas of method and theory; explore key issues, current debates, and critiques; and discuss future trends and opportunities.

Historical Background

The history of ethnoarchaeology can be summarized in four main periods of growth, drawn

Ethnoarchaeology: Building Frames of Reference for Research, Fig. 1 Quechuan woman deploys a sling, Central Peru, observed by members of her community and Margaret Brown Vega (Photo: Nathan Craig)

loosely from David and Kramer (2001). Like the archaeological record itself, the history of ethnoarchaeology is a palimpsest; traces of early tactics and perspectives can still be discerned in ethnoarchaeological research today, although they may be situated in new geographic or culture-historical contexts.

Initial Period, 1956–1967

The term "ethnoarchaeology" was first coined in 1900 by Jesse Fewkes, who was describing the direct application of present-day cultural phenomena to materials left behind by past behavior. In 1948 Walter Taylor advocated the need for a "conjunctive archaeology" that brought anthropological techniques of observation and categories of data into archaeological research. Female researchers were proponents of ethnoarchaeology early on, evidenced by Patty Jo Watson's 1950s work in Iraq, Iran, and Turkey and Maxine Kleindienst's interest in the African Paleolithic (Kleindienst & Watson 1956). The call of Taylor, Watson and Kleindienst, and others to integrate ethnographic and archaeological patterning grew from dissatisfaction with the "mainstream" strategy in the early to mid-twentieth century, which emphasized analytical categories. Culture-historical archaeology mostly involved excavating sites with relatively rich, well-stratified arrays of material remains; grouping their stylistic elements into formal artifact types; tracing the distribution of those types through time and space; identifying bounded, co-occurring sets of types as archaeological "cultures"; and explaining changes in composition and distribution by reference to past movements of people or ideas or both (O'Connell 2011).

Most early ethnoarchaeological approaches superimposed cultural phenomena observed in the present directly onto material traces of the past, and this had some success in cases where cultural continuity was strong. Analogical approaches during this time largely explored the parameters of artifact manufacture, focusing on characteristics that are visible in the archaeological record. Spatial analyses of living spaces at that time were scarce and served mostly as cautionary tales against unwarranted inferences about site structure and function (Heider 1961). This early role of ethnoarchaeology as a check and balance against "just-so stories" is still relevant today (Gifford-Gonzales 2010).

New Ethnoarchaeology, 1968–1981

The emergence of ethnoarchaeology as a major subdiscipline was linked with the advent of cultural ecology studies that documented human subsistence, technology, and mobility as essential indicators of the dynamic relationship between societies and their home environments (cf. Steward 1955). Archaeologists, moving from discernment of categories of artifacts toward descriptions of dynamic adaptive systems, realized that frames of reference were needed to explain the relationships between properties of the archaeological record and behaviors that condition for those properties. Lewis Binford's series of publications in the 1960s asserted that

archaeologists must not only use anthropological information but become proficient in anthropology in order to build frames of reference for archaeological research problems. The groundwork for ethnoarchaeological fieldwork among the Nunamiut in the 1970s grew from his doubts about F. Bordes's "ethnic geography" of Mousterian tools; Binford felt that Mousterian technological variation could be functional, but realized that he needed a frame of reference about arctic hunting tools and lifeways (Binford, *pers. comm.*). In the 1960s and 1970s, most proponents of the New Archaeology focused on adaptive systems and processual change rather than ideology and symbolic thought, and they found a ready source of baseline information in ethnoarchaeology. At about the same time, Richard Gould was conducting ethnoarchaeological fieldwork among the Ngatadjara peoples of the Australian Western Desert. His interests in symbolic and ideational behaviors led him to assert that these behaviors could be discerned in the archaeological record by identifying the anomalies between archaeological expectations and ethnographic observations.

Ethnoarchaeology underwent a brisk self-examination in the 1970s and early 1980s in a series of debating articles between Gould and Binford: Gould (1980) asserted that the proper research objectives of anthropology are symbolism and meaning, thereby confining ethnoarchaeology to the more humble realms of behavior that generate archaeologically visible material residues (e.g., cooking, toolmaking, and house construction). The danger of investigating *only* materially significant behaviors was a uniformitarian, determinist view of human culture as materially dictated. Binford countered that culture mediates human interactions with the world, and variability in those culture-environment interactions are patterned, with material signatures that are observable anthropologically (Binford 1989). This back-and-forth discussion, never "resolved," foreshadowed the vigorous processual/post-processual debates that began in the mid-1980s and continue today (see below).

The geographic scope of ethnoarchaeology expanded during the 1960s and 1970s to include nearly every region of the world, with particularly active research programs in sub-Saharan Africa and Australia. Nearly every level of societal organization was investigated with emphasis on foraging peoples, but industrialized or "state"-level societies were underrepresented during this period. Not surprisingly, accumulating ethnoarchaeological data led to the realization that linkages between behaviors and their archaeological consequences are complex. New archaeologists who sought large generalizations felt that ethnoarchaeological data were sometimes too particularistic due to the "embedded" nature of the data collection process. The 1980s arrived with no grand unifying theory of archaeology in place, but the wealth of data generated by pioneering ethnoarchaeological fieldwork during this time period remains highly influential to archaeological and anthropological research today.

Expansive Period, 1982–1999

With the advent of post-processual archaeology in the 1980s and 1990s, Hodder (1982), David et al. (1988), and others employed ethnographic information to argue that symbolism, ideation, meaning, and identity are active formative agents in the archaeological record and that material culture is itself an active agent of communication. Ethnoarchaeology was now called upon to document the social, ritual, and geopolitical contexts within which behaviors play out and the ways that materials are made, used, and employed as social and ritual symbols. Along with reflexive anthropology, which reoriented the object of inquiry from observed to the observer by making explicit the observer's sociopolitical position, post-processual archaeology focused on subjective interpretations of the textual or narrative aspects of the material record, which was described as a series of symbols. The persons conducting ethnoarchaeology were viewed as active agents of communication who influence research outcomes in non-replicable ways. Although post-processual approaches may have influenced ethnoarchaeology less than other research strategies, post-processualism addressed ritual and ideational behavior in

a more robust manner than the "new ethnoarchaeology" and led to a growth of interest in complex, sedentized societies with a more robust material record of symbolic and textual expression.

Recent Diversifying Period, 2000–2011

Ethnoarchaeology in the 2000s has expanded to include processual, science-oriented forms of inquiry about variability and evolution that involve explanation of differences and similarities as well as post-processual explorations of the ways that researcher and researched explore meaning and reify their own connections to the past: for a good cross section of current variability in ethnoarchaeological research problems, see the SAA Archaeological Record, Volumes 9(5) and 10(1). Ethnoarchaeology contains enormous potential to contribute fine-grained, reliable information to heritage and identity studies, which has captured the interest of scholars associated with descendant communities. Ethnoarchaeology has become a major contributor to intangible archaeology by documenting spiritual implications of seemingly utilitarian objects and helping to document and pass on key language terms and traditional skills to the next generation. The social systems studied in ethnoarchaeology now include foragers, horticulturalists, pastoralists, industrialized urban peoples, as well as occupational specialists from every socioeconomic status and corner of the globe. Research topics range from lithic tool production to the study of material expressions in urban Middle America. In the past three decades, the transformation of the main job market from academia to cultural resources management and other forms of public archaeology – particularly in North America – has given rise to the citation of ethnoarchaeological research for rapid diagnostic ascriptions of archaeological materials, features, and settlement complexes. Women researchers, always well represented in ethnoarchaeology, are growing in number; in the recent double issue of the Society for American Archaeology's Archaeological Record in 2009 and 2010, women authors outnumbered men by eight to two.

Key Issues and Current Debates

Functions of Ethnoarchaeology

Ethnoarchaeology as a research strategy is a chameleon, taking on different shades from the contexts of its use. Gifford-Gonzales (2010) notes that ethnoarchaeology has functioned in the larger landscape of anthropology as

- A category checker for implicit assumptions or analytic categories of archaeological materials
- A prediction tester for hypothetical statements drawn from a formal body of theory
- A middle-range theory builder that defines relational analogies in ways that are relevant to the formation of the archaeological record

These functions are generally "built in" by researchers during the formulation of research designs. Other important functions of ethnoarchaeology may become apparent after the conclusion of research, sometimes many decades afterward. In these cases, people come to realize that ethnoarchaeology has also served as

- A spoiler to received wisdom, disproving generalizations and revealing unanticipated variability
- A heritage keeper for descendant groups who have inhabited a region for long periods
- A public relations bridge builder that shows archaeologists engaging directly with living people and societies

Sometimes unintentionally, the ethnoarchaeologist may find herself or himself acquiring bodies of knowledge that are outside the "traditional" confines of archaeology; these could range from proficiency in indigenous languages to an ability to identify dozens of species of fish to competency in traditional skills like weaving, butchering, or home construction. Thus an important "after-the-fact" function of ethnoarchaeology is to broaden the experiential, intellectual, and ethical repertoire of archaeologists (Fig. 2).

Ethnoarchaeological Research Problems and Strategies

When these many functions are overlaid with different theoretical perspectives, the variation in uses of ethnoarchaeological research questions can be breathtaking, reflecting a very broad

Ethnoarchaeology: Building Frames of Reference for Research, Fig. 2 Claudia Chang talking to a Greek woman herder in Grevena in the late 1980s (Photo: Perry A. Tourtellotte)

spectrum of anthropological and archaeological research domains. The below categories are derived from David and Kramer (2001), in approximate chronological order of appearance and emphasis. Ethnoarchaeology has been, and is, employed to study

1. The ways that residues of human activities enter archaeological contexts
2. Mobility, at varying temporal, spatial, and organizational scales
3. Subsistence, including procurement and processing
4. Artifacts, including functions, as elements of technological systems; operating sequences; and taxonomic categories
5. Style and the marking of boundaries including regional studies
6. Settlement systems and patterns
7. Site formation and structure
8. Architecture, including form, construction, function, and context
9. Specialist craft production and apprenticeship
10. Trade and exchange
11. Systems of thought such as status, ideology, and mortuary practices

This list is evolving with each passing day. Emphasis in the 1960s and 1970s centered on foraging and small-scale horticultural societies with a focus on hunting and processing of game animals, production of lithic tools, and frequent mobility. Over the decades, ethnoarchaeological research has diversified to agriculturalists, pastoralists, fishing societies, and urban settings; craft specializations such as ceramics, weaving, and metallurgy are well represented.

There are very few people who identify themselves as full-time ethnoarchaeologists; rather, ethnoarchaeology is conducted by researchers trained as archaeologists in the broader sense. Whether a student or an "old hand," identifying the best data to collect – and the means to collect them – is a major challenge to the ethnoarchaeological researcher. Simple questions such as "Where should I go, and how long should I stay? Whom should I talk to? What should I observe?" can generate complex research logistics. In the field, duration of the research can play a key role in the applicability of data to the research problem; seasonal, interannual, or long-term variation is unlikely to be reflected in a 2-week field stay. But a researcher interested in manufacture of a specialized artifact type can focus field time and target observations more narrowly.

Techniques for collection of quantified data might include item counts, identifications (of species, material types, methods, architectural

traits, etc.), weights, durations, measures of distance, and demographic information. Archaeologists' proficiency at mapmaking and visual data collection like photography is very useful. Methods borrowed from the field of human ecology have proven quite transferable and include "scans" (cyclical observations of varied phenomena, such as walking through a camp and recording all activities at hourly intervals) and "focals" (targeted on individuals or activities and collected in a continuous stream for the duration of the activity, such as observing a man making a mask or following a woman on a trip to gather weaving materials). Scans provide low-resolution data at large spatial and temporal scales that offer opportunities for pattern recognition and generalizations, and focals generate high-resolution information at smaller scales that illuminate the ways that individuals operationalize bodies of knowledge in specific contexts.

The role of qualitative data is complementary and essential. Interviews and direct participation in activities (nearly always as a clumsy acolyte) can capture nuances and variability that do not manifest in quantitative data. Children and teenagers who are still in the learning phases, and enjoy interacting with unusual grown-ups, can be particularly effective language coaches, teachers, and informants. Photographs, video, and audible recordings are precious forms of documentation that can be referenced in the remote future for a wide variety of research questions. When considering ethnoarchaeological research design, it is important to consider the comfort level of the study community and its individual members with the presence of a researcher. Techniques that require prolonged observation periods in houses, or focal follows of individuals, are obviously invasive, especially early in the acquaintance between the researcher and the community. These techniques are best undertaken after a preliminary adjustment period in which the researcher becomes a known, and hopefully trusted, entity (also see Critiques, below).

Although the most visible and charismatic form of ethnoarchaeological data collection is direct engagement with traditional peoples in the field, background information collected in library settings is an essential pre-field step for structuring and refining research questions. Consulting library sources post-field will likely provide insights in the light of the ethnoarchaeologists' newly acquired knowledge. Too, traditional experts are not always available to the researcher; lifeways may have changed or vanished. In these cases, collection and analysis of ethnographic library sources alone can also contribute to original and useful hypothetical statements about material correlates of behavior and organization that can be assessed with archaeological data.

Critiquing Goals of Ethnoarchaeology

Because ethnoarchaeological research comes in every theoretical stripe, it is subject to an equally wide spectrum of critique. Ethnoarchaeology has been called particularistic by processualists, deterministic by post-processualists, and colonialist and reductive by descendant communities. This entry focuses on critiques of ethnoarchaeology as a research strategy and the ways that ethnoarchaeologically derived arguments about key linkages can lead to weak or inaccurate inferences. Wobst (1978) makes a strong case against directly superimposing ethnographic observations, which are localized and temporally narrow, to archaeological data, which reflect long periods of time and/or clusters of sites or regional scales. This could be read as a critique of ethnoarchaeology, particularly in its early career as a fairly direct means of comparison. The intervening step of deriving a hypothesis from appropriately scaled ethnographic observations (e.g., numerous comparable observations on similar subject matter or observations taken from a large spatial area) that can be tested using archaeological data should, in most cases, alleviate the issue raised by Wobst.

Obviously, the successful application of ethnoarchaeological observations to archaeological problems requires the researcher to understand the context and applicability of observations, and a reasonable critique is that ethnographic techniques can never "perfectly" capture phenomena. If an observed behavior or relationship is anomalous, or observed/interpreted in error, the

usefulness of the research is lost or reduced. This can result from insufficient consideration of variability (such as overstating the applicability of a small-scale observation) or observations never made (a researcher cannot be everywhere at once and may miss important facets or variations of systemic relationships). Something as simple as unwillingness of a host community or informant to discuss a sensitive subject, or insufficient control of the language by the researcher, can also compromise the accuracy of observations. Addressing this critique requires careful attention to the context and applicability of observations to one's research problem, adjusting as needed, and acknowledging data gaps and future research needs.

A related critique of ethnoarchaeology as a research strategy is insufficient integrity or "authenticity" of the traditional nature of the study culture (e.g., Belcher 2009; Jones 2009; Hudson 2010). The excitement and controversy generated by discoveries of the Tasaday and other small, allegedly pristine "Stone Age" groups highlight the hunger of the academy and the larger public for cultures unaltered by the modern world. Once more, ethnoarchaeologists must emphasize the role of the intermediary role of the frame of reference, which requires that the research question specify scales of observation, and exercise control over properties that vary and those that are held constant. For example, an ethnoarchaeological investigation of wild plant gathering might note that women climbed through barbed wire fences and carried metal machetes. This does not compromise the value of observations of, say, the number and type of plants gathered, the decision when to leave a patch, the relative contribution of young girls and a blind woman in the group, and distribution of raw and cooked plant foods to family members back at camp. However, if the women hitch a ride to the gathering site on a friendly rancher's truck, this obviously reduces this trip's explanatory power for patterns of mobility. A similar issue is lack of control over context: no field conditions today can approach the conditions encountered by foragers colonizing the Australian Western Desert in the Pleistocene, for example. No people (or animals) resemble Pliocene hominids today, so using ethnographic information to explore Pliocene behaviors is risky according to paleoanthropologists (Liebermann et al. 2007). Addressing conditions for which there is no modern comparative context requires close control over variables and clear, defensible rationales for the derivation of ethnoarchaeological frames of reference and their application to archaeological questions (Fig. 3).

Related to the above is inadequate applicability or "fit" of ethnographic observations to the archaeological record, a very common critique. Ethnoarchaeologists frequently find themselves explaining to a variety of audiences why motorized transportation, modern tools, wage labor, loss of language, participation in the national education system, nontraditional clothing, manufactured items and commodity foods, and other influences of the globalized culture and economy do not *necessarily* compromise the value of ethnoarchaeological observations. Global influences cannot be ruled out in most ethnoarchaeological field contexts, and (as with the Pliocene case above) ethnoarchaeologists must maintain good control over variables, describe defensible rationales for deriving ethnoarchaeological frames of reference, and explain clearly their application to archaeological questions. This is no reason to cease the practice of ethnoarchaeology: indeed, the continual influence of industrialized, globalized society and its material forces on traditional life and culture enhance the research utility and heritage value of ethnoarchaeological observations.

The uneven use of ethnoarchaeological concepts in public archaeology has received its share of criticism. Few archaeologists working in public archaeology have not seen the forager/collector dichotomy (Binford 1980) invoked to explain everything from site distribution and structure to lithics, along with curated/expedient tools, and MNI/NISP for faunal remains, particularly in dealing with foraging cultures. Simplistic application of ethnoarchaeological categories can be a cost-effective way to "interpret" the archaeological record, leading to hasty assignment of archaeological materials to established,

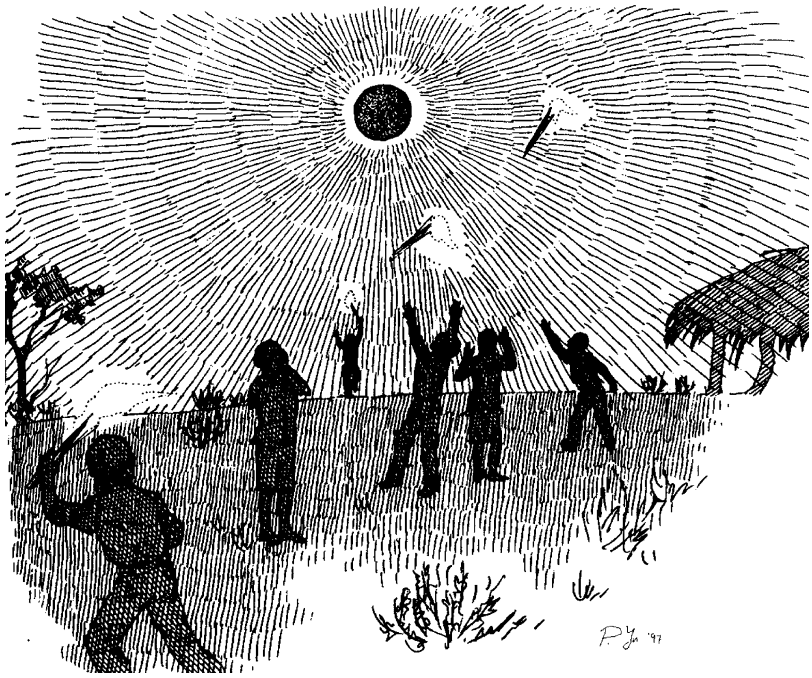

Ethnoarchaeology: Building Frames of Reference for Research, Fig. 3 Illustration of rituals associated with lunar eclipse, Doro Ana community of Pumé Indians, Venezuela, 1993 (Illus. by Pei-Lin Yu)

prescriptive categories. This is reminiscent of culture-historical taxonomics and forecloses the strength of ethnoarchaeological research, which lies in the formation of frames of reference prior to data analysis. However, ethnoarchaeology has an important role to play in public sector archaeology; data can contain information of immense value in hypothesis generation and testing for cultural resources-related research. In the past 20 years, descendant communities have become professionally involved with the practice and goals of public archaeology and are recruiting ethnoarchaeological information for the preservation, protection, and perpetuation of cultural heritage in both tangible and intangible realms.

Critiquing Methods of Ethnoarchaeology

The unpredictability of fieldwork is particularly high in ethnoarchaeology; a reasonable critique is the likelihood that unanticipated field conditions will compromise a research agenda. If ethnographic background data used to structure the research question are not adequate or field conditions (geopolitical, socioeconomic, environmental, climatic, etc.) are dramatically different from those anticipated, the researcher must be prepared to adjust data collection methods or even research questions, all while living under conditions that are challenging in and of themselves. For this reason, many ethnoarchaeological research programs build in a brief reconnaissance prior to the main body of fieldwork, to assess conditions and make adjustments. Failing to account for the influence of a researcher in the community and resulting compromise in the validity of observations constitutes another basis for methodological critique; the immediate local economy is altered by trade relationships or provision of goods or wages, and the status of the community relative to neighbors and the government will almost certainly change. Researchers bringing food or tools for themselves or the community, or providing medicines or trade goods, can have a huge influence on a small traditional community – sometimes leading to undesirable impacts. These considerations should be front and center when planning for ethnoarchaeological research.

Critiquing Ethics of Ethnoarchaeology

The ethical landscape affects how ethnoarchaeological research is structured, carried out,

interpreted, applied, and referenced. More importantly, ethical decisions that a researcher must make on a daily basis can have a disproportionate effect on the economic, physical, emotional, and spiritual health of the community and its members. Many ethical issues echo those of ethnographic fieldwork: how should the researcher reimburse people for information? If yes, how? For shouldering the burden of a naïve anthropologist living in their midst who often must be fed, protected, housed, and instructed? Is it appropriate to enter into wage relationships for services like laundry, housecleaning, and food? Should an ethnoarchaeologist interfere in situations like the perceived mistreatment of a child or a helpless person? What about reporting abuses or crimes perpetrated by neighbors, local military, or local governments? How should the ethnoarchaeologist best protect sacred or other sensitive information? What about personal involvement with a community member? Each situation will require careful, and sometimes very rapid, decision-making – and "one size does not fit all." One guarantee in ethnoarchaeological fieldwork is that the ethnoarchaeologist will be called upon to deal with ethical situations that she or he has not anticipated, which increases the value of a short reconnaissance before major fieldwork.

Critiques from within and without have strengthened and refined this uniquely productive and powerful research strategy and are worth careful consideration by practicing ethnoarchaeologists, students of ethnoarchaeology, and scholars who use ethnoarchaeological data collected by others. Taking steps to avoid, offset, or remedy theoretical, methodological, and ethical pitfalls involves background research, discussions with experienced field researchers, and excellent communication skills with communities in which researchers live and study.

International Perspectives

As the theoretical stage of ethnoarchaeological practice has broadened, so has its use by non-Western researchers from all over the globe. Some areas of emphasis are listed in Table 1 below, summarized from David and Kramer (2001) and a survey of recent journal articles in international ethnoarchaeology.

Ethnoarchaeology: Building Frames of Reference for Research, Table 1 A sampling of topics in non-Western ethnoarchaeological research

Research subject	Geographic area
Ceramic-making and its larger role in society	Philippines, Mexico
Settlement patterns as they relate to house construction, agricultural practices, ethnohistory, ethnogenesis, and community interactions	Africa, China, Palestine
Material expression of symbolic behavior, including animal sacrifice and mask design/construction	Africa
Metallurgy	India, Africa
Agropastoralism	India
Post-disaster recovery subsistence and exchange	Iran
Tropical mobility and technology, architecture and settlement	South America

Underrepresented in this listing are South America, North America, and Australia. Although robust ethnoarchaeological research has been carried out in these countries, researchers are usually of Western European or Euro-American origin. This situation likely reflects low numbers of archaeologists of non-European descent in nations with colonial pasts. However, the growth of legislation mandating cultural resources management-related archaeology is fostering the growth of Native American archaeology programs and students in North and South America. Increasing research partnerships between archaeologists and Australia's First Peoples are gradually integrating scientific and cultural heritage perspectives on the goals and techniques of research about ancient peoples.

Regardless of the ethnicity of the person collecting the information, there is considerable overlap in the value of ethnoarchaeological data to both scientific and traditional domains of knowledge. "Salvage ethnoarchaeology" can help document and perpetuate lifeways that are in danger of being overwhelmed by global culture and economies. This contributes to the

stewardship of heritage both tangible and intangible. Ethnoarchaeology carried out "of the people, by the people, for the people" can provide data that are simultaneously

- Germane to archaeological inquiry
- Relevant to heritage resource managers, museums, and heritage tourism
- Essential to descendants striving to maintain and transfer traditional knowledge, skills, techniques, materials, and worldviews (also see Conte 2006)

Future Directions

Ethnoarchaeology is maturing as a research strategy. David and Kramer (2001) describe maturity as "progressive incorporation into the discipline from a variety of viewpoints within a broadly agreed philosophical framework, a range of lively approaches to diverse subject matter, and the appearance of second generation studies that group and synthesize individual case studies" (31). There is no doubt that ethnoarchaeological data will continue to inform and structure archaeological research far into the future; the value of these data grows daily as traditional knowledge becomes transformed by global culture and economy. When combined with expansion of the research enterprise to archaeologists from increasingly diverse cultural backgrounds, the scope, depth, and societal value of ethnoarchaeological research will continue to broaden (although the data collected may become less obviously generalizable, at least in the short run).

That said, the boundary between "scientific/theoretical" and "heritage" ethnoarchaeology is porous and mutually beneficial. Lewis Binford noted that members of the Nunamiut community felt his research was very important and directed children to watch elders as they demonstrated traditional hunting, butchering, and construction techniques for anthropologists. Children followed Binford and his crew around on their mapping trips (Binford, *pers. comm.* 2006). The author of this entry was recruited as a "teaching tool" by Pumé parents and grandparents during fieldwork in Venezuela, and educating the anthropologist in traditional skills and knowledge provided one more way for the Pumé to maintain continuity and integrity for the next generation (Yu 1997). Ethnoarchaeological data collected and used for research purposes have irreplaceable, and growing, value for other anthropologists and the traditional peoples of the world. The ethnoarchaeological data collected today certainly possess scientific and heritage value that may not be obvious today.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Archaeology as Anthropology
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Indigenous Peoples, Working with and for
- ▶ Middle-Range Theory in Archaeology
- ▶ New Archaeology, Development of
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory

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Ethnoarchaeology: Learning from Potters in Gilund

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Introduction and Definition

Ethnoarchaeology is an ever-expanding subdiscipline within archaeology, and pottery undoubtedly gets more than its fair share of attention. But with recent social and economic trends, it can be seen that opportunities of undertaking certain kinds of ethnoarchaeological study are themselves diminishing. By an interesting coincidence, the village of Gilund in Rajasthan, NW India, was host to an important early third millennium BCE, Chalcolithic settlement of Ahar-Banas Complex (Sankalia et al 1969; Shinde & Possehl 2005), and at the same time to some of the last indigenous potters still working in the twenty-first century CE. The modern village of Gilund is located approximately 1.5 km from the archaeological site of Gilund, northeast of the modern village. The potters are locally called *Kumhar*. According to the potters and their family members, use of earthenware or ceramic vessels is no longer profitable because of modernization and the popularity of stainless steel vessels. None of their children have taken up this tradition, which is therefore likely to disappear with the present generation of adults. These potters will be the last to practice, and in this respect ethnoarchaeology is itself under threat (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

All the potters in Gilund obtain clay from the same source, named Soniana, which lies approximately 8 km to the northwest of the village. On rare occasions, usually for emergency purposes when demand is higher than expected, the

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 1 Women carrying both earthen ware vessels and steel vessels during a marriage ceremony in Gilund village (Sarkar 2011)

potters get clay from a location much closer to the village named *taknivali nadi*. In this case, the clay is transported to their homes by donkey which is owned by them. Pottery produced in Gilund is customarily ornamented with red and white pigment. The red pigment locally called *harmachh* and the white pigment locally called *Khadi* are brought from a market in Gangapur, which is approximately 25 km from Gilund. The potters purchase one year's worth of pigment at a time.

Potters in Gilund usually prepare their clay 2–3 h before they plan to make vessels. The raw clay is first pounded to reach to a finer consistency and then sometimes sieved in order to remove large impurities. Water is then added to the crushed clay and wedged until it has a sticky yet elastic consistency. Some potters add ash or dried donkey dung to their clay as tempering material. After a vessel is shaped on the wheel and dried to leather-hard condition, it is then carefully beaten to achieve the required shape by using a marble dabber – *pindi* in the local Mewari dialect – and the other implement used is a wooden tool called *thapa*, which looks like a table tennis bat.

After the vessel is made on the wheel and then beaten to its required shape, the outer surface is rolled in ash, locally called *bani*. Once dried in the sun, the vessel is then dipped into a liquid of dissolved red pigment. The most common surface treatment is painting. The pots are painted in both geometric and naturalistic designs. These include straight and wavy lines, dots, and leaf and peacock designs. Most of the surface treatment and design is done by women of the family, both old and young, using a paint brush of donkey tail hair. Pots are open fired in fields close to the potters' houses or in the workshops themselves. Generally, cow dung, wood, and twigs are used as fuels.

The modern pottery of Gilund village (Sarkar 2011a, b) can be classified into types used for storage, cooking and food processing, eating and drinking, ceremonial, and miscellaneous, following the typology designed by Dr Malti Nagar at Parla (Nagar 1967). *Storage and cooking vessels* include the *matka*, a big globular pot with broad mouth, round belly, and base. It is used for fetching water and for liquid storage, particularly for water and butter milk. *Matki* is a smaller version of the matka with the same function. *Pauni* is a *tawa* (slightly concave disk-shaped griddle) for making *chapatti* (flat bread made of whole wheat flour). A *Kelaria* is similar to a *pauni* but comparatively deeper.

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 2 (*Left*) Chalcolithic, narrow-mouthed, globular pot in thick red slipped ware from Gilund; (*right*) modern day matka (Sarkar 2011)

Kala handi or *munho* is narrow-mouthed carinated cooking pot mostly used for making butter milk. They are burnished on the outer surface. *Chuklio* and *nani chuklio* are small globular pots used for drinking water or transferring water from larger pot.

Ceremonial vessels include *dhupania* which are incense stands used in worship and in rituals. *Karva* are small globular spouted pots used by married Hindu women during *Karvachaut* (a festival celebrated by Hindu married women where they keep fast that ensures the well-being, prosperity, and longevity of their husbands). *Dela* is similar to *karva* without the spout and is used by the Hindus to proffer offerings in death rituals. A similar vessel is used by Muslims in the village to drink water. *Bijora*, *dhakno*, *dhakni*, and *dhankan* take the form of small goblets with narrow mouths and pointed bases. *Miscellaneous vessels* include the *gurga* – a stand. A handi-like vessel is made first; it is then separated along the line of carination. The upper part is used as stand for seating cooking vessels over chulhas, and the lower portion is used as tawa. A *galla* is a coin box, for collecting money. *Deepak* are lamps.

The prehistoric Chalcolithic people at Gilund seem to have used narrow-mouthed and wide-mouthed globular jars in coarse red ware and thick red slipped ware which are very similar to modern *matka* and *matki*. Similarly, the carinated wide-mouthed cooking vessels in gray ware recall present-day *handi* produced in Gilund Village (Fig. 2).

Another remarkable resemblance is found between the present-day *dhupania*, which are incense stands used in worship, with dishes-on-stands and bowls-on-stands retrieved from Ahar-Banas Complex sites (Sankalia et al 1969) (Fig. 3).

Further striking similarity may be noted between a vessel from the Ahar excavation described as "crucible-like with slightly sloping sides, bulbous at the belly, rimless" to that of the vessel in which *lassi* (butter milk) is sold on trains in Rajasthan. There is even similarity in the painted decorations. Present-day potters in Gilund village use painted motifs such as groups of straight or wavy lines, dots, and hatched diamonds, which parallel Chalcolithic buff ware and BRW's groups of straight or wavy lines, spirals, dots, hatched diamonds, concentric circles, and chevrons filled with dots and circles (Sankalia et al. 1969: 88–98) (Fig. 4).

Thus, ethnographic data gathered from the present village potters of Gilund has been able to throw some light on the Chalcolithic pottery of Ahar-Banas Complex including likely methods of manufacture and the possible functions of certain ancient vessel forms. This shows that ethnographic data helps us in providing insights into the technology and behavior of prehistoric people.

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 3 (*Left*) Modern day dhupania manufactured in Gilund village; (*right*) Chalcolithic bowl-on-stand reported from Ahar (courtesy of Deccan College) (Sarkar 2011)

Ethnoarchaeology: Learning from Potters in Gilund, Fig. 4 (*Left*) Example of Chalcolithic painting on buff ware reported from Ahar; (*right*) similar painting executed on present-day pots in Gilund (Sarkar 2011)

Cross-References

- ► Ethnoarchaeology
- ► Ethnoarchaeology: Approaches to Fieldwork
- ► Ethnoarchaeology: Building Frames of Reference for Research

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Ethnomuseology

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Introduction

Ethnomuseology is the field of scholarship concerning culturally appropriate museum curation and conservation of ethnographic materials using methods that reflect social, cultural, spiritual, or religious aspects of objects. These include traditional and ceremonial forms of care of culturally or spiritually significant objects in mainstream museums as well as methods being used in some community museums, cultural centers, and keeping places where cultural materials, knowledge, and values are actively being maintained and renewed using both traditional practices and conventional museological methods (Clavir 2002; Simpson 2003, 2006a, b, 2007; Kreps 2003; Peers & Brown 2003; Haakanson & Steffian 2004; Henry 2004).

Definition

Conventional museum practices are generally based upon Western scientific principles and the materiality of the object. An ethnomuseological approach is more holistic. It is informed by local knowledge systems and by the spiritual beliefs, cultural protocols, and rituals of source communities and reflects the functions, meanings, values, relationships, authority, and power attached to specific cultural materials by traditional owners.

The prefix "ethno," from the Greek word "ethnos" meaning "people," follows Harold Conklin's introduction of the term "ethnoecological" in 1954 to describe the practices of plant cultivation in different cultural settings, a term that was then adopted by other writers, including Ward Goodenough, William Sturtevant, Catherine Fowler, Darrell Posey, Victor Toledo, Virginia Nazarea, and Duncan Cameron, and which is now widely accepted. In many fields of study and related professional practices, when a concept develops or occurs as a global phenomenon, it is adapted, reinterpreted, or manifest in local forms according to the system of knowledge and cultural values in any particular cultural setting. Recognition of knowledge as a social construct has led to the development of culturally diverse forms of many disciplines. Culturally embedded subdisciplines – such as ethnoastronomy, ethnomathematics, ethnocomputing, ethnomusicology, ethnoarchaeology, and ethnomuseology – emphasize anthropological studies of these disciplines within contemporary societies in local and global contexts. The philosophical intent underlying these developments is to avoid the application of rigid Eurocentric disciplinary practices that impose Western concepts and values to the exclusion of alternative, culturally specific perspectives.

The study of and incorporation of ethnomuseological practices extends curatorial and conservation concerns from the physical to include intangible and spiritual dimensions by using culturally appropriate museum practices that reflect cultural, spiritual, and ethnoscientific principles and the customary laws of traditional owners. This approach incorporates diverse viewpoints and "recognition of the unique values, associations and qualities inherent in the material culture of the originating community. It responds

to the concepts divulged through interrogation of objects from an ethnographic and an ethno-aesthetic standpoint and accommodates specific cultural signification through historical and cultural associations, religious expression and concepts of the sacred" (Simpson 2003).

Indigenous curation methods, used to protect and preserve tangible and intangible forms of heritage, are based upon knowledge, values, and practices that are in themselves forms of intangible heritage. They are both a method of preserving heritage and, in the process, are being preserved and renewed themselves.

Historical Background

The first references to "ethnomuseology" occur in literature emanating from eastern European countries, such as Romania and Czechoslovakia from the 1980s onwards, where it is used in reference to ethnographic museology. In these contexts, ethnographic collections comprise material culture from rural communities in those countries, and references to ethnomuseology emphasize the significance of local, rural, or village life for providing evidence of authentic forms of culture (Stránský 1981; Nikocevic 2001).

This is in contrast to museums in Western European and other Western countries, where ethnographic museology and "ethnomuseology" initially referred to the curation and conservation of ethnographic collections comprising material culture from "foreign" cultures most typically from non-Western cultures in Africa, Asia, the Americas, and the Pacific. While these were informed by field research amongst traditional owners, museum curation and conservation practices remained in the hands of non-Indigenous museum staff using methods based upon Western scientific principles and the physical materiality of the artifact.

Over the past two to three decades, source communities have become more actively involved in the management and academic study of their heritages through increased collaboration between museums and Indigenous peoples. The involvement of traditional owners in ethnographic museology provides opportunities for curators to gain new insights into the nature, significance, and traditional uses of objects in the collections. Berta G. Ribeiro, a Romanian anthropologist who conducted research amongst Amazonian peoples, used the term "etnomuseologia" to describe the work of the Emile Goeldi Museum in Belem, Brazil, where anthropologists, curators, and Amazonian Indians have been working together to research and interpret the collections and present collaborative exhibitions which reflect the knowledge of traditional owners (Ribeiro 1994). Anthropologist Glenn Shepard, referring to the involvement of the Kayapo (Their autonym is Mebêngôkre) Indigenous people of Brazil with the Goeldi Museum, describes ethnomuseology as an approach that "puts indigenous peoples into dialog with their own heritage" (Shepard 2012a, b).

Key Issues

Collaborations between museums and source communities lead to a two-way flow of knowledge that enhances curatorial understanding of the meanings, values, and significance of objects for traditional owners and in many cases also facilitates the renewal of Indigenous knowledge and understanding of ancestral objects amongst current generations. The entry of Indigenous people into professions such as archaeology, anthropology, museum curation, and conservation has opened these areas to influences from diverse knowledge systems and philosophical perspectives.

The significance of world views and the need for diverse cultural approaches to heritage management and conservation were recognized at an international level relatively recently. The UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage Protection (commonly referred to as the World Heritage Convention) became the first international legal instrument to acknowledge cultural and spiritual values attached to landscape, when

guidelines were adopted at the 16th session of the UNESCO World Heritage Committee in 1992, to include cultural landscapes on the World Heritage List. The importance of intangible and spiritual aspects of heritage were further reinforced by the Nara Declaration on Authenticity in 1994, revisions to the Burra Charter in 1999, the Tokyo Declaration on Cultural Diversity and Heritage in 2000, and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage in 2003.

The development of ethnomuseology and culturally appropriate museum practices is addressed in a growing body of literature by museum conservators and curators. Most, but not all, discuss policy developments in collecting, conserving, and managing Native American, Canadian First Nations, New Zealand Maori and Australian Aboriginal and Torres Strait Islander cultural materials, and also in parts of Indonesia and the Pacific (Canadian Museum of Civilisation, University of Victoria and Commonwealth Association of Museums 1996; Simpson 2001, 2003; Clavir 2002; Kreps 2003; Peers & Brown 2003; Hunter et al. 2003; Capone & Loren 2004; Haakanson & Steffian 2004; Henry 2004; McCarthy 2011). A forum in 2003 provided further examples of religious perspectives that apply to conservation practices in including the use of specific materials and procedures when conserving and exhibiting sacred items of Judaica and guidelines and restrictions observed by the Islamic Arts Museum in Malaysia in the care of Islamic heritage items according to Shari'ah law (Stovel et al. 2005).

Examples

Museum Practices Informed by Ethnomuseology

While conventional Western museological practices remain dominant in most museums, there are nevertheless significant changes taking place as museums adopt conservation and collection management practices that reflect the beliefs and values of traditional owners and the intangible dimensions of objects by incorporating Indigenous cultural and spiritual protocols into collection management and conservation policies.

Methods of museum care and conservation employed at the request of traditional owners frequently relate to the spiritual care of objects. Traditional owners may request that museums establish protocols concerning specific ways of handling and storing sacred and ceremonial items, or the performance of rituals of care or protection, such as singing, smudging, and feeding (Simpson 2001, 2003; Clavir 2002; Sullivan & Edwards 2004). At the National Museum of the American Indian (NMAI) in Washington, DC, traditional forms of care are applied at the request of representatives of American Indian tribes. These include orientating objects to the cardinal directions; segregating materials from different tribes; covering certain objects from view; ceremonial feeding or dusting with corn pollen; smoking ceremonies using cedar, sage, tobacco, or sweetgrass to cleanse an area or those who enter the area; restrictions upon freezing or creating low-oxygen environments (e.g., by covering with plastic); and no opening or disassembling of sacred or ceremonial bundles (Hunter et al. 2003; Henry 2004).

In the Alutiiq Museum in Alaska, "spiritual care" is an integral part of museum curation and conservation. The museum's *Guidelines for the Spiritual Care of Objects* explains the nature of Alutiiq sacred objects, the Alutiiq belief that "everything in the universe – the wind and the animals, the rocks and the trees, has a *sua*, a human-like consciousness" and therefore requires special care. The staff members:

> approach collections care by combining the best Western conservation techniques (for physical stability) with practices that reflect Alutiiq values (for spiritual care). Like Alutiiq people of all eras, we use the best technologies available in ways that are uniquely Alutiiq. For example, we store stone lamps in seats of archival-quality foam on non-off gassing, baked enamel, space-saver shelving, but they are stored upside down, a practice that keeps their spirits from departing .... Extending very special treatment to religious artifacts, therefore, mirrors traditional practices of caring for cultural property. By honoring the cultural perceptions that existed when artifacts were made, we maintain their integrity in the modern world (Haakanson & Steffian 2004: 1).

In some museums, rituals such as smudging, blessing, or purification are now regularly performed as part of the curatorial care of objects. These may be conducted by traditional custodians such as elders, ceremonialists, priests, or others who have the responsibility for preserving, handling, and conserving sacred and ceremonial objects or by curatorial staff authorized to do so (Mibach & Green 1989; Herle 1994; Simpson 2002; Haakanson & Steffian 2004; Conaty 2006; McCarthy 2011).

The performance of rituals and ceremonies associated with artifacts serves as a mechanism for helping to preserve the intangible forms of heritage. Jim Pepper Henry (2004: 105), assistant director for Community Services at the National Museum of the American Indian, explains that having Native American priests and ceremonialist regularly perform rituals is seen as preserving and perpetuating "living culture," a central philosophy of the NMAI and of many other museums that employ ethnomuseological approaches.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Conservation in Museums
- ▶ Heritage Museums and the Public
- ▶ Human Remains in Museums

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Europe Incastellated: Medieval Archaeology

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Introduction

The castle is perhaps the signature building of the European Middle Ages. Whether surviving as earthworks, ruined masonry or, in a minority of cases, still inhabited, castles are a testament par excellence to the ambition and achievements of the landed aristocracy that ruled Europe from the eleventh to the fifteenth centuries. The castle's origins, longevity, and decline were intimately bound up with the European system of social relations and landholding conventionally defined as feudalism. In the popular imagination, the castle is associated primarily with its military function, but equal weight should also be given to its more domestic aspects and role as a residence. The subject has seen considerable revision in the past two decades, and debate has chiefly focused on the martial character of the castle, with a strong tendency to emphasize the role of the castle as an icon of lordship and as a visual projection of seigniorial power, as much as a tool of war.

Definition

The term "castle" derives from the Latin *castrum*, "fortification," and took a variety of vernacular forms across Europe, such as *chastel* in French, *castillo* in Spanish, *castello* in Italian, and *Berg* in German. The classic definition of a castle is that of "the fortified residence of a lord," which neatly encapsulates the idea that in essence, it is a fusion of both fortification and residence. Such a definition has the utility of distinguishing the medieval castle from those fortifications such as Roman forts and Iron Age hill forts which, although sharing some of these attributes

(and confusingly also sometimes referred to as castles during the Middle Ages and beyond), did not combine both and so never constituted the private residences of individuals. In castle studies, the emphasis has traditionally been placed on the fortified element of buildings, as the presence of battlements, arrow loops, and other defenses marked out a castle from the unfortified manor or palace.

In almost every other way, the definition of the castle is problematic. In particular, arriving at a clear definition is bedeviled by the fact that during the Middle Ages, the word *castrum*, or its diminutive *castellum*, was not only a term applied to fortified residences but numerous other structures, such as chambers, urban defenses, the fighting platforms of ships, and sometimes the precinct walls of monastic houses. Especially in modern English usage, the word "castle" has lost the more wide-reaching medieval definition and refers chiefly to its function as a fortification. A closer medieval approximation is found in the modern French use of the word "chateau," which can apply equally to buildings of the twelfth or eighteenth century, inasmuch as it refers primarily to the noble status of the lordly residence.

A further complication is that even if used in a restricted sense and applied only to the fortified homes of the medieval aristocracy, definitions are hampered by the sheer range of fortified buildings constructed in Europe from the tenth to the fifteenth century. Royal castles, as both residences and centers of administration, were often monumental in design, and castles such as Windsor in England and Vincennes in France were occupied and redeveloped over several centuries. The majority of castles were the residences of the feudal aristocracy, but again, the scale and nature of buildings varied enormously, from the masonry castles of major magnates down to more humble knightly families dwelling in fortifications made of earth and timber. Some, but not all, of these castles also played a part variously in manorial, local, or sometimes national administration.

In addition were the more temporary fortifications built by armies during campaigns or as "counter castles" during the course of sieges. Although these latter castles are more ephemeral structures, some do survive as archaeological monuments, for example, at Burwell and "The Rings" at Corfe in England.

A further complication is that the modern emphasis on the fortification tends to privilege the purely military dimension of castles and focus attention on the defensive elements – battlements, gatehouses, and arrow loops – that are themselves interpreted as purely utilitarian in function. In the past two decades, castle studies has, however, seen a move towards emphasizing the social role of crenellation which stresses that equal consideration be given to the symbolism inherent in building in a military architectural style. In part down to this shifting historiographical climate, more holistic definitions of castles are now employed, such as that used in one recent major survey, which defines the castle as "the residence of a lord made imposing through architectural references to fortification" (Goodall 2011: 6). Such a definition has the advantage of neatly sidestepping the issue over the utilitarian purpose of the defenses but keeps at its heart the idea that the castle was a private fortification.

Historical Background

The overarching characteristic feature of castles is their sheer variety of form. No two castles are identical, and while certain common principles underpin their design and constituent structures at any given point in time, it is their individuality as archaeological monuments that resonate today. When viewed across the Middle Ages as a whole, however, the key elements were the hall, the private chamber, the kitchen, and the chapel, with each structure relating closely either to the demands of noble living or the nature of the noble household. How these building blocks related to each other varied from site to site, but enduring themes were to combine all or some of them into a tower or to arrange them around a courtyard.

For the purposes of analysis, a useful distinction can be made between those castles

Europe Incastellated: Medieval Archaeology, Fig. 1 Rathmore Motte, County Kildare, Ireland. Originally the mound would have been topped by a wooden tower

Europe Incastellated: Medieval Archaeology, Fig. 2 Caesar's Camp, Kent, England. A ringwork and bailey castle

built of earth and timber and those with masonry buildings. Earth and timber castles chiefly comprised two forms: the motte and bailey and the ringwork castle (Figs. 1 and 2). In the former, the artificial mound of earth (the motte) was crowned with a timber tower with one or more enclosures (bailey) to one side which housed the ancillary buildings. The ringwork was a simple ditch and bank topped with a wooden palisade with the castle buildings within, but here too it was not uncommon for there to be one or more baileys. It was castles of these types that dominated the early centuries of European castellation.

The principal building of early masonry castles was the central tower today normally called a keep or, as it was known to contemporaries, the great tower or *donjon*. In its early form, the keep represented the traditional elements of the Carolingian palace, the hall, chamber, and

chapel, integrated into a single structure. Other elements frequently built in stone at early date were the entrance tower or gatehouse and sometimes the curtain walls. From the late twelfth century, there was a general move towards constructing castles (or at least their major elements) from stone, and from c. 1200, the history of castle development is usually discussed in terms of the evolution of masonry buildings. This said, in practice, masonry and earth and timber fortifications coalesced, and it was not uncommon for masonry castles to retain at least some wooden defenses well into the fourteenth century.

The Origins and Development of the Castle

The origins of the castle lay in the collapse of Carolingian kingship and with the resultant power vacuum filled by a dynamic warrior aristocracy, who controlled their fiefdoms from their own fortified bases. In the tenth century, the castle emerged as an expression of the authority of the feudal magnate and the place from which he exercised lordship. The cradle of the European castle is often held to be post-Carolingian France, particularly Anjou where a group of early towers such as Doué-la-Fontaine, Beaugency, and Loches, herald the beginning of the idea of the private fortified residence. A particularly clear case is Doué-la-Fontaine in the Loire valley, where an early tenth-century hall was transformed c.950 into a more defensible tower, itself later embanked by a motte and cut off from the immediate surroundings by a bank at ditch.

The situation in the Loire valley is particularly clear but should be seen as part of a more generalized growth in private fortification across Europe. The rise of the "new" aristocracy about the year 1000, together with economic expansion and improved technological skill in building, ensured that Europe became "incastellated" over the course of the tenth to the twelfth centuries. This process was often, but not always, linked directly to politico-military events. Although private fortification was known in Anglo-Saxon England, it was the Norman Conquest of 1066 that brought about castle-building on a rapid and unprecedented scale and also saw the introduction of new elements of fortification such as the motte and the stone keep. Subsequent Norman campaigns saw the castle brought to Wales, Scotland, and Ireland, and the Crusades saw European forms of castle architecture exported to the Holy Land. Although definitive numbers for the total number of castles built in Europe over the course of the Middle Ages is not known, one estimate puts the figure at a massive 75–100,000, a total that is based upon a wide-ranging definition, some five hundred years of cumulative building and includes both northern and southern Europe (Thompson 1987: 4). More closely defined estimates of numbers for individual areas are predictably lower; in the case of England, a figure just under 2,000 sites is probably realistic (Cathcart King 1983). But this represents total numbers of sites; in reality those in residential use at any one time was much less. In England it has been estimated that during the heavily militarized period at the end of the eleventh century, some 500 castles were occupied (Eales 1990).

Up to about the year 1200, the majority of castles at any one time would have been constructed principally of earth and timber, as either ringworks or motte and bailey castles, although the chronology is subject to considerable variation across Europe. Archaeological excavation has shed considerable light on the nature of these fortifications and done much to dispel the idea that they were the poor relation of their masonry counterparts. At Hen Domen (Wales), excavations of the bailey revealed a series of phases dating from the eleventh to the thirteenth century. During the mid-twelfth century, the impression is one of a cramped enclosure crammed with earth and timber buildings, something that befits a fortress built on the English-Welsh border. Excavated postholes on such sites belie a greater sophistication of the timber castle as a whole, however, which proved extremely durable and was the dominant form in Europe for at least two centuries.

It is against this earth and timber background that the masonry castles that tend to dominate

Europe Incastellated: Medieval Archaeology, Fig. 3 Dover Castle, Kent, England. The donjon of Henry II behind the castle's inner curtain wall

writing should be seen. The late eleventh, twelfth, and early thirteenth centuries were the classic age of the castle keep, with some of the finest examples surviving at Trim in Ireland, Dover in England (Fig. 3), Peñafiel in Spain, and Coucy in France. Such buildings still impress today though their solid massive walls and their design ensured that they were difficult to capture, but donjons also served an important ceremonial role and acted variously as symbols of lordly authority whether or not the lord was in residence.

The thirteenth century witnessed considerable developments in castle design, with larger curtain walls, elaborate gatehouses and increased domestic provision. Castles such as Caerphilly in Wales exemplify these trends, with substantial water defenses, concentric curtain walls, and twin-towered gatehouses. The string of castles built in North Wales by the English king Edward I after his conquest of Gwynedd exemplifies developments up to this time, with Beaumaris often cited as something of the perfect medieval castle, while the twelfth- and thirteenth-century works at Krak de Chevaliers in modern Syria represent something of the high point of medieval military engineering.

The fourteenth and fifteenth centuries were also periods of considerable change in design, with residential considerations and the demands of high-status living coming to the fore. The hallmark of new castles in this period was an increasing sophistication in the spatial planning and the integration of domestic ranges of buildings into the overall design. The advent of gunpowder weapons in the fourteenth century was ultimately to lead to the end of the castle as a military building, but this process was drawn-out and did not happen overnight. Early adaptations for the use of gunpowder weapons are found in the fourteenth century, and by the fifteenth century, gun ports were a familiar part of new castle-building. Developments in artillery had, by the early sixteenth century, rendered medieval fortifications effectively obsolete, and the introduction of the Italianate bastion marked the end of the castle as a military building.

The Castle and War

During military campaigning, the principal role of the castle was to hold up advancing armies and buy the time necessary for a relieving army to be assembled and put into the field. As an immovable defense, the castle also had the advantage of hindering conquest. In order to be successful, the subjugation of any territory by a medieval commander required the reduction or surrender of all castles before any conquest could be considered complete. There were occasions when sieges

Europe Incastellated: Medieval Archaeology, Fig. 4 Château Gaillard, Eure, France. During the early thirteenth century, the castle was the scene for one of Europe's most famous sieges

were important events in national and international politics. The fall of Château Gaillard in Normandy (Fig. 4) in 1204 by Philip II of France precipitated the loss of Normandy by the Angevin kings of England, while the successful siege of Rochester in England in 1215 by King John sent out such a strong message to his rebel barons that a contemporary chronicler wrote that "our age has not known a siege so hard pressed nor so strongly resisted . . . Afterwards few cared to put their trust in castles."

Castles in the Postmedieval Period

The redolence of crenellation as a sign of lordship and noble status continued however; in areas such as Scotland, castles in medieval style continued to be built into the seventeenth century. Arguably it was only with the rise of Palladian architecture that crenellation lost its association with noble status that the true "medieval" castle ceased to exist. The ruins of castles evoked fascination with postmedieval artists and builders alike and were a common subject for painting and illustrations. During the nineteenth century, medieval fortifications again became the focus of architectural projects either in terms of restoration, as at Carcassonne (France), or for new building projects, such as Neuschwanstein Castle (Germany) and Castell Coch (Wales).

Key Issues/Current Debates

The key issue in castle studies since about 1990 has concerned military function. While the importance of castles as symbols of lordship has always been recognized, the orthodoxy up to this date had been one primarily centered on castle architecture and taken a "form follows function" approach: the evolution of castles, together with the design of their constituent buildings, was driven by the demands of war. According to this approach, the castle underwent a military "rise" up to about the year 1300, with a protracted "decline" thereafter.

Problems with this overarching interpretation were voiced by Coulson in an important article in 1979, which suggested that the placing of fortifications on the homes of the medieval aristocracy may have had as much to do with the expression of social rank and chivalric culture as it did with aiding an active defense by the garrison. The implications of this observation were twofold. Firstly, it suggested that the trappings of fortifications on castles were part of a noble style and not a utilitarian response to the demands of warfare. Secondly, in proposing that war was not necessarily the engine of change in the development of castle architecture, the rationale for the "rise and fall" thesis was effectively

Europe Incastellated: Medieval Archaeology, Fig. 5 Bodiam Castle, Sussex, England. The castle was the subject of a major historiographical debate in the 1990s over the military role of such buildings

removed. Nowhere, it should be noted, is the basic defensibility of the castle denied; rather, there is an acceptance that a military purpose should not be automatically assumed on the basis of the architectural presence of fortification.

In English castle studies, the debate crystallized around the fourteenth-century castle at Bodiam (Fig. 5) with arguments over whether the castle was primarily one connected with the defense of southern England against the French during the 100 Years War or something akin to an "old soldier's dream house," with the trappings of defensive display. Subsequent case studies, such as that at Orford in Suffolk extended this thinking back into the twelfth century, in this case arguing that the form of Henry II of England's idiosyncratic great tower was inspired by nostalgia and ideas of Byzantine palaces, rather than a building constructed at the cutting edge of military design. Such new ideas have been exported across the whole subject. The donjon, for example, is now chiefly interpreted primarily as a vehicle for lordly display and a place of ceremony and ritual, rather than the place built to provide the final refuge in the event of siege. The late Middle Ages too have been subject to redefinition and in place of decline instead seen as a period that sees a continuation of the ideals and ethos of castle-building that were formed in earlier centuries. Moreover, overarching explanations for castle development often take their lead from a small number of buildings built by those at the top of medieval society; those buildings built by those lower down the social scale often exhibit different characteristics. Later medieval Scotland, Ireland, and Northern England is a case in point as this period saw the development and proliferation of fortified towers called "tower houses," which continued to be built into the seventeenth century.

Allied to the questioning of the military role of the castle is the move towards a more holistic approach to the castle, both in terms of the physical buildings and also their place in medieval society. Central to this has been the "landscape approach," which emphasizes the broader geographical context of castles and how the building of castles impacted upon the wider environment. Studies have shown how the majority of castles reflected local conditions such as ease of access to estates, communication networks, and a range of natural and seminatural resources. In turn, the arrangement of estate assets, such as churches, ponds, mills, deer parks, markets and settlements, and sometimes monastic foundations around the castle site not only reflected the demands of economics but also reflected the broader social standing and

Europe Incastellated: Medieval Archaeology, Fig. 6 Caernarfon Castle, Gwynedd, Wales. Together with being a monument to the English conquest of North Wales, the castle also embodied elements of chivalric culture

ambition of the builder. At their most developed, there is evidence that these landscapes structured the approach of visitors to the castle, an observation which only heightens the status of the castle as an icon of lordship.

International Perspectives

When viewed in an international context, castles are one the most important elements in the built environment from the European Middle Ages. As buildings they not only reflect the warrior ethos of the ruling aristocracy but the social organization of society. The large-scale survival of archaeological and architectural remains represent an important archaeological resource of a society in which land was held in return for military service and, as such, invite comparisons with analogous cultures, such as feudal Japan. European earth and timber castles belong both to an earlier tradition of fortification dating back to the Bronze and Iron Ages and also share affinities with some later bastion forts in which earthworks were the principal defense, for example, the fort of Ninety-Six in South Carolina in the United States, constructed during the American War of Independence. Comparisons can also be drawn with other cultures where earth and timber defenses were the norm, such as Maori *pa* villages in New Zealand and Native American stockades in North America. Masonry fortifications characterize the great civilizations and empires of human history from Antiquity, but the castle retains its distinctive character, in part due to the duality of its status as a fortified residence.

Future Directions

The past 20 years has seen a great deal of academic research on castles, with much of it taking a "revisionist" standpoint. The debate over the military role of the castle has sometimes generated more heat than light, but there are a number of key areas for future work.

The castles built by those at the highest end of the social spectrum have tended to frame wider debates, as have those castles that are well documented (chiefly royal castles) and those that are in state or public guardianship and where consequently structural remains tend to survive relatively intact. Future work is likely to be directed at those sites at the lower end of the range, particularly those that could be termed "sub-baronial" fortifications that lie on the cusp of castle-building threshold.

The place of the castle within the medieval imagination remains understudied. It has become clear from several studies that there is a tendency for castle-builders to look to the past for

inspiration as much as taking advantage of new designs, both in terms of architecture and for inspiration for grand projects. For example, in England, Henry II's keep at Dover looked back to an earlier generation of great towers, while Edward I's Caernarfon (Fig. 6) and Thomas of Lancaster's Dunstanburgh both drew inspiration from Arthurian legend. How common examples such as these may have been and to what extent they permeated down the castle-building class are important questions for the future.

The future for castle studies lies in coupling subject specialisms with broader interdisciplinary study. In medieval Europe, the castle was a multifunctional institution that seamlessly blended aspects of fortification, residency, estate management, iconography, and the cultural imagination. It is unrealistic to expect a rounded picture of the castle and its development to emerge without reference to a broad constituency of academic disciplines.

Cross-References

- ▶ Fortifications, Archaeology of
- ▶ France: Medieval Archaeology
- ▶ Hillfort Investigations in the Czech Republic
- ▶ Iberia: Medieval Archaeology
- ▶ Italy: Medieval Archaeology
- ▶ Medieval Archaeology
- ▶ New Spain: Forts and Transport Archaeology

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Europe: Early *Homo* Fossil Records

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Introduction

Research during the last decades on the first human dispersal out of Africa, into Eurasia, has changed the ideas on the chronology of this event, providing also new data on the ecological scenery that allowed humans to colonize new territories with different environments and climates from those in subtropical Africa, sometimes subject to inhospitable marked seasonality.

The origin of the genus *Homo* is directly related to a radical change in dietary behavior from its mostly vegetarian ancestors, the australopithecines, to more systematic carnivorous activities. This change in diet runs in parallel to an increase in encephalization, which resulted in greater cognitive abilities, and a decrease in gut size (Aiello & Wheeler 1995), thus allowing the emergence of a more intelligent and ubiquitous hominin. Meat is a food resource available everywhere inhabited by large mammals living and dying, which means that the genus *Homo* was not constrained to only exploiting soft vegetables, eggs, insects, and a few other food stuffs. For this reason, the *change in food behavior* is not only a key issue for explaining the major patterns of biological and social evolution in the human lineage but also helps to explain the dispersal and colonization of new territories around the Earth, especially in the middle and high latitudes, where vegetables are scanty in seasonal climates, particularly in winter, and a substantial part of the feeding resources must be obtained from other animals (Martínez-Navarro 2010).

Definition

There is no evidence outside Africa of the presence of *Homo* without flaked stones. It is probable that our ancestors developed in Africa an unprecedented pattern of dispersals, unusual in the previous related species. So, the presence of *Homo* remains outside Africa implies also the use of technological tools. At this sense, earliest *Homo*, or its ancestor, developed a new kind of nongenetic transmission system, which allowed an unprecedented geographical expansion by increasing its ecological ubiquity during the dispersals across Eurasia. Therefore, the early *Homo* fossil records of Europe are a consequence of different achievements in the development of the genus, modifying forever the basic patterns of biological dispersal among primates.

Historical Background

There has been a persistent debate on the first human peopling of Europe until the middle 1990s. A number of researchers argued for a *Short Chronology*, as they claimed that humans did not colonize the continent before half million years ago, when evolved Acheulian tools associated with remains of *Homo ergaster* appeared in the European archaeological record (Roebroeks & Kolfschotten 1994). However, the finding of (1) a human mandible together with a huge assemblage of Oldowan (Mode 1) lithic artifacts at the Caucasian site of Dmanisi (Georgia), placed at the gates of Europe and dated ~1.8 Ma; (2) Oldowan tools at the sites of Fuente Nueva 3 and Barranco León (Orce, southern Spain), dated 1.3–1.4 Ma; (3) Oldowan lithic artifacts associated with human remains at the site of Atapuerca TD6 (northern Spain), dated 0.8–0.9 Ma; and (4) other findings of lithic artifacts at Early Pleistocene southern European sites in France (Vallonnet, 1.0 Ma) and Italy (Monte Poggiolo, 0.85 Ma; Isernia La Pineta, 0.6 Ma) helped to change the views of prehistorians and paleoanthropologists, considering a *Long Chronology* for the first human colonization of the continent.

Later, the new findings of human cranial and postcranial remains at Dmanisi (Lordkipanidze et al. 2007), a mandibular symphysis and more lithic artifacts at the site of Sima del Elefante (Atapuerca, Spain), dated to 1.2 Ma (Carbonell et al. 2008), and a human tooth and more tools at the site of Barranco León (Orce, Spain), dated to 1.4 Ma (Toro et al. 2013) – as well as new Oldowan lithic artifacts at Pirro Nord (Italy), dated 1.3–1.6 Ma; at Lézignan-la-Cébe and Pont-de-Lavaud (France), 1.57 and 1.1 Ma, respectively at Kozarnika (Bulgaria) 1.6–1.4 Ma; Vallparadís (Spain), 0.9 Ma; and in England at Pakefield, 0.7 Ma, and Happisburgh, 0.8–1.0 Ma – have definitely convinced researchers that humans inhabited Europe as early as one and a half million years ago (Figs. 1 and 2).

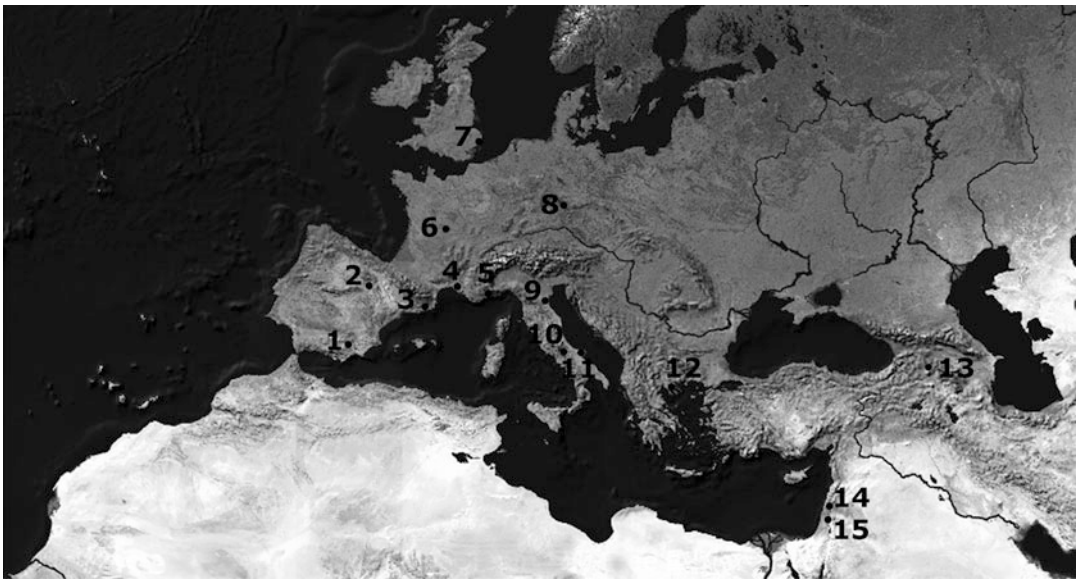

Europe: Early *Homo* Fossil Records, Fig. 1 Geographical location of some of the most important Early Pleistocene archaeological and paleontological sites of Europe, the Caucasian Region, and the Levantine Corridor: (*1*) Orce (including Barranco León, Fuente Nueva 3, and Venta Micena), (*2*) Atapuerca (including Sima del Elefante and Gran Dolina), (*3*) Vallparadís, (*4*) Lézignan-la-Cébe, (*5*) Vallonnet, (*6*) Pont-de-Lavaud, (*7*) Pakefield and Happisburgh, (*8*) Untermassfeld (only paleontological record), (*9*) Monte Poggiolo, (*10*) Isernia La Pineta, (*11*) Pirro Nord, (*12*) Apollonia (only paleontological record), (*13*) Dmanisi, (*14*) Gesher Benot Ya'aqov, and (*15*) 'Ubeidiya

At the base of the middle Pleistocene, the arrival into the continent of hominins that developed Acheulian tools is generalized everywhere in most of southern and central Europe, informing on the important demographic increase of human populations.

Key Issues/Current Debates

The oldest records of hominins with carnivorous habits, making and using lithic artifacts, are documented at Kada Gona (Ethiopia) at around 2.6 Ma. Curiously, these findings are chronologically coincidental with the Gauss/Matuyama paleomagnetic transition and also with the onset of the "Glacial Plio/Pleistocene" climatic cooling, resulting from bipolar glaciations, which led to the transition to cooler, drier, and more seasonal climates in the temperate latitudes during the Pleistocene epoch. Glacial ice rafting was produced periodically in the glacial–interglacial fluctuations, being caused by the 41-ka cycle of variations in obliquity of the Earth axis during the interval comprised between 2.8 and 1.6 Ma and by higher-amplitude cycles of 100 ka resulting from variations in orbital eccentricity at 1.2–0.8 Ma (Shackelton 1995).

In Europe, as in Africa, an important faunal turnover is detected around 2.5–2.6 Ma. It is known as the so-called Elephant–*Equus* event, and it is coincidental with the Early–Middle Villafranchian faunal transition. This event is characterized by the arrival in Europe of the first one-toed horses, *Equus livenzovensis*, and the spread of *Mammuthus meridionalis* originated in Africa, although the record of both genera seems to take place somewhat earlier. The same faunal turnover is also detected in Asia, both in the Upper Siwaliks in the Tatrot Formation and Central Asia.

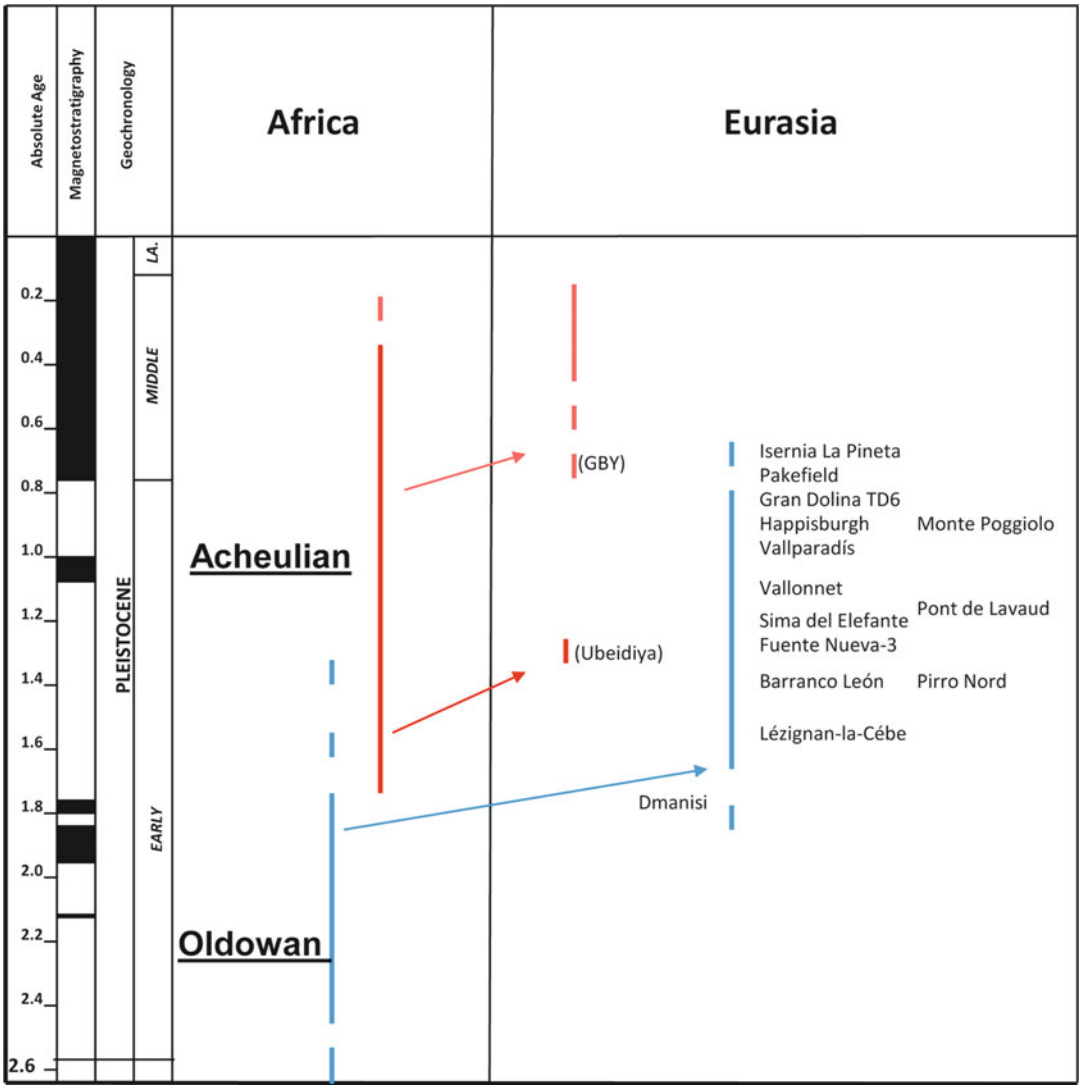

Europe: Early *Homo* Fossil Records, Fig. 2 Chronologic chart of some of the most important Early Pleistocene European archaeological and paleoanthropological localities of Europe, the Caucasian Region, and the Levantine Corridor

Although there are some references that point to a possible human dispersal into Eurasia older than 2.0 Ma, the oldest clear human record out of Africa is found in Dmanisi during the Olduvai normal paleomagnetic chron, where a very good collection of fossil hominins (crania, mandibles, and postcranial bones) together with Oldowan primitive lithic artifacts has been unearthed. The fossil record of Eurasia reveals an important faunal turnover at this moment, which is coincidental with the Middle–Late Villafranchian transition (Rook & Martínez-Navarro 2010, and references there in), and was called *the Wolf event* after Azzaroli (1983). Recently, this episode has been renamed as "the *Pachycrocuta brevirostris* event" by Martínez-Navarro (2010), because of the deep impact of this giant, hyperscavenger hyaenid of African origin in most of the Eurasian fossil assemblages during the rest of the Early Pleistocene (which is coincidental with the Late Villafranchian), from the Iberian Peninsula through to eastern and southern Asia (Palmqvist et al. 2011).

This event is also followed by the arrival of other several large mammal species of African origin, most of them chronologically coincidental with this human dispersal, such as the sabertooth tiger *Megantereon whitei*, the giant gelada baboon *Theropithecus oswaldi*, and the aquatic megaherbivore *Hippopotamus antiquus*, which is a sister species, if not the same, of the giant African hippo *H. gorgops*.

At around 1.3–1.4 Ma, a new wave of dispersal is detected, but it is only well recorded in southwestern Asia at the Levantine Corridor, especially at the site of 'Ubeidiya (Israel), where primitive Acheulian tools have been found together with some large mammals originating in Africa, such as the giant African buffalo *Pelorovis oldowayensis*, the giraffe *Giraffa camelopardalis*, the pig *Kolpochoerus olduvaiensis*, the hippo *Hippopotamus gorgops*, the scavenger and social hunting hyena *Crocuta crocuta*, the sabertooth tiger *Megantereon whitei*, and the giant monkey *Theropithecus oswaldi*. These species are mixed with others of Asian origin, such as the giant deer *Praemegaceros verticornis*, the buffalo *Bison* sp., the spiral horned antelope Antilopini indet. (*Spirocerus* sp./*Pontoceros ambiguus*), or the bear *Ursus etruscus* (Tchernov 1986; Martínez-Navarro et al. 2009, 2012). A primitive Acheulian record is also detected in southern India in a chronology close to 'Ubeidiya at the site of Attirampakkam, dated 1.51 Ma.

A new and mostly pan-Eurasian dispersal event coming from Africa is detected during the Early–Middle Pleistocene transition (~0.8–0.6 Ma). Hominins coming with Acheulian (Mode 2) tools colonize the Levantine Corridor, with the best example at Gesher Benot Ya'aqov (Israel) (0.7–0.8 Ma), bringing the domestication of fire with them and a high degree of socialization (Alperson-Afil 2008). The arrival of this developed tool technology is coincidental with the colonization of Europe by *Homo heidelbergensis* and the arrival into the continent of several large mammals of African origin, such as the bull *Bos primigenius*, the elephant *Elephas* (*Palaeoloxodon*) *antiquus* (evolved from *Elephas recki*), the hyenas *Crocuta crocuta* and *Hyaena* sp., the lion *Panthera leo*, and the leopard *Panthera pardus* (Martínez-Navarro & Rabinovich 2011). The arrival of this African fauna is part of the important Galerian faunal turnover, and it is coincidental with the long transition between climates forced by the 41-ka cycles and the later accentuated glacial climate characterized by the alternation of pronounced glacial–interglacial periods modulated by the 100-ka periodicity (Shackelton 1995). This dispersal event has recently been named "the *Crocuta crocuta* event" (Martínez-Navarro 2010).

Climate changes, faunal turnovers, and human dispersals into new continents seem to be coincidental. There is no doubt that climate and climate change interact with the biosphere and can therefore be expected to influence also on human activity, either directly or through paths leading from climate to plant cover to faunal resources. What is not so clear is how and to what degree the social and cultural human evolution interacted with these changes. At this sense, an important question is to explain the effects of increasing sociality in early and more recent humans in order to be more successful during the global dispersal process, in competence with other faunal species and/or human populations.

International Perspectives

Ecological Landscape of the First Human Dispersal Out of Africa

The study of the extraordinary collection from the southern Spanish Early Pleistocene site of Venta Micena (Orce, southern Spain), dated ~1.5 Ma, with more than 17,000 fossil remains corresponding to a large mammal taphocoenosis unearthed from 350 m^2 of excavation (but with a potential of more than one million m^2 to be excavated), has provided interesting information on the paleobiology and paleoecological preferences of the most important species related with the Early Pleistocene human ecological scenario in Europe. Although no human remains have been unearthed for the moment at Venta Micena,

all taxa recorded there are found also in assemblages with lithic artifacts and/or human remains from other archaeopaleontological localities on the continent.

These studies were firstly performed with the African origin sabertooth tiger *Megantereon whitei*, which earliest record outside Africa is at the site of Dmanisi at 1.8 Ma, together with the earliest hominins of Eurasia. It was an ambush, super-predator felid which inhabited mixed habitats and had powerful forelimbs, elongated and non-crenulated upper canines, and a short mandible with reduced precarnassial cheek teeth. It was well adapted to hunt medium- to large-sized ungulates, but its masticatory structure only allowed it to eat the softer parts of its prey, leaving most of the carcass intact for scavengers (see Palmqvist et al. 2007, and references there in; Martínez-Navarro 2010), especially for the giant hyena *Pachycrocuta brevirostris*, but probably also for hominins.

Similar studies were performed with the Early Pleistocene painted dog *Lycaon lycaonoides* thanks to the finding of a pathologic skull preserved complete at Venta Micena, specimen VM 7000. This fossil corresponds to an old individual, 6–7 years old, and shows several pathologies: it is bilaterally asymmetric and, after a radiologic analysis, it was possible to demonstrate that, during its life, it never had the right upper canine (C) and the right third molar (M_3). These pathologies were, probably, the consequence of a high degree of endogamy in the populations of this carnivore species, which resulted in an increase of the level of genetic homozygosis and thus a loss of developmental homeostasis. The canine is a crucial element for a predatory carnivore, but this specimen survived to an old age without it and with a pronounced asymmetry in the skull. The survival of such a pathologic individual suggests that collaborative social behavior helping sick, disabled, and/or old individuals by the other members of the family, as seen in extant *Lycaon pictus*, was already developed as early as the Early Pleistocene (Palmqvist et al. 1999). Similar social behavior, helping an old and toothless human individual, has been detected at the site of Dmanisi thanks to the finding of skull D3444 and jawbone D3900 (Lordkipanidze et al. 2005), showing convergent behavior among social large carnivores and early humans with developed carnivorous habits. Curiously, painted dogs dispersed into Africa coming from Eurasia at the same time (1.9–1.8 Ma) as hominins went out of Africa following the same route, the Levantine Corridor, but in the opposite direction (Martínez-Navarro 2010).

Another example is the paleobiological study of the ethology of the superscavenger that lived in Europe during the Early Pleistocene, the giant, short-faced hyena *Pachycrocuta brevirostris*. It was the largest bone-cracking hyaenid that ever existed. With the mass of a lioness, it had massive limbs with shortened distal bones and a heavy, powerfully built mandible with robust, well-developed premolars. All these features reflect its adaptation for dismembering ungulate carcasses, transporting large pieces of them without dragging to the denning site and fracturing bones. The relative contribution of hunting and scavenging to the diet of this extinct hyena was estimated using combined biomechanical, biogeochemical, and taphonomic approaches. Analysis of the bone-cracking behavior of *P. brevirostris* was based on the abundance of skeletal elements in the large mammal assemblage from Venta Micena. Results obtained showed that the bones with greater marrow contents (femur, humerus, and tibia) were preferentially fractured by the hyenas, while those others with less nutritional value (radius and metapodials) were better represented as complete elements in the assemblage. The quantitative analysis of the preservational state of skeletal elements allowed testing specific patterns of bone modification by the giant hyenas, such as a proximo-distal sequence of consumption for humerus and tibia, thus revealing the highly specialized bone-cracking behavior of *P. brevirostris*. Regression equations adjusted with modern carnivores for body size on craniodental and postcranial measurements provided an average estimate of mass of more than 110 kg for the giant hyena. The high moment arms for masseter and temporalis muscles

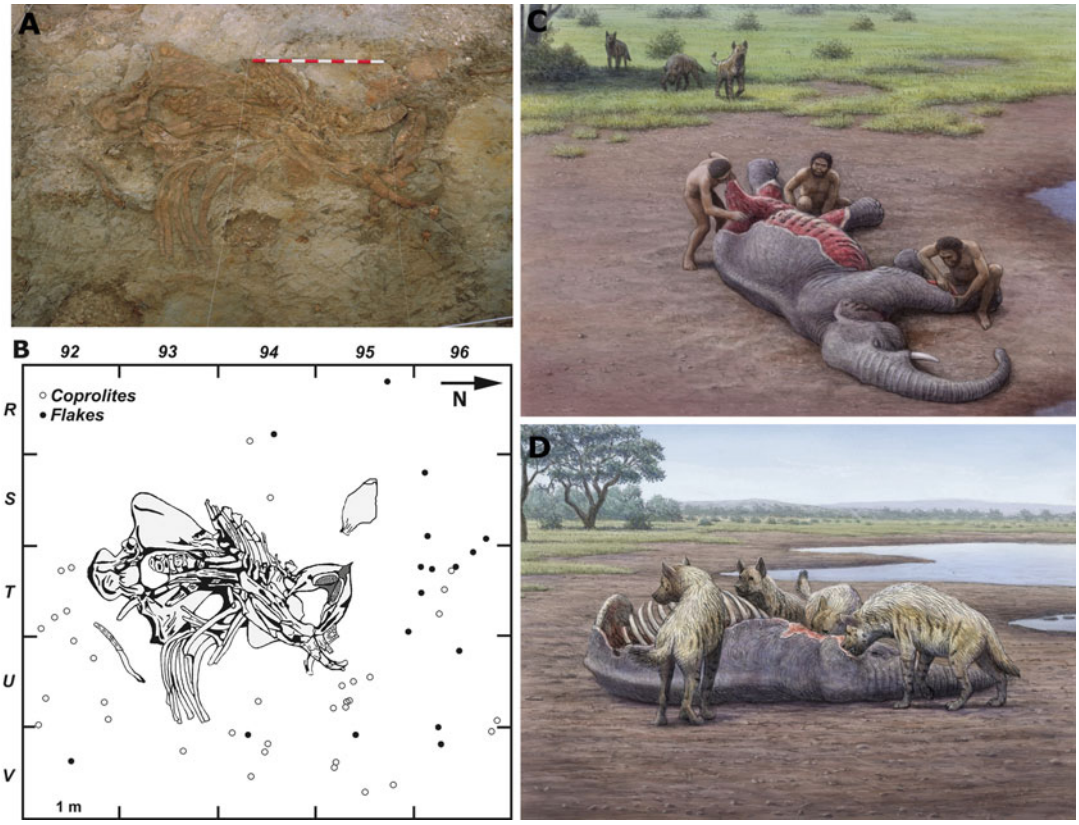

Europe: Early *Homo* Fossil Records, Fig. 3 (**a**) Partial skeleton of *Mammuthus meridionalis* unearthed at the Early Pleistocene site of Fuente Nueva 3 (Orce, southern Spain), (**b**) spatial distribution of coprolites and flint flakes surrounding it, and reconstruction of the possible sequence of interaction between hominins (**c**) and hyenas (**d**) during the exploitation of the elephant carcass (Drawings by M. Antón)

indicated a substantial strength for bone fracturing with the well-developed premolar teeth. Jaw depth provided resistance against dorsoventral loads during bone-cracking activities. However, the moment arm of resistance for an object positioned at the canines revealed a loss of bite strength compared with spotted hyenas and thus less predatory abilities. These results are in agreement with the scavenging niche deduced for *P. brevirostris* from taphonomic analysis (see Palmqvist et al. 2011 and references therein). After this work at Venta Micena, the direct competence between the giant hyenas and hominins for the exploitation of an elephant carcass (*Mammuthus meridionalis*) has recently been described at the Orce archaeopaleontological site of Fuente Nueva 3 (Espigares et al. 2013) (Fig. 3).

Current work is also in progress with other species, such as the giant African origin hippo *Hippopotamus antiquus* (Palmqvist et al. 2008), showing that this megaherbivore is an aquatic better than amphibious species. The evidence comes from a biogeochemical analysis of bone collagen remains preserved in Venta Micena, which showed that, compared to other ungulates, the hippo $\delta^{15}N$ values were extremely high, even more than in the sabertooth tigers *Homotherium* and *Megantereon* from the same faunal assemblage. These results showed that this hippo species did not eat terrestrial grasses, as do modern hippos, but was limiting its alimentary income to only aquatic plants such as macrophytes, which do not fix atmospheric N_2. Elevated $\delta^{15}N$ values resulted from the high saline contents (strontium sulfates) of the

paleolake waters in the surroundings of Venta Micena, contributed by hydrothermal vents. This inference on the paleobiology of the extinct hippo is also confirmed by skull anatomic adaptations to water living, with more elevated orbital and nasal cavities, and a more elongated muzzle than in the extant, less aquatic and more amphibious species *Hippopotamus amphibius*. In addition, ecomorphological studies have shown that *Hippopotamus antiquus* was 2.2 times heavier than modern hippos and showed shortened limbs, which resulted in less ability for moving on land. The finding of these aquatic megaherbivores in the European Pleistocene sites is very significant and informative, because they need to live in big rivers or lake biotopes and cannot survive in cold waters, under 0 °C, when water became ice. In the case of Venta Micena, contribution of thermal waters resulting from tectonic activity in the Guadix–Baza basin during Early Pleistocene times resulted in a milder environment than today, which made possible the colonization by hippos. Curiously, these ecological and climatic conditions are the best for hominin survival. One interesting data is that Early Pleistocene African origin hippos are recorded in the Levantine Corridor, the Caucasus, Anatolia, and Central and Southern Europe, but they are not found in other regions of Asia, probably because there were not rivers (waterways) to disperse into the eastern continent. Finally, we can say that the finding of hippos is a good track to try to find hominins (Martínez-Navarro 2010).

Future Directions

Human Autoecology: Tool Typology and Technology and Their Importance in the Food and Social Behavior

Lithic tools are a key question. Although human teeth are bunodont and polyvalent, they are not adequate to cut the animal skin, dismember a carcass, and eat the meat. Our ancestors became systematic carnivores only thanks to the use of artifacts. Without the lithics, the access to animal resources would have been impossible for Early Pleistocene hominins. But thanks to this change in our food behavior, we are finally humans. Thus, the extrasomatic cultural/technical evolution prompted a direct biological evolution.

The access to meat and other more energetic animal foodstuffs, such as the marrow and the brain, changed our anatomy and physiology. Our digestive system, starting from the teeth, became shorter, and our abdomen reduced the volume; the neurocranium and brain grew, increasing the intelligence and, of course, the social skills. Humans became able to move and colonize a latitudinal wide spectrum of environments, only constrained by the need of water, the presence of potential food resources (especially animal carcasses), and, of course, the impossibility of surviving in seasonal climates with very cold winters. Social hominins with primitive Oldowan tools and a scavenging behavior colonized the favorable biotopes of the middle latitudes of Eurasia, around 1.8–1.9 Ma (Lordkipanidze et al. 2007), but they were not able to survive in continental and cold climates until one million years later. At the Early–Middle Pleistocene transition, around 0.7–0.8 Ma as documented at Gesher Benot Ya'aqov, Israel (Goren-Inbar 2011), a new hominin coming from Africa with a new technology, the evolved Acheulian, was able to colonize the territories formerly occupied by the Oldowan hominins in Europe and Asia, probably in direct competition with the previous populations, which were less culturally evolved. Most probably, humans with evolved Acheulian tools were able to hunt and did not depend on the scavenging of the prey left abandoned by the large carnivores, as it was the common behavior of the Oldowan hominins. One of the most important data in support of this hypothesis is that in Oldowan and primitive Acheulian assemblages, large carnivores are abundantly preserved, as it is recorded in Dmanisi (Georgia), the Orce sites of Fuente Nueva 3 and Barranco León (Spain), or 'Ubeidiya, (Israel). However, in the evolved Acheulian assemblages, fossils of large carnivores are usually scanty, as in Buia (Eritrea) at 1.0 Ma, Gesher Benot Ya'aqov (Israel) at 0.7–0.8 Ma, or La Polledrara (Italy) at 0.4 Ma.

The possibility of hybridization of Acheulian hominins coming from Africa with local Oldowan hominins living in Eurasia cannot be discarded, as it is evidenced in modern human populations by data on haplotype trees for mitochondrial DNA, Y-chromosomal DNA, two X-linked regions, and six autosomal regions, which suggest a major expansion event out of Africa at 0.84–0.42 Ma, characterized by interbreeding and not replacement of earlier populations (Templeton 2002).

Then, future research has to affect the improvement of the archaeological and paleontological record around the continent, the paleoecological studies of the fossil human environments, and the cultural and social evolution of the early paleolithic societies.

Cross-References

- ▶ Fossil Records of Early African *Homo*
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ West and Central Asia: Early *Homo* Fossil Records

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Europe: Early Upper Paleolithic

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State of Knowledge and Current Debates

The transition from the Middle to the Upper Paleolithic is a period of the most vital changes in the evolution of population and European cultures when Neanderthals had been replaced by Anatomically Modern Humans and the Middle Paleolithic cultures (Mousterian and Micoquian) were replaced by the Upper Paleolithic cultures. The process of changes that were taking place in Europe between 45 and 30 Kyr BP was not uniform it is nature, but complex and multilinear (Mellars & Stringer 1989; Mellars 1990; Mellars et al. 2007; Kozłowski & Sacchi 2007). In terms of physical anthropology, the concepts of local evolution of Neanderthals into Anatomically Modern Humans have to be rejected on the basis of recent palaeogenetic analyses. Neanderthals evolved locally in western Eurasia beginning from more than 200 Kyr until their extinction between about 30 and 28 Kyr BP (Stringer & Gamble 1993). These populations created a variety of Middle Paleolithic cultures. The Anatomically Modern Humans evolved in eastern Africa more than 250 Kyr and, from northeastern Africa spread first to Eurasia, subsequently to other continents. These populations created a gamut of different Upper Paleolithic cultures (Boyle et al. 2010).

This model is today commonly accepted on the basis of the evidence of fossil mt DNA. Most reports on the first identifications of fossil sequences of mt DNA seem to support the view that mt DNA of Neanderthals is totally unlike that of mt DNA of European Modern Humans. The final split between DNA of the ancestors of the two populations is assumed to have taken place at about 325 000 years ago, still in Africa. Consequently, a model should be accepted of total replacement of Neanderthals by Modern Humans in the effect of the second "out of Africa" migration via the Near East to Europe and to western, possibly also central, Asia (Caramelli et al. 2003; Currat & Excoffier 2004; Serre et al. 2004).

Recently, however, arguments have appeared in support of some contribution of Neanderthals to the formation of the genome of European Modern Humans. S. Paabo et al. (2004) suggested that Archaic Modern Humans had intermingled with Neanderthals; later, however (2008), he admitted that this could have been contamination of fossil Neanderthal DNA by recent human DNA. This issue still remains highly controversial. Some arguments point to genetic differentiation of Neanderthal populations in the period when they cohabited with Modern Humans (Schmitz et al. 2002;

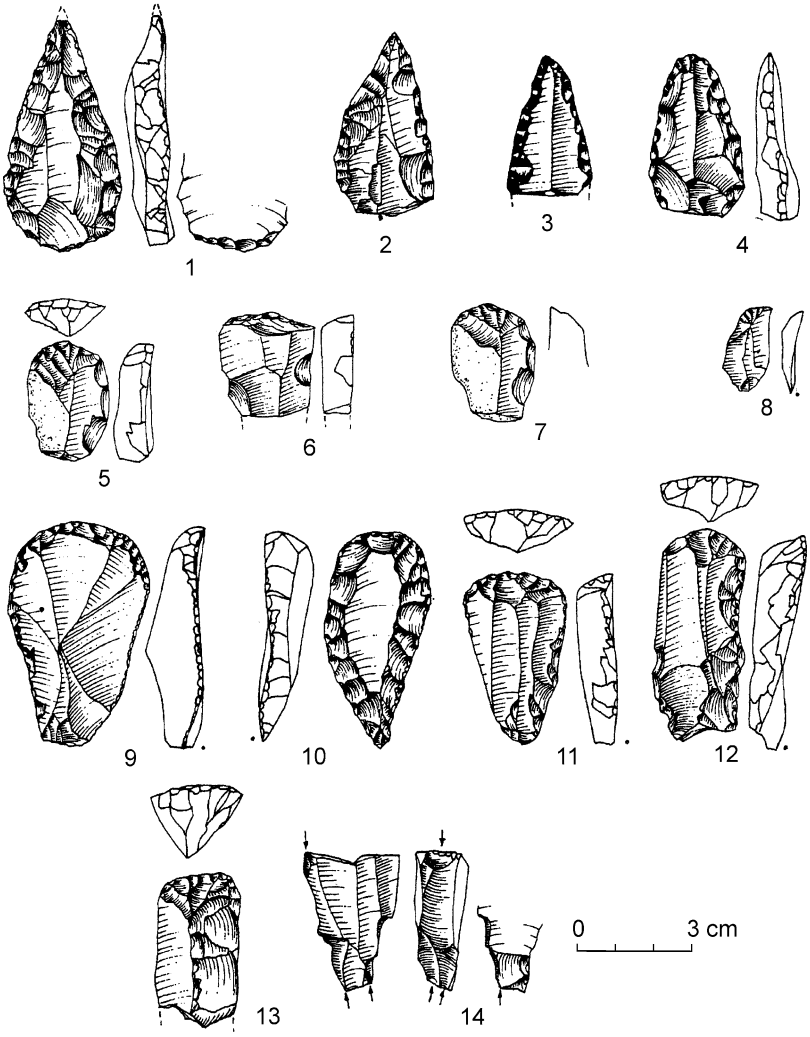

Europe: Early Upper Paleolithic, Fig. 1 Bacho Kiro, layer 11, Bulgaria. Bachokirian lithic implements: *1–8* – retouched Levallois points, *5–13* – end scrapers, *14* – burin

Lalueza et al. 2006); some others point to more divergent Neanderthal haplotypes before 45 Kyr BP (Orlando et al. 2008). Effectively the hypothesis about the total replacement has to be reassessed. Moreover, the fact should be taken into account that the identification of mt DNA of European Modern Humans is based on bone remains from the period as late as 28–25 Kyr BP (i.e., from the period of the Gravettian, when in Europe founder haplogroups I, U, and H were forming – Forster 2004), whereas we do not know mt DNA sequences of early Homo sapiens from the period of Neanderthal/Modern Man cohabitation.

Prior to the beginnings of the Upper Paleolithic in Europe, Archaic Anatomically Modern Humans had appeared in the Middle East about 120–100 Kyr, where, initially, they had been the sole population; it is only about 60 Kyr BP that European Neanderthals arrived to this territory. The two populations co-occur in the Near and Middle East until the first migrations of Anatomically Modern Humans to Europe about 45–42 Kyr BP.

In the Near East taxonomic differences between Archaic *Homo sapiens* of Qafzeh type (also Tabun II and Skhul) and Neanderthals from Amud and Kebara are, to put it simply, as

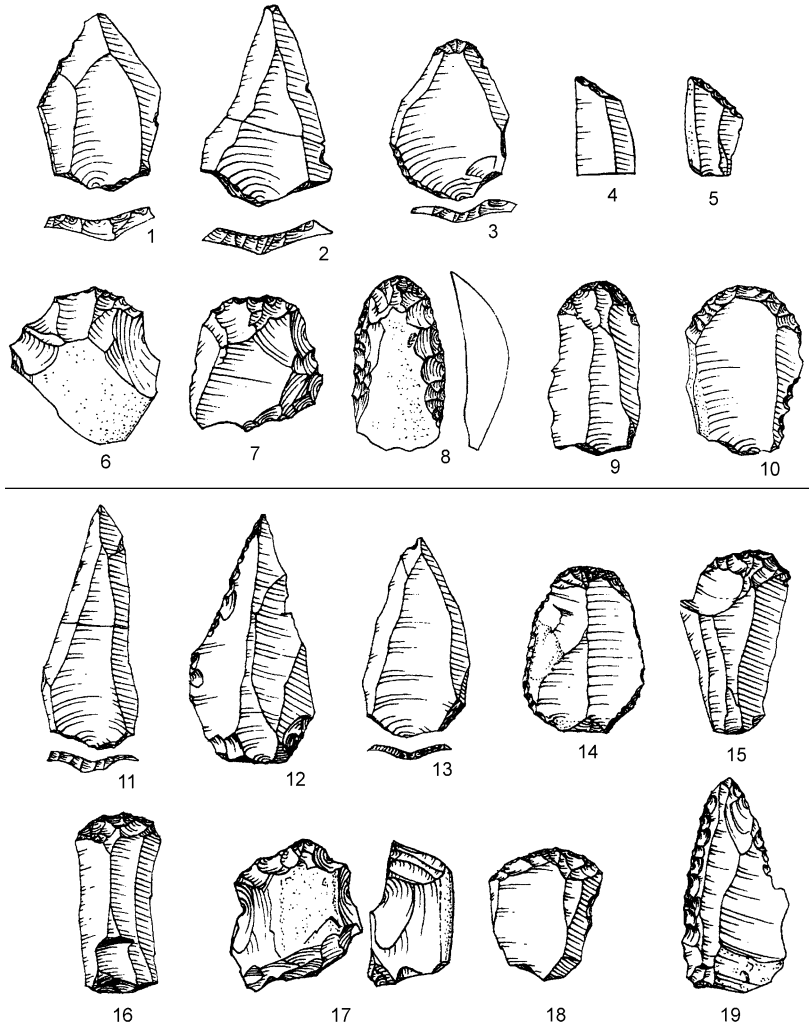

Europe: Early Upper Paleolithic, Fig. 2 Brno-Stranska skala IIIa, Moravia, Czech Republic. Bohunician lithic implements from layer 4: *1–3* – Levallois points, *4*, *5* – retouched truncations, *6–10* – end scrapers; from layer 5: *11–13* – Levallois points, *14–18* – end scrapers, *19* – sidescraper (After J. Svoboda)

those between Levallois–Mousterian type Tabun D and C and the industry of Tabun B (Meignen & Bar-Yosef 2005). Despite taxonomic differences, Archaic Modern Humans and Neanderthals in the Near East are behaviorally similar. Minor differences are in hunting strategies, carcass processing, some aspects of diet reconstructed on the basis of stable isotopes, and in settlement mobility (Stiner 1993; Lieberman 1998). The differences between Archaic Modern Humans and Neanderthals can be seen first of all in the sphere of symbolic culture (e.g., appearance of incised ornaments, grave furnishings – Bar-Yosef & Vandermeersch 1993; Marshack 1997). In the Near East the cultural evolution leading to the Initial Upper Paleolithic began about 50–40 Kyr BP together with the formation of the Emirian – the unit characterized by the evolution of Levallois technique, which was the most important technique in the Middle Paleolithic Mouster–Levalloisian, into blade technique. As the new technology evolved, other innovations appeared such as the use of the soft hammer which replaced the hard hammer in production of blanks. Several sequences show local

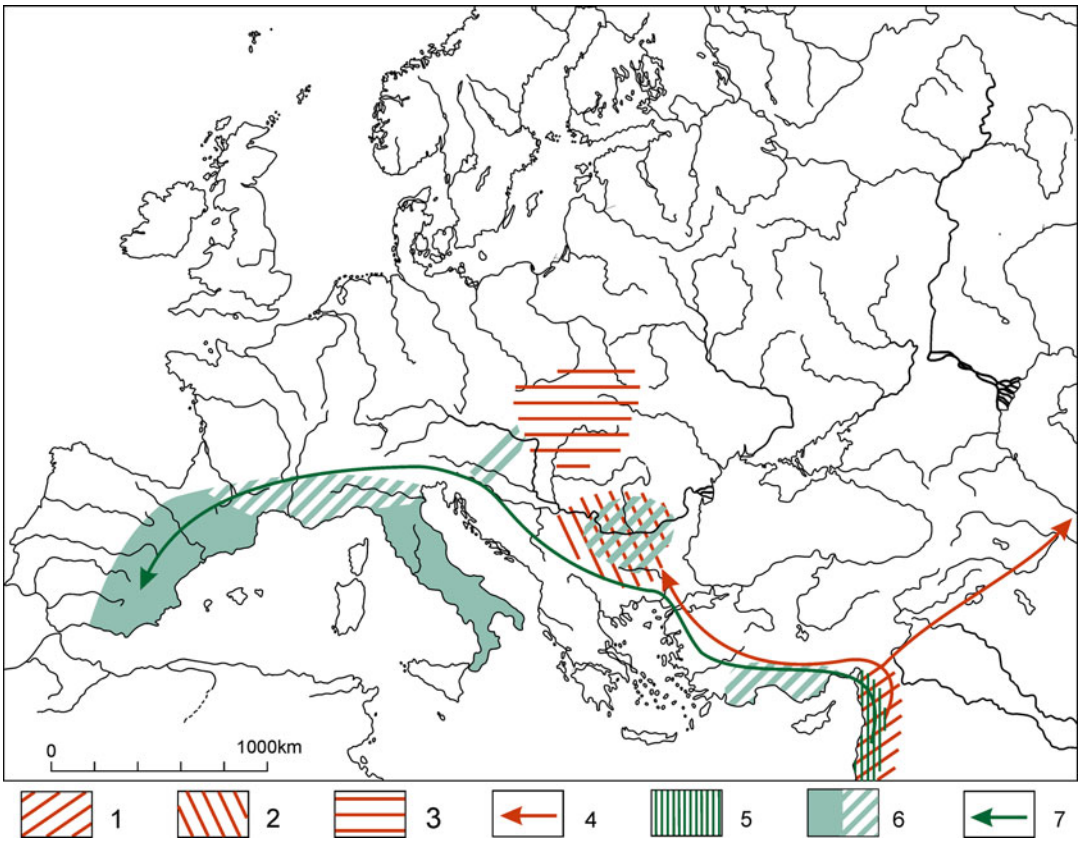

Europe: Early Upper Paleolithic, Fig. 3 Map of the first weaves of Anatomically Modern Humans migrations to Europe: *1* – area of the Emirian, *2* – Bachokirian, *3* – Bohunician, *4* – first migration weave, *5* – area of the Ahmarian, *6* – Proto-Aurignacian/Fumanian, *7* – second migration weave

evolution from the Levallois–Mousterian to the Emirian, most importantly Boker Tachtit in the Neguev (layers 1–3) and Ksar Akil in the Lebanon (Bar-Yosef 1998; Bar-Yosef & Pilbeam 2000; Marks 2003).

In Southeastern and Central Europe, similar elements appear of new blade technologies whose presence cannot be accounted for by the evolution of a local Mousterian. We can, therefore, assume that the formation of European Initial Upper Paleolithic cultures such as the Bachokirian in Bulgaria and the Bohunician in the Middle Danube Basin was the result of migrations of Anatomically Modern Humans from the Near East between 45 and 42 Kyr BP (Svoboda & Bar-Yosef 2002; Kozłowski 2004).

The first unit – the Bachokirian – known from layer 11 of the Bacho Kiro Cave and layer VI (trench TD-II) and layer 4 (trench TD-I) of the Temnata Cave (Bulgaria) was characterized by the use of Levallois technique based on the reduction of single- and double-platform cores, which evolved toward the volumetric Upper Paleolithic blade cores. The types of retouched tools include forms representing Middle Paleolithic tradition, but most tools are end scrapers, burins, and retouched blades of Upper Paleolithic type (Fig. 1). It should be stressed that raw material economy, especially in Bacho Kiro Cave, is highly specific based on the exploitation of extralocal siliceous rocks. The occurence at sites of mainly blanks and

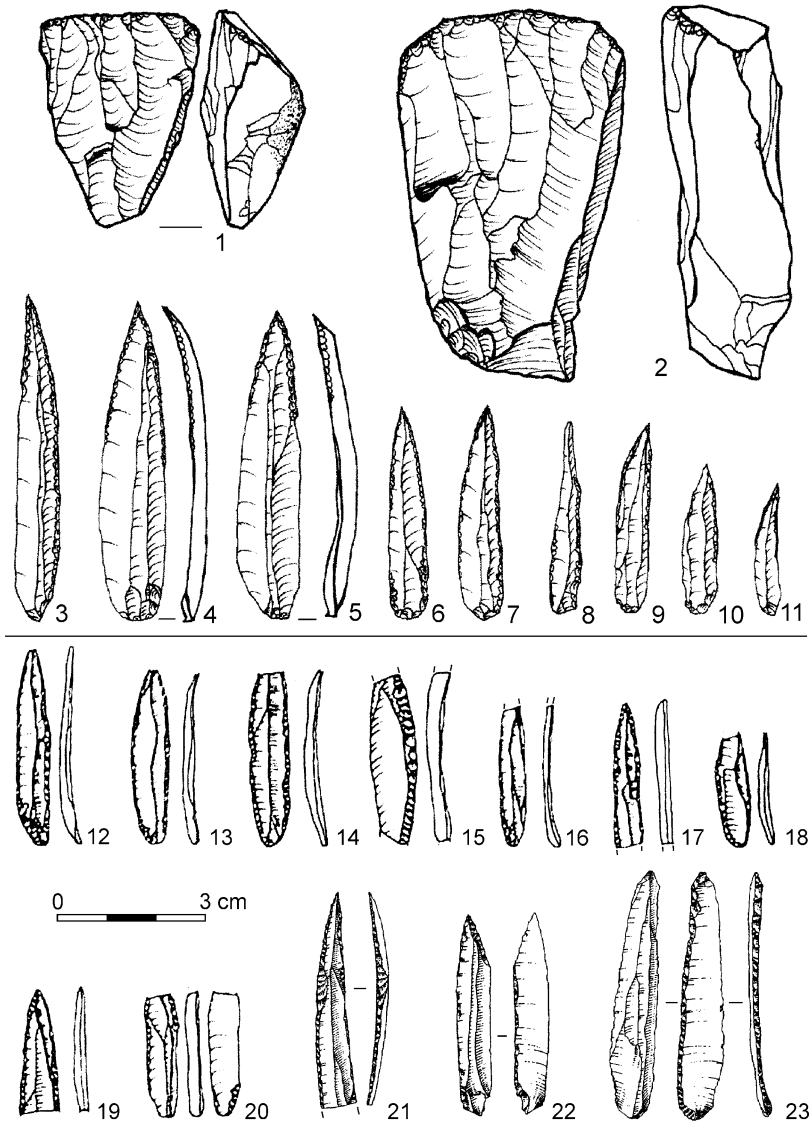

Europe: Early Upper Paleolithic, Fig. 4 Lithic artifacts of the Early Ahmarian in the Near East (*1*, *2* – cores, *3–11* – retouched bladelets after A. Belfer-Cohen and N. Gorring-Moris) and the European Proto-Aurignacian from the Fumane Cave, Northern Italy (*12–23* – microretouched bladelets, after A. Broglio)

retouched tools points to the segmentation of reduction process in time and place, thus making the Bachokirian different from local Middle Paleolithic industries (Kozłowski 2004; Tsaneva 2007).

The second unit, similar to the Bachokirian, is the Bohunician, known from southern Moravia (Brno-Bohunice, Brno-Stranska skala). This unit exploited mainly south Moravian siliceous rocks that were worked on-site in a full reduction cycle. Blank production, first of all points and blades, was based on Levallois technique; however – parallel to it – the Upper Paleolithic technology of volumetric blade cores was also used. Among tools, too, there are both Middle Paleolithic sidescrapers and points, as well as Upper Paleolithic end scrapers and burins (Fig. 2). The sites of the Bohunician were situated on the Loess Plateaux in the tundra and steppe environments. Except the hearths habitation structures have not been registered (Svoboda 2003). The

Europe: Early Upper Paleolithic,
Fig. 5 Fumane Cave, Northern Italy: painted rock fragments from the Proto-Aurignacian layer (After A. Broglio and G. Dalmeri)

range of the Bohunician extended further north to southern Poland (Dzierzyslaw) and probably to Volhynia (Kulitchivka).

After the first expansion of Anatomically Modern Humans, represented by the Emirian from the cradle area in the Near East, further leptolithization (transformation into the Upper Paleolithic) continues (Fig. 3). The process gave rise to the Early Upper Paleolithic, most importantly represented by the Ahmarian on the Syro-Palestinian coast (Fig. 4: 1–11), whose characteristic feature are microretouched bladelets (Bar-Yosef & Belfer-Cohen 2010). From the Early Upper Paleolithic, industries like this are known along the entire northern coast of the Mediterranean where they are described as the Proto-Aurignacian or the Fumanian (Broglio & Dalmeri 2005). Similar industries of the Early Upper Paleolithic are also known from the Middle East (Baradostian in Iraq and Iran – Otte & Kozłowski 2009).

Diffusion via Anatolia and the Balkans is documented by Fumanian assemblages in the eastern Balkans (Kozarnika Cave – Tsaneva 2007), in the Northern Italy (Fumane Cave – Fig. 4: 12–23; Riparo Mochi), in Southern Italy (Paglici, Castelcivita), southern France (the southern facies of the Aurignacian acc. to Bon 2002), and in Catalonia (Arbreda, Raclau, Viver, Mollet I, etc. Fullola i Pericot, Soler i Masferrer 2003-2004). The Fumanian displays a fully developed blade and bladelet technique based – among others – on carenoidal cores, also with Aurignacian bone points, numerous shell decorations, with structured layout of camps, and incipients of figural rock paintings (Fig. 5) (Broglio & Dalmeri 2005). Most components of the "Upper Paleolithic" revolution were introduced in the Fumanian; many of these innovations became later a component of the typical Aurignacian – a unit that for several millennia dominated western Eurasia.

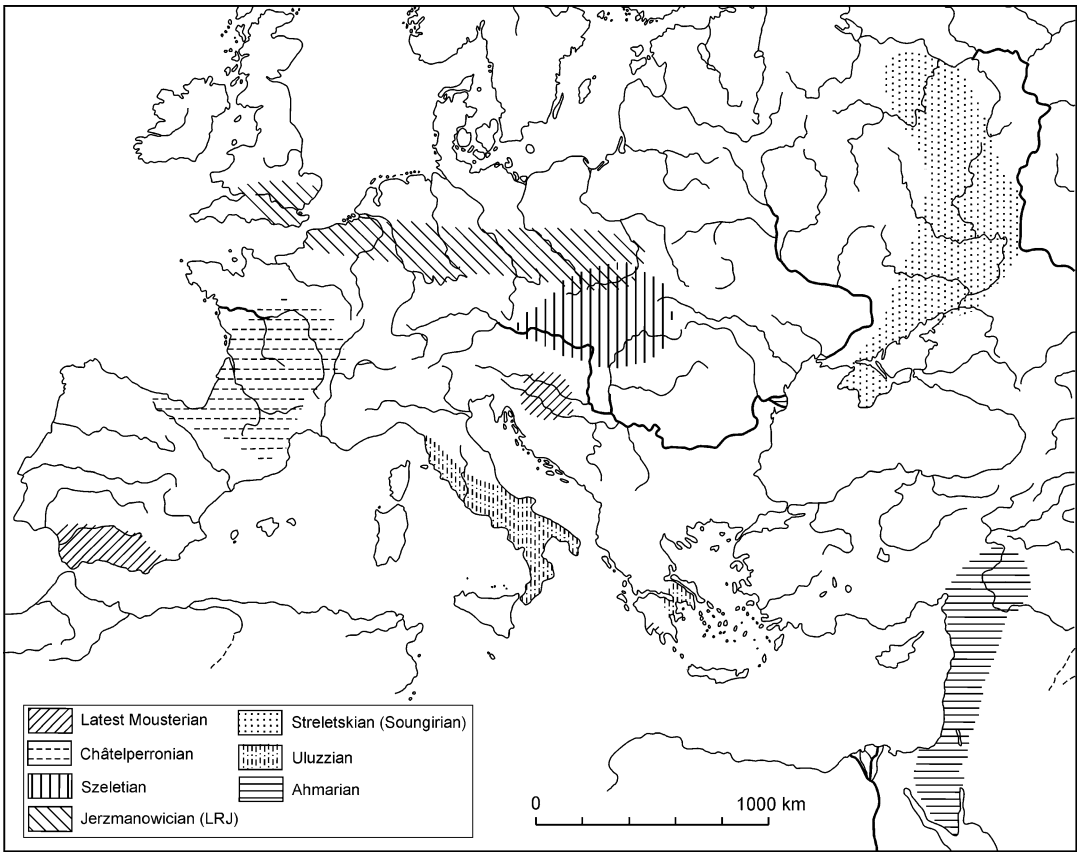

Europe: Early Upper Paleolithic, Fig. 6 Map of the "transitional cultures" and the last Mousterian

Most of the radiocarbon dates for the Fumanian are in the interval between 30 and 33 Kyr BP (Higham et al. 2009). But at some sites in Italy (Castelvicita, Paglici, Serino – Giaccio et al. 2008), also in the Russian Plain (Kostenki 14 – Sinitsin 2003), Fumanian levels are sealed by Campanian Ignimbrite tephra which is the effect of the volcanic eruption of Phlegraean Fields today dated at 39.3 Kyr BP. This age of the eruption has been confirmed by recent AMS determinations (using ABA and ABOX methods) for Upper Paleolithic levels covered by Campanian Ignimbrite from Italy as far as the Russian Plain. It should be added that the Bachokirian in the Temnata Cave is too sealed by tephra from the same CI eruption in Central Italy.

Besides these two units (Levallois-derived and Proto-Aurignacian/Fumanian), alien in Europe, some units developed on local substratum of Middle Paleolithic traditions. "Transitional units" emerged in Europe in the period of cohabitation of Neanderthals and Anatomically Modern Humans; it is difficult to decide whether "transitional units" are the effect of exclusively local, autonomous evolution of Middle Paleolithic tradition or the effect of contacts with and "borrowings" from the first Homo sapiens. "Transitional units" evolved from the Mousterian as well as the Micoquian; besides technological traditions of the Middle Paleolithic, "transitional units" display, too, in a various degree, Upper Paleolithic technologies and stylistics (Fig. 6).

From the Mousterian evolved units using blade technique and steep retouch shaping backed pieces: in Western Europe this is the Chatelperronian (Pelegrin 1995) and in central Mediterranean the Uluzzian (Palma di Cesnola 1993). In both units blade technique was used to produce blanks retouched into backed points.

From the Micoquian evolved industries with bifacially retouched leaf points, technologically highly advanced; in Central Europe this is the Szeletian and in Eastern Europe the Streletskian/Sungirian. In these units the Upper Paleolithic component is represented by mainly end scrapers, but basic tool kit is on flakes.

Unfortunately, we have very little data on the biological nature of the populations of "transitional units." We know that at least the early phases of the Chatelperronian and the Szeletian can be ascribed to the Neanderthals (compare remains from layer EJOP at St. Cesaire, also – in all likelihood – from the lower Szeletian layer from the Szeleta Cave in Hungary). If we take into account the long duration of the functioning of these units (e.g., Szeletian and Streletskian/Sugirian until the middle phase of the Upper Paleolithic 27/25 Kyr BP), we can assume that late populations of these units were already Anatomically Modern Humans. It should be stressed that one of the individuals from the relatively late graves from Sungir in the central Russian Plain (dated to about 27 Kyr BP) shows – as some anthropologists claim – some Neanderthaloid features, while the second individual is typically modern. This interpretation is, however, still controversial (Mednikova 2005).

The period when Neanderthals vanished and the Anatomically Modern Humans expanded saw rapid climatic changes (RCC) with large amplitudes (Dansgaard/Oeshger fluctuations, between subsequent Heinrich 4 and 2 cold events). The environmental changes, rhythmically repeated, could not have major influence on the recession of the Neanderthals and the expansion of Anatomically Modern Humans. Rather it was the competition for ecological niches, to which Neanderthals had been adapted, that was the main cause of the extinction of Neanderthals before the Glacial Maximum when this population was pushed into enclaves in Andalusia, Croatia, and Crimea (Fig. 7).

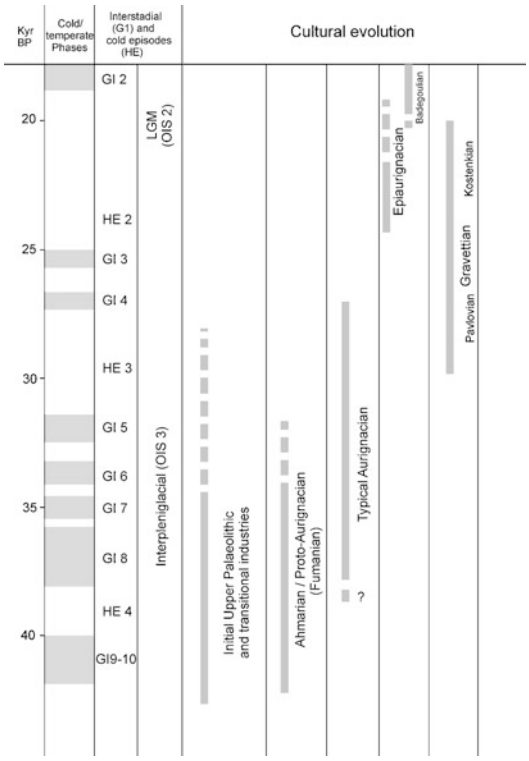

Europe: Early Upper Paleolithic, Fig. 7 Chronological table of the Initial and Early Upper Palaeolithic

The final stage of the formation of the Upper Paleolithic in Europe is represented by the typical Aurignacian (Fig. 8), mostly dated after 36 Kyr BP (Kozlowski & Otte 2000; Otte 2010). The origin of the typical Aurignacian is the subject of discussions, but it seems most probable that the Proto-Aurignacian/Fumanian was its ancestor. Some centers of the early phase of the typical Aurignacian were situated more to the north from the Proto-Aurignacian, i.e., in the middle and upper Danube Basin and in southern France (Teyssandier 2007).

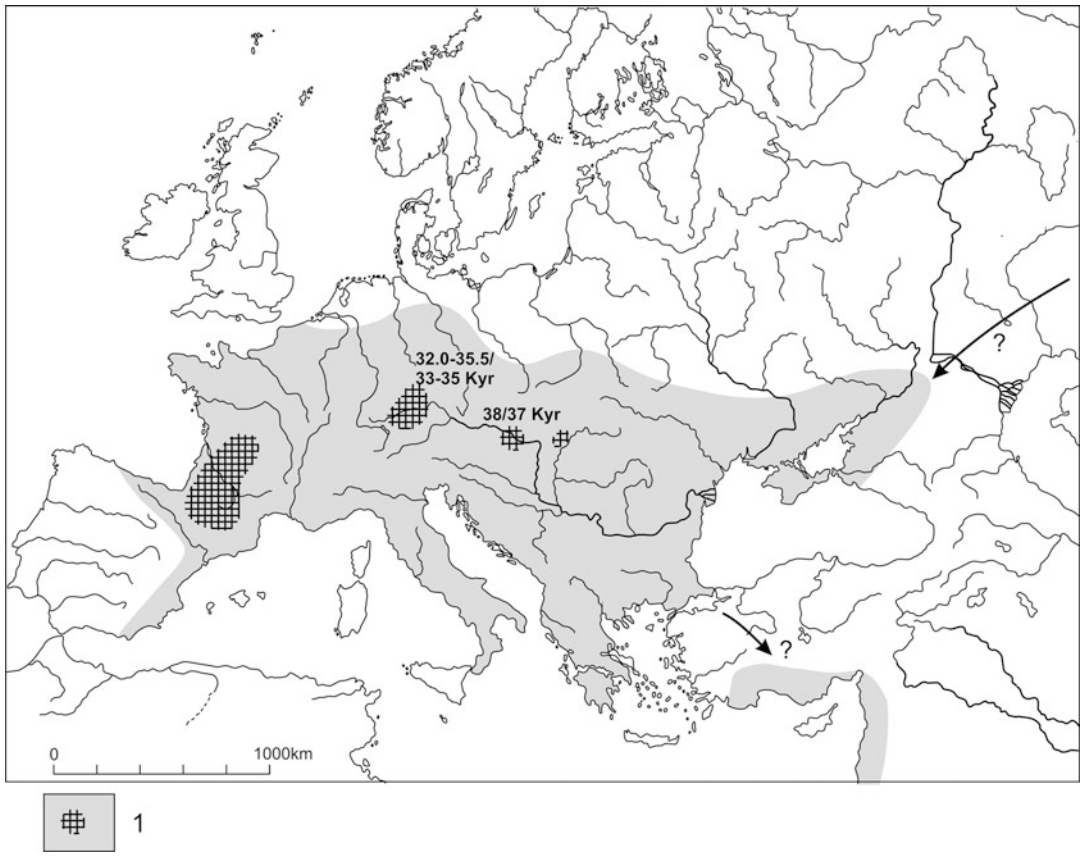

Europe: Early Upper Paleolithic, Fig. 8 Map of the typical Aurignacian (*1*) with primary centers in the middle and upper Danube Basin and in France

Cross-References

- ▶ Art, Paleolithic
- ▶ Bone Tools, Paleolithic
- ▶ Lithic Technology, Paleolithic

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Europe: Mesolithic-Neolithic Transition

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Introduction

As is known, the Mesolithic is not distinguished by striking specific traits in the archaeological record: it is actually defined as the age of the "middle" Stone Age, halfway between the "early" Stone Age, or Paleolithic, and the "new" Stone Age, or the Neolithic. In addition, it is the last prehistoric period recognized as such (Rowley-Conwy 1986: 17), and its origin seems to be vitiated by errors of assessment. The first and chief student of European Mesolithic, Grahame Clark (1980), who has also recounted the history of the emergence and development of that concept, concludes that it was defined by the so-called hiatus theory, based first on the belief that there were few archaeological traces of this period (occupation gap), and later also on the belief that the cultures of that period were of minor importance (cultural gap). The theory of discontinuity, according to Clark, "can be shown to have warped much of our thinking" (quoted in Rowley-Conwy 1986: 17). There were additional difficulties later: the introduction of the term Epipaleolithic, used to designate the end of the Paleolithic and superimposed ambiguously upon the Mesolithic, and the occasional use of the term Neolithic to indicate not only the new economy but also those hunting cultures which are still Mesolithic, but which already use pottery.

Definition

What is then the modern meaning of the concept of the Mesolithic? From the chronological point of view, it is easy to describe, since it coincides with the end of the glaciation in Europe and the beginning of the postglacial period, that is, of the climatic conditions of the Holocene. In this sense, it is possible to argue that the Mesolithic is the first archaeological period of the Holocene, which began about 11,000 years ago, and comprised the last European fishing and hunting cultures, highly specialized and extremely productive particularly in the area of northern Europe, recently freed from ice. In fact, agriculture emerges as the dominant economy immediately after the Mesolithic cultures.

Key Issues/Current Debates

Nevertheless, the problem of the Mesolithic is not in its chronology, but in the evaluation of its role. Therefore, some fundamental questions have to be asked: Is the Mesolithic merely a period of highly specialized postglacial fishers, or something much more? Is it simply a continuation of the Upper Paleolithic (Gamble 1986), somewhat more advanced in some western parts of northern Europe, but static in central Europe (Vencl 1986), or a period of major innovations leading to the development of agriculture and facilitating its adoption? What was the role of the Mesolithic in the transition to agriculture: a passive role in face of invasion and colonization, or an active role, involving contribution and collaboration?

Seen within the framework of current archaeological research, the transition from the Mesolithic to agriculture can be explained in two radically different ways: by giving western Asia, as the fountainhead of agriculture, the chief role in this transition, effected in the course of the colonization of Europe, or by assigning that

role to Europe and assuming that the transition was the result of a supposed process of adoption and/or active development by European Mesolithic hunters and gatherers. According to the former view, the cultivators migrated from east to west and colonized Europe, and the European hunters and gatherers were mere survivors, destined to be absorbed by the newcomers; according to the latter view, the cultivators and the hunters-gatherers were the same persons, and agriculture emerged as a result of an active process during the transition from one economy to another. In the former case, all the innovative developments took place in western Asia, and the role of the Mesolithic hunters and gatherers of Europe was limited to that of assisting the inexorable advance of the oriental Neolithic civilization. In the latter case, the autochthonous hunters and gatherers were the principal factors responsible for the transition, which was carried out with an equipment of the do-it-yourself type, adapted to intensify the practices of the management of groups of animals, practices which, according to this view, can be traced back to the Upper Paleolithic and which had been experimented with in connection with all animals, from snails to sheep, well before the Neolithic (Zvelebil 1986b: 175).

At the center of this ongoing controversy concerning the Mesolithic and its role in the transition to the Neolithic is the thought of an entire archaeological school, represented by scholars like Clarke, Ashbee, Dennell, and Price (Vencl 1986: 43), which maintains that the Mesolithic hunters and gatherers made a fundamental contribution to the process leading to the emergence of agriculture in Europe and which arrives at the conclusion that there was not a break but only, or at least predominantly, continuity. Typical of this school is the assertion: "In virtually every area of Europe, the transition from Mesolithic foragers to Neolithic farming witnesses distinct aspects of continuity in human adaptation... The end of the Mesolithic is not brought about by an advance of invading farmers but rather reflects a period of readaptation and adjustment to changing environment and new subsistence practices, often within the context of existing societies" (Price 1983: 771).

It is quite clear that the new view of the Mesolithic is a typically processual one, which opposes continuity and processes of local development to the hypothesis of an invasion from the east. As an archaeologist has said: "continuity, rather than contrast, is the fashion of the day" (Zvelebil 1986b: 168).

The study of continuity, naturally, leads to two different results depending on the context. Where continuity is an already existing phenomenon, that is, in the substantially unitary long periods of prehistory (Paleolithic, Neolithic, the Metal ages), the tendency is to find elements which anticipate the next period and prepare the transition to it. Where discontinuity is implicit, that is, in the transition from one period to another, the tendency is to look for continuity and downgrade the disruptive elements.

As regards the transition from Upper Paleolithic to Mesolithic, for example, research has brought to light numerous traits which link these two periods in spite of their discontinuity. The technological ones include the bow and arrow, harpoons, and tools made of polished stone. Among the traits concerning the use of resources are fishing, gathering of sea food, and, possibly, domestication of the dog. The organizational traits include logistic mobility, storage of products for later use, tendency toward sedentarism, and specialization of labor.

As regards the Mesolithic, the traditional view, which interprets the postglacial socioeconomic developments as a later elaboration of patterns already emergent in the Upper Paleolithic and postulates a neat break only at the beginning of the Neolithic, is opposed, as I have already said, by scholars who see the postglacial period as an age of such fundamental innovations that it led inevitably to the agriculture of the Neolithic (Zvelebil 1986b: 168).

The Neolithization of Europe: Zvelebil's Theory

Confronted with the two opposed theories of Mesolithic – either exclusively indigenous development or exclusively external colonization – one may naturally ask: Is it really necessary to adopt one of these two models? Would it not be

possible to take a less clear-cut view, without abandoning completely the model of colonization and also leaving place for local processes (Zvelebil 1986b: 167-8)?

A major representative of the innovating school, Marek Zvelebil, who has recently been defined "as being among the most important and influential archaeological thinkers of his generation" (Lillie 2011), stands out as both editor of a fundamental collection of studies (Zvelebil 1986) and author of two major articles (Zvelebil 1986a, b), in which he advocates a position of the above mentioned type, which seems to me particularly congruent with facts and free from apriorism.

Zvelebil directs his criticisms primarily against the traditional invasionist approach, which is in his view impaired by too reductive a view of the hunting-gathering cultures. Actually, Zvelebil, too, shares what is today the common view of archaeologists and historians of archaeology: the identification of colonialism as the source of many ideas, ideological rather than scientific, which persist in archaeology to the present day. To him, the endurance "of prejudices towards recent hunters-gatherers [is] itself a consequence of the European colonial expansion" (Zvelebil 1986b: 6-8).

This constant emphasis on ideology as an explanatory factor is in my view one of the major merits of modern archaeology. According to Zvelebil, it was only with the publication of *Man the Hunter* (Lee & De Vore 1968), which introduced the conception of the affluent forager, that an approach not vitiated by ideology was adopted in the study of hunter-gatherer cultures. The discovery of the economic prosperity of the forager of Upper Paleolithic and Mesolithic led to the discovery of his social complexity and to the emergence of the notion of the complex forager and that in turn was followed by the resumption – after a long interval – of comparative studies of ethnographic and archaeological cultures of hunters and gatherers. These studies gave rise to a new conception of hunting-gathering cultures, the basic traits of which are (1) a remarkable degree of sedentarism, (2) increase in demographic density, (3) socioeconomic differentiation with consequent division of labor, (4) development of trade, (5) emergence of war, and (6) intensification of social and ritual life (Zvelebil 1986b: 8). In other words, traits previously attributed solely to the revolutionary cultivators of the Neolithic were now recognized as existing also in the immediately preceding societies of hunters and gatherers. Seen in this light, the postglacial hunters and gatherers represent, needless to say, the necessary "prelude" to the cultivators.

Zvelebil then makes some lucid comments on certain factors of innovation which emerge as a result of the great ecological changes at the end of the glacial: the awareness of the seasonal availability of resources, the risk and effort involved in the exploitation of resources within such seasonal limits, and the development of important technical innovations for the more efficient use of the time available for exploitation. The new implements for fishing (ditches, traps, dams, and nets) can be in fact seen as means of saving time and ensuring storage (Zvelebil 1986b: 169-70), serving the same purpose as composite tools (microliths set into wooden or bone handles) (Zvelebil 1986b: 168-9).

The relationship between the increase of sedentarism and the increase of population is also important. Among the modern ethnographic populations, the demographic increase of fishers, leading a sedentary life and using storage of resources typical of the Mesolithic, is equal to that of the simple farming populations, and it is much higher than the increase in the hunting-gathering societies (Zvelebil 1986b: 172).

Recent research has identified some Mesolithic technical innovations which were unknown in the Upper Paleolithic but are common in the Neolithic: new flint working techniques; some types of bone and antler tools such as axes and sickles; nets, fish traps, and other sophisticated implements for fishing and hunting; pottery; means of transportation like sledges and skis; the majority of objects of adornment; new burial rites; etc. (Zvelebil 1986b: 168).

Other scholars (e.g., Higgs & Coles 1969) have identified pre-Neolithic forms of managing herds of ungulates, which show that it may be

possible to trace the beginnings of the techniques of domestication to the early postglacial, and even to the late glacial, in geographical areas which include the Mediterranean and parts of temperate Europe (cf. Zvelebil 1986a: 9; Forni 1990).

Accordingly, European agropastoralism might represent a continuation of tendencies which asserted themselves in the Mesolithic. This is particularly apparent in southeastern Europe and in the western Mediterranean, where it assumed the form of a replica and development of the already existing systems of the exploitation of resources (Zvelebil 1986b: 181).

The transition to agriculture took place against this complex and innovative background. Zvelebil distinguishes a number of approaches to this problem, which, for convenience sake, can be reduced to the two already mentioned opposite views: the traditional invasionist model and the innovative model based on the principle of continuity.

The traditional diffusionist and invasionist model is based on the idea of the absolute superiority of agriculture, as an economic system, to hunting and gathering, and, consequently, of the invaders to the natives. The adoption of agriculture is seen as a more or less automatic process, followed, after the conversion, by the colonization of new areas by the neo-agricultural communities and by the dislocation and assimilation of the surviving groups of hunters (Zvelebil 1986a: 8-9).

Zvelebil is critical of this model of the Neolithization of Europe and particularly of that based on the so-called wave of advance, proposed by Ammermann and Cavalli Sforza (1973, 1984), which has also inspired Renfrew (1987). According to these authors, the wave-like spread of agriculture is compatible with the real dates of the diffusion of agriculture as established by archaeology, as well as with the patterns of genetic variation of the European population, as established by geogeneticists. Zvelebil considers this as a more sophisticated variant of the traditional model insomuch as it assumes a uniform diffusion of agriculture in Europe from its center in western Asia, with a gradual colonization of areas increasingly remote from the original source of diffusion. His objection is that this model is too reductive as regards the hunting-gathering cultures and that it assumes a "normal" (instead of "exceptional") discontinuity between the Mesolithic and the Neolithic, in spite of the fact that there are many evident forms of overlapping and continuity between the cultures belonging to these periods (Zvelebil 1986a: 10-11).

It may be useful to enumerate at this point both the responses of the supporters of the invasionist model and Zvelebil's counterarguments (Zvelebil 1986b: 177-178).

I. The wave of advance of agriculture clearly spreads from the eastern Mediterranean northward and westward, which proves the eastern provenance of the colonizers.
   1. Counterargument: the diffusion might have been a diffusion of new traits of economy, not necessarily of people.

II. There are notable similarities between the material culture of the cultivators from western Asia and that of European cultivators, particularly in pottery and stone technology.
   2. Counterargument: there are equally numerous proofs of continuity between the material culture of the European Mesolithic and the Neolithic. One thing does not exclude the other.

III. It may be expected that the superior numbers of the farming populations led to the assimilation and disappearance of the less numerous autochthonous communities.
   3. Counterargument: the Neolithic demographic potential has been overestimated and that of the Mesolithic underestimated.

      Zvelebil adds to these three counterarguments two arguments of a different kind but in my opinion of considerable weight.
   4. It has been established that the wild ancestors of some species domesticated later were present in the Mediterranean, too, so that it is possible that there was a local development of the process of domestication.

5. There is no proof of demographic pressure in western Asia which might have driven colonizers to migrate, and there is little proof of early Neolithic settlements in western Turkey, supposed to be the base for the colonization of Europe (Zvelebil 1986b: 178).

Further elaborating his model, Zvelebil (1986b: 178-9) distinguishes four types of habitats in Europe:

A. Areas ideal for agriculture and not suitable for hunting and gathering: the Thessalian plain, the Tavoliere in Puglia, the loess regions of central Europe, and the basins of great rivers such as the Danube, the Rhine, or the Seine. It is not by chance that these were the first areas to be cultivated.
B. Areas suitable for both farmers and hunters-gatherers: river valleys and large coastal plains. These areas witnessed the introduction of agriculture immediately afterward.
C. Areas very suitable for hunting and gathering but rather unsuitable for cultivation: the coastal zones of Scotland, estuaries, river gorges, and lakes. They were the last to adopt agriculture in the initial period.
D. High and mountainous zones, which were cultivated or exploited for stockbreeding only in the stage of the secondary expansion of agriculture, in the late Neolithic.

Hence, Zvelebil's important conclusion: the expansion of agriculture did not follow the wave model but had a mosaic-like pattern.

Natural factors, on the other hand, do not explain everything: the boundary of agriculture remained stationary in the north European plain for a long time, as might be expected, but there was a long delay in the adoption of the new economy even in some areas suitable for cultivation, like the river valleys and the terraces of Ukraine and the southern Urals. Variations of this type can be explained only by assuming that they were caused by local factors, such as the favorable socioeconomic conditions of the local hunters and gatherers (Zvelebil 1986b: 180).

The originality of this analysis consists in the new general interpretation of the Mesolithic and Neolithic economy: the highly specialized Mesolithic hunting and gathering and the Neolithic agriculture are no longer seen as "stages" of an evolutive sequence with a predictable outcome but as specialized systems of exploitation, alternative and parallel, and both conditioned by the varying ecological factors prevailing in the difficult postglacial conditions: in western Asia, there was genetic domestication of mutually complementary animal and plant species, while moderate Europe saw only an advance in technological specialization and intensification of exploitation, without any form of animal or plant domestication (Zvelebil 1986b: 173-4). In western Asia, there were both wild cereals and gregarious ungulates, amenable to domestication; in Europe, on the other hand, there lived red deer, roe deer, the stag, the moose, and the gazelle, none of them responsive to domestication. The only European animals which could be domesticated were the wild pig, the wild ox, and the goat. Hence the hypothesis of a limited domestication of the goat, bovine cattle, and the pig in eastern Europe and on the southern fringes of central Asia. The picture is not different as regards the domestication of plants.

On the basis of this, Zvelebil argues that agriculture could not have developed in temperate Europe. Besides, agriculture had a decidedly minor role in the European areas where the hunting-gathering economy attained a high level of productivity (i.e., along the Atlantic coast and the ice cap, as well as in the valleys of great rivers and lakes – all habitats rich in aquatic resources), because the level of prosperity achieved by the Mesolithic economy favored the continuation of specialized hunting and gathering (Zvelebil 1986b: 181). Nevertheless, there were always contacts and mutual influences between the two systems, since the boundary between the two areas was not closed, but "porous" (Zvelebil 1986b: 182-3).

To conclude, Zvelebil (1986b: 175) advocates a regional model of transition to agriculture, which combines and integrates the invasionist and evolutionist approaches, and leaves the determination of their respective contributions to the interpretations of objective archaeological data. As a result, we have the following situation.

I. In the eastern Mediterranean (Greece), in the Balkans and central Europe, archaeological evidence indicates that the introduction of agriculture was a rapid process developing on the foundation of a complete "package" of cultivated plants and domesticated animals, with the appertaining techniques of exploitation, introduced from the outside. Consequently, the Neolithic cultures of Tripolye in Ukraine, the Linear Bandkeramik (LBK) in central Europe, the Funnel-Beaker culture (TRB) of Scandinavia, and the Impressed Ware culture of southern Italy are seen as intrusive cultures and products of colonization (Zvelebil 1986b: 184).
II. The archaeological documentation for the second group of areas shows that a rapid process of local adoption took place, that is, that agriculture was taken up by the indigenous populations in a local Mesolithic context. The most likely area in this group is the western Mediterranean, where agriculture appeared too soon to be a result of migration (Zvelebil 1986b: 175, 184).
III. In the two lateral areas, on the shores of the Atlantic and in eastern Europe, archaeological evidence indicates a much slower process of local adoption, protracted over millennia.

Besides, in the areas where archaeological evidence indicates colonization, the most likely explanation is not a wave-like invasion, but a limited, regional immigration, followed by the adoption of agriculture by local hunters and gatherers (Zvelebil 1986b: 185). There is in fact much more archaeological evidence of population movements in temperate Europe and Asia during the late Neolithic, Eneolithic, and the Bronze Age than at the beginning of the Neolithic. The processes of proper colonization seem to begin only after the initial period (Zvelebil 1986b: 186).

To sum up, the Mesolithic can no longer be considered as a lull, as maintained by the traditional theory, nor, as the most radical innovating school asserts, as an epoch which saw a uniform and smooth development of the Neolithic from a Mesolithic base (Zvelebil 1986b: 167). It is rather a period of transition, which lasted much longer than was thought previously and which was of an extremely complex nature. The hunters-gatherers of the Mesolithic adopted cultivation selectively and not indiscriminately and not everywhere.

Accordingly, the general principle of continuity remains valid: the Mesolithic "prepared" the Neolithic, just as the Upper Paleolithic "prepared" the Mesolithic. But Zvelebil also admits, and that seems to me the principal contribution of his theory, the possibility of intrusive ethnic contributions, limited to certain areas, which were reabsorbed by autochthonous populations.

Zvelebil's model is superior to the exclusively migratory model of Neolithization, adopted by Renfrew; it is also more plausible than the model based on a radical conception of the role of the autochthonous population. It does not reject a priori either migration or autonomous development, and it makes use of both processes only when this is warranted by archaeological documentation and a careful study of evidence.

Linguistic Evidence of Continuity from Mesolithic to Neolithic

Language also confirms the continuity model of the transition from Mesolithic to Neolithic, as can be shown, for example, by the common origin of the name of "tar" in three different linguistic areas of Europe. As is known, the extraction of tar from trees has been dated to Mesolithic by prehistorians (e.g., Clark 1975: 127, 140, 171). And in fact, (1) the English word *tree* (from Proto-Indo-European root **deru* "tree, wood") is akin to the northern European words for "tar": Icel. *tjara*, Norw. *tjøra*, Swed. *tjära*, Dan. *tjøre*, Old Engl. *tierwe* (f.), *teoru* (n.), Old Fris. *tera*, Middle Low Gm. *tere*, Middle Dutch *ter(re)*, *tarre*, Germ. Du. *teer*, Engl. *tar*, Lith. *dervà* "pitch, tar," Lett. *darva* "tar," Finn. *terva* (Pokorny 1969: 214-7). (2) In the Alpine region, the Latin word *bitumen* "tar" comes from the Latin word *betulla* "beech" (cf. Germ. *Birkenteer*) (Ernout & Meillet 1959–1960 s.vv. *betulla*, *bitumen)*. And (3) in the Mediterranean area, the Latin word *pix* "pitch" comes from *pinus* "pine tree" (Pokorny 1969: 794).

Cross-References

▶ European Mesolithic: Geography and Culture
▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation

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Europe: Middle to Upper Paleolithic Transition

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Introduction

This "transition" condenses in fact an extreme variety of cultural factors dispersed across all continents but especially in the "Old World": Africa, Europe, and Asia. Within each of these continents, these factors and processes interacted constantly. We focus here only on the apparently fundamental elements in each region. In terms of technology, China and the Far East shift in particular from the use of bamboo and cobbles to light blade blanks. During this phase, the general gracilization of the human skeleton and anatomic uprightness, observed simultaneously everywhere, are the result of bipedalism. In Africa an avalanche of autonomous technical inventions took place: from cobbles to bifaces, Levallois to blade production, up to agropastoral Neolithic civilizations and metallurgy. The immensity of this continent made it a sort of laboratory in which innovations and convergences emerged. But, leaving to one side these fabulous and exotic territories, we now focus on an overview of the transition in Europe, itself already quite complex.

Key Issues

For hundreds of thousands of years, the Middle Paleolithic existed in Europe, in an infinite range of environmental contexts depending on time,

space, latitude, and solar exposure. However, human populations were continually present, diversifying their cultures, refining their rites, customs, and beliefs. The most extraordinary aspect is the anatomical coherence presented by this enormous fossil population. Abundant in Europe, Neandertals are also found in Asia. They thus appear to have had varied origins probably combining African and Asian components. Regardless, the biological form of Neandertals is quite uniform. It is identified both by bone morphology and by recent ancient DNA studies. Yet these populations, so homogeneous physically, possessed infinite varieties of cultural traditions, extending from Portugal to the Caucasus. They are differentiated by "styles," or variability in their diet, hunting strategies, and modes of shelter. In a word, the European Mousterians had abstract and metaphysical mental structures equivalent in their refinement to those of later or external populations. It must thus be accepted that a broad ethnic diversity divided Europe, although the demographic and biological basis remained identical. If we consider the vastness of the region, countless cultural phenomena can be observed, simultaneously in their integration and evolution. Europe constitutes a repertory of all human innovations and their dissolution, as much as "progress" as we define it today. Considered retrospectively, we could also argue that these variations (spiritual or technological) were so subtle and so well elaborated that they led to unequaled human survival, a persistence depending on the equilibrium between human needs and natural resources.

This force of equilibrium and this aptitude for permanent renewals can be seen in what appears to be both harmonious and in perpetual balance. Isotopic analyses of fossil proteins demonstrate the importance of meat in the diet, while dental enamel shows the importance of plants, more similar to the diet of primates in general (including humans). Neandertals lived in perfect coherence with nature because nature was never disrupted as a result of their subsistence practices. But social rules imposed during these millennia enabled both the cohesion and articulation of human groups. Human burials and burned, dispersed, and broken bones broadly demonstrate the importance of the subtle and elaborate metaphysical relationship; these rituals illustrate the capacity of thinking, language, and especially a form of conciliation between natural forces and human society. This unprecedented diversification between needs, means, and ethnicities in Europe leads to an essential consequence: the history of the continent is extremely subtle and of extreme complexity. However, the differences seen between them has still allowed the general use of "Mousterian" as an overall term for Middle Paleolithic cultures. Yet this is only a functional, inoffensive, and universal category. Countless cultural traditions succeeded on another over tens of thousands of years and over an immense territory and can be distinguished only by the flexibility in a style, by the inflection of a handle, or simply by systems of sharing food and the social networks in which they existed. Thousands of stone flakes found throughout Europe in extremely varied contexts form the background of a real composite technology, functions, and traditions over time. However, tools, veritable both in its use and in its mythical scope, resulted in contrast from complex assemblages, twisted branches, arm movements, and modes of hafting. Motions are also endlessly varied, both in the sense given to the human action in the different environments they were carried out. Such capacities rapidly became traditions through the interplay of social gratification. But only working edges in hard and brittle materials (stone, shell, antler) alone do not constitute an essential cultural category. Other elements of social behavior must be added, such as habitat, hunting strategies, mythology, and rituals, in order to reconstruct a sort of history of Paleolithic peoples, probably of an extreme fineness since it appears uniform over a very long time.

Changes in the use of stone create reflections and shadows of this constant revolution in concepts.

The simplest flakes (e.g., at the site of Hoxne) demonstrate the broad range of uses for which they were used prior to their abandon: splitting, cutting, sawing, scraping, etc. Countless components were also present in ongoing operation in relation to the rhythms of festivities, ceremonies, traditions, and

values. The loss in the historical period is only a drop of water in the ethnic ocean of Europe over hundreds of thousands of years. So, the colored feet of dancers, ceremonies around domestic hearths, decorations of leaves, flowers, tattoos, songs, and dances. A thousand times dispersed, a thousand times lost. A Paleolithic "history" would be made up of a superposition of "symbolic systems" described by ethnology but here spread over an enormous range of time because all of these populations knew one another, influenced one another, and continuously evolved following certain axes and according to the importance accorded to different elements. Populations, traditions, and periods are distinguished by elements in stone materials grouped under the term "flint." But the general impression offered from stone artifacts leads to the greatest confusion since they are considered out of context and are only incomplete "vestiges." Conversely, evidence exists to indicate organized social life: charred human bones, colorants, etc. One can imagine a swarm of ethnicities spread out across all environments and in constant collective exhibition (arts, games, weapons).

Around 100,000 years ago, the entire world was covered with fossil humans following the same convergent anatomical trends and linked to general uprightness. This process, absolutely generalized, took place everywhere and in the same direction. But very schematically, the universal evolutionary trend varied depending on the isolation of the group, its density, and its demography. Neandertals are only one example among a thousand others where, like polar bears or varieties of horses, the species remained intact, while the morphology (its external aspect) became specialized due to the rate of reproduction and isolation. In other terms, Neandertals were created by extremely long isolation in a backdrop of a huge global population in which all other anatomical forms within the modern human species developed, e.g., Chinese, Kenyans, and Australians.

On these general "mechanical" bases, the human form changed abruptly in Europe between 40 and 35,000 years ago. This was due to the arrival of one of the other human populations to occupy Europe (modern humans or Cro-Magnon). Different non-European anatomical forms had thus followed identical laws of biological evolution, but at different rates, probably due to the lack of geographic isolation (e.g., the steppes of Central Asia) where gene flow was greater than in Europe, such that contrasts were more rapid and more striking. These very early observations, made in the nineteenth century, were particularly striking in academic settings at the time, but the stigma of an opposition between two different populations remains today.

On the margins of Europe, all other populations were in general advancing toward modernity, especially in these regions because population density was higher, spread out, and in constant and distant exchange such that any population could be seen as "modern" if its anatomy had advanced beyond the Neandertals remaining in Europe. This is nothing other than degrees on a biomechanical scale, but there were no biological differences to separate them into different species.

All of these populations were "modern" as a function of their technological development.

From all sides, new population waves penetrated Europe. From the Maghreb (Gibraltar and Sicily), obvious influences can be seen on both sides of the straits: the Aterian ending in the extreme west around 28,000 years ago and the Iberomaurusian in Sicily, identical to that found in Tunisia. Much later, around 12,000 years ago, this invasion of modern humans into Europe is also seen by art, techniques, and navigation.

In Eastern Europe, direct Paleolithic relationships are observed nowhere, despite the geographic proximity of Greece and Turkey. The Aurignacian lithic industry is also present (around 30,000 years ago), but no longer corresponds to the early penetration or pioneer phase (between 40 and 35,000 years ago) and is not associated with a modern form of humanity. This southeastern region should remain an important region for research, not only because excavations are still in progress but also because this transition appears "logical." The Italian industries on curved flakes (Uluzzian) are also found in western Greece and may have had a part in such kinds of movements, if human remains were discovered.

In the question of the MP-UP transition, Asia played an enormous role, probably many

times, with several migration routes and different cultural traditions.

The earliest tradition, but the least well known, is called the "Streletskian-Sungirian." Since 40,000 years ago, refined toolmaking techniques from Central Asia spread directly along the same latitudes to the west. Their expansion, however, remained limited to the current Russian Plain (Sungir, near Moscow; Beroutcha Balka near the south of Russia; and Buran Kaya in Crimea). The associated human remains are clearly modern and are burials. Rituals, weapons, and the bone and ivory industry indicate that they belong to the European Upper Paleolithic. But, although very evolved, these traditions remained exclusively eastern. The rest of Europe was occupied by Neandertals and their Mousterian culture, with immense regional variation reflecting cultural traditions.

The essential axis for total and definitive migration of modern humans into Europe is "oblique": from Iran to Great Britain. All the other coasts, rivers, and valleys seem to have depended strictly on this axis. Art is present in abundance: it shows a seeking for beauty and the incarnation of mythologies, previously mute. Inhabitation sites are very common, with a few burials and bone remains spread across the sites proving the high density of the new population, which probably arrived in successive waves.

This would have been a real colonization on the model of historical societies. Weapons, following the symbol of the image, killed at distance by propulsion (unique to humans) and thus imposed a new symbolism on both reality and the dream world.

This particular "metaphysical" relationship is fundamental to explain the prosperity and permanence of modern humans from then on in Europe. Man sought to impose his will on nature by his spirit (figured mythology), by the conquest of hunting at distance (using spears and bows), and by deregulating the natural biological rhythm of reproduction (less chance for prey, more for humans). Once begun, this cycle is unceasing and exponential: we are today on the threshold of a definitive change with the extinction of everything that is wild (ourselves included) and the definition of increasingly constraining normative rules. Equilibrium thus unbalanced explains current processes. Even if we accord a stronger natural visibility to it, its origin is always and especially spiritual: in the challenges launched by humans to make their own destiny.

Conclusion

The transitions in Europe took place due to the relative isolation of the continent, on which the different Mousterian traditions persisted in complete equilibrium with a changing environment and climate. Conversely, all other regions of the Old World (from Tangiers to Beijing) more readily exchanged techniques, values, and genes. Thus, the "modern" migratory movement, here from Central Asia, is seen in Europe as an abrupt phenomenon in which propulsion techniques, new myths, and gracile anatomy. This was not reflected in specific variations but rather genetic associations oriented toward bipedalism that had begun three million years before. Depending on demographic density, displacements, and contacts, this speed of anatomic evolution varied more or less rapidly although always in the same direction across the world (even today). Only "isolates" such as Australia and Europe followed regional evolution, with an archaic tendency anatomically.

The most curious phenomenon in human history is linked to the intense concentration of these new populations, their density, and then their rapid expansion across all of Europe. Conditions, one could term "triangular," were thus necessary. The new peripheral populations had a very particular relationship with the universe and destiny: they sought to master it. New mythologies were constructed that "enabled" humans to break the sacred link with nature (increased consumption due to thrown weapons), thus leading to increased population size, and to have a tendency for geographic expansion, which explained their rapid mass displacements toward the west. The relationship fundamental to this "transition" is thus found in the way people lived.

This new "self-reading" is evidenced as much in cave art (where myth is embodied), in precise, rapid, and long-distance weapons (spears, bows), in the now extremely abundant and varied burials, and especially by the repulsion of natural forces by

"shamans" (tombs, decorations). With the European Upper Paleolithic, people fought against the absurd and forged their own destinies. The difference between such achievements and those of Neandertals is not in kind but in speed. In a dense and sedentary population, innovations are absorbed into the set of traditional practices (Neandertals). Among modern humans, the population dispersal was much larger (hundreds versus thousands of kilometers), and variations are more common and more diversified. These scattered attempts of singular combat against nature could then be crystallized in a strong and coherent metaphysics in which the place of humans was consolidated, as much by thrown weapons as by mystical images.

At this stage, migrations took place more rapidly and violently as the terrain thus conquered participated in a slow, permanent, and fixed mythology. It was thus fairly simple, by the influx of ideas brought by more "victorious" populations, to weaken the honor render to the animal until it disappeared. Only this spiritual force distinguishes modern humans. This is a solidly structure metaphysical development, of which the population was capable, on the condition that it was rewarded collectively and put into action, as the Bible does today. The spirit justifies all "sacrilege," breaks old laws that held them in another form of equilibrium in a harmonious web of physical and spiritual relationships with a world become "savage" that shifted from the status of partner to that of objects. Once this spiritual crisis was overcome, it offered humanity a new daring and thus a stronger demographic, the "right" to new inventions and the possibility of unlimited expansion. Indeed, the essence of this early modern humanity was the search for cultural inventions (technological, mythological, economic) suitable for overcoming new natural challenges. Such formidable freedom was made for humans out of their own minds. But it is also this freedom that forces us to be responsible for our own destiny and to change it. Finally, it causes the rip (which we still suffer today) between our own natural component and our need for a humanity made by thought. In this direction, modern humans tilted the scales a little more in favor of the mind and a little less for the animal side.

The difference between these two metaphysics was so strong that, in the nineteenth century, the first archaeologists immediately identified the two worlds, either by technology or by art. The metaphysics are as clearly opposed as between, for example, Roman civilization and the Bororos of Amazonia: no spiritual superiority but different scaffolding employed to justified one's place in the universe and to thus authorize all forms of conquest, over nature, other human beings, and finally ourselves.

Between the hasty rummaging in the nineteenth century and the logical coherence now acquired in the historical sciences, the opposition between Neandertals and modern humans can be understood in terms of opposition between value systems. From this depends all other behaviors: displacements, techniques, metaphysics, hunting practices, diet, social distribution, habitat, and education, for example. The operation of all human society possesses a constructive, implacable, and perpetual logic. But the inertia of the history of populations transforms these innovations into a sort of nebulous lineage that characterizes its trajectory. Encounters between populations with profoundly different values, such as Neandertals and modern humans, would cause enormous spiritual shocks, both sides at once and by way of reciprocity and multiplication. While the Aurignacian with Asian origins differs from that in the Dordogne, this difference is less pronounced than within the Mousterian that "absorbed" innovations, integrating them into their own traditions without weakening their specific way of life. All of the potential of modern humans can be already found in other forms during the Middle Paleolithic. What appears vague and disparate among the Neandertals (tools, habitats, burials) becomes clearly defined in a single package along modern humans. This focus and concentration would give them the force and determination to follow this path until the final break with preceding metaphysical systems (Neandertal). This new cohesion would immediately begin an evolutionary line that was chosen and determined and, especially, in perpetual competition with itself. History was born.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Demographic Transitions
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ Northern Europe: Middle to Upper Paleolithic Transition

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Europe: Paleolithic Art

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Introduction

In the western peninsula of Eurasia, Paleolithic art is particularly concentrated and is the earliest. It would appear that the migrations of modern humans from the East had to "mark" the geographic extremity and their new territories. Such materialization of oral myths guaranteed their reality and performance by adding the harmony of plastic forms. Based on the opposition between two systems of thought (Neandertal and Cro-Magnon), graphic imagery rendered this difference in supernatural substance and accentuated the two metaphysical worlds. "Images" are not absent during the Middle Paleolithic (Neandertals) in Europe, but follow entirely different paths from that of plastic illusion. Their burials and habitats have remains with a natural connotation, much more realistic than any later images: horns, antlers, skulls, and mandibles, isolated in tombs, designated the animal symbol, status, and the perpetuity of the deceased, like nature itself to which humanity associates its own destiny. "Hyperrealistic" images are also included in the inhabited areas via isolated bones or exotic minerals such as colorants, sparkling minerals, and mineralized marine shells in early geological deposits.

With the Upper Paleolithic in Europe, a profound separation is made between animal trophies and their "illustrations," being the extraction of their real contour put to the service of mythical thought. This is a deep and moreover irreversible spiritual change: the entire history of art begins here, between 40 and 35,000 years ago, and continues today. So, Paleolithic art first sheds light on the power, cohesion, and harmony of thought. Even if these codes remain nearly indecipherable, their importance is demonstrated by the works produced. Not only do these series of images evolve, by becoming rooted in turn to each other, each phase in this history of forms presents obvious coherence, attesting to highly coercive laws governing the most precious collective thought and its different modes of expression. From time immemorial, human societies were (and remain) united due to a metaphysical explanation that justifies their presence in the eternal reign of the universe.

Everywhere applicable, these spiritual operational rules for humanity are expressed through an extreme variety of formulas, across space and time, but according to constant mechanisms. The laws of the image, freed from the relationship to oral myths, then reflect

autonomous histories, where art and artists follow an increasingly independent lineage in relation to the theoretical concepts that they created. The reproductive process is thus reversed: from producer of images that the mind envisioned first, it becomes determined by their harmony and coherence. This occurs as for writing: starting with letters formed by schematic images, which lose their meaning, later the most sublime texts are produced, from Aristotle to Balzac, without anyone having the idea to reduce these works to the structure of the schema of the images that were originally realistic (e.g., the letter A is an inverted steer head).

A similar trajectory animates the entire history of plastic forms, increasingly dissociated from the original mythological abstraction, as if this history of form tended to orient ideas rather than to illustrate them. For example, the introduction of realism in animal images, then human silhouettes, guided the spirit of man to be more daring by forging their own destiny: this is the Neolithic. As art introduced humanity into the supernatural forces that determine us, craftsmen, peasants, and herders became masters materially of the earthly life as well. This final part of the history of art (extending until 1850), relative to producing and conquering peoples, will not be discussed here.

Paleolithic art is in effect limited to the periods and situations (even today) in which human societies were intimately integrated with nature, by limited plant gathering, occasional hunting, light shelter, regular movement of ethnic groups in the landscape, and, principally, the arts and dreams that they evidence. Paleolithic art thus responds to this situation of harmony with nature by adding its uniquely human dimension: plastic beauty. For us as well, only such extreme sensitivity of the disappeared artists still "speaks": their creations were spiritual vectors prior to their creation, becoming carriers of aesthetic messages and magical power to fascinated humans today.

Thus this spontaneously felt emotion immediately classifies them in the domain of the arts, although the initial assumptions considered this early humanity as cave dwellers, mammoth hunters, and competitors of hyena and bear.

Key Issues/Current Debates/Future Directions/Examples

Distribution

On a global scale, all of the regions that experiences or are still experiencing hunting ways of life also show artistic activities. They are presented in varied forms but always evidence the same fundamental tripartite relationship: integration with nature, oral myths that justify such integration, and plastic expressions occurring at the intersection of the first two, like harmonic evidence of these articulations. The arts of hunters are recognized so surely that their radiometric dates appear unnecessary. Because they immediately reveal this form of tension between assumed natural constraints and the flexibility of spiritual means used by the artist to harmonize human society and the part of the universe with which it is confronted.

For Europe, evidence of mobile art was spread everywhere man had access, being the territory of the continent and less so the areas covered by glaciers (Scandinavia) and more the marine expanses that were exposed by the low sea level (North Sea). These mobile arts accompanied humans as they moved across the landscape, from habitat to burial, where their symbolic values took their power.

But parietal art, the most sumptuous, is found particularly in southwest Europe (Spain, France, Italy), very curiously concentrated in rocky regions, although the rest of Europe also had countless caves and intense human occupations. Some parietal art has been found in the Ural Mountains and the Carpathians, considered quite important as it was isolated and reflects regional plastic codes. The painted cave recently discovered at Coliboaia (in the western part of the Romanian Carpathians) exactly reproduces the figures proper to the Western Aurignacian. It thus proves once again the extreme geographic extension of European civilizations during the Upper Paleolithic.

Categories

The Paleolithic images were above all mental creations, produced by a single mind, in response

to social functions of a sacred nature. We can readily see mythological expression, magic, and initiations, for example. The plastic "images" were therefore probably accompanied by ephemeral events, as what took place around the world and through time: dance, music, song, disguises, masks, tattoos, and body painting. It remains however that to survive, the plastic work must create emotion as much as it was the product of emotion: Lascaux "speaks" to us as much in the absence of its original mythic context as through mythical fragments. The fact alone that these Paleolithic works of art number today among our cultural monuments demonstrates the power of this fascinating mystery that plunges us to the depths of our own self-questioning.

Nonetheless, like modern populations who remain in harmony with nature, indirect evidence of personal decorations sheds light on the opacity imposed by the passage of time. The preserved statuettes open perspectives on the emphasis given to ritualized costumes: belts, hair styles, and disguises. Such mobile art thus constitutes both tridimensional plastic realizations, essentially feminine, and evidence of ritual values. In parallel, some decorative objects were also found, either scattered across an occupation site or preserved in original position with the dead. Countless "pendants," colorants, and animal trophies indicate the complexity of dress codes. Similarly, we have a new series of works of art, sometimes tiny but very carefully engraved and sculpted: animal heads, striated and perforated teeth, beads, discs, and rings made of mammoth ivory. The intrusion of the natural mythology is also seen in zoomorphic statuettes: horses, bison, mammoths, and lions, for example. The symbolic possession imposed on living nature takes all its power here via the reduction of the real model to small dimensions, manipulable, transportable, and extracted from its wild context to become part of the ritualized domain. These images, in three dimensions, were chosen and reproduced and then spread across social space and in the claimed places, forming from then on an element of the message between man and the absurdity of his destiny.

This mythic veil is also imposed on craft objects whose utilitarian function would seem to be predominant: knives, spatulas, lamps, and spear throwers, for example. With these, we simultaneously have two complementary means of accessing mythical thought: changing the world via the mechanical laws defied and the abstract component with which this act is invested due to the superimposed image. On a purely plastic plan, a strict harmony joins form and function: the bison head wrapped spontaneously around a perforation hole, fish aligned with handles. Sometimes certain mythical elements (mythemes) are concentrated on the massive ends of spear throwers (the "bird fawn" of the Pyrenees). Such formal play, in which dream is associated with action, is found in all societies where motions remain free and where the two fundamental human functions have not been separated, that is, everyone except our own. In traditional societies, there is no tool, however humble, from a hollowed bowl to a decorated shelter that is not touched by this tripartite equilibrium, instituted between the technological formula determined by tradition, the spiritual function justified by metaphysics, and the natural context in which the two functional modes are fulfilled. Bags, quivers, basketry, village structure, or religious delegation all respond to a single metaphysical formula with which a given population identifies and is reassured.

Physically intermediary between the statuette and the decorated cave wall, engraved stone or bone plaquettes are found in shelters, organized like transportable scenes. Their thematic specialization is added to a relative stylistic autonomy vis-à-vis the monumental "life of forms." They have more liberty perhaps because there is less seriousness in the weight of this art, somewhat like decorated tools or our country chapels in comparison with the dogmatic coercion corseting our city cathedrals. To the unusual animation, the engraved plaquettes at Gönnersdorf (Germany) respond the circulation distribution of painted plaquettes at Dalmieri (Italy), prolonged by the entire range of human illustrations; the most prosaic on the engraved plaquettes at La Marche (France); or the countless plaquettes decorated by the liveliest imagination at Enlène (Pyrenees) to the plaquettes at Parpalló (Spain) with marked

Solutrean spirit. The monumental bones at Mézine (Ukraine) have schematic painted decorations, forming an authentic "parietal art" in the strict sense, that is, structured by the wall of the shelter, this time built rather than chosen, like a cave or rockshelter. Mobile art, made on transportable plaquettes, presents a total intellectual revolution vis-à-vis sculptures because the reduction to only two dimensions forces the spirit to use one's imagination in order to reconstruct the whole volume of the being suggested by its contour alone.

These different formulas, from flat to three-dimensional, were then transposed to selected fixed locations on cliff faces, rocky overhangs, and caves. There we find the entire range of plastic modes of expression: clay models (bisons at Montespan); stone bas-reliefs barely connected to the walls (horses at Cap Blanc); fine engravings like nervous lines of an artist (Les Combarelles); flat paintings, like the colored spots giving substance to contours (Cosquer); gradations creating volume (Font-de-Gaume); contours drawn in red or black (Pasiéga, Covalanas, Niaux); and up to the majestic polychrome frescos (Lascaux, Altamira, Chauvet).

The rocky supports themselves vary from slabs facing the landscape (Foz Coa, Siega Verde), rockshelters in which daylight animates the reliefs (Le Roc-aux-Sorciers, Angles, Gorge d'Enfer), and the innermost depths of mysterious chambers, formidable, damp, cold, and completely dark, where the loss of landmarks upsets the spirit and disposes it to receive sacred myths (Niaux, Chauvet, Cosquer, Lascaux).

All of these formulas, along with their infinite varieties, express both the religious complexity, irreducible to a single story, and the proliferation of artistic modes of expression, combined in strict coherence. From the tool made sacred as much by its decoration as its function to profound sanctuaries, cadenced by the successive chambers, rocky accidents, and messages grafted by progressive rhythms, the entire Paleolithic soul is inspired, expressed, and based on the same spiritual lineage: that of an attempt to obtain harmony with nature, slowly shifting to an ambitious desire to place humans, increasingly conquering by technology, migrations, and especially his influence, through realistic imagery, above the world of creative forces that he believes dominate. The end of the history of forms, tens of thousands of years later, sees indeed the trend to realism, i.e., disembodied, return, and be confirmed; the increasingly animated figures being of animals made banal, while allusions to humans themselves appear frozen and exposed (Figs. 1–5).

Iconography and Schematization

The range of images in the European Paleolithic focuses especially on the large glacial fauna, essentially horse, aurochs, reindeer, bison, mammoth, woolly rhinoceros, and bear. These species were chosen from the natural environment, but were not always those actually consumed. Their choice reflects rather their ability to reconstruct a mythical world clearly based on the relationships between animal and human societies. The species selected and represented also vary more and differently than the environment itself, either according to the periods considered or the geographic areas where art developed. This is really the embodiment of the unreal, with distant and distorted relationship to the lived reality. Similarly other more recent forms of art, where the symbolic role played by allusion to forms extracted from lived experience, place them in an entirely different sphere of thought, like the Athena's owl, Diana's deer, Hercules's feline, or the Christian lamb.

During the European Paleolithic, certain animal species dominated depending on the stories they offered, including the felines at Chauvet, the mammoths at Rouffignac, the bisons at Font-de-Gaume, and the aurochs-horse pairs at Lascaux. These preferential representations cross technical constraints, from sculpture to painting passing by drawing and engraving, and the vastest regions having a single cultural tradition. Spatial and mechanical challenges always give way before the gravity of the religious schema to which the consciousness of a group is attached.

Alongside animals appear rare human figures, mainly in two forms. Feminine representations are found sporadically in Paleolithic

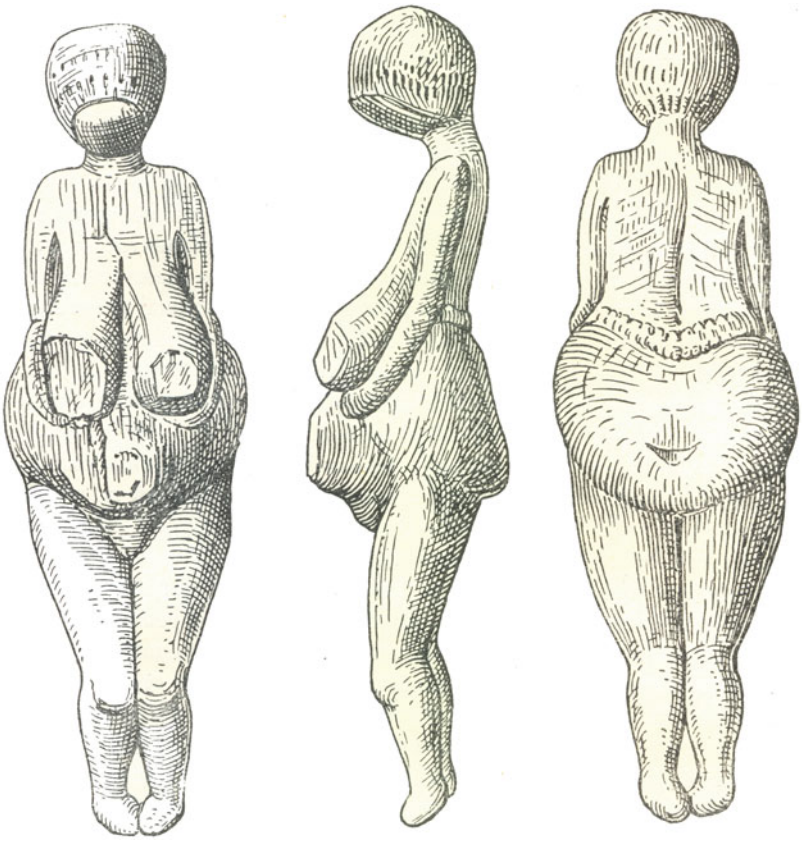

Europe: Paleolithic Art, Fig. 1 Feminine figures appear regularly during the European Paleolithic, but according to highly stereotypes plastic formulas. By waves, they periodically submerge the Eurasian steppes, manifestly carriers of distinct meanings since the graphic formulas continually change. Here, at the start of the period, these "women" are obese, naked, and without faces. This iconographic model crosses all mechanical laws imposed by the different supports: modeled clay, soft rock, ivory, calcitic crust, bas-reliefs, paintings, and sculptures. The "laws" of style were also the most constraining (Kostienki, European Russia, Gravettian, c. 23,000 years ago)

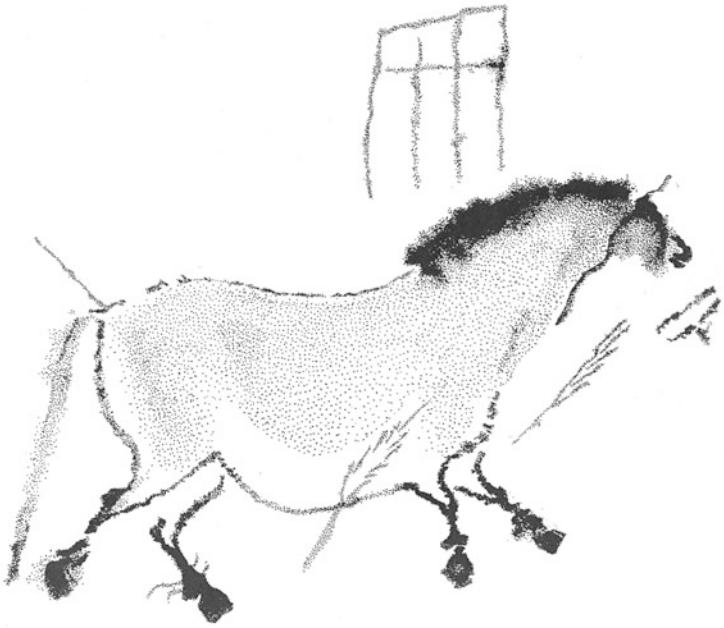

Europe: Paleolithic Art, Fig. 2 Natural forms undergo distortion due to the laws of dreams. The "real" animal is that which takes its source in the myth and conforms to it. The interplay of signs, encoded with meaning, is assembled in perpetual arrangement, from the image to the schema (Lascaux, Dordogne, France, Magdalenian, 18,000 years ago)

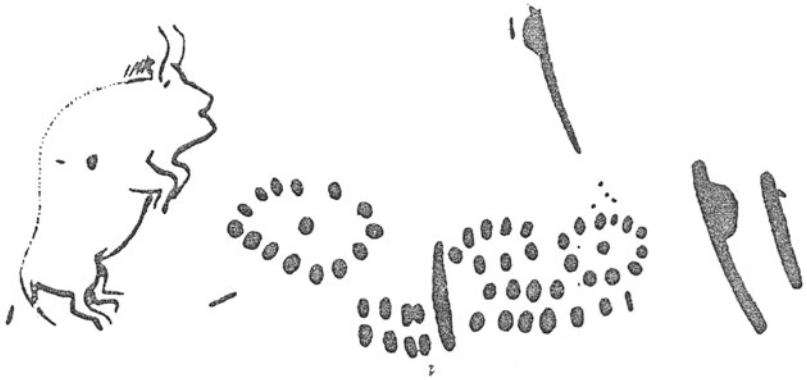

Europe: Paleolithic Art, Fig. 3 The "plastic phases" present a prodigious complexity during the European Paleolithic. Abstract signs (*points*, *lines*), schemas (women), and ambiguous representations (bison upright like a human) are associated to create syntactic groups on rocky reliefs at strategic points. Here, all these indications were brought in to highlight a deep gallery at the beginning of the decorated areas, thus sanctified by mythic processes (Niaux, Ariège, France, Magdalenian, 14,000 years ago)

Europe: Paleolithic Art, Fig. 4 The thematic associations were loaded with evocation resulting from dreaming, never from observed reality. The fundamental theme illustrated here groups bison and horse, like the ass and cow in the Christian nativity scene, also charged with strong symbolism (Le Gabillou, Dordogne, France, Magdalenian, 18,000 years ago)

aesthetic-religious fields as sculptures, paintings, or engravings. The most spectacular and most widespread are found in the Gravettian tradition in which images of seated women were made in the form of statuettes across Eurasia from the Pyrenees to Irkutsk near Lake Baikal in Eastern Siberia (Malta). The opulent forms (breasts, hips, thighs) and the lack of facial representation suggest the existence of a clear stereotype defined by religious thought and may indicate preoccupations linked to the fertility of the group and its resources. A second series of feminine images developed during the Late glacial (15–12,000 years ago). These are rather curved contours and profiles of young women, even as statuettes reduced to a limited contour (Nebra, Gönnersdorf, Monruz). Since these silhouettes are also known on cave walls in Aquitaine

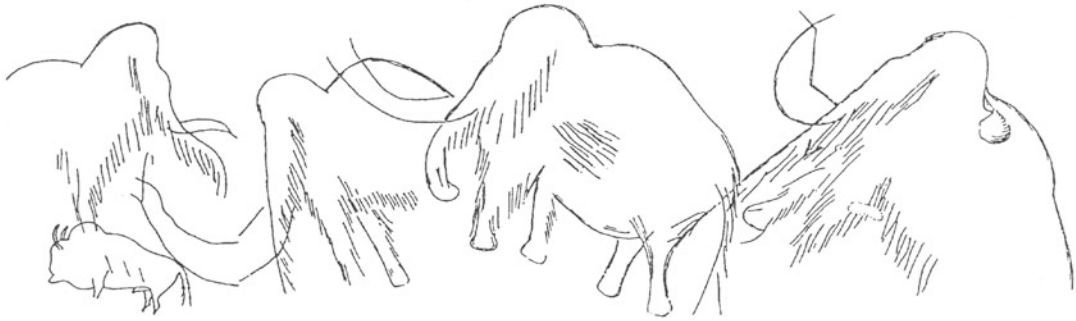

Europe: Paleolithic Art, Fig. 5 Parades, barely evoked, suggest a moving mass, as if through a mist. But the code appears suddenly by the frontal opposition of an individual walking away and by the introduction, drawn from dreams, of a bovid filled with lines. All mythical thought is contained here, by a vague illusion to a reality employed as a pretext, immediately transposed into a supernatural world, the extreme reference to material life

(e.g., Les Combarelles), their extension as mobile art across Europe seems to follow the movements of territorial reconquest by Magdalenian populations in rapid demographic expansion after the Last Glacial Maximum. Whatever the meaning, these silhouettes clearly evidence the importance of this symbol during expansion, somewhat like we see the symbols of the Christian cross "come down" from churches to be carried as a crucifix, as mobile as the missionaries themselves.

Masculine forms increase in frequency but are masked, transfigured, strange, or hidden beneath animals. These ambiguous appearances are related to the fear of magical influence exerted by the image on its real model. Regardless of the meaning of these representations, they could not affect the existence of their own creator, who appears there in a protected, hidden, and allusive aspect. Animal disguises that they seem to wear directly reflect shamanic practices in which some beings could enter the supernatural world of the spirits where their will affects fundamental natural forces and where they can influence action. Such practices and concepts, universal among peoples in harmony with nature, often involve plastic expressions intermediary between humanity and animals. Indeed, any animal embodies, in the mind of humans, the essence of vital strength because their reactions, as in physiology, have powerful similarities with ours. The feeling of opening toward these deep abysses would be clearer and stronger when the image in which it is found enters in proximity and esteem. The lion man of Höhlensteinstadel (Southern Germany) or the bison at Trois-Frères (French Pyrenees) summon as much the idea of formidable but mastered power as that of a physical analogy with humans, thus assumed by the image embodying this complicity.

As for the Paleolithic "life of forms" (H. Focillon), this does not always tally with a realistic illusion, but holds a subtle dialogue with the visual suggestion, passing by the schema, an extreme graphic reduction, like our alternative transitions of an alphabet in capital letters or in cursive. There is not progression from one form to another in the chronology, but we note concomitant use of one or another form of plastic expression corresponding to expressive mode, qualifying the visual discourse. These contractions of signs, illustrated in our original pictographic alphabet (the letter A is an inverted steer head), enrich and condense considerably the semantic variations of Paleolithic art. The values of genres slide from a sexual representation to schemas of an extreme sobriety due to which they enter into easy dialogue with all other forms of images, as today we have hearts pierced by arrows or medical signs with distant allusions to men and women. Bison heads, associated with

perforations (dual feminine value), are maintained in a given place, but they lose their plastic substance, become distanced from the analogy with reality but manifestly preserve their symbolic value. This is similar to the sign of the cross in Christian gestures, an extremely abstract codification that carries with the same force as its distant model in Golgotha, the redemptive power to which the believer aspires and can attain by the humble hand movement. Such processes of iconic reduction also affect, for example, images of horses (reduced to a succession of right angles), ibex (series of interlocked V's), and bovids (horns only in the form of a U) and introduce a dense and structures dialectic used simultaneously as a formal condensation on small tools and on huge wall compositions (Lascaux).

Morphemes

The plastic images of the European Paleolithic play and utilize frequent formal games in textural, spatial, and temporal domains. The texture of the images derives from the fineness of the engraved line and the voluptuous models provided by graduated tones, the harmony between colors, and reflections of sparkling light. Fundamentally, the Paleolithic images hold a subtle dialogue with the underlying stone on which they are made: the support gives these forms their grain, velvety texture or hardness, their contour, curves, and movements.

Animal parades, with careful structuring, extend along the walls, benefiting from the natural architecture, reliefs, crevices, and flaws. We thus see the articulation of the mythical message combined with that of the cave. The chambers are opened, shrink, plunge, or climb by offering life to the images that they transport. Manifestly, the relationship between the plastic sign and the support on which it is made was so strict that we can no longer distinguish one from the other, as if the message of the whole is validated only by this dynamic equilibrium between the mystical and the cavern, definitively joined.

Morphemes in which images were immersed in time abound, during certain periods, in certain messages, to end by dominating at the end of this series of aesthetic-religious experiences, when desanctified art became oriented toward the accurate reproduction of reality in both details and movements. Time was injected by attitudes, raised hooves, turned heads, moving tails, alignments, falls, and flowing blood. Many times, the contraction of time is expressed by the superimposition of successive movements made in real time. A shift then took place between the contraction in a single space of action in successive times (Chauvet, Foz Coa, Lascaux). Close to the lived reality, the animation from the real world does not meet the authentic aspirations of Paleolithic art, always oriented toward the evocation of another world, situated beyond and above the real world. In its essence, art was thus used for the imaginary in which humanity was projected and where the immobility of living beings participated in the persistence of this daring by which, once again, humanity defies its own condition and biological destiny. By these means and through time, awareness has led humans to disengage from their nature toward sources of change where his arts are emerging and seek to appease him.

Composition and Semiotics

The organization of aligned figures gives the key to the structures dreamed by Paleolithic man. Most of the time, the articulation of mythical messages remains clearly susceptible, even if reduced to a binary disposition. Often it is found organized around natural rocky elements, such as a fissure, protuberance, or an alcove. The intimacy between natural contexts and added motifs is again powerfully felt. The scene uniting the deer of Lascaux crossing a river with their necks held high takes its meaning once created on the rocky gorge on which the gaps suggests the torment of the water. The simple choice of panels, for their brightness, exposure, delimitation, position and texture, forms the first step in this structuring approach.

These interpretive lines, imposed on the eye by the spatial organization of their themes, force

thought to follow its own story imprinted in plastic arts, images, and rock combined. The sequence of chambers, their distance from daylight, total obscurity, oppressive dampness, and low temperature condition are the soul for the reception of founding myths as to the justification of the group and the mysteries with which all conscious existence is confronted. The solutions were there, revealed as soothing, real with respect to the dangers of the path taken into the cave, and unreal with respect to the secrets of life, all combined in a dazzling of physical and spiritual senses. Gothic windows do nothing other than seduce in order to convince. And the temples of Science are even more suspect of soliciting, with their columns, tympanums, porticos and statues from Antiquity.

The revelations contained in the depths of damp dark caves harnessed the suspended conscience, by adolescence as much as by the dangers overcome. But the solutions were there, in the trembling illumination on the damp walls with bright vivid colors. Their harmony, linked to the scale of forms, gigantic and dancing figures, came literally out of the darkness and anguish. The revelation of the mysteries of existence was accorded by the seduction stimulated by the rhythms, color, and strangeness. Paleolithic art, like man who overcame the challenges of earthly life, also contributes one of the culminating points in the spiritual adventure of civilization.

Cross-References

► European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism

Further Reading

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Europe: Prehistoric Rock Art

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Introduction

In its broadest sense, the term prehistoric rock art covers the whole of graphic manifestations affixed by prehistoric humans on rock surfaces of all kinds. The surfaces can be rocks out in the open air, walls protected by shallow rockshelters, or deep cave walls in total darkness. For deep cave situations, the term "parietal art" is often used, but these two terms cover the same reality. The phenomenon is widespread throughout the world, as it meets the basic needs of preliterate human societies. In Europe, prehistoric rock art extends from northern Norway to Andalusia and covers more than 30,000 years, from the Upper Paleolithic to the Roman conquest. As a result, it responds to an infinite number of motivations depending on beliefs, systems of social organization, and types of subsistence economies. In formal terms, it uses a wide range of techniques (engraving, sculpture, finger strokes in clay, line drawings, monochrome or polychrome painting) and a wide range of styles (from figurative naturalist art to schematic and to geometric abstraction). Although the word art is sometimes criticized because of its contemporary connotation, it is difficult to escape the idea that the human groups

who made rock art were pursuing, in addition to the basic motivations that animated them, an undeniable aesthetic quest, even if it sometimes diverges from our own criteria.

Historical Background

In the nineteenth century, there was little acceptance of the aptitude of prehistoric people to paint and engrave images onto rock. The idea of the "primitive savage" perpetuated for a long time and prevented the acceptance of the full intellectual capacities of societies before history. The remarkable bison paintings on the ceiling of Altamira, discovered in 1879, were not officially recognized as a prehistoric work until 1902. There is no doubt that the aesthetic, naturalism, and polychrome character of these figures impeded this recognition. It was not until the second half of the twentieth century that paleoanthropological approaches to rock art meant that rock art study could acquire the status of a scientific discipline within prehistoric archaeology. Today, rock art is considered a precious tool with which to address the cultures and the ideological and symbolic universe of hunter-gatherer, then herders and farmers societies who succeeded on the European territory. The need to leave a lasting mark of one's culture on monumental mediums is universal. Only the forms and locations that were selected to practice this exercise change with the subsistence economy and the prevailing systems of thought.

In a report presented to UNESCO in 1984, the number of individual rock art graphics in Europe was estimated at four million (Anati 2003). This number has easily been surpassed today. Paleolithic art alone counts for more than 360 sites, with recent discoveries of major scientific interest in France (Chauvet in 1994), Portugal (Foz Côa in 1994), and Spain (La Garma in 1995). The debate is no longer about the authenticity but rather about the chronocultural attribution of these works, given the difficulty of absolute dating.

Key Issues

Paleolithic Rock Art

General Points

Paleolithic rock art occurs throughout the Upper Paleolithic, beginning c. 35,000 BP (or earlier) (with the arrival of *Homo sapiens sapiens* in Europe) and ending around 12,000 BP, shortly before the end of the glacial period. The oldest figurative works, attributed to the "Aurignacian" culture, are the statuettes of Swabian Jura (Germany) and the parietal paintings and engravings on the caves of Fumane (Italy), dated between 32,000 and 36,500 14C BP, and of Chauvet (France), between 30,000 and 32,000 14C BP (radiocarbon dating strongly underestimates calendar ages).

Paleolithic art is fundamentally an art of animals: human representations are rare and are most often caricature-like, in contrast to animals which achieve a sometimes striking realism. Numerous nonfigurative drawings or "signs" complete the iconography. Deep caves, invested since the beginning of the period, remained the most popular places until the end, to the extent that we sometimes speak of "cave art," even though engravings and sculptures also decorated occupied rockshelters, and that rocks exposed to the open air have also recently been discovered in Spain and Portugal.

An in-depth examination reveals deep regional thematic and stylistic differences and significant changes over time across Europe. Several models of relative chronology, based on archaeological data, superpositions, and stylistic sequences, have been proposed. Those of Henri Breuil (1952) and André Leroi-Gourhan (1965) are the better well known, but new methods for direct dating by accelerator mass spectrometry and also recent discoveries like the Chauvet Cave have forced a reconsideration of the chronostylistic models based on the assumption of a linear evolution leading from an original schematic form toward better controlled realism. Some advances and setbacks, phases of invention, and regression have crisscrossed over these 20,000 years and provided a more complex schema.

Iberian Peninsula

In the extreme southwest of Europe, the Iberian Peninsula retains evidence of intense graphic activity during the Upper Paleolithic, with more than 200 parietal assemblages distributed in all regions, not including the many portable art objects (Bicho et al. 2007). The most important concentration is that in the Cantabrian region, a narrow strait between sea and mountain, open at its eastern point toward the southwest French region, which contains around 120 decorated caves covering all the periods of the Upper Paleolithic (Collective 2002; González Sainz et al. 2003; Ríos González et al. 2007). Centers, such as Peña Candamo, Altamira, El Castillo, and La Pasiega, have played an important role in the history of research on Paleolithic rock art. Other regions on the peninsula, which had practically no parietal evidence around thirty years ago, today present important concentrations. We can cite among others the spectacular rock outcrops in open air in the Duero valleys (Domingo Garcia, Siega Verde, Mazouco, and specially the 27 sites along the Côa River), Tagus (Ocreza), and Guadiana (Molino Manzánez) (Baptista 2009). To these open-air sites, several caves need to be added: Escoural in Portugal, Maltravieso in Extremadura, and in the interior of the peninsula, some cavities in the foothills of the Central and Iberian systems (La Griega, Los Casares, La Hoz, El Reno, etc.). In the Mediterranean area, today several small ensembles can be counted (Meravelles, Cova Fosca, the group of Cieza, El Niño) and isolated parietal representations (Parpalló, Reinós), without forgetting the engravings in daylight of the En Melià shelter (Castellón) (Mártinez-Valle 2006). Finally, in the extreme south, Andalusia has about twenty parietal sites in caves or rockshelters: La Pileta, Ardales, Malalmuerzo, El Morrón, Ambrosio in the interior; El Moro and Palomas near Tarifa; Nerja, Navarro, Victoria on the coast of Málaga; and a single open-air site (Piedras Blancas).

Figurative graphic activity spread in the Iberian Peninsula like an oil stain, affecting diverse territories and subject to highly variable environmental conditions and resources. The phenomenon began with the Aurignacian (at least in the north: La Viña rockshelter, early phases of Castillo) and is present at the southern end (Tarifa group) from the Gravettian (Fig. 1). Paleolithic art from the Iberian Peninsula is fully integrated with that of Western Europe and presents the same two formal conceptions of the animal figure, a conceptual naturalism, minimalist, in the early phases (figures reduced to a contour with very few details and internal elements) and, from 17,000 BP, a more visual naturalism, attentive to anatomical details, with a more successful treatment of volume (infills and internal details, correct perspectives of limbs and horns). However, art from the Iberian Peninsula shows notable singularities such as engraved rocks in open air in the valleys of Atlantic rivers with large-size figures produced by pecking (Fig. 2). With few exceptions, paintings are only preserved in deep caves. Additionally, more temperate climatic conditions than in the northern regions of Europe brought about a distribution of rich fauna including horses, aurochs, stags, does, and ibex with a gradient from north to south: in the Cantabrian region, in addition to this fauna, bison and reindeer (mostly during the Magdalenian) and some very rare mammoths and megaloceros can be found. By contrast, bison and reindeer are exceptional in the two sub-plateaus and completely absent from Levant and Andalusia.

The strong compartmentalization of the territory due to the mountainous character of the peninsula presents other differences that cannot be explained by climatic reasons, such as the distribution of abstract signs (particularly abundant in the Cantabrian region and Andalusia) or the proportion of stags and does, which is very contrasted depending on the region. Similarly, the stylistic changes during the Upper Paleolithic do not follow the same models in all regions. The case of the Cantabrian region is very distinct in this respect because of its interactions with southwestern France, particularly intense during certain periods (central and final phases of the Magdalenian; cf. Fig. 3), and more restrained during others (during the

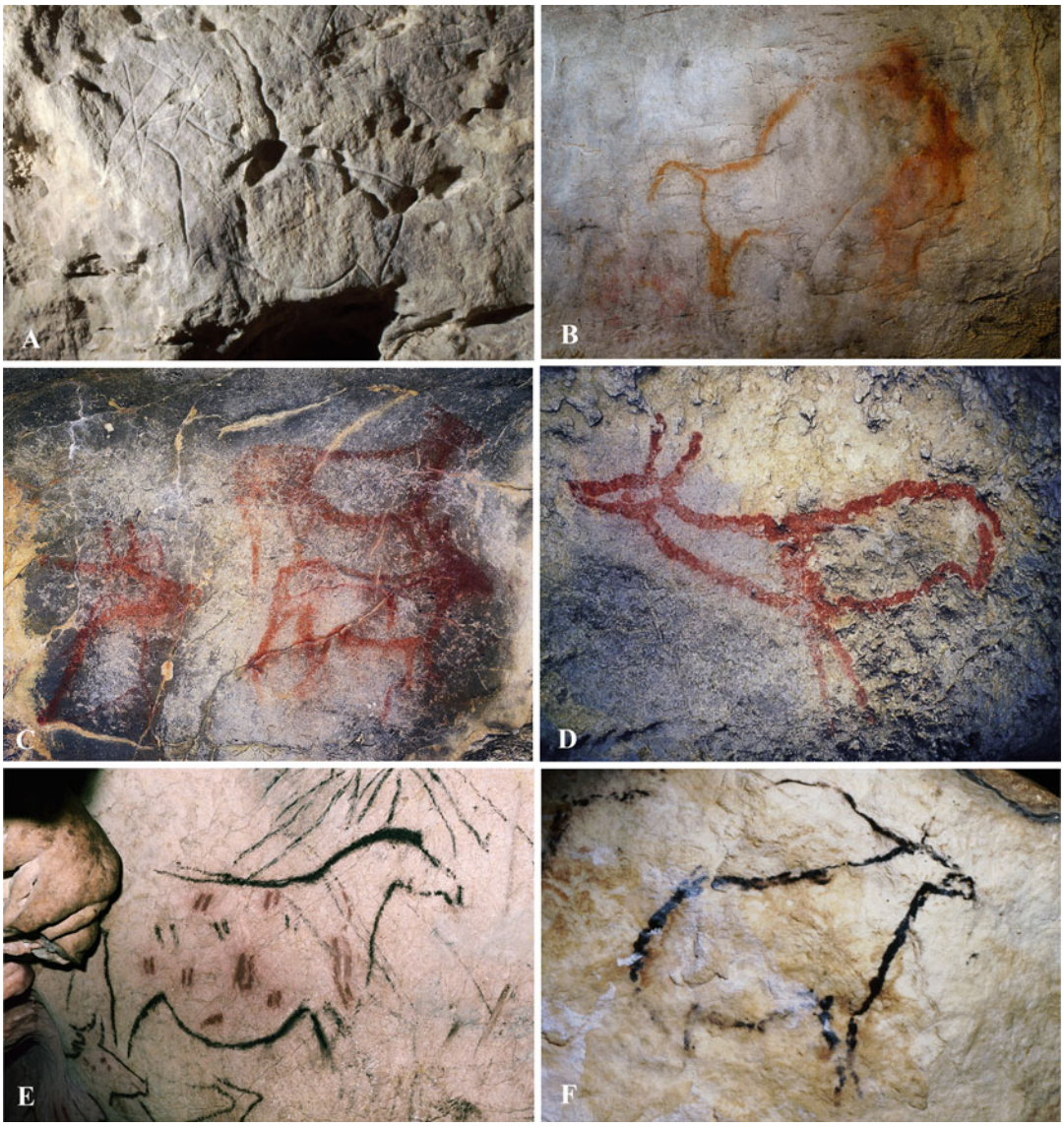

Europe: Prehistoric Rock Art, Fig. 1 Parietal art of the Upper Paleolithic in Spain. (**a**) Santo Adriano (Asturies). (**b**) Castillo (Cantabrie). (**c**) La Garma (Cantabrie). (**d**) Covalanas (Cantabrie). (**e**) La Pileta (Málaga). (**f**) Nerja (Málaga) (Photos: G. Sauvet (**a**, **f**); C. Fritz and G. Tosello (**b**); C. González Sainz (**c**, **d**); J.L. Sanchidrián (**e**))

glacial maximum and its extension in the older Dryas where the Cantabrian region showed a high artistic personality). Other peninsular regions (Levant, Atlantic face, and even Andalusia) present a greater continuity from the graphic point of view, with less modification over time. In these regions, the Gravettian and Solutrean conceptions continued with very little change in the Magdalenian. These regions show some similarity in the graphic conventions, which indicate real interactions between them. These are also confirmed by the extension of some elements of the lithic weapons such as the stemmed and eared arrowheads, which are known in the Solutrean of Levant and Portugal.

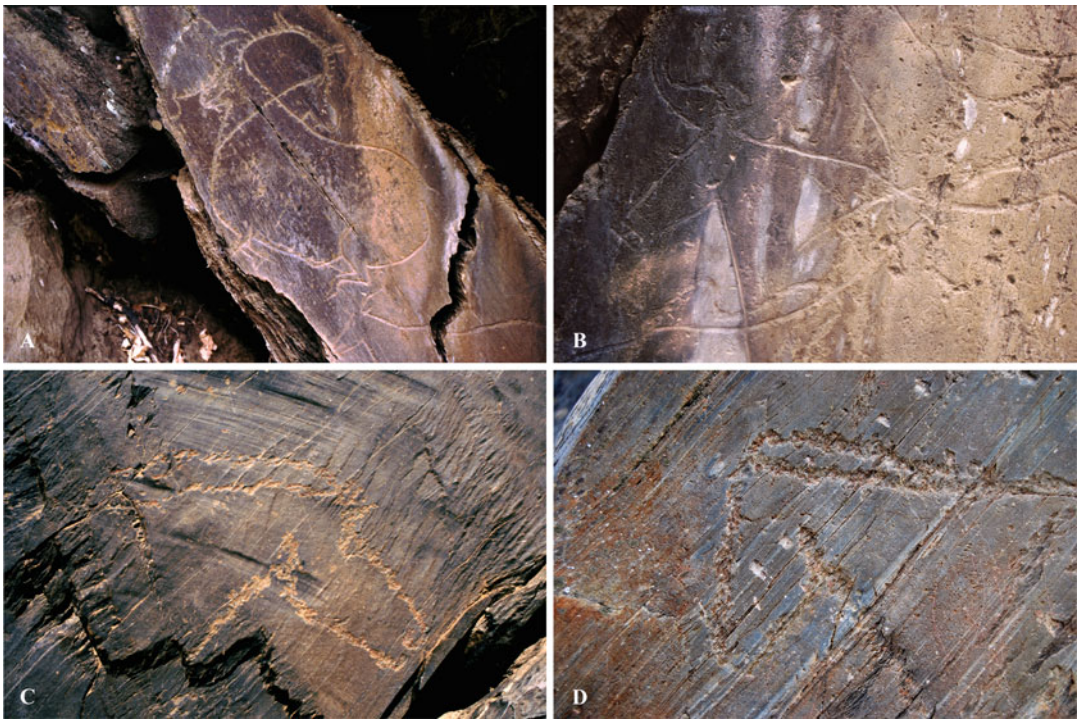

Europe: Prehistoric Rock Art, Fig. 2 Paleolithic art on rocks in daylight on the Iberian Peninsula. (**a**–**b**) Foz Côa (Portugal). (**c**–**d**) Siega Verde (Salamanque) (Photo: G. Sauvet)

Decorated objects (portable art), during the Upper Paleolithic, are strongly associated to rock art but their distribution is strongly conditioned by the conservation of organic material, more favorable in caves (Cantabrian region, Ebro valley, and north of Catalonia) where a diversified and conventional portable art is known. On the Atlantic coast, in the northern sub-plateau and on all the Mediterranean coast, mostly objects in stone can be found such as the collection from Parpalló (Valencia) including thousands of engraved and painted plaquettes distributed throughout a long sequence going from the Gravettian to the Magdalenian and, consequently, with a great interest to conduct a diachronic and comparative analysis with the regional rock art (Villaverde 1994).

France

France is home to 167 caves and shelters attributed to the Upper Paleolithic. Animal motifs constitue the larger group of representations. In general, herbivores dominate (equines, bovines, caprine, cervid); carnivores (bears and felines) are more rare as are humans and anthropomorphic figures. The proportions vary from those of consumed fauna, as it involves iconography linked to myths and beliefs and not directly related to daily life.

The sites related to the first culture of the Upper Paleolithic, Aurignacian, are very rare and often reduced to a state of relics. This makes the discovery of the Chauvet Cave (Ardèche) even more exceptional. The technical quality and the conservation of these painted and engraved representations (felines, rhinos, mammoths, horses, bison, ibex, bears, etc. in descending order) have cast doubt on their age despite the argument of the eight consistent direct radiocarbon datings. In Dordogne, it is more than likely that parietal art must have flourish in shelters that have unfortunately collapsed (Blanchard and Castanet rockshelters).

The following period, known as Gravettian, sees the rock art phenomenon increase and extend from the north of the Loire (Mayenne-Sciences,

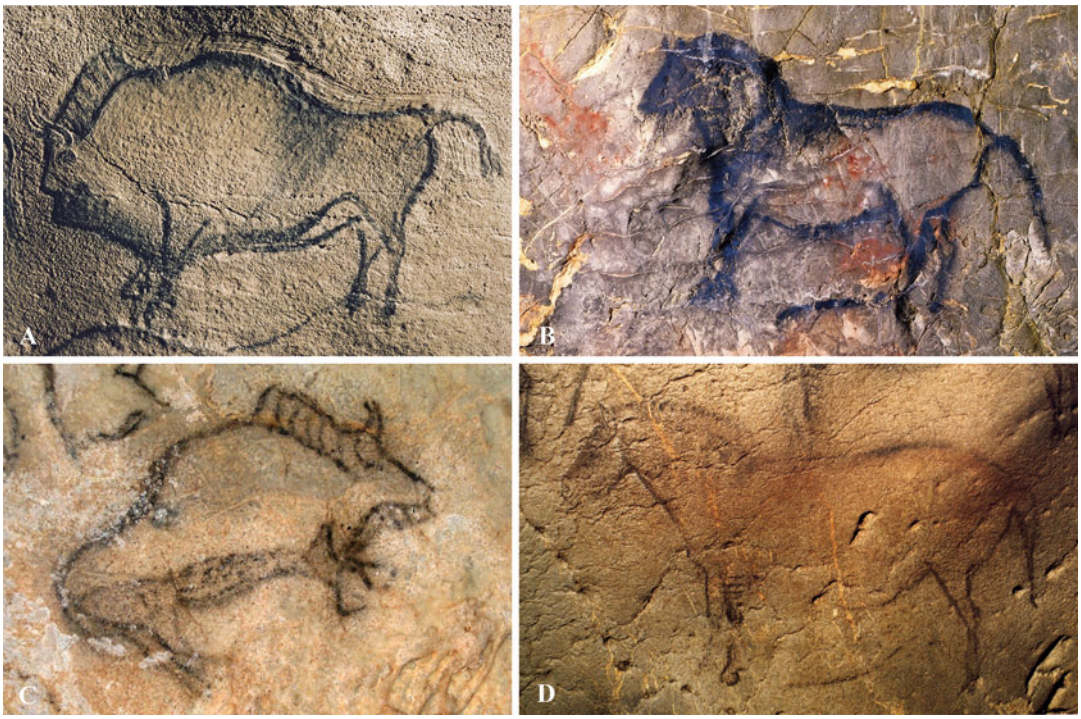

Europe: Prehistoric Rock Art, Fig. 3 Parietal Paleolithic art in Spain, attributed to the Magdalenian. (**a**) Covaciella (Asturies). (**b**) La Garma (Cantabria). (**c**) Santimamiñe (Viscaye). (**d**) Ekain (Guipúzcoa) (Photos: J. Fortea Pérez (**a**); C. González Sainz (**b**, **c**); P. Diaz de González (**d**))

Arcy-sur-Cure) to the Pyrenees (Gargas) passing by Dordogne (Cussac) and Quercy (Pech-Merle, Cougnac) (Fig. 4a–d). The Cosquer cave, today immerged under 30 m of water near Marseille, belongs to this formal universe. The represented fauna are again more or less the same as in Aurignacian: mammoths and megaloceros are omnipresent. Apart from exceptional representations of "wounded" men struck by multiple strokes (Pech-Merle, Cougnac, Cosquer), humans are represented by the bas-reliefs of Laussel, with the famous "woman with a horn" which is related to the immense trend of feminine representations with opulent forms whose hundreds of statuettes have circulated in Europe between 25,000 and 23,000 BP. Another original theme, typical to this period, is that of negative hand stencils produced by blowing pigment around the hand applied to the wall. This motif saw a considerable expansion from the Yonne valley (Arcy-sur-Cure) to Andalusia (Ardales), through Extramadure (Maltravieso), the Cantabrian region (Castillo, Fuente del Salín), the northern and southern slopes of the Pyrenees (Gargas, Tibiran, Fuente del Trucho), Quercy (Pech-Merle), Provence (Cosquer), and even Italy (Paglicci), to name only a few major sites.

The Solutrean, the culture following the Gravettian, is very original in terms of lithic industries, but left few unmistakable traces in terms of parietal creation. The most remarkable are sculptures in bas-relief (Le Roc de Sers, Charente and Le Fourneau du Diable, Dordogne). Several caves in the Rhone valley have been attributed to this period but without certainty (Chabot, Ebbou, Oulen, Les Deux-Ouvertures).

The Magdalenian, the last material culture of the Upper Paleolithic, saw a real explosion in rock art and portable art (Fig. 4e–f). In France, Lascaux is certainly the most famous Paleolithic cave because of its monumental polychrome frescos and its thousands of entangled engravings, but its belonging to the Magdalenian world is still debated (without doubt Lascaux belongs to

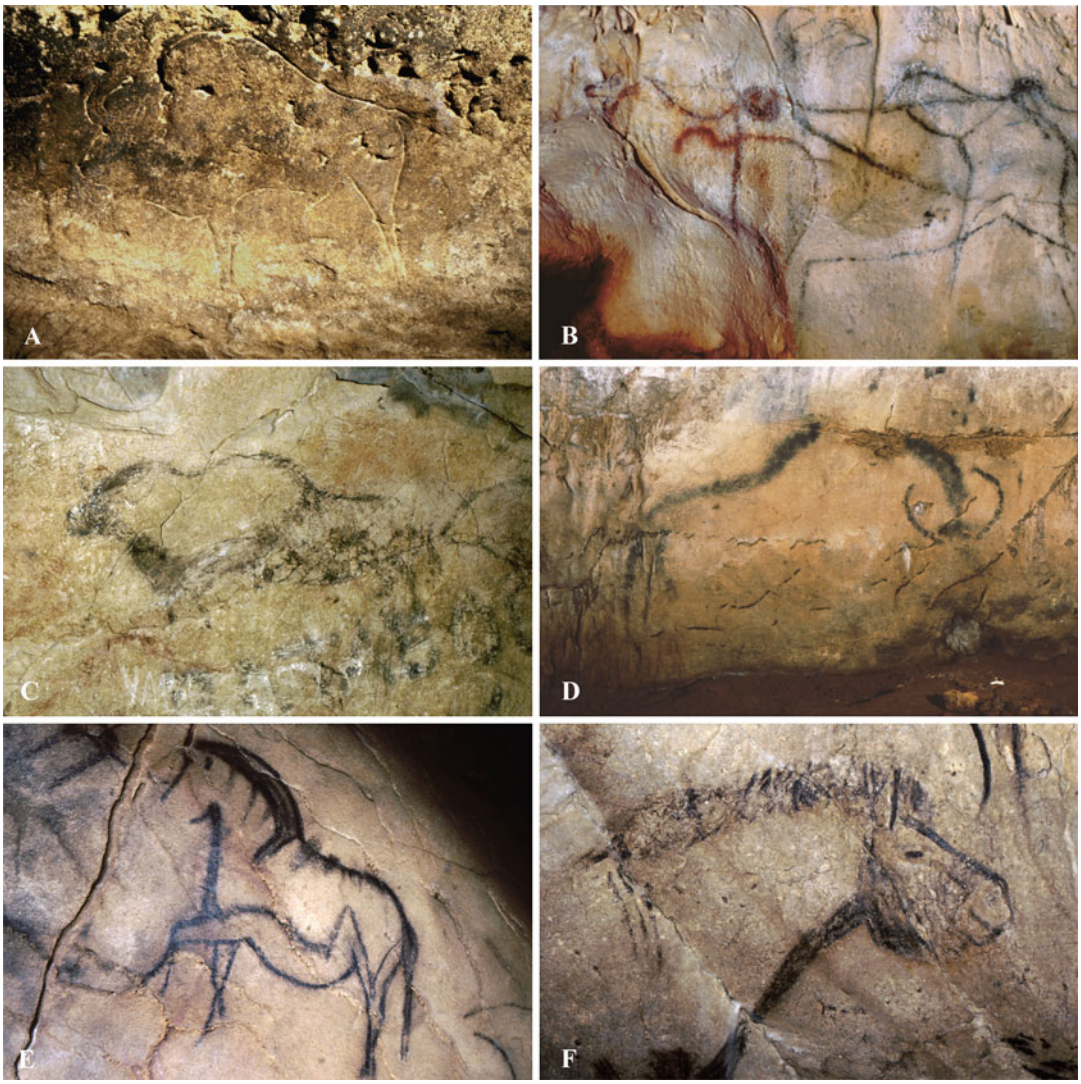

Europe: Prehistoric Rock Art, Fig. 4 Paleolithic parietal art in France attributed to the earliest periods (**a**–**e**) and to the Magdalenian (**e**–**f**). (**a**) La Grèze (Dordogne). (**b**) Cougnac (Lot). (**c**) Mayrière supérieure (Tarn-et-Garonne). (**d**) Marcenac (Lot). (**e**) Le Portel (Ariège). (**f**) Niaux (Ariège) (Photos: G. Sauvet)

a very early stage of the Magdalenian or even previous to this one). In the area of line drawings and paintings, authentic works of art were produced in many Magdalenian sites (Font-de-Gaume in Dordogne, Niaux in the Pyrenees). At the same time, the art of engraving reached its heights as much in Dordogne (Les Combarelles, Teyjat) as in the Pyrenees (Les Trois-Frères, Le Tuc-d'Audoubert, Fontanet). Sculpture in rockshelters also reached a remarkable level (Angles-sur-l'Anglin in Vienne, Cap-Blanc in Dordogne); it finds an equivalent no less remarkable in the Pyrenees in the form of a sculpture in the round modeled in clay (bison from Tuc-d'Audoubert, bears from Montespan). Among the original motifs from Magdalenian in its final phase, it is appropriate to signal the new type of female representations, reduced to a simplified outline with no head or extremities. This model known in several caves in Dordogne and Quercy (Pestillac, Carriot, Fronsac, Les Combarelles) saw many transpositions in portable art. These female

silhouettes were also engraved on plaquettes (Lalinde in Dordogne, Gönnersdorf in Germany) and exported all over Europe in the form of figurines and pendants carved in stone, bone, antler wood, lignite, and even flint. This shows the difficulty in separating rock art from portable art for this period in prehistory.

Along with figurative motifs, the Paleolithic artists elaborated multiple conventional forms, which are called "signs." These drawings range from simple (punctuation fingerprints, large blown discs, alignment of sticks) to complex forms with evocative, but simplistic names: tectiforms (roof shaped), claviforms (club shaped), aviforms (bird shaped), etc. These signs were sometimes considered as territorial markers representative of human groups despite their vast dispersion.

The Rest of Europe

For a long time, Paleolithic rock art was circumscribed to the "French-Cantabrian" domain, and this remains the reference point today, even if caves in Andalusia like La Pileta and Ardales have been known since 1911 and 1918 respectively.

Nonetheless, a comparable art is known in the south of Italy (Romito, Romanelli) and Sicily (Addaura, Niscemi, Levanzo). Animal art in these rockshelters, most of them discovered in the 1950s, recalls by its formal characteristics the art of the final Magdalenian on the Mediterranean border, which confirms the dating of neighboring archaeological sites belonging to the final Epigravettian and the Romanellian. The Paglicci cave (Puglia) deserves a special mention, as it is probably the oldest decorated cave in Italy (apart from Fumane in Venetia), its belonging to the Gravettian world being confirmed by the presence of negative hands.

Much more recent discoveries have considerably extended the domain of Paleolithic parietal art in Europe. This is the case for the Church Hole cave in Creswell (Derbyshire, England) in 2003. Despite some uncertainty about its iconography, it seems that there are several animal engravings of Paleolithic type, which is not surprising given that several final Paleolithic deposits, named here Creswellian, are known in this region.

In 2006, some engravings were observed for the first time in a German cave (Mäanderhöhle, Bavaria). While not figurative, their association with speleothems evoking breast or phallus brings them closer to the Paleolithic way of doing. Even more recently (2009), the site of Coliboaia in Romania was signaled. This extremely important site is similar to Chauvet in its bestiary (rhinoceros, feline, bear, bison, horse) and by its style. A recent dating confirms an age close to that of Chauvet, which is not surprising as Aurignacian settlements are abundant in Romania. It is only a matter of time before other discoveries are made in this region of Europe.

The Meaning of Paleolithic Art

At the beginning of the twentieth century, bathed as we were in ethnographic accounts, we imagined the "primitives" randomly drawing on the walls of caves the image of their game to kill them in effigy. Fortunately, the majority of specialists today recognize that rock art is the fruit of coherent and structured thought which expressed a "symbolic construction" (D. Vialou) complemented by a "figurative syntax" (A. Leroi-Gourhan). Some people think that Paleolithic thought has remained relatively constant for all its duration and others that it has been affected by a profound evolution. Without entering into this debate, we rightfully note that, despite its longevity and expansion, and despite its formal diversity, Paleolithic rock art presents undeniable structural constants which confer upon them some unity. Among these is the expert use of the irregular morphology of the walls of caves. In addition to the fact that these reliefs increase the visual salience of these works, they establish a close relationship between the underground mineral world and the animals depicted by man. This sought-after osmosis may in part explain the preference for caves. Another motif that seems a constant in Paleolithic thought is female sexual signs, which have played an important role since the Aurignacian (Chauvet, Castanet, La Ferrassie), and continues without interruption to the Magdalenian (Bédeilhac) through the Solutrean (Micolón, Spain). To this can be added the very significant tendency

concerning the assemblages of distinct animal species, which persist throughout the Paleolithic.

These formal constants must correspond to ideological constants. Over time, all kinds of theories, more or less inspired by ethnology and drawn from the history of religions, followed one another, periodically resurfacing due to lack of consensus. Art for art's sake, hunting and fertility magic, totemism, and shamanism have in turn been highlighted. Given the difficulties of ethnographic comparative method and the impossibility to interpret works coming from another culture of which we know nothing, the tendency among specialists of prehistoric art is currently to divert questions of interpretation to make rock art a tool in the service of social and cultural paleoanthropology.

Post-Paleolithic Rock Art

At the end of the Paleolithic, with a change in the conditions of life, the form and function of rock art changed. It is difficult to link with certainty rock manifestations with the Mesolithic period (such is the case of geometric signs engraved in sandstone massifs in Fontainebleau, France) and to set apart local innovations from various influences coming from the east Mediterranean and the North Atlantic coast. During the Neolithic and in the zones under the influence of megalithism, a trend in schematic and geometric art developed and became the dominant form with the introduction of metallurgy (Chalcolithic, Bronze Age, Iron Age). Thousands of rock works are known in rockshelters and caves, but mostly on rocks in the open air. Only the most important sites, the most original, and the most representative ones will be mentioned here. Their relative chronology and their reciprocal influences are very difficult to establish.

Levantine and Macroschematic Art

Levantine art is a manifestation of rock art whose center is located on the Spanish Mediterranean side (Beltrán Martínez 1968). The most significant sites are Prado de Las Olivanas, Val del Charco del Agua Amarga in Aragon, El Cogul in Catalonia, Cavalls, Civil, Remigia, La Araña in Valencia, La Sarga in Alicante, Minateda, Torcal de las Bojadillas in Albacete, and La Fuente del Sabuco in Murcia (Fig. 5). These are rockshelters exposed to daylight and rain as well as to contact with animals that used these shelters as protection, which explains why the conservation is unequal and some rockshelters are sometimes very faded and deteriorated.

The main color is red, with various hues. Black and white paint also exists, but white is only important in some regions like the Albarracín sector (Teruel). In the majority of cases, the pigments employed are iron oxides or manganese. Some examples of engravings are also known to exist.

Generally, we associate Levantine art with representations of archers, who are often illustrated in hunting scenes. However, humans appear in a wide variety of themes including representations of groups in movements, scenes of collecting honey, and executions or warlike confrontations.

In terms of style, the human figure is more useful to conduct classifications than animals. Indeed, the human figure presents marked differences allowing the definition of different graphic horizons succeeding one another in the whole domain of Levantine art. Among others these differences concern the proportions of the body; the degree of naturalism, movement, decorations; the way to represent weapons; and the type of scene in which figures are involved. In general, archers are dominant and definite representations of women are rare. The naturalism of the human representation extends from figures with legs and arms modeled with certain anatomical details, even though these are subject to marked conventions with respect to bodily proportions, to linear figures, very simplified and devoid of individuality.

Only a few animal species are represented. Basically, these are deers and wild goats and some bulls, horses, and wild boars, but these latter species are concentrated in certain regions, which allows for some regionalization to be established. Other species such as canidae, birds, or insects are in very small number.

Pictorial painting techniques used for animals range from solid infill with biangular perspective formulae for the legs and horns to parallel lines infill or simple linear contours, with the exception of the head, but this latter technique is very underused.

Europe: Prehistoric Rock Art, Fig. 5 Post-Paleolithic art of Levantine Spain. (**a**) Cinto de Las Letras (Valencia). (**b**, **c**, **d**) Cingle de la Mola Remigia (Valencia). (**e**) Prado de las Olivanas (Teruel). (**f**) Solana de las Covachas (Albacete) (Photos: V. Villaverde (**a**–**e**); G. Sauvet (**e**–**f**))

In some sites, notably in Sarga (Alicante), Levantine art appears superimposed to other graphic manifestations called *macroschematic* which presents a clear relationship with figurative motifs of Neolithic ceramic, thus enabling the establishment of a Neolithic chronology of Levantine art. Macroschematic art is characterized by the absence of figurative zoomorphic motifs and the predominance of human representations of a relatively large size, created with the help of wide red strokes. They frequently show lifted arms and are associated with meander-like motifs finishing with some kind of hands. The range of macroschematic art is limited to the north of the Alicante province, a major focus of the early Neolithic.

Schematic Art

The so-called schematic rock art comprises paintings under rockshelters and exceptionally in caves and engravings on rock surfaces in the open air. This art spans more than three

Europe: Prehistoric Rock Art, Fig. 6 Post-Paleolithic schematic art in Europe. (**a**) Los Letreros (Almeria, Spain). (**b**) Porto Badisco (Pouilles, Italy). (**c**) Campo Lameiro (Galicia, Spain). (**d**) Naquane (Valcamonica, Italy). (**e**) Domingo Garcia (Ségovia, Spain). (**f**) Tanum (Bohuslän, Sweden) (Photos: G. Sauvet (**a**–**e**); Sven Rosborn (**f**) (Figure is licensed under the Creative Commons Attribution 2.0 Generic license))

millennia, from the early Neolithic to the Bronze Age. Its duration and geographic extension explains the large diversity in technique, style, and form (Fig. 6).

Schematic Rock Paintings Schematic rock painting is a figurative phenomenon that occupies practically all of the Iberian Peninsula and even extends to the southeast of France (Acosta 1968). The latest research suggests that these graphic manifestations have a chronocultural framework beginning in the early Neolithic (c. 6,500 BP) and finishing in the Chalcolithic (c. 4,000 BP).

Schematic rock painting essentially consists of drawings created with the help of liquid paints. The dominant colors are in descending order: red, black, and white, with different hues caused by conservation issues and/or saturation of the

pigments used. White is only used as a supplement to illustrate certain details. To apply paints, any instrument producing broad strokes a centimeter wide can be used (the crushed plant sprig, small wad of hair, or just a fingertip end). The loading capacity of these technical processes is very limited, making it difficult to make lines of a certain length; this determines the form and conditions the usual sizes to around 10–30 cm, the largest figures not exceeding 50 cm.

With these techniques and figurative means peculiar to schematism, highly stereotyped patterns based on simple linear features were represented: full-frontal human figures and side-on quadruped animals, that is, minimal elements of identification. Next to these anthropomorphic figures of varied typology and the animals often appear drawings resembling suns (stelliforms) in ancient phases and the so-called *oculated idols* (idols with eyes) in the later phases.

We most often find schematic paintings in the rockshelters, which easily allows daylight, or simply on unprotected vertical crags, standing out in the landscape. The lithology of mediums is very diverse: limestone and sandstone are predominant, but examples in the quartzite or granite outcrops are also known. Much more exceptional are paintings in deep caves in complete darkness like the Spanish cave of La Pileta (Malaga) or the Italian cave of Porto Badisco (Otranto) with black figures (coal in the first case or bat guano in the second). However, the specificities of these two cavities attributed to the Bronze Age mean that we must consider them as marginal in comparison to schematic paintings treated here.

Engraved Rocks from the Metal Age With the diffusion of metals, we encounter across Europe large concentrations of rocks in the open air engraved by pecking, probably corresponding to places of cultural significance.

Mont Bego (Alpes-Maritimes, France), more than 2,000 m above sea level, was a place of pasture between 2,500 and 1,700 BCE (the Chalcolithic and Early Bronze Age). Agricultural activities are illustrated (plots, plows, schematic bovines called *corniforms (horn shaped*) and metal weapons (daggers, axes, halberds)). These very stylized and repetitive graphic representations (nearly 40,000 counted engravings) are probably related to the seasonal cycle of transhumance, through sun worship or worship of the bull (De Lumley 2011).

In Valcamonica (Lombardy, Italy), on the sides of a 70 km long valley, rock art was practiced for over 4,000 years, which explains its wide variety found in over 250,000 engravings. The earliest phase refers to the Neolithic scenes of everyday life. A second phase seems contemporary to Mont Bego with similar motifs to the exclusion of *corniforms*. The greatest number of figures belongs to the most recent periods (Late Bronze Age, Iron Age, and even Roman epoch) and consists mainly of dynamic human representations (dancing and fighting, etc.).

Another very rich zone in rock art is in Scandinavia. In the region of Tanum (west coast of Sweden), rich in megalithic relics, nearly 10,000 engravings, engraved on slabs of granite, are attributed to the Bronze Age, from the second millennium BCE. Hunting scenes, agricultural scenes, ships, and men armed with swords and spears constitute most of the iconography with signs (cups, suns, spirals). Along the Norwegian coast and close to the Arctic Circle (Alta), there are also many engravings. An early phase abundant in animals (elk, reindeer, bears, whales) is attributed to a culture of hunters, while the most recent phase is comparable to that found in Sweden and Denmark.

All along the Atlantic coast, from Ireland to the Portuguese coast, a megalithic phenomenon has developed which is largely widespread in the interior; it is, in this sense, difficult to separate it from Iberian schematic art, as shown by some motifs (axes, daggers, halberds, sun signs, snakes) that are found in both the megalithic funerary monuments, rocks in the open air, caves, and shelters.

The Atlantic coast in the Iberian Peninsula has large concentrations of engravings in the open air. More than 500 such sites are known in the region of Pontevedra (Galicia). There are granite rocks with schematic engravings

attributed for the large part to an early phase in the Bronze Age. The main motifs are geometric signs (cup marks, concentric circles, spirals, zigzag) and schematic animals among which the deer plays an essential symbolic role (male cattle, bellowing males, hunted animals, etc.). Men and weapons (spears and daggers typical to the Early Bronze Age) are rare. Some swastikas and horse riders could indicate a long stretch in the Late Bronze Age.

Schematic rock carvings attributed to the Bronze Age also exist in caves in Spain (Flint Gallery, in Atapuerca, Kaite II in the karst complex of Ojo Guareña) and in France (Les Fraux, Dordogne).

Current Debates and Future Directions

Prehistoric Rock Art and the Evolution of Research

The study of rock art has long been restricted to establishing patterns of evolution of forms and styles from a cultural-historical perspective, most often based on linear trajectories taken from the History of Art (formative period, maturity, degeneration). Almost all theories responsible for explaining the place of rock art in prehistoric societies have a functionalist background, because they view art as designed to solve problems related to the functioning of society. As the processes that manage and change cultures rely on communication tools, of which graphic arts form part, their study easily came under the processual paradigm of New Archaeology in the 1950s. In the 1990s, post-processualism, born in reaction to the excesses of processualism, had the main effect of bringing archaeology and cultural anthropology together and taking into account human beings. In the field of art, the individual artist, the creator, has finally been fully acknowledged.

Conservation and World Heritage

Prehistoric rock art is an extremely fragile world heritage. Many European sites have been classified by UNESCO as having outstanding universal values (1979, Valcamonica and decorated caves in the valley of Vézère; 1985, Altamira; 1994, Tanum; 1998, the Côa valley (and subsequently Siega Verde) and rock art in the Mediterranean basin of the Iberian Peninsula; 2008, 17 caves in the Cantabrian region). Cultural parks and the setting-up of similar replicas today enable the control of public access to their exceptional heritage, but irreversible damage has been committed by vandalism and urbanization. The conservation of the Côa valley, threatened by the construction of a dam, is a remarkable example, but cannot counter other irredeemable losses. In 1974, tens of thousands of engravings belonging principally to the Bronze Age, but some could have belonged to the Epipaleolithic, were drowned by the waters of a hydroelectric dam in Fratel in the Tagus valley (Portugal). More recently, the same drama has been repeated in the Guadiana valley (Alqueva dam) on the Spanish-Portuguese border.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Côa Valley Rock Art Sites
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Mobiliary Art, Paleolithic
- ▶ Portable Art Recording Methods
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of
- ▶ Siega Verde Rock Art Sites
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Techniques of Paleolithic Art
- ▶ Valcamonica Rock Art

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European Association of Archaeologists (EAA)

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Basic Information

The European Association of Archaeologists (EAA; http://www.e-a-a.org) is a membership-based, not-for-profit association which is open to all archaeologists and other related or interested individuals or bodies. It is fully democratic, and is governed by an Executive Board elected by full members of the Association. A Nomination Committee ensures that the Board is representative of the different regions of Europe and the different sectors of the profession. Its membership covers most European countries, but also includes residents of all other continents interested in European Archaeology.

The EAA was established in 1994 at an Inaugural Meeting in Ljubljana, Slovenia, where its Statutes were formally approved (Cleere 1995; http://www.e-a-a.org/statutes.htm). These stipulate that the EAA was created:

- To promote the development of archaeological research and the exchange of archaeological information
- To promote the management and interpretation of the European archaeological heritage
- To promote proper ethical and scientific standards for archaeological work
- To promote the interests of professional archaeologists in Europe
- To promote cooperation with other organizations with similar aims

The EAA has held Annual Meetings since the first conference in 1994; sessions cover topics varying from the interpretation of material culture through theoretical perspectives to cultural heritage management. These conferences have been held in a range of different European cities: Santiago de Compostela, Spain (1995); Riga, Latvia (1996); Ravenna, Italy (1997); Göteborg, Sweden (1998); Bournemouth, UK (1999); Lisbon, Portugal (2000), Esslingen am Neckar, Germany (2001), Thessaloniki, Greece (2002), St. Petersburg, Russia (2003), Lyon, France (2004), Cork, Ireland (2005) Cracow, Poland (2006), Zadar, Croatia (2007), Valletta, Malta (2008), Riva del Garda, Italy (2009), The Hague, Netherlands (2010), Oslo, Norway (2011) and Helsinki, Finland (2012).

The EAA has published a journal since 1993: originally the Journal of European Archaeology 1993–1997, since 1998 the European Journal of Archaeology (EJA) (Chapman 1995; Pearce 2002). It also publishes

The European Archaeologist (TEA) electronic newsletter (http://www.e-a-a.org/tea/).

Major Impact

Since 1999, the Association has awarded the annual European Archaeological Heritage Prize to an individual, institution, or to a local or regional government for an outstanding contribution to the protection and presentation of the European archaeological heritage (http://www.e-a-a.org/prizes_awards.htm). A Student Award was instituted in 2002 and is awarded annually for the best paper presented at the EAA Annual Meeting by a student or an archaeologist working on a dissertation.

The Association creates Working Parties for a limited period in order to achieve a particular result (formulate policy, develop a standard, create an inventory, etc.), while Committees are established where an issue is considered to be of permanent concern to the EAA (http://www.e-a-a.org/working_groups.htm). EAA Committees include the Committee on the Trade in Cultural Material, the Committee on the Teaching and Training of Archaeologists, and the Professional Associations in Archaeology Committee.

The Association promotes ethical professional behavior through its Code of Practice, Principles of Conduct for Contract Archaeology, and Code of Practice for Fieldwork Training (http://www.e-a-a.org/codes.htm). The EAA acts as an advisory body on all issues relating to the archaeology of Europe, and is affiliated to major institutions active in cultural heritage protection and management. In 1999, the EAA was granted consultative status with the Council of Europe, which in 2003 was upgraded to participatory status.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Ethics in Archaeology
- ▶ Heritage and Archaeology

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European Contact and Global Expansion (Post-CE 1500): Historical Archaeology

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Introduction

The mass movement of Europeans outside their continent, beginning in the fifteenth century and the experiences of the native peoples with whom they came into contact, is one of the most important narratives of world history. Historical archaeologists have been engaged in understanding, interpreting, and explaining cross-cultural contact and interaction, especially as it pertains to the post-CE 1500 world, since their field was first formalized as a subfield within archaeology in the late 1960s. Since then, historical archaeologists' views on cultural contact have changed along with the general theoretical trends of anthropological archaeology and as greater amounts of information have been collected from across the globe.

Historical archaeologists originally tended to interpret cultural contact rather simplistically using acculturation as their guiding theory.

Using this perspective, they tended to view the contact process as overwhelmingly unidirectional, meaning that indigenous peoples simply accepted foreign products and eagerly incorporated them into their ways of life. This process was observable, thought archaeologists, through the presence and abundance of foreign objects within indigenous settlements. Thus, a high percentage of European objects such as copper pots, silver bracelets, and glass beads – when compared against "traditional" objects such as stone tools and clay pottery – could be interpreted as representing a high degree of acculturation. Fewer foreign materials would imply less acculturation. With time, and using anthropological ideas as a guide, historical archaeologists began to appreciate the complexity of culture contact, realizing it to be a two-way process. In this new model, Europeans and natives learned from one another, as both were acculturated into elements of the other's culture.

The more refined understanding of cross-cultural engagement moved archaeology away from facile concepts of superiority and inferiority (where "inferior" native cultures readily accepted the "superior" products of the Europeans) and demonstrated the complex social and cultural factors that influenced the many cultural contact situations that had taken place as a result of post-CE 1500 European global expansion. An interest in the development of new cultures from a blending of two or more cultural traditions was one outcome of acknowledging the complexities of cultural contact. These new cultures – frequently termed "hybrid" or "creole" – developed around the globe as one result of culture contact. Observers can see their expressions in many places today, including throughout the Caribbean, South America, and everywhere that diverse cultures have been in contact for generations.

Since the 1990s, historical archaeologists have almost completely abandoned the acculturation model and are now conducting some of the most important and interesting research in the field of cultural contact. In the process, they are adding to the general storehouse of anthropological information concerning what happens when peoples of vastly different cultures come together and exchange material culture. This research has developed in tandem with the general maturation of historical archaeology and has spread throughout the globe as indigenous archaeologists are adding their own perspectives about cultural contact and European expansion. Researchers investigating the cultural contacts between native peoples and Europeans have explored a huge array of complicated subjects, including the roles that gender, race, and class play, the significance of ecological variables in shaping cross-cultural encounters, and strategies of accommodation and resistance. Much of this research has become the centerpiece of study within contemporary historical archaeology because of its anthropological and historical importance to understanding post-CE 1500 global history.

Definition

The term "European contact" refers to a situation where people of European culture and heritage encounter people of non-European culture and heritage in the latter's homeland. Historical archaeologists typically reserve the term for post-CE 1500 history, but it can also be used for earlier eras as well.

Contact itself can be "direct" or "indirect." Direct contact involves a face-to-face meeting between at least two people of different heritages, backgrounds, traditions, or cultures. Indirect contact involves a minimum of three people, one of whom serves as an intermediary for the other two. Let us imagine three people in an indirect contact situation, two indigenous individuals (A and B) and a European (E). In an indirect contact situation, the European and one indigenous person will be in direct, face-to-face contact (A and E). The third individual (B) is in direct contact with the other indigenous person (A) but not with the European (E). Rather, the second indigenous person (B) is thus only in indirect contact with the European (E) through the other indigenous person (A). Indirect contact occurs between the European (E) and the indigenous person (B), even though they have never actually met face

to face. The two indigenous people (A and B) can exchange European objects, ideas, or even harmful pathogens long before direct contact has occurred between the European (E) and the second native person (B).

Communities and entire cultures can equally stand in for the individuals in this simple example. And knowing this, we can easily imagine how complex and nuanced any single contact situation can be when the number of people and communities is expanded. For example, if we think about eight Europeans in contact with just 100 native people, we can see that a vast number of direct and indirect contact situations are possible. The shear number of likely contacts makes it possible to imagine the variability of circumstances that may result in real historical situations.

Some archaeologists have found the term "cultural contact" problematic for several reasons, one of which is that the concept tends to imply more interest in short-term encounters than in long-term "entanglements" (e.g., Silliman 2005). This problem is easily solved by understanding that both "short-term" and "long-term" contacts have occurred in history. A short-term contact would be represented by Martin Frobisher's meeting native people on Baffin Island in 1576, whereas a long-term contact is exemplified by the multiyear interactions between European missionaries and Maoris in nineteenth-century New Zealand. The cultural impacts of a contact situation may be small or great depending upon the precise circumstances. Frobisher may have handed out European artifacts to the Baffinland Eskimo (Nunatsiaqmiut) he met, but this encounter had little lasting impact on them. Conversely, the missionary contacts in New Zealand drastically altered traditional patterns of life as various individuals accepted the entire foreign Christian religion.

"European global expansion" refers to the historical process whereby various continental nation-states traveled far beyond their homelands in search of riches, religious converts, and new markets. The identification and exact dates of the first European encounters outside Europe remain a matter of considerable speculation, but the overall goals of European expansion were well established by CE 1500. For historical archaeologists, one of the key factors of this process is to discover where each European colonial power built fortifications, trading posts, religious missions, industrial facilities, and settlements. These places constitute a major focal point of much research in the historical archaeology of European contact and global expansion. The history of exploration is complex, and only a brief overview can be presented here.

Historical Background

The expansion of European nation-states outside their continental homelands began long before CE 1500, as Norse, Hanse, Venetian, and Genoese traders established contacts with peoples outside Europe (Scammell 1981: 1-224). Opinions vary widely concerning the distinctions between the pre-CE 1500 and the post-CE 1500 trading networks, but historical archaeologists who accept the principles of world-systems analysis understand that the post-CE 1500 era was markedly different from what had gone before. The essential difference is that post-CE 1500 European expansions were rooted in the creation, maintenance, and expansion of a capitalist world-economy that sought to link peoples around the world into a global system of economic and political exploitation. This system funneled wealth to the capitalist cores (e.g., Lisbon, London) while creating dependencies across the globe in what came to be called the Third World (Wallerstein 2004).

Pre-CE 1500 trading networks did not have the same overarching goals as the later capitalist networks and did not include a comprehensive theory of imperialism (Abernethy 2000: 24-29). After about CE 1500, each European nation-state engaged in transoceanic exploration had the same general goals, even though the precise histories of each nation's efforts are unique. As participants in the capitalist world-economy, their basic goals were to funnel riches to the financial centers of their respective countries through extractive industries – such as gold and silver mining

using the enforced labor of slaves and indentured servants – and to ship furs, spices, and other sought-after commodities to Europe. The Spanish were the first to send explorers across the Atlantic Ocean with Columbus' voyage of 1492. A protracted series of follow-up explorations took them to the coasts of both the Atlantic and the Pacific, where they established outposts throughout the Caribbean and in Mexico, Peru, and what is today the American Southwest and California (Eakin 2007: 62-87). Another colonial superpower to seek transoceanic riches was Portugal, the other great Iberian power. The Portuguese began their voyages of exploration as early as 1419, heading south rather than west. By 1500, they had visited most of the African coast, reached India, located Brazil, and traveled throughout Indonesia (Russell-Wood 1998). The Dutch, British, French, and others (such as the Swedish) soon followed on the heels of the Iberians and sought their own colonial bases of operation that they hoped would challenge the growing wealth of their Spanish and Portuguese rivals. The Dutch began their maritime trade in 1590 and soon had outposts in North and South America, the Caribbean, Indonesia, and Africa, all places that they could directly defy the economic supremacy of the other Europe powers (Boxer 1973). The French and British adopted much the same strategy in their efforts to carve out their own overseas markets, with their greatest colonial conflicts playing out in the seventeenth- and eighteenth-century wars of eastern North America (Hart 2008: 48-91).

Native peoples were continually caught in the midst of the European search for economic domination, and frequently with devastating consequences. The development of African slavery represents a glaring example because a number of the Europeans' cultural contacts were with the African peoples they enslaved as part of the burgeoning Atlantic slave trade that involved all the major European superpowers. This trade helped to shape the history of the world after CE 1500 in ways that are still being experienced today (Nimako & Willemsen 2011). Many indigenous people and communities often played the Europeans against one another in a series of clever manipulations designed to forestall their cultural destruction and physical decimation or to eliminate the European threat altogether. Trigger's (1987: 461) account of Amantacha, the seventeenth-century Huron man who was adept at convincing both the French and the British of his good intensions, provides a poignant example of indigenous intercultural understanding.

Though similar in structure, every single contact situation experienced by indigenous peoples and Europeans throughout the world was unique. In some cases, the contact situations involved hostility and in other cases cooperation. Some involved both conflict and acquiescence as the circumstances of contact evolved. The singularity of events and processes has meant that historical archaeologists have had to adopt research strategies that are sensitive enough to identify local characteristics, yet robust enough to capture the true nature of European global expansion. It would make little sense for an archaeologist to investigate a local contact situation while ignoring the larger cultural frameworks at work, such as Eurocentrism. Similarly, it would be unwise for an archaeologist to examine the forced inequalities of Eurocentric attitudes and practices without explaining their impacts on an identifiable indigenous people. The investigation of European expansion and cultural contact allows archaeologists to study the interplay between the local and the global in interesting and enlightening ways.

Key Issues

Some of the key issues that historical archaeologists face when attempting to understand and interpret the material, social, and cultural aspects of European contact and global expansion involve creating a narrative of a particular contact situation itself. Archaeologists create these ethnohistories after carefully studying the available primary and secondary historical sources and comparing this information with the archaeological evidence. Some of their primary concerns are to understand the duration of the contact, its characteristics, the people and communities involved, and how the artifacts left behind by both

indigenous peoples and Europeans can provide information that may not be available in any other source. Thus, like most historical archaeology, the archaeology of European contact and global expansion is pursued in a multidisciplinary manner, with the archaeologist drawing upon a number of diverse sources.

Archaeologists can often identify the key actors in a contact situation by the artifacts that are present at a contact-period site. Using porcelain as an example, in the fourteenth century, Marco Polo (Marsden 1818: 560) mentioned that anyone with Venetian coins could purchase porcelain cups in the Chinese city of Hangzhou. This simple reference suggests the early European interest in these exotic ceramics, and the acquisition of porcelain soon became an obsession for many Europeans. The discovery of porcelain bowls and other vessels in archaeological contexts in European cities documents some measure of contact between European traders and Chinese potters (e.g., Vermeulen et al. 2006). The discovery of shipwrecks laden with thousands of pieces of blue-and-white Chinese export porcelain indicates the strength of the continuing contacts between Europe and Asia (e.g., van der Pijl-Ketel 1982). European trade items at native sites throughout the world perform the same function of signaling that cross-cultural contact has occurred in the past (e.g., Quimby 1966).

As noted above, however, the contemporary examination of cultural contact involves much more than simply identifying the dates, duration, and characteristics of contact situations. Today's analyses are far more nuanced, as a number of historical archaeologists are engaged in unraveling the material, social, and cultural complexities of actual contact situations using archaeological research as a primary tool. Just two examples will indicate some of the complexity that is entailed in the historical archaeology of European contact and global expansion in real archaeological situations.

The area called the Flatts (also called Schuyler Flatts) was located in Colonie, New York, north of the colonial Dutch settlement of Beverwijck (later Albany). In 1643, Kiliaen van Rensselaer, the Dutch-based owner of the vast region around Beverwijck, ordered the construction of a stockaded farmhouse there. This residence/trading post was home to Arent van Curler, widely regarded as one of the most effective Dutch diplomats in New Netherland. His primary task was to establish cordial ties with Mohawk and Mahican fur trappers in the Hudson River valley. After the British took control of New Netherland in 1664 and renamed it New York, a prominent member of the Albany aristocracy named Philip Pieterse Schuyler bought the land and constructed a new house on the site of van Curler's now-collapsed outpost. Like van Curler, Schuyler maintained friendly ties with the local Native Americans. Because the Mohawks and the Mahicans engaged in frequent hostilities, however, he, like van Curler before him, was often forced into the role of cultural mediator.

Archaeologists excavating at the Flatts between 1971 and 1974 discovered a large collection of European artifacts there, including many objects one would expect to find within any Dutch house in the Netherlands or within a Dutch colonial house in New Netherland. Familiar European artifacts included leaded window glass, fragments of drinking glasses called roemers, white clay smoking pipes, and pieces of ceramic vessels made of faience, majolica, red earthenware, and stoneware. The archaeologists also found objects useful to the local Native Americans: wampum, glass beads, glass bottles, lead shot, and gunflints (Huey 1998).

In this case, the artifacts are interpreted as objects that assisted in creating peaceful trading relations between the Europeans and the Native Americans living in the region. The reason for this interpretation rests on the reality that "with nearly constant warfare between the Dutch and native people in the lower Hudson Valley [south of the Flatts], good relations with the Mohawk were essential" (Bradley 2005: 7). Objects offered in trade – made in Europe and processed through cross-cultural transportation and social networks – thus serve as tangible markers for the social relations enacted in this particular contact situation. Elsewhere, however, the presence of similar artifacts may have a completely different meaning.

Two hundred years later and thousands of miles away in Tasmania, the Van Diemans Land Company built Burghley. Their plan was to develop a large sheep-grazing and wool-producing concern on pastureland that they judged to be of exceptional quality. The first hut at Burghley was perhaps built in 1827, but only 2 years later, the residents had constructed several wooden houses. In the end, however, the settlement was a failure, and by the late 1830s, almost everyone had abandoned it.

Relations between the Aboriginal Tasmanians and the Europeans were hostile throughout Burghley's tense history. The placement of the buildings and fences needed for the wool industry disrupted the time-honored routines of the Aboriginals, and frequent violent confrontations occurred. The Australian authorities' solution was to capture and remove the entire indigenous population from Tasmania, and in 1842, they had accomplished their goal. The one pertinent fact that stands out in this particular contact situation is that "it is clear from the historical records that Aboriginal and European people did not coexist at Burghley" (Williamson 2002: 79).

Archaeologists excavated at Burghley during two seasons in 1990s and discovered both Aboriginal and European artifacts. Many of the same kinds of artifacts found at the Flatts in New York were present at the site, including musket balls, lead shot, pieces of clay smoking pipes, and gunflints. In this particular case, however, the archaeologists interpreted the musket balls, the lead shot, and the gunflints as evidence of the violent nature of the cultural contact situation.

These extremely brief examples demonstrate at least two important points about the archaeology of European expansion and culture contact. First, every contact situation has its own history and its own narrative of intercultural association. Some situations might involve conflict and violence, whereas others exhibit collaboration and cooperation. Other contact situations might involve conflict and cooperation at different times in their histories. Although the overall plans of the various European nations were similar, their precise strategies for carrying them out could be quite distinct, often based on the actions of the indigenous peoples they encountered. No contact situation ever occurred within a cultural or historical vacuum; every instance was rooted in history and cultural tradition. Second, every historical archaeologist examining culture contact understands that they must adopt a fully multidisciplinary approach and use whatever sources they can locate, from tiny artifacts to entire landscapes. Only in this way will they ever begin to understand both the true nature of culture contact as an overarching, post-CE 1500 process and the infinite variation in the many unique cultural encounters that have taken place throughout the world over the past 500 years.

Future Directions

The historical archaeology of European expansion and culture contact will continue to expand in the twenty-first century, and archaeologists will discover new topics to explore and new theoretical perspectives to employ. One of the most exciting areas of research involves the union of traditional knowledge with archaeological research, as historical archaeologists interact with descendant communities and begin to include traditional knowledge in their research strategies. Historical archaeologists are learning to incorporate personal interviews and ethnographic materials in their efforts to understand indigenous perspectives and insights. For example, the oral history provided by a man named M. Kennedy helped archaeologists in north-central Australia to develop a strong sense of daily life in stock-raising camps in a way that was not possible with either the archaeological or the historical information (Paterson 2008). Instead, the orally provided information was another data set that the archaeologists could combine with the other amassed evidence to provide a richer understanding of cross-cultural engagement in twentieth-century Australia.

The knowledge of post-CE 1500 European contact and global expansion will continue to grow because so much historical archaeology is now being conducted around the world. Historical archaeologists are today conducting research

in regions that were left unstudied just 10 years ago. This knowledge, when amassed, evaluated, and combined, will provide important new understandings of one of the most significant processes of global history. At the same time, this concerted effort will demonstrate the importance of research in historical archaeology and the ways that historical archaeologists can contribute to knowledge on both local and global levels.

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- ▶ Atlantic World: Historical Archaeology
- ▶ Australasian Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
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European Convention on the Protection of Archaeological Heritage (1992)

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Introduction

The 1992 Council of Europe Convention on the Protection of the Archaeological Heritage (Council of Europe 1992a), known as the Valletta Convention after the city in which it was signed, is a revision of the 1969 Convention with the

same title (Council of Europe 1969). Following ratification by four Member States, it came into force on 25 May 1995. At the time of writing (June 2011), it has been ratified by 40 of the Member States of the Council of Europe (the States that have so far not ratified it are Austria, Iceland, Italy, Luxembourg, Montenegro, San Marino, and Spain).

The major threat to the archaeological heritage was seen in the immediate postwar period as resulting principally from clandestine excavation, and as a result, the 1969 Convention was concerned principally with the regulation of archaeological excavations and the dissemination of the results of those excavations. By the 1980s, it was recognized that a far more destructive menace had arisen as Europe entered into a period of massive development for the rehabilitation and expansion of Europe – large-scale construction projects such as motorways, high-speed trains, housing, industry, and airports, along with the loss of great expanses of land hitherto devoted to agriculture and forestry. The impact of these forces on the fragile archaeological heritage was enormous, calling for more effective protective legislation, aiming wherever possible to preserve the fragmentary evidence of Europe's past and at the same time to set up specialized archaeological teams to investigate archaeological sites and monuments before they were destroyed and to develop intensive professional survey and inventory systems. The education of the public in the value of the archaeological heritage was also identified as a major component in the recognition of the cultural identity of Europe.

Of considerable importance in the discussions that led up to the start of work on revising the 1969 Convention were a number of professional conferences and meetings during the 1980s. The most significant of these were those in Florence in 1984 (Council of Europe 1987) and in Nice in 1987 (Council of Europe 1989) on *Archaeology and Planning* and *Archaeology and Major Public Works*, respectively.

In 1988 the Council of Europe received a recommendation from its Select Committee of Experts on Archaeology and Planning, composed of professionals from all the Member States (Council of Europe 1989), that the 1969 Convention should be revised in the light both of the threats to the heritage that had developed since 1969 and of the significant new techniques for archaeological survey and analysis, such as geophysical prospecting, satellite imagery, and laboratory analysis, that had become available. The draft Convention prepared by the Select Committee over more than 2 years' work was approved by the Committee of Ministers and opened for signature in 1992.

Key Issues/Current Debates/Future Directions/Examples

The Valletta Convention

The preamble to the 1992 European Convention on the Protection of the Archaeological Heritage (Revised) places it in the broader framework of the activities of the Council of Europe in the field of the cultural heritage that had been established by the European Cultural Convention (Council of Europe 1954). It emphasizes the problems facing the archaeological heritage, which is deemed to be "essential for a knowledge of the history of mankind." It concludes by stressing the necessity for joint action by the European States.

Article 1 begins by stating that the aim of the Convention is to protect the archaeological heritage "as a source of the European collective memory and as an instrument for historical and scientific study." Its elements are considered to be all remains and objects and other traces of mankind from past epochs, defined as including structures, constructions, groups of buildings, developed sites, movable objects, and monuments of other kinds, as well as their contexts.

In Article 2, State Party to the Convention is required to have in place a legal system for the protection of the archaeological heritage that includes the inventorization of its archaeological heritage and the designation of protected monuments and areas; the creation of archaeological reserves, even when there are no visible remains on the ground or underwater; and the mandatory reporting to the competent authorities by finders

of chance discoveries of elements of the archaeological heritage.

States are required in Article 3 to apply procedures for the authorization and supervision of excavations and other archaeological activities in order to prevent illicit excavation. They should ensure that archaeological excavation and prospecting are undertaken in a scientific manner, employing nondestructive techniques wherever possible and making provision for proper preservation, conservation, and management. All excavations and other potentially destructive interventions may be carried out only by qualified and authorized personnel. Metal detectors and similar equipment may only be used after prior authorization.

Article 4 specifies that measures must be implemented for the physical protection of areas intended to become archaeological reserves, for the conservation and maintenance of the archaeological heritage (preferably in situ), and for the provision of appropriate storage facilities for archaeological materials that have been removed from their original locations.

The integrated conservation of the archaeological heritage is dealt with in Article 5, which specifies that States must seek to reconcile and combine the respective requirements of archaeology and development planning. This should entail archaeologists participating in developing planning policies designed to ensure and formulate well-balanced strategies for the protection, conservation, and enhancement of sites of archaeological interest. Archaeologists must be involved in the various stages of development schemes and systematically consult planners so as to make possible the modification of plans likely to have an adverse impact on the heritage and also to obtain the allocation of sufficient time and resources for the appropriate scientific studies to be carried out. Environmental impact assessments should be carried out so as to ensure that decisions are made that take account of archaeological sites and their settings.

The important aspect of financing archaeological research and conservation is dealt with in Article 6. States are required to arrange for public financial support to be available for this purpose from national, regional, or local authorities, in accordance with their respective competences. They are further required to increase the material resources for archaeology by ensuring that provision is made in major public or private development schemes for covering the total costs of any necessary archaeological operations. The budgets for such schemes must provide for preliminary study and prospecting as well for eventual full publication and recording of the findings.

The Convention requires States to create or update surveys, inventories, and maps of archaeological sites and to take all practical measures to ensure the drafting, following archaeological operations, of a publishable scientific summary record before the essential comprehensive specialized studies are published (Article 7). Article 8 requires States to facilitate the national and international exchange of elements of the archaeological heritage for professional scientific purposes and to promote the pooling of information on archaeological research and excavations, as well as to contribute to the organization of international research programs.

The importance of developing public awareness of the significance of archaeological research and conservation is recognized in Article 9. States are required to conduct educational activities with a view to arousing and developing this awareness of the heritage in understanding the past and also of the threats to it. This field of activity should include promoting public access to important elements of the heritage, particularly sites, and encouraging the display to the public of suitable selections of archaeological objects.

In order to prevent the illicit circulation of elements of the archaeological heritage (Article 10), States are required to arrange for the relevant public authorities and scientific institutions to pool information on illicit excavations. They shall also undertake to inform the competent authorities in the State of origin which is a Party to the Convention of any offer suspected of coming either from illicit excavations or unlawfully taken from official excavations. Steps should be taken to ensure that museums and similar

institutions whose acquisition policy is under State control do not acquire archaeological material suspected of coming from illicit excavations or unlawfully from official excavations. The attention of museums where the acquisition policy is not under State control should be drawn to the provisions of this Convention, and no effort should be spared to ensure their respect for its principles. Every effort should be made through education, information, vigilance, and cooperation to restrict the transfer of elements of the archaeological heritage obtained from uncontrolled finds, illicit excavations, or unlawfully from official excavations.

The basic legal and practical problems involved in preventing unlawful trade in elements of the cultural heritage are acknowledged to be complex and lying outside the scope of the present Convention. As a result, Article 11 States that nothing within the Convention may be taken as affecting existing or future bilateral or multilateral treaties dealing with these problems: this Convention cannot be used to interpret, minimize, or expand such treaties.

Article 12 requires States to afford mutual technical and scientific assistance through the pooling of experience and exchanges of experts in matters concerning the archaeological heritage. Furthermore, they should encourage, under the relevant national legislation or international agreements that bind them, exchanges of specialists in the preservation of the archaeological heritage, including those responsible for further training.

Explanatory Report and Commentaries

Simultaneously with the approval of the Convention in 1992, the Council of Europe issued an Explanatory Report (Council of Europe 1992b). This document puts professional flesh on the legislative bones of the Convention proper and is essential reading for archaeologists, planners, and administrators concerned with the protection of those elements of the European archaeological heritage located within the frontiers of their own countries.

The promulgation of the draft Convention and its progressive ratification by Council of Europe Member States have resulted in the publication of a considerable number of papers and articles. One of the key papers is that by a prominent member of the Council's Select Committee of Experts on Archaeology and Planning (Willems 2007). This traces the evolution of the Convention and the reactions to it by archaeologists and heritage managers in Council of Europe Member States. Early reactions to the Convention and its implication were presented in a series of papers in *Antiquity* in 1993, covering aspects such as the legal aspects (O'Keefe 1993) and the task of achieving agreement on the often complex problems of a common nomenclature for archaeology and archaeological heritage management and conservation (Trotzig 1993). Of special interest is a review of the degree of success achieved in the interpretation and application of the Convention 10 years after it came into force by the chairman of the Select Committee of Experts on Archaeology and Planning (Trotzig 2003).

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European Mesolithic: Geography and Culture

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State of Knowledge and Current Debates

Introduction

Holocene hunter-gatherers define the European Mesolithic. The beginning of the Mesolithic is marked by the transition from Pleistocene to Holocene, which has been dated to 11,700 cal. BP (Walker et al. 2009). The end of the Mesolithic is marked by the transition from hunting and gathering to agriculture. There is no firm date for the end of the Mesolithic because agricultural transitions occurred at different times in different regions throughout the continent. This variability, however, is not restricted to the end of the Mesolithic. From subsistence to ritual, the Mesolithic was a period of enormous diversity. The evidence for sociocultural diversity during the Mesolithic was largely due to the increasing diversity of regional landscapes caused by the amelioration of climate during the Early Holocene. The Mesolithic is a very important period for our understanding of humanity because it represents the first evidence for human occupation of the postglacial environments in Europe that have been continuously inhabited through contemporary times.

The variability of the Mesolithic archaeological record has caused a number of different subperiod designations between different regions. At a continental scale, archaeologists have traditionally separated the Mesolithic into two subperiods (Early and Late Mesolithic) based on changes in ecology, stone tool technology, and a range of other aspects of life (Jochim 2011). This entry uses this bipartite division of the Mesolithic in Europe.

Early Mesolithic

The Early Mesolithic starts with the massive appearance of microlithic armatures made according to the microburin technique, a technique aiming at producing oblique fractures on bladelets. Although microliths already existed during the Final Paleolithic, for example, within the (Epi)Ahrensburgian culture of northern Europe (Deeben 1988) and the (Epi)Laborian culture of southern Europe (Naudinot 2008), from the early Holocene they become a standard tool all over Europe.

The Early Mesolithic roughly spans the Preboreal and Boreal periods, which occurred between 11,000 and 9,000 cal. BP. It thus coincides with the period immediately following the last extensive glacial stadial, known as the Younger Dryas. The rapidly increasing temperature in the early Preboreal led to an acceleration in the melting of glaciers. Melting glaciers caused an abrupt rise of sea levels, with the impacts being more drastic in northern Europe, particularly in the North Sea and western Baltic Sea, than along coasts of the Mediterranean Sea (Fig. 1). The northern Adriatic Sea region, however, also experienced considerable coastline change due to rising sea levels. The inundation of former coastlines and land bridges, which continued into the Late Mesolithic, resulted in a considerable loss of lowland occupation and hunting grounds and the drowning of Early Mesolithic settlements. Many ongoing underwater survey projects using scuba diving in shallow waters and acoustic methods are starting to reveal offshore remains of Mesolithic settlements, burials, fishing installations (weirs, platforms), and implements

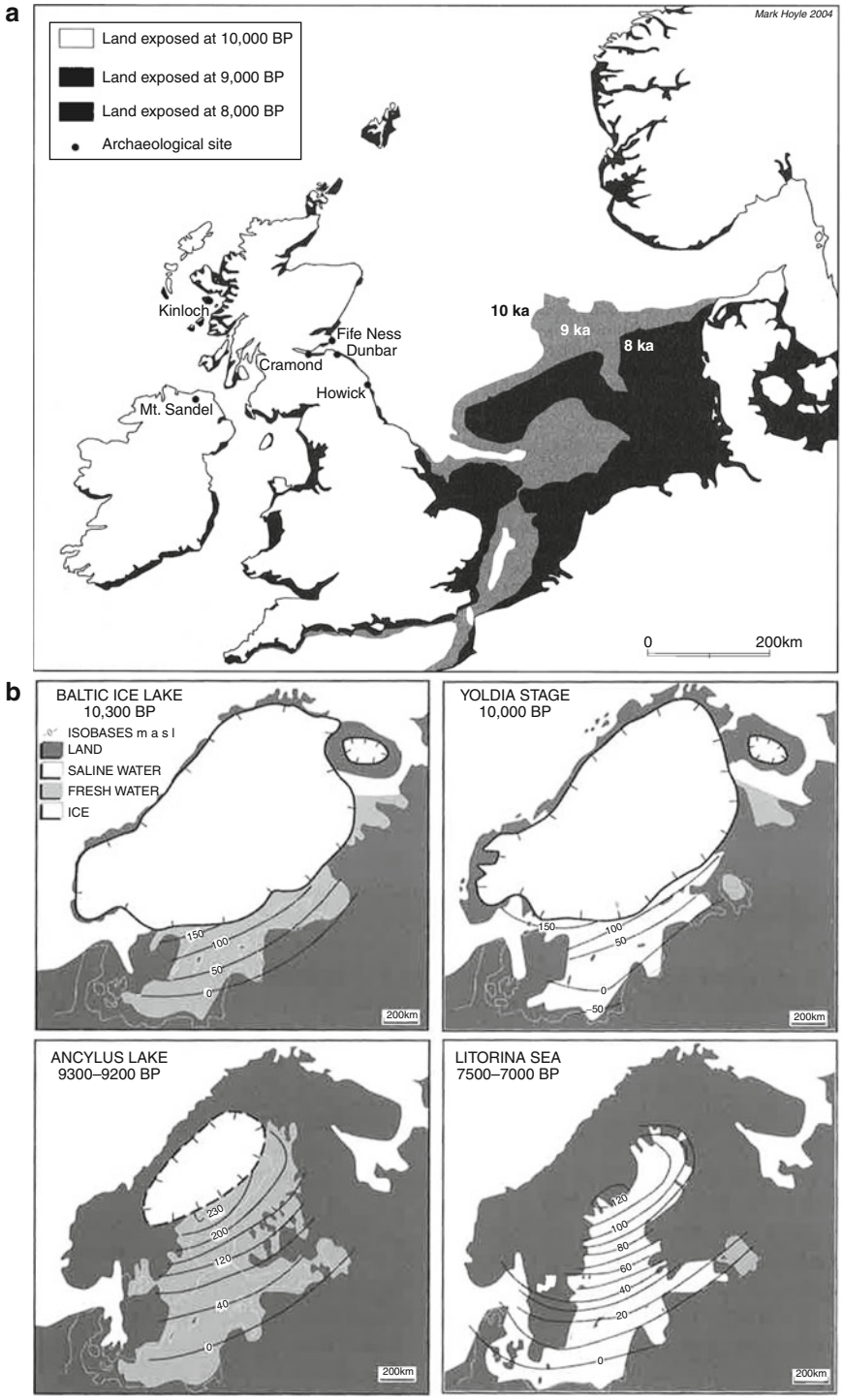

European Mesolithic: Geography and Culture, Fig. 1 Progressive inundation of (**a**) the North Sea basin (Bailey 2007), (**b**) the Baltic Sea basin (Eronen et al. 2001)

(harpoons, hooks), albeit so far most of these seem to belong to the Late Mesolithic (Benjamin et al. 2011). The bias in the recovery of these sites thus far is likely due to Early Mesolithic sites being buried at deeper levels that have rendered them much more difficult to detect.

In northern circum-Baltic Europe (Norway, northern and central Sweden, Finland), sea-level changes were outpaced by isostatic rebound of land freed from ice. This situation therefore caused land to be uplifted and newly habitable landscapes to become available for colonization by animals and humans. Based on similarities in stone technology and raw materials, it is believed that hunter-gatherers ("Fosna-Hensbacka," "Komsa," and "Kunda" cultures) colonized these northern regions both from the south (northern Germany, Denmark) and the east (upper Volga river, NW Russia) (Rankama & Kankaanpää 2008; Bjerck 2009). The overwhelming concentration of Early Mesolithic sites along former, now elevated shorelines in southern Sweden and Norway suggests that initial colonization of these regions was organized by societies that had developed an advanced maritime technology (Bjerck 2009). Boats allowed these Early Mesolithic hunter-gatherers to settle on virgin coasts, islands, and archipelagos that were newly born out of the sea by isostatic uplift.

Despite climate during the Preboreal and Boreal being substantially more temperate compared to the preceding Younger Dryas, these periods were characterized by notable climatic instability. According to the high-resolution paleoclimate records from the Greenland ice cores, there were two abrupt, short-term cooling events during the Early Mesolithic that caused mean annual temperatures to drop by around 2 °C (Blockley et al. 2012). A first one, called the Preboreal oscillation (PBO), happened right at the start of the Mesolithic around 11,300 cal. BP and was characterized by a more continental climate with dry, warm summers and cold winters (Bohncke & Hoek 2007). A second cooling event is dated around 9,300 cal. BP. According to recent radiocarbon evidence, this "9.3 event" had a considerable impact on Early Mesolithic hunter-gatherers, especially in the southern North Sea area, which is reflected by changes in sociocultural territory demarcation, raw material distribution, and projectile technology (Robinson et al. 2013). Even though there has been initial evidence yielded for the impacts of short-term cooling events on Mesolithic ecosystems and societies, there is much research to be done in the future that will deepen our understanding of the complexities of ecosystem and Mesolithic responses to paleoclimate change at diachronic, interregional scales of analysis.

Vegetation during the Early Mesolithic shifted from an overall open grass and shrub vegetation in the Preboreal to a more closed birch/pine forest landscape in the Boreal. From the early Boreal onward, hazel colonized large parts of Europe and in some areas constituted a major part of the vegetation.

Early Mesolithic Technology

Throughout Europe the Early Mesolithic is best documented by its lithic industries, which were mostly made on local flints. Standard tools are microliths, end scrapers, borer, and simply retouched bladelets and flakes. Burins, a typical tool of the Final Paleolithic, however, decreased in importance, albeit antler and bone working is still well represented in the Early Mesolithic. Microliths, which were mostly used as barbs and points on arrow shafts, include various types with unretouched bases, retouched bases, crescents, and triangles (Fig. 2). The ratio between these different types varies regionally; crescents, points with retouched base, and isosceles triangles, for example, are characteristic mainly for southern and central European traditions such as "Sauveterrian," "Beuronian," and "Tardenoisian," while points with unretouched bases and scalene triangles occur in large numbers within assemblages from northern European traditions such as the Maglemosian and (Epi)Ahrensburgian techno-complexes. In some regions of Europe, these broader traditions are further separated by

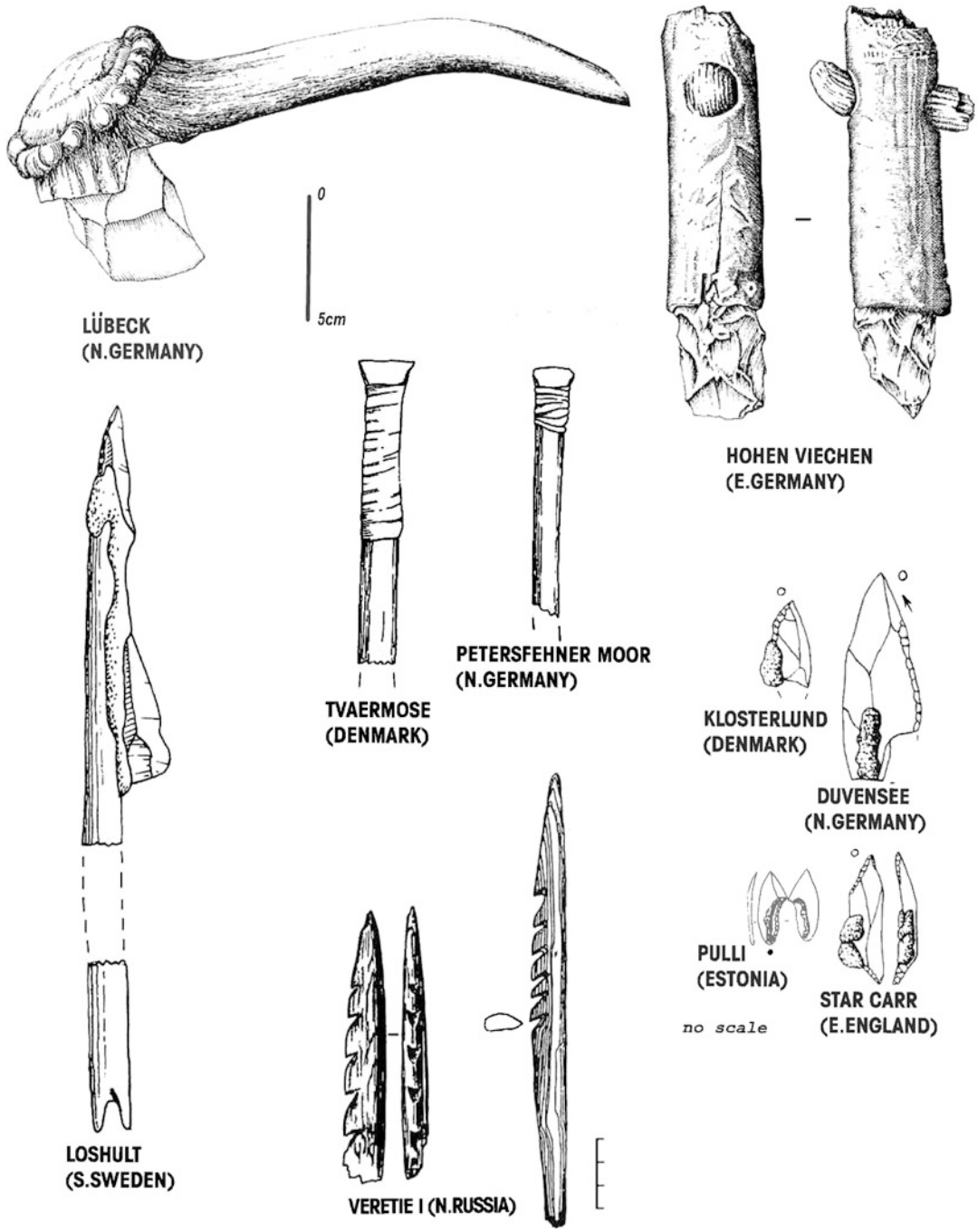

European Mesolithic: Geography and Culture, Fig. 2 Composite technologies (from Kozlowski 2009)

more localized traditions. For example, within the Rhine-Meuse-Scheldt region of northwest Europe, new types of microliths characterized by flat, partially bifacial retouch appear during the last centuries of the Boreal. Also, in certain regions of northern Europe macrolithic tools such as flake and core adzes are frequently found in Early Mesolithic contexts (Fig. 2). These

tools were typically associated with various wood-working activities such as tree-felling, debarking, and likely the construction of wooden dugout canoes. Tool type designations are not the only more regionalized demarcations during the Early Mesolithic. The blades used to produce most Early Mesolithic stone tools were also knapped in different ways in different regions of Europe. For example, while blades in most regions of Europe were produced by direct percussion techniques, there appears to be a distinct change in northeastern Europe within which blades were produced by pressure knapping techniques. Pressure knapping techniques appear to be transmitted from the "Butovo culture" of the upper Volga river region of Russia to the "Kunda culture" of the eastern Baltic and finally to the Maglemosian of southern Scandinavia (Sørensen 2012).

In wetland environments, such as peat bogs, river floodplains, and inundated coasts, excavations also revealed a wide range of tools and objects made of organic materials, such as bone, antler, and wood (Fig. 2). Interesting Early Mesolithic contexts are the sites of Star Carr (Clark 1971), Amsterdam "Europoort" (Verhart 1988), Friesack (Gramsch & Kloss 1989), Mullerup I (Brinch Petersen 1973), and Zamostje II (Lozovski 1996), among others. Perforated mattocks, barbed points or harpoons, fishhooks, and axe-sleeves were made from either antlers from red deer and elk or bone. Long bones from large mammals, mainly aurochs and red deer, were also used to make awls, adzes, needles, daggers, and hide-working tools. The techniques used to make these different organic tools have been studies in detail by David (2003). Wood served for the manufacturing of arrow shafts, bow, paddles, and also dugout canoes. The oldest canoes within Europe were found at Pesse in the Netherlands (Fig. 3).

Early Mesolithic Subsistence

The profound environmental changes that occurred at the transition from the Late Glacial to the Holocene necessitated changes in the lifeways of Early Mesolithic hunter-gatherers. The progressive reforestation and resulting installation of a temperate-boreal type of fauna caused changes in hunting strategies from an intercept-based "specie-specialized" and "group-organized" strategy during the Final Paleolithic to an encounter-based "broad-spectrum" and "small-group or individual-organized" strategy during the Early Mesolithic. In most parts of Europe, large herds of migratory animals (horse, reindeer) were no longer present from the Late Glacial onward. In southern Europe reindeer was no longer present in faunal records at the start of the Allerød, while in the hilly upland of western and central Europe were not present by the end of the Younger Dryas. Reindeer migrated further north and survived in Scandinavia well into the late Preboreal (Aaris-Sørensen et al. 2007), where they were hunted by survivors of the Tanged Point Traditions ("Fosna-Hensbacka" and "Komsa" cultures). The large reindeer herds were replaced by small- to medium-sized herds of widely dispersed and less-mobile thermophilous game. Large- to medium-sized animals (red deer, boar, roe deer, auroch, and also ibex and chamois in mountainous areas of southern and central Europe) were hunted by means of bow and arrow, while smaller species were probably trapped. Especially in the Mediterranean area (Portugal, southern France, Italy, Greece), smaller animals, such as lagomorphs, rabbits, and hare, became important meat suppliers from the Early Mesolithic onward (Bicho et al. 2000), while in northern Europe fur-bearing animals such as beaver, otter, pine marten, and wild cat were frequently killed, mainly for their hides. Although on most Early Mesolithic sites a broad range of game is present, there are also sites that provide evidence for more specialized hunting, such as chamois, ibex, or marmot hunting sites in the Pyrenees and Alps (Barbaza 1999).

Data from across Europe also indicate that the exploitation of marine and riverine resources intensified at the transition from the Late Glacial to the Early Holocene. The first evidence of coastal exploitation has been dated to the Middle Paleolithic (e.g., at Gorham's cave in Gibraltar)

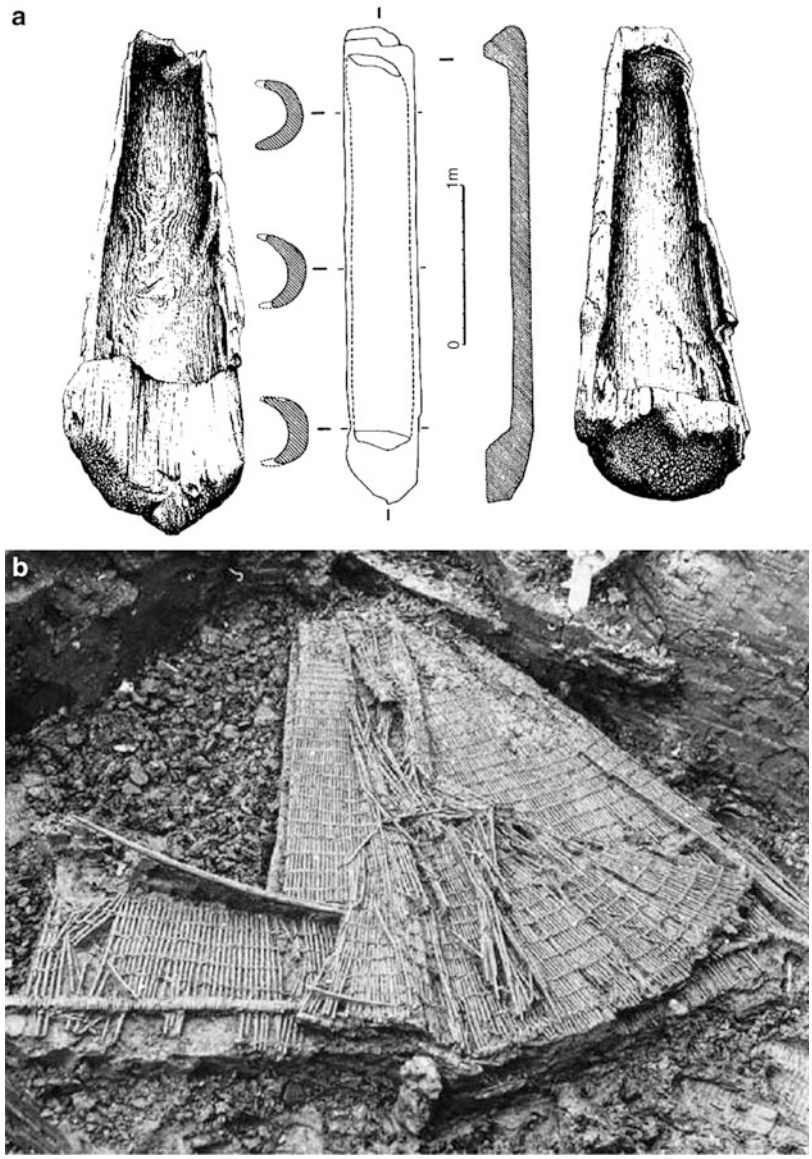

European Mesolithic: Geography and Culture, Fig. 3 Aquatic technology. (**a**) Dugout canoe from Pesse, the Netherlands (Kozlowski 2009). (**b**) Fish weir from Bergschenhoek, the Netherlands (Louwe Kooijmans 1987)

but still remains scarce. Evidence of a systematic exploitation of the Atlantic shore comes from Portuguese and northern Spanish sites dated to the Late Paleolithic (c. 40,000–10,900 cal. BP) (Gutiérrez-Zugasti et al. 2011). These sites yielded accumulation of shells, however, without forming true middens. The latter first appeared during the Early Mesolithic, albeit they usually remained smaller and less dense compared to the typical Late Mesolithic shell middens (cf. below). Yet, these Early Mesolithic shell middens prove an intensification of the marine exploitation at the onset of the Holocene. Again, Early Mesolithic shell middens so far have been found only in Portugal and northern Spain, sometimes as far as 60 km away from the former coastline. The marine remains indicate the consumption of molluscs such as limpets (*Patella vulgate* and *Patella intermedia*), top shell (*Osilinus lineatus*), mussels (*Mytilus galloprovincialis*), and common cockles (*Cerastoderma edule*); marine fish such as tope shark (*Galeorhinus galeus*)

and sea bream species (*Diplodus vulgaris*, *Sparus aurata*); as well as crustaceans. Similar species have also been exploited along the Mediterranean coast of Italy and Greece (Pluciennik 2008), although not resulting in true shell middens.

Early shell middens are also absent further north along the Atlantic coast, but this certainly does not imply that marine resources were not important in northern and western Europe; their apparent absence is most likely a result of a bias due to sea-level changes, which had a much stronger impact in northern and western compared to southern Europe. It is clear that Early Mesolithic shell middens are still preserved below sea level, awaiting their discovery. In addition, in northern Europe there is other evidence which supports the importance of marine resources from the start of the Mesolithic. Recent stable isotope analysis on skeletons from Wales (Schulting & Richards 2002) and southern Sweden (Lidén et al. 2004) gives a clear marine signal with an intake of >50 % of marine resources for some individuals, clearly pointing to the existence of a specialized coastal economy already during the early stages of the Mesolithic. Furthermore, in Scandinavia there is increasing evidence of intense and perhaps even specialized hunting of sea mammals, in particular seals, from the Early Mesolithic onward (Bjerck 2009).

In addition of coastal harvesting, numerous inland sites situated in major river valleys provided evidence for the exploitation of freshwater environments. Substantial evidence, such as large amounts of fish bones (pike, tench, bream, and eel), barbed bone projectiles, fishhooks, and fish equipment, has been reported on numerous Early Mesolithic sites especially in the Rhine and upper Danube valley (Svoboda 2008), while in other areas such as the Iron Gates in the lower Danube, heavy reliance on fish has been deduced from isotopic evidence (Bonsall 2008). In many other, mostly smaller river valleys, the evidence is less conclusive, while often (burnt) fish remains are found; their frequency is generally too low to conclude important freshwater consumption. This is also confirmed by stable isotope data from areas such as the Belgian Meuse valley (Bocherens et al. 2007) and French Charente-Maritime (Schulting et al. 2008), which indicate a strongly terrestrial diet dominated by animal protein with just a possibility of a slight contribution of marine-derived protein.

Besides aquatic and animal resources, plants (tubers, roots, mushrooms, various fruits) also became increasingly important within Mesolithic diets (Zvelebil 1994). The Early Mesolithic provides the first clear evidence for the regular gathering of plants and their central component in human diets (Jochim 2011). However, the exact contribution of plants often remains difficult to assess due to the bad preservation of plant remains. On northern European sites, carbonized shells of hazelnuts are frequently encountered in association with open fireplaces, sometimes even in large quantities. Either hazelnuts were roasted in these hearths for preservation purposes and/or destroying contaminants (Holst 2010) or they were dumped as waste in hearths after consumption (Sergant et al. 2006). According to recent estimates (Holst 2010), this high-quality, easy to store and digest resource could have covered 44 % of human energy demands. In the Mediterranean region, remains of wild legumes (vetch, pea, lentil), nuts (acorn, walnut, pistachio), and seeds are frequently found (Pluciennik 2008). Besides plant macroremains, there is also indirect evidence of plant gathering during the Early Mesolithic, especially in northwestern Europe. Recent microwear analyses (Beugnier 2007) have revealed traces of plant processing on many unretouched artifacts, connected with the scraping and splitting of nonwoody, silica-rich soft plants such as reeds. Albeit these tools were clearly not involved in plant harvesting for consumption, they prove that from the Early Mesolithic plants started to play a significant role in the production of fibers, for example, for making basketry and nets. Small fragments of vegetal cords and nets have been found in the bog site of Friesack (Gramsch & Kloss 1989) in NE Germany.

To summarize, Early Mesolithic subsistence varied considerably on a local and regional scale. Along the former coasts, communities mainly

focused on the exploitation of marine resources, with an emphasis on molluscs and fish in southern Europe and sea mammals (seals) in northern Europe. In the interior, subsistence heavily relied on game hunting and trapping combined with plant gathering, except for the main river valleys where the consumption of freshwater resources was also very important. The frequent discovery of marine shells on inland sites, in particular used as beads in burials, possibly indicates contact and exchange between coastal and inland communities. At the French site of La Vergne (Schulting et al. 2008) c. 3300, marine shell beads, originating from the former coast 60–80 km from the site, were found in three grave structures. The near absence of marine isotopes in the skeletal material clearly proves that these individuals did not exploit nor consume marine resources at all, but just exchanges shells.

Early Mesolithic Settlement, Land Use, and Territories

The unpredictable, dispersed character of resources, in particular of wild game and edible plants, must have forced Early Mesolithic hunter-gatherers to move almost continuously through the landscape, in particular those groups that occupied the forested interior of Europe. A high residential mobility can be deduced from both the considerably larger number of sites compared to the Late Mesolithic and the generally small size of the seasonal campsites. Early Mesolithic settlements tend to cluster along open water systems, such as rivers, lakes, and fens, sometimes forming extensive site-complexes covering several hectares (Barton et al. 1995). These latter kinds of site-complexes likely represent cumulative and/or spatial palimpsests (Bailey 2007), resulting from repeated reoccupation of the same locations. Extensive radiocarbon dating of some of these palimpsests has shown that reuse sometimes spanned several centuries or even millennia, in a continuous or discontinuous way (Crombé et al. 2012). Within these Early Mesolithic settlements, lithic concentrations, probably corresponding with former dwelling spaces (Grøn 2003), are usually rather small, covering less than 20–30 m^2. The few preserved remains of Early Mesolithic superstructures, such as at Howick (Waddington 2007) or Mount Sandel (Woodman 1985) (Fig. 4), indicate that these living spaces were sometimes covered by subcircular or subrectangular tents or timber huts and had a shallow dugout floor that might have been covered with organic material. At Howick, high-resolution radiocarbon dating points to a temporary use of these dwellings over several generations up to 150–200 years. On dry-land sites with bad organic preservation, however, it remains unclear whether dwelling tents or huts have ever been present; some archaeologists believe that daily activities such as cooking, stone knapping, and hide-working were carried out in open air. At best, superstructures were erected just for sleeping in areas free of settlement waste, making them almost archaeologically invisible. In wetland environments, such as the Duvensee peatland in northern Germany (Bokelmann 1971), dwellings consist of an organic flooring made of layers of pine, birch bark, and/or bundles of twigs and branches. These "bark floors" probably formed a kind of foundation for settling in a wet and damp peat area. An exceptional wooden construction was found at the lake site of Star Carr (Clark 1971), where on this lake shore settlement, a wooden platform was made presumably to stabilize the edge of what would have been a muddy area.

Most Early Mesolithic dwelling spaces, both open air and sheltered, were provided with one or more central fireplaces which based on the often abundant presence of burnt bones and hazelnut shells served mainly for cooking and heating. On several wetland sites, sand was imported to the site in order to construct these hearths; at Duvensee, for example, considerable amounts of white sand most likely served as a heat conductor for roasting hazelnuts (Holst 2010). Based on the distribution of small flint implements (mainly microliths) combined with the presence of hearths, Grøn (2003) has attempted to reconstruct the social composition and positions of individuals within Early

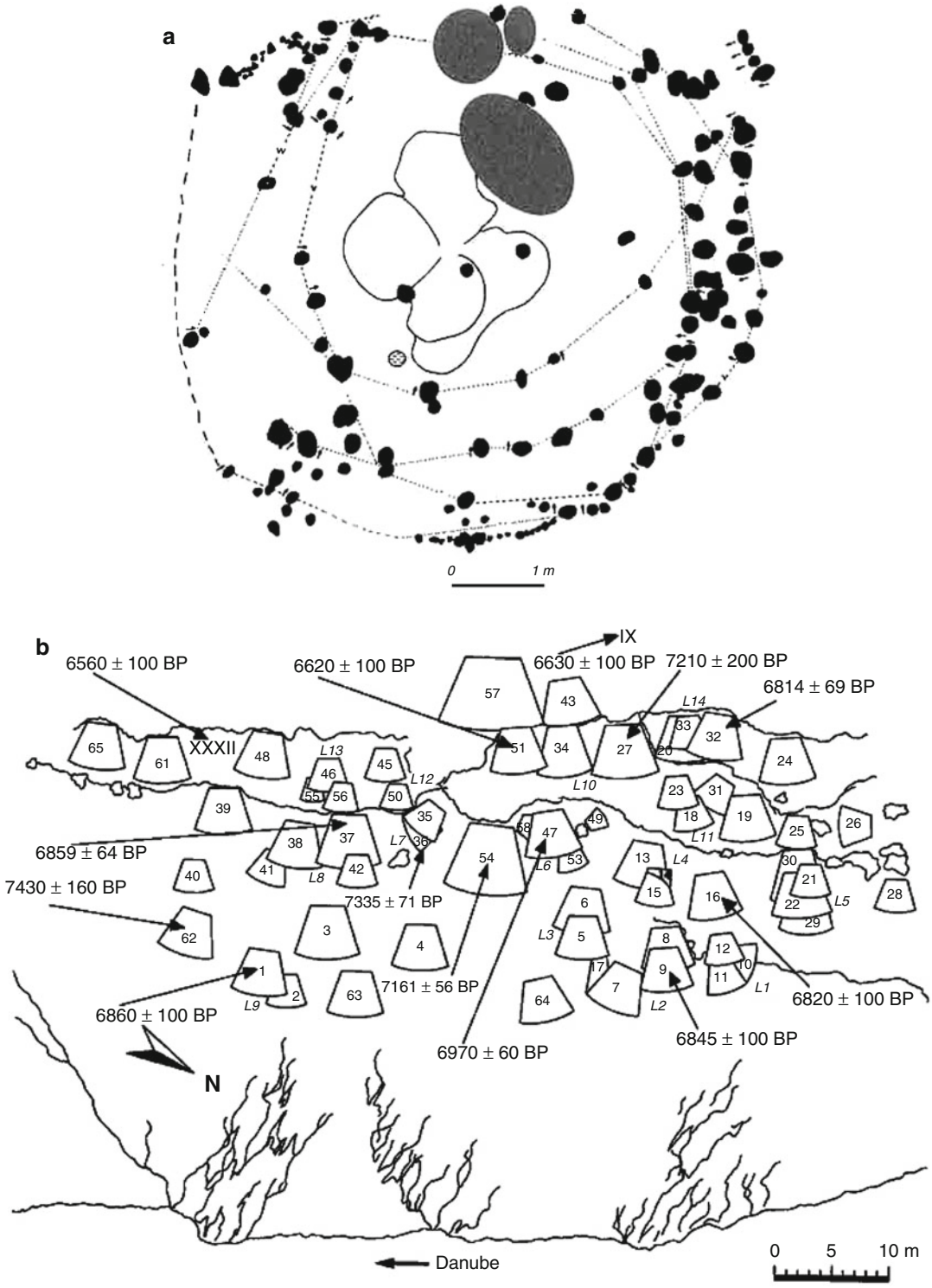

European Mesolithic: Geography and Culture, Fig. 4 Dwelling structures. (**a**) Mount Sandel (Woodman 1985), (**b**) Lepenski Vir 1 (Bonsall et al. 2000)

Mesolithic ("Maglemose culture") dwellings in southern Scandinavia. According to his analyses, repeated patterning in the spatial distribution of lithics and features leads to the identification of single and two-family dwellings, with a gradual increase of the latter toward the end of the Early Mesolithic. Judging by the small size of the dwellings, the limited (lithic) waste, and the weakly developed wear-traces on the lithic tools, it is generally assumed that most inland Early Mesolithic campsites were used for relatively short stays of small "residential" groups such as nuclear families or small microbands. Special purpose "logistical" sites, such as small hunting camps characterized mainly by a predominance of microliths within the lithic toolkit, are also regionally known, though microliths alone are not sufficient to determine such sites. Studies of microwear traces (Beugnier 2007) and/or faunal remains (Valdeyron et al. 2011) on some of these alleged hunting sites have shown that often a much wider range of activities, including domestic ones (consumption, plant processing), have been carried out. Examples of potential hunting camps can be found, for example, in the Duvensee peat area (Bokelmann 1971) and the Alpine region (Fontana 2011). In the latter region, many high mountain open-air sites and rockshelters covering areas of less than 50 m^2 have yielded evidence of specialized provisioning and exploitation of animal resources such as red deer, ibex, and chamois. These small sites were probably used during summer by small groups living in the surrounding valley in the context of vertical seasonal transhumant migration between uplands and lowlands. The recent discovery of sites with numerous pits, especially in the Paris basin (Verjux 2003), has led some archaeologists to suggest the existence of inland communities with a reduced mobility during the Boreal. At Auneau, for example, altogether more than 60 pits have been excavated next to a number of burials. These pits can be classified in five types: rubbish and cooking pits, cylindrical storage structures with vertical walls, postholes with stones, and pits with intentional faunal deposits (aurochs, deer antler). These kinds of sites possibly represent so-called aggregation sites, as known from (sub)recent hunter-gatherer, where large groups met in order to exchange goods, raw materials, ideas, and mating partners, as well as for feasting and shared ritual activities.

Settlement of upland mountainous regions is also one of the most noteworthy aspects of Early Mesolithic settlement. Early Mesolithic settlements have been found as high as 2,400 m above sea level in northern Italy and as high as 2,200 in the Austrian and Swiss alps (Jochim 2011). Settlement of these high-altitude regions was not confined to particular kinds of sites but rather ranged from caves and rockshelters to open-air sites, often near lakes.

Contrary to the inland occupants, Early Mesolithic groups living along former coastlines and perhaps also major rivers might have known a more restricted residential mobility. The existence of shell deposits in Portuguese caves and rockshelters at a distance of 60 km from the ancient coastline suggests mobility in a relatively small strip along the coast (Gutiérrez-Zugasti et al. 2011). Similar conclusions have been drawn from raw material studies (Marchand et al. 2011) and stable isotope analyses (Schulting et al. 2008) along the west coast of France. In south Wales stable isotopes demonstrate the existence of coastal communities which focused almost entirely on coastal resources year-round (Schulting & Richards 2002).

By analogy with recent hunter-gatherers occupying forested environments, it may be assumed that Early Mesolithic groups had to cover large territories within yearly cycles. Lithic raw material procurement analyses (Gendel 1984; Jochim 2011) point to yearly territories of minimal 80–100 km in diameter. Similar studies also show that these local groups were part of larger cultural units, so-called dialectic tribes, which had extensive social territories. Geographical analyses of specific objects and raw materials, such as Wommersom/Tienen quartzites and flat retouched microliths in the Rhine-Meuse-Scheldt area (Gendel 1984; Robinson et al. 2013); personal ornaments, for example, pendants and

beads (Newell et al. 1990); bone points and harpoons (Verhart 1988); or decorated bone and antler objects (Terberger 2006), all point to social territories covering >50,000 km^2, sometimes even attaining 230,000 km^2.

Early Mesolithic Burials and Rituals

Compared to the Late Mesolithic, Early Mesolithic burial practices are not extensively documented, although in recent years, an increasing number of burials have been discovered. These recent discoveries have been recorded throughout the continent, from northwest Europe (Cauwe 2001; Conneller 2006) to the lower Danube (Bonsall 2008) and Dnieper (Dolukhanov 2008) basins. Early Mesolithic burials occur in both caves/rockshelters and open-air sites. The most common burial rite is inhumation. Cremation burials do begin to appear in some regions of Europe in the later parts of the Early Mesolithic (Toussaint et al. 2009). Burials occur both on settlements and in separate locations.

Inhumation practices are very diverse, ranging from individual burials to multiple burials, collective burials, and secondary burials (Meiklejohn et al. 2009). In single burials the deposition of the dead occurs mostly either stretched out on the back or in sitting position. Grave goods are generally restricted to personal ornaments (perforated animal teeth, shells), faunal remains (mainly deer antler, auroch horns), and ochre. Some graves (e.g., at the French site of Chaussée-Tirancourt), however, contain only parts of an individual and should hence be considered as secondary burials. Single graves are found either isolated (e.g., in caves) or in usually small groups of 5–10 pits.

Eastern Europe has yielded some very large communal cemeteries at sites such as Vasylievka and Volos'ke on the Danube-Dniester interfluve in Ukraine, which indicate a homogeneity of burial rites (Dolukhanov 2008). Many of these burials also yield evidence for bodies penetrated by flint arrowheads that suggest that these people died by violent encounters (Dolukhanov 2008). Combined with the evidence from northern and western Europe, it is clear that there was not a linear progression from single burials to cemeteries from the Early to Late Mesolithic but rather a complex mix of various burial rites throughout the entire Mesolithic (Meiklejohn et al. 2009).

The burial of multiple individuals within the same structure or locality also seems to be a common trait for the Early Mesolithic. In several caves, mainly in Belgium (Cauwe 2001) and the UK (Conneller 2006), and a few burial pits on open-air cemeteries (e.g., La Vergne; Schulting et al. 2007), remains of up to 11 individuals have been discovered. The famous British cave of Aveline's Hole even contained remains of 50–100 individuals, making these burial places real cemeteries which were probably reused over several generations. However, some graves at open-air sites, such as La Verge, probably need to be interpreted as real multiple graves given the fact that different individuals have been interred simultaneously. The way the deceased are treated within these "multiple and collective" burials is very diverse and complex. A common trait, however, is in the disarticulation of bones and partial internment of skeletons, leading to the conclusion that part of the treatment was done outside the burial place. In some caves (Autours, Aveline's Hole) both articulated and disarticulated skeletons have been observed. In addition, some bones display traces of cut and burning marks, pointing to excarnation. At La Verge a burial pit even combined the remains of an inhumation and cremation grave. All this points to the existence of very complex and individualized rituals during the Early Mesolithic, at least along the Atlantic coastline.

Remains of rituals early during the Mesolithic are very scarce and often difficult to determine. Perhaps one of the clearest evidence are the finds of stag headdresses, made out of the skulls and antlers of red deer, smoothed out inside and pierced, presumably for wearing on the head. The most important findspot of such headdresses is Star Carr, where 21 of these were found (Clark 1971). Other European sites (e.g., Bedburg) usually only yield one or two of these finds. There are various interpretations as to how they were used,

including perhaps worn during stag hunts or perhaps in "ritual" ceremonies, as is known in the ethnographic record. The latter hypothesis is further strengthened, especially at Star Carr, by the high numbers of barbed points (191 specimens) made of antler splinters. According to some, Star Carr is therefore "a site where hunter-gatherer's relationship with red deer are negotiated" (Warren 2006).

Late Mesolithic

The Late Mesolithic roughly coincided with the Atlantic period, which occurred between 9,000 and 6,000 cal. BP. The Atlantic period witnessed the highest temperatures throughout the entire Holocene, as well as an increase in rainfall. Vegetation change was the hallmark of the Atlantic, wherein much of Europe open coniferous forests were replaced by closed, mixed deciduous forests primarily comprised of elm and oak. In mountainous regions tree lines rose considerably. Continued increase in sea levels during this period led to the complete inundation of the North Sea basin, thus separating Britain from the continent and flooded regions of the northern Adriatic Sea. This rise in sea level promoted the development of numerous coastal estuaries that were rich in aquatic and marine resources (Jochim 2011). Another major influence on sea-level rise and aquatic and terrestrial ecology during the Atlantic period was a glacier meltwater outburst from the Laurentide Ice Shield over North America, which altered thermohaline circulation over the North Atlantic Ocean and caused an abrupt climate change event around 8,200 cal. BP (Barber et al. 1999). Recent evidence suggests that this cooling event had impacts on Late Mesolithic hunter-gatherer societies (Perrin et al. 2009; Fernández & Jochim 2010). During the course of this "8.2 event," another abrupt environmental change in northwest Europe was caused by the Storegga tsunami, which led to the final drowning of the Dogger Bank in the middle of the North Sea basin and was detrimental to populations settling in the coastal areas of Britain, the Netherlands, Denmark, and Norway (Weninger et al. 2008).

One of the largest challenges currently facing Mesolithic archaeologists is to understand the different impacts that these gradual and abrupt environmental changes might have had on hunter-gatherer societies across the continent (Robinson et al. 2013). There is a possibility that regional resource productivity thresholds were not passed in some regions, and therefore, Late Mesolithic populations were not impacted by these events, whereas in other regions thresholds were passed, and these events had major impacts that are reflected by changes in the archaeological record. The impact of the environment on these Early Holocene hunter-gatherer societies was undoubtedly most complex at the local and regional level (Spikins 2008), and an important area for future research will be teasing apart these various scales of complexity and their possible influence on changes recorded in the Late Mesolithic archaeological record.

The overall increasing productivity and diversity of natural landscapes during the Atlantic period allowed for a wide range of sociocultural adaptations that are reflected in increasingly differentiated archaeological assemblages from one region to the next. The Late Mesolithic also witnessed a rise in regionally differentiated cultural groupings that were most identifiable in the preference for specific stone raw materials and microlithic armature types.

Late Mesolithic Technology

At a continental scale, one of the diagnostics of the transition to Late Mesolithic is the introduction of new stone blade knapping techniques that produced larger blades with more regular shapes in order to produce trapeze-shaped microlithic armatures (Fig. 2). The chronological variability of the transition from Early to Late Mesolithic is largely based on the different times at which regular blade and trapezoidal armatures appear throughout the continent. There is little consensus at present on whether both spread from a specific origin region or whether they entered Europe through two corridors in the western Mediterranean (Perrin et al. 2009) and (south) western Asia

(Binder et al. 2012). Evidence indicates that these industries were accompanied by two different kind of knapping techniques. Work in the Mediterranean region indicates that they were accompanied by pressure knapping techniques (Perrin et al. 2009; Binder et al. 2012), whereas in areas of northwest and central Europe, they were accompanied by indirect percussion techniques (Perrin et al. 2009). The issue of the introduction of regular blades and trapeze industries to Europe is a good example of the major social organizational changes that were occurring during the Late Mesolithic period. During the Late Mesolithic period people were becoming more settled in regional and local landscapes, and rather than ideas and technical innovations spreading by the movement of people to new landscapes, they were rather spread by social networks and a complex range of cultural transmission processes. A further example of the importance of these more regionally restricted social networks during the Late Mesolithic is yielded by the absence of regular blade and trapeze industries in Britain and Ireland.

Increasing regionalization of stone technologies is further exhibited by other innovations that were developed in a limited number of regions. This is evidenced in northern Europe, for example, by the increasing prominence of flake axes. Flake axes likely became more prominent due to a combination of their roles in dugout canoe construction and landscape clearance as populations grew. Likewise, in northwest Spain and Scotland, chipped stone picks were made that seem to support the evidence for increasing reliance on shellfish in these regions.

Other developments in stone technology are indicated by finds of perforated mace head that possibly indicate the growing role of tubers and roots in Late Mesolithic diets (Jochim 2011). Further related to changing diets during the Late Mesolithic, grinding stones and slabs have been recorded at various sites across Europe. Ground stone is also indicated by finds of ground slate points and polished axes and chisels in northern Europe.

Bone and antler technologies continue to increase in importance during the Late Mesolithic period. A new innovation in northern Europe during this time was bone points that were slotted in order to set in place various combinations of microlithic armatures. However, despite these new slotted-bone points, there are few innovations in bone and antler technologies during this period. A more prominent feature is the increasing importance of these raw materials during the Late Mesolithic. This increasing importance is evidenced by greater finds of barbed harpoons, perforated antler mattocks, and axes across Europe.

A key feature of Late Mesolithic technology is the continued development and expansion of wood and other plant technologies. In northern Europe a complex range of fishing technologies such as nets, weirs, and traps have been recorded at sites such as Tybrind Vig (Andersen 1985) and Bergschenhoek (Louwe Kooijmans 1987) (Fig. 3). These fishing technologies were often constructed out of dogwood, alder, or birch branches. Numerous finds of wooden hooks and net floats have also been recorded. The development of these technologies indicates the intensive fishing activities of these northern Mesolithic societies through the course of the Atlantic period.

Further evidence of the increasing role of aquatic activities and exploration comes from finds of dugout canoes in northern Europe. The most impressive finds of this technology have come from the site of Tybrind Vig (Andersen 1985), where decorated paddles have been found alongside a large 9.5 m long dugout canoe made from a linden tree.

Pottery appeared in some regions of northern and western Europe during the Late Mesolithic. There appears to be two possible sources for the spread of pottery technology to these regions. The first source is from the steppe zone between the Volga and Ural rivers in eastern Europe, wherefrom pottery technologies spread to the Baltic and North Sea basins by around 5,500 cal. BCE (Dolukhanov et al. 2005). The second possible source is from neighboring Early Neolithic farming societies

in the Danube, Rhine, and/or Paris basins (Crombé 2009). Each of these possible sources of pottery technology had different economies; the eastern source was hunter-gatherers, whereas the southern/southwestern source was the earliest farmers in the region. The transmission of pottery technologies to northern hunter-fisher-gatherers was therefore a variable process from one region to the next that was based on specific local social and ecological factors. Stable carbon and nitrogen isotope analyses of lipid residues on pottery from these northern Late Mesolithic sites have indicated that some pottery vessels were utilized for the processing of marine products and freshwater fish (Craig et al. 2007). Thus, while pottery technology was adopted from both hunter-gatherer and early farming societies, the adoption of this technology by northern hunter-fisher-gatherers was incorporated into ongoing subsistence systems.

Late Mesolithic Subsistence

In terms of terrestrial animal and plant species exploited, there was little change between the Early and Late Mesolithic. A key difference from the Early Mesolithic, however, is the increasing regional differentiation of Late Mesolithic diets. The most distinctive subsistence change during the Late Mesolithic was the increased dietary role of a diverse range of aquatic fauna, both freshwater and marine. Extensive shell middens develop for the first time during the Late Mesolithic and are found across the Atlantic coastline from Portugal to Scotland and across the North and western Baltic Sea basins (Fig. 5). A wide variety of shellfish species were exploited, such as clams, cockles, mussels, and oysters. Shellfish were exploited alongside a variety of marine fish such as cod, eel, mackerel, salmon, and even deepwater species such as tuna. An important change in the increase of marine components of Late Mesolithic diets in northern Europe, particularly in the Baltic Sea area, was the exploitation of marine mammals such as seals and whales. The role of aquatic resources in Late Mesolithic diets varied considerably throughout Europe. Assessment of rates of caries in human teeth found that caries rates were low in areas such as southeast (specifically, Greece and the Iron Gates area) and northern Europe due to a relatively high consumption of fish and other aquatic resources, whereas in the western Mediterranean, the higher incidence of caries provided evidence for the higher consumption of carbohydrate-rich plants alongside meat (Meiklejohn & Zvelebil 1991). Variability of the relative components of aquatic versus terrestrial resources becomes even greater when approached from local and regional perspectives.

In parts of northern and western Europe, the uptake of an entire coastal component alongside continued freshwater and terrestrial resource exploitation is one of the main features that delineates the Early from Late Mesolithic. Shellfish undoubtedly comprised an important element of Late Mesolithic subsistence, as indicated by the large size of some shell middens, but shellfish gathering represents just a part of this entire coastal component. Coastal exploitation not only enabled shellfish gathering but also the exploitation of a wide range of fish, sea mammals, and waterfowl (cranes, ducks, eagles) (Blankholm 2008). In these regions there is evidence for smaller more specialized procurement sites both along the coasts and in inland regions. This evidence shows that there were smaller specialized sites along coastal zones for waterfowling and sea mammal hunting and in inland zones for pig hunting and pine marten trapping (Blankholm 2008). These sites indicate that during the Late Mesolithic they were utilized in combination with larger procurement sites that were utilized over many generations, as indicated by the evidence for long-term accumulation of shell middens. Subsistence strategies were thus highly variable and in close relationship with local and regional differences in seasonal coastal and inland resource availability. A good example of the scale of local variability comes from Portuguese shell middens, which indicate differences in the shellfish species that were exploited between neighboring middens. In this region there is evidence for the prominence of different shellfish species between different middens within the same coastal estuary, which was due to variability in local aquatic habitats (Straus 2008).

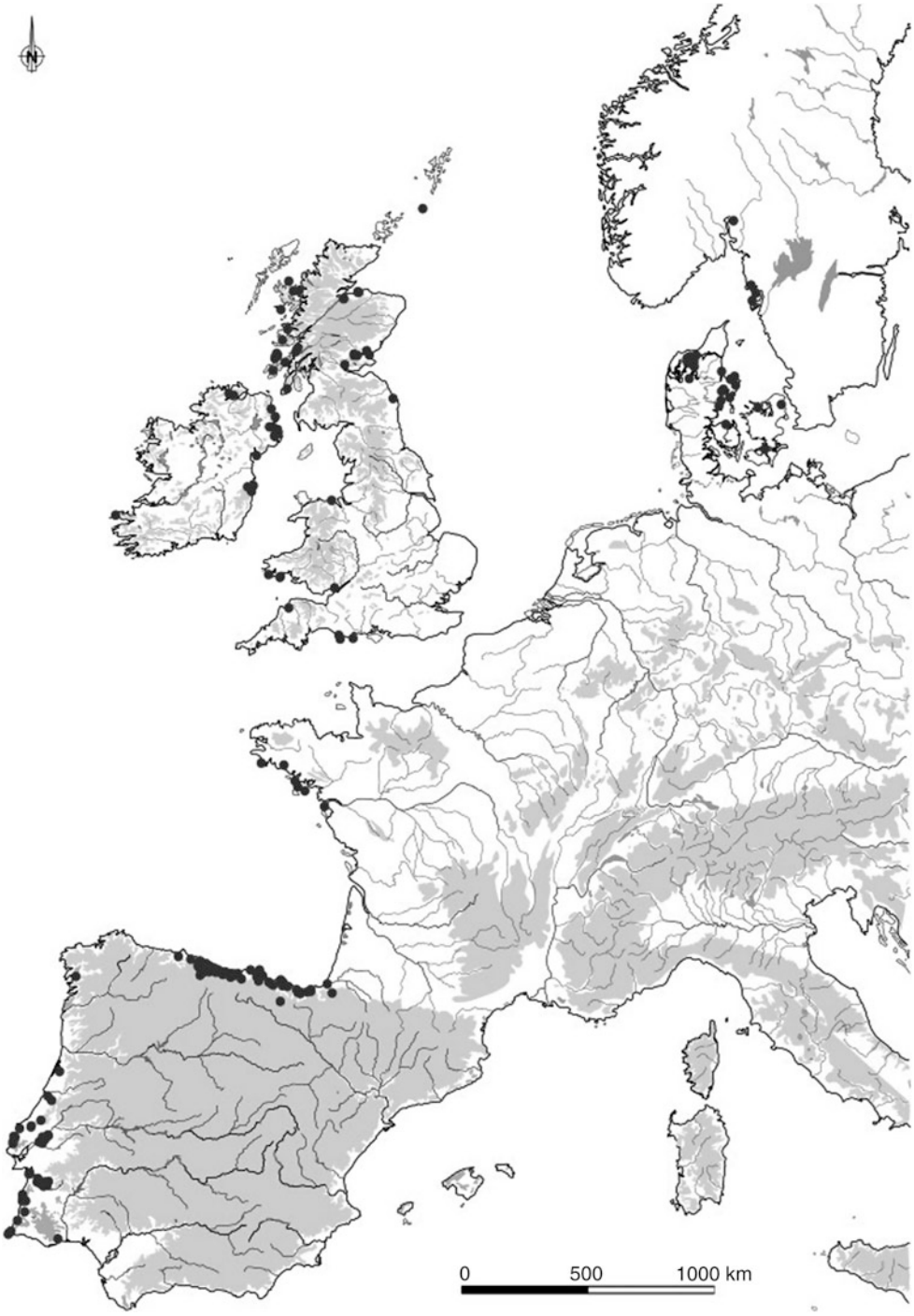

European Mesolithic: Geography and Culture, Fig. 5 Distribution map of shell middens in western Europe (Gutiérrez-Zugasti et al. 2011: 239)

While the uptake in the coastal component of Mesolithic diets occurred earlier in the Mesolithic in southern Europe, there is evidence for an increase during the Late Mesolithic in this coastal component at some sites in the Mediterranean. This increase in a coastal component was, however, highly variable from one local context to the next. For example, at the Grotto dell'Uzzo in Sicily, there is evidence for a change in the dominance of wild boar and red deer during the Early Mesolithic to a much more diverse diet during the Late Mesolithic that added an entire coastal component of birds, fish, sea urchins, and shellfish alongside an increase in the gathering of a wide range of plant species such as olive, pea, wild strawberry, wild grape, and pulses (Pluciennik 2008). On the other hand, at the Franchthi Cave site in the Argolid of Greece, there is evidence for shellfish exploitation from the late Upper Paleolithic, and the major changes that occurred during the Late Mesolithic were the dominance of bluefin tuna bones and the increasing utilization of a broad range of plant resources (Pluciennik 2008). These contrasting sites provide good evidence for the scale of variability in the coastal component of Late Mesolithic diets in the Mediterranean.

Subsistence evidence from Lepenski Vir in the Iron Gates region of SE Europe indicates that carp and sturgeon were major components of Late Mesolithic diets at this site. Both of these species have periods of large runs up and down the river during and after spawning. Late Mesolithic hunter-gatherers likely took advantage of these seasonal fish runs, which enabled them to maintain a more sedentary lifestyle compared to hunter-gatherers in other inland regions of Europe (Radovanovic 1996). Despite this probably heavy seasonal reliance on fish, Late Mesolithic hunter-gatherers at Lepenski Vir also had very diverse diets that included large terrestrial food components. These terrestrial foods include aurochs, wild boar, domestic dog, and various bird species. The particular aquatic species that were exploited by the inhabitants of Lepenski Vir and neighboring sites of the Iron Gates region were available in abundance at a specific time, which enabled relatively intensive exploitation, but throughout the rest of the year, diets had to be sustained by a range of terrestrial species.

Further evidence of the increasing seasonal variability of Late Mesolithic diets and the relative proportions of aquatic versus terrestrial resources in diets come from wetland sites in the Rhine-Meuse-Scheldt area of the southern North Sea basin. The Hardinxveld sites (Louwe Kooijmans 2001a, b) in the Rhine-Meuse delta of the Netherlands indicate seasonal exploitation of wetlands for hunting and fishing. There is evidence from these sites for particular concentration on trapping species such as beaver and otter and fishing for pike (Verhart 2008). At these sites wide variety of different freshwater species such as bream, carp, eel, perch, and roach were consumed alongside wild boar and red deer and waterfowl such as ducks, geese, and swans.

The diversity of Late Mesolithic diets and the evidence for specialized plant and/or animal procurement have had implications for interpretations of the transition to agriculture. Evidence for the intensive gathering of plants on some sites has led to the proposal of plant husbandry, which has been interpreted as setting the foundations for the incorporation of domestic plants into Late Mesolithic subsistence (Zvelebil 1994). Despite growing evidence for domestic cereal pollen in pre-Neolithic contexts in a few regions of Europe, there is still too little evidence to reliably confirm this hypothesis (Price 2000). There have been proposals of local domestication of both cattle and pigs in different areas of Europe. Analyses of mitochondrial DNA have provided clear evidence for the Near Eastern origin of domestic cattle in Europe and therefore the lack of a role played by indigenous European aurochs to domestication (Edwards et al. 2007). Evidence from wild boar and pig mtDNA, on the other hand, does suggest a much more complex situation in which there were different independent domestication events in a few areas of Europe and that the appearance of domestic pigs was caused by both indigenous and introduced animals (Larson et al. 2007).

Late Mesolithic Settlement, Land Use, and Territories

As with subsistence, Late Mesolithic settlements are characterized by a higher amount of inter- and intraregional variability compared to the Early Mesolithic. The Atlantic period witnessed higher temperatures, precipitation, and dense deciduous forests that created increasingly patchy resource niches and caused a greater differentiation between inland and upland landscapes and those along coasts and rivers. Coastal and riverine sites increased considerably during the Late Mesolithic. Coastal sites have been recorded from Sweden, Denmark, Norway, Britain, France, Spain, Portugal, and Italy. While many of these coastal sites were large and had shell middens, they should not bias our understanding of the variability of coastal and inland settlements during the Late Mesolithic. For example, in southern Scandinavia inland sites of the Early Mesolithic ("Maglemose" and "Kongemose" cultures) have often been contrasted with large coastal midden sites of the Late Mesolithic ("Ertebølle" culture) in order to argue for intensive coastal settlement at the expense of inland settlement during the Late Mesolithic. This interpretation is biased due to both taphonomy and specific histories of research. Early Mesolithic coastal sites are deeply submerged and have not been recorded, and Late Mesolithic survey has been traditionally biased toward coastal areas, leaving inland settlement during the Late Mesolithic heavily underinvestigated (Blankholm 2008). Furthermore, while shell middens are a defining feature of the Late Mesolithic in these regions, the number of coastal sites without shell middens is still higher than sites with shell middens (Blankholm 2008). In recent years the accumulation of evidence from this region has indicated that the relationship of coastal to inland settlements during the Late Mesolithic was much more complicated. For example, a model has been developed for Ertebølle settlement systems in Denmark in which larger base camps were combined with small seasonally inhabited satellite sites in the coastal surroundings (Andersen 1995). This specific model of late Mesolithic settlement has recently been extended to other areas of the western Baltic (Terberger 2006). Certain large sites with shell middens were permanent fixtures in cultural landscapes and were inhabited by a large number of family units over many generations, whereas other sites attest to more ephemeral habitation by small family units for no more than a few select seasons. Dwelling structures had variable layouts that included oval, rectangular, and trapezoidal huts/tents, some with internal platforms. Comparative analysis of Early and Late Mesolithic dwelling structures across southern Scandinavia has highlighted important changes in the internal organization of larger multiple family unit dwelling structures and continuity in the organization of smaller dwellings (Grøn 2003). Large Late Mesolithic dwellings were constructed closer to each other and had no limits on the total number of units that could be included within a single structure, which has been interpreted as an increase in the number of nuclear families that comprised a household (Grøn 2003).

The continental interior of Europe witnessed an increase in river and streamside settlements during the Late Mesolithic. This was likely due to the increasingly closed forest canopy that developed during the Atlantic period, which decreased species richness and productivity in inland areas and increased species richness and productivity in areas beside watercourses. This situation is both good and bad for Late Mesolithic archaeology: on one hand, sites buried by alluvial sediments possess higher organic preservation potential and can yield rich material culture and subsistence data; on the other, sites near rivers or streams could be rendered archaeologically invisible due either to sites being buried deep beneath alluvial sediments or entirely eroded due to fluvial activity.

One of the most remarkable riverside Late Mesolithic sites is Lepenski Vir (Fig. 4), which was rescue excavated in the 1960s due to the construction of a reservoir in the Iron Gates region of the Danube River (Serbian-Romanian border). Lepenski Vir is a special Late Mesolithic site, but in the Iron Gates is just one of many Late Mesolithic sites with house structures and

a variety of formal burials. This site, located on a narrow terrace sheltered in a cove along the right bank of the Danube, yielded a complex arrangement of 95 superimposed trapezoidal-shaped houses constructed over different building subphases (Radovanovic 1996). The houses faced the river and were half-buried or dug-in to the natural hollows of the terrace slope, where wooden posts were slotted in back foundation ditches to support a tentlike construction (Radovanovic 1996). House floors were plastered with a red limestone mixture, and hearths lined with limestone slabs were constructed near the fronts of the houses. Sandstone alters, sculptures of human or fishlike figures, and ornamented portable artifacts are found within houses. The different arrangements of alters and sculptures from one phase to the next indicate that changes were made in the internal spatial organization of houses through time.

The high resource productivity of coastal and riverside sites, and the corresponding suite of material culture and subsistence data found on these sites, had led to interpretations of the relatively sedentary nature of Late Mesolithic settlement in some areas of Europe. The evidence, however, possesses a high amount of local and regional variability which indicates that there are not clear one-to-one relationships between particular site types and sedentarily settled populations. A good example is provided by coastal settlement in the Mediterranean. At Franchthi Cave in Greece there is evidence for decreasing presence on the site through the Mesolithic, and during the Late Mesolithic, there was only sporadic habitation of the site (Pluciennik 2008). On the other hand, Grotto dell'Uzzo in Sicily shows an increasing presence on the site through the course of the Mesolithic, wherein during the Late Mesolithic there were a wide variety of marine, terrestrial animal, and plant species procured across different seasons that has led to an interpretation of lengthy seasonal occupation and possibly year-round occupation on the site (Pluciennik 2008).

On the whole, Late Mesolithic settlement can be characterized by increasing variability of settlement types, locations/concentrations, and regional site densities. There were important changes in the organization of settlement within local and regional landscapes during this period. In many areas of the continent, larger sites that were inhabited over multiple generations are surrounded by smaller more ephemerally inhabited sites. The remarkable coastal sites of southern Scandinavia or riverside sites of the Iron Gates region get the most attention, but our understanding of the realities of Late Mesolithic settlement is based on other less spectacular inland sites and smaller more ephemerally inhabited coastal or riverside sites. By placing these less spectacular sites within the context of the major coastal and riverside sites that had multiple generations of occupation, we are able to gain a more holistic understanding of the complex variability of Late Mesolithic settlement systems in different areas across the continent.

Late Mesolithic Burials and Rituals

Late Mesolithic burials were comprised of a wide variety of different burial types, including cremations, single inhumations, multiple burials, burials of dismembered heads, dog and bear burials, and cemeteries. Cemeteries and burials of dismembered heads are two remarkable characteristic of Late Mesolithic burial practice. However, as mentioned earlier in the discussion of Early Mesolithic burials, cemeteries should not be viewed as a new practice confined to the Late Mesolithic (Meikeljohn et al. 2009). What sets these Late Mesolithic burials apart from the Early Mesolithic is their size, internal complexity and diachronic development, and spatial distribution across many regions of Europe.

Late Mesolithic cemeteries were constructed in a range of different settings. Cemeteries were built within settlements or on sites nearby settlement locations. At Lepenski Vir burials have been recorded inside houses. Burials were placed inside houses in a variety of ways, from under the house floors before the construction of the house, dug underneath already existing floors, on the floors of already abandoned houses, and the secondary placement of different body parts

such as ribs and skulls throughout the houses. During the early phases of settlement, burials are orientated perpendicular to the river, but through time they are solely orientated parallel to the river (Radovanovic 1996). The change to the orientation of burials parallel to the river and the fishlike motifs of some of the sandstone sculptures indicates the major importance of the river not only for resource procurement but also for the identity or cosmology of the people who inhabited this site (Radovanovic 1996).

In some regions, such as southern Scandinavia, researchers have noted the difficulty of actually being able to demarcate settlement and burial places in the landscape, which has led to a rejection of the concept of cemetery as a formal and delimited burial ground (Blankholm 2008). Numerous burials have been recorded from shell middens across Europe, from Denmark to Portugal. On some sites, such as Skateholm in Sweden, multiple cemeteries were constructed. These cemeteries varied considerably in size. Some cemeteries contained around 10 burials, whereas others, such as Olenii Ostrov in Russia, contained an estimated 400 total burials (O'Shea & Zvelebil 1984). At cemeteries across Europe, men, women, and children are found, and there is evidence for the differentiation of individuals based on familial or clan lines, gender, and status/prestige. As in the Early Mesolithic, burials, whether they be isolated, multiple, or in cemeteries, were often sprinkled with red ochre. In terms of variability of mortuary treatment, grave goods vary significantly both within cemeteries and between different regions. In some regions there does appear to be some patterning in the differentiation of people within cemeteries, notably along gender lines. At some sites, female graves have been recorded with goods such as jewelry, whereas male graves have been recorded with bone daggers and projectile points and stone blades and axes. On the whole, an enormous amount of variability is recorded for grave goods during the Late Mesolithic. Some of these notable goods are pendants of bone and stone, perforated animal teeth from a variety of species, carved figurines of bone, teeth or antler, and various stone and bone tool types. One of the most remarkable grave good finds in all of Europe is the famous burial at Vedbaek-Bogebakken in which a child's head was placed on the wing of a swan.

In eastern France and Germany, numerous finds have been made of Late Mesolithic burials with multiple decapitated human heads, which has led some researchers to hypothesize the presence of a "skull cult" during this period. The most remarkable of these skull finds comes from Ofnet cave in southeast Germany, where two shallow pits were found that contained multiple jawbones, skulls, and vertebrae. Around 34 or 38 skulls were found in these two pits, where they all faced west and were covered with ashes and red ochre (Jochim 2011). Analyses of the Ofnet finds have indicated that women outnumbered men and children outnumbered adults and that many of the deaths were due to blunt trauma to the head and the skulls were later defleshed and decapitated. The Ofnet finds, coupled with various other skull burials in neighboring regions and evidence of bones with projectiles imbedded in them from other regions of Europe, have led many researchers to suggest that there was a high rate of violent conflict during the Late Mesolithic (Jochim 2011).

Cross-References

- ▶ Cattle: Domestication
- ▶ Clark, John Grahame Douglas
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Lepenski Vir: Geography and Culture
- ▶ Star Carr, Archaeology of
- ▶ Star Carr: Environmental Archaeology
- ▶ Submerged Prehistoric Landscapes
- ▶ Zvelebil, Marek

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European Middle Paleolithic: Geography and Culture

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State of Knowledge and Current Debates

Introduction

The Middle Paleolithic, in Europe, comprises an archaeological period between 250,000/300,000 and 35,000 years BP. This period corresponds to several climatic, anthropological (in a biological sense), and techno-cultural events.

From a climatic perspective, the Middle Paleolithic can be merged with the Saalian (Riss in Alpine terminology, Wolstonien in Britain) and Weichselian (Devensian and Würm, respectively) glaciations. Between the two is a brief temperate episode: the Eemian (Riss-Würm; Ipswichien). In isotopic chronology, the Middle Paleolithic generally extends from stages 10 to 3.

A human type is traditionally associated with the European Middle Paleolithic: Neanderthals. This is a typical European hominin species, even though its maximum extent reached the Middle East and the Altai Mountains in southwest Siberia.

The appearance of a new system of stone flake production, the Levallois technique, traditionally marks the beginning of the Middle Paleolithic. However, the limits with the Acheulean of the preceding Lower Paleolithic are not clear; this transition involves a slow continuum rather than an abrupt break. Some bifacial industries of the Final Acheulean are in fact contemponeous industries with Levallois production (thus Middle Paleolithic in the strict sense). The limits are even more blurred in regions where Levallois production is absent (i.e., much of southern and eastern Europe); in the absence of human fossils, the academic tradition thus relies on dating for a Middle Paleolithic attribution.

The European Middle Paleolithic is nearly synonymous with the Mousterian, a techno-complex for which a range of different expressions are encountered across the same territory (from the Atlantic to the Ural Mountains). The Mousterian is a paradox: it is at once a period of great technological and economic stability lasting over more than 200,000 years and of great variability in its different cultural features. This variability has for years been the subject of heated debates within the Paleolithic scientific community, even creating "schools" of thought (for a history of research, see Jaubert 1999).

While the limit with the Lower Paleolithic is unclear that between the Middle and Upper Paleolithic is by contrast much clearer. A change in the type of human (anatomically modern Humans – AMH – replacing Neanderthals) is also associated to profound technological innovations (use of animal bones and antlers, different lithic techno-complexes with no continuity with the Middle Paleolithic, the appearance of highly developed non-utilitarian behaviors including parietal and portable art).

The European Middle Paleolithic is thus defined by the combination of several parameters:

- A human type: Neanderthal
- A main cultural system, but with many variations: the Mousterian, produced either by Neanderthals or by AMH as in the Middle East
- A new technical system: the Levallois production
- A temporal span: from 300,000 to 35,000 years BP

Yet a clear definition remains an instrument of comfort and covers realities that are much more complex and difficult to understand: the exploitation of territories, modes of habitat, symbolic behaviors, etc.

History of Discoveries and Evolution of Concepts

More than any other human fossil, Neanderthals have sparked intense debates and polemics; thousands of pages have been written on the subject and no doubt as much nonsense. This is because Neanderthals, more than any other human fossil, urge us to question our human uniqueness. Moreover, it is the hominin whose remains are the most abundant: around 400 Neanderthals have been discovered to date, admittedly more or less fragmentary.

The first Neanderthal was discovered in 1828 in Belgium, at Engis, by Doctor Philippe-Charles Schmerling; another was found in 1848 in Gibraltar, but neither were initially identified as such. It was in 1856 that a German anthropologist, Hermann Schaaffhausen, studied the skeletal remains entrusted to him by a naturalist, following their discovery in a cave in the Neanderthal Valley near Dusseldorf (Germany). The skull presented very strange characteristics: sloping forehead and a pronounced bulge above the eye sockets, and Schaaffhausen attributed it to a primitive man antedating the Germans. But he did not convince everyone and, although in 1864 William King proposed the denomination *Homo neanderthalensis*, recognizing in the fossil a new hominin, many contested its status and antiquity. For some it was an idiot suffering from rickets, and for others it was a Cossack deserter from the Russian army during the Napoleonic wars. It was not until the discovery in 1886 of two skeletons in Spy (Belgium) presenting the same characteristics and accompanied by the bones of fossil animal and stone tools that the ended the discussion. Scientific attitudes were probably better prepared for this discovery; the second half of the nineteenth century was a time of fantastic upheaval challenging millennia of beliefs: Darwin published *On the Origin of Species by Means of Natural Selection* in 1859 and Pasteur his discoveries against the theory of spontaneous generation in 1862, and so on.

However another, much longer, debate then began: that of the primitive nature of Neanderthals. In 1908, a Neanderthal was discovered in the cave of La-Chapelle-aux-Saints (France). Marcellin Boule, a paleontologist at the Natural Museum of Natural History, described the remains in great detail. But some errors resulting from problems of interpretation and the pathological state of the skeleton (this Neanderthal was notably suffering from arthritis and a hip deformation) led to an ape-like reconstitution: curved spine and semiflexed lower limbs making it appear closer to the gorilla. This first representation would make a lasting impression in people's minds and mark our imagination, even up to the present, with the concept of Neanderthals as a thick brute, narrow minded behind a low forehead and with a hairy body: in short, an ape-like being.

Antiracist movements in the 1970s caused us to consider Neanderthals much closer to us. However, it should not be forgotten that many elements still elude us: pigmentation, hair, eye color, and type of clothing, which are so far only speculation. Close to us, but despite everything still anatomically different. In the 1930s, Carleton Coon published its portrait, shaved, wearing hat, and tie, and claimed that, in a subway, nobody would pay attention to him. This statement has since been reconsidered many times. Could this hold true?

The first thing that would impress us about a dressed-up Neanderthal would be his corpulence: rather small in height, about 1 m70 for men and 1 m60 for women, and sturdy and solid,

weighing, respectively, around 90 and 70 kg. This anatomy and muscle attachments suggest great physical strength, useful for hunting. But this size also presents another advantage: better resistance to the cold. The anatomist Carl Bergmann proposed a rule in the nineteenth century which correlated the mass of the body with the temperature of the environment: the more body mass increases, the more the relationship between body mass and the skin surface diminishes, which limits the loss of heat. Similarly, Allen's law, described in 1877 by Joël Asaph Allen, specifies that the size of bodily appendages (limbs, ears, and tail) of animals living in cold climates is smaller than that of those living in hot climates, the advantage being less heat loss. Among current populations, the proportion of the leg compared to the thigh and the forearm compared to the arm decreases from the equator toward the poles. The proportions found among the Neanderthal are even lower than among the Inuits. We would also be struck by his face, with a sloping forehead, no chin, and strong supraorbital ridges.

Biological Anthropology: Elements of Social Anthropology

The first physical Neanderthal characteristics appeared between 500,000 and 400,000 years ago (Hublin 2008). Discrete marks can be noted on the skulls of Petralona (Greece), Sima de Los Huesos in Atapuerca (Spain), and Tautavel (France). These *Homo heidelbergensis* appear to be the ancestors of Neanderthals. This is also true for Swanscombe Man (Great Britain), dated around 400,000 BP. The first skull from Bilzingsleben (Germany, between 400,000 and 300,000 BP), by contrast, presents few Neanderthal characteristics, whereas the second one is much similar to it. As can be seen, these features do not appear simultaneously in all subjects; the difficulty is obviously to take into account changes in comparison with a successful type such as classic Neanderthals. The fossils from Biache-Saint-Vaast (France), around 200,0000 BP, are much closer to these classic Neanderthal forms.

Two factors led to the development of these genetic traits. The first is the isolation of the European peninsula during the glacial phases, being the major part of its history during the Middle Pleistocene. During these periods the advancement of Finnoscandian glaciers and massifs of the Alps and the Caucasus, as well as the extension toward the north of the Caspian Sea, opened up only a narrow corridor between the Mediterranean and the Black Sea; the connection between Europe and the Middle East or Africa, and thus to other groups of people, was, if not impossible, at least difficult. Such geographic isolation led to genetic isolation. The second factor concerns the demographic weakness of populations. The density of Neanderthal population is estimated, depending on the calculations methods used, between 0.5 and 10 inhabitants for every 100 km^2, or a total, for a territory like today's France, varying between 3,000 and 50,000 inhabitants. In these conditions, "extreme" genetic characteristics are not lost in the population and can be perpetuated.

Neanderthals are the best represented human fossil (close to 400 individuals), and physical characteristics are well known (Maureille 2007). He is robust and stocky in appearance (see above) and has strong muscle attachments (Fig. 1). He is small in size: around 1 m65; nevertheless, these characteristics fall within the range of current human variability. By contrast, some characteristics are unique to Neanderthals: brain volume is the same or higher than that of AMH, but the encephalization coefficient (ratio of brain mass and body mass) is lower; the brain of Neanderthals also shows a different organization of its lobes. The skull is long, wide, and low; the chin is absent; and the supraorbital ridges are developed. The teeth are also different, as well as the forearms and the legs, whose relationship to the arms and thighs is comparatively lower than that of AMH.

In the last several years, paleogenetic studies have contributed significant new data for the study of the physical characteristics of Neanderthals (for a bibliography on the subject, see http://www.eva.mpg.de/neandertal/index.html). The presence of some genes in the genetic sequence of Neanderthals gives some indications regarding their capacities and potential: for example,

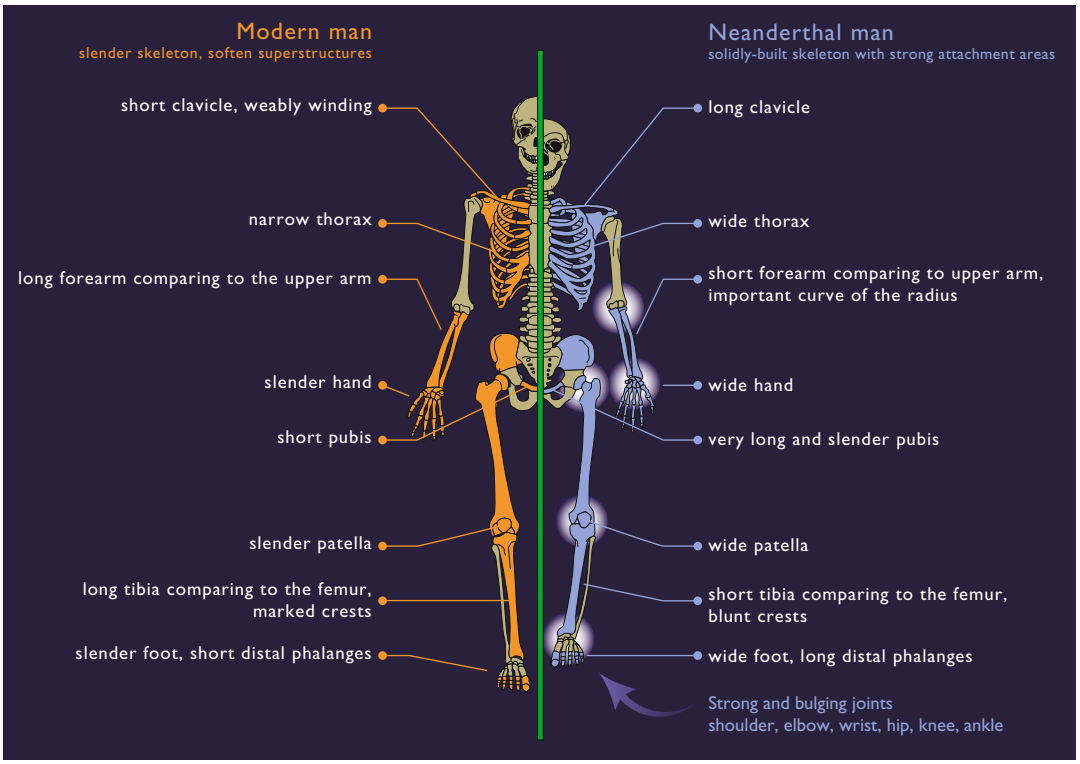

European Middle Paleolithic: Geography and Culture, Fig. 1 Anatomic difference between an anatomically modern human and a Neanderthal (After Depaepe 2009b; Archéosphère SARL- graphics F. Lacrampe-Cuyaubère, database B. Maureille)

presence of the FOXP2 gene which is associated with voice and language in man. Conversely, mutations in modern humans genes linked to autism (CADPS2, AUTS2) and schizophrenia (NRG3) seem to be absent from Neanderthals. The increasingly advanced sequencing of nuclear DNA also shows a genetic exchange between Neanderthals and AMH. This exchange seems to have taken place in the Middle East, after AMH exited from Africa between 100,000 and 60,000 BP; the genome of current African peoples does not have this 1–4 % Neanderthal origin that is found in other populations in the world. Archaeological and paleoanthropological data are consistent with this genetic data: Neanderthals and AMH shared the same culture (the Mousterian) in this region, and according to some anthropologists, the Neanderthals in these regions have physical characteristics that are less marked than in European Neanderthals, signaling the possibility of cross-breeding.

DNA analysis of a tiny bone fragment discovered in Denisova Cave (Altaï, Russia) has proved the existence of a new species of the *Homo* genus: Denisova Man, who contributed for 4–6 % to the genome of current Melanesians. The Denisovans were derived from a common ancestor with the Neanderthals, from whom they are separated by around 0.6 Ma and would have populated a large part of Asia. This contribution to the genetic heritage of modern man, while modest, may, according to some researchers, prove to be important: variations in the human leukocyte antigen (HLA), whose function is to help the immune system detect faulty cells, would, for half in Europe, and nearly 70 % in Asia, come from the DNA of Neanderthals or Denisovans.

Paleogenetic analyses of 12 Neanderthals from El Sidrón Cave (49,000 BP, Spain; Lalueza-Fox et al. 2011) led to the reconstitution of a familial history of this group formed of three men, three women, three adolescents (of which

two were boys), and three children between 2 and 9 years of age (undetermined gender). All seem to have been killed and skinned simultaneously; the bones show signs of flesh removal. The study of lineages (using mitochondrial DNA and Y chromosomes) highlighted kinship links between members of the group: the three men are of the same lineage (brothers, uncles, or nephews), while two of the women are from different lineages, the third was from the men's line (sister or niece). Such patrilocal behavior, in which it is the women who change groups to join their spouses, is common in today's hunter-gatherer societies. The analysis also highlighted a gap of about three years between births, which is also frequent behavior among contemporary hunter-gatherers.

Neanderthal Ecumene

Neanderthals are above all a product of Europe (for a synthesis of the settlement of Europe during the Pleistocene, see Depaepe 2009a). But some of them also the Eurasian peninsula for other territories (Fig. 2). Thus we find Neanderthals in the Middle East around 60,000 BP (see above). Perhaps they were driven by important drops in temperature relating to isotopic stage 6 of the Saalian glaciation and stage 4 of the Weichselian glaciation. They were contemporaneous with the first AMH, present in the region since 120,000 BP. But Neanderthals also benefited from temperate phases to expand out of Europe. Recent DNA sequencing of a bone fragment discovered in Okladnikov Cave in the Altaï Mountains in south-central Siberia showed that it belonged to a Neanderthal, pushing their territory more than 2,000 km toward the east. It seems that the occupation of the vast Russian plain and Siberia and incursions was contemporary or subsequent to the last interglacial, the Eemian (c. 125,000 BP). Neanderthals are also known from Shanidar (northern Iraq) and reached the south of Finland, at Wolf Cave, undoubtedly during a warm period, perhaps the Eemian.

Very recently a Mousterian site was excavated in Byzovaya, in the north of Russia (Slimak et al. 2011). Located near the Arctic Circle, at 65 ° north latitude, this site pushes the limit of the Neanderthal habitat 1,000 km northward, if we consider the lithic industry that has been discovered there to be their work (no human fossils were present). Moreover, the date for this site is very recent: between 29,000 and 33,000 BP, that is, after the disappearance of Neanderthals in the major part of Europe. The discoverers see there an area of refuge for the last Neanderthals who were pushed into these remote and inhospitable regions by AMH.

These vast territories were not continuously populated. According to climatic variations, immense regions were inaccessible, covered by ice or too inhospitable (cold, extreme drought, lack of game). On the other hand, during the glacial phase, lowering of the global sea level exposed thousands of square kilometers. But rare are the regions which could be continuously populated; the Périgord (France) is probably one of them which explains its nickname of the Eden of prehistory. The north of France, by contrast, is a region where settlement was very dependent on climatic conditions. Archaeological data collected during recent years show that its occupation was important around 70,000 BP during a temperate-cold climate that favored large mammals and therefore their predators, the Neanderthals. Subsequently, a sudden cooling period (Weichselian Glacial Maximum) forced hominins to completely abandon the region and take refuge in other more welcoming places such as southwest France, unless they purely and simply disappeared locally (see below). The region would subsequently be regained during a return to warmer conditions, but certainly by different human groups, holders of another lithic technology (Depaepe 2007). This case, which is now attested in northern France thanks to the multiplication of excavations and research, is certainly not unique, and many regions have known these comings and goings of populations.

However, it is possible that these populations did not migrate southward in search of more favorable conditions (Hublin & Roebroeks 2009). Neanderthal populations could have become locally extinct due to the reduction of animal biomass, itself reduced by the

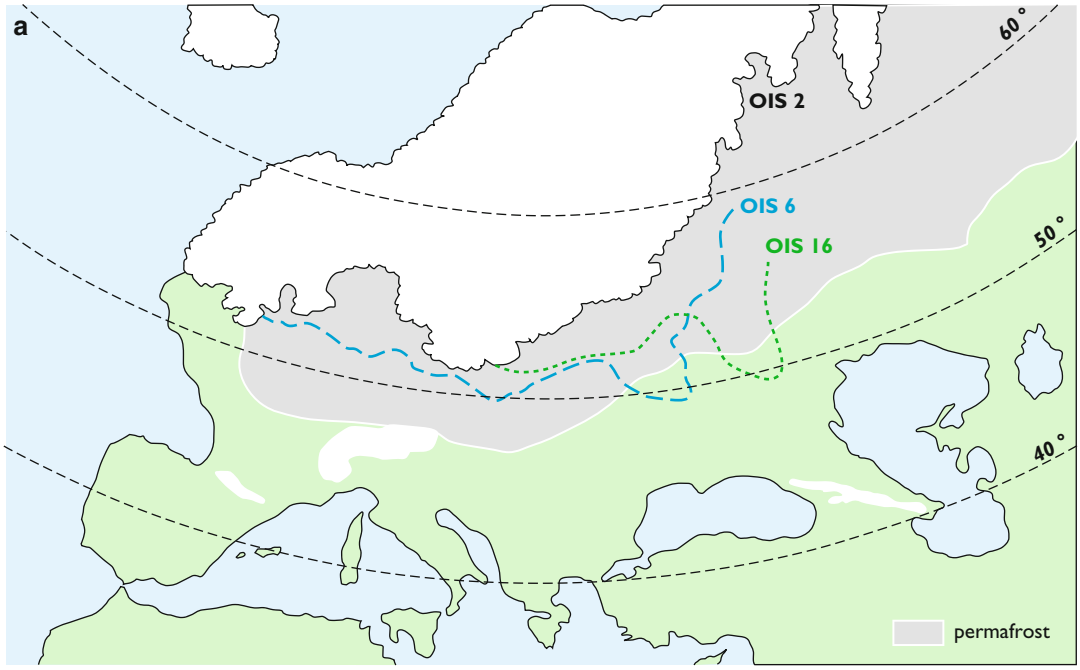

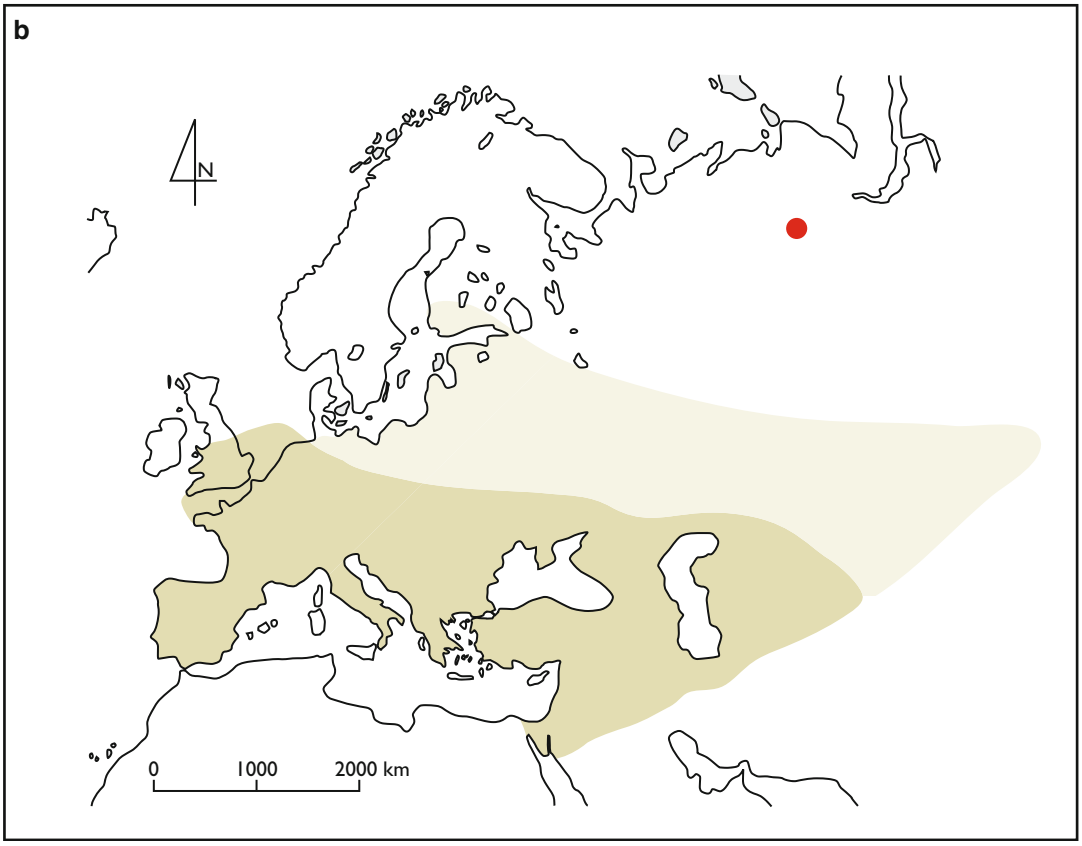

European Middle Paleolithic: Geography and Culture, Fig. 2 (continued)

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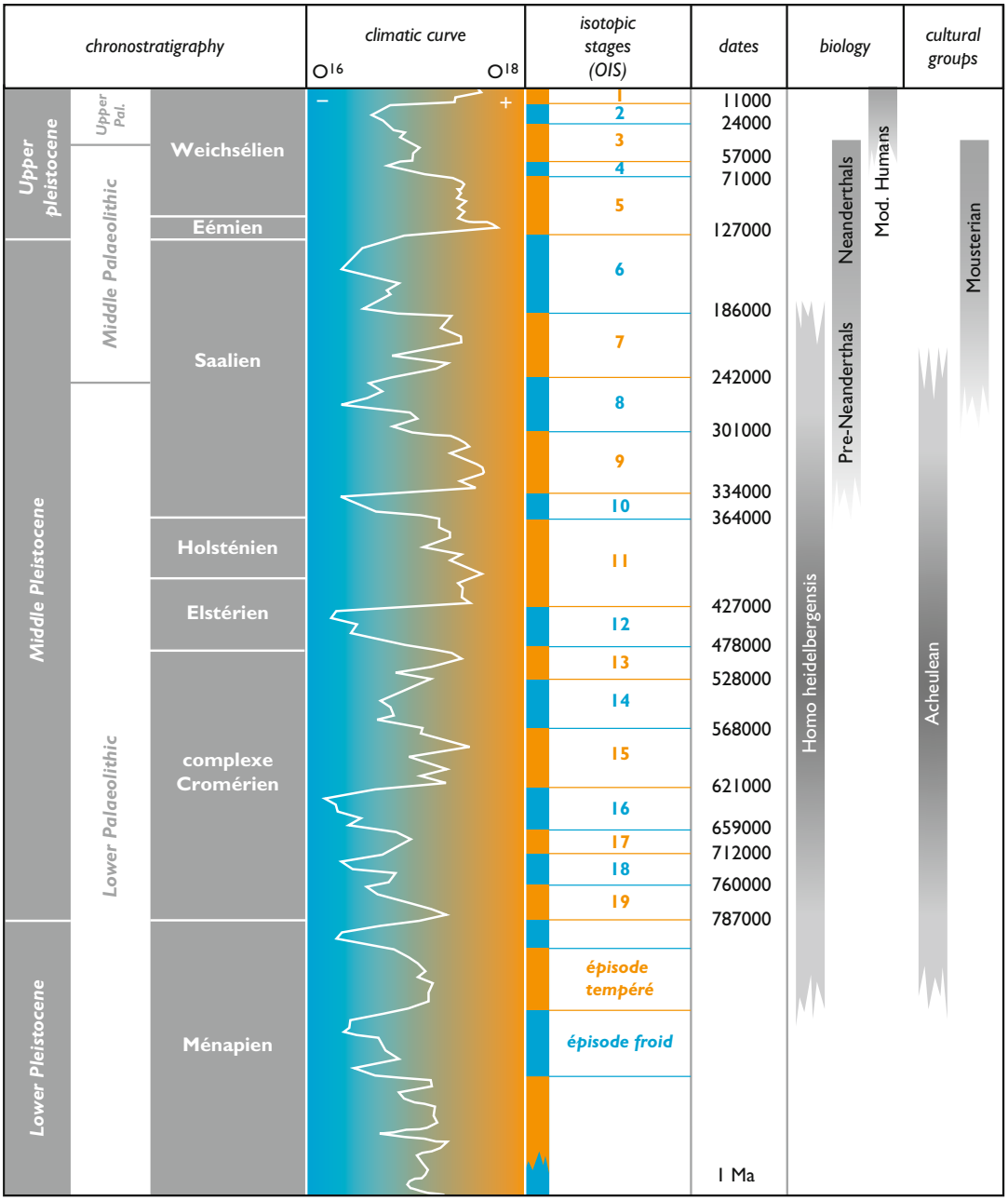

European Middle Paleolithic: Geography and Culture, Fig. 2 (**a**): Extension of a glacial calotte in isotopic stage 2 (around 20,000 BP), stage 6 (around 150,000 BP), and stage 16 (around 630,000 BP); during glaciations, water trapped in the icecaps exposes vast areas covered by the sea during temperate episodes. (**b**): The Neanderthal ecumene: in plain English, the occupied territories in the Late Middle Palaeolithic and in *red*, site position in Byzovaya (Russia). (**c**): General chronology of last million years in Europe (**a**: After Hublin 2008, DAO S. Eusèbe, Inrap. **b**: DAO S. Eusèbe/P. Depaepe, Inrap. **c**: after Depaepe 2009b, DAO P. Depaepe, Inrap)

disappearance of the "mammoth steppe," a very favorable environment for the development of large mammals, the preferred prey of Neanderthal hunters. From a strictly archaeological perspective, it is indeed troubling to note that the cultural traditions seem to have suddenly disappeared, in situ, and replaced a few thousand years later by other traditions, therefore most probably by other human groups.

Britain is a particularly interesting case of successive occupations and abandonments of a region. Occupations are very early (Happisburgh, around 0.85 Ma at minimum; Parfitt et al. 2010). Subsequently, England was occupied until isotopic stage 7 (or the beginning of 6), with perhaps a few interruptions. The glacial maximum of the Saalian (isotopic stage 6) led to abandonment of the territory, but the sudden warming of Eemien, around 125,000 BP, creating the Channel by the sudden upwelling, formed a barrier to the expansion of Neanderthals from the continent to England, and this up until isotopic stage 4. This finding also raises questions about the inability of Neanderthals to cross the sea, and it is worth noting the absence of Neanderthal fossils in the Mediterranean islands.

Habitats and Land Use

Knowledge of Neanderthal habitats (in its broadest sense) remains limited for many reasons: firstly, taphonomic factors which, in caves just as in open-air sites, disrupt to varying degrees the organization of an occupation as it originally was when abandoned. A prehistoric Pompeii does not exist, at least not yet, and the multiple alternating freezing and thawing phases of the ground have blurred the relationships between artifacts left by men by rearranging them. These are valuable relationships that allow the archaeologist to reconstruct a site and move beyond the simple collection of material. In addition to these inherent difficulties, there is a very small amount of available data, which prevents comparisons especially when dealing with long periods of time (the Middle Paleolithic counts 10,000 generations in comparison, e.g., with the duration which separates us from the first farmers in France, less than 350 generations, or that of the Christian area, barely 80). Finally, our own perception of things, an unconscious search that drives us to want to make comparisons according to our own modern criteria, influences interpretation. And yet, we know that we do not have exactly the same brain structure as Neanderthals, which may lead to different conceptions.

Most often cave sites deliver little information on their organization; in general, there have been many successive occupations within a confined space, each one destroying and mixing with the previous one, known as the "palimpsest" effect. In open-air sites, these problems do not occur as often. In recent years several prehistorians have undertaken the search for open-air sites extending over large areas, up to 6,000 m^2 (it should be noted that large-scale excavations areas were undertaken in Central and Eastern Europe before Western Europe). The results are quite surprising. Artifact densities are highly variable, ranging from less than one piece per square meter to several dozen, but rarely uniform; high concentration areas can be adjacent to areas with almost no artifacts. These zones reflect different activities: knapping, butchery, etc. (Fig. 3). At the site of Lailly (France, c. 65,000 BP; Depaepe 2007), two flintknapping clusters have been found next to each other, the first showing confident mastery of knapping, the other some inexperience, which perhaps reveals apprenticeship by imitation.

The sizes of these sites are also quite variable, reflecting different types of occupations as well as perhaps environmental constraints; the installations could be in fact potentially different depending on whether one finds oneself in a clearing or an open plain. Data provided by the study of faunal remains on sites show that these occupations were certainly seasonal. But their actual duration is often a question for archaeologists: while it is clear that some of them were very short, such as a butchery site after a hunt, for other occupations it is difficult, or even impossible, to estimate, especially as we also do not know the number of occupants; an extended family and a group of 50 people do not

produce the same amount of artifacts. And yet it is often difficult to determine the function or functions of the site.

Preventative archaeological operations have demonstrated the phenomenon of successive occupations at a number of open-air sites (Depaepe 2007). In contrast to caves which are clearly welcoming structures, no topographic constraints exist for open-air sites. When occupations spread out over long periods, with intervals of many millennia between them, we can assume that the area was of particular interest, bringing people back to the same place and that its attractions were perennial: waterhole, flint sources, etc. It may also be possible that it is only due to chance that people become established in the same place as others did 10,000 years before them. But at some open-air sites, we find successions of occupations most certainly quite close in time: within a year, maybe less. The similarities between these occupations suggest that it is the same group of people who periodically returned to this place, probably as part of a pattern of land use.

While we can assume that the hearth would have been a structuring element of a habitat, particularly in cold, even periglacial climates, the traces that remain are tenuous. In cave sites, hearths are sometimes discovered, in the form of a few blocks arranged in a circle to delineate the heating area. Outdoors, hearths are extremely rare, while elements which were heated, such as bones and flint, are more frequent. One is tempted to believe that the homes were only rudimentary and that the covering of sites led to their destruction. It is also possible that for some occupations of short duration, men were not bothered to make fire. Curiously, the traces of hearths outdoors are more frequent in Central and Eastern Europe than in Western Europe.

Evidence of organization of the living space is even rarer than for hearths: for the whole of France, we count only a few post holes at Combe-Grenal rockshelter, several hollows devoid of all archaeological material, which could perhaps have been used for storing meat, at La Quina rockshelter, Le Moustier, or even La Ferrassie. In Poitiers (France), a recent excavation revealed what could have been a windbreak (Bourguignon et al. 2003 – Fig. 4). Internal structuring may also be perceived: sleeping areas, knapping areas, etc.

European Middle Paleolithic: Geography and Culture, Fig. 3 (continued)

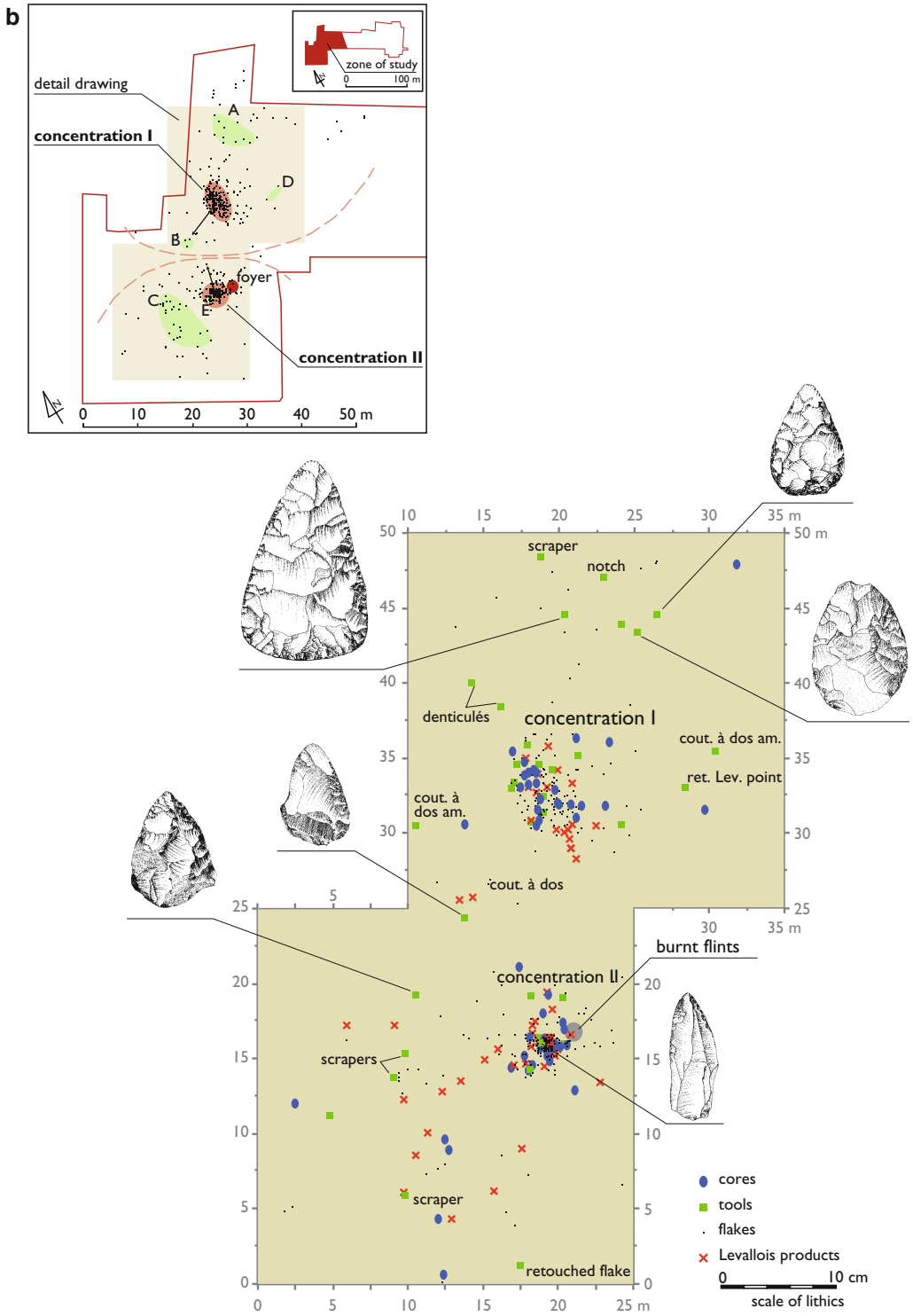

European Middle Paleolithic: Geography and Culture, Fig. 3 (continued)

By contrast, in Central and Eastern Europe, traces of domestic organization are more abundant. Large pits have been found in Rheindahlen (Germany), with traces of hearths, knapping areas, and stone blocks arranged in a ring (rigging walls?). Structured habitats are also evident at Ripiceni-Izvor (Romania): groups of pits with hearths and lithic artifacts; stone blocks and mammoth tusks perhaps contributed to the construction of superstructures. This site may have been a place dedicated to seasonal mammoth hunting (Paunescu 1993), like the one at Molodova (Ukraine). However, for some researchers, these structures would be either natural or wrongly dated and actually much more recent (15,000 BP like the most of these types of sites in Eastern Europe).

At Abric Romani (Spain), combustion areas within the J level form real domestic zones around which revolved the activities of the group, with possible exchanges and sharing of food between hearths, which could reflect different family units. In level H, wooden plates of homogenous size have been discovered close to the hearths; their function is unknown, but a relationship with fire is obvious.

The activities practiced in these habitats varied: knapping flint, making tools, preparing skins, and butchery. But also the transmission of knowledge, learning, stories being shared, projects to discuss, and perhaps joys and sorrows to share, that is to say, everyday life.

Territories and the Environment

A hypothesis has often been invoked linking the difficulty of Neanderthal to adapt to a temperate climate: such a climate would have deprived it of the large herbivores to which he devoted his hunts. Rare indeed are the sites which can be dated to the Eemien interglacial (around 130,000 to around 115,000 BP; in a climate similar to the present day; 15 sites, for the most part in Germany: Lehringen, Taubach, Gröbern, Burgtonna, Neumark-Nord, e.g., Roebroeks et al. 1992; Speleers 2000). In France, these Eemian occupations are quasi absent in the south, and in the north, it is only at the site of Caours (where five archaeological levels are preserved; Antoine et al. 2006) that these can be unambiguously dated to the interglacial. These occupations are mostly preserved in lake sediments (travertine), and the scarcity of datable sites of the Eemian is certainly due in part to poor preservation conditions of human settlements.

However, it may well have been that Neanderthal inhabited forests to a lesser extent than the shrub-steppes where large mammals were plentiful. This seems to be confirmed by the rarity of Eemian occupations in caves.

The wooded plains environment specific to the Eemian certainly conditioned the size and location of human occupations (Fig. 5). These are in general small areas, often located at the edge of water holes – lakes, rivers, etc. It is important, however, to take into account taphonomic factors of the erosive phase following the Eemian which could explain the disappearance of occupations in other contexts. These Eemian occupations seem to present a large range of functions: knapping, tool use, etc. These may have been short duration occupations, providing evidence of a model of land occupation of high residential mobility.

Just as the forest environment of the Eemian determined the size and location of sites, it is likely that subsequent environmental changes had an impact on the size of occupations and their functions.

In regions where excavations are sufficiently numerous and large scale to allow for this type of

European Middle Paleolithic: Geography and Culture, Fig. 3 (**a**): Tourville-la-Rivière site (France), view of fauna processing zone (J.P. Faivre, Inrap). (**b**): One of the sites from the Molinons site complex (France). Below, distribution plan of the material; above, interpretation. Zones of concentration I and II are dedicated to reduction, with secondary reduction in concentration II (zone E). The Levallois tools and blanks are grouped around the periphery (zones A to D). Some pieces were exported from the reduction zone toward the periphery zone. No refits link concentrations I and II, no doubt the work of the same group at different times (After Depaepe 2009b, DAO P. Depaepe)

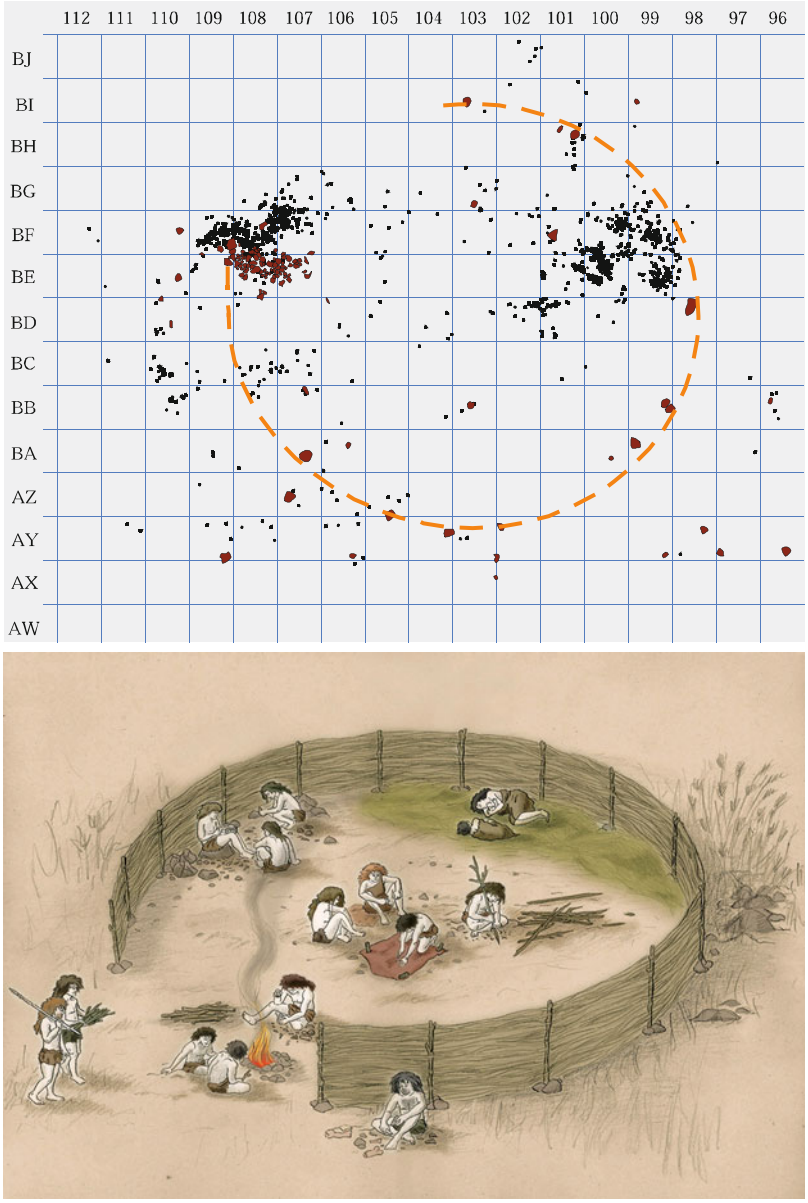

European Middle Paleolithic: Geography and Culture, Fig. 4 Plan of Poitiers "La Folie" site (After Bourguignon et al. 2003) and attempt to reconstruct the site (P. Galibert, Inrap)

analysis (France, Belgium; Depaepe 2010), it appears that it is mostly the slopes and plateaus that were occupied and that the size of the occupations increased in parallel with the progressive continentalization of the climate, generating more open steppe-like environments. In these landscapes, small or medium size occupations of short duration with specialized and sometimes unique functions (e.g., biface shaping, slaughter of a large herbivore, and initial butchery) seem to be related to more important sites, in terms of size and duration, with varied activities and from which a territory could be exploited (base camps called "residential site" linked to comings and goings to associated specialized sites called "logistical sites").

But this distinction is certainly not as dichotomous as that. During the Eemian, very brief and single-task occupations also existed: sites for processing large game, lithic raw material

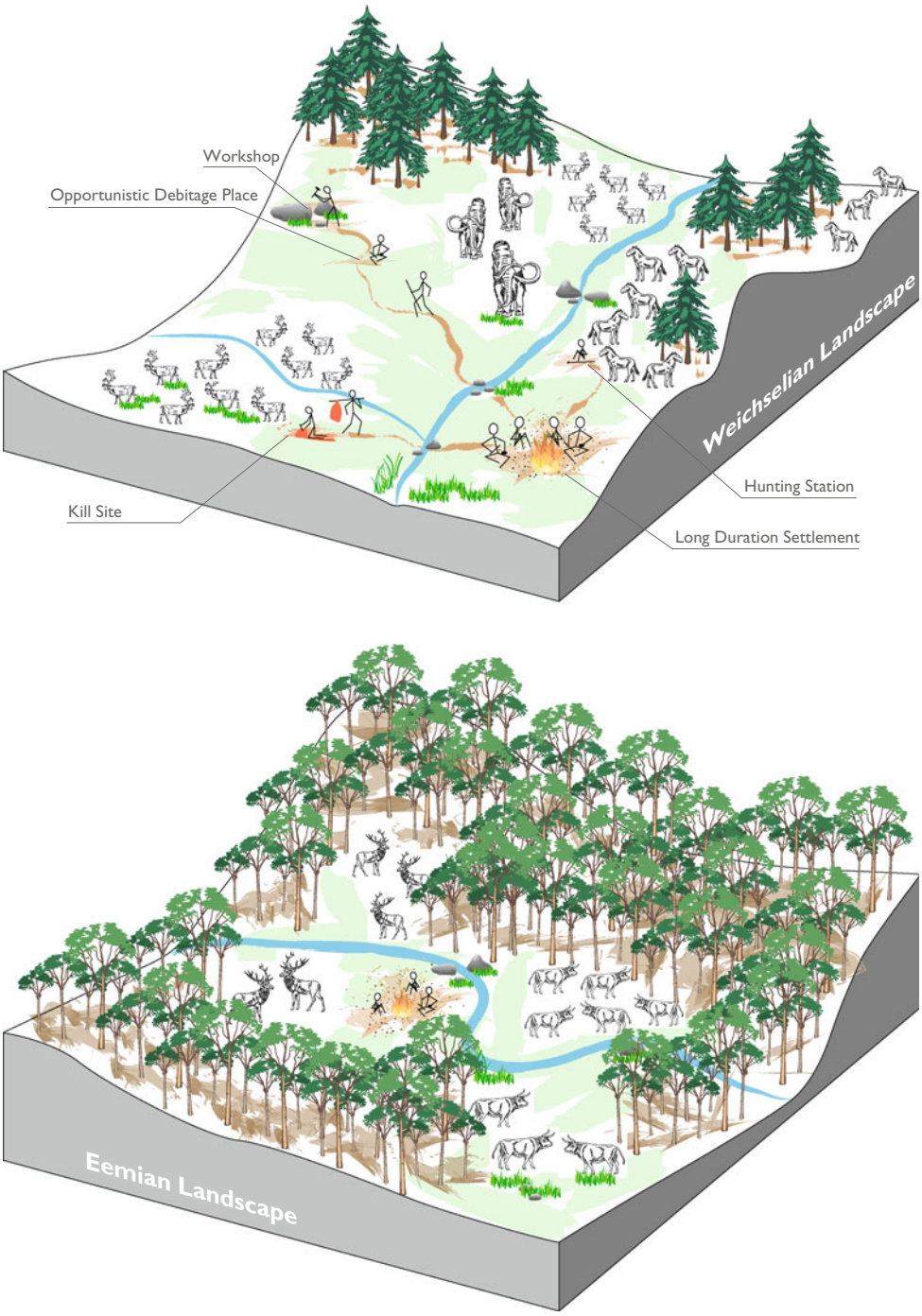

European Middle Paleolithic: Geography and Culture, Fig. 5 Reconstructions of human occupations in cold (*above*, Weichselien landscape around 70,000 BP) and temperate environments (*below*, Eemian interglacial, around 125,000 BP – after Depaepe 2009b, DAO S. Eusèbe/P. Depaepe, Inrap)

procurement sites, short-term knapping workshops, etc. Unfortunately, these sites are very difficult to discover, because of their very small footprint and the few artifacts needed for the activities to be performed. Among these, hunting is fundamental.

Food and the Acquisition of Food Resources

The anatomy of Neanderthals required substantial energy intake, particularly in cold climates: 6,000 kcal per day according to several researchers. Chemical analyses performed on Neanderthal bones have shown that they were large consumers of animal proteins: their diet approached that of the wolf.

Animal food resources were varied. Herbivores of medium size are very often represented: reindeer, bison, and horse; in temperate periods the Neanderthals hunted deer, wild boar, and cervids. Very large mammals were also hunted: in Lehringen (Germany) a spear was found stuck in the chest of an elephant. Nevertheless, we still do not know all the hunting methods of the Neanderthals. It seems that they used pole arms, like spears with a fire-hardened tip or a flint point (the French sites of Bettencourt-Saint-Ouen, Combe Brune, and Angé each yielded one Levallois flint point with wear showing their use as a weapon). Traces from hunting activities are thus evident, which does not preclude scavenging. The presence of an herbivore at many sites, overrepresented in comparison to others, points to evidence of hunting oriented toward this species (e.g., bison at the sites of La Borde, Mauran, and Puycelsi, France). The reason for this selection escapes us: opportunism, hunting strategies, cultural practices, or worship?

Small animals were also hunted: hare, birds, and terrestrial mollusks.

Recently, a traceological study showed actions of scaling fish with some lithic tools. It seems, however, that fishing was relatively rare, but this may perhaps be because of problems involving the preservation of fish remains. Marine shells were consumed (Bajondillo Cave, Spain, around 150,000 BP), and at Gibraltar, mussels were cooked and seals consumed.

Very recently traces of cooked plant foods have been documented at sites as distant as Shanidar (Iraq) and Spy (Belgium) (Henry et al. 2011); since then studies have been extended to other sites and have confirmed preliminary data (Henry *pers. comm.*). This is an important element in the understanding of Neanderthal food consumption practices in comparison to those of AMH. Nevertheless, these studies cannot as yet provide an estimation of the respective proportions of animal and plants resources in the Neanderthal diet.

Industry: Raw Materials

Comprehensive understanding of their territory allowed Neanderthals to acquire the raw materials needed to make tools. They mainly worked with hard stone; tools made of perishable materials such as wood were no doubt frequent but have mostly disappeared. Some traces, however, still exist: spears or lances at Lehringen, pointed sticks at Königsaue (Germany) and Krapina (Croatia), and plaquettes placed near hearths at Abric Romani (Spain). The Königsaue site has also yielded evidence of hafting systems of a bifacial piece on a wooden handle using birch resin (Grünberg 2002). These few elements are certainly only a pale reflection of the use of wood in Middle Paleolithic technology, which is also shown by use-wear studies on flint, although traces of woodworking can sometimes be confused with taphonomic phenomena caused by burial in periglacial context (Caspar et al. 2003). It is important to note that wood is found at sites during the Lower Paleolithic in Clacton (England), Schöningen, and Bilzingsleben (Germany), also showing the continuum between the Middle and Lower Paleolithic.

By contrast, the explanation for disappearance due to taphonomic reasons does not hold for bone, frequently preserved on sites as consumption waste but, for reasons that escape us, rarely used by Neanderthals (some retouchers and bifacial pieces in bone or ivory, as at Rhede, Germany). Some authors have postulated cultural taboos and rituals, taboos prohibiting the use of tools made of bone, wood, tusks, and horns of killed animals, although their presence is attested in graves.

Studies of lithic raw materials are based mostly on their provenance, defining local or

exotic materials based on the distance from the site where they were found. Mousterian groups had a very opportunistic behavior in relation to raw materials: they mainly use local materials, even if their quality was not the best. In relation to a site, the provenances of the raw materials used (the sources) were often nearby, rarely more than a hundred kilometers away. The Mousterians were certainly among the prehistoric humans those who used the broadest diversity of stone to make their tools.

Flint is undoubtedly the most common material used. If we take the example of the French territory, it largely dominates the lithic industries in the north, the Paris and Rhodanian Basins, Burgundy, the north Aquitaine basin, part of Provence, and the Alpine foothills. Quartzites were taken from the Pyrenees to the Garonne, quartz from Quercy, basalt from Auvergne, dolerite in Britain (with phtanite) and in the Massif Central, etc.

Proximity of the raw materials appears to have been an important criterion: in the very heart of flint-rich regions (e.g., the north of France), some sites show dominant use of sandstone, a local material, over flint of better quality but whose deposits were a bit further away.

Despite this, artifacts of nonlocal materials are nearly always present at sites, but in small quantities. These artifacts are for the most part retouched tools or unretouched flakes with a cutting edge, and thus usable as such for cutting, or destined to be transformed into a tool; they are in this case considered as a material reserve. Two observations have been made about these pieces: firstly, their proportion within the totality of material decreases with the distance from the source; next, these are nearly always pieces showing high technical investment, and not flakes from core preparation (such as cortical flakes and flakes produced during maintenance of flaking surfaces). These particular pieces probably constitute individual equipment, transported from one place to another, and sometimes abandoned to be replaced by new tools when their use became obsolete. These tools sometimes have a complicated "life": a flake may well be revived several times during its existence as a tool, each time adopting a new form, more reduced than the preceding one (Fig. 6).

Lithic Technologies

Several flake production systems were employed by the Neanderthals. The most famous is the "Levallois" method, named after the municipality close to Paris where flakes and cores of this type were discovered in the nineteenth century. This system was described at the beginning of the twentieth century by Victor Commont, then by François Bordes in the 1960s, and Eric Boëda in the 1980s, who clarified the concept, the latter identifying several methods within the Levallois system in order to obtain different products. The Levallois production systems first appeared around 300,000 BP and became widespread during the Middle Paleolithic where it is a characteristic element. Levallois reduction is based on a concept of predetermination, which illustrates the mental capacities of the users: the core is prepared in such a way that its volume has two complementary surfaces, one destined for preparation and the other for the production of flakes (Fig. 7). Among the different production systems used by the Mousterians, Levallois is the one that offers the widest range of products: flakes, points, and blades can be produced depending on the method used. Even if it was used at other times and in other places, the Levallois system constitutes the common base of Mousterian technology and its distribution covers almost the whole of the Old World.

Discoidal reduction appears to have been older than Levallois reduction, its presence attested in Africa a million years ago. During the Middle Paleolithic, it occupied a large geographical and chronological range. Discoidal reduction produced short and wide-backed flakes, due to the alternation of knapping on the two equally important surfaces of the core. Another reduction system called Quina produces thick flakes of triangular section that has a sharp retouched edge opposite an unretouched back. Quina reduction is quite recent in the Middle Paleolithic, between 70,000 and 35,000 BP, and is more geographically limited than the discoidal technique.

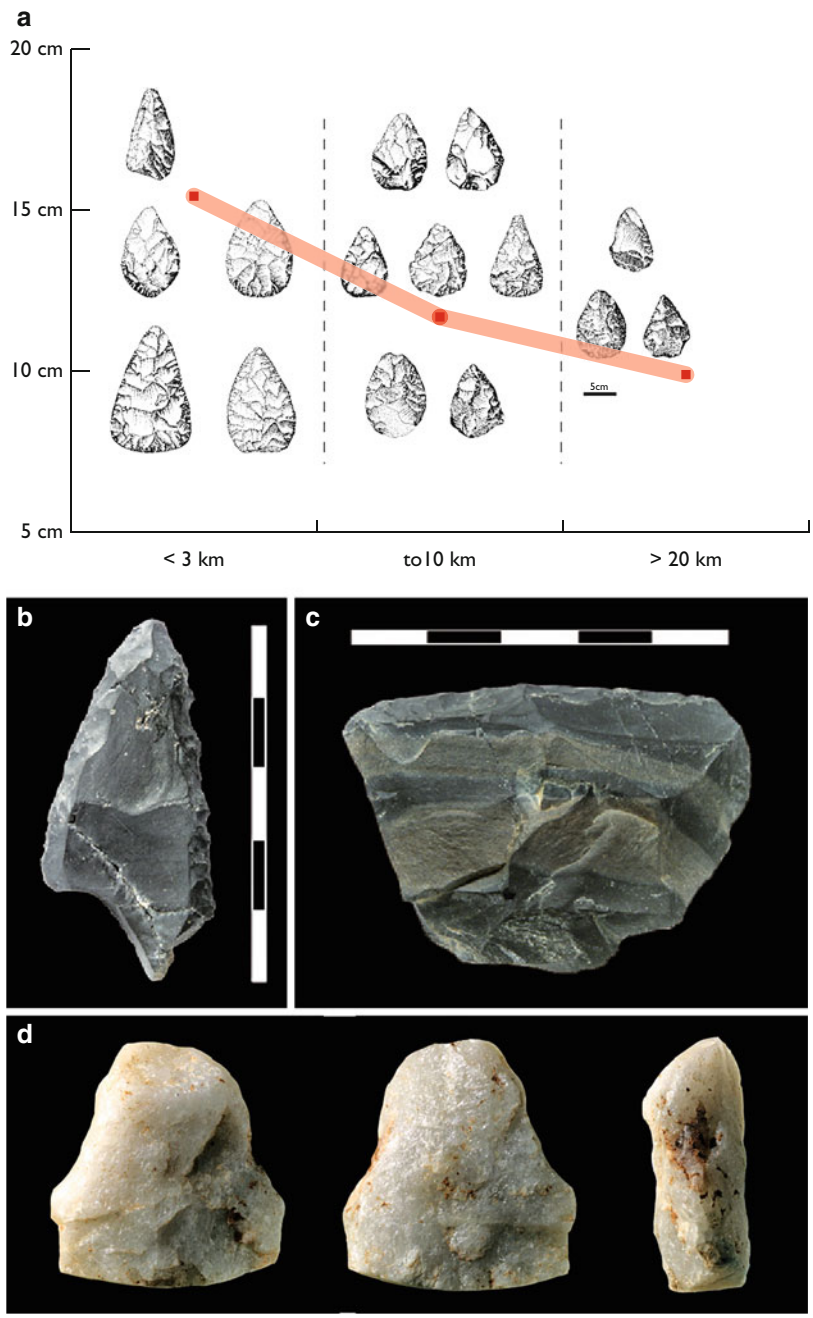

European Middle Paleolithic: Geography and Culture, Fig. 6 (**a**): The size of these bifaces decreases with increasing distance to the raw material source, as they have been reknapped several times during their use at different locations before being abandoned (After Depaepe 2009b, DAO P. Depaepe, Inrap). **b**, **c**, and **d**: Examples of raw materials (**b**: lydian point, **c**: quartzite scraper) (these two last from the Grotte du Noisetier, France, photo J. Viguier). **d**: Quartz notch (4.9 cm; Fieux site, France, photo Vincent Mourre)

Volumetric blade production consists in exploiting the volume of the block, in contrast to Levallois which exploits the surface. It was long considered to be exclusive to the Upper Paleolithic, and thus "modern." The quite recent discovery of blade production in the Middle Paleolithic therefore compelled the revision of the dogma surrounding its modernity. In our present state of knowledge, blade production is limited in time and space: it made its appearance appeared in isotopic stage 6 (around 180,000 BP) in the north of France and became quite common during isotopic stage 5, between 115,000 and 70,000 BP. It suddenly disappeared

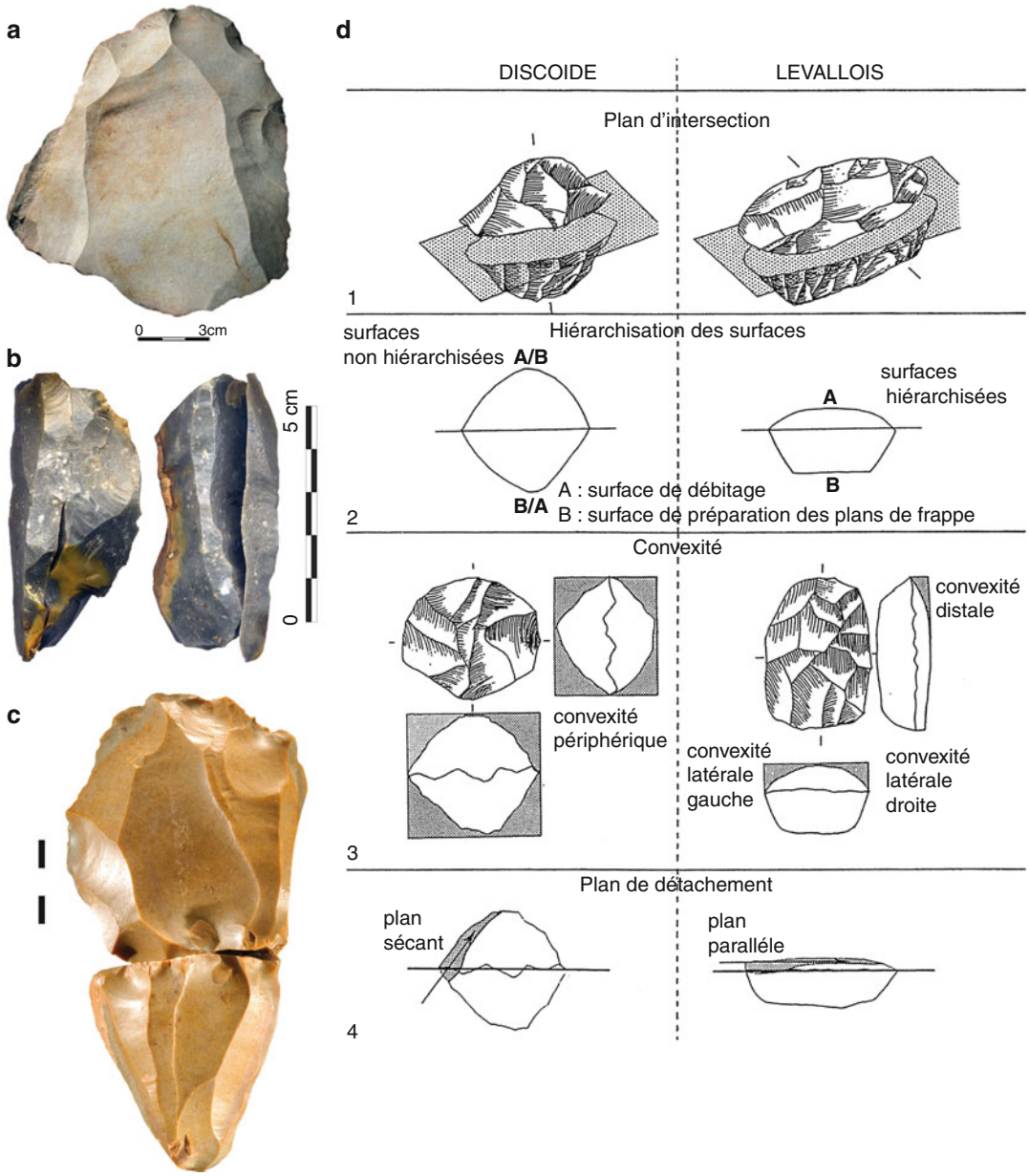

European Middle Paleolithic: Geography and Culture, Fig. 7 (**a**): Preferential Levallois core (Garris II, France, L. Bourguignon, Inrap). (**b**): Refit on a blade core (Saint-Hilaire-sur-Helpe, France, P. Feray, Inrap). (**c**): Levallois and blade core on the same block (Cantalouette IV, France, L. Bourguignon, Inrap). (**d**): Levallois and discoidal reduction (After Boëda 1993)

never to return along with the abandonment of this region during the glacial maximum of MIS 4. Blade production existed in Poland between 60,000 and 35,000 BP, as well as in other regions such as southwest France.

Other reduction systems, more limited in time and space, are also used, including reduction on anvil, the Le Puchueil type, Kombewa, and SSDA, among others. It is also important to take into consideration unorganized reduction,

frequent but much less commonly described in the study of lithic industries (note that lithic studies are not typically focused on how reduction techniques are learned and archaeological evidence of such apprenticeship).

Finally, the shaping of bifaces is also present in the Mousterian, although to a lesser degree than during the Acheulean. Mousterian bifaces are different in their concept from their predecessors: the Acheulean biface is a tool in itself; the Mousterian biface is an object supporting tools. The structure of the Mousterian biface gives it the double advantage of having edges that could be retouched and hence transformed into sidescrapers, due to its plano-convex and not biconvex profile like Acheulean bifaces and its ability to be transformed many times. This characteristic means that bifaces could be mobile objects, transported, used and transformed from one point to another, and finally abandoned when they no longer met the needs of their owners.

The range of blanks designed to be transformed into tools is thus vast (Fig. 8). Yet all tools are not retouched: traceology has shown that a number of unretouched flakes were also used, essentially for cutting. Retouching allows resharpening of its edges, as well as strengthening and smoothing, but the absence of retouch thus does not mean lack of use. Tools called "domestic" are largely dominant compared to objects that could serve as weapons like some Levallois points. In the domestic tool kit, sidescrapers are the most common. These tools are flakes where one or both sides are retouched and designed to deflesh, cut, and process hides for tanning reinforced by the action of mineral substances like ochre, in order to prevent rotting. The many kinds of sidescrapers, which vary according to the location of retouch, form, etc., define many types often used as cultural markers. Notches and denticulates are also frequent tools, at least in some regions; the north of France, for example, is basically devoid of them. Such tools with retouched edges in the shape of a rudimentary saw may have been used to process wood; they were also very effective in the disarticulation of limbs (cutting of tendons).

Industries and Cultures

Concepts

Due to their preservation, knapped stone tools were used as the basis for the definition of "cultural systems." This approach is obviously simplistic, a bit as if our current "culture" was studied only through the tools of a handyman in his workshop. Nevertheless, they serve as the basis for the definition of "cultures" in the Middle Paleolithic, which thus must be considered with caution.

In the 1950s, François Bordes developed a statistical method, based on the typology of Mousterian tools, allowing for the classification of industries into four or five groups in order "to reorganize the Mousterian morass." According to him, the differences recorded between the industries were cultural, applicable to the last glaciation (between 125,000 and 35,000 BP, or the recent Middle Paleolithic) and thus correspond to as many human groups.

Other archaeologists have, however, proposed different interpretations for this observed variability. Since 1916, Victor Commont contrasted the open-air sites in northern France, in close proximity to raw material sources and with often non-retouched flakes with the sites of the Périgord caves, located far away from the raw material sources and where tools were intensively retouched. In the 1970s, Lewis Binford hypothesized that the Mousterian facies were in fact a reflection of different activities, while Paul Mellars saw in these a chronological sequence, at least among some of them.

The archaeological truth, provided one can ever get near it, is most probably a combination of all three. Some features are more recent than others or limited to specific regions. Their distance vis-à-vis raw material sources leads to more intensive use of tools, which are thus both reduced and more retouched. Some sites are oriented toward particular functions and this specialization can have an impact on tools. Finally, it is undeniable that cultural aspects had an important influence on the composition and the typology of lithic assemblages, influenced by stylistic traditions.

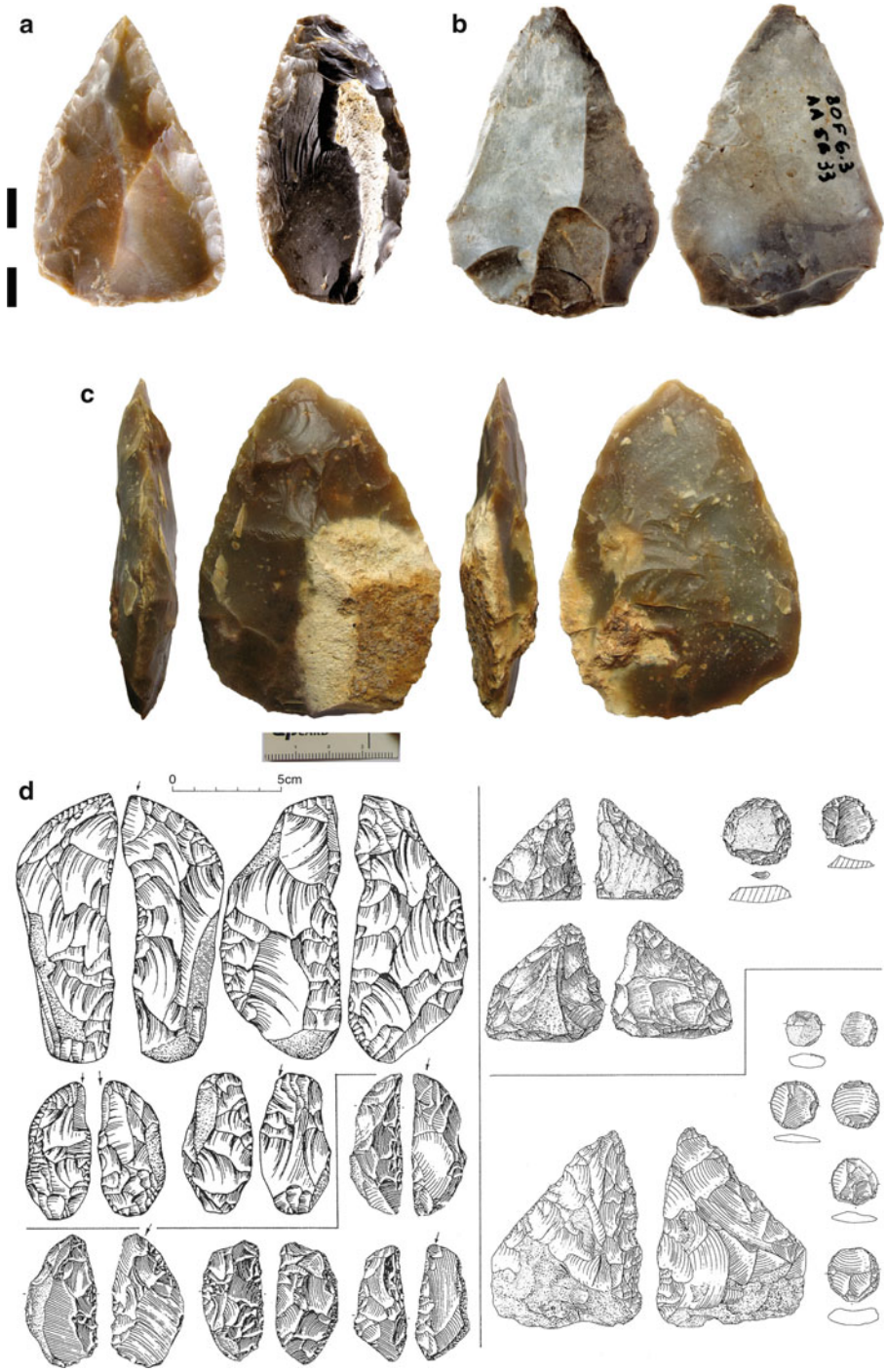

European Middle Paleolithic: Geography and Culture, Fig. 8 (**a**): Mousterian sidescrapers (Cantalouette II, France, L. Bourguignon, Inrap). (**b**): Levallois point used as a lance point (Bettencourt-Saint-Ouen, France, J.L. Locht, Inrap). (**c**): Mousterian biface (Combe Brune II, France, M. Brenet, Inrap). (**d**): Micoquian tools (Sesselfelsgrotte, Germany; Kulna, Hungary; after Richter 2000)

Cultural Systems

The Middle Paleolithic can be divided into two major phases. The first is called the Early Middle Paleolithic and ranges from around 300,000 BP to the beginning of the Eemian Interglacial (around 125,000–115,000 BP, isotope stage 5e). The second, the Late Middle Paleolithic, goes from the Eemian to the disappearance of the last Neanderthals, around 35,000–30,000 BP depending on the region. The second phase corresponds largely to the Weichselian glaciation (isotopic stages 5–3). This subdivision is questioned by some authors but nevertheless presents the advantage of simplifying the vision of these 250,000 years of the Middle Paleolithic.

The cultural systems of the Early Middle Paleolithic are not clearly defined as sites still remain relatively rare for this period. Since isotopic stage 10, tools of Mousterian style appear (e.g., thick sidescrapers from La Micoque, France), accompanied by Acheulean bifaces. During isotopic stages 9 and 8, Levallois production is present, and its flakes serve as blanks for typically Mousterian sidescrapers; some bifaces persist. During isotopic stages 7 and 6, blade production appears; Levallois flakes are retouched into Mousterian points, sidescrapers, etc., and large Levallois points complete the tool kit. Some industries still have an Acheulean bifacial element.

The Late Middle Paleolithic is better known, with the exception of the Eemian (isotopic stage 5e poor in archaeological sites). Its premises are firmly in the early phase (reduction methods, tool types), but most sites have led to a multiplication of "cultures."

For this recent phase, François Bordes thus defined five main Mousterian groups: the Mousterian of Acheulean tradition characterized by the presence of bifaces; the Denticulate Mousterian; the Mousterian of Quina type, very rich in sidescrapers intensively retouched but without Levallois reduction; the Mousterian of Ferrassie type which resembles that of Quina, but with Levallois reduction; and finally the Typical Mousterian with the different types of tools in a "harmonious" balance. Defined from sites in southwest France, this classification had a resounding success, leading many archaeologists from other regions, and even other countries, to assimilate their findings with one or other of these groups, with varying success and some exaggerations. It now appears that these features have nearly no validity outside their zone of origin, which moreover only increases the variability of Mousterian expressions.

Thus, a number of "cultures" are defined, usually with a regional recognition (stylistic traditions). In Central and Eastern Europe (from Germany to Volgograd, Russia) several groups generically coming together under the term Micoquian become individualized by the presence of bifacial pieces (Keilmesser, Prondnikmesser, Faustkeilblätter, etc. – Fig. 8d). The first Micoquian phase, sometimes called "Keilmessergruppen" (around 60,000, perhaps earlier, to 40,000 BP), is followed by a second phase, the "Blattspitzengruppen" (leaf points), considered Late Micoquian. Contrary to popular belief, some of these groups employed Levallois reduction (Richter in press). The Hungarian Babonyen appears to be connected with the Micoquian in its first phase, and the Szeletian (northern Hungary, Slovakia, Moravia, Southern Poland) later includes foliate tools similar to the Final Micoquian (the Altmühlian seems to correspond to the equivalent of the Szeletian in Bavaria).

An earlier industry, the Taubachian in Central Europe, characterized by thick flakes produced from small pebbles and used tools with deep retouch and by some microlithization, would be for some authors a survival of archaic traditions. Nevertheless, its near systematic association with interglacial contexts and lake environments (lake banks) suggests rather an adaptation to a particular context. This could also be valid for the Pontinian at Latium (Italy).

The period around 38,000–30,000 BP saw the appearance of "transitional" industries (from the Middle Paleolithic to the Upper Paleolithic – Fig. 9). These are industries in the final phase of the Middle Paleolithic, which for some researchers include Upper Paleolithic traits (blades, burins, end scrapers, etc.). This does not necessarily mean that they were influenced

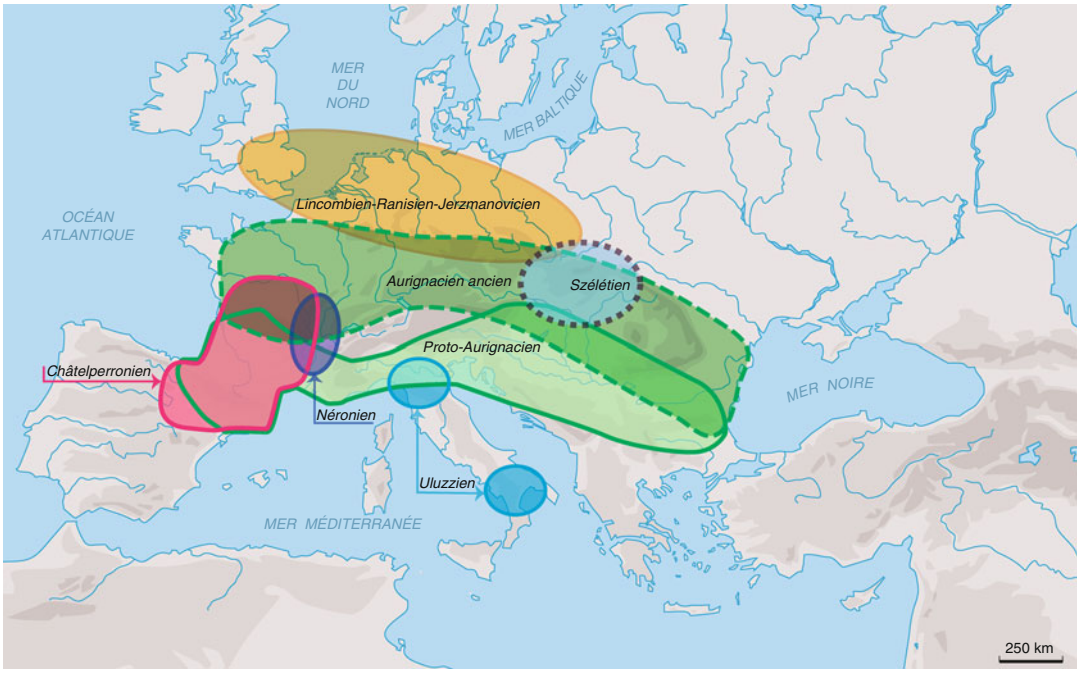

European Middle Paleolithic: Geography and Culture, Fig. 9 Europe between 38,000 and c. 33,000 BP (DAO AFDEC, After P. Depaepe 2009b, modified)

by the Upper Paleolithic industries that originated outside Europe. A common characteristic of these industries is the production of armatures for projectiles (points).

From around 38,000–30,000 BP, the industries grouped under the term Lincombian-Ranisian-Jerzmanowician (LRJ – see Flas 2008 for a detailed approach) occupied a vast area across the northern plains of Europe, from Wales to Poland. These "transitional" industries are characterized by a particular type of leaf point made on blades. A few Polish industries like the Zwierzyniecien show blade production (laminar industries existed since the beginning of isotopic stage 3 in the south of Poland, at Piekary and Krakow "Ksiecia Jozefa"). Further east, the Streletskian, with bifacial points, sometimes with a concave base, sees its origin in the Late Middle Paleolithic of the Crimea or the Russian plain.

The Châtelperronian developed in southwest France and northern Spain, of which the characteristic tool is the Châtelperron point (armature on blade, with a curved back created by abrupt retouch). In Italy, the Uluzzian presents similarities with the Châtelperronian, albeit less strongly laminar.

Non-Utilitarian Preoccupations

Evidence of symbolic expression in the Middle Paleolithic is rare: a few cases, less than thirty (Otte 1996; Jaubert 1999, 2010; Soressi & d'Errico 2007; Soressi 2009.). Indeed, extensive taphonomic studies have led to the elimination of many artifacts that were found to be natural products, such as the "Neanderthal flute" of Divje Babe, Slovenia, which is still the subject of intense debate within the scientific community, and many bones whose "engravings" are actually signs of vascularization.

In Europe, some evidence linked to the Neanderthal sphere are essentially made up of incisions on stone artifacts or bones, traces of pigment use, collections of odd pieces, and some jewelry in the Chatelperronian levels.

A few flint artifacts and pebbles have incisions that are not structured (flint from Champlost and pebbles from Chez-Pourré-Chez-Comte, France;

European Middle Paleolithic: Geography and Culture, Fig. 10 Blocks of colorant (Pech de l'Azé I; left block measures 27 mm; photo M. Soressi, Inrap)

Tata fossil, Hungary; shale plaquettes from Temnata, Bulgaria). Again on stone, the famous slab from the Ferrassie burial (France) should be mentioned, with shallow depressions on its underside (see below). On bones, a severe taphonomic revision has left only the rarest elements, the most compelling being an engraved bone with zigzag signs at Bacho Kiro (Bulgaria).

A few fossils were discovered in some habitats (polypus and gastropod fossils from Hyena Cave, Arcy-sur-Cure; brachiopods at Pech de l'Aze I and Chez-Pourré-Chez-Comte, France). In some cases these fossils were transported from many kilometers away, but the reasons for this collection elude us: symbolism attached to "stone animals," simple curiosity, and playful approach?

The use of natural pigments is clearly evident at more than 70 archaeological sites during the Middle Paleolithic. These are mainly manganese and ochre; blocks show very clear traces of abrasion on the surfaces which reveal intentional usage (e.g., at Pech de l'Aze I and IV, Fig. 10), in some cases perhaps functional (ochre has an antiseptic function in addition to its coloring component). At Néron Cave (France), a color container (hematite) was found arranged in a pebble. At Cueva de Aviones (Spain), marine shells impregnated with dyes have been discovered.

The register of ornaments is also very poor: some pierced teeth and bone pendants in Chatelperronian levels (Grotte du Renne at Arcy-sur-Cure, Grotte Quincay, France). In the Uluzzian pierced shells have been discovered.

But the lack of traces of symbolic expressions should not obscure a potential taphonomic problem. In fact, we cannot rule out the possibility of symbolic expressions that are now invisible in the archaeological record, such as tattoos, body painting, drawings on sand or perishable materials (bark, skins, etc.), masks, or jewelry. Thus, at Abri Fumane, raptor bones show signs suggesting the removal of feathers, in an esthetic intention according to the authors (Peresani et al. 2011). Despite the controversy concerning the "flute" of Divje Babe, the manufacture of non-utilitarian objects (in the strict sense of the term) remains conceivable (whistles, flutes, rhombs, percussion, or other musical instruments are no longer present due to the conditions of preservation of their supports in organic material).

It should be noted that as far as we know, these traces of non-utilitarian expressions are

attributable to the final stage of the European Middle Paleolithic, after 60,000 BP. They could thus be the result of local evolution of Neanderthal societies, also linked with the appearance of burials, again around 60,000 BP in Europe.

Similarly, such traces of expression remain modest in comparison to the extraordinary artistic flowering of anatomically modern humans (parietal art, portable art). These findings should be taken into consideration when discussing the abstract capacities of Neanderthals, while trying to retain a balance between an overvaluation and a denial of these capabilities, these extremes being untestable and emerging from dubious comparisons with our own abilities.

Outside the Neanderthal sphere, there is evidence of expression which seem older (at least 80,000 BP) as, for example, pierced shells in Morocco and Israel, engraved ostrich eggs (Diekploof, South Africa), and engraved stones (Blombos, also South Africa).

Death and Then? Funerary Practices in the Middle Paleolithic

Around twenty Neanderthal burials have been discovered so far, of which a third are found in southwest France (Maureille 2004; Vandermeersch et al. 2008). Their recurrence in certain sites suggests the existence of necropolises, sites favored for the burial of members of the same group (e.g., seven subjects at La Ferrassie, France). These remains include both men and women and neither does there seem to be a selection linked to age.

These burials dug within habitats themselves were not intensively structured: generally shallow vaguely rectangular or oval pits sometimes protected with a cover (stone blocks or slabs, as at La Ferrassie (France) where a slab with shallow depressions covers a child's grave). The corpse was placed directly in the grave together with an occasional piece of burial goods (flint tools, bones, deer antlers, etc.). The presence of some bedding is hypothesized at Shanidar 4. In certain cases of constrained disposition, bonds may have possibly secured the corpse.

Secondary funerary practices are also likely to have taken place: multiple reburial of the corpse, removing the skull after the disappearance of flesh; similarly, isolated skulls are sometimes discovered at the sites. These elements suggest a form of religion. Traces on some skulls also show the removal of the scalp.

Cut marks appear on some bones, indicating removal of flesh, but the intentions of this practice remain unknown: endocannibalism for food or ritual purposes, cleaning the bones of the deceased, and food cannibalism (El Sidrón cave, Spain; Lalueza-Fox et al. 2011). The comparison with cut marks from animal bones invokes the recovery of meat for consumption, without it being possible to determine whether such a practice was integrated within a ritual. It is important to note that in southwest France, such practices concern Mousterian sites of Quina type, which suggests a cultural component to this practice.

Neanderthal burials can be dated within a range between 60,000 and 40,000 BP, that is, in the final phase of the European Middle Paleolithic. Burial practices, however, are known earlier, around 100,000 BP in the Middle East (Qafzeh and Skhul, Israel), but these were anatomically modern humans with a Mousterian industry. However, recent evidence suggests an earlier date than what is generally accepted for some burials in southwest France (Jaubert 2010); if confirmed, these new dates are important to the debate on the originality of the sepulchral act, between Neanderthals and anatomically modern humans.

Toward a New World: The End of the European Middle Paleolithic

Neanderthals disappeared from the European scene between 35,000 and 28,000 BP depending on the region in Europe, where he was replaced by anatomically modern humans (AMH) who reached the European continent around 37,000 BP (Proto-Aurignacian in southern Europe). However, Neanderthals and AMH had already crossed paths in the Middle East, at least around 60,000 BP (perhaps earlier): they shared the same culture (Mousterian), buried their dead (see above), and analyses of the human genome show cross-breeding.

Until 37,000 BP, the Neanderthal was the only human to occupy Europe. Then, over a few thousand years, he disappeared, at the same time that AMH made its entry, which is rather late compared to other regions in the world which they seemed to have reached earlier, around 60,000 BP, for example, in Australia. In Europe, the oldest AMH fossil is the one discovered in Oase (Romania); it dates from around 35,000 BP, but unfortunately is not clearly associated with archaeological material, which prevents it from being associated with a specific cultural current.

Modern humans reached a Europe which seemed to be in great turmoil. Indeed, from about 38,000 BP, the world of the Neanderthals went through several currents which, although based on a Mousterian substrate, significantly altered the cultural landscape of the Late Middle Paleolithic: the "transitional" industries (cf. above). These millennia are marked by the climatic warming of Les Cottés interstadial (or Hengelo depending on terminologies used) (between 38,000 and 35,000 BP), succeeding a brief, but very cold, climatic episode (the Heinrich 4 event). Benefiting from this warming, Neanderthal populations were able to significantly expand their territories, but since their overall population size remained stable, the density of the population would de facto have dropped (Maureille 2008). This dispersion led to a reduction, or even a discontinuation, of contacts previously maintained between groups, which would have been a factor for cultural stability. This would have resulted in this incredible disparity, some groups developing a new cultural system on a Mousterian substrate, others preserving Mousterian traditions.

The extreme end of the Middle Paleolithic seems thus to correspond to the Neanderthal world experiencing a rupture in their cultural balance, with groups sharing less or not at all, and therefore becoming culturally and demographically weakened. The last Neanderthals disappeared from France around 35,000 BP, possibly 32,000 BP, in the southwest. In remote areas (refugia), they persisted later: southern Spain and Portugal until 28,000 BP or for some authors 24,000 BP (Gibraltar, but this date is disputed), perhaps also in some areas of the Balkans or in Byzovaya (see above).

There was therefore on the European scale a coexistence between Neanderthals and AMH, for varying periods depending on the region, but this cohabitation does not necessarily mean contacts: the weak genetic contribution of Neanderthals in current European and Asian genomes seems to derive from encounters which occurred in the Middle East, not more recent ones. It is possible that Neanderthals had already undergone a phase of demographic reflux and that entire regions had been abandoned, AMH therefore arriving in a human desert. In other places, the two groups may have occupied the same territory and competition for food resources may have well been fierce between AMH and Neanderthals (Banks et al. 2008), these resources remaining identical for an overall increased population. For reasons which elude us (better social cohesion? better technology? better demography?), AMH won this competition. Other hypotheses, which may also be cumulative, have also been put forward: epidemics, conflicts, etc. (see Depaepe 2009b for different scenarios). Regardless, Neanderthals were definitively replaced by AMH after –30,000 BP.

Conclusion: Neanderthal Heritage

Who, therefore, was the Neanderthal? A typically European human, having only expanded slightly beyond this continent. A man perfectly adapted to his environment, withstanding important climatic changes for more than 200,000 years. A man with a culture, the Mousterian, which even if shared with anatomically modern humans in the Middle East, is no less a very European culture, with regional specificities. It is during the Mousterian, indeed, that Europe constructed an identity different from other regions of the world. A man whose clans roamed varied landscapes, hunted for big and small game, and made tools developed by complex and diverse systems. A man who no doubt questioned himself, who buried his own, who may have developed a mythology, rituals, and beliefs. A man who took care of his relations, as is shown by some skeletons with such pathologies that the survival of these

individuals without the help of their relatives would certainly have been impossible. Another man, a cousin, at once so close to us and so far away, who left a little of himself in our genome.

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European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach

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State of Knowledge and Current Debates

Introduction

It is generally assumed by most scholars that the European Middle Paleolithic (MP) to Upper Paleolithic (UP) transition is the result of the arrival of modern men groups in Europe and replacing the Neanderthals. Since 20 years, scholars have tried to identify the way of circulation of the first Aurignacian groups inside Europe from the east (e.g., Djindjian 1993). More recently, in the first general synthesis on European Upper Paleolithic (Djindjian et al. 1999), the chapter concerning this question has been opened with two different hypotheses, the first one with the arrival of the modern man with the Aurignacian material culture and the second one with a systemic change due to the context of the interpleniglacial of OIS 3. For the readers unfamiliar with that question, a history of the last 150 years of researches on the beginning of European Upper Paleolithic has been recently given (Djindjian 2006). More recently, a method has been proposed to reconstitute the mobility inside the territory of European Upper Paleolithic human groups using data from site mapping, raw material procurement circulation, dwelling seasonality, and food resource management inside the annual cycle (Djindjian 2009a). The method is applied here to the period 75,000–34,000 BP (OIS 4 and OIS 3). It is then possible to argue a new model, based on the explanation of systemic changes in the economic and social organization of human groups and then their material culture, due to the adaptation to a changing environment. The model has the virtue to be independent of the eventual actors of the material culture, whatever they are.

The European Middle Paleolithic (MP)

The studies of the European Middle Paleolithic are limited since 100 years by several major difficulties:

- The lack of absolute dating before 40,000 BP, over the range of the radiocarbon method, which has been slowly improved by the use of alternative techniques like thermoluminescence, uranium-thorium, or ESR, which have unfortunately a reliability and a precision much weaker than radiocarbon dates
- The data of lithic assemblages based on the Bordes typology (Bordes 1961), which are showing a lack of space and time structures at the origins of the famous historical controversy between Bordes (1953) promoting some kind of undefined Mousterian groups, Binford and Binford (1966) promoting a mistaking functional site analysis, and Mellars (1969) trying unsuccessfully to extract a chronological structure from the nonchronological Bordes typology
- The data of lithic assemblages based on a core reduction sequence analysis, which are renewing insufficiently the results of Breuil

and Kozlowski (1931–1934) in the beginning of twentieth century, because they consider them as a technical typology (replacing the Bordes morphological typology) and not as a manufacturing process

Nevertheless, the previous contradictions may be revisited by several new approaches like:

- The raw material procurement studies, which are showing in Middle Paleolithic industries the use of raw material of very various quality of stone (flint, radiolarite, quartzite, etc.) collected at very short distances from the dwellings
- The core reduction sequence analysis, viewed as a manufacturing process, focusing on the very early emergence of blade and bladelet technologies and the strong correlation with the raw material procurement
- The stratigraphic correlations at a regional scale, revisited by new environmental analyses and better absolute dates

It is not possible, here in a limited space, to propose a new chronostratigraphy of the Middle Paleolithic European industries and to argue it in an enough detailed approach, site by site. Based on Middle Paleolithic data assemblages using a simplified typo-technological list and revised chronostratigraphic site sequences, new results are used to argue the present analysis.

The Middle Paleolithic Assemblages

The revision of the famous typology of François Bordes (1961) is revealing that the decomposition of types in subtypes is, in most of cases, artificial (e.g., for scrapers and hand axes) involving in a much more limited number of types than the hundred types of the reference list: points, side scrapers, notches, denticulate and other retouched pieces, knives, hand axes, and Upper Paleolithic types.

At the opposite, the technological information is not complete, individualizing only the Levallois technique and neglecting other well-known Middle Paleolithic techniques like discoid, Quina, bifacial, blade prismatic, and bladelet prismatic manufacturing processes, without forgetting the use of multi-integrated manufacturing process ("ramification").

In a very interesting paper, Callow and Webb (1981) have processed a PCA (principal component analysis) of 96 Mousterian assemblages from southwestern France, described by 15 ratios elaborated directly from the types and the technical indices of the Bordes list.

The first factorial axis is opposing the assemblages rich in side scrapers to those rich in notches and denticulate. The second axis is ordering the assemblages by the abundance of Levallois artifacts. The third axis is ordering the assemblages by the abundance in Upper Paleolithic types and hand axes. The point diagram in the two first axes is showing a continuum (and not a partition) of the classical Bordes Mousterian facies: denticulate, typical, Ferrassie, and Quina. The so bad named "Mousterian of Acheulean tradition," which is, chronologically, the latest Mousterian of the area, is individualized on the third axis. These results, though limited to the southwestern France, are very important:

- Firstly, they are showing a chronological component in the Mousterian assemblages, as supposed by Mellars, but unfortunately masked by other structures, when processing Mousterian assemblages.
- Secondly, they are showing that the main variability of the assemblages is based on the opposition between side scrapers and notches/denticulate. Such variability has no any spatial or chronological links, but is correlated with the raw material procurement (see below).
- Thirdly, the important role of the Levallois technique variability has to be pointed out, anticipating the role of the variability of the different core reduction sequences. Unfortunately, the abundance of the Levallois technique cannot be correlated here with the other core reduction sequences and separated between flake Levallois and blade Levallois techniques.

Compared with the Upper Paleolithic stone industry, the Middle Paleolithic lithic industry is characterized by a strong individual variability. A part of this variability is due to intrinsic factors which allow, at several scales (individual, group), a large liberty of manufacturing inside the choice

of one or more among the set of known core reduction technologies. But it is also possible to affirm that a part of the variability of the Mousterian assemblages may be explained by other extrinsic processes. To identify them, the only method is the correlation between techno-morphological studies of the artifact assemblages and extrinsic data like chronology, territory, environment, and raw material procurement distance, able to reveal other processes at the origin of the variability.

It is then an illusion to conclude to the superiority of the Upper Paleolithic stone technology over the Middle Paleolithic lithic technology. The internal dynamism of various techniques is characteristic of the Middle Paleolithic manufacturing, while the standardization is characteristic of the Upper Paleolithic manufacturing.

A Chronological Structure in Middle Paleolithic Assemblages

There is a chronological structure in the variability of the Mousterian assemblages:

- Isotopic stage 7 (250,000–200,000 BP) corresponding to an interglacial phase. The assemblages are showing the apparition of the Levallois technique (defining the beginning of Middle Paleolithic) in a general flake core production industry. But blade technology is also known.
- Isotopic stage 6 (200,000–135,000 BP) corresponding to a glacial phase. The assemblages are showing the importance of the Quina technology (side scrapers).
- Isotopic stage 5 (135,000–75,000 BP) corresponding to an interglacial phase. The assemblages are showing the abundance of the Levallois technique. The blade prismatic core technology is present.
- Isotopic stage 4 (75,000–60,000 BP) corresponding to a pleniglacial period. The assemblages are showing a dominance of side scrapers and/or notches/denticulate types. The Levallois technique is decreasing progressively at the transition between the isotopic stages 5 and 4.
- Isotopic stage 3 (60,000–34,000 BP) corresponding to a interpleniglacial phase:

  At the beginning of OIS 3, the assemblages are defined by a new development of the Levallois technique; the apparition of bifacial points, hand axes, and knives; and the apparition of a blade Levallois technique and of a blade prismatic technique, anticipating the rapid emergence of the transition industries during the second part of the OIS 3.

Raw Material Procurement and Middle Paleolithic Assemblage Variability

The researches of the outcrops of raw material for Paleolithic sites have been multiplied since the last 20 years. There is globally a main opposition between Middle Paleolithic and Upper Paleolithic raw material procurement for lithic industry. The Upper Paleolithic raw material is quite totally flint, while Middle Paleolithic raw material has been made from various stone materials including local flint.

For example, in the Armorican Massif (western France), the raw material list includes flint, various sandstone, dolerite, phtanite, quartz, and tuff (Monnier 1991). In Liguria (Italy), Middle Paleolithic industries are using local quartzite, siliceous limestone, rhyolite, and jasper (Negrino & Starnini 2003). In central Europe, region where the flint is rare, the material used is quartzite, opal, jasper, radiolarite, and porphyry.

Recent studies are confirming that the procurement distance for Middle Paleolithic sites is less than about 20 km or equivalent to a day walking (Feblot-Augustins 1997), revealing the weak mobility of Middle Paleolithic groups. Nevertheless, the sample of Middle Paleolithic sites concerned by such a synthesis is mainly western and central Europe sites dated from OIS 4 and few from OIS 6 pleniglacial periods. We have quite no information concerning OIS 5 Middle Paleolithic sites.

The difference in the quality of the raw material explains a correlation between raw material quality and tool type. For example, in the Middle Paleolithic site of Karreg-ar-Yellan (Brittany, France), side scrapers, points, and hand axes are made for 65 % with flint and 35 % with microgranite; notches and denticulate and other retouched flakes are made for 65 % with

microgranite and 35 % with flint (Huet et al. 2003). Such a variability is enough to create the first factorial axis opposing side scrapers to notches/denticulate in the PCA discussed before (§ 3). Generalizing such examples, it is possible to conclude that the variability of the ratio "side scraper/notches + denticulate" may be associated with the raw material variability and no longer with culture (Bordes), function (Binford), or chronology (Mellars).

The European Middle Paleolithic to Upper Paleolithic Transition and the Early Upper Paleolithic

Several important changes have been recorded during the isotopic stage 3:

- An important change of the Mousterian assemblages as defined previously: the Mousterian of Acheulean tradition in western Europe, the Micoquian industries in central and eastern Europe, the Levallois blade technology industries like the Bohunician (Oliva 1984) in central Europe and the Kremenician (Stepanchuk & Cohen 2000–2001) in eastern Europe.
- And then, after 40,000 BP, the apparition of the so-called "transition" industries, some of them correlated with the reoccupation of the central and northern European territories: southern Italy (Uluzzian), western Europe (Chatelperronian), central Europe (Szeletian), eastern Europe (Streletian, Gorotsovian), southeastern Europe (Bacho-Kirian), west-northern Europe (Lincombian), northern Europe (Jerzmanowician), and east-northern Europe (Ouralian). At the same time, in the upper Danube basin and along the western Mediterranean coast, the first stage of the Aurignacian industry (Very Early Aurignacian) is emerging. But simultaneously, in the southern Iberia and in Crimea, the late presence of Middle Paleolithic assemblages is actually showing no process of transition until a Late Aurignacian.

During the isotopic stage 4, the glacial climate reduced the peopled areas to southern and middle Europe through closed areas, increasing endogamous reproduction, at the origins of the accentuation of the west European Neanderthal morphocranial features. During the isotopic stage 3, Europe is opening again, helping the repopulation of middle and northern Europe, and then crossing populations and accentuating the mobility of the human groups. At the beginning of the isotopic stage 2, from 34,000 BP, the climatic variability is announcing after a succession of oscillations, the progressive come back of the pleniglacial climate. Between 34,000 and 21,000 BP, all Europe is seeing a process of standardization of the lithic industries at the origin of a blade and bladelet Upper Paleolithic industry starting with the Early Aurignacian and finishing with the Late Gravettian, balanced by the progressive closing of the European space.

The Territory Management During Late Middle Paleolithic and Early Upper Paleolithic

For Middle Paleolithic sites, the distance of raw material procurement from the site of about 20 km defines the size of the territory of traveling of an Middle Paleolithic human group (1,000 km^2) and then their food resource management. When the food resources, mainly herbivores (aurochs, bison, horse, deer, reindeer, ibex, etc.), are being exhausted by hunting, the group is obliged to leave its dwelling and to move elsewhere. Such a type of territory resource management is called "Local Opportunist Strategy" (Djindjian 2009a).

During the stage of polymorphic diversification of the "transition" industries (Djindjian et al. 1999), the actual data are showing a progressive change in the territory resource management, from a "Local Opportunist Strategy" towards a "Restricted Planed Strategy" with territories growing until 10,000 km^2 and more (Djindjian 2009a). This is then the emergence of the territory in the sociology of the hunter-gatherer groups.

A major change occurred with the Early Upper Paleolithic, the stage I (Early) of the Aurignacian after 34,000 BP. The procurement of flint, often at long distances (several hundred kilometers) depending of the availability of outcrops of good flint in the territory (and also sea or fossil shells); the specialization in the hunting of

herbivores; and the spatial organization of seasonal dwellings are argumenting the evidence of a large territory until 100,000 km^2, where the groups are circulating in and meeting altogether. Such a type of territory resource management is called "Extensive Planed Strategy" (Djindjian 2009a).

The "Extensive Planed Strategy" is known in the European Upper Paleolithic with Aurignacian, Gravettian, and Magdalenian, corresponding to large territories, with high mobility of human groups and consequently a general uniformity of the material culture. In a recent paper (Djindjian 2009a), we have defined several types of territory resource management in association with the main European cultural facies:

– Middle Paleolithic industries	"Local Opportunist Strategy"
– Transition industry	"Local Opportunist to Restricted Planed Strategy"
– Aurignacian	"Extended Planned Strategy"
– Pavlovian	"Semisedentary Strategy"
– Gravettian	"Extended Planned Strategy"
– Lower Solutrean	"Local Opportunist Strategy"
– Upper Solutrean	"Summer Mobility Strategy"
– Early Badegoulian	"Local Opportunist Strategy"
– Late Badegoulian	"Summer Mobility Strategy"
– Sagvarian	"Summer Mobility Strategy"
– Steppe zone Industries	"Summer Mobility Strategy"
– Magdalenian	"Extended Planned Strategy"
– Mezinian	"Semisedentary Strategy"
– Southern Epigravettian	"Restricted Planed Strategy"
– Epipaleolithic	"Restricted Planed Strategy"

The identification of a territory management strategy is a new approach in Paleolithic studies, based on the superposition of the circulation of groups due to raw material procurement, food resource management, and seasonal site locations, registrated in the annual cycle. If the data are now more and more available to identify the Upper Paleolithic strategies, it is not the case for Middle Paleolithic strategies where the researches have started since very few years. With better dated Middle Paleolithic sites, it would then be possible to confirm the evidence of a "Local Opportunist Strategy" for OIS 4 Middle Paleolithic sites and to look at, as expected here as a consequence of our model, different strategies for Middle Paleolithic sites in the OIS 5.

The Material Culture Contradictions of the Standard Model

The change of the material culture of the Lower and Middle Paleolithic is generally studied as a general technological evolution model of stone knapping (Leroi-Gourhan 1964–1965) based on progressive efficiency in producing more numerous blanks to make tools. Recent data have supported contradictions to this model.

The first apparent contradiction is the evidence of blade and bladelet core technology in the Middle Paleolithic industries at various times, from OIS 7 to OIS 3.

The first blade technology in an Middle Paleolithic industry is the well-known Tabun D type, in the Levant, dated essentially from OIS 7 to 8 between 260,000 and 180,000 BP. No human remains are associated with such an industry (Bar-Yosef & Kuhn 1999; Bar-Yosef & Meignen 2001). Blade industries are also appearing in northwestern Europe during OIS 7–8 (Saint-Valery-sur-Somme).

During OIS 5, blade industries are now well known all over Europe: France, Belgium, Rhineland, and Poland (Tuffreau & Révillon 1994; see also the workshop of 6–7 April 2006 in Bordeaux ("The laminar phenomena during Middle and Upper Palaeolithic in Eurasia"): Riencourt les Bapaume, Seclin, Bettencourt Saint-Ouen, Rocourt, Vanne river in Yonne region, Bergeracois, etc.).

At the beginning of OIS 3, the development of a Levallois technique may be adapted to a production of blades and bladelets, associated sometimes with a blade and bladelet prismatic core production. In the Levant (Boeda & Bonilauri 2006; Pastoors et al. 2008; Otte & Kozlowski 2009), after the OIS 4 Tabun B Middle Paleolithic industry, are known industries showing a strong dynamic of technical innovations: a mix of Levallois technology and blade prismatic technology or bladelet knapping on Levallois technology. A similar process appears in eastern and central

Europe with the development of Levallois laminar technology: Bohunician and Kremenician, participating to the reoccupation of the middle and northern Europe. Alternative technologies using bifacial points and bifacial knives are also participating to the same process (MTA, Micoquian), reinventing the features of the multiuse portable hand axe of the Acheulean (see below).

Another interesting example is the lower Rhone basin where a local industry around 40,000 BP, the Neronian, is characterized by the production of blades and bladelets, and the development of microliths made on a good quality flint procured at a distance more than 100 km. The Neronian is superposed by a Late Mousterian and then by a Very Early Aurignacian (Slimak 2008).

The second apparent contradiction is the comeback of a flake core industry made on various raw material procurement during Upper Paleolithic, at the time of the maximum ice age in the periods called Lower Solutrean and Early Badegoulian in western Europe. It is interesting to point out here the archaic features of the Lower Solutrean industry which are at the origins of a hypothesis about the origins of the Solutrean directly from a Very Late Mousterian in the lower Rhone basin (Smith 1966). It is also interesting to remember the Badegoulian has often been considered as the "ugly" Upper Paleolithic industry, coming just after the Upper Solutrean leaf points, considered as the Upper Paleolithic "most esthetic" industry (Bordes 1968). The real reason of such a change is the withdrawal of the territories of the middle Europe by the Gravettian groups when the climate is at the maximum ice age around 21,000 BP. Going down to the southern Europe, the groups have lost all the knowledge about flint raw material outcrops and specialized herbivore hunting and have been obliged to regress to a "Local Opportunist Strategy" and various bad quality raw material procurement like the Mousterian during OIS 4 but with a long tradition of blade prismatic core technology they have not forgotten. When the climate has changed towards a more humid but always very cold period first between 20,000 and 19,000 BP (Upper Solutrean) and second between 18,000 and 16,500 BP (Late Badegoulian), then the groups have moved towards a "Summer Mobility Strategy" which allows them to circulate to the north, during the summer, to exploit again the good flint outcrops and the resource of the migrating herbivores (reindeer). It is the case in western Europe (Upper Solutrean, Late Badegoulian), in central Europe (Sagvarian, Epigravettian), and in eastern Europe (walking up the Dniester, the Dnepr, and the Don valleys).

A Mobility Process Is Explaining Also the Material Culture Variability

We are introducing here an explaining variable, the mobility, which is playing a major role in the process of adaptation of the human groups with their environment, at a given time, in a given physical geography and under a given climate. The mobility of the human groups is associated with the size of a territory in which the network of the human groups is circulating and meeting altogether, during the annual cycle and with their food resource management strategy, as those we have defined above.

The mobility process is involving all the technical, organizational, and social solutions which may get easier the mobility of the human groups. At the level of the material culture, they concern mainly the toolkit and the dwelling architecture.

The toolkit needs to be easily portable. The technical solution of the blade and bladelet prismatic core allows producing standardized and numerous blanks more easily than an Middle Paleolithic flake core. The invention of the blade and bladelet production is due to a functional need and not to the evolutionist model proposed by A. Leroi-Gourhan (1964–1965). It is because the invention has already been made before (OIS 5 and 7) for certainly the same reasons and because a regression has also occurred during the Upper Paleolithic at the maximum ice age of OIS 2.

The spatial distribution of the tool manufacturing process is very different between the Middle Paleolithic and Upper Paleolithic industries. In the Middle Paleolithic industries of OIS 4, the raw material origin is very near from the permanent dwelling, and all the products of the core reduction sequence are generally

found inside the site. In the Upper Paleolithic industries of OIS 2, where the raw material outcrops are often very far from the site (until several hundred kilometers), the cores are prepared directly at the outcrop, they may be stored in a cave or rockshelter bivouac easy to be found again, and they are carried by hunters who can produce blanks when they need it during the travel or in a seasonal site, until complete exhaustion.

It could be untimely to suggest some kind of analogous process for Acheulean during the temperate period OIS 12 to 9, with the hand axes. Such a portable artifact may be considered both as a multiuse tool for chopping and a core to produce flakes for cutting. Their comeback during the beginning of OIS 3 (MTA, Micoquian) may be considered as an alternative to blade solutions.

In conclusion, during the temperate periods, the increasing of the mobility of human groups has for consequences the long-distance circulations, the Extended Planned Strategies over large territories and portable tools. During the cold periods, the decreasing of the mobility of human groups has for consequences the short-distance circulations, the Local Opportunist Strategies over small territories and tools produced and used inside the permanent dwelling.

Then we may change the proposal of A. Leroi-Gourhan (1964–1965: 192, Fig. 64) who sees an optimization of the production (number) of blanks (cutting edge length for 1 kg of material) inside an evolutionist model, by an optimization of the lightness of the blanks inside an adaptation to the environment. Consequently, the technical evolution of the knapped stone industry, which is traditionally seen as a long cognitive process, must be revisited as a serendipity process. Such a conclusion is not so surprising when, by experience, it is easy to understand how to pass from a chopper or a chopping tool to a hand axe (by flaking all around the piece), from a hand axe to a Levallois flake (by knapping on the butt of the hand axe to obtain a Levallois flake), from a Levallois core to a prismatic core (by pivoting 90° the core and using the lateral edge as a crest blade), from a Quina side scraper to a bladelet prismatic core, etc. Then, the invention of the blade or bladelet prismatic core may be seen not as a technical revolution but just as an invented and reinvented technical potential for a functional need.

The Emergence of "Art"

The evolutionist theory of Paleolithic art proposed by A. Leroi-Gourhan (1965) has been refuted by the recent discoveries of caves and radiocarbon dates made on progressive more numerous paintedly figures. It appears that cave art, like portable art, emerged very quickly with the beginning of Aurignacian (Early or phase I) around 34,000 BP (for a detailed discussion of data, see Djindjian 2004a). There is actually no evidence of animal figurative or schematic representations in the previous period during the "transition industries" or with the Very Early Aurignacian (phase 0), but only few ornament objects (if they are not coming from an upper Aurignacian layer like in the case of the reindeer cave in Arcy-sur-Cure).

When it emerged in the Early Aurignacian, the technical control of the animal figurative representations seems to have been immediate both in cave art like in the Chauvet cave in the Rhone basin and in the portable art like in the Geissenklosterle rockshelter in the upper Danube basin. This means that the emergence of this so-called art was not a cognitive question but an invention corresponding to the need for a function (to be discovered) inside the human group.

A new explanation for the variability of animal species figurations in the both cave and portable art has been recently proposed (Djindjian 2004b, 2009b). It is based on a correlation, at the scale of territory, between the regional mammal zoocenoses, the bone taphocenoses of the Paleolithic campsites, and the cave iconocenoses (bestiaries). The conclusions of the studies are revealing several types of bestiaries for each period (Aurignacian/Gravettian, Solutrean/Badegoulian, and Magdalenian). A type of bestiary is identifying a territory, and the cave is a symbolized representation of the territory through the zoocenoses living in. The caves, often located in the frontiers of the territory, are marking the territory of the hunter groups.

The animal representations in the cave and portable Paleolithic art have then a function associated with the territory of the network of human groups, marking and symbolizing their territory.

It is certainly the reason for which there is no portable and cave art in the European MP, because there is no defined territory associated with a "Local Opportunist Strategy." The MP groups are leaving their dwellings when they have exhausted the food resource of their small 1,000 km^2 area and they are searching for a new location elsewhere. The links between groups are then much weaker and the meeting of two groups is more randomly than planned. The difference between Middle Paleolithic and Upper Paleolithic systems is then also a difference of social organization.

Change of System or Change of Peopling?

The argumentation we have developed previously has concluded that the material culture change between Middle Paleolithic and Upper Paleolithic industries may be explained by mobility changes associated with different territory management and social organization of the human group network.

Consequently, it is not possible to use those differences as arguments to conclude that Middle Paleolithic industries are made by Neanderthals and Upper Paleolithic industries by modern men. We also point out that in Middle East, both Neanderthals and modern humans are responsible for making Middle Paleolithic industries. It is also the case in Africa, where modern humans are making Middle Paleolithic industries (Middle Stone Age, Aterian).

Results of genetic studies are more confusing. A difference of 99.5–99.9 % between the genome of Neanderthals and modern humans has been published argumenting the absence of interbreeding aptitude, and then they are contributing to the hypothesis of the arrival of modern men and the extinction of Neanderthals (Krings et al. 1997). But more recent studies are informing us there is a common genetic stock of 1–4 % between the two genomes (Green et al. 2009). It involves a greater complexity of the anthropological model where the replacement hypothesis could be challenged by an interbreeding hypothesis including or not a local evolution model, in which the role of the archaic features is much more emphasized.

But the definitive arguments for elaborating the models may only be based in the discovery of sufficient human bone remains in reliable stratigraphic sequences and associated with industries. Such data are lacking today in Aurignacian sites (Churchill & Smith 2000; Henry-Gambier 2002). Either we have very few bone remains, difficult to attribute definitively to the modern man, or we have intrusive bones into the Aurignacian layers like in Vogelherd (Conard et al. 2004), Velika Pecina (Smith et al. 1999), Hahnöfersand 1, and Zlaty Kun (most of them have played an important role in the thesis of the arrival of the modern man), or owning to uppermost Gravettian layers like in Cro-Magnon (Djindjian et al. 1999; Henry-Gambier 2002), or we have unquestionable modern man bone remains but in a questionable stratigraphic context like in Mladec (Wild et al. 2005; Teschler-Nicola 2006) or we have radiocarbon dated bone remains but without archaeological context like in the cave bear of Pestera cu Oase in Romania (Trinkaus et al. 2003). The human remains coming from Late Aurignacian remains (e.g., Les Rois or La Crouzade), considered as modern men, are nevertheless indicating that around 30,000 BP, the process of modernization (whatever the model) is progressing rapidly. Perhaps, such a position would be considered too pessimistic. Looking at the last inventory of human remains in an Aurignacian context, favorable to the hypothesis of the replacement of Neanderthal by the modern man (Hublin 2010, in Otte), it is always not totally convincing they are proving such hypothesis, due to a lack of definitive evidence like that given by an adult burial found in a Aurignacian layer. The archaic features of various limited and often juvenile bone fragments, of which the interpretations are often different among the specialists, are always opening the way to alternative explanations.

Conclusions

The Middle Paleolithic to Upper Paleolithic transition in Europe may be interpreted as a change in the economic and social organization of groups of hunter-gatherers, independent of the actors involved by the transition. The key to understanding such a transition is a better knowledge of the Middle Paleolithic system at the same level of

information we have actually for the Upper Paleolithic system: chronology, thin climatic changes, food resource management system, raw material procurement, and mobility in association with the material culture. We need also to make some methodological revolution in trying to think process and no longer to classify data, either through a morpho-typology like in the fifties or trough a techno-typology since the eighties. In archaeology, the research for origins somewhere or elsewhere is always like the "Tartar desert" syndrome. The discovery of a successful process does not need to find its initial "big bang" but only its significant effect.

Cross-References

- ▶ Central Asia: Paleolithic
- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Crimean Middle Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ Northern Europe: Middle to Upper Paleolithic Transition

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European Middle to Upper Paleolithic Transitional Industries: Châtelperronian

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State of Knowledge and Current Debates

About 45,000 years ago, anatomically modern humans migrated into Europe, and a few

thousand years later Neanderthal populations had completely vanished from Europe. This replacement of the local populations by anatomically modern humans also happened in the rest of Eurasia. It explains why today we are the only human species on the planet when Hominin groups flourished for several million years.

The Châtelperronian industry (*Châtelperronien* or *Castelperronien* in French) is considered to be the very last behavioral testimony of Neanderthals in France and northern Spain. For a few millennia, Neanderthals switched to systematic blade production, focused on stone knives that could also be used as projectile points, and in some instances produced domestic bone tools and used black and red pigments as well as personal ornaments.

What appears to be a brief episode, compared to other Late Pleistocene industries, is indeed often considered as a Neanderthal *"swan song."* Châtelperronian behaviors are actually part of a more global industrial change and evolutionary trajectory. This global industrial change would have been driven by the search for stone-tipped weapons, and possibly correlated with new organic and lithic material procurement strategies as well as a new social network organization (Bon 2010). The model of a clear-cut revolution with the arrival of modern Humans in Europe (Mellars & Stringer 1989) was put forward in the mid-1980s. At that time, it was grounded on available data on Neanderthal behavior, which were a compilation of Neanderthal behavior over the Middle and the Late Pleistocene. During the last decade, new data on Neanderthal behavior during the last glacial cycle (including Neanderthals right before the peopling of Europe by modern humans) nuanced this model. In fact, almost every behavior previously thought to be unique to anatomically modern humans was shared, at least occasionally, by Neanderthals; image production on durable support is still one major difference (d'Errico 2003; Soressi 2005; Peresani et al. 2011). The Châtelperronian no longer appears as an *"avatar of a dying middle Paleolithic but [indeed] as the first machinery of an Upper Paleolithic to become"* (Bon 2010: 139).

Because the Châtelperronian is in a stratigraphic position at the crossroads of the Middle and Upper Paleolithic, because it is of Upper Paleolithic type, and because only Neanderthal remains were discovered associated with it, the Châtelperronian is often called a "transitional industry." Even if Mousterian "souvenirs" had been actively searched within Châtelperronian industries, they are almost nonexistent (see below). It is indeed clear that the Châtelperronian is neither an intermediate between the Middle and the Upper Paleolithic nor a mix of Middle and Upper Paleolithic behaviors. On the contrary, it is a unique set of behaviors that shares commonalities with contemporaneous industries.

It is interesting to note that the use of contemporary ideological construction is sometimes pleaded for (e.g., Zilhão et al. 2008) to contest interpretative models of the Middle to Upper Paleolithic transition. This passion is also visible in popular science movies and journals, and certainly illustrates how much Paleolithic archaeology can be a popular topic grounded on an ongoing debate. This entry aims to summarize the current state of understanding on a highly debated topic: the nature and significance of the Châtelperronian.

The Recognition and the History of the Châtelperronian

The Châtelperronian was originally defined by H. Breuil after the lithic industry found at the cave of fairies ("la grotte des Fées") in Châtelperron, a small village in central France. This industry contained a specific blade and point with a back shaped with abrupt retouches, the back of the point type being curved. Breuil emphasized the similarities between the Châtelperronian and the Abri Audi type industry, later attributed to the Mousterian of Acheulean Tradition (MTA), especially the high frequency of backed blades and poorness of bone tools. For Breuil, the Châtelperronian as well as the Mousterian of Acheulean Tradition were the first stage of the Upper Paleolithic. At the time, the Upper Paleolithic was divided into "Lower Aurignacian" (MTA and Châtelperronian), "Middle Aurignacian" (the actual early

Aurignacian), and "Upper Aurignacian" (the actual Gravettian); these were all clustered within pre-Solutrean sites (Breuil 1909–1911).

Twenty-five years later, D. Peyrony put the emphasis on what he called the Perigordian complex (*Périgordien complex* in French). He suggested that the Châtelperronian and the Gravettian were part of the same phylum, as they shared an emphasis on backed pieces with abrupt retouches. The "Middle Aurignacian" would be indeed intrusive in southwestern France and would have developed there, while the Perigordian would have found refuge in remote places and would be indeed only exceptionally visible in the archaeological record (Peyrony 1936).

With the start of the second half of the twentieth century, Peyrony's theory and the Perigordian phylum started to be disputed, first by H. Delporte. From his excavation and study of Châtelperron and La Gravette, Delporte advocated that these industries are not genetically related and should be named Châtelperronian and Gravettian (Delporte 1954). D. Sonneville-Bordes argued that the second stage of the Perigordian complex, the "Périgordien II," results from mixing the Aurignacian with some intrusive backed pieces (Sonneville-Bordes 1955). However, Sonneville-Bordes as well as others (including F. Bordes and L. Pradel), were convinced of the evolutionary link between what they renamed the Lower Perigordian (equivalent of the former Perigordian I, i.e., the Châtelperronian) and the Upper Perigordian (actual Gravettian). They used the interstratification Châtelperronian and Aurignacian recognized in 1967 at Le Piage and Roc-de-Combe as evidence of contemporaneity of the two industries (see references to original publications in Bordes 2003). And, they indeed supported Peyrony's view that the Aurignacian episode was caused by the intrusion of a non-local group into the Perigordian territory.

The debate went on through the 1960s but lost some of its interest during the following two decades. It eventually shifted towards the independence between the Châtelperronian and Gravettian when the first radiometric dates showed that the two industries were separated by about 10,000 years (Mellars et al. 1987). The interstratification between the Châtelperronian and Aurignacian were also shown to be not of anthropic origin and related to geological disturbance (Bordes 2003). Finally, another attempt to support potential interstratification (Gravina et al. 2005), or at least evidence for contemporaneity between the Aurignacian and Châtelperronian, was recently put forward but seems to suffer from insufficient demonstration (see Zilhão et al. 2008).

In fact, the major change of perspective on the Châtelperronian came at the end of the 1970s and was caused by the unexpected discovery of Neanderthal remains, and noticeably an almost complete skeleton, in a Châtelperronian context (Lévêque & Vandermeersch 1980). The Gravettian, Aurignacian, and Châtelperronian were not only technically different industries but were also generated by two biologically different human populations. The equation between the Middle Paleolithic type industry and Neanderthals, or Upper Paleolithic type industry and anatomically modern humans, then started to be questioned in Europe, as it had already been questioned in the Near East.

The Makers of the Châtelperronian

Châtelperronian human remains (some of which are illustrated in Fig. 1) are overwhelmingly more abundant than human remains found in the late Mousterian or in early phases of the Aurignacian. There are 29 isolated teeth, one temporal bone, and other fragmentary remains in the Châtelperronian from Grotte du Renne at Arcy-sur-Cure. All the teeth but one were assigned to the reference Neanderthal group with posterior probabilities ranging from 59 % to 99.9 % (Bailey & Hublin 2006). The morphology of the Grotte du Renne inner ear preserved in the temporal bone is typical of Neanderthal morphology (Hublin et al. 1996). Châtelperronian human remains also include one nearly complete skeleton and some extra isolated teeth found at Saint-Césaire (Lévêque & Vandermeersch 1980). Taxonomic attribution for the Saint-Césaire skeleton has been confirmed by several authors, and the Saint-Césaire isolated teeth also display

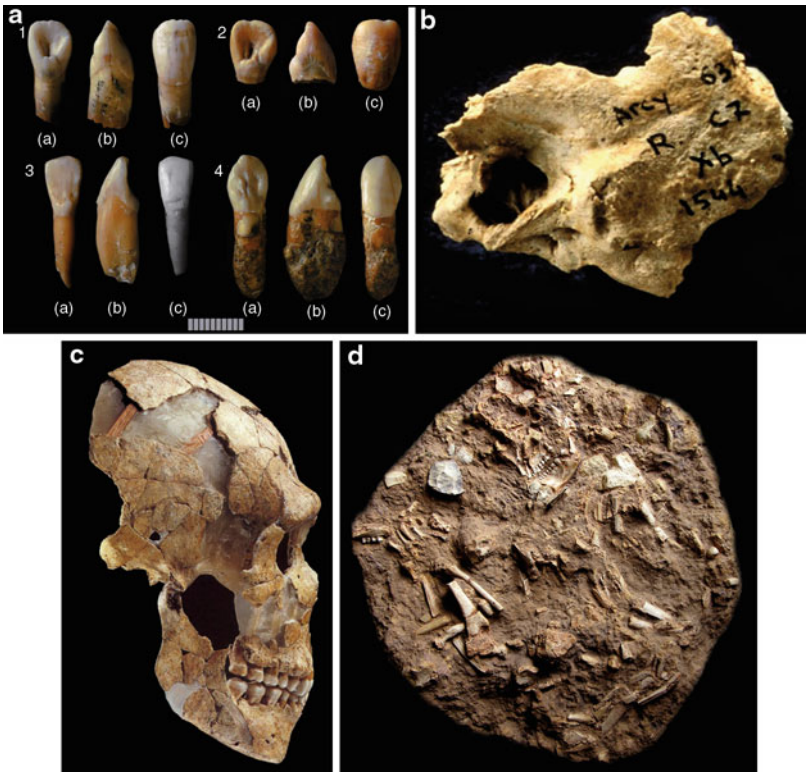

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 1 Châtelperronian human remains from Grotte du Renne at Arcy-sur-cure (**a**: teeth and **b**: temporal bone), and from Saint-Césaire (**c**: in-situ skeleton and **d**: close up of the skull of the skeleton after reconstruction) (After Bailey & Hublin 2006; Hublin et al. 1996; photo of the cast of the in-situ skeleton © Soressi)

a Neanderthal morphological pattern (Bailey & Hublin 2006). By comparison, the number and quality of human remains attributed to the Protoaurignacian are much lower, only some fetal remains and one deciduous tooth, and none of them are diagnostic (Hublin in press).

Nevertheless, the view that the Châtelperronian was made by Neanderthals was recently challenged, primarily by questioning the stratigraphic integrity of key sites, rather than discovering new human remains that would have directly challenged the Neanderthal signal for the Châtelperronian. It was suggested that Neanderthal remains found at the Grotte du Renne result from contamination from underlying Mousterian layers. This conclusion was reached thanks to the analysis of a series of ^{14}C AMS dates that were inconsistently variable in the Châtelperronian layer (Higham et al. 2010). However, 31 new ^{14}C measurements falsify the notion that large-scale movements of archeological material occurred between the Mousterian, Châtelperronian, and Proto-Aurignacian layers at the Grotte-du-Renne and questioned the sampling methodology in the first study (Hublin et al. 2012; see details below in the chronology section). Reworking of the Neanderthal remains from the underlying Mousterian layers is inconsistent with the fact that these Mousterian layers contained very few human remains, and last but not least Neanderthal remains were found throughout the four Châtelperronian layers at Grotte du Renne, not only the lowermost one (Hublin et al. 2012).

The Neanderthal nature of the makers of the Châtelperronian was also indirectly challenged by criticizing the local origin of the Châtelperronian. If the origin of the Châtelperronian is not within the local Mousterian of Acheulean Tradition type B, as put forward first by H. Breuil (1909-11), it opens the door for a non-Neanderthal origin. This hypothesis is also intriguing inasmuch as anatomically modern human remains had been recently published in another so-called "transitional" industry: the Uluzzian from Italy (Benazzi et al. 2011).

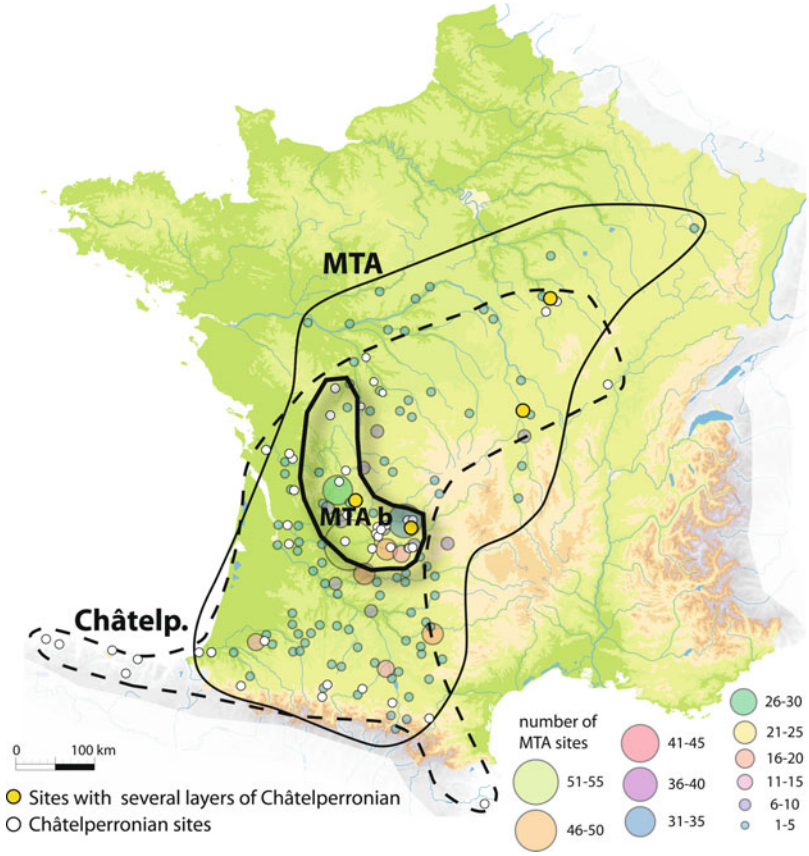

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 2 Map of the distribution of the Mousterian of Acheulean Tradition (MTA; *bolded line*), the Mousterian of Acheulean Tradition type b (*shaded line*) and the Châtelperronian (*dotted line*)

Yet, arguments for a local Mousterian of Acheulean Tradition origin for the Châtelperronian are as follows:

1. The Mousterian of Acheulean Tradition and the Châtelperronian share a unique interest for backing tools and for unretouched backed blanks,
2. They also share a unique combination of elongated and backed blanks or retouched tools, which does not exist in any other contemporaneous industry,
3. The necessity to obtain backed artifacts (retouched and unretouched) is actually guiding the production of Mousterian of Acheulean Tradition elongated flakes (Pelegrin & Soressi 2007; Soressi 2005) as well as the production of Châtelperronian blades (Roussel 2011 & in press). Backed elongated flakes and backed blades (i.e. with an asymmetrical transversal section) are obtained directly during the production. The method used to produce blanks within the two industries is relying on the obtainment of a high quantity of backed blanks, some of which will be retouched. Some extra backed artifacts, retouched backed knifes and châtelperron points, are obtained through a-posteriori retouch of blanks symmetric in section.
4. Geographic distribution of the Châtelperronian matches outstandingly that of the Mousterian of Acheulean Tradition (Fig. 2), and they are chronologically compatible (Soressi 2005).

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 3 Map of Châtelperronian sites (sites with several layers of Châtelperronian are indicated in *yellow*) (modified from Pelegrin & Soressi 2007 and from Roussel 2011)

Geographic Distribution

The Châtelperronian point or knife is quite distinctive from other Paleolithic retouched artifacts and allows for a quite easy diagnosis of Châtelperronian sites (Pelegrin & Soressi 2007). The map of Châtelperronian sites is indeed reliable. In contrast to other industries of the Middle or Upper Paleolithic, the geographic distribution of Châtelperronian sites is relatively small (Fig. 3). A little more than 40 sites have been recognized on an arch about 300 km wide, which fits closely the west half of the Massif Central. They are found from Burgundy, with the famous site Grotte du Renne at Arcy-sur-Cure, extending through the Dordogne Valley, down to Cantabria, with Cueva Morin,

and the Oriental Pyrenees with Le Portel (Fig. 3). No Châtelperronian sites were found in the Rhone valley, in southeastern France, or in northeastern France, in the heart of the Parisian basin or in Brittany.

Dating

The Châtelperronian is always interstratified between Mousterian and Aurignacian layers (see details about putative stratification Châtelperronian/Aurignacian/Châtelperronian above). If this stratigraphic position is clear, precise dating of the Châtelperronian with radiometric methods is nonetheless difficult. The ^{14}C method is at the edge of its time range, and the radiocarbon community agreed only recently on a calibration curve for the time range covered by the Châtelperronian. Specific methods were recently developed to cope with the very low percentage of carbon 14 contained in such old samples as well as with contamination issues (Higham et al. 2010; Hublin et al. 2012).

How to properly date Châtelperronian samples is intensely debated, as illustrated by a series of papers published on the Grotte du Renne deposits. First, 31 accelerator mass spectrometry (AMS) ultrafiltrated dates on bones, antlers, bone artifacts, and teeth indicated that the Châtelperronian from Grotte du Renne was 44 to 40,000 years old (cal. BP). The high degree of intralayer variation in the radiometric dates obtained was used by the authors to support admixture between the Châtelperronian, Mousterian, and Protoaurignacian (Higham et al. 2010). It is interesting to note that this latter conclusion was put forward assuming that enough progress has been made within ^{14}C dating to make it totally reliable and to become a piece of data supporting site integrity on its own. This former conclusion was first contested and discussed in a series of papers that showed that there were several arguments grounded on the study of the archaeological material to show that there was no major mixing between layers at the Grotte du Renne. Also, 35 new measurements were recently performed with a different sampling strategy aiming at the acquisition of well-preserved collagen, by selecting bigger and thicker samples of cortical bone (Hublin et al. 2012). These have shown that:

1. younger ages obtained by the first study were certainly related to a low collagen content
2. no mixing could be deduced from new AMS ^{14}C measurements done on bone with high percentage of collagen content,
3. the age of the Châtelperronian at the site fits between 45,000 and 40,500 years cal. BP with a 2 sigma range. This fits with other ages obtained at other sites with the same method (Fig. 4).

Characteristics of the Châtelperronian Lithic Industry

The first extensive study of Châtelperronian lithic industries was done by F. Harrold (1978), who studied 19 Châtelperronian assemblages from France and northern Spain (after having reviewed more than 100 potential Châtelperronian assemblages). Using Sonneville-Bordes and Perrot stone-tool type lists, Harrold highlighted the recurrent features of the Châtelperronian. He showed that the Châtelperron points/knives are typical of the Châtelperronian, and they count for up to 60 % of the typological count. Châtelperron points or knives go with end-scrapers and burins. The typological spectra of these Châtelperronian assemblages allowed Harrold to conclude that the Châtelperronian is a *"distinct lithic tradition of the earliest Upper Palaeolithic"* (Harrold 1978: 435).

A new approach to the Châtelperronian lithic industry was brought in by J. Pelegrin in the mid-1980s (Pelegrin 1995). From his analysis of cores, stone-tools, and by- and end-products found at two Châtelperronian sites in southwestern France (Roc-de-Combe and La Côte), he provided the first description of the Châtelperronian "*chaîne opératoire*." For a long time, his study was in fact one of the rare detailed *chaîne opératoire* analyses available for the Late Pleistocene. Pelegrin showed that Châtelperronian cores are aimed toward the production of rectilinear blades, and that they are organized with a narrow and wide surface, the narrow surface being a maintenance surface. Blades obtained on the wide surface and with

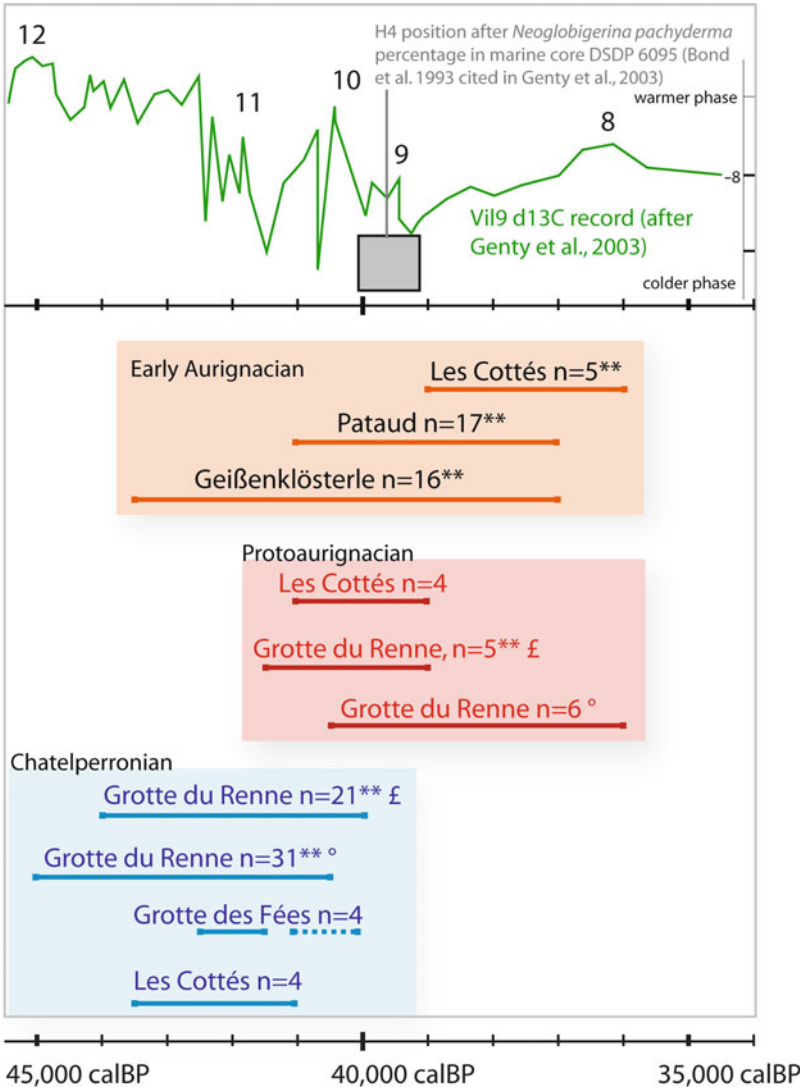

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 4 Two sigma intervals for ages obtained using AMS and ultrafiltrated ^{14}C samples and calculated using a Bayesian model of Châtelperronian and other western European contemporaneous Early Upper Paleolithic industries. Les Cottés: see Talamo et al. 2012; Grotte de Fées: see Gravina et al. 2005; Grotte du Renne: see Higham et al. 2010; Hublin et al. 2012; Pataud: see Higham et al. 2011 cited in Higham et al. 2012; Geißenklösterle: see Higham et al. 2012. The number of samples is indicated. ** indicates that more than one level was studied. D13C record from the Villars stalagmite indicates a probable warm short event as recorded on the continent in the north of the Aquitaine basin (see Genty et al. 2003). The position of the Heinrich event 4 is also indicated after Bond et al. 1993, cited in Genty et al. 2003

regular edges are selected to be retouched into Châtelperron knives or points. Larger and thicker blades are retouched into end-scrapers, burins, or retouched blades. End-scrapers are also made out of flakes produced during the shaping of the core. From a detailed analysis of blade platforms, Pelegrin argued for the use of a soft hammer or a soft stone hammer during Châtelperronian blade production (Pelegrin 1995: 252). Scarce bladelet production was observed in both sites, but without any evidence of retouched bladelets.

Pelegrin argued that Châtelperronian lithic production is specific and shows strong differences from that of the Early Aurignacian. He indeed concluded that differences between Châtelperronian and early Aurignacian debitage did not support the hypothesis of an acculturation of the last Neanderthals by the first anatomically modern Humans (d'Errico et al. 1998). However, Pelegrin actually brought new data supporting a link between the Mousterian of Acheulean Tradition type B and the Châtelperronian. From his analysis of two MTA B assemblages, he showed that the MTA B and the Châtelperronian shared an emphasis on backed pieces made on elongated flakes or blades. This was later one

confirmed by extensive analysis of several other MTA B assemblages (Soressi 2005). Pelegrin main point was that this peculiar retouched tool should be linked to a specific kind of hafting, and indeed reflects a similar technical answer to comparable needs (Pelegrin 1995; Pelegrin & Soressi 2007).

Building on Pelegrin's pioneering work, a detailed analysis of the Grotte du Renne at Arcy-sur-Cure began. The totality of this abundant collection was studied by N. Connet (2002). She refined the understanding of variations through time and showed an increasing use of flint relative to other raw materials, coupled with an increasing use of blades. Backed pieces are more elongated and less curved toward the top of the sequence. Connet (2002) also insisted on the fully "Upper Palaeolithic character" of the Châtelperronian from the Grotte du Renne. There is no elaborated flake production at Grotte du Renne, as already seen in other Châtelperronian assemblages by Pelegrin (1995), and recently confirmed by Roussel (2011) and Bachellerie (2011).

The first use-wear analysis of Châtelperronian points/knives from Grotte du Renne showed that they were used as knives and also certainly as projectile tips (Plisson & Schmider 1990).

A more refined description of Châtelperronian blade production, as well as a precise first description of the bladelet production, was recently done from first-hand analysis of three Châtelperronian layers from Quinçay (Roussel & Soressi 2010; Roussel 2011). At Quinçay, the Châtelperronian sequence is sealed by a large roof fall and there is no other Upper Paleolithic layer documented in stratigraphy: contamination from more recent Upper Paleolithic industry is indeed improbable. The recent technological analysis showed that blades are removed by independent series on narrow and on wide surfaces of the core (Roussel in press). Each surface of a blade core is an independent flaking surface (Fig. 5). Blade cores show mainly a triangular section. Blades symmetrical in section as well as blades asymmetrical in section are produced. The latter are obtained at the intersection of two angular surfaces (Fig. 6). Châtelperronian blade production is qualified as a *"two step rhythm on an angular flaking surface."* Blades with strong metrical norm, noticeably minimum thickness and minimum width, as well as technical norm are selected for Châtelperron points/knives. The size of Châtelperronian points ranges between fixed minimum and maximum dimensions. This norm is constant throughout the sequence at Quinçay (Roussel & Soressi 2010; Roussel 2011) and appears to be similar to the one in southwestern France (Bachellerie 2011: 351-354). Quinçay analysis also suggests that semi-circular end-scrapers retouched on large cleaning flakes removed at the end of the blade production on blade core might be another type fossil for the Châtelperronian (Fig. 7: o and p). The blank seems to be specific to Châtelperronian blade production, as well as to the location of the retouch (Roussel 2011, in press).

Bladelet production is documented in the three Châtelperronian layers from Quinçay and follows a method similar to the one used for the blade production. However, bladelet cores are not reduced blade cores. Bladelet production is independent from blade production, and is done on already small blocks. Bladelets are long and slightly curved and are mainly retouched with marginal and inverse retouches on one edge only (Roussel 2011). Bladelet production would also be documented in southwestern France, but the rarity of retouched bladelets as well as potential biases in assemblages excavated before the systematization of fine screening make it difficult to interpret (Bachellerie 2011: 367-368). Comparison with the Protoaurignacian production allows the suggestion of stimulus diffusion between Protoaurignacian and Châtelperronian groups (Roussel 2011; and see below).

Personal Ornaments, Bone-Tools, and Pigments in the Châtelperronian

Personal ornaments and bone-tools are rare within the Châtelperronian, but one site, Grotte du Renne, revealed a significant collection (Hublin et al. 1996; d'Errico et al. 1998, 2001; Carron et al. 2011; Fig. 8). About 40 personal ornaments were found at Grotte du Renne, and 6 pierced teeth were also found at Quinçay

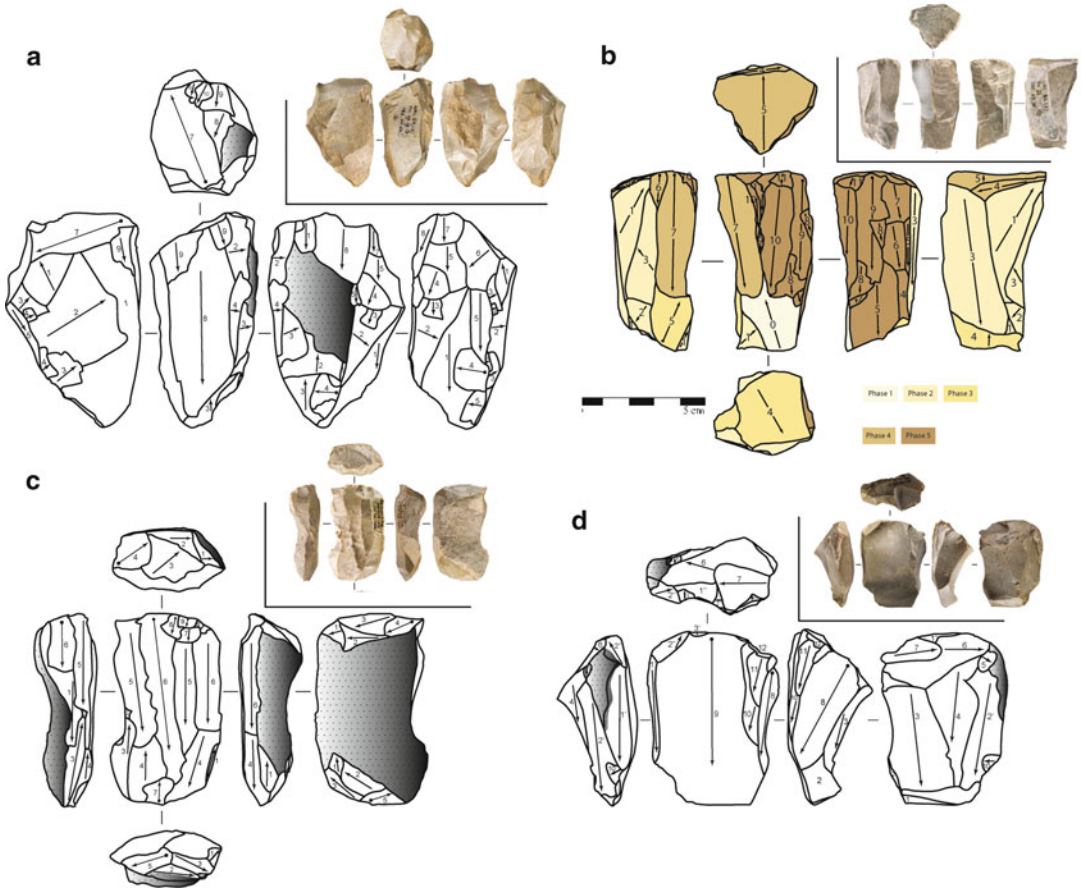

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 5 Châtelperronian blade cores from Quinçay (After Roussel in press) abandoned at different stages. (**a**) Initialized core with a dissymmetrical volume, (**b**) Core exploited on two surfaces with a triangular section, (**c**) Core exploited on the wider surface with a testimony of a previously exploited narrow surface, on the right, (**d**) Core with a large cleaning flake on the wider surface

(Granger & Lévêque 1997). Some of the bone-tools from Grotte du Renne are decorated. At first, they were interpreted as resulting from exchange with Aurignacian groups because they show some similarities with personal ornaments discovered in the above Protoaurignacian layer (Hublin et al. 1996). Later, it was shown that bone tools manufacturing waste are present at the site during the Châtelperronian, which does not support the exchange hypothesis for the bone-tools (d'Errico et al. 2001). It was also shown that the highest number of bone-tools is found in the lower and richest Châtelperronian layer at the Grotte du Renne, and that they are found in areas that do not correspond to areas where the Aurignacian bone-tools are found in overlying deposits. Contamination from the above Aurignacian layers is indeed unlikely (d'Errico et al. 2001; Caron et al. 2011). Study of perforation techniques has shown that pressure or percussion techniques after thinning by scraping were preferentially used at Quinçay (Granger & Lévêque 1997). Meanwhile, percussion techniques seem more variable at Grotte du Renne and are similar to the perforation techniques used during the Aurignacian (White 2001).

More than 20 kg of pigment, as well as pigment grinding tools, have been discovered at

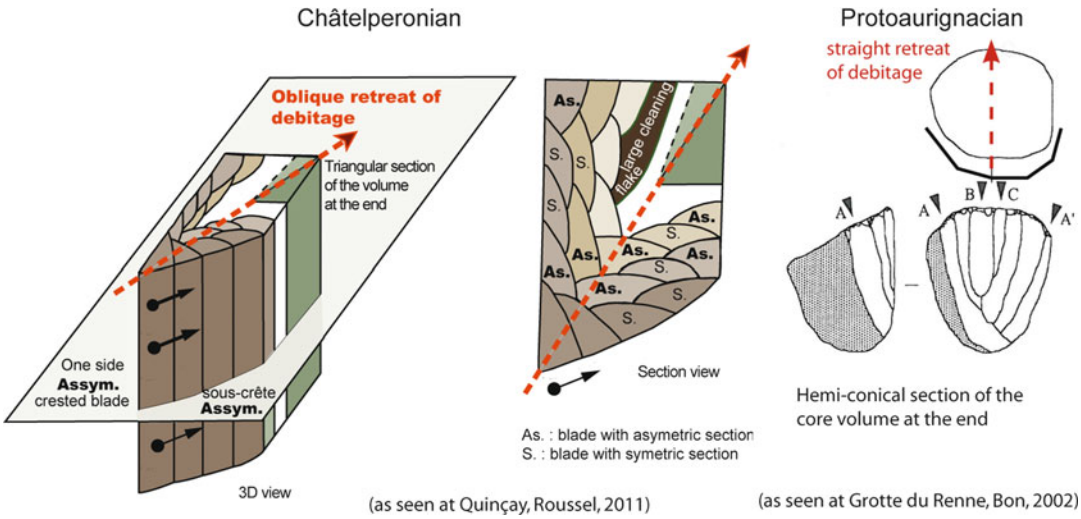

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 6 Schematization of blade production in the Châtelperronian and in the Protoaurignacian (After Roussel in press)

Grotte du Renne. Black and red pigments had been used (without heating), mostly as coarse powder to cover large surface areas, soils, or hides, and also as fine and highly coloring powder (Salomon 2009).

Contacts with Contemporaneous Groups

The existence of contacts between Châtelperronian and Aurignacian groups was intensely debated during the late 1990s. The lithic industry was quickly identified as being clearly different from the Aurignacian (Pelegrin 1995; d'Errico et al. 1998). Nonetheless, the fact that bone-tools and personal ornaments were not intrusive (d'Errico et al. 1998; Carron et al. 2011) seemed irreconcilable with the fact that some of them looked like the Aurignacian specimens and used techniques similar to the Aurignacian techniques (White 2001). Also, the development of these behaviors in indigenous groups when Aurignacian groups were entering Europe appeared to be an *"impossible coincidence"* (Mellars 2005).

The recent analysis of Quinçay bladelet production as well as a precise comparison of the blade production within the Protoaurignacian shed new light on the question of contacts. The method, as well as the goals, of the Châtelperronian blade production is clearly different from that of the Protoaurignacian. For the Protoaurignacian, the core volume is symmetric instead of being asymmetric in section, the flaking surface is large and integrates edges of the core, and the blade production is continuous all over the surface and is divided in series on each side of the core. The production rhythm is continuous on a large and curved surface and is in essence very different from the *"two step rhythm on an angular flaking surface."* Moreover, the Protoaurignacian blades do not show any asymmetrical section, and they are removed from a platform that is more oblique relatively to the debitage surface than the Châtelperronian one (Roussel 2011, in press). Bladelets are obtained following a method similar to the one used for blades in both industries; they are indeed different in the Châtelperronian and in the Protoaurignacian. However, the goal is similar: obtaining bladelets with marginal and inverse retouches on one edge, i.e., Dufour sub-type Dufour bladelets (Roussel 2011).

According to the theoretical model put forward by G. Tostevin (2007), sharing a common goal and using a different method of production can be interpreted as a testimony of the effects of stimulus diffusion. Stimulus diffusion implies that ideas are diffused inside a territory of one group from an adjacent one. These ideas are reinterpreted by the borrower group, depending

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 7 a to **l**: Châtelperronian knives/points; **m**: Audi type knife; **n** to **r**: semi-circular end-scrapers, including two (**o** and **p**) which were manufactured on a large cleaning flake extracted at the end of the blade production, and which might be another type fossil of the Châtelperronian. All artifacts are from Quinçay (After Roussel & Soressi 2010)

European Middle to Upper Paleolithic Transitional Industries: Châtelperronian, Fig. 8 Châtelperonian personal ornaments, bone-tools and pigments from La Grotte du Renne at Arcy-sur-Cure (Reproduced after Carron et al. 2011)

on the contact type between the two groups, and noticeably depending on the level of social intimacy. Episodic contacts at places with a low degree of social intimacy, like along the pathways, are opposite to intimate contact at residential sites where not only the end-product can be observed but also the process of manufacturing it can be observed, learned, and reproduced. Depending on the degree of social intimacy and social organization of each group, the results of contact would vary from conservatism up to total integration of procedures (Tostevin 2007). Given the geography and the age of the Châtelperronian and of the Protoaurignacian (see above), given the similarity between Protoaurignacian retouched bladelets that could have been lost during the hunt along pathways, and given the fact that they were produced using different processes, it is indeed probable that the idea of Dufour bladelets diffused from one group to the other. This could have been the case on pathways, for instance, and would then imply a low degree of social intimacy between the two groups (Roussel 2011). The nature and style of personal ornaments could also be explained by a similar process.

Conclusions

The Châtelperronian is an early Upper Paleolithic industry with blade and bladelet production, personal ornaments and bone-tool production and use, and without any formal flake production. The debate around it fundamentally changed when an almost complete Neanderthal skeleton was discovered and associated with it at Saint-Césaire, confirming the earliest discoveries of Neanderthal remains made at Grotte du Renne. From then on, what was initially considered as a fully Upper Paleolithic industry started to be called a "transitional industry" in order to reconcile the archaic biology of the authors and the advanced nature of the industry. Nonetheless, except at some exceptional sites, the Châtelperronian is a well-defined and fully Upper Paleolithic industry that is neither a mix nor an intermediary between industries, as suggested by the unfortunate term

"transitional." It is only transitional because it is in stratigraphic sequences after the Mousterian and before any other Upper Paleolithic industry.

The Châtelperronian is always replaced by the Aurignacian: the stratigraphic position of the Châtelperronian suggests a global shift. Still, this does not preclude contemporaneity and long-distance contact between the Neanderthal makers of the Châtelperronian and other groups, especially with anatomically modern humans using Protoaurignacian technology. The diffusion of the idea of Dufour bladelets from one group to the other, in the absence of diffusion of the process used to manufacture them, would imply a low degree of social intimacy and only episodic contacts on non-residential sites.

Cross-References

- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ *Homo neanderthalensis*
- ▶ Neanderthals and Their Contemporaries

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European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism

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Introduction

Where, Why, and How

In this entry, I discuss, albeit briefly, the evolutionary development and research history relating to Upper Paleolithic parietal rock art in Europe which, based on current research, probably represents more than 30,000 years of artistic endeavor. The physical act of producing art is not confined to engravings and paintings on static surfaces; a significant portable art assemblage comprising engraved antler, bone, and ivory, and often occurring alongside cave and rockshelter rock art, is also attested over the same period. Cave contexts have, in addition, revealed clay sculptures and bas-relief images carved from stone, such as the two clay bison at Tuc d'Audoubert (Ariége), the sculpted head of a horse at Camargue in the Dordogne, and plaquettes – simple animal-and human-engraved images on stone and clay tablets. In the past labeling, these assemblages as "art" have proved contentious (see Ucko & Rosenfeld 1967); it is my view that this aesthetically potent artistic form represents a visual communication but, at the same time, that it was probably restricted to certain members of a stratified society, possibly as part of a process of initiation or a way of a community communicating with the spirit world, deep within the recesses of a cave.

A quarter of a century ago, research was focused on two areas: southwest France and northern Spain, that is, the Franco-Cantabrian region. However, during the early 1990s following a number of major dam projects affecting several rivers in northern and central Portugal, engraved Upper Paleolithic rock art was discovered on a large number of open-air rock panels within the Douro, Tejo, and Tagus Basins and in particular in the Côa, Ocreza, and Zezere Valleys and along the Guadiana River.

Based on discoveries elsewhere, it was becoming clear that the phenomenon of carving and painting reached well beyond the Franco-Cantabrian region, extending into areas of Atlantic, Mediterranean, and southeast Europe and as far north as the British Isles. More significant (and indeed controversial) is the recent use of chronometric dating at a number of rock-art sites, including the famous Altamira cave in northern Spain, the results of which place the art in an almost inconceivably early time frame, contemporary with the presence of Neanderthals in southern Europe (Pike et al. 2012).

The geographical range of Upper Paleolithic rock art remains a major source of contention among specialists. However, recent years have witnessed the discovery of painted and engraved imagery of this period in the British Isles (Bahn & Pettitt 2009; Nash et al. 2012), Hungary, Germany (Bahn & Vertut 1988), and Romania, extending considerably the known geographic range (Fig. 1).

Until the mid-1990s around 300 parietal art sites were known, mostly within the limestone gorges and deep river valleys of the Dordogne, Loire, and Pyrenees regions of southwest France and the limestone mountain cliffs of northern coastal Spain (Bahn & Vertut 1997). The last century saw the discovery of a spectacular repertoire of images, mainly comprising vibrant and naturalistic depictions of animals and utilizing a variety of ingenious techniques.

These techniques vary geographically. The Franco-Cantabrian region is characterized largely by the use of organic or inorganic pigments applied to mainly smooth contoured panels on cave walls or ceilings using fingers, sticks, or feathers. Shades of red ochre (or hematite) or charcoal are commonly used, and it is from minute fragments of charcoal within the pigment that scientists have obtained dating evidence using chronometric methods (e.g., Accelerator Mass Spectrometry [AMS]). Caves containing paintings may also contain

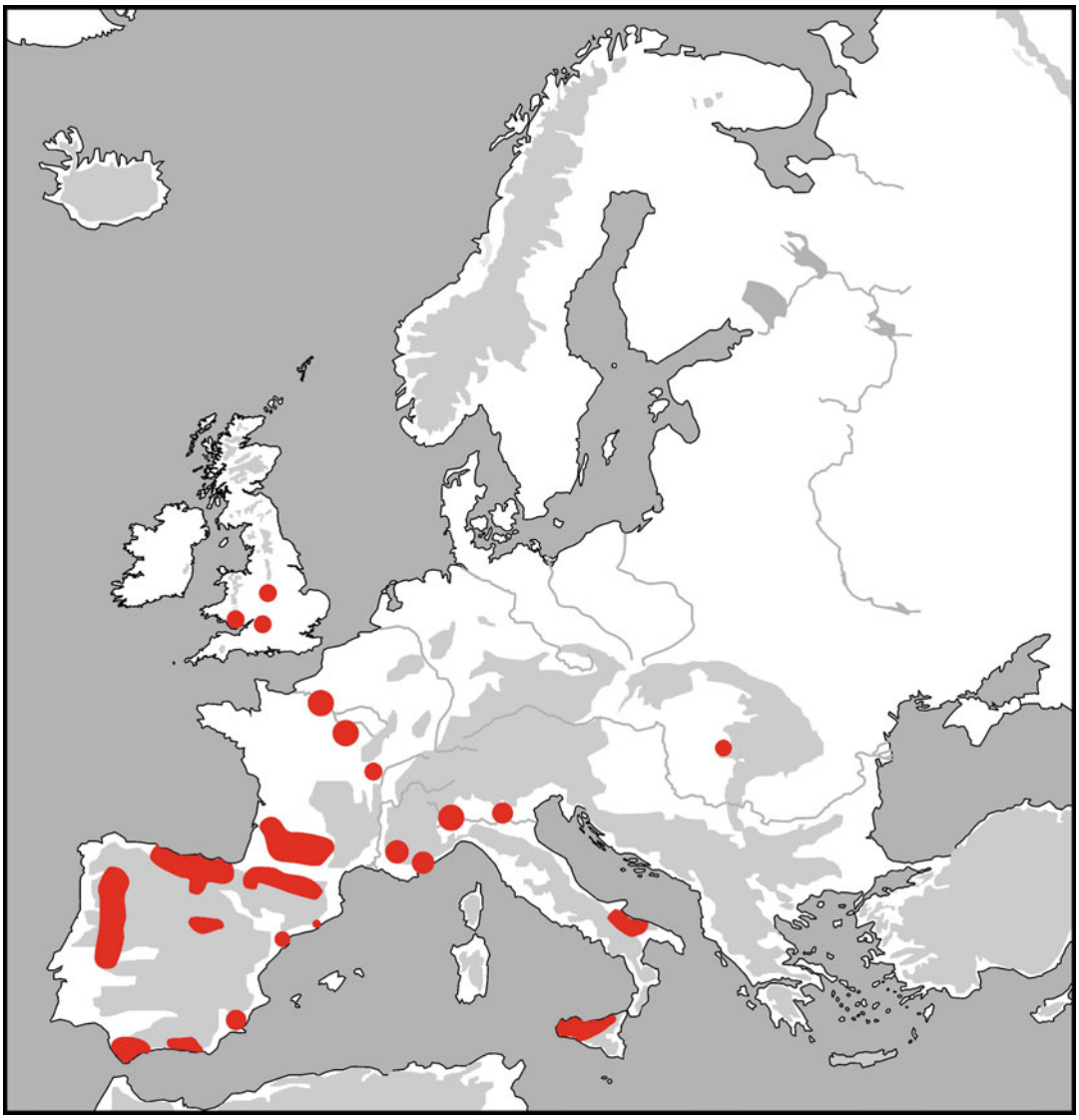

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 1 The rock-art core areas of Upper Paleolithic Europe

engravings and examples of finger fluting, suggesting the cave was frequented by different artists at different times. Pecking was evidently the preferred engraving technique on open-air panels in northern and central Portugal and Spain, where large superimposed images of animals such as bison and horse are found. The topography of the panel was also widely used (e.g., at Chauvet Cave), enabling the artist to create sometimes three-dimensional figures.

Historical Background

You Reap What You Sow

The initial period of discovery and interpretation spanned the late nineteenth/early twentieth century and focused principally on Upper Paleolithic cave art; however, this period coincided with a number of important archaeological discoveries elsewhere in the world relating in particular to portable art. The scientific community

at this time, reinvigorated by Darwin's revolutionary ideas, found itself locked in battle with the various religious orders of Europe. Furthermore, intense rivalries between European universities and individuals vying for academic supremacy tended to cloud judgment and led to the persistence of some entrenched and timeworn ideas. Doubt was therefore cast on many of the major discoveries in France and Spain in the belief that early modern humans were incapable of producing elaborate narratives on rock surfaces. Even if these images were authentic, it was held, they represented nothing more than idle doodling – "art for art's sake."

The first discoveries of parietal art were met with skepticism and, in some cases, outright rejection, the most infamous being Europe's first scientific discovery at the cave of Altamira in northern Spain. The site and its wealth of art were made public in 1880, but controversy soon followed. The cave was discovered by archaeologist Marcelino Sanz de Sautuola and his daughter in 1879. Before this, the cave entrance had been blocked by a landslide that occurred around 13,000 years ago. Later that year, the cave floor was excavated by Sautuola and Juan Vilanova y Piera from the University of Madrid. Following publication of the excavation, French scientific verifiers Emile Cartailhac and Gabriel de Mortillet completely rejected the authenticity of the rock art, intimating that it was a forgery. As a result, Sautuola and Piera were scorned at the *International Congress for Prehistoric Anthropology and Archaeology* held in Lisbon in 1880. Rejection was based on the excellent state of preservation and the notion that such complex art could not have been produced by such primitive people. Rumors within Spain suggested that Sautuola had actually commissioned artists to produce the paintings.

Following the Altamira debacle, a number of high-profile rock-art discoveries were made, suggesting that Paleolithic people were indeed capable of producing complex forms of artistic endeavor, which led to Sautuola and Piera being finally vindicated in 1902. Emile Cartailhac made a formal and open apology to Sautuola's daughter (Sautuola had died in 1888) and published *Mea culpa d'un sceptique*, wherein he admitted he had been wrong and had held back the science and study of Paleolithic rock art for many years. The public outpouring of guilt and apology appears to have benefited Emile Cartailhac, allowing him to accompany French cave expert the Abbé Henri Breuil on a number of expeditions in the Franco-Cantabrian region. This collaboration resulted in the discovery of 150 painted rock-art images in the Grotte de Niaux in the Pyrenees (Fig. 2).

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 2 Painted ibex from Grotte de Niaux (Image: Courtesy of Jean Clottes)

The Floodgates Open

Most discoveries in the core areas of Europe, particularly in Franco-Cantabria and southern Italy, were made during the first part of the twentieth century. Henri Édouard Prosper Breuil, often referred to as the Abbé Breuil, began his adult life as a priest (ordained in 1900) but soon developed a keen interest in prehistory. He was responsible for the discovery and authentication of a number of important Upper Paleolithic rock-art cave panels in the early twentieth century, including red-ochre decoration in Bacon Hole, on the South Wales coast. Breuil's influence spanned some 60 years until his death in 1961. His early travels took in most of the prehistoric

world and involved him either in discovery or in verification. Much of what he said was widely accepted by academic colleagues and the general public. Breuil took the stance that rock art was part of a ritual package, the ultimate objective of which was the successful hunting of large animals. Based on direct observation of the Arunta people of Central Australia, Breuil proposed that Upper Paleolithic hunting parties would don masks and animal pelts to perform ceremonies in the guise of their quarry. They would then paint images of the animal on the walls of a cave. The ceremonial performance and the act of depiction created a potent source of magic that would, it was believed, guarantee a successful hunt. Ceremonial performances may have incorporated the act of killing an animal – involving the use of *sympathetic magic* – and this act would also have assisted in the ritual act of the hunt. Breuil further suggested that the multiple images found on cave walls represented attempts to increase the fertility of the herds, with each generation of artists adding their signature to an increasingly complex and potent narrative (Breuil 1952). Though plausible, Breuil's interpretations have been heavily criticized since his death. Many of the animals depicted are seldom found in the archaeological record of Upper Paleolithic habitation sites, and furthermore, animals such as the bear, felines, hyena, and rhino probably formed no part of the hunters' diet, so why are they depicted? The ferocity of such predators may have served as some form of totemic identity, giving the artist and his or her respective clan potency and power over others.

Arguably, one of the most influential theorists of the twentieth century was the French anthropologist André Leroi-Gourhan, who defined a series of stylistic stages within the development of Upper Paleolithic art (styles I–IV) (Leroi-Gourhan 1982). These styles coincided with successive cultural periods within the Upper Paleolithic and suggested that rock art evolved from primitive to complex compositions over a period of some 20,000 years, from the Aurignacian and Gravettian (style 1) to the later Magdalenian (style IV). This attempt to develop a hierarchal artistic chronology was met with considerable opposition, although it did gain momentum outside the rock-art world as a plausible hypothesis. Critics were concerned with the rigidity of Leroi-Gourhan's model, suggesting that the development of a complex art form from simple motifs to high artistic achievement was far too simplistic. Although this hypothesis was largely acknowledged, advancements in chronometric techniques, particularly the development of AMS and uranium-series dating during the latter part of the twentieth century, suggested a more complex picture. Many rock-art panels included within Leroi-Gourhan's stages III and IV, which he dated to the latter part of the Upper Paleolithic, are now considered much earlier (e.g., Clottes & Geneste 2012; Pikes et al. 2012).

Key Issues/Current Debates

A Plethora of Images in a Multitude of Places

The archetypal Upper Paleolithic cave site is Lascaux, located near the town of Montignac in southwest France. Discovered in September 1940 the cave system is currently closed to the public and scientific community alike due to the formation of fungal molds that have been affecting the paintings for some time. The access restrictions have curtailed scientific work, and until opportunities arise for further research, the consensus view places the rock art at around 17,000–18,000 years BP. However, based on the results of chronometric dating elsewhere within the Franco-Cantabrian region, the Lascaux assemblage could be much earlier. The dominant theme of the panels in this cave is the depiction of large animals such as bison, bovines, horse, and red deer. Each category of animal comprises a thematic area within the cave, these areas being aptly named the *Great Hall of the Bulls* and the *Chamber of Felines*.

The cave was accidentally stumbled upon by four teenagers and a dog and was opened to the public in 1948. However, by the mid-1950s the carbon dioxide expelled by over 1,000 visitors a day had taken its toll on the paintings, and

the cave was closed in 1963. An extensive conservation program ensued and the cave was strictly monitored for atmospheric and temperature changes. In order to fulfill the public's overwhelming desire to see these amazing works of art, the French heritage authorities in 1983 commissioned several facsimile sections of the cave – Lascaux II – to be constructed close by. In spite of the restrictions on entry to the cave, monitoring has, since 1998, revealed an aggressive fungus that is attacking the fragile pigments. This fungal infestation has been caused by a recently installed air-conditioning system and by heat emitted from a lighting system. Since 2008, monitoring has been tightened.

One of the most intriguing caves within southwest France is, in my view, the example of Rouffignac (within the commune of *Rouffignac-Saint-Cernin-de-Reilhac*), a major archaeological site but with little archaeology. Known as the *Cave of the Hundred Mammoths*, the back section of the cave actually contains over 220 engravings and paintings/drawings, including 158 mammoths, 28 bison, 15 horses, 12 goats, 10 woolly rhinoceros, and one brown bear. In addition to the painted imagery, the cave also has 17 tectiforms and six serpentine forms, as well as finger fluting and finger meanders, thought to have been executed by children. The majority of the art is located some 2 km inside the deep recesses of the cave, within an area called Le Grand Plafond chamber. More than 60 animals, mainly mammoth, are painted/drawn (sketched) on the ceiling using mainly charcoal with some drawn merely as a black outline. Interestingly, the artistic repertoire omits red deer and aurochs. Based on Leroi-Gourhan's stages, the rock art of Rouffignac falls within *style IV* and, therefore, dates to the Middle Magdalenian period (c. 13,000 years BP). Unfortunately, very little archaeology survives, except for a very small lithic assemblage. In the recent past, the authenticity of the art has been questioned and subsequently denounced. In common with other caves in the region, parts of it were periodically occupied by European brown bear, probably during periods of hibernation. Within the entrance to the cave, archaeologists have found evidence of Mesolithic and Neolithic activity consisting of hearths, animal bone, and a small diagnostic lithic assemblage. The earliest date for this activity is c. 9,200 to 7,800 years BP. In terms of stratigraphy, this material was sealed by Iron Age activity.

Also within southern France is probably one of the most important discoveries of recent years. The cave site of Chauvet, located in the Ardéche southwest France, sits within a limestone cliff face overlooking the former course of the Ardéche River and was discovered on December 18, 1994 by a group of speleologists, including Jean-Marie Chauvet. Following discovery, French rock-art specialist Jean Clottes has conducted a detailed study of the cave and its spectacular rock art. Chauvet is one of many hundreds of caves that occupy the deep gorges of the Ardéche region.

Chronometric dating of the rock art and archaeological deposits has revealed two distinct periods of use. Over 31 samples were taken by Clottes from pigments that included charcoal. These revealed that Chauvet was in use during the Aurignacian period, the earliest confirmed date of 32,900 ± 490 years BP (Gifa 997776). Archaeological evidence, in the form of children's footprints, hearths, and fire torches, suggests that the cave was also in use during the latter part of the Gravettian, between 25,000 and 27,000 years BP. A landslide appears subsequently to have sealed the cave entrance until its discovery in 1994. During these periods of Early Upper Paleolithic (EUP) occupation, the cave appears to have been utilized as a hibernation den for brown bear, with both skeletal remains and hibernation nests being found. Despite the widely accepted radiocarbon dates for Chauvet, several archaeologists have questioned the dating (Pettitt & Bahn 2003). Their concerns are based on potential surface contamination and the link between charcoal deposits on the floor of the cave and those used within the composition of the painting. However, Pettitt and Bahn's concerns have now been dispelled, as, by 2011, more than 80 radiocarbon samples taken from torch marks, floor deposits,

and the paintings unequivocally push the dates of the rock art to between 35,000 and 30,000 years BP. Furthermore, chemical analysis on deposits within the only entrance area of the cave revealed that this was sealed by a landslide around 29,000 years BP and that the main occupation was between 32,000 and 30,000 years BP (Clottes & Geneste 2012).

This rock art includes many hundreds of painted polychrome and monochrome animal figures representing at least 13 generic species depicted in a naturalistic style, many of which are extinct. In addition to the usual range of herbivores, such as bison, horse, and mammoth, are certain predatory species, the presence of which is, arguably, unique to the cave; these include brown bear, cave lion, hyena, and panther (Fig. 3). Many animal figures are grouped to form herds of bison, horse, panther, and rhinoceros; each group is enhanced by use of the panel/surface topography to create three-dimensional imagery and the illusion of movement across the panel.

Although complete human figures are virtually absent, sexual attributes, including vulvae, are present, along with body parts, such as legs and hand stencils. These figures may represent personal signatures of the artists or *special* people who witnessed the art being executed. David Lewis-Williams and Jean Clottes (1998) have further argued that the combination of subject and location, that is, within the deep recesses of the cave, suggests a ritual significance and that these images evoked possible shamanic and magical powers. Unlike Upper Paleolithic rock art elsewhere, a great deal of panel preparation appears to have taken place, with the rock surface being scraped clean of mold debris and flowstone concretions. This cleaning resulted in a notably near-smooth white "canvas" on which to paint the images.

Still within the Franco-Cantabrian region is the cave that started all the interest in Paleolithic rock art – Altamira, sitting within limestone rock outcropping on Mount Vispieres, along the northern Spanish coast. The cave is noted for its fine polychrome paintings of bulls and for hand stencils. Formed by a former major rock collapse

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 3 The wealth of animal depictions in Chauvet Cave (Image: courtesy of Jean Clottes)

from above, the cave, discovered in 1880, measures around 270 m in length and comprises a series of distorted passages and chambers. Following discovery, a section of the cave floor was excavated to reveal a rich stratigraphic sequence dating to a period spanning the Upper Solutrean (c. 18,500 years BP) to the Lower Magdalenian (c. 16,500 and 14,000 years BP). The cave was also intermittently occupied by hibernating animals. At round 13,000 years BP, a rock fall sealed the entrance, around which, according to archaeologists, most human occupation was concentrated. The rock art, though, extends right along the length of the cave. Charcoal and hematite were used to create polychrome images. Sometimes these natural pigments were mixed with water to create shading and to vary the intensity of color (referred to as *chiaroscuro*). Polychrome images are strategically painted to take advantage of the natural contours and topography of the panel. The cave contains a plethora of images and features the famous polychrome ceiling depicting

a herd of extinct steppe bison (*Bison priscus*) arranged in a number of poses. Other animals include horse, deer, and a wild boar. In 2008, uranium-thorium series dating was applied to samples of calcite covering some of the rock art. The results indicated that the art spanned 10,000 years, between 25,000 and 35,000 years BP (Pikes et al. 2012). Like Lascaux, Altamira is now closed to the public due to concentrations of carbon dioxide produced by large numbers of visitors damaging the microclimate of the cave.

Moving West: The Engraved Rock Art of Central and Northern Portugal

Before 1991, it was considered that Upper Paleolithic rock art was concentrated within two areas of southwest Europe. However, in advance of a highly controversial dam project in the Douro Basin, significant engraved open-air rock art was discovered, in particular within the Côa Valley (a tributary of the Douro) in northeast Portugal. In addition to the Upper Paleolithic assemblage, later prehistoric engravings were also found in association with carvings dating from the seventeenth century. From this initial discovery, archaeologists began to look elsewhere and as a result both Upper Paleolithic and later prehistoric rock art were found in the Sabor, Agueda (both Portugal and Spain), and Tua Valleys. Within the central eastern part of Portugal, further Upper Paleolithic rock-art discoveries were made within the Tejo/Tagus Basin, particularly in the Ocreza and Zezere Valleys and also within the Guadiana River.

Most of the engraved art within the Côa Valley extends along 17 km of vertical schist outcropping and comprises mainly large naturalistic zoomorphic images, such as horse, auroch, caprid, cervid (red deer), a rare occurrence of fish, and a small assemblage of geometric/abstract forms (Fig. 4). Much of the imagery is superimposed (over 1,000 engraved images on 137 panels). Several engraved panels also occur on granite. On the panel of Faia are engravings that have evidence of image enhancement through the application of red ochre (hematite). On both geologies, the artist(s) appears to be concerned with the vibrancy of the animal through movement and physical interaction. The engraving techniques include incised pecking, which produces fine linear imagery (Zilhão 1995).

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 4 A plethora of wild animal engravings from the Fariseu 1 panel, Côa Museum (author)

The dating of this assemblage, probably the largest concentration of early prehistoric open-air rock art in Europe, is potentially difficult to assess. However, broad dating based on artistic style and complexity places much of the imagery between 22,000 and 10,000 years BCE.

During the so-called Battle of the Côa, both the Portuguese Government and the energy company EDP played down the international significance and dating of this assemblage. Experts employed by EDP applied a controversial unproven direct dating technique which dated the imagery to the later prehistoric period. Fortunately, a change of government in 1995 reversed the decision to dam this and other valleys in this part of Portugal, and as a result, the Côa Valley was designated a World Heritage Site in 1998.

Moving North to a Very British Assemblage

Until 2003 and the sensational discovery of engraved imagery at Church Hole Cave near the mining village of Creswell, it was considered by

many that a human presence in the British Isles between 12,000 and 27,000 years BP was, at best, limited to a few seasonal hunting visits in southern Britain. However, the famous early Upper Paleolithic burial at Paviland Cave on the Gower Peninsula, in South Wales, contradicts this assumption. The burial, originally thought to be a Roman prostitute and known as the "Red Lady of Paviland," was excavated by the geologist and creationist William Buckland in 1823. By the time of the second investigation of the cave in 1912–1913, a comparison had been made between the finds and deposition at Paviland and Upper Paleolithic discoveries in other European caves. Following a series of successive radiocarbon dates from the 1960s until the present, the date of this remarkable find has been advanced from Kenneth Oakley's date of 18,460 ± 340 years BP to 33,000 years BP, based on recalibrated test results by Thomas Higham and Roger Jacobi.

Prior to a recent discovery of an engraved reindeer in a cave in South Wales, only one other authenticated discovery had been made, at Church Hole and Robin Hood Caves, Creswell Crags, on the Derbyshire/Nottinghamshire border in April 2003 (Bahn & Pettitt 2009). These figures are considered to be Europe's most northerly Paleolithic rock art. This discovery included a small number of anthropomorphic and zoomorphic engravings and bas-relief figures, including a bison, red deer, and several avian species (Fig. 5). These engravings were overlain by a thin veneer of calcium carbonate flowstone and were ascribed a minimum age of 12,800 BP using the uranium-series disequilibrium dating method (Pike et al. 2005). Several of these figures, including the red deer, used the natural topography of the cave wall to construct or enhance various parts of the animal, a common theme running throughout European Upper Paleolithic and Mesolithic rock art.

Associated with the Creswell discovery, and recovered from other nearby caves within the gorge, were a number of Upper Paleolithic mobile artifacts discovered during the course of late-nineteenth- and early-twentieth-century excavations (Bahn & Pettitt 2009). These included Creswell's infamous horse, which had been carved on a piece of rib bone and discovered in 1876, and a bird-like head on a human torso, which had been carved on a piece of bone from a woolly rhinoceros (*Coelodonta antiquitatis*), a species considered to have become extinct in Britain by around 15,000 BCE. The presence of these exotic artifacts, along with a handful of other portable "valuables" from other Upper Paleolithic core areas of Britain, including perforated shell and stone made for garment decoration, necklaces, and pendants, is set against a backdrop of sometimes rapid climatic amelioration.

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 5 Probable head and neck of two cervids, located deep within a recess of Church Hole Cave, Creswell, England (author)

Prior to the Creswell discoveries, there had been several "false dawns," where Upper Paleolithic rock art had been discovered and authenticated but later rejected. One of these so-called discoveries occurred at Bacon Hole on the Gower Coast in 1912, when experts of the day – the French verifier, Abbé Henri Breuil, and W. J. Sollas – reported in The Times (14 October) the discovery of 10 parallel red streaks of hematite within one of the recesses of the cave. The Times reported it as "the first example in Great Britain of prehistoric cave painting." However, this discovery turned out to be either natural hematite secretions or paint, possibly from a sailor merely cleaning his brushes,

and was subsequently rejected by 1928. A second discovery, in the Wye Valley of South Herefordshire in 1982, was claimed as Britain's first representative Paleolithic rock art and included the outline of a bison and a red deer, among other animals, from Cave 5615, located high above a deep gorge known as Symonds Yat. The discovery was duly reported in the popular press and later the academic world but lacked any expert validation, and, following a series of personal attacks, rebuffals, and a confession or two, the discovery was soon rejected.

In September 2010, the author was exploring the rear section of Cathole Cave, a limestone cave that stands within the eastern part of an inland valley on the Gower Peninsula. The cave had been first excavated during the nineteenth century. An array of flint tools, metal implements, and pottery dating from the Upper Paleolithic to the Bronze Age were recovered, plus a significant Pleistocene faunal assemblage that included (extinct) elephant, giant deer, hyena, woolly rhinoceros, wolf, and reindeer. A further two excavations outside the cave were made by Charles McBurney and John Campbell in 1958–1959 and 1977, respectively. Recovered from these excavations were more than 300 lithics, many of which were diagnostically similar to flint blades and points found at other so-called Creswellian cave sites at Creswell Crags and within Cheddar Gorge. Discovered on a small vertical niche was an engraved cervid, probably a reindeer. This side-on view figure, measuring approximately 15 × 11 cm, was carved using a sharp pointed tool, probably flint (Fig. 6). The elongated torso was infilled with irregular-spaced vertical and diagonal lines. Several internal diagonal lines extended below the lower section of the torso, merging to form three of the four legs, the longest measuring 4.5 cm. Incorporated into the left side of the torso is the head (or muzzle) comprising a semicircular snout, chin, and mouth. Above the muzzle was a thin rectangular block on which three lines extend to the right forming a stylized antler set. The various engraved lines were cut into a weakly botryoidal calcite flowstone surface. In April 2011, members of the NERC-Open University Uranium-Series Facility extracted samples from the surface on which the engraving was located for uranium-series dating, along with a sample from a section of flowstone that covered a section of the reindeer's muzzle. Two minimum dates from the flowstone of 12,572 ± 600 years BP and 14,505 ± 560 years BP have been revealed, making this engraving Britain's earliest rock art (Nash et al. 2012).

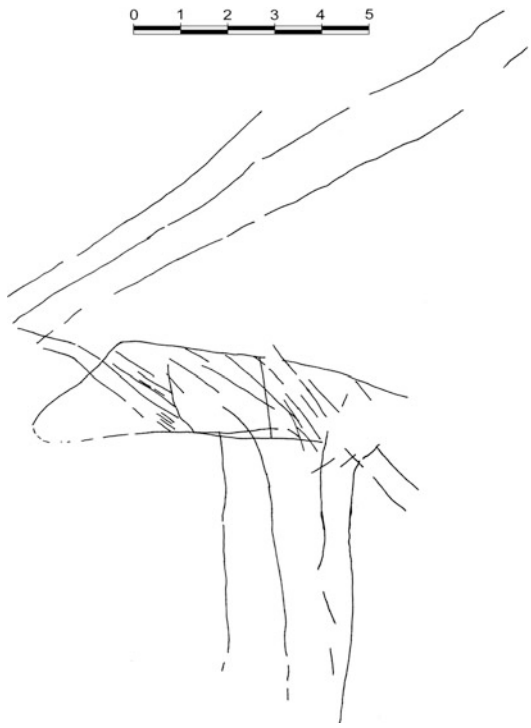

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 6 Tracing and image of a cervid, possibly a reindeer from Cathole Cave, South Wales

Future Directions

Over the past 50 years and since the death of Abbé Breuil and Leroi-Gourhan, Paleolithic rock-art research has come of age and is now incorporated into mainstream archaeology. Following the sometimes novel ideas and concepts of late-nineteenth- and twentieth-century archaeologists and scientists engaged in the study of Paleolithic art, a new chapter has

emerged which includes the pioneering and polemic work of Paul Bahn, Robert Bednarik, Michel Lorblanchet, Jean Clottes, David Lewis-Williams, David Whitley, and Joao Zilhão (to name but a few), each scholar adding new ideas to an otherwise healthy rock-art debate. Foremost in this revolution are the groundbreaking and sometimes controversial approaches of Jean Clottes, David Lewis-Williams, and Thomas Dowson and their ideas on how Paleolithic rock art formed part of a shamanistic performance (Lewis-Williams & Dowson 1988; Lewis-Williams & Clottes 1998; Lewis-Williams 2002, 2003). It is clear from these principal scholars that rock art is polysemic and once formed part of a much wider ritual-symbolic package that was probably initiated and controlled by the hierarchical will of clan elites. The animal-bias suggests some form of totemic relationship between the individual artist, the hunter, and the hunting community alike.

Current ideas, now supported by hard science, consider earlier dates of an otherwise entrenched chronology (e.g., Pikes et al. 2012). Through direct dating methods, Bahn and Vertut (1988: 75) clearly show a spread of chronometric dates taken from pigments from a number of caves from the Franco-Cantabrian region, the most recent being Le Portel (Ariége) at 11,600 ± 150 years BP (AA 9766) to the earliest, Chauvet 32,410 ± 720 years BP (Gif A 95132). Since the publication of this summary, further, more refined dates have been accomplished (Clottes & Geneste 2012).

In June 2012, a British-Spanish scientific team revisited 11 caves with Upper Paleolithic rock paintings and engravings in northern Spain (part of the Franco-Cantabrian area of Upper Paleolithic southwest Europe). Many of the sites, including Altamira, El Castillo, and Tito Bustillo, had been previously dated based on artistic style and indirect dating methods. Using uranium-series disequilibrium dating on calcite deposits overlying and underlying the paintings, the team was able to date the rock art (Fig. 7). The results revealed that the art, which included a painted red disk, a hand stencil, and a claviform symbol, dated to the Early Aurignacian period, with a minimum age range for the art of between 35,600 and 40,800 years BP, a time when either the first wave of anatomically modern humans moved into Europe or maybe when Neanderthals were involved in artistic endeavor.

European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism, Fig. 7 Dated hand stencils from the cave of El Castillo, Northern Spain (Image: Marcos García Diez)

A few months earlier, within the cave of Nerja, near Malaga, in southern Spain, further probable painted rock art of Neanderthal date was discovered; I say "probable" as the dating material from a floor deposit was indirectly associated with the actual rock art that was until recently believed to be Upper Paleolithic.

Where next? Attention once focusing entirely on the traditional centers of southwest Europe appears to be shifting further east and north. Over the past 10 years, significant discoveries have been made in Romania and the British Isles. This, along with the recent dating program within the 11 caves in northern Spain, extends the work of the Paleolithic artist geographically and deeper into our distant past. Just a few years ago, who could have conceived the idea that the painted rock art could have possibly been executed by Neanderthals?

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Bednarik, Robert G.
- ▶ Côa Valley Rock Art Sites
- ▶ Europe: Paleolithic Art
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Lewis-Williams, James David
- ▶ Siega Verde Rock Art Sites

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Evans, Arthur

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Basic Biographical Information

Arthur John Evans was born on 8 July 1851 at the Red House, Nash Mills, Hertfordshire (Brown 1993: 11). He died at the age of 19, on 11 July 1941, but not before he became a well-known archaeologist for his discovery of the Palace of Minos at Knossos (Ashmolean Museum 2012). Evans was John Evans' eldest child. John Evans was also a well-known archaeologist as well as a numismatist, geologist, and collector of antiquities (Brown 1993: 11). As this was the case, Arthur Evans was brought up surrounded by archaeology and history-related subjects. This sparked his interest in such a career at a young age. At the age of 9, Evans accompanied his father on expeditions and his interest in archaeology grew (Brown 1993: 11).

Arthur Evans was educated at Harrow School and went on to study at Brasenose College in Oxford. Even though his school achievements

are academically modest, Evans won prizes for English poems and Greek epigrams he had written (Brown 1993: 11). In 1874, he graduated from Brasenose College and was awarded first-class honors in Modern History (Ashmolean Museum 2012). In 1884, Arthur Evans was appointed to the post of a keeper at the Ashmolean Museum (Ashmolean Museum 2012). During the 25 years that he was a keeper at the museum, he successfully transformed the Ashmolean into an archaeological museum that was recognized internationally as a first-rate research institution (Ashmolean Museum 2012).

Between 1894 and 1899, Evans travelled extensively through Crete in search of evidence pertaining to pre-alphabetic writing in the Aegean (Ashmolean Museum 2012). This search led him to identify three systems of writing: Cretan Hieroglyphic, Linear A, and Linear B (Ashmolean Museum 2012).

Prior to his excavations at Knossos, Evans carried out an illicit excavation of a Roman cemetery near Trier where he found lamps and broaches (Brown 1993: 17). At this time he was working as a journalist while also pursuing his interests within archaeology (Brown 1993: 21). At Canali, Evans started an excavation of a large barrow, but this was interrupted by the war that broke out between the Turkish and Montenegrins. Later, he was able to continue the excavation (1993: 21).

Major Accomplishments

Arthur Evans is best known for his excavations of the Palace of Minos at Knossos, Crete, which he started on 23 March 1900 at the Kefala Hill in Knossos (Brown 1983: 15). When Evans began this excavation, he had very little experience, but he was guided by more experienced researchers, D. G. Hogarth and Duncan Mackenzie (Brown 1983: 15). Between 1900 and 1905, the majority of the Palace of Minos was found and excavated (Stiebing 1993: 135). The walls of the structure were located just below the surface as Evans was uncovering parts of frescoes and a stucco relief that decorated the palace walls, while many pieces of pottery and oblong clay tablets were also found during this excavation (Stiebing 1993: 135).

At first, the artifacts that Evans discovered were called "Mycenaean." However, as he continued to uncover underlying strata, he came to realize there had already been a high level of cultural development amongst the occupants of Knossos prior to the Mycenaean Age that he named "Minoan" (Stiebing 1993: 135). Evans distinguished many different pottery types as well as styles of decoration at Knossos. On the basis of these finds, he created a chronology for the prehistory of Crete (1993: 139). Subsequently, the presence of datable Egyptian objects in some of the Minoan strata allowed Evans to provide approximate absolute dates for his sequence (Stiebing 1993: 139).

As well as excavating the palace at Knossos, Evans also extensively restored the remains of the site (1993: 136). Once the palace had been excavated as well as restored, Evans published his findings in four volumes, as *The Palace of Minos at Knossos* (Scarre & Stefoff 2003: 6). There has been criticism of Evans' excavations and restorations due to the personal nature of the site (Stiebling 1993: 136). While the visitor at this site is able to form a great mental picture of the Palace of Minos in comparison to other Cretan sites, it has been argued that this picture is seen largely through Arthur Evans's eyes (Stiebing 1993: 136).

Cross-References

- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Crete, Archaeology of

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Evolutionary Anthropology: Issues, News, and Reviews

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Brief Definition of the Topic

Evolutionary Anthropology is a peer-reviewed journal focusing on current issues in biological anthropology, paleontology, archaeology, primatology, genetics, human ecology, and other areas pertinent to understanding human evolution in a broad perspective. It is designed to provide researchers, educators, and students in anthropology and related disciplines with reviews of recent research, discussions of theoretical issues, and changing perspectives on human evolutionary biology in a concise, readable format. It was founded in 1992 and appears in six bimonthly issues each year.

Evolutionary Anthropology normally publishes four types of articles:

1. *News Articles* are brief reports on recent professional meetings, symposia, workshops, and other events of general interest to the anthropological community.
2. *Issues Essays* are articles on subjects of broad interest to topical interest and are designed to raise awareness of important topics in the study of human evolution that have perhaps been overlooked or not widely known, but are not suitable for a major review. Issues Essays can take more of a personal or adversarial approach rather than offering a scholarly review.
3. *Articles* are minireviews of up to 10,000 words that provide an overview of the current state of knowledge on a topic of general interest to a wide audience of students, teachers, and researchers in the broad area of human evolution. They should provide a balanced treatment of current literature and views.
4. *Book Reviews* are designed to discuss recently published books in the broader context of current research in the area to which the book contributes.

In addition to the above, *Evolutionary Anthropology* also publishes obituaries of prominent figures in the field of human evolution and sometimes publishes essays from regular contributors. In the 1990s, the journal published a series of debates between Ian Tattersall and Milford Wolpoff on topics in human evolution. In the early part of the twenty-first century, Dr. Kenneth Weiss contributed a regular series of essays on aspects of genetics and evolution entitled *Crotchets and Quiddities*. Beginning in 2008, *Evolutionary Anthropology* published one special issue a year devoted to a single topic. The first of these were on Modern Human Origins (2008), The Evolution of Human Behavior (2009), and Genetics and Human Evolution (2010).

Articles in *Evolutionary Anthropology* are commissioned by the editor in conjunction with the associate editors and are subject to editorial review prior to acceptance and publication. *Evolutionary Anthropology* is published and distributed by Wiley-Blackwell and is available in both electronic and paper formats.

Cross-References

► Journal of Human Evolution

Further Reading

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Excavation Methods in Archaeology

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Introduction and Definition

Archaeological excavation is the procedure by which archaeologists define, retrieve, and record cultural and biological remains found in the ground.

Past activities leave traces in the form of house foundations, graves, artifacts, bones, seeds, and numerous other traces indicative of human experience. These *strata* survive vary variously, depending on the type of location and geology (hilly, lowland, wet, dry, acid, etc., known as the *terrain*). Survival and visibility also depend on how far the remains of the past have already decayed or been disturbed by later activities, such as cultivation or building. These *site formation processes* give a site its modern character, and this has a strong influence on the excavation method that is used.

Excavation usually (but not always, see below) requires the removal and permanent dispersal of strata so they can never be reexamined. So the method is also influenced by the need to conserve cultural strata as far as possible – never dig more than you need to understand the site. Many sites are situated in socially sensitive areas, where excavation (particularly the removal of skeletal remains) is to be avoided or kept to a minimum.

Successful excavation depends on our ability to see or detect these traces, so that they can be measured and sampled, and this in turn depends on the *techniques* and the skilled workforce available. Like other sciences, excavation requires us to devise new techniques that enable us to see more, so that excavation method is in a state of continual development.

The way an excavation is done is therefore determined by what you want to know, the state of preservation of the site, the techniques and skills available, and the social context of the country in which the excavation takes place. In best practice, these are brought together and balanced in a program specially designed for each project. Contrary to popular belief, success is much less dependent on the application of a standard method (or *default system*) to every situation (Carver 2011).

Key Issues/Current Debates/Future Directions/Examples

Excavation Areas

The type of area opened in an excavation is determined by its purpose. Small-scale excavations, such as *shovel tests* and *test pits* and *trenches*, are used in the reconnaissance stage to locate sites or in the evaluation stage to help assign their current value. Shovel tests are the size of a shovel blade say 15 × 15 cm, test pits are 1 × 1 to 4 × 4 m, and test trenches are 1–3 m wide and can be very long (100 m or more). They are especially valuable for testing deep strata, since the sides can be held up by shoring, so protecting the excavators from the danger of collapse (Fig. 1).

Sets of test pits and trenches also have a wide application in addressing particular research questions over a wide area. In this case the pits and trenches are distributed over the landscape with a view to obtaining examples (*samples*) of assemblages and local sequences from which an occupation or behavior can be generalized (see Hester et al. 1997, 58–74; and the entry on American Pioneers and Traditions, Fig. 3 in this encyclopedia). *Box excavation* consists of a number of test pits (up to 5 × 5 m in area) set adjacent to each other in a grid, each separated from the other by a *balk* (about half a meter wide) along which excavators can walk and earth be removed. The balk also serves to retain a *section*, a vertical slice of strata, drawn by excavators to record the sequence of layers at that point. Box excavation was pioneered in Russia and adopted in China, and a version was also enthusiastically promoted in England by Mortimer Wheeler (see the entry on ▶ British Pioneers and Fieldwork Traditions in this encyclopedia).

Area excavation refers to an excavation where the area opened is continuous (Fig. 2). In research excavations, the size of the area is closely connected to the questions addressed: early pioneers in Denmark used areas of up to 3 ha to reveal the shallow but extensive traces of Iron Age villages consisting only of pits and postholes. In CRM excavations the size is related to the area to be affected by development; these are often very extensive, such as the Framework Excavations in advance of London's Fifth terminal at Heathrow, or the excavations by the National Road Authority in Ireland (see the entry on ▶ Ireland: Investigations in Advance of Motorway Construction in this encyclopedia).

Excavation Methods in Archaeology,
Fig. 1 Excavation through part of the tell settlement at Catal Hoyuk, Turkey, showing edges protected from collapse by sandbags and a deeper trench supported by timber shoring (M. Carver)

Excavation Techniques

Archaeological strata are defined in the horizontal plane by scraping the surface until boundaries (anomalies) are seen in the soil. These denote the edges of *contexts*, deposits that are made at different times (Fig. 3). The object of excavation is to define contexts and put them in order to produce the story of the site. Initial definition of a deposit is often achieved with a mechanical excavator with a front bucket or backhoe, used for example to remove topsoil or a concrete platform. The surface may then be cleaned with a shovel and further defined with a trowel, a tool which archaeologists have adopted from the building trade (a pointing trowel) and made especially their own (Fig. 4). The ability to define strata and to see objects depends on the technique and the intensity of effort applied. For example, clearance of the topsoil with a back-actor is fast but visibility is sacrificed – smaller objects and more subtle edges in the soil will not be noticed. By contrast, to ensure that everything is noticed in a feature of special importance, such as furnished grave, the excavator will proceed with the greatest caution, not only taking care to define every tiny anomaly in the ground, but *screening* (sieving) all the waste soil (*spoil*) to make sure nothing escapes.

Excavation Methods in Archaeology, Fig. 2 Area excavation at Portmahomack, Scotland. The horizon is being exposed by a troweling line and will be recorded with the assistance of observation from a tower (M. Carver)

Excavation Methods in Archaeology, Fig. 3 The dark curved patterns of post pits and ditches revealed by troweling. On this sandy terrain, the edges are rendered more visible for visible with the aid of a light spray (M. Carver)

These different levels of digging at which excavation may operate also imply the application of different levels of *recording*. For example, the character and location of a wall exposed by a bulldozer will not be as accurately known as one carefully revealed by the trowel and brush. Accordingly, the more detailed the excavation, the more detailed should be the records. It can be seen too, that the more detailed the digging, the longer it will take and the more it will cost. The question of how much trouble to take is therefore a vital one to consider at the design stage. One useful way of controlling the application of appropriate level of digging and recording is to use *Recovery Levels*, lettered A–F (Fig. 5), a handy template which lays down in advance the minimum recording required for each type of digging. This ensures not only that the full record is made but that features excavated at the same level can be compared: the assemblages of two garbage pits excavated at the same recovery level are comparable, since they were retrieved at the same level of intensity and subjected to the same screening regime.

Recovery levels are decided in the design stage. In general, Level A is used for the clearance of the top of a site by machine: Level B usually refers to tidying with a shovel and Level C to preliminary definition with a trowel. The vast majority of features are excavated at Level D or its equivalent. Here definition is as good as can be achieved by the naked eye, each context is recorded individually, 25 % of the spoil is screened, and there are detailed written and photographic records of all features. Level

Excavation Methods in Archaeology, Fig. 4 Trowels in use. (**a**) The pointing trowel favored in Europe. (**b**) The handpick favored in East Asia (M. Carver)

E tends to be applied to features of special importance like an undisturbed floor or a furnished grave. Here the tools used are the dental pick or the scapula, rather than the trowel, and the excavator works very slowly and close to the ground. There will be occasions when a feature is so unusual, and in such good condition, that the excavators cannot do justice to it on site. In this case (Level F) it is boxed and lifted and taken to the laboratory, where it can be slowly dissected in controlled conditions. A pioneering example was the lifting of an entire

LEVEL	COMPONENT	FIND	CONTEXT	FEATURE	STRUCTURE	LANDSCAPE	e.g.
A	(not recovered)	Surface finds PLOT 2-D	Inferred by sensor OUTLINE PLAN	Inferred by sensor OUTLINE PLAN	Inferred by sensor OUTLINE PLAN	Inferred by sensor	Field walking
B	(not recovered)	Large finds RECORD EXAMPLES KEEP EXAMPLES	Defined by shovel DESCRIBE	Defined by shovel SHORT DESCRIPTION. OUTLINE PLAN	as features	PLOT STRUCTURES on OS	19th C House
C	(not recovered)	All visible finds. RECORD ALL. KEEP EXAMPLES. MAY PLOT BY m^2	Defined by coarse trowel DESCRIPTION (Munsell for mortars and natural)	Defined by coarse trowel FULL DESCRIPTION. DETAILED PLAN HEIGHT	Defined by coarse trowel EXCAVATE AS ONE. PHOTOGRAPH	1:100 PLAN PROFILE	16th C Pits
D	SAMPLE SIEVING of spoil on site for presence of specified material (spoil not kept)	All visible finds PLOT 3-D and KEEP ALL	Defined by fine trowel DESCRIPTION (Incl. Munsell) PLAN 1:20	Defined by fine trowel FULL DESCRIPTION. DETAILED PLAN 1:20 (colour coded) CONTOURS PHOTOGRAPH (B/W)	Defined by fine trowel EXCAVATE AS ONE. PHOTOGRAPH by PHASE	1:100 PLAN CONTOUR SURVEY	Timber trace building
E	TOTAL SIEVING of spoil on site for presence of specified material and KEEP SPOIL	All visible finds PLOT 3-D and KEEP ALL	Defined minutely DESCRIPTION (Incl. Munsell). PLAN (natural colour) 1:10 or 1:5 contour	Defined minutely FULL DESCRIPTION. PLAN (colour) 1:10 or 1:5 CONTOUR. PHOTOGRAPH	Defined minutely EXCAVATE AS ONE. PHOTOGRAPH by PHASE	(as LEVEL D) CONTOUR SURVEY	Skeleton
F	MICRO SIEVING soil block in laboratory	(as component)	(as LEVEL E) and LIFT AS BLOCK	(as LEVEL E)	(as LEVEL E)	(as LEVEL D)	Storage pit fill

Excavation Methods in Archaeology, Fig. 5 Recovery levels used to control the levels of precision applied to digging and recording in excavation (M. Carver)

burial chamber at Högom in Sweden. At Monruz in Switzerland, an Upper Paleolithic floor was defined on site and then lifted and put on permanent display – a combination of Levels E and F excavation.

Nano-Excavation

Recent technical advances have further enlarged the ambitions of excavators to detect, and record in ever more detail, the phenomena encountered on archaeological sites. Archaeologists started screening and taking bags of soil (*context samples*) back to the laboratory since decades ago, in order to extract material that was suspected of being there, but not visible to the naked eye. Examples are grains of pollen or the husks (carcasses) of insects, which give information about the vegetational resources and the local environment, respectively.

Further developments, which might be termed Level G, use chemical and geophysical readings taken on site, to infer the former presence of certain activities. ICP analysis was used at Sutton Hoo to detect traces of iron and copper from a vanished cauldron and the residue of bones from a burial chamber that had been scoured by tomb robbers. Minute traces of bone can now be identified to species by *proteomics*, using the weight of specific proteins. In Greenland, an archaeological team described 500-year sequence of animal farming, using DNA drawn from a sequence of samples taken from a vertical core driven down into an open field (Hebsgaard et al. 2009). Magnetic instruments have proved revealing on site, for example, at Pinnacle Point where Paleolithic hearths have been detected using magnetic susceptibility measurements. Perhaps the most interesting advances, from the excavators' point of view, are the results of using geophysical and geochemical techniques in combination. An example is Karen Milek's analysis of the floor of Viking houses in Iceland where magnetometer readings and chemical readings allowed her to infer the presence of wool washing, latrines, and beds and map their location (Milek 2006; Fig. 6).

Arbitrary and Stratigraphic Excavation

Since the basic sequence of an archaeological site is given by the contexts (layers), the ideal is to record each of these in the order in which it was deposited. This is *stratigraphic excavation*, which, in its simplest form, maps each layer separately (Roskams 2001) and in more sophisticated schemes records all the layers but also higher-order concepts like features and structures (Carver 2009; and see the entry on ▶ Recording in Archaeology in this encyclopedia). The order of deposition may be partially captured in *section* and is worked out for the site as a whole with the aid of *stratification diagrams*.

Arbitrary excavation divides the deposit into horizontal slices 5–10 cm thick, known as *arbitrary levels* (or spits). This is naturally a much faster method of digging than defining each original cultural layer in three dimensions. It is often justifiable in the case of deposits where stratification is extremely difficult to see, for example, in *cave sites* or *LBK settlements*. Even when layer interfaces are visible, it is sometimes championed as more scientific than the definition of individual contexts, which is subject to the variable skills of excavators. If a deposit is precisely sliced, horizontally and vertically, the records of these surfaces provide an unequivocal, and checkable, account of where interfaces were located and what layers looked like.

Analysis and Publication of Excavations

The minimum duty of every excavator is to conserve the records made in a publically accessible archive (see the entry on Publication in Field Archaeology in this encyclopedia) and provide an account of the sequence of activities encountered on the site. Many thousands of CRM excavations are conducted each year that meet these minimum requirements on behalf of clients. The full yield of research requires a comprehensive program of analysis, in which all the artifacts and biota (the *assemblages*) are studied and the *use of space* is analyzed and the *sequence* and date determined. In general the assemblages indicate the activities on site; the spatial analysis discovers the shape of buildings and how floors, yards, and routes were used. The sequential analysis puts the

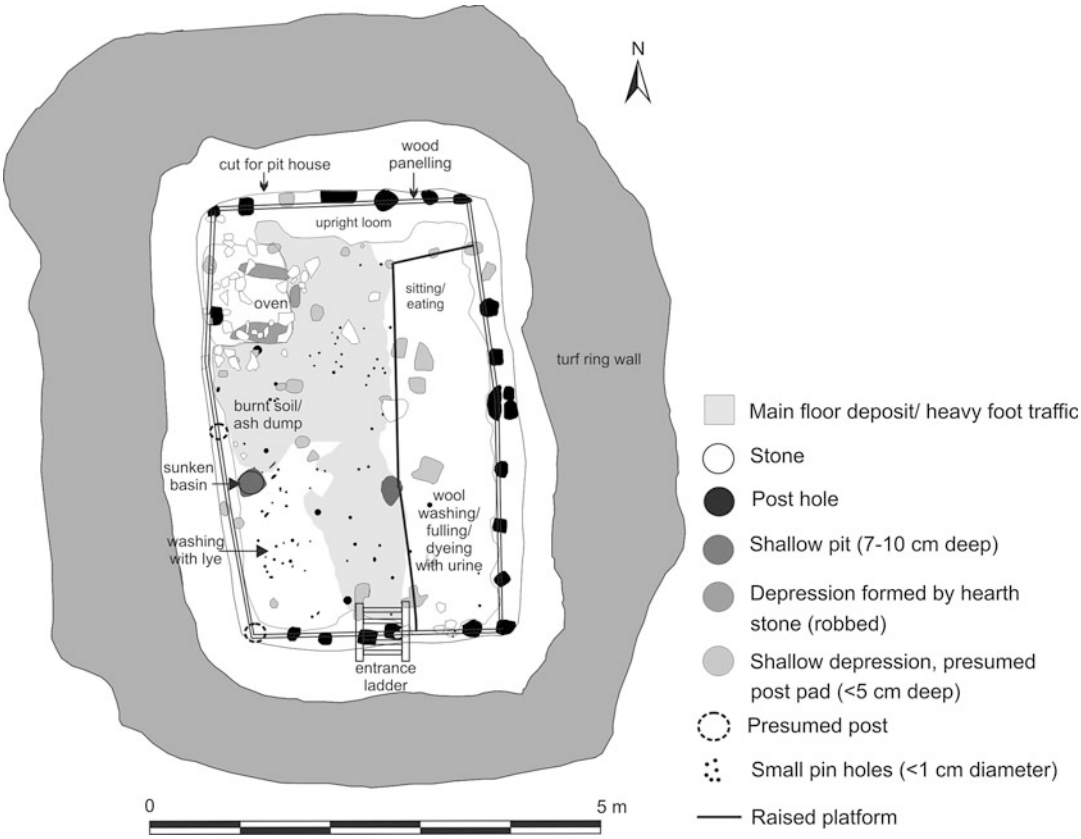

Excavation Methods in Archaeology, Fig. 6 An interpretation of Hofstadir pit house G, owed to microchemical and geophysical mapping (Courtesy of Karen Milek)

structures and activities in order and gives them a date. These results are synthesized to give a documented account of the events that occurred in order of date, often divided for convenience into phases or periods. What every excavation should offer is a strong, evidence-based local story, which can then be deployed to understand bigger questions couched in more generalized theoretical frameworks.

Cross-References

- ▶ American Pioneers and Traditions
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Burial Excavation, Anglo-Saxon
- ▶ Ireland: Investigations in Advance of Motorway Construction
- ▶ Publication in Field Archaeology
- ▶ Recording in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

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Experiencing Cultural Heritage

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Introduction

The experience of cultural heritage is varied according to the person's realm of experience, the setting of the experience, and the intent of the experience from the point of view of the participator and the provider. The most readily accessible experience of cultural heritage is in the realm of tourism, whereby tourist motivation can be explicitly linked to cultural heritage resources and locations. Notable in European countries, and borne out in global tourism statistics, the cultural heritage tourist has particular motivations, allied to education and cultural improvement, is looking for authentic experiences of cultural traits allied to distinct geographic locations, visits particular sites, spends more at a location in both time/duration, and money/investment in the leisure activity. Figures produced by other national tourism organizations (NTOs) around the globe tend to concur with this trend too: Experience of cultural heritage is a popular leisure motivation on an international scale as well as a local driver for economic and social development.

Definition

Heritage tourists can be readily identified in demographic studies of leisure activities, and for tourism, businesses are a sought-after group who will often act as repeat visitors to an area. Heritage tourists can therefore be categorized as a sector of the visitor population who desire to engage in and respond to an immersive experience associated with *genius loci*, or the "spirit of place," comprising all aspects of the built, natural, cultural, and social environment. Studies in tourism management which have created typologies of visitor according to motivation and behavior continue to subdivide and refine the form of the heritage tourist, according to specialized area of business/activity focus, but the general principle of this type of tourist can be understood distinctly alongside categories such as cultural tourist, or eco-tourist. Associated variables in the types of tourist and form of encounter can be analyzed by the origin of the visitor, local, domestic, or overseas; the duration of stay, as a day visit or longer; and by the visitor context, staying with friends or relatives, within a family group, or on business.

The different types of tourist unsurprisingly take part in different types of heritage tourism, and the form of experience is molded by where the encounter with cultural heritage takes place. The most readily understood and studied form of heritage experience can be found at sites operated as visitor attraction. It should be remembered that many sites operated as heritage visitor attractions were not designed for the purpose of tourism (e.g., castles, country houses, and battlefields), and therefore can be argued to provide the most accessible authentic form of encounter, albeit requiring further interpretation for visitors through guidebooks, display materials, and other visitor service functions. The further major locations for a definable cultural heritage experience can occur within a museum or gallery, which display specific aspects of a community's history or types of artform, and the function, form and operation of museums and galleries have a well-established literature and philosophy of museology (Bennett 1995). Recognition of the cultural heritage aspects of the wider tourism environment beyond the defined site or building is seen through increasing prominence of heritage-themed events (associated with folk customs, historical or geographical traditions, and

established calendar events); wider forms of "heritage" hospitality via distinct types of food and beverage (regional or historical foodstuffs), or locations for visitors to stay, such as historic buildings converted into self-catering accommodation or hotels. Broader cultural experiences, allied to the wider tourism field of cultural tourism, can also have distinct characteristics allied to cultural heritage, and the resurgence of the civic trust or main street movement in Europe and North America capitalizes on areas of towns expressing their historic/cultural character to attract visitors, and support regeneration of local economies. The growth in interpretative technologies deployed in the tourism field, as part of the overall marketing and visitor strategy for a location, provides a newly distinct facet of the cultural heritage experience, with "apps" and websites developing rapidly to provide rich content and information about pin-pointed historic locations, and additional layers of encounter which reach beyond the site itself.

The actual encounter with cultural heritage is itself obviously an intensely personal experience, and study within the fields of tourism studies draw readily on psychological and psychogeographic technique, allowing the ontology of the encounter to be closely analyzed. The experience of cultural heritage is thus deeply influenced by personal and cultural psychologies (education, upbringing, religion, culture, personal association, interests and so on); extraneous experiential factors (location; symbols, aesthetics, societal behaviors); and practical physical factors (such as site operations; visitor management; interpretative engagement). The visitor journey to and encounter of cultural heritage has come to be recognized as a complex set of circumstances, and ever more so when understood within what American business academics Pine and Gilmore (1998) believe to be the growth of the "experience economy." This work has significantly influenced tourism studies' approach to studying the visitor experience, noting that forms of behavior, communication and interpretation, and transaction change over time as the level of sophistication in the management of the visitor experience increases.

Key Issues/Current Debates/Future Directions/Examples

Worth noting in the cultural heritage experience is the level of implicit and explicit communication between the managers "staging" the experience and the receivers or participants in the encounter. Heritage, as considered elsewhere, can be heavily laden with political and social resonance, and the visitor experience may also be influenced from the point of view of educational, cultural, political, or environmental message. This has been most readily studied within the museological field, but is also significant in areas such as World Heritage Site designation, the interplay of environmental protection and heritage preservation seen in the work of the varied National Trusts in different parts of the world, and Governmental heritage agencies with education as a part of their strategic mission. The range of locations where an encounter can occur, and the ambient environment for that encounter, be it a sense of place, a distinct historic location, or an activity explicitly associated with tangible or, indeed, intangible expression of cultural heritage, means that the experience is a rich field of study. This has led to a welcome growth in academic study and critique from different subject origins, such as geography, archaeology, and business management and tourism. A strong publication stream is developing in journals such as *the Journal of Heritage Tourism; the International Journal of Heritage Studies; and the Journal of Public Archaeology*, among others.

The practicalities of the visitor experience of cultural heritage are important considerations in the management of the built environment in locations wanting to attract tourism more generally. Cultural heritage plays a distinct role in the development of the tourist destination image (TDI) of a location, and even entire country: Scotland is a good example of this, where an interesting juxtaposition is navigated between the country's tourism infrastructure development requiring to be competitive and by necessity up-to-date, and at the same time incorporating the key tourism attractiveness factors of iconic historic sites and culture (Edinburgh Castle, bagpipes, tartan, and

whisky being the recognized stereotypical heritage symbols). At a city-scale, a similar tension can be seen playing out in the visitor management within the city of Venice, balancing very practical conservation pressures on the built environment, and the increasing tourist demand, leading to sometimes drastic management measures of capacity management when the pressure on numbers gets too high for facilities to cope in peak season. Equally, the "Outstanding Universal Values" (OUV) of World Heritage Sites represented through monumental sites such as the Great Wall of China, or wider cultural landscapes such as the recently inscribed World Heritage Coffee Cultural Landscape of Colombia can iconically represent a nation's cultural wealth and by consequence its attractiveness to tourists through the location's TDI.

The experience of cultural heritage will continue to develop in complexity, as the types of transaction and encounter with forms of tangible, intangible, and technological representations and interpretations of heritage increase. Leask (2010) provides the best recent account of the state of research into the management of visitor attractions, noting that many of those management aspects are intimately tied into the effective production and enhancement of the visitor experience. The use of cultural heritage as a factor in leisure and tourism activity, as well as a context for the management and development of the built and natural environment will also increase the pressure on cultural heritage advocates and protectors – and the tension between heritage and development in its broadest sense will lead to ever more complex debates in divergent situations around the world. Equally, the opportunity for a visitor to encounter rich cultural heritage experiences may be a positive tool for intercultural dialogue.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Heritage Research and Visitor Planning
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

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Experimental Maritime Archaeology

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Introduction and Definition

Experimental archaeology has been variously defined, early examples being Ascher (1961) and Coles (1966). Broadly, one may say that experimental archaeology involves recreating material aspects of technology or modes of production of the past, based on archaeological and historical evidence. If the experiment is

based on good evidence and is conscientiously conducted, it will likely increase our understanding of the technology investigated.

Maritime or nautical experimental archaeology usually involves building and sailing a replica or recreation of a ship or boat of the past. Experimental maritime archaeology can be seen as having started in Spain when the impending 1892 quatro-centenary of Columbus's first voyage to the Americas prompted the construction of a Columbus ship reconstruction. In 1893 a replica Gokstad ship built in Norway was sailed across the Atlantic to the Exposition at Chicago. Neither of these projects was explicitly experimental archaeology and the term had not yet been coined.

Key Issues/Current Debates/Future Directions/Examples

A notable attempt to formulate "right principles and methods" of experimental ship and boat archaeology was made in Coates et al. (1995). The ten authors clearly had a range of opinions, and while some sections impose a rigid scheme analogous to scientific laboratory experimentation with data collection, formulating a hypothesis, testing the hypothesis, presenting the whole process for criticism, and finally reassessment, there is acknowledgement that the hypothesis will "almost invariably fail to comprehend the whole extent of the matter in question." Watercraft, in the interplay of their construction and the dynamic environments in which they operate, are very complex artifacts. Coates et al. (1995) provide a good overview of how nautical experimental archaeology should be done. They note the need for careful and rigorous work, good recording, involvement of wide interdisciplinary expertise, and the proper publication of aims, hypotheses, methods, and results. But this is true of archaeology and other academic work in general. Some sense of differing attitudes to theory and philosophy can be gained from the published transcripts of discussions at The International Ship Replica Seminar, Roskilde 1984 (Crumlin-Pedersen & Vinner 1986).

Experimental archaeology is often interesting to the public and the media. The recreation of ships and boats of the past and recreation of voyaging has considerable romantic appeal. As a form of purely academic research, it is expensive and time-consuming, but replica ships and boats are funded and created for reasons other than pure academic research, including the enhancement of national identity and prestige. Academics should work with such projects and aim for maximum practicable authenticity.

A distinction between replica watercraft and reconstructions of watercraft is useful. A replica, as defined by Fenwick (1993), is only possible where shipwreck archaeology provides near complete data about the design of a vessel from a substantially intact shipwreck or there are good archived records of the design. Replicas built from shipwreck data include the Kyrenia ship (third century BCE) (Katzev 1987) and the several replicas based on the Viking ships at Skuldev (eleventh century CE). The *Endeavour* replica was built on the basis of the plans of James Cook's most famous ship which were drawn when the ship was purchased by the Royal Navy and converted for exploration. The *Endeavour* replica was not conceived as experimental archaeology and only recently has been published as experimental archaeology (MacArthur 2009), but the ship, now owned by the Australian National Maritime Museum, could be used for programs of experimental archaeology. All replicas involve some conjecture because the archaeological and historical data are never completely comprehensive. The several recreations of Columbus's ships are examples of "reconstructions." The designers have attempted to reconstruct the design of typical Spanish vessels c. 1490 because data about Columbus's ships is limited to the ship types (e.g., *caravela redonda*) and some indication of the sizes. The Columbus ship reconstructions have served to demonstrate our imperfect understanding of the original designs because the reconstruction ships have been unable to average more than about half the speed under sail that Columbus achieved.

Scandinavian experimental maritime archaeology is widely regarded as the best. There is an

excellent resource of shipwreck archaeology of substantially intact vessels from the Viking period and later, and there has been rigorous determination to recreate the appropriate tools and woodworking techniques, particularly by the Danish National Museum's Institute for Maritime Archaeology at the Viking Ship Museum at Roskilde, Denmark, under the leadership of the late Ole Crumlin-Pedersen. A Viking replica vessel made from cleft (split) oak logs is very much stronger than a replica made from sawn planks. Indeed, the light and flexible structure of Viking ships is only possible with cleft planks (Johansen 2009). The most spectacular of the Roskilde-Skuldev Viking replica ships is the 30 m longship *Sea Stallion from Glendalough*, launched in 2004. She was sailed to Dublin and back to Denmark in 2007–2008 making nearly 14 knots at best (Johansen 2009, http://www.vikingeskibsmuseet.dk/en/the-sea-stallion-past-and-present/).

It might be argued that the experimental archaeology based on replica watercraft is potentially more valid than that based on reconstructions. However, reconstruction watercraft – "floating hypotheses" as Sean McGrail (2009) has called them – can be used to test important hypotheses and even resolve important questions. Two or three centuries of debate as to how classical era triremes were propelled were effectively resolved by the Hellas reconstruction. It had long been argued that the geometry of three separate banks of oars at different levels and of different lengths was impracticable to the point of impossibility; that triremes were propelled like more recent galleys with three men to each oar but a single bank of oars. The Hellas replica has demonstrated that three banks of oars can be arranged to provide functional and effective propulsion for an entirely plausible warship design (Rankov 2009).

The construction of the "Duyfken replica," a reconstruction of a Dutch *jacht* of appropriate date (early seventeenth century) and size, was an opportunity to test the practicality and effectiveness of the Dutch system of plank-first construction. The idea that the European age of discovery and subsequent domination of much of the world's maritime trade was made possible, in part, by the switch to frame-first construction of ships is undermined by the Dutch retention of plank-first construction at a time when Dutch shipping was superior to that of the rest of Europe in terms of tonnage, volume of cargoes carried, and successful execution of the long voyages to and from East Asia. The Duyfken replica has made long voyages demonstrating maneuverable and seaworthy performance.

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- ▶ Maritime Iconography
- ▶ McGrail, Seán
- ▶ Ship Archaeology
- ▶ Steffy, J. Richard

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Eyo, Ekpo Okpo

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Basic Biographical Information

Professor Ekpo Okpo Eyo was an eminent Nigerian scholar of many parts known to people as an Archaeologist, art historian, and museologist. He was regarded as a giant pillar, on which the growth of Nigeria's museums, was establishment in Nigeria.

Ekpo Okpo Eyo was born on 28 July 1931 at Creek Town, Odukpani Local Government Area, of the present-day Cross River State, Nigeria. He began his early education at the Creek Town School and subsequently at the Duke Town School, Calabar. His secondary education was at the Evening Secondary Continuing School, Calabar between 1937 and 1947. In 1960, he proceeded to the Institute of Archaeology, London, and Pembroke College, Cambridge University, where he spent the next three years (1960–63). It was at the Institute of Archaeology, London, that Eyo began to chart a path for the journey he was to take for life. However, it was in Ibadan that his intellectual maturity blossomed. Having obtained a B.A. (Cantab.) in Social Anthropology in 1963, and an M.A. (Cantab.) in 1967, he earned his Ph.D. in Archaeology in 1974 from the University of Ibadan, the first Nigerian to ever achieve this feat.

As a scholar, he garnered several awards including those received during his early years: School Prize in English and Mathematics at his Duke Town School, Calabar, in 1947; *Silver cup in Broadcasting* at the "All Nigeria Festival of the Arts" in 1956. The following year, he was awarded a Certificate in Conservation and Restoration of Archaeology and Ethnographical Specimens at the University of London in 1957. In 1962, he earned the Gordon Childe Prize for the best student of the year in Archaeology at the University. The same year, Professor Eyo was offered an associateship of the Museum Association of Great Britain and Ireland, and was awarded a Professional Diploma in Museology.

Major Accomplishments

He distinguished himself as the first and only Nigerian Director of the Federal Department of Antiquities (1968–1979), and first Director General (DG) of the National Commission for Museums and Monuments (NCMM) between 1979 and 1986. During his stint as a Director for 18 years, Ekpo Eyo laid the foundation of NCMM and made it a success. In the following years, Professor Eyo became an authority in Archaeological research, particularly African arts. His passions for archaeology and the arts were inseparable. It was once said that it was to the arts that he devoted more love and attention. However, Prof Eyo opined that it was Archaeology that opened his eyes to the arts. Thus, among the several positions he held, between 1963 and 1973, he was the President of the Museum Association of Tropical Africa (1963–73) and Vice President of the Advisory Council of the International Council of Museums (ICOM) (1965–74). Between 1976 and 1980, he became the chairman of the West African Archaeological Association; Vice Chairman of the World Heritage Committee of UNESCO; and Chairman, Organization of Museums, Monuments and Sites in Africa (OMMSA) from 1976 to 1978.

Ekpo Eyo: A Blend of Archaeology and the Arts

His passion for the arts was legendary that, Prof Ben Enwonwu, one of Nigeria's finest Artists, described him as a great man of Antiquities (Adaka 2012). This passion culminated in the exhibition "Treasures of Ancient Nigeria: Legacy of 2000 Years." It successfully put an end to the concept that the African continent lacked any civilization until contacts with Europe. The exhibition was a major instrument that made Nigeria more respected around the world. The exhibition was later to tour Britain, USA, and Canada between 1980 and 1986 (Archibong 2011).

The exhibition had been published into a book, with the same title, coauthored by Frank Willet in 1980. Other books written by him included *2000 Years of Nigerian Art* and *From Shrines to Showcases: Masterpieces of Nigerian Art*.

After retirement from the NCMM, Eyo was appointed Professor of African Arts and Archaeology at the Department of Art History and Archaeology, University of Maryland, College Park, USA, in 1986. There he spent the latter part of his life researching and teaching. During this time, Professor Ekpo Eyo often carried out archaeological excavations in Calabar. One of the major results of these excavations was *The Terracottas of Calabar*, published in 2008. Professor Eyo published over 25 scholarly articles in learned journals and delivered about 30 lectures in museums and top universities in America Europe and Nigeria. He was, in 1975, admitted into the *"Ordre des Arts et des Lettres"* by the French Government. In 1980, he bagged the Officer of the Federal Republic (OFR) award by the Federal Government of Nigeria. In 1989, he was conferred with an Honorary Degree of Doctor of Letters by the University of Calabar, Nigeria. Five years later, he was presented with the Art Council of African Studies Association (ACASA) Leadership Award at the 13th Triennial Symposium on African Art at Harvard University.

†On May 28, 2011, Professor Ekpo Okpo Eyo passed away in Maryland, USA, at the age of 80. A former Secretary General of the Commonwealth, Chief Emeka Anyaoku, said of him: "a true icon of Nigerian Archaeology, Anthropology and Museums, and an outstanding scholar of Nigeria's cultural heritage (Adaka 2012)." However, a succinct description of him was given by a former director of heritage, monuments, and sites in Nigeria that Prof Eyo, even in death, is "a priceless museum piece (Archibong 2011)."

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- ▶ West Africa: Museums
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Facial Approximation and Craniofacial Superimposition

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Introduction

When concerns exist as to the identity of a set of remains and when DNA, dental, and radiographic comparisons are not possible, the morphology of the skull can be used in conjunction with the biological profile to help provide answers (İşcan & Helmer 1993). These methods consequently hold special pertinence to medicolegal cases, and they take two forms: craniofacial superimposition and facial approximation (see the section "Definition" and Fig. 1). Unlike its counterpart method, facial approximation is also routinely used for paleoanthropological (Balter 2009) and archaeological purposes (Prag & Neave 1997).

Craniofacial superimposition typically enables the determination of persons to whom the skull *does not* belong via image comparison, i.e., exclusion of individuals whose facial anatomy is inconsistent with that of the skull (Ubelaker 2002). Where multiple photographs and views of the face exist, and/or the teeth are visible, increased weight to positive matches may be assigned. On the other hand, facial approximation is used to predict the facial appearance from a skull (Gerasimov 1955). In medicolegal contexts, correct recognition of the publically advertised facial approximation is ideal; however, successes may also be attained via facial approximation's ability to capture public attention and focus it on the jointly advertised case details that, in turn, provide the stimulus for recognition (Stephan 2009). In non-forensic contexts, facial approximation may be employed to illustrate the potential facial appearance of the individuals to whom the recovered remains belong (Prag & Neave 1997; Balter 2009), and it is largely used in this context to boost public interest in archaeological finds. In these circumstances, facial approximations are typically constructed with greater detail and greater artistic license because the faces serve educational/entertainment purposes whose accuracy is impossible to verify (Montagu 1947).

Historically, superimposition and facial approximation coevolved from early attempts to authenticate the identities of skeletons thought to represent well-known historical figures (İşcan & Helmer 1993). The implementation of facial approximation methods predates, however, that of craniofacial superimposition (see Kollmann & Büchly 1898; Pearson & Morant 1934). In terms of medicolegal work, the first published use of facial approximation for homicide case investigation comes from the USA in 1916 (Wilder & Wenworth 1918) while that for craniofacial superimposition comes from Scotland in 1937 (Glaister & Brash 1937). While His (1895) is routinely cited

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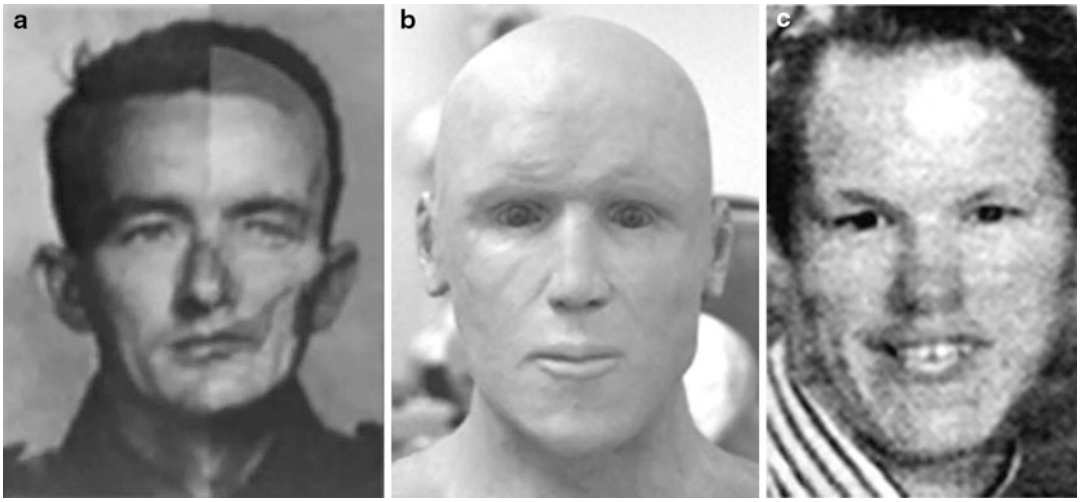

Facial Approximation and Craniofacial Superimposition, Fig. 1 Craniofacial superimposition and facial approximation: (**a**) semitransparent vertical skull wipe during video superimposition to compare the skull and face (the skull in this case belongs to the person depicted in the facial photograph); (**b**) a facial approximation that was constructed without a priori knowledge of the facial appearance of the correctly matching individual depicted in (**c**) (Parts (**b**) and (**c**) are reprinted from Stephan and Henneberg (2006), with permission from Elsevier)

in the scientific literature for first implementing facial approximation techniques, Sefner's attempt to construct Bach's face was not undertaken in the blind and so it does not qualify as face prediction (His 1895).

Of the two methods, craniofacial superimposition is widely recognized to be the more reliable, and should always be given precedence if a short list of potential candidates for a match, and antemortem photographs of the decedent, exist (Stephan 2009). Where this is not the case, facial approximation is warranted. Note here that facial approximation has been cautiously regarded in the broader anthropological realm due to its weak scientific foundations (Tyrrell et al. 1997; Stephan 2009). Even greater skepticism has been directed toward paleoanthropological approximations due to their larger degrees of subjectivity (Montagu 1947).

Typically, anthropologists or anatomists should be employed to execute the methods because of the method's anatomical underpinnings. However, where the anatomist/anthropologist does not possess the requisite knowledge/skills in photography (craniofacial superimposition) or dexterity for modeling (facial approximation), collaborations should be pursued with other relevant parties (photographers and artists) as appropriate.

Definition

Craniofacial superimposition (also known as photo superimposition, video superimposition, and supraprojection) is the simultaneous comparison of skull and face anatomy via the mixing of photographic or video images to determine their degree of correspondence (see Fig. 1).

Facial approximation (also known as facial reconstruction, facial reproduction, and forensic sculpture) is the prediction of a face from a skull without a priori knowledge of the decedent's true antemortem facial appearance (see Fig. 1).

Key Issues

Craniofacial Superimposition

Superimposition progressed from the overlay of tracings of the skull and face to the overlay of photographic still images and then to motion

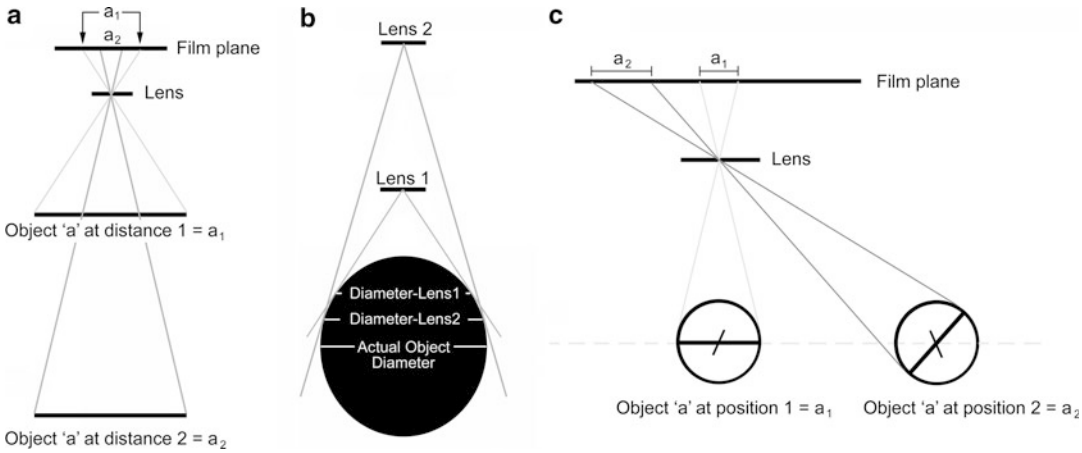

Facial Approximation and Craniofacial Superimposition, Fig. 2 Some properties of rendering a 3D scene to a 2D photographic plane: (**a**) at short subject-to-camera distances, parts of objects closer to the lens are magnified; (**b**) an object's profile depends on the subject-to-camera distance used; and (**c**) spherical objects are broadened when they fall toward the edges of the camera's field of view (Parts (**a**) and (**b**) are redrawn after Gavan et al. (1952))

pictures in the 1970s (Taylor & Brown 1998). The latter method, which largely remains unchanged up until the time of this writing, requires two video cameras: one to film the 3D skull and one to film the 2D facial photograph. The two acquired 2D images (one of the skulls and one of the photographs) are then mixed together and viewed on a single screen for the craniofacial alignment to be assessed.

It is crucial to understand that the raw anatomies of the skull and the face are not compared in craniofacial superimposition. Instead, it is the rendering of these 3D structures onto two 2D planes (i.e., their point projections) that form the platform for the comparison. Thus, the photography conditions used to capture the 2D images must be very nearly the same for a valid superimposition to be made.

Since specific settings have normally been used to acquire the preexisting 2D facial image, the task for the superimposition analyst is to recreate the photographic conditions for the skull recording (Taylor & Brown 1998). Modern video superimposition holds a major advantage above its older still-frame counterparts in this respect because the skull can be moved, with real-time superimposition viewing, for fast and correct placement relative to the face. Of course, the superimposition procedure is most accurate and expedient if the photographic conditions are known and can be set prior to skull alignment (e.g., Glaister & Brash 1937). This is best attained by asking the photographer, who took the original antemortem photograph, what photographic settings were used. If the photographer cannot be consulted, trial and error is usually pursued to approximate (as closely as possible) the photographic settings used for facial image capture (Taylor & Brown 1998). These photographic variables include the following:

- *Subject-to-Camera Distance:* The subject-to-camera distance must be replicated so that (1) parts on the 3D object closer (or further) from the camera are not differentially magnified between the comparison images (Fig. 2, or for real-life examples Fig. 3 – Panel 1), and (2) the camera does not record different edges of the same three-dimensional object (Fig. 2, or for real-life examples Fig. 3 – Panel 2). This is especially important when small subject-to-camera distances (<5 m) are employed.
- *Film Plane Relative to the Subject:* The angle of the film plane relative to the subject (i.e., camera tilt) must be replicated so that the

degree to which the top or bottom of the subject vanishes (= keystone distortion) is the same. This factor also helps to determine the vertical height at which the camera is placed relative to the subject and vice versa.

- *Position of the Subject in the Field of View:* The position of the skull in the field of view must reflect that of the face because the point projection of a 3D scene to a 2D plane results in the elongation of objects if they are located far from the center of the field of view (Fig. 2, or for real-life examples Fig. 3 – Panel 3).
- *Camera Equipment:* It is helpful to use the same or similar camera equipment for

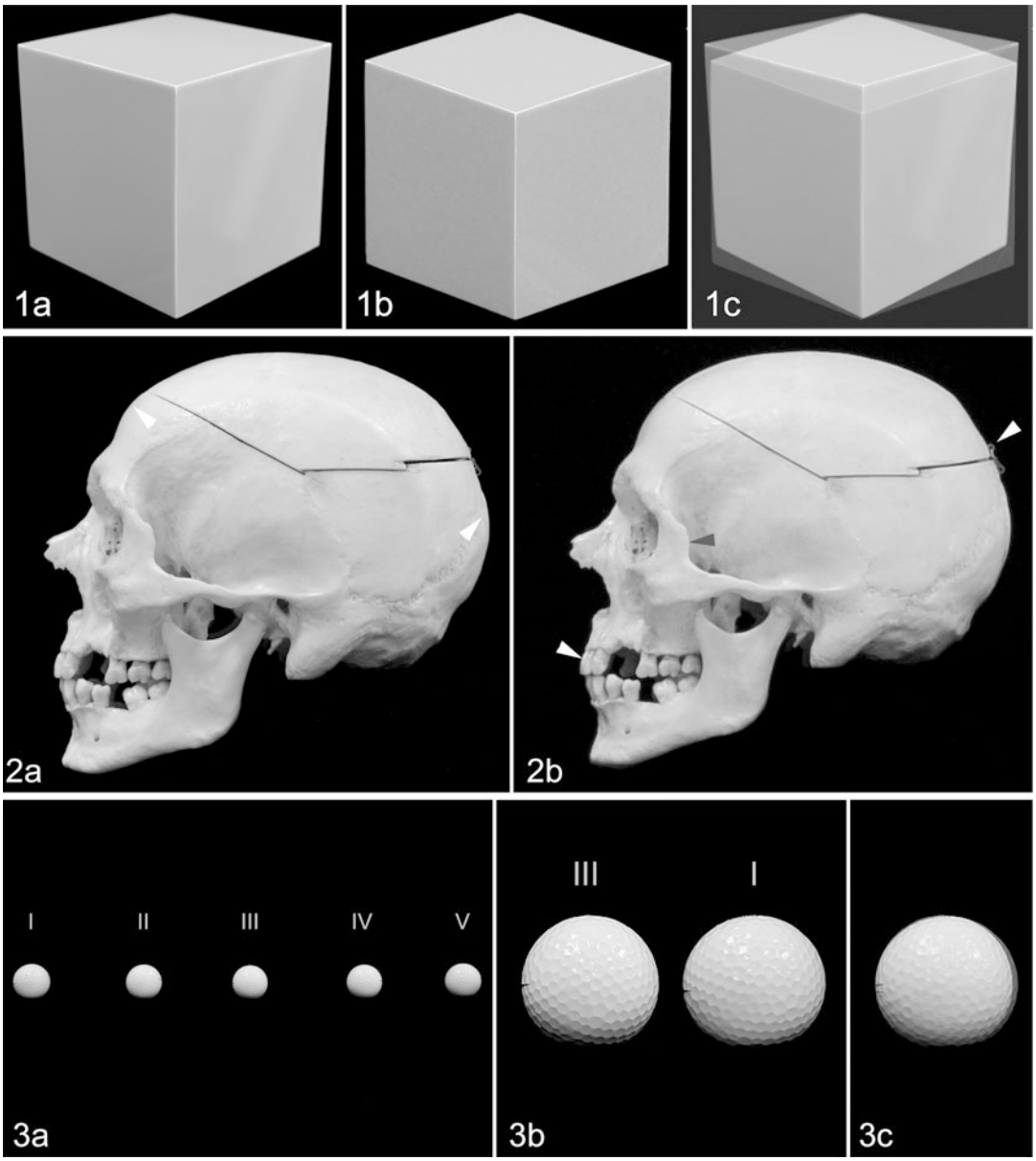

Facial Approximation and Craniofacial Superimposition, Fig. 3 (continued)

consistency of images (e.g., Glaister & Brash 1937). Note here that using different focal length lenses does not affect the perspective of the object at a given camera-to-subject distance, but does affect the zoom of the object and thus the resolution on the recorded image.

In terms of method accuracy, the most comprehensive study of craniofacial superimposition was undertaken by Austin-Smith and Maples (1994) who found a false-positive match rate of 9 % when three skulls were compared to c. 100 facial photographs in either frontal or profile view. When both front and profile skull-face views were simultaneously used for comparison by these same authors, the false-positive rate was reduced to <1 %.

Facial Approximation

Face prediction from the skull is a challenging task that requires a high degree of dexterity when the face is manually constructed (Gerasimov 1955). For this reason, anthropologists have often collaborated with artists and computer automated methods have been pursued to reduce the subjectivity of the methods (Tyrrell et al. 1997). While statistics and computer automation hold many advantages for standardizing methods, decreasing subjectivity, and increasing replicability (Tyrrell et al. 1997), obstacles remain and most of these methods have not been validated or made publicly available. As a result, manual facial approximation methods (clay-based sculpting and/or drawing) continue to be popular.

A replica of the skull is often used as a scaffold for facial approximation so that the original is spared of any damage and can be used as a reference during the face construction process (Fig. 4). Mean soft tissue depths are normally represented on the replica skull to indicate the amount of soft tissue typically overlaying the skull (Figs. 4 and 5). Methods for face construction vary according to the degree of weight that an analyst chooses to award to mean facial soft tissue depths or individualized face anatomy (Prag & Neave 1997). It is common for the temporalis and masseter muscles to be constructed (Fig. 4), or at least considered, in the face construction process according to the rugosity of their bony attachments. The muscles of facial expression may also be added (Prag & Neave 1997), but their construction according to stereotypical anatomical patterns should not be mistaken for scientific derivation of individualized face anatomy. A multitude of soft tissue prediction guidelines exists for face modeling (Gerasimov 1955); however, many have not been empirically derived or tested, and those that have been subject to validation tests do not often stand up to scrutiny. Space does not permit

Facial Approximation and Craniofacial Superimposition, Fig. 3 Changes in object appearance with photographic factors. **Panel 1** – change in object shape due to differential magnification as a result of subject-to-camera distance: (*1a*) a cube photographed with a Nikon D700 camera body fitted with a Nikon 60-mm 2.8 speed lens at a distance of 0.7 m; (*1b*) the same cube photographed with the same camera and lens, but with a camera-to-subject distance of 4.0 m (cube is rescaled for size); and (*1c*) superimposition of the two photographs, aligned on the cube's leading inferior corner. **Panel 2** – change in a spherical object profile due to change in subject-to-camera distance: (*2a*) skull shot with a Nikon D700 camera body fitted with a Nikon 60-mm 2.8 speed lens at 0.6 m; and (*2b*) the same skull photographed with the same camera and lens, but at a subject-to-camera distance of 3.0 m. Note: (i) the marked contribution of the frontal eminence and the occipital bun to the skull outline in *2a* but not *2b* (*white arrows* in *2a*); (ii) the left maxillary central incisor and the superior hinge for the calotte, which is visible in *2b* but not *2a* (*white arrows* in *2b*); and (iii) the more posterior placement of the zygomatic region in *2b* compared to *2a* (*grey arrow*). **Panel 3** – elongation of an object at the edge of the field of view, due to point projection onto a 2D plane: (*3a*) photograph of five identical spheres (*golf balls*) spread across the field of view of a Nikon D700 camera body fitted with a Nikon 60-mm 2.8 speed lens at a distance of 2.1 m; (*3b*) close up view of the center ball (III) and the left most lateral ball (I; note the elliptical shape of I in contrast to III); and (*3c*) superimposition of the center ball and the left most lateral ball, aligned at their left margin, to illustrate differences. Thanks go to T. Nguyen for photography support

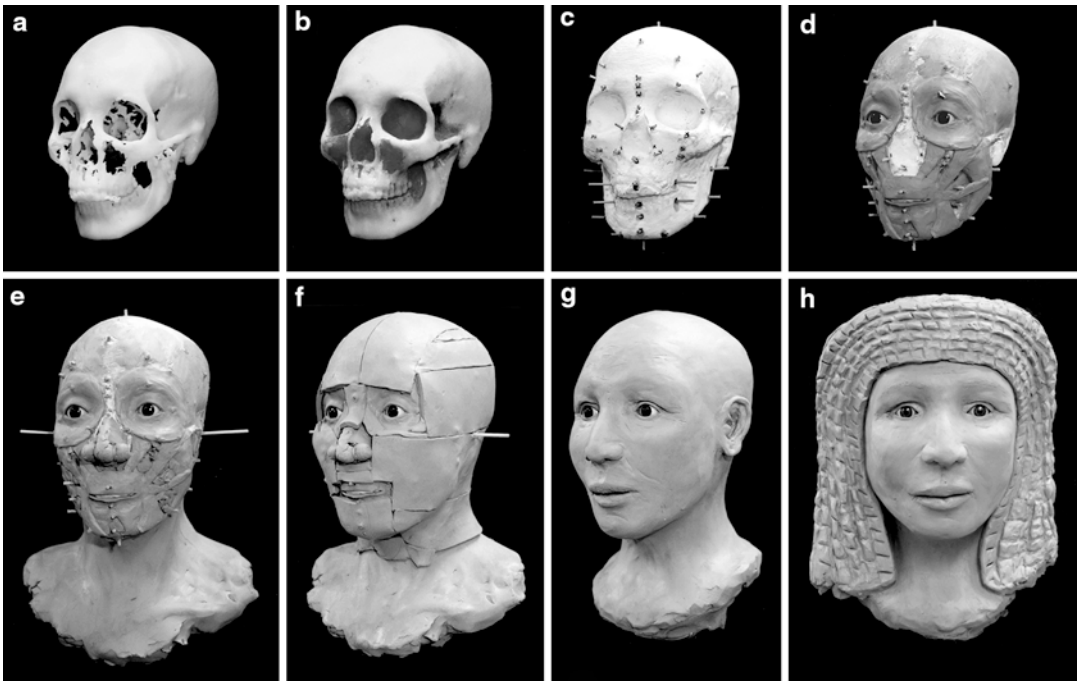

Facial Approximation and Craniofacial Superimposition, Fig. 4 Time-lapse sequence of the facial approximation of Renpit-Nefert (one of the Egyptian Mummies at the South Australian Museum, Australia): (**a**) laser-sintered skull from CT data; (**b**) laser-sintered skull with voids and undercuts filled using dental-modeling wax); (**c**) plaster skull cast with mean soft tissue depth markers in place; (**d**) skull with eyes and facial muscles added; (**d**) partially completed facial approximation (dowels track the location of the external auditory meatus); (**f**) addition of clay sheets to simulate the skin and subcutaneous structures; (**g**) the facial approximation after refinement of the nose, smoothing of the skin surface, and addition of lips and ears; and (**h**) completed facial approximation

for a complete listing of these soft tissue prediction guidelines; however, some that have been recently analyzed and verified include:

Setting the:

- Eyeballs so that the corneal apex is c.16 mm anterior to the lateral orbital wall and its edges are closer to the orbital roof and lateral orbital wall
- Inner corner of the eye fissure c. 5 mm lateral to the medial orbital wall, and the lateral corner of the eye c.4.5 mm medial to the lateral orbital wall
- Level of the eye fissure c.10 mm below the frontozygomatic suture or at the level of the malar tubercle
- Nose width to 167 % of the nasal aperture width
- Height of nose wing to the height of the crista conchalis on each side
- Mouth width to 133 % of the distance between the lateral most aspects of the canines
- Heights of the lips to approximate the height of the enamel of the font teeth
- Lip closure line to one third of the way up the central incisors
- Bony meatus of the ear c.5 mm anterior and inferior to the soft tissue meatus of the ear

In medicolegal contexts, atypical skull anatomy should be represented in the facial approximation wherever possible since it may trigger recognition. This includes atypical dental features, which may mandate the face to be set with an open smile. For casework, the completed facial approximation should be photographed in black and white so as to play down color that cannot be predicted from the skull (e.g., eye color). Advertisements of the facial approximation should be made on a "slow media day" when other major news events do not detract from the

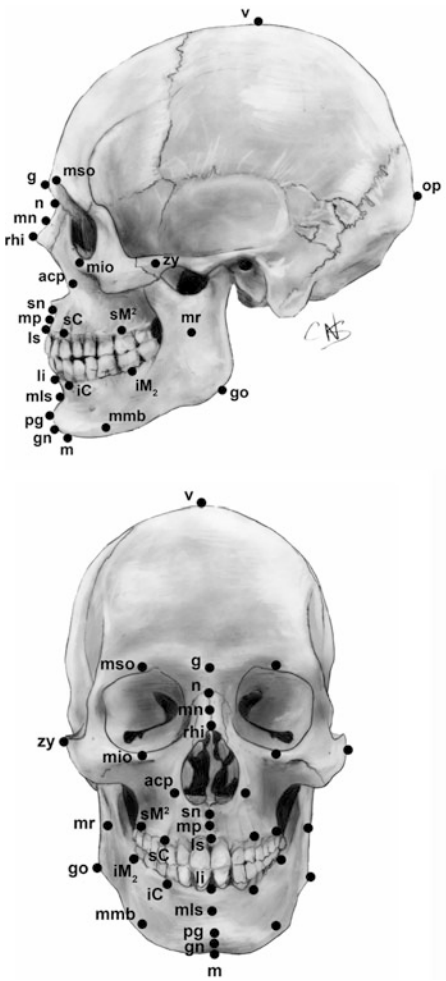

Soft Tissue Depths	0-11 years		12 - 17 years		18+ years	
	Mean	n	Mean	n	Mean	n
Median points						
op (opisthocranion)	-	-	-	-	6.5	1152
v (vertex)	-	-	-	-	5.0	1055
g (glabella)	5.0	2116	5.5	1558	5.5	5791
n (nasion)	8.0	4088	8.0	2754	6.5	6159
mn (mid-nasal)	4.0	433	4.0	472	4.0	1272
rhi (rhinion)	2.5	1064	2.5	719	3.0	5511
sn (subnasale)	10.0	1447	12.0	1233	13.0	1768
mp (midphiltrum)	11.5	3671	15.0	2485	11.5	5508
ls (labrale superius)	13.5	1675	14.5	1798	11.5	5106
li (labrale inferius)	14.5	1493	15.5	1639	13.0	4886
mls (mentolabial sulcus)	10.0	1884	11.0	1687	11.0	5792
pg (pogonion)	10.5	4285	11.5	3020	11.5	6786
gn (gnathion)	6.5	1062	7.5	679	8.5	545
m (menton)	9.0	160	9.0	103	7.0	4475
Bilateral points						
mso (mid-supraorbital)	5.0	469	6.0	246	6.0	2225
mio (mid-infraorbital)	6.0	521	7.0	521	7.0	2298
acp (alare curvature point)	7.5	410	8.0	104	9.5	1511
go (gonion)	13.0	575	17.0	109	10.0	4168
zy (zygion)	7.5	110	8.0	147	6.0	4390
sC (supra canine)	-	-	11.0	104	9.5	3138
iC (infra canine)	-	-	10.5	104	10.5	1184
sM^2 (supra maxillary 2nd molar)	-	-	27.0	104	25.5	1405
iM_2 (infra mandibular 2nd molar)	-	-	23.0	104	19.0	1344
mr (mid-ramus)	18.0	108	19.5	142	17.5	2858
mmb (mid-mandibular border)	10.5	411	12.5	104	10.5	935

Facial Approximation and Craniofacial Superimposition, Fig. 5 Mean soft tissue thicknesses, at craniometric landmarks, as collated from the literature for adults and subadults (Illustrations and data reprinted from Stephan and Simpson (2008a, b), with permission from Blackwell-Wiley)

facial approximation advertisement. Additionally, the analyst should retain control over what images of the face are released so as to maximize opportunities for recognition success. In archaeological and paleoanthropological contexts, the faces are typically given full expressions, decorated and dressed consistent with the time period, and are photographed and/or displayed in full color (see, e.g., Prag & Neave 1997; Balter 2009).

The accuracy of archaeological and paleoanthropological facial approximations is difficult, if not impossible, to assess because antemortem facial records for these individuals rarely exist. In the historical context, comparison to artistic portraits holds severe limitations since these portraits represent the artist's rendered perception of the subject (Gerasimov 1955). Despite numerous small sampled studies in the medicolegal context, no consensus on the method's accuracy is held since there are as many papers reporting poor success as there are studies reporting high success (Stephan 2009). Note that casework success rates cannot be used as a measure of facial approximation's accuracy due to confounding factors (e.g., facial approximations are accompanied by written case details, and analysts define and record successes in different manners) and that in this applied field, greater motivation exists for analysts to report their successes than to publically disclose their failures. Recent research on the anatomical validity of the guidelines used for face prediction have found considerable errors and much of the research effort now focuses on the production of more accurate face prediction rules, including computer automated statistical methods for face prediction. In terms of replicability, there is unanimous agreement that facial approximation's is poor (Tyrrell et al. 1997; Stephan 2009). Despite these limitations, previous successful employment of the method in forensic casework justifies its future use.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Osteology: Definition
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

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Falabella, Fernanda

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Basic Biographical Information

Fernanda Falabella is a South American archaeologist. She was born and grew up in Santiago de Chile. After high school, she attended a course given by a university professor to a group of volunteers in archaeology who were doing fieldwork along the coast near Santiago, and recognized immediately a passion for the questions being asked and the potentials of the answers being explored. She enrolled in the Licenciatura of Anthropology program at the Universidad de Chile, studying archaeology. She obtained the title of archaeologist in 1979. Her thesis focused on pre-Hispanic horticultural societies in Central Chile starting a long-term research of cultural processes in this region. She has conducted research on various topics related to the cultural practices and the social organization of these groups, such as dietary patterns, ceramic technology, resources circulation, settlement patterns, and identities. Parallel to these academic and scientific activities, she got married and raised three children.

Currently, she is a professor at the Universidad de Chile, where she has been a faculty member of the Department of Anthropology since 1977, involved in the formation of many generations of archaeologists in Chile. In the last years, she has given mainly courses in methods and theory of ceramic analysis and courses in technology and style in archaeology.

She was member of the board of directors of the Chilean Society of Archaeology for 15 years, being its president from 1991 to 1997, and has actively participated, until present, in various editorial, academic, and governmental agencies scientific committees dealing with the field of Archaeology.

Major Accomplishments

Fernanda Falabella's career in archaeology, spanning four decades, has been focused in understanding pre-Hispanic societies in Central Chile. Her pioneering research in the coastal area, near the banks of the Maipo River, resulted in a new local cultural sequence and introduced a new explanation for the social developments that superseded up to then accepted traditional diffusionist theories. In collaboration with archaeologist M. Teresa Planella, they identified the different cultural contexts in the area, describing their contexts and introducing new interpretations. Their studies on Llolleo and Bato cultural units brought about a new approach that emphasized diversity. During

the decade of 1980 she did research in line growth and in oxygen isotope analyses in mollusks in collaboration with other researchers, and with the support of FONDECYT (a program of the Chilean Science Foundation). In the 1990 she was involved in studies of ichthyo-archaeology that concluded in the publication of an ichthyo-osteoarchaeology of fishes from Central Chile.

In the last 15 years, she has conducted and participated in several research projects supported by FONDECYT on the same horticultural groups of Central Chile in the inland valleys, searching to understand cultural patterns, mobility, interaction networks, and exploring how these societies configured their social relations at different spatial and social scales. Basic to these questions were the settlement pattern data, a product of projects conducted in the basins of Santiago, Rancagua, and along the Maipo River in collaboration with archaeologists Lorena Sanhueza and Luis Cornejo. Her research on stable isotopes in pre-Hispanic populations from Central Chile contributed to the understanding of maize introduction and how its dietary importance changed through time in this area; provided information on the contribution of marine resources, as food, in coastal groups; and offered new insights on mobility patterns. In the last years, she has been conducting research focused on studying social relations at the local level, with an emphasis on communities of practice.

Fernanda Falabella has a special dedication to ceramic studies. She received a grant in the 1990 for a comparative investigation on mechanical and morphological properties of pottery from the Early, Intermediate, and Late Ceramic periods, and she has participated in several national and international collaborative projects to study clay sources and the provenience of ceramics from archaeological sites.

Cross-References

- ► Ceramics: Majolica in Colonial Latin America
- ► Ceramics: Scientific Analysis
- ► Ichthyoarchaeology
- ► Isotope Geochemistry in Archaeology

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Farming-Language Dispersals: A Worldwide Survey

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Introduction

The farming/language dispersals hypothesis, most simply put, proposes that many of the world's most significant language families – in both geographical range and speaker numbers – dispersed along with, and primarily thanks to, the spread of agriculture. The entry on "▶ Farming-Language Dispersals: Principles" in this encyclopedia explores the range of issues and qualifications that attend this general hypothesis, to clarify those cases in which one might in principle expect that it would or would not hold true. Much necessarily hangs on the particular "real-world" contexts – cultural, chronological, and geographical – through which each of the world's major language families dispersed. Given the great diversity in those variables in the human story worldwide, the hypothesis duly does not play out consistently from case to case, or in others simply does not apply at all. Such is what this contribution now aims to survey, across the globe.

The first main exposition of the hypothesis already explored possible instantiations on three different continents – see Renfrew (1987: ch. 11). Especially in the last decade, however, attempts have been made to apply it more comprehensively still on a worldwide scale. What follows here can but briefly survey, compare and contrast the main debates from continent to continent. As well as the specific references given below in each case, further key sources include the dozens of contributions collected in Bellwood and Renfrew (2002). Note also Bellwood (2005: esp. ch. 10), who pushes the strongest interpretation of the hypothesis worldwide, but remains very far from commanding broad support – especially among historical linguists, notably Campbell and Poser (2008: 337-50). Finally, claims for farming/language dispersals are repeatedly debated and set within a much broader survey of the many other aspects of language prehistory, in the eight continent-by-continent chapters by Heggarty and Renfrew, within Renfrew and Bahn (forthcoming).

Key Issues and Current Debates

Eurasia

East Asia enjoys the status of one of the world's rare hearths of agriculture and "pristine" civilization, home to vast populations since far back in (pre)history. The general subsistence/demography model (see under "▶ Farming-Language Dispersals: Principles") – and more specifically, farming/language dispersals – might thus seem an obvious candidate explanation for this region's major language expansions.

Across *Inner China* particularly, language expansions have indeed often been imputed to farming spreading southwards out of the core domestication region (of cereals *other* than rice) in the North China Plain, along the Yellow River and immediately to its south. The linguistic story, though, is actually of *more* than one major expansion, but all usually taken to have begun out of this same general homeland area. The spread of Mandarin specifically, out of its northern origins, dates largely to recent centuries and is still ongoing. This expansion has clearly been determined by historical and political factors that bear only the most indirect of relationships to the rise of farming many millennia ago – indeed the languages that Mandarin has been replacing were also those of developed farming populations.

Stepping further back in time, however, Mandarin and its many sister languages within the Chinese (or "Sinitic") family only arose in the first place thanks to an earlier and wider expansion of (Proto-)Chinese as a whole. This most plausibly began some three to four millennia ago, out of the heartland region where the Yellow River runs through the North China Plain. Earlier still, by another couple of millennia or so, must have been the dispersal even further afield of the putative "Sino-Tibetan" family, which alongside Sinitic would include the Tibeto-Burman languages (a standard hypothesis, even if it does not quite command unanimity among linguists of the region).

Of these three expansions, only Sino-Tibetan would make for a rough fit with the chronology of initial farming expansion. A good number of scholars (e.g., Janhunen 1996: 222) have duly proposed a linguistic homeland in the middle Yellow River region, identified with the Neolithic Yangshao culture in the fifth and fourth millennia BC. Even that, however, is but a default starting hypothesis, given how many uncertainties remain in linguistic prehistory here.

As for the later and specifically Sinitic expansion, to entertain some link with farming would entail looking to some step-change(s) in agricultural intensification and productivity (see under "▶ Farming-Language Dispersals: Principles"), perhaps thanks in part to grand-scale public works such as the great canal network. This intensification might thus have propelled another wave of demographic (and linguistic) expansion. But if so, this scenario only reinforces how by this stage farming alone is hardly the proximate explanation: it was only the growing scale and political control of complex societies here that could direct the great labor forces required for such intensifications in the first place.

On a much smaller scale – arguably a function of inherent geographical constraints – the independent *Korean* and *Japanese* language lineages are also often associated with farming expansions/intensifications. That said, each today shows far less internal diversity than would be expected to have arisen since the initial spreads of farming, or even intensive rice-farming specifically, to Korea and Japan. So the full explanation has also to include recent unifying socio-political conditions overwriting presumed greater original diversity – as hinted at, for example, by the Ryukyuan languages surviving in the southernmost islands of Japan.

South of Sinitic, meanwhile, *southernmost China and Mainland South-East Asia* are home to various language families, much smaller but still significant regionally. These too are routinely (if also rather vaguely) attributed to the spread of agriculture – although here with rice as the key crop, and putative homelands thus all within the wider Yangtze region instead. Again, however, the main expansion phases of most families of Mainland South-East Asia are too recent for a direct association with the *first* spread of farming here – just as with the Sinitic and Mandarin expansions, and in fact not unconnected with them. For the general trend here is of expansion southwards from homelands assumed to have been in southern China, whose now minority populations speak languages of the same lineages found across much of Mainland South-East Asia, particularly Tai-Kadai (including Thai/Lao) and Tibeto-Burman. As so often, however, it remains unclear precisely what role was played by agriculture, among various other factors. Rich (rice-)farming lands such as the Mekong Delta may have been a key attraction, but that does not explain which particular

populations (and their languages) came to enjoy the *wherewithal* to occupy them, at the expense of others pushed aside to become the "hill peoples" (notably the speakers of Hmong-Mien languages). In any case, perhaps more powerful than any such pull of the south was the push from the north: the pressure of a powerful and expansive Chinese culture and population.

The one family in Mainland South-East Asia that does not seem intrusive from further north is Austroasiatic (including Khmer and Vietnamese). Estimates of its greater time-depth are also rather more compatible with the *first* spread of agriculture here. Proponents of a farming/language dispersal (e.g., Higham 2002; Bellwood 2005: 214-16) even hypothesize that Austroasiatic enclaves as far west as the Munda languages in central *India* may be a linguistic footprint of how *rice*-farmers expanded westwards into the subcontinent, out of Indochina, or perhaps specifically along the course of the Brahmaputra, once across the watershed with the Yangtze. In India, they would ultimately be surrounded and far outnumbered, though, by speakers of the Indic branch of Indo-European, which that same general hypothesis identifies – very controversially – with cultivators of other cereals arriving from the north-west, ultimately from the Fertile Crescent (Renfrew 1987), as we shall shortly see.

Indic intruded also on the other main language lineage of the subcontinent, Dravidian, ousting it from much of its original range to confine it now largely to the southernmost third of India (save for a few intriguing outliers further north). That is, Dravidian is widely accepted as predating the arrival here of Indic. Much else about its prehistory remains unclear, however, not least whether and how Dravidian's expansion may itself in some way have been "driven" by agriculture. It has been variously attributed to local processes of domestication, or to a preceding stage of merely foraging for wild grains, or even to already developed farming arriving ultimately from the Fertile Crescent (for a discussion, see Fuller 2002). The "evidence" and interpretations behind each proposal remain questionable and much disputed. In particular, a link back to the Fertile Crescent is built upon a putative relationship of Dravidian to ancient Elamite, a claim generally dismissed by linguists. In short, we still know too little of Dravidian prehistory to tell whether it stands more as an illustration of a farming/language dispersal, or a counterexample.

Most of *Northern Asia*, meanwhile, has over recent millennia been exploited by subsistence regimes very different to sedentary agriculture. In the far north and Siberia, hunting and gathering predominate, not least fishing and some domestication of reindeer (from perhaps around 3000 BP), albeit still principally to aid in tracking wild herds for meat. The Eurasian Steppe, meanwhile, formed the quintessential environment for nomadic pastoralism based around domesticated horses, although only reaching its famous heights in the last two to three millennia.

The linguistic picture, too, is radically different to the rest of Asia. Arrayed very roughly from east to west – although also widely interspersed among each other – are first a cluster of minor "Palaeosiberian" lineages, and then the four rather larger families of Tungusic, Mongolic, Turkic and Uralic. Siberia and Central Asia do, then, attest to language expansions, and ones that over this vast landmass can appear impressive in their territorial ranges, at least. Yet in crucial respects – in speaker populations and time-depth – they do not remotely approach the scale of the language families spoken across the agricultural heartland regions to their south and west. Alongside those, Mongolic and Turkic are of particularly shallow time-depths of just a millennium or two. Moreover, for all their terrorizing of Europe and "elite dominance" conquests of China (the Yuan dynasty) and India (the Mughals), the *language* lineages of these Steppe populations never significantly broke into those farming regions. Apparent minor exceptions turn out to be largely limited to similar steppe-type biomes in any case: the Great Hungarian Plain and the highlands of Anatolia.

Rather, the extreme mobility of these nomadic populations has left across Northern Asia a linguistic signal of a very different form.

The "linguistic area" of North Asia attests not to a great expansion out of a single origin (the "Altaic" hypothesis, now increasingly rejected), but to all but the reverse: intense interaction and *con*vergence between groups originally of different origins (Janhunen 1996: 237-42). Northern Asia is home to environments where farming is either not viable at all (over much of Siberia) or only marginally so, at least for most of prehistory, and especially by comparison to the great success of horse-borne pastoralism on the Steppe. In this sense, these regions fall by definition outside the scope of the farming/language dispersal hypothesis in any case, since agriculture did not generally become the dominant subsistence mode here until the modern period. This is also clear from these regions' relatively very low population density and thus the relatively small demographic scale of the language expansions here, however geographically extensive they may be.

The Steppe does nonetheless bear directly on the farming/language dispersal debate in one sense, and indeed in one of the first and most controversial claims of all: Renfrew's (1987) invocation of the hypothesis to account for the existence of the Indo-European family, which includes the native tongues of a far larger share of the world's population and land area than any other. For the leading traditional theory (see Mallory 1989) had instead long imputed Indo-European's expansion to warlike, horse-borne, and (semi-)nomadic populations spreading out of the Steppe, and specifically in this case from the Pontic-Caspian area. The estimated timeframe was around the sixth millennium BP, that is, at least three millennia earlier in the trajectory of pastoralism than any of the known historical conquests. Most language data have traditionally been held to support such a vision, in geography, chronology, and even a supposedly key role for the horse. Yet the "laws" that allow us to reconstruct the ancestor language on the level of sound do not extend so reliably to precise meanings, so any supposed referents in "Proto-Indo-European culture," such as the wheel or *domesticated* horse, are much more a matter of subjective interpretation. Recent (and likewise disputed) Bayesian analyses of the Indo-European family's linguistic phylogeny, meanwhile, favor an origin in central Eastern Anatolia – that is, the northern arc of the Fertile Crescent – and at an earlier time-depth in line with the expansion of agriculture (Bouckaert et al. 2012). Moreover, as just observed, the many historical cases of elite dominance by Steppe pastoralists all signally failed to carry their *languages* durably into neighboring farming lands. And where they failed, how plausible is it that "Kurgan" pastoralists of the fourth millennium BC could on the contrary have succeeded so spectacularly, to impose their speech across so much of Europe, India, and many lands between? Expansion by demic diffusion with the spread of farming at least seems an explanation more commensurate with the scale of the striking linguistic outcome that Indo-European calls upon us to explain.

Island South-East Asia and the Pacific

Ever since the early days of the hypothesis, *Island South-East Asia and the Pacific Islands* have been hailed as a prime illustration of a farming/language dispersal. It is certainly striking how just a single language family – Austronesian – is so disproportionately dominant here. No less conspicuous, though, are the glaring exceptions to that dominance: New Guinea and various neighboring islands in Melanesia, not to mention Australia.

There is now little dispute that Austronesian dispersed out of a homeland in Taiwan, through the Philippines and across Island South-East Asia, and ultimately throughout Polynesia as far as New Zealand, Hawaii, and Easter Island. The broad direction, scale, and time-depth of the *language* expansion are clear, and cannot be overturned by the original arguments from genetics for a "slow boat" expansion out of Wallacea instead, some ten millennia earlier – a scenario that fits neither the time-depth nor the structure of the Austronesian family. Those do indeed seem to fit only with a "fast boat" out-of-Taiwan model – see, for example, Gray et al. (2009). In archaeology, meanwhile, Taiwan is widely claimed as at least the main source from which farming too, over similar timescales, spread into Island South-East Asia and the Pacific.

Many have made the direct match with Austronesian, and the general hypothesis has fared relatively well here.

That said, lively debate continues on quite how significant was the contribution from Taiwan on levels other than the linguistic. How important to the overall agricultural "package" here were other plants (and animals) domesticated elsewhere in the region (Donohue & Denham 2010)? How much did Austronesian spread by immigrant farmers outpopulating the locals, or by native populations simply switching language to it? And agriculture aside, how critical too was the development of very sophisticated seafaring technology and navigational skills? Were not these, more than farming, the limiting factor in determining which particular population group (i.e., speakers only of the Proto-Malayo-Polynesian sub-lineage of Austronesian) would expand so spectacularly, when other nearby farming populations did not?

The hypothesis also seems to leave unexplained the case of *New Guinea*: for agriculture did develop here, yet the island ranks as the most diverse place on earth in its diversity of independent language lineages. Much remains unclear, however, not least on the nature of early farming here, how and when it arose, and on putative "big picture" classifications of these most under-researched languages of the world. The "Trans-New Guinea" hypothesis, notably, would bring a significant proportion of the island's language lineages, especially through its mountainous interior, into one large family (though still leaving dozens of others). Advocates of "Trans-New Guinea" as a linguistic construct, and of the general farming/language dispersals model, have accordingly both seized on the potential match between the linguistic "effect" and the rise of agriculture as its potential cause: see for instance Pawley (2005: 95-102) and Bellwood (2005: 231-2), respectively. Just how much the New Guinea case may either challenge or even support the farming/language dispersals hypothesis, then, hangs on many unresolved issues. The mix of potential explanations for language prehistory here includes a host of other factors too, not least on the environmental and cultural levels: for instance, the long isolation between human groups here, given the tortured mountain topography and apparently endemic warfare.

Australia is entirely different again, for here farming never arose in any case. The continent is thus relevant to the debate only in a negative or indirect sense, and from either of two very different perspectives. On the standard majority view, almost all indigenous languages of Australia form a single large family, dubbed "Pama-Nyungan." This covers the entire continent save for most of the "Top End" of northernmost Northern Territory, much more linguistically diverse, and perhaps Tasmania, whose vanished native tongues are simply too little known to classify at all. Pama-Nyungan would thus imply a territorially significant language family expansion, estimated to date back five millennia or more, only here without farming (and thus relatively small in demographic scale). This is sometimes invoked as if to challenge the idea of farming/language dispersals, yet that is greatly to misconstrue a hypothesis that by definition simply cannot apply to regions and time periods without agriculture in any case, and can make no claim to explain language dispersals there.

On a minority alternative view, meanwhile, the linguistic panorama of Australia is not to be interpreted in terms of one dominant and divergent "Pama-Nyungan" language family at all, but as an area of long-standing linguistic *con*vergence instead. Dixon (1997) sets this also within his wider "punctuated equilibrium" model of language prehistory. The "punctuations" are episodes in which just a few major language families were somehow propelled to expand across large parts of the world, overwriting a greater underlying linguistic diversity. Farming would rank among the plausible causes of such punctuations (Dixon 1997: 77-8). Australia, then – in Dixon's minority view – would then be an instance of the linguistic outcome *without* the "punctuation" impact of the Neolithic.

Africa

In Africa, agriculture is invoked to account for the two major language family dispersals, independently across the north and Sub-Saharan parts

of the continent – though in the former case the proposal remains much disputed.

Berber, ancient Egyptian, and many languages of the Horn of Africa all go back to the dispersal of the "Afro-Asiatic" language family. The *Asiatic* half of its name refers to the family's lone branch outside Africa, confined moreover to *Western* Asia, in the form of the "Semitic" languages, today most notably Arabic. The Levant is also where the farming/language hypothesis puts the origin of the entire Afro-Asiatic family, with the Natufian and Pre-Pottery Neolithic B populations (Militarev 2002). Not that this hypothesis enjoys any consensus; it is but one of a number of equally disputed proposals (e.g., Ehret 2002: 35-9), which point instead to homelands in various regions beyond the Red Sea in Africa itself, and to a range of time frames before farming here. Without agriculture, though, these alternative hypotheses do struggle to find plausible explanations commensurate in impact with the scale of the vast linguistic legacy that is Afro-Asiatic.

The Bantu language lineage, by contrast, is often held up as a paradigm case of a farming/language dispersal, more widely accepted even than in the case of Austronesian. Certainly, much of the linguistics is undisputed: out of a homeland in the Nigeria/Cameroon region, Bantu has over the last three millennia or so spread to dominate most of southern and eastern Africa. Zulu and Swahili, for instance, are just two among hundreds of fairly closely related languages within a vast Bantu "dialect continuum." Correlations have been widely proposed with the spread of farming and ironworking, and indeed with signals in human population genetics. Data from these various disciplines have increasingly been brought together (e.g., by Filippo et al. 2012) to argue even for particular paths of expansion and for "demic diffusion" as the mechanism by which it proceeded, as per the initial formulation of the farming/language hypothesis (Renfrew 1987: ch. 6).

The few other and much smaller lineages found in southern and eastern Africa – particularly San and Khoe in the far south-west and Hadza and Sandawe in Tanzania – are now largely isolated and endangered, and seem clearly to represent rare survivals of whatever language lineages were spoken before Bantu spread into the region. Contrary to early, outdated hypotheses, there is no good case at all that these various "click" language lineages are related to each other, whatever their speakers' deep genetic inheritances may be. For a survey of these questions and the exact nature of the impact of the Bantu advance on the Khoe pastoralists and their own migrations, see Güldemann (2008).

Yet while Bantu seems a clear-cut case, again it remains just one part of a far wider dispersal, beginning some millennia earlier: that of the great "Niger-Congo" family to which Bantu belongs. What drove that initial dispersal? If that too was farming, then how could that one explanation account for these two dispersals at very different time-depths? Do they represent different stages of intensification? Or rather, was it not farming alone that lay behind the Bantu spread, but the crucial extra ingredient of ironworking?

The Americas

The far north of *North America*, where farming was not viable at all, is nonetheless filled by three language families spoken by hunter-gatherer groups, and certainly widespread, albeit demographically very thinly: Eskimo-Aleut, Algic (mostly Algonquian), and Na-Dene. Any candidates for farming dispersals can only lie further south. Bellwood (2005: 244-50) does venture claims to this effect over parts of the eastern USA, but our knowledge of pre-Columbian language distributions here is very patchy, and suggests a relatively fragmented pattern of various language lineages, rather than any single predominant one. Moreover, farming itself here developed relatively late and never became so intensive as in the two main and much earlier hearths of agriculture in the Americas, both further south.

In *Mesoamerica*, the hypothesis has often been invoked but remains highly controversial, especially in the case of the Uto-Aztecan family. This has one foot in the Mesoamerican heartland (not least in the form of Nahuatl or "Aztec"), but another in south-western USA (e.g., as Ute, whence the name Utah). Standard linguistic

thinking (see, e.g., Kaufman & Justeson 2009) has long assumed that the family's ancestral language was spoken by originally forager populations along the western reaches of what today is the US-Mexico border, though without a convincing explanation of how they also came to penetrate deep into the Mesoamerican heartland. One rival (though much disputed) interpretation of the language data, however, fits instead with a dispersal northwards out of a Mesoamerican homeland, together with maize farming (Hill 2002). It thus has also to envisage Uto-Aztecan speakers ultimately reverting to foraging as they spread northwards into environments much less suited to farming.

For the other main language families of Mesoamerica, firmly within the core farming region, the hypothesis is rather more widely entertained (for references, see Bellwood 2005: 237-239), notwithstanding continuing objections (Campbell & Poser 2008: 345-6). Certainly, the Mayan and Otomanguean families appear to go back to quite different time-depths, so if both were farming dispersals, then some explanation is required (again, perhaps different stages in intensification). Also, although the main language families of Mesoamerica (and indeed the Andes, see below) remain significant in speaker numbers by the standards of most indigenous language lineages of the Americas, they still pale alongside the vast Old World language families. In large part this reflects the devastating mortality wrought on their speaker populations by Old World pathogens in the decades after 1492, and centuries of language shift in favor of European tongues ever since. Yet even allowing for this, at their peak the main indigenous language families of Mesoamerica were still minnows in Old World terms, and not only in demographic but also in geographical scale. The farming/language dispersal hypothesis would presumably have to impute this to the much more gradual way in which agriculture came to be incorporated into subsistence regimes here, together with other peculiarities such as the lack of large domesticated animals, and indeed environmental constraints. For agricultural expansion out of Mesoamerica clearly did face considerable obstacles in the arid climates immediately to its north and the constriction of the isthmus of Panama to the south.

Amazonia constitutes, after New Guinea, the world's other main hotspot of language lineage diversity, also all too thinly researched and sketchily understood. Far from presenting some single-language family expansion able to exclude all others, the region presents a striking linguistic mosaic. There were certainly some major family expansions here – Arawak, Carib, and Tupí, as well as Jê more in the savannah zone to the southeast – but each far less continuous than the great Old World spreads like Indo-European, Sinitic or Bantu. The main Amazonian families do range far and wide, but their distributions are unusually fragmented, scattered, and interspersed both with each other and with many other minor families and isolate lineages. Many hypotheses on where the main families originate point to the upper reaches of the Amazon Basin, that is, the foothills of the Andes where farming too is widely taken to have originated. For Arawak and Tupí particularly, farming/language dispersals are regularly invoked (see, e.g., Dixon & Aikhenvald 1999: 16-9) – farming, that is, at least in one form or another, given how agriculture here followed a very different trajectory to the Old World. It often took the form of shifting slash-and-burn, and in many regions such farming continued to coexist with hunter-gatherers, often occupying riverside territories vs. the rainforest interior respectively. Moreover, complementary or rival explanations are also invoked, not least one factor promoting mobility over great distances here: the relative ease of moving along the region's great watercourses – and especially *down*river, i.e. ultimately also from (farming) homelands around the periphery of Amazonia.

In the (Central) *Andes*, a particular set of environmental constraints again shaped the very independent development of farming and civilization here. This key hearth of agriculture (not least of tubers) seems at first sight a counterexample to the farming/language hypothesis, for it conspicuously fails to exhibit any major language expansions at a time-depth commensurate with

the very early beginnings of agriculture here. On closer inspection, however, the Andean case tends rather just to underline the refinements and qualifications that must attend the hypothesis if it is to be applied across regions of the world where farming itself arose so differently and over such contrasting trajectories through time. In the Old World, farming is effectively defined by certain key components present right from the start: cereals and large domesticated animals for both traction and (mobile) protein. Both were glaringly absent in the Andes until millennia after agriculture first began here. Environmental hyperdiversity through 6,500 m of altitude variation, and within the tropics, also much delayed crop adaptations, while the world's richest seafood resources underpinned subsistence so reliably that societies here were raising monumental architecture even before they were heavily reliant on farming at all. Thresholds in the *intensification* of farming and their concomitant demographic and sociocultural impacts followed a chronology quite unlike that of the Old World, and may not after all be so incompatible with the relatively recent major language family expansions here (Aymara and Quechua). The Andes are a good illustration of how the wider debate on the farming/language dispersal hypothesis would do well to be sensitive to a range of necessary refinements – as summarized "▶ Farming-Language Dispersals: Principles" and explored in more depth in Heggarty and Beresford-Jones (2010).

Cross-References

▶ Farming-Language Dispersals: Principles

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Farming-Language Dispersals: Principles

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Introduction and Definition

Among various potential "windows on our past," one rich seam of data is all too often overlooked: the linguistic record. Above all, much of the world is so dominated by just a handful of vast language lineages as to cry out for explanation. That explanation, moreover, can only lie in the same contexts and processes that shaped humanity's cultural and population (pre)history more widely. Indeed, of all attempts to account for these broadest of patterns in the linguistic panorama, one of the most ambitious generalizations is the "farming-language dispersals hypothesis." Most simply put, this proposes that many of the most significant language families – in both geographical range and speaker numbers – dispersed along with, and primarily thanks to, the spread of agriculture. If so, then the modern panorama of linguistic relationships and diversity across the world would in effect still reflect, at least on the very broadest scale, the impact of the "Neolithic Revolution."

The basic mechanism invoked by the farming-language hypothesis is population growth and expansion. This is clearest where developed, sedentary farming comes to be contiguous with mobile hunting and gathering. For in favorable environments, at least, agriculture can support far greater population densities; the farmer population, then, is assumed to grow and spread geographically at the expense of the forager one. This outcome is then taken to be mirrored in the fates of the respective languages they speak: as the agriculturalists disperse, they take with them their language, and as it spreads it naturally diverges, ultimately into a broad family of related languages. The hunter-gatherers' languages, meanwhile, if they survive at all, end up cantoned into inhospitable areas of little value to agriculturalists.

As one instance, such has been the fate of most of the languages once spoken across southern Africa. Just a handful of San and Khoi languages have survived here, and ever more perilously now, against the tide of the Bantu family (e.g., Zulu and Xhosa) arriving with incoming farming populations originally from further north. This conspicuously one-sided outcome is duly invoked as a paradigm case of the farming-language dispersals hypothesis. Many scenarios worldwide are much less straightforward, of course, although much of the debate has nonetheless unhelpfully polarized around all-or-nothing stances either for or against the hypothesis, as if it were valid for almost all major language dispersals, or none.

Here, we are at pains to avoid any such all-or-nothing visions, hence the qualifications already built into the working definition just given: *many of the most significant language families*. That is, this formulation refers to the dispersals of language families, not just single languages, and makes no claim to explain *all* such cases, particularly not the more minor ones.

Moreover, this working definition is in any case taken only as a useful starting point from which to explore a range of refinements and challenges to the hypothesis (hence various alternative formulations by both advocates and critics). Much hangs in particular on just *how many* language dispersals are attributed to farming, and *how uniquely*, given that languages can clearly also be spread by many other factors.

Historical Background

Among the first to set out the hypothesis was Renfrew (1987), who applied it to the one-language family that has long accounted for the native tongues of a far larger share of the world's population and land area than any other: Indo-European. Renfrew assumed a genetic signal too, for his model calls directly upon Ammerman and Cavalli-Sforza's (1984) vision of farming spreading by "demic diffusion" in a "wave of advance."

From the start, controversy has surrounded the hypothesis. For Indo-European, it directly challenged traditional thinking among specialists in the family's language prehistory, and among those archaeologists who had built such linguistic interpretations into how they read the material culture record too (e.g., Mallory 1989). Undaunted, Renfrew (1989, 1991) soon sought to generalize the hypothesis, stoking a debate embodied particularly in the many contributions to Bellwood and Renfrew (2002), ranging across much of the world. Diamond and Bellwood (2003) and Bellwood (2005: ch. 10), moreover, specifically explore how the hypothesis might apply on a worldwide scale. The attendant controversy, meanwhile, is neatly summed up by Golla et al.'s (2003) riposte that the hypothesis "more frequently distorts than illuminates the histories of the speakers of the world's languages." For a more extensive skeptical response from linguists, see also Campbell and Poser (2008: 337-50).

Both as a general principle, then, and in host of individual cases worldwide, it remains hotly disputed whether the farming-language dispersal equation is a valid, fundamental insight into human prehistory, or a simplistic and unproven generalization. One can be forgiven for coming away from the debate in the literature with the impression of a sterile stand-off between those who would overegg the role of agriculture and those who would unduly minimize it. (As an example, see some of the commentaries, and particularly the response, published with Heggarty & Beresford-Jones 2010).

For its part, this contribution seeks above all to clear a path through the traditional all-or-nothing stances – or at least the mutual accusations painted in such stark terms. It explores the general issues of principle that attend the hypothesis, illustrated from among the ongoing debates on the various claims to apply it to many a language family around the globe. A fuller and more systematic worldwide survey, continent-by-continent, is provided in the entry on "▶ Farming-Language Dispersals: A Worldwide Survey" in this encyclopedia.

Key Issues/Current Debates

The hypothesis can certainly benefit from important qualifications and refinements on a number of levels. Once these are borne in mind, though, many objections and apparent counterexamples lose their edge, and much of the controversy is defused. This entry will now summarize in turn each of these key limitations and refinements to the hypothesis. For a fuller treatment, see Heggarty and Beresford-Jones (2010).

All, Some, or Which Language Families?

The first essential qualifications are those already built into the working definition of the hypothesis as followed here: *many* of the world's *most significant* language families.

Firstly, most obviously and most crucially, *many* does not mean *all*. Even the most ardent advocates of the hypothesis explicitly acknowledge (e.g., Bellwood 2005: 2) a good number of language families to which it patently does not – indeed cannot – apply, and which were evidently spread by *non*agricultural societies, as we shall shortly see. There *can be* no claim to universal

and unique validity, then. That said, in the eyes of some critics, many proponents of the hypothesis do nonetheless err in that direction: imputing far too exclusively to farming many a language dispersal that evidently relied heavily on other factors.

The second qualification – the most significant language families – is usually tacit. The hypothesis was first conceived especially for a number of the most widespread and populous language families, dispersed long before the modern era, and indeed thus proposed to date back to the "Neolithic Revolution." Some criterion of scale, both in chronology and internal diversity, is inherent in the specification *families* (rather than single languages), but that too is often not clarified. Here, both qualifications are made explicit, particularly since criticism is often strongest and most telling when the hypothesis is "pushed" to apply even to very recent dispersals of single languages, especially out of Europe during the ages of colonialism and imperialism.

All or Nothing? Importance Relative to Other Factors

For a language replacement to happen, some factor(s) must be decisive enough to confer upon one human group – or at least upon its language, usually as part of a broader cultural complex – some greater impulse, ability or propensity to expand, at the expense of others. Or to see this from another perspective, a language dispersal may in principle be driven by *any* process able to confer such greater expansive propensity.

There are of course many plausible candidate demographic and sociocultural processes with the potential to precipitate language expansions. The "coming of agriculture" is just one of the possible players, then. In principle, any given language dispersal might be attributable to any one such process or any *combination* of them. So the real question is just how significant farming was *vis-à-vis* other processes in any given case.

It is only the polarization of the debate that deforms this into a false all-or-nothing question. Take the settlement of Micronesia and Polynesia. For Diamond and Bellwood (2003: 598), this is one of their "two clearest examples" of a farming-language dispersal. Golla et al. (2003), meanwhile, retort that it "was driven by the development of sophisticated seafaring technology, not farming success." Note that neither party disputes the linguistics – an expansion of the corresponding subbranch(es) of the Austronesian language family – nor the chronology, nor even that the settlers were both farmers and great seafarers. They in fact disagree only on which of those two attributes essentially accounts for the expansion.

Yet there is no justification in any case for framing the question in exclusive terms either way ("by seafaring . . . not farming"). More to the point is what was the *respective* significance of one factor as opposed to the other(s). This entails also thinking in terms of sufficient conditions and limiting factors. In this case, it seems obvious that neither farming nor seafaring technology alone was a *sufficient* condition. Without farming, the populations that settled the remote Pacific islands could not have flourished as they did. But equally, they could not have reached those islands in the first place without great seafaring skills.

Nonetheless, the *limiting* condition was not agriculture. Many other populations in the wider surrounding region (East and South Asia and the Pacific Rim) were farmers, without this having enabled them to colonize Micronesia and Polynesia. That could be achieved only by those who developed the necessary seafaring prowess. Only that can complete the explanation of why the region's languages are of *Austronesian* lineage, rather than stemming from one or more of the many other language lineages spoken by other "surrounding" agriculturalist populations. In any case, the particular subbranch of Austronesian spread across the furthest-flung islands of the Pacific is hardly a paradigm instance of the hypothesis as Diamond and Bellwood (2003: 598) themselves define it. For this was no "replacement of local hunter-gatherers by expanding farmers" but a first settlement – another reminder of the range of contexts to be borne in mind.

Simply to *identify* the speakers of a language lineage as farmers, then, is by no means to demonstrate that it was *because* of farming that they and/or their language lineage were able to expand. Similarly, simply desiring or needing land for farming is no explanation, since that alone does not entail enjoying the wherewithal actually to take it, at the expense of others. As explored below and in the entry on "▶ Farming-Language Dispersals: A Worldwide Survey" in this encyclopedia, alternative and additional factors were evidently also at play in many language family expansions worldwide. Even the classic instance of the Bantu dispersal proceeded *pari passu* not just with farming but ironworking too.

The farming-language dispersal hypothesis has come in for particular criticism when applied to the spread of European languages across the globe during the periods of colonialism and imperialism. Again, it is certainly not agriculture that can explain *which* particular languages spread (and which did not), across which regions and at which times. Why was it specifically English, Spanish, and Portuguese that became the languages spoken by most people in the Americas today, for example, rather than French, German, or indeed Hindi or Chinese, also spoken by farmers? What does explain this straightforwardly, of course, is a combination of well-known demographic, social, political, cultural and technological factors, and indeed historical happenstances. Whatever ultimate causation those factors might themselves eventually be traced back to on the grandest scale, as a practical, direct explanation for the dispersal of any *particular* language lineage one must in the first instance invoke any evident proximate factors and historical contingencies. To see language expansions of the modern era, in particular, as driven *primarily* by agriculture rather than by a host of other relevant factors, is greatly to overstate the case.

Farming as a Special Case?

Since so many factors may in principle be involved (for a survey see Heggarty & Renfrew forthcoming), the real judgement of the value of the farming-language dispersals hypothesis hangs on whether the advent of farming was just one contributing factor among many equals, or whether there is anything special about it as unusually powerful *vis-à-vis* most others.

The tendency to overegg how widely the hypothesis applies, especially in recent historical cases, is unfortunate and does a disservice to what is nonetheless a significant insight. For the general principle does still stand: it is expansive processes in the real world that shape the dispersals of our language lineages. Given this cause-and-effect relationship, it would be curious if such a defining, cardinal change in the trajectory of human societies as the transition to agriculture had somehow left precious little imprint in the fates of the language lineages that those societies spoke. On the contrary, it is only to be expected that the Neolithic should have impacted upon the human linguistic panorama too.

Again, then, the question is most sensibly seen as a matter of degree: just how significant a role may the spread of farming have played in how many of the world's major language expansions?

Genes and Language

On another level too – that of human genetics – things are often far less straightforward than in the paradigm instance of the hypothesis, which pits hunter-gatherers against a demographic "wave of advance" of faster-growing and much denser farming populations.

For language expansions may come about by either of two very different mechanisms (or indeed by any complex of both). On the one hand, a speaker population itself may expand territorially, taking its language with it into ever more extensive territories, largely ousting any population there previously, and their language(s). Linguistic lineages thus remain in step with genetic ones. On the other hand, speakers may largely stay put, but switch to speaking another language: usually one to which some distinct (social) utility attaches, thanks to its association with some prestigious cultural complex that is doing the expanding in this case (rather than an actual population). The outcome this time is that linguistic and genetic lineages no longer match.

It makes a great deal of difference, then, whether the language spoken in a given territory changed either because the people who spoke it were themselves largely swamped by incomers (as in much of North America), or because significant native populations remained but switched to an outside language (as increasingly today in parts of Mesoamerica and the Andes).

The demographic logic at the core of the farming-language dispersal hypothesis entails essentially the former: farmers spread largely by outpopulating the hunter-gatherers, so there should be a human genetic expansion in step with the linguistic one. There is little doubt that in appropriate environments agriculture can support population densities an order of magnitude greater than hunting and gathering can. Yet in several cases where a given language family is argued to have dispersed in tandem with agriculture out of the same "homeland," the genetic lineage of many of its speakers in fact points elsewhere. Almost all of Island Southeast Asia, for example, is dominated by languages of the Austronesian family that hail ultimately from Taiwan; their speakers' genes, however, majoritarily do not, at least according to many analyses (see, e.g., Donohue & Denham 2010).

Yet one must be clear on exactly what the "wave of advance" model predicts, which is not the *entire* replacement of hunter-gatherer populations by expanding farmers. On the contrary, it accommodates both interbreeding and some adoption of farming by hunter-gatherers on the advancing farming "frontier", and thus actually predicts that the proportion of "farmer" to "hunter-gatherer" genes should progressively decrease with distance from the agricultural homeland. In the case of the Indo-European-speaking populations of Europe, some studies (e.g., Balaresque et al. 2010) do indeed reveal genetic clines away from the family's putative "farming homeland" in Anatolia – although there is no lack of counterclaims too.

The debates remain complex and in flux. Y-chromosome and mtDNA genetic lines often give quite different results, indicative of different histories for male and female populations respectively (see, e.g., Forster & Renfrew 2011). The advent of both full-genome and ancient DNA analyses is now revolutionizing the field in any case. On the farming-language dispersal hypothesis, the geneticist jury is still out.

Hunter-Gatherer Language Expansions

And what of those major, expansive language families first spread and still spoken by populations not of farmers but of hunter-gatherers? Prime examples are three families of North America, particularly the far north, namely, Eskimo-Aleut, Algic (mostly Algonquian), and "Na-Dene" (alias Athabaskan-Eyak-Tlingit). These three, along with Pama-Nyungan in Australia (at least on the standard view that it is a true family), are repeatedly cited by critics who interpret them as disqualifying the hypothesis: language dispersals but without farming.

Yet that is again entirely to misconstrue the claim, as if farming can or even must account for *all* language expansions. It obviously does not and cannot, as is nowhere clearer than in the particular parts of the world where these major "hunter-gatherer language families" are (or at least were) spoken. For large parts of their territories are Arctic, subarctic or arid regions where farming is essentially not viable at all, or only marginally so. Whatever happened here can hardly undermine a hypothesis about the impact of farming, which by definition is simply not applicable in those regions. To be crystal clear, then, one might even preface the definition of the hypothesis with a further explicit qualification, namely, that "*across those parts of the world where agriculture became established before the modern era*, many of the most significant language families – in both geographical range and speaker numbers – dispersed along with, and primarily thanks to, the spread of agriculture *there*." Strictly, of course, such a qualification is redundant, because "the spread of agriculture" by definition limits the claim to only those regions and periods through which farming could and did indeed spread. Nonetheless, since this issue has generated so much misunderstanding and polarization, it is still valuable to spell out the qualification explicitly.

It is clear to all sides in the debate, then, that hunter-gatherer language expansions unquestionably have taken place. The hypothesis hardly denies that; on the contrary, it is best understood from precisely this perspective. For what it actually claims is effectively just this: *only* (by definition) in those regions of the world where original hunting and gathering has since been *replaced* by farming, that very process of agricultural expansion may offer a plausible account for a number of major language family expansions also visible across such regions.

In this perspective, the relevance of known hunter-gatherer language dispersals is simply as evidence of the obvious: that there are certainly other factors beside farming that can lead to language expansions, and more specifically that those factors may even include the other basic mode of subsistence that farming itself has since so often replaced. These most widespread of all hunter-gatherer language families are thus in fact perfectly consistent with the even more general framework to which the farming-language hypothesis belongs: the subsistence/demography model (for discussion, see Heggarty & Renfrew forthcoming). On that broader logic, all that matters is that a given set of subsistence technologies – whether for hunting, farming, pastoralism, or any other subsistence regime – confers on the population that uses it, and/or their cultural package (language included), markedly greater expansive potential over other populations/languages in a given region.

Differences in subsistence technology can be just as acute between groups who both practice hunting and gathering – as per the scenario in which the Eskimo-Aleut language family, for instance, spread to replace the preceding "Dorset culture," and whatever language(s) they spoke. Indeed, in Greenland the Inuits' successful hunter-gatherer subsistence contrasts just as starkly with the ill-fated Norse *farming* settlements, in the face of a changing climate. Such cases are far removed from the prototypical instance of the hypothesis, and they fail to meet the obvious precondition that the environments must be amenable to farming in the first place.

It may be no coincidence, then, that the most striking expansions of hunter-gatherer language families played out in large part across extreme, marginal environments such as the Arctic, subarctic, or the arid interior of Australia. It is precisely where conditions are so harsh that the net gain conferred by specific innovations in subsistence technologies can be all the greater and more exclusive, as in the case of the Inuits. In less inhospitable regions, meanwhile, hunter-gatherer language lineages (where they survive at all) more often present smaller-scale, more fragmented, and less exclusive distributions. (See the coverage of Amazonia under "▶ Farming-Language Dispersals: A Worldwide Survey").

Farming *vs*. Foraging or Farming *and* Foraging?

In other respects too, many contexts are by no means so clear-cut as in the prototypical vision of the hypothesis. It thus can hardly be expected to apply straightforwardly across all such contexts.

In practice, few subsistence regimes fall neatly into exclusive categories of either sedentary farming or mobile hunting and gathering. How much a population lives off food they produce rather than procure is no all-or-nothing contrast, but a sliding scale. Along Peru's north-central Pacific coast, for instance, complex societies arose in the third millennium BCE based initially upon gathered maritime resources (uniquely rich here) more than upon farming. Is a language dispersal to be expected in such an intermediate case? It turns out that there is no evidence for any at this time-depth here. In northern Europe, too, can we expect a straightforward farming-language dispersal, when coastal hunting and gathering (notably fishing) remained a rich subsistence resource long after the Mesolithic? On many scales, the "Neolithic Revolution" is of course better seen as a gradual *transition* between subsistence regimes (for many examples, see Barker 2006).

Different Forms of Farming

Agriculture itself, moreover, comes in a range of very different forms, which have by no means

always been equal worldwide. In much of Amazonia, farming takes the form of slash-and-burn, shifting territory frequently along the region's great watercourses. Might this help explain the wide but unusually scattered distributions of language families there?

Meanwhile, and as in many parts of the world, farming in Island Southeast Asia is widely seen as not stemming from just one single and exclusive origin point but as having come together as a package of crops and livestock from various geographical sources (see Donohue & Denham 2010). So even in this case, where the claim for a farming-language dispersal is relatively strong and broadly accepted, it might enjoy greater consensus by conceding that it does nonetheless need to be qualified: the key components in the archaeological package were not *all* brought out of Taiwan by Austronesian speakers. Indeed, quite what proportion of them was, and just how critical they were, remains in debate.

In fact, many languages expand in encounters between populations that *both* practice agriculture, albeit in different forms. In principle the basic hypothesis might make no prediction in such cases. Yet enthusiasts have nonetheless interpreted such encounters as farming-language dispersals, attributed now just to qualitative differences between the different forms of farming, one of them taken to confer some "superiority" in subsistence/demography terms. That vision would have the spread of European languages across the Americas, for instance, as reflecting some putative superiority of the Old World's agricultural package over that of the New World. Yet that interpretation is in itself highly debatable, at least for crops if not livestock. Europe today lives on potatoes, maize, beans, and tomatoes, for example, just as much as the Americas live off European crops. The New World hearths of agriculture in Mesoamerica and the Central Andes are also precisely where indigenous languages have bucked the trend and *resisted* European ones in greatest numbers. And in any case, as already observed above, a host of other historical factors were in play in shaping Europe's impact on the Americas, in language as in so much besides.

Intensification Thresholds

That all farming is not equal also applies on the time dimension, of course, entailing another key consideration. Even within the same region, agriculture can have a significant impact on demography (and indeed culture), and with it possibly also on language, at more than one stage in time. Step changes in technology and productivity (thanks to the development and spread of new crop strains or animal breeds, for instance) can take even established farming across successive "intensification thresholds." These may help account for certain language family trees that are disproportionately dominated by individual subbranches, which underwent later great dispersals of their own. Might this explain, for instance, the successive expansions of Sino-Tibetan, and then of its main Sinitic subbranch; or the Niger-Congo family, and then its most famous subbranch, Bantu?

Sherratt and Sherratt (1988) even suggest that the Indo-European family might be the result not of the initial "Neolithic Revolution" at all, but of a following revolution a few millennia later, in "secondary products" such as wool and milk. This attempts also to bridge the chronological gap to the time-depth traditionally assumed for Proto-Indo-European, three millennia or so after the Neolithic began here. Intensification thresholds have been invoked especially where farming (of some form) began before the first major language dispersals detectable in a given territory. One example would be the Japonic family (Bellwood 2005: 114); others include both main families of the Andes, where it was not until relatively late that some large animals (camelids) were domesticated, and a true cereal crop (maize) became ubiquitous (Heggarty & Beresford-Jones 2010).

Intensification thresholds might also be crossed thanks to critical new technologies or human transformations of the landscape on grand scales: terracing in Southeast Asia or the Andean highlands, for example, or great canals for irrigation and water control in Mesopotamia, China, or on the arid coast of Peru. These transformed agricultural productivity and thus population sizes, again with potential for

concomitant linguistic impacts. This only serves to recall, though, that farming per se is not a full explanation, for it may in itself be shaped by other factors and in turn feed back positively into them. Only once complex societies grew to sufficient scale and levels of organization could huge labor forces be directed to vast public works for agricultural ends.

Language Dispersals Through Time

On each of the levels just explored, then, the farming-language hypothesis is subject to a series of qualifications, and agriculture competes with a range of alternative processes that can equally well underlie language dispersals. Among these many candidate "driving forces," though, can one still make some useful distinctions and generalizations?

One crucial perspective is the time dimension, and specifically the trajectory of the development of human societies. For the various expansive processes impacting on human populations have hardly kept the same significance relative to each other over the fluctuating course of prehistory. The fates of our language lineages are determined by causes that lie in the nature of human societies, but those societies themselves have been anything but constant through (pre)history. On the contrary, most have changed radically on a number of defining levels: in their ways of subsistence, in mobility or sedentism, in the scale and complexity of societal units, and so on.

Among key shapers of the *recent* linguistic past (as well as the present and immediate future) are the rise of the nation state – and with it mass education, literacy and language "standardization" – as well as long-distance mass transport and telecommunications. It is particularly because these phenomena are so far removed from any farming-language logic that critics have duly decried the hypothesis when invoked for relatively *recent* language dispersals that were clearly shaped by these much more immediate forces and by historical contingency. On the other hand, many of these forces so powerful today were simply absent for most of history, let alone prehistory. Before them, great complex societies nonetheless also drove spectacular language dispersals, not least the Romance (i.e., "Neo-Latin") family spread by Rome or the more complex linguistic legacy of the Incas (see Heggarty 2008).

Rolling back further millennia still, the story is one of many individual "ups and downs" and societal collapses, but the long-term trend, at least, remains clear: human societies tended overall to be of lesser demographic scale and complexity. Also less acute, then, was the scope for disparities between societies in political and social organization, economic and military technologies, and so on. Ever fewer processes were yet in play that might so sharpen the disparities between human groups as to propel just a privileged few of them – and their languages – to expand dramatically at the expense of their neighbors. Except, that is, for the contrasts in subsistence regimes, and thus also in demography, that emerged in particular with the dawn of the Neolithic. Certainly, the advent of agriculture remains the single most significant transformation of human society and ecology, upon which so many subsequent transformations rest. It seems only logical that its linguistic impact too should have weighed heavy.

Indeed, to respect a principle of commensurate scale in cause and effect, the most potent linguistic impacts we see – that is, the most spectacular language family expansions, in territorial and above all demographic terms – demand explanation in terms of correspondingly powerful processes affecting the fates of human societies. Agriculture does stand out, then, as a uniquely plausible candidate for language expansions at this scale and at this early stage in the trajectory of human societies.

In chronology too, many of the deepest language families that we can detect appear to go back to timescales very roughly consistent with the "Neolithic Revolution" in their respective parts of the world. Such claims hold, though, only to the limited extent that one can trust in the controversial and inexact enterprise of "linguistic dating" at all, for it is necessarily attended by many grave caveats. In part this reflects how quickly languages naturally change, which also obscures their own origins and ensures that our

ability to reconstruct language relationships back into the past ultimately fades and fails completely, at a ceiling usually estimated as of the order of ten millennia or so ago.

The great language expansions that we *can* detect, though, are also a function of those that ever took place at all. That we cannot reliably uncover any episodes of language (family) dispersal back before the Neolithic may not be coincidental, given the limitations on the nature and scale of human societies before then. For those limitations arguably entailed that it was less likely that any one group could enjoy some exclusive propensity to expand much more than others. For as far back as we can tell, the count of language *lineages* across the world appears to have progressively declined over recent millennia, and at an ever-accelerating rate. Projecting back, at the dawn of the Neolithic the picture may well have been one of a great diversity of language lineages, arisen over the tens of millennia since first human settlement of most continents. (This necessarily refers to "effective diversity," i.e., of lineages independent at least as far back as language relationships can be identified. All lineages may in principle ultimately go back to a monogenesis of human language before *Homo sapiens* spread across the globe, but linguistic data certainly cannot aspire to reconstruct remotely so far back).

Such a vision would fit with the general ethos of the farming-language dispersal hypothesis, but meets with objections in its turn. Hunter-gatherer language dispersals unquestionably have occurred, as we have seen. Nonetheless, the classic examples are largely limited to relatively recent millennia and to extreme environments (to which hunter-gatherers have been restricted precisely by the demographic expansion of agriculturalists). On both grounds, such cases do not by any means necessarily offer robust analogies for hunter-gatherer groups in pre-Neolithic times and in more productive landscapes and temperate climes.

Another rider is the claim for putative "macro-families" of languages, such as those dubbed "Nostratic" or "Eurasiatic," that would go back to earlier dispersals still. These are rejected as but "faces in the fire" by linguistic orthodoxy, which disqualifies the methodology the claims are founded upon. They have nonetheless been entertained by some enthusiasts for the farming-language hypothesis (e.g., Bellwood 2005: 217), even if this seems rather ironic. For if such putative macro-families existed, then they would have to go back to dispersals at least several millennia *before* those attributed to agriculture. So to account for them would require some other, *pre*agricultural transformation, that is, some rival expansive process(es) that would only undermine the claim that farming was a uniquely significant and powerful driver at great time-depths.

To recap, then, the generalization suggested here focuses on the cumulative nature of developments in technology and social organization over the millennia (and even more so across the 1492 watershed). Over time, contrasts between one human population and/or cultural package and another – even where both had farming – became increasingly acute, not least in their propensity to spread at others' expense. And as they did so, the earlier great significance of agriculture per se diminished in relative terms, along with any ability to explain and identify *which* language families expanded where and when. This raises obvious parallels with the traditional concept of a scale from ultimate to proximate causation. On how this might usefully be adapted specifically to language dispersals, and for further exploration of this possible generalization, see Heggarty & Beresford-Jones (2010: 165–9).

The generalization just proposed radically reins in the ambition of how much of language (pre)history the farming-language dispersals hypothesis might be pushed to explain. That has the virtue, though, of thereby sidestepping many of the most persuasive recent "counterexamples" and focusing the hypothesis where its logic has most to offer: on the very broadest and deepest language expansions that we can detect, commensurate in scale and broad chronology with the key threshold stages in the transition from hunting and gathering to full-blown intensive farming. Just how, when and whether such stages came to pass varied enormously from one part of

the globe to the next, however, according to local cultural trajectories and timescales. So as with any such generalization, quite how this one might apply will likewise depend heavily on context, on all the levels explored here. This is precisely the lesson that duly emerges from how the farming-language dispersals hypothesis has fared across the world – as surveyed in more detail under "▶ Farming-Language Dispersals: A Worldwide Survey".

Future Directions

As that survey duly reveals, across great many cases worldwide our understanding of human prehistory does in principle have much to gain from the farming-language dispersals debate and the extent to which the hypothesis fares well or ill from one case to the next. This holds from both perspectives: how much of a role agriculture may have played in shaping the broad panorama of human language relationships and diversity, and how those language data might in turn contribute to assessing the impact of farming *vis-à-vis* the many other processes that shaped our cultural and population prehistory.

Prospects for progress lie first in crossing the fault lines between the different disciplines involved, along which much of the dispute has aligned. For notwithstanding all the caveats that attend the idea of the "Neolithic Revolution," among archaeologists there is wide recognition of the scale of the impact of agriculture and its defining role, through the many changes that it ultimately set in train for the nature of human societies and the disparities between them. Among linguists, however, there seems little recognition of what this entails: at least in principle, good reason to expect commensurate impacts in the linguistic record too. Rather, it is often specialists in the language families in question who have objected most strongly to any association with agriculture, particularly in those cases where the language data have hitherto traditionally been interpreted as setting a given family's first dispersal into a real-world context in prehistory very different to that entailed by any association with the spread of farming (see, e.g., Campbell & Poser 2008: 337–50).

Yet much linguistic commentary still betrays a rather simplistic vision of "the coming of agriculture," insensitive to the various key issues and refinements covered here. Moreover, many historical linguists' counterarguments have failed to convince in their turn, for relying so heavily on their own traditional techniques for seeking to identify those real-world contexts – techniques that themselves face heavy criticism as unreliable and too open to subjective interpretation. All too often, similar or even the same language data are interpreted by different linguists as implying quite opposite conclusions. "Linguistic paleontology," in particular, is often invoked as if it "proved" that the speakers of a given family's ancestor language either must or must *not* have been farmers, or collectors of wild grains, or indeed nomadic pastoralists, as in the debates on Indo-European, Afro-Asiatic, Dravidian, and Uto-Aztecan (see "▶ Farming-Language Dispersals: A Worldwide Survey"). Too much faith also continues to be placed in the supposed linguistic dating technique of glottochronology, when it has already been widely discredited for decades. For a survey of all such techniques (and their weaknesses), see Heggarty and Renfrew (forthcoming).

Meanwhile, novel quantitative and phylogenetic approaches to language data, inspired by analysis techniques drawn from the biological sciences, are opening up new perspectives on some major language family expansions, on both the chronological and geographical levels (e.g., Bouckaert et al. 2012 on Indo-European). Results have more often than not supported associations with farming dispersals, although the methods continue to face objections from many linguists who hold to established, more qualitative interpretations of language data.

Above all, however, the best prospects for future progress would seem to lie simply in a greater balance in the debate, pulling back from polarized, all-or-nothing interpretations on either side. On each of the levels explored here, the farming-language dispersal hypothesis requires significant refinements and qualifications. Those

duly rein in any over-ambitious claims for quite how much of our linguistic origins it might really explain. Equally, though, they serve to reconfirm that behind the complexities there nonetheless lies a fundamental logic. If the coming of agriculture was such a defining step that molded so much else of human cultural and population prehistory, it would seem all the more curious if our languages had largely escaped its otherwise pervasive impacts.

Cross-References

► Farming-Language Dispersals: A Worldwide Survey

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Farmsteads and Rural Life in the United States, Archaeology of

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Introduction

The historical archaeology of farmsteads and rural life investigates the development of agriculture in North America from the 1500s to the 1900s. The topic emerged in the 1970s due to the large number of rural sites and farmsteads routinely encountered during cultural resource management (CRM) archaeology projects in the United States. Rural sites are important archaeologically from a cultural and historical perspective because the majority of North American

households practiced farming until the twentieth century. A rapidly declining way of life, today a small proportion of the American population pursues farming as an occupation. Consequently, archaeologists emphasize that it is important to materially document the cultural trajectory of this significant aspect of American life.

Definition

The archaeology of rural life and farmsteads examines the material culture and social history of farms from the 1500s to the 1900s in North America. Several relevant topics are typically addressed archaeologically at farmsteads, such as the landscape and architectural history of the farm, the standard of living that the residents experienced based upon the type of agriculture they practiced, and the types of economic strategies pursued at farms. The ways that production regimes over time may have influenced the built environment and household material life, such as the transition from subsistence to commercial farming, are often addressed in farmstead research. The influence of progressive, modern farming practices upon rural life is also explored in farm studies, in addition to the effects of consumerism upon farm households. Social and cultural questions are also explored in farmstead studies, such as the effects of place of origin, nationality, and ethnicity upon agricultural practices. Changing gender roles in farm families and the effects of race and inequality in rural contexts are also addressed.

Historical Background

The archaeology of farmsteads and rural life examines material culture trends that occurred during the colonial, antebellum, and post-bellum/modern periods in US history. Paralleling this time span, the transition from folk, vernacular-based regional cultures to national-level industrially influenced consumer culture is a major topic of inquiry in material culture research. Consequently, farm studies and the examination of rural life in general are well suited for exploring the timing and extent of this transition from folk to industrially based culture in different parts of the United States between the 1500s and the 1900s. The transition from producer-consumer households to predominantly consumer households can also be addressed via archaeological studies of rural life. The archaeology of colonial period farms (c. 1500s to 1780s) often focuses upon small, vernacular-oriented settler farms that practiced self-sufficiency and subsistence-level agriculture. Log houses and timber frame post-in-ground dwellings were prevalent during this period in eastern North America. Artifact assemblages from farms of this period often contain kitchen and food related items and a much smaller amount of personal or household-related artifacts. Between the late 1700s through the mid-1800s, farms became increasingly profit-oriented and emphasized efficiency in farming and production maximization. Consequently, the domestic landscape and built environment at antebellum farms (c. 1790s to the 1860s) are usually more structured and planned than farms dating to the preceding colonial era or settler periods in different regions (Groover 2008). Likewise, as farms began to practice commercial production, the amount of factory-manufactured consumer goods recovered from farm sites often increases dramatically. During the post-bellum/modern period from the 1870s to the 1900s, farms increasingly incorporated new technology into their operation, revolutionizing agricultural production and rural life in many regions of the United States. Likewise, consumerism that began in the 1800s continued in rural locations during the twentieth century. The challenge for contemporary historical archaeologists is to effectively reconstruct the primary material trends that occurred among rural households as the transition from noncommercial to commercial-level farming transpired in different regions of the United States.

Key Issues and Current Debates

Key issues and debates in farmstead archaeology center upon interpreting the significance of rural

sites encountered during CRM archaeology projects. Since the 1970s, a minority of archaeologists have argued that farmstead sites represent a very prevalent, redundant, and hence expendable type of archaeological resource that consequently should not be preserved or studied archaeologically, given the amount of written information regarding farm life in the United States. In contrast, most contemporary historical archaeologists recognize that farmsteads are a very important research topic and type of cultural resource. The archaeological research significance of farmstead sites is based upon the information potential that farmsteads offer to archaeologists. Significance is also based upon the current state of knowledge related to farmsteads in a specific region, depending upon the types of farm sites previously investigated and the range of questions addressed at these sites.

An important element of farmsteads in the significance debate is that farmsteads, often occupied by several generations in the same extended family, usually possess considerable time depth, having been occupied for at least a century or more. Because of their characteristic time depth, farms represent relevant "time laboratories" where archaeologists can explore long-term material trends related to the archaeological dynamics of continuity and change in domains such as the domestic landscape, architecture, economic strategies, foodways, and household material culture within an extended family. Previous studies have demonstrated that landscape change and material consumption and deposition, particularly of foodways related items, are significantly influenced by the life history and family cycles of the farm residents (Groover 2003, 2008). Due to the time depth often associated with farms, they represent significant archaeological resources and an important context for exploring medium-term material trends.

International Perspectives

The systematic study of farmsteads internationally is beginning to develop in different parts of the globe. International studies of farming households and landscapes (e.g., Morrison 1991; MacDonald Lake & Edwards 2006; Tarlow 2007; Carroll 2011; Prossor et al. 2012) dating to the past 500 years are very relevant and valuable because they illustrate the range of variation in agriculture throughout the world. Archaeological studies have been conducted in England, Ireland, and Australia at farmstead sites dating from the late medieval period to the nineteenth century (e.g., Barnwell & Giles 1997; Brunskill 1999; Dalglish 2003; Atkinson 2010; Orser 2010). For American archaeologists, international farm studies can highlight the origins of farming practices that were transplanted to and modified in the United States. Using migration as a primary analysis topic, farm studies in the United States often emphasize the ethnic practices and place of origin of farm residents. Origin studies attempt to establish what material practices were reestablished in the New World and how agricultural practices and material traditions may have changed over time.

Future Directions

As the number of farmstead studies increases in the United States and elsewhere, a pressing challenge for historical archaeologists is to systematically synthesize new information into a coherent state of knowledge regarding the trajectory of rural life in different regions over time. This task is particularly necessary for future archaeology projects supported by public funds. Evaluating the significance of farmstead sites is based on establishing the context of the site and determining the research potential of encountered farmsteads. The research potential of specific farms can be established through reference to a current state of knowledge in a given region. Simply put, the current state of knowledge, especially in cultural resources management, refers to the existing body of information related to a topic and existing questions that should be addressed by future site

studies. Unfortunately, in the United States, an overarching, systematic synthesis of farmstead archaeology based on previous studies is yet to be conducted. However, many archaeologists have conducted regional-level studies of rural trends in specific geographic areas over time.

Cross-References

- ▶ Buildings Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Finch, Jonathan
- ▶ North America (USA): Historical Archaeology
- ▶ Plantation Archaeology
- ▶ Tarlow, Sarah

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Fedorov-Davydov, German A.

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Basic Biographical Information

German A. Fedorov-Davydov was born on July 17, 1931 and died on April 23, 2000. He was a doctor of historical sciences, a professor, a corresponding member of the German Archaeological Institute (1983), a member of Academy of Natural Sciences (1993), and the winner of the Lomonosov Award of the first degree of Moscow State University (1998).

His father was a professor at Moscow State University and a famous Soviet art historian. His mother was an artist.

After leaving school in 1949, he joined the history department of Moscow State University, where he majored in the department of archaeology. As a student, he participated in the Khorezm expedition and wrote a thesis on "The Mint minted Khorezm in XIII-XIV centuries" (head – Professor S.P. Tolstov).

From 1954 to 1956, he was a postgraduate of Moscow State University Department of Archaeology (supervisor – known Soviet archeologist A.P. Smirnov). In 1957 he defended his thesis on "The Treasures of Coin the Golden Horde (main stages of development of currency and monetary-weight systems in the Golden Horde XIII-XIV centuries)."

In 1956–1960 G.A. Fedorov-Davydov worked in the Institute of History of Material Culture – Institute of Archaeology of Academy Science of the USSR (in 1958–1960 he was executive secretary of the journal "Soviet Archeology"). From 1960 until his death, he was working at the Department of Archaeology of the History Department of Moscow State University (since 1960, the assistant; since 1962, associate professor; since 1969, professor). G.A. Fedorov-Davydov defended his doctoral thesis entitled *Nomads of Eastern Europe in the X-XIV Centuries* in 1966 at Moscow State University.

Major Accomplishments

The scientific interests of G.A. Fedorov-Davydov were extremely wide: medieval archaeology of the Eurasian steppes; history, archaeology, and numismatics of the Golden Horde; the ancient and medieval art of the Eurasian steppes; ancient and medieval culture of the Volga; currency and trade in the Northeast; statistical methods in archaeology; and relationships and civilizations of the East and West in the context of the history of the Silk Road.

He lectured on "Fundamentals of Archaeology" and "The Historiography of Archaeology" and conducted special courses: "Archaeology of the Volga Region," "Archaeology of Central Asia," "Archeology and Culture of the Muslim Countries," and "Statistical Methods in Archaeology" at the Department of Archaeology of the Moscow State University. Among G.A. Fedorov-Davydov's students, there are known archeologists of Moscow, including Kazan, Saransk, Volgograd, Astrakhan and Dagestan, Azerbaijan, Uzbekistan, and Tajikistan.

G.A. Fedorov-Davydov participated in many archeological expeditions that took place from 1950 to 1990 (Central Asia, Ukraine, the Middle and Lower Volga Region, Mongolia, Tunisia). In 1970–1990 he led the Institute of Archaeology of Academy of Sciences and Moscow State University expedition in the Volga Region.

The most significant scientific accomplishments of G.A. Fedorov-Davydov concerned research related to the Golden Horde city.

Since 1959, he led the research in Tsarevskoe, Selitrennoye, and Vodyanskoe sites. He detailed stratigraphy of the excavated sites and specified the time of death of the Golden Cities. The archeological materials were summarized in the monograph "Golden Horde cities of the Volga region" and in his books and articles published abroad.

One of the most striking episodes in the career of G.A. Fedorov-Davydov was the discovery of the burial ground with masterpieces of ancient art at Kosik in 1984.

His theoretical works, illustrated by methods of mathematical statistics, were of great importance for the development of Russian archaeology.

G.A. Fedorov-Davydov did a lot of research, organization, and socializing; he is the author of about 230 scientific and popular-scientific works, including 26 books.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Medieval Archaeology
- ▶ Medieval Russia (Rus'), Archaeology of

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Basic Biographical Information

T. J. Ferguson (b. 1950) is a luminary in the global movement to make archaeology more relevant to and respectful of Native American communities. He has been particularly instrumental in issues surrounding repatriation, the development of tribal cultural resource management (CRM) programs, and the advancement of an applied archaeological paradigm that bridges different elements of anthropology and the humanities to understand native peoples past and present.

The son of a career military officer, Ferguson spent his high school years in Oahu, Hawaii, and graduated with a bachelor's degree in anthropology from the University of Hawaii at Hilo in 1973. Ferguson went immediately into graduate school. After receiving his master's degree in anthropology from the University of Arizona in 1976, he planned to return to Polynesia but instead accepted a job at the Pueblo of Zuni in New Mexico. Through that work he became interested in historic and cultural preservation, and land claims, and would come to spend his career (to date) focused predominately on the American Southwest. After the position at the Pueblo of Zuni, Ferguson went back to graduate school to pursue a master's of community and regional planning, which he received in 1986 from the University of New Mexico. He would later earn a Ph.D. from the University of New Mexico in 1993 – with a dissertation using an archaeological application of space syntax to illuminate historic Zuni architecture (Ferguson 1996a) – while also working as the Director of Southwest Programs at the Institute of the North American West. Following this position, Ferguson established his own companies (first with Roger Anyon) in which he could pursue

applied research. He is currently the owner of Anthropological Research, LLC, and a Professor of Practice at the University of Arizona.

While working for the Pueblo of Zuni, in 1978, Zuni religious leaders decided to seek the return of stolen *Ahayu:da* (War Gods). Ferguson became part of the Zuni team that eventually would recover virtually every known War God in a US public institution (Ferguson et al. 1996). Their success helped lay the groundwork for US repatriation law and the global repatriation movement. In the years since, Ferguson has worked for both tribes and US federal agencies to conduct cultural affiliation studies, which provide a vital legal pathway for cultural items to be returned from museum repositories and archaeological sites. He has actively contributed to the academic and intellectual debates about cultural affiliation and other issues relating to repatriation (e.g., Ferguson 2003, 2004). He has also served as a member (2005–2013) of the Smithsonian Institution's Repatriation Review Committee.

In 1976, Ferguson became the Assistant Director of the Zuni Archaeological Enterprise – the first tribally run cultural resource management firm in North America. The next year, when the program reorganized, he became the Director of the Zuni Archaeology Program. Through these efforts, Ferguson and his colleagues demonstrated the value of archaeology for tribes and thus established a framework for heritage management conducted by tribes (Ferguson 1984). Since then, dozens of tribal CRM programs have been established, as well as more than 100 Tribal Historic Preservation Offices.

Major Accomplishments

The experiences at Zuni provided a basis for Ferguson to build a career around using archaeology to serve tribal needs and interests. He has developed a unique brand of archaeology that spans an array of anthropological and humanistic approaches that include ethnohistory, ethnography, and geography (e.g., Ferguson & Hart 1985). Many of his projects have directly supported tribal welfare in the domains of cultural preservation and land and water rights. For example, he has served as an expert witness for the Pueblo of Zuni, successfully helping them in their decade-long land claims case as well as their efforts to protect the sacred Zuni Salt Lake; he has conducted research for the Pueblo of Taos to successfully prevent the impacts of a proposed airport expansion on the tribe; and he has helped the Pueblo of Laguna successfully have the sacred Mount Taylor acknowledged as a traditional cultural property under New Mexico state law. Much of his applied work involves the documentation of traditional cultural properties that are potentially threatened by development projects through the Section 106 process of the National Historic Preservation Act, but he has also collaborated on projects that proactively study tribal histories, such as a National Science Foundation study to document Hopi place names.

Over a three-decade plus career, Ferguson has thus shaped a research agenda that demonstrates how archaeology can be conducted by, for, and with Native Americans. While much of his applied work has led to a long list of technical reports, Ferguson has been a regular, vocal, and intelligent contributor to the discipline's ongoing discussion about its relationship with indigenous peoples (e.g., Ferguson et al. 1993; Ferguson 1996b, 2009). He has also greatly advanced these efforts through service to the discipline, holding a range of positions in professional organizations, most notably serving on the Executive Board of the American Anthropological Association (2007–2010). His contributions to archaeology have been recognized through numerous awards, including the Society for American Archaeology Presidential Recognition Award in 1997 for his work bridging archaeology and Native views and the Solon Kimball Award for Public and Applied Anthropology in 2006 for developing models of mutually beneficial collaboration between American Indian communities and archaeologists in field research, museum practice, and assessments of cultural landscapes.

Cross-References

- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Indigenous Archaeologies
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation: Overview
- ▶ Sacred Site Conservation and Preservation
- ▶ Society for American Archaeology (SAA)
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture

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Field Method in Archaeology: Overview

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Introduction

Most archaeological research depends, directly or indirectly, on information recovered in the field, primarily as a result of campaigns of *survey* and *excavation*. The way field projects are designed, implemented, analyzed, and published is summarised here and reviewed in a number of case studies (see Cross-references).

Much of the *archaeological resource* is vulnerable to disturbance from the exigencies of modern life, and may be destroyed through the construction of roads (motorways) and buildings, especially in towns. Even in open country and desert, the surface is subject to continual attrition. Archaeological investigation therefore demands work to be of the highest quality and precision, designed to maximize information while it is still detectable and wherever possible to conserve deposits in the ground. While much field method is directly applied to research questions, much more effort goes in recording archaeological sites that are likely to be damaged by modern construction or clearance. This work is undertaken by the rescue or commercial profession (said to be engaged in *CRM* or Cultural Resource Management). At the present time, CRM activity greatly outnumbers university activity in both in its staff and their budgets.

Definition

Field archaeologists explore the past at a number of different scales and use a basic vocabulary to designate what they find. The basic unit of past activity is the *object*, which might be an *artifact* (man-made – e.g., a brooch) or an *ecofact* or biota (natural- e.g., a seed). A collection of

such objects is an *assemblage*. The earth or mineral *deposit* from which an assemblage is retrieved is a *context* (also called a stratum, a stratigraphic unit, or a cultural layer). Any set of contexts which offers evidence for past activity is a *feature* – a general term of great use in archaeology since it so often happens that we find something but do not yet know what it is. A wall, a grave, a path are examples of features. A set of features, like four walls, can be designated as a *structure* (e.g., a building). A *site* is the term used for a concentration of features, which imply former human occupation. It is also used to denote a place at which archaeologists have focused their investigations. A *landscape* (or *historic landscape* or *historic environment*), in archaeological terms, is compounded of the detected parts of ancient land use, particularly sites.

Key Issues/Current Debates/Future Directions/Examples

Archaeological investigation is a science that responds to the needs of research, to the way that information has survived in the ground and to the present ownership and stakeholders of the site or landscape in question. Research objectives, terrain, and the social context therefore have to be matched for every field project in a *project design*. The best known methods of field investigation are survey, which reviews large areas on the surface (extensive investigation); excavation, which examines a constricted piece of ground by dissecting it (intensive investigation); and building recording, which deduces the history of buildings that are still standing. Modern projects, whether applied for pure research or for CRM, use all these in combination in rigorously planned programs (Carver 2009: Ch 14).

Investigative Procedure

Field investigation typically takes place in six consecutive stages, each of which deploys a range of different methods, described in more detail below (see Table 1).

Field Method in Archaeology: Overview, Table 1 Field work design stages, *left to right: FRP* Field Research Procedure (Carver 2009), *CRM* Cultural Resource Management (Neumann & Sanford 2001), *MAP* Management of Archaeological Projects (Andrews & Thomas 1995)

FRP	CRM	MAP
Reconnaissance	Background	
Inventory survey	Surface survey (Phase 1)	
Evaluation	Evaluation (Phase 2)	*Appraisal*
Desktop assessment		
Resource modeling		Field evaluation
Research agenda		
Project design	Memorandum of agreement	Project specification
Research programmed	Scope of work/data recovery plan	
Management programmed		
Investigation	Data acquisition (Phase 3)	Fieldwork
Analysis		*Post-excavation assessment*
Programmed design: analyses		
Publication		
Programmed design:		
Reports		
Exhibition		
Site presentation		

1. The object of *RECONNAISSANCE* is to explore ancient landscapes and identify sites, the site used in this case to denote areas likely to contain concentrated remains of earlier human activity. Methods of finding sites include *aerial archaeology*, using satellites, airplanes, or balloons as platforms to capture images of features that are often only visible or most visible from the air. *Surface investigation* involves walking over the surface of the ground and recording the artifacts that lie on the surface. Sites are located by mapping concentrations of objects as they lie. *Subsurface investigations* use geophysical or geochemical prospection, where anomalies picked up in, or under, the surface are mapped

to show the traces of now vanished walls, roads, pits, and an increasing variety of other features.

2. An area suspected of containing buried information is designated as a site and then subject to *EVALUATION* to determine the best course of further action. The object of the evaluation is to supply as much information as possible to the design (which constitutes the subsequent stage). Predicting what lies under the ground is the first task, the result being reported as *deposit model*, showing the depth and character, and if possible the date, of the strata encountered. The research objectives and the social factors affecting further investigation are also assembled at the evaluation stage. This part of the investigation is undertaken inflicting as little damage as possible, using the techniques of *subsurface investigation*. But many sites require small-scale digging to give a preview of what lies beneath; these include *shovel testing* (small shovel sized pits), *test pits* (square pits, usually 1 × 1 m in plan), or *test trenches* (cuttings between 1 and 2 m wide) (Hester et al. 1997).
3. *DESIGN* is the principal stage of field procedure, because it is at this point that the future of an identified site is decided. The importance of design is threefold – first it determines the agreed purpose of research and its outcome; secondly it determines the desired measures for the conservation of the site; and thirdly decisions taken at the design stage are often irreversible, particularly those that involve digging. A project design is a comprehensive document that incorporates and justifies a research program, a conservation program, and a program for continuing interaction with the public and stakeholders. The research program includes costed plans for survey, excavation, building recording, their anticipated outcome, the likely program of analyses (see below), and the plans for publication. Within this program are included the sampling strategies, itemizing the number, size, and location of areas to be surveyed and excavated. The conservation program includes measures for the long-term protection and management of the resource. The program of public interaction includes plans for display of the site and for serving the requirements of local ownership.

   The project design provides the basis for funding and for permissions as well as the document that shows how the academic research agenda is to be addressed. Since there are many interested parties here, not only local, it follows that in modern professional practice, the project design will be published before implementation, allowing "multi-vocal" responses from a wide constituency. These responses will be incorporated into the agreed programs confirmed by the representative and funding bodies.

   Since the project design is intended as an agreed contract between the field researcher and society, it is generally not varied until it has run its course, when another agreed program may supersede it. In some parts of the world, the old "seasonal" system still endures, whereby the archaeologist redesigns the project every year. However, this would now be considered as less ethical than conforming to an agreed design-led package. The procedure for reviewing and accepting designs is appropriate to both university research and CRM reactive fieldwork, though there will be some variations between them. For example, while both should have research and management plans, CRM will often omit plans for public display.
4. *IMPLEMENTATION* is the active execution of the agreed programs. Using *survey, excavation* and *building recording*, and other bundles of techniques where appropriate, the implementation stage is usually performed in intensive seasons of fieldwork, using a range of crews stretching from two or three professional surveyors to a workforce of 50 or more volunteer excavators. The business of this workforce is to execute the study of the landscape or site on the ground and create records of what was measured, seen, or sensed, together with samples of materials encountered. The strategy for *Recording and Sampling* is laid out in project design, and is

determined by the research objectives and terrain (see below). Many countries have laid down standard procedures for surveying, digging, and recording, although these are not helpful when they reduce creative observation, and thus the potential of the fieldwork to generate new knowledge. Site records have evolved over the last 20 years to capture observations at a number of different levels: primary data, agreed in advance and captured on proformae (for example, context records), interpretative definitions, using common vocabulary to describe interpretations on the ground (for example, using feature records) and metadata, which record the course of the field work, the circumstances of locality and weather, the crew, interim assessments, and numerous other matters; this information is traditionally captured in journals, photographs, and audio and video files.

5. *ANALYSIS*. Records made during fieldwork are examined at the analysis stage, with a view to understanding the results. Both survey and excavation usually generate large assemblages of objects, and detailed spatial records relating to objects, contexts, and features. The three main parts of the analytical program are: assemblage, *space*, and *sequence*, which together result in a narrative of what happened in the area examined.

The *assemblage* comprises all the objects and materials that are kept for analysis. The yield of an assemblage has been greatly increased by screening (sieving) the dirt, which helps to capture small objects that may be missed. Dry soil may be dry-sieved, and wet cloddy soil wet-sieved, i.e., broken up with water. The size of the mesh depends on what we want to find and varies from 1 mm for beads and potsherds to a few microns for pollen. New science is hugely increasing the range of what we can learn from the ground, by examining microscopic remains such as seeds, pollen, insects, and residues in pots. The study of *artifacts* usually requires the determination of its fabric (what it is made of), its form (implying its use), and its style (suggesting its cultural affiliations). Routine study of *stone, metal, ceramic, wood, leather*, and *textile* objects is well developed. The biota (biological fraction of the assemblage) includes the *soil, animal* and human remains, *seeds, pollen, phytoliths*, and other plant remains and insects. Parts of the assemblage are particularly valuable for their indications of date, for example, coins, which are provided with a date of minting and circulation by *numismatics*. The single most important method of scientific dating used routinely by field archaeologists is *radiocarbon dating*, which determines the date at death of organic materials, such as wood or bone. Details of all these methods, shown in italics, will be found elsewhere in this encyclopedia.

The *use of space* is fundamental to the understanding of human activity, and is recorded on a wide range of scales – at the level of a landscape, a settlement a cemetery, a house, a room, or a hearth. Much of field archaeology is taken up with measuring location, usually in three dimensions and archaeologists produce some of the most precise and fastidious of all land surveys. The use of space is analyzed by *plotting* objects, and *planning* features and structures. Details of the use of space inside a building may also be determined by chemical and geophysical mapping (Carver 2011: Ch 2). The many kinds of result include the determination of activities, routeways (paths, tracks), social hierarchies (from room and house size), and sequence (by comparing alignments).

On excavated sites, the *sequence* is worked out by stratigraphy – the order that contexts and features succeeded each other in the deposit. Their relationships (which came first, which came after) are recorded on site and drawn up in comprehensive *stratification diagrams*. Archaeologists also record sample sequences by cutting a slice through a deposit and drawing the set of layers seen from the side and shown in *section*. Sequence may also be informed by absolute dates of material in the assemblage and by relationships in space (see above). Spatial analysis also plays a role in determining sequence.

Sequence, space, and assemblage together produce the site model or site narrative – our best archaeological account of events that occurred at a place. There will be more research to come – placing these events alongside others near and far, and making better sense of them in human and historical and environmental terms. In this process, a vital ally is *ethnoarchaeology*, which provides analogies from ancient practice and behavior drawn from observations made in modern communities.

6. *PUBLICATION*. Drawing on the analyses, the results of fieldwork are modeled or synthesized, and are then distributed to the people who need them. *Through different kinds of publication* in the modern profession, the range of users is considerable. CRM archaeologists have to report their findings rapidly clearly and succinctly in Client Reports. Researchers will look to outlets in journals and monographs appropriate to the research community. The public are served by exhibitions and displays supported by popular summaries. And all the records made are deposited in an archive (often digital) for the long-term curation of information for the use of future generations.

Terrain

Procedures for survey and excavation are greatly varied the world over, since the character of archaeological sites, and what we want to know from them, both vary. The geology and topography of the land, and the way it has been treated by humans (quarried, cultivated, built on) has the collective term *terrain*. In general, the terrain is the greatest influence on the way archaeological information has been captured, and thus how it can be accessed and understood through investigation. Broad flat sites with little stratification in open country can be best examined in wide areas, and their rewards are to offer comprehensive plans of a settlement or cemetery, while deeply stacked strata under a modern town is much less accessible but offers excellent accounts of historical sequence using stratification. At each site, local events will have influenced the way that archaeological strata have built up and survived. Frost or flood may crack or disperse strata. Organic materials may decay, so that structures of wood become barely visible. A waterlogged site, on the other hand, preserves wood; but if the water flows, objects may migrate out of their original layers and be redeposited in much earlier (or later) contexts. These are *processes of site formation* which deserve to be studied both in general terms and site by site (Schiffer 1987; Goldberg & Macphail 2006).

A number of case studies are given in this encyclopaedia to illustrate different responses to different challenges the world over (see Cross-references). From England, we have an example of *landscape mapping* applied to a favorable terrain, using surface collection and geophysics deployed as far as possible to give total coverage. *Motorway construction* in Ireland gives an example where very comprehensive coverage was again achieved, both in survey and excavation, in advance of motorway construction. Stark contrasts in terrain are provided by the struggle to investigate *permafrost sites* in Siberia and sites embraced by *jungle* in Belize (Chan). Particular site types also provoke certain kinds of practice. *Klithi* (Greece) shows an exemplary approach to rockshelters in the 1980s, while the *Pinnacle Point* cave site is deploying advanced methods of remote sensing. Three examples show how information can be won by careful excavation from sites where stratified layers are sparse: an *upper palaeolithic floor* in Switzerland, a *Lapita settlement* in the Mariana Islands (Pacific Ocean), and a Neolithic, *linearbandkeramik settlement* in Germany.

Specially revealing sites demanding particular approaches are the well-preserved wetland *crannog*, a type of artificial island in Scotland; the *tell*, a large mound created by the decay of a long sequence of mud-brick structures (the example is from Syria); and a *terp*, artificially raised settlement mounds in the Netherlands. An alluvial site in Italy Terramara and hillforts in the *Czech Republic* likewise require their own procedure. *Human burials* are rich sources of demographic information, and need to be dug with an

enhanced care. A pioneering example of a *burial mound dissection* from central Sweden included the lifting of the entire burial chamber for study in the laboratory. A *mining site in Spain* and an *urban site in New York City* show something of the ingenuity required from excavators wishing to profit to the maximum from what terrain and opportunity offer.

An example of a project mainly dedicated to building recording is seen at *Bam* in Iran, where an archaeological team was faced with the challenge of recording of the buildings of a famous historic town severely destabilized by an earthquake. Our last example is of *ethnoarchaeology* in action: a record of the Gilund potters, themselves now under threat of economic extinction.

There is archaeology in every country and every country's archaeology is of equal value to the world as a whole. There is a world agenda, which seeks to understand the stories of every land and draw general conclusions from them, and there are local agendas in which the local heritage is paramount. These tensions between the values of scientific research and the values of cultural property result in different national strategies and attitudes toward the past. The values may change through time and sometimes look outward to international goals and sometimes inward to the national social mission. There are pioneers of field archaeology who have achieved some prominence but they are usually the instruments rather than the causes of particular forms of practice. For these reasons, rather than credit selected great figures with making all the advances, we have thought it more interesting to study the circumstances in which some of the more widespread *traditions* have developed: the American, Polish, British, Scandinavian, French, Australian, Chinese, and Japanese experience is considered in a number of brief contributions.

Cross-References

- ▶ Aerial Archaeology
- ▶ American Pioneers and Traditions
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Bam: Archaeological and Social Investigations after the Earthquake
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Buildings, Archaeological Study of
- ▶ Burial Excavation, Anglo-Saxon
- ▶ Burial Mound Dissection in Sweden
- ▶ Chan: A Tropical Rain Forest Site in Belize
- ▶ Chinese Field Methods
- ▶ Crannog Investigations in Scotland
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Excavation Methods in Archaeology
- ▶ France: Field Method Origins
- ▶ Gavà Mining Site: Fieldwork
- ▶ Hillfort Investigations in the Czech Republic
- ▶ Inner Ionian Sea Archipelago: Archaeological Survey
- ▶ Ireland: Investigations in Advance of Motorway Construction
- ▶ Japan: Field Archaeology
- ▶ Klithi Site: Excavating a Rockshelter in Northwest Greece
- ▶ Landscape Mapping at West Heslerton
- ▶ Linearbandkeramik Site Excavation
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Pacific Islands: Finding the Earliest Sites
- ▶ Permafrost Digging
- ▶ Pinnacle Point: Excavation and Survey Methods
- ▶ Polish Pioneers and Traditions
- ▶ Publication in Field Archaeology
- ▶ Recording in Archaeology
- ▶ Scandinavia: Field Methods
- ▶ Sequence and Date in Field Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Spatial Analysis in Field Archaeology
- ▶ Surface Survey: Method and Strategies
- ▶ Switzerland: Upper Paleolithic Living Floor Investigations
- ▶ Tells in Archaeology
- ▶ Terp Excavation in the Netherlands
- ▶ Terramara Santa Rosa di Poviglio Alluvial Site
- ▶ Urban Archaeology at Five Points

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Field Schools, Archaeological

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Introduction

Although widely recognized as fundamental to the discipline, the provision of practical skills training in archaeology is currently a cause for concern, particularly in the UK, in response to continuing changes in the structure and funding of archaeological activity. A divergence has grown between training needs in the strong independent sector and the requirements of increasingly "professionalized" developer-funded units. In addition, a gulf has grown between field schools that provide training as part of an academic degree and the need for vocational training in support of a career in commercial archaeology (Aitchison 2004). Behind these issues lies a concern about the finite nature of archaeological evidence and the inevitably destructive nature of skills training "on the job." A rise in community archaeology projects funded through the Heritage Lottery Fund also represents a shift in emphasis which, despite the best intentions, has raised concerns about training needs in the light of an enthusiasm for invasive research (Thomas 2010). Despite these concerns, field schools continue to provide opportunities for people of all ages and abilities to acquire skills in the practice of archaeology and frequently also in their own personal development: the social aspects of field schools and their role in the development of the discipline as a whole should not be underestimated (Schofield 2011).

Definition

The term "Archaeological Field School" covers a wide variety of practical training opportunities, mostly but not exclusively associated with an educational institution. It may relate principally to an annual field course run by a university or college as part of an archaeology program, but in a few cases, field schools are run by independent organizations and are open to anyone who wishes to take part; assessment and accreditation are occasionally available, either through a formally recognized system or as ad hoc records of achievement.

Field schools provide training and experience in archaeological fieldwork skills, usually in the techniques of excavation, but also sometimes covering other practical skills such as topographical and geophysical survey, the recording of standing buildings and finds analysis. They are usually residential, and minimum periods of attendance may be specified. Costs can vary enormously depending on the quality of the residential component (from "squatting" in borrowed buildings to camping, hostels, or study centers) and the degree of subsidy that might be available.

Key Issues/Current Debates/Future Directions/Examples

Field schools exist at one end of a spectrum in a discipline which has a very mixed approach to

practical skills training. At the opposite end of this spectrum, excavation skills are picked up by default on projects where the overriding emphasis is on getting the job done. This need not be restricted to developer-funded projects, but the pressures of commercial archaeology are often perceived as running counter to any substantial training input. "Training excavations" exist somewhere in the middle of the range of training opportunities, with more or less priority being given to instruction while ensuring that progress overall is not unduly delayed. The majority of university-based undergraduate field experience falls into this category, with students working on excavations in support of the research goals of staff or postgraduates. The quality of training provided in these circumstances may be highly variable, with some excellent reports but also a less than satisfactory learning experience in some cases as reported in a recent survey (Croucher et al. 2008: 30).

Currently, there is little coherence to the provision of training in practical archaeological skills through field schools, despite the development of National Occupational Standards as a benchmark for vocational training by the Archaeology Training Forum (2007). University-based field schools are more likely to adhere to their own internal accreditation requirements, and with a general maximum period of 4–6 weeks spent on fieldwork training, this element is in practice a relatively minor component of a 3-year degree program (Everill & Nichols 2011). Concerns within the HE sector focus on the impact of the introduction of tuition fees and students' abilities to support themselves financially, with previous years being presented as a "Golden Age" for fieldwork training (ibid. 8). Although most HE institutions provide some form of financial support, there are concerns about the ability of students in the future to meet the extra costs usually implicit in attending a Field School and the conflict with increasing pressures to obtain paid employment during the summer vacation or to uphold existing commitments to part-time employment.

Fieldwork training has, in the past, been the focus of some notable field schools or dedicated training excavations, and university extramural departments (more recently re-branded as continuing education) have made a major contribution. Among the most significant of the early training excavations were those run by Philip Barker at Wroxeter in the late 1970s/early 1980s for Birmingham University Extramural Department. These field courses have epitomized the spirit of university extramural teaching, being open to all and providing the highest quality of instruction. They have inevitably suffered as a consequence of changing patterns in university-based adult education, and the disappearance of this active support structure is of great concern (Lee 2009).

Other field schools in the UK have been run by organizations outside the formal education system; early examples include excavations at Bryn y Castell run by the Snowdonia National Park, at Strageath run by the Scottish Field School of Archaeology, and residential courses run at the Kindrogan Field Center. In many cases these have been inspired by the presence of individual archaeologists within these organizations, but recent economic trends have tended to curtail these opportunities significantly as the jobs supporting them have been cut back. In some cases, however, new training opportunities are being developed, for example, through the Dales Heritage Field School run by the Yorkshire Dales Landscape Research Trust (http://ydlrt.co.uk), which was created following the closure of the School of Continuing Education at the University of Leeds. The Kent Archaeological Field School (www.kafs.co.uk) is another independent organization which has now been offering a wide variety of training opportunities for 10 years.

A major strand which is increasingly taking up the role of providing "on-the-job" training and practical experience arises from the strong tradition in the UK of public or community archaeology, organized by local archaeological societies and more recently by community groups with funding from the Heritage Lottery Fund. Some

local society projects have been set up as field schools, and "learning" and "participation" are two key themes for HLF-funded projects. The training needs in these circumstances are many and varied – some archaeological societies have developed a wealth of in-house expertise which can be passed on to new members, while HLF funding supports the contracting-in of specialist expertise and "mentors." However, major concerns have been expressed with this type of project-specific funding (Thomas 2010), including the ability of groups to maintain activities in the long term and the lack of progression routes by which people can continue to develop their skills outside an increasingly expensive formal education system.

Practical experience in archaeological fieldwork skills can increasingly be acquired through field schools that recognize the widespread public interest in the past and are happy to welcome absolute beginners. Opportunities to suit a wide range of interests and pockets can be found through websites such as the directory of digs published by the popular magazine *Current Archaeology* (http://digs.archaeology.co.uk), the regular briefings published by the Council for British Archaeology (http://www.britarch.ac.uk), and on a worldwide basis through organizations such as the American Anthropological Association (http://www.aaanet.org/profdev/fieldschools/) or ShovelBums (http://www.shovelbums.org/index.php?option=com_sobi2&Itemid=100). All of these organizations provide directory listings and disclaimers about the actual experience and quality of training on offer: it remains to be seen whether field schools can build on current foundations to develop a more coherent approach towards training in the essential practical skills of archaeology.

Cross-References

- ▶ Avocational Archaeology
- ▶ Clubs and Societies Promoting Archaeology (National and Local)
- ▶ Community Archaeology
- ▶ Volunteers in Archaeology

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Field Stabilization of Immovable Heritage

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Introduction

In recent decades, conservation professionals have been increasingly involved in field excavations in order to stabilize materials during the critical moment when they are most susceptible to rapid and severe deterioration due to the radical change in environment from buried to

Field Stabilization of Immovable Heritage, Fig. 1 Preventive measures to stabilize and protect sites: temporary seasonal covering to protect an excavated pavement (foreground), wall capping intervention to stabilize and protect wall tops, and a permanent shelter to protect decorative surfaces (background). (Photo: Livia Alberti, J. Paul Getty Trust)

exposed states. While it is more common for archaeological objects removed from a site to be subject to stabilization treatments during the excavation process, similar measures are now more frequently being planned and carried out in the field also on immovable heritage, namely, the architectural remains of a site, and the site itself, to prevent their deterioration or loss. Both preventive conservation measures and remedial interventions to stabilize sites during excavation, followed by monitoring and maintenance programs, are essential components of conservation and management planning for archaeological sites (Fig. 1).

Definition

In situ stabilization interventions, whether they are remedial treatments to correct damage, or preventive measures to limit future deterioration, and whether they are carried out during or long after the site's excavation, can encompass temporary or emergency measures, as well as complete and planned conservation programs. The variety of intervention options should be undertaken in the context of site-wide conservation and management planning, and on the basis of an assessment of condition, significance and degree of exposure (risk) of all site remains. Site assessments and conservation intervention planning involve professionals from different disciplines in addition to archaeology, such as architects, engineers, and conservators, as well as from allied fields such as soil science and hydrology. All stabilization interventions, whether they address deterioration at a structural level or on surfaces, should follow the conservation principles of documentation, reversibility, and minimum intervention to preserve the

physical integrity and authenticity of sites. An effective and increasingly practiced preventive measure to stabilize sites and their excavated remains is reburial. Yet it remains an option that is often considered as a last resort rather than an essential tool to preserve our archaeological heritage.

Key Issues/Current Debates/Future Directions/Examples

Reburial and Other Preventive Measures to Stabilize Sites

The creation of the professional journal "*Conservation and Management of Archaeological Sites*" (James and James, then Maney) in 1995 has played a significant role in drawing attention to site stabilization by greatly expanding the literature focused on conservation activities on archaeological sites. One of the journal issues has published the proceedings of an international colloquium on the reburial of archaeological sites (Stanley-Price & Burch 2004), an important preventive stabilization intervention option, but a controversial one still among many archaeologists and national authorities. The introductory paper of the colloquium provides a general argument for the reburial of archaeological sites by examining the rationales for reburial, and the objections to it, while taking into consideration stakeholder, technical and management needs (Demas 2004). Despite the convincing rationale and motivations for reburial, tourism, political pressures, and archaeological constituencies can still work against the conservation and management needs of a site, as one of the better-known case studies of site stabilization through reburial, the Laetoli Hominid Trackway site, revealed (Demas & Agnew 2006). In this case, the site is regrettably being pushed by the national authority to be uncovered and presented to the public, despite its remote location.

Without the institution of national policies to rebury sites or parts of sites, while presenting to the public those sites or parts thereof where the resources are available to protect and maintain them, more and more of our archaeological heritage will be lost (Caple 2000). Part of raising awareness about reburial as a conservation option is the need to document the positive results of reburial and to learn from the mistakes of past practice (Roby et al. 2010). Reburials have often been carried out in an ad hoc manner without sufficient planning and understanding of the type of new reburial environment to be created or the properties of the materials used, either fill materials or separation membranes. Lack of subsequent maintenance of reburials has also contributed to their poor performance in some cases. Yet experience has shown that when properly designed and executed (Fig. 2), the cost of maintenance of a site or site element is significantly reduced after reburial, which more than compensates for the initial cost of the reburial (Roby & Alberti in press). A recent review of the literature on the reburial of mosaics in particular provides a summary of many of the issues pertinent to the reburial of sites in general (Roby & Demas 2012b).

In addition to reburial, there are a number of other preventive conservation measures that can be employed to stabilize sites and protect them from a variety of environmental causes of deterioration (Corfield 1996; Stewart 2013).

Landscape stabilization measures, such as the installation of geogrids or nets, slope modification, and pinning, as well as revegetation can be used to prevent slope erosion, either soil or rock, and baulk erosion.

Water management measures, such as dikes or diversion walls and drainage channels and pits, can be carried out to prevent damage from flooding and to evacuate water from sites when it accumulates. Shelters can also be constructed to prevent water erosion and flooding of elements of sites. In recent decades, shelters have been increasingly employed to mitigate the principal cause of deterioration of ancient monuments and excavated sites – water. They also provide shade which can create a more stable environment and at the same time can positively affect visitor comfort and site interpretation. However, if not designed in response to design criteria regarding the new sheltered environment, a shelter can adversely affect the conservation of a site.

Field Stabilization of Immovable Heritage, Fig. 2 Preventive measures to stabilize and protect sites: an example of a reburial regime for an excavated pavement using a fill layer of sand, a separation membrane, and a covering layer of gravel to inhibit weed growth. (Photo: Thomas Roby, J. Paul Getty Trust)

The causes of deterioration to the site that a shelter aimed to address can be exacerbated, and new unforeseen causes of deterioration can be created by shelters. For example, by concentrating rain water at the perimeter of a shelter, erosion and salt crystallization phenomena can be worsened by a shelter if not designed with adequate drainage measures.

If shelters are to perform their primary purpose of protection, the architect designing a shelter needs to work with other disciplines and conservation professionals and be provided with and respond to a conservation brief with specific performance criteria coming from an assessment of the site and collection of local environmental data (Demas 2001; Stanley-Price & Matero 2001; Roby & Demas 2012a).

In addition, other preventive measures, such as regular maintenance and revegetation, can be employed to control vegetation and prevent site damage from plant and tree root growth.

Limiting access by animals, whether they burrow, graze, or roost, such as by exclusionary fencing or netting or by altering their habitat, can also prevent damage to sites.

Remedial Interventions to Stabilize Sites

Although preventive conservation measures should be considered first in any site conservation and management planning before, during, and after the excavation process, remedial interventions also play a major role in stabilizing sites. These interventions should be limited to the minimum required to re-establish structural integrity of the site or site element.

Another key conservation principle to follow in planning site stabilization interventions is the use of appropriate, compatible materials which are also capable of being removed at a later date without causing damage to the original material.

In the past, inexpensive modern materials, such as reinforced concrete and cement, have often been used to stabilize site elements, which over time have lead to accelerating deterioration of the adjacent original material, due to their very different physical/chemical and mechanical properties. The original materials should be identified and their basic properties assessed in order to identify the most compatible repair material, which in general will be as similar to the original material as possible, whether the site elements are constructed of masonry bonded with lime or gypsum mortars or of earthen materials.

Prior to undertaking any stabilization interventions, recording should be carried out to document both the condition of the site or site element and the interventions themselves. This recording will be critical to effective monitoring and maintenance in the future (Corfield 2003).

Field Stabilization of Immovable Heritage, Fig. 3 Remedial interventions to stabilize sites: structural repair of an architectural element using multiple carbon fiber strapping around the architrave blocks and a tie beam inserted above them. (Photo: Livia Alberti, J. Paul Getty Trust)

Interventions can be grouped by those carried out to stabilize the structure of an element and those to stabilize the surface. Structural interventions on site elements, which generally consist of masonry structures but also rock-cut or earthen materials, include filling of areas of loss with like material; grouting of deep voids and fractures with mortar; insertion of structural pins, ties, or bolts, or use of strapping, to keep elements together (Fig. 3); and application of a layer of mortar or earth as a protective capping for wall tops.

Stabilization of surfaces, sometimes of a decorative nature, carved stone, stucco, wall painting, and mosaics, to mention a few, includes filling of areas of loss with like material, micro-grouting of voids behind the surface (Fig. 4), and mortar edging repairs to contain and protect areas adjacent to loss. Friable surfaces can also be stabilized with the application of consolidant materials, often synthetic in nature, both inorganic and organic. Consolidation treatments will change the properties of the treated material and will generally not be reversible and will affect the retreatment of materials, so such treatments should be undertaken by professionally trained conservators or specially trained architects (Stewart 2013).

In principle, remedial interventions should employ materials that are reversible, namely, that can be removed at a later date without causing damage to the original material. For this reason, and also due to their compatibility with most ancient porous building materials, lime or earth-based mortars are generally preferred for most treatments of architectural elements. For certain structural repairs, however, drilling into a material for the insertion of reinforcement elements, like pins, may be needed, as well as structural adhesives which are generally not reversible (Ashurst 2007). In such cases, intervention layers of a reversible material or adhesive may be applied between the original material and irreversible material to make the operation less irreversible.

Cleaning is an operation which is generally carried out before stabilization interventions in order to insure a successful treatment, as soil or dust present on or below surfaces will prevent the proper adhesion of mortars or other repair materials. Otherwise, cleaning with the aim simply of making the surfaces more visible should be avoided unless the presence of an accretion or film is helping to provoke the deterioration of the surface.

Levels of Intervention

Whether preventive or remedial, there are basically three levels of intervention that can be undertaken. First-aid or emergency treatments

Field Stabilization of Immovable Heritage, Fig. 4 Remedial interventions to stabilize sites: stabilization of a mosaic surface through grouting with lime-based liquid mortar. (Photo: Sebastiaan Godts, J. Paul Getty Trust)

represent the first level, which aim to quickly prevent loss or collapse of site or architectural elements until sufficient time and funding are available to plan and implement a more complete conservation program for their long-term stabilization. For preventive measures, such interventions include temporary reburial or sheltering, while for remedial interventions, first-aid treatments could consist of shoring or propping of structures or baulks. Regarding decorative surfaces of structures on site, facing with a tissue or fabric and a reversible adhesive, or protecting broken edges from loss with mortar edging repairs can be considered part of this first level of intervention.

While publications exist which address this level of intervention for archaeological objects or movable heritage (see the entry on ▶ Field Stabilization of Movable Heritage in this encyclopedia), there are no similar texts addressing emergency treatments of immovable heritage. However, there are articles in the conservation literature which report on emergency treatments carried out during excavations, demonstrating that increasingly conservation professionals are present during excavation, not only those with training in objects conservation but also those with training in architectural and site conservation.

The second level of intervention is complete conservation treatment, which ideally should be based on a thorough condition assessment of the site, including both the characterization of constituent materials and their properties and the identification of prevailing causes of deterioration. An example of a preventive measure at this level of intervention would be the installation of new drainage systems for rainwater at a site or the cleaning of the ancient drainage system to make it functional again. The various remedial stabilization treatments mentioned above, both structural and superficial ones, are considered part of the conservation process and should be carried out in a management framework to stabilize and protect the site and its elements.

The third level is restoration or reconstruction, which aims to go beyond the minimum intervention required to stabilize the element and instead to add new material to the original in order to complete the element and render it more understandable to the visitor. This level of intervention has frequently been carried out in the past on archaeological sites. Some would argue that, if the interventions of restoration or reconstruction are well-documented to international standards, and therefore what is not original material is recognizable in the future by consulting the documentation, these types of intervention should be acceptable. However, this level of intervention is not consistent with recent and current international conservation charters and guidelines because it compromises the authenticity of the site or element (Jokilehto 2006) and can provoke damage to the original material over time.

Field Stabilization of Immovable Heritage, Fig. 5 Maintenance and monitoring: documented regular inspections followed by remedial repairs with compatible lime-based mortars, as needed, will keep excavated site remains in stable condition. (Photo: Elsa Bourguignon, J. Paul Getty Trust)

Maintenance and Monitoring

All stabilization interventions, particularly those carried out in uncontrolled environments on sites, require monitoring of condition followed by maintenance operations as needed in order for the interventions to continue to be effective. Depending on the aggressive nature of the environment and the fragile nature of the site or its elements, the frequency of condition inspections will vary. Maintenance operations can consist of vegetation removal, repair of previous stabilization interventions, repair of new areas of damage or loss, and repair of protection interventions such as shelters, reburials, or barriers. These operations require trained if not professional personnel and a consistently applied methodology of documentation of both inspections and interventions in order to determine the required interval of maintenance cycles to avoid future deterioration. An example of such a methodology has been developed recently for the training of technician-level personnel for the maintenance of mosaics on archaeological sites (Getty Conservation Institute 2011) (Fig. 5), but the methodology could be adapted and applied for the maintenance of a variety of site elements to ensure that they are regularly and sufficiently inspected and kept in stable condition.

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Cross-References

- ▶ Architectural Sites: Monitoring
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Field Stabilization of Movable Heritage
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Mosaics: Conservation and Preservation

▶ Stone: Preservation and Conservation
▶ Stone Treatments in Archaeological Conservation and Preservation
▶ Trackways in Archaeological Conservation and Preservation
▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Field Stabilization of Movable Heritage

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Introduction

The conservation of sites and artifacts is an integral and important part of the archaeological process. Conservation has a role to play in the elucidation of the site and of the material recovered from it, and the process often starts with field stabilization and even before that with the planning process.

Definition

Field stabilization (also often referred to as "first aid for finds") aims to prevent objects from deteriorating both chemically and physically by using correct lifting, recovering, packaging, transportation, and storage procedures. Not all objects require intensive conservation treatment in a lab-based setting, but all objects require field stabilization.

Key Issues/Current Debates/Future Directions/Examples

During burial, objects are prone to biological, chemical, and physical decay. They are affected

by a number of environmental factors including the presence of water and oxygen, the degree of acidity or alkalinity, the temperature and redox potential (oxidative or reductive power of the environment), the depth of the soil overburden, the presence or absence of salts, their proximity to other objects and the materials from which those objects are made, and the condition of the object before it was buried. Organic materials, for example, may totally disappear in damp aerated soils but survive beautifully in anaerobic conditions (such as waterlogged deposits), in very dry conditions (such as the Southwestern United States or the Near East), and in close proximity to certain metals and their alloys (due to the toxicity of these materials to many microorganisms) (Chen et al. 1998). Unfortunately, the physical and chemical integrity of an object can be severely affected while the object itself continues to look much the same. An example of this is waterlogged wood. The cellulose and hemicellulose in the wood are easily lost, leaving behind a fragile lattice of lignin that can collapse on drying, resulting in dramatic dimensional changes unless something is done to stabilize the wood. Another example is metal artifacts where salts absorbed during burial can contribute to the rapid corrosion of the metal once it is excavated.

Most objects deteriorate rapidly when they are first buried. Those that survive do so because they reach equilibrium with the burial environment; their deterioration progresses to a certain point and then either stops or drastically slows to a more sustainable rate. Once these artifacts are excavated, they are subjected to a new environment, which may be radically different from the burial environment, and they begin to deteriorate again unless a new equilibrium can be reached. The goal of field stabilization therefore is to move the object to a new state of equilibrium. This can be achieved by recreating aspects of the burial environment, for example, keeping waterlogged materials wet. Or it may be achieved by creating an entirely new environment, for example, using materials such as the Escal film® and the Revolutionary Preservation System®, to create very dry, oxygen-free environments aimed at preventing iron from corroding further, prior to more interventive forms of treatment (Mathias et al. 2004).

Occasionally objects cannot be removed from the ground safely without the application of an external support. This may be necessary because of the size of an object and the condition of the piece or to maintain the associations between multiple related components until there is more opportunity to understand them. Support may take the form of a consolidant that is applied directly to the object to help strengthen it internally or it may take the form of an external support such as plaster bandages, steel lifting frames, or even freezing the object and the soil around it and lifting it as a block. The term "lifting" is most frequently used to denote a situation where an object is removed from its context after a support has been added.

There are several important points to consider prior to "lifting" any object. Lifting is a temporary stabilization technique that mandates future work on an object in order for it to be studied, exhibited, and understood. It is important to be clear as to why the object is being lifted and what will happen to it afterward. Museum storage units are littered with objects that have been lifted but never excavated or worked on further, either because interest or funding evaporated. It is best to have a plan in place that includes who will do the post-lift work, when the work will occur, what the end goals of the work are, and how it will be funded. If this is not in place and it is at all possible, it is better to rebury the object and return to it once suitable arrangements have been made. If the decision is made to lift an object, it is important to remember that excavation conditions are seldom ideal. In the field, it is rarely possible to get an object clean enough for study or exhibit. Further work will be needed to clean the object, provide permanent support for it, and stabilize it for the long term. The consolidants or supports applied in the field may need to be removed during this process and new ones applied. It is important to think about the reversibility (or removability) of the materials being used. Some materials are easily removed while others, such as epoxy resins, can rarely be removed successfully. It should be noted that even

when a consolidant is reversed, small amounts are almost always left behind, often in cracks or pores. These trace remnants can affect later analysis so if analysis is planned, it is best to sample the piece before any consolidation is undertaken.

Documentation is an important part of the field stabilization process, and there are a number of forms it can take, including but not limited to written documentation, photography, and 3-dimensional scans. It is important to document the actions taken and the materials used as thoroughly as possible, as they can impact both future treatment and analysis. It is much easier and less time consuming for a conservator to reverse a consolidant if she/he knows what it is and does not have to test all the possible materials it could be. Similarly, a scientist wishing to analyze certain materials may be able to use an object's treatment history to determine which objects are suitable (or not) for analysis. For these reasons, conservation documentation should be integrated into the main excavation archive. Additionally, if field stabilization or later conservation has occurred, it should be noted and summarized in the overall project publication.

Planning is a key component of any form of field stabilization. There are three models that are often adopted for the involvement of conservation on a site. The first is to have the conservator working on the site full time; the second is to have a conservator on call who can visit the site frequently and help stabilize fragile materials, and the third is to have a member of the team who oversees the welfare of the finds with advice from a conservator. In this last scenario, the conservator may only visit the site for emergencies and complex conservation problems, or if the site is remote, all stabilization activities may be carried out by a member of the excavation staff. The choice of which level of involvement is appropriate for the site should, ideally, be made in conjunction with a conservator and should consider factors beyond the mere budget implications of each scenario; for example, thought should be given to what sort of artifacts are likely to be recovered, the conditions they are likely to be recovered from, the size of the excavation, whether a conservation lab is available near the site, and what the conservation capacity of the receiving institution or museum is. The more thought is given to these matters up front, the more successful the outcomes are likely to be. Field situations are unusual – no site ever presents the same exact problems as another site – and stabilization activities can be hampered by additional constraints, such as weather and the availability of products or materials.

In some ways, field stabilization is one of the more conservative aspects of archaeological conservation, a fact which is reflected in the literature on the topic. This is due in part to the variables in sites, in artifact materials and condition, and in the availability of stabilization materials; what worked beautifully in one location may be less successful at another site or difficult to replicate. Additionally, field stabilization labs are often quite basic, and few are furnished with the equipment necessary to scientifically test new materials, a prerequisite for publishing in most conservation journals. As a result, many of the newest developments in the field are focusing on documentation techniques, particularly 3-D scanning (Karas et al. 2010; Logan et al. 2010) and the application of 3-D computed tomography to visualize archaeological objects in blocks of soil (Stelzner et al. 2010). This is a trend that is likely to continue as these imaging techniques become more powerful and more affordable.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Bones: Preservation and Conservation
- ▶ Conservation in Museums
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Field Stabilization of Immovable Heritage
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Glass: Conservation and Preservation
- ▶ Leather, Archaeological: Conservation and Preservation
- ▶ Metals: Preservation and Conservation

▶ Stone: Preservation and Conservation
▶ Waterlogged Finds: Conservation
▶ Wood: Conservation and Preservation

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Figs: Origins and Development

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Basic Species Information

Ficus carica, fig, common fig. The fig tree has a short, branched trunk, which creates a broad crown with rather large and usually emarginated, deciduous leaves. Its life span is short (decades) in comparison to that of an olive tree. The fig protects itself against ruminants by producing bitter latex found in its leaves and young branches. It is dioecious, i.e., the species produces male and female trees.

The flowers are tiny, grouped by the hundreds in a closed inflorescence called a syconium, which develops into a fruit of almost spherical to pear shape, with a somewhat rounded apex and a narrow base. An opening, called ostiole, is located at the center of the fig's apex (Fig. 1). Pollination is carried out by a tiny wasp (*Blastophaga psenes*) that develops inside the male syconium, which is dry, is spongy, and has uncomfortable taste. The wasp, which lives in symbiosis with the fig, exits the male syconium and flies to find a female tree; it then penetrates through the ostiole of the female syconium. When ripe, the 3–7 cm long fruit contains up to 1,000 fertile nutlets, each with a diameter of approximately 1 mm and containing a single seed (Fig. 2). Because the fig is fleshy and sweet, it attracts birds and bats, which eat them and disseminate the seeds, the natural reproduction scenario of this species.

The fig is one of the major traditional fruit-bearing trees in the Mediterranean and Middle Eastern regions. In countries surrounding the Mediterranean Sea, wild fig distribution largely overlaps that of the grapevine and olive (Zohary et al. 2012).

The fig has been grown for many thousands of years for fresh as well as dried fruits. In ancient records, including the Bible, there are numerous

Figs: Origins and Development, Fig. 1 Ripe fruits of a common fig variety, Brown Turkey (Photo by Dr. O. Simchoni)

Figs: Origins and Development, Fig. 2 Half fleshy fig showing the nutlets (Photo by Dr. O. Simchoni)

references to the fig being eaten and grown by humans. In fact, one opinion in Jewish tradition claims that the Tree of Knowledge was the fig and not the apple, a fact derived from Adam and Eve's sewing fig leaves together to cover them

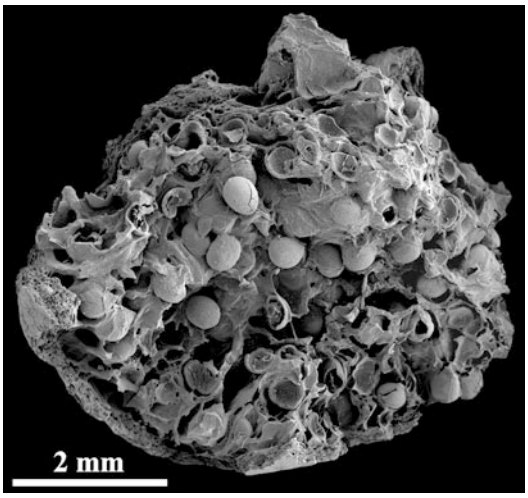

Figs: Origins and Development, Fig. 3 Charred fruit fragment from early Neolithic Gilgal (Kislev et al. 2006a) (SEM photo by Dr. Y. Langsam)

following their eating of the Tree (Condit 1947; Flaishman et al. 2008).

It was generally accepted that horticulture started much later than grain crop agriculture, because cereals and pulses are "short investment" annual crops, while fruit trees are perennials and begin bearing fruit some years after planting. However, recent archaeological findings have pushed back fig horticulture by several thousand years. Charred fig nutlets and fruit fragments were retrieved from some early sites in southwest Asia, such as the Pre-Pottery Neolithic A (PPNA) sites Gilgal and Netiv Hagdud, Lower Jordan Valley, Israel, dated to the 12–11th millennia BP (Fig. 3). Fig trees may therefore have been the first domesticated plant of the Neolithic revolution, which preceded cereal domestication by about a thousand years (Kislev 1997; Kislev et al. 2006a, b).

It is suggested that the first step of domestication was unintentional (later intentional) planting of branches of a selected female fig in the mother-tree habitat. Indeed, vegetative propagation by Neolithic people was the first step of domestication, because it preserved exactly the qualities of the mother plant. Apparently, the Neolithic gardener discovered that a fig branch driven into the ground would root

and start to grow. The second step was an expansion of the female fig orchard to additional fields and eradication of unwanted female figs and other trees to make room for the preferred females. The third step was the residents noting parthenocarpic mutations in their fig trees. These novel fig plants produced fruits without wasp fertilization and had a much longer fruiting season than their non-parthenocarpic varieties. They were then chosen for vegetative propagation. Since these female trees were independent of the presence of male figs, they were ready for expansion to new regions where figs did not grow naturally.

The fig crop would be extremely valuable to Neolithic farmers, who, upon occasion, had no winter reserves of wild cereals and pulses. This could occur if the seeds were eaten throughout the summer and all the rest had to be sowed at the beginning of winter for the next year's crop. However, by planting a fig branch in the ground for receiving a fruit tree in the near future, even after a few years, they took nothing away from their dietary reserves.

The fruit ripening is not uniform and a small number of figs ripen every day. The inhabitants could have enjoyed fresh or dry sweet figs throughout the year, and they seem to have even grown them near their homes. The fig was relatively more important during Neolithic and Chalcolithic periods, because grapevine and olive were mainly cultivated for fruits and not for their liquid products – wine and oil. This lack of production may have resulted from the lack of suitable vessels for large-scale production (Garfinkel 1999).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Date Palm: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Grapes: Origins and Development
- ▶ Olives: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Figueiredo, Silvério

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Basic Biographical Information

Silvério Manuel Domingues Figueiredo (Fig. 1) is a Portuguese archaeologist. He grew up in Lisbon and graduated in history from Universidade Lusíada in Lisbon in 1994. In 1995, Figueiredo studied paleontology made, as an external student, with the Faculdade de Ciências, Universidade de Lisboa. He was awarded a Ph.D. in prehistory archaeology from Universidad de Salamanca in 2010, on the basis of his research into Pleistocene birds in their paleontological and archaeological contexts.

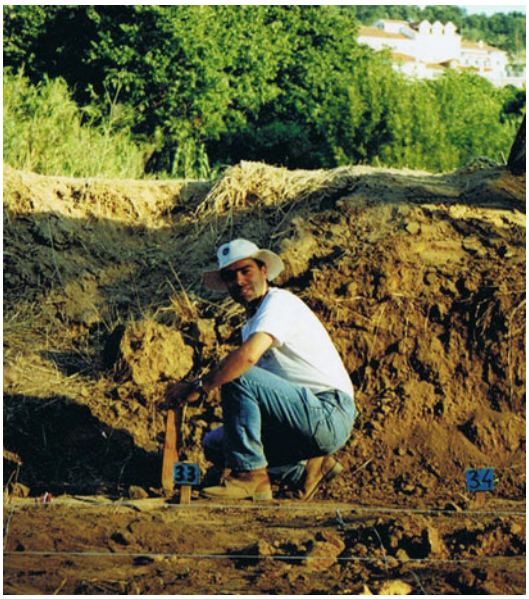

Figueiredo, Silvério, Fig. 1 Silvério Manuel Domingues Figueiredo (Photography by Edmundo Rijo)

In 1993 Figueiredo established, with some colleagues, the Centro Português de Geo-História e Pré-História, a research association in paleontology and prehistoric archaeology. Since 1991 he has participated in and directed several archaeological excavations. In 2000 he began teaching at the Instituto Politécnico de Tomar in the areas of archaeology, paleontology, and history. In 2009 he established the Laboratório de Arqueozoologia e Paleontologia at the Instituto Politécnico de Tomar and Centro Português de Geo-História e Pré-História.

Major Accomplishments

Silvério Figueiredo has been dedicated to archaeology since 1991. He participated in the excavations of several important Middle Paleolithic sites in Portugal, such as Foz do Enxarrique, Conceição and Casal do Monte. Since 1996 he has organized, within the framework of Centro Português de Geo-História e Pré-História, various congresses, seminars, and lectures on paleontology and archaeology. He has conducted lectures and participated in national and international congresses on paleontology and archaeology. Between 1996 and 2000 Figueiredo worked in the Geological Museum of Lisbon, making an inventory of paleontological and archaeological collections, and between 2000 and 2002 he worked at the National Museum of Archaeology, participating in the inventory of collections of prehistoric archaeology.

Figueiredo has directed research projects in archaeology and paleontology in the region of Espichel, south of Lisbon, since 1998. Between 2000 and 2005, he coordinated research for the development of the "Archaeological Chart of Montijo." He is connected to Instituto Politécnico de Tomar (Tomar), Centro Português de Geo-História e Pré-História (Lisboa and Golegã), Laboratório de Arqueozoologia e Paleontologia (Tomar), Instituto Terra e Memória (Mação), and Centro de Geociências da Universidade de Coimbra (Coimbra).

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► Zooarchaeology

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Film, Archaeology in

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Introduction

Cinematic depictions of archaeology and archaeologists in film are diverse. Genre classifications are crude expressions of thematic difference in movies, with multiple genres often being hybridized in a single film, but they are one way to characterize the variety of films containing archaeology. The most common genres in recent years have been action/adventure, horror, and science fiction. But it was in westerns that archaeologists were first commonly screened. During the 1930s archaeologists featured in westerns such *Hidden Valley* (1932), *Riders of the Whistling Skull* (1937), *Death Rides the Range* (1939), and *The Fighting Renegade* (1939). Such early films often portrayed archaeologists as pith-helmeted intellectuals who were elderly and neither streetwise nor athletic. To drive the narrative action forward, these archaeologists were paired with the lead action figure: archetypically male, young, and sporty. Plots usually had the archaeologist hiring a cowboy to guide them or rescue kidnapped members of the scientific team. As narrative sidekick the archaeologists were often wounded or killed, but sometimes the aged archaeologist also fought the bad guys, and sometimes archaeologists were the bad guys. Virtually the same plots were found in popular science fiction serials of the 1930s, such as *The Lost City* (1935), *The Phantom Empire* (1935), *Ace Drummond* (1936), and *Undersea Kingdom* (1936), and this is not surprisingly because those early science fiction narratives were effectively westerns set in exotic contexts with high technology. As cinematic science fiction developed, archaeologists and archaeological themes continue to be occasionally represented (e.g., *Forbidden Planet* (1956); *Planet of the Apes* (1968); *Alien* (1979)).

Key Issues/Current Debates/Future Directions/Examples

Depictions of archaeologists in modern cinema grew out of the action of early westerns, and the influence is still potent and obvious. The costume of Indiana Jones, his hat, jacket, and gun, all hark back to these Western images, and his code of behavior is largely that of Tucson Smith (note the name) in *Riders of the Whistling Skull* or Bob Harding in *Hidden Valley*. A key change in representations since early cinema is that the characters of action hero and knowledgeable archaeologist have morphed into the modern filmic persona of adventurous archaeologist exemplified by Indiana Jones.

Archaeological work and the nature of the ancient human past were variously sketched in the early decades of cinema. Depictions of life in the Stone Age began in silent films, with *The Cave Man* (1912), Chaplin's *His Prehistoric Past* (1914), *The Stone Age* (1917), and Keaton's *The Three Ages* (1923). These movies employed comic situations to provide commentary on human nature and modern life. "Caveman" films have persisted ever since, often with the same comic role, as in *Caveman* (1981) or *Year One* (2009). Dramas of Paleolithic people have also been attempted: set in the past such as *One Million Years B.C.* (1966), *La Guerre du feu* (*Quest for Fire*, 1981), and *10,000 BC* (2008) or in the present such as *Iceman* (1984).

Historical dramas dealing with classical civilizations have also been persistent over the past century, as in Griffith's *Intolerance: Love's Struggle Throughout the Ages* (1916), *Ben-Hur*

(1959), *Spartacus* (1960), *Cleopatra* (1963), *Gladiator* (2000), or *Troy* (2004). Such films typically explored the epic narratives of history and in many ways were not attempting to be historically accurate.

In films depicting the past, however, it is the image of archaeology as the pursuit of lost civilizations and their treasures which was often repeated. Hollywood focused on this theme from the 1930s onwards, commencing with films such as *The Live Wire* (1935) and *King Solomon's Mines* (1937, remade 1950, 1985), a trend encouraged by parallel themes in *Lost Horizon* (1937, remade 1973). The tradition of combining adventure with archaeologists searching for lost civilizations and treasures has continued in a stream of B-movies until today, such as *The White Orchid* (1954), *The Mole People* (1956), *The Lone Ranger and the Lost City of Gold* (1958), *Invaders of the Lost Gold* (1982), *The Lost Treasure of the Grand Canyon* (2008), and *Lost Treasure of the Maya* (2008). Additionally archaeology is now commonly used as a backstory for action/science fiction movies dealing with ancient civilizations, as exemplified by *Doom* (2005) or *Timeline* (2003).

A number of films also explored human relationships in the physically extreme and dangerous situations archaeological adventurers are thought to inhabit. Films such as *Bitter Victory* (1957), *Legend of the Lost* (1957), *March or Die* (1977), or *The English Patient* (1996) are classic examples, but movies have also explored the dangers and difficulties of relationships with family or friends as in *The Purple Rose of Cairo* (1985), *Old Explorers* (1990), and *Around the Bend* (2004) or even of sexual encounters in the soft-core erotica of *Laura's Toys* (1975).

Images of archaeologists have typically been white and male, but even in Hollywood, these stereotypes have sometimes been broken. In the 1930s and 1940s, a series of movies depicted Asian archaeologists acting as detectives, or detectives acting as archaeologists, such as *Charlie Chan in Egypt* (1935), *Mr. Moto Takes a Vacation* (1939), or *Phantom of Chinatown* (1940). Female leads have been rare, but notable examples include *Lara Croft: Tomb Raider* (2001) and its sequel *Lara Croft Tomb Raider: The Cradle of Life* (2003), as well as the telemovie *The Last Templar* (2009). More frequently female archaeologists are presented as only minor characters, often with the implication that it is a quirky social role for a woman, as in *Tea with Mussolini* (1999). Even more rarely has Hollywood selected African American actors in films with archaeological themes, but it has occurred in movies such as *Blood Tide* (1982). When indigenous people have been included in films, they are often represented as being betrayed and exploited by archaeologists. In films such as *Raiders of the Lost Ark* (1981) or *A Thief of Time* (2004), archaeologists are presented as obsessively searching for treasure or knowledge with little concern for the consequences for native peoples.

Fundamental elements of filmic representations of archaeologists, archaeological practice, and the ancient human past were shaped in the early 1930s, particularly through the powerful work of Boris Karloff in *The Mummy* (1932) and *The Ghoul* (1933). Building on Egyptian/mummy themes in earlier silent films (Lant 1992), these movies presented narratives in which popular concepts of reanimation and resurrection were evoked, and their dramatic impact and popular appeal linked plots about archaeology with supernatural processes. This articulation has been repeated and reworked until it became the central theme in archaeological films. Movies reworking *The Mummy*, in which archaeologists accidently reanimate mummies and/or battle the monstrous beings, have persistently been released: from Universal Studios (e.g., *The Mummy's Curse* (1944); *The Mummy's Ghost* (1944); *The Mummy* (1999); *The Mummy Returns* (2001)), from Hammer Productions (e.g., *The Mummy* (1959), *The Mummy's Shroud* (1967)), and by numerous small studios and independent filmmakers. These plots were parodied in films such as *Abbott and Costello Meet the Mummy* (1955) and *Where's My Mummy?* (2005). Non-Anglophone cinemas have played with the notion, as in *La momia azteca* (*The Aztec Mummy*, 1957) and its sequels from Mexico, *Belphégor – Le fantôme du Louvre* (2001)

from France or *La malédiction de Belphégor* (1967) from Italy. Variations on the theme were also presented in some films, such as spiritual possession in *The Awakening* (1980) and *The Exorcist* (1973).

Ever since *The Mummy*, the connection of archaeology and the supernatural has been the strongest narrative theme in films dealing with the discipline. This connection was transferred to movies without any reanimation element but with supernatural, or transnatural, events and evil forces threatening us and opposed/fought by archaeologists. This was the basis for horror films such as *The Exorcist* (1973) and its prequels, *The Lair of the White Worm* (1988), and others. Supernatural themes are also seen in plots in which extraterrestrial events threaten humanity or in which the objects left by aliens or gods are about to be used to destroy humanity. Examples of these films include *Lara Croft: Tomb Raider* (2001) and *Lara Croft Tomb Raider: The Cradle of Life* (2003), *Stargate* (1994), *Stonehenge Apocalypse* (2010), *A Genesis Found* (2010), and of course the iconic archaeology movie *Raiders of the Lost Ark* (1981) and its sequels. In those narratives archaeological sites and archaeological knowledge are central to saving the situation.

Emphasis on supernatural and extraterrestrial events in archaeological movies reflects the reality that cinema explores the interests of the public rather than the nature of archaeological practices or discoveries (Hall 2004; Noble 2007; Hiscock 2012). Often the narratives presented in films are founded on popular religious and nonscientific beliefs, and cinema has commonly presented archaeologists either as meddling academic elites who release danger into the world through their ignorant actions or as advocates for pseudo-archaeological views (Hall 2004; Hiscock 2009, 2012). Representations of archaeology in cinema can be viewed as a public dialogue about the nature of the past, the nature of contemporary culture, and the value of science. Movies have not so much romanticized or fetishized archaeology as they have employed nonspecialist fictions of what it is to be an archaeologist to pursue mythic imperatives.

Cross-References

- ▶ Internet, Archaeology of the
- ▶ Media and Archaeology
- ▶ Television and Archaeology: Views from the UK and Beyond

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Finch, Jonathan

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Basic Biographical Information

Jonathan Finch, an expert in designed and agrarian historic landscapes of the postmedieval period, began his academic career at the University of East Anglia, completing his M.A. in Local and Regional History (1989) and his Ph. D. (1997) at the latter institution. He was briefly a part-time lecturer at UAE (1997–1998) before taking up a 1-year post in the Department of History and Archaeology at the University of Wales, Bangor (1998–1999). He was then appointed lecturer in the Department of Archaeology at the University of York in 1999;

he is currently a senior lecturer in the same department. He was elected a fellow of the Society of Antiquaries of London in 2006.

Major Accomplishments

Though Finch's recent focus has been on postmedieval landscapes, his initial research interests were more oriented towards commemoration in both the medieval and postmedieval periods. Changes in the iconography of commemoration before 1400, the impact of the Reformation on commemoration, and the role of commemoration in constructions of social identity have all been strong themes in this work (Finch 2000, 2003, 2007a). This continues to be a research interest for Finch, who is currently working on a thematic summary of death, memory, and identity in Britain between CE 1000 and 1850.

Finch's research turned more directly towards postmedieval estate landscapes in the first decade of the twenty-first century. His work has a range of subjects related to the character, context, and development of landed estates (e.g., Finch 2004; Finch & Giles 2007). Yorkshire has been a particular geographical focus (Finch 2007b, 2008), and Finch has worked closely with the Yorkshire Country House Partnership – a joint venture between the University of York and seven country seats in the county – to develop new archaeological approaches to the archaeology of eighteenth- and nineteenth-century estate landscapes. Some of this work was presented in the "Work and Play" exhibit hosted by Burton Constable, Brodsworth, Harewood, and Temple Newsam houses.

Most recently Finch has built on the international connections of these estates to engage in international comparative research focused on the Lascelles family holdings in Yorkshire and Barbados. Harewood House (near Leeds), where Finch is directing an ongoing program of excavation, is the seat of the Earls of Harewood, a title originally created for George Lascelles in 1812. The Lascelles family wealth had been made in the Caribbean – primarily Barbados – via sugar plantations, the slave trade, and the collection of local customs duties; as a result, in addition to Harewood House, they maintained extensive landed estates in the Caribbean, where Finch has also been directing fieldwork. His current research therefore uses the international Lascelles holdings to explore the global connections of rural landscapes by examining the relationships between both colonial and domestic environments, while also studying the impact of West Indies land holdings on the English rural landscape.

Cross-References

- ▶ British Isles: Medieval Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Post-Medieval Archaeology (Europe)

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Finger Millet: Origins and Development

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Basic Species Information

Finger millet is the common English name of the crop *Eleusine coracana* (L.) Gaertn., a domesticated cereal of African origin which spreads in prehistory to Asia, also sometimes referred to as korakan or ragi (a widespread local name in India) or dagusa (in Ethiopia). Its English common name comes from the growth form of its seed heads (panicles) which take the form of several fingers (Fig. 1). This cereal is widely cultivated in eastern and central Africa, India, and Sri Lanka and extends eastwards through the Himalayas to southern China, the hills of Southeast Asia and into the hills of Taiwan, and parts of Indonesia and Guam. In Asia it is frequently a cereal in shifting cultivation systems, although it is also produced in permanent field systems on the plains of India. It is also cultivated to a limited extent in modern Yemen and Oman. Although the wild progenitor species (*Eleusine africana* Kennedy-O'Byrne) is well established, where and how many times within the African native range of this species it was cultivated initially remains unclear (Hilu & De Wet 1976). Ecologically it is regarded as coming from an upland environment, and as a crop it is most commonly grown in hill zones, above 900 m. Nevertheless, it can be grown in the lowlands, to a limited extent in Africa and to a larger extent in India. In Asia upland races, which are especially widespread in the Himalayas from India to Nepal and southern China, appear to be a secondary adaptation. One limited genetic study suggested that the hills of western Tanzania might be the region of origin (Hilu 1995), while many botanists have pointed to the Ethiopia highlands as a point of origin (e.g., De Wet 2000). There remains no clear evidence from botany or archaeology on where within the range of the wild progenitor it was first brought into cultivation or whether this occurred more than once (Fig. 2).

Finger Millet: Origins and Development, Fig. 1 Photograph of finger millet panicle, in cultivation in the Western Ghats, Maharashtra, and India

Major Domestication Traits

Finger millet is somewhat less hardy than other millets, preferring richer and wetter soils, but it has exceptional storage advantages. Finger millet grains are rarely attacked by pests or spoil in storage, and shelf life of up to a decade is commonly reported. Although it may survive with 500 mm of rainfall, it is generally grown on 800–1,000 mm. It is often the first crop in rotations of shifting cultivation or the second crop after rice, as it does not do as well on impoverished soils as other millets. While it can be made into porridges and flat breads, finger millet beers are traditional both in parts of Africa and Asia.

Studies of the crop processing of finger millet have been carried out in both Africa and India and indicate that it is a free-threshing grain, with most grains freely separated from chaff after one stage of threshing and winnowing. This may bias against preservation of this species by comparison to cereals, such as rice and most small millets, that require intensive dehusking (Reddy 1997; Young 1999).

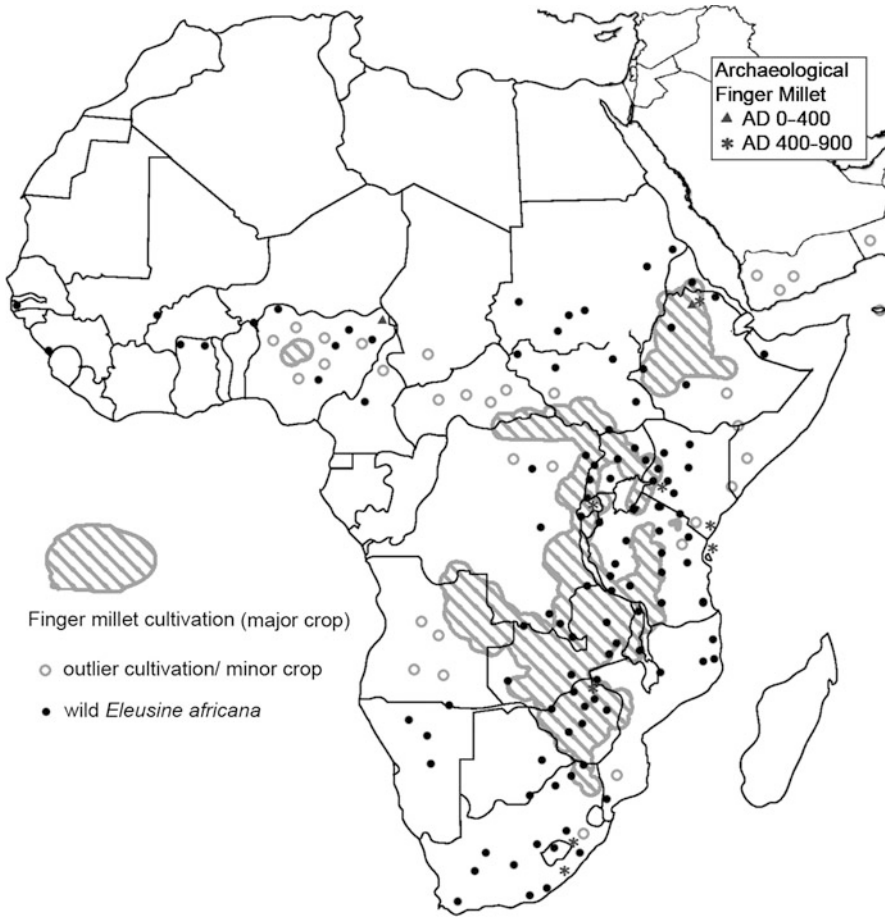

Finger Millet: Origins and Development, Fig. 2 Map of wild progenitor (after Hilu & De Wet 1976) and approximate limits of cultivation in Africa (after Murdock 1960) together with distribution of archaeological reports in Africa (based on the database of Giblin & Fuller 2011)

Recognition of grains of finger millet should be straightforward if preservation is good (Fig. 3). It has a distinctive globose but angular shape, a short embryo, and a hilum placed at the edge of the embryo on a separate edge rather than on the ventral grain surface. The surface of the grain is distinctly sculptured with small warts. Nevertheless, there have been recurrent misattributions of other small millets to "finger millet" in older archaeological studies in India due to confusion of the husk of *Setaria*/*Brachiaria* with grain surface of *Eleusine* and an anachronistic assumption that finger millet is the most widespread small-grained millet in India (see Fuller 2003). Therefore, within South Asian archaeobotany, the antiquity and distribution of this cereal remains controversial.

Timing and Tracking Domestication

Archaeobotanical evidence does not yet shed much light on where or when finger millet was brought into cultivation (Giblin & Fuller 2011). The earliest finds in Africa are only just over 2,000 BP from Nigeria and northern Ethiopia. Most evidence in Ethiopia is post-Axumite, while further south in Eastern Africa, it is widespread from Middle Iron Age times after c.

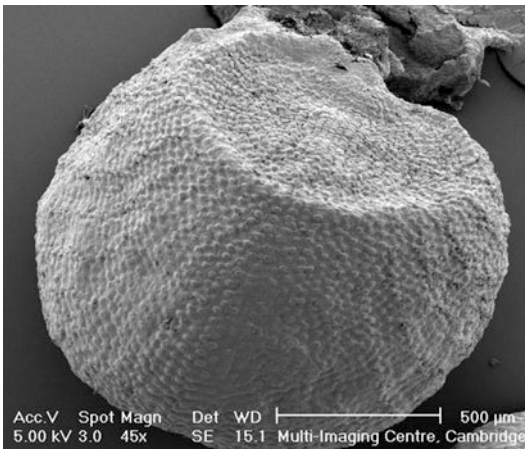

Finger Millet: Origins and Development, Fig. 3 Scanning electron micrograph of finger millet grain, dorsal view

CE 600 (Giblin & Fuller 2011). As a result of concerns over identification, the date at which finger millet arrived in India from Africa remains contentious, but it is certainly present by the end of the second millennium BCE (Fuller 2011). Some claims would put it in India as early as c. 2,500 BCE (Weber 1991). On most Indian sites where it has so far been found, both prehistoric and early historic levels occur, raising the possibility of later intrusive grains. It also appears to be a fairly minor component by comparisons to other millets on most sites, suggesting that its rise to importance only took place in the past 1,500 years or so. There is no archaeological evidence yet that sheds light on its spread through the Himalayas or eastwards to south China and Southeast Asia.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Brown Top Millet: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Millets: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Fiorelli, Giuseppe

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Basic Biographical Information

The Italian archaeologist Giuseppe Fiorelli was born in Naples on 8th June, 1823. Educated in Naples, Fiorelli achieved a degree in legal studies

by the time he was 18, but chose a career in archaeology instead because of his passion for ancient cultures (Dwyer 2010: 25). In addition to this, Fiorelli had a background in the study of epigraphy, numismatics and pre-Romantic Italic languages (Dwyer 2010: 25). He was also an excellent antiquarian and had solid scientific knowledge (Cooley & Cooley 2004: 192).

By the age of 20 Fiorelli had published an article on numismatics in an archaeological journal. In 1847, at the age of 24, he secured the position of Inspector of the Pompeii excavations (Dwyer 2010: 25). His post was terminated in 1848 due to his activities during the political uprising in Italy (Cooley & Cooley 2004: 192). In 1849 Giuseppe Fiorelli was detained as a political prisoner under Bourbon rule. It was during this sentence that Fiorelli assembled manuscript notes from previous excavators of the site, and transformed them into a three-volume work entitled *History of Pompeian Antiquities* (Cooley & Cooley 2004: 192). Fiorelli's professional life suffered as a result of regulations set in place by organisations and political parties during the 1840s and 1850s. During this time, publications that concerned sites in the Kingdome of Naples needed the official approval of the Royal Herculaneum Academy. In 1850 when Fiorelli published the first volume of an intended series of eight books, his work was confiscated and burned by the authorities (Cooley & Cooley 2004: 192).

While these events limited Fiorelli's professional life to a degree, he found employment through Count Leopold of Syracuse, who hired him to work as a private secretary between 1853 and 1860. During this period Fiorelli excavated and published works relating to Cumae (Cooley & Cooley 2004: 192). In 1863, following the fall of the Bourbon dynasty, Fiorelli became superintendent of excavations at Pompeii, where he developed a unique approach to conserving the material remains of this ancient city (Amery & Curren 2002: 43). Fiorelli was appointed as director of the National Archaeological Museum in Naples, a position that had been previously filled by the French author Alexandre Dumas. In 1875, after extensive and groundbreaking work at Pompeii, Fiorelli successfully published his findings known as '*Descrizione di Pompei*', or 'Description of Pompeii'. In the same year he was appointed as General Director of Antiquities and Fine Arts in Rome (Amery & Curren 2002: 43). After a successful and groundbreaking career as an archaeologist, Giuseppe Fiorelli died at the age of seventy-six in Naples on 28th January, 1896.

Major Accomplishments

Giuseppe Fiorelli's wealth of knowledge influenced his approach to archaeology and gave rise to new methods in archaeological practice, particularly in regards to excavation. One of his major achievements concerned development of innovative techniques for the excavation of ancient structures at Pompeii. The archaeological approach to excavating houses at that time was destructive and recorded little information. The earth and debris would be shoveled out of the structure at ground level, and any material remains of interest were set aside with no documentation or context (Amery & Curren 2002: 44). Due to a lack of reinforcement, these buildings would often collapse, causing further damage and inducing a vast loss of information (Amery & Curren 2002: 44). In response to this, Guiseppe Fiorelli developed a new system of excavation in which every structure was uncovered by removing the individual strata from the highest point of the site to the original ground level. Fiorelli's innovation allowed buildings that were being uncovered at Pompeii to maintain their structural integrity, thus salvaging and yielding more information for archaeologists (Amery & Curren 2002: 44).

Guiseppe Fiorelli´s second major accomplishment in archaeology involved the development of a method for preserving cavities in the layers of ash and soil of Pompeii. Fiorelli recognized that these air pockets were impressions of humans, animals and other organic material that had been encased in ash and eventually decomposed over time, leaving distinct impressions (Amery & Curren 2002: 45). When such

cavities were located Fiorelli organized for plaster to be poured into them. Once it hardened and the debris was cleared away casts of human bodies and animals were exposed. This technique, known as Fiorelli's process, revealed the true nature of the terror that engulfed the inhabitants of Pompeii when Mount Vesuvius erupted. To this day, it is one of the most poignant features of the excavations (Amery & Curren 2002: 45; Luongoa et al. 2003).

Giuseppe Fiorelli also brought order to the way in which excavations were managed, in terms of the topography of Pompeii. He divided the city into *regions* and *insulae*, or regions and blocks, so that every region and block was numbered and could be easily identified (Amery & Curren 2002: 45). This enabled the specific descriptions of building locations and their proximity to other structures to be accurately recorded, which further aided any map making and drawing plans. Archaeologists who continued Fiorelli's work maintained the use of this grid-like system which it is still in use today in archaeological work (Amery & Curren 2002: 44).

Cross-References

► Excavation Methods in Archaeology
► Pompeii

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First Australians: Origins

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Introduction

Many Aboriginal people view that their ancestry is closely linked with the creation of the Australian landscape during the period they refer to as "the Dreaming." From a scientific perspective, this is in some ways complementary to the picture from archaeology. The Australian landscape, with its diverse and changing environments during the dramatic fluctuations over the last 50,000 years, has been assumed to play a significant role in influencing and forming the diverse morphology of the modern Aboriginal people. Understanding the biological basis that underpins these diverse and changing morphologies is one of the key challenges confronting Australian palaeoanthropology.

In general terms, the picture from the archaeological record identifies that Aboriginal origins are external to Australasia and what would appear to be emerging from the global picture is that within the last 100,000 years of human evolution, several species of hominins once coexisted across the globe at the time of the great *Homo sapiens* expansion. The known species include: *Homo floresiensis*, *Homo neanderthalensis* (which may or may not include the Denisovans), and possibly also *Homo erectus*. What remains unclear is how these species interacted, although the evidence from ancient DNA (aDNA) now indicates that some degree of assimilation of Neanderthals and/or the Denisovans did occur, albeit on a small scale. The First Australians play a key role in the understanding of modern human origins globally and within their aDNA would appear to be preserved the signature of both Neanderthals (Yotova et al. 2011) and Denisovans.

Historical Background

Huxley (1863) published the first study comparing Aboriginal skeletal biology to the fossil record in an attempt to explain modern human origins. At the time, he compared an Aboriginal calotte to that of the recently found Neanderthal fossils where he observed a number of similar characteristics. The general opinion at the time suggested that as Aboriginal people still lived in a hunter-gatherer state, then it was likely that they more closely represented the original state of humankind. They were in the words of numerous scientists of the late nineteenth century "living fossils." This was a position also largely supported by the social anthropology of the time, as reflected in the works of such scholars as Tylor (1873).

Of course, there were exceptions to this position, and indeed, some physical anthropologists considered the Aboriginal peoples position in the human evolutionary story in a different light. Klaatsch, the German physical anthropologist known for his pre-World War I work on the Neanderthals, and inspired by Huxley's (1863) comparisons with the Neanderthal calotte, argued for ancient human origins in Southeast Asia. He suggested that the first modern humans evolved in Southeast Asia and were: (a) the ancestors of the Aurignacians (an archaeological culture of the Upper Paleolithic); (b) the population responsible for the extinction of the Neanderthals; and (c) the colonists of Australia. Klaatsch made a detailed study of a range of Australian crania indicating that the first modern humans were still represented in Aboriginal populations. The Great War saw a dramatic decline in interest in German science and British models came to dominate debates. Sir Arthur Keith was the preeminent physical anthropologist of the time and greatly influenced the course of American physical anthropology through his training of Earnest Hooton, a preeminent United States physical anthropologist in the first half of the twentieth century, Earnest Hooton (Brace 2005). It was a student of Hootons, Joseph Birdsell, who was to establish a theory of human evolution known as the "Trihybrid" model of Aboriginal origins that was to dominate debate and influence scientific and popular opinion for almost 40 years. Birdsell (1967, 1977) argued that three successive waves of migrants arrived in Australia, the first represented by the Barrineans (a 'Negrito' – based population), the next the Murrayineans (Aboriginal people that inhabited the Murray River corridor), and the latest the Carpenterians (people of tall stature from Lake Carpentaria). Opposing Birdsell's view was that of Abbie, who argued that the variation that was present represents homogeneity in a population adapted over a long period of time to differing environments (Abbie 1951, 1963, 1966) (Fig. 1).

The other main interpretation was initiated by Sir Arthur Keith (1936), building on the idea and discoveries of Eugene Dubois. Dubois (1922) suggested that there was an evolutionary sequence of regional continuity represented in Sunda and Sahul by the Trinil, Sangiran, and Ngandong *Homo erectus* sequence through to the Wajak *Homo sapiens* to Aboriginal Australians. This idea was further developed by Weidenreich (1943) who is often credited with the theory of regional continuity. He added to the model the Keilor fossil to extend the regional evolutionary sequence into Pleistocene Sahul. The concept of a close evolutionary connection with Java was further developed by the work of Macintosh (1965) who referred to the "mark of Ancient Java" being present in Australian populations. However, it was Macintosh's student Alan Thorne who was to become the most prominent supporter of this theory through the development of his own brand of multiregional continuity known as the Di-Hybrid view of Aboriginal origins. Others such as Howells (1973) considered that two differing morphologies representing two different populations were most likely represented in the Australian fossil record. This idea was developed in far greater depth, in both time and space by Thorne who through his survey and excavations at the Willandra Lakes and Kow Swamp developed an extensive fossil series that brought Australian palaeoanthropology into the global scene. It also played an important role in inspiring a generation of new Australian biological anthropologists

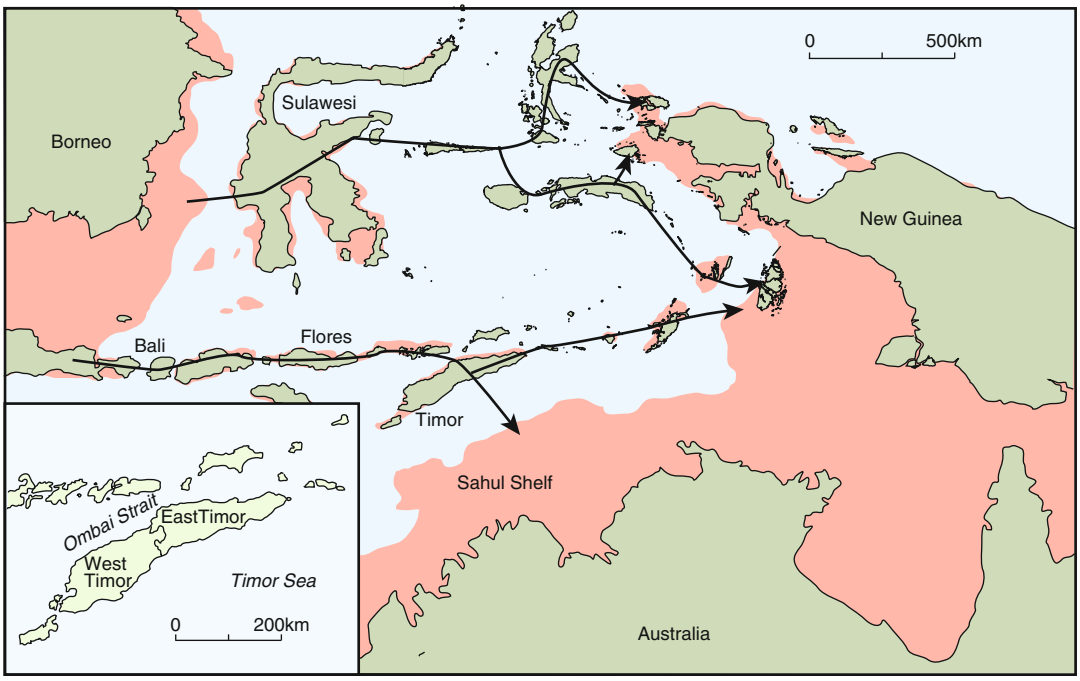

First Australians: Origins, Fig. 1 Birdsell's map illustrating the northern and southern migrational routes through Sunda into Sahul

working out of schools of archaeology as opposed to schools of anatomy.

Key Issues/Current Debates

Interpreting the Fossil Trail to Sahul

While local evolution from more ancient predecessors has been claimed for Sunda and Sahul in the past, it is only in Africa that we see transitional premodern and modern human fossil forms. The consensus is that it is only in Africa that we can trace the origins of the First Australians. The first appearance of *Homo sapiens* in the fossil record occurs in Eastern Africa in Ethiopia around 190 ka with the Omo and Herto fossils. The first appearance of *Homo sapiens* outside of Africa is in the Levant with the Jebel Skhūl and Jebel Qafzeh fossil series generally thought to date between 110 and 90 ka. The general assessment is that this population seems to have been replaced sometime after 90 ka by Neanderthals who returned to South West Asia (Tchernov 1998). Curiously, there seems to have been little consideration of the possibility that this initial range extension of *Homo sapiens* (some 100 ka) may have extended further east than the Levant. This possibility has received little attention perhaps because of the uncertainly regarding the dates of the Liujiang fossil and isolated teeth from Punung in Java (120 ka), together with the fact that there is no other fossil evidence of *Homo sapiens* in Asia before 50 ka. The available record for *Homo sapiens* prior to the Marine Isotope Stage (MIS) 2 between Africa and Australia is currently very sparse and provides little evidence of the evolution of modern humans in the Asian region.

As a result of the scarcity of the modern human fossil record, much of the interpretation of the human fossil record from Sahul in the past has depended upon the record of more archaic hominins from neighboring Sunda, the land mass incorporating the islands of Southeast Asia. As noted in the preceding section, the record from Java played a primary role in influencing our understanding of Aboriginal origins for much of the twentieth century. For many years, a number

of variations of multiregional continuity proposed that Aboriginal origins were closely associated with the evolution of *Homo erectus*, as known from the extensive record from Java at sites such as Trinil, Sangiran, and Ngandong. Despite earlier claims of a late Pleistocene age for *Homo erectus* (Swisher et al 1996), there would currently appear to be no evidence to suggest that *Homo erectus* survived beyond the middle Pleistocene (Westaway & Groves 2009; Indriati et al. 2011). We do not presently know from the available evidence if *H. erectus* and *H. sapiens* overlapped in time.

However, there is evidence from the Lesser Sunda Islands that suggests that at least two hominin species perhaps coexisted within Sunda. Several specimens of *Homo floresiensis* recovered from Liang Bua, Flores, have revealed that a small bodied hominin continued in this island refuge perhaps as late as 18 ka (Morwood et al. 2004). The most parsimonious explanation for this hominin is that it is a species predating *Homo erectus*. Descriptions of the available post crania (e.g., Jungers et al. 2009) also support the view that *Homo floresiensis* derived from a pre-ergaster/erectus hominin.

In terms of other archaic hominins from the Asian region on the fossil trail to Australia, there is very little. The Namarda fossil is the only representative of a post ergaster/erectus hominin from the Asian region on the trail to Australia and has been interpreted as an Indian representative of *Homo heidelbergensis* (Groves 1989). More recently, the discovery of a new hominin from aDNA recovered from a phalange has revolutionized our idea of hominin interaction during the last 100,000 years. Nothing is known of the morphology of this new hominin identified from the Denisovan Cave in Siberia, and neither do we know anything much regarding its geographical distribution.

Our understanding of the distribution of *Homo sapiens* is limited as there are very few modern human fossils dating to the crucial period of Marine Isotope Stage 3 when Southeast Asia is alleged to have been colonized by *Homo sapiens*. Fossils include the Niah skull dated to 40 ka. The record for *Homo sapiens* in Sunda dating to the Pleistocene is minimal to say the least. The Wajak fossils have been dated as terminal Pleistocene (although this age determination is by no means definitive) and as noted above their morphology is often compared to the Keilor fossil discovered on the outskirts of Melbourne, Victoria. Another intriguing specimen suggested to be representative of *H. sapiens* is known from Punung, dated to 120 ka and it is known only from teeth.

The First Seafarers

Of all the continents colonized by modern humans, Australia is the only one that was not connected at some stage during the Pleistocene by a land bridge. Its colonization has always required the use of water craft capable of a number of significant sea crossings. Birdsell (1977) was the first to summarize these sea routes. The shortest leg of the journey taking the northern route would have involved a sea journey of around 70 km. Much planning and preparation was required for the colonization and it is likely that a familiarity with the sea and an understanding of the type of signs to look for (such as smoke well over the horizon and the movement of migratory birds) were part of the intellectual tool kit required to undertake long-distance sea journeys. This process has been identified as the earliest example of modern human cognition (Noble & Davidson 1996; Davidson 2010). Watercrafts were most likely rafts constructed from bamboo. The absence of bamboo on mainland Australia perhaps made return journeys quite difficult although there is evidence in the archaeological record, such as the early appearance of edge ground axes and the presence of CusCus in East Timor, which indicates that return journeys may have been made. The survival of the archaic hominin *Homo floresiensis* along the southern route on Flores perhaps indicates that the northern route through the Birds Head of Papua was taken in the initial colonization of Sahul (Balme et al 2009) (Fig. 2).

The Australian Fossil Human Record

The extent of the Pleistocene *Homo sapiens* fossil record from Sahul is quite considerable when

First Australians: Origins, Fig. 2 A Lardil man paddling a "walba." The vessel was built in 2 days from rope stripped from hibiscus, white mangrove logs, and the paddle constructed from a splayed mangrove root. Lardil men would traditionally tie rope around their waist so that they could make repairs to the craft at sea. Rafts provided a far more stable platform in choppy seas than canoes. It is likely that similar (but larger) rafts made from bamboo lashed together with rope made by plant fibers represented the first vessels to bring people to Australia

compared to the regions to the north within the tropical belt. This is in large part an outcome of taphonomy, the large extinct lake systems that covered much of Southeast Australia provided excellent conditions for the fossilization of carefully interred human burials, of which there must have been many thousands. Australia has a rich record of human fossils dating to the Pleistocene, although the record was built over a century. The initial record was patchy, with the discovery of Talgai in 1886 and the recognition of its importance being identified at the British Academy of Science meeting in 1914. It was followed by the discovery of the Cohuna fossil in 1925 and Keilor in 1940 (both from Victoria). Numerous other key specimens were collected by George Murray Black during the 1930s including probable Pleistocene fossils from Coobool Creek and Lake Benanee along the Murray River. Several other key specimens including those from Lake Nitchie and Mosgiel reported in the 1960s. It was not until the concerted effort of Alan Thorne that Australia started to accumulate a larger fossil sequence from more controlled stratigraphic contexts. Between 1968 and 1988, Thorne and colleagues amassed a fossils series representing over 160 individuals first from Kow Swamp and then the Willandra Lakes (Fig. 3).

First Australians: Origins, Fig. 3 The Cohuna fossil found in 1925. The frontal flattening, initially thought to be a trait shared with *Homo erectus*, is now recognized as a result of deliberate cranial deformation (Photo Colin Groves ANU)

One of the most intriguing elements of the Australian fossil record is its considerable diversity. Arguments have been based around

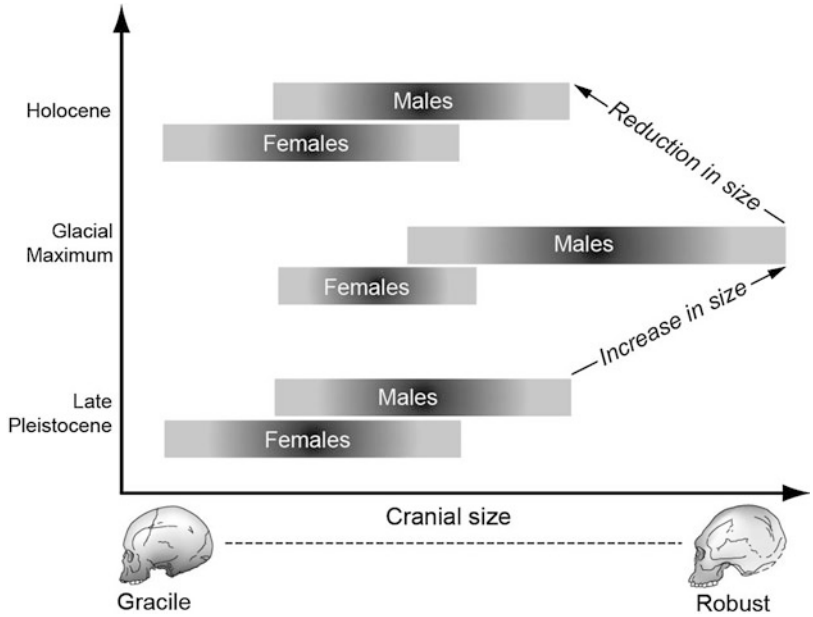

First Australians: Origins, Fig. 4 Theorized representation of the emergence of cranial robusticity associated with the onset of the Last Glacial Maximum

the two "morph" types, defined by many as robust and gracile, that were the foundation of Thorne's Dihybrid model. Others have argued that the differences are a result of sexual dimorphism while others still have indicated that the variation in morphology may in fact be the result of microevolutionary change and genetic isolation during the period of climatic stress at the Last Glacial Maximum. What is of particular interest is the general chronological pattern that emerges from the assessment of the burial age range with cranial robusticity appearing no earlier than 25 ka. This age range correlates with the onset of glacial aridity, and suggests that robusticity may in fact be influenced by the harsh environmental stress associated with the LGM. The proposal that cranial robusticity may be associated with the LGM is supported by recent age ranges from Kow Swamp (Stone & Cupper 2003). Certainly sexual dimorphism plays a role in morphological expression (Pardoe 1991), but the harsh climatic conditions of the LGM may have applied evolutionary pressure on the series also. Gilligan and Bulbeck (2007) have suggested that, based on the large Birdsell's (1993) late Holocene Aboriginal data set, a considerable amount of morphological variation within the Australian Aboriginal population can be explained in terms of adaptations to the physical environment. Correlations (particularly with temperature) are found for measures relating to body shape, head size and shape, limb lengths, and limb proportions. These observations are in accordance with correlations predictable from biological principles of long-term human adjustment to environmental conditions. A larger cranial shape is often correlated with colder climates (Guglielmino-Matess et al. 1979). They note that exposure to cooler conditions during the late Pleistocene, particularly in the southern part of Sahul, might have amplified regional variation in evolutionary or phenotypic change in response to thermal conditions at the time (Fig. 4).

The earliest fossils from Sahul which can be considered representative of the First Australians are those of Mungo Woman (WLH 1) and Man (WLH 3) dating to soon after first human arrival approximately 42 ka ago. These individuals have very lightly built crania with vault thickness not exceeding 7 mm. Mungo Man does have very robust postcrania, the general dimensions supporting the assessment that the remains are those of a male. An intriguing component of WLH3's morphology is his high frontal curvature index and minimal development of the superciliary ridges. This is a pattern quite different to that in

First Australians: Origins, Fig. 5 Lateral view of WLH 3. There is very minimal development of the lateral trigone and superciliary ridge. Interestingly, the frontal curvature index is quite high when compared to later Australian fossils (Photo: Dragi Markovic, NMA)

First Australians: Origins, Fig. 6 Lateral view of WLH 50. This specimen represents the most robust fossil cranium yet known from the fossil record. Thickening in the diploë suggests that there has been some hematopoietic reinforcement in the cortical bone as a result of pathology (Photo: Dragi Markovic, NMA)

later Australian male fossils and it is primarily these characters that have resulted in Brown's (2000) assertion that these represent the remains of a female. This is not supported by the dimensions of WLH 3's postcrania (Durband et al. 2009) (Fig. 5).

There are 23 other fossils that preserve enough of their cranial anatomy to provide an insight into the range of cranial variation in the Willandra Lakes. This represents an important series as it provides us with an insight into population variation at least around the time of the LGM, rather than just simply depending on one or two key specimens for our understanding of cranial variation. Some of these individuals are very robust, including WLH 19 and the most heavily studied specimen WLH 50. Robust characters do not appear to be restricted to males, with WLH 45 (established from female characters in the pelvis) also preserving characters that could be assessed as robust. From the available dates, cranial robusticity correlates with the Last Glacial Maximum and, as suggested by Bulbeck (2001), may reflect evolutionary or at least phenotypic processes in response to significant climatic change (Fig. 6).

The suggestion that cranial robusticity may be associated with the environmental stress of the LGM is further supported by the evidence from Kow Swamp, located south of the Murray River some 400 km Southeast from the Willandra Lakes. This site was redated to between 19 and 21 ka through a more recent assessment of the site (Stone & Cupper 2003). Criticisms have been raised that this series of OSL ages date the surrounding units and not the burials. However, as all burials (with the exception of KS 15) are sealed in the Cohuna silts (Stone & Cupper 2003), this indicates that the above age range is reliable. Another very significant element of the series is that it preserves the earliest evidence of the practice of artificial cranial deformation in the world. Cranial deformation has exaggerated some of the characters, such as the angle of the receding frontal, which has resulted in the more archaic appearance of these fossil human remains (Fig. 7).

Further to the west downstream along the Murray are a series of other significant burial sites that have quite often been described as very early cemeteries. Little detail exists to support the suggestion that cemeteries were in existence in the Late Pleistocene-Early Holocene, and these are likely to represent individual and small group burials scattered over many centuries, rather than evidence of Pleistocene cemeteries per se. Coobool Creek is one of the more significant of these sites (although its precise location is now lost) and like Kow Swamp, it preserves crania, demonstrating artificial cranial deformation.

First Australians: Origins, Fig. 7 Kow Swamp 1. Like the Cohuna fossil, the heavily receding frontal is the result of artificial cranial deformation and not admixture with more archaic hominins from Sunda (Cast, photo Arthur Durband)

First Australians: Origins, Fig. 8 Nacurrie 2. This heavily mineralized calotte preserves a well-defined superciliary ridge and mental trigone (Photo NMA)

Existing absolute dates suggest that these individuals are terminal Pleistocene. The Nacurrie calottes, 1 and 2, are often considered as part of the Coobool Creek series. These heavily mineralized crania also preserve evidence of cranial deformation. The Roonka fossil series (Pretty 1977) provides important insights into prehistoric cemeteries as it represents one of the only such site types to be archaeologically excavated (the other is the late Holocene cemetery site at Broadbeach). The site complex is defined into three stages, Roonka I (20–8 ka), Roonka II (8–4 ka), and Roonka III (4–2 ka). Over 216 burials have been excavated and there are over 250 age determinations. Only one burial EB2 F8 has been excavated that has been established as Pleistocene in age, bracketed between two OSL ages at 20–16 ka (Fig. 8).

Another key fossil that has featured prominently in debates was discovered on the northern outskirts of Melbourne, Victoria, in the Pleistocene terraces of the Maribyrnong River. This is the site of the discovery of the Keilor skull in a quarry in 1940 (Wunderly 1943). Keilor Man is intriguing in that he represents a large individual; however, he does not preserve robust cranial characters. Historically, Keilor was often compared to the Wajak crania from Java, and it is true that they share a very similar general morphology.

Numerous other fossils have been recovered that preserve robust cranial morphology that extend into the early Holocene. These include two specimens from Western New South Wales, Mossgiel, and Lake Nitchie. Lake Nitchie is an extraordinary burial in that it also preserves a necklace representing the teeth of 47 different Tasmanian Devils (*Sarcophilus harrisii*). One further robust Australian fossil that requires further discussion is the individual from Cossack. It represents the only known fossil representative of Western Australia. The male cranium was discovered in 1972 and bears robust characters that have been identified as similar to the robust individuals from the Kow Swamp series. Cranial vault thickness and the low frontal curvature index sits closely to the robust individuals from the Kow Swamp series (Freeman & Lofgren 1979), and yet, this individual's age range is from the mid to (more likely) late Holocene. If the cranium dates to the last few thousand years and the reconstruction is accurate, it suggests that some robust characters continued to be present much later in prehistory and may be representative of adaptation to harsh environmental conditions, rather than a late Pleistocene or early Holocene cranial morphology. There are however numerous issues in the published image of the Cossack reconstruction, including the positioning of the malar which impacts on the

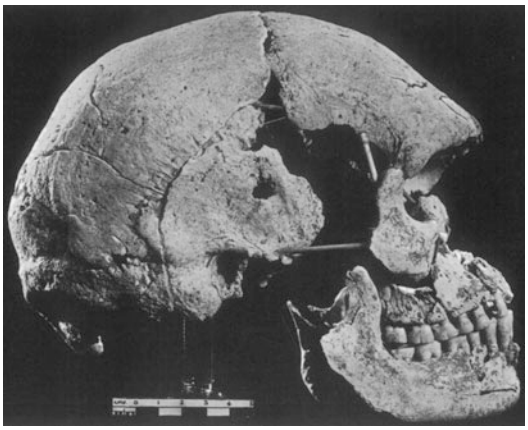

First Australians: Origins, Fig. 9 Cossack Man. It is probable that the prognathism is exaggerated in this reconstruction giving the fossil a more archaic appearance. In all likelihood the face was probably positioned more posteriorly beneath the cranial vault. This is supported by the angle of the occlusal plain in the above reconstruction (from Freedman & Lofgren 1979)

reconstruction of the shape of the orbit, which has resulted in placing the fossil in the incorrect orientation of the Frankfurt Horizontal Plain. In addition, the reconstruction of the position of the maxilla would seem to exaggerate prognathism in the fossil, and this is supported by the angle of the occlusal plain in the teeth, which angles unnaturally upward. The superciliary region is also not as well developed as the more robust specimens such as WLH 50, Kow Swamp 1 and 5, and Nacurrie 2. It lacks any sign of a sulcus behind the superciliary ridges. A reconstruction of Cossack is overdue and if undertaken will in all likelihood reduce exaggerated robust characters such as midfacial prognathism and indeed the orientation that the frontal is often illustrated (Fig. 9).

In the last several years, a number of important fossil discoveries from Papua New Guinea have helped build a picture of Australian morphology in northern most Sahul. A semicomplete burial excavated from Liang Lemdubu dating to 18,000 years provides an important insight into the morphology of people living in this region during the peak of the Last Glacial Maximum. Unlike the Willandra which at this time was under severe environmental stress, Lemdubu woman was living well within the

First Australians: Origins, Fig. 10 Lemdubu woman (Bulbeck 2005)

tropical belt, the Aru Archipelago of West Papua being at the time adjacent to the coast (Hope & Aplin 2005) (Fig. 10).

The Emerging Picture from Studies of Aboriginal DNA

The evidence from DNA studies is providing new insights into our understanding of the origins of the First Australians that were not possible previously from studies of the fossil and osteological record. While in the past there has been a number of studies that have examined variation in Aboriginal blood genetic markers (blood groups, leukocyte, serum protein groups, and red blood cell enzymes), more recent Aboriginal genomic studies have altered our understanding of the early population history of Australia. Two lines of investigation have been undertaken that have revealed the genetic composition of the First Australians. Studies on living populations have distinguished unique Y chromosome and mtDNA haplotypes in Aboriginal Australia which indicate that migrations into Australia through Asia predate 50 ka (Keinan et al. 2007; Gutenkunst et al. 2009; van Holst Pellekaan 2011). However, like all other non-African populations, all Aboriginal Australian mtDNA studies demonstrate that their ancestry can be traced to a single L3 haplotype. One important component of mtDNA studies from Melanesia, as

highlighted by Davidson (2010), is that the genetic evidence indicates two possible migration events, with a separation between the mtDNA of the colonists of north and east Papua New Guinea, with those from southern Sahul. Indeed it would appear that the haplotypes from Melanesia represent earlier haplotypes from those present in southern Sahul (Merriwether et al. 2005). The Australian mt haplogroups S, O, and M42a are not shared with New Guinea on current evidence and this, together with shared haplogroups P and Q, has been interpreted as indicating separate origins of Australian and New Guinea people, while at the same time different migration histories of these separate groups of colonizers. Van Holst Pellekaan (2008) has raised the question: Do the differences in haplogroups indicate that there were different entry points into Australia. This proposition has been explored by Davidson in reference to archaeological, ethnographic, and linguistic evidence (2010 and in press). In particular, Davidson (2013) suggests that separate studies of mtDNA (van Holst Pellekaan et al. 2006) and of mtDNA and Y chromosome (Hudjashov et al. 2007) show consistently that variations within the region of Sahul have deep roots going back to the first colonization of the continent at 40 to 50 kya. We agree that, taken together, these data are consistent with the possibility of separate colonizations along Birdsell's northern and southern colonization routes to Sahul (Fig. 1).

The recent sequencing of genomes of *Homo neanderthalensis* and of Denisovans and their subsequent comparison with modern human genomes has been suggested to indicate hybridization with modern human populations, subsequent to their movement out of Africa (Reich et al. 2010). Specifically, it has been proposed that 1–4 % of the Eurasian genome derives from Neanderthal and 5–8 % of the Melanesian genome is derived from Denisovan and Neanderthal sequences (Reich et al. 2010; Abi-Rached et al. 2011; Mendez et al. 2012).

This latest evidence for hybridization from genomic studies has been based on the number of derived shared SNPs from either the Neanderthal or Denisovan samples, compared with those of selected modern individuals representing the major population groups. These studies have shown that both the Denisovan and Neanderthal samples share more derived SNPs with Eurasian and Melanesian populations than they do with African. It has been argued that this indicates hybridization with these populations subsequent to their migration out of Africa (Reich et al. 2010; Lalueza-Fox & Gilbert 2011; Stoneking & Krause 2011). In support of this view, recent simulations conducted by Hammer et al. (2011) allowed the authors to reject the null model of no admixture between *H. sapiens* and archaic forms. Instead they suggest that contemporary African populations have retained a small proportion of genetic material (~2 %) that introgressed ~35 ka from an archaic population that split from the ancestors of anatomically modern humans ~700 ka. One particular locus ~31kb in length on chromosome 4 appears to have introgressed into modern Africans from an unknown and now extinct taxon that may have lived in central Africa.

This issue had been debated extensively in the past with partial mitochondrial DNA sequences suggesting that there was no evidence of hybridization (Serre et al. 2004), in contrast to some morphological studies (Bilsborough 1972). Wall and coworkers have, for some time, argued that, based on haplotype length data, there is strong evidence for ancient admixture in both European and West African populations, with contributions to the modern *H. sapiens* gene pool of at least 5 %. This issue was important because the integrity of the Out of Africa (OOA) theory, in its formal sense, was at stake. That is the proposal that anatomically modern humans evolved in Africa 200,000–150,000 years ago and that they subsequently migrated out of Africa 100,000–60,000 years ago, displacing other archaic hominins (with no hybridization), giving rise to all current human populations. Hence, any evidence for hybridization between modern humans and any archaic group(s) is contrary to that view.

The now recognized relatively large contribution of archaic DNA to modern human is in stark contrast to the absence of any evidence for hybridization from uniparental Neanderthal of

Denisovan markers in modern or even early modern populations (Ghirotto et al. 2011). However, Currat and Excoffier (2011) suggested that nuclear DNA introgression is compatible with the observed absence of Neanderthal mitochondrial lineages among contemporary humans. These authors concluded that an interbreeding success smaller than 2 % for Neanderthal human hybrids is fully compatible with limited Neanderthal nuclear introgression and with no introgression of mtDNA. The authors note that they obtained comparable estimates of maximum interbreeding success rates (<3 %) in an earlier simulation study that focused on the absence of Neanderthal mtDNA introgression into modern humans (Currat & Excoffier 2004).

In addition, the robustness of the data themselves has been questioned including the possibility of human contamination, and the confounding effects of ascertainment bias and/or genetic drift (Reich et al. 2010; Skoglund & Jakobsson 2011). The latter authors (Skoglund & Jakobsson 2011) showed that genetic similarity to Neanderthal increases with increasing distance from Africa. However, and conversely to expectation, a significant gene flow was detected between the Denisovan and Southeast Asians. The former authors (Reich et al. 2010) suggested that similarities between modern human and the Denisovan and Neanderthal genomes may simply be the result of parallel substitution, or convergent evolution and that this might be enough to influence archaic hominin/modern human associations by a few percent, perhaps ample to infer hybridization events.

Specifically with respect to Australian Aboriginals, investigations into aDNA of subfossil remains from the Willandra Lakes and Kow Swamp, these have revealed some intriguing insights into the population history of Australia. The evidence from aDNA has indicated that two of the sampled individuals, WLH 3 and KS 8, lie outside of the range of modern Aboriginal genomic variation, it being argued that they have non-L3 ancestry (Adcock et al 2001). This position has been the subject of considerable criticism, (Groves 2001; Relethford 2001; Cameron & Groves 2004) and it is by nuclear mitochondrial sequences (numts) may have resulted in the observed mtDNA sequence or that it may in fact represent modern contamination (Colgan 2001; Trueman 2001; Cameron & Groves 2004). A current study being undertaken by the authors is expanding on the original aDNA study undertaken on the Willandra fossil series to assess if the results can be replicated and if so an ultimate goal is to determine if a signature for Neanderthals or Denisovans can be detected in any recovered sequences.

Future Directions

It would seem that aDNA research is opening up new avenues of understanding on the origins of the First Australians. If the original study of the aDNA of Mungo Man is correct, and does not represent modern contamination, Mungo Man (WLH 3) and KS 8 represent a distinct lineage. If accurate, this has enormous bearing on our understanding of the population history of Sahul and indeed the evolutionary history of modern humans. The very gracile cranial features, including a reduced superciliary region and high frontal, may not simply represent variation within a homogenous population but could in fact represent a more gracile morphology, represented also by the Niah fossil from Borneo which supports the hypothesis that the first significant population movement into Australasia was represented by a lightly built population (Bulbeck & O'Connor 2011). Perhaps the more robust characters that we see in the once rich fossil record of Sahul represent a later movement into Asia. Could this include a phenotype that incorporated the assimilation of Denisovan and Neanderthal genes that reintroduced a robust cranial morphological component? As discussed above, the available evidence from the genome indicates that genetic exchange between modern and archaic people was on such a small scale that it is unlikely to have had any influence on the expression of cranial morphology. The differences in haplogroups between Aboriginal and

Melanesian populations indicate that there may have been different entry points into Sahul during the Late Pleistocene, but it is not clear how this could relate to diversity in Pleistocene cranial form.

An alternative hypothesis is that the robust cranial morphology is a character somehow selected for in environments of climatic stress, or that it represents the results of a process of genetic drift in some populations. It is interesting that this morphology is present from 25 to 10 ka supports the proposal that it is associated with the climatic changes of the LGM. Higher chronological resolution is required in order to support this hypothesis. A major obstacle to our understanding, as pointed out by Pardoe (1991), is that until we have larger samples that provide us with an understanding of variation within a certain point in time, as opposed to simply a picture from one or two key fossils from a known time period, our understanding of evolutionary processes and possible migratory events will remain limited. This is a problem that has been exacerbated by the repatriation and reburial of numerous key fossil specimens that are no longer available for future analysis. The concept of a "keeping place" for such important collections (such as the 100+ individuals from the Willandra fossil series) would represent a key achievement as it provides a positive compromise to both science and Aboriginal cultural responsibilities for the deceased.

The archaeological and linguistic record for later migrations in the Holocene provides yet another complex picture to be investigated. It is clear that there was a linguistic expansion which is argued to have occurred in the mid-Holocene, but what is unclear from the available evidence is whether this had any impact on the Aboriginal phenotype through a pulse of new genes into Sahul. These questions and more will hopefully be the focus of future collaborative efforts between archaeologist, geneticists, biological anthropologists, and traditional owners as we continue to expand on our understanding of one of the more intriguing chapters on the global dispersal of our species.

Cross-References

- ▶ *Homo erectus*
- ▶ *Homo sapiens*
- ▶ Java Man
- ▶ Kow Swamp
- ▶ Lake Mungo, Archaeology of
- ▶ Stringer, Chris
- ▶ Wolpoff, Milford H.

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Basic Biographical Information

Kent Vaughn Flannery was born in 1934 and grew up in the Chesapeake Bay region of Maryland. One of his high school teachers instilled in him a strong interest in zoology,

ecology, and evolution. Flannery took advantage of the University of Chicago's "early entrant" program to enroll after his sophomore year of high school, receiving his B.A. in 1954. He then began studying for an M.A. in zoology. In 1957–1958, Flannery spent a year in Mexico collecting data for his thesis. He took archaeology courses at the Universidad de las Américas and participated in excavations in the Valley of Oaxaca. On his return to Chicago, he switched to anthropology. In 1960, Robert Braidwood took him to Iran as a field assistant to his staff zoologist, Charles A. Reed along with fellow student Frank Hole. Flannery wrote a Master's thesis (1961) in which he distinguished wild and domestic pigs from Near Eastern Neolithic sites. In 1961 Hole and Flannery returned to Iran to conduct excavations at Paleolithic and Pre-pottery Neolithic sites. They were joined in 1963 by James Neeley (Hole et al. 1969).

Flannery maintained his interest in Mesoamerica by working in Chiapas, Mexico, with Robert McC. Adams and at Ocós, Guatemala, with Michael D. Coe (Coe & Flannery 1967). Enroute to Guatemala, Coe and Flannery visited Richard S. MacNeish's project in Mexico's Tehuacán Valley. Once MacNeish learned that Flannery was an archaeozoologist and had worked with Braidwood on the origins of agriculture and animal domestication, he invited Flannery to join the Tehuacán project. Flannery worked with MacNeish during 1962–1963 and his archaeozoological research was included in Volume One of *The Prehistory of the Tehuacán Valley* (1967). MacNeish also encouraged Flannery to use data from the Tehuacán Formative for his Ph.D. thesis (1964) at the University of Chicago.

Flannery was hired as Associate Curator of Mesoamerican Archaeology by the Smithsonian Institution in 1964. One of his first responsibilities was to begin a new research project. Remembering the many unexplored caves and Formative sites he had seen in the Valley of Oaxaca, Flannery obtained funds for a pilot season in Oaxaca. In 1966 Flannery (1986) excavated Guilá Naquitz Cave, which yielded what were then the New World's oldest preserved gourds and squash (8000 cal. BCE), runner beans (6400 cal. BCE), and maize (4250 cal. BCE). By 1967 Flannery began excavations at the large Oaxacan Formative site, San José Mogote, a task that would occupy him for 15 years. By 1972 he had been joined there by Joyce Marcus. Flannery and Marcus discovered that San José Mogote had been occupied continuously from the beginnings of village life in Oaxaca (c. 1600 cal. BCE) until its transformation into the largest civic-ceremonial center in the valley (600–500 cal. BCE) (Flannery & Marcus 1983; Marcus & Flannery 1996).

Flannery also collaborated with colleagues in the Andean region of South America. In the early 1970s he joined MacNeish in Ayacucho, Peru, analyzing faunal remains from sites like Jaywamachay Cave and Tukumachay Cave. During the 1980s he served as the faunal analyst on Joyce Marcus' project at Cerro Azul in Peru's Cañete Valley.

Major Accomplishments

Kent Flannery is a leader in applying an ecosystem approach to reconstructing the past, using archaeological and other relevant data to construct models that identify the adaptive changes in the relationships between human societies and their environments. This perspective has provided the basic theoretical foundation of Flannery's precedent-setting research in both the Middle East and Mesoamerica. Flannery (1968, 1972) united this approach with broader systems theory as it is applied across many scientific disciplines. He also adopted a broad multidimensional perspective on ecosystems, which encompass all relationships maintained by a given society with its natural and cultural environment. In Flannery's view, information is one of the most crucial aspects of these relationships and identifying the what, how, and who involved in the flow of information is key to understanding how systems change.

Application of an ecosystem approach allowed Flannery to reconstruct the gradual transition from hunting and gathering subsistence to agriculture in the Valley of Oaxaca. Based on both archaeological and ethnographic data, Flannery (1968) proposed that the subsistence activities of early Oaxacan societies were regulated by seasonality and scheduling in a deviation-counteracting system that maintained the equilibrium of the subsistence system. Such a system has the potential to shift to a deviation-amplifying system when one or more components change causing the entire system to diverge from its former state – in this case, the trigger was genetic changes in several food plants that encouraged their increased exploitation, which ultimately led to a new subsistence system based on agriculture.

Throughout his career, Flannery has maintained a multidimensional perspective of change within human society. While acknowledging there are universal factors and processes at work, these are expressed in each case in unique ways, so that archaeology must seek and reconstruct the specific conditions and factors that were the crucial agents of change. To do this Flannery takes an inclusionary perspective to problem solving, considering all relevant archaeological, ecological, and anthropological data. In reconstructing the rise of complexity and urbanism in Oaxaca, Flannery led his colleagues and students to apply data from multiple disciplines to investigate each level within society – household, community, village, region, and area – to trace the unique developmental course toward increasing complexity. His inclusive perspective is also apparent in his application of ethnographic case studies to illuminate specific archaeological situations and provide insights into in the past based on similar ecological conditions and sociocultural factors. Flannery also applies ethnographic data from descendent native Zapotec communities in Oaxaca. A case in point is Flannery and Marcus's (1976, 1993; Marcus & Flannery 1994) studies of the crucial role of ideology to both the continuities and changes in pre-Columbian Oaxacan society which presaged developments in cognitive archaeology.

Flannery's career as an archaeologist is strongly shaped by his early background in science and his love of zoology, paleontology, and ecology. He continues to believe in a unique past that is knowable through the collection of empirical data, and the testing of universal models of social evolution. In his favorite theoretical model, agriculture began in an early Holocene period of "broad-spectrum" plant collecting and resulted from attempts to increase the density of certain plants while reducing travel time. A key turning point for early farmers was the privatization of storage; this allowed certain families to work harder and outstrip their neighbors, leading to social inequality. Flannery sees hereditary inequality as based not simply on economic advantage but also on ideological changes that justify inequality by giving it supernatural authority. He sees the origins of the world's first states as taking place in the context of competing hierarchical societies, when one of those societies gained an advantage that allowed it to subjugate the others. He is also a trenchant critic of fads in archaeological theory, especially those that pay limited attention to empirical data (Flannery 1982a, 2006).

Perhaps the most important impact of Flannery's inclusive ecosystem approach can be seen in the recent shift in our concepts concerning the long-term evolution of human societies. While there certainly has never been a single unified "school of thought" within archaeology on cultural evolution (nor on any other perspective on the past, for that matter), the once popular assumption that human societies evolved along a course set by "prime movers" and "technological determinism" has given way to a more particularistic view of change that operates in an infinite number of ways under an infinite number of conditions – and can be reconstructed and understood by archaeology from an almost infinite number of approaches and theoretical perspectives. Seen in this light, Flannery's contribution to a multidimensional ecosystems approach clearly has been one of the most essential "prime movers" in the evolution of American archaeology over the past half century.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Braidwood, Robert John
- ▶ Cognitive Archaeology
- ▶ Marcus, Joyce
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture

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Floors and Occupation Surface Analysis in Archaeology

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Introduction

In the same way modern carpets reflect the activities of their owners, occupation surfaces can tell many things about their users. Looking at the characteristics of the carpet once it has been removed from the floor of the whole house, one can realize that there are worn areas, consequence of intense transit and intact zones normally placed under heavy furniture. It is also possible to differentiate between clean areas and dirty parts of the carpet containing many residues spelt on the surface. Then, after a careful study of this carpet, it is possible to reconstruct most of the everyday activities of its users.

The same happens with the study of archaeological structures. In the case of occupation surfaces, it is now possible to use this approach to try to understand how people lived in the past. Traditionally, archaeological artifact distribution and architecture have suggested the way spaces were used. In recent times, chemical residues detected in the porous of floors have

complemented this information and in many cases have confirmed preliminary inferences, but in some others, especially when there is no archaeological material on surface floors, they have been the unique indicator of the human activities carried out on the occupation surfaces.

In general terms, productive activities are easily recognized because the energy, the amount of materials involved, and the intensity of the activities produce a dramatic change in the archaeological context. However, occasional activities with limited material and energy involved are difficult to detect.

As a consequence of the use of chemical indicators, floors, which not so many years ago were disposable, became a new important archaeological material that has to be preserved, documented, and studied in order to recover valuable information concerning human activities carried out in the past.

Definition

Following well-established definitions, *soils* can be considered as the top of weathering profiles (vertical sequences) developed by the in-place physical and chemical alterations of preexisting sediments. If a sediment mass is stable, weathering at the surface creates horizons with distinctive physical and chemical properties that become superimposed on the previously deposited sediments. Soils are not sedimentary deposits, and normally support the vegetation allowing agriculture.

Sediments are produced by the weathering of rocks that are transported as solid particles or dissolved chemicals and are accumulated or precipitated in sedimentary environments. They are usually horizontal and nevertheless might be modified by tectonic movements.

In archaeological context, *fill dirt* describes the earthy material that is used to *fill in* a depression, but especially to level surfaces or to build mounds and archaeological structures in general.

Occupation surface is any surface that was used in the past. An example of these surfaces is the irregular level occupied by the inhabitants of a cave. One special case of this kind of surfaces is the *floor* that can be defined as a man-made nearly horizontal surface consisting of several layers of preparation and finishing. An outstanding example of floor is the lime-plastered floor (usually called stucco floor) that represents an important technological and architectonic development in Mesoamerica. Any occupation surface is able to preserve organic residues, but the reliability of the interpretation is maximized in lime-plastered floors.

As a result of the accumulation of thousands of analyses of floor samples, the importance of looking at floors as a new archaeological material became evident. During the first stage of chemical prospection, the object of study was the soil, but for the study of intrasite human activities, the focus changed to occupation surfaces and floors, man-made surfaces that behave in very different ways than soil. During an archaeological excavation, it is very important to establish the difference between fill earth, sediments, soil, and specially floors because the same chemical results can be interpreted in different ways depending on the kind of material under study.

In recent years, it has been demonstrated that chemical residues are well preserved in the porous texture of the floors, allowing their study after hundreds, even thousands, of years, and revealed the floor as an outstanding archaeological material that preserves information that has not been traditionally taken into account.

Historical Background

Hirth (1975) published a paper that put together the results of fieldwork carried out during 1972 in Manzanilla, Puebla and Chalcatzingo, Morelos, Mexico. In this entry, he mentions that in Puebla he used sampling grids to search for intensive habitation areas. The high phosphate values were interpreted as the place for fire spot, trash pits, and burials. After excavating the detected areas, he found habitational remains.

In Chalcatzingo, Morelos, the main goal of the project was to detect the most intensive

occupation areas of the site, the relationship with the surroundings, and the function of different parts of the site. In that case, the fieldwork used pits within transects to define the site extension and intensive occupation areas.

Most of these results had bad diffusion and were almost unknown. The only paper, published by *Vínculos* in 1975, had a resume of the first two experiences of phosphate studies in Mexico, but no figures were included. It was a shame because these two field experiences were the first successful applications of phosphate analysis in Mesoamerican archaeology.

Some years later, other applications of this new technique were made in the Laboratorio de Prospección Arqueológica, using phosphates as an archaeological prospection tool to look for settlement limits and garbage dispersion. Despite of some success in the delimitation of archaeological sites in Terremote, Tlaltenco, DF, in 1978, I considered that the time investment was not in accord with the information obtained (Barba 1980).

It was during fieldwork carried out in Xochipala, Guerrero, in 1978 that something changed. In prospection, we used to work with large regular grids, taking soil samples at intersections. After analyzing the samples from one small grid, it was clear that one part of the grid presented high values of phosphate, while the other showed lower values. The most interesting thing was that after a shallow archaeological excavation in the same grid, a wall foundation was exposed exactly between the high and low phosphate values (Barba 1990).

Up to then, I was used to deal with large-scale sampling of entire sites and their interpretation, but in this case, for the first time, I was looking at differences on both sides of a wall. The excavation also showed that the exterior of the structure had higher values than the interior, suggesting the important idea that human activities produced different chemical enrichment of the same surface, inside and outside of a structure.

Previously, some authors had shown how some chemical indicators such as organic matter and nitrogen were related to human activities. In order to test these ideas and the relationship with phosphates, I proposed a project to sample the earthen floor of the house of a family who was living in a small town in Tlaxcala, Mexico. The idea was to also observe their daily activities in order to correlate this information with the results from the samples. We spent some days making a floor plan of the house and taking almost 40 floor samples, as well as pictures and notes of their everyday activities.

The hypothesis to test was that the activities we observed would produce differential chemical enrichment of the floor in both sides of the walls. After some days of lab work, spot test results were mapped on the house plan. The distribution of phosphates was explained according to different activities. Also interesting, during the phosphate analytical procedure, we applied Eidt's acid solution, which produced an effervescent reaction in many samples. That reaction was the first approach to the establishment of carbonate determination; it was also plotted and by the first time showed a very interesting correlation with human activities.

That was the beginning of an important change in the use of phosphate analysis and chemical indicators. In those days, it was generally thought that these chemical techniques could detect human settlements, even going to the extreme of supposing they could detect structures. With the arrival of geophysical techniques to archaeology during the 1970s, it was soon realized that these techniques were the best approach for the detection of architectural remains, and chemical techniques were more or less put aside. Our lab, nevertheless, proposed that the chemical techniques could be even more useful for archaeology in detecting areas of human activity in floors within architectural structures. With this new approach, a major change occurred in both the scale and goals of the study of chemical residues not in soils but in floors.

During the first stages of the study of chemical residues in the floors of living spaces, it was very difficult to accept that human activities could leave such a permanent track and that residues found in the present could be related to materials used in the past. It was difficult to support because we were dealing with intangible and

invisible substances that were impossible to see after excavation, and it was unbelievable that after hundreds of years, organic residues were in floors against our personal experience that these substances are lost just after some weeks.

Nevertheless, the ethnoarchaeological studies carried out showed that chemical enrichment patterns found in floors of traditional households remained some months and years and had direct relationship with activities and substances spilled on floors. Then, the main problem was to go back on time and demonstrate that organic residues could survive hundreds and even thousands of years.

Fortunately, during this time, the first results of organic residues found in Mediterranean ceramic pots came out. In some cases, those pots had inscriptions or marks describing the ancient content, and that information was useful to contrast the chemical analysis results that showed the presence of organic residues. This fact allowed to build the bridge that connected the activities carried out hundreds of years ago and the organic residues found in the pores of ceramic pots in the present. This important coincidence provided the support to accept that organic residues could survive and also be present in the pores of the floors.

In this way, the crazy idea of recognizing activity areas through the chemical study of floors was transformed in a reasonable idea that perhaps could be improved including another kind of analytical techniques. In the 1980s, the ICP was included to study chemical residues in floors (Middleton & Price 1996).

In the same way that centuries ago the Galileo's telescope and the observation of the Moon surface produced the optical theory to support it, in our field of study, the presence of chemical residues in floor is no longer questioned thanks to the discovery of the residues in pottery pores. Now the discussion could be on the appropriate analytical technique, the smallest portion of sample to be analyzed, the original substances that can be identified after the time transformation of residues, etc., but the existence of organic residues is presently a commonly accepted knowledge.

Some of the most comprehensive reviews of papers published in this field are the articles published by Holliday and Gartner (2007) and Wells and Moreno (2010), the first emphasizing phosphorous chemistry and analytical techniques while the second more concerning on the applications to archaeology in Mesoamerica.

Key Issues

Theoretical Background

The detailed analyses of archaeological materials, as well as their spatial associations, are very powerful tools for studying activity areas. An activity area has been usually defined as the association of raw materials, products, artifacts, and chemical residues accumulated in specific places as a consequence of human activities. As a part of complementary information for the study of activity areas, there are chemical indicators that can be analyzed to determine the kind of activity that was carried out on the floors (Pepe et al. 1989).

The use of chemical indicators for the study of activity areas is based on the following assumptions:

1. When an activity takes place, some liquid residues could be spilled on the floor, and, sometimes, depending on the characteristics (porosity) of this surface, the residues could be absorbed. For that reason, a differential enrichment of the floor could be observed depending on the distribution and diversity of the activities made in a room or household.
2. Once the chemical compounds, which were the by-products of human activities, have been incorporated into the floor's pores mainly as solutions, they remain protected and preserved by this matrix.
3. Through the chemical analyses of floor samples, it is possible to identify and evaluate the presence and the spatial distribution of several indicators. Some of the floors were used for specific activities, so through their characterization, it could be possible to identify the function of the studied area.

4. The comparative study of materials and substances in any particular case, as well as previous studies in modern households, offers the possibility of improving interpretation in archaeological terms.

The differential chemical enrichment of floors is related to the type of activity (production, use-consume, storage, or waste); the periodicity, the intensity, and the duration of the activity; the changes in the spatial distribution of the activity; and the different uses of the area (in the same and later times).

For these studies, the assumption that the original floor had a homogeneous composition at the moment of its construction is required; this means that the floor composition is the same in every point of its surface; thus, the human activities modify such homogeneity by adding specific chemical residues.

Several types of floor can be recognized in Mesoamerica. From this variety, the lime-plastered floors are the most suitable for the study of activity areas because their production process with fire discards the chemical residues possibly incorporated before the use of this material as a floor (Barba 2007).

Ethnoarchaeological Approach

The ethnoarchaeological approach has been one of the ways to achieve the interpretation of results regarding the distribution of chemical residues in archaeological terms. To correlate the origin of a chemical concentration of any compound found in a floor with any kind of activity that has taken place, we can draw upon the study of the activities carried out in an inhabited domestic structure. In this respect, several interesting essays have been carried out as part of the research project on activity areas at the Archaeological Prospection Lab, with the main goal of establishing the general enrichment patterns for various activities, whether they are domestic, productive, or ritual.

As the first part of this general project in 1978, we used the phosphate analysis in a house at San Vicente Xiloxochitla, Tlaxcala, Mexico. We related direct observations, the information provided by the inhabitants with a traditional way of life, and the concentration of chemical residues in the floors of the residential unit. Among the outstanding conclusions, we found that there was a strong evidence of distribution patterns directly associated with observed activities, where the resting areas (around and under the beds) were found to be poor in phosphates, while food consumption areas and open yards were very rich in this compound. Moreover, intensive transit areas suffered considerable erosion, being, therefore, poor in phosphate content. Finally, the area where meals were prepared and cooked (where the hearth was located) was low in phosphate content but high in pH values. Some years later, the same floor samples of this house were studied again, this time including a new set of inorganic and organic tests (Barba & Ortiz 1992).

As a second stage of the same project, we made a research in the recently abandoned village of Osumacinta Viejo, Chiapas. We studied two houses, one located downtown and the other in the outskirts of the village. Both had been abandoned for 3 years. We arrived to the following conclusions: the area close to the hearth where meals were eaten presented high phosphate concentrations, while the corners and the spaces close to walls showed a considerable depletion of this compound. The places where hearths and fireplaces had been located showed high pH values. Two large concentrations of chemical elements were visualized in the areas outside the rooms. In order to explain them, the authors resorted to ethnoarchaeological explanations. For instance, the calcium distribution pattern is explained as a result of the use of lime to soften kernels for nixtamal, and, on the other hand, iron concentration was due to the treatment of agave leaves.

A more recent study of a household at Muxucuxcab, Yucatan, provided information concerning the distribution of chemical compounds in a modern house that reflects the activities of the inhabitants. Additional information was obtained interviewing the people living there and including the results of the detailed

archaeological excavation. The joint interpretation of these three levels of information clearly delimited four activity areas at the household. The same samples were studied years later to compare results from different analytical techniques (Middleton et al. 2010).

After the study of ethnoarchaeological cases, it has been proved that chemical residues existed in floors, that their distribution was not random, and that it depended on activities performed by the inhabitants. Some differences in the use of the spaces can be observed, and many of the activities produced recognizable patterns.

It was important to accumulate information from ethnoarchaeological cases in order to understand patterns in the use of domestic spaces. The study of modern and recently abandoned houses has made possible to apply the recognized patterns to the study of archaeological house floors.

The importance of the lime-plastered floors is enhanced by the fact that limestone is not readily available in the Basin of Mexico, so the lime used, firstly at Teotihuacan and later at Tenochtitlan, had to be transported from limestone outcrops close to present Tula city, among others places (Barba et al. 2009). Pre-Hispanic lime plaster was a very important technological development. Floors were very homogeneous and had a very low content of residues, since, in order to prepare the lime, limestone was fired at temperatures of up to 800 °C, thereby removing all organic materials. During the slaking and preparation with water, masons produced homogeneous mixtures that were evenly applied to floor surfaces. Once the floor was dry, it was used and began to accumulate residues in the pores as a consequence of the inhabitants' activities. After Teotihuacan, many other settlements used this kind of floors providing the opportunity to investigate the past everyday living to the present archaeologists.

Analytical Techniques

In the case of our laboratory, most of the tests selected are characterized by the ease of application; all of them are simple, reliable, semiquantitative tests, and they allow the immediate processing of numerous samples at a minimum cost and time (Barba 2007). The first set of tests carried out included phosphate, carbonate, and Munsell color determination, along with pH measurement. In addition, calcium and iron were sometimes analyzed to determine their distribution in residential areas. In all cases, the experiments have shown that variations in concentration reflect human activities. Tests for organic compounds have been incorporated in later times. It has been shown that organic compounds remain in the pores of floors as well as in the pores of ceramics. Spot tests for fatty acids, carbohydrates, and protein residues have been successfully used to study floors. Since most human activities are related to organic solutions, the study of both kinds of chemical compounds (organic and inorganic) has enriched the interpretation substantially.

Samples are usually obtained by drilling at grid intersections and collecting in plastic bags the produced powder. Sampling density is an important factor of the study. The most common density is one sample per square meter. In some cases, such as in the interior of small roofed rooms, the density can be increased to four samples per square meter, but in large open areas, it might decrease to one sample per 4 or 16 square meters. As a result, it is quite common to have hundreds and even thousands of samples for the study of a single household or residential unit. This kind of studies requires the use of low-cost and easy spot tests. For the interpretation of human activities through chemical analysis of residues in floors, it is important to look for enrichment patterns that are only revealed by large numbers of analyzed samples.

In all cases, a map of isoconcentration lines is produced showing the distribution of chemical residues in the floor under study. Whenever available, this distribution should be related to the archaeological materials found on top of the floors during excavation. In the course of fieldwork, the immediately processed analytical results sometimes have enabled researchers to modify their sampling strategy.

Gas Chromatography–Mass Spectrometry Analysis (GC-MS)

As discussed above, spot tests inform about the distribution of residues but cannot provide information on the origin of the organic residues, often constituted by complex mixtures. Frequently, it is advisable to identify each component of these mixtures, and, for this purpose, gas chromatography coupled with mass spectrometry (GC-MS) is one of the most suitable techniques. This analytical technique allows the separation and identification of many substances, lipids in particular. This permits the interpretation of the residues absorbed in the pores of archaeological floors and ceramics, through the identification of specific markers that are characteristics of the different substances (Evershed et al. 2005).

For example, it is possible now to distinguish between animal and vegetal fats. In many cases, it has been possible to identify olive oil. Furthermore, GC-MS has allowed the identification of markers characteristic of other vegetal substances common in the European ancient diet such as wine (Guash Jané et al. 2004) and *Brassicaceae*, a common vegetable (Chartres et al. 1997). The presence of animal stables and latrines can also be detected by monitoring the presence of *coprostanol* (Bull et al. 2003; Evershed et al. 2005).

The advantages of GC-MS are therefore evident, and they are particularly related to the possibilities of knowing the specific substances involved in ancient activities. On the other side, the main disadvantage of this kind of chemical analysis consists mainly in the complex and expensive instrumentation required. Considering procedures often carried out to extract different compounds (Mottram et al. 1999), in many cases it can be an extremely time-consuming technique.

As mentioned before, the study of the distribution of organic residues in archaeological floors requires the analyses of hundreds of samples, and, probably for this reason, no case studies exist of this kind of study performed only by GC-MS analysis.

At the National University of Mexico and the University of Siena, integrated analysis of spot tests and GC-MS has been applied in order to understand the horizontal residue distribution and function of different areas or structures by spot test and then verified by the identification of some specific substances by GC-MS (Pecci 2009; Middleton et al. 2010).

Induced Coupled Plasma–Optical Emission Spectrometry Analysis (ICP-OES)

Another approach to study archaeological floors and the function of archaeological structures is the use of ICP-OES analysis of an acid extract of floor samples. This technique has been particularly useful in the identification of anthropogenic chemical elements present in archaeological surfaces (Middleton et al. 2005). It entails the characterization of a suite of elements that includes both anthropogenic and geochemical indicators, therefore making it possible to distinguish between anthropogenic and natural processes in the composition of the archaeological surfaces. A variety of extraction techniques can be used, ranging from a buffered neutral extraction to a total digestion. The particular technique employed in a given case depends on the purpose and goals of the study.

The advantage of this technique is that it is highly sensitive to subtle differences in the chemical composition of floor samples, making it possible to distinguish between a wide range of by-products involved in human activities and to distinguish between human activities and geochemical processes. The copious quantitative data produced by this technique readily lend themselves to powerful inferential statistical analysis. Factor analysis of principal components and numerical classification recognize patterns of covariance in the enrichment and depletion of elemental concentrations in the data that help to identify the patterns of activity that took place upon the surface. Both the raw data and the derivative statistics, such as factor scores, can be surface plotted to provide a visual aid for the interpretation of enrichment patterns. Both the distribution of the factor scores and the raw elemental data often mirror the areas of most intense activity and reflect activities such as food

preparation, washing, or the contribution of human metabolic by-products in the soil. Because data can range over several orders of magnitude, data are usually converted to a logarithmic scale for analysis and plotting (Middleton & Price 1996).

Although a powerful technique, there are limitations to this approach, particularly in comparison to spot tests in the field. Foremost, the length of time involved in sample preparation and extraction would bar this approach for use in the field in most cases, whereas spot tests can provide immediate results in the field, which can be used to guide excavation and interpretation. A second and significant drawback is the cost of the instrument. However, beyond the instrument cost, ICP-OES analysis of samples is fairly economical. Finally, although sensitive to some constituents of organic matter such as phosphorus, ICP-OES analysis cannot identify organic compounds.

Current Debates

One of the latest technologies developed for fieldwork that shows a broad field of applications, including archaeology, is the portable X-ray fluorescence. Recent electronic developments have provided compact instruments, with high sensitivity and at a reasonable cost. Besides many other applications in industry, environment, and conservation, in the particular case of archaeology, this kind of instruments might contribute to the advancement of chemistry applications to archaeology mainly because this analytic technique does not require sample preparation, which is a problem with previously mentioned techniques.

As many of the analytical techniques XRF determines elements. But since most of the human activities in the past are related with organic residues composed by C, N, H, and O, the challenge is to build a bridge between elementary distribution and the chemical residues produced by human activities.

Nowadays, a lot of sophisticated analytical techniques are available; depending on research goals and economic resources, all of them can be successfully applied to the study of chemical residues in floors. However, no matter which analytical tool is used, whether the most technologically sophisticated or the simplest one, it is important to bear in mind the necessity of building a bridge between the concentration of chemical residues in floors and the human activities that produced them, through the study of living households by means of observation or with controlled laboratory experiments. By not doing so, we could end up with a long list of chemical elements, even in parts per billion, with no archaeological meaning.

International Perspectives

After 30 years promoting the use of spot test in archaeology, interesting attempts have been done to establish these analytical procedures in different places. The successful ones have been done by universities. The first successful experiences were carried out in Cuba, at Universidad de la Habana and in Costa Rica. In more recent times, these ideas have been spread out in some other countries. One of these cases is the recent study of the residential units in the Aburrá region in Colombia, to figure out the domestic and productive activities of the ancient inhabitants. A special case is Italy, where Pecci at the University of Siena has been intensively working in the application of spot test to archaeological contexts of different temporalities in the Mediterranean area in addition to the use of GC-MS for the identification of residues in ceramic vessels and floors (Pecci 2009). United States has various groups that have developed different analytical approaches for the study of human activities in the past. The group in Madison, University of Wisconsin, has a long-term successful application of ICP for the study of residues in floors that began with Middleton's Ph.D. dissertation. The group in BYU has been using spot test, phosphate quantitative determinations, and ICP for the study of Mayan archaeological sites and associated market places (Terry et al. 2004). The group in the University of South Florida has been performing different experiments to understand

residue behavior in the archaeological context and studying different sites (Wells et al. 2000). Very recent is the establishment of the Chemistry Laboratory in the Universidad Autónoma de Yucatán that began the study of historic and archaeological floors in the Maya region using spot tests.

Future Directions

Besides the ongoing development of the pXRF equipment for the study of elements associated to human activities, either in soil samples as a chemical prospecting tool or in floors as a tool to detect residues produced by human activities, there is a new analytical tool with promising perspectives in the detection of organic residues: the new portable infrared spectroscopy equipment. For many years, this technology has provided reliable information analyzing organic residues in laboratories, but now it is possible to use portable equipment for the detection of organic residues in floor samples, even during the fieldwork.

A little behind is the development of new portable RAMAN spectroscopy that, theoretically, is able to detect organic residues, but this technology needs some time to reach the reliability of the infrared technology. Nevertheless, these technologies represent an open field of research to discover and need a lot of work to become useful for archaeology.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Archaeological Prospection Laboratory (National Autonomous University of Mexico)
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Laboratory for Archaeological Chemistry (University of Wisconsin)
- ▶ Organic Residue Analysis in Archaeology

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Florence Charter on Historic Gardens (1982)

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Introduction

The 1982 ICOMOS Florence Charter on Historic Gardens (Florence Charter) was developed at a meeting of the members of the ICOMOS IFLA International Committee for Historic Gardens (now known as the ICOMOS IFLA International Scientific Committee on Cultural Landscapes) in Florence on 21 May 1981. The Florence Charter, a document addressing a specific field of garden preservation within preservation of historic resources, was registered by the International Council on Monuments and Sites (ICOMOS) as an addendum to the Venice Charter on 15 December 1982. The drafting and acceptance of this charter as an addition to guiding documents in the preservation of cultural heritage signaled an enlargement of the realm of preservation from consideration of significant architecture and monuments to include historic gardens and parks in a range of sizes, which may be associated with a building or a property important for a significant landscape. The Florence Charter ushered in the landscape as a realm for research, planning, and action in cultural heritage preservation that has progressed and enlarged in 40 years since its registration.

Definition

The Florence Charter is a document approved by ICOMOS in 1982 that defines historic gardens as "an architectural and horticultural composition of interest to the public from the historical and artistic point of view" (ICOMOS Florence Charter: Article 1). This charter specifically addresses the conservation of gardens, parks, and commemorative landscapes purposely designed and constructed of organic and inorganic materials. Historic garden maintenance, conservation, restoration, reconstruction, use, legal protection, and administrative stewardship are specifically outlined in this charter. The charter provides a clear capture of the realm of historic gardens identifying the composition of the historic garden as (1982, Article 4, The Florence Charter):

- Its plan and its topography
- Its vegetation, including species, proportions, color schemes, spacing, and respective heights
- Its structural and decorative features
- Its water, running or still, reflecting the sky

Further, the charter refers to the setting for the historic garden, beyond the garden boundaries, indicating that "The historic garden must be preserved in appropriate surroundings. Any alteration of the physical environment which will endanger the ecological equilibrium must be prohibited" (1982, Article 4, The Florence Charter). This inclusion of setting heralded the contemporary definition of buffer zones for protection of heritage resources. The Florence Charter is a touchstone to which professional practice in the realm of historic gardens and cultural landscapes constantly refers to as a foundational document framing international guidance.

Key Issues/Current Debates/Future Directions/Examples

Leadership by René Pechère, Landscape Architect

The Committee on Historic Gardens and Sites, the precursor to today's ICOMOS IFLA Cultural Landscape International Scientific Committee, brought together a group of professionals interested in historic gardens. The committee first convened at Fontainebleau in 1971 under the leadership of René Pechère, a prominent professional with many notable private and public commissions. Pechère served as the president of the International Federation of Landscape Architects (IFLA) from 1956 to 1958 and became active again a decade later, taking charge of forming and fostering a section on historic gardens. Landscapes of historical significance were not popular topics at the time. Pechère spoke to his colleagues to convince them to support formation of this committee, saying: "Nothing starts from nothing, and it is on your past, on what you are now, that everything that you will be depends" (Pechère 2011). He defended the formation of an IFLA Committee on Historic Gardens and Sites n this way, and his leadership led to the formation of the committee in 1968 at Sardinia. In the years following, Pechère worked first with Gerda Gollwitzer, editor of "Garden and Landscape," and then brought together a garden history research team extending beyond the landscape architecture profession to include "art historians, architects, botanists, and archaeologists" (Pechère 2011). He engaged ICOMOS president Piero Gazzolo in the garden history effort, which yielded the first meeting of the committee in 1971 in Fontainebleau. Pechère assembled a talented and experienced team to work on this committee, founded on a decade of effort. At Florence in 1981, he led the drafting of the Florence Charter, which ICOMOS approved in 1982.

From Historic Gardens to Cultural Landscapes and Issues for the Future

The ICOMOS (International Charter for the Conservation and Restoration of Monuments and Sites) of 1964 (Venice Charter) is the forbearer of the Florence Charter and addresses monuments of civilization, citing architectural works within their urban or rural setting that bear witness to a civilization, cultural development, or historical event. The Venice Charter focused on the conservation of monuments as works of art and historical evidence, but failed to explicitly direct such attention to gardens or landscapes. In fact, the words "landscape" and "garden" do not appear in the Venice Charter. The Florence Charter, framed 18 years later, sought to enlarge the consideration of shared global heritage from monument and site to designed landscape. This step opened a preservation direction toward the landscape as cultural heritage worthy of conservation, an expanding understanding that continues to enlarge through the present day.

The Florence Charter of 1982 was a signal call to include garden and landscape works created with purposeful designs as heritage worthy of conservation and preservation alongside historically important monuments and sites. The concept of cultural landscapes as expressions of outstanding universal value was intensely debated through the 1980s. The entire Lake District of Great Britain was proposed for World Heritage listing during these years and denied. Cultural landscapes were added to the World Heritage Operational Guidelines in 1992 and defined as defined landscape, designed and created intentionally; organically evolved landscape,

either relict or fossil where the evolutionary process is ended, or continuing evolved landscape where contemporary society is present and evolution continues; and associative cultural landscape, which have inspired art and literature, which are places of religious or spiritual beliefs or embody traditions and intangible aspects of cultural heritage (UNESCO 2012).

The 20 years from 1992 to 2012 have seen an increasing interest in and evolution of the recognition and protection of cultural landscape resources. Based on recent research, the World Heritage inscriptions of cultural landscapes in the past two decades number 98 inscribed properties, representing, in only 20 years, 10 % (10 %) of total inscriptions (O'Donnell et al. 2012). The following distribution of types shows:

- 7 clearly defined
- 32 organically evolved – relict
- 73 organically evolved – continuing
- 25 associative

This distribution shows the prevalence of organically evolved continuing landscapes, which represent some 75 % of the 98 inscribed cultural landscape properties. This predominance also underscores the pivotal issues in retaining authenticity of the cultural landscape heritage: managing change while evolution continues. The threats to the integrity of cultural landscapes are varied and broadly include population growth pressures, socioeconomic transformation, climate change, and human conflict with examples of urban sprawl, migration, poverty, extractive industries, modern infrastructure, civil war, and natural disasters affecting valued cultural landscapes inscribed on the World Heritage list. This range of pressures also threatens cultural landscapes of national, regional, and local significance.

Inscribed cultural landscapes represent a global range throughout the UNESCO world regions. The dispersion of properties is listed with increasing counts top to bottom as:

- 3 in the Arab States
- 10 in Africa
- 15 in Latin America and the Caribbean
- 21 in Asia and the Pacific
- 43 in Europe and North America

Thirty (30) of these inscribed properties are historic urban landscapes, where global urban populations coalesce in greater numbers. In November 2011, UNESCO approved the UNESCO Historic Urban Landscape Recommendation (HUL), which positions urban cultural heritage broadly for the first time within considerations of quality of life, economic vitality, development, industry, tourism, and evolution of urban centers. This holistic view sees heritage as a co-contributor to urban vitality in the twenty-first century. Sparked by out-of-scale development proposed adjacent to the core of historic Vienna, HUL is directed toward all urban places, each unique and each a place of heritage, enlarging the notions of the historic center or urban ensemble to include the broad urban context and larger setting (Fig. 1).

Cultural landscapes of urban areas, defined as the combined work of humanity and nature, generally comprise about half of the settlement space and contribute significantly to the character of the place. Buildings represent the other half and contribute, as a whole, to the scale, density, and character of the townscape. The public and private historic urban landscape expresses traditions and values, both tangible and intangible, forming an accreted record of interactions between people and place and rooting culture in landscape. The historic urban landscape and the urban cultural landscape offer parallel terminology for the same resources. HUL and urban cultural landscape both address the entire townscape ensemble of structures and landscapes, views, hills, slopes, vegetation, shorelines, rivers, parks, streets, bridges, walls, residences, commercial buildings, transit stops and tracks, and so forth. These urban features are composed, by humanity and nature over time, to establish the urban character. The contemporary threats to the protection of urban heritage and to fostering its vitality into the future are myriad. HUL is a vehicle both for capturing and directing a reinforcement of traditional values of monument heritage and for framing and applying a wider framework for sustaining contemporary and future urban

Florence Charter on Historic Gardens (1982), Fig. 1 Vienna panorama (O'Donnell & May 2005)

Florence Charter on Historic Gardens (1982), Fig. 2 Ifugao Rice Terraces, Philippines (O'Donnell, Nov 2012)

heritage values. It encourages stewardship by diverse urban actors in a collaborative, iterative process. HUL signals a scale shift that embraces historic urban cores and the territory around them, urban and rural. This evolution of foundational concepts imbedded in the Florence Charter demonstrates over 30 years a transition from precious garden and parks to cityscape and townscape, where gardens and parks are elements within a continuous urban context, all of which has heritage value and intangible and tangible heritage resources.

Another cultural landscape relevant evolution within cultural heritage preservation activity is the emergence of cultural routes and regional itineraries of large areas or multiple sites. Recognizing linear corridors of heritage value, such as the Silk Routes of ancient trade of transboundary resources and the 150 km Quebrada de Humahuaca that follows the line of the Inca Route, Argentina, among others, captures the heritage of corridor landscapes marked by human transportation and settlement uses. While the Agave Landscape and Ancient Industrial Facilities of Tequila, Mexico, a site of nearly 35,000 ha, the five regional sites of the Ifugao province Rice Terraces of the Philippine Cordilleras, the tentative listed Cape Winelands Cultural Landscape of South Africa, and many other agricultural landscapes bring forward regions that embrace long traditions of farming, crop production, and related settlements as integrated land-based cultural resources (Fig 2).

The recognition of large-scale heritage corridors and regional itineraries embraces landscapes of place and humanity, living and evolving or relict, where archeological resources abound.

There are 91 cultural landscapes inscribed as World Heritage cultural property and 7 as mixed properties. This small group of mixed properties, which are recognized for both outstanding cultural and natural resources, opens another avenue for consideration. In cultural landscapes, we find the intersection of humanity and nature. At a 2004 US ICOMOS Symposium, a declaration on heritage landscapes, which embody cultural and natural resources, was prepared that captures a pressing issue in the realm of cultural landscapes and the future of human society: "There is a convergence of natural and cultural values in the landscape, and a growing recognition that the traditional separation of nature and culture is a hindrance to protection, and is no longer sustainable. Further, heritage landscape protection is required at the local, national and global levels in order to transmit these universally valuable heritage resources to future generations... With this declaration, we call for increased commitment to the gamut of preservation and conservation planning and management efforts to preserve the universally significant heritage landscapes of our planet" (2004, US ICOMOS, Natchitoches Declaration on Heritage Landscapes). One of the core challenges of the current day is for humanity to embrace a positive relationship with landscape in all its forms. As stated in the World Heritage Operational Guidelines, "Cultural landscapes often reflect specific techniques of sustainable land use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Protection of cultural landscapes can contribute to modern techniques of sustainable land use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land use supports biological diversity in many regions of the world" (UNESCO 2012: 98, item 9). Cultural landscapes we live in, enjoy, and learn from each day are significant cultural resources expressing historic human endeavor and the qualities of place with import for tomorrow. By addressing the cultural value of gardens as the combined works of humanity and nature, the Florence Charter began the steps on the path we tread today. Cultural landscapes are heritage resources at the junction of our global future.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Landscapes
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Urban Heritage
- ▶ Urban Landscapes: Environmental Archaeology
- ▶ Zoning: Boundary Areas and Buffer Zones

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Folorunso, Caleb Adebayo

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Folorunso, Caleb Adebayo, Fig. 1 Bayo Folorunso, Adelaide, Australia

Basic Biographical Information

Caleb Adebayo Folorunso (Fig. 1) was born on 13 April 1956. He attended Oyan Grammar School for his Secondary education and the famous Igbobi College for his Higher School Certificate. He graduated from the then Department of Archaeology, University of Ibadan, in 1979 with a Bachelor of Arts honors degree with Second Class Upper Division Certificate. He completed his Masters in the same department in 1981 before proceeding to the Universite Paris I Sorbonne in France for his doctorate degree program which was successfully defended in 1989. Caleb Folorunso also has a certificate in African archaeology from the Universite Libre de Bruxelles, Belgium, under the Erasmus program in 1989.

Major Accomplishments

Professor Folorunso's contributions to African archaeology centered on four main themes, ethno-archaeology, historical archaeology, cultural resource management, and archaeology and tourism. He has written over 30 journal articles and has contributed more than 20 chapters in books. His contribution has not been limited to teaching and research as he has supervised over 15 Master's Degree dissertations and six Ph.D. theses. Three of his former doctoral students are now associate professors in Universities in Nigeria while the rest are also occupying research positions in the Universities.

Professor Folorunso served as Head of Department of Archaeology and Anthropology for 10 years, 1995–1997, 2002, and 2005–2010. His tenure witnessed tremendous infrastructural growth coupled with a strong support for the department by the university authority in terms of equipment and facilities. The scholar is currently the chairman of University of Ibadan Senior Staff Housing Committee, a member of Senate, member of several academic boards, and a member of Appointment and Promotions Panel in the University of Ibadan since 1993.

Adebayo Folorunso is one of the most visible African archaeologists based on the continent. He is the Vice-President of the World Archaeological Congress which he has been occupying since 2008 when he was elected at WAC 6 in Dublin Ireland. Before then he was for a decade, the Senior Representatives of WAC for the West African Region. For his invaluable contributions to the organization, Folorunso was given a life membership award of WAC since 2004. Other distinctions include General Secretary, West African Archaeological Association, 1994–1996; Business Manager, West African Journal of Archaeology, 1989–1999; and a member of the advisory board Nigeria Heritage, a journal of the National Commission for Museums and Monuments. He is a member of several editorial boards including archaeologies, a journal of the World Archaeological Congress, Journal of the Environment and Culture, and Journal of African Diaspora and Heritage.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ World Archaeological Congress (WAC)

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Foraging to Farming Transition: Global Health Impacts, Trends, and Variation

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Introduction

Among the most important developments in the history of our species was the transition from a dietary focus based exclusively on hunting, gathering, and collecting wild plants and animals to a diet based in whole or in part on domesticated plants and animals (Gremillion 2011). This development is especially profound because it laid the foundation for the world we live in today, including the rise of complex societies, urbanization, dramatic population increase, and establishing conditions for the appearance and spread of various infectious diseases (sometimes as epidemics), decline in nutritional quality, increase in interpopulation conflict, and the appearance of a plethora of other health and well-being issues now present and anticipated for the foreseeable future.

The transition to farming and domestication generally is all the more remarkable when one considers that the shift took place in just the last 10,000 or so years of the 6–7 million years that humans and humanlike ancestors have been inhabiting the planet. The shift to farming began some 10–12 thousand years ago by a few human groups in the Middle East. By 5,000 years ago or so, dependence on domesticated plants had developed in at least 10 primary centers in both the Old World and the New World and had begun to spread from these centers around the globe. Today, all of humanity is dependent to some degree on domesticated plants and animals for food. In this discussion, the human impacts of the foraging to farming transition – especially with regard to consequences for health and lifestyle – are highlighted using the study of human remains recovered from archaeological contexts.

Key Issues/Current Debates/Future Directions/Examples

There has long been a scientific interest in health outcomes in past human populations, especially with regard to the origin and history of specific diseases, such as leprosy, syphilis, and tuberculosis (Buikstra et al. 2012). For much of the history of paleopathology – the study of ancient diseases – the interest in this topic has been largely in diagnosis in either individual skeletons or limited collections of skeletons from archaeological localities. Today, the prevailing focus has been in documenting and interpreting health outcomes based on the study of collections of remains from localities and regions in order to understand population variation in health. It is this population orientation coupled with broad-based temporal and spatial comparative analysis of series of human remains that has helped to open up new perspectives about the history of health and well-being (Ortner 2003). These kinds of investigations have been crucial in developing a more informed understanding of etiology of disease and health conditions. In part, bioarchaeologists strive to understand health for addressing issues relating to major adaptive transitions, such as those associated with dietary change, settlement pattern shifts, and alterations in living circumstances generally. The foraging to farming transition is probably the most comprehensively investigated issue addressed by bioarchaeologists, in part because it reveals some common patterns globally. On the other hand, it has also revealed considerable variation in health and well-being that is likely related to highly localized circumstances and conditions.

In the 1970s and 1980s, a small group of biological anthropologists recognized the fund of data that the study of human remains could provide for drawing a better understanding of the foraging to farming transition, especially with regard to assessment of health as a measure of adaptive success (or failure). For example, in a number of settings in North America, authorities reported increased prevalence of pathological conditions, reduced stature, and other indicators, reflecting poorer health and elevated stress in later farming populations compared to earlier foragers or incipient farmers (e.g., see Stout 1978; Goodman et al. 1980; Larsen 1982; Cook 1984; Rose et al. 1984). Similarly, other early studies revealed evidence of impacts of food and food preparation technology on masticatory function and craniofacial morphology (e.g., Carlson & Van Gerven 1979). These investigations provided the basis for the development of the general hypothesis that the shift from a lifeway based on foraging to farming occasioned a worldwide decline in health and quality of life.

The early studies stimulated the further investigation of the costs and consequence of the foraging to farming transition (and other forms of economic intensification) in settings around the world. These investigations of various indicators of health and lifestyle (Table 1) reveal some common trends in comparison of earlier foragers and later farmers in a range of settings worldwide (Cohen & Armelagos 1984; Larsen 1995, 2003; Cohen & Crane-Kramer 2007; Mummert et al. 2011). This record is dominated by the generally better context for and study of larger samples of skeletons in North America than in most other areas of the world. In view of the North American record, a number of key trends emerge that are repeated in some (but not all) settings in other continents where archaeological human remains have been studied. Indeed, the scientific literature for these continents is far more comprehensive now than it was just 10 years, especially in Asia (e.g., Domett 2001; Oxenham & Tayles 2006; Perry 2012; Pechenkina & Oxenham 2013; Temple & Larsen 2013). Nevertheless, skeletal samples are either nonexistent or poorly studied for large regions of South America, Europe, Asia, and Africa (and see discussions by various authors in Steckel & Rose 2002; Cohen & Crane-Kramer 2007). Viewed collectively, however, the record shows a picture of increasing morbidity, poorer health, and generally deteriorating conditions and quality of life as human populations became increasingly dedicated to farming.

What do we now know about human impacts in relation to the transition from foraging to farming and its biological impact? Health

Foraging to Farming Transition: Global Health Impacts, Trends, and Variation, Table 1 Skeletal variables used to characterize health and lifestyle in archaeological contexts[a]

Variable	Cause/condition
Health	
Dental caries	Carbohydrate consumption (sugars, starches)
Periodontal disease	Poor oral hygiene in carbohydrate-rich diet
Antemortem tooth loss	Periodontal disease, dental caries
Enamel hypoplasia	General physiological stress under poor living conditions
Enamel microdefects	General physiological stress under poor living conditions
Dental asymmetry	General physiological stress under poor living conditions
Tooth size	General physiological stress under poor living conditions
Growth rates	General physiological stress under poor living conditions
Adult height	General physiological stress under poor living conditions
Cribra orbitalia and porotic hyperostosis	Iron deficiency of various causes
Periosteal reaction/ inflammation	Infection or trauma
Scurvy	Vitamin C deficiency
Rickets/osteomalacia	Vitamin D deficiency
Leprosy	Specific bacterial infection
Tuberculosis	Specific bacterial infection
Treponematosis (venereal and nonvenereal)	Specific bacterial infection
Lifestyle/activity/workload indicators	
Osteoarthritis	Repetitive loading of articular joints
Cross-sectional geometric properties	Continuous loading of limb bones involving bending/ torsion

[a]This list is not exhaustive. See Cohen & Crane-Kramer 2007; Steckel & Rose 2002; and Ortner 2003 for detailed explanation and additional variables

outcomes reflect two circumstances. First, they reflect the properties and nutritional quality of kinds of foods consumed, especially of the domesticated plants. For example, the major plants – maize, wheat, and rice – are starches. Dietary focus on starches promotes dental caries (tooth decay), periodontal disease, and oral health problems generally (Larsen 1997; Hillson 2008). Second, farming societies tend to live in more permanent, densely crowded settlements. In contrast to foragers, who tend to move on a regular basis and have low population size and density, this kind of environment promotes the maintenance and spread of infectious disease (Larsen 1997; various in Cohen & Crane-Kramer 2007). Some of the best evidence for this process is in North America where there is an impressive body of evidence to show increase in various specific and nonspecific infectious diseases and other health conditions (e.g., treponematosis, dental caries, periosteal reactions), nonspecific stress indicators (e.g., enamel hypoplasias, cribra orbitalia, porotic hyperostosis, stature), and workload/activity impacts on articular joints (osteoarthritis) and skeletal adaptation involving work and activity (cross-sectional geometric analysis of long bone morphology). Generally speaking, for example, in North America and some settings in South America, the increased focus on maize and some other plant domestics resulted in significant declines in oral health, and the associated settlement changes involved decrease in mobility substantial evidence for disease and illness.

Bioarchaeological analysis inferring level of workload and activity reveals highly variable results (Larsen & Ruff 2011), as do analyses of indicators of health and lifestyle (e.g., various authors in Cohen & Crane-Kramer 2007; Pinhasi & Stock 2011). That is, in some regions, biomechanical properties known as cross-sectional geometric properties increase (e.g., Tennessee River valley) but decrease in others (e.g., coast of the southeastern US Atlantic). In the Georgia coast, dramatic increases in osteoarthritis and skeletal robusticity following European contact suggest the intensification of farming practices (Larsen et al. 2001; Larsen & Ruff 2011). Other regions of the world show similar trends as North America and South America, especially in regard to a general deterioration in health in nearly all places where plant domesticates were adopted and consumed with some degree of dominance in diet.

The growing record of bioarchaeological data is beginning to reveal some important trends that show variation in health, with some regions

displaying evidence of less dramatic changes in health than in other regions. Presumably, the pattern of variation reflects geographic differences in the types of plants that were produced and consumed (various in Cohen & Crane-Kramer 2007). For example, in East Asian rice farmers, there is significant presence of dental caries and periodontal disease (e.g., Douglas & Pietrusewsky 2007; Temple & Larsen 2007). On the other hand, a number of Asian rice farmers have relatively low caries prevalence, especially when compared to maize farmers in the Americas. Some authorities argue that rice is less cariogenic than maize (Sakashita et al. 1997; Tayles et al. 2000; Domett 2001; Oxenham 2006; Pietrusewsky & Ikehara-Quebral 2006; Domett & Tayles 2007). In at least one setting where rice production and consumption increased, there is a significant decline in prevalence of dental caries (Domett 2001). Similarly, although diachronic comparisons of foragers and farmers show clear reduction in adult stature (an indication in reduced health), there are some exceptions showing no change or increase in stature (see Mummert et al. 2011).

The record for links between population aggregation and health outcomes in early farming societies is also highly variable. There are numerous instances of increase in cribra orbitalia and porotic hyperostosis (indicators of iron deficiency anemia) and periosteal lesions (infection) in farmers relative to earlier foragers (Larsen 1995; Cunha et al. 2007; Pechenkina et al. 2007; Klaus & Tam 2009), but the frequency of these conditions is low in a number of settings in Southeast Asia (e.g., Domett & Tayles 2007; Douglas & Pietrusewsky 2007) and Western Asia (e.g., Hillson et al. n.d.). Community health in late prehistoric populations in eastern North America was highly variable (Milner 1991). The variable pattern of infection prevalence also points to a high degree of diversity between human groups occupying very different landscapes and physiographic zones, ranging from highly fertile river bottoms to marginal uplands or coastal regions (various in Steckel & Rose 2002; Cohen & Crane-Kramer 2007).

Analysis of patterns of osteoarthritis and skeletal robusticity (cross-sectional geometry of limb bones) reveals evidence relating to workload and activity patterns in the foraging to farming transition and in populations who intensified their farming practices. Osteoarthritis presents a highly variable record, with some regional analyses revealing declines, others showing no change, and still others showing increases to varying degrees (Cohen & Armelagos 1984; Bridges 1992; Larsen 1995; Lambert 2000; Steckel & Rose 2002; Cohen & Crane-Kramer 2007; Larsen & Ruff 2011). A complementary bioarchaeological record of workload and activity is available from long bone biomechanical analysis. This record reveals a pattern of decline in skeletal robusticity. This record, however, is highly region specific reflecting variation in degree of sedentism, terrain, climate, the kinds of plants grown, and degree of commitment to domestication (see Ruff 2008, 2010; Larsen & Ruff 2011; Lieverse et al. 2011; Stock et al. 2011).

There is a decline in skeletal robusticity in Neolithic and other early farming societies compared to foragers, with some exceptions (e.g., Bridges 1989). The record also reveals, however, that intensification of farming shows a reversal of a trend for decrease in skeletal robusticity in at least one locality (Larsen & Ruff 1994). There is considerable variation in the rate and timing of decline in skeletal robusticity in comparison of the skeletons of men and women. For example, in the Nile valley, activity in women appears to have decreased later or only minimally in comparison with men (Stock et al. 2011). This pattern reflects the degree of variability in temporal and spatial patterns of sexual dimorphism in comparison of a broad range of biomechanical analyses emerging around the globe. These male–female differences in timing and pattern of skeletal robusticity are no doubt related to local circumstances and strategies of plant and animal exploitation. Most settings analyzed by bioarchaeologists reveal that while males clearly had a role to play in plant production, they were nevertheless largely responsible for hunting, sometimes involving long-distance travel, whereas females were likely responsible for tending crops and preparation of food. It seems

likely, then, that women were more closely associated with the village or habitus than males.

Much of the bioarchaeological record described above represents a cost assessment of health for populations that adopted agriculture. The record of health in many places where the farming transition took place, however, seems to contradict the record emerging from paleodemographic reconstructions for the period. That is, the record of health shows one of general decline, whereas the record of demography shows one of increasing fertility and population growth – often remarkably so – during and/or following the adoption of agriculture (Sattenspiel & Harpending 1983; Buikstra et al. 1986; and see applications by Bocquet-Appel & Naji 2006; Bocquet-Appel & Bar-Yosef 2008; Bocquet-Appel 2008; Lambert 2009). A central goal of bioarchaeology is to assess the relative success of a population to maintain homeostasis under different environmental circumstances, including the foods eaten and the degree of success in acquiring them (see Lambert 2009). The skeletal indicators discussed above track the ability of a population to maintain homeostasis. The biological costs seem to be at odds with the increase in enhanced reproductive outcomes, with the latter showing indication of success, at least as it relates to survival and increased birth-rates (Armelagos et al. 1991; Lambert 2009). The implication is that health should not be regarded as a prime mover for the rise of agriculture. Rather, declining health was a consequence of the increase in population and change in the kinds of foods consumed. It would seem, therefore, that humans can live in deplorable conditions involving more disease and debility, but not so much as to have a negative impact on reproductive success.

In summary, the transition from foraging to farming had clear disadvantages and advantages for our species. The remarkable increase in population in the last 10,000 years speaks to the evolutionary success of humankind. The increase in disease and morbidity reveals the health and behavioral costs of our evolutionary success. The balance of cost and success is the story of our species, a story that will likely continue for the long term.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Skeletal Biology: Definition

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Forensic and Archaeological Analyses: Similarities and Differences

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Introduction

Methodology in the analysis of human remains varies considerably in relation to context and problem orientation. Human remains are found in a myriad of contexts, with different levels of completeness and with varying degrees of preservation. All of these factors influence approach and the types of tests that can be utilized in analysis. The central problem to be examined also shapes methodology selection.

Definition

Forensic Analysis

In forensic applications, the particular issues presented by each case largely dictate what procedures should be employed. Forensic anthropologists bring awareness of the range of approaches possible to each issue. With this perspective, they then can select the appropriate techniques to solve the problems presented by each individual case.

Methodology selection in forensic work begins with recovery. Knowledge that remains are buried within a discrete location calls for archaeological techniques that remove the surrounding soil, leaving the remains and associated evidence in situ. Thorough documentation employing photography, mapping, and note-taking is required.

If remains are known to be buried but the exact location is unknown, remote sensing techniques may be called for. These can include ground-penetrating radar, electromagnetic testing, soil resistivity, and even manual probes. The terrain and topography can be key factors in selecting approaches. Remote sensing methods excel in rural areas with homogeneous soils and topography.

Of course, human remains can be found in many different environments and each requires thoughtful consideration of appropriate recovery techniques. Skeletonized remains located on the ground surface do not require the archaeological approaches discussed above but still call for careful documentation and removal of debris so that evidence position can be clearly ascertained. Marine environments present special challenges and may dictate use of diving equipment. Recovery in all situations demands proper documentation, packaging, and general evidence control, ensuring the integrity of the chain of custody.

Key Issues

Human Versus Nonhuman

Recognition of human remains usually can be accomplished with visual examination by a skilled practitioner. Challenges surface with fragmentation and/or evidence of extensive postmortem (taphonomic) alteration. Scanning electron microscopy/energy dispersive spectroscopy (SEM/EDS) can be useful to distinguish fragments of bone or tooth from other materials. Histological techniques examining internal structure at the microscopic level sometimes can distinguish nonhuman fragments from those of humans. Protein radioimmunoassay (pRIA) offers a procedure that can determine species of bones and teeth. The nature of the evidence, financial resources, and the medicolegal problem dictate which of the above approaches are employed.

Age at Death

The choice of methods to use in the estimation of age at death depends upon the general life stage of the individual. For neonates and very young infants (0–2 years), bone size provides the best information. If the small bones are relatively complete, measurements can be taken and utilized in regression equations to estimate body length. Chronological age can then be estimated by using appropriate population-specific data on the age correlation with body length.

For older infants, children, and adolescents, bone size can provide useful information as well, but if present, teeth represent the most accurate age predictors. Although dental eruption proffers some information, the most accurate estimates are derived from dental formation. Selection of which published dental standards to utilize depends upon the likely ancestry of the remains and the particular teeth present.

Many means exist for adult age estimation depending upon the evidence present and the general age of the individual (young or old adult). Most seasoned practitioners utilize all of the approaches that are suitable for the evidence recovered and then develop a reasoned interpretation. These applications may involve teeth as well as bones. They can include morphological assessment, measurement, and/or microscopic and radiographic techniques. Key areas of the skeleton examined include the sternal rib ends, pubic symphysis, vertebral bodies, long bone joint surfaces, teeth, auricular area of the pelvis, long bone internal structure (both microscopic and macroscopic), and cranial sutures.

Sex Estimation

Approaches to sex estimation usually involve visual examination of comparative adult morphological features, especially those on the pelvis. Metric techniques also are available including custom discriminant function equations. These morphological methods are not applicable to juvenile remains because of the minimal expression of sexual dimorphism in them.

Recently, molecular processes for sex determination have been employed as well. These approaches can determine sex in both adult and immature remains and also in fragments that allow sufficient DNA recovery. Molecular

procedures are more time-consuming and costly but offer definitive determinations in cases where sex assessment is crucial. Thus, if the pelvis is present and well preserved, morphological techniques of pelvic assessment would likely be chosen. If the pelvis is not present, size of other bones should be considered with the realization that only those extremely robust (male) or gracile (female) offer definitive information. Molecular techniques comprise the methodology of choice with fragmentary or immature remains or any situation in which accurate determination of sex is extremely critical.

Stature Estimation

Estimates of living stature can be useful in building the biological profile of a recovered skeleton. Regression equations derived from various population samples are available to aid in this process. Determining the appropriate equation to use depends upon the bones recovered and their likely ancestry. When multiple equations are possible, selection should be driven by their relative accuracy.

Ancestry Estimation

Ancestry evaluation in a forensic context can include a variety of methods such as morphological assessment of bones and teeth as well as metric discriminant function analysis. Recovered evidence and its context must influence decisions on the approach and interpretation method. Analysis of ancestry calls for an understanding of the social/historical dimensions of locally employed racial categories as well as representation/sampling issues of the metric approaches.

Time Since Death

Evaluation of time since death can include methods of morphological assessment as well as more analytical approaches. Since the extent of tissue preservation is highly variable and context dependent, objective techniques such as radiocarbon analysis can prove useful. The use of radiocarbon analysis with special attention to the modern bomb curve can distinguish ancient from modern remains. This type of analysis can even clarify the birth and death dates for individuals in some age at death and chronological categories, granted that the appropriate tissues are preserved.

Other Issues

Multiple forensic techniques are available for personal identification, assessment of pathological alterations and treatment of disease, facial imaging, taphonomic (postmortem) factors, and evidence of foul play. Like other areas of forensic application, choice of methodology depends upon the particular evidence recovered and the specific question being addressed.

Cases in forensic anthropology vary extensively in the problems they present. An unknown skeleton recovered from any context usually requires a full analysis with the general goal being construction of the biological profile of a missing person that might lead to identification. In contrast, some cases that arrive in forensic anthropology laboratories may represent previously identified individuals but trauma analysis may be required. Some requests for examination focus specifically on such techniques as facial approximation, photographic superimposition, or identification of particular evidence.

In studying human remains from archaeological contexts, skeletal biologists employ a similar logic in methodological choice. Selection is problem oriented and shaped by the nature of the recovered evidence.

In paleopathology, proper employment of differential diagnosis techniques is critical. Microscopic and radiographic procedures frequently are utilized to assist diagnosis and interpretation. Molecular attempts to identify the residual DNA of particular pathogens represent an exciting new development with great potential to sharpen understanding of the history of disease.

Paleodemography relies extensively on the methodology of age and sex estimation outlined above in regard to forensic applications. Consideration of appropriate statistical approaches and sampling issues are key factors.

Biological distance studies rely upon varied methodology of measurement, morphological assessment, population sampling, and statistical procedures. Recent advances in instrumentation

and computer software development have enabled three-dimensional morphometric assessment providing more penetrating interpretation. Ancient DNA analysis offers a genetic approach to issues of past population relationships. Methodology assessment in this area of skeletal biology is influenced by sample preservation and availability, as well as cost factors and accessibility to appropriate equipment and facilities.

The field of biomechanics presents the opportunity for understanding patterns of human physical activity as evidenced in skeletal remains. Studies of biomechanics rely extensively on methodology in radiographic imaging and computer modeling. Such technological advances can aid in providing appropriate methodological choices in this field.

Although analyses of human skeletal remains vary greatly in the different areas of application and research, several themes are apparent. The extent of tissue preservation and context of recovery represent key factors in methodology selection. The particular problem being investigated largely determines the selection of techniques used. While many techniques are routinely employed, there is no standard protocol for all applications. Investigators must be aware of the range of possible methods available and wisely select those that are most useful for each specific application. Technology continues to advance rapidly offering skeletal biologists a growing number of choices.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Bone: Chemical Analysis
- ▶ Bone: Histological Analysis
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Demographic Transitions
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Excavation Methods in Archaeology
- ▶ Facial Approximation and Craniofacial Superimposition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Radiocarbon Dating in Archaeology
- ▶ Sex Assessment
- ▶ Stature Estimation
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

Further Reading

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Forensic Anthropology and Archaeology in Disaster Response

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Introduction

Forensic anthropology has continued to demonstrate its usefulness to the field of disaster response since the publication of T. Dale Stewart's *Personal Identification in Mass*

Disasters (1970). Today, the increasing numbers of specialists in this area are applying their knowledge, skills, and research abilities to all aspects of disaster victim recovery and identification, personal effects management, and family assistance (Sledzik 2009).

Victims of mass disasters are often difficult to identify due to extensive trauma, fire, and other modifying forces associated with these types of incidents. Depending on the scale of the disaster, human remains may also be in advanced stages of decomposition by the time responders can extricate them from the scene, thus adding to the overall suite of identification challenges. In these circumstances, bereaved family members cannot be expected to provide reliable visual identifications of remains; instead, appropriate scientific practices must be employed.

Although the legal requirement for conducting identifications resides with the medicolegal authority in the jurisdiction where the disaster occurred, it is possible for a high-volume surge in fatalities, associated with a specific incident, to overwhelm the capabilities of these systems – particularly at smaller medical examiner or coroner's offices with limited resources. Such challenges require a multidisciplinary response that can include the assistance of forensic anthropologists experienced in disaster recovery operations, human remains and evidence processing, and the identification of individuals whose remains are severely fragmented, burned, decomposed, or otherwise unrecognizable (Kontanis & Sledzik 2008; Sledzik 2009).

Definition

Forensic anthropology plays a comprehensive role across the three critical areas of disaster response: the recovery scene, the temporary morgue, and interactions with families (Sledzik 2009). Trained in the principles and techniques of archaeology, with an extensive background in taphonomy, human osteology, and trauma analysis, anthropologists routinely work alongside medicolegal and forensic practitioners in the fields of pathology, dentistry, radiology, fingerprint analysis, and molecular biology (i.e., DNA). When requested to attend a scene, the work of an anthropologist is primarily to assist and support the medicolegal authority responsible for victim recovery, identification, death certification, and the final release of remains – all areas of critical importance to family members and to the settlement of insurance claims and estates.

Key Issues

Disaster scenes can be broadly categorized as having resulted from natural phenomena (e.g., earthquake, tsunami, tornado); an accident (e.g., vehicle collision, pipeline explosion, stadium collapse); or criminal activity (e.g., shooting, bombing). The recovery contexts that result from such events are complex, presenting commingled biological remains, personal effects, and other diagnostic evidence that can be distributed over areas ranging from meters to kilometers. These immediate challenges are only exacerbated by the compressed timeline that all medical examiners/coroners face as they attempt to balance the needs and concerns of family members and society with their overall medicolegal responsibility for victim recovery and identification, and in a "zero defect" operational environment (Dirkmaat et al. 2001; Sledzik 2009).

Victim identification begins with the recovery effort at the disaster scene. Regardless of the type of incident encountered (natural, accident, or criminal), preserving the overall integrity of the scene's spatial and temporal context is of paramount concern. Subsequently, the shared core objectives that drive investigators at any mass fatality incident are very similar: locate the scene, define its maximum dimensions, and if possible, clearly delineate and secure its boundary line; identify, number, document, and collect all physical and contextual evidence; and transfer all such evidence to the proper medicolegal authority, in a manner that does not harm its probative value or the chain-of-custody.

Appropriate strategies for search and recovery operations ensure that all areas throughout the disaster scene are surveyed and that human

remains, associated personal effects, and other probative evidence are systematically detected, recorded, and collected using scientific methods and techniques. The quality of work at the recovery scene can influence the overall success of the victim identification process inside the morgue. Thoughtful practices on scene can mitigate additional disturbance of human remains and evidence by responders and the accidental loss or destruction of evidence. Subsequently, practitioners are developing and implementing more consistent operating procedures; reporting on the accuracy, repeatability, and level of estimated uncertainty; and defining the quality assurance and quality control processes employed.

Today, systematic approaches designed to maximize search coverage and effectiveness are being codified almost exclusively within the discipline of forensic anthropology. The development and validation of these standardized protocols – specifically in measures of survey completeness, precision mapping systems and technologies, and spatial data collection, visualization, and analysis – are firmly rooted in the study of geographic surfaces and field archaeology (O'Sullivan & Unwin 2003; Dirkmaat 2012). Applied science programs at institutions like Mercyhurst University, the University of Sydney, the Victorian Institute of Forensic Medicine, and Istanbul University represent just a fraction of the total number actively supporting worldwide advancements in survey methods, body documentation techniques, and recovery protocols for disaster scenes. In addition, the International Committee of the Red Cross (ICRC), the International Commission on Missing Persons (ICMP), and the international policing organization (INTERPOL) have all created guidelines for the recovery of victims from mass fatality contexts.

Among the first tasks confronting any disaster response is determining the scope of the incident and the context of the recovery scene. In order to effectively respond, the incident command structure needs to gather information (as soon as possible) about what happened, where the incident occurred, the pertinent environmental conditions, an estimated number of victims and fatalities, the potential health and safety hazards associated with the scene, and any immediate security issues. These data, in turn, help shape the planning effort and the mobilization of personnel and resources for human remains recovery and identification, personal effects management, and other evidence collection and investigation activities.

While there have been significant advances in a number of technological areas associated with disaster response, the implementation of new, higher-resolution remote sensing instruments in some contexts is one of the most useful innovations being applied during initial evaluation of recovery scenes. A reconnaissance survey, similar to the type used in archaeological fieldwork, provides a systematic and comprehensive approach for defining and securing the scene. The goal of this survey is to rapidly evaluate the scene's general size, orientation, and complexity at the earliest moment possible, in order to guide operational planning efforts and develop the most appropriate recovery strategy.

Integrating overhead imagery with data collected on the ground (during initial walkthroughs) can provide a more complete and accurate understanding of the incident area as a whole and the spatial distribution of the victim recovery scene across the landscape. In modern response work, the traditional walkthrough is being supplemented (if not preceded) by aerial reconnaissance of various kinds – e.g., vertical and oblique photography, overhead satellite imagery, and even active types of remote sensing, such as LiDAR. A key advantage shared among these techniques is the fact that they are nonintrusive, thus the potential for scene disturbance or contamination is nearly eliminated. Large-scale assessment and interpretation of damage areas, evidence and wreckage distributions, and scene accessibility is enhanced by the advent of spatial analysis and visualization software capable of layering and displaying massive amounts of remote sensing and other geo-referenced data via Geographic Information Systems (GIS). These systems integrate data collected by various means, at different times, and across a range of scales (Greene 2002).

The context of a recovery scene is the basic interpretive framework used by forensic

anthropologists in the field; the same concept is fundamental to medicolegal, and to some extent, accident investigations (Dirkmaat 2012). The position of and spatial relationship between human remains, personal effects, and other physical evidence is the key to understanding what happened and to reconstructing the different factors that contributed to the event.

The location of evidence and the spatial associations that exist between items of evidence contained within the scene, or between evidence and its surrounding matrix, help to create statistical models that assist with some of the more challenging disaster victim recovery tasks. Among these are models for identifying the full horizontal and vertical limits of scene boundaries, maximizing coverage of search areas, quantifying the effectiveness of various survey patterns and regimen, and interpreting scene context through spatial analysis of evidence distributions (Dirkmaat et al. 2008; Dirkmaat 2012).

As practitioners, Dirkmaat and Hochrein have, in particular, recognized that a significant number of the problems that arise in disaster scene recovery work are inherently spatial in nature; therefore, exacting methods in survey, mapping, and evidence collection, specifically adapted for use in either open or confined mass fatality scenes, can help mitigate post-incident commingling and damage of human remains and other evidence (Dirkmaat 2012). Although protecting the spatial integrity of these scenes can be difficult, it is indeed necessary. As an example, during the transition from life-safety to recovery operations, responders often have to move victims, property, and other potentially diagnostic evidence. Non-transportable, contextual data are subsequently lost, unless they can be documented.

Wind, water, and other geomorphic agents – completely apart from human activity – present some of the most dynamic forces affecting the spatial integrity of evidence at scenes. Aircraft accidents into steep, mountainous terrain have resulted in landslides capable of obscuring large portions of wreckage, as was the case with Avianca Flight 410, lost near Cucuta, Colombia, in 1988 (Levinson & Granot 2002: 80). By contrast, impact into water may involve a combination of high and low-energy transport mechanisms. These recovery scenes can become dispersed over a distance of seabed, or along the bottom of a river, into a secondary context by the movement of the water (e.g., waves, tidal currents, flow volume).

Although the interpretive value of three-dimensional spatial patterns and postdepositional formation processes has been widely understood by the geological and archaeological sciences, the same awareness is only recently gaining acceptance among medicolegal investigators, largely through their increased contact with forensic anthropologists working in medical examiner/coroner settings (Crowder et al. 2012).

Arguably one of the greatest challenges presented by mass fatality scenes is the mixing together, or "commingling," of highly fragmented human remains. Tuller and colleagues (2008) have begun examining ways in which spatial analysis can assist in sorting out commingled remains using statistical methods, such as the nearest neighbor criterion. Although this application of spatial analysis and statistics is relatively new, the concept has been widely employed as a presumptive starting point in forensic anthropology casework, especially for scenes with multiple individuals deposited into complex assemblages (Tuller et al. 2008).

Traditionally, the function of the forensic anthropologist in the disaster morgue centered on triage and sorting tasks, as well as the documentation of hard tissue remains (Kontanis & Sledzik 2008; Mundorff 2008). The anthropology station represents just one stop along the high-throughput morgue operation. Complete post-mortem documentation follows a well-defined work progression from case admission processing and the assignment of a unique tracking number to photography, radiography, pathology, fingerprints, dental, and DNA sampling (Sledzik 2009).

A number of different evidence accountability and data management challenges must be addressed through sound quality control and assurance measures before the first set of

remains enters the morgue flow. As anthropologists have assumed greater management roles in disaster victim morgue operations over the past two decades, they have had to move beyond the limits of their forensic specialty and develop a better understanding of the effectiveness and efficiency of evidence tracking systems, the proper order of analytical stations, and what configurations best support the requirements of the broader medicolegal investigation. Redundant systems of data capture, with systematic verification checks, are also being modeled from professional survey and archaeological site work, and applied to help manage the overall quality and reliability of the documentation effort at the scene.

Effective management of the identification effort also demands a proactive role in family assistance on the part of the medicolegal authority. Anthropologists can assist with identifying the core needs of victims, family members, and their support networks; they help facilitate and coordinate the timely recovery and identification of victims and the return of personal effects; and they help explain the re-association and group remains processes to families and legal authorities. In some cases, the provision of family assistance is required by law; yet even when there is no formal requirement, local, state, and federal entities continue to provide information and guidance to the medicolegal community and to others affected by the incident.

Antemortem data collection – a critical factor in victim identification – hinges largely on contact with the families of those "unaccounted-for" individuals known to be associated with the incident. This process is complex and it requires a commitment of personnel and resources beyond the postmortem data collection effort being carried out in the morgue. Antemortem data can be influenced by several variables: the nature of the disaster (open, e.g., bomb blast in a shopping mall vs. closed, e.g., plane accident); the demographic profile of each respective decedent; and the availability, quality, and accuracy of the data (Kontanis & Sledzik 2008). Death investigators, mortuary personnel, and forensic anthropologists are among the specialists trained to conduct antemortem data collection interviews.

Positive identification of victims requires the comparison and reconciliation of antemortem and postmortem information. The threshold of certainty needed to move from a "circumstantial" to a "positive" identification, however, presents a complicated problem that medicolegal professionals confront daily. In a disaster victim context the potential for a misidentification can be magnified by the number of victims, the condition of their remains (fragmented, burned, etc.), the thoroughness of the recovery effort, the nature of the victim population (open vs. closed), the availability and quality of antemortem records, and access to DNA reference samples. Forensic anthropologists are examining likelihood ratios as a means of quantifying the strength of an identification (Steadman et al. 2006). Specifically, they are looking at the ratio between the likelihood that evidence of a unique biological characteristic (or set of characteristics) came from a particular individual, versus the likelihood that it came from a random, unrelated individual. In other words, what would be the probability of obtaining the evidence if the identification was correct versus the probability of obtaining the same evidence if the identification was incorrect? Figura (2011) has developed this concept further for its specific applications in disaster victim identification work. And recently, de Cosmo (2012) has devised a decision support tool designed to reduce subjectivity when using physical attributes to make identifications in these same types of contexts.

Future Directions

New emphasis is being placed on the use of validated scientific practices in disaster victim recovery and identification. This trend has been stimulated in part by the Supreme Court's rulings in *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993), *Kumho Tire Company v. Carmichael* (1999), and the Rule 702 Amendment (2001).

Daubert, in particular, has changed the rules on the admissibility of expert testimony in federal courts; expert witnesses are being required to provide an estimation of probability and to substantiate their assertions with methods that have been scientifically tested and validated (Dirkmaat et al. 2008). The National Academy of Sciences (2009), in the USA, has further underscored the Supreme Court's concerns, specifically citing a need for standards, guidelines, and best practices in human identification techniques (National Academy of Sciences 2009).

Significant variation in medicolegal and law enforcement systems across the country has prompted the development of best practices in death investigation. Just a few years after the *Daubert* ruling, the National Institute of Justice and the National Association of Medical Examiners in the USA began pushing for standardized operating procedures and checklists in the field of death investigation and in the performance of autopsies (National Academy of Sciences 2009). Refining the focus more specifically on mass fatality management issues, forensic anthropologists and other practitioners from the medicolegal and forensic communities have voiced a similar need for guidelines and best practices specifically in the area of disaster victim identification. In 2009, the Federal Bureau of Investigation (FBI) in the USA received funding to assemble a Scientific Working Group on Disaster Victim Identification. Although this group has no enforcement function, its efforts are intended to generate consensus among practitioners in disaster planning, response, and victim identification through the recommendation of best practices and an emphasis on quality control and assurance. These documents are made available for public review and feedback as a way to encourage maximum contribution and acceptance.

The growing membership of physical anthropologists within the American Academy of Forensic Sciences and the American Board of Forensic Anthropology is also reflective of an expanding interest in the medicolegal aspects of disaster response and victim identification. Traditional employment opportunities for forensic anthropologists at universities and other research institutes have expanded to include agencies focused specifically on mass fatality issues, human rights and humanitarian organizations; federal, state, and city medical examiner's offices; crime laboratories; emergency management departments; public health and safety offices; and the armed forces. In fact, the largest numbers of staff dedicated to the practice of forensic anthropology in the world today is the Central Identification Laboratory, comprised of multiple facilities run by the US Department of Defense and accredited through the American Society of Crime Laboratory Directors/Laboratory Accreditation Board.

Forensic anthropologists with technical expertise in archaeology are treating disaster scenes as large-scale death investigations requiring the use of scientifically validated field methods and techniques. As a result, their research is expanding rapidly into the wider application of spatial data analysis and visualization, mapping systems and technologies, and the quality assurance and control measures that define effective survey and recovery operations.

The accurate identification and efficient return of disaster victims to their loved ones is an integral part of the grieving process that transcends all cultural boundaries. In its current state of development, forensic anthropology and its use of standardized archaeological field procedures, has begun to take a new role within the framework of disaster response, providing medicolegal authorities with more consistent and reliable ways of detecting, mapping, and recovering victims. Amid the chaos of a disaster, it is only through comprehensive scene processing and interpretation that the complexity of the incident can be understood and articulated in a way that strikes an effective balance between the concerns of the bereaved and the responsibilities of the medicolegal authority.

Disclaimer The author is an employee of the National Transportation Safety Board. The views expressed are the personal views of the individual and do not necessarily represent the views of the National Transportation Safety Board or the United States Government.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Burned Remains in Forensic Contexts
- ▶ Commingled Remains: Field Recovery and Laboratory Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic Anthropology: Definition
- ▶ Forensic Anthropology: Investigating Human Rights Violations
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
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Forensic Anthropology: Definition

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Brief Definition of the Topic

Since the development of the discipline, forensic anthropology has been defined in different ways depending on the context (Blau & Ubelaker 2009). Initially defined by Stewart (1979: ix), forensic anthropology was seen as "the branch of physical anthropology which, for forensic purposes deals with the identification of more or less skeletonized remains known to be, or suspected of being human." In 1977, an official definition was provided by the American Board of Forensic Anthropology that defines forensic anthropology

as "the application of the science of physical or biological anthropology to the legal process. Physical or biological anthropologists who specialize in forensics primarily focus their studies on the human skeleton" (http://www.theabfa.org/).

More recently, the Scientific Working Group for Forensic Anthropology (SWGANTH) proposed a new definition: "forensic Anthropology is the application of anthropological methods and theory – particularly those relating to the recovery and analysis of human remains – to resolve legal matters" (http://www.swganth.org/index.html).

These definitions illustrate the wide role that forensic anthropology practitioners have been developing over the last 30 years: from an initial specific role analyzing skeletal remains to a wider contribution that today incorporates the archaeological recovery of human remains, the analysis of taphonomic processes and the analysis of perimortem bone trauma.

The expansion of the application of forensic anthropology also highlights the undefined boundaries of the discipline. This broadness sometimes creates confusion for lawyers and police forces in terms of what is possible to expect from a forensic anthropologist.

More recently, forensic anthropology has been applied to the investigation of human rights violations. Such work is redefining the role of forensic anthropologists in the identification process and their role in the collection and analysis of antemortem data.

It is worth mentioning that perceptions about the role of a forensic anthropologist differ from country to country. In some contexts, forensic anthropologists almost exclusively analyze skeletal remains in order to produce a biological profile; in other contexts, practitioners are involved in physical work at the crime scene, involving fleshed remains and bones; in others, they also incorporate the analysis of different kinds of trauma in the skeleton, complementing the work of the forensic pathologist, and in others, their work involves also the analysis of living people, in terms of age estimation of migrants, for example.

In conclusion, the traditional concepts that are usual to mention when talking about forensic anthropology, as "skeletal remains," "physical anthropology," "identification," and "biological variability", are increasingly expanding. A forensic anthropologist may work at the crime scene (survey, recovery, taphonomy, interpretation), at the laboratory (trauma, disease), and in antemortem data collection.

Finally, it is important to remember that a forensic anthropologist is primarily an anthropologist, someone with a wider background than a forensic odontologist or a forensic pathologist. This may be an advantage in the understanding and comprehension of processes in forensic contexts, where cultural and religious elements could play an important role.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Bone, Trauma in
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Investigating Human Rights Violations
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

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Forensic Anthropology: Investigating Human Rights Violations

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Introduction and Definition

Forensic anthropology and archaeology have significantly improved human rights work throughout the world, particularly in contexts where investigations are carried out following armed conflicts where state officials have perpetrated human rights abuses. International instruments set forth by the United Nations (UN) to prevent crimes against humanity, such as the Geneva Conventions, the Convention on the Prevention and Punishment of the Crime of Genocide, and the Convention for the Protection of All Persons from Enforced Disappearance, have set the groundwork for the increasing inclusion of forensic anthropology and archaeology in the search for legal, historical, and humanitarian identification purposes. These scientific fields use an important variety of methods for gathering and analyzing data. The physical evidence helps to establish human behavioral patterns that provide important clues about the most probable sequence of events.

Key Issues

Forensic anthropology and archaeology contribute to three main areas of the investigations of human rights violations: preliminary investigation, recovery, and analysis. These contributions in turn aid historical record keeping, that is, "getting the record straight," enforcing "the right to know" of surviving families, and the creation of new approaches in the "jurisprudence" pertaining to the interpretation of evidence of violations against International Humanitarian Law and International Human Rights Law.

Preliminary Investigation

> Every event generates its own patterns, which are the result of the interaction in time and space of the actors involved. To rebuild these patterns, it is necessary to determine who the actors were, what space they occupied, and how they interacted (EPAF 2008).

Unlike common criminal cases, the investigation of human rights violations typically occurs many years after the event. Consequently, the elements available to reconstruct the crime are limited. The objective of a preliminary investigation is to determine the nature and extent of the crime and to define the number of victims. Open and closed sources as well as interviews with relevant witnesses and family members can be used to determine details about the crime under investigation.

Antemortem data (AMD) provide important social and biological information about the victims when they were alive that can be compared with information obtained from an examination of the deceased. AMD is generally collected from the victim's next of kin, spouse, partner, friend, or simply the person that last saw the victim alive. This serves both to underline that victims are more than just names on lists – that they are people who need to be individuated as part of the search strategy – and to assist in delimiting the boundaries of an event, the who, where, when and how an event was created, and how many victims it involved. Separating events in order to refine the search strategy is essential.

One of the first and most important steps in an investigation is to compile all the information that exists about the case: files, testimonies, maps, etc. In extrajudicial killings, investigators generally know who the victims are, but they need to look for patterns among the victims, such as age, gender, or occupation since clues as to why they became victims in the first place could be found. In forced disappearances, it is

necessary to determine the numbers and identification of the victims. This step helps prepare a strategic plan for investigation.

Sources of information may be oral or written. Oral sources include testimony of family, friends, and witnesses of the crime. There are two types of written sources: open and closed. Open sources are those to which everyone has access, for example, newspapers, public documents, and court documents. Closed sources are classified or restricted documents such as police reports that require special permission to view. A thorough preliminary assessment of all available evidence is undertaken in order to try and make sense of recognizable patterns, for example, if the victims were all young males, if the victims all belonged to a specific religious or political group, and/or if all the victims were killed in the same way. Conclusions must be made if it is not possible to identify any patterns. Similarly, the circumstances of a disappearance must also be investigated. Who took the victim? Who went missing with the victim? Was the victim seen by a survivor? This information helps determine where to search for the remains of the victim.

The selection and execution of victims in extrajudicial killings executions typically occurs in the same place, since the intention is often to send a message or warning to the community. Thus, extrajudicial killings executions can be described as having a linear pattern. Forced disappearances on the other hand are complex crimes in which the victim may be conducted through a circuit of detention centers before being killed. The victim's remains are then generally disposed of in a separate clandestine location. As a result, forced disappearances tend to follow a nonlinear pattern. "For example, [the victim] may be detained at point A and taken to point B to be interrogated, then taken to point C for the execution, and to point D for the burial. In more complex cases the remains may be later moved to a point E" (EPAF 2008).

The patterns that characterize both extrajudicial executions and enforced disappearances should be taken into account at the time of formulating an investigation, since the way in which the investigation is carried out will determine the types of information that will be collected. For example, based on the scenario outlined above, what would happen if we tried an investigation of forced disappearance only from point A (detention) or point B (burial)? We would have a biased and probably incomplete view of the crime, since each point represents only one phase of what happened. These criteria, which will be discussed later on, underline the importance of carrying out complementary, multidisciplinary investigations with sufficient information regarding the people that you are looking for (EPAF 2001).

Concentrating only on the material representation of certain practices (e.g., a mass grave) does not necessarily help solve why a crime happened, that is, the exhumation of remains does not always address questions about the identity of the victims in the grave or why they were in that particular location.

Forensic anthropologists and archaeologists require the victim's relatives and close friends to provide information about the victim and the circumstances surrounding his or her disappearance. To this end, a set of standardized protocols is used to collect all relevant information. Antemortem data (AMD) information is used to build a social and biological profile of the victim and includes the victim's full name, age, sex, height, handedness, and identifying marks, as well as descriptions of the victim's clothing and personal belongings at the time of his or her disappearance. Identifying marks may include external physical characteristics of the body and teeth, as well as descriptions of events that occurred in the person's life that may have left an imprint a mark on the bones (i.e., an accident in which the person broke an arm; after healing, the bone will retain a distinctive mark indicating the place of the fracture). Photographs, newspaper cuttings, and other documents about the victim can also be helpful in constructing the victim's profile.

Recovery

Almost every human activity produces associated material that characterizes it. This "material" can appear in the form of objects or modifications of

the place where the activities took place. Within the framework of criminal investigations, these objects or the record of these modifications become the evidence. Material evidence of a crime is, for example, the gun used in a murder or a piece of cloth that was worn by the killer. However, objects are not the only things that should be considered as material evidence. For example, the marks left by the machine that dug a mass grave, imprints of vehicle tires or shoeprints, or the traces of gunshots on a wall are important evidence. The goal of a forensic investigation, therefore, is to recover, document, and interpret all evidence from a crime scene in order to attempt to reconstruct specific actions related to the crime. This does not mean that everything should be recovered; rather, it is necessary to focus on what is relevant for the investigation. In other words, the investigator should have an understanding of what may be used to prove one thing or another rather than collecting every possible item. For example if identity cards, prayer beads, shell casings, and water bottles are located in a mass grave, the first three may have some relevance regarding the identity, religious affiliation, and manner of death of the victims, while the latter would not prove in itself anything specific. In that case the first three items may be collected, while the presence of water bottles in the grave may only be noted.

To encourage a systematic, unbiased investigative procedure, it is important to follow a standard protocol, such as the "Minnesota Protocol." The "Minnesota Protocol" (model protocol for a legal investigation of extralegal, arbitrary, and summary executions) is a model procedure for the recovery and analysis of skeletal remains intended for law enforcement personnel and members of independent investigative commissions. It contains guidelines for death investigations, including in suspected extralegal, arbitrary, and summary executions. It also calls for cooperative work between law enforcement personnel (police, prosecutors, etc.) and investigators (forensic pathologists, anthropologists, archaeologists, etc.) while processing the crime scene. It includes a comprehensive checklist of the steps in a basic forensic examination (http://www.mnadvocates.org/4Jun20046.html#III).

Other relevant protocols include:

- Istanbul Protocol: Manual on effective investigation and documentation of torture and other cruel, inhuman, or degrading treatment and punishment (Office of the United Nations High Commissioner for Human Rights, 1999). http://www.unhchr.ch/pdf/8istprot_spa.pdf
- Crime Scene Investigation: A guide for law enforcement (US Department of Justice, 2000). http://www.ncjrs.gov/pdffiles1/nij/178280.pdf
- Model protocol on the forensic investigation of death suspected to have been caused by Human Rights Violation. Office of the United Nations High Commissioner for Human Rights (Office of the United Nations High Commissioner for Human Rights – México, 2001). Spanish language only. http://criminalistic.org/DescargablesPDF/ProtocoloModelo.pdf An overview of a standard protocol is presented in this manual.

The stages of recovery include:

1. *Visual inspection and documentation* of the presumed burial sites or crime scene. In this stage, it is necessary to thoroughly evaluate the case and begin planning for the forensic archaeological work that will be undertaken. In order to accomplish this goal, an activity schedule must be developed with lists of both available human and material resources as well as logistical needs.
2. *Survey and excavation of test pits*. This stage refers to locating human remains and other materials associated with the crime scene that could be of forensic interest.
3. *Exhumation process*. In this stage, all of the evidence is recovered and registered in written, graphic, or photographic form. All of these elements are then passed through the chain of custody. The systematic recovery of clues and evidence at the crime scene, including the exhumation of the victims, is oriented toward reconstructing the circumstances of the crime in the most precise manner possible. This is achieved by using the principles of *superposition*, *association*, and *recurrence*.

Superposition. In principle, the elements found at the crime scene (both organic and nonorganic) are deposited according to a certain order. In a forensic archaeological investigation, the first objects to be found during the excavation, from top to bottom, were the last to be deposited.

Association. There are often material and physical associations among the evidence that is found at a crime scene. Sometimes these associations are random, though they may lead to important discoveries. Recording these associations helps to better interpret the evidence and reconstruct the crime.

Recurrence. When an event or a set of events occurs repeatedly, or when an artifact, a piece of equipment, or a machine is used frequently, the existence of a modus operandi for the crime can often be confirmed.

Analysis

When human remains are decomposed, skeletonized, or badly burned, forensic pathologists work together with other specialists such as forensic anthropologists. Skeletal remains are considered material evidence that give much information about the victim and his or her cause of death. First, the anthropologist must establish the forensic nature of the remains. There are three main questions:

- Are the remains bone?
- If they are, are they human or nonhuman?
- If they are human, are they contemporary (forensic) or non-contemporary (archaeological)?

Once the forensic nature of the remains is established, other questions must be answered:

- Do the remains represent one or more individuals?
- What is the biological profile of the victim?
- Does the skeleton show significant antemortem features (deformations, signs of diseases, old fractures, etc.) that can help with the victim's identification?
- Can the cause and manner of death be determined?

In order to determine if the remains represent one or more individuals, forensic anthropologists count bones or the unique parts of them (e.g., the right femoral head). The number obtained from this count is called the Minimum Number of Individuals (MNI) that could exist in the sample. For example, 7 right femora would represent a MNI of 7 people. With non-single bones (e.g., right ribs), the number of bones are divided and counted by the maximum number of those particular bones in a normal body: 15 right ribs represent an MNI of 2 individuals since there are 12 right ribs in a single body. Forensic anthropologists can assign the victim's biological profile, that is, age, sex, ancestry ("race"), and stature, depending on the state of preservation of the remains.

To assist the forensic pathologist in determining the cause and manner of death, forensic anthropologists must determine which injuries occurred before death (antemortem), around the time of death (perimortem), and/or after death (postmortem). Antemortem injuries can be distinguished from peri- or postmortem changes because they show signs of healing indicating that the individual lived for a period of time after sustaining the injury. The amount of healing can indicate if the injury occurred months to years before or more recently. In some cases, antemortem injuries may be related to the cause and manner of death. Postmortem trauma can frequently be distinguished because there is a color difference in the bone. The new break exposes bone that has not been in contact with the environment. The characteristics of the fracture may also be different. When bone is dry, it breaks differently than when it is fresh (similar to how a dry stick breaks differently than a fresh one). Postmortem fractures tend to have straight edges with no bending. Other postmortem changes to the bone may be scrapes by tools or machinery and tooth marks left by scavengers. Perimortem fractures often have irregular edges and may warp. Also, certain types of fractures, such as radiating and concentric fractures, are characteristically perimortem. The perimortem period may span days or weeks. It is preferable however when describing skeletal injuries to refer to trauma or traumatic injuries rather than perimortem injuries since we cannot necessarily prove they occurred shortly before or after death (Kimmerle & Baraybar 2008).

Clothing

Clothing is important evidence and should never be cut away from the body. It should be thoroughly documented and photographed before being removed from the body, once it has been removed from the body but before being cleaned, and then once again after cleaning.

Conclusion

Over the years, forensic anthropology and archaeology have earned a specific position within the investigation of human rights abuses, especially, in the Southern Hemisphere. The focus is perhaps due to the high number of human rights violations that occurred in countries of the Global South and the consequent need to apply new scientific protocols and standards other than those developed in the Global North, which cannot always be applied. Perhaps one of the main characteristics is the multiple roles that the anthropologist may play in the process. In addition to skeletal analysis, the forensic anthropologists may be concerned with the preliminary investigation, interviews with family members, and processing of artifacts and evidence, tasks not traditionally attributed to them. This combination of tasks has, however, built a solid discipline in which anthropologists become multitasked individuals ready to confront complex situations such as human rights violations.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bone, Trauma in
- ▶ Commingled Remains: Field Recovery and Laboratory Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition
- ▶ Time Since Death in Bioarchaeology and Human Osteology

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Form in the Archaeology of Art

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Introduction

The study of form or morphology is one of the fundamental bases of classification analysis

in the archaeology of art. Unlike anthropology that denied the study of art almost entirely until the 1960s (Morphy 1994), archaeology of art was established at the beginning of the twentieth century. It began with the study of form as general configuration of the object, to establish the first typological or stylistic classifications of the "primitive," prehistoric, or exotic arts. Today, recent trends linked to material culture studies allow us to go beyond initial, essentially descriptive and functional, approximations of these visual artifacts to deal with form in its material dimension.

Definition

Form, in archaeology of art, is defined as the fundamental physical property of an object, from its material composition to its constructive composition and contrast with its environment. In the archaeology of art, the study of form corresponds with the analyses of the different properties of the objects or visual arts relating to their general configuration or outline (contour), their size, their texture, their color, and relationship with space. In methodological terms, the study of the form of visual artifacts implies their analysis as a visual system through the selection and definition of specific morphological attributes, emanating mostly from the history of art and semiotics. At an interpretive level, the study of form has been traditionally linked to the search for the significance and accuracy of its function, touching on established focuses from the analyses of perception and aesthetics.

Key Issues

Form currently possesses various meaning and applications in archaeology of art. This is due, among other reasons, to the fact that its study formed one of the first pillars of archaeology as a discipline and to the diversity of focuses that have been covered in the study since then. Since the beginning of the twentieth century, form, limited to the study of outline (as with iconography), contributed to the definition of countless seriations, typologies (Adams & Adams 1991), and styles, by way of arranging a set of visual evidence of which the chronological attribution established itself relatively. Form as outline was initially analyzed as an external aspect or the general configuration of an object or image, in order to later tackle the constituent elements of the form. The first studies of form meant to distinguish images or visual objects in terms of natural or abstract or geometric forms; on the basis of its size (small, medium, large); in terms of its color, referring to the surface or exterior of the object or image; in terms of its texture (rough and smooth, among others); and on the basis of its distinction from its environment or base. At that time, the visual object was limited to the study of the content or configuration established in the outline or silhouette, taking into account different attributes that constitute its general morphology. In the analysis of animals in European art, this meant studying the number and placement of paws, of ears, and of the head to define a series of perspective forms, understanding that these visual configurations had a relative chronological value (Breuil 1952). Under the influence of the French structuralist school, the study of form as composition, defined as the spatial relationship and compositional logic established between the parietal images, would later be addressed for the definition of styles (Leroi-Gourhan 1968) and accuracy of meanings (Raphael 1986).

Current Debates

This structuralist vision is taken up again and amplified, from the 1980s through post-processual or New Archaeology whereby form is defined as a complex visual system requiring codes or grammatical specifics and Cultural Semiotics (Layton 2006), in relation with determined local contexts (Preucel & Hodder 1996). The study of form as composition is also extended, for example, to the study of the structure of iconography by way of language (Washburn & Crowe 1988). More recently and in this same logical framework, form has been

understood also from the point of view of the spatial relationships between objects at a macro-analytical level, the conception of which constitutes one of the foundations of landscape archaeology.

Regardless of these different meanings, the discussion of the relationship between form and function has undoubtedly occupied a special place in archaeology of art. Form as essence of style and form as a result of the selection between functioning alternatives have oriented the debate towards the functionality of the form and its meaning in the 1970s and 1980s. Consequently, form has been defined as an ethnic or territorial marker, a differentiator of role, status, or genre, among other things (Dunnell 1978; Sackett 1982, 1985; Wiessner 1983, 1985; Conkey & Hastorf 1993).

In the last few decades, from the material culture (Tilley 2006) and technology (Sigaut 2004) perspectives, the analysis of form of visual artifacts incorporates, beyond its physical appearance, the study of its materiality. That is to say, it considers the materials, knowledge, abilities, techniques, and specific movements used in the different stages of its production (Sepúlveda 2009; Fiore 2011). As a visual system, the materiality of a form implies cultural decisions, particularly in relation to temporal space contexts. Because of the broadening of previous, essentially functionalist, views, form today could also be interpreted in terms of culture, in terms of material, economic and social implications, and more.

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► Style: Its Role in the Archaeology of Art

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Formal Education up to Age 18, Archaeology in

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Introduction

When we look at the place of archaeology in formal education in the United Kingdom, we see a paradox. Archaeology is extremely popular with the general public and with the media. Millions of people are members of organizations like the National Trust, up to 3 million viewers will regularly watch TV programs on archaeology, many thousands attend events such as the Festival of British Archaeology, and over 200,000 are members of local societies and clubs concerned with the historic environment, and yet archaeology has no explicit place in the school curriculum. The reason may be simple, that archaeology had not yet established itself as an academic subject in universities at the time when the school curriculum was being determined in the later nineteenth century. Subjects like history and geography were well established and could claim a presence in the curriculum. The nineteenth century curriculum has proven very hard to change and is still the basis for education up to the age of 18.

However, this is unlikely to be the only reason for archaeology's unpopularity with educators. Archaeology is widely seen as a technical and physical discipline concerned with excavation and recording of remains and, therefore, of less academic standing than a purely intellectual subject than history. This was for a long time an attitude among historians that archaeology was the handmaiden of history, providing physical backup for the written record of the past. This attitude is no longer part of academic discourse in archaeology or history, and yet it does still seem to be held by many outside the hallowed halls of academia. The great advances in archaeology from the 1960s onwards which have shifted archaeology away from culture history towards more sociological, geographical, or psychological interpretations of the past and toward a more self-reflexive questioning of archaeology's role and purpose have yet to find their way into popular understandings of the subject.

Key Issues

The traditional method of educational delivery is of the didactic provision of information. Bodies of knowledge as structured facts about the world or as agreed narratives are the life blood of teaching. Over the last 20 years, there has been a move towards balancing imparting knowledge with the acquisition of skills. There has also been a longer-term move towards more child-centered approaches to education. In practice, the assessment of learning in formal examinations at 16, 17, and 18 still privileges knowledge. Universities continually complain that their new entrants are unable to work independently and expect to be spoon-fed ideas and facts. In such a situation, archaeology is at a disadvantage. Archaeological facts belong firmly within the discarded tradition of culture history. Newer forms of archaeology are based around contested interpretations, and single narratives are hard to find in modern archaeological publication. Archaeology is too contested and uncertain of its knowledge base to be easily delivered as a subject in schools.

This weakness of archaeology is, however, also its strength. Archaeology offers more than knowledge. It is a set of processes involved in learning about the past and in understanding the role that the past could play in people's lives today. It offers critical thinking of an advanced kind. It can give students of all ages intellectual challenge and fascination, as well as deep emotional engagement. The variety of work involved in archaeology can reach every kind of learner. It is especially well geared towards supportive constructivist education. To understand why, we must understand what archaeology is. It is not the simple accumulation of artifacts and sites from the past. It is the study of human life and

behavior as reflected in those artifacts and sites. Archaeologists study people, not things. All aspects of human existence are reflected in archaeology. All kinds of analytical, recording, and descriptive processes are involved in archaeology. Archaeology can support every subject in the school curriculum.

Most archaeologists do not understand education. There is a long tradition of thinking about education. Education theory is complex and contested. A range of thinkers and educators have provided different models of how children learn. One early influential thinker was the developmental psychologist Jean Piaget, who came up with a chronological scheme for how a child's mind assimilates information, a kind of cognitive learning theory. The earliest stage is the sensorimotor, from birth to approximately 2 years old in which the child explores the world directly through action. The preoperational stage lasts from 2 to around 7 years old, where objects are associated with words and learn to classify things by their characteristics. Concrete operational thinking follows from around 7 to 11 years old in which the ordering of information becomes more sophisticated. Children at this age can manipulate more than one variable at a time and think in terms of hypotheses, asking "what if" and thinking about the consequences of this. From the age of about 11 onwards, the mind enters the formal operational stage, involving abstract reasoning, thinking about hypothetical futures and ideologies. Where followers of Piaget may have erred is in assuming his stages of development replace each other rather than build upon and extend each other. There is a common and fallacious assumption that as children develop, the intellect takes over from more physical ways of engaging with the world and that abstract thought is a higher form of thinking than concrete thought. If archaeology is seen as a technical exercise in finding, classifying, and recording artifacts, then it is hardly worthy to be taught alongside subjects like history. Indeed, we shall see that where archaeology is used in schools, it tends to be used with younger ages below the age of 11. By looking at the work of more recent educational theorists, we can see how wrong this is.

Another cognitive psychologist whose work has been important for education was Lev Vygotsky, who stressed the importance of the social context of learning. Vygotsky understood how children need to make sense of the world and internalize their external experiences. Most children do not learn in isolation. Learning is a social process where children exchange ideas and information with adult and with each other. The role of teacher is one of enabling and guiding rather than telling. The setting of puzzles or problems to be solved is a legacy of this way of seeing education, as is the creation of group activities where dialogue is part of the learning process. The necessity for teamwork in archaeology and the intellectually challenging nature of archaeological inquiry are clearly well suited to social learning.

Vygotsky's ideas are the basis of constructivism, in which children construct their own understanding of the world from the stimuli they receive from others. The theorist who did most to develop a constructivist theory of learning was Jerome Bruner, who stressed the importance of active learning by structuring knowledge into forms suitable for the child, building on existing skills, stimulating self-discovery, and learning by doing rather than listening. Good teaching should understand the child's motivations and willingness, or otherwise to learn, and should be designed to stretch the child to go beyond what it taught and to extrapolate or fill in gaps in knowledge and understanding. Again, archaeology has advantages for this kind of learning in that it is tactile, necessitates going beyond the immediate evidence, and has an innate fascination that makes children want to learn.

It is now appreciated that not all children learn in the same way. However, there is little agreement on the different ways in which children learn. One simple and easily applied scheme is the taxonomy of learning devised by Benjamin Bloom. Bloom identified three domains of learning: cognitive, affective, and psychomotor. Cognitive learning involves the assimilation of knowledge and development of thinking skills. Such skills would include pattern recognition, devising abstract concepts, evaluating data,

solving problems, and justifying arguments. All of these are clearly involved in archaeology. Affective learning involves making use of our emotional responses to things. This involves understanding our attitudes, ethical standards, making judgments, and being artistically creative. Again, all of these can be found in archaeology. Psychomotor learning involves the development of physical skills. Archaeology of course uses a great many such skills. It is perhaps significant that there is an unspoken hierarchy of domains in that cognitive learning is rated above affective learning, which in turn is rated about psychomotor learning. The scientist ranks higher than the painter who in turns ranks higher than the plumber. This is wrong and highly unfortunate. All three domains are an equal part of learning, and archaeology is one of the rare subjects able to include them in the same activity.

Another popular way of looking at different ways of learning is the experiential learning theory of David Kolb. This envisages learning as the reaction to a four-stage cycle of understanding. Concrete experiences are used as a basis for making observations and reflections, which in turn lead to developing abstract concepts. These are then used to derive implications for active testing, which in turn produces concrete experiences, and so the whole cycle begins again. Some people are better than others at learning in different parts of the cycle, depending on their preferred learning style. There are four such styles: feeling and watching, watching and thinking, doing and thinking, doing and feeling. Archaeology involves both thinking and doing but also thinking and watching, being able to make sense of information gathered by others. There is a clear sense in which the divergence between processual and post-processual archaeology can be understood as the irreconcilable opposition of different learning styles, where those who feel were asking for equal space alongside those who think.

Perhaps the most widely known learning theory of recent years in the heritage sector is Howard Gardner's multiple intelligences theory. Gardner's idea is that the human mind is wired up to see the world in different ways and that we all have a combination of at least eight different kinds of understanding or intelligences. Linguistic intelligence is the ability to understand and use the spoken and written word. Mathematical-logical intelligence involves analyzing problems and understanding logical relationships. Musical intelligence involves recognizing and using sounds rather than words, with the ability to distinguish pitch, tone, and rhythm. Kinesthetic-bodily intelligence involves being able to coordinate bodily movements and solve problems by doing rather than thinking. Spatial intelligence involves awareness of space and spatial patterns. Naturalist intelligence involves being able to observe, classify, and categorize the world around us, spotting its patterns and potential. Interpersonal intelligences involve empathizing with others and working well within teams. Intrapersonal intelligence is a capacity to know yourself and understand our own interactions with others. Most people have all eight but usually have two or three dominant intelligences. Apart from musical intelligence, these are all a natural part of doing archaeology. The lone researcher who likes to solve the problem of untangling the palimpsest of features in the landscape would score highly in intrapersonal, naturalist, and logical intelligences. The excavator who loves being on site and unraveling contexts would score highly in spatial, kinesthetic, and interpersonal intelligences. Gardner's ideas are ideal for use in heritage education where artifacts and sites can be understood through different learning approaches. Children can be asked to write a guidebook for a historic site, sort artifacts into types, investigate why sites are where they are on a map, work in groups to say whether a site was used for domestic or religious purposes, or be asked to write a personal description of poem based on their favorite artifact. All these activities will involve different mixes of intelligences. There are very few children who cannot engage with archaeological evidence as a way of learning.

Archaeology then is ideal for learning, no matter what the educational theory that underlies the curriculum or teaching in the classroom. It is concerned with the physical manipulation of

evidence. This evidence comes from real people with whom we can make an imagined emotional connection. Making sense of the evidence involved solving puzzles and problems and using words to express and debate our ideas. We work in teams, yet can also have intensely personal responses to the past. We use science and technology in our work. We make use of artistic representation and delve into all aspects of past life from exploiting the environment to religious belief. Archaeology can not only reach every learner, it can also support every subject on the school curriculum.

The United Kingdom Perspective

School curricula in the United Kingdom are developed separately in England, Wales, Scotland, and Northern Ireland. A national curriculum was first introduced in England from 1988. All the curricula have been revised a various times and continue to be under revision. The curriculum orders have often made reference to the evidence of the past in various of the subjects. In spite of this, and the utility of archaeology for a range of subjects, archaeology has mostly been used in support of history or, occasionally, geography. It is also more used for teaching children aged below 11 or 12.

It has proved hard to get any explicit reference to archaeology in the various curriculum orders and guidelines. There has always been reference in the history orders in England to artifacts, buildings, and sites as sources of evidence and more recently of museums as places that should be visited. The work of archaeologists was only included as an example in the latest form of the orders, under the skill of interpretation. The key historical skills to be taught have included chronology, the facts about events and life at different times, how the past is interpreted, the types and uses of historical evidence, and communicating an organized historical narrative. Archaeology can play a role in all of these but was most used as a way of interrogating physical evidence for life in the past, often using the key question "how do we know what life like at that time?" Archaeology was clearly seen a methodology for studying the past. Conspicuously missing from the curriculum was any reference to prehistory. The periods of time to be taught in primary schools (up to the age of 11) were highly selective. These were mostly Roman Britain, the Anglo-Saxons, the Vikings, Tudor times, the Victorians, Britain in the 1930s and 1940s, ancient Greece, and usually ancient Egypt. Archaeology of course came into several of these periods. The history taught in secondary schools after the age of 11 dealt with all of history after the Norman Conquest of 1066 along with some European history (often the Roman Empire) and one world history topic. Most of the secondary history could safely include traditional political and socioeconomic documentary history. The lack of prehistory involves pupils knowing nothing of the development of humans as a species or of the settlement of the British Isles and its continuous occupation from around 15,000 years ago until the Roman involvement in Britain 2,000 years ago. The shaping of the British landscape and the development of society and its rituals as reflected in iconic sites like Stonehenge were ignored.

A comparison between the history taught in different pasts of the United Kingdom is instructive. There are clear differences between the four nations, which reflect the different political and cultural relationships that each nation has with the past. In Wales, there was explicit reference to teaching about the earliest inhabitants and the Iron Age Celts. Some 1,500 years after the Anglo-Saxon migration and conquest of southeast Britain, there is still a sense of continuity between modern Wales and the prehistoric past that is missing in England. There was no mandatory study of ancient Greece in Wales and instead a much greater concern with local history. Likewise, in Northern Ireland there was a concern with prehistory from the Mesolithic onwards as part of Irish identity. The Irish have deep historical roots, partly rooted in literary myth, but nonetheless deeply felt, and prehistory provides a noncontentious way of providing an identity separate from that of Britain. The teaching of the medieval past immediately polarizes between the history of the native kings and the incoming English lordship. Likewise, the

Vikings were active throughout the British Isles and so not uniquely an Irish experience. In Scotland, prehistory was never emphasized as it was the medieval period which provided Scotland with its roots and identity. What Scotland did have that the other nations did not was an explicit recognition in the rationale for teaching history as a subject of the importance of the historical heritage of Scotland for tourism and the economy. History had a purpose beyond mere curiosity about the past. This linked history with heritage and could allow teachers to touch on the historic environment and issues involved in its management and conservation.

Whatever the guidelines and orders of the curriculum, teaching of history is in the hands of teachers. History teaching is far from homogeneous. There are different visions of the kind of history that should be taught and deep divisions within history teaching. These divisions can be simplified into a polarity between teaching knowledge and teaching skills. The balance between knowledge and skills has often been one of the debated topics during curriculum reform or revision. Traditional history teaching until the 1970s focused on the acquisition of historical knowledge and dates of events and of kings and queens. History was equated in the popular mind with knowing what happened when. This is still the attitude of many. Repeated newspaper scare stories about the inadequacy of history teaching usually involve showing how little people know about dates, events, and famous people in the past. This kind of history is often closely tied to national history and notions of national identity. Good history is deemed to be the history of the nation. Archaeology suffers badly under such a regime of history teaching since it rarely provides a chronological narrative or association of site or events with names individuals.

A reaction against this kind of history began in the 1960s among teacher dissatisfied with didactic teaching. An article by Mary Price in 1968 called for the use of primary sources in the teaching of history in schools. This became a reality with the formation of the Schools Council History Project in 1972. This body still exists as an association of like-minded teachers as the Schools History Project (SHP). The SHP approach is based on the teaching of historical skills, using primary evidence. It moves history teaching away from a narrow focus on dates, events, and personalities towards understanding past ways of life, motivations, and contested interpretations. Many members of the SHP are sympathetic towards the use of archaeology in teaching history precisely because it allows (even demands) the exploration of issues relating to historical methodology. The SHP produces resources and teaching ideas, many of which include archaeology. A key member of the SHP, Ian Dawson, has made resources for teachers at all levels of education available from his Thinking History website (http://www.thinkinghistory.co.uk). These often include archaeology.

The SHP principles have been followed in the creation of history qualifications at GCSE and A level. These balance learning about the development of a theme over a long time scale and the history of one particular time in depth. The development studies include warfare, medicine, and crime and punishment. Some of the qualifications also focus on using historical evidence. Archaeology can be a part of these qualifications, in a supporting role to history. Archaeology has more of a presence in the GCSE History Pilot that was developed to move history away from its traditional emphasis at GCSE on the nineteenth and twentieth centuries. The Pilot ensures that medieval history is covered and that there are options on archaeology and heritage management. Although useful, the Pilot is not a replacement for the GCSE Archaeology that was abolished in 2004. This had been an excellent introduction to the subject. Its abolition was unjustified and contested in vain by the Council for British Archaeology and others. There is still an A-level Archaeology (run by the AQA awarding body), which is a rigorous and challenging qualification which equips students well for further study. There is also some archaeology within GCSE and A-level Classical

Civilization and A levels in Travel and Tourism. In Scotland, there is some archaeology in Standard Grade Classical Studies and as options in Highers.

One reason why the GCSE Archaeology was abolished was the low numbers of students taking the exam. This was partly a product of the difficulty that archaeology graduates have in becoming school teachers. Without teachers who have a knowledge of archaeology, there are few incentives or confidence to use it. Some teacher training institutions have taken a very strict attitude that only graduates in subjects that appear in the national curriculum can be accepted for training as teachers, especially for teaching at secondary level. This is unfortunate and not the intention of the teacher training regulations. It is far easier to be accepted for teacher training with a joint archaeology and history degree than with a single honors archaeology degree. There are some enlightened training colleges and universities who will take archaeologists, but there are still too few teachers with a knowledge of the subject and confidence to use it within their teaching.

Future Directions

Archaeology is a wonderful subject for use in teaching all ages of children. It can inspire and enthuse otherwise demotivated pupils. It can stretch and challenge to high attainers. The nature of archaeological evidence and methods is ideal for meeting the needs of different learning styles and intelligences. Yet, archaeology as practiced by archaeologists has weaknesses. The end product of research is seldom synthesized as narratives of the past, and many aspects of archaeological practice are only debated or explained in esoteric or hard-to-obtain academic forums. The full richness of archaeology is not as accessible to teachers as it should be.

The way to make archaeology more accessible and available is to make sure that archaeology finds its place within wider educational contexts. Recent initiatives in England have sought to improve the use of the built environment and out-of-classroom resources generally by teachers. Archaeology obviously has a place within these. The Engaging Places initiative has the aim of encouraging teachers to make more use of the built environment. This could easily be dominated by contemporary architecture, but from the beginning, the Council for British Archaeology was able to make sure that the historic environment was also included. All environments have a historic element, and archaeologists can enable people to see this and make use of it. The Council for Learning Outside the Classroom has a wider aim to encourage learning in real-world situations outside of the classroom. Heritage is one of the eight sectors within the council, and archaeology is clearly a key arena for real-world learning. Again the Council for British Archaeology played a key role in the early formation of the Council.

We also need to make sure that heritage educators improve the quality of their work with schools and the public. No matter how good the offering is, there is always room for self-reflection, evaluation, and improving the learning outcomes for pupils and students. The Council for Learning Outside the Classroom has instituted a quality badge for providers of educational opportunities. Another organization, the Heritage Education Trust, issues the Sandford Heritage Education Awards for the provision of quality education by heritage sites. More and more archaeologists are working with schools and have the skills and knowledge to make use of opportunities such as these. Many field units and local authority archaeology services now provide resources for teachers to make use of archaeology within the curriculum.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Constructivism in Archaeology Education

▶ Heritage Values and Education
▶ Material Culture and Education in Archaeology
▶ Public Education and Archaeology: Disciplining Through Education
▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

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Fort Odanak Archaeological Project

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Brief Definition of the Topic

Since 1979, the High Council of the Waban-Aki Nation, commissioned by two band councils of Odanak and Wôlinak, has had a mission to ensure the future of the Abenaki Nation by offering a series of studies related to the documentation of their past and the promotion of their culture. It thus seems only natural to integrate archaeology in this process. It was in 2010, with the collaboration and financial support of the Department of Canadian Heritage, the Abenaki Museum, and the Odanak Band Council, that the Fort Odanak archaeological project began under the responsibility of two archaeologists: Geneviève Treyvaud and Michel Plourde. They set up a research project aimed at discovering the missions and the Abenaki fort and by extension, a better understanding of their way of life in the "Transition" and "Colonial" periods. This project lasted 3 years and ended with the publication of a report and the establishment of a semipermanent exhibition.

The Abenaki territories of Wôlinak and Odanak are the only two Abenaki communities recognized in Quebec. The village is situated in the MRC (regional county municipality) of Nicolet-Yamaska on the eastern shore of the St. François River, 32 km east of Sorel and near Lake St. Pierre. The community counts about 1,800 residents, 400 of which reside in Odanak. The land area is 6.07 km^2. It is composed of upper and lower riparian terraces, some islands upstream and downstream of the village, as well as two woodlands located in the municipalities of Saint-François-du-Lac and Pierreville.

The excavations in 2010 found two archaeological sites: CaFe-4 dating to the Woodland period and CaFe-5 dating to the Archaic. In the fall of 2012, an inventory was undertaken on the historic quadrilateral of Odanak. An important

archaeological site, CaFe-7, was excavated. This site presents many occupations dating from the Woodland period until today. The artifacts and the relics discovered, as well as stratigraphic levels, have enabled the identification of an occupation contemporary to the fortified village at the beginning of the eighteenth century.

Cross-References

- ▶ Canada: Cultural Heritage Management
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: World Heritage

Further Reading

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Fortea, Javier

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Basic Biographical Information

Javier Fortea (born in Arnedo (La Rioja, Spain) in 1946; died in Oviedo (Asturias, Spain) in 2009) studied Philosophy and Arts, with an expertise in History, at the University of Salamanca between 1963 and 1968. In this same university, Professor Francisco Jordá became his academic guide into Palaeolithic research, with a special focus on the Upper Paleolithic and Epipaleolithic periods. He received his Ph.D. in 1972 from the University of Salamanca with an in depth dissertation on the Epipaleolithic sequence of the Mediterranean area of Iberia (Fortea 1973), which is still a reference work for anyone studying this period.

Up until 1979, while being assistant lecturer at the University of Salamanca, his research was mainly focused on a specific geographical area, the eastern part of Iberia, and more specifically on the central area: Valencia. The excavations of Mallaetes and Cocina caves, together with the studies of other lithic industries and art evidences from other key sites, provided him a wide picture to suggest a robust synthesis of the Upper Palaeolithic in eastern Iberia, from Catalonia to Andalusia (Fortea et al. 1983). His approach to rock art research also began with a very important *status quaestionis* of Palaeolithic art in the Mediterranean area (Fortea 1978).

In 1979, his academic career took a turn, as he became Professor of Prehistory at the University of Oviedo, in Asturias, one of the richest European regions in Upper Paleolithic sites and rock art caves. The excavations conducted at two main sites, La Viña and Llonín, gave him the opportunity of introducing innovations in the archaeological methodology and finding important series of Upper Palaeolithic bone and lithic industries.

But his rock art discoveries and research mark the highlight of his scientific career. New sites as Covaciella and El Bosque were studied, dated, and published, becoming part of the list of ornamented caves of Western Europe. He had a special interest in the precise dating of the animals represented in Upper Palaeolithic caves, and he devoted most of his time and efforts to work closely with the laboratories to assure that the resulting dates were correct (Fortea 2002).

His international papers on rock art were very appreciated by foreign colleagues; each paper being the product of in depth research. It means that Professor Fortea did not publish hundreds of papers and thousands of pages, but each of them was so solid that they could easily resist the passing of time.

Some English-speaking colleagues, such as Ian Davidson and Lawrence Straus, were well aware of the scientific achievements of Professor Fortea, as they worked for many years in Spain and met him often to debate about their common research interests. He became a member of many international institutions, although he always preferred working in the field and in the

laboratory, more than assisting to hard and non-productive meetings. Perhaps, his most important international positions were being member of the Upper Palaeolithic Commission of the UISPP and of ICOMOS.

Major Accomplishments

Professor Fortea's most important accomplishments took place in France. He collaborated with Jean Clottes in the research teams that studied the new rock art discoveries at Cosquer, Coussac, and, the most important, Chauvet. And, in the last decade, he studied and published many papers with Georges Sauvet, Carole Fritz, and Gilles Tosello (Sauvet et al. 2008, among others) concerning key aspects of rock art, such as styles and chronology.

One of Professor Fortea's creations, which will last forever, was the archaeological park of prehistoric art of Teverga. In this little town of Asturias, in the mountains, he offered the public a walk along the birth of prehistoric art, with visits to real size reproductions of three significant sets of European Palaeolithic with paintings and engravings. In Teverga, Professor Fortea applied all his knowledge in the service of society to give to the public an understanding of prehistoric art.

The last years before his death in 2009, Professor Fortea was involved in a very high-level scientific research concerning Neanderthals and their DNA sequence. Together with his collaborator Marco de la Rasilla, also from the University of Oviedo, he began working at El Sidrón cave, where they discovered the best-preserved Neanderthal remains to obtain DNA. The collaboration with the most important international specialists in the field provides Professor Fortea his last projection with several impact papers (Torres et al. 2010; Green et al. 2010).

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Davidson, Iain
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Europe: Paleolithic Art
- ▶ European Mesolithic: Geography and Culture
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ International Council of Museums (ICOM)
- ▶ Lithic Technology, Paleolithic

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Fortifications, Archaeology of

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Introduction and Definition

Defensive structures come in a wide variety of forms and cover an exceptionally long time frame; indeed there are relatively few societies existing either today or in the past that have not utilized some form of fortification, even if it was just a thorn brush fence around a group of huts. What is not clear is when they first appeared, though Mesolithic (c. 10,000–4,000 BCE) possibilities have been cited (Sippila & Lahelma 2006). In their most obvious guises, they range from European Iron Age hillforts to medieval castles, seventeenth-century Anglo-Scottish bastle houses, eighteenth-century fortresses, colonial stockades, and Maori Pãs to First and Second World War concrete defenses, but this list is just the tip of the iceberg. Although this wide portfolio of structures is an obvious response to interhuman conflict, or the threat of it, the nature of this conflict has almost as many variants as there are types of fortifications. This is not however the place to be considering the anthropology of conflict, beyond recognizing that this variation exists.

Limiting this entry to fortifications from the historic period makes the subject matter only slightly more manageable. However, to narrow the field even further, our period will commence with the end of the European medieval period, which conveniently removes most castles from the mix. The beginning of our period was heralded by not just the introduction of gunpowder weapons, which can be traced far back into medieval times, but the point at which they came to dominate warfare, at least in Europe. This watershed occurs at some point in the late fifteenth and the early sixteenth century and is marked by the appearance of new styles of fortification which, following their introduction in the Italian wars, spread throughout Europe in the form of the so-called trace italienne, a largely earthwork fortification designed to withstand the onslaught of heavy artillery. These structures were also known as star forts due to projecting triangular bastions which provided mutual support from the artillery pieces placed in them.

Historical Background

Developments in Europe c. CE 1300–1800

The arrival of cannon in the fourteenth century marked the beginning of the end of the stone-walled castle. Stone balls and then iron fired by cannon of various sizes were very effective at bringing down stone walls, having the ability to punch through even thick masonry. In response to this redundancy, battered earth walls were introduced. These did not achieve the same height as the earlier stone walls, and the thick masses of earth effectively soaked up the impact of cannon shot while angled faces helped to deflect the blow. This is not to say that stone fortifications were abandoned entirely, and many earthwork forts were fronted with stone. Modifications to preexisting castles and forts were also common and can be seen in the form of bastions replacing towers, the addition of gun loops, and the throwing up of earthworks around older, stone defenses. The effectiveness of these defenses can be judged by their rapid spread across Europe, which by the early sixteenth century had brought them to the western fringes of Scotland and Ireland. The recent upsurge in conflict archaeology has seen a flowering of

interest in these and other fortifications. For example, the archaeological investigation of the battlefield of Flodden, fought in 1513 by the armies of James IV of Scotland and Henry VIII of England, in a hilly landscape not far south of the Scottish border, has brought to light Scottish defenses on Flodden Hill which appear to have been influenced by the Italian school, with triangular buttresses providing a platform for cannon with interlocking fields of fire (an important advantage which these purpose-built artillery forts had over the earlier castles was the absence of blind spots, into which defensive artillery or other firearms were unable to fire). Italian inspired modifications to Edinburgh Castle dating to roughly the same period have also come to light thanks to archaeological intervention within the castle's precincts. In the wake of English victory at Flodden, the town of Edinburgh gained a city wall and the castle also underwent some modification. It was not however until the mid-1500s that substantial new defenses, including a formidable earthen artillery fortification known as the spur, were thrown up. Subsumed beneath the parade ground or esplanade in 1753, the remains of this structure, actually a triangular ravelin, a defensive fieldwork placed in advance of the castle entrance, were exposed during an archaeological intervention related to the construction of stands for the Edinburgh Tattoo in 2010.

As fortifications for defense developed, so did those for offense. Siege warfare reached a peak of sophistication in the medieval period with the evolution of siege engines such as the mangonel, giving the attacker the ability of launching heavy missiles, usually stone, against the walls (Viollet-Le-Duc & Bucknell 2009). Underground, the digging of tunnels allowed attackers to undermine castle walls and towers. However, all of this changed with the widespread adoption of artillery. Artillery allowed attackers to stand off from the target at greater distances, but this did not negate the need to get close enough to deliver attacking infantry into breaches created by the cannon. The need to accommodate artillery and to deliver infantry assault led to the construction of siegeworks, which included artillery bastions, trenches, saps, and mines, which ideally would entirely surround the castle, fortress, or walled town under siege in what was called circumvallation. Siege tactics included the digging of parallels, which as the name suggests were trenches sighted parallel to the defensive walls. These trenches provided cover for the digging of saps, which ran perpendicular to the defenses, heading toward them. Once a suitable distance had been covered, another parallel system was dug to provide a new platform for operations closer to the defenses. During this process the walls were continually bombarded by heavy artillery located further back until a breach was created, by which time troops were theoretically positioned close enough to the walls to allow an attack on the breach from cover rather than a costly charge over open ground.

That fortification and siege warfare were regarded as key aspects of the arts of war is emphasized by the flowering of manuals and scale drawings published from the mid-sixteenth century onward. An impressive example of the latter is the Petworth map (so called because it resides in Petworth House, Sussex) which shows the citadel of Leith, to the north of Edinburgh, which in 1560 was a French enclave, and the surrounding siegeworks thrown up by a combined force of Scots and English. This map was to provide the key to an attempt to locate surviving remnants of the siegeworks within the modern urban environment of Leith, which is now essentially a suburb of Edinburgh (Pollard & Banks 2008a, b). Although the wider landscape was portrayed in three dimensions, the town walls and siegeworks were based on measured surveys. When these were scaled up and overlaid on a modern street map, it was apparent that elements of the siegeworks corresponded to areas which are free of development, surviving as open parkland (Fig. 1). The resulting project uncovered buried banks and ditches associated with an artillery fort in Pilrig Park, with a metal-working forge in the bottom of the ditch to the rear of the feature – presumably where it was far enough away from powder (Pollard 2008).

Fortifications, Archaeology of, Fig. 1 Details of siegeworks around citadel of Leith taken from Petworth map and overlain over modern map – showing relationship to open spaces

The Dutch War of Independence fought against Spain, between 1568 and 1648, was to see a flowering in fortification technologies, though the influence of the Trace Italienne was still dominant. Warfare at this time was characterized by siege warfare rather than open-field battles, and this tendency was only to begin to break down during the Thirty Years War (1618–1648), of which the Dutch war became a part. Gustav Adolf, King of Sweden, followed in the footsteps of Prince Maurice of Nassau and overhauled the way armies operated – largely based around the complex relationship between pike and shot. Many European cities retain at least some vestige of their late-sixteenth-century and early-seventeenth-century defenses, though they have yet to attract the archaeological attention they deserve. When archaeological intervention has taken place, it is usually prompted by urban development, as most of these impressive structures are now embedded within the framework of modern towns and cities. This was the case with the discovery in 2011 of two skeletons of soldiers killed during the siege of Stralsund, a heavily fortified German Hanseatic town on the shore of the Baltic which over several weeks in 1628 was besieged by Imperial troops under Wallenstein (Anonymous 2012). The two men, who were found face down in a ditch and seemed to have been buried where they fell, along with their muskets, swords, and various pole-arms, are thought to have been Imperial Landsknecht mercenaries killed by besieged Protestant troops during a sally outside of the defenses. One thing that this discovery does demonstrate is the rich contexts of burial which fortifications and siegeworks can provide – for at this time formal mass graves on battlefields seem to have consisted of bodies stripped bare of clothing and equipment, as demonstrated by the graves at Leipzig (1632) and Wittstock (1636) – the first of which was discovered thanks to a program of research, the second accidently in a sand quarry (Eickhoff et al. 2008).

Just as the various infantry tactics introduced by Maurice of Nassau, King Gustav Adolf of Sweden and others had an influence on the battlefields of the British Civil Wars in the mid-seventeenth century, so the military engineers of the Netherlands, France, and Italy also played a hand in defining the nature of fortifications during this conflict. Again, sieges rather than battles dominated, with major towns such as Bristol, Oxford, and York having old defenses, usually medieval walls, strengthened and new fieldworks constructed. Siegeworks were equally impressive, though the practice of slighting these and other features after the wars ended has left few surviving examples of upstanding earthworks. Perhaps the most dramatic of these in the British Isles is the Queen's sconce, outside the town of Newark. "Sconce" comes from the Dutch *schans* meaning "small protective earthwork or shelter" and is itself an indication of the importance of continental influence, with early treatises such as *The Practice of Fortification* by Paul Ive (1589) translating techniques into English. At Newark, there were originally two of these artillery positions, a square rather than triangular defense mounded from earth but making good use of a natural rise, outside the main defenses of the town, where they were positioned to provide protective fire from an advanced position. Connecting sconces to one another with ditches and banks was a popular way of providing defense for towns which had expanded drastically since the medieval period, when stone curtain walls were not unusual, and London, Bristol, and Plymouth were just some examples of this type of urban defense (Harrington 2005: 29).

One legacy of the British Civil Wars which has only recently attracted the attention of conflict archaeologists is the impact craters created by musket balls and other types of ordnance when they struck stone-walled buildings. The gatehouses of Stirling Castle and Linlithgow Palace are just two examples from Scotland, and similar damage has also recently been identified around the ground floor windows of the tower at Cambuskenneth Abbey. Musket balls indicative of seventeenth-century conflict have also been recovered by metal detectorists in nearby fields, and the two forms of evidence in combination may indicate a previously unrecorded combat on the outskirts of Stirling, perhaps an

unrecorded incident from the Battle of Stirling which was fought in September 1648.

The continued process of fortification design in the early modern period reached its climax with Sébastien Le Prestre de Vauban (1633–1707), a French military engineer renowned to this day for his flair for fortress design, though he actually made his reputation in taking forts by siege rather than designing them. Many of the elements of Vauban forts, such as angled bastions, glacis slopes to deflect cannon shot, covered ways, and caponniers, which allowed defenders to shoot along the defensive ditches from cover, can be seen in the earlier trace italienne, but Vauban refined them and combined the key elements to work in conjunction with the terrain. Although Vauban is usually associated with European forts, particularly those in France such as Bayonne, Cambrai, La Rochelle, and Verdun, his influence was to be much wider, with the colonies of various European powers, and most particularly the French and the British, constructing Vauban-style forts in the Americas, Africa, and India.

By the time of the Napoleonic wars, armies were much bigger than they had been for much of the eighteenth century and open-field engagements, of which the Battle of Waterloo in 1815 is the most famous, became more common. Sieges did however still occur, and the storming of French-held citadels such as Ciudad Rodrigo and Badajoz, both in 1812, demonstrated the delivery of infantry to the enemy walls via the trenches, saps, and parallels first developed by military engineers in the sixteenth and seventeenth centuries, while heavy artillery created breaches. The continued use of stone walls, despite angled bastions and other refinements, demonstrated their fallibility in the face of siege artillery, though at Ciudad Rodrigo the breaching was assisted by poor-quality mortar. Storming fortifications was however a costly exercise, and for obvious reasons, the lead units into a breach were known as the forlorn hope. After the death of 3,000 British and Portuguese troops in the final assault on Badajoz, Wellington's army wreaked a terrible revenge on the occupants, military, and around 4,000 civilians alike, in an act of barbarity which led him to famously describe his soldiers as "the scum of the earth."

Trends in North America c. 1750–1900

In North America, forts were usually constructed from timber rather than stone, though Quebec City is the last city north of Mexico to retain its original stone walls, dating from the mid-eighteenth century, largely intact (the British modified the French walls after Wolfe's victory on the Plains of Abraham, outside the walls, in 1759). It was, however, smaller forts rather than walled cities that were the norm in North America, including what was to become Canada, following the defeat of the French in the French and Indian War of 1754–1763 (known as part of the Seven Years War in Europe). These forts provided footholds on the European frontier as colonists expanded their territories further west and were to provide the focus of conflict first between the French and the British, and then the British and Americans during the American Revolution, which in part grew out of the previous conflict.

Given the longer history of historical archaeology in the USA and Canada, largely due to the colonial character of these late-forming nations and the more recent unwillingness to disturb potentially earlier indigenous sites, it is no surprise that these complex structures have provided a particular focus for archaeologists. Perhaps the most famous of these is among the very earliest. The first archaeological evidence for Jamestown, the site of the first European settlement and fort, in the form of weaponry and ironwork, was ironically uncovered by Confederate troops building fieldworks on the island during the American Civil War. Major excavations in the mid- to late twentieth century have provided a rich body of evidence for life and death among the first settler communities and also their relationship with Native Americans, which at times was a conflicted one (Kelso 2008). Remains of postholes marking the palisades from which the first fort was constructed have shown a simple triangular plan, with circular bastions in each corner. Of note in the present context is a large

assemblage of weaponry and armor, a lot of which was recovered from a well. Much of this equipment, including breastplates, helmets, musket rests, and pike heads, was already well out of date when it was issued from the royal armories for use by the expedition, which perhaps suggests that it was not regarded as a mission likely to succeed. The abandonment and recycling of some of this equipment, including heavy body armor, indicates that it was more of a hindrance than a help when fighting the local inhabitants, in periodic conflicts climaxing in 1622 when 200 colonists were killed. As such, the assemblage provides early evidence for the difficulties inherent in colonial warfare and perhaps even an attempt to adapt to what we would today call asymmetric warfare.

By the mid-eighteenth century, American forts were generally modeled on the Vauban model; though these were usually simpler in plan than their European antecedents and although timber was a popular building material, the larger forts, such as Fort Ticonderoga, included substantial stone elements. As European settlements spread further west and the influence of European powers subsided, most obviously after the American War of Independence, fort design also began to demonstrate variation from the Vauban form in part because protection against artillery became a lesser concern. Simpler, square forts were more common on the Western frontier, just one example being Fort Union, a bison fur trading post in North Dakota, occupied in 1828–1867 (Matzko 2001). As ever, it is difficult to make generalizations, with each fort demonstrating variation based on resource availability, location, architectural preference, garrison size, etc. Despite this, and largely thanks to Hollywood, the "wild west" stockade fort has become an icon of American history.

Although they had an obvious role in defense and conflict in general, colonial forts in the Americas and elsewhere were also an important focus for settlement and trade, and archaeological research based on these sites has made an important contribution to our understanding of social relations among colonists and between colonists and indigenous peoples, with houses (civilian as well as military barracks), sutling houses (stores), and trading posts, all commonly associated with the larger forts (Starbuck 2010). Studies of artifact distributions and food refuse have allowed archaeologists to examine the various ways in which different social and ethnic groups negotiated their place within what could at times have been hostile environments. A typical study is an analysis of military tablewares from 1760 to 1830 from sites in Canada, largely based on a rich assemblage of ceramics from Fort Beauséjour in New Brunswick (Sussman 1978). This suggested that British line regiments chose popular forms of design and pattern as they were more likely to be available in bulk and readily replaced, which in turn led to a number of regiments choosing to use the same ceramic types in the mess. Analysis of building materials from the Fort at Crown Point, New York, built in 1759 (Feister 1984), has demonstrated that even at a wilderness outpost the difference in social standing between officers and men was marked architecturally, here through the use of more expensive materials in the flooring and fireplaces in the officer's barracks than was the case for the accommodation built for other ranks.

The Mid- to Late Nineteenth Century

Military technology, which was always an important factor influencing the evolution of fortifications, saw to it that dramatic changes were again evident by the mid- to late nineteenth century, when further increases in the efficiency of artillery and firearms created the first indications of trench warfare during the American Civil War. The advance of Empire, particularly under the British, also saw an upsurge in the construction of forts across the globe, in places such as India and Africa, and again European patterns were to dominate. In some cases fortifications were makeshift, constructed in a hurry to defend against attack, usually from technologically weaker indigenous peoples. Such was the case at Eshowe, in Zululand in South Africa, where after a British invasion in January 1879 a fort was constructed around a Norwegian mission station (Pollard & Banks 2005). Captain Wynne, a Royal Engineer officer, integrated well-tested features

Fortifications, Archaeology of, Fig. 2 Contemporary drawing of interior of fort at Eshowe by Lt. Knight of Buffs. Note loopholes under eaves of church roof

of European forts, such as the caponnier, within a structure which also demonstrated a good deal of initiative in the face of limited sources and harsh local conditions – including loopholing the church so that rifles could be fired from cover and using biscuit boxes covered in earth to create ramparts (Fig. 2). Today these ramparts with external ditch still stand, and geophysical survey and excavation has identified structures within, including the mission church, from which the iron window frames were removed by Zulus after the siege so that the metal could be recycled (Pollard & Banks 2005).

European military engineers were also in demand in foreign parts outside the Imperial sphere, including Paraguay in South America, where for instance in the 1860s the despotic leader of Paraguay, Francisco Solano Lopez, contracted a Colonel Thompson, along with British railway engineers, iron founders, and surgeons, to supervise the construction of forts and linear defense systems in advance of the catastrophic, but outside of South America little known, War of the Triple Alliance, which between 1864 and 1870 pitted Paraguay against the combined might of Argentina, Uruguay, and Brazil. The remains of these earthwork fortifications, which like those of the American Civil War were to presage the trenches of the First World War, can still be seen today in the south of the country, where urbanization has not had a chance to erase them. Limited archaeological assessment has suggested that these sites have the potential to tell us much about this conflict and the people who fought it (Pollard 2006).

More basic types of fortification are also known, including the *sangar*, a word originating from the nineteenth-century British experience in the North West Passage and in Afghanistan, and referring to stone breastworks and still used today by the British Army and others to describe small-scale defensive structures usually constructed from sandbags. Archaeological survey has identified one of these structures on the battlefield of Isandlwana, fought in Zululand on 22 January 1879. During the battle, which was a resounding victory for the Zulus, a British soldier created a barricade by piling rocks between two boulders; metal detector survey recovered five Martini Henry cartridge cases from the ground just behind the sangar, from where the soldier had fired on the advancing Zulus, probably just before retiring back to the camp area with the rest of the force, where it is likely he met his death. A rare example of fieldworks surviving on a British battlefield is rock-built *sangars* constructed by Spanish troops during the battle of Glenshiel, fought by Jacobite forces, supported by the Spanish, against government troops in 1719. Several of these structures are still to be seen on a hilltop position in the glen in an area which because of their presence has been protected as a scheduled monument (Fig. 3).

Fortifications, Archaeology of, Fig. 3 Stone sangar built by Spanish troops on hilltop at Glenshiel from 1719 Jacobite Rebellion

Another category of makeshift fortifications relates to the defense of buildings, either during a siege or battle. The British fort at Eshowe could be taken as an example; however, this was more of a fort built around a mission station than an attempt to fortify the mission station itself. The defense of Rorke's Drift, which took place on the same day as the battle of Isandlwana, is a better known example of modification, with the mission buildings linked with defensive breastworks which themselves were ad hoc, with biscuit boxes, mealie bags, and wagons utilized. These temporary palisades leave little if any archaeological trace, as they are entirely removed after the fighting has ceased, but the remains of the buildings at Rorke's Drift, one of which was burned to the ground in the battle, have been subject to excavation (Pollard & Banks 2005). Other examples include the Alamo, where American irregular troops fighting for Texan independence from Mexico fortified a Spanish mission station. Archaeological excavations have provided some idea of how the defenses were constructed, with trenches not really fitting with the popular image of the defenders standing on walls and makeshift ramparts, though these were also utilized (Ivey & Fox 1997). Some buildings have been subject to the minimum of modification, no matter how rapidly executed, prior to them providing effective defense against attack. A good example of this is the farm complex of Hougoumont, which during the 1815 Battle of Waterloo was defended by British and Allied troops against repeated French attacks (Paget & Saunders 1992). This was only possible thanks to walls and gates which linked various buildings around a courtyard, thus providing a ready-made fort. Loopholes were created and parts of the roof removed to allow sharpshooters a high vantage point, but for the most part the building was left unmodified. Some archaeological excavation has been carried out on the site, but this was merely geared toward uncovering wall bases for display; as yet a full academic program of recording and investigation has to be instigated.

Finally, it was not just Europeans who constructed forts during many of the colonial wars that characterized the rise and fall of the age of Empire. In the 1840s the Maori of New Zealand went to war with the British Empire and used their traditional forts, multi-vallate palisaded settlements often located on terraced hill tops and known as Pãs, to great effect, even using tunnels to evade the enemy and execute ambushes. Archaeologists have recently adopted these indigenous forts as ethnographic parallels

to much earlier structures in Europe, namely, Iron Age hillforts, which although built 2,000 years before the nineteenth century Pãs share some similarity in form and perhaps function (Armit 2007). Another example of non-European forts which were utilized in defense against the forces of Empire was the Taku forts in China, with some of them built specifically to defend against incursions by the Western powers. The forts saw action during the Opium wars of the 1850s and 1860s, when they were assaulted by British, American, and French troops, and although they put up stiff resistance, they ultimately fell due to superior firepower, the same being the case for forts stormed by a multinational force during the Boxer Rebellion of 1899–1901. Most of the forts were dismantled in the nineteenth century, but two of them, the Hai and Dagu forts on the banks of the river Haihe, have been renovated and serve as visitor attractions.

First and Second World Wars

It was the First World War (1914–1918), especially on the Western Front in Europe, which saw the evolution of trench warfare on an epic scale, as both sides fell into a stalemate following the halting of the German advance by French and British armies. Thousands of kilometers of trenches were dug by both sides, with the no man's land between them sometimes being just a few meters wide. The Germans, who generally managed to occupy more advantageous higher ground, even if it was a ridge line at a few meters altitude, prior to the stalemate, also integrated concrete pillboxes into their trench systems, which provided protection against shell fire and often served to threaten Allied assaults from the rear once they had successfully pushed through several lines of trenches. This defense in depth was a key feature of the development of German trench tactics. The ancient arts of mining beneath enemy fortifications in order to destroy them from below were reintroduced and updated thanks to new types of explosives, which could kill hundreds of men in a single detonation from deep underground. Ultimately, it was the Allied adoption of a combined arms approach, infantry supported by tanks, aircraft, and targeted artillery, late in the war which turned the tide and pushed the Germans back to secondary defensive systems such as the Siegfried line.

First World War archaeology has developed over the past decade and been given new impetus due the last veterans of the war passing away (Novotny 2009). Trenches have provided an obvious focus, and an increasing number of projects have demonstrated that archaeology can shed new light on a conflict which might be thought to be adequately covered by a wealth of photographs, maps, war diaries, and even moving pictures (Fraser & Brown 2007). Archaeology has allowed archaeologists to study this vast, industrial conflict on a micro- and personal scale, and some projects have demonstrated that archaeology can provide insights into aspects of large-scale battles, which have not been recorded in the historical record. An example is the previously undocumented construction of a new communication trench by German troops in advance of the Australian attack in late September 1918 at Mont St Quentin on the Somme. The previous trench was deeper but ran in a straight line rather than in zigzag (Fig. 4) and thus placed men moving along it at greater risk from incoming artillery fire.

In the years following the First World War, the devastated landscape of France and Belgium was repaired and the trenches backfilled. Thousands of laborers were employed on the task, including many Chinese "coolies," and farmers were paid cash for every meter of trench they filled in. Today, there are relatively few original sections to be seen, though bands of chalk running across plowed fields in the Somme are a giveaway of their location. Exceptions are areas of woodland, within which silted remnants of trenches escaped backfilling as they are not on agricultural land. This is the case at Mont St Quentin, where the trench lines can still be seen as linear depressions running through the floor of the wood, in which double-trunked trees are said to be the result of shell damage and then recovery.

In addition to temporary field fortifications, permanent concrete built forts and defenses became a feature of the twentieth century, though the origins of what were sometimes subterranean complexes have their antecedents in the forts of

Fortifications, Archaeology of, Fig. 4 Topographic survey of German communication trenches at Mont St Quentin, Somme, France. Shows original trench (*lower*) and later zigzag version (*upper*)

the nineteenth century (including coastal artillery positions in the UK and USA). Advances in gunnery and shell penetration and the need to provide interlocking fire brought about the introduction of underground magazines, with elevators to bring up propellant and shells to the guns mounted in surface batteries. The pop-up gun, which could be loaded under cover and then raised to be fired, was a good example of how in the late nineteenth century artillery was being developed for incorporation into forts rather than fortifications being built around guns. The dominance of artillery on the battlefields of the Western Front eventually meant that there was no safe place on the surface, not even in trenches, and so deep dugouts were constructed to accommodate men in their off-duty hours 15 meters or more underground (as previously mentioned, the Germans tended to prefer pillboxes to deep dugouts). Several of these structures have been excavated, and, in some, the water-logged conditions (Fig. 5) have demonstrated incredible levels of preservation not only in the wooden structure but also in the objects surviving (Barton et al. 2005).

Fixed fortifications could be found wanting, as was the case with the Maginot Line, a series of underground magazines, barracks, communication hubs, and tunnels, supported by an underground railway and linking guns enclosed in armored cupolas on the surface. This impressive structure was built after the First World War across the French-German border to prevent future incursions by the latter. In 1940 the Germans, utilizing Blitzkrieg tactics honed in Poland, simply sidestepped the defenses and went around them. The Germans were however to place much store on an impressive range of largely concrete built fortifications known as the Atlantic Wall, which stretched along the western seaboard of Europe. These installations included massive bunker-type emplacements which housed 15- and 16-in. guns capable of hitting the English town of Dover nearly 50 kilometers away across the English Channel. Slave labor

Fortifications, Archaeology of, Fig. 5 Stairway in British deep dugout known as Vampir, near Ypres, Flanders, Belgium. Structure has just been drained, hence sludge on steps

was utilized in the construction of these fortifications in a program supervised by Organisation Todt, the civil and military engineering wing of the Third Reich also responsible for the German system of freeways known as the autobahn.

In the lead up to D-day on 6 June 1944, the Allies in Britain developed various technologies for overwhelming these defenses, including a series of specialist armored tanks and other vehicles, known as Funnies, which were variously capable of swimming ashore, laying tracks over soft sand, clearing mines, and planting explosive charges on heavily fortified positions. These were tested against replicas of the German defenses, the most impressive of which can still be seen on an isolated moor not far to the north of Stirling in Scotland (Fig. 6). This striking reminder of the effort put into D-day is protected as a scheduled monument and is likely to be subject to full archaeological recording at some point in the future. Despite heavy losses on some of the invasion beaches, D-day was a success, and the major problems occurred once the Atlantic Wall had been negotiated, when the Allied advance was slowed due to the enclosed nature of the French landscape and the effective deployment of German forces, especially their tanks. In a move similar to the German treatment of the Maginot Line, the heavily fortified gun emplacements were simply bypassed and isolated, most of them finally surrendering to the Allies after some resistance in September of 1944.

Hindsight is a wonderful thing, and today we are comfortable in the knowledge that Hitler's Germany and the Axis powers lost the Second World War. Obviously, this was not the case in the early months and years of the war, when prior to the intervention of the USA, Britain alone continued to resist. For a time, German invasion of mainland Britain seemed inevitable, and so in order to defend against it, a wealth of defensive fortifications were constructed. These included stop lines around major cities such as London, where ditches were dug and concrete bunkers built in order to break the momentum of a German advance. The pillbox, small concrete boxes, mostly built to accommodate just a handful of men armed with rifles and machine guns, became a ubiquitous feature of the British landscape. Today, they can still be seen covering roads, railways, and bridges, sitting on high ground where they had good fields of fire or covering the approach to a crossroad. In addition, there were coastal gun installations, underground headquarter complexes, airfield defenses, subterranean hospitals, and all manner of inventive devices. The Tett turret for instance was a one-man pillbox, really nothing more than a pipe sunk vertically into the ground with a rotating concrete turret sitting on the ground surface. Not many were put into service, largely because they were a defense of last resort; for once in them there was little hope of escape once combat commenced. Several of these were located during an archaeological survey of Hornchurch airfield in Essex and have since been integrated into a heritage walk around the remains of the old airfield which saw heavy service during the Battle of Britain (Pollard & Oliver 2002).

Fortifications, Archaeology of, Fig. 6 Replica section of German Atlantic Wall used for D-day training, Sheriffmuir, Scotland

Post–Second World War Examples

The post–Second World War nuclear age brought about another shift in the nature of fortifications with the destructive power of the atom bomb which encouraged the move to deep protective structures, for both the defense against nuclear strike and the accommodation of missiles in fortified silos. With nuclear limitation and the demise of the USSR, many of these sites have fallen into disuse and to a degree have been accepted as elements of our cultural heritage (Cocroft et al. 2005). Field fortifications of a more traditional nature did not however disappear, and entrenched firebases became a key element of the failed US insertion strategy in Vietnam where helicopters, aerial bombardment, and artillery provided support for these isolated strongpoints deep in enemy-held territory. Following the invasion of the Falkland Islands in 1982, Argentine troops built great numbers of small bunkers or sangars from rocks, turf, and timber, one reason being that the ground is so wet that the digging of trenches is all but impossible. In Iraq and Afghanistan, the modern equivalent of the firebase can be seen in the form of the many strongpoints, depots, and fortified camps which provide protection for US, British, and other forces engaged in these theaters. There can be little doubt that at some point in the future these conflicts, raw and alive as they are at present, will attract the attention of archaeologists. Some of these sites, such as the tunnels dug by the Viet Cong to provide protection from American aerial bombing and artillery fire and also as a means of springing ambushes, have already become a popular visitor attraction and perhaps serve as an indicator of the potential for other modern fortifications and installations as tourist-friendly heritage sites.

Future Directions

The foregoing has attempted to provide a basic overview of the many different types of fortification, both defensive and offensive, which have played a role in various conflicts across the globe in the postmedieval period (1500–present). Although it has not been possible to provide an exhaustive survey, it is hoped that the wide range of variation in form and function is apparent, given a modest suggestion of the sorts of information which the archaeological analysis of these structures can provide.

Cross-References

- ▶ American Pioneers and Traditions
- ▶ Battlefield Archaeology
- ▶ Cold War
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ New Spain: Forts and Transport Archaeology
- ▶ West and Central Africa: Historical Archaeology

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Forum

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Introduction and Definition

A *locus celeberrimus* composed of an often-rectangular space delimited by religious and administrative buildings, the forum constitutes the institutional, commercial, and monumental center of a Roman city (Gros 2001: 228–59, with bibliography). An inaugurated area, ritually

delimited as a *templum augurale* to be able to host, as in the *Saepta*, popular meetings and electoral assemblies in particular, the forum is the site devoted to the essential social and public activities of colonies and municipalities alike: in fact, the chief ritual celebrations of the community are either observed in the forum or passed through it. Laws are promulgated in the forum, trials conducted, and justice administered. Just as in Greek *agorai*, commercial transactions are often conducted in the forum. Forum squares equipped with temporary wooden stands (public *fori*) would be the site of games (*ludi*) or gladiatorial contests in the presence of the populace (Liv. 41.28.11).

During the late Republican period, the need to satisfy the multipurpose uses of the forum seems to have inspired the emergence of a number of different building typologies and/or complexes, each with a specific functionality organically linked to the forum space. These included the architecturalization of the curia-*comitium* system (Balty 1991), present in the Forum Romanum since the sixth century BCE as an area for meetings of the Senate and for the *comitia curiata* (Coarelli 1983; Coarelli 1985). Certain Latin colonies in Italy dating to the third century BCE reproduced this architectural form. The *atria publica* were venues of both public and religious activity provided with shops (*tabernae*) for commercial use. The *basilica forensis* was a monumental building with a complicated usage; the building could accommodate judicial, administrative, and financial activities. The *tabularium*, a building mainly used as an archive (*tabulae publicae*), faced the Forum Romanum from the slope of the Capitoline hill, in Rome's case. Lastly, the *macellum*, a structure with a peculiar plan, served as a market for the sale of meat and fish.

Surrounding many of these secular buildings, often placed in emphatic positions, one could find the monumentalized forms of preexisting sacred sites linked to the venerable traditions of the city's past (and often its origins). In the case of subjugated cities or territories, these cults were always adjusted according to the rules of *interpretatio romana* (e.g., Hercules of Alba Fucens; the Greek divinities of Paestum; the Iuppiter cult of Pompeii). Otherwise temples and shrines (*sacella*) for newly established cults, as demonstrated by the *Capitolia* and the numerous temples (*aedes*) dedicated to members of the Imperial house, constituted a clear manifestation of Roman politics and power, and consequently of the loyalty of the municipal élites towards the central government.

This cumulative function makes the forum and its buildings the privileged site for individual and collective, private and public, profane and religious meetings. Accordingly, in such a frequented place the most relevant commemorative and honorific monuments of the city were displayed and adorned with both images and inscriptions that promoted the military exploits and the munificence of generals, politicians, and notables. It has been correctly pointed out that the forum is:

> "an authentic *monumentum*, a site of memory", "in which all of the symbols of municipal dignity are concentrated and around which the next generations, aside from their juridical status, acquire or enforce the awareness of belonging to a community" (Gros 2001: 228).

Arches, trophies, columns, and honorific statues constitute the usual architectural and sculptural adornment of the open central area. From the second century BCE onwards there exists a tendency to use framing devices to both regularize and emphasize the longitudinal perspective of the forum and its buildings. This included the use of side streets and gates and, in particular, the *porticus*.

Key Issues/Current Debates/Future Directions/Examples

The city of Rome's so-called Imperial *fora*, a series of majestic squares bordered by arcades, began with the Forum of Julius Caesar and, with the exception of the Forum of Trajan, were dominated on their short sides by temples dedicated to the tutelary deities of the dynasty. These forum complexes doubtlessly represent the culmination of this arc of monumental and

ideological development. These Imperial *fora* were configured as complexes with celebratory and commemorative purposes that prevailed over the institutional and commercial functions. The spatial progression and the monumental evolution of the Forum Romanum, but also of the different colonial and municipal *fora*, coincide also with the history of the conquest of public power over private property. It is a phenomenon that emerged as another sign of the gradual and unavoidable crisis of Republican society, already underway in the second century BCE with the Roman triumphs in Greece and in the eastern Mediterranean and the consequent diffusion of the multiform manifestations of *luxuria Asiatica* (Pollitt 1978). The residences of the local aristocrats normally occupied many central and/or contiguous blocks of a city's layout until the final two centuries of the Republic when these residences often were expropriated for the extension of the forum spaces and for the creation of new civic and religious buildings. For example, the luxurious house (*domus*) that Publius Cornelius Scipio Africanus had built facing on to the Forum Romanum was razed by Ti. Sempronius Gracchus in order to make way for the construction of the Basilica Sempronia (Liv. 44.16.10). Similar is the case of the land on which the Forum of Julius Caesar was built after Cicero purchased it in 54 BCE, under the mandate of his then-friend Julius Caesar, for the sum of 60 million sesterces (Cic. *ad Att*. 4.16.8). The latter operation was accompanied by the complementary, firm will to unhinge "the old Republican symbology" (Coarelli 1985: 237) and which culminated, in fact, in the demolition of the Curia and some of the monuments of the ancient *Comitium*.

In the articulated process of monumental and architectural development of forum squares, it is possible to distinguish at least three crucial moments, documented not only by means of historiography but also by decades of archaeological investigation. The phase of middle Republican colonization that followed the dissolution of the Latin League in 338 BCE (Gros & Torelli 2007: 165–81) coincided with the final decades of the fourth century and the early decades of the third century BCE. This was a first, crucial moment in the conceptualization and realization of both the space and the architecture of forum squares, as demonstrated by the excavated colonial sites of Fregellae, Alba Fucens, Cosa, and Paestum. These middle Republican sites, at least, seem to adopt urban and architectural solutions in faithful conformity and in full synchronicity with the city of Rome (Torelli 1999). As documented by a series of pits discovered at the margins of the squares of these cities, the *fora* created by the new colonies were founded, as in Rome, not only according to augural doctrine so that they could serve as *saepta* (Torelli 1991), but also in keeping with the process of the *imitatio Urbis*. In Cosa, for example, the combination of the citadel (*arx*), the sacred road (*via Sacra*), and the forum may be seen to imitate the urban situation at Rome (Brown 1980; Brown et al. 1993).

The circular *comitium*, perhaps inspired by the *ekklesiasterion* of Magna Graecia and Sicily, preserves in its quadrangular enclosure its original nature as *templum* following the Italic tradition. It is significant to note that this situation is present in all four of the colonies mentioned above as a reproduction of the Roman *Comitium* that gained this particular configuration from a reconstruction of c. 263 BCE (Coarelli 1983: 145–53). On the other hand, the *atria publica* with *tabernae* investigated at the margins of Cosa's square (Brown et al. 1993: 57–106) are reproductions of the analogous buildings that bordered the mid-Republican Forum Romanum (Welin 1953: 178–219); these are mainly known via the literary sources (*atrium Regium*, *atrium Vestae, atrium Libertatis*, *atrium Sutorium*, *atria Licinia*, *atrium Maenium*, *atrium Titium*). And finally the discovery of a bronze statue of Marsyas in the area of Paestum's forum is perhaps a replica of the statue present in the *Comitium* of Rome since 294 BCE; this demonstrates the deep and faithful accuracy that guided the imitation of urban models, in that it even involved, for political purposes, the reproduction of single statues.

A second important moment in the evolution of the forum is certainly the second century

BCE, coincident with Rome's eastern conquests and with the transformation of the institution of colonialism that had fallen into a crisis because of the increasing political and economic demands of the settlers (Gros & Torelli 2007: 181–98). This is the phase of rationalization and monumentalization of the Italic cities, which was made possible thanks to the wider availability of resources and was carried out under the decisive influence of Hellenistic urban planning and architecture. Also in the *fora* the monumental apparatus increased considerably, as they started to include building typologies not previously or substantially well known in the Roman world, such as the *porticus*, the basilica, the *macellum* (market), and sometimes public baths (*thermae*). In many cases, however, the planning and the transformation processes of the period are conditioned by preexisting circumstances and structures that, as demonstrated by the Forum Romanum itself, can significantly scale down the ambitious intentions of regular urban planning.

After the establishment (*deductio*) of a Sullan colony in 80 BCE at Pompeii, an increased degree of regularity in the forum area may be observed. This took the form of a basilica, the *macellum*, and arcades that were aligned with the axis of Iuppiter temple that was transformed into the Capitolium of the town. These building activities contribute to an attempt to realign the public space on an axis that diverged from that of the preexisting ancient sanctuary of Apollo that stood adjacent to the forum square.

The addition of the basilica and a *forum Piscarium* constitutes the most relevant building integrations of the period in Cosa's forum; in the arcades positioned on the three sides of the forum and in the monumental arch erected at the northwest entrance of the square shortly after 180 BCE, an analogous desire for spatial and prospective regularization is revealed. In the forum of Alba Fucens, where there is also an attestation for the presence of a statue of Marsyas, a basilica and *macellum* were part of the same phase of construction. As in the previous century, the Forum Romanum remained the model for those realizations of the colonial *fora*. At Rome the comedic playwright Plautus described the Forum Romanum in the final years of the third century BCE and, based on the textual account, it seems that the elaboration of both basilica and *macellum* typologies had begun. These complexes were inspired by an increasing specialization of space and function that, as a matter of fact, replaced structures considered outdated by this time such as the *atria* or the alimentary *fora* (*Piscarium* and *Cuppedinis*). In Rome, in a few years and despite a strong opposition, three *basilicae* were built that not only conferred a certain symmetry at the long side of the forum square but radically changed the organization and the efficiency of the forum space. In 184 BCE the Basilica Porcia replaced the two public *atria* (*Maenium et Titium*). In 179 BCE the Basilica Fulvia-Aemilia was built during the famous censorship of M. Fulvius Nobilior (Liv. 40.51), and finally, in the area of the still visible Basilica Iulia, the Basilica Sempronia was built in 169 BCE (Liv. 39.44). The sumptuous Basilica Aemilia remained for centuries as a commemorative monument of the *gens Aemilia*, showing how, at its best, enduring propaganda was always combined with ordinary functionality (Plin. *HN* 36.102).

This evident inclination for celebration, already present for centuries in the buildings and monuments of the Forum Romanum, was transformed into dynastic glorification under the pressure of the imperialistic tendencies of the first century BCE, as the creation of the Forum of Caesar clearly demonstrates. The complex inaugurated by the dictator in 46 BCE therefore ratifies a new phase of the general evolution of the ideology of forum squares: from this time, not just the successive Imperial *fora* (La Rocca et al. 1995; Packer 1997; La Rocca 2001; Meneghini & Santangeli Valenzani 2007, 2010) but also all of the *fora* of the Italian and provincial centers (Gros & Torelli 2007: 243–392) will be tasked to satisfy the fundamental needs of propaganda and the cult of the emperors and of their families through every public and religious building, a phenomenon that coincides with a phase of gradual "restriction of municipal and colonial powers" (Gros 2001: 237). The

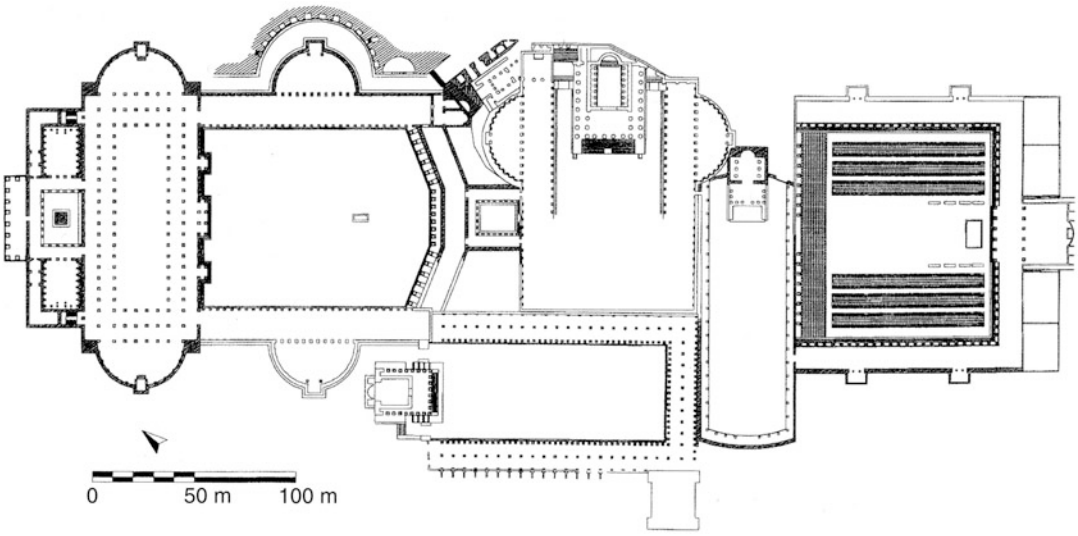

Forum, Fig. 1 The Imperial fora (From Meneghini & Santangeli Valenzani 2010: 104, Fig. 2)

structural solutions tested in the Italic territory since the second century BCE, though, will turn out to be perfectly up to date in the new constructions, and they will sometimes be applied in an even more radical way, as clearly shown by the Imperial *fora* (Fig. 1) and, outside of Italy, by the exceptional "provincial *fora*" (e.g., Tarragona) (Gros 2001: 252–55). The width of the squares with arcades, the size of religious buildings, and the tendency towards enclosure are characteristics that had already been proven in Rome in the *porticus* of the Campus Martius. On the other hand, each of the Imperial *fora* is provided with distinctive monumental features, a clear result of contingency, but also of centuries of architectonic progress and intentionally diverse ideological choices. Accordingly, in the Forum of Augustus (42–2 BCE) large hemicycles are added to the porticoes that flank the central temple dedicated to Mars Ultor, elements that were already present in the Forum of Caesar. In the Forum of Augustus the inclusion of an exceptional sculptural program summarized the mythic origins and the history of Rome. Vespasian built the *Templum Pacis* (71–75 CE) on the site of the Republican *macellum* in order to celebrate his victory of the Judean war; it featured the temple with its façade aligned with the lateral arcades that delimited a central area glorified by works of art and gardens. A long and quiet narrow square characterized the Forum of Nerva or Transitorium, inaugurated in 97 CE and dominated by a temple dedicated to Minerva. Due to the constraints of the available space it showed very particular arcades, constituted by a colonnade raised close to the walls at the end of the complex. Finally the most revolutionary and extensive of the Imperial *fora*, that of Trajan (107–113 CE), *locus sepolturae* of the *optimus Princeps* and of his wife Plotina, was built between the Quirinal and Capitoline hills after an exceptional program of excavation. Financed with the proceeds of the Dacian campaigns, it was composed of a monumental sequence that included a large square with arcades, two lateral *exedrae*, and the equestrian statue of Trajan; the Basilica Ulpia closed the minor northwestern side of the square and, behind it, finally, stood the Column of Trajan with its two flanking libraries.

In line with the urban models, there are two traditional building types that, more than others, seem to qualify the municipal forum as belonging to the Imperial period. These two are the principal sanctuary of the city, most often axially aligned and dedicated to the Capitoline Triad or to the

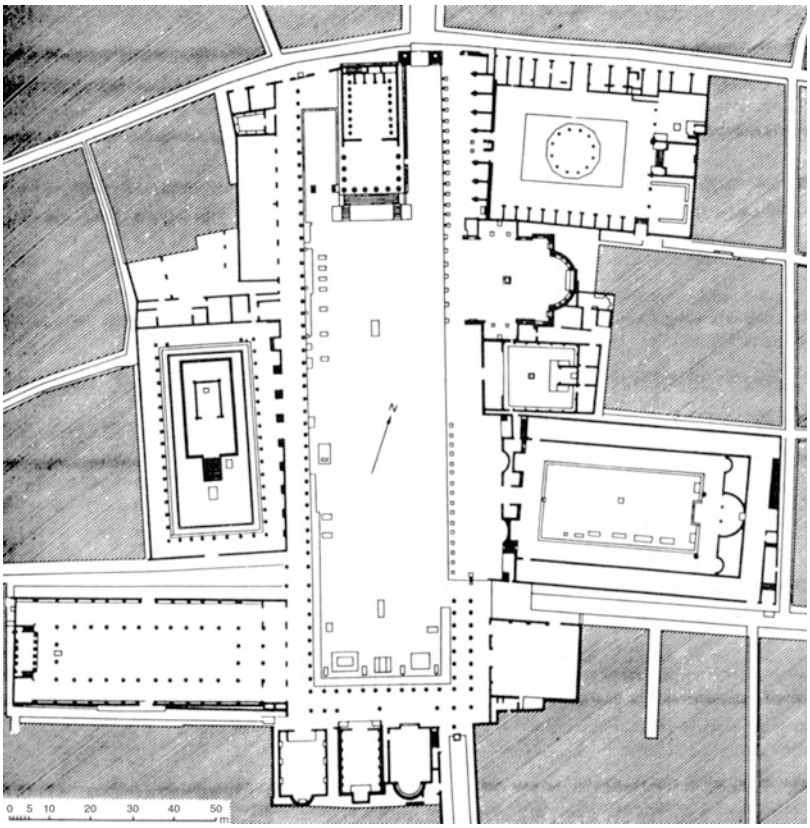

Forum, Fig. 2 Plan of the forum of Pompeii (From Gros 2001: 232, Fig. 247)

cult of Roma and *principes*, and the civil basilica, that often closes one of the short sides of the forum and that now, with the disappearance of *comitia*, includes the Curia inside it. Buildings that when located in the same position, one in front of the other on the same axis, divided in the middle only by the regular square with arcades, create the popular system of the forum called "tripartite," which became very common during the Imperial period in the provincial centers (Gros 2001: 242–47). Since the Augustan period, the need to celebrate scenic *ludi* in honor of the dynasties could determine the location of theatres close to the forum temples dedicated to the dynastic cult, as is demonstrated well by the cases of Minturnae, Brixia, and Augusta Bagiennorum.

The forum of Pompeii and the forum of Glanum – one Italic, the other provincial – constitute two optimum demonstrations of the development of public areas reflecting the new needs of Imperial religion and Roman administration. The eastern part of the forum of Pompeii (Fig. 2), already occupied by the temple of the Capitoline Triad and by Apollo's sanctuary in the northern and western sides, is entirely reshaped by the creation of a temple of the *Genius Augusti*, the temple of Public *Lares*, and the building of Eumachia, imitating the *porticus Liviae* of Rome in the Campanian center (Torelli 1998). At Glanum, located in Gallia Narbonensis, the Roman conquest resulted in the obliteration of the Hellenistic public area around 40 BCE; it was replaced by two temples (30–20 BCE) and by a forum provided with arcades, a basilica, Curia, *tabularium*, and public bath. The growing desire for self-representation on the part of the local élites, ever more greedy for political privileges and for the good will of the Imperial court, led some families to focus their euergetic activity and to invest their own funds in the construction

and embellishment of the monumental centers, as happens, for example, in the cities of Dougga and Lepcis Magna in north Africa. The dynamism of three prominent *gentes* (ancient Roman families), together with some preexisting structures, renders quite peculiar the plan and spatial organization of the forum of Dougga in *Africa Proconsularis*. *Domi nobiles* (local nobles) belonging to wealthy indigenous families are responsible, from the late first century BCE, for the realization of the main public and religious buildings of Lepcis Magna, a city that concentrated in the so-called Old Forum the basilica, the Curia, and six cult places dedicated to traditional Punic divinities now side by side with the new Roman divinities (Roma, Augustus, and the Capitoline Triad).

Thanks to the generosity of the locally born emperor Septimius Severus (r. 193–211 CE), the city of Lepcis Magna was provided with a second, monumental forum in the third century CE. The monumentality of the dynastic temple and scope of the wide square bounded by arcades, the impressive basilica built on the minor side of the square, and provided with two mirror hemicycles just as the Basilica Ulpia in Rome, shows one more time the prestige exercised in the monumental center of the *Urbs Roma*.

The Forum Romanum itself would maintain both its charm and some of its ancient functions for centuries, until the construction of the final ancient monument in the square. This final monument was an honorific column crowned with a statue and dedicated to the Emperor Phocas in 608 CE; it remains visible in the Forum Romanum to this day.

Cross-References

- ▶ Agora in the Greek World
- ▶ Architecture, Roman
- ▶ Basilica in Classical Archaeology
- ▶ Baths and Bathing, Roman
- ▶ Domestic Architecture, Roman
- ▶ Imperial Cult, Roman
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Romanization
- ▶ Topography of Rome
- ▶ Urban Planning, Roman

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Fossil Records of Early African *Homo*

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Introduction

Molecular and paleontological evidence suggests that modern humans first originated in Africa as early as 250,000 years ago. However, fossil remains in Eurasia dating to at least 1.8 mya (million years ago) suggest that some of our ancient relatives had already migrated out of Africa by the time modern humans emerged. Thus, the peopling of the world does not begin with modern humans. Rather, the fossil record suggests a long history of previous occupations in Africa and Eurasia.

In this review, we discuss the nearest fossil relatives of modern humans. The fossil species we review include the early members of the genus *Homo*, a group within the broader category of "hominins" (all primate species more closely related to modern humans than to any other living taxon). Early *Homo* likely shared its environment with non-*Homo* hominins such as *Paranthropus*, a taxon with a suite of morphological features distinct from the derived characteristics of the genus *Homo*. When we speak of derived traits in *Homo*, we mean traits shared with modern humans. In contrast, primitive traits are morphological features shared by all hominins and therefore not unique to *Homo*. Both primitive and derived traits are combined to define the morphology of a fossil taxon. "Taxon" (pl. taxa) refers to a hierarchical category, and although taxon is often equated with species, this is not necessarily correct. "*Homo*" is a genus-level taxon, while our species, *Homo sapiens*, is a species-level taxon. Because it is difficult to establish speciation events for certain in the fossil record, we prefer to use the term taxon and begin by reviewing the definition of the taxon *Homo*.

Definition

What Is *Homo*?

In 1940, Franz Weidenreich proposed the inclusion of several hominin fossils in the genus *Homo* on the basis of their morphological similarities with two well-established taxa of *Homo* known at the time, *H. sapiens* and *Homo neanderthalensis* (Neanderthals). These additional specimens were classified as *Homo erectus*. The addition of a new taxon to the genus *Homo* necessitated an improved definition of the genus *Homo*. In 1950, Ernst Mayr proposed that *Homo* was a genus of modern human-like creatures whose members showed morphological evidence of increased brain size and bipedal locomotion. However, this definition was unsatisfactory, for it would have included specimens belonging to, *Australopithecus*, a different hominin genus established in 1925. Wilfrid Le Gros Clark expanded upon Mayr's definition and provided four criteria for inclusion into the genus *Homo*: a minimum endocranial volume of 750 cc (cubic centimeters), evidence of tool use, evidence of a precision grip, and evidence of spoken language. Additionally, he suggested that derived morphological traits of *Homo* included a cranium with less robust muscular markings, a flatter (more orthognathic) face, a rounded dental arcade with no evidence of a premolar-canine honing complex, smaller teeth, and adaptations for bipedalism.

This description of *Homo* has undergone many revisions and interpretations, especially in light of the discoveries of many more hominin fossils since the 1950s. Some of the modifications to this definition are discussed in the text that follows, but it is important to note that researchers today have the benefit of more fossils and more rigorous phylogenetic methods to assess the evolutionary relationships of modern humans and fossil hominins. One prominent cladistics-based definition describes the crania of members of *Homo* as possessing, relative to *Australopithecus*, a thicker cranial vault, greater cranial vault height, reduced postorbital constriction, increased contribution of the occipital bone to the cranial sagittal arc length, an anteriorly

situated foramen magnum, reduced prognathism, narrow tooth crowns especially in the premolars, and reduction in the length of the molar row (Chamberlain & Wood 1987). Another phylogenetic study found only four derived features common to all members of the genus *Homo* – a larger brain, the absence of a nasal sill, reduced temporal lines, and fewer air cells in the temporal squama (Strait et al. 1997). Though there are discrepancies between analyses, definitions of *Homo* are becoming more specific and quantifiable.

In both historic and modern approaches to defining the genus *Homo*, there is a well-recognized distinction between the earliest forms of *Homo* that still share many traits with *Australopithecus* and intermediate forms of *Homo* that appear more like *H. sapiens* but have not yet reached complete anatomic modernity. We refer to these groups as transitional *Homo* and premodern *Homo*, respectively, and discuss the significance, morphology, and key fossils of the taxa within these groups below.

Historical Background

Transitional *Homo: Homo habilis*

Significance

From 1960 to 1963, a series of fragmentary fossils were found in Olduvai Gorge, Tanzania, that seemed to belong to a new *Homo* taxon. Despite some morphological similarity to younger *Homo* remains, these fragments (OH 4, a mandibular fragment, and OH 6, cranial fragments and an upper molar) were considered too incomplete to determine a new species. Instead, the announcement was made after the discovery of OH 7, an associated find of fragmentary parietal bones, a badly damaged juvenile mandible but with the tooth crowns in good condition, an isolated upper molar, and hand bones. The discoverers of OH 7 noted derived traits shared between this specimen and members of the genus *Homo*, but the endocranial volume of OH 7 was unusually small for *Homo*. The discoverers of OH 7 combined its announcement with a revision to the criteria for membership in *Homo* that reduced the requisite endocranial volume to only 600 cc and thus within the upper range of *Australopithecus*. This decision was met with objection by other researchers.

Since OH 7 was found in the same stratigraphic level as primitive (i.e., Oldowan) stone tools, it was dubbed *Homo habilis*, the Handy Man. In addition to proposing a new species of *Homo*, the announcement of *H. habilis* changed our understanding of the depth of the evolutionary history of the genus *Homo*. The stratigraphic level of OH 7 dates to 1.8 mya, a million years earlier than the previously known emergence date of *Homo*.

Morphology

Some researchers argue that *H. habilis* marks the first evidence for derived features such as encephalization (Tobias 1966: 1971), a more modern human-like cranium and face (Bromage 1989), and reduction in the size of the tooth and jaw size (Vandebroek 1969).

H. habilis appears especially distinct from *Australopithecus* in the shape of its cranial base (Wood 1996).

Until the discovery of potential tools at Dikika dating to 3.39 mya, *H. habilis* was also considered the oldest tool-making hominin. *H. habilis* has some modern human-like features of its hand bones that suggest the ability to craft tools. The trapezium, the wrist bone that articulates with the thumb, has a broad articular surface that would have allowed for a wide range of medial rotation, and *H. habilis* has broad apical tufts on the distal phalanges that suggest robust finger tips (Napier 1962; Tocheri et al. 2008).

However, some researchers consider the morphology of *H. habilis* too primitive for inclusion in the genus *Homo*. With an average of 680 cc among specimens, the cranium of *H. habilis* is only slightly larger than *Australopithecus*, and the crown areas of the cheek teeth are not notably reduced. Even the bones of the hand appear less modern human-like than originally believed. The phalanges are curved and robust, with fibrotendinous marks suggesting frequent climbing. Some aspects of the wrist, including broad lunate and scaphoid

articular surfaces, also appear primitive. Whether or not *H. habilis* possessed the precision grip that defines modern human hands cannot be reliably determined from the current evidence.

Whether or not emerging *Homo* possessed the striding gait of modern humans is also a matter of debate. Although the foot of *H. habilis* (OH 8) possesses some adaptations for supporting the body during bipedal walking, its morphology does not suggest a propulsive role for the big toe. The foot overall retains apelike morphology consistent with climbing, and the femur has a knee joint not well adapted for modern bipedalism. It is possible that *H. habilis* shared a form of bipedalism with *Australopithecus* that was unlike the gait of *H. erectus* and later *H. sapiens*. Recently, some researchers have reopened the proposal that the OH 8 ft may not belong to early *Homo* but to *Paranthropus boisei* (Gebo & Schwartz 2006).

Notable Fossils

In addition to the type specimen OH 7, Olduvai has yielded many fragmentary remains of *H. habilis*. Notable specimens include OH 8, dating to 1.76 mya. The fossils comprising OH 8 are a well-preserved left foot (see above), some dental fragments, and the adult hand bones originally grouped with OH 7. The foot is likely adult and therefore not part of the juvenile OH 7. However, some researchers argue that the foot is juvenile, in which case it could belong to the same individual as OH 7, and the remains of a tibia and fibula (OH 35) may also belong to the same individual (Susman & Stern 1982). However, this unlikely as the discrepancies in joint surfaces and the respective stratigraphic and spatial locations of OH 7, OH 8, and OH 35 are not consistent with them belonging to the same individual.

Other discoveries of *H. habilis* at Olduvai include two fragmentary juvenile skulls (OH 13 and OH 16), a fragmented and distorted cranium (OH 24), and a partial skeleton (OH 62). The skulls of OH 13 and OH 16 date to 1.7 mya, and the OH 24 and OH 62 date to at least 100,000 years earlier. The OH 24 cranium includes derived cranial traits distinct from *Australopithecus* such as reduced postorbital constriction, an inverted V shape formed by the lambdoidal suture, and a more modern human-like mandible. The cranial capacity, however, is small even compared to the juvenile OH 7.

The OH 62 partial skeleton allows for a poor estimate of body proportions in *H. habilis*, and the forelimb to hindlimb proportions are suggested to be more apelike than those of *Australopithecus*. Although these differences in limb proportions may be the result of intraspecific variation, they may also be evidence that *H. habilis* did not share the locomotor style of later hominins.

Beginning in the 1970s, transitional *Homo* remains were also recovered from the site of Koobi Fora, Kenya (Fig. 1). KNM-ER 1813 is a nearly complete cranium with a cranial capacity of only 510 cc. It dates to 1.88–1.90 mya, although earlier dates have been proposed (Gathogo & Brown 2006). The incomplete skull KNM-ER 1805, which is possibly older than 1.87 mya, is similar to KNM-ER 1813, and both specimens are often designated as examples of *H. habilis*. However, some researchers argue that some unusual features of the cranium and teeth of KNM-ER 1805 preclude it from belonging to early *Homo*. A recent discovery at Koobi Fora, the KNM-ER 42703 maxilla, dates to 1.44 mya and expands the temporal range of *H. habilis* to much later than previously thought.

Also found at Koobi Fora is KNM-ER 3735, a partial skeleton with evidence of the cranium, the upper limb and its girdle, the sacrum, and the lower limb dating to 1.88–1.9 mya. The postcranial evidence of KNM-ER 3735 is more similar to *Australopithecus* than OH 62; the scapula and radius are especially apelike.

The geographic range of *H. habilis* expands beyond the boundaries of the principal sites of Olduvai and Koobi Fora. A fragmentary cranium, L 894-1, dating to 1.8 mya, that comes from the Shungura Formation, Omo, Ethiopia, is comparable to OH 13 and OH 24. A maxilla from Hadar, Ethiopia (AL 666-1), extends the earliest known date of appearance for *H. habilis* to 2.3 mya. A temporal bone KNM-BC 1 from the Tugen Hills, Kenya, dates to 2.4 mya and has also been referred to transitional *Homo*.

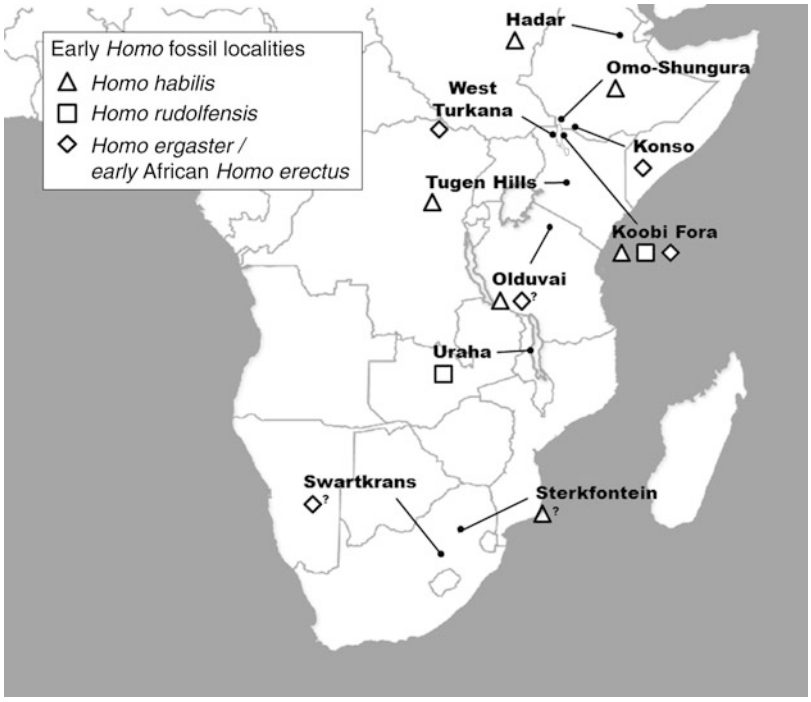

Fossil Records of Early African *Homo*, Fig. 1 Fossil localities of transitional and premodern *Homo* in East and South Africa. Triangles denote discoveries of *Homo habilis* remains, *squares* denote discoveries of *Homo rudolfensis* remains, and *circles* denote discoveries of *Homo ergaster* remains. *Question marks* indicate that the affinities of specimens to specific taxa are uncertain. Note that most of the African continent remains unexplored

One African specimen outside of eastern Africa has been likened to *H. habilis* though never formally included in its hypodigm. STW 53 is a well-preserved cranium from Sterkfontein, South Africa, that dates to at least 2.0–1.5 mya. Examination of the bony labyrinth of STW 53 suggests that it is not similar to later *Homo* and may have relied on less bipedal locomotion than *Australopithecus* (Spoor et al. 1994). Cladistics analyses that treat this specimen as its own taxonomic unit suggest it is a sister-taxon to a *H. habilis*/*H. erectus*/*H. sapiens* clade (Smith & Grine 2008).

Transitional *Homo* – *Homo rudolfensis*

Significance

Several of the transitional *Homo* fossils found at Koobi Fora, Kenya, in the 1970s were referred to transitional *Homo* and later subsumed within the *H. habilis* hypodigm (i.e., KNM-ER 1813). Others, however, exhibited more robust features than the Olduvai sample of transitional *Homo* (i.e., KNM-ER 1470). Aleexev (1986) argued that KNM-ER 1470, a cranium dating to 1.88–1.95 mya, was distinct enough to constitute a new species and recommended the name *Pithecanthropus rudolfensis*. Groves (1989) later transferred this taxon to *Homo* since the genus name *Pithecanthropus* was no longer used.

There remains considerable debate over the Koobi Fora sample of *H. rudolfensis* and whether it represents a taxon distinct from *H. habilis*. Some authors argue that the variation within a combined *H. habilis*/*H. rudolfensis* sample reflects a high degree of sexual dimorphism or anagenetic change rather than evidence of speciation. However, if the specimens belonging to *H. rudolfensis* are incorporated in the *H. habilis* hypodigm, the resulting interspecific variation is greater than seen in several extant ape species and the pattern of variation is different from that seen in any great ape or in modern

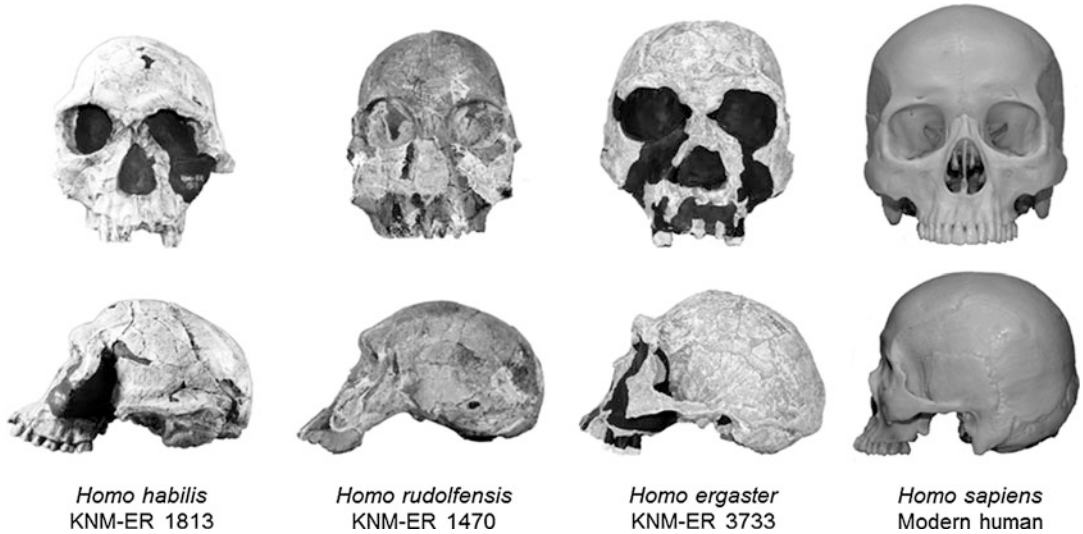

Fossil Records of Early African *Homo*, Fig. 2 Cranial comparisons of (*left to right*) *Homo habilis*, *Homo rudolfensis*, *Homo ergaster*, and *Homo sapiens* in portrait (*top row*) and profile (*bottom row*) views. Casts represent Koobi Fora specimens in the collection of the National Museums of Kenya and a modern human

humans. Additionally, KNM-ER 1813 shares with *H. habilis* buccolingually narrow premolars and molars, while KNM-ER 1470 does not. It is likely that two transitional *Homo* taxa are sampled at Koobi Fora.

Morphology

The suite of derived and primitive traits in the crania of *H. habilis* and *H. rudolfensis* are distinct. *H. rudolfensis* retains several primitive traits, including a thin-walled cranium with marked postorbital constriction and an inflated mastoid region, deep zygomatics, and larger postcanine teeth with more complex premolar and molar crowns and roots. The face of *H. rudolfensis* is also wider at the midface rather than the upper face as in *H. habilis* (Fig. 2). However, *H. rudolfensis* also has more some features more derived than *H. habilis*, including a more orthognathic face. At 800 cc, its endocranial volume is larger than *H. habilis* and larger than its contemporary KNM-ER 1813, which has a cranial capacity of only 510 cc. However, when the effects of body size are taken in account, the endocranial volume of KNM-ER 1470 and *H. habilis* is not significantly different.

Notable Fossils

There are several craniodental discoveries at Koobi Fora referred to *H. rudolfensis* but none as complete as the lectotype, KNM-ER 1470. There are no postcranial remains unequivocally referred to *H. rudolfensis*; the site at which potential *H. rudolfensis* postcrania have been found is also where cranial evidence of *P. boisei*, *H. habilis*, and *H. ergaster* has been found. Two femora, KNM-ER 1472 and KNM-ER 1481, *may* belong to *H. rudolfensis*.

A mandible found in 2.5–2.3 mya sediments of Uraha, Malawi (HCRP-UR 501), has also been referred to *H. rudolfensis*. If this designation holds true, it greatly expands the geographic and temporal range of this taxon.

Premodern *Homo*: *Homo ergaster*/*Homo erectus*

Significance

In the early 1890s, a hominin fossil found on the island of Java was classified as a new hominin called originally *Anthropopithecus erectus* and later *Pithecanthropus erectus*. This discovery, the Trinil calotte, demonstrated a smaller brain size and more primitive features than the two species of *Homo* (*H. sapiens* and

H. neanderthalensis) known at the time of its discovery. The calotte was also much older than these taxa, dated originally to 500,000 years old and later closer to between 700,000 and 1 mya. Similar finds were subsequently discovered at the site of Sangiran, also on Java and at what is now called Zhoukoudian, in China. The overall similarity of the cranial morphology of these Asian specimens to modern *Homo* eventually led to their inclusion within the genus as *Homo erectus*.

Fossils of similar morphology were later found in Koobi Fora and dated to around 1.5 mya, 0.5 mya older than the Trinil calotte. Although the Koobi Fora specimens shared some of the derived features of *H. erectus*, they were less well defined. For example, *H. ergaster* generally had thinner cranial vaults, less sagittal keeling, and larger and more complex premolars. Groves and Mazak (1975) argued that these early African specimens do not share the morphology of Asian *H. erectus* and they provided a new species name, *Homo ergaster*, for the East African sample. However, some researchers argue that the East African sample is an early form of *H. erectus* that does not require a separate name and they refer to this taxon as "early African *Homo erectus*" (Kramer 1993).

Morphology

Homo ergaster is, in general, more modern-human like than transitional *Homo*. The mandible of *H. ergaster* is reduced in size compared to transitional *Homo* as is the dentition of *H. ergaster*. However, the endocranial volume of *H. ergaster* is still relatively small, and when body size is taken into account, the endocranial volume is not significantly larger than *Australopithecus*.

Homo ergaster is the earliest hominin to demonstrate a modern body form. *H. ergaster* is also larger than hominins of the past, with an especially significant increase in the height of females. The lower limbs of *H. ergaster* and its modern thoracic shape suggest bipedal locomotion, with no evidence of climbing adaptations. Cross-sectional measures of the femoral and humeral shafts demonstrate a modern human-like strength in the forelimbs and hindlimbs, and the pelvis is similar to modern humans. Additionally, the semicircular canal structure of the inner ear is similar to modern humans and suggests upright posture (Spoor et al. 1994). It is probable that *H. ergaster* was capable of long-distance walking and transport and possibly adapted to endurance running. Archaeological evidence from *H. ergaster* localities suggests that raw materials for stone tools were being carried over long distances (Anton 2003).

Notable Fossils

The KNM-ER 992 mandible that dates to 1.5 mya is the type specimen of *H. ergaster*. The first well-preserved cranium of *H. ergaster* to be recovered is KNM-ER 3733, which dates to 1.78–1.65 mya; it has an endocranial volume of about 848 cc. This is similar to the endocranial volume estimates for KNM-ER 3883, an *H. ergaster* calvaria that dates to 100,000 years later. The 1.55 mya cranium without a face, KNM-ER 42700, is referred to *H. ergaster*, but it has an estimated adult body size more similar to transitional *Homo*. This relatively large range of body size suggests that *H. ergaster* may have retained a high degree of sexual dimorphism.

Among the postcranial remains known for *H. ergaster*, two notable discoveries are KNM-ER 803, a partial skeleton dating to 1.5 mya, and KNM-ER 3228, a 1.9-million-year-old pelvic bone. These fossils provide evidence that *H. ergaster* shared a similar walking pattern with modern humans.

Perhaps the most significant fossil remains of *H. ergaster* are those of KNM-WT 15000 (Turkana Boy), a well-preserved skeleton of an 8–12-year-old boy dating to 1.55 mya. Found in 1984, KNM-WT 15000 took four seasons to excavate and is one of the most complete skeletons in the early human fossil record. The discovery demonstrates conclusively that *H. ergaster* possessed modern limb proportions and a modern body shape. The teeth of KNM-WT 15000 provide for some life history reconstruction, and it has been determined that *H. ergaster* shares a similar dental development pattern with transitional *Homo* (Dean & Smith 2009). This

suggests that modern life history patterns originated late in human evolution. Turkana Boy also has a cranial capacity of 909 cc, which is still small relative to later *Homo*.

All specimens formally referred to *H. ergaster* come from Kenya, but other *H. ergaster*-/*H. erectus*-like remains have been found in Ethiopia, Tanzania, and South Africa. At Konso, Ethiopia, the left side of mandibular corpus with preserved postcanines was found in association with Acheulean tools. This specimen, KGA 10-1, dates to 1.4 mya and has strong similarities to KNM-ER 992.

At Olduvai, several specimens have been formally referred to early African *H. erectus*. The OH 9 partial calvaria has a well-preserved supraorbital region and dates to 1.5–1.2 mya. The OH 12 skull, which comprises a fragmentary calvaria plus part of the mandible, is more recent (c. 0.78 mya) yet its endocranial volume of 727 cc is substantially smaller than that of OH 9.

Among the hominin remains at Swartkrans, SK 15, SK 45, and SK 847 have been referred to early *H. erectus*. SK 15 is a distorted mandibular corpus dating to 1.5–1.0 mya, and SK 45 is a fragment of the right mandible dating to 2.0–1.5 mya. SK 847 is known as the "Composite Cranium" and also dates to 2.0–1.5 mya. In 1969, 20 years after their discovery, Ron Clarke realized that the fossils SK 80, SK 846, and SK 847 belonged to the same individual. Today, SK 847 is composed of the left side of the face and cranial base. Some authors argue its affiliation is with *H. erectus*, but others refer all three of these specimens to transitional *Homo* (Strait et al. 1997).

Key Issues/Current Debates

Phylogenetic Relationships

Phylogenetic analyses demonstrate that *H. habilis* is not consistently grouped more frequently with *Homo* than with *Australopithecus*, and some argue for its removal from the hypodigm of *Homo*. Still other researchers maintain that there exists phylogenetic support for a clade of *Homo* that includes *H. habilis*, with *H. habilis* as the possible sister-taxon of *H. ergaster*. Regardless of whether or not *H. habilis* belongs in the genus *Homo*, it is unlikely to prove an ancestor of later hominins such as *H. ergaster* because some remains of *H. ergaster* are found in the same fossil localities and date to the same era as *H. habilis*.

Homo habilis and *H. rudolfensis* overlap significantly both temporally and geographically, and their potential sister-taxa relationship is often debated. Like *H. habilis*, *H. rudolfensis* does not group consistently with *Homo*, and it is possible this taxon represents a member of *Australopithecus*. However, *Homo rudolfensis* may also represent a better candidate for the ancestor of *H. ergaster*/*H. erectus* than *H. habilis* based on its cranial shape (Gonzalez-Jose et al. 2008). This ancestral relationship, however, is unlikely since *H. rudolfensis* and *H. ergaster* also overlap considerably in time and place (Fig. 3).

H. ergaster's inclusion in the genus *Homo* is well established, but its relationships to other *Homo* taxa are debatable (Fig. 4). *Homo ergaster* overlapped significantly in time and place with members of transitional *Homo*, suggesting they do not have an ancestor-descendant relationship. Similarly, the earliest known emergence dates of *H. ergaster* in Africa and *H. erectus* in Asia are close, and it is hard to reconstruct an ancestor-descendant relationship between these two taxa if these earliest known dates of emergence are correct. Although traditionally described as "early African *Homo erectus*," *H. ergaster* may be a sister-taxon of *H. erectus* or both taxa may be descendants of an earlier taxon.

Dispersal from Africa

Paleoenvironment

Transitional *Homo* and *H. ergaster* are known from 1.9 mya and older geological sediments in East and Southern Africa. Around 2 mya, Africa experienced great climate change, especially increasing aridity. Olduvai fossil plants from the same stratigraphic level as OH 7 imply the emergence of more grasslands during this time, and high C_4 isotopic signals suggest the same (Cerling 1991). High C_4 signals have also been

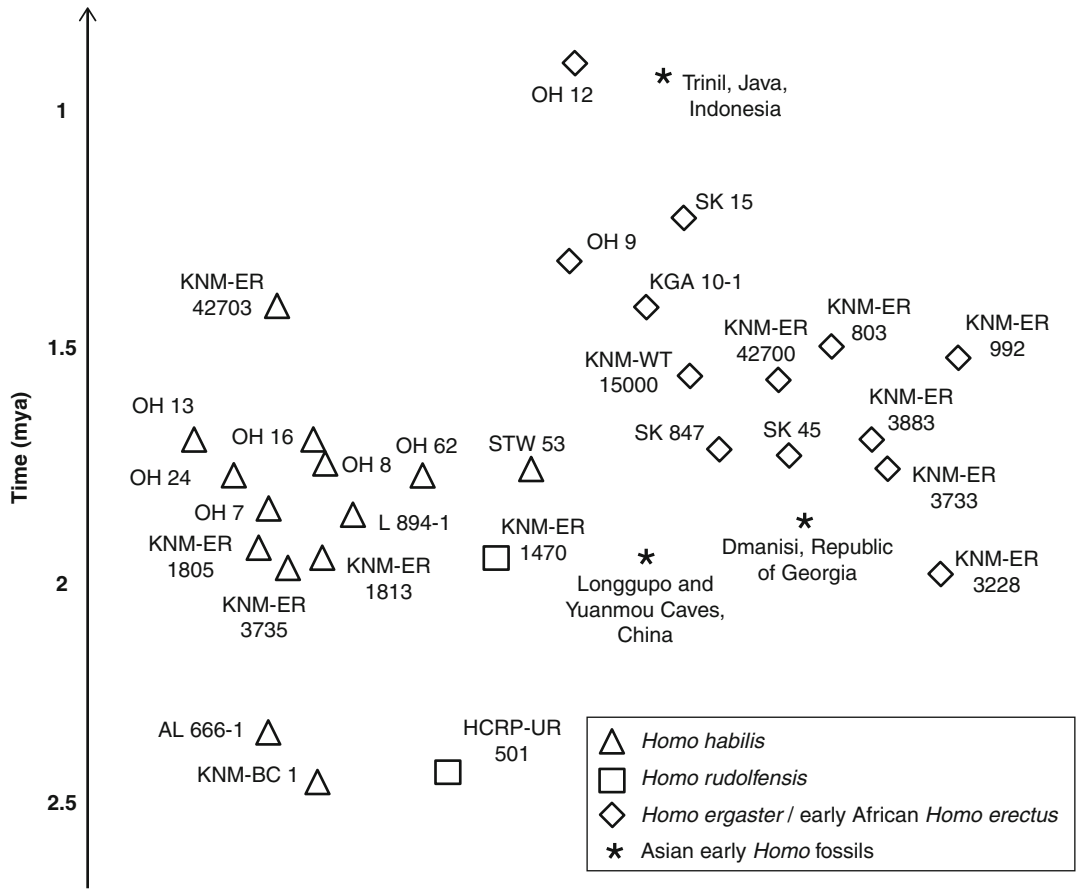

Fossil Records of Early African *Homo*, Fig. 3 Specimens mentioned in this review plotted against their age (averaged). *Triangles* denote discoveries of *Homo habilis* remains, *squares* denote discoveries of *Homo rudolfensis* remains, and *circles* denote discoveries of *Homo ergaster* remains. *Stars* denote comparative Asian specimens of both transitional and premodern *Homo*. Note the high degree of overlap between transitional and premodern *Homo* specimens, suggesting that *Homo ergaster* does not represent a descendant of the transitional *Homo* taxa known to date

found in the lacustrine sediments around Koobi Fora (Cerling et al. 1988) and in Southern Africa (Hopley et al. 2007). Grazing bovids appear to become more prevalent in East Africa around 2.4 mya, also suggesting the emergence of more grassland. Current environmental reconstructions suggest that transitional *Homo* and *H. ergaster* evolved during a time of increasing complexity and heterogeneity in the landscape, which was likely composed of a mixture of closed forests and open grasslands. While the fossil and archaeological records of transitional *Homo* do not yet support long-distance travel, it is reasonably certain that *H. ergaster* made use of a wider range of landscapes than previous hominins. Certainly the presence of *H. erectus* in East Asia implies that hominins must have left Africa sometime before 1.3 mya ago.

Out-of-Africa and the Multiregional Hypothesis

Historically, there are two theories concerning the dispersal of hominins beyond Africa. The "Out-of-Africa" Hypothesis argues that the genetic changes giving rise to modern humans evolved

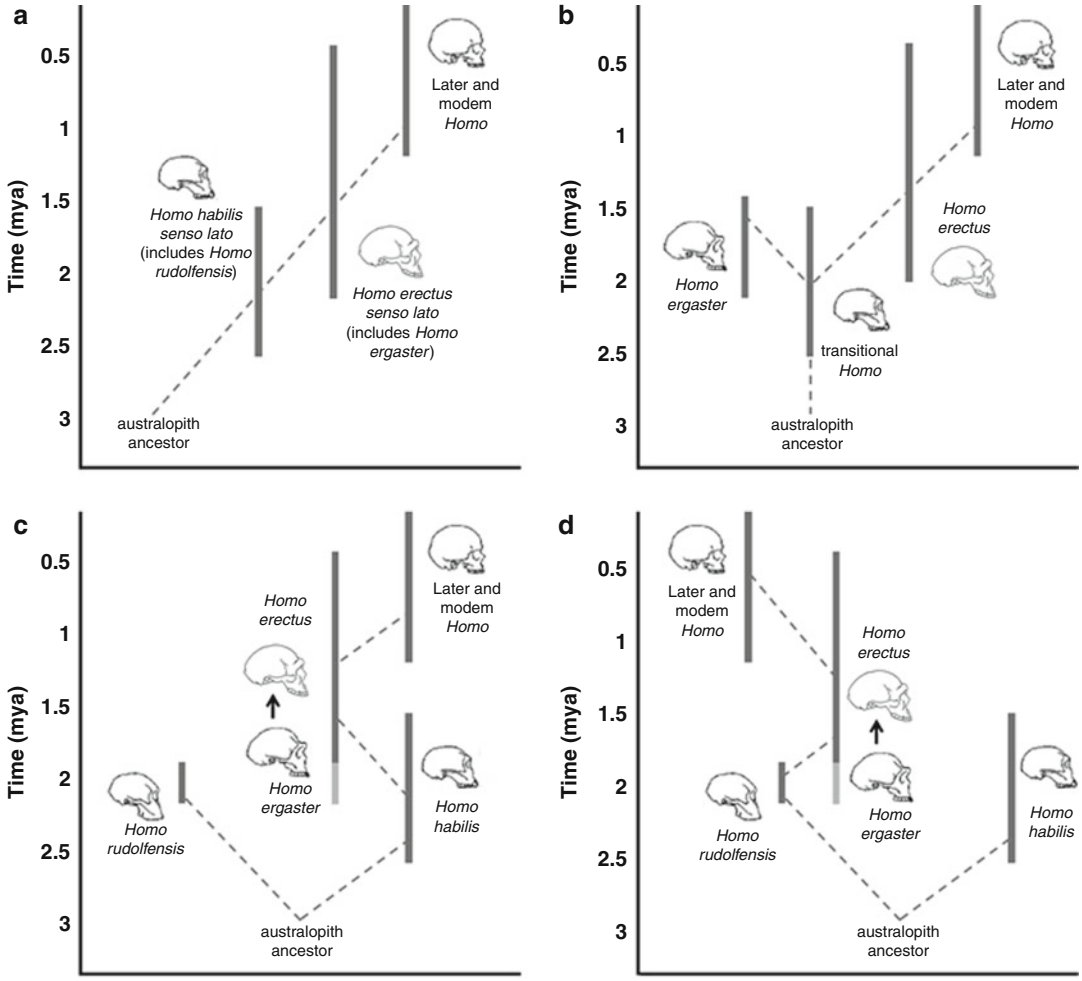

Fossil Records of Early African *Homo*, Fig. 4 Four hypotheses of the taxonomic and phylogenetic relationships of transitional and premodern *Homo* remains (there may be others). (**a**) A conservative hypothesis that places specimens referred to *Homo rudolfensis* within *Homo habilis* and specimens referred to *Homo ergaster* within *Homo erectus*. This phylogeny also indicates a direct descendant relationship between transitional *Homo*, premodern *Homo*, and modern humans. (**b**) A sister-taxa hypothesis that suggests an unspecified transitional *Homo* ancestor (possibly *Homo habilis* or *Homo rudolfensis*) gives rise to the sister-taxa *Homo ergaster* and *Homo erectus*. Modern humans are descendants of *Homo erectus*. (**c**) An anagenetic hypothesis suggesting that *Homo ergaster* is an early form of *Homo erectus*, descended from *Homo habilis*, and gives rise to modern humans. This phylogeny also shows *Homo habilis* and *Homo rudolfensis* as sister-taxa. (**d**) A second anagenetic hypothesis, in which *Homo ergaster* is instead descended from *Homo rudolfensis*

only once in an African population and then dispersed to Asia and Europe and subsequently the rest of the world. This theory has since been divided into Out of Africa I (the dispersal of *H. ergaster/H. erectus*) and Out of Africa II (the dispersal of *H. sapiens*). Genetic evidence demonstrates that the most parsimonious origin for modern DNA variation is Africa, lending support for this theory. The alternative hypothesis, the "Multiregional Hypothesis," argues that gene flow between hominin populations gave rise to modern humans. Neanderthal DNA is more similar to non-African populations of modern *Homo*, suggesting some interbreeding between *Homo*

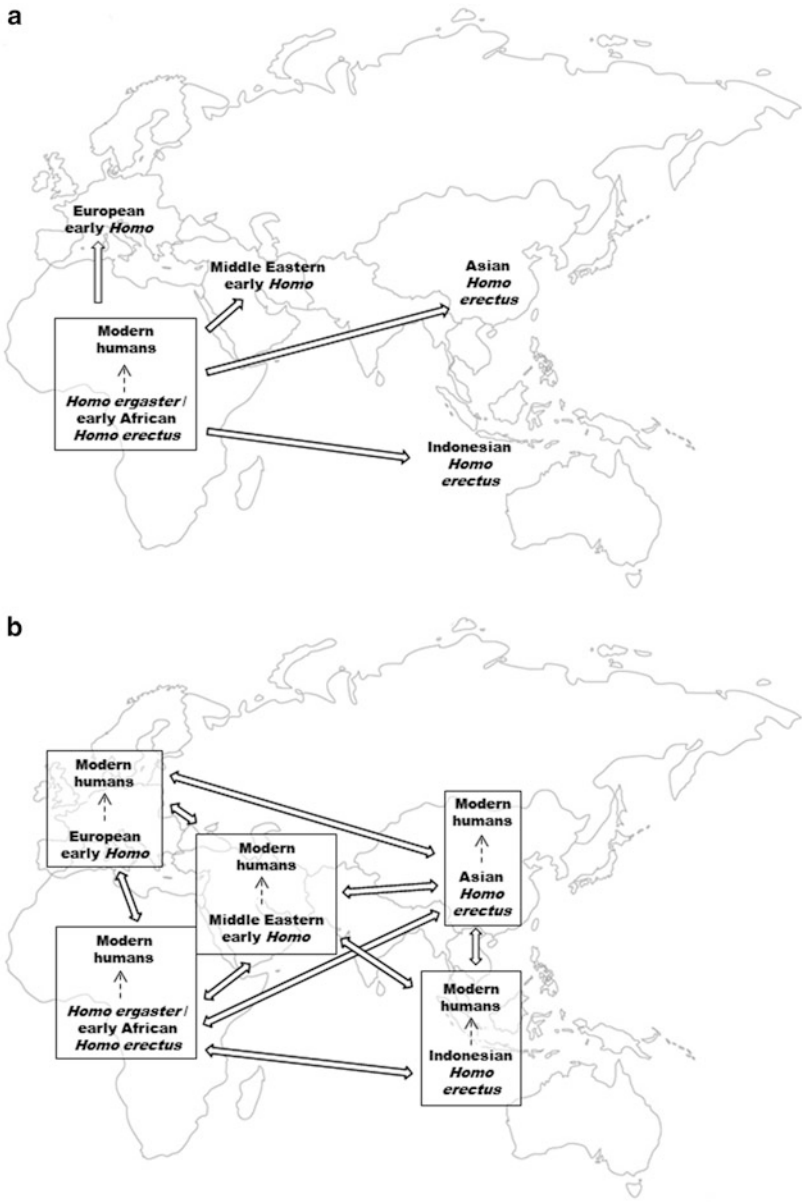

Fossil Records of Early African *Homo*, Fig. 5 Possible scenarios of the origin of modern humans from early *Homo*. (**a**) The Out-of-Africa Hypothesis, in which modern humans evolve from an *Homo ergaster*/*Homo erectus* population in Africa, disperse throughout the world, and replace existing archaic hominin populations. (**b**) The Multiregional Hypothesis, in which early *Homo* populations regularly encounter and interbreed with each other, eventually giving rise to regional but regularly interbreeding populations of modern humans

populations. The debate between Out-of-Africa and the Multiregional Hypothesis is ongoing; new morphological and molecular data promise to provide some resolution in the coming years (Fig. 5).

Early Fossil Evidence of Homo *Outside of Africa*

While this review has focused on the fossil records of transitional *Homo* and *H. ergaster*/*H. erectus*, there are several sites outside of Africa that show evidence of these hominins or

very similar taxa. Morphological analyses of these fossils provide an especially rich source of information for assessing the migration patterns of premodern hominins and the evolutionary origin of *H. sapiens*. These fossils deserve their own review, and we include here only a few highlights found in the Republic of Georgia and China.

At the site of Dmanisi in the Republic of Georgia, a *Homo* mandible dating from 1.85 to 1.78 mya has been referred to the *H. ergaster*/*H. erectus* hypodigm. This mandible shares with *Homo* its small size, relative gracility, and symphyseal shape, but the mandible is also smaller than the earliest *Homo* currently known and includes a diminutive P_4, M_2, and M_3. The premolars are especially narrow, similar to OH 13, a representative of *H. habilis*. The discovery of several skulls at Dmanisi sharing a unique combination of transitional *Homo* and premodern *Homo* traits has led some researchers to propose a new taxon, *Homo georgicus*, for this population, and at least one phylogenetic analysis suggests the cranial shape is similar to *H. ergaster* samples (Rosas & Bermudez De Castro 1998). The postcrania of the Dmanisi fossils are a mosaic of primitive and derived traits, combining a small estimated body size and an encephalization coefficient within the range of *H. habilis*. There is no evidence of the humeral torsion seen in later *Homo*, and the glenoid cavity is cranially oriented as in apes, suggesting the retention of adaptations for climbing. The clavicle, however, is modern like *H. ergaster*/*H. erectus*. The Dmanisi hominins also appear to have modern body proportions, including relatively long lower limbs.

Longgupo Cave, a 1.96–1.78-million-year-old site in the Sichuan Province of China, is the site of another mosaic hominin referred to both *H. ergaster* and *H. habilis*. The Longgupo Cave remains include a fragmentary left mandible and right upper later incisor, originally referred to *H. erectus*. The same authors, however, note affinities with *H. habilis* and *H. ergaster*. The mandibular corpus of Longgupo Cave hominin is small for this taxon and the cusp morphology more primitive, leading some authors to identify it as an ancient ape (Etler et al. 2001). The P_4 is especially distinct from the hypodigm of Asian *H. erectus*, having different talonid and root morphologies. Like other transitional *Homo* remains, the Longgupo Cave hominin was found in association with two items that may represent Oldowan tools.

A second fossil site from China dating to the same era as Longgupo Cave is Yuanmou Cave in southwest China. The incisors of a hominin found in this cave strongly resemble the incisors of *H. ergaster* and have similarities to *H. habilis*. The Yuanmou Cave hominin was also found in association with stone tools.

Future Directions

We are the last surviving species of a diverse hominin lineage. Previous members of our genus, *Homo*, were likely the earliest hominins to spread beyond Africa, having expanded beyond that continent by at least 1.8 mya. The diversity of transitional and premodern *Homo* forms is a testimony to the adaptive radiation of hominins to occupy new landscapes and ecological niches in a changing world 2 million years ago. The evolutionary and cognitive abilities that have enabled modern humans to occupy many different environments have their origins millions of years prior to the emergence of *H. sapiens*. Ongoing analysis of our fossil relatives *H. habilis*, *H. rudolfensis*, and *H. ergaster* will improve our understanding of these abilities and help us reconstruct the phylogenetic history of our lineage. Like the many modern human populations we observe today, these fossils of early *Homo* provide us with a view of the great antiquity of human migration, adaptation, and diversity.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Australopithecines
- ▶ Dmanisi Hominins and Archaeology
- ▶ East Africa: Museums
- ▶ East Asia: Early *Homo* Fossil Records

▶ Europe: Early *Homo* Fossil Records
▶ Leakey Family
▶ Olduvai Gorge Archaeological Site
▶ Out-of-Africa Origins
▶ Hominids, Earliest African
▶ *Homo erectus*
▶ *Homo ergaster*
▶ *Homo habilis*
▶ *Homo sapiens*
▶ West and Central Asia: Early *Homo* Fossil Records

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Fossil Records of Early Modern Humans

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Introduction

Efforts to understand the origin of *Homo sapiens* were bedeviled for decades by the inclusion within our species of a host of late Middle or Late Pleistocene "archaic" fossils possessing cranial morphologies that deviated, sometimes enormously, from those we see among humans living today. In recent years, however, it has begun to dawn on some paleoanthropologists that modern *Homo sapiens* is actually very distinctive, and highly derived in its morphology, and that it makes most biological sense to include within this species only fossils that bear significant osteodental hallmarks of the living form (Tattersall & Schwartz 2009; Schwartz & Tattersall 2010). This morphological requirement makes the search for the origins of *Homo sapiens* more straightforward, although not necessarily easier.

Definition

Without doubt, the single most significant cranial apomorphy of the living species *Homo sapiens* is the retraction of its small facial skeleton beneath the front of a more or less globular braincase (that averages some 1,330 ml in volume: Holloway et al. 2004). This complex and ramifying feature is most exhaustively documented and discussed by Lieberman et al. (2002; see also Lieberman 2011), who plausibly suggest that facial retraction is associated both with the extreme flexion of the *Homo sapiens* cranial base and with the typical rounding of the well-inflated human cranial vault in side view. It is this overall ensemble that gives the modern human skull its very

characteristic Gestalt; but several more detailed features (some of them possibly also developmentally correlated) additionally appear to be *Homo sapiens* autapomorphies.

Such detail autapomorphies include extension of a deep and compressed vaginal process to the margin of the ectotympanic tube; approximation of the vaginal process to the mastoid process; extreme lateral placement of the styloid process, with the stylomastoid foramen lying very posteromedially at its base; narrow, high, occipital plane of the occipital bone; retention into the adult of a discernible arcuate eminence on the superior internal face of the petrosal; fully segmented cranial sutures, with some segments deeply interdigitated; bipartite brow area, in which a medial segment continuous with a more or less swollen glabella is undercut by a distinct lateral plate that originates around the supraorbital notch; mandibular symphysis that is thicker than the corpora behind it when seen from below; and a chin in the form of an "inverted T," with a vertical central keel bounded by depressions on either side, and a horizontal bar below running between more or less well-defined lateral tubercles (Schwartz & Tattersall 2005). Additional *Homo sapiens* characters that have also been noted include an unenclosed subarcuate fossa and an inferior orbital plane that tilts down and back from the inferior orbital margin (Arsuaga et al. 1997).

Together, these characteristics produce a cranium of highly individual aspect, and the postcranial skeleton is equally distinctive. A recent composite reconstruction of a Neanderthal skeleton by Sawyer and Maley (2005) appears to be reasonably representative of the structure of robust Middle Pleistocene *Homo* in general (Tattersall 2010), and comparing it with its counterpart in *Homo sapiens* emphasizes just how autapomorphic the latter species is in its postcranial morphology as well as its skull structure. This highly derived condition is dramatically visible in the overall gracility of the *Homo sapiens* postcranial skeleton, and it is most specifically observed in the barrel-shaped rib cage that tapers in at the top and the bottom and in the matching narrowness of the pelvis, with its laterally compressed iliac blades and short pubic rami. All in all, despite some variation in its defining cranial and postcranial features, today's *Homo sapiens* is a highly distinctive morphological entity. But when we broaden the scope to the fossil record, some grayer areas emerge.

Key Issues/Current Debates

The Fossil Record: Africa

Leaving aside the motley assortment of hominins in the 500–200 ka age range that have been called "archaic *Homo sapiens*" despite possessing morphologies very unlike those of modern humans, the earliest generally accepted *Homo sapiens* fossils are known exclusively from African sites younger than 200 ka. Best preserved among these is one of three crania from the Ethiopian Middle Awash site of Herto that are dated to between 160 and 154 ka (White et al. 2003). With a braincase volume of some 1,450 ml, the BOU-VP-16/1 cranium (along with the other Herto specimens) was referred by its describers to a new subspecies of *Homo sapiens*, *H. s. idaltu*, because it is "morphologically just beyond the range of variation" seen in the living species (White et al. 2003). Its allocation to *Homo sapiens*, at least, seems provisionally reasonable based on rather scanty published information. Whether the recognition of a distinct subspecies is wise, or even useful, is a separate and perhaps trivial question.

Unfortunately, it is unclear whether the two most striking skull details of the living species, the bipartite brow and the chin, are present in the Herto skull: the brow region is damaged and its detail undescribed, while the mandible is unknown. But interestingly, these two features are indeed absent in the oldest credible candidate of all for "anatomically modern *Homo sapiens*." This is Omo Kibish 1, a fragmentary skull from southern Ethiopia that has been dated to as much as 195 ka (McDougall et al. 2005). As reconstructed by Day and Stringer (1982), Omo 1 has a tall, roomy cranium with a *Homo*

sapiens-like high occipital plane. Atypically for our species, however, the occipital is undercut by a transverse sulcus; and while in the mandible there is a low swelling in the symphyseal midline, there is no classic "chin," with vertical keel and horizontal bar. What is more, the incomplete supraorbital margins are pinched inferosuperiorly, and it seems very unlikely that they were originally bipartite. A second and penecontemporaneous cranium from Omo Kibish has a more complete braincase of 1,435 ml volume, but its proportions are not those of the extant form, and despite their common provenance, it is hard to see the two fossils as members of the same population.

Interestingly, there is a suite of later fossil hominins from southern Africa that also show the Omo 1 pattern of basically *Homo sapiens* skull morphology in the absence of the modern chin and/or bipartite brow (Schwartz & Tattersall 2005). These include specimens (from Border Cave [BC5], Boskop, Fish Hoek, and most from Klasies River Mouth), that span a period of almost 100 kyr (some of the KRM fragments appear to be well over 100 kyr old, while the Fish Hoek cranium has been dated to around 12 ka: Singer & Wymer 1982; Deacon & Wilson 1992). Given that an admittedly rather spotty record in the region also includes individuals of more comprehensively modern morphology (e.g., Border Cave 1 and 2, KRM AP 6222, Hofmeyr) throughout much of this period, it seems legitimate to conclude that aspects of an Omo 1/Herto-like morphology may have been primitive for *Homo sapiens* or at least common as variants among its early populations. Subsequently, such conformations became lost in African populations, their last traces disappearing only quite recently.

At the very least, the Omo and Herto fossils are in the right places, at the right times, to have been very early members of our species: molecular comparisons among modern populations indicate strongly that *Homo sapiens* originated somewhere in sub-Saharan Africa, and coalescence calculations converge on a date of origin for our species in the period following about 200 ka (Harpending & Rogers 2000; Campbell & Tishkoff 2010; Scheinfeldt et al. 2010).

Perhaps a bit unusually for such an osteologically distinctive form, the larger phylogenetic context in which the species *Homo sapiens* appeared remains quite opaque. Unlike *Homo neanderthalensis*, for example, which has well-established antecedents in the fossil record (most notably at the Sima de los Huesos at Atapuerca), *Homo sapiens* lacks clear fossil precursors. Apart from the specimens just discussed, which may provisionally be subsumed into the living species, there are no almost-but-not-quite *Homo sapiens* fossils known in the African record: nothing, for example, that possesses the facial retraction of the modern form in the absence of other *Homo sapiens* autapomorphies (or vice versa). African representatives of *Homo heidelbergensis* such as Kabwe, Bodo, and Saldanha most emphatically do not fill this particular morphological role, even though *Homo heidelbergensis* is often considered a strong candidate for ancestor of *Homo sapiens*. Such more recent specimens as the apparently pathological >133 ka Singa cranium from Sudan (McDermott et al. 1996), the fragmentary >180 ka Guomde skull from East Turkana in Kenya (Brauer et al. 1997), and the badly damaged >200 ka Eliye Springs specimen from the western side of the same basin (Brauer et al. 2003) remain problematic, while fossils such as those from Ngaloba, Ndutu, and even Florisbad that have at one time or another been described as "archaic *Homo sapiens*" do not obviously group monophyletically with our species (Schwartz & Tattersall 2005, 2010).

If the hominin fossil record as it stands has any reliability whatsoever as an indicator of actual phylogenetic history, it is thus looking increasingly probable that the anatomically distinctive species *Homo sapiens* was born in a single event of altered gene regulation or expression, presumably minor at the genomic level, that had cascading developmental effects throughout the body.

Perhaps the nearest thing we have to a "close but [probably] no cigar" situation is found among hominin fossils from northern Africa that have broadly Aterian or pre-Aterian associations. The ~160 ka crania from Jebel Irhoud in

Morocco have often been loosely considered *Homo sapiens*, and a juvenile jaw from the site exhibits a dental developmental schedule comparable to our own (Smith et al. 2007). But the best-preserved Jebel Irhoud adult skull (JI 1) has a rather squat braincase of 1,305 ml volume, in addition to a substantially unretracted face that, while smallish, is distinctive in structure from its counterpart in *Homo sapiens* (Schwartz & Tattersall 2005). The Jebel Irhoud hominids resemble in some respects the marginally more *Homo sapiens*-like ~80 ka (Barton et al. 2009) cranium from Dar es-Soltan, also in Morocco, and perhaps additionally a very badly crushed and fractured ~108 ka adolescent cranium from a third Moroccan site, Contrebandiers Cave (Balter 2011). Together, all of these specimens may turn out to constitute a morphologically (and perhaps also culturally) distinctive regional morph, one that might have shared a fairly recent common ancestry with more fully recognizable *Homo sapiens*. And indeed, if anatomically distinctive *Homo sapiens* originated from a less derived ancestor in a single major reorganizational event, then we might not expect ever to find anything anatomically much closer to it.

The Fossil Record: The Near East

Perhaps not unexpectedly, the earliest fossil occurrence of clearly anatomically modern *Homo sapiens* outside Africa occurs in the Levant, a region often considered to be a biogeographic extension of the continent to its south, and situated athwart the major exit route from it. The fossils in question are from the cave site of Jebel Qafzeh, in Israel, and are dated to around 95 ka (Bar-Yosef 1998). Associated with Mousterian lithics, hominid remains from this site have all been allocated to *Homo sapiens* (Vandermeersch 1981). But while two of the individuals concerned (the subnasally prognathic adult Q9, of 1,531 ml cranial volume, and the immature Q11) are clearly of entirely modern *Homo sapiens* morphology (as are Q1 and 2 which are intrusive more recent burials), the majority of the Qafzeh fossils are anatomically non-modern. The best-preserved cranium among these latter is Q6, which has protruding supraorbital margins that are continuous across glabella, together with a smallish but poorly retracted face. It also lacks many of the detailed *Homo sapiens* apomorphies listed above (Schwartz & Tattersall 2005, 2010), although it has an impressive cranial volume of 1568 ml (Holloway et al. 2004). Including all of the Qafzeh hominids in *Homo sapiens* certainly simplifies interpretation, but it clearly obscures the evident morphological complexity at this site.

What might explain the morphological heterogeneity at Qafzeh? There are only three potential scenarios possible, namely, that all the hominids are *Homo sapiens*; that two distinct kinds of hominid occur at the site, one of them represented by Q9 and the other by Q6; and that hybridization was occurring between two entities at Jebel Qafzeh, one of them evidently anatomically modern *Homo sapiens*. If the first possibility is the correct one, it would unsettlingly imply that our species is undefinable morphologically. In that case, all systematic bets would be off (by implication across the hominin board), and there would basically be no utility whatever in seeking the origin of our morphologically distinctive species in the fossil record. One rather hopes this is not the case.

If the second possibility in fact applies, we have recognizable *Homo sapiens* at Qafzeh, plus a second species that has not been named and may be unknown from elsewhere.

The third option is the most intriguing, especially in view of the curious morphology exhibited by the hominids from Skhūl, another site in Israel that are probably substantially older than 100 ka (Grün et al. 2005). The Skhūl fossils were originally described (together with the Tabūn Neanderthals) under the name of *Palaeanthropus palestiniensis* just before the outbreak of World War II (McCown & Keith 1939). This name actually appears to be a nomen nudum, since no holotype was specified for it, and it was applied equally to the Skhūl and Tabūn populations – which are now acknowledged to represent distinct hominin species. In any event, the new name never caught on, and for the last half-century or so, the Skhūl fossils have generally been crammed into *Homo sapiens*. It is not easy to understand why.

With fairly nicely rounded braincases of 1,450–1,590 ml in volume (Holloway et al. 2004), the Skhūl hominins do have faces of modest size. But those faces are poorly retracted at best, and while there is some variation within the Skhūl sample in supraorbital conformation, all individuals agree in lacking the classic *Homo sapiens* morphology. What is more, in the best-preserved specimens (Skhūl II and Skhūl V), this region is very aggressively unlike *Homo sapiens* in being transversely bar-like and more or less continuous across glabella. Further, while there is some swelling at the lower anterior border of the symphysis in all of the adult Skhūl mandibles, none of them shows any hint of the complex human chin morphology. Interestingly, although the best-preserved specimens from Qafzeh and Skhūl (Q6 and Skhūl V) present distinctively different Gestalts, some resemblances between other individuals from the two sites have been recorded (Schwartz & Tattersall 2010).

Altogether, the fairly chaotic assortments of morphologies at Qafzeh and Skhūl invite the speculation that some hybridization among different hominid lineages may have occurred in the Levant. When such speculations have been made in the past, they have involved mingling between *Homo sapiens* and *Homo neanderthalensis*: a species that is well documented to have occurred in the region in the same general time frame. The morphological consequences of interspecies hybridization among hominids are at best poorly understood, but the radical morphological differences between Neanderthals and moderns, and the difficulty of detecting any specifically Neanderthal features in the Skhūl and Qafzeh hominids, do suggest that such intermingling was likely not the case. A more plausible scenario of intermixing might involve Levantine hybridization between emigrating North African Aterians (exiting the continent eastwards along the continent's northern coast, thence north through the Sinai peninsula), and *Homo sapiens* of ultimately Eastern African origin (migrating northwards along the Nile corridor). Intuitively, this seems to make better morphological sense; and in the time around 120–100 ka, the initial separation of the two populations would have been a relatively recent event. What is more, the levels of technological sophistication of these two groups (hence possibly their cultural compatibility) would have been comparable to each other—as, admittedly, they also evidently were to that of *Homo neanderthalensis*, a hominin species that was already resident in the Levant, at least episodically.

Whatever the exact case, and however the curious mixture of Levantine morphologies will eventually be explained, the early foray of anatomically (but not behaviorally) modern *Homo sapiens* out of Africa that is confirmed by the Qafzeh 9 and 11 fossils (and also by recent archaeological findings in Arabia: Armitage et al. 2011) appears to have been short-lived – as apparently were any putatively hybrid populations. Due either to climatic vicissitudes or to competition, or to a combination of both, *Homo sapiens* soon found itself confined once more to Africa. Molecular comparisons (of mtDNA, Y-chromosome DNA, and some nuclear autosomal markers) suggest that expanding populations (which were evidently both anatomically and behaviorally modern) later reemerged from Africa at around 70–60 ka (see Maca-Meyer et al. 2001). This exodus likely followed a severe contraction of the already thinly spread *Homo sapiens* population during the climatic vicissitudes of MIS 4, and probably in the wake of (though most likely not as a direct result of) the super eruption of Mount Toba in Sumatra at about 74 ka.

The Fossil Record: Europe and Asia

Following the 70–60 ka exodus from Africa, *Homo sapiens* rapidly spread to the ends of the Eurasian continent. By ~40 ka, armed with an Aurignacian toolkit, it had begun flooding into western Europe (Mellars & French 2011), a region already occupied by Neanderthals. This early stage of colonization is documented by numerous archaeological sites but relatively few fossils, although the late Aurignacian (>31 ka) Mladeč crania from the Czech Republic are

clearly anatomically modern (see Teschler-Nicola 2006). Following the end of the Aurignacian, the record rapidly picks up, with numerous standard-issue *Homo sapiens* fossils from classic Gravettian sites such as Cro-Magnon and the Abri Pataud.

At the very early end of the timescale, though, some paleoanthropologists (e.g., Rougier et al. 2007) have found it tempting to propose that such *Homo sapiens* fossils as the ~40 ka cranium and mandible from the Peştera cu Oase in Romania show various "archaic" features that are attributable to "complex population dynamics" (for which read: "hybridization with Neanderthals"). Similarly, a Gravettian child's skeleton from the Portuguese Abrigo do Lagar Velho has been reported to show Neanderthal-like features (Duarte et al. 1999), even though this individual lived at least 100 generations after the final disappearance of *Homo neanderthalensis* from Iberia.

In both of these cases the various morphologies concerned, while interesting, offer on closer examination no convincing indications of Neanderthal admixture (Schwartz & Tattersall 2010). Indeed, the fossil record makes it pretty clear that, although the recently announced draft Neanderthal genome (Green et al. 2010) is said to offer some evidence for a low level of (oddly one-way) genetic introgression (1–4 %) from Neanderthal into modern populations at an early stage, any early introgression there may have been was evidently not biologically significant, i.e., it did not materially affect the subsequent morphological or evolutionary histories of either species.

In Australia, the earliest physical evidence for human occupation comes from two gracile early modern human burials at Lake Mungo in New South Wales. Dated to ~40 ka (Bowler et al. 2003), they occur some 10 kyr after the first evidence for human habitation both in the region and on the continent. Australia was then virgin territory for hominins, something that cannot be said for Java, where the *Homo erectus* lineage is documented as late as about ~40 ka (Swisher et al. 1996). By this time, we can fairly safely surmise that *Homo sapiens* had already arrived on the island, although the earliest recorded occurrence of modern humans in island southeast Asia, the cranium from Niah Cave in Borneo, is also dated to ~40 ka (Barker et al. 2007).

On the Asian mainland, *Homo erectus* may well have already been displaced by *Homo heidelbergensis* (known in China from Dali and Jinniushan), which was presumably the hominid in residence when *Homo sapiens* arrived. The earliest clear evidence for the advent of *Homo sapiens* in China is a partial skeleton, including a mandible with a distinct chin, from the cave site of Tianyuan, near Beijing (42–39 ka: Shang et al. 2007). It is just possible that a clearly *Homo sapiens* skull from Liujiang in southern China is considerably older than this, but the exact provenance of this specimen is greatly disputed (contrast Shen et al. 2002 with Wu 2004). A recently described "*Homo sapiens*" mandibular fragment from the Zhirendong Cave, also in southern China, seems more reliably dated to >100 ka (Wu et al. 2011), but despite the presence in this specimen of a low swelling at the anterior base of the symphysis, it is largely edentulous, lacks the hallmarks of the *Homo sapiens* chin, and is in general pretty undiagnostic. At present then, there is no really reliable evidence for the presence of modern *Homo sapiens* in China prior to about 40 kyr ago.

Future Directions

Modern *Homo sapiens* is a morphologically distinctive (and highly derived) species that originated in sub-Saharan Africa as indicated by both fossil and molecular evidence. The main elements of the characteristic modern morphology, notably the small face fully retracted below a tall, rounded cranium, are first seen in Ethiopian fossils dating to between about 195 and 160 kyr ago. However, two of the features of the modern form, namely, the bipartite brow area and the complex chin, were most likely absent in both of these individuals and apparently did not become universal among *Homo sapiens* in sub-Saharan Africa until the very end of the Pleistocene.

The northern African Aterians (broadly defined) seem to represent a distinctive population that evolved independently in the Saharan region and its northern fringes at a time when the region was substantially better watered than at present. Aterian populations may have spread before 100 Ka to the Levant, where they intermingled with anatomically (but not behaviorally) modern humans who were following the Nile Corridor north at around the same time. This scenario would account for the odd combination of morphologies found at Levantine sites such as Qafzeh and Skhūl, and also for the contemporaneous occurrence of typical *Homo sapiens* individuals at the former.

In any event, the record strongly suggests that *Homo sapiens* first exited Africa at over 100 Ka but subsequently became reconfined to that continent, from which it emerged once more, equipped with a modern behavioral repertoire, at around 70–60 ka. By about 40 ka, fossil remains of fully modern *Homo sapiens* testify that the descendants of those second-wave émigrés had become established as far afield as in western Europe, Australia, and eastern China. In Australia (as, later, they did in the New World), they encountered virgin territory, but both in Europe and eastern Asia, modern humans would have encountered entrenched hominid populations. The exact nature of any putative interaction among the residents and the newcomers is barely documented, if at all, and must for the moment remain conjectural. However, the frustratingly slender relevant fossil record lacks any firm indication of significant genetic interchange among expanding *Homo sapiens* and the hominid residents whose territory they invaded – and whose disappearance followed close on their arrival.

Cross-References

- ▶ Genetic Bottlenecks in Archaeology
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Out-of-Africa Origins

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Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology

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Introduction

Few techniques for chemical analysis are as rapid and informative as Fourier transform infrared spectroscopy (FTIR). FTIR can be used to identify and compare sample compositions and in a quantitative fashion to determine the concentration of different components of a mixture (Smith 1999: 1). Its popularity in the field of conservation reflects attributes that make the technique appealing for many archaeological applications as well, including the small amount of sample required for analysis (milligrams or micrograms) and the fact that samples can be organic or inorganic and have a crystalline or amorphous structure. Its wide applicability makes FTIR a particular asset to nearly any professional archaeology laboratory as it can aid in determining the composition of such materials as fired clays, bone and tooth enamel, wood ash, fibers and dyes, plasters, and resins.

Infrared spectroscopy (IR) is used to identify the functional groups that are the building blocks of molecules. Examples include the amides found in silk proteins and the phosphate component of bone mineral. In brief, a sample is exposed to a beam of infrared radiation and responds by vibrating (bending and stretching) in patterns unique to each functional group. Older IR devices worked by separating out individual infrared frequencies and recording the interaction of the sample with each. FTIR trumps these by using a special optical device called an interferometer to measure the interaction of a sample with all infrared frequencies simultaneously. An automated mathematical procedure (the Fourier transform) translates the resulting interferogram into a spectrum whose peak locations along the x-axis are associated with the vibrational patterns distinct to a particular type of chemical bond. Peak (band) heights are measured in absorbance or % transmittance on the y-axis, and their position along the x-axis is a measure of radiation frequency, typically recorded in units of cm^{-1}. Once a spectrum is produced, identifying the composition of the sample then becomes a process of learning (or looking up) the functional groups that are associated with particular bands and determining how these functional groups together comprise a molecular structure.

Key Issues

Advantages of FTIR

FTIR is particularly well suited to investigating not only the composition of the types of materials that archaeologists are often interested in but also how these have transformed through time as a result of human or natural processes. Our understanding of site formation processes and artifact life histories has been enriched through research on the chemical signatures of bone and sediment diagenesis, degradation of organics such as silk proteins, and crystallinity shifts as clays and bone undergo thermal alteration, all through the application of FTIR techniques.

A general advantage of FTIR is the ease and rapidity with which samples can be prepared and spectra produced. FTIR may be applied to liquids and gases but most archaeological applications involve solid phase samples. The common sample preparation technique of creating a pressed pellet mixture of ground sample and a potassium bromide (KBr) matrix (see Weiner et al. 1993) is relatively easy to carry out. It takes only a few minutes to produce a spectrum whose band positions, heights, and widths all relay information about the sample makeup. Moreover, only a few milligrams of sample are needed – or even micrograms if used in conjunction with an FTIR microscope – making the technique a good choice for use on trace

compounds or rare objects (e.g., Doménech Carbo et al. 1996; Lluveras et al. 2010; Liu et al. 2011).

Finally, benchtop FTIR instruments are inexpensive relative to many types of high-tech analytical equipment. An "M series" instrument from MIDAC Corp. (CA, USA) currently (2011) runs about $20,000 (USD) – a good bargain for such a general utility analytical tool. Manufacturers have also made great strides in improving the ease of the instrument's physical transport for field applications. In the 1990s, pioneering efforts at on-site FTIR analysis for archaeology required daily hauling of a benchtop instrument (roughly the size of a trombone case but considerably heavier) into a remote cave site, where the machine was powered by a gasoline generator and draped in plastic sheeting for protection from dust (Weiner et al. 1993). The rugged miniaturized and even handheld portable instruments on the market today command roughly two to five times the price of a benchtop machine, placing them out of reach for many archaeologists. Many of these instruments are quite specialized, developed for niche markets like federal law enforcement. As consumer interest in portable FTIR instruments continues to grow, however, archaeologists may soon find it easy to conduct real-time analysis of archaeological materials as they are revealed through excavation.

Disadvantages of FTIR

FTIR has important limitations. Potential users should be aware that results can vary with sample preparation technique and the type of instrumentation employed (Coleman 1993). A particular nuisance that accompanies the use of KBr as a pelleting medium is its propensity to absorb liquid and atmospheric water. Unlike KBr, which is transparent in the mid-IR range, water produces bands that may overlap with those associated with the material of interest. Researchers must thus take care to keep the samples and instrument free of ambient moisture (e.g., Weiner et al. 1993). Partly for this reason, many scientists outside of archaeology have turned to other sampling techniques. Attenuated total reflectance (ATR) is one of the more popular but produces different spectra from those obtained with KBr. Data collected with an ATR accessory may be referenced to spectra produced using the standard KBr technique (Thompson et al. 2009; Smith 2011: 132-8), but archaeometrists have so far shown little enthusiasm in adopting alternative sampling methods (Thompson et al. 2009) as they work to build spectral reference libraries unique to the discipline.

A more specific problem regards the preparation of bone samples. Mineral crystallinity is one measure used to evaluate the extent of burning and other postmortem processes that bone has undergone (Stiner et al. 1995; Lebon et al. 2010). Surovell and Stiner (2001) have shown, however, that crystallinity is also affected by the intensity with which a bone sample is ground in preparation for KBr pelleting, but offer a protocol to standardize the procedure.

Applications

Below I offer examples of the array of archaeological problems to which FTIR can be profitably applied, drawing on representative publications that I hope will inspire the reader to consider how FTIR may be used in her own research. Many of these can be found in the *Journal of Archaeological Science*, a major publisher of archaeometry studies whose readership is international.

In a particularly noteworthy group of studies, researchers used FTIR to document the surprising extent to which archaeological deposits may become chemically transformed. Wood ash from prehistoric hearths and bone are two archaeological materials capable of delivering key information about past hominin behavior. FTIR analysis of Pleistocene sediments from Israel's Kebara and Hayonim Caves (Weiner et al. 1993, 2002) and Theopetra Cave in Greece (Karkanas et al. 1999) has revealed that both types of deposits are susceptible to severe diagenetic alterations in the complex chemical environments that caves frequently support. In some areas of these sites, chemical alterations significantly reduced sediment volume by dissolving large deposits of

fresh wood ash, leaving behind only relatively insoluble silica-rich bodies called silicious aggregates. In other areas, often in close proximity, diagenesis transformed bone and ash from their fresh, calcite-rich state into a sequence of intriguing minerals that can be identified using FTIR by their distinct phosphate structures (Schiegl et al. 1996; Stiner et al. 2001). The implications of diagenesis for taphonomy, site dating, and reconstructing site formation processes are significant and wide-reaching. FTIR has proven especially important in ongoing attempts to measure and improve our understanding of how bone diagenesis works. Research in this vein is likely to grow in the future, coordinated with studies aimed at reconstructing past diets and environmental conditions through the use of stable isotopes derived from well-preserved bone and tooth enamel (e.g., Wright & Schwarcz 1996; Lebon et al. 2010; Roche et al. 2010).

FTIR can also provide clues to artifact production sequences, such as the temperature ranges in which clay vessels were fired (Damjanović et al. 2011). These types of studies often require that researchers create their own reference spectra *de novo*. The investigators cited here, for instance, collected reference data by conducting experiments on the effects of thermal alteration on local materials using heating methods appropriate for the time period under investigation.

Finally, FTIR has important applications in provenance studies such as amber sourcing (Beck et al. 1965; Peñalver et al. 2007), materials identification (e.g., Lluveras et al. 2010), and conservation. To illustrate, Liu et al. (2011) were interested in identifying the types of fibers and dyes used in elaborately decorated textiles unearthed from tombs located along China's Silk Road. FTIR coupled with an FTIR microscope revealed amide bands particular to a particular form of silk protein, while complementary analyses including scanning electron microscopy and high-performance liquid chromatography (HPLC) allowed the researchers to examine the morphology of the fibers and identify the dyes used to tint them. Significantly, FTIR also revealed degradation of the textiles that had gone previously undetected. Excellent examples showing the range of materials and applications to which FTIR can be applied for conservation purposes can be found in Doménech Carbo et al. (1996).

A Note on Training

With a little practice, a user can learn to produce consistently high-quality spectra using ATR or KBr methods. Making meaning from these spectra, however, requires additional training and experience – as well as a good reference library of spectra. As suggested above, users may need to generate some of these comparative spectra on their own. Smith (1999) rightly describes the process of interpreting IR spectra as equal parts art and science, and his 1999 and 2011 texts are essential guides for users of all types. No book, however, can replace the experience of working alongside a skilled practitioner as one first learns to navigate the spectral landscape.

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Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Provenance Studies in Archaeology
- ▶ Textiles and Fabrics: Conservation and Preservation

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Fournier, Patricia

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Basic Biographical Information

Patricia Fournier is a Mexican archaeologist, professor, and researcher at Mexico City's National Institute of Anthropology and History. Born on April 28, 1955, she completed her undergraduate degree at the National School of Anthropology and History in Mexico City (1985) under the supervision of Thomas H. Charlton and obtained her M.A. degree in Anthropology from the University of Arizona (1989), where she worked under the supervision of Michael B. Schiffer. In 1995, she obtained her doctorate in Anthropology at the National Autonomous University of Mexico. Her postdoctoral research was at the Smithsonian Institution's Center for Materials Research and Education in Washington, DC in 2003 under the supervision of Ronald L. Bishop. Her academic career began in 1980 working for the National Institute of Anthropology and History. By 1989,

Fournier, Patricia, Fig. 1 Patricia Fournier in 2012

she was one of the main protagonists in the foundation of the first graduate program in archaeology in Mexico at the National School of Anthropology and History (Fig. 1).

Fournier has a vast experience in both fieldwork and analysis of archaeological materials. Throughout her career, she has directed and participated in historical archaeology research projects in diverse Mexican rural and urban sites as well as in Texas and New Mexico.

Fournier has received several distinctions along her career such as the Fulbright-LASPAU scholarship to pursue her M.A. studies in anthropology at the University of Arizona and the award for best archaeological undergraduate thesis in archaeology in 1985, as well as the award for the best research in archaeology in 1995 on behalf of the National Institute of Anthropology and History of Mexico. She has been an active member of the Society for American Archaeology serving as coeditor of Latin American Antiquity (1999–2002) and in the Committee on the Americas. She has also been an active member of the Society for Historical Archaeology; since 1999, she has served in the Advisory Editorial Committee for the journal Historical Archaeology, and she is a member of the Mexican Academy of Sciences. Since 2006, she is a research associate at the Archaeometry Program (National Museum of Natural History-Smithsonian Institution, Washington, DC) and an associate collaborator with the Arizona State Museum (The University of Arizona).

Major Accomplishments

It is not an easy task for a female archaeologist interested in the early modern period to catch the eye of local and international scholars in a field dominated by men and pre-Hispanic archaeology. This is an inherent quality of Patricia Fournier, one of Mexico's best representatives of historical archaeology who has raised the field to its highest levels in terms of impeccable scholarship, practical development, and theoretical understanding. As a faculty member and senior archaeologist at the National School of Anthropology and History, in 1992, she founded the specialization in historical archaeology and later in ethnoarchaeology and modern material culture studies.

Early in her career, Patricia Fournier became aware of the need to develop archaeological research of the historical periods in Mexico. This pioneer interest took her into the adventure of studying local and imported ceramics found in Mexico City which resulted in the foundational study *Evidencias Arqueológicas de la Importación de Cerámica en México, con base en los Materiales del Ex-Convento de San Jerónimo* (1990). Her interests in conducting research of historic sites were further shaped by Thomas H. Charlton with whom she collaborated in research projects that have had substantial impacts in Mexican historical archaeology, namely, on the study of indigenous and Hispanic ceramic traditions and technologies (e.g., Charlton et al. 2007).

Her vast interests and fascination for historical archaeology have taken her into the pioneer archaeological research of mining sites, rural settlements, and historic ceramic correlates for the understanding of commercial networks along the colonial Royal Road and Afro-descendant groups (e.g., Fournier 1999; Fournier & Charlton 2008; Fournier & Blackman 2010). Moreover, her research on ceramics has resulted in a range of

works related to production and consumerism during the colonial and independent periods in Mexico, a topic that had been overlooked in Mexican archaeology. Those works now serve as a foundation for subsequent studies (Fournier 1997). Recently, she has been collaborating with scholars from the Smithsonian Institution utilizing archaeometric techniques in the study of majolica and glazed wares (e.g., Blackman et al. 2006; Fournier et al. 2009), identifying production centers and addressing commercialization, consumerism, identity, display of wealth, and the impact of colonizing processes in the lives of indigenous and European groups. The results derived from these research projects have changed significantly previous conceptions on the production origin of Mexican ceramics and have enabled the reframing of previous assumptions on exchange, technology, production, and consumerism.

The vast trajectory of Patricia Fournier has established an archaeological tradition that has paved the way for students and scholars alike. It pronounces the importance of studying historical remains through a scientific approach. Moreover, she stresses the relevance of incorporating concepts related to site formation processes, ethnoarchaeological techniques, experimental archaeology, material culture studies, the dynamics involved in social complexity, symbolic anthropology, and an emphasis on the use of primary and secondary documentary sources in archaeological studies. Her innate ability as a researcher and professor since 1984 has enabled her to prepare generations of students and continues to inspire many in Mexico and elsewhere to follow her steps into the fascinating adventure of unraveling the recent past.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Charlton, Thomas H.
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Industrial Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ Oral Sources and Oral History

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France: Field Method Origins

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Brief Definition of the Topic

It was through the innovative application of sound field methods that Jacques Boucher de Perthes (1788–1868), a customs official in northern France, contributed decisively to the establishment of human antiquity. He argued that proof of an object's antiquity resided first and foremost in "its surrounding [*entourage*] and the place where it is encountered" (Boucher de Perthes 1847: 34, 178, 181). By insisting on such principles of stratigraphic position and integrity, Boucher de Perthes could argue that the artificially shaped flint *haches* he found beneath meters of undisturbed gravels in association with fossil bones of extinct species were therefore of infinitely ancient age, long before the Biblical Flood (thus *antediluvian*). While these claims had met with skepticism, a dramatic reversal of fortune occurred in 1859 with the visit to the region of two English scientists, the wine merchant and geologist Joseph Prestwich (1812–1896) and the paper manufacturer and numismatist John Evans (1823–1908). Besides conducting a thorough audit of the context of discovery, the visitors also took the unprecedented step of having a photograph taken, on the 27th April 1859, of an in situ hand axe embedded in a quarry section at Saint-Acheul (Fig. 1). This very first use of the photographic medium for stratigraphic demonstration not only confirmed human antiquity but also served to shift the onus of archaeological demonstration from rhetoric and personal reputation to methodically documented observation (Gamble & Kruszynski 2009).

Meanwhile in the South of France, cave sites were being explored by Édouard Lartet (1801–1871), a lawyer and paleontologist from Sarlat. The *Reliquiae Aquitanicae* he published together with banker Henry Christy in the mid-1860s highlighted the rich potential of these caves, with their well-preserved faunal remains as well as flint and bone tools, for establishing a sequence of periods when rhinoceros, mammoth, and reindeer roamed. This research was soon brought together at the newly created *Musée des antiquités nationales* by the engineer and curator Gabriel de Mortillet (1821–1898). By means of their association with geological strata and fauna, de Mortillet defined the artifacts themselves as fossil types, so establishing the succession of Acheulean, Mousterian, Solutrean, and Magdalenian periods, named after the French sites where they were defined. While undergoing many revisions and expansions over the years, this classificatory system still remains today as the cornerstone of Paleolithic archaeology.

France: Field Method Origins, Fig. 1 A quarry worker showing the location of an in situ hand axe, Saint-Acheul, 27th April 1859 (Photograph by C. Pinsard, albuminated paper. Courtesy of Bibliothèques d'Amiens Métropole, Ms 1370.f.33)

This development of vertical investigation in France was followed in the 1960s by the

France: Field Method Origins, Fig. 2 On-site briefing in front of a décapage at Pincevent. From left: André Leroi-Gourhan, Michèle Julien, Claudine Karlin, and Michel Brézillon (©: Centre archéologique de Pincevent)

development of the horizontal (*décapage*) method of excavation pioneered by the ethnologist, technologist, and prehistorian André Leroi-Gourhan (1911–1986. See Audouze & Schlanger 2004). It was not of course without precedents. In the loess plains of Central and Eastern Europe, from Dolní Věstonice in Moravia to Kostenki in Russia, Upper Paleolithic habitations and mammoth-bone huts had long been identified and excavated through investigations in open area. Fluent in Russian, Leroi-Gourhan was well aware of these studies, though not necessarily of their historical materialist underpinnings. Drawing on his own paleontological and anatomical expertise, he himself had undertaken since the 1940s (e.g., at Les Furtins) the meticulous recording of human burials, in their sequence of inhumation and deposition, thus pioneering the subfield of funerary archaeology.

These initiatives converged in 1964, at the excavation of an extremely well-preserved hunter-gatherer occupation site in the sand quarries of Pincevent, south of Paris. This series of Magdalenian camps (c. 12,500 BP) represent the seasonal halts of reindeer hunters, next to a ford on the R. Seine (Bodu et al. 2006). The dedicated excavation methodology deployed there by Leroi-Gourhan and his team included the meticulous exposure and millimetric stripping (sometimes with dental tools) of vast surfaces of finds and features, left for as long as possible in situ to be drawn, recorded, photographed, and thoroughly documented, square meter by square meter (Fig. 2). This small-scale plotting of the distribution of the finds – flint and bone remains – made it possible to map the functional and spatial relations between such features as hearths, tents, butchery areas, knapping areas, and dumps and led to the identification of vanished structures. Moreover, the extensive refitting of flint débitage and tools at Pincevent (and subsequently at other sites in the region) not only served to retrace the spatial and functional biographies of tools and thus grasp "precise moments in the remote past" – they also made it possible to reconstruct the technical

processes of Upper Paleolithic flint tool production and use, thus contributing decisively to the development and demonstration of the *chaîne opératoire* approach in prehistoric archaeology.

Leroi-Gourhan's concern with the minutiae of "prehistoric ethnology" led subsequently to ongoing comparative research in Arctic areas – where it was to converge with ethnoarchaeological studies by Lewis Binford and others on hunter-gatherer campsites in Alaska, as well as Australia and Southern Africa.

Cross-References

- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Europe: Early Upper Paleolithic
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Lithic Technology, Paleolithic
- ▶ Spatial Analysis in Field Archaeology

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France: Medieval Archaeology

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Introduction

In 2006, when a congress of the *Société d'archéologie médiévale* (*SAM*) reviewed the history of the field, about 500 people in France were being paid to work "for the benefit of medieval archaeology," which accounted for 25–30 % of all archaeological activity in the country. The research sector was vigorous: between 1991 and 2008, for example, 103 research projects recognized by the *Centre national de la recherche archéologique* (CNRA) were under way – with most activity conducted by professionals from the "preventive archaeology" sector. The lion's share of publication, however, was done by researchers based in the universities and/or the *Centre national de la recherche scientifique* (CNRS). Between 1999 and 2008 some 377 works treating of medieval archaeology (168 of them almost exclusively) appeared; 37 of the 69 authors who published at least twice from 2002 to 2005 were University or CNRS. The next largest group, 16, belonged to the *Institut national de recherches archéologiques préventives* (INRAP), the public archaeology operator which since its creation in 2002 has been responsible for most excavation in France. The phenomenal growth of highly professional, publically funded archaeology over the past 30 years has fostered methodological innovation and improvement (Chapelot 2010: 393–435). Two recent works aimed at a popular audience offer well-illustrated examples of preventive excavations (Burnouf 2008; Catteddu 2009). Aimed at students and scholars, the *Manuel d'archéologie médiévale et moderne* stresses how our perspectives on the Middle Ages as a whole are being reshaped by the results of expanded and improved fieldwork integrated with the analysis of written, iconographic, and other surviving sources (Burnouf et al. 2009).

Definition

Traditional usage deriving from written sources defines the Middle Ages as the millenium between the Fall of the Western Roman Empire (CE 476) and the Renaissance (c. 1500). Recent research incorporating archaeological data blends the earliest phase with a new chronological period labeled Late Antique, already

transforming the Roman world by CE 300, when the influence of barbarian groups and of Christianity had become significant (Catteddu 2009: 6–23). Archaeology strongly supports the view that by the twelfth century, notably in France, major social, political, and environmental changes were under way that were to define the basic structures of Europe in the early modern period, before the transformations wrought by industrialization. Joëlle Burnouf would thus blend the Renaissance into a long second Middle Ages that extends throughout the sixteenth century and even beyond (Burnouf 2008: 6–13).

Historical Background

Origins of Medieval Archaeology in France (c. 1830–c. 1960)

Before about 1970 medieval archaeology had no institutional standing and no generally recognized identity in theory or practice. There were predecessors going back into the first half of the nineteenth century: Merovingian funerary archaeology and monumental religious (essentially Christian) archaeology (Young 2001). Both were tributary to paradigms derived from established academic disciplines. Merovingian graves, identified by artifacts frequently placed with the deceased (notably weapons, personal ornament, ceramics), were thought to reflect the settlement of ethnically distinct "barbarians" who took power, as the narrative derived from written sources had it, in the western provinces of the former Roman Empire. From the 1850s, marked by the excavations and publications of the Abbé Cochet in Normandy, through the 1950s when Edouard Salin closed his long career with four volumes synthesizing fieldwork and laboratory analysis, many thousands of graves were excavated, at times by amateurs with some sense of method, but many more were plundered or simply destroyed by development (Périn 1980). Following the creation of the *Monuments Historiques* in 1830 and the founding by Arcisse de Caumont of the *Société française d'arché ologie* and the *Bulletin monumental* in 1834, the decision to preserve the churches (and a few castles) of medieval France led architects like Viollet-le-Duc and art historians to develop methods to study the historical development of these monuments where some excavation might be combined with stylistic analysis to guide restoration (Barral I Altet 1991). In the twentieth century this tradition was continued not only by *Monuments Historiques* architects like Jules Formigé but further developed with long-term projects by the American art historians Kenneth Conant at Cluny and Sumner Crosby at Saint-Denis concerned primarily with understanding the history and the influence of these major monuments (Young 2001).

Emergence of Medieval Archaeology (c. 1960–c. 1980)

As a discipline and practice "modern" medieval archaeology in France has developed over the past 40 years (Burnouf 2008: 12–24; Chapelot & Gentili 2010). Its godfather was Dean Michel de Boüard of the University of Caen, who created there the *Centre de Recherches Archéologiques Médiévales* (CRAM), linking it also to the CNRS, with the consequence that systematic, ongoing research excavation as well as salvage operations could enjoy permanent laboratory support. As he was also regional director of historical antiquities, the organism of the Ministry of Culture responsible (since 1942) for overseeing all excavation, de Boüard was able to develop a model of practical cooperation among archaeological actors and consumers which dynamized research and raised overall standards. Himself a pioneer of the archaeology of castles (Chateau de Caen, Doué-la-Fontaine, early *motte* sites), he also created in 1971 the scholarly journal of reference, *Archéologie Médiévale*, published the first textbook (de Boüard 1975), and founded the *Société d'Archéologie Médiévale* (1983). His students and associates conducted innovative and rigorous Merovingian cemetery excavations in the Caen region, notably, at Frénouville, the first totally excavated and published necropolis (Pilet 1981) complemented by a complete study of the physical anthropology (Buchet 1978). The second University/CNRS medieval research center working closely with the public authorities

was created in 1967 by Gabrielle Démians d'Archimbaud at Aix-en-Provence (*Laboratoire d'Archéologie Médiévale Méditerranée*, or LAMM) with a particular focus on ceramics and, later, glassware. She also launched the first long-term research excavation of a medieval settlement at Rougiers, near Marseille (Démians d'Archimbaud 1981). The third research pole developed in Paris, where Jean-Marie Pesez, working with historians of the *Annales* school based at the future *École des Hautes Études en Sciences Sociales* (EHESS) launched in 1965 at Dracy (Côte d'Or), a long-term, multisite research program involving deserted villages (inspired by Wharram Percy in England), later expanded along with his pupils to other types of rural settlement of the later Middle Ages (Pesez 1998). He founded in 1969 the *Groupe d'archéologie médiévale* (GAM), today directed by Jean Chapelot. Beginning with the excavations from 1968 to 1972 of the pottery workshops at the Carolingian site of Saran (Loiret), Chapelot launched systematic research into the production, technology, and distribution of medieval ceramics.

Heightened awareness of the accelerating destruction of the archaeological heritage by development favored, in the 1970s, the growth of salvage archaeology conducted by better-trained teams accountable to public authorities (Chapelot & Gentili 2010). The creation in 1973 by the Ministry of Culture of the *Association française d'archéologie nationale* (AFAN) as a vehicle to publically fund excavation by paying shovel bums on limited contracts provided a flexible workforce. Medieval urban archaeology emerged as a major enterprise for the first time in Douai, the first town to salary a full-time archaeologist (Pierre Demolon, in 1971), and in Tours, where Henri Galinié returned from working under Martin Biddle at Winchester to win municipal support for an urban archaeology unit (*Laboratoire d'archéologie urbaine)* which would host the first national colloquium on urban archaeology in 1980 and provide the basis for the *Centre national d'archéologie urbaine* (CNAU) in 1984. The longest ongoing urban program began as a salvage operation by Olivier Meyer and Nicole Meyer-Rodrigues in 1973 in Saint-Denis, just north of Paris; it expanded in 1982 into a municipal archaeology unit as well as a field school for various branches of the University of Paris and a beacon for "civic archaeology", developing since 1998 a "*Parcours historique*" as a permanent feature of the renovated city center. By 2008 about 13 % of the medieval town had been seen in the course of some 160 operations, with about 3 %, including key areas adjacent to the famous abbey church at the core, systematically excavated with the open-area methodology originally borrowed from Britain, and in use here since the 1970s (Meyer-Rodrigues 2010).

Other long-term research projects which got under way in the 1970s concerned the transition from Roman towns to Christian episcopal cities, with very active excavation programs in Grenoble (M. & R. Colardelle) and Lyons (J-F. Reynaud) inspired by the pioneering work of Charles Bonnet in Geneva and the study of religious monuments and cemeteries in Burgundy (Sapin 2010). The excavation of an early castral site at Andone (Charente) by André Debord would provide a model archaeological case study of the historians' "feudal mutation" (Bourgeois 2009), while Michel Colardelle's exploration of a timber-built early eleventh century settlement, subsequently submerged under an Alpine lake at Charavines (Isère), was innovative for its underwater excavation methodology and its multidisciplinary environmental perspectives (Colardelle & Verdel 1993). Merovingian archaeology was renewed with the creation in 1979 of the *Association française d'archéologie mérovingienne* (AFAM) and Patrick Périn's development, with the help of René Legoux, of more precise and reliable artifact chronologies and of innovative tools of topochronological analysis (Périn 1980).

Nonetheless, a 1976 report to the French parliament on the state of national archaeology found it alarmingly undermanned and underfunded in the face of the challenges posed by accelerating development. Medieval archaeology was particularly badly served. Of the 198 archaeologists paid by the CNRS, only four were

medievalists; indeed, only 74 worked primarily in France. There were rather more in the universities, 16 as compared to 28 specialized in earlier periods. For France as a whole, Jean Chapelot finds that there were then 27 specialists for the Middle Ages compared to 180 concerned with the Gallo-Roman and prehistoric eras. Professional infrastructure overall was weak. Of France's 44 archaeological circumscriptions, only 12 were then headed by salaried directors, who were aided by 23 salaried assistants. Not one of them was a medievalist (Chapelot & Gentili 2010: 11–14).

Maturity and Expansion in the Age of Preventive Archaeology (1980–2010)

The year 1980, decreed by the French president as Heritage Year (*l'Année du Patrimoine*), marked the beginning of a phase of phenomenal growth for archaeology in France, with the creation of the *Sous-Direction de l'archéologie* in the Ministry of Culture, a sign of government engagement. The passage of a law requiring an environmental impact study in 1976 came to normalize the principle that developers pay for preventive archaeological study; public funding for research was also increased massively (Chapelot & Gentili 2010: 13–14). Over the 20 years from 1989 to 2009, the number of archaeological operations increased by 60 % (and they tended to encompass much larger areas), the number of people employed multiplied by 4, and funding multiplied by 7 (Chapelot 2010: 396–8). The last two decades of the twentieth century also saw much infrastructure development in France, with new high-speed lines (TGV-Nord), new autoroutes, and massive redevelopment in core urban centers (Paris Grand Louvre is the outstanding example), peri-urban areas (Marne-la-Vallée and Eurodisney east of Paris; Roissy airport to the north), and rural areas as well, providing opportunities for salvage – now called preventive – archaeology on a scale hitherto unimaginable. The challenges encouraged methodological innovation carried out by an increasingly professional workforce, their status strengthened when in 2002 AFAN was replaced by INRAP (*Institut nationale de recherches archéologiques préventives)* as the primary archaeological operator in France. The medieval component has been particularly dynamic (Chapelot & Gentili 2010: 14–9). In 2008 some 25–30 % of all archaeological operations were medieval, with around 500 people salaried full time at work on some aspect of medieval research. Of these about 15 % were based in the universities or the CNRS (they account for the lion's share of publication); more than a third of the total worked for INRAP. Between 1991 and 2008, 103 research projects concerning the Middle Ages received national funding, about half of them directed by University/CNRS scholars, with the other half directed by INRAP or other public archaeological authorities (Chapelot 2010: 393–404).

One field spectacularly transformed by the change in scale of operations and multidisciplinary character of the research teams is the study of the rural landscape. In 1979 only four rural settlements had been excavated in all France; in 1991 the total was 155, a quarter of these in the Ile-de-France alone. The scale of excavation jumped from a norm of a few hundred square meters at best before 1985 to over 4 ha at La Grande Paroisse by 1986 and in the 1990s to over 10 ha at Serris and Villiers-le-Sec (Chapelot & Gentili 2010:17–9). Perspective shifted from an emphasis on the individual settlement – or even certain of its phases – to the dynamics of spatial organization over time, as at Montours in Brittany where the INRAP team studied how a landscape was structured in Carolingian times through the interaction of four poles of settlement (Catteddu 2001). The traditions of architectural history have given rise to a new methodology for studying the modification over time of standing buildings, *l'archéologie du bati*, which, conjoined with excavation, has enhanced our understanding of the medieval town as the direct ancestor of the modern city and the complexity of its role as a site of the material and ideological competition of local and regional elites (Burnouf 2008: 69–87; 102–11). Before preventive archaeology the recovery and post-excavation conservation of artifacts (to say nothing of ecofacts) was often haphazard; today the millions

of tons of objects – ceramics, metal, glass, bone, and construction materials – preserved are testimony, as Joëlle Burnouf stresses, to a medieval industrial revolution that prepared the one better known to historians, resulting in an expansion and refinement of products available that prefigures consumer society (Burnouf 2008: 118–55).

With that founding at Caen in 1983 of the *Société d'Archéologie Médiévale (SAM)*, the new discipline entered a phase of maturity. Beginning with the theme of ceramics in 1985, the SAM has organized ten international congresses (the latest, at Arles in 2012, focused on the horse) and regularly published their proceedings. A review of these volumes, of *Archéologie Médiévale* with its valuable annual gazetteer of sites under excavation, of the major regional journals, the monographs published in the nationally supported series *Documents d'archéologie française (DAF)*, by the *Association française d'Archéologie mérovingienne* (AFAM), and by private publishers, confirms the vitality of the field today (Faure-Boucharlat & Flambard Héricher 2010).

Key Issues/Current Debates

1. Migration, ethnic identity, and Christianization. Authors from the Abbé Cochet through E. Salin accepted as self-evident the notion that the funerary practices of Late Roman and Merovingian times reflected the ethnic identity and religious ideas of the Romans and barbarians. Since the 1970s this view, still tenacious in popular literature, has been challenged by interpretations which emphasize social, economic, and cultural factors and area more critical of the written sources from which the older view derives. Ethnographic, folklore, and cultural studies have helped show that "Christianization" was not a monolithic process, that funerary practice could vary considerably even within Christian contexts and similar or even identical symbols could have a variety of meanings, often inaccessible. Debate continues regarding the establishment of Christian infrastructure, such as rural parish churches, monasteries, in the earlier Middle Ages, or chapels of mendicant orders later on, and their role.
2. The urban phenomenon. The caricatural view, based on a few written sources and still commonly held in the 1960s, was that Roman towns in Gaul brutally declined and fell to barbarian invaders, leaving a largely primitive, Dark Age landscape. Excavation now suggests that almost all survived, transformed into Christian capitals, though debates continue on the nature and function of these towns in earlier medieval times, including how to interpret the strata of dark earth often encountered. The role of "Dark Age" emporia, long overlooked, is now posed by the Quentovic research program. Another older notion, forcefully argued by the historian Henri Pirenne before WWII, of a revival of towns and trade in NW temperate Europe around the year 1000, needs considerable nuancing in the light of recent research. Discussion today stresses the densification, apparent by the twelfth century, of a complex urban network, hierarchically organized, in the context of rapid demographic and economic growth and the self-affirmation of emerging elites confronted with growing royal and princely power.
3. The village and the rural landscape. The village has long been viewed as a key artifact of medieval civilization, its origins and development a matter of research and ongoing debate. Historians like R. Fossier argued in the 1970s that it was largely a post-Carolingian creation, an aspect of the "feudal mutation" associated with the imposition of lordly power, village churches, and serfdom. Earlier medieval settlements, he thought, were poor, fluctuating, and unstable. The large-scale preventive excavations since the 1980s have provided an enormous amount of new data still being analyzed, but it is already clear that Carolingian and Merovingian settlements were more complex and varied than had been appreciated and that Christian infrastructure sometimes appeared well before the year 1000.

The case for the plausibility of continuity from Late Roman, Roman, or even Iron Age times for key settlements appears stronger. The debate will likely continue, since much of the archaeology of rural settlements concerns those which were subsequently abandoned and that excavation of permanently occupied villages on any significant scale has not been possible.

4. Fortification, castles, and feudal mutation. A key tenet of the "feudal mutation" hypothesis, based mostly on written sources, is that the extensive network of rural fortifications whose visible remnants are the stone castles surviving today was largely developed in the post-Carolingian times with the spread of lordship, whereas earlier villages and elite residences were usually unfortified. The twelfth century saw new fortifications around towns, rebuilt and expanded as these grew in the following centuries. Excavation since WWII has provided much new data about the fortification of the reduced core areas of Late Roman cities and their continuing use throughout the earlier Middle Ages. More surprising is the recent discovery in some regions, such as the Languedoc and the Massif Central, of Late Antique or early medieval fortified rural sites subsequently abandoned (Schneider 2010). Much new data has also emerged about the construction of earthen mottes topped with timber ramparts and towers in Normandy, Flanders, and similar regions in the tenth to twelfth centuries, but Annie Renoux warns that these need to be understood in the context of a wide variety of elite residences, more or less fortified urban and rural (Renoux 2010). Two very different types of fortified sites from the time of the now contested "feudal mutation" at the turn of the millenium are now known through the publication of systematic modern excavations followed up by specialist studies of artifacts and ecofacts: the palisaded Alpine lakeside settlement of Charavines (Colardelle & Verdel 1993) and the stone *castrum* of the Counts of Angoulême at Andone (Bourgeois 2009).
5. Environment, climate, economy, infrastructure, and society. Forty years ago a strong contrast was drawn between, on the one hand, a primitive, even autarchic, earlier medieval landscape peopled (sparsely) by poor peasants living in villages surrounded by forests, marshes, and wastelands and surviving (barely) with crude technologies and, on the other, the dramatic expansion after c. 1000 of population and production driven by innovative technologies, with massive land clearances and vigorous exchange networks prefiguring the early modern world. Though the twelfth century now appears more than ever as an irreversible threshold, the picture needs much nuancing. The early medieval countryside now appears more the result of the successful adaptation of environmentally savvy local communities to changed conditions, with climate deterioration (not even on the radar 40 years ago) perhaps as much a factor as political changes. Fluvial archaeology, another new field, reveals a more complex and sophisticated infrastructure of exchange than hitherto suspected, and the excavation of emporium sites abroad, like Dorestad in Holland and Ribe in Denmark, is prompting research in France around sites like Quentovic. For Joëlle Burnouf the "second Middle Age" inherited many key features from the earlier centuries (transportation networks, rural landscapes already largely cleared and structured, metal-working techniques perfected since Iron Age times) and carried them to unprecedented levels of development under the favorable conditions of the climatic optimum. When in the fourteenth century the beginning of the Little Ice Age conjoined with the more abrupt brutality of the Black Plague so rooted were the technologies and productions, the elite-dominated but flexible social structure with their nuanced displays of power and prestige upholding religion-infused ideologies that the lifeways attested by archaeology reflect not catastrophe but continuity, a cultural resilience that carries right through the "Renaissance" of art historians right through the sixteenth century (Burnouf 2008: 102–10, 138–59).

6. Technologies and the medieval industrial revolution. Research into the production and distribution of ceramics was the first subfield of medieval industrial production to emerge; more recently new research has focused on glass manufacture, mines and quarries, iron working, energy production through wind and water, salt extraction and distribution, brick and tile and timber as construction components, products made from animal matter such as leather and bone, and other organic materials (the latter aided by methodologies favoring the recovery and conservation of artifacts from water-saturated zones). Altogether they confirm an unprecedented change in the scale of production during the later Middle Ages and, hence, an impact on lifeways and expectations which prepared the later, better-known Industrial Revolution (Burnouf 2008: 118–36).

International Perspectives

In the nineteenth and twentieth centuries, French Merovingian archaeologists were often in contact with colleagues also excavating barbarian graves in England, Belgium, Germany, Switzerland, and even Russia but were little influenced by the pioneering settlement excavations of such sites as Gladbach, in Germany, before WWII. The American art historians excavating religious monuments at Cluny and Saint-Denis shared the same essential training and methodologies and perspectives as their French peers (Barral I. Altet 1991). International influences became notable and decisive in the postwar period. *Medieval Archaeology*, created in 1956, was the model for *Archéologie Médiévale*, and Michel de Boüard's engagement in castle research soon led to the regular international meetings and publications of the *Chateau Gaillard* group. Wharram Percy and the deserted villages project influenced both G. Demains d'Archimbaud and J.-M. Pesez to launch settlement excavation in the 1960s, and in that decade Paul Courbin encouraged the use of the Wheeler method in France. Pesez and the EHESS group developed strong and regular relations with the school of Polish archaeologists, adopting their methods for excavating timber-and-earth structures (Chapelot & Gentili 2010: 4–8). The innovative approaches to studying the internal dynamics, chronology, and socioeconomic and cultural implications of Merovingian cemeteries developed by German scholars like Kurt Böhner and Joachim Werner became familiar in France from the 1970s through the work of Patrick Périn (Perin 1980). At the yearly AFAM conferences since 1979, presentations of ongoing research by British, German, Dutch, Scandinavian, East European, Italian, Spanish, and even American scholars have been a regular feature. The American "New Archaeology," however, has had only limited influence on French archaeologists; medievalists, in particular, used to working collaboratively with colleagues in the historical disciplines, have been little tempted by calls for rigid separation.

Since the 1970s a growing number of close-knit international groups of scholars have collaborated on common projects. The pioneering excavations of Charles Bonnet, cantonal archaeologist of Geneva, on the development from Roman times of the Christian episcopal center in relationship to its countryside inspired similar programs led by Michel and Renée Colardelle in Grenoble and Jean-François Reynaud in Lyons (as well as by Rinaldo Perinetti in Aosta); these archaeologists met regularly to follow one another's work and together organized the 1985 international congress of Christian Archaeology which visited all these sites. Their work fit into the larger project on the *Topographie chrétienne des cités de la Gaule*, launched in 1974 by N. Duval, P-A. Février, and Ch. Pietri, which has since that time been publishing standardized notices, developed through regular and rigorous discussion by the participating scholars, of the Christian monuments and religious topography from all the Gallo-Germanic provinces. Christian Sapin cites the influence of Joseph Mertens (Belgium), William Rodwell (England), Hans Sennhauser, and Charles Bonnet (Switzerland) in the recent development of religious archaeology in France;

since 1986 the *Centre d'Études médiévales* he founded in Auxerre has sponsored research on cathedrals, abbeys, funerary churches and cemeteries, and other religious monuments throughout Burgundy (Sapin 2010). The American archaeologist Harry Titus (Wake Forest University) collaborated on the study of the Auxerre cathedral using nondestructive, digital-based laser methodologies. Since 1982 Clark Maines (Wesleyan University) and Sheila Bonde (Brown University) have been excavating the abbey of Saint-Jean-des-Vignes in Soissons in the context of an interdisciplinary, international study of medieval monasticism (MonArch project). The strong influence of English examples on urban archaeology, most notably through the efforts of Henri Galinié at Tours, has been noted above. Fluvial and coastal archaeology developed in France after the International Waterfront Archaeology conference in London in 1981. English and Belgian archaeologists are associated with French colleagues in an ongoing study, coordinated by Laurent Verslype of the *Université catholique de Louvain*, of the Canche Valley where Quentovic, a major "Dark Age" emporium site, once flourished.

In the age of preventive archaeology and the World Wide Web, Medieval Europe has emerged as the focus of an international research community. French researchers were active in the first three congresses at York (1992), Bruges (1997), and Basel (2002); the fourth congress, organized by Joëlle Burnouf, was held at the Sorbonne in Paris in 2007.

Future Directions

Writing the conclusion to the 2006 SAM colloquium, Jean Chapelot stressed that the remarkable growth of medieval archaeology since 1980, the new fields of inquiry and the robust infrastructure it has developed, should not arouse ambitions of disciplinary autonomy (Chapelot 2010: 431). As Michel de Boüard stressed 40 years ago (DeBoüard 1975) and Joëlle Burnouf and her coauthors reaffirm (Burnouf et al. 2009), the Middle Ages offers archaeologists the challenge of a field which, to a much greater extent than earlier periods in Europe, is richly furnished with a great variety of surviving written, iconographic, and architectural "documents." With their specific methodologies so much enhanced by the progress of the past generation, archaeologists must continue to work closely, collaboratively, and creatively with textual scholars, art historians, epigraphers, anthropologists, geographers, and of course scientists concerned, for example, with the history of plants and animals, human populations and disease, climate and environment, in order to broaden and enhance our understanding of the crucial millennium which gave birth to the modern world.

Cross-References

- ▶ Medieval Archaeology
- ▶ Medieval Urbanism
- ▶ Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology
- ▶ Urban Heritage
- ▶ Western Roman Provinces, Archaeology of the

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France: Promotion of Archaeological Heritage

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Introduction

The conservation of archaeological remains in France is part of a process of heritage promotion and education. It is also directly involved in the Tourism sector of the territories and their reputation.

As they are often called upon by heritage preservation associations and the public at the time of discovery and relayed by the media, these presentations of archaeological remains have always been exceptional for various reasons: the exhumed remains are extremely fragile, their readability is complicated by the superposition of remnants over many periods, the costs of investment and maintenance are very high, and they are incompatible with development plans.

Definition

We can estimate that in France the number of surveys leading to a sustainable promotion, in one form or another, of substantial archaeological heritage is in the low hundred. In the sites corpus, we can distinguish between two main types: open-air sites and crypts.

Within these groups, there are sites where access is fee paying with the possibility of guided tours for some. A few of these heritage sites benefit from a protection as Historical Monument (registered or listed), and sometimes they can even benefit from international recognition, directly or indirectly (UNESCO).

Examples

"Open-air" sites: for the Prehistory, we will mention as an example the Neolithic megalithic site of Carnac (Morbihan). For historical periods, especially in urban areas, the "garden of remains" of the Centre Bourse in Marseille (Bouches-du-Rhône) is an archaeological conservation area of nearly 1 ha in direct relation with a large history museum of the city.

It should be noted that this achievement is recognized in the national history of archaeology as a major event since it is the result of a political compromise achieved during the 1970s between the decision to build modern constructions in the heart of the oldest town in France and the decision to conserve highly significant Greek, Roman, and Medieval remains (port and fortifications).

Some presentations are limited to a consolidation of ruins in the state they were in after excavations. In this regard, the site with the most extensive archaeological remains, listed as Historical Monuments in France, is that of Vaison-la-Romaine (Vaucluse) with an area of more than 8 ha.

In the south of France, many archaeological sites are open to visitors, of which several are oppida, in Ensérune (Hérault) and Entremont (Aix-en-Provence, Bouches-du-Rhône), for example, or ancient cities like Glanum (St. Rémy-de-Provence, Bouches-du-Rhône) and Vaison-la-Romaine already cited.

Other sites open to visitors are still undergoing more or less substantial research programs, with the example of the Bibracte site (Mont Beuvray) bordering the regional departments of Saône-et-Loire and Nièvre. This undeniably increases the public's interest and therefore attendance at the site.

The visit can be extended to the experimental archaeology structures like at the European Park Bliesbruck-Reinheim (Moselle) or at Saint-Romain-en-Gal (Vienna) with the reconstruction of a vineyard and elsewhere to museographic installations (Cimiez, Nice (Alpes-Maritimes); Bavay (North)).

In recent years, several sites have been given prominence right after the excavations on the site with the construction of a museum space, for example, in Languedoc-Roussillon Loupian (Hérault) and Sallèles-d'Aude (Aude). The presentation of the ruins can also be enhanced by markings in the soil and soil treatments (colored gravel, grass) to facilitate the easy reading of plans. Only the site of Glanum (Saint-Rémy-de-Provence, Bouches-du-Rhône) has been the object, about 20 years ago, of a life-size anastylosis for the angle of an Augustus temple erected on the side of the forum.

Archaeological crypts make up the second group. The most monumental example is that of the Grand Louvre (Paris) with pits from the fortress of Philippe Auguste and Charles V. They were brought to light between 1983 and 1985. These archaeological crypts primarily show the vestiges from the Gallo-Roman or Medieval period. For this latter period, these are essentially religious relics. Among the most important recent achievements worth mentioning are the crypts of churches of Saint-Laurent de Grenoble (Isère), Saint-Raphaël (Var), and Digne-les-Bains (Alpes-de-Haute-Provence) and most recently the one in Nice (Alpes-Maritimes) made during the construction of a tram line to showcase modern and medieval fortifications. This crypt is the largest built in France after the Louvre in Paris.

To these two main categories, we must also add, in recent years, facsimiles or virtual tours of major World Heritage sites that are

prehistoric caves. These initiatives allow a large number to discover these remarkable sites, where visits are prohibited for conservation reasons. The most representative example is being that of Lascaux II (Dordogne).

Finally, on this theme of the promotion of archaeological heritage, we must not forget the twenty or so archaeological parks, or archaeosites, that offer the public the possibility to visit educational reconstructions, relating to one or several periods, like, for example, the site of Aspanio (Villeneuve d'Asq, Nord).

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Conservation in Archaeological Practice

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Frankel, David

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Basic Biographical Information

David Frankel is an Australian archaeologist with expertise in the prehistory of Australia, New Guinea, and Cyprus. He was born in Johannesburg in 1946 and moved to Australia in 1963. He received his B.A. (1970) and M.A. (1973) in Archaeology from Sydney University and his Ph.D. from Gothenburg University, Sweden, in 1975. From 1975 to 1978, he worked in the Department of Western Asiatic Antiquities at the British Museum, before taking a Lectureship at La Trobe University in Melbourne in 1978. He was subsequently appointed Senior Lecturer in the Department of Archaeology in 1982, Reader in 1992, and Professor in 2009.

In order to gain experience, Professor Frankel worked at Burrill Lake, Irrawang, and Elizabeth Farm in New South Wales and at Kauri Point in New Zealand, as well as in Israel, Greece, Cyprus, and Jordan, before embarking on his own career as a field director. His dissertation was a groundbreaking analytical survey of the White Painted Ware pottery of Middle Bronze Age Cyprus. Published in 1974, it was one of the first studies to use multivariate statistical analysis of design motifs to assess social relationships.

Professor Frankel has served on numerous state and national bodies, including the Australian Archaeological Association, the Australian Quaternary Association, and the Australian Association of Consulting Archaeologists, and played a key advisory role in the development of Indigenous cultural heritage and teaching programs. He is a member of the Permanent Council of the International Union for Prehistoric and Protohistoric Sciences (IUPPS) and co-organizer of the IUPPS conference to be held in Melbourne in 2017. He has also had an active engagement

with the Jewish Museum of Australia, coordinating an exhibition on the Archaeology of Ancient Israel in 1986 and teaching Adult Education courses.

Major Accomplishments

David Frankel has set new standards for teaching, research, and publication in Australia and beyond. His fieldwork has provided opportunities for technical training for generations of students, while also serving as the basis for a teaching program strongly informed by the research process. His status within the discipline rests on an integration of the practical and theoretical aspects of archaeological research and a deep engagement with primary evidence.

In his early years at La Trobe University, Frankel developed innovative courses on the archaeology of Australia and Melanesia and began an active program of fieldwork in order to develop a research profile for the discipline and cater to the needs of students. Over the next decade, he carried out excavations at Sunbury, Moonlight Head, Gisborne, Phillip Island, and Mt. Talbot in Victoria, Barham in New South Wales, and Karremarter and Koongine Caves in South Australia, as well as in the Gulf Province, Papua New Guinea. He developed new models for assessing changes in land-use, technology, and behavior during the last 10,000 years. *Remains to be Seen: Archaeological Insights into Australian Prehistory*, a textbook published in 1991, drew heavily on these studies and on Frankel's courses in Australian archaeology. It differs from other texts in its self-conscious evaluation of the research process and is used extensively at Australian universities.

Since 1990, Frankel's research focus has been on Cypriot prehistory. A decade of excavations at the Early and Middle Bronze Age settlement of Marki uncovered deposits spanning 500 years in the largest exposure of any settlement of this period on the island. This was followed by the excavation and survey of Bronze Age cemeteries at Deneia, the excavation of a Chalcolithic hunting station at Politiko, and the documentation and publication of an Early Bronze Age cemetery at Psematismenos and two Early and Middle Bronze Age cemeteries at Karmi. These projects have had a profound influence on the understanding of prehistoric society in Cyprus and led to new insights into issues of broader significance in the discipline, including households, identity, ethnicity and migration, technology transfer, population growth, and social relationships. Importantly, also, Frankel's excavation reports offer a new approach to understanding and presenting the archaeological record and use innovative technologies to make large quantities of primary data available in digital form.

Professor Frankel has played an important role in shaping research policy in Australia as a member of the Australian Research Council's Research Evaluation Committee, Excellence of Research in Australia (2010, 2012) and Humanities Disciplinary Panel (1996–1998). His 1998 review of archaeology in Australia for the Academy of Humanities made a major impact nationally. He has received a number of rewards in recognition of his contribution to the profession. He is a Fellow of the Australian Academy of the Humanities, a Fellow of the Society of Antiquaries, London, and the recipient of a Prime Minister's Centenary Award for services to Australian society and the humanities. He is a Member of the Australian Institute of Aboriginal and Torres Strait Islander Studies, joint Editor-in-Chief of the Swedish monograph series *Studies in Mediterranean Archaeology*, and has served on the editorial boards of *Archaeology in Oceania*, *Journal of Australian Studies* and *Mediterranean Archaeology*.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Cyprus, Archaeology of
- ▶ Hunter-Gatherer Subsistence Variation and Intensification

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French Guiana: Archaeology and Indigenous Peoples

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Introduction

French Guiana, a department of France covering 84,000 km^2, was inhabited by approximately 50,000–100,000 Amerindians before the European Conquest. In the late seventeenth and early nineteenth centuries, the Amerindian population was reduced to less than a thousand throughout the territory (as a result of illness, wars, and, at times, escape).

At the end of the nineteenth century, during several World's Fairs, the Kali'nas were displayed in human zoos. In 1930, the territory of Inini was created, to "protect Indians from civilization." Between 1946 and 1969 (which marks the end of the status as a territory for the Inini), some geographers (Hurault, Frenay) and ethnologists (Grenand, Pierre, and Françoise) mingled with the people from "the Hinterland." In 1970, a prefectorial decree limited access to the south of French Guiana, still in order to protect the "primitive and traditional populations who live in the forest." Young Amerindians, however, were sent to religious homes, to be "educated."

French Guiana today is home to six Amerindian nations and four different groups of Bushinengés (Maroons or descendents of runaway slaves) who are all regarded as indigenous, plus Metropolitans (people from the European French territory), various Creole communities (French Guianese, Saint Lucians, Martiniquans, Haitians), as well as more recent arrivals including Chinese, Lebanese, Hmong, Peruvian, and Colombian immigrants, making it an ethnically diverse and multicultural country.

Definition

Administratively speaking, French Guiana is one of the 100 departments of France which is made up of, by definition, one single people, the French people. French Guiana is still, to this day, "an administrative department like any other," even though in 2014, this overseas department is to become an overseas collectivity within the legal framework of decentralization. French Guiana, however, is the only French department in which an "indigenous" group lives, according to the international definition.

France has not officially recognized Amerindian and Bushinengés peoples of French Guiana, neither through its national laws nor through many international treaties or conventions. For example, it has ratified neither the Convention 169 of the ILO (Article 13 de la

Convention 169 de l'Organisation Internationale du Travail (O.I.T.): "*[...] les gouvernements doivent respecter l'importance spéciale que revêt pour la culture et les valeurs spirituelles des peuples intéressés la relation qu'ils entretiennent avec les terres ou territoires, ou avec les deux selon le cas, qu'ils occupent ou utilisent d'une autre manière, et en particulier des aspects collectifs de cette relation*"), nor the UN Declaration on regional languages, nor the Declaration on the Rights of Indigenous Peoples, adopted on 13 September 2007 at the UN (Article 11 (extraits) de la Déclaration sur les droits des peuples autochtones: "*1. Les peuples autochtones ont le droit d'observer et de revivifier leurs traditions culturelles et leurs coutumes. Ils ont notamment le droit de conserver, de protéger et de développer les manifestations passées, présentes et futures de leur culture, telles que les sites archéologiques et historiques, l'artisanat, les dessins et modèles, les rites, les techniques, les arts visuels et du spectacle et la littérature.*"

Article 12 de la Déclaration sur les droits des peuples autochtones: "*1. Les peuples autochtones ont le droit de manifester, de pratiquer, de promouvoir et d'enseigner leurs traditions, coutumes et rites religieux et spirituels; le droit d'entretenir et de protéger leurs sites religieux et culturels et d'y avoir accès en privé; le droit d'utiliser leurs objets rituels et d'en disposer; et le droit au rapatriement de leurs restes humains. 2. Les États veillent à permettre l'accès aux objets de culte et aux restes humains en leur possession et/ou leur rapatriement, par le biais de mécanismes justes, transparents et efficaces mis au point en concertation avec les peuples autochtones concernés*").

In this short presentation on the relationship between archaeology and indigenous peoples in French Guiana, the current legal situation will be presented, followed by a short discussion of their relationships to nature and sites, while objects and museums will be discussed in the third section, and finally, the multicultural approach gradually being set up in French Guiana will be presented as a tentative conclusion.

Key Issues

Current Legal Situation and the Struggles of Amerindian Demands

Some decrees have superficially masked the monolithic French republican laws, when indigenous peoples are concerned. Since 1970, some French laws are applied "notwithstanding." These exceptions included limited access to the southern zone of French Guiana and the non-conscription of young indigenous boys, as well as the collective use rights of state land (1987).

A 1970 prefectural decree restricted access to certain parts of French Guiana to protect indigenous peoples from modern civilization. It was followed by the land decrees of 1987 and 1992 establishing articles R.170-56 and R.170-58 of the Code of State Domain. The Ministerial Decree of 14 April 1987 (art. 170.56) allows "The people who traditionally draw their livelihood from the forest" (Amerindians and Maroons or Bushinengés) to be granted "on federal lands in Guiana collective use rights for hunting, fishing and, in general, for any activity necessary for the subsistence of these communities." This concerns only use rights as the ruling n · 98-777 clearly reaffirms that the State can only grant rights to people, not to communities.

Since 1981, with the creation of the Association des Amérindiens de Guyane française (which includes the six Amerindian nations) and after Félix Tiouka's address to the French State in 1984 and the advent of the Fédération des Organisations Amérindiennes de Guyane (1992), the struggle of native Amerindians (conducted mainly by the Kali'nas) intensified, including demands for access to their native language, their culture, and their own political organizations and, at times, to lands.

Membership in COICA (Coordinadora de las Organizaciones Indígenas of the Amazon Basin) in 1992, as well as participation in the Charter of the Indigenous and Tribal Peoples of the Tropical Forests (Penang, Malaysia), also strengthened the internationalization of the struggle for recognition of the rights of indigenous peoples. The creation of the Guiana Amazonian Park

(le Parc amazonien de Guyane) in February 2007 may be an opportunity or a disaster for the Amerindians of the forest, though it is too early to be certain. In 2008, the "Conseil consultatif des peuples autochtones de Guyane" was created, but they have not yet held a meeting.

Relationships with Nature and with Archaeological Sites

Relationships with nature create, in many societies, a construction of territorial identity as well as individual and collective local roots, based on the past, memory, and heritage. Archaeological sites, by their very nature, are part of Mother Earth. In French Guiana, inselbergs and rockshelters and caves, which are inlets into Mother Earth, are seen as sacred.

Similar to other regions of the world, Guianese archaeological sites, including Amerindian sites (Bushinengé archaeological research is in its early phases and the age of these peoples in Guiana has not yet produced archaeological sites in the usual sense), are under threat of being destroyed by the natural processes of erosion and on a larger scale by recent "economic and social development," which include the construction of roads, subdivisions, schools, and hospitals along with heavy extractive activities, such as sand, granite, and laterite quarries and both illegal and legal gold mines.

However, the main problem remains that of the territories claimed by some Amerindians. The French government does not recognize collective land ownership by a community nor does the administration of the Guiana Amazonian Park created in 2007. Only those areas used by populations who *traditionally draw their livelihood from the forest* are recognized.

In recent years, the Department of Archaeology of French Guiana has drawn inspiration from the Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples of the Canadian Archaeological Association, in particular that of "recognition and respect for the spiritual bond that exists between Aboriginal peoples and special places and features of the landscape of high symbolic significance" (Canadian Archaeology Association. n.d.).

Thus, the altars of the ancestors, the altars of the dead, both traditional and illegal cemeteries, and sacred Bushinengé groves of Apatou and of Papaïchton are protected, as are the unofficial Amerindian cemeteries in Kali'na villages on the west coast of French Guiana. These are being integrated to the database Patriarche, as sites on the national archaeological map. In addition, during each preventive or research-based archaeological study, Amerindian communities living on or near the archaeological sites concerned are not only informed of the arrival of archaeologists, but fieldwork (prospecting, testing, excavating) does not begin until permission to do so is granted by traditional chiefs and shamans. This was the case in Kourou during excavations conducted prior to the construction of the Soyuz Launch Complex, which unearthed graves, and again at Awala-Yalimapo during the excavations of funeral urns, from 2009 to 2011.

Objects and Museums

What about objects in museums? According to the French Heritage Code (2004), there is no legal requirement to return bones belonging to indigenous peoples, nor objects found in their graves, nor any other objects deemed sacred, back to their communities of origin. The discovery of culturally significant human remains and associated objects in the municipality of Awala-Yalimapo inspired the identification and dedication of a community storage space for such objects in 2010. The associated Amerindian human remains and funerary urn were entrusted to the care of the chief of Awala-Yalimapo. French law allows this type of storage, if the archaeological remains are preserved and kept safe (normally under the responsibility of a qualified heritage agent). For now, the remains of the urn unearthed in 1997 are stored in a communal room, but will a subsequent reburial by the community take place? When this happens, should we consider then that their conservation can no longer be ensured? For now, trust has been placed in the hands of the Kali'na

community. In November 2011, the Department of Archaeology was asked to create an exhibition for the town's library, using funerary urns excavated since 2009. Interpretations of the function and symbolism of these objects are presented both in Kali'na and in French, along with Amerindian and Western interpretations.

The practices of museums have also evolved; the Museum of Guianese Cultures regularly mounts exhibitions on the peoples of Guiana, using bilingual or trilingual signage, and the participation of indigenous peoples is sought, active, and valued.

Examples

A Multicultural Approach

In 2010 in Awala-Yalimapo, a township of 1,500 inhabitants was founded in 1989 at the request of representatives of the Kali'na from the township of Mana. The Amerindian mayor subsequently created a Council of Culture. The Council brings together representatives of the town's associations, from town hall, as well as two traditional chiefs. One of the goals is to establish the identity of the municipality and the community, which is partially based on the results of archaeological research. Discussions and briefings are organized several times a year, thus allowing people to get better acquainted and speak a shared language. The results of archaeological studies are made available in a timely manner to the communities and citizens, but admittedly not always in a manner that is accessible to all. In addition, conceptual approaches are different as archaeologists are used to sorting, classifying, and dividing remains, while Amerindians consider minerals, animals, plants, and their spirits, and humans as an inseparable whole.

However, since 2010, the Awala-Yalimapo town council is developing the capacity to reclaim ownership of their collective past. Thanks to regional, national, and European funding, it has implemented training for four young Kali'nas to carry out a participatory inventory, relying on the help of heritage professionals. This will create a better understanding of Amerindian heritage in the township and contribute to its future prominence by the community. This inventory is based on traditional field surveys (archaeological and architectural surveys), but also on oral traditions, that enhances the knowledge and expertise of the elders. The participation of Amerindian youth in archaeological heritage is growing, and the future recruitment of more young Kali'nas as archaeologists or heritage officers will continue this work. Archaeology can also become a means of social development for members of indigenous communities. The Kali'na township of Awala-Yalimapo thus plays a pioneering role in the conservation of its heritage, shared by other Amerindians of French Guiana.

Another example is that of Camopi, an Amerindian (Teko and Wayãpi) township on the Oyapock River. They also seek to foster heritage through basketry workshops led by elders, photographic exhibitions taken by young people in their villages, or archaeological objects collected by their own families and presented to the community during Heritage Day. Other communities, such as those of the Tekos (Arawaks) of Balaté in Saint-Laurent-du-Maroni or that of the Kali'nas of Yaou (Bellevue) in Iracoubo, as well as the Wayana, whose rite of passage, the Maraké, is in the process of being registered as immaterial heritage for humanity, have expressed great interest in the archaeological heritage of their respective traditional territories.

The Bushinengés recognition of the importance of material heritage via archaeology is recent. One of the first archaeological research programs on Maroon groups of Guiana began in 2012.

Future Directions

The address to the French people and government of 1984, issued by Félix Tiouka on December 9, has thus seen some result, though the process has been slow and rather lengthy. Since 1981, the

year in which the Association des Amérindiens de Guyane Française (currently called the Fédération des Organisations Amérindiennes de Guyane) was created, archaeological heritage has become a preoccupation for Amerindian nations and particularly for their political and spiritual leaders, their traditional chiefs, and their elected representatives. It is seen as a means to provide historical legitimacy that is sometimes contested by other communities living in Guiana and also as a way to reinstate their culture in the past.

Cross-References

- ▶ Cultural Heritage Management and Native Americans
- ▶ Decolonization in Archaeological Theory
- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Indigenous Archaeologies
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ South American Archaeology: Postcolonial Perspectives
- ▶ The Guianas: Pre-Columbian Heritage
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

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French Guiana: Archaeology and Minority Communities

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Introduction

French Guiana, one of the hundred overseas departments of the French Republic, has many minority groups administered from a cultural, political, and economic perspective at the State, Regional, and Departmental levels. These include six American Indian nations and four Bushinengé (Maroons or descendants of runaway slaves) groups, diverse Creole communities (primarily from Saint Lucia, Martinique, and Haiti), and more recent immigrants such as Hmong, Peruvians, and Colombians.

Definition

Archaeological Sites of Minorities

The national archaeological map (Patriarche) does not allow for the easy integration of sites such as occupation sites and cemeteries dating from the eighteenth century which are still in use. Also challenging are sites and cemeteries known only through oral traditions, and for which physical evidence is tenuous. Yet in French Guiana, Amerindian, Bushinengé, and Creole populations practice many rites in places considered natural by the Metropolitans and other communities living there. Examples include the Amerindian cemeteries of Mana, Awala-Yalimapo, Iracoubo, the sacred forest of the Bushinengé in Apatou, the old houses of traditional Aluku (one of the four Bushinengé groups), chiefs in Boniville or the grand Man Difou in Papaïchton, and the Haitian voodoo cults at the foot of trees in a number of places like the rock carvings in Rémire-Montjoly.

Key Issues

These sites generate numerous important ethical questions. For example, how can one recognize an Amerindian or Bushinengé cemetery when there is nothing to signal the location of graves and the only means of correctly identifying these sites is to trust local people? How does one know that a particular part of the forest is sacred and that only those who are initiated can enter it? How can one guess that the remains of a few bottles, planks of wood, and a destroyed cassava oven are sacred because they are those of the last grand historical Man of the Boni of Papaïchton? When we identify a voodoo place of worship made up of offerings of food and flowers and candles that leave few traces for future archaeologists during surveys, are we to save it on the national database?

Technically, it is much easier to record Amerindian sites such as grooves or engraved rocks which leave tangible traces, than the Bushinengé houses of the eighteenth and nineteenth centuries which are almost invisible. Much of the problem lies in the immateriality of many human activities practiced by these groups who did not build monuments, particularly in a context where tropical plants offer a wide range of effective and simple tools needed for construction.

In French Guiana, the Department of Archaeology has decided to register past and contemporary Amerindian and Bushinengé cemeteries as well as their altars and sacred groves. Alukus and Creole sites, such as the Creole village of Guisanbourg near Regina, which has been abandoned by its inhabitants for nearly 30 years, but is still regularly visited by former families for an annual "pilgrimage," are also recorded. We have chosen to do so in order to protect them. For now, there is no intention to "restore" these Bushinengé or Creole sites and cemeteries, and it should be noted that Bushinengé cemeteries are forbidden to the uninitiated and even to some of the Bushinengé population.

Another issue is the conservation of cultural landscapes, such as the case of hundreds of hectares of former Amerindian farmland or Bushinengé Kottika burnt brush piles (the latter being classified as natural sites) that are unique cultural landscapes. The Archaeological Service of French Guiana considers them archaeological sites, as they are culturally altered landscapes. Some of these field areas are also protected by classifying them as a ZNIEFF (natural zone of faunal, floral, and ecological interest). These places are therefore twice protected with double classifications. Ideally, this offers complementary protection since natural and cultural heritage are, at times, inseparable.

Examples

The Archaeological Collections of Minorities

The three main State museums in French Guiana have collections which speak to diverse pasts. The oldest, the Musée départemental Alexandre-Franconie, which opened in 1901, is a historical museum and displays cabinets of curious exhibits. On permanent display are naturalist collections and objects from different peoples of Guiana (Amerindians, Bushinengé, Creoles), together with an amazing collection of paintings and engravings by convicts sent to French Guiana in the nineteenth and twentieth centuries.

The Musée des Cultures Guyanaises opened in the late 1980s and houses more varied collections. The exhibitions are all on temporary display and are often thematic, multicultural, and cross-disciplinary and aim to show Guianese cultural diversity, even if the collections are mostly made up of Amerindian, Bushinengé, and Creole ethnological objects. One difficulty in Guiana lies in the demarcation between the archaeological and the ethnological. Is a Kali'nas vase from the 1930s considered ethnological or archaeological? And what about a Saramaka bench? And Creole furniture? And what about the collecting methods? Was the object collected in its context? If so, these objects are considered archaeological. In fact, it is better to understand the objects in their cultural and functional contexts, rather than trying to catalog and classify them.

The third museum is an eco-museum, established in 2008 in a Creole house, which

was once the trading post and home of a prosperous family. This museum houses collections relating to life on the Approuague River in the early and middle twentieth century and also presents industrial heritage, as the owners had a nearby sawmill. There are several displays of pre-Columbian objects, as well as others dating from the colonial period. Displays also discuss the development of the lowlands, particularly through the reclamation of flooded land and the contribution of the first steam engines to the area. All three museums are housed in Creole mansions; should this signify something particular? Everyone is free to find the symbol hidden behind these beautiful wooden facades. But it is clear that the dominant Creole minority sought primarily to preserve its past more than the past of other communities in Guiana. An original project under development in association with the council and the Guyanese Amazonian Park is at the Agasso House. This was the name of a Saint Lucian gold prospector and grocer from Saül. The house has been acquired by the municipality with the intention of converting it into an eco-museum displaying the tradition and history of gold mining in the region.

What happens elsewhere in Guiana outside the official State institutions? In another article in this encyclopedia "Archaeology and Indigenous Peoples in French Guiana," we highlighted the pioneering role of the Kali'nas community from Awala-Yalimapo, which has engaged in recording and preserving their heritage via a participatory inventory, by exhibiting past and recent objects and educating young people in research techniques, conservation, and heritage management. The Kalawachi of Kourou have, over the past three years, set up and organized an exhibition on Amerindian traditions in a traditional kalian hut near Kourou. An interest in heritage by members of the Hmong in Cacao, the most populous Hmong village in French Guiana, has emerged in recent years. In contrast, the Chinese and the Lebanese communities have not yet demonstrated any desire for heritage recognition. Other minority communities such as Haitians, Martiniquais, Indians from India, and more recent arrivals, Peruvians, Colombians, Guyanese, Surinamese, and Brazilians are virtually invisible in official exhibitions

Future Directions

To conclude, the contribution of specific individuals from minority communities in archaeological and heritage institutions should be highlighted. Amerindian political and cultural struggles carried out mainly by the Kali'nas have intensified since 1981, with the creation of the *Association des Amérindiens de Guyane Française*, which includes the six Amerindian nations. The *Fédération des Organisations Amérindiennes de Guyane* was created in 1992 after the address to the French State by Felix Tiouka in 1984. The demands for access to indigenous language, culture, land, and political organizations have led the Kali'nas of Awala-Yalimapo to take control of their culture and more specifically their archaeological heritage. To date three young Amerindian archaeologists have been trained and have worked within the State archaeological system, though in museums and other heritage institutions, representatives of minorities are rare.

Cross-References

- ▶ Cultural Heritage Management and Native Americans
- ▶ Decolonization in Archaeological Theory
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ French Guiana: Archaeology and Indigenous Peoples
- ▶ Indigenous Archaeologies
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Sacred Sites in Indigenous Archaeology

▶ South American Archaeology: Postcolonial Perspectives
▶ The Guianas: Pre-Columbian Heritage
▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

Further Reading

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French, Charles A. I.

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Basic Biographical Information

Pressed on the point, Charly French (Fig. 1), the Canadian-born UK-based Professor of Geoarchaeology at the University of Cambridge, recalls that he fell into his first excavation – a deep pit for plutonium rods at McMaster University – when he was four years of age. However, his steps into the field of geoarchaeology begin with his first archaeological foray: helping out with the excavations at Wharram Percy, Yorkshire, during a visit to the UK in 1971. This experience prompted him to return to Britain to study archaeology. During his bachelor's degree at the University of Wales, Cardiff, Charly was taken in by landscape analysis and wrote an undergraduate dissertation on the earlier prehistoric molluscs and paleo-vegetation of the dry valleys of South Wales (1975). Immediately after, Charly took up a job with Francis Pryor, digging and analyzing molluscs at Fengate. This he followed up with a cataloguing job at the Royal Ontario Museum, and, next, with excavations at East Karnak in Egypt. He then embarked on the study of a Masters in Environmental Archaeology under the direction of Professor Dimbleby at the Institute of Archaeology, London. Around the late 1970s and up to the mid-1980s, Charly was employed by Francis Pryor as part of the Welland Valley Project team and the Fenland Project, leading to the discovery of Flag Fen and the Etton causewayed enclosure. At the same time, he successfully obtained a Ph.D. at the Institute of Archaeology, London, in July 1983. His dissertation, which focused on fen-edge and river valley site/landscape data, was defended in June 1983, a month before receiving a deportation order for overstaying in the UK (successfully appealed with the support of Ian Longworth at the British Museum and Geoff Wainwright, then Chief Archaeologist of what would in time become English Heritage). At around this time, Charly got together with his partner Kasia Gdaniec, also an archaeologist, joined the UK Institute of Field Archaeologists and (with Francis Pryor and Maisie Taylor) formed the Fenland Archaeological Trust, which oversaw the opening of Flag Fen to the public a year later in 1986. Charly went on to work in contract and developer-funded archaeology in the later 1980s and early 1990s, until – unexpectedly, in April 1992 – he was made Lecturer in Archaeological Science at the Department of Archaeology, University of Cambridge. By this time, Charly was already one of the pioneers in the use of soil micromorphological analysis to tackle landscape and archaeological research questions. In 2000, Charly became head of the Department of Archaeology and Senior Lecturer in Archaeological Science. In 2005, Charly became Cambridge University's first Reader in Geoarchaeology. In 2009, he received the Pilkington Teaching Prize, and in 2012, he became the first Professor of Geoarchaeology at the University of Cambridge.

French, Charles A. I., Fig. 1 Professor Charles French in the McBurney Geoarchaeology Laboratory (Photo by Tonko Rajkovaca)

Major Accomplishments

As a researcher, Charly's main activities have centered on the application of geoarchaeological, especially micromorphological, analytical techniques to tackle archaeological questions. At Cambridge University, he oversaw the development of the McBurney Geoarchaeology Laboratory (Fig. 1), the world's largest archaeological soil micromorphology laboratory. The McBurney Lab currently undertakes investigations and contract work funded by research bodies and developers (Charly acts as consultant and micromorphologist in many parts of Britain and beyond). The lab also serves as a hub for postgraduate research and undergraduate teaching and has its own in-house facility for the manufacture of archaeological thin sections.

Charly's approach to geoarchaeology is a unique blend between the study of specific features of anthropogenic deposits and the interpretation of signatures of geomorphic and paleo-pedological processes affecting the archaeological record. This perspective, which is firmly anchored in landscape evolution and landscape history, emphasizes the reconstruction of buried landscapes, the characterization of archaeological formation processes, and the study of landscape degradation and human impact. Recently, Charly has also turned his attention to the interpretation of domestic space within settlement sites. The multiple strands of his approach make up a vast bibliography (some case studies can be found in his book *Geoarchaeology in Action: Studies in Soil Micromorphology and Landscape Evolution* (French 2002)) and are also well represented by the research of his former students. The latter make up a cohort of world-class geoarchaeologists that use soil micromorphology in a wide range of landscapes across Europe, Africa, the Middle East, the Americas, Australia, and Asia. Many of them are now university lecturers and researchers in different institutions around the world.

Charly's regions and countries of special research interest have included the East Anglian fenlands and the river systems that drain into them, the chalk downlands of Wessex, the Channel Islands, northern Bosnia, northwestern India, southern Patagonia, and the Ica valley of southern Peru. He is currently involved with a number of research projects: multidisciplinary investigations of Neolithic/Bronze Age environmental change in the Avon River Basin around Durrington Walls and the Kennet valley around

Avebury; geomorphological and micromorphological investigations of Holocene erosion and paleosol sequences in southern Sicily, the Sava River Basin of northern Bosnia, the island of Herm (Channel Islands), and coastal and steppe regions of southern Patagonia and Tierra del Fuego in Chile; and the geoarchaeology of the Ica valley in southern Peru, as well as more site-specific investigations of settlements of the Harappan period sites in Haryana and Rajasthan provinces of northern India. The McBurney Geoarchaeology Laboratory continues to attract research students from these regions and other parts of the world.

Cross-References

► Archaeological Soil Micromorphology
► Geoarchaeology

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Freshwater Archaeology

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Introduction and Definition

Freshwater archaeology can be defined as archaeological research that takes place in or near streams, rivers, lakes, ponds, oxbow lakes, or inundated natural and man-made features such as springs, cenotes, or flooded mines and quarries. In this venue, freshwater archaeology will not include features located in oceanic sounds, bays, gulfs, and some seas that contain brackish (mixture of fresh and salt) water. For archaeological purposes, therefore, freshwater can be defined by water at which point the average salt content, or salinity, is or remains lower than .5 ppt (parts per thousand). Typical oceanic salt content averages 35 ppt and importantly for archaeologists, 12 ppt is the point at which typical oceanic fouling assemblages such as corals, coralline algae, shellfish, and tubeworms as well as wood borers such as shipworms, piddocks, and gribbles can no longer live.

Freshwater systems typically demonstrate high levels of artifact preservation as well as a lack of concretion and biodegradation. The preservation qualities of freshwater are largely due to the absence of chloride ions, living corals, and fewer bio-organisms that break down artifacts. Preservation can also be enhanced by cold temperatures found in the deeper large bodies of freshwater exemplified by the North American Great Lakes. However, it should be noted that as sea levels rise, due to climate change, the defined geographical parameters of fresh- and saltwater systems, particularly riparian, will become more complex.

Historical Background and Key Issues

The chronological range of archaeological sites that may be located in freshwater systems theoretically stretch to the beginnings of mans' migration from Africa. Every stream, river, and lake crossed by early humans potentially contains invaluable artifacts or evidence of habitat sites and food-gathering activities. The Little Salt Spring site in Florida suggests that some prehistoric underwater archaeology is certainly possible and remarkable finds can be made. Archaic riparian fishing activity in the form of stone fish weirs has been noted in the American Midwest. And trading routes extending from the Caribbean to the Yellowstone region can be deduced by the presence of unique artifact materials of copper, mica, flint, and seashells found in excavations far from their origin, indicating that extensive freshwater-borne trade existed in North America as long ago as 2,500 years before present.

Yet there are several major problems with exploring freshwater riparian systems for prehistoric archaeological evidence. The recent Pleistocene glacial period, which only ended some 10,000 years BP, has remade much of the geography of North America, Europe, and Asia, forming most of the northern river, lake, and gulf systems we see today. These recently formed river systems are extremely dynamic and tend to flood with some regularity, periodically scrambling or eliminating much of the evidence of human activity. In one recorded archaeological case study (albeit historical), a dozen archaeologically documented shipwrecks dating to the early nineteenth century were swept away in Eastern North Carolina during the flooding from hurricane Floyd in 1999. It follows that if this happens in historic times, then it must have happened in prehistoric times, creating similar problems for archaeological interpretation. Geologists relate that it is also not uncommon, given the proper circumstances of outlying severe climatic events, for rivers to dramatically change shape in very little time. Given a long enough time frame, river systems often form a braided system of older dried courses and oxbow lakes that can be located some distance from the present watercourse. It is easily demonstrated archaeologically that many nineteenth-century North American Western riverboats lie buried under cornfields or are entombed in the mud at the bottom of oxbow lakes. It must follow that in these instances, archaeological sites, be they prehistoric or historic, have not moved, the rivers have.

Yet freshwater historic archaeology has become a growing success story, in both rivers and lakes, with more scientific data accumulated annually. Most often these successful projects use research designs that tap into data presented by well-preserved sites that lie in more stable deep-water rivers and lakes in both Europe and North America. The more recent craft and vessels of the historic period lie in greater abundance on lake and river bottoms and can be used to piece together a patchwork quilt of archaeological information extending from Roman times to the twentieth century. As in all historic archaeological study, the goal is to gather information to better interpret the lives of the people who created these artifacts. Underwater archaeology is a new profession and not well represented in some major areas of the world. This entry will, therefore, concentrate solely and by necessity on the areas of the world where most of the freshwater archaeology has taken place, Europe and North America.

International Perspectives

European Freshwater Archaeology

It would be impossible in this small venue to discuss all of the Continental freshwater archaeological finds. At best, some of the better examples can be described and placed in a sort of archaeological/historical context. As elsewhere, European lakes and rivers offer an archaeological glimpse into freshwater human activity. And as elsewhere, these studies are often enhanced by unsurpassed freshwater preservation of artifacts and strata. It should also be noted that the concept of freshwater archaeology adds an artificial barrier that does not concern most archaeologists, who most often follow overarching research designs regardless of what environment this information is located.

Likely the first freshwater archaeological research accomplished on the Continent of Europe centered on examination of Irish and Scottish Crannogs, small artificial islands that were built over and used as dwellings from the Neolithic period onward. Crannogs were placed deliberately in lakes, rivers, and estuaries as both a means of protection and to allow humans easy access to resource use and waterborne transportation. Proto-archaeological examinations of crannogs first took place toward the end of the nineteenth century but continue to present day, where modern scientific method and theory is used to glean a great deal of archaeological data concerning Neolithic and Bronze Age life.

Some of the earliest finds in the freshwater nautical archaeology venue are log boats discovered in Britain, Denmark, Spain, France, and Germany. The earliest of these seem to date from the Mesolithic period, examples being the

Pesse, Netherlands, log boat (8300 BP) and a log boat site located in Locharbriggs, Dumfriesshire, in Britain (4000 BP). Log boat finds are common in the freshwater archaeological record, and their use spans virtually all recorded history until nearly present day. Log boats were produced in large numbers and despite river changes and flooding, many still exist in riverbanks and lake bottoms. Log boats were produced to carry out all activities associated with prehistoric and historic living practices including hunting, fishing, trading, exploration, and warfare. It can be surmised that log boats became more practical to human use after the glacial retreat and the growth of large Continental forests.

Woven or skin boats were likely used before this time. The Husan boat fragments (11000 BP) seem to be the only archaeological evidence of these craft, but they are represented in the ethnographic use of woven coracles and hide kayaks. Sophisticated intermixing of log boat, skin boat, and woven boat technologies are also hinted at in the Evanshus, Berguter, and Karelia Petroglyphs. These early craft showed such utility that they are still being produced today in some areas of the world, but importantly in this case, and in the context of freshwater environments, these craft gave humans the ability to travel great distances, turning freshwater obstacles of lakes and rivers into freshwater roadways. Log boats, skin boats, and woven vessels allowed humans to migrate while taking better advantage of the environment for production of food.

European freshwater navigation technology changed during the late Neolithic and Bronze Age as humans found a greater need to take advantage of riparian, brackish, and estuarine environments to transport a new and growing wealth of agricultural commodities. Bronze and Iron Age flats were constructed combining log boat and skin boat technology as exemplified by the Brigg Raft in Yorkshire, England, and the Polish Galar flat (2800 BP). These early examples of flat boats designed for freshwater and estuarine trade began another vessel tradition that spans the entire historic range from that period nearly to present time. Flats, scows, ferries, barges, litter freshwater and estuarine environments, and rival log boats are the most plentiful example of freshwater vessel.

During this same period, vessels were produced in Europe to take advantage of both river and cross channel trade. These stitched plank boats were lighter and likely faster to paddle than log boats, and some were designed to not only navigate up rivers but to make short dashes carrying tin between Britain and the Continent. Good archaeological examples of these types of vessels can be seen in the Dover Boat (3300 BP) found near the River Dour and the Ferriby Boats (3300 BP and 2400 BP) found on the Humber Estuary. From descriptions given by Sean McGrail and Basil Greenhill, these vessels can best be described as large canoe-type craft that could carry up to 7 t of material and driven by a fair-sized crew of paddlers.

The Continental freshwater archaeology trail continues in the rivers of Central Europe with Roman period riparian trade vessels of Celtic design referred to as the Laiback type, best exemplified by those archaeologically excavated and recovered at Pommeroeul. These river vessels were intended to be poled and later towed by animals on the peaceful Roman period rivers of Central Europe. They were plank built and could be quite large at up to 30 m in length. Their construction, with flat bottoms and slab sides, made them ideal for rolling cargo on and off from riverbanks, but unlike the other flats previously discussed, they were narrow enough to make headway towed against the river current. It can be seen in Roman funerary reliefs that another type of vessel shared the rivers of Central Europe with the Laiback type; the Blussus Boat is pictured as a large dugout-type vessel. It was designed to be towed upstream but oared downstream. As yet there are no archaeological examples.

It should be mentioned here that a fantastic discovery was made when the Italian Lake Nemi was drained in Northern Italy in 1929. Two vessels were discovered in the lake that dated to the reign of Emperor Caligula in the first century CE. The Lake Nemi vessels were flat bottomed and over 70 m in length, but otherwise built in the Romano-Greek oceanic vessel tradition. They were likely constructed as floating temples or

palaces, and although they were destroyed by fire near the end of WWII, much of the stone and ceramic work for the deck buildings was saved.

The Scandinavian tradition in boat building and ship construction was only in its infancy during the Roman period. Many of these early vessels were intended to ply both fresh- and saltwater, but here, we will concentrate on those examples found in freshwater. Classic period Viking vessels were fully capable of transitioning from a marine environment to a riparian environment, but a full discussion of these seagoing vessels and their predecessors is not possible here. However, proto-Norse vessels such as the Als boat at Hjortspring in South Denmark is a good example of an early Norse-type freshwater technological tradition. It is dated to 2350 BP and described as a dugout-type boat with additional planks added, lapstrake style, to the sides. Adding to the proto-Norse style were a carved stem and stern. Als was found in a lake along with various weapons and likely placed there as a spoil of war. Als can be placed in context with other finds from Denmark; the Bjorke Boat (2100 BP) and the nineteenth-century finds of two vessels at Nydam (dated to 310–320 CE) together give a hint at how proto-Norse vessels evolved.

Finally it should be noted that many river and lake discoveries will not be mentioned here as they involve vessel types that were never intended for inland lake and river use. The Bremen Cog, located and excavated out of the River Weser, in Germany is a good example of an archaeological project that took place in freshwater, but whose implications mostly affect marine archaeology and seagoing technology. The Thames River alone contains many archaeological sites that may be termed freshwater but relate more to the sea. Blackfriars and County Hall sites represent a Gallo-Roman marine shipbuilding tradition that is beyond the scope of this submission. Other known historic vessel types such as medieval hulks and bardes will, no doubt, be discovered, perhaps well preserved in a freshwater environment. But these vessels are, as well, of a marine oceanic technical tradition and not intended to spend their working lives in freshwater.

North American Freshwater Archaeology

American freshwater archaeology is a recent phenomenon having been conducted to date with only one generation of trained archaeologists. But these archaeologists were trained to respond to the needs of their time. The period between the common use of scuba diving gear in the 1960s and the introduction of Federal and State cultural resource management laws in the 1980s can best be described as a period of underwater cultural resource chaos. This time period leads to the destruction and near destruction of vast amounts of submerged archaeological evidence in often well-intentioned but ill-advised attempts to salvage and or recover freshwater shipwrecks of all types. This included the eventual complete destruction of the intact Great Lakes Schooner Alvin Clark (raised in 1969) and the near destruction of the Civil War ironclad gunboats USS Cairo (raised in 1964) on the Mississippi, along with Confederate ironclads CSS Neuse and CSS Jackson (CSS Muscogee), as well as a multitude of ship parts and machinery from other sites. It should be noted that although these Civil War ironclad gunboats were eventually saved, preserved, and curated, their complete destruction due to lack of preservation funding hung in the balance. Given this, a large amount of freshwater archaeological data has, since the 1980s, been retrieved in America's inland fresh waterways, and our understanding of maritime trade, ship construction, and history has been greatly enhanced.

In North America, freshwater archaeology can be divided between freshwater lakes and the great river systems that span the country. These freshwater systems were often commercially interconnected yet were serviced by unique freshwater technologies and ship classes that evolved to service an area's individual geographic needs. It is, therefore, most meaningful to organize this entry into a section concerning the Great Lakes and juxtapose that discussion with a section concerning American River Transportation.

The Great Lakes

The Great Lakes of North America consist of five large interconnected lakes that contain 94,500 m^2

(244,754 sq. km) of inland freshwater sea. The combined lake shores stretch for thousands of miles forming a partial boundary between Canada and the United States. The Great Lakes combined create the world's largest freshwater body exceeding 1,300 ft (396 m) in depth in Lake Superior. The upper lakes of Huron, Michigan, and Erie are on average 570 ft (174 m) above sea level, while Superior is elevated an additional 20 ft (6.1 m). Lake Superior became economically connected to the other lakes in 1856 by the busiest lock system in the world at Sault Ste. Marie. The lower easternmost lake of Ontario is 245 ft (75 m) above mean sea level. Ontario receives the runoff of the Western lakes over the great cataract of the Niagara Falls located in Western New York State. Navigation, however, is made continuous with the other lakes by the Welland Canal system in Canada that bypasses the falls. Since 1825, the Atlantic port of New York has been connected to the Great Lakes via the Hudson River and the Erie Canal, while today, larger vessels can navigate from the Atlantic Ocean into the Great Lakes via the St. Lawrence Seaway.

Professional freshwater archaeological studies began on the Great Lakes in 1985 in Wisconsin waters near Bayfield with the publication of the first of several reports put out by the Submerged Cultural Resources Unit of the National Park Service – the *Submerged Cultural Resources Site Report: Noquebay*, by Toni Carrell. In all, three reports emerged from these efforts outlining the condition and relevant histories of several shipwreck sites in Lake Superior. It should be noted that unlike European studies that tend to concentrate on prehistoric occupation and freshwater vessels, American studies have remained within the historic archaeological realm. Dugout canoes and prehistoric artifacts no doubt exist in the lakes' area but as yet have received little archaeological attention.

At nearly the same time, a branch of the Wisconsin State Historical Society (WSHS) became charged with examining and managing the shipwrecks located on the State's bottomlands in both Lake Superior and Lake Michigan. The first of these management efforts took place in 1985 with a collaborative study conducted by the WSHS and East Carolina University (ECU) on the Schooner Fleetwing site. This single wreck study was published by David Cooper in 1988, as *ECU Research Report #6 The 1986–1987 Archaeological Survey of the Schooner Fleetwing Site, 47DR 168, Garrett Bay, Wisconsin*. This began an ongoing 28-year collaboration between East Carolina University and the State of Wisconsin that has produced to date 4 books, 14 Master's theses, and an additional 12 collaborative and independent reports that can be accessed through the Wisconsin Historical Society and ECU websites.

Since that time, additional collaborations have been forged between the aforementioned entities and the Federal NOAA Marine Sanctuary at Thunder Bay; the Michigan State Department of History, Arts, and Libraries; the Rodger's Street Museum; and the Wisconsin Maritime Museum. Other organizations conducting freshwater archaeology and collaborations on the lakes include Texas A&M University (TAMU), Parks Canada, Wisconsin Sea Grant, as well as private nonprofit groups such as Save Ontario's Shipwrecks, and the Great Lakes Historical Society.

Freshwater archaeological research on the Great Lakes began with site-specific projects aimed at recording individual shipwrecks. This research was often driven by cultural resource management needs to identify the extent of the submerged resources on state bottomlands. Additional efforts soon branched to include systematic remote sensing surveys such as those conducted by the SHSW.

Site surveys of shipwrecks combined with and underlined by sound background historical studies have given, since then, a more focused view of the maritime history and archaeology of the Great Lakes. These studies demonstrate that during the nineteenth century, freshwater vessels transitioned or technologically evolved from generic sailing craft, that would have been at home in any oceanic environment, to vessels that were specifically designed to meet the needs and varying niches of the economic and geographic restraints placed on them. History and

archaeology have demonstrated that nineteenth-century freshwater ships diversified in design and evolved via the increasing influence of large shipping and railroad companies.

The following descriptions of nineteenth-century vessel types are placed here in the historic order that they appeared. It should be noted that not all of the archaeological evidence for these vessel classes can be cited in this venue. The sustained and systematic exploration of the following identified vessel types follows the basic research design set into motion in 1985. It should also be noted that site-specific research has evolved to now include more salient overarching questions of culture, economics, and human systems interaction.

The Millecoquins vessel is named for the stream in Michigan's Upper Peninsula where it was found. Likely a brig or topsail schooner, the wreck is located several hundred meters from Lake Michigan where it was likely blown in a gale. This small vessel exemplifies the generic trading ships of the early nineteenth century and is largely intact and still contains its cargo of salt fish in barrels within the hold. Its dimensions of 65 ft (19.8 m) by 24 ft (7.3 m) with a five-foot (1.5 m) draft would have allowed it to navigate the unimproved harbors and river mouths of the Great Lakes. It had no centerboard, a sailing improvement adapted from the coast in the late 1830s and 1840s. It also contained an American penny in the mast step dated to 1833. This owner/operated vessel likely traded with various fishing camps located along the lake shores.

By the mid-nineteenth century, sailing vessels on the lakes increased in size and carrying capacity very dramatically and also diversified in form and function. This was made possible by an increased use of iron in construction, improved harbor infrastructure, and the use of centerboards. The addition of an internal centerboard (originally located beside the keel keelson structure and eventually moved to actually penetrate through the center of the ship) allowed better use of the fore-and-aft schooner rig that became predominant in lakes sailing vessels. These freshwater schooners evolved to become various classes known as Canal Schooners, Lumber Schooners, and, largest of all, the Grain Schooner and Schooner Barge. Smaller flats were also schooner rigged to service unimproved shallow water ports; these were known as Scow Schooners. All of these vessel types have now been archaeologically documented in site-specific archaeological projects, in many instances demonstrating the sophisticated nature of the designs. But sail was not the only type of power in use on the Great Lakes.

The use of steam had a great influence on nineteenth-century freshwater inland navigation. Each of the following steamship classes has also been archaeologically documented in site-specific projects. Since there are few if any remaining plans for these early ships, the archaeological data is sometimes the only way to tell these ship classes from one another when a new site is located.

The geography and natural resources of the Great Lakes area allowed steamship companies to operate early inefficient steamships at great profit. Several factors allowed steam to compete and even dominate sail on the lakes much sooner than it could in an oceanic environment. First, distances between ports, though it could be hundreds of miles, were considerably less than that on the ocean. In addition, the boilers had all of the freshwater they could consume without the need to worry about salt buildup, while fuel was found in the abundant forest reserves that crowded the shoreline. A variety of classes of steamer have been archaeologically studied on the Great Lakes and include large passenger paddle wheelers known simply as Steamers. These vessels specialized in passenger transportation between the 1820s and the Civil War and were responsible for much of the migration westward in the nineteenth century.

Steam Barges or Lumber Hookers originated in the late 1840s and quickly found a niche towing heavily laden lumber schooners in what became known as the consort system. The consort system speeded transportation of lumber from the great pineries of the American Midwest to the east via the lakes. The Steam Barge towed

as many as seven lumber schooners in line astern, alleviating the need for each schooner to carry a full crew. A Steam Barge, as is seen archaeologically, is simply a schooner hull, sometimes complete with centerboard, into which a single cylinder direct-acting steam engine, propeller, and boiler were added. Outwardly early Schooner Barges were given a deckhouse aft but later sported houses both fore and aft much like their technical progeny the Bulk Carrier. Internally, however, they remained for all intents and purposes, a schooner with a steam engine.

As mentioned, Bulk Carriers evolved on the Great Lakes from Steam Barges, the first being produced in 1869. Unlike Steam Barges, however, bulk carriers grew to enormous size to carry all of their cargo internally. Steam and propeller driven, these vessels pioneered large open cargo holds to accommodate fast and easy loading of unpackaged bulk commodities such as grain, stone, coal, and ore. It is not uncommon for these wooden vessels to exceed 200 ft (61 m) in length with a 50-ft (15.2 m) beam and a 24-ft (7.3 m) depth of hold. Internally they evolved a very sophisticated support structure unlike anything produced for any other type of wooden vessel. Bulk Carriers are still in use today and when they transitioned to much stronger iron and steel hulls at the turn of the twentieth century, they became truly enormous; today some exceed 1,000 ft (305 m) in length.

One more lakes vessel class has been identified archaeologically and deserves short mention here, the Propeller or Passenger/Freight Propeller. These were fast, well-appointed medium-sized ships of less than 200 ft (61 m) and a high length to beam ratio. Their purpose in the 2nd half of the nineteenth century was to extend passenger and manufactured freight rail service to the harbors and ports on the lakes that did not yet have rail.

North American River System

As happened in the Great Lakes, the period before adequate cultural resource management practice in the 1960s and 1970s opened a Pandora's box of sporadic riverboat recoveries in the American West. Riverboats Bertrand (1865) and Arabia (1856) were excavated on land (as the river had moved since their sinking), and partially recovered. The material remains of these vessels have made for spectacular historical museum exhibits by the organizations that recovered them, but unfortunately, much of the archaeological information concerning the construction and engineering of these vessels has been lost in their excavation. Many other sites were partially salvaged for their artifacts, engines, and boilers. But these sites do highlight the fact that rivers offer a unique opportunity for archaeological study. The preservation qualities of freshwater are well documented, and if the site can be placed in a holistic context, archaeologists are often offered a greater potential to study the integrated maritime cultural landscape as it extends from the shoreline.

Sites included in this genre of research include abandoned and wrecked vessels, plantation landings, town waterfronts and submerged infrastructure, wharf and dock structures (some of which include abandoned vessels), bridge structures, and nearshore settlements and trading posts. Each of these types of study offers unique insight to human habitation. Yet it should be noted that although archaeological studies have taken place on all of these types of sites, they have not received the same professionally planned systematic research attention that the Great Lakes has received.

Riparian archaeological attention first centered on a wrecked steamboat with George Bass's 1980 survey of the Steamboat Black Cloud in the Trinity River in Texas. At nearly the same time, Gordon Watts conducted a visual and remote sensing survey of an area near historic Fort Fisher also in 1980 and followed this with an abandoned ferryboat survey in the N.E. Cape Fear River in North Carolina in 1986. These surveys contributed to the research design for the Yorktown Shipwreck Archaeological Study of an abandoned British seagoing collier of the Revolutionary period in the brackish water of the

York River in Yorktown, Virginia. The project, under direction of John Broadwater, was conducted within a steel cofferdam between 1983 and 1994. Although the cofferdam made it possible to deal with the low visibility and currents of the river, it proved too expensive for routine river archaeology.

During this early period, scattered systematic remote sensing river surveys followed in the Delaware River near Philadelphia and White Oak River in Southeast North Carolina. Many abandoned and wrecked vessels were located in these surveys ranging from iron- and steel-hulled ocean-going ships of the late nineteenth centuries to canoes, johnboats, and flats from much earlier periods. In fact, the diversified nature of riparian submerged cultural resources and the difficulties involved in working black and brown water river sites tended to slow the development of a riparian archaeological tool kit. Archaeologists needed techniques to help them deal with lack of visibility, fast currents, and the location of sites that sometimes were not only submerged but also lay under several meters of flowing and viscous silt.

The study and excavation of the Maple Leaf site in the St. Johns River in N.E. Florida near Jacksonville between 1992 and 1994 became a test platform for riparian excavation techniques in the USA. The Maple Leaf project was a collaborative effort between the private non-profit St. Johns Archaeological Expeditions and East Carolina University. During this project, Rodgers and Cantelas designed a portable prefabricated underwater cofferdam system that could be assembled in place on the wreck site. It was used in conjunction with surface-supplied air and underwater communications gear to excavate the vessel under 20 ft (6.1 m) of black water (rich in tannins) and 8–10 ft (2.4–3.0 m) of silt. The techniques, which included carrying clear plastic bags of water in order to see gauges, slate drawings, and tape measures, proved workable, successful, and inexpensive but required skilled technicians and many hours of labor.

Riparian archaeology continued with the examination of a ship's graveyard at Castle Island in the Tar/Pamlico River near Washington, North Carolina, between 1998 and 2002. Over a dozen southeastern river and estuarine working craft from sailing canoes to sharpies, oyster boats, and schooners dating from the early nineteenth century were recorded archaeologically. This collection included one unique style flat-bottomed, sloped-sided stern-wheeled river steamer later identified as an up riverboat. Another example of this class of craft was recorded in the Tar River near Old Sparta, North Carolina, between 2008 and 2010.

Although most of the freshwater river archaeology conducted in the United States has taken place in the Southeast, sporadic finds and work in Western Rivers are continuing, and finds continue to this day. Wreck sites on the Red River and the Missouri River have revealed an early low-pressure side-wheeler (TAMU) as well as the Montana (1879), the largest Mountain Steamer ever constructed and documented by ECU in 2003. Very recent finds have drawn the attention of archaeologists to steamboat remains on the banks of the Yukon River. As can be seen, although conditions can be challenging, freshwater archaeology continues in the United States and other places around the world.

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- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Deep-Water Archaeology
- ▶ Maritime Archaeological Organizations
- ▶ Maritime Contact Rock Art
- ▶ Maritime History
- ▶ Maritime Iconography
- ▶ Maritime Landscapes
- ▶ Plantation Archaeology
- ▶ Ship Archaeology

▶ Shipyard Archaeology
▶ Society of the Ship
▶ Underwater Archaeology
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Frost, Honor

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Basic Biographical Information

Honor Frost (1917–2010) was born and brought up in Cyprus surrounded by the sea. The lands of the Eastern Mediterranean retained her loyalty throughout her life. Of Byblos in the Lebanon, she wrote late in her career "this is where I belong." She learnt her diving at the Nice Divers Club when convalescing and where Cousteau's original team hung out. They introduced her to amphora wrecks from antiquity that stimulated her interest in submerged archaeology. She had already had a ballet staged by Ninette de Valois in London and attended art school which refined her drawing skills which she readily applied underwater. She joined the last season of Kay Kenyon's excavations of Jericho as draftsperson. This gave her a flying start in surveying stone structures underwater, the telltale remains of 11 ancient harbors along the shelterless Levantine coast. Stone anchors that marked ship graveyards also became an obsession.

Major Accomplishments

A chance encounter with a sponge-diver at Bodrum, South Turkey, brought about the discovery of a twelfth-century BCE Bronze Age wreck deposit which made her famous and put underwater archaeology on the map. It was the first deep-water site to be excavated to land archaeology standards and focused the Anglo-American world on the new discipline. The cargo of ingots and bronze scrap suggested a traveling tinker's workshop benefiting from the contemporary Trojan War. Honor's 1963 best-seller *Under the Mediterranean* describes this period, and she was soon to be invited by UNESCO to provide a guide for international consumption – *Underwater Archaeology, A Nascent Discipline* (1972) – which was highly influential and made her something of a world mentor for budding archaeological divers.

As 1970 opened, Honor led a project that resulted in the discovery and excavation of a third-century BCE Punic warship off Sicily. This time, it was a fisherman who reported bringing up very old timbers from the site of a sea battle with the Romans. It was the first time than an ancient warship had been discovered intact. Honor's Punic ship showed through matching marks on the timbers that the ancients used prefabrication to build an entire fighting fleet in months. It took rather longer to reconstruct and put on display but became in effect Italy's *Vasa*.

Honor Frost was now the world authority on stone anchors as well as the lost harbors of antiquity submerged by sea level and climate change. Among her other achievements were over a 100 scholarly publications, the initiation in 1972 of the unique *International Journal of Nautical Archaeology* (still the lead journal in this subject), and her promotion of best practice and innovative techniques. In one hundred years time, she will probably be best known for the fruit of her legacy of £30,000,000 for the encouragement of nautical archaeology research, particularly in the Eastern Mediterranean.

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▶ Throckmorton, Peter
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Frozen Conditions: Preservation and Excavation

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Introduction

Frozen sites can provide unique opportunities to understand the full range of a people's material culture. From frozen bodies to wooden structures to faunal remains and intact multicomponent artifacts, these sites provide unparalleled opportunities for cultural insights. Excavation has special challenges, including the need for multiple specialties in the field, the typical need for a field laboratory, the multiple seasons to allow the site to thaw, and the extraordinary logistical costs. Global warming increases the challenges.

Definition

There are various types of sites and contexts that frequently involve long-term frozen conditions. There are some differences among them, which can influence preservation conditions and determine choices for excavation techniques. These include permafrost, cold dry sites (polar or alpine), ice patches, and glaciers. About one-quarter of the Earth's land area carries permafrost. Where continuous, it is typically hundreds of meters deep. Further south, discontinuous permafrost is tens of meters deep. In the first International Polar Year, the Point Barrow Expedition personnel spent two years (1881–1883) digging to find the bottom of the permafrost. They never found it, but did pass through an archaeological deposit (Murdoch 1892). Upon the end of the expedition, they left behind what for many decades was the deepest ice cellar in the Native Iñupiat Eskimo community of Utqiaġvik.

Permafrost

The technical definition of permafrost (permanently frozen ground) is soil, sediment, or rock that remains at or below 0°C for at least two years. When applied to archaeological sites, the term generally refers to sites in which cultural materials and the surrounding matrix have remained frozen essentially since they were deposited. Depending on the regional climate, the upper levels of a site (the active layer) may go through freeze-thaw cycles if there is not enough overburden to insulate the cultural deposits. During the unfrozen period, underlying frozen ground can trap melting water at the surface, essentially creating waterlogged conditions which aid preservation. Excellent examples of permafrost sites include Utqiaġvik (Hall & Fullerton 1990; Sheehan 1997), the Zhokhov and Yana River RHS sites in Siberia (Pitulko 2001, 2008; Pitulko et al. 2004), and Qeqertasussuk (Grønnow 1994; Meldgaard 2004).

The depth of the active layer varies with the type of matrix. Permafrost sites can be found in gravel as at Nuvuk (Jensen 2009), in tundra soils as at Utqiaġvik (Hall & Fullerton 1990), and in sand as at Pingasugruk (Sheehan 1997). The looser the matrix, the deeper the active layer. The deeper the active layer, the more potential damage to more recent (higher) levels of an otherwise permafrost-embedded site.

People in cold regions often found the most effective protection from the cold was to get out of the wind. Lacking trees and often lacking any natural windbreaks in prime locations, as in the Arctic Coastal Plain, this protection often was assisted by excavating structures into the permafrost and insulating them with grass sods. The inadvertent result was increased preservation. In a house whose floor lay in the permafrost, freezing started immediately once there was a lack of

a heat source, whether a seal oil or whale oil lamp or a fireplace, and a lack of human body heat.

Cold Dry Sites

In cases where the surrounding environment is extremely dry (alpine or high arctic deserts) or the matrix has a low organic content and is well drained, organic materials in a site can essentially be freeze dried. While such sites may meet the technical definition of permafrost, the lack of moisture creates somewhat different preservation conditions and excavation issues. Good examples of dry sites are Mount Llullaillaco in Argentina (Reinhard & Ceruti 2010) and Qilakitsoq in Greenland (Meldgaard et al. 1991).

Ice Patches

Ice patches are not massive enough to form glaciers. They are permanent ice or snow fields that do not melt away over the summer and that continue to accumulate and turn to ice. They attract animals such as caribou, serving as summer insect-relief areas. The animals have attracted hunters over millenia. Animal dung and artifacts have been deposited and preserved frozen in the ice.

Warming climate is melting back the patches, so that new materials can be exposed annually. If not collected very quickly, they will decay or be destroyed by caribou trampling. Ice patch archaeology in the Americas is a developing field, beginning with finds in the Canadian Yukon in 1997. Examination of nearby ice patches as part of a project during the 4th International Polar Year led to finds at additional locations. Europeans have been finding archaeological materials in ice patches for much longer. Known concentrations of ice patch sites include Wrangell-St. Elias National Park and Lake Clark National Park in Alaska; Rocky Mountain National Park and the Greater Yellowstone in the US Rocky Mountains; the Mackenzie and Selwyn Mountains between the Yukon and Northwest Territories in Canada; Oppdal, Oppland County and Finnmark in Norway; and in the Swiss Alps (Andrews & MacKay 2012; Vanderhoek et al. 2012).

Glaciers

Glaciers can contain what could be considered archaeological sites, although they are usually encased in a moving matrix of snow and/or ice. The majority developed when some form of material culture (e.g., crashed aircraft, scientific research stations) was deposited on the glacier's surface layers and then covered by snow.

As glaciers move they develop crevasses that change the relative position of items, so glacial sites generally lack integrity. Even large aircraft can be torn apart in a few decades. For this reason, archaeologists rarely deal with such "sites."

Sometimes an advancing glacier covers an existing site that is protected by terrain from the moving ice. These sites can be revealed when the glacier retreats. The most famous find from such a site is Ötzi, the "Iceman," who was recovered with many of his belongings from a gully in the Italian Tyrol (Höpfel et al. 1992). He had died in the gully and was found shortly after glacial retreat exposed him.

Key Issues/Current Debates/Future Directions/Examples

Preservation in Frozen Sites

Frozen sites are generally protected from insects and digging creatures. Roots from vegetation cannot penetrate them. More recent human occupations typically do not excavate very far into previous occupations, since digging into permafrost requires almost the same effort as digging into concrete. This often results in superimposed stratigraphically intact cultural levels that can cover periods of thousands of years and multiple cultural designations.

Deterioration typically seen in organics at unfrozen sites is delayed. Frozen conditions allow for the preservation of a wide range of organic material, in addition to the inorganic materials, which are more commonly found at archaeological sites. Most chemical and biological processes are slow in cold conditions, almost stopping at temperatures below freezing.

Freezing of organic remains like a human body or an animal carcass does eventually result in dehydration, even if the freezing is accomplished in a pool of water that turns to ice.

The active layer in permafrost is the soil or level that actively thaws each summer, starting at the ground surface and penetrating repeatedly to roughly the same depth in any given location. Materials below the active layer are permanently frozen. Those in the active layer are frozen for much of the year. In most cases the long periods of freezing seem to protectively outweigh the brief annual thaws, despite the disruptions that thawing and freezing can induce or allow.

Excavation for Maximum Preservation

Significant portions of standing structures can be preserved when buried in permafrost. Organic artifacts can outnumber lithics in frozen sites 100 to 1, rewarding fieldwork with assemblages rarely seen in most of the world. Interpretation of past lifeways is likely to be more successful, thanks to this much more representative sampling of material culture. However, excavation of frozen sites is technically demanding, the logistics are complex and expensive, and analyzing and conserving the resulting collections can be challenging. Successful excavation in frozen sites requires a good deal of multiyear planning.

Wooden architectural components may best be preserved, after documentation and sampling, through on-site reburial deep in the permafrost. Refreezing important organics may be the best way to maintain integrity after analysis in the laboratory. This requires a long-term institutional commitment to freezers and their maintenance. Costs for frozen sites fieldwork increase due to remoteness, the need to work with the daily thaw rate, extremely short "warm" seasons, and the need for representation of multiple skilled disciplines on-site and during analysis.

The often spectacular preservation of the spectrum of human material culture plus processed and unprocessed animal products and sometimes the presence of frozen human remains requires a large multidisciplinary field crew, many of whom might be confined to a laboratory during excavation of less well-preserved sites. Specialists may attend to architectural elements, to multicomponent artifacts that incorporate organic and inorganic materials, and to faunal remains. Wood specialists and clothing specialists, especially for fur and hide, are needed. Also, aDNA specialists must be present to successfully retrieve uncontaminated samples.

Competent polar bear guards must be employed in some locations in order for staff to focus on fieldwork. Experienced field hands and camp and logistics managers, field laboratory supervisors, and staff are all required to take advantage of the pristine status of materials on the day they are removed from the ground, a status that cannot be maintained without instant and constant attention during what can be a long period of partial exposure. It may be days before an item can successfully be removed, so this attention must start as artifacts are first revealed in the frozen levels. During this period preservation must be maintained until the item can be extracted and moved to the field laboratory.

The slow rate of thaw after exposure typically means that sterile soil cannot be reached in a single season. Funds for multiple seasons are necessary to successfully recover a site's archaeological history. Part of a season's fieldwork is working to preserve the site's integrity for the following season. Many reviewers are shocked by the cost of proposals for frozen sites archaeology and unfortunately do not get past it to consider the value of data from sites where "everything ever left at the site" is still there and still in very good condition.

The Good and the Bad of Frozen Conditions On-Site and in the Laboratory

Frozen soils can be subject to a process called solifluction, where soils move and flow downhill. This can considerably disturb site integrity, sometimes folding strata and causing stratigraphic reversals. Frozen sites can be more cohesive than the natural strata below them. When the sites are elevated and on the coast, as at Utqiaġvik (Mason 1991), entire stacks of superimposed semisubterranean houses can be undermined by

Frozen Conditions: Preservation and Excavation, Fig. 1 Slump block on beach at Utqiaġvik (Photo: Owen K. Mason)

wave action and can fall *en bloc* onto the beach or into the water, rotating as they fall and resulting in reverse stratigraphy until thawing and erosion eliminate the evidence (Fig. 1).

In conditions where patterned ground forms, if sufficient water is present, ice wedges can develop and they also can affect the integrity of the site as a whole. This generally takes the form of separate chunks of the site moving relative to each other.

Frozen conditions can greatly slow, if not entirely stop, biological and chemical processes which cause the decay of organic materials. Thus, the period of time that organic materials can be preserved is extended well beyond that which could be expected for the same materials in unfrozen conditions.

Freezing is not an unmixed blessing for artifacts and organic remains. Freezing water expands, potentially damaging them. Ice crystals form in moisture-bearing materials as freezing occurs. The size of the crystals depends on the speed of freezing, with smaller crystals forming with faster freezing and larger crystals doing more structural damage. Ice crystals damage organic materials' cellular structure. Since past freezing and thawing of organic artifacts may have damaged cellular structures, artifacts can appear in excellent shape when first excavated and then deteriorate fairly rapidly. Many artifacts from permafrost sites have high moisture content, requiring slow drying to avoid serious cracking. Lithics tend to split into plates in a process called frost spalling, particularly artifacts manufactured from softer sedimentary rock such as sandstone.

It is sometimes possible to stabilize certain classes of materials in the field or a field laboratory. Field options may be limited by equipment and compounded by airline safety regulations that limit transport of some important chemicals. In some cases, treatment by a conservator in a fully equipped laboratory is the only practical solution.

It can be difficult to find a conservator to assist in the field, since most frozen sites contain a very wide range of materials, and conservators are becoming more specialized. They are also usually employed by institutions which do not wish to be without their services for months at a time.

Again, funding is generally a limiting factor. It has been fairly standard practice for many decades not to apply any conservation treatments to faunal collections from frozen sites. In addition to reserving funds for conservation of artifacts, this has the advantage of avoiding contamination to bones and keeping them suitable for use in aDNA, stable isotope, trace

Frozen Conditions: Preservation and Excavation, Fig. 2 Remains of house and ice-filled tunnel exposed and undercut by erosion. Nuvuk, view south

elements, and other analyses that were not anticipated when the practice was first adopted.

Long-Term Prospects for Frozen Sites

The long-term prospects for frozen sites are not good (Figs. 2 and 3). With a warming climate, ice patch sites are rapidly disappearing. Already some newly discovered ice patches, which held materials of more than a millennium in age, have disappeared. Most known sites are coastal or next to bodies of water and subject to erosion. Comparatively little inland exploration has been accomplished. Inland sites are therefore less well documented and threats to their integrity are less well understood.

As climate warms, so does permafrost. The depth of the active layer is increasing around the Arctic, which means that sites and artifacts previously in stasis are being exposed to repeated freeze-thaw cycles with longer annual opportunities for chemical and biological decay-producing processes to act. In Alaska, predictions are that the active layer may reach 2 m in depth even in the northernmost part of the state by 2100 CE (Murray et al. 2011).

For coastal sites, rising sea level and less marine ice cover increases erosion. As threats increase to these sites and as their potential to contribute to our understanding of human culture is better understood by reviewers and the general public, we can expect more research. The best archaeological record of cultures adapting to rapid climate change is found in frozen sites dating to the last major warming period, roughly a thousand years ago. To better understand how

Frozen Conditions: Preservation and Excavation, Fig. 3 House timbers and whale bones slumping due to permafrost collapses and erosion. Utqiaġvik, view southwest

we can adapt to current climate warming, we should more thoroughly understand how people did it a thousand years ago.

Cross-References

- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Permafrost Digging
- ▶ Zooarchaeology

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Basic Biographical Information

Richard Fullagar is an Australian archaeologist and a Founding Director of Scarp Archaeology.

He grew up in Melbourne, Victoria, and completed his Higher School Certificate in 1972. He completed a B.A. at the University of Melbourne in 1977, picking up archaeology as a fill-in subject, and worked for the Victoria Archaeological Survey (VAS) from 1978 until 1983. He went on to complete a Ph.D. in archaeology at La Trobe University in 1986.

While at the VAS, he undertook numerous surveys and excavations on the Victorian coast and along a transect running north from Warrnambool (through the Western District, the Mallee, and the Little Desert) to the Murray River. He also undertook field research in the Philippines, initially with Peter Coutts (Director, VAS) and later on his own. He has lived in Wollongong since 1987 and has held Australian Research Council (ARC) Fellowships at the Australian Museum (Sydney) and the University of Sydney.

Fullagar has undertaken collaborative projects with colleagues in the Netherlands, Belgium, and South Africa and developed broad interests in hunter-gatherer lithic technology, the history of plant food processing, and modern human dispersal into Australia.

He is one of Australia's most experienced field archaeologists, having undertaken research projects in all states of Australia and in Papua New Guinea. Fullagar received ARC support for projects in West New Britain, Papua New Guinea; the Keep River area in the East Kimberley; Cuddie Springs, Western NSW; and Riversleigh, Northwestern Queensland. He is a Chief Investigator on two current (2011–2015) ARC projects: one to re-excavate early archaeological sites in Australia and Timor and the other to undertake collaborative research into wetlands with Aboriginal groups in New England and Tasmania.

Dr. Fullagar is a founding Director of Scarp Archaeology (established 2007), a company that focuses on cultural heritage management projects and related research in the Pilbara (WA) and the Hunter Valley (NSW).

Major Accomplishments

Building particularly on the work of Johan Kamminga and Tom Loy, Richard Fullagar pioneered the integration of lithic usewear and residues in Australia. He was the first Australian to systematically study usewear and residues of stone tool assemblages under vertical incident light microscopes. His initial work focused on use-polishes and plant residues, notably starch grains, to reconstruct food processing and ancient diets. He advocated the use of different microscope types and initiated the establishment of microscopic usewear/residue laboratories at La Trobe University, Australian Museum, University of Sydney, and University of Wollongong, where he is currently Honorary Principal Fellow in the Centre for Archaeological Science, School of Earth and Environmental Sciences. He has advised several other institutions on appropriate facilities for similar laboratories.

He has made important contributions to archaeology in Australia, New Guinea, and the Asia-Pacific. Much of his work has been in the form of specialist stone tool studies linked with diverse archaeological projects in Australia, Papua New Guinea, Asia-Pacific, and Africa. Research highlights over the last 35 years include identification of 28,000-year-old seed-grinding tools at Cuddie Springs, Western NSW; excavation and dating of Jinmium rockshelter, Northern Territory, Australia; and the discovery of 10,000-year-old taro-processing tools from Kuk Swamp, PNG.

Dr. Fullagar has authored or coauthored more than 65 technical and consultancy reports, three edited volumes, and 115 journal articles and book chapters. He has taken a special interest in public engagement with 65 contributions published regularly from 1999 to 2006 in *Nature Australia*, the Australian Museum's award-winning magazine (now discontinued).

Dr. Fullagar has served on the Executive of the Australian Archaeological Association (AAA) and is a past President of the Australian

Association of Consulting Archaeologists Inc. (AACAI). He was awarded the inaugural AAA Bruce Veitch Award for Excellence in Indigenous Engagement in 2006.

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► Stone Tool Usewear and Residue Analysis

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Funari, Pedro Paulo A. (Historical Archaeology)

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Basic Biographical Information

Pedro Paulo Abreu Funari was born in Sao Paulo, Brazil, and earned his Bachelor's Degree in History at the Sao Paulo University (USP) during the early 1980s. He has specialized in Ancient History and Classical Archaeology, with special emphasis on the subject of olive oil circulation within the Roman Empire. He continued to develop this theme for his Masters in Social Anthropology and doctoral studies in Archaeology, under the supervision of Professor Haiganuch Sarian. During this process, Funari continued specializing in material culture studies, while attending internships at the USP Archaeology and Ethnology Museum. In the latter, he participated in several excavations and archaeological projects, such as the amphora's research, and the Pompeii graffiti and paintings' study (Funari 2002).

In 1992, Funari became part of UNICAMP History Department as a professor. Since then he has continuously taken a leading role in the promotion of archaeological investigations at the university, transforming it into a center of excellence in archaeological studies and formation. Currently, he is a professor at the History Department of Campinas State University (UNICAMP), and coordinator of the Advanced Studies Institute (UNICAMP).

Major Accomplishments

In the 1990s, Funari organized a project of Historical Archaeology in collaboration with American Archaeologist Charles E. Orser and British Archaeologist Michael Rowlands, studying the Barriga Ridge. This site was the former capital of the Palmares Quilombo in the seventeenth century. Sponsored by Brazilian, American, and British funding, the excavations were very important as they revealed the Archaeology of the Subaltern for the first time in Brazil (Orser & Funari 2001; Funari 2006).

Another field of interest to Funari has been the History of Brazilian Archaeology. Considering ideological and historical contexts through a critical perspective, he has focused on how they have influenced the process of succession among different schools and theoretical trends in the Brazilian context (e.g., Funari 1999; Funari & Menezes Ferreira 2006).

Most recently, Professor Funari has been introducing Brazil to important discussions regarding the archaeological practice, the political enrollment of archaeologists inside the local communities with whom they work, and the building of the past and its effects on the present, among other issues. Therefore, the creation of the Public Archaeology Center in UNICAMP is the result of all these debates envisioned through the public archaeology perspective (e.g., Funari 2004; Funari 2009). Among Latin-American archaeologists, Professor Funari has one of the greatest scholarly productions and enjoys regional and worldwide recognition (Funari et al. 1999). He has published several books and more than 300 articles. A confirmation of his success is his vast work that has become a reference in several fields, such as Classical Archaeology, Historical Archaeology, Archaeological Theory, the History of Brazilian Archaeology, and Public Archaeology.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Funari, Pedro Paulo A. (Indigenous Archaeology)
- ▶ Orser, Jr., Charles E.
- ▶ Race in Archaeology

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Funari, Pedro Paulo A. (Indigenous Archaeology)

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Basic Biographical Information

Pedro Paulo A. Funari (1959–) was born in São Paulo, southeast of Brazil, to a family of humble origins but adept to reading and to culture in general (Fig. 1). Influenced by the family environment, he became, at a young age, interested in the humanities, specially philosophy, politics, and religion. Philosophy would have been his choice for ingressing in higher education, but the political context of Brazil in the 1970s – the military dictatorship – forced him to choose another path: history. The undergraduate major in history at the Universidade de São Paulo/USP, between 1977 and 1981, however, allowed his insertion in a forum of reflections on the social injustices, in particular, on the political panorama of Latin America (one of his constant concerns) and, at the same time, granted him the right to lecture history. For Funari, the teaching of history at the time fulfilled two roles: the chance to share with his students a more critical view of history and of society and his ingressing in a field of work that would permit the improvement of his studies. His proposal to study the military dictatorship right at the time of the military regime, however, did not find echo at the academic environment of freedom curtailed by the authoritarian

Funari, Pedro Paulo A. (Indigenous Archaeology), Fig. 1 Funari, Pedro P. de A. (Brazilian archaeologist)

government. Once more, the opting for another path was necessary. This was how ancient history became one of his major areas of interest. While developing research on olive oil in ancient Rome during his Masters in Social Studies (Anthropology) at the Universidade de São Paulo, between 1982 and 1986, Funari came across the field of study of material culture, which would come to define a significant part of his career. The research on ancient ceramics was further developed during the Doctorate in Archaeology at the Universidade de São Paulo, between 1986 and 1990, period in which he undertook various research trips and internships in renowned teaching and research institutions in Europe. His fluency in various languages enhanced these experiences, leading him to establish contacts and partnerships with distinguished foreign researchers. His international career consolidated itself between the years of 1992 and 2004, a period in which he conducted 6 postdoctorates in universities of Brazil, the United States, Spain, and England. In 1992 he became professor of the Universidade Estadual de Campinas/UNICAMP, one of the most prestigious universities in the country, where he works until today. At UNICAMP, Funari coordinates groups and research projects related to classical antiquity, to politics, and to archaeology and edits periodicals such as "Arqueologia Pública." Besides being editor of over 40 foreign and Brazilian scientific publications, he has published over

100 books, 190 book chapters, and 490 articles in Brazil, other countries of South America, Europe, Oceania, and the United States.

Major Accomplishments

His extraordinary academic production, summed to the political activism which characterized his career, has made him respected by colleagues in various countries, which resulted in his indication as Southern American Representative (1994 and 2002) and Secretary of World Archaeological Congress (2002 and 2003). In Brazil, Funari has occupied various positions in scientific societies in the history and archaeology areas. His political inquietudes, arisen while still in his youth, have always accompanied him. A tenacious critic of dominant ideologies – inside and outside of the academy – Funari has formed a generation of researchers concerned with establishing more humane and solidary academic relations. His vast bibliographical production includes such themes: dictatorships in Latin America, slavery, postcolonialism, education, teaching of indigenous history, critique of archaeology, public archaeology, and heritage, therefore of issues that involve reflection on power relations in the past and in the present. His formation in history, social sciences (anthropology), and archaeology allows his ideas to transit between distinct domains of knowledge and reach diverse audiences. One of the most cited authors in Brazilian archaeology at present time, Funari is author of the first book on introduction to archaeology in the country. The book "Arqueologia," released in 1988 and reedited in 2003, is widely used by students of archaeology and related areas as well as by teachers of diverse areas. Also of his authorship is the first book on Brazilian prehistory in an accessible language to a main audience (Funari & Noelli 2002). In 2001, he published a book that presents the precolonial history of Brazil to child and teenage audiences. Recently Funari released, in coauthorship with Spanish researcher Ana Piñon, a book that discusses the indigenous theme in school for teachers (Funari & Piñon 2011). Such category of literature demonstrates one of the most marked characteristics of this acting archaeologist and historian: his concern with the formation of students and teachers and the democratization of science in Brazil. Pedro Paulo A. Funari is a brilliant researcher who possesses the rare ability to stimulate vocations. In his teaching career, he has supervised 12 postdoctorates, 23 doctorates, and 31 masters in Brazil and abroad. Funari has a strong political commitment to archaeology and a solid dedication to his students, with whom he has shared authorship in articles and books in Brazil and abroad. Currently (2012), Funari directs the Center for Advanced Studies, founded by him in 2009, at UNICAMP and is an associated faculty at the Universidade de Algarve (Portugal), Universidad del Centro de la Provincia de Buenos Aires (Argentina), Illinois State University (United States), Universidad de Barcelona (Spain), and various Brazilian universities. His passion for academic life, allied to his combative – but elegant – political positioning against hierarchies, has attracted many young and restless students that, such as young Funari, aspire to social relations that are less unequal, inside as well as outside of archaeology.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Classical (Greek) Archaeology
- ▶ Critical Historical Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ "Public" and Archaeology

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G

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Basic Biographical Information

Manuel Gamio Martinez was a Mexican archaeologist and anthropologist and a promoter of the welfare of indigenous Mexicans. He was born in Mexico City on March 2, 1883, and died on July 16, 1960, in the same city at age 77. Gamio completed his basic studies in the colleges Fournier and Colón and his high school studies in the National Preparatory School from which he graduated in 1903. Pressured by his father, he went to the School of Engineering but soon abandoned it due to lack of interest (Comas 1956; Gallegos 1996). In 1905, he obtained the post of Assistant in Evening Elementary School Supplemental Instruction No. 5, and in 1907, he joined as editor of the Spanish section in the *Revista Moderna de México* (*Modern Mexico Magazine*) where he wrote about the Indians (Gallegos 1996: 25-65)

In 1906, he attended courses in archaeology at the National Museum taking classes on Nahuatl, and ethnology given by Nicolas Leon and Andres Molina Enriquez. In 1907 he was appointed Assistant Professor of History class and he presented, along with Leon the project *Archaeological Guide to Mexico*, which was rejected. Being a student of the Museum, after an excursion to Zacatecas his work "The archaeological monuments in the vicinity of Chalchihuites, Zacatecas," was published in *Anales del Museo Nacional*, (Annals of the National Museum 3rd season, vol. II) (Gallegos 1996: 29-65). With the support of Zelia Nuttall, he studied at Columbia University with Franz Boas and Marshall Saville from 1909 to 1911. When he returned to Mexico he was appointed Professor of Archaeology and Practice Professor of Archaeology in charge of the tours in the National Museum at the National Museum (August 1911–January 1912). In parallel, he became a fellow at the International School of American Archaeology and Ethnology, and he was appointed Assistant Inspector of the Inspectorate of Monuments, which caused his dismissal from the Museum due to the neglect of his work (Gallegos 1996: 65-98). The constant duplication of work caused him problems with Franz Boas, who repeatedly complained about his informality with the International School. In June 1913, he quit the International School to take up the post of Inspector in the General Inspectorate of Monuments. The following year he was appointed Head of Inspection, and he removed this office from the Museum (Gallegos 1996; Rutsch 2007).

Gamio held a number of important administrative positions throughout his career. He was member of the Supreme Council of Welfare from 1929 to 1932. In 1933, he held various positions

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in Public Education, National Economy, and the Agricultural Department. In 1934, he was General Director of Rural Population and Settlement in the Ministry of Agriculture and from 1935 to 1937 was a member of the Technical Advisory Committee of the SEP and, from 1938 to 1942, Head of Vital Statistics of the Ministry of Interior (Comas 1956: 12-7). In 1942, he was appointed Director of the Inter-American Indigenist Institute, which allowed him to join the indigenismo. He was reelected twice in this post, which he held until his death. One of his main concerns in the Institute was the improvement of indigenous peoples by the introduction of American soybeans in their diet (Comas 1956; Gallegos 1996).

Major Accomplishments

Gamio is sometimes considered to be the father of modern anthropological studies in Mexico. He postulated that anthropology should be considered as an applied science that focused on solving problems of contemporary peoples and on the cultural identification of indigenous cultures based on social, paleontological, archaeological, anthropological, linguistic, and historical knowledge (Gallegos 1996; Rutsch 2007). Gamio is also considered one of the key practitioners of stratigraphic excavation (Adams 1960). From 1910 to 1912, he excavated a series of deep trenches in the refuse deposits at San Miguel Amantla (Azcapotzalco) in Mexico City under the direction of Boas, who proposed the sequence of De los Cerros-Teotihuacan-Azteca for Mexico Basin.

In his classic work *Forjando Patria* (1916), Gamio portrayed contemporary Indians as backwards, uneducated, and poor. He advocated stronger education programs, with an emphasis on Spanish education and the sciences. He saw cultural fusion, linguistic unification, and economic equilibrium as a means of building a new nation. His approach was launched in the new Department of Ethnographic and Archaeological Studies founded in 1917 (called also Department of Anthropology from 1919) in the Ministry of Agriculture and Development. As Director of the institution, he proposed regional studies as tools to understand and improve the indigenous population in their physical and cultural aspects and to exercise good governance. He proposed the use of applied anthropology as a tool of government, taking into account Molina Enriquez and Boas' proposals. With these concerns in mind, Gamio attended the Second International Congress of Eugenics in New York, representing the Mexican government (Urías 2002; López 2003).

Since 1917, Gamio conducted a regional study of the Teotihuacan Valley integrating archaeological, historical, and anthropological investigations. He held workshops to teach people Spanish; science and craft manufacturing, to encourage economic activity complementary to agriculture, were established. The results were published in *The Population of the Teotihuacan Valley* (Gamio 1922).

When Gamio was appointed Assistant Secretary of Public Education, he moved the Department of Archaeology to the Secretariat (with the name of Department of Anthropology). He denounced the inflated expenses in several purchases of the Secretariat and had to leave the post and the country since Plutarco Elias Calles rejected all these allegations and supported the secretary Puig Casauranc. With his departure, the Department was converted into an office for archaeological research (Department of Archaeology), canceling the second regional project in Monte Alban, Oaxaca (Urías 2002; López 2003). Gamio sought refuge in America. There he joined the archaeological-ethnographic exploration of the American Archaeological Society of Washington in Guatemala and then, sponsored by the Social Science Research Council and the Rockefeller Foundation Spellman, took the migration to the USA as subject of research, studying its impact on economy and society and the reasons why migrants had preserved their traditions and customs without full integration to the American lifestyle (Gamio 1930, 1931).

Gamio never lost hope of regaining the confidence of President Calles and maintained

a constant correspondence in which he always showed his unconditional support, despite the disdain of Mexican politics. He returned to the Mexican public administration occupying minor positions; this fact was the end of his archaeological career and also an impasse in his interest in improving indigenous races (Urías 2002: 110-3).

Cross-References

► Mesoamerica: Complex Society Development
► Nationalism and Archaeology

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Garden Hunting

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Introduction

Garden hunting was originally proposed as an indigenous subsistence strategy associated with pre-Hispanic tropical agroforestry in western Panama. At the time, it was offered as a potential means for farmers to supplement their carbohydrate-dominated diets in tropical environments that were traditionally viewed as "protein deserts" (Nigh & Nations 1980). As a subsistence option that exploited wild game animals that were either passively or intentionally attracted to indigenous agroecological landscapes, the possibilities of garden hunting subsequently engaged the attention of archaeologists working in different areas of the world and biologists who were interested in its possible conservation implications within anthropogenic landscapes.

Definition

Garden hunting refers to subsistence exploitation of local animals that are attracted to the concentrated foraging opportunities provided in horticultural settings throughout the tropics. Although it refers to the opportunistic hunting of prey items whose availability in and around tropical gardens is increased simply as a by-product of farming, it is often used to connote the intentional game farming of anthropic (related to humans) faunas.

Historical Background

The term "garden hunting" was first introduced by Olga Linares (1976) to refer to a game procurement system less reminiscent of tropical forest hunting than of agricultural harvesting and maritime collecting. Previously, Conklin (1957: 102–103) had described a pattern of hunting in Philippine Hanunóo shifting gardens that was undertaken primarily for crop protection but also partly for food and sport. In particular, Linares (1976) inferred a pre-Columbian garden hunting pattern from preserved archaeofaunal specimens recovered at the site of Cerro Brujo which was occupied between CE 960 and CE 985 in northwestern Bocas del Toro province, Panama. The assemblage was overwhelmingly comprised of specimens identified as terrestrial mammals with strong predilections toward disturbed habitats and the increased foraging opportunities associated with swidden gardens. These included principally agouti (*Dasyprocta*), paca (*Cuniculus*), and armadillo (*Dasypus*), along with collared (*Tayassu*) and white-lipped (*Pecari*) peccaries, white-tailed (*Odocoileus*) and brocket (*Mazama*) deer, as well as rats (*Sigmodon, Oryzomys, Hoplomys*) and opossum (*Caluromys*, *Marmosa*). This "cultural faunal assemblage" differed markedly from fauna associated with "natural undisturbed habitats" as it was predominantly composed of disturbance taxa that readily invade anthropogenic clearing and excluded canopy-dwelling, shy, forest animals. The cultivation of root crops in tropical swidden gardens, which affects the locally available biomass of animals behaviorally preadapted to commensality, may have been a form of neotropical domestication in the manner of "animal tending." Garden hunting has become a popular strategy for understanding how indigenous agroecology can provide sufficient protein in tropical forest environments traditionally characterized as "protein deserts" (Nigh & Nations 1980) (Fig. 1).

Garden Hunting, Fig. 1 Skinning a garden-hunted paca (*Cuniculus*) or hochi (San Calixto, Beni, Bolivia) (Photo by author)

Key Issues/Current Debates

The number of different kinds of species (richness) and their relative abundance (equitability) tend to be much higher in tropical forest ecosystems that have developed over longer periods of time under optimal growing conditions. Unlike temperate ecosystems which tend to be dominated by eurytopic taxa (generalists with broad niche requirements), tropical ecosystems contain more stenotopic taxa (specialists with narrow niche requirements). The latter have not had to adapt to extreme seasonal fluctuations, which enables them to increasingly partition their habitats and focus on environmental heterogeneity (Eldredge 1991). Tropical ecosystems composed of canopied forests are dominated by small-bodied animals which tend to be stenotopic as they perceive their environments in a relatively fine-grained manner. Many of their larger mammalian counterparts tend to be eurytopic as they exploit their temporally and spatially dispersed resources in a relatively coarse-grained manner and thus require greater foraging space (Mares & Willig 1994). Stable environments with low levels of resources tend to favor small populations with narrow niche tolerance and low reproduction rates. Small populations of K-selected (producing larger and/or fewer offspring less frequently) specialists can exploit heterogeneous environments that have reached maximum population levels more effectively. Stable environments with low resource levels tend to be characterized by many different kinds of species (high richness) with comparable population sizes (high equitability). This is in contrast to unstable environments with high and fluctuating resource levels which favor populations tolerant of broader niches and with high reproduction rates. Large populations of r-selected (producing smaller or more offspring more frequently) generalists are favored under conditions where the most food can be harvested and the largest families can be reared (MacArthur & Wilson 1967; Valentine 1971).

Environmental instability is important for understanding the historic evolution of biological diversity in the tropics. Although classical characterizations of tropical forest ecosystems have depicted a steady accumulation of species in benign settings over long periods of time, more recent models emphasize continuous but modest change as the engine behind high species richness. The ecological history of tropical forests is one of dynamic stability, which relies on temporally and spatially localized instability to prevent monopolization by a few species while presenting new opportunities for others (Connell 1978; Colinvaux 2001). Sporadic and localized instability in canopied forests may be caused by a variety of natural perturbations including tree fall, fire, disease, drought, flood, or animal activity. As a universal cultural footprint, anthropogenic clearance is an important feature in landscape modification that contributes to changing plant and animal diversity in the forested tropics. Ecologically, indigenous gardens can be considered as mechanisms that produce higher net productivity while maintaining or increasing high diversity through a pattern of "intermediate disturbance" (Nigh & Nations 1980).

Indigenous cultivation is characterized by a wide range of land-intensive as well as land-extensive practices but is today dominated by shifting cultivation, so named because the technique usually involves leaving older gardens to fallow for periods of variable length when farmers shift their focus to preparing, planting, and harvesting newer gardens. The practice normally involves the selective clearing of vegetation in small garden plots, after which the slash can be mulched or dried and burned for additional fertilization. Indigenous gardens are diverse and multistoried plots characterized by multiple cropping and interaction with natural vegetation. Early succession gardens often feature plantings of higher nutrient-demanding annuals requiring greater ambient sunlight. Subsequently, with increased vegetational maturity and complexity, less nutrient-demanding shade-tolerant perennials, particularly root crops, dominate later succession gardens. Over time, farmers manage and utilize forest fallows in an active form of agroforestry. Old fallows are returned to for various reasons

Garden Hunting, Fig. 2 Neotropical chakra or swidden garden (Jasiaquiri, Beni, Bolivia) (Photo by author)

and can be considered both structurally and functionally as "orchard fallows." Fallow utilization is a way to convert a system of short-term cropping into a longer-term agroforestry system; however, eventual abandonment "is not a moment in time but a process over time" (Denevan et al. 1984: 347) (Fig. 2).

Garden hunting is generally considered as an integrated feature of indigenous tropical agroecology. It is undertaken throughout the entire cycle of garden life but can continue particularly during the management of later stage swidden fallows. For the same reason that farmers who manage the succession of their fallow orchards continue to harvest relic products, these sites also continue as favorite foraging locales for eurytopic and synanthropic (wild animals living near and benefitting from humans) species. In most cases, this latter propensity should be viewed as an actively managed outcome of fallow orchards in order to take advantage of the increased productivity found in unstable forest clearings. Mosaic landscapes created by indigenous agroecological systems can be productive habitats for human populations as they provide multiple, dispersed, and productive venues in tropical forest settings. Controlled field studies in neotropical forests are identifying the ecological effects of habitat fragmentation and edge creation on the abundance and distribution of animal life. These are linked to body size, mobility, and trophic status, along with the willingness and physical ability of organisms to cross non-forested gaps, the minimum area of forest necessary to maintain normal behavior, the degree of spatial/temporal patchiness of resource distribution, and the effects of edge environments on animals (Dale et al. 1994). Fragmentation and edge creation create conditions that can favor certain synanthropic faunas which have a propensity for dramatic population increase under anthropogenic conditions. Many of these animals are preferred prey items that thrive in fragmented mosaics and thus complement the agroecological strategy of tropical agroforestry.

The production and exploitation of agroecological landscape mosaics in the past can be potentially inferred from an analysis of recovered and preserved archaeofaunal and archaeobotanical specimens. However, the reliability of these inferences is subject to many of the problems usually inherent in archaeological data interpretation, particularly those associated with assemblage accumulation and preservation. For example, the original accumulation of many of the faunas recovered at the site of deposition in an archaeological site may have actually been incidental to garden hunting. However, in certain kinds of depositional

contexts, it is possible to identify the mode of accumulation in the archaeological record based upon patterned preservation. The natural histories of incidentally accumulated faunas, moreover, might also suggest local conditions that can be used to support an interpretation that suggests habitat fragmentation. Recognizing a pattern of garden hunting in the archaeological record involves identifying a suite of eurytopic taxa that proportionately dominates the recovered sample in a cultural assemblage. These can be compared and contrasted to faunal distributions associated with continuous primary forest habitats. The relative proportions of eurytopic taxa supporting the inference of garden hunting and expressed in the form of richness and evenness values can be assessed through ubiquity measures, rank correlations, and techniques that are sensitive to sample size differences like rarefaction, regression, sampling to redundancy, and computer simulation (Stahl 2000; Stahl & Pearsall 2012).

In its first appearance, garden hunting was presented as a potential indigenous subsistence strategy practiced by pre-Hispanic neotropical horticulturalists. It was originally an archaeological interpretation that was based upon patterning of animal bone specimens recovered from archaeological contexts in forested Panama and coupled with inferences derived from ethnographic analogy and ecological observations. Critical issues surrounding garden hunting as a prehistoric subsistence strategy have been raised in archaeological studies from areas outside the tropics. Field-based studies of garden hunting by tropical subsistence farmers have also been undertaken to understand its possible implications for conservation. It has been argued that the relationship between increasing agricultural effort, human sedentism, and hunting is a complex and interrelated issue. Citing diachronic data from archaeological assemblages in the Near East, North America, and particularly the American Southwest, Speth and Scott (1989) suggest that reliance on large game actually increased in association with increasing settlement stability. This appears to have arisen independently of environmental change, demographic increase, or technological innovation. Instead, they suggest that increased reliance on large game is causally linked to fundamental socioeconomic changes associated with larger community size, residential stability, and augmented horticultural commitment. Larger and more permanent communities tend to deplete local game, while increased horticultural effort also places constraints on time and labor which involves a rescheduling of hunting effort. Additionally, the increased stability afforded by a predictable agricultural diet enables hunters to engage in greater risk-taking. Hunters, therefore, increasingly tend to spend more time farther afield pursuing larger, high-quality game. This critique, however, does not clearly define what is meant by "large" and "small" game animals nor does it substantiate how increased reliance on larger animals is established in the archaeological record. It also relies on research undertaken among neotropical, primarily Amazonian, farmers and foragers to critique the application of an hypothesis which was originally proposed for pre-Hispanic neotropical horticulturalists to archaeological assemblages in ecologically unrelated geographical areas like the desert Southwest.

Recent field-based studies of tropical horticulturalists, mainly conducted among non-indigenous small-holding ribereños and subsistence farmers, have been undertaken specifically to examine the contemporary practice of garden hunting. An 18-month study of 60 non-indigenous farms in the Peruvian Amazon found that the most common game animals above 2 kg in live weight consisted of species that regularly consume agroforestry crops. In order of importance, these included the following: agouti (*Dasyprocta*), paca (*Cuniculus*), collared peccary (*Tayassu*), tayra (*Eira*), armadillo (*Dasypus*), brocket deer (*Mazama*), and rabbit (*Sylvilagus*). Large game animals like capybara (*Hydrochoerus*), tapir (*Tapirus*), and white-lipped peccary (*Pecari*) were seldom observed (Naughton-Treves 2002). A related study of non-indigenous colonist and lowland Quechua farms in the Peruvian Amazon determined that older forests contained significantly

more wildlife per unit area; however, animals were more readily available to hunters in secondary vegetation both in terms of biomass and number of collection events (Gavin 2007). It has been suggested that non-indigenous hunters prefer to pursue wild game in primary forest and tend to spend more time there. Although anthropogenic habitats may be more productive in terms of hunting effort, primary vegetation may be preferred because of less dense understory, increased prey predictability, and the opportunity to combine hunting with the pursuit of other forest products (Parry et al. 2009). Highly prized game like paca is usually hunted in gardens and fallow, where hunting takes on the dual role of guarding crops. The choice of technology is also a factor as some hunters will not waste a relatively expensive shotgun shell on a small game item like an agouti (Naughton-Treves 2002: 498). It has been suggested that non-indigenous ribereños do not manage gardens in order to intentionally attract game, a pattern also followed by the indigenous Buglé of western Panama. Buglé hunters encounter most of their wild game within agricultural areas and do not consider it necessary to garden intentionally in order to attract crop pests that would be normally attracted anyway. The primary reason that Buglé hunt in their gardens is due to the constant threat that animal pests pose to agricultural production. As in other tropical areas of the world, garden hunting is a complementary activity that is undertaken within a broader cultural ecological pattern (Smith 2005).

International Perspectives

Garden hunting as a potential subsistence strategy has been pursued by archaeologists in different world areas, but it remains best studied and recognized in tropical areas as a complement to indigenous agroforestry. Conservation biology is particularly interested in garden hunting as it relates to conservation efforts linked to expanded farming, global deforestation, and the loss of animal biodiversity. Throughout tropical regions of South America, Africa, and Asia, secondary forests are particularly important for the acquisition of wild meat (Parry et al. 2009). Open anthropogenic landscapes are particularly productive in this regard as the tropical wildlife most likely to survive in the fragmented conditions created through farming tend to be a suit of relatively small, highly adaptable, rapidly reproducing, and pervasive faunas that include rodents, deer, and peccary in South America; cane rat, porcupine, pig duiker, baboon, and vervet monkeys in Africa; and, pig, deer, and primates in Southeast Asia (Naughton-Treves 2002). Typically, high-canopy species are rare, minimally due to canopy removal, and farmers often "clean the forest of large predators" (Naughton-Treves 2002: 499). However, the removal of large predators may also be a preventative measure, particularly by farmers who maintain domestic stock. It is particularly because of their habits that small, pervasive, r-selected, and highly adaptable eurytopic species are in low risk of extinction and consequently of no interest for conservation (Naughton-Treves 2002: 500). The higher species richness that often accompanies anthropogenic habitats also does not take into account the rare endemic species that are of particular interest for conservation (Smith 2005: 527). Conservation biology has considered secondary forests as a possible source for replenishing game depleted through hunting in primary forests (Gavin 2007). Also, hunting in anthropogenic habitats is also considered as a potential source for relieving hunting pressure of primary forest prey. Nevertheless, the former primarily consist of terrestrial species of low interest for conservation, whereas the latter include many of the canopy dwellers like birds and primates that are targeted by conservation efforts (Parry et al. 2009: 1785). Studies undertaken throughout the tropics suggest that humans do indeed prefer large wild prey over their smaller counterparts; however, the former decrease in numbers and can become locally extinct in association with settlement age (Wilkie & Lee 2004). Hunting effort is often greater in fallow

forests than in primary forests and continues to be a complementary activity within agroforestry throughout the tropics. Animals are hunted and meat protein is obtained while crops are cultivated and protected from predation (Wilkie & Lee 2004: 358). Field studies have however suggested that human hunting in agroforestry landscapes does not otherwise necessarily alleviate the pressure of species loss, nor is it a strategy that is more productive than the maintenance of animal domesticates, nor does it support game biomass similar to that found in savanna habitats. Fallow hunting currently appears to supply sufficient protein for human populations when their density is kept under four people per square kilometer (Wilkie & Lee 2004: 366). The metaphor of gardens as enclosed spaces for attracting animals, as opposed to enclosed spaces for excluding animals, has been criticized as a false allegory that was originally coupled with an ancient dream of human harmony with nature (Naughton-Treves 2002).

Cross-References

- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Sustainability and Cultural Heritage
- ▶ Vertebrate Taphonomy in Archaeological Research

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Basic Biographical Information

Jean-Claude Gardin has not only left a lasting impression on archaeological theory but he was also an avid contributor to Middle Eastern Archaeology, as well as a pioneer for the utilization of computer and information sciences to the social sciences. Gardin, a native of France, served in the French Free Army during the Second World War, receiving the Croix du Guerre among several other honorable awards for exceptional service. After leaving the army, Gardin enrolled at the London School of Economics where he completed his B.Sc. in Economics in 1948. Gardin continued his studies at the Sorbonne in Paris where he studied Computer and Information science. His early research focused on the use of computers for organizing and cataloging the archaeological record. Later in his research, Gardin became interested in the role that cognitive sciences have in archaeology of interpretation, specifically semiotics.

Gardin's primary geographic focus was Western and Central Asia, where his publications reflect his growing interest in the semiotics of style. Gardin's use of semiotics in relation to archaeological fieldwork has influenced the recent work of several archaeologists, including that of Robert Preucel. In the United States, Gardin has been compared with Processualism, especially his research and incorporation of mathematics in archaeology. He is associated with the University of Indiana in the United States, as well as serving as director of research at the Centre National de la Recherche Scientifique (CNRS), director of studies at the Ecole des Hautes Etudes en Sciences Sociales in Paris. In 1958, he founded the Centre d'Analyse Documentaire pour l'Archéologie and in 1970 founded the Centre de Recherches Archéologiques of the CNRS. He also served as director of the UNESCO committee that produced the General Information Program (UNISIST) for the sharing of scientific knowledge and was a recipient of the Prix International de la Foundation Fyssen in cognitive studies in 1989. Gardin is also a founding member of the Arkeotek association and a member of the House of Archaeology and Ethnology at the University of Nanterre in Paris.

Major Accomplishments

The main focus of Jean-Claude Gardin's research was concentrated around semiotics in archaeological theory. He was particularly interested in how an archaeologist can look at an object and interpret its meaning. According to Gardin, one of the central issues in archaeology was the disconnection between an artifact and the interpretation given to that artifact by the archaeologist (Gardin 1997a, 2000). He strove to help create a universal system that allowed for precise classification of artifacts, ultimately leading to better communication of interpretation (Gardin 1958, 1980). In order to create this universal system for classification, Gardin introduced mathematics and scientific methodology to semiotics (Gardin 1958, 1980). The use of mathematics and scientific method in Jean-Claude Gardin's work appealed to the Processualist archaeology in the United States. Later research by Gardin involved

the use of semantics in interpretation, specifically the use of declensions in descriptive analysis of artifacts (Gardin 1989a, 1997a, b). Much of his research involves the use of coding in descriptive analysis in order to achieve accurate physical descriptions of artifacts.

Jean-Claude Gardin conducted archaeological research in the Western and Central Asia, specifically in Afghanistan and the Indus Valley. His system for codes and semiotics was applied to his research on the pottery of the ancient culture of Bactria (Gardin 1985, 1998). Among the most recent of Gardin's research interests in the area include the study of artificial intelligence and the role of technology among the humanities (Gardin 1989a), as well as the role of local knowledge in archaeology (Gardin 1989b). Regarding the role of local knowledge in archaeology, Gardin is particularly interested in the role of universal versus local semantics in providing interpretations of artifacts (Gardin 1989b: 110). Universal semantics is described as symbols that are generally accepted without argument and local semantics as more relative to a certain context and not common knowledge (Gardin 1989b: 110-111).

Jean-Claude Gardin was a pioneer for the role of mathematics and semiotics in the humanities, specifically in archaeology. His primary research included the use of semiotics in classification systems, artificial intelligence, and the importance of semantics within archaeology. His work has influenced many archaeologists regarding the use of coding to aid in descriptions of artifacts. Gardin's primary goal was to simplify classification systems and coding systems for the description and interpretation of artifacts to provide a universal system of classification to the discipline of archaeology.

Cross-References

- ▶ Interpretation in Archaeological Theory
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Semiotics in Archaeological Theory

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Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology

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Introduction

Gas chromatography-mass spectrometry (GC-MS) is an analytical technique that allows the separation of mixtures of volatile organic compounds and the identification of each constituent compound. Due to its sensitivity, speed, versatility, inexpensiveness, and the ability to identify many different compounds in a mixture,

it is a favorite instrumental technique for archaeological organic chemistry and can be applied to analyze any substance containing volatile organic compounds are expected. It is commonly used to analyze absorbed pottery residues, visible pottery residues, organic binders and pigments in paintings and artwork, resins, sealants, and many other substances.

Definition

GC-MS is the combination of two well-known analytical techniques: gas chromatography and mass spectrometry. Gas chromatography utilizes variable compound retention time on a carefully selected column to separate complex mixtures. The separated compounds can then be analyzed with a variety of detectors attached to the end of the GC column. In the case of GC-MS, the detector is a mass spectrometer.

Once the volatile compounds are separated by the GC, the mass spectrometer (MS) ionizes each separated compound and measures the mass-to-charge ratio (m/z) of each positive ionic fragment that enters the analyzer. The result is a mass spectrum, a graph showing the molecular weights of the ionic fragments coming from a single compound (Fig. 1). Since the molecule fragments according to the unique structure of the parent compound, each compound's mass spectrum is unique and reflects its original structure. The compound can then be identified by comparison with a sample library or by comparison with a known control sample. If a compound cannot be identified by either of these methods, then interpretation of the chemical structure confirmed by comparison with a known control is usually used.

When applying this type of analysis, an organic archaeological sample is dissolved in a solvent and a very small amount (1–3 μl) is injected into the GC portion of the instrument. The result is a gas chromatogram showing the presence and abundance of volatile compounds in a sample, with the area underneath each "sample peak" corresponding with the abundance of a compound (Fig. 2). If a known amount of internal standard has been added to the initial sample, the amount of each separated compound in the sample can be calculated.

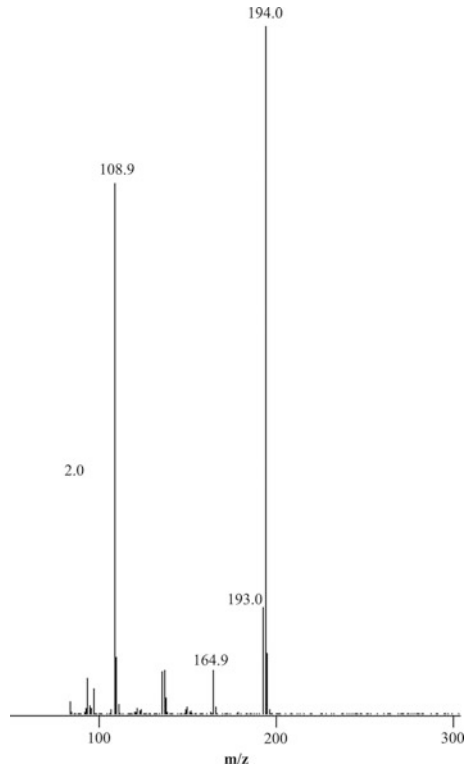

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 1 Mass spectrum of caffeine from *Ilex vomitoria* tea. This spectrum reflects the molecular structure of caffeine and can be matched with a known sample of caffeine in a computer database

Many variables are present in the GC portion of the instrument, including solvent used, injection type and temperature, carrier gas type and velocity, column type and length, stationary phase type and thickness, and temperature programming. A change in any of the variables affects compound separation, and all of these variables must be tweaked to maximize the desired result when using the GC for archaeological science applications. Fortunately, for most archaeological science applications of the GC, there are standard instrumental methodologies to aid the investigator and give consistency to

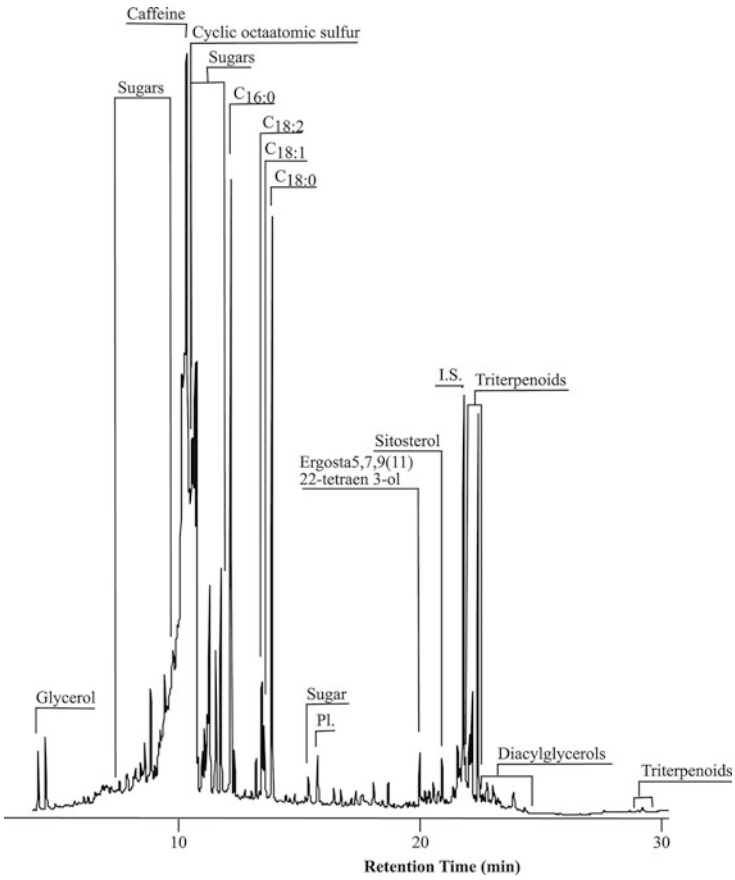

Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology, Fig. 2 Gas chromatograph of the total lipid extract of an experimentally produced sherd from a pot used to make a caffeine-containing tea from *Ilex vomitoria* (yaupon holly) that was buried for two months in southeastern North Carolina. Note that many of the sugars have already washed out of the residue, although a few still remain. Also, the free fatty acid pattern is typical of a plant origin, having a high abundance of $C_{16:0}$ and 18-carbon unsaturated fatty acids ($C_{18:2}$ and $C_{18:1}$) relative to $C_{18:0}$. The cyclic octaatomic sulfur is a soil contaminant

results across different laboratories (Evershed et al. 1990; Regert et al. 1993).

The mass spectrometer in most archaeological science applications is set to scan a range of ionic fragment weights, for example, from 50 to 650. This allows complete mass spectra to be produced for almost every compound in a sample. Such a scan does take a small amount of time, however, and so there is a slight trade-off between sensitivity and completeness in mass spectrum detection. If a very sensitive analysis of a known compound is needed, the mass spectrometer may be run in selected ion monitoring (SIM) mode, so that the mass spectrometer is only detecting a small range of selected compounds. This dramatically increases the sensitivity of the analysis, at the cost of not detecting any nonselected mass fragments. As a result, SIM is not appropriate for definite identifications of unknown compounds or structural determinations of related compounds. Instruments run in SIM mode will not detect any unexpected compounds present in the sample.

In some cases, an isotope-ratio monitoring mass spectrometer (GC-IRMS) is attached to the end of the GC column, with the result that the carbon or oxygen stable isotope ratios of each compound separated by the GC can be determined. The GC-IRMS is generally applied to mixture that has already been analyzed by GC-MS, so that the identity of each compound undergoing compound-specific isotopic analysis is known. GC-MS analysis only works on compounds that are volatile enough to vaporize in the GC column, and archaeological science applications of this technique often involve a mixture of compounds of varying (and sometimes unknown) volatility. In order to maximize compound

volatility, a sample is often derivatized. In this procedure, a sample undergoes a chemical reaction to produce a "derivatized sample" in which most of the compounds are more volatile and stable than the original compounds and have better GC separation than the un-derivatized parent compounds. There are many types of derivatization, but in archaeological science applications, trimethylsilyl esters (TMS esters) are often used in samples containing a mixture of compounds, including alcohols, fatty acids, terpenoids, and acylglycerols. Methyl esters are often used in samples consisting primarily or entirely of fatty acids.

Historical Background

The GC-MS was invented in 1955 by Roland Gohlke and Fred McLafferty while working for the Dow Chemical Company (Gohlke & McLafferty 1993: 367). The first application of gas chromatography to archaeological science was published in 1976 by Condamin et al. when they used the technique to confirm the survival of olive oil residues in Roman amphorae. Gas chromatography alone was also used by a few analysts to analyze assorted organic materials during the 1980s (Rottlander & Schlichtherle 1979; Morgan et al. 1984). The first application of GC-MS to archaeological science was published in 1985 by Evershed et al. and identified the origin of pitch from the anaerobically preserved shipwreck the *Mary Rose*. GC-MS was used occasionally through the late 1980s in archaeological science, generally to identify pure substances, such as sealants and adhesives (Beck et al. 1989; Heron et al. 1989).

In 1990, Evershed et al. published the first description of using high-temperature GC-MS to analyze complex mixtures of intact archaeological residues, such as pottery residues. This paper began a new era of using GC-MS in archaeological science and formed the basis for what became the standard methods of pottery residue extraction and analysis. It was soon followed by a raft of other papers utilizing the technique in a variety of situations, many produced by Richard Evershed and his students. From this beginning, GC-MS has become the standard instrumental application for the analysis of most complex organic mixtures found on an archaeological site or in anthropogenic soils, including but not limited to absorbed pottery residues, visible pottery residues, and organic binders in painting.

In 1994, Evershed and colleagues first applied GC-IRMS to archaeological science (Evershed et al. 1994). Although this technique is not yet widespread, probably due to the expense and rarity of the instrument, it is extremely useful in the identification of isotopically unique resources in residues and soils, such as dairy products and maize (Dudd & Evershed 1998; Reber et al. 2004).

Key Issues

The key issue in the application of GC-MS to archaeological science is the successful interpretation of data from GC-MS analysis. Since any volatile mixture of organics can be successfully analyzed by this technique, it is easy for anyone with a background in organic chemistry to obtain results from archaeological samples. Interpretation of these is always challenging and often problematic, however, and requires familiarity with a wide range of biochemical and chemical knowledge. Difficulties in the interpretation of GC-MS data from archaeological samples include issues in residue degradation, issues of resource mixing in organic mixtures known or suspected to come from a variety of sources, and modern contamination.

A good example of these issues is shown in the interpretation of pottery residues, a common application of GC-MS in archaeological science. Residue degradation occurs in two major phases. First, compounds in a residue can undergo thermal degradation during cooking and processing. Then, after the pottery sherd is deposited in the archaeological site, some of the compounds will wash into the soil, while others undergo oxidation and hydrolysis. As a result, the GC-MS analysis of an archaeological extract

of even a known resource often looks remarkably different from a modern control extract of the same resource. In general, compounds with longer carbon chains survive intact for longer than those with shorter chains, while compounds with fewer double bonds (saturated compounds) survive longer than those with more double bonds (unsaturated compounds) (Eglinton & Logan 1991). This problem varies according to environment, with dry and anaerobic environments providing the best preservation for organic compounds. The probable loss and degradation of compounds in an archaeological mixture must always be kept in mind during interpretation.

The second major issue in the interpretation of archaeological GC-MS data is that of resource mixing. For example, an extracted organic pottery residue is comprised of a mixture of lipids, including acyl lipids, fatty acids, long-chain alcohols, alkanes, terpenoids, and many others. Unless the pottery vessel was known to have processed only one resource, these compounds cannot be assumed to have come from the same source. Often, these compounds were derived from all of the resources processed in a vessel over its lifetime. For example, the common fatty acid $C_{16:0}$ (palmitic acid) in a residue may derive from literally every resource ever processed in a pot, with no way of knowing how much of the compound derived from any one resource. For this reason, interpretations of vessel contents based only on common compounds such as fatty acids and acyl lipids tend to be problematic, aside from issues of oxidative degradation mentioned above. A general interpretation of "primarily vegetable in origin" (more unsaturated fatty acids and more abundant $C_{16:0}$ vs. $C_{18:0}$ fatty acids) or "primarily animal or meat in origin" (more saturated fatty acids and more abundant $C_{18:0}$ vs. $C_{16:0}$ fatty acids) is usually the most precise interpretation that can be derived from fatty acid and acyl lipid abundances in most organic residues of mixed origin. This is generally disappointing to the excavator, who was hoping for a more precise characterization. An exception to this issue is present in the case of vessels that are known to have contained only one resource, such as transport amphorae, labeled chocolate pots, etc.

Given the issue of resource mixing in many residues, most resource identification from this type of analysis rests on the identification of relatively rare compounds, also known as "biomarkers." Biomarkers are compounds that are unique to a particular resource or class of resources. For example, the presence of cholesterol in a residue allows a confident interpretation of meat being processed in a vessel. Much of modern GC-MS analysis of archaeological residues and soils rests on the identification and detection of such biomarkers. Plant resins, chocolate, marine resources (in the presence of heat), and other resources all produce biomarkers known to survive in the archaeological record (Mills & White 1977; Hurst et al. 1989; Hansel et al. 2004). An important part of biomarker interpretation is a solid knowledge of the biome from which an organic sample derived. Many biomarkers may exist in several different sources around the planet, but be unique in a particular biome. For example, caffeine detected in a residue from Mesoamerica generally indicates chocolate, while the same compound identified in a Chinese residue would indicate tea, and in the Southeastern United States would indicate *Ilex vomitoria*, the main ingredient in black drink.

Compound-specific isotope analysis using GC-IRMS may be used in some circumstances to help in the analysis of mixed residues, such as when an isotopically unique resource or resources is present in the mixture in large enough amounts to affect the stable isotope ratios of a given compound. As in any isotopic study, a good understanding of the archaeological biome is crucial when performing compound-specific analysis. For example, a compound-specific carbon isotope analysis of fatty acids may detect a primarily C_4 component in fatty acids or other compounds from a residue. If the residue is from Eastern North America, the source of the C_4 component is probably maize (Reber et al. 2004). If the residue originates from another biome, the source of the C_4 component might be completely different.

Modern contamination is also an issue in the interpretation of GC-MS analysis of archaeological samples. Due to the sensitivity of the technique, compounds from excavators' bug spray and sunscreen often enter the analyzed residue. Contamination from modern plasticizers is ubiquitous and appears to be exceptionally difficult to eliminate. Contamination also commonly arises from modern fertilizers and pollution, as well as archaeological labeling procedures. For this reason, all samples taken for GC-MS analysis should ideally be handled minimally by excavators and placed in aluminum foil in the field. Contact with plastic bags should be minimized, if possible. That said, the ability of GC-MS to separate complex mixtures means that contaminants, if correctly identified, may be separated from the remainder of the sample with minimal problems to interpretation.

A secondary issue in GC-MS analysis is the correct selection of instrumental analysis. GC-MS is generally the best instrumental technique to use when a complex mixture of volatile organic compounds is known to be present. When a complex mixture of nonvolatile compounds is present, liquid chromatography-mass spectrometry (LC-MS) is preferred. If a substance is known to come from a single source, then Fourier-Transform Infrared Spectroscopy (FTIR) analysis may be considered, although it does not allow for the separation of different compounds. If a mixture contains a mixture of volatile and nonvolatile organic compounds, derivatization may allow the analysis of the entire mixture by GC-MS.

Future Directions

GC-MS analysis has a bright future in archaeological science. As more background research is performed, more biomarkers will be identified. As a result, the number of biomarker identifications of prehistoric resources in a residue will increase. Further, the ability to compare results from similar GC-MS analysis across sites in a region or a time period will allow this technique to be more helpful in addressing human behavior than has been the case heretofore. The future direction of standalone GC-MS analysis seems to be one of increasing maturity and helpfulness to the understanding of past human behaviors.

Continuing developments in compound-specific isotope analysis and other combined GC-MS techniques will almost certainly develop in the future, as instrumental analysis techniques improve in complexity and sensitivity, and the availability of inexpensive GC-IRMS analysis increases.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Chemistry: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Ceramics: Scientific Analysis
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Isotope Geochemistry in Archaeology

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Gavà Mining Site: Fieldwork

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Brief Definition of the Topic

Gavà, a village by the sea at the mouth of the Llobregat river in the northeast Iberian Peninsula, is the site of the only known Neolithic mine in Europe extracting *variscite*. This green mineral, similar to turquoise, is found in Neolithic tombs; its color is probably linked symbolically with the regeneration of life. At Gavà it occurs as seams of slate within layers of limestone and dolomite or sealed under clay where it outcrops. The prehistoric miners followed the seams, digging shafts leading to tunnels between 5 and 10 m long and about 2.5 m wide. These later expanded into more complex galleries with chambers, reaching depths of 30 m and more. In general the prehistoric mining cavities had been backfilled with extraction debris, including broken mining tools (stone picks and bone wedges); this saved the labor of transporting it outside the mine. Some of the cavities were reused as graves in Neolithic times (Figs. 1 and 2).

The first task of archaeological investigation was to make the mining galleries safe. Shoring with metal frames and concrete, as in modern mining, was unsuitable, as it would mask the surface of the rock, where prehistoric tool marks are still visible. Instead, metal anchors are placed on the rock with a resin coating that protects and secures the surface. Cracks and fissures are also filled with resin. The rock surface is impregnated with a product that allows moisture to escape. Humidity and the flow of water inside the mines are controlled with high precision, and warning instruments monitor the stability of the rock.

Excavation to date has focused on the deposits inside the mine. A full stratigraphic record of the strata in the galleries, chambers, and minor cavities is being made, both to define any features such as the graves and to investigate the patterns of extraction and discard noted in the debris. The assemblage includes different kinds of lithics, ceramics, and animal bones. Systematic screening maximizes recovery and has allowed the find of a variscite necklace. The date of the mining, from radiocarbon, is between 4100 and 3400 cal. BCE.

After nearly four decades since its discovery, a sizable, but unknown, proportion of the mine has been examined. The mine was declared a site of National Cultural Interest in 1996, and there is a plan to open it to the public once safe access and robust conservation measures are in place.

Gavà Mining Site: Fieldwork, Fig. 1 The drawing process (Museu de Gavà, Josep Bosch)

Gavà Mining Site: Fieldwork, Fig. 2 Restoration of one of the mines (Museu de Gavà, Benet Solina)

Cross-References

- ▶ Archaeological Record
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ "Public" and Archaeology
- ▶ Spain: Archaeological Heritage Management
- ▶ Western Europe: Historical Archaeology

Further Reading

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Gender, Feminist, and Queer Archaeologies: Australian Perspective

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Introduction

Gender, feminist, and queer archaeologies in Australia, as elsewhere around the world, are represented by a multiplicity of approaches and individual experiences. The progress of their development can, however, be traced to the emergence and influence of feminism and the women's movement. They are linked by a concern with examining the social construction of gender and its representations, ideologies, identities, and other such manifestations in the archaeological record. Uniquely Australian political and institutional settings have also impacted the evolution and outputs of gender, feminist, and queer archaeologies in this country, in combination with theoretical and research progress in these areas of archaeology globally.

Definition

Feminist, gender, and queer archaeologies are commonly associated together as they examine the social construction of gender and their materialization in the archaeological record, but are not mutually exclusive. They have also been grouped together under post-processualist archaeology. Feminist archaeology critiques androcentric interpretative biases and validates the place of women, either as subjects of study or as practitioners in archaeology. It also concerns the need to examine gender roles and inequalities within the archaeological profession and how this impacts on archaeological theory and method. Feminist archaeology also takes a political standpoint and often examines power relations.

Gender archaeology can be differentiated as an approach which foregrounds gender (which is the socially constructed conception of women and men, not biological sex), with other social categories, such as class, age, ethnicity, religion, and kin. It can also be practiced within a nonfeminist framework and may examine the relative positions of men and women in relation to each other and how these manifest archaeologically.

Queer archaeology challenges heteronormative interpretations by seeking to take the perspective of marginalized sexual, intellectual, or cultural groups. It is not concerned only with homosexuality; rather it presents alternatives to mainstream archaeological discourse.

Historical Background

A distinctively Australian archaeology developed in the 1960s and 1970s (see Colley 2002). Prior to this time it was possible to study anthropology and the archaeology of other continents, but it was during this period that Australian archaeology was first taught at Australian universities, and theory and method were modified for Australian conditions. Fieldwork was essential in providing archaeological evidence for environmental and cultural diversity and in growing an understanding of the antiquity of Indigenous occupation as well as increasing the number of recorded sites, including those resulting from post-European contact. Explanations of the human past were framed in terms of environment and technology, and cultural materialism was the dominant theoretical framework (Huchet 1991: 44). A strong processual platform still characterizes Australian archaeology. This backdrop of disciplinary culture is essential in understanding the development of feminist and gender archaeology in Australia as it has been characterized as distinctively male (see Smith & du Cros 1995; Smith & O'Donnell 2006; Moser 2007). Moser observed: "With its connections to colonialism and penetration of the frontier, fieldwork has

been instrumental in attributing archaeology a masculine status" (Moser 2007: 251). Thus, a dominant theoretical setting which de-emphasized social archaeology and human agency, combined with a masculinist subculture of fieldwork, left little room for a feminist or gender archaeology to penetrate the mainstream research agenda. Indigenous archaeology had been further complicated by a Western and male bias towards perceived men's activities in complex Indigenous social and knowledge systems, such as hunting and stone artifact manufacture, often laden with assumptions about the meaning and universality of gendered task attribution. Despite this, research on women's and men's roles had been undertaken, but work had not come together under the umbrella of any theoretical or professional association. For example, as early as 1939 Phyllis Kaberry recorded women painting rock art and their roles in economic systems and information exchange in Northern Australia (Kaberry 1939). Women such as Judy Birmingham, Sandra Bowdler, Isabel McBryde, Betty Meehan, and Sharon Sullivan played a critical role in the formation of the discipline in Australia, but gender was not fostered as a legitimate research area until the 1990s.

In Australia the response to a gender and feminist archaeology is distinctive yet follows the path of similar academic traditions in Europe and North America. Although the first feminist and gender archaeology emerged from Scandinavia, Margaret Conkey and Janet Spector's 1984 paper *Archaeology and the Study of Gender* can be credited as the watershed article globally. Being in English it is still widely cited and can be seen as the first influential summary of the feminist critique of the discipline in Australia. Outside Australia feminist archaeology enjoyed an earlier emergence and greater support among the archaeological community. The 1989 Canadian Chacmool Conference, where overtly feminist papers were presented in conference symposia and published in the *The Archaeology of Gender* (1991) monograph, was undoubtedly an influence which led to the first meeting of the Women in Archaeology Conference in Australia in 1991. The attendance of international keynote speakers Margaret Conkey, Joan Gero, and Alison Wylie aided in the perception that gender was a legitimate research area, and their presence assisted in garnering support for an Australian agenda. Thus, the 1991 Women in Archaeology Conference is highly significant with respect to research on gender in Australia. It was a turning point for gender as a field of study in Australian archaeology. It reflected both a broader change in Australian society about gender roles, national identity, and workplace rights and a change in the research directions for archaeology. This conference triggered formal discussions of gender and feminist archaeology and legitimized research interests and groups, generating five subsequent conferences and three published monographs (see du Cros & Smith 1993; Balme & Beck 1995; Casey et al. 1998). Much later in 1998, the first session on gender was held at an annual conference of the Australian Archaeological Association.

Key Issues

The key issues and influences to have emerged in Australia can be seen to pertain to two main areas of research. First there are issues of professional identity, equity, status, and the employment of women in Australian archaeology which are linked to personal and political motivations. Second there are issues relating to the establishment and recognition of gender in the archaeological record and, further to this (but to a lesser extent), the development of distinctive Australian feminist theory and interpretation. Queer archaeology has had the least impact of the three standpoints in Australia in terms of publication and influence.

Of the small number of published articles on gender or with a feminist perspective in Australia, the majority are thematically on women's status as archaeologists, not gender, queer, or feminist theory, or on women as subjects of archaeological enquiry (e.g., Bowdler & Clune 2000; Smith & Burke 2006; O'Connor 2008). As such, it is difficult to distinguish the

influence of gender archaeology from that of the broader impacts of the women's movement. However, it can be surmised that women may have felt marginalized or a sense of inequity in the archaeological workforce or perhaps experienced personal discrimination. This is likely to have been the initial impetus for research and publication directed into this area, as has been the case internationally (see Nelson et al. 1994). It is also an indication of the nature of the archaeological workforce in Australia where there has been some degree of segregation; most women archaeologists have worked in consulting and cultural heritage management (CHM) and few in senior research or academic positions (with women clustering in lower paid and lower status positions). This is echoed in a study undertaken by du Cros and Smith (1995), who found that it was workplace issues, such as inequity or discrimination, rather than a theoretical standpoint or familiarity with feminist literature, that prompted most participants to attend the first Women in Archaeology Conference in 1991. As recently as 2007 Stephanie Moser has argued for the existence of a hegemonic (heterosexual) masculinity in the discipline in Australia, perpetuated through the subculture of fieldwork. In a 2006 study Smith and Burke found that there were systemic barriers to women's progress in academic archaeology. They found that there was what they term a "two-tiered glass ceiling" where women are less likely to gain entry level and tenured positions into academic archaeology. Of those who have obtained tenure at universities, they were underrepresented in senior positions. Bowman and Ulm (2009) have investigated the disparity between men and women's success in obtaining project funding. Their analysis of 2001–2008 Australian Research Council (ARC) grants found a link between the sex of the funding panel members and the sex of the successful applicants. They also found that more men receive fellowships than women, despite more women undertaking research. This means that women are disadvantaged as early career researchers in Australia; the majority of research is undertaken by women, but the majority of funding is going to the minority, who are men. Though overt discrimination has diminished in recent years and women have made up the majority of the paid archaeological workforce in Australia, they are still not breaking through the proverbial glass ceiling.

In terms of perspectives on homophobia, there is silence on the issue in Australian publications – not because the problem does not exist but, as writers such as Dowson (2000) have pointed out, because there has perhaps been a need for professionals to downplay their sexuality to maintain authority and/or shield themselves from discrimination. Australia has a history of repression of homosexuality in society largely until the 1990s. Postmodern feminist theory since that time has influenced theories and gender research on sexuality, as well as masculinity in archaeology. A postmodern approach to researching historic masculinity/ies was advocated by Knapp (though not an Australian archaeologist) at the 1995 Australian Women in Archaeology Conference, and archaeologists such as Casella (2000) have demonstrated the validity of interpreting female homosexuality on Australian historic sites. A heterosexual hegemony, however, remains unchallenged in the archaeology of Australia's Indigenous past. This is because Australian archaeologists rely heavily on ethnographic information to complement interpretations of Indigenous archaeologies. Indigenous Australian social and kinship systems operate in terms of male–female relationships, and traditionally homosexuality is a "taboo" topic, presumed not to exist or remaining unquestionable in many communities, as well as the added dimension of men's business/women's business and sacred-secret knowledge (whereby particular customs, rituals, and practices are undertaken by men and women separately [see Smith & Jackson 2005]). Men and women have separate systems of meaning, and these can also be public or private. This is further complicated as Australian archaeology has largely not come to grips with the notion of sex and gender as spectrums rather than as binary male/female dichotomies. Queer archaeology can potentially fill a gap in analyses and be applied to a range of sites by potentially asking

new questions (not only in terms of homosexuality), which may in fact be complementary to Indigenous perspectives, and encouraging archaeologists to think "outside the box" of Western and male perspectives.

Dominant models and narratives of Indigenous occupation have failed to move beyond male – female dichotomies. In 1990 Wendy Beck and Lesley Head pointed to the lack of Australian prehistorians moving beyond simplistic male and female assignment of gender to material culture, for example, continuing to identify stone artifacts with males and shell middens or seed grinding stones with women, rather than challenging the idea that a prehistoric division of labor existed. They state, "...there has been little systematic feminist influence on either theory or methodology in Australian prehistory" (Beck & Head 1990: 41). Given the minimal output of work in the area of gender prehistory to date in Australia, it is apparent that there is still a reluctance to move beyond evidence derived via natural sciences and "safe" interpretations of hunter – gatherer societies and male – female dichotomies based on ethnography. There has been some work directed towards reexamination in the areas of stone artifact use, manufacture, and hunting, whereby women making stone artifacts are often dismissed as exceptions. The groundbreaking article in this respect was by Bird (1993), who evidences women's manufacture and use of stone artifacts across Australia and New Guinea. For example, in the western desert of Australia, women used stone artifacts for woodworking and meat cutting, including the manufacture of bowls, digging sticks, fighting sticks, and flake scrapers. As well as differences in use, the raw materials selected also differed from those selected by men. Bird demonstrated that women could and did make stone artifacts; men's and women's technology is organized differently, but it should not be presumed that women were less skilled at manufacture than men. This area of research exemplifies much of the work on gender in Australian archaeology. It still focuses on making women "visible"; to date the majority of analyses have been concerned with establishing the mere presence and contribution of women. It is also important to note that publication in this area has decreased since the 1990s.

Rock art is an area where some contribution has been made to the consideration of gender as archaeologically significant. Rock art is found in all environmental zones of the continent, with examples of Pleistocene antiquity, although most sites are dated to the Holocene. Early ethnographic research had assumed that only men were responsible for its production. This was disputed by Smith (1991), who collated a number of ethnographic and archival examples from regions of Northern Australia. She contended that gender was a variable that needed to be factored into rock art interpretation; that rock art may have been produced by men, women, and children; and that it may encode information on the age and gender of the artist. Likewise, McDonald (1992) systematically challenged the androcentric interpretation in several papers, while providing evidence that men, women, and children had a role in the stencilling of hands and implements in an analysis of rock art and excavated material. Such studies have permeated the study of rock art and led to a recognition of both genders in art production. Despite ethnographic records which indicate men are responsible for most rock art in recent generations, the contexts of production over thousands of years are most likely to have been much more diverse.

Several studies have sought to reassess the interpretation and assumptions made in terms of sex and gender of human remains held in museum collections. Donlon (1993) found that in the sexing of human remains held in the Australian Museum, there was systematic bias in the attribution towards males, particularly those from the Pleistocene and early mid-Holocene. This may be explained by differences in male and female burial practices or simply the bias of researchers. Hope (1998) also found bias in interpretations of Indigenous burials in Southern Australia. In a similar fashion, McCardle (2002) found that Indigenous bark burials of the Central Queensland Highlands included both sexes and all age groups, which contradicted prior

researchers who had assumed these types of burial were only for young men and children.

Historical archaeology was first taught in Australia in 1974 at the University of Sydney, and Judy Birmingham is accredited with being instrumental in its development. With its links by way of British colonialism and European invasion of an Indigenous population, Australian historical archaeology is similar to that practiced in the United States. Although potentially able to provide more detailed social perspectives as aided by text, pictorial, and other evidence, gender is often left to a few sentences together with ethnicity and class and, like Indigenous archaeology, is practiced with a processual focus. As discussed by Lydon (1995), the influential Birmingham and Jeans (1983) model had less to say about social structures than economic and technological ones and was highly androcentric. Though historical archaeology has progressed since the Birmingham and Jeans model, the main focus in the areas of gender to date has been the construction of gentility (Russell 1994; Young 1998), the status of women (Hourani 1990), identifying women in male dominated spheres such as mining, whaling, and frontiers (Lawrence & Davies 2010), and more general issues of cultural identity (Lydon 1999; Ireland 2002). In maritime archaeology, which has undergone significant growth in Australia over the past two decades, there has also been a technological focus, but some work has been directed into the nuances of social relationships (Staniforth & Lawrence 1998). While the complex nature of the relationships between such phenomena as social organization and spatial organization has been recognized and addressed theoretically and despite papers which identify women in the archaeological record, there has been no substantial development of a particularly Australian feminist framework. The significant body of feminist theory developed from the United States has established a context for historical (and Indigenous) archaeology into which gender and feminist theories can be integrated. A reluctance to include such theoretical perspectives is perhaps a reflection of the passive opposition to gender and feminist archaeology in Australia. In a similar sense, a shunning of a feminist "heritage" and theory, in favor of a post-processual narrative, or a mere change to gender neutral language, can be interpreted either as taking a "safer" option or as an attempt at some degree of political correctness.

International Perspectives

One of the major research questions for archaeologists working in Australia is the timing and means by which Sahul (and hence the continent of Australia) was first colonized by humans and the origins of those humans. Theories on colonization in this region are distinctive, following the argument put forth by Davidson and Noble (1992) that the maritime colonization of Australia must have been linked to people with language and therefore probably constitutes some of the earliest evidence of modern human behavior. Research of this nature thus continues to generate interest and contribute to debates of international significance. There is consensus that the first colonization was by anatomically modern humans and is central to understanding human evolution. Balme and Bowdler (2006) have put forth an argument for the role of gender in the colonization of Australia. While the binary assumptions and universalizing regarding gender that serve as the basis of their arguments are likely to be flawed, Balme and Bowdler nevertheless raise important considerations about the role of gender in such processes as colonizing new lands, an area where discussions on gender or women as active participants in this process is traditionally absent.

An internationally significant study also undertaken in Australia is that by Casella (2000) (although not an Australian archaeologist herself). Gender, sexuality, and power were strong emergent themes in her analysis of networks of black market exchange throughout the inmate population at the Ross Female Factory, a nineteenth-century Australian colonial prison for transported British female convicts in Tasmania. She concluded that both material

objects and sexual encounters fuelled systems of illicit barter by relating the differential distribution patterns within the button assemblage to sexual dynamics of the convict black market. Asking and testing whether same-sex relationships can be archaeologically interpreted has highlighted the validity of asking such questions in these environments and demonstrated how a rigorous and gendered archaeology can be produced.

Future Directions

Despite efforts to construct and include gender theory in Australian archaeology, few methodological or theoretical breakthroughs have occurred in any mainstream sense. This lack of progress is due to several factors, including the issue that fundamental terms such as gender, sex, and queer have been used inconsistently and are often used interchangeably, which indicates a negligence in theoretical understanding or interest. This has also led to a misconception that all studies in these areas are concerned with the conflation of the status of women. The notion that gender is invisible archaeologically also persists – especially in relation to Indigenous women and the archaeology of deep time. Such archaeology is largely thought only to be accessible through perishable, organic ("gatherers") material remains or other invisible social processes. There is also, perhaps, a reluctance to consider gender in isolation from other social categories, such as ethnicity, particularly in historical and maritime archaeology. Despite some of the aforementioned work and given the distancing of much of gender archaeology from feminism, the discipline in Australia is *still* in the process of "adding women" (proving their existence) and thus has only achieved what Engelstad (2007) refers to as simply a "cosmetic change" to our interpretations of past societies. In this sense distancing gender from the political, and from theorizing, even within the gender archaeology "camp" may have contributed to the decline in inclusion and relevance in publications over the last decade in Australia.

To clearly delineate a future trajectory for such archaeologies, it is necessary to acknowledge that gender, queer, and feminist archaeologies do have a history and a "tradition" in Australia. Though this may be short and small, an agreed "version" of events, a recognition of an Australian discourse, may in fact prompt archaeologists into generating further discussion or regain the traction that was lost at the end of the 1990s. What is needed is an acknowledgement of those who worked so hard in these areas in the past and new ways to inspire the younger generations of conservative Australian archaeologists to recognize that there is still much more work to be done. These issues could be addressed in future by the creation of new communities as occurred through conferences in the past. The inclusion of the theoretical aspects of gender, queer, and feminist archaeologies in teaching at undergraduate level at universities within mainstream archaeology, as was done in the 1990s, would also provide opportunities for greater understanding and debate. Following Bowman and Ulm (2009) it can also be asserted that individuals lack the capacity and/or funding to undertake directed research or publish on gender archaeology, as this is an area that has seen a decline in interest and attracts fewer funding opportunities. This is a problem not easily addressed, and not one confined to this discipline.

Australian archaeology has moved forward in developing some aspects of feminist archaeology, such as equity in employment opportunities, and removing overt discrimination. Despite its promising development, particularly in the 1990s, the future of an archaeology of gender (and especially of feminist archaeology) in Australia is uncertain. Given the recent focus on job and fieldwork training, the emphasis on "testable" data, combined with the general apathy towards feminism, and a major focus on CHM employment particularly in areas where mining is being undertaken, most archaeologists in Australia will never work in a university or pursue a higher degree. With a small pool of academics as compared to other countries, the percentage of the archaeological population who could focus on gender is small compared to the

proportion who will earn a living from never having to do it. The question must be asked, does feminist, gender, and queer archaeology have a future in Australia at all?

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Post-Processualism, Development of
- ▶ Social Archaeology

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Gender, Feminist, and Queer Archaeologies: European Perspective

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Introduction

In some European countries, gender archaeology started as early as the 1970s; in others the first gender-related research projects have yet to be created. Thus, there will be considerable differences within Europe regarding the interest in and development of the field, and it seems right to speak of European gender archaeologies in the plural rather than one monolithic gender archaeology. On the other hand, the interaction between the different approaches, gender, feminist, and queer archaeologies, has been so close that treating them separately becomes meaningless.

In this entry, the historical development of European gender archaeologies will be traced in terms of four distinct regions, each defined by common traits in language and academic culture: Scandinavia, the British Isles, the German-language area, and the Mediterranean region. Central and Eastern Europe would be a fifth region. Gender archaeology here is still in its incipient stage, however, and will only occasionally be referred to. Chronologically, the discussion will be restricted to prehistoric and early medieval archaeology, following regional definitions. A European perspective is understood as archaeology by scholars working in Europe and dealing with the European past. Nevertheless, there will be a bias toward Northern Europe, the region best known to this author. Within North Europe more attention will be paid to Scandinavia and the German-language area than to the United Kingdom and Ireland, simply because Anglophone European gender archaeology has been addressed extensively elsewhere (Gilchrist 1999; Sørensen 2000; Whitehouse 2006). Spanish gender archaeology is addressed

in a separate entry in this encyclopedia (▶ Gender, Feminist, and Queer Archaeologies: Spanish Perspective).

Overviews of European gender archaeology have been presented in two recent papers, by Whitehouse (2006) and by Dommasnes and Montón-Subias (2012). While the first study is organized by categories of evidence and discusses almost exclusively Anglophone research, the second presents a chronological/thematic discussion of four different European regions, referring to literature both in English and local languages.

Definition

"Gender archaeology" is often used as an umbrella term for several related but separate approaches:

- Studies of women in the past (women are the subjects of study)
- Archaeology that investigates past societies, including gender arrangements, based on feminist theory, critique, and epistemology (defined by its theoretical approach, feminist archaeology)
- Analyses of gender and gender relations in past societies (gender as an analytical category)
- Masculinist archaeology (still in a nascent stage)
- Queer archaeology (investigates difference, sexualities, and the character of gender)

A common factor in these approaches is the inclusion of gender as a central element of social structures. All modern gender archaeology presupposes problematizing gender as a social construct, rather than taking it for granted, and analyzing the consequences of different gender arrangements. Studies focusing on women or gender without problematizing the concepts are sometimes termed gender-*relevant* research.

Historical Background

General Overview

Gender has been one of many aspects considered in interpretations of archaeological material from the early days of archaeology as an academic discipline, in the sense that artifacts have been ascribed to men and women, respectively.

Modern gender archaeology, going back to the 1970s, was from its inception firmly based in the second wave of feminism. European archaeologies were, at the time, overwhelmingly culture historical or processual (see the entry in this encyclopedia entitled Processualism in Archaeological Theory) and "science" was considered to be objective in the sense that it should be unbiased. In archaeology, feminism therefore became an early introduction to the idea that scholarship could, and should, be value-laden.

The invisibility of women in archaeology and in the past was considered to be a central problem and as a result early feminist archaeology was to a certain extent simply an archaeology about women. But it was soon realized that feminist approaches must dig deeper. Challenging basic concepts, epistemologies, and practice became one of the hallmarks of feminist scholarship. Sex essentialism was rejected, while gender as a social structure was considered to be a pervasive element of any society. Asymmetrical power relations between men and women were seen to be part of most gender systems, and gender roles were conceptualized as social constructions which had to be investigated within their specific cultural contexts.

Post-processual archaeology, emerging in Europe from the early 1980s onward, brought new impulses from the social sciences and humanistic scholarship as well as an increasing emphasis on cultural diversity in the past. Diversity also became a key word in later developments of gender archaeology, largely inspired by third-wave feminists who were critiquing, often from black, lesbian, or third-world points of view, the monolithic constructions of femininity and masculinity prevalent in previous feminisms.

In spite of the fact that men and masculinities have sometimes been explicitly addressed in post-processual archaeology, the scholars involved do not necessarily think of themselves as gender researchers (Treherne 1998). Masculinity theory and masculinity studies as such have

so far been very rare in European archaeology. In a paper advocating the development of a masculinist archaeology inspired by feminism Knapp (1998: 94) distinguishes between *reactionary masculinities* and *motivated masculinities*. Motivated masculinities are influenced by feminist research and problematize masculinities in much the same way that femininities have been investigated. In a few cases, studies of masculinity are undertaken by women, from a feminist standpoint.

In the context of archaeological gender studies in Europe, postmodern deconstruction of the concepts of sex and gender has emerged as a dominant approach to gender studies, an approach that does not focus on women only. Postmodernism in archaeology has tended to favor the study of individuals, constructed identities, and personhood rather than groups, societies, and systems. In this process, focus in the sex/gender dichotomy has moved from gender to sexuality and embodiment, paving the way for queer archaeology, which can basically be described as an archaeology of difference, and in this sense includes anybody and anything that does not fit into the society in question. In a narrower sense, queer archaeology is understood as investigation into genders and various sexual identities in the past. The impact of queer archaeology (in the narrower sense) in Europe has so far been limited mainly to the United Kingdom. A Scandinavian study of gender and the role of the main god Odin in Old Norse religion and ideology is based partly on queer approaches (Solli 2002).

The many approaches sketched above now exist side by side in gender archaeology, globally and in Europe. In sum, gender research is still developing and is characterized by critique on the one hand and theoretical eclecticism on the other.

Chronology: Where and When

Scandinavia, and particularly Norway, seems to have been the first place where a new feminist-inspired archaeology took hold, in the early 1970s. The inspiration was derived mainly from two sources, the critical theory of the German "Frankfurter school" and second-wave feminism from Simone de Beauvoir to American standpoint theorists.

The first Scandinavian gender archaeology initiatives took place among students in the early 1970s and were related to equity issues. A Norwegian conference organized by teachers and museum curators, "Var de alle menn?" ("Were they all men?"), followed in 1979. In 1985 the organization K.A.N. – *Kvinner i Arkeologi i Norge* (Women in Archaeology in Norway) – was founded. Its concomitant journal became the main publication venue of gender archaeology in Scandinavia until it was discontinued in 2005. Thus, critical theory and feminist/gender perspectives had already become part of Scandinavian archaeology when British post-processualism became a strong force in international archaeology during the late 1980s.

British gender archaeology, on the other hand, developed in parallel with post-processualist approaches. Again, the gender initiative came from students who dedicated a whole issue of *Archaeological Review from Cambridge* (Arnold et al. 1988) to gender issues. In addition to presenting prehistoric women and discussing feminism as a basis for archaeological interpretations; gender as an analytical category was now introduced. In the following decades, this was going to become one of the most influential approaches of British gender archaeology.

Language is probably the reason why the vast amount of German-language gender archaeology, steadily increasing in volume from its inception in 1988 and addressing a wide variety of topics, is little known outside its own linguistic area. Like in Britain, German gender archaeology developed from student initiatives (Mertens & Koch 2005). The German-language archaeological tradition in the 1980s was strictly culture historical and processual but also deeply influenced by neighboring humanistic disciplines. Early gender-relevant inspirations varied from popular engagement with the idea of matriarchies in the past to gender constructivism (Julia Koch, *pers. comm.* 2011). The *Netzwerk archäologisch arbeitender Frauen* (FemArc), which was to become the focal point of much

German-language gender archaeology, was founded in 1991. FemArc now publishes a newsletter for its members and a book series, *Frauen-Forschung-Archäologie*, on the renowned Waxmann Verlag.

As a whole, southern Europe has so far shown relatively little interest in gender archaeology. Spain is a special case, with a strong tradition of women's and gender archaeologies going back to the 1980s and addressing many different issues (Sánchez Romero 2005; Prados Torreira & Ruiz López 2008) (see also the entry in this encyclopedia entitled "▶ Gender, Feminist, and Queer Archaeologies: Spanish Perspective"). During the 1990s, a new and innovative strand of gender archaeology emerged from the basis of Marxist and feminist standpoint theories. This "maintenance archaeology" examines small events and the routines of daily life as part of social structures, often reevaluating their importance for the well-being of society and technological and political progress (González-Marcén et al. 2008).

In Eastern Europe, gender archaeology is still in its incipient stages, dependent on a few active scholars (Berseneva 2008). Like many Eastern scholars, gender archaeologists still tend to work within the processual paradigm, although changes are on the way (Palincas 2008). A few papers on gender in East and Central Europe have also been published by scholars based in Western universities.

The chronological sequence presented here also indicates a process of diversification and specialization where different regions have been taking leading roles at different times. The golden years of Scandinavian gender archaeology were from 1985 onward, with a clear focus on feminist approaches. Later on, British (and American) gender archaeology took on leading roles internationally, developing gender as an analytical tool and anthropologically inspired approaches to past genders, respectively. At the same time, a German-language gender archaeology strengthened its position in its own cultural area, combining detailed analyses of archaeological finds with new theoretical impulses. At present, the Spanish development holds promises for a future archaeology where gender and daily-life activities are included in the study of social structures, history, and development.

Key Issues/Current Debates

In a historical perspective, gender and feminist archaeologies are mainly associated with the study of women and the relationship between women and men. This is now slowly changing as queer and masculinist archaeologies are emerging.

It should also be mentioned that in a European setting, the archaeology of childhood has been closely associated with gender archaeology. Two early papers (Lillehammer 1986, revised and enlarged English version 1989; Sofaer Derevenski 1994), published in the K.A.N. journal and the *Archaeological Review from Cambridge*, respectively, focused on how to identify children in the archaeological record. In tune with the development of gender archaeology proper, interest has since moved from visibility to the question of children's roles in prehistoric societies and relations between children and adults (e.g., Moore & Scott 1997; Röder 2002; Sánchez Romero 2004; Berseneva 2008). The archaeology of children is now recognized as a separate field represented all over Europe and is organized in The Society for the Study of Childhood in the Past (http://www.sscip.org.uk/).

In the following section, primary issues will be discussed against the background of goals and aims of early gender archaeology. Early publications and the agendas of the two gender archaeology organizations founded in 1985 and 1991, respectively, will provide keys to what was deemed important at the time.

The edited volume "Were they all men?" (Bertelsen et al. 1987), one of the very first volumes in English dedicated to gender archaeology, presented papers from the abovementioned Norwegian conference held in 1979. The editors stated that their aim was "identifying individuals in a prehistoric context" but also acknowledged their debt to the feminist movement which "may have provided a better basis for

viewing not only the present but also the far past with a feminist perspective in mind," and the table of contents reveals that focus was almost exclusively on women (Bertelsen et al. 1987).

K.A.N. (*Kvinner i Arkeologi i Norge*, Women in Archaeology in Norway), the organization founded by Norwegian women archaeologists in 1985, presented its aims and goals in the first volume of its journal (published in Norwegian [English from 1996]) by the same name:

- To promote well-established research on and by women in archaeology
- To present traditional research areas as well as new aspects of research into prehistory
- To be a medium for archaeologists seeking a qualitatively new research strategy through the development of new theories, reassessment of methodological principles, new ways of evaluating sources, and search for new source material
- To be a medium of thoughts and opinions on the working conditions and the work of women in archaeology and in society

In the United Kingdom, the editors (Arnold et al. 1988: 2) of the 1988 "Women and archaeology" volume of *Archaeological Review from Cambridge* argued that the subject of women in archaeology demanded a critical evaluation of the following points:

- The conditions under which women work in all areas of archaeological practice.
- How women are portrayed in the interpretation and presentation of the past.
- What gender is and what epistemological questions an archaeology of gender forces us to recognize in terms of social theory.

The German FemArc organization (founded 1991) presents its aims and goals on its English-language website (http://www.femarc.de/) like this:

- Create contact between women who are involved with archaeology and its related fields.
- Prevent the isolation of female archaeologists.
- Encourage the exchange of experiences between women.
- Improve the employment situation of female archaeologists.
- Promote the discussion between archaeologists and other academics involved in women's and gender studies.
- Establish an interdisciplinary approach between female archaeologists, scientists of other fields, and interested amateurs.
- Expand the theoretical foundations for feminist archaeology.
- Open feminist archaeology to the public and to all women.
- Establish feminist archaeology and gender studies as themes and methods in archaeology.

In slightly different terms, these declarations of intent all agree on three areas of concern: equity issues, the ways that women had been presented in archaeological narratives, and theoretical approaches. These three issues have been constant companions to gender and feminist archaeologies ever since.

Equity Issues

Equity issues were one of the main issues of second-wave feminism. Equity issues which have been addressed in archaeology include:

- The number of women archaeologists and women working in archaeology
- Positions held by women in archaeology
- Research fields dominated by women and men, respectively
- Archaeological arenas (research, teaching, museum, excavations) dominated by women and men, respectively
- The prestige of women-dominated research fields

Research carried out in the 1980s and 1990s shows that in some countries, women made up a fair proportion of the archaeologists, but even so, few held permanent positions and even fewer held top positions. Power and prestige followed the subfields or arenas where men dominated. The number of women professionals in archaeology is now increasing all over Europe but gender inequality is still a serious problem in many European archaeological communities. As for gender archaeology, this is still dominated by women.

Learning about the history of women in archaeology became part of equity research.

An edited volume "Excavating Women: A History of Women in European Archaeology" (Díaz-Andreu & Sørensen 1998) addressed women's contributions to archaeology in many European countries. Similarly, the FemArc publications *Eine Dame zwischen 500 Herren* (Koch & Mertens 2002) and *Ausgräberinnen, Forscherinnen, Pionierinnen. Ausgewählte Porträts früher Archäologinnen im Kontext ihrer Zeit* (Fries & Gutsmiedl-Schümann 2013) present portraits of female pioneers in the German-language area.

Representations of Women and Gender

It is only a short step from noting the asymmetrical relationship between female and male practitioners of archaeology to asking if this would also have affected the interpretations of the past.

Rock Art and Other Depictions

Past depictions of women, varying from statues to embroideries and rock carvings, were particularly important in early women's archaeology, as part of the project of making past women visible. Rock carvings, which are relatively common over many parts of Europe and cover a time span from the Early Stone Age to the Early Iron Age, were a special challenge, as they highlighted the problem of identifying sex as well as gender when confronted with foreign picture conventions. It has been claimed that all the humans depicted, for example, on Scandinavian rock carvings were male. Gender researchers have challenged such viewpoints and presented convincing arguments that women, women's activities, and in some cases even different (ethnic) gender ideologies are represented on European rock art panels (Figs. 1 and 2).

Gender, Feminist, and Queer Archaeologies: European Perspective, Fig. 1 Woman, man, and reindeer. Mesolithic rock carving, Vingen, West Norway (Photo: Svein Skare. © The University Museum of Bergen, Norway)

Graves and Funerary Assemblies

Funerary assemblies will often be associated with individuals and have for that reason been central in gender studies, which have often focused on hierarchical statuses, power relations, and social roles.

Jewelry and weapons have been generally accepted as tentative gender markers. An example of a study based mainly on jewelry is Ursula Koch's (1997) study of two Merovingian cemeteries in Germany. Intimate knowledge of the archaeological material enabled her to divide the burials into families (households) and analyze the female burials in order to reveal geographical origins, ethnicity, and relative ranks of the women in each household. Skeletons were examined in order to determine age and other aspects such as whether the women had given birth. Koch's study does not aim to fundamentally challenge existing conceptions of early medieval women. But through meticulous analyses of finds and contexts, one of the hallmarks of German archaeology, new insights in women's gendered lives are generated and our understanding widened.

Studying roles and statuses from burial finds is most fruitful where burials are individual and gendered differences are indicated in terms of monuments, in body treatment, or in grave gifts. One should note, however, that dichotomous gender roles and other easily recognizable variations will be overrepresented in studies based on supposedly exclusive gender-related artifacts. Another source of error is that often

Gender, Feminist, and Queer Archaeologies: European Perspective, Fig. 2 Mesolithic woman. Vingen, West Norway (Photo: Svein Skare. © The University Museum of Bergen, Norway)

a considerable percentage of burials in the cemeteries investigated cannot be gendered through the grave gifts. They therefore tend to be left out of the interpretations, thereby possibly creating sharper gender divisions than warranted. Finally, a question related to all representations of women (and men) in the past is whether the representations are idealized or realistic ones, gender ideologies or "gender in action."

Subsistence, Trade, and Technology

In spite of the great number of prehistoric settlements known in Europe, these have played a relatively small role in gender studies. One reason may be that tools found in settlement contexts can rarely be definitely attributed to any gender. Interpretations tend to rely on ethnographic and historic evidence, inviting the interpretation of subsistence activities like hunting or farming as men's work. But there also seems to be a general agreement that both women and men must have participated in economic activities in all kinds of societies. Grave gifts sometimes indicate what kind of work the people buried engaged in. As an example, agricultural implements in female graves may indicate that women have taken active parts in farm work during the Scandinavian Iron Age, and scale-weights found in graves indicate that Viking women in Russia may also have been traders, probably participants in family businesses (Stalsberg 1987). More generally, women seem to have been engaged in textile work all over Europe. Again, this is supported both by grave gifts and iconography (spindle whorls, weaving equipment, and depictions of women weaving).

Technology is a masculine laden word, effectively often leaving women out of fields such as metalwork or boat building, although the question of women's participation has been raised (e.g., Sørensen 1996). A fruitful approach is to point to the fact that activities traditionally considered female, such as ceramic production, textile work, the preparation of food, and caring for people, require skill and knowledge and therefore represent sophisticated technologies. This is the strategy of the Spanish "maintenance archaeologists" (González Marcén et al. 2008; ► Gender, Feminist, and Queer Archaeologies: Spanish Perspective in this encyclopedia) who claim that these and related activities are basic for the structure and continuation of societies.

Theoretical Approaches/Current Debates

Insofar as the theories are applicable to archaeology, European gender archaeologies have followed the development of second (and third)-wave feminisms. Two issues, however, may be said to characterize the European archaeological scene. One is a sometimes explicit discussion of

the relationship between feminist and gender research; second is the conflation of postmodern deconstruction and gender analyses as keys to understanding genders of the past.

Feminist studies are defined by their approach. A feminist study in archaeology may have as its subject any aspect of the archaeological past, men, women, the emergence of agriculture, technological innovations, or religious ideologies. The ensuing new interpretations would not only include women but be made from women's standpoints. Although feminist theories have been fundamental to the critiquing of androcentric science and vital to the early development of gender scholarship in Europe, feminism has not remained a preferred framework of interpretation for all gender archaeologists. Some scholars consider feminism to be political, or biased, while true scholarship should be objective and unbiased. Others claim that objectivity is impossible in humanistic scholarship and that the solution is to recognize your bias and take it into account in interpretations, as recommended by standpoint feminists.

The study of gender (or women), on the other hand, is defined by its subject and may take at least two different directions. One is the anthropologically inspired study of how gender works, that is, how people of the past have lived their lives as women, men, and possible other genders within different cultural contexts. Another approach, which will be discussed in the following paragraphs, is closely linked to the impact of postmodern scepticism and deconstruction in parts of European archaeology and concentrates on the character of gender and gender as an analytical concept.

British archaeologists signalled the analysis of gender as a central concern as early as 1988 (Arnold et al. 1988: 2). Discussion concerning the relationship between gender and material culture as archaeology's special contribution to gender research (cf. Sørensen 2000) is a further development of this theme, postmodern deconstruction and analysis another.

An early comment on the relationship between postmodernism and the study of gender in archaeology relates to the danger inherent in approaches that advocate pluralism and open-ended interpretations, namely, that with no fixed authority to appeal to, interpretation becomes a matter of power (Engelstad 1991). Power is still predominantly male in academic circles, and Engelstad's comment thus reflects the basic idea of feminist scholarship, namely, critique of androcentrism in any form. Another comment would be that by deconstructing the concept of gender, gender studies no longer have an object, and consequently the legitimacy of the field as such is undermined.

In a relatively recent paper, Whitehouse (2007) claims that European gender archaeology as a whole has developed in a post-processual and even postmodern direction, with the consequence that European gender archaeologists tend to neglect the fact that most people worldwide do in fact live and identify themselves as women and men. Central issues like male/female power relations and the role that reproduction and motherhood must have played in women's lives are likewise excluded. In sum, claims Whitehouse (2007), European gender archaeology has removed itself from the lives of real women and men of the past.

This is a legitimate critique of strands of gender archaeology that seem to have problems accepting the category of "gender" at all. But it is a mistake to assume that this attitude characterizes European gender archaeology. Whitehouse's discussion is based almost exclusively on Anglophone gender archaeology. The trends she criticizes represent one particular European tradition which, because English is the academic lingua franca, tends to dominate the international field. European gender archaeologies are, however, situated within national archaeological communities of scholars. Spanish, German-language, British, Scandinavian, and the emerging East/Central European gender archaeologies all carry the hallmarks of their own local academic traditions, which may be culture historical, processual, post-processual, or postmodern, and favor different issues, approaches, and forms. In many European languages, it is also the case that biological sex and gender are intrinsically linked – even covered by the same term. Native speakers of such languages think

differently about gender, thus contributing to the multivocality that is a precondition for new insights.

With these reservations, it is probably still the case that the analysis of gender in all its variations has become one of the most important – in terms of papers presented maybe *the* most important – strands of archaeological gender research in Europe today. Most British gender archaeology today falls into the category of gender analysis. The approach is represented in Scandinavian and Spanish archaeologies as well, although feminist archaeology is relatively strong in these regions. In German-language archaeology, some scholars prefer working within a feminist framework, while others have emphasized the importance of finding a place for "nonideological" gender research (Mertens & Koch 2005), as, for example, gender analysis.

International Perspectives

Viewed from a Norwegian perspective, the first years of gender archaeology were characterized by a high degree of Scandinavian cooperation and enthusiasm. With the advent of the first English-language publications in the 1980s, a feeling of sharing a common frame of reference and working toward a common goal developed. On a European level, the British TAG conferences became an international meeting place for gender archaeological discussions.

From then on, gender archaeology was definitely an international phenomenon, with steadily increasing communication across borders. The number of publications increased dramatically, especially English-language books and papers. A positive effect was that scholars who wanted to participate on the international arena were often encouraged to publish in English, thus reaching a wider (academic) public. On the negative side is the fact that those who chose to write in their native languages, and thereby also to communicate with the general public in their countries, became more marginalized than ever internationally. The end result of the ongoing internationalization may be that in many European countries, gender archaeology is only occasionally disseminated to local publics.

International communication did not stop at the European borders. Conferences in Europe, North America, and Australia attracted participants from many continents, and the conference papers were read by everyone with an interest in gender and archaeology. Some sources of inspiration were shared by almost all gender researchers. Foremost among these are the writings by feminist theorists like Simone de Beauvoir from France and American standpoint feminists like Nancy Hartsock and Sandra Harding, who became household names to anyone working with women and gender. Donna Haraway and Judith Butler have also influenced European gender archaeology considerably, as have the philosopher/archaeologist Alison Wylie and gender archaeological pioneers like Margaret Conkey and Janet Spector.

International contacts tend to be unilateral between Britain (or the USA), where well-known international centers of education are to be found, and individuals of other nationalities. In the context of gender archaeology, however, multilateral contacts within Europe should not be underestimated. Naturally, these tend to go between regions with related traditions in culture and language, as reflected in the regions discussed above, but wider networks have also been established. From 2008 onward, European gender archaeologists have had a common meeting place in the working group "Archaeology and Gender in Europe" (http://www.upf.edu/materials/fhuma/age/), part of the European Association of Archaeologists (EAA). One of the goals of this network is to ensure that information and inspiration will cross borders and oceans in all directions.

Future Directions

In archaeology, gender research has been mainly an academic field or a discourse between archaeologists. But archaeology also has a role to play in society at large. Doing gender archaeology should, among other things, mean reaching out

to the general public and presenting recent research through popular books and papers, museums, and other media.

Gender Studies and the Archaeological Record

The archaeological record, or the material remains recognized mainly through surveys and excavations, kept in the landscape or stored in museum collections, is the basis of all archaeological interpretations. Today, most of the additions to the archaeological record are results of rescue excavations taken on not for academic reasons but because the land in question is being developed for new purposes.

Increasingly, rescue archaeology is carried out by commercial firms, although guided by local heritage legislation and international agreements. In Europe, rescue archaeology works closer to the processual paradigm than does academic archaeology. The general opinion seems to be that (gender) theory is not relevant to rescue excavations or to the excavation phase at all: interpretation comes later. Large-scale excavations also tend to be headed by men, something that has not favored gender or feminist approaches. In future, a closer relationship between rescue archaeology and academic research would be desirable in order to generate gender-relevant discoveries in creating the archaeological record and activating its potential in research and dissemination.

Gender in Teaching, in Museums, and in Books Directed at the General Public

Gender archaeology has a long history in teaching departments and many universities offer courses in gender archaeology at different levels. Dissertations in gender archaeology have also been defended all over Europe from 1976 onward, in sum an imposing body of new knowledge.

The dissemination of all this newly generated knowledge to the general public, however, seems to be lagging behind. Museum archaeologists have been involved in gender archaeology from early on, but in spite of this there have been far too few permanent museum exhibitions incorporating gender-relevant questions or women. Occasionally smaller, temporary exhibitions dedicated to women in the past are shown. A future task would be to include a gender aspect in all museum exhibitions, especially the permanent ones.

Another arena not yet conquered is that of general historical accounts, in textbooks and overviews aimed at nonspecialists. Like museum exhibitions, these tend to be conservative, and gender is seldom in focus. Incorporating the results of gender archaeology into the great narratives of humankind has been the main motivation of gender archaeology from the 1970s onward. It is now time to make this a priority in future work.

Cross-References

- ▶ Gender, Feminist, and Queer Archaeologies: Spanish Perspective
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory

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Gender, Feminist, and Queer Archaeologies: Spanish Perspective

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Introduction

In the 1970s, in the aftermath of second-wave feminism, feminist scholars identified androcentric sexist biases behind scientific research, which included archaeology. They noticed that both the professional practice and the interpretation/presentation of the past were permeated by values enmeshed in the twentieth-century hegemonic gender system, and argued for a culture of equality within the discipline.

In the following decade, Spanish archaeology began to incorporate this critique, lead until then by archaeologists working in Norway and the USA. Since then, the momentum gained by a growing number of researchers has turned feminist and gender studies into one of the most dynamic fields of the discipline in Spain, a field in its own right both in the general context of gender and feminist archaeology and in the particular context of theoretical and methodological discussion in the Iberian Peninsula. In the same way as the pioneers of this field, these researchers have promoted self-criticism and reflexivity within the discipline, provided alternative interpretations to problems previously examined, and developed new fields of inquiry. This does not include, however, the queer archaeologies that developed from the end of the 1990s, fundamentally in English-speaking and Scandinavian countries. Because of this, the majority of this entry focuses only on the development of feminist and gender archaeologies, since queer archaeology is practically nonexistent in Spain.

Definition

Gender, feminist, and queer archaeologies refer to those archaeologies that explicitly problematize sex, gender, and/or sexuality in interpretations of the past and/or in the practice of the discipline itself. Feminist and queer archaeologies are politically engaged with the end of patriarchy and, therefore, promote a cultural change in the discipline that removes its sexist and heterosexist biases. The archaeology of gender may have such a political dimension, but this is not always the case – there are both feminist and nonfeminist archaeologies of gender. When the political dimension is not present, the archaeology of gender only broadens the content of other interpretive frameworks in considering the sociocultural interpretation of sexual difference as a structural principle in society, therefore adding gender to the study of the past.

Historical Background

In Spanish archaeology, the explicit interest in questioning androcentrism and problematizing questions linked to the experiences and practices of women began only a little later than in the pioneering countries, since the first related paper was published at the end of the 1980s (Sanahuja & Picazo 1989). Since then, the rejection of

the double discrimination of women, in the profession and in the explanation/presentation of the past, has promoted a critical review of archaeological practices and narratives, new hypotheses for interpreting and reinterpreting the archaeological record, and new analytical categories for understanding historical dynamics in the past. Currently, the volume of publications is such that there are already compilations that track events until present day (e.g., to mention just a few, Zarzalejos 2008; Díaz-Andreu & Montón-Subías 2012).

As in Norway and the USA, Spain also incorporated these concerns from feminist perspectives. However, both the theoretical-methodological context that received them and the interpretive model that supported them were different. While in the aforementioned countries processual archaeology already had a lengthy history and the post-processual critique was beginning to emerge, in Spain, cultural historicism prevailed and, above all, the description of archaeological materials was the primary concern. This traditional way of understanding and practicing archaeology was primarily questioned from historical materialism – well informed, nonetheless, by the processual methodology so popular in the English-speaking world. This early theoretical phase should be understood within the context of the unique political and historical situation of Spain at that time. The Spanish University had just experienced a transition, due to the end of the Francoist dictatorship in 1975, and a number of archaeologists engaged in Marxism – and, in the case of some women, feminism too – were recruited into the team (on this process, see Vincent 1994).

For the previous reason, the first feminist archaeologists in Spain were also immersed in Marxist ideology. This union between Marxism and Feminism initially lead to the distrust of gender archaeologists in the USA and England, which were seen as examples of historical idealism and low-intensity political practice. From this standpoint, the category of *gender* was initially met with suspicion, perhaps even dismissal, and the concept of *sex* was preferred: "relations between the sexes" and "sexual roles," among others, were the expressions in use (Colomer et al. 1993: 5). An explicit wish to differ from gender archaeologies continues to be present in some of the current proposals from the Marxist tradition, such as those that also seek links with feminism connected to the French and Italian theories of sexual difference (Sanahuja 2002; Escoriza & Sanahuja 2005). That is why in Spain, apart from the fact that there are "feminist" and "nonfeminist" archaeologies of gender, there are also "gender" and "non-gender" feminist archaeologies.

Despite the fact that in the 1980s interest in gender studies was very minor in Spanish archaeology, it had a significant weight within the group of professionals interested in promoting theoretical debate. For instance, one of the sessions of the first and only "Reunión de Arqueología Teórica" (Meeting of Theoretical Archaeology, RAT), held in Santiago de Compostela in 1992, was devoted to "Arqueología y Mujeres" (Archaeology and Women). This was the first time that the discussion of androcentrism in the discipline, including concerns of some female archaeologists for their professional practice, was transferred from individuals and specific groups to a wider national academic framework. As had happened previously in Norway, the USA, Canada, Great Britain, Germany, and Australia, the session provided much-needed reference for some female archaeologists who had personal experience of sexism and spurred interest in the issue, and at the end of the 1990s, the first book about archaeology and feminism was published (Colomer et al. 1999). It was a reader with 12 seminal works, mostly produced in England and the USA, but also in Norway, Sweden, and Mexico, aimed at facilitating access to the Spanish-speaking public to some of the most significant contributions in the development of feminist archaeology. It was also at the end of the 1990s when, faced with the unstoppable tide of Anglophonic production and the influence of other disciplines like anthropology or history, the archaeology of gender – strictly speaking, that which incorporates gender as an analytical category – also entered into Spanish academia, giving

rise to feminist archaeologies different to the earlier Marxist ones.

Finally, it was during the first years of the twenty-first century that feminist and gender archaeologies were firmly established in Spain. In this period, the first monographs were published. In the year 2000, for instance, the *Seminario de Arqueología y Etnología Turolense* dedicated the 22nd volume of *Arqueología Espacial* to gender and space in archaeology. Furthermore, new gatherings of women in archaeology were organized in different universities. The first was the course "Archaeology and Gender" that took place at Granada in 2003 (Sánchez-Romero 2005). Inspired by the Wedge conference procedure, and its influential *Engendering Archaeology*, this occasion also saw various archaeologists discuss their ways of understanding and practicing feminist and gender archaeology in front of the student body of the university. Soon after, thematic seminars on specific questions, such as "maintenance activities" (see below), held in Barcelona in 2005 and 2007 (Montón-Subías & Sánchez Romero 2008), began to be organized. In 2006, the Museum of Prehistory in Valencia organized the first museum exhibition of women in prehistory (Soler 2006). Originally designed with a provincial character, it soon aroused the interest of other Spanish museums and institutions, generating debates, courses, and circuits of academic dissemination where it was exhibited.

Key Issues/Current Debates

In over 20 years of research on gender and feminist archaeology in Spain, works on diverse themes have been published. Drawing on the critique of androcentrism, concerns similar to those demonstrated first in the pioneering countries have prospered. Thus, we have publications on the work and contributions of women in the past, works that analyze the labor situation of female archaeologists, that expose the sexist bias of archaeological discourse and language – verbal and nonverbal –, that discuss new ways of presenting the past, that reflect on fundamental concepts – like those of space, time, and identity –, and that propose new categories of historic analysis (a more detailed examination of those works can be seen in Díaz-Andreu & Montón-Subías 2012). Some of these concerns have been brought together around two specific lines of inquiry that Spanish archaeologists have and are contributing to the global scene: maintenance activities and the sociohistorical construction of gendered personhood and self-identity (see also Montón Subías & Lozano 2012). The approach of maintenance activities arose at the beginning of the 1990s among a group of feminist archaeologists linked to a research team at the Universitat Autònoma de Barcelona, within the emphasis given by a feminism of Marxist inspiration to the analysis of women's work and the material conditions of their existence. Maintenance activities were initially aimed at investigating a specific sphere of social production and reproduction, a sphere that had been forgotten in the traditional historical narrative (including that of Marxism). Soon other researchers joined their efforts. They shared with them concern and dissatisfaction of the sexist biases affecting the practice of archaeology and the motivation to create new categories of analysis to evaluate the practices and experiences of women. Inevitably, many of these contributions, although not all, exceeded the original theoretical framework, adding and/or combining concerns stemming from feminist theories different to the Marxist ones. Currently, this approach continues to be enriched by the contributions of different researchers within and outside of Spain (see, e.g., Montón-Subías & Sánchez-Romero 2008).

The concept of maintenance activities embraces all basic activities necessary to create, regulate, stabilize, and reproduce (in the short, medium, and long term) social life. Related to the management of everyday life and the well-being of all of its members, they include, *grosso modo*, caregiving, cooking, basic weaving and cloth manufacture, hygiene and public health, the socialization of children, and the fitting out and organization of related spaces. Specialized in maintaining the group's connections and links,

they are part and parcel of the relational framework in which they take part and which they create. Although the specific content of maintenance activities is not always the same, and may vary depending on chrono-geographical coordinates, what remains stable is the structural function to which the term refers (González Marcén et al. 2008: 4). In any case, both the historical and ethnographic record show continuity with respect to the relations and practices that articulate the day-to-day management of the communities, and their long-term sustainability. For this reason, with slight variations, the study of the previous tasks, in their possible conjugations, is what often appears in the analyses of maintenance activities (see Montón-Subías & Lozano 2012 and Sanahuja 2002: 172-89 for a review of the Marxist perspective).

The approach emphasizes, therefore, the structural character of these activities, whose ultimate goal consists in securing continuity of lifeways, either through repetition and recurrence or through channeling changes into new patterns of repetition and recurrence. Because of this, it has been unveiled as a tool with great potential to evaluate social dynamics over vast lapses of time and periods considered to be historic transitions (see, for instance, section 3 in Montón-Subías & Sánchez-Romero 2008). Analyzing daily life in the long run, their forms of permanence and change, allows us to better understand the articulation of the different variables – also those considered macro – that integrate the social fabric, as well as their changes and modifications.

In this already established approach, one of the most recurrent debates has referred to the nature of the association between women and these practices (Picazo 1997: 60; González et al. 2008: 3; Lozano 2011: 31). It is true that the proposal was initially partly aimed at interpreting the experiences and practices of women in an alternative way and that, therefore, there was an implicit link between maintenance activities and practices carried out by women. But already in the first contributions, it was stressed that their dismissal by mainstream archaeology was due to their association with the female sphere in modern times. Subsequently, their relational character and their recurrent rhythm, in direct opposition to change, individuality, and power the values highlighted by history, which is the discourse created to legitimate Modernity (Hernando 2005), were added as main reasons in their concealment. In any case, many different works have insisted that the association between women and maintenance activities has a historical character, and that in the origins of humankind, the whole group – men, women, and children – would have been involved in their practice.

Subscribing the perspective of maintenance activities and suggesting that an important part of the times and roles of many women has been overlooked do not mean defending that maintenance activities represent the whole set of (potential) activities carried out by them (in fact some of the professionals that work on maintenance activities also investigate the presence of women in other spheres of action, traditionally assigned to men [Sánchez-Romero & Onorato 2005]). It does, of course, mean understanding this sphere of action in its singularity and articulating it with the rest of the social, economic, political, and ideological variables that orchestrate the course of life for human societies.

The feminist politics in this line of inquiry is underpinned by reflection on the values that should be integrated in the writing of history and how they might help building a new form of public rationality. With the inspiration of authors grouped around the "ethics of care," like Nancy Chodorov or Carol Gilligan, unorthodox Marxist authors like Anna Jónasdóttir, and others linked to the feminism of difference connected to the Milan Women's Bookstore Collective such as Luisa Muraro and Adriana Cavarero, emphasis is placed on the value of relationality and interdependence, hitherto deemed as exclusively feminine. This endeavor is shared with another of the most original contributions of feminist archaeology in Spain: that which proposes to explain the historical reasons for gender inequality in the Western world starting from the study of the mechanisms through which we construct self-identity.

This line of investigation, which arose in Madrid in the late 1990s, started from a different point than the majority of feminist studies. It did not initially focus on women, but rather on the way that human beings construct their identity (Hernando 2005; Hernando et al. 2011). On the basis of his own previous ethnoarchaeological work in oral societies and drawing from studies in psychology, sociology, philosophy, and anthropology that had already examined the differences between relational and individualized identity, Hernando suggested that individuality and relationality constitute "packages" of characteristics that are combined in complex and dynamic ways within one single person, depending on their position of power or control in the social group. The author analyzed the genealogy of contemporary gender identities in the Western world, concluding that, initially, all men and women in human societies would have had relational identities (similar, in structural terms, to those that characterize contemporary hunter-gatherers).

This means, according to Hernando, that the so-called feminine identity would be the "relational identity" typical of both men and women in the beginnings of humankind, which allows her to escape from essentialisms linked to sex. In accordance with this perspective, men would have been slowly and gradually developing individuality, while women would have maintained the relational identity until modern times. Since then women would have also developed characteristics of individuality, but by virtue of their different historical trajectories, there would be a difference between the current individuality of men and women. Obviously, this line of work was aimed at analyzing the reasons of this differentiation or, in other words, the genesis of the patriarchal order. To this end, Hernando accepted that the extreme fragility of the *Homo* offspring played an important role in the differentiation of identity trajectories between males and females, although unlike other approaches, she did not argue that the central tenet of this differentiation was due to biological factors, but rather to cultural factors related to differential mobility between men and women. Caring for the highly dependent human offspring would have implied travelling shorter distances or less mobility for women than for men. This fact would have been critical in hunter-gatherer societies, considering the vital importance that oral societies place on the spatial dimension in the construction of the world (Hernando et al. 2011). These initial subtle differences in mobility did not establish power relationships between the sexes, but could have constituted the base for a progressive increase of masculine individuality and, with this, the subsequent appearance of the patriarchal order.

International Perspectives

Feminist archaeology in Spain has always shown great interest in knowing debates generated abroad. This openness has lead researchers to integrate similar concerns from other countries and to develop strategies to internationalize their own reflections. Out of this, exchanges and collaborations have followed, which make this field one of the most dynamic and international in Spain. These external influences were first expressed through the weight that the "Women the Gatherer" movement of US anthropology in the 1970s had in promoting interest on the origins of humankind (Querol 2001; Sanahuja 2002). Some years later, in the RAT of 1992, the title "Somos todas hombres?" (Are we all men?) was selected to present a paper about sexism in the practice of contemporary Spanish archaeology. It was the recognition paid by a group of Spanish female archaeologists to the first workshop on the subject *Were they all men*, held in Norway in 1979. Equally decisive was the arrival of *Engendering Archaeology*, published by Meg Conkey and Joan Gero in 1991, that would inspire many later works on feminist and gender archaeology in Spain (see also Cruz Berrocal 2009: 124).

Spanish feminist and gender archaeologies have repaid this initial input, bringing to the global scene more examples of how sexist and androcentric values have inappropriately

influenced archaeological practice and archaeological knowledge, alternative or new interpretations of the Iberian archaeological record – that, as a consequence, begins to be much more renowned internationally (the Iberian Iron Age is an outstanding example (Prados & Izquierdo 2006; García-Luque & Rísquez 2008)), and new analytical categories or perspectives, such as the ones reviewed in the previous section.

This spirit of internationalizing Spanish production has resulted in diverse forums. There have been international conferences in Spain, such as seminars on maintenance activities in Barcelona, which have brought together female archaeologists from the Peninsula and abroad to reflect on concrete aspects of the approach (Montón-Subías & Sánchez-Romero 2008). In the same vein, conferences abroad have been attended, including the organization of sessions in the annual editions of the EAA (European Association of Archaeologists) and the SAA (Society for American Archaeology), and publications on platforms of international scope have also appeared (e.g., Berrocal 2009; Montón-Subías 2010; Lozano 2011; Hernando et al. 2011), however mostly in English (in September 2011, only 5 of the 81 journals listed for archaeology in the Thomson Reuters Arts and Humanities citation index were in Spanish). It is important to value the extra effort that this fact implies and the situation of double (or triple, or quadruple) demand faced by many of these archaeologists: on the one hand, to find a way in a national and international academia dominated by androcentric power structures and, on the other hand, to do it in an international academia of Anglo-American hegemony, much more receptive to the empirical cases proposed by Spaniards than the theoretical approaches generated in our language. In fact, by the works cited in the English-speaking world, one could reach the misleading conclusion that there are very few theoretical contributions outside of its own linguistic area.

Furthermore, forums of debate to bring together Spanish-speaking feminist archaeologists from both sides of the Atlantic have also been created. For example, the interest in exploring the relationship between feminism and historical materialism has joined Spanish archaeologists with representatives of the Latin American Social Archaeology (see, e.g., Vargas 2004). The promotion of multilateral, international contacts is also behind the presence of several Spanish archaeologists in the creation and functioning of AGE, the Archaeology and Gender in Europe working party of the European Association of Archaeologists (http://www.upf.edu/materials/fhuma/age/), a network designed to bring scholars of different nationalities and academic traditions together in order to develop and exchange information on gender in archaeology in its many dimensions (Dommasnes & Montón-Subías: 2012).

This internationalist vocation has been in part supported by the Spanish research policy conducted after the Francoist dictatorship in relation to the concession of fellowships for research residencies in foreign research centers (Díaz-Andreu & Montón Subías 2012). Thanks to these visits, for example, the first news of the influential *Were They All Men* and *Engendering Archaeology* reached Spain.

Future Directions

The strength and importance that research on feminist and gender studies holds in Spanish archaeology is established. This said, it should be also clarified that there are obstacles and challenges, both internal and external, for this research. The explicit involvement or the affinity of many of these researchers with feminist approaches and the resulting critique of academic androcentrism, often experienced in first person, cause doubt, reticence, hostility, and rejection in one part of the academic establishment. Without doubt, the progressive popularization of the issue has diminished public critiques, as they would be perceived as politically incorrect. However, from less visible platforms, such as anonymous decision-making panels, a veiled discrimination may act against research and candidacies related to the investigations of gender. These forms of

discrimination are not only more difficult to identify but also more difficult to challenge.

Furthermore, the very dynamic nature and development of this research raises questions that demand greater attention and confront challenges of a different character depending on whether or not the research has a political involvement. A first necessary challenge would be to explicitly clarify the differences and affiliations among feminist archaeologies, archaeologies of gender, and women's archaeologies to avoid conceptual ambiguities. In fact, conceptual ambiguity has begun to happen already within archaeologies of gender. Since the popularization of the issue in the 1990s, some authors have just "targeted" gender, but ignored or rejected its original critical theoretical framework. In these works, gender is no longer a concept, but instead a term with which to designate women and, to a lesser extent, also men. By incorporating gender as only a word, one can continue writing about men and women in a conceptual framework that perpetuates stereotypes and gender roles characteristic of the traditional imaginary and from the same androcentric positions confronted initially by feminist archaeologies. Although the original desire of those who devote themselves to gender archaeology from a feminist position was and is to transform the *mainstream*, the opposite effect has often times resulted from "less politicized" approaches. In these cases, the mainstream has transformed gender archaeology, diffusing its feminist critique. Still, it should remain clear that in Spain, currently, the majority of the works on gender are elaborated from positions involved with feminism.

In Spain, as in other countries, feminist and gender research has mainly been identified with that of women. Indeed, women were the first who drew from their gender stereotypes and expressed the need to find themselves in another way in written history. This being acknowledged, it is however now important to associate feminist and gender archaeologies not only with women, especially when this fact particularizes their study and prevents the understanding of the social and power dynamics of which they are part. While it is important, for example, to continue writing historiographies about female archaeologists, it is even more vital to incorporate women in the general historiography of the discipline. Precisely, to move in this dual field, which is not incompatible, constitutes one of the most important challenges that feminist archaeologies and gender archaeologies face.

On the other hand, questioning the "hegemonic gender system" from which history has been written also means understanding that men of the past have been constructed following the dominant contemporary model of masculinity, a model which has assigned them a particular way of being and behaving, associated with success, heterosexuality, aggression, and violence. But, above all, it means understanding that the very writing of history has been associated with these values and has oversized activities, such as war, related with them. Despite the fact that in 1998 Thomas Dowson published an article in the 14th edition of the Catalan journal *Cota Zero* calling for queer archaeology (see the entry on "▶ Engendered Archaeologies," in this encyclopedia) and that the construction of masculinity has become a growing concern in other fields of the social sciences in Spain, this issue has gone practically unnoticed in the archaeology of our country. Recently, however, prevailing assumptions related to the hegemonic model of masculinity have begun to be questioned to critically reevaluate, for instance, the supposedly structural character of warfare and warriors in the Argaric Bronze Age of Southeast Spain (Aranda et al. 2009).

As occurs in other countries, feminist archaeologists in Spain also should reflect more upon the implementation and the implications of their political involvement in archaeological practice. Building a new disciplinary culture should imply awareness and change of the different forms that patriarchal power structures adopt (in fieldwork, in the teaching of the discipline, in Ph.D. supervision, in academic management or, among others, in the nature of the links with nonprofessional communities

interested in archaeology (on this last aspect, see Gonzalez Marcén 2005)). Otherwise, we run the risk of modifying archaeological discourse – the most visible front – but perpetuating an androcentric structure through the gears of its production.

Cross-References

- ▶ Engendered Archaeologies
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective

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Gender, Feminist, and Queer Archaeologies: USA Perspective

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Introduction

This entry presents a brief history of the emergence of feminism, gender, and queer in North American archaeology, which, along with the United Kingdom and Scandinavia to a lesser degree, represents the geographic origin and center of such work. The key concepts as used by archaeologists are defined; the relationship among them is explored and shown to be both problematic and productive. The place of feminism, gender, and queer within North American archaeology today is characterized and, finally, likely avenues of future research are suggested. The greatest impact of feminist, gender, and queer archaeologies has been on the authority of positivist approaches, the objectivity of interpretation, equity issues within the profession, collaborative knowledge making, and the understanding of key archaeological interpretive concepts.

Definition

None of the terms "feminism," "gender," or "queer" have fixed meanings. Different academic disciplines have their own interpretations, histories, and methods embedded in each. In the following, the terms are defined in relation to how they have been used and employed within archaeology. Contrasts are drawn between North American and other usages, where relevant. Feminist archaeologies emerged in North America in the early 1980s; queer archaeologies were inaugurated in the early 2000s in both North America and Europe. Gender as an explicit object of study emerged with feminism. Stereotypically, feminist and queer archaeologies have been assigned their proper objects of study, mimicking that same division of labor in academia more broadly: feminism studies gender, while queer approaches are centrally concerned with sexuality. In actuality, neither feminism nor queer in archaeology need be limited to these objects of study.

Feminism

Feminism is recognized as an approach rooted in contemporary political goals. Feminist social science commitments are those that are relevant to women and others oppressed by gender structures (Wylie 2007: 211). Feminism in archaeology is concerned with the conditions of archaeological knowledge production in the present and the reconstruction of the past and past peoples' lives. Since this concerns power relations, focus is often – but certainly not exclusively – on women (Tomášková 2011). Feminism in archaeology is further about recognizing gender bias, rewriting histories of the discipline and the past that exclude or downplay the role of women, questioning the alleged neutrality of science, and addressing equity issues in the discipline and the theoretical development of key concepts, especially gender, but also power, bodies, and the State, among others (Conkey & Spector 1984; Wylie 2007). Ultimately, feminist archaeology involves a fundamental rethinking of the questions archaeologists address and the frameworks they use (Conkey 2005; Wylie 2007).

The feminist critique of science has come to dominate North American feminist archaeology and can be seen to constitute the orthodox approach. Work typically draws on feminist

philosophers of science, such as Helen Longino and Sandra Harding (Wylie 1992, 2007). This orthodoxy co-exists with a lesser post-structuralist feminist production inspired largely by the work of feminist philosopher Judith Butler (e.g., Joyce 2008), which is concerned with questions of discourse and the performance of gender. Butler is a useful figure who crosses the divide between continental post-structuralist feminists and social science feminists by using a vocabulary of gender and performance. Work that draws on Butler in gender archaeology shares the concern of the feminist critique of science with empirical adequacy and evidential constraints (Joyce 2008). The more radical elements of Butler's and other continental feminist philosophers' work tend to be re-categorized as queer. Regardless of the type of feminism, all share a set of concerns around *reflexivity*, *accountability*, and *reframing* key debates.

Reflexivity

Reflexivity has its roots in feminism's grounding in the experience of oppression of women, where people are understood as constituted by their experiences rather than simply "having" them (Conkey 2005: 27). Reflexivity also refers to a commitment "to locating the researcher on the same critical plane as the researched" (Marshall et al. 2009: 226). The importance of reflecting on daily lives is double: research is founded on the experience of the everyday life of women and marginalized people in the present and aims to validate the lived experiences of past peoples, to "people the past" (Spector 1993; Joyce 2008). A reflexive, situated archaeology is a response to the insight that all research reflects the position of the researcher within a given social structure and incorporates the pragmatic interests of that position. Counter-intuitively, this is seen as the central virtue of reflexivity. A situated, feminist archaeology raises the bar epistemologically because it is a "critical, theoretically informed, *standpoint* on knowledge production" (Wylie 2007: 213).

Accountability

Accountability to research subjects is of central concern. The situatedness of knowledge production means that issues of power are recognized as inherent to all aspects of the research process. Archaeology is recognized to be inescapably political, as is the knowledge it engenders. A concern with ethical and pragmatic norms means that egalitarian and collaborative forms of knowledge production are sought, leading to community archaeology projects and alternative writing genres (Spector 1993; Joyce & Tringham 2007; Marshall et al. 2009). Accountability also refers to the recognition that feminist research is simultaneously about the past and how versions of the past are sustained or not (Conkey 2005: 33).

A widespread acknowledgment among feminist archaeologists is that while feminist research starts with the experience of women, it should ultimately lead to a general *reframing* of questions, practices, theories, and goals within the field as a whole (Conkey 2005: 26; Wylie 2007). In this regard, feminists question the central concepts of archaeology, such as technology, inequality, household, hunting/gathering, gender, and bodies, as well as archaeological practice and theory (Wylie 2007).

Gender

The original formulation of gender in archaeology was adopted from a social science understanding in which sex referred to biology (male and female), and gender referred to the meanings ascribed to that biological foundation by particular cultures. As such, gender is commonly understood as a social or cultural "construction." Conkey and Spector's (1984: 16) groundbreaking article "Archaeology and the Study of Gender" defined gender as "a system of social rather than biological classification that varies cross-culturally and changes over time" and stipulated a range of ways in which gender could be conceptualized and studied, including roles, identity, and ideology. Gender attribution was a central concern. Genders could be identified archaeologically through burials, representations, tool use, and skeletal remains by associating cultural items with biological sex or its representation. Ethnoarchaeology was also seen as key to illuminating the range of activities in which males and females were engaged.

Gender is now recognized as a historical process and a major structuring principle of societies of the past and present (Gero & Conkey 1991). Gender is also increasingly thought of as more a process than a static ascription of identity or one among a list of social variables. It can also be thought of as an ongoing embodied and performative process of identity formation which structures relations. Thus, gender is also relational (Joyce 2008).

Gender implies a definition of sex. The conceptual foundation of gender is the ascription of cultural meanings onto male and female bodies; even when gender is understood to be an important element of how societies, in general, are organized, this foundation remains. This means that when gender is explored as a social variable, even a structuring one, it is used to provide interpretations of historically and culturally specific ways of organizing people on the basis of difference grounded in binary sex. The concept itself is rarely open to theoretical reconsideration within the social construction formulation.

The concept of gender initially served the important purpose of liberating interpretation from the essentialism of sex role identity, where one's sex was assumed to determine one's capacities and roles in society (Conkey & Spector 1984). Quite quickly, sex was questioned as a static foundation for culture to ascribe gendered meanings – sex was also recognized as historical (see Joyce 2008). The implications of the critique of sex have resulted in work on embodiment and performativity (Joyce 2008). Arguably, not even these approaches manage to dispense with the distinction between sex and gender which rests on that between nature and culture, although the nature of the relationship has been rethought.

Finally, some archaeologists, especially those influenced by queer theory, question the unconditional relevance of gender in all contexts (Joyce 2008), while others continue to argue that its central importance to feminist archaeology should be given (Wylie 2007).

Queer

Queer refers to a deliberate strategy by activists and academics to reclaim and redefine a word in terms of identities and bodies that avoid the essentialism of more conventional forms of identity labeling. In North American archaeology, queer theory has predominantly inspired work on sexualities (Schmidt & Voss 2000; Casella & Voss 2011). Nonetheless, queer also implies a critique of the ubiquity of heteronormativity, the notion that an assumption of heterosexuality underlies many political and social structures (Dowson 2006; Voss 2009).

Queer archaeology, in general, includes redemptive counter-histories that bring to light previously hidden histories of sexualities (Voss 2009), queer statements that challenge heteronormativity beyond a focus on sexuality (Dowson 2000), and work on embodiment predominantly influenced by Judith Butler's theory of gender performativity (Joyce 2008). Thus, the naturalization of heterosexual institutions such as the family and the division of labor is challenged (Dowson 2006; Voss 2009). Past identities are understood to be constructed in fluid ways (Joyce 2008). In common with feminism, queer critiques have appeared in response to equity issues within the discipline, such as the relationship between non-straight subjectivity and professional success and the "epistemological privilege" of straight archaeologists and their accounts of the past, although this trend is more visible outside North America (Dowson 2006; Voss 2009).

Historical Background

Gero and Conkey (1991) inaugurated a reflexive, self-conscious history of feminist archaeology in which the "three fold" development of feminism in the social sciences is cited: the critique of androcentrism and destabilizing assumptions about women's capacities, the "remedial" search for women in the past, and finally the theoretical development of gender as a concept. As such, feminism and gender co-emerged in archaeology.

Prior to the early 1980s feminist work had little visibility and much was outside the English-speaking world. Conkey and Spector's (1984) article is a milestone in feminist and

gender archaeology; in it, the authors presented the case for the general applicability of gender and feminism. They presented a critique of androcentrism in the discipline, argued that in the absence of an explicit framework for theorizing gender archaeologists drew on common sense understandings, and provided a set of conceptual tools with which to address gender in a systematic way.

In the late 1980s, two quite different but equally agenda-setting events occurred: the small conference at the Wedge Plantation in 1988 and the far larger, student-organized 22nd Chacmool Calgary conference in 1989. Frustration with the slow development of gender archaeology led to the Wedge conference where the goals of the 1984 article were deliberately pursued in a series of detailed case studies (Gero & Conkey 1991). The Chacmool conference was notable for the number of papers presented as well as debate around the question of the relationship between gender and feminism.

Recently, the stance that gender archaeology in North America is feminist within the terms of the feminist critique of science was reaffirmed in a 2007 special issue of the *Journal of Archaeological Method and Theory* (although based on an earlier conference) (Wylie 2007). Particular emphasis was placed on feminist praxis. In her introductory paper, Wylie (2007) reorients the question away from "feminist archaeology" and toward what it means to do work as a feminist archaeologist. Epistemological issues remain at the forefront, including questions about the gender of theory and the intersections that are possible among marginalized perspectives within archaeology (see also Conkey 2005). Since Janet Spector's (1993) groundbreaking book, *What This Awl Means: Feminist Archaeology at a Wahpeton Dakota Village*, feminist concerns have been increasingly seen as paralleling those of class, race, and indigeneity, resulting in collaborative projects and de-centered authorship. In addition, issues of representation have led to alternative writing genres, explorations of language, and research in hyper-media as a means of representation (Spector 1993; Joyce & Tringham 2007). North American leadership in the field of gender archaeology was demonstrated by the publication of the *Handbook of Gender in Archaeology* (Nelson 2006), which provided an exhaustive survey of the field from thematic, temporal, and geographic perspectives.

Feminist archaeology has rarely influenced feminist debate beyond archaeology except in the form of review pieces in general interdisciplinary surveys of feminism, of which there have been few. An exception is Marshall's (2008) contribution in the journal *Feminist Theory*, which prompts feminists to explore change, transition, and transformation using the archaeology of the Pacific Northwest as a case study.

Queer archaeology in North America has its roots both in feminism and the study of sexualities, first gaining visibility through two edited volumes published in 2000 (Dowson 2000; Schmidt & Voss 2000). Queer work in North American archaeology is generally influenced by Judith Butler and work on sexualities, resulting in specific case studies on bodies and performance or explorations of sexual identities, most often in historical contexts. It is recognized that many of queer archaeologies' concerns parallel those of feminism, where its roots lie (Voss 2009).

Queer is not overly visible in North American archaeology today. In an attempt to galvanize a focus on queer and gender archaeology, the 2004 Chacmool conference was organized around the theme "Que(e)rying archaeology"; even though it produced statements from leaders in the field surprisingly few queer papers were presented. Recent work on sexualities and colonialism may indicate a new avenue for queer research in archaeology (Casella & Voss 2011).

Key Issues/Current Debates

Some long-standing and some recent debates crosscut feminist, gender, and queer interests, while others feature more strongly in one area. The key issues outlined here are (1) the relationship between feminism and gender; (2) epistemological concerns; (3) accountability; and

(4) identities and embodiment. In the latter, the question of whether gender is necessarily relevant to all identities is raised.

The Relationship of Feminism to Gender

The question of whether gender archaeology need necessarily be feminist emerged in the late 1980s and has not entirely gone away. Gender is now present in many conventional archaeological interpretations alongside other social variables, but feminism is rarely mentioned. This is seen as a problem for some feminists who argue that gender without feminism loses the possibility of producing fundamental change (Conkey 2005; Wylie 2007). Moreover, feminist theoretical resources enable gender to remain as a dynamic concept in archaeology and allow us to account for the "epistemic and political commitments that inform practice" (Wylie 2007: 215).

The counterclaim is that feminism introduces an unnecessary political bias and risks further isolating gender from the mainstream. Though, it has been claimed that feminist epistemological concerns are central to gender work in archaeology at all levels irrespective of whether the label is used (Tomášková 2011).

Most feminist archaeologists retain the concept of gender in their work; gender as a category of analysis is still needed, even if expanded in scope (Conkey 2005: 19). Wylie (2007: 213) argues for the methodological axiom that gender should not be disappeared. Queer and some feminist archaeologists, however, see gender as a potential barrier to conceptualizing identities and bodies in nonbinary ways (Joyce 2008). Many continental feminists, for example, do not work with the notion of gender at all, but rather work through sexual difference. Judith Butler is a bridging figure who draws on sexual difference feminists but uses the social science conceptual language of gender, which may account both for her popularity and the misunderstanding or disavowal of some of the more radical implications of her work.

Epistemology

The charge leveled against feminists that objectivity cannot be maintained when an explicitly politically oriented approach is taken is rebuked by feminist archaeologists who claim that feminism can provide better, more objective accounts of the past while simultaneously valuing ambiguity (Conkey 2005). Thus, in common with post-processualism, feminist archaeologists tend to be concerned with the nature of political influence. Though, feminism is even more concerned with equity issues, leading to some adversarial exchanges on the grounds that post-processualism simply reproduces androcentric and heterosexist structures in the discipline (Tomášková 2011: 113-5).

Conkey and Spector (1984: 21) argued that the greatest limitations on our knowledge of the past are epistemological rather than lack of data (see also Wylie 1992). Epistemological concerns have to do with what we say about the past, how we go about saying it in a reasonable and justifiable way, and who has the authority to speak – all parts of the feminist method debate (Wylie 2007: 211). Questions that have concerned North American feminist archaeologists in relation to archaeological practice include ending inequality in the workplace, methodological issues, especially around objectivity, and who has the authority to speak. Workplace inequities are real and systematic, and the politics of gender affects data collection and interpretation in profound ways (see contributors to Gero & Conkey 1991).

The method debate is commonly phrased in terms of how to have gender while keeping archaeology objective, neutral, value-free, and scientific. Feminist archaeology has established itself as a legitimate field partly by addressing conventional archaeological concerns about empirical adequacy, hence its long-term protagonism with processual archaeology. One response has been the argument that gender archaeology can lead to "processual plus," a better but fundamentally unchanged processual archaeology (see Tomášková 2011: 115). The suggested has been criticized as an add-on to an unreflexive positivist approach (Tomášková 2011). In contrast, by locating feminist archaeology firmly within the tradition of post-positivist feminist critiques of the sciences,

a philosophical space is opened for an engaged feminism without conceding the legitimating authority of science. Feminist archaeologists argue that it is the reflexive recognition of our standpoint as positioned subjects that provides the grounds for "strong objectivity" (Wylie 2007: 213). Wylie (1992: 30) has argued that "politically engaged science is often much more rigorous, self-critical, and responsive to the facts than allegedly neutral science, for which nothing much is at stake." Accordingly, social location rather than a polluting effect of our subjectivity is constitutive of the research process and simultaneously decenters a singular, authoritative science and hence opens the way to legitimizing other perspectives.

Ambiguity of data and interpretation is embraced by some feminist and queer archaeologists; data are irreducibly ambiguous, so interpretations must be uncertain and open (Conkey 2005: 25). To think otherwise is to falsely reduce complexity, to seek closure and causal simplicity (Wylie 2007: 213). Feminist archaeology adopts "strategic ambivalence" (Wylie 2007: 81) that refuses both unreflective objectivism and reductive constructivism. Empirical constraints exist but feminist archaeology has created an alternative epistemic position that also recognizes ambiguity and sociopolitical factors (Conkey 2005).

In queer theory, the impact of subjectivity on what pasts get written meets feminist critique in the recognition that masculine norms define the process of professional socialization, with institutions reproducing gendered and sexually normative conventions (Wylie 2007; Voss 2009).

Accountability

Feminist archaeology is concerned with ethical and political responsibility for knowledge production. Recognizing the stakeholders in knowledge claims implies a different type of research practice involving the formulation of questions, the control and management of projects, and the forms of knowledge dissemination. Spector's (1993) work has achieved iconic status. Her project included Wahpeton Dakota people from the outset; she then wrote an account that melded conventional scientific analysis and presentation of the data with reflexive discussion of the research process and narrative reconstructions of the life of a young Dakota girl.

The question of accountability can also refer to the early and ongoing effort to recover women researchers whose contributions to the history of archaeology had been lost. Similarly, queer archaeologists, while signaling the danger of writing a history of deviants, stress the importance of uncovering a queer heritage to counter sometimes brutal contemporary politics (Voss 2009).

Joyce and Tringham (2007) stress the multiplicity of voices that need to be recovered from the past. Other authors have experimented with nonconventional narrative reconstructions of archaeological data (Spector 1993) in an attempt to get away from exclusionary scientific discourse. The BACH (Berkeley Archaeologists at Çatalhöyük) project's "Remixing Çatalhöyük" website (http://okapi.dreamhosters.com/remixing/mainpage.html), in which knowledge of the Neolithic site is created and mediated through an experiment in multi-vocal "open construction," clearly draws on Ruth Tringham's earlier, explicitly feminist work (Joyce & Tringham 2007). The inclusion of a broad range of publics in archaeological debate and interpretation of the past has resulted in the development of other web-based projects, such as the "Sister Stories" hypertext work, which presents fictional accounts based on Nahuatl-language texts about the Aztec capital, Tenochtitlan (Joyce & Tringham 2007).

Identities and Embodiment

Initially, the notion of gender identity was used in a straightforward way as the compliment to a socially constructed idea of gender (Conkey & Spector 1984). While it is still used commonly in this form, the introduction of post-structuralist feminist and queer theory that challenges the notion of a stable core to identity has led to work that conceptualizes identity in nonessentialist ways. Work on the archaeology of the Chumash of coastal southern California shows that identities may only be relationally relevant, based more on practice and profession than an enduring attachment to biologically based categories (see summary of Sandra

Hollimon's work in Joyce 2008). The case demonstrates that we need not assume that identities are stable or co-terminus with bodies or that age and gender categories remain universally recognized and fixed.

The limited work on masculinities in archaeology provides an interesting case of the limits of identity archaeology (Alberti 2006). In archaeology, successful accounts of historically and culturally specific masculinities have demonstrated that identities associated with male bodies are highly variable and hierarchically organized (captured by the model of "hegemonic masculinities"). Most work in this genre has been carried out on documented cases. A notable recent example is the archaeology of the University of California's chapter of the Zeta Psi fraternity (Wilkie 2010). Wilkie (2010) uses a rich array of archaeological, architectural, and documentary evidence to reconstruct the changing and heterogeneous nature of modern masculinity from the late nineteenth to mid-twentieth centuries. However, the use of the term "masculinity" outside of historical contexts may have the paradoxical effect of reinstating an ahistorical essentialism to masculinity (Alberti 2006).

The concept "embodiment" was developed to explore ways in which identity and bodies can be thought of in nonbinary ways (see Joyce 2008). This perspective accompanies a critique of the sex/gender dualism as a timeless structure. Sex is understood to be equally historically contingent; a critique that has actually been present since early in the history of gender archaeology. One result has been the development of archaeologies of embodiment and the theory of gender performativity (Joyce 2008). Embodiment indicates that all people experience their worlds from specifically embodied perspectives and, moreover, that a gap can exist between an individual's or group's embodied experience and the norms or expectations of the dominant society. Not all people or groups experience their bodies and society's norms the same way; such norms have a differential and sometimes exclusionary impact.

Judith Butler's theory of gender performativity has been a major influence on the archaeology of embodiment. The theory has been taken in archaeology to mean that gender is a kind of incessant action involving dress, gestures, and material culture, in fluid relationship to the materiality of the physical body (Joyce 2008). Such acts enforce or naturalize sex into historically contingent organizations, stereotypically binary in the modern West.

International Perspectives

Norway, along with Sweden, saw the establishment of a feminist archaeology in the late 1970s and 1980s; the United Kingdom was also an early influence. Today, however, North American archaeological publications devoted to issues concerning feminisms, gender, and queer dominate (Fig. 1). As such, they serve as a source of inspiration for feminist archaeology in Scandinavia, although the interest does not appear to be reciprocated.

There are apparent differences in the scholarship on queer archaeology between North America and the United Kingdom. North American

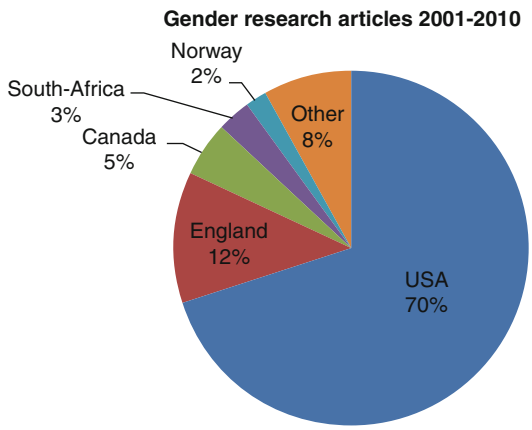

Gender, Feminist, and Queer Archaeologies: USA Perspective, Fig. 1 Number of gender research articles published in archaeology by country between 2001 and 2010 according to Thomson & Reuter's Web of Science (Arts & Humanities Citation Index, ISI). Gender research includes keywords, such as gender, feminism, masculinity, queer, embodiment, and intersectionality. There were 97 gender articles published out of a total of 3,525 archaeological articles

work tends more toward studies of sexuality, bodies, and performance (Schmidt & Voss 2000; Joyce 2008), whereas queer theorists in the United Kingdom and Scandinavia often take the dictum that queer is about opposition to the norm as their starting point (see contributors to Dowson 2000). Moreover, the genealogical relationship to feminism is stressed less in the United Kingdom. Exclusions in feminist scholarship have been noted, such as the assumption of normative family structures or the implication that sexuality is a secondary effect of gender (Dowson 2006); and epistemological concerns in relation to queer are more visible. Marginalization of studies of sexuality in archaeology and the recognition that the past is always already heterosexual has been linked to the question of epistemological privilege – whose account of the past is given greater credibility (Dowson 2006).

Future Directions

Work that takes gender as a social variable seems entrenched in North American archaeology. The most exciting theoretical developments, however, are in feminism and queer archaeology, including work on intersectionality, community or public archaeology, and new feminist and queer materialisms.

It has been argued that intersectionality and the postcolonial critique represent a turning point for archaeology in general (Conkey 2005: 10). Intersectionality is a means of describing and theorizing the many intersections among gender and other elements of identity, such as "race," class, age, and sexuality, within complex sociopolitical contexts. It is clear that an analysis of gender alone is inadequate – gender is constituted by its intersections. Earlier convergences between the interests of feminists and indigenous peoples in North American archaeology (e.g., Spector 1993) have been reframed and explicitly theorized as intersectionality (Conkey 2005). Within this framework it is understood that multiple relations of domination result in privilege, differing positions and hierarchies among communities and individuals. In this light, Conkey (2005: 12) redefines gender as a contingent set of ideas and practices within multiple systems of oppression. The type of analysis entailed directs us toward the small scale, to daily lives, and the specific details of singular sets of relations. One point of intersection is the need to understand how inequality, in general, works in our present-day lives and in the lives of past peoples. However, just as intersections are needed precisely because of the partiality of perspectives, as feminist epistemology has outlined so clearly, Conkey (2005: 25) warns against scaling down or making hierarchical the relations that are intersecting, reducing, or subordinating one relation to another. Seeking clarity about gender, ironically, could produce just such a privilege.

Work in this genre includes contributions to Casella and Voss (2011), which demonstrate the constitutive intersections of sexualities, embodiments, and colonialism. Battle-Baptiste (2011) presents a non-formulaic Black feminist reflexive methodology to study the intersections of "race," gender, and class in the historical archaeology and history of Diasporic African Americans. There are also strong connections among intersectional approaches and recent Marxist archaeologies of praxis.

Although located in the United Kingdom, one model for the important convergence of feminist and queer approaches is the archaeology of the women's protest camps at Greenham Common (Marshall et al. 2009). The camps were occupied by women and children in the 1980s to protest the deployment of Cruise missiles. Spector's (1993) work, which emerged from a concern that archaeological practices and interpretation be meaningful on human terms, is a clear antecedent. In the Greenham Common case, the reflexive autoethnographic narratives of the three women researchers provide a possible model for feminist and queer archaeology, where issues of authority, vocality, and intersectionality are put into practice. Refusing to stay outside of Greenham's politics (Marshall et al. 2009: 233), their research method mirrors the queer nature of the site, with women and children living outdoors in

communities and adopting practices that were threatening to heteronormative society.

On more speculative theoretical grounds, one direction that diverges from current work in North American archaeology but has its roots in queer and feminist approaches is a renewed interest in materiality. In the social sciences, in general, there is much recent interest in "post-human" approaches to materiality and identity. This is partly a response to what are thought to have been the excesses of the linguistic turn, represented in archaeology by symbolic and interpretive approaches under the umbrella of post-processualism. The theory of gender performativity, for example, would appear to give culture or discourse too much power over bodies and materiality. Archaeologists are consequently returning to the materiality of their subject matter as a source of agency in social life. In relation to sex and gender, this can take the form of a reassessment of the agency of the body conceived of as plastic and developmental rather than static. Or the body's natural variability and peoples' experiences of their embodied selves can be thought of as never fully erased by discourse and therefore free to challenge the binary gender/sex model (Joyce 2008). New queer and feminist approaches to osteoarchaeology in North America stress that knowledge of the sexed body is historically bound and thus open to future reformulations (Joyce 2008).

Tomášková (2011: 113) has recently asked whether gender archaeology is thriving. While gender in archaeology clearly has an enduring legacy and the impact of feminism on the discipline is undeniable, they arguably have not produced the sought after revolution in archaeological questions, frameworks, and practice. Has gender archaeology lost its cutting edge, its aura of creativity? One legacy of feminist archaeology is the space opened up for queer archaeology (Dowson 2006; Voss 2009). In some ways, queer has come to occupy the position of the radical side to gender archaeology and has taken on elements of a feminist project not addressed by more orthodox feminist approaches in the discipline.

Cross-References

- ▶ Activism and Archaeology
- ▶ African Diaspora Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Çatalhöyük Archaeological Site
- ▶ Colonial Encounters, Archaeology of
- ▶ Community Archaeology
- ▶ Conkey, Margaret Wright
- ▶ Engendered Archaeologies
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: Spanish Perspective
- ▶ Gero, Joan
- ▶ Handsman, Russell G.
- ▶ Indigenous Archaeologies
- ▶ Joyce, Rosemary
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Materiality in Archaeological Theory
- ▶ Meskell, Lynn
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory
- ▶ Sex Assessment
- ▶ Wylie, Alison

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Genetic Bottlenecks in Archaeology

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Introduction

Inferences about human population histories are often made from genetic data. These are formed on the basis of some theoretical assumptions which relate the extent and nature of observed genetic variation with certain demographic events in the past. There are a number of factors contributing to genetic diversity of a population, but all others being equal the populations with larger number of breeding individuals have generally higher genetic diversity than populations with smaller size. The relationship between the effective population size (Ne) and genetic diversity is dynamic and maintained by random genetic drift. In a simplified model where a population maintains its size over time at a constant level in the absence of selection, recombination, and new mutations, we can make predictions on how many generations it would take before all genetic variation would be removed from the population by random genetic drift. In such theoretical population with Ne breeding male individuals, any new mutation in a genetic locus, such as Y chromosome, will have a probability of 1/Ne to become eventually fixed in the future generations. That means that on average the expected time for one Y chromosome lineage to reach 100 % frequency and all others to become extinct is Ne generations. On average, 1/Ne-th of genetic variation is lost by drift every generation. Small populations loose proportionally more variation than large populations during the same time period. Under equal sex ratios, there are four copies of an autosomal gene for any gene on Y chromosome in the population, and thus, the expected time of the fixation of one autosomal variant in a population of 2Ne breeding individuals is 4Ne. Thus, autosomal loci loose genetic variation by drift more slowly than the Y chromosomes. Adding mutation to this model, an equilibrium point can be considered where the amount of new genetic variation generated by mutation will be equal to the amount of genetic variation lost by drift. In real life, however, the population sizes are fluctuating over time. During the time of population expansion, new mutations can accumulate more rapidly than drift eliminates them, and, conversely, when a population is under contraction, drift eliminates more variation than is being created by mutation (Wright 1931).

Definition

Genetic bottleneck is a time period in the demographic history of a population during which the effective population size decreases significantly to the extent that leads to a detectable reduction of genetic diversity of the population.

Conceptually similar to the genetic bottleneck is a phenomenon called *founder effect*, that is, "*the establishment of a new population by a few original founders (in an extreme case, by a single fertilized female) which carry only a small fraction of the total genetic variation of the parental population*" (Mayr 1963).

In cases of both the founder effect and genetic bottleneck, a population can be derived from a small number of ancestors. The difference between the two lies in the separation of the parental and daughter populations either by time or space. Bottleneck refers to a demographic event, a disease epidemic or natural catastrophe which reduces the size of a single population while founder effect involves typically a dispersal event, such as colonization of a new territory by a small group representing a minor subset of genetic diversity of the parental source population.

Key Issues/Current Debates/Future Directions/Examples

Speciation Bottleneck?

African origins of anatomically modern humans are widely supported by genetic, archaeological, and fossil evidence. There is less agreement, however, on whether the human-specific traits evolved continuously over time or emerged suddenly as a result of a genetic bottleneck. What is the date of birth of our species? While recognizing humans and Neanderthals as two separate species that split from each other 300–500 ka ago (Noonan et al. 2006; Endicott et al. 2010; Green et al. 2010), we can expect that traits specific to humans evolved gradually over time. If the evolution of human-specific traits was indeed gradual, then the human-Neanderthal split time should also be considered to be the birth date of our species.

An alternative model of speciation bottleneck claiming that the birth date of anatomically modern humans is much younger than the split from Neanderthals was proposed in 1990s. The evidence for this model came from the analyses of human mitochondrial DNA and Y chromosome loci that showed coalescent times less than 200 ka ago. These young coalescent dates along with scarce fossil evidence of anatomically modern looking crania from Africa dating approximately to the same time period became to be interpreted in favor of the speciation bottleneck model. According to this model, modern humans emerged suddenly as a new species after their ancestors had gone through a severe bottleneck. Analyses of autosomal loci, however, have yielded coalescent times ranging from half a million up to a few million years, failing to support the scenario involving a more recent 200-ka-old speciation bottleneck. The long-term effective population size 10,000 as often estimated from genetic data is thus not to be taken as a bottleneck estimate, but rather it should be understood that the effective size of human ancestral populations never decreased to less than 10,000 for the last 1 Ma. Analyses of autosomal genes have not been able to identify a significant demographic event in the history of human populations that would date to around 200 ka. Estimates based on the genome-wide sequence data, instead, suggest that the size of human ancestral populations remained relatively stable (Ne $\sim$ 8,000–10,000) for the last 1 Ma (Li & Durbin 2011). The highest of Ne at 13,500 individuals was dated to the time period approximately 150 ka ago. This peak could reflect either a temporary increase of human census size in Africa or be an outcome of previous fragmentation of African populations followed by their subsequent admixture. According to the analyses of complete genome sequence data, the size of human ancestral

populations had dropped drastically down to that level by approximately 3 Ma ago. Before that the effective population size may have been an order of magnitude higher.

Global Bottleneck Induced by the Toba Volcanic Eruption 74 ka Ago?

It is widely accepted that modern humans spread out of Africa and colonized the rest of the world during the last 100 ka. There is much less agreement on the route, how many times and exactly when the dispersal(s) from Africa took place. One of the models, the Weak Garden of Eden hypothesis (Harpending et al. 1993), suggests that humans dispersed out of Africa as early as 100 ka ago, then passed through parallel population bottlenecks and expanded again in size around 50 ka. One of the possible causes for a bottleneck between 50 and 100 ka according to the paleoclimatic evidence is the volcanic eruption of Mount Toba 74 ka ago, which is the largest known explosive volcanic eruption of the Quaternary. It has been thought that the volcanic winter induced by the Toba eruption could have decimated globally much of human population and that only some refugee populations in the tropical regions of the world survived (Ambrose 1998). Archaeological evidence from India suggests continuity of occupation of some sites below and above the Toba ash layers (Petraglia et al. 2007) consistent with the view of early dispersal. The hypothesis lacks support so far, however, from paleoanthropological evidence as no anatomically modern human fossils have been found outside Africa before 50 ka. Coalescent dates of mitochondrial DNA and Y chromosome haplogroups that are found outside Africa and their closest African sister clades suggest that the out-of-Africa dispersal had to have taken place after the Toba eruption, sometime between 50 and 70 ka (Underhill & Kivisild 2007). Autosomal estimates of the split times of non-African populations have also supported the recent chronology rather than pre-Toba dates.

While not supporting the bottleneck scenario, evidence from autosomal, mtDNA, and Y chromosome loci, by showing reduced genetic variation in populations living outside Africa, has been commonly interpreted in terms of a founder effect. Genetic diversity declines in correlation with geographic distances from Africa, and this has been taken to suggest that peopling of Eurasia was a process involving a series of founder effects (Ramachandran et al. 2005).

Mitochondrial Bottleneck

Bottlenecks affect not only the genetic diversity in populations but they can also occur within the organisms at the cellular level. Mitochondrial bottleneck is a drastic reduction of the number of mitochondria in the germ cells that takes place at certain stage of development of each individual female. Mitochondria are present in all human cells as vital organelles that generate the ATP molecules that are used as chemical source of energy by the cell. Human egg cells can contain up to a few thousand mitochondria, and all other human cell types have, depending on their energy demand, a few tens up to thousands of mitochondria. At one stage of the oogenesis, between the primordial germ cells and primary oocyte, there is a drastic reduction of mitochondria that are carried over to the next cell generation. As a result, all cells of the offspring can be traced back to a small number of maternal mitochondria (Carling et al. 2011).

Cross-References

- ▶ DNA Interpretation Constraints in Archaeology
- ▶ First Australians: Origins
- ▶ Human Evolution: Molecular Timescale

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Genetics of Animal Domestication: Recent Advances

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Introduction

Although domestic species of plants and animals were key to the development of Darwin's theory of natural selection and featured prominently in his books, domesticates have not recently been central to the study of evolution and evolutionary genetics. However, recent developments in molecular genetics tools and techniques are changing this, renewing interest in the genetics of domestication and the use of domesticated species as model organisms for addressing general evolutionary questions (Wiener & Wilkinson 2011). This entry reviews how current genetic analyses are clarifying our views of animal domestication.

Key Issues and Examples

Detection of Selected Genes or Genomic Regions

Selection has clearly been a key force in shaping the histories and phenotypes of domesticated animal species, but the processes by which this has happened have only recently been addressed. Various approaches, many borrowed from human genetics, are being used to identify regions of the genome carrying signatures of selection, which thus may be associated with changes underlying domestication and breed development. One approach adopted in domestication genetics is to examine patterns of diversity around candidate genes, which based on their function are likely to have been targets of selection. However, most techniques have been developed or extended to exploit the current availability of dense

genome-wide marker panels, allowing scans of the genome that search for patterns consistent with selection. These include tests identifying breed differentiation, reduced genetic diversity, extended linkage disequilibrium (statistical associations between loci), or non-neutral allele frequency patterns in specific genomic regions as well as associations between genotype and domestication-related phenotypes.

The application of these various population genetic approaches has identified several classes of genes that appear to have been under selection. The strongest evidence for genetic changes associated with domestication and breed development has been found in genes related to animal color and pattern. Selection on a number of genes has resulted in a wide variety of colors and patterns across breeds, as evidenced by genetic differentiation and frequency spectrum patterns near these genes, including *MC1R* (melanocortin 1 receptor), which is associated with the switch between eumelanin (brown/black) and pheomelanin (red/yellow) pigment production. Although the closest wild relative to the domestic pig, wild boar, carry substantial neutral variation at this gene, nearly all individuals genotyped so far express the same *MC1R* protein, resulting in a coat in different shades of brown (Fang et al. 2009; Li et al. 2010). In contrast, there is reduced neutral variation in domesticated pigs but at least 10 different *MC1R* proteins, associated with a wide range of coat colors (Fang et al. 2009). Variation at *MC1R* is also responsible for independent evolution of the black coat in both European and Asian pigs, which carry different variants at this locus (Li et al. 2010). The selection in Chinese pigs appears to be due to the preference for the black coat in animal sacrifice rituals during the Neolithic period. There is also a suggestion of selection acting on several other color and pattern genes, including *KIT*, which affects melanocyte migration from the neural crest to the skin and is associated with spotting, belting, and other coat patterns in pigs, horses, and cattle. Evidence for selection near the *KIT* locus has been found from allele differentiation patterns between breeds of sheep (Kijas et al. 2012) and cattle (Stella et al. 2010).

Another group of genes that show signatures of selection are related to growth, size, and body conformation. The *GDF*-8 (myostatin) gene has been associated with a variety of muscle conformation phenotypes in cattle, sheep, and dogs. A dramatic reduction in genetic diversity, indicative of selection, has been identified near this gene in cattle breeds with exaggerated muscle development (double muscling) such as the Belgian Blue and Asturiana de los Valles (Wiener & Gutierrez-Gil 2009), and there is strong differentiation between Texel sheep, a highly muscled breed, and other sheep breeds (Kijas et al. 2012) near this gene. The region including the growth hormone receptor gene (*GHR*), associated with growth and cattle production traits, has also been highlighted by both breed differentiation and within-breed selection scans of the bovine genome (e.g., Hayes et al. 2009). The regions surrounding *IGF1* and *HMGA2*, two genes associated with body size, show signatures of selection in dogs (Sutter et al. 2007; Akey et al. 2010; Boyko et al. 2010).

There is limited evidence of selection signatures on genes related to fertility and reproduction. The clearest example is that of the thyroid-stimulating hormone receptor (*TSHR*) gene (Rubin et al. 2010), which is involved in metabolic regulation and reproduction. The region encompassing this gene was almost completely identical over a 40-kilobase segment across all domestic chicken lines. This gene also showed evidence of differentiation between sheep breeds (Kijas et al. 2012).

A final group of genes that show strong evidence of selection-imposed changes are those associated with skeleton- and skin-related phenotypes. One of the strongest signals of breed differentiation in a genomic scan of 10 dog breeds (Akey et al. 2010) was seen near the *HAS2* gene. This signal was seen only in the Shar-Pei breed, characterized by a distinctive skin folding phenotype not seen in other breeds. By comparing groups of dog breeds with distinct characteristics, genomic regions

associated with ear shape and tail curl have also been located, although the underlying genes have not yet been identified (Boyko et al. 2010). Similarly, a region on sheep chromosome 10 shows a strong signal of differentiation between horned and polled (hornless) breeds, and it has been suggested that mutations in the *RXFP2* (relaxin/insulin-like family peptide receptor 2) gene may be associated with loss of horns in this species (Kijas et al. 2012).

Detecting Demographic History

Genetic data is also helping to unravel the demographic history of domesticated breeds. Linkage disequilibrium (LD) declines with the genomic distance between markers; moreover, the shape of the relationship provides information on population history. LD patterns can be used to infer past effective population size (the number of individuals in an idealized population that would have the same rate of genetic drift as the actual population) and demographic events, as the LD between tightly linked markers reflects effective population size further in the past than the LD between loosely linked markers.

The relationship between LD and genomic distance has been exploited in a number of studies to estimate past effective population sizes of domesticated animal species. The cattle HapMap study (Gibbs et al. 2009) analyzed dense genome-wide SNP data from 19 breeds. They found that the decline of LD with distance between markers was generally rapid but varied between breeds. In contrast to the pattern seen in humans, effective population size appears to have declined recently for all breeds, presumably due to bottlenecks associated with domestication and breed formation. Comparing LD-distance relationships across breeds can be used to understand the different breed histories. The N'Dama (an African taurine breed, humpless cattle originating in the Middle East) had the highest LD values of all breeds at short distances, indicating a small ancestral population, whereas the three indicine breeds (humped cattle originating on the Indian subcontinent) had lower LD than the other breeds at short distances, indicating a relatively large ancestral population compared to the taurine breeds. This characterization of indicine cattle is consistent with findings of higher nucleotide diversity in indicine than taurine breeds (Gibbs et al. 2009).

An LD-based approach has also been used to reconstruct the demographic history of dogs. The publication of the first genome sequence for the dog and the initial set of dense SNP genotypes for dogs from various breeds allowed an assessment of LD patterns both within and across breeds (Lindblad-Toh et al. 2005). The decline in LD with respect to physical genomic distance for the overall dog population was rapid, falling quickly to low background levels. This relationship is consistent with a domestication-related bottleneck ~5,000–9,000 generations ago, based on comparisons with simulated data (Lindblad-Toh et al. 2005; Gray et al. 2009). In contrast, within most dog breeds, the presence of long-range homozygous haplotypes and high levels of LD over extended regions is consistent with a more severe contraction in population size 30–90 generations ago, at the time of breed-creation events. However, some dog breeds (e.g., Labrador Retrievers) do not have particularly high levels of LD (Lindblad-Toh et al. 2005; Gray et al. 2009), presumably because of their relatively large effective population size.

Introgression

Genetic data has also shed light on past introgression (hybridization) between breeds. Animal breeders often practice crossbreeding to introduce certain desirable traits for breed improvement. In the case of pig breeds, human-mediated crossing has influenced the genetic composition of European breeds (Wiener & Wilkinson 2011). In the eighteenth and nineteenth centuries, Asian alleles were introduced into certain British pig breeds to promote traits such as fattening and earlier maturation (White 2011). Molecular genetic studies have since provided evidence of this introgression. A study examining mitochondrial diversity in pigs revealed that a number of European commercial pig breeds carry Asian-like mtDNA

haplotypes (Fang & Andersson 2006). Genetic introgression can also be non-human-mediated, such as gene flow between wild relatives and domestic populations. For example, Fang et al. (2009) found that a Chinese wild boar carried an *MC1R* allele common in European domestic pigs, presumably resulting from gene flow.

Future Directions

Although identification of the genes important in animal domestication and breed development is still in its early stages, some common themes have emerged. One is that there are clearly strong signatures of selection near a number of genes associated with coat color and pattern. There are also indicators that suggest selection on genes related to growth and body composition. For example, there is clear evidence in cattle and sheep for selection on the myostatin gene, associated with muscle composition, and several studies also suggest that there may have been selection in cattle on the growth hormone receptor gene, associated with growth rate and various production traits. In dogs, there is also evidence of strong selection on a number of genes associated with growth and skeletal traits, many of which are associated with breed-specific characteristics. Understanding the selection history of complex traits such as those related to behavior and milk production will require more extensive analysis. Genomic information has also provided substantial insight into the demographic and breeding history of domesticated animal species.

Cross-References

- ▶ Cattle: Domestication
- ▶ Dog: Domestication
- ▶ Genetic Bottlenecks in Archaeology
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Pig: Domestication
- ▶ Sheep: Domestication

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Genetics of Early Plant Domestication: DNA and aDNA

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Introduction

The evolution of domesticated forms of crops was associated with the transition from hunting-gathering to agriculture at various centers around the world. Genetics has long been used to study domestication to answer questions about the mode and length of the process. Ancient DNA has been used to add a temporal dimension to interpreting genetic diversity by providing evidence of past expansions, some of which failed, and direct evidence of the selection of traits associated with domestication. A major challenge of the field is to reconcile genetic evidence with archaeological evidence and to redefine what exactly is meant by the term domestication.

Definition

In the case of plants, the evolution of domestication involves the selection of a characteristic group of traits that are collectively termed the domestication syndrome. Typically, half a dozen or so traits occur in any one domesticated plant. These traits include the loss of shattering (the ability for a plant to abscise and drop its seeds), changes in seed size, loss of photoperiod sensitivity, changes in plant physiology, and architecture. A combination of genome-wide information and direct evidence from the DNA obtained from the archaeological record is being used to assess the molecular mechanisms underlying domestication syndrome traits, the pace of the transition and the strength of the selection processes involved to understand this human-plant interaction.

Key Issues/Current Debates/Future Directions/Examples

Understanding the evolution of domestication of plants is a subject that is interlocked with understanding the rise of civilization. In broad terms, there have been two extreme viewpoints about the origins of domesticated plants, and the debate is ongoing. The first viewpoint is that the evolutionary process was rapid, artificial selection was strong, and domestication events were infrequent and often geographically restricted (Zohary & Hopf 2003). Associated with this viewpoint is that predomestication cultivation was limited and that domesticated plants appeared as a package originally described by Gordon Childe as a "revolution." The alternative viewpoint is that the evolutionary process was slow, and domesticated forms appeared in parallel in different locations (Weiss et al. 2006; Willcox et al. 2008).

Genetic evidence based on early techniques initially supported a simple origin for most crops (Brown et al. 2009). A problem was that these genetics-based findings contrasted with emerging evidence from the archaeological record that suggested that predomestication cultivation occurred for substantial periods before the emergence of domesticated forms and also that the assemblage of the traits of the domestication syndrome occurred in a staggered manner over a considerable time period (Fuller 2007). Further evidence directly from the archaeobotanical record suggests that the selection pressures involved for at least some of the domestication syndrome traits, such as seed size and loss of shattering, were low within the range of normal natural selection for both wheat and rice (Purugganan & Fuller 2011). While these initial differences between the interpretation of genetic evidence and emergent archaeological evidence were reconciled through computational models that established that the genetic data could be interpreted within the archaeological framework (Allaby et al. 2008), the debate about the pace of transition continues and is dominated in particular by consideration of cereals of the East and Near East (Abbo et al. 2011).

A similar series of developments have occurred in the understanding of the evolution of domestication at tropical latitudes. The types of plants domesticated in the tropics differ in character to those of temperate latitudes including a large number of arboreal and herbaceous species with large fruits or tubers. It has long been known that tree species such as sweet almond were exploited well into the Pleistocene by peoples of the tropics. This can perhaps be compared to the well-known exploitation of hazel nuts by Mesolithic peoples of temperate Europe; however, the latter are not considered a domesticated species. In the case of arboreal species, the domestication syndrome is subtler than for cereals often only being evident in the thinning of nutshells or fruit skins in the case of screw pines and loss of seeds in the case of breadfruit, for instance, which raises the question at what point a plant species can be considered domesticated. A variety of features such as dwarf habit, self pollination, and a "*niu vai*" fruit morphology have been identified in the case of the coconut, which has now been shown to have complex origins from genetic evidence (Bunn et al. 2011). Despite the acceptance of a long history of tree exploitation, little credence had been given to the exploitation of herbaceous species in the early Holocene, until recently. Archaeological evidence shows the exploitation of bananas, for instance, in the Papua New Guinea Highlands in the early Holocene well before what is normally considered the onset of cultivation in that region. The genetic evidence in this case shows an extremely complex origin of bananas involving the differentiation of subspecies of the diploid progenitor in the islands of Southeast Asia and western Melanesia, followed by hybridizations repeatedly producing sterile triploids which have the seedless syndrome trait, such as the Cavendish banana (Perrier et al. 2011).

As analyses have moved to the genomic level increasingly, the specific genetic mechanisms underlying some domestication syndrome traits are being understood for several of the major cereal crops (Fuller & Allaby 2009). In the case of rice, it is apparent that different traits appear to have originated in different geographic origins (Shomura et al. 2008). The scale of the genetic underpinning of domestication is also becoming apparent, and although the number of syndrome traits is relatively low, the number of loci involved appears to be high. For example, in the wheat 30–70 genes have been estimated to be involved, over 30 genes in sunflower, and 50 genes in maize (Peng et al. 2003; Wright et al. 2005; Chapman et al. 2008; Peleg et al. 2011). Such a large number of genes involved suggest that the evolution that is associated with domestication has been ongoing and that a rethink is required about what is meant by domestication and the relevance of the term "domestication event." In the past domesticated plants in the archaeobotanical record have been identified as such on the basis of one or two traits, particularly the loss of shattering trait, and the implicit assumption has been that other less visible traits are probably also present. However, the

staggered arrival of traits suggests this is a simplification and that a discrete "event" might be better replaced with the concept of a "domestication trajectory."

The evolution of plant domestication has also been directly studied through the use of ancient DNA. This approach has been used to establish the presence of particular species at specific locations in the past, the temporal stability of phylogeographic patterns of genes, and direct change of DNA through time. For example, the presence of one wheat species in Bronze Age Greece where it no longer occurs established the occurrence of a failed expansion (Brown et al. 1998). On the other hand, the geographical distribution of alleles from maize compared between ancient cobs and primitive land races showed that there had been little change in South America over the past millennium and that such phylogeographic patterns can be stable to the point of being indicative of initial expansions of the plant (Lia et al. 2007). Furthermore, studies in maize remains over time have shown the process of selection of domestication syndrome traits was staggered with some traits such as architecture being selected early and traits affecting flour quality being selected millennia later (Jaenicke-Depres et al. 2003). More recently, ancient DNA studies in plants have moved to the genomic level where extensive genome level evolution has been observed in cotton in the past few thousand years (Palmer et al. 2012). Such studies are leading to a consensus common to that based on extant genetic data that the evolutionary process of domestication is an ongoing trajectory rather than discrete event and that crops have and continue to change in their local habitats and in some cases represent local adaptation over thousands of years. In the coming years a more complete picture of the evolution of domesticated crops is likely to develop as new technologies are increasingly applied directly to genome change viewed through the archaeological record.

A recurrent theme in the discourse about the evolution of domestication is the level of consciousness there was in the human agency of selection. In one extreme view, early cultivators were highly aware of all "sports" (visibly mutant plants) that occurred in plant populations and judiciously selected for desirable traits. At the other extreme all traits arose through the unconscious actions of the cultivators. The former appears to lend itself to scenarios of more rapid selection, while the latter appears less restrained to a rapid or protracted process. The truth of the matter is likely to differ for different traits and species. However, understanding the mode of human agency will ultimately require the integration of archaeological and genetic evidence in meaningful and deterministic ways, which is possibly one of the greatest challenges that lie ahead.

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- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
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- ▶ Bananas: Origins and Development
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- ▶ Hunter-Gatherer Subsistence Variation and Intensification
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- ▶ Kuk Swamp: Agriculture and Domestication
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- ▶ Millets: Origins and Development
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Pigeon Pea: Origins and Development

▶ Plant Domestication and Cultivation in Archaeology
▶ Potato: Origins and Development
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Geoarchaeology

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Introduction

Geoarchaeology unites the study of the record of past human activity with the natural sciences. The geoscience approach in archaeology is used in a variety of ways, including planning and performing fieldwork and collecting information from the field, deciding on the most appropriate and useful laboratory techniques, and evaluating the long-term connections between humans and the environment. A diverse array of archaeological questions can be addressed by using earth science approaches, including studies of environmental contexts, examining patterns of human use of the land and natural resources, predicting the preservation potential and location of archaeological sites, documenting site and regional-scale sedimentology and stratigraphy, identifying and describing raw materials, evaluating taphonomic processes and the dynamics of site formation, dating, and ecological integration. Conceptually, geoarchaeology provides a means to examine long-term linkages between human populations and other components of the geosphere and biosphere.

Definition

Geoarchaeology includes the application of earth science methods to archaeology as well as the broader study of long-term patterns of interaction between people and natural systems. From the 1970s to the turn of the century, there were many discussions in the American literature concerning the definitions of geoarchaeology and archaeological geology.

Operationally, geoarchaeology is the application of any of the many subdisciplines in the geosciences (e.g., sedimentology, geomorphology, geophysics). It uses the methods, theories, and knowledge base of the geosciences to solve archaeological questions.

Based on this approach, geoarchaeology is affiliated with environmental archaeology and Quaternary geology as well as physical geography. Because of this, geoarchaeological projects employ nearly all the geoscience subdisciplines, except those that are focused exclusively on pre-Quaternary research. For instance, structural geology (folds and faults) has largely a pre-Quaternary focus, although tectonic geology, the study of earth forces resulting in folding and faulting, is important in understanding recent vertical earth movements that affect sites of human habitation, such as changes in relative sea level at coastal archaeological sites. Tectonic earth movements also generate earthquakes which have had devastating effects on humans in many parts of the world and have done so in the past as well.

There are many examples where subdisciplines of the geosciences play a critical role in archaeological studies. The study of sediments and soils is a crucial component of archaeological excavations. Artifacts can be found in unaltered sediments or in deposits transformed by soil-forming processes. Geoarchaeologists apply standard descriptive techniques to the matrix enclosing artifacts and features in archaeological sites. This approach is extended to the study of raw materials that compose artifacts. Besides the use of a standard nomenclature to document sediment and soil color, particle size, and mineralogy, the physical and chemical properties are used to infer environmental conditions before, during, and after human use of a site. Thus, one role of a geoarchaeologist as part of an archaeological research project is to make observations, take measurements, and collect samples that will help make it possible to evaluate changing physical environments at a particular site.

The principles of stratigraphy are crucial for interpreting the natural and human processes that produce an archaeological site. Stratigraphic studies provide a way to document the changes

over time at a particular site and also a way to connect sites on a regional or even global basis. These types of studies are linked to the description of sediments and soils, but they expand the application of these techniques both horizontally and vertically within an archaeological site. Stratigraphic principles are crucial for interpretations of patterns within a site and also between sites. Thus, they play a crucial role in relative dating and in landscape studies. The application of the principles of stratigraphy in archaeology also connects geoarchaeology with other historical sciences such as geology and paleontology.

Geomorphology, the study of landforms and their development over time, is used by geoarchaeologists to evaluate the long-term dynamics of landscape and climate change as well as site preservation. For instance, Das and Panjo (1999) give a geoarchaeological perspective on the late Holocene archaeological record of a region in West Bengal, in eastern India. Their work is an attempt to examine the evidence available for a landscape with a dynamic and constantly changing river environment. Their study was centered on habitation deposits and structures from the early Medieval Period (eighth to twelfth centuries). The study of Quaternary landforms should be an important part of any archaeological field project. It is important to understand the physical setting and the resources that would have made a particular location attractive for human use. Additionally, geomorphic features can contribute to an understanding of the long-term, ongoing processes that have affected an archaeological site.

Soil science, and especially the study of ancient soils, contributes in many ways to archaeology. Soil formation, or pedogenesis, occurs when a parent material like sediment or bedrock is altered over time by climate, plants, and animals. In the 1940s, Hans Jenning used the acronym CLORPT to designate the soil-forming factors of climate, organisms (plants and animals, including humans), relief, parent material, and time. Over time, a vertical sequence of soil horizons can develop within the parent material, based on additions, removals, transformations caused by processes like weathering, and movement of materials within a profile. Geoarchaeologists study the properties in the soil horizons to provide information on the conditions that led to the soil, including human activities. The basic soil horizons include (from top to bottom) the A horizon, primarily characterized by the accumulation of higher amounts of organics, weathering, and loss by leaching or translocation; the B horizon associated with weathering and enrichment by illuviation; and the C horizon, consisting of unconsolidated parent material. Soils that were formed in the past are designated as paleosols and can be on the surface or buried. Soils are very valuable in archaeology because they typically imply a period of landscape stability or period of nondeposition and can be used to infer ancient environments. In some regions, buried paleosols can be traced across landscapes. For instance, the Brady Soil and Leonard Paleosol are associated with a period of landscape stability associated with human presence during the terminal Pleistocene and early Holocene on the Great Plains of North America (Holliday & Mandel 2006). Holocene mound sites also contain paleosols. For example, four buried soils were documented at a Harappa site in the Indus Valley in Pakistan (Schuldenrein et al. 2004). Harappa period structures dating to about 4000 BP were constructed above a paleosol with A-B horizons. Below this paleosol, there were other Holocene soils and soils developed within Pleistocene river deposits. Anthrosols, or soils resulting from human activity, can provide information on how humans used the landscape. These are often studied using geochemistry.

Geochemistry has been of great value in understanding archaeological sites. This geoarchaeological technique can be used to help interpret the sediments and soils within sites. Often, changes in the acidity (pH) of the site matrix can be used to explain the preservation or absence of certain artifacts. For instance, bones are commonly preserved in sites with sediments that have high pH levels (such as calcareous or carbonate rich deposits). One of the most useful geochemical approaches has been phosphate analysis. Phosphates are deposited in

sediments and soils as the result of the decay of organic materials. Phosphorus in soils undergoes both fractionation and bonding to soil minerals. Because it bonds to soil minerals, it is not easily removed by water within the soil profile. Analyses of phosphates in archaeological sites can provide both chronometric and land use information. One example comes from the study of a large Mayan ruin in Yucatan, Mexico (Huston et al. 2009). Phosphate analysis was used to explain different lengths of occupation, variations in land use, and reveal the byproducts of maize processing. Thus, the geochemical analysis of sediments and soils provide a means for understanding human activity within sites but also can be applied to the study of broader-scale landscape dynamics.

A completely different aspect of geochemistry in archaeology is provenance studies, which can be used to help determine the source of raw materials used to make artifacts. Small changes in the abundance or types of chemicals found within artifacts can be used to determine their place of origin. Trace-element signatures can indicate geological and geographical sources of unaltered raw materials such as native copper and host of minerals and rocks including obsidian. Less well known are isotope methods. Lead isotope studies have been used for decades with modest success to determine the source of copper used to make artifacts. Recently, the vexing problem of sourcing tin has been aided by breakthroughs in tin isotope methods (Haustein et al. 2010). Although tin-bronze was used in Greece by about 2600 BCE and in central Europe 400 years later, the source of the tin has not been determined. Chemical sourcing methods were applied to tin from several regions. The measured variations in isotope values made it possible to distinguish between ores made in three different regions. These kinds of techniques contribute to an understanding of ancient networks used for the trade and exchange of raw materials used to make artifacts.

Petrography, the technique of using a polarizing microscope to analyze the content of 30-micron-thick sections of rock, was invented by geologists over 100 years ago. In recent decades, this technique has been adopted by geoarchaeologists to study a variety of archaeological materials, such as stone tools and ceramics. A good example of such studies can be seen in a paper by Fitzpatrick et al. (2003) which demonstrated the use of petrography in establishing cultural interaction in Palau, Micronesia. This study examined pottery from both volcanic and limestone islands in the Pacific. An analysis of the materials in the pottery suggested that the ceramics were locally made and then transported to other islands. This example shows how geoarchaeological studies of raw materials can be used to look at patterns of exchange and interaction.

Microstratigraphy and thin-section analysis of sediments using micromorphology are ways of examining the taphonomic (depositional and postdepositional) processes that have helped in the formation of archaeological sites and to assess their stratigraphic integrity. Micromorphology involves first collecting an intact block of sediment from an archaeological site. In the laboratory, the block is impregnated with polyester resin and then sliced to make thin sections that are examined using a microscope. For example, the micromorphological analysis of sediments collected along the contact between Middle and Upper Paleolithic deposits at a cave in Germany revealed a sharp erosional contact between the two groups of deposits, thus indicating that no mixing had occurred. Thin-section study of sediments from a Paleolithic cave in France provided evidence of burning, trampling, and hearth-cleaning activities (Goldberg & Berna 2010). A micromorphological study of cave deposits in China with pottery dating to about 19,000 years ago (the Last Glacial Maximum) demonstrated that mixing and redeposition was negligible, lending support to the stratigraphic integrity and dating of the site (Wu et al. 2012).

Geophysical techniques are used by geoarchaeologists in situations where they cannot excavate or to study places they may not be able to reach on the ground. The most common use of geophysics in archaeology is in geophysical

prospecting, often referred to as remote sensing. These techniques have proved especially important in broader-scale landscape studies. Parkyn (2010) used high-resolution geophysical surveying as a precursor to field studies, as a way to guide excavation in addressing the 120-year development of a late Victorian municipal park. Remote-sensing techniques are used to distinguish anomalies in the ground which may indicate the presence of archaeological features.

In terms of dating, archaeologists usually are somewhat familiar with carbon 14 dating but geoscientists have played only a minor role in these methods. Chronometric dating methods such as the use of carbon 14 provide a numerical estimate for the age of an archaeological site. This is in contrast to stratigraphic dating which (in the absence of correlation with other dating methods) provides only an understanding of the relative age of an archaeological deposit. Several dating techniques have been developed that can be used to analyze materials associated with archaeological sites. Besides carbon 14, the major dating techniques used by geoarchaeologists are U-series and K-Ar dating. While carbon dating has been extensively used to date organic materials from archaeological sites that are younger than 40,000 years, U-series techniques have been commonly applied to carbonates, including shells, bones, and limestones (such as travertines). K-Ar dating is used at archaeological sites that can be stratigraphically linked to lava flows and tephras. The age range for dating using U-series is on the order of several hundred thousand years, while igneous materials that are millions of years old can be dated using the K-Ar technique. In recent years, newer techniques such as luminescence dating have become more reliable and are now being applied more often to understand the chronologic context of archaeological sites.

The concepts of paleontology are especially important in biostratigraphic correlation and taphonomy. These concepts have been applied in paleoethnobotanical studies and in palynology, and zooarchaeology. Their usefulness for geoarchaeologists is in relative dating (by biostratigraphic correlation), site formation, and providing information on environmental change as reflected by biotic communities. Research on environmental change connected with the archaeological record usually studies either the general habitat associated with human presence at a particular locality or the specific resources used by people (for instance, plants or animals that are incorporated into an archaeological site because of human activities). Palynology, the study of fossil pollen, has played a crucial role in documenting changes in climate and in human land use. Changes in the types and abundances of pollen over time generally reflect changes in vegetation. The changes in vegetation may be the result of climate change, such as changes in temperature or precipitation. For example, a drought would be reflected in a change in vegetation and could be related to a contemporaneous change in the archaeological record. As an alternative, the inferred changes in vegetation may reflect human land use, such as deforestation connected with agriculture. Macrobotanical remains have proven very useful for ethnobotanical studies and also are valuable materials for carbon 14 dating. Animal remains, including vertebrates and invertebrates, also provide information on the ancient environments and resources available for human use. Usually, invertebrate remains and fossils of small mammals provide useful information on local environments, while the fossils of larger mammals provide regional-scale environmental information. Biotic remains are also important in correlations between sites; these types of comparisons have been used to examine broader-scale environmental patterns or to help place a site within a time framework.

Climate and long-term environmental change are important topics in global archaeology, and geoarchaeologists play an important role in evaluating the interplay between human societies and natural systems. These studies have focused on the ways environmental change has impacted human biological and behavioral evolution as well as the ways humans have affected the environment. The techniques applied by geoarchaeologists to study the archaeological

record and its context are especially valuable in documenting patterns of climate variation at different scales of space and time. Thus, geoarchaeological techniques are useful for understanding the record of human response to climate change at the scale of a single layer within a stratigraphic sequence at a site as well as evaluating patterns of human-environment interaction at regional, continental, and global scales.

Historical Background

The term geoarchaeology or its variations were rarely used in the scientific literature until the 1970s. The term is used to describe research that applies geoscience techniques to examine and evaluate the archaeological record. While the first explicitly geoarchaeological text might be considered Sir Charles Lyell's *Geological Evidence for the Antiquity of Man* published in the mid-nineteenth century, the history of using the geosciences to examine archaeological questions begins in the 1700s. Lyell likely would have called his work "archaeological geology," and this term is still in use today, for example, in the Archaeological Geology Division of the Geological Society of America (GSA).

One of the first and most important uses of geological concepts in archaeology is in stratigraphy. The use of stratigraphic principles to study the archaeological record is based on ideas proposed by Niels Stensen (also known as Nicolaus Steno) in the 1660s and James Hutton in the late 1700s. John Frere's 1797 report of the discovery of stone hand axes within a stratified sedimentary sequence in England is a good early example of the application of stratigraphic principles to archaeological discoveries.

While the principles of stratigraphy were crucial to understanding the archaeological record, the emergence of ecological perspectives connected with past human-environment interactions also has a long history of application to archaeological studies. From 1799 to 1803, Alexander von Humboldt conducted pioneering field research on archaeological sites in South America and Mesoamerica. Characterized by an empirical approach, Humboldt included descriptions of the raw materials used in the archaeological monuments and, in one instance, documented the internal structure of the pyramid. His studies in Venezuela linked human activities such as deforestation and cultivation to environmental change. The *Principles of Geology* published by Lyell from 1830 to 1832 included descriptions of the geology associated with archaeological sites like Vesuvius, Pompeii, and Herculaneum. Like the earlier work of von Humboldt, Lyell also recognized the contribution of human activity to environmental change. Lyell writes about how deforestation since the time of Caesar during the Iron Age had transformed the landscapes of Europe. At the same time as Lyell's *Principles* was first published, Boucher de Perthes used the principles of stratigraphy to evaluate the association of artifacts and extinct animals in the terrace river gravels of the Somme Valley, France.

Geoscience techniques were also being used to study archaeological sites in North America. Squier and Davis published *Ancient Monuments of the Mississippi Valley* in 1848 using stratigraphic methods to evaluate whether human or geological processes had created mounds found in the Mississippi Valley. In 1855, Lapham published *The Antiquities of Wisconsin* demonstrating the ways archaeological information could be incorporated into studies of landscape evolution and connected with human activities. Lapham's studies provided an example of long-term changes in the landscape associated with the transformation from prehistoric hunting and gathering to agriculture and the construction of mounds. He concluded that land covered by forest at the time of European settlement had been cultivated during prehistoric times. This is a good historical example of a study that connected the study of present-day landforms to past human land use.

Archaeologists and geologists in Europe during the middle of the nineteenth century began to develop an understanding of the ways the record of the human past reflected the long-term patterns

of human use of natural resources. A prominent example of this was the realization that there were changes in the types of raw materials used by people to create tools over time. Geologist Forchammer and archaeologist Worsaae conducted studies of shell middens in Denmark and Sweden and in 1848 collaborated with paleontologist Steerup. This multidisciplinary research became the basis for verifying the Three-Age System (Stone, Bronze, Iron) used in archaeology. Thus, in the mid-1800s, geoarchaeological techniques were being applied to both the contexts of artifacts (using stratigraphic principles) as well as the composition of artifacts to document sequences through time.

Another important historic application of geoscience techniques to archaeology was connected with the then controversial question of human antiquity. Excavations of Brixham Cave in England by Pengelly in 1858 provided well-documented evidence for the presence of humans with extinct Ice Age animals using systematic excavation techniques. The geoarchaeological observations undertaken by Pengelly, as well as Falconer, Prestwich, and Lyell eventually led to a breakthrough in our understanding of human antiquity. There were other influential publications during the 1860s. Lubbock published *Pre-Historic Times* in 1865 arguing that archaeology formed the bridge connecting geology and history.

Geoscience techniques were also an important part of classical archaeology during the last half of the 1800s, especially the use of stratigraphy. In 1860, Fiorelli started stratigraphic excavations at Pompeii, and in 1873, Conze used stratigraphic techniques during his excavations at Samothrace. In 1882, Dorpfeld began careful stratigraphic excavations at Hissarlik (Troy), following the earlier studies of Schliemann.

In America, Powell had one foot in geology and the other in ethnology; he helped establish the United States Geological Survey and the Bureau of American Ethnology in the late 1800s. There were many connections between the geosciences and archaeology during this time. Putnam worked for the survey and was known for careful archaeological excavations that employed arbitrary levels and documentation of stratigraphy. Powell felt that the evidence for a Paleolithic stage in North America had to be based on geological evidence. Likewise, Holmes, an energetic critic of the American Paleolithic, wrote that the only reliable test for human antiquity in North America rested on geology. During the 1890s, researchers such as Haynes, Abbott, and Salisbury believed the reliability of the geological evidence was crucial to evaluating archaeological sites. Winchell used his 1902 presidential address to the Geological Society of America to summarize the geological evidence for ancient humans in the New World.

During the early part of the 1900s, techniques from the geosciences were used to examine archaeological sites in the context of landscape change. Von Post used pollen studies to document vegetational change since the melting of the glaciers. Relative dating techniques were also employed. Varve dating was used by deGeer in Sweden, Sauramo in Finland, and Antevs in North America. Remote sensing in the form of aerial photography was also used. Crawford mapped over 200 archaeological sites in southern Britain using aerial photography as part of a study of settlement patterns and ancient landscapes. The links between environmental and climatic change and human activities were also of interest after 1900. In 1905, Pumpelly, another president of the Geological Society of America, applied geological methods to study the archaeology of the Anau in Turkestan.

In 1911, Gamio used a stratigraphic approach in excavations at Azcapotzalco in Mexico City, Mexico, and similar methods were employed in 1914 by Nelson at Pueblo San Cristobal. Beginning in 1915, Alfred Kidder used more controlled stratigraphic excavation techniques at Pecos Pueblo. Andersson, a Swedish economic geologist, pioneered geoarchaeology in China. He defined the Chinese Neolithic and excavated at the famous Paleolithic cave site at Zhoukoudian from 1921 to 1926.

By the 1920s and 1930s, Carl Sauer was developing his ideas about the landscape as a product of space, time, and natural and human processes.

Sauer uses the term *archaeogeography* to designate the study of archaeological sites in relation to their environmental setting (Sauer & Brand 1932). From about 1924 to 1950, Kirk Bryan was the preeminent figure combining geoscience techniques and archaeology.

Bryan's student, Herbert Wright, served as geologist for excavations at Ksar Akil, Lebanon, and also participated with Robert Braidwood's multidisciplinary project in Kurdistan, northern Iraq.

During the 1950s, geological studies were part of many archaeological studies in the Old World and in the New World. In Old World studies, Judson conducted a study of the geological and geographical setting of Abri Pataud. Sedimentological studies of Abri Pataud were started by John Miller in 1958 and additional studies were completed by Bill Farrand in 1964. Karl Butzer began his geoarchaeological research in the Nile Valley of Egypt during 1956 and 1958. Cornwall's 1958 *Soils for the Archaeologist* demonstrated the great potential sediments and soils offered in archaeological analysis and interpretation. In New World studies, geology played a prominent role in Paleoindian research in western North America. For example, Evans conducted stratigraphic studies at the Clovis type-site in New Mexico and at Lubbock Lake, Texas. Wendorf led a team which included Albritton in the study of the Midland site in west Texas. C. Vance Haynes began his important geological studies of archaeological sites in the 1950s.

Pyddoke's 1961 *Stratification for the Archaeologist* emphasized the importance of stratigraphic context. One of the most important contributions to geoarchaeology was Butzer's landmark *Environment and Archaeology* first published in 1964. In East Africa in 1962, Hay initiated his geological studies of Olduvai Gorge (Hay 1976). In Greece during the 1960s, William McDonald included earth scientists in a survey of Messenia, bringing in Wright (who had previously collaborated in archaeological projects in Lebanon and Iraq) then Rapp in 1966. Field studies conducted by Kraft, Aschenbrenner, and Rapp from 1971 to 1975 focused on the paleogeography of the coastal plain of the southwestern Peloponnese. The studies initiated by Kraft and Rapp in the 1970s turned into a long-term investigation of the ways coastal change has affected major archaeological sites in Greece and Turkey such as Troy, Ephesus, Ancient Pylos, and the landscape of the famous battle at Thermopylae.

Historically, events and publications during the 1970s and 1980s served to firmly establish the discipline of geoarchaeology. The enhanced visibility of geological applications to archaeology led to a short note coauthored by Rapp, Albritton, and Bullard entitled "Geoarchaeology Anyone?" in a 1974 newsletter of the Geological Society of America (GSA). The Archaeological Geology Division of the GSA was founded in the 1977, providing a venue and structure for specialists in the field. Several publications provided an understanding of the wide scope of geoscience techniques that could be applied to archaeological contexts and artifacts. For instance, in the late 1970s, an edited volume was published by Davidson and Shackley entitled *Geoarchaeology* and Vita-Finzi published *Archaeological Sites in Their Setting* (Butzer 1982). These were soon followed in the 1980s by Butzer's *Archaeology as Human Ecology* which emphasized the application of a geoarchaeological approach and *Archaeological Geology* edited by Rapp and Gifford which demonstrated the strong diversity of techniques used to understand the human past. The first volume of *Geoarchaeology: An International Journal* was published in 1986.

From the nineteenth century to the mid-twentieth century, the application of geology in archaeology was a "specialty" practiced by a few geologists. Since the last third of the twentieth century, it has become an organized discipline with professional societies, journals, conferences, and university programs. For the first 100 years or so, geoarchaeology was the province of the geologists. But since the late twentieth century, most geoarchaeologists have been educated in archaeology or anthropology departments and/or previously trained in geology, geography, and/or soil science. At the same time, some research traditions, especially those rooted in continental Europe, continue to emphasize the

collaboration between archaeologists and earth scientists over and above the training of students as geoarchaeologists.

Key Issues/Current Debates

Because of the wide scope of geoarchaeology, it addresses many key questions regarding the long-term connections between humans and the environment. Indeed, there is a debate about how geoarchaeology is related to other disciplines that also study people and nature. For example, some people see geoarchaeology and archaeological geology as having the same goals, while others see them as using the same concepts but having different objectives. Although there does not seem to be too much controversy over the concepts and techniques, there are different perspectives on how these should be applied. For example, archaeological geology can be viewed as the use of the archaeological record to study geological questions in contrast to geoarchaeology which would apply geoscience techniques to answer archaeological questions. There is also a debate regarding the relationships between geoarchaeology and archaeometry. One approach is to place studies of sediments, soils, stratigraphy, and landforms within the realm of geoarchaeology and to distinguish it from archaeometry which would have a focus on geochronology, geophysics, and raw material analysis. Geoarchaeology has also been considered as a subdiscipline (along with zooarchaeology and archaeobotany) of environmental archaeology. Overall, geoarchaeology is a discipline that has as a primary goal the understanding of humans and past environmental systems. Three keys issues that can be addressed using geoarchaeology are (1) human response to climate change, (2) human use of resources and impact on the environment, and (3) natural hazards and people.

Geoarchaeology is a critical source of information for examining human biological and behavioral responses to climate change. This includes biological adaptations to changes in climate as well as the response of ancient societies to climate change. Many questions connected with the ways humans use natural resources and impact the environment can be examined using geoarchaeology. Examples would include petrographic or geochemical provenance studies designed to study the flow of raw materials or studies of how resource exploitation is linked to erosion and sediment deposition and landscape evolution. Geoarchaeology thus can provide important information on the use and management/mismanagement of resources. Another focus of geoarchaeology is the use of records of the past to understand and predict environmental hazards. These include studying the patterns and effects of earthquakes and other geological catastrophes such as floods, volcanic eruptions, and tsunamis. A broad look at the dramatic effects of seismic events around the globe is given by Nur (2008). This volume covers major earthquakes from ancient Israel to modern Japan. A volume on archaeoseismology that details other seismic impacts is focused on the eastern Mediterranean, especially Greece (Stiros & Jones 1996).

International Perspectives and Future Directions

One of the important aspects of geoarchaeology is that it is an empirical natural science approach that can be applied to any archaeological record, regardless of its location on the globe. An emphasis on process and product encourages an international perspective. This is reflected in the *Developing International Geoarchaeology* (DIG) conferences which bring together a diversity of international researchers to share research and promote international studies in geoarchaeology. The application of geosciences techniques can be applied to any environmental context. Any region of the world can be studied using the geoarchaeological approach. For example, since the last third of the twentieth century, coastal studies in the Aegean and elsewhere have aided historians and archaeologists in discovering and understanding coastal sites. Kraft et al. (2007) provide an excellent example

of how core drilling and the geological analyses of the sediment cores offer critical information about ancient Ephesus otherwise unavailable to archaeologists, historical geographers, and historians. On the other side of the world, Jing et al. (1995) show how sediment coring can discover deeply buried sites that would otherwise remain unknown, even after intensive surface survey. The geoarchaeological community has benefited from international cooperation and collaboration for both conducting field work and laboratory studies. Because geoarchaeology examines the way natural systems interact with humans, there is great value in the exchange of ideas and techniques that can be used to understand how ecosystems work at various scales of time and space.

Cross-References

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- ▶ Archaeological Chemistry: Definition
- ▶ Ash: Geoarchaeology
- ▶ Beach, Timothy
- ▶ Butzer, Karl W.
- ▶ Cornwall, Ian Wolfram
- ▶ Dating Techniques in Archaeological Science
- ▶ Deflation Archaeology
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Flood
- ▶ Disaster Response Planning: Tsunamis
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Gamio Martínez, Manuel
- ▶ Goldberg, Paul
- ▶ Haynes, Jr., C. Vance
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Karstic Landscapes: Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Lubbock, John
- ▶ Macphail, Richard I.
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ Provenance Studies in Archaeology
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- ▶ Rapp, George R.
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Geoglyphs

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Introduction

Geoglyphs are handmade features created on the surface of the earth. These have been made by removing or clearing sand or stones or sometimes adding stones. This creates contrast between the figure and the ground, enhancing visiblity (Fig. 1). The most famous geoglyphs are in Nazca, Perú. Geoglyphs, nevertheless, also occur in a range of different forms worldwide. Despite the similarities that can be found between regions, it is clear that geoglyphs have independent origins and development in time and space.

Definition

What defines a geoglyph? This question is particularly relevant when we observe this phenomenon on a global scale; a wide variety of geoglyphs exist, although within limited parameters. Geoglyphs are intentional human-made renderings of naturalistic/identifiable or abstract/unidentified forms. They frequently include large-scale designs, i.e., either the individual figures are large or there are compositions of smaller figures that extend over a sizable area. The term "geoglyph" may also apply to culturally significant patterns or locations resulting from ceremony, such as dance circles. Its design – a llama, for example – fulfills a function which could be religious, aesthetic, economic, etc. Geoglyphs can last over time as a testament or witness. Although we can identify its form, without additional information it is not possible to know its functions.

The term "geoglyph" was first used by the Venezuelan archaeologist Cruxent in 1949, although it was Mostny (1964), head of the Anthropology section and subsequently the director of the Chilean Museo Nacional de Historia Natural, who explicitly defined this concept. Additional variants for the term include *pintados*, earth art, earthworks, terraforms, ground drawings, intaglios, mounds, stone arrangements, and ring ditches.

The creation of geoglyphs is accomplished through two techniques, additive and subtractive, either singly or in combination Fig. 1. Making a geoglyph does not require a great deal of labor investment. Generally, the materials are not large or heavy, and the activity is not labor intensive, and thus, the task can be undertaken by the very young through to the very old. Some techniques require a greater degree of labor investment, such as the geoglyphs from Venezuela and Colombia, where the figures are engraved on rocky slopes, or the Amazonian mounds, the construction of which required deforestation, and the excavation of deep trenches to supply the sufficient quantities of heaped earth for platforms.

The specific location, size, style, and situation of geoglyphs on the ground have direct

Geoglyphs, Fig. 1 The visibility of a linear geoglyph created using both additive and subtractive techniques is further enhanced by raking light that highlights differences in color and intensity between the geoglyph and the natural surface. Nazca, Perú

implications for their visibility. Geoglyphs on slopes are visible from a distance (Fig. 2). Geoglyphs situated on flat or horizontal surfaces are more difficult to see from a distance, although they can be discernible up close, and "seen" through the senses when people walk or move over the geoglyph (Fig. 3). Visible but difficult to discern in their totality are large geoglyphs (e.g., Nazca) and three-dimensional geoglyphs (e.g., Hopewell/Adena, Amazonia). The use or significance of some geoglyphs can be understood from oral traditions and aboriginal knowledge. Thus, geoglyphs are comprehended visually (e.g., in Chile, England, Venezuela, and Colombia) or experienced (e.g., Nazca) or known (e.g., Californian rituals).

The relationship between the suitability of the earth's surface and the visibility of geoglyphs results in different kinds of techniques employed by the geoglyph makers. Suitable natural surfaces are common in arid regions of western Americas (e.g., Nazca in Perú, northern Chile, California, and Mexico), Argentina, Australia, Algeria, Libya, Egypt, and Israel, and in regions of limited vegetation due to subsurface geology (e.g., limestone/chalk in England and the rocky surfaces of Venezuela and Colombia). In such regions, images are added to or created on the natural surface. Forested or otherwise verdant landscapes required clearing prior to creating geoglyphs. These areas include the effigy mounds of the Mississippi Basin (Hopewell and Adena cultures) and the Amazon Basin.

The construction technique and placement can also affect durability as well as the visibility of geoglyphs. Images on slopes, such as the Uffington Horse in England, are visible from a long distance. The use of large stones to form a large panel of numerous figures on a moderately sloped surface at Quebrada Tiliviche in northern Chile has withstood the effects of gravity, wind, and rain (Fig. 4). Geoglyphs created with heaped soft soils or on steep slopes are less likely to withstand the effects of wind, precipitation, and/or gravity. Visibility of additive and subtractive geoglyphs on horizontal or sloped surfaces is enhanced by raking light; this is particularly evident in older geoglyphs where the color or texture contrast between the original surface and disturbed subsurface may fade over time.

Key Issues

Purposes

Geoglyphs belong to a class of material culture commonly described as having religious, ritual, or ceremonial functions, when and if no utilitarian function is clearly evident (Clarkson 1998). In fact, in virtually every region where geoglyphs can be found, the main purpose in the construction of a geoglyph has been attributed to ceremonial and ritual activities. There are, obviously, other valid interpretations of ethnographic evidence of ritual or ceremonial use. References to shamanic activities associated with geoglyphs in prehistoric contexts have been framed in

Geoglyphs, Fig. 2 Traditional llama caravan passes below additive/subtractive geoglyphs inscribed high on hillsides at Cerros Pintados, Chile, which are visible from both near and far

Geoglyphs, Fig. 3 Linear trapezoidal geoglyph. Nazca, Perú

cognitive archaeological explanations that employ scientific methodologies within social science and humanities investigations (Lewis-Williams 2010).

In the Bolivian altiplano, it is thought that the so-called Sajama lines were originally associated with sacred places and mountain worship. This interpretation has been backed by ethnographic documentation (Morrison 1978; Reinhard 1996). The enigmatic geoglyphs of the Mojave Desert, in the southwestern United States, were interpreted as "rites of passage" in the nineteenth and twentieth centuries through ethnographic accounts and ceremonies (Johnson 1985). In Nazca, Perú, a variety of reasons have been suggested: geoglyphs had astronomical purposes, served as pilgrimage sites, as well as to worship ancestors, mountains, water, and

Geoglyphs, Fig. 4 Additive geoglyph composition of camelids and running humans situated on a gentle slope is comprised of large stones. Quebrada de Tiliviche, Chile

fertility, among other functions. Cosmological and astronomical functions have been proposed for Mound 72, as well as for other related mounds in the plains of Cahokia (Illinois, USA), a major site of the Mississippian Culture, dated between 800 and 1350 CE. There are also rich ethnohistorical sources dating to the seventeenth century or later on Mississippian culture, including cosmological rituals and activities (Demel & Hall 1998). The geoglyphs of northern Chile are one of the few cases that seem also to have included a utilitarian purpose: they served as logistical markers to indicate routes for llama caravans on the western slope of the Andes. Similarly, the colored stone structures found in the province of La Rioja, Argentina, associated with water sources and natural steps, could have been related to trading routes of pre-Hispanic populations (Callegari & Raviña 2000).

Some geoglyphs executed on horizontal surfaces, particularly large images, are visually best observed from an elevated location directly from above (Fig. 5). Such visual conceptualizations popularly invoke an intention for deities, supernaturals, or humans in altered states of consciousness. San Pedro cactus (*Trichocereus pachanoi*), portrayed on Nazca ceramics and native to the Nazca and Andean regions, contains hallucinogenic alkaloids which can produce a sensation of flying. Ethnographic evidence from southern California indicates that walking on and/or tracing the outline of geoglyphs was intended or practiced (Johnson 1985). Nazca figural geoglyphs were consistently made with a single line that scribes the entire figure, regardless of the complexity. The width of the line is consistent with that of a footpath, and thus, an individual can (de)scribe an entire figure, beginning and ending at the same location. The sensual and ritual effect is analogous to walking a prescribed route, such as the effect attributed to the thirteenth century labyrinth in the floor of Chartres Cathedral, where the meandering line of the labyrinth is said to have been intended to be experienced as a ritual of devotion and contemplation or as a simulation of pilgrimage to the Holy Land. Similarly, the "wheel" and "pendant" forms reported in Arabia may have been used for the ritual circumambulation of sacred spaces, identified in both Islamic and early Arabic contexts (Kennedy 2011).

Distribution

Geoglyphs are known from every continent, except Antarctica (Fig. 6).

Geoglyphs, Fig. 5 A large geoglyph of a spider inscribed on a horizontal surface is difficult to discern from a static location on the ground; the entire figure is visible from the air (approximate length 45 m/150 ft)

North America

In North America, the earliest geoglyphs described in the literature were the earthen mounds found throughout the Mississippi River and Ohio River basins and around the Great Lakes. The effigy mounds are naturalistic renderings of identifiable fauna, often in clusters. The complexity and precision of execution of both effigy and geometric mounds belie large-scale effort and abstract visual comprehension of images that could only be viewed from above or by walking around and over them. The makers of these mounds are collectively referred to as "mound builders," and the mounds span broad cultural and temporal spheres, dating as early as approximately 3500 BCE (e.g., Watson Brake in Louisiana) and continuing up to European presence in the sixteenth century. The "mound builders" were alternately ascribed to Phoenicians, Egyptians, Romans, lost tribes of Israel, etc., in line with pre-twentieth century "scholarly" thinking that ignored both the long-term presence of indigenous populations and their successful, unique, varied, and complex adaptations in the New World.

Subsequent explorations throughout the Americas revealed additional examples of geoglyphs in the arid western regions of North and South America. These geoglyphs use the landscape as a natural "blackboard" on which soil and stone were scraped or heaped up to form low-profile naturalistic or abstract images, as well as alignments of stones or boulders. Cultural assignation of geoglyphs in the western regions of North America is difficult to ascertain due to a general lack of associated and dateable sites, material culture, or ethnographic reference. Some geoglyphs in the Great Basin and West may date to the Paleo-Indian (at least 13,000 years ago) or Archaic (8000–2000 BCE, up to the nineteenth century in some areas) periods. Research on geoglyphs in the American Southwest and the Northern Plains of the United States and Canada has revealed viable hypotheses regarding historic or protohistoric cultural affiliation of use, age, and purposes of the geoglyphs (Whitley 2000; Aveni 2008). The forms of these geoglyphs are varied and reflect a diverse cultural and chronological history. "Medicine wheels" on the Northern Plains have been correlated with astronomical or cosmological significance (Aveni 2008), while geoglyphs in the Southwest (California and Arizona, USA) and adjacent regions of Sonora (Mexico) have been ethnographically correlated with historic Pima and Papago peoples relating to their dance circles, community rituals, and social identifiers. The geoglyphs in these regions, known also in the literature as "alignments," "gravel effigies," and "pictographs," have proven difficult to date due

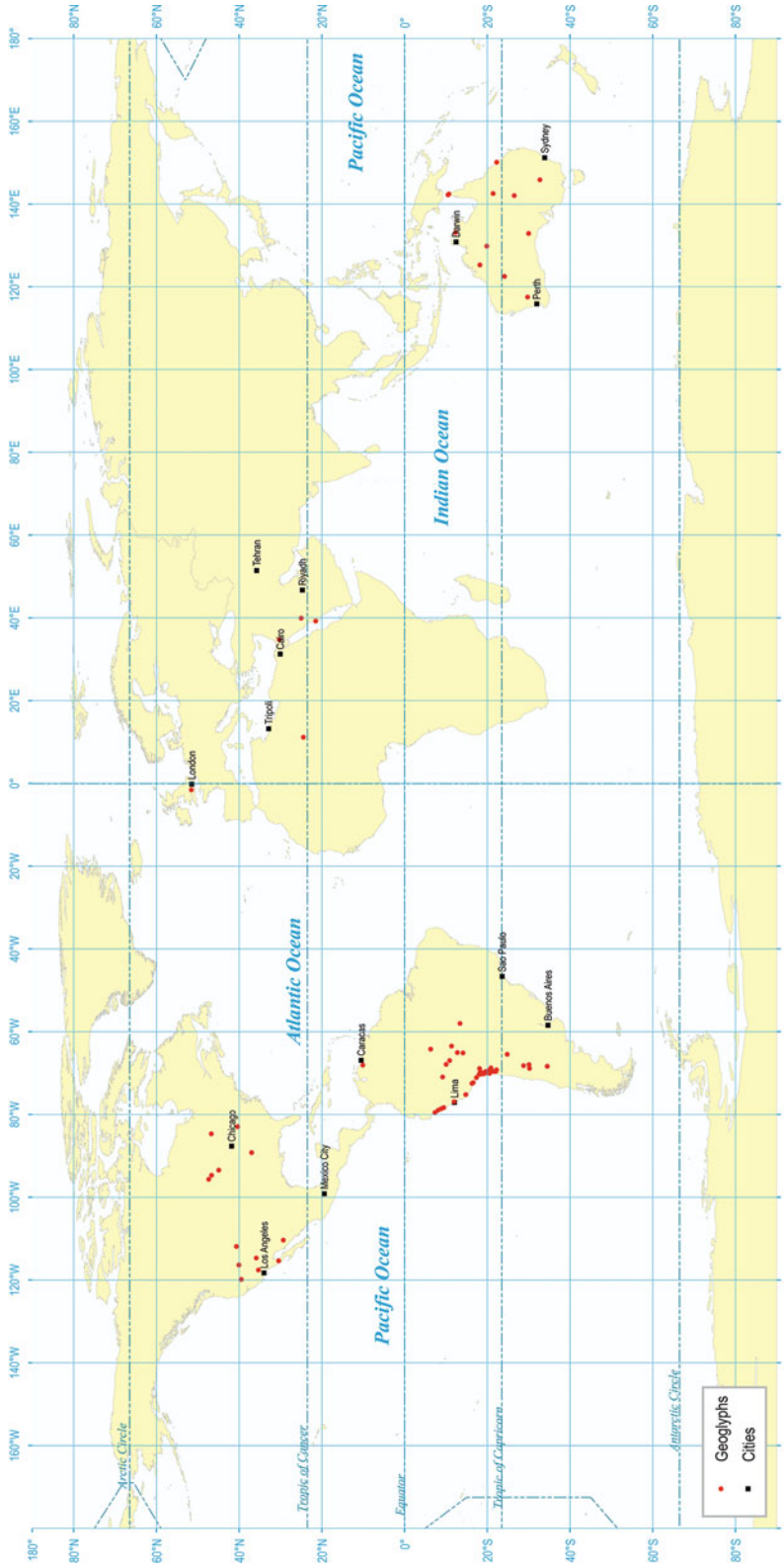

Geoglyphs, Fig. 6 Locations of geoglyphs discussed in the text

Geoglyphs, Fig. 7 Subtractive geoglyph of indeterminate age, cultural affiliation, or representation in the Colorado River region (Photo permission of R. Dorn)

to the general lack of chronological markers within or associated with the geoglyphs (Whitley 2000) (Fig. 7).

Researchers also extend the term 'geoglyph' to refer to other culturally significant patterns or locations resulting from rituals associated with puberty rites, healing, harvest feasts, and origin myths, particularly in the American Southwest. The information is derived from natives living in and historically associated with the areas where such geoglyphs occur (Johnson 1985). The categories that distinguish these so-called 'patterns' from geoglyphs are often indistinguishable to the Western researcher. The patterns convey information to the traditional people of the region, a unique form of art. Comparisons have also been drawn to the similarity of subject matter, motif, and execution technique between geoglyphs and petroglyphs (Davis & Winslow 1965) and sand paintings, although there is no evidence that people who created geoglyphs also created sand paintings (Harner 1953; Cohen 1987). Petroglyphs are also known as rock art, and sand paintings are elaborate images of mythological beings created during healing ceremonies and subsequently destroyed as part of the cure. Among the Navaho, the art of sand painting is deeply embedded with the intensive training for healers. Thus, ethnographically documented purposes for the artistic expressions of geoglyphs are usefully applied as hypothetical analogies elsewhere.

South America

The coastal deserts of western South America comprise excellent conditions for the creation of geoglyphs – minimal vegetation, minimally dissected terrain, and soils and stone suitable for creation. In Perú, the most famous geoglyphs are those in the region of Nazca, but geoglyphs have been found from the north coast to the southern tip of this country. Apart from the Nazca region, geoglyphs can also be found in the north coast valleys of Santa, Jequetepeque, and Moche, Rimac and Casma on the central coast, and in the valleys of Majes, Sihuas, Moquegua, and Tacna in the south coast (see Wilson 1988; Abanto 2009). The geoglyphs in Perú have been made by using both extractive and additive techniques. In Nazca, most linear and biomorphic geoglyphs are made through an extractive technique, while the additive technique is limited to certain biomorphs from the Andean highlands (see the entry on "▶ Nasca and Pampa Jumana Lines and Geoglyphs" in this encyclopedia).

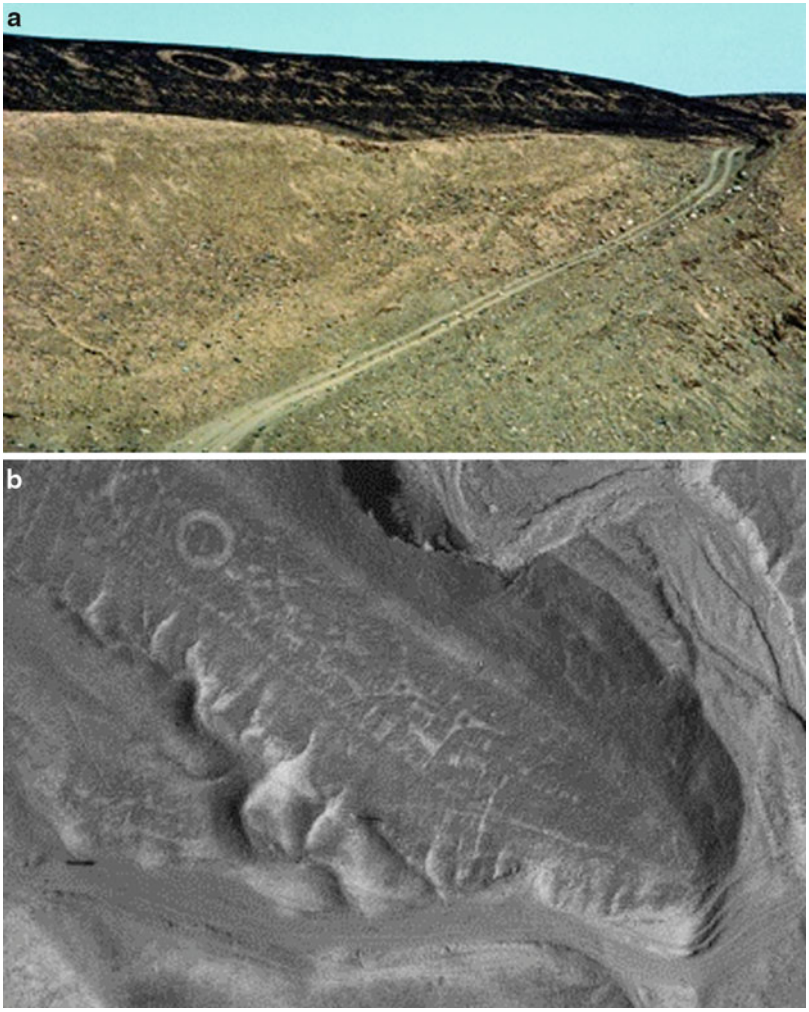

Geoglyphs, Fig. 8 A principal north to south caravan trail cuts across the Quebrada de los Pintados (Chile), flanked by geoglyphs on both sloped and horizontal surfaces. Geoglyphs on slopes are visible from the ground (**a**) and aerial views of both sloped (**b** is an aerial view of a) and horizontal surfaces easier to conceptualize. The different styles and themes of the geoglyphs may indicate different cultural and/or chronological factors

In the north, central, and south parts of the country, geoglyphs have been created using both additive and extractive techniques, and their forms vary from geometric to figurative.

In northern Chile, geoglyphs were first noted by European travelers and geographers during the eighteenth and nineteenth century. They are found mainly in lowland valleys and are scattered in the slopes and plains of the western side of the Andes and the coast. They can be also found in the Arica, Tarapacá, and Antofagasta regions. Here, geoglyphs show significant differences in terms of technique: additive, subtractive, and mixed, displaying an array of regional style, culture, and traditions (Briones 2006). The majority of the motifs are zoomorphic, mainly camelids, and there are also a variety of anthropomorphs (often with camelids) and geometric motifs. In general, geoglyphs in northern Chile are located on slopes, but they can also be found on horizontal surfaces, all of them normally associated with caravan trails (Fig. 8). This has led to geoglyphs being interpreted as markers of the old caravan routes that connected the Andes and the Pacific coast during pre-European times (Núñez 1976). Although most geoglyphs currently are dated from the late pre-Hispanic period (c. CE 900–1535), it is thought geoglyphs began to be used from the Late Formative period (c. 500 BCE–600 CE), as evidenced by funerary manifestations directly associated with them (Briones 2006).

Geoglyphs, Fig. 9 Additive geoglyph of colored stones in Piedras de Afilar, Ischigualasto, San Juan, Argentina (Photo permission of Mercedes Podestá and M. Pía Falchi)

Geoglyphs are also located in the highlands of South America. In Chile, geoglyphs can be found in the Zapahuira region in the Sierra de Arica (Briones 2006). The highland Bolivian Sajama region in the province of Oruro is home to several hundred-plus linear geoglyphs spread across a wide area of the Andean uplands. The "Sajama lines" were documented over a century ago by a variety of anthropologists and explorers (Morrison 1978). Their age and purpose remain enigmatic, although parallels have been drawn to the appearance of Nazca line centers, ancient and modern Andean traditions related to ritual travel, and the Inca ceque system. Many of the Sajama lines coincide with community boundaries, and lines often extend between communities and major peaks (Tierra Sajama n.d.).

In Argentina, geoglyphs with particular technical and stylistic features have been discovered in recent archaeological explorations. They are located mainly in La Rioja province, although isolated examples can be found in Salta, San Juan, San Luis, and Mendoza. So far, all known geoglyphs in Argentina were made with an additive technique by heaping rocks and dirt on horizontal surfaces. Noteworthy are tall structures or structures of tamped earth covered with black, white, and red colored stones that were deliberately selected to form geometric shapes like circles and stars; the structures range in size from approximately 10 to 30 m (Callegari & Raviña 2000). Some of the geoglyphs are associated with sites of the Aguada Culture (550–900 CE), although the chronology is still uncertain (Fig. 9).

There have been recent isolated reports of geoglyphs in areas where they were previously unknown, such as in the high valleys of the western state of Carabobo, north-central Venezuela (Urbani & Urbani 2001). The technique used in this region to create geoglyphs is unique: these occur as large circular and linear shapes (c. 35 × 42 m) and are located on rocky slopes. They are made by an engraving percussion technique (Urbani & Urbani 2001). Given their large size and location on the hillsides, these petroglyphs have been termed geoglyphs.

Geoglyphs were first identified in the Amazon region of Brazil and Bolivia in the late twentieth century, and only recently have they been conceptualized and recognized as geoglyphs. There are two main areas of distribution: the Baure region in the Bolivian Amazon and the Acre region in the Brazilian Amazon (Pärssinen et al. 2009; Erickson 2010). These are large structures built by digging a deep trench and heaping the

removed soil into desired forms. Their shapes are largely geometric circles and ellipses; octagonal, hexagonal, square, rectangular, "U", groups of circles, and concentric circles have also been observed. The perfect geometric forms suggest a symbolic significance (Pärssinen et al. 2009: 1093–4). A variety of other functions, such as defense, settlements, residences of the elite, land and resource markers, animal traps, cemeteries, water management features, and/or ceremonial public spaces, have also been proposed (Erickson 2010).

Australia

Numerous examples of geoglyphs referred to as 'stone arrangements' have been documented in Australia. 'Stone arrangement' is a broad category that includes features consistent with those shared with geoglyphs. These earth features characteristically appear in arid coastal regions of central, western, and northern Australia. Usually the geoglyphs take geometric, circular and linear forms, as well as those of figurative effigies of animals. They are made by laying stones on horizontal surfaces on the ground or, in some cases, in inter-tidal zones along the coast. The meanings of some of these features have been discerned through rich ethnographic and ethnohistorical data, plus recent archaeological research. These geoglyphs were integral to traditional Aboriginal ceremonies, marking totemic centers or locations associated with myth, in addition to places where initiation ceremony and rites of passage occurred, among others (Mathews 1896; McNiven 2003; David et al. 2004).

Africa and Asia

In Algeria, Libya, and Egypt, geometric shapes, such as irregular and meandering lines, created by clearing dirt and rocks, are located on horizontal desert surfaces (Gauthier 2007). In Israel, geoglyphs have been described in the Negev Desert, made by extractive and additive techniques (Anati 1999). The distribution, forms, meanings, functions, and timing of these geoglyphs are unknown.

An extensive remote sensing study in Arabia (including Syria, Jordan, Egypt, Israel, Saudi Arabia, and Yemen) has revealed hundreds of thousands of "structures" that are analogous to geoglyphs. Referred to as "works of the Old Men" by Bedouin from a number of regions in Arabia, these forms can extend up to several kilometers. The purposes ascribed to the variety of forms include hunting traps, funerary sites, ritual feasting, and possible astronomical or directional alignments. Chronological assessments via relative dating indicate these are up to 9,000 years old (Kennedy 2011).

Europe

The Uffington White Horse (Oxfordshire) is the best reliably confirmed geoglyph in England. The 3,000-year-old Bronze Age figure was constructed by digging a trench and filling it with chunks of locally available white chalk. Other chalk figures are known in England, although their authenticity as ancient monuments is discredited in many cases.

Chronology

Two methods have been used to date geoglyphs: relative dating and absolute dating. Relative dating relies on associating artifacts of known age with the geoglyphs. It is usually difficult to determine what the association is between the stone features and artifacts found nearby. Furthermore, geoglyphs were likely reused, and therefore, the associated artifacts could relate to the construction event or subsequent use of the geoglyphs. For example, in northern Chile, geoglyphs associated with caravan trails and habitation sites between the oasis of Tamentica and Quebrada de los Pintados were likely reused, reinterpreted, and redrawn, over a considerable time period. The reuse of geoglyphs is indicated by superimposed drawings, although it is difficult to determine the chronological interval: it could be 1 h or a millennium. When superimposed drawings have distinct stylistic/iconographic features, reuse over time can be suggested. Relative dates also can be established through stylistic and iconographic comparisons with dated iconography, such as that found on ceramics, textiles, or gourds, thus providing viable ages (Kennedy 2011). Lastly, patination

Geoglyphs, Fig. 10 Geoglyphs inscribed on the slopes of Cerro Caramucho (Chile) were irreparably damaged by recreational vehicles sometime between 1998 and 2000. The area was signed as an archaeological site

may indicate relative ages within the same ecological zone (Dorn 2009).

Absolute dates are provided by a variety of different chronometric analyses, such as cation ratio, ^{14}C, AMS ^{14}C, pedogenic-carbonate inversion (PCI), varnish microlamination stratigraphy (VML), ^{36}Cl, backscattered electron microscopy (BSE), and energy dispersive X-ray analysis (EDS), with the appropriate technique applied in different environments and contexts (Dalton 1999; Dorn 2009).

Future Directions

The fragile and ephemeral nature of geoglyphs has led to an increase in recent years in national and international efforts to conserve, preserve, protect, and document geoglyphs. Geoglyphs situated in undeveloped regions had been shielded from all except natural factors (e.g., erosion and taphonomy). In more developed regions, geoglyphs have disappeared in the wake of agricultural expansion, residential and urban construction, resource exploration and exploitation, and through recreational activities, particularly those involving motorized vehicles (Fig. 10).

Some circumstances make the protection and conservation of geoglyphs an arduous task: remote locations are difficult to police and protect, and funding is limited. In the north of Chile, a process of documentation, restoration, and conservation of geoglyphs was carried out during the 1970s and 1980s, supported by the government and the University of Tarapacá. One example of effective management is the case of Cerros Pintados (northern Chile), where vehicle access is controlled, and there are designated footpaths, guards, and an entrance fee. Similarly, in Nazca (Perú), guards are stationed at key locations, and aerial flights over the geoglyphs are encouraged and popular. Nevertheless, illegal incidents of modern creation of geoglyphs within archaeologically protected zones in Perú and Chile have been documented, usually after irreparable damage has been done. Some of these modern creations have made their way into the literature as examples of the ancient corpus, in spite of documentation to the contrary. The well-known "trident" geoglyph prominently inscribed on the slope facing the Paracas Bay in Perú has been documented as a creation of late Colonial times but continues to be featured in the corpus of "ancient" geoglyphs in the Nazca tradition. Unfortunately, dangerous remote

locations cannot feasibly be studied or protected (e.g., northern Mexico is currently a domain of drug cartels, coyotes, etc.; see Hayden 1998), and sites situated on either side of the US-Mexico border are difficult to coordinate under a single research program.

The advent of new technologies, beginning with aerial photography early in the twentieth century, has led to discovery in regions that are otherwise poor in natural resources or difficult to access: the enormous repertoire of geoglyphs in Arabia is an excellent case in point (Kennedy 2011). Subsequent refinements to remote sensing, such as satellite imagery, infrared and SLR ("side looking radar") for vegetated areas, and easy access to Google Earth, have increased the inventory of geoglyphs. The ready access to information for scientific research on the geoglyphs is accompanied by increased likelihood of damage as a result of recreation and economic exploration that needs to be addressed by local governments before it is too late.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Beans: Origins and Development
- ▶ Capsicums/Chiles: Origins and Development
- ▶ Chile's World Archaeological Heritage and Its Management
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
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- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
- ▶ Paleoethnobotany
- ▶ Phytolith Studies in Archaeology
- ▶ Potato: Origins and Development
- ▶ Quinoa: Origins and Development
- ▶ Rock Art, Forms of
- ▶ South American Rock Art
- ▶ Squash: Origins and Development
- ▶ Sweet Potato: Origins and Development
- ▶ Waynuna: Agriculture and Domestication

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Geometric Morphometrics and Environmental Archaeology

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Introduction

History and Development of Geometric Morphometrics

The study of biological shape (morphometrics) involves the analysis of anatomical variation of an organism or its constituent parts. Geometric morphometrics (GMM) has taken advantage of contemporary developments in computing technology and statistical objectivity to establish a means of shape analysis that is mathematically derived, allowing comparisons of shape to be performed quantitatively. The main advantage that GMM has over traditional morphometrics (TMM) is that the latter inherently deals with size, not shape. While descriptions of size variation are useful, shape can inform on a greater range of biological processes, such as ontogeny, and adaptation to specific ecological niches (Zelditch et al. 2004).

Morphometric analysis is rooted in biological research with key advances made during the last decade. However, if one considers that both taxonomic classification and our understanding of biological diversity are based on morphological variation, it is evident that the analysis of *shape* has been an underlying tenet of biological research for centuries (Adams et al. 2004). D'Arcy Thompson is credited for his pioneering work on geometry and biology, which paved the way to modern morphometrics, demonstrating how simple changes in the body part proportions of an organism could "transform" it into another (Fig. 1, adapted from Thompson 1917). With the advent of computers, the early theory of shape analysis found practical applications that had previously been impossible to perform.

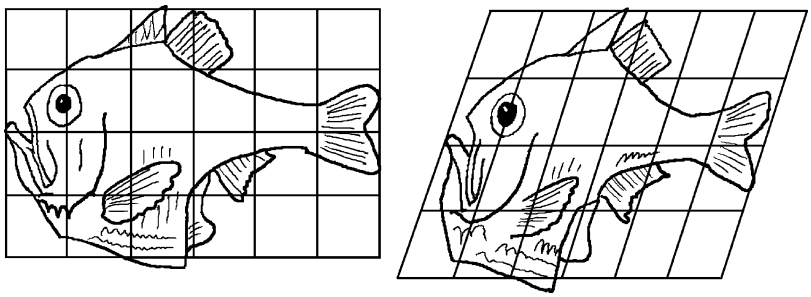

Geometric Morphometrics and Environmental Archaeology, Fig. 1 Adapted from D'arcy Thompson's (1917) original depiction, illustrating the transformation of *Argyropelecus olfersi* into *Sternoptyx diaphana* through a 20° shear

The field effectively underwent a revolution in the early 1990s (Rohlf & Marcus 1993) with the development of robust statistical models for testing variations in shape and size between organisms, and of sophisticated computerized tools for the visualization of these differences.

Performing GMM Analysis: Landmark Configuration, Digitization, Superimposition, and Visualization

As a broad simplification, morphometric techniques can be two- or three-dimensional and use either landmarks on, or the outline/surface of, the organism (or its morphological part/s) being studied.

The landmark technique relies on the anatomy of the organism to provide distinct, nameable, loci that have clear one-to-one correspondence from one specimen to the next (e.g., the apex of a leaf, the meeting point of frontal and parietal bones in the skull, the intersections of homologous veins in a fly wing). The type of correspondence of landmarks, or "homology," varies depending on the specific context within a morphometric analysis. Biological homology can be loosely derived: for example, the hind limb of a lion can correspond to the hind limb of a gazelle in terms of its development and evolutionary origin. The wing of a bat and that of a bird, in contrast, originated independently and differ in development but could still be analyzed in terms of correspondence in a study on flight biomechanics. The choice of the landmarks and the type of correspondence are, therefore, functional to the specific hypothesis being tested. Numerically, Cartesian coordinates along two or three axes univocally define each landmark.

Although morphometric techniques have tended to favor the landmark approach with the majority of applications in 2D, this is not always applicable, as on occasion, landmarks are not available, practical, or replicable. The outline method was the first attempt to address this issue by using the delineation around the curvature of an organism or its parts (Bookstein 1997: 44-45) discretized by a series of ordered points along its contour. Recent advances in morphometric research have led to the development of 3D quantitative imaging techniques that extend the outline approach to surfaces. In general, 3D methods tend to be more accurate as most biological structures are not flat objects, i.e., a fly wing, but are highly complex organs, i.e., the skull.

Once landmark coordinates have been captured, termed digitization and employing data from a basic digital camera to sophisticated MicroScribe digitizers or CT scans, the first step in the process of analysis is to remove the information that does not alter shape, that is, translation, rotation, and scale (Fig. 2).

One method that has been particularly favored for this function is the Procrustes superimposition. This method scales the centroid (a mathematically derived midpoint, hence centroid, between all landmarks, Fig. 3) size of each specimen, makes the centroid the new common origin of the Cartesian space, and minimizes differences in rotation to produce shape data that can then be statistically analyzed (Fig. 4). Importantly, while

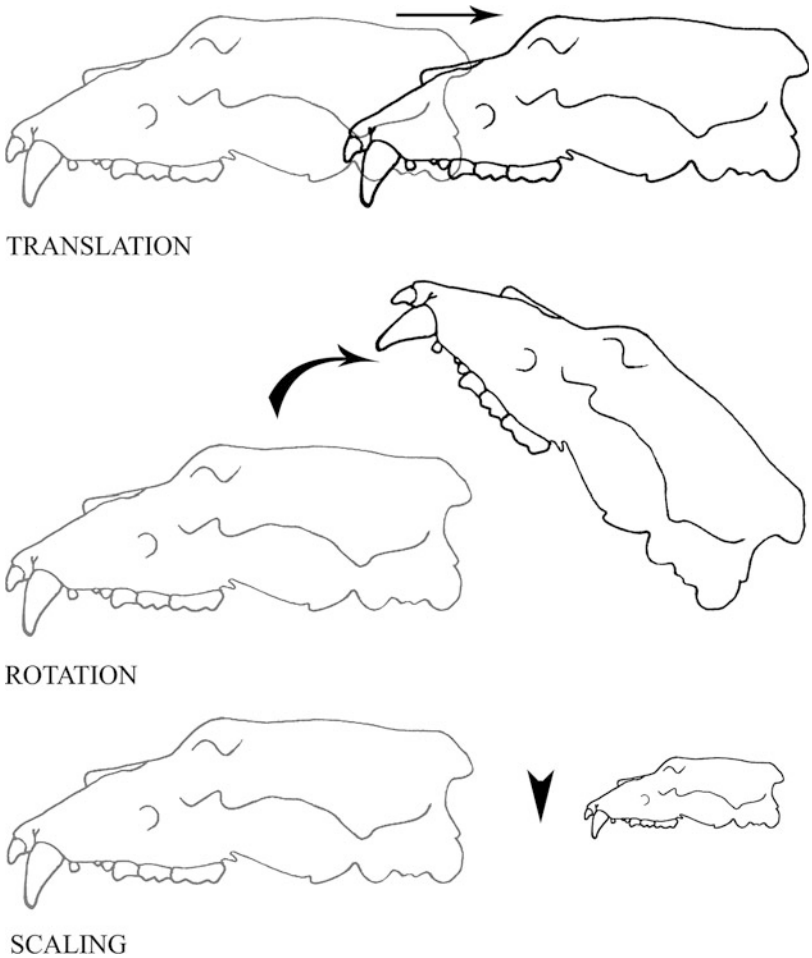

Geometric Morphometrics and Environmental Archaeology, Fig. 2 Shape independent variables: translation, rotation and scale (example using bear cranium)

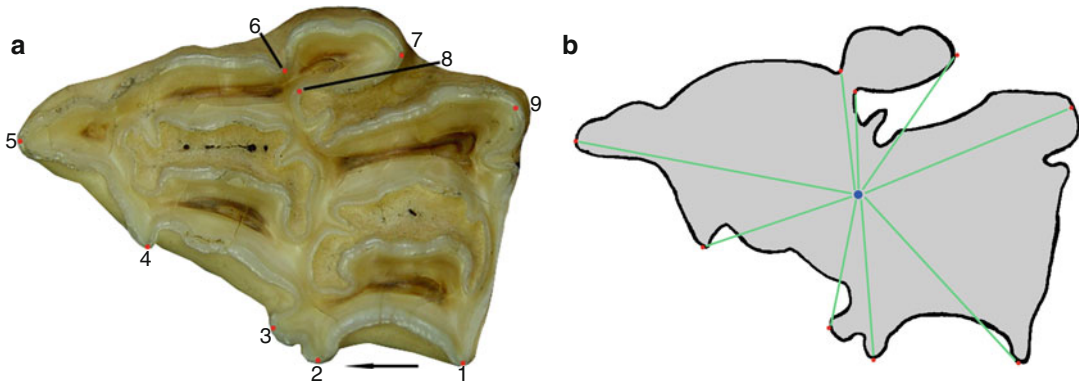

Geometric Morphometrics and Environmental Archaeology, Fig. 3 Centroid and the set of distances to the landmarks, used to computed size in GMM, as derived from the configuration used to capture data from horse upper permanent dentition (P2)

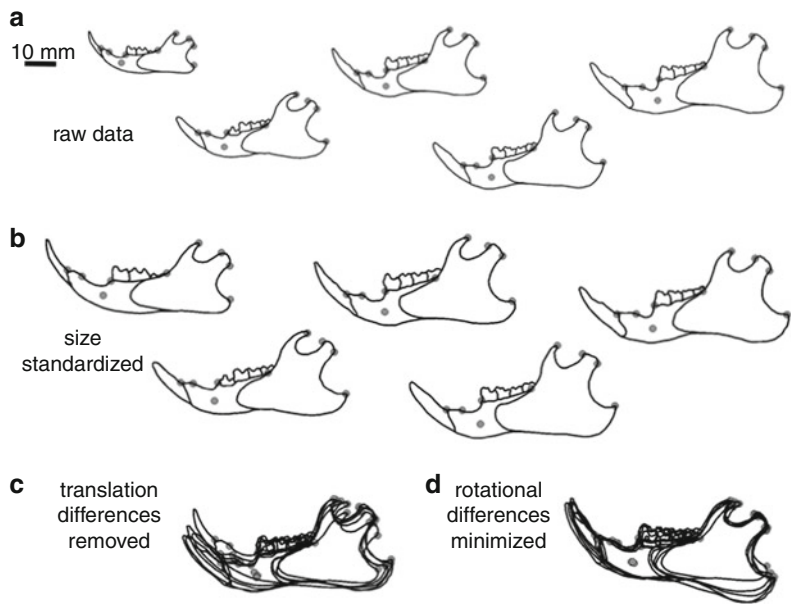

Geometric Morphometrics and Environmental Archaeology, Fig. 4 Generalized Procrustes analysis (GPA) showing how raw data are scaled to account for size variation, repositioned to remove translation differences and realigned to minimize rotation (Image courtesy of A. Cardini)

the size data are removed, they are not lost and can be used for comparisons between groups.

Visualization follows and, in one of its most common forms, reverts to the basic tenet described by Thompson (1917), albeit with a greater degree of sophistication. Visualization of shape changes relies on a principle derived from engineering whereby a thin sheet of metal, on which a grid may be superimposed, is deformed in order to illustrate the variations that occur *between* the landmarks, when one shape is warped until it overlaps with the points of a different shape. This method of visualization, termed the thin plate spline (TPS), has been adopted by James Rohlf for his widely used and arguably one of the most important software packages for GMM, the TPS Suite (http://life.bio.sunysb.edu/morph/). Whether using the TPS software or other programs, the principle remains the same: to intuitively illustrate shape variation between specimens using a deformation grid (Fig. 5). Other more sophisticated diagrams and techniques include contour, surface, and volume rendering. In tandem with visualization methods is the obvious need to interpret and understand "shape space," distances, and directions of any observed variation (Klingenberg & Monteiro 2005). Principal components analysis (PCA) has proved to be a highly popular exploratory technique for this (Zelditch et al. 2004: 156), and more recently, the "R" language has increasingly been employed for the statistical analysis of GMM datasets (Claude 2008).

Applications of GMM

In terms of relevant applications, GMM has been widely employed within comparative zoology and biological/physical anthropology. Furthermore, it is by no means restricted to studies of vertebrate fauna and has been applied to arachnids (Crews & Hedin 2006), echinoderms (David & Laurin 1996), crustaceans (Aguirre et al. 2006), and hemiptera (Dujardin et al. 2007). Indeed, application of the technique is not limited to fauna and has been applied to plants (Viscosi & Cardini 2011). Given the ubiquity of plant, pollen, and insect remains on archaeological sites and their significance for studying paleoenvironments, for the paleobotanists, palynologists, and palaeoentomologists, these latter examples will no doubt serve as increasingly important for future research.

While the above exemplifies the diversity of application of GMM, and despite the variety of species and range of research themes that this method has been employed to study, to date,

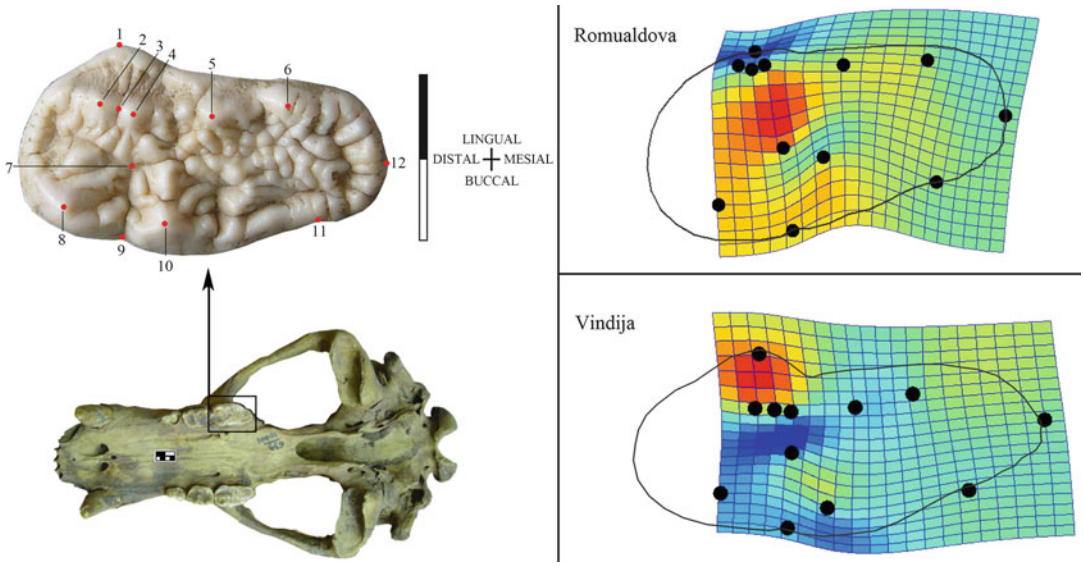

Geometric Morphometrics and Environmental Archaeology, Fig. 5 Deformation grid used to appraise variation between two groups of cave bears from Croatia. Selected tooth and landmark configuration (*left*) and grids for Romualdova and Vindja (*right*)

it has not been as widely applied in archaeology as one might expect. This is especially surprising where zooarchaeology is concerned, particularly when one takes into account the long history of use in zoology. This should not be taken to suggest that GMM has not been employed to study the archaeological or fossil record. In the same way that the technique itself underwent dramatic developments over the last two decades, it is now undergoing a revolution with regard to application, which will ultimately have implications for its use in archaeology.

When the technique has been employed, it has proved to be highly effective. Cucchi et al. (2011) showed how trends in pig domestication could be interpreted using morphological variation and phenotypic divergence; research has also shown the potential of this method for identifying discrete populations of a species within a spatial-temporal framework (Seetah et al. 2012). Questions of wider significance have also been investigated: Larson et al. (2007) addressed issues of human dispersal in Island SouthEast Asia, using domestic animals as a proxy and employing GMM in combination with molecular techniques. The large-scale migration, and ultimately the importance of horse as a source of subsistence for humans in Western Europe, was studied from Magdalenian sites within the Paris Basin (Bignon et al. 2005) using GMM.

Definition

Geometric morphometrics is, in its most common implementation in evolutionary biology and related disciplines, the analysis of size and shape derived numerically from landmarks (topographically corresponding points) on biological/nonbiological organisms.

Key Issues/Future Directions/Examples

Arguably one of the main issues with regard to using GMM is that, despite the considerable potential for application to a variety of fields including archaeological research, developments made in the mathematical theory of shape were slow to be adopted into mainstream research due to jargon and statistical complexity. These issues have now been addressed with notable

developments in both textbooks (Zelditch et al. 2004; Claude 2008) and software to facilitate statistical analysis (MorphoJ/Morphologika/Morpheus, IMP series, PAST, etc. – refer to http://life.bio.sunysb.edu/morph/soft-comprehensive.html).

Despite improvements, statistically analyzing the complex datasets that GMM produces requires some caution and may not be without pitfalls. The advent of advanced software with easy-to-use interfaces, while circumventing much of the complexity, has the negative outcome of detaching the analyst from a clearer understanding of the mechanics behind the analysis, an issue most detrimental for the novice. Additionally, the more complex statistical aspects of GMM data analysis and interpretation can occasionally lead to a misrepresentation of what is possible (at present) with the outcomes of GMM analysis (see Adams et al. 2011 for a discussion of the limitations of principle components (PC) for cladistics analysis).

Once these, often subtle, potential issues are clarified, and with step-by-step analytical examples available in the literature (Viscosi & Cardini 2011), there should be few barriers to the widespread application of GMM in environmental archaeology. Although there is little doubt that GMM can be applied to a very wide range of biological systems, in archaeology it is the study of bone, and in particular animal bone, that will invariably benefit the most from this method. GMM has two main applications in this regard: investigating phenotypic changes in populations and understanding ecomorphology (divergence in form as an adaptation to the environment). In the former case, as a first step, the landmark data may simply be compared between groups in order to identify significant morphological variation. This can then be used as a means of classifying unknown individuals using cross-validated models derived from well-known samples. In the latter, a more complex understanding of the animal's anatomy is achieved through cross-group comparisons (i.e., different species of bear) in relation to their ecology, often using modern populations to model variation in the past. Ancient specimens are then projected into the shape space and similarities with modern counterparts used to infer past behavior (see Figueirido et al. 2009, using extant and extinct bears).

One of the main strengths of GMM is its inherent compatibility with complementary techniques to explore a greater range of questions that are pertinent to archaeological research. Though this is very much underexploited, there is much potential in combining GMM with both molecular methods, such as DNA, and morphological techniques, such as finite element modeling (FEM). DNA can provide evidence detailing evolutionary history, the role of drift and selective pressures, as well as other processes that may leave a genetic signature. FEM uses stress modeling to interpret load bearing and force capabilities of different parts of an organism's body, which can be used, for example to infer bite force and thus indirectly inform on diet, ecology, and behavior. GMM data not only provide quantitative phenotypic information that can be mapped onto the genetic landscape obtained from molecular analyses to explore the tempo and mode of evolutionary change but also allow the multivariate comparison of deformations from FEM-computerized experiments and the analysis of their covariation with predictors (environment, genetics, etc.) in an accurate statistical biomechanical framework. Taking this approach a step further, by combining the evidence from phenotypic and genetic studies with those that detail environmental conditions in deep time, it should be possible to position fauna into a more appropriate "archaic ecological niche."

Ultimately, GMM allows archaeologists to use modern biological approaches to investigate deep-time phenomena. The consensus remains that environmental samples from archaeological contexts, and bone in particular, are often too fragmented or scarce to carry out the type of rigorous experimentation that details past ecological systems. However, while the physical numbers may not compare with those available to contemporary biologists, for the environmental (and indeed "biological") archaeologist, by using species that occur in considerable abundance, such as the cave bear (Europe) or dire wolf (North America), it is possible to carry out the type of studies that are being performed on modern faunal

populations (Cardini et al. 2007). Fragmentary material could still be fruitfully analyzed (Hublin et al. 2009) and incomplete fossils reconstructed (Gunz et al. 2009). The method could be instrumental in understanding the process of domestication and its outcomes (such as paedomorphism), as well as the mechanism promoting island dwarfism/gigantism and the role of allometry (the covariation of shape and size) in creating phenotypic variation, and other recurrent phenomena observed in species that underwent domestication.

GMM may well underpin a trend toward the type of interpretive studies that bridge a gap between contemporary biological and ecological studies and those concerned with adaptive changes through time as a consequence of environmental fluctuations and agency. Given its scientific rigor, the fact that it can be relatively inexpensive to perform and the range of questions it can potentially provide evidence to address, it would be a great surprise if this method does not enjoy the type of widespread application currently witnessed for DNA and isotope analysis.

Cross-References

- ▶ Archaeobotany
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Biometry in Zooarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Gero, Joan

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Basic Biographical Information

Joan Gero is one of the leaders in the sociopolitics of archaeology, feminist archaeology, and Andean archaeology. She was born on 26 May 1944 in New York City and grew up in the city's suburbs. The countercultural movement served as historic backdrop for her undergraduate years at the University of Pennsylvania. Social activism and the seeds of feminist thinking were planted at this time. Gero graduated in 1968 with a B.A. in English Literature. In 1970, she received a M.Ed. from Boston College and then worked for Teacher Corps, a domestic program that educated the socioeconomically disadvantaged. Enamored with the Corps's commitment to equality, the experience offered an important anthropological lesson about cultural differences in the classroom and community. After two years of teaching, Gero revisited the role of student. During a summer exchange program at Oxford, she enrolled in an archaeology course that involved excavation of an Iron Age site in Wiltshire.

Gero returned to the USA in 1973. She attended classes in archaeology at Harvard and excavated at Chan Chan, Perú, under Michael Moseley's aegis. This fieldwork served as a springboard for her ongoing investigations of Andean prehistory. In 1974, Gero commenced graduate studies at the University of Massachusetts, Amherst. Several personal experiences during this time shaped her theoretical approach to archaeology. Sexism, as Gero soon discovered, was the status quo. Doctoral research in 1977 was initially hindered by a supervisor who questioned the appropriateness of a woman living in the project house, and many colleagues found research about ancient women implausible. Despite these obstacles, Gero completed her dissertation, which examined material culture's active social roles. In 1983, she was granted a Ph.D. in Anthropology.

Gero accepted a position in the University of South Carolina's Department of Anthropology where she taught from 1983 to 1997. She was hired as Assistant Professor at American University in 1998 and retired as Professor Emerita in December 2007 but remains active in archaeology. Gero has also held several visiting appointments – at England's University of Cambridge, Sweden's University of Umeå and Uppsala, and Argentina's Universidad Nacional de Catamarca and Universidad Nacional del Centro de la Provincia de Buenos Aires.

Gero has been a Research Associate at the Smithsonian Institution's Department of Anthropology since 1996. She has also received grants from the National Endowment for the Humanities, National Science Foundation, Fulbright, Wenner-Gren Foundation, and Heinz

Foundation. In 2007, Gero was awarded the Squeaky Wheel by the American Anthropological Association's Committee on the Status of Women in Anthropology.

Major Accomplishments

Gero has long participated in the radical transformation of archaeology. To this end, her investigations of the past have incorporated feminist perspectives and addressed contemporary politics at global and local scales. Her earliest writings reveal the crystallization of perduring research interests. Notably, the publication of *The Socio-Politics of Archaeology* (Gero et al. 1983) called for sociological analysis of the field and its epistemological production. For her, critical consideration of North American archaeology ran parallel to, not in the wake of, paradigmatic shifts in British postprocessual archaeology. Gero's (1983) own chapter identified the gendered segregated nature of research; men predominated in the field, while women labored largely at museum studies and lab analysis. She continued to hone these arguments about inequities and expectations in the influential article "Socio-Politics and the Woman-at-Home Ideology" (Gero 1985). These writings were inspired by Gero's early experiences conducting fieldwork in Perú. In making the personal (and political) the professional, her feminist approach has exposed and challenged the discipline's pervasive androcentrism, as well as questioned normative ways of thinking about the past.

One of Gero's major contributions is the fomentation of feminist archaeology. In this regard, she is best known for *Engendering Archaeology* (1991), which she co-edited with Margaret Conkey. The now-canonical volume, which began as a 1988 conference titled "Women and Production in Prehistory," destabilized assumptions about men's societal contributions, legitimated gender as an issue for investigation, and effected more holistic understanding of ancient societies. In her chapter, Gero (1991) identified the implicit sexism in Paleoindian archaeologists' studies of tool production. Building on her knowledge of lithics, Gero deconstructed "Man the Toolmaker" and the undue emphasis this notion places on supposedly "male-only" activities (i.e., hunting, butchering). She then argued for women as manufacturers of stone tools. Affirmation of women's roles and abilities, she concluded, laid important groundwork for more nuanced reconstructions of gender systems and social transformations. With gender's analytical validation, Gero's feminist concerns have expanded. She has examined the complex gendered arrangements of ancient households in Argentina, arguing that social relations often defy easy dichotomization as hierarchical or complementary (Gero & Scattolin 2002). Engagement with feminist perspectives has also provided a basis for the querying of taken-for-granted evidence. In her study of Recuay pots from Perú, for instance, Gero (2004) deliberates about the sociopolitical significance of their graphic sexual couplings.

Gero's engendering of and subsequent contributions to feminist archaeology underscore her concern not just for the theoretical and topical but also for disciplinary politics and remediation of asymmetrical power relations. Her archaeological praxis promotes social justice. Dedicated involvement in the World Archaeological Congress (WAC) represents one means to an equitable end. The organization subverts traditional archaeology born of colonialism, and it gives practitioners who have been historically marginalized – due to nationality, ethnicity, and economic disadvantage – an opportunity to shape practice and theory. Gero has worn many hats in WAC. She was elected the North American representative from 1999 until 2008 and has served on the Standing Committee on Ethics since 2007. In June 2003, Gero acted as Academic Secretary for WAC-5 in Washington, DC, a congress of particular importance given its attendance and international visibility. From 2003 to 2010, Gero was Head Series Editor for the *One World Archaeology* book series. Gero's own contribution to the series, coauthored with Dolores Root, argued that *National Geographic*'s portrayal of archaeology endorsed a nationalist ideology of American

expansionism and capitalism (1990). In sum, Gero has worked throughout the duration of her career to realize an archaeology that is fully self-aware, less exploitative, and more collaborative.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Conkey, Margaret Wright
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Post-Processual Archaeology

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Basic Biographical Information

Dr. Gerstenblith earned her A.B. from Bryn Mawr College, her J.D. from Northwestern University, and her Ph.D. from Harvard. As well as law, she studied anthropology and art history. She is a Distinguished Research Professor at DePaul University, where she also acts as Director of the Center for Art, Museum, and Cultural Heritage Law.

Major Accomplishments

Gerstenblith is the Chair of the President's Cultural Property Advisory Committee of the US Department of State (2011–present). She also currently serves as a Director of the US Committee of the Blue Shield and is Cochair of the American Bar Association's Art and Cultural Heritage Law Committee. Prior to these appointments, Dr. Gerstenblith was Editor in Chief of the *International Journal of Cultural Property*, a position she held from 1995 to 2002. She is the author of *Art, Cultural Heritage, and the Law* (2012).

Cross-References

- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions

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Getty Foundation

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Basic Information

The Getty Foundation (http://www.getty.edu/foundation/index.html) functions as a philanthropic arm of the J. Paul Getty Trust. Originally based in Santa Monica, the foundation is now administered from the Getty Center in Los Angeles, USA. The Getty Grant Program was announced on the 11th of October 1984 and assumed its current title in 2005 reflecting the changing needs for funding support (About the J. Paul Getty Trust n.d). The initial motivation was to provide a source of funding for the visual arts and in particular "...works of exceptional merit" (Administrative History n.d.). From 1985 the early grant categories comprised library and archival projects at independent centers for advanced research in the history of art, scholarly cataloging of art museum collections, publications, conservation, museum programs to interpret permanent collections, education in the arts, and national and international service organizations (Administrative History n.d.). The postdoctoral fellowship program which was previously administered externally commenced at the Getty Museum in 1986.

From 2005, key priorities were established to assist "...individuals and institutions committed to advancing the greater understanding and preservation of the visual arts in Los Angeles and throughout the world" (About the Getty Foundation n.d.). These areas are supported by the Getty Foundation in conjunction with collaborative programs offered by the Getty Research Institute, the Getty Conservation Institute, and the J. Paul Getty Museum. The foundation currently focusses on four strategic areas based upon:

- Access to museums and archival collections
- Art history as a global discipline

- Advancing conservation practice
- Leadership and professional development

By the year 1990, 530 grants had been distributed to 18 countries, amounting to funding of US $20 million (Muchnic 1990). Between 2002 and 2011, nearly 100 grants, totaling US$11 million, were awarded to the *Pacific Standard Time* project alone, which began as an archiving project for postwar art in Los Angeles. In August 2012 US$1.95 million was granted to the Getty Leadership Institute, which relocated to Claremont Graduate University in 2010, as a 3-year commitment to ensuring the leading-edge development of museum professionals. The Getty Trust produces numerous publications with many works resulting from research funded through the Getty Foundation.

Applications for funding are competitive and must meet stringent selection criteria. Residential Grants and Fellowships for the Getty Research Institute and the Getty Conservation Institute, as well as Graduate and Undergraduate Internships are accepted online.

Major Impact

Since inception, the Getty Foundation has awarded significant grants to projects around the world. In 2012, 28 grants totaling more than US$1.3 million were given in the Access to Collections category. For the 2011 to 2012 period, seven grants ranging between US$48,000 and US $310,000 were allocated to five countries to enable international exchange among scholars in art history. A further seven grants, totaling approximately US$1.9 million, were also awarded in Conservation for the same period. To encourage professional development, undergraduates were included among 115 internships awarded in 2012. In the same year the foundation administered 83 residential grants (J. Paul Getty Trust 2012).

Examples of the range of projects the Getty Foundation has supported include:

- 2005 National Trust for Historic Preservation, Washington, DC. For an assessment of damage to historic structures in the Gulf Coast region affected by Hurricane Katrina. US $100,000
- 2008 New Orleans Jazz and Heritage Foundation, Inc., Louisiana. For a conservation survey of the foundation's archives. US $25,000
- 2008 West African Museums Program, Senegal. For training in the preservation of historical photographs. US$200,000
- 2008 International Council of African Museums, Kenya. Assist in the organization restructure to better serve the African museum community. US$175,000
- 2010 Conservation of the *Ghent Altarpiece* and Vasari's *The Last Supper*. €630,000
- 2011–2012 University of Sydney, Australia. For a series of planning meetings to assess the status of the history of modern and contemporary art in Southeast Asia. AU $94,000
- 2011–2012 The British School at Rome, Italy. For a workshop on protective shelters for archaeological sites. €78,000
- 2011–2012 Association Internationale des Critiques d'Art, Paris, France. For participants from developing countries to attend the 2012 Congress in Zurich, Switzerland. US $43,600

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Conservation in Museums

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Glacial Advances in Asia, Europe, and North America

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Introduction

Glacial-interglacial cycles (when glaciations advance to their maximum and retreat to their minimum) have occurred throughout much of the Earth's climatic history (EPICA 2004). Presently, in the Holocene epoch, the Earth is experiencing an interglacial period of a glacial-interglacial cycle that began approximately 100,000–124,000 years ago within the Pleistocene epoch (Berger 2002). Glacial advances have not only covered vast expanses of Asia, Europe, and North America but the globe as early as 2.4–2.0 billion years ago within the Proterozoic eon, when the first global glaciation is said to have occurred (Strand 2012: 70). The most extensive glacial advance to have dominated the global landscape occurred between 800,000 and 600,000 years ago, with glaciers advancing to mid-latitudes (Strand 2012: 70). Giving this period the term "snow ball earth," researchers, through studies of oxygen-isotopes gathered from deep-sea ocean sediments and ice cores, have determined further glaciations at roughly 100,000-, 41,000-, 23,000-, and 19,000-year intervals (Berger 1992: 572; Berger 2002; Strand 2012: 70). The most recent glacial advance occurred approximately 18,000–24,000 years ago and reached its peak 21,000 years ago (Mix et al. 2001). Termed the "Last Glacial Maximum" (LGM) this event saw, once again, the advent of large expanses of Asia, Europe, and North America covered in a number of ice sheets (Mix et al. 2001).

Definition

Glacial advances or glaciations occur when layers of snow accumulate in an area where the local climate is cold enough to sustain the newly deposited snow during the summer. Each winter, as younger snow is deposited, the layers of older snow compact further. The pressure of overlying layers eventually increase and the hexagonal points of snowflakes partially melt and bond together. After some time, the layers of snow turn into an increasingly solid material (approximately 25 % air) called firn (Marshak 2009: 472-3). With additional layers of snow causing more pressure, melting, and recrystallizing, the firn becomes a solid of interlocking ice crystals containing less than 20 % air trapped in bubbles (Marshak 2009: 472-3). These solid masses of ice are called ice sheets on sea or glaciers on land, can last year round and can take from 10 to 100 years to many thousands of years to develop (Marshak 2009: 473). The two main types of glaciers are mountain glaciers and continental glaciers.

Continental glaciers accumulate much the same way as mountainous glaciers but rather than flow from higher latitudes to lower latitudes with the force of gravity, continental glaciers flow outward as the precipitation of snow increases. Glacial thickness can be several kilometers to a few hundred meters in depth and can span continents.

During the Last Glacial Maximum, a number of continental ice sheets (Fig. 1.) covered large areas of the northern hemisphere (Clark & Mix 2002: 2). The Laurentide and Innuitian ice sheets accumulated in and covered all of Canada east of the Rocky Mountains. These ice sheets advanced into North America with the greatest extent reaching southern Illinois (Marshak 2009: 491). The Cordilleran ice sheet covered the southern third of Alaska, including the Alaskan peninsula. In North America, mountain glaciers developed in the Rocky Mountains,

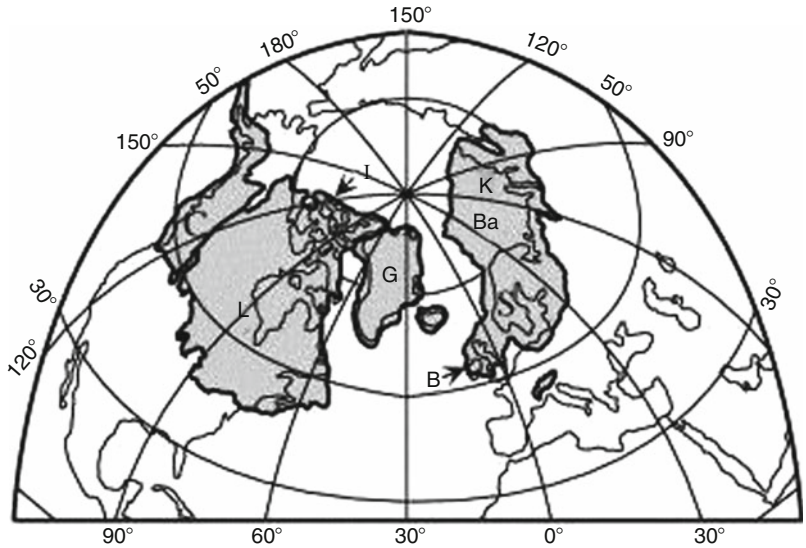

Glacial Advances in Asia, Europe, and North America, Fig. 1 The CLIMAP maximum model. Ice sheets are identified by letters: (*C*) Cordilleran, *L* Laurentide, *I* Innuitian, *G* Greenland, *B* British, *S* Scandinavian, *Ba* Barents Sea, and *K* Kara Sea (Clark & Mix 2002: 2)

Sierra Nevada, and the Cascade mountains (Marshak 2009: 491). In Europe, Ireland was entirely covered and Britain near covered by the British ice sheet bar its southernmost extent (CLIMAP 1981; Marshak 2009: 491). The Scandinavian ice sheet covered all of Scandinavia and northern Russia and reached the Swiss Alps. Northern Asia from northeastern Russia and Siberia to the higher latitudes of Tibet were covered by the Kara Sea and Barents Sea ice sheets (CLIMAP 1981; Clark & Mix 2002).

For the phenomenon of a global glaciation to occur, such as with the LGM, a drop in global climate had to occur. Factors that enable global cooling and glaciations have been attributed to the Astronomical or Milankovitch theory (CLIMAP; EPILOG; Berger 1992). As the Earth travels on its elliptical orbit around the sun, it experiences certain variations in its eccentricity, obliquity, and precession thought to arise by the orbital forcing of planetary bodies within the solar system. These in turn affect climate variations or cycles on the planet (Rial 2004: 1). Although challenged in recent debates, the Milankovitch theory has maintained its validity through modern research techniques and a rigorous assessment of previous findings (Rial 2004; Strand 2012).

Key Issues/Current Debates/Future Directions/Examples

In the 1970s, the CLIMAP (Climate: Long range Investigation, Mapping, and Prediction) research project began a global collaboration to map the global extent of ice sheets and ascertain a definitive chronology for the LGM (CLIMAP 1981). In recent debates, their initial finding for the peak of the LGM at 18,000 BP has been in dispute. In 2001, the EPILOG (Environmental Processes of the ice age: Lands, Oceans, Glaciers) research project undertook a similar study and, with the aid of modern modeling techniques, found the peak of the LGM closer to 21,000 BP (Mix et al 2001). A further debate involves the extent of the Kara Sea ice sheet in northwestern Russia (Clark & Mix 2002). The CLIMAP (1981) findings and geomorphic evidence indicates that a large ice sheet did cover this area (Grosswald & Hughes 2002). Clark and Mix (2002) and Mangerud et al. (2002), however, argue that a detailed look at the chronological evidence suggests that the Kara ice sheet existed before the LGM at its onset and that the Kara ice sheets' extent was limited to the western region of the Novaya Zemlya.

Cross-References

▶ Geoarchaeology
▶ Glacial Landscapes: Environmental Archaeology

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Glacial Landscapes: Environmental Archaeology

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Introduction

Glacial landscapes are distributed all over the planet, and they are present even in tropical regions. Hominins were necessarily involved with these landscapes, sometimes avoiding them, but many times developing means to adapt to them. The history of the advances and retreats of the ice during the Pleistocene shows that many of the areas where hominins lived after their initial radiation from Africa were characterized by glacial and periglacial conditions. Indeed, most of the process of hominin dispersal took place under very cold conditions. In most mountain areas, valley or cirque glaciers covered parts of regions that were eventually colonized by hominins. In many places, especially in the high latitudes of the northern hemisphere, periglacial environments were present even at sea level inhibiting or at least affecting the feasibility or continuity of human occupation in many places (Hoomard 2011).

Historical Background

The very first systematic accounts of the prehistory of humankind in Europe were organized by using a scheme of four Alpine glaciations, which now is known to be much more complicated, with a variable number of ice advances punctuating the Pleistocene in different parts of the world (Bradley 1999). These ice advances affected the distribution of hominin populations mainly in Europe and Asia, restricting their distribution to the southern portions of those continental masses during millenia. By the end of the Pleistocene, *Homo sapiens* were present at most of the continents

but were rare or absent in the extreme north (Straus 1996). During the Last Glacial Maximum (LGM) around 24–20 ka BP, many portions of the Northern Hemisphere were glaciated, a time during which many European human populations contracted to environmental refugia like the Iberian and Italian peninsulas. However, at a global scale the human response to cold glacial conditions was varied, ranging from dispersal to concentration (Gamble & Soffer 1988). The last significant ice advance of the Pleistocene was the Younger Dryas, a cold period characterized by its very fast inception that occurred in a matter of a few decades. It is dated around 11–10 ka BP – 12,900–11,600 cal BP – and it is known that it produced no important effects on populations living in central Europe (Jochim 2012) or North America (Meltzer 2009). However, this is a time during which the northern Netherlands, Scandinavia, and most of North America were not inhabited. In North America, human occupations were practically restricted to Alaska, Yukon, or the Southern Plains. On the other hand, it is not clear what was the importance of the Younger Dryas in southern South America or in Australia and New Zealand. However, late Pleistocene cold spells in synch with the Antarctic Cold Reversal were identified in the region of the Strait of Magellan, Southern Patagonia (McCulloch et al. 2005). As a result it must be inferred that the process of human colonization of southern South America took place under very cold conditions (Borrero 2012).

The colonization of Northern Europe or Northern Siberia required the availability of shelter, insulating clothing, and relatively sophisticated stone tool and bone technologies. It took hominins millions of years to be able to colonize these north cold periglacial habitats, and it was only with the advent of *Homo sapiens* that those regions were effectively reachable. In spite of claims for Neandertal's occupations at Byzovaya, near the Ural Mountains at 65° N (Slimak et al. 2011), it must be kept in mind that this attribution was solely based on characteristics of the stone tools. This evidence is not strong enough to move 1,000 km north the known limit in the distribution of Neandertals.

Specifically in Northeast Siberia, the hominin range apparently never reached above 55°N during the early Upper Paleolithic, "and it was not until c. 25,000–20,000 BP that they inhabited the extreme continental north" (Goebel 2004: 195). This panorama, of course, implicates that the human entry to America took place under very cold conditions and relatively late in the Pleistocene. Even when most of the Beringian habitats were not glaciated, the conditions were difficult for humans. Palynological evaluations suggested that at that time Beringia was a barren landscape (Colinvaux 1986). However, the faunal vertebrate richness of Beringia – that characterizes the so-called Mammoth Steppe – surely facilitated the peopling process by providing an adequate subsistence base (Guthrie 1982). The subsequent history of human expansion toward the south through an ice-free corridor presents a classic example of interaction with periglacial environments. It is clear that if this corridor was the main access to the Americas, then hunter-gatherers have to wait until significant biotic resources were available to live and circulate in order to reach the North American plains (Meltzer 2009). Alternative coastal routes were proposed to explain the human expansion to the south, but the northern coastal habitats potentially used by the first colonizers were also in part glacial or periglacial. More recent theories suggest an Atlantic crossing with an origin in the European Solutrean (Stanford & Bradley 2011). This scenario also involves periglacial environments.

Key Issues/Current Debates

The evidence related with the human colonization of mountain environments is particularly relevant. The Tibetan plateau was covered by ice c. 50,000 years ago, after which retreat of the ice facilitated the expansion of animal resources into the plateau. It is postulated that c. 30,000 years ago, humans entered the plateau, but the evidence is not abundant. At site Xiao Qaidam, 3,100 masl, there are simple core and flake quartzite tools probably dating to c. 22,000–18,000 BP. At site Chusang, at 4,200 masl, hand and footprints impressed on

travertine are dated by OSL approximately 21,700–20,600 BP (Aldenderfer & Zhang 2004: 16). Several sites with core and flake tools are typologically assigned to Paleolithic times. Brantingham et al. (2003) proposed that the plateau was populated from the north, with people getting into eastern Qinghai lakes, at 3,000–4,000 masl, before the advent of the LGM. It is maintained that at that time, humans acquired the physiological adaptations required to live in the high country. Finally, displacement to the high plateau "may have occurred at the onset of LGM conditions, c. 23,000-22,000 B.P." (Aldenderfer & Zhang 2004: 21). Basically, the timing of the colonization necessarily was in synch with the retreat of the ice.

In the Central Andes, there is evidence of early human populations occupying mountain environments slightly before 10,000 BP (Aldenderfer 1997), while at Agua de la Cueva, Mendoza, Argentina, mountain environments begin to be used around 11,000 years ago (García 2003). In both cases, hunter-gatherer adaptations focused on the exploitation of wild camelids were defined. For these and other high altitude sites, the default interpretation is that human occupations are seasonal. However, interpretations of year-round occupations also exist, for example, at Pachamachay Cave, Perú, at c. 4,300 masl (Rick 1980). This cave was occupied since the end of the Pleistocene by wild camelid hunters, and Rick suggested that the conditions were adequate for sedentary occupations. Alternative models can be offered for the evidence of Pachamachay, but it is clear that some of the high altitude environments of the Puna of the South Central Andes witnessed the early Holocene process of domestication of camelids (Yacobaccio 2007), a process that at some point was inequivocally related with year-round occupations.

Glacial and periglacial landscapes can be very prohibitive for humans, requiring complex sets of adaptations (Binford 1978). One example is the Palaeo-eskimos that were living in the relatively warm climate of the Arctic mid-Holocene, a region whose climate at some point began to change toward very cold conditions. One result was that entire sectors of that area were abandoned. The availability of both terrestrial and sea mammals was basic to select regions of human survival, which was possible even when it changed dramatically to the point of unpredictability, especially in Arctic Canada (Hoomard 2011). Hunter-gatherers living in the central Arctic were able to adapt to this conditions, probably constituting the best example of a human population living under glacial conditions. Of course, they were continuously exposed to starvation and other risks, especially during the Little Ice Age (McGhee 1997). Except for the mountain habitats, the importance for humans of periglacial environments in the Southern Hemisphere is less notable. Ultima Esperanza, Chile, is one of the few places where early colonizers were regularly living relatively close to the ice near a proglacial lake c. 10,500 years BP (Martin et al. 2011). Moreover, in other Southern Hemisphere places like Australia, there were very few areas affected by glaciers, and it is possible that the distribution of ice played no role in the process of exploration and colonization.

As already mentioned, mountains offered some of the more characteristic human-inhabited periglacial landscapes. For example, the lands around the Andes or the Himalayas present large high altitude periglacial habitats that were inhabited by humans with difficulty. Humans are not adapted to live in high altitude and required behavioral, cultural, and physiological adaptations to those habitats in order to survive (Aldenderfer 1997: 19–25). For that reason, the process of human colonization of these and other mountain environments started near the end of the Pleistocene and only after the effective colonization of lowlands nearby took place.

Future Directions

One problem in understanding the archaeology of periglacial landforms is that glacial erosion and other dynamic processes associated with deglaciation probably erased any indications of previous human occupation. This is especially

important since many proglacial lakes and other areas marginal to glaciers probably functioned as magnets for earlier colonizers, and the catastrophic draining of lakes completely destroyed any sites located nearby. For this reason, formational and taphonomic studies will be crucial in appreciating the magnitude of these problems and in trying to reconstruct the history of human use of those environments.

Finally, the literature discussing the tactics and strategies used by humans living under periglacial conditions emphasize the availability of fire technologies and all kinds of shelter adaptations (Jochim 1981). Even more important is the existence of a full suite of secondary adaptations, like the intensive use of the different products offered by hunted animals, the use of stone boiling, or the use of bones for fuel. Examples of humans inhabiting periglacial habitats using these and many other tactics are well described in the literature (Jochim 1981; Soffer 1985; Meltzer 2009) and constitute the best proof of human adaptability. Bioanthropological studies should play a more important role in discussing these adaptations in the past, since it was only by conquering periglacial environments that *Homo sapiens* was able to successfully colonize the earth.

Cross-References

- ▶ Fossil Records of Early Modern Humans
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Glacial Advances in Asia, Europe, and North America

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Glass: Conservation and Preservation

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Introduction

Glass artifacts that are successfully recovered and preserved have the potential to contribute to the archaeological record in many ways. However, conservation and preservation of archaeological glass can be challenging. Some glasses are inherently less stable than others, and some burial environments more deleterious. Surface weathering on archaeological glass is common, and it is rare for glass to survive burial unbroken.

A successful preservation plan for glass incorporates both active and preventive conservation and begins before excavation. Because glass is fragile, careful handling, both at the time of excavation and subsequently, is important for its preservation. Once a glass artifact has been excavated, the level of deterioration, physical damage, and the stability of the glass itself must be evaluated, and steps to improve the artifact's condition should be taken if necessary. Wet or damp glass that may have absorbed soluble salts must be treated to remove the salts and slowly dried. Reconstruction and/or consolidation are sometimes necessary for the study, interpretation, publication, and preservation of archaeological glass, but conservation treatment should be as minimal as possible. Conservation treatment can have unintended long-term consequences, even when the most current recommendations are followed, and should only be undertaken by a conservator experienced in the treatment of archaeological glass. Finally, good storage conditions are required to ensure long-term preservation of glass and are best planned before excavation begins.

Definition

Conservation and preservation for archaeological glass may refer to both active and preventive conservation measures. The goal of active conservation treatment is to stop or slow the rate of deterioration in glass. Cleaning, reconstruction, and restoration, also considered active conservation, may also be involved if these steps are desired for interpretation or exhibition of glass objects. Preventive conservation refers to measures which do not intervene chemically or physically to alter the condition of an artifact, but which act to promote long-term preservation. Careful handling and climate-controlled storage at low relative humidity, for example, are two preventive conservation measures for glass. Preventive conservation is often the most cost-effective means of ensuring long-term preservation for archaeological objects.

Key Issues/Current Debates/Future Directions/Examples

Basic knowledge of the properties of glass is necessary to understand how it deteriorates in archaeological contexts and to plan adequately for its conservation. An in-depth explanation of the chemical composition and physical structure of glass is outside the scope of this entry, but these topics are covered in detail in monographs on glass conservation as well as in many other sources (Davison 2003; Koob 2006). In short, glass is composed of silica, an alkali like soda or potash, and a stabilizer like lime. In wet or damp burial environments, water leaches the alkali from the surface of the glass, leaving behind an unstable layer of silica. This layer will reflect and transmit light differently from the original glass. Depending on the level of deterioration, the glass surface may appear iridescent or opalescent but still relatively intact, or it may appear as if it has a thick, flaky weathering crust, a result of accumulated layers of thin, unstable silica.

Other factors which affect the preservation of archaeological glass are the pH and temperature of the burial environment. The preservation of archaeological glass is dependent not only on the burial conditions – dry environments promote preservation while damp environments accelerate deterioration – but also on the composition of the glass. Glasses made with an organic alkali like potash are inherently less stable. Preservation of archaeological glass not only varies widely from site to site but can also vary across a site, and even on the same vessel.

Deteriorated archaeological glass can be very fragile, and even well-preserved glass is easily subject to breakage. Careful handling is important at the time of excavation to ensure successful recovery. Like other fragile materials, deteriorated glass artifacts can be block-lifted and micro-excavated. Block lifting can assist not only with preserving fragile glass but also with the retention and orientation of the fragments and, therefore, the subsequent reconstruction of complex broken vessels. As with most archaeological materials, rapid changes in the ambient environment should be avoided. Wet glass should be dried slowly, for example. For the same reason, damp glass should not be tightly sealed in plastic bags or condensation may accumulate on the surface.

The recovery and conservation of glass from very wet or underwater environments, whether marine or freshwater, can be especially challenging. Glass from such environments can be severely compromised structurally, with a consistency like gelatin, and may be permeated with soluble salts. In these cases, a conservator with experience in the treatment of glass from wet environments should be consulted. A few books and multiple articles provide information on conservation of glass from such environments and can be consulted for further information (Pearson 1987; Singley 1988; Hamilton 1996; Anastassiades & Ellis 2008; Mardikian & Girard 2010).

The condition of glass artifacts should be thoroughly documented after excavation, both in writing and with photography. Professional conservators should be familiar with this type of documentation, and archaeologists should expect the conservator to provide a written report summarizing the condition of the artifact(s) and any conservation treatment undertaken. Books on glass conservation can provide more information for those unfamiliar with documenting and describing the condition of archaeological glass (Davison 2003; Koob 2006).

Conservation treatment of deteriorated archaeological glass can be complex. In general, it is a good idea to remove soil and other surface accretions which might attract and hold moisture against the surface. Glass that is not weathered can be gently brushed or even rinsed with water. But if, as is the case with most archaeological glass, the surface is fragile, cleaning can be a dangerous operation and is best left to an experienced conservator. The outer, fragile, weathered layers of deteriorated glass should never be removed during cleaning; they represent the original surface of the glass. Surface details and decoration may be lost if these layers are removed, and the glass revealed beneath them is likely to be dull, pitted, and unattractive.

If the weathered surface of an archaeological glass object is flaky, consolidation of the outer

layers of glass may be necessary. The decision to consolidate should not be undertaken lightly; consolidation of archaeological glass is rarely reversible, and the materials used can have long-term effects on the stability and appearance of the object. If the artifact can be stored safely and extensive handling is not required, consolidation of the surface should be avoided. Consolidation should only be carried out by an experienced conservator. Conservation science is a field which advances rapidly, and the most recent literature should be consulted before a consolidant and application method are chosen.

Often, reconstruction is required before fragmentary glass artifacts can be studied, photographed, or drawn for publication. Epoxy resins have been used extensively as adhesives for glass, but they are not recommended for archaeological glass; the epoxies commonly used in glass conservation are too strong for archaeological glass. Their use can create joins which are stronger than the surrounding glass, producing unintentional but problematic strains in joined artifacts (Koob 2006: 48). Softer solvent-based acrylic resins are a better choice, and the use of such resins has been documented and discussed extensively in conservation literature (Koob 1986, 2000, 2006; Horie 2000). The same considerations are important when creating infills for missing areas on archaeological glass vessels. Commonly cited drawbacks to using acrylic resins as adhesives and fill materials are that they must be prepared for use and that they create visible joins in glass objects. There is some truth to both observations, but most archaeological conservators find that acrylic resins are straightforward to prepare and apply, even in field conditions. Invisible joins, desirable in some museum settings, are rarely a concern for deteriorated archaeological glass. A desire to match the refractive index of the glass and a desire to produce joins without small bubbles from solvent evaporation are two reasons that museum conservators might choose an epoxy adhesive over an acrylic resin for joining or infilling non-archaeological glass. However, epoxies do not provide a good refractive index match for most archaeological glass. The small bubbles which result from solvent evaporation in acrylic resin adhesives, if visible at all, are a small price to pay for an adhesive that will not cause further damage to the glass (Koob 2006: 48–50).

The previous paragraphs have discussed recovery and active conservation treatment for archaeological glass, but preventive conservation following excavation is the most important long-term preservation factor for glass artifacts. A good ambient storage environment is crucial because unstable glass that is exposed to high relative humidity can deteriorate quickly. In general, lower relative humidity is best for storage of glass. Storage at 45 % relative humidity, +/− 5 %, is recommended for stable glass, and 40 % is suggested for unstable glass (Koob 2006: 141). Archaeological glass in storage should be checked regularly for signs of deterioration, which might appear as clouding of the surface, flaking or cracking, or moisture on the surface of the glass.

Glass, although durable, is also easily broken and chipped. It should always be handled and packed carefully. Glass that has adhesive joins and/or fills should be handled with special care, especially if the adhesive is old. Use common sense when packing glass for storage. Glass objects should be well supported, should not be stacked on top of one another, and should not move when drawers or cabinets are opened. Very fragile objects may require individual boxes or rigid containers, but air should be able to circulate around objects and they should not be tightly sealed inside containers, as this can create a microclimate which may accelerate deterioration of unstable glass. Acid-free storage materials are best (i.e., not wood or acidic papers like newsprint). A good, soft packing material is unbuffered acid-free tissue paper. Place the heaviest part of any object towards the bottom of the container and provide adequate padding. Inert foam, like Ethafoam, can be used when sturdier support is required.

When packing glass for transport, follow the same general principles. Air circulation is less important for temporary situations like transportation. For transport, glass can be completely wrapped in acid-free tissue and even surrounded by bubble wrap. The bottom and sides of the

container should be well padded with several inches of foam, and all space between objects should be padded with a material that will not shift when the container is moved. Styrofoam pellets or other types of packing peanuts are not recommended because they may shift during transport and thus fail to provide adequate support (Koob 2006: 141–50).

In conclusion, the conservation and care of archaeological glass is not always straightforward. Glass is subject to damage and deterioration from many sources, and each artifact, collection, and site will present unique challenges. Collaborative planning that involves both archaeologists and conservators will yield the best results when designing conservation treatment and long-term preservation plans for archaeological glass.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Ceramics: Conservation and Preservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Field Stabilization of Movable Heritage
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Mosaics: Conservation and Preservation
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Basic Biographical Information

Internationally known folklore scholar Henry H. Glassie III, born March 24, 1941, received

his B.A. in English and Anthropology from Tulane University (1964), an M.A. in Folk Culture from the Cooperstown Graduate Program of the State University of New York at Oneonta (1965), and a doctorate in Folklore from the University of Pennsylvania (1969). During the period of his doctoral work, he was the State Folklorist of Pennsylvania and Director of the Ethnic Culture Survey (1967–1969) for the Pennsylvania Historical and Museum Commission. He taught at Indiana University's Folklore Institute (1970–1976) before returning to Penn as Chairman of the Department of Folklore and Folklife (1976–1988) and coming back to Indiana as College Professor of Folklore (1988–2009). Glassie also served as Codirector of Turkish Studies and held adjunct appointments in Central Eurasian Studies, Near Eastern Languages and Cultures, and American Studies, and is now Emeritus Professor, Department of Folklore and Ethnomusicology and Emeritus Adjunct Professor, Department of Near Eastern Languages and Cultures. He also helped establish three museums in the United States and Ireland, including Conner Prairie, an outdoor living history museum in Fishers, Indiana. He is married to Pravina Shukla, a folklorist who specializes in clothing and adornment; they have four sons and four grandchildren.

Major Accomplishments

Glassie was a John Guggenheim Memorial Foundation Fellow (1972) and an Invited Fellow at the National Humanities Institute (1975–1976). In addition, he was a Fellow of the American Folklore Society (1976) and served as its president (1988-1990); he was also president of the Vernacular Architecture Forum (1983–1985) and Senior Research Associate at the Museum of International Folk Art (1986–1993 and 1993–2000). During the 1990s, Glassie was honored as a Folklore Fellow of the Finnish Academy, and received an Award for Superior Service by the Turkish Ministry of Culture and the Award for Outstanding Achievement in the Arts by the Assembly of Turkish American Associations, as well as a Certificate of Honour from the Ministry of Cultural Affairs of Bangladesh. In 2003, the Vernacular Architecture Forum honored him by naming its outstanding achievement accolade the Henry Glassie Award. With expertise in folk art, folklife, vernacular architecture, and material culture, Glassie has written 23 books and 102 articles on folklore and material culture from Ireland, Turkey, Bangladesh, and the United States (especially rural Virginia) (1999a, 1999b, 2000a). Most books are illustrated with Glassie's own photographs and drawings; he also designed many of the Indiana University Press's volumes. His initial research resulted in major books on vernacular architecture (1969, 1975), followed by five books about Irish culture. In 1982 he began studies on the living arts of modern Turkey which resulted in a major traveling exhibition and book (1993), with additional research in South Asia (1997, 2000b), and a biography of a Nigerian artist (2010). Recognized as a master teacher at Indiana, he has received the Teaching Excellence Award from Indiana University. In 2000 he was named by President Clinton to serve on the National Council on the Humanities. His book, *Vernacular Architecture* (2000a), was the winner of the 2001 Cummings Award for the best book on North American architecture. Glassie is presently working on a monograph on Japanese figurative ceramics.

Cross-References

- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Ethnoarchaeology: Learning from Potters in Gilund
- ▶ Islamic Archaeology and Art History

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Global Archaeology

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Introduction

The history of science cannot be dissociated from its multiple contexts (Patterson 2001), whether they be in the physical or the spiritual domain. To tackle the topic of the rise of global archaeology, we choose to reflect on three great ruptures in the experiential context of the history of western humanity and consequently of the human sciences.

The first of these is linked to the very concept of culture. If before the end of World War it were possible to imagine a homogenous culture, pure or superior, after the experiences of the totalitarian states (Arendt 2004: 3-15), the danger of thinking about culture in the singular became evident. The effect of the tragedies caused by Nazi-fascism, added to the later experiences of the different civil rights movements, was to introduce pluralist aspects into culture, including the humanistic and therefore the global. In this new context, the Declaration of Human Rights, among other things, gathered strength and was adopted by the United Nations Organization on December 10, 1948. Apart from the many criticisms that can be made, this Declaration did consolidate the idea of the universality of basic human rights.

The second rupture, closely related to the former, is centered on the human conception of the environment in which we live. The premise arose that all our actions have global consequences, based on experiences with nuclear weapons and the uncontrolled use of agro-toxins, both of which saw the rise of epidemics and disease. With the ecological movement was born the premise that it is imperative to think globally and act locally.

Finally, the third rupture was linked to the end of the Cold War and the fall of the Berlin Wall. By the mid-1980s, capitalism was accepted as the choice for life; it seemed to have been victorious, and in turn it became plausible to consider a history of mankind from the ideological bias of capitalism.

Clearly one could have chosen other ruptures to contextualize the birth of global archaeology, but we consider that these three lines will help us to understand the globalization process and the expansion of thinking about humanity. The influence of this thinking about human beings in a global context can be seen in various fields of knowledge, one of which is archaeology. It is quite common to find in the discussion agendas of this discipline, such as in the World Archaeological Congress (WAC), proposed topics related to the "re-humanization" of archaeology and

global archaeology. Our aim is to understand some of the ideas that support these proposals.

Definition

Archaeology as a discipline started in the nineteenth century in the wake of the main thrusts of globalization, such as the spreading of capitalism worldwide and the imperial moves by colonial powers. The main intellectual ambitions of the discipline were also global, such as understanding the spread of material culture over large areas and later in the century the evolution of human ancestors (Boast 2009). In the twentieth century, this trend grew even larger, as witnesses the ambitious project of a global archaeological understanding of the whole human past as proposed by Vere Gordon Childe (1951). However, archaeology as a global interpretive move was very much centered on a core of western scholars and institutions, so that even the most daring global perspectives, such as Childe's, took a patronizing approach, leaving peoples and civilizations of the past as predecessors to the enlightened western world. So, culture history (Webster 2008: 34) and a global discipline did not escape the traps of being part of the array of western domination of the world.

The situation changed dramatically though in the later part of the twentieth century due to several reasons, not least the emergence of a plethora of social agents: women established themselves in the workplace and public sphere; former colonized peoples fought for their liberation; ethnic, religious, and other minorities struggled to have their rights recognized; and sexual liberation also led to new social mores in both western and non-western countries. Archaeology would not remain for a long time isolated from all those social changes, for, as David Clarke proposed as early as 1973, it lost the innocence (Clarke 1973). The Paradise Lost – echoing both Genesis, chapter 3, and Milton's opus magnum – was this land of joy but no awareness about the limits of knowledge itself. Processualism was a first response (Watson 2008: 2), soon to be criticized from several quarters (Johnson 2009). The emergence of social actors – women, blacks, and former colonized peoples and beyond – led to a challenge to the old global approach and fostered a new, less imbalanced global archaeology. The World Archaeological Congress (Ucko 1987: 10), established in 1986, has proven a turning point in this new direction, for two different but related reasons (Funari 2006).

In epistemological terms, diversity, pluralism, and conflict in interpretation were increasingly recognized as key concepts to interpret the archaeological record, considering how important those same tenets are for contemporary life. This is directly related to a global approach to knowledge, considering that different people, in different historical and cultural contexts, offer a diverse array of understandings of the world and of material culture, as a consequence. The African origin of all human beings is seen probably from diverse perspectives in Africa and in other continents, and the role of chinaware is perceived also probably differently in China and in other parts of the world, to mention just two subjects clearly related to global issues. Archaeology shifted from a potentially limited, western narrative of the past to a chaotic, but pluralist, study of past material culture, from a variety of conflicting standpoints. This is indeed a huge epistemological shift from a normative, uniform, and totalizing narrative to a diversity of different interpretations. As Nick Shepherd (2005: 26-30) put it, this was a move from one world archaeology to one world and many archaeologies.

In social terms, all those concepts were related to the inclusion of a variety of social actors in the scholarly field of archaeology, in a global scale. Archaeologists from non-western countries were often sidelined or ignored and considered as part of the uncivilized scholarly world. This changed gradually and WAC was a major turning point. The new scholarly association for the first time ever was run by a worldwide body of scholars and included also native representatives, traditionally subjects, not actors in the scholarly world. Western scholars were for the first time in a minority and global gained a new meaning, really implying the participation of archaeologists from all over the world. Then, breaking with hierarchical tenets,

WAC put together senior scholars and young students, and also natives and other social actors, so that a major hierarchical principle of western scholarship was put down (Smith 2005: 20). This is also a new global approach, taking global to mean comprehensive. So that epistemology and social aspects are interwoven in inextricable ways.

A global approach has also been related to capitalism, as pointed out by Michael Shanks (2008: 142): "Some have discerned a latest cultural phase, belonging with postmodernity and termed globalism. It refers to the expansion, especially after the fall of the eastern bloc in 1989 and after, and with the opening up of communist China to market forces, of the capitalist market across the globe." It is indeed impossible to set apart capitalism and globalization, so much so that historical archaeologist Charles E. Orser (1996) equated modernity, globalization, and capitalism and established the starting point as early as 1415. It is also clear that globalization did not end local specificities and, to the contrary, contributed to a plethora of global and local interactions, encouraging local identities and standpoints, as stressed by Wallace (2008: 12-18):

> The internet's ties to globalism are clear-cut. Yet the goals of the Internet highway's profiteers to "promote a world culture" (Bill Gates) conversely contribute to the desire by many people do find their own personal or group's identity within this global world. In fact, globalization is just a continuing process, which started much earlier and archaeology is particularly apt to deal with the subject (Kristiansen 2009: 36). Global archaeology in this sense is a catch word for archaeology in contemporary context, and it is no longer possible to think specificities without references to overall processes (and vice-versa).

Key Issues/Current Debates

Towards Global Thinking: Transformations of the Concept of Culture

Through the twentieth century, it is easy to find historical events that serve as models for understanding the conceptualization of past, present, and future (La Capra 2001). Undoubtedly, among these examples, we can highlight the experiences of two world wars and their accompanying genocides, the civil rights movements, and feminism, which have all generated a new reflection on culture, memory and politics, and other topics related to constructing a present that is more democratic and diverse.

Specifically in the case of culture studies, which appear in the Humanitarian Sciences of Archaeology, Anthropology, and History, among others, the aforementioned events had a wide impact in the 1950s. According to the cultural theorist Stuart Hall (1980), three publications were fundamental to the interior revolution of this investigative field: firstly, *The Uses of Literacy: Aspects of Working Class Life*, published in 1957 by British author Richard Hoggart; secondly, *Culture and Society*, published in 1958 by the Welshman Raymond Williams; and finally, *The Making of the English Working Class*, published in 1963, by E. P. Thompson.

Despite marked epistemological differences between the works of Hoggart,Williams,and Thompson,which nonetheless came from each of them reading Karl Marx, the three intellectuals brought drastic changes to the way "culture" was treated. According to Hall, the change was linked to new ways of conceiving society, given that until this time "culture" had been viewed as the "anniversary calendar" of social display, that is to say, as demonstrations barely to be considered a product of economic status; after the publication of these three works, culture came to be viewed as the pillar of society. So culture became the primary concern of the humanities and was no longer seen as superfluous to economic and political topics.

According to Hall, these intellectuals tried to draw their readers' attention to the idea that the concept of culture includes matters directly related to the so-called great historical changes (Hall 2009: 127). However, it was Raymond Williams from among the cited authors who chose to open dialogue with archaeology, thus moving towards building a global perspective.

From among Williams' many definitions of culture, two caught the attention of Stuart Hall. The first related culture to the sum of possible descriptions by which societies bestow meaning

on the world and reflect on their common experiences (Hall 2009: 126). Thus intellectual history was not only concerned with those few western traditions classified as "worthy of record," such as the great artists of the Renaissance, the great monuments and construction works of Antiquity, or the writers of holy illuminated texts. On the contrary, it dealt with the idea of a democratized "culture" that encompasses any human being's descriptions of the world.

While this first definition developed the concept of culture as an idea, the second definition would take in the anthropological universe. On this occasion, Williams emphasized culture as related to social practices and characterized culture as a global way of life (Hall 2009: 126). According to Hall, by integrating diverse lifestyles, this definition became one of the central axes of humanities.

From this viewpoint, the theory of culture became defined as the study of the relationships between typical elements of a global lifestyle. So culture would be neither a practice nor the descriptive sum of a society's popular customs. On the contrary, it would overflow the confines of social practices to become the sum of the interrelations that exist between them.

The writings of Raymond Williams were of added importance to the birth of new fields of action in the archaeological field. In the British case in particular, according to archaeologist Paul Courtney (2007: 38), landscape studies and the later foundations of industrial archaeology were profoundly influenced by Williams' text, *Culture and Society*. In understanding the relationships between human groups, having the starting point as an analysis of the cultural material was one contribution that would have made archaeology a new point of reference.

This new field, built from discussions of Hoggart, Williams, and Thompson, would be institutionalized in the 1970s as the "Linguistic Turn" Movement. The Linguistic Turn, whose roots lie, in part, within anthropology, immediately influenced the definition of culture as well as its supposed global character.

In 1973, the US anthropologist Clifford Geertz published *The Interpretation of Cultures: Selected Essays*. Profoundly disturbed by the so-called conceptual bog around culture – which, according to the author, ended up creating an indefinition of the term – Geertz applied himself to building his own redefinition of culture and of all the areas involved in cultural studies. For Geertz, culture would always be something essentially semiotic. In his own words: "Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be not an experimental science in search of law but an interpretative one in search of meaning" (Geertz 1973: 5). From this point of view, all science dedicated to cultural analysis would be, therefore, interpretive science.

Supported by his interpretation of the "thick description" of English philosopher Gilbert Ryle, Geertz championed the practice of ethnography as a field that deciphers codes, and chooses and reads semantic structures, attributing to them specific meanings. This means that cultural interpretation would become an incomplete and subjective operation, since it is characterized by the understanding of human behavior as a symbolic action. For the readers – and followers – of Geertz's proposals, his description of the actions, possibilities, and limitations of ethnography act as a window through which human sciences can be understood as a whole, across the fields of anthropology and archaeology and including historiography.

Beyond this concept of culture, which is related to the beginning of contextual archaeology (Hodder 1982), we are also interested in understanding the limits Geertz imposes on the work of cultural reading. According to the anthropologist, there are three characteristics of ethnographic description: it would always be interpretative, it would interpret the flow of social discourse, and it would aim to save the "said" through speech in forms that are able to be investigated. Finally, he adds one more: the reading is microscopic. This is where we meet the problem of thinking on a global scale.

According to this theoretical model, culture is understood contextually; in this way, it can only be read on a singular and small scale: the local

dimension. For Geertz, the only global element of the semiotic model for the interpretation of culture is that which allows us access to the conceptual world with which our subjects overlap, in such a way that, with this wider scope of meaning, we would be able to communicate (1973: 35). In this way, the global nature of thought would respond better to our desire to establish general rules of human behavior than would the possibility of understanding its local specificities. Not because the global should be left aside; on the other hand, for this author, whatever generalization we manage to establish should come from the finesse of its particularities and not from the scale of its abstractions. Thus, the local scale is shaped as a crucial piece of any attempt to think in global terms.

Geertz's proposals, which were explored and amplified through the studies of anthropologists from the School of Chicago in the 1970s, had a significant impact on anthropology and archaeology, upsetting the existing trend among behaviorists, linguistic formalists, and the like. The proposal of the symbolic interpretation of cultures on a local scale, cultures which nonetheless showed global interconnections, would gather strength within the humanities area.

In the particular case of archaeology, one cannot deny the contribution to the forms of analysis on a global scale of North American anthropologist James Deetz and his work *In Small Things Forgotten*: *The Archeology of Early American Life*, dated 1977. For this author, archaeology has a duty to approach anthropology with the aim of comprehending the diffusion of European culture around the world, commencing in the fifteenth century, and from this perspective understanding the impact and interactions between those cultures that were expanding and the native cultures they affected. Understanding of the so-called global transformations was modeled on an analysis of the small actions (and objects!) of daily life, many of which were related to food and housing in the North American colonies. In this way, the global scale was built up from the analysis of highly specific contexts.

For Deetz, who dialogued with anthropologists Edward Burnett Tylor, Franz Boas, Alfred L. Kroeber, Leslie White, and Claude Levi-Strauss, the concept of culture should be the central paradigm for the conception of archaeology itself. Supported by the studies of Walter Taylor (1948: 50-64), culture was defined in this context as mental constructs that cannot be observed directly, but rather come to light in different ways, such as ritual practices, social structures, and even the physical world. Global scale thinking became part of archaeology, in the beginning from discussions of the term "culture" and consequently from debates about how each researcher perceives the world they are studying. Speculations in the theoretical area were closely tied to archaeological practice.

Global Thinking: The Ecological Movement on a Global Scale

Change to the concept of culture, as well as the consequent value given to the global scale, was intertwined with the gradual understanding of the "environmental crisis" in the second half of the 1950s (Palacio 2002: 13). Concomitant with an increased value given to a new model of life based on consumption, a practice stimulated by the world of the Cold War was the beginning of doubts about the same model. During the decade of the 1950s, pollution of European rivers, for example, the River Thames, reached alarming levels, while air contamination produced a proliferation of severe respiratory problems in the population. Even the seemingly unquestionable models of food production were put in check by the book *Silent Spring* (1962) by Rachel Carson.

In this book, the author denounces the chemical products used to improve agricultural production. From the 1950s, then, people were casting doubt on the belief that technology and science were the saviors of humanity. The perception that something had gone awry, something inherent in the development models being practiced in the West, would bring about the correction and redefinition of the concept of "environment" and in the same way expand its field of action to a global scale.

If the concept of the environment had previously been relegated to the darkest corners of scientific theory, by the 1960s, it became the

banner of social movements, besides movements for the defense of civil rights and feminism. From then on, the definitions of what is "environment" have multiplied. In 1969, for example, the British researcher James E. Lovelock, with the North American biologist Lynn Margulis, launched the "Theory of Gaia," which imagines the planet Earth as an enormous living entity capable of self-regulation. The Theory of Gaia, which won sympathizers from members of mystic movements, environmentalists, and some researchers, facilitated the popularization of the concept of "environment" as composed of not only natural resources but also of human beings. Within this conception, man forms part of a planetary whole that is able to self-regulate and respond to the aggressions it suffers. The Earth, in this context, can be defined as the interaction between living and nonliving beings.

In his search for a holistic theory of environment, the geographer Yi-Fu Tuan defined "environment," in this same decade, as the set of conditions under which any person or thing lives or develops. The environment would be, therefore, the sum total of the influences that modify the development of life or character (Tuan 1974).

In a more pragmatic way, the environment could also be understood from the viewpoint of natural resources, a trend that materialized in the report *The Limits to Growth*, produced by the Club of Rome and published in 1972. In this report, the sustainability of the planet was analyzed, in terms of the demand for raw materials and natural resources, as well as eventual wastes. In this text, it was affirmed that the planet Earth could not support population growth, owing to the pressure that this would produce on the natural and energy resources and the increase in pollution, when taking into account technological advances.

From the 1960s, therefore, the definitions of "environment" have become different from the concepts of landscape. According to Brazilian researcher Tereza Emidio, the landscape became an integral part of a wider universe, denominated "environment": this landscape could be conceived then as a universe in miniature which, when articulated with other small universes, would constitute the environment (Emidio 2006: 13-4).

In this way, the global scale is converted into an imperative, above all for the biological sciences, which should come around to conceiving human actions as phenomena that cause an impact on the globe, this being conceived as a whole (Kingsland 1985).

Global Capitalism and a New Historical Archaeology

The archaeology of modernity and global capitalism has been particularly focused on a comprehensive approach, but it took a time for this universal stand to develop. Historical archaeology started in the United States as the narrow study of the Anglo-American material culture, excluding African-Americans, Natives, Latinos, Jewish, Irish, Italian, and other components of the American past. Critical understandings started in the 1970s and 1980s, mostly from a Marxist background, with groundbreaking studies by Orser, Leone, and MacGuire (Hicks & Baudry 2006: 27-30). There has been since then a growing emphasis on global features of modernity, taking capitalism as a force organizing "a set of social relations," as put by Leone in 1999. Orser stressed that there is no global trend without local features, so that global and local are interwoven and enmeshed in profound ways.

From the late 1980s, from a global perspective, several archaeologists questioned the universal role of capitalism and proposed instead a variety of specificities in different continents, countries, and regions (Funari et al. 1999). Diversity and identities in the plural have also featured a plethora of studies, from Shanks and Tilley (1988: 5-10), and Voss (2008: 18-20), but also peripheral outlooks (Funari et al. 2005). Global archaeology did not lose its strength, but recognized the relevance of concrete situations in different historical and social contexts.

Future Directions

Archaeology has moved from a most conservative and even reactionary endeavor to become a force

for change in the contemporary world. It is a no mean feat in itself. Within a few two or three generations, the discipline moved from defending the status quo, hierarchical relations, and social imbalances to contributing to challenging all those features and to promoting diversity, freedom, and the empowerment of people in general. There is future for archaeology out of a global perspective and the actual practice in concrete situations (Jones 2009: 109). Archaeologists are now largely from non-western countries, thousands of them from China, India, Japan, and other Asian countries, a large number from the Middle East, Africa, Latin America, Central Asia, and beyond. The USA, Canada, and Western Europe continue to be crucial do the discipline, but archaeologists working there are now in a minority and will increasingly be so. However, most archaeological intellectual scholarship is still from former colonial powers and this is to remain so for quite some time. A global archaeology is an archaeology accepting and including all those mixed features.

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- ▶ Capitalism: Historical Archaeology
- ▶ Culture in Archaeology
- ▶ Historical Archaeology

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Global Heritage Fund (GHF)

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Basic Information

Global Heritage Fund (GHF) is a private, nonprofit organization dedicated to the preservation of endangered archaeological and architectural heritage sites in developing countries and regions. It is distinguishable from other international heritage preservation nongovernmental organizations by its exclusive developing country focus and its signature methodology integrating conservation and economic development.

Headquartered in Palo Alto, California, GHF was founded in 2002 by entrepreneur Jeff Morgan. Morgan oversaw day-to-day operations as Executive Director, serving under a Board of Trustees responsible for determining overall strategy and direction until 2013, when Dr. Vince Michael took over the post. A Senior Advisory Board comprised of a multidisciplinary team of noted archaeologists and architectural conservators provides guidance in matters of conservation.

Funding for GHF operations comes from corporate and private donations and project-specific matching allocations from governmental and nongovernmental organizations. According to GHF, they had invested $25 million and garnered $20 million in project co-funding as of 2011 (Jeff Morgan, *pers. comm.* 2011).

GHF seeks to advance the goals of site conservation, community development, and preservation advocacy through a program of field projects, fellowships, the Global Heritage Network (GHN) initiative, and various workshops, events, and publications.

Major Impact

Over its first decade of operations, GHF staged 19 major conservation projects in 12 countries. Project sites are selected on the basis of their estimated significance, threat level, regional economic need, and potential for long-term sustainability via community involvement. GHF has historically focused on World Heritage Tentative List and other major sites informally deemed to possess "Outstanding Universal Value." Of particular interest are those for which preexisting preservation leadership and grassroots support has been in evidence. The GHN threat-monitoring initiative, described below, informs the identification of potential GHF project locations through a program of expert site assessments.

A hallmark of GHF field projects is their overarching focus on long-term community development through heritage tourism, for which the conservation of physical fabric is intended to serve as catalyst. What GHF describes as an "integrated community-based conservation and development" framework is built around a trademarked "Preservation by Design" methodology comprised of four elements: planning and protection, conservation science, community development, and partnerships.

Planning and protection refers to preparatory research and investigation, the development of conservation and master management plans having defined goals, responsibilities, milestones, and provisions for monitoring. Conservation science refers to tailored research and direction by leading international architectural conservators in consultation with local experts. Community development includes local-level promotion, training, and capacity building for conservation, site management, heritage tourism, and craft production. Finally, GHF views partnerships with in-country governmental, academic, and special interest groups for conservation, funding, and executive management to be tactically and strategically critical.

Current and completed GHF projects include work at sites in East, South, and Southeast Asia; the Middle East; North Africa; South America; Central America; and Eastern Europe. These have entailed the conservation of historic structures, at places like Izborsk (Russia) and Pingyao (China); archaeological ruins, such as those of Hampi (India) and Banteay Chhmar (Cambodia); and in situ archaeological remains at locations including Chavin (Peru) and Çatalhöyük (Turkey). In ongoing efforts at the rapidly developing World Heritage Site of Pingyao, China, GHF is working with regional governmental and academic institutions to stem the deterioration and loss of traditional Qing Dynasty courtyard houses and promote locally based heritage tourism through a program of survey, planning, conservation, training, and the promotion of local craft production. At the heavily looted ancient Khmer complex of Banteay Chhmar, GHF has assembled an array of domestic and international partner organizations to develop a site Master Plan, stabilize and conserve key structures, facilitate the preparation of a World Heritage List nomination, and train local residents in conservation and tourism. At the Neolithic settlement of Çatalhöyük, GHF has acted in concert with a range of sponsors and collaborators to enact improvements including a shelter, walkways, and signage; conserve murals; train locals in conservation and tourism; and assist the Turkish Ministry of Culture in the revision of a site management plan and establishment of a regional Heritage Park.

In 2011, GHF launched Global Heritage Network (GHN), an Internet-based preservation collaboration, advocacy, and threat-monitoring platform. Intended to facilitate international information exchange among working professionals and students, GHN consists of a threatened site database, a member community, and a documentation library. "GHN Sites" is a Google Earth-supported dynamic repository of satellite imagery, spatial data, photos, videos, news items, technical reports, GHF-sponsored site assessments, and other resources relating to the preservation of select developing country sites. The "GHN Community" is an online social network featuring preservation news and user-created discussion groups. The "GHN Library" consists of preservation literature such as management plans, studies, reports, articles, and bibliographies pertaining to heritage conservation, tourism, economics, and related themes. In addition to its active member community, GHN is supported through the voluntary efforts of qualified Site Coordinators and Site Monitors.

Other GHF activities include an annual Preservation Fellowship program supporting international students and scholars in the preservation of developing country sites, workshops and public fora on conservation-related topics, and the production of occasional research reports, white papers, a blog, and a biannual newsletter.

To its advocates, GHF's brand of "venture philanthropy" is a model of grassroots preservation engagement bridging developed and developing countries. The direct effects of GHF's work include the physical conservation, protection, and improvement of a significant number of sites and the enhancement of local-level knowledge and skills regarding conservation and tourism. By bringing together networks of partner organizations, they have promoted intra- and international cooperation and raised the visibility of best practices heritage management and planning.

Global Heritage Network provides unprecedented public access to information on developing country heritage site management and hosts a sizable community of active participants.

Among the indirect impacts of GHF's efforts must be counted as yet unquantified economic effects of heritage tourism for households and communities, enriched future personal and professional opportunities for trainees and fellows, increased public awareness of the special vulnerability of developing country heritage, and strengthened appreciation among peer organizations of the importance of financial savvy for NGO efficacy and long-term site sustainability. By advertising their Preservation by Design™ methodology, GHF arguably helps to raise the bar of international heritage management practice, accentuating the need for holistic planning, community commitment, and clear accountability.

Cross-References

- ▶ Çatalhöyük Archaeological Site
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Goat: Domestication

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Basic Species Information

The domestic goat *Capra hircus* (Linnaeus 1758) (Mammalia, Artiodactyla, Bovidae, Caprinae) is a small ruminant herbivore that browses on shrubs and weeds. Females reach puberty between 6 and 12 months and after a mean gestation time of 150 days give birth to a single or twins. On average, the wither's height is 60 cm and the weight 60 kg for a female, but these characteristics strongly vary according to the breed (e.g., for females from 27 kg for an African Pygmy to more than 100 kg for a Boer). Both sexes have a beard and horns in most breeds, and many breeds bear wattles. The 800 million goats distributed all over the world are mainly present in Asia and in the Near East (70 % of the worldwide population) and are found in almost all kinds of environments. There are more than 640 breeds, including about 560 traditional breeds/populations adapted to local conditions (Fig. 1) and industrial breeds. The worldwide goat population show a high level of genetic diversity distributed independently of the breeds (Naderi et al. 2007).

Timing and Tracking Domestication

Archaeological (Harris 1961) and genetic (Manceau et al. 1999; Pidancier et al. 2006) data revealed that the goat's wild ancestor is the bezoar, *Capra aegagrus* (Fig. 2). Bezoars are distributed in mountains of the Middle East, from southwestern Turkey to central Afghanistan and southern Pakistan (Fig. 3), mainly in relatively arid habitats such as mixtures of rock outcrops and shrubby thickets or conifer forests (Fig. 2). Goats were among the first farm animals

Goat: Domestication, Fig. 1 Traditional goat population locally adapted to a semiarid mountainous environment (Atlas Mountains, Morocco) (Photo credit: F. Pompanon)

Goat: Domestication, Fig. 2 Male bezoars (*Capra aegagrus*) on a rocky slope in a protected area (Lashkar Dar Malayer, Iran) (Photo credit: H.R. Rezaei)

domesticated and rapidly had an important role in the economies of human societies. This is due to several characteristics inherited from its wild ancestor, including flexible feeding habits and the ability to live and breed under coarse conditions (Clutton-Brock 1999) and to be transported over long distances. Goats provide meat, milk, and dung (for fuel) but also hair and skin for clothing, or sinew (for glue or strings) and bones used for making tools and weapons. Since the beginning of domestication, the control of livestock by people released environmental pressures such as those exerted by sexual selection or predation on horn morphology or coat color. Simultaneously, new selective pressures appeared since farmers instinctively or deliberately favored some characteristics. A general trend differentiating domestics from wilds is changes in skeletal conformation (i.e., mainly a reduction in body size), but traditional breeding led to a diversity of locally adapted

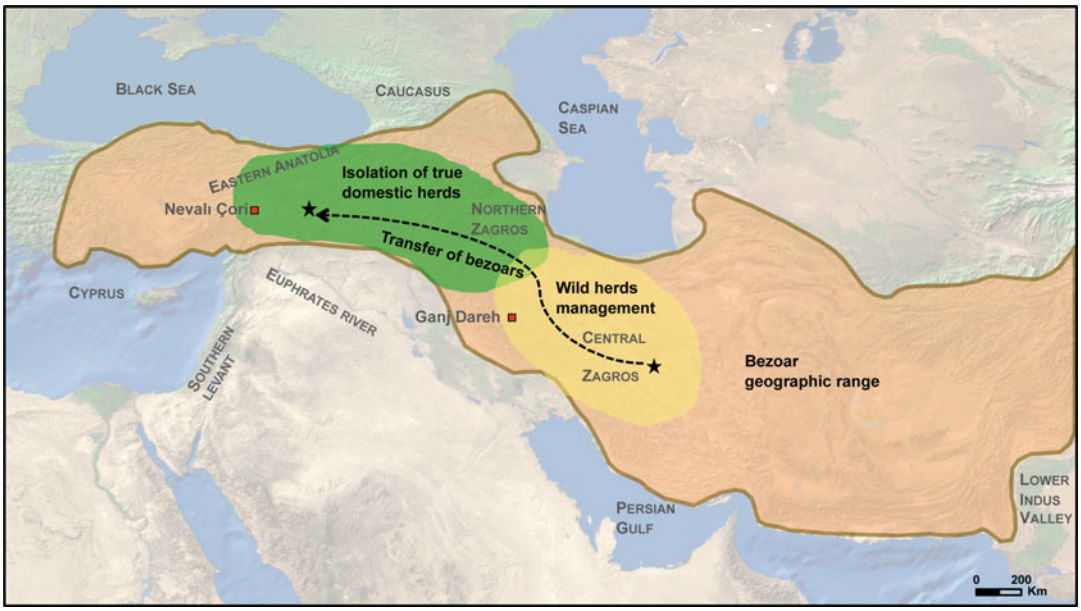

Goat: Domestication, Fig. 3 Simplified scenario of initial goat domestication from the bezoar in the Middle East. The *light brown* area represents the geographic range of the bezoar (*Capra aegagrus*) that may not have changed since the beginning of domestication. The *yellow* and *green* areas represent the approximate areas where herd management took place and where true domestic herds were isolated, respectively. The *stars* give an example of localities with bezoars sharing the same genotype (for a mitochondrial DNA gene) supporting past translocations by man (Naderi et al. 2008). In *red*: archaeological sites giving evidence for local pre-Neolithic goat domestication (see text)

phenotypes. The intensity of artificial selection strongly increased with the emergence of the breed concept 200 years ago, resulting in the standardization of morphology (e.g., size, coat color) and performance within well-defined industrial breeds.

The bezoar was among the wild ungulates hunted by hunter-gatherers from the Neolithic in Western Asia. Several tactics of animal use, more or less successful, may have been developed to ensure the transition from hunting to domestication. The control and protection of wild flocks kept in a favored place may have existed besides and/or before the taming and rearing of animals that led to the isolation of true domestic herds (Clutton-Brock 1999). Such archaeological prediction of herd management is coherent with the genetic signature of a past demographic expansion of the bezoars from Central Zagros (Fig. 3), which occurred before the isolation of domestic herds (i.e., time of expansion of Iranian goat populations, Naderi et al. 2008).

This is also consistent with young male-biased culling patterns without body size reduction found in this region (Ganj Dareh, Iran) about 10,000 Before Present (BP), although it has sometimes been interpreted as true domestication (Zeder & Hesse 2000). However, the first domestic herds may not have appeared from controlled populations from Central Zagros, but in a region ranging from Eastern Anatolia to Northern Zagros where the wild populations are genetically closer to the domestics and where there is archaeological evidence for local goat domestication c. 10,500 BP (Nevalı Çori, Turkey). However, the managed bezoars from Central Zagros would have contributed to a small part of the domestic gene pool captured in Northern Zagros/Eastern Anatolia through an early translocation of controlled animals (Fig. 3, Naderi et al. 2008).

Human-mediated long-distance transfers during the phase of herd management or at the early stages of true domestication are archaeologically

attested by the presence of wild or feralized goats outside the geographical range of the species (e.g., in Cyprus during the eleventh millennium, Vigne et al. 2011). Such feralized populations are still living in several Mediterranean islands. Animal translocations are consistent with the weak phylogeographic structure of the bezoar over its whole range (Fig. 3), which is very unusual in wild ungulates. The high level of genomic diversity currently observed in goats, similar to that of bezoars, cannot be explained by the domestication of less than 1,300–1,900 ancestral lineages (Naderi et al. 2008).

Thus, the domestication of goats has been a long-term process which initial phase lasted at least several hundred years, over a large area (Western Anatolia/Northern Zagros), involving several hundred to several thousand individuals. Independently, an earlier phase of wild herd management in the Central Zagros did not contribute to the modern goat gene pool except by the transfer of wilds and/or early domestics by people to the area where domestication took place (Fig. 3). After isolation of the first domestic herds, goats diffused from the domestication area to reach Western Europe (c. 7,600 BP in southern France), Eastern Asia (not well documented, probably c. 3,000 BP in China), and Africa (c. 7,400 BP in the Maghreb and later than 4,000 BP in more southern parts). The current mix of genotypes in bezoar populations from the domestication area suggest that the weak genetic structure of modern goats at the worldwide level results more from the initial capture of genotypes from already mixed wild populations than from further transportations of domestics for commercial trade (Naderi et al. 2008). The introgression of wild genomes into the domestic gene pool through hybridization may have also taken place, but its importance and timing are still unknown.

Cross-References

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- ▶ Cyprus, Archaeology of
- ▶ Genetic Bottlenecks in Archaeology
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

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Göbekli Tepe: Agriculture and Domestication

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Introduction

The Site

The Pre-Pottery Neolithic (PPN) tell of Göbekli Tepe (GT) lies 15 km NE of the modern city of Şanlıurfa in SE Anatolia. It is located at the highest point of the Germuş range overlooking the Harran plain. Ongoing excavations since 1995 revealed a unique monumental architecture rich in symbolism (Schmidt 2011, 2012).

Göbekli Tepe: Agriculture and Domestication, Fig. 1 Göbekli Tepe – overview of the main excavation area with the characteristic round enclosures. In the foreground Enclosure D, the one best preserved (© DAI, Photo N. Becker)

Key Issues

Traces of domestic structures have not been found yet. At least two occupation phases can be distinguished. The monumental architecture (Fig. 1) with huge T-shaped pillars arranged in circle-like enclosures around two even taller central pillars (>5 m) corresponds to Layer III and dates to the PPNA (Dietrich & Schmidt 2010). The pillars are interconnected by walls and stone benches. Layer II represents a later occupation phase dating to the Early and Middle PPNB. Its architecture consists of small rectangular buildings, usually with two pillars (<2 m) placed in their center.

The pillars of Layer III are richly decorated with figurations of animals as diverse as insects, spiders, scorpions, snakes, birds, and mammals (Peters & Schmidt 2004; Fig. 2). These enclosures also produced limestone sculptures of human beings and animals. A geophysical survey revealed the presence of many more large enclosures all over the mound. Obviously, these were backfilled rapidly and intentionally after some time of use, ritually buried as it seems.

It is assumed that the T-shaped pillars represent supra-natural beings (Schmidt 2011). In addition, depictions of human arms and hands together with garments, such as decorated belts or loincloths made of a fox pelt, indicate their anthropomorphic nature (Fig. 3). As such, the complex belief system visualized by the findings at GT illustrates considerable sociocultural complexity in foraging communities inhabiting PPNA Upper Mesopotamia.

Subsistence

The carving of the monoliths and the building of the enclosures necessitated considerable man power and a well-organized community. Moreover, cult practices including feasting likely

Göbekli Tepe: Agriculture and Domestication, Fig. 2 Pillar 43 in Enclosure D is covered entirely by depictions, mostly of animals (© GEO & DAI, Photo B. Steinhilber)

Göbekli Tepe: Agriculture and Domestication, Fig. 3 Pillar 31, one of the central pillars of Enclosure D, illustrates the anthropomorphic character of the pillars. It shows arms and hands as well as elements of clothing – a stola, a belt, and a loincloth made of a fox pelt (© DAI, Photo N. Becker)

attracted large groups, implying that food procurement had to be organized. If the numerous grinders, mortars, and pestles found in the backfill suggest large-scale plant processing at GT, other evidence for this activity is poor. Storage facilities have not been found so far and remains of edible plants are rare. Up to now, only wild taxa including cereals such as einkorn, wheat/rye, and barley could be identified (Neef 2003). At this stage of research, however, activities pointing at cereal cultivation can neither be evidenced nor excluded.

Besides plant collecting, hunting was essential. The faunal assemblage illustrates that throughout site occupation, people predominantly hunted Persian gazelle. Wild cattle, asiatic wild ass, wild boar, wild sheep, deer, hare, fox, and a variety of bird species contributed to the diet as well. Faunal composition in Layer III indicates that besides gazelle (58 %), wild cattle (18 %) were a major supplier of meat too considering the species' liveweight. However, its economic importance declined markedly during later occupation when medium-sized ungulates (gazelle, wild sheep) provided most of the meat.

Göbekli Tepe and the "Neolithic Revolution"

Architecture and art at GT are indicative of a complex belief system and a hierarchically structured universe. Of particular interest is the anthropomorphic nature of the T-shaped pillars and the fact that insects, spiders, and vertebrates have been depicted on them. This could signify that the supra-natural beings exerted power over these animals and therefore – in the figurative sense – over the world of the living. The GT findings might therefore suggest that within the hierarchy of the PPN belief system,

anthropomorphic beings – and hence humans – considered themselves superior to other living creatures. If this interpretation is correct, then the symbolism displayed at PPNA GT could indeed evidence a mind-set that was conducive for achieving cultural control over animals. It has been argued that the Neolithic revolution could not have taken place without this mental development (Cauvin 1997).

A sedentary way of life and long-term acquaintance with wild forms were essential prior to domesticating ungulates. At a certain point in time domestication moreover necessitated the spatial isolation of individuals from free-ranging herds and their raising and breeding in an anthropogenic environment. However, evidence for human interference with the life cycle of ungulates during the initial stages of the domestication process, when hunting activities still provided the bulk of the meat (and hence of the osseous remains in the assemblage), is problematic based on the available zooarchaeological methods. Thus, whether domesticates were kept at GT is difficult to ascertain, but it is not impossible that this was the case during the later occupation stage (Layer II).

Particularly noteworthy is the evidence for feasting at GT (Dietrich et al. 2012). In combination with the wide geographic distribution of elements of its iconography in Upper Mesopotamia, this implies that groups of hunter-gatherers originating from different parts of Anatolia and northern Syria assembled here. On these occasions, hunters from different communities had the possibility to share their knowledge and experience relative to the exploitation of economically important species, e.g., gazelle, wild cattle, wild sheep, and wild boar. This way, more efficient hunting techniques as well as innovative methods for monitoring mobility in wild ungulates within the site catchment could have spread quite quickly. The same is true for aspects concerning the practicability, workload, and economic benefits of keeping and breeding animals within the boundaries of a settlement. Not only would this kind of dissemination scenario be consistent with the available zooarchaeological and genetic evidence indicating multiple and broadly contemporaneous domestication events throughout the (northern) Fertile Crescent, it would also help understanding why PPN ungulate domestication was not restricted to a single taxon or to animals confined to a particular ecogeographic setting (Peters et al. in press).

Interestingly, the fact that in SE and E Anatolia livestock husbandry was already practiced a few centuries before reaching the early Holocene climatic optimum c. 8000 BCE (Peters et al. 1999) suggests that ungulate domestication occurred when climatic conditions were still improving and with it the carrying capacity of the landscape. Thus, rather than taking place under acute resource stress, we cannot exclude that meat procurement was still quite secure when efforts to appropriate animals started.

Around c. 8200 cal BCE, GT was abandoned. It is perhaps telling that this coincided with a major economic change in Upper Mesopotamia, namely, the replacement of gazelle hunting by small livestock husbandry as the main subsistence activity to procure meat (Peters et al. in press). Because cult centers with large catchment areas like GT may have served over the centuries as places of exchange between communities of foragers inhabiting the northern Fertile Crescent, it is not unlikely that these gatherings played a catalytic role in the propagation of innovative techniques relative to food acquisition and ungulate domestication as well, causing the long-term demise of the foraging lifestyle lying at the very origin of these unique megalithic ritual places.

Cross-References

▶ Agriculture: Definition and Overview
▶ Plant Domestication and Cultivation in Archaeology

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Goggin, John M.

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Basic Biographical Information

John Mann Goggin (1916–1963) was a great mind that led a life of expedition and discovery, had vast interests and eccentric hobbies, and was a devotee of natural history. Moreover, he was an anthropologist and archaeologist committed to the history of humanity (Sturtevant 1964: 386-9).

Goggin was born in Chicago and undertook his graduate degree at Yale University. His experiences growing up in Miami with the Seminole Indians and his excursions to New Mexico and to Chihuahua with the Tarahumara, along with his passion for the great outdoors and collecting natural specimens and artifacts, influenced the way in which he understood the relationship between humankind and the natural environment. This made him increasingly aware of the problems involved in sampling and the similarities and variations within artifacts. These ideas were translated into the methodological tool known as cultural traditions, following the work of Rouse in Connecticut and that by Willey in Peru (Goggin 1964: 110). Moreover, this was applied in the St. John's region, where he identified a Spanish-Indian tradition that resulted from the impact of Hispanic culture on Indian one (Goggin 1998: 71-2).

Major Accomplishments

Goggin's main interest was the interaction between colonists and indigenous groups in the New World. His fascination for the pottery of former Spanish colonies made him aware of the necessity to create a complete typology of majolica pottery from the sixteenth to the eighteenth centuries. This drew him into studying materials from Mexico, Colombia, and the Caribbean, which culminated in the posthumous publication of *Spanish Majolica in the New World* (1968). This is a foundational study that set the basis for typological analysis of majolica in the Spanish Empire and the Indies. Along this one, *The Spanish Olive Jar* (1960) is a comprehensive typological work that emphasizes the relevance of studying these artifacts from the former Spanish colonies. Unfortunately, his untimely death in 1963 left much of his research in note and manuscript form (Goggin n.d.) (Fig. 1).

His legacy of scholarship and theoretical developments continue inspiring students and scholars alike to follow his steps in the archaeology of the former Spanish Empire, and shaped the interests of scholars and students allocated in the Department of Archaeology in the University of Florida.

His work on pottery from the Indies was translated into one of the most complete databases

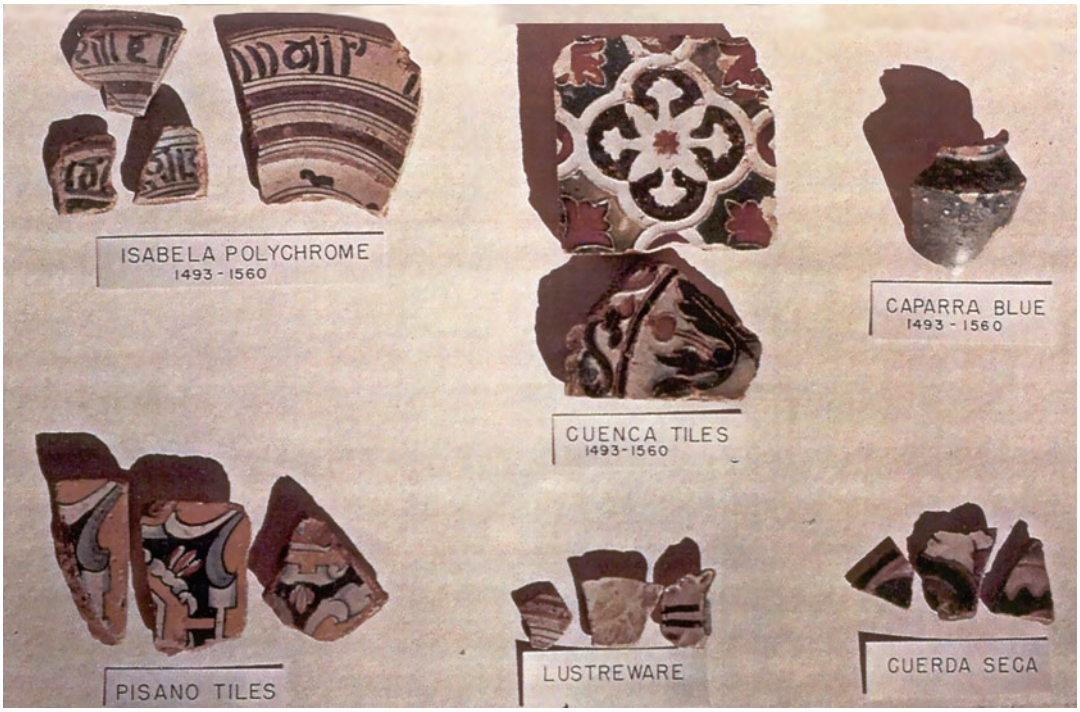

Goggin, John M., Fig. 1 Majolica samples originally classified by Goggin

intended for pottery identification by the Florida Museum of Natural History (http://www.flmnh.ufl.edu/histarch/gallery_types/). His emphasis on the value of combining surface collection, stratigraphic tests, typology and the use of historical sources, and examination of works of art and artifacts in museums to study historical periods is widely used today (Rouse 1964: 372). His seminal studies of majolica, glass beads, and Spanish olive jars are still relevant reference works, although subsequent researchers have refined our understanding of these artifacts (Weisman 2002).

His personality and bequest were unique and his written works reveal his passion and profound respect for archaeological and ethnographic cultures.

Cross-References

- ▶ Caribbean Historical Archaeology
- ▶ Deagan, Kathleen A.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Mexico: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Willey, Gordon Randolph

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Gold Museum (Museo del Oro)

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Basic Information

Museo del Oro ("Gold Museum")
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http://www.banrepcultural.org/museo-del-oro

The Bogotá Gold Museum was created in 1939 and houses archaeological objects of gold, pottery, bone, shell, stone, and textiles. The extraordinary quality of its collection of pre-Hispanic goldwork, the largest in existence, makes it unique in the world. It was established by the Central Bank of Colombia, to which the museum belongs, to save metallurgical pieces from being destroyed or removed to museums and private collections in other parts of the world, especially Europe and North America. From its foundation, the museum has valued the unique and artistic nature of the objects and their importance to Colombians as representations of a common past. The Gold Museum is by nature a national museum, the most important Museum of Anthropology and Archaeology in the country, being, from its creation, the leading institution in museology, museography, and conservation. Research programs in archaeology, archaeometallurgy, and education, the latter focusing on public primary schools, have been of particular importance.

The majority of objects forming the Gold Museum's collection have not come from systematic archaeological excavations, but rather from treasure hunters, or "guaqueros," grave robbers, and so come from the looting of pre-Hispanic indigenous tombs and places of offerings. The lack of an archaeological context for the museum's objects makes study of the social significance of the cultural material difficult, especially of the goldwork. The information that is presented to the public, therefore, comes from various other sources, such as ethnography, ethnology, and ethnohistory, which are used to explain the objects and suggest possible meanings for them and their uses. Other aspects can be studied from the objects themselves and have been widely investigated, such as the technology and iconographic styles of diverse groups of metal objects (e.g., Plazas & Falchetti 1986; Falchetti 1995; Lleras-Pérez 1999; Uribe 2005, 2007; Sáenz Samper 2010).

The museum has four exhibition galleries and one interactive gallery, the Exploratorium. The first gallery is dedicated to Metal Technology. The second gallery exhibits objects produced by the different pre-Hispanic societies that existed in the territory now known as Colombia. Here, archaeological information is used to contextualize the objects of metal and other materials, emphasizing their relationship with the political and religious organization of those societies. The third gallery deals with the cosmology and symbolism of the metal objects and exhibits objects that have been interpreted as genuine examples of shamanic art by various authors (e.g., Reichel-Dolmatoff 1988). The gallery of Offerings is a closed precinct, which, through exhibiting hundreds of diverse types of objects with lights and sound, evokes the Tribute Ceremony, in which many pre-Hispanic societies would use metal objects. The Exploratorium is a gallery where visitors interact across distinct Anthropological and Archaeological themes, facilitating reflection on the importance of archaeological heritage and cultural diversity.

Major Impact

History

In 1939, the Colombian government requested that the Central Bank buy pre-Hispanic gold

objects in order to preserve them. Subsequently the Central Bank acquired archaeological pieces from private collections. In 1968, a building specially designed for the museum was opened (Londoño Vélez 1989). During the 1970s and 1980s, the collections were expanded and objects of pottery, shell, bone, and textile acquired. The museum considered it essential to draw on anthropology and archaeology in order to enable its exhibitions to present a more full understanding of many aspects of pre-Hispanic societies.

Towards the 1980s, the theoretical basis of archaeology in Colombia changed from being a purely traditional one that emphasized the characterization of archaeological zones, chronological sequences, and artifact classification to a processual theoretical framework that emphasized, among others, studies of settlements and relations between humans and the environment. At the museum, this change was reflected in the content of the permanent exhibition; the guidebooks used information obtained from the museum's own archaeological research (e.g., Plazas & Falchetti 1986), and from other institutions, and at the same time adopted an approach that utilized the insights of anthropology to incorporate ethnographic information and suggest uses and functions for the objects (e.g., Pineda Camacho 1986; Reichel Dolmatoff 1988).

Today

The museum was completely renovated in 2008. The museum's new exhibition constitutes a modern museographic design and includes an interactive gallery (see above) and audio visual aids specially designed for different audiences. The current museum guides separate the technological information about metallurgy, derived from the more than 30 years of investigation by the museum, from that of a more archaeological nature, which draws on current information from other researchers. Three of the new museum galleries are dedicated to the interpretation of meanings and symbols of the metal objects. Making use of ethnographic analogy, and working from the fact that various indigenous societies currently living in Colombia have ancestral links with the pre-Hispanic period, anthropological information about the cosmology, symbolism, and religious beliefs of indigenous American societies, particularly from Colombia, is used to interpret and suggest the meanings of archaeological objects.

The importance that the museum has given the country's indigenous societies contributes to valuing and respecting the present-day indigenous peoples as part of a multicultural nation. The museum constitutes a unique space that attracts a large and diverse audience and is moreover a highly regarded institution. The Gold Museum's excellent and invaluable work of informing and educating has made it a distinguished institution in Colombia and an obligatory reference for any statements about Colombian identity.

Cross-References

- ▶ Conservation in Museums
- ▶ Heritage Museums and the Public
- ▶ Modern Material Culture Studies
- ▶ Museums and Memory Experiences
- ▶ South American Rock Art

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Goldberg, Paul

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Basic Biographical Information

Paul Goldberg is a geologist by training and obtained his B.A. in Geology from the University of Colorado (1965), Boulder. For his postgraduate studies he moved to the University of Michigan, Ann Arbor, where he studied under William R. Farrand, one of the pioneers of Geoarchaeology; he earned M.S. (1968) and Ph.D. (1973) in Geology. His doctoral dissertation was a sedimentological study of the Palaeolithic deposits in Tabun, Mt. Carmel, Israel.

In 1973, he moved to the Institute of Archaeology, Hebrew University of Jerusalem, Israel, to undertake a Lady Davis Fellowship. He remained there until 1991, reaching the level of Associate Professor. During this time he continued his research on prehistoric cave sediments, such as at Kebara Cave (Goldberg et al. 2007), but also began to investigate the relationship between Quaternary landscapes and environments associated with archaeological sites in the Negev and Sinai Deserts (Goldberg 1984). Concomitantly, he began to develop the technique of micromorphology and its application to geoarchaeological problems (Goldberg 1980; Courty et al. 1989).

From 1991to 1995 he became a Research Scientist at the Texas Archaeological Research Laboratory (TARL), The University of Texas at Austin, where he carried out geoarchaeological research, examining the micromorphology of burnt rock middens and the geoarchaeology of the Paleoindian-Prehistoric site of Wilson-Leonard. In 1995, he moved to the Department of Archaeology, Boston University, as Associate and, currently, Full Professor and is involved in teaching courses in geoarchaeology, micromorphology, and site formation processes, emphasizing the importance of documenting artifacts and their microstratigraphic context (Goldberg & Berna 2010). Around 2000 he and colleagues from Israel, China, and the USA employed micromorphology and Fourier transform infrared spectrometry (FTIR) to demonstrate the lack of ashes and fireplaces at the *Homo erectus* site of Zhoukoudian in China (Goldberg et al. 2001).

Major Accomplishments

Goldberg's research interests focus on the application and development of micromorphological techniques to Pleistocene caves in France (Goldberg et al. 2012), Israel, Germany, and South Africa and the use of micromorphology in interpreting anthropogenic deposits ranging from Pleistocene sites in the Old World to sixteenth-century Spanish settlements in Jamaica. He is currently investigating the geoarchaeology, microstratigraphy, and site formation processes at Lower and Middle Palaeolithic cave deposits at La Ferrassie (France) and Wonderwerk Cave

(South Africa) and understanding the contextual framework of Upper Palaeolithic and Neolithic deposits in China. Much of this work and the geoarchaeological approach is documented in the 2006 publication with R.I. Macphail (Goldberg & Macphail 2006). He has collaborated on a number of projects with colleagues at the Institut für Naturwissenschaftliche Archäologie, Universität Tübingen (N. Conard, C.E. Miller and others), and is currently a member of the Institute.

He has received a number of awards for his work in geoarchaeology and micromorphology, including the Rip Rapp Award (Archaeological Geology Division, Geological Society of America, 2002), the Roald Fryxell Award (Society for American Archaeology, 2008), and the Pomerantz Award (Archaeological Institute of America, 2010).

Cross-References

► Archaeological Soil Micromorphology

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Golmsten, Vera V.

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Basic Biographical Information

Vera Vladimirovna Golmsten (1880–1942) was an archaeologist and a doctor of historical sciences. She was born in St. Petersburg into the family of a military doctor, Vladimir V. Golmsten. She graduated from the Gymnasium for Females at the Ministry of Public Education at the Intercession community of nurses in St. Petersburg in 1898 and took an additional eighth pedagogical class in 1899. In 1910 she graduated from the Moscow Institute of Archaeology. She was a student of famous the Russian archaeologist V.A. Gorodtsov.

After graduating from the Institute in 1910, Golmsten spent a few months living in Ufa province. In 1911 she carried out excavations of the "Chortovo (Devil)" fortified site near Ufa. After defending her dissertation in 1909–1912, she conducted archaeological excavations in Slavic and prehistoric sites in the Pskov region and the Urals. Her life was connected with the Historical Museum in Moscow from 1911 to 1919. In 1912 she became a corresponding member of the Imperial Moscow Archaeological Society.

From 1919 to 1929, Golmsten worked in Samara as a professor of Samara University. She was a teacher of higher ethnological and archaeological courses and scientific secretary of the Society of Archaeology, History, Ethnography and Natural History. From 1922 to 1929, she was the director of the regional museum.

Since 1929, after her departure to Leningrad, Golmsten worked at the State Hermitage and the State Academy of the History of Material Culture (IHMC). In 1935 she received a doctorate in history. At the end of 1930, her field studies were conducted on the Lower Don.

Vera Golmsten died of hunger on March 8, 1942, during the Leningrad blockade in the Second World War.

Major Accomplishments

Under Golmsten's leadership, continuous archaeological surveys were conducted in Samara province on 1200 archaeological sites. Excavations were conducted on monuments of all eras, including the Paleolithic in Postnikov ravine, Bronze Age burial mounds near the stations Bezymyanka and Red Kryazhok, an early Iron Age burial ground in Berezovka, and the fortified site era Volga Bulgaria in s. Valy – "Muromsky town." There are more than 100 collections by Golmsten in the Samara Regional Museum named after Alabin.

Cross-References

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Golson, Jack

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Basic Biographical Information

Jack Golson was born in 1926 and raised in Rochdale in northern England (Fig. 1). As a child of the Great Depression, growing up during World War II, he was attracted to join the Young Communist League in his late high school years and to join the student branch of the Communist Party at university. In 1943 he won a scholarship to study history at Cambridge University but was called up for national service at the end of his first year, 1943–1944. For his national service, he was conscripted to work in the coal mines as one of the "Bevin Boys" named after the Minister of Labour, Ernest Bevin (Stewart 1998). These experiences helped to form Jack Golson's strong sense of social justice.

Golson, Jack, Fig. 1 Jack and Clare Golson receiving the World Archaeological Congress' Lifetime Achievement Award at the annual meeting of the Australian Archaeological Association, Adelaide, 2009

He resumed his history studies at Cambridge in October 1948 and almost immediately discovered archaeology in the lectures on European medieval history, which brought the contribution of archaeology to an understanding of the non-literate invaders who had overthrown the Roman Empire and laid the foundations of the European Middle Ages. Golson switched his major from history to archaeology, becoming a student of Grahame Clark. He graduated with B.A. (Hons) in 1950 (M.A. in 1952) and began doctoral research in 1951, under the joint supervision of the archaeologist Clark and the historian Maurice Postan, combining history and archaeology in the study of medieval settlement in an English county.

The doctorate was never finished because in 1953 he was persuaded to apply for a Lectureship in Prehistory in the recently established Department of Anthropology at the then Auckland University College, New Zealand. The argument was that a few years' experience of this type would justify his appointment back in England in the minority field of medieval archaeology. In fact, he had decided before the end of 1954, the first year of his appointment, that he would prefer to stay where he was.

Nevertheless, in 1961, he left the University of Auckland to take up the first position in archaeology at the Australian National University, a Fellowship in Prehistory in the Department of Anthropology and Sociology in the Research School of Pacific Studies, being certain that the ANU offered greater opportunity for a professional career in the archaeology of the region. Indeed, by 1969, the archaeological component of the Department of Anthropology was strong enough to form an independent department, with Golson as the foundation Professor of Prehistory. He retired in 1991 and continues as Emeritus Professor at the Australian National University. The Jack Golson Lecture is held biennially at the Australian National University to honor his work as a founding figure in developing modern archaeology in several nations and as an important researcher in the evolution of horticultural economies in the Pacific.

Major Accomplishments

Jack Golson is an individual of remarkable talents. His research, teaching, and professional service have had a profound impact on archaeology globally. In his early career based in New Zealand, he led in some of the first productive collaborations between Indigenous peoples and archaeologists.

In New Zealand, he saw his role as introducing the archaeological practice of stratigraphic excavation and scientific collaboration that he had learned in his student years. In 1954 he was instrumental in the establishment of the New Zealand Archaeological Association, which became the vehicle for these aims and for his own education in a proper relationship of his discipline with the Indigenous Polynesian population, whose history he, as an archaeologist in New Zealand, was addressing (Golson 2004).

In 1957 he was invited to undertake archaeological research in Tonga and Western Samoa for the Tri-Institutional Pacific Program – the Bishop Museum (in Honolulu), the University of Hawaii, and Yale University – which was part of the post-WWII story of the growth of serious archaeological involvement in the South Pacific field. This entailed his own entry not only into the Pacific field but also into the wider one of island and mainland Southeast Asia and the Pacific, which was looked after by the recently (1953) established Far Eastern Prehistory Association (FEPA), whose American branch had launched the first issue of the journal *Asian Perspectives* on its behalf in 1957. In 1971 FEPA held one of its 4-yearly congresses in Canberra, in what is seen as a landmark meeting, in the course of which it was decided to change its colonial era name to one more appropriate to current political reality – the Indo-Pacific Prehistory Association (IPPA) (Golson 1998), in which Australian archaeologists have and continue to play an important role. These developments came at a time when the archaeological profession that had expanded so rapidly in the 1960s worked together to form the Australian Archaeological Association. In this it was helped by the fact that, from its establishment by the Commonwealth government in the early 1960s, the Australian Institute of Aboriginal Studies gave archaeology recognition as a separate discipline.

The brief that Golson had been given for the post to which he had been appointed in 1961 was to develop a program for archaeological research in Australia and the nearer islands of the southwest Pacific, with particular reference to the then dependent territory of Papua and New Guinea. Golson was joined in this task by John Mulvaney, who was recruited in 1965 to take over the direction of Australian research, leaving the Pacific, including New Guinea, to Golson. Meanwhile, to help their planning, they organized seminars to which they recruited the talent of ANU and

CSIRO staff active in field research in tropical Australia and Papua New Guinea on climates, landscapes and land systems, soils, geology, botany, ethnobotany, and wildlife. Out of these came, not only, an edited book on *Aboriginal Man and Environment in Australia* (Mulvaney & Golson 1971), which now ranks as a landmark publication, but also information to help planning archaeological survey in little known Papua New Guinea.

His work of site survey and excavation for the Tri-Institutional Pacific Program was done in 1957 on the Tongan island of Tongatapu and the Western Samoan one of Upolu. From the mid-1960s Golson was a pioneer and major player in the development of archaeological studies of Papua New Guinea (Denham & Ballard 2003). In March 1992 his contribution to academic research in the region was recognized when the University of Papua New Guinea awarded him an honorary doctorate.

In 1966, at an early stage of his work in PNG, Golson discovered the potential of the Wahgi Valley swamps of the central highlands to reveal agricultural history through collaboration of archaeologists with geomorphologists and palaeoecologists. Investigations of the 1970s at Kuk Swamp, followed up by Tim Denham in the 1990s, produced evidence for the antiquity (at least 7,000 years ago) and independence of the origins in the region of an agriculture based on yams, taros, and bananas that was characteristic of the South Pacific as a whole in later times. In 2008 Kuk was given World Heritage status by UNESCO.

This was the sort of contribution to national identity that Golson and colleagues inside and outside PNG were confident that archaeology could make to a country that was moving towards independence (Golson 1970) and achieved it in 1975.

Jack Golson was one of a small group of scholars who initiated study of the interrelationships between environment, ecology, and people in the Australasian region. Seminal publications in this area include *Sunda and Sahul*: *Prehistoric Studies in Southeast Asia*, *Melanesia and Australia* (Allen et al. 1977) and *Aboriginal Man and Environment in Australia* (Mulvaney & Golson 1971). Today, the study of people and their environments is a thriving area of research in Australian and Pacific archaeology.

Along with John Mulvaney, Rhys Jones, Betty Meehan, and others, Golson played a key role in the professionalization of archaeology as a discipline in Australia, a process that started in the 1960s and included establishment of the Australian Archaeological Association. Golson was a prime mover in many other initiatives that were critical to the development of archaeology in Australia, including establishment of a radiocarbon-dating facility at the Australian National University in 1965.

Jack Golson was President of the World Archaeological Congress (WAC) from 1990 to 1994. He and his wife Clare were present at the 1986 conference in Southampton out of which it grew. He was elected to the Steering Committee that drafted the original WAC statutes and codes of ethics for approval at the second WAC conference in Venezuela in 1990. In 2009, Jack and Clare Golson's personal and professional contributions to the World Archaeological Congress were recognized in them being awarded its Inaugural Lifetime Achievement Award.

Jack Golson's contributions to Pacific archaeology were honored by his departmental colleagues following his retirement in 1991 in the edited volume *A Community of Culture*: *the People and Prehistory of the Pacific*, published in 1993.

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Gomes, Mário Varela

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Basic Biographical Information

Mário Varela Gomes is a Portuguese archaeologist who was born in Lisbon in 1949. He developed an interest in archaeology while still a young boy searching for the evidence of "past civilizations" wherever he travelled, not only in Lisbon where he grew up but also in Ericeira where his family had a summer house where he passed many months each year. The adventurous interests of his youth developed into a professional occupation. He graduated in architecture from the Lisbon Fine Arts University and studied history and archaeology at the Faculdade de Letras in Lisbon and also at other institutions in Spain, Italy, England, and Sweden. He has a Ph.D. in archaeology based on his research into pre- and protohistoric rock art sites in Vale do Tejo, Portugal (Fig. 1).

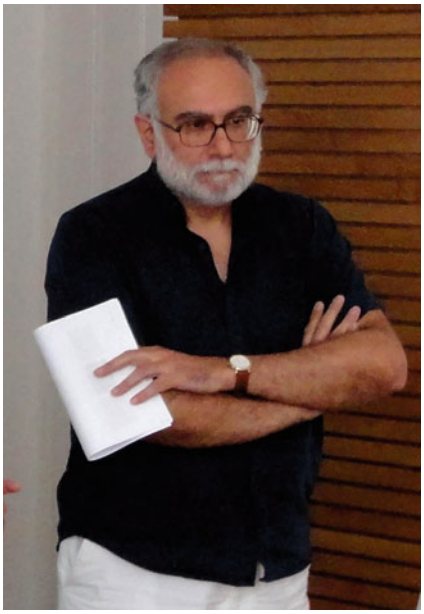

Gomes, Mário Varela, Fig. 1 Mario V. Gomes in 2012

Mário Varela Gomes was the director of the Silves' Archaeology Museum and of the Montemor-o-Novo's Museum. From 1992 to 1995 he was a teacher at the Masters in Urban Centres Architectural Rehabilitation in the Fine Arts University. In 1994–97 he was one of the responsible people for the first studies from Foz Côa leading to the site's classification as world heritage, a scientific advisor for the Chauvet cave (France), and an expert in the European Commission for the 2000 Cultural Program. Today, he is a professor in Prehistory and Cognitive Archaeology with the Faculty of Humanities and Social Sciences at the New University of Lisbon.

Major Accomplishments

Mário Varela Gomes' archaeological activities have been extensive. He is responsible for the study, classification, and publication of two major rock art groups in Portugal, Foz Côa, and Vale do Tejo, as well as major discoveries in other archaeological periods. He has undertaken tracings and studied rock art engravings in many regions, including Stonehenge, Züschen, Vale do Tejo, the Arronches shelters, Escoural cave, Vale do Côa and Monte de Góios in northern Portugal. In addition, he has studied other rock and megalithic art, southwest Portuguese Bronze Age stelae, and Iron Age epigraphic stelae.

Gomes has supervised dozens of archaeological excavations in sites from all prehistoric and historic periods, including the Xarez, Portela de Mogos, and Almendres stone circles; Perdigões, Algarve, Padrão, Amantes, and Caramujeira menhirs; the megalithic graves from Pedra Escorregadia, Bulhoa, and Anta Grande da Comenda da Igreja; the Bronze Age necropolis from Vilamoura, Alfarrobeira, and Vale da Telha; and also the protohistoric settlements of Escoural and Pontes de Marchil, the Rocha Branca Phoenician-Punic factory, and the Iron Age Garvão sanctuary. Islamic archaeology is another of his major research activities, undertaken through excavations in the Silves cistern-well, castle, and urban areas and also the rural castle (husun) from Castelo Belinho where a stupendous Neolithic village was found, and in the Arrifana *Ribat*. All of his students at the New University of Lisbon remember Gomes as an enthusiastic and accessible teacher who took them on field assignments or worked with them in the lab, teaching and publishing together.

Gomes has published more than 250 books and papers dedicated to archaeology, art history, ethnology, and architecture, in Portugal and in other countries. With A. Coelho F. da Silva, he is the coauthor of the students' handbook *Portuguese Protohistory* (1998) and the founder of the scientific journal *Xelb*, published by Silves.

In his 40-year career Gomes was a presence in the major archaeology and history associations of Portugal. As vice-president of the Portuguese Archaeologist Association, the oldest archaeological institution in Portugal, founded in 1853, Gomes was responsible for many of the association's activities over the last decade and for quite some time he was the youngest member of the Portuguese History Academy.

Despite his lifelong dedication to archaeology, Gomes is also known as an architect responsible for the concept and construction of many Portuguese museums such as the Silves, Salir, Albufeira, and Loulé. In 2003 he received the Portuguese History Academy award for archaeology and the Portuguese Archaeologist Association's silver medal. Although a recognized expert outside Portugal with published works in Spain, France, Italy, and the United Kingdom, Gomes still finds time to be a major enthusiast and advocate of local history, supporting and writing to local journals and newsletters in the defense of archaeological heritage.

Cross-References

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Gönnersdorf (Magdalenian): Geography and Culture

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Introduction

Gönnersdorf is one of two major Magdalenian settlements in the Central Rhineland of Germany (the other being Andernach-Martinsberg). The site was largely saved from destruction by burial under ash deposits of the late-glacial Laacher See volcanic eruption. Analysis of a broad range of well-preserved finds and features provides detailed insights into many aspects of Magdalenian life, such as technology and subsistence economy, use of the on-site living space, medium- and long-range mobility patterns, the use of personal ornament, and forms of artistic expression.

Definition

The Magdalenian locality Gönnersdorf (Central Rhineland, Germany) is characterized by the preservation of complex settlement features exceptional for an open-air site of this age. Due to burial beneath volcanic deposits, the site offers a rare opportunity to investigate a broad range of settlement information preserved largely in situ over an area of several hundred square meters and, by comparison with other sites, integrate this within a synthetic model for Magdalenian settlement processes and land use.

Key Issues

Location and Research History

The Gönnersdorf Magdalenian site was discovered in 1968 at the western end of a step formed by the Rhine Middle Terrace, on higher land secure from flooding by the river which flows at the foot of the terrace to the north. Just west of the site the Rhine reenters the narrow channel of the narrow Rhine Gorge, leaving the open Neuwied Basin. The site is sheltered to the west and the north by higher land, and the long known Paleolithic site Andernach-Martinsberg lies in view only 2 km distant south of the Rhine.

Between 1968 and 1976, Gerhard Bosinski excavated a total of 687 m^2 at Gönnersdorf, uncovering five distinct find concentrations (Konzentration = K) K I–K IV and SW characterized by differing combinations of placements

of large stone slabs, groups of pits, various lithic and faunal materials, and areas stained by ocher (Bosinski 1979).

Chronology and Environment

The chronological position of Gönnersdorf is now quite well understood (Stevens et al. 2009), with the main Magdalenian occupation falling toward the end of the cold and arid Greenland Stadial 2a (~13,800 BCE in calibrated years, with radiocarbon dates between 13,270 BP and 12,990 BP). This contradicts the initial interpretation of the site (Brunnacker 1978) as dating to the end of an interstadial (*Bølling*) phase but is consistent with the wider range of environmental/ecological information available today.

The species of the Gönnersdorf hunted mammal fauna are those typical of the open, continental to arctic *mammoth steppe*, and for Magdalenian subsistence activities (Poplin 1976; Brunnacker 1978). Small rodent remains associated with the archaeological horizons include numerous lemmings (*Dicrostonyx*) and voles (*Microtus gregalis*) typical of arctic/continental conditions. By contrast, four absolute dates for remains of woolly rhino and mammoth are older than those for the hunted ungulates by ~600/1,600 radiocarbon years and potentially represent collected subfossil material. Both species were however still part of the fauna and known to the Magdalenian hunters as demonstrated by their engraved depictions. The few specimens of postcranial bone of two species more characteristic of wooded conditions, red deer and elk, showed a spatially limited distribution in area SW, away from the main site structures (Buschkämper 1993; Street & Turner 2012) and are certainly (in the case of a directly dated elk bone) or probably several hundred years younger than the main faunal assemblage.

Settlement Features

The artificially dug pits in the Gönnersdorf structures K I–K III have been variously interpreted as posthole settings, hearths, or cooking pits, and these three structures, also characterized by central zones of dense paving, are interpreted as stable and quasi permanent dwellings used for long-term residence (Jöris et al. 2012).

The largest, centrally located concentration (K II) can be subdivided into two subunits, a larger central area (K IIa) and a smaller area (K IIb) to the immediate northwest, each located around a distinct group of pits (Sensburg 2007). K IIb has now been interpreted as an open-air activity area possibly involving the use of cooking pits (Sensburg & Moseler 2008).

K IV (at the northern edge of the excavated area) and SW (adjacent to and west of K I) have no pits and were interpreted as the remains of possibly transportable dwelling structures used only for shorter stays (Buschkämper 1993; Terberger 1997). GIS-supported analyses of lithic find densities and systematic refitting studies provide details of the inner organization of K IV and its relationship to several external areas which probably had several different functions (Sensburg & Moseler 2008).

Taken together, the investment of time and effort represented by the great quantity and diversity of accumulated material suggests that at least some of the Gönnersdorf structures were in use over an extended period of time. Many of the rocks used as constructional material show complex patterns of modification, such as splitting and notching of the edges of blocks and slabs, and this possibly represents ad hoc modification of these elements to accommodate now perished objects such as wooden stakes or supports, perhaps during multiple episodes involving reuse of the same elements. The features and material as they were uncovered represent only the final, abandoned stage of a complex development, which probably took place during repeated occupations, conceivably extending over several years.

Gönnersdorf provides no evidence for a super-stratification of living floors which might enable the recognition of distinct occupation horizons, but other methods have been used to try and establish some degree of temporal differentiation. Long-distance refits of slate slabs and quartzite blocks between K IV and other concentrations produced a complex model of the relationships between these structures

(Terberger 1997). In K III certain lithic raw materials occur in some pits, whereas others are never found in pits, suggesting that the dwelling was occupied on at least two and perhaps three occasions during which the several pits were variously open or already closed by infilling.

In view of this complexity, Gönnersdorf has been interpreted as the remains of a group of dwelling structures occupied intermittently over an extended period of time; several of them possibly occupied contemporaneously, in effect forming a *temporary village*. Differential spatial patterning of lithic raw materials (Franken & Veil 1983) brought the suggestion that this *village* was occupied by distinct groups of Magdalenian people with various geographical origins who possibly visited Gönnersdorf with perhaps only partly overlapping phases of occupation, conforming to a model of an aggregation camp.

Gönnersdorf provided some evidence for the use of fire. Burnt lithic artifacts are present in very small numbers and almost no bones show traces of burning. Small quantities of charcoal were identified and plotted during excavation.

Well-defined evident structures recognizable as hearths are rare. The clearest evidence comes from K IV, where complexes of fire-cracked and reddened quartz and other rocks at the center of the dwelling structure and outside this are interlinked by refitting. The presence of an internal hearth at the center of the large K I structure is suggested by a pit containing charcoal and burnt quartz. The use of fire at Gönnersdorf is also shown by quantities of thermally reddened slate and quartzite slabs and cobbles and fire-cracked quartz pebbles interpreted as cooking stones (Brunnacker 1978). Their location provides an indication of areas in which fires may have burned, but the absence of clear hearth structures suggests that thermally altered rocks were moved after contact with fire, perhaps being used repeatedly in different parts of the occupation area. Such multiple use of hearth construction materials during different occupations or phases of activity would remove or blur traces of earlier activities.

The non-cryptocrystalline rocks brought to the site did not only serve as constructional material, and many of them were transformed into various forms of artifacts. Fragments of geodes and conglomerate with naturally concave surfaces and slate slabs with artificially hollowed depressions are believed to have served as lamps fueled with animal fat, and it can be discussed whether light and heat within the dwellings were provided by these and not by open fires (see above). Some of these objects probably served as mortars for grinding red hematite, a material found at the site, sometimes in the form of clearly abraded or facetted pieces.

Different types of pebbles obtained from river gravels were used as hammer stones for stone working or for the secondary retouch of lithic artifacts in manufacturing tools. Larger cobbles probably served for processing other inorganic or organic materials, by crushing, pounding, or grinding. More than 400 small perforated slate disks and their fragments were found. Many of them are engraved with geometric patterns, although it is sometimes clear that disks were manufactured from fragments of slate that had been engraved previously. These finds are not necessarily or principally symbolic items but may have had a practical function, perhaps as aids in fastening together hides which are presumed to have covered the dwelling structures.

Lithic Artifacts and Group Mobility

The Gönnersdorf site produced a total of almost 82,000 lithic artifacts (Floss 1994). The majority comprises exogenous flint (>50,000 artifacts) with regional to local materials (forms of limnic quartzite (~15,000) and lydite (~12,000) making up the balance). Smaller groups of material include chalcedony (~3,000) and indurated oolite (~2,000), while a small number of artifacts are made of probably exotic semiprecious stones such as rock crystal, opal, or jasper.

The flint was derived from various sources. Good quality Cretaceous flint (*Western European Flint*) was obtained from primary chalk formations in the region of the Belgium-Dutch-German border, some 120–130 km to the northwest and in derived form from river terraces in the western part of the Lower Rhineland. This material characterizes K II in particular and is associated with

a small quantity of probably Mesozoic quartzite, probably imported from the same region. A second variety of Cretaceous flint (*Baltic Flint*) was obtained from moraines left by the antepenultimate glaciation, the nearest of which are immediately north of the River Ruhr, some 100 km north of the Central Rhineland.

The chalcedony and indurated oolite (*Kieseloolith*), which are quite important in structures at the north of the Gönnersdorf site (K III, K IV), were very probably obtained from the Mainz Basin and lower Main valley some 80–100 km to the southeast.

The exogenous lithic raw materials are generally accepted as proxies for the mobility of Paleolithic groups or individuals, and the sources of the flint suggest possible contacts from the Central Rhineland to the Magdalenian of the Rhine-Meuse loess region (and possibly further west to the Netherlands or Belgium) on the one hand and to the eastern Lower Rhineland and perhaps further to the north and east on the other. The materials obtained from southern sources could indicate contact to southern German Magdalenian groups.

Fine-grained Tertiary limnic quartzite occurs in the region at numerous localities (outcrops, block fields) and was probably available within a range of some 30 km, perhaps being targeted by middle-range expeditions during the occupations of the Gönnersdorf site or collected during the initial journeys to the sites.

Intensive use of the local raw material lydite, obtainable in the Rhine gravels, might reflect a late phase of site occupation prior to leaving the region, when expeditions to obtain raw material were not an option. Alternatively, it might simply represent ad hoc collecting of a poor quality rock type during periods of low mobility. This material is predominantly found in structure K I.

The varied origin of the Gönnersdorf lithic raw materials has contributed to an interpretation of the site as a meeting point of distinct Magdalenian groups from different regions. It is possible that these groups met at Gönnersdorf, which would then have the character of an *aggregation camp* or *base camp*. Alternatively, a single larger group occupying the Central Rhineland may have dispersed into different regions at certain times of the year and brought back specific materials from these regions.

Subsistence

At Gönnersdorf the most important food species in all investigated structural concentrations is the horse. In the largest assemblage, from K II, some 2,100 postcranial specimens and 850 cranial and tooth fragments must come from at least 28 animals. K I produced more than 1,500 horse remains, representing at least 12 individuals, while at least 7 individuals of horse are represented in K III by c. 300 specimens. At least five horses are represented by 150 specimens in the SW structure, whereas at the north of the site, 159 identified specimens in spatial association with the K IV structure demonstrate only two horses. The total number of horses represented at the site is thus 54, if the figures established for the different concentrations are added together.

Other large and small mammal species, together with some birds (raven, ptarmigan, swan, goose, snowy owl, and seagull) and very few fish remains (trout, burbot, and a cyprinid), play a far less significant role in the diet; indeed not all of the identified species represent a food resource. Specimens of a rhinoceros maxilla and mammoth bone and ivory are shown by radiocarbon dating to be subfossil remains collected possibly as a curio or for use as raw material (ivory) or a constructional element (mammoth femur). Much of the material identified as reindeer is in the form of antler tools or their waste, in some cases demonstrably collected shed antlers. Teeth and foot bones of wolf might represent pelts rather than animals hunted locally while bird remains, in particular wing and foot bones, may derive from ornamental feathers and claws. A large bovine, chamois, and saïga antelope are represented by at most one or two animals and cannot always definitively be demonstrated to represent animals hunted for food.

Many other faunal remains clearly do represent the animals hunted during human residence at Gönnersdorf. A number of cut-marked and fractured bones reveal standardized stages of

butchering. Skinning, disarticulation, and filleting of meat can be identified, along with intensive bone fracturing for obtaining marrow and grease.

The composition of the faunal assemblages of the various structures shows clear differences. Arctic fox is the most common species in K I (c. 2,500 specimens from at least 30 animals), probably as a result of winter trapping for furs, followed by horse and varying hare. By contrast horse dominates the assemblage of K II and less than 200 remains of arctic fox were present. Hare overtakes arctic fox in importance with more than 400 specimens. Several other species present here (large bovine, rhinoceros, chamois) are not represented in K I. It was noted above that their role in the diet is sometimes unclear. Some 280 bones and teeth of reindeer from K I represent at least three hunted animals, whereas of the c. 170 pieces of antler, some were demonstrably brought to the site as shed specimens. Reindeer is represented in K II by some 350 specimens of bone, tooth, and antler, but no more than one individual can be demonstrated here.

The presence in K III of bones of the large bovine, rhinoceros tooth fragments, and chamois teeth suggest that it was somehow linked to the adjacent K II. Apart from horse, described above, K III also produced 71 finds identified as arctic fox (no more than one individual), c. 100 specimens of varying hare, and over 200 specimens of reindeer from at least two animals.

Faunal remains are comparatively poorly represented in the northern area of K IV and at the southwestern part of the site (SW). The smaller species fox and hare are absent or exceedingly rare, and reindeer is absent from K IV and represented by less than 20 finds in the SW area, where it might be argued that some or all of this is waste discarded from adjacent K I and K II.

Organic Artifacts and Objects of Adornment

The numerous artifacts of bone, antler, and ivory found at Gönnersdorf are typical for the later Magdalenian. They include eyed needles of bone and the cores from which they were manufactured, mainly horse metapodial bones. Spalls and projectile points, batons percés, and baguettes demi-rondes were made of reindeer antler, and waste debitage shows the manufacture of such items at the site. K I, K II, and K III produced a small number of mammoth ivory artifacts, such as projectile points or a perforated disk, and debitage mainly in the form of small fragments.

Various types of material modified to objects of personal adornment were found. Red deer is mainly represented at the site by teeth or tooth fragments modified as personal adornments, among them a group of six perforated canine teeth in K I and fragments of incisor teeth modified by removal of the roots in K II. These probably have nothing to do with subsistence and may have been imported over a large distance. This is certainly the case for perforated marine mollusk shells (*Homalopoma sanguineum, Dentalium*), which are ultimately derived from southwestern Europe and provide evidence of contact between the Mediterranean or the southern French Atlantic coast and the Central Rhineland. Whether their transport over a distance of some 800–1,000 km reflects the mobility of individual persons or human groups is unknown.

Reindeer incisors were cut or sawn as articulated series from the mandible, and the presence of the removed roots shows that in some cases, these were certainly manufactured at the site. This also applies to the canine, incisor, and premolar teeth of arctic fox which were removed from the jaws and perforated for suspension. Some specimens of collected fossilized wood are equivalent to jet in their density and appearance and were used for the production of beads. That this took place on site is demonstrated by half-finished specimens. A small pit in K I contained several jet beads associated with perforated teeth.

Art

Among the most interesting finds from Gönnersdorf are numerous slabs of slate engraved with figurative art, including depictions of women (Bosinski & Fischer 1974; Bosinski et al. 2001) and many species of animals (Bosinski & Fischer 1980; Bosinski 2008), together with abstract symbols.

The highly schematic human female depictions are shown with pronounced buttocks and

sometimes with breasts, but without head and feet, and are often arranged as pairs or in groups to form scenes interpreted as dancing. The abstract style is typical of the period and is also known from neighboring regions. Female figurines in the same style are normally carved of ivory, but specimens made of antler or stone are also present at Gönnersdorf.

The most commonly depicted animal species represented are horse and mammoth (Bosinski & Fischer 1974), with representations of woolly rhinoceros, large bovines (bison and aurochs), red deer, reindeer, saïga-antelope, wolf, bear, lion, and seal present in far lower numbers. There are few engravings of birds and rare examples of fish, reptiles, and amphibians. The realistic engravings clearly prove that these species were well known to the artists, but they may have encountered or observed some of them in other regions and not in the Central Rhineland. Very rarely the engraved figures appear to be grouped together to form a narrative or symbolic scene.

The Gönnersdorf art mirrors the wealth of artistic expression from Magdalenian caves in Western Europe and suggests the complex social activities which occurred at the site.

Season and Duration of Occupation

Seasonality information from the analysis of the faunal remains suggests that Gönnersdorf was occupied over an extended period of the year. The season of horse hunting was established by analysis of milk teeth to establish the age of the foals at death. For K I, K II, and K III, the season of death and hence human presence at Gönnersdorf extended from December/January until the beginning of the summer. An apparent cutoff here was perhaps when horses (and possibly reindeer) left the lowland Neuwied Basin for upland foaling and calving grounds, which may suggest a possible abandonment of the Gönnersdorf site during summer.

Other evidences such as tooth eruption patterns of reindeer and wolf, the presence of an otolith of a burbot (*Lota lota*), horse fetal bone at various stages of development, arguments for winter trapping of fox and possibly hare, and the probable seasonal presence of migratory birds provide support for a scenario of occupation over a longer period of time and through different seasons of the year. Altogether it suggests that coexistence by the inhabitants of K I, K II, and K III may have extended over a large part of the year.

The season of occupation for K IV and SW remains unknown due to both their generally limited faunal evidence and absence of relevant information on the age at death of the horses.

Future Directions

Gönnersdorf must be seen as only one location in an extensively oriented land-use occupation strategy of highly mobile Magdalenian groups. That these mobile groups were also in a position to occupy specific localities intensively is shown by the vast amount of material accumulated at favored locations in the landscape such as Gönnersdorf. The observed intensity of settlement is probably a palimpsest of several occupations extending over several weeks to several months, representing repeated visits separated by periods of desertion.

The winter half of the year with the shortest hours of daylight and coldest temperatures is the time of year when the *temporary sedentism* reconstructed for Gönnersdorf would be the most appropriate survival strategy. It is possible that northern Magdalenian groups generally spent this time of the year in sheltered locations, such as the Rhine valley. While we have no certain information on the frequency of Magdalenian peoples' absence from the Central Rhineland, the available seasonal data strongly suggests that the season of their absence would have been the summer, while exogenous lithic materials and other materials give some indication of the distant regions visited at this time.

Finally, any analysis of complex Magdalenian sites must recognize their adaptability and variability. The sometimes very different structures at Gönnersdorf do not all represent the same range or intensity of activities, and it is quite probable that the function of a specific

concentration changed dynamically through time according to several factors.

The apparently younger occupation of Gönnersdorf SW, with an associated fauna of elk and red deer, probably took place under quite different environmental factors than the main settlement phases of K I–K IV. The far more ephemeral evidence for human presence in SW possibly foreshadows the settlement patterns of the Federmessergruppen that will emerge during the younger wooded Allerød interstadial.

Cross-References

► Andernach-Martinsberg (Magdalenian): Geography and Culture

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González, Alberto Rex

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Basic Biographical Information

Alberto Rex González (1918–2012) was a charismatic figure with the most profound influence on Argentine archaeology through the twentieth century. Born in the Pergamino locality of

Buenos Aires, his introduction to archaeology came through an early reading of the work of Argentine naturalist Florentino Ameghino. This drove him from a young age to carry out excavations at different sites around the country.

After gaining his medical qualifications at the University of Cordoba, he took archaeology courses at Columbia University. In 1948, he began to work at the La Plata Museum (Argentina), and in 1953, he started to lecture at the University of Rosario. Three years later, he settled in Cordoba, where he was the Director of the university's Institute of Anthropology. In 1962, he returned to La Plata, now an established figure of Argentine archaeology, as a researcher at CONICET (the Argentine National Council for Scientific and Technical Research). In spite of all this, in 1976, he was fired from his academic position at the university, in the context of the terrorist military dictatorship which razed the country. Once democracy returned in 1983, he took up the role of lecturer at the University of Buenos Aires, where he was the Director of the Ethnographic Museum. Through his long career, he carried out numerous excavations, formed a considerable group of disciples, and published around 150 scientific and dissemination works. After retirement, he spent his last years organizing his archives in the city of La Plata.

Major Accomplishments

From the University of La Plata, at the end of the 1940s, he started a tenacious campaign to revive the practice of field work and promote a deeper temporal conception of the native occupation of Argentine territory. After obtaining the country's first radiocarbon dating, of the deepest deposits of the cave of Inti Huasi (San Luis Province), he could reliably determine a minimum antiquity of 8,000 BP for the occupation of present Argentine territory, which constituted a true milestone in the history of archaeological investigations in Argentina.

Due to his initiatives, the first Argentine radiocarbon dating laboratory was set up, installed in the University of La Plata (Latyr). He also fostered the creation of CONICET, the Argentine National Council for Scientific and Technical Research; this is the country's principal research institution which gathers a large proportion of Argentina's professional archaeologists.

His reformulation of the prehistory of northwestern Argentina, in the 1950s and 1960s, was based on analysis of the mortuary contexts of the Muniz Barreto Collection held at the Museum of La Plata, which boasts an itemized record of its documents. Calling on his detailed stylistic knowledge of the materials, and carrying out further excavations and radiocarbon dating, he proposed a *master sequence* of cultural development of the "agricultural ceramicist stage" of Hualfín Valley, which he extrapolated to the whole region denominated "valliserrana" (mountain valley), greatly stimulating archaeological investigation.

His summary work, in collaboration with Pérez Gollán – *Indigenous Argentina. Eve of Conquest* (1972) – became a fundamental reference work about the prehistory of the Argentine territory.

With his 1974 book, *Art, Structure, Archaeology* (2007), he ventured into the terrain of the symbolic interpretation of aboriginal art, a subject that monopolized his interest during the latter years of his investigative career. In this work, influenced by the structuralism of Levi-Strauss, he recognized the diverse mechanisms of physical and visual expression of Andean dualism in the cultural material of the agricultural ceramic societies of northeastern Argentine:

1. Mixed features, feline-human, (Fig. 1)
2. Multiple hybrid features
3. Mixed feline-human, posterior view
4. Dual realistic images in the same piece
5. Duality of binary opposition as expression of other concepts
6. Duality in the same image (anatropical figures)
7. Duality by split representation (Fig. 2)
8. Duality by opposition of antipodean figures

His masterpiece is *Pre-Columbian Art of Argentina* (1977) in which he described and analyzed the plastic expressions of all the native

González, Alberto Rex, Fig. 1 Ceramic piece from Aguada culture, taken by Gonzáles as an example of the mixture of feline and human features (Taken from González 2007: Figure 4.1)

González, Alberto Rex, Fig. 2 Exampe of two-sided representation in a Santa Maria piece, Museo de La Plata (González 2007: Figure 2.3)

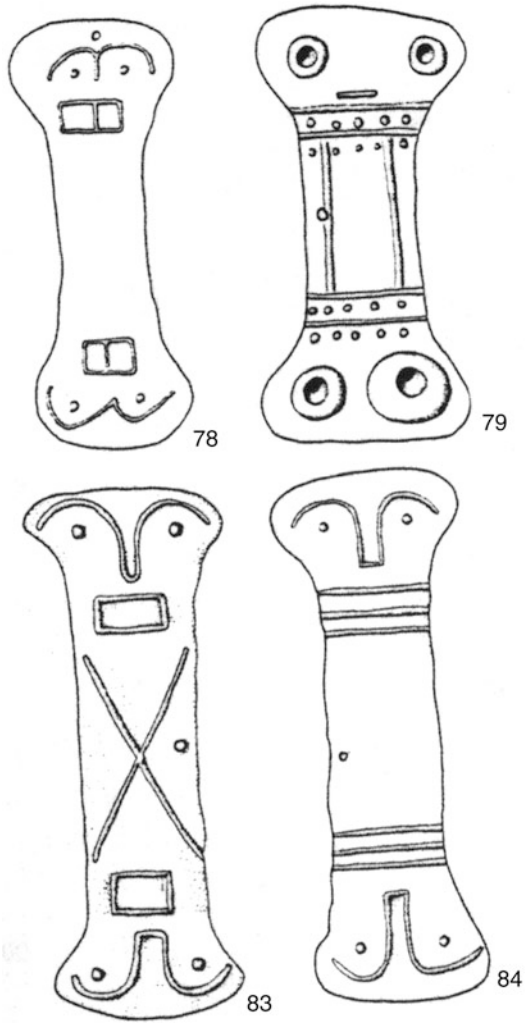

González, Alberto Rex, Fig. 3 Metallic plates from Río Lípez (Bolivia), from the corpus studied by González in his work *Las placas metálicas de los Andes del Sur* (Taken from Tomado de González 1992: plate 3)

cultures of Argentina, developing in particular the agricultural ceramicist stage in the northwest of the country with the greatest detail realized at that point.

In 1992, he published *The Metallic Plates of the Southern Andes*, an exhaustive compilation about the class of objects most manufactured in the South Andes area in pre-Columbian times.

With profuse iconography, the metallic plates (Fig. 3) constitute, even still, a giant archaeological question mark, it being very rare to recover

examples in context. In this work, González provided a first chronology based on elements of stylistic judgment and unfolded an original hermeneutic approach supported by historical and ethnographic sources.

At nearly 80 years old, at the end of the 1990s, he returned to field work on the archaeological site *La Choya*, in the Province of Catamarca, revealing a new ceremonial center of the *La Aguada* culture. It is to the latter that he dedicated his last great work: *La Aguada Culture, Archaeology and Designs* (1998). Here, he provided the most complete image of cultural context that he himself would have defined in the 1960s, and which would have constituted, from Max Uhle's synthesis in 1910, a fundamental watershed in the agro-ceramic cultural sequence of northeastern Argentina.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Structural Archaeology
- ▶ Style: Its Role in the Archaeology of Art

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Google Earth Afghan Surveys

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Introduction and Definition

The development of "virtual globes," such as Google Earth and NASA's World Wind, represents "the most important development in aerial archaeology" for 35 years (Irwin Scollar, cited in Scollar & Palmer 2008: 15). "Virtual globes" provide a user-friendly means of accessing geo-referenced (i.e., accurately located) satellite images of the world – there are no Google Earth or World Wind images per se, merely satellite images and aerial photographs available through these digital portals. "Virtual globes" are much more dynamic and interactive than more traditional, static photographic and cartographic representations of Earth, enabling viewers to move around, and zoom in and out, to determine what they want to investigate (Parcak 2009a: 3, 48). The costs involved are also low compared to purchasing commercially available satellite images and acquiring the geographical information systems (GIS) software and skills necessary to utilize these images – standard versions of Google Earth and World Wind are freely available to anyone with a high-speed internet connection, while the annual license for Google Earth Pro, which has some useful additional features but does not offer higher resolution or different images, currently costs $400.

World Wind consists of the Blue Marble, a true-color image of the entire Earth. When you zoom in closer, the "virtual globe" transforms into a seamless mosaic of Landsat 7 images, collected from 1999 to 2003. These images have been draped over a digital terrain

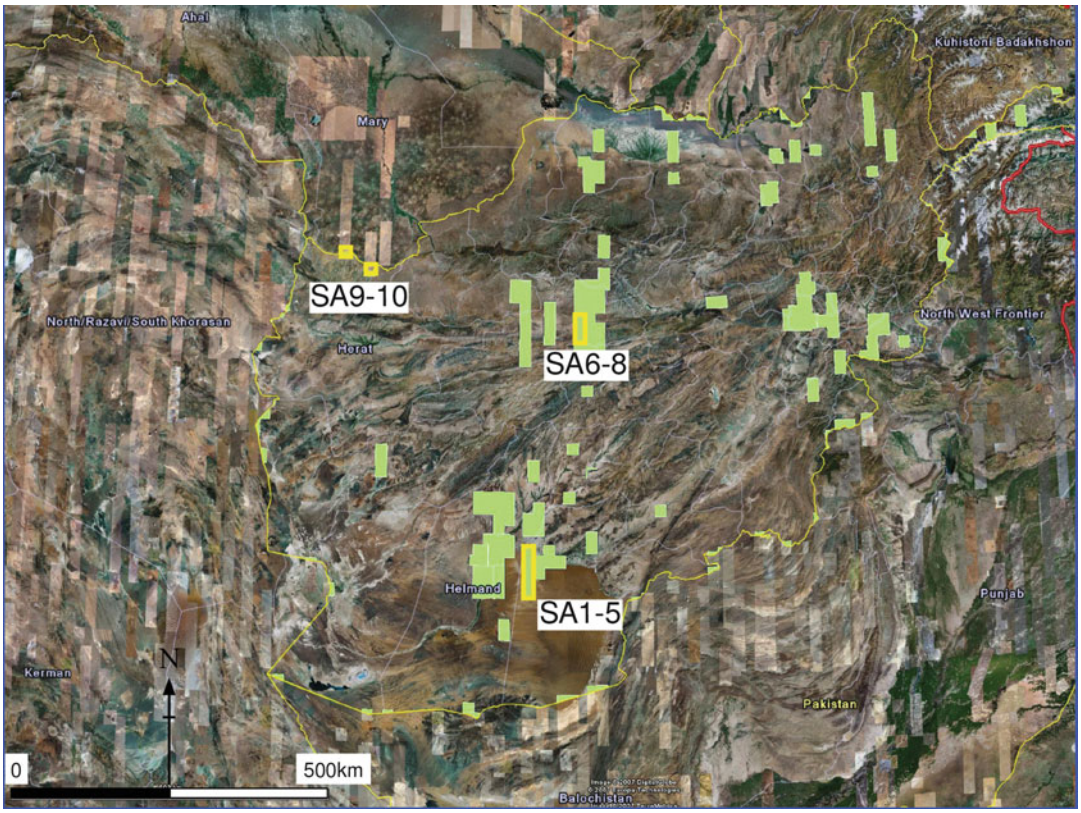

Google Earth Afghan Surveys, Fig. 1 Satellite images of Afghanistan, available through Google Earth prior to the 2009 upgrade to SPOT imagery; high-resolution strips are highlighted in *green* and ASAGE study areas outlined in *yellow*

model (DTM) derived from Shuttle Radar Topography Mission (SRTM) data to generate a relatively accurate three-dimensional model of the Earth's surface. World Wind also includes images with other color bands such as the infrared spectrum, which can be useful in identifying archaeological features (Parcak 2009a: 61), although the 15 m per pixel resolution of the Landsat images limits the value of World Wind to archaeologists interested in small sites and features.

Unlike World Wind, Google Earth consists of thousands of geo-referenced high- and mid-resolution satellite images and aerial photographs, displayed on a flat-surfaced sphere rather than one which is topographically accurate. The highest-resolution images range from 0.1 to 1.0 m per pixel and thus are much clearer and more detailed than those available through World Wind. The different image sources and resolutions, however, currently result in an unnatural, mosaic-like appearance in some regions such as the northern Indian subcontinent and much of China and Southeast Asia.

The patchy nature of the high-resolution satellite coverage available through Google Earth presents one of the major constraints to its use by archaeologists. While densely populated areas, particularly in Western countries, tend to have higher resolution coverage, due to user demand and the commercial synergies inherent in such projects, the coverage of sparsely populated, less developed countries such as Afghanistan is poorer. Only 7 % of Afghanistan was covered by the relatively narrow strips of high-resolution images prior to an upgrade to 2.5 m spatial resolution SPOT imagery in June 2009 (Fig. 1). These high-resolution images,

however, still amounted to a total area of 47,000 km^2 and formed the basis for detailed studies of known archaeological sites and under-explored areas by the Archaeological Sites of Afghanistan in Google Earth (ASAGE) project (Thomas et al. 2008; see below). Unfortunately, although the upgrade to SPOT imagery, which was not announced in advance, resulted in a general improvement in the coverage of the country, many of the highest-resolution image strips are no longer available. This lack of transparency in the policies and timetabling of imagery upgrades is a major deficiency in Google Earth's program of updating satellite image coverage.

Despite its variable image resolutions, Google Earth has largely superseded World Wind due to the higher resolution of many of the images it uses. It has become an integral part of news broadcasts, television dramas, academic presentations, and "virtual" travel – over 600 million copies of Google Earth software have been downloaded since its launch in 2005. Users can visit specific places by searching Google Earth's database or simply explore whichever part of the globe interests them, unrestricted by national boundaries, topography, and no-fly zones.

The coordinates of sites can be uploaded from a spreadsheet using Google Earth Pro to create "placemarks." "Placemarks" can in turn be enriched with images, video clips, links to other internet resources, and additional information via .kmz files posted on on-line bulletin boards such as History Illustrated (Ur 2006: 37). The extra measuring tools available in Google Earth Pro enable archaeologists to calculate the area of sites and their components, while existing maps and plans can be laid over the satellite images available through Google Earth to verify and improve site descriptions and integrate additional information such as geological data in the interpretative process (Fig. 2). Sketch plans of standing structures can also easily be generated over saved images using drawing software packages such as Adobe Illustrator.

The thousands of postings on the History Illustrated bulletin board highlight the popularity of the medium among "armchair archaeologists" and the plethora of unusual features which excite human curiosity (Fig. 3). The opportunities generated by this "democratization of satellite imagery," to use Stefan Geens' term, were soon recognized by several archaeologists, who saw the potential to increase the spatial area that can be studied and to engage with, and even enlist the help of, the general public (Beck 2006; Ur 2006; inter alia). Archaeologists, however, have largely failed to maximize the potential of Google Earth, primarily because most use Google Earth as a precursor to conducting fieldwork, rather than as a source of data for desk-based studies in its own right.

This oversight is starting to be addressed, as several recent innovative studies have demonstrated the value of Google Earth to archaeologists wishing to investigate regions which are difficult or impossible to reach for political, security, or logistical reasons. Archaeologists are in particular using Google Earth to revisit semiarid parts of North Africa, the Near East, and Central Asia, regions which were the foci of many of the pioneers of aerial archaeology such as Theodor Wiegand, Ft Lt Maitland, Father Poidebard, and Sir Aurel Stein (Kennedy & Bewley 2004: 51-2). The environmental conditions which facilitated previous aerial archaeology studies of these regions remain essentially the same – relatively low levels of natural vegetation and cloud cover, and the inhospitable terrain, result in optimum site preservation and visibility. The primary reason that these new studies using Google Earth are proving so productive is that much more of the landscape can now be studied systematically (Contreras & Brodie 2010: 101).

Reconnaissance of southern Libya as part of the Desert Migrations Project, for example, has revealed numerous "lost cities" built by the Garamantian civilization c. CE 1–500 (Sterry & Mattingly forthcoming). Visible structures include the mud-brick remains of fortified farms and village complexes, along with traces of cairn cemeteries, associated field systems, wells, and sophisticated irrigation systems. Over the border

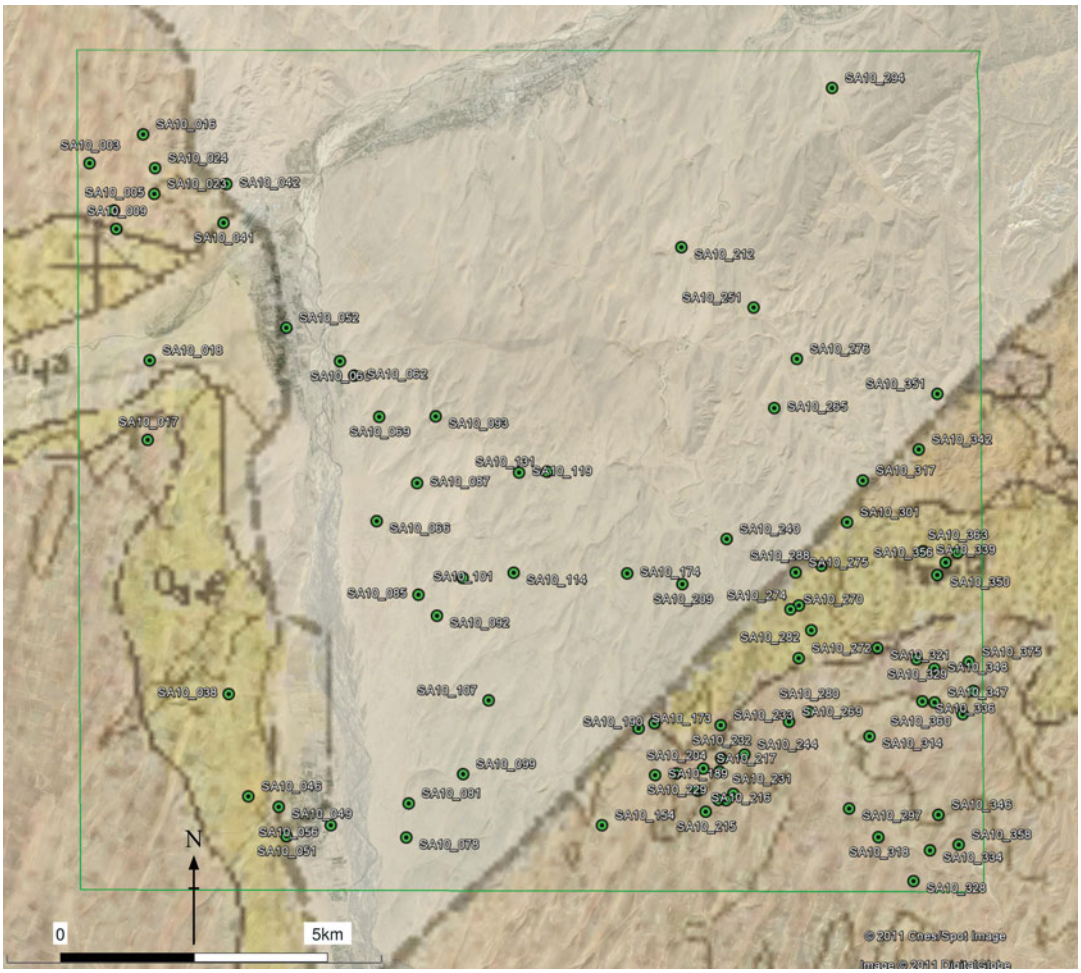

Google Earth Afghan Surveys, Fig. 2 US Geological Survey map of northern Afghanistan laid over ASAGE study area 10 in Google Earth

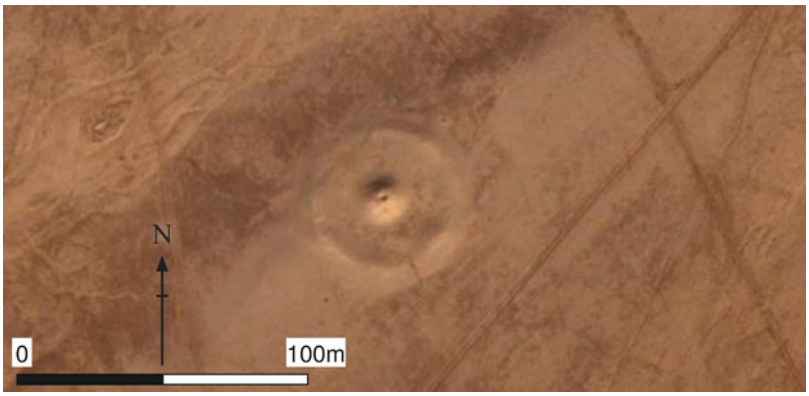

Google Earth Afghan Surveys, Fig. 3 An enigmatic "saucer-shaped" site (SA2_569) in the Rīgistān desert, Afghanistan – possibly a burial in a banked enclosure

in Egypt, Sarah Parcak has used images available through Google Earth to gain "virtual" access to industrial compounds in the Markha Plain. This has enabled Parcak to identify a string of circular fortresses to the south of Tell Ras Budran, which are out of view of the main fortress but within fire-/smoke-signalling distance. These sites would probably have remained undiscovered and thus prone to unwitting destruction without the images available through Google Earth, because fieldwork is impossible in these restricted areas (Parcak 2009b: 363).

Further east in the Levant and Arabian Peninsula, David Kennedy's team has revealed much older and more extensive archaeological remains (Kennedy & Bishop 2011). The surviving desert kites (hunting traps), funerary/religious sites, and seasonal camps, many of which are virtually impossible to recognize at ground level without the benefit of an aerial perspective, indicate a prehistoric cultural continuum stretching across thousands of kilometers. The identification of nearly 2,000 sites in the 1,240 km^2 pilot study area illustrates both the potential of the technique and the rich pre-Islamic archaeological heritage of the region which has largely been ignored in the past – previous survey work has recorded just c. 1,800 sites throughout the whole of Saudi Arabia (Kennedy & Bishop 2011: 1292).

Elsewhere, the contemporary relevance of this form of archaeological research and the value of Google Earth's Historical Imagery View tool are evident in the documentation of the looting of archaeological sites in Jordan (Contreras & Brodie 2010) and Adrian Myers' study of Camp Delta (Guantánamo Bay, Cuba). The Historical Imagery View tool enables users to study successive images of the same place. By overlaying these images in a geographical information system and mapping changes in the site over time, Myers has been able to demonstrate both the rapid expansion and increasingly permanent nature of the prison facilities. As a result, Myers has been able to juxtapose the expansion of the USA's top security goal with official policy announcements relating to the site (Myers 2010: 464).

Few countries illustrate the vital importance of Google Earth to archaeologists better than Afghanistan, where the volatile security situation and unexploded ordnance render fieldwork impractical in many areas. Although the country was systematically photographed from the air during the 1960s, as part of a photogrammetric mapping initiative, these valuable archival images have since been lost. Satellite images, therefore, represent the major, largely untapped source of data for archaeological sites in the country and form the basis of two research projects: Cameron Petrie (2007) has used Google Earth to explore the archaeological sites positioned along ancient trade routes between Afghanistan and Pakistan, while the ASAGE project has sought to document a spatially and diachronically broader range of sites across the country.

Key Issues/Current Debates

Only 10 % of the sites listed in the archaeological gazetteer of Afghanistan (Ball 1982) have even rudimentary plans, so at the most basic level, Google Earth is being used to generate detailed sketch plans of numerous unplanned sites (Fig. 4; Thomas et al. 2008). Google Earth also provides valuable data on the relatively few sites which have been planned, such as the early Islamic (twelfth- to thirteenth-century CE) capital of Bust/La*sh*kar-i Bāzār. A French team led by Daniel Schlumberger conducted pioneering excavations and surveys at this sprawling site from 1949 to 1952. Despite their best efforts under difficult working conditions and with few resources, the art historian Terry Allen estimates that nearly 100 *Gh*aznawid/*Gh*ūrid buildings, some standing two storeys high, survive at Bust, most of which have never been documented. The external walls of many of these structures, which are not marked on the French expedition's plans of the site, are clearly identifiable in Google Earth, while additional details can be collated for several of the other structures which were merely outlined (Thomas & Zipfel 2008). The archived satellite images also create benchmarks against which the impact of threats to archaeological sites, such as the encroachment of agriculture and urbanism, can be monitored over time.

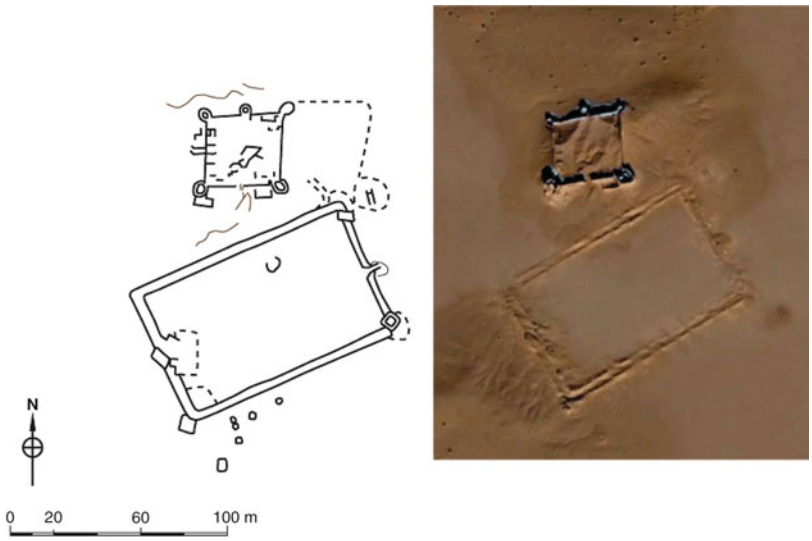

Google Earth Afghan Surveys, Fig. 4 Sketch plan of the hitherto unplanned *Gh*aznawid site of Qal'a-i Hauz, derived from the imagery available through Google Earth

In addition to providing valuable data on known sites in Afghanistan, Google Earth also provides a means of investigating unsurveyed areas. Given the limited opportunities for "ground truthing" (i.e., checking results by site visits), this form of "remote" archaeological exploration benefits from the process of "visiting" and verifying known sites mentioned above – by exploring the known sites, researchers' eyes can become attuned to how archaeological features appear in Google Earth. This "virtual experience," as well as years of fieldwork experience in the region, and a detailed appreciation of both landforms and archaeological site formation processes, is essential if previously undocumented sites are to be identified (and natural or modern features are not to be mistaken for archaeological sites).

A systematic approach to the study of images available through Google Earth, which by its very nature is highly time-consuming, wearying, and often tedious, is essential when they are being used for reconnaissance purposes. ASAGE researchers "zoomed in" to the 100–200 m scale, beyond which even high-resolution satellite images start to pixelate, and spent dozens of hours methodically scrolling up and down selected high-resolution study areas, "placemarking" ambiguous features (Thomas et al. 2008). The most experienced field archaeologist on the project was assigned the task of cataloguing all the placemarked sites, in an effort to standardize site recognition and descriptions. This review process resulted in three quarters of the placemarks being dismissed as natural or too uncertain to document. Once catalogued, the images and data for the remaining placemarked sites were cross-checked by another archaeologist with first-hand knowledge of the region, so as to minimize errors, reduce subjectivity, and maximize standardization.

A degree of subjectivity is inherent in the process of cataloguing a placemark as an archaeological site, particularly when it is not possible to ground truth the site and when the site's date and contemporaneity with other sites are difficult to determine. Subjectivity can be reduced by defining site types explicitly at the start of the project. Chronological parameters can be set by adopting the rolling 50-year date used by numerous heritage agencies around the world as the arbitrary division between "archaeological" sites and "modern" sites and comparing the satellite images in Google Earth with declassified CORONA images from the 1960s and 1970s. These images provide an effective terminus ante quem (date before which the sites must have formed) for most of the larger

Google Earth Afghan Surveys, Table 1 Details of the ten ASAGE study areas in Afghanistan

Study area	Area (km^2)	Placemarks	Sites	Site density	Location	Date of image
SA1	312.5	163	55	0.18	N5 – south central desert around Qal'a-i Hauz	6/12/2004
SA2	273.5	579	118	0.43	N1 – primarily N of Arghandab	6/12/2004
SA3	240.5	599	171	0.71	N2 – south of Arghandab	6/12/2004
SA4	267.5	382	91	0.34	N3 – north central desert	6/12/2004
SA5	273.0	107	16	0.06	N4 – central desert	6/12/2004
SA6	225.0	123	20	0.09	Ghur province, north of Hari Rud	25/07/2004
SA7	263.7	41	17	0.06	Ghur province, south of Hari Rud	25/07/2004
SA8	265.5	143	24	0.09	Ghur province, south of Hari Rud	25/07/2004
SA9	299.0	285	81	0.27	Afghan/Turkmen border	20/09/2006
SA10	260.0	257	86	0.33	Afghan/Turkmen border	30/08/2002
Total	2,680.2	2,679.0	679.0	0.25		

sites visible in both images and thus increase confidence that many of the other smaller sites identified in Google Earth are also premodern.

This relatively recent cutoff point differs from that adopted by Warwick Ball, who argues that if post-Tīmūrid (c. CE 1526) remains were included in his gazetteer "virtually every modern town and even many villages would qualify as a 'site'" (Ball 1982 I: 14). While Ball's reasoning is understandable given the practicalities of producing a gazetteer which already has over 2,000 sites in it, the relatively recent cultural heritage of Afghanistan is just as worthy of recognition, preservation, and protection as its older sites, as is the case elsewhere in the world.

The ten ASAGE study areas were selected in different environmental zones close to major early Islamic urban centers to investigate the use of different "marginal" landscapes by nomads and to test whether the methodology ASAGE has devised is applicable across the Afghan landscape and beyond. Only one of the ten study areas yielded more than 0.5 sites per km^2 (Table 1). Despite this apparently low success rate, 679 definite or probable archaeological sites were identified over an area of 2,680 km^2. These include isolated nomad campsites and corrals, fortified dwellings and *tepe*s (occupation mounds, probably dating back several millennia), deserted villages, dams and reservoirs, and *kārīz* (underground water channels; Fig. 5). Prior to the study, only three archaeological sites were listed in the study areas.

The wealth of sites found in the Ar*gh*andāb river valley and Rīgistān desert contrasts with the much smaller numbers identified in the three study areas in the mountains of *Gh*ūr province (SA6-8) and the two on the steppe in the north of Harāt province (SA9-10). The most obvious explanation is the differing intensities of use in the different environmental zones. Other factors, however, may have contributed to the reduced site numbers in these areas – summer campsites in the mountains are likely to be more dispersed and ephemeral than winter ones, while the harsh winters, which are accompanied by heavy snow falls and violent spring floods, may also have impacted on site preservation and visibility in the mountains of *Gh*ūr.

The value of adopting a systematic approach to studying archaeological landscapes in Google Earth, therefore, extends beyond the numbers of sites identified. It permits an assessment of the significance of the distribution of sites in quantitative terms, relative to the types of sites found, different landforms covered, topographic features, and varying levels of preservation and visibility. The conclusions derived from such analyses have obvious implications for cultural heritage management and archaeological impact assessments.

Google Earth Afghan Surveys, Fig. 5 SA2_101: *tepe* with towers guarding the entrance in the west; note the overlapping *kārīz* spoil heaps running to the north and south of the *tepe*

Future Directions and Examples

The large number of sites in Afghanistan (and elsewhere) identified using Google Earth should not come as a surprise, despite the dearth of sites previously recorded in the study areas. Survey work in the 1960s and 1970s in the nearby deserts of Sīstān, the anecdotal reports from travelers in the region and fieldwork in other semiarid regions of the Near East and Central Asia have demonstrated that deserts have been utilized by nomads for millennia, and that their sites survive, despite often being ephemeral and difficult to date. The blanks on distribution maps are frequently due to a lack of investigation arising from Western preconceptions about "uninhabitable" semiarid regions rather than a lack of archaeological sites.

The primary value of the ASAGE research is as a basis for future fieldwork. The newly discovered sites need to be ground truthed, both to establish the veracity of their identification and to collect datable ceramics from the surface. The detailed sketch plans can be used by the relevant authorities and other archaeologists to develop site management plans, particularly where farmers are encroaching upon sites. The latest 3G mobile phone and iPad/tablet technology even raise the possibility of developing tourist itineraries and context-rich on-line resources at sites such as *Gh*azni, which has been nominated as "Cultural City of the Islamic Civilization" for 2013.

The archaeological potential of Google Earth is so vast that it cannot be exploited fully by a few academics alone. Much can be achieved by engaging with the sizable "armchair archaeologist" community and enlisting their assistance in exploring study areas and identifying sites. Engagement, however, is a two-way process and requires considerable commitment of time (in training, cross-checking, and providing feedback) and a willingness to communicate and share knowledge on the part of academics. Similarly, while much of Afghanistan remains a no-go zone for Westerners, it is imperative to share data with the National Afghan Institute of Archaeology and other relevant Afghan authorities, foreign archaeologists, NGOs and individuals, and sections of the military who are interested in discovering and protecting cultural heritage. The ease with which Google Earth data can be generated, exported, and exchanged provides a further example of how central this versatile medium will be to archaeological research for the foreseeable future.

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▶ Aerial Archaeology

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Goose: Domestication

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Basic Species Information

Domestic geese descend from two wild species, the Greylag, *Anser anser* (Linnaeus, 1758), and the Swan Goose, *Anser cygnoides* (Linnaeus, 1758) (Shi et al. 2006). The natural breeding range of the Swan Goose, the ancestor of the Chinese Goose, is in Mongolia, North China, and southeastern Russia, and wintering areas are mainly in China. The breeding area of the Greylag, the wild form of the domestic goose in Europe (European goose), covers northern and central Europe and Asia; wintering areas are in southern Europe and northern Africa. Two subspecies of the Greylag are known, *A. a. anser* (western form) and *A. a. rubrirostris* (eastern form). Both *A.a. rubrirostris* and the European domestic goose have pink beaks while *A.a. anser* has an orange beak. The pink beak indicates that the European domestic goose descends from the eastern form.

The two domesticated forms of geese, the European and the Chinese, are closely related. Both are widely spread in the world today, and they can have fertile offspring. Also wild forms, the Greylag and the Swan Goose, can interbreed (Gray 1958). The Chinese goose grows larger than the European, and has a longer neck; the male has a pronounced knob at the base of the beak.

Both Chinese and European geese have white and gray breeds.

The Egyptian goose *Alopochen aegyptius* was kept by ancient Egyptians a long time before the Greylags, but this species never became fully domesticated. One early use of domesticated geese has been for sacrifices (e.g., in Mesopotamia, Middle East, and classical Greece). Geese were probably sacred in Pre-Roman Britain (Zeuner 1963). Domestic geese were associated with religious symbolism in Roman times in Britain and Italy (Albarella 2005), and geese bones are regularly found in Iron Ages burials in northern and central Europe. Over time, geese have provided meat, liver, and eggs. Wild or domestic goose was identified, for example, in Tutankhamun´s tomb (c. 1330 BCE) among the remains of the funerary meal (Houlihan 1986). Romans and probably ancient Egyptians overfed geese in order to improve the flavor of the liver and meat. Perhaps, the most important material advantage of geese was the fine quality of feathers and down. Quill pens were used in medieval and historical times. Geese were respected house guards at least from Roman time onward.

It is currently not possible to date or locate when and where geese were kept for the first time, though in China, the goose was domesticated by ~1000 BCE and most likely earlier. The first introduction of the Chinese goose to Europe was in the eighteenth century.

Domestic geese are depicted on the walls of burial chambers in ancient Egypt c. 1400 BCE. Domestic geese appeared in ancient Greece by 700 BCE. Homer mentions white geese in the Odyssey c. 800–700 BCE, apparently meaning the domestic bird. Zeuner (1963) proposed that the domestication must have happened first in the breeding areas, where young birds were taken from nests and raised though the breeding distribution of the Greylag does not cover Egypt.

The Greylag may have been domesticated in many places at different times. Crossbreeding of domestic and wild forms has most likely happened often. For example, in Scotland and Fennoscandia, it had been common to take young wild geese from the nests and raise these (Sirelius 1919). Geese probably belonging to the domestic form have been identified in samples dating from the Bronze Age (c. 1700–500 BCE) in southern Sweden and eastern Germany, and Pre-Roman and Roman Iron Age (c. 400 BCE–CE 400) in Southern Sweden (Ericson & Tyrberg 2004), probably indicating a local domestication.

Based on size, domesticated geese were kept in Iron Age and Viking Age Denmark (c. CE 500–1000) and in Roman and Saxon Britain (c. CE 0–1000). However, according to archaeological materials, domestic geese became abundant only during medieval times in most of Europe (Reichstein & Pieper 1986; Yalden & Albarella 2009). A sudden increase in the amount of goose bones and bones of young individuals in archaeological data can be interpreted as indirect evidence of the presence of the domesticated form.

Molecular studies of recent and archaeological specimens show a close genetic relationship between the different species of genus *Anser* (Barnes & Dobney 2000; Ruokonen et al. 2000; Shi et al. 2006). Separation between the domestic and wild *Anser*-geese, or the eastern and western form of the Greylag, by ancient mitochondrial DNA has not yet been successful. Identification of plumage color by analysis of ancient DNA from bone might in the future give good results in tracking the early domestication of geese.

All species in genus *Anser* are very similar in skeletal morphology, which makes species identification of archaeological bones difficult. Vague morphological differences occur in the cranium and sternum. In sternum, the keel is deeper in the domestic compared to the wild form (Yalden & Albarella 2009). However, these elements are rarely preserved in archaeological samples.

The earliest domestic geese were of similar size to their wild ancestors, making the bones of the earliest domestic geese indistinguishable from wild geese. Only few changes have occurred in the appearance of the European goose during domestication. As a consequence of selection, their size became larger and heavier, which led to a restricted ability to fly. Leg bones (probably not the tibiotarsus) of domesticated geese are stouter than those of wild forms because they

carry the increased weight, and the wing bones are shorter and broader (Reichstein & Pieper 1986; Boessneck & Von den Driesch 1979).

The plumage color changed from gray to heterogeneous and finally to white in some domestic breeds. In about CE 27, Pliny the Elder writes about the value of down and meat from white geese, evidently pointing to the domestic form. The Romans knew several breeds of geese such as the small white German and the large white (Albarella 2005).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Basic Biographical Information

Vasily Alekseevich Gorodtsov (1860–1945) (Fig. 1) was an outstanding Russian archaeologist. He began the scientific work in the archival committee of Ryazan and Yaroslavl (1889–1899). During this period, Gorodtsov explored Neolithic settlements on the Oka River downs (the right feeder of the Volga River). In 1901, he was given a mission from the Moscow archaeological committee to lead excavations in the South of Russia. Over a period of six months, he excavated 107 barrows in the river Donets Basin (Kharkov Region). During this time, scientific excavation and describing the methodology of burial complexities was invented for the first time.

From 1903 to 1929, Gorodtsov worked in the Historical Museum of Moscow. In 1905, his excavation report on the barrows was published. Four groups of burials were identified according to their stratigraphic horizons, all of them belonging to the second Bronze Age. There were three consequent Bronze Age cultures: pit-house, catacomb, and log house.

Gorodtsov, Vasily A., Fig. 1 Vasily Alekseevich Gorodtsov

Gorodtsov's division into periods took its rightful place in the history of European science in line with such systems as Montelius', Reineke, and Furumark.

Gorodstov had an active teaching profession also. From 1907–1914, he taught archaeology at the Moscow Archeological Institute and from 1915 to 1918, he taught at Shanyavsky National University. After 1918, he became a professor at Moscow State University. Sometime later, he became a professor at the Chernyshevsky Literature Philosophy and History University. Gorodstov was also a member of the Material Culture Institute of the ASUSSR. Many talented students followed him, the most famous of which is N. Y. Merpirt.

Major Accomplishments

V.A. Gorodtsov was the first person in 20 years to explore pit-houses of paleontological humans in the East European territory (Timonov settlement, 1928). He classified Fatianovskaya, Panfilovskaya forest-steppe archaeological cultures. He researched sites of Scythian-plowmen and also artifacts of the Gorodetskaya and Diakovskaya cultures. Gorodtsov was the first archaeologist to organize large excavations in the Old Ryazan. He is the author of more than two hundred scientific works.

Gorodtsov's scientific works determined the direction of Russian archaeology for many years. This was characterized by the holistic and systematic approach of archaeological material classification. Gorodtsov's scientific work "typological methods in archaeology" was republished in the USA. V.A. Gorodtsov developed the historical approach to archaeology, which was initiated by his predecessor, Count A.S. Uvarov, and which is now typical of the Russian science. He invented a model concerning the establishment and the expansion of industrial farms in the Middle East, Balkans, and Central and East Europe. His publications prefigured Gordon Childe's diffusion theory in many respects. Gorodtsov's research regarding Eurasian cultures still plays a significant role in contemporary archaeology.

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- ▶ Russia: Management of Archaeological Heritage

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Gould, Richard A.

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Basic Biographical Information

Richard Allen Gould was born in 1939, in Newton, Massachusetts, as an only child. His father served in the Pacific during WWII on the aircraft carrier USS *Yorktown* (CV-10) and, after the war, spent a career in higher education as President of Antioch College, Chancellor of the University of California at Santa Barbara, and, ultimately, Chancellor of the State University of New York (SUNY). During the war, his first-generation Finnish mother worked at a shipyard in Massachusetts, and Gould grew up in a bilingual household (Fig. 1).

Gould graduated with a B.A. (cum laude) in anthropology from Harvard University in 1961 and followed with a Ph.D. in anthropology from the University of California at Berkeley in 1965.

Gould's initial interest in archaeology was sparked by a meeting with the former Chair of the University of Chicago Department of Anthropology, Fay Cooper-Cole, who had retired to California and was a family friend. Through Cooper-Cole, Gould was introduced to one of Cole's former graduate students, Jessie Jennings, who was leading the southern section of the Glen Canyon Project – a vast public archaeology undertaking that was to catalogue and excavate key sites along the Colorado River that would be submerged by the construction of Glen Canyon Dam. Gould worked under the exacting tutelage of Jennings during field seasons in 1961–1962 and came to appreciate the value of science and intellectual rigor as applied to archaeological work.

While at Berkeley, Gould wrote a Ph.D. thesis on Northern California Tolowa ethnoarchaeology. The work addressed questions of cultural continuity and change that were tested via excavations at the Point Saint George Site. Gould's thesis advisor, John Rowe, was a prominent Peruvian scholar, and though he did not become an Inca specialist, Gould was drawn to Rowe by his expertise in ceramic analysis and culture history which he has applied to other areas throughout his professional life.

Gould, Richard A., Fig. 1 Richard Gould measuring the propeller of the Bird Key Shipwreck, Dry Tortugas National Park c. 1991 (Courtesy of US National Park Service)

Subsequent to his graduate work in California, Gould and his wife Elizabeth (Betsy) did groundbreaking work in ethnoarchaeology with the Aboriginal people of the Western Australian Desert. Drawing on past experiences, the Goulds proposed the concept of a Western Desert Culture – a discernible amalgamation of the ideas of cultural continuity drawn from John Rowe coupled to the culture area theories of Jessie Jennings.

After work in Western Australia, Gould looked to his mother's homeland of Finland

where he studied the historical processes of farm abandonment and the material residues that were left behind as Finish families reacted to varying degrees of socioeconomic stress after the Russo-Finnish War and WWII.

In 1977 while on sabbatical to Cambridge University to work on his book *Living Archaeology*, Gould met maritime archaeologist Keith Muckelroy. Muckelroy sparked a long-term interest in the subject of underwater archaeology in Gould, and in 1981 he chaired a School of American Research Seminar dedicated to the subject. From this seminar came the highly regarded book *Shipwreck Anthropology*, one of the first volumes to advocate for an explicitly anthropological approach to underwater archaeology. The seminar began a long, productive professional relationship between Gould and National Park Service underwater archaeologists Daniel Lenihan, Larry Murphy, Matthew Russell, and David Conlin. Following the seminar, Gould expanded his research interests to include underwater work in Dry Tortugas, Florida, and Bermuda.

After the September 11, 2001 terrorist attacks, Gould realized that the techniques of archaeology could provide insights into mass-casualty events and bring closure to the families of those who died. Gould's World Trade Center work was followed, in 2003, by a much larger examination of a tragic fire at "The Station" nightclub in Warwick Rhode Island – this work tied in with his commitment to a "knowable past" and an empirical approach in line with the standards of modern crime-scene forensics.

Gould retired from his position in the Department of Anthropology at Brown University in 2009 and currently lives in Honolulu, Hawaii, with his sweetheart and wife of 50 years Betsy Gould (neé Barber).

Major Accomplishments

After completing his Ph.D. in Anthropology at Berkeley, Gould embarked on a diverse examination of different subjects, all tied together by the common thread of human cultural and behavioral adaptations to stress, risk, conflict, and uncertainty (http://philosopedia.org/index.php/Richard_A._Gould). Gould's career blossomed during the transition in American archaeology from cultural-historical particularism to the scientific/ecological focus of the New Archaeology in the late 1960s and 1970s, and he remained heavily involved in the field during the period of paradigmatic confrontation between Post-Processual and Processual archaeology in the late 1980s and 1990s.

Gould's definition of "culture" shades closely to a "bio-cultural" mechanism of adaptation that combines elements of both biological and nonbiological aspects of human experience as opposed to an ideational notion of culture defined as a negotiated system of symbols. As such this sometimes put him at odds with archaeologists of the Post-Processual movement as it moved into maturity in the 1990s.

Gould's writings are fundamentally scientific and carry a theme of a "real past" that is knowable in some of its facets via the careful application of science and the scientific method. Gould's approach has been to apply standards of evidence akin to courtroom testimony (i.e., empiricism, logical connection, minimal assumptions, and rigorously argued linkages between the observed material and inferred behavioral causes) to the results of his research. His mass-casualty work came as a result of his emphasis on science and the notion that in some instances there is a single answer that adheres most closely to the facts and is at least "provisionally true." Gould privileges statements about the past that carry with them minimal assumptions, yet he has also been able to ague from particular instances such as the shipwrecks of the Spanish Armada and the salvage of WWII aircraft during the Battle of Britain towards more generalized statements of human behavior as related to risk, stress, and conflict that have broad applicability over time and space.

Gould argues that the past is knowable with varying degrees of certainty and also notes that a large amount of human behavior, even in some surprising instances, can be linked to adaptive responses to the environment. In this he defines "environment" as encompassing both the

physical environment and also the larger socioeconomic forces that shaped human decisions in the past. He is a strong proponent of a stepwise approach to the study of cultural adaptation that encompasses multiple feedback loops combining a systemic relationship of both the ideational and biological aspects of human experience. In this Gould advocates for the use of both "emic" (i.e., internal, socially constructed categories of thought and meaning such as local religion) and "etic" (i.e., external categories of thought and meaning such as the application of the Western scientific method).

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Ethnoarchaeology
- ▶ Underwater Archaeology

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Graffiti Archaeology

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Introduction

Graffiti is an important source of material evidence through which archaeologists can learn about cultural identities and ideas. The tradition of graffiti goes back to ancient Greece and Rome, if not earlier (Baird & Taylor 2010). One of the renowned characteristics of Pompeii and Herculaneum is the wealth of political slogans and bawdy statements that are inscribed on the walls of buildings, both inside and outside (Benefiel 2010; UNESCO 2013). In contemporary societies, graffiti is widely perceived as undesirable and labeled as "vandalism" and often connected with feelings of adrenaline (O'Doherty 2012).

Archaeologists investigate the nexus of technique, form, and content of this visual culture to extract uncensored, uninstitutionalized information about attitudes toward social, political,

religious, and ideological issues. Graffiti is a continuation of the landscape-marking and mark-making communication practices that have been used by humans for at least 40,000 years. While rock art receives much academic interest owing to its ability to reveal a myriad of information about past societies, economies, material culture, and ideologies (McDonald 2012), the same can be said of classical, medieval, and historical colonial, military, and convict graffiti. Though this entry focuses on contemporary graffiti, the issues discussed are relevant to classical, medieval, and historical graffiti.

Definition

Graffiti, the plural of graffito, comes from the Italian word *graffiare*, meaning "to scratch" and is used to refer to human-made markings in the public domain. The term is widely used to describe markings that are unauthorized or illegal and can include expressions in both two- and three-dimensions. Certainly, graffiti is generally conceived as illegal behavior (e.g., Fig. 1); however, not all types of graffiti are illegal. Graffiti becomes illegal and/or vandalism when the author does not have a legal right to be making their mark on the surface they are marking.

Graffiti can be defined as a form of visual communication and intended human-made marking that occurs publicly on any fixed surface in natural and built landscapes. Put simply, graffiti is communication through landscape-marking, and is inclusive of a wide range of forms, such as regulated traffic signs, public murals, advertising, and street art. This definition maintains a degree of fluidity and flexibility and is consistent with archaeological approaches to rock art style as a means of communication (Wobst 1977; McDonald 2012). From this viewpoint, graffiti encompasses all public visual communication, regardless of authorship, form, material, technique, message, legality, and social and cultural acceptances.

Key Issues and Current Debates

One key issue under current debate concerns what actually constitutes graffiti. Daniell (2011: 455) explains that graffiti comprised "essentially handwriting or hand-drawn designs" until the late 1960s and early 1970s, when "tagging" became popular and urban graffiti became "larger and more colourful and included designs, writing and pictures"; this change came about due to the availability of new techniques and implements, such as aerosol

Graffiti Archaeology, Fig. 1 Sign describing graffiti as vandalism, New York, USA, 2011

spray cans. Macdonald (2001: 2-3) argued that the contemporary practice of graffiti is "far from mindless or senseless and that there is always a purpose behind [its] production". Frederick (2009: 212) agreed, stating that graffiti is "a mode of expression and communication which comprises a vast array of media, technique, subject matter, form and meanings" and that a common feature of most graffiti is that comprises "text and/or images that [are] made in shared spaces where it is viewed publicly, be that a privately owned building, public transport, or an alleyway" (Frederick 2009: 212). David and Wilson (2002: 43) say that graffiti:

> . . . has a more pointed definition, referring to unsolicited inscriptions in public spaces. As a form of inscription usually practiced outside the censoring arm of the power elite, graffiti confronts and contradicts the ordered and ordering space of institutionalised life. Thus by definition, graffiti is imbued with a polluting and vandalistic quality irrespective of its decorative potential. It threatens the status quo not just because of the words or images written, but by the fact that its execution in public spaces lies outside the control of existing social forces.

Daniell (2011) argues that our understanding of contemporary graffiti should be informed by contemporary issues, such as legality, regulation, control, and resistance; however, using a similar approach toward non-contemporary graffiti is problematic because those markings were created under different legal, political, and social circumstances (Daniell 2011: 458, 462).

Several archaeological studies of graffiti have been undertaken across the globe and the following paragraphs are examples of some of the recent graffiti archaeology projects that have been undertaken around the world. In the United Kingdom, Graves-Brown and Schofield (2011) studied graffiti found on the interior walls of an apartment at 6, Denmark Street, London. This location was once occupied by members of the punk band, Sex Pistols, and the study mainly focused on caricatures of band members drawn by Sex Pistols lead singer, John Lydon. Graves-Brown and Schofield (2011: 1398) questioned whether heritage conservation of this location might betray the "spirit of punk and rock music more generally," and were criticized in mainstream media for suggesting this site should attract the same level of significance and attention as a site from the distant past. One of the major messages to come out of Graves-Brown and Schofield's (2011) article, and one that was missed in the media, is the issue of cultural heritage management, preservation, and conservation in light of intersecting and even counteracting cultural needs:

> In case readers are wondering whether this paper is written tongue in cheek — or with tongue sticking out — it is worth recalling that modern archaeology includes recent periods in its remit, and uses recent materiality to help understand more ancient times as well as a critique on modernity itself.

Oliver and Neal (2010: 15) focused on tree carvings throughout their study of contemporary graffiti in the UK, and argue that "archaeologists and others have begun to turn their attention away from symbols of authority and towards the daubed, painted and scratched writings of the disadvantaged, the excluded or the subversive in society" because these are the stories that are not likely to be discovered in other media. Such an approach allows people to understand the ways in which visitors and inhabitants actively use the space and landscapes available to them, and helps people to acknowledge that these places are not "ageless, static or just plain dull" (Oliver & Neal 2010: 20).

In continental Europe, Merrill and Hack (2013) investigated Soviet graffiti at a former military base in Germany. Merrill and Hack (2013: 101) argued that it is archaeologically important for "graffiti and other forms of what is traditionally considered vandalism to contribute to the cultural significance and interpretation of heritage sites." This study includes an argument similar to that of Oliver and Neal (2010) that graffiti can highlight and reveal information about people, places, and events that would otherwise remain unknown or lost. It is suggested that the Soviet graffiti adds to, rather than reduces, the cultural significance of the heritage site, and can be used as a system of interpretation (Merrill & Hack 2013).

South African archaeologist Sven Ouzman (2010: 1) examined the implications of

approaching historic and contemporary graffiti as a "multi-sensorial" artifact comprising blends of "crime, art, corporate co-option, and historic witness" to understand post-Apartheid South Africa. Our understanding of what constitutes "rock art" and what constitutes "graffiti" is questioned by Ouzman (2010: 17) upon his discussion about attitudes toward inscriptions made by soldiers from the Boer War, because, he argues, some people do not like these inscriptions being referred to as rock art, despite having striking similarities; Ouzman (2010: 18) asks:"is this because 'rock art' is perceived to reside unthreateningly in the past and 'graffiti' is an easy to ignore pollutant?"

In Australia, Frederick (2009) considered the link between ancient Aboriginal Australian rock art and contemporary urban graffiti in Perth. Frederick (2009: 210) used an archaeological approach to contemporary graffiti to identify the significance of contemporary graffiti as an artifact. This study (2009: 229) has implications that may lead to a more informed approach to rock art research, in particular, the suppositions that rock art researchers make about the images depicted in rock art. For example, images and slogans depicted in contemporary graffiti can be sanctioned by some from the community, while at the same time be unsanctioned by others. Interpretations of contemporary graffiti data are marred by our separation from insight into the graffiti writer's intention and motivation; this is equally so for rock art data. Frederick (2009: 231) argues that there is no single conclusion that can be drawn from contemporary graffiti data, and rock art researchers should not be aiming for a conclusive interpretation of rock art data.

Ralph (2012) conducted research into contemporary Indigenous graffiti in the Jawoyn Aboriginal communities in the Northern Territory, Australia. He developed a theoretical model to underpin a more nuanced understanding of contemporary landscape-markings, drawing upon actor-network theory, in which a "disparate family of material-semiotic tools, sensibilities and methods for analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located" (Law 2007: 2). Accordingly, communication through landscape-marking is interpreted as existing in a web of interdependent relationships which are embedded in empirical, materially grounded practices (Callon 2006). Actors in this web include governments, communities, and individuals who communicate their own experiences and agendas through the action of landscape-marking. As Couldry (2004: 1) points out, both human and nonhuman entities within these webs "acquire power through the number, extensiveness and stability of the connections routed through them." In Aboriginal communities in Northern Australia, Ralph (2012) found that graffiti serves the intra-group purpose of communication between community members, rather than the intergroup purpose of propagating political and social commentary (e.g., Fig. 2). He argued that the graffiti was more closely aligned to the ongoing cultural tradition of rock art production and landscape-marking, than to the contemporary graffiti expressions often found in urban settings (e.g., Fig. 3).

Each of the above studies has three common themes. Firstly, the authors acknowledge that graffiti in contemporary societies is often seen as vandalism, and they each attempt to redress that point of view, for example, Oliver and Neal (2010) and Merrill and Hack (2013) who claim that graffiti archaeology has the potential to uncover information about people whose stories may not be found elsewhere. The archaeology of graffiti, while by no means a new area of archaeological inquiry, is growing at a rapid rate. Prior to the early twenty-first century, very little archaeological research was conducted on contemporary, or even historical, graffiti. During the early twenty-first century, graffiti archaeology has become a considerably sized stream of the archaeological discipline, which involves a number of researchers from across the globe, particularly in the United Kingdom, continental Europe, Africa, and Australia. In saying this, and coupled with contemporary viewpoints toward graffiti, the second common theme of the above studies is that graffiti archaeologists tend to argue for the legitimacy of their work; for example,

Graffiti Archaeology, Fig. 2 High-density minuscule graffiti on a road sign, community meeting area, Barunga region, Northern Territory, Australia, 2012. The location, size, and density of graffiti demonstrate that this is a form of intra-group communication

Graffiti Archaeology, Fig. 3 "Tag" graffiti, inscribed over public mural, Venice Beach, California, USA, 2011

Graves-Brown and Schofield (2011) and Oliver and Neal (2010). Finally, many archaeologies of graffiti attempt to situate the contemporary practice of graffiti as part of an ancient, continuing visual culture that consists of vital social meaning and information, rather than a clandestine, unsavory, and meaningless act, for example (Frederick 2009; Ouzman 2010; Graves-Brown & Schofield 2011; Ralph 2012).

In 2013, the state of graffiti archaeology intimates that this stream of archaeology will continue to grow in both scholarship and interest. This is due, in part, to the capacity for up-and-coming archaeologists to explore "new ground" in these relatively under-examined contemporary, historical, medieval, and ancient material practices, but more so because the purpose of archaeology and archaeological

research is to learn about past human behavior. As with other archaeological materials, graffiti allows archaeologists to understand the cultural identities and behaviors of humans in the past.

Cross-References

- ▶ Landscape Archaeology
- ▶ Pompeii
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Urban Heritage

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Grapes: Origins and Development

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Basic Species Information

It is difficult to discern the true wild ancestor of cultivated grape (*Vitis vinifera* L.) because the Mediterranean Basin has a wide variety of wild forms. These include escapees and seed-propagated weedy types growing in natural habitat, occurring mainly in disturbed surroundings and cultivated clones of the grapevine (Zohary & Hopf 2001: 152). Recent genetic studies have proven that cultivated grapevines growing in different regions have genetic diversity and heterozygosity which can only have been established through an influx of genes from nearby wild *V. sylvestris* populations

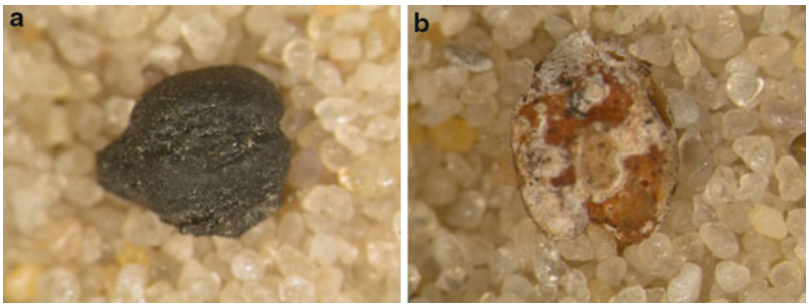

Grapes: Origins and Development, Fig. 1 (**a**) Carbonized Vitis vinifera (grape) pip and (**b**) mineralized Vitis vinifera (grape) pip (both dorsal view) from Insula VI.I, Pompeii, Italy (Photo by author)

Grapes: Origins and Development, Fig. 2 (**a**) and (**b**) Carbonized Vitis vinifera (grape) pips and (**c**) mineralized Vitis vinifera (grape) pip (all ventral views) from Insula VI.I, Pompeii, Italy (Photo by author)

(Imazio et al. 2006: 1009). *Vitis sylvestris* C. C. Gmelin is now considered to be the wild race of the cultivated grape and is indigenous to southern Europe, the Near East, and the southern Caspian belt (Zohary & Hopf 2001: 152).

Vitis vinifera (L.) (grape) is the sole Mediterranean representative of the genus *Vitis* (Zohary & Hopf 2001: 155). The plants are monosexual with the female flowers only ripening into grapes. *Vitis vinifera* is hermaphroditic and occasionally, with the escape of cultivated vines into the wild, reverts back to *Vitis sylvestris* (wild variety) in all characteristics except for being a hermaphrodite, and the seeds of these escapees remain much closer to those of the cultivated form. In terms of elevation, the plant can establish itself at a height of 400 m above sea level and is rarely found as high as 800 m. The cultivated *Vitis vinifera* has a more restricted distribution than its wild variety (Renfrew 1973: 125; Olmo 1995).

Timing and Tracking Domestication

Using genetic studies, Imazio et al. (2006: 1003) have claimed to have found a unique domestication center for all the European cultivars of *Vitis vinifera* located in the Caucasian and Middle East regions, which was present around 6,000–7,000 years ago and is supported by historical sources. Molecular genetics has shown the existence of varietal exchange and propagation throughout Europe (Imazio et al. 2006: 1010). However, the process of domestication of the grapevine is still largely unknown.

Within the palynological record, *Vitis* is noted in several locations in northern Greece with an increasing presence, albeit patchy, both spatially and temporally, since the beginning of the Holocene. Around 3500 BP (1550 BCE) onwards, there is a rise in the pollen record that is believed to reflect human manipulation and cultivation of the grapevine (Bottema 1982 cited in Valamoti et al. 2007: 56). Recent

archaeobotanical analysis has confirmed this complex interaction and spread of the grapevine through Europe and the Mediterranean region by humans with carbonized seeds of both *Vitis sylvestris* (*Vitis vinifera* ssp. *sylvestris*) and *V. vinifera* recovered from prehistoric sites throughout Europe (Renfrew 1973: 125; Zohary & Hopf 2001: 156; Terral et al. 2010: 443). The earliest archaeological evidence of the domesticated grape comes from Egypt and Syria during the fourth millennium BCE. In Palestine seeds of grapes date from 3000 BCE to Bronze Age sites in Jericho (Jashemski 2002: 174). Based upon archaeobotanical and historical information, it is known that domesticated grapevines appeared during the first half of the third millennium BCE in Minor Asia, Southern Greece, Crete, and Cyprus. At the start of the second millennium BCE, they have been recovered from the Southern Balkans, and during the second half of the second millennium BCE, they first appeared in southern Italy. Subsequently, during the second part of the first millennium BCE, the distribution extended to Northern Italy, Southern France, Spain, and Portugal (Riviera-Nunez & Walker 1989 in Imazio et al. 2006: 1004).

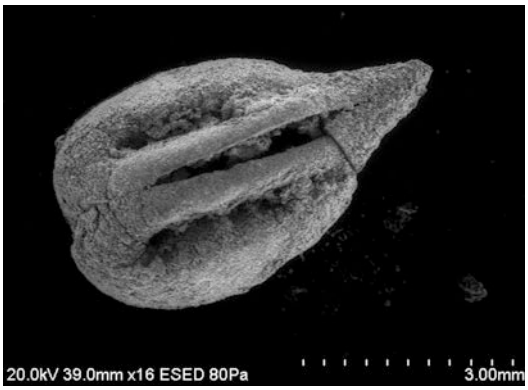

Grapes: Origins and Development, Fig. 3 SEM of carbonized Vitis vinifera (grape) pip from Insula VI.I, Pompeii, Italy (SEM by author)

The fresh fruits of grapes are rich in sugar, containing 15–25 % sugar content. Practically, grapes can be easily stored as dried raisins in winter storerooms, and the juice can be fermented and made into wine. Viticulture is considered a risky agricultural enterprise compared with other non-staple crops that are suited to the Mediterranean climate. Fermented grapes were the commonest source of alcohol in the ancient world and probably the cheapest intoxicant available, as well as an extremely important trade item around the Mediterranean Basin (Brothwell & Brothwell 1998: 147; Zohary & Hopf 2001: 151).

The secure identification of cultivated versus wild grapes has proven problematic and has been a topic of heated debate among archaeobotanists for the last half century. Stummer (1911) initially pointed out that pips from *Vitis sylvestris* were small, short, and broad, whereas pips of cultivated grapes had longer stalks and were narrower in relation to their length (Renfrew 1973: 127-9; Runnels & Hansen 1986; Smith & Jones 1990: 317). Traditionally, the established distinction between archaeological specimens of wild (*Vitis vinifera* ssp. *sylvestris*) and domesticated (*Vitis vinifera* ssp.

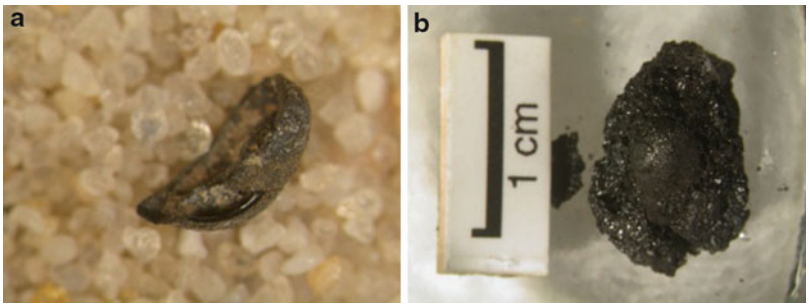

Grapes: Origins and Development, Fig. 4 (**a**) Carbonized half fragment of Vitis vinifera (grape) pip and (**b**) carbonized grape pip embedded in mesocarp from Insula VI.I, Pompeii, Italy (scale in centimeters) (Photos by author)

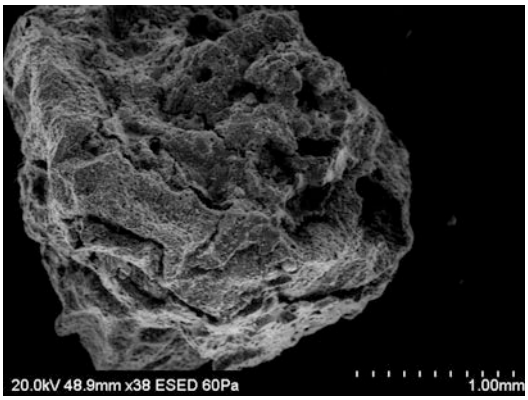

Grapes: Origins and Development, Fig. 5 SEM of carbonized Vitis vinifera (grape) petiole from Insula VI. I, Pompeii, Italy (SEM by author)

vinifera) grapes has been based on the overall dimensions and other morphological characteristics of the grape pips. Due to the fact that there is considerable overlap between the cultivated and wild types, "pip shape cannot be regarded as a safe diagnostic trait for distinguishing between wild and cultivated Vitis remains in archaeological excavations" (Zohary & Hops 2001: 153). A number of studies on both cultivated and wild charred grape remains have demonstrated that the moisture content in the plant and fruit and the oxygen level present during the time of charring could potentially influence the final dimensions and morphology of the charred grape seeds and ultimately affect their preservation and survival in the archaeobotanical record (Margaritis & Jones 2006: 791-2) (Figs. 1–5).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Date Palm: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Figs: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Olives: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Greater Syria: Islamic Archaeology

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Introduction

Greater Syria (also Bilad al-Sham, meaning literally the "country of Syria") is one of the most extensively excavated regions of the Middle East. The wealth of excavations is complemented by numerous field surveys as well as published studies of the material culture, architecture, and environmental data gathered during these projects. Most phases of Islamic history are well represented from the seventh to the early twentieth century, as are the centuries preceding the Islamic conquest (the period known as Late Antiquity). Archaeological projects have targeted every type of settlement from cities and towns to villages and transient forms of occupation. There have also been excavations of built structures as diverse as industrial installations, water catchment systems, religious monuments, domestic architecture, palaces, and fortifications. While the geographical coverage of this archaeological work is somewhat uneven, the volume of published studies allows for the formation of sophisticated research questions concerning the political, socioeconomic, and cultural life of Greater Syria in the Islamic period.

Definition

The term Greater Syria refers to a large area encompassing the modern states of Syria, Lebanon, Jordan, Israel, and the Palestine Authority. In addition, the historical boundaries of Greater Syria take in the southeastern part of Anatolia (Turkey). Damascus, also sometimes known in Arabic as al-Sham, was the principal city from the seventh century onward and usually functioned as the administrative capital of Greater Syria. Other major urban centers of Greater Syria during the Islamic period are Aleppo, Jerusalem, Homs, Hama, and Beirut. Places such as Ramla, 'Akko (Acre), Karak, and Raqqa rose to political and economic prominence for more limited phases before the modern period.

The backbone of the premodern economy was the agricultural sector, and many parts of Greater Syria were densely occupied with villages (as they still are today). The heavily populated areas are mainly located in the fertile lands of the western side of Greater Syria and along the Euphrates river. Estimates of the population of rural areas also need to take into account the pastoralist groups (bedouin) who have coexisted with sedentary farmers for millennia. Bedouin and their flocks move in an annual cycle between semiarid steppe lands and areas of permanent agricultural cultivation. Prior to the widespread employment of modern irrigation techniques and chemical fertilizers, agriculture was largely determined by the climatic and geological factors. Most other parts of the region possess semiarid or arid climates, with an annual precipitation of about 300 mm being the minimum required to sustain dry farming techniques (principally for growing wheat and barley). The Dead Sea and Jordan valley and parts of the Syrian littoral experience a subtropical climate that allows for the cultivation of a wide variety of fruits as well as valuable crops such as sugar cane, dates, rice, and indigo. There is debate concerning the occurrence of periodic fluctuations in annual temperature and rainfall in the Late Antique and Islamic periods (Rubin 1989). Allowing for the possibility of

cooler and wetter phases, it remains the case that adequate rainfall in the winter period (typically October to March) dictated whether crops would succeed. Periods of severe drought are recorded in written sources, though the archaeological evidence suggests that rural communities were usually able to recover from these and other types of short-term catastrophe (Johns 1995). Cisterns and other simple forms of water catchment are commonly employed in rural areas, often for sustaining flocks or sheep. Sophisticated systems of dams and canalization are relatively rare in Greater Syria, and some of those utilized during the Islamic period were actually constructed in earlier centuries.

The economy of Islamic Greater Syria was also reliant upon manufacturing and trade. The region was famed in Medieval Europe as a source for the finest crafts. The most lucrative crafts – particularly high-quality textiles, glass, decorated glazed ceramics, inlaid woodwork, and inlaid metalwork – tended to be located within or on the peripheries of urban centers. Less expensive objects were produced in towns and villages all over Greater Syria. Pastoralists also made items for sale including woolen rugs, leather, and food items such as dried yoghurt. The region contains some of the necessary resources for these activities, including plant and animal products, deposits of high-quality clay and sand, and limited reserves of copper and iron ore. Other raw materials had to be imported from neighboring areas. For instance, Greater Syria contains few forests, and wood needed for building, manufacturing, and as fuel for industrial activities might sometimes be brought from more densely wooded areas such as the Taurus mountains in southern Anatolia. Throughout the Islamic period Greater Syria benefited from a vibrant mercantile sector. The location of the region must in part account for this: Greater Syria connects to both the Mediterranean and Red Seas (the latter principally through the port of Ayla in southern Jordan), and land routes lead north to Anatolia, east to Iraq, south to the Arabian Peninsula, and southwest via the Sinai to Egypt.

Historical Background

Greater Syria was one of the first regions to be incorporated into the nascent Islamic state in the years following the death of the Prophet Muhammad in 632. Muhammad sent troops north in 629, but they were defeated near Mu'ta by a force led by a Ghassanid phylarch of the Byzantine empire. The decisive engagements in the conquest of Greater Syria were at Ajnadayn in 634 and at Yarmouk in 636; as a result of these victories, the Arabs were able to occupy the administrative capital of Damascus (634) and the symbolically significant city of Jerusalem (probably 637). In 638 the region of Jazira (i.e., between the Euphrates and Tigris rivers) was conquered. The Arab armies continued to fight against the Byzantines in northern Syria during the caliphate of 'Uthman (r. 644–656). In the early Islamic period, Greater Syria was subdivided into administrative regions (*jund*, pl. *ajnad*) comprising Dimashq (Damascus), Hims, Urdunn (Jordan), Filastin (Palestine), and Qinnasrin.

Mu'awiya ibn Abi Sufyan, the founder of the Umayyad dynasty (661–750), served as governor of Syria under 'Uthman and used the resources of the region in his struggle with caliph 'Ali (r. 656–661). When Mu'awiya assumed the caliphate (661–680), it was a natural move for him to transfer the capital of the empire to Damascus. Papyri excavated at Nessana in the Negev provides evidence for the operation of a bilingual (Greek and Arabic) bureaucracy during the reign of Mu'awiya (Hoyland 2006). With the exception of Marwan II (r. 744–750) who favored Harran in southern Anatolia, the Umayyad caliphs all employed Damascus as their seat of government. Due to the patronage of al-Walid I (r. 705–715), the city was equipped with a magnificent Congregational Mosque occupying the ancient *temenos*. The caliphal palace was located immediately south of the mosque. Damascus is also important as the mint for gold (*dinar*s) and silver (*dirham*s) coins, other provincial mints in Greater Syria only being permitted to strike copper (*fals*, pl. *fulus*) (Walmsley 2007: 59-64). Jerusalem too was the subject of

extensive Umayyad patronage, particularly under ‘Abd al-Malik (r. 685–705) and al-Walid I. The remodelling of the Temple Mount (Haram al-Sharif) included the rebuilding of the Aqsa Mosque and the construction of the Dome of the Rock, the Dome of the Chain, and a complex of palatial/administrative structures to the south and southwest of the enclosure walls (Creswell 1989: 18-42, 73-82, 94-6; Prag 2008: 101-241).

The Umayyads were toppled in 749–750 and the caliphate passed to a new dynasty, the Abbasids (749–1258). The eastward focus of the Abbasids led them, under the caliphate of al-Mansur (r. 754–775), to establish a new capital, Baghdad, on the banks of the Tigris in Iraq (constructed between 762 and 766). This crucial shift in the center of power into the heartlands of the former Sassanian Empire (c. 224–651) was to have far-reaching consequences for the development of Islamic culture; for Greater Syria the effect was rather negative with the removal of the caliph and his court diminishing the political importance of Damascus and reducing economic activity throughout the region. The south of Greater Syria was also hit by a massive earthquake in 749, and evidence for the destruction of urban architecture is abundant in the archaeological record. It is important not to overemphasize the extent of the decline after c. 750, however; Abbasid caliphs continued to build new structures – most notably the cistern at Ramla (dated 789) – and renovate others, such as the Aqsa Mosque and Dome of the Rock. The Umayyad buildings south of the Temple Mount evidently remained in use through the early Abbasid period (Prag 2008: 157-8, 195-207). Even more important is the foundation of a new city, al-Rafiqa (“the companion”), about 600 m to the west of the town of Raqqa (known as Kallinikos prior to the Islamic conquest). This urban development also comprised a series of palaces and related structures to the north, and between 796 and 808 it served as the capital of the caliph Harun al-Rashid (r. 786–809) (Daiber & Becker 2004).

The authority of the Abbasid caliphs eroded in the latter part of the ninth century. This process led to the establishment of semiautonomous or fully independent dynasties in various parts of the Islamic world. The political map of Greater Syria in the tenth and eleventh centuries is complex with a combination of major empires – most importantly the Fatimids (909–1171) and the “Great Saljuqs” (1034–1057) – and local dynasties controlling the region. The First Crusade (1096–1099) created an entirely new dynamic with the establishment of a series of Frankish states in Greater Syria and southern Anatolia. These comprised the Kingdom of Jerusalem, the County of Tripoli, the Principality of Antioch, and the County of Edessa. The Franks brought with them a militant Christianity and a fierce determination to capture and hold territory in the “Holy Land.” Analysis of surveys and excavations in Israel has also brought forward intriguing information about the Frankish (European) occupation of the countryside of the Kingdom of Jerusalem (Ellenblum 1998: 213-87).

The capture of Edessa in 1144 by Zangi, the *atabak* of Mosul (r. 1127–1146), marks a turning point in the political life of Islamic Greater Syria. This is the beginning of the Muslim “counter-Crusade” or Holy War (*jihad*) which was prosecuted with varying degrees of commitment by his son, Nur al-Din (r. 1146–1174), and the sultans of the Ayyubid (1171–1250 in Egypt and 1174–1260 in Syria) and Mamluk dynasties (1250–1517). Features of this period are a greater centralization of power, increased military expenditure, and a closer relationship between Egypt and Syria (with Cairo usually as the most important center of power). Nur al-Din unified most of Syria, while Salah al-Din (Saladin, r. 1171–1193) brought together Egypt and Greater Syria into one empire. This unity was broken during the Ayyubid confederacy that followed his death, but the Mamluk sultans, particularly Baybars (r. 1260–1277) and al-Nasir Muhammad (r. 1294–1295, 1299–1309, 1310–1341), sought to create an empire that would dominate the Levant. Salah al-Din scored a decisive victory over the forces of the Crusader states at Hattin in 1187 and went on to liberate Jerusalem from the Franks. The Mamluks ended the Crusader occupation of mainland Syria with

the capture of ‘Akko in 1291. Even more important was the Mamluk defeat over the Mongol army at ‘Ayn Jalut in Palestine in 1260. This battle halted the westward expansion of the Mongols through the Islamic world and established the Mamluks as defenders of Sunni Islam. While Mongol military activity doubtlessly brought short-term suffering for the inhabitants of Greater Syria, it is only among the urban communities along the Euphrates that the damage was more lasting; for instance, the pottery and glass industries of Raqqa and Balis cease around this time, and the towns themselves are abandoned.

In contrast to the instability of the later Ayyubid period, the Mamluk period from Baybars to the death of al-Nasir Muhammad in 1341 was one of considerable prosperity for Greater Syria. There was extensive investment in military architecture and in the transport and communications infrastructure of the region. The relative security offered by the Mamluk sultanate facilitated trade, industrial activity, and investment in agriculture, especially valuable crops such as sugar cane (see below). Surveys conducted in Jordan and Israel provide plausible evidence that settlement numbers reached a peak in the thirteenth and fourteenth centuries. While locally produced handmade pottery predominates (Johns 1998), this phase is also characterized by the presence of glass and high-quality ceramics in many villages. A similar picture can be drawn from excavations in urban sites and ports in Greater Syria; in addition to Syrian luxury items, one sometimes also encounters exotic imports from Italy, Spain, or China.

The arrival of the Black Death in Syria in 1348 certainly had a huge impact upon the urban and rural communities of the region. Depopulation combined with a failure to invest in new technology affected the economic health of Greater Syria. Damascus also suffered during the occupation by Timur Lenk (Tamerlane, r. 1370–1405), probably losing many of its skilled artisans at this time. Evidence of destruction by Timur is also apparent in the excavations of the citadel in Hama, though the ceramic record indicates that the site was partially reoccupied in the late Mamluk and early Ottoman periods (Milwright 2000: 192). Judging from anecdotal evidence in contemporary written sources, the Mamluk authorities of fifteenth- and early sixteenth-century Greater Syria struggled to maintain security.

The Ottomans controlled Greater Syria between 1516 and 1918. Greater Syria was not one of the most profitable areas of the Ottoman Empire, and there is evidence for gradual decline in many aspects of the economy, particularly between the later seventeenth and the early nineteenth century. Ottoman authority in southern Greater Syria was also challenged in the first half of the nineteenth century by the expansionist policies of Muhammad ‘Ali (d. 1849), ruler of Egypt. One area of significant Ottoman state investment from the sixteenth to the eighteenth century was in the route of the annual *hajj* through Greater Syria and northwestern Arabia. The major investment by the state was in the erection of a line of forts – each garrisoned with troops – and the construction of related features such as cisterns and bridges (Petersen in MacDonald et al. 2001: 685-91).

The Ottoman authorities demonstrated their continued commitment to the patronage of the *hajj* with the construction of the Hijaz railway from Istanbul to Medina (1900–1908). The military value of the Hijaz railway was recognized by all sides during World War I, and the southern section of this vital route was the subject of repeated attacks during the Arab Revolt (1916–1918). Following the expulsion of the Ottoman army in 1918, Greater Syria was placed under mandate by the League of Nations, with Britain controlling the southern part (Palestine and Transjordan) and France the northern part (Syria and Lebanon). The modern nation states of Syria, Jordan, Israel, and Lebanon emerged after the end of World War II.

Key Issues/Current Debates

A particularly fertile area of study is the period of transition from Byzantine rule to Islam. Broadly, the issues revolve around the degree to which the material record of the first phase of Islamic rule

(from the conquests of the 630s to the mid-eighth century) manifests continuity with earlier centuries. If there were radical changes during this period, what were they and how did they affect the future development of Islamic culture in Greater Syria and elsewhere in the Middle East? These questions call for a comparative evaluation of Late Antique and early Islamic Greater Syria that takes into account the material culture of both urban and rural areas. Starting with the towns and cities, there has been considerable debate concerning the timing and nature of the evolution from the "Classical" city (Greek: *polis*) to the archetypal "Islamic" city (Arabic: *madina*). Consistent features of this evolution are the encroachment upon public spaces such as the forum and the wide colonnaded street as well as the disappearance of key institutions such as theaters, temples, and nymphaea (Kennedy 1985). In addition, most Late Antique/early Islamic towns occupy a smaller area than their Classical predecessors (indicating a reduction in the population), and previously extramural activities, most importantly industries such as ceramic manufacture, start to be located within urban areas. In some cases pottery workshops were set up within abandoned theaters in the Late Antique and early Islamic periods.

It is now well understood that these processes predate the arrival of Islam and that in the early seventh century only remnants of Classical urban planning remained within most towns and cities of Greater Syria. The Christianization of the region from the fourth century eradicated the pagan temples and theaters (this was mirrored by a massive expansion in church building with single towns such as Jarash/Gerasa in Jordan boasting over 20 places of worship). Private building can also be detected in the colonnaded streets and other public areas, particularly from the sixth century onward. It has been persuasively argued that these adaptations reflect both a reduction in the power of local officials to control the public spaces and the expansion of mercantile activity within urban areas. The replacement of wheeled transport with pack animals (particularly camels) also made the wide, straight urban streets rather irrelevant.

Recent archaeological research has provided a nuanced picture of these changes in the urban fabric of Greater Syria during the transition from Byzantine to early Islamic rule (Magness 2003: 193-214; Walmsley 2007: 71-112; Avni 2011). Change was far from uniform across the region; for instance, there is evidence for the maintenance of colonnaded streets and other aspects of Classical urban planning in some towns in Palestine and Jordan through the sixth and early seventh centuries. Furthermore, the arrival of Islam did not result in a wholesale abandonment of these principles. The early eighth-century settlement of 'Anjar is striking for its orthogonally arranged streets and orderly arrangement of space, and it seems likely that Ramla and other new Muslim cities (*misr* pl. *amsar*) of this time adopted similar principles. Within existing towns one encounters numerous examples of interventions by caliphs and other members of the Umayyad elite, ranging from new markets to mosques and administrative structures. Good examples of Umayyad architectural patronage have been identified at Beth Shean/Baysan (Scythopolis), Arsuf, Palmyra, and Jarash. The mosque at Jarash is notable for the way in which it is integrated into the street plan, despite its orientation being different from that of the main street (Walmsley 2007: 84-7). Archaeology is increasingly demonstrating that trade and industry continued to thrive in Greater Syria after the fall of the Umayyad caliphate; even in towns affected by the 749 earthquake, one encounters evidence for relatively ambitious phases of rebuilding.

While scholars in the early twentieth century had posited a reduction in the rural population in Greater Syria during the sixth and seventh centuries and virtual abandonment of some regions (most famously the "Dead Cities" of northern Syria), this picture is now subject to considerable revision. Reevaluation of occupation phases evidences continuous settlement into the eighth or ninth centuries. In the case of the Negev, this picture of rural prosperity under early Islamic rule is confirmed both by settlement patterns and the archive of papyri recovered from the town of Nessana (Magness 2003: 130-94). Umayyad patrons also invested in the countryside

through the creation of country estates (*qasr*, pl. *qusur*), particularly in the more marginal lands of Jordan and Syria. While the *qusur* (sometimes known rather misleadingly as "desert castles") clearly had a role as sites of private entertainment for the Umayyad elite, more recent investigations have focused upon their placement along the major arteries of trade and communication and the promotion of agriculture in the surrounding areas. Links to the architectural patronage of the Ghassanid dynasty in the fifth and sixth centuries are suggested in the locations chosen for many of the Umayyad *qusur*. Dams, canalization, and extensive retaining walls have been found around several of the *qusur*; existing hydraulic structures were obviously brought into use, but some of what remains can probably be attributed to Umayyad patrons (Genequand 2006).

The most significant phase of activity in the Euphrates region dates from the last quarter of the eighth into the ninth century. The largest urban project was the walled city of Rafiqa (from 771). The construction techniques (principally mud brick and baked brick), the use of carved stucco decoration, and the plans of the fortifications, palatial complexes, and mosques all suggest comparisons with the Iraqi cities of Baghdad (from 762) and Samarra (from 836) (Daiber & Becker 2004: 59-134). The presence of underground canals (*qanat*) in the vicinity of Raqqa-Rafiqa is a further indication of the eastward orientation of this Abbasid enterprise in Syria. Surveys of the irrigation systems of the Middle Euphrates and the Balikh and Khabur Rivers have demonstrated an upsurge in canal construction in this phase; presumably the expansion of irrigated agriculture was a response to the demands created by the huge urban populations of Raqqa-Rafiqa and Baghdad (Berthier 2001).

Considerable attention has been paid to the industrial sectors of the region, particularly the establishment of pottery- and glass-making facilities to the north and northeast of the existing settlement of Raqqa (Heidemann 2006). Analysis of the broken glass and glass waste indicates that artisans adapted their techniques (particularly the replacement of Egyptian natron with ashes made from locally abundant plants as the major fluxing agent), probably in response to difficulties in obtaining imported materials (Henderson 1999). Pottery production in the late eighth and early ninth century was more conservative, with potters concentrating upon the manufacture of utilitarian unglazed vessels and other items such as drainage pipes and roof tiles. Glazed ceramics were produced in very limited numbers in the early Abbasid phase, with luxury pottery (such as blue and white and luster-painted wares) being imported from Basra and other production centers in Iraq (Miglus 1999; Mason 2004: 92-4).

Raqqa was just one of the production centers for luster-painted and underglaze-painted stonepaste (fritware) wares in Greater Syria between the late eleventh and the fifteenth century. Excavations have identified evidence of production at sites including Damascus, Aleppo, Balis, Qal'at Ja'bar, and Raqqa, while others such as the "Tell Minis" (located near Ma'arrat al-Nu'man) group have less secure provenance. The understanding of the evolution of these centers of production has been further refined through petrographic analysis of thin sections of ceramic bodies and other forms of scientific analysis of glazes. It is now possible to establish a reasonably secure chronology with "Tell Minis" forming the transition between the techniques and styles of Fatimid period Cairo and the products of Syrian centers such as Raqqa (Mason 2004: 91-120).

Jordan and Israel have been the subject of extensive survey work, and these data allow researchers to plot the spatial variations and temporal fluctuations in rural settlement patterns. In many areas the ceramic record indicates an upsurge in sedentary occupation in the twelfth to fourteenth centuries (i.e., associated with the Crusader, Ayyubid, and early Mamluk periods). According to this evidence, settlement levels reduce during the latter part of the fourteenth century, and a process of decline continues unabated in areas such as Jordan until the end of the nineteenth century. One aspect of this process is perhaps a move from sedentary to pastoralist modes of occupation. While the relative prosperity of the twelfth- to fourteenth-century phase remains secure, the extent and nature of the later

"decline" has been questioned. Much of the ceramic evidence in regions such as Jordan comprises handmade pottery, which has proven very difficult to date with accuracy. Furthermore, Ottoman cadastral records (*daftar*s) of the sixteenth century suggest continued productivity and sedentary occupation in rural areas (Johns 1995; Walker 2004).

The production of sugar and molasses was one of the most economically significant activities in Greater Syria between the twelfth and the fifteenth century, and numerous processing sites have been identified in the Jordan valley, around the banks of the Dead Sea, and in the region of 'Akko. The processing of sugar was expensive requiring the construction and maintenance of the installations themselves, the manufacture of copper boiling vats and ceramic vessels (molasses jars and conical sugar pots), and the provision of labor, fuel, and water. Most of the sugar mills of Greater Syria probably ceased to operate during the fifteenth century largely because they were unable to compete with cheaper sugar imported from Cyprus. Wadi Faynan, located south of the Dead Sea on the eastern side of the Wadi 'Araba, has provided evidence for the revival of copper smelting in the thirteenth century (Kind et al. 2005).

The Ottoman period in Greater Syria has often been characterized as one of economic and cultural decline. This picture can now be revised in many respects; while it is true that the traditional crafts found it difficult to compete against industrially manufactured products from Europe (particularly after the late eighteenth century), the archaeological record suggests considerable economic activity with the inhabitants of Greater Syria consuming a wide range of locally made and imported goods. Notably successful in the confrontation with foreign imports were the ceramic producers of Gaza and Rashaya al-Fukhkhar. Examples of the gray-bodied (reduction-fired) "Gaza wares" are encountered on numerous sites in the south of Greater Syria. Pottery can also be used to track the emergence and spread of popular pastimes of the Ottoman period, tobacco smoking and drinking of coffee (and, from the nineteenth century onward, tea). The former is evident principally in the ceramic pipe bowls of the traditional *chibouk* pipe; the ubiquity of these artifacts is allowing for the formation of increasingly accurate typologies. A vital component of coffee drinking was the small glazed ceramic cup. Syrian manufacturers satisfied some of the demand for these decorative items, but it is also clear that they were also imported from Turkey, Europe, and Southeast Asia (Milwright 2000; Walker 2009). The issues of diet and disease in the Ottoman period have been investigated in paleopathological studies (e.g., Smith & Horwitz 2009).

International Perspectives

The study of the material culture of Greater Syria requires a constant awareness of the integration of the region into international networks of mercantile exchange and cultural interaction. Excavations of major ports such as Ayla on the Red Sea and Beirut and 'Akko on the Mediterranean provide excellent evidence of changing patterns of long-distance trade. Chinese ceramics first make their appearance on sites of the early Abbasid period, such as Raqqa-Rafiqa, and by the thirteenth century enjoy a relatively widespread distribution across Greater Syria. The Ayyubid and Mamluk periods are particularly notable for the diversity of the imported ceramics, particularly on urban sites. These imports include slip-incised (sgraffito) wares from Italy, Cyprus, and the Aegean region, tin-glazed maiolica from Italy, luster wares from Spain, blue and white porcelain and celadon ("green ware") from Southeast Asia, and glazed stonepaste from Iran. During the Ottoman period one also encounters imported glazed pottery from Turkey (particularly from Iznik, Kütahya, and Çanakkale) and a range of decorated porcelains from China, Japan, Korea, Germany, France, and Britain.

There is evidence of international contact in many other aspects of the material culture of Greater Syria between the seventh and the twentieth century. In architecture there are

numerous examples of building plans, decorative styles, or modes of construction entering from other regions. For instance, minarets in locations such as Raqqa, Balis, and Qal'at Ja'bar draw upon Persian prototypes. Greater Syria formed part of larger polities during the Ayyubid, Mamluk, and Ottoman periods, and this facilitated further cross-pollination of architectural forms and decorative features. The presence of these forms of artistic exchange in architecture also opens the possibility of identifying similar phenomena in many aspects of the archaeological record from portable arts to urban planning and agricultural practices.

Future Directions

It seems likely that the archaeological study of Greater Syria in the Islamic period will continue to build upon many of the themes outlined in the previous sections. The ability of archaeology to appreciate long-term processes also means that continued excavation will refine our knowledge of such questions as the evolution of urban spaces through the Islamic period and the fluctuations in rural settlement and modes of cultivation in different regions of Greater Syria. The Ottoman period is particularly rich in primary textual sources, and this can facilitate future collaborative projects between historians and archaeologists. The potential of integrating textual sources – chronicles, geographical and topographical writing, charitable bequests (*waqfiyyas*), travellers' accounts, mercantile or consular archives, cadastral records, and so on – with archaeological data has been demonstrated in numerous case studies. Archaeological projects now tend to emphasize collaboration between a wide range of specialists, and the recent contributions by archaeobotanists, zooarchaeologists, physical anthropologists, and environmental archaeologists illustrate the ways in which we can ask new questions of the physical remains of past cultures in Greater Syria. Lastly, there is much scope for comparative perspectives in future study. Periods of transition in Greater Syria could fruitfully be compared with equivalent phases in other regions of the Mediterranean (cf. Hodges & Whitehouse 1983) and elsewhere. The impact of the Crusades upon the Middle East invites comparison with Crusades in other regions as well as with later phases of colonial occupation. The Ottoman period offers rich potential for comparative research, with recent research in areas such as Greece and the Balkans providing an opportunity to evaluate the divergent experiences of being a province within a larger Muslim empire.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Clay Pipes in Historical Archaeology
- ▶ Decapolis, Archaeology of
- ▶ Dura-Europos, Archaeology of
- ▶ Historical Archaeology
- ▶ Islamic and Crusader Archaeologies
- ▶ Islamic and Maritime Archaeologies
- ▶ Iraq: Archaeological Heritage
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Military Activity in Islamic Archaeology
- ▶ Palmyra, Archaeology of
- ▶ Petra, Archaeology of
- ▶ Polis
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Syrian Archaeological Heritage Management: "Dead Cities" and Living Communities

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Greece: Cultural Heritage Management

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Introduction

Greece is a country with very rich cultural heritage. From the prehistoric ages down to present, Greek civilization has created monuments and artworks, which are outstanding landmarks and exceptional points of reference in human history. Greek art and architecture have inspired and highly influenced the Western world throughout the ages. The protection and preservation of this heritage has always been a priority for the Greek state since its independence in 1830. The legal framework for cultural issues offers guidelines for the management of antiquities and cultural heritage in general.

Definition

The most recent legal framework, established in 2002 (www.yppo.gr), protects monuments or cultural goods dating from prehistoric times until 1830. Certain categories, however, from more recent periods are also included, if they are important or have a specific significance. The management of Greek tangible and intangible heritage is administered and controlled by the state.

Efforts to protect remains of the past actually began before 1830 (Pantos 2000: 15-16), during the war for independence, by the revolutionary Greek government. The first legal measures for the protection of antiquities in the modern Greek state were taken as early as 1833, and a year later, the first official law was published. The sensitivity and importance given to antiquities is apparent.

Since then, the legal framework has broadened its scope and is considered as one of the strictest and most extensive in the world. The constitution since 1975 gives more power to the state, while it weakens private property for the benefit of the protection of antiquities and their environment. According to the law, all movable finds and monuments are owned by the state and all activities relating to them are controlled by the Archaeological Service.

Inside the state boundaries protection covers antiquities on land or sea including marine zones, in which Greece has the right of jurisdiction according to international law. Greece seeks the protection of its antiquities outside its borders as well, in correspondence to the regulations of international cultural law, irrespective of the time when they were removed.

Examples

For the better control of customs and the import of antiquities, Greece has signed bilateral agreements, protocols, and memoranda with countries such as Cyprus, France, Switzerland, China, Turkey, Peru, and the USA.

Greece gives great importance to the repatriation of its cultural property and has internationally been very active in this field (Μπουτοπούλου et al. 2008). Repatriation of many cultural goods has been achieved in the last years. In several cases, a compromise solution was found, and in others, goods were returned on voluntary basis. Greece and Italy have launched major campaigns for the restitution of cultural property and have even organized common exhibitions of returned antiquities under the title "Nostoi" with impressive objects repatriated from the J. Paul Getty Museum, the Shelby White collection, and others.

Since 1982 the Greek Ministry of Culture has officially requested the return of the Parthenon Marbles from the British Museum in London (Korka 2003, 2006). The request has been discussed at various international fora and organizations (Meyer 1977; Shaw 1979; Prunty 1984; Greenfield 1989; Walden 1996: 49-66; Renfrew 2000). This issue has world significance, because the Parthenon is considered the symbol of Western civilization and forms the logo of UNESCO. Today 22 International Committees all over the world exist for the support of the reunification of the Parthenon Marbles in Athens. Greece undertook the construction of the New Acropolis Museum, which was inaugurated in 2009 next to the Acropolis in order to house all the Parthenon Marbles. Three museums (Heidelberg University Collections, Palermo Salinas Museum, and the Vatican) have supported this campaign by returning either permanently or on loan fragments of the Parthenon, which existed in their collections. The issue is pending on the agenda and is discussed by UNESCO at every meeting of the Intergovernmental Committee for promoting the return of cultural property to its countries of origin or its restitution in case of illicit appropriation (Hitchens 2008).

Key Issues

Because the Ministry of Culture places great emphasis on the fight against illegal excavations and the illicit traffic of antiquities, it passed a law in 2008 founding a new service

(http://www.unesco.org/culture/natlaws), the Directorate for the Documentation and the Protection of Cultural Goods. This recent and innovative framework offers more flexible means and better possibilities for more immediate results. The targeted individual is also given motives to surrender antiquities and collaborate.

Greece has ratified almost all international cultural conventions and is signatory to most relevant instruments. Specifically, Greece has ratified the following conventions (Βουδούρη-Στρατή 1999: 1-92, 209-46, 391-422, 503-26):

- Hague Convention on the Protection of Cultural Goods in the Event of Armed Conflict (1954) and its two protocols 1954 and 1999 (Clément 1995: 133-50)
- UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (Paris 1970) (Askerud & Clément 1997)
- UNESCO Convention on the Protection of World Cultural and Natural Heritage (Paris 1972)
- European Convention on the Protection of Archaeological Heritage Revised (Valetta 1992)
- Convention on the Protection of Architectural Heritage (Granada 1985)
- UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (Rome 1995) (Siehr 1998: 617-689)
- Convention for the Safeguarding of Intangible Cultural Heritage (Paris 2003)

These conventions along with the application of international charters and recommendations are implemented by the Greek public administration and have enriched the existing legal framework giving it an international perspective and dimension.

Furthermore, Greece has entered the European Union and has therefore incorporated EU directives in its legislation. The EEC Regulation 3911/92 concerning the export of cultural property is implemented in regard to customs issues, as it harmonizes export controls over cultural property outside the borders of the EU by establishing the procedure of granting an export certificate for these goods. Most important is the application of Directive 93/7/EEC of the Council on March 15, 1993, concerning the return of cultural goods unlawfully removed from the territory of a member state, the annex of which was modified by Directive 96/100/EC of the European Parliament and the Council on February 17, 1997 (Γραμματικάκη- Αλεξου 2002: 274-99).

Greece has inscribed 17 monuments and sites on the World Heritage list of UNESCO and four sites on the European Label catalogue. The law provides for the examination of every issue concerning World Heritage monuments by the highest council in the Ministry (Korka 2004).

Among the activities undertaken abroad are archaeological missions and excavations in countries, where antiquities of Greek interest have been found.

Control of the import, export, and transfer of cultural goods is strict in Greece and falls under the responsibility of the Ephorate of Antique Shops and Private Archaeological Collections, which was founded in 1963. In previous years, permits to form private collections were granted to possessors of antiquities of considerable number and scientific significance. Basic preconditions for acquiring a collector's permit were knowledge of the subject and the economic means to purchase important antiquities. A central idea, around which the creation of the collection evolved, was necessitated, as well as the unity of the collection. Collectors are obliged by law to declare their new acquisitions. Many of the earlier collectors have donated all or part of their collection to the state, and major public or semipublic museums were created.

Today provisions for the creation of a collection are very strict, as well as for its transfer or commercial disposition. The state always has first priority in acquiring objects from a collector or simple possessor of antiquities.

Furthermore, the legislation stipulates that antiquities in the possession of any citizen, acquired through inheritance, purchase, or gift, must be declared to the above- mentioned ephorate. Propriety of antiquities belongs only to the state. The individual can only hold possession

of them. The objects are inventoried and photographed, their provenance is checked, and a permit of legal possession is issued. This way a very important data base is accumulated with important antiquities, which benefit scholarship considerably. On the other hand, the individual is sensitized concerning the protection of cultural heritage. There is also strict control of the use of metal detectors.

The Archaeological Service includes two general directorates, one for antiquities and cultural heritage in general, including conservation and folklore, and a second for restoration of monuments of all periods, photogrammetry, conservation of museums, and technical infrastructure in general. There are individual directorates and departments, as well, which coordinate regional services. These are the ephorates and institutes for antiquities on the one hand side and for modern monuments on the other. The Archaeological Service also includes a series of special regional services: for antique shops and private archaeological collections, caves, underwater antiquities, and individual museums.

In addition, there are councils either regional or central, which examine issues of importance, before which the citizens can present their requests and support their cases. Furthermore, there are special committees for the monitoring of the restoration of specific monuments or task forces, which are appointed for a specific project.

The Archaeological Receipts Fund for Sites and Expropriations, which is supervised by the ministry, is in charge of publishing archaeological guide books, special editions, and annual periodicals and producing exact replicas of antiquities. The revenues from this fund support the work of the regional archaeological services.

The central services form the executive body, which plans, directs, approves, and monitors the work of the ephorates and other services and secures their funding. A large part of the work of the ephorates includes the control of modern works carried out in the environs (built or natural) of monuments. Monitoring takes place in every type of activity that could directly or even indirectly affect the archaeological sites, monuments, and places of historical interest. Most often, there is a demarcation of a broader area of protection, buffer zones, and specific land use. Excavations, conservation, restoration, rehabilitation of monuments, and their protection through shelters and other means, educational programs, and cultural events are controlled by the Archaeological Service, which examines the feasibility and extent of the intervention, quality of the work, scientific documentation and reversibility of the interventions, and guaranty of proper publication. The sensitization of the broader public is also important, and there is a lot of effort put in combining the needs of modern society with the benefits of a monument or site. There is always communication between the Archaeological Service and the competent authorities and social actors, especially concerning expropriations or compensation of the individual for the deprivation of use of immovable property for archaeological reasons. Expropriation takes place in recent years only when a group of monuments needs to be promoted and there is no other alternative for their preservation and enhancement or in case an extraordinary site is revealed. In the case of major public works, there is allocation of important funds for salvage excavations, conservation, preservation, storage, landscape design and promotion, and finally publication of the finds.

There are 17 foreign archaeological schools functioning in Greece, which carry out excavations and survey projects, either in collaboration with the Greek Service or on their own. They receive their permits under specific preconditions. They offer know-how; advanced technology; funds for expropriation of the land, on which they excavate; periodicals with annual publications and specialized libraries; as well as other benefits (Korka 2007).

Greek university professors and other researchers also conduct excavations under the supervision of the service, which must control that all Greek and foreign excavators abide

by the law and keep proper inventories in their storerooms along with digital photographs. Surveys and other nondestructive methods are encouraged, while excavation is conducted only when proven necessary.

Current Debates

In recent years, the ministry has focused on reorganizing and upgrading its museums. Most museums were site museums or in any case were continuously supplied with new material from the ongoing systematic or rescue excavations. A new tendency prevailed, however, and many museums became independent from the local ephorate. The most advanced framework today is that of the New Acropolis Museum, which has an independent governing board appointed by the Minister of Culture (www.newacropolismuseum.gr). Management of museums has become more user-friendly to the public, and info-kiosks; educational programs; visitor facilities, especially for handicapped people; audio systems; and electronic entry machines are now available.

Many periodic exhibitions take place along with cultural events and educational programs, which bring the public closer to antiquities. Funding, in general, comes from the state and is boosted a lot with European development programs. There is a new law also encouraging sponsors.

Future Directions

Greece participates in the UN, UNESCO, the Council of Europe, the UN Economic and Social Council, the EU instruments, and other international governmental and nongovernmental organizations with the goal to promote the protection of cultural heritage. Many exhibitions of Greek antiquities are circulated abroad in collaboration with major museums and cultural institutions all over the world. Through various initiatives and programs, the Greek Ministry of Culture and Tourism wishes to enhance its heritage, strengthen its collaboration with cultural actors, and promote cultural and educational activities.

The scientific personnel of the ministry is open to exchanging expertise and collaborating with foreign colleagues. There is great concern about modern management problems such as cultural tourism, climate change, natural and human-provoked hazards, and sustainable development. At the time of writing, however, an economic crisis risks diminishing personnel, services, projects, and cultural benefits, which had occurred due to great effort and years of dedication.

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- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
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- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Repatriation: Overview
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions
- ▶ UNESCO's World Heritage List Process
- ▶ Uses of Heritage
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme
- ▶ World Monuments Fund (WMF)

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Greek Colonialism, Archaeology of

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Introduction

From the mid-eighth century BCE onwards, Greeks began to migrate in significant numbers from Greece and the Aegean to many areas of the Mediterranean. By the sixth century, Greek communities had been established as far afield as Spain, Italy, France, North Africa, Asia Minor, and the Black Sea coast. This colonialism raises important questions about the processes of migration and the reasons for it. Other issues include the nature of interactions between Greeks and non-Greeks, the influence of colonialism on the development of the Greek city, and whether settlement overseas impacted on expressions of Greek ethnicity. There is a high degree of local variation in the way these communities developed, but they highlight some central aspects of Greek archaeology. Greek cities continued to be founded outside Greece during the fifth to third centuries BCE, but these were rather different in character and this article will focus primarily on colonialism in the eighth-sixth centuries.

Definition

The definition of Greek colonialism is contentious. The Greeks had no word for "colony," referring to overseas settlements as *apoikiai* (literally homes away from home), or *emporia* (trading settlements). This distinguishes between independent Greek city-states (*apoikiai*) and trading communities – sometimes of mixed ethnicity (*emporia*). Until the 1990s archaeologists and historians largely accepted the terminology of colonies and colonization to describe the Greek diaspora of the eighth to sixth centuries BCE (Graham 1982; Dunbabin 1999). Recent scholarship has problematized these terms. They imply acceptance of ancient sources which present settlement as an organized state-sponsored act of colonization to an extent which is now no longer tenable. They are also shaped by analogy with eighteenth and nineteenth century imperialism and colonialism, which are not appropriate models to apply to Greek colonialism (Osborne 1998; Shepherd 2005). The terms "colony" and "colonization" have now been largely replaced by more neutral terms such as "settlement" or "migration." Where the terms "colony" or "colonization" are used in this article, it should be understood that they are being used as a synonym for Greek settlements outside Greece, and do not carry any implication that these settlements were the result of the structured state foundation of the type critiqued below.

Historical Background

Greek mobility in the Mediterranean has a long history. Mycenaean finds indicate contact between Greeks and other areas of the Mediterranean from at least the twelfth century BCE, and Greeks were a significant presence in ports such as Al Mina during the ninth century (Boardman 1999). By the mid-eighth century BCE, the size and importance of Greek settlement increased markedly. Between c. 750 and 650 BCE, Greek settlements were established at many locations on the coasts of Sicily, southern Italy, and Campania. During the seventh and sixth centuries, numerous settlements developed in the northern Aegean and the Black Sea area, north Africa, the Dalmatian coast, and coastal Asia Minor. There was also further sixth century settlement in Italy, Spain, southern France, and on some of the islands of the western Mediterranean. Finally, a number of settlements were founded in Italy, Sicily, and the Black Sea area in the fifth and early fourth centuries (Figs. 1 and 2; Osborne 1996: 119-29). The settlers were drawn from many different areas of the Greek world. Ancient sources attribute notional founding cities or regions to each colony, and relationships, but they are based largely on fictive rather than real kinship. Many settlements have yielded finds from many areas of the Greek world in their early phases, suggesting mixed groups of settlers from several areas of Greece.

In addition to self-identified Greek colonies, there were many Greeks living in indigenous communities (Lomas 2006). In Spain, only two Greek cities – Emporion and Rhode – were established, but seventh and sixth century Greek pottery and amphorae found around Tartessos suggests large-scale trade between Greeks and Iberians. Inscribed Greek personal names from Iberian contexts demonstrate the presence of Greek people as well as Greek goods, and a fifth century inscribed lead tablet from Pech-Maho records a complex commercial contract involving both Greeks and Iberians. The Greek presence in Spain was extensive but did not take the form of city-foundation, and has been termed colonialism without colonization (Dominguez Monedero 2002).

The motives for Greek migration are unclear. The large quantities of Greek goods circulating throughout the Mediterranean area suggest a connection with trade, and the nature of the earliest settlements supports this. Pithekoussai (modern Ischia), established c. 750 BCE, was located on an off-shore island, in close proximity to a major trade route linking Italy and Sardinia with Cyprus and Greece. Grave goods from the settlement include pottery from many parts of the Greek world, along with Italic fibulae, Egyptian scarabs, and Phoenician artifacts. Remains of smelting furnaces and waste metal indicate that the smelting of iron ore from Etruria was an important activity (Ridgway 1992). Trade, particularly in metals, was a key activity as well.

Colonialism is often presented as the result of a desire for land, prompted by demographic pressure (Graham 1982: 83-94, 157-9; Dunbabin 1999: 1-47), but this is questionable. Although some settlements had abundant supplies of fertile land, others did not. Settlements on the "instep" of Italy controlled large amounts of land, as did those of south-east Sicily, but other colonies seem to have had different priorities. Rhegion, Taras, and Massalia had good harbors and strategic positions on trade routes. Others, such as those on the Calabrian coast, were in areas that were not attractive to those mainly seeking land. Evidence for demographic pressure in Greece which might have forced Greeks to migrate is also ambiguous. Increases in the size of cemeteries in the eighth century demonstrate that the population was growing (although it also reflect changes in funerary customs) but not at a rate to force mass migration. A survey of Megara Hyblaia and its colony Selinous, designed to test the hypothesis that migration was driven by demographic expansion and need for land, conclusively demonstrated that in this case, it was not (De Angelis 1994). When Selinous was founded, c. 650 BCE, Megara had a plentiful supply of land and no sign of demographic pressure. Ancient sources attribute colonialism to specific factors such as drought, famine, and political strife, rather than a specific desire for land.

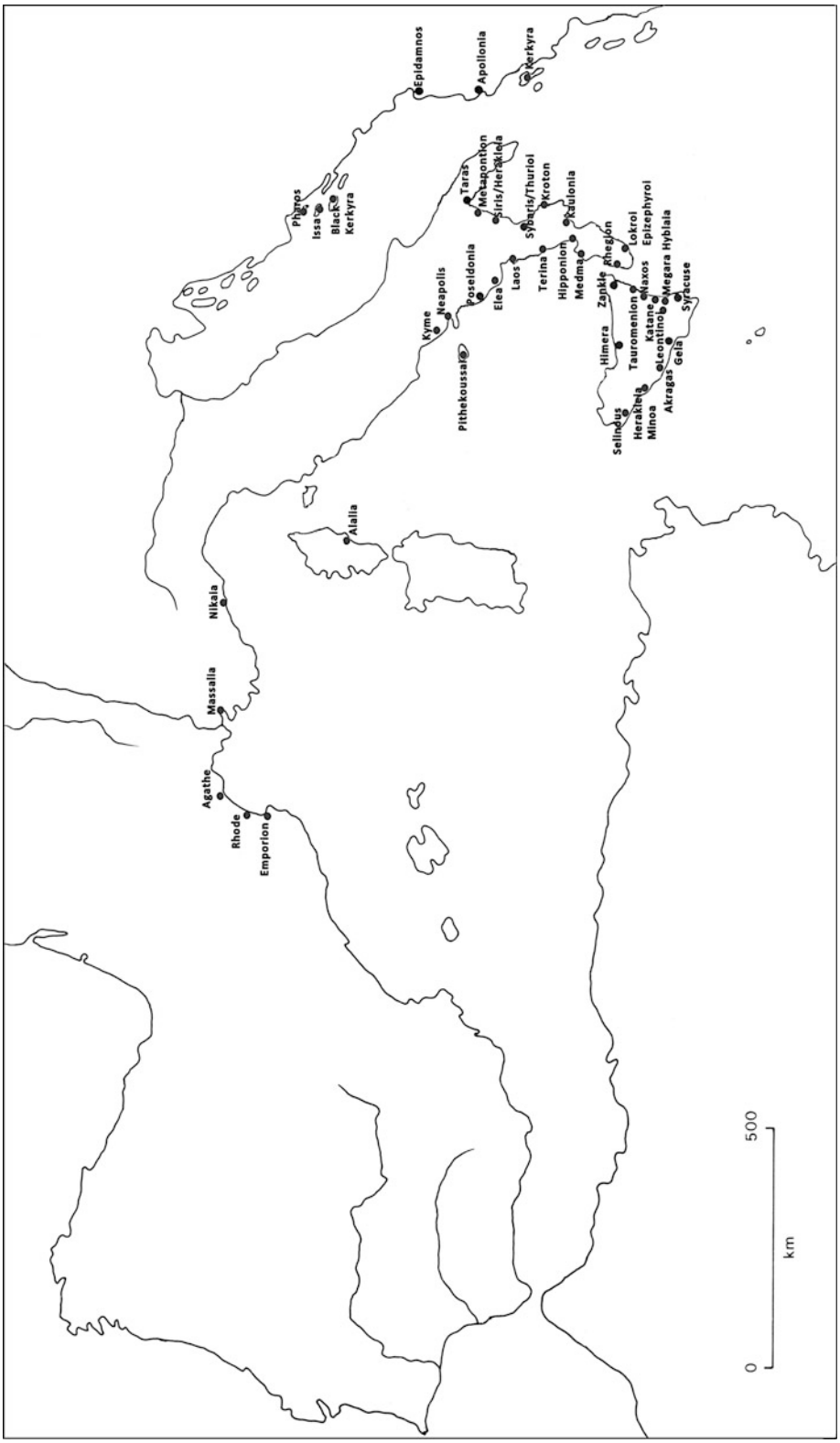

Greek Colonialism, Archaeology of, Fig. 1 Greek colonial settlement in the Western Mediterranean

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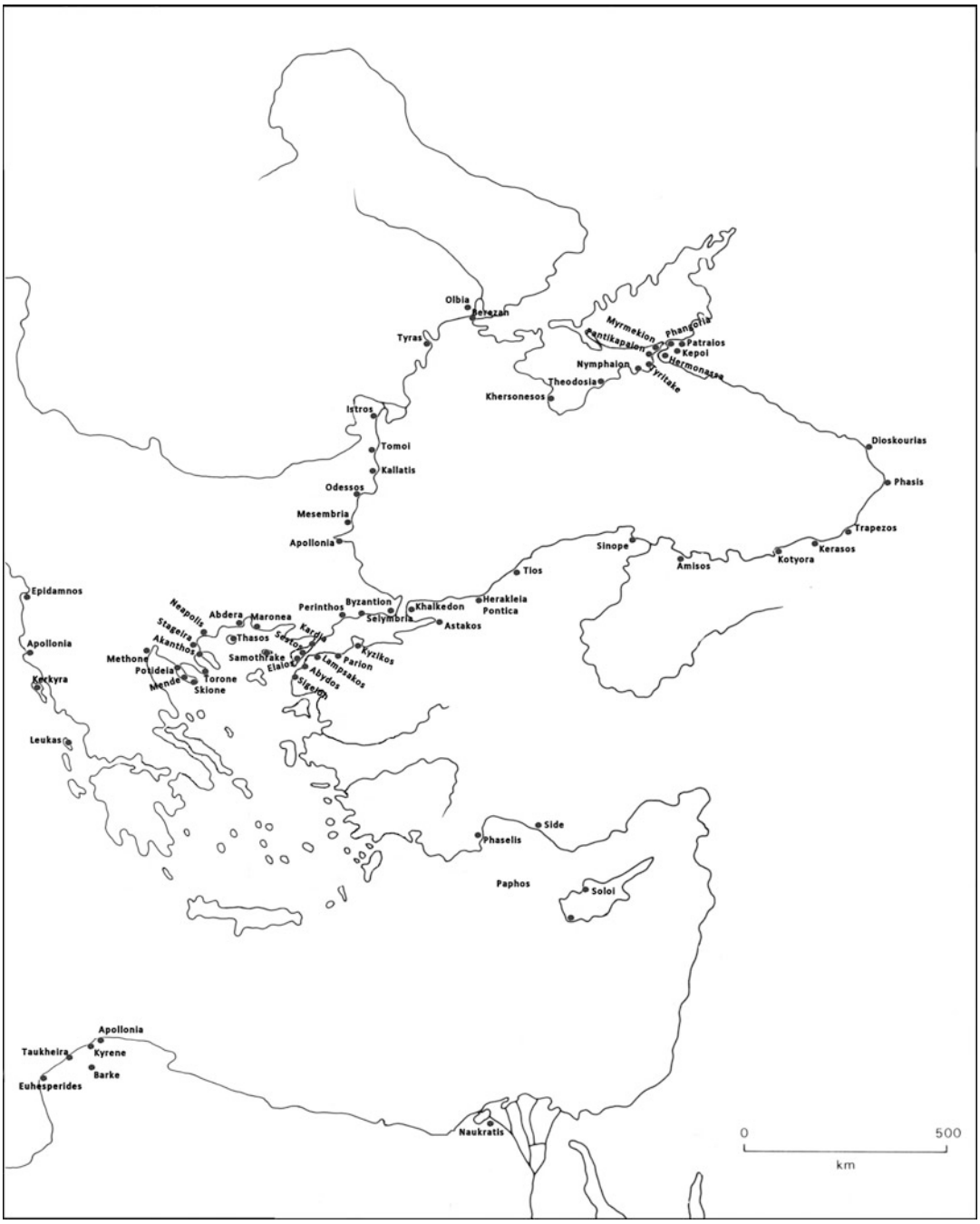

Greek Colonialism, Archaeology of, Fig. 2 Greek colonial settlement in North Africa, Asia Minor and the Black Sea area

The answer may lie in the fact that the eighth to seventh centuries BCE were periods of great personal mobility, driven by a variety of factors. It has been described as an era of exploration, in which Greeks moved to exploit a range of new social and economic opportunities (Purcell 2005). The colonialism of the period may have been driven by a mixture of

commercial motives, opportunism, and curiosity about the wider Mediterranean world, rather than by demographic pressure and lack of land.

Between c. 720 and 600 BCE colonial settlements show a high degree of local variation in their development. Some were ethnically mixed communities and many others may not have been fully urban in their early stages. By the end of the seventh century, most had established themselves as fully urban and fully Greek settlements. Many developed organized urban plans to a much greater extent that cities in Greece, and did so from an early date. This so-called Hippodamian town plan was based around two main thoroughfares crossing at the centre of town and a grid of streets dividing the area into long rectangular blocks, which were subdivided into regular plots for housing. The agora was usually placed near the centre of the urban area. Temples and sanctuaries could be grouped together on an acropolis (as at Akragas), placed at the edges of the urban area (as at Poseidonia), or a mixture of both. However, there were many local variations in the ways sites developed. At Megara Hyblaia, the regular layout seems to have been in place from the earliest date of settlement, with designated areas for cemeteries and sanctuaries and for public business. The uniformity of the early houses in size and form suggests a high degree of central organization in allocating space. At Thasos, in contrast, pottery deposits demonstrate that sanctuaries were established early, but the seventh century city was haphazard and the first signs of communal planning and organization date to the early sixth century (Osborne 1996: 233-42).

Greeks overseas were early adopters of many aspects of Greek urban life. Colonies built monumental stone buildings earlier and more prolifically than the cities of Greece; in particular many monumental temples were constructed. Coinage was adopted early, as were writing and codified laws. Territories were also carefully organized. During the sixth century, the territory of Metapontion was systematically reorganized and a regular grid of land divisions imposed (Di Siena 2001: 24-9). The fact that these were new communities may have prompted this investment in civic infrastructure. Unlike cities in Greece, which had grown up piecemeal, developments on new sites could develop more systematically, and also a need to create strong civic organization and a strong civic identity to integrate the inhabitants into a functioning citizen body.

Ancient sources describe ethnic conflict between Greeks and their non-Greek neighbors, but archaeological evidence presents a more nuanced picture. Some settlements started out as mixed communities before adopting a fully Greek identity during the seventh century. Graves at Pithekoussai have yielded Italic and Phoenician grave goods, suggesting an ethnically mixed rather than purely Greek community (Ridgway 1992: 109-19). At Metapontion and Siris, Greek and Italic burial customs co-existed in earliest phases of the cemeteries, and both Greek and non-Greek pottery has been found, although buildings are mainly of Greek type (Carter 1998; Di Siena 2001: 17-26). This persists until the late seventh century, after which these sites become more clearly Greek in character. This is accompanied by changes in the territories of these communities which may suggest a phase of more aggressive expansion (Di Siena 2001: 24-31). One hypothesis is that many Greeks arrived in all-male groups rather than as families, and intermarried with the local populations, although studies of this in the western Mediterranean have shown mixed results (Shepherd 1999). At Pithekoussai, Metapontion, and a number of other sites, some female burials contained Italic fibula brooches rather than the straight dress-pins used by Greeks, suggesting that these may have been local women. As there was no spatial distinction between these and graves with Greek grave goods, they have been taken as evidence for women intermarrying with Greek colonists. At other Greek sites, however, there is little evidence of ethnic intermingling, and patterns of interaction with local populations varied from colony to colony.

Whatever the specific nature of social relations, there were significant levels of economic and cultural contact and exchange of goods and ideas between Greeks and non-Greeks, even during periods of conflict. Religious sanctuaries

seem to have acted as important points of contact for such exchanges. Greek inscriptions are found in non-Greek contexts; the Greek alphabet was adopted for writing non-Greek languages and coinage based on Greek designs and weights was minted by some non-Greeks. Greek pottery styles were also widely adopted, and adapted by non-Greeks, often from an early date. In Italy, for example, Apulia, Lucania, and Campania all developed local red-figure pottery, closely based on Greek techniques and designs but with their own distinctive shapes and decorative styles. In extreme cases, it can be difficult to distinguish between Greek and non-Greek settlements. The Sicilian city of Segesta constructed a fine Doric temple, despite being an indigenous community. At Morgantina in southeast Sicily, a settlement of the indigenous Sikels, the centre of the city had Greek-style buildings and looked very similar to the agora of a Greek city, despite its non-Greek population (Antonaccio 2005: 98-101). The social and cultural interactions between Greeks and their non-Greek neighbors were both highly complex and central to the development of areas of Greek settlement.

The Greeks of the colonial world were not a cohesive group and is evidence of tension, sometimes on ethnic lines between those of Dorian and Ionian origin. Despite this, they maintained a strong Greek identity. Greeks overseas participated in events symbolizing shared ethnicity, such as the Olympic games and other Panhellenic festivals. The victory lists at Olympia and other sanctuaries include victors from the colonial world. Colonies built treasuries at Delphi, and made victory dedications at Delphi and Olympia. Although founding 'mother-cities' are likely to have been largely fictive, social, and political links between a colony and its putative founder were important. Cults associated with the foundation formed a vital part of civic religion in the colonial world, whether they were cults of deities associated with colonialism, cults of a heroized founder, or cults associated with the nominal mother city. It was also common for colonies to adopt the linguistic dialect and form of script used by their assumed mother city, and to use the same weight standard for their coinage. Although these relationships were largely based on fictive rather than real kinship, they became more prominent, and more politicized, from the sixth century onwards. The colonies founded by Phokaian refugees after the Persian sack of Phokaia - Alalia, Elea, Massilia and Emporion - shared a strong sense of common Ionian identity, maintaining their Ionic scripts and dialect, and many aspects of architecture and material culture derived from Phokaia (Dominguez Monedero 2004), while Korinth maintained active links with states which claimed Korinthian origin during the fifth century. Greeks outside Greece were embedded in a complex web of connections to both their non-Greek neighbors and the wider Greek world.

Key Issues/Current Debates

There are currently several key issues in the archaeology of Greek colonialism. These include: the nature of the process by which new communities were created; the reasons for the migrations of the eighth and seventh centuries, the interpretation of relations between Greeks and local populations, and the impact of colonialism on Greek conceptions of their own ethnicity. They touch on important problems such as how (or if) archaeological evidence can be integrated with ancient sources, whether we can identify ethnic origins from material evidence, and what sort of analytical frameworks can be used to clarify cultural interactions between Greeks and their neighbors.

Trade and Colonialism

Discussions of mass migration in the eighth and seventh centuries BCE historically assumed that trade was of relatively little importance and the main motivation was desire for land (Boardman 1999; Dunbabin 1999). This was, in part, based on a tendency to privilege the ancient sources over material evidence. Accounts which mentioned desire for land as a motive (Strabo, *Geography*, 5.4.9) or drew distinctions between mercantile

Phoenicians who founded trading posts and Greeks who founded cities (Thucydides 6.2) were largely accepted. It also relies on a primitivist view of ancient Greek economies in which trade is assumed to be of little importance. Recent critiques demonstrate that this approach was shaped by eighteenth and nineteenth century colonialisms, in which trading relationships were rapidly followed by territorial expansion. New research on the economy of the archaic Mediterranean suggests that economic behavior was much more sophisticated and diverse than this model suggests, and that nineteenth century concepts of 'trade before the flag' distorts both the nature of ancient trade and that of the settlement process (Shepherd 2005: 24-30). The excavations at Pithekoussai show that it was a community with a vibrant economy based on trade in mineral resources as well as agriculture. The archaic Mediterranean was a region of high mobility, in which long-distance travel motivated by commercial opportunities and curiosity about an expanding world, was not unusual (Purcell 2005).

The Nature of Settlement

The process by which settlements were established has generated much debate. Until the 1990s, ancient accounts of how to found a new settlement were largely accepted (Graham 1982). These present colonization as an well-defined and organized process, whether carried out by a state or an individual. An oracle was consulted to gain divine approval for the mission, leaders were appointed, and the colonists set off to find the place indicated by the oracle. Once located, the leaders laid out the boundary of the new city, instituted the main cults, and divided the land within the new city and its territory to ensure that settlers received a fair share. The foundation process was presented as setting up a community to a recognized pattern, replicating the organization of a Greek *polis*.

There are many problems with this model. The texts on which it relies were written long after the foundation of the early colonies, reflecting later practices and attitudes, and cannot be accepted as an accurate account of how colonies were established. In addition, ancient sources and archaeological evidence address fundamentally different questions (Owen 2005: 6-8). Archaeology reveals long-term trends and patterns but dating is too imprecise to pinpoint short-term factors. Ancient sources, in contrast, focus on immediate events and motivations. Both yield valuable information, but from radically different perspectives. Recently, the debate about the nature of Greek settlement overseas has swung strongly against the model of colonization as an organized political project. Many scholars now regard it as a fluid process, in which Greek settlements formed by piecemeal migration by individuals and small groups, some of whom initially lived in mixed communities alongside indigenous populations. Many did not develop a fully Greek identity and city-state organization, either by assimilating or ejecting these local populations, until the late seventh century.

This view is strongest in Anglo-American scholarship, where the use of the term "colonization" to described Greek settlement overseas has become problematized, but it is not universally accepted. One of the key arguments against the organized foundation of colonies is that the city-state was at an early stage of development in Greece in the eighth century and that the *polis* was not yet established as the main form of political and social organization, so the creation of new settlements which replicated this emergent form of organization seems unlikely (Osborne 1998). However, counter-arguments have been made, that the development of the *polis* was assisted precisely by colonization and the need to create new forms of community from scratch, and that there is nothing implausible about a new society inventing new forms of community and new ways of setting them out (Malkin 1994, 2002). Although the balance has tipped in favor of Greek settlement overseas as a process of migration rather than organized colonization, there are still ambiguities to resolve.

Modelling Cultural Interactions

The concept of Hellenization – the adoption, either voluntary or enforced, of Greek

customs, language and material culture by non-Greeks – has long been the dominant model for understanding Greek relations with local populations. It is an analytical framework shaped by eighteenth and nineteenth century colonialisms, in which a mission to civilize non-European cultures was an important part of colonial ideology (Shepherd 2005). However, it is no longer tenable to view the archaeology of areas of Greek settlement as shaped by a one-way transmission of advanced Greek customs and culture to more backward locals. Instead, various analytical models have been put forward to interpret relations between ethnic groups.

A core-periphery model, in which the Greek core obtained natural resources such as mineral ores from the non-Greek periphery in exchange for Greek manufactured goods, is one possible approach. This argues that Greek goods were circulated to non-Greek elites, by either trade or gift-exchange, in return for resources such as mineral ores. These goods were regarded as prestige items, the ownership of which enhanced the status of the non-Greek owner and also his/her social and political power (Dietler 1995). This opens up alternative ways to look at trade and exchange of goods, and also gives the local population a more dynamic role in the relationship but it also implies the same basic level of inequality between non-Greeks and Greeks which characterized the Hellenization model.

Post-colonial theories of hybridization and Middle Ground theory offer a possible alternative. These argue that interaction between Greeks and non-Greeks resulted in the emergence of hybrid (or creole) culture which contained elements of both cultures and which facilitated the development of local and regional identities which were not Greek or non-Greek but Sicilian, or Italiote, or Graeco-African, etc. (Antonaccio 2005). A site such as Morgantina, where there is evidence of the adoption of at least some Greek customs (e.g., Greek civic architecture) but not others (Greek religious architecture, Greek sculpture) is not an example of Hellenization but of an expression of local Sicilian identity in which Greek and Sikeliote elements mix to produce new cultural forms. One strength of this model is that it allows for changes in the ways in which artifacts are used. For example, Greek drinking vessels are frequently found in elite burials in many areas of Italy, but they do not prove the adoption of the Greek *symposion*. Most Italian societies had their own traditions of elite banqueting, which were very different from that of the all-male *symposion*, and it is far more likely that Greek drinking sets were used for these local celebrations. Although Middle Ground theory and hybridization escape from the overtly top-down and colonialist aspects of Hellenization and core-periphery analysis, they are still problematic as a framework for studying Greek-local interactions. Recent critiques note that they potentially underplay aspects of conflict or imbalances of power between the parties involved. They can also make it difficult to differentiate between the various cultural elements under discussion, and can obscure important factors such as gender or social class, which have an important role in determining which cultural features are transmitted and how they are used.

Another influential approach has been examination of Greek and non-Greek cultures in terms of localism versus globalization (Hodos 2009). The spread of Greek culture over such a wide area of the Mediterranean meant that Greek customs and artifacts could be used as a form of cultural *lingua franca*, just as the Greek language could be used as a common language to communicate across ethnic and cultural boundaries. Greek red-figure pottery, for example, could be customized with local scenes and therefore used to present local identities in a visual idiom which was familiar throughout the Greek world. South Italian red-figure vases frequently depicted scenes of warriors in local costume and with Italic armor and weapons, using it to present local elite culture. Greek culture could be seen as a form of globalised cultural language which could be customized to reflect local cultures but also used as a form of communication across cultural boundaries.

Ethnicity and Colonization

The role of colonialism in the development of Greek ethnicity, and how reliably we can identify ethnicity in the archaeological record, is an important issue. Distance from one's own culture or proximity to other cultures is frequently a factor in the emergence of a stronger and more assertive sense of ethnic identity. Ethnicity is often more in evidence in frontier areas where cultures are in contact, and for this reason, it has been suggested that Greeks living in colonies may have had a stronger sense of Greek identity. This oppositional Greek identity, and the polarity between Greeks and barbarians is, however, more developed in the fifth century, when Greek identity was tested by the Persian invasion, than it was in the archaic period. It has been argued that Greeks of the eighth and seventh centuries may have been more aware of the differences between settlers from different parts of Greece as between themselves and neighboring non-Greeks (Hall 2002).

There is evidence for both points of view. Greeks outside Greece were not a cohesive group. Evidence of regionalization is apparent in their use of different alphabets and dialects and they seem to have maintained sub-group identities as either Dorians or Ionians. The mixed communities found in some early settlements, and evidence for commercial, social and even familial contacts with non-Greeks suggests that ethnic boundaries were flexible. However, there are methodological problems. The hypothesis that Greeks and non-Greeks intermarried is based on presence of certain artifact types in funerary assemblages, but possession of local objects may be a matter of taste, patterns of trade or gift-exchange, or simply what was available, rather than an indication of ethnicity (Shepherd 1999). The presence of other evidence such as the use of non-Greek burial customs in a Greek city strengthens the case for mixed communities, but inferring a mixed population on the basis of grave goods alone is unwise. As with most aspects of Greek colonialism, patterns were geographically and chronologically varied. Relations with locals differed from colony to colony, and Greek identity became more sharply defined from the fifth century, but it was never a simple matter of Greeks versus barbarians.

International Perspectives

Greek colonialism is hugely varied, with many local variations in the development of Greek settlements outside Greece. Some regional patterns can be discerned: settlement in Spain and the islands of the western Mediterranean seems to be less *polis*–based and more integrated with local populations than elsewhere, and the emergence of regional styles in material culture can be identified, but there is also intense variability of development even between settlements in the same areas of the Mediterranean. This has been exacerbated by some trends in modern scholarship. There has been a tendency for researchers to focus on specific regions and sites, and dialogue between these has sometimes been limited. One of the key challenges in the archaeology of Greek colonialism is to identify overarching themes and patterns in colonial settlements without losing sight of these local factors.

Future Directions

There are many important issues which remain to be explored in relation to Greek colonialism.

1. Better methodologies for integrating archaeological and textual evidence are badly needed. Historians frequently privilege texts over material evidence, while some archaeologists adopt the extreme position that textual evidence should be rejected entirely. Dialogue between archaeologists and historians is essential for the resolution of this problem.
2. Further research on cultural identities and the interactions between Greeks and other ethnic groups is needed. This is a complex area, and none of the models review above are without their problems. A single interpretative framework which will address cultural interaction without any bias or distortion maybe difficult

to achieve. In particular, more investigation is needed on how factors such as gender, or social class may shape cultural interactions. There is much scope for the development of new models of cultural interaction which place Greeks and non-Greeks on a more equal footing.

3. Better integration between researchers working on different areas of the Greek colonial world is required. As noted above, Greek experiences of colonialism were often locally-specific, but more dialogue between researchers working on different areas of the Greek world may help to illuminate aspects of colonialism. Recent research applying network analysis to the ancient Mediterranean has opened up valuable new approaches to aspects of colonialism and connectivity between different areas of the Greek world.

Cross-References

- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Ethnicity and Identity in the Ancient Mediterranean World

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Greek Houses, Archaeology of

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Introduction

Most visitors to Greek archaeological sites can be excused if they never visit the residential districts or even realize that houses have been excavated there. Greek domestic architecture is often poorly preserved and consequently neglected by countries that have more cultural property to protect than their budgets will cover. This situation is regrettable, as houses and their contents can reveal much about the cultural and social life of the Greeks, providing an insight on the economy, religion, relationships between men and women, and the interactions between freemen and slaves. Careful examination of the archaeological remains, informed by a judicious reading of ancient literary and epigraphical testimonia, and cautious use of ancient visual depictions of domestic scenes can help bring Greek houses to life.

Definition

What are the determinants for identifying a house and for labeling that house as Greek? The first question can be difficult to answer, as many excavated buildings were both residences and the locations for industrial or commercial activity. It is probably most accurate to say that a house was a building where the primary function was residence but where there could be attendant workshop production and/or commercial sales. A number of Greek houses accommodating such multiple uses have been recognized in rural settings and almost by definition include agricultural or pastoral production. The identifying characteristics for a domestic use of space are as much the artifactual assemblages as the architectural structure. The collections of household impedimenta reveal the human use of space within, including food storage, preparation and consumption, as well as sleeping, household production such as textile work, and the entertainment of guests. The answer to the question of Greek identity is dependent in part on chronology. From the Early Iron Age until the late fourth century BCE, it is fair to say that a Greek house is a residence constructed in territories established and occupied by Greeks, who identified themselves as such by virtue of their common language and the gods they worshiped. This definition follows Greek ideas of self-identification which were based on language and religion (see, e.g., Herodotus 8.1.44).

Historical Background

The houses considered in this entry date over the course of a single millennium, from c. 1,000 BCE until the first century BCE. While Greek speakers were resident in the Balkan Peninsula, the homeland of Greece, from before 1,500 BCE, the governing political and economic structure of the Greek Bronze Age was such that the house types of that period were shaped by factors very different from those in the succeeding Iron Age when social changes fundamentally altered the forms of domestic architecture. The study of the Greek house is inextricably bound to the study of urbanism in the Greek world, as domestic architecture responds to the organization of the city in its adherence to the street system; the interior arrangements of the house also recognize the interplay between the interior, with any attendant notions of privacy or segregation, and public life in the city.

Throughout the Greek world, Early Iron Age houses were limited in both size and elaboration. Houses of one, two, or at most three rooms were the norm whether the houses were built on the Greek mainland or in the colonies that multiplied, especially in the western Mediterranean, from the late eighth century BCE. The techniques of construction that prevailed throughout history seem to have originated at an early date – mud brick walls were built on a low stone socle in order that the easily fashioned mud brick could provide

insulation and so that the stone underpinnings could prevent moisture from destroying the mud brick. Early Iron Age houses usually had fixed hearths to serve as a heating element and probably also as a source of light, a space for cooking, and a focus of family life and ritual (Tsakirgis 2007).

Another characteristic feature of Greek houses also emerges early, that is, their southern orientation. Doors and windows were often placed to open to the south so that the rays of the winter sun shining low would penetrate the rooms and warm them and so that the summer sun, high overhead, would beat on the roof, thus providing much needed shade in the hot season. This environmentally conscious architectural arrangement is seen equally in the early colonial houses at Megara Hyblaea in Sicily, in Classical houses in Athens (Fig. 1), in the Late Classical houses at Olynthos (Fig. 2), and in the Late Hellenistic House on the Hill on Delos (Hoepfner & Schwandner 1994: 4; Trümper 1998: 211-12; Cahill 2002: 75). The archaeological evidence for the practice of southern orientation predates by several centuries the testimony of the fourth century authors Xenophon (*Mem*. 3.8.8-9) and Pseudo-Aristotle (*Oec*. 1345a), both of whom prescribe that houses should be built facing south.

In front of, generally south of the earliest Greek houses, there is evidence of an open yard. Given the usually limited size of these houses, the unroofed area greatly increased the household's living area. At sites such as Zagora, the yard was shared, suggesting familial or social relationships among the families who resided in the surrounding homes (Hoepfner 1999: 163-69). No architectural embellishment of the early yards exists, although the overhanging eaves or shaded porches in front may have anticipated or given rise to the roofed porticoes of later houses.

Greek houses increased in both size and architectural complexity in the sixth and early fifth centuries BCE, as cities expanded in economic and political complexity. The open yard, formerly in front of the house, was in many cities at this time enclosed within the architectural structure, creating an unroofed courtyard surrounded by rooms. The plans of Late Archaic houses at Athens reflect this change. Entrance to the living space was no longer through the yard but rather through a door in the façade and often into a vestibule, creating what has been called the single-entrance courtyard house. Unlike the foyer of a modern home, the vestibule of the Late Archaic and Classical houses was a buffer, separating the public world of the street from the domestic world, and there was neither easy physical nor direct visual access to the innermost parts of the house because the interior doorway of the vestibule was not placed directly in line with the street entrance (Fig. 1). These architectural changes have been recognized as reflecting changing social practice in Greek cities and houses, a subject that will be discussed in more detail below (Nevett 1999: 103).

In many houses of the fifth and fourth centuries BCE, the unroofed courtyard was located fairly centrally (Figs. 1–4). Judging from the materials found in Greek domestic courtyards, many and varied activities took place there over the course of a family's life, including food preparation, ritual events, and probably activities that leave no archaeological record, including children's play. Since the courtyard was unroofed, light and air would penetrate into the surrounding rooms through both doorways and windows, as can be seen in better preserved Hellenistic houses at Iaitas and Delos (Dalcher 1994: 29-32; Trümper 1998). The courtyard was the major node of access to all of the surrounding rooms. Suites exist in Greek domestic architecture, but passage through several rooms was not common, and almost all parts of the house opened directly onto the courtyard. Because of this arrangement, it has been argued that the courtyard also enforced social control, as any inhabitant would have to pass through the courtyard on the way to any other room or to the street door of the house (Nevett 2010: 49).

The courtyard served the crucial purpose of housing the domestic water source. While running water from springs was preferred for drinking and was collected from fountains close to residential districts, wells were dug in or near Greek houses from a very early date. In the Late Classical period, the Greeks came to prefer cisterns to wells as domestic water sources, and one or more of these storage tanks were dug under the

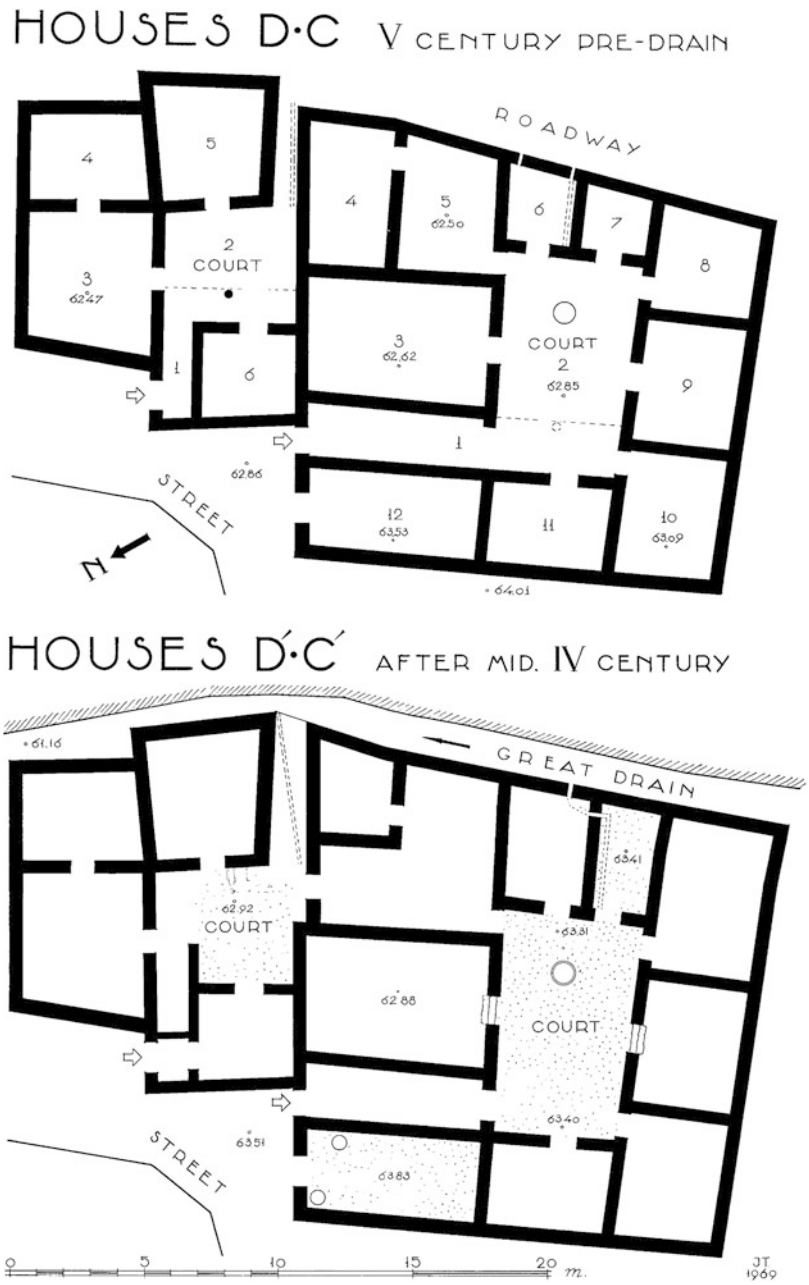

Greek Houses, Archaeology of, Fig. 1 Athens, industrial district, houses C and D, plans (permission: Athenian Agora excavations)

courtyard. The cisterns were usually bottle shaped but larger scale tanks were excavated under the houses on the dry Cycladic island of Delos and at Soluntum in Sicily (Wolf 2003: 93). The terracotta roofs of the houses were sloped to shed the rainwater into the courtyard, where the runoff would fill the cisterns (Fig. 4). The paving of Greek domestic courtyards further facilitated and maximized the water collection, and gardens were not planted in courtyards until the Hellenistic period and then only rarely (see, e.g., the House of the Arched Cistern, Tsakirgis forthcoming).

Beginning in the Classical period, there is increasing evidence for a shed roof built on one or more sides of the domestic courtyard. The roofs were supported on a row of pilasters or

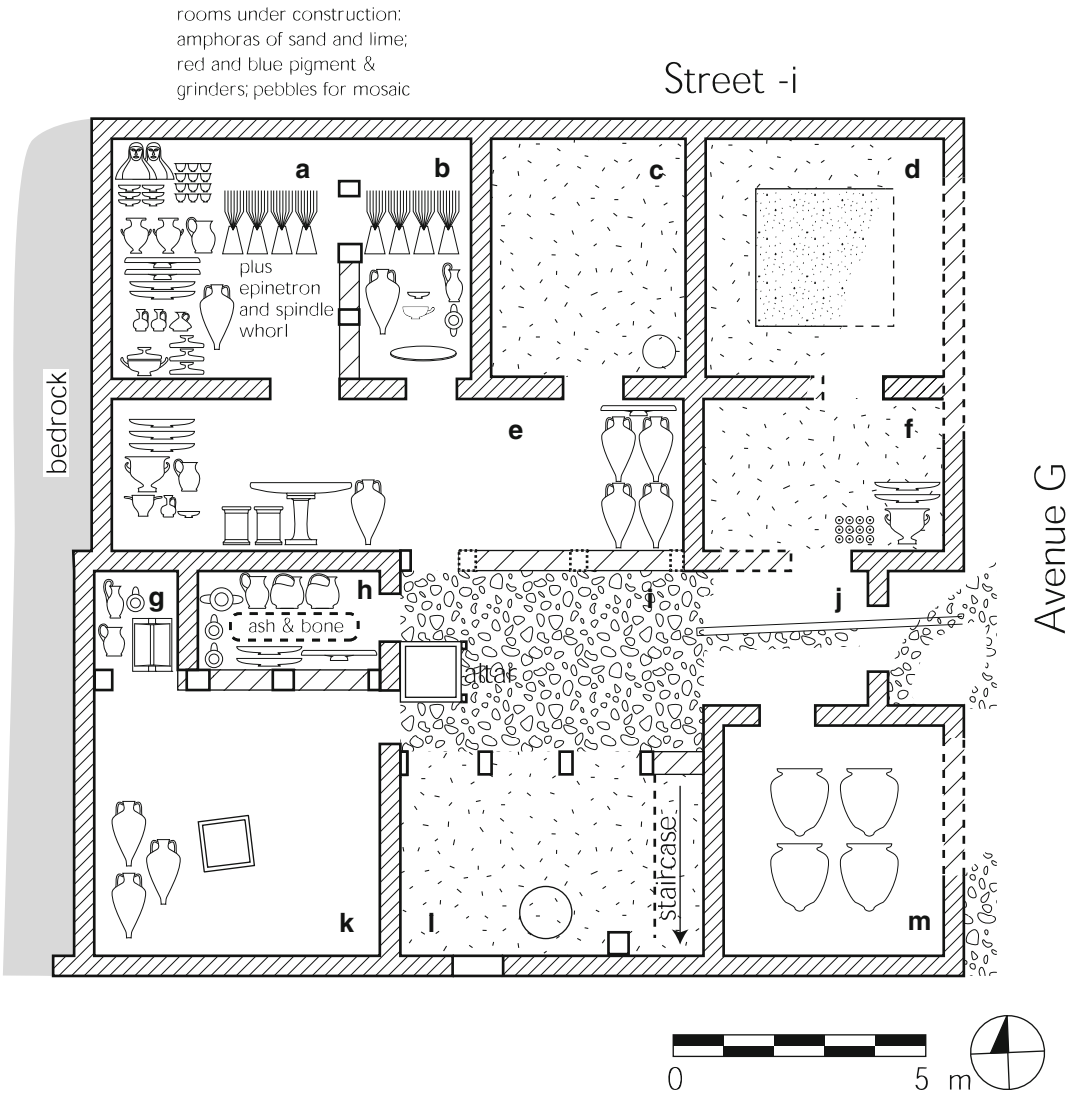

Greek Houses, Archaeology of, Fig. 2 Olynthos, House of Many Colors, plan with distribution of finds (permission: Nicholas D. Cahill)

columns, but peristyles running around all four sides of the court were not common until the fourth century BCE. The covered porticoes provided shelter for the inhabitants to sit or work out of the elements while still enjoying the light and air. Depending on the time of day and the season of the year, the porticoes also provided shade to the surrounding rooms. The shade could keep the inhabitants cool in the summer and the contrast between the bright exterior and the darker interior could increase the privacy of those within.

What we learn from the domestic assemblages recorded at Olynthos, Halieis, Halos, and elsewhere is that the Greek house was characterized by a considerable flexibility in the use of space (Cahill 2002; Ault 2005; Reinders & Prummel 2003: 284-94). The rigid identifications and specific functions of rooms in modern houses were not a feature of ancient domestic space. This flexibility was enhanced both by the furnishings in Greek houses, which were fewer than those we are accustomed to today, and also by the

Greek Houses, Archaeology of, Fig. 3 Athens, block of classical houses on the north slope of Areopagus, plan (permission: Athenian Agora excavations)

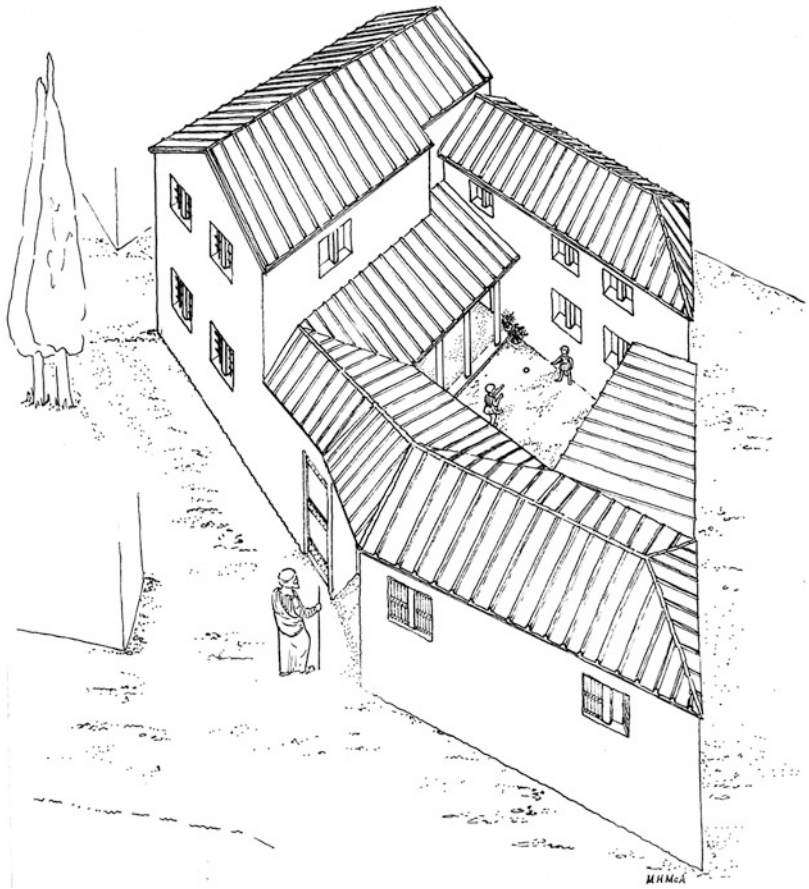

Greek Houses, Archaeology of, Fig. 4 Athens, House of the Greek Mosaic, reconstruction drawing (permission: Athenian Agora excavations)

portability of many of the household objects, including the charcoal brazier and beds.

In the later fourth century BCE, houses increased significantly in size and in interior decoration. It has been theorized that the breakdown of the traditional Greek polis turned the Greeks to the home as a location for the types of social interaction that had previously taken place in public settings (Walter-Karydi 1994). From this date, many houses throughout the Greek world were built with two courtyards, one of which served as the hub of a nexus of rooms devoted to private domestic activities, while the other was the centerpiece of large and well-decorated rooms intended to be seen and used by guests. As will be discussed below, not all could afford such expansive living space, but those who could would decorate their homes with mosaic floors and painted wall plaster (Fig. 5). Hellenistic houses in both this extensive plan and highly embellished interiors may have been influenced indirectly by the palaces built by the Macedonian kings and their successors and the importation of ideas of private luxury from the newly Hellenized east.

Key Issues/Current Debates

There are many aspects of Greek houses that have led to scholarly studies; the following section highlights several that have garnered the most attention and others which have attracted recent attention: typology, gender, economy, and regional variation.

Typology

Early studies of Greek houses focused on establishing typologies, emphasizing one feature

Greek Houses, Archaeology of, Fig. 5 Morgantina, House of Ganymede, mosaic of Ganymede (permission: Princeton University, Department of Art and Archaeology)

over another as important in the layout of the house. Many of these early works are barren, as they focus solely on establishing typologies of house form. Of particular note in these typological studies was the distinction made between the *pastas* and the *prostas* house. Both terms derive from the same passage of the Roman architectural historian Vitruvius (VI.7.1), who wrote in the first century BCE that the porch-like area mediating the transition between the courtyard of the house and its main rooms was called by some Greeks the *pastas* and by others the *prostas*. The excavators of the 102 houses at Olynthos adopted the first term for the wider northern portico of the central courtyard (Fig. 2), while the excavators of the nearly contemporaneous houses at Priene adopted the second term for the columned porch serving a similar but limited function in front of the main room of the house. The arrangement of porch and rooms at Priene was limited to some houses in the eastern Mediterranean and possibly derived from the *megaron* form common in Bronze Age architecture. The typical *megaron* includes a main living room with a front porch, often facing south, and an overall axial approach, that is, direct line of access from the porch to the main room. In many Late Classical and Hellenistic houses the portico on the northern side of the courtyard was wider than any of the other three and can be seen as a survival of the earlier *pastas* form.

These earlier studies in terminology and typology have recently been supplanted by more nuanced considerations which have attempted to understand the use of space in the Greek house. These later studies stem ultimately from an attention to research on domestic architecture conducted by anthropologists and prehistorians who have not relied solely on literary sources for their interpretation of the use of space in the dwellings. Ultimately the more recent analyses have been of greater value in explicating life in the Greek house as scholars have based their ideas more on the humble objects of the domestic assemblages than on the textual sources (e.g., Xenophon. *Oec*. or Lysias 1), some of which are highly idealized accounts of Greek private life.

Gender

A critical area to be understood is how Greek houses were used by women and men in the course of their daily lives. In the past it was held to be true that women were secluded in quarters separate from those of the men, and because physical proof of this separation is difficult if not impossible to recognize in the remains of houses, the women's quarters were conveniently assumed to have occupied the upper, now

destroyed, story. The living arrangement in the Greek house was doubtlessly far more nuanced than was earlier believed. The vestibule, as described above, allowed for a separation of the private from the public and ensured that the family, in particular its female members, were kept apart from men to whom they were not related.

The parts of the house where women lived and worked cannot be recognized as separate from that of the men's quarters because women probably used all or almost all of the house throughout the day. What remains to give testimony of their daily lives is the household equipment used by them as they tended to domestic affairs. For Classical Athens these activities can be recognized in the highly idealized *Oeconomicus* by Xenophon. The unnamed bride in this account oversees the domestic activities, including cooking, textile work, management of the slaves, and the safekeeping of the family storerooms. It is not clear how much the wife in question actually participates actively in the housework.

Food was cooked for the family or for the male guests dining in the *andron* in any one of several locations. Terracotta braziers which burned charcoal were commonly used for heating and cooking and were small enough to be moved from one part of a house to another, thus reinforcing the flexible use of space (Fig. 6). Much cooking was likely done in the courtyard, where smoke could be easily evacuated through the unroofed space. Some houses may have allowed for food preparation in the anteroom of the *andron* (Fig. 2, rm. f), in order to facilitate the presentation of the hot dishes to the guests. In many later houses, a fixed hearth was never built, and its role as heat source, cook stove, and locus of ritual was accomplished by the humble brazier. Some houses, especially in northern Greece, continued to have fixed hearths: for example, less than a quarter of the houses at Olynthos (Fig. 2, rm. k), as well as at Orraon, and in one house at Kassope (Hoepfner & Schwandner 1994: 146-49). Many of these domestic hearths preserve no traces of bones or other food stuffs, and they probably served instead as gathering points for the family and as sources of heat, light, and ritual activity rather than as cook stoves. In the later

Greek Houses, Archaeology of, Fig. 6 Eschara-type brazier (Agora P 21956) (permission: Athenian Agora excavations)

Classical and Hellenistic periods, purpose-built kitchens became more common and at Olynthos, flues were constructed in part to evacuate the smoke from cooking (Cahill 2002: 139).

Weaving is presented in the literary sources as quintessentially women's work, but the *histeion* (loom room) as referred to by Menander (*Sam.* 19) appears to mean not a dedicated room but rather wherever the warp-weighted vertical loom was erected. As the loom was fashioned of wooden beams, none survives, but the terracotta weights do, and they are found everywhere in Greek houses, showing that looms could be erected wherever the weaver chose (Fig. 7). Store rooms (*pitheon*, *tameion*) can be identified by a concentration of storage jars (*pithoi*) or amphorae, but many houses lack traces of these terracotta vessels and may have had provisions stored in now disintegrated cloth or leather sacks and baskets.

The upper stories of classical Greek houses are better known from literature than they are from material evidence and in his first forensic speech, Lysias (1.9) locates the women's quarters of an Athenian house on the upper story. The layout of the rooms mentioned by Lysias and whether they were dedicated only to the housing of women are much disputed by scholars of Greek private life. The northern rooms of classical houses at Olynthos are restored with upper stories that were approached by staircases rising from the domestic courtyard. The upper story was a feature in many Hellenistic houses such as Peristyle House I at Iaitas and most of the houses

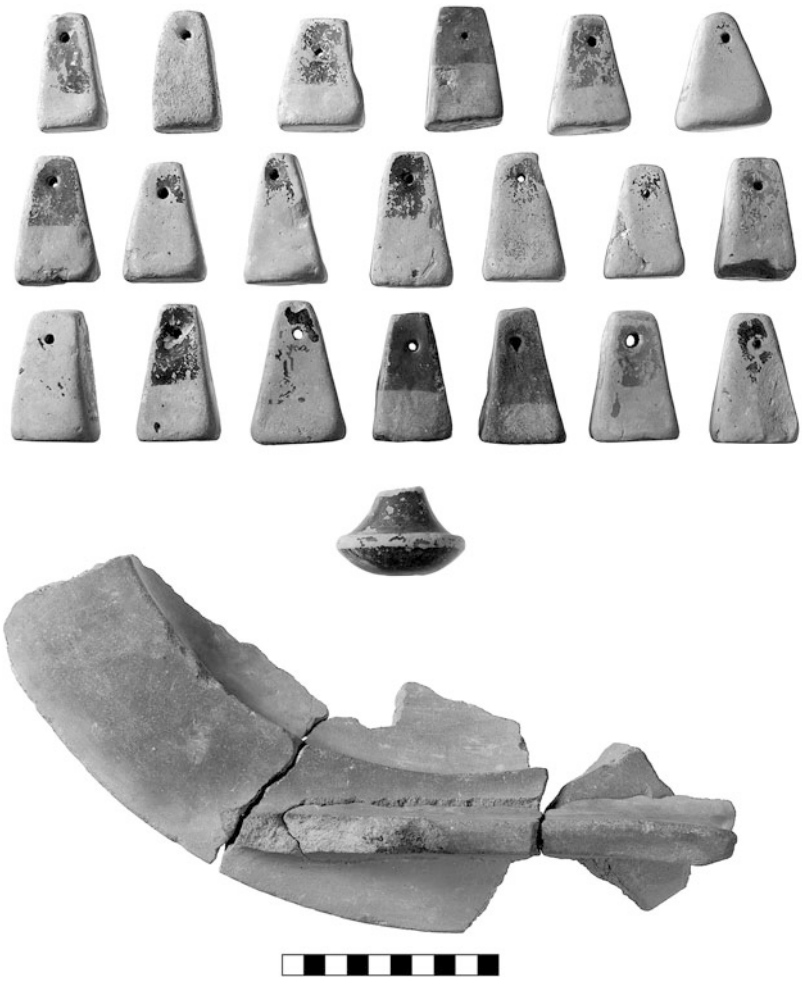

Greek Houses, Archaeology of, Fig. 7 Athens, house C, collection of loom weights, spindle whorl, rim of brazier (permission: Athenian Agora excavations)

on the Aegean island of Delos (Dalcher 1994; Trümper 1998: 90-106). In contrast to the assumptions about the use of the upper rooms as women's quarters, domestic assemblages show that they could serve a variety of functions, including the men's office, as in the House of the Seals in Delos (Siebert 2001: 91). Many rooms on the upper floors of Hellenistic houses were no less well decorated than those on the lower story indicating that they were to be seen by guests. One upper room in Peristyle House I at Iaitas was a dining room, paved with mosaic rosettes and an inscription set in *opus signinum* (Brem 2000: 98-100, 116).

A characteristic room in many Classical Greek houses is the *andron*, used primarily as a setting for entertaining male guests. Purpose-built *andrones* appear in Classical houses at Priene, Athens, and Olynthos (Fig. 2, rm. d), but many houses do not contain a room intended solely for hosting the symposium. Men could lie on couches or mattresses around any room and eat or drink wine, so a house without an *andron* is not necessarily a house where the symposium did not take place. Rooms built to function primarily as *andrones* were usually square, with an off-center doorway, so that the maximum number of dining couches could be placed against the walls; a raised platform for the couches was common in the Classical house. *Andrones* accommodating three, seven, or even eleven couches were common in domestic buildings (Fig. 4; Fig. 2, room d).

The *andron* was the room displaying the highest quality decoration; mosaic floors were

first placed here and only later were used to pave other rooms of houses and public buildings (Westgate 1997-1998). The mosaics were primarily decorative with the designs aligned to be seen best by diners entering the *andron* (Fig. 5). The pavements were conceived of as carpets in stone and some rooms also had a small panel laid in the doorway to mimic a doormat. The stone floors had a practical aspect. Many dinner and drinking parties ended with spilled food and drink mixed with the remains of vessels that had slipped from the grasp of drunken guests and the stomach contents of those who had over-imbibed. Slaves charged with cleaning the *andron* could simply sluice out the mess without damaging a floor laid in stone. Some *andrones* were preceded by an anteroom, a buffer between the noise of the all-male party, and the privacy of the household residents, and many anterooms were furnished as nicely as the dining room itself, with mosaic pavements and painted walls. The quality of much of the décor was intended to declare the wealth and taste of the householder to his guests.

Economy

Status Display

Throughout Greek history, the householder had many ways to demonstrate his wealth. Some status displays were on the house façade and were intended for both the passerby and the invited guest. Storage jars were often prominently placed in early Greek houses on Crete and the Cycladic islands, declaring that the owner had the necessary resources to supply his dependents in times of need. Doorways and some windows were inserted into the exterior walls of Classical and Hellenistic houses and were further means for demonstrating wealth (Tsakirgis 2010). Because the regions that border the Mediterranean are extremely dry, wood was rare and extremely costly, so much so that evidence from inscriptions (e.g., sales contracts and leases for houses as well as auctions of property) often stipulated that the doors and shutters were movable property, rather than part of the real estate (e.g., IG I^3 422, ll. 13-6; IG I^3 l. 3, l. 6). The metal nails and bronze bosses attached to the doors made the wooden doors impregnable and even more impressive to a visitor. The street entrance to the Classical Greek house was rarely distinguished by any architectural embellishments, although some were favored in the Hellenistic period when pilasters were fashioned on either side of the main door, as in the House of the Official at Morgantina (Tsakirgis forthcoming). The upper rooms in several Delian houses, such as the House of the Pediments, were provided with large windows, framed with impressive pilasters.

In the Late Classical and Hellenistic period when larger houses were built, the rooms were more commodious than their predecessors, but more specialized rooms were also constructed. As noted above, purpose-built kitchens first appear in fourth century houses. Personal cleansing, which was earlier accomplished with water poured into *lekanai* (basins) or *louters* (shallow basins on stands), took place instead in the bathrooms of elite houses. The bathrooms were often constructed next to rooms with hearths, either the kitchen, as at Eretria, or the hearth room, as at Olynthos (Reber 1998: 56-7; Cahill 2002: 250). The proximity of the two rooms allowed water to be heated before it was used by the bather. Bathing culture developed considerably in the Hellenistic period when heated domestic baths were built in Hellenistic houses, for example, the House of the Arched Cistern at Morgantina (Tsakirgis forthcoming; Trümper 2010).

Early Greek houses lacked any permanent decoration; textiles used as curtains or rugs may have provided some interior embellishment. The second half of the fifth century BCE was a watershed for domestic décor as it was for house size. At this time mosaic pavements and painted wall plaster first appeared in domestic settings and both were intended to impress guests, as is evident from their placement first in the *andron* where men were entertained. As did the doors and fittings of the street entrance, the formal flooring and the painted plaster declared the wealth and taste of the householder to those outside of the family. The earliest domestic mosaics were created with black and white pebbles laid in designs including the geometric and floral forms known from vase painting, architecture, and probably also no longer extant textiles.

Central scenes were largely mythological and Dionysos was favored in the *andron* where drinking was the preferred activity. In the third century BCE, the stones were cut into cubic *tesserae* so that they could be set more closely together and the palette was broadened to include as full a spectrum of colors as the available materials allowed (Dunbabin 1999: 18-37) (Fig. 5).

The painted wall plaster was quite simple in its arrangement in Classical houses, with one color used for the dado and another for the wall above. On the walls of Hellenistic houses, fictive architecture was produced in painted and sometimes molded stucco; rows of blocks with drafted edges were rendered in a variety of hues, often reflecting the wider array of colors used in the floor mosaics. Some blocks were painted with imitation veining to resemble expensive marble, the ultimate inspiration for all of the colorful display. Doorframes and cornices were created in stucco in imitation of the forms used in public architecture. Figural painting was very rare in the domestic setting until the late Hellenistic period, when it is found in some Delian houses. As houses became larger in the Hellenistic period, rooms that would be seen by guests were favored with expensive decoration, but increasingly more of the house was decorated in some way (Westgate 1997-1998).

The evidence for other forms of decoration in domestic contexts is scant, largely due to the vagaries of archaeological preservation. Greek houses possessed some sculpture, although most if not all must have been dedicated to household ritual; however, a secondary function of the images would have been their aesthetic effect. Sculptures in the houses at Eretria and Delos were displayed so that they could be seen from many parts of the home and especially by those entering the front door. Terracotta figurines are abundant in domestic assemblages and also functioned as both ritual equipment and decoration of the interior space. Written sources (IG I^3 423, ll. 59, 60-1, 62; Pritchett 1956: 250-3) attest that painted panels (*pinakes*) were displayed in some Classical houses, but none is preserved to give any information as to common subjects or settings for the pictures.

Socioeconomic Considerations

Distinguishing between elite and non-elite housing can be difficult in the absence of both prosopographic information and complete artifactual assemblages. A further complication results from anachronistic assumptions about elite residences. While it might be assumed that the wealthy or politically powerful lived in large and elaborately furnished homes, testimony from Demosthenes (*Olynthiac* 3.25) suggests that at least in the fifth century BCE men of power lived in houses indistinguishable from those of other Athenians. In cities such as Athens, with a large population of metics (resident aliens) in the Classical period, it is also difficult to distinguish between houses occupied by citizens and those lived in by the metics who could not own a property before the fourth century BCE and thus rented living space from a citizen landlord (Thür 1989).

The homes of the poor are especially challenging to identify. Literacy among this group was virtually nonexistent, so there are no firsthand accounts of their houses. Some two- or three-room residences, identified as such from the domestic wares recovered there, have been recognized in a block of Classical houses on the slope of the Areopagus in Athens (Fig. 3). A few of the original housing lots at Olynthos were later divided into smaller units, perhaps for families of lesser means. Some Delian houses of the Hellenistic period, for example, the House of the Masks, had staircases located in the street, suggesting that the upper story was independent of the house below and may have been a rented or separately owned apartment (Trümper 2005: 136).

Commercial Activity and Houses

In many Greek cities the divide between residential areas and those dedicated to industry and commerce was not as pronounced as it is in modern urban areas. In some Athenian houses living and workspace was little distinguished, and both tools and worked materials suggest that industrial activity was conducted in the same building where whole families resided (Tsakirgis 2005). Spacious houses allowed for the segregation of industrial activity from the domestic, the

assemblages indicating that household activities were relegated to one part of the building and the manufacturing and sales to another. Several such houses stand on the periphery of the Athenian Agora (Fig. 1) and because of their location take advantage of the commercial activities that were one focus of the civic center.

Some Greek houses have single rooms or two-room suites which open directly onto the street and do not communicate with the living quarters within (Fig. 1, rm. 12). While these rooms were likely shops, many do not contain evidence of what was manufactured or sold within. Such shops lined major thoroughfares or clustered at the intersections. The shopkeepers of antiquity were well aware of the advantage of location for attracting passersby to purchase their wares.

Regional Variation

There is evidence of regional variation in Greek houses. Some differences can be ascribed to the availability of materials, such as wood or expensive stone, for example, although wood was scarce in mainland Greece, it was more abundant in Sicily, and so wooden doors were more commonly built in the island houses and woven curtains probably used to close off rooms in mainland houses. In mainland and eastern Greece where marble was abundant, household sculpture or *tesserae* in the mosaic floors could be crafted from the more expensive stone.

Other differences were due to climatic variation in the areas where Greeks lived. Most of the islands, for example, were especially dry, and the flat roofs of Cycladic houses can be seen as responses to this climatic condition. The rainfall there was so negligible that the pitched roofs with costly terracotta tiles common on the mainland were not constructed on island houses. Some northern sites (e.g., Olynthos and Stageira) were subject to cold and windy weather in winter, so fixed hearths continued to be built there throughout the Classical period, even though elsewhere the portable brazier served for heating and cooking.

Significant regional differences in the plans of houses result from variations in social practice. While the Greeks can be recognized in general terms as a cultural group, their social organization, whether familial or political, was based on varied practices throughout the Mediterranean. As the layout of houses has been deemed to be a direct response to the organization of social life, we can observe the social variations in the plan of the city in macrocosm and the house in microcosm. Thus, while the single-entrance courtyard house prevailed in democratic cities, communities with different social practice built their houses to a different model. Houses on Crete, for example, continued to have direct access from the exterior and a linear layout of rooms in later periods, indicating that the social norms and practices there differed from those in cities such as Athens (Westgate 2007).

Cross-References

- ▶ Andron
- ▶ Baths and Bathing, Greek
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Crete, Archaeology of
- ▶ Domestic Architecture, Roman
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Nuragic Culture and Architecture (Bronze Age to Iron Age)
- ▶ Polis
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Symposion
- ▶ Urban Planning in the Greek World

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Greek Islands (Excluding Crete), Archaeology of

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Introduction

The Aegean Sea is full of islands ranging in size from a few large ones to numerous islets and uninhabited rocks. It is easy to discern a series of distinct clusters: the Northern and Eastern Aegean islands, the Northern Sporades, the Argo-Saronic Gulf islands, the Cyclades, and the Dodecanese. Another cluster is formed by the islands in the Ionian Sea. Although the Greek islands differ in size, landscapes, or resource wealth, they share many common features, which have consequently shaped their more or less common history. In addition to the numerical dominance of smaller islands over large ones, just a handful of islands can be characterized as rather isolated (e.g., Lemnos, Skyros, and Astypalaia) since interisland distances are modest and the majority of the islands are a short distance from mainland shores. This feature entails, in optimal weather

conditions, the high degree of intervisibility in the island-studded seas of Greece. Thus, the islands became enmeshed in interaction networks and, thanks to their key role in communication routes, occupied diachronically a particularly favorable position in these networks. The dialectical relationship with non-insular communities significantly influenced the Greek islands from their early history. The insularity, however, enabled islands to assimilate selectively continental elements and develop their own cultural diversity. Nevertheless, the escalating incorporation by the great powers of each historical period led to the gradual loss of the islands' cultural identity. Explicitly, the flourishing islands of the Early Iron Age (EIA) and the Archaic period gradually lost their autonomy and were controlled by the emergent *poleis* (city-states) of mainland Greece and the Hellenistic kingdoms, until they were reduced to a minor part of the Roman provinces.

Definition

Archaeology of the Greek islands may be defined as the study of every element of their material culture, in order to provide an expanded understanding of island history. The available archaeological information results from the numerous systematic or rescue excavations and field surveys that have been undertaken in the Greek islands since the end of nineteenth century by many organizations: the Greek Archaeological Service, the Archaeological Society at Athens, and other Greek institutions (such as universities and institutes), as well as several foreign archaeological schools (e.g., the British, the French, and the Italian) and institutes (including the German, the Austrian, the Swedish, the Danish, the Norwegian, the Irish, the Netherland, the Australian, and the Canadian).

Historical Background

The time span from the end of the Bronze Age to Byzantine times is conventionally divided into five periods: the Early Iron Age (c. 1050–700 BCE), the Archaic (c. 700–479 BCE), the Classical (c. 479–323 BCE), the Hellenistic (c. 323–31 BCE), and the Roman period (c. 31 BCE–324 CE).

The collapse of Mycenaean palatial centers in the late thirteenth century BCE and the consequent gradual disintegration of the Mycenaean civilization during the twelfth and early eleventh centuries BCE marked the beginning of a long period of social upheaval and political ferment that significantly affected the Greek islands (Dickinson 2006). In the early 1970s, the term "Dark Ages" was adopted for the period c. 1050–900 BCE in order to denote its culture, which seemed to be in a state of decline and isolation, as well as the low level of our knowledge of this period (Lemos 2002: 1). Recent archaeological research, however, is gradually changing this picture, particularly regarding the alleged poverty and isolation. An alternative term for the period c. 1050–900 BCE is "Protogeometric," after its characteristic pottery style (Lemos 2002: 27-100).

The ensuing Geometric period (c. 900–700 BCE), named after its main style of pottery, was a time of dramatic transformation that led to the establishment of primary Greek institutions (Coldstream 2003). The small Protogeometric settlements developed into well-organized towns, population increased, overseas contacts were intensified, trade was expanded, and iron metallurgy developed significantly. Moreover, the Greeks adopted the Phoenician alphabet during the first half of the eighth century BCE. It is not possible to determine the birthplace of the Greek alphabet, but there is no doubt that Euboea and the Aegean islands played a pivotal role (Mazarakis Ainian & Leventi 2009: 214-215). All these advances were interdependent and resulted in the general improvement of living conditions. The major rise in population, however, created a land hunger, which eventually led to the foundation of colonies overseas, and wars in the homeland (Coldstream 2003: 368). Moreover, maritime trade rivalries aroused the hostility between certain islands, and archaeological research may reveal some events related to these conflicts (e.g., the two massed graves at

Paroikia on Paros; Coldstream 2003: 398-399; Mazarakis Ainian & Leventi 2009: 215).

The Archaic period (c. 700–479 BCE) was the heyday of the islands. They enjoyed great prosperity, thanks to the exploitation of raw materials (e.g., marble quarries of Naxos and Paros, gold and silver mines of Siphnos), their strategic position for control of sea routes, and their political autonomy. Many flourishing islands, such as Naxos, Paros, Andros, Thera, Samos, Chios, Thasos, and Rhodes, took a leading role in the colonization of Sicily, southern Italy, Thrace, the Black Sea, the west coast of Asia Minor, and the north coast of Africa, while several offshore islands (e.g., Thasos, Lesbos, and Rhodes) controlled extensive lands on the mainland opposite (Constantakopoulou 2007: 231-253). On the other hand, trade rivalries led to clashes between island and mainland cities (e.g., Mytilene-Athens and Samos-Megara) or between islands (e.g., Naxos-Paros and Samos-Aegina). Meanwhile, political ferments and social upheavals took place in the island *poleis*, as a result of the economic success of more middling citizens (e.g., seafarers and merchants) or the disaffection of excluded aristocrats. This allowed the emergence of tyrannical regimes in a few islands, such as Naxos (Lygdamis) and Samos (Polycrates). In order to maintain and stabilize their own positions of power, the tyrants embarked on major building projects, whose distinguishing feature is monumentality. Herodotus (3.60) considers the Samian buildings as the greatest of all Greece and admires particularly the temple of Hera, the aqueduct, and the great harbor mole, ordered by Polycrates (Rolley 1994: 157).

From the Persian wars onwards (the Classical period, c. 479–323 BCE), the islands lost their political independence and stayed in the shadow of the great powers of each historical period. At the beginning of the fifth century BCE, most of the islands were under Persian rule. After the Greek success against the Persian Empire, the islands fell under the direct control of Athens, first in the "Delian (or 'First Athenian') League" and then in the "Second Athenian League," interrupted only by an interval under Spartan domination (c. 404-378 BCE). After the victory of Phillip II over the combined Greek forces at Chaeronea (338 BCE), the islands became subject states of the Macedonian kingdom. Nevertheless, thanks to their strategic position and the exploitation of their natural resources (e.g., marble from Paros and Thasos; wine from Thasos, Chios, and Kos; ruddle from Kea; mastic from Chios), several islands achieved economic prosperity which is clearly manifested in their material culture (see below).

During the early Hellenistic period (late fourth–early third centuries BCE), the rivalries between the rulers of the Successor kingdoms involved the Greek islands, as the Antigonids and the Ptolemies were trying hard to assume the leadership of the "League of Islanders." Rhodes was the only island able to maintain her political independence and developed into a naval power until Delos was declared a free port (167/6 BCE), delivering a severe blow to the Rhodian economy and promoting the explosive growth of Delos during the second half of the second century BCE (Bruneau & Ducat 2005: 41). Meanwhile, trade and, to a lesser extent, religious festivals (for instance, in honor of Hera on Samos, Asklepios on Kos, and the Kabeiroi on Samothrace) gave island communities a cosmopolitan character, reflected in the temples which served non-Greek deities on Delos, as well as in the Jewish synagogues on the islands of Samos, Delos, Kos, and Rhodes. Throughout the Hellenistic period, piracy was a constant threat to the islanders but at the same time yielded substantial profits for several islands, such as Delos, Rhodes, and Aegina, where there were thriving slave markets (de Souza 1999: 43-96). Moreover, the islands suffered many hardships as a result of the Mithradatic wars and Rome's civil strife during the first century BCE, as, for example, Delos, which was sacked twice (88 and 69 BCE) and never fully recovered (Bruneau & Ducat 2005: 42-43).

Rome first established trade contacts with the Greek world in the sixth century BCE, while her political and military involvement started with the 1st Illyrian war (229–228 BCE) and grew steadily, resulting in the complete submission of Greece (Alcock 1993: 8-24). It was not

until the battle of Actium (31 BCE), however, that Greece was finally reconciled to Roman rule in a unified empire. The islands were included in the Roman provinces of Achaea, Macedonia, Epirus, and Asia, until the end of the third century CE when a separate island province (*Insulae*) was formed including most of the Aegean islands. Trade routes were extended throughout the Mediterranean due to the vast size of the Roman Empire. As a result, the islands lost the key role they had played over the preceding centuries. A clear indication of their marginal importance is illustrated by the fact that many islands (e.g., Amorgos, Donousa, and Gyaros) served as places of exile. Nevertheless, *negotiators* or *pragmateuomenoi* (businessmen; Alcock 1993: 75-77, 101) settled in many islands (e.g., Kerkyra, Zakynthos, Tenos, Delos, Naxos, Melos, and Thera), and as archaeological evidence indicates, several island communities or certain islanders enjoyed economic prosperity.

Key Issues/Current Debates

Archaeological research of the Greek islands is very important, as it can inform us about the history of the islands themselves, as well as about the history of the Greek world and, more generally, of the Mediterranean. There are notable idiosyncrasies related to island culture as islanders can be temporarily linked in or cut off from the Aegean/Mediterranean as networks shift. Thus, one of the greatest challenges for scholars is to explore the indigenous island elements and how they factored into the formation of island culture. Another challenge is to understand which aspects of island culture resulted from the influence of other regions, as well as in what way the islands affected the non-island world. Thanks to fieldwork and study conducted by several generations of Greek and non-Greek archaeologists, our knowledge about the archaeology of the Greek islands has increased significantly. There is certainly a lot that remains unknown or which requires further examination, but the current state of archaeological knowledge about the Greek islands provides enough material for a satisfactory understanding of what living on the islands might have been like.

Settlement and Settlements

The limited data available about the Protogeometric settlements do not permit safe conclusions about their layout. However, it can be stated that in most islands, habitation was scattered in villages, hamlets, and isolated farmsteads (Dickinson 2006: 84-93). Dramatic changes during the Geometric period resulted in the gradual development of well-organized towns towards the end of the eighth century BCE. Most of these towns (e.g., Zagora and Hypsele on Andros, Emborio on Chios) were founded on rather inaccessible and naturally defensible positions, indicating a feeling of insecurity (perhaps because of piratical raids), and were usually densely built but with no precise plan (Coldstream 2003: 305-311, 399). The houses were rectangular and stone built, while flat roofs must have been the general rule (Mazarakis Ainian & Leventi 2009: 216-218).

During the Archaic period, some of the EIA settlements grew into *poleis* (e.g., Naxos, Xobourgo on Tenos, and Minoa on Amorgos), while others did not (e.g., Ayios Andreas on Siphnos, Hypsele on Andros). Island *poleis* also were created by the unification of communities which peacefully abandoned their previous settlements to found a new city. For example, Palaiopolis on Andros probably received an influx of population from Zagora and Hypsele, and on Paros, the inhabitants of Koukounaries apparently moved to Paroikia (Mazarakis Ainian & Leventi 2009: 219). It is noteworthy that several large islands, such as Andros, Tenos, Naxos, and Paros, had only one single *polis*, while smaller and less prosperous islands (e.g., Kea, Mykonos, and Amorgos) had more than one *polis* from the Archaic period onwards. There is no universal explanation for this phenomenon, as it seems that each case was affected by local factors. For instance, the division of Kea into four territories reflects either different periods of settling or intervention by neighboring and powerful Athens (Cherry et al. 1991: 5, 8).

During the Classical, Hellenistic, and Roman periods, the *poleis* of Archaic times continued to be inhabited, but the available information is rather restricted since most of these cities lie under the modern towns. Regarding settlement patterns of the islands, archaeological research indicates a three-tier hierarchy: towns, villages and/or hamlets, and farmsteads. The Archaic and Classical houses were simple structures and served the needs of a family. However, from late Classical times and during the Hellenistic period, houses became a medium for the rich and powerful to demonstrate their wealth and social status. As a result, luxurious edifices of two or even three stories, with peristyle courts, elaborate banquet halls (*androne*s), sumptuously decorated rooms, and a large number of service rooms, were constructed (Winter 2006: 157-182).

During the Roman period, the island cities gradually acquired a pronounced Roman flavor, but they retained their Greek character (see below). Both in the cities and in the countryside of islands like Lesbos, Samos, Kos, Naxos, Melos, Kerkyra, and Kephallenia, luxurious buildings (usually referred to as "villas," Alcock 1993: 64-68) decorated with mosaic pavements, wall paintings, and statuary were constructed. These buildings, the most distinguished of which are the so-called "Menandros's House" on Lesbos and the "Casa Romana" on Kos, usually served as residences of wealthy families or were intended for certain public services, such as the "Hall of the Mystae" in the city of Melos, a religious meeting place for worshipping Dionysos (Karvonis & Mikedaki 2012: 38, 92-93, 174, respectively).

Public and Religious Architecture

Strong fortification walls reinforced the natural defensibility of many EIA settlements, including Zagora and Hypsele on Andros, Xobourgo on Tenos, Vathy Limenari on Donousa, Minoa on Amorgos, and Emborio on Chios. The construction of fortifications was a corporate enterprise, indicating a remarkable degree of political cohesion among the people who dwelt inside them, as well as of political organization of island communities. Moreover, in some of the better-preserved island settlements (Emborio on Chios and Zagora on Andros), an open space between the sanctuary and the chief residence has been interpreted as a space for assembly, where the elite group was entitled to take the decisions on the public life (Coldstream 2003: 314-315).

Due to the lack of architectural evidence with undisputed religious purposes, it is assumed that almost all worship took place in the open air during the Protogeometric period. The focal point of the cultic activity was usually an altar or a large rectangular hearth (*eschara*). During the Geometric period, these open-air sanctuaries gradually evolved into temples, and worship habits were standardized. In addition to the urban temples (e.g., at Emborio on Chios, Zagora on Andros, and Koukounaries on Paros), there were sanctuaries and temples located outside the settlements. These are divided into "rural" and "peri-urban," such as at Ayia Irini on Kea and Iria on Naxos. The Heraion on Samos is a characteristic case of an open-air sanctuary which subsequently evolved into a major "peri-urban" temple.

During the Archaic period, the prosperity of the islands and intense competition between citizens, tyrants, and *poleis* for wealth, power, and prestige is evidenced by the public and religious architecture. Until the end of sixth century BCE, many island *poleis* had constructed impressive fortifications (e.g., Thasos, Samos, Aegina, Karthaia on Kea; Xobourgo on Tenos; Vryokastro on Kythnos; Kastro on Siphnos; Paroikia on Paros; Minoa on Amorgos; Melos) and aqueducts, such as the famous aqueduct by the architect Eupalinos for the city of Samos and the aqueduct on Naxos. Moreover, public buildings with different functions appeared mainly in major sanctuaries, such as Delos (e.g., "Oikos of the Naxians," "Treasury 5," "Bouleuterion" or "Building D," "Stoa of the Naxians," "Oikos of Andros"; Bruneau & Ducat 2005: 171-176, 188, 189, 199-200, 205, respectively) and the Samian Heraion ("South Stoa"; Gruben 1966: 319-320). Display of wealth is also observed in impressive architectural offerings, such as the treasury of the Siphnians dedicated at Delphi and the Naxian

dedications at Delos (Gruben 1966: 81-82, 144; Bruneau & Ducat 2005: 199-200).

Several of the most prosperous islands contributed significantly to the process that led to the canonical form of the monumental Greek temple (Gruben 1966: 32-42, 309-315). At Samos, three successive temples dedicated to Hera were built during the Archaic period: the "Hekatompedon II" (c. 675–625 BCE; Gruben 1966: 318-319), the "Rhoikos temple" (the first monumental Ionic temple, c. 570–560 BCE; Gruben 1966: 321-325), and the "Great Temple" (erected by Polycrates before the end of sixth century BCE; Gruben 1966: 325-329). Naxos undoubtedly played a leading role in the shaping and development of the Ionic order, as evidenced by the temple of Yria, the unfinished temple of Apollo Delios in the city of Naxos, the temple of Gyroulas (Mazarakis Ainian & Leventi 2009: 220-222), and the Oikos of the Naxians on Delos (Gruben 1966: 144; Bruneau & Ducat 2005: 199-200). Paros rivaled Naxos with the temple of Athena at Koukounaries, the temple of Artemis on the Delion, and the Apollo sanctuary on the islet of Despotiko near Antiparos (Mazarakis Ainian & Leventi 2009: 219, 222-223). Lesbos contributed to the formation of the so-called "Aeolic" (or "Proto-Ionic") order, whose main feature was the Aeolic column capital (Betancourt 1977: 87). The Doric order was formed in mainland Greece, yet important Doric temples are found on several Greek islands, as, for instance, the two successive temples of Athena Aphaia on Aegina (Gruben 1966: 110-115) and the temple of Artemis on Kerkyra (Gruben 1966: 103-107).

During the Classical period, the majority of cities had massive fortifications, which were both a military advantage and a vivid symbol of the sovereignty of the *polis*. Some of them (e.g., Thasos in 463 BCE, Aegina in 457 BCE, Samos in 439 BCE, and Mytilene in 427 BCE; Hansen & Nielsen 2004: 779, 622, 1095–1097, and 1027, respectively) were compelled to demolish their walls for political reasons. Numerous temples, political structures (e.g., *prytaneion* and *bouleuterion* on Delos and Paros), and other public buildings (e.g., stoas on Delos, Andros, Thera, Kos, and Thasos) are attested archaeologically. Moreover, theaters (e.g., Delos, Methymna on Lesbos, Ialysos and Lindos on Rhodes) and stadia (e.g., Aegina, Rhodes) started to be constructed in the islands probably before the end of the Classical period (Hansen & Nielsen 2004: 1379-1381).

Freestanding towers, round or square in shape, are one of the most common features of the islands in the late Classical and Hellenistic periods (Morris & Papadopoulos 2005). Particularly numerous on some islands (33 on Thasos, over 70 on Kea, 76 on Siphnos), they have been detected on the Cyclades (Andros, Tenos, Naxos, Kythnos, Seriphos, Ios, Amorgos), the Northern Sporades (Skopelos, Alonnesos), the northeastern Aegean (Lesbos), and the Ionian islands (Leukada), as well as on tiny islands (e.g., Seriphopoula, Herakleia, Arkioi, and Pharmakonisi). Various interpretations have been proposed, such as that they served as agricultural storehouses, slave quarters, lookout, and signaling posts and that they protected mines and quarries and/or were used as places of temporary refuge in cases of emergency; their precise function, however, remains disputed.

The most characteristic feature of the Hellenistic architecture is the theatrical mentality, which is expressed mainly in planning and organization of sanctuaries (Pollitt 1986: 230-242). Stoas, stairways, ramps, colonnades, and gates were used in a calculated, coordinated way in order to slowly lead potential visitors to a dramatic climax before the temple was revealed. Perhaps the most impressive of such arrangements are the temple of Athena at Lindos on Rhodes and the sanctuary of Asclepios on Kos (Winter 2006: 216-218). It is worth mentioning that the initiative in the architectural formation of the great sanctuaries (e.g., on Samothrace, Kos, and Rhodes) was being seized by rulers (such as Ptolemy II Philadelphus, Arsinoe II, and Eumenes II), who flaunted their power, wealth, and hegemonic ambitions.

In Roman times, the temples, public buildings, and urban infrastructure resulted from the beneficence of local patrons and, sometimes, the emperor himself, who donated the construction

costs and materials or underwrote repairs. The traditional forms of urban architecture could easily absorb Roman structures. As a result, certain typical building structures, such as fora and basilicas, did not exist in most island cities. Arenas, the main feature of Roman public leisure, are also not found on the islands, since preexisting theaters and stadia could be adapted, as is the case of the theater on Thasos. Odea (music halls) were built on several islands (e.g., Ikaria, Kos, Rhodes; Karvonis & Mikedaki 2012: 58, 94, 124) in order to host music competitions, oratorical speeches, and philosophical lectures. Despite their strong Greek character, however, the islands adopted numerous typical Roman features, such as temples constructed on podiums, paved streets (e.g., Samos, Kos; Karvonis & Mikedaki 2012: 68-69, 94), drains (e.g., Samos; Karvonis & Mikedaki 2012: 69-70), aqueducts (e.g., Lesbos, Samos, Melos; Karvonis & Mikedaki 2012: 32-33, 65-66, 174), and cisterns (e.g., Karpathos, Amorgos; Karvonis & Mikedaki 2012: 81, 143). Moreover, bathhouses have been found on many islands, such as Lesbos, Ikaria, Kalymnos, Kos, Nisyros, Telendos, Amorgos, and Skiathos (Karvonis & Mikedaki 2012: 27, 59, 79-80, 95-97, 105-106, 136, 141, 242), proving that the islanders had adopted the habit of public bathing, a salient characteristic of Roman daily life. The scale and the quality of the baths varied enormously, from small, less sumptuous structures to large, luxurious facilities.

Burial Customs

Graves and grave goods provide the greater part of the available archaeological data for the Protogeometric period in the islands. The presence of numerous small, separate, and close clusters of graves (e.g., at Naxos or Skyros) indicates a dispersed settlement pattern on most of the islands, on the assumption that each cemetery was attached to a settled area. Although the universal rite was inhumation in cist tombs and in vessels, some cremated burials have been dated to the same period (Dickinson 2006: 183-195). Offerings from the graves consisted of pottery, dress-ornaments, jewelry, and weapons.

During the Geometric period, the dominant practice was inhumation in cist or pit graves (e.g., at Tenos and Kos) and urn cremation (e.g., at Lemnos, Naxos, Paros, Kimolos, Thera, and Rhodes). Grave goods (mainly pottery, jewelry, and weapons) reflect the growth of prosperity in the period. Also worth mentioning are the cemeteries at Tsikalario in central Naxos and at Kylindra on Astypalaia, as they are unique in the islands. At Tsikalario, a cemetery of tumuli that contained varying numbers of cremation *pyres* was used during the Middle Geometric period (c. 850–750 BCE). In the recently excavated Kylindra's cemetery on Astypalaia, over 2,000 children younger than three years old were buried in pots from the second half of the eighth century BCE through Roman times. Finally, during this period, a new form of cult developed in the Greek world; the veneration of heroic forebears first appeared during the ninth century BCE and became firmly established at the end of the eighth century BCE. Excavations at the Metropolis square site on Naxos revealed that rituals in honor of the dead gradually took the form of an abstract ancestor cult (ninth–eighth centuries BCE) and finally evolved into hero worship (second half of the eighth century BCE). Other examples of this new form of cult come from several islands, such as Amorgos and Paros (Dickinson 2006: 191, 234; Mazarakis Ainian & Leventi 2009: 219, 237 n. 29).

In the seventh century BCE, diversity of burial customs continued, since the dominant practice in some islands was inhumation, while in others was cremation. During the sixth century BCE, however, inhumation became the more popular method of burial, although still not exclusively, and only Thera retained a preference for cremation burials (Kurtz & Boardman 1971: 177-179). In Aegina, an important series of chamber tombs began to appear in the early sixth century BCE. A remarkable innovation of the Archaic burial customs was the use of the plain or decorated stone *sarcophagus*, which was used from the seventh century BCE in many islands, including Rhodes, Samos, Chios, and Aegina. The decorated clay sarcophagi, which were used in Kameiros on Rhodes, Samos, Chios, and Lesbos,

date mainly to the sixth and early fifth century BCE. Moreover, many island cemeteries have yielded a fair number of grave markers and monuments, such as *stelai*, relief and decorated gravestones, and statuary (mainly *kouroi* and *korai*). Finally, worth mentioning is the grave of Menekrates on Kerkyra, an impressive circular cenotaph of c. 600 BCE (Kurtz & Boardman 1971: 245, 375).

During the Classical period, there was a marked decrease in funerary monumentality and offerings. In general, chamber tombs went out of fashion, and graves had the form of shafts or pits cut into the ground, slab-lined pits, and *sarcophagi*. In several islands, however, there are groups of elaborately constructed chamber tombs (e.g., Rhodes, Aegina). For adults, inhumation was the usual method of burial, and cremation was still practiced to any marked extent only in Thera, although it did not completely disappear from the islands. Children were buried in pots, clay tubs, and small *sarcophagi* (Kurtz & Boardman 1971: 193, 195-196).

In the Hellenistic period, burial customs did not change considerably from the preceding centuries, but in many cases, there is a marked tendency towards monumentality and theatricality, adopting the characteristic cultural attitudes of the period. In Rhodes, for example, there are impressive rock-cut tombs, several vaulted chambers, and a small stone tumulus. In Kos, Charmylos was honored by a two-story building constructed over a vaulted crypt (c. 300 BCE), and on second-century BCE Paros, there were *sarcophagi* raised on rectangular bases (Kurtz & Boardman 1971: 281, 286, 300, 373-374).

Finally, in Roman times, there was a great range of grave types, including rock-cut tombs and carved stone (usually marble) *sarcophagi*. The grave goods included pottery, terracotta figurines, lamps, jewelry, and coins. Worth mentioning also is the rock-cut necropolis of the city of Melos (the so-called catacombs) with the several thousand burials of the third and fourth centuries CE (although a few were earlier), virtually unique in Greece (Karvonis & Mikedaki 2012: 175).

Pottery

Protogeometric pottery offers valuable evidence for island communities, as well as for their external contacts (Lemos 2002). Besides imports, local productions afford evidence for close contacts with the mainland world, and especially with Attica and Euboea. During the Geometric period, many non-insular regions (mainly Euboea, Attica, Corinth, and Anatolia) continued to exercise considerable influence on island pottery production (Boardman 1998: 23-55). Nevertheless, several islands (e.g., Naxos, Paros, Melos, Thera, and Rhodes) established their own workshops, which contributed greatly to the development of Greek Geometric pottery.

From the end of the eighth century BCE, there were several local workshops which incorporated models and ideas from the east into their Geometric tradition (sc. "Orientalizing phase" in Boardman 1998: 83-85, 110-112, 141-147). Gradually, however, these workshops developed their own Archaic styles, which were under the greater influence of Athenian and Corinthian black figure pottery (Boardman 1998: 177-178, 216).

Throughout the Classical period, island pottery production was under the artistic domination of Athens. Besides Atticizing imitations, ceramic production of the island workshops was almost limited to the production of transport *amphorae*. The Thasian, Chian, Lesbian, Samothracian, Samian, Rhodian, and Koan wine was famous and their *amphorae* are found in large quantities throughout the Mediterranean world (Whitbread 1995: 41-44).

Production of painted vases in the islands declined in the Hellenistic period, due to the general replacement of fine pottery by metal vessels. Particularly popular, however, was the relief ware, which imitated luxurious metal tableware. The relief bowls (the so-called Megarian, as it was formerly believed that the sole center of production was Megara) are black- or red-glazed hemispherical cups with decoration covering the entire exterior of the vase (except for the rim) and ranging from abstract and floral ornaments to animal and human figures (Henig 1983: 182; Pollitt 1986: 256). Rhodes has yielded a fair

amount of distinct black-figured pottery reserved for funeral use, which has been named the "Hadra" style after the homonymous cemetery near Alexandria, where the first examples were discovered (Politt 1986: 256-257). Again, several islands produced transport *amphorae* for liquid products, like wine and olive oil. The shape of a typical transport *amphora* with a pointed or rounded toe was unsuitable for storage but ideal for transportation in the hull of a ship, where the vessel could be tightly packed (Whitbread 1995: 19-24, 34-37). Finally, in Roman times, the local pottery production was restricted to domestic and commercial needs, while imports from Rome and other major centers were increased (Henig 1983: 186-187).

The Plastic Arts

Throughout the EIA, the range of plastic works was restricted to figurines in terracotta, bronze, wood, and, extremely rarely, ivory. The figurines, usually male and female, were used almost exclusively as sanctuary dedications (especially at major sanctuaries, such as Delos and the Samian Heraion), but their number increased gradually during the course of the eighth century BCE.

In the early Archaic period, elaborately decorated female statuettes in terracotta were dedicated at sanctuaries (e.g., Samos, Despotiko, and Kastro on Siphnos). Plastic works in terracotta, bronze, wood, and ivory continued to be produced, but from this time on, stone became the basic material; one of the earliest works of monumental sculpture was the female statue dedicated by the Naxian Nikandre at Delos (Rolley 1994: 145-146; Bruneau & Ducat 2005: 86).

From the later seventh century BCE onwards, monumental sculpture underwent a considerable improvement, and the islands played an important role in the development of the two basic sculptural types: the *kouros* and the *kore* (Rolley 1994: 165-174, 176-187). The *kouroi*, young men appearing as "heroic nudes," were votives at sanctuaries or used as funeral monuments. Initially, the *kouroi* had supernatural size, such as the "Colossus of the Naxians" on Delos, a few *kouroi* from Samos and from the Archaic cemetery of Thera, and the so-called *kriophoros* ("man carrying a ram") from Thasos (Rolley 1994: 146; Bruneau & Ducat 2005: 177-181). Gradually, however, they became more realistic: for instance, the so-called Strangford Apollo (Anaphe is the reputed provenance, now in the British Museum) and the *kouros* from Kea (Rolley 1994: 272). Several early *korai*, seated or standing clothed women, were also represented as larger than life size (e.g., the fragment of a 2.5 m. tall *kore* from Samos), while later artistic focus shifted to a concern for a detailed rendering of their elaborate dresses. The *korai* were widely set up as dedications to female deities (e.g., to Artemis on Delos, to Hera and Nymphes on Samos), though funerary *korai* may have been extant on Samos, Chios, and Thera. Dedicatory inscriptions and signatures of their sculptors are quite often found on both types. Several island workshops, with their own stylistic characteristics, have been identified; most famous were the Naxian and Parian workshops which received commissions from other islands and mainland Greece. Finally, the architectural sculpture was restricted to sacred buildings, such as the temple of Artemis on Kerkyra, the treasury of the Siphnians at Delphi, and the Samian Heraion (Rolley 1994: 183, 190, 221, 269-270).

The Archaic tradition continued into the first half of the fifth century BCE, when several schools (e.g., Naxian, Thasian, Samian, and East Ionian) functioned on the islands. Paros, especially with the reliefs in the so-called Severe style (c. 480–450 BCE), was the leading center for early Classical sculpture (Rolley 1994: 359-362). Parian works, in addition to those found on the island itself, have been found on the Aegean islands (mainly Thasos) and mainland Greece. In the second half of the fifth century BCE, the sculptural style of Classical Athens proved to be so influential that the local island workshops gradually lost their unique styles. A fine example of this process is seen on the *stele* of Krito and Timarista from Rhodes (c. 410 BCE, Archaeological Museum of Rhodes), which combines the Parian tradition

with the achievements of Attic sculpture (Rolley 1999: 185). During the fourth century BCE, works (mainly grave *stelae* in relief or with *anthemion*) of Attic origin or inspiration appear on most islands (mainly grave *stelae* in relief or with *anthemion*; Rolley 1999: 220).

The Hellenistic sculpture covered a wide range of types, such as freestanding statues of eminent men and distinguished women, equestrian statues of rulers, narrative groups, and athlete or hero figures. The typical feature of these works is a theatrical manner of representation, which emphasizes emotional intensity and a dramatic crisis. This theatrical temperament is obvious in the famous "Winged Nike of Samothrace," one of the masterpieces of Hellenistic sculpture (Ridgway 2000: 150-157). The goddess is shown in the form of a winged woman standing on the prow of a ship, braced against the strong wind blowing through her garments. This colossal work was placed in a pool filled with water in which the ship appeared to float. It has been suggested that this monument was dedicated to the sanctuary of the great gods by the Rhodians in commemoration of a specific naval victory in the early second century BCE. Naturally, sculpture flourished on prosperous islands, such as Rhodes, Kos, and Delos. During the Hellenistic period, Rhodes became a great center of sculpture in the Aegean, and some of the most important Hellenistic sculptures, for instance, the Aphrodite and the Poseidon of Melos, have been attributed to Rhodian sculptors (Ridgway 2000: 167-171). Kos has also yielded a rich collection of statues in a distinct style (Ridgway 2000: 164). The most renowned sculptors of the period worked on Delos, and a few workshops were established on the island, even though they cannot be considered a school in the sense of a unified style (Bruneau & Ducat 2005: 101-111).

Finally, during the Roman period, all the public places of the cities were adorned with honorific statuary of prominent citizens, local benefactors, governors, and emperors. Although sculpture did not flourish as formerly, a large number of plastic works have come to light: copies of great Classical or Hellenistic originals (such as the well-known "Hermes of Andros"), portraits, funeral or votive steles, sarcophagi, and altars (Henig 1983: 66-96).

Mosaics

The first mosaics, made of natural pebbles, appeared in the Greek world c. 400 BCE, but it was only during the Hellenistic period that the technique of mosaic making underwent a striking development and remarkable innovations as a result of the prosperity of individuals and the desire to demonstrate their wealth (Pollitt 1986: 210-229). The house was a tangible symbol of the owner's status and helped to establish and enhance his position in the social order. Decorated pebble mosaics were produced in Greece probably from the late fifth century BCE and continued into the Hellenistic period. However, from the late third century BCE onwards, regular cubes (*tesserae*) of stone, glass, and terracotta replaced pebbles as the principal material for mosaics. Mosaics of very high quality were made in a technique known as *opus vermiculatum*, in which extremely tiny *tesserae* were used (Pollitt 1986: 212). Some of the finest Hellenistic mosaics are found on Delos, where the great majority were produced between 166 and 100 BCE (Pollitt 1986: 215-218; Bruneau & Decat 2005: 125-130). Geometric designs are the most common, including bands of guilloche, complex meanders, groups of lozenges, or bead and reel; also popular are pictorial themes derived from the world of the sea (e.g., dolphins, tritons, and anchors) or the theater (e.g., masks). During the Roman period, mosaic art continued to flourish using geometric or abstract patterns and depicting mythological scenes. Masterpieces of Roman mosaics are found at "Menandros's House" on Lesbos and at "Casa Romana" on Kos (Karvonis & Mikedaki 2012: 38, 92-93).

Numismatics

The first Greek coins seem to have been struck on Aegina around the middle of the sixth century BCE, and until the end of that century, many island *poleis* (e.g., Kerkyra, Siphnos, Naxos, Paros, Thasos, Lesbos, Chios, Samos, and Rhodes)

minted their own coinage – evidence of their prosperity in Archaic times. During the Classical period, the majority of the islands issued their own coins, although Athens suppressed the civic coinage of several islands for a substantial part of the fifth century BCE (Hansen & Nielsen 2004: 144-149, 1382-1389). The coins were normally minted in silver or bronze, although some gold (Thasos) or electrum (Lesbos) issues were also produced. In most cases, they carry legends referring to *polis*-ethnics, regional ethnics, or place-names, as well as pictorial and other devices (e.g., the principal deity of each island, subsidiary or local divinities, heroes, animal, and plants). Coinage was an essential feature of Greek economies and the different standards and issues did not prevent commerce. Nevertheless, the domestic coinage of many islands, including Lemnos, Tenos, Syros, Amorgos, and the Northern Sporades, enjoyed circulation only at a local level. Finally, numismatics reveals the loss of the islands' autonomy during the Hellenistic and Roman periods. In the Hellenistic period, there were few civic issues of independent types, as civic coin types were replaced by the mass-produced coinage of the Successor kingdoms (Hoover 2010: esp. lix-lxiv). During the Roman period, several islands (e.g., Chios, Samos, Lesbos, Cos, Rhodes, and Ios) enjoyed the right to mint their own coins in order to be used locally, but it was the Roman currency that dominated exchange (Heuchert 2005: 29-40, Maps 3.1, 3.2.1, 3.2.2).

Future Directions

The Greek islands are an ideal theater for exploring the ideas, agendas and methods employed in island archaeology. The first major steps in this direction have been made by several recent publications (e.g., Broodbank 2000; Berg 2007), but these studies so far focus mainly on the prehistoric periods. More efforts should be made to analyze the Early Iron Age and later periods, as island archaeology is vital in order to enhance our understanding of past communities in the Greek islands. Moreover, interdisciplinary research projects should be intensified. The systematic involvement of palynologists, archaeobotanists, zooarchaeologists, osteoarchaeologists, geologists, mineralogists, etc. in fieldwork and material analysis will contribute to the fuller exploration of the islands.

Some islands have been investigated for many decades, and as a result, much information about their archaeology and history is available. However, there are still several islands that are less well explored, while others have had little or no exploration. Therefore, in some cases, scholars have based their work on incomplete data, and as the flow of information increases, these interpretations are proved to be not valid. For example, until quite recently, Zagora was considered to be the only major settlement on Geometric Andros. In the last decades, however, another important settlement was excavated at Hypsele, completely changing the picture of the settlement pattern of Andros during the Geometric period. Excavation is a very time-consuming and expensive process, but intensive surveys may provide a fuller picture of the archaeology of the Greek islands and assess the risks and impact that development projects will have on archaeological heritage.

Finally, it is important to note that archaeology is not just for scholars but for all society. Unfortunately, there are several sites where the excavation was completed many years ago, but the final publication has not yet been produced; thus our information comes mainly from preliminary reports. Excavators should publish the results of their studies as soon as possible and inform both the scientific community and the general public (especially the local communities) about their work. Also, the enhancement of the archaeological sites is very important in order to make them accessible to everyone.

Cross-References

- ▶ Agora in the Greek World
- ▶ Andron
- ▶ Baths and Bathing, Greek
- ▶ Baths and Bathing, Roman

- ▶ British School at Athens
- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Crete, Archaeology of
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Cyprus, Archaeology of
- ▶ Domestic Architecture, Roman
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Greek Colonialism, Archaeology of
- ▶ Numismatics, Ancient Greek
- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican
- ▶ Orientalizing Phenomenon: Greek Archaeology Perspective
- ▶ Panhellenism
- ▶ Polis
- ▶ Religion, Greek, Archaeology of
- ▶ Romanization
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Stoa
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Tombs, Greek (Iron Age)
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Planning in the Greek World
- ▶ Urban Planning, Roman
- ▶ Villas and Farms in the Mediterranean World

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Green, Jeremy N.

Myra Stanbury
Department of Maritime Archaeology, Western Australian Museum, Fremantle, WA, Australia

Basic Biographical Information

Jeremy Green (Fig. 1) is Head of the Department of Maritime Archaeology at the Western Australian Museum, a position he has held since 1971. After receiving a B.Sc. (Hons) in Physics from the University of Hull (1963), and a B.A. (Hons) in Physiology at Oxford (1966), Jeremy worked at the Research Laboratory for Archaeology, Oxford University (1967–1971). Here, under the direction of Professor E.T. Hall (1924–2001),

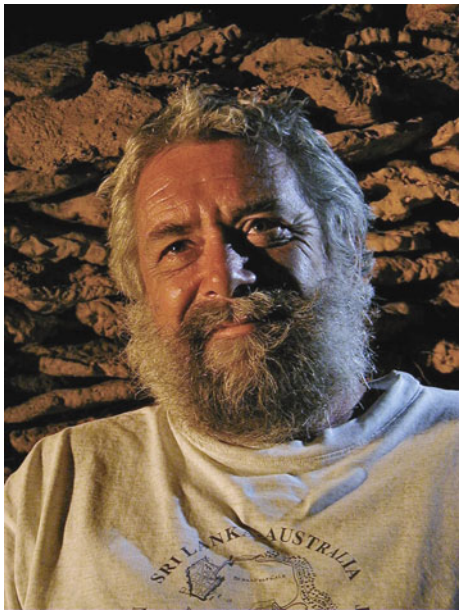

Green, Jeremy N., Fig. 1 Jeremy N. Green, Head, Department of Maritime Archaeology, Western Australian Museum (Photo: Glen Martin)

a leading expert in archaeometry and the development of scientific techniques to examine archaeological discoveries, Jeremy developed an underwater metal detector, a proton magnetometer, and four systems of underwater photogrammetry. These techniques and instruments were investigated in field conditions in England, Ireland, and in the Mediterranean. Jeremy deployed them on shipwrecks such as the Byzantine wreck at Yassi Ada, the late fourth-century BCE Greek merchant shipwreck at Kyrenia, the Spanish Armada ships *Santa Maria de la Rosa* and *Trinidad Valencera*, the Dutch East Indies ship *Amsterdam*, and various sites around Cyprus dating from the Classical to the Byzantine period.

Major Accomplishments

Jeremy Green's appointment to the Western Australian Museum arose out of a need for expertise to manage a number of significant shipwreck sites that had been legally protected under the jurisdiction of the museum. He set up the Department of Maritime Archaeology and established a program involving presettlement, post-settlement, and wreck inspection work. Jeremy Green's expertise was initially applied to the survey and excavation of the English East India ship *Trial* (1622), and the Dutch East India ships *Vergulde Draeck* (1656) and *Batavia* (1629), and later the preliminary work on the *Zeewijk* (1727) and *Zuytdorp* (1712). The excavation of the *Batavia* was the first archaeological excavation of a postmedieval shipwreck in the world and certainly Australia's most significant maritime archaeological excavation. Assisted by an Australian Research Council grant, and an Honorary Research Fellowship at the Institute of Archaeology, University of Oxford, Jeremy Green pursued a research program investigating early seventeenth-century shipbuilding techniques and Asian ships. He collaborated with international colleagues over the reconstruction of the *Batavia* timbers and the *Batavia* Reconstruction Project in Lelystad, the Netherlands, and expanded his work to sites in the Indian Ocean, Southeast Asia, and East Asia.

Aimed at developing a sustainable network between maritime archaeological practitioners and avocational groups throughout Australia, Jeremy Green co-founded the Maritime Archaeological Association of Western Australia (MAAWA) (1973), shortly followed by the Australasian Institute for Maritime Archaeology (AIMA), of which he was foundation President and Editor of its Bulletin and Special Publications from 1977. In 1980, Jeremy Green initiated the first of a series of postgraduate diploma in maritime archaeology courses through Curtin University of Technology (WA); his book *Maritime Archaeology: A Technical Handbook* (1990, 2004) was designed as a primary reader for subsequent postgraduate courses, practicums, teaching, and supervision of students from Flinders and James Cook Universities, the University of Western Australia, and overseas interns. He also provides technical advice and services to professional practitioners

in the use of remote sensing equipment – magnetometers and side scan sonar – and the computer software packages that have radically changed the efficiency and application of this type of equipment for locating, surveying, and mapping shipwreck sites.

Scientifically motivated, Jeremy Green was the first to install computer technology into a curatorial department at the Western Australian Museum, progressively developing shipwreck and artifact databases that provided the initiative for a national online system – the Australian National Shipwreck Database (http://www.environment.gov.au/heritage/shipwrecks/index.html). Always eager to experiment with new technology to improve underwater surveying techniques, Jeremy has trialed different computer programs – PhotoModeler, VirtualMapper, and Rhino – on Australian and international shipwreck sites to test their accuracy and usefulness in different situations.

Jeremy Green's career includes a long span of field and academic experience around the world. He has provided expert advice to governments embarking on maritime archaeological programs; assisted with the training of overseas personnel through UNESCO Regional Workshops and local training programs in places such as Thailand, China, and Sri Lanka, to advance underwater cultural heritage in these countries; and participated in numerous international conferences. In addition to leading the first archaeological project in China after the Cultural Revolution, Jeremy Green's work has taken him to Mombasa, Thailand, Japan, Korea, Malaysia, People's Republic of China, the Maldives, Philippines, Sri Lanka, Sicily, and Turkey. Reports on the various projects may be found in his extensive list of publications (http://www.museum.wa.gov.au/maritime-archaeology-db/maritime-reports).

In recognition of his expertise, Jeremy Green has been the recipient of numerous grants, fellowships, and awards, among them a Churchill Fellowship to conduct research work on the Dutch East India Company in Indonesia, an Australia-China Council grant to visit the Quanzhou ship in the People's Republic of China, and an Australia-Japan Foundation grant to work on the Kublai Khan Fleet in Japan.

Jeremy Green holds an M.A. from Oxford University and is an Honorary Research Fellow of the Institute of Archaeology, Oxford. He has held respected positions in Australian Universities including Honorary Fellow of the Centre for Archaeology, University of Western Australia, and Adjunct Associate Professor at Curtin University of Technology, Flinders and James Cook Universities. In 1994, he was appointed Head of the Australian National Centre of Excellence for Maritime Archaeology and is Editor of its Special Publication Series. He is a Fellow of the Australian Academy of the Humanities, Research Associate of the Institute of Nautical Archaeology, and Advisory Editor of the *International Journal of Nautical Archaeology*.

Jeremy Green's contributions to maritime archaeology have been acknowledged both in Australia and the United Kingdom. In 1986, he was awarded the Keith Muckelroy Prize for Achievement in the Field of Maritime Archaeology (UK). The following year, he was a finalist in the Bicentennial BHP Awards for the Pursuit of Excellence in Science and Technology. In 2003, he received an Australian Centennial Award and, in 2007, the prestigious Rhys Jones Medal in recognition of his pioneering work in the development of maritime archaeology in Australia. At the 2011 Inaugural Asia–Pacific Regional Conference on Underwater Cultural Heritage in Manila, Philippines, Jeremy Green was presented with the Asia-Pacific Maritime Archaeology medal in recognition of his contribution to maritime archaeology, and in 2012 his long and dedicated service to the Australasian Institute for Maritime Archaeology (AIMA) was acknowledged with a special Appreciation Certificate.

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Greenland: Approaches to Historical Norse Archaeology

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Introduction

The prehistory of Greenland is the story of successive migrations of Arctic hunters entering Greenland from what is now Canada. According to the archaeological record, the first humans to set foot on Greenland were the Independence I Culture who spread from High Arctic Canada into North Greenland about 4,500 years ago. During the next 3,000 years, people of the Saqqaq, Independence II, and Dorset cultures followed (Gulløv 2004). The first people to introduce a "writing" culture, however, were Norse colonists, who emigrated from Iceland to the southern subarctic parts of the Greenland west coast around CE 980. Unfortunately, we do not have written accounts from the Norse Greenlanders themselves; most information concerning events in Greenland was written down in either Iceland or Norway. About 100 years after the Norse had become established in South Greenland, a new group of Arctic hunters, the Thule Inuit, arrived in North Greenland from Canada. These were the first Inuit to be described in texts by the Norse, commencing around the middle of the twelfth century CE.

Historical Background

According to early historical sources from Iceland and Norway, Icelanders under the leadership of Erik the Red migrated to Greenland around 985, where they settled in what they called the Eastern Settlement in what is today Kujalleq municipality, and in the Western Settlement close to Nuuk (Fig. 1). In broader perspective,

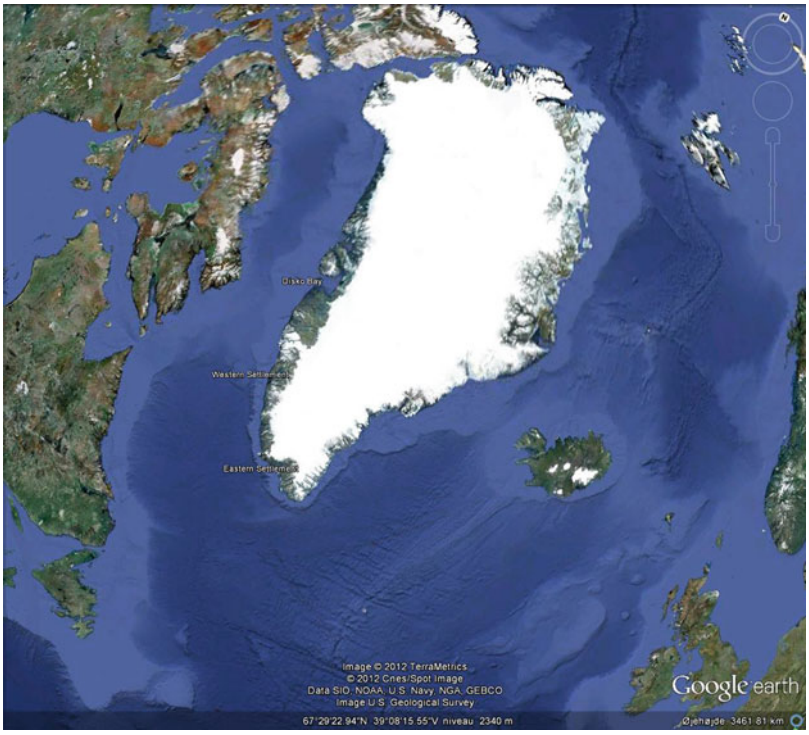

Greenland: Approaches to Historical Norse Archaeology, Fig. 1 The Norse settlements are both located on the west coast of Greenland. The Eastern Settlement around 60° N in present-day Kujalleq municipality and the Western Settlement around 64° N near Nuuk in Sermersooq municipality

Norse settlement in Greenland was the last step in the colonization of the North Atlantic Islands which began with the settlement of the Faroe Islands and Iceland in the later part of the ninth century. Around CE 1124, the first Greenlandic bishop was appointed and in 1261, Greenlanders became subjects of the Norwegian king. The last bishop residing in Greenland died in 1378, and in the same period, the Western Settlement is reported as being abandoned. Thirty years later, in 1408, an Icelandic couple married in the Hvalseyfjord church in the Eastern Settlement and the attestation of their marriage is the last written testimony of life in the Norse settlements in Greenland (GHM III 1845).

The history of the early years of Norse settlement in Greenland is based on Icelandic and Norwegian historical accounts and Icelandic sagas written down in the thirteenth century from much older oral tradition. Later periods are based on contemporary Icelandic annals, contemporary ecclesiastical correspondences, and topographical accounts; the latter are often only known from much later copies.

Archaeology and the study of material culture was introduced in Norse Greenlandic research early in the nineteenth century, often with closely defined problems originating from a reading of the written sources and, as was the common attitude to archaeology at the time (Andrén 1997), the archaeological record was interpreted from the perspective of the written sources. Discussions of the chronology of the settlements depended entirely on written accounts, for instance, and archaeology only served to illustrate and verify what was already understood from the written sources. The medieval topographical accounts were used to identify the ruins of farms and churches in the landscape, several of which were subsequently excavated. Among others, key sites investigated during this phase included Erik the Red's farm Brattahlid (now the present-day settlement of Qassiarsuk); Gardar, where the bishops lived (present-day

Igaliku), and Herjolfsnes (present-day Ikigaat), which comprise the southernmost of Norse farms mentioned in the accounts.

In the late twentieth century, processual archaeology began to have more influence on approaches to the archaeology of Norse Greenland, encouraging a focus on the kind of social and economic questions that only archaeology can answer. For a period, archaeologists ignored churches, dwellings, and the stables and barns of the manor farms and turned instead to excavation of middens so as to recover data that could provide insights into the economy of the farms. This produced fresh insights. In particular, while the written sources and the settlement pattern gave the impression of an economy based on pastures and animal husbandry, the animal bone record indicated that marine resources played a much larger role than formerly recognized. In addition, careful, stratigraphically controlled excavations and the introduction of radiocarbon dating provided new insights into changes over time. These showed that the dependence on the marine resources increased over time. The animal bone record also revealed social differences between the cattle-based manor farms compared to the smaller farms, where sheep and goats dominated (McGovern 1985).

Today, midden excavations and the application of the methods and approaches of historical ecology, environmental archaeology, and the natural sciences still play a fundamental role in Norse Greenland archaeology. However, research has been expanded so as to get a broader perspective on questions such as the nature of social organization, systems of governance, variations in economy and subsistence, religious practices, and evidence for human well-being/suffering. This has prompted new surveys and excavations of farm buildings and churches, and a revival of interest in artifact studies. Instead of single site studies, whole regions and the interaction of the many cultural elements of the landscape are now standard, and the results are interpreted from a broader perspective, that include theoretical frameworks derived from social anthropology and "Annales"-oriented research, with special emphasis on human-environment interaction. Most research is also interdisciplinary including both natural sciences and humanistic social-science approaches, i.e., history, human bioarchaeology, zooarchaeology, archaeobotany, geoarchaeology, stable isotopic analysis, historical ecology, environmental modeling, and artifact studies.

Key Issues

Although there are other topics of research, the following three broad themes capture many of the current concerns in the historical archaeology of Norse Greenland. These are the enigma of Norse settlement, Norse Greenland ecodynamics, and the causes of depopulation.

The Enigma of the Norse Settlements

One of the key concepts to the New Archaeology was to seek explanations rather than just providing descriptions of events, and this has been a recurrent feature of Norse Greenlandic archaeology. Above all, the human story about Norse Greenland has been a story about colonization of virgin land, survival for half a millennium, and then disappearance. The enigma of the depopulation of the settlements has always attracted archaeological attention and many explanations have been put forward.

Written accounts indicate hostile encounters between the Norse and the Thule Inuit who moved very rapidly from North Greenland southward toward the Norse settlements, and the explanation that the Thule Inuit wiped out the Norse population has for a long time been the most persistent explanation of Norse disappearance.

With the growing recognition of the damaging consequences of modern utilization of Earth's limited natural resources, the Thule Inuit theory has been overshadowed by ecological explanations, and from the 1980s, the prevailing explanation of the depopulation of the Norse Greenland settlements has been one of maladaptation and ruthless exploitation of the very fragile natural resources. The impacts of climate changes have added yet another facet to the discussion.

In his famous book *Collapse – How Societies Choose to Fail or Succeed*, Jared Diamond (2005) summarized the state of play and argued that the Norse Greenland society collapsed for three related reasons. First, they depleted the environmental resources on which they depended by cutting down trees, stripping turf, and overgrazing their pastures, all of which resulted in heavy soil erosion. Second, they did not utilize additional and available food sources such as fish, ringed seal, and stranded whales, and thirdly because they had established a rigid social system, that could not adapt to the changing world. All these arguments can be challenged on archaeological grounds.

Norse Greenland Ecodynamics

In 2007, a new large scale research project, the Vatnahverfi project, was launched as one of the many International Polar Year projects (Vatnahverfi project n.d.). Vatnahverfi is a c. 500 km^2 large peninsula situated in the Eastern Settlement south of the elite farm Gardar, where the Greenlandic bishops lived. In the Middle Ages, Vatnahverfi was relatively densely populated, and the aim of the project was to study a larger region, for the first time ever, with the focus on the interaction between the individual farms and between settlement and environment. At the time of writing (Dec. 2011), post-excavation work is still in progress. However, preliminary results from the Vatnahverfi project and other research projects indicate that the theories of maladaptation and unsustainable farming practices are contradicted by the material evidence.

Norse *landnám* did impact the environment. The introduction of animal husbandry and stripping off large areas of turf for house construction caused increased erosion, but in the long run, Norse interaction with the environment seems to have been sustainable (Massa et al. 2012; Schofield & Edwards 2011; Dugmore et al. 2012). Vatnahverfi, for instance, does not show erosion disasters of consequence – many farms established artificial irrigation systems and they fertilized their grass fields, perhaps in the hope to increase yields, or at least to preserve status quo (Buckland et al. 2009). In the Norwegian text *The King's Mirror* written around CE 1250 (Jónsson trans. 1920), it is stated that the Greenlanders had good pastures and large and good farms and that they held many heads of cattle and sheep for butter, cheese, and meat (Fig. 2). Yet, the author also mentions that the Greenlanders in addition subsisted on meat from reindeer, whale, seal, and bear, and both the animal bone record (McGovern 1985) and the δC13 and δN15 values measured on Norse human bones show that the marine component of the diet increased over time (Arneborg et al. 2012). From the middle of the thirteenth century, the subsistence economy shifted from a predominantly terrestrial diet to a more marine diet with seal as the prime meat producer.

The climate deteriorated in the settlement period (Masson-Delmotte et al. 2012), and climate changes could be part of the explanation of the increased dependence on marine resources – either because of easier access to seals or because of a decline in the pasture economy.

In the first period, settlement was concentrated in the inner and mid-fjord regions where pasture farming was possible. The large and most wealthy farms were situated in the inner fjords where conditions were by far the best. Large houses, festal halls, byres for cattle, warehouses, and connected churches were clear marks of status (Fig. 3). There are indications that a smaller number of manors owned all the land and the farms sitting there, and the reduction in the number of farms with a connected church at the same time as a limited number of much larger stone churches were constructed in a few core manors suggests a consolidation of power around a few great families from the thirteenth century and onward. In the same period, marginal farms on less favorable locations were abandoned.

During the period of climatic deterioration, the elite consolidated their farms in the inner fjords, pasture farming declined, the scale of animal husbandry decreased, and the subsistence economy became more and more dependent on the marine resources that were only available on the outer coast. Moving inland to the more "rural" region at the same time as subsistence became more dependent on outer coast resources appears to be inconsistent and could be interpreted as cultural rigidity – but may in fact have been the

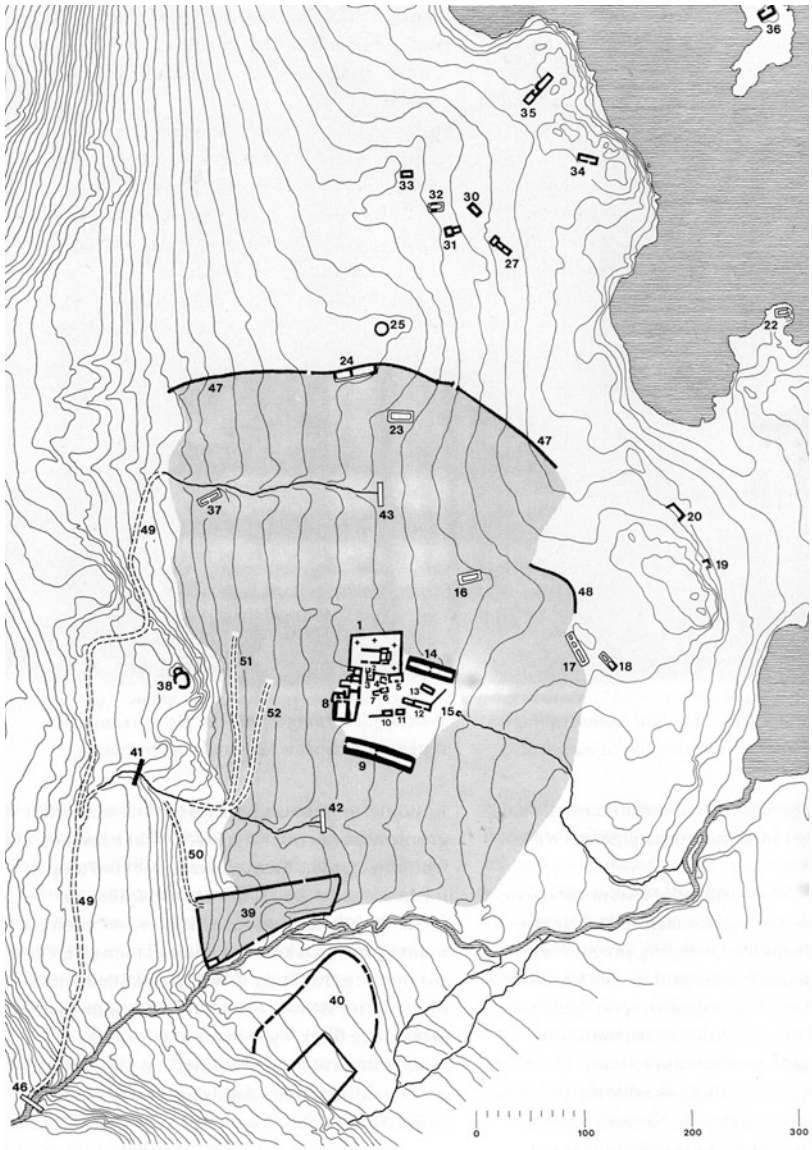

Greenland: Approaches to Historical Norse Archaeology, Fig. 2 The ruins of the Norse farm *Gardar* in present-day Igaliku (After Krogh 1982). *Gardar* represent one of the largest farms in the Eastern Settlement. The Greenlandic bishops lived here and ruin no. 1 is the cathedral. Ruin no. 8 is the main dwelling, and ruins nos. 9 and 14 are large byres with connected barns. The main buildings were placed centrally in the infield. The infield was used for growing grass for winter fodder for the animals kept in the byes and stables during winter. A fence surrounding the infield kept the grazing animals out of the infield. Water from dams in the mountains was led to the infield through the channels 49, 50, 51, and 52

opposite. Compared to the animal husbandry seal kept people alive, and as long as the elite was able to control the resources and maintain the perception of Norse Greenland as a society based on farming and landownership sealing would only support the prevailing social order.

Depopulation

Although most focus has been on the subsistence economy, one should however not ignore the fact that the survival of the Norse in Greenland depended on both local subsistence *and* trade with Europe. Necessities such as iron had to be imported, and the Greenlanders' most important trade item was tusk ivory from walruses caught in the Disko Bay and northward (see Fig. 1).

The walrus hunt was elite driven and it was the elite who controlled the foreign trade linking Greenland with North Atlantic/Scandinavian networks that provided the North European markets with Arctic exotics – first and foremost walrus tusk. At home, redistribution of imported items

Greenland: Approaches to Historical Norse Archaeology, Fig. 3 The ruin of the church at the elite farm in the *Hvalsey* fjord in n the Eatsern Settlement seen through the door of the festal hall. The remains of the dwellling can be seen between the festal hall and the church (Photo: J. Arneborg 2004)

formed part of the elites' power base. However, over time, trade patterns changed, and the highly valued and very valuable walrus tusk lost prestige during the Middle Ages, especially as other ivory sources became more accessible, and it was no longer worth risk losing both ships and men to acquire it (Roesdahl 1995). As a result, in Greenland, the elite lost prestige and power *pari passu* as the calls by foreign merchants' ships become fewer and fewer (Fig. 4).

International Perspectives and Future Directions

The Norse settlements in Greenland were populated for about 500 years. New research indicates that the Norse Greenlanders were well adapted – at least with respect to local subsistence economy, and economic strategies seem to have been sustainable. Still, Norse Greenland society faced several difficulties caused by climate changes, changed international trade relations, and, perhaps, the arrival of the Thule Inuit, circumstances that were out of their power to change. Altogether life in Greenland became difficult, resulting in a decrease of population to end with the total depopulation.

Greenland: Approaches to Historical Norse Archaeology, Fig. 4 Woolen dress found 1921 in the *Herjolfsnes* church yard in the Eastern Settlement, C14 dated to the beginning of the 1400s. The dress is of contemporary European fashion and clearly shows the importance the Norse Greenlanders attached to their European identity (© National Museum of Denmark, reproduced with permission)

One stress factor on Norse society of which we know very little was the appearance of the Thule Inuit in Greenland and in the settlements in particular. In a late twelfth century

Norwegian History book *Historia Norwegiae* (trans. 2008), we learn for the first time about Norse encounters with the *Skrælings*. The presence of Thule Inuit in the Disko Bay region is documented archaeologically from around 1200 and onward and encounters between the two people must have been unavoidable. The archaeological record is still uncertain when it comes to the arrival of the Inuit to the Norse settlements. Nevertheless, if the Thule Inuit actually settled on the coast in the Norse settlements while the Norse were still living on their farms, the Thule– perhaps – would have been positioned to cut off Norse access to migratory seals. Future research may resolve this.

Finally, as research on these issues has progressed, from having been of local interest only, the fate of the Norse Greenlanders has now turned into a matter of global interest. Today, ecologically orientated archaeology forms part of interdisciplinary studies on issues of sustainability, resilience, and the future of humans on earth, and Norse Greenland has become one of the classic examples of societies that did not make it. Against this background, future research in Norse Greenland is likely to seek to improve our understanding of the complex interactions of human governance, climate change, global commodity flows, human environmental impact, and world system effects.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Landscape Archaeology
- ▶ Medieval Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Scandinavia/Northern Europe: Historical Archaeology
- ▶ Zooarchaeology

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Grimaldi, Stefano

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Basic Biographical Information

Stefano Grimaldi is an Italian archeologist who specializes in hunter-gatherer groups (Grimaldi 2009; Grimaldi & Flor 2009). He grew up in Rome and completed his graduate studies in Prehistoric Archaeology at the "La Sapienza" University of Rome (1992). He received a Ph.D. (1996) in anthropology in the same university under the guidance of Professor Amilcare Bietti.

Early in his career, Stefano Grimaldi worked as a field technician in several excavations in Europe. At the same time, he was co-founder member of a private company that specialized in cultural heritage management. Grimaldi has received research grants from the European Community to work in Portugal (1996–1999). In 1999 he was an assistant professor at the Instituto Politecnico de Tomar, Portugal, as a colleague of Luiz Oosterbeek. At this institution he taught prehistory, human evolution, and lithic technology. Since 2005 he has been an assistant professor at the University of Trento, Italy, teaching human evolution and European prehistory.

Since 2006 Stefano Grimaldi has been president of the "Human Occupations in Mountains Environments" Commission of the International Union of Prehistoric and Protohistoric Sciences.

He is a researcher in the "Quaternary and Prehistory Group," Geosciences Center, at University of Coimbra, Portugal, and with the Instituto Terra e Memoria of Maçao, Portugal.

Major Accomplishments

Stefano Grimaldi's major accomplishments involve the development of a techno-functional approach to the study of lithic assemblages and new evidence from archaeological excavations in Italy and Portugal. Since 2007 Stefano Grimaldi has been a scientific director of excavations at the Middle-Upper Palaeolithic Riparo Mochi rockshelter, Balzi Rossi, Italy (Douka et al. 2012). Since 1999 he has been one of the scientists responsible for excavations at the Lower-Middle-Upper Palaeolithic Ribeira Ponte da Pedra open-air site in Portugal (Grimaldi & Cura 2009).

Cross-References

- ▶ Europe: Early Upper Paleolithic
- ▶ European Middle Paleolithic: Geography and Culture

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Gryaznov, Mikhail P.

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Basic Biographical Information

Mikhail Petrovitch Gryaznov (1902–1984) was an outstanding Russian scientist, Doctor of Historical Sciences, Professor, Laureate for the USSR National Award, and corresponding member of the German Archaeological Institute. M.P. Gryaznov entered into the archaeological chronicles of Euroasia as an outstanding specialist in archaeology, anthropology, and the ethnography of Siberia, Kazakhstan, and Middle Asia.

Mikhail Gryaznov made his pathway to archaeology through a untraditional route. While being a first year student in the physics branch of the Physics and Mathematics Department at the University of Tomsk, he participated in the Achinsk geographical expedition. On the banks of the Yenisei River, 17-year-old Gryaznov met an archaeology squad. He stayed there as he was excited by the excavations. From that time onward, Gryaznov's scientific interests were in archaeology, anthropology, and ethnography. Those interests were strongly connected to the discovery of the first four stages of currently well-known cultures by ancient Siberian archaeology: Afanasiev's, Andronov's, Karauk' memorials of Bronze Age, and Scythian Time mounds. In 1922, Mikhail Gryaznov transferred to Leningrad University, and in 1925, upon finishing a 3-year study period in the anthropology branch of the Physics and Mathematics Department, he left the university and started to work as a scientist in the ethnographic department of Russian National Museum.

At the end of 1920, under the guidance of his teacher S.A. Teplouhov, Mikhail Petrovitch Gryaznov's area of interests had become even clearer. During this period, he concentrated his attention on researching the monuments of the Bronze Age in a wide region, including Southern Siberia, Kyrgyzstan, and Kazakhstan.

M.P. Gryaznov's fieldwork on the Scythian period in Altai Mountains holds a very important place in the ancient history of Siberia. During the excavations of large mounds Shibe (1927) and Pazyryk (1929), cultural and art monuments of the "early nomads" were obtained, as they had been preserved in permafrost. In 1939, Gryaznov formulated the definition of the *early nomads period* as a distinctive period in Eurasian history. The definition "early nomads period" entered into specialized literature thanks to him.

In 1937, M.P. Gryaznov started his work at the National Hermitage, and from 1939 to June 1941, he held the position of senior researcher with the Institute of History of Material Culture at the Russian Academy of Sciences in Leningrad. During these years, he finished his study of early nomads and monuments of the Bronze Age. His first book about Pazyryk mound was published in 1937 and was completed as a great handwritten work, later published in shortened form (Great Pazyryk Mound, 1950). In January 1945, M.P. Gryaznov completed his master's thesis on *Bronze Age Burials in West Kazakhstan* and in June of the same year, he was awarded his full doctoral degree in history for his monograph *Pazyryk – Burial of a Tribe Chief in Altai*.

Major Accomplishments

At the same time, Gryaznov studied the shaping and development of Bronze Age and Scythian period cultures in Kazakhstan and Southern Siberia very closely. He devoted a line of his publishing to this topic, which entered the list of specialists' desk books not only in Russia, but also abroad. The top of his scientific heritage is *Southern Siberia* (Gryaznov 1969 and 1970; in *Sudsibiren Archaeologia Mundi* in English, French and German in Stuttgart, Munich, Geneva and Paris) and *Arzhan – Royal Mound of Early Scythian Period* (Gryaznov 1980). Gryaznov received the Laureate of the State Prize of the USSR.

His scientific legacy contains more than 140 published studies. They all have an extraordinary subtlety and accuracy of observation and are of great interest on the subjects of technology and the usage of ancient objects. Scrupulous analysis and deep erudition gave him the opportunity to recreate the lifestyle of ancient tribes in completely innovative ways and with details seemingly unavailable to archaeologists. Those studies were based on the results of first-rate excavations undertaken by Gryaznov himself. Many currently well-known in Commonwealth of Independent States (CIS/Former USSR) archaeologists passed through his field schools. From 1946, Gryaznov supervised archaeological expeditions to Siberia, and from 1955 to 1970, he headed one of the biggest expeditions in Krasnoyarsk (USSR). It can be said without exaggeration that it was due to Gryaznov's study of the archaeological data of southern Siberia that we have the most perfect method of complex study of burial memorials. He often used the correlation

method for researching archaeological materials. M.P. Gryaznov was a pioneer in involving new methods to study artifacts, from statistical and multidisciplinary to trasological (*science of traces*, from Franch *la trace* and Greek λόγος)

M.P. Gryaznov was an excellent teacher. From 1946, he was giving lectures on Siberian archaeology and trasology in the history faculty at Leningrad University, producing highly qualified archaeologists. The broadness of his scientific mind and his gift for educating united many students and followers from different scientific schools.

Gryaznov always combined his research work with teaching, lecturing, and administration. From 1949, he was the head of office work laboratory, and from 1957, he was in charge of the laboratory of archaeological technology at the Institute of Archaeology at USSR's Academy of Sciences. He was the head of the Middle Asia and Caucasus Sector at Leningrad Department of Institute of Archaeology (at present time Institute of Material Culture in Saint-Petersburg) for 15 years from 1953 to 1968. For the last 10 of these years, he led the Leningrad Section of field research at the Presidium of USSR's Academy of Sciences.

In the archaeological chronicles of Eurasia, M.P. Gryaznov is recognized as an outstanding archaeologist, one of the main specialists of ancient Siberian history and Eurasian steppe cultures.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Art Studies: Normative Approaches
- ▶ Askarov, Akhmadali A.
- ▶ Burial Archaeology and the Soviet Era
- ▶ Excavation Methods in Archaeology

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Guinea Pig: Domestication

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Basic Species Information

Guinea pigs (*Cavia porcellus*, Linneaus 1758; Rodentia, Caviidae) were the only small mammals domesticated in the Americas. The other New Word animal domesticates were turkeys (*Maleagris gallopavo*), llamas (*Lama glama*), alpacas (*Lama pacos*), and muscovy ducks (*Cairina moschata*).

Guinea pigs are small Andean rodents that still function as a delicacy food (Fig. 1), as an instrument to diagnose disease, and as key component in sacrificial offerings in traditional communities. In indigenous Quechua, they are referred as *jaca* or *saca*, and in Ayamara the word is *wanku*. However, most people in the central Andes call them *cuy*. Other known terms in South America are *cobayo* and *conejito de Indias*.

As part of the family Caviidae, guinea pigs present a particular dental formula: Teeth cheeks are ever growing and have two enamel prisms with sharp folds and angular projections. They have four toes on the front feet, three on the hind feet, and the tail is extremely reduced. The adult guinea pig weighs approximately 750 g and is on average 30-cm long. The most common colors are white, brown, and gray. Their life span is 5–7 years. Puberty occurs

at roughly 70 days of age. The gestation period is generally 10–12 weeks, and litters are usually composed of two to four pups. A few days after birth, young *cuys* are able to care for themselves. Fertilization takes places again shortly after a female produces a litter. Pups and pregnant *cuys* do not need a special human care. In Andean communities, they are generally kept inside the kitchen (Fig. 2), and they are fed with alfalfa and table waste such as potato peelings, grass, fresh corncobs, and grains (Bolton 1979).

At sites like Ayamachay and Puente in the Peruvian Andes, the association between man and wild *Cavia* dates back as far as 10,000 years before present (Wing 1977). Changes from selection for large size were noted by measuring the height of the jaw in the middle of the diastema. Archaeological samples from Ayacucho and Cuzco show that the most recent samples are the most variable; the mean of the diastema measurement shows a large and significant increase in size over older samples. These changes are seen by 3,000 BP at the Pikimachay cave in the Ayacucho Valley (Wing 1977). From this likely single domestication center, they were then introduced to sites outside of central Peru. While domestic guinea pigs preceded Inca occupation in southern Peru, northern Chile, and Ecuador (Stahl 2003; Sportorno et al. 2007), their presence in northwest Argentina appeared to be due to the Inca occupation (Rodriguez Loredo 1997-1998).

Guinea Pig: Domestication, Fig. 1 Fried guinea pig dish as served in a restaurant in Ayacucho, Peru

Two wild ancestors of the domestic guinea pig have been suggested: *Cavia tshudii* and *Cavia aperea*. The distribution of both wild species extends from Colombia to Argentina, though *C. tshudii* inhabits high altitude environments, *C. aperea* inhabits the eastern lowlands. Both *Cavia* species would have been good candidates for domestication as they have high birth rates, eat household refuse, and can easily be raised in captivity: important elements of pre-adaptation to domestication. Both species produce fertile hybrids when crossed with *C. porcellus* (Gade 1967). However, skull morphology (Wing 1977)

Guinea Pig: Domestication, Fig. 2 Guinea pigs kept in a kitchen, Ayacucho, Peru

and recent molecular analysis of cytochrome b (Spotorno et al. 2004) suggests that the wild species *C. tschudii* from western South America, and not *C. aperea*, is the ancestor of the domesticated species, *C. porcellus*.

Wild *cuys* were surely attracted to human refuse in caves or other early settlements. People realized they were a good source of meat and probably encouraged wild *cuys* to stay around the house by giving them food scrapes. They were eventually brought into the kitchen areas where they received warmth, food, and protection until when, finally accustomed, they started reproducing in captivity (Gade 1967).

Given their small size, the domestication of guinea pigs does not seem to be related to increases in their meat productivity. They do not provide secondary products such as milk, leather, or wool. Yet *cuy* manure is a rich fertilizer. It is collected to nourish orchards, and cornfields in the Andes. Manure may have also been used as fuel, although it would have been needed in large quantities.

A cultural ecological analysis has been used to explain the successful introduction of guinea pigs in the Andean diet as environmentally determined. Data recorded in Cuzco (Peru) shows that *cuys* are primarily eaten during Christmas, Carnival, Easter, and Corpus Christi (Bolton 1979). It has been claimed that major communal *fiestas* in rural Andean Peru serve guinea pigs to distribute proteins during the wet season, November through April, the time of greatest protein need in Southern Peru (Bolton 1979). However, this explanation does not take into account other sources of protein common in rural Peru today, namely, the introduced chicken and pigs, and the native camelids. Furthermore, this explanation does not consider the need for fat and carbohydrates in the Andean human diet.

Another explanation for the domestication and incorporation of guinea pigs in the Andean diet is the fact that they represented an additional source of fat, especially during the wet season when carbohydrates and grain proteins were short in supply (Rosenfeld 2008). Guinea pig meat is 7.8 % fat, as a weight-based proportion of the edible meat. This is not a high fat value but it could have been crucial as an additional source to that of camelids, particularly during certain times of the year and especially to the most needy segment of the human population (infants, pregnant, and nursing women). When carbohydrates are not abundant, humans must switch to animal fat as an energy source and/or synthesize energy from protein. Therefore, when carbohydrates were in short supply during the wet season of the Andes, guinea pigs could have provided the fat needed to help metabolize animal protein in order to have a balanced diet (Rosenfeld 2008).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Gwion Gwion

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Introduction and Definition

Gwion as Ancestors and Images

The term "Gwion" refers to a type of figurative pictogram found in northwestern Australia, especially the sandstone of the Kimberley Plateau. Typically, but not exclusively, the form of the paintings appears to be elegant "humans"; they are depicted in various poses, and appear to be wearing "wigs" and carrying items in their "hands" or attached to their "bodies" (Fig. 1). Often the figures are grouped in apparent scenes; both as single figures and in groups, the stance and orientation of many is suggestive of dance or ceremonial activity. Typically, the depiction is of small, slender figures, outlined and in-filled profiles, whose finely executed painting was achieved by delicate brush-work. Gwion figures are usually a wine red, a hue that has been described as "cherry" or "mulberry-colored." Their subject matter and method of execution may be contrasted with those of the much larger, more boldly wrought Wanjina figures; the distributions of the two overlap. Not dissimilar figures are found to the northeast in the Keep River and Fitzmaurice River regions, and it has been suggested that they are related to the Mimi figures of Arnhem Land, and that in the ancient past, there was a shared cultural area joined by the extensive coastal plain of northwestern and northern Australia that is now a shallow sea.

The region includes the traditional lands of the Ngarinyin; adjacent languages groups are the Wunambul and the Worora. The Ngarinyin term for the figures is "Gwion Gwion," sometimes written "Guyon" or "Kwion"; the Wunambul and Worora use linguistically similar descriptors (Ngarinyin are the largest language group). Some commentators have seen the Gwion as "mysterious" and even as having been produced by non-Aboriginal cultures or even "alien beings." Such a "mystery" if it ever existed has been "solved" by research conducted in collaboration with four senior Ngarinyin traditional owners, *munnumburra* (initiated men, "lawmen"). The verbal testimony of the Pathway Project was recorded on-site in painted shelters and published in an illustrated book entitled *Gwion Gwion: Dulwan Mamaa. Secret and Sacred Pathways of the Ngarinyin Aboriginal People of Australia* (Ngarjno et al. 2000: 14).

Essentially, Gwion are (depictions of) ancestral beings and are treated with great respect; they are not spoken of lightly. It needs to be recalled that people were frightened of ancestors, who were powerful enough to hurt or to kill them (e.g., Ngarjno et al. 2000: 27, 83); they exercised great caution in approaching the painted images (e.g., Ngarjno et al. 2000: 38). They were secretive about them, to the extent that some commentators thought and regrettably still publish that the local people knew nothing of them. It is evident, however, that the Gwion are an integral part of the cosmology and social history of the Ngarinyin and others, and that they are part of their continuing cultural heritage has been recognized formally by granting of native title rights.

"Gwion" is both the term for the original humans born from the "Great Mother Jillinya" and who inhabited a land without boundaries (Ngarjno et al. 2000: 36), and, secondly, the corpus of painted images created by the ancestors. The subject of the Gwion paintings is "law." Gwion were inventors of hunting technology – of stone tools, spears, and woomera (Ngarjno et al. 2000: 85, 93, 209, 232); *Munga.nunga* is a

Gwion Gwion, Fig. 1 "Inventors": Yandama site. The named Gwion personage, "Yandama," the inventor of the spear-thrower, is depicted at *left*; his body is delineated with stripes and his feet end in three digits – a reference to his avian clan. He is depicted wearing a feathered head-dress, and in his right hand (as seen from the viewer's perspective) he holds the hooked throwing-stick (*nyarndu*) of which he is the historic inventor. About his waist height, his spear is depicted horizontally to the *right*; it is shown having pieced the upper body of the kangaroo depicted on the *right* of the panel; the spear is shown with multiple, sharpened wooden barbs – used before hide-penetrating *gimbu* points were manufactured. Scale: central figure c. 150 mm (Photograph: Pathway Project 1994 PP1309*08 [130908])

term for the same artists as visionaries – law-makers and story-tellers (Ngarjno et al. 2000: 128); and *Jenagi Jenagi* for them as messengers (Ngarjno et al. 2000: 176), who are depicted carrying messages relating to the laws of the *Wunan* council across the extensive *dambun* regions and further afield, to the Dampier Archipelago and Arnhem Land (Ngarjno et al. 2000: 174) (Fig. 2). While Gwion are the first skilled painters of the human form, it is important not to consider Gwion images as an art form, as entertainment, but as legal documents. Depictions of Gwion express the complex *Wunan* system of law and exchange that the Gwion invented and that originated with the actions of two Gwion heroes named Wodoi and Jungun, seekers of wisdom and knowledge (Ngarjno et al. 2000: 192-204). They inform the senior members of the community, especially the *munnumburra*, and might serve for instruction of younger generations (Ngarjno et al. 2000: 310-6) (Fig. 3).

Gwion images are painted with skill and often with some anatomical realism but also with bird characteristics including pairs of wings (Ngarjno et al. 2000: 126-7). Frequently, images appear to depict persons wearing or holding unfamiliar objects; but these items are extensions of the persons depicted, as if they are growths from the knee, elbow, hand, or shoulder – they are

Gwion Gwion, Fig. 2 "Visionaries": Galeru.ngarri North site. The Gwion figure on the *left* is depicted passing a sacred object to the first of a series of other figures; the image depicts the distribution of the Wunan Law through cultural exchange. Note dense silica skin covering part of imagery at *lower left*. Scale: central figure c. 110 mm (Photograph: Pathway Project 1999 PP0059*02 [005902])

extensions of the personage, making emblematic connections with the landscape of the clan ancestors (Fig. 4). In these conceptualizations, every painted place has its own specific body and *mudurra* (headdress) extensions (Figs. 5 and 6), and refers to the various totems, to plants, animals, and especially to birds.

The term "Gwion" invokes the story of the cave-dwelling Gwion Gwion bird, which used his beak to wipe blood across the surface of stone and thus was responsible for the first paintings copied by humans (Ngarjno et al. 2000: 118-20). The color of the Gwion paintings derives from the wine-red sap of the *mamandu*, a mulberry-like bush that is commonly found near painted shelters. The liquid sap was extracted into shallow cup-shaped depressions in the stone – "cupules" (*norgun* in Ngarinyin) (Fig. 7) – that usually are found on the floor near shelter entrances, like painters' palettes (Ngarjno et al. 2000: 99-100, 123). (The Ngarinyin say that the original Gwion artists were clever because this sap gave them a fixative as well as red color!) Some images, despite being exposed to sun and rain, are vivid, contrasting with the surrounding rock face. Unlike the Wanjina, they were not regularly over-painted, although if damaged, might be repaired, restored to maintain the integrity of the image (for example, in the case of exfoliation of a painted surface: the ring dance imagery: Ngarjno et al. 2000: 209, 232), and many painted areas show a great complexity of superimposition. Researchers have observed that there is no residual pigment in Gwion paintings, but the images remain visible. Pettigrew et al. (2010) have written that the original paint "... has been replaced by a biofilm of living, pigmented microorganisms whose natural replenishment may account for [their] longevity and vividness ...". The cherry to dark purple colors of the image was determined by the proportions of black pigmented fungus and red Cyanobacteria. It is likely that the organic character of the original paint provided the basis for the development of the biofilm.

Key Issues/Current Debates/Future Directions/Examples

Origins and Ownerships

A colonial settler, Joseph Bradshaw, exploring the Prince Regents River region of the Kimberley in 1891 provided the first known European recordings of the distinctive Gwion imagery; while he recognized them as "native paintings," he wrote that standing in front of them was like viewing ancient Egyptian temple walls. Later, in ignorance of the significance of these images to indigenous peoples, his name was used for these figures, and his casual comparison of the rockshelter to a southwest Asian locus appears to have supported ideas of "alien origins" for the motifs.

Since then, there has been some debate about the source of the Gwion images. Ignorance of their cultural significance encouraged speculation contextualized by the history of nineteenth

Gwion Gwion, Fig. 3 "Visionaries": Guringe site, a women's place within the Anaut.ngarri territorial division of the Wunan. This scene depicts a public meeting-dance (*birrina*); here a distinction is made between male and female Gwion figures. The central (*dark*) Gwion figure depicts a female dancing as a praying mantis among women who are depicted to each side; the scene signifies acceptance of the male figure depicted at *left*. Females wear *mambi* (a triangular skirt not in daily use; turned to back for dancing; cf. *jalgun*). Guringe is an important women's site of the Great Mother, a sanctuary established prior to the Wunan laws that were developed by males. The panel is many-layered and of considerable complexity. Scale: central figure c. 180 mm; note that the figures are small, and necessarily very finely painted, perhaps with feather "brushes" and probably by women (Photograph: Pathway Project 1997 PP1711*23 [171123])

and twentieth century colonial settlement of the continent and concomitant racism in which the autochthonous occupation was seen in terms of hyper-diffusionism, "primitive peoples," and "advanced civilizations." The "non-Aboriginal origin" argument sat within a pervading colonial discourse; if the elegant and sophisticated Gwion figures were "aesthetically superior" to other Aboriginal paintings, how could they have been made by uninventive "savages," by a "primitive culture"? They must have been painted by another race.

There had been nineteenth century speculations about earlier, non-Aboriginal, occupants of Australia – some prompted by apparent denials by traditional owners of knowledge of the origin and meaning of rock art images; indeed, some similar suggestions were made by twentieth century anthropologists – so it was perhaps not surprising that an "exotic" origin became a convenient if naïve explanation of the Gwion images. Few commentators apparently had read in Bradshaw's account – in the paragraphs immediately preceding his descriptions of the paintings – of a large group of men encountered by his party in the same area; many were painted and some wore large headdresses – which description sounds not too dissimilar to the painted images that he had recorded.

The debate regarding the "origins" of the Gwion images became one of "ownership" contextualized again by the concerns of the late twentieth century. The claims of a "mystery race" had implications for indigenous land rights, and attempts to deny indigenous peoples, authenticity and legitimacy were pursued by various elements of the popular media. Despite informed comments from and rebuttals by researchers, the popular misconceptions about the Gwion continue; a researcher who has been following the debate considers that informed responses have

Gwion Gwion, Fig. 4 "Messengers": King Edward River site. This scene depicts a ceremonial dance with *walbud* (marsupial hide aprons) removed and holding *mandi* (crescent-shaped ceremonial boomerangs). "In the early days, there were three nations. When they came together to dance, one brother stole another brother's wife; so he hit him with a *mandi*. After that they all turned into different types of birds". – *Munnumburra* Paddy Neowarra 28 August 2012. Scale 100 mm; these figures are small and finely depicted (Photograph: GK Ward 1999 (AW09-24) [AW09-24 24Jun99 KEdwardR site2 7 val Gwion Bcc])

Gwion Gwion, Fig. 5 "Messengers": King Edward River site. This scene depicts a group of women wearing conspicuous *mudurra* (sculptured headdresses). "This is a painting of a special women's dance. The women would go to a sacred place where they would teach the young women how to dance. It was a sacred women's place and men could not go there". – *Munnumburra* Paddy Neowarra 28 August 2012. Scale 100 mm; these figures are among the largest depictions of Gwion figures (Photograph: GK Ward 1999 (AW09-18) [AW09-18 24Jun99 KEdwardR site2 Gwion x4 Bcc])

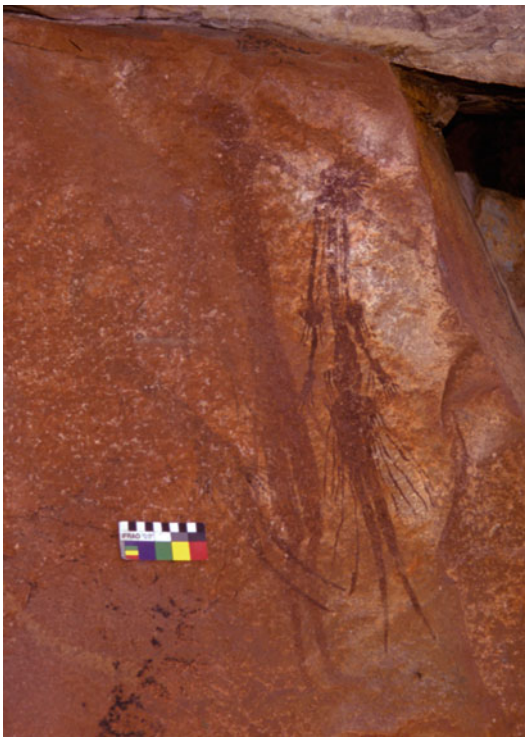

Gwion Gwion, Fig. 6 "Messengers": Donkey Creek site. Here a couple is depicted; a female (on *right*) is shown with long skirt, elbow, and other ornaments. Scale 100 mm; these figures are also large but finely delineated (Photograph: GK Ward 1999 (AW08-30) [AW08-30 24Jun99 DonkeyCreek Gwion Bcc])

Gwion Gwion, Fig. 7 *norgun* (concave palette) with typical staining from *mamandu* bark – (recent) red around lip and (transformed) black within *norgun*. Scale: width of opening c. 140 mm (Photograph: Pathway Project 1995 PP1318*13 [PP-Wulungarri-53norgun])

been ineffective, and suggests that it is necessary for archaeologists and indigenous people to combine efforts to provide more proactive mass-media engagement (McNiven 2011).

In 1992, Banggal (David Mowaljarlai), one of the Ngarinyin *munnumburra*, initiated a recording project in conjunction with ethnographer and film-maker, Jeff Doring. Their intention was to regain ownership of the Gwion by revealing previously secret aspects of their culture. Their collaboration resulted in a book (Ngarjno et al. 2000), symposia, and exhibitions of film in France and Australia, and explicit public statements: At the 1998 meeting of the Australian Rock Art Research Association, they spoke of their knowledge of the Gwion imagery and called for the Gwion figures to be known by their correct name.

In August 2004, the Wanjina-Wunggurr Community gained Native Title rights over their traditional lands (Neowarra v State of Western Australia [2004] FCA 1092), including the painted imagery. The Ngarinyin research and recording including the published accounts were significant in achieving the native title determination.

Dating

Dating of the Gwion figures has been the subject of much research and considerably more debate. The Ngarinyin and other traditional owners in the region consider Gwion to be part of their cultural landscape, both long-standing and contemporary. The claims by some of an early age based on identification of a non-Aboriginal origin (above), rejected by traditional owners and the Federal Court, nevertheless have inspired the popular imagination and much ill-informed commentary. Part of this was based on the mistaken identification of the Gwion as "rubbish" pictures, a term that may be used to refer to old matter (Redmond 2002: 58) or that is sometimes used when one wishes to avoid discussion of a matter – particularly given the possible severe sanctions (above).

Subsequent research into the dating of the Gwion figures has produced questionable results. Claims of Pleistocene age are reinforced by

identification of depicted megafauna known to have been extinct millennia ago, by excavation of ochre-stained rock panels, and by the results of optically stimulated luminescence (OSL) applied to quartz grains from mud-wasp nests seen to overlie rock paintings. An admirable review of the various methods of archaeological and chronometric methods and results from the Kimberley recently has been made by Aubert (2012). Aubert suggested that the possible identification of examples of extinct fauna (mostly extinct during the Pleistocene) should be treated as stimuli for further investigation rather than as conclusive. The identification (using elemental analysis) of ochre on a limestone slab excavated from the Carpenters Gap (Napier Range) site and dated to about 40,000 years ago could not be regarded as conclusive because of the possibility of a natural source of staining, and lack of clear figurative intent: "... a robust interpretation of Pleistocene rock art would require a recognisable motif as ochre was not exclusively used to produce rock art" (2012: 574).

Accelerator mass spectrometry (AMS) radiocarbon analysis has been used to date various materials enveloping rock art pigments in Kimberley sites (Aubert 2012: 574-5). Determinations made on debris contained within beeswax deposited over paintings typically range from modern to less than 4000 years BP; those made using charcoal suggest that Wanjina motifs were painted – or repainted – relatively recently (dates range from modern to about 1200 years BP). AMS dating of oxalate salts layered with paint pigments at the Carpenters Gap site produced results dating two examples of Gwion figures to between three and four thousand years BP, and results using silica skins indicated that another two Gwion figure types had minimum ages of about 1,500 years.

The most often quoted age determination for a possible Gwion figure is that of about 17 000 BP obtained from application of the OSL technique to dating quartz grains from mud-wasp nests. Aubert's review (2012: 575-6) of the results questioned whether the dated nest was actually overlying the painting, and whether application of the technique should be restricted to large nests where quartz grains could be extracted from the nest core where gains are protected from modern sunlight: whether "... the Kimberley has Pleistocene aged rock art remains debatable and requires additional dated motifs".

Aubert (2012: 576) considers that high-resolution uranium-series dating methods could be applied to the natural calcite and silica laminations that have been identified as enveloping rock paintings in the Kimberley and could be used to provide estimates of maximum and minimum ages; there are further such techniques applicable to age analysis of other natural surfaces that so far have not been applied to rock art.

Considering the range of non-figurative and figurative pictogram motifs recorded in the Kimberley region, the complexity of the superimposition sequences at many sites, the putative depiction of some fauna known to have become extinct during the Pleistocene, and the presence of various biogeological factors enhancing the preservation of painted surfaces, it would perhaps be surprising that a rock art of Pleistocene age was not present in the Kimberley. This likelihood should not, however, mean that the painting tradition that includes the Gwion figures be considered to be exclusively ancient; not only are there AMS determinations establishing that Gwion figure painting was done in the last 4,000 years, but also the strong and formally recognized claims of the Ngarinyin that the Gwion are part of their continuing cultural tradition of *Wunan* Law. The last aspect is emphasized by the cinematographic record made by Jeff Doring in 1999 of Nyawarra (Paddy Neowarra) spontaneously painting a sentinel Gwion at the Garimbu Creek shelter, at the junction of three *dambun* districts, using charcoal mixed with water and a sap fixative (Ngarjno et al. 2000: 120-1) (Fig. 8); the sequence was included in the ACMI series of films shown throughout 2002 and discussed at an international congress in 2004 (Neowarra et al. 2004). The Ngarinyin recognize periodicity in the imagery and relate this to their cultural history. The earlier motifs, as well as being less expertly painted, tend to depict figures with three digits (e.g., Ngarjno et al. 2000: 292-3), a reference to the legacy of

Gwion Gwion, Fig. 8 "Messengers": Garimbu Creek site. Paddy Neowarra painting sentinel figure in 1999. The figure marks the location of the Wunan cultural exchange route connecting three territorial boundaries in Wunan Law. Scale: sentinel figure c. 600 mm high (Photograph: Pathway Project 1999 [JDC297brush03])

birds in the time of unrestricted wandering; this is followed by the time of the inventors in which the importance of the *gimbu* and woomera is emphasized; later, following the agreement at the stone table at Dududu.ngarri (Ngarjno et al. 2000: 141-7,164) to divide the country and to control access to one another's *dambun*, to institute moiety kinship relationships, and to follow the *Wunan* law, the images of the messengers carrying the *maya.ngarri* and various Wunan ceremonies prevail. In this context, the chronometric results are not so important, but perhaps they will serve to confirm the longevity of the Wunan and the distinctive Gwion images.

Glossary

(After Ngarjno et al. 2000: 322-5)

birrina "Coming together" dance linking men and women in public event

dambun Clan regions allocated by the first Kamali council when originating law . . .; pattern of land titles inherited by Ngarinyin that defines the network of exchange with their neighbors

Dududu.ngarri Place near the location of the stone table

gimbu Reddish-brown stone; raw material for the sharpest spear-points invented by the Gwion; circumcision and cicatrise scalpel

jalgun A small skirt of hide or string fiber worn by women

Jenagi Jenagi Another title for the Gwion artists; literally the "wanderers" or nomads who became messengers of law; "messengers" who began the exchange of sacred *maya.ngarri*

mamandu Sticky red sap of rough-barked mulberry-like tree; provides fixative and dye used to paint and stain many indelible Gwion figures onto rock surfaces

mambi Triangular girdle skirt worn by women in Gwion paintings; mother's ceremonial skirt inherited by daughter

mandi Crescent-shaped boomerang; pairs are clapped together for keeping the rhythm of songs

Munga.nunga Gwion title for ancestors acknowledged as visionaries and originators of Wunan law . . .

maya.ngarri Messages through sacred objects; secret or private forms of incised and painted boards preserving primary cultural concepts; abstracted law symbols circulated as messages of law . . .

mudurra Sculptured wig or headdress of various shapes and sizes recorded in Gwion painting . . .

norgun	Concave palette worn into stone, used for extraction of red liquid from *mamandu* bark
nyarndu	Hooked sick used as a spear-thrower . . .
walbud	Tri-pointed belt-girdle of marsupial hide worn by Gwion males
Wunan	The sharing Law; ancient agreements that ended nomadism by fixing family *dumbun* estates and by establishing moiety divisions of society into two cross-marriage groups. . .

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Rock Art
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Pigment Analysis in Archaeology
- ▶ Rock Art Sites: Management and Conservation

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Haakanson, Jr., Sven David

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Basic Biographical Information

Sven Haakanson, Jr. is a Native Alaskan archaeologist, museum professional, and artist. He was born in Kodiak and grew up in the native village of Old Harbor, which is a rural fishing community on Alaska's Kodiak Island. After earning his high school diploma from Anchorage's Bartlett High School (1985), he attended the University of Alaska Fairbanks (1985–1992). Here he studied English and education and discovered anthropology in classes with his mentor Dr. Lydia Black. A year teaching English in Magadan helped him develop fluency in Russian. Volunteering on archaeological projects in the Kodiak Archipelago fed his interests in history, technology, and native arts.

In 1988, Haakanson attended the Sixth Inuit Studies Conference in Copenhagen, an opportunity that shaped his career. Listening to Dr. Black speak about his ancestral culture on the opposite side of the globe motivated Haakanson to continue his studies. In the fall of 1992, he entered Harvard University's graduate program in anthropology. During graduate school he taught at Vermont's Center for Northern Studies (1995) and joined archaeological surveys in Siberia led by Smithsonian archaeologist Dr. William Fitzhugh (1994–1997). Working with Fitzhugh led to two years of fieldwork on his own with the Nenets Reindeer Herders in the Yamal Peninsula, Russia (1996–1997), and a doctoral dissertation on the ethnoarchaeology of Nenets settlement patterns (Haakanson 2000, 2001). It was the first study of its kind in Siberia.

After completing his Ph.D., Haakanson returned to Kodiak to lead the newly established Alutiiq Museum & Archaeological Repository, a tribal heritage center dedicated to preserving and sharing the culture of the Alutiiq people. At the museum he works to reawaken Alutiiq traditions through research and educational programs that connect people to collections (Haakanson 2004, 2007). In 2007 he received a McArthur Foundation fellowship. In 2013, Haakanson accepted a joint appointment to the University of Washington's Burke Museum and Department of Anthropology

Haakanson's service to cultural and scientific organizations includes appointments to the Alaska State Council for the Arts, Alaska Humanities Forum, Alaska Native Science Commission, First Alaskan Institute, Museums Alaska, Alaska Native Heritage Center, Polar Research Board, and the Western Museums Association.

Major Accomplishments

Haakanson's professional life developed in the decade following the passage of NAGPRA, at

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Haakanson, Jr., Sven David, Fig. 1 Sven Haakanson on survey at Cape Alitak, 2010 (Photograph by Patrick Saltonstall, Cape Alitak Archaeological Survey Collection, Alutiiq Museum (AM688))

a time when the Alutiiq heritage movement was gaining momentum. As the director of a fledgling tribal museum, he set reestablishing cultural knowledge as a goal. Through archaeological inquiry, collections research, linguistic studies, and hands-on experimentation, his projects capture cultural information not found in the written record and reinvigorate traditions in the Alutiiq community. He calls this process "knowledge repatriation" (Haakanson 2007). He argues that helping native peoples learn from the archaeological record and collections is a powerful way to extend the value of cultural resources and promote partnerships that empower indigenous communities.

Haakanson is known best for his studies of ethnographic collections. From 2001 to 2008, he worked with the Château-Musée of Boulogne-Sur-Mer, France, to develop an international exhibit of ancestral Alutiiq masks (Haakanson & Steffian 2009), connect Kodiak carvers directly to the works of their ancestors, and return carving knowledge to Alutiiq people by teaching skills preserved in the mask collection. From 2008 to 2012 he worked with museums in St. Petersburg, Russia, to develop a catalog of Alutiiq objects collected by early Russian traders in Alaska (Haakanson 2012), connect basket weavers with ancestral works, and teach weaving skills to youth.

Haakanson's archaeological research includes a long-term study of the Cape Alitak petroglyphs (Figs. 1, 2). This set of rock art sites at the southern tip of Kodiak Island holds the largest known assemblage of petroglyphs in Alaska. Since 2001, his research has expanded the number of known rock art localities from 5 to 13, documented over 1300 individual glyphs, recorded the settlement history of Cape Alitak, and created an accessible archive of rock art data at the Alutiiq Museum.

Throughout his work, Haakanson promotes scientific inquiry, museology, and Alutiiq values. Under his leadership, the Alutiiq Museum gained accreditation from the American Association of Museum (2011). The organization is only the seventh museum in Alaska and the second tribal museum in the United States to earn this rigorous national certification.

Haakanson is an accomplished artist. Museums and private collectors hold examples of his wooden masks, and his photographs are widely published. *National Geographic Magazine* printed a selection of

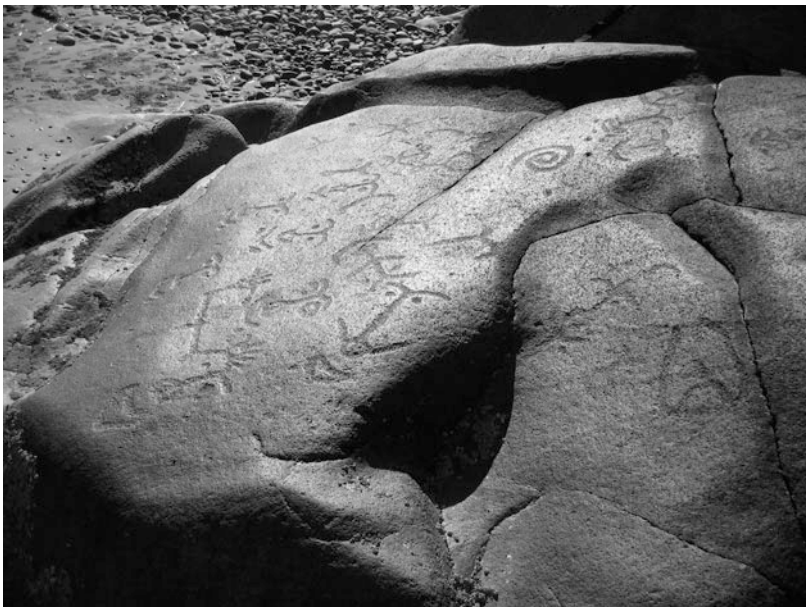

Haakanson, Jr., Sven David, Fig. 2 Petroglyphs from site 49-KOD-00129, Cape Alitak, Kodiak Island, Alaska (Photograph by Sven Haakanson, Jr., Cape Alitak Archaeological Survey Collection, Alutiiq Museum (AM688))

his images of the Nenets people in 1997 and photographs of the last Eyak Speaker Maria Smith in 2007.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ North America (USA and Canada): Museums
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Rock Art, Forms of

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Haber, Alejandro Fabio

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Basic Biographical Information

Alejandro Fabio Haber was born in Buenos Aires, Argentina, on September 16, 1964. In 1982 he began studying Anthropology at the Faculty of Philosophy and Arts at the University of Buenos Aires (UBA), graduating in Anthropological Sciences in 1988. His academic interests from early on were sparked by the Puna of Atacama in the Argentine Province of Catamarca. However, the allures of the place would be more than academic. In Catamarca he met Silvina Del Carmen Ahumada, then an archaeology student, married her, and stayed to share her life over 20 years ago. Together they had four children: Santiago, Ignacio, Francisco, and Valentina.

A constant challenge for Alejandro is the critical analysis of the supposed theorems about nature and culture that underlie archaeological narratives. This has led him to have an interest in a number of fields, among them "domestication," "the social appropriation of natural resources," "the ethno-archaeology of shepherds," "the zoo-archaeology of llamas and vicunas," "systems of settlement: oases and enclaves," "domesticity," the "uywaña" (the Andean concept of nurture), "environmental politics in indigenous territories," and "territorial wangling."

Alejandro Fabio Haber received his doctorate in Anthropological Sciences from the UBA in 1999, under the guidance of Dr. José Antonio Pérez Gollán. His thesis was titled *An Archaeology of the Oases of Puna: Domesticity, Interaction, and Identity in Antofalla in the First and Second Millennia BP*. In it, he deconstructs the geographical image of the Puna of Atacama as a marginal landscape and incorporates it into the archaeological discourse. This signals the bond between Puna of Atacama landscape's narrative and the successive practices of appropriation of Puna territory by outsiders. This indicates the solidarity between the different scientific disciplines, in this case archaeology, and the colonial progress plan.

Apart from this thesis, Alejandro conducted several research projects in the Comunidad Indígena Colla Atacameña de Antofalla (the Atacama Colla Indigenous community of Antofalla). These projects have been embraced by the members of the community to the extent that some of them have been actively involved in research projects by Alejandro and his team. Significantly, they have even been involved as coauthors. The affection and wisdom of the locals from Antofalla has strongly guided Alejandro's academic interpretations. Undoubtedly, the Puna ancestral teachers have left their imprint on his work and his life. Perhaps it is this mutual friendship that warrants the classification of this biography under "Indigenous Archaeologies."

With the Colombian anthropologist Cristóbal Gnecco, Alejandro has initiated several archaeological projects that move towards the decolonization of his own discipline and his own work. An example of this is founding the publication *Arqueología Suramericana/Arqueología Sul-Americana* ("South American Archaeology," in Spanish and Portuguese). The first issue was published in 2005 with the support of the Anthropology Department from the University of Cauca, Colombia, and the World Archaeological Congress (WAC). The beginning of the first editorial encapsulated the spirit of this endeavor, positing that the search for historic meaning is a form of resistance to the postmodern devaluation of the past (Haber & Gnecco 2005: 2).

Currently, Alejandro is an independent researcher with CONICET (the National Scientific and Technical Research Council of the Argentine government), a member of the Academic Committee and coordinator of Indigenous Studies in the Doctorate of Human Sciences, Faculty of Humanities, of the National University of Catamarca (UNCa), and the incumbent lecturer of "Archaeology of the Old World II" and "Research Design" at the UNCa School of Archaeology.

As demonstrated by his most recent works, Alejandro is thinking of an "undisciplined archaeology" and a "non-methodology" which lets us find

ourselves again in the "colonial wound," in the immense community of life, still charmed by the land to which all creation eventually returns.

Major Accomplishments

Alejandro Fabio Haber has presented a dozen national and international academic lectures. He has been invited to teach numerous graduate and postgraduate courses at the University of Buenos Aires (Argentina), the Universidad of Cauca (Colombia), Columbia University (USA), Sociedade de Arqueologia Brasileira (Brazilian Archaeological Society, Brazil), University of Melbourne (Australia), Universidad de la República (Republican University, Uruguay), and University of Cambridge (UK), among others. He is a member of the World Archaeological Congress (WAC) Ethics Committee and a member of the Editorial Committees of several publications in archaeology. Alejandro has received an external postdoctoral scholarship from CONICET and been a Visiting Research Fellow at Flinders University (South Australia). He has been awarded national and international grants for his research from such entities as UNCa (National University of Catamarca), CONICET, Agencia Nacional de Promoción de la Ciencia la Técnica (National Agency for the Promotion of Science and Technology), the National Geographic Society, and Wenner-Gren Foundation for Anthropological Research.

Furthermore, Alejandro has supervised dozens of theses and scholarship holders for CONICET and FONCyT (the National Science and Technology Fund, Argentina). He has published numerous articles and a total of six books, among them the highly recommended *An Archaeology of the Oasis: Domesticity, Interaction, and Identity in Antofalla, Puna de Atacama, Argentina, First and Second Millennia B. P.* (Haber 2007).

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Decolonization in Archaeological Theory
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Postcolonial Archaeologies

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Hall, Edward T.

A. Mark Pollard
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Basic Biographical Information

Edward Thomas (Teddy) Hall (1924–2001) was born in London in 1924, the son of Lt. Col. Walter

D'Arcy Hall, and grew up at Shipton Court in Oxfordshire. His grandfather, Thomas Hall, had left England in straitened circumstances in 1854 for Australia and returned at the end of that century a multimillionaire from his interests in the Mount Morgan goldmine. Following Eton, Teddy joined the Royal Naval Volunteer Reserve in 1943 and served during the Second World War in charge of a group of landing craft. In January 1946, he came to New College, Oxford, to read chemistry. On graduating, he decided to turn his hand to physics and offered his services to the head of the Clarendon Laboratory, Prof. Lindemann, later Viscount Cherwell, who, on learning that he required no payment, promptly set him to work! He worked in a team which designed and built a mass spectrometer for measuring ^{3}He in order to date rocks. He then turned his attention to X-rays and designed and built the first X-ray fluorescence spectrometer for the nondestructive analysis of museum objects.

Major Accomplishments

His first significant application was the analysis of the Piltdown skull, which had been found by Charles Dawson between 1912 and 1914 in a gravel pit near Lewes in Sussex. Teddy persuaded Kenneth Oakley of the Natural History Museum in London (by means of a lobster lunch!) to bring the skull to Oxford in 1949, and his XRF analysis showed high concentrations of chromium, which he attributed to artificial staining. He submitted his D.Phil. thesis (*Quantitative Analysis by Secondary X-Rays for Use Particularly in Archaeology*) in 1953. With the support of Lord Cherwell, Teddy was introduced to Christopher Hawkes, Professor of European Archaeology, at a dinner in Christ Church in 1949, and the resulting great friendship between the two led to the establishment, in 1953, of the Research Laboratory for Archaeology and the History of Art (RLAHA), in a Victorian terraced house in Keble Road. Typically, he made a deal with the University that he would forfeit his own salary in return for another position, and so Stuart Young, another physicist, was appointed as Deputy Director of the Lab in 1955, to be replaced, in 1957, by Martin Aitken.

Teddy's interests rapidly spread from XRF to other aspects of archaeometry, including optical emission spectrometry, electron microprobe analysis, and magnetometry (including proton magnetometers for marine survey work). He also developed equipment for monitoring ultraviolet levels within museums. He started a business manufacturing such equipment from a workshop at his house (Beenhams) in Littlemore, the Littlemore Scientific Engineering Company (LSEC). In addition to manufacturing equipment for archaeologists and museums, LSEC also made the "Cavendish Chair," in response to the plight of his friend Robin Cavendish, who contracted polio in Kenya and was flown back to England on a ventilator. To reduce the restrictions imposed by the cumbersome nature of the ventilator, Teddy developed a lightweight ventilator which ran on batteries, fitted to a modified aircraft seat on wheels, which gave him a certain degree of mobility.

During the late 1970s, along with Robert Hedges, he became increasingly interested in making radiocarbon dates by direct measurement of the ^{14}C atoms present using accelerator mass spectrometry, and in 1981 RLAHA took delivery of one of the first dedicated radiocarbon accelerators. In the early days, Teddy would often be found crawling inside the accelerator tank, or discussing design modifications, or even sweeping the floor. The first dates were published in 1984 in the journal *Archaeometry*, which had been founded by Teddy and Martin in 1958 as the Bulletin of the Research Lab. The Oxford Radiocarbon Dating Unit has now produced more than 22,000 archaeological radiocarbon dates.

One date in particular has created considerable public interest – that of the Shroud of Turin, which in 1988 was independently dated by three laboratories (Oxford, Zurich, and Arizona) to between CE 1260 and 1390. The Archbishop of Turin had written to Teddy in 1978 (when the Shroud was publicly displayed for the first time in 30 years) asking if it was possible to date it by radiocarbon. He replied to say that dating by

AMS, when the technique was perfected, would enable a date to be obtained on a few milligrams of cloth. Consequently, in September 1986, a meeting took place in Turin where representatives of seven AMS laboratories proposed a protocol for the analysis. A year later, it was announced by the Cardinal of Turin that the Shroud would be dated by three laboratories, with the project to be coordinated by Dr. Michael Tite of the British Museum. Samples were taken in April 1988, and the results were announced in October of that year. The result that the Shroud is of medieval manufacture has not been accepted in all quarters, and the debate continues. Criticisms of the date range from the outlandish to the vaguely plausible, but Teddy's view was predictably robust: "Some people may continue to fight for the authenticity of the shroud, but this settles it once and for all as far as we are concerned."

He married Jeffie de la Harpe in 1957 and had two sons, Martin and William. He was made a Professor in 1975 and in 1989 Emeritus Professor of Archaeological Sciences, on his retirement from the University. In 1973 he was appointed a Trustee of the British Museum and also of the National Gallery. He also sat on the Advisory Council of the Science Museum. He was made an Honorary Fellow of the British Academy in 1984 and was appointed CBE in 1988. When he retired, the University realized that it was likely to have to pay a salary to his replacement and, like all universities, immediately claimed poverty, thus threatening the future of RLAHA. In response, Teddy launched an appeal and raised a million pounds to endow a Chair, which is now known as the Edward Hall Professorship in Archaeological Science.

Over and above his considerable scientific achievements, Teddy has always been a larger-than-life character. From being a collector of cigarette cards as a child, he became fascinated by Chinese porcelain in the 1950s and assembled a world-class collection of monochromes. He also collected clocks and scientific instruments, but, unlike many museums, was not averse to taking them apart and analyzing the brass from which they were made! In order to keep himself sane in retirement, he decided to make a pendulum clock with the accuracy of a quartz watch. The Littlemore Clock was housed in a wooden shed in the garden of Beenhams, sitting on a 12-t block of concrete. Teddy was gratified to find that after three years of running, his clock had kept better time than the US Naval Observatory clock and was probably the most accurate pendulum clock ever built!

His summer Laboratory parties at Beenhams became the stuff of legend – strawberries and champagne around the swimming pool, followed by a trip in his hot air balloon for the chosen few! Not only was he gifted and generous, he was a world-class scientist, and the world of archaeology owes him a huge debt of gratitude.

Cross-References

- ▶ Aitken, Martin
- ▶ Radiocarbon Dating in Archaeology
- ▶ Research Laboratory for Archaeology and the History of Art (University of Oxford)
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Hall, Martin (Historical Archaeology)

Natalie Swanepoel
University of South Africa, Pretoria, South Africa

Basic Biographical Information

Professor Martin Hall was born in Guildford and spent his youth in the south of England. He studied archaeology (both undergraduate and

postgraduate degrees) at Cambridge University, where he was influenced by David Clarke and Eric Higgs. Although he had initially wanted to study Sociology, he took Anthropology and Archaeology in his first year and, after a fieldtrip to Bulgaria, switched his interest to Archaeology. After working as a contract archaeologist in London and assisting on Stone Age excavations in Lesotho, he embarked on Ph.D. fieldwork on the South African Iron Age under the supervision of David Clarke. He was employed as an ethnoarchaeologist at the Natal Museum (today the Kwazulu-Natal Museum) in Pietermaritzburg from 1975, taking up the appointment of Chief Archaeologist at the South African Museum in Cape Town upon the completion of his doctorate in 1980. He joined the Department of Archaeology at the University of Cape Town in 1983, becoming a full professor in 1991 (Lucas 2006).

After a number of years as the Chair of Historical Archaeology and Head of the Archaeology Department at the University of Cape Town, he moved into the administrative sector of the university, serving as the inaugural Dean of Higher Education Development for three years and as the Deputy Vice Chancellor of the University of Cape Town for six years, while continuing to publish in archaeology. He was appointed to the Vice-Chancellorship of the University of Salford (United Kingdom) in 2009 (Biography n.d.).

Major Accomplishments

In a career that has included a diversity of research interests – the southern African Iron Age, the making of the modern world, the social and political context of archaeology, the representation of the past, the role of technology in pedagogy, and the role of tertiary education and the university in society – Hall's most prominent accomplishments in the field of archaeology are his contribution of a critical, materialist perspective to the study of the Iron Age and his role in the establishment and development of the subdiscipline of Historical Archaeology in South Africa.

Hall's (1981) doctorate focused on Iron Age settlement patterns in Kwazulu-Natal where he adopted an ecological perspective shaped by the New Archaeology's processualist approach but, as he became more engaged with the politics of archaeology, he disengaged from the idea of a purely "scientific archaeology" (Lucas 2006), a move clearly evident in his 1987 book *The Changing Past: Farmers, Kings and Traders in Southern Africa*, which took a materialist approach to the study of the Iron Age, in addition to situating Iron Age studies within the larger social and political contexts of their time (also see Hall 1984a & b).

The move away from a purely "scientific" approach to the past, within the increasingly fraught political context of apartheid South Africa, also spurred Hall's interest in the archaeology of colonial settlement and the potential that archaeology had to add to a different interpretation of that past. This development was solidified by the presence of Mark Leone and James Deetz who were invited to spend time as guest lecturers at the University of Cape Town in the mid-1980s (Lucas 2006). In collaboration with colleagues and students, Hall was involved in numerous historical projects in and around Cape Town, producing a series of seminal articles reporting on work at sites such as Paradise, Onrust, the Barrack Street Well, the Castle, and the urban landscape of Cape Town, resulting finally in the publication of his book *Archaeology and the Modern World: Colonial Transcripts in South Africa and the Chesapeake* (Hall 2000). This period also saw ongoing collaboration with the University of California, Berkeley, and the establishment of the Historical Archaeology Research Group and the Archaeology Contracts Office at the University of Cape Town Archaeology Department (Lucas 2006). Hall's students at this time undertook studies of architecture, probate records and various sites in and around Cape Town.

Hall organized the first World Archaeological Congress to be held in Africa at Cape Town in January 1999 (highly symbolic of South Africa's return to the international fold), and served as president of the organization from 1999 to 2003.

In addition to all of his other accomplishments, Hall (1996) also produced a textbook, *Archaeology Africa*, which is perhaps the only introductory archaeology text that presents the history, method, and theory of archaeology from an African perspective.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Deetz, James (Historical Archaeology)
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Malan, Antonia
- ▶ Modern World: Historical Archaeology
- ▶ Southern Africa: Historical Archaeology
- ▶ World Archaeological Congress (WAC)

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Hall, Martin (Modern World)

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Basic Biographical Information

I began research in 1975, when I was appointed Ethnoarchaeologist at the Natal Museum in Pietermaritzburg, South Africa. My interest was in early farming settlement from the first millennium through until the rise of the Zulu Kingdom in the early nineteenth century. At this time, few radiocarbon dates had been obtained, and it was widely argued that the first Black farmers had arrived in southern Africa at much the same time as white colonists had moved northwards and eastwards from the Cape. This work culminated in my books *Settlement Patterns in the Iron Age of Zululand: An Ecological Interpretation* and *The Changing Past: Farmers, Kings, and Traders in Southern Africa, 200–1860* (Hall 1987).

Doing archaeology of this kind in apartheid South Africa was inherently political, as I realized when I published my radiocarbon dates for a first millennium farming settlement. I developed this connection between politics and practice in a series of papers published in the *South African Archaeological Bulletin*, *World Archaeology*, *American Antiquity*, and *Archaeology*. This trend in my research culminated in my book *Archaeology Africa* (Hall 1996) and in my invited contribution on Africa for the British Academy's millennial view of global archaeology (Hall 2002).

On joining the Department of Archaeology at the University of Cape Town in 1983, I became interested in the archaeology of colonial settlement, at that time almost unexplored.

With a group of master's and doctoral students and in partnership with the University of California Berkeley (then a leading center for Historical Archaeology), we began fieldwork at a number of seventeenth- and eighteenth-century sites, looking particularly for evidence of slavery, the underclass and the ways in which colonial domination was marked through material culture.

Research in Historical Archaeology – as in other parts of the world – is closely related to cultural resource management. In order to gain access to sites of importance, promote site conservation, and fund archaeological research in partnership with the public and private sector, I founded the Archaeological Contracts Office in partnership with colleagues in the Archaeology Department. Between 1987 and 1993, I was responsible for a range of cultural resource management projects, including field surveys, urban excavations, and a major project at the Castle in Cape Town.

Our initial research in Historical Archaeology was brought together in two collections of papers, the first in *Social Dynamics* and the second, edited jointly with Anne Markell, in the *South African Archaeological Society Goodwin Series*. My own interest has been in the way that multiple sources of evidence could be used to expand the range and depth of archaeological interpretations. This is well represented by my study of the work of nineteenth-century Cape artists, published in the *South African Journal of Art and Architectural History*, by my chapter in *The Art and Mystery of Historical Archaeology: Essays in Honor of James Deetz* (Hall 1992) and by my paper on the ambivalences of gender in the archaeology of colonialism (Hall 1997). A prospectus for this approach to archaeological interpretation was developed in full in my book *Archaeology and the Modern World* (Hall 2000) and in the collection of essays co-edited with Stephen Silliman.

Major Accomplishments

My interests in multiple sources of evidence and in the connections between material culture, identity, and political practice have resulted in a theme of interpretation that reaches beyond the traditional disciplinary boundaries of archaeology. I started exploring this in my contributions to Malcolm Payne's artwork, *Face Value: Old Heads in Modern Masks*; Terry Kurgan's portfolio of prints, *Bodyparts*; and photographer Mark Lewis's piece on the Lost City and in fictional writing for young adults. This direction led to an awareness of the ways in which material culture, identity, and memory can be interwoven "beyond words," ideas that I have explored in a series of publications. "Blackbirds and Black Butterflies" and "The Reappearance of the Authentic" (Hall 2006) extend the interpretation to other parts of the world. My essays "Industrial Archaeology of Entertainment" (Hall 2005) and "Las Vegas in Africa" extend this line of thinking to show how the past is appropriated in the late capitalist imaginary.

Cross-References

- ▶ Hall, Martin (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Modern Material Culture Studies

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Hall, Robert Leonard

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Basic Biographical Information

Robert Leonard Hall (Fig. 1), of Stockbridge Mahican and Menominee descent through his mother, was born on February 8, 1927 in Green Bay, Wisconsin, where his father William Taylor Hall was a partner in a family grocery store. Robert Hall died on March 16, 2012, of cancer. Hall earned his B.A., M.A., and Ph.D. degrees, 1950, 1951, and 1960, from the University of Wisconsin-Madison. In 1958 he married Barbara Lee Mohr, with whom he had four daughters and four grandchildren. Robert Hall was six feet tall, with dark hair and blue eyes, and a warm, gentle manner.

Robert Hall's modesty and sense of humor belied a remarkable intelligence able to grasp recondite Mayan calendar astronomy as well as technical details of Midwest archaeological materials. His power of visual synthesizing enabled him to discern symbols in Mesoamerican and North American artifacts and mythology and think through them into profound meanings, often shared over wide areas and millennia of time. Familiarity with his own Mahican and Menominee heritage and the cultures of the Oneida and Ho-Chunk (Winnebago) neighboring the Stockbridge and Menominee Reservations sensitized Hall to indigenous understandings of the cosmos and its inhabitants. His book *An Archaeology of the Soul: North American Indian Belief and Ritual* (1997), now in its fourth printing, brought together a wide range of archaeological and ethnological researches, proposing deep-time traditions through which, for example, the atlatl, outmoded as a weapon, became the potent stem of calumet pipes. Hall himself illustrated and laid out the book design for this notable work.

Hall's interest in archaeology led him to work at his hometown's Neville Public Museum while

Hall, Robert Leonard, Fig. 1 Robert L. Hall

in high school, 1943–1945. His scientific ability won him national second-place (out of forty finalists) prize in the 1945 Westinghouse (now Intel) Science Talent Search for high-school seniors. Military service as Seaman 1/c with the Navy 1945–1946 interrupted this, to be resumed when he worked as a student at Wisconsin State Historical Society Museum, 1946–1949, and then as a curator (level 1) in anthropology, 1949–1953. Summers 1947 and 1948, Hall worked on a crew of the Smithsonian Institution River Basin Surveys Missouri Valley Project. His first career-related employment after receiving his Ph.D. was at the University of South Dakota, Vermillion, where he was Director of the Institute of Indian Studies, 1959–1961. Then he moved to the Illinois State Museum, Springfield, serving as Curator of Anthropology 1962–1967, and after a year at Marquette University in Milwaukee, Wisconsin, as Associate Professor of Anthropology, settling into his principal academic home at the University of Illinois at Chicago as Associate and then full Professor of Anthropology, from 1968 until retiring with Emeritus status in 1998.

Robert Hall presented his first scientific paper, coauthored with Warren Wittry and Robert Linck, in 1944 at the annual meeting of the Wisconsin Academy of Sciences, Arts and Letters. More than 60 years later, he coauthored the position paper "Cosmology and Society in the Ancient Amerindian World" and presented his own paper "The Role of Metaphor in Perceived Cosmologies: Variation and Redundancy in Metaphors of Sky-Earth Dualism" at a workshop of the prestigious Santa Fe Institute. He presented over 60 papers at professional conferences and published more than 30 chapters in edited volumes and articles in journals ranging from *American Antiquity* to *Archaeoastronomy*.

Major Accomplishments

Robert L. Hall was one of the soundest empirical archaeologists working in North America, painstaking and thorough in his research and keen to perceive significant data, combining this care for observations with an often breathtaking insight into links with deep time, other societies, and other sciences such as astronomy. Hall was one of the first to point out that radiocarbon dates from maize and certain other grasses will differ by as much as several centuries in radiocarbon age from dates on wood of the same calendar age. He noted, years before other archaeologists realized it, that the constructions of certain burial mounds of the Midwest USA were ritual reenactments of earth creation as described in the widespread Earth Diver myth. Hall studied historical documents and ethnographies to obtain ethnohistorical information to meld with archaeological interpretation. In 2006 the Ho-Chunk Nation wrapped him in an honoring blanket in gratitude for his contributions to their history. Midwest archaeologists presented him with a Distinguished Career Award in 2008 and a festschrift in 2003 (Richards & Fowler 2003). His work in progress, *Touching History: Four Centuries of Indian-White Relations Told as a Family Story*, relates his family lines, Stockbridge Mahican, Menominee, and Euroamerican, to significant events in American history to which they were witness.

Although Robert Hall has always been respected as an excellent field archaeologist, and his published dissertation analysis of Oneota ceramics is a classic in continuing demand, many Midwestern archaeologists have been uncomfortable with his use of indigenous cosmologies to deepen interpretation of archaeological and

ethnographic data and with his presentations of Mesoamerican links with Anglo-American First Nations. Long before the term "indigenous archaeologies" was introduced, and long before most archaeologists learned of his Native American ancestry, Robert Hall was quietly working from an indigenous standpoint. During the 1970s–1980s heyday of the narrowly scientific "New Archaeology," Hall's interpretations grounded in ethnohistorical and indigenous approaches were not always taken seriously. Never discouraged, Hall continued pursuing breadth and depth, gradually winning wider respect for what have often been brilliant insights illuminating the great traditions of Mesoamerica and Eastern North America. His work is likely to remain foundational to archaeologies east of the Rockies, while fads and personalities fade.

Cross-References

- ▶ Cahokia
- ▶ Holographic Epistemology: Native Common Sense
- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia

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Hamada, Kosaku

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Basic Biographical Information

Kosaku (Seiryo, as a pseudonym) Hamada (1881–1938) was the father of archaeology in Japan (Fig. 1). He was born in Osaka. During his elementary school days, he became interested in ancient finds such as arrowheads. His first work on archaeological materials was published in 1898 during his junior high school days (in the old system of education; almost equal to the high school in the present educational system). After he graduated from Waseda Junior High School in Tokyo in 1899, Kosaku Hamada went to Third High School located in Kyoto. In 1902, he joined the Department of Occidental History at the University of Tokyo. In 1905, he finished an undergraduate course, having been supervised by Professor Tsuboi Shogoro. In his postgraduate studies, he focused on the relationship between European and Japanese art in ancient times, with the aim of elucidating the origin of Japanese ethnicity. Before becoming a lecturer of Kyoto University on 1909, he taught history and Japanese language at his alma mater (Waseda Junior High School) for several years.

From 1910 onward, Dr. Hamada acquired considerable experience in archaeological research, not only in Japan but also in East Asia. Immediately after being promoted to associate professor in 1913, he started a three year overseas inspection in Europe (1913–1916). One outcome of this was

Hamada, Kosaku, Fig. 1 Kosaku Hamada (© Department of Archaeology, Kyoto University)

his subsequent establishment of the first department of archaeology in Japan. In hindsight, it appears that this European inspection was the preparatory work that formed Kosaku Hamada's framework for archaeology. This framework was based primarily on Flinders Petrie's archaeological methods and values. Soon after returning to Kyoto in 1916, Kosaku Hamada founded what is now the oldest department of archaeology in Japan, and became a professor of archaelogy in the next year. In 1922, he published the first textbook of archaeology in Japan, based upon Flinders Petrie's *Methods and Aims in Archaeology* (1904).

Professor Hamada was awarded a doctorate by the President of Kyoto University in 1918. In 1927, he directed excavations of the Chinese prehistoric site, Hishika, as the first expedition of the Far Eastern Archaeological Society. In 1931 he was recommended for membership of the Japan Academy. He became the President of Kyoto University, but one year later, in 1938, he died of renal failure while in office as the President.

Major Accomplishments

In spite of his early death, Dr. Hamada's career in archaeology spanned 40 years. His interest in the origin of the ethnic culture of Japan does not seem to have borne much influential fruit in Japanese prehistory in itself. However, this interest must have served as a tool through which he understood the contemporary state of archaeological aims and methods. The outstanding accomplishment of his archaeological career was *Tsuron Koko-gaku* (*An Introduction to Archaeology*) which was published in 1922 and used as the textbook of archaeological methodology for several decades.

As a practical archaeologist, Dr. Hamada fully understood the importance of introducing the principle of stratification to archaeological excavations in Japan. It is likely that one of the reasons he excavated several shell middens was to prove to himself the importance of recognizing stratigraphy. He also took part in the first systematic archaeological research project by an academic organization in Japan: the series of excavations in Saitobaru tombs in Kyushu Island, undertaken from 1912 onward. After coming back from his European inspection, Dr. Hamada organized excavations of the tombs himself. This project is likely to have been guided by his interest in the origin of Japanese ethnicity, and probably, the same kind of motivation led him to excavate some of the above-mentioned shell middens; prehistoric human bones surrounded by shell can often survive in contrast to the ordinary soil condition in Japan. This interest was shown too in the excavations of Ko site in Osaka, undertaken from 1917, where he tried to identify the first evidence of Paleolithic settlement in Japan, inspired by the find of an ancient stone implement like a hand-axe.

As a missionary of sophisticated archaeology, Dr. Hamada formalized the style of editing an excavation report, which definitely improved Japanese scholars' recognition of archaeological findings as not only past remains but also historical resources. Moreover, Dr. Hamada paid great attention to publishing a report precisely and in a proper time after excavation, possibly because

he concurred with Petrie's view on ethics in archaeology (1904).

As the founder of the first department of archaeology in Japan, Dr. Hamada not only collected past remains even from overseas but also rigorously recorded archaeological materials with clear information on context and location. He used these materials to develop archaeological education in the department and also produced a condensed English version of some archaeological reports. Considering his various accomplishments together, it appears that Kosaku Hamada consciously worked on a number of fronts in order to ensure that archaeology in Japan caught up with the high standard of archaeology in European countries such as England and France as quickly as possible.

Cross-References

- ▶ Kanaseki, Hiroshi
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Saito, Tadashi
- ▶ Tsuboi, Shogoro

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Hamster: Domestication

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Basic Species Information

The golden hamster *Mesocricetus auratus* (Waterhouse, 1839) belongs to the class of mammals and to the subfamily hamster (Cricetinae): Order: Rodentia, Suborder: Myomorpha, Superfamily: Muroidea, Family: Cricetidae. This subfamily consists of approximately 20 species. The natural distribution of all hamsters belongs to the northern hemisphere in the palearctic region (Europe and Asia). The most well-known hamsters are species from the three genera *Cricetus*, *Mesocricetus*, and *Phodopus*.

The genus *Cricetus* consists only of one species, the common or European hamster *Cricetus cricetus* (Linneaeus, 1758). This is also the largest species of hamsters, with up to 30-cm body length and up to 1 kg body mass. The common hamster is widely distributed from the eastern part of Russia to the Netherlands and France in the west. There are three species in the genus *Phodopus*: the Dsungarian dwarf hamster *P. sungorus* (Pallas, 1773), Campbell's dwarf hamster *P. campbelli* (Thomas, 1905), and the Desert hamster *P. roborovskii* (Satunin, 1903). These three species of dwarf hamsters are relatively small (up to 10 cm and up to 50 g). They were brought to Europe in the 1970s and are used in scientific research in laboratories and kept as pets. Four to five species are described in the genus *Mesocricetus*, the so-called middle hamsters. One is the golden hamster and the other three are the Turkish hamster, *M. brandti* (Nehring, 1898), distributed in Anatolia (Turkey), Armenia to Iran; the Ciscaucasian

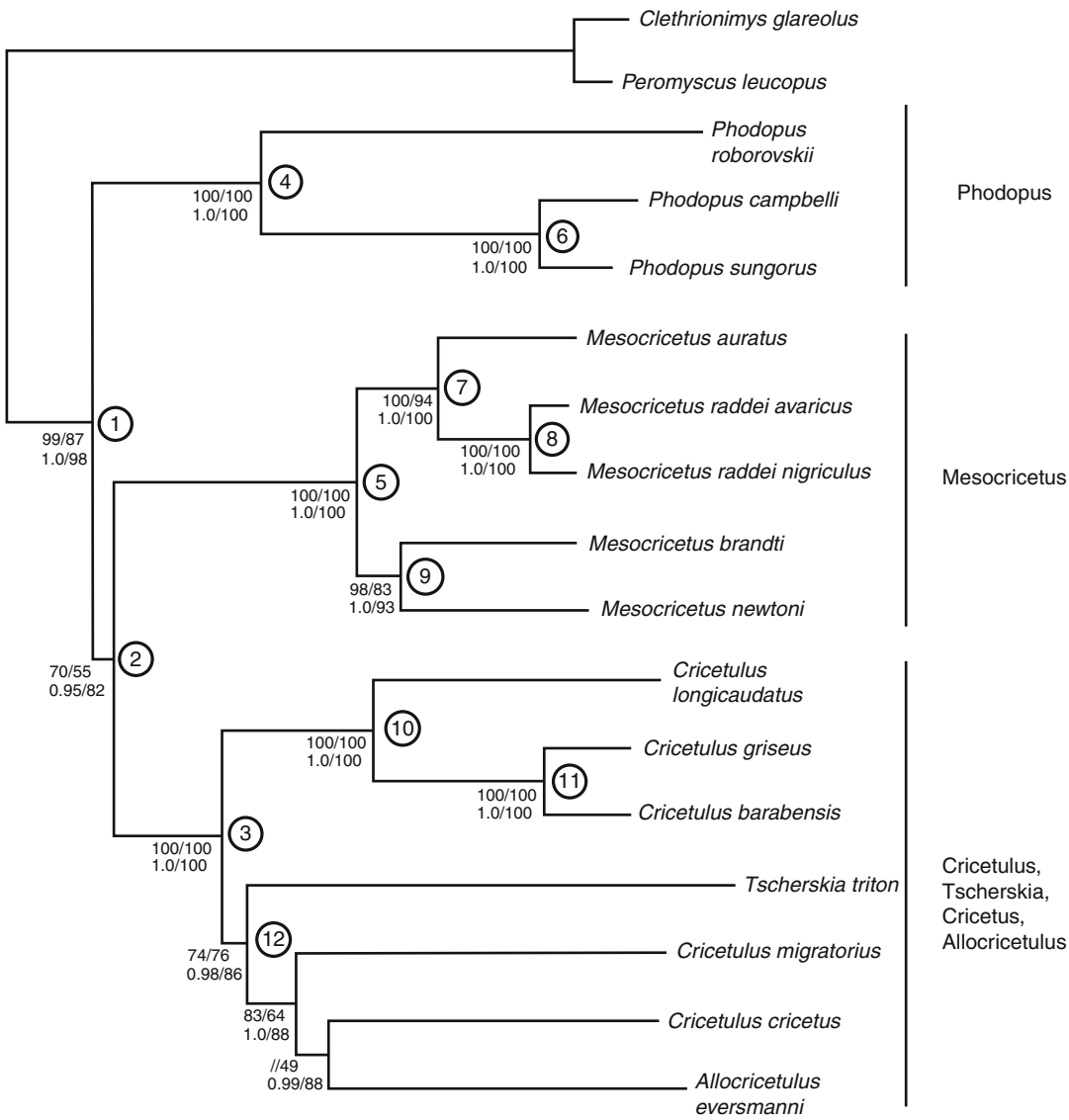

Hamster: Domestication, Fig. 1 Tree of the molecular phylogeny of hamsters (Neumann et al. 2006)

hamster, *M. raddei* Nehring, 1894, living in Aserbaijan and Dagestan, and the Romanian hamster, *M. newtoni* (Nehring, 1898) which can be found in Romania and Bulgaria. The existence and relationship of a probable fifth species, *M. nigriculus*, is uncertain (Panteleyev 1998; Yigit et al. 2006) (Fig. 1).

The most prominent hamster is the golden hamster. In countries outside Europe, the word "hamster" refers to the *golden* hamster. The natural distribution of this species is very small. It occupies the northern part of Syria in the so-called Aleppinian Plateau (around and north of the city of Aleppo) and a southern portion of Turkey. The distribution of the golden hamster is limited by natural borders: the Mediterranean Sea in the west, the Taurus Mountains in the north, the Euphrates River in the east, and the Syrian Desert in the west (Gattermann et al. 2000). Burrows are mainly found in agricultural fields. As a result of the increasing urbanization in Syria, this species is increasingly endangered (Fig. 2).

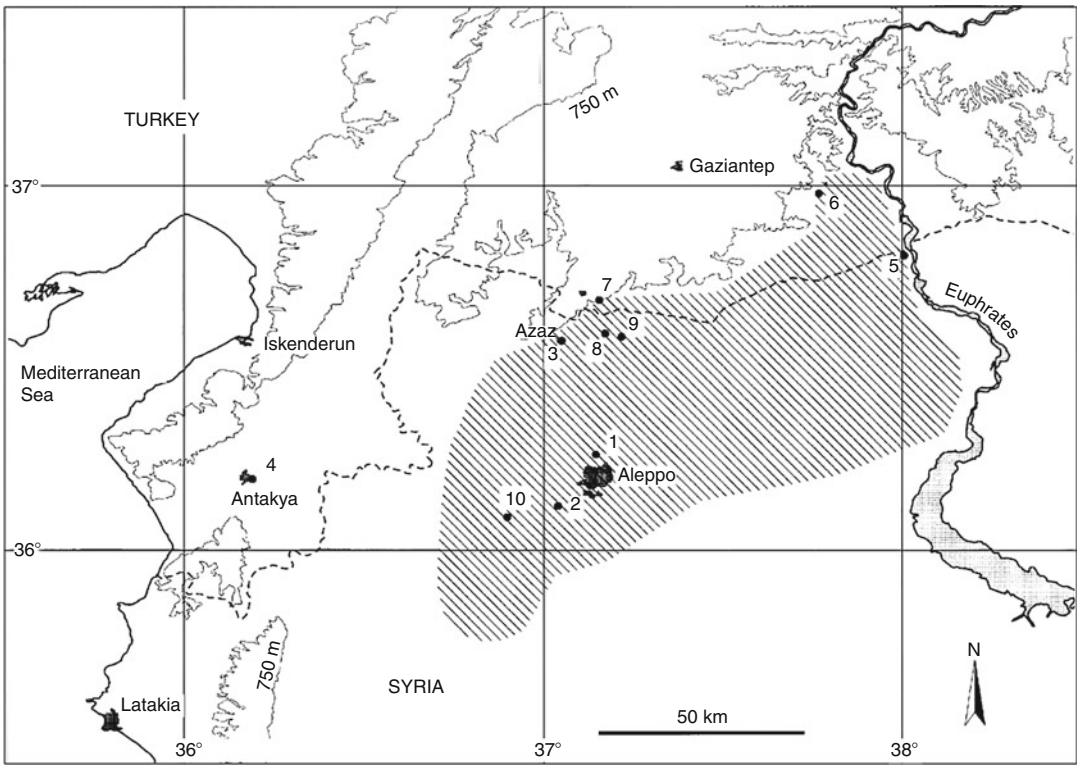

Hamster: Domestication, Fig. 2 Distribution map of the golden hamster. Numbers indicate historic and recent records (Gattermann et al. 2000)

Golden hamsters are mainly solitary animals with a promiscuous mating system. In captivity, they behave aggressively against conspecifics and grouping of unrelated animals is impossible. In the wild they live solitary in burrows approx. 65–100 cm deep dug by themselves. The individuals reach a length of about 18 cm and weigh up to 180 g. With their expendable cheek pouches, golden hamsters can carry about 20 g of grain into their burrow. In their natural habitat in spring and summer, and in captivity during the whole year, females are sexually receptive every four days. Only 16 days after successful copulation, they give birth to ~8 pups. Though golden hamsters in the wild only live up to two years, in captivity, they can reach an age of three years.

The golden hamster is a popular pet and a widely used laboratory animal. Its unique domestication history started nearly 100 years after its scientific description in 1930 when an Israeli scientist discovered a female with 11 pups in an agricultural field near the city of Aleppo. Though the mother and several pups died, one female and three males survived. After successful mating, these animals established a captive hamster population that was the foundation for the entire modern domestic population that numbers several million individuals. No other mammal has achieved a similar breeding success from such a narrow gene pool.

In 1971, an additional 12 wild animals were brought to the USA (Murphy 1971). Since then, only a few golden hamsters have been caught in Syria and Turkey and they have not influenced the modern gene pool of domestic hamsters. In 1999, after an expedition to Syria, 19 wild hamsters were brought to the University of Halle (Germany). The wild hamsters have been compared to the inbred lab hamsters regarding genetic variability, morphology, and behavior.

An expected reduction in genetic variability was found. The domestic (lab) hamster sample shows an evidently reduced genetic variability (Neumann et al. 2005). Surprisingly, a remarkable feature of the species is that the domestic (lab) strain shows nearly no signs of inbreeding changes or depression. Differences between the strains in morphology and behavior are very small (Gattermann et al. 2002; Schneider & Fritzsche 2011). Given the opportunity to choose between lab and wild males, females of the lab strain prefer males of the wild strain for mating. If wild males and lab males have the same time to mate with females of both strains, the reproductive success of wild males dramatically exceeded that of lab males. A kind of sperm competition seems to occur (Fritzsche et al. 2006).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Handaxes and Biface Technology

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Introduction

Few objects in the history of prehistoric archaeology have attracted such sustained scholarly interest – and proved so resilient to scientific explanation – as the handaxe.

Handaxe is an early term that is still widely used to describe an enigmatic type of stone tool found at archaeological sites across at least two-thirds of the Paleolithic Old World (Lycett & Gowlett 2008). These are stones that were flaked on two opposing surfaces in such a manner that a generally ovate- or teardrop-shaped plan form, and symmetry or near-symmetry about two planes, was produced (Figs. 1–2).

Handaxes are of particular interest to Paleolithic archaeologists, as they appear to be the first artifacts in the human cultural record to display characteristic hallmarks of intentional design. That is, to many – but not all – observers, they seem to have been deliberately shaped by hominins into particular tool forms (Wynn 1995).

Handaxes and Biface Technology, Fig. 1 Acheulean handaxes from Middle Pleistocene Britain. Scale bars are in 10 mm increments (Photos: A. Brumm; the artifacts are in the collections of the British Museum; used with permission)

The term handaxe was first used in a teleological sense to describe flint bifaces found in deeply stratified gravel quarries and clay pits in mid-nineteenth-century France and Britain (Prestwich 1860; Evans 1872). These curiously shaped stones, first described in the published literature a half century earlier (Frere 1800), occurred alongside extinct fossil fauna. Early French scholars named them *haches* (axes) or *coups de poings*, the latter meaning "blows of the fist," from which originated the English term handaxe (Debénath & Dibble 1994). The eventual acceptance of handaxes as humanly made artifacts (Prestwich 1860) provided the earliest scientific proof of the great antiquity of humankind. The first handaxe assemblages brought to the attention of nineteenth-century science were recovered from the St Acheul gravel pits of northern France. Thus, the entire time period of handaxe manufacture is often referred to as the "Acheulean" (alternative spelling: Acheulian) and the objects themselves as Acheulean handaxes.

Present evidence suggests that handaxe technology first arose in Africa ~1.76 Ma ago and had spread into western Asia and Europe by ~1 Ma ago. In the preceding Oldowan period, it is argued, stone toolmaking was less advanced from a technological, and also a cognitive, perspective. Dating to at least 2.6 Ma ago, African Oldowan assemblages constitute the earliest known evidence of stone technology. They typically contain few if any standardized artifact forms and are dominated by unretouched flakes and a limited range of relatively amorphous core types (i.e., choppers, discoids, core scrapers, and polyhedrons). Oldowan artifacts were made from almost any locally available raw materials, regardless of quality, and making them required little advanced planning and minimal investments of time and energy.

In light of this, it is often contended that the appearance of handaxes in the archaeological record reflects a major leap forward in hominin cognitive abilities, in particular, the emergence of the human capacity to impose preconceived forms on the environment – a possible

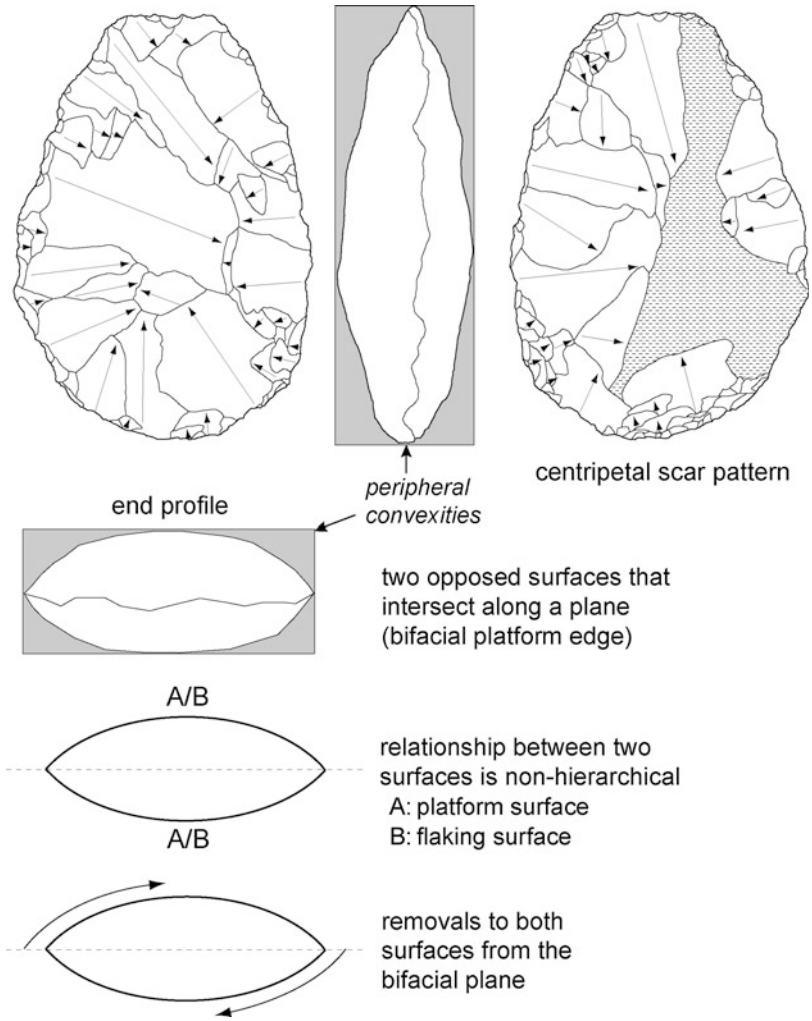

Handaxes and Biface Technology, Fig. 2 Schematic model showing the technological features of a handaxe. Flakes were typically removed from around the bifacial platform edges and towards the center of each face, creating a generally radial or sub-radial (i.e., centripetal) scar pattern (modeled after concepts in Boëda 1995)

precursor to language (Wynn & McGrew 1989; Wynn 1995). The intuitive impression that handaxes are over-engineered for functional purposes has led some to conclude that they reflect an incipient understanding of geometry and mathematics, perhaps even a sense of the aesthetic.

Recent findings from Ethiopia indicate the persistence of handaxe technology, in essentially unchanged form, until as recently as ~100 thousand years ago (Lycett & Gowlett 2008). This extraordinarily long time span implies that handaxes were associated with multiple hominin species, including *Homo erectus/ergaster*, *Homo heidelbergensis*, and early *Homo sapiens*.

The vast time-space distribution of the Acheulean has led some scholars to call it the most widespread culture in human history. However, others have questioned the extent to which handaxe technology represents a real tradition. As Clark and Riel-Salvatore (2006: 37) point out, for instance:

> …there is simply no behavioral or cultural mechanism by which a hypothetical tool-making tradition could be transmitted over hundreds of thousands of years and millions of square miles. So, whatever the Acheulean is, it is manifestly not a "culture" or "tradition."

Some archaeologists have also challenged the long-held theory that handaxes were products of an intended design ("finished artifacts"), a point returned to below.

Definition

Handaxes are technically bifaces. A biface is any piece of stone that has been worked by a toolmaker on two opposing surfaces (i.e., *bifacially*) (Fig. 2), while a bifacial technology is the culturally embedded suite of technical practices and know-how employed by the toolmaker to do so. Bifaces and bifacial technology are ubiquitous in the prehistoric and recent archaeological records. They are present in the world's oldest known stone tool assemblages, from the African Oldowan. There are also many ethnographic accounts of bifacial tool making by modern human groups.

Most Acheulean assemblages contain varying proportions of bifacially flaked stones. Paleolithic archaeologists classify these bifaces into two distinct categories: bifacial handaxes and bifacial cores. The conventional view of Acheulean bifacial cores is that hominins set out to remove sharp-edged flakes from them, which were used as tools. With Acheulean handaxes, on the other hand, bifacial knapping was done with the conscious aim of shaping the biface itself into a tool.

Accordingly, with Acheulean core reduction, it is assumed that only the flakes removed from a core were important to hominins – the resultant core was discarded as waste. With handaxe reduction, however, it was the *final form* of the biface that was of greatest interest to hominins – the flakes produced in the process of handaxe manufacture were merely unwanted rubbish. The fundamental difference between core and handaxe reduction in Acheulean technology, therefore, according to received wisdom, is that cores were the incidental *by*-products of bifacial reduction, whereas handaxes were the desired *end* products of this process.

Most present-day archaeologists define Acheulean handaxes using a fairly polythetic set of characteristics. "Typical" handaxes comprise large (>10 cm in length) bifaces with a generally pointed or ovate plan form, acute and often finely retouched cutting edges extending around part or all of the outer perimeter, slender tips opposite thick, globular butts, and, most characteristically, approximate bilateral symmetry around the long axis. While not all handaxes are symmetrical, and indeed, asymmetrical specimens are the norm in most assemblages, some display high degrees of bilateral symmetry in plan outline, cross section, and profile (but see below).

Allometric scaling is also seen as a defining characteristic of handaxes. Several studies have shown that Acheulean bifaces occur in similar size ranges across time and space, indicating standardization. Gowlett (2009), for example, uses the analogy of modern screwdrivers, which show similar uniformity in dimensions. He suggests that some handaxes, like screwdrivers, were intentionally worked into specific sizes and shapes for use for particular purposes.

Handaxes were manufactured on cobbles, nodules, or large flake blanks, the latter in some cases being struck from specially prepared cores. The earliest handaxe assemblages were made using hard-hammer percussors, resulting in deep flake scars, sinuous bifacial platform edges, and a generally "crude" appearance. Some Middle Pleistocene handaxes, however, appear to have been made using soft-hammer percussors of antler, bone, or wood. The use of soft-hammer percussion is thought to imply a concern with controlling the reduction of three-dimensional volumes by removing thin, expanding flakes, resulting in shallower scars across the surfaces of the tools, permitting more careful shaping and refinement of the overall form.

It has often been argued that handaxe reduction – from initial raw material procurement through to the various sequential phases of manufacture – was complex and multistaged, implying careful planning ahead in the production of the tools. Gowlett (2009), for example, argues for flexible planning in handaxe production routines. He maintains that the fact that the same product (a handaxe) could be made from three distinct blank types (nodules, flakes, and cobbles) provides strong evidence that the artifacts were deliberately designed.

Cleavers and picks are other kinds of large Acheulean bifacial tools that are morphologically distinct from handaxes but often tacitly subsumed within this category. Cleavers are bifaces, usually

made on large flakes, with an unretouched distal edge oriented in a perpendicular or slightly oblique direction to the long axis of the blank. Picks comprise large, thick, retouched tools with high-backed plano-convex or triangular cross sections and robust pointed tips.

It is generally assumed that handaxes were used for a wide range of purposes – indeed, they have been called the "Swiss Army knife of the Stone Age." Although experimental studies emphasize their role as butchery tools, many different functions have been inferred, ranging from missiles lobbed at animals to objects of sexual display (Kohn & Mithen 1999). Few residue or microwear analyses of archaeological specimens have produced unambiguous evidence of handaxe function, however.

Whatever Acheulean handaxes were used for, it is unlikely that they functioned as axe-like implements. The term is so deeply embedded in Paleolithic studies, however, that its continued use is largely a matter of convenience, although many prefer alternative appellations like large cutting tool (LCT) or biface.

By definition, "true" bifacial handaxes only occur in the Lower and Middle Paleolithic periods. It is important to emphasize, however, that there are no attributes of Acheulean bifaces that are chronologically unique. Virtually any technology in which tools or cores were produced by bifacial flaking could result in the discard of objects resembling handaxes (Brumm & Moore 2012). Indeed, there is a long history of scholars mistakenly attributing bifaces produced by modern humans, such as "Neolithic" bifacial axe blanks, to the Acheulean (see, e.g., Johansen & Stapert 1995). Despite frequent assumptions to the contrary, therefore, bifaces found in undated surface contexts cannot be used as a reliable source of dating evidence, for example, to designate a surface site with handaxe-like bifaces as Acheulean.

Key Issues

As noted above, the standard interpretation of Acheulean handaxes holds that, prior to the appearance of these objects, hominins did not shape stones into preconceived forms. One of the most pressing issues in our understanding of handaxe technology, therefore, is a simple but fundamental question: were handaxes really intentionally shaped tools? That is, were handaxes made according to fixed designs that guided the planned actions of toolmakers, or is the appearance of complexity in these artifacts merely fortuitous? The standard story relies on the accuracy of the assumption that the forms of handaxes were, indeed, deliberately imposed, so this is clearly an important problem.

Iain Davidson argues that it is impossible to know what was going on in the minds of hominins when they made stone artifacts, so it is a fallacy for us to presume to know which artifacts were intended for use as *tools* and which were not. Indeed, Davidson (2002) suggests that handaxe shapes could well have resulted from the same underlying processes that produced bifacial cores. Contrary to popular belief, the target of hominin reduction may have been the *flakes* removed from handaxes, which were useful as tools, rather than the handaxes themselves. In other words, handaxes might have been leftover by-products of flake manufacture (i.e., *cores*), and handaxe symmetry may be merely an "accidental" outcome of the flake removal process.

Clark and Riel-Salvatore have offered a similar interpretation of handaxes as cores: "If such is the case, the formal convergence that is so much a part of lithic reduction everywhere would have produced [handaxes] simply as an accidental consequence of centripetal flaking of large, relatively flat, oval cobbles and flakes" (Clark & Riel-Salvatore 2006: 38). Shea further supports this viewpoint, stressing the extent to which preconceptions about handaxes bias our understanding of them:

> The "handaxes as cores" hypothesis may seem implausible if one's impression of these artifacts is shaped largely from illustrations in the archaeological literature. These illustrations are biased in favor of large, thin, symmetrical and carefully flaked artifacts. However, such "trophy specimens" are almost always a minority of the bifacial core tools in any substantial Acheulean

> assemblage. Most such tools are short, thick, asymmetrical and with exactly the kinds of deep and invasive flake scars that result from flake production (Shea 2006: 221).

Iain Davidson takes this argument a good deal further:

> Hand-axes look alike because archaeologists select for analysis objects that look like hand-axes. There are objects in Acheulean assemblages that have some of the characteristics of hand-axes, but not all. These are excluded from comparison, reinforcing some of the appearance of standardization (Davidson 2002: 193).

Shannon McPherron has put forward an alternative, and somewhat less extreme, hypothesis. He believes that, even if handaxes were tools, rather than cores, morphological patterning in the artifacts need not imply cognitive intent. Handaxes, McPherron (2000) points out, were often "resharpened" by successive generations of bifacial removals from around the periphery. This was done in order to get maximum use out of the tools. The process of rejuvenating tool edges in this way reduced the mass of a handaxe and modified its overall form.

If such was the case, it is possible to imagine how an individual handaxe could have varied in shape at different points in its "life history," as a result of resharpening. Indeed, McPherron has argued that certain recurring handaxe shapes routinely interpreted by archaeologists as purposefully designed tool forms – namely, ovate and pointed handaxes – might be arbitrary points along a morphological continuum. In fact, his analyses imply that ovate handaxes might simply have been pointed handaxes that were intensively resharpened.

This leaves open the possibility that the unresharpened forms of handaxes reflected elements of conscious design. The chief implication is that morphological complexity in handaxes, including handaxe symmetry, may be largely due to chance, rather than the deliberate intent of hominins to impose these forms on stones.

The idea that Acheulean handaxes were simply worn-out cores is difficult – if not impossible – to verify empirically, but no less so than the more orthodox view that handaxes were deliberately shaped tools. Proof of either notion requires observations of hominin behavior that the archaeological record, so far, cannot provide.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo heidelbergensis*
- ▶ Human Evolution: Theory and Progress
- ▶ Lithic Technology, Paleolithic
- ▶ Movius Line
- ▶ Oldowan Industrial Complex

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Basic Biographical Information

Russell G. Handsman is an archaeologist working in the northeastern United States. After receiving his Ph.D. from American University in 1977, he worked for a series of organizations, including the American Indian Archaeological Institute, the University of Rhode Island Program in Public Archaeology, the EcoTarium Center for Environmental Exploration, and the Mashantucket Pequot Museum and Research Center (MPMRC). His research interests range from the origins of capitalism in New England (Handsman 1981) to the archaeological study of ancestral homelands and their long-term histories (Handsman 2008a). While most of his research has focused on New England, he has also contributed to archaeological thought in other areas (e.g., Handsman 1991).

Handsman often takes a Marxist approach, applied to topics such as critical archaeology, gender studies, and the tensions between document-based knowledge of the past and archaeology. This can be seen in his recent work on issues such as race (2008b). He has called for an archaeology of "Our Times" the years between 1900 and 1935, in order to challenge conventional history (1995), and has used documentary sources to develop an archaeological approach to the study of Wampanoag Indian whaling and maritime communities (2011). Overall, what has united Handsman's research is an interest in challenging uncritical assumptions about the past and in documenting the resistance and survival of groups whose histories are often ignored.

Major Accomplishments

In addition to his research interests, Handsman has always maintained a commitment to considering the place of archaeology in everyday society. This includes support of reburial, the rights of indigenous people, and the involvement of descendant communities in archaeological research. While at the University of Rhode Island, Native people were included in designing research projects and employed in field work. At the MPMRC, Handsman carried out a cooperative project between the center and the Zuni Tribal Nation and also conducted a hands-on archaeological field project incorporating local 6th grade students in New London, CT. This combination of innovative archaeological ideas, meticulous and hypothesis-based research, and a commitment to the larger community makes Handsman one of the most interesting archaeologists currently working in historical archaeology.

Cross-References

▶ Archival Research and Historical Archaeology
▶ Capitalism: Historical Archaeology
▶ Critical Historical Archaeology
▶ Historical Archaeology: Indigenous Perspectives and Approaches
▶ Indigenous Archaeologies

▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
▶ North America (USA): Historical Archaeology
▶ Oral Sources and Oral History

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Hanse Archaeology

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Introduction

The Hanseatic League was an association of North German merchants aiming to represent their common interests and to secure their trading operations abroad. To this end, traders got together to travel in groups from the mid-twelfth to the late seventeenth centuries. However, they were not a uniform group of German merchants but rather an association of traders from several different nations, representing trading towns in various countries and arranged in several different quarters. Over the course of the Late Middle Ages, the Hanseatic League became the largest economic power in northern Europe. It was also highly significant from a political, social, and cultural point of view, both in its core area and its peripheral regions.

The Hanse is no longer a mere domain of (economic) history. For more than 60 years, it has also been subject to archaeological research. The scope of the so-called Hanse Archaeology (or Hanseatic Archaeology) is now as international as the Hanseatic League itself was in its day.

Definition

To put it simply, Hanse Archaeology investigates the history of the Hanseatic League with archaeological methods. With regard to its content, Hanse Archaeology has both a narrow focus, concerned mainly with analysis of the intercultural exchange between the Hanseatic merchants and their agents (e.g., seamen, craftsmen) and their customers abroad, and a wider focus, which studies the social, economic, and cultural impact these contacts had for both

societies. Hanse Archaeology thus has a different emphasis from Hanseatic history, which has traditionally been concerned mainly with questions of economic and political history. The reasons for this dichotomy lie largely with the different sources. The written records that have survived deal mainly with various aspects of the movement of goods, thus providing more detailed insight into this area, while the archaeological sources shed more light on facets of everyday life, which are only rarely, if at all, mentioned in the written records.

Thanks to the equal treatment and inclusion of written and pictorial sources, Hanse Archaeology can be considered a case study in the field of Historical Archaeology (Gaimster 2005a: 408). It studies artifacts, biofacts, architectural remains in towns and rural areas, coastlines and their hinterlands, port facilities, ships, and commercial routes, thus also forming an area of Maritime Archaeology.

Geographically, Hanse Archaeology operates over a very wide region, both in the core areas of the Hanse, i.e., the major Hanseatic towns in present-day northern Germany (Lübeck, Wismar, Stralsund, Bremen, Hamburg, etc.), and in the many subsidiaries (e.g., Bergen in Norway, Turku in Finland, Gdansk in Poland) and their surrounding areas.

The concept of Hanse Archaeology originated with David Gaimster (1999) and his research on the Hanseatic League throughout the Baltic. However, archaeologists were studying the Hanse much earlier, without identifying it explicitly as a distinct field of research. All the medieval or early modern excavations which have been regularly carried out, at least since the 1960s, in the core towns of the Hanse such as Lübeck, Bremen, or Hamburg, can also be associated with Hanse Archaeology in its wider scope. Moreover, archaeological methods have long been used to study the history of the Hanse in northern European towns like Bergen, which held great importance for the Hanse.

It is important to point out a linguistic detail: the German language differentiates between the adjectives "hansisch" and "hanseatisch." While "hansisch" denotes everything associated with the medieval and early modern Hanse, "hanseatisch" is a more recently coined term referring solely to the three towns of Lübeck, Bremen, and Hamburg, still called Hanse towns to this day, and their inhabitants. The English language does not make this distinction, and the adjective "Hanseatic" can also be used to denote the medieval and early modern Hanse.

Methods

Today, Hanse Archaeology operates in a very interdisciplinary manner. The methods used vary greatly, however, from project to project and depend ultimately on the funding available. Besides the archaeological sources, the second most important source category is written records, tying Hanse Archaeology closely in to the fields of history and economic history. Written records are an ambiguous data source, however. Customs records or toll registers tell of goods exported and imported, but they do not mention all the items shipped. Pottery, for example, is hardly ever listed as ship's cargo (e.g., Hofmeister 2001), though it was widely exported from the German coastal cities to the north and into the Baltic, and is found in many excavations (Fig. 1). Many written documents are concerned with political issues or disputes between traders and the authorities. Everyday or personal matters, on the other hand, are very rarely mentioned.

Also very important are pictorial sources, such as portraits of merchants or images of ships or ports identified by name, or simply material culture depicted in contemporary still lives (Fig. 2). Sixteenth and seventeenth century maps help identify small Hanseatic trading bases, as do place names and even oral history, e.g., farmers talking about ruins on land which have been in their family for generations. In cases where an archaeological excavation takes place, all the usual archaeological and scientific methods are applied. The latter include, in particular, archaeobotany, archaeozoology, and palaeoentomology, as well as dating methods such as radiocarbon dating or dendrochronology. The latter is particularly important in determining the age and even the origins of timbers recovered

Hanse Archaeology, Fig. 1 Fragments of a so-called Schnelle made of Siegburg stoneware, found during excavations in Tórshavn, Faroe Islands. This stoneware was made in Siegburg in the German Rhineland and was widely distributed throughout the Hanseatic region (After Arge & Mehler 2012, Fig. 4)

from ship wrecks. Hanseatic wrecks and their cargoes are investigated and recorded applying the usual methods of underwater archaeology and some are actually salvaged.

Historical Background

The term "Hanse" has been known since the twelfth century. It originated from the Old High German word "hansa," meaning roughly "band" or "community," and denotes both a group of travelling merchants and the charge which was due for membership of such a community. In a third meaning, the term "Hanse" additionally denotes the legal right to carry out communal commercial enterprise (Hammel-Kiesow 2004: 27).

The Hanse came into being in the mid-twelfth century. While no exact date or event is linked with its formation, the founding of the town of Lübeck in 1143, giving access to the Baltic Sea, is considered to have been one of the decisive elements in the formation process, since it meant that Western Europe could now trade with Russia, by navigating the Baltic and the rivers Dnjepr and Volga, and reach as far as the Caspian Sea. The founding of Lübeck was linked with the German eastward expansion (c. ninth to fourteenth centuries) which increasingly opened up the Baltic region to western trade (Dollinger 1970: 19; Fehring 1989: 61; Hammel-Kiesow 2004: 21–2).

This early association of merchants, which can be traced back to 1160, is called the Merchants' Hanse (*Kaufmannshanse*). An important role in its inception was played by the Gotland Community (*Gotländische Genossenschaft*), a society of merchants which had formed in Lübeck. At that time the island of Gotland acted as the most important commercial hub. While trade with the Baltic region and Russia had previously been dominated by the Scandinavians, the Hanse merchants now took over the leadership (Dollinger 1970: 24–6; Hammel-Kiesow 2004: 30).

Several pan-European political and social changes in the mid-thirteenth century resulted in the Merchants' Hanse evolving into the Hanse of the Towns (*Städtehanse*). During the Interregnum (1245–1273) in the Holy Roman Empire, the imperial protection which had previously been enjoyed by the merchants was lost. They found

Hanse Archaeology, Fig. 2 The Hanse merchant Georg Gisze (1497–1562), painted in 1532 by Hans Holbein the Younger. Georg Gisze was a merchant from Gdansk, Poland, and is shown here in his office at the Steelyard in London. Gisze imported fish, probably from Iceland, using Hamburg vessels; having sold the fish in London, he brought cloth back to Hamburg. On the table sits his official stamp, consisting of a bone handle and a metal seal matrix (From Mehler 2009, Fig. 7 see also Friedland 1999)

new protection in the towns, which now ensured the safety of trading routes and the maintenance of trading privileges. The towns formed alliances and organized so-called *Tagfahrten* or *Hansetage*, Hanseatic Diets, where envoys from the towns assembled in order to regulate their trading interests. All the resolutions were recorded in the so-called *Hanserezesse* (Hanse legislative records). The first Hanseatic Diet at which representatives of all the Hanse towns met took place in 1356. The Hanse of the Towns lasted from around 1250 to the early fifteenth century, and this period is considered to have been the heyday of the Hanse (Dollinger 1970: 45–85, 92–7; Hammel-Kiesow 2004: 71–3).

With the discovery of the New World, the Hanse increasingly lost its importance. Trade had shifted and in addition powerful competitors began to enter the market. Moreover, the towns were now increasingly forced to subordinate their interests to the ruling princes. Sixteenth century attempts at reorganizing the Hanse failed. By the early seventeenth century, the Hanse was a union only in name. The final demise eventually came with the Thirty Years' War (1618–1648). In 1669, Lübeck held the last Hanseatic Diet, with the participation, however, of only a small number of towns (Dollinger 1970: 281–370; Hammel-Kiesow 2004: 97–115).

Geographically, the Hanse's main area of activity was enormous. The core area comprised the towns of the so-called Wendish Quarter, including Lübeck, Wismar, Rostock, Stralsund and Hamburg (all in Germany), and Visby (in present-day Sweden). Trade was pursued principally in the Baltic region and took in important towns of the so-called Baltic Quarter, such as Gdansk (Poland), Riga (Latvia), or Tallinn (Estonia). In the west, towns of the Westphalian Quarter such as Deventer and Groningen (both in the Netherlands) were of great importance (Dollinger 1970: map 3).

A major aspect of the Hanseatic League was its role as the predominant agent for the transport of goods from east to west, south to north, and north to west in northern Europe during the late medieval and early post-medieval periods. The weights and measures used throughout the Hanseatic trade region, while not identical, were at least sufficiently compatible to allow business to run smoothly. However, direct trade between the points of supply and the final destinations of goods was rare. Instead, goods were usually transported in several stages within the Hanseatic network (Dollinger 1970: 210–50), a factor which makes interpreting the distribution of archaeological artifacts somewhat problematic.

Long-distance trade was largely conducted via four so-called *Hanseatic kontors*, trading enclaves abroad, within which the merchants had formed associations with the aim of advancing their interests. Moreover, kontors were also legal communities endowed with privileges. The merchants and their retinues usually lived in these kontors all year round. The easternmost and oldest Hanseatic kontor was the so-called *Peterhof* in Novgorod, Russia, a fenced area

within the city which had come into being in the mid-thirteenth century. St. Peter's Church stood at its center and was surrounded by residential buildings, shops and storage sheds, a bakery, a brewery, an infirmary, and a jail. The kontor in Bruges, Belgium, was the most important Hanseatic kontor in economic terms. It had been founded around the mid-fourteenth century. A short while later, the so-called *Tyske Bryggen*, the kontor in Bergen, Norway, was founded. In its heyday it comprised around 30 farmsteads on the northern side of the Vågen Bay. It is estimated that some 2,000–3,000 Germans lived in Bergen during the summer months in the fifteenth and sixteenth centuries. However, Bryggen was not an isolated German ghetto but operated in vibrant interaction with its surroundings. The so-called *Steelyard* in London, the final kontor, was a fenced-in area on the northern bank of the river Thames which existed from 1475 onwards (Dollinger 1970: 85–116; Hammel-Kiesow 2004: 61–4).

History of Research

Hanse Archaeology as a discipline is considerably older than its name. Two basic fields of research can be distinguished: the inward focus, which deals with the core region of the Hanse, and the outward focus, which looks at the contact areas abroad that were heavily influenced by the Hanse. Urban archaeology has long been pursued in many towns throughout the Hanseatic core region, essentially making a contribution to Hanse research, without, however, actually stating this or asking specific questions about the history of the Hanse. Strictly speaking, almost every inner-city excavation carried out since the Second World War in, for instance, Lübeck or Gdansk, which has uncovered late medieval or early modern remains, has provided information on the Hanse. After all, at that period many inhabitants of these towns were involved in the operation of the Hanse in some capacity or other. Besides the merchants, this included, first and foremost, the numerous craftsmen, who made the trade in goods possible in the first place. At the end of the fourteenth century, it is estimated that approximately half of the population of Lübeck, to give just one example, were pursuing occupations connected to the harbor and shipping (Fritze 1998: 113). During the high and late medieval periods, Lübeck had grown considerably, and this development went hand in hand with the emergence of a merchant class in the town. Economic and demographic growth in Lübeck is reflected by the repeated subdivision of large plots and the change in architectural style from wooden constructions to brick-built houses with several stories (Fehring 1989). In the case of Lübeck, the results of these archaeological investigations have been published in the series *Lübecker Schriften zur Archäologie und Kulturgeschichte* since 1978. Moreover, the town hosts regular conferences on urban archaeology in European Hanseatic towns, whose proceedings have been published in the series *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum* since 1997.

Archaeological research into the Hanseatic kontors abroad also has a long-standing tradition. Since 1932, excavations have regularly been taking place in Novgorod, uncovering an impressive number of excellently preserved timber finds. The results have been presented to European readers in the series *The Archaeology of Medieval Novgorod* (Brisbane & Gaimster 2001). Comprehensive excavations have also been carried out in the area of the German Brygge in Bergen. After a large conflagration in 1955, the remains of several timber buildings which had made up the Hanseatic kontor were excavated over the course of 15 years. The buildings were both post and log constructions and had storage areas on the ground floors, while the living quarters were located on the upper stories. The excavations were also an important milestone in the evolution of a European Archaeology of the Middle Ages. Besides the architectural remains, the emphasis of the published post-excavation reports has to date focused on find categories such as pottery, shoes, textile remains, and fishing equipment. The results of these, and of new excavations carried out more recently, have been published in *The Bryggen Papers, Main Series* and *The Bryggen Papers, Supplementary Series* since 1985.

In contrast, significantly fewer studies of Hanse Archaeology have so far been produced in Bruges or London. A example from London was the excavation carried out in the grounds of the Steelyard complex (1988–1989). It revealed stone walls which had been preserved up to a height of 1.4 m and had belonged to the Guildhall of the Cologne merchants (Keene 1989) (see Fig. 2).

In the 1990s, archaeological research into the Hanse began to be carried out in the Baltic coastal states. Here, too, the main emphasis has been on the study of material culture, primarily pottery. A good example is the research into the Hanseatic pottery trade in the Baltic. Western European ceramic products, especially tableware and interior fittings for buildings, were imported, adapted, and even imitated in order to emulate the Hanseatic urban lifestyle (Gaimster 1999, 2005a, b).

Key Issues/Current Debates

Archaeological Hanseatic research, including both fields of research mentioned above, concentrated for a long time on the core region of the Hanse and on the Baltic trade. In this it followed the lead of Hanseatic historical research, which has traditionally concentrated on this area. While until the 1990s the main focus of archaeological research was analysis of material culture, more recent research has increasingly studied sociocultural questions. This line of approach was initiated by David Gaimster's work, which for the first time discussed the impact of the imported goods and the ongoing presence of foreign merchants on local societies, how the Hanseatic and the local cultures approached each other, and whether assimilation occurred on the part of the local population, among the Hanseatic merchants, or perhaps from both sides. The main data upon which Gaimster's studies were based were once again the numerous finds that had come to light in the excavations of recent years in Hanse towns, both throughout the core region and abroad (e.g., Gaimster 1999, 2005a, b). He concluded that there was a distinct Hanseatic culture, which manifested itself mainly in the lifestyle of the urban bourgeoisie. Tangible evidence for this culture is gleaned from archaeological analysis of artifacts like stove tiles or tableware such as serving and eating vessels, which were often made in the Rhineland or northern Germany and widely exported throughout the Hanseatic trading area. When a purchaser at a Finnish market bought, for example, an item of Siegburg stoneware, he was expressing a wish to share the lifestyle that his purchase represented (Gaimster 1999, 2005b). This line of approach follows the general trend of no longer viewing artifacts as mere indicators of trade but as carriers of cultural and ideological content.

Gaimster's concept of an explicitly Hanseatic culture and the methods he uses to identify such a culture have since been criticized, as has his perspective, which views the evidence largely from a Hanseatic point of view, thus assigning too passive a role to the local societies within the process of cultural exchange. In recent years, various researchers have questioned whether such a Hanseatic culture really existed, asking how it would be defined if in fact it did exist (e.g., Suhonen 2001; Immonen 2007), and which archaeological methods would allow us to make such cultural interpretations (Mehler 2009).

Recent studies have broadened their focus to include European islands in the North Atlantic such as Iceland, Shetland (Fig. 3), and the Faroe Islands, thus including the peripheral regions of the Hanseatic area of influence, which were characterized by rural societies rather than urban centers (Gardiner & Mehler 2007; Mehler 2009; Arge & Mehler 2012). This stands in stark contrast to the investigations of Hanseatic influence on the urban bourgeoisie in the Baltic region, where large numbers of people from what is today Germany had settled in many of the late medieval towns. In Turku in Finland, these made up more than half of the population around 1400 (Immonen 2007) (Fig. 4). Many German merchants and seamen also lived on the islands in the North Atlantic. However, they did not spend their summers in towns but in small remote trading posts, which often consisted of just one to

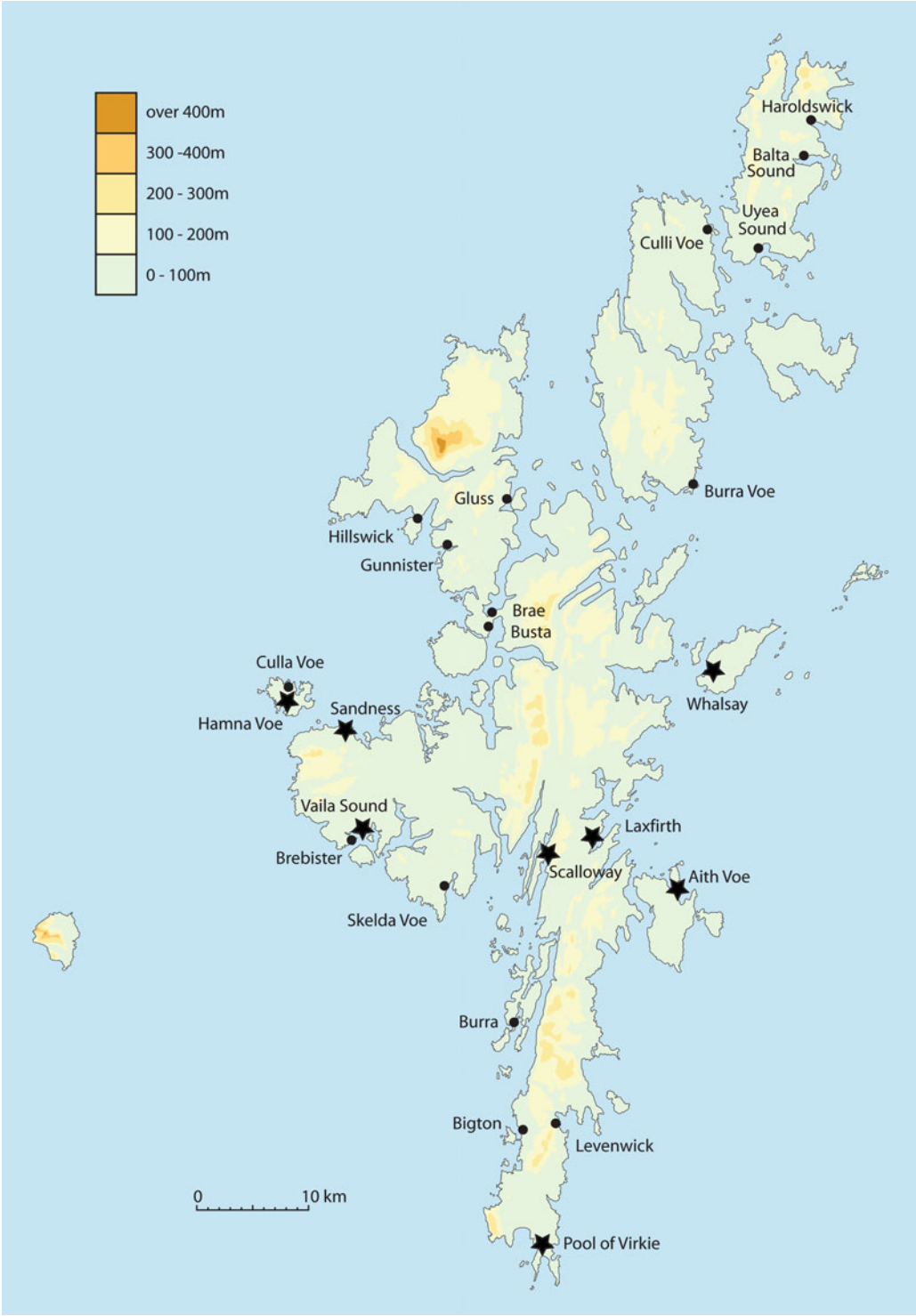

Hanse Archaeology, Fig. 3 Map of Shetland showing the ports frequented by Hanse merchants, based on fieldwork and written documentary evidence. The main ports are marked with a star (Map by M. Gardiner and N. Mehler)

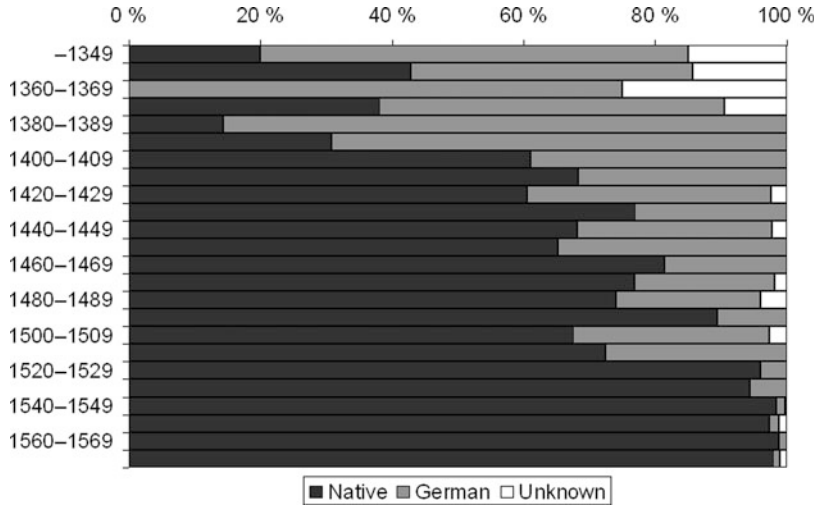

Hanse Archaeology, Fig. 4 Proportion of German burghers in medieval Turku, Finland (After Immonen 2007, Fig. 1)

three buildings and served clients within a radius of up to 100 km (Hofmeister 2001).

The research in the North Atlantic is connected to that of the European westward expansion, which began in the fifteenth century and subsequently extended to the New World. The enterprises run in these islands, mainly by merchants from Bremen and Hamburg, were under great pressure from competition by Dutch and English merchants, of whom the latter eventually moved their business to the New World and founded colonies. In consequence, archaeological research in this area, as well as the Baltic, has been influenced by postcolonial theory. In both areas the Hanse has been discussed as a proto-colonial force (Immonen 2007: 729; Mehler 2009; Mehler & Gardiner, 2013).

New research approaches have also been adopted in Norway, where Hanseatic archaeology had long been dominated by the kontor base in Bergen. However, a previously unknown Hanseatic port has now been identified in Avaldsnes on the Island of Karmøy. This was made possible by reevaluating written records and by mounting excavations on land and under water, which, apart from numerous finds, have also brought to light a shipwreck whose timbers were dated to the late fourteenth century by dendrochronological means (Fig. 5) (Elvestad & Opedahl 2001).

New approaches have also been pursued in Hanseatic nautical archaeology. Since the 1960s, several examples of ships thought to be cogs, a type of ship which came to be symbolic of the Hanse, have been found. Famous examples include the so-called Bremen cog, which was built in 1380 and found on the bottom of the river Weser near Bremen, and the Mollö cog, built in c. 1365 and found off the west coast of Sweden. It has since become clear, however, that reconciling the features uncovered with the ship types mentioned in the written records is fraught with difficulties. The written records only provide information about loading capacities and goods rather than details about the construction of the ships (Weski 1999). Many nautical finds are now being critically reevaluated. The Mollö cog, for instance, exhibited technical details characteristic of Scandinavian shipbuilding. As more old finds are critically reevaluated, the boundaries between Hanseatic and Scandinavian shipbuilding techniques appear to be progressively dissolving. This is a reflection of a significant exchange of shipbuilding skills throughout northern Europe, which went hand in hand with a considerably increased international trade in the Late Middle Ages (Crumlin-Pedersen 2000; von Arbin & Daly 2012).

International Perspectives

The earlier studies within Hanse Archaeology, in particular, were heavily focused on local

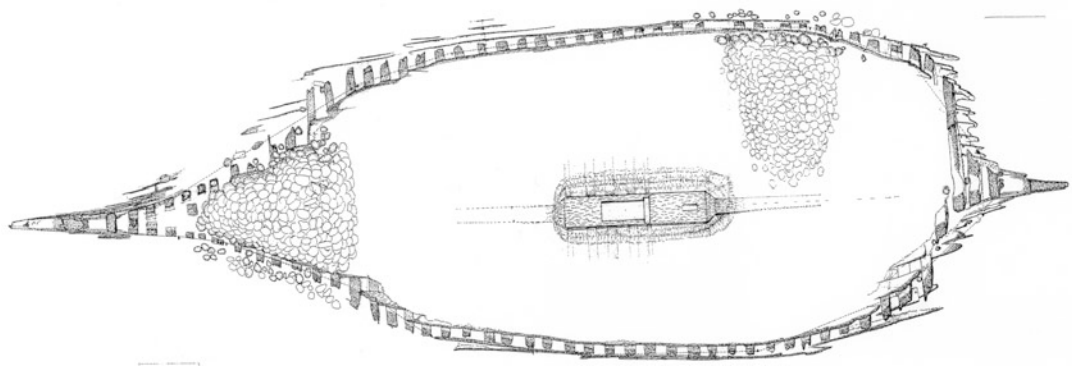

Hanse Archaeology, Fig. 5 Drawing of the shipwreck discovered at Avaldsnes, Norway. The ship has been dated by dendrochronology to c. 1395 (Drawing: E. Elvestad and H. Alopaeus)

interpretations. In addition, some countries tended to use Hanse Archaeology as a reflection of nationalistic views of history. In Norway, for instance, Hanseatic archaeological research is only carried out in Bergen, although so-called factories or trading posts also existed in Oslo and Tønsberg, which were also important for the Hanseatic trade. The recent research in Avaldsnes has not attracted enough attention to date.

Inner-city excavation teams in northern Germany and Poland have so far put very little effort into searching for wares imported from the countries of trading partners (e.g., fish) or analyzing the products created by their craftsmen for influences from other countries. It is therefore difficult to gain insight into the potential interaction between the Hanseatic traders and their partners abroad.

Icelandic researchers have to date viewed Hanseatic trade merely as a prelude to the Danish trade monopoly (1602–1786), while the Shetland Isles see their Hanseatic past in a rather positive light, since the takeover of trade by Scotland in the wake of the Act of Union in 1707 plunged Shetland into an economic depression, whereas the Islands had prospered during the Hanseatic period.

For the past 10 years approximately, Hanse Archaeology has attempted to free itself from such nation-centric thinking. Hanseatic trade is now being viewed and interpreted against the background of broader historical movements, and international perspectives are being developed. Moreover, a paradigm shift is becoming noticeable. While in many parts of northern Europe Hanseatic traders and their agents used to be viewed as colonialists, who exploited the native populations, such interpretations are now being criticized for their all-too-simplistic definition of colonialism. At first sight, Hanseatic trade appears to exhibit all the traits of simple colonial relationships between the economic powers of northern Europe. However, the asymmetry of economic power that this seems to suggest is not borne out by the actual relationships between the Germans and their clients abroad. The type of interaction between the Hanseatic merchants and their overseas customers is now being viewed as proto-colonial (Gaimster 2005a: 419; Immonen 2007; Mehler 2009: 89; Mehler & Gardiner 2013). It was this economic interaction in the peripheral regions of Europe that eventually formed the basis of the northern European expansion into the New World. In this sense, Hanse Archaeology may be seen as a northern European contribution towards archaeological colonial research, a core subject of Historical Archaeology.

Future Directions

Hanse Archaeology has clearly evolved in its focus, particularly over the past decades. International and interdisciplinary research cooperation,

mainly between archaeologists and historians both from the core region of the Hanse and from the countries with which it traded, has proved indispensable. Although Hanse Archaeology is headed in the right direction in this respect, more attention must nevertheless be paid to the written records. The archaeological results are still too often presented without their historical context. However, it is just as important to assess critically the written sources, since records do not necessarily always correspond with the truth. An example of this is the 1294 ban on trade issued in Bergen. It decreed that Hanseatic merchants would henceforth be banned from trading with other sites north of Bergen, including Iceland, Shetland, and the Faroe Islands. Among other things, the ban was imposed because different Hanse towns were competing in the large trade region in the North Atlantic. However, it appears not to have been very effective, since it needed to be renewed several times, e.g., in 1417 (Dollinger 1970: 49, 242). The mention of this trade ban in several records has had an impact on archaeological and historical Hanseatic research and still does. It has prompted many researchers to exclude the possibility that there were any direct trade links between Hanse ships and areas such as northern Norway or Iceland prior to the lifting of the ban. However, there are a number of indications that Hanseatic merchants continued to trade despite the ban. Illicit activities were generally difficult for any authority to monitor and eliminate, particularly for those who wished to exert their control over the coastlines of Iceland or Norway, which are characterized by extensive and deep fjords. Such activities are, of course, hardly ever recorded in written documents, making it all the more important to take into account the artifacts recovered from archaeological excavations (Mehler 2009: 97).

Cross-References

- ▶ Ceramics: Stonewares
- ▶ Colonial Encounters, Archaeology of
- ▶ Historical Archaeology
- ▶ Medieval Archaeology
- ▶ Ship Archaeology
- ▶ Underwater Archaeology
- ▶ Urban Archaeology

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Harris, David Russell

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Basic Biographical Information

David Harris is a leading authority in research into human ecology and agricultural origins. He was born in 1930 in London, England, and in 1950 commenced study of geography at Oxford University and in 1955 leading to a Master's thesis entitled *Water Resources and Land Use in Tunisia*. His growing interest in environmental diversity and the varied history of human and use took him to the University of California at Berkeley, where he engaged with the work and ideas of Carl Ortwin Sauer. His Ph.D. (1963) entitled *Plants, Animals, and Man in the Outer Leeward Islands, West Indies. An Ecological Study of Antigua, Barbuda and Anguilla* was the first of the many projects conducted during his career which took an ecological-historical approach to human land use.

After periods of lecturing at both Berkeley and London, in 1964 he took up a readership in Geography at University College London. In 1980 he was appointed Professor and Head of the Department of the Human Environment, at the Institute of Archaeology in London. He served as Director of the Institute from 1989 to 1996 and retired in 1998. He served as President of the Prehistoric Society from 1990 to 1994 and of the UK Chapter of the Society for Economic Botany from 1995 to 1997. Among several honors and awards, he was elected Fellow of the Society of Antiquaries and Fellow of the British Academy and presented by the Royal Geographical Society in 1972 the Back Award for contributions to biogeography.

Major Accomplishments

Harris has been a significant authority in the fields of agricultural origins and the historical ecology of human land use and has also published on the history of archaeology. Two seminal publications (Harris & Hillman 1989; Harris 1996) served to extend the discourse of agricultural origins and spread beyond the conventional centers of origin, thus promulgating a truly global approach to human ecological history that researchers around the world have followed. Many earlier studies of the genesis of farming had placed a strong emphasis on a core set of classic centers of agricultural origin. The two publications above both extended the conceptual range of engagement with economic species and the geographical and ecological range of where its history could be explored.

The first of these publications also marked an early episode in the long-standing collaboration between Harris and the renowned archaeobotanist Gordon Hillman (also at the London Institute of Archaeology). That collaboration led to groundbreaking work at such sites as Tel Abu Hureyra in Syria (Harris & Hillman 1989) and Jeitun in Turkmenistan (Harris 2010). Their research with Victor Masson at Jeitun and sites in the surrounding region constitutes a key Central Asian study in human ecological history, providing some of the earliest indications of agricultural practices in

Central Asia (Harris 2010). Over the course of his career, Harris's explicitly global approach has taken him to each of the world's continents to conduct field research. In addition to the Eurasian projects mentioned above, he has undertaken research projects in New Guinea, the Torres Straits, Africa, and Central America. His works have drawn attention to the diversity of ecosystems in the human past from which economic plant tissues of some sort have been harvested and have stimulated the diversification of archaeological method to trace these ecologies accordingly.

Throughout his career, Harris articulated and developed an explicit ecosystem-based approach to the human past (cf. Harris 1969; Harris & Thomas 1991), which has been particularly influential in the novel foci of research into agricultural origins, such as the tropical regions (Harris 1971) and arid/savannah regions (Harris 1980, 1984).

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Domestication: Definition and Overview

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Haua Fteah Cave

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Introduction

The Haua Fteah (22°3′5″E/32°53′70″N) is a large limestone karstic cave situated about a kilometer from the present-day coast of Cyrenaica, northeast Libya, at the foot of the northern escarpment of the Gebel Akhdar ("Green Mountain") massif (Fig. 1). In the course of three seasons of fieldwork (1951, 1952, 1955), Charles McBurney (University of Cambridge) excavated a trench ~14 m deep in the center of the cave's interior (Fig. 2). The excavations revealed a succession of sediments associated with evidence of human activity (stone tools, animal butchery waste, etc.) believed to represent a more or less continuous sequence of human occupation from the present day back to at least 80,000 years ago (McBurney 1967). This sequence has remained unparalleled in the region, and most subsequent research on North African prehistory has referred to McBurney's discoveries and interpretations. Renewed excavations directed by Graeme Barker (University of Cambridge) began in 2007 and are continuing.

Definition

During McBurney's excavations, sediments were removed in horizontal spits, and stratigraphic layers were then defined from the trench walls as the excavations proceeded downwards. These layers were divided into seven cultural phases, principally on the

Haua Fteah Cave, Fig. 1 The Haua Fteah cave: (*left*) looking up to the cave from the coastal plain and (*right*) looking across the doline floor into the cave (Photographs: G. Barker)

basis of changes in the stone tool assemblages. Eighteen radiocarbon (^{14}C) dates on charcoal gave indications of date for the upper layers, from the present day to the then-limits of the method c. 40 ka BP; lower down, ages were estimated from assumptions about rates of sediment deposition (Table 1).

Phase A was a flake and blade industry categorized as a "Pre-Aurignacian" Middle Paleolithic similar to Pre-Aurignacian and Amudian assemblages in Southwest Asia. This was succeeded (Phase B) by "Levalloiso-Mousterian" industries broadly comparable with Middle Paleolithic industries in the Levant and Europe. Two human mandibles in Layer XXXIII were categorized as "Neanderthaloid." Phase C consisted of an industry characterized by the preferential selection of blanks for the production of blades and with an artifact range similar to that of the European Upper Paleolithic Gravettian, termed the "Dabban" by McBurney after the Cyrenaican cave of Hagfet ed-Dabba where he had found similar material (McBurney 1960). The Dabban was succeeded by a microlithic late or final Upper Paleolithic industry (Phase D) termed the Eastern Oranian or Iberomaurusian from its similarities with assemblages in the Maghreb (northwest Africa), and this was succeeded (Phase E) by a microlithic Mesolithic-type industry with parallels to Capsian assemblages in the Maghreb and, hence, classified as the "Libyco-Capsian." The final prehistoric occupation (Phase F), with Neolithic pottery and domestic sheep and goats, was termed "Neolithic of Libyco-Capsian tradition" because of similarities in stone tools (e.g., the frequency of backed pieces) with the preceding Libyco-Capsian. This was capped (Phase G) by a substantial boulder-supported structure dating to the Graeco-Roman period (Layers III, II), covered by burnt animal dung and other evidence of animal stalling dating to recent centuries (Layer I). The cave is still used for stalling sheep and goats, and similar deposits continue to accumulate.

Key Issues

The McBurney excavations were remarkable in their scale, and the subsequent analyses of the material were pioneering for their time (McBurney 1967), but subsequent research on North African prehistory raised questions about the sequence, its age, the character of the various phases, and the explanations proposed for changes between them – McBurney generally favored population replacement to account for lithic changes. For example, sedimentary and faunal signatures of wetter climates in the basal sediments were interpreted by Moyer (2003) who suggest that they might in fact be far older than McBurney realized, dating between marine oxygen-isotope stage (MIS) 5 and MIS 7, c. 195 ka. McBurney regarded the blade-based Dabban industry as the evidence for the arrival of modern humans (Upper Paleolithic, in the

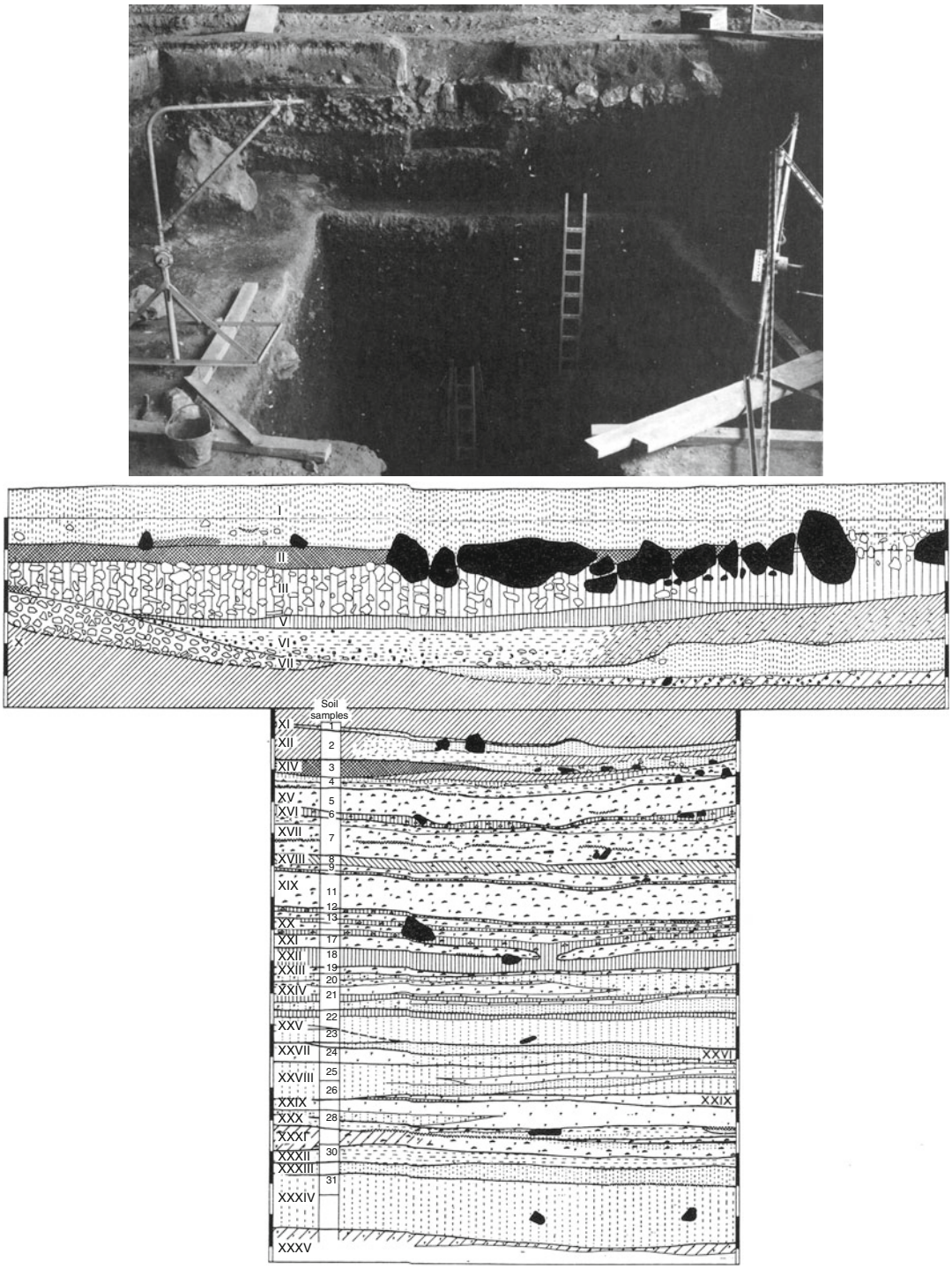

Haua Fteah Cave, Fig. 2 The McBurney trench in 1955: (*top*) "general view on completion of the operation" looking west to the east-facing sections of the Upper and Middle Trenches (Photograph: R. Inskeep), and (*bottom*) the same faces as recorded by R. Inskeep (McBurney 1967: Fig. 1.4)

Haua Fteah Cave, Table 1 Major phases of occupation defined at the Haua Fteah by McBurney (1967); the Middle Paleolithic was further subdivided

Phase	Layers	Cultural designation	Estimated age ka BP McBurney (1967)
A	From base of deep sounding to XXXV	Libyan Pre-Aurignacian	80–65
B	XXXIV–XXV	Middle Paleolithic	65–40
C	XXV–XVI	Dabban (Upper Paleolithic)	40–15
D	XV–XI	Eastern Oranian (Final Paleolithic)	15–10
E	X, IX	Libyco-Capsian (Mesolithic)	10–7
F	VII–IV	Neolithic of Libyco-Capsian tradition	7–4.7
G	III–I	Historic	4.5 to present

Haua Fteah Cave, Fig. 3 The CPP excavations in the Haua Fteah: (*left*) part of the north-facing section of the Middle Trench; the visible holes are the locations of OSL tubes; scale in.5 m divisions: (*right*) looking across the McBurney trench to a new excavation (Trench M); the second plywood sheet to the *left* of the standing figure covers the part of the trench wall shown in the *left* image; the north-facing and east-facing walls of the Holocene sediments in the Upper Trench are visible in front and to the *right* (compare the latter with the same face in 1955: Fig. 2, *left*) (Photographs: G. Barker)

European sequence), but the Pre-Aurignacian also contained a significant number of blades and burins, and evidence of shellfish collection which McBrearty and Brooks (2000) identified as a potential signature of modern human behavior in Africa, whilst bioanthropological analysis indicated that the two human mandibles in the Levalloiso-Mousterian layers were fully modern human (Hublin 2000), so the sequence raised major questions about when modern humans first arrived and what the technological changes represented by the Dabban and the subsequent three microlithic industries (phases D–F) signified in terms of behavioral changes and/or population changes. Questions like these were the context for the renewal of archaeological fieldwork at the site by the Cyrenaican Prehistory Project in 2007.

In the course of five seasons of fieldwork, the CPP has removed the backfill deposited in

the McBurney trench at the end of the 1955 season; cleaned and recorded the original sections (which are well preserved, with many of the original aluminum labels still in place) using the single-context system; removed two 30 × 30 cm column samples of sediment from the cleaned faces for sedimentological and palynological analysis; and is in the process of excavating a new 2 × 1 m trench down the profile to provide new data about the sedimentary and cultural sequences, and the climatic and environmental contexts, in which they developed (Barker et al. 2007, 2008, 2009, 2010, 2012; Fig. 3). A suite of dating methods (^{14}C, OSL, ESR, tephra) has provided a new chronology that has greatly refined the McBurney chronology for phases B–F, indicates that initial occupation began c. 130 ka (the start of OIS 5), dates the layer with the human mandibles to 74.6–69.3 ka, and dates (including with a clear stratigraphic relationship to Campanian Ignimbrite tephra) the start of the Upper Paleolithic Dabban industries to 46–41 ka, approximately contemporary with the appearance of Early Upper Paleolithic industries in the Levant and southern Europe (Douka et al. in review). The Oranian began c. 17.5–16.6 ka BP, the Capsian c. 13–12.3 ka BP, and the Neolithic c. 7.4–6.9 ka BP.

The dating program has been integrated with palaeoclimatic investigations using sediment micromorphology, palynology, vertebrate faunal and molluscan assemblages, and isotope studies of mammal teeth, marine molluscs, and land snails. Despite sediment transport and reworking, sedimentary facies have been defined which correlate well with OIS climate stages 5–1. Archaeological investigations of materials from the new excavations include studies of lithic technologies, microwear, and residues; vertebrate fauna and molluscs; and carbonized plant remains; and these are being integrated with new studies of materials from the 1950s excavations archived in the Museum of Archaeology and Anthropology, University of Cambridge. This work is being combined with geoarchaeological survey and palaeoclimatic studies across the Gebel Akhdar.

The first human activity at the site cannot definitely be linked to modern humans, in that the only fossils are in a Levalloiso-Mousterian layer, but the fundamental similarities between the Pre-Aurignacian and Levalloiso-Mousterian industries suggest that this is highly likely. Interesting, the modern humans at the Haua Fteah are not associated with Aterian industries as in the Maghreb (e.g., Barton et al. 2009; Scerri 2012). It is argued that modern humans first spread into North Africa across the Sahara in MIS 5, when wetter climates created major lakes across what is now desert (Drake et al. 2011), but in the case of the Gebel Akhdar, movement westwards from Egypt and/or the Levant may be as likely. Given the evidence of contemporaneity in the appearance of blade industries at Haua Fteah, the Levant, and southern Europe, it is unwise to assume that the Dabban is necessarily evidence of population movement from the Levant into North Africa. There is evidence for increasing aridity through the later Dabban and Oranian phases of occupation, but although the use of the Haua Fteah was highly variable in its intensity and seasonality, the indications are that the Gebel Akhdar was an important refugium at this time for animals, plants, and people. In the Early Holocene, Capsian people practiced broad spectrum subsistence, and this continued alongside animal herding in the Neolithic – there is no definite evidence for plant cultivation in the Neolithic. The cave was used for stabling livestock in the Graeco-Roman period, and there is evidence of significant impacts on the landscape around the cave from ploughing and cultivation (Hunt et al. 2010). The new work at the Haua Fteah suggests that the remarkable succession of human occupation in the cave first revealed by Charles McBurney's excavations will continue to remain seminal for the study of North African prehistory.

Cross-References

▶ African Stone Age
▶ Isotopic Studies of Husbandry Practices
▶ Lithic Technology, Paleolithic

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Haverfield, John Francis

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Basic Biographical Information

John Francis Haverfield (1860–1919), distinguished British classical scholar and archaeologist, was born in Shipston-on-Stour, Worcestershire, and educated at New College, Oxford, where he took a degree in Literae Humaniores (Classics) in 1883.

After graduation he became a schoolmaster at Lancing College in Sussex, where he pursued research on various aspects of classical antiquity, publishing articles on classical authors and also on Roman epigraphy. His work on the latter led to

contacts with Theodor Mommsen (1817–1903), who invited him to complete and refine Emil Hübner's Volume 7 of the *Corpus Inscriptionum Latinarum*, containing the inscriptions found in Britain. In 1892 Haverfield was invited back to Oxford and appointed initially to a fellowship at Christ Church and later (1907) to the Camden Professorship of Ancient History. He then entered upon the most fruitful and productive phase of his career, with a focus on the history and archaeology of Roman Britain. He was constantly called upon to make progress reports on ongoing fieldwork and was closely associated with a number of important excavations, although he was never the formal director of any of them. Notable among his publications were his contributions to the Victoria County History series, where he wrote the chapters on the Roman period of a number of counties. His work was curtailed by a stroke in 1915. He died 4 years later.

Major Accomplishments

Haverfield gained recognition as the foremost authority on Romano-British history and in a very real sense was responsible for the discipline of Romano-British studies becoming a component of the university curriculum. He saw Britain as a province within a greater empire, and his great achievement was to redefine the study of that province on scientific lines. He was particularly noted for his meticulous and disciplined classification and cataloguing of small finds. Before him, Roman Britain was largely the preserve of the amateur and the dilettante, for whom Haverfield had much contempt. Inspired by Mommsen, he applied rigorous scholarly standards and was particularly insistent on archaeology, professionally conducted, as an important element of history. His record of publication was prodigious, but sadly he did not live to complete a comprehensive history of Britain in the Roman period. His Ford Lectures, given in Oxford in 1906, were published posthumously by Oxford University Press in 1924 as *The Roman Occupation of Britain*.

Cross-References

▶ British Pioneers and Fieldwork Traditions
▶ Epigraphy, Imperial Latin
▶ Western Roman Provinces, Archaeology of the

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Haynes, Jr., C. Vance

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Basic Biographical Information

Vance Haynes' (1928–) initial training was in rocketry, engineering, and economic geology. He first attended Johns Hopkins University (1947–1949) but earned a B.S. in Engineering Geology at the Colorado School of Mines (1956). An early interest in human prehistory led to work with North American archaeologists studying the earliest occupations on the continent (Paleo-Indian archaeology). He joined the geochronology program at the University of Arizona and earned a Ph.D. in Geology (1965). With the exception of five years at Southern Methodist University (1968–1974), his career has been in Geosciences and Anthropology at the University of Arizona. He technically retired in 1999 but has maintained his research, producing several of his more

substantive publications in the 2000s, including a magnum opus on Murray Springs (University of Arizona Press, 2007).

Major Accomplishments

Few North American researchers have made so many contributions to the archaeological sciences in so many different fields for so many years. His research includes site stratigraphy, environmental reconstructions, artifact typology and technology, and geochronology in both North America and North Africa. Very early in his career, he had the opportunity to combine a strong avocational interest in archaeology with his professional interest in geology. Through the 1960s and 1970s, he was one of the very few practicing geoarchaeologists in North America. Moreover, he remains one of the few geoarchaeologists in this country with both training and experience in the fundamentals and the subtleties of geology and archaeology. This background combined with careful, meticulous fieldwork allowed him to portray the physical environment in an archaeological context at both site-specific and regional scales. This work included investigations throughout the southwest, Great Plains, and midcontinental USA and in Egypt and Sudan.

Archaeologically, Vance has a long record of substantive contributions to the study of the peopling of the New World. His initial professional involvement in archaeology focused on the stratigraphy and geochronology of Paleo-Indian sites on the Great Plains. This work eventually included the southwestern USA. His fieldwork included a series of key sites: Clovis, Folsom, Lindenmeier, Hell Gap, Mill Iron, Lehner, and Murray Springs. Beyond site specifics, Vance has also produced a number of classic syntheses including a landmark 1964 paper in *Science* that first laid out a Paleo-Indian chronology based on careful application (mostly by him) of the then still relatively new radiocarbon method. He has since published a series of summary papers on the origins, paleoenvironments, and chronology of the Clovis and Folsom occupation of North America. Vance is also remarkably generous in sharing his experience and time with other Paleo-Indian specialists, traveling all over the continent (and down to South America) to view sites and collections and offer his advice.

Haynes' site-specific Paleo-Indian research, combined with his broad interdisciplinary interests, resulted in his classic publication on an "alluvial chronology" for the Great Plains and southwest (in the edited volume *Means of Correlation of Quaternary Successions*, 1968, University of Utah Press). He pursued this research throughout his career and is a leading authority on alluvial geoarchaeology. In working on alluvial chronologies, he sought to discover the driver of these apparently synchronic records (e.g., his paper on "Clovis Drought" in *Quaternary Research*, 1991). The result was a synthesis of his work on "black mats" (*Proceedings of the National Academy of Sciences*, 2008) which demonstrates the value of making such correlations. At the same time, Vance has always been careful at detailing the stratigraphy at each of the sites on which he has worked. Further, repeated visits over the years to view new sections or apply new dating methods (e.g., the Clovis and Lindenmeier sites: *Denver Museum of Natural History Proceedings*, 1960; *American Antiquity*, 1966; *Ice Age Hunters of the Rockies*, University Press of Colorado, 1992; *Geoarchaeology*, 1995) helped refine Paleo-Indian stratigraphy and chronology. Though best known for his geoarchaeological work at Paleo-Indian sites in North America, his investigations span the late Pleistocene and Holocene and include stratigraphic studies at historic sites such as the Little Bighorn Battlefield.

Another major contribution by Vance Haynes is in the development and application of geochronological methods in both the geosciences and archaeology. Beyond simply applying the radiocarbon method, Vance has helped to develop many techniques. He built a lab at Southern Methodist University that always maintained a reputation for innovation and precision. Throughout his career, Haynes conducted pioneering research into the problematic issue of dating bone. In a 1971 paper (*Arctic Anthropology*),

he was one of the first to realize that the calibration of the radiocarbon timescale for the late Pleistocene and early Holocene could have serious implications for understanding the Paleo-Indian chronology (over 20 years before the tree-ring and U-series/coral curve could be extended back that far). And he was one of the first and strongest proponents of careful application of the AMS radiocarbon method in archaeology (in the edited volume *Proceedings of the First Conference on Radiocarbon Dating with Accelerators*, 1978; *Archaeology of Eastern North America*, 1984).

Vance's career in North Africa began when he joined the Combined Prehistoric Expedition, directed by Fred Wendorf and Romuald Schild, drawing him into the Western Desert of Egypt where he became interested in the geoarchaeology of middle and late Paleolithic sites. In more than 40 papers on the Western Desert (or Darb el Arba'in Desert, as he named it), Vance delved into such diverse topics as the geochronology of playas, dune migration, and remote sensing of sand movement, Quaternary climate change, and the geomorphic evolution of the eastern Sahara (e.g., two papers in *Science* in 1982; *Quaternary Research* 1989). In his travels across the desert, he documented previously unknown Paleolithic sites and the historic camps of early desert travelers. And like his work on Paleo-Indian projectile points, Vance's research in the Western Desert touched the core of his many avocational interests, including military history and planetary geology.

In recognition of his many contributions to archaeology, geoarchaeology, geomorphology, and geochronology, Vance was presented with the Roald Fryxell Award of the Society for American Archaeology (1978), the Archaeological Geology Distinguished Career Award from the Geological Society of America (1984), election to membership in the National Academy of Sciences (1990), the Medal of Merit of the Egyptian Geological Survey (1996), and the Distinguished Career Award of the American Quaternary Association (2002).

Cross-References

- ▶ African Stone Age
- ▶ Dating Techniques in Archaeological Science
- ▶ Geoarchaeology
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ Radiocarbon Dating in Archaeology

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Head, Lesley M.

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Basic Biographical Information

Professor Lesley Head is an Australian geographer who grew up in Melbourne, Victoria, and completed her Higher School Certificate in 1974. She completed a B.A. (Hons) at Monash University in 1979 and her Ph.D. in 1984. She worked briefly for the Australian Bureau of Statistics, and as a tutor in geography at Monash University, before taking up a lectureship at the University of Wollongong in 1987. She was Coordinator of the GeoQuEST Research Center from 2000 to 2005 and Head of the School of Earth and Environmental Sciences from 2007 to 2009.

Professor Head's research – focused on long-term changes in the Australian landscape and the interactions of both prehistoric and contemporary peoples with these environments – has positioned her as an international leader in geographic debates about the relationship between humans and nature. Her work is multidisciplinary and draws on concepts and analytical methods from physical geography, archaeology, and cultural geography. Her Ph.D. and early postdoctoral work focused on terrestrial pollen records to reconstruct Aboriginal landscapes, with significant contributions to archaeological research in southwestern Victoria and Australian prehistory.

Professor Head was the first Australian to be appointed the King Carl Gustaf XVI Visiting Professor of Environmental Science, taken up at Kristianstad University, Sweden, in 2005–2006. The international eminence of her work was also recognized when she was among the first group of Australian Research Council (ARC) and Australian Laureate Fellows announced in 2009.

Major Accomplishments

Central to Head's intellectual contributions is the concept – and challenge – of coming to terms with landscapes that have been peopled for many thousands of years. Although it is now widely understood that human influences pervade all Earth surface processes, ideals of pristine past landscapes without people continue to dominate environmental management. Head's scholarship has focused on articulating, then finding ways to overcome, these contradictions. Her theoretical contributions are grounded in the empirical findings of fieldwork projects across tropical, temperate, arid, and urban Australia. Her early work made significant contributions to knowledge through study of the social and ecological dimensions of Aboriginal fire and implications for vegetation change; prehistoric and contemporary Aboriginal interactions with East Kimberley landscapes; and the pioneering study of stick-nest rat nests as evidence for vegetation and climate change in arid Australia.

Professor Head's recent work has been mostly in cultural geography, where she has continued her work on nature/culture interactions, and human-plant relations, in more contemporary time frames. Projects have included research on backyard gardens, wheat, and invasive plants. Head is Founding Director of the Australian Center for Cultural Environmental Research (AUSCCER), established in 2009 and funded by her ARC Laureate Fellowship and the University of Wollongong. AUSCCER aims to make significant conceptual, methodological, and practical contributions in conceptualizing the cultural environment and advancing cultural research for environmental sustainability.

Professor Head's professional service includes President of the Australian Quaternary Association (1989–1991); President Australia, NZ, and SW Pacific Subcommission, INQUA Holocene Commission (1995–1999); Chair Australian Academy of Science National Committee for Geography (2006–2008); and President and Vice-President Institute of Australian Geographers (2006–2011). Professor Head is a Fellow of both the Australian Academy of Humanities and the Australian Academy of Social Sciences.

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- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Landscape Archaeology

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Head-Smashed-In Buffalo Jump

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Introduction

Over four million years of evolution as hunters, nothing in human history compares to the amount of food obtained at one "buffalo jump" on the Great Plains of North America. Elsewhere, animals much larger than the bison have been hunted for food – mammoth, rhinos, giraffes, elephants, and whales – but usually just one at a time. But in the great communal hunts, many groups of Plains hunters would cooperate to bring down as many as a hundred bison. At the conclusion of a typical successful jump, something in the range of about 60,000 kg of meat, fat, hide, and bone lay at the bottom of a cliff.

Hundreds of mass bison kill sites have been found in the western United States and Canada; some are yet to be discovered, still more have been swept from the land by erosion, cultivation, and settlement. Of all that are known, perhaps the most imposing, perfectly designed, consistently executed, and lethal buffalo jump is Head-Smashed-In. It has been recognized as a Provincial Historical Resource in Alberta, a National Historic Site in Canada, and a UNESCO World Heritage Site as the premier example of a buffalo jump in North America.

Definition

Head-Smashed-In Buffalo Jump is located in southwestern Alberta, Canada, about 160 km

Head-Smashed-In Buffalo Jump, Fig. 1 Location of Head-Smashed-In Buffalo Jump in southwestern Alberta, Canada

south of the city of Calgary and 20 km west of the town of Fort Macleod (Fig. 1). It lies directly east of the Rocky Mountains, at the very southern terminus of a linear set of rolling uplands known as the Porcupine Hills, with the immense edge of the northern Plains to the east. Tracking herds of bison on the open prairie would have been a daunting exercise, but the rolling, broken country surrounding Head-Smashed-In is ideal for rounding up and moving herds of grazing animals. The hills also attract large numbers of herbivores, thanks to the great amount of dependable water, the shelter of valleys and occasional groves of trees, and the rich, nutritious rough fescue and blue grama grasses. The combination of these features leading to sheer sandstone cliffs almost always guaranteed a successful hunt.

The total area of land figuring into the Head-Smashed-In Buffalo Jump complex is vast, covering some 40 km^2. This includes the massive natural basin of the Porcupine Hills that lies to the west side of the jump, dozens of individual lines of small stone cairns (rock piles) that formed the drive lanes along which the bison were herded, the cliff itself, the kill site below the cliff, plus an extensive prairie whereon the spoils were butchered and processed.

Key Issues

The Basin

Directly west of the jump extending toward the mountains is a huge collecting basin where the bison were rounded up (Reeves 1978). It is a natural bowl-shaped landform with a number of tributary basins that feed into the main basin, mostly from the north side, adding additional territory from which bison could be harvested to bring to the jump. The complex topography of the basin produced a landscape ideally suited for hunters to use in hiding, running, maneuvering, and orchestrating the events of the kill. A small stream draining the main basin provides water for hunters and bison alike. The almost perfectly formed gathering basin at Head-Smashed-In was the single most important factor in making this site

perhaps the most productive of all known buffalo jumps, because it directed herds located in the region to the kill.

The Drive Lanes

Long lines of rock piles used at many bison kills to funnel the animals in the desired direction are called "drive lanes." Although farming has disturbed some of the rock lines at Head-Smashed-In, many remain intact. More than two dozen lanes have been identified and mapped, some extending as much as 8 km from the kill site (Reeves 1978; Rollans 1987). Today the lanes consist of small clusters of rocks that are rarely a foot high. It is unlikely that the rock piles were ever higher; rather, their role in directing herds of bison was derived from the addition of other materials to the rock piles: stacks of buffalo chips (dung), clumps of overturned sod, and especially branches of trees and brush that were likely wedged between the rocks (Brink & Rollans 1990). The purpose of the rock piles may have been twofold: to serve as a permanent marker for the proper direction of the drive to the cliff and as a place to anchor brush and branches that made the structures more imposing, more visible and perhaps more like human beings.

The Cliff

The cliff that formed the jump-off faces east, as do many other bison kills in the area. Winds prevail from the west, so having the kill located downwind from the direction of the drive helped to hide the scent of hunters waiting at the site. The cliff at Head-Smashed-In is currently about 10 m high (Fig. 2). But windblown soil, bedrock topple, decayed vegetation, and bones of bison have gradually accumulated on the narrow bench below the cliff. The deepest excavations at the kill site recovered artifacts and bison bones nearly 10 m below the current surface (Reeves 1978). Thus, when the site was first used some 5,700 years ago, bison were falling a considerably greater distance, so the fall was probably lethal. As debris accumulated at the base of the cliff over millennia, the drop became shorter, meaning that more animals had to be dispatched at the bottom of the cliff.

The Kill Site

Slump and bedrock topple has formed a narrow bench that parallels the north–south trend of the cliff (Fig. 2). This bench was the kill site, where the bison slammed into the hard earth, wounded animals were finished off and initial butchering of their carcasses took place. An average buffalo jump may have involved some 50–100 animals (Frison 1991). This represented an enormous butchering task. The carcasses would spoil quickly if steps were not taken to process the meat and fat. The mound of carcasses was pulled apart, the thick hides of the bison removed and their stomachs opened to remove the heat-generating gastric fluids. With this accomplished, carcasses would cool down much more quickly. Individual bison were then cut into manageable pieces and loaded on the hides. These carcass portions were then dragged down slope to the prairie for the next step in the rendering procedure.

The Butchering/Processing Site

To the east of the Head-Smashed-In kill site, the ground slopes down sharply for about 100 m, then levels off into a broad prairie. This region served as an immense butchering area (Brink & Dawe 1989). Most likely, the piles of disarticulated pieces of bison carcasses were rendered into a variety of food products here. It was critical to treat the animal remains in ways that ensured long-term preservation, or the great effort of the communal drive would have been in vain. Drying was the most common preservation method. Meat and fat were cut into thin sheets and hung from wooden racks to be dried by the incessant winds of the Plains. Meat was also smoked over damp fires to reduce moisture further and to impart chemicals from smoke that aid preservation. Meat dried thus would last for weeks and months and was also much lighter to carry away from the site.

A great deal of cooking was also conducted at the Head-Smashed-In butchering site. A favorite cooking technique was to dig pits into the prairie soil and line them with a fresh bison hide (fur side out) filled with water. Rocks heated in a nearby fire were placed in the pits to bring the water to a boil.

Head-Smashed-In Buffalo Jump, Fig. 2 The cliff at Head-Smashed-In and the bench below where the killing and initial butchering was conducted (Courtesy Royal Alberta Museum)

Many types of soups and stews were made in this manner. Roasting was also popular. Deep pits were lined with slabs of rock, meat wrapped in vegetation placed inside, and a fire made on the surface above. Left for many hours, the meat cooked in its own juices and was said to be a rare treat.

Archaeological studies of the butchering area have uncovered countless fireplaces, literally tons of stones used for boiling and dozens of roasting and boiling pits. Thousands more are estimated to remain at the site (Brink & Dawe 1989, 2003).

Future Directions

The future of Head-smashed-In Buffalo Jump lies more with public interpretation than with continuing archaeological research. In 1987 a 10,000 square foot interpretive center opened, funded, and operated by the Alberta government. The Head-smashed-In Buffalo Jump Interpretive Centre (Fig. 3) has since welcomed more than two million visitors. It is built into the sandstone bedrock cliff and contains five levels of interpretive displays as well as a theater, gift shop, cafeteria, and administration areas. With 90 % of the building underground, Head-Smashed-In preserves the vistas and the sense of the jump at the time it was being used.

From its inception, Head-Smashed-In was intended to be inclusive of contemporary Aboriginal people. Members of the local Blackfoot Nation played important roles in the planning and development of the site as well as on the archaeological digs. Blackfoot people continue to advise on the operation of the site and still make up most of the staff (Brink 1992; Slater 2006).

Annual visitation in 2012 was about 70,000 people. However, this number has been declining for more than a decade, so directions for the future at the site are aimed at reclaiming visitation. A major renovation to the building is planned, and a process of renewing and replacing old exhibits is underway.

While no archaeological research has been conducted at the site since the mid-1990s, discussions with a local university about a cooperative summer field school are in progress. Excavations would be conducted in an area of the site accessible to the public, thus serving as an interpretive display as well as a research project.

Head-Smashed-In celebrates the astonishing skill, ingenuity, knowledge, sophistication, and spiritual power that went into a successful buffalo jump. The interpretive center is open year round. For information visit: http://www.head-smashed-in.com/.

Head-Smashed-In Buffalo Jump, Fig. 3 The seven-story interpretive center built into the cliff at Head-Smashed-In (Courtesy Head-Smashed-In Buffalo Jump Interpretive Centre)

Cross-References

- ▶ Canada: World Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Hunter-Gatherers, Archaeology of
- ▶ North American Plains: Geography and Culture

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Hedges in Historical Archaeology

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Brief Definition of the Topic

Hedges are field boundaries composed of lines of managed shrubs, often growing on a bank and accompanied by a ditch. They are found throughout Britain, and in many parts of lowland Europe including central and western France, the southern Low Countries, and parts of Germany. To serve their primary function, as stock-proof barriers, hedges need to be maintained or else they will develop into a line of disconnected trees and shrubs. In some areas they were, in English parlance, *layed* or *plashed*: the hedge was cut back rigorously but some of the principal stems were allowed to remain, cut roughly three quarters of the way through and bent downward at an angle of 60° or more so that each "pleacher" (as they were usually termed) overlapped its neighbor. In the spring, when growth resumed, a thick, impenetrable wall of vegetation was created. Elsewhere hedges were simply *coppiced*, like the understorey in traditionally managed woods: that is, their constituent shrubs were cut down to a point at or near ground level at intervals of between 10 and 20 years. Some local traditions combined elements of both practices.

In England, where most research has been undertaken, hedges of the eighteenth and nineteenth centuries tend to be composed mainly of hawthorn or blackthorn, while older examples contain a range of shrubs, including ash, maple, hazel, dogwood, holly, oak, elm, and hornbeam, depending on soil and climate. In the 1960s, Max Hooper suggested that the difference reflected the fact that these older hedges had originally been planted with a single species but had gradually been colonized by new ones. He further argued, on the basis of a large amount of field survey and documentary research, that this occurred at a relatively steady rate and that a hedge could therefore be approximately dated by counting the number of species it contained in a standard 30-m length, hedges acquiring, on average, one new species per century. Recent research has suggested that the "Hooper Hypothesis" is unreliable for a number of reasons, and especially because in the period before the eighteenth century hedges were usually *planted* with a range of species, in part because of the difficulty of obtaining hedging thorn but mainly because, as well as serving as boundaries, hedges were also regarded as an important source of fuel and fodder.

During the twentieth century, vast numbers of European hedges were neglected or removed. They were no longer needed as a source of fuel; agricultural mechanization and the development of specialized arable farming rendered them redundant and inconvenient in many areas; while even in livestock districts the development of barbed wire in the mid-nineteenth century provided a less labor-intensive method of constraining livestock. In many areas, hedges are now largely retained because of their importance as wildlife habitats and as elements of cultural landscapes.

Cross-References

► Agrarian Landscapes of the Historic Period
► Estate Landscapes in Historical Archaeology

Further Reading

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Hellenistic and Roman Anatolia, Archaeology of

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Introduction

Anatolia, literally "the land of the sunrise" and constituting the Asiatic part of modern Turkey, is a very important peninsula for the birth and transmission of various cultures and peoples (Fig. 1). During the Hellenistic and Roman periods (roughly 300 BCE to 300 CE for present purposes), many cultures such as the Persians, Macedonians, Greeks, and Romans passed through Anatolia and had constant contact with indigenous peoples like the Lydians, Lycians, Phrygians, Pisidians, Cappadocians, and Paphlagonians. The encounter of the new cultures with indigenous peoples paved the way for new transformations and developments in Anatolia's cultural history, which can be defined as "acculturation." The archaeologists of the Hellenistic and Roman periods of Anatolia have been investigating, in the first 12 years of the twenty-first century, this phenomenon of encounter among different cultures and have been posing new scientific questions.

Definition

In the last 150 years, it seems that Anatolian archaeology has been marked by the study and documentation of ancient Greek and Roman cultures, as Western scholars specializing in natural and physical sciences recognized these as incontinuity with the cultures in Greece and Italy. The material elements of Greek culture arrived in Anatolia in abundance after the conquests of Alexander the Great, which introduced the Hellenistic period (after 330 BCE), and after increased Roman intervention, which began in the late second century BCE. Yet, Anatolian archaeology has reached a new stage due to the decipherment of indigenous Anatolian cultures and their written records through comparative linguistic and philological studies employed since the early twentieth century. Cultures like prehistory, antiquity, and medieval and modern periods that encompass the Seljuqs, Emirates, and Ottomans come under archaeological and scientific study, documentation of Anatolian archaeology seems daily to exceed the chronological limits of antiquity and illuminate a wide time span, as attested by numerous new finds.

Historical Background

Research on the Hellenistic and Roman periods of Anatolian antiquity started with the observations of various travellers such as Ibn Battuta in 1333 and Ciriaco di Pizzicolli, a merchant of Ancona between 1430 and 1452. The monuments in the Anatolian land were discovered by monks and pilgrims on their way to the Holy Land, and in 1555 Ogier Ghiselin de Busbecq, the Austro-Hungarian ambassador to Istanbul, deciphered the bilingual Greek and Latin text of *Monumentum Ancyranum* inscribed on the walls of the temple of Mên (Fig. 2). The text, often known today as the *Res Gestae* of the Roman emperor Augustus, contains the personal account of the deeds and wars of Augustus Octavian through the transition from Republic to Empire. Two noteworthy names in the epigraphic studies for ancient Greek and Latin inscriptions are Philippe le Bas and William Henry Waddington.

European and American researchers started to excavate archaeologically promising spots in Turkey in the second half of the nineteenth century; however, it is not possible to claim that all these excavations targeting a variety of purposes were the fruits of an academic spirit. The British Museum was in fierce rivalry with the Louvre for the procurement of antiquities at that time. This rivalry spread to encompass the museums of Berlin and Vienna.

It was in this context that Troy and Heinrich Schliemann became inextricably linked. Schliemann's admiration of Homer led him to

Hellenistic and Roman Anatolia, Archaeology of, Fig. 1 Map of Asia Minor (Modified from van Kampen 1956)

Hellenistic and Roman Anatolia, Archaeology of, Fig. 2 The temple of Mên with Latin and Greek texts of *Res Gestae Divi Augusti* in Ankara (*Monumentum Ancyranum*, 1st c. CE) (Photo by author)

search for Ilium where the events of the *Iliad* putatively took place. It was in 1868 when he first went to Troas (Biga Peninsula) from Greece where he had recently settled. Inspired by a long discussed theory, he began searching for Troy at Hisarlık Höyüğü and carried out his first excavations in 1870–1873 and then in 1879. In the first expedition he uncovered what he called "Priam's Treasure." This has been the most exciting archaeological find in history, together with

Tutankhamun's tomb discovered at the Valley of Kings by Howard Carter in 1922. The discussions regarding whether the discovery of Schliemann was the actual Troy of Homer continued after his death. The claim was fiercely refuted at that time and paved the way for various discussions today. The scientific value of excavations carried out by Wilhelm Dörpfeld in 1893–1894 was to be appreciated much later. This excavation constituted the basis of modern archaeology, which is based on stratigraphy and chronology established from pottery studies.

Pergamum's excavations received no less interest than those at Troy. Their undertaking was shaped by diverse factors characteristic of this period, including diplomacy and politics between Berlin and the Ottoman administration, railway and road constructions in Turkey, Wilhelm II's passion for archaeology, the establishment of the German Archaeological Institute, and many other contemporary trends. These started with the railway constructions carried out by German companies and the removal of the reliefs of Pergamum's Altar of Zeus to Berlin. The excitement that this grand monument aroused paved the way for an accelerating interest in Anatolia. Carl Humann (1839–1896), the so-called pasha of Pergamum, is considered one of the pioneers of archaeology.

When the Prussian professor of archaeology Otto Benndorf was appointed in charge of surveys in Lycia by the Austrian Academy of Sciences, the Austro-Hungarian Empire grasped the chance to enrich its museum in Vienna. Felix von Luschan and Count Lanckoroński joined in these surveys and excavations culminated in the shipment to Vienna of reliefs of the monumental tomb/heroon at Trysa, dated to the fourth century BCE. Benndorf also founded the Austrian Institute of Archaeology in order to conduct excavations at Ephesus.

The career of Osman Hamdi Bey, son of the grand vizier Edhem Pasha, reached its zenith when he was appointed the director of the Imperial Museum in 1881. In addition to founding the Istanbul Archaeological Museum in 1891, he initiated the first Turkish excavations at Nemrut Dağı, at the Hecate temple in Lagina, and at Sidon. The royal *necropolis* that he excavated at Sidon contained the renowned "Alexander's Sarcophagus," the Whining Women Sarcophagus, the Satrap Sarcophagus, the Lycian Sarcophagus, and the Sarcophagus of the Phoenician King Tabnit, which were all brought to Istanbul, together with other sarcophagi and stelae.

Following the foundation of the Republic of Turkey after World War I by Mustafa Kemal Atatürk, H. T. Bossert and H. G. Güterbock contributed to the discipline of archaeology and research by establishing themselves in the young state and by training Turkish scholars. Bossert became a professor at Istanbul University in 1934. Together with his German student Franz Xavier and multilingual Turkish students Bahadır Alkım, Selim Dirvana, Halet Çambel, and Muhibbe Darga, he dedicated himself to the Hittite hieroglyphs, and between 1947 and 1957 he excavated Karatepe in Cilicia, which was to call for great attention in the future.

After World War II, scholars leaving Nazi Germany were invited to Turkey by Atatürk. Before the Nazis came to power in Germany, the German Archaeological Institute had opened its Istanbul branch in 1929, whose first director was Martin Schede until 1938, and the Turkish Historical Society (Türk Tarih Kurumu) was founded in Ankara in 1931. Promising youths were sent to Europe for university education at the demand of Atatürk. Among these students were Sedat Alp and Ekrem Akurgal, both of whom went to Leipzig to learn languages at the Schulpforta Gymnasium, renowned because Friedrich Nietzsche and Ulrich von Wilamowitz-Moellendorff studied there. After language training, they went to Berlin where Alp became the student of Johannes Friedrich and Akurgal of Gerhart Rodenwaldt. They returned to Turkey in 1940 and 1941.

Key Issues/Current Debates

During the twentieth century, Ekrem Akurgal was among the most experienced representatives of modern Turkish archaeology. His second and

third generations of students now direct many important excavations. Within his research covering all Anatolia, he particularly concentrated on the Greek culture in western Anatolia. The disputed and unknown location of Dascyleum, the Persian satrapy center as of the sixth century BCE, was clearly identified by him.

Carl Blegen of Cincinnati University directed the excavations at Troy between 1932 and 1938 and brought it back to the focus of international interest. The excavations were halted by World War II and could only be resumed in 1988 by the prehistorian Manfred Korfmann of Tübingen University. The continuous expedition undertaken until his death in 2005 attained an impressive dimension. A chemical engineer and archaeometrist of Vienna, Ernst Pernicka of Tübingen University succeeded him. As of 2013 the excavations will be led by American scholars and will concentrate on the Hellenistic and Roman phases of the city-state of Ilium, a continuation of ancient Troy.

The German tradition at Pergamum continued with the directors of the German Archaeological Institute in Istanbul after World War II. Longitudinal research at Miletus was conducted by Wolfgang Müller-Wiener, an architectural historian and the director of the German Archaeological Institute at Cairo, and Volkmar von Graeve. When the work was resumed, the most unusual temple under Miletus' hegemony, the temple of Apollo at Didyma, which had been excavated by Theodor Wiegand, came under restudy and restoration by archaeologist Klaus Tuchelt. Architectural researcher Lothar Haselberger noticed the payment lists and plans on the inner walls of the adyton, all incised on marble. Similar drawings identified at Sardis and Priene have shown that ancient architects used the walls and floors as sketchbooks. Following a long hiatus, the excavations at Priene were resumed by Wolf Koenigs, an architectural historian of Munich and director of the German Archaeological Institute in Istanbul, and then continued by the archaeologist Wulf Raeck (Frankfurt). The work in this city by the Maeander River has yielded great information, particularly on ancient urban planning and the development of Greek-Roman house architecture. Another important project of the German Archaeological Institute is Aizanoi in Phrygia (Fig. 3). One of the best preserved temples of Zeus in Roman period Anatolia is found there. The archaeologist Ralf von den Hoff of Freiburg University, who took on the direction of the expedition after Rheidt, is particularly interested in the city's development in the Hellenistic period. As of 2011, the excavations were taken over by Elif Özer of Pamukkale University, and the work in 2012 covered the stage building and the *necropolis* behind the theater.

The grandest focus of the twentieth-century archaeology, which concentrated on the architecture of ancient city-state centers, has naturally been Ephesus. The Austrian Institute of Archaeology conducted excavations between 1895 and 1913 as well as 1926 and 1935 under the direction of Otto Benndorf, Rudolf Heberdey, and Joseph Keil. However, during the hiatus created by World War I and the Greek occupation of western Turkey thereafter, Greek scholars carried out some restoration work at St. John's Church and Virgin Mary's House. After World War II, under the direction of Hermann Vetters until 1987, the Roman period architecture of Ephesus was widely uncovered and reconstructed. The best examples are the houses on terraces and the library. The most important data regarding domestic life in Roman Imperial period provinces comes from Ephesus; the only other sites yielding such information are Pompeii and Herculaneum in Italy. On the other hand, the south gate of the commercial agora and the library reconstructed by Friedmund Hueber and Volker Michael Strocka in 1978 provide us with striking evidence regarding the grandeur of life in the capital of province of Asia in the Roman Empire. However, there is a cost to the success of the engineers and architects; intervention in the ruins has led to the damage of some structures of late antiquity. As in many other sites, here too the excavation site has been transformed into something of a construction site, and developments in mass tourism have brought both gains and damages. The largest archaeological park of Turkey, Ephesus

Hellenistic and Roman Anatolia, Archaeology of, Fig. 3 Maximum price edict of Roman Emperor Diocletian, CE 301 (Aezani, Phrygia) (Photo by author)

continues to grow and develop attracting millions of tourists every year.

Apart from Smyrna there are many other ancient city-states along the Aegean littoral. Though smaller in size, they are of great importance: Nysa and Magnesia by the Maeander River, Claros in Ionia, Teos, Clazomenae (Urla), Phocaea (Foça), Erythrai (Ildırı), and Aigai are some examples. Some stone constructions at Aphrodisias and Sardis, which have been excavated by American teams, have been rebuilt in a similar way to those at Ephesus and Pergamum. The sculpture finds at Aphrodisias are so rich that clearly a school of sculpture was active in Aphrodisias in the Roman Imperial period.

Southwest Anatolia extending between the Maeander and Pamphylia houses numerous ancient cities, monuments, and temples. These include Hierapolis in Phrygia; Iasos in Caria; Patara; Tlos in the upper Xanthus valley; Limyra; Cnidus, located at the westernmost tip of Datça Peninsula; Stratonicea and Lagina; the temple of Carian Zeus Lepsynos in Euromos; the temple of Zeus Labrandeus in the mountainous parts of Caria; the Halicarnassian Mausoleum; Caunus; Arycanda; Xanthus, the capital of Lycia; and the nearby sanctuary of Letoon. A trilingual inscription in Lycian, Greek, and Aramaic has been found at Xanthus, the center of a region with a mixture of Lycian and Greek cultures. This philologically invaluable find can only be compared with a bilingual one in Carian and Greek of a later period found in Caunus.

Eastward along the south coast, the number of sizable excavations is more limited to Perge and Side. Numerous works of sculpture from Perge are accompanied by sculpted marble sarcophagi. Other systematic excavations in Cilicia include Anemurium excavated by Elisabeth Alföldi-Rosenbaum and James Russell (from 1960s to 1980s) and Elaiussa Sebaste excavated by Eugenia Equini Schneider of Roma La Sapienza University since 1995.

Northward and northwestward from Pergamum, there are not many current excavations, except for that at Troy. Recent work has focused on the Athena temple at Assos; Alexandria Troas, founded in the Hellenistic period and turned into a Roman colony; the temple of Apollo Smintheus; a temple of the Roman Imperial period in Cyzicus; the marble quarry at Marmara Island; Dascyleum; the Persian satrapy center; and the Roman theater in Nicaea (İznik).

As Europeans have traditionally focused on ancient Greek culture and its influence on the architecture and art in the Hellenistic and Roman periods, the central parts of Anatolia have been neglected, with the exception of Hattusha, the Hittite capital. National customs

have generally led most scholarly attention toward temples, large roofed structures, theaters, baths, and palaces; thus, most budgets were allocated for such excavations. Hence, systematic study of previous cultures in the country was rendered difficult. However, the British Institute of Archaeology at Ankara (BIAA) founded with the encouragement of Seton Lloyd in 1948 has followed a different course. Although the work that occurred between 1971 and 1978 at certain points in Turkey indicates that the archaeological mentality of the nineteenth-century museums still prevailed, Stephen Mitchell and Anthony W. McNicoll proposed the New Archaeology approach of the British in order to challenge such perspectives. The most successful project of this approach is the one at Aşvan Kale on the south bank of Murat River, which was settled from the Bronze Age through the Middle Ages. David French, the director of BIAA, decided to study the *höyük* and the modern village on its foot, and his efforts culminated in a study exploring the relations between humans and their environment from prehistory to the present. In 1970–1973 he employed the most sensitive sieving techniques and obtained paleobotanic data from this settlement, which contained very infrequent architecture and man-made tools. The purpose was to obtain evidence regarding the living conditions of the concerned period through, for instance, the study of animal bones and carbon samples and then to compare this evidence with the modern village life. The interests of many scholars, however, remained restricted only to the pottery, tools, and architecture, and it took about 30 years for many excavations and surveys in Turkey to adopt the teachings of New Archaeology.

Away from the above-mentioned coastal settlements and in the Central Anatolian Plateau, many excavations of medium and large size are worth noting: Sagalassos in Pisidia, Pessinus in Galatia, and Gordion, the capital of the Phrygians. Amorium, an important Byzantine settlement, has been found in the central part of western Turkey. Similar methods are also employed by joint German-American-Turkish research at Eski Kahta and Nemrut Dağı in Commagene. Elmar Schwertheim, Sencer Şahin, and Jörg Wagner, all students of Friedrich Dörner, attempted to find a path to reach the burial chamber of Antiochus I of Commagene at Nemrut Dağı by using geophysical techniques in 1987–1988 but did not succeed. Dörner, who conducted surveys in Bithynia, founded the Asia Minor Research Center at Münster University in 1968. Under Schwertheim, who succeeded Dörner, this center transformed to a Research Center on Anatolia, focusing on Commagene. The temple of Jupiter Dolichenus at Duluk, which had a worldwide importance in the Roman Imperial period, has been under study and excavation by Engelbert Winter since 2001. Some settlements of Commagene have been flooded under dam lakes – Samosata entirely and Zeugma partially. Rescue excavations were conducted before the dams started to collect water. Rescue excavations at Zeugma have been going on since 1996 as a Turkish-Swiss joint project. Excavation and restoration of Roman villas with gorgeous mosaics are being undertaken by Kutalmış Gökay of Ankara University.

The pioneer of historical geographical surveys in Biga Peninsula was John M. Cook. Philologist Joseph Stauber conducted a study concentrating on Homer's topography in the 1990s. Some surveys in Mysia, Aiolis, and Lydia were aimed mainly at epigraphic research. Already in 1890 the Austrian Academy of Sciences had started compiling inscriptions in Anatolia into an inscription corpus project titled *Tituli Asiae Minoris* (*TAM*). The series, foreseen as a continuation of *Inscriptiones Graecae* published in Berlin, started in 1901 and 1920 when Ernst Kalinka compiled Greek and Lycian inscriptions in Lycia. In Mysia, the environs of Pergamum have come under more detailed study recently. Exploration of Polis Elaia, the main port of Pergamum, by Felix Pirson has already provided important information on Pergamene history and the historical topography of its environs. The historian Walter Voigtländer and the archaeologist Hans Lohmann conducted surveys in the environs of Miletus in the 1980s and 1990s. In addition Lohmann also surveyed Mt. Mycale facing Samos and discovered many new settlements.

Caria gained in popularity for surveys after World War II: Louis Robert was one of the researchers interested in this region. Besides Amyzon and Tabai, Robert explored Milas as well. George E. Bean explored southwest of Anatolia between 1946 and 1952 and published books on philology and guidebooks. Swedish Paavo Roos prepared a fundamental work on the typology of rock tombs in Caria in the 1960s. About the same time Wolfgang Radt, who would later become the director of Pergamene excavations, was exploring remains of Lelegian settlements in the Halicarnassian Peninsula. A Turkish-French team of Pierre Debord (Bordeaux) and Ender Varinlioğlu (Ankara) as well as Wolfgang Blümel of Köln University collected much data regarding the written works and historical topography of west and south Caria. The Heraclea region in Beşparmak (ancient Latmos) Mountains has been surveyed by Anneliese Peschlow-Bindokat for many years as part of a multidisciplinary project. The Carian-Lycian border region in the Gulf of Fethiye is now under investigation by Hans Lohmann and Werner Tietz, who are conducting new research on the topography and archaeological finds.

In recent years Lycia has been more extensively studied by international research projects. Research work on Byzantine Lycia and Pamphylia by Hansgerd Hellenkemper and Friedrich Hill was published as the eighth volume of *Tabula Imperii Byzantini* (*TIB*). The region was formerly surveyed by Martin Harrison and George Bean as well. Oinoanda, a small city in north Lycia, has a sizable reputation in academia thanks to a long inscription of importance in the history of philosophy. Discovered in the late nineteenth century, the text narrates the teachings of a local Epicurean from the Roman Imperial period about what he had learned from his teacher. Thomas Corsten of Vienna University currently conducts surveys in Cibyratis, another northern neighbor. Bülent İplikçioğlu conducted epigraphical surveys over the last twenty years in some parts of Lycia.

Surveys in south Lycia by the architectural historian Wolfgang Wurster and epigrapher Michael Wörrle are a pioneer of their kind. Wurster studied and compared a series of cities of various sizes, while Wörrle studied and published the incredibly rich epigraphic materials found shedding light onto the history and geography of entire Lycia. The Kyaneai project conducted by Frank Kolb of Tübingen in the 1990s has cast much light onto the quantitatively and qualitatively important finds of this city in central Lycia. The project compiled data for relations between the mother city and its agricultural settlements. Kolb's students have initiated lesser projects of the same framework. These are, for instance, Andreas Thomsen's architectural studies at Avşar Tepesi, Christina Kokkinia's re-transliteration of the Opramoas inscription in Rhodiapolis, and Martin Zimmermann's and Christoph Schuler's research at Teimiussa, Phellos, and Tyberissos. Thomas Marksteiner of Austria has conducted surveys in the area facing Limyra where he had conducted excavations. Sencer Şahin and Mustafa Adak currently survey the border region between east Lycia and Pamphylia while studying the topography and epigraphic evidence through the place names in the *Stadiasmus Patarensis* inscription.

British researchers have been heavily engaged in the region extending from north of Lycia into central Anatolia. The then newly founded American Society for Archaeological Research in Asia Minor encouraged research trips and surveys in the area extending from Rough Cilician coasts to Phrygia and environs in the latter half of the 1920s and 1930s. As per its newly introduced research method, each surface find was photographed and descriptions written, which were published in *Monumenta Asiae Minoris Antiqua* (*MAMA*). More than 1,200 texts copied were finally published in MAMA IX and X by Barbara Levick, Stephen Mitchell, et al. The *Classical Atlas of Asia Minor* published by Bean and Calder via BIAA is the product of these surveys as well. BIAA supported field research has covered the cities of Antioch in Pisidia, Cremna, Sagalassos, and Ariassos and some agricultural settlements under the direction of Stephen Mitchell between 1982 and 1996. Taking into consideration the research carried

Hellenistic and Roman Anatolia, Archaeology of, Fig. 4 Temple of Zeus Olbios in Diocaesarea in Cilicia Trachea (3rd c. BCE) (Photo by author)

out by Bean, Hall, Balance, Mitford, and French, it can be said that Pisidia is a "BIAA region."

Emilie Haspels, continuing in the footsteps of Ramsay, published the first comprehensive study on the rock monuments in Midas City, *The Highlands of Phrygia: Sites and Monuments* in 1971. Louis Robert and Georges Radet are among epigraphers who concentrated on this extensive region. Marc Waelkens has studied in detail the grave stelae called "door-stones," particularly those from Phrygia. Results of epigraphic studies on Dorylaeum (modern Eskişehir) by Peter Frei during the 1980s and 1990s will be published as a volume of *Tituli Asiae Minoris*.

Michael Gough followed W. M. Ramsay and H. Swoboda, who did research in Lycaonia, and studied the Alahan Monastery and the churches in Rough Cilicia between 1952 and 1972. In addition Gough undertook the surveys in Anazarbos (Anavarza). Serra Durugönül, who founded the Research Center for Cilician Archaeology at Mersin University, explored the towers and settlements. In Rough Cilicia Levent Zoroğlu from the University of Konya carried out the excavations in Kelenderis over thirty years. Yusuf Boysal from the University of Ankara/Konya began in the middle of the twentieth century with research into the Zeus Olbios temple in Uzuncaburç (Fig. 4). Detlev Wannagat from the University Rostock continued this research until 2006 (Fig. 5). Recently Emel Erten from Gazi University conducted an archaeological survey and newly carried out new excavations in the ancient city of Olba concerning the Hellenistic architecture. In Rough Cilicia Ümit Aydınoğlu from the University Mersin conducted surveys in Kanytellis (=Kanlıdivane) on the *necropolis*. The first city of Cilicia Plain on the west is Soloi/Pompeiopolis, which has been excavated by Remzi Yağcı over the past 15 years. The results on the columned street from the Roman Imperial time are remarkable. Finally, Friedrich Hild and Hansgerd Hellenkemper conducted a longitudinal survey covering the entire region which was rich in the Late Antique and Early Byzantine remains and published their finds in the fifth volume of *TIB* (1990). All the epigraphic work from the 1930s to 1980s was compiled in two volumes of *MAMA*, several reports, and a monograph. New surveys by historian Mustafa Hamdi Sayar of Istanbul University have found numerous inscriptions. Sayar has also identified the Karasis Fortress which was unknown until recently (Fig. 6). Built in the Seleucid period, the fortress has been studied by an interdisciplinary team under the direction of Sayar and Adolf Hoffman from the German Archaeological Institute, the Department of Istanbul and

prepared for publication. Since 1990, Sayar has also documented monuments of the Roman Imperial period and Late Antiquity in Anazarbos (Fig. 7), the largest city in the Cilician Plains, with an interdisciplinary team under Richard Posamentir from the German Archaeological Institute. The first volume on the ancient inscriptions from this city has been published, and the second volume is under preparation. In addition, Sayar studied and published on the sites of Hierapolis-Castabala and Uzunoğlan Tepesi with Ralph Christian Rosenbauer while he was researching the area of hegemony of the former pirate Tarcondimotus who was active in the late Hellenistic period (Fig. 8). He also investigated the cities of Mallus and Magarsus in the Karataş region with Ralph Christian Rosenbauer from the University of Bern. Mopsuhestia on the Ceyhan River, which was known as Epiphania and located to the north of the Gulf of İskenderun, was among the Hellenistic and Roman cities of Cilicia explored by Sayar. The Cilician capital Tarsus (Fig. 9) and settlements in its environs constitute an important part of Sayar's surveys. The road network concerning these cities and milestones on them have also been explored (Fig. 10).

Hellenistic and Roman Anatolia, Archaeology of, Fig. 5 The monumental tomb in the south of Olba in Cilicia Trachea, probably the monumental tomb of the last Seleucid King (1st c. BCE) (Photo by author)

Cappadocia seems to be poorer in finds. The border region between the Black Sea and Cappadocia, literally between Trabzon and Commagene, as separated by the Euphrates, has been under the monopoly of British scholars since Biliotti (1874) and Hogarth (1894). David French, a prehistorian from the family and

Hellenistic and Roman Anatolia, Archaeology of, Fig. 6 Karasis Lower Fortress, Seleucid fortress in the Taurus Mountains in east Cilicia (2nd c. BCE) (Photo by author)

Hellenistic and Roman Anatolia, Archaeology of, Fig. 7 Anazarbos, metropolis of Cilicia Plain, monument with three arches from the Roman Imperial period (2nd c. CE) (Photo by author)

Hellenistic and Roman Anatolia, Archaeology of, Fig. 8 Uzunoğlan: Temple of Thunderbolt God on Uzunoğlan Hill in east Cilicia from the Roman Imperial period (1st or 2nd c. CE) (Photo by author)

long-time director of BIAA, studied the Roman road network and milestones in entire Anatolia while publishing numerous inscriptions. His last publication was a compilation of inscriptions from Sinope. The most important surveys in the interior of north Anatolia were carried out at Sebastopolis and the Central Black Sea region. Sebastopolis was studied by Bernard Rémy, director of École française d'Istanbul, while the historian Eckart Olshausen of Stuttgart surveyed the Central Black Sea region. The most noteworthy finds in this area and neighboring Paphlagonia are the rock tombs, which the archaeologist Robert Fleischer has recently studied. Work by Hubertus von Gall has been insufficient to document uncountable monuments in Paphlagonia, and the gap in this area has been filled by the doctoral dissertation in Turkish of F. Eray Dökü, which lists all the rock monuments of Paphlagonia. Christian Marek conducted 19 epigraphic surveys in north Anatolia from 1983 to 2009. He has been studying the epigraphy of Pompeiopolis together with his team as of 2006.

Bithynia on the western tip of north Anatolia is quite behind the Aegean and Mediterranean

Hellenistic and Roman Anatolia, Archaeology of, Fig. 9 The fundament of the Roman Temple Donuktaş in Tarsus; built probably under Roman emperor Hadrian; the largest Temple of Asia Minor

Hellenistic and Roman Anatolia, Archaeology of, Fig. 10 Roman road between Tarsus, metropolis of Cilicia, and Pylai Kilikiai near Sağlıklı (3rd–4th c. CE)

regions with respect to surveys and finds. There are several local projects on the topography and epigraphy of the region, but the most comprehensive one is that by Karl Dörner and Sencer Şahin. Dörner compiled and studied all the epigraphic material of Bithynia except for Chalcedon (Kadıköy) and published it in the fourth volume of *TAM* (1978). Şahin's surveys cover Nicaea, the largest city of the region. In addition to compiling the texts from this city, he has also encouraged and supported the work on Prusias ad Hypium, Cius, Apamea, and Bithynion/Claudiopolis.

International Perspectives

Recently a new phase in Anatolian archaeology has been marked by the increasing numbers of excavations at ancient Greek and Roman sites as well as settlements and fortifications of the Middle Ages in addition to the East Roman (otherwise known as Byzantine) sites. Not only the indigenous Anatolian cultures, which include the Hittites, Urartians, Phrygians, Lydians, Lycians, and Galatians, but also incoming cultures that settled in Anatolia, such as Assyrians, Persians, and Sassanids, have been studied in detail in recent years.

Future Directions

Following World War II, fieldwork other than excavations underwent transformation. There were no more travellers riding on horseback. Now suitable motor vehicles are used, thus covering larger areas. "Voyage" is replaced by "survey." This new term is used in the sense of studying large areas focusing on certain material groups. In time new and complex methods have been developed. In comprehensive surveys a single researcher may examine intensively a small area, or a group of researchers may share the site according to a plan and thus cover wider areas. Thus, it becomes easier to study larger areas and to reach architectural remains and all types of scattered surface finds.

Regarding the Greek-Roman civilization on the southern shores of the Black Sea, it is striking that the region has been greatly neglected in terms of academic studies. After the excavations at Sinope by Akurgal and Budde, the first projects worth noting are those at Pompeiopolis by Latife Summerer of Kastamonu University and at Hadrianopolis in Eskipazar by Vedat Keleş of Atatürk University in Erzurum.

Developments attained in Anatolian archaeology with the participation of scholars from a number of countries in the last 100 years have made this peninsula of utmost importance for the study of humankind's history. In the twenty-first century, new ways to examine, document, interpret, and share new finds with wider society and academics will surely emerge.

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Hellenistic and Roman Egypt, Archaeology of

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Introduction

Until recently, the archaeology of Hellenistic and Roman Egypt has received little attention from scholars. The reasons for this scarce interest are various and mainly due to the fact that the scholars who are greatly involved in archaeological study and research in Egypt mostly focus on the millenary dynastic or Pharaonic period. Moreover, the best-preserved areas and monuments in the country belong to the periods prior to Macedonian domination. On the other hand, Egypt is the region that has the greatest amount of written evidence for the Hellenistic and Roman periods, documentary and literary papyrus in particular. These documents have amply contributed to scholarly knowledge of Egypt's economy and culture in the period between Alexander the Great's conquest (332 BCE) and the Arab conquest (639 CE).

For a long time classicists and papyrologists have been the only scholars to work on Hellenistic and Roman Egypt. Only scarce attention has been dedicated to aspects related to material culture and to archaeology, which has often been merely considered a means to acquire new texts. Besides, the poor state and scarce conservation of monuments of this period have apparently encouraged classical archaeologists to shift their interests toward other provinces, and Egypt has often been considered a unique case for the survival of ancient Egyptian language and culture until the late Roman period.

A favorable concomitance of historical, climatic, and geographic conditions contributed to the good conservation of Egyptian cultural heritage at least until the end of the eighteenth century. The modernization of the region and its demographic growth, which started at the beginning of the nineteenth century and are still in progress, have contributed to the loss of several archaeological areas and monuments, sacrificed in the name of progress and economic development (Davoli 2008). Many ancient settlements have been destroyed to extract natural fertilizer (*sebbakh*) and to obtain building materials to be reused. Most of the more recent archaeological strata, namely, from the Byzantine, Roman, and Hellenistic periods, were the first to be dismantled. Another cause of demolition of later inhabited levels can be found in the prevailing interests of the first archaeological excavations, mainly focused on the Pharaonic levels. Much archaeological, urban, and architectural information was lost during the hurried excavations, as is evident, for example, in the great temples and *necropoleis* in the area of Thebes (Luxor).

It is certain that the substantial lack of classical monumental architecture in Egyptian territory is not due to its absence but to a systematic reutilization of stone materials that began in Late Antiquity and to a widespread use of mud brick, which is far less durable than the stone. In recent years an increasing number of scholars and archaeologists have conducted excavations and studies on Greco-Roman and Byzantine Egypt (Bagnall & Davoli 2011). Archaeological excavations and surveys all over the country have demonstrated the widespread presence of classical architectural elements and buildings that do not belong to local traditions, such as public baths (Boussac et al. 2009), theaters, and hippodromes. Urban studies, settlement excavations, investigations of quarries, and caravan trails, not to mention the difficult recovery of Alexandria and its harbors, are filling a gap in our knowledge of the territory and of its exploitation in the post-Pharaonic and pre-Islamic periods (Bagnall & Rathbone 2004).

Definition

Material culture, architecture, and city planning from Alexander the Great's conquest in 332 BCE to the beginning of the reign of Constantine I as the sole emperor in 324 CE constitute the core of the study of the archaeology of Hellenistic and Roman Egypt. There is, however, a cultural continuity between the late Roman and the Byzantine periods, and it is consequently difficult to determine precisely the chronological limits of a discipline.

The field of investigation for the archaeology of Hellenistic and Roman Egypt covers all Egyptian territory, including the Delta, the Nile Valley, and the eastern and western deserts, together with the Red Sea and Mediterranean coasts. In this period a homogeneous culture in fact existed throughout this vast territory, which was controlled and administered by a central authority based in Alexandria. Nevertheless, regional traditions persisted and are evident in the production of ceramic pottery, architecture, and town planning.

Key Issues

Alexandria assumed the role of capital of the country as early as 320 BCE and brought about a loss of importance for Memphis, the previous historical capital and administrative center. The location of the new capital on the Mediterranean coast shifted the central administration's center of gravity to the sea and even beyond Egypt itself. This position certainly suited better the new political and commercial situation of the period and

opened Egypt to the Mediterranean world. The Ptolemaic kingdom extended its boundaries outside Egypt, and its Greek maritime fleet enormously improved trade and movement in the Mediterranean, in which the Egyptians of the Pharaonic period did not excel.

Alexandria was built according to classical schemes and styles, following the prompting of Alexander himself, but in the meantime using stone monuments from previous periods located in the cities of the Delta. The city is today lost; part of it is buried by the new Alexandria and part of it has been demolished to recycle building materials (McKenzie 2007: 8-18). Recent archaeological investigations at Kom el-Dikka, in various places in the city center, and at the harbor are considerably improving the knowledge of its urban layout and stratigraphy. The use of water in the city and as a means of communication and trade has been the recent object of important archaeological, geographical, and historical investigations that have extended also due to Alexandria's surroundings. Water continued to have a central function in post-Pharaonic Egyptian religion and politics. Numerous local and regional hydrological projects were implemented in the Hellenistic and Roman periods, including the reclamation of large territories for irrigation. The best-known example of this is in the Fayyum, thanks to the conservation of a series of settlements and documents written on papyrus (Davoli 1998).

The Nile Delta, which was less investigated until the last few decades, is now the focus of surveys, archaeological excavations, and hydrographic studies that have finally filled a noteworthy gap in our historical knowledge of Egypt. 700 sites have become recent objects of investigation (Bagnall & Davoli 2011: 108-14), but much needs to be done to reach a detailed picture of the settlements from the Greco-Roman period. These seem to be characterized by the lack of perimeter walls and by the presence of a large main temple surrounded by high walls and situated in a prominent position, often with a *dromos*, or a processional way, that constituted one of the road axes (Leclère 2008). In the *metropoleis* (main cities) of the *nomoi* (administrative regions), there could be more than one temple with a *dromos*, as in the case of Tanis. The history of the landscape, including changes in the course of the Nile's branches in particular, is providing new elements for the evaluation and comprehension of the local dynamics of human habitation. The development and decline of settlements depended on their relatively strategic locations close to waterways. Furthermore, subsidence has caused the sinking of settlements such as Herakleion/Thonis, recently discovered through underwater explorations. Herakleion/Thonis and Canopus were two of the most important harbors on the Mediterranean Sea, as they were strategically located on the Canopic branch and consequently directly linked to the Nile, which was an artery that helped connect the Mediterranean Sea, Africa, and Indian Ocean at the time.

Other important commercial settlements were founded on the coast west of Alexandria (Davoli 2010: 351-2), in a zone no longer within Egypt's boundaries but connected with it. The westernmost of these was Paraetonium (Mersa Matruh). Among them was Plinthine, well known for its *necropolis* that counts about a hundred Hellenistic well-preserved hypogea (second century BCE). The town seems to have had a role in commercial traffic on Lake Mareotis, as did Taposiris Magna (Abusir), one of the places associated with the cult of Osiris and the location of an imposing temple dedicated to the god. Its *temenos*, built of limestone blocks, is preserved. Taposiris Magna probably had the role of a customs station. Additionally, Marina el-Alamein (Leukaspis or Antiphrae) was involved in trade as well as the agricultural exploitation of the area since it was located on the terrestrial and maritime communication routes between Alexandria and Cyrenaica. The *necropolis* has been restored: there were different types of tombs, built with local stone, that were sometimes adorned by monumental structures in the form of pyramids, sarcophagi, pillars, or columns.

The area of Lake Mareotis was important for both commercial and agricultural reasons. Many installations for wine production attached to rural

villas with vineyards have been identified: they started to develop during the Hellenistic period and expanded considerably in the Roman period. About 30 workshops for the production of amphorae for transport, used for the trade of locally produced wine, have been recently discovered.

The western and eastern deserts have also attracted renewed attention for the Hellenistic and Roman periods in regard to agricultural exploitation in the oases and in regard to the opening of new communication routes to the Red Sea and its ports. These ports, which were oriented toward eastern trade, include Myos Hormos, and Nechesia (Marsa Nakari) (Sidebotham et al. 2008; Bagnall & Davoli 2011: 134-7). The eastern desert was also exploited for the extraction of precious stones, such as black granite (Mons Claudianus), porphyry (Mons Porphyrites), and emeralds (Mons Smaragdus), mainly in the Roman period.

Edfu and Koptos, in the Hellenistic and Roman periods, respectively, became key cities for trade because of their location on the Nile and at the confluence of caravan trails leading toward the Red Sea's ports (Davoli 2010: 256). Koptos in particular was an important emporium through which passed the goods imported from Arabia and India and then shipped toward the Mediterranean Sea along the Nile. The caravan routes of the eastern desert were equipped with rest areas constituted by small forts (*praesidia*) at whose center was a well for water (Cuvigny 2003). The excavations conducted at Berenike, on the Egyptian coast of the Red Sea, have revealed the importance assumed by this port in trade between the Hellenistic world, and then the Roman Empire, and India. The materials found there also indicate the existence of commercial routes from and to Arabia and the east African coast, from which elephants and ivory were imported. The port and the city reached their maximum expansion during the first three centuries of the imperial Roman period; they were inhabited by soldiers and by a multiethnic population of traders (Sidebotham 2011).

In the oases of the western desert, which were already very active during the Third Intermediate and the Late Periods, a demographic expansion and consequently an increased number of settlements occurred during the Roman period. Recent excavations at the various sites of Bahriya, Dakhla, and Kharga oases attest to the presence of intense agricultural activity and commerce from and to the Nile Valley, and even Africa and the Mediterranean, and a noteworthy prosperity exhibited by large richly decorated houses, stone temples, monumental tombs, and thermal structures (Bagnall & Davoli 2011: 138-41). At Kellis (Ismant el-Kharab) and Trimithis, both located in Dakhla Oasis, the practice of decorating houses, temples, churches, and tombs with wall paintings on plaster in classical and Egyptian styles and with plastic refinements molded from stucco plaster, such as capitals and cornices, was particularly widespread in the Roman and Late Roman periods (Bagnall & Davoli 2011: 140-1). The discovery of stone temples decorated in high relief (first and second centuries CE) shows the interest of Roman emperors for this marginal area of the Empire, which received particular attention also during the tetrarchy, when a series of small forts were erected probably for the defense of the caravan routes. The desert, its arid climate, and its remoteness from large populated areas have favored an optimal conservation of many archaeological areas and buildings built mainly of mud brick. For some of these sites, continuous habitation is attested from the Old Kingdom to the Mamluk period, as in the case of Mut el-Kharab, the main city in the oasis of Dakhla, for example (Hope et al. 2009).

The Fayyum is a region of the western desert not classifiable as an oasis, but better as a pseudo-oasis. It is a natural depression located approximately 100 km southwest of Cairo and supplies by water from the Nile through the Bahr Yussuf, a branch of the Nile. A very fertile area, it became a widely exploited agricultural region when Ptolemy II completed a land reclamation project that consisted of the digging of numerous artificial channels and the building of dams and sluices that facilitated the optimal usage of water for agriculture. Various new settlements of colonists were founded and expanded, with assignments of

land to "Greek" immigrants. Only a small part of those settlements (Davoli 1998), for which the regional capital was Crocodilopolis (Medinet el-Fayyum), has been preserved because of their location along the perimeter of the region, at the edges of the desert. The sand has preserved not only houses of mud brick but also temples and abandoned furnishings, among which there was a large amount of papyri. Some of these sites have been preserved until today and are still under excavation and survey, such as Soknopaiou Nesos (Dime), Karanis (Kom Aushim), Bakchias (Kom el-Atl), Tebtynis (Kom Umm el-Boreigat), Narmouthis (Medinet Madi), and Dionysias (Qasr Qarun). By contrast, other sites were excavated from the end of the nineteenth century to the first 30 years of the twentieth century only to disappear subsequently because of the activity connected to modern land reclamation projects. Among these are Philadelphia (Kom el-Kharaba el-Kebir) and Theadelphia (Bathn Ihrit), where, besides a great number of papyri, Roman funerary portraits (the so-called portraits of the Fayyum) and an intact temple dedicated to the crocodile god Pnepheros (partly preserved today at the Greco-Roman Museum of Alexandria) were found.

Karanis is so far the most investigated and best-known site, thanks to the excavations conducted by the University of Michigan from 1924 to 1935 (Davoli 1998: 73-116). Beyond the evolution of the site, whose five inhabited levels have been explored, and its urban layout and architecture, studies of categories of materials, such as ceramics, lamps, coins, and statuary, have become possible. Such cataloguing has constituted a useful starting point for comparing categories of objects, whose typological evolution, production, and circulation are now better known, and for the publication of recent works on them.

The Greco-Roman settlements in the Fayyum are often multi-stratified because of the accumulation of sand and phases of abandonment that alternated with phases of reoccupation and expansion. Some of those settlements can be defined as small urban units (towns) in terms of social complexity, population density, and urban structure. They reached maximum extension and flourished during the first centuries of the Empire, and, like the sites in the Delta, they are characterized by the lack of perimeter walls and the presence of at least a main temple surrounded by a *temenos*. The *dromos*, provided with one or two kiosks, constitutes the continuation of the temple into the settlement, and on it processions, or religious celebrations that involved the inhabitants many times a year, took place. The papyrus documentation and the monuments found along these processional areas permit a dating of the foundation of temples and their *dromos* to the Hellenistic period, with expansion and rebuilding during the Roman period. The *dromos* was considered the main public area in these settlements, in which no *agora* was generally present (Davoli 2011: 80-81). The most exceptional *dromos* in terms of its monumental features is that of Soknopaiou Nesos, originally 400 m in length and built so that it was elevated 3 m higher than the roads parallel to it. In such a way it constituted a barrier that divided the settlement into two parts, and it was also a scenographic footbridge for processions. Two tunnels built within the road's foundations and various lateral stairs allowed people to go from one quarter to the other and to go over the *dromos* (Minaya 2012).

The Hellenistic and Roman settlements in Egypt seldom imitate the capital Alexandria in their urban organization. The solutions adopted in small provincial towns are not standardized and often reflect regional particularity. By contrast, the *metropoleis* of the *nomoi*, insofar as they are poorly and little preserved, exhibit more monumentality only in part inherited from pre-Hellenistic periods. New types of buildings, whose existence is known above all through written sources and a few architectonical remains, were built by the local elite according to Classical style or Alexandrian style. In particular, an intense monumental building phase is documented by papyri from the second to the fourth century CE (Davoli 2011: 70).

The study of stone architectural material from Alexandria and other places in Egypt (Pensabene 1993; McKenzie 2007), together with the study of archaeological remains scattered throughout the region, reveals a certain diffusion of

monumental buildings in Classical style beyond what has been expected, at least in the main cities. It is accordingly thought that the urban landscape was not very different from that of other provinces of the Empire (Bailey 1990). Nevertheless, a strong local influence endured in urban life in this period due to traditions of building with regional peculiarity for thousands of years and to the presence of cultic buildings and structures in Egyptian style. The style in which certain buildings were built was often a new architectonical style, called Greco-Alexandrian. It was created in Alexandria and was circulating as early as the second century BCE. In this style some elements of Egyptian tradition are found along with Classical ones, which in their turn were employed according to new schemes and combinations. The Classical and Alexandrian styles were mainly used in buildings that did not exist in the dynastic period in Egypt, such as public squares, streets with colonnaded porticoes, public baths, fountains, theaters, hippodromes, perhaps gymnasia, and temples dedicated to divinities not Egyptian and to the imperial cult. The temples dedicated to Egyptian gods continued to be constructed in Egyptian style, but with various innovations (Arnold 1999).

Among the settlements founded in the Roman period, one was willed by the Emperor himself during a visit to Egypt in 130 CE: Antinoopolis, today Sheikh Ibada. The emperor Hadrian founded this city (*polis*) in the place where the Via Adriana started toward the Red Sea. The new city was mainly inhabited by "Greeks" coming from other areas of Egypt, and in particular from the Fayyum, to whom particular privileges were granted. The urban organization follows classical architectural schemes and models, with a perimeter wall on three sides, a *cardo*, and a *decumanus* whose length was adorned with statues and Doric columns. The city plan (Pensabene 1993: 274, Fig. 178) seems to follow a grid plan with two main street intersections on which were four, granite, monumental columns (*tetrastylon*), in Corinthian style, and surmounted by statues. There were also a triumphal arch with three fornices, a theater, a large public bath, and a hippodrome outside the city. It was probably after the foundation of Antinoopolis that other cities adopted monumental architecture of a Classical style, such as Hermopolis Magna (Bailey 1991), located nearby. Also this city adopted a *tetrastylon* and public buildings in Classical style situated along the main roads. The preexisting temples dedicated to the Egyptian divinities Amon and Thoth were integrated in the new city plan, in which various cults and styles coexisted.

During the tetrarchy, military forts were built in Egypt to host regional garrisons, just as in other provinces. Besides the well-known fort built by Diocletian around Luxor's temple, the fortresses of Dionysias and Narmouthis in the Fayyum, those of Trimithis and el-Deir, respectively, in the oases of Dakhla and Kharga, and those situated along the Nile Valley (at Atripe in Sohag, at Wadi Kubbaniya, and at Nag el-Hagar to the north of Aswan) are to be mentioned (Bagnall & Davoli 2011: 121, 131, 141). Other fortresses were built on the borders, like Tell el-Herr, to the south of Pelusium, which has seen continuous use from the fifth century BCE to Late Antiquity (Bagnall & Davoli 2011: 113). This fortress, together with those at Sile and Pelusium, constituted part of a chain of forts located along the eastern border and mainly possessing the duty of regulating trade. Also the fortress of Babylon (Old Cairo) has recently become the object of excavation and restoration. It is now certain that it was located on Trajan's canal, that it silted up at the beginning of the Islamic period, and that various harbor installations were located nearby (Shehan 2010).

The multiethnic culture of Egypt during the Greco-Roman period is also expressed in funerary beliefs. Next to the purely Egyptian *necropoleis*, in which the tradition of mummification persisted, there were *necropoleis* for incineration and inhumation, the last being especially widespread in Alexandria, in which large underground complexes with multiple tombs and various *loculi* are present. Alexandria's *necropoleis* certainly constitute the best preserved part of the ancient capital and testify to the presence of various cults and social groups, Christians and Jews included. The more monumental *necropoleis* are

those of Kom el-Shuqafa, which developed on three storeys and were decorated with bas-reliefs in the Egyptian style of the Roman period (first and second centuries CE). But no less important for the history of the city are the Gabbari's collective *hypogea*, dated to the beginning of the third century BCE.

Mummification continued to be practiced until Late Antiquity according to techniques that gradually became more imprecise and hasty. Since the end of the nineteenth century, great interest has been revived in the so-called portraits of the Fayyum, which were painted on wooden tables or on textile during the Roman period, and set in the bandages of mummies, and have been found in great number in the Fayyum as well as in other places in the Nile Valley. These portraits follow in function the tradition of the funerary masks of the Pharaonic and Hellenistic periods, as is also the case with painted shrouds and sarcophagi (Riggs 2005). The funerary documentation that has been preserved, as well as the varied testimony for regional traditions, is very rich. Monumental tombs of the Roman period have been found in the oasis of Dakhla; they were made out of mud brick and decorated with stuccos and wall paintings. Among the more singular monuments are a number of "pyramids," which are often only partially preserved, truncated at the top, and with plinth bases in which sometimes funeral rooms painted with traditional Egyptian motifs were built. On the contrary, the decoration is in Classical style on the outside, like on the tombs at Bir el-Shagala, Dakhla. Of noteworthy monumentality is also Tuna el-Gebel, the *necropolis* of Hermopolis Magna (El-Ashmunein), in which are stone temple tombs from the Hellenistic period. That of Petosiris is a sort of prototype. The so-called house tombs of the Roman or Late Roman periods are sometimes built with mud brick; they often are articulated into several floors and are richly decorated with stuccos and paintings (Lembke 2010: 234-40). Small pyramids are also present there.

Workshops for the production of ceramic pottery have been found in several sites and testify to the introduction of new cooking techniques for the production of copies, such as in the case of kilns of the first century CE at Buto in the Delta (Ballet 2007). The careful study of ceramic vessels is now widespread in archaeological excavations in Egypt, but with a great delay compared to other countries, with the consequence that complete repertoires for the Hellenistic and Roman periods are still lacking. The general picture that emerges is that of a local Hellenistic and then Roman production that imitates the shapes widespread in the Mediterranean, but with different clays and fabrics, and peculiar morphologies according to the region. This enables the identification of the inland commerce both of vessels and of products contained in amphorae and jars. The fabrics used are made from Nilotic silt, marl clays, and kaolinitic clay from Aswan (since the end of the Hellenistic period) and the so-called iron-rich clay of the oases. The compositions and the techniques of manufacture and baking became increasingly refined due to the influence of the so-called "sigillata" vessels imported from Italy and from the Eastern Mediterranean and of African "sigillata" imported during the later Empire. There is no discontinuity in production from the end of the Hellenistic period to the beginning of the Roman period. The study of amphorae has led to the identification of vast areas of production, if not individual workshops, associated with the production of wine, such as in the area of Maryut Lake (typologies AE 3 and 4) and the Fayyum in the Roman period (Marchand & Marangou 2007).

Besides the production of earthenware pottery, that of molded statuettes (*coroplastica*) was widespread in Egypt during the Hellenistic and Roman periods; these represent divinities, men and women, and animals too. The usage of such figurines ranges from temple precincts, probably as ex-voto offerings, to domestic and funerary contexts. It appears that such usage had been introduced to Egypt by Macedonian soldiers at the moment of the conquest of Alexander the Great; the iconography and the subjects, initially inspired by Greek culture, became increasingly derived from local Egyptian culture in later times. A workshop dated at the beginning of the Hellenistic period has been identified at Athribis in the Delta (Szymańska 2005).

Faïence and glass are two kinds of materials widely used for the production of vessels, small statues, and decorative elements. Already in use in the pre-Hellenistic period for the production of similar manufactured items, the techniques and shapes used during the Greco-Roman period transformed and were enriched (Nenna & Seif el-Din 2000). During the Roman period particularly the techniques for the production of blown glass vessels, which reproduced forms common to the Empire, were imported. The glass raw material was produced in Egypt in workshops of the "primary" type, thanks to the presence of natron in natural deposits situated in the western desert to the south of Alexandria. Workshops of this type have been found at Beni Salama, in Wadi Natrun.

International Perspectives

In recent years research in the region has highlighted the strategic importance of Egypt, which can be understood as a commercial crossroads during the Hellenistic and Roman imperial periods. Water ways and caravan trails in the desert are quite well known, but much remains to be done to enable full understanding of the importance and modalities of international trade. Poorly known is the dispersion of ceramic vessels and other objects of Egyptian production in the countries linked to this trade, in the Arabian peninsula and India in particular. The systematic study of Egyptian ceramic is very recent if compared to the study of ceramics of other ancient civilizations. This is the main reason for the misidentification and thus of lack of data concerning the types and quantities of Egyptian pottery vessels found in other countries.

Future Directions

There is no doubt that the archaeology of the Greco-Roman Egypt is at its beginning. Many settlements and *necropoleis* still need to be excavated with rigorous scientific methods, and materials from previous excavations and stored in museums need to be studied and published. The archaeological methods applied in Egypt are still often obsolete and inadequate to answer the questions of a scientific world by now accustomed to studying ancient civilizations with multidisciplinary approaches. The so-called "archeometric" analyses and landscape archaeology are still not very common, even if in part because of the heavy restrictions imposed by Egyptian law.

Numerous artifacts and documents housed in collections and museums all over the world are completely out of their archaeological context because of the conditions of their discovery and their dispersal through the antiquities market. The study and virtual relocation of these artifacts within geographical and cultural contexts would enable their better evaluation and comprehension, not just in regard to their specific characteristics but also in terms of their material functions in the daily and religious life of the population.

The archaeological research conducted in the last 10 years has substantially contributed to a better understanding of the multicultural society of Egypt during the Hellenistic and Roman periods, which until now has been mainly studied through the rich textual documentation available in Greek, Latin, and Egyptian.

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► Berenike, Archaeology of

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Heng, Piphal

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Basic Biographical Information

Piphal Heng received his degree in Archaeology in 2002 from the Faculty of Archaeology at the Royal University of Fine Arts (RUFA), Cambodia. He joined the University of Hawai'i-Mānoa (UHM) Anthropology graduate program in 2007 and is currently a Ph.D. candidate working on his dissertation, which explores the political economy of the pre-Angkorian period using a comparative analysis of early state formation, temple economy, and settlement patterns in Southeast Asia, South Asia, and other regions.

Major Accomplishments

His work focuses on settlement pattern analysis, archaeology, history, epigraphy, and art history of Cambodia. Since 2003, he has participated in many national and international archaeological projects related to Iron Age, pre-Angkorian, and Angkorian archaeology, as well as work on

ceramic analysis, settlement patterns, inscriptions, history, art history, and political economy. He has presented at several major international conferences, and published the results of his research in conference proceedings. In addition to research and fieldwork, Piphal Heng instructed archaeology students at RUFA in 2005–2006 and on various archaeological field projects from 2004 to the present. He has also helped train staff from the Ministry of Culture and Fine Arts, APSARA Authority, and Preah Vihear Authority in GIS and cultural resource management, and has participated and designed multiple education campaigns to raise awareness on heritage protection and conservation to reduce looting and smuggling of archaeological materials in Cambodia.

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Heng, Sophady

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Basic Biographical Information

Sophady Heng completed his degree in the Faculty of Archaeology at the Royal University of Fine Arts in Phnom Penh in 1999. In 2005, he received a scholarship from the Erasmus Mundus Program to study in Paris for a M.A. degree in Quaternary and Prehistory, which was completed in July 2007.

Major Accomplishments

He has worked for the Memot Centre for Archaeology almost for 8 years. The Memot Centre was founded as a research institute for prehistoric archaeology in Cambodia and also as a training center for young Cambodian researchers to conduct archaeological research independently. During this period, he has participated in several excavations in and outside the country and organized many excavation projects, such as training programs for the students of the Faculty of Archaeology in the red soil region of Krek and Memot, Kampong Cham province. In 2002, he spearheaded the establishment of the Memot museum, which opened to the public in October 2002. Between 2007 and 2009, he served as the Deputy Director for the Department of Archaeology and Prehistory, Ministry of Culture and Fine Arts. In 2009 he was promoted to the position of Deputy Director General for Cultural Heritage, Ministry of Culture and Fine Arts and is responsible for collaboration with national and international institutions for archaeological research in Cambodia. Since 2007 he also has served as a lecturer at the Faculty of Archaeology, Royal University of Fine Arts in the field of Prehistory. Heng has participated in many national and international conferences, meetings, and workshops on archaeology, museum management, museum collections management, and conservation inside and outside Cambodia. He has written several articles about archaeological research in Cambodia and published in both Khmer and foreign journals. Recently, he worked on a salvage archaeology project at Kampong Preah temple, Kampong Chhnang province after a mobile phone company damaged a temple foundation during construction. In June 2012, he conducted preventive archaeology in the Sambor Prei Kuk area in the future site of a community market and tourism facility. This was a joint project between the Ministry of Culture and Fine Arts and the Ministry of Tourism with support from the Asian Development Bank. Between December 2012 and January 2013, he conducted a rescue excavation at the 12th century Banteay Chhmar temple complex in Thmor Pouk district, Banteay Meanchey province. The project was a

collaboration between the Ministry of Culture and Fine Arts, the Ministry of Transportation and Public Works, Kumho Industrial and Engineering (Republic of Korea) and the Embassy of the United States of America to Cambodia. In the course of the project, six complete burials were discovered in different locations associated with offering goods such as pottery vessels, iron tools, bronze objects and beads. Currently, he is a co-project organizer for the Mission Prehistorique Franco-Cambodgienne. This project was created in 2009, in collaboration with the Ministry of Culture and Fine Arts and the Muséum National d'Histoire Naturelle, Paris, France. This project focuses on prehistoric research in Cambodia and is currently investigating the site of Laang Spean. Excavation at Laang Spean, which began in 2009, will extend until 2016. An exhibit of work from the project is expected to be on display in the National Museum at Phnom Penh at the end of 2013.

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Heritage & Society

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Brief Definition of the Topic

The international, peer-reviewed journal *Heritage & Society* (Maney Publishing Press, Inc.) is devoted to theoretical and practical discussions on the interface between heritage practice and contemporary social policy and public life. It has been edited by Elizabeth S. Chilton and Neil A. Silberman since 2010, with the first issue published under this name in 2011 (Vol. 4, No. 1). Cornelius Holtorf is the Associate Editor of the journal; Sophia Labadi is the Forum Editor; Angela Labrador is the Book Review Editor; and Ian Baxter is the Resources Editor. The journal was formerly *Heritage Management*, and the founding editors Kelley Hays-Gilpin and George Gummerman published six issues volumes between 2008 and 2010 (Vol. 1, No. 1 through Vol. 3, No. 2). Just as *Heritage Management* crossed disciplinary boundaries and recognized the need for a holistic approach to the planning and administration of heritage resources, Chilton and Silberman aim to extend and progressively widen the trail that the founding editors blazed in the first three volumes. The journal aims to reflect the evolving theoretical and methodological developments in the international field of heritage practice as structured by present intellectual frameworks and preservation laws. It attempts to bridge and bring together the sometimes divergent approaches of archaeologists, public historians, CRM professionals, heritage administrators, and community leaders. It also seeks to document emerging alternative approaches to the conservation, cultivation, and sustainability of collective memory through tangible and intangible manifestations of heritage. These new approaches are at once global and local, place-based and diasporic. They are connected with heritage resources that are sometimes shared and sometimes contested but consistently considered significant by both the official heritage organizations and the unofficial "memory communities" that sustain them.

In renaming the journal *Heritage & Society*, the goal was to highlight the complex interactions between heritage resources and contemporary life. Subjects covered in the journal include the current social roles of collective memory, historic preservation, cultural

resource management, public interpretation, cultural preservation and revitalization, sites of conscience, diasporic heritage, education, legal/legislative developments, cultural heritage ethics, and the problematic nature of central heritage concepts, such as authenticity, significance, and value.

While continuing the tradition of *Heritage Management* in offering an international forum for scholarly and professional case studies of heritage places and methods, the primary goal of *Heritage & Society* is to encourage systematic social science approaches to understanding how and why the past matters so deeply to so many individuals and groups throughout contemporary society. As a way to continue to reach out to an international audience, abstracts are now published in French and Spanish, as well as English. The Editorial Advisory Board includes heritage professionals from several countries and fields of expertise.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Outreach
- ▶ Heritage and Public Policy
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Values and Education
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ International Journal of Heritage Studies
- ▶ Public Humanities and Cultural Heritage
- ▶ World Heritage Journals

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Heritage and Archaeology

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Introduction

Heritage is, literally, that which has been, or may be, inherited. Although the concept of *inheritance* has considerable antiquity, the word *heritage* is of western and medieval origin, and applied originally to property and land. Insofar as there is a shared understanding of what constitutes heritage in modern western society, it is ostensibly a broader and more democratic understanding than it once was, encompassing both tangible inheritances, "natural" (not man-made, though not unnecessarily unaffected by human agency) and cultural, and intangible inheritances (such as language, dance forms, craftsmanship, and ritual practices, passed down behaviorally from generation to generation). But heritage is far from an uncontested realm, and it is arguable that an uncontested consensus with respect to definition and constitution cannot be conceived of. This is because heritage is entirely a cultural construct, originating in "the West." Consciousness of heritage as a "thing" is itself a heritage. Though not negated, the concept of *global cultural heritage*, of an inheritance of which some value is shared by mankind, is rendered somewhat problematic by that fact. So too, for that matter, is the concept of a *natural* heritage, since nature is itself a cultural construct. To debate what constitutes heritage in the first place, and to debate the range of possible engagements with heritage (as signified by such terms as "protection," "destruction," and "preservation"), is to engage, then, in a conversation about humankind itself. The relative ease with which the idea of a universal and cross-cultural heritage might be deconstructed and some of its inherent ideological dangers exposed do not mean that heritage does not matter profoundly. On the

contrary, forms of identity are defined almost everywhere by reference to some conception of heritage, while tourism, one of the key drivers of economic wealth nationally and internationally, rotates around it.

The actual constitution of heritage might be contested, but as a construct it has long been "black-boxed." The question "what is heritage?" – the question at the heart of virtually every heritage-related initiative in the past half century and usually explicitly so – might suggest that the opposite is the case, that its very essence is under constant scrutiny. But close examination of the contexts in which that question is asked usually reveals the expectation of an actual answer: in other words, the question is asked not to find out if heritage *is*, in an ontological sense, but to find out *what* it is. Indeed, one could argue that heritage, perhaps like all cultural constructs that have been "black-boxed," is central to two conversations in two different languages: one is a conversation about philosophy and epistemology and is predicated on the knowledge that heritage has no ontological reality, while the other is a conversation that may well acknowledge the value of philosophical reflection but has as its more urgent agenda the need to find out what is in the heritage box so that it can be saved from damage, theft, or decay.

Archaeology is historically the key discipline with investigative and curatorial authority in the realm of tangible, cultural heritage of protohistoric and prehistoric antiquity. It goes without saying that it occupies this position historically in western society and western thinking and that it is western heritage to which it claims specific ownership of access; like heritage itself, archaeology is after all a product of "western culture" as vaguely defined. But it has historically claimed jurisdiction over the retrieval and interpretation of heritage data outside "the West" as well, some of that data being of relatively recent vintage in terms of absolute chronology (but still "prehistoric"). Anywhere in the world with tangible cultural relics belonging to historically undocumented pasts – another western concept – will find that archaeology is not only interested in it but will find a way to know about it. If the discipline's grasp has always been truly global on the horizontal axis of geographic scale, it is increasingly, thanks to its new interests in the heritages of modernity and contemporaneity, just as extensive on the vertical axis of temporality.

It is debateable whether the relatively new "heritage professions," most of them linked to accredited academic courses (in Cultural Heritage Management, Museum Studies, and so on) and possessed of strong managerial dimensions, challenge archaeology's historic hegemony over tangible heritages from the distant past or indeed its more recent claims to some authority over more recent tangible heritages. To a degree, that hegemony is, like heritage itself, "black-boxed." If tangible heritage is conceptualized as possessing an inherent archaeology, regardless of its actual date, the discipline of archaeology can claim in theory to give at least associate membership to the entire cadre of heritage professionals, whatever their training (and whether they like it or not). One might argue that archaeology has actively claimed its hegemonic position by redefining itself: just as the constitution of tangible cultural heritage expanded to include "things" as diverse as the tourist landscape of Las Vegas or the Apollo Mission detritus on the Moon (Gorman & O'Leary 2007; Weaver 2011), archaeology itself expanded to meet it. There is no longer anything that the archaeologist regards as out of bounds, even (and increasingly) the intangible.

However it is defined, archaeology's relationship with its heritage subject matter has changed in one very radical way in recent decades, although one hesitates to claim that the change has been effected universally. Readers of this encyclopedia, who constitute a "knowledge community" in themselves and who are likely to be as "western" as the discipline of archaeology, will know that it no longer claims innocently to be a disinterested scientific praxis, simply retrieving and making sense of tangible heritages. It now self-identifies as

a social praxis and highlights its own social responsibilities. Few would contest this as a positive development. Practitioners from western countries are rightfully mindful that archaeological investigations of heritages in non-western places and contexts can be construed as colonial, and many would identify archaeology (with anthropology) as *historically* complicit in the "othering" of the non-western people (Trouillot 2003). Practitioners in western countries are also rightfully mindful that archaeological investigations more locally of the heritages of minority or politically disenfranchised communities can be construed as elitist and, in the cases of communities originating in historic colonial expansions, neocolonial. There is a conviction within the global profession, though, that archaeology itself is fundamentally benign as both a practice and an intellectual pursuit and that potential allegations of neocolonialism or elitism are circumvented if all communities and societies are encouraged to engage positively with their own heritages on their own terms. Archaeology is, in this view, an agency which sensitively and reflexively empowers communities by providing strategies by which they can access their own pasts – their own heritages – in manners and for purposes which are culturally appropriate to them.

Definition

Dictionary definitions of heritage as "that which has been or may be inherited; any property, and esp. land, which devolves by right of inheritance" and/or as "that which comes from the circumstances of birth; an inherited lot or portion; the condition or state transmitted from ancestors" (OED Online 2012) disguise the struggles which national and international agencies, charged with oversight and management of heritage, have experienced over decades to arrive at an adequately broad definition. The modern (post-Venice Charter, 1964; see below) history of international heritage organizations and movements is in part a history of definition searching. The general tendency in every new initiative has been towards broadening the definition. One can see this by comparing definitions between two benchmark documents 40 years apart. In 1965 the Constitutive Assembly of ICOMOS (the International Council on Monuments and Sites), a nongovernmental international organization, defined heritage solely in terms of monuments and sites and excluded conventionally defined archaeological collections precisely because ICOM (the International Council of Museums) was regarded as the authoritative body. By contrast, in 2005 the *Council of Europe Framework Convention on the Value of Cultural Heritage for Society* (the so-called Faro Convention) dealt with the broader category of "cultural heritage" which it defined as "a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions, [and which] includes all aspects of the environment resulting from the interaction between people and places through time." It defined "a heritage community" as one "consisting of people who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations."

These two definitions reflect a desire among international heritage agencies to achieve politically neutral definitions. They, and other definitions like them, have been generated in contexts of international debate about heritage and are subscribed to in broad principle in many countries, but there is little standardization of definition between countries, a fact which has long hampered the effective implementation of many heritage charters. Thus, for example, the Australian view of heritage privileges "place, cultural significance and fabric," the Canadian view privileges "material culture, geographic environments and human environments," while the Chinese view privileges "immovable physical remains" (Ahmad 2006: 299). National definitions of heritage reflect national intellectual traditions and political needs. National agendas always trump international aspirations.

Not all agencies have been as sensitive as UNESCO (the United Nations Educational,

Scientific and Cultural Organization), ICOMOS, or the Council of Europe in defining heritage. For example, in 2001 the World Monuments Watch, a nonprofit heritage organization based in New York, added the recently created Ground Zero (the former World Trade Center site) to its global list of 100 sites which it regarded as needing protection. It was, as that organization proclaimed, included as one of "our landmarks," alongside Mostar Bridge and the Bamiyan Buddhas, which "have become prized targets for terrorists because they are what defines the cultures, ideals, and achievements of the people who created them, who use them, who live with them." The description of these places and sites as "*our* landmarks" and the use of the term "terrorists" capture with an economy of words precisely what international heritage agencies attempt to avoid. In any case, the World Trade Center prior to its destruction was a place of international finance and business and has little to do with the "culture and ideals" of Americans (O'Keeffe 2010).

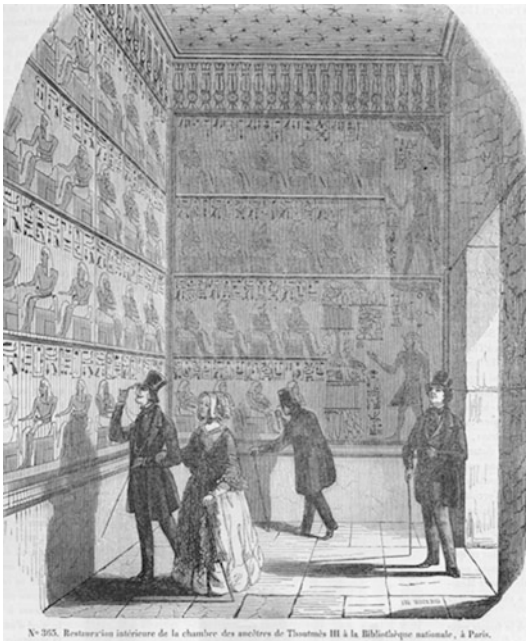

Heritage and Archaeology, Fig. 1 Visitors to a reconstructed Egyptian tomb in the Bibliothèque nationale de France in the mid-nineteenth century (From Joanne 1850: 223).

Historical Background

Although the origins of the modern concept of heritage are to be found in the context of nineteenth-century modernity in western Europe (Smith 2006: 16-22; Fig. 1), the period of greatest expansion internationally of heritage consciousness was after World War II, particularly from the 1960s. A key event was the decision by the Egyptian government to build the Aswan High Dam, thus flooding the valley containing the Abu Simbel and Philae temples. UNESCO launched a successful international campaign to raise money for safeguarding this heritage. The temples were dismantled and reassembled elsewhere. Subsequent UNESCO projects, similarly conceived, ensured the preservation of Mohenjodaro in Pakistan and the Borobudur temple compounds in Indonesia.

Briefly, UNESCO remains the leading force in the development of practices for the protection of cultural heritage. Member states (of which there are 196) are required, though only at the cost of censure, to honor the contents and recommendations of its various conventions, declarations, and guidelines. UNESCO maintains a list of what it designates World Heritage Sites, places both "natural" and "cultural" which it regards as having special significance to the global community. This list, which has 962 "sites," 77 % of them "cultural," spread across 157 states, is overseen by its World Heritage Committee, the elected membership of which is drawn from the 190 countries which have signed and ratified the 1972 *World Heritage Convention (or Convention Concerning the Protection of the World Cultural and Natural Heritage)*. Whereas member states are represented on UNESCO's World Heritage Committee, membership of ICOMOS is comprised of individuals and institutions specializing in conservation in the broadest sense. ICOMOS advises UNESCO on World Heritage Sites.

Between them, UNESCO and ICOMOS are responsible for most of the thirty-odd charters

and other documents created for international reference since World War II (or, more specifically, since the *Hague Convention* of 1954). Key documents created in these 60 years include (after Ahmad 2006, with additions):

- *International Charter for the Conservation and Restoration of Monuments and Sites*, CATHM, 1964 (http://www.icomos.org/charters/venice_e.pdf)
- *Recommendation Concerning the Preservation of Cultural Property Endangered by Public or Private Works*, UNESCO, 1968 (http://unesdoc.unesco.org/images/0016/001601/160145eb.pdf)
- *Resolution of the Symposium on the Introduction of Contemporary Architecture into Ancient Groups of Buildings*, ICOMOS, 1972 (http://www.international.icomos.org/publications/93towns7e.pdf)
- *Convention Concerning the Protection of the World Cultural and Natural Heritage*, UNESCO, 1972 (http://whc.unesco.org/archive/convention-en.pdf)
- *Recommendation Concerning the Safeguarding and Contemporary Role of Historic Areas*, UNESCO, 1976 (http://unesdoc.unesco.org/images/0011/001140/114038e.pdf#page=136)
- *Charter for the Conservation of Places of Cultural Significance*, Australia ICOMOS, 1979, revised 1999 (http://australia.icomos.org/wp-content/uploads/BURRA_CHARTER.pdf)
- *Charter for the Conservation of Historic Towns and Urban Areas*, ICOMOS, 1987 (http://www.international.icomos.org/charters/towns_e.pdf)
- *Charter on the Preservation of Historic Gardens*, ICOMOS, 1982 (http://www.international.icomos.org/charters/gardens_e.pdf)
- *Guidelines for Education and Training in the Conservation of Monuments, Ensembles and Sites*, ICOMOS, 1993 (http://www.getty.edu/conservation/publications_resources/research_resources/charters/charter52.html)
- *Nara Document on Authenticity*, Japan and UNESCO, 1994 (http://whc.unesco.org/uploads/events/documents/event-833-3.pdf)
- *Charter on the Protection and Management of Underwater Cultural Heritage*, ICOMOS, 1996 (http://www.international.icomos.org/charters/underwater_e.pdf)
- *Principles for the Recording of Monuments, Groups of Buildings and Sites*, ICOMOS, 1996 (http://www.icomos.org/charters/archives-e.pdf)
- *Principles for the Preservation of Historic Timber Buildings*, ICOMOS, 1999 (http://www.international.icomos.org/charters/wood_e.pdf)
- *Charter on the Built Vernacular Heritage*, ICOMOS, 2000 (http://www.international.icomos.org/charters/vernacular_e.pdf)
- *Convention on the Protection of the Underwater Cultural Heritage*, UNESCO, 2001 (http://unesdoc.unesco.org/images/0012/001260/126065e.pdf)
- *Charter for the Interpretation of Cultural Heritage Sites*, ICOMOS 2002 (http://icip.icomos.org/downloads/ICOMOS_Interpretation_Charter_ENG_04_10_08.pdf)
- *Framework Convention on the Value of Cultural Heritage for Society, The Council of Europe*, 2005 (http://conventions.coe.int/Treaty/EN/Treaties/Html/199.htm)

Archaeology features in most of them, but, surprisingly, perhaps, one cannot map particularly well its own historical development as a heritage praxis, or its historical relationship with the concept of heritage, through an interrogation of their texts. In the 1964 *Venice Charter*, at the head of the list above, the disciplines of archaeology and history are given equal rank; the Charter does refer to the need for archaeological excavation to accord with agreed international scientific standards, but does not otherwise privilege the subject. The 1968 Recommendation which followed also mentioned archaeology but placed it among rather than in a privileged position within other disciplines and practices. It advocated, for example, "the conservation and the protection of monuments and historic, artistic, *archaeological* and scientific sites" and asserted that "the services responsible for the safeguarding of cultural property should be adequately staffed with the specialists required for

the preservation or salvage of cultural property endangered by public or private works, such as architects, urbanists, *archaeologists*, historians, inspectors and other specialists and technicians." By the time of the *Faro Convention* of 2005, the last item on the list above, archaeology is not mentioned by name at all.

Key Issues

The key issues in heritage, certainly from an archaeological perspective but probably from every perspective, can be grouped under three headings: ethical, practical, and theoretical. Separating them like this suggests three different bundles of issues to be addressed, but all three are interconnected, with ethical concerns probably overarching all others. The application of theories and practices of heritage preservation and conservation, and of presentation, all require an advance rapprochement with the ethics of engaging in anybody's heritage or any group's heritage other than one's own.

In part, the ethical concerns are with respect to ownership of heritage. The role of western archaeological agencies, or indeed of archaeology as a western agency, in investigating heritages overseas, and the potential ethical conflicts, has already been alluded to above, but the issues extend also to the investigation of certain heritages within those western places themselves. The rights of communities to their own heritages, regardless of geographic location, are now recognized. In the United States, for example, initiatives addressing the specific concerns of indigenous peoples relating to cultural resource management have been in place since the mid-1970s, while a 1992 amendment to the *National Historic Preservation Act* allowed tribes to establish their own Tribal Historic Preservation Offices, enabling direct involvement in heritage preservation on tribal lands (Nicholas 2008). The treatment of burials is no longer the point of conflagration that it once was. The sort of controversy generated by the American burial ground (Epperson 1997) is unlikely to be repeated. Sometimes, though, the identification of rightful claimants to a heritage is a problem. In some cases, as with Stonehenge in the mid-1980s, there is no descendent community for an ancient heritage, but claims are still made for ownership (Chippendale 1986). In other cases, there is a descendent community, but claims from outside that community are made, as at Chaco Canyon (Finn 1997); identifying some heritage as global in significance opens a door for arguments to be made that everybody should have rights of access and intervention. In other cases again, communities with specific heritages have not sought heritage protection, and no offer of protection is made to them, thus creating the possibility that a heritage to be valued in the future will be destroyed in the present (Fig. 2). Ownership is one part, albeit a significant one, of a larger ethical-practical matrix. Imbricated with it is the problem of attaching a notional global heritage value or significance value if the communities whose heritages are being evaluated (such as "ethnic groups," as loosely defined) do not subscribe culturally to such metrics. This challenge trickles down to micro-level where tension can exist between a collective with a heritage that it desires not to retain and those within the heritage profession who might regard that same heritage as worthy of protective intervention (Fig. 3).

Once issues of the ownership and significance value of heritages are dealt with, there is a further area of on-going concern: presentation and interpretation. Establishing professional and ethical standards in tandem in these areas was central to the ICOMOS *Charter for the Interpretation of Cultural Heritage Sites*, drafted in 2002 by the Ename (Belgium) Center for Public Archaeology and Heritage Presentation. Cultural heritage site is defined in this context as broadly as possible: "a locality, natural landscape, settlement area, architectural complex, archaeological site, or standing structure that is recognized and often legally protected as a place of historical and cultural significance." In meeting its goal of establishing "international standards and guidelines for authenticity, intellectual integrity and sustainable development in the public preservation of archaeological and historical

Heritage and Archaeology, Fig. 2 Moore Lane, Dublin (2009). One of the first sites of worship of Dublin's Nigerian community, it is typically in a back-street location. Will future generations of African-descended Irish people lament the loss of the site of the Tower of Power Pentecostal church? (Photo: T. O'Keeffe)

Heritage and Archaeology, Fig. 3 The remains of the Magdalene laundry attached to the Gloucester Street convent, Dublin (2009). The abuses (psychological, physical, sometimes sexual) suffered by women in such laundries are now public knowledge. According to local informants, there is no desire among survivors for their experiences to be memorialized in the preservation of this ruin, yet it represents an important, if very dark, passage in modern Irish history (Photo: T. O'Keeffe)

sites and landscapes," it distinguished between *interpretation* ("the full range of potential activities [including "professional and popular publications, on-site installations, community activities, and so on"] intended to heighten public awareness and enhance understanding of cultural heritage site"), *presentation* ("the carefully planned communication of interpretive content through the arrangement of interpretive information, physical access, and interpretive infrastructure at a cultural heritage site"), and *interpretive infrastructure* ("physical installations, facilities, and areas at a cultural heritage site that may be specifically utilised for the purposes of interpretation and presentation"). Most interestingly, though, the same Charter defined *site interpreters*

as "staff or volunteers at a cultural heritage site who are permanently or temporarily engaged in the public communication of information relating to the values and significance of the site." The information they communicate to "the public," in other words, is not information about the heritage but about its evaluation. The follow-up to the Charter, the *Charleston Declaration on Heritage Interpretation* (2005), suggested an "operational difference between *Presentation* and *Interpretation*" describing the former as a "one-way mode of communication" in which "scholars, design firms, and heritage professionals" (note the order of listing and the distinction made between the first and third) are involved and describing the latter as "the totality of activity, reflection, research, and creativity stimulated by a cultural heritage site" (www.enamecharter.org/downloads/charleston_declaration.doc). But it elided, arguably, the problem raised by the concept of the *site interpreter* who mediates a site's significance.

Among many key issues of a practical nature for scholars and heritage professionals, three can be picked briefly as representative. One is dealing with the impacts of so-called heritage tourism (see, e.g., Poria et al. 2003). The commodification of the past requires some accommodation between those involved in commerce and those concerned with conservation. Heritage tourism that is not carefully regulated damages more than just the physical: it can limit the sense of stakeholding among those whose heritage is commodified. A second issue is the tension between heritage sites in urban areas and the simple modern economic functioning of those urban areas. There is a difficulty of "translating traditional conservation concepts... to the diverse and dynamic urban contexts urban WHS [World Heritage Sites] represent" (Pendlebury et al. 2009: 349). A third issue is the problem of heritage theft. This has been addressed many times in the past 60 years, going back to the *Hague Convention* (http://unesdoc.unesco.org/images/0008/000824/082464mb.pdf). Yet, in more recent times, ICOM has had to issue what it described as *Red Lists* in which are classified the endangered categories of archaeological objects or works of art in the most vulnerable areas of the world, in order to prevent them being sold or illegally exported (http://icom.museum/programmes/fighting-illicit-traffic/red-list/). There are lists for *African Archaeological Objects* (2000), *Latin American Cultural Objects* (2003), an *Emergency Red List of Iraqi Antiquities at Risk* (2003), *Afghanistan Antiquities* (2006), *Peruvian Antiquities* (2007), *Cambodian Antiquities* (2009), *Endangered Cultural Objects of Central America and Mexico* (2009), an *Emergency Red List of Haitian Cultural Objects at Risk* (2010), *Chinese Cultural Objects* (2010), *Colombian Cultural Objects* (2010), and an *Emergency Red List of Egyptian Cultural Objects at Risk* (2011).

International Perspectives

UNESCO, the institutional epicenter of heritage history, and other international agencies have had considerable success in getting nation states to conceive of their national heritages as part of a greater, global heritage matrix and in encouraging most of those nation states to sign up to what are essentially covenants to protect the future(s) of heritage. But proposals from the international community to internationalize protection strategies for heritage have not always been compatible with national cultural traditions or chimed with national interests. The response to UNESCO's 1970 *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Cultural Property*, mentioned above, illustrates this point very well. Declarations and reservations came from 18 countries, most expressing reservation. Three examples from different corners of the world can be picked out as representative. They are of historic interest now, but they underline a point that is far from historic: the tension that exists, almost inevitably, between the aspirations of internationalization and national self-interest. For Australia came the declaration that it

> is not at present in a position to oblige antique dealers, subject to penal or administrative sanctions,

Heritage and Archaeology, Fig. 4 Tourists visit the *USS Lexington*, Corpus Christi, Texas (2008) (Photo: T. O'Keeffe)

> to maintain a register recording the origin of each item of cultural property, names and addresses of the supplier, description and price of each item sold and to inform the purchaser of the cultural property of the export prohibition to which such property may be subject. Australia therefore accepts the Convention subject to a reservation as to Article 10, to the extent that it is unable to comply with the obligations imposed by that Article.

The Union of Soviet Socialist Republics declared that

> the provisions of Articles 12, 22 and 23 of the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, providing for the possibility for the contracting parties to extend its application to the territories for the international relations of which they are responsible, are outdated and contrary to the Declaration of the United Nations General Assembly on the Granting of Independence to Colonial Countries and Peoples (resolution 1514/XV of 14 December 1960).

A third example is the declaration by the Republic of Guatemala that

> in conformity with the Fundamental Statute of Government, monuments and archaeological vestiges are the property of the nation and that, furthermore, national law prohibits the unauthorized export of property constituting its cultural wealth, makes an express reservation concerning paragraph (b) (ii) of Article 7 of the Convention to the effect that it does not consider itself obliged to pay any compensation to any person or persons holding cultural property that has been looted or stolen in Guatemala or exported illicitly to another State Party and that, at the request of the Government of Guatemala, has been the subject of appropriate steps for its confiscation and/or restitution by that other State Party. In any case, the Republic of Guatemala does not consider that the purchase of property forming part of its cultural wealth is in good faith solely through having been made in ignorance of the law. Concerning Article 3 of the Convention, the Republic of Guatemala shall also consider to be illicit the import and transfer of ownership of cultural property effected contrary to the national provisions in force that are not in conflict with the provisions of the Convention.

These very tensions are especially in evidence where underwater cultural heritage is concerned. The UNESCO *Convention on the Protection of the Underwater Cultural Heritage* aimed to provide an international legal framework for the protection of shipwrecks and other cultural remains located in international waters. It was adopted in 2001, but some major maritime states opted not to adopt it. Their principal legal concern was that their rights, under the UN *Convention on the Law of the Sea* 1982 (LOSC), would be compromised by signing up to the UNESCO Convention. A principal ethical concern was the protection offered by the Convention to sunken warships (Fig. 4). When afloat, such ships have a special legal status; they are afforded immunity

from the jurisdiction of any state other than the flag state. Some maritime states insist that such protection survives their sinking. This issue has a particular currency: the Convention protects heritages which have been underwater for at least a century. The *Titanic* has recently fallen within its embrace; in 2014 the first of the World War underwater wrecks will be covered by the Convention (Dromgoole 2012).

Future Directions

The observation was made above that heritage is a topic in two conversations in two different languages, one philosophical and epistemological and the other concerned with practicalities. The two conversations converge on the issue of ethics, in that those engaged in the first recognize the ethical problems inherent in legislating for concepts inherently unstable, and those in the second understand how negotiation with ethics is necessary for practical action to be taken on heritage. Neither of these conversations will stop; the challenge into the future is to make their languages more compatible with each other.

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- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Council of Museums (ICOM)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Preserving Heritage: The Role of the Media
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ UNESCO World Heritage Convention (1972)

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Heritage and Higher Education

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Introduction

In the UK, Archaeological Higher Education courses have, in recent years, incorporated a growing component of heritage studies, and in addition, heritage is now often separated from archaeology as its own distinct discipline of study. The question of how closely linked the disciplines should be is rarely addressed, although many recognize the interdisciplinary nature of their research in these fields. This section will discuss the traditional "education versus training" debate, which sees a dichotomy of practice between academics and education, and professional archaeology, with a segregation between education and practice. Epistemologies of practice are also discussed, where the demographics of education contrast with those of the profession, especially at higher levels, a pattern also seen in other arts areas of study and practice. Finally, the importance of sociopolitics and the role of "alternative narratives" in heritage education and management will be considered.

Key Issues

Education Versus Training

In a current climate of financial downturn, the disciplines of archaeology and heritage face challenging times. The role of education is ever-more vital, securing the future knowledge base of the next generation of professionals, while also fundamental for nurturing an understanding of the value of the past and its role in life today. However, the heritage sector, including professional archaeologists, and academia debate the responsibilities for vocational training: the "education versus training" debate (Collis 2000; Aitchison 2004; Hamilakis & Rainbird 2004: 52). Archaeological employers argue that graduates are becoming increasingly ill-equipped for a career in field archaeology (Aitchison 2004), and at the heart of the discussion is the issue of whether universities are responsible for producing professional archaeologists, equipped with the field knowledge to work effectively on archaeological sites, or whether vocational aspects of training should fall under the remit of employers. A factor in the debate is the role of universities in ensuring the employability of all of their graduates, whether they decide to pursue archaeology or some other career, requiring a broader focus on employability skills, rather than simply

archaeological techniques. With new jobs in archaeology predominantly awarded to those with degrees, there are responsibilities for both the education and professional sectors. Two major research projects which have investigated fieldwork training in the UK (Croucher et al. 2008; Everill & Nicholls 2011) have called for a closer relationship between the profession and universities, with the most productive training projects frequently resulting from collaboration between field units and universities (Croucher et al. 2008). It is also clear that archaeological training equips graduates with a range of transferable skills (e.g., analytical skills, interpretative abilities, communication skills, and team working) which are valuable to employers outside of archaeological careers.

Recent research by Everill (2009) has investigated the working conditions of archaeologists, observing a profession which is repeatedly subject to low-pay and poor conditions, further emphasizing a gap between the profession and academia. As the professional sector faces increasingly diminished funds in a competitive environment, the exploitation of excavators is frequently inherent in contracts of work. Schlanger and Aitchison (2010) describe a crisis in archaeology in the UK; a change in policy, brought in by a new coalition government, has resulted in cuts to publically funded projects, rather than the previous strategy of investment in order to drive growth. The government strategy, placed in its context of global economic downturn, has contributed to a diminishing construction industry, directly impacting on the archaeological sector (Aitchison 2010), alongside dramatic cuts in funding to education and heritage (Everill & Nicholls 2011). Schlanger and Aitchison describe the current situation as affecting four areas within archaeological and heritage research and practice: research funding and its priorities; professional employment; conservation and public outreach policies; and heritage management, policies, and legislation (2010: 10), themes which are interdependent and together their plight spells an overarching crisis for the profession and education. Aitchison estimates that in the UK, an equivalent of one in every six jobs in archaeological fieldwork was lost between 2007 and 2009, a decline of around 10 % in the archaeological sector as a whole (2010: 26). Not only is the situation leading to an employment crisis, but is also resulting in the burgeoning of skills, knowledge, and experience from archaeological practice (Aitchison 2010; Schlanger & Aitchison 2010). With diminishing archaeological jobs, it is clear that only the most proficient of graduates will secure their place in an archaeological career, yet a career that is dominated by low salaries and poor conditions (Everill 2009). As the training of future generations of archaeologists and heritage sector professionals is fundamental to the continuity of the heritage sector, the way forward lies with a closer allegiance and understanding between the sectors of education and the profession. The effects of the financial crisis are echoed across the globe (see Schlanger & Aitchison 2010 and chapters within).

Demographics of the Profession

Alongside the decline in career opportunities, the demographics of those working in the sector remains a concern. Aitchison and Edwards' (2008) *Profiling the Profession* research describes how the profession is still dominated by a male workforce. It is apparent that within Higher Education, there is greater equality between the sexes at undergraduate level, yet the traditional picture highlighted by Gero in 1994, of gender inequalities within archaeology, remains the same, with a narrowing of the career pyramid for female opportunities throughout the various levels of education and employment, with ultimately few female archaeology professors in the UK (see also Cant 2009). This worrying trend is not only evident with gender divides but permeates into fields of ethnicity, disability, and class, with the profession still remaining predominantly white, male, able-bodied, and middle class; 99 % of the UK sector are white, and 98.4 % able-bodied (Aitchison & Edwards 2008). The situation, writes Pope (2011), is in part attributable to a change in demographics and expectations during the 1950s in Britain, leading to the professional fast-tracking of many (male)

Cambridge graduates into professorships, a legacy which still impacts on the discipline today. Highlighting the current indiscrepancies in our professional and academic workforce is essential if the situation is to be rectified and the heritage sector is to become more representative of our modern population. This is a situation which has been of concern for a number of years, with McGuire and Walker observing class inequities in archaeology in 1999, with inequalities relating to class as well as gender. While the current situation in terms of class is more difficult to define, research is demonstrating that the gender imbalance in the heritage sector remains a challenge. An investigation by the Cultural Leadership Programme (2008) into the arts and heritage sector in the UK confirmed the continuing situation. While in 2006 52 % of the Cultural Heritage workforce were female (Dodd et al. 2008: Table 4), the percentages for executives were 62 % male and 38 % female (Dodd et al. 2008: Table 6). This figure does not seem so problematic until the sizes of companies with female executives are compared; companies with an all-female executive body make up 82 % of those businesses employing 0–4 members of staff, with companies employing larger workforces dominated by male executives (Dodd et al. 2008: Table 8). Thus, female executives, where they are present, are predominantly situated in the smallest organizations.

Future Directions

It is clear that the heritage sector faces great challenges ahead. It must become more commercially viable if it is to exist in today's climate of cuts and financial downturn. Education is key, not just of tomorrow's professionals but of the whole population in securing its understanding of the value of the past. In order to increase participation in heritage projects, it can be argued that the sector's demography needs to be more diverse to represent a multicultural Britain. This also includes the acceptance of alternative narratives of the past, which enable different voices to be heard and accept different claims on heritage, rather than offering a single, unified interpretation of monuments, archaeological sites, and places. The acceptance of difference pasts offers a forum for greater engagement in archaeology and heritage (Joyce 2002; Mapunda & Lane 2004). Indeed, a multiplicity of meaning no doubt existed in the past as it does in the present. Finally, these challenges are not unique to Britain; they place Britain in a global context and in an international community, which is striving to communicate the past and the relevance of heritage to lives and communities today and in the future.

Cross-References

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- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Outreach
- ▶ United Kingdom: Cultural Heritage Management Education

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Heritage and Public Policy

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Introduction

The policy environment is a crucial factor affecting cultural heritage and its preservation in local, national, and international settings. It is policy that sets goals, determines courses of action, and establishes common principles for use in cultural heritage management.

Definition

Definitions of public policy vary considerably and it could be argued that there is no universally accepted definition. However, most generally acknowledge that policy, although usually made or initiated by government, is interpreted or implemented by both public and private sector actors. In the context of cultural heritage, policy can be defined as courses of action – identified or undertaken by governments (national, subnational, or local), organizations (public or private, multinational, national or local) and private sector entities or civic groups – to preserve, protect, maintain, or manage tangible or intangible aspects of cultural heritage.

Historical Background

Cultural heritage policies in use today can be categorized into at least two general categories: (1) conceptual or definitional policies; and, (2) policies guiding program action or implementation. Policies in either category typically address approaches for preserving or protecting heritage and/or ways for responsibly combining cultural heritage and economic interests (such as cultural resource management and tourism).

Conceptual or Definitional Policies

Some policies or statements of heritage preservation objectives are long-standing and often emerged from a process of national dialogue. One that has become a model is the United States (U.S.) *National Historic Preservation Act* of 1966 (Public Law 89-665) which amounts to a national declaration of policy for preservation that applies to several government agencies and organizations. The *National Historic Preservation Act* also authorized the National Register of Historic Places in the USA as part of the effort to identify and protect the country's historic and archeological resources. As of 2010, the Register had over 86,000 properties listed. Although a model that may be emulated by others, the venerable public policy, that is, the *National Historic Preservation Act*, was amended

18 times between 1966 and 2006 – illustrating that public policies for cultural heritage are evolving and changing to meet the needs of times or circumstances.

Within the international arena, a major force for cultural heritage issues in public policy has been the United Nations Educational, Scientific and Cultural Organization (UNESCO). The *World Heritage Convention* of 1972 linked the concepts of nature conservation and the preservation of cultural properties (United Nations Educational, Scientific and Cultural Organization (UNESCO) 1972). This convention has guided the foundations of policy dialogue on cultural heritage issues internationally for about four decades. By October 2011, 188 countries had signed the convention and are listed as participating states in the accord. Interestingly, the concept of nature conservancy and cultural heritage preservation remained linked in this policy forum.

In 1992, UNESCO established the World Heritage Centre, which serves as an action arm within UNESCO for the coordination of the *World Heritage Convention*. By organizing annual sessions of the World Heritage Committee, the Centre plays a lead role in setting significant policy issues related to heritage preservation across the globe. The Centre also maintains the World Heritage List, a compendium of cultural and natural properties that are considered the most outstanding heritage sites from an international perspective in need of preservation and protection. From a policy perspective, the World Heritage List performs a similar set of functions to that of the U.S. National Register of Historic Places. In 2011, there were 936 properties on the World Heritage List: 725 cultural properties, 183 natural properties, and 258 mixed natural properties in a total of 153 countries.

Subnationally, policies regarding cultural heritage are often products of state and local governments or nongovernment organizations concerned with heritage issues. For example, the *Heritage of Western Australia Act* 1990 (Government of Western Australia as amended 2009) establishes heritage conservation principles for the State of Western Australia. This Act served as the foundation for the creation of the Heritage Council of Western Australia that functions to establish and maintain the State Register of Heritage Places, ensure that any development of heritage places is in harmony with cultural values, and promote awareness and knowledge of cultural heritage. The 2011 *State Cultural Heritage Policy of Western Australia* builds upon the *Heritage Act* of 1990 and sets specific heritage policy objectives (Government of Western Australia, Heritage Council of Western Australia and the National Trust of Australia 2011).

Policies Guiding Program Action or Implementation

Once heritage policies are basically defined or established, additional policies often emerge that are designed to guide heritage program activities or the efforts to achieve more broadly defined heritage goals. For example, the U.S. National Park Service Management Policies describe procedures and protocols for the management of cultural resources on Park Service properties. These management practices relate to both preserving and fostering the appreciation of cultural resources.

On the international level, UNESCO and the World Heritage Centre issued its Operational Guidelines for the Implementation of the *World Heritage Convention* (United Nations Educational, Scientific and Cultural Organization (UNESCO) 2008) which defines key processes of the Convention functions and documents implementation formats for signatory countries. Another international example is the *Charter for the Interpretation and Presentation of Cultural Heritage Sites* that was ratified in 2008 by the General Assembly of the International Council of Monuments and Sites (International Council on Monuments and Sites (ICOMOS) 2008). The Charter's stated purpose is "to define the basic principles of Interpretation and Presentation as essential components of heritage conservation efforts and as a means of enhancing public appreciation and understanding of cultural heritage sites" (International Council on Monuments and Sites (ICOMOS) 2008: 2).

Some policies relating to cultural heritage guide program operations of organizations not

necessarily established to serve a specific cultural heritage purpose. The World Bank, for example, adopted policies (BP 4.11 and OP 4.11) in 2006 concerning the conservancy of "Physical Cultural Resources." These policies relate to the funding processes within the World Bank and are designed to "avoid or mitigate adverse impacts on physical cultural resources from development projects" that the World Bank finances (World Bank 2006a, b). As the policy title suggests, the definition of cultural resources is oriented to heritage that has physical form and the policy specifies that the assessment of risk to cultural resources is to be undertaken within a broader environmental assessment process for a proposed development project.

Key Issues/Current Debates

Public policies at the local, national, and international levels have made substantial progress in raising awareness about cultural heritage and promoting the principles of heritage preservation. A very common theme within the heritage policy arena is the linkage between issues of preservation or protection and those related to the economic potential of heritage sites. These potentially competing interests and how they are addressed or balanced are often the topic of the current dialogue on heritage policy.

Increasingly, cultural heritage policies are being woven within economic strategies and interests. Economic interests typically are driven or defined locally and within a country-specific context. Consequently, the policy issues associated with economic development and cultural heritage are increasingly being defined in terms consistent with the perspectives of national, district, or even city governments. As Western Australia's Minister for Heritage, G. M. Castrilli, states in his government's State Cultural Heritage Policy, "The protection and management of our heritage is also important to our social, environmental and economic prosperity" (Government of Western Australia, Heritage Council of Western Australia and the National Trust of Australia 2011).

Some have acknowledged the inseparability of heritage preservation and economic development. Yang and Phares, for example, outline protocols for including heritage management within poverty-reduction efforts, sustainable tourism, and job-creation interests at even the city level. Bono has emphasized the important role that countries and communities can play in identifying sites of heritage significance to indigenous cultures, while also recognizing the importance of linking cultural heritage interests with common interests in tourism, private enterprise, and job creation. Sullivan (2004: 54) identifies some of the advantages of empowering local communities to become involved in the cultural heritage management process and advocates addressing the economic and social interests of local communities to strengthen the policy environment for heritage preservation.

Managing heritage preservation objectives with economic growth interests also needs guidance. Acknowledging the importance of responsible site stewardship within an economic context, UNESCO's World Heritage Centre produced a manual for managing tourism at world heritage sites (Pederson 2002). In 2010, the U.S. State of Georgia's Historic Preservation Division of the Department of Natural Resources and the Tourism Division of the Department of Economic Development produced a *Heritage Tourism Handbook* to "to assist communities in leveraging their historic assets to realize economic and cultural goals . . ." (Georgia Departments of Natural Resources and Economic Development 2010: 2). The Handbook provides the context for blending both heritage preservation and economic growth interests at the subnational level.

The effort to address various interests in the use of heritage sites can produce concerns over potential adverse impacts to heritage sites. ICOMOS (2011) recently issued guidance on how to assess the impact of development or other changes on World Heritage properties that both acknowledges that development can have negative effects on sites and offers concepts for mitigating impact. As such, the guidance provides an example of the effort

to better manage potentially competing factors affecting heritage resources.

Another common theme within the public policy arena for heritage is resource allocation for cultural heritage work and the implementation of existing policies. While public awareness and willingness to do more in cultural heritage conservation and heritage management has grown, the financial resources available to fully implement existing heritage policies often limit what is possible. By 2002, for example, requests from countries to the World Heritage Centre for assistance with new World Heritage sites exceeded the resources available (Phares & Guttman 2002: 8-9). The interest among participating countries to receive financial assistance from UNESCO and the World Heritage Centre is regularly higher than annual funding levels. Similar situations of funding scarcity exist at national or subnational levels for cultural heritage work

Recognizing the resource availability limitations, recent policy issues addressed in the international arena have included how to best expand the resources available to organizations active in cultural heritage. The World Heritage Centre held a conference in 2002 to help identify opportunities to develop new partnerships with civil society and corporations for cultural heritage efforts. Among the suggestions made were the development of public-private partnerships, and the "mainstreaming" of world heritage into the development processes of the World Bank and the United Nations (World Heritage Centre 2003: 144). Public-private partnerships often are relevant topics for local-level heritage preservation efforts or even in conservation efforts for a specific site.

International Perspectives

Internationally, initiatives are constantly evolving to build or maintain new systems of international cooperation for cultural heritage. Some (Barbosa 2003: 21) recommend new partnerships for heritage conservation that will involve "South-South" (developing country to developing country) cooperation and wider "North-south" (developed country to developing country) relationships that extend beyond traditional donor-recipient agreements as well as the involvement of corporations, research institutions, trust funds, foundations, and individuals in heritage conservation efforts. The fact that, in 2011, the World Bank hosted the 13th Annual International Symposium on the Economic Benefits and Challenges of Supporting Cultural Heritage for Sustainable Development illustrates that there are continuing ongoing gatherings in which new resources may be identified to help realize heritage policy goals.

One common issue within the policy arena affecting cultural heritage is that definitions of heritage change and evolve with time and location. Early cultural heritage policies focused largely upon tangible heritage and physical sites or items. Over time, definitions of cultural heritage have become more varied and more encompassing – incorporating oral or visual art forms, for example, and a variety of types of intangible heritage. Public policies, consequently, also must evolve with new policy expressions or be applied with flexibility to accommodate new concepts of heritage. As a result, public heritage policies are constantly being updated.

Once heritage policies are in place or adopted, organizations charged with implementing such policies often have insufficient internal capacities to fully implement them. Heritage policies, therefore, frequently require capacity-building efforts (training, awareness-raising, adding staff, etc.) in order for policy principles to be realistically applied or undertaken. How best to build capacity for implementing heritage policies or realizing policy goals can be an important issue affecting the ultimate success of public policy.

Another issue that affects heritage policies is the complexity of stakeholder involvement in policy formulation as well as policy interpretation or implementation. The community of stakeholders for cultural heritage can be quite large and diverse. Stakeholders may be representatives of a particular cultural group, the residents of a specific location, local government officials,

corporate executives, or senior national decision makers. The variety and wide range of disparate stakeholders can make effective involvement within the policy dialogue process challenging. Although new techniques for stakeholder involvement in heritage policy keep emerging, constant efforts for greater effectiveness in stakeholder participation are needed.

Future Directions

Within the public policy arena, new opportunities for cultural heritage dialogue appear destined to include more linkages between cultural preservation, job creation, and the economic benefits of cultural resource management. Policy advocacy, however, will need to be at international, national, subnational, and local levels in ways that also involve economic development interests and organizations.

At the country level, policies will be needed that clearly articulate a place for cultural heritage preservation within the economic growth strategies of national governments. These policies may require refining tourism policies and the role of cultural resource management in long-term plans for tourism over time. Significant opportunities exist at the national and subnational levels to rethink national policies related to cultural heritage management and longer-term national economic growth interests.

Within organizations or departments oriented to economic development or economic growth, new policies will be needed to ensure that initiatives succeed in conserving and protecting heritage and incorporate principles of prudent heritage management beyond just doing no harm to known cultural heritage sites. Development organizations will need help from cultural heritage experts to develop policies on financing heritage preservation efforts and also for creating an appropriate cultural resource management policy niche within economic growth or poverty-reduction priorities.

There are also opportunities for more active technical exchanges in cultural resource management where agencies with a historically domestic focus (such as the U.S. National Park Service or the Australian National Trust) can share proven cultural resource and asset management expertise within the wider global community. Countries which have a strong tradition of melding national cultural heritage management programs with a vibrant and important tourism industry (Italy, Egypt, or Tunisia, for example) also can provide valuable models for combined cultural heritage and economic growth strategies on a national scale that can be more effectively shared within the global community.

Another opportunity for public policy lies in the realm of measurement indicators for successful management of cultural heritage resources that can help governments and donor organizations know if growing investments in cultural heritage preservation are having the desired impact – both on heritage conservation and with respect to economic growth interests. New measurement indicators for heritage management will probably need to be developed and additional measurement techniques identified. Economists, archaeologists, other cultural heritage specialists, and a variety of other professionals will need to work together to formulate new multidisciplinary models for defining policy outcomes that link cultural heritage and economic growth goals.

Cultural Heritage and Future Public Policy

One of the most exciting aspects about cultural heritage in the future is that the policy environment will continue to change as new cultural heritage conservation interests are expressed and heritage needs evolve at all levels. An ongoing challenge will be the broader involvement of stakeholders in the heritage policy process and the quest to link policy implementation with a broader array of available financial resources for the important work of cultural heritage preservation.

To realize the full potential of current and future heritage policy, there will need to be a vibrant and effective advocacy on the stage of public opinion for the importance of cultural heritage and the vital processes for responsible management of cultural resources. Advocacy for

cultural heritage preservation within the economic development arena, where the financial resources at stake are substantial, remains incomplete. The development of new and evolved heritage policies will be required to take cultural heritage management to new levels and to attract the level of political and economic support that it deserves.

Advocacy champions for cultural heritage will still be needed within the policy context at all levels of government and civil society. These policy champions will have to be able to communicate convincingly with policymakers, using arguments that can link heritage conservation with economic goals and other programmatic imperatives of broad global concern. Policy champions may not be limited to cultural resource management professionals or to those who hold positions within the policy-formation arena of organizations already active in cultural heritage work.

There is also an important role for committed and informed laypersons with a cultural resource management perspective to play in future heritage policy development. They too can champion cultural heritage issues knowledgeably within the policy-formation process as communities become more involved in heritage management. Future advancements in public policy for cultural heritage issues will need to be based on an active and vibrant collaboration between cultural heritage professionals, managers of economic growth, communities, heritage organizations, and others. Therefore, the formulation of public policy for cultural heritage will continue to be a dynamic, multifaceted process.

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- ▶ Canada: Cultural Heritage Management and First Nations
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- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United States: Cultural Heritage Management

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Heritage and the Need for Theory

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Brief Definition of the Topic

Whether or not "heritage" should have a theoretical foundation or whether it should stand aloof merely as practice depends on scope and definition. Heritage has been traditionally defined as a thing, or more precisely as a collection of things, inherited from the past and given value by us, in the present. We value these "things" both for our own sake (e.g., to protect them and keep them around us as buildings, monuments, or artifacts) or for that of future generations. Heritage has also been defined as a set of processes (administrative and political, notably in the form of conventions and laws) by which we manage these things. And often, those processes go unchallenged or untested, at least by heritage practitioners. But heritage has recently come under critical review, leading some to identify it as exclusive and specialized under both of these interpretations, either because it is only "special things" which are given value (the rest being merely ordinary and everyday) or because "heritage management" is entirely in the hands of specialists and experts, who make decisions on behalf of society. Under this critical review (e.g., Smith 2006; Council of Europe 2009), heritage now has a broader definition, one that recognizes the values attributed to things, not by "the system" or "the establishment" and its facilitators, but by society and the many and diverse interest groups within it. And this is where theory becomes not only relevant but essential to heritage practice.

The 2005 *Council of Europe (Faro) Framework Convention on the Value of Cultural Heritage for Society* usefully defines heritage within the related contexts of democracy, multi-vocality, localism, and participation:

> Cultural heritage is a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. It includes all aspects of the environment resulting from the interaction between people and places through time.

Faro also recognizes the concept of a "heritage community," being:

> People who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations.

And of course "transmitting to future generations" does not necessarily mean preservation, and certainly not keeping things unchanged. In its current guise, at least in the developed world, "transmitting" and "sustaining" means passing things on in such a way that a link can be maintained to past human actions or events. So not necessarily a building that is preserved unchanged but perhaps the character or planform of a neighborhood that is retained or a style or density of architecture reflected in new development.

Heritage is not only about decisions made by a group of specialists, and the processes by which

those decisions become recommendations, for statutory protection for example. While these specialists and their processes remain significant, the "constantly evolving" values of the heritage community are paramount. Faro notes in its preamble how "*every person* has a right to engage with the cultural heritage of their choice," while being "convinced of the need to involve *everyone* in society in the ongoing process of defining and managing cultural heritage" (my emphases). Similarly, English Heritage's *Conservation Principles* (2008) include recognition of social value, defined as being:

> Associated with places that people perceive as a source of identity, distinctiveness, social interaction and coherence. Some may be comparatively modest, acquiring communal significance through the passage of time as a result of a collective memory of stories linked to them. . . . (Further) Social values tend to be less dependent on the survival of historic fabric. They may survive the replacement of the original physical structure, so long as its key social and cultural characteristics are maintained.

All of this represents progress and a move away from heritage as things to heritage as process and from heritage being divided between that which is tangible and intangible to an entirely intangible heritage. But it also takes us back to the fundamental questions that we ask of heritage: why does having a heritage benefit us, and can we recognize value in the landscape around us? For heritage to be critically engaged, to have social value and retain currency requires it to have a robust theoretical foundation. The authorized heritage discourse is one example of how this can work. As Smith has stated, heritage is not a thing or a site; heritage is what goes on at these sites, and the sites are ordinary, everyday places just as much (in fact more) than they are special and iconic. Heritage in other words is a broad church, and above all, a cultural process that "engages with acts of remembering that work to create ways to understand and engage with the present, and the sites themselves are cultural tools that can facilitate . . . this process" (Smith 2006: 44). Here we can summarize the argument to a point of simplicity: for those who recognize a heritage made up entirely of things, it can indeed by seen as a largely atheoretical pursuit, more concerned with following procedures and protocols. But once all heritage becomes intangible, and concerned with cultural processes that change with time, then theory becomes central to a concept that has a vital part to play in creating a sustainable future.

Cross-References

- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage & Society
- ▶ Heritage Landscapes
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: History and Context
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Heritage Areas

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Brief Definition of the Topic

Heritage areas in the United States are large-scale living landscapes where residents and community leaders unite behind a common vision of shared heritage. Heritage areas strive to conserve natural and cultural resources while enhancing the vitality of communities within a region and managing change so that the region's sense of place is retained. As such, a heritage area is not only a place, but it is also a management strategy

by which local citizens work cooperatively to protect and enhance natural and cultural resources and living traditions resulting in economic, educational, and quality of life benefits for residents and visitors.

This United States' conceptualization of heritage areas aligns with specific categories for populated landscapes recognized by the International Council on Monuments and Sites (ICOMOS) and The World Conservation Union (IUCN). Both of these international organizations have established formal documentation schemes to describe and classify heritage. Both contribute to the definition of the World Heritage List through the United Nations Educational, Scientific, and Cultural Organization (UNESCO), with ICOMOS focusing on historic places and IUCN emphasizing natural heritage listings. Heritage areas fall under ICOMOS' Category 2 cultural landscapes, organically evolved landscapes that can be both relict (fossil) or continuing to evolve (UNESCO-ICOMOS Documentation Centre 2001). Category 2 landscapes are living places reflecting the combined interaction of humans and nature and are mostly rural, primarily agricultural landscapes. Similarly, IUCN's Category V, protected landscapes and seascapes, recognizes the importance of places "where the interaction of people and nature over time has produced an area of distinct character" (World Conservation Union IUCN 1994).

Under the conceptualization shaped by cultural resource management policy in the United States, a theme common to a specific region serves as the central element around which a heritage area is organized. The theme reflects the intangible heritage of a region, the shared history, and cultural identity of the people who live there. The tangible heritage of the region – resources including archaeology, the extant built environment, living traditions, and the natural environment used by humans through time – is related to the primary theme of a region. In turn, this theme connects the individual resources to other resources, helping to define a cohesive cultural landscape with a shared history.

National Heritage Areas and National Heritage Corridors are designated by the United States Congress. They have evolved in conjunction with the National Park Service and share similarities with some national parks established in the latter half of the twentieth century, notably those whose boundaries include living populations. However, heritage areas are distinctive for the way in which they are managed from a local base of support. They expand on established resource stewardship models through their realization of large-scale, community-centered initiatives in which residents of the region, in partnership with the National Park Service, guide preservation and planning. As a partner and advisor, the National Park Service provides technical, planning, and limited financial assistance to National Heritage Areas, while decision-making authority remains in the hands of local people and organizations.

Each National Heritage Area has a coordinating entity that facilitates a broad network of partners who work collaboratively to preserve and interpret important resources and build a sustainable economy based on the heritage assets within a region. The coordinating entity oversees the development and implementation of a management plan to accomplish this. The coordinating entity also serves in an administrative capacity, including oversight of federal funding authorized by Congress through the National Park Service. The governance structures of coordinating entities vary widely, including nonprofit organizations, local and state governmental agencies, federal commissions, and universities. Although nonprofit organizations manage the majority of existing National Heritage Areas, the wide range of governance structures reflects the continued importance of identifying a coordinating entity that fits the individual circumstances of a region.

The first National Heritage Area, the Illinois and Michigan Canal National Heritage Corridor, was established in 1984. Since that time, the concept has experienced tremendous growth in popularity in the United States. In 2011, there are 49 congressionally designated National Heritage Areas, as well as numerous state and local programs. While resources, landscapes, themes, and management structures vary widely, the common

element among all heritage areas is the strategy to utilize a broad partnership network grounded at the local level for the protection and enhancement of cultural and natural resources related to a region's heritage.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Landscapes: Conservation and Preservation

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Heritage Conservation Training

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Introduction and Definition

Training in heritage conservation is separated by specializations. It will differ from one country to another or even from one institution to another in the same country, but there are usually two ways in which it is done. It will sometimes be by materials: paper, stone, wood, glass, ceramics, etc. In other cases, it can be divided by subjects: painting (e.g., on canvas, wood, and metal), graphic work (e.g., papyri, parchment, and paper), sculpture (e.g., wood, metal, and stone), and others.

There is also the archaeological conservation specialization, which deals with all materials that can be found at archaeological sites (e.g., rock art, mural painting, mosaics, stone, glass, wood, papyri, parchment, metal, and ceramics). Whether in the desert, forest, or underwater, an archaeological conservator must be ready and able to assure the protection and conservation of archaeological heritage at all its chemical, physical, and biological levels.

Archaeological conservation is separated from other specializations because all its materials have been in environments with many elements other than those present in the air and they have been that way for very long periods of time. An archaeological wood, for instance, may have been underwater for centuries; therefore, an archaeological conservator must understand the properties of both wood and of water to be able to understand the alterations to the material when it is in this environment for a long time. Understanding the damage at the materials' cellular level is crucial to planning proper treatment and guaranteeing integrity from the delicate moment of an object's transition to exposed open-air deterioration agents and the subsequent phases of transportation, storage and exhibition.One of the main differences between other conservators and those working with archaeological materials, is that the latter must be very familiar with the natural properties of other environments as well, like seawater, lakes, bogs, deserts, and the different kinds of sediments. Each of these interacts differently on materials and leaves a permanent mark on their chemical, physical and biological characteristics, thus needing very specific treatments and ongoing conservation measures.

Like other specializations in conservation, archaeological conservation is very interdisciplinary. All aspects related to the appreciation

and preservation of archaeological heritage to future generations are studied. Training includes subjects from history, archaeology, and ancient artistic techniques to the intrinsic properties of environments and materials, their transport, documentation, museum storage and exhibition, public conservation awareness, and site conservation planning, besides many other subjects necessary for the areas in which conservators work.

After the basic training (which can take up to five years), the practical work and/or further studies for professional development are what usually specialize the conservator within the archaeological conservation field. Some will choose to work only in museums, others will prefer to stay in excavation-related work, but both very often lead to conservation of a specific kind of material (e.g., ceramics in general); heritage from a single culture/civilization (e.g., Coptic); from a specific environment (e.g., underwater); or materials produced in a certain period in time but in different regions (e.g., Islamic culture). Some may continue in the academic field by teaching, others may prefer to stay researching in laboratories for new conservation and restoration techniques. Common to all these choices however, is the requirement to be familiar with of publications from specialized areas and from all over the world.

Many articles are written in an attempt to categorize the fields of conservation research and work. Even within a country, scholars differ on the terminology. In a broad sense, the word "preservation," when referring to heritage, is a general word for all that is done to protect and keep heritage from harm, including moving objects to a safe place during a flood. "Conservation" is sometimes used as a synonym for "preservation," but it is a term that is mostly used to refer to the more direct measures and actions taken to assure the preservation of heritage. Examples of conservation measures are always linked to chemical, physical, and biological stability and the "health" of heritage materials, during transport, storage, and exhibition for instance. It is sometimes called "preventive conservation," because actions taken need to foresee all possible risks and sources of degradation to prevent the damage from happening, preserving heritage for future generations, and minimizing its needs for restoration. So, if using the example mentioned above, conservation would be making sure that the objects saved from the flood were transported and stored with adequate wrapping and storage material and in a safe place with adequate levels of light, air quality, temperature and relative humidity.

When heritage material is in an advanced state of degradation and its aesthetic or historical significance cannot be appreciated, then restoration is needed. Restoration is when intervention work is done directly on the material for those purposes, using specific tools, solvents, chemicals, and new materials to compensate for volume and color loss. Although conservation work may include direct intervention, like the cleaning and consolidation of fragile material, its aim is the materials' health and stability, while restoration work brings back other characteristics, such as shape.

Key Issues/Current Debates/Future Directions/Examples

Conservation training varies a lot around the globe, depending especially on the mentality of a culture, which directly influences its criteria for conservation and restoration and thereby training.

In the East, for instance, some regions do not conserve parts of original materials during a restoration intervention. A wooden beam in front of a temple may be replaced completely by a new one and painted as the original one was, because the imperative, in this case, is to preserve the integrity of the structure, while the authenticity is less important. On archaeological objects, the filling used to consolidate cracks, for example, may be made very evident by the restorer (in color and/or in texture) to show and value even more clearly the object's history.

On the other hand, in many regions of the Middle East and Arab countries, there is a tendency to restore archaeological objects to what they may have looked like in the past.

Consolidation products used for filling cracks will usually be painted in the same color and have the same texture as the original object so that it cannot be not seen. For missing parts of an object, a new piece will be made separately and then applied to the original so that it will look whole again.

In the Western world, keeping all the original materials is generally considered to be important, so that future generations will be able to research the original wood, glass, stone, etc. Only the minimum amount of new products and materials are added, just enough to assure conservation and aesthetic appreciation. Filling for cracks on an archaeological object, for instance, will be in a different color to the original, but very discrete. The aim will be for the observer to be able to appreciate the original from a certain distance without noticing the cracks but, from very up close, be able to see the restoration and differentiate the original from the newly added products and materials.

These few examples to illustrate the different approaches towards restoration are important to understanding conservation training. The training will be directed to follow conservation criteria, and, depending on what kind of heritage the region or country has, courses will be concentrating on some subjects more than others. Also, since all specializations in conservation are interdisciplinary, it is very common for professionals from different backgrounds, like artists and artisans, even archaeologists, to work as conservators, although they have not received the prior conservation training that is required.

The base of heritage conservation is science. All artistic and cultural heritage comes from materials present in nature, which are manipulated and transformed through complex processes, to then become cultural heritage. The intrinsic and new characteristics of materials react to the environment, so training in conservation starts with a deep understanding of environments and materials in nature.

New interventions may seem correct and look harmonious, but underneath what we see, chemical-physical reactions are happening to an object due to cleaning, storage material, transport, humidity, temperature, lighting, etc.

All procedures and new products and materials introduced into an ancient material's body will produce some kind of reaction. Inevitable reactions already start when archaeological material comes into contact with the open-air atmosphere. Then, the following step, which is the cleaning of an object, seen by many as a simple and harmless procedure, is actually a crucial moment when much of archaeological information is lost.

Since conservation procedures by professionals are necessary on-site, the relationship between archaeologists and conservators is very close in many countries. This relationship continues because, although they study archaeological materials from different perspectives, the materials being studied are the same. It is common for conservators to discover more information that will then enrich archaeologists' research, especially because the training and perspective is so different. By having a background in chemistry, physics and biology, for instance, and by using different technologies and procedures in their everyday work, new information that contributes to archaeologists' research comes to light. Examples of these are seeing internal characteristics of materials that lead to ancient manufacturing techniques and color pigments in the materials' body that hadn't been noticed before.

Besides contributions to archaeological research being, it is important to bear in mind that future conservators and archaeologists will also research the same material. Not only it is important for materials to be treated by conservators, but it is also essential for the professional to have good training.

Improper interventions without expertise, if not disastrous shortly after they are done, will surely be noticeable many years afterwards. It is for these reasons that it is best to avoid having professionals other backgrounds working as conservator-restorers. In the attempt to consolidate and restore heritage it is very common to see that irreversible damage has been done.

Although conservation training will be different from one specialization to another and will change depending on the institution and country from which it is offered, to have

professional recognition as a conservator-restorer, many adopt the minimum training curricula below.

Practical Training

Practical training must involve the treatment of original objects deemed particularly suitable for didactic purposes. The objects chosen should provide material for a well-documented case study, including technical examination, diagnosis, and related treatment. From the beginning of their education, such case studies make the students understand every object as a unique case in the most practically oriented way. Furthermore, case studies offer the best possibility to integrate all the theoretical, methodological, and ethical aspects of conservation-restoration into the practical training. The study and practice of historical techniques, technology, and the manufacturing processes of related materials are encouraged, as they promote greater understanding of the physical, historical, and artistic aspects of cultural heritage.

Theoretical Instruction

A balance between science and the humanities is indispensable for theoretical instruction. The theoretical subjects should be determined by the specialization in the field of conservation/restoration and should include:

- Ethical principles of conservation-restoration
- Science (e.g., chemistry, physics, biology, mineralogy, color theory)
- Humanities (e.g., history, paleography, history of art, archaeology, ethnology, philosophy)
- History of materials and techniques, technology, and manufacturing processes
- Identification and study of deterioration processes
- Display and transport of cultural property
- Theory, methods, and techniques of conservation, preventive conservation, and restoration
- Processes involved in making reproductions of objects
- Methods of documentation
- Methods of scientific research
- History of conservation-restoration
- Legal issues (e.g., professional statutes, cultural heritage law, insurance, business, and tax law)
- Management (e.g., collections, staff, and resources)
- Health and safety (including environmental issues)
- Communication skills (including information technology)

(Professional Guidelines: European Confederation of Conservator-Restorers' Organizations - E.C.C.O. Adopted by its General Assembly. Brussels 1 March 2002).

Basic training can be done as 3- or 4-year diploma courses, 4- or 5-year undergraduate courses, or 2-year masters programs. Diploma courses are completely focused on conservation--restoration, usually having a first common year to all specializations. These courses are usually offered by institutions that teach only heritage conservation, and the student earns a specialized diploma in conservation-restoration of heritage (e.g., archaeological heritage, painting, and sculpture).

At some of these institutions, the course may be a 4- or 5-year undergraduate course, sometimes studying conservation-restoration of all materials in general or dividing the last years into specializations. Students in these cases will receive undergraduate degrees in conservation-restoration of cultural heritage in general or in one of the heritage specializations chosen.

At universities, undergraduate courses will usually be a fine arts curricula for the first three years, and then students opt to specialize in conservation during the last two years. These last years will include heritage conservation in general, even modern painting and sculpture. Students receive a fine arts undergraduate degree with specialization in conservation-restoration.

Masters degrees in conservation-restoration are offered not only by universities but also by a few institutions that deal only with heritage. It is at master's level where a general conservator-restorer of heritage may specialize in one heritage field, or an archaeological conservator may specialize even more in archaeological site conservation, for instance. It is also through masters degrees that professionals from other fields of knowledge come to work in the conservation field.

An example of this is chemists, who may enter a masters course that doesn't train for restoration and conservation procedures, but will enable the student to work in management of museum collections as a preventive conservator in museums.

It is also at masters level where a distinction may appear between a conservator and a restorer. Many masters programs do not have laboratory and practical work, so the student does not become a restorer. In the example above, the student may later work as the one responsible for establishing museum levels of lighting, relative humidity, temperature, monitoring the state of conservation of the objects, and everything that is important for the care of museum collections, but may not have the hand skills and the knowledge required to restore an ancient object.

On the other hand, every restorer is a conservator, someone who knows conservation but also has practical laboratory training. There are many restorers that, even without the formal education mentioned above, are recognized professionals due to their great skills and the scientific knowledge they gained as apprentices and through many years of work. In some countries, restorers are referred to as "heritage doctors," because they must know how to diagnose, plan treatments, and have great hand skills to be able to intervene directly on fragile objects with chemicals and specific tools. Again, terminology differs from one country to another, and this distinction between conservator and restorer may not be drwan. In some countries, a distinction between a conservator-restorer and a professional without restoration knowledge will be drwan by identifying the professional with the specific job they carry out (e.g., museum collections manager).

Degrees received at master's level will have these distinctions as well. When training includes practical laboratory work, students receive a masters degree in conservation-restoration, and if not, a degree in conservation or in the specific field of knowledge.

Very few universities and institutions offer Ph.Ds with specific programs in heritage conservation-restoration. What is most common for those who want to pursue a higher degree is to do a Ph.D. in archaeology, chemistry, biology, art history, management, and other related fields. The degree acquired will depend on the chosen related field.

Besides these, there are internships and fellowships that can be done in museums and heritage-related institutions. Conservators-restorers are expected to always continue studying, contribute to scientific research, and be updated in the new technologies and knowledge in their specializations. There are a great variety of professional development courses, from short workshops to 2-month courses in very specific subjects of heritage conservation. Examples of these are new adhesives applied to conservation, conservation of ancient masonry, applied photography, uses of lime, and heritage impact assessment.

As mentioned before, training in conservation differs from one country to another. Also, the minimum training required to earn professional recognition as a conservator-restorer is very different in each country. International institutions are a great source of information about conservation specializations and training opportunities, but many countries do not adopt the same international regulations of the conservation profession. To know more about professional guidelines and conservation training, it is advised to research heritage conservation institutions and universities in each country.

Cross-References

- ▶ American Institute for Conservation of Historic and Artistic Works (AIC)
- ▶ Authentication and Conservation in Archaeological Science
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Archaeological Practice
- ▶ Conservation in Museums
- ▶ Documentation of Treatment and Intervention in Archaeological Conservation and Preservation
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)

- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Preservation Paradigm in Heritage Management
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ World Heritage Education, Training, and Capacity Building

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Heritage Ethics, Cultural Base of

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Introduction

Most would agree that every profession has its own culture: a set of shared beliefs, values, customs, and appropriate behaviors that are passed on from one generation to the next. We recognize this culture in the friendly stereotypes derived from them: the archaeologist in safari gear, trowel in one hand, beer in the other; the art historian with CDs full of adjectives and a glass of chablis; politicians kissing babies and shaking hands; and so on. Aside from stereotypes, a professional culture includes a shared sense of the responsibilities and standards that guide members in the practice of their profession, that is, their professional ethics. These professional ethics are often implicit, passed on from mentor to student by example in the course of general training.

In the early years of most heritage-related disciplines, when the world felt simpler, fewer views were actively voiced and considered and most members of a profession knew each other (McGimsey 2002), this process worked reasonably well. Today, when the professions are themselves fragmented into subgroups and specialties, all interacting more frequently with the world outside the profession, implicitly conveyed ethics and standards seem insufficient. Thus, professional standards are increasingly being made explicit (O'Keefe 1998: 33), codified by professional organizations, and tailored to the specific goals and values of each organization; in a sense, their code of ethics grows out of their professional culture.

Key Issues/Current Debates/Future Directions/Examples

Professional organizations generally undertake the hard work of producing or revising a statement on ethics when the profession feels poorly represented by the actions of some or when serious issues with an ethical dimension shake the organization (McGimsey 2002; Davis 2003). Those drafting a new code basically begin with lists and discussions of perceived problems. These may include issues shared across professions but most are specific to one profession, even to one organization within that profession.

For example, in the early years of their discipline, archaeologists often worked closely with,

or were themselves, collectors of antiquities (e.g., Butcher & Gill 1993). The archaeology of the day saw benefit, or at least no harm, in the practice. Major developments in archaeological practice and goals, as well as the UNESCO *Convention on Cultural Property* (1970), encouraged rethinking and reevaluation of that practice. Archaeologists in a number of countries began suggesting that the commercial market in antiquities led to the permanent loss of information and to increased site destruction by essentially encouraging looting to meet the demands of the market. That is, they argued that the practice of collecting brought about results that had become antithetical to the contemporary goals of archaeology (see the *Journal of Field Archaeology's* regular feature on the Antiquities Market, renamed Archaeological Heritage and Ethics in 2008, for discussions that show changing attitudes and concerns about this and other archaeological heritage issues over the decades since the journal's inception in 1974).

Soon, participation in the antiquities market was seen as a serious problem by most professional archaeologists. By 1990 the membership of the Archaeological Institute of America (AIA), the primary professional organization for classical archaeologists in North America, had reached sufficient consensus on the problem to adopt a brief code of ethics (Professional Codes of Ethics and/or Standards of Professional Conduct can be found on the web sites of most professional organizations) for both its professional and numerous nonprofessional members. Each of the code's three statements addresses an aspect of the commercial market – calling for all excavation to be carried out to the highest standards by qualified personnel and for AIA members to refuse to participate in the illicit market in antiquities and to report illegal excavation and trade in antiquities to appropriate authorities. The professional culture had changed sufficiently to change ethical practice.

Four years later the AIA adopted a Code of Professional Standards to guide its professional members toward ethical choices. Members, most of whom are academics, generally do their fieldwork in the Mediterranean area, under permits, laws, and limitations imposed by the countries in which they work. They are often members of large, interdisciplinary, and international teams that work on extensive sites over many years. Directors assign publication responsibilities to individual scholars, who claim exclusive access to the relevant data until it is published. Reading the AIA Code of Professional Standards, one can discern the kinds of problems that came from that particular archaeological practice. Of 20 itemized points in the code, six (I.5, III.1, III.5, III.6, III.7, III.8) address aspects of behavior related to team projects and publication, that is, they reflect concerns arising from the specifics of AIA culture.

In the 1990s the Society for American Archaeology (SAA) also developed its Principles of Archaeological Ethics. The SAA is the primary professional organization for archaeologists practicing in the Americas, including many academics, although a majority of members work in government and business settings. While also concerned about the antiquities market and looting – in 1960 the SAA had already adopted Four Statements for Archaeology that included a prohibition on the buying and selling of artifacts (McGimsey 2002: 16; Lynott 2003: 20) – in the 1980s and 1990s the membership of the SAA was especially focused on issues related to reburial and other concerns of native peoples (Levy 2002: 96), issues that had less resonance in the classical world. The SAA Principles address many of the concerns also addressed by the AIA, but the emphasis on consulting and cooperating with "affected groups" is more prominent than in the AIA's document, while concerns about timely publishing are less extensively noted. The SAA document reflects the culture of the SAA in the 1980s and 1990s.

The codes of archaeologists in other parts of the world address most of the issues included in the AIA and SAA codes, reflecting the commonality of archaeological culture, but each code has different emphases and some items that are specific to the time, place, and organization. The Swedish Archaeological Society, for example, for its Principles for Good Archaeological Practice, adapted the Code of Practice of the European Association of Archaeologists, making adjustments to reflect

specific situations encountered by, and the concerns of, Swedish archaeologists (Broadbent 2004: 88).

Other professions concerned with aspects of heritage have broadly similar histories and variations in their codes of ethics and practice depending on the nationality and particular focus, or culture, of the organization. Archaeological conservators, for example, once looked rather narrowly at *the object* and were primarily concerned with the reversibility of treatments, with concerns about conservation as opposed to restoration, and with maintaining full and accurate records of treatment (Tubb 1995: 256). As public discussion about the destructive nature of the antiquities market became more frequent in the 1980s and 1990s, more and more conservators recognized the role their profession unintentionally played in aggravating those problems (Elia 1995; Tubb 1995; Sease 1998). One result was that the American Institute for Conservation of Historic and Artistic Works (AIC) Code of Ethics and Guidelines for Practice now call on conservators in the USA to, for example, be aware of laws and regulations relevant to their practice, including those concerning excavated objects, human remains, and stolen property. The European Confederation of Conservator-Restorers' Organizations Professional Guidelines (II): Code of Ethics (Article 2) also draws attention to the need to practice in accordance with national and European laws, specifically mentioning those that deal with stolen property.

An official comment that accompanies the AIC statement goes on to say that:

"Conservation professionals should be aware of and adhere to non-governmental charters and other recognized documents that have a bearing on professional activities (e.g. Venice Charter, New Orleans Charter, Secretary of the Interior's Guidelines for the Preservation of Historic Buildings, ICCROM's Site Management Guidelines for World Heritage Sites) and Codes of Ethics of allied professional organizations (e.g. American Association of Museums, American Association for State and Local History, Society of American Archivists, Society for American Archaeology, Association of Art Museum Directors)." (Commentary under item 3, Laws and Regulations, Guidelines for Practice, AIC, www.conservation-us.org7/13/11).

The more frequently the various professions interact on heritage issues, the more each learns about the concerns of the others and the more likely all the professions are to recognize common ground and to address similar issues in their codes. Nevertheless, opportunities for disagreements among (indeed, within) professions about the best way to proceed on any heritage issue remain abundant. Codes of ethics and best practice were never intended to cover every possible situation nor to provide easy or absolute answers on how to proceed in every situation. Ethical conflicts rarely involve clear rights and wrongs. Explicit codes of professional ethics provide useful guidelines, ways to think ethically about problems, but all require careful interpretation in each particular circumstance. Everyone involved needs to understand that others' arguments are not evil or wrong-headed, but stem from the cultural differences among the various professions and nonprofessional stakeholders. Everyone needs to listen to each other carefully and consider the arguments in the context of the source culture. Each professional may find it helpful to consult with her or his professional organization's committee or group in charge of the ethical code and standards. Individuals on these committees have a great deal of experience in ethical disputes and may well have been through or know of situations similar to the current one and be able to offer advice and suggestions for resolving the disputes. Those committees also need to know where the codes are creating or not helping to resolve problems. Each specific situation has the potential to be the catalyst for changing a professional culture and for revising its code.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage Management and Native Americans
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Valuation: Paradigm Shifts

▶ Heritage: History and Context
▶ Looting and Vandalism (Cultural Heritage Management)
▶ Society for American Archaeology (SAA)
▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)
▶ World Archaeological Congress (WAC) and Cultural Heritage Management

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Heritage Landscapes

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Introduction

Heritage landscapes, also referred to as cultural landscapes, represent some of the most well-known landmarks on earth, and some of the most contentious. Their complexity, scale, and significance often mean that these landscapes are valued for different reasons and used for conflicting purposes, creating challenges for those who seek to manage and preserve the landscapes. An increasing awareness of the importance and complexity of heritage landscapes has brought them to the fore of debates within the heritage community over issues of control, access, purpose, and preservation.

Definition

The term "heritage landscape" brings together two concepts, each of which is a cultural construction. As W. J. T. Mitchell (2002: 1) has suggested, "landscape" is a verb rather than a noun, and heritage, as Lowenthal (1998) and others have argued, is a product of the shared values and beliefs that connote a sense of belonging. The definition of heritage landscapes is, therefore, dependent on their political, economic, and social contexts. They include publically recognized sites such as those designated by UNESCO as World Heritage Sites and those listed on the U.S. National Register of Historic Places, but they also include landscapes valued by descendant communities or other groups without official sanction.

Key to most definitions is the recognition that heritage landscapes contain both natural and cultural resources, and the complexity of documenting, managing, protecting, and

interpreting the landscapes often stems from the interplay of the two. The *UNESCO 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage* linked notions of cultural and natural heritage, and its operational guidelines divide cultural landscapes into three main categories depending on the "manifestations of the interaction between humankind and its natural environment" (UNESCO 2008: 86).

Heritage landscapes include all manner of forms, scales, and time periods. An inventory of heritage landscapes in Massachusetts, for example, identified forms as varied as scenic roads, formal gardens, cemeteries, shipyards, and cranberry bogs (Massachusetts Department of Conservation and Recreation 2008). Various criteria for assessing and classifying heritage sites have been developed since the 1964 Venice Charter. As of 2006, there were at least 40 documents at the international and national level establishing definitions and policies for the documentation and conservation of heritage sites and little consensus in definitions of heritage among nation states (Ahmad 2006: 299).

Historical Background

While cultural landscapes are clearly as old as humanity, their study has been framed over time by different disciplinary approaches. For example, art and architectural historians look to the genre of landscape painting as the genesis of the concept of landscape. While the study of geography dates to classical times, geographers point to the work of Otto Schluter and Carl O. Sauer for the development of cultural geography with its increasing attention to the variety of vernacular traditions (Jackson 1984) and the diversity of expressions along societal divisions such as race, class, and ethnicity (Noble 1992; Hayden 1995).

In archaeology, interest in environmental factors creating conditions for social complexity, domestication, urbanization led to a focus on landscape. For example, Karl Wittfogel (1956) identified water control in the landscape as a central factor in the development of complex societies. The systematic investigation of the relationship of sites to each other and the patterning of sites in space was brought into the forefront with Gordon Willey's (1953) survey of the Viru Valley. Statistical models of site prediction and sampling strategies for regional surveys became essential methodologies for the study of archaeological landscapes, and increasing sophistication of environmental modeling, particularly the advent of GIS with its integration of data layers, improvements in remote sensing, and the development of three-dimensional computer-generated reconstructions of space, has advanced the study of past heritage landscapes. It has become possible, for example, to reconstruct processual experiences with "fly throughs" of ancient villages and to trace the succession of environmental changes as ancient harbors silted in and became farmland. The use of technology has even helped to bring astronomical and terrestrial landscapes together with reconstructions of lunar and solar alignments in landscapes such as Stonehenge, Cahokia, and Chaco Canyon.

This emerging field of landscape studies has been accompanied by the development of policy and legislation for the management of these cultural resources. In the USA, federal legislation dates to 1906 with the passage of the Antiquities Act that included the designation and protection of national monuments on federal land. The 1966 National Historic Preservation Act established the National Register of Historic Places. With it has come a growing public awareness of the significance of heritage landscapes, particularly in the face of threats for expanding development and climate change, and an increasingly complex apparatus for their management and protection (Birnbaum 1996).

Key Issues

Current debates in heritage landscapes often stem from their contested use and values. Sites such as Devils Tower National Monument in the Black Hills of Wyoming and Uluru (Ayres Rock) in Australia have pitted the interests of rock climbers against indigenous peoples for whom

the sites are sacred. These tensions challenge the authority vested in civic entities with the rights of descendant communities and test principles such as the separation of church and state. Other contested heritage involves privileged narratives at the sites and the political implications of highlighting certain time periods or peoples while others are marginalized, as at the California missions (Kryder-Reid 2010) and Luang Prabang (Dearborn & Stallmeyer 2010). It is not just the management of specific sites that has come under scrutiny, but the heritage profession itself. Laurajane Smith and Emma Waterton (2009) have critiqued what they call the Authorized Heritage Discourse (AHD), and they challenge heritage professionals in all fields to reflect on how their own interests perpetuate the paradigms and methodologies of a heritage industry over community concerns.

Recognizing the multivalence of heritage sites and acknowledging the role of heritage sites in the politics of identity have implications for practice. The range of values of heritage landscapes is being incorporated into official designations of significance, such as the inclusion of "traditional cultural properties" on the U.S. National Register (King 2003). Similarly, a more inclusive perspective on landscape values is changing methodologies that some archaeologists are deploying to understand the meaning and significance of cultural resources, such as consultation with tribal elders as part of investigations of the ancestral homelands of the Zuni and Hopi in the San Pedro Valley of Arizona (Colwell-Chanthaphonh & Ferguson 2006).

Another response to the concerns about a lack of inclusive decision making about heritage landscapes is the increasing use of collaboration and consultation in site management. For example, Hadrian's Wall in northern England exemplifies the potential for collaborative management plans to negotiate the interests of diverse stakeholders. Begun in 122 CE as a military fortification along the Roman frontier, today it is a World Heritage Site running 118 km through multiple legal and civil jurisdictions and incorporating public lands and more than 700 private property owners. The contemporary land use is complicated and includes urban neighborhoods, farms and pasturage, towns and villages, tourist destinations (museums, forts, etc.), hiking trails, and archaeological research sites. This complex site is managed by a collaboration of numerous national departments and agencies, as well as a multitude of local county and district councils, which have developed a 5-year rolling management plan that accommodates the wide-ranging interests of those who manage, use, and enjoy the site (de la Torre 2005; Norman 2007).

As the definitions and criteria of heritage landscapes expand, another source of debate is the intersection of landscapes and social issues. For example, site managers and educators are challenged by landscapes where the heritage is one of disaster, tragedy, or injustice. Opening sites such as the Pennsylvania farmland where Flight 93 crashed on September 11, 2001 for public visitors raises complicated issues of memorialization and commemoration, and at the same time it can be a catalyst for important public dialogue. Heritage landscapes can also be sources for understanding issues of landscape and power in the context of political acts (Bender & Winer 2001; Shackel 2001). Members of the International Coalition of Sites of Conscience or marginalized people such as the homeless (Zimmerman et al. 2010) are challenging heritage site administrators to be advocates for social justice through the conservation and interpretation of sites such as the District Six Museum in South Africa, with its focus on reconciliation and landscapes of postcolonial memorialization, and Russia's Gulag Museum at Perm-36 dedicated to raising public awareness of the history and consequences of totalitarianism (Ševčenko 2011).

Future Directions

The future directions of heritage landscapes seem overshadowed by the threats from increasing development, particularly economic pressures that drive decisions for immediate profit over longer term stewardship. Climate change also raises the specter of inundation for heritage landscapes in low lying coastal and island communities, as well as other threats from increasing

drought, erosion and flooding caused by changing precipitation patterns. In other areas, political instability and extremist regimes pose threats to heritage landscapes and monuments, such as the Taliban's destruction of the Bamiyan Buddha statues in 2001. For prominent tourist destinations, the price of popularity may be damage that diminishes the integrity of the site.

In times of threat of conflict and contracting resources it is tempting to assume a defensive posture about the future, but many are moving forward with innovative ideas nonetheless. For example, technological innovations have the potential to increase our capacity to understand and reconstruct past landscapes. The same sophisticated visualization and analytical tools offer the possibility of sharing the stories of past landscapes in innovative and engaging ways with ever-broadening audiences. Social media and the ubiquity of personal digital devices have created capacities for citizen-curated interpretations of cultural resources in ways that are transforming traditional cultural authority relationships. The *2004 Natchitoches Declaration on Heritage Landscapes* called for the "understanding and continuation of traditional practices in the stewardship of heritage landscapes," and countries such as Australia and New Zealand have incorporated indigenous values into their heritage landscape planning process. The Declaration also urged increasing cooperation across national boundaries, not only on advocacy and protection issues, but also in research and educational initiatives such as thematic studies of landscape types including agriculture land, water migration routes, pilgrim trails, etc. Countries continue to use heritage to support their unique national interests, but those impulses are countered by a growing recognition of a human heritage that knows no geopolitical borders (Von Droste et al. 1995).

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Heritage Legislation, The Introduction of: Disciplining Through Law

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Introduction

Legislation protecting cultural heritage emerged first in classical antiquity in the Mediterranean Basin, as royal edicts by Alexander the Great and later by Rome were proclaimed to protect archaeological remains deemed to represent the heritage of the state. This was driven by the recognition in the Mediterranean Basin that physical materials from the past represented a record of cultural heritage for subsequent generations. Similar proclamations and expectations developed later in the eighth-century Islamic caliphates of the Middle East and in imperial China in the eleventh century, then at the national level in Sweden in 1666 and Russia in 1704. All of this set a cultural precedent, such that the emergence in Europe of Humanistic Antiquarianism, along with Enlightenment values, drove interest in the archaeological past, precipitating sequentially ethnological and archaeological societies, and then acceptance in the 1820s of national heritage legislation meant to protect the cultural patrimony of Greece and the newly independent states of Latin America. By the end of the nineteenth century, heritage legislation of some form was common across Europe and the Mediterranean Basin, but was just starting to emerge within the Western

Hemisphere. This legislation was often aimed at access to and movement of archaeological materials and frequently was restricted to properties held at the national level. Laws giving the state the right of first refusal on cultural properties, regardless if owned privately or publically, developed early in Greece and Mexico, followed by the Ottoman Empire in the last quarter of the nineteenth century (and later becoming rather common for many Latin American nations).

National heritage legislation across South and East Asia, Oceania, and sub-Saharan Africa was introduced through some affiliation with European colonial powers such as the British Commonwealth/Commonwealth of Nations, in imitation of laws of such states, or in response to regional or international agreements, such as those promulgated by UNESCO. In China and Japan, for example, such laws started emerging in the late nineteenth century, in former British colonies, usually close to the time of independence from Great Britain, particularly in sub-Saharan Africa.

International (as distinct from imperial or intrastate) heritage legislation first appeared with the treaties between France – under Charlemagne in the eighth century and Francis I in the sixteenth – and Islamic caliphates for protection of religious heritage sites in the Levant. Various bi- and trilateral agreements developed between the Ottoman Empire, and Britain and France in the nineteenth century, also protecting heritage properties across the greater Middle East.

In 1899, the first *Hague Convention*, a multinational instrument protecting heritage properties in times of war, was passed. It was amended in 1907 and again in 1935 as part of the Washington Pact. However, it was not until after World War II and the establishment of the United Nations that international agreements – in the form of conventions, recommendations, and declarations – were promulgated globally for the protection of cultural properties. Under the aegis of UNESCO (United Nations Educational, Scientific, and Cultural Organization), these instruments set out definitions of cultural properties along with expectations for their protection – both from damage either from domestic activities or from war, and from looting and illicit trafficking. The UNESCO instruments, though, found acceptance for two reasons. The first reason was because issues of heritage legislation had been considered earlier across Europe, the Mediterranean Basin, and the Western Hemisphere – thus except for China – essentially the founding nations of the United Nations. The second reason was because many of the eventual signatories to the UNESCO instruments either were or had been possessions/cultural descendants of those founding nations.

Definition

"Heritage" here refers to "cultural heritage" in a material remains, archaeological sense, which in turn is used interchangeably – despite the definitions given below – with "cultural property" as used by UNESCO in six recommendations, five conventions, and a declaration all promulgated from 1954 to 2005. UNESCO (1972: I.1.) defined "cultural heritage" as:

> . . .monuments: architectural works, works of monumental sculpture and painting, including cave dwellings and inscriptions, and elements, groups of elements or structures of special value from the point of view of archaeology, history, art or science;
>
> groups of buildings: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of special value from the point of view of history, art or science;
>
> sites: topographical areas, the combined works of man and of nature, which are of special value by reason of their beauty or their interest from the archaeological, historical, ethnological or anthropological points of view.

UNESCO (1970: Article 1) stated that "the term 'cultural property' means property which, on religious or secular grounds, is specifically designated by each State as being of importance for archaeology, prehistory, history, literature, art or science," going on to specify that this includes both non-portable items like architectural features, archaeological sites, and the settings of such, and portable items ranging from artifacts to portions of those architectural features and

archaeological sites. The term "cultural resources" commonly is substituted for "cultural property" amongst professionals in some nation-states, the USA and South Africa being examples, but is not a term found in those nations' regulatory definitions.

"Heritage legislation" refers to legislation meant to govern recovery, use, protection, and possession of elements of the physical or conceptual world produced by a particular human culture. There are basically four levels of legislated governance within nation-states: (1) "legislation," which here is coincident with "laws" and "acts" (seen to include statutes passed through some kind of parliamentary/legislative body; "common law" developed through a judicial system such as in classical Rome, Great Britain, and their scions; constitutional provisions and articles; and "royal proclamation," "royal edict," "imperial fiat," or equivalent); (2) "ordinances," which are enacted by a governmental entity and provide the authority as well as intent; (3) "regulation," which specifies how that legislation is to be accomplished in the everyday world; and (4) "guidance," which aims to clarify specific applications of those regulations by the particular regulatory branch of government. Establishment of governmental agencies, offices, or ministries, along with designated administrative/enforcement responsibilities that may not be clearly set out in statutory law, also can be included under a general rubric of heritage legislation in that such entities are implementing or exercising some sort of governmental authority. This has been very common across Middle and South America.

"Treaties" might also be viewed as a form of legislated governance. In essence, these are international agreements – approved by the participants – that can ask, cajole, or require a signatory to abide by a series of rules both within the nation-state and in its interactions with other nation-states. For example, the UNESCO conventions, recommendations, and declarations can be placed here, as can the various Hague Conventions and League of Nations mandates along with the CE 1535 treaty of Francis I of France with the Ottomans for protection of religious heritage sites in the Levant.

Finally, it should be noted that heritage legislation in the sense considered here – material cultural property associated with archaeology – overlaps with the kind of heritage legislation covered by copyright law and similar laws protecting intellectual property, traditional knowledge, and traditional cultural expression. This touches on the separation of tangible and intangible heritage, which is beyond the scope of this entry. The draft Model Law for the Pacific Community is an example of where that form of heritage legislation treating intellectual property and other intangible heritage issues conceptually adjoins the kind of heritage legislation under consideration in this entry.

Historical Background

Heritage legislation is a product of the Western Intellectual Tradition, but found traction worldwide because many nation-states early on held that the materials of the past were of value to their own nation-state identity in some way and as such should be protected, both within national borders and from removal from the country. Globally, heritage legislation grew from efforts confined to limited territorial governance – fiefdoms, preindustrial countries, and empires – to both nation-state mandates and international agreements, and currently exists at both levels. While emergence varied in particulars across the world, in all cases it grew first from a concern to protect a culture's/nation's ownership over materials associated with its past and, in all cases, depended upon recognition that there was a "past" represented by material remains from which the "present" had emerged.

Ignoring common cultural proscriptions on the disturbance of burials and the somewhat less common but not unusual proscriptions on the disturbance of former living sites, both of which are social sanctions against disturbance of cultural property and archaeological sites, formal governmental or religious decrees effectively protecting cultural heritage existed in many preindustrial states. And since all preindustrial states have or had a state

religion, secular or religious origin of prohibitions and regulations come out to the same thing.

Antiquity

Heritage legislation in the form of preindustrial state policies, edicts, and similar governmental actions are known in premodern times for two regions: The general Mediterranean Basin area and China. The actions that emerged in the Mediterranean Basin form the basis of modern heritage legislation and as such will be considered here. Those of China provided a cultural predilection for emplacing the sort of heritage legislation that would be promulgated globally from the European-Mediterranean Basin; the antiquity of their heritage legislation will be considered when "Asia" is discussed below.

Recognition of a past that is accessible through some sort of excavation is one requirement for archaeological heritage legislation to make any sense. However, recognition by one culture of the evidence for a past does not mean that another culture will interpret that evidence in the same way: Classical Greece and Rome long excavated, recovered, reassembled, displayed, and interpreted past remains, both what would now be identified as human and paleontological. However, those remains were interpreted in keeping with the given culture's cosmology, such that mammoth and mastodon bones became the bones of giants or the war elephants of Alexander the Great and *Protoceratops* skulls, those of griffins (Mayer 2000: 48-49, 55). People in Mediterranean Basin antiquity were aware that people lived in the past and that physical remains of them were present; thus, the finding of things was used to make known things better understood and interpreted in terms of their understanding of the past (Mayer 2000: 157-163).

Herodotus in his *Histories* in the fifth century BCE talked of Cimmerian remains left behind in lands since occupied by Scythians, as well as of the fortifications left by Darius in his futile pursuit of those Scythians. He spoke, too, of remains left by Ionians and Carians testifying to their early presence in Egypt. He identified ruins with events from the Trojan War, effectively recognizing that actions in the past left material remains from a world that was politically much different than his own time.

Arrian recounted in the *Anabasis Alexandrou* Alexander's (356–323 BCE) defense of Macedonian and Persian antiquities as matters of state policy, since those items – tombs, especially that of Cyrus the Great in 324 BCE, and temples from centuries past – provided justification of Alexander's political and territorial attainments. This is an early example of heritage legislation through imperial fiat: The penalty was that the perpetrators were sent to discuss their desecration face-to-face with the long-deceased Cyrus.

By the first century BCE, the wealth and power of imperial Rome was such that archaeology, along with jurisprudence, history, religion, and philosophy, became a favorite area of study by educated – upper class – Romans (Rostovtzeff 1960: 160). The Roman Empire limited what would now be called archaeological research. Under Augustus, there was a campaign to restore ancient shrines as part of an overall effort to reaffirm the character of ancient, pre-imperial Rome (Rostovtzeff 1960: 188-189): "the relics of Rome under the ancient kings. . .were carefully preserved."

The mother of Constantine, Empress Helena, undertook in CE 326 what amounted to a sustained and coordinated archaeological exploration of what is now Israel, driven by a desire to locate and then protect Christian religious heritage sites. This exercise, along with Christianity becoming the state religion of the Eastern Roman Empire, resulted in a period of pilgrimage that continued well into the time of Islamic control of the region, prompting Caliph Harun al-Rashid in the eighth century to conclude a treaty with Charlemagne for Christian protection of those religiously significant sites (Silberman1982: 7). For all practical purposes, that treaty ended first with the onset of the Crusades (the Crusades out of Europe in the twelfth century were exercises driven by a desire to defend or secure cultural property – and thus protection of cultural-religious heritage), then later with the collapse of the last Crusader Kingdom in CE 1291. Protection of

what would be deemed explicitly archaeological sites – in this case again, Christian religious sites – was reestablished in CE 1535 by Francis I of France in a treaty with the now-governing Ottomans.

It was during the Abbasid Caliphate (CE 750–1519) that Baghdad was founded (CE 762) and later became a center of learning, drawing to it the scholarly community that had flourished for centuries at nearby Gondeshapur in what was then southwest Persia. That community, combined with the nighttime dream had by Caliph al-Ma'mun in which Aristotle appeared, precipitated an expansive era of scholarly research, including sustained, state-sanctioned efforts to identify and then bring to Baghdad earlier writings in Greek, which were then translated into Arabic. This was state-sponsored acquisition of cultural properties – early books and documents – because of their heritage value, a form of acquisitive proactive heritage legislation by state policy. However, by the late eleventh century, there was a reaction against al-Ma'mun's legacy and "foreign sciences" across the Abbasid Caliphate, which resulted – when the Ottomans inherited power in the sixteenth century – in a continuation of a lack of recognition of the importance of material cultural heritage which enabled the expansion of archaeological work (and removal of antiquities) from the Levant into the late nineteenth century.

Something similar transpired in what is now Spain, to where the Umayyads, deposed by the Abbasids, moved in CE 756. Cordova, Toledo, and Granada became, like Baghdad, cosmopolitan centers of learning. As with Baghdad, efforts were made to translate earlier works in Greek and Latin, identifying a link between a classical past that would be recognized. Indeed, it was the Islamic civilizations of the eighth through fifteenth centuries that preserved much of the earlier Mediterranean Basin intellectual and cultural heritage. And they did so intentionally by obtaining and then moving earlier works – the Elgin Marbles of their day – in those classical languages to a new place.

Societal Basis for Introduction of Heritage Legislation

Heritage legislation, particularly as it bears upon archaeology, is legislation normally forwarded, promoted, and then enacted by the upper social strata of state-level societies, but which preserves information about – potentially – everyone's past stored in the physical remains found archaeologically, architecturally, or otherwise materially. Two things are required: Recognition that there is a physical past, in the form of archaeological materials, present to be protected, and recognition that those archaeological remains are worth protecting.

Archaeological remains exist in a "destroyed-as-read" medium, which is how initial computer memories were configured (Silberman 1982: 178; The *La Valetta Convention* 1992 Article 1.1; Neumann & Sanford 2010: 12). This is why regulations exist for the protection of those long-term physical records of the past: Extracting information about the past from a destroyed-as-read matrix requires personnel trained in meticulous recordation skills, along with research protocols aimed at doing that recordation. All current heritage legislation has that embedded as understood and in this respect is subsumed under what is known in the USA (United States of America) as "public trust doctrine." "Public trust doctrine" holds that public lands, along with their contents, be they wildlife or cultural resources, are held in trust for the citizenry writ large (Bruskotter et al. 2011). Although not explicitly stated, much of the heritage legislation currently in existence along with the UNESCO conventions assumes that this is understood.

The societal process leading to modern heritage legislation has been similar worldwide: It begins with recognition of cultural heritage in archaeological materials and sites; shifts to a realization that those materials and sites are in some way imperiled, be it from looting, privateering, or inadvertent destruction; then becomes a *cause célèbre* for the upper social classes, in the form of the ruling social class (e.g., Roman Emperor, Chinese Emperor, Ottoman Emperor), an upper social class social group (e.g., Mount Vernon Ladies' Association of the

Union in the USA), or scientific societies underwritten by the upper social classes (e.g., Royal Society of Canada; nineteenth-century excavations in Jerusalem). In the Western Hemisphere as well as Europe, the scientific societies that emerged in the mid-eighteenth century as an outgrowth of Humanistic Antiquarianism, normally dominated by the upper social classes with access to those who legislate (who often were themselves members of the given scientific society and even now, as with the Smithsonian Institution in the USA, are *ex officio* members), eventually succeeded in having legislation either enacted (e.g., USA, Canada, Great Britain) or set forth for a larger community of nations (e.g., Council of Europe or the United Nations). From here it is embraced by the given state of concern as a starting point for its own heritage legislation. The British Empire was particularly instrumental in distributing heritage legislation, or the desire to have such, throughout the world. States adjacent to those Empire – later Commonwealth – states often adopted or were inclined, when the various UNESCO protocols emerged, to adopt similar laws. The British Empire served as a geographic-conceptual conduit for heritage legislation.

Introduction by Region of Modern National Heritage Legislation

Heritage legislation as a global initiative on a global scale, started as a response to European actions within the Mediterranean Basin, was refined in the European/Mediterranean part of the world, to be later taken up by the cultural descendants of those nation-states. Thus, the first legislative exercises were spread amongst lands as disparate as Spanish America and the Ottoman Empire, and were then coalesced amongst those when they became the newly independent nation-states of Latin America and the Mediterranean Basin. Those exercises were further consolidated within the British Empire and subsequent Commonwealth of Nations, then through global organizations that were developed from that overall European/Mediterranean Basin/Western Hemisphere impetus. This global-level consolidation began first with the League of Nations, which facilitated wider acceptance of the Hague Conventions, and continues with the United Nations and the UNESCO conventions and resolutions that drive global heritage legislation today.

Europe and the Near East/Mediterranean Basin

Heritage legislation has at least a 2,400-year history in Europe and the Mediterranean Basin, dating first from Alexander the Great's protection of state-significant heritage sites, then from the first-century BCE imperial Roman requirement that, during construction within Rome, relics and architecture associated with the founding and early days of the City were to be preserved.

Although Phillip II declared in 1573 that all indigenous heritage materials in Spanish America were the property of the Crown, thus reflecting the view that the state had jurisdiction of cultural property when it so chose, that restriction did not apply to Spain proper. It did, though, reflect an emerging regional view of a national material patrimony contained within cultural property. Sweden's Royal Proclamation of 1666 (also known as the Ordinance of 1666), protecting graves, monuments (including stones with runic inscriptions), sites, and antiquities in general (particularly those related to ancestral "greatness," especially those related to the royal household) from "interference," was the earliest legislative statement protecting cultural heritage. Under Peter the Great, the first Russian antiquities law was set forth in 1704. Similarly, Portugal in 1727 established the Royal Academy of History to protect architectural elements, although this was not really acted on. Napoleon, during the occupation of what would become Italy, in 1798 undertook systematic restoration and heritage protection of elements identified during archaeological excavations.

Through the late eighteenth and early nineteenth centuries, heritage legislation in Europe and the Mediterranean Basin was forwarded by royal or imperial directive, if perhaps for no other reason than it represented the structure of most national governments. The intellectual climate of Europe at the time included the founding of national scientific and ethnologic societies (e.g., Royal Society [England] 1662; ethnographic

societies were established in Paris in 1839, London in 1841, and New York in 1842; ethnology as a field dates from around 1828; ethnography, 1834; and archaeology qua archaeology, 1837, with the Imperial Russian Archaeological Society established in 1846), all of which were products, first, of Humanistic Antiquarianism (which recognized that there was a "past" from which the "present" emerged), then of the Enlightenment along with expansion of European powers to overseas possessions.

The sudden emergence of heritage legislation during this time is not surprising. For example, Russia's Alexander I prepared a register to protect archaeological (especially Greek) sites on the Black Sea in 1805, a list expanded for all of Russia by Nicholas I in 1829. Sweden revised the 1666 Ordinance in 1828 and appointed the first National Antiquary. During the Greek War of Independence (1821–1829), establishing modern Greece, the Minister of Internal Affairs issued decrees ordering collection and then safekeeping of antiquities on school premises (1825) and the protection of the Athenian monuments (1826). In 1828, Article 18 of the Greek Constitution of the Third National Assembly in Troezen directed the Head of State to make sure Greek antiquities were not sold or otherwise removed from Greece. In 1834, Greece issued the first archaeological laws, developed by G.L. von Maurer, declaring in part that "all the antiquities in Greece, being works of the ancestors of the Greek people, are considered as national property of all the Greeks in general." The law regulated, amongst other things, reporting of discoveries, ownership of antiquities, and excavation procedures. In many ways, the Greek law from 1834 became the inspiration for national-patrimony-oriented legislation across the Western world (e.g., Mexico's 1934 *Law for the Protection and Conservation of Archaeological and Historical Monuments, Typical Towns, and Natural Beauty Sites)*.

Similarly for the period, the Spanish Academia San Fernando, in response to the establishment of the publication *El Artista*, began in 1836 protecting convents and monasteries. This led to a series of government orders and rulings for protection, such as the 1844 government commission to establish inventories and evaluate national heritage. France established the Commission Nationale des Monuments Historiques in 1837 in response to the damage done during the Revolution and Napoleonic era; the Commission would eventually become the Ministry of Culture.

In 1830, efforts by American merchants to develop an exclusive trade route into the Ottoman Empire resulted in the American-Ottoman Friendship Treaty. This enabled US Navy Lt. William Lynch to obtain a permit (*firman*) to pursue what we would now call an archaeological exploration through what is now Israel and Jordan. Indeed, it can be argued that, beginning around this time, it was competition amongst European powers for access to antiquities in the eastern Mediterranean that precipitated the second wave of heritage legislation, shifting it from a concern with internal protection of national heritage to that of protection of a shared cultural heritage – the religious and classical civilization basis of European civilization – along with concerns about the removal of that heritage from the nation/territory in which it originated.

The mid-nineteenth century until the early twentieth century saw the beginnings of regional heritage legislation in the form of various internal laws, along with treaties and international mandates. It was also a politically unsettled time, seeing, for example, the unified Kingdom of Italy proclaimed in 1861. The 1858 Treaty of Paris shifted protection of "the integrity" of the Ottoman Empire to Britain and France, which here included retaining exclusive access to the archaeological/cultural resources of the region (Silberman [1982: 68] argued convincingly that the Crimean War grew sequentially from conflict between Russia and France over control of cultural materials in Palestine). Even allowing that, the first formal legislation to regulate cultural property in Turkey was put forth by the Ottomans in 1869 (Roosevelt & Luke 2006: 181). After the mid-1500s, the Ottoman Empire was seriously dysfunctional; Egypt, for example, had long been conceded to be under its own control, which Egypt had succeeded in doing by simply ignoring Constantinople. This was a period of

considerable political instability. In the 1800s, for instance, Egypt, while like Tripoli [somewhat coterminous with the current nation of Libya] at the time nominally under the control of the Ottoman Empire, in reality was governed by several European powers, principally Great Britain.

However, even allowing for British and French jurisdiction over archaeological research, the Ottomans nevertheless retained control over the distribution of the recovered cultural properties, at least on paper. In 1874, the Empire promulgated the *Ottoman Antiquities Law* for regulation and protection of antiquities trafficking by foreigners. This was the antecedent to the *Ottoman Law of 1884*, which "established national patrimony (ownership) over all artefacts in the Ottoman Empire" (Kersel 2006: 24), declaring further that Turkey was the sole owner of its own cultural heritage. That 1884 law also regulated archaeological investigations: Although very late to realize the financial value of controlling its cultural heritage, in 1888 the Ottomans detached Jerusalem administratively from the Pashalic of Sidon and transferred control directly to the Sublime Porte to better control – and tax – excavations and recovered artifacts from the plethora of religious-archaeological expeditions (Silberman 1982: 154-155).

It was also during this period that in 1899 Greece replaced its *Law of 1834* with *Law BXMS – 2646*, establishing that all Greek antiquities, without exception, were the property of the state as well as the State's right to acquire all antiquities after paying compensation. This held regardless of where on the planet those antiquities were. The 1899 law was modified in 1914, 1921, and 1932, redefining what antiquities were under what kinds of state jurisdiction. Understanding the controversy over repatriation of the Elgin Marbles to Greece – which is not necessarily seen to be a repatriative act by everyone – requires awareness of this legislation.

Similar actions were happening elsewhere in Europe. Britain, for instance, after considerable effort by Sir John Lubbock, enacted its *Ancient Monuments Protection Act* in 1882 (because of the extent and influence of the British Empire, arguably one of the most important heritage acts in history). Italy passed its *Monument Act* in 1902, providing an impetus for the restructuring of its heritage management. This seems to have grown out of private societies, such as the Society for the Defense of Old Florence (founded in 1898), established by people from Great Britain enamored with Italian cultural heritage. During this time, France passed the *Act of 1913*, which focused mainly on architecture and preservation of the setting of that architecture.

After the upheaval and political realignments from World War I, heritage legislation began expanding from the protection of national heritage to the protection of the cultural heritage in territories under the jurisdiction of external European powers. Again, the idea for protecting the cultural heritage of countries other than one's own had been in the air certainly since the *Hague Convention of 1899*, which set out general rules of war. Under the Hague II Annex to that Convention, four articles (46, 47, 55, and 56) addressed the protection of private property and property deemed part of education, arts, and sciences. Those articles were clarified in the *Hague Convention of 1907*, where under the Hague IV Annex to that Convention Articles 46, 47, 55, and 56 singled out the protection of cultural properties. Consonant with this broader, international view was the establishment of the League of Nations in 1920.

At the end of World War I, the Ottoman Empire was subdivided amongst the Allied powers, and with it came a distribution over the control of antiquities. This redistribution brought to a conclusion the ongoing competition amongst European powers for access to the cultural heritage of the western Mediterranean since the late 1700s (see Silberman 1982), but in doing so presaged the kind of international heritage legislation/conventions that would emerge under the United Nations after World War II. The first step was the Antiquities Proclamation (British Mandate in Israel and Palestine) in 1918, which noted the region's cultural heritage and shifted it from a religious focus to a legal, secular status (since Helena in the fourth century, heritage regulations and attendant issues surrounding cultural property had been almost entirely religious in nature).

This was soon followed by the Antiquities Ordinance in 1920, the primary goal of which was protecting archaeological materials by "vesting the ownership of moveable and immoveable cultural heritage in the Civil Government of Palestine" (Kersel 2006: 26). The League of Nations Mandate for Palestine in 1923 explicitly outlined guidelines for excavation and preservation of archaeological remains while ensuring access to excavations and archaeological research for any member of the League, as well as giving authority to punish looters and unauthorized archaeological excavators. Out of this, in 1929, came Antiquities Ordinance No. 51, which "now forms the basis for all current domestic legislation concerning protection of cultural property in Israel and Palestine" (Kersel 2006: 26).

It was also during the interwar years that many nations updated or otherwise revamped their heritage legislation: For example, Greece in 1921 and again in 1932, Italy in 1922 and again in 1931, and Spain in 1933.

After World War II – and with the devastation visited by the Nazis particularly on the architectural heritage of Europe – there were three emerging themes. For nation-states with a history of heritage legislation, the legislation was updated and the associated regulations refined not just to protect cultural property but also to record that property in such a way that its physical destruction would not result in the complete loss of the heritage – the behavioral data content. This rendered the reactive nature of the earlier *Hague Conventions of 1899* and *1907* proactive for the protection of cultural property.

The second theme that emerged was an effort to establish international rules protecting cultural heritage, rules that ranged from prohibitions on international trade and the looting it spawns, through agreements on the protection of cultural heritage during times of war, to active recommendations on national cultural heritage protection. Such rules were an extension of national patrimony laws to the world, in effect recognizing that cultural property embodies the record of all human heritage, not just the heritage of a particular nation as that nation's boundaries are currently drawn. The Roerich Pact (see below), for example, drafted by a Russian artist and a Parisian professor in 1930, and intended to declare all cultural properties neutral zones in times of war, was a product of the time.

The third theme after World War II were developments in nation-states lacking a history of heritage legislation. For members of the British Commonwealth, the additional/subsequent national legislation often was patterned closely on that found in Great Britain. For non-Commonwealth nations, such legislation was based on UNESCO conventions or some combination of that and the legislation enacted in adjacent Commonwealth nation-states.

Not long after World War II, there was a restructuring of the global political landscape. Israel as a state was established in the western Mediterranean Basin, and with it a reemphasis on heritage legislation. In 1948, Israel replaced the 1929 *Antiquities No. 51 Ordinance* with the *Law and Administration Ordinance of Israel* (No. 1 of 5708) protecting cultural properties. Jordan, also part of that British Mandate, in 1966 replaced the same ordinance with *Jordanian Temporary Law No. 51 on Antiquities*, which in turn forms the basis of the draft *Palestinian Cultural Heritage Legislation* of 2003.

Although outside of Europe, thematically consistent with the European lead in much of global heritage legislation, India as part of its independence from Great Britain in 1947 embodied in its Constitution Article 49, which states that "It shall be the obligation of the State to protect every monument or place or object of artistic or historic interest, declared by or under the law made by Parliament to be of national importance, from spoliation, disfigurement, destruction, removal, disposal or export, as the case may be"; while Article 59A makes preservation of India's "composite culture" the duty of every citizen (Pachauri 2006: 236). From this came the 1947 *India Antiquities (Export Control) Act*, which in 1972 was augmented by the *Antiquity and Art Treasures Act*.

North America

North America resolves into two political entities that, for the purposes here, have different

histories for heritage legislation. The first is Canada, which as a member of the British Commonwealth has been strongly influenced by the heritage legacy of Great Britain and, to a lesser extent, France. It also has found inspiration in the heritage legislation of its neighbor to the south. The second entity is the United States of America (USA), where the introduction of heritage legislation followed a pattern similar to that in Europe from the early nineteenth century onwards. Both represent nation-states with two distinct cultural heritages: One left from the pre-European populations and the other from the colonizing European population.

The Dominion of Canada was established by the British Parliament as a confederated union in 1867. One consequence of this establishment is that "legislative control of heritage properties. . .is exerted mainly at the provincial and municipal levels, not at the federal level" (Stubbs & Makaš 2011: 485). In recent times, this has been achieved through a sequence beginning with some sort of commission, ministry founding/assessment, or report at the federal level that recommends legislative action at the provincial level. As became true in the USA, the impetus for Canadian heritage legislation grew from local historical societies and similar organizations, after which it became institutionalized as part of government agency mission. Thus, Manitoba established a historical society in 1870 and the Imperial Order of the Daughters of the Empire was established in 1895 to record the history of European settlement along St. Lawrence River. The Royal Society established a Committee for the Preservation of Scenic and Historic Places in Canada in 1901, and the Historic Landmarks Association was formed in 1907 (renamed the Canadian Historical Society in 1922). In 1922, Quebec passed Canada's first conservation act protecting cultural properties.

In 1951, the Royal Commission on National Development in the Arts, Letters, and Sciences called for legislation enhancing the protection of heritage properties, and doing so in a way similar to that established in Great Britain and France (Great Britain, for example, reworked its 1882 legislation in 1949 with the *National Parks and Access to the Countryside Act*). This resulted at the federal level in the *Historic Sites and Monuments Act* of 1953, which was aimed at federally owned properties. Action followed the 1951 report at the provincial level as well: Quebec rewrote its 1922 legislation in 1952, while New Brunswick passed its *Historic Sites Protection Act* in 1954. Other provinces followed suit until legislation was in place in all by the early 1970s (Stubbs & Makaš 2011: 489, 493).

The introduction of heritage legislation in the USA was different. Unlike in Canada, where the pre-European remains encountered by Europeans starting in the fifteenth century were seen to be the products of the native peoples – referred to as "First Nation Peoples" – in the USA it was long felt that much of the prehistoric remains, and certainly the extensive array of earthworks and mounds across the eastern half of the country, were left from the Ten Lost Tribes of Israel, the Jewish population mentioned in Christian and Jewish scriptures that disappeared with the Babylonian conquest in 587 BCE. There were two inferences from this: (1) The archaeological remains associated with those earthworks and mounds were part of Judaic-Christian heritage and thus the arriving European's cultural patrimony, and (2) the current native population – referred to almost always in current US federal regulations as "American Indians" – were late interlopers who displaced the descendants of the Ten Lost Tribes. Not all agreed with that interpretation, and as a consequence archaeology in the USA emerged in the early 1850s as a field bent on solving – one way or another – the "Mound Builder Question." The Congress of the USA specifically set aside $5,000 per year for the Smithsonian Institution to resolve that question. As long as the possibility remained of the prehistoric Mound Builders having been descendants of the Ten Lost Tribes, the funding stipulation remained intact. When it was demonstrated in 1894 that those earthworks and mounds had been built by ancestors of American Indians, the funding requirement was withdrawn.

As in Europe, the early nineteenth century was a time in the USA of emerging scientific and anthropological societies, with an ethnological

society established in 1842 and the Smithsonian Institution established by the Congress in 1846. In 1853, the Mount Vernon Ladies' Association of the Union, a society made up of the upper social stratum, purchased the property and buildings of George Washington's estate as part of an effort to preserve it. This action is viewed as critical in establishing the heritage preservation movement in the USA (Hosmer 1981: 184-185, 525-527; Neumann & Sanford 2010: 7; Stubbs & Makaš 2011: 430-431).

The Mount Vernon Ladies' Association established upper class societal approval and reflected emerging values that would lead to common law legislation for protection of heritage properties. In 1876, the courts ruled to protect from demolition Independence Hall, the structure in Philadelphia, USA, where the American Declaration of Independence had been signed. In 1896, the US Supreme Court ruled constitutional the use of federal funds to purchase private property to protect public interest, in this case part of the Gettysburg Battlefield in south-central Pennsylvania.

Reflecting the emerging feeling that there was heritage of sorts worth protecting, the US Congress passed legislation in the 1880s protecting some Revolutionary War (War of Independence from Great Britain) battlefields. In 1889, specific legislation was enacted aimed at protecting Casa Grande, a prehistoric classic Hohokam ruin in southern Arizona.

It was not until 1906 that the comprehensive *Antiquities Act* was passed, which provided for the protection of historic or prehistoric remains, "or any object of antiquity," on federal lands. Further, it established regulations and sanctions regarding disturbance or damage of those remains. The next major package of legislation was the *Historic Sites Act* of 1935. This, in essence, was the first attempt to join together, under one statute, a federal policy that would encompass the decisions regarding historic structures, battlefields, and antiquities. It went beyond the *Antiquities Act* of 1906, although it was restricted to historic resources of national importance.

After World War II, there were a few governmental and legislative actions dealing with specific situations of heritage protection: The establishment of the National Science Foundation in 1950 (the first two awards for Anthropology were for archaeological research in the Yucatán Peninsula of Mexico and the Zagros Mountains of Iran, not the USA); the Interagency Archaeological Survey, established in 1946 that would do salvage (rescue) archaeology along the Missouri River; the *Federal Aid Highway Act* of 1956; and the *Reservoir Salvage Act* of 1960. The last two acts prescribed archaeological salvage on a national level as a mitigative effort in the face of the loss of cultural properties from pending construction enabled by the federal government.

All of US heritage legislation was consolidated and focused in 1966 in the *National Historic Preservation Act* (NHPA), the single most important legislative act in the nation's historic preservation history, and one that serves as a model worldwide. NHPA, particularly in its Section 106, in effect requires that, before any federally enabled – meaning federal funding, permit, or property somehow involved in whole or part – land-alteration activity takes place, cultural properties that would be deemed eligible for listing on the nation's National Register of Historic Places must be identified. As that land-alteration activity unfolds, such identified properties can either be salvaged and recorded so that their continued existence is somewhat redundant from a recordation view, or those properties can be avoided through project redesign. This entire procedure is termed the "Section 106 Process." It is important to recognize that the nation's National Register of Historic Places is meant to serve only as a listing/inventory device to facilitate project planning; it does not confer protection on the heritage property. NHPA also became the single most important employer of archaeologists in the USA: Four out of every five archaeologists who work in positions in the USA that can only be held by an archaeologist do so as a result of NHPA (Neumann & Sanford 2010: 1-4, 25-26). Indeed, private-sector archaeology addressing the requirements of NHPA in the USA employs one out of every two anthropologists, working in positions that can only be held by an anthropologist, in the USA.

Six other acts were passed by the US Congress between the passage of the NHPA in 1966 and 1979, of which the *National Environmental Protection Act* (NEPA) of 1969 is the most important. It, too, requires cultural properties to be considered during federally enabled land-alteration projects. NHPA, however, has regulatory precedence.

The NHPA applies only for federally enabled actions; many states have passed counterpart NHPA legislation, as have local governments, to address non-federally enabled situations. However, for completely private ventures involving private property, there is no heritage protection. Unlike in Middle and South America, Europe, the Mediterranean Basin, and China, the USA is not driven by a view of material remains representing a cultural patrimony that needs protection. Indeed, there is a thriving industry amongst the rural poor in locating and subsequently selling prehistoric – and some historic – antiquities. While denounced by professorate, professionals, and Indigenous communities, it is all perfectly legal provided public properties are not involved.

Middle and South America (Latin America)

The introduction of heritage legislation across Spanish America – which, with the exception of Belize, Brazil, and some small European territories, is coterminous with Latin America/Middle and South America – begins with the tension that came from Spanish suppression and manipulation of the cultural heritage of Indigenous peoples. Such legislation blossomed after independence from Spain, as the newly formed governments identified and then sought to reaffirm their precolonial heritage. It should be noted that Latin American heritage legislation itself normally consists of a mixture of statutes and ministerial policies, depending upon the nation-state and the extent to which it contained extensive pre-Columbian populations and monumental architecture. It is also very important to note that those ministries often have, as part of their title, the Spanish or Portuguese cognate for "patrimony." As is the case with Greece, cultural property often is classified linguistically as synonymous with national identity and ownership. And since people think in and classify reality through their language, this is essential to understanding how important such heritage protection is viewed in those nations.

The conquest of Middle and South America began with Cortez's conquest of the Aztec Empire in 1513 and Pizarro's of the vast Inca Empire in 1534. As mentioned earlier, by 1573, Phillip II had declared that all cultural properties under Spain's colonial dominion belonged to the Crown.

How the introduction of heritage legislation plays out amongst the various Spanish territories seems to follow how those territories were organized during the period of the Spanish Imperium, along with the heritage resources those territories contained. For administrative reasons, Spain eventually divided its possessions into four sets: The Viceroyalty of New Spain, which ran from what is now the Southwestern United States through Mexico into Central America (set out in 1528); the Viceroyalty of New Granada (set out in 1739), which included some southern sections of Central America into what is now Panama, Columbia, Venezuela, and Ecuador; the Viceroyalty of Peru (declared in 1542), including mainly Peru; and the Viceroyalty of Rio de la Plata (set out in 1776), which included Bolivia, Paraguay, Uruguay, Chile, and Argentina. While all of these areas were freed from Spain within 15 years of each other in the early 1800s, their subsequent emplacements of heritage legislation varies, in the main because of the differences in the ruling philosophies of the viceroys combined with major differences in their pre-Columbian heritages.

The first major changes in Spanish control came with independence from Spanish rule by Argentina in 1816; Chile and Paraguay in 1818; Mexico and Central America republics (except Panama, which was part of Columbia until 1903, and Belize, which became independent of Great Britain in 1981) in 1821; Peru, in a sequence running from 1821 to 1824; Bolivia in 1825; Uruguay in 1828; and Ecuador, Columbia, and Venezuela, first together as Gran Columbia in 1821 and then each separately by 1830 (Brazil was a Portuguese possession, with independence

coming in 1822). Mexico, Guatemala, El Salvador, Belize, and Honduras in Middle and Central America and Columbia, Ecuador, Peru, Bolivia, and Chile in South America are particularly rich in pre-Columbian antiquities that have long been sought internationally, be it as part of research efforts or simply as plunder. The emplacement of heritage legislation historically has had protection of those materials in mind.

Mexico serves as an extreme example of how the territories of New Spain sorted out protection of their heritage after independence. Mexico acted quickly, banning the export of antiquities while establishing a national museum in 1826, an action reflecting the international feelings of the time and closely matching what was taking place in Greece during its independence movement. In 1864, during a brief time when Mexico was a monarchy, Maximilian I banned all excavations in the Yucatán. Legislation passed in 1868 declared that all Mexican archaeological sites and associated antiquities were the property of the state, further requiring that the state was to protect and preserve those properties. A governmental archaeological institution – Inspección de Monumentos Arqueológicos (IMA) – was established in 1885 and was charged with documenting archaeological sites, making heritage preservation an institutionalized government policy. That policy, along with earlier laws establishing state control, was enhanced in 1897 by legislation criminalizing the destruction of archaeological sites, restricting the export of cultural materials without federal permit, and requiring that all recovered archaeological objects be housed in the national museum. Heretofore, the laws enacted were aimed mainly at protecting the pre-Columbian heritage. However, legislation was passed in 1914 protecting the colonial heritage. By 1916, the IMA had been incorporated into the national museum.

In 1934, Mexico enacted the *Law for Protection and Conservation of Archaeological and Historical Monuments, Typical Towns, and Natural Beauty Sites*, a law based upon the 1931 Athens Charter for the Restoration of Historic Monuments (adopted by the International Congress of Architects and Technicians of Historic Monuments). In 1939, INAH (Instituto Nacional de Anthropología e Historia) was established, becoming the government agency tasked with, amongst other things, explicating and preserving Mexico's cultural heritage. In 1972, a new federal law, the *Law of Monuments, Archaeological, Artistic, and Historic Zones*, was passed, again reinforcing state ownership of cultural properties while also expanding restrictions on the marketing and export of antiquities and other items of cultural heritage value. One aspect of this law was the inclusion of the following statement: "all documents of local and federal offices and all books and printed materials in Mexico from the same period [from the sixteenth through the nineteenth centuries]. . .are worthy of inclusion [as protected cultural properties] due to their importance or rarity" (Stubbs & Makaš 2011: 514). This law identified and also protected the kinds of classical documents that the Abbasid Caliphate in Baghdad and Umayyads in Spain had obtained in the eighth century, along with the various sacred texts removed from South Asia to Europe in the seventeenth to nineteenth centuries.

Introduction of heritage legislation in the remaining nation-states of what had been New Spain followed a similar pattern, although not always as quickly, comprehensively, or patrimonially. For example, Guatemala, which became independent at the same time as Mexico, has also sought the same kind of state-level control over its cultural heritage; Costa Rica, less so. Costa Rica did not establish its Museo Nacional until 1887; Guatemala, not until 1898. Generally, though, all of the nation-states viewed the pre-Columbian remains especially as part of their patrimony and historically have endeavored, at least on paper, to prevent those remains from being taken out of the country.

Honduras began government actions for protecting heritage properties even before becoming a separate, independent nation-state with the dissolution of the United Provinces of Central America in 1838. Action was taken in 1836 to protect the prehistoric Mayan site of Copán after archaeologist John Lloyd Stephens purchased it, a purchase Honduras later revoked.

Heritage action at the legislative level did not resume until the turn of the last century, in a sense following from the activities going on in Europe in the late 1800s. By 1900, Honduras had enacted a national heritage law, although this was mainly aimed at pre-Columbian antiquities. El Salvador did this in 1903, enacting laws to restrict the export of antiquities. And that is how things remained until after World War I.

During the interwar years, as in Europe, efforts were made to consolidate and strengthen heritage legislation. In 1935, for example, Honduras enacted laws protecting historic sites, and that legislation was extended in 1940 to protect portable historic items. El Salvador passed a similar law in 1935, extending protection to portable objects in 1938. Costa Rica enacted its first laws to protect cultural properties – a law aimed mainly at archaeological excavations and limited removal from Costa Rica of artifacts recovered from sites – in 1938. However, for Guatemala, the various laws regarding its archaeological heritage would not be enacted until the 1940s.

After World War II, Guatemala's counterpart agency to Mexico's INAH, IDAEH (Instituto de Antropología e Historia), was established in 1946; Honduras set up a similar agency, IHAH (Instituto Hondureño de Antropología e Historia), in 1952. Both were given authority over the respective nation's archaeological and historical heritage. The Costa Rican Constitution in 1949 declared that the government was to protect its cultural heritage. In 1955, Guatemala passed legislation declaring state ownership over its archaeological and historical patrimony, while also prohibiting the export of antiquities and similar sorts of cultural property.

Six UNESCO conventions and recommendations were set forth between 1970 and 1978, the first being the *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property 1970*. As happened in many parts of the world, the nation-states formerly of New Spain acted accordingly, with all eventually ratifying the 1970 convention by 1996. This was further encouraged by the OAS (Organization of American States) 1976 *Convention on the Protection of Archaeological, Historical, and Artistic Heritage of the American Nations*. Known much more conveniently as the *Convention of San Salvador*, it was aimed primarily at illegal trade in antiquities, although it urged each signatory to pass heritage legislation.

Thus, between 1976 and 1984, most Guatemalan government heritage legislation came from ministry and agency procedures, where such government agencies were charged with protecting cultural property, be it archaeological or architectural. Some of this was done with the assistance of the OAS. Guatemala was the first Central American nation to sign the *Convention of El Salvador* in 1979, but it would not be until 1997 that it passed its *Law for the Protection of the Cultural Heritage of the Nation*. In 1983, Honduras also signed the *Convention of San Salvador*, and in 1984 enacted its *Law for the Protection of the Nation's Cultural Heritage* (revised in 1997). The law protected not only buildings, archaeological sites, and artifacts, it also protected manuscripts, while vesting authority over all of this in IHAH (Instituto Hondureño de Antropología e Historia), which itself had been established in 1952.

Costa Rica signed the *Convention of San Salvador* in 1980; it enacted its *Law for the Conservation of the National Archaeological Heritage* in 1982. This was augmented in 1995 by the *Law for the Historic and Architectural Heritage* of Costa Rica which not only protected sites, pre-Columbian and historic, but also prescribed fines for damage to such properties. The 1995 law also shifted protection of privately held cultural properties from the state to the owners, offering tax incentives and other enticements for preservation.

Across the former viceroyalties of New Granada, Peru, and Rio de la Plata, the introduction of heritage legislation was not as detailed or organized as it has been to the north, generally because many of the nation-states have a history of government instability. This has resulted in periods of government interest in promoting heritage legislation or the equivalent ministerial policies, and periods when such were not

promoted. Stubbs and Makaš's (2011: 620) remark that Ecuador's "cultural resource policy and its enforcement has been. . .somewhat erratic during the past century" can been seen as an apt description for all of the nation-states formed out of those earlier viceroyalties.

Ecuador itself is a case in point, where the first cultural heritage legislation was not passed until 1945, but it was not until 1978 that the INPC (Instituto Nacional de Patrimonio) was established to protect and promote the country's cultural heritage. The same holds for Venezuela, where heritage preservation measures were initiated in the town of Coro (founded in 1593, it was listed as a World Heritage Site in 1993 because of its architecture) as early as the eighteenth century, and has been intermittently preserved through the subsequent centuries, but only to have UNESCO place it on its List of World Heritage in Danger in 2005. Like Ecuador, Venezuela's first legislation – the *Protection and Conservation of Antiquities and Artistic Works Act* – also was enacted in 1945 to protect the nation's cultural heritage. That law was updated in 1993 with the *Law for the Protection and Defense of the Cultural Heritage*.

Concern in Columbia over pre-Columbian heritage was exhibited in 1761 when construction of a church over a pre-Columbian structure was prohibited. However, excepting for establishment of a national museum in 1827 and formation of a Commission of Cartography – tasked with, amongst other things, documenting archaeological sites and similar heritage properties – in 1850, it was not until 1920 that comprehensive legal measures were taken to protect cultural properties from theft and export. In 1934, Columbia adopted the Roerich Pact (see below) as part of its constitution, which would render all heritage properties neutral during times of war. The Pact also was seen to provide clearer definitions of cultural properties than had Columbia's 1920 law.

After World War II, Columbia refined and updated legislation in 1959 to specifically include archaeological sites and architecture and also to allow the state to expropriate archaeological sites if needed for their protection. The new law also established the Consejo Nacional de Monumentos, which was charged both with registering private property deemed of national importance and stopping the illegal export of cultural property. The responsibilities of the Consejo were shifted to the Instituto Columbiano de Cultura between 1968 and 1997. Columbia enacted a new constitution in 1991, which in part indicated that the state was responsible for protecting the nation's cultural heritage. As a result, the *General Law on Culture* was passed in 1997, replacing the Instituto Columbiano de Cultura with the Dirección de Patrimonio, which deals with heritage protection, conservation, and promotion of Columbia's heritage.

Peru set forth in its 1852 Civil Code that archaeological finds belong to the discoverers as well as to the owners of private property. This statute, so different from the patrimony laws found elsewhere in Latin America, was changed in 1929 by the *Law for the Protection of Archaeological Monuments* which declared state ownership of portable and immobile cultural property, restricted export of such properties, and required registration of "objects of value", be they in public or private ownership. The law was not retroactive; it only applied from 1929 forward (or backward, as Quechua phrases it, since one walks backwards through time). While the 1929 law protected historic artifacts, it did not do so for historic structures; those were added in 1939, with registration of historic artifacts further added in 1958. In 1971, following the 1970 UNESCO convention, Peru established its INC (Instituto Nacional de Cultura), a government agency charged with protecting the country's cultural heritage. In 2004, Peru again updated its heritage legislation, reaffirming state ownership of all cultural heritage sites and objects, unless the INC declared the item of little value.

Bolivia followed a pattern more in line with Peru than with other nation-states of the old Viceroyalty of Rio de la Plata, in part because it contained extensive pre-Columbian remains. Heritage legislation in Bolivia has been, like Peru, both statutory and ministerial. Following independence in 1825, Bolivia issued a Supreme Decree calling for the preservation of

historic – post-Columbian – buildings for educational purposes. In 1906, a number of the more significant archaeological sites were declared property of the state, and in 1927, the new *National Monuments Act* set in place more comprehensive heritage policies while also initiating a historical sites registration program. Beginning in 1961, a series of Supreme Decrees and Ministerial Resolutions refined the 1927 law by clarifying what cultural properties were protected and the legal procedures to be used.

Bolivia established its IBC (Instituto Boliviano de Cultura) in 1975 which was concerned mainly with documenting and conserving the architectural and artistic heritage of the nation. It was replaced in 1993 with the National Secretary of Culture that, itself, was in 1997 restructured into the current VDC (Viceministerio de Desarrollo de las Culturas). The VDC is responsible for policies regarding cultural properties, compliance with international agreements, and dealing with illicit trafficking in antiquities and similar cultural properties.

Chile, like Bolivia, also has extensive pre-Columbian remains, although not as spectacular as Peru or Bolivia. Thus, Chile was late in developing heritage protection. In 1925, it established its Council of National Monuments (Consejo de Monumentos Nacionales), but due to internal Chilean politics, it was irregular in protective actions. It was not until 1970 with the *Law 17.288 of National Monuments* that heritage properties to be protected were defined and categorized. The Consejo was reorganized first in the later 1970s and again in 1994. One element that had contributed to heritage protection in Chile was the requirement starting in the 1990s of environmental impact reviews prior to construction, serving in part to identify and salvage archaeological materials.

The remaining nation-states of the old Viceroyalty of Rio de la Plata had far less in the way of pre-Columbian populations and prehistoric wealth. Heritage legislation in the region has been more in the direction of historic remains and, excepting action by Argentina in 1913 protecting archaeological sites, did not emerge until well into the twentieth century. As elsewhere in Latin America, much of the heritage protection has come from establishing government agencies that were then charged with developing some level of heritage protection. Argentina, for example, established its Comisión Nacional de Museos y Monumentos y Lugares Históricos in 1940, which was responsible for everything from designating to regulating the export of heritage properties. Uruguay established a similar government commission treating historic sites in 1950, but did not pass heritage legislation until the early 1970s which, in turn, reorganized the earlier Commission into the current Comisión del Patrimonio Histórico, Artistico y Cultural de la Nación. That Commission was reorganized in 1997 with the authority over archaeological excavations, rehabilitation, and the export of heritage properties.

Paraguay did not establish heritage legislation until 1982 with the creation of the General Directorate for Cultural Heritage (Dirección General de Patrimonio Histórico Cultural), which was mainly concerned with identifying heritage properties and overseeing restoration. A new constitution was set out in 1992, which specified the government's responsibility for protecting the nation's cultural heritage. This would be done not only by protecting what was present within Paraguay but also by locating and, if possible, buying back items that had left the country.

The introduction of heritage legislation in Brazil was different to that in Spanish America, reflecting both the Portuguese roots of Brazilian colonization as well as the absence of Indigenous civilizations with monumental architecture, large populations, and great wealth. Settlement began along the coast in the early 1500s and the economy developed by 1700 into one of large sugar plantations enabled by native and African slaves. In 1808, the Portuguese royal family took refuge in Brazil from Napoleon; in 1822 and with the return of the royal family to Portugal, a son engineered an independence movement such that the Empire of Brazil was established, which lasted until 1889. Throughout that royal/imperial time from 1808 to 1889, there not only was extensive construction in a European style, there was a concern by that royal class for the

built environment. The humid tropical climate necessitated continual conservation measures, and that need resulted in early and ongoing efforts at heritage preservation, mainly focused on architecture and related elements. Thus, the earliest protection program was in 1742 with the Palacio das duas Torres in what is now Recife, representing a pattern into the nineteenth century of a concern by the governing royal classes for the protection of key buildings, sites, and even inscriptions.

The period from 1889 forward was politically unsettled and so too was any effort to protect the nation's cultural property and associated heritage. For example, in 1920, the Sociedade Brasileira de Belas Artes introduced legislation to protect cultural properties in Brazil, but the legislation did not pass. Efforts to pass such acts continued into the 1930s, and the concern for heritage protection worked its way into the 1934 constitution. A constitutional decree – Protection of Cultural Heritage – and the establishment of IPHAN (Instituto do Patrimônio Histórico e Artístico Nacional) occurred in 1937. The decree called for the registering of heritage sites and, for the built environment, the obtaining of government permission before anything was altered. The decree also classified types of cultural properties, which included historical and prehistoric sites along with portable objects. IPHAN was empowered in 1940 to acquire properties if needed to protect them. IPHAN remains the core agency attending to Brazil's heritage, such that its policies are effectively the country's heritage legislation. In recent times, it has followed UNESCO conventions in how to address heritage protection.

Asia

The introduction of heritage legislation across Asia varied according to the cultural values of the given area. In India, the idea of heritage was readily acceptable in part because of a long-standing acceptance of the past, which included a cosmology that had the world four billion years old. Thus, when India found unification under the British, the incorporation of a British sense of antiquity and antiquity laws was comparatively uneventful. That incorporation was also found in other British territories, such as present-day Pakistan, Burma, Malaysia, and the nation-states along the north coast of Borneo (the remainder of Borneo, along with most of the rest of the Indonesian archipelago, constitutes modern Indonesia – formerly the Dutch East Indies; Indonesia gained independence from the Netherlands in 1945). In China, heritage legislation came from a vision of a culturally unified people present in one geographic area for a very long time. This to some extent is true for Japan as well, although the impetus for heritage legislation postdates European penetration in the Japanese market, with most of the legislation itself emplaced after World War II. The cultural properties within those areas represented the peoples who, given the cosmology and structure of rule, represented the mandates of the imperial households themselves.

Other nation-states across Asia – Burma, Thailand, the three kingdoms that currently are coalesced as Vietnam, amongst others – all had a sense of a cultural past, but it would not be until the various UNESCO conventions that each would start attending to their own cultural properties and the heritages represented by them. Each has done so in a way concordant with its own cultural values.

For South Asia: India has always had an awareness of its own antiquity, but the extent of that antiquity and how it related to the broader world – especially that of Europe – was not fully apparent until the eighteenth century. As in Latin America, it was the heritage content of South Asia, combined with the desire of other parts of the world to possess pieces of that heritage, that precipitated India's current heritage legislation.

Just as Spain controlled so much of Middle and South America, so too did Great Britain of India. British rule was incrementally established beginning in 1757, continued with the acquiescence of the Mughal Emperor to the British in 1803, and was completed with the placement of the Princely States under British tutelage in 1858. During those 200 years, Great Britain enacted the *Regulating Act* of 1773 and the *India Act* of 1784, which together placed the Indian possessions

firmly under British parliamentary control and, thus, physical control. Coincident with that control was the realization in the late 1700s not only of the antiquity of Sanskrit and its relationship to Latin and Greek – and thus its value for understanding European culture history – but the realization that that philological history was contained within India's sacred texts. By 1822, religious texts were being acquired then sent back to England as part of those philological studies.

There had been an awareness of the value of historic Indian – mainly Vedic – texts and similar literary items since the seventeenth century, mainly as a consequence of Jesuit research. However, with the growing interest in Western Europe in philology, stimulated by the discovery of the Rosetta Stone in Egypt; the finding of the relationship of cuneiform writing to Sanskrit; and the general investigation not just of languages but of how languages as geographically disparate as Latin, Greek, and Sanskrit could all share a common ancestor (and eventually casting doubt on the idea that Hebrew was the original human language, a premise in the Judeo-Christian Europe/Mediterranean Basin), India's cultural property in the form of manuscripts and similar documents was suddenly of great value to northern European scholars. Indeed, it was seen in the early and mid-nineteenth century that it was from India particularly that the origins of language and religion emerged, an enormous paradigm shift. Remember, the central intellectual issue in Europe by the second half of the nineteenth century was how modern humans had come to be as they are; that issue drove nearly all archaeological/heritage-related research and underlay much of the desire to acquire evidence documenting the origins of such things as language.

This removal of ancient texts (and other items) from the Subcontinent is a history of which modern India is very aware, and it influenced how the country approached its cultural heritage and heritage legislation when it became independent in 1947. India as part of its independence from Great Britain in 1947 embodied in its Constitution Article 49, which states that "[i]t shall be the obligation of the State to protect every monument or place or object of artistic or historic interest, declared by or under the law made by Parliament to be of national importance, from spoliation, disfigurement, destruction, removal, disposal or export, as the case may be", while Article 59A makes preservation of Indian's "composite culture" the duty of every citizen (Pachauri 2006: 236). From this came the 1947 *India Antiquities (Export Control) Act*, which in 1972 was augmented by the *Antiquity and Art Treasures Act* (coincidentally when the UNESCO 1972 World Heritage Convention came out). India's heritage is protected mainly through the Archaeological Survey of India.

Government-level policies regarding cultural properties across Eastern Asia are known mainly from China and Japan. The People's Republic of China (PRC) has a long and established cultural tradition of collecting relics, a practice common before the Revolution amongst intellectuals and the elite, and a practice that continues today amongst many (Anonymous 2000). In imperial China, cultural properties – the cultural heritage that heritage legislation is now meant to protect – were seen to be a product of the people's cultural past.

Formal archaeological work began during the reign of Huizong [b. CE 1082, reigned CE 1101–1125, d. CE 1135]. Huizong was a collector and his fascination with the past "fostered a fashion in antiquities" (Watson 2005: 315). This appears to have been part of the *zeitgeist* for the time, with the Chinese Southern Song Dynasty (CE 1127–1279) conducting archaeological research as an exercise in state identity (Paludan 1998: 138). All of this built on a legacy of formal historical research and classification of known antiquities/relics, such as Lu Dalin's *Archaeological Plates* published in CE 1092 and Sima Guang's vast *Complete Mirror of the Illustration of Government* published between CE 1072 and 1084 (Watson 2005: 314). Those who could afford to do so collected what would now be termed "cultural property": relics, be they items from under the ground, books, antiques, or architectural elements.

China does not have a cultural history of legislative rule of law, certainly not in the sense of

the Roman legal system that gave rise to Western constitutional law. True, from the late 1800s into 1949, China was influenced by Western legal systems, but from the end of the Revolution until the Open Door Policy of 1978, that approach was abandoned by the PRC in favor of a patchwork of rules and regulations meant to protect cultural heritage. Guidelines on the export as well as the preservation of relics were issued in 1960, 1961, and 1967. After 1978, there was a conscious effort to establish a national legal system, which came to include consolidation and coordination of heritage legislation. The National People's Congress adopted the *Law for the Protection of Cultural Relics* in 1982 (revised 1991), while the State Council approved regulations protecting underwater cultural property in 1989, administration of archaeological excavations done by foreigners in 1990, and an overall *Rules for the Implementation of the Law of Protection* in 1992. The PRC is a signatory on the UNESCO 1970 and 1972 conventions; heritage protection proceeds from those.

Heritage legislation in Japan can be seen to start with the enacting of the Koshaji-hozon-ho (*Law for the Preservation of Ancient Shrines and Temples*) in 1897 (Leibs 1998: 680). This was supplemented by Siseki-Meisho-Ten'nenki-nenmutsu-hozon-ho [*Law for the Preservation of Historic Sites, Places of Scenic Beauty, and Natural Monuments*] (1919), Kokuho-hozon-ho [Law *for the Preservation of National Treasures*] (1929 amendment to the 1897 law), and Juyo-bijutsuhin-to-no-hozon-ni-kansum-horitsu [*Law for the Preservation of Important Art Objects*] (1933).

Post-World War II Japanese heritage legislation starts with the 1950 Bunkazai-hogo-ho [*Law on the Protection of Cultural Properties (Act No. 214)*], which has been amended as recently as 2007 (*Act No. 7*). The *Law on the Protection of Cultural Properties*, both the original and subsequent modifications, has resulted in separate provisions "for protection of structures, designed and natural landscapes, archaeological sites, traditional crafts and skills, and even living people who could be designated as living national treasures" (Leibs 1998: 680).

Oceania

Heritage legislation across Oceania comes as much from legislation derived from or inspired by earlier colonial or protecting powers as it does from autochthonous development or using UNESCO conventions as a model. The USA and Great Britain have had the greatest influence across the region, with the latter's impact coming as much through the Commonwealth of Nations as through current or past territorial administration.

There are also regional agreements, both in force and draft. The *Protection of Traditional Knowledge and Expressions of Culture Act* 2001 is one such Pacific Basin regional instrument, although it is geared more to traditional cultural knowledge as it pertains to the given people's ecological setting.

These ideas gave rise to the *Model Law for the Protection of Traditional Knowledge and Expressions of Culture* (2002) ("the Model Law"). The *Model La*w was developed at a joint conference of the South Pacific Commission (SPC), the Pacific Island Forum Secretariat, and UNESCO and then endorsed at the First Conference of Ministers of Culture of the Pacific Region in 2002. The *Model Law* includes amongst its aims protection of traditional knowledge and expressions of culture.

Commonwealth of Nations (former British Commonwealth) in Oceania includes Australia, Papua New Guinea, New Zealand, Samoa, the Solomon Islands, Tonga, Vanuatu, Nauru, and Kiribati. The predisposition for all of this, though, would have come out of Great Britain's 1882 *Ancient Monuments Protection Act*.

Australia's national law is entitled the *Environmental Protection and Biodiversity Conservation Act* of 1999 (EPBC Act). The EPBC Act lists eight categories of concern, of which two – world heritage properties and national heritage places – would include cultural properties of the kind under consideration here. The EPBC Act declares that any action that could affect such properties must first receive government approval, a decision made by the Minister for the Environment, Heritage, and Arts.

Nationally, Australia also has its *Historic Shipwrecks Act* of 1976, which protects shipwrecks over 75 years of age in Commonwealth waters. It also has the *Protection of Moveable Culture Heritage Act* of 1986, which protects portable cultural properties from export. The list of "moveable cultural heritage of Australia," detailed in Part II, Division 1.7, consists of "objects that are of importance to Australia, or to a particular part of Australia, for ethnological, archaeological, historical, literary, artistic, scientific or technological reasons." However, like Canada, a lot of legislative initiative has been vested in subnational administrative jurisdictions, which in Australia are called either "states" or "territories." Each of the states along with the Northern Territory and the ACT (Australian Capital Territory) has counterpart legislation, administered by heritage councils and branches, along with Departments of Aboriginal Affairs or equivalents. Australia, in particular, has established extensive heritage legislative protocols, to the point where it, like the USA and South Africa, has an extensive archaeological private-sector industry that helps clients stay in compliance with the heritage legislation.

The introduction of heritage legislation to New Zealand – in addition to that prescribed by Great Britain's by the *Ancient Monuments Protection Act* of 1882 – can be seen to start with the *Kapiti Island Public Reserve Act* of 1897, which broadly protected cultural properties. The 1928 *Canterbury Provincial Buildings Act* too was a heritage protection act. And thus after 1928 came a series of acts addressing heritage matters in New Zealand, somewhat focused in intent before World War II when there still was provincial sway, but more encompassing on a national level after New Zealand became a Commonwealth realm in 1947. A signatory to the UNESCO 1972 *Convention Concerning the Protection of the World Cultural and Natural Heritage* (World Heritage Convention), New Zealand followed soon after with a series of acts aimed in whole or part at protecting is cultural heritage.

For New Zealand, the 1975 Treaty of Waitangi (or *Treaty of Waitangi Act*) grew out of the Maori protest movement against non-Maori cultural dominance, establishing cultural rights to lands and subsistence practices. The Treaty's wording with respect to heritage properties is at best vague, but was interpreted in keeping with the intent of protecting heritage properties and thus in the spirit of early-mid-1970s UNESCO cultural heritage protection. Soon after the Treaty of Waitangi came the *Reserves Act* of 1977. In addition to the protection of habitat along with flora and fauna, the *Reserves Act* provided for the preservation and management of "historic, cultural, [and] archaeological" features. This was complemented by the *Local Government Act* of 1977, which enables local authorities to protect archaeological sites, historic buildings, and similar cultural properties (as well as wildlife habitats and similar).

All of this set the stage for the *Conservation Act* of 1987. While the *Conservation Act* of 1987 was aimed mainly at noncultural properties, it did include in Section 2 "protection of…historic resources for the purpose of maintaining their intrinsic values…." However, the core legislation consists of the *Resource Management Act* (RMA) of 1991, which identified the preservation and protection of cultural properties as a matter of national importance and provided funding for such (protection funded through a national Heritage Lottery), and the *Historic Places Act* of 1993. The RMA of 1991 replaced the *Town and Country Planning Act* of 1977.

Sub-Saharan Africa

African nation-states contained within the Mediterranean Basin were considered above. Introduction of heritage legislation across the remainder of the continent found inspiration in at least one of three sources: (1) legislation developed by former colonial powers, which overlaps with (2) participation in the Commonwealth of Nations (formerly the British Commonwealth) or (3) UNESCO conventions implemented on a national level. Most heritage legislation in sub-Saharan Africa dates from after 1960. However, some nation-states do not have formal heritage legislation.

There is a disconnect between the cultural proscriptions on disturbing heritage sites – archaeological sites, graves, cultural landscapes by whatever definition – on the one hand and the kind of legislation structured within UNESCO or its coincidents in Western legislative tradition on the other. Ndoro et al. (2009: 5), who see much of cultural heritage legislation as being distorted through the non-sub-Saharan African linguistic lens of temporal structure and material heritage, explained:

> In most areas of Africa, traditional regulatory mechanisms and practices have existed down through the ages of the protection of heritage places such as sacred groves, streams, rivers, shrines, temples, tombs, palaces, and mausoleums. These comprise prescriptive taboos, avoidances, and practices put in place by local communities and constitute customary laws and traditions which can be regarded as unwritten constitutions and laws passed on from one generation to the next.

This prejudice, particularly for objects defined somehow as "ancient," is shown by the predilection of heritage laws being titled "Historical Monuments, Relics, and Antiquities Act" or similar (Ndoro et al. 2009: 25).

Roughly half of the Sub-Saharan nation-states are members of the Commonwealth of Nations. Some were originally British colonies/territories by 1900: Sierra Leone, the Gambia, Ghana, Nigeria, South Africa, Botswana, Zimbabwe, Uganda, Kenya, Zambia, and Somalia. Some were essentially protectorates or applied for and were granted admission in the Commonwealth: What is now Tanzania (formerly German), Mozambique (formerly Portuguese), Rwanda (formerly Belgian), and Cameroon (formerly French). Each became independent between 1957 and 1965; excepting Zimbabwe, which withdrew in 2003, all remain active members of the Commonwealth.

For example, in South Africa: The Republic of South Africa (RSA) became independent of Great Britain in 1961. The *National Monuments Act* of 1969, which in addition to clearly archaeological properties, protected paleontological (which would include hominin-related) as well as mineralogical properties. The *Environment Conservation Act* of 1989 and the *Minerals Act* of 1991 enhanced heritage protection, although were not aimed directly at that area; the *Environmental Conservation Act* was updated with the *Environmental Management Act* of 1998. Major heritage legislation came about with the *National Heritage Resources Act* (NHRA) of 1999. The NHRA established the South African Heritage Resources Agency, which is responsible for protection of national heritage resources, controlling export and illegal import of cultural properties, and assisting provinces in managing their heritage resources. The NHRA protects archaeological and paleontological sites, burial grounds, and grave sites; these may not be disturbed, in any way at all, without a permit from the relevant heritage resources authority.

The legislation means that developers and people managing land that contains cultural heritage must employ qualified professionals to identify and mitigate harm to such sites. This requirement has resulted, as in the USA and Australia, in a professional archaeological sector, represented by the ASAPA (Association of Southern African Archaeologists), dominated by private-sector archaeologists. As in the USA, the heritage archaeological work in response to statutory mandates is known as "cultural resources management."

The only sub-Saharan nation-state that does not quite follow all of this is Sudan, now divided between North and South. Sudan was part of the Anglo-Egyptian Sudan, a dominion under joint French and British governance within the Ottoman Empire. However, it is from that heritage that Sudan – before its split between North and South in 2011 – had in place its *Antiquities Act* of 1952, protecting all human-associated objects from 1821 and before and all nonhuman fauna objects from before CE 1340.

For the other former British territories, the sequence has not been as detailed nor as immediate. Initial postindependence heritage legislation included Uganda's 1967 *Historic Monuments Act* (protecting not just landscape and culturally valued properties but also archaeological sites in a wide variety of possibilities), incorporated in general into its Constitution in

1995; and Malawi's 1965 *Monuments Act*, which is similar in nature to Uganda's Act. Ghana enacted its National Museums Regulation in1973, but protected materials only from the period before the "gold rush" of 1900. Tanzania emplaced its *Antiquities Act* in 1964, protecting "relics, monuments, and protected objects."

The other 14 Southern African Development Community (SADC) countries – Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, Swaziland, Tanzania, Zambia, and Zimbabwe – have legislation equivalent to the NHRA that makes similar demands to protect their national heritage. Zimbabwe's *National Museums and Monuments Act* of 1972 is one such example. All 15 SADC nations are also signatories on the 2000 Blantyre Protocol on Cultural, Information, and Sport, which includes a broadly worded provision for the preservation of vaguely defined cultural heritage. That Protocol was guided by the OAU (Organization of African Unity) 1969 Cultural Charter for Africa (Cultural Manifesto of Algiers) as well as the 1980 OAU Lagos Plan of Action for the Economic Development of Africa and the Final Act of Lagos. None of these, though, are mainly for or restricted to heritage protection.

In addition, many of those nations passed heritage legislation soon after establishing independence. For example, Tanzania – which was a merger of Tanganyika and Zanzibar in 1964 – had in place *Tanganyika's National Museum Act* of 1963, Tanganyika becoming independent in 1961. Zimbabwe, which as Rhodesia separated from Great Britain in 1966, emplaced its *National Museum and Monument Act* in 1972, the wording of which is very similar to Kenya's 1983 *Antiquities and Monuments Act* and *National Museum Act* (Kenya's 1983 law was updated with the 2006 *National Museums and Heritage Act*). That similarity may be due to a shared heritage as British territories.

Zambia, too, after World War II had several heritage-related Government Notices protecting specific heritage properties, ranging from prehistoric rock art and quarries in 1950 and 1952 to protection of the Kabwe Big Tree in 1955 (the tree from which the World War I East African Campaign departed in 1914). Zambia's *National Heritage Conservation Commission Act* of 1989 consolidated the earlier specific protective actions. Zambia passed its *National Heritage Conservation Commission Act* in 1994, which established a Commission for the Preservation of Natural and Historical Monuments and Relics. The Act relegates to the Commission responsibility for heritage protection such that permits are required from the Commission for archaeological excavations at any heritage site, or for the collecting of relics. Further, the Act gives the Commission the right to purchase any privately held relic.

Introduction of Global Heritage Legislation

Global and Regional Actions

All regional and global initiatives for heritage legislation either began in Europe/Mediterranean Basin or were developed then promulgated from their cultural heirs, such as the USA and nation-states in Spanish America. The Hague Conventions were European in origin; the League of Nations then the United Nations, of which UNESCO is a part, were USA and European in origin.

The immediate precursors for global heritage legislation were the *Hague Conventions* of 1899 and of 1907, both of which were concerned primarily with the conduct of war and were aimed at nation-states regardless of where they were located on the planet. Articles 46, 47, 55, and 56 of the *Annex to the Convention of Hague II*, 1899, specifically protected private property, equated art and scientific property as private property, prohibited pillage, and required that all public property and lands to only be administered – not used – by occupying powers. The same articles were repeated with essentially the same content in the *Annex to the Convention of Hague IV*, 1907, but with the expansion of Article 56 to explicitly protect cultural properties, both fixed and portable.

The spirit of the heritage protection element of the Hague Conventions was embodied in the so-called Roerich Pact, a document drafted in 1929

by artist Nicholas Roerich along with George Chklaver. The basic idea of the Pact was that the protection of cultural properties during times of war was more important than military needs. The Pact eventually became the Treaty on Protection of Artistic and Scientific Institutions and Historic Monuments, which was approved in 1933 at the seventh International Conference of American States and signed by those nation-states in 1935.

In 1931, the First International Congress of Architects and Technicians of Historic Monuments passed "The Athens Charter for the Restoration of Historic Monuments." It embodied much of the heritage preservation concerns of the interwar period and is significant here for three reasons: (1) Resolution 4 calling for the reburial of excavated sites that cannot be adequately protected, (2) Resolution 6 calling for custodial protection of historical sites (which would include archaeological sites), and (3) Conclusion II recognizing the right of private ownership. This last point is of interest since some nation-states – for example, Mexico and Greece – view antiquities as being part of the nation's patrimony and thus rightly property of the state.

In 1976, the Organization of American States (OAS) issued its "Convention on the Protection of Archaeological, Historical, and Artistic Heritage of the American Nations." Known as the "Convention of San Salvador," it is concerned primarily with the illegal export and trafficking in antiquities, although also stressing that each country ensure modern excavation and conservation practices, maintain an inventory of cultural properties, and pass legislation protecting sites from destruction. Primarily the Central American republics – Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama – follow and are actively engaged in the Convention of San Salvador.

Three European regional agreements between 1985 and 1992 – *The European Convention for the Protection of Architectural Heritage* (the so-called *Granada Convention*), issued from Granada in 1985; *The European Convention on Offences to Cultural Property* (the so-called *Delphi Convention*), issued from Delphi in 1985; and *The Convention for the Protection of the Archaeological Heritage of Europe* (the so-called *La Valetta Convention*) issued from Malta in 1992 – form the basis of a European Union agreement on heritage protection. The *La Valetta Convention*, which replaced the *European Convention for the Protection of Archeological Heritage* signed in London in 1969 and recognizing that Europe's archaeological heritage is increasingly threatened by development, aims to "protect the archaeological heritage as a source of European collective memory" (1992, Article 1.1). It further seeks to protect that heritage – that three-dimensional information storage matrix, as mentioned earlier – through prohibitions on illicit antiquities trading, pursuit of non-invasive archaeological investigations, and basic protection of archaeological resources.

UNESCO

Since its founding in 1946, the United Nations through UNESCO has issued five conventions (1954/1999, 1970, 1972, 2001, 2003), one declaration (2003), and six recommendations (1956, 1968, 1972, 1976, 1976, 1978) in some way providing for the protection of cultural properties, ranging from protection of architectural and archaeological sites, through execution of proper scientific research on those cultural properties, to prohibitions on illicit excavations and trade in antiquities. The vast majority of nation-states are signatories to each of those conventions.

Three conventions are seen as key: The *Convention for the Protection of Cultural Property in the Event of Armed Conflict*, often referred to as the *Hague Convention*, with the first protocol set forth in 1954 treating the return of cultural property after conflict and the second protocol in 1999 refining issues while extending penalties for violations; the 1970 *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*, which treated national ownership of moveable or portable cultural property; and the 1972 *Convention Concerning the Protection of the World's Cultural and Natural Heritage*, which addressed the deterioration and destruction of the world's cultural and natural heritage.

This 1972 Convention, known as the *World Heritage Convention*, is what established the World Heritage List, which includes what are termed World Heritage Sites, "properties forming part of [the given signatory nation's cultural heritage and natural heritage. . .which it considers as having outstanding universal value" as set forth by the Convention's criteria. Together, these three UNESCO conventions have served variously as models or impetuses for the establishment of heritage legislation in nation-states either lacking a history of such legislation or nation-states newly emerged from outside administrative governance.

Key Issues/Current Debates

There are three key issues underlying the introduction of heritage legislation: (1) removal of cultural property from one nation-state to another (often viewed as loss of patrimony); (2) repatriation of cultural properties; and (3) damage, intended or not, to cultural properties as a consequence of modern activities.

The overriding issue underlying all heritage legislation has been the taking of cultural materials from the territory/jurisdiction of a nation-state. The taking could be in the form of items, recovered from archaeological research, transferred to another nation's university or museum. This underlies much of modern heritage legislation based out of the Mediterranean Basin, the original laws from Mexico (1826), Greece (1834), or the Ottomans (1874) being good examples. Or the taking could be the acquisition by private individuals of materials for personal use, be it for personal display or for commercial sale, which actually has a greater antiquity. Alexander's classification of the looting of Cyrus's tomb as an attack on the legitimacy of the state or the concerns during the Song Dynasty would fall into this category.

The term used for the unauthorized removal of cultural materials is "looting." The issue, though, is complicated by the need to distinguish between legitimate transfer of ownership during one period that no longer is recognized as legitimate in another, subsequent period; and the acquisition of materials in a manner deemed illegal regardless of the period.

Major related issues to the ongoing looting of cultural materials all derive from the social structure that results in the heritage legislation. Heritage legislation is a product of stratified societies and is initiated when the upper social classes are sufficiently concerned about national patrimony to move the forces of the state to deal with the threat to that patrimony. It is the degree to which the upper social classes desire heritage legislation to be *enforced* that the resultant laws or regulations *are* enforced. Modern Greek antiquity law was framed in part to accommodate government employees who were also antiquities collectors; museums and auction houses in the USA have long lobbied that nation-state to not become a party to international rules.

None of this is right or wrong; rather, it is how stratified societies work and it means that until and only when, a situation is in the best interests of society's upper social stratum will legislation against looting and its equivalent be enacted then enforced (and being enacted does not automatically mean that it will be enforced). Further, that will hold only for as long as it *is* in that upper social stratum's interest. Thus, several sub-Saharan nation-states are UNESCO signatories, but the rules are ignored while private gains in looting are made by those in power.

Stratified societies have by definition "haves" – people with power, privilege and prestige, as Gerhard Lenski, following from Max Weber, noted – and "have nots" those lacking such. Lenski, as Weber before him, noted that power, privilege, and prestige were social resources, enabling those who have such (again, the "haves") to exercise their will in matters regardless of how those lacking such social resources (the "have nots") may feel about how matters should be addressed. What is defined as "looting" is also, in the end, defined by the given society's upper social classes. However, looting is often for the lower social classes a fiscally lucrative endeavor, where the income derived from it can form a significant portion of a lower social class family's annual income. The looting

of graves and archaeological sites for material gain – often by local farmers – has been going on around the world for several millennia. Indeed, the lower social classes often view heritage legislation as a product of the upper social classes and as an instrument that prevents those lower classes from accessing wealth that from their perspective is no longer of any immediate value.

Another issue is repatriation, which may seem odd for a topic dealing with the introduction of heritage legislation. However, it appears to be the grounds under which a given nation-state introduces heritage legislation that can make repatriation an issue. Laws in several Spanish American nation-states make provisions for reacquiring cultural property that has left the current geographic boundaries of the country. The Elgin Marbles – again – can serve as an example. They are seen by Greece to belong in Greece, and Greece has a law now that says that those Marbles – like other Greek antiquities – are to be brought back to Greece. That law is derived from an earlier sequence of laws, beginning in 1834. Those laws in effect (1) declare that anything made within the current geographic confines of what is now the Greek state (2) belong to Greece and (3) that Greece has every right to buy back or otherwise acquire said wandering antiquity, with a tacit understanding that the current possessor must sell. Yet the Elgin Marbles were removed, amid controversy yet under permit (Lord Elgin claimed to have a *firman*, a claim that in modern times has been challenged), between 1801 and 1812 from the Ottoman Empire and then purchased from him by the British government in 1816. That purchase was well before the modern Greek state existed and 18 years before the first of Greece's laws – laws set out before Greek independence from the Ottomans – came into being. A second issue, then, is who owns the past, and how retroactive is that ownership? And that is an enormous pan-cultural/state debate.

Repatriation has become a retroactive restoration of materials. In the USA, the *Native American Graves Protection and Repatriation Act* (NAGPRA) requires that items associated with American Indian burials recovered as part of a federally enabled process be returned to the descendants of the peoples who interred those remains. However, the issue that emerges with such actions is identifying suitable cultural antecedents to whom those cultural materials are to be repatriated. There are instances in the USA where the federal interpretation of NAGPRA requires that burial remains be handed over to the descendants of the people who killed those who were buried, that is, handed over to the decease's sworn cultural enemies. Such things were unanticipated when the laws were first set up and are extremely complicated and touchy in their resolutions.

The third issue underlying the introduction of cultural heritage legislation has been potential damage to cultural properties, be it collateral or intentional as may occur during war, or unintentional as may happen during construction. In the USA, any federally enabled land-alteration project must first have the affected area checked to see if there are any cultural properties present that could be listed on the National Register of Historic Places. If such are present, then there is a regulatory system in place to evaluate those materials relative to what is already known, then to either protect or record so that the loss of those materials through construction is not a major issue. Counterpart regulations also often exist in the USA at the state and, much less often, local governance levels. Similar procedures exist in many nations, Mexico, the British Commonwealth, and general European Union being good examples.

International Perspectives

There are three international-scale perspectives on heritage legislation and its presence: (1) the very existence of a tolerated international market enabling illicit trade in antiquities; (2) differences in how languages classify reality and thus what is or is not heritage needing protection; and (3) intentional destruction of the heritage of one culture by another, conquering or ruling culture.

The first major issue on the international scale involves illicit trafficking in cultural property.

Despite UNESCO as well as regional and even national laws, such trade continues. Where laws prohibit, enforcement is inconsistent. Some of this erratic enforcement can be seen to arise from conflicts of interest within the particular nation-state; some of it, though, can be seen as a fundamental difference in how one culture understands the world to work relative to another. In any event, illicit trafficking in antiquities cannot be substantively reduced until there is complete international commitment to stopping it.

The second issue involves how reality is classified. The main impetus for the introduction of heritage legislation has come out of the Western Intellectual Tradition and as a result out of a linguistic heritage that places a great deal of value on how old things are, as well as on how "material," for lack of a better term, things are. Other parts of the world, with other linguistic classificatory schemes, do not see things quite this way, melding what in an Indo-European language would be past and present into a continuum. This is an issue amongst sub-Saharan African nation-states; it is also an issue in New Zealand and the USA. In the latter, American Indian languages and kinship systems do not distinguish "past" from "future" in the same way as English. For American Indians, the skeleton of a centuries- or millennia-old individual often will be seen as the remains of a person closely and immediately related to the particular American Indian group. The phrasing that that American Indian people will use will express in English that closeness of relationship as "recently departed next of kin." This is extremely hard for English speakers to internalize, but for the American Indian group involved, such removal and handling of burial remains – prehistoric *only* in English-speaking US eyes – is extremely upsetting. Again, this goes back to what was said above about how people think in and classify their reality through their language.

A third issue is that not everyone's heritage is seen as heritage by others. Historically, conquering nations have attempted either to merge the heritage of the conquered with their own or to erase that heritage, the Spanish razing of Mesoamerican temples then the capping of said with their own churches being such a case, a practice common across post-Roman Europe as Christianity spread, but also found across South Asia for both Hindu and Islamic places of worship.

The statues of the Buddha destroyed by the Taliban reflect an ongoing problem of religious intolerance. Proselytizing religions hold that everyone else except the practitioner is in error. A logical extrapolation from this – frequently exercised throughout history – is that the conquered people must have the material heritage associated with their beliefs destroyed (it should be noted, as part of this, that commonly in the classical world the conquering peoples defaced and otherwise destroyed the images of their foes – the destruction of the cultural materials of subject peoples has a long and bitter history). And while Islam, amongst other proselytizing religions, has done this for centuries – the destruction of the Library at Alexandria and the stripping of the façade from the Pyramids to construct mosques being two better known examples (the core blocks of the Pyramids proved too large to be taken away) – it is not alone; the Franciscan obliteration of the Mayan libraries in the 1500s ranks, along with the First Emperor's Burning of the Books in 220 BCE in China, as similar – and successful – efforts to erase a people's cultural heritage. The Mediterranean Basin has a long history of destroying heritage properties after conquest; so, too, do most other nation-states.

Future Directions

There are future directions for the introduction of heritage legislation: International and intranational. International directions include further refining of existing legislation to cover heritage issues left vague or unaddressed by earlier acts, while also getting hesitant nation-states to endorse or otherwise approve the various UNESCO conventions and recommendations. Nation-states must always act in their own interests first; this means that the aims of heritage legislation have to be shown to be of paramount importance for each particular signatory and must be done so in ways that can be enthusiastically

embraced by that signatory. Until that is done, the various regional and international agreements will work more as ideals than actualities.

There are two future intranational directions, one which works for the other. The first is the emplacing of heritage legislation that details what is covered and what triggers protection. For example, in the USA, any federally enabled action that results in land alteration or property transfer requires the area impacted to be examined first to see if anything present *could* be listed on the National Register of Historic Places. Such listing is specific in the general categories, but quite flexible in what within those categories is eligible. But again, as mentioned under "International Perspectives," the USA works in an Indo-European language along with a cultural heritage driven by an empirical, Aristotelian, Enlightenment perspective of fixed rules and protocols, something derived from Roman law by way of English common law.

In the USA, Australia, and to some extent South Africa, retrieval of imperiled heritage properties has become a business concern, where private-sector archaeologists, reviewed and regulated by government archaeologists, recover endangered archaeological materials in response to heritage regulations. However, in the USA particularly, such work outside of a university setting in what has been until the mid-1960s traditionally an academic field is viewed as anathema, such that those participating are normally refused candidacy for faculty posts. Yet such work melds the need to save a long-term three-dimensional information storage matrix with ongoing research questions, generates basic analyses while saving that information, and offers a chance for new archaeologists not just to do research but to underwrite future research. Indeed, in the USA particularly, major referents for ongoing scholarly questions in prehistory are scientists in the archaeology divisions of engineering firms.

The collapse of archaeological research funding, along with the enormous surplus of Ph.D. archaeologists the needs both of the German research university model for publications as well as the needs of the emplaced regulations, will drive an emerging private-sector/university research alliance enabled by heritage legislation. In the USA, where the demographics are well known (Neumann & Sanford 2010: 2-3, 23-24), there are around 1,263 university archaeologists but federal funding for less than 20. Each year, 87 or so archaeology Ph.D.s graduate, but only 52 or so faculty positions open. There is at the same time a shortage of people to work within private-sector firms doing archaeology, which employs 5,469 archaeologists with graduate degrees, or six out of every 10 archaeologists employed as archaeologists in the USA. A similar ratio of private-sector to academic-sector archaeologists appears to exist in the Republic of South Africa and Australia, at least to judge by institutional affiliations listed amongst the association of Southern African Professional Archaeologists and the Australian Association of Consulting Archaeologists. Both of those countries also have an active private-sector archaeological community addressing compliance requirements from heritage legislation.

Certainly in the USA, the capacity to protect archaeological heritage properties has in large measure been due to the availability of full-time archaeology firms (either stand-alone firms or divisions/departments within engineering firms) to execute the demands of the nation's heritage legislation. A future direction, then, not just in the USA but globally, will be archaeologists helping entities to comply with the requirements of heritage legislation. The second intranational direction grows out of that first, that presence of legislation that automatically triggers protection: Development of professional heritage archaeologists who make those regulations work.

Related to this, a second collateral direction will be the mandatory training of future archaeologists in heritage legislation. Most university curricula internationally prepare the nascent archaeologist for life within a university setting. However, the field techniques, research, and management skills needed to do heritage-driven archaeology, especially as a full-time

non-university exercise, are often quite different and rarely are presented in university settings. Future archaeological training will need to address not just how the heritage legislation and associated regulations work in the particular nation-state but also how the data-recovery mechanics work in the extra-academic world.

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- ▶ Lubbock, John
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Tenochtitlan (Aztec): Geography and Culture
- ▶ UNESCO World Heritage Convention (1972)

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Heritage Museums and the Public

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Introduction

Museums are public institutions. The American Association of Museums Code of Ethics states that "for museums, public service is paramount." But there is continuing and useful debate about how public service, indeed how the public, should be defined and what the public might require, demand, or need. What is the appropriate role for the public in the work of museums? How might museums balance the needs of the general and specific publics? And how should museums balance their responsibility to the immediate needs of the public today and those of future publics?

Museums have long been public institutions, but the nature of their interaction with the public has changed. Victorian museums often aimed at "edifying" the masses. In the early twentieth century, many museums saw their role as providing training for citizenship. Exposure to the best that civilization had to offer, the thought went, would improve museum visitors, making them better people and better citizens.

Current Debates

Over the past few decades, the role of the public in heritage museums has changed dramatically. Members of the public or the publics – many museums now prefer to use the plural to acknowledge the diversity of participants in their communities – have gone from being *visitors*, passive recipients of the wisdom of the curators, to *participants* in museum processes and have become increasingly central to the ongoing work of the museum. Many museums – though by no means all – have begun to share authority with the public.

This has happened in three ways. Many heritage museums have invited source communities to participate in the curation of collections and exhibitions, giving selected publics a large measure of control over aspects of the museum related to them. Museums, driven by funders looking to measure results, have been increasingly concerned about the outcome of their work and have looked to see how museums affect the public who visits. And, in what has been called Museum 2.0, museums are increasingly allowing visitors to co-curate collections and exhibitions, part of a more general rise in participatory culture.

The reasons for these changes are social, cultural, and technological. New public funding sources have demanded that museums consider public outcomes of their work. The rise of a postmodern museology that encourages multiple points of view and decenters authority, part of a larger change that has shifted authority from experts to participants, is key. So too is the rising importance of education as the goal of museums and the concomitant rise of evaluation, making reception of the message as important as transmission. Finally, new technologies, especially Web 2.0, have made it almost as easy to participate in as to observe museum exhibits and have raised the expectation of participation as a norm of cultural experience.

Heritage museums with indigenous collections have seen the most dramatic changes in the public role. Stating in the 1960s and 1970s, as part of a postcolonial rise in communities demanding control of their history and future, many source communities for museum collections protested the way their objects were displayed and the way their stories were told. Heritage museums, they noted, were agents of colonialism and deculturation and needed to be redefined for a postcolonial era. Repatriation, the creation of culturally specific museums, and a new role for these publics in heritage museums reshaped museum culture of the last quarter of the twentieth century.

Indigenous peoples around the world, and especially in the United States, Canada, Australia, and New Zealand, gained increased control of the stories museums told about them.

In the United States, Native Americans wrested some collections away from museums, a policy written into law by the Native American Graves and Repatriation Act of 1990. The National Museum of the American Indian (1989) put Native concerns central to its mission; it "works in collaboration with the Native peoples of the Western Hemisphere to protect and foster their cultures by reaffirming traditions and beliefs, encouraging contemporary artistic expression, and empowering the Indian voice." In New Zealand, a policy of biculturalism gave Maori a formally recognized stake in the display of not only cultural materials but also historical paintings that showed their ancestors (Kirshenblatt-Gimblett 2012). The rise of ethnically specific museums in the 1980s, for example, the Wing Luke Museum of the Asian Pacific American Experience, in Seattle, and the Japanese American National Museum, in Los Angeles, shows the increased role that specific publics play in heritage museums. These museums preserve and tell a community's story by and for that community.

The general audience for museums has also come to play a larger role in the work of museums. Part of a widespread rise in participatory culture, many heritage museums now consider their public audiences as the central factor in shaping, collecting, research, and display, where they might once have put collections, or research, in that place. A focus on the importance of the audience's needs and interests was rare, but not unknown, in the early twentieth century. For example, John Cotton Dana, director of the Newark Museum, emphasized the importance of allowing local communities to help shape the collections of museums and the stories told about them. "Learn what aid the community needs: fit the museum to those needs," he wrote (Dana 1917).

This focus on the importance of the public as audience became common in museums in the 1980s and 1990s. Increased dependence on federal and foundation funding and an increased demand by funders for evaluation of the results of their funding played a key part. Museums moved from considering *intent* of their programs (what did they claim to do?) to *output* (what did they produce?) and to *outcomes* (what change did they produce in their audiences?). This change, following similar changes in social services and then education, meant that audiences were central to funding and thus to mission.

Related to this is the rise to prominence in many museums of museum educators. "Audience advocates," as some educators called themselves, were responsible for seeing that exhibitions worked for an increasingly diverse audience. Evaluation became central to exhibitions with questionnaires, focus groups, and other survey instruments becoming a part of the process of exhibitions in many museums. Front-end evaluation helps shape ideas for exhibits, based on public interests and knowledge; formative evaluation helps to shape exhibition concepts and techniques; remedial and summative evaluation helps to suggest improvements or to show funders that exhibitions had the desired outcome. Together, these kinds of evaluations bring the public's voice into the processes of museum work in significant ways.

The third trend in the increasing role of the public in the heritage museum is the rise of audience participation in museum work. This trend, part of a more general participatory culture, is sometimes called Museum 2.0 (the term, coined by museum consultant Nina Simon, derives from Web 2.0, the increased participation, collaboration, and interoperability that became common on the World Wide Web starting in about 2004). It is a part of more general trends in public engagement noted above but includes a more profound sharing of authority with the public.

Like Web 2.0, Museum 2.0 embraces the idea of a two-way interchange and the blurring of lines between authors and readers or curators and exhibit audiences (Simon 2010). While visitors have always been cocreators of meaning, interpreting exhibitions based not only on the intent of curators but also based on their own interests and knowledge, museums have increasingly recognized this, allowing visitors to suggest collections for acquisition, choose objects for display, display their own collections in museums, "tag" collections both online and in the museum, and to add their own labels to exhibitions, among other experiments.

Future Directions

The notion that the museum is fundamentally for the publics that use it and should be shaped to their needs and desires – rather than about museum staff expertise, collections, or research – remains a contested one. The contest of ideas about the role of the public in museums and the compromises and synergies that it promotes provides for some of the most exciting opportunities in museum work today.

Cross-References

▶ Cultural Heritage and the Public
▶ Museums and Memory Experiences
▶ Public Humanities and Cultural Heritage

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Heritage Research and Visitor Planning

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Introduction

Visitor planning and management are crucial to achieving the sustainability of resources presented and the effectiveness of the educational messages imparted in the visitor experience. Increasingly, the world is developing an experience economy. In terms of visitor planning, designing meaningful and engaging visitor experiences is also becoming as important as managing physical impacts. Archaeological heritage assets are also meaningful in more than one context and planning should take into account pluralism in their presentation by using the most comprehensive heritage research available, as well as paying attention to physical planning issues, such as visitor flow. Accordingly, this entry will discuss planning principles and models for managing physical impacts of visitation, as well as a few examples of the measures essential for ensuring a memorable and educational visitor experience.

Definition

Visitor management has been defined as "the management of visitors in a manner which maximizes the quality of the visitor experience while assisting the achievement of an area's overall management objectives" (Hall & McArthur 1998: 107). This definition would fit with that for most archaeological heritage sites, but perhaps not purpose-built facilities, such as museums, which tend to act as if visitor management is not a distinct activity. Accordingly, museums tend to submerge visitor management for archaeological assets among a number of planning and management concerns.

Underlying Principles

The three key books that have influenced the development of visitor management for archaeological assets in most cases deal with both heritage sites and museums (Hall & McArthur 1998; Leask & Yeoman 1999; Swarbrooke 2002). Hall and McArthur (1998) outline a range of possible visitor management models for heritage sites, from those developed directly for mainstream tourism attractions (e.g., Recreation Opportunity Spectrum) to those that have been applied more commonly to archaeological and other heritage sites (Carrying Capacity and Limits of Acceptable Change approaches). Leask and Yeoman (1999) principally advocate an Operation Management

Heritage Research and Visitor Planning, Table 1 Underlying principles of visitor management for archaeological assets (Based on McKercher & du Cros 2002 and own later research)

Themes	Principles	Explanatory notes
Nature of archaeological assets	Not all archaeological assets are suitable for visitation or should be visited	Some assets may be unsuitable for a number of environmental, social, or political reasons
	Purpose-built facilities, such as museums and visitor centers, are easier to manage well for visitation than archaeological sites	Although this seems obvious, resources are not always allocated in a way that reflects this principle or protects the asset
Factors influencing visitation levels	Access and proximity to large population centers and easy transport dictate the potential number of visitors	Consequently, remote assets will have to be very appealing or well known to attract visitors. Also, popular assets may need congestion management to prevent impacts
	Time availability influences the quality and depth of experience sought	Some visitors may not allow themselves or be allowed by others to spend much time during the visit
Visitor behavior	The visitor experience must be controlled, which in turn controls the actions of the visitor	Careful design of the activities the visitors' undertake is essential to the first stages of planning. It will also govern expectations of the visit later on
	Visitors want controlled experiences	Most visitors are risk adverse
	If visitors encounter engaging interpretation or activities, there is likely to be less damage to assets	Research has shown that bored or unhappy visitors are less likely to absorb conservation messages
Visitor experiences	Visitors differ in depth of experience sought	Marketing research is therefore essential as part of visitor management and planning
	Visitors want memorable and enjoyable experiences	Who would not? However, this aspect does not always get directly addressed in planning
	Updating and improving interpretation needs to be an ongoing process	Repeat visitation, particularly from a local area, is more likely if resources can be found to provide new ways to engage visitors over time
Tourism issues	Not all tourists are alike	Increasingly, popular assets are being visited by tourists from all over the world, so language and other needs have to be taken into account
	Not all archaeological assets are tourist attractions	Tourist market appeal does not equal archaeological significance – they are two different things
	Cultural tourism products may be presented in a challenging and confronting manner, but cannot be presented in an intimidating or accusatory manner	Conservation and other messages cannot be absorbed, if the visitor feels unwelcome or uncomfortable for some reason

System based on Schmenner's Service Process Matrix (1995). Overall, both Hall and McArthur (1998) and Leask and Yeoman (1999) advise the use of specific models in order to assist heritage managers achieve a balance between visitor experience requirements and conservation needs.

In terms of the underlying principles of visitor management in relation to archaeological assets, Table 1 will act as a basis for the discussion that follows.

Key Issues and Current Debates

Key issues for visitor management generally revolve around the initial planning, operations management, and ongoing monitoring and revision of actions. This cycle is often inseparable from other kinds of management for a well-managed heritage asset. Even so, some issues may arise for monitoring efforts that require faster or more frequent revisions. If an archaeological asset is managed with consideration of

service quality, this aspect will often be one that requires frequent attention and revisions.

An example of a current debate regarding visitor management is that regarding whether World Heritage Sites are always managed as exemplars of international best practice and in a way that clearly conveys their outstanding universal values to visitors (Su & Walle 2011). The sad truth is that, despite receiving such a designation, many sites have been inscribed without visitor management plans and a number still lack these instruments to guide the institution of best practices, despite availability of information on the topic (e.g., Pedersen 2002). Taking a step back, the evaluation process for nomination should actually call for more information on possible visitor and tourism development impacts to make this planning easier.

Another delicate issue is that of how to manage visitation of archaeological sites that are close to, or of significance to, particular groups. Asia has a number of significant archaeological sites that either include settlements (Angkor World Heritage Site) or are located close by settlements (Wun Yiu Archaeological Site, Hong Kong) (Miura 2005; du Cros & Lee 2007). Multiple issues that need some consideration in planning and management include shared use, visitor flows, profit from visitation, possible impacts on privacy, use of local volunteers and employees in education/interpretation programs. Archaeological sites that have been more recently found to have significance for particular groups, such as for Stonehenge and Avebury in the UK, where these groups want to conduct rituals or festivals at these sites, need visitor management planning strategies to prevent inconvenience to other users and possible damage to the asset (Morris 2011).

Recent research on visitor behavior and visitor experiences (McKercher et al. 2008) indicates that inappropriate behavior (such as souveniring) can involve a complex set of rationalizations. The visitor may well know that what they are doing is against conservation needs or other interests, but deals with this knowledge in a number of different ways cognitively to assuage their guilt. Strategies to engage visitors before they decide to undertake some activity likely to result in a negative impact are more successful than leaving them on their own to decide. Such strategies generally include greeting and orientation at the start of the visit (Shackley 1999), clear signage, and engaging staff who provide more than just a security function in order to manage the visitors' experience. Accordingly, bored visitors have been found to be more likely than others to engage in inappropriate behavior (du Cros 2007; McKercher et al. 2008).

Finally, a key issue for popular archaeological assets is that of overuse. This is an issue for cases where there are many user groups competing to visit or where the asset is particularly well known, such as some archaeological sites in Europe. Some popular assets are already seeing impacts from overuse as tourism grows to include visitors from developing countries to others' and their own countries' attractions. The United Nations World Tourism Organisation (UNWTO) has issued a series of reports about tourism management and sustainability issues that sometimes include archaeological assets. The Congestion Management at Cultural and National Sites' (UNWTO 2004) set of guidelines is particularly useful in this respect.

Future Directions

Future directions for visitor management of archaeological assets may include more attention to and discussion on international best practices. While funding and resources will always remain a problem for many sites, there still should be more discussion on how new strategies can be used. Even those strategies that utilize community involvement and information communication technology (ICT) can be inexpensive and employed to prepare visitors' expectations prior to arrival and promote better visitor activities that engage the public. Also, visitor management needs to be more clearly recognized as important prior to any kind major promotion or designation of assets.

Archaeological heritage management of assets for tourism means more partnerships with

tourism stakeholders. For instance, archaeological authorities interested in responsible tourism are finding that there are a number of initiatives in place from intergovernmental sponsored projects to self-regulation of tour operators (UNWTO 2011; Responsible Tourism 2011). Marketing still has an important role to play in visitor decision making and behavior, and so heritage managers should try to employ more and increasingly sophisticated marketing research techniques to aid them in understanding how to reach their publics.

Overall, tension remains between resourcing services for the visitor experience as against the asset's long-term well-being. Visitor management could be seen in this context as a means to "generate a benefit between the heritage manager and visitor" (Hall & McArthur 1998: 138). While it tries to provide as high a quality visitor experience as possible from within its resources, it must also provide this service without allowing a reduction in the values of the asset. Some issues for future heritage managers and others to research may include: increasing/decreasing visitation levels; visits involving shorter time frames; increasing public expectations; increasing mobility, such that nowhere is truly remote; changing markets; increasing politicization of heritage (in some countries); unpredictable weather conditions; and finally, unpredictable and often decreasing resourcing.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Heritage Tourism and the Marketplace
- ▶ Marketing Heritage

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Heritage Sites: Economic Incentives, Impacts, and Commercialization

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Introduction

Commercialization of heritage sites has increased dramatically, particularly as tourism has grown into the world's largest service industry. Commercialization has created opportunities for investment and income production, and generated debate about the economic and noneconomic impacts of the process on sites themselves and on the people who live and work around heritage sites. The debate over commercialization raises ethical, practical, and technical economic questions that are of importance to archaeologists.

Definition

Tourism and other activities around heritage sites create opportunities for governments or entrepreneurs to generate economic activity. The organization and exploitation of these opportunities is commercialization. The economic impacts associated with the commercialization of heritage sites may be positive, for example, on-site job creation and admission fees associated with sites and museums themselves, or off-site economic benefits such as job creation and expansion of business opportunities in nearby communities. However, commercialization also may be criticized for negative impacts such as destructive wear and tear on the site from tourism or degradation of the indigenous character of the locality. What is considered to be a "positive" or "negative" change will be different for each site and its context. Incentives, the monetary and nonmonetary inducements that drive much human behavior, are often critical in determining whether positive or negative consequences accrue from commercial activities around heritage sites. For archaeologists, one hoped-for result created by the benefits of commercialization is increased incentive for local people to protect sites themselves.

Key Issues/Current Debates/Future Directions/Examples

Commercialization

Tourism creates the vast majority of commercial opportunities for heritage and has grown remarkably in the past 50 years due significantly to visitors' interest in the cultural, historical, and archaeological displays available in the countries to which they journey. Tourism enables a variety of commercial activities at heritage sites including guiding; retail sale of books, souvenirs, or refreshments; collection of fees for admission or entertainment; and economic activity associated with operating and maintaining the site. Outside of the sites, one generally encounters local microeconomies of shops, transportation concerns, restaurants, hotels, and other retail and service businesses created to satisfy the heritage tourist. This basic pattern is true from Chichen Itza in Mexico to the British Museum in London, often making heritage sites important commercial enterprises individually and collectively making heritage a key economic asset. While perhaps less traditionally seen as commercial, archaeological excavations, particularly sponsored field schools, and other conservation or heritage-related projects also create economic opportunities associated with sites. While varied, it can be generally stated that field projects tend to produce primarily local impacts through direct employment and provision of supplies.

While commercialization can create jobs and revenues for a variety of stakeholders, it may have detrimental effects. For example, the preparation of a site to appeal to the tourism market may displace long-standing residents from newly demarcated parks, looters may become aware of the value of artifacts unearthed at the site, or the aesthetic value of the site may be disrupted through construction of facilities designed to

service tourists and staff. Increased visitation risks potential degradation of the physical site from foot traffic or pollution. Some critics decry the "commoditization" of heritage that detaches the meaning of traditional artifacts, practices, and people from their original context and presents them for display and enjoyment by visitors who may not appreciate their cultural significance (see Timothy & Nyaupane 2009: 56–69).

Economic Impact

Commercial activities around heritage sites create economic flows to companies, local communities, and countries. These flows can be beneficial by creating employment and revenues, thus contributing to economic development. Direct benefits can include the jobs created at heritage sites and the "value added" created in the economy by the various suppliers, tradespeople, and service industries who support the site. Many, though not all, heritage sites require substantial investments in conservation, signage, and site preparation to receive visitors. Each of these activities creates jobs and value added. However, the introduction of new economic activity can have negative consequences. With tourism, jobs created are often low skilled and poorly paid; there may be unplanned and rapid migration to the area; and a reliance on tourism may reduce local economic diversity, which can have adverse longer-term effects since demand from tourists is highly unstable.

In addition to direct benefits, economists also have identified indirect benefits that are known as "multiplier effects" from these sorts of activities (Stynes 1997; Bowitz & Ibenholt 2009). To illustrate, an investment in a new retail shop generates demand for products and services to build and stock the store. Locally procured products create employment and generate profits for their producers. Some portion of the money spent to stock the store will be saved, and the rest will be used by suppliers to restock their warehouses or pay workers or themselves. Some portion of that money also will be saved and the rest spent again. The economic impact of an investment is thus multiplied through this chain-reaction process. Computing multipliers is complex and a subject of considerable technical debate. Their magnitude depends on whether the money triggering the effect originates outside or from within the economy under study, the source of investment capital, and the rate of spending or saving of the various members of the value chain. Heritage managers need to understand how much of the multiplier re-spending occurs within their targeted economy (e.g., a local village) and how much is lost or "leaked" outside that area or beyond the stakeholders of the heritage site. For example, if souvenirs sold at a site are made in another region or country, much of the value goes to those foreign producers. Similarly, if staff members come from other regions or accommodation is owned by a national or international chain, their incomes and revenues are "leaked" outside the immediate region.

Governments often benefit from commercialization because they generally are responsible for heritage sites and often earn revenues from ticket sales and on-site services or from taxes on the private tourism sector. Sales to foreign tourists are counted as "exports" and can be a key source of foreign exchange in many countries. Revenue from sites may be used by governments to benefit the sites themselves, be redirected to subsidize other sites or heritage in general, or may simply be used to support government activities. Corruption is not unknown.

The overall economic impact of all this activity is substantial. Globally, in 2011, tourism directly generated $2 trillion in gross domestic product (GDP) and 98 million jobs worldwide and indirectly constituted 9.1 % of global GDP (World Travel and Tourism Council 2012: 1). Visiting heritage sites is a primary driver of this vast industry. For example, in 2011, 41.3 % of all visitors to the United States surveyed in a recent study said they planned to visit historical places and 24.1 % planned to visit cultural or heritage sites (Office of Travel and Tourism Industries 2012: 10). It is likely that heritage plays a leading role in the global tourist economy, although there are few studies concerning the exact magnitude, and that it is of particular value to developing countries with weak export industries. In one study that took into account

direct and multiplier effects, the Heritage Lottery Fund of the United Kingdom concluded that heritage tourism drove 4 out of 10 overseas visits to the UK in 2009 and, even when natural sites are excluded, generated 270,000 total jobs in the UK and accounted for £11.9 billion of Gross Domestic Product (Heritage Lottery Fund 2010: 1–3). At the local level, there are relatively few studies that focus on archaeological sites and calculate the magnitude of their economic impact. More generally, the methodology used in local economic impact studies has been open to criticism (Bowitz & Ibenholt 2009).

Incentives

Incentives are the inducements that drive personal behavior. They may be pecuniary – working for wages or seeking to profit from an investment – or they may be nonfinancial. Economists argue that individuals whose behavior is incentivized by personal gain are likely to be more productive and efficient; however, actors driven by purely economic incentives may pay little heed to cultural or aesthetic values that are important to indigenous people or to heritage professionals. The noneconomic values associated with heritage sites, such as their cultural, social, religious, and other values, incentivize the behavior of individuals, communities, and organizations toward those sites in ways that may not meet economists' tests. For example, heritage sites typically are managed and staffed by government employees, often including archaeologists and heritage professionals whose behavior may be motivated more by intellectual interests, career goals, and ethical and practical standards established by their professional affiliations than by the pursuit of economic efficiency. Similarly, local residents' attitudes toward protection of the site and their cultural identification with it may be changed, either positively or negatively, by commercialization. Correctly analyzing the source of individuals' incentives can play an important role in understanding why people behave as they do, whether specifically in relation to heritage or more generally. From these contesting views of how best to incentivize behavior and manage human activities emerge a host of issues relating to the commercialization of heritage sites.

Issues

Site Protection. Those who enjoy an economic benefit from a heritage site may have an incentive to conserve and protect that site, and even to invest in it to continue to receive that economic benefit. The use of economic benefits to incentivize protection of places has been widely applied in environmental conservation (McNeely 2006). The concept of ecotourism relies on using tourist revenues to make natural resources economically valuable for the groups that otherwise may cause them harm or that have the opportunity to protect them. Similarly, Integrated Conservation and Development Projects use a broader range of development aims to incentivize conserving behavior. While widely used, these methods have had mixed success, encountering problems that include difficulty in getting economic benefits to intended groups (e.g., the local population), achieving a linkage in people's minds between the economic impacts and the natural resource, and producing the desired behavioral changes as a result of the economic incentives (de Vasconcellos Pêgas & Stronza 2008). Parallel issues have been seen with heritage commercialization projects that have preservation as a central objective.

Privatization. Heritage sites are often referred to by economists as public goods, tangible or intangible assets that by their nature benefit people in common in ways that cannot be managed purely through private ownership. Private goods, by contrast, are those that can be owned and controlled for the benefit of individuals for the purpose of making profits. In economic analysis, an entrepreneur incentivized by the opportunity to earn a profit on investment brings to the process of commercialization financial capital, operational skills, knowledge of customer desires, and the willingness to take a financial risk. In the case of heritage sites, market theorists welcome the emergence of privately owned businesses to deliver tourist services because they believe that inefficient firms will be driven out by more efficient competitors that deliver services at the

quality and price customers require. Government-owned enterprises, facing no such competition, are regarded by some economists as inherently less efficient than commercial counterparts. To many economists, by asking entrepreneurs rather than government employees to manage the activities of heritage sites, virtually every sort of commercial activity associated with a heritage site may become "privatized" and subject to individual profit incentives. In the extreme, and a particularly vexing issue when government budgets are under stress, governments may ask whether they can afford to subsidize archaeological and heritage parks and sites at all or whether sites should be subjected in their entirety to a market test and privatized or forced to survive on income they earn from visitors and visitor services. While market incentives are generally credited with achieving efficient allocation of scarce resources within a given market situation and time frame, economists also recognize that "market failures" occur because the conditions required for markets to produce efficient outcomes, ranging from free mobility of resources and numerous competitors to substantial information about the future, may not be satisfied. This is particularly true in the case of heritage sites (Mason 1999). These market failures undermine the expectation that the results of privatized activities will necessarily be the most efficient possible for the local or national economy.

Benefit Distribution. Who enjoys the benefits from commercialization can lead to contention among local, national, and international stakeholders, each of whom may assert rights to the site and its benefits. Local residents around a heritage site may be disadvantaged in this contest in many ways. They may lack access to the banking system, to investment capital, or to political power to obtain permits or approvals, and they may lack the market knowledge and experience needed to compete with more sophisticated outside parties, especially national or multinational corporations. The distribution of benefits therefore depends on the capability of stakeholders to take advantage of economic opportunities, as well as the multiplier benefits and leakages discussed above. Whether any particular distribution pattern is preferable will depend on the political, social, and economic context of each site and the aims of any commercialization project. Studies into the distribution of economic benefits have described difficulties in targeting certain groups despite management plans designed to do so (Adams 2010; Kausar & Nishikawa 2010).

Investment Decisions. A key issue is how one determines which sites to invest in. Economists often take a "benefit/cost" approach to such questions. In principle, this is a straightforward matter of measuring the benefits of a project, in monetary terms, versus the investment and operating costs of the project. If the value of the benefits exceeds the costs, the project may be seen as having a positive overall return. If not, it is either a poor investment or requires a government subsidy to continue providing benefits to the public. However, the measurement of benefits in these matters can be tricky because many intangible "benefits" of heritage sites cannot be reduced to monetary terms. These may include the value of local or national identity attached to a site, the value to indigenous people of sustaining aspects of their culture that are not shared with fellow citizens, the scientific or historical value of preserving artifacts from the past, or the general social value from uplifting the public through education that results from visiting heritage sites. Each of these and many other "intangible values" may be valid to politicians and citizens alike, but each can be challenging to monetize for purposes of cost/benefit comparisons. Furthermore, there may be intangible costs. Opening a site to the public can lead to degradation of the site that destroys its value both for scientific and tourist purposes. Indigenous peoples may object to the commercialization of an important sacred place. These are examples of "costs" from opening a site to tourism that also are not easy to quantify in monetary terms. Intangible benefits and costs may be understood and measured through techniques such as contingent value analysis (CVA) or choice modeling (CM) which can offer heritage managers insights to compare the costs of investing in and operating

heritage sites (McLoughlin et al. 2006). Both CVA and CM describe hypothetical scenarios for heritage resources and ask respondents to evaluate their responses to changes, either in monetary amounts (CVA) or in comparison with other scenario options (CM). The results of CVA or CM studies can be aggregated in various ways to suggest a measure of the social benefits or cost arising from investments in heritage sites. The method is highly contentious within the economics profession because questions are posed under artificial circumstances, often relating to hypothetical situations, and are subject to numerous technical and psychological critiques. Nonetheless, at this point, CVA and CM are two of the few tools available to place a value on intangible benefits that can be compared to the costs of investing in and operating a heritage site.

Time Frame. The various economic principles applied to the analysis of commercial activity at heritage sites are all applications of neoclassical economic theories developed to explain the behavior of firms and consumers in short-term market situations. While the theory may be applied sensibly to some long-term questions, such as investment returns, one may question whether the time horizon associated with heritage sites—measured in decades if not centuries – is one that economic principles can address. The question whether to preserve, conserve, and open a heritage site to the public has implications that extend well beyond one individual's lifetime. Policy makers assessing heritage site issues, regardless of their disciplinary background, thus face difficult choices that transcend generations in their importance. This problem may constitute an argument for government intervention in the management or regulation of commercial activity at heritage sites.

Sustainability. The question of time frame leads to the topic of "sustainability" and its implications for the government/private sector debate. Nearly three decades ago, the Brundtland Commission defined sustainable development as a process that "seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future" (World Commission on Environment and Development 1987: Ch.1 Par. 49). Applied to heritage sites, that definition raises the question of who should manage the process of commercializing heritage, over what time frame, and to what ends. As noted, governments historically have performed this role, and some critics argue that market-based management solutions are best despite market failures and the short-term orientation of market behavior. Others argue that a better route is to lodge responsibility in community-based structures established to manage common resources such as heritage sites. This debate whether "top-down" or "bottom-up" control over heritage resources is most sustainable and has practical, theoretical, and political aspects that yield no single solution (Binswanger-Mkhize et al. 2010).

Role of International Organizations. Finally, international organizations also play an important role in the commercialization of heritage resources. UNESCO certifies World Heritage Sites, those heritage sites deemed to be of the greatest global importance, and requires management plans and detailed schemes both to conserve and preserve the site and to exploit it for economic purposes through tourism (Robinson & Picard 2006). International financial institutions, including the World Bank and regional development banks, provide capital for infrastructure investments, such as roads, electrification, and water systems, that are at times associated with the development of heritage tourism (Cernea 2001). Various nongovernmental organizations, such as the World Monuments Fund, the Sustainable Preservation Initiative, and the Global Heritage Fund, are experimenting with community-based projects intended to create economic benefits for localities adjacent to important archaeological sites. Government entities such as USAID in the United States and the European Commission also are significant underwriters of projects to engage heritage resources to promote economic development. Usually, these international programs are undertaken with the approval and involvement of national

governments, although increasingly analysts are looking at alternative, country-specific, or community-based models to address the operational failures of past top-down-driven programs or to redress the unequal distribution of benefits from many past projects (Timothy & Nyaupane 2009; Adams 2010).

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Sustainability and Cultural Heritage

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Heritage Theory

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Introduction

The field of heritage studies burst onto the academic scene in the late 1980s in tandem with the birth of critical museum studies, rise of the new social history, growth of postcolonial theory, the cultural turn in anthropology, and so forth throughout the humanities. Over the past three decades, heritage studies have ranged from descriptive to theoretical, local to worldwide in scale, focused on developing and developed societies, and directed at deep prehistory through to the present day. A multitude of issues in countless places have been addressed, sometimes repeatedly with different disciplinary nuances.

Definition

The retheorization of heritage studies as "critical heritage studies" (henceforth, CHS) focuses on many topics of interest in the humanities and social sciences overall: bodies of knowledge, class, colonialism/postcolonialism, dominant rhetoric/authoritative discourse, gender, globalization, identity, ideology, institutions, memory work, nationalism, negotiation, political economy, power structures, and the reproduction of hierarchy, race, representation, resistance, spatialities, technologies, and voice. CHS privileges some of these interests more than others and adds other concerns particular to it, such as cultural rights and human rights. Fundamentally, CHS examines "how power, identity and knowledge intersect with the practice, interpretation, display and management of cultural heritage" (Baird 2010). Harrison and Linkman pithily define the scope of CHS as "understanding how heritage functions in societies and the relationship between heritage and power" (2010: 77). Basically, CHS investigates top-down/official and bottom-up/unofficial processes and the relationship between them (Harrison 2010a: 8-9). A CHS approach reveals competitive intersections of power (political, economic, other), knowledge (monopolized/shared, authoritative/avocational), discourse (official/outsider), and interest groups (professional, international, national, popular, other).

CHS is sensitive to those who typically receive inadequate attention from the wielders of power. CHS recognizes the different and often contradictory understandings of the nature, ownership, value, meaning, and significance of heritage that are held by official interlocutors and unofficial sectors of the population. It attends to the varied ideologies and economies that underlie the uses of heritage. For instance, CHS responds to the commodification of heritage by the tourism industry and its nation-state partners. CHS valorizes non-Western as well as Western approaches to heritage conceptualization and practice. CHS considers the range and vast differences in scale of intangible heritage while retaining interest in the tangible manifestations of heritage that are well represented in heritage research. CHS advances the discipline of archaeology – so prominent in the heritage field – from its traditional interest in sites and monuments (the ultimate tangibility) to the inextricably associated intangibilities of the past and present.

Key Issues

Knowledge Brokers

CHS is very interested in institutional and vernacular decision-making as this reveals and enacts relations of power and domains of knowledge. CHS interrogates unofficial expressions of heritage and different (including non-Western) practices of heritage preservation (e.g., Karlstrom 2005), management, and promotion, including how these, at the local level, challenge official prescriptions and representations. Thus, CHS eschews authoritative positionality (e.g., Smith 2006).

Governance

Governance is the capacity of non-state organizations to accomplish something without the legal competence that states have to command their fulfillment (Czempiel 1992: 250). Instead, global governance may draw on moral power to advance its agenda. Global governance is of particular interest for CHS because it characterizes entities like UNESCO. Kirshenblatt-Gimblett observes that UNESCO's "World Heritage is one of several ways of envisioning and constituting a global polity. The goal is an active cosmopolitan citizenry" (2006: 189). But that global citizenry actually has little say in global cultural governance because of the monopoly of decision-making and lack of transparency in UNESCO's World Heritage Committees.

The authority of UNESCO itself and of national heritage institutions is being challenged intellectually by CHS scholars and also on the ground by a new form of heritage organization: the independent global-reaching heritage NGO that is unencumbered by the bureaucratic and diplomatic baggage of the United Nations/UNESCO and has its own private sources of financial capital. NGOs occupy an interesting intermediary terrain as knowledge brokers for they operate outside the self-policing of academic peer review and professional societies. The World Monuments Fund and Global Heritage Fund are exemplary as heritage NGOs. They have created a community of heritage-sympathetic individuals and sponsoring foundations. They are able to contract talented practitioners from the necessary disciplines to go into a country and, commando-like, tackle a perceived problem.

Following a recent discussion by Kate Clark (2008: 92), the following principles of heritage governance fall fully within the CHS agenda:

- Enable multi-sector participation.
- Formulate a strategic vision that encompasses human development and take into account historical, social, and cultural complexities.
- Insist on responsive performance by institutions.
- Maintain transparent accountability to the public and all stakeholders.
- Practice fairness involving equity and the rule of law.

The Contribution of Legal Scholars to CHS

A number of talented legal scholars are working within and advancing the CHS framework. Rosemary Coombe (2010), for instance, explores the global legal geography of cultural rights and cultural property as framed by international legal documents of a compulsory nature as well as various forms of "soft law" that recommend or proscribe certain actions. She explicitly unwraps neoliberalism as the context in which heritage operates and correctly argues for the inseparability of tangible and intangible heritage. Coombe recognizes new forms of social organization and their expression in social movements. Here we see CHS attending to the grassroots but with keen awareness of the significantly larger processes and agents in whose context they act. Other lawyers include Yvonne Donders (2008, 2009, 2010), Ana Filipa Vrdoljak (2009), and Jane Anderson (2009).

Heritage as Performance and Process

Whereas much previous heritage scholarship approached its object of study as fixed, something that can be apprehended because it is "there" (whether tangible or, more recently, intangible), CHS emphasizes the dynamic process of heritage production and the vernacular performativity of heritage. CHS denies the separability of tangible and intangible heritage. As David Crouch observes, "heritage is continually emergent in living" (2010: 57), what he calls "perpetual performance," which is intrinsically related to cultural practice or the practice of culture in a Bourdieuian sense.

Festivals are an obvious example of heritage as performance and process (Kirshenblatt-Gimblett 1998; Harrison 2010b). Some formally staged performances in the tourist circuit are also very interesting to CHS scholars, especially when the nation-state or other official entity expresses interest in them or exerts control (see Bruner 2001).

This is because "choices in repertoire and style are ideologically charged" (Kirshenblatt-Gimblett 1998: 65).

Memory and Landscape

Memory and landscape are at the heart of many diasporic heritages. Landscape – physically, socially, and cosmologically constructed – grounds heritage. Moreover, some landscapes are imbued with tragedy: a "heritage that hurts" (e.g., Sather-Wagstaff 2011) and places of pain and shame (Logan & Reeves 2009). Keller gives the example of geographies of memory and identity under conditions of migration and diaspora in the Melanesian archipelago, whereby "the heritage principles derived from emplaced community life are clearly still relevant... as generative principles embodied in memories subject to transformation and relevant to forming new dispositions and principles of habitus" (2009: 143). Fennell observes of memory that a "particular social group's construction of their cultural heritage often entails a selective emphasis on specific subjects within their history. The selective process of heritage construction includes instances of elision and omission as well as those of remembrance and commemoration" (2009: 149).

Heritagescapes

Across a range of disciplines, we are now awash in *scapes*, beginning with the social constructivist reengagement with *landscape* (e.g., Cosgrove 1984) and especially since Appadurai's (1996 [1990]) proposal of five dimensions of global cultural flows – all *scapes*: *ethnoscape*, *mediascape*, *technoscape*, *financescape*, and *ideoscape*.

It was inevitable that *heritagescape* would be coined (see Garden 2006). Among the many uses of the term today, Mitchell and DeWaal (2009) define heritagescape as a landscape of historical buildings cum amenities, a place of commodified heritage. Here we have awareness of the economic forces driving heritage construction (literally and figuratively). Their work resonates with earlier studies of the manufacture and consumption of heritage (see, e.g., AlSayyad 2001).

Michael Di Giovine (2009) analyzes the *heritage-scape* that UNESCO has created, deploying the term in hyphenated form with the full weight of Appadurai's disentanglement of globalization. He asserts, correctly, that UNESCO is engaged in an "ambitious placemaking strategy designed to rearrange the geopolitical landscape into a reconceptualization of the world... the heritage-scape is a real social structure which creates real material effects on a globally distributed population in accordance with UNESCO's long-term goals" (2009: 6). This apprehension becomes a new point of departure in CHS.

Activism

CHS challenges the material-based notion of heritage in favor of recognition of public or community-based assertions of heritage and history (Waterton & Smith 2009). Heritage is not simply past looking, building upon dead remains excavated by archaeologists, be they grand or small. The issue is what living people *do* with those remains in the present, working toward the future. Indeed, criticizing the old model of heritage as material, Denis Byrne argues for "a new model: heritage as social action" (2008: 162; see also Harrison 2010b).

Not content to remain in the theoretical sphere of "studies," CHS has an activist dimension that builds, for instance, on applied anthropology's laser focus on real-world problems of race, gender, class, knowledge, political power, and the naturalization of discursive and embodied privilege. Examples include the work of Australian colleagues with Aboriginal communities (Davidson 1995 inter alia), "teaching archaeology as a revolutionary act" (Pyburn & Shepherd 2005), and African American community mobilization (McDavid 2004; Mullins 2004).

The archaeology of the contemporary past is the study of the present as the present in terms of its materialized pathologies of class, race bias, economic disparities, conflict, labor, and human rights – issues of great importance to any engaged person today. The papers collected by Rodney Harrison and John Schofield (2009) and Larry Zimmerman's (Zimmerman & Welch 2011)

work on the archaeology of the homeless are remarkable for their incisive and unflinching treatment of these issues, so different from the usual past focus of archaeologists.

Future Directions

Although the theoretical pendulum swings cyclically in the humanities and social sciences, in the case of CHS it is difficult to believe that this perspective will recede, since lack of attention on the ground to its concerns has resulted in too many multiparty heritage confrontations or deficient heritage management decisions, whether tangible or intangible in focus.

CHS has demonstrated that heritage is not a monolithic project. Rather, heritage should be conceived as an arena where "various issues are debated, negotiated, fought out, forced and manipulated by representatives" (Strauss 1991 [1978]: 124). Although not all participants have an equal voice, the opening of CHS is a dramatic advance in heritage studies and, to an increasing degree, heritage practice.

In decades past – as is well documented in early heritage instruments (conventions, charters, declarations, etc.) – heritage was an extremely limited arena with few participating social worlds. Indeed, it was the realm of architects and conservators, particularly. As living culture came to be regarded as part of the built heritage, the social worlds expanded, but it has taken a long time for primary cultural stakeholders – the communities – to be meaningfully involved. CHS will be more focused on the intersections of macro, midrange, and micro levels of social worlds.

CHS will increasingly involve institutional ethnography, particularly of NGOs and their relationship to the national entities charged with the care of cultural heritage (tangible and intangible) and to the local stakeholders whose heritage it is. This focus also speaks to the increasing scrutiny of UNESCO and heritage policy overall by CHS scholars.

CHS scholars will not just write about their discomfort with the purveyors of "authorized heritage discourse" (Smith 2006), they will increasingly demand to be heard in practical terms.

Attention to cultural rights, human rights, and cultural property/intellectual property rights will grow in importance. Issues of environmental heritage and the biological environment in which heritage operates will also become significant in CHS. Bioprospecting is an example (see Pan 2006).

CHS will increasingly focus on the economic and social dimensions of sustainability in the face of tourism's linkage with economic development and its propensity to consume vernacular life and its meaning-laden built environment.

CHS will become particularly concerned with historical discourses of citizenship and their evolution into new discourses, as well as with reconfigurations of citizenship in the current global world order. An important aspect of this issue is networked technologies of citizenship and their relationship to democratic movements and the generation of individual and collective subjectivities (see especially Stevenson 2003). We need to attend more to new social, cultural, and political forms of participatory heritage.

Western and especially Anglophone scholars dominate international academic forums on cultural heritage. If CHS is to be true to its own stance, it will need to more actively engage with non-Western scholars and heritage practitioners who may hold very different notions of what heritage, heritage studies, and heritage management are. Since its creation in 1986, WAC (World Archaeological Congress) has striven for equitable incorporation of colleagues and viewpoints from outside the dominant countries.

As the context of heritage studies changes, so, too, does its empirical focus and theorization. Today's transnationalism, multiscalar politics, and multidimensional and diasporic societies call for a different kind of research and fieldwork than that of the traditional community ethnography, richly nuanced though it has been. The situation of heritage today is so complex that its investigation and professional practice must be multisited, transdisciplinary, and longitudinal – involving the historic, present, and future study of culturally

diverse local communities, regional governments, national offices, public policy, foreign players, and their networks and discourses. Archaeologists are increasingly subscribing to the CHS agenda.

Ultimately, CHS should produce not just academic scholars but also public practitioner-interlocutors who can advocate before an audience beyond university walls and directly engage policy makers.

Cross-References

- ▶ Heritage and Archaeology
- ▶ Marketing Heritage
- ▶ Social Memory in Archaeological Theory
- ▶ Uses of Heritage

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Heritage Tourism and the Marketplace

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Introduction

Tourism destinations attract visitors for many reasons, and heritage is high on the list of things many travelers want to experience. Visitor expectations about the nature of the place and the experiences they will have there will be set in advance of their visit, based on what they have read, seen, or heard.

Successful tourism at heritage places must incorporate regard for heritage values and integrity. Through marketing, it must create accurate expectations of the nature of the place and the experiences available to selected groups of potential visitors (target markets). These experiences should be designed to engage visitors with the place, and help them understand its meaning. Host communities should be able to collaborate actively in both heritage management and tourism activities (ICOMOS 1999, 2008).

The heritage tourism marketplace is global but product and consumer bases differ at local level, depending on the nature and location of the heritage place and the potential market segments it might attract. Understanding of both domestic and international expectations and markets is increasingly important as use of electronic and social media expands along with globalized tourism (European Commission 2009; Govers & Go 2009).

Balancing these potentially conflicting elements to achieve outcomes that meet heritage, community, industry, and customer needs poses continuing challenges.

Definition

Heritage tourism includes both production and consumption of "experiences" based on places or collections with heritage or historic value. This value need not always be formally recognized in official heritage lists, but is realized at community level. It often includes intangible cultural elements as well as material culture. The "marketplace" in this entry refers to the global tourism marketplace.

Key Issues

1. Destinations and attractions are the product component of the tourism marketing mix (Ritchie & Crouch 2003; Pike 2008). Heritage

attractions are part of the product mix of destinations, and include interpretation centers, shops, thematic reproduction, trails, and staged events, as well as the original site, place, or collection.

In some cases, sites can be such strong attractions that they create destinations (Timothy 2011: 276-7). Sites like these usually have World Heritage status, like Machu Pichu (Peru), Angkor Wat (Cambodia), Pompeii (Italy) and Uluru (Australia). Most cultural heritage sites, however, act as attractions for destinations that people visit for a variety of reasons. In this case, they compete with all other attractions in that destination, as their destination competes with all other destinations

Images of destinations and attractions are projected into marketplaces through a wide range of media. They are the vehicle through which destinations compete in the marketplace (Pike 2008: 201) and are central to branding and positioning. Visitor expectations of what a site will offer are frequently set well in advance of the actual visit, and their behavior on site reflects those expectations.

2. For any product to succeed in a marketplace, it must set itself apart from its competitors (Pedersen 2002: 53) and convince potential customers to prefer it over others. Where the attributes of an attraction or destination are very strong, these can create the necessary points of difference. Heritage classification is often used as a point of difference, and World Heritage listing is particularly valuable as a visitor attractor.

   In heritage tourism, the heritage values of the place should form the basis of its distinctive difference. Once heritage values are identified and accepted by stakeholders, they can become a springboard for planning appropriate tourism experiences and activities. Such experiences of the visitors are often used as market differentiators.

   Frequently, this does not happen. For instance, Uluru is a sacred place for the indigenous people of central Australia, who strongly prefer that visitors do not climb the rock. Yet many tour companies develop itineraries featuring "the climb" as the essential experience at Ayers Rock (the preferred tourism marketing term for Uluru) rather than taking a tour with an Anangu guide who can give unique insight into some of the meanings of the Dreaming site Uluru.

3. "Authenticity" is often used as a selling point, but tourists are often seeking a sense of "otherness" rather than authenticity per se (Timothy & Boyd 2003: 239-55; Timothy 2011: 103). The concept of authenticity itself is constructed differently in the tourism and heritage sectors, (Wang 1999; Smith et al. 2010) and in different parts of the world. Tourism, for instance, is likely to focus on the "authenticity" of the visitor experience, which may mean a tour is led by local guides and local food is served at meals. For heritage managers influenced by western paradigms of heritage, their main concern is likely to center on integrity of physical fabric, but in Asian cultures like Japan, there is no such concept as authenticity (Winter 2009).

   It is never possible to recreate the past accurately, nor to offer a single version of heritage as the only one that is true or authentic. Using an informed understanding of heritage values offers a path toward honesty in presentation, if not authenticity.

   The need for visitors to enjoy themselves, to have a positive experience, is likely to be paramount for a tourism operator, and that is what they will promote. If cultural and heritage values are not to be compromised through tourism, heritage managers need to be able to convince tourism operators that it is in their interest to offer and promote an experience that relates to the heritage values of the site.

4. Selection of elements of heritage for tourism promotion is political, in the sense that it favors some histories over others (Timothy 2011: 118-39) and can be contentious (Graham & Howard 2008). Representations of the past are always selective and subjective. The reductive processes of branding and positioning for marketing aim to arrive at a simple, clear statement. "Honest" representation of heritage and culture through marketing is

bound to be problematic because complexity and multiple voices are difficult to convey accurately in a way that will entice visitors.

As Graham and Howard (2008: 13) note, "[when] heritage place meanings are contested, communication, and control over it, are potentially powerful weapons." For many countries, heritage which is closely linked to cultural and national identity is their main tourism selling point. Often, heritage tourism operators need to consider whether they will reinforce a national position or interpretation of the past. The following questions are raised:

Which strands of heritage are chosen for representation and promotion? Are representations accurate? Do they create or reinforce stereotypes of past events and groups of people, for instance, of different races, classes, or religious faiths? Will minority views or unpleasant events and memories (such as war, slavery, massacre) be represented? Whose viewpoint will prevail? Which aspects will attract money for development? Which elements will attract paying visitors? How will these factors influence decision making? Baram and Rowan (2008) and Hitchcock et al. (2010) put forward case studies examining these and related questions in Asia, Europe, the Middle East, and North and South America.

5. Potential markets for heritage tourism vary with nature of the product and the experiences it offers at a location and with the demographic and psychographic profiles (values and interests) of potential visitors. Visitors have different interests, motivations, behaviors, and desired experiences – for instance, somebody traveling to visit cultural monuments will have quite a different motivation, set of expectations, and likely behaviors than someone who visits the same monument but is only incidentally there (Pedersen 2002: 24).

To enhance their competitive position in the cultural and heritage tourism marketplace, many governments and industry associations carry out research that identifies their target markets and potential matches of different types of product with different market segments. For instance, the Canadian Tourism Commission (2002 n.p.) "identified culture in its broadest sense as a key component of the tourist industry" and began to work on a business strategy to "position culture and heritage as a key product line for Canada's tourist industry." The New Zealand Government commissioned a report on the demand for cultural tourism in that country (Angus and Associates 2008). Both these reports analyzed their potential cultural and heritage tourism product, and the market segments to which these products might successfully be promoted. The European Commission (2009) has also published research that identifies potential markets for cultural and heritage tourism product.

Heritage values and the tourism marketplace have the potential to conflict at many levels. Heritage specialists, marketers, communities, and product developers need to work together to meet the needs of the site, its visitors, and host community.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ Heritage Research and Visitor Planning
- ▶ Heritage Tourism and the Marketplace
- ▶ Marketing Heritage

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Heritage Valuation: Paradigm Shifts

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Introduction

The heritage preservation movement in the United States has traditionally focused on tangible, physical resources – real property – as its anchor to a concept of national heritage, with language about intangible heritage values finding footing in more recent years in National Park Service Preservation Brief 36 and National Register Bulletins 18, 30, and 38. The historical development of this unique preservation movement and how heritage resources have come to be valued and managed are well documented (e.g., Murtagh 1997; King 1998; Tyler 2000). In short, there were several major paradigm shifts in the early years of the preservation movement. What began as a wealthy women's grassroots movement intended to enshrine colonial patrons shifted over decades into the domain of sociopolitically elite philanthropists. It then evolved into a federalized bureaucratic system in response to the Great Depression and, later, in reaction to destructive federal transportation and housing programs launched in the mid-twentieth century. This entry is an overview of an additional transformation that has occurred in the decades since the 1960s. Specifically, this entry asserts that the civil rights movement coincided with a rise in a multi-vocal interpretation of the past, which largely overwhelmed the notion of a monolithic national patrimony, and the response in the last three decades was to emphasize stakeholder power and community-level heritage valuation. The result was a pendulum swing from the definition of heritage value by affluent, sociopolitical gatekeepers to a much more democratized practice of historic preservation.

Definition

Heritage valuation is simply the process by which stewards – ranging inclusively in scale from governments to local community members – attempt to assess, identify, and specify what it is about a particular place on the landscape that gives it cultural significance and meaning. It reflects an understanding that values are mutable, multifaceted, and open to divergent interpretation, and that heritage resources have both historical depth and contemporary meaning.

Historical Background

More than a century since its inception, heritage valuation in the United States is now codified in more than a dozen laws, regulations, and presidential executive orders, and is measured in the coin of national patrimony. Arguably one of the most influential laws in terms of fiscal and preservation impact is the *National Historic Preservation Act* of 1966 (NHPA; PL 89-665). The NHPA, among other things, established the National Register of Historic Places and placed it under the administration of the National Park Service (16USC470[a]). The law was passed to ensure that resources significant to national heritage and exhibiting a certain "quality of significance" and "integrity" would be preserved (36CFR60). Such resources were defined strictly as "any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion on the National Register" (16USC470 [w][5]). In advance of destructive federal projects, it is only properties listed on or eligible for listing on the National Register that are afforded consideration to determine whether their preservation or destruction is in the public's best interest. An entire private sector enterprise – "cultural resource management" – has arisen in response to the NHPA and other relevant preservation law, with parallel responses in the government sector and with theoretical grounding in the academic world.

Key Issues/Current Debates

The National Register and its associated guidelines have at times had difficulty reconciling the interwoven areas of stakeholder consultation, community-level resource valuation, intangible resources recognition, and national documentation. Major preservation interests in the United States have in recent years begun to grapple with these issues, responding to calls to reconcile the national recognition system with more democratic, grass roots understandings of what it is that gives heritage resources and places their value. A shift seems to have occurred in the late 1980s and 1990s, in which community-level valuation of these resources by ordinary people began to penetrate the traditional preservation practice of commemorating patrimonial icons.

International Perspectives

Several historical trends in different arenas – academic, economic, and social – have converged to make such a paradigm shift possible. One trend is for the deconstruction of the notion that there is "a" national heritage, largely as a consequence of the activism of descendant communities during and after the 1960s civil rights movement. Accepted national stories, such as how the west was "won" or how enslaved people were treated on plantations, were questioned, contested, and sometimes recast. Even the primacy of Western epistemology, including notions of "property" and "ownership," has been challenged by indigenous belief systems that view cultural objects and society as inextricably entwined (Ziff & Rao 1997; Warren 1999). Native Americans in the 1960s and 1970s were especially vocal, and their perceived connection with the natural environment made them key players in the evolution of cultural resource management (King 1998: 16). This position enabled them to advocate strongly in the 1980s for federal recognition of "intangible" heritage values. Ultimately, they influenced the

NHPA by means of an amendment in 1992 that specifically identifies properties of "traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization" as eligible for the National Register (16USC470 Section 101[d][6]).

The National Park Service issued National Register Bulletin 38 in an effort to illustrate how traditional cultural properties were to be identified, assessed for significance and integrity, and considered for inclusion on the National Register (Parker & King 1990). Significantly, the authors of Bulletin 38 identified community stakeholders as the only people with the ability to recognize and evaluate the value of these types of resources, but reversed themselves to make stakeholders' opinions subject to validation by cultural anthropologists, i.e., "outside experts." One of the unintended consequences of the guidance thus was to highlight issues of authenticity, authority, and cultural legitimacy and their gatekeeping roles in the national heritage documentation system. Gatekeeper controversies and how to surmount the sociopolitical realities embedded historically already were a part of the traditional preservation conversation, and the new bulletin expanded that dialogue significantly, even if unintentionally. Consider, for instance, the highly visible and controversial "Chumash Debate" that transpired in the 1990s in cultural resource management and academic circles (e.g., Haley & Wilcoxon 1997). A series of critiques emerged and centered around the notion that at some level, arguments about the authenticity of indigenously identified traditions are a subtext for continued arguments over imperialism, sovereignty, and power. These discussions held that federal preservation law fosters the notion of a static past that is incompatible with the anthropological notion that change, fluidity, and situational boundaries are the sine qua non of culture.

Similar debates also arose that were centered on resources of value to other communities (e.g., places of African-American enslavement, Japanese American prisoner internment camps, and other "sites of conscience"), and the challenge to resource valuation grew. The recognition of subaltern histories and contradictory, competing interpretations of "patrimonial" icons became a primary concern in the traditional preservation community. Consider, for instance, the promulgation in 2004 of the *Ename Charter for the Interpretation of Cultural Heritage Sites* by the International Council on Monuments and Sites (ICOMOS), which was ratified in 2008 and called for interpretation of contested viewpoints. Gustavo Araoz (2006), then executive director of U.S. ICOMOS, explained that although "the international heritage community has managed to get by without detailed guidance on how to articulate a site's significance to the general public," there was a need for a new set of ethical principles based on the recognition that there are no unchallenged, uniformly accepted stories within a pluralistic democratic society. In summary, the empowerment of indigenous communities as part of the civil rights movement gave them the means by which to challenge the notion of a homogenous national patrimony, which indirectly challenged the idea of a homogenous national recognition system.

In addition to multivocality, another trend that has converged to promote a paradigm shift in heritage valuation is the growing recognition that, with few exceptions, the developmental trajectory of historic preservation in the United States has resulted in the exclusion of places that give specific communities their particular identity – sense of place. Sense of place is the connection between people and the places they repetitively use, in which they dwell, in which their memories are made, and to which they ascribe a unique feeling (Morgan et al. 2006: 706). Historic preservation in the national context has excluded the commonplace and the seemingly inconsequential markers on the landscape that anchor people to what they call home, and to what they identify as their heritage. This became poignantly clear in the aftermath of Hurricane Katrina in 2005, when local communities on the central Gulf Coast questioned the value of a federal commemorative system when it was not individual icons but an entire "sense of place" that was endangered (Morgan et al. 2006). Preservationists were obliged to reconsider exactly what it is that our federal system

documents and how effective it is at helping communities preserve the places important to them. Seemingly ordinary places underrepresented in the federal system can be as important to the people who live among them as the properties that preservation "experts" deem worthy of the National Register. That the gap between community sense of place and National Register placement did not come into sharp relief sooner suggests there is an institutional misunderstanding about what makes heritage resources valued in local and community contexts.

Additionally, the globalization of national communications, economics, and politics in recent years has strained notions of community identity. Randall Mason (2006) places the impetus for a paradigm shift in resource valuation in what Andreas Huyssen (2003) termed "memory culture." The last decade, Huyssen asserts, represents a time of innovation in how society deals with memories of its past, a crisis response catalyzed by "deep, fundamental dislocations in society caused by mega-trends like globalization, regional economic transformations, post-colonial policy shifts, migration, and the influence and reach of the media" (Mason 2006: 26). Memory culture, says Mason (2006: 28), "demands a different sort of preservation practice, in which preservationists' traditional focus on materiality is augmented by means for dealing with different cultural interpretations, competing political demands, and economic influences," which he dubs values-centered preservation.

Future Directions

Internationally the shift in heritage resource management toward decentralization and toward the placement of management and valuation into the hands of stakeholders is well under way (e.g., Mitchell 2003; Phillips 2003). In the United States, the practice of resource management suggests that what the American people value about the past is changing. Evidence may be seen in the explosive growth of National Heritage Areas: a grassroots, decentralized management strategy anchored on the concept of community sense of place, with valuation and management both at the local level (e.g., Barrett & Carlino 2003; Barrett et al. 2006; Morgan et al. 2006; Morgan 2010; Morgan et al. 2010). It is also evident in the rising interest in historic highway corridors and historic trails, and in professional discourse about heritage values. The latter includes recent Preserve America Summit proceedings held by the Advisory Council on Historic Preservation (2007a, b), and a round table discussion at the National Trust for Historic Preservation annual meeting in 2007. Discussions at the Preserve America Summit, for instance, were oriented formally around stakeholder and intangible heritage value issues, and panels of distinguished preservation practitioners urged the Council to attempt to merge "places presently protected informally by cultural groups in the greater protection of the NHPA," with resource evaluation beginning with the stakeholder (Hutt et al. 2007: 1).

From these, we glean a sense that what ordinary citizens value about the places they hold dear is much more expansive than what is currently encompassed by traditional historic preservation. That which is valued tends to include modified and unmodified aspects of the landscape; encompasses living and diverse communities, along with their cultural traditions; is centered on people and sense of place rather than historic "fabric" alone; and connects people through their heritage via the act of narration. In short, preservation has belatedly embraced its overlap with cultural anthropology as it shifts the locus of its efforts to contemporary communities of local people. Stakeholder participation must rest at the heart of any documentation and preservation system that tries to capture sense of place at a local level.

Cross-References

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- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public

▶ Cultural Heritage Management and Gender
▶ Cultural Heritage Management and Native Americans
▶ Cultural Heritage Management and the Colonial Culture
▶ Cultural Heritage Management: Building Bridges
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Heritage Values and Education

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Introduction

Heritage is a complex topic that has critical relevance to social, cultural, and national issues around the world. In general, heritage professionals seek to document, preserve, interpret, and promote heritage stories on local and global levels. There are many complex issues involved in this work. For example, how does one interpret the heritage of the past, the present, their own heritage, or the heritage of others? More importantly, how do heritage professionals responsibly distribute this information to the public once it has been created and interpreted? This section examines how researchers in a wide variety of academic fields have studied heritage and how these researchers struggle to negotiate heritage in an increasingly globalized world.

Definition

The nature of its existence necessarily means that heritage is a difficult concept to identify in concrete terms. Heritage has a wide range of meanings and interpretations throughout the world and can hardly be defined in a way that would be appropriate for all of its applications. However, it is possible to consider some of the key issues that surround the idea of heritage. Identity, memory, and sociocultural values all contribute to how heritage is understood and interpreted (Smith 2007). While it may seem that heritage is necessarily synonymous with culture, the two concepts have very different aims in what they seek to describe. Heritage is the conglomeration of cultural or ethnic practices, beliefs, and expression throughout time. Although culture is absolutely necessary to understand heritage and it is very often the case that heritage helps in the understanding and formation of culture, both heritage and culture must be taken in their own contexts and then considered in relation to one another rather than as a single entity. Heritage and culture are not so much two sides of the same coin as they are different variations of social currency that influence one another heavily.

Beyond looking at manifestations of culture that include music, dance, art, architecture, language, religion, mythology, and/or folklore, heritage as a concept also represents the impressions, reactions, and the formation of ideas that come from interactions with each of these forms of cultural expression. Also at issue is whether heritage is purely a construction of those who recognize some notion of the concept for themselves or if heritage is constructed from the outside. Some could argue that the answer to this question is a combination of these two ideas. Heritage is not only the connections to the past that are recognized by a particular cultural group but also the characteristics assigned to the interpretation of these connections from those on the outside. It is from this point of view that key studies into the misinterpretation or "silencing" of cultural heritage come into play, an issue that will be discussed further in this entry (see Trouillot 1995).

Although heritage cannot be easily defined, the ways in which researchers have considered heritage in their work can lend to an understanding of the concept's scope. Valene L. Smith's highly influential book, *Hosts and Guests* (1977), catalyzed the analysis of cultural tourism within the context of anthropology and ultimately influenced the study of heritage for the next three decades. In subsequent editions, Smith's view of

heritage places the identification of the concept firmly in the hands of the cultural group. What this means is that the members of the group are the ones that claim association with a particular cultural tradition and are the ones who determine how this tradition is made available to an audience outside themselves (Smith 2001a). Furthermore, Smith carefully asserts that heritage is not history. Rather, heritage is the result of cultural groups adding value to the interpretations built from historical fact (Smith 2001b). It is clear from the evolution of the discussion of tourism and culture in her work that heritage grew as a focal point for tourism studies from the 1970s through to present-day studies of the concept.

The consideration of heritage in relation to tourism typically necessitates a commoditized view of heritage. Barbara Kirshenblatt-Gimblett (1998) views heritage as a new concept that works to connect the past to the present with the result of a new cultural interpretation of the past. Where some authors acknowledge a relatively narrow view of what heritage means, others explore the meaning of the concept in broader terms. In his book, *The Tourist Gaze*, John Urry (2002) grapples with the idea of what heritage is – or how it evolved – and examines how it has been folded into the tourism industry. He considers the many embodiments of the concept: heritage as a commodity constructed by the state, as fantasies about history, as artificial stories meant to entice the imagination into connecting with the history of a region, or as a result of public nostalgia and the need to tie together preservation efforts and public interest. In Urry's (2002) treatment of heritage, it seems that heritage displays as representations of history fail to properly encompass the social processes necessary for understanding the past on display. Thus, while heritage exists outside of historical fact and functions as a story about what took place during a particular time, the perception of what has taken place relies on the interpretation of facts rather than on the facts themselves. This interpretation is ultimately what is meant when heritage is discussed in present-day contexts. Erve Chambers (2000) also examines heritage through the lens of the tourism industry. Rather than focusing on heritage as the product of past cultural or historical expression, Chambers characterizes heritage as the history and cultural connections to the past that groups – in this case, indigenous groups acting as hosts for tourist engagement – recognize and embrace as part of their cultural story. The performances and simplistic representations of these stories are commoditized manifestations tied to the intersection of heritage and the tourism industry and not manifestations of heritage in and of themselves.

Looking beyond heritage in the context of tourism, authors such as Laurajane Smith and David Lowenthal characterize heritage as tangible and intangible links to the past, whether these links are manifest in the form of place, material culture, or other culturally significant connections to a shared past. Smith (2004, 2007) considers heritage in association with identity formation and how indigenous communities and professionals who view manifestations of heritage as data interact with one another. Lowenthal (1998) succinctly characterizes heritage as anything that has been handed down from the past, yet carefully ensures that heritage is understood as distinct from history. As both authors show, heritage and environment are inextricably linked, as are heritage and history, and these links are the foundations for the cultural stories that develop into the heritage product. Though these considerations of heritage are not particularly unified, they do point to an effort to broadly characterize heritage and heritage studies rather than constrain the concept to a single definition.

Historical Background

In the last several decades, the study of heritage has blossomed as both an anthropological and archaeological topic. The discussion of cultural heritage in an anthropological context has been building in importance and frequency since the late nineteenth century with a marked rise in relevance in the final decades of the twentieth century (Smith 2007). The past 75 years have been particularly formative for the theoretical,

methodological, ethical, and professional underpinnings of cultural and archaeological heritage issues. Until recently, heritage studies were focused largely on the technical matters of conservation, preservation, and management. It has taken this long period of development for heritage studies to be considered in a more socio-cultural context (Harvey 2001). As has been discussed, heritage is not an easy concept to define but can generally be taken as a way cultural groups link the past, present, and the identities and connections formed from this link.

For centuries what we now refer to as heritage was a deeply meaningful but un-termed connection to the past that was inherent in cultural and personal identities. Serious academic consideration of heritage as an anthropological and archaeological topic took hold in the 1980s and 1990s. Since its inception, the concept of heritage has been viewed from a number of theoretical and academic perspectives. Cultural heritage as presented in the museum was the earliest manifestation of heritage for the public and was thus the aspect of heritage that was first considered by researchers. Discussions of display eventually gave way to the global showcasing of heritage and how it fits in to the globalization and the spread of culture that can be connected to the dawn of the mass tourism industry in the 70s. With the increased engagement with physical manifestations of heritage – architecture, artifacts, and monumental remnants of the past – it has become necessary to consider how these objects and spaces can be protected while functioning to educate the public on their origins and uses. While exhibition and public access to sites and monuments are some of the key ways in which the public is educated on both the heritage of their own cultures and the cultures of other groups, these exhibitions are inherently taxing on the integrity of the object, if not destructive. Thus, the intersection of technology and heritage has gained relevance for researchers as it is becoming necessary to present tangible and intangible heritage digitally in order to preserve and protect this important resource (Pozzi & Ott 2011). This recent and innovative avenue of research coupled with issues of globalization, identity formation, agency, and community involvement makes up the contemporary format of heritage studies as it functions across disciplines today.

Key Issues/Current Debates

The distribution of heritage to the public is a complex process fraught with challenges and opportunities. Michel-Rolph Trouillot's work on "silences" is a key example of how heritage presentation can have both positive and negative outcomes (1995). In this work, Trouillot considers that heritage presentations do not always encompass the whole story. Rather, the truth in matters of history and heritage is bypassed by the narrative's presentation as a result of the power and authority that the narrative carries. The silencing of cultural history has to do with the power that competing stories have. This can mean that the most powerful faction, the group with the ability to make their voice heard, tells the story and effectively silences other interpretations of heritage and the past or it could mean that a particular story is more interesting or economically exploitable than another that is equally valid, as is frequently seen in heritage tourism. One must always consider what the representation of one set of facts or ideas rather than another does to the viability of the alternative views regarding the story being presented.

The display of cultural and archaeological heritage in venues such as museums or heritage centers is the primary way in which the public encounters the materiality of heritage. Whether these institutions are utilized at home or abroad, their influence is no less profound. Museums give legitimacy and authority to the items on display within them, they carry a certain level of power that allows objects to be seen as outside the world as it is typically presented. In some cases, this has the result of items on display in this context being viewed as artistic expressions, rather than as a cultural item with tangible connections to people alive today (Alpers 1991). This view of "object as art" disconnects the material cultural

heritage from the community that claims it, and audiences come to see these items as having little to no relevance in the present. However, display can be used effectively to unite heritage stories with their objects, particularly as new technological methods for enabling interaction and engagement between museums, heritage centers, and their audiences continue to emerge (Pozzi & Ott 2011).

The issues of ownership and agency have recently gained primacy in the discussion of heritage. Community involvement in the interpretation of heritage and the production of heritage display has risen to a level of ethical necessity. Just as display influences how those who engage with heritage presentations understand the heritage on display, the process of interpreting heritage for display influences how it is understood. Those professionals who decide what the story is and how it should be told filter the information through their own perspectives and experiences before they arrive at the final representation of the heritage they are considering (Karp & Lavine 1991; Copeland 2006). Thus, it is necessary to involve communities in the interpretation of their own heritage. Agency and ownership are vital in the authenticity of the story. The telling of one's heritage gives individuals power not only over the story of their past but the identity that grew out of it. They are able to influence how other people see them and engage meaningfully with their past, and in many cases this can have a powerful effect on the community on both a local and global scale (Jackson 2009; Figueroa et al. 2012). When heritage professionals attempt to interpret cultural stories without the help of the communities who embrace them as heritage, they effectively change how the story is perceived. Rather than originating from those who hold the heritage story as part of their cultural history, it is filtered through an outside perspective and becomes distanced from those who hold that heritage as their own (Karp & Lavine 1991).

Though the problems involved with the presentation of heritage are many, they are not insurmountable. The distribution of cultural heritage in both local and global contexts can serve to help cultural groups tell their stories and promote a more culturally relative world. When community relationships are built between the heritage professional and those whose heritage is being presented, the community can directly benefit. Participating in the display of their heritage, and deciding what will and will not be made available to the public, gives communities control over how their stories are used in a present context. Heritage and the cultural past have been used for centuries to affirm rights over lands, inheritances, and identities, and this is no less at issue today. This discussion has been focused on heritage as an embodiment of the past and the connections that people make to their own perceived history. However, it is also necessary to consider the production of heritage as it takes place today. How does society protect what they feel will be important for future manifestations of the cultural patterns that are identified and adhered to as heritage? What is the legacy that is left for future researchers, archaeologists, and enthusiasts? How does our own interpretation of what is important about us now and in the past influence the way we think about our past, present, and future? The establishment of heritage for the future is one realm of exploration that has yet to be considered and is one that will undoubtedly make for intellectually stimulating dialogue as the conversation about heritage develops.

International Perspectives

Heritage concerns vary across national borders. While in some countries it may be important to ensure preservation of intangible forms of heritage or work closely with cultural groups who identify as living ancestors of past peoples, other countries place greater emphasis on preserving the built environment. The United States and Australia are two examples of countries where a close relationship with local groups is vital to understanding and responsibly interpreting and displaying archaeological and cultural heritage. In both cases, there are descendent communities whose concern for the integrity

of their ancestors' property and remains outweighs the interest of the general public. In the Mesoamerican region, the relationship between the built heritage and the descendent community is tied so closely to the tourism industry that much of the power involved in heritage presentation is in the hands of the government or foreign interests.

Heritage has been developed at an international scale to appease both local and global publics. As tourism ventures have become more accessible to people living around the world, so have the cultures in the areas to which tourists are drawn. Outside of the media, tourism is the largest heritage educator for the global audience today. Despite the fact that travel may not be a possibility for every individual who learns a cultural lesson as a result of tourism, the stories that travel with those who are able to leave their home cities and countries influence how heritage is learned and understood throughout the world. As the world becomes more globalized, so does the understanding of culture and heritage. Depending on the context in which this information is presented and the methods taken to ensure responsible public education, people will come away with different perceptions of the places they visit (Salazar 2012). This globalization essentially builds heritage identities that may not necessarily be those that are embraced by the cultures to which these identities are inscribed.

With the recognition of heritage as a valuable asset for knowledge and commerce, the international community has developed a concern for the protection of these resources to be appreciated on a global scale. Indeed, it has become the trend to protect and view natural, anthropogenic, and intangible heritage resources as the legacy of all people, not just those that live in the areas where the resources reside. In order to facilitate the protection of these resources, the United Nations and other world organizations developed programs to oversee the preservation and care of the world's heritage. The United Nations Educational, Scientific, and Cultural Organization (UNESCO), the International Council on Monuments and Sites (ICOMOS), and the International Committee on Archaeological Heritage Management (ICAHM) are three examples of organizations who strive to protect the world's heritage legacy. Where UNESCO focuses on a variety of global issues and works to protect and educate the public on both tangible and intangible forms of heritage, ICOMOS, which operates in association with UNESCO, focuses mainly on bringing together professionals that work towards the research and protection of architectural and archaeological heritage. The ICAHM advises ICOMOS on issues concerning the protection of both archaeological sites and landscapes with a focus on professional method and practice.

Although these organizations certainly do a lot for heritage resources throughout the world, it is important for heritage professionals and academic researchers to recognize that, though these organizations have an international focus, they are largely based in Western views of heritage and heritage management. This results in an organizational bias towards Western heritage management strategies and practices that are not necessarily applicable globally. While Western cultures have largely embraced the roles of organizations such as UNESCO, ICOMOS, and the ICAHM, non-Western cultures are beginning to lament the assertion of Western heritage values on their cultural properties and perceived heritage (Smith 2007). A reflexive self-analysis of the role that heritage professionals and interpreters play in the final representation of heritage has become a vital part of heritage studies. This same reflexivity needs to be applied to the discipline and to look more closely at non-Western considerations of heritage, what it means, and how it should be presented to the global public, if at all.

Future Directions

This entry considers heritage education as a complex process of interpretation and presentation. How archaeologists and anthropologists interpret heritage is always changing and is

consistently influenced by the local stakeholders and public interests that are at play. Although individuals may construct and interpret a personal view of their own heritage, the heritage of the other is mediated by professionals who strive – typically from an outside perspective – to understand past cultural knowledge for the benefit of a global audience. Although a definition is elusive, it is possible to understand heritage as connecting the past and the present of cultural groups in a way that is meaningful for the formation of identity and the mutual understanding of cultural differences and similarities in the world. Heritage is essentially an umbrella term for a variety of cultural expressions that link people to their past and present. Heritage can, and does, represent everything from material culture to intangible forms of culture, such as dances or musical expression. In order to ensure that the host culture is properly served, heritage professionals must be responsible in the ways in which they showcase heritage. One must always be acutely aware of audience, display, context, and, inevitably, their own biases, as well as their knowledge of the material they are attempting to disseminate to a wider public. Without this care and attention to detail, the public may come to know a heritage story that is either inaccurate or does not do justice to the wishes of the community.

Cross-References

- ▶ Activism and Archaeology
- ▶ Advertising and the Appropriation of Culture
- ▶ Archaeology and Anthropology
- ▶ Archaeology as Anthropology
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Global Heritage Fund (GHF)
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values, Communication of
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Intangible Cultural Heritage
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Local Populations and Global Heritage
- ▶ Marketing Heritage
- ▶ Preservation Paradigm in Heritage Management
- ▶ Space Heritage Protection
- ▶ Sustainability and Cultural Heritage
- ▶ Tangible Heritage in Archaeology
- ▶ Uses of Heritage

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Heritage Values, Communication of

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Introduction

Safeguarding natural and cultural heritage is complex for many reasons, not least, determining what is important, to whom, and why. Inherent in the challenge is the engagement of a broad public. Fostering attachment and custodial responsibility for our patrimony, while ensuring heritage values embody the aspirations of sustainable futures in an inclusive and constituency-building manner, is not simple. Layered on this are the increasingly borderless and entangled realities of the "glocal" (Bauman 1998). Moreover, "heritage" and "identity" are contested, continually reconstructed, renegotiated, subject to reinterpretation and to shifts in collective worldviews (Kirshenblatt-Gimblett 2004). ICOMOS acknowledges this slipperiness in Article 3 of the *Quebec Declaration for the Preservation of Spirit of Place*:

> A continuously reconstructed process, which responds to the needs for change and continuity of communities, we uphold that it can vary in time and from one culture to another according to their practices of memory, and that a place can have several spirits and be shared by different groups (ICOMOS 2008).

This constancy of change and plurality of view are at the heart of numerous debates around heritage. Cultural migrations and blurrings are nothing new, however the speed of change is much greater, as is our awareness and sensitivity to what Bauman (2000) describes as "liquid modernity" where change is hyperconstant. Current debates cover tensions between conservation and development, between the developed and the developing world, between different cultural constructions of our connections to place and time, between global and local,

between Indigenous and non-Indigenous views among others of what is important. These delibrations set in motion contestation around who should arbitrate on what is important, what should be protected, who should be entitled or empowered to make such decisions, and through what processes. In communicating heritage values, consideration needs to begin to what agendas should be privileged; who is "authorized" to speak on behalf of particular places, histories, and understandings; who has agency and voice; and whose values are being communicated in these processes (Staiff & Bushell 2003). These are significant ethical, philosophical, and pragmatic questions.

Definition

Heritage sites and places have both official and unofficial interpretation and visitor information, through visitor centers, Internet sites, guides, audio tours, guidebooks, and so on. With the democratization of mass communication and the exponential rise of electronic experience and idea sharing, various new forms of social networking are employed to distribute information and experiences of place. Communicating heritage values entails processes of engaging and sharing with others, with place, and with debates about these values should encourage an appreciation for tangible and intangible heritages. The process must be mindful of the complexity, fluidity, and hybridity of heritage and communities, located at the interface of economy, place, stakeholders, history, and cultural production.

Key Issues

Many processes and relationships, social, political, and cultural, are in play, shaping views of heritage values. Contestations surrounding integrity and authenticity continue unabated and influence what is to be valued, to be protected, and thus communicated as the embodiment of heritage. The *Nara Document on Authenticity* responded to concerns about *very* particular cultural views of how authenticity should be managed, protected, and understood. It states that

> In a world that is increasingly subject to the forces of globalization and homogenization, and in a world in which the search for cultural identity is sometimes pursued through aggressive nationalism and the suppression of the cultures of minorities, the essential contribution made by the consideration of authenticity in conservation practice is to clarify and illuminate the collective memory of humanity. [Article 4]

The document continues . . .

> All judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture. It is thus not possible to base judgements of values and authenticity within fixed criteria. On the contrary, the respect due to all cultures requires that heritage properties must be considered and judged within the cultural contexts to which they belong [Article 11] (ICOMOS 1994).

A nuanced and sophisticated framing is requisite to communicate such ideals to preserve the very local essence of these heritage values. This suggests moving away from approaches that treat heritage as though it were a "neat bundle," something that can be readily presented, explained, and communicated. Attempts to do so through particular heritage "messages" – the triggers that curators, interpreters, and heritage professionals and bureaucracies hope will invoke passion and commitment toward heritage – are too simplistic in several ways. Rather than a "takeaway message," what seems more relevant, given all we know of the complexity, is an ongoing dialogue, an engaging and empowering process through personal connections and embodied responses, allowing a diversity of experiences, meanings, understandings, attachments, and purposes. Such processes should be designed to encourage greater opportunity for involvement from those who reside in and visit these special places, not keep the safeguarding, the rights, and the responsibilities for heritage specialists only. This would seem to be an appropriate mechanism, resonating also with the democratization of communication and information sharing, allowing for a more subtle and personal sense of connection. Communities

working together to identify and protect that which is important to them – their heritage – build civic pride, knowledge, and stronger bonds for the future (Lennon 1999).

The technological revolution has us all connected in real time to everywhere and everyone. In this highly mobile and technologically linked world, places are not fixed entities; rather they are sites of movement and change. The idea of "the expert," "the local," "the visitor," "the guide," and "the tourist" and the relationship of each to place, and hence the relationships, connections, cultural productions, rights, and responsibilities toward the heritages of place, are blurred, converging, and transformed by contemporary movements and mobilities (Bushell & Staiff 2012) through and of place:

> There is no simple and unmediated relationship of subject and object, presence and absence. There is a haughtingness of place, through voices, memories, gestures and narratives that can inhabit a place for locals and for visitors, although this distinction too becomes increasingly difficult to sustain (Urry 2006: vii).

Problems may occur as places are packaged and presented to visitors. Discursively constructed and selective representations of heritage places and landscapes through which particular narratives and images are appropriated, (re)produced, and (re)circulated may resonate with visitors who arrive with certain expectations created through online environments, travel shows, tourist brochures, and so on, but these same representations may alienate the "local," causing residents to feel like the stranger within the intrusiveness of the touristic performance of place. Such issues are an incumbent component of ethical processes alluded to earlier in regard to how heritage places are portrayed, by whom, and in whose voice. However, visitation should not be positioned as a problem. Issues of scale, volume, and distribution of tourism pressures and the effects of commodification of heritage values worry many who consider tourism a threat to the integrity of the tangible and intangible heritage of many sites. Of particular concern are the most iconic and heavily visited such as small World Heritage towns which are increasingly attracting large numbers of investors, tourism operators and visitors. Visitation therefore deserves more careful and holistic consideration, planning, and management. It is an important mechanism, not only for the financial support of heritage enterprises and regional economies, but also for the presentation and transmission of heritage values to both local people and visitors. Well-managed tourism not only communicates and reinforces conservation values to local people, for many living in places with significant heritage, these sites are symbolic of hope. They can be catalysts of community development and, through improved education, can engage local people to advocate for the protection of their natural and cultural heritage. Conversely, badly planned and/or not managed responsibly, tourism can contribute, along with many other forces in play within all communities, to degradation and loss. It can create many negative impacts on the integrity of the material, the ambient, the cultural, and the spiritual, destroying sense of place and quality of life for associated communities.

While heritage sites are complex with multiple stakeholders, values, and meanings (Edensor 1998; Wall & Black 2005), contested by competing stakeholder groups (Owens 2002), and nodes where global forces converge (Teo et al. 2001), they are also the intrinsic elements of nation-building projects (Winter 2007). Hence, the communication of heritage values needs to be seen in a much wider context than just the local.

Winter (2004) also argues the importance of places being sites of living heritage, in which the past is significant in the formulation of "collective identity" (Edensor 1998), but these pasts should not erase the present. "[A]ll heritage interventions . . . change the relationship of people to what they do. They change how people understand themselves" (Kirshenblatt-Gimblett 2004: 58). This locates ethical responsibility with historians, heritage professionals, national and international bodies, as well as tourism developers to respect the present and to find processes and opportunities that are inclusive and empowering in community development as well as the representations of place. Further to concern about selectivity, Byrne (2007)

eloquently reminds us of the disjunction between that which is readily accessible and that which has been socially and politically silenced; that heritage is a "surface discourse" selectively presenting some aspects of heritage and history.

Tourism can and should be planned to integrate local culture into its heritage economy and invigorate the sense of place and perhaps enable more voices to be heard. But often, instead, tourism acts as a valorizing and idealizing agent of the past (Kirshenblatt-Gimblett 2004), selectively sanitizing histories (Hewison 1989) and further vanquishing inconvenient pasts (Byrne 2007), stereotyping and commodifying peoples, places, and traditions. In these heritage spaces, the flow is not only of different bodies, the "local" and the "visitor," but of different histories, cultures, purposes, and understandings of the values of a place. Edensor (2007: xvi) suggests that

> Tourism is a situated, multiple, dynamic and lacks any essential or overarching quality. It changes continually and is a site of contestation, generating a host of competing discourses and practices about place, identity and culture.

Everything is relational, messy, in process, and complex. With increasing self-authored communication to worldwide audiences on blog sites, Facebook pages, and so on, these competing discourses are powerful and give significant voice to those who may have an intimate knowledge or may indeed have quite limited connection, knowledge, or respect for a place, its heritage, or its people. Processes and ways to engage with these alternate modes of communication need to be part of any strategy if heritage values are to work in the service of conservation, people, and place. Winter (2004: 330) describes tourism as "the context within which . . . history [can be] articulated and made meaningful." If embraced as an opportunity, tourism can be a vehicle to communicate and share multiple heritages and understanding of one place with many pasts and presents.

Future Directions

Albert and Dyer (2009) have undertaken a very thorough critique of current heritage interpretation praxis. They too call for a very different framework, moving away from the dominant thinking in communication models based in cognitive psychology and characterized by the presentation of information. They express deep epistemological concerns about the objectivist, western scientific paradigm on which the "tradition" of interpretation praxis is based. This analysis raises ontological issues with the asymmetry inherent in such approaches, which are based on many assumptions about "facts," "knowledge," and "experts."

Heritage practitioners should not feel they are the "keepers" of the understandings; rather they are the facilitators who should encourage a multiplicity of explorations and a wealth of engagements. These should be two-way, and utilize processes respectful of the knowledge systems of others. The alternative – to be didactic and *expert* – may serve to alienate and threaten that which is deemed to "belong" to all. Heritage professionals know the material history and archaeological bibliography of things, yet may hold quite limited understandings of the emotional and spiritual meanings (Appadurai 1986). Evocatively Byrne (2007: 20) talks of his experiences as a heritage professional "travelling through a universe of traces with insufficient local knowledge to be able, for the most part, to quite see them or of being conscious of the murmur of traces without, for the most part, ever quite hearing the words." This is the "world of local knowledge."

Different backgrounds, beliefs, attitudes, understandings, and purposes means people can relate in meaningful ways to the same place for very different reasons. Seeking to acknowledge, respect, and communicate plurality, diversity, and constancy of change in living heritage serves the protection of tangible and intangible values of heritage places while sustaining local values and encouraging more responsible and custodial practices.

Cross-References

- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage and the Public

▶ Heritage Values and Education
▶ Heritage Museums and the Public
▶ Heritage: Public Perceptions

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Heritage, Changing Views of: A Legal Perspective

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Introduction

The role of law in cultural heritage management is now commonplace. Most, if not all, nations have a legal framework to preserve, protect, and regulate the past. From local to global, law has become interwoven in current cultural debates and practice, as well as in the contemporary fabric of archaeological discourse. International norms and consensus – in some instances amounting to customary international law – have embraced jurisprudence as implicit, if not compelling or obligatory, to appropriate heritage management. Law has the capacity to order, and even to transcend, nation-states' sovereignty as well as conventional geographical, national, and methodological boundaries. Legal burdens of proof, evidentiary standards, and jurisdiction affect the disposition of heritage as well as who has access to the past. Conflicts over repatriation and reburial decided by court ruling are highly visible and typify well-known and easily identifiable points of intersection (*Bonnichsen v. United States*, 367 F.3d 864 (9th Cir. 2004); Burke et al. 2008). However, the compass of law orienting heritage reaches further (Prott & O'Keefe 1984; Carmen 1996; Greenfield 1996; Pugh-Smith &

Samuels 1996; Richman & Forsyth 2003; Hutt et al. 2005; Gerstenblith 2012). For archaeology, law stipulates excavation and curation protocols and provides enforcement measures to combat threats to preservation and protection, such as looting, illicit trade, and fraud. It defines what constitutes a protected archaeological artifact, establishes who has standing to claim such an object, and frequently is the tool utilized to determine ultimate ownership and disposition. Indeed, legality also structures contemporary policy formation, viability of partnerships, and socio-politics of the past, present, and future.

Definition

Insofar as jurisprudence has become a customary managerial norm or apparatus for governance, divisions continue to separate the bailiwick of law from the trenches of archaeology (Bruning 2006, 2010). Legal and cultural heritage metrics are often at odds. Cultural heritage encompasses conventional conceptions of the archaeological record as well as intangible constructs of tradition, expression, knowledge, skills, and practice that recognize nuance and diversity. The ascription of value to heritage can be highly individualized and acutely subjective, particularly when heritage is viewed as a non-fungible, singular commodity. Authenticity and identity vest in modalities of culture. In contrast, law typically adheres to fixed standards and bright line rules. Definitional specificity is essential and legal reasoning is predicated on precedent, procedure, and canons of statutory interpretation. Law has a limited capacity to deviate from such jurisdictional principles, evidentiary standards, burdens of proof, and the right to judicial relief (the requirement that a claimant demonstrate a showing of "standing").

Key Issues/Current Debates/Future Directions/Examples

As such a formal prescriptive mandate, law situates heritage within a rigid regulatory rubric. Archaeological excavation constraints (such as permit requirements), curatorial methods, museological practices, and ownership rights all fall within its regulatory reach. So does prosecutorial discretion for enforcing criminal penalties. Legal standards that operationalize archaeological practice and policy also affect a claimant's ability to assert rights under the law by dictating that expressions of cultural heritage align with or, indeed fit within, a legally articulable right (Bruning 2006). Within heritage contests, the judge's gavel, not the archaeologist's trowel, increasingly directs how the concept of cultural heritage is to be interpreted, and accordingly, whose ownership claim or status is validated. In the legal adversarial process, juridical standards and procedure, as well as legal definitions of heritage, are dispositive. Thus, the true practical nature of opposing cultural heritage claims is exemplified because the contested cultural heritage object(s) (such as ceramics, burial goods, or skeletal remains) effectively can be owned by one claimant only. Ownership determination grants possession, and simultaneously legitimizes and authenticates both the claim to the heritage (or cultural property) and the particular claimant as stakeholder (Crawford 2000). Contentious heritage litigation is not immune to the media fanfare that accompanies courtroom contest and involves a wider, sometimes global, audience.

Nevertheless, as law affects the expression of heritage, so too does heritage inflect the lawmaking process. Heritage and law increasingly acculturate. Both within and beyond national borders, law has become a foremost instrument of change within the domain of cultural heritage and in the field of archaeology. From preservation protocols and looting prohibitions to proprietary interests, change to archaeology has – and will continue – to emerge through legislation and policy. Yet, law, akin to heritage and archaeology, is not exempt from inequalities or power imbalances and so the entrenchment of (post)colonial and hegemonic paradigms exists. Law accords rights to some but not to others. For instance, in the

United States, the 1990 *Native American Graves Protection and Repatriation Act* differentially situates indigenous peoples vis-à-vis their cultural heritage since only lineal descendants, "Indian tribes" recognized by the United States federal government, or "Native Hawaiian organizations" have standing under the statute (25 U.S. C. § 3001 *et seq.*). Legal standing also can remain elusive for groups or peoples in "occupied" or war-torn areas or in regions of disputed sovereignty or without formal recognition under international law.

Heritage's definition and demarcation in law for nations to implement protective and regulatory policies, to prioritize rights to certain stakeholders, and to adjudicate conflicting claims is steadily expanding. This phenomenon raises the question of how legal classification directs a contemporary understanding of heritage (Miller 2003; McHugh 2004). It also inquires whether increasingly narrow definitions within law hinder law's capacity to offer a framework that can effectively reach beyond – as well as within – national borders. For even though judicial mores of justice, equity, and impartiality impart useful precepts to competing cultural heritage claims, formal adjudication can fail to account for the multiplicity of values embodied in heritage (Johnson 2007). Traditional forms of legal redress are not always appropriate or realistic when heritage has suffered irrevocable harm – financial compensation ("money damages"), and even restitution/repatriation, may never truly right a "wrong," or make the heritage "whole" again.

Law is certainly not a flawless instrument of heritage management. It does not offer an automatic solution or panacea for conflicting ideologies and complex questions. Tension between cultural heritage/archaeology and law can be great, particularly when court ruling, legal doctrine, or *stare decisis* (precedent) can be viewed as upholding the letter, but not the spirit, of the law. Heritage as a complex dynamic construct with intangible and culturally sensitive attributes is more fluid than law and can be incompatible with law's strictures. Law is often inadequate, lacks sufficient enforcement capabilities, impedes viable local or indigenous partnerships, or is ill-suited or overwhelmed by the practical realities of management, local priorities, indigenous perspectives, and/or grassroots initiatives. However, in spite of its limitations, law is a modern instrument of management often chosen to resolve heritage conflicts. Successful joint management plans or memoranda of understanding can be crafted carefully under judicial auspices to offer innovative, equitable, and legally binding resolution. Differences in law and heritage are not necessarily irreconcilable. With the expanding role and place of law vis-à-vis heritage, law is becoming a fundamental international instrument not only in the domain of cultural heritage but also in the contemporary archaeologist's toolkit.

Cross-References

- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Blue Shield
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)

▶ Cultural Heritage Management and Armed Conflict
▶ Cultural Heritage Management and Maritime Law
▶ Cultural Heritage Site Damage Assessment
▶ Cultural Property, Trade, and Trafficking: Introduction
▶ Heritage Legislation, the Introduction of: Disciplining Through Law
▶ Indigenous Intellectual Property Issues in Archaeology
▶ Legislation in Archaeology: Overview and Introduction
▶ Looting and Vandalism (Cultural Heritage Management)
▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
▶ South Africa: Maritime Legal Management
▶ Underwater Cultural Heritage: International Law Regime
▶ UNESCO (1970) and UNIDROIT (1995) Conventions
▶ UNESCO (1972) and Malta (1992) Conventions
▶ UNESCO World Heritage Convention (1972)
▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)
▶ Vermillion Accord on Human Remains (1989) (Legislation)

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Heritage: History and Context

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Introduction

Definitions of "heritage" are unstable. In particular, the categories of phenomena covered by regulatory definitions of heritage are subject to periodic alteration in scope and content. This is due largely to the fact that in contemporary multicultural and diverse societies, there is constant competition among cultural groups and communities of interest to have their heritage formally or officially recognized. More recent definitions

recognize that definitions are rooted in subjective understandings of material culture, not objectively inherent in the material traces of prehistory and history.

Definition

In thinking about heritage, we need to distinguish between a primordial intergenerational practice and a particular, institutionalized mode of structuring identity and experience that the word has more recently come to embody.

It is part of our common humanity to inherit things, practices and ideas bequeathed us by our predecessors. This sense is largely captured in the term "inheritance." But in modern times "heritage" has become detached from the realms of personal, familial, and tribal transaction and emerged as an *episteme*, a way of structuring our understanding of the world (Hooper-Greenhill 1992: 12). By the 1980s, we had become so suffused in heritage-consciousness that it precipitated a strong, critical reaction. Lowenthal's spirited polemic *The Heritage Crusade and the Spoils of History* (1998) described a world cosmically supersaturated with heritage. "All at once," he cried out in exasperation, "heritage is everywhere – in the news, in the movies, in the marketplace – in everything from galaxies to genes" (1998: xiii).

Though it is possible to trace the modern roots of heritage from practices of collecting and keeping in Renaissance Italy, and onwards through the incipient stages of a travel and leisure industry in the nineteenth century, the elevation of heritage into an episteme that structures our understanding of the world, and saturates it in the way described by Lowenthal, postdates the Second World War. The long-run period of prosperity that stretched from the late 1940s through to the crisis of 2008 facilitated a massive expansion in the scale and scope of leisure activities, combined with the economic means to pursue interests in culture. More than 90 % of the world's museums postdate the Second World War, as does most national heritage legislation and almost all international charters and conventions designed to protect it.

Tourism became the primary medium through which cultural phenomena and experiences were converted into economic resources and objects of consumption. Travel, the key modality of tourism, shaped the modern idea of heritage through the sense of space and place (one traveled to see places – Machu Picchu – or to see things gathered together in certain locations, the British Museum and the Louvre). Heritage was both material and experiential in nature, what you went on your holidays to see and what you photographed to prove you had been there. However, the construction of heritage through tourism and cultural consumption provoked the emergence of a heritage critique in the 1980s. At the heart of this critique lay a challenge to the assumption that the prehistorical, historical, natural, and aesthetic dimensions of the world can be categorized and packaged as heritage according to expertly determined or putatively objective criteria.

Tunbridge and Ashworth offered the first systematic analysis of heritage as a deeply subjective phenomenon in *Dissonant Heritage: The Management of the Past as a Resource in Conflict* (1996). They noted how the meaning of the term had been dramatically expanded to include all physical traces of the past in the present, the natural world, and those "experiences" generated by the tourist industry (1996: 1-2). The effect of this category expansion was to render heritage increasingly unmanageable. If heritage was without apparent boundaries, how were scarce resources to be deployed in its care? They rejected the notion of heritage as a "fixed resource endowment." The idea that there was "a fixed quantity of a conservable past that is recognizable through objective, universal, and measurable sets of intrinsic criteria" was, they argued, an illusion given credibility by legislation designed to define, conserve, and protect it. Heritage arose in response to consumer demands and management skills in exploiting them (1996: 9). Heritage, in essence, was rooted in subjectivity; it was a matter of choice, most often of consumer choice.

French economist Francois Benhamou noted how the definition of heritage for legislative purposes was subject to refinement and expansion

but rarely to contraction. "The concept of heritage is becoming more and more extended," she wrote and warned that "heritage policies promote their own destruction by widening the definition of heritage" (Benhamou 1998: 75). A growing body of national and international legislation authorized an iterative and expansionary approach to the definition of heritage. The *UN Convention on the Protection of the World Cultural and Natural Heritage* (1972), for example, divides heritage into "built" and "natural" components but then leaves it to each state to decide how these broad categories are to be extended to particular properties in its jurisdiction – a level of discretion that allows for boundless variation in how the convention is applied. The resource challenges posed by heritage led some to argue, the author among them, that the effective management of heritage required its containment through more restrictive approaches to its definition (Cooke 2003).

A more historically based approach to defining heritage was to focus on the process of its production. Stanziola (1998: 168-76) traced the growth of heritage in the American context. Up to the 1940s, the rationale for recognizing phenomena as heritage remained primarily patriotic (Washington's home at Mount Vernon was the first protected historic house) and aesthetic (landscapes protected under the National Parks Act of 1916 were chosen primarily for their sublime and picturesque qualities, while wealthy philanthropists funded the great art museums). Then, beginning in the 1950s, the process of definition expanded to include the heritage content of the historic environment and its role in maintaining the fabric of community at local and regional levels. Hitherto, heritage's reach had embraced a selection of iconic national sites and artifacts and things and places chosen with discriminating connoisseurship for their aesthetic appeal; now, it extended over a wide expanse of popular culture and subcultures.

Goodey traces this growth more precisely in the British context. In the 1960s, he identifies two main vectors of growth: firstly, the "democratization of culture," a process by which the heritage of all was deemed to be as significant as that of the (mostly aristocratic) few and secondly what he calls "geographical equality," which is closely related to the democratization process but arises more precisely from the attempt to revitalize areas impoverished by the decline of heavy industries. Government, local, and national turned to the "designers of a new geography" that relied heavily on nostalgia and historic associations to bring new life to dilapidated towns and industrial areas (1998: 201).

Tunbridge and Ashworth's "dissonant heritage" model works both as an epistemological tool and as a vector of production. At its core is the question of representation. Where nation states used to project a synthetic "imagined community" by claiming authority over a coherent national culture and heritage, now the diluting influence of globalization compels them to recognize and validate complex layers of local, communitarian, and multicultural forms of identity. Heritage dissonance arises substantially from these competing perspectives. The more we disagree about heritage as an expression of disputed identities, the more of it we tend to produce to satisfy the various identity claims.

The growth of cultural economics as a discipline added further tools and refinements to the critique. A central concern of economics from a public policy perspective is the allocation of scarce resources among competing interests. Though most economists accept the legitimacy of public funding of heritage, Peacock (1998: 22) states as a basic principle of its economic analysis that "the preservation of the past is not some segregated element in the list of benefits to humankind, but consists of inputs of resources which must be shown to contribute to our welfare in a more effective way than in any alternative use." Keeping up the stock of heritage amenities requiring care and conservation creates opportunity costs, as the resources involved could be used for alternative purposes (Frey 1997: 31). By developing concepts such as option value (the postponed gratification of enjoying a cultural amenity in the future), bequest value (a thing whose intrinsic value lies in its anticipated value to future generations) and existence value (the sheer pleasure of knowing something

exists, regardless of the personal opportunity to experience it), and methodologies such as contingent valuation (a survey used to elicit people's willingness-to-pay for objects or projects), economists have contributed to the containability and manageability of heritage at both the conceptual and managerial levels (Throsby 2010).

Cross-References

- ▶ Heritage & Society
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: Public Perceptions

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Heritage: Public Perceptions

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Introduction

In the public domain, heritage is perceived and widely appreciated in relation to stories which people tell about themselves. This applies in particular to the perception of cultural heritage in public life within so-called Western societies. Intriguingly, heritage is here often not valued for its literal content, that is, what it reveals about a past reality, but for its metaphorical content, that is, the stories it evokes about present reality. Such stories may establish social distinction through the onlooker's display of knowledge that is considered desirable; they may manifest belonging through symbolic references of heritage to a common past suggesting a shared collective identity; or they may describe alternative ways of life which can stimulate audiences in the process of reconsidering their own lives. All such stories are sometimes used politically or for commercial purposes, for example, in the context of cultural tourism, advertising, and commodified experiences. The way heritage is publically perceived has profound implications for how to manage cultural resources.

Key Issues

Heritage and Social Distinction

As tourists, people travel the world to visit heritage attractions but they also visit local heritage sites. Visitors often wish to learn about a culture by learning about its heritage and

history. This preference is often perceived as a question of personal choice and taste. Taste and preference are however acquired and governed by social parameters like class and lifestyle. This is the main point of the French sociologist Pierre Bourdieu's (1984) famous "social critique of the judgment of taste": tell me what you like and I tell you who you are!

The German sociologist Gerhard Schulze (1993) argued similarly that the experience society in which we are living is segmented and that customers demand experiences that correspond to one of several predefined schemes related to their social position and lifestyle. Some people, who see themselves as particularly cultivated, enjoy culture that is consumed with the brain and does not stimulate extensive bodily reactions. Others will prefer cultural experiences that are unpretentious, embodied, and best consumed collectively. A final group prefers experiencing environments that involve the entire body and all the senses, and quickly change focus in order to avoid boredom. All these different groups may enjoy heritage, yet in distinctive ways that conform to the particular scheme with which they associate themselves. Whereas some can never have enough written information, others may primarily demand short and entertaining guided tours, and others again mostly want to engage themselves in exciting activities. Often heritage destinations now offer something for each of these (and other) preferences. Significantly, in each case one of the main aims of consuming heritage is in fact a confirmation of the visitor's own social milieu and lifestyle.

The story people are perhaps most interested in when they choose to visit heritage sites is thus in parts a story about themselves rather than one about the sites or objects they look at. It takes some education and class (!) to actually choose to look at ancient ruins at all, rather than lie on the beach or watch a blockbuster movie (Schulze 1993: 145). Heritage is valued because it allows people to tell stories about – and thereby reaffirm – their own social affinities and lifestyles. These stories are best told at sites whose significance is widely recognized in people's own social context, which is why tourists always "must see" the same sites first. At the same time, heritage can be meaningless for visitors when it appears to be unrelated or contrasting to the scheme governing their own lifestyle. The story of heritage matters insofar as it is about the visitors themselves and not about the past. Visitors like to buy, and often treasure, tokens of their visits such as postcards, entrance tickets, and especially souvenir guidebooks. Although many such guides will remain unread, they remind people for many years of their trip and that (rather than what) they have learned. In *The Great Museum: The Re-Presentation of History*, Australian writer Donald Horne (1984: 10) argued accordingly that "what matters is what [tourists] are told they are seeing. The fame of the object becomes its meaning; what finally matters may be a souvenir postcard, perhaps even the admission ticket, kept for years afterwards. . ."

Heritage and Shared Collective Identities

Another public perception of heritage is related to stories it evokes about the visitors' shared collective identities as members of distinctive ethnic or cultural communities. At the most general level, World Heritage sites and any exhibits about human origins emphasize our human identity as members of the same species and the fact that all people on this planet belong into this same category. For example, the Hall of Human Origins at the Smithsonian Museum of Natural History opened in 2010 with the aim "to provide visitors and online guests with an exciting educational experience that will encourage them to explore for themselves the scientific discoveries about what it means to be human" (humanorigins.si.edu/). On a continental level, the European Commission and the Council of Europe have long been pursuing cultural policies that promote European integration, for example, with the new European heritage label.

At the same time, heritage sites and many museums have long been managed as part of the collective heritage of a given nation-state. They thus reify preconceived national identities (Kristiansen 1993). On a somewhat smaller scale, something equivalent might be said about

regional and local heritage and the regional and local identities supported by them. In each case, the cultural heritage contributes to people's self-understanding as members of a given community, whether as neighbors locally, as inhabitants of a region, or citizens of a nation-state. The heritage seemingly manifesting such collective identities is often proudly presented to visitors of these nations, regions, or local communities. By appreciating the shared heritage of other communities, the visitors may also become more aware of their own ethnic or cultural collective identities.

In some cases, heritage can also stimulate or strengthen cultural identities of people that are linked to their social positions, as discussed earlier. Examples are particular segments of the population pursuing an interest in the heritage of the working classes, the heritage of African Americans, or the heritage of specific families. Here too, a shared heritage serves to link people with each other and contributes to their shared identities in the present. But at the same time, these identities reflect social realities and lifestyles as well.

Heritage is thus valued because it allows people to tell stories of the past which can reassure them as members of particular communities in the present. It is almost irrelevant precisely what kind of past is shared or how limited our knowledge about that past may be. The limited knowledge of our most distant ancestors during the Pliocene is as sufficient for collective human identity as the well-documented heritage of twentieth-century cities for collective urban identities. German collective identity is to the same extent manifested in the heritage of Nazi atrocities (or Beethoven) as is Russian collective identity in the heritage of Pushkin (or Stalinism). A community of people may be as strongly defined by genealogical links going back three or four generations as by racial oppression or discrimination that has been going on for centuries. What matters is not so much the richness or character or length of the story being told but that a story is being told at all! Heritage thus does not necessarily function as a source of information about the past but may also become a therapy for people uncertain about who they are.

Heritage and Alternative Ways of Life

Heritage is also valued in society because it tells stories about alternative ways of life which stimulate audiences in the process of reconsidering their own present-day realities. Time-travel experiences are becoming ever more popular, whether in the form of role play or living history, docu-soaps, historical novels, or computer-generated simulations in games and films. Time travel does not demand a particular intellectual attitude but it is about imagining other worlds from the embodied perspective of somebody actually living in that world, often involving multiple senses (Holtorf 2007a). The lessons drawn from such experiences may be nostalgic in character, admiring conditions of the past; they may be reconfirming the status quo of human life in present society; or they may be progressive, hoping for continuing improvements in the future.

The popularity of time travel is indicative for the transformed society we have been living in for the past two decades. Gerhard Schulze (1993) argued that experience value is quickly replacing use and monetary values in significance. As people in affluent Western societies have become economically secure and possess all the tools they require, they are orientating their lives more and more toward other values. Sometimes you hear today that a full life worth living is one in which the person concerned has seen and experienced a lot of different things. The market for experiences has thus been expanding fast. The American economists Joseph Pine and James Gilmore argued in their book *The Experience Economy* (2011) that those businesses that relegate themselves to the diminishing world of goods and services will be rendered irrelevant. Instead, businesses now need to offer experiences to people. These experiences consist of more than simply fun and are first and foremost about engaging people sensually, cognitively, socially, culturally, and emotionally. Yet there is still also a risk that fictive commercial pasts serve nothing but monetary gain or particular political ideologies (Kristiansen 1993).

Another widely appreciated alternative way of life linked to heritage is expressed in stories about the experts working with heritage. The aura of the

genuine and authentic site or artifact puts even professional archaeologists and conservators (among others) in a special light. David Horne (1984: 17) reasoned that precisely "the importance of the authentic can be so great that techniques of restoration may be more interesting to tourists than what has been restored." This was borne out, for example, in the extremely popular Vasa Museum in Stockholm, Sweden, where for many years the main display in a foggy hall were the partly covered remains of a seventeenth-century warship regularly sprayed with water during the process of conservation.

Heritage may also evoke stories about exciting exploration and discovery, about meticulous documentation and analysis, and about outreach and preservation. This is mostly the domain of the archaeologist investigating heritage, not the least through the method of excavation. In popular culture, the archaeologist is often portrayed as a hero and role model, competent and resourceful, responsibly serving the interests of society and of humanity (Holtorf 2007b). Many visitors are excited about the process of archaeological research and would like to get involved in archaeological excavations themselves. Many wish they could realize this childhood dream in their own lives. The Canadian archaeologist Karolyn Smardz (1997: 103) once speculated that it is precisely "the excitement and romance of archaeological discovery that makes people think archaeology is worth doing and learning about." Quite rightly, she concluded that "it is not archaeology's ability to help all of us gain a better understanding of how people lived in the past that makes archaeology marketable, it is also that mysterious, romantic, exotic sense of delving into the unknown – ergo, the very process of archaeological research." The process of doing archaeology seems in many cases more exciting than its results, and it may bring about benefits for the visitors' quality of life that reach far beyond those gained from insights about the past.

Conclusions: Public Perceptions of Heritage and Cultural Resource Management

This analysis of the public perceptions and appreciation of heritage may imply that it is almost beside the point to convey to visitors any specific information about what actually happened in the past. Whether or not this conclusion holds true in its totality, heritage managers are certainly well advised to acknowledge existing preconceptions of heritage and the stories it evokes about the present. The motivation to travel and visit heritage sites is in many cases not a genuine experience of foreign places and their past but the realization of dreams and desires preconceived at the point of origin (Hennig 1999). David Horne cited the telling example of the Stoa of Attalus which the American School of Classical Studies at Athens, Greece, reconstructed during the 1950s in its original place on the Athenian Agora. Significantly, "they were faithful to every known detail except one – they couldn't bring themselves to paint it in red and blue as it had been in the original. To have been authentic would have made it seem untrue to the modern stereotype of the classical" (Horne 1984: 29). In other words, the authenticity of a place is judged by the tourists' own preconceptions of the place and need to be carefully managed by the heritage and tourism industries.

The main asset of cultural heritage is thus its capacity to tell or evoke stories that appeal in the present. An interesting medieval cathedral may be interesting because it reaffirms a social milieu in which "you know your art history," and a precious Stone Age burial may be precious because it marks the beginning of the story of your own local community. Heritage is often less valued for its literal than for its metaphorical content, that is, stories about remains of the past that are much more so stories about the present. As a consequence, it matters little for the storytelling potential if a heritage site has been meticulously repaired, faithfully restored, or entirely reconstructed – as long as it provides visitors with a believable experience. This does not make heritage any less important. If anything, experiencing heritage in terms of the stories it tells about the present increases its currency in the Experience Society. As many have argued, stories and experiences have become essential to peoples' social identities and often give inspiration, meaning, and happiness to their lives. It is the stories

we tell that distinguish us from each other and make life enjoyable, maybe even worth living (Schulze 1993; Pine & Gilmore 2011). This is the larger social context within which the contemporary significance of cultural heritage must be seen (see also Altrock et al. 2010).

One immediate implication is that heritage managers should from the very start of their involvement be actively engaging with all the people involved (the multiple stakeholders) and take seriously the stories about the present that are told through the cultural heritage. By the same token, in a major review of the Swedish heritage sector entitled "Putting People First" it was concluded that "we must make the public's involvement and participation our top priorities" and that "the motivation for preserving an object or an environment comes from the need and desire to tell a story" (Operation Heritage 2004: 12-3). Not all such stories will, however, be equally acceptable in political and indeed ethical terms. Whereas some public perceptions may deserve to be supported for the benefits they bring to quality of life and social cohesion, others may need to be problematized and even undermined when they harm political or ethical core values that heritage professionals, whether as citizens or as state employees, do not share. In order to do so competently, a great deal of new research will be needed in order to better understand precisely how the cultural heritage is experienced and what stories are being told or appreciated by whom and in which contexts. As the Danish archaeologist Kristian Kristiansen pointed out already in 1993, it is high time that archaeologists lose their political innocence and critically assess the way in which heritage and the past are popular, useful and marketable in present society. Although research into that direction has begun by now, there still remains much to be done, especially as society is continuously evolving.

Archaeologists and historians may always run the risk of construing in their work a representation of the past that is mostly an extension of the present. But this is maybe less a risk as an opportunity, as heritage matters when the stories about heritage matter. Ironically, therefore, an extension of their present may be precisely what visitors value most in their perceptions of heritage.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Ethics, Cultural Base of
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High Lodge Archaeology Site

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Introduction

The site of High Lodge is situated in a disused clay pit in the Brecklands of Suffolk, UK. Artifacts were first discovered in the 1860s and were described together with the stratigraphy of the site by Sir John Evans (1872). He noted that at the base of the site lay glacial chalky boulder clay, which was overlain by red clay containing finely retouched scrapers. These in turn were overlain by sands and gravels containing handaxes, and boulder clay was also noted higher up the slope. Skertchley was the first to argue that this was a separate, stratigraphically higher boulder clay (Whittaker et al. 1891), which was controversial in the late nineteenth century as the pre-glacial antiquity of people had yet to be accepted.

A second controversy arose because the finely retouched scrapers were likened to those from Le Moustier in France (later termed Mousterian), while the overlying handaxes were typical of the earlier "drift" period or Lower Paleolithic. This inversion of the typological sequences observed elsewhere led to a series of papers describing a variety of stratigraphic schemes, none of which could be observed within single sections (Evans 1897; Sturge 1911; Marr 1921; Harrison 1938).

Key Issues/Current Debates/Future Directions/Examples

The first large-scale excavations took place from 1962 to 1968 by Gale Sieveking of the British Museum. In addition to recovering properly excavated lithic assemblages and environmental data, a primary aim was to unravel the geological sequence and dating of the site. A conflict between an early geological age for the site and the apparently late date for the "Mousterian-like" flint artifacts delayed publication. These problems were resolved through further fieldwork in 1988, and the excavations were finally published in 1992 (Ashton et al. 1992). This latter work established the current understanding of the geological and environmental succession.

The oldest sediments at the site consist of clayey silts laid down as floodplain sediments and attributed to an eastward flowing river, called the Bytham (Lewis 1992). The Bytham river flowed from the Midlands across East Anglia, depositing quartz- and quartzite-rich gravels from its source areas and incorporated into the floodplain sediments at High Lodge. The course of the Bytham river was destroyed by the Anglian glaciation (MIS 12: c. 470–420 ka), which was the most extensive glaciation across Britain, reaching as far south as London. At High Lodge the floodplain sediments were glacially transported as frozen blocks by the ice, resulting in their emplacement above Anglian Lowestoft Till (the "chalky boulder clay"). The transported clayey silts were then overlain by outwash gravels and a soliflucted till from the same ice sheet. The clayey silts therefore date to a temperate phase prior to the Anglian glaciation, probably MIS 13 (c. 500 ka) or possibly older. An MIS 13 age is also supported by the recovery within the clayey silts of part of a rhinoceros tooth attributed to the *Stephanorhinus hundsheimensis* group, which became extinct after MIS 12 (Stuart 1992).

The clayey silts preserve pollen, insects, and occasionally wood and vertebrate remains. The palynology appears to show little change through

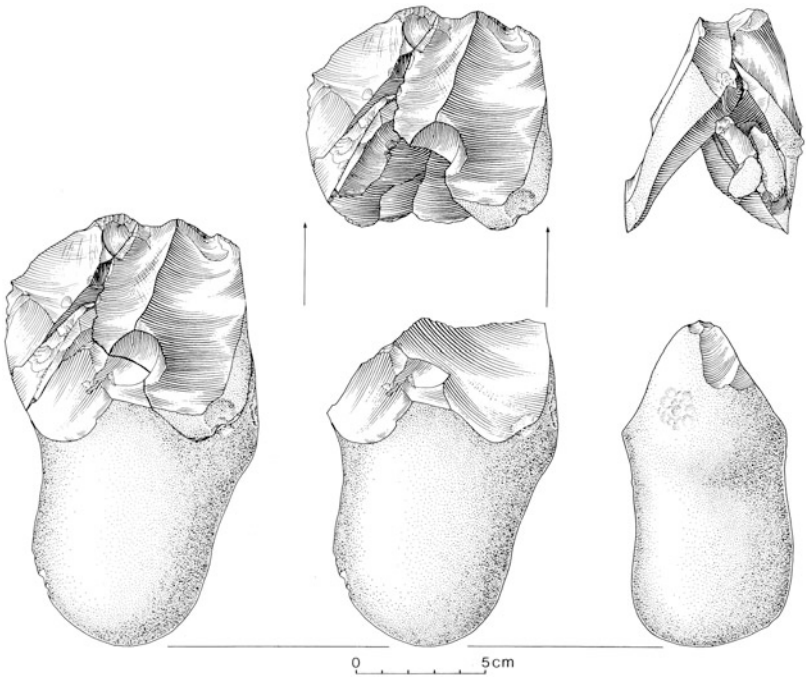

High Lodge Archaeology Site, Fig. 1 Flint core with refitting flakes from High Lodge Bed C2 showing alternate-platform technique (Illustration by Phil Dean. Reproduced by permission of the Trustees of the British Museum)

the sequence with vegetation dominated by pine and spruce together with juniper and heathland plants (Hunt 1992). Pools and marshland are indicated with seasonal flooding from the nearby river. The insect fauna reflects a similar array of wetland habitats and also provide Mutual Climatic Range temperature estimates of summers between 15 °C and 16 °C and winters between –4 °C and 1 °C (Coope 2006). The vertebrate fauna is sparse but in addition to *Stephanorhinus hundsheimensis* can be added straight-tusked elephant (*Palaeoloxodon antiquus*), horse (*Equus sp.*), a medium-sized cervid, and a large bovid (Stuart 1992). In combination, the environmental remains reflect the marshy floodplain of a large river, surrounded by pine and spruce forest in a climate several degrees cooler than East Anglia today (Ashton & Lewis 2012).

The archaeological assemblages have been divided into five stratigraphic units, three of which come from different horizons within the clayey silts (Beds B, C1, and C2). A fourth assemblage (Bed D) was recovered from small runnels cut into the top of the clayey silts and probably derived from that bed. The final assemblage (Bed E) was recovered from the base of the overlying outwash sands and gravels (Ashton 1992). All the assemblages are in fresh condition, with slightly more abrasion occurring on the artifacts from Bed E.

The assemblages from Beds B, C1, and C2 can be treated as a single unit. The artifacts are spread over a depth of 2 m, but it is difficult to recognize distinct horizons, although they occur in greater densities towards the top. Over 1,200 artifacts were excavated including 984 flakes, 69 flake tools, and 52 cores. The exact source of raw material is unknown, although as chalk-containing flint underlies the site, large nodules of flint would have been available in the nearby river sediments. The core working is typical of that found in other British Lower Paleolithic assemblages, where nodules of flint were worked through single-platform and alternate-platform techniques, sometimes with the core being rotated to find the next best platform from which to detach further flakes (Fig. 1). In this

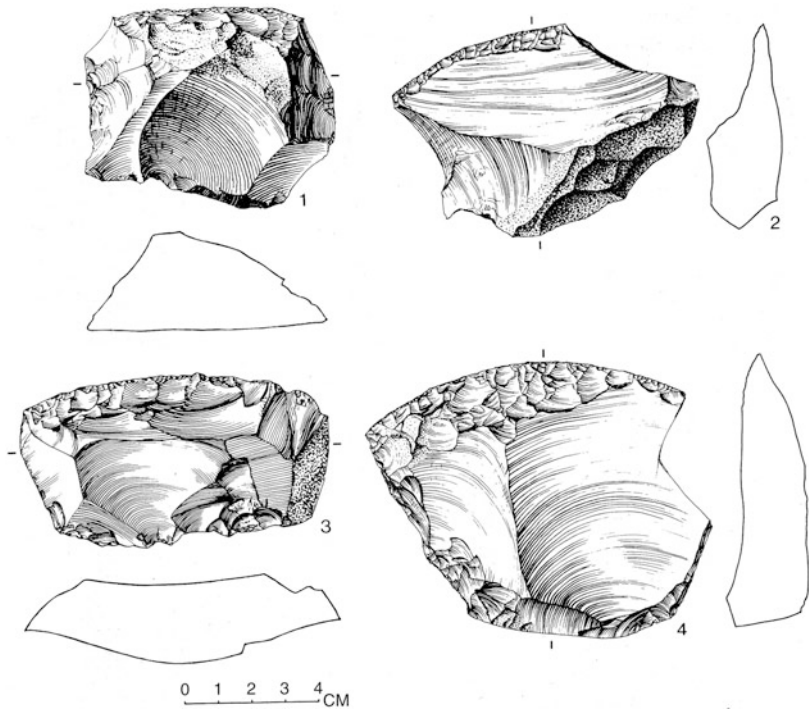

High Lodge Archaeology Site, Fig. 2 Flint scrapers High Lodge Bed C2 (*1*, *2*, and *4*) and Bed D (*3*) (Illustrations by Phil Dean. Reproduced by permission of the Trustees of the British Museum)

way the evolving configuration of the core determined the next flake removals. This type of technology has often been described as Clactonian but in fact also occurs in Acheulian handaxe assemblages (McNabb 2007).

Flint knapping occurred on the site, as shown by the refitting flakes, flake tools, and cores, which were excavated as distinct knapping scatters in two locations. Elsewhere the scatter of artifacts seems more disturbed, perhaps caused by the transportation by ice.

The flake tools consist of notches, denticulates, and a range of scrapers. The notches and denticulates tend to be made on smaller flakes with single or multiple detachments from lateral, distal, or proximal edges and sometimes on the ventral side. By contrast the scrapers tend to be made on slightly larger flakes with semi-invasive retouch on a variety of lateral or distal edges. In two particular cases, large single scrapers have been created with finely executed, invasive retouch (Fig. 2) and are more typical of those recovered by collectors during the nineteenth and early twentieth centuries. The old collections are clearly biased towards the larger more elaborate tools, but they do provide an insight into the full range of scraper forms. These include convergent scrapers, sometimes with retouching or thinning of the butt and occasionally retouch on the ventral face.

The assemblage from Bed D was recovered from fine silts that infilled shallow channels and runnels across the surface of the floodplain clayey silts. The runnels were often less than 1 m wide and 50 cm deep and contained a small lag gravel containing artifacts at the base. The lag gravel was almost certainly derived from the underlying floodplain deposits. This interpretation is supported by the similarities in technology and typology of Bed D with Beds B, C1, and C2. The Bed D assemblage consists of 301 artifacts including 254 flakes, 16 flake tools, and 15 cores. The core technology is indistinguishable from that of Beds B, C1, and C2, and there is a similar range of notches and scrapers.

The assemblage from Bed E occurs in the lowermost part of the overlying glacial outwash gravels and consists of 462 artifacts, including 384 flakes, 15 flake tools, 14 handaxes, and 13 cores. The technology of the core working is again similar to that from Beds B to D with the

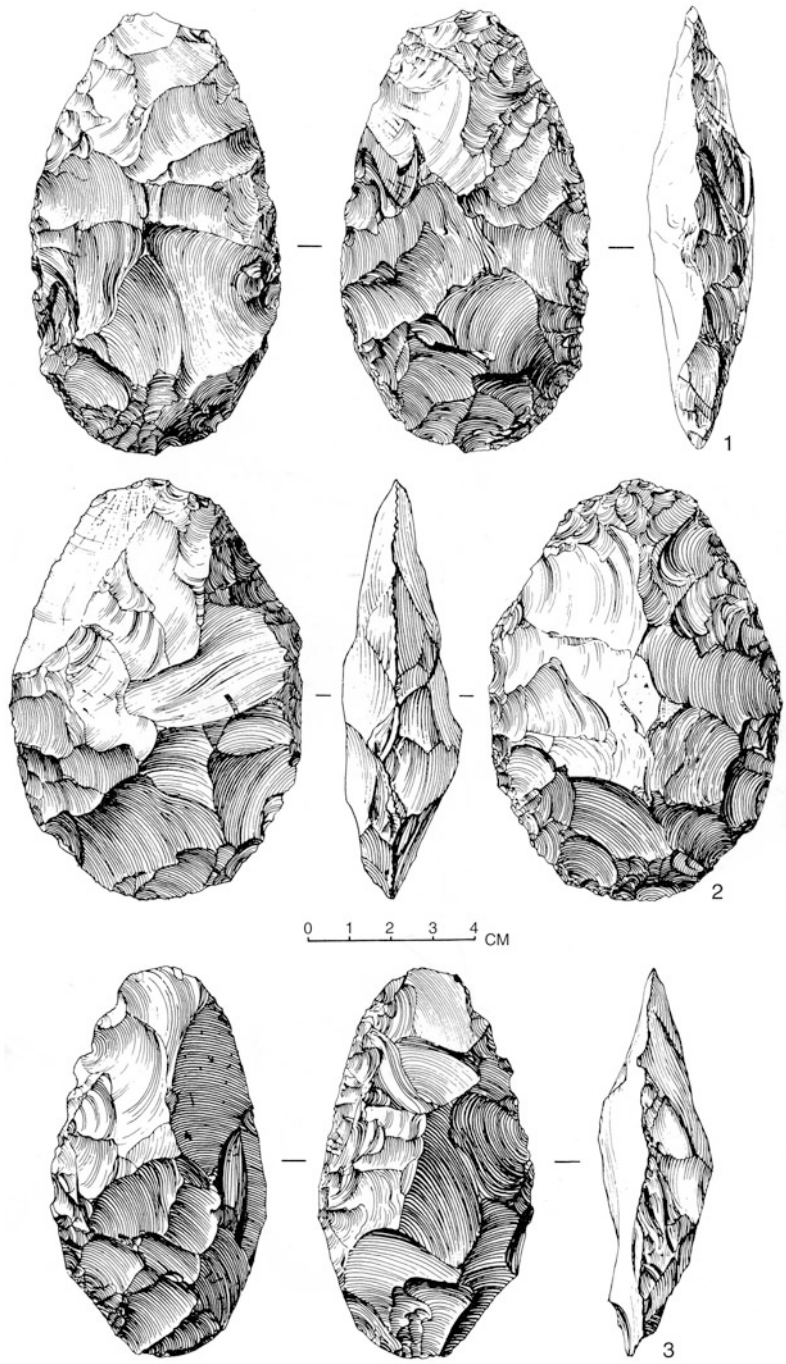

High Lodge Archaeology Site, Fig. 3 Flint handaxes from High Lodge Bed E (Illustrations by Phil Dean. Reproduced by permission of the Trustees of the British Museum)

use of single-platform and alternate-platform techniques deployed around the evolving cores. The flake tools are also similar with a range of notches, denticulates, and scrapers. At least one of the scrapers is invasively retouched and resembles the more elaborate scrapers from Bed C2. The only distinction of the assemblage from Bed E is the presence of 14 handaxes (Fig. 3). These consist of cordiform, ovate, and limande forms varying from 20 to 7 cm in length. They are

finely made with soft-hammer percussion and occasionally have tranchet-sharpening removals. This range of forms is consistent with those recovered by collectors during the nineteenth and twentieth centuries.

The slight abrasion of the artifacts in Bed E suggests minimal transport within the glacial outwash gravel. Equally it seems unlikely that the assemblage is contemporary with the glacial conditions represented by the outwash gravel, when Britain would have been difficult to inhabit. The most likely explanation is that the assemblage was derived from a different location on the floodplain and transported a minimal distance prior to deposition. Whether the distinction in the assemblages reflects different activity areas on the floodplain or separate human groups with different tool types perhaps occupying the area at slightly different times is not clear.

The finely made scrapers from High Lodge are still unusual in the context of the Lower Paleolithic of Britain, where scrapers are rare and retouch is often sporadic with little attention paid to form. One exception is the site of Warren Hill, which lies only 800 m to the south of High Lodge (Bridgland et al. 1995). Here Bytham river gravels from the lowest terrace, also dating to MIS 13, contain a wealth of handaxes, many being similar to those from Bed E at High Lodge. In addition to the handaxes is a small series of elaborate scrapers, which have a remarkable similarity to the scrapers from Bed C2 at High Lodge. Indeed the assemblage from Warren Hill has been fluvially transported and could derive from the same floodplain sediments.

One aspect of the scrapers that should not be overlooked is their possible function. Although there is no direct evidence, there is little doubt that they would have functioned well in the processing of hides. If this is the case, High Lodge provides one of the earliest records at least in northern Europe for the abundant production of hide-working tools and by inference the use of hides for perhaps clothing or shelter (Ashton & Lewis 2012). It also implies that they were the top carnivore and had first access to the carcasses prior to the destructive scavenging by other predators such as hyena. At High Lodge it is pertinent that the possible early evidence for thermal buffering in the form of hide use coincides with a climate that is several degrees cooler than Britain today.

In summary, the site of High Lodge dates to c. 500 ka or possibly earlier. Humans occupied the open, marshy floodplain of the Bytham river surrounded by forest of pine and spruce in a climate several degrees cooler than Britain today. At least one of the activities taking place at the site was the manufacture of carefully crafted scrapers, perhaps used for the processing of hides for use as clothing or for shelter. Elsewhere on the floodplain, another or perhaps the same human group made handaxes, perhaps closer to the flint raw material sources exposed by the river. With the ensuing Anglian glaciation about 450 ka, the floodplain deposits were rafted as frozen blocks and emplaced above and within the glacial sediments, awaiting discovery in the middle of the nineteenth century.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Handaxes and Biface Technology
- ▶ Lithic Technology, Paleolithic

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Hillfort Investigations in the Czech Republic

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Brief Definition of the Topic

The *hillfort* is one of Europe's best known types of pre- and protohistoric monument. Those found in the Czech Republic range in date over the Neolithic, Eneolithic, Bronze Age, Iron Age, Roman, and early medieval periods. Many of these sites have long been familiar in the landscape, but more have been identified or studied during various archaeological survey projects (e.g., Gojda et al. 2004; Křivánek 2004). They vary in size from 0.1–0.5 ha to 100–200 ha. They offer important information on the key roles they performed in each period: military bases, settlement, industry, trade, communications, agriculture, burial, cult, or other activities.

The traditional method of investigating hillforts was the excavated trench, and in this country attention was focused on Slavic and Celtic fortified sites. The new approach places the emphasis on *remote mapping*, making particular use of *aerial survey*, *geophysical survey*, and *surface collection*. *Geochemical mapping* and *metal detector* surveys have also been used in particular situations. The purpose is to obtain the maximum amount of information about the structure and date range of the site using nondestructive methods, before applying targeted excavation for the solution of particular historical problems. Some examples follow.

The prehistoric hillfort near Zlončice (district Mělník) was first identified from surface collections by an amateur regional archaeologist. Enclosure systems of 12–13 ha on a promontory by the Vltava river confirmed later results of geophysical prospection (Fig. 1a). A *magnetometric survey* subsequently revealed an intense level of occupation in the form of numerous pits and seven boundary ditches (Fig. 1b). Surface collection of artifacts suggested a Neolithic origin but with some later occupation (Křivánek 2011). Magnetometry also proved very effective at Libice (district Nymburk), an early medieval stronghold of 20 ha in a lowland area on a sand and gravel terrace on the flood plain of a meandering Jizera rives (Křivánek-Mařík 2009). The Hallstatt hillfort of Prague-Hostivař (district Prague 14) had more or less disappeared from view, but investigators made use of an early map and the cadastral boundary plan to locate the probable location of the fortified enclosure. The extent of occupation and the burnt out defenses were then located by magnetometry (Fig. 2).

Hillfort Investigations in the Czech Republic,
Fig. 1 Zlončice, district Mělník. Combination of (**a**) vertical aerial photography (public web source www.mapy.cz) and (**b**) the result of magnetometric survey of prehistoric hillfort (terrain: plowed field and meadow; surveyed area: approx. 9.5 ha; magnetometric survey: Křivánek 2008–2010)

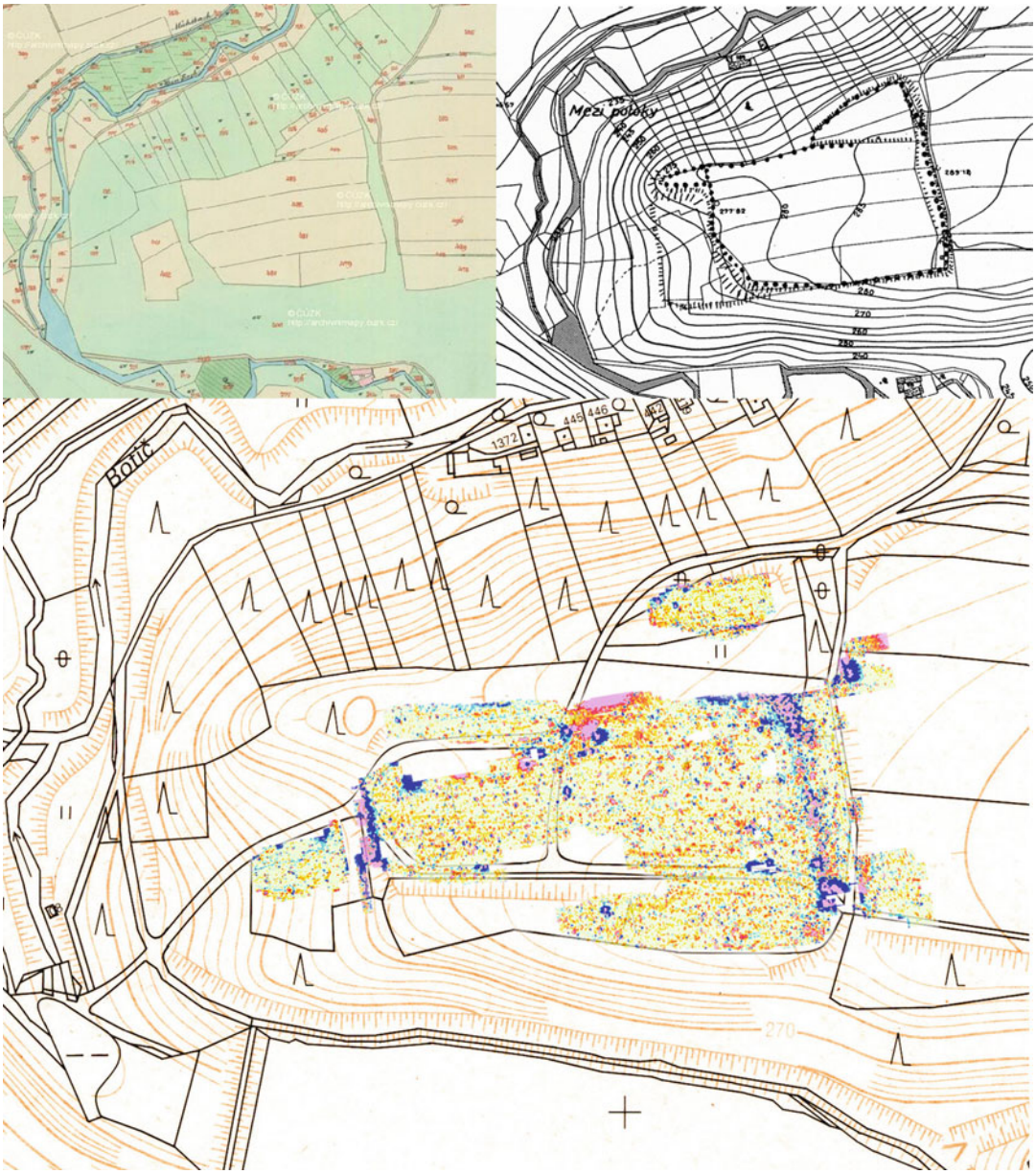

Hillfort Investigations in the Czech Republic, Fig. 2 Prague-Hostivař, district Prague 15. Comparison of old map (stable cadaster 1841), old site plan (Fillip 1949), and magnetometric survey of the Hallstatt hillfort (terrain: park; surveyed area: approx. 4.3 ha, magnetometric survey: Křivánek 2008)

The La Téne oppidum at Závist in cadaster Lhota (district Prague-west) represents a different type of large hillfort in the Czech landscape, on hilly terrain and now thickly wooded (Fig. 3a). This kind of terrain presents a challenge to conventional methods of aerial and geophysical survey. Even so magnetometry was able to map part of the site on the plateau of Balda (Fig. 3b), showing ordered settlement, a burnt rampart, and evidence for later plowing (see also *Lidar*, *radar* for other possible approaches).

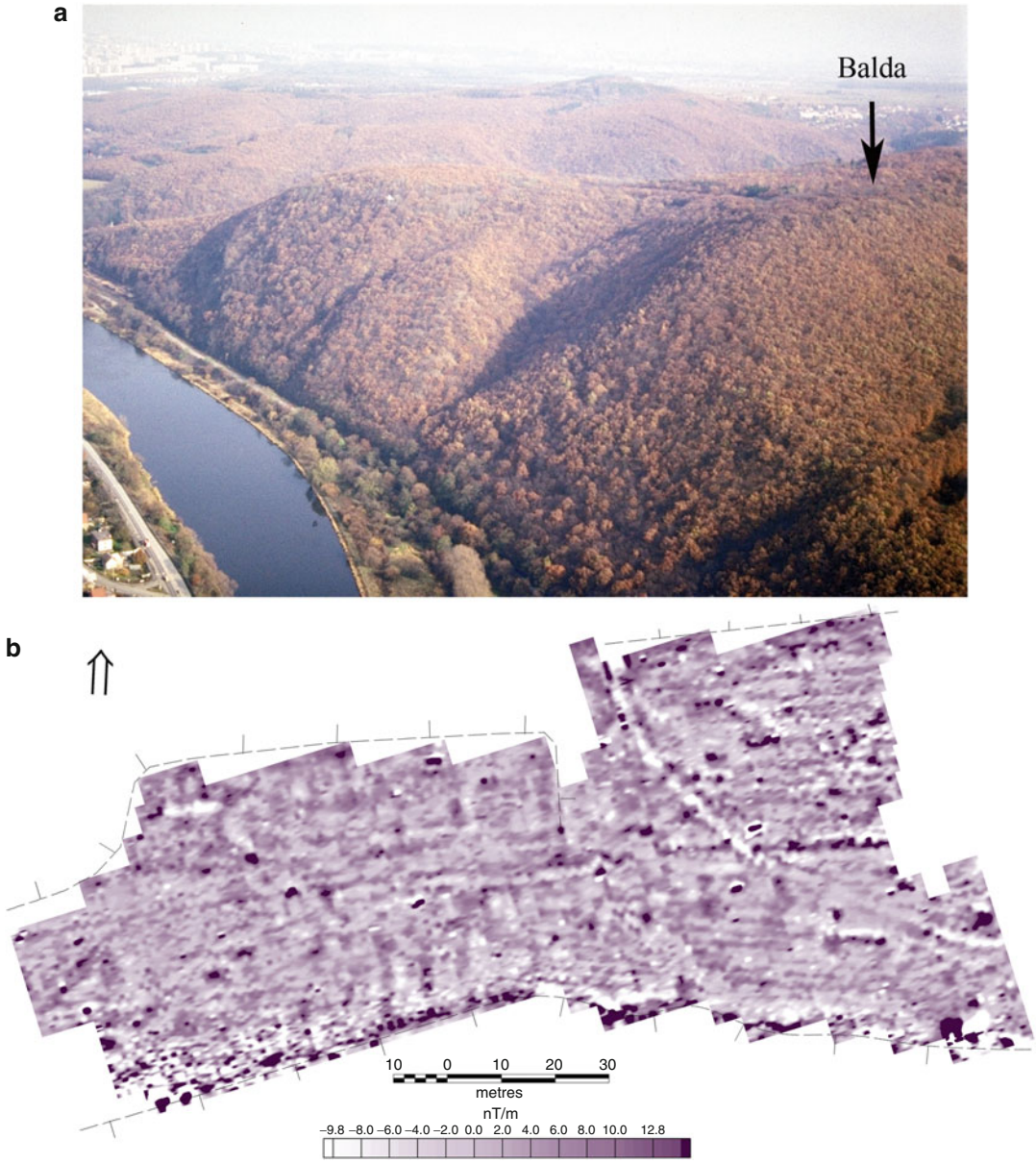

Hillfort Investigations in the Czech Republic, Fig. 3 Lhota, district Prague-west. Combination of (**a**) aerial documentation (photo by M. Gojda, Inst. of Archaeology, Prague) and (**b**) magnetometric survey of plateau Balda in central part of La Téne oppidum Závist (terrain: hilly forest; surveyed area: approx. 1.1 ha, magnetometric survey: Křivánek 2005)

The new research initiatives applied to the study of hillforts, both known and previously unknown, in every type of terrain, are providing a systematic basis for understanding their structure and use in different periods. This information leads to proposals for intensive investigation at particular sites for research purposes and at the same time provides an overall inventory to assist in the long-term protection of these cultural (or archaeological) monuments.

Cross-References

- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Fortifications, Archaeology of
- ▶ Heritage Landscapes
- ▶ Landscape Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ Surface Survey: Method and Strategies

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Hispanic South America: Historical Archaeology

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Introduction

Historical archaeology is a relatively new discipline in South America, systematically practiced only since the 1980s. The small number of archaeologists specializing in the field and lack of venues for the creation of professional networks, as well as the fact that scholars live and work in nations with distinct histories, have impeded the emergence of overarching theoretical orientations or research agendas. Over the last twenty years, however, the historical archaeology of Hispanic South America has experienced a period of rapid growth and professionalization, including the development of specialized academic programs and institutes that train students and conduct research, regional and national conferences focused on the subfield, and both print- and web-based publications that facilitate communication among scholars (Funari et al. 2009). Historical archaeology is now a well-established field in Argentina, Venezuela, Chile, Uruguay, and Colombia and is emerging as a recognized discipline in other South American countries. While historical archaeologists have practiced in Brazil for decades and have interacted regularly with scholars in neighboring Argentina and Uruguay, their work is not discussed in this entry as it is restricted to Spanish-speaking countries.

Definition

The emergence of historical archaeology as an academic discipline has generated a number of debates about its purpose, disciplinary affiliation, and the nature of its sources. One ongoing issue is how historical archaeology should be defined. In both South and North America, the field's initial development was tied to the creation of Eurocentric national histories. Excavations centered on sites associated with historical figures who played a role in official discourses and were almost always men of European descent. In addition, historical archaeology was defined as the study of archaeological remains in conjunction with written records, but non-Western societies, such as the Maya and Aztecs, were excluded, thus reinforcing the colonialist distinction between supposedly civilized Europeans and the people who were conquered by them.

One way that contemporary archaeologists have responded to the Eurocentric nature of the early history of the field is by proposing changes to the definition of historical archaeology. Some scholars have called for the inclusion of all literate societies in the subdiscipline. A more popular approach has been to employ Charles Orser's (1996) definition of the field's purview as the development of the modern world, a process that encompasses colonialism and the emergence of capitalism and one that involved all sectors of the population. Regardless of theoretical orientation, the majority of scholars working in South America today understand historical archaeology to be the study of societies that date from the beginning of European expansion about 500 years ago to the present, using material culture as well as texts, maps, paintings, and oral histories when available. Such an approach includes not only elite men of European descent but all people who contributed to the creation of contemporary South American societies.

Historical Background

The field of historical archaeology has followed a similar intellectual trajectory in many countries. The earliest studies in Hispanic South America were often the result of fortuitous discoveries and thus tangential to other objectives. Historical materials were sometimes encountered during construction activities in urban areas and as a consequence of excavations at pre-Hispanic sites. The formal development of the discipline was linked to cultural heritage management, usually the restoration of colonial churches and buildings associated with people who played salient roles in national history. Initially, this work was conducted by non-archaeologists, and reports were highly descriptive, with the primary aim being to document the building's original form and subsequent development or to corroborate information provided in documents. Spanish colonists and institutions were emphasized, in part because of the use of archaeology to instantiate national histories but also because of the urban focus of many of these projects. One of the earliest endeavors began in the 1940s when Augustín Zapata Gollán started excavations in Santa Fe la Vieja, Argentina, in order to prove that it was the location of the original city founded by the conquistadors (Zapata Gollán 1991). For the following three decades, archaeologists throughout Hispanic South America occasionally excavated colonial forts, churches, indigenous settlements, harbors, and houses, but the research was sporadic and usually unconnected to broader intellectual discourses.

The field of historical archaeology only crystallized during the 1980s. The rapid development of the discipline in the Southern Cone countries was a consequence – at least in part – of the fall of long-standing dictatorships (Funari et al. 2009). The reestablishment of democratic regimes resulted in an upsurge of intellectual creativity and, particularly in Argentina and Chile, stronger intellectual connections with foreign scholars. Research also became more explicitly framed by theory; concepts drawn from processual archaeology, the theoretical perspective that dominated the United States at the time, were briefly explored by some archaeologists, while others adopted versions of historical materialism, including *arqueología social*, an approach originally promulgated by Luis Lumbreras (1974) in Perú and further developed by Sanoja Obediente and Vargas Arena (2011) in Venezuela, among others. It was during this decade that a number of robust programs of archaeological inquiry were developed, especially in urban centers where municipalities helped support salvage excavations.

The subsequent 20 years witnessed the emergence of historical archaeology as a recognizable discipline in the Southern Cone countries as well as in Venezuela and Colombia; the scope and number of research projects increased, symposia and conferences were devoted to the subject, and specialized courses were developed for undergraduate and, in some cases, graduate programs. Research also continued to become more explicitly theoretical, with Marxist and postmodern approaches being the most common perspectives. The development of this academic infrastructure resulted in the first

generation of historical archaeologists who were specifically trained in the discipline, a key hallmark of professionalism.

Key Issues

From a continental perspective, the size of the professional community is now large enough to sustain an intellectual discourse regarding issues of interest to historical archaeologists, but this has not happened to any great extent. There are, therefore, few debates or research foci in which archaeologists across the continent – or even within regions – are mutually engaged. However, some commonalities exist due to similarities in the historical development of the field in different countries as well as their shared history as Spanish colonies.

Cultural Heritage Management

Cultural heritage management is still a mainstay of historical archaeology in South America, in part because funding for archaeological research is sometimes included in the budget for civil works and restoration projects. In addition, all countries now have laws regarding the protection of culturally significant sites, although enforcement is inconsistent. In contrast to the past, however, heritage management is now usually conducted by multidisciplinary teams that include archaeologists. Projects range from salvage work to mitigate the effects of infrastructural development such as the expansion of the metro in Santiago, Chile, to less common programs focused on the preservation and study of significant cultural properties. An outstanding example of the latter is the extensive research, conservation, and interpretation of the *área fundacional*, or historic core, of Mendoza, Argentina (Chiavazza 2005). This project, along with many others, attempts to address issues of anthropological and historical significance in addition to furnishing architectural data. Some scholars have even redefined the concept of historic site management to include the restoration of largely forgotten social histories to the collective memory (Therrien 1998) and the preservation of contemporary traditions that have colonial roots (Grupo de Estudio de Arqueología y Antropología Colonial in the Quebrada Humahuaca, Argentina), while others have extended the notion by engaging in public archaeology. As in most countries, though, heritage management usually entails salvage operations that yield purely descriptive information.

Colonial Archaeology

The investigation of colonial remains was the goal of most early historical archaeology in South America and continues to be important today. Churches, convents, and monasteries – structures associated with a crucial colonial institution and usually the most elaborate buildings of that time – have probably been excavated more than any other type of site. These projects have provided information about architecture and other types of material culture but often remain unpublished. The human remains found in cemeteries beneath or adjacent to these structures represent an important source of information about health, demography, and colonial mortuary practices but have rarely been analyzed. Important exceptions include Douglas Ubelaker's work in Quito (Ubelaker & Ripley 1999; Ubelaker & Newson 2002) and the more recent research by Haagen Klaus (Klaus & Tam 2010) on the coast of Peru.

Colonial archaeology has, however, moved far beyond its role as an aid to architectural construction and has yielded information about many issues of broader anthropological significance. Chief among these is an examination of how indigenous populations as well as European colonists were affected by the colonial experience. The conceptualization of this issue has changed over time, with earlier research based on an implicit model of passive culture change and more recent work explicitly investigating the active negotiation of identity. Additional research foci include early urbanism, frontier expansion, the organization of extractive industries, dietary change, the reconfiguration of rural landscapes, and the local implementation of Spanish colonial policy. An important example of the last is Senatore's (2007) examination of

Spanish attempts to control Patagonia. Floridablanca was a fortified agrarian community that was established on the colonial frontier in 1781 in accordance with Enlightenment ideas regarding order and equality. By examining the everyday social practices of the settlers, Senatore has shown how a very different kind of order was generated by local residents, thus highlighting the negotiated and uncertain outcomes of colonial rule. This emphasis on agency, practice, and historical contingency is a hallmark of the most recent research on the colonial period by both South American and foreign scholars.

With the exception of Ross Jamieson's study of the relationship between domestic architecture and power in Cuenca (Jamieson 2000), most archaeological research conducted by foreigners on historical sites in Hispanic South America focuses on the hinterlands. All of these projects consider the ways in which indigenous and European peoples negotiated the colonial experience. One of the earliest was an investigation of the wine industry in the Moquegua Valley of Peru by Prudence Rice (2011) and her students in the late 1980s. They examined the interchange of technologies between Spaniards and Andeans and the effects of colonization on diet, exchange, and other aspects of the economy. More recent investigations have examined the organization of silver mining, the reconfiguration of rural landscapes in the wake of conquest, the impact of Western goods on indigenous practices and systems of value, and the interaction of Dominican friars with the population of an early *reducción*, or indigenous community resettled by the Spaniards. In addition, a new cohort of foreign and local scholars working in Peru is beginning the study of *haciendas*, or large agricultural estates, which has been a notable lacuna in colonial research.

Urban Archaeology

Urban phenomena have been the focus of much of the historical archaeology conducted in South America, in large part because of the discipline's involvement in the management of architecturally significant cultural properties, which tend to be located in cities. Most notable are the Buenos Aires Urban Archaeology Project (Schávelzon 2000), the San Francisco Ruins Project in Mendoza (Chiavazza 2005), the Urban Archaeology Project in Caracas, and the Colonia del Sacramento project in Uruguay (Fusco 1997). Smaller projects have also been carried out in Bogotá, Cartagena, Cuenca, Quito, and Lima. All of these initially focused on colonial remains.

By the 1990s, urban archaeology had become a distinct subdiscipline with its own techniques, opportunities, and limitations. Chief among the latter is the opportunistic nature of excavations that are usually carried out in advance of construction activities, making it difficult to excavate according to a preconceived research design. This constraint is overcome, to some extent, by the accumulation of data over time. The use of data sets from sites used during different periods has also allowed some investigators to produce long-term urban histories that extend from early colonial to republican times. Daniel Schávelzon directs one of the most productive and longest running projects of this type in Buenos Aires. He and his colleagues have produced fundamental descriptive information about the material culture of Buenos Aires, including a catalogue of ceramics from Buenos Aires that date from the sixteenth to the twentieth century (Schávelzon 2001). They have also investigated such diverse issues as the development of residential structures, the complex history of food and drink, and the archaeology of class, ethnicity, race, and gender (Schávelzon 2000). Of particular importance is Schávelzon's history of the African-American population in Buenos Aires, as the African diaspora has received little archaeological attention outside Brazil (Schávelzon 2003). In Venezuela, Sanoja and Vargas (2008) have taken advantage of the rich data sets there to compare urban development in three regions of the country. They point to differences in these trajectories, which they attribute to unique historical conditions that shaped their incorporation into the globalizing capitalist economy. Exploring diversity as well as the commonalities among different cities and regions is one of the important next steps in the historical archaeology of the continent.

The Archaeology of Republican and Modern Sites

In the 1980s, historical archaeology in South America was practically synonymous with colonial archaeology, but over the last decade, scholars have investigated a variety of sites dating to the nineteenth and twentieth century. These projects are diverse, but three bodies of research stand out. One of the earliest to emerge was the investigation of nineteenth-century forts on the pampas of Argentina. These forts were constructed as the Argentine state expanded into indigenous territories and were meant to protect roads linking Buenos Aires with other Argentine cities. Research at these sites has included analysis of the strategies used by the state to conquer the region, the ways in which garrison personnel adapted to local conditions, and the relationships between personnel and indigenous groups (Zarankin & Salerno 2008).

The nineteenth century also witnessed the development of industrial capitalism, which manifested itself in South America in different ways. Monika Therrien (2007) directed a multidisciplinary investigation of a ceramic factory that was established in Bogotá by Colombian entrepreneurs shortly after Independence. This work included interviews with families who currently live on the property, an experience that has led her to both defend the importance of industrial patrimony and to challenge plans to remove the inhabitants in order to construct a museum on the site. Far to the south, nitrate production became an important industrial activity in Chile's Atacama Desert during the late nineteenth and early twentieth century. The first archaeological study of a nitrate plant was published in 1984, and after a lull of more than a decade, the industry is once again being investigated on the basis of survey, excavation, documentary records, and oral histories. This research centers on the experience of workers in a developing capitalist economy and links the past to the present through interviews with living people.

Finally, a number of researchers have turned their attention to the archaeology of the modern world. Some, drawing on Foucault, have analyzed the relationship between the architecture of institutions such as schools and the daily routines of discipline and surveillance that are practiced in them. Others have studied the detention centers used by twentieth-century military regimes to incarcerate political prisoners. By examining architecture, graffiti, and other kinds of material culture, these scholars can reveal both the means by which inmates were controlled and the ways in which these were resisted.

International Perspectives

Historical archaeology has followed the same general trajectory in Hispanic South America as it has in many other regions of the world, but the development of the field has been shaped by distinct aspects of regional history such as shared colonial and postcolonial experiences, as well as conditions at a national level, including differences in resources between wealthy and poor states. Thus, some countries, such as Argentina, have a well-trained cadre of historical archaeologists, many of whom have been educated in specialized doctoral programs and who enjoy a professional infrastructure that includes journals, conferences, research institutes, and funding opportunities. In Bolivia, on the other hand, only a handful of students have graduated with the equivalent of an undergraduate degree accompanied by a thesis that focused on historical archaeology, and no institutions specifically support training or research in the field. Most countries fall in the middle of this range, and thus the development of professional infrastructure as well as fundamental research tools such as artifact chronologies are still in progress.

A related challenge faced by archaeologists working in this region is the continuing destruction of the archaeological record. This is a problem in all countries but one that is exacerbated in South America by the lack of resources and inconsistent application of heritage management laws. Rather than being normal practice, enforcement usually occurs only in exceptional cases, either at sites that have already been declared national monuments or in cases where communities have protested the destruction of local sites.

The current position of South American countries in the modern global political economy, however, also presents an opportunity that has not been adequately explored. The relative lack of wealth and political influence that characterize most countries on the continent makes the legacy of colonialism palpable and has promoted continuity in many traditional practices. These factors could facilitate the creation of theoretical perspectives framed by the distinctive experiences of the "global south" in the process of modernization in counterpoint to the conceptual schemes produced by scholars working in the United States. These conditions also generate similar interests among archaeologists, cultural anthropologists, sociologists, and historians, points of intersection that could serve as the basis for interdisciplinary research.

Future Directions

Over the last three decades, historical archaeology has developed into a fully professionalized field in some South American countries, while in others it has not yet emerged as a formal discipline. This unevenness is due primarily to differences in resources and will not be remedied unless the underlying economic conditions change. Nonetheless, the field continues to develop throughout the region and will attract increasing numbers of foreign and domestic scholars.

The archaeological study of nineteenth-century capitalism will undoubtedly grow as mining, rubber production, railways, and other industries are explored. This process will also link the subjects of archaeological research more closely to the concerns and memories of the contemporary population, enhancing opportunities for public outreach and collaboration with descendant communities.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Argentina: Maritime Archaeology
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Colonial Encounters, Archaeology of
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Industrial Archaeology
- ▶ Latin American Social Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Mexico: Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ New Spain: Forts and Transport Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Post-Processual Archaeology
- ▶ Practice Theory in Archaeology
- ▶ "Public" and Archaeology
- ▶ Schávelzon, Daniel
- ▶ Social Identity in Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Historic Building Conservation: Current Approaches

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Brief Definition of the Topic

The twentieth century has seen changes in the way historic buildings are treated, from reconstruction to restoration and on to conservation. The development of specialized techniques and products makes it easier for professionals to maintain the material integrity of a construction, something that was not feasible 20 years ago. Current trends center around the training of specialists and research into new low-cost products that make it possible to act to prevent major interventions or replacements of the materials in historic buildings.

The conservation of historic buildings has changed over time and rapidly so in the late twentieth century. The first generations were people with an art history or architectural history perspective concerned with maintaining buildings exactly as they supposed they had been originally. Without specialized technical knowledge, which was only

just coming into being, their work was characterized by the replacement of the deteriorated or missing part by trying to make an exact but modern copy of what they supposed had existed. Materiality was not important itself but rather that it resembled what had been there before, whether or not this had actually existed. This trend still exists in many countries. But the advance of applied chemistry and physics to knowledge of materials, in addition to the professionalization of architects especially and now professional preservers and buildings archaeologists, led to the generation of theories that centered on preservation rather than restoration. It was cheaper and simpler to take precautionary measures than to allow a building to deteriorate and then fix it. In addition, theories demonstrated that architecture is not just walls and floors, it is also the historicity and significance that these possess; hence replacement, reconstruction, or building can only occur in extreme cases resulting from unintentional destruction, such as from wars.

Today there are nonintrusive methods that make it possible to observe the processes of deterioration of the stone or masonry, understand their problems, and resolve them with low-cost techniques. This sometimes means specialized knowledge and laboratory products, but these can be found in the market. This has changed conservation throughout most of the world since 1980. Likewise, the progress of international bodies such as UNESCO and the creation of national institutions formed by professionals, and not just art and history lovers, have gradually made preservation possible as a habitual action.

The central problems that have marked different policies are the differences in the level of economic development or levels of investment and interest in maintaining the past or certain material facts from the past. Hence there are cities that continue to prefer the building of highways and others that give priority to pedestrians, not out of ignorance but as conscious decisions about their priorities, as the result of different histories. Today it is understood that many variants of preservation forms were already established by the end of the Second World War when bombed-out European cities opted for paths that may seem opposed: Warsaw was rebuilt stone by stone, while Rotterdam was rebuilt as new; Hamburg preserved all that was not destroyed, and Berlin and Cologne rebuilt buildings of which only the shells or foundations remained. These variants are present today, with continuing controversy and marking different paths. Perhaps the example of ancient Japanese architecture, where for centuries every piece of wood that deteriorates has been replaced, cutting it in the same way, with the same tools; painting it with the same colors; and joining it all together without nails. Nothing remains of the original example, nor is it possible to know what it looked like, but the spirit, the form, and the builder's way of relating to the building have not been altered. That is to say, there are many varied ways, something which generates conflicts with ideas of globalization and the high consumption of industrial products that are encouraged at present.

Cross-References

- ▶ Buildings Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Historic Jamestowne

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Historic Jamestowne

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Basic Information

Historic Jamestowne is the official name given to the site of Jamestown, Virginia, England's first

permanent New World colony. Jointly administered by the National Park Service and the Colonial Williamsburg Foundation on behalf of Preservation Virginia, Historic Jamestown is located approximately 45 km inland from the Chesapeake Bay on the James River and was settled by the English in 1607. Jamestown served as the capital of Virginia until 1699, when the seat of government moved to nearby Williamsburg. Jamestown has been the site of archaeological excavations since the 1890s and therefore holds a significant place in the development of historical archaeology. Presentation of the site is facilitated through a series of indoor and outdoor exhibits and ongoing archaeological excavations.

In 1994, archaeologists working on the 22.5 acre property owned by the Association for the Preservation of Virginia Antiquities (now Preservation Virginia) discovered traces of the fort constructed in 1607. Visitors to Historic Jamestowne can see the displays about the fort excavations in the Nathalie P. and Alan M. Voorhees Archaearium (Straube 2007). Special tours are available in the archaeological labs, and in the warmer months of the year, visitors can watch the excavations taking place. Adjacent to the excavation area is a reconstructed church and its original seventeenth-century brick church tower. Several structures relating to the early years of the fort have been partially reconstructed. Portions of an earthen Civil War fortification also survive on the Preservation Virginia land. Information about Jamestown Rediscovery can be found online at https://www.historicjamestowne.org/.

On the National Park Service property (1,500 acres), a visitor center highlights the history of the site and the results of over a century's worth of archaeological investigations and also incorporates displays about the history and current activities of Virginia's state-recognized Indian tribes. Outside, paths lead through the New Towne area (the portion of Jamestown settled after 1618) where archaeological features are interpreted through display panels and low brick outlines. A five-mile loop road takes visitors around the remainder of the island, where pull-in places feature displays on the natural and human history of the island over the past 10,000 years. Glassblowers demonstrate seventeenth-century techniques in a reconstructed glasshouse. Information about the Park Service property and displays at Jamestown can be found online at http://www.nps.gov/jame/index.htm.

Major Impact

Long celebrated as the birthplace of English-speaking America, Jamestown is also the birthplace of modern historical archaeology. The first excavations took place in the 1890s in advance of the reconstruction of the brick church and were followed in the 1930s by a major government-sponsored initiative that drew upon the labor of Civilian Conservation Corps volunteers. Directed by Jean C. "Pinky" Harrington, the 1930s investigations pinpointed the locations of 52 buildings in the townsite and pioneered the analysis of historic material culture. In the 1950s, another US government-sponsored project led by John Cotter employed extensive linear trenching across the townsite and exposed domestic, military, and manufacturing structures as well as a range of landscape features (Cotter 1958). Preparations for the 2007 four hundredth anniversary of the settlement of Jamestown led to two further projects in the 1990s. The Jamestown Archaeological Assessment (JAA), sponsored by the National Park Service in cooperation with the Colonial Williamsburg Foundation, took an interdisciplinary approach to assessing all cultural resources on the island (Brown & Horning 2006). A full survey pinpointed 58 new sites, attesting to Native American activity from the Archaic through late Woodland periods as well as previously unknown historic activity (Blanton et al. 2000). Dendrochronological research identified a major period of drought corresponding to the English settlement of Jamestown (Stahle et al. 1998). A thorough reevaluation of all previously excavated materials was carried out, informing limited new excavations in New Towne (Carson et al. 2006) and a revision of understandings of urban development in the Chesapeake (Horning 1995, 2000; Carson et al. 2008).

Since 1994, Jamestown Rediscovery archaeologists have unearthed the original James Fort (1607–1624) and excavated more than a million artifacts. Over 480 ft of palisade lines from the initial triangular fort have been exposed, as have the east and north cannon projections (bulwarks), a section of the western bulwark ditch, 11 filled-in cellars, three wells, dozens of burials, and ten structures (Kelso 2007; Kelso & Straube 2008). The range of material culture has significantly changed understandings of the character of Native and English relations in the early Chesapeake, with native wares comprising over 80 % of the ceramic assemblages from the period 1607–1610. Extensive clearance deposits dumped into a series of early wells, which include personal items such as jewelry and still functional items including armor and weaponry, attest to the extreme stress experienced by inhabitants during the 1609–1610 Starving Time. The size and diversity of the archaeological assemblage from James Fort makes it one of the most significant early seventeenth-century collections of material culture relevant to European Atlantic expansion.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
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Historic Site and Historic Building Preservation: Overview

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Introduction

The buildings and historic sites of Western culture are preserved according to this culture's

own values or values added following arbitrary selection by each society. The theories, methods, and techniques for taking these decisions arose with the Enlightenment and have varied over time and regions. After a peak in autonomy and growth in the twentieth century, a process has now arisen to homogenize meanings and preservation methods as part of the process of globalization. In particular, toward the end of the twentieth century, criteria were unified under the *Venice Charter* of 1964 (ICOMOS 1964), based on previous agreements articulated in the *Athens Charter* of 1931 (CIAM 1931), bringing about the creation of international bodies and universal standards, albeit respecting regional variants (Page & Mason 2004). As a result, local concepts of historical value have been lost in favor of more general ones acceptable to Western tourists and heritage professionals (e.g., De Oliver 1996).

Definition

Since historic sites and buildings began to be judged to have values external to themselves or seen to have a significance that exceeded their own functionality and the society that produced them, it has been necessary to preserve them. The terms historic buildings and historic sites preservation, or more generally, "heritage conservation," refer therefore to the legal measures, practical conservation methods, and philosophies that underpin these goals and facilitate their implementation. The conceptual shift that attributed historical "value" or "significance" to elements of the built environment occurred in Western culture over the course of the seventeenth to nineteenth centuries, although other cultures began it earlier or approached it differently. These developments essentially arose in England and France and were gradually imposed with the expansion of the Industrial Revolution, the Bourgeoisie, and early Liberalism. The new ideas behind these changes were based on the Enlightenment concept regarding the past as different from the present and its potential for legitimizing the present (Lowenthal 1985), the growing body of knowledge of other cultures, and the growth of antiquarian interest in the past (Sweet 2004). Figures such as John Ruskin (1849) and Emanuel Viollet-le-Duc (1854) played a particularly important role in the construction of these new theories, which eventually spread around the world. In these early decades, the Romanticism of the nineteenth century was a fundamental factor for the aestheticizing appreciation of the legacy of the past, as William Ruskin preached.

The expansion of nationalism and the creation of the first modern nations in the USA, Latin America, and Europe gradually defined the need for special theories that permitted the construction of explanations of identity that these territories had or were supposed to have (Kohl 1998; Díaz-Andreu 2007). For this, it was necessary to have significant material elements and ensure these were accepted by all. There were two sides to this: buildings and sites had to be recognized for their historic value while at the same time the state imposed that same value on the nation as a homogenizing process (e.g., Dietler 1994). Thus arose the Cult of Heroes, the conservation of their houses or of battlefields, the erection of monuments, and preservation of important places in the foundation of the nation and the state as monuments of inestimable value that should not be altered, maintaining them for the future. National heritage was a form of didactics, of teaching unarguable values. Constructing a nation implies defining an identity and deciding what stays and what is left out of history, what symbolizes it, and what can or must be destroyed.

Key Issues

In the twentieth century, standards were established with regard to how a historic building or place should be preserved and whether a damaged part may be replaced or not and in what way, especially after wars and other types of armed conflict. Schools, principles, and techniques of heritage conservation were created

(Feilden 2003; Fisch 2008). Although the experience of Central Europe was that which had greatest impact in the world, other outstanding theories and methods were developed in the twentieth century, especially in Mexico and Japan.

By the end of the twentieth century, it became clear that every country gives different levels of importance to their heritage and to historic and archaeological sites because these historic locations are used to support and convey different identities unique to these individual countries and their political system (e.g., Trigger 1989; Kohl 1998). Cultural heritage was not seen as similarity but as difference. For some, it was used to consolidate ideologies in the light of the collapse of major political groupings; for others, it was a means to increase tourism; for still others, heritage became a way to siphon off illicit gains through the tendering of public works, or to represent elite groups, but rarely has heritage been used to represent the majority. All these issues are controversial and enmeshed within the globalizing processes of the late twentieth century. In recent years, with the development of norms established by UNESCO in the World Heritage system, preexisting theoretical concepts in each region have had to be homogenized, wiping out a large number of local differences in heritage theory and practice. This has led to a world increase in tourism to regions that are not prepared for it, causing major problems for the sites and local populations. These are cases where economic policy has prevailed over social or cultural development. It is from the creation of these policies that new theoretical positions will arise on the use and role of heritage.

Cross-References

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- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ European Convention on the Protection of Archaeological Heritage (1992)
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Historic Building Conservation: Current Approaches
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process

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Historic St. Mary's City

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Historic St. Mary's City, Fig. 1 St. John's site at Historic St. Mary's City (Courtesy of Historic St. Mary's City)

Basic Information

Historic St. Mary's City (HSMC) is an active archaeological site and museum at St. Mary's City, Maryland's first capital, founded by Cecil Calvert, the second Lord Baltimore in 1634. Calvert constructed the first English Catholic chapel in the United States and instituted a policy of "liberty of conscience" in Maryland at a time when England was riven by sectarian political disputes. The City was designated as a National Historic Landmark District (NHLD) by the United States National Park Service in 1969.

Major Impact

St. Mary's City was Maryland's capital from 1634 until 1695, when the colony's political center was moved to Annapolis. The city was then abandoned for the most part; the land was farmed until the 1960s, when the state created the Historic St. Mary's City Commission to protect and govern the site. In the 1970s, historical archaeologists and social historians began working together to excavate and study the cultural remains and primary documents related to the City's history. Scholars have discovered evidence of the indigenous people of the Woodland period; the city's planning and development of Maryland's government; its ties to the Atlantic World; the tidewater tobacco economy; and the development of slavery. The museum's staff has trained generations of archaelogists through its annual archaeological field school, the longest running colonial archaeology field school in the United States.

HSMC has been recognized as a pioneer in public archaeology, beginning in 1972 at the St. Johns site (Fig. 1) with student and professional

archaeologists offering tours of the excavation. In January 2012, HSMC was recognized with the Award of Merit by the Society of Historical Archaeology (SHA) for over four decades of effort to preserve, protect, and interpret Maryland's "ancient and chief seat of government" as an archaeological treasure for the public.

Today, the museum tells the stories of early St. Mary's City and of the lives of its people through living history interpretation, a tall ship and outdoor exhibitions of reconstructed seventeenth century structures across forty acres. Its collections of more than seven million artifacts include fragments of such material culture as stoneware, Venetian glass, colonial and American Indian tobacco pipes and pottery, oyster shells, glass beads, construction materials, religious artifacts and three lead clad coffins from the chapel site.

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- ▶ Annapolis: Historical Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Buildings Archaeology
- ▶ Ceramics: Stonewares
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Field Schools, Archaeological
- ▶ Heritage and Archaeology
- ▶ Heritage Areas
- ▶ Heritage Museums and the Public
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ Historical Archaeology
- ▶ Households and Domesticity: Historical Archaeology
- ▶ North America During the European Contact Period
- ▶ North America (USA and Canada): Museums
- ▶ North America (USA): Historical Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Regional/Site Museums
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Historical Archaeology

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Brief Definition of the Topic

This quarterly journal is the flagship publication of the Society for Historical Archaeology (SHA) and the most widely distributed scholarly periodical pertaining to historical archaeology. Its purpose is the dissemination of substantive and theoretical articles relevant to researchers in the field, scholars from allied disciplines, and the interested

public. *Historical Archaeology* also includes testimonials to major SHA award recipients, transcribed interviews with prominent practitioners, and memorials that mark the passing of major figures. Reviews were pulled from the printed journal in 2007 and moved to the SHA website http://www.sha.org/publications/book_reviews.cfm.

Created with the establishment of SHA in 1967, *Historical Archaeology* was then an annual publication. Founding editor, J. Glenn Little II, resigned soon after appointment owing to illness, so the premier volume was prepared by an "emergency editor," SHA President John L. Cotter. David A. Armour accepted a 3-year appointment as editor starting with the 1968 volume and, after serving a second term, was succeeded by John D. Combs in 1974.

Following a transitional year, Ronald J. Michael assumed full editorship of *Historical Archaeology* in 1978, a position he held through nine successive appointments until the start of 2005. Over that time, the journal expanded to a semiannual in 1981 and ultimately achieved its current status as a quarterly in 1990.

During his long and influential tenure, Michael introduced thematic journal issues (usually two each year) with guest editors and added occasional "forum" features promoting discourse among several authorities in response to a provocative position paper. A *Special Publications* series was launched, as well as topical guides to the literature, underwater proceedings from the conference, and readers compiled from reprinted journal articles. Print and on-line indexes to the journal, as well as searchable CD-ROM collections of journal volumes, also were produced. During the latter part of Michael's editorship, SHA unveiled its Internet website http://www.sha.org and began a joint publication program with the University of Florida Press.

Rebecca Allen became editor of *Historical Archaeology* in 2005 and served through the end of 2007. She built upon prior initiatives and expanded the co-publications program to include a partnership with the University of Nebraska Press. Allen also worked to define the roles and functions of newer editorial positions responsible for co-publications and SHA's website.

J. W. Joseph accepted appointment as journal editor in 2008, with Mary Beth Reed serving as coeditor. The current editorial focus is managing the orderly transition to electronic media, including creation of SHA's Print-On-Demand (POD) Press. POD initiatives include the *Perspectives* series of topical readers from the journal, each with an introduction to the subject matter by the compiler.

All journal back issues more than 5 years old are now available for downloading at SHA's website http://www.sha.org/publications/onlinepubs_html/, whereas more recent issues are available to current SHA members who successfully log in. JSTOR archives digital back issues of *Historical Archaeology* for retrieval and downloading subject to the same "moving wall" http://www.jstor.org/action/showPublication?journalCode=histarch. Printed copies of many special publications and recent journal issues are also available through SHA.

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Historical Archaeology: Indigenous Perspectives and Approaches

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Introduction

In discussing the perspectives of Indigenous populations on historical archaeology, it first

becomes necessary to discuss the varied perspectives on the general discipline of history. As James Wilson in his popular history of Native America writes "It is often very difficult to interpret the surviving oral tradition: the written English version of a story not only translates it into another language but also transposes it from the cultural context in which it was originally told"(1998: xxviii). Such interpretation may be necessary in order to "document" the events described by the speaker (such as the oral traditions by the Indian victors at the Battle of the Little Big Horn). It is important to also consider the fact that, even with these limitations, Wilson continues, "Indians are the central characters, rather than simply bit players; in which the importance of their history lies in its significance to *them* rather than for us; and in which the very concepts of history itself is [sic] radically at odds with Western assumptions and beliefs." Other groups, such as the Northern Cheyenne, are concerned that the tribe's "real history" is being lost. As McDonald et al. (1989: 266) note, "Tribes have remained largely silent with historical information because they consider it sacred. Many tribes, however, are now acknowledging the concept that 'history belongs to those who tell it,' and are striving to take action to eliminate inconsistencies between white and Indian accounts."

Definition

Historical archaeology, or, more precisely, archaeology of the historical period, is a branch of the discipline of archaeology that is devoted to using archaeological methodology to illustrate archaeological sites and events that have occurred within the period of time within a region that falls after contact between populations and those groups who have initiated and maintain a written historic record. In this manner, historical archaeology draws together written historic records, oral histories, and lesser known sources in conjunction with archaeological research to create fuller pictures of events that have transpired.

Key Issues

An issue in the relationship between historical archaeology and Native Americans is, as Rubertone notes, "hampered by the undefined role of archaeological findings in what has traditionally been the domain of the ethnohistorian" (2000: 426). Early historical archaeological work began by focusing on sites of historical situations and then working from those sites and chronologies backward in time, the "direct-historical approach" working extremely well in the Great Plains and American Southwest areas. This served "more as a means of gaining a backward glance at earlier cultural periods and less as a critical source of evidence for illuminating the realities of Native peoples' lives and struggles in colonial America" (Rubertone 2000: 427).

In general, the historical archaeology of Native Americans can be divided into four main categories: the archaeology of early contact, the archaeology of military events, the archaeology of frontier contact, and the archaeology of assimilation.

Archaeologists looking at the archaeology of early contact in the United States have sought to gain insights into the actions and reactions of groups of people who are thrust into uneasy contact. In the southeastern United States, early archaeological sites that document events between the Spanish and Native North America peoples can be used, argues Galloway, "as explanations for the origins of changes *following* contact" (1997: 292). Similar approaches might be suggested for the Native American-Russian contacts of California, the Spanish-Southwestern Native American contacts, and the contacts between the French and Native American groups, although each European group interacted differently with the native peoples with whom they came into contact.

The historical archaeology of military events has also been a point of contention among Native Americans and historical archaeology, often because the recorded history of the military event is often told by the victorious (or valorous) military historians. In 1988, Dull Knife Memorial College initiated an archaeological survey to determine the most likely escape route taken by

Dull Knife's band of Northern Cheyenne during the "Cheyenne Outbreak" from Fort Robinson, Nebraska, on January 9, 1879. A literature search and results of field investigations suggested that the escape route suggested by the US Army and local historians was in error, and, instead, the most probable route was that described in the oral history of the tribe. "No single piece of evidence was sufficient to reach this conclusion, but the weight of the available evidence leans significantly towards this conclusion" (McDonald et al. 1989: 268). More frequently, however, the Native American version is given subservient positioning in relation to written documents. At the Sand Creek Massacre Site in Colorado, the National Park Service's determination of the most likely site of the massacre (based on archaeological materials) was at odds with the determination made by Cheyenne tribal members based on oral histories. In spite of the conflict with the scientific evidence, the Cheyenne consecrated the site of the massacre at the point established by *their* histories, thereby fixing the significance *of that particular location* (rather than the location determined by the archaeologists) as the location where "the village stood and the massacre began" (Greene & Scott 2004: 115). In this manner, the Cheyenne are content to consecrate their own location supported by their histories and yet allow the archaeological location to coexist with their own.

In looking at the archaeology of frontier contacts, it is important to realize that "Native Americans were never passive participants in the process; rather they were *active agents* . . . [in] everything that came their way" (Ware 2010: vii, emphasis added). In an analysis of the Townsend site in eastern Tennessee, Marcoux examined Indian occupations at the community level during a time when not only large events created enormous (and long-lasting impacts) but also the time when impacts hundreds of miles away rippled through the Indian habitations of the eastern part of the United States. Such impacts – the ripples across the shatter zone – influenced the lives of towns and community sites. Marcoux (2010) attempted to use the archaeological process and archaeological analyses to answer questions related to the period of initial English contact with the Indigenous populations along the east coast. For example, by examining the variety of pottery styles represented at the Townsend site, he hypothesized that the community was formed people from different settlements in direct response to the violence and population loss associated with the time of English contact. This tumultuous period of contact, with its disease, warfare, the deer skin trade, and expansion of economic impact, had far-reaching and long-lasting effects on the groups of the area, and the archaeological information can provide insights into ways the local populations not only survived the clash of worlds but also reestablished themselves at the time.

The historic archaeology of assimilation can be viewed as the archaeology of historic sites created by Native Americans but which are nearly indistinguishable from those of surrounding non-Native inhabitants. Robert Brooks (1996: 265) notes: "(A)rchaeologists have been remiss in not examining the profound changes the tribes experienced, and there has been limited study of postremoval southeastern natives." It is not that such studies do not exist. Judy Bense recognizes some of this disconnect and presents some examples of archaeological research on historic Indian towns and structures (Bense 1994: 297-9, 306-7, 308-9, 317-22). The tribal groups immediately accepted the durable and ornamental European trade goods both as evidence of social status and also as technological items; the tribal groups also shifted in their habitation and subsistence patterns from large towns to smaller farmsteads. Some tribal groups, however (most notably the Seminole and Creek Indians), apparently rejected European items, perhaps as an outright rejection of European influence and a reaffirmation of pre-European native ways. Ultimately, she notes that "Southeastern Indian groups tried both to assimilate into and reject European-American culture, and these strategies are well reflected in their archaeological remains" (1994: 322). Hartley and Watkins' excavations at the Whirlwind Mission site in western Oklahoma (1993: 43-56) noted the appearance of artifacts considered to be "traditional" to the American Indian culture

within a so-called Western cultural context. The authors note: "Although the artifact assemblage is overwhelmingly of European-American manufacture, the early twentieth century survival of aboriginal technological traditions is indicated by a few chert flakes and one deliberately worked glass jar base dating to the second decade of the 1900s" (Hartley & Watkins 1993: 50).

International Perspectives

Indigenous groups in other parts of the world are also becoming involved in research concerning interactions between Indigenous and non-Indigenous people at contact and after through the archaeology of the historical period. However, in some areas, even defining the sites under consideration can be challenging. For example, the Department of Planning and Community Development of Victoria, Australia, limits historical archaeology to "the study of the past through non-Indigenous archaeological sites, artefacts (sic) and landscapes with the assistance of historical documentation" (2012 Victoria Department of Planning and Community Development). Still, other areas of Australia integrate the Indigenous population into the study of archaeology of the contact and early historic periods.

Greer, Harrison, and McIntyre-Tamwoy (2002) examine the range of archaeological research involving Indigenous populations in the York Peninsula, New South Wales, and North Western Australia involving communities relating to World War II events, the pastoral industry, and the convict periods of Australia's history. The authors conclude that stronger and more direct involvement of the Indigenous community in the research process creates a tendency to focus on the more recent, remembered history rather than the archaeology of a deep Paleolithic one, finally noting "the separation between indigenous and non-indigenous, so-called 'historic' archaeology, is nebulous" (2002: 283), a point that Kent Lightfoot, among others, has made with reference to North American archaeology. Wendy Beck and Margaret Somerville (2005) also look at the relationships between archaeology of the historic period and oral history as recognized as a result of work carried out from 1996 through 2002 by the University of New England (UNE) and the Yarrawarra Aboriginal Corporation. This work was oriented at utilizing conventional academic research as a means to record "place knowledge" so as "to establish credibility with government agencies" (2005: 469). In their work, they integrate oral history and archaeology without dominance of one discipline over the other, working toward the idea that the importance is not "whether the archaeology is richer or poorer in detail than the oral history, it is about presenting the diversity of place-stories" (2005: 480). Tim Murray, in reviewing the relationship between archaeologists and Indigenous people (2011: 368-70), examines the historical archaeologies of indigenous peoples, primarily post-contact with outside cultures, offering a very broad and coherent discussion of these burgeoning relationships.

Susan Lawrence and Nick Shepherd (2006: 80-4) provide a glimpse into the relationships between Indigenous people of South Africa and the archaeology of the historic period as they discuss the situation that arose during the excavation of a historic cemetery on Prestwich Street, Cape Town. In their chapter, they note the need for "archaeology to come to terms with what might be characterised (sic) as the necessary entanglements of race, culture, and identity in the post-colony" (2006: 84).

Future Directions

The historical archaeology of Native American sites can move beyond the mere presentation of vanquished populations at the hands of a technologically advanced conqueror. The idea of cultural change and adaptation, rather than one of pure assimilation, can provide insights into the ways that Native American cultures adapted to external forces in the midst of cultural pressures brought about by land loss, changing land patterns, and pressures to give up traditional ways of life and to convert to European-American ideas or lifestyles. The archaeology of Native American sites, Rubertone warns, should not be interpreted as indicative of culture loss and

assimilation, but can also be interpreted "in ways that capture a diversity of experience and that challenge accounts in which the variations are finite and predictable" (2000: 439).

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- ▶ Indigenous Archaeologies
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- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Peoples, Working with and for
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Oral Sources and Oral History
- ▶ Watkins, Joe (Indigenous Archaeology)

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Historical Archaeology in Latin America

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Basic Information

Historical Archaeology in Latin America was the only specialized publication on historical

archaeology that existed in the region until 2007, when some other journals, such as *Vestígios – Revista Latinoamericana de Arqueologia Histórica*, and *Revista de Arqueología Histórica Argentina y Latinoamericana*, began to be published. It was coordinated by Stanley South, an American scholar mostly known for his pioneering work on pattern analysis in historical archaeology. These series of publications were funded through a grant from The Conference on Historic Site Archaeology, and enjoyed the support of the South Carolina Institute of Archaeology and Anthropology. Sixteen different volumes were published between January 1994 and April 1996, and after this year, *Historical Archaeology in Latin America* ceased being published.

Major Impact

The volumes show the heterogeneous development of historical archaeology in the region. Articles were mostly written by Latin American archaeologists in Spanish, Portuguese, or English and 90 % of the contributions were produced by Argentinean, Uruguayan, and Brazilian scholars, showing their strong presence in this field of study. The vast majority of the contributions focused on colonial archaeology (mainly the analysis of the European settlement in the region and its consequences) with Hispanic and Portuguese settlements as the major topic. However, some scholars also discussed the nature of other kind of sites during colonial times (such as those created by maroon slaves). The study of all of these contexts involved, among other things, discussions on the production and distribution of artifacts and the construction of social differences.

In the course of its short existence, *Historical Archeology in Latin America* was fundamental in the consolidation of historical archaeology in the region. The works collected in this series stress two main arguments: On the one hand, different areas and countries had been traditionally connected by similar historical processes; on the other hand, archaeologists should stop working in isolation to improve the understanding of the past and present of their own societies.

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Historical Ecology and Environmental Archaeology

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Introduction

Historical ecology is an interdisciplinary research program that studies the dynamic and dialectical interactions between humans and their environments. A relatively recent scientific approach with deep intellectual roots, historical ecology is related to, but differs from, other ecological perspectives by maintaining an anthropocentric focus on humanized landscapes. Stridently eclectic and multidisciplinary in its approach, historical ecology has borrowed from diverse sources including the "new" ecology, history, and geography. It is characterized by a set of core independent postulates which accentuate the impact of humans as keystone species; advocate recursive, nonlinear, and nondeterministic human environmental manipulation; underscore variability in humanized landscapes through time; and appreciate the inseparability of humans and landscapes. Archaeology and historical ecology are also inseparable. Environmental archaeology is essential for historical ecology, while archaeology, by definition, engages in historical ecology through its practice.

Definition

Historical ecology is an interdisciplinary and anthropocentrically oriented research program that is centered on studying the diachronic interactions between human societies and their environments. Historical ecology focuses on the landscape, both as the multidimensional material legacy of human activity and as an agent that actively shapes human actions in time and space through an embedded and dialectical relationship. Human activity, primarily through various forms of disturbance activities, is key to understanding the production of landscapes that are shaped by, and which simultaneously influence, human behavior in an historically contingent relationship. Past human behaviors can therefore be inferred from environmental settings as these are the material records of a culture which becomes physically embedded within humanized landscapes (Balée 2006; Balée & Erickson 2006).

Historical Background

Although a relatively recent scientific approach, historical ecology has deep intellectual roots.

The term was earlier used by the late ecologist and paleolimnologist Edward S. Deevey (1964) who characterized a multidisciplinary and historical ecology that was capable of tracing the interactions of culture and environment in far more detail than written history. The idea of humans as historical agents active in the transformation of landscapes is of course traceable to classic antiquity and later Enlightenment philosophy (Balée 2006: 78), but one which was more recently anticipated in the work of historians (Marx & Engels 1970, original 1888) and geographers (Sauer 1925) who explicitly rejected the contemporary existence of forms of nature that preceded human history.

Historical ecology is related to, but differs from, a number of approaches that developed out of an earlier cultural ecology. The latter focused principally on how culture adapted to non-transformable and manifestly balanced equilibrial environments, thereby placing little to no emphasis on human agency. Human behavior was largely considered as a disruptive force in the environment, and where anthropogenic disturbance was ephemeral or small in scale, homeostasis could be restored after removal of the disturbing agent. As such, cultural ecology was limited in its ability to explain anything but small-scale and technologically simple cultures that could be considered as adaptive when their ephemeral or sustainable activities enabled environments to retain or return to some preexisting "natural" condition (Balée 2006: 79). Through distancing itself from notions of steady-state ecosystems and functional adaptations, historical ecology is allied with the "new" or "dynamic" ecology which gained traction in the 1970s. Environmental balance, equilibrium, and homeostasis were replaced with instability, disequilibrium, and chaotic fluctuations, regardless of whether they occurred in the presence or absence of human action (Botkin 1990; Zimmerer 1994; Scoones 1999). Although the new ecology shared basic perspectives with historical ecology, its own historical divergence from systems ecology was facilitated through concepts developed in population and evolutionary biology. Historical ecology differs from the new ecology primarily through its strident anthropocentric focus and insistence on the holistic study of humans embedded within their landscapes through time and across space. This sets it apart from most materialist perspectives which variably emphasize the separation of humans from nature.

In accordance with its multidisciplinary perspective, historical ecology also utilizes concepts originally associated with the twentieth-century French *Annales* school of historiography. Dialectical processes between humans and humanized landscapes occur over differing temporal scales. These include short-term events (*événment*), much like the "punctuated equilibrium" of paleontological events; repetitive statistical patterns or cyclical episodes (*conjuncture*) that might occur within the time span encompassed by a human life; and the critically important long-term history (*longue durée*) which for most of the temporal span of human existence can only be made accessible through archaeology (Crumley 1998; Balée 2006: 80). It is the long-term perspective of historical ecology that is particularly powerful and one that corresponds well with the techniques, methods, and scope of environmental archaeology. The recognition of deep antecedent structure as the legacy of past human populations, one which also continues to carry important implications for contemporary human populations, certainly approaches the synthetic and multidisciplinary ecology that Deevey (1964: 34) saw as a bridge between the humanities and the behavioral, social, and earth sciences. This is made manifest particularly through highlighting its focal referent, the landscape (*paysage*), which records intentional and unintentional human action through time and across space. A focus on landscapes is highly integrative as it is a shared analytical unit in archaeology, geography, ecology, geomorphology, architecture, art, and regional planning (Crumley 1998).

Landscape is the paramount concept in historical ecology (Balée 1998a). The ancient western notion of the garden where humans habitually interact with various life-forms is the underlying premise of the landscape (Balée 2006).

It provides the key analytical portal for studying the dialectical relationship between humans and their environments through time and across space. Eschewing adaptationist perspectives, historical ecology emphasizes the humanization of landscapes; instead of sociocultural and political systems adapting to environments, environments are adapted by human systems to facilitate their particular needs and desires. Landscapes are treated in their totality as multiscalar, diachronic, and holistic units that embed the patterned material manifestations of culture. As such, humanized landscapes are studied as artifacts from which human intentions and actions can be inferred through time and across space (Balée & Erickson 2006). Due to their central role in the modification and creation of humanized landscapes, humans are considered as keystone species, a term that ecologists have used since the 1960s to refer to any species whose impact on the ecological community is usually greater than that of any other member because their presence is considered to be particularly crucial for maintaining both organization and diversity within the community (Mills et al. 1993). The principal mechanism by which humans assume the ecological role of a keystone species is through disturbance, which is a universal hallmark of modification by humans in the process of adapting landscapes to their particular requirements. The process is recursive, dynamic, and nonlinear, for as humans modify the landscape, they establish an historically contingent trajectory which directs all subsequent landscape history. Landscapes are both products of, and templates for, human actions (Scoones 1999: 493).

Key Issues/Current Debates

Anthropologist and ethnobiologist William Balée (Fig. 1), a key historical ecologist, considers historical ecology to be a partially accepted research program within the scientific community. It is characterized by a set of core independent postulates which (1) accentuate the deep temporal and globally spatial extent of human impact; (2) advocate the recursive, nonlinear, and nondeterministic trajectory of human environmental manipulation; (3) underscore the historically variable relationships between different societies and landscapes over time; and (4) appreciate the importance of understanding humanized landscapes in their totality (Balée 1998b, 2006).

Historical Ecology and Environmental Archaeology, Fig. 1 William Balée in the Central Amazon basin, 2010 (Photo taken by author)

Postulate 1: Human Activities Have Had a Significant Impact on the Non-Human Biosphere

The older adaptationist perspectives of ecosystems and cultural ecologies were predicated on the notion of stability in nature. They required belief in equilibrium, homeostasis, and orderly succession, which are ideas with ancient roots in western thought (Botkin 1990). They in turn necessitate the teleological assumption that a pristine nature must exist in an original and

unspoiled (particularly by humans) condition and that a subsequently spoiled (particularly by humans) nature can return to its prior state in the absence of the disturbing agent. The idea that human activity was capable of transforming environments also has a deep history in western thought, beginning with Classical philosophy, continuing through the Enlightenment, and into the nineteenth and twentieth centuries, as historians and geographers questioned the existence of pristine conditions. In 1845, Karl Marx considered that a nature preceding human history "...is nature which today no longer exists anywhere (except perhaps on a few Australian coral-islands of recent origin)" (Marx & Engels 1970: 63). In his latter characterization of natural and cultural landscapes, geographer Carl Sauer believed that the former no longer existed in its entirety in many parts of the world (Sauer 1925). The concept of pristine environments is today considered to be a myth (Denevan 1992), one which is probably more like an old and cherished wish rather than an established fact. Wherever humans have been present, "natural" environments have been altered, and once altered they never revert back to a "natural" condition (Balée & Erickson 2006). An important question about an assailable nature concerns the temporal depth of human impact. Does it span the entire temporal range of genus *Homo*? Does it begin with the appearance of modern humans? Is it associated with the early Holocene advent of agriculture, or as some would prefer to call it, the Anthropocene? Agricultural humans are perhaps the pinnacle of disturbance agents, although all humans regularly modify landscapes regardless of their particular subsistence orientation. Indeed humans are unique only in terms of the scale to which they have modified landscapes and the degree to which they have intentionally planned their modification (Balée 1998b). Niche construction is a general and pervasive feature, and one which has likely influenced the ecology and evolution of many different species. Defined as the "activities, choices, and metabolic processes of organisms through which they define, choose, modify, and partly create their own niches" (Laland et al. 2000: 132–3), niche construction can proceed through the building of artifacts or benign habitat modification and can be undertaken by diverse life-forms. In all cases, descendant generations receive constructed niches as *ecological inheritance*; however, because it is dominated by learned knowledge and cultural inheritance, human niche construction is "unusually potent" (Laland et al. 2000: 141). It underscores the ecological role of humans as a keystone species. As the ecological impact that cultural humans assert on the landscape is both quantitatively and qualitatively greater, they assume a dominant and critical role in structuring the ecological community. Human activity affects all other organisms within the landscape and plays a key role in determining the kinds and numbers of different species within the community (Mills et al. 1993).

Postulate 2. The Effects of Human Activities Are Neither Inevitably Linear Nor Deterministic

The equilibrial perspectives of ecological systems that were premised on the assumption of stability and balance in nature, and which dominated scientific discourse on the relationship between humans and environments, have been supplanted by an increased appreciation of history, variability, complexity, and uncertainty (Scoones 1999). Despite the tenacious hold that metaphors of balance, regulation, and harmony have in anthropology, historical ecology can be a productive arena for coalescing contributions of the new ecology within the social sciences (Scoones 1999: 490). Historical ecology is particularly interested in the complex relationship between humans and their environments which is manifest in landscape change through time and across space. With this interest, historical ecology understands the dynamic interaction between cultural and ecological processes. Humanized landscapes are dynamic and recursively created in nonlinear, nondeterministic, and historically contingent ways. Their unique histories can be accessed by studying humanized landscapes as cultural artifacts. Furthermore, the holistic study of historical ecology appreciates the complexity, nonlinearity, and indeterminacy of humanized landscapes as

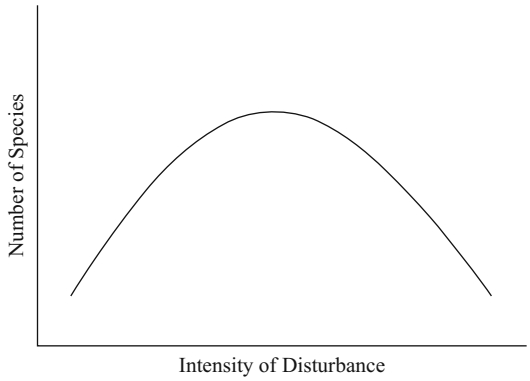

Historical Ecology and Environmental Archaeology, Fig. 2 Simplified model of the relationship between species abundance and disturbance intensity (Reprinted, with permission, from the Annual Review of Anthropology, Volume 35 © by Annual Reviews www.annualreviews.org)

historically contingent artifacts. The contingent perspectives of historical ecology and its rejection of equilibrial assumptions avoid essentializing an ecological role for humans in their interactions with landscapes. Humans are neither cast as obligate destructive agents (*Homo devastans*) whose activities necessarily degrade the environment through decreasing species richness, nor are they stereotyped as "ecologically noble savages" harmoniously adapted to, and existing ephemerally within, a balanced ecosystem (Balée 1998b). Humans, like any niche-constructing organism, are disturbance agents, except for the fact that humans are unique keystone species whose cultural equipment enables them to assert a quantitatively and qualitatively greater influence on the landscape. Nor should disturbance be automatically considered as ecologically destructive; rather its subsequent effect on the landscape must be understood in terms of degrees along a continuum. Empirical and mathematical modeling suggests that intermediate disturbance can lead to higher species richness (Fig. 2). At either extreme of the continuum, species richness diminishes as stable or undisturbed communities are characterized by a tendency toward monopolization by a few dominant species, whereas catastrophic widespread and continuous disturbance radically decreases community complexity. Spatially and temporally localized instability prevents monopolization by a few while simultaneously presenting new opportunities for others (Connell 1978).

Postulate 3. Different Human Activities in Different Contexts Can Lead to Different Outcomes

Historical ecology emphasizes the dynamic nonlinearity and indeterminacy of environmental change advocated by the new ecology and stresses the historically contingent nature of humanized landscapes. Landscapes, once modified, never return to a "pristine" or "original" state but are produced through time and across space in dialectical fashion. Different social arrangements with different actors in different locations at different times can produce different outcomes (Scoones 1999: 494). For example, it has been conclusively demonstrated that Amazonian agroforestry can contribute to comparable if not greater species richness in old fallow fields when compared to species richness in surrounding high forest. However, fallow formations differ from high forest formations as they tend to be characterized by unique species. Also, disturbance indictors are the ecologically most important species in fallow, whereas their ecological counterparts in high forest are indicators of non-disturbance (Balée 1994). Many different kinds of biological enhancement are recorded in neotropical landscapes that are and were humanized through indigenous agroecological systems, including Kayapó apêtê forest islands in the Brazilian cerrado, raised field systems in savannas, anthropogenic forests, and dark earths (ADEs) throughout the Amazon basin and beyond (Balée 1998b; Balée & Erickson 2006; Erickson 2008). Conversely, biological degradation has been recorded in certain landscapes, especially island habitats which are particularly vulnerable to local extirpation of endemic species whether through intentional human exploitation or unintentional habitat destruction or introduction of exotic invasives. However, Balée (1998b: 23–4) has suggested that it is only within the context of ancient and modern state societies, in particular, that associated biodiversity reduction and decreased habitability have been solidly

recorded. Whether state societies are intrinsically destructive or not remains an ethnographic and historical question, not a biological one. In any case, the results of human activity are not deterministically programmed.

Postulate 4. Humans and the Landscapes in Which They Interact Are Mutually Interdependent

Landscapes are both products of, and templates for, human actions (Scoones 1999: 493). Historical ecology emphasizes the humanized character of landscape and in doing so rejects the dualistic separation of humans and culture from landscapes and ecology. The anthropocentric focus of historical ecology emphasizes the ecologically important activities of humans within landscapes and simultaneously considers the effects of landscape modification through time on the human condition. In ecological terms, humans might be characterized as particularly dominant and somewhat unique keystone species; regardless, it is in the material manifestations of landscapes that humans and environments can be considered as inseparable (Balée 1998b: 24).

Historical Ecology and Environmental Archaeology

It is specifically in the notion that landscapes can be studied as material artifacts of human behavior that culture and environment appear inseparable. It is also where environmental archaeology assumes particular importance not only for an understanding of the past but also for issues that transcend traditional subdisciplinary and disciplinary boundaries in archaeology and anthropology (Hayashida 2005; Stahl 2008). The historical ecological study of landscapes is strongly multidisciplinary. Balée and Erickson (2006: 7) emphasize that the primary data of historical ecology lie in the patterning of material residues, anomalies, and cultural imprints that human activity has inscribed in the landscape. These data are necessarily captured through an interdisciplinary application of techniques and methods as they minimally include genetics, plant and animal domestication, agroecology, soils, inventories of biological and agroecological diversity, hydraulic engineering, linguistic terms, environmental memory and oral histories, archaeology and material culture, and actualistic studies (Balée & Erickson 2006: 7). Archaeology and historical ecology are inseparable. Archaeology, through its techniques and methods, is essential for historical ecology, as its can access a "deep time" that is inscribed within the landscape yet far exceeds human memory and the advent of written records. Environmental archaeology is an entrée to data used for the establishment of reliable inferences about past ecologies. These are inscribed in the landscape in the form of preserved and retrievable information that is either directly relevant to or indirectly implicated as proxies for establishing past conditions. Simultaneously, whenever archaeologists retrieve data from landscapes or from the buried record of archaeological sites, they are exploring anthropogenic phenomena through time and across space and are by definition engaging in historical ecology. Furthermore, archaeologists practicing historical ecology are not simply learning about the past. Their interpretations can have serious consequences in contexts where indigenous rights are juxtaposed with issues of biodiversity management. They also have direct relevance to issues ranging from preservation and conservation to ecological restoration, rational development, and the elusive goal of sustainability (Stahl 2008).

International Perspectives

Historical ecology has rapidly become a major global research program. Specifically designed historical ecological research initiatives are retrieving important results and developing provocative interpretations in every continent and progressively more crucial insular contexts. Although it is an important perspective with temporally deep intellectual roots, the historical ecological approach in all its forms has been variably embraced at different times and in different places. Certainly, the minimal acceptance

of the human capacity to transform landscapes has been better appreciated in Europe for decades, but it has been in the western hemisphere where the most dramatic recent developments have been undertaken. This is undoubtedly attributable to the intransigent and lingering belief that indigenous populations could only have affected a benign and ephemeral presence prior to the arrival of Europeans in the late fifteenth century (Delcourt 1987; Denevan 1992). A similar viewpoint was traditionally also projected onto many of the world's tropical areas. Historical ecology has become a dominant research program in the neotropics and particularly throughout the Amazon basin where its practitioners have countered long-held views that pre-Columbian populations were small, dispersed, and both technologically and socially simple. This viewpoint is being rapidly discarded, and in the process, some of the most dramatic and exciting empirical discoveries and theoretical formulations of historical ecology are emerging today from contemporary studies in the neotropical lowlands of the western hemisphere (Erickson 2008).

Cross-References

- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Cultural Ecology in Archaeology
- ▶ Garden Hunting
- ▶ Historical Ecology in Archaeology
- ▶ Human Evolution: Use of Fire
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology

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Historical Ecology in Archaeology

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Introduction

Edward S. Deevey, who directed the Historical Ecology Project at the University of Florida in the early 1970s, introduced the term "historical ecology" to archaeology. Working with archaeologists on Mesoamerican lake sediments, Deevey's integration of archaeology and paleoecology was visionary. Deevey's son Brian finds the first mention of historical ecology in his father's publications of 1964 (Brian Deevey *pers. comm.* 2009).

In the early 1980s, historian Lester J. Bilsky solicited the contributions of anthropologists, a human ecologist, an economist, and fellow historians for *Historical Ecology: Essays on Environment and Social Change* (1980). Anthropologist Alice Ingerson organized a session on historical ecology at the 1984 annual meeting of the American Anthropological Association. This session addressed the chasm between cultural (e.g., nature as metaphor) and environmental (e.g., energy cycle) studies within anthropology and explored political economy and social history approaches in the discipline.

By the late 1980s, Carole Crumley and William Marquardt – drawing on anthropology, archaeology, history, and the biophysical sciences – employed historical ecology in the study of long-term regional change in Burgundy, France (Crumley & Marquardt 1987). Later, they collaborated with colleagues in archaeology, evolutionary ecology, and anthropology to produce the edited volume *Historical Ecology: Cultural Knowledge and Changing Landscapes* (Crumley 1994). Independent of Crumley and her colleagues' work, William Balée and his colleagues, working in South America, enriched the traditional cultural ecology approach to include history. Balée organized a conference of anthropologists, historians, and geographers at Tulane University in 1994; the papers were published as *Advances in Historical Ecology* (Balée 1998). The same decades also witnessed the development of political ecology, which directly addresses the political economy of contemporary environmental processes and practices (Robbins 2012). There are obvious resonances with historical ecology. Because we act out our thoughts on landscapes, the history of landscapes can be seen as "congealed" politics: outcomes of the struggle over resources and ideas (Crumley in Sinclair et al. 2010: 10).

Working together since the mid-1990s, Balée and Crumley furthered the approach of historical ecology with the creation of two fruitful publishing venues for historical ecology. The first was a Columbia University Press series which produced seven volumes, including Balée and archaeologist Clark Erickson's exploration of deep-time biodiversity in the Amazon. Balée and Crumley's current series focuses on applications of historical ecology and is published by Left Coast Press.

Historical ecology has another source, derived from forest history and restoration ecology (e.g., Swetnam et al. 1999; Egan & Howell 2001; Foster & Aber 2004; Jackson & Hobbs 2009; Burgi 2011; Szabó & Hédl 2011; Grossinger 2012; Jackson 2012). While drawing initially on geography and environmental history, the expanding framework for such research has come to resemble the strand of historical ecology found in anthropology and archaeology, in that it addresses community involvement, a longer time frame, and contested visions for modified landscapes. The involvement in landscape management of diverse stakeholders, along with the political issues they represent, requires an integrative approach both to understand current-day ecosystems and landscapes and to plan their future. In multiple-use landscapes,

such as public lands and urban spaces, managers must understand the combined physical and social history of the ecosystems and landscapes in their charge. Archaeological evidence plays an important part both in developing landscape histories and in developing new strategies for more integrated and functionally robust landscape management.

Definition

For archaeologists and others who study the linked past of humans and the environment, historical ecology is a cluster of concepts in a practical framework for studying the past and future of that relationship (Crumley 1994, 2007a, 2012; Balée 1998, 2006; Meyer & Crumley 2011). While historical ecology may be applied to spatial and temporal frames at any resolution, it finds particularly rich sources of data at the "landscape" scale – where human activity and cognition interact with biophysical systems and where archaeological, historical, ethnographic, environmental, and other records are plentiful.

The term *historical ecology* employs a definition of ecology that includes humans as a component of all ecosystems. Its definition of history is not limited to the written record but encompasses both the history of the Earth system and the social and physical past of our species. Historical ecology constructs an evidence-validated, open-ended narrative of landscape evolution and transformation. It follows the dialectical interaction between (spatially and temporally) diverse human activities and changing environmental conditions.

Historical ecology may not be familiar to every archaeologist, but its salient characteristics will be recognized as those which undergird most archaeological practice. Chief among these is a collaborative, transdisciplinary research environment. Historical ecology perforce draws on a broad spectrum of concepts, methods, theories, and evidence, taken from the biological and physical sciences, the social sciences, and the humanities.

Some examples of the power of this transdisciplinary approach are helpful. Traditional/local environmental knowledge can be equally valued and scrutinized along with scientific evidence: this requires a combination of field biology and other natural science disciplines, archaeology, written and oral history, and ethnography (e.g., Balée & Erikson 2006). Because cultural landscapes are inherently political, the combined study of biogeophysical processes with historical and political ecology can expose social forces active in their formation and more completely analyze decision outcomes. Systems ecology offers a provocative heuristic approach, termed "resilience," to the study of complex adaptive socio-ecological systems over time (Folke et al. 2004). While the resilience concept has several drawbacks, it can focus archaeologists' interpretation of past system changes on issues that have immediate current applications (Costanza et al. 2012; Plieninger & Bieling 2012). More generally, complex adaptive systems theory contributes concepts such as initial conditions, emergence, and path dependence to the analysis of these ancient systems, broadening the archaeological study of change across time and space and into the future (Redman 2005).

Historical ecology enhances collaboration among differently trained researchers. It takes into account a project's stakeholders who could be impacted by providing an intellectual meeting place where diverse knowledge communities can exchange information about the past and present of a physical region and discuss various courses of action for its future. Of course, such exchanges require a strong commitment to dialogue, extensive translation, and significant efforts at coordination. Nonetheless, standard analytic procedures of these various disciplines are respected; the information thus derived provides critical "cross-checks" upon other data sets, revealing new patterns and encouraging researchers to ask further questions. From the beginning of the project, agreed-upon goals and frequent interaction underlie successful collaboration.

Key Issues

What term of theoretical reference should be used to describe historical ecology? It is not

a discipline, recognizable in the equipment that practitioners employ; the material or phenomena that they examine; the research questions, methods, and hypotheses; and the results that they obtain. Because each archaeological "case" (e.g., site, research question, and availability and quality of the material record) is different, practitioners of historical ecology are far more concerned with a pragmatic approach to particular circumstances, using what is available to build a narrative of landscape history. Neither is historical ecology a method, meaning that particular procedures and techniques are employed.

Historical ecology is not a theory, in the sense of a proposed explanation of empirical phenomena. While there are certain postulates which are largely (but not universally) agreed upon (Balée 1998: 14, 2006: 2), historical ecology does not explain so much as it provides the tools to build a body of data that can be inductively assessed. Balée is a strong advocate of the notion that historical ecology is a body of theory, identifying "a core of interdependent postulates" used to explain human/biosphere interactions. While his postulates do capture a number of the concerns that are central to historical ecology, "theory" implies that certain interpretive positions follow from them. However, the inductive approach of historical ecology admits many interpretive frameworks, as does archaeology in general. While archaeological fieldwork and analysis are tied to a broadly scientific approach to the data, the interpretation of those data reflects the archaeologist's attachment to particular theories of human agency and action, whence come the research questions that led to fieldwork. Thus historical ecology does not claim exclusive association with any theoretical approaches, other than embracing holism.

Having ruled out historical ecology as a discipline, method, or theory, what is left to describe it? Perhaps Winterhalder's characterization of the field as "an investigation within a framework provided by a certain set of concepts" (in Crumley 1994: 18) is most satisfying. Concepts are flexible, both in the breadth of their applicability and in the fact that they are subject to change. Historical ecology is a cluster or "toolbox" of concepts. This is an antidote to entrenched approaches in that the research design is necessarily broadly collaborative, thus ensuring many perspectives. It is also unabashedly particularistic, in that every site, landscape, or region has a unique history and particular resources that can tell its story.

Aside from its academic role, there is also an applied aspect to historical ecology. For example, the US National Park Service employs a historical ecology approach to manage and interpret the enormous national park system, which must respond to the often contradictory needs of many users (e.g., conflict between rock climbers and Native Americans who consider Devil's Tower, Wyoming, a sacred site). The Society for Ecological Restoration International (SER) frames its research and instructional programs around historical ecology. The San Francisco Estuary Institute (SFEI) is a pioneer in using historical ecology to track linked biophysical and anthropogenic changes in wetlands. The Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) hosted an international conference on Frontiers in Historical Ecology as recently as 2011, an event that underscored the rapidly entwining origins and histories of historical ecology.

Current Debates

Complexity science is the transdisciplinary study of *complex adaptive systems* (CAS) (for an introduction by archaeologists, see Beekman & Baden 2005). They are dynamic, nonlinear systems that are not in equilibrium and do not act predictably, which aptly describes systems that include humans. These key features also distinguish contemporary complex systems thinking from earlier systems theory, which assumed that "natural" systems could be modeled with a few key variables and would return to equilibrium after being disturbed. The CAS concept represents a highly practical "multi-tool" (Meyer & Crumley 2011: 112) in the historical ecologist's toolbox, introducing useful ideas such as system history, initial conditions, path dependence, and emergence. In concert with the more heuristic idea of resilience,

referring to systems that do not degrade critical resources (Berkes et al. 2003; for an archaeological perspective, see Redman 2005), these conceptual tools allow archaeologists to think across time and space (thus following the evolution of specific societies and comparing them over the *longue durée*) and to ask questions whose answers have relevance today (Butzer 2005; Costanza et al. 2012).

More familiar concepts such as *diversity, region*, and *scale* also have an important place in the toolbox. As Evelyn Pielou demonstrated several decades ago, *scale* defines diversity. We must think of scale both in terms of how systems organize themselves and in terms of how we, in turn, study them. Scale – spatial, temporal, economic, social, and/or political – is of central importance to the archaeologist. It is in addressing this issue that archaeologists describe diversity in the past. If we choose the wrong analytic scale, we may miss critical evidence of similarity or difference. The same is true if we fail to recognize that systems organize themselves at multiple scales which differ from one another and which evolve. To follow regional change over time, one must be able to work across changing analytic and systemic scales.

In order to understand change in the past, the traditional approach has been to establish a temporally ordered chain of events, termed *causation*, which allows generalization about the system. But because complex systems, like human societies, are comprised of properties that can change at various temporal and spatial scales and can interact in unanticipated ways, a simple temporal ordering of events cannot describe "causal" interactions among variables. While in complex systems a clear line of temporal causation is compromised, it is possible to analyze profound change in the nature of the system (termed a *regime shift*) by identifying the variables that concatenate to bring about the change. This requires a meta-theoretical approach that takes into account the properties of dynamical systems that frequently include human societies.

Variables that change quickly are only the most recent arrivals in a series of rapid, not-so-rapid, and slow variables within these systems. For example, a plant disease causes system collapse only after agricultural lands have been slowly depleted of nutrients *and* after local populations have decided to specialize in a limited number of plant crops. Archaeologists – with their close attention to scales of time and space – are perfectly poised to study not only rapid variables but also the slower, less-easily identified variables which operate during periods of seeming system stability. Historical ecology enables archaeologists to study such periods of apparent inertia, encouraging us to seek evidence of slow variables in regional and local contexts.

Historical ecology draws from several strong historical traditions. Beginning in the 1920s, the French historical school *Annales* (Burke 1992) broke with traditional event-focused disciplinary history and instead emphasized context, incorporating geography, ethnography, and folklore as well as environmental science. The humanistic and dialectical *Annales* approach gave rise to a new collaborative framework for the study of regional history (e.g., the work of Braudel, Duby, and Le Roy Ladurie). Especially useful is the concept of processes operating among temporal scales of varying duration: these broad divisions are termed *événement* (event), *conjoncture* (cultural and historical context), and *longue durée* (long-term trends). Broad temporal frameworks, such as those that characterize an *Annales* approach, guide all historical sciences. Interpretation must rely on all three: events, whether they are a cleric's account of famine or stratigraphic evidence of flood, must be set in immediate and more distant contexts. The central *Annales* concept of landscape (*paysage*) allows researchers to address time and space simultaneously, follow intentional and unintentional acts, study human modification of the global ecosystem, and assess past events in shaping human choice and action. The study of changes in the temporal and spatial configurations of landscapes (a traditional pursuit of archaeology), along with work in cognition, offers practical means to integrate the natural and social sciences and the humanities.

Any discussion of causation in the systems of which humans are a part necessarily leads to *agency*. Agency has a long history in Western

social theory (Dobres & Robb 2000). The last three decades have seen a revival of agency thinking throughout the social sciences, largely in response to the work of practice theorists Pierre Bourdieu and Anthony Giddens. Actor-network theory (ANT), most closely associated with Bruno Latour, describes human society as a complex, interactive, and iterative collective of human and nonhuman actors; no effective "science of the social" can exist without including both humans and nonhumans (Latour 2005). Studies that explore the agency of objects as well and living beings can provide models for exploring the complex ecological collectives/systems of which humans are a part (Ingold 2000).

It is important to note that complex adaptive systems have no overarching hierarchy of dominant/determining "stimulators" and subordinate "responders." Rather, they are complex *heterarchies* of interacting elements that may sometimes stimulate and at other times respond and that may sometimes dominate the system and at other times may be dominated. A promising development in complex systems research is the concept of heterarchy, "which treats the diversity of relationships among system elements and offers a way to think about systemic change in spatial, temporal, and cognitive dimensions" (Crumley 2007b: 468). Originally developed in brain research, definitions of heterarchy are remarkably consistent across a vast array of disciplines, including artificial intelligence and computer design, mathematics, and sociology. Heterarchy refers to the relation among elements in a system in which they are unranked, or possess the potential for being ranked in a number of different ways, depending on systemic requirements (Crumley 1979: 144). Heterarchies stand in contrast to hierarchies, but do not replace them; rather the two exist in dialectical relationship with one another. Heterarchy is a corrective to the naturalized characterization of power relations, which conflates hierarchy with order.

Future Directions

It is important to remember that historical ecology extends the concept of heterarchy not only to the material being studied but also to the conceptual framework of that study. As a transdisciplinary endeavor, historical ecology recognizes the contribution of many different kinds of researchers and types of data. Correlating the contributions of these researchers and integrating their data represent two of the biggest challenges of an historical ecological approach but also account for the richness of the understandings obtained. A set of operational principles guide research design (Meyer & Crumley 2011). Among the most important are collaboration from the beginning, ground rules that admit qualitative as well as quantitative data, "best practice" protocols, and other agreements that respect diverse knowledge communities.

The *Integrated History of the People of Earth* (IHOPE) is a global network of researchers (many of them archaeologists) and research projects that uses historical ecology's integrated approach to study combined human and Earth system history (Costanza et al. 2007; Sinclair et al. 2010; Costanza et al. 2012). IHOPE's long-term, human-scale perspective is intended as a corrective to Earth system science-based models that often exclude place-based ways of knowing the world. Such models, using relatively recent data and not taking into consideration long histories of human-environment interaction, cannot steer society toward long-term sustainability. IHOPE's vision affirms the need to critically evaluate these models and the relevance of archaeology in demonstrating that by searching the past we can find clues to our future.

Particularly exciting is the possibility that organizations and communities that seek to avoid further degradation of the planet could work with those that would conserve human history or culture. For example, the Yucatan peninsula and the Amazon basin are regions of great biodiversity and also places that warrant cultural, linguistic, and heritage conservation (Maffi & Woodley 2010). Moreover, as several historical ecology studies have demonstrated, much of the biodiversity found in these landscapes has emerged as a direct result of human presence and the patterns of ecological mutualism that have evolved between humans and nonhuman species over the *longue durée* (e.g., Arroyo-Kalin 2010).

Today many archaeologists have shifted their work from monumental architecture to ancient infrastructure in an effort to learn about place-based management solutions that are sturdy, inexpensive, and relatively easy to maintain. Archaeology, with its ties to groups that safeguard biological and cultural heritage, and with knowledge of the myriad experiments that are part of our human past, can play an important role in linking efforts to safeguard human history while envisioning an equitable and secure future.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge

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The Historical Metallurgy Society is the lead body for those interested in the past of metals and metal-working, from the earliest origins to the present day. Although UK based, its interests, membership, and publications cover the whole world. The Society is a registered UK Charity (No. 279314) and a Company limited by guarantee (England and Wales No. 1442508).

The Society celebrates its fiftieth anniversary in 2012–2013. It was originally set up by academic and industrial metallurgists interested in the past of their subject, as the Historical Group of the (UK) Iron and Steel Institute, but is now an independent society whose membership includes metallurgists, metal-industry workers, archaeometallurgists, archaeologists, historians, craft blacksmiths, members of related professions, and academic disciplines, and those whose interest in the subject is entirely amateur. Membership is increasingly international, with 36 countries represented in January 2012.

Major Impact

The Society aims to promote research, conservation, and experimental archaeology; disseminate knowledge and understanding; and promote discussion, throughout its subject-area and throughout the world. It does so mainly by the following.

Publications

The Society publishes a refereed academic journal, *Historical Metallurgy*, issued twice per year, and an informal *Newsletter* produced three times per year. It also produces monographs and Occasional Papers on an intermittent basis; most of these have been conference proceedings but other material can be considered. Digitization of back-issues of the Journal is in progress (http://www.hist-met.org/publications.html).

Meetings and Conferences

The Society holds at least three meetings per year: a residential Annual Conference (normally held over a weekend in September or October); a nonresidential day meeting (normally held in May or June and combined with the

administrative Annual General Meeting); and a Research in Progress meeting normally held on a weekday in November and aimed at research students and others conducting active research within the subject. Other workshops and small meetings are arranged on an ad hoc basis, often on specialist topics. All of these meetings are normally held in the UK. The Society also welcomes opportunities for joint meetings, conferences, and study-trips with other like-minded organizations, both in the UK and overseas (http://www.histmet.org/meetings.html).

Grants

The Society offers grants toward costs of research, experimental work, and conference attendance within its subject-area. At the moment, these grants are for small sums, but the Society intends to increase its endowments in order to increase its grant-giving (http://www.hist-met.org/grants.html).

Conservation

The Society gives advice on, and lobbies for, the conservation of archaeological sites, historic monuments, artifacts, metallurgical collections and samples, and historical documents relevant to its subject, including company archives (http://www.hist-met.org/conservation.html). This activity has until recently centered on sites and monuments in the UK, but the focus is now moving toward artifact, sample, and documentary collections. *Metals and Metalworking*, the HMS Research Framework on Archaeometallurgy, is available as a free download from the Society's website (http://www.hist-met.org/specpubs.html), or by payment for the printed version; its detail is designed for the UK research and conservation situation, but much of the content is applicable more widely. A series of Datasheets, on specific topics, is available for free download on the website (http://www.hist-met.org/datasheets.html)

Resources

The Society holds a library of printed books, an archive of documents, etc. relating to its own activities plus the papers of Charles Blick and of Professor R.F. Tylecote, and reference collections of slags and metallurgical samples. It also manages the UK National Slag Collection held at Ironbridge Gorge Museum. It is intended to actively develop all of these collections, both for coverage and accessibility (http://www.hist-met.org/resources.html).

Cross-References

- ▶ Archaeometry: Definition
- ▶ Conservation and Management of Archaeological Sites
- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute
- ▶ Metals: Preservation and Conservation
- ▶ Museos de Real de Monte
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Research Laboratory for Archaeology and the History of Art (University of Oxford)
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Histories of the Archaeological Discipline: Issues to Consider

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Introduction

One could argue that archaeology is a discipline obsessed with its own history. It is as if the discipline, through studying the material remains of past human populations, feels that this is an obvious part of its mission. Indeed, textbooks, handbooks, regional syntheses, books on theory, and more will greet you with an archaeological history on the given topic within the first few pages.

Any general history of archaeology will tell you a version of how it was born, how it developed, and how it changed as new techniques or new theories or perspectives arose. In fact, archaeology and archaeologists cannot be disentangled from social and economic contexts or political orientations and institutions (see Harmansah & Shepherd 2012: 52). When one of these contexts changes so does the discipline by virtue of its reaction to these situations. As such, some archaeologists and theorists have become increasingly concerned with:

> . . .tracing the genealogies of the discipline in colonial modernity and reflecting on its powerfully political status in the postcolonial world (e.g. Hamilakis & Duke 2007; Liebman & Rizvi 2008) (Harmansah & Shepherd 2012: 52).

Key Issues

Political, Social, and Economic Considerations

The political, social, and economic interrelationships that link archaeologists and academic institutions with broader political contexts are particularly explored in this entry (as well as many other entries edited by Haber and Roberts in this encyclopedia – see Cross-References listed at the end of this entry). Indeed, it is argued that the ideological needs of political regimes have been shown to influence the development of certain archaeological interpretations in a number of cases.

Given the interrelationships outlined above, it can be argued that the narratives of the past produced by archaeologists can, therefore, be read as allegories of the narratives of power (of gender, race, class, etc.). In the majority of histories, archaeology is represented as changing over time according to either external influences or its own internal evolution (e.g., its techniques, theories, and institutions). However, the epistemic conditions of the discipline are often unexplored. Epistemic assumptions about the discipline are reinforced in the ways in which the discipline tells its own history. It is only by telling their own history that history-tellers reinforce their claims. Indeed, as Pocock (1998: 220) has remarked about historians:

> They may be unruly members, but still they are members, of the society and culture within which they write, and whose history they are as a rule in some sense writing. . . It follows that every political society tends to maintain and recount what may be termed an autocentric history, a history of itself so far as it has succeeded in maintaining itself. . .

While Pocock frames this debate in relation to "political societies," we would argue that the sentiments are just as relevant to "disciplinary societies" such as the archaeological community. Likewise, just as Hamilakis (2012: 70) remarked in his recent paper, we should remember to heed Said's (1994) recommendations to continually reflect "on the dangers of professionalized scholarship, a scholarship that fails to interrogate the structures it is implicated in. . .."

Issues with Disciplinary Histories

Thus, in this entry, we attempt to consider a number of assumptions present in many narratives. For it can be stated that history produced by the history-tellers often reveals as much about the process of producing historical texts as it does about the discipline. For example, many narratives take for granted the idea of Western lineal time and thereby signify that certain philosophies and approaches are better suited than others for knowing the past. Although some accounts, such as Trigger's (1996: 40-1), point to alternative ideas:

> This assessment assumes that there is a past and, hence, that time, whether it is viewed as an attribute of the natural world or a form of perception embedded in the human brain, is invariably conceptualized as a linear, irreversible flow. This conclusion may be psychologically correct in the sense that, because of awareness of causality, everyone perceived time as they are experiencing it to be unidirectional. Yet it is known anthropologically that the imaging of time is culturally variable. . . .

We would argue that historical narratives about the discipline of archaeology should actually serve to highlight the often arbitrary relationships between the kind of knowledge we call archaeology and the ontological-epistemic assumptions on which it is based and which it sustains.

Thus, archaeologists and historians of the discipline should be the ones insisting that there are always exceptions to the primary stories told (after Pocock 1998: 229). By attempting to highlight such exceptions, researchers can at least try to avoid reinforcing typical assumptions (such as linearity), thereby revealing that histories are particular and contingent. Further, we would contend that the discipline now needs histories about the history-tellers so that the hegemonies inherent in past accounts may be illuminated. Areas where such hegemonic ideas have become general and pervasive should also be deconstructed and countered. Indeed, archaeology, like other Western traditions, cannot be separated from the habits of Western historiography. Thus, the history of history-tellers may also be a privileged and pervasive arena where ontological assumptions regarding history are reproduced.

The particular and contingent nature of disciplinary narratives becomes more apparent when regional meta-disciplinary accounts sit side by side – this can be more apparent in a compilation such as this encyclopedia which assembles histories written by scholars from around the globe and from different archaeological traditions and social, economic, and political persuasions. Such a collection is not, however, without complications as further explored below.

Grappling with Multiple Frameworks

It could be argued that a global encyclopedia, such as this volume, represents the attempt to grapple with the perhaps impossible task of presenting a comprehensive examination of multiple frameworks – primarily through the introduction of numerous international perspectives. However, there is the potential to over-estimate the results of this globalizing exercise and thereby introduce a systematic deformation.

In fact, it should be noted that many narratives profess a global standpoint, although in reality they may be quite insular in their own frameworks. In this sense, Trigger (1984) began the process of addressing these issues in his insightful and much-debated paper entitled "Alternative archaeologies: nationalist, colonialist, imperialist." He concluded that archaeology is "strongly influenced by the position that the countries and regions in which it is practiced occupy within the modern world-system" (Trigger 1984: 355). He also rightly criticized Clarke's (1979: 154) belief that there should be a "single coherent empirical discipline of archaeology." Thus, taking into account the many corners of the world in which archaeology is now practiced and also given that many researchers who write archaeological histories are not necessarily reflective about the influences (social, political, economic etc.) on all aspects of their work a comprehensive examination of multiple frameworks will undoubtedly always be an impossibility.

It should also be acknowledged that there is disagreement about how much influence political (and other) forces have on the discipline. Indeed, since Trigger's influential paper, there has clearly been much debate on this topic with some

researchers ultimately arguing that nationalism is at the very heart of some archaeologies (e.g., European and the so-called third world) with others taking a middle road – these discussions are apparent in the quote below:

> Yet it is going too far to claim that nationalism was embedded in the very concept of archaeology and was the only cause of its development (Díaz-Andreu & Champion 1996: 3) or that nationalism cannot do without archaeology (Slapšak & Novaković 1996: 290). . . . (Trigger 1996: 248-9)

Thus, the degree to which researchers should reflect on the external forces involved in the creation of archaeological histories is also a contested ground, further complicating the task of understanding multiple frameworks. We would also argue that there is still some way to go in relation to understanding how the debates about ideas such as nationalism have progressed. It has seemingly become popular to condemn nationalistic tendencies in "third world countries," for example, with little reflection on the purported universality from which the critique arises or the potential imperialistic underpinnings of such condemnations. As Trigger (1984: 363) noted nearly 30 years ago, we must not lose sight of the hegemonic ways in which some nations may exert their powerful cultural, political, and economic influences over neighboring countries.

It should also not be forgotten that archaeology is also a territorialized practice. As Hamilakis (2012: 71) has commented, "As in all colonial ideologies, the neo-colonialism or perhaps the crypto-colonialism of certain strands of archaeological and museographic thinking today enacts simultaneously strategies of territorialisation and temporalisation: sustained engagement with certain locales can be linked to primordialist ties and essentialist claims, nationalist or other, on the part of the scholar; but it may also be indicative of a long-term commitment to a place and all its people, past and present, things and objects, sentient and non-sentient beings that belong to that place."

Identifying Silences

When considering archaeological histories, we should not only be concerned with understanding multiple frameworks and contested understandings but also be cognizant of the fact that current interpretations will be bounded.

The history of archaeology, like any disciplinary history, is also an important mechanism for the demarcation of its boundaries. We can scrutinize such histories by considering the areas that they exclude. In this case, such exclusion may operate in the manner as outlined by Fabian (1983) in his discussion about anthropology which he described as a denegation of coevalness.

Ways of relating to objects and beings that are considered different in approach to an institutionalized archaeological discipline are often narrated as "pre-disciplinary" in archaeological histories. Indeed, archaeologies other-to-the-discipline are described as not only as nonscientific but also as prescientific, as if they were superseded by the arrival of the discipline. As Byrne (1995: 278) writes, "multiple and mature discourses on the material past already exist in the space archaeology depicts as a void." Thus, the archaeological discipline, being positioned on the same timeline as discarded versions, both excludes its other and confirms its own epistemic assumptions regarding time.

Conclusions: A Polyphony of Partial and Contingent Voices and an Infinity of Alternative Histories

We would argue that the edited entries relating to the history of archaeology (see Cross-References below) do not represent a thorough global coverage. Instead, we would contend that this selection is rather a polyphony of voices, all of them partial and all of them contingent. It should also be noted that most of the voices in these entries originate from within the discipline.

Thus, we encourage readers to consider imagining an infinity of histories of archaeology that could be written or compiled as an alternative to this volume – and to think about all that remains to be written. For example, we pose the question: How would those outside of the disciplinary context view and write such histories?

Such a history of archaeology could detail encounters with archaeology, with its texts, its actions in the field, its works for the public, and

its monuments. These encounters would not assume a position already inside the discipline and could include displacements and subjective transformations. In such a history of archaeology, events will not happen within a thing called "archaeology," but things would happen to archaeology-as-a-thing. As Haber (2012: 64) has remarked, the task of undisciplining archaeology "has to be done in conversation, not merely with other colleagues, already participants of the same disciplinary faith, but with non-academic actors and collectives" and that through these intercultural relationships with the hegemonic episteme a political and poetical job of critical theorizing might take place.

Cross-References

- ▶ Archaeology and Politics
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Archaeology as Anthropology
- ▶ Archaeology in the Enlightenment
- ▶ Archaeology: The World at 1800–1850
- ▶ Chronological Systems, Establishment of
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Early Excavations Around the Globe
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: European Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: Spanish Perspective
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ History and Archaeology: Relationship over Time (US Perspective)
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Nationalism and Archaeology: Overview
- ▶ New Archaeology, Development of
- ▶ Post-Processualism, Development of
- ▶ Professionalization: Archaeology as an "Expert" Knowledge
- ▶ Public Archaeology, The Move Towards
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Reflexive Approaches in Archaeology, Development of
- ▶ Second Modernity and the Second Phase of European Colonialism
- ▶ South American Archaeology: Postcolonial Perspectives
- ▶ Spain: Nationalism and Archaeology
- ▶ "Speculative Phase" of Archaeology
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Historische Archäologie

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Brief Definition of the Topic

Today, the excavation of medieval and postmedieval sites is a major part of the work of archaeological heritage agencies. Medieval contexts and finds have been analyzed critically and comprehensively, after an initial period in which they were discussed uncritically and in isolation. In German-speaking Europe, however, there is no real methodological or theoretical forum for postmedieval themes. This gap should be filled by the online journal *Historische Archäologie*. The journal aims explicitly to present research and analysis from the late medieval period and the modern period up to contemporary history in all its aspects. Its time frame ranges from the 14th/15th century CE until today.

"Historical archaeology" is a term used differently by the various different archaeological traditions found worldwide, but all definitions and uses have in common an emphasis on periods with so-called dense tradition. This generally means that the archaeological material sources are accompanied by written and visual records and perhaps by oral history. The availability of such a density and diversity of sources offer greater potential for an emic and internal view of the culture being studied than is possible for "prehistoric" societies; this is an aspect which this entry intends to emphasize.

With this entry, a bridge should be built to other parts of Europe and other regions in the world, regions that in the early modern and later periods were by no means border areas and peripheries but instead saw cultural developments and independent phenomena, which have been increasingly appreciated in archaeology since the 1990s. This entry aims to offer young scientists and "established" colleagues the opportunity to present their research, in the form of well-founded, methodologically or theoretically oriented papers, which are likely be discussed in professional circles, rather than data-heavy field reports. All types of sources (archaeological, documentary, visual, and oral) should be incorporated, analyzed, and evaluated in a complementary fashion to answer the questions asked. This is the only way comprehensive cultural scientific and historic conclusions can be reached. It is repeatedly said with regret in archaeology that there is hardly any professional interchange between English and German-speaking colleagues due to the language barrier. To address this, *Historische Archäologie* hopes to publish many articles in English or at the very least with a detailed English summary. Only in this way will international attention be drawn to research from the German-language area and take part in international discussion.

The journal was founded in 2009 and publishes articles in no particular order. The submitted manuscripts are reviewed by an editorial board, currently, Prof. Dr. Georges Decoeurdres, University of Zürich; Prof. Dr. Uta Halle, Landesarchäologin of Bremen; Prof. Dr. Harald Stadler, University of Innsbruck; and Prof. Dr. Hand-Georg Stephan, University of Halle. At the time of writing, the editors are Dr. Natascha Mehler and Prof. Dr. Claudia Theune, both University of Vienna; Prof. Dr. Ulrich Müller, University of Kiel; and Prof. Dr. Jörn Staecker, University of Tübingen.

Cross-References

► Central–Eastern Europe: Historical Archaeology
► Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)

▶ Historical Archaeology
▶ Industrial Archaeology
▶ International Journal of Historical Archaeology
▶ Post-Medieval Archaeology
▶ Western Europe: Historical Archaeology

Further Reading

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History and Archaeology: Relationship Over Time (US Perspective)

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Introduction

Anglo-American archaeology, like all archaeology, has always been about history (i.e., the past). Nonetheless, the relationship between archaeology and history, as disciplines, has not always been consistent. The views of archaeologists and historians toward one another's fields have changed over time as new ideas and approaches have come into prominence. As a result, any brief overview such as this must be limited in scope, touching on only a few of the more salient points.

Any exploration into the nature of the relationship between archaeology and history must begin with the explanation that "history" has two distinct meanings. In one sense, "history" represents what has actually happened in the past; it refers to the trillions of events that have occurred since the beginning of time. The renowned Italian historian Benedetto Croce (1921: 125) uses the phrase "the actuality of living history" (or past actuality) to refer to this meaning of history. All scholars acknowledge that human history is made by people going about their daily lives – building institutions, attending school, harvesting, sleeping, and performing millions of other activities throughout their lifetimes. In this sense, history is simply everything that has occurred before "now." This history – the real past – being gone forever, remains today as images in living memory or physical representations, such as standing structures and textual records.

Accepting that the past actually existed but appears in the present as images or reflections means that scholars disagree on precisely how history should be understood and interpreted. None of us today can observe the actions of past individuals. The second sense of "history" is thus much more contentious. Croce (1921: 19) terms the writing of history "chronicle" or history "recorded in abstract words." A chronicle is a written history reconstructed from images taken from the vast sweep of past actuality. Contention among scholars occurs because, as the American historian Carl Becker (1955) argues, any written history is necessarily selective; archaeologists and historians can only include a finite number of historical facts in their accounts. Recounting all of human history would take as long as human history itself. The result is that archaeologists, like historians, must select "historical facts" from past actuality to create images of history. This conclusion does not mean that archaeologists and historians are permitted to write fantasies because their professional responsibilities require them to be as honest and accurate as possible. Just how this is to be accomplished, however, has encouraged archaeologists and historians to ponder, discuss, and debate the meaning of history and the relevance of the past to contemporary life. Shifting views about who writes history, the relevance of the intended audience, and an account's long-term impact mean that controversies over the relationship between archaeology and history will continue to occur as long as both disciplines exist. Contention is not necessarily detrimental because the overt engagement with difficult issues forces scholars to reflect on their professions' meanings and societal responsibilities.

Becker's understanding of historical fact selection is especially pertinent to the practice of archaeology because the act of excavation overtly involves sampling. No matter how careful an archaeologist may wish to be in the field, he or she can never perfectly collect all possible information. The minute spatial relationships between all other artifacts (even those not excavated), the precise angles of artifacts in the earth, and the number of grains of sand brushed from an artifact's surface constitute facts that may be lost forever. Thus, all archaeological research, even the most overtly scientific in design and implementation, involves some measure of selection.

Definition

A dividing line between archaeologists and historians is difficult to draw with clarity. During the 1960s, many scholars debated the differences between the two disciplines, but in the end decided that the actual differences were quite negligible (e.g., Hughes 1960). Both professions concern themselves with many of the same topics, and many often use the same sources of information. It would be too facile to state that archaeologists excavate sites and historians interpret documents because some historians excavate and most archaeologists examine written records. American archaeologists differ from most historians by virtue of the archaeologists' formal training in anthropology, but even this distinction is too simple because English archaeologists and social historians regularly rely on anthropological perspectives and concepts. It can be reasonably observed, however, that archaeologists and historians have different disciplinary traditions and histories even though their work with the past is similar. Self-identification as belonging to one discipline or another thus may be something of a personal matter based on one's disciplinary home or research approach.

The tension that sometimes exists between archaeology and history may occur because archaeological excavation can refute long-held historical understandings that have been based on written accounts alone. At the same time, excavation can cast light upon subjects little studied by historians and can change the ways we perceive the past. Many historians have recently begun to use more anthropological methods and materials in their research, and many archaeologists have learned to give more weight to the historians' methods. The willingness to bring the two disciplines closer together has had many positive outcomes, even though the practice of archaeology and history continues to exhibit a healthy tension that serves to improve both fields of inquiry. Perhaps the most obvious link between archaeology and history occurs in historical archaeology, a subfield of archaeology that explicitly combines archaeological research with historical materials and interpretation. Nonetheless, all archaeologists regardless of area of interest use history to create narratives about the past.

Historical Background

The history of the relationship between archaeology and history is difficult to characterize with ease because of the variety of opinions. The first archaeologists who excavated the ancient cities of Greece, Italy, and Egypt viewed themselves as engaged in historical research (e.g., Stiebing 1993; Dyson 2006). They adopted a crude evolutionary framework – sometimes only tacitly – that tended to envision broad-scale cultural change along a trajectory that extends from simple to complex. The acceptance of broad-scale cultural evolution was certainly prevalent after 1859 when Darwin published *The Origin of Species*, and this outlook on human history was partly responsible for creating professional archaeology (Willey & Sabloff 1993: 86). The cultural evolution paradigm holds that human history has changed over time from incorporating relatively simple elements (such as hunting and collecting) to developing extremely complex institutions (such as industrialism). Of course, as archaeologists and historians began to investigate the realities of cultural evolution in actual settings, they began to question the

precise ways in which it operated both locally and globally, and today's understanding of cultural evolution is much more nuanced than was possible in the late nineteenth century.

V. Gordon Childe, an Australian-born British archaeologist of international repute, was arguably the most well-read archaeologist to espouse an explicit cultural evolution and to work as an archaeologist-historian. He observes in his book *History* that "It should be the historian's business to disclose an order in the process of human history" (Childe 1947: 5). A committed proponent of Marx's historical materialism, Childe believed that human history had progressed through a series of distinct stages and that culture advanced when revolutions in the economic base caused broad-scale social changes in other institutions. For example, when people learned to feed themselves with sedentary horticulture rather than with nomadic hunting, they had time to develop writing, to devise different family structures, and to build cities (and thus create "civilization"). Childe's views on history were widely accepted for many years, partly because having a broad view, he was intimately familiar with little-known museum collections throughout Western and Central Europe and the Near East.

Not every Anglo-American archaeologist accepted Childe's views in their entirety, especially not in the United States where the Cold War era fostered a strong disinclination for all things that appeared Marxist in influence, even archaeological theory. Still, most archaeologists generally accepted the idea of broad cultural change over time, even though they may not have agreed with precisely how to model and interpret it. One problem with the approach is that it has been used outside archaeology to promote and reinforce social Darwinist claims about cultural superiority and inferiority.

One Anglo-American archaeologist who did not wholly ascribe to Childe's evolutionary view was the British scholar R.G. Collingwood. Collingwood, a professor of Metaphysical Philosophy at Oxford University, had performed archaeological research on Roman sites in Great Britain. His book *The Idea of History* (1946) appeared 1 year before Childe's book. Collingwood (1939: 133), who like Childe moved easily between the worlds of the archaeologist and the historian, defined archaeology as "history in which the sources used are "unwritten" sources, or, more accurately, are not pre-existing narratives of the events into which the historian is inquiring." In other words, archaeologists write history for those times that lack textual documentation, whereas historians write history with extant records.

Collingwood (1946: 213) focused one of his historical interests on "the outside and the inside" of events. By "outside," he meant past action or the movement of actual physical things in the past – Caesar's crossing of the Rubicon, the blood spilled at the assassination of Abraham Lincoln, and the course taken by Napoleon's army toward Waterloo. But the "inside" of an event could only be described in terms of thought: the ideas behind the events. For him, then, the ideas of history provide the key to understanding. His view offered an important refocusing of archaeological thought away from the strict materiality of artifacts as expressions of art or even as metaphors for technologically driven cultural evolution.

In the early 1940s, when British archaeologists Childe and Collingwood were pondering the relationship between archaeology and history, an American archaeologist named Walter Taylor was contemplating the same issues for his doctoral thesis. Taylor finished his thesis in 1943, reworked it after the Second World War, and published it for the first time in the *American Anthropologist* as a memoir in 1948. Since that time, his *A Study of Archaeology* has been republished and widely read.

Taylor wrote the study as a critique of the practice of Americanist archaeology in light of the historical perspective prominent in American anthropology. Unlike English anthropology, American anthropology had been founded to investigate the precontact expressions of Native American life, in other words, all those elements of Indigenous life in North America that were beyond the reach of field ethnographers. The overall goal of early American anthropology – of which archaeology was

perceived as an integral element – was based on the mistaken concept that Native American cultures were rapidly disappearing and so evidence of them needed to be saved for posterity. Given this mandate, the role of American archaeology during what has been termed the "Classificatory-Historical Period" (1914–1960) was to collect and describe ancient Native American artifacts and settlements (Willey & Sabloff 1993: 96–213).

Taylor's goal was to delve into the nature of archaeology, history, and anthropology and to determine how the three were interlinked. His controversial conclusion was that archaeology is "neither history nor anthropology" but is an "autonomous discipline" that is essentially a method of data collection (Taylor 1948: 44). He viewed carefully controlled, scientific excavation as merely a tool for gathering information. What divided archaeologists – as anthropologists or historians – was based on the way each individual used archaeological information. Taylor (1948: 32) explained how this worked using five steps. The first step concerns problem definition or what was to be studied and how; the second step involves collecting empirical information using a particular method, such as archaeological excavation; and the third step is characterized by developing the chronological sequence using the empirical information. For archaeology, this step could be characterized by dividing potsherds into time periods based on their physical characteristics. Taylor's analysis suggested that many archaeologists ceased their research at the third step without considering the fourth step, historical reconstruction. Many American archaeologists had joined their colleagues in the other "historical disciplines" (geology, astronomy, cultural anthropology, and history) and moved more toward historical reconstruction, but for Taylor, this step was not enough. Where the three disciplines actually separated, he thought, was at a fifth level focused on "the study of the nature of culture" (Taylor 1948: 38). This highest level of analysis, originally envisioned by Franz Boas, the founder of American anthropology, led to the development of processual archaeology in the 1960s because one of its goals was the discovery of general laws of cultural process.

Vestiges of the views of Childe, Collingwood, and Taylor remain in contemporary archaeology, but it would be unfair to suggest that any of their perspectives are followed without significant modification. For example, many of today's archaeologists who ascribe to a Marxian view of history have delved deeper into Marx's thought than was possible in Childe's time because of the greater availability today of more published sources. Radiocarbon dating also has undermined many of Childe's cultural chronologies. Today's archaeologists no longer perceive their research as limited to nonliterate societies as Collingwood believed, and archaeologists interested in recovering mind have been able to rely on today's sophisticated comprehension of the interactions between psychology, action, and material things. Taylor's understandings of the relationship between archaeology and history had a major impact on the development of late twentieth-century archaeology – and, like Collingwood, he was interested in recovering mind – but much of his work reflects the scholarship of the 1940s. One important offshoot of Taylor's perspective is that he legitimized historical archaeology by refusing to construct temporal boundaries around archaeological research.

Key Issues/Current Debates

The key issues and current debates that surround the relationship between archaeology and history often concern the scale at which archaeologists should attempt to write history, topics that Childe, Collingwood, and Taylor each tacitly considered. The key question is: Should the focus be purely on one or two archaeological sites, with the goal of attempting to understand all their facets before thinking in extra-site terms? Some archaeologists argue that their profession's biggest contribution comes from working at the site level, where they can intensively examine one household, village, or settlement. Historians have termed these studies "microhistories."

Other archaeologists propose that detailed research conducted at a single site can be built upon in increasingly larger scales to inform our perspectives about world history. Issues of historical scale remain one of the most prominent controversies in contemporary archaeology.

Many Anglo-American archaeologists learned about the importance of historical scales from the work of French historian Fernand Braudel. Braudel studied history as a member of the French *Annales* school, a perspective on history named for the journal *Annales d'histoire économique et sociale* created in 1929. The general goal of the school is to provide analyses of social and economic history, while also including information about geography and human thought processes. Thus, Braudel's perspective, which reveals themes addressed by both Childe and Collingwood, demonstrates how scholarly research on the relationship between archaeology and history accrues over time.

The potential of the *Annales* school was most clearly presented by Braudel (1972) in his sweeping history of the Mediterranean, originally published in French in 1949 but only appearing in English in 1972. Archaeologists were intrigued by Braudel's use of three levels of historical time: the event (short-term history), *conjuncture* (processes being enacted from around 10 to 50 years), and structure (long-term history), more commonly termed the *longue dureé*. The archaeologists' interest stemmed from three elements of Braudel's approach: his interest in historical process (as Taylor-influenced processual archaeology was the major paradigm at the time), his investigation of specific events (which could be likened to an individual archaeological site), and his concern with long-term history. Braudel (1980: 29) explicitly understood that archaeology is especially well suited to study history over the long term. He sought to capture the rhythm of life in these different scales and to construct histories of large structures and huge processes over long periods of time. One of the criticisms of Braudel's approach, however, is that he tended to focus too strongly on the *longue dureé*, thus overlooking the local and the particular. Still, the concept of the *longue dureé* has entered the lexicon of most practicing archaeologists and is viewed as an especially rich area of investigation.

As noted above, some Anglo-American archaeologists are committed to microhistory. Microhistorians tend to focus on the minute and the local and seek to present images of past daily life in intimate detail through the close examination of a few especially enlightening documents. Often termed "cultural microhistory" to indicate its affinity to anthropological approaches, the authors of such studies seek to use the experiences and events in the lives of one or two people as a metaphor for the sociocultural environment of a single society at a particular point in history. In one of the most famous microhistories, Italian historian Carlo Ginzburg (1980) charts the life of an obscure sixteenth-century miller, Domenico Scandella – called Menocchio – who was burned at the stake for opposing official Church doctrine. Ginzburg's account provides rich detail on life in a small early modern European town and in the process illustrates how larger forces, such as religious intolerance, affected the lives of ordinary people. Ginzburg (1980: xvii) also argues that microhistories illustrate the "circular, reciprocal influence between the cultures of subordinate and ruling classes," a goal that is consistent with Braudel's perspective.

Significantly, Ginzburg (1980: xv) fully appreciates the value of archaeological information in microhistorical research: "Since historians are unable to converse with the peasants of the sixteenth century (and, in any case, there is no guarantee that they would understand them), they must depend almost entirely on written sources (and possibly archaeological evidence)." This statement perfectly agrees with much research in contemporary historical archaeology because of this field's inherent interest in men, women, and children who were not in the upper echelons of society – Ginzburg's "subordinate classes" – and so were frequently ignored in the accounts of "official" history. Archaeology is especially well suited to investigating the everyday lives of ordinary people and in this regard is similar to "bottom-up history" (Ginzburg & Poni 1991), "grassroots history" (Hobsbawm 1985), and "the history of the common people" (Lüdtke 1995). Archaeology

directed toward the world's largely undocumented, so-called "inarticulate" classes has significantly enhanced our appreciation of history's majority. Such research has been instrumental, for example, in providing unwritten information about numerous facets of everyday life extending from subsistence habits to spiritual practices of enslaved men, women, and children of African heritage in the Americas. Equally invaluable insights have come from the archaeological study of sites associated with Chinese and Irish laborers living and toiling outside their home countries.

Another trend in the writing of history is world-systems analysis, largely created by Immanuel Wallerstein (2004). World-systems analysis appeared in the 1970s as an overt way to examine the broad trends of the world's interconnections since about 1500 CE. Strongly influenced by Braudel, Wallerstein attempts to demonstrate how large-scale analysis can reveal the presence of interlinked "world-systems" or webs of interaction that existed within "a spatial/temporal zone which cuts across many political and cultural units" and which "represents an integrated zone of activity and institutions which obey certain systemic rules" (Wallerstein 2004: 17). One feature of world-systems analysis is the interconnections between a core and its peripheries or between a dominant, powerful administrative center and its distant dependencies.

Many archaeologists, particularly those engaged with the archaeology of the post-1500 CE world, immediately found merit in world-systems analysis because of its systemic perspective and its overt plan to link distant places together into a single network of interaction. Using world-systems analysis, archaeologists could forge clear connections between seventeenth-century Spain as core and postcolonial Central American native cultural settlements as peripheries. In addition, Wallerstein's interest in the movement of commodities – the archaeologists' artifacts – gave world-systems analysis immediate archaeological relevance. Some archaeologists, thinking that Wallerstein's ideas might be widely applicable to all history, sought to apply his concepts to pre-Columbian history. This usage remains controversial because Wallerstein presented his ideas for the investigation of the world after the rise of capitalism – which he termed "the capitalist world economy" – not for ancient times. As with other ideas, Wallerstein's views have been critiqued and refuted by some and expanded and refined by others.

An important current debate in archaeological practice concerns differences between Ginzburg's microhistorical approach and Wallerstein's world-systems analysis. What is the "proper" scale for archaeological research? Many archaeologists have expressed their interest in microhistory by specifically focusing on the household or even sub-household scales. Much of this research has the anthropological goal of building "thick processual understandings that transport the reader into the rich context of some previous place" (Paynter 2005: 404). This level of analysis is based on the idea that the small and seemingly insignificant things with which people surround themselves help to define, manipulate, and signal who they are. Archaeologists inherently find this scale interesting because it provides a contextual comprehension of history in intimate detail. Archaeological research focused on single sites at first may appear to run counter to modern-world analysis because the latter seeks to interpret extra-site interactions and connections in broad geographical space. To the contrary, however, even modern-world analysis begins with the household. The broader perspective, once termed the "international comparative approach" (Deetz 1991), has been reformulated more rigorously as modern-world archaeology (Orser 2004). Modern-world archaeology is focused specifically on the post-1500 CE world and explicitly employs ideas and concepts from Braudel, Ginzburg, Wallerstein, and even Collingwood to some extent. Modern-world archaeology relies on the careful interpretation of individual archaeological sites and seeks to present analyses at several historically relevant scales that begin at the household and terminate in the world at large.

International Perspectives

The use of works by Braudel (French) and Ginzburg (Italian) by Anglo-American

archaeologists shows that an international perspective has been integral to their conception of the relationship between archaeology and history. In a practical sense, some of the archaeologists' appreciation of such works has been hampered by the lag between initial publication in the original language and translation into English. The lag time can be considerable, as in the case of much of Braudel's work. Many Anglo-American archaeologists, of course, speak or at least read a language other than English and so are unaffected by the language barrier. Even so, an additional, practical factor that can add to Anglo-American provincialism is the often-limited distribution of non-English journals and books. A number of professional journals – both in print and online – have substantially improved every scholar's access to the works of non-English-speaking scholars. The general archaeological perspective is thus in the process becoming truly internationalized.

Future Directions

Archaeologists of all interests and areas of expertise will undoubtedly continue to ponder the relationship between archaeology and history. The intellectual exchange between archaeologists and historians is likely to continue, with practitioners of both disciplines borrowing perspectives and approaches as practicable. Archaeologists will likely continue to explore ways to investigate the various scales of analysis and will undoubtedly provide significant contributions along the way. One of the topics likely to be pursued in the future is a more intense examination of the different scales of analysis. The globalization of archaeology, increasingly conducted outside the Anglo-American world by Indigenous scholars, will provide new insights to old problems, such as the creation of archaeological linkages between the local site and the rest of the world. The spread of commoditized artifacts – as part of the globalization process – remains fertile research territory for archaeologists interested in local–global connections, and increasing numbers of archaeologists are likely to conduct this research in the future.

Increasing academic specialization is one obstacle that must be overcome, however. Unlike in the early-mid-twentieth century when Childe, Collingwood, and Taylor were writing, today's often-confining academic specialization has not always improved the frequency of collaboration between archaeologists and historians, even as the rise of the Internet has made communication easier and faster. The Internet has the power to defeat professional provincialism because of the sheer volume of information now available. At the same time, the explosion of research around the world may actually encourage increased specialization. The electronic availability of materials once difficult to obtain has meant that scholars now have a much more difficult time staying current with their own field of expertise. Reading widely in related disciplines is today more difficult than in the past, and the explosion of information tends to restrict the broad overviews that scholars like Childe once produced. Even with the Internet, archaeologists and historians who are investigating the same subjects may be unaware of one another's research or, if they are aware of their similar topics, may not readily perceive the benefits of disciplinary cross-pollination because of narrow specialization. Increased specialization thus may have had the unintended consequence of diminishing interaction between scholars in different albeit related fields like archaeology and history. With time, archaeologists and historians will hopefully find more common ground and create innovative ways to interact and collaborate.

Cross-References

- ▶ Archaeological Archives
- ▶ Historical Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Modern Material Culture Studies

▶ Oral Sources and Oral History
▶ Post-Medieval Archaeology
▶ Social Memory in Archaeological Theory

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Hodder, Ian (Modern World)

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Basic Biographical Information

Ian Hodder was trained at the Institute of Archaeology, University College London, and at Cambridge University where he obtained his Ph.D. in 1975. After a brief period teaching at Leeds, he returned to Cambridge where he taught until 1999. During that time, he became Professor of Archaeology and was elected a Fellow of the British Academy. In 1999, he moved to teach at Stanford University where he became Dunlevie Family Professor in the Department of Anthropology and where he was also for periods Director of the Stanford Archaeology Center. His first large-scale excavation project was at Haddenham in the east of England with Chris Evans; together they also set up the Cambridge Archaeological Unit. Since 1993, Hodder has reopened the excavations at Çatalhöyük in Turkey where he has led a large international team and has experimented with and developed reflexive methods.

Major Accomplishments

During the 1970s, Hodder developed techniques for spatial analysis in archaeology, drawing on quantitative and statistical techniques successfully developed in human geography (see Hodder & Orton 1976). His main application of these techniques was to the archaeology of Roman Britain. Unsatisfied with the ability of these

techniques to discern the causes of cultural patterning, he then undertook several seasons of ethnoarchaeological fieldwork in Kenya, Zambia, and Sudan. The results of this work, published in 1982 (*Symbols in Action*; Hodder 1982a), demonstrated that material culture was actively used in social strategies and that it was meaningfully constituted. These ideas became part of a wider reaction against positivist processual archaeology that had initially taken hold in the United States in the 1960s and 1970s, strongly influenced by social evolutionary and adaptational accounts. A group of students at Cambridge in the late 1970s and early 1980s became more influenced by the social theoretical threads in anthropology and explored the critiques of positivism and the interpretive turn in anthropology. The first development of these ideas in archaeology was published in 1982 as the edited book *Symbolic and Structural Archaeology* (Hodder 1982b). Numerous other texts followed including Hodder's (1986) *Reading the Past* and books by Michael Shanks and Chris Tilley. The influences on this new approach were numerous, including critical theory, Marxism, structuralism, poststructuralism, and feminism, but also the agency and structuration theories of Bourdieu and Giddens. In 1985, Hodder termed this diversity of approaches postprocessual archaeology, and his main sustained attempt to apply the approach in prehistory was published in 1990 as *The Domestication of Europe* (Hodder 1990).

In the 1990s, the often-fierce debate between processual and postprocessual archaeology began slowly to settle down and the latter approaches often came to be termed interpretive. Hodder had by this time started excavating at Çatalhöyük, and he used this opportunity to develop a series of reflexive methods that made the field recording process more transparent and more open to diverging interpretation by multiple stakeholders. One idea was to bring forward interpretation to "the trowel's edge" instead of seeing excavation as descriptive followed by later interpretation in the laboratory or armchair. Another focus was to document the documentation process so that others could scrutinize the excavation and recording at a later date. But the main idea was to develop archaeology as a collaborative and participatory endeavor (Hodder 1999).

In the 2000s, Hodder became dissatisfied with the continuing tensions between positivist and rationalizing accounts and those informed by contemporary social theory. The rise in importance of material culture and materiality studies in archaeology had remained very much involved in social theory and insufficient attention had been paid to matter itself. Hodder developed a theory of entanglement that explored the dependencies between humans and things. Indebted to the theories of Bruno Latour, this approach was predominantly a response to the data from Çatalhöyük and to the necessity while working on that project of engaging with archaeologists with wide ranges of theoretical perspective. Entanglement theory was an attempt to bridge the divide between positivist and interpretive accounts of the past (Hodder 2012).

Throughout, Hodder's main concern has been to argue that archaeology is a social process. Its role in society is to create places and temporalities that others have to live by. Archaeology therefore has a duty to respond to the interests and needs of a diversity of communities and to take seriously the notion that it is as much about the present as about the past. In the 1990s and 2000s, he increasingly wrote about heritage and about the relationships between cultural heritage and human rights.

Cross-References

- ▶ Hodder, Ian (Theory)
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Reflexive Approaches in Archaeology, Development of

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Hodder, Ian (Theory)

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Hodder, Ian (Theory), Fig. 1 Ian Hodder

Basic Biographical Information

Ian Richard Hodder (Fig. 1) is one of the most important figures in contemporary archaeological theory. He was born in Bristol, England, on November 23, 1948, and spent his childhood between Singapore and Oxford, where he attended Magdalen College School. He took his undergraduate degree at London University and pursued graduate and postgraduate studies graduate at Cambridge University. Hodder completed his Ph.D. and graduated with honors from Cambridge University in 1976, under the supervision of David Clarke.

Upon graduation, Hodder took a position as a Lecturer at Leeds University (1974–1977). Three years later, he returned to Cambridge as a Lecturer (1977–1990), Reader (1990–1996), and then Professor (1996). He has held numerous other appointments including adjunct positions at State University of New York at Binghamton (1984–1989) and the University of Minnesota, Minneapolis (1986–1994), and Visiting Professorships at the Van Giffen Institute for Pre- and Protohistory in Amsterdam (1980) and the University of Paris I-Sorbonne (1985). In 1999, he joined newly created department of ultural and Social Anthropology at Stanford University, California. There, he was appointed as Dunlevie Family Professor, Chair of the Department, and Director of the Archaeology Center.

Hodder has conducted innovative archaeological and ethnographic work in England, Italy, Kenya, Sudan, and Turkey. In England, he directed the excavations at Wendens Ambo (1973–1974), Ledston (1976–1978), and Haddenham (1981–1990). He was codirector of excavations at Maxey (1980). He was the director of prehistoric site survey in Calabria, Southern Italy (1979–1980). Interspersed among his archaeological projects, he conducted ethnographic fieldwork in Kenya (1974–1976, 1980–1981, 1982–1983) and the Sudan (1978–1979). Hodder is best known, however, for his ongoing research project at Çatalhöyük, Turkey (1993–present).

Hodder has received numerous awards and honors. These include the Gordon Childe Prize from Institute of Archaeology, London (1971), the Oscar Montelius Medal from the Swedish Society of Antiquaries (1995), the Lucy Wharton

Drexel Medal from the University of Pennsylvania Museum (2009), and the Huxley Memorial Medal from the Royal Anthropological Institute (2009). He has held Residential Fellowships at the Center for Advanced Study in the Behavioral Sciences at Stanford (1987) and the Research Center for Anatolian Civilization at Koç University (2010). He has received honorary doctorates from the University of Bristol (2009) and the University of Leiden (2011) and a national prize from Turkish Minister of Culture for scientific contributions to Turkish archaeology. He is a Fellow of the British Academy, the Royal Anthropological Institute, and the Society of Antiquaries.

Major Accomplishments

Hodder and his graduate students at Cambridge University provided an important critique of processual archaeology and offered new approaches to the study of the social past. Highly influenced by human geography, his initial contributions were related to spatial analysis of prehistoric settlements in England. His work *Spatial Analysis in Archaeology*, coauthored with Clive Orton (Hodder & Orton 1976), earned him recognition during the apogee of the processual archaeology. However, Hodder became dissatisfied with the rather sterile and one-dimensional view offered by this perspective and set in motion a strong critique of functionalist archaeology and systems theory (Hodder 1986; Hodder & Hutson 2003).

At this same time, Hodder was conducting ethnoarchaeological work that was to generate one of his most influential theoretical contributions to archaeology. Based on the study of the peoples of the Baringo district of the sub-Saharan Africa, Hodder sought to understand the processes of social boundary formation in diverse ethnic communities. At this time, most archaeologists were using ethnoarchaeology to secure Middle Range Theory. In his seminal contribution *Symbols in Action: Ethnoarchaeological Studies of Material Culture* (Hodder 1982a), he argued that material culture was meaningfully constituted and that it needed to be studied contextually because meaning is made of specific and non-fixed relationships and associations. Thus, far from being a passive by-product or mere reflection of human behavior, material culture plays an active role in shaping social relationships, which, in turn, speak of identity, individual, and group intentionality. In 1982, Hodder also published *The Present Past* (1982c) in which he reflected on the use of ethnoarchaeology, as a means to contribute to an interpretation of the past.

Convinced of the need for a new agenda, Hodder and his students organized a series of seminars inviting other colleagues to present alternative theoretical perspectives to the New Archaeology. Although *Symbolic and Structural Archaeology* (1982b) is now considered among the most groundbreaking and influential books in archaeological theory, it did not achieve a felicitous reception at that time. The book was an attempt to overcome – despite the title – the constraining notions posed by structuralism and materialist determinism (Hodder 2007: 200). As part of this new current that was being developed, Hodder stressed the need to conceive material culture as a text that could be read and interpreted within a specific historical context. By the mid-1980s, Hodder had firmly stepped into the theoretical debate and ignited by the emergence of what came to be known as "Post-processual archaeology." In *Reading the Past* (1986), Hodder presented the first synthesis of the main theoretical trends of the newly born post-processualism.

During the second half of the 1980s, Hodder (1987a, b) also produced a series of edited volumes and papers that consolidated the "Post-processual" approach and its emphasis in the symbolic and active role of material culture as well as historicity and narrative. In both the importance of context was emphasized and – contrary to his detractors' accusations of relativism – he argued optimistically for making a more rigorous theoretical move to approach the past. In 1986, Hodder participated in the formation of what would become the World Archaeological Congress, alongside the late Peter Ucko and other colleagues. From then on his writings evidenced a rather politically engaged tone in his critiques to the neutrality of science, mainly influenced by the work feminist

thinkers and postcolonial critique, that would later take shape through the notion of multivocality (Hodder 1999).

By the mid-1990s, he embarked upon his most important and ambitious project: the excavation of Çatalhöyük, a 9,000-year-old Neolithic site located in the Konya region in Turkey, which had been excavated in the 1960s by James Mellaart. Determined to provide an empirically based argument for his theoretical claims along with a post-processual methodology, he began a long-term project that starting in 1993 was envisioned to last for 25 years. Hodder was convinced that the site, because of its rich symbolic expressions and well-preserved condition of its architecture and artifacts, as reported by Mellaart, would provide enough data to test his ideas about the symbolic nature of the Neolithic revolution (Hodder 1990).

Over the years, the Çatalhöyük Project has involved up to nine excavation teams from various Turkish, Greek, US, and European universities, each comprised by specialists and graduate students who work in collaboration with the other teams, conducting their own research questions through diverse methods. In the course of the project, (Hodder 1999) fleshed out his reflexive methods through what he called "theorizing at the 'trowel's edge'" pointing out the importance of reflexivity, relationality, interactivity, and multivocality and the need to engage in a closer and more dialogical relationship between data and theory. Hodder embraced the Internet as a tool to promote the project and facilitate dialogue (http://www.catalhoyuk.com/). As part of this process, he began a critical inquiry into the field of ethics and the roles of tourism and heritage in the production of the past in the present.

Even though the debates between processualism and post-processualism have diminished, Ian Hodder continues to advance theory and practice. He has reengaged with an old interest: the symbolic aspects involved in the process of sedentarization, during the Neolithic (Hodder 2006). He has revamped his ideas about the role of the house as part of the process and attempted to move on from a previous structuralist framework, by emphasizing the role of ritual, ancestry, memory, and practice in a more pervasive fashion, and advanced his theory of material entanglement (Hodder 2010, 2011). His most ambitious publication entitled *Entangled:An Archaeology of the Relationships Between Humans and Things* (2012), combines aspects of actor network theory with behavioral archaeology and evolutionary archaeology as a way of examining the dialectic of dependence and dependency between humans and things. Hodder's contributions to a series of seminal ideas and debates have undoubtedly changed archaeology.

Cross-References

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- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
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Hokkaido Sequence and the Archaeology of the Ainu People

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Introduction

The archaeology of Hokkaido has long been recognized as a part of Japanese archaeology or a northern variation of Japanese history without attention to Hokkaido's particular history. The primary focus of Japanese archaeology and history has been on state formation, and narratives about the past have been constructed according to this framework. In other words, the archaeological narratives that have been produced present a model in which various local cultures are integrated under a homogenous cultural and political hegemony. The goal of those narratives was to support the unification of the nation state.

The greater part of history in Hokkaido was positioned outside of Japanese history. Long before Hokkaido and neighboring islands were annexed into Japanese territory, there were historical and cultural sequences of local societies, which gradually became related to the broader territory. Historical depictions of the Ainu, who did not have their own written history, have been created by the Japanese state, which considers the Ainu as peripheral undeveloped populations or resistant to the imperial state. However, accumulated archaeological information over the last decade suggests that the archaeological cultural sequence in Hokkaido and neighboring islands had an original complex historical dynamism. Now we must reconsider the normative framework and interpretations based on new perspectives.

The recent shift in practice, evaluation, and interpretation around northern Japan, especially in Hokkaido, addresses several exciting issues: the subject of the history of Ainu people, ownership of historical cultural heritage, and testing the validity of normative theoretical and methodological frameworks. The challenge for contemporary archaeology is developing relationships with all stakeholders in the local community, including indigenous peoples.

Definition

Who Are the Ainu?

Ainu refers to indigenous peoples who inhabited the north part of the Japanese islands. Ethnographically, the Ainu have been classified into three local populations: Hokkaido, Kuriles

(Chishima), and Sakhalin (Karahuto) Ainu. Local populations include smaller local dialect groups. A living condition survey in 2006 estimated the Ainu population in Hokkaido to be just 23,782 people, but this number does not include Ainu populations around Tokyo and Osaka on Honshu Island.

The ancient Japanese state began to gradually encroach on the northern part of Honshu Island between the sixth and eighth centuries CE. Cultural contact between the ancestors of the Ainu and ancient Japanese (the Honshu Japanese) started through active trading with each other. In the fourteenth century CE, Honshu Japanese settlers constructed 12 political and trading centers ("Tate") in the southern part of Hokkaido. After the early nineteenth century CE, the whole of Hokkaido was controlled under the Tokugawa shogunate, and the Ainu gradually lost their original villages ("Kotan") and traditional lifestyle. In 1868, after the Meiji Restoration, Hokkaido was officially annexed by Japan. The Ainu language was banned, and the Ainu were forced to take Japanese names. Then, under assimilation policies like the Hokkaido Former Aboriginals Act of 1899, the Ainu were prohibited from performing traditional activities that were necessary for their life and culture. This act was in force until 1997.

Key Issues/Current Debates/Future Directions/Examples

The Roots of Ainu in Hokkaido

The first inhabitants on Hokkaido Island date back to 30,000 years ago in the Upper Paleolithic period. Under unstable climate conditions in the postglacial period, early Holocene complex hunter-gatherer society was sustainably continued on Hokkaido Island. These early Holocene hunter-gatherers are usually categorized as the northern Jomon culture.

Though a rice-cultivating culture ("Yayoi") spread to Honshu Island in the fifth century CE, their influence did not reach Hokkaido. Those living on Hokkaido maintained a hunter-gatherer society and formed various local cultures based on deer hunting, sea mammal hunting, and fishing. This post-Jomon stage is referred to as Epi-Jomon culture. After the fifth century CE, the Okhotsk culture – the northern marine hunter culture – dispersed to the Okhotsk seacoast of Hokkaido Island. This culture had unique cultural characteristics that related to a bear cult and maintained trading networks with the lower Amur basin and Northern China. The Okhotsk population included not only those living locally in Hokkaido but also those who migrated from the north. The Satsumon culture, which was closely related to ancient cultures on Honshu Island, formed around the seventh century CE in southwest Hokkaido. This culture was influenced from the south, especially in pottery-making traditions, mortuary systems, and the use of iron items as weapons and tools. The Satsumon culture dispersed into northeast Hokkaido and integrated with Okhotsk culture. Through this cultural integration, the historical Ainu culture is archaeologically evident in the thirteenth century CE (Fig. 1).

As mentioned above, the historical sequence of Hokkaido Island differs from Honshu and the southern Japanese islands. The history of Honshu Island has been presented as one evolving from hunter-gatherer societies, to agricultural societies, to early states. On the other hand, the historical sequence of Hokkaido has been continuous from sustainable hunter-gatherer societies to non-state ethnic formation. For this reason, we cannot sufficiently explain this historical dynamism in Hokkaido based on normative archaeological perspectives. Archaeological resources in Hokkaido are extremely unique and important for reconsideration of non-state societies. This long sequence of sustainable and open prehistoric hunter-gatherer culture suggests that we need new models and images to reconstruct the diversity of human history.

Ainu Studies and Japanese Anthropology

One of the important issues in Japanese anthropology has been to understand the cultural identities and origins of the inhabitants of the Japanese archipelago. Around the end of the nineteenth and beginning of the twentieth

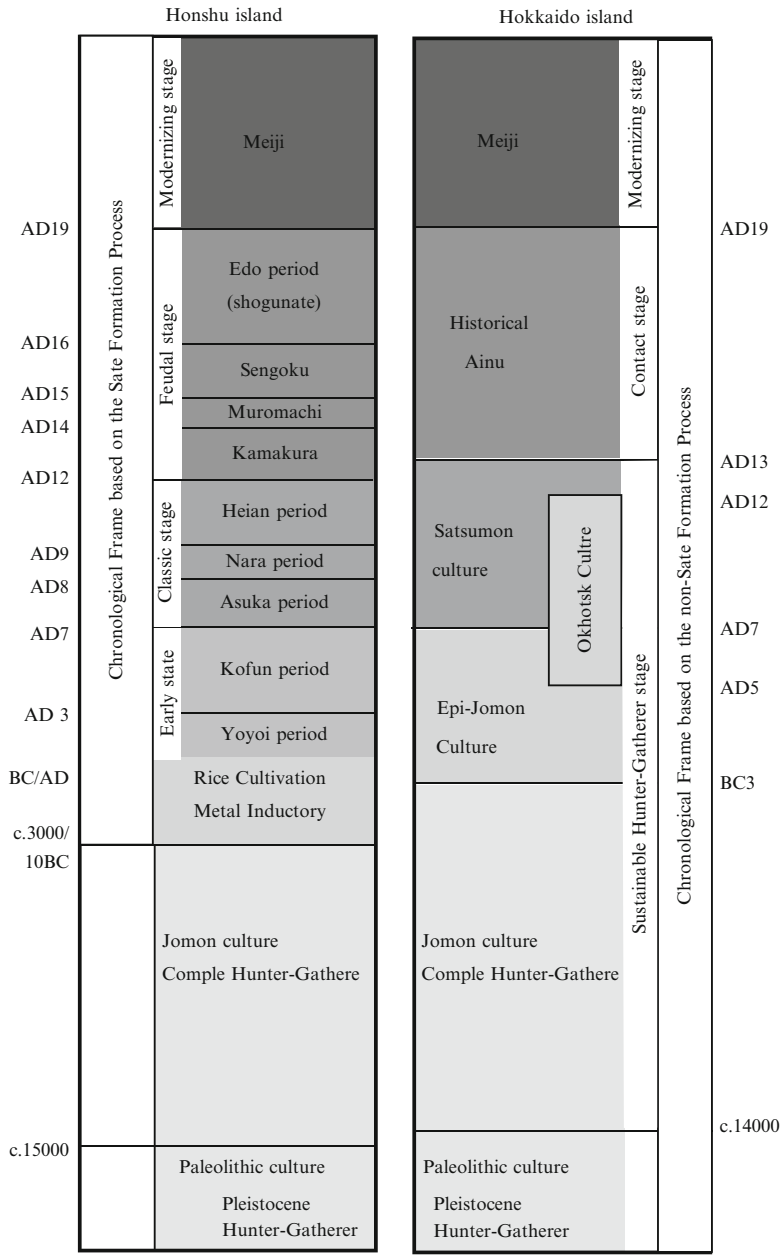

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 1 Comparison between sequences of Hokkaido island and Main island Honshu

century, when Western science was first introduced to Japanese anthropology, the Ainu people were repeatedly represented as the descendants of the Japanese Stone Age. This perspective has persisted until now.

In present studies, contact and hybrid models are becoming predominant for understanding the cultural formation processes of modern Japanese who integrated local populations with newcomers. The Ainu have been considered to derive from the Jomon. "The dual structure model," proposed by Hanihara Kazurou, is the most popular model for the modern Japanese formation process (Hanihara 1991). Hanihara's model

assumes that the local Jomon population migrated from Southeast Asia to the Japanese archipelago during the Upper Paleolithic period. There was then a second migration wave with rice cultivation and metal industries from Northeast Asia in the Yayoi period. Hanihara believed that modern Japanese populations gradually formed through this integration process, but this migration movement did not prevail on Hokkaido and Ryukyu islands. In these areas, which were less influenced by Yayoi culture migration, the Jomon population was ancestral to the Ainu.

This model is based in outmoded ideas about cultural development and change. In this context, newcomers who had more developed technologies and food production economies became the founders of early states, while hunter-gatherer populations who had a lower degree of contact with these innovations continued previous Stone Age traditions and food-gathering economies and eventually became the target of the ruler of the ancient and medieval state.

Until recently, anthropological and archaeological research interest in the Ainu has focused on their role in the formation modern Japanese society. The term "Ainu archaeology" has appeared in the literature since 1945. This research largely considers the Ainu to be a culture that keeps some elements of Stone Age traditions (e.g., Komai 1952). Ainu people were considered the subject of the study, and researchers were interested in them as the descendants of the Stone Age in Japan or as living relics of the Jomon. In this sense, past anthropological and archaeological Ainu studies never aimed to reveal the formation process and the cultural characteristics of the Ainu people.

The Impact of Recent Genealogical Studies

Recent genetic studies have drawn considerable attention. The study of ancient DNA from Jomon sites has been used to reconsider population homogeneity of the early settlers of the Japanese archipelago. Traditionally, inhabitants of the Japanese archipelago during the Jomon period were considered to be a homogeneous human group: the "Jomon population." However, ancient DNA analysis based on Jomon skeletal remains from archaeological sites has shown local diversity in the structure of mtDNA haplogroups between Hokkaido and Honshu islands (the Tokyo Bay area) (Adachi et al. 2009). The Hokkaido Jomons were biologically isolated from other populations for a prolonged period (Fig. 2). The frequency of mtDNA haplogroups from Hokkaido Jomons suggests genetic similarities with modern Ainu and indigenous peoples from the lower Amur region. The most distinctive feature of the haplogroup structure of the Hokkaido Jomons is the high frequency of haplogroup N9b, with a common ancestor calculated to be c. 22,000 years. It is likely that human migration to Hokkaido from Siberia occurred before the Jomon (Adachi et al. 2011).

In another study, the diffusion of other haplogroups from Siberia has occurred after the Jomon period in Hokkaido (Sato et al. 2009). The haplogroup Y was not present in the Hokkaido Jomon sample but was found to be the most dominant haplogroup in the lower Amur region. This haplogroup is the most prevalent in the Ainu today. Genetic testing of ancient DNA from skeletal material from Okhotsk culture sites dating to the fifth to tenth century CE indicates that haplogroup Y was common in the Okhotsk people. In fact, the dispersal of Okhotsk culture from the lower Amur to Hokkaido might reflect an increase in the number of people with a haplogroup Y-dominated mtDNA profile in Siberia. Based on this data, the haplogroup Y may have been introduced to the Ainu by the Okhotsk people after the fifth century CE.

These genetic studies force us to reconsider the historical formation processes of the Ainu. While previous explanations posited that historical Ainu culture originated in a merger of the Okhotsk culture with the Satsumon culture, the genetic evidence indicates that the impact from the north may have been more significant. In further studies, it is necessary that we focus more on regional characteristics of the Hokkaido Jomon and reexamine a simple framework for Jomon culture. There is a need to study more deeply the population and cultural influences from Okhotsk culture in the formation process

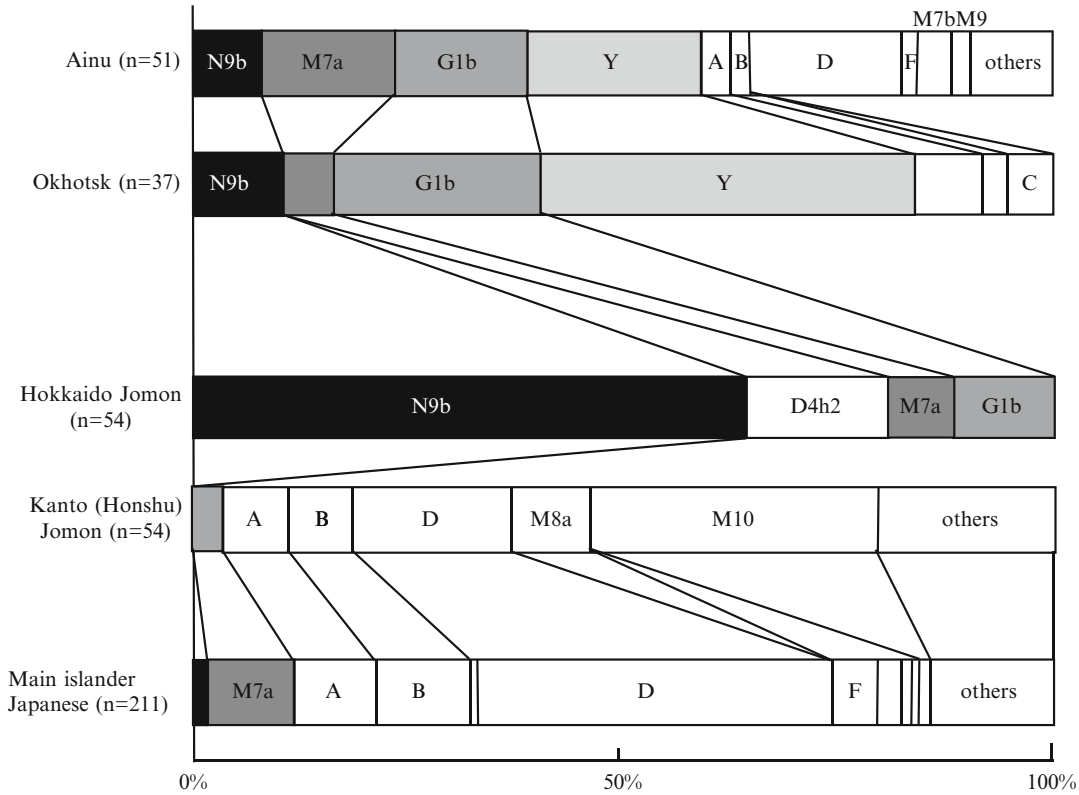

* This figure based on Adachi et al. 2009 and 2011

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 2 Frequencies of mtDNA haprogroups in Hokkaido Jomon and the ancient and present-day populations in Japanese islands

of Ainu culture and to review of the cultural and subsistent aspects of Ainu culture and its regional diversities.

Debates on the Meanings of "Ainu Culture"

There are, currently, two different meanings of the term "Ainu culture." One refers widely to the ethnic culture that has been historically developed by the living Ainu. The other is a narrowly fixed archaeological meaning dealing with explanations of the historical sequence of Hokkaido Island, indicating a period equivalent to medieval and modern ages for the thirteenth to eighteenth centuries in Honshu, the main island of Japan (Fujimoto 1984).

In the broader sense, "Ainu culture" is found in northern areas of the Japanese archipelago, which includes Sakhalin Island and the northern Kurile Islands. Watanabe Hitoshi featured the bear sending ceremony as an index of "Ainu culture" in social and religious practices and defined "Ainu culture" as "the cultural complex of bear sending ceremony" (Watanabe 1982; Fukazawa 1998; Amano 2003; Segawa 2005). This "Ainu culture" is characterized by a worldview shaped by the idea of "Okuri" (sending of spirits), which is based on the reciprocity between the natural world (*Kamuy-moshiri:* the world of Gods) and the human world (*Ainu moshiri:* the world of Ainu). Their material culture, language, oral tradition, and dance are deeply related to this idea. By practicing and sharing this way of life, the identity of the Ainu has been maintained, and Ainu-pri (the way of life as an Ainu) has been reproduced.

"Ainu culture" was narrowly defined as an archaeological period and culture based on the emergence of new material culture, such as iron pots, lacquer wares, ikupasuy (stick for sending human words with alcohol), ceramic wares, and

level ground houses, and the disappearance of the ancient (Satsumon-type) pottery-making tradition. This usage of "Ainu culture" is problematic. Using the name of the living ethnic group as a label for a particular historical cultural stage is inappropriate. There is no evidence of displacement by the pre-stage "Satsumon culture" by the archaeological "Ainu culture."

Furthermore, recent genetic studies suggest that there was not much biological contact between local populations in Hokkaido and the Jomon on Honshu (Adachi et al. 2009, 2011). It has been pointed out that the unique ethnic formation processes in Hokkaido have hereditary influences of the groups in northeast Eurasia (Sato et al. 2009). In other words, the cultural shift from Satsumon culture to the archaeological "Ainu culture" occurred within the same ethnic group, and it is a tautology to discuss the "formation of Ainu culture" only by the appearance of materials related to the "Ainu culture" after the eighteenth century (Watanabe 1972).

In addressing the question of what "Ainu culture" is, a central problem we face is that when we define the ethnic culture as stationary, we are blind to its variability. Ainu cultural history has been treated as a broadly conceived ethnic unit and narrowly defined archaeological culture and has been the object of comparative studies and the regional case studies in Japanese history and Japanese archaeology (Sasaki 1988). Today, it is necessary to understand these dual usages.

Future Directions

Since 2008, circumstances have gradually changed for the Ainu with a policy shift of the Japanese government that is favorable to the Ainu. Until then, the government had not recognized the Ainu as indigenous peoples in Japan. However, the "Resolution Calling for the Recognition of the Ainu People as an Indigenous People of Japan" was passed unanimously by both houses of the Japanese Diet on June 6, 2008.

After the policy shift, the Council for Ainu Policy Promotion was set up in December 2009, based on the Report of the Advisory Council for Future Ainu Policy in July 2009. The working group under the council is currently discussing various policies, including the establishment of the national museum of Ainu culture in Hokkaido. To further promote Ainu policy, it is now necessary to consider the perspectives and methods of the preservation and the use of indigenous heritage. As has been pointed out worldwide, the normative perspective of assessment for the historical cultural heritage based on the Western modern science cannot accurately evaluate the sacred sites and the holy places of indigenous ideological systems.

In Japan, it is necessary to consider whether the historical cultural heritage of Ainu can be evaluated within the framework of the current the "Act on Protection of Cultural Properties." Only 18 out of 260 sites that are registered as nationally important cultural properties in Hokkaido are directly related to the culture of the Ainu. While some Ainu cultural heritage is registered as intangible folk culture, the cases of architectural heritage and historical monuments are few. Fifty-one archaeological sites in Hokkaido have been registered as "historical sites" of "Act on Protection of Cultural Properties," and only seven of the sites are related with "Chashi" sites of the Ainu culture. The "Chashi" are multifunctional sacred sites for the Ainu and were used for fortification, negotiation, and sometimes as places to bury valuables.

In general, historical cultural heritage has been evaluated as a monument with a high visibility and distinctive artificial structure. The cultural landscape of the Ainu called "Chi-nomi-shir" ("where we pray") is the important natural landscape for the Ainu and has little in the way of artificial structure. This raises important issues with the evaluation criteria for historical cultural heritage, as the criteria have been largely defined by those who do not share Ainu values and an understanding of important Ainu landscapes.

The worldwide movements trying to understand the uniqueness of history and culture of indigenous peoples are also affecting cultural heritage assessments in Hokkaido. In the 2004 revision of the "Act on Protection of Cultural Properties," the importance of regionally specific

Hokkaido Sequence and the Archaeology of the Ainu People, Fig. 3 Collaboration of archaeologist and Ainu people at the archaeological site

landscapes, which closely relate to lifestyle and climate, was recognized and identified as "cultural landscapes" subject to protection. In 2007, the "cultural landscape of the Ainu tradition and the development of modernity in the Saru River basin" was registered as an important cultural landscape. It was also registered for the unique landform of "Pirika-noka" (the beautiful form) and named by the Ainu land name, including "Chi-nomi-shir" as the place of scenic beauty.

New Approaches to Indigenous Archaeology in Hokkaido

The question of who owns the past is an important subject in the archaeology of Hokkaido Island. The concern is that Ainu are not sufficiently guaranteed the opportunity to participate actively in preservation and use of cultural heritage in Hokkaido (Fig. 3). While internationally there is increasing engagement with indigenous peoples in the preservation and utilization of cultural history, there has been relatively little discussion and action on this front in Japanese archaeology. In order to promote discussion and action in the direction of increased engagement with Ainu, it is necessary to consider the contemporary context. In Hokkaido, a place with a polyethnic past and present, archaeologists should aim to develop heritage protection and management programs that involve indigenous and nonindigenous stakeholders as equal partners. We well understand that "archaeology is a powerful tool in the creation of cultural identities in the past" (Smith & Wobst 2005: 14). Archaeologists should recognize that they cannot exist without a partnership with regional communities (Kato 2010).

Cross-References

- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge

▶ Japan: Cultural Heritage Management
▶ Japan: World Heritage
▶ Japanese Archaeological Museums

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Holographic Epistemology: Native Common Sense

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> Research in a Maori sense seeks to expand knowledge outwards (tewhanuitanga); in depth (tehohonutanga); and toward light (temaramatanga) (Mead 2003).

> Knowledge is embedded in the culture of the people. Knowledge comes through in the lives of the people (Una Nabobo-Baba, Fijian).

Introduction and Definition

In ancient systems around the world, there are inevitably three main ways in which to view and experience knowledge: (1) via the objective, physical, outside world, the world of science and measurement and density and force; (2) via the inside subjective world, the space of thought, mind, idea, and interiority that helps us understand meaning and our linkages with phenomenon; and finally (3) via the quantum world shaped by transpatial descriptors and intersections, a spiritual dimension unlinked to religious dogma, described in ethereal, mystic, and yet experiential terms, i.e., *All my relations* or in science the *Implicate Order* – simply put, *body, mind, and spirit* or in Maori, *tinana, hinengaro, and wairua*. Hawaiians refer to this

epistemological trilogy as *manaoio, manaolana*, and *aloha;* Fijians see it as *vuku, kilaka* and *yalomatua*.

The challenge is to not see this trilogy as a linear sequence, rather as an event happening simultaneously and holographically. A hologram is a three-dimensional photograph made with the aid of a laser. To make a hologram, the object to be photographed is first bathed in the light of a laser beam. Then a second laser beam is bounced off the reflected light of the first, and the resulting interference pattern (the area where the two laser beams commingle) is captured on film. When the film is developed, it looks like a meaningless swirl of light and dark lines. But as soon as the developed film is illuminated by another laser beam, a three-dimensional image of the original object appears. The three-dimensionality of such images is not the only remarkable characteristic of holograms. If a hologram of a rose is cut in half and then illuminated by a laser, each half will still be found to contain the entire image of the rose. Indeed, even if the halves are divided again, each snippet of film will always be found to contain a smaller but intact version of the original image. Unlike normal photographs, every part of a hologram contains all the information possessed by the whole (see Talbot 2011).

In and of itself, each category exists potentially untangled and separate. Here is the state we are now in within classical physics and our current scientific epistemology. Objectivity is divorced from subjectivity and both are synonyms for the hard/soft sciences, while the topic of spirituality has become a pink crystal New Age embarrassment to all forms of science. The trilogy has become a dysfunctional family. Here is where we heal. *Right here*.

> Quantum Mechanics has established the primacy of the inseparable whole. For this reason, the basis of the new biophysics must be the insight into the fundamental inter-connectedness within the organism as well as between organisms, and that of the organism with the environment (Marco Bischof).

If we are to alter and explore a more robust version of reality, then here is where our suspension of disbelief can be practiced. Here is where faith in wholeness and interconnection is rigorously definitive. Here is where indigenous realities, contexts, and understandings can benefit from cross-fertilization with Western classical sciences because a hologram is made with modern techniques but its implications are best understood with an ancient mind: *The whole is contained in all its parts* (Nadeau & Kafatos 1999). Body/Mind/Spirit is one idea. Or as quantum physicist David Peat explained, *The ground out of which matter emerges is also the source for consciousness*. Here is a (k)new idea we can all investigate together. Holographic epistemology thus helps us better understand the depth and rigor of an indigenous mind, but first we must understand our own (Mahalo to Dr. Shane Edwards of Te Wananga o Aotearoa of New Zealand for this idea of (k)new. It was found in his Ph.D. dissertation: *Titiro Whakamuri Kia Marama Ai Te Wao Nei: Whakapapa Epistemologies and Maniapoto Maori Cultural Identities*. It summarizes both the feeling and fact of the idea of ancient/new).

The following table gathers in one place this holographic image, using three "laser beams" to bring out facts, logic, *and* metaphor to help us get to this "inseparable whole" we have known all along exists. It is separated now for discussion only and only for a moment! (Table 1).

Is this idea of a hologram using three "beams" clear for you? Look at the list again. *See it with your own expansive awareness*. Lend your consciousness to its purpose and you will intersect with my own, across space/time, and we will be in sync with each other. Familiarize yourself with the three categories: Body, Mind, *and* Spirit. Do you hear their distinctive harmonics?

Do you see how the location of the idea describes the boundaries/freedom of that idea? No judgment here, just an observation of what the physical plane offers, what the mental plane offers, and what the spiritual plane offers. Here is a radical and profound simplification of a (k)new world epistemology Indigenous people and allied scholars are putting forth. Ken Wilber (2001) refers to this trilogy as The Big Three. Hale Makua (2004), Hawaiian elder-mystic, called it the Three Souls. It is found in the Tao Te Ching, chapter 42:

Holographic Epistemology: Native Common Sense, Table 1 Holographic epistemology: native common sense

Body	Mind	Spirit	Source
Perception	Conceptualization	Remembering	*Yoga sutra*
Manaoio	Manaolana	Aloha	*Native Hawaiian*
Techne	Episteme	Phronesis	*Aristotle*
Objective	Subjective	Cultural	*Karl Popper*
External	Internal	Transpatial	*Ken Wilber*
Mohiotanga	Matauranga	Maramatanga	*Maori*
Instinct	Intelligence	Intuition	*Hale Makua*
Empiricism	Rationalism	Mysticism	*Ken Wilber*
Facts	Logic	Metaphor	*Mike McCloskey*
Gross	Subtle	Causal	*Ken Wilber*
Seeing	Hominization	Convergence	*Teilhard de Chardin*
Technical rationality	Hermeneutic rationality	Emancipatory rationality	*Henry Giroux*
Consumer intelligence	Recreative intelligence	Creative intelligence	*Molefi Asante*
Hearing	Thought	Meditation	*Buddhist*
Life	Mind	Joy	*Upanishads*
Tinana	Hinengaro	Wairua	*Maori*
Force	Power	Liberation	*David Hawkins*
Knowing	Knowledge	Understanding	*Manu Aluli Meyer*
Coarse	Subtle	Secret	*Buddha*
Vuku	Kilaka	Yalomatua	*Una Nabobo-Baba*
Sensing	Presencing	Realizing	*C.O. Scharmer*
Ways of knowing	Ways of being	Ways of doing	*Veronica Arbon*
Voice	Thought	Silence	*Rumi*
Classic	Relativistic	Unified	*Brian Greene*
Dense	Dynamic	Still	*Nityananda*
Tamas	Rajas	Sattva	*Upanishads*
Interpretation	Mythic maturation	Gnostic revival	*Taupouri Tangaro*
Measurement	Reflection	Witnessing	*Manu Aluli Meyer*
Ike (to see)	Ike (knowledge)	Ike (revelations)	*Native Hawaiian*
Duality	Non-duality	Wholeness	*Ken Wilber*
Emotion	Feeling	Awareness	*Spinoza*
Pleasure	Happiness	Bliss	*Osho*
Temporal	Noetic	Ineffable	*William James*

> The Tao gives birth to One.
> One gives birth to Two.
> Two gives birth to Three.
> Three gives birth to all things.

I had once referred to this process and thinking as the Triangulation of Meaning (Aluli-Meyer 2008). It was meant to bring coherence between the three operating principles, but it gave the impression of a linear sequence and unnatural hierarchy. I had initially thought that information came first in some kind of text or noun form, then it was experienced and *then* it was understood. Here is the dilemma of our schooling system. For years I've been trying to understand what happens simultaneously and yet it was described as a sequence, the lock-step approach found in modern expectations more interested in quantity, control, and time rather than *quality, consciousness* and *space*.

I now see these sets of three as holograms to collect, play with, and trade with others. There is a clear knowing that each beam in the hologram is necessary to bring forth the fullness of its essence, form, and purpose. See, there it is

again: Mind/Body/Spirit. A holographic approach to knowledge has changed everything in my own life and scholarship. It is no longer simply about *technical rationality*, as Henry Giroux (1988) has detailed. It is about *hermeneutic rationality* and *emancipatory rationality*. It is about my own authentic interpretation and the freedom experienced when I render it clearly with an interest, reverence, and understanding of context/content. That has indeed changed *everything*.

Key Issues

Three Whole Ideas*: Separately*

Body: External, Physical, and Objective Content

> *Context is the content* (David Hawkins).
>
> *Context is within. Content is external* (Roxanne Kala, Native Hawaiian).

Here is one laser beam in the hologram we know how to operate. It is the beam we are most familiar with and the projection we can recognize, even if it only makes the understanding two dimensional. The physical/body aspect of holographic epistemology is the foundation of Science, of classical Physics, and of positivism and all its empirical measurements and verifications. The physical world is an outside phenomenon we experience through our senses. It's our scraped and bloody knees from a hill we knew would thrill us. It's the flash of light you saw come before sound and boats listing at low tide. It's the weight of a premature baby in your one hand. It's the color blue in sky and water we knew quickened our pull for outdoor play.

Fundamental objectivity is also the basic ground for an Indigenous knowing because experience, over time/space, cannot occur without awareness of that which is physical, external, and the interacting agent grossly encountered outside oneself. The physical aspect of holographic epistemology is knowledge that comes from direct experience, a knowing because it has been encountered, registered, and remembered in bone and muscle. It is also knowledge gained by the full spa treatment of a scientific regime: time, weight, mass, velocity, etc. The physical world is a world that can be predicted, controlled, and shot into space. It extends the life of our hearts and kidneys and cloned itself by its own hand.

Indigenous scholarship is simply asking for an evolution of this idea with the heightened rigor of a just-as-real subjective and spiritual/quantum reality (aka *culture*) we know exists and indeed celebrate. It is a call for critical consciousness and respect for other way of knowing. It is what enduring practices in place have developed and processed: a knowledge ethic shaped by the needs of place and people. Here is *cultural empiricism* so to speak, altered by seasons, the sharing of ideas with others, and with its own referential knowing steeped in ancestral memory. It is also real, alive, and part of the external world – we just have different priorities and names for how we experience and express it.

Mind: Internal, Mental, and Subjective

> We must assume behind this force [in the atom] the existence of a consciousness and intelligent mind. This mind is the matrix of all matter (Max Planck).
>
> The electron does not have objective properties independent of my mind (Fritjof Capra).
>
> The great consciousness exists in my mind (Oscar Kawagley, Yupiaq).

Here is the laser beam we squirrel away as intimacy unshared, a light we believe separate from quantifiable observability and our own bodies. Mind is the culprit in a qualitative quagmire and forever in some kind of conflict of interest. Subjectivity is the stain science and research has not yet been able to wash away. The mind category of our holographic/indigenous epistemology is the relative truth of what is not seen but yet available via thought, idea, and reflection. The mind beam in our hologram is about insideness, about the richness and infinity of difference found in our own humanity. Mind illuminates experience and brings forth meta-conscious awareness and purpose to detail meaning and interconnection. It is the maturing agency of collective and individual *thinking*. Without paper and pencil, without clock, and without competitive comparisons – a thinking that

inspires what Maori have called aromatawai or self-reflection that instructs and transforms. Paulo Freire (1970) called this revolutionary process of waking up *conscientization*, while Teilhard de Chardin called it *hominization* vital to the larger transformations of society, this capacity to reflect, to think, and to *use* our minds.

Mind in this discussion is not the firing of neurons in our brain. It is the capacity to review an idea, to link what is known to new patterns, and to offer fresh understanding to reoccurring problems. Mind is the inside capacity that recognizes variations and brings forth their logic with symbols of shared meaning. It is the same as body, just from an inside vantage point. Hawaiians refer to this idea as naau or stomach region. It is the root word for wisdom, naauao, which means "enlightened intestines." I know, this idea may be hard to consume, but we must at least agree to its presence and legitimacy. *Mind matters*. It is the inside agency of body and the connecting essence of all that is material.

> Sensations originate in the body but it is the mind that experiences them. We say emotionscome from the heart but it is the mind that is aware of them (Francesca Freemantle).

How one develops mind is the focus of this entry. Do you see it separate from body? Do you see mind as a hindrance to technical rationality? How one sees mind is perhaps the turning point of self-reflective subjective awakening. Remember, mind is one part of the trilogy necessary for our hologram to be fully operational. It is no less valuable, no more valuable than any of the other beams. It is what Indigenous scholarship brings forward as a segue to spirituality. We develop awareness through the mind/body of our own selves, and here is where the simultaneous immersion into quantum realities changes everything. From the beginning of space it has been this way. Don't you think it's *time* to understand it?

Spirit: Transpatial, Nonphysical, Culture

> At this point, the rational, conceptual aspect of the mind must let go, allowing a breakthrough into direct, intuitive experience (Fremantle 2001).

Ulua'ekewelina a ke aloha. Loving is the practice of an awake mind.

> Life, being an ascent of consciousness, could not continue to advance indefinitely along itsline without transforming itself in depth. It had, we said, like all growing realities in the world, to become different so as to remain itself (Teilhard de Chardin 1959).

It is time/space to speak of the spiritual dimension of life. Do not curl away in antireligious dismay or leap into dogmatic exaltation. This discussion of spirituality is not a religious idea; *we just think it is*. Shake that belief off and clear your mind. Wairua/wailua is as real as the tangible and mindful realms. It has been proven, stitched, sung and experienced that *we are more than our bodies* (Near Death Experience (NDE) summary/lesson from L.M.S. of Pepeekeo, Hawaii, after drowning accident and immersion in coma at Hilo hospital, 2009) and more than our minds. *Matter is not separate from spirit* and so here is the culminating idea of this chapter and the animating third beam that Indigenous scholarship confirms. It is the laser that popped images into three-dimensional holograms surprising the world with its implicate wholeness, even as shards splintered on scientific floors across the planet and we discovered *the whole of life is found in all parts*. That is as much a physical and mental idea as it is a miracle of the quantum world. For many Native peoples, this is basic common sense. It is a *culture* shaped around an environment and the specific needs of people.

Many synonyms exist for this idea of dynamic interdependence; this field of mind enmeshed within body as the causal agent in an unseen reality we have direct access to and indeed are the shapers of the implicate order, self-organizing systems, auamo kuleana, coherence, nonseperability, fundamental character of reality, dependent co-arising, akashic field, paticca samuppada, interdependence, systems theory, mutual causality, holographic epistemology, complimentarity, the Divine Milieu, entanglement, makawalu, milestone of human thought, whakapapa, Indra's net, the blanket, undivided wholeness, and Indigenous epistemology.

Buddhists call this matrix the *expressible content of enlightenment* and their scientific collaboration is helping us understand our role in its creation or demise. The transpatial, contemplative,

intuitive, loving, mystic, still, and joyful dimension is the on switch of our lives. It's the third laser beam that makes sense of the other two. In science it is an event horizon of knowledge that is causing a rethinking of classical epistemology and classical physics. Do you understand this idea? We are all three realms: Body, Mind, *and* Spirit – but we must be conscious of it to actualize them. Slow down, take a breath. Physical/mental/causal – three facets of one idea. *He 'ikekaihohonu* – here is deep ocean knowing.

The perceived contradiction is that spirituality has developed its own bureaucracy in the form of Religion and thus it has become an invalid source of scientific inquiry. Is it any wonder we ritualized our awe and gathered en masse at unseen mysteries? Science needed to pull away from dogma and what was labelled as superstition; it is part of our shared history. We are not talking about returning to this way of viewing the world. What Native intelligence as an enduring pattern of thinking is putting forth with the aid of quantum sciences is the notion that a realm of unseen connecting patterns exist and we are the causal linkages that alter its capacity. There is a new/old game in town. It must include what has forever been present but denied because of the beliefs of the day. As always, Indigenous peoples are near – watching, waiting, and ready to be of service.

Indigenous World Views

> *Makawalu* – A Hawaiian interpretation and practice of interdependence
>
> The depth of relatedness is so powerful that it guides our lives. It is our Law (Karen Martin, Aboriginal).
>
> Wisdom is the recognition of the interdependence of things (Sulak Sivaraksa).

An Indigenous world view thus begins with the idea that relationships are not nouns; they are *verbs*. This basic notion of relationality, dynamic coherence, interdependence, and mutual causality helps us see the *context* of an idea and people, tangible or not, and respond appropriately. The hard part of this notion is that you can't weigh verbs, well not really. Relationship as verbs infers the *intentional quality* of connection that is *experienced* and remembered. Here we begin our walk into Indigenous epistemology, into the simultaneity of the unseen and seen. We are entering a wide-open field of knowledge production and exchange with priorities in *practice, relevance, context, consciousness* and *shared common sense*. It is knowledge through *experience* individual or collective, and a way of being via site-specific familiarity through years, generations, and lifetimes. In this way, patterns emerge collapsing time into space and all unknowns into mystery and story. It is knowing shaped by purpose and knowledge prioritized by function. Finally, it is an understanding that has *endured* for a *reason*.

An Indigenous Weltanschauung (world view, product of culture, constructed in language) then is indeed a challenge to bring forward because of the myopia of our independently trained minds. The vast amount of difference the world offers us is currently withering in a hailstorm of uniformity, capitalistic assimilation, and literal renditions of reality asserting a predictable empiricism now waiting to evolve. It is at these very sites of tension, however, where the future of rigorous scholarship lies. For us to move forward in the exploration of indigenous ideas and to actually *see* other views of the world, there is first a call for the suspension of currently held thought patterns, particularly around knowledge, science, and reality.

> There is a critical need for a new old way now (Veronica Arbon, Arabana – Aboriginal).

This entry is embedded within a global archaeology text. Archaeology as a system of science has brought specialized facts of humanity and cultural practices to the world and as a field worked to articulate the connection of people to place, history, and ideas. There are infinite ways one can portray a people, knowledge, values, or culture. Archaeology has historically privileged the technical form of rationality and strengthened the view that objectivity and measurement is the accurate and best way in which to engage and explore peoples. *That is a world view*. It is tutored by the expectations and values of a cultural system, a language, and the political/economic climate of the times. I believe Indigenous people share the same view, just *differently*.

Indigenous is simply a synonym for *that which has endured*. It is not a nostalgic or romantic cast over objective data, nor does it dismiss what modernity has thrust upon us. It is a way of behaving that offers us older ways to view the world. It is not meant to operate in lieu of but rather to synergize with classical views of science and now with a quantum world already dreamed of, debated, and woven into art forms of function, reliability, and beauty.

(K)new Science: An Indigenous Perspective

> The perspective of Native science goes beyond objective measurement honoring the primacy of direct experience, interconnectedness, relationship, holism, quality and values, and they are specific to tribe, context and cultural tradition (Cajete 2000).

Science, the process to understand our natural world, is not a new idea; it is old. How it now unfolds within a mathematical, technical, capitalistic, and positivistic structure is relatively new. Engagement and meaning-making with our world is an evolutionary process, always present, that accelerates or expands with mature, conscious, and rigorous *reflection*. The opposite is also true: the understanding of our world remains static without reflection in a field of reference that mirrors itself with itself eventually pulling away from direct experience into a self-justifying loop. This is our current situation in my own field of philosophy, and I sense even in science. We then begin to name events in isolation from others, defying contextual comprehension born through the ages, and understood by those who have witnessed them, remembered them, and sung their lessons in the life exchanged.

> The problem is not with the empirical data of science but with the contention that these data alone constitute the legitimate ground for developing a comprehensive worldview or an adequate means for responding to the world's problems. There is more to human existence and to reality itself than current science can ever give us access to (Dalai Lama 2005).

Here it is, a call for a comprehensive world view in which to engage an idea, an object, and a collection of artifacts. How does one evolve in this manner without exposure to other ways of thinking? It is the key challenge to address in modern society.

> Hahai no kauaikaululaau. Plant a forest and the rain will follow (Native Hawaiian).

> To gain a sense of Native science one must participate with the natural world. To understand the foundations of Native science one must become open to the roles of sensation, perception, imagination, emotion, symbols and spirit as well as that of concept, logic, and rational empiricism (Cajete 2000, Tewa Pueblo).

Native Science practitioners do not separate mind from body, nor do they separate that from the quantum world. We are neither wistful about their union. Sensual cues, coupled with imagination and emotional awareness, sharpen ones' sense of rational empiricism; they do not diminish it. Here is the perceived contradiction Native Science offers the world: wholeness and mature understanding of systems by seeing patterns, both tangible and in thought, of concrete, quantum, and causal worlds.

> In Blackfoot, objects that we see are simply descriptions; they are collective agreements only (Leroy Little Bear).

> When you start seeing the world in patterns instead of laws, everything opens up. Vision itself changes (Dolores LaChapelle).

How does one enter this kind of epistemological arena where the integration of an idea is the understanding of it? To see patterns develop themselves and then intersect, fractal, and converge with others in an infinite array of evolving life. How *do* you enter this kind of thinking/seeing? Here are the building blocks of *cultural empiricism*, the kind of empiricism that begins with a different sensory immersion, a heightened sense of context, and a whole different tool belt useful in shaping cultural priorities for different understandings. How will I describe this orange with an apple vocabulary?

> The world is mind (Vine Deloria Jr.).

Here again is the segue from indigeneity into the quantum sciences, this reckoning with simultaneity and our own role in reality production and scientific findings. When the world becomes mind, as Standing Rock Sioux world scholar Vine Deloria (1999) suggests, he is inferring the

radically empirical universe William James outlined almost 100 years ago. It is a connection with the physical and nonphysical states altered by our own seeing. Einstein held the same belief that our own viewing of phenomenon changed it. Is it any wonder the Hawaiian word for knowledge is "ike," to see/to know. Seeing then is an act beyond mere looking. Seeing is infused with the cultural shaping of its *purpose* and that by itself collapses waves into particles. Yes, why not work to understand this miracle? Why not see what intentionality and consciousness have to do with matter?

Here lies the path across dangerous waters where science and culture must meet and cross if we are to develop solutions necessary for our own evolution. Here is where indigenous sits down to discuss the latest ideas in nonlocality, coherence, and the universe as a self-organizing system some have long ago called Indra's net, the akashic field, the Divine Milieu, whakapapa, and the great ancestral plan.

Future Directions

Ha'inamaikapuana: Thus Ends My Story

> A modern "ecosophy" would be about the rediscovery of meaning as it relates to our universe. It would require not only a different way of thinking, but also a different way of knowing and living. Such an ecosophy would build a unitary view of the cosmos in which everything is interdependent and moved by creative energy, one that views the Earth and the universe with reverence and explores our essential relationships and responsibilities there in. It would be, essentially, the philosophy Indigenous people have lived for generations (Greg Cajete, Tewa Pueblo).

It has always been about reverence, the act of care for others and for our earth. Aloha Aina is how we refer to it in Hawaii. It is also about the energy and life force found in *meaning as it relates to our universe*. Mahalo Greg, *I love that*. It does not matter if you view land as mother or sky as father. These are simply extensions of another's world view. What matters is that you have some kind of relationship with this place we live and breathe in, and if you only have an academic one, you must at least seek those who do not. *It is the quality of our relationships that will help us evolve*.

I believe the main purpose of these ideas is to get us to *think* together – to open our minds and explore the purpose of our lives, our work, and our particular way of viewing. Why are we this way? Why are you reading this article in a Global Archaeology text? There is a reason why you found this piece of my mind. Find out what it is and go into it with your passion for science, truth, culture, and the needs of our time. *Be of service to that*. Respond with your life to the questions of your heart. Don't make it only about cognitive accumulation of information. We do not have the luxury of time. Discover what interdependence *really* means by listening to others, by watching how those who have more experience do things, and by sharing ideas when asked. Then go out and watch the moon rise and swim in waters freshly seasoned with spring rains.

Finally, here is what mentor/friend Willis Harman had to say on the subject:

> I think the wisest thing is being humble and listening. We live in a very arrogant society. Listening has to do not only with listening to myself, but listening to nature and listening to very simple people. There are things that Native Americans have said to me in just a few words that just summarize so much. I was talking with one Native American and he got a little tired of my questions and he said, "you know you white people, you have so much trouble understanding the way we Indians look at the world, it is very simple to understand how Native Americans view things, you only have to remember two things, one is, everything in the universe is alive, the other is, we are all relatives"... and that is wisdom (Willis Harman, Institute of Noetic Sciences; http://twm.co.nz/Harm_bio.html).

So here it is: *effulgent coherence*. This is why *three ways* of our knowing must now be detailed, debated, and understood: physical, mental, and spiritual *are* aspects of our holographic universe. They operate as beams of energy teaching us in separate ways about wholeness.

Our Wholeness

Indigenous world views will thus survive. Tides come in and they go out again. *Nouns have always been verbs*. It has been like this for a long time. The Big Three exist: *see* the science in it, *think* it

through carefully, and then *inspire* the world with the quality of your participation. Please, most of all *ulukale'ale'a* – create *joy in the process*.

Amamauanoa.

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► Indigenous Knowledge and Traditional Knowledge

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Homelessness, Archaeology of

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Introduction

The archaeology of homelessness is an emerging specialization; it is in its infancy in international terms. It emerges from the study of modern material practices and an engaged archaeology and can articulate with archaeological studies of poverty and urban slums. The archaeology of homelessness uses the traditional methods and techniques of archaeological investigation to examine the material cultures, ways of life, and behaviors of people who are homeless and who reside without homes in geographically, socially, and politically diverse environments. In recent times archaeologists have identified as unique the archaeological signatures that are evidence of the human experience of homelessness and regard this to be an intrinsic part of human history and present life (Zimmerman et al. 2010).

Key Issues and Current Debates

The archaeology of homelessness is an emergent area of research that has so far been undertaken primarily in high-income countries. This entry investigates how this new area is developing

through the analysis of case studies in Australia, the United Kingdom, and the United States. The scholars involved in these studies are involved in large- and smaller-scale research projects that focus on different aspects of the archaeology of homelessness.

St. Paul, Minnesota

The seminal publication in the archaeology of homelessness is that of Zimmerman et al. (2010) in their study of homelessness in St. Paul, Minnesota, in the United States. The theoretical framework for this study emerges from the view that archaeological knowledge can and should be of social benefit to society. To this end, and by way of illustration, the study shows the potential of material culture analyses to suggest solutions to problems in the lives of homeless people. One example of this concerns the observation that empty cans of food are a common type of artifact on homelessness sites, yet the cans display evidence of having been torn open, without the use of a can opener. The presence of empty hair conditioner containers is another type of artifact on homelessness sites. Of these two artifacts, Zimmerman et al. argue that homeless people would get more benefit from the issuing of can openers than they would from being given hair conditioner. While the archaeological evidence shows people consume a lot of canned food, the study of their land use patterns (and oral collaborations) also indicates that homeless people do not necessarily have access to water for washing. The study sheds light on the behaviors and habits of the homeless in St. Paul, Minnesota. The archaeological evidence suggests that it would be a better policy to distribute something that is of use and would have a tangible benefit to people instead of something which is of little use, since it needs to be used in conjunction with a scarce resource, and which may represent in archaeological terms, discard. By extension, the study shows that archaeology does have the capacity to suggest changes in social policy through contributing knowledge about what homeless people actually need, as opposed to perceptions of what they need, perceptions not necessarily being based on evidence.

Archaeologists wield power because they generate knowledge about human society, in the past and the present. Accordingly, it follows that archaeologists have responsibility to take into account the potential impacts of their investigations on the lives of the people with whom they work. Zimmerman et al. (2010) advance a philosophical argument calling for a politically aware "activist" form of practice in which archaeologists discern the social benefit to be derived from archaeological interpretation of homelessness and use that knowledge to pursue new policy outcomes which improve the lives of homeless people. Underlying this argument is the notion of accountability as the core of ethical practice and awareness that a well-designed problem-oriented archaeological research can empower local communities.

Bristol, England

The United Kingdom study by Kiddy and Schofield (2011) aimed to use archaeology as a lens through which to understand the experience of contemporary homelessness in Bristol. The theoretical framework for this study is based on the notion of an archaeology that is social inclusive and which provides social benefits to the local community. In this study, homeless people collaborated with the authors to communicate their experiences of homelessness to the wider community through meetings and the mainstream media. This facilitated a mutual reevaluation of each group's perceptions of legitimacy, humanity, and identity. The aims of the research were multiple: to empower homeless people in research, recognize the significance of homelessness oral history as an alternative narrative of contemporary land use and settlement patterning, describe the material culture of homelessness in archaeological terms, advocate an evolving definition of heritage to include homeless sites and places in the landscape as representations of "nonconformist" lives, and finally, to evaluate how to measure "benefit" to the homeless participants in the research.

The authors reviewed the notion of how archaeology is defined in traditional and populist terms but argued that archaeology has a "broad base and range of intellectual possibilities." From this viewpoint, archaeology is not a pursuit confined to the study of the remote past but has relevance and

application to the understanding of contemporary societies. In this sense the concept of heritage is also a community-owned and ascribed living reality (Kiddy & Schofield 2011: 5). In this study, six sites occupied by homeless people were identified, surveyed, and recorded for knowledge about land use and settlement patterns. The results shed light on the everyday lives and activities of homeless people, identifying occupational variability and changes in material culture through time and across space. In order to facilitate their contributions from the long-term unemployed homeless people, the methods were devised to accommodate their work ethics and, where necessary, substance misuse addictions. These people played a significant role in guiding surveys and in interpreting the past and present occupation histories of sites.

The broader local community benefited from the findings of this study through an enhanced understanding of the reality and complexity of the lives and experiences of homeless people. This research attracted widespread academic, professional, and lay interest and coalesced the community by forging new working relationships between homeless people and other people from diverse occupations and backgrounds. A planned exhibition about homelessness will foster awareness of the issues on a national scale.

Darwin, Australia

In Darwin, Northern Territory, Australia, Pollard has examined the material culture and land use and settlement patterns of "countrymen," Aboriginal people from remote communities, who live homeless in the "long grass." The "long grass" is an iconic term in this region for those areas on the fringe of urban settlements where marginalized people live – without proper shelters, amenities, or service delivery. This study encompasses both the past and present use of hinterland areas around Darwin, contributing to theoretical understandings of the past and present land use. The study of Aboriginal homelessness is one aspect of a broader archaeological study of the post-European contact and adaptation of the Larrakia people on whose traditional country the colonial capital was established in 1869.

Homeless countrymen live a fringe existence on the margins of Darwin society, on the traditional lands of the Larrakia people. A network of sites across the Darwin landscape attest to the way of life of homeless countrymen, and the material culture the sites contain provides insight into their habits and social organization. The archaeological evidence shows that many homeless countrymen eke out an existence on government support but exploit traditional marine and freshwater resources around Darwin to supplement their diet. The presence of countrymen on Larrakia country hints at the complex history of former and continuing interaction and engagement between the Larrakia and Indigenous people from the nearby islands, and regional and remote communities. This historical relationship is relevant to elucidating continuity of a former and current way of life living on the fringe of a dominant culture.

People from diverse Indigenous communities throughout the Top End of the Northern Territory are a major component of the homeless population in Darwin. The study demonstrates the strength of individual groups' ties to specific tracts of land, even though that is not the traditional homeland of the Aboriginal people concerned, as the same cultural group will visit and stay in the same area over many years, sometimes decades. The distribution of settlement patterns also can be interpreted in terms of the strength of positive and negative relationships between groups and in relation to the need to access basic services, such as medical facilities.

Discussion

The archaeology of homelessness is in its infancy. However, the studies outlined here show the potential for this form of archaeology to provide new information and insights on the behaviors and needs of people who are homeless.

Cross-References

▶ Indigenous Archaeologies: Australian Perspective
▶ Modern Material Culture Studies

▶ Urban Archaeology
▶ Urban Archaeology in Twenty-First Century Perspective

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Hominids, Earliest African

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Introduction

The term "Hominid" in the traditional sense and the sense in which it was used for decades and is used here, derives from the family name Hominidae which applies to humans and their ancestors as far back as the divergence from the great apes traditionally known as Pongidae or pongids.

Definition

In recent years many, but not all, palaeoanthropologists have abandoned the traditional terminology because they have accepted genetic studies that indicate humans are more closely related to chimpanzees than to orangutans and they therefore argue that it is wrong to group chimps together with orangs in the family Pongidae and that, instead, all the great apes and humans and their ancestors should be classed as hominids. They then separate off the African apes (gorilla and chimp) together with humans and their ancestors in the subfamily Homininae (which has for decades been used only for *Homo* and *Pithecanthropus* to distinguish them from the subfamily Australopithecinae). Then they further separate off humans and their ancestors as a newly introduced tribe, the Hominini or "hominins" (Klein 2009: 75).

Such a scheme has not found favor with all researchers into human origins. Some, e.g., Schwartz (1987), consider that we are not more closely related to chimps than to other great apes. Schwartz has argued that we are closer to the orang utan. Furthermore, there is no consistency in classifications based on supposed genetic distance. Stringer and Andrews (2005) and many others separate the gibbons and siamangs (*Hylobatidae*) and the *Hominidae* but Goodman et al. (2001) not only include gibbons in the family Hominidae but also in the subfamily Homininae. Goodman et al. also classify the orang, gorilla, chimp, and *Homo* together in the tribe Hominini. This was taken even further by Watson et al. (2001) who classify gorilla, chimp, and humans together in the genus *Homo*.

The purpose of classification is to provide clearly defined groupings so that people know what they are talking about. The variability in classification listed above does not do that and so, here, the established classification is retained wherein Hominidae or hominids refers only to humans and their ancestral kin going back to their separation from Miocene apes.

Key Issues/Current Debates/Examples

The search for the earliest hominids has been a challenge, not only because of the rarity of such fossils but also because the closer they are to the ape ancestor, the more difficult it is to determine whether a fossil fragment is that of an ape or an early hominid. This was well illustrated by the case of *Ramapithecus punjabicus* represented by fragmentary jaw fossils from the Siwaliks of Pakistan. During the 1960s, these were generally accepted as early hominids from the Miocene of Asia (Simons & Pilbeam 1965; Simons 1968). Louis Leakey (1962) even championed his own version of this Miocene ancestor from Fort Ternan in Kenya. He called it *Kenyapithecus wickeri* and entered into arguments with Pilbeam and Simons who considered it to be *Ramapithecus*. The Siwalik fossils were about 12 Ma, and the Fort Ternan specimen was well dated to 14 Ma. Leakey was determined to find even earlier hominids and selected several jaw fossils from Lower Miocene sites in western Kenya dating to 18 Ma ago. He named a new species *Kenyapithecus africanus* as an early Miocene hominid (Leakey 1967). At that time, "hominid" meant member of the human family. Leakey's claim was not generally accepted and even *Kenyapithecus wickeri* was later demonstrated to be an ape. Andrews (1978) found that an ape mandible from Fort Ternan actually belonged to the same individual as the supposed hominid maxilla. *Ramapithecus* also was eventually considered to be an ape and all thoughts of the possibility of Lower and Middle Miocene hominids were abandoned with the general acceptance of the geneticists' contention that chimp and human ancestors shared a common ancestor around 5 Ma ago. That divergence date has been put back further with the discovery of older fossils claimed as hominids, i.e., *Orrorin tugenensis* at six million and *Sahelanthropus tchadensis* at seven million (discussed below), in the recent past.

Questions then arise as to, firstly, whether the geneticists could be wrong, and secondly, as to whether the dates for these fossils are accurate. A third, and very important, question is the matter of how one recognizes an early hominid, i.e., what are the distinguishing hallmarks of hominids that set them apart from the apes?

When *Australopithecus* was first discovered, the fossils were for several years referred to as apes with man-like features, even by their discoverers Dart and Broom. Now, with the wealth of fossils that we have of Australopithecines, their status as hominids or human ancestors is undeniable. They have three main characteristics that set them apart from the apes, living and fossil. These are: (1) a dentition that is morphologically like that of humans albeit sometimes of exceedingly large size, and canines that are relatively small compared to those of apes, (2) skeletal adaptations in the pelvis and lower limbs to facilitate bipedal walking, (3) a hand with relatively short palm and fingers, and relatively long and opposable thumb when compared to the hands of apes.

It is all or any of these three features that are looked for in fossils in order to determine whether they are ape or hominid. The problem is that in the fragmentary and sometimes poorly preserved fossils available, such features are sometimes not so clear-cut and thus subject to debate and disagreement.

The earliest fossils that have been claimed by their discoverers to be hominids are *Sahelanthropus*, *Orrorin*, and *Ardipithecus*. *Sahelanthropus tchadensis* was found in 2001 in the Djourab Desert of Chad, more than 2,500 km west of the fossil hominid sites of the East African Rift Valley. The crushed cranium was located by Ahounta Djimdoumalbaye, a member of a team organized by Michel Brunet on a paleontological survey of the desert that was once the shore of mega Lake Chad. Although the team had located many magnificent fossils of a variety of fauna, this was the first hominid fossil from those remote Miocene deposits.

The fossil was found resting on the surface of the sands which were littered with fossil bones of other animals. As there was no way to obtain an absolute age for the fossil, it was dated by comparing the contemporary fauna with that of

well-dated East African sites. An age of 6 or 7 Ma was considered probable for the cranium which has been given the name Toumai, meaning, in the Goran language of Chad, "hope of life." The name was given by the president of Chad, Idriss Déby. In order to better refine the dating, the associated sediments were dated using beryllium isotopes. The result was 6.8–7.2 Ma. Hence, the usual date suggested for this cranium is 7 Ma.

It is a small cranium and has some small teeth preserved. The most noticeable feature is the massive brow ridge. It is human-like in its lack of anterior facial projection, its small canine which is worn at the tip, thick tooth enamel, and the anteriorly positioned foramen magnum and short basicranium which suggests that such a skull was supported on an upright walking hominid (Brunet et al. 2002, 2005). There is no resemblance to a chimpanzee and the brow ridge is not only more massive than that of a male gorilla, but it does not have a supratoral sulcus which is a characteristic of gorillas.

Another claimant for early hominid status is *Orrorin tugenensis* found in 2000 in the Lukeino Formation of the Baringo district in Kenya by Martin Pickford and Brigitte Senut (Senut et al. 2001); it is represented by some partial limb bones, jaw fragments, and teeth, and dated to 6 Ma. The discoverers noted that the upper part of the femur with the head and neck had human-like features indicating that Orrorin was adapted to terrestrial bipedalism.

A third candidate for early hominid ranking is *Ardipithecus ramidus* from Ethiopia, dating to 4.4 Ma ago (White et al. 2009). A fragmented partial skeleton found in 1995 took many years of careful extraction before it could be published in a series of 11 articles in a special section of the journal "Science." The skeleton was excavated at Aramis in the Middle Awash region of Ethiopia and represented a 120-cm tall female. There is much of the skull with teeth, revealing human-like features of short cranial base, short face, small canines, and broad mandibular corpus. The brain is small (300–350 cc) and the foot has a divergent big toe. The pelvis has ilia that are broad and short in comparison to the apes. This and other features of the limbs and spinal column led the researchers to conclude that *Ardipithecus* was bipedal.

These suggestions of bipedality coupled with the dentition and skull structure were enough to convince White et al. (2009) that they had an early hominid. There have of course been skeptics just as there were with *Sahelanthropus* and *Orrorin*. This emphasizes the problems mentioned before of how to distinguish an early hominid from an ape when the fossils are fragmentary, poorly preserved, and nevertheless display a mixture of ape-like and human-like characters. The fact remains that somewhere in Africa, there was undoubtedly an ancestor to the earliest generally accepted hominid which is *Australopithecus anamensis* at 4.2 Ma and *Sahelanthropus*, *Orrorin*, and *Ardipithecus* represent good candidates for such ancestral status.

An even earlier form of *Ardipithecus ramidus* dating to between 5.2 and 5.8 Ma ago also comes from the Middle Awash of Ethiopia. The fossils consisting of some teeth, a partial mandible, ulna and humerus portions, a foot phalanx, and a hand phalanx were named *Ardipithecus ramidus kadabba* (Haile-Selassie 2001).

A similarly aged fossil, part of the right side of a mandible with one heavily worn first molar was recovered in 1967 at Lothagam, west of Lake Turkana, Kenya (Patterson et al. 1970) and dated to 5.5 Ma. The Lothagam site was discovered by Larry Robbins, a University of California Berkeley student, who, together with a small team of assistants and another student, John Yellen, was exploring the remote western shore of what was then Lake Rudolf (now Lake Turkana), in the hope of finding Late Stone Age sites for his Ph.D. research. He showed it to Ron Clarke who, realizing the great age of the fossils, brought it to the attention of Brian Patterson of Harvard, who had been working at Kanapoi. Patterson's team subsequently surveyed Lothagam and, together with a significant collection of Miocene fauna, they found the tantalizing fragment of a possible hominid mandible. However, the worn molar and the

fragment of corpus were insufficient for palaeoanthropologists to be sure of its status, as it might instead have been an ape. Thus, for years, it remained largely undiscussed. However, Pilbeam (1972) was impressed with its similarity to *A. africanus* and published a photograph in which he compared it to a Makapansgat *A. africanus* mandible. Fourteen years later, it was discussed in more detail by Kramer (1986), and then by Hill et al. (1992). Now that the 4.2 Ma old *Australopithcus anamensis* has been found at the nearby site of Kanapoi, and with the revelations of the 4.4–5.8 Ma old *Ardipithecus*, it seems most probable that the Lothagam mandible is that of an early hominid, possibly belonging to *Ardipithecus* or to an early Australopithecine.

Cross-References

► Australopithecines
► *Homo habilis*
► *Paranthropus*

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Hominin Paleoecology and Environmental Archaeology

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Introduction

Reconstructing the lives of our closest fossil relatives is relevant to our understanding of the history of the human lineage, our biology, and our relationship with the environment. Further back in time, evidence of material culture dwindles until, at around 2.6 million years ago, there ceases to be any surviving record. Prior to this, researchers must work with the same record of fossils, sediments, and rocks as any paleontologist. For the period before 2.6 million years ago, an ecological perspective – as opposed to the archaeological one usually employed for *Homo sapiens* – is therefore necessary. But the value of the paleoecological approach is not limited to species which predate material culture. The insights to be gained from studies of trophic relationships, ecological structures, and hominin interactions with the physical environment ensure that this perspective remains important to the study of human evolution up to and including *Homo sapiens*.

Definition

Paleoecology is the study of ancient ecology. Environmental archaeology, in its broadest definition, is also concerned with the ecology of the past, specifically with an ecological approach to past human populations. The two fields are thus very similar, with the key difference lying in their scale and subjects. Hominin paleoecologists largely study fossil specimens of extinct species, and their study spans the entirety of paleontological history. Environmental archaeology is more circumscribed, focusing on a single species typically represented by subfossil and archaeological evidence. There are exceptions to this, as in the case of the paleoecological study of subfossil specimens like *Homo floresiensis* (Flores, Indonesia) or specimens of our own species. Both fields draw upon methods from biology and geology, but paleoecology, by virtue of the nature of its source evidence, has a somewhat stronger relationship with the geological sciences, particularly the study of taphonomy (Hardt et al. 2007).

"Hominin" denotes all those species more closely related to modern humans than to their closest living relatives *Pan paniscus* and *Pan troglodytes* (Wood & Lonergan 2008). Panins and hominins shared a common ancestor some 5–6 million years ago. For much of their history, two or more hominin species have coexisted, resulting in a complex and unstable taxonomy. While different authors champion different demarcations between species and even genera, this article recognizes the genera *Sahelanthropus*, *Orrorin*, and *Ardipithecus* as stem hominins and *Australopithecus*, *Paranthropus*, and *Homo* as later, more certain forms.

Key Issues/Current Debates

Given the diversity of paleoecological research, which can include everything from isotope studies of ocean sediments through to microscopic studies of fossil teeth and computer modeling of paleoclimates, it is difficult to produce a general classification of the field. There is much ongoing debate and many questions remain unanswered, focusing at all scales from the individual site or specimen through to intercontinental studies of evolutionary ecology and dispersal of lineages and at every intermediate scale. There are four major topics in the literature, specifically:

1. Diet: what hominins ate, how they obtained their food, and the implications for anatomy, behavior, and energetics
2. Ecological interactions and intrinsic ecology: the relationships between hominin taxa and

between hominins and other organisms, life history, and adaptations
3. Environment: the environmental tolerances and preferences of the hominins
4. System dynamics, agency, and cooperation

These topics are interlinked by the complex relationships between paleoecological evidence and its interpretation. A paleoecological dataset can typically be used for more than one purpose, and specific research questions can be approached in several ways through different analyses. For example, Bobe et al. (2002) used data on faunal samples from strata in the Omo Valley in Ethiopia between 4 and 1.9 million years old to reconstruct changes in the abundance of different taxa. Skeletal element counts were used to evaluate the role of taphonomic processes in producing these patterns. The resulting environmental reconstructions were then checked against evidence from marine dust records and found in part to reflect climatic changes at the time (Bobe et al. 2002). This sort of multi-proxy approach is becoming ever more common as it provides the opportunity to validate and enhance reconstructions based on a single line of evidence and to identify or reduce the impact of taphonomic bias. Research may also draw on computer modeling, studies of modern analogue environments and ecosystems, and comparative data on primates and other taxa. These comparisons may be with homologous taxa (those closely related to hominins) or analogous ones which perform similar ecological roles. The use of diverse methods has had a key impact on paleoecology. It raises second-order questions of data quality, the choice and accuracy of specific methods, and the role of theories and assumptions which are almost as important as first-order concerns about diet, environment, and ecology.

Hominin Diets

The earliest proposals of hominin diet were heavily influenced by contemporary anthropological emphases on the "humanness" of fossil specimens and the importance of hunting and meat eating in setting humans (and hence hominins) apart from our closest relatives. Despite significant new methodological advances, such as the advent of tooth microwear studies, isotopic analyses of dental enamel and bones, and enamel microstructure analyses, scientists remain uncertain about hominin diets. Between 4.4 and 2.3 million years ago, the early hominins (*Australopithecus anamensis*, *Au. afarensis*, and *Au. africanus*, with initial signs also in *Ardipithecus ramidus*) developed a characteristic pattern of small incisors, large flat molars, thick tooth enamel, and robust mandibles which would have enabled them to eat both hard and soft, though not tough, foods (Teaford & Ungar 2000). This would have permitted a flexible diet consisting of a range of foods from savannah and forest. *Paranthropus robustus*, in contrast, may have been capable of processing more tough plant foods as well (Teaford & Ungar 2000). Later species likely made more use of higher-quality resources, perhaps including terrestrial and aquatic animal foods, honey, or tubers (Braun et al. 2010).

As more specimens of each species have been subjected to analysis, the significance attributed to intraspecies dietary variation has increased. The flexible adaptations of *Australopithecus*, and the mosaic patterns of dietary evolution in this taxon, suggest that they could have eaten a wide range of foods (Teaford & Ungar 2000), and indeed evidence for this is found in isotopic analyses of *Au. africanus* and *P. robustus* which are both more extreme generalists even than modern baboons (Codron et al. 2008). Emphasis has shifted from a focus on absolute dietary differences between taxa to one which recognizes the potential role of "fallback foods" – those which are important in times of scarcity, but which may not typically form a central part of the diet – in anatomy and ecological adaptation. Current debate centers on questions of dietary variability, niche breadth, niche overlap, and flexibility at the individual and species level. Concomitant considerations include "adequate" sample sizes, theoretical frameworks for adaptive evolution which might explain the complex relationship between food consumption and craniofacial anatomy, and analytical robusticity.

Ecological Interactions and Intrinsic Ecology

Questions of diet are closely linked to those of ecological interaction, including predation,

competition, commensalism, and parasitism. Characterizing the communities at hominin sites is one priority and involves analyzing environmental context and taphonomy in an attempt to move from the paleocommunity (the species represented in a fossil assemblage) to an understanding of the living community. Studies of modern analogue communities and interpretations of an organisms' ecological niche based on that of their living relatives can be used to check or confirm these reconstructions (Potts 1998). In many cases, there is a focus on comparisons between sites or strata, as in the study by Bobe et al. (2002) of change in the dominance of suids, bovids, and cercopithecids through time in the Omo Valley. Another example is Lewis and Werdelin (2007)'s work on the ecological structure of the carnivore guild at various east African sites. These studies may help in placing hominins within a particular ecological group and in the identification of broader patterns in faunal evolution and ecology. Two examples are the "turnover pulses" characteristic of African mammal lineages which may correlate with hominin adaptive radiations or ecological shifts (Potts 1998) or changes in vegetation distributions and structures which might cause ecological divergence of hominins and panins (Hardt et al. 2007).

Closely linked to the question of the ecological position of hominins with respect to animals and plants are those of niche separation and coexistence among hominins themselves. Multiple hominin species have existed in parallel, often in the same regions and similar habitats, for all but the last few tens of thousands of years, with perhaps as many as six in certain periods (Wood & Lonergan 2008). Their classification into species and genera implies some sort of evolutionary and hence ecological separation from one another. Identifying precisely what this might imply, especially when all aspects of hominin ecology are showing increasing evidence of intra- and interspecies variability, is difficult and is an area which focuses on the synthesis of external factors (environment and community ecology) with intrinsic ecological ones relating to life history and behavior (Senut 2007). Aspects of life history, such as lifespan, fertility, and reproductive rates may determine the long-term strategies available to hominins. They can be reconstructed for fossil species using "life history-related variables" like body mass, dental, and osteological development patterns and brain growth schedules (Robson & Wood 2008), through the application of general rules based on primate and mammal studies.

The first specimen to show a developmental pattern similar to that of extant *Homo sapiens* appears late in our history. Smith et al. (2007) identify a juvenile from Jebel Irhoud, North Africa, as this individual – but the relatively small sample size of immature hominins throws into context the issue of paleoecologists' reliance on individual specimens which may not always be representative of their populations. This humanlike pattern is not something which appears steadily from an apelike precursor. Robson and Wood (2008) note that early attempts to describe hominin life histories tend to focus on characterizing the shift from "apelike" (usually characterized by members of *Pan*) to "humanlike," but that in more recent research, it has become increasingly apparent, once again, that hominin life history variables not only change at different rates and periods but also show unique, distinctive configurations that differ from all living species. *Paranthropus*, in particular, has a pattern of dental development which sets it apart from both living African apes and humans (Robson & Wood 2008). Understanding these patterns, and how they fit with hominins' ecological strategies and niches, is thus less a question of characterizing evolution as it is of developing a more detailed understanding of each species' unique ecology. Questions of theoretical perspectives and their validity, and of how and why scientists approach hominin ecology (historically as intermediate between us and the nonhuman apes, or more recently as distinctive in their own right) are therefore central.

Hominin Environments

The interactions between hominins and the physical environment are also very important. The identity and role of specific environments which drove "hominization" or the acquisition of key

human/hominin ecological and anatomical characters are of particular interest. There are two major groups of hypotheses as to the nature of the key environment. The first group focuses on simple shifts, either in the nature of the environment, for example, aridification and the expansion of grassland, or in the preferences and tolerances of hominins. The second group focuses on changes in environmental variability or evolutionary turnover, like the turnover pulse hypothesis or the variability selection model (Potts 1998). A new suggestion, focusing on spatial (as opposed to temporal) variability and the role of physical landscape rather than climate or vegetation in driving hominin evolution, has also recently been proposed (King & Bailey 2006), highlighting the role of spatial mosaics in environments and of rough topography in providing resource-rich refugia and tactical advantages over predators.

These environmental hypotheses are usually based on theories of the way(s) specific contexts might influence hominin precursors living in them, but they are closely tied to paleoenvironmental evidence from fauna, flora, geology, isotopes, and sediments for validation. Such studies are responsible for recent proposals which highlight the role of forests in generating hominin traits, as studies of the stem hominins *Ardipithecus*, *Orrorin*, and *Sahelanthropus* have suggested that forests and lakesides, rather than open plains, were typical of their localities (Senut 2007). Later species have been found in a variety of contexts, and questions today center not just on the nature of habitats but on the role of taphonomic bias and preservational factors in generating observed patterns in distributions and habitat associations (King & Bailey 2006). Fossils are often found in lake and river sediments, because these are the places where deposition is common and preservation most likely. A range of paleoenvironmental methods, modern analogue studies, and modeling techniques are therefore used to contextualize specific sites. This enables researchers to fill the gaps left in the fossil record by taphonomic bias, transport of remains, and uncertain dating (Potts 1998). Later studies often focus on the role of coasts and other environments as dispersal routes for *H. erectus* and *H. sapiens* and the interactions of *Homo* spp. with the environments and ecosystems they encountered.

System Dynamics, Agency, and Cooperation

Much of the seminal literature on hominin paleoecology actually predates the word "ecology" and is closely linked to broader paradigms in biology and archaeology. Alfred Russel Wallace's paper on the origin of human races mounts a powerful challenge to the coevolutionary model presented in Darwin's *Origin* (Wallace 1864). Wallace argues that advanced cognitive skills effectively enabled humans to evade the universal effects of natural selection. In his later writings, notably *What is Life*, Wallace argues that this intellectual and technological liberation cannot be explained in purely scientific terms and infers the existence of a universal intelligence comparable to Henri Bergson's *élan vital*. Wallace's idea undermines all those chapters in Darwin's *Origin* that deal with cooperation and creative synergy. Wallace seems to have believed that only humans, with their superior intelligence and technology, could set natural selection in abeyance and influence the course of evolution.

Charles Darwin's *Descent of Man* presents a naturalistic model, which the older Wallace and Bergson rejected. Darwin believed higher cognitive function may actually have reduced the relative fitness of some individuals but would have persisted if it increased the fitness of the community in which the individual is embedded. Similar arguments are made in *Origin*, where Darwin discusses the coevolution of humans and their domesticated commensals and of plants and their pollinators. An insect that can only feed from rare, long-throated flowers, for example, may not enjoy the same reproductive success as a generalist but can persist as long as the community of plants and insects maintains the fitness of all. This difference of emphasis between Darwin and Wallace prefigures the twentieth-century tension between neo-Darwinists (who favor Wallace's model) and coevolutionary ecologists, who allow for the possibility that selection pressures can be mitigated by interspecies cooperation. This anticipation is

all the more remarkable when one observes that Thomas Henry Huxley argued for a stick-slip model of evolution, which anticipated Hugo de Vries' later work on "mutationism" and later twentieth-century theories about "punctuated equilibria."

Although some of the key concepts of later twentieth-century systems ecology were well documented in the 1860s and 1870s and discussed almost continually since, the ideas did not become scientifically respectable until the 1960s and 1970s, when an innovation cascade fueled by postwar perestroika and the development of new computer methods led to a partial rehabilitation of Darwinian complexity. The first scholarly biological papers to explicitly use the word "coevolution" date from the 1960s; research on behavioral ecology and ethology that had been the preserve of natural historians and amateurs now came into the scientific mainstream, and models of stick-slip evolutionary dynamics and continental drift were rehabilitated. Although some textbook and popular literature presents this as a cascade of scientific discoveries, the primary sources are more consistent with an institutional veto that pushed complex dynamics beyond the pale, as it were.

In archaeology, this innovation cascade produced a number of confusing hybrids that tried to meld classic and complex approaches. It is helpful here to distinguish large-P from small-p processual archaeology. Large-P processualism had been a hybrid of classic and complex systems approaches that strove to link new developments in anthropological archaeology to classic science, particularly to Karl Hempel's concept of the scientific law. Small-p processualism or "new archaeology," on the other hand, was a more pragmatic attempt to integrate systems ecology, new scientific methods, and anthropological archaeology. Thus, by the time Lewis Binford (1981) published his research on taphonomy and hominin ecology, he had publicly repudiated his earlier processual polemics, rejecting the quest for universality in favor of what he called "middle-range theory." By studying animal modifications of bones, Binford learned to distinguish the shearing and crushing actions that can be effected using jaws alone from modifications that could only have been effected by hominins. By analyzing faunal data in the light of this understanding, he felt able to reject the "man the hunter" hypothesis and suggested that early hominins were scavengers. The essential feature of Binford's later (small-p) processual research was a separate effort of research on process and transformation designed to provide an inferential platform. Middle-range theory identifies inferential links between the mundane and frankly uninteresting phenomena we can observe and unobservable phenomena that interest us.

As the processual vs. post-processual debates intensified in the later 1980s and 1990s, a number of new archaeologists became interested in more dynamic models of paleoecology. Where post-processual debates often degenerated into a paradigmatic argument about agency, scale, and the relative merits of environmental determinism and agency, the dynamic approach looked for some common ground. All socio-natural systems are "dynamic" in the sense that they change, but the studies referred to here involve co-dynamic situations, where cultural and natural systems create and recreate each other. This approach invites us to consider a stick-slip dynamic in which one set of causal structures can become unstable and a new, qualitatively different type of co-dynamic interaction can emerge.

The (co-)dynamic or coevolutionary approach is rare in archaeology as a whole, but two examples can be found in Pleistocene hominin paleoecology. Bailey's (1997) Epirus Project included a study of predator-prey interaction based on a hypothesis of constant disequilibrium. The result was an individual-based "toy-world" model of plant, herbivore, and predator interaction that suggested resilience could be lost if this open-ended game of hide and seek was constrained, for example, by obstacles to dispersal. By relating these middle-range insights to climate and sea-level changes, the project was able to predict the distribution of hunting sites through space and time, including some in regions that currently lie offshore.

A second example of co-dynamic paleoecology in Pleistocene ecology is provided by Mithen's (1993) work on mammoth populations. Mithen developed a simple model of mammoth reproductive behavior and used it to show that a relatively small human cull (less than 3 %) could reduce the resilience of a healthy population, rendering it susceptible to relatively minor fluctuations in predation pressure and natural disasters. Again, the focus is on resilience and co-dynamic interaction between populations. Our final example uses a more ethnographic approach to systems analysis. Like Binford, Ezra Zubrow (2005) is concerned with developing methodological protocols for interpreting patterns in space and time. Where Binford's analyses were, at a first level of approximation, a-spatial, Zubrow is interested in GIS and exploring a form of auto-ethnography. Pleistocene hominins did not use the abstract, analytic skills we deploy, but those abstract methods are based on a similar cognitive foundation. By exploring the concepts of patchiness and crowding and the ways people perceive spatial pattern, Zubrow hopes to gain new insights into paleoanthropology and the dynamic ecologies of culture.

Conclusions

Our understanding of hominin paleoecology is variable and rapidly changing. Certain topics – for instance, diet in *Paranthropus* species, the interactions of species at major sites like the Omo and Olduvai, and the environments that may have driven hominization – have been intensively studied, while others are less well known. Both direct questions about ecology and more abstract problems of taphonomy, data quality and use, and methodological validation remain under active investigation. Progress is driven by a combination of methodological advances and refinements, new fossil discoveries, novel approaches to existing questions, and synthetic "meta-analyses" that integrate data from several sources and projects. Hominin paleoecology is a highly relevant and wide-reaching field with much to contribute to our understanding of the human past.

Cross-References

- ▶ Australopithecines
- ▶ Fossil Records of Early African *Homo*
- ▶ Hominids, Earliest African
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Theory and Progress
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Taphonomy in Human Evolution

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Homo erectus

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Introduction

Homo erectus is a geographically widespread and temporally long-lasting fossil hominin species known from Africa and Asia between c. 1.9 Ma and 500 ka (but perhaps to <100 ka). The taxon subsumes a large amount of skeletal variation, and one of the central debates concerns whether this variation should be partitioned into multiple species. *Homo erectus* was the first hominin to disperse out of Africa as well as the first to take important steps toward modern human form, development, and behavior. *Homo erectus* has traditionally held a canonical position in hominin evolution, chronologically succeeding *Homo habilis* and preceding *Homo sapiens*. However, this simple time-successive progression has been complicated by additional fossil discoveries in Africa that confirm the presence of multiple species of non-erectus early *Homo* (Leakey et al. 2012) as well as the temporal and geographic overlap of *Homo erectus* and *Homo habilis* (Spoor et al. 2007). Nonetheless, *H. erectus* remains the presumptive common ancestor for *H. sapiens*.

Definition

Species History and Distribution

The *Homo erectus* nomen dates to the 1940s, but fossils attributed to this species have been known since the nineteenth century. Spurred by the prevailing hypothesis that human ancestors would be found in Southeast Asia, Eugène Dubois sought and found fossils in Java in the 1890s that were recognizably nonhuman but possessed brain sizes well above those of modern apes. He assigned the material to a new species, *Pithecanthropus erectus* (upright ape-man; Dubois 1894). Subsequent discoveries at the site of Zhoukoudian in China were dubbed *Sinanthropus pekinensis* (Black 1927). Both genera, along with others named in Indonesia and South Africa, were eventually subsumed into *Homo* based on their similarities to each other and relationship to modern humans. The original species name was retained to create *Homo erectus* (Mayr 1944). Discoveries at Olduvai Gorge in the 1960s (e.g., OH 9) expanded the known range of *Homo erectus* into East Africa. The species is known from East, South, and possibly North Africa and West, East, and Southeast Asia.

Homo erectus is defined by its distinctive cranial morphology, including a long, low vault and the presence of cranial suprastructures such as sagittal keeling, an angular torus, a bar-like or

arching supraorbital torus, and a projecting occipital torus (Antón 2003, 2012). The widest part of the cranial vault is low and in combination with sagittal keeling and parietal deflation gives the cranium a heptangular shape when viewed from behind. Crania display moderate to marked postorbital constriction and facial prognathism, and the bones of the cranium and mandible tend to be thick and robust, although some of these attributes scale with brain size. Brain sizes range from ~650 to 1,200 cc's, with an average of ~900 cc's (Spoor et al. 2007). While there is a trend of increasing average brain size within *Homo erectus* throughout the Pleistocene, most of this range in variation is present throughout the entire temporal span of the species. The lower end of the range overlaps with other early *Homo*, although average brain size is ~25 % greater in *Homo erectus* than in non-erectus early *Homo* (Antón & Snodgrass 2012).

Characterizing the postcranial skeleton of *Homo erectus* is a more difficult task given the paucity of skeletal remains that are definitively associated with diagnostic cranial remains and the temporal overlap with other *Homo* species. The most complete *Homo erectus* skeleton, KNM-WT 15000, demonstrates that some individuals were relatively large and probably possessed the long, linear body form associated with tropically adapted recent humans (Ruff & Walker 1993; Graves et al. 2010). As with cranial capacities, however, there is a wide range of body sizes for *Homo erectus*, with small individuals found in all regions (Antón & Snodgrass 2012), such as the small-sized individuals from Dmanisi, Georgia. South African and East African *H. erectus* are similar in size, with East African *H. erectus* ranging from 51 to 68 kg and 160 to 185 cm tall depending upon whether the Gona pelvis is included, but some of the South African remains may be as small as 30 kg (Antón 2012). The Georgian remains are 17–24 % smaller (40–50 kg; 146–166 cm), although this difference may be the result of a categorization bias in Africa that has tended to place smaller isolated postcrania into early *Homo* and larger into *H. erectus* (Antón 2012). Although previously argued to differ from earlier hominins in possessing a more modern-human-like body plan with longer legs and a less funnel-shaped rib cage, recent work suggests that hind limb elongation is a ubiquitous feature of hominins (Pontzer 2012). Nonetheless, overall the fossil record reveals larger average body sizes in *H. erectus* than in non-erectus early *Homo* (Pontzer 2012). Coupled with increased brain size, these body size differences suggest larger home range sizes and the beginning of an adaptive shift.

Homo erectus is notable for being the first hominin to disperse out of Africa, which is generally attributed to a combination of increased dietary quality, body size, and home range size (Antón et al. 2002). In particular, increased efficiency in the acquisition and processing of meat is arguably tied to increased body and brain sizes in *Homo erectus*. The discovery of the relatively small-brained and small-bodied *Homo erectus* individuals from Dmanisi, Georgia, however, suggests that increased body size may not have been a prerequisite for dispersal from Africa. In addition, microwear analyses of the Dmanisi teeth suggest they shared a similar dietary breadth as other *Homo erectus* specimens, which may imply a shift in foraging strategy independent of body size (Pontzer et al. 2011). The geographic range of *Homo erectus* within Africa exceeds that of any earlier hominin and, combined with the ability of *Homo erectus* to disperse out of Africa and colonize novel environments such as higher latitudes in Eastern Asia, points to a species able to adapt to a wide range of environments, foreshadowing the highly adaptable nature of modern humans.

The oldest *Homo erectus* fossils are found in Africa, including specimens from Koobi Fora, Kenya, dated from 1.89 to 1.7 Ma (e.g., KNM-ER 2598, 3733, and 3883; Fig. 1). Interestingly, *Homo erectus* is found outside of Africa almost from the beginning of its first appearance datum in Africa. Fossils from Dmanisi in the Republic of Georgia, for example, date to ~1.8 Ma (Gabunia et al. 2000). The ages of the Indonesian *Homo erectus* remains are less secure but nearly as old; the Mojokerto (Perning) child's cranium may date to ~1.8 Ma, a series of

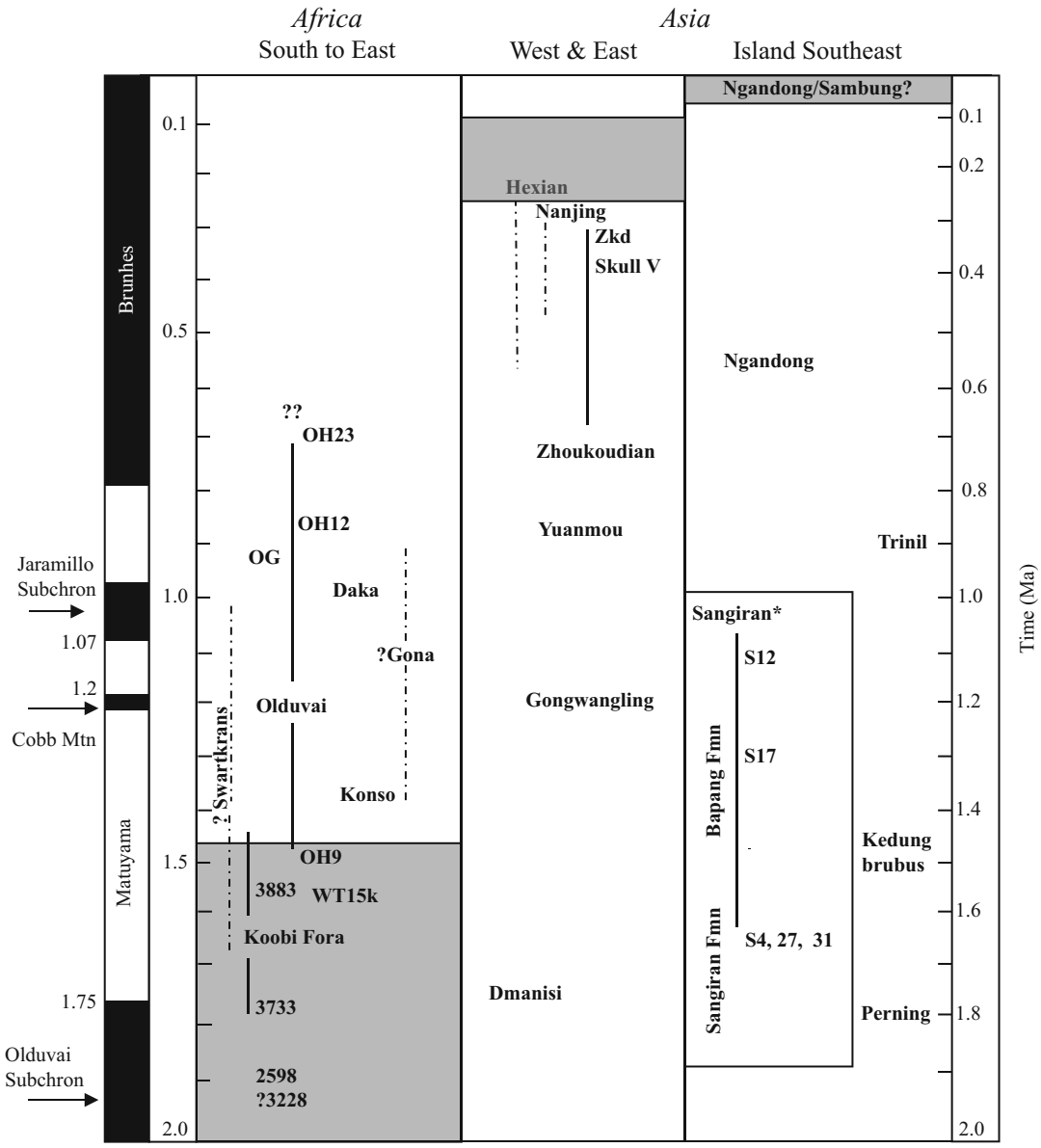

***Homo erectus*, Fig. 1** The temporal and geographic distribution of *H. erectus* localities and some important specimens. The geomagnetic polarity timescale, with normal periods in *black* and reversed in *white*, is on the far *left*. Radiometric time is indicated in millions of years on the far *right*. Within regional columns, *solid lines* on either side of site names indicate time spans suggested by multiple *H. erectus* individuals from a site; *dashed lines* indicate possible time range around a single/few specimens. Within Africa, sites are grouped from *left* to *right* as South Africa, Kenya, Tanzania, and Ethiopia; OG is Olorgesailie, OH is Olduvai Hominid, numbers on the Koobi Fora line are KNM-ER numbers, and WT15k refers to KNM-WT 15000. In Asia, the sites are grouped from Georgi to China; the earliest Chinese localities are archaeological assemblages presumed to be made by *H. erectus*. In Southeast Asia, the Sangiran box delineates the timing of the hominin bearing Sangiran and Bapang formations; however, hominins are present only from about 1.6 Ma as indicated by S4, 27, 31 (which refer to Sangiran specimen numbers), younger overlying sediments are not (currently) hominin bearing and are not shown. In all columns, gray boxes indicate a period of temporal and geographic overlap with other species. The overlapping species are as follows: in Africa, *H. habilis* (LAD, 1.44 Ma Spoor et al. 2007); in China, archaic *H. sapiens* or *H. heidelbergensis;* and in Java, *H. sapiens*

H. erectus bearing deposits at Sangiran range from 1.6 to 1.0 Ma, and the holotype, the Trinil skullcap recovered by Dubois, dates to about 1.0 Ma (Swisher et al. 1994; Antón & Swisher 2004). The oldest archaeological material in China dates to about 1.6 Ma, with the oldest fossil remains approximately 1.2 Ma at Gongwangling and 800–500 ka at Zhoukoudian (Antón & Swisher 2004). If the Ternifine mandibles are excluded, the youngest African *H. erectus* is about 900 ka at Olorgesailie and Daka, Ethiopia. The youngest mainland Asian remains are about 250 ka, and the last appearance datum for the entire species appears to be for Indonesian fossils from Ngandong and Sambungmacan that may date to 500–250 ka (Indriati et al. 2011) or perhaps even to 50–27,000 years (Swisher et al. 1996).

Homo erectus is associated with both the Oldowan and Acheulean stone tool industries. African *Homo erectus* fossils from the earliest Pleistocene (1.8–1.5 Ma) are often found with the core and chopping tools of the Oldowan, as are the earliest specimens outside of Africa (e.g., Dmanisi) and all of the Asian fossils (Ferring et al. 2011). The oldest Acheulean appears about 1.7 Ma in Africa (Lepre et al. 2011). The lack of the Acheulean tradition at *Homo erectus* sites in China and Indonesia has led researchers to hypothesize a different material culture perhaps involving bamboo tools in conjunction with Oldowan-type chopping tools. The fossil record shows much evidence for butchery and demonstrates that *Homo erectus* often had primary access to animal carcasses (Potts 2012).

Key Issues/Current Debates

The taxonomic debates surrounding *Homo erectus* center on how to partition the variation seen in a long-lived, globally dispersed fossil species. The paleoanthropological community remains divided on this core issue. Some researchers (e.g., Antón 2003; Baab 2008) argue that all of the Indonesian, Chinese, and African fossils represent the single, variable species *Homo erectus*, while others divide the fossils geographically, allocating the earliest African and Georgian specimens to *Homo ergaster*, with the Chinese, Indonesian, and some African fossils as the *H. ergaster*-derived species *Homo erectus* (Wood 1994; Wood & Collard 1999). The grounds for the latter view are both geographical and morphological, as several of the African specimens are more gracile than the Asian specimens, in particular possessing thinner cranial vault bones, although these have been shown to be allometrically scaled (Antón et al. 2007). Several conditions make *Homo ergaster* a problematic taxon. The differences between the African and Asian specimens tend to be in the degree of expression of traits, and there are African specimens (e.g., OH 9, Daka) that closely resemble the classical Asian *H. erectus* morphotype. In addition, even among researchers who advocate splitting the African and Asian material, debate exists over which fossils should be allocated to *Homo ergaster*. Others would split the material into even more species, including *Homo soloensis* for the younger Indonesian fossils from Ngandong or *Homo georgicus* for the Dmanisi material; these remain minority views.

A corollary of the taxonomic debate concerns whether or not *Homo erectus* is found in Europe. *Homo erectus* fossils may persist in Asia until the latest Pleistocene, but the hominin fossils found in Europe after 1 Ma (e.g., the Ceprano calvaria, the Sierra de Atapuerca specimens) lack the distinctive cranial morphology of *Homo erectus* and are generally agreed to represent a transitional or archaic form of *Homo sapiens* (e.g., *Homo antecessor*, *Homo heidelbergensis*). Although some researchers would allocate the earliest European fossils to *Homo erectus* (e.g., the Ceprano and Gran Dolina material at ~800 ka), most agree that these fossils represent a transitional form between *Homo erectus* and *Homo sapiens*.

Another important issue concerns the life history of *Homo erectus* and the extent to which the species had acquired the modern human behavioral package of altricial birth, a large energy-expensive brain, long juvenile

dependency with relatively late reproduction, short interbirth intervals with high fertility, and a long postreproductive life span (Antón & Snodgrass 2012). With this package humans appear to have been able to circumvent several of the key constraints that affect other primate species and are able to produce numerous high-quality offspring that experience relatively low mortality, grow slowly, and live long lives. Until recently, the juvenile Nariokotome specimen had been interpreted to suggest that much of the human package might have been in place by the time of *H. erectus*. However, recent studies of dental and skeletal development have suggested a faster rate of development and smaller adult size (Dean et al. 2001; Dean & Smith 2009; Graves et al. 2010), suggesting that the life history shifts in *H. erectus* were more modest. Similarly, sexual dimorphism in body size has also been argued to be reduced in *Homo erectus* relative to earlier hominins but still greater than that observed in modern humans (McHenry & Coffing 2000), but recent evidence again suggests this is not the case (Antón 2012; Plavcan 2012). However, a certain level of cooperative breeding appears to be implied over the condition in non-*erectus* early *Homo* and a level of developmental plasticity similar to recent humans may be implied as well (Antón & Snodgrass 2012).

Cross-References

- ▶ Dmanisi Hominins and Archaeology
- ▶ Dubois, Eugène
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Handaxes and Biface Technology
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ Indonesia's World Heritage
- ▶ Movius Line
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ Peking Man
- ▶ Weidenreich, Franz
- ▶ West and Central Asia: Early *Homo* Fossil Records
- ▶ Zhoukoudian, Archaeology of

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Homo ergaster

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H

Introduction

Homo ergaster is a fossil hominin species often used to describe a subset of fossils within *Homo erectus*. Proponents generally allocate early African *Homo erectus* fossils dating from c. 1.8–1.4 Ma to *Homo ergaster*, mainly on the basis of smaller, more gracile crania and a lack of robust cranial suprastructures. In this schema, the geographic distribution of *Homo erectus* sensu stricto is restricted to Asian localities with a few examples (e.g., OH 9) of back migration into Africa. *Homo ergaster* includes the early African and Georgian specimens attributed by others to *H. erectus* and is therefore posited as the ancestor to *Homo erectus*, *Homo heidelbergensis*, and *Homo sapiens* (Wood 1994). However, considerable debate over the validity of the taxon exists, and there is growing support for the idea that the African and Asian specimens instead constitute a single, long-lived, polytypic species, *Homo erectus* (e.g., Rightmire 1990; Antón 2003, 2012).

Definition

Species History and Distribution

Current usage of the nomen *H. ergaster* as a descriptor for the early African subset of

H. erectus sensu lato differs from the original use of the name (Antón 2012). The type of the *Homo ergaster* nomen is the mandible, KNM-ER 992, from Koobi Fora, Kenya (Groves & Mazek 1975). The original paratypes included other remains often attributed to *H. erectus* (most notably KNM-ER 730 and 820). However, they did not include iconic African *H. erectus* crania KNM-ER 3733 or 3883 but did include the partial cranium KNM-ER 1805, which is universally otherwise allocated to non-erectus *Homo* (Wood 1991; Leakey et al. 2012). In contrast, in its current usage most of the additional fossils attributed to *Homo ergaster* are allocated elsewhere to *Homo erectus* (or *Homo* aff. *H. erectus;* Wood 1991). These include the key crania and partial crania from Koobi Fora (e.g., KNM-ER 3733 and 3883), Swartkrans, South Africa (SK 847), and Dmanisi, as well as the mostly complete juvenile skeleton from West Turkana (i.e., Nariokotome boy, KNM-WT 15000), but exclude other African specimens, most notably Olduvai Hominid 9 and Daka.

When so designated, *Homo ergaster* differs in several ways from non-erectus early *Homo* and *H. erectus* sensu stricto. *H. ergaster* shows an increase in average brain size relative to the specimens attributed to non-erectus early *Homo* (i.e., *Homo habilis/Homo rudolfensis*), as well as overall reduction in the size of the face and postcanine teeth. On the other hand, *Homo ergaster* has a somewhat smaller average capacity (~800 cc's; range 650–909 cc's; Antón 2003) than does *H. erectus* sensu stricto. And overall, the cranium is generally more gracile, and the cranial bones are thinner. As discussed below, however, these perceived differences are arguably related to allometric scaling across *H. erectus*. Additionally, *Homo ergaster* has been argued to lack pronounced cranial suprastructures such as a well-developed bregmatic eminence, sagittal keel, and angular or occipital torus seen in specimens from Indonesia and China, yet key African specimens such as KNM-ER 3733 and 3883 and the Dmanisi remains express several of these features (Rightmire 1990).

The relatively complete juvenile skeleton of KNM-WT 15000 demonstrates that some individuals were relatively large and may have possessed the long, linear body form associated with tropically adapted recent humans (Ruff & Walker 1993; Graves et al. 2010). However, there is a wide range of body sizes for *Homo ergaster*, including small-sized individuals from Dmanisi, Georgia. For a more complete discussion of postcranial morphology, body size, and range expansion, see the entry on *Homo erectus*.

Key Issues/Current Debates

The key issue for *H. ergaster* is whether the species exists or is a junior synonym of *H. erectus*. The taxonomic debate centers on how to partition the variation seen in a long-lived, globally dispersed fossil species. Several conditions make *Homo ergaster* a problematic taxon. The grounds for allocating the earliest African and Georgian specimens to *Homo ergaster* and the Asian remains to *H. erectus* are arguably both geographical and morphological. Several of the African specimens are more gracile than the Asian specimens, in particular possessing thinner cranial vault bones. However, differences in cranial vault thickness and supraorbital toral development have been shown to be the result of allometric scaling of vault thickness with brain size (Antón et al. 2007; Spoor et al. 2007). The purported differences between the African and Asian specimens in the presence of cranial superstructures (i.e., keeling, tori, eminences) also fails to separate the regions as a number of included African specimens (i.e., KNM-ER 3733, 3883, Ileret) express such superstructures (Spoor et al. 2007).

Even among researchers who advocate splitting the African and Asian material, debate exists over which fossils should be allocated to *Homo ergaster*. As mentioned above, the original designation of the taxon included a mixed paratype of non-erectus and *H. erectus* specimens from Koobi Fora. More common today is a loose use of the term to refer to all African *H. erectus* specimens as *H. ergaster*. However, this view cannot be supported given that many African specimens (e.g., OH 9, Daka) closely resemble the classical Asian *H. erectus* morphotype (Wood 1994;

Asfaw et al. 2002) yet cannot be separated from other African *H. erectus* on the basis of two- or three-dimensional metric analyses (Antón 2003; Spoor et al. 2007; Baab 2008) or non-metric analyses (Rightmire 1990; Antón 2003). Additionally, the inclusion in *H. ergaster* of historically earlier discoveries such as the OH 9 calvaria and the Tighennif (Ternifine) mandibles should give priority to the species for which these specimens serve as holotypes, *H. leakeyi* and *H. mauritanicus*, respectively (Arambourg 1954; Heberer 1963).

Cross-References

▶ Dmanisi Hominins and Archaeology
▶ *Homo erectus*

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Homo habilis

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Introduction

This new species name was given by Leakey, Tobias, and Napier (1964) to the parietal bones, mandible with dentition (Fig. 1), and hand bones of a juvenile hominid (OH7) that was excavated at site FLK NNI by Jonathon Leakey on 2 November 1960. It came from a horizon with many broken bones and stone tools of the Oldowan industry dating to 1.8 Ma ago.

From the size of the parietal bones, the child clearly had a brain considerably larger than that of either *Australopithecus* or *Paranthropus*. To Louis Leakey this was the confirmation of his long-held conviction that what he called "a true ancestor of *Homo sapiens*" would be found in the Lower

***Homo habilis*, Fig. 1** OH 7 type mandible of *Homo habilis*

Pleistocene. He had in 1932 proposed that the Kanam mandible fragment from Western Kenya represented such an ancestor. Then, in 1959 he convinced himself that the OH5 Zinjanthropus cranium (in reality a massive *Paranthropus*) represented the maker of the Oldowan industry and was in the direct line of our ancestry.

With the 1960 discovery of the large parietals and a mandible with smaller teeth than those of Zinjanthropus, Leakey relegated Zinjanthropus to a side branch of humanity and embraced the new fossil as the true ancestor of *Homo sapiens* and the maker of the associated Oldowan stone tools. Most of his colleagues were not so readily convinced. Even his collaborator Phillip Tobias, for 3 years after the discovery of the OH 7 fossil, considered that it could be a variant of Australopithecus. It was not until the finding of more Olduvai hominids (OH 13, 14, 15, and 16) coupled with his further analysis of the OH 7 fossil that Tobias agreed to join Leakey and hand expert John Napier in naming the new species as *Homo habilis*.

Definition

The name had been provided by Raymond Dart at the request of Tobias who was very familiar with Dart's facility with words. *Habilis* meant able, handy, and mentally skillful – an appropriate name for an early large-brained toolmaker.

Key Issues/Current Debates/Examples

Ironically while the additional fossils helped to sway Tobias into recognizing the reality of *Homo habilis*, it was those extra fossils that were to cause confusion and disagreement over exactly what fossils belong to *Homo habilis* and what it represented. While Tobias accepted OH 13 and OH 16 as members of the species, Leakey considered OH 16 to be distinct and called it a proto *pithecanthropine*. This was a reflection of their differing views on the path of Human evolution. Tobias saw *Homo habilis* as a stage between *Australopithecus* and *Homo erectus*, but Leakey did not accept *Australopithecus* as ancestral to *Homo* and did not accept *Homo erectus* as a stage between *habilis* and *sapiens*. His view was that *Homo* had a long separate ancestry alongside *Australopithecus* and that *Homo habilis* evolved directly into *Homo sapiens*. He saw *Homo erectus* as a side branch.

Much later, in 1968, a badly crushed cranium was found by Peter Nzube compacted into a concretion that had derived from lower Bed 1 at site DK, Olduvai Gorge. The almost unrecognizable hominid was cleaned out of the rock and reconstructed by Ron Clarke. It was immediately accepted by Louis and Mary Leakey, by Phillip Tobias, and currently by most of the palaeoanthropological community as *Homo habilis*. This fossil, known generally as "Twiggy" and with the catalogue number OH 24, was in the words of Tobias (1991) "so fine a specimen of *H. habilis*" that it was given the distinction of being the first-described specimen in his *Homo habilis* volume. OH 24 is often depicted as a classic representative of *Homo habilis*. This is unfortunate because it is actually remarkably similar in cranial morphology to South African *Australopithecus africanus* in the form of Sts 5. This has been discussed by Clarke (2012) who has intimate knowledge of the fossil and who states that it should be noted that Leakey et al. (1971)

found OH 24 and OH 13 to have morphological differences from the OH 7 type specimen as well as OH 16 and that they said one could not disregard the possibility of taxonomic variation.

OH 13 is one of the fossils assigned by Leakey, Tobias, and Napier as a paratype of *Homo habilis*. It was found in 1963 by Ndibo Mbuika at site MNK, Olduvai Gorge, and was eroding out of Bed II deposits. It consisted of a fragmentary occipitoparietal region with some temporal fragments and the maxilla and mandible with much of the dentition in place. This had been one of the fossils that helped to convince Tobias that the creation of a new species of *Homo* was justified. The teeth were relatively small with narrowing of the cheek teeth when compared to *Australopithecus*, and the form of the parietals was thought to be humanlike and similar to, though smaller than, OH 7.

Later, Tobias (1971) calculated endocranial capacity for OH 13 on a partial endocast made by Ron Clarke under his direction. Clarke also made comparable partial endocasts of OH 5 *Paranthropus* and Sts 5 *Australopithecus* both of which had complete endocranial volumes that were known. By making six water displacement volumetric measurements on the partial OH 13, OH 5, and Sts 5 endocasts and comparing them proportionally with the complete endocast volumes, Tobias calculated the endocranial volume of OH 13 at 640 cc and then worked out a projected adult volume of 660 cc.

As this was much larger than the 480 cc he gave for Sts 5 and the 530 cc he gave for OH 5, Tobias thought this confirmed the status of OH 13 as a member of the genus *Homo*. Such a method of calculating brain size is of course prone to much error, and this was well demonstrated when a complete cranium KNM ER 1813 virtually identical in dentition and cranial morphology to OH 13 produced a complete endocranial volume of only 510 cc (Holloway 2000). This is larger, but not much larger, than the 492 cc upper limit for *A. africanus* tabled by Tobias (1991: 708). As Sts 5 is the only complete, undistorted *A. africanus* brain case known, one should expect possible variation from that individual within other members of the species particularly if such members are from geologically younger sites and separated by great distance geographically.

The KNM ER 1813 cranium was found by Kimoya Kimeu at East Lake Turkana in 1973. It is dated at nearly 1.9 M years. Richard Leakey (1974) considered it to belong to *A. africanus* as did Walker (1981), Falk (1986), and Clarke (2012). From this it follows that the virtually identical OH 13 would also belong to *A. africanus* or to a young variant of that species. KNM ER 1813 was even named as a new species, *Homo microcranous* by Ferguson (1995).

The hand bones associated with the OH 7 mandible and parietals were found to show some features like those of humans which would have facilitated toolmaking. Subsequent finds of hand bones of *Australopithecus* including the complete hand of STW 573 from Sterkfontein have shown that such features indicating manual dexterity are not confined to *Homo* but were a general and primitive hominid character associated with probable tree climbing (Clarke 1999).

In 1972 on the east side of Lake Turkana, Bernard Ngeneo found a fossil that would bring new insights to the *Homo habilis* debate (Leakey 1973). Its catalogue number KNM ER 1470 provided its commonly used name of "1470 Man." It dates to 1.9 Ma ago and though reconstructed from many fragments is reasonably complete but lacking tooth crowns. It has a large cranial capacity of 752 cc (Holloway 2000), a prominent upper nasal skeleton, and a broad, flat lower face with widely flaring roots of cheek teeth and indications of relatively large anterior teeth. While Richard Leakey (1973) assigned 1470 to the genus *Homo*, Alan Walker who had worked on the fossil was inclined to view it as an *Australopithecus* in spite of its large cranial capacity (Walker 1981). Some researchers accepted 1470 as *Homo habilis*, while Bernard Wood (1992) who was very familiar with the Lake Turkana fossils accepted it as representing the new species *Homo rudolfensis*.

Some clarification eventually came in the form of a maxilla discovered by Rob Blumenschine and team in an excavation at Naisiusiu in lower Bed 1 of Olduvai Gorge in 1995. The maxilla was directly associated with butchered bones and

***Homo habilis*, Fig. 2** OH 65 maxilla of *Homo habilis*

***Homo habilis*, Fig. 3** KNM ER 1470 cranium (above), compared to OH 65 maxilla (below)

Oldowan stone tools. It was exposed in blocks of tuffaceous and calcareous silty sandstone which was cleaned from the specimen by R.J. Clarke and he then reconstructed the maxilla (Clarke 2012). He could see that it had strong resemblances to KNM ER 1470 (Blumenschine et al. 2003) but unlike that specimen it preserved a complete dentition in excellent condition (Fig. 2). It had the same broad, flat lower face (Fig. 3) and the same wide, flaring roots of the cheek teeth. The crowns of these teeth however were not correspondingly enlarged but were clearly those of *Homo* and not *Australopithecus* or *Paranthropus*.

It was further pointed out in Blumenschine et al. (2003) and in the OH 65 description by Clarke (2012) that the parietals 1470 matched in size and shape those of the OH 7 type specimen of *Homo habilis* and thus there is no justification for separating 1470 into a new taxon *Homo rudolfensis*. The fact that the OH 65 maxilla is so obviously that of *Homo* and that it closely matches 1470 reinforces the placement of 1470 as a cranium of *Homo habilis*. At the same time it adds weight to the argument that the very different maxilla and dentitions of OH 13, OH 24, OH 62, and KNM ER 1813 coupled with their much smaller brain sizes suggest they be removed from *Homo habilis* and allied to *A. africanus*. The type mandible of OH 7 *Homo habilis* has the kind of dentition and robustly structured corpus that one might expel to match the dentition and robustly structured lower face of 1470.

Olduvai hominid 16 found in lower Bed II Olduvai by Maiko Matumbo in 1963, after it had been smashed by cattle hooves, would probably have been a complete or nearly complete skull. Several differing reconstructions based on the cranial vault fragments were made by M. Leakey, P. Tobias and L. Distiller (Tobias 1971). One reconstruction included 107 fragments. However, none of these is conclusive and there remains the possibility that it originally had a much larger cranial capacity than the 633 cc calculated by Tobias on partial endocasts made by Clarke. Certainly from the dentition, OH 16 could fit with *Homo habilis* as represented by OH 7 and OH 65.

Another badly broken-up Olduvai fossil, a partial skeleton with maxilla, upper dentition, and cranial fragments (OH 62), was found in 1986 (Johanson et al. 1987). The first fragment (part of an ulna) was spotted by Tim White on the eroded surface of Bed 1 deposits close to the FIK Zinjanthropus site. More fragments were then picked up by Berhane Asfaw, Don Johanson,

and Gen Suwa and the ensuing careful sieving of the area produced much more.

The fossil was assigned to *Homo habilis*, but it is clear that it aligns with the smaller-brained forms that had been placed in that species rather than with the bigger-brained OH 7 and 1470. One of the oldest fossils attributed to *Homo* is the maxilla AL 666 (Kimbel et al. 1997) dated to 2.3 Ma ago from Hadar, Ethiopia. It has similarity to the OH 65 maxilla and could be an early *Homo habilis* representative.

Homo habilis of the 1470 kind also lived in South Africa. Clarke (1977) identified as early *Homo* a crushed child cranium, SK 27, from Swartkrans Cave that Broom and Robinson had classed as a large-brained *Paranthropus* with an aberrantly large canine (Fig. 4). Clarke showed that it was actually a cranium of early *Homo* with a normal sized large brain for that genus and a normal sized canine for early *Homo*, and he found similarities with 1470. He has now also compared the dentition with that of OH 65 and found them to be very similar in tooth sizes and morphology.

Also in South Africa, at Sterkfontein Caves there was excavated a cranium in 1976 that Alan Hughes and Phillip Tobias (1977) believed to be that of *Homo* largely because of its supposed association with stone tools. However, Ferguson (1989) showed that it did not differ from *A. africanus*. Kuman and Clarke (2000) showed that it actually came from a separate deposit without stone tools and that morphologically it matched *Australopithecus africanus*. Clarke (2008) has demonstrated that it is in reality the cranium of a male *Australopithecus africanus* very similar to the TM 1511 first adult *Australopithecus* found at Sterkfontein by Robert Broom in 1936.

A mandible from East Lake Turkana, KNM ER 1802, and another from Uraha in Malawi have been assigned to *Homo habilis* in some publications, and from their robusticity and dental size and morphology, they could belong in the same taxon as OH 7. It seems possible that *Homo habilis* spread from Africa to the Far East. The Meganthropus Sangiran 6 mandible from Java was shown by Tobias and von Koenigswald to have strong resemblances to OH 7, and there are, from cave sites in China, isolated teeth that are large in comparison to those of *Homo erectus*. There are also intriguing resemblances between some crania from Dmanisi in Georgia and the cranium of 1470.

***Homo habilis*, Fig. 4** SK 27 cranium of *Homo habilis* child

Cross-References

- ▶ Australopithecines
- ▶ Hominids, Earliest African
- ▶ *Homo erectus*
- ▶ *Paranthropus*

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Homo heidelbergensis

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Introduction

The species name *Homo heidelbergensis* was applied by Otto Schoetensack to a mandible recovered in 1907 at Mauer, near Heidelberg in Germany. Lying in fluvial sands deposited by the Neckar River, the human fossil was accompanied by animal bones indicating an early Middle Pleistocene age. In describing the well-preserved jaw (Fig. 1), Schoetensack (1908) commented on the lack of any bony chin but noted that the teeth are similar in form to those of recent humans. Many years later, F.C. Howell confirmed the presence of primitive features in the specimen while arguing that *H. heidelbergensis* could be distinguished from Asian and African representatives of *H. erectus*. Howell (1960) left open the relationship of the fossil to later Europeans, but *H. heidelbergensis* is now often regarded as ancestral to Neanderthals. It is generally accepted that the jaw from Mauer can be grouped with the mandibles and partial cranium from Arago Cave in France and the cranium from Petralona in Greece. If this grouping is expanded to include the Sima de los Huesos in Spain, then several additional skulls and numerous postcranial bones can be added to the species hypodigm. The Petralona and Arago specimens are also similar in many anatomical respects to crania from sites such as Broken Hill (Kabwe) in Zambia, Elandsfontein in South Africa, and Bodo from the Middle Awash of Ethiopia.

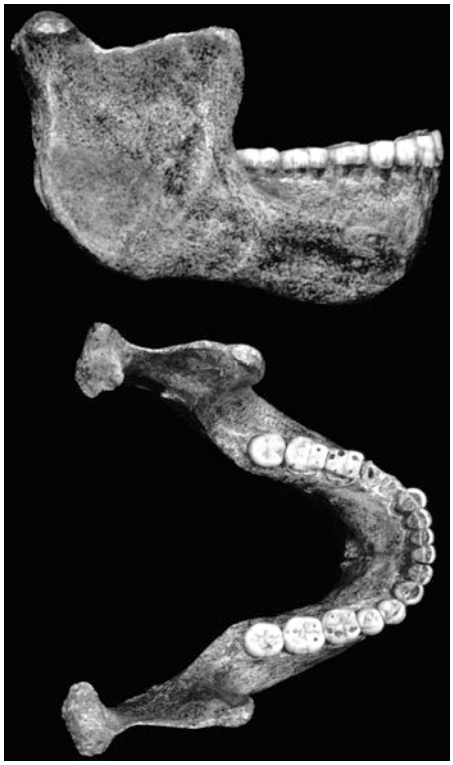

***Homo heidelbergensis*, Fig. 1** The Mauer mandible, considered by Schoetensack (1908) as the type specimen of *H. heidelbergensis*

Thus, it can be argued that *H. heidelbergensis* inhabited Africa as well as Europe. This species may be related not only to Neanderthals but also to modern humans.

Definition

Morphology and Evolutionary Significance of *H. heidelbergensis*

Homo heidelbergensis differs from *H. erectus* in brain size. Crania from Petralona, Arago, the Sima, Broken Hill, and Bodo have capacities of 1,100 cm^3 or greater (Holloway et al. 2004), and the average for this group is close to 1,230 cm^3. Height of the cranial vertex is increased in comparison to *H. erectus*. The frontal region is broader, the outline of the squamous temporal is high and arched as in recent humans, and there is more rounding of the back of the vault. The occipital upper scale substantially exceeds the nuchal plane in length. Morphology of the temporomandibular joint generally resembles that in *H. sapiens*, as is also the case for the tympanic and petrous portions of the temporal bone. In Petralona and other individuals referred to *H. heidelbergensis*, the supraorbital torus is partitioned into medial and lateral segments. Nevertheless, the torus remains very massive. The frontal profile is flattened as in *H. erectus*, and the vault appears less globular relative to that of recent people. There is no reduction in overall face size in relation to *H. erectus*, and the facial skeleton seems to be "hafted" to the braincase in such a way as to accentuate facial projection. Reorientation of the nasal aperture and forward placement of the incisive canal within the palate suggest that the face of *H. heidelbergensis* may be more nearly vertical than is true for *H. erectus* (Rightmire 2008). But only in anatomically modern humans is the face significantly shortened supero-inferiorly and repositioned so as to lie underneath the anterior cranial fossa (Lieberman et al. 2002; Pearson 2008). The mandibular symphysis is receding as in *H. erectus*, and an internal alveolar planum is developed. European jaws referred to *H. heidelbergensis* also display resemblances to Neanderthals (Mounier et al. 2009). Limb bones and a pelvis excavated from the Sima de los Huesos demonstrate that at least some (male?) individuals were tall and robust (Arsuaga et al. 1999), while overall size differences assumed to reflect sexual dimorphism are comparable to those expressed in recent populations.

The place of *H. heidelbergensis* in the human family tree has been the subject of controversy. Dating of the Mauer sands and the mammal teeth contained in these deposits indicates an age of 609,000 years (Wagner et al. 2010). The Mauer mandible is thus one of the oldest fossils from Europe and comparable in age to material from Bodo in Africa. It is likely that populations differing from *H. erectus* evolved very early in the Middle Pleistocene. Just where this speciation event occurred cannot be determined from the evidence available. Whatever the locus, "new" populations must have dispersed quickly through Africa and western Eurasia, and perhaps also into

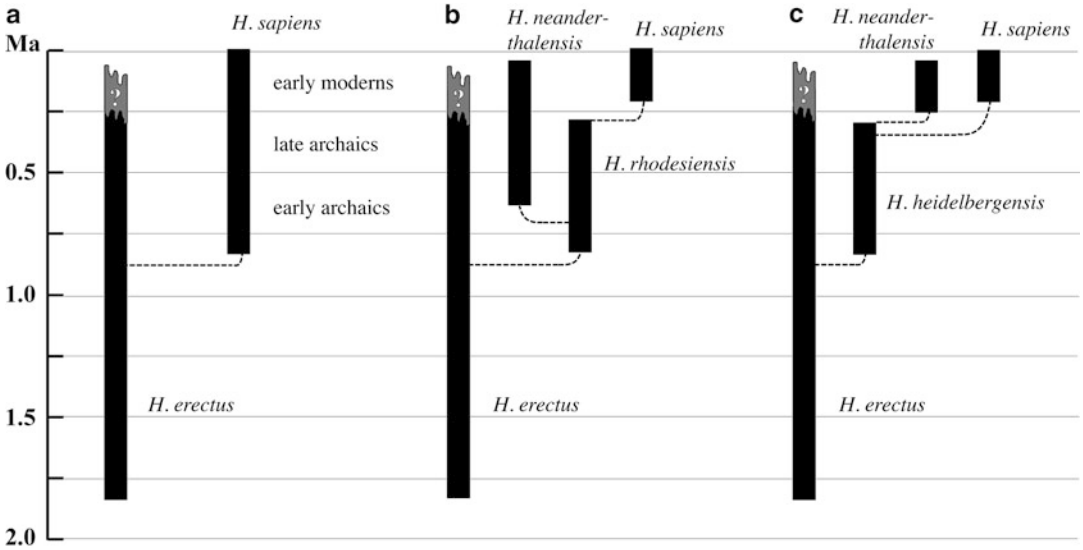

***Homo heidelbergensis*, Fig. 2** Alternative evolutionary trees showing the relationships of *H. erectus* to Middle Pleistocene hominins, Neanderthals, and recent humans. *Solid bars* depict the duration (first appearance date and last appearance date) estimated for each species. *Broken lines* indicate likely links of ancestors with descendants. In scenario (**a**), mid-Pleistocene and later populations are grouped into a series of grades within a broad *H. sapiens* category. In a second tree (**b**), there are two lineages in addition to *H. erectus* and recent humans. A European branch comprising the Neanderthals can be traced far back into the Middle Pleistocene. Proponents of this view claim that even the oldest European hominins share apomorphies with *H. neanderthalensis* and can be distinguished from a second lineage that is rooted in Africa. The latter is recognized as *H. rhodesiensis*. A third perspective (**c**) holds that morphological differences among the most ancient European and African specimens are minor and can be attributed to geography and intragroup variation. If the Mauer mandible is included within such a broadly construed hypodigm, then the appropriate name for this species is *H. heidelbergensis*

southern Asia. Several evolutionary scenarios have been advanced, and each suggests a different taxonomic interpretation. Bräuer (2008) has grouped Middle and later Pleistocene populations into a series of more archaic and more modern grades within a broad *H. sapiens* category (Fig. 2a). Each grade is defined by advances in brain size and skull form. Although changes to the vault and face accumulate in a mosaic pattern, early and late groups follow one another seamlessly, as segments of a single evolving lineage. Bräuer's scheme recognizing only one species in the later Pleistocene has generally given way to hypotheses emphasizing cladogenesis within *Homo*. Tattersall and Schwartz (2008) and Schwartz and Tattersall (2010) regard living humans as a unique morphological entity, easily separable from most fossil hominins. In their view, *H. sapiens* possesses a package of derived cranial and mandibular features, and individuals that do not share this morphology can confidently be excluded from our species. Thus, multiple distinct taxa should be recognized, and speciation must have occurred repeatedly throughout the Pleistocene. In one such scenario, there are two lineages in addition to *H. erectus* and recent humans (Fig. 2b). A European branch comprising the Neanderthals can be traced back via Petralona, Arago, Sima de los Huesos, and Mauer deeply into the Middle Pleistocene. Proponents of this view (Arsuaga et al. 1997; Hublin 2009) claim that even the oldest European fossils share apomorphies with *H. neanderthalensis* and can reasonably be attributed to this species. A second lineage is rooted in Africa. Specimens including Broken Hill, Elandsfontein, and Bodo are referred to *H. rhodesiensis*, following the nomenclature proposed by Woodward (1921). Some (chronologically late) members of this group exhibit morphology that is archaic, coupled with characters

suggestive of a link to anatomically modern humans. Another perspective (Fig. 2c) holds that morphological differences among the most ancient European and African fossils are minor and can be attributed to geography and intragroup variation (Rightmire 2008; Mounier et al. 2009; Stringer 2012). It is argued that all of the hominins should be placed together in one geographically dispersed taxon. The appropriate name for this species is *H. heidelbergensis*.

In summary, the Mauer mandible can be regarded as belonging either to a lineage restricted to Eurasia or to a larger population including representatives from Africa. If the latter, more comprehensive hypodigm is accepted for *H. heidelbergensis*, then this species may be the ancestor to both Neanderthals and anatomically modern *H. sapiens*. Which of these scenarios is to be preferred will be determined by the strength of morphometric similarities linking the European and African remains. The very complete Petralona cranium, for example, is demonstrably like Broken Hill in overall form of the braincase, proportions and massive construction of the upper face and cheek, orientation of the infraorbital region, and several measures of facial projection (Rightmire 2001; Harvati et al. 2010). Such findings support the hypothesis that *H. heidelbergensis* was a widespread (polytypic) species. Later in the Middle Pleistocene, some populations of *H. heidelbergensis* must have moved northward within Europe, where they were subjected repeatedly to episodes of extreme cold. During glacial advances and retreats occurring over several hundred thousand years, these hominins continued to adapt to harsh (cold/dry) conditions. In addition, random drift would have influenced the genetic make up of small or isolated groups. Eventually, such populations evolved the specialized craniofacial characters and (unique) body build of the Neanderthals. During this same time period, other representatives of *H. heidelbergensis* in Africa were becoming more like modern humans. Fossils from Irhoud in Morocco, the Omo KHS locality in southern Ethiopia, Herto in the Middle Awash region, and Laetoli in Tanzania document this evolutionary progression toward *H. sapiens*.

Current Debates

A differing interpretation arises from ongoing analyses of the discoveries at the Sima de los Huesos. It has been established that the Sima skulls exhibit traits expected to occur (very) early in the evolution of the Neanderthal lineage. As described by Arsuaga et al. (1997), the midface of SH 5 seems to anticipate the distinctive morphology associated with Neanderthals. The infraorbital surface and the side wall of the nose meet at a shallow angle, so as to produce a slight concavity. The cheek region is thus not "inflated" in the extreme manner of Neanderthals, but it can be interpreted as intermediate in form. Also in the Sima sample, continuity of the supraorbital tori at glabella is said to be reminiscent of Neanderthals, and the broad nasal bones are set in a relatively horizontal orientation. At the rear of the cranium, the suprainiac area is large but not very depressed. This trait, and the shape of the occipital torus, may also foreshadow the Neanderthal condition.

Recently, it has been emphasized that the Sima de los Huesos teeth are remarkably like those of "typical" Neanderthals (Martinón-Torres et al. 2012). The upper incisors display conspicuous labial convexity and a distinctive shovel shape, while the upper premolars present a bulging of the buccal aspect of the crown. The M^1s possess an enlarged hypocone, giving the crown a rhomboidal outline characteristic of Neanderthals. The P_3s have a symmetrical contour. Here, the talonid is reduced or absent, so that the remaining cusps occupy a small area near the lingual border of the crown. This Neanderthal-like morphology is more pronounced in the Sima sample than in other Middle Pleistocene hominins. Indeed, Martinón-Torres et al. (2012) claim that the Sima specimens are "more Neanderthal" in form than the Mauer or the Arago dentitions. They suggest that the Sima may constitute a source population for Neanderthals, while Mauer and Arago document the presence of a morphologically distinct lineage. Such a conclusion is favored by Stringer (2012), who envisions two species coexisting in the European Middle Pleistocene. The second species

(*H. heidelbergensis*) includes fossils presumed to predate the evolutionary emergence of *H. neanderthalensis*, as well as specimens such as Petralona from later time periods.

Future Directions

Our understanding of human evolution in the Middle Pleistocene remains incomplete. It is likely that additional clues will emerge, as new methods of analysis are applied to the fossils. Also, genomic data are continuing to accumulate, as more detailed DNA sequences are teased from ancient bones and teeth. Already, there are tantalizing indications that a group of archaic hominins related to but genetically distinct from Neanderthals was living in Siberia, several hundred thousand years ago. These "Denisovans" contributed genes to modern Australasian populations (Reich et al. 2010). Integrating the findings from DNA with inferences drawn from the fossil record presents a challenge. Nevertheless, the existence of Denisovans in the Far East can be accommodated by the view that *H. heidelbergensis* was dispersed across Eurasia and into Africa. This morphologically primitive species remains a good candidate for the last common ancestor to both the Neanderthal lineage and modern humans.

Cross-References

- ▶ Europe: Early *Homo* Fossil Records
- ▶ *Homo erectus*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ West and Central Asia: Early *Homo* Fossil Records

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Homo neanderthalensis

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Introduction

In August 1856, a group of quarry workers exploring the Feldhof caves in the Neanderthal (Neander Valley), Germany, discovered a collection of bones, buried in mud, which they initially assumed to be bear bones. Being quarry workers, and not archaeologists, and believing the bones to be simply animal remains, the men's excavation techniques were far from delicate, and even with encouragement from the quarry owners to recover more bones, only a small number were found – including parts of the arms and legs, ribs, pelvis, and skullcap, many of these fractured (Jordan 1999: 3). Despite the initial identification as nonhuman, the collection of bones was handed over to grammar school teacher, and Elberfield naturalist's society president, Johann Carl Fuhlrott for further study. Fuhlrott quickly established that the finds were not bear remains but those of an ancient human and in 1857 sent a cast of the cranium to anatomist Hermann Schaaffhausen of Bonn University (Jordan 1999: 11). After further study of all the recovered bones, Schaaffhausen meticulously described the first scientifically recognized Neanderthal, clearly stating his belief that the unusual skull morphology, particularly the pronounced brow ridges, was not due to injury or disease, but an indication of the discovery of a new species of human. Despite some initial controversy, with several academics claiming the remains belonged to a disfigured and crippled man of various, much more recent, origins, the Neanderthal specimen was finally, and reluctantly, recognized as new, unique species in 1864 and named *Homo neanderthalensis* by William King, Professor of Geology at Queen's College, Galway (Reader 1988: 11). Much of the reluctance to accept the "Neanderthal Man" for what he was came from the lack of facial bones and teeth which would have more firmly identified him as a human ancestor, or as it now appears, a human "cousin" – the product of another branch of human development from our own. It was not long before the required evidence appeared however, with the reemergence of a female specimen found in Gibraltar sometime around 1948 (this "Gibraltar Woman," who's discovery predated "Neanderthal Man's" by approximately 8 years, was actually at least the second Neanderthal discovered and not recognized for what it was; a child's skullcap had been found at Engis in Belgium in 1830 (Jordan 1999: 8-10)) and the discovery of several more individuals in Belgium and France (Reader 1988: 13). Today, *Homo neanderthalensis* has been discovered across Europe and the Middle East, and it has been widely accepted that the "Neanderthal Man" and all the other specimens uncovered belong to their own, unique species. Current debate and research now focuses on whether Neanderthals are genetically related to modern humans, how intelligent they may have been (early descriptions painted them as primitive, brutish creatures, a view which is slowly shifting), how they communicated, whether they possessed any artistic traditions, how they lived, and also how they died.

Definition

Homo neanderthalensis is generally considered to be a separate species of human to *Homo sapiens*, although some scholars argue for a subspecies classification of *Homo sapiens*

neanderthalensis (Tattersall & Schwartz 1999: 7117). Neanderthals (also spelled Neandertals without the "h" so as to more clearly represent the German pronunciation), as they are commonly known, likely separated from *Homo sapiens sapiens*, whether on a species or subspecies level, around half a million years ago, becoming geographically isolated, *H. neanderthalensis* developing in Eurasia while *H. sapiens* evolved in Africa (Finlayson 2009:viii). *Homo neanderthalensis* likely became extinct around 30,000 years ago. Recent revision of radiocarbon dates for the Vindija Neanderthals (found in Croatia), some of the youngest known, now place these specimens at approximately 32,000–33,000 ^{14}C years ago (Higham et al. 2006: 553). No Neanderthal fossils dating from later than 30,000 years before present have yet been found, although evidence of fire, butchered animals, and Neanderthal tools have been discovered at Gorham's Cave, in the Rock of Gibraltar dating to 24,000–28,000 years ago, possible evidence of the last of an entire species (Finlayson 2009: 144).

Key Issues/Current Debates/Future Directions/Examples

The Morphology of *Homo neanderthalensis*

The four hundred or so Neanderthal individuals found to date reveal a considerable diversity in morphology, with features varying over geography and time. However, most individuals do show traits relating to the classic Neanderthal type: robust and heavily built with slightly bowed, and proportionally short, limbs; barrel chested, with thick ribs; and broad feet and strong hands with thick, rounded fingers and long thumbs (Jordan 1999: 49-50). However, these postcranial traits can still be seen in some cultures today, especially in Eskimos and other groups who live in cold climates – robustness and shorter limbs are evolutionary adaptations designed to preserve heat – and none of the "typical Neanderthal features" on their own are beyond what could be found in modern humans. Therefore, it is the combination of a number of postcranial and cranial features that help define the species. It is the skulls of Neanderthals that show the distinctive features most people now associate with *H. neanderthalensis* and those which most differ from our own. The "typical" Neanderthal had a large, thrust forward jaw with big teeth, small or almost nonexistent chin, broad nose, swept back cheek bones, and large pronounced brow ridges over the eyes. His or her skull would also have been longer and flatter than ours with a bun-shaped protuberance at the back (Jordan 1999: 52-54). The Neanderthal skull most likely housed a different shaped and larger brain than the average modern human's (Holloway 1985: 320), ranging from 1,200 to 1,740 ml (with a male average of 1,600 ml and a female average of 1,300 ml) (Jordan 1999: 52). Sexual dimorphism between Neanderthals is represented in both brain size and height (with males standing at around 164–168 cm and females at 152–156 cm (Helmuth 1998: 1)), but *H. neanderthalensis* men and women display a similar pelvis shape (unlike modern humans where male and female pelvises can appear quite different), although the Neanderthal female birth canal is no bigger than a modern woman's (Jordan 1999: 51). Dental growth patterns in Neanderthal children suggest that they developed much faster than *H. sapiens* children although they may have been no bigger at birth (Rozzi & de Castro 2004: 936).

Habitat, Range, and Diet

Although it is theorized that *Homo neanderthalensis* may have diverged from a modern human ancestor as much as half a million years ago, much of the fossil evidence for Neanderthals comes from much later. Most Neanderthal remains have been dated to the time of the last glacial period (around 110,000–10,000 years ago), possibly because shifting glaciers during this period may have destroyed many earlier sites, and it is these individuals that show the most typical Neanderthal features – as discussed above. This is not to say, however, that there is not a range of fossil evidence from prior to this period, but rather that those specimens, while still *H. neanderthalensis*, are of a more generalized

type (Jordan 1999: 65). Nevertheless, a picture is painted, in most people's minds, of Neanderthals living in a cold, unforgiving climate in which much of their world was covered in towering glaciers. It is true that many would have lived in an icy Western Europe, but the Neanderthal range was not restricted to glacial areas. In fact evidence has been found of Neanderthals all across Europe and into Central Asia, as far south as the Levant (Jordan 1999: 65), and more recently as far east as Uzbekistan and the Altai region of southern Siberia (Krause et al. 2007: 1). Obviously not all of these places were under ice and snow, but they were impacted by the glacial period – their climates were different from today, some hotter, some colder, and some much drier; their coastlines were different – with much of the ocean bound up in ice sheets, the global sea level was lower, and their flora and fauna was also very different. How Neanderthals exploited this flora and fauna is widely debated. One view of Neanderthals, the one generally most accepted, is of carnivorous apex predators who effectively and selectively hunted a range of animals based on seasonality, the animal's availability, and the hunter's skill (Patou-Mathis 2000: 389). However, some researchers have argued that scavenging and the opportunistic killing of small prey was the Neanderthals most likely subsistence strategy (Henry 2003: 6). In reality, *H. neanderthalensis* probably employed a mix of both selective hunting and the scavenging of recently dead larger animals (Patou-Mathis 2000: 393) as well as the gathering and cooking of plant foods (Henry et al. 2010).

Tools, Art, and Language

Homo neanderthalensis is most commonly associated with the Mousterian culture, a style of stone tools named for the type site of Le Moustier, France (although there are other traditions also linked to Neanderthals such as the Chatelperronian). All Mousterian sites in Eurasia, dating from between 120,000 and 24,000 years ago, which also contain human fossils have been exclusively linked to Neanderthals (Finlayson 2009: 128), and it is the presence of Mousterian tools at Gorham's Cave, Gibraltar, which help define it as one of the, if not the last, sites ever occupied by Neanderthals. The Neanderthals employed a full stone toolkit including points, scrapers, hand axes, grindstones, and backed knives which were used for butchery, food preparation, and other everyday uses. Some of these tools were hafted and show breakage that is linked with use as projectile points, and a large number show wear consistent with woodworking (Jordan 1999: 84). Wood, generally, does not survive well in archaeological sites, and so it is Neanderthal tools alongside their bones and the remains of their prey which have been used to define their culture. Neanderthal art is practically nonexistent. Unlike their archaic *H. sapiens* contemporaries and successors, Neanderthals did not appear to indulge in elaborate cave painting, nor did they construct statues or figurines. There is some evidence of possibly intentional bone engraving and a few pierced shells and animal teeth have been found associated with Chatelperronian sites (Jordan 1999: 110-111, 213) (which date from around 45,000 to 36,500 years ago (Finlayson 2009: 129), right at the end of the Neanderthal period), but that is about the extent of Neanderthal "art" represented in the archaeological record. It may be, however, that *H. neanderthalensis* expressed his or herself through body painting or the dying of clothes as fragments of iron oxide and manganese dioxide as well as possible ochre grinding stones have been discovered at Neanderthal sites (Jordan 1999: 110). A perceived lack of creative and artistic output by Neanderthals has led people to question how they communicated and whether they had language. Study of *H. neanderthalensis*' skull, jaw, neck, and hyoid suggests that they were capable of speech, if not able to pronounce the full range of sounds that modern humans can (Jordan 1999: 57). It is unknown, however, what form their language, if they had one, took; if they were able to speak in different tenses or with any form of grammar; and whether they possessed the ability to think and express abstract thoughts and feelings and communicate beyond the there and then.

Extinction

Somewhere around 30,000 years ago Neanderthals begin to disappear from the fossil record.

Current evidence suggests that the last remaining group of true *Homo neanderthalensis* perished in Gibraltar 24,000–28,000 years ago, but it is, as yet, not definitively proven how or why. Various theories exist as to why Neanderthals suddenly vanished from the archaeological record. Some researchers suggest that *Homo sapiens*, who likely entered Europe around 40,000 years ago and coexisted with Neanderthals for some time, are to blame, either wiping out the Neanderthals through conflict or, less consciously, through the introduction of new parasites or diseases or via competitive exclusion (Banks et al. 2008) where slight advantages on the part of *H. sapiens* allowed them to out-compete Neanderthals for vital resources. The changing climate has also been blamed for Neanderthal extinction – the time they vanish from the archaeological record coincides with the approach of the last glacial maximum, which altered the climate, and ecology, of Europe. It has been suggested that *H. neanderthalensis* simply was not prepared for this change and could not adapt to it as the culturally and technologically superior *H. sapiens* could – Neanderthal hunting and subsistence strategies, living arrangements, and even clothing (Gilligan 2007) may just not have been suitable for the cooling climate. The last major argument for the extinction of the Neanderthals was that they did not go extinct at all but rather interbred with *Homo sapiens*, producing hybrids and passing on genes that remain with us today. Recent genetic evidence suggests that around 2–3 % of the genome of modern non-Africans may be attributable to *H. sapiens*/*H. neanderthalensis* interbreeding (Currat & Excoffier 2011: 15129). This suggests either a low level of interbreeding with a high level of avoidance between the species and/or that the resulting hybrids were evolutionary unfit and mostly unable to successfully pass on their hybridized genes. Either way, it is possible that Neanderthals did not simply "die off" but rather integrated with *H. sapiens*, passed on their genes, albeit probably not very successfully, and still exist in some small way within the DNA of modern non-Africans. Without further archaeological and genetic research, it is impossible to know exactly what happened to *Homo neanderthalensis*. Each theory has its proponents and each has been argued extensively in the literature; at this point a combination of factors may be the most likely cause for the extinction of the Neanderthals.

Cross-References

- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ *Homo sapiens*
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries

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Homo sapiens

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Introduction

Homo sapiens, is the species commonly referred to as humans. The species originated in Africa around 200,000 years ago and is the only living representative of the genus *Homo*. Humans have a gracile body build compared to earlier members of the genus *Homo*. All humans have a chin and a large brain that is highly developed. This brain allowed for the evolution of behavioral modernity and for continuous social and technological innovations to take place that allow *Homo sapiens* to survive in all habitats.

Definition

Homo sapiens (Linnaeus 1758). Species to which all living modern humans belong. While fossils closely resembling living humans are often referred to as "anatomically modern *Homo sapiens*", earlier members of the lineage are sometimes termed "archaic *Homo sapiens*".

Key Issues/Current Debates/Future Directions/Examples

Morphology

Homo sapiens around the world share a number of derived characteristics (Lieberman 2008). These features were not present in previous hominins and include a rounded skull with a high forehead. Also, the browridges are reduced. The face is small, tucked under the forehead, and characterized by the presence of a mental protuberance, or a forward projecting chin. The anterior teeth are small, indicating that they were less used as tools and that food was alternatively softened by processing such as grinding and cooking. The brain has a mean cranial capacity of about 1350cc. This value is comparable with that of *Homo neanderthalensis* but is larger, relative to body size. The postcranial skeleton of *Homo sapiens* is more gracile than that of previous hominins. The earliest humans were more robustly built than people today because of their high level of daily activities, but in general, there was a tendency even in early *Homo sapiens* to have thinner walled long bones and more lightly built hands and feet. The scapula (shoulder blade) is less muscular and the pelvis is less robust, with a shorter pubic area. The skeletons of the earliest modern humans displayed long limbs and short trunks, reflecting

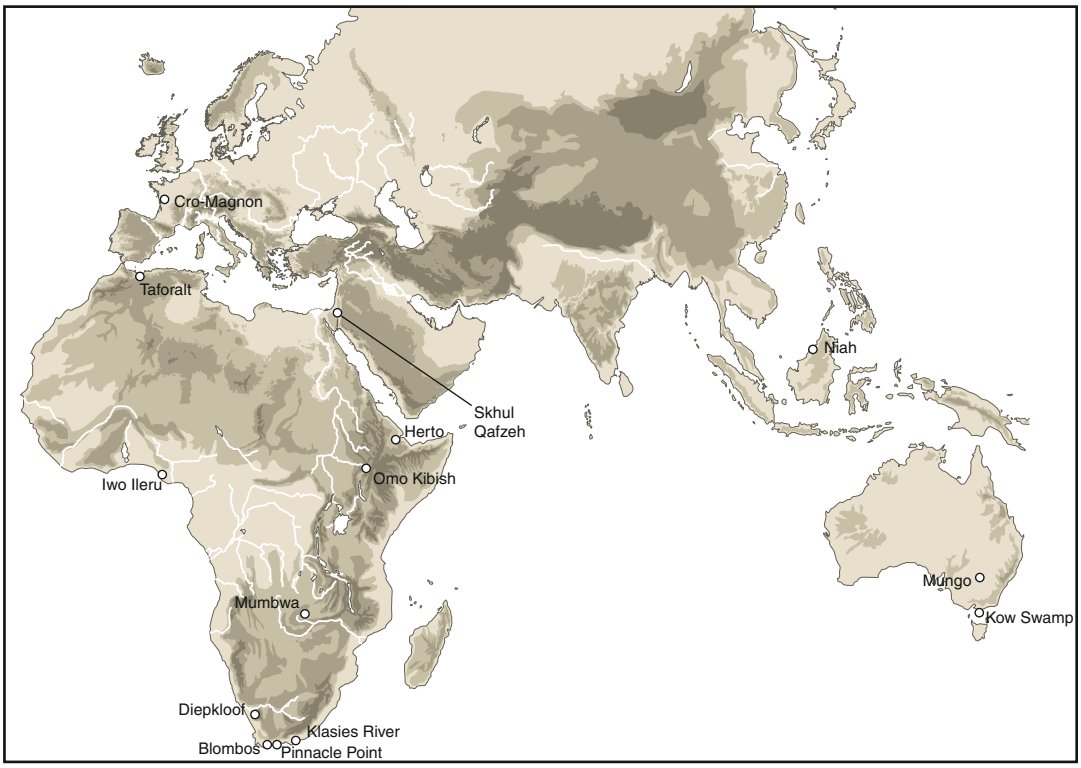

***Homo sapiens*, Fig. 1** Map showing some key *Homo sapiens* sites mentioned in the text (Credits: Silvia Bello)

the warm African climate in which they evolved (Holliday 1997). More recent humans show adaptation to the environment in which they live.

Key Fossils

The first widely accepted ancient *Homo sapiens* fossils were discovered in the Cro-Magnon rockshelter in Les-Eyzies-de-Tayac, France (Fig. 1). The human remains at the site represented at least five people. The associated fauna and Upper Paleolithic archaeology confirmed that these fossils were very ancient. The site gave its name to European early modern humans in the Old Stone Age: the Cro-Magnon people. Not long after this discovery, more sites were uncovered across Europe, showing that humans had occupied Europe from at least 35,000 years ago, while recent re-dating of specimens from Italy and the UK indicates that they may have been present in Europe as early as 45,000 years ago (Benazzi et al. 2011; Higham et al. 2011).

The African continent has yielded the oldest *Homo sapiens* skeletons that include modern human-derived characteristics. The most securely dated of these are two partial skulls from Herto, in Ethiopia's Middle Awash River Valley. They date to between 160,000 and 154,000 years and show a humanlike cranial capacity, a tall forehead and rounded braincase of the skull, with a small, non-projecting face. There is earlier evidence from Omo Kibish (Fleagle et al. 2008) at 195,000 years, and this includes two partial skulls and some postcranial material. The first skull Omo 1 shows the most modern features, but Omo 2 is much more archaic, and additional newly excavated fossils have also displayed this mixed morphology (Fig. 2).

Life History

Modern humans have distinctive growth and development patterns. These are different from those of our living primate relatives. Through the study of perikymata in teeth (incremental growth lines),

***Homo sapiens*,**
Fig. 2 Omo 1 (*right*) and Omo 2 (*left*) showing modern and more mixed features respectively indicating the mosaic nature of the first *Homo sapiens* (Credits: Michael Day. Digital editing: Charley Coleman)

it became clear that modern humans grow up slower than do our living primate and fossil hominin relatives. This slow growth is due to a long period of childhood growth and dependency. The extended childhood allows children to develop linguistic and other complex cultural skills that other primates do not have and, arguably, skills that earlier fossil hominins did not possess (Smith et al. 2010). In addition to extended childhood, modern humans often live post-reproductively, indicating that the elderly in society still have a crucial role to play. This extended lifespan has been suggested to be linked to the importance of intergenerational transfer of cultural information. Even though older members of the population no longer play an active role in reproduction and hunting, they can collect resources more locally and provide knowledge and skill to the younger generations.

Genetics

Before the development of genetics, *Homo sapiens* was distinguished from earlier hominins primarily using morphology. Fossils and associated archaeology were the only sources of evidence to uncover the evolutionary past of humans. Advances in molecular genetics now not only allow scientists to look at how humans differ genetically from other living primates, but ancient DNA (aDNA) analysis of fossil material and genetic patterning in modern humans elucidate the origins and diversification of *Homo sapiens*.

Initially, analysis of modern human and chimpanzee DNA was compared (The Chimpanzee Sequencing and Analysis Consortium 2005) and found to differ in around 1.06 % of the nucleotides. Insertions and deletions in parts of the DNA account for another 3 % of the difference between the genomes. Nevertheless, phenotypically, there is a big difference between chimpanzees and humans, and this is because of the different ways in which similar genes express themselves in humans and in chimpanzees. This demonstrates clearly that the number of mutations in protein coding genes is not necessarily proportional to the phenotypic expression.

Recent developments in the successful extraction of DNA from fossil hominins have created a whole new area of research on ancient DNA. Several Neanderthal mitochondrial and nuclear DNA sequences, as well as Denisovan DNA, are currently being compared and are helping palaeoanthropologists to determine what makes *Homo sapiens* genetically, and thus, physically. As geneticists further unravel the genome of humans and living primates and study the phenotypic expression of individual genes, it will be possible to reconstruct phenotypic differences between earlier hominins and *Homo sapiens* more accurately than is possible from the fossil and archaeological record alone.

Modern Human Behavior

For over a million years, *Homo erectus* and the subsequent species *Homo heidelbergensis* used

Acheulean tools through most of western Eurasia and Africa. These tools proved advanced enough to allow the survival of the hominins using them over a wide range of habitats. With more complex technology and specialized tools, *Homo sapiens* has gradually been able to adapt to an even wider range of environments. In addition, *Homo sapiens* also show a range of other behaviors not seen in other living and fossil species: elaborate symbolic, artistic, and religious behaviors as well as advanced problem solving. These are the result of our cognitive abilities and our cumulative and complex learning strategies.

Until fairly recently, many workers believed that modern human behavior had evolved rapidly in Europe some thousands of years after anatomically modern humans had originated in Africa. Anthropologists believed the presence of cave paintings in Europe, the use of symbolism, the diversification of hunting techniques and technology, the inclusion of aquatic resources in the diet, and a wider use of raw materials provided the essentials for behavioral modernity. Recent discoveries and a more comprehensive interpretation of what makes up modern behavior have now shown that human behavioral modernity did not evolve suddenly in Europe. Instead, it accumulated more episodically in Africa during the Middle Stone Age and reached the essentials of modernity before modern humans spread out of Africa around 60,000 years ago (McBrearty & Brooks 2000).

Some of the earliest potential evidence for modern behavior comes from sediments dated to about 164,000 years at the Pinnacle Point caves, South Africa, in the form of stone bladelets, ground red pigment, and the cooked remains of shells such as mussels and abalone (Gibbons 2007). Other evidence for the use of aquatic resources comes from Katanda (Congo) where bone harpoons were found and the remains of catfish dating back to about 90,000 years (McBrearty & Brooks 2000). Also at Blombos Cave in South Africa, bone points have been found, with evidence for pressure flaking in the Middle Stone Age Still Bay industry, well before these are widespread across Europe. Composite tools were also included in tool assemblages during the Middle Stone Age in Sudan, and there is clear evidence that raw materials were transported over extended distances. At Mumbwa Cave in Zambia, there is early evidence for the construction of shelters, and many sites have yielded remnants of hearths.

There is also evidence for decorative non-utilitarian objects in the form of *Nassarius* shell beads, with the oldest currently documented at Skhul and Qafzeh Caves in Israel, and Taforalt Cave in Morocco, at about 100,000 years. The shells are perforated in the same way, and some show signs of ochre treatment. These are also known from sites such as Blombos Cave in South Africa at a somewhat later date. Ostrich egg shell beads are a little younger than shell beads but are evident before *Homo sapiens* left Africa about 60,000 years ago. Red ochre use seems widespread from at least 150,000 years ago, with ochre applied to artifacts, and engraved pieces dating back to about 100, 000 years. In 2011 (Henshilwood et al. 2011), what appear to be red ochre paint kits from Blombos Cave were published, also dating to about 100,000 years ago. Evidence of the first ritual burials is known from about 110,000 years ago at Skhul and Qafzeh Caves in Israel. However, so far, there is only disputed evidence for figurative art older than about 45,000 years ago, as modern humans spread from Africa into the rest of the world.

The slow accumulation of modern human behavior in Africa despite clear evidence for anatomical modernity around 195,000 years ago can be explained by the gradual technical advances during the Middle Stone Age that slowly gave rise to larger and more networked populations. Increased group size would have facilitated the spread and growth of technological innovations, and extended social networks would have positively affected food acquisition efficiency, leading in turn to surpluses, role specialization, increased symbolic and linguistic expression, and ritual activity. Although some authors (Klein 2009) argue that these changes were associated with possible brain mutations, we see similar rapid accelerations in cultural and technological advances without these mutations throughout human history (e.g., the Neolithic and Industrial Revolutions).

Cross-References

- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Europe: Early *Homo* Fossil Records
- ▶ Fossil Records of Early Modern Humans
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Molecular Timescale
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Honey Bee: Management

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Basic Species Information

The relationship between humans and honeybees (genus *Apis*) spans centuries (Crane 1983). Honeybees consist of between 10 and 12 extant species predominantly located in Asia (Ruttner 1988). *A. mellifera*, the European honeybee, is the most well-known and intensively managed bee. Fossil evidence suggests that honeybees originated between 30 Ma and 20 Ma ago (Engel 1998). It is likely that *Homo sapiens* learned to hunt honey from wild bee colonies

early on in human evolution, given the ubiquity of honeybees in Africa, Asia, and Southern Europe. Some of the earliest evidence of honey hunting – the process of destructively acquiring honey from wild colonies – was depicted in cave paintings in Eastern Spain, between 8000 BCE and 2000 BCE (Crane 1983). There is extensive evidence of honey hunting in Africa from numerous depictions in rock paintings, but such paintings are difficult to date reliably (Crane 1983).

Beekeeping – the propagation of honeybee colonies by humans – is a more recent practice and evidence of it can be found in scenic depictions from Ancient Egypt around 2400 BCE (Crane 1983). Outside of pictorial representation, the oldest discovered apiary is from Tel Rehov about 3,000 years ago and suggests beekeepers were already importing bees and managing large commercial apiaries (Bloch et al. 2010). Collecting and storing colonies in pots rendered inspecting a colony and extracting honey in an noninvasive manner very difficult (Crane 1983). With the ability to selectively remove honeycomb on pieces of wooden frames, beekeepers were able to nondestructively harvest honey and see the inner workings of the hive (Kritsky 2010). The first instance of moveable frames came from Greece in 1682 and these would be the predecessors of today's modern Langstroth hive, which was invented in 1852 (Crane 1983; Kritsky 2010). The Langstroth hive allowed beekeepers full access and control of honeybee colonies and spurred the development of commercial beekeeping around the globe (Crane 1983; Kritsky 2010).

The biogeographic and evolutionary history of the European honeybee is – like humans – both complex and intriguing. There are four recognized ancient evolutionary lineages in Africa, Asia, Western Europe, and Eastern Europe, and each group contains a number of subspecies characterized by distinct morphology and behavior (Ruttner 1988). *A. mellifera* is not native to the New World (Ruttner 1988; Sheppard 1989). European settlers introduced honeybees to the new world as early as the seventeenth century. Subsequent introductions from Europe brought a mix of different European honeybee subspecies, including *A. m. mellifera* (the German honeybee), *A. m. carnica* (the Carniolan honeybee), and *A. m. ligustica* (the Italian honeybee) (Sheppard 1989). European honeybees thereby spread in North and South America via beekeeping activities and natural dispersal. A more recent introduction of the African subspecies *A. m. scutellata* in Brazil in 1956 led to the prevalence of Africanized – so-called killer – bees (Kerr 1967). Currently, Africanized bees are found from the southern United States to northern Argentina.

The evolutionary history of honeybees is best studied by examining differences in the genetic makeup of bees across the globe. Recent genetic studies have shown that the honeybee originated in Africa (Whitfield et al. 2006) or the Middle East (Han et al. 2012), then colonized Europe and Asia via at least two independent expansions. Surprisingly, honeybees colonized Europe in two opposing migrations (North Africa and Asia), resulting into two geographically proximate but genetically distant population groups. The timing of these expansions is not yet known. Despite the presence of distinct or "pure" populations in some parts of the Old World, commercial honeybee populations show a great deal of admixture – or mixed ancestry – which results from intentioned or natural hybridization events between subspecies from Western Europe and Eastern Europe (Whitfield et al. 2006; Harpur et al. 2012). The large degree of admixture is readily explained in light of beekeeping practices such as international importation of honeybee queens as well as by the honeybee's mating biology: queens naturally mate with 15–20 different males from a relatively large geographic area, which promotes outbreeding and genetic mixing. As a result of mixing, managed honeybees actually have higher genetic diversity than their progenitors in Eastern and Western Europe (Harpur et al. 2012).

Today, honeybees are responsible for a large portion of pollination services in agricultural settings, for example, they account for at least 34 % of pollination in the UK (Breeze et al. 2011) and probably more in North America. No single insect pollinates more plant species

than the honeybee (Breeze et al. 2011). Beekeepers use their stocks to pollinate fruit crops (apples, apricots, avocados, blueberries), oilseeds (cotton, flax, soy), forage and legume crops (alfalfa, clover, buckwheat), and vegetables (broccoli, beans, cucumbers, carrots, peppers). Crop pollination is a multibillion-dollar industry, dominated mostly by honeybees (Breeze et al. 2011). Though traditional honey harvesting and collecting methods still persist today, the contemporary relationship between humans and honeybees has expanded to a global industry.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Hopewell Culture, Archaeology of the

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Introduction

The Hopewell culture, named for the Hopewell Mound Group in the Paint Creek valley of southern Ohio, is best known for its monumental earthworks and the broad range of exotic raw materials its artisans acquired and crafted into magnificent works of art (Fig. 1). The Hopewell culture reached its fullest expression in the valleys of the major streams that flowed southward into the Ohio River in southern Ohio and neighboring Indiana during the Middle Woodland period (100 BCE and CE 400). Hopewell-related manifestations, however, are known throughout eastern North America, from the Mississippi River to the western flanks of the Appalachian Mountains and from the southern Great Lakes to the Gulf of Mexico.

The Hopewell culture was an outgrowth of the earlier Adena culture in the Ohio Valley. The Hopewell people built upon the foundation of mortuary ceremonialism centered on mound-building and the acquisition of exotic raw materials established during the Early Woodland period (800 BCE–CE 100). The reasons for this florescence are unclear, but it appears to have been rapid and is not obviously due either to demographic or ecological causes (Carr & Case 2005: 290).

Hopewell Culture, Archaeology of the, Fig. 1 Hopewell copper face effigy from the Hopewell Mound Group (A283/000140). 6.25 mm high. Ohio Historical Society

Definition

The Hopewell culture represents a brilliant florescence of art, architecture, ritual, and interregional interaction that was unparalleled in North America up to that time (Fig. 2). It encompassed a number of societies in eastern North America linked by an intense focus on mortuary ceremonialism performed in monumental architectural settings and participation in an exchange network that likely involved a mixture of trade, gift-giving, pilgrimage offerings, and the direct acquisition of exotic materials through extraordinary journeys by individuals and small groups.

Typical artifacts that appear to have reflected a Hopewell identity included earspools and breastplates made from copper, elegant mica cutouts, marine shell vessels, animal effigy platform pipes, frequently oversized spear points and knives made from obsidian, and cores and bladelets made from both Flint Ridge and Wyandotte chert (Seeman 2004).

Hopewell farmers cultivated the plants of the Eastern Agricultural Complex, including goosefoot, knotweed, and maygrass, with their starchy seeds rich in carbohydrates, the sunflower with its

Hopewell Culture, Archaeology of the, Fig. 2 Artistic representation of life in the Middle Woodland period. Ancient Ohio Art Series, artist Susan A. Walton

oily seeds, and sumpweed, as well as tobacco. In addition, small amounts of maize also have been documented from a few Hopewell sites. In spite of this evidence for horticulture, Hopewell people appear to have relied principally on hunting, gathering, and fishing for their livelihoods. The cultivated plants provided a storable surplus of comestibles that would have alleviated seasonal food shortages and provided food to support the periodic large gatherings at major earthwork centers.

In addition to the Hopewell Mound Group, the most important ceremonial earthwork sites include the Newark and Marietta earthworks in the Muskingum River drainage; Mound City, Seip Earthworks, and the Portsmouth Earthworks in the Scioto River drainage; Fort Ancient and the Turner Earthworks in the Little Miami Valley; and the Mann Site and Mount Vernon Mound in the Wabash Valley in Indiana.

The Newark Earthworks is the preeminent example of geometric earthworks consisting of two large circular enclosures, a square, and an octagonal enclosure all connected by avenues framed by parallel walls with the entire complex covering more than 1,000 ha (Lepper 2004). The Fort Ancient Earthworks is the largest hilltop enclosure in the Hopewell world. More than 5 km of earthen walls surround a mesa top overlooking the Little Miami Valley. In spite of its name, it does not appear ever to have functioned as a fortification. Instead, it likely was a ceremonial center very like Newark.

The ceremonial nature of the Hopewell earthworks is indicated by a number of factors, including a focus on mortuary ceremonialism, the frequent incorporation of cryptic astronomical alignments into the architecture (Fig. 3), and the general absence of significant residential sites at the earthworks. Many earthworks do have domestic sites in association, but these plausibly have been interpreted as the temporary encampments of largely nonresident visitors, such as pilgrims coming to the site to participate in ceremonial activities.

Although earthworks dominate our view of the Hopewellian ceremonial landscape, it is increasingly clear that originally these sites included a significant number of wooden structures, including Big Houses (often characterized as charnel houses) and woodhenges. The woodhenge at the Stubbs Earthworks, for example, consisted of 172 wooden posts configured in a nearly perfect circle 73 m in diameter (Lepper 2004: 148).

Hopewell Culture, Archaeology of the, Fig. 3 Moonrise over the Octagon Earthworks at Newark, Ohio. CERHAS, University of Cincinnati

Key Issues

An important unresolved question is the nature of Hopewellian domestic sites, which occur in proximity to the earthworks as well as in widely dispersed locations in the surrounding valleys and uplands. There is disagreement among Hopewell researchers as to whether these settlements were sedentary homesteads of dedicated farmers or hamlets occupied seasonally by mobile foragers (Dancey & Pacheco 1997; Yerkes 2002). Excavations at the Patton site in southeastern Ohio revealed the remains of a substantial rectangular structure of wattle and daub suggesting to the investigators a commitment to some degree of permanence at least at this site (Weaver et al. 2011).

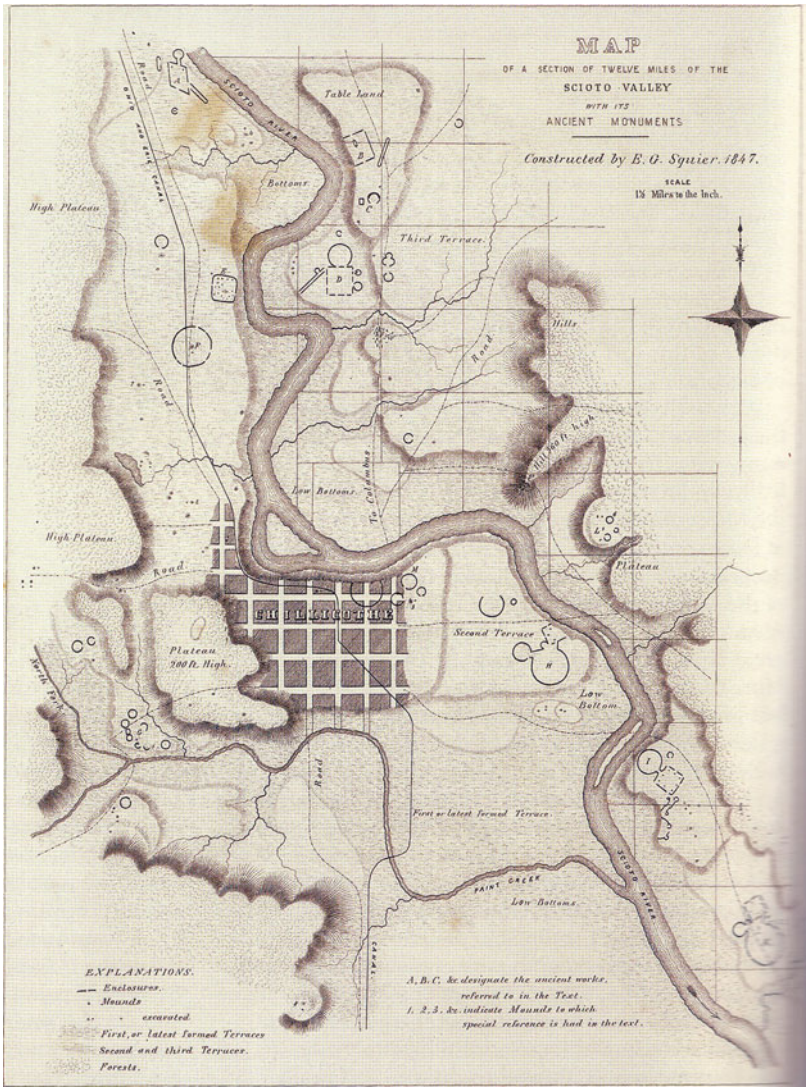

Hopewell Culture, Archaeology of the, Fig. 4 Map of a section of 12 miles of the Scioto Valley with its ancient monument. Published by Ephraim Squier and Edwin Davis in the first publication of the Smithsonian Institution

The most striking aspect of the Hopewell culture is the impressively large ceremonial earthen architecture (Fig. 4), including geometric enclosures, hilltop enclosures, and mounds in a variety of shapes and sizes. The scale of these ceremonial landscapes is far grander than would be needed to serve the needs of the local population who lived in the small, dispersed domestic sites. Therefore, the earthworks must have been locations of periodic large gatherings. Perhaps the most fascinating set of issues raised by the monumental architecture and its associated far flung interaction sphere (Fig. 5) is that they were created and operated by largely egalitarian societies that did not coalesce into a hierarchically organized polity.

The nature of Hopewell society and the purpose of the large ceremonial centers is the focus of ongoing debate. The most widely accepted model of Hopewell social organization is the Vacant Center/Dispersed Hamlet model (Dancey & Pacheco 1997). In this model, the earthworks are the ceremonial centers for a territorial proto-polity of related small hamlets in a sort of orbit around a centrally located earthwork. Alliances of these proto-polities are expressed in larger earthworks possibly located

Hopewell Culture, Archaeology of the, Fig. 5 Map showing the extent of the Hopewell "interaction sphere"

at territorial junctures at which joint funerary ceremonies helped to solidify the alliance (Carr & Case 2005). Byers (2011) presents an alternative model in which the networks of Hopewell hamlets were not territorial and the earthworks were built by sodalities, that is, groups bound by ties of companionship instead of kinship. For Byers, the mortuary foci at the earthworks were not kinship-based cemeteries, but the result of complex world renewal rituals in which human remains served as the principal sacrificial offerings.

There is no general agreement on the factors responsible for the dramatic rise and precipitous decline, sometimes characterized as a true collapse, of the Hopewell culture. Case and Carr (2008) convincingly argue that neither the florescence nor the dimming of Hopewell culture can be linked to demographic or ecological causes and that particular, historical events of a spiritual-religious nature likely initiated both.

Alternatively, the collapse of the Hopewell culture may be related to increasing competition between communities for scarce resources. Certainly, the achievements of the Hopewell culture were tied to a network of peaceful cooperation, sometimes referred to as the *Pax Hopewelliana*, and the subsequent Late Woodland period (CE 400–1000) witnessed a shift toward population aggregation into larger villages frequently situated in defensible locations and with palisades, earthen walls, or ditches surrounding the settlements. In addition, Late Woodland and Late Prehistoric (CE 1000–1650) human remains recovered from burials frequently exhibit traumatic injuries, including projectile points lodged in skeletons, whereas there is little or no evidence of such interpersonal conflict in any Hopewell human remains (Case & Carr 2008: 650-1).

Cross-References

- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
- ▶ Woodland and Mississippian Cultures of the North American Heartland

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Horning, Audrey

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Basic Biographical Information

Audrey Horning earned her B.A. at the College of William and Mary in Williamsburg, Virginia, and completed her M.A. in 1991 and her Ph.D. in 1995, both at the University of Pennsylvania. Her doctoral thesis focused on comparative analysis of colonial Jamestown, the first English colony in Virginia. Horning previously lectured in historical archaeology and colonialism at the University of Leicester. Prior to this, she was Assistant Professor of Anthropology at the College of William and Mary. She also worked as an archaeologist for the Colonial Williamsburg Foundation and directed excavations at Jamestown.

In 2001 she received the John L. Cotter Award (Society for Historical Archaeology) for her outstanding contributions as a young historical archaeologist, as recognition for her doctoral dissertation on seventeenth-century Jamestown and a study of the "mountain folk" of Appalachia. Horning has recently been hosted as a visiting scholar at St. Mary's College, Maryland, in 2010, and at the University of Denver in 2011.

Horning's work is primarily concerned with colonialism, identity, and the North Atlantic world from the seventeenth century to the present day. She currently teaches and conducts research at Queen's University Belfast. She is a fellow of

the Society of Antiquaries of London and Associate Editor of Historical Archaeology journal. Horning is an active member of the Irish Post-Medieval Archaeology Group, and edits the newsletter, and of the Society for Post-Medieval Archaeology, of which she is secretary.

Major Accomplishments

Reassessment and realignment of early colonial sites within a broader North Atlantic context has been a central focus of Horning's research, notably at Jamestown (2006). She has brought this approach to postmedieval archaeology in the British Isles. Horning's work in Ireland has centered on the study of rural sites, notably excavations at Achill Island on the west coast and at rural sites in Northern Ireland. Inferences drawn from these excavations have addressed the problematic nature of the presentation of identity through material culture (Horning 2000, 2001, 2007). Similarly, investigations at rural sites in the reforested region of Shenandoah National Park, Virginia (Horning 2000), formerly a working agricultural and small-scale industrial landscape, have focused on the displacement of people and the appropriation of identity. This forms part of Horning's broader research the role of historical archaeology in reassessing accepted historical identities.

In her work on historical identities, Horning has examined material culture of rural identity in Ireland in a museum context. Her research on museum collections has illustrated a stark contrast between the prominence of "authentic" Irish wares in museums and the substantial volume of imported goods such as tea cups evidenced by fragments uncovered during excavations (Horning 2007). This is comparable with her work on the people of Shenandoah. In the context of early twentieth-century land clearance at Shenandoah, the public image of the local people as cultural backwards was countered by the discovery of artifacts like a toy ray gun at one of the rural sites, among other contemporaneous artifacts (Horning 2005). Central to Horning's thesis is that the creation of an "authentic" ideal has been used in the past as a motive for displacement; she also asserts that "authenticity" has been used as a vehicle for nationalism in postcolonial Ireland.

Horning's most recent publications have been concerned with the re-situation of Ireland within a broader North Atlantic context, both as a colonial enterprise and a market for the consumption of colonial goods (Horning et al. 2007; Horning & Palmer 2009; Horning & Brannon 2009). She has focused on the early plantation period in Ireland and earlier, drawing inferences from the remains of medieval village sites on the relationship between English settlers and native Irish in Anglo-Norman Ireland (2012). She has written extensively on the future of historical archaeology and has promoted the practice of postmedieval archaeology in Ireland (Horning et al. 2007; Horning & Brannon 2009).

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Historic Jamestowne
- ▶ Irish Post-Medieval Archaeology Group (IPMAG)
- ▶ Modern World: Historical Archaeology
- ▶ Plantation Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Urban Archaeology

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Horse Gram: Origins and Development

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Basic Species Information

Horse gram (*Macrotyloma uniflorum* (Lam.) Verdc. (syn. *Dolichos uniflorus* Lam.)), also known as *kulthi, gahat, Madras gram, grain de cheval, kerdekorn*, and *favalinha*, is a domesticated bean grown today across tropical Africa, South Asia, Southeast Asia, China, and Australia. In much of the older literature on the botany and archaeology of India, it is referred to as *Dolichos biflorus*, although this is a misnomer, and accepted nomenclature today is *Macrotyloma uniflorum* (see Smartt 1990; Fuller 2002). The stems and leaves of the plant are often used as fodder, while the beans are harvested for human consumption. Horse gram is tolerant of both drought and low soil fertility,

making it a particularly important crop in drier areas of south India (Kachroo & Arif 1970; Smartt 1990). It requires very little input and can be used as a green manure to improve depleted soils. As such, it is often an important component of crop rotation systems in which it is usually planted on fallow fields. It can be successfully intercropped with cereals, including pearl millet, sorghum, and the small millets. In addition, it does well as an understory crop in orchards and plantations.

Horse gram is a drought-resistant crop largely grown in areas with less than 900 mm annual rainfall, though it can be grown with as little as 380 mm. While it can tolerate higher temperatures, ideal temperatures for growth range between 25 °C and 35 °C. As such it is particularly suited to tropical environments. It takes around 120–180 days to reach maturity. Horse gram is easily harvested by uprooting. Because of this a relatively high number of weeds may be incorporated into the crop, increasing the prevalence of weed seeds in assemblages from each stage of processing and potentially increasing the visibility of horse gram crop processing in the archaeological record. It is processed in a similar way to glume-wheats, with two episodes of threshing and winnowing (Fuller & Harvey 2006). The second episode may occur daily, with the day's quota of the pulse removed from storage and prepared separately. This method increases the chance of archaeological preservation and may bias towards the prevalence of this crop in the archaeological record. The beans are usually dried for storage and longevity. These dry beans tend to be soaked overnight prior to cooking. Boiling is most common; however, they can also be fried or roasted. Boiling produces both cooked beans, which may be fed to humans or livestock, and horse gram water, which can be condensed to produce a thick protein rich stock for soups and broths. In addition, the beans can be sprouted prior to cooking. There are several claimed health benefits and medicinal properties to horse gram, including its diuretic effect which may help kidney stones.

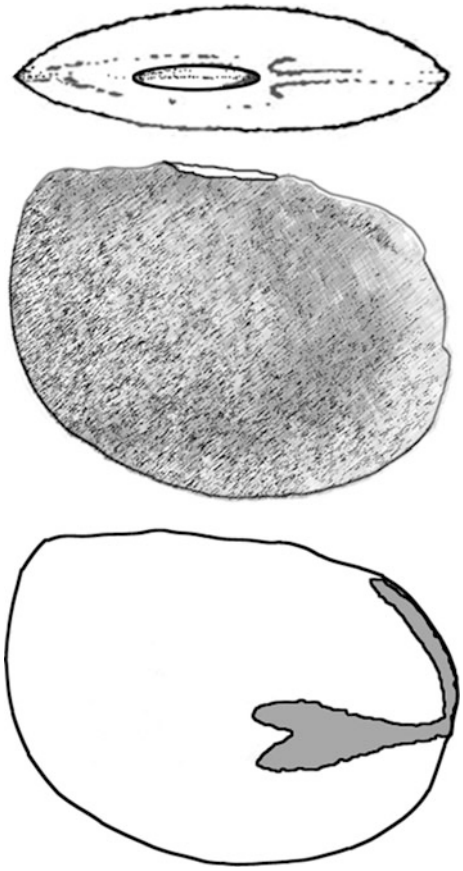

Horse Gram: Origins and Development, Fig. 1 Sketch of *Macrotyloma uniflorum* seed, from side view, hilum view, and interior of split cotyledon

Major Domestication Traits

The identification of horse gram is relatively straightforward, although there is quite a lot of variability in both modern and archaeological populations. The beans of horse gram are generally around 5 mm in length when mature, are trapezoidal, and tend to be slightly reniform (Fig. 1). The hilum can be found within a depression at the center of the bean's edge. When the bean is split, the embryo can be seen to be around a third of the length of the bean and roughly parallel to the base of the seed.

The wild progenitor of horse gram is not well studied; however, archaeobotanical and ecological evidence indicates that it is a domesticate of India (Fig. 2). Wild populations are found across India within dry tropical evergreen and savannah

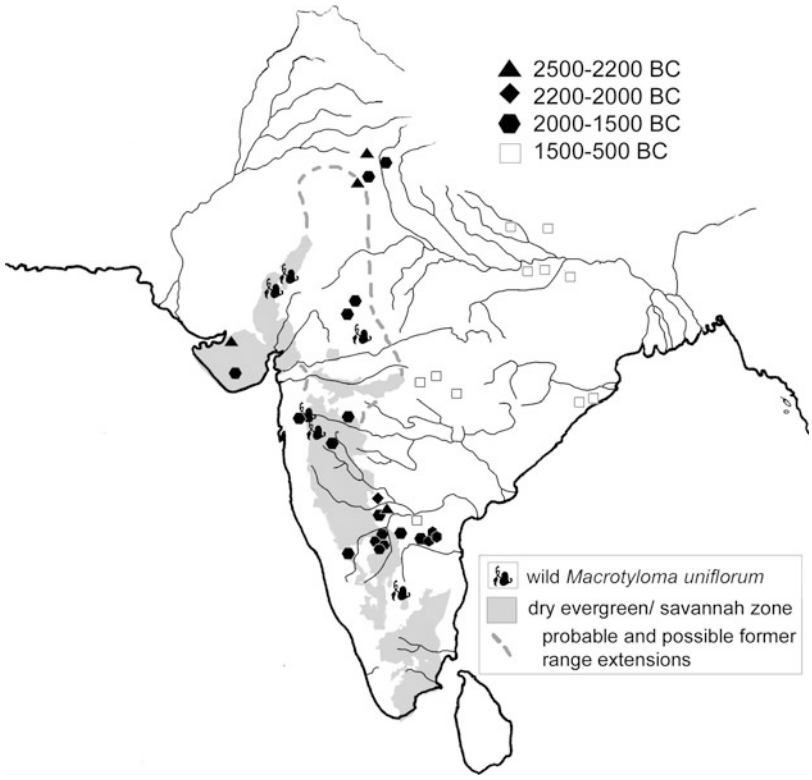

Horse Gram: Origins and Development,
Fig. 2 Map of wild South Asian horse gram and distribution of early archaeological finds. Modern documented wild populations are few, but it is inferred that they should have been wild spread in the dry savannah zone (shaded) and possibly more sporadically through areas enclosed in dashed lines. This map has been modified from Fuller & Harvey (2006) and updated

vegetation zones (Jansen 1989; Asouti & Fuller 2008). From c. 2500 BCE there is evidence for horse gram stretching from southern to northwestern India (the state of Haryana), and this could imply that it was brought into cultivation more than once. The Haryana region, the Gujarat region, and the south Deccan are all plausible foci or early cultivation or domestication. Wild populations of horse gram are also found in Africa; however, there is no evidence to indicate that these were ever brought into cultivation there.

Timing and Tracking Domestication

The high ubiquity of this crop at Neolithic southern Indian sites c. 2000 BCE suggests that it was a staple food. Furthermore, early finds indicate that it was part of an indigenous south Neolithic crop package along with two millets (*Brachiaria ramosa* and *Setaria verticillata*) and another pulse (*Vigna radiata*) (Fuller et al. 2004). This crop package appears to be synonymous with the semi-pastoral Ashmound culture, in which large areas of accumulated burnt cattle dung and hilltop settlements are prime features. It appears to be a later introduction to the agriculture in the Ganges plains and eastern India (Orissa) in the Chalcolithic after c. 1500 BCE. In the period 400–100 BCE, horse gram is found on the Malay peninsula in southern Thailand, for example, at Khao Sam Kaeo, where it might have been imported with other Indian pulses for Indian enclaves at important craft and trading cities (Castillo & Fuller 2010). Today it is not cultivated for human consumption in Southeast Asia, and this crop has remained restricted to South Asia, mainly as a low-status pulse.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants

▶ Domestication: Definition and Overview
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Plant Domestication and Cultivation in Archaeology
▶ Plant Processing Technologies in Archaeology

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Horses: Domestication

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Basic Species Information

Small varieties of horse are often referred to as *ponies*; stallion: male adult horse; gelding: castrated male adult horse; mare: female adult horse; foal: juvenile horse; filly: female juvenile horse; colt: male juvenile horse.

Horses (*Equus caballus* L. 1758) belong to the genus *Equus*, family Equidae in the order Perissodactyla (odd-toed hoofed mammals). Domestic horses are derived from the wild horse *Equus ferus* which was widespread across Eurasia and North America in the late Pleistocene, but went extinct across nearly all of that range in the early Holocene to mid-Holocene. The tarpan may have been a remnant population on the wild horse in Europe; the last individual died in captivity in the early twentieth century. The highly endangered Przewalski's horse, which historically went extinct in the wild but survived in zoological collections, may also be a remnant of this wild progenitor species. However, this horse has a different chromosome number and paternal and maternal lineages that are not present among modern horses, so it represents a differentiated lineage.

There are currently several free-ranging populations of horses in Eurasia, Africa, and the Americas. They are commonly referred to as wild horses, especially in North America (where they are also called mustangs). All these populations are actually feral, that is, descendants of domestic animals that are now free ranging.

Contrary to what seems to have occurred in many domesticates, no obvious morphological characteristics can be used to separate the first domestic horses from their wild counterparts. This has made it quite difficult to identify early domestic horses in the archaeological record. The earliest remains have most often been identified on the basis of tooth wear that could be indicative of wearing a bit or cribbing, changes in frequency of remains at individual sites, or remains of ritually sacrificed horses (Olsen 2006). The recent examination of abnormalities on the skulls of some ancient horses suggested that they wore a bit, and isotope analyses of food remnants on pottery shards revealed the presence of horse milk. These two pieces of evidence indicate that a population of central Asian horses was domesticated by 5,500 years ago (Outram et al. 2009). This may be close to the time and place of

domestication, and shows that at this early point in their domestication, they were used both as a food resource and for transport.

The mode of domestication in horses was likely unique. Horses were probably the last of the common farm animals to be domesticated, thousands of years after dogs, cattle, pigs, goats, and sheep, and when these species were spread across continents. Consequently, it would seem that there was no obvious reason for the domestication of horses and their expansion. Despite this, a very large number of wild horse lineages were introduced in the domestic population (Vilà et al. 2001; Jansen et al. 2002; Achilli et al. 2012). This could indicate a widespread deliberate incorporation of this new species into human groups, which may be associated with improved transport and warfare capabilities (Vilà et al. 2006). The introduction of horses would have had a dramatic impact on many human cultures. This is well illustrated by the historically documented changes in the Native American groups which rapidly adopted horses after their arrival to the Americas with Europeans in the sixteenth and seventeenth centuries. This gave groups with horses a competitive advantage over horseless neighbors. A similar process likely occurred across Eurasia starting around 6,000 years ago.

Unlike other domesticates in which there was a focus or a few foci of domestication from which domesticated animals expanded, the appearance of horses may represent the expansion of an idea. Under this scenario, horses were domesticated in one or a few places in the Eurasian steppe, and from there spread to neighboring cultures, where large numbers of local wild mares (handling wild stallions may be much more difficult) were captured and used to reinforce domestic stocks. This view is supported by the large amount of female-inherited (mitochondrial) genetic variation (Vilà et al. 2001; Jansen et al. 2002) and the absence of male-inherited (Y-chromosome) genetic variation (Lindgren et al. 2004) as compared to wild horse populations in the Pleistocene (Vilà et al. 2001; Lippold et al. 2011), and by the linkage disequilibrium in the whole genome (Wade et al. 2009). By fitting a spatially explicit model to genotype data from horses sampled across northern Eurasia, Warmuth et al. (2012) deduced that the domestication took place in the western part of the Eurasian steppe, and that domestic herds were repeatedly restocked with local horses as they spread out of this area.

Despite the lack of obvious skeletal changes after domestication, ancient DNA analyses have illustrated the early selection for alternative coat colors through the analysis of known coat-color mutations (Ludwig et al. 2009). Wild horses were most likely dun, as is depicted in some cave paintings. Black may have become more common in wild populations in areas where the forest was expanding in the Holocene. Other colors are associated only with domestic horses, and were identified from remains dating from 3,500 years ago.

Horses today are divided into numerous breeds, many of which are maintained reproductively isolated from all others. Some of these breeds have very well-documented recent origins, such as the Thoroughbred. Others have longer more obscure histories, such as the Arabian. Still others are the result of geographic isolation, such as the Icelandic. Although the breeds are easily distinguishable by nuclear markers, they do not have unique male- or female-inherited markers. This indicates that local breeds do not represent local domestications, but originate from more recent isolation from a broadly mixed stock. In fact, the study of Viking age horse remains showed that a great admixture of maternal lineages existed over a reduced geographic area more than a 1,000 years ago (Vilà et al. 2001, 2006). However, some maternal lineages show a somewhat restricted geographic distribution (Jansen et al. 2002; Achilli et al. 2012).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Asses/Donkeys: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Households and Domesticity: Historical Archaeology

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Introduction

The archaeology of households and the related area of domesticity are fields most often explored in relation to the nineteenth century and are dominated by work on sites in North America and Australia. Household archaeology is one of the areas where the close synergies between the archaeological record and text may be best exploited. The wealth of data on household composition from a personnel and financial point of view which exists for the nineteenth century is indicative of official preoccupation with categorizing and analyzing socioeconomic units in the period, out of which the very notion of the household as a definable concept may be said to have arisen. Such documents mean that excavated sites can be tied to individuals. In some cases, based on date range or occupation data, specific artifacts

can even be linked to individuals, making the field one in which analysis can take place on both a macro and a micro level.

Definition

Household archaeology is a relatively newly defined area, emerging as a properly theorized field in its own right only in the 1980s (Barile & Brandon 2004: 5-6). Its roots lie in the very movements which form part of the modern theoretical background, in particular North American concerns to preserve and present the domestic sites of its founding fathers from the 1850s. The emphasis on domestic sites was in itself part of a "cult of domesticity" which is now recognized as part of the contested ground which household archaeology seeks to address. By the 1960s, prevailing processual trends within archaeology had redefined the household as an economic unit, a complete entity in its own right, and one which could be used as the basis of pattern analysis. Current scholarship emphasizes the tensions within that unit, and seeks to explore the household on a micro level, unpicking tensions based on class, race, gender, and age, to name but a few.

The definition of a household, and therefore of household archaeology, is itself an issue. It is often defined by what it is not, rather than what it is: thus, not merely an economic unit; not bounded by narrow spatial boundaries; not defined by architectural conventions. It is generally accepted that a household comprises one or more individuals with an emotional, economic, or spatial tie to one another. At its most basic, a household may comprise a nuclear family of wife, husband, and children, living in one spatially distinct dwelling and using any associated outdoor space. However, a household always encompasses more than a family, not least due to the difficulty of definitively attributing deposits to individuals. The household must, at the very least, include lodgers and servants, whether live-in or living outside. Guests, both occasional and longer term, may also be included. On a wider basis, any individuals having ties to the base unit may be considered as being part of the household. That unit may not be familial: work on temporary camps, boarding houses, and institutions such as workhouses have all considered the issues involved. The result of this complexity has been that those explicitly considering the household within their analysis have had to clearly state their own definition of that term and use it accordingly.

The aim of household archaeology is to explore tensions within each household, and not to study units as if they are a homogenous whole. Recognition and exploration of the various interests, which make up an individual household, and interpretation of artifacts and spaces in the light of intra-household tension as well as inter-household relations form the basis of household-based archaeology. Hence, it is crucial to understanding class and, while little work has yet been done on extant sites, has potential to shed light on differing racial experiences within communities.

Furthermore, it is impossible to study households, especially in the core period of the nineteenth century, without an understanding of notions of domesticity (and, with them, a familiarity with wider issues around feminism and gender). At the beginning of the nineteenth century, the position of women in Britain and its colonies, along with North America, was the subject of fierce debate. Women were frequently cast in a negative role, ranging from frivolous spendthrifts, to more seriously undermining a nation's virility and with it, ability to wage successful war, a preoccupation of many countries, especially until the fall of Napoleon in 1815. These views had long been combated by an alternative view of women as civilizers, able to tame man's natural propensities toward violence and lead society toward more genteel and cultured ways. By the 1840s, pressure on women to cease work and concentrate their energies in the domestic sphere was building. Class identity played a huge role in defining the accepted role of women. In many ways, little changed for the upper and lower ends of society: aristocratic ladies had never worked for a salary, while working class women struggled financially if they did not. Among the middle class, across borders, a pattern of movement can be seen in which the workplace was

separated from the home, and women thereby encouraged to give up their former roles as – often unpaid but nevertheless key – administrators and assistants in their husbands' businesses (Wall 1994). Emphasis was put on the role of women as mothers and wives, a discourse which both strengthened their authority within the home and undermined their relationship with the workplace. In the USA, a quasi-religious "cult of domesticity" grew up, which influenced architecture and furniture design (Clark 1988), as well as the choice of material culture in those households in which one or more people subscribed to it. Yet ideologies of domesticity were by no means fixed, nor were they universally accepted. Most definitions of acceptable domesticity were promoted by the middle classes, and most contemporary sources reflect that view. Generally, three tenets were held to constitute the aspirational idea: the absence of working women; the concept of the home as a sanctuary; and the idea of childhood as sacrosanct, a time for education and play, rather than work and early adulthood (Lampard 2009). However, not only was the middle class not a homogenous group, but attitudes varied by country, region and, of course, within each household.

Key Issues

A primary concern of household archaeology is to explore notions of domesticity, often sited within a class context. Most published work on excavated sites, to date, has been predominantly working class, urban, and either North American or Australian. Several essays in the special issue of *Historical Archaeology* on the Five Points area of New York analyzed domestic sites, with the issues raised by work on households running strongly through them (Yamin 2001). One driver, especially in this case, but also in exploration of The Rocks area of Sydney (Karskens 2003), has been to challenge popular views of particular urban areas as being slums. The definition of slum has been heavily influenced by middle class definitions of domesticity, and both the Five Points and The Rocks have been popularly seen as devoid of "homes," where home meant sanctuary and safety. Studies of these areas contradict such definitions, suggesting that middle class markers of domesticity, such as flowerpots and knick-knacks were embraced. Moreover, working class units, whether familial, individual, or communal, formulated their own ideas of the domestic.

A major interpretive theme is the question of how far the working class accepted middle class domestic ideals, and to what extent they adhered to them even when, for example, women and children had to work, either through financial exigency or personal choice. Evidence of flowerpots, figurines, vases, and toys for children is usually associated with the desire to adorn the home, while fancy hinges, picture hooks, and wallpaper are interpreted to show more dedicated structural change, often the case where occupiers are in residence for longer periods of time.

The integration of interpretation of the physical structure of each dwelling with smaller finds is ongoing. The emphasis away from architectural definitions of household and the drive to consider individual agency and action has led to a lessening of the exploration of space. More recent scholarship has considered space and gender through interpreting small finds (Yentsch 1991), but it is unclear how best to bring together spatial elements with an artifact-led approach.

Current Debates

Related to the definitional difficulties is discussion over what constitutes a household. While the general approach of multiple definitions has been accepted, it still poses problems for an integrated approach. The inclusion of nontraditional households such as cooperatives, boarding houses, and camps within the corpus of work in the field can pose difficulties (Beaudry 2004).

Emerging from economic definitions of the household in the 1960s–1970s, along with Marxist and post-Marxist emphasis on production, the role of the household as producer and reproducer is a key area for debate. Current scholarship looks both at the obvious aspects of production – homeworking such as taking in laundry or

sewing – and the more nuanced role of the household in reproducing morals and belief systems grounded in a particular set of circumstances.

Archaeological data used in the exploration of households and domesticity tends to be small finds. Beyond the dominant artifact groups of ceramics and glass, household-related items such as sewing ephemera, especially buttons; toys; fittings from furniture; parts of technical and musical instruments; and writing implements are all well represented in samples. Debate over the interpretation of these is evident across the field. For example, sewing equipment may be indicative of appropriate, domestically focused feminine activity, or it may show one or more women in the household were working from home. Pins may form part of a sewing kit, but they may also simply have fallen off garments in an age where pins were much used as fasteners. If a household contains no women, sewing-related ephemera may still be present, at which point its usefulness as a gendered item may also be questioned.

Examples

Key work on households and domesticity can be found in an edited volume by Barile and Brandon (2004). The essays within it cover a variety of approaches and differing definitions of household and show the breadth of approaches currently being taken in the field. The most frequently used definition, of a group of people living for a stated period at a specific, bounded, location, can be found in work on urban domestic sites. Lampard (2009) compares three working class sites in Port Adelaide, Australia, to demonstrate the interaction of financial circumstances and personal choice in the acceptance and exhibition of middle class domesticity. Significant work has also be done on brothels, considering domesticity as a middle class construct which was deliberately aped in public areas of brothels, but interpreted in a working class context behind the scenes (Seifert 1991, 1994).

Outside the strict confines of archaeology, work on recipe books and kitchens has demonstrated the potential of material culture to elucidate the changing notions of "home" and the way in which domestic space was conceptualized and used. Use of inventory and probate data, rather than results from excavations, has demonstrated the multiplicity of uses to which a room might be put, negating easy assumptions of gender and assignation of spaces to individuals or interest groups within the household (Pennell 1998). More recent archaeological work has started to incorporate a wider time period, as well as using more data from documentary sources and collections showing, for example, the negotiation of household responsibility through objects, such as tea things, heavily imbued with domestic significance (Spencer-Wood 2013).

Future Directions

Most work on households has concentrated on class and gender. However, work on cultural differences between immigrant groups in colonial contexts (e.g., Lampard 2009) has shown alternative readings are possible. More significantly, racial aspects are starting to be explored (Beaudry 2004; Praetzellis & Praetzellis 2004; Rotman 2006). Although the houses of both free and unfree African Americans have been excavated and interpreted in North America, consideration of them in the light of the issues around households and domesticity has often been lacking. Very little work has considered the post-Bellum differences in notions of domesticity and the relative influences of class and race in the formation of household identity. Moving beyond plantation sites and into exploration of houses where the servant divide was racially distinct but which were never associated with slavery would be a potentially rich area for exploration, as would the households of the rich in general.

Indeed, there has been a marked avoidance of the households of the rich, with the exception of certain well-known historical figures. In the UK, where little has been published to rival the interpretive output from America and Australia on domestic sites, country houses have been increasingly recognized as sites through which class and

gender tension may be usefully explored. Inevitably, many of them are still standing, but useful work has been done where structural work has necessitated the removal of floorboards (Newman 2004). It has not, as yet, been subject to systematic analysis within the theoretical tenets of household archaeology. It would be useful to see further archaeological exploration of the acceptance of or resistance to notions of domesticity among the upper classes.

The field of household archaeology is not restricted to the nineteenth century, but much work has to date been concentrated there. This is in part due to availability of sites to excavate – there are many more nineteenth century examples than earlier – and partly due to the explicit discourse on domesticity which occurs in the mid-late nineteenth century. This discourse can be directly related to archaeological data, affording the archaeologist a clear set of hypotheses. The wealth of documentary data to aid in the task is also important. Contemporary debate over the domestic sphere and the role of women ranges far beyond this period, however, and it would be valuable to investigate the formation of households and conflicts within them in the light of the rhetoric of the seventeenth and eighteenth century, especially in Britain.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Beaudry, Mary C.
- ▶ Buildings Archaeology
- ▶ Critical Historical Archaeology
- ▶ Engendering Historical Archaeology
- ▶ Social Identity in Historical Archaeology

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Households in the Ancient Near East, Archaeology of

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Introduction

The archaeological study of houses and households in the ancient Near East has traditionally focused on aspects of architecture and domestic artifact assemblages to elucidate ethnic groupings and kinship structures. More recent investigations have broadened their scope to examine such diverse topics as craft specialization, gender roles, and site formation processes that are manifest in, and interpreted from, the archaeological remains of houses. Households in the ancient Near East served as the basic unit of society and as an important focal point for the enculturation of its members. It is a place where social norms were learned, created, and disseminated and can thus be argued it formed the physical and psychological foundation for civilizations in this region.

Definition

The study of the practices, behaviors, and sociocultural structure of domestic groups or collectives related through kinship or shared activities. Households offer a window onto the everyday actions of people in the past. As a microcosm of society at large, households can also serve as linking agents between theories of social change and material culture.

Key Issues/Current Debates/Future Directions/Examples

Archaeologists do not excavate households directly. Instead, they must derive their impressions of households and the activities they performed in the past through the physical remains of those activities, including the construction, habitation, and destruction or abandonment of domestic dwellings or houses. A house is the physical structure in which households live, work, and play. Though households have many interests that are not always, or even usually, confined to the physical, architectural house, archaeologists have tended to rely on this focal point to offer clues about habitual household behaviors—cooking, eating, sleeping, creating, reproducing—and what these can tell about both "everyday life" (micro-narratives) and the effects of larger processes of social change (macro-narratives) on domestic groups.

Until recently, the archaeological study of houses and households remained underdeveloped in ancient Near Eastern scholarship. Excavations of large public buildings like temples and gateways, and private royal residences and palaces dominated the field. Thus, theoretical emphasis was traditionally placed on elucidating political history, large-scale economic and social systems, and royal and religious elite participants in these systems. True household investigations have become more of a focus in the last 25 years as the importance of domestic economy and social organization is increasingly recognized as crucial factors in the overall development of complex political, economic, and religious institutions that define the ancient Near East.

Today, archaeologists strive for a holistic approach to households by combining architecture with domestic assemblages, ecofacts, and site formation processes. These data are derived from field methods that take advantage of the full suite of scientific archaeological specialties including zooarchaeology, paleoethnobotany, lithic studies, and, increasingly, microarchaeological techniques. These involve the study of the microscopic archaeological record comprised of "residues" from human behaviors and natural formation processes that remain generally unseen to the naked eye in artifacts, features, or deposits. Examples of these techniques include geochemical analysis to detect ancient use of fire in

domestic contexts (Alperson-Afil et al. 2007), microstratigraphy to chart the preparation and creation of living floors (Matthews 2001), and microartifactual analysis to identify room use patterns or even deeply buried archaeological sites (Rainville 2005). Ethnoarchaeological studies in the modern Middle East have also provided interpretive frameworks by which to understand architecture, the use of space, and artifact assemblages (Watson 1979; Kramer 1982a).

The most prolific application of household archaeology in the ancient Near East is reserved for prehistoric periods. Households of the Paleolithic/Natufian (c. 12,000–9,000 BCE.) and Neolithic periods (9,000–6,000 BCE.) in particular have garnered the greatest concentration by scholars who are interested in the social dynamics of hunter-gatherer groups, the adoption of sedentary agricultural practices, and how this latter change affected the social composition and framework of communities. It is here that remains of (now permanent) domestic structures—in the form of ovoid, cell, tripartite, or "megaron/pier" rectangular houses—play a key role. Architectural change has come to be seen as reflecting social change in, for example, newly developed strategic floor plans that impeded movement and developed social barriers at places like Basta (Kuijt 2000). Others argue that new building configurations were accompanied by psychological shifts, as households reconceptualized the physical house as symbolic "home" at Qermez Dere (Watkins 1990), Baida, Jericho, Jarmo, Hacilar, and other sites. Architectural changes over time for a single house can also be manifestations of changes in the coresidential group. These dynamic shifts can be brought about by multiple factors such as adjustments to room function, subdivision of private property through inheritance, ideological developments, physical deterioration of the building, or, as at 'Ain Ghazal, shifts in household composition over the course of a few generations (Byrd 2000; Banning 2003).

Perhaps the most progressive studies of prehistoric households in the ancient Near East are centered at the Neolithic site of Çatalhöyük in Anatolia. Exceptional preservation has allowed the multidisciplinary team to examine the entire use life of domestic structures, from construction and habitation to destruction and/or abandonment. The Berkeley Archaeologists at Çatalhöyük (BACH) team meticulously excavated a single house to reveal five major building phases characterized by a series of floors, fire installations, platforms, post-retrieval pits, bins, and niches (Fig. 1; Tringham & Stevanović 2012). Good preservation ensured the recovery of residues from woven baskets, a domed clay oven, and even the entire collapsed roof. These remains served as a template for a modern replica of the Neolithic house where the application of experimental archaeology provided information about the physical experience of living in these prehistoric dwellings, from working in smoky conditions to negotiating the narrow ladder to access the rooftop entrance. Others have focused on the social and psychological roles of houses (*domus*) specifically as the vehicle by which both wild animals *and* humans were domesticated. Though the factors behind human sedentarization remain contentious, Hodder (1992) has argued that Neolithic peoples accepted the constraints of sedentary lifestyles and agricultural production because the institutions of house and home were believed to ensure continuity as well as protection against the various perceived dangers of the outside natural world.

The development and characteristics of households within urban settings have also received increased attention in Near Eastern archaeology. At the dawn of urbanism in the ancient Near East, households appear to have retained productive control over such products like ceramics and chipped stone tools in the face of growing specialization and centrally administered facilities, a dynamic best exemplified at Tell Abu Salabikh (Pollock et al. 1996). This trend continues into the late third millennium BCE. when, at a time of increasing political centralization in the region, it appears that some households chose to acquire select specialist products with a high degree of social visibility, like serving vessels and textiles, instead of producing them domestically. Nonelite households were thus actively engaged in the creation of a social system demarking elite status

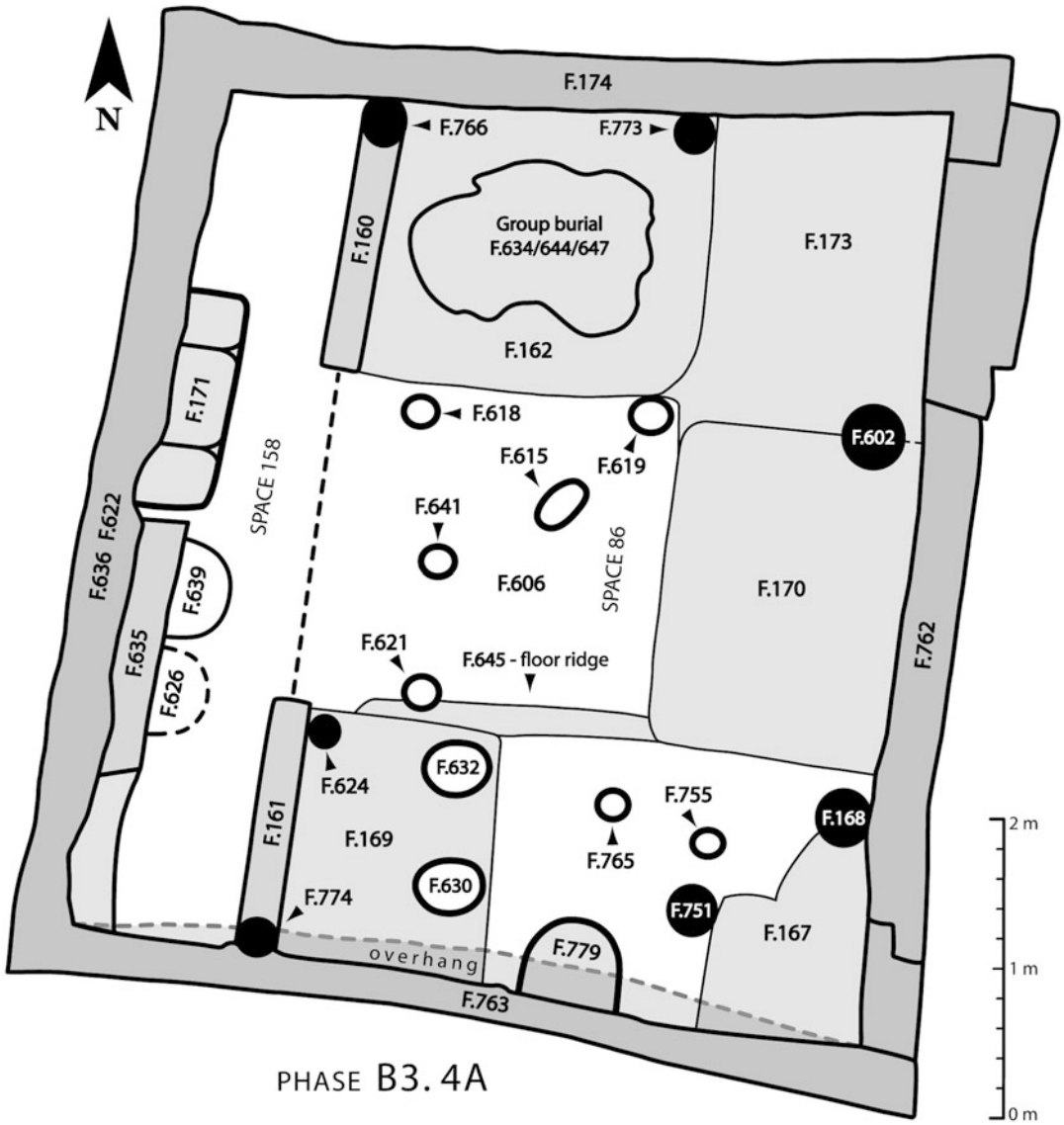

Households in the Ancient Near East, Archaeology of, Fig. 1 An example of a Neolithic dwelling from Catalhöyük (Building 3, phase B3.4A) with raised platforms, an oven in the south, and basins and bins along the west wall (Çatalhöyük Research Project; Reused with permission by Cotsen Institute of Archaeology Press)

through the demand for prestige-laden products (Wattenmaker 1998). These studies illustrate how households played important roles in complex systems of increased craft specialization and centralization, with the simultaneous retention of cottage industries.

In the southern Levant, urbanization—as viewed through a household lens—was a process whereby communities transformed their built environments to create new patterns of economic and political relationships and realign social identities while maintaining kinship bonds and alliances (Chesson 2003). This process was not a determined continuum, but instead a disjointed development that favored an outward ideology of uniformity in domestic

architecture (i.e., "broadhouse" and "front-room" house) and city planning, best seen at sites like Tel Bet Yerah and Arad (Greenberg 2003). Later, household groupings and alliances were to become powerful forces within ancient cities. The work by Stone (1987) at Nippur—which combined architecture, artifact assemblages, textual sources, and analogous patterns of urban residence in Islamic cities of the modern Middle East—shows the structure and life histories of urban households during the second millennium BCE. which determined the long-term social development of particular individual neighborhoods or quarters on a local scale, as well as the city as a whole.

For the Iron Age (c. 1200–612 BCE.), most scholarly attention has been paid to documenting and characterizing domestic buildings in the southern Levant. It is here that a standardized architectural form became dominant between the eleventh and sixth centuries BCE. after a period of development stretching back as far as the thirteenth century BCE. The so-called four-room house and its three-room subtype—composed of living and storage spaces encircling a central open courtyard—have been attested at multiple urban and rural sites including Tell el-Far'ah (N), Tell en-Nasbeh, Shechem, and Beersheva (King & Stager 2001; Schloen 2001). These buildings housed either nuclear or extended families or households, and they can be found in both urban and rural settings (Fig. 2). Until recently, these and other house forms (notably Aegean building traditions) and associated artifact assemblages were examined chiefly to characterize ethnicity ("Israelites," "Philistines," "Canaanites"), group identity, and/or family structure. The power of the text in biblical archaeology has led scholars to ignore aspects of gender, household production, and status in favor of house form and dietary indicators of ethnicity (Yasur-Landau et al. 2011). This is changing as more scholars begin to explore domestic economies, the physical use of space within domestic compounds, and aspects of gender relations that crosscut all household segments.

Still, several fundamental issues remain for the archaeological study of households in the ancient Near East. Beyond studies of prehistoric sites that, on the whole, grapple with the limits of preservation and sample size, other studies narrowly focus on a single house or household group at a site and do not consider its position within the larger contexts of the local community and the region. Households do not exist in a vacuum; they are affected by sociopolitical or economic conditions that exist beyond their front doors. Diachronic investigations are also essential for seeing the entire picture of domestic life; however, archaeologists often do not account for internal fluctuations or variation between household groups over time. Nor do they always consider aspects of natural and cultural formation processes of the archaeological record that not only affect household remains but all ancient contexts. Postdepositional processes are sometimes overlooked in household investigations in the Near East, where there is a frequent assumption that objects are excavated in their place of use. The application of microarchaeological techniques is beginning to address this problem, but their use remains limited.

Deeper theoretical considerations of ancient Near Eastern households are heavily weighted toward prehistoric contexts, where textual documentation is not available. Scholars of these early periods have managed to tease out the subtle nuances of ancient human behaviors, social structures, and cultural underpinnings based on archaeological materials and ethnographic parallels. On the opposite end of the scale, there remain fundamental gaps in our knowledge about later period households, most notably from Neo-Assyrian (c. 883–612 BCE) contexts. In this case, Assyriologists have provided the most information about households of the ancient Near East, particularly royal ones, through letters and inscriptions, but examinations of archaeological data remain woefully neglected. Thankfully, research projects at sites like Ziyaret Tepe and Ayanis in Turkey are beginning to address this lacuna for both provincial Assyrian and Urartian households alike.

Finally, the archaeological study of households has tended to favor the nonelite portions

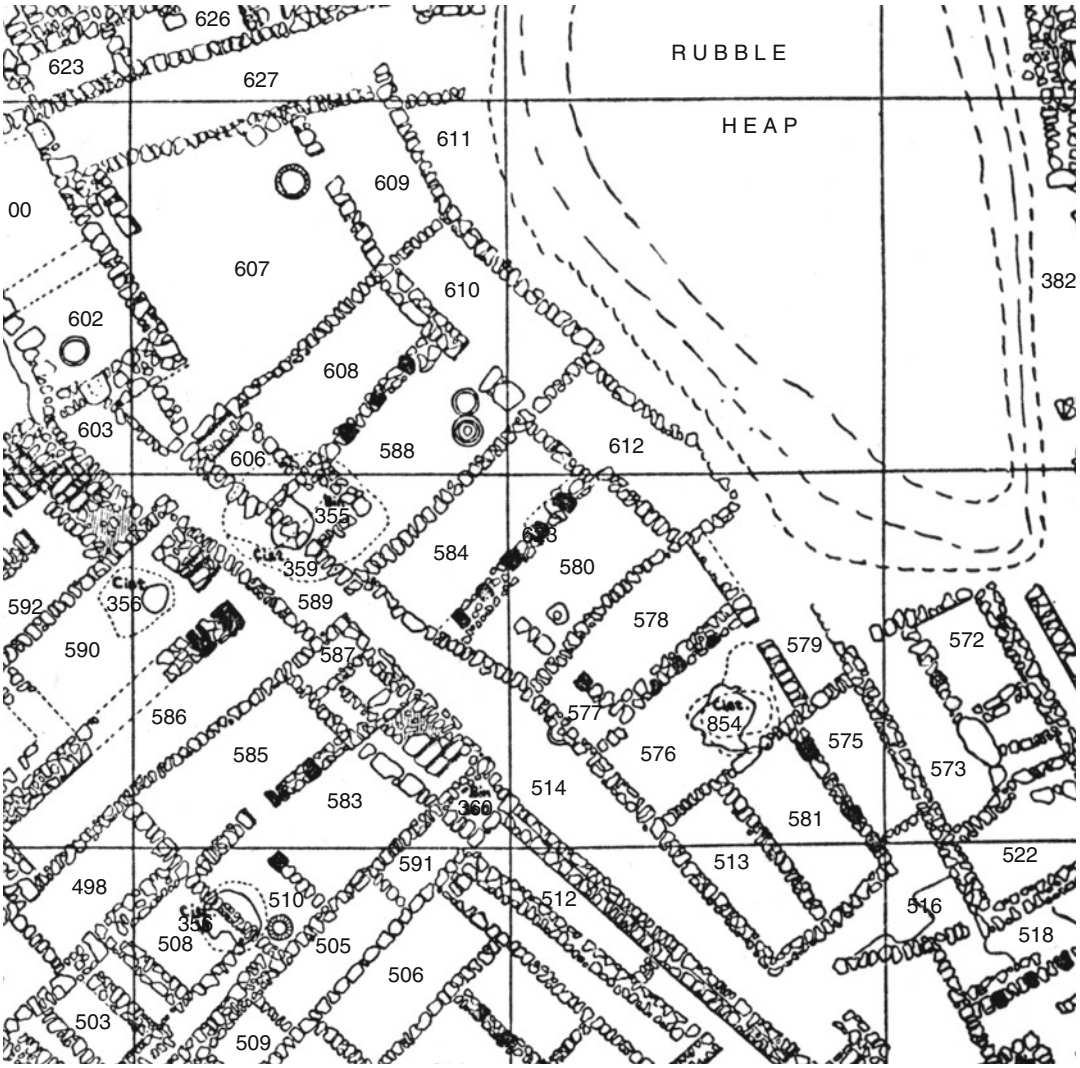

Households in the Ancient Near East, Archaeology of, Fig. 2 Tightly packed Iron Age house compounds with narrow street at Tell en-Nasbeh; scale: one grid square equals 10 m^2 (Reused with permission by Badè Museum, Pacific School of Religion)

of society as scholars seek to understand the daily lives and interactions of the majority of the population. However, the palace was both a place of business and home to the royal family and their attendants and staff and would in theory also be amenable to household archaeological investigation. While legacy collections from excavations during the late nineteenth and early twentieth centuries do not allow for particularly nuanced examinations of palaces beyond architecture and monumental artistic programs, contemporary excavation techniques and household archaeological theory allow scholars the opportunity to reexamine palace life as a lived experience with its own daily rhythms and many social actors.

Houses and households of the ancient Near East form a core dataset by which archaeologists can examine the everyday life of families and communities. They simultaneously offer a glimpse into the mundane and provide a lens by which to magnify the actions of people whose

relationships weave together the fabric of society. Beyond providing basic shelter, houses are embodied spaces that both exhibit and reinforce cultural rules, practices, and beliefs. In short, they are a microcosm of society at large. Their inclusion in any truly holistic investigations of cultural, political, or economic developments within or between sociocultural groups of the ancient Near East is thus imperative (Parker & Foster 2012).

Cross-References

- ▶ Archaeology as Anthropology
- ▶ Behavioral Archaeology
- ▶ Buildings, Archaeological Study of
- ▶ Çatalhöyük Archaeological Site
- ▶ Engendered Archaeologies
- ▶ Ethnic Identity and Archaeology
- ▶ Ethnoarchaeology
- ▶ Hodder, Ian (Theory)
- ▶ Iraq: Archaeological Heritage
- ▶ Jericho Archaeological Site
- ▶ Material Culture and Education in Archaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes
- ▶ Spatial Analysis in Field Archaeology
- ▶ Urbanism in the Ancient Near East
- ▶ Watson, Patty Jo

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Hrdlička, Aleš

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Basic Biographical Information

Aleš Hrdlička, a pioneer of American biological anthropology, was born in 1869 in Humpolec in the Vysočina Region located between Prague and Brno in the present-day Czech Republic. Hrdlička was a founder of the Division of Physical Anthropology at the US National Museum of the Smithsonian Institution (now the National Museum of Natural History, under the same institution), and of the *American Journal of Physical Anthropology* – one of the 10 most influential biology and medicine journals of the century.

At the time of his youth, the area where he was born belonged to the Austro-Hungarian Empire. The Empire had an excellent system of education encouraging intellectual development of all children, irrespective of their socioeconomic status. From an early age, Aleš, the oldest of the seven children of an artisan cabinet maker, showed great aptitude for learning and interest in natural history. When he emigrated with his father to the United States of America at the age 13 years, he had to work in a cigar factory to help his father to earn a living for the family who followed them later to America. Hrdlička completed his education at evening courses.

At the age of 18, Aleš fell seriously ill with typhoid fever and tuberculosis. This period of illness led to his interest in studying medicine. He entered the Eclectic Medical College in New York, graduating as the first in his class in 1892 and continued his studies for the next two years in the New York Homeopathic Medical College. After graduation in 1894, he became a physician at the State Homeopathic Hospital for the Insane in Middletown, New York. Following his early education that compelled him to conduct objective observations, he became interested in reliable measuring of the human body and the brains and started his lifelong research in anthropometry and physical anthropology. Moving as a researcher to the newly established Pathological Institute of the New York State Hospital, he had an opportunity to travel to Paris to study biological anthropology in the Ecole d'Anthropologie with Leon Manouvrier, the successor to Paul Broca, the founder of the Ecole.

Upon return to New York, Hrdlička applied his skills in anthropometry to accumulate large samples of measurements of patients in various hospitals by involving about 20 collaborators. As a physical anthropologist, Hrdlička joined the Hyde Expeditions which were run by the American Museum of Natural History and nominally overseen by Frederick Ward Putnam of the Peabody Museum at Harvard. At the turn of the

twentieth century, these expeditions were exploring all aspects of archaeology and anthropology of the American Southwest. During those regular trips to the Southwestern United States and Mexico, he accumulated observations on Native Americans that sparked his interest in their origin. When in 1903 the National Museum in Washington, DC created the new Division of Physical Anthropology, Hrdlička was given charge of this Division as an Assistant Curator. Promoted to full Curator seven years later, he remained in the Division for the rest of his career, finally retiring in 1941.

Major Accomplishments

During his studies that took him all over the world, he accumulated extensive osteological collections for the Museum, later renamed the Smithsonian Institution. These collections remain an important resource for anthropological studies, though many are now subject to repatriation. He was an indefatigable missionary for the discipline of physical anthropology establishing in 1928 the American Association of Physical Anthropologists which today is the largest, and to a certain extent international, association of biological anthropologists in the world. Although a leading figure in American anthropology, Hrdlička did not neglect his country of origin. He subsidized the foundation of a Chair of Anthropology at the Charles University in Prague that is still an important center of biological anthropology today. He also funded exploration of prehistoric sites by Czech Academy of Sciences and Arts. There is the Hrdlička Museum of Man in Prague and International Anthropological Congresses of Aleš Hrdlička are regularly organized by Czech anthropologists.

Aleš Hrdlička was principally an observer and a describer rather than a theoretician. He precisely measured large numbers of human skeletal remains of various peoples all over the world. Working in the era when physical anthropology was heavily involved in the studies of human races and their dangerously misinformed outgrowth of racism, he largely avoided drawing any conclusions about the superiority of one race over others. He maintained that all human races had a common origin in the Old World. His meticulous studies of Native Americans lead him to postulate that Americas were settled fairly recently (in the last 15,000 years) by people moving in from Asia through Bering straits.

There are more than 350 items in Aleš Hrdlička's bibliography. From the year of his graduation in 1894, he published an average of eight papers a year. Among his most important books are the following: *Catalogues of Human Crania in the U.S. National Museum* (1924, 1927, 1928, 1940, 1944); *Brain Weight in Vertebrates* (1905); *Physiological and Medical Observations among the Indians of Southwestern United States and Northern Mexico* (1908); *Early Man in South America* (1912); *Anthropometry* (1920) republished as expanded *Practical Anthropometry* in 1939; *The Skeletal Remains of Early Man* (1930); *Melanesians and Australians and the Peopling of America* (1935); *Diseases and Artifacts on Skulls and Bones from Kodiak Island* (1941), and *Alaska Diary* (1943).

Although married twice (1896 and 1920), Hrdlička had no children. He was considered by many as a man of authoritarian character delivering arbitrary judgments. In the words of M.F. Ashley Montagu (1944), an American anthropologist and humanist who popularized major themes of anthropology "Hrdlička was a kindly soul, and appeared much more formidable than he really was." This agrees well with the translation of his name into English – a turtledove. Aleš Hrdlička died on 5 September 1943.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Demographic Transitions
- ▶ Osteology Reference Collections
- ▶ Osteology: Definition

▶ Pathological Conditions and Anomalies in Forensic Contexts
▶ Skeletal Biology: Definition

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Huashan Mountain Petroglyphs

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Introduction

The Huashan Mountain petroglyphs are located in Ningming County, Guangxi Province, in southern China. In addition to the rock art of Huashan Mountain itself, a total of 79 petroglyph sites, painted in a similar style and on steep cliffs, have been found along the Zuojiang River in this region. These petroglyphs usually are found at elevations higher than 20 m above the ground or water surface (i.e., for cliffs fronting the river) and can extend up to 80–120 m above the surface (Figs. 1, 2, 3, and 4).

Huashan Mountain Petroglyphs, Fig. 1 Details of the most well-known site

Huashan Mountain Petroglyphs, Fig. 2 Main panel

Huashan Mountain Petroglyphs, Fig. 3 Details of one of the panels

Huashan Mountain Petroglyphs, Fig 4 Detail of one motif

Definition

All the images are painted in varying hues of reddish-brown color. While human figures are most commonly represented at all these sites, representations of dogs, birds, and implements such as knives, swords, and bells are also found. While some humans seem to be dancing or performing other ritual acts, some are seated in boats, and a few appear to be engaging in sexual intercourse. Huashan Mountain itself is the largest of the known sites in this region. About 1819 figures can be seen on a cliff 210 m wide and extending 50 m above the Zuojiang River.

Key Issues/Current Debates/Future Directions/Examples

Based on implements interpreted from the images, associated archaeological materials, and C-14 dating, it is estimated that the Huashan petroglyphs were drawn in four stages sometime between the early Warring States Period and the Han Dynasty (c. 475 BCE–CE 220). The initial stage dates to the early and middle period of the Warring States. The main fluorescence of the paintings was in the second stage, between the later Warring States Period and the early period of the Western Dynasty. While still flourishing, rock painting began to decline during the middle and later period of the Western Han Dynasty. The fourth and final stage of painting took place during the Eastern Han Dynasty.

According to the historic records, the rock paintings were executed by the ancestors of the modern "Zhuang" people, the largest native ethnic group in the Guangxi region. According to Zhuang myths, legends, and traditional religious beliefs, the ancestor deities have many functions. The Huashan petroglyphs express the worship of ancestors to invoke their aid in preventing natural disasters of flood and drought, to ensure a flourishing population, and to bless and protect Zhuang warriors.

The Huashan rock paintings were drawn mainly by outlining of figures in rough lines and in a style of primitive simplicity without details. The artists were rather good at composition, clearly portraying the main characteristics of human figures, animals, and implements. These petroglyphs use strong color and primitive lines, emanating an atmosphere of great zeal and mystery. The Huashan petroglyphs exhibit a style that is distinct from that of other regions.

All the Huashan petroglyphs show evidence of damage to varying degrees from a combination of natural and man-made causes. Many images have become incomplete and blurred, and some of them cannot be recognized. Sometimes there are only some mottled spots left. So far, there has not been any effective scientific means to prevent further damage from the natural elements, even if protected from human-caused damage. It is necessary to organize concerned experts to carry out experiments and scientific research to identify ways to better conserve these petroglyphs. At the same time, these and other rock art need to be protected from human-caused damage. This work would benefit from collaboration between rock-art specialists and concerned scientists in China and abroad.

The rock art of the Huashan Mountain region is the precious cultural heritage left by the ancestors of the Zhuang people. The grand scale of the rock painting and its stylistic characteristics are seldom seen in other places. It has great academic value for cultural and religious history, archaeology, and the history of fine arts. It is natural that interpretations of this rock art vary in different academic circles at present, but we are confident that the differences will be reduced with further scientific research.

Cross-References

- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of

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Human Evolution: Molecular Timescale

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Introduction

The timescale of human evolution and dispersal has long been a source of research interest. Past estimates of this timescale were based on palaeontological, archaeological, and linguistic evidence. Molecular data were first brought to bear on this question in the 1960s, when Sarich and Wilson (1967) studied the albumin protein to infer the timing of the human-chimpanzee divergence. At the time, their estimate of 5 million years was controversial because it was generally believed that humans had split from the other great apes much longer ago. Subsequent molecular analyses have looked not only at the time of divergence of modern humans from other hominids, but also at the divergences among human populations.

Molecular estimates of the timescale of global human dispersals have largely been based on DNA data from the mitochondrial genome, which is inherited maternally. The mitochondrial genome does not recombine, meaning that the genealogical history of the entire molecule can

be explained by a single tree. The mutation rate of the mitochondrial genome has been analysed in detail across various scales, ranging from studies of pedigrees to comparisons with DNA from other primates.

Date estimates from mitochondrial DNA are in broad agreement with those obtained using palaeontological and archaeological data, at least in terms of the temporal order of demographic events (Endicott et al. 2009). On current evidence, modern humans arose in Africa more than 100 thousand years ago and dispersed to Eurasia and Australasia less than 60 thousand years ago. Colonisation of the Americas occurred after the Last Glacial Maximum, whereas settlement of remote regions of the Pacific, including New Zealand, did not commence until 3–4 thousand years ago.

In recent years, improvements in sequencing technology have enabled researchers to overcome the problems of contamination when working with ancient hominin specimens. These developments have provided access to genetic data from ancient modern humans, Neanderthals, and Denisovans (e.g., Reich et al. 2010). Analyses of these data can provide an estimate of the evolutionary timescale of modern humans and our close relatives.

Definition

The Molecular Clock

Molecular estimates of evolutionary timescales are obtained using the molecular clock. The molecular clock hypothesis states that DNA and protein sequences evolve at rates that are relatively constant over time and among lineages (Zuckerkandl & Pauling 1962). Consequently, the difference between any two DNA or protein sequences is proportional to the time since they last shared a common ancestor. This relationship can provide a very useful method for inferring evolutionary timescales from molecular sequence data, complementing the estimates derived from other sources of evidence. Since its development in the 1960s, the molecular clock has become an essential tool in many areas of evolutionary biology (Bromham & Penny 2003).

In practice, the assumption of a strict molecular clock is rarely met. Rates of molecular evolution can vary significantly among lineages, even among populations within a species. Different lineages vary in their demographic history, exposure to natural selection, and physiological characteristics, all of which can influence the rate of molecular evolution. The evidence for heterogeneity in mutation rates has inspired the development of 'relaxed' molecular clocks. In these models, the molecular rate is allowed to vary among lineages (for a review, see Welch & Bromham 2005). By modelling this variation in a controlled manner, it is possible to estimate the evolutionary timescale even when there is considerable rate variation among lineages.

With both strict-clock and relaxed-clock methods of genetic analysis, the most important consideration is how to calibrate the molecular clock. To do this, it is necessary to know the absolute age of some evolutionary divergence event, such as the split between humans and chimpanzees. An estimate of the timing of these events can be gained by examining the fossil record or by correlating the evolutionary divergence with an event of known age (such as a colonisation event that can be dated archaeologically). Once the evolutionary rate is calculated using such a calibration, it can then be applied to other organisms and individuals to estimate the timing of evolutionary events.

Key Issues/Current Debates

Molecular estimates of the timescale of human evolution and dispersal are broadly similar to those derived from palaeontological and archaeological data. Nevertheless, persistent discrepancies are observed, with molecular evidence generally supporting a more protracted timescale for the global dispersal of modern humans. Some researchers regard this as a challenge to the reliability of genetic estimates.

There are several grounds for such concerns, as described below.

Molecular estimates of the human evolutionary timescale are usually made by adopting a published estimate of the DNA mutation rate. For example, there are several "standard" mutation rates that are utilised in studies of mitochondrial DNA (for a review, see Endicott et al. 2009). Most of these rate estimates have been calibrated with reference to the human-chimpanzee divergence. Use of this calibration normally relies on the assumption that the genetic divergence between humans and chimpanzees occurred about 6 million years ago, and that subsequent molecular evolution has been relatively homogeneous.

The assumptions underlying the human-chimpanzee calibration, however, are not necessarily valid. First, there is uncertainty over the exact timing of the human-chimpanzee split. Molecular estimates vary from 4 to 8 million years, whereas there is fossil evidence that the divergence occurred at least 6 million years ago (White et al. 2009). The process of estimating this calibration from the fossil record is further complicated by virtue of the fact that the physical characteristics of the last common ancestor of hominids are not known. Moreover, the timing of genetic divergence does not always coincide exactly with the timing of speciation, introducing an additional source of uncertainty.

The second assumption is that the molecular evolutionary process has remained unchanged over time. This assumption of homogeneity is reflected in the use of methods based on a strict molecular clock. However, parts of the mitochondrial and nuclear genomes are subject to various forms of natural selection. These include purifying selection, which removes detrimental mutations from the population. This produces a pattern of excess mutations in younger lineages because purifying selection is incomplete (Kivisild et al. 2006). In turn, rates of molecular evolution appear to be higher in younger branches of the human genealogy (Henn et al. 2008).

In view of these concerns, there is a need for a rigorous evaluation of current practices. The growing availability of genomic data and improvements in computing power present an excellent opportunity for methodological development. For example, relaxed molecular clocks allow different mutation rates among lineages, whereas multiple age calibrations derived from archaeological or palaeontological sources, along with their associated uncertainty, can be incorporated in a molecular dating analysis (Ho & Phillips 2009).

Some researchers have attempted to address the problem of purifying selection by restricting their analyses to synonymous mutations in the coding region of the human mitochondrial genome (Loogväli et al. 2009). Synonymous mutations in protein-coding genes are considered to be under minimal selection, because they do not change the proteins that they encode. Non-coding regions in the nuclear genome can also be used to minimise the impact of selection.

Other researchers have proposed a post-hoc correction formula for molecular evolutionary rates (Soares et al. 2009). In these models, mutation rates are assumed to vary in a predictable manner over time.

Date estimates of the last common ancestor of humans and of their expansion from Africa vary according to the evolutionary rate and methodology employed to estimate them. These differences can be substantial and have led to irreconcilable interpretations of human prehistory. For example, based on mitochondrial estimates, it has been widely promulgated that humans left Africa and arrived in Australasia, via South Asia, around 20 thousand years before they appear in the archaeological record of the Levant and Europe. This hypothesis, however, does not receive support from archaeology and palaeoanthropology, and stands in contrast to other genetic estimates from both mitochondrial DNA and nuclear genome sequences (Gronau et al. 2011). Nevertheless, the route that humans took out of Africa and the timing of their arrival in the Levant, from where they are presumed to have settled Europe, remain key research topics in human evolution and will continue to generate hypotheses that can be tested with genetic data.

Future Directions

Molecular estimates of the timescale of human evolution and dispersal are continually improving as a result of methodological advances and growing data availability. Nevertheless, considerable work remains to be done on several aspects of genetic dating. First, reliable calibrations need to be identified. This will improve the accuracy of timescale estimates and will allow better quantification of molecular rate variation among lineages. Second, there needs to be development of methods that can handle large amounts of data, such as complete nuclear genomes. Third, the impact of confounding factors needs to be reduced. This can be done by developing improved models to account for the effects of purifying selection and mutational saturation.

With the growing availability of data and the continual improvement of analytical methods, we will gain a better understanding of the timescale of human evolution and dispersal. This will provide a useful framework for studying the evolutionary tempo and mode of our own species.

Cross-References

- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Human Evolution: Multiregional Origins
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies

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Human Evolution: Multiregional Origins

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Introduction

Understanding human phylogeny has always been contentious. For more than a century after

Darwin, human phylogeny usually reflected current racial taxonomy. Through the end of the nineteenth century and into the twentieth, most paleoanthropologists and paleontologists were evolutionary polygenists who essentially described human races (=subspecies) as having independently evolved from different primate species, some ancient and others more recently (Wolpoff & Caspari 1997). In the twentieth century, evolutionary polygenism had come to focus on the independent evolution of human races (=subspecies) from a single prehuman hominid ancestor. The key element all variations of evolutionary polygenism had in common was the independent evolution of human races for so long that the races acquired their humanity separately (Wolpoff & Caspari 2000).

Even in its heyday evolutionary polygenism was not accepted by all paleoanthropologists, and after the end of the Second World War, as biological races lost any vestige of scientific validity (Caspari 2010), prominent evolutionary schemes could no longer be based on them (at least, not without repercussions). This polarized the developing interpretations of human variation and consequently theories of human evolution. For some, variation in the human fossil record was elevated to become species variation, a viewpoint prominent among scientists who accepted the punctuated-equilibrium theory. For others, the taxonomy of human variation was reduced to a lower level, and the null hypothesis became one of a single species lineage. A reduced number of species lineages were recognized in the human fossil record, and only one in genus *Homo* (at the extreme, see Wildman et al. 2003). The predominant single lineage model for *Homo* (Wolpoff et al. 1994) is explained by the hypothesis of Multiregional Evolution (Wolpoff et al. 1984, 2000).

Definition

Multiregional Evolution describes the pattern of Pleistocene human evolution (Thorne & Wolpoff 1992). It describes a long-term evolution of central (African) and peripheral populations in the widespread polytypic human species that, in recent times with expanding populations, changed to no longer be polytypic (Wolpoff et al. 1984). This evolutionary pattern was structured by the initial and ongoing geographic dispersals of human populations (Hawks 2011) and their continued interconnections through gene flow and population movements allowing adaptive genes and behaviors, under selection, to spread throughout the human range. The key aspects of the multiregional pattern combine global evolutionary changes under selection, as adaptive genes disperse (Hawks & Wolpoff 2001), with continuity over time for regionally prominent features in various parts of the world, especially the peripheries – "regional continuity" (Wolpoff et al. 1984; Wolpoff 1989). This is an ethnogenetic pattern (Moore 1994) in which populations exist within a network, usually with both multiple ancestors and multiple descendents, and the trends in human evolution are universal as genes under selection evolution disperse throughout the network of interconnected populations.

Multiregional Evolution, in Templeton's words (2007: 1511), "is not just a single alternative of recent human evolution, but rather is a class of models. . . . Population genetic theory and observations indicate that there is a broad range of conditions that will result in this pattern." Examples of this class of models, besides those directly described as Multiregional Evolution, include the "assimilation model" (Smith et al. 2005), "hybridization with continuity" (Wu 1998), and "regional continuity" (sensu stricto) from Trinkaus (2007). Constructs such as the "Afro-European sapiens hypothesis" (Bräuer 1984) might also be considered this way, but the fit is not as clear.

The human species was quite small for most of the Pleistocene, totaling as little as one million or less (Eller et al. 2004). Multiregional Evolution is a consequence of its population structure and the fact that its populations were intermittently connected in a network of gene flow and population movements. It is likely that half or more of the human species lived in Africa, until the still ongoing population expansions beginning at the end of

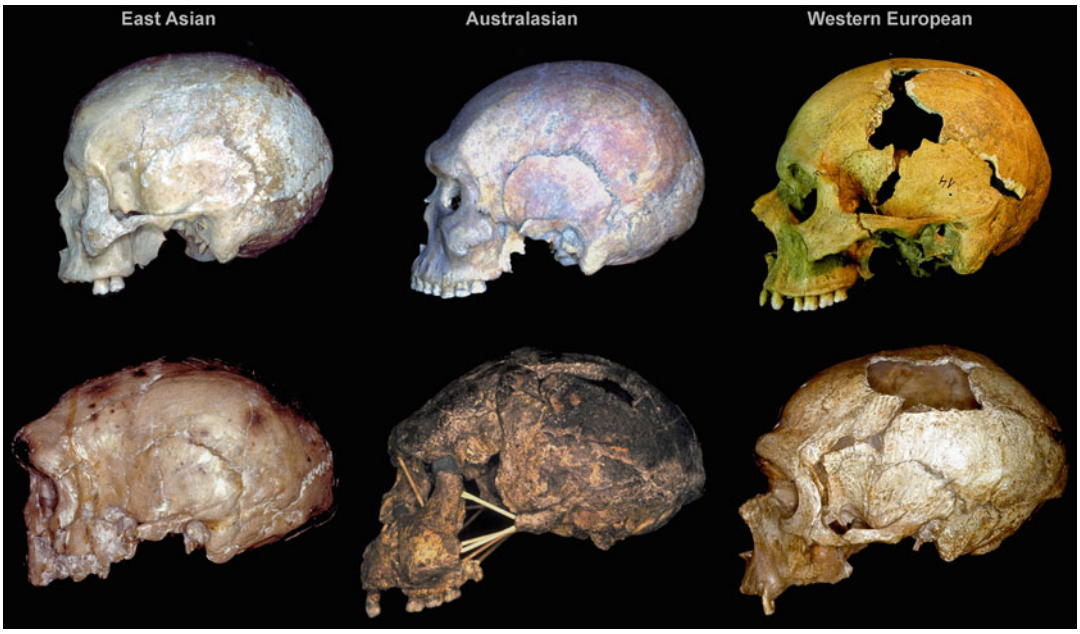

Human Evolution: Multiregional Origins, Fig. 1 The multiregional pattern at the human peripheries is shown in the comparison of archaic humans (*below*) from East Asia (Dali, *left*), Australasia (Sangiran 17, *center*), and Western Europe (La Chapelle Neandertal, *right*) with their recent counterparts. Regional features include, among other things, prognathism (little, alveolar, total facial), cheek orientation (forward or side facing), and nasal projection. In all cases, the recent crania (*above*) are higher, shorter, and rounder with smaller faces and less prominent buttresses, reflecting global changes in the human species

the Pleistocene, and this superimposes the multiregional pattern across the human range because the direction of gene flow across this interconnected network is very often from the center of the human range, where there were more people, to the various edges. In our first description of Multiregional Evolution (Wolpoff et al. 1984), we described a "center and edge" pattern in which most gene flow went from the African center with its large population to the more sparsely occupied peripheries. This has been a persistent pattern in the Pleistocene; the movement of genes from the center often brought new adaptive genes to the peripheries, but regional features were also maintained there, and at no time did the African features fully replace the regional ones. Two elements combine to strengthen this pattern: (1) the fact that with more people there were more adaptive mutations in Africa and (2) the several distinct dispersals out of Africa (Templeton 2007) that superimpose over lesser magnitudes of sporadic, continued gene flow.

The conditions are different at the peripheries where some differences between populations appeared (Fig. 1) – in human evolution, these are regions such as China, Europe, and Indonesia – where gene flow across the network of interconnected populations "can be a strong force that inhibits peripheral populations from evolving to their local ecological optima . . . as a result peripheral populations experience persistent directional selection" (García-Ramos & Kirkpatrick 1997), the "center and edge" effect. This pattern of variation, relating the center and the various edges of humanity, is reflected in the regional continuity of different anatomies in different places that extended beyond the time of initial colonizations (Wolpoff et al. 1984) and through continued Pleistocene dispersals (Templeton 2007). But finally, as the significant population expansions and movements of the late Pleistocene and more recent times began (Hawks et al. 2007), the ancient pattern of distinct regional differences (subspecies) was obscured.

One consequence is that today variation within populations is greater than variation between populations, and subspecies (biological races) do not exist. Only some manifestations of the Pleistocene population structure can be found in recent populations (Fig. 1).

The key insight of Multiregional Evolution is that it describes evolutionary changes *within* an evolving species (lineage), not evolution as one species replaces another. Evolutionary history and local adaptive variations are related by selection throughout the Pleistocene, to account for how genetically interconnected populations in the widespread human species developed and maintained significant geographic differences, while the dispersal of adaptive genes under selection accounts for the global, adaptive evolutionary changes. Toward the end of the Pleistocene, this global pattern was increasingly obscured, as dramatic population size expansions from approximately one million humans, with concurrent dispersals and some population extinctions in the Neolithic, came to characterize the still expanding human species.

Key Issues/Current Debates/Future Directions/Examples

There have been ongoing debates about Multiregional Evolution since its first publication 30 years ago. If correct, the Eve replacement theory would be the disproof of Multiregional Evolution, and the question of whether this disproof is valid is the most important recent debate. The Eve replacement theory posits that human evolution occurred by speciation and modern humans originated from a single, unique ancestral population living between 100 and 200,000 years ago in Africa that gave rise to and closely relate all of humanity. It would mean that modern humans are a new species that replaced all archaic populations without mixture. Like any theory, the Eve replacement theory can be tested, and new discoveries have made this alternative theory invalid to its supporters:

> The recent finding that significant interbreeding occurred between Neanderthals and modern populations refutes the long-standing model that proposes all living humans trace their ancestry exclusively back to a small African population that expanded and completely replaced archaic human species, without any interbreeding (d'Errico & Stringer 2011: 1060).

Even before these findings, anatomical evidence from the human fossil record indicated that at the furthest peripheries of Europe and Australia, there is statistically significant evidence for dual ancestry of the earliest modern populations, one in African descendants and the other in local archaic populations (Wolpoff et al. 2001).

Subsequent studies of ancient genes and the human genome reveal more key details about past population movements and structure and directly address the multiregional issue. Neandertal genes dispersed under selection, in many cases long after the genes first appeared, into non-African populations where they led to significant adaptive changes (Hawks et al. 2008; Green et al. 2010). Neandertal genes persist in both Europe and Asia, but for the most part, the persisting genes in these two regions are different. This suggests two things: (1) a common region where the mixture took place – almost certainly the Levant, where anatomical evidence (Fig. 2) first suggested mixture of Europeans with Africans for more than a half-century, and (2) the likelihood that very small populations were involved in the incidences of mixture, wherein random loss of genetic variation from drift could play a significant role.

Nuclear DNA of a non-Neandertal specimen from Denisova Cave in Siberia (Reich et al. 2010) provided further evidence of intermixture, between a different lineage of archaic hominids and other ancestors of modern humans. The Denisovan and Neandertal lineages share a common ancestor that is more recent than the common ancestor with Africans. In further work, Skoglund and Jakobsson (2011: 18301) concluded:

> In addition to the previously reported gene flow between Neandertals and non-Africans as well as gene flow between an archaic human population from Siberia ("Denisovans") and Oceanians, we found a significant affinity between East Asians, particularly Southeast Asians, and the Denisova

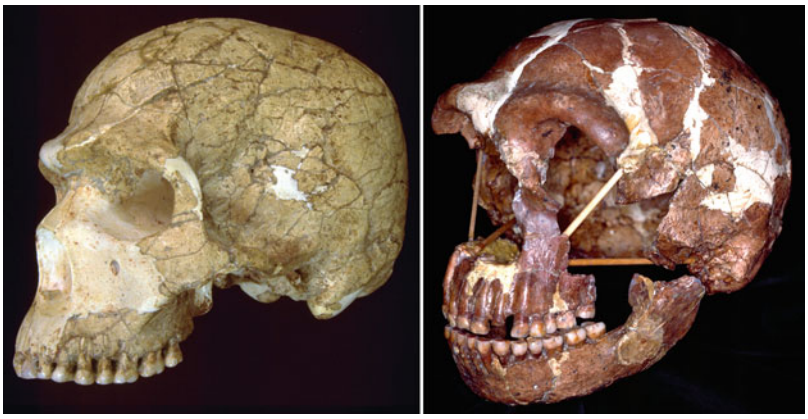

Human Evolution: Multiregional Origins, Fig. 2 Middle Paleolithic Levant specimens from Skhul (*left*) and Tabun (*right*) contrast anatomies that may reflect (respectively) primarily African and European descent. Some authors have regarded these two as "early modern" and "Neandertal" crania, but anatomy and archaeology reveal that these and other Levant specimens from the Middle Paleolithic reflect mixed descent

> genome. . . .These results suggest admixture between Denisovans or a Denisova-related population and the ancestors of East Asians.

The extent of mixture between these two archaic lineages and Africans was significant and persistent; ancient populations, meaning Neandertals and the Denisovan Asians, account for some 8 % of the ancestry of living non-Africans in one estimate from Reich and colleagues (2010). This is a substantial percentage, given the likelihood that these were small, peripheral populations at the northern margin of the Eurasian range. This growing body of new information fleshes out the details of Multiregional Evolution in ways that the fossil record could not address. The perseverance of Neandertal and Denisovan genes in significant numbers marked the end of the Eve replacement theory. But support for Eve replacement will not end so easily because science is a *human* activity.

Cross-References

- ▶ Fossil Records of Early Modern Humans
- ▶ Human Evolution: Theory and Progress
- ▶ Journal of Human Evolution
- ▶ Out-of-Africa Origins

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Human Evolution: Theory and Progress

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Introduction

In one of the most remarkable understatements in the history of science, Charles Darwin wrote about his theory of evolution by natural selection that "light will be thrown on the origin of man and his history" (Darwin 1859: 488). That was practically all Darwin was prepared to share about the consequences for humankind of his theory in the *Origin of Species*, the seminal work on modern evolutionary ideas. But everybody around him immediately understood the implications, and as archaeological evidence and human fossil remains accumulated during the nineteenth and twentieth centuries in combination with genetic data, theories of human origins eventually became the science of human evolution.

Often overlooked, but central to Darwin's original method and the force of his argument, is the power of converging evidence from a number of different disciplines and bodies of knowledge. For the general theory of evolution, these originally included geology, paleontology, zoology, botany, physiology, anatomy, and, famously, selective breeding. Similarly, human evolutionary studies today are characterized by their multidisciplinarity. Whereas archaeology and paleoanthropology have been central to defining early human history, pushing the chronological boundaries of the first of everything further back in time, they no longer stand in unique positions to the understanding of the evolutionary history of humans.

Definition

Every extinct and extant species on earth have resulted from the same evolutionary processes determining the way they are through shaping their morphology, physiology, and behavior. The traits specific for the human species are the result of the same evolutionary processes responsible for any other living creature. From a general evolutionary perspective, humans are consequently no different than any other species on the planet. Human evolution refers to the natural process involved in the evolutionary history of all members of the human clade (consisting of *Homo* and other members of the human tribe, *Hominini*, after the split from chimpanzees and bonobos). Members of the human clade are referred to as hominins. Previously, the date, nature, and identity of the last common ancestor between modern humans and their closest living relatives were determined on the basis of comparative anatomy of living species and fragmentary fossil remains. Today, molecular genetic data play an increasing role in establishing phylogenetic relatedness between hominoids, the superfamily including all living and extinct ape and human species. Theories of human evolution refers to the complex defining methods, practices, hypotheses, models, explanations, and interpretations of data, answering the question what makes us human from an evolutionary perspective.

Historical Background

Nineteenth-century discovery of early human archaeological and fossil remains led to a systematic investigation of human origins using a scientific explanatory framework. The gradual

acceptance of deep time that eventually included humans gave rise to the scholarly division of human history into history and prehistory. Deep history was connected to a deep evolutionary ancestry with the introduction of the scientific theory of descent with modification. A number of key events and publications were instrumental in shaping early theories of human evolution, including among others the publication of Darwin's *Origin of Species* (1859) and *Descent of Man* (1871), Charles Lyell's *Geological Evidences to the Antiquity of Man*, Thomas Henry Huxley's *Evidence as to Man's Place in Nature* (1863), and John Lubbock's *Pre-Historic Times* (1865), the discovery of Neanderthals in Gibraltar, Belgium, Germany, and France, along with archeological artifacts such as stone tools and kitchen midden remains from early settlements, and cultural expressions such as cave paintings found in Spain and France.

From the second half of the nineteenth century, theories of human evolution were largely driven by discoveries. Archeological evidence, which includes any objects that have been made by hominins, played an important part in generating evidence and establishing theories about the behavior of early modern humans. Comparative anatomy, which reasons that organisms that are closely related to each other share many anatomical similarities, was another source of knowledge establishing evolutionary kinship. But fossil evidence was generally seen as most important to prove evolutionary theory right, leading to a race to find the Missing Link connecting humans and apes (Reader 2011; Kjærgaard 2011).

With a limited fossil record, many questions in human evolution remained speculative. It was thus more a theoretical preference and indeed the order in which fossils were discovered at different locations that determined the favored geographic local of human origins. Darwin had tentatively suggested Africa, but he was a minority. Asia was generally seen as the most likely place for the cradle of humankind, which was supported by Eugène Dubois' recognition of the first *Homo erectus* (1891–1892) found, at the time known as the Java Man echoing the location of the excavations. With a number of fossils turning up in Germany, France, Belgium, and Britain, including the first recognized Neanderthal (1856), *Homo heidelbergensis* (1907) and the notorious Piltdown Man (1912), Europe entered the race to find the first human. The discovery of *Australopithecus africanus* in South Africa 1924 was initially met by skepticism and the location of the true origin of humans remained undecided.

With the increasing number of early human fossils, in particular from Africa (Fig. 1), the resolution of the human family tree got better. But still with so few fossils to build ancestral phylogenies, there continued to be great difference in opinion among leading paleoanthropologists. Some argued for few species, others for a larger variety of early hominins. These groups are commonly referred to as lumpers and splitters. The scarcity of fossil data also made room for radically diverging interpretations of the human family tree. For decades, there were two coexisting theories. The "out of Africa hypothesis" stressed descent of modern humans from a single common ancestor with a growing support for an African origin. The other so-called multiregional theory argued for a multi-linear theory of descent postulating regional origins of modern humans from different ancestral species. With the tides turning in favor of the "out of Africa hypothesis" in the 1980s, the multi-linear model gradually went out of fashion. Following the "fossil explosion," which has seen 11 new species and four new genera named since 1987, understanding of the range of variation in the hominin phenotype was much improved. Two further developments have since revolutionized the empirical base supporting human evolution and emphasized the importance of transdisciplinary enquiry: dating technologies and genetics.

Dating Challenge

There are four primary dating technologies: radiogenic isotopes, paleomagnetism, thermoluminescence, and electron spin resonance. Henry Becquerel, French physicist, discovered the natural radioactive decay of uranium at the turn of the twentieth century. Further work by Ernest

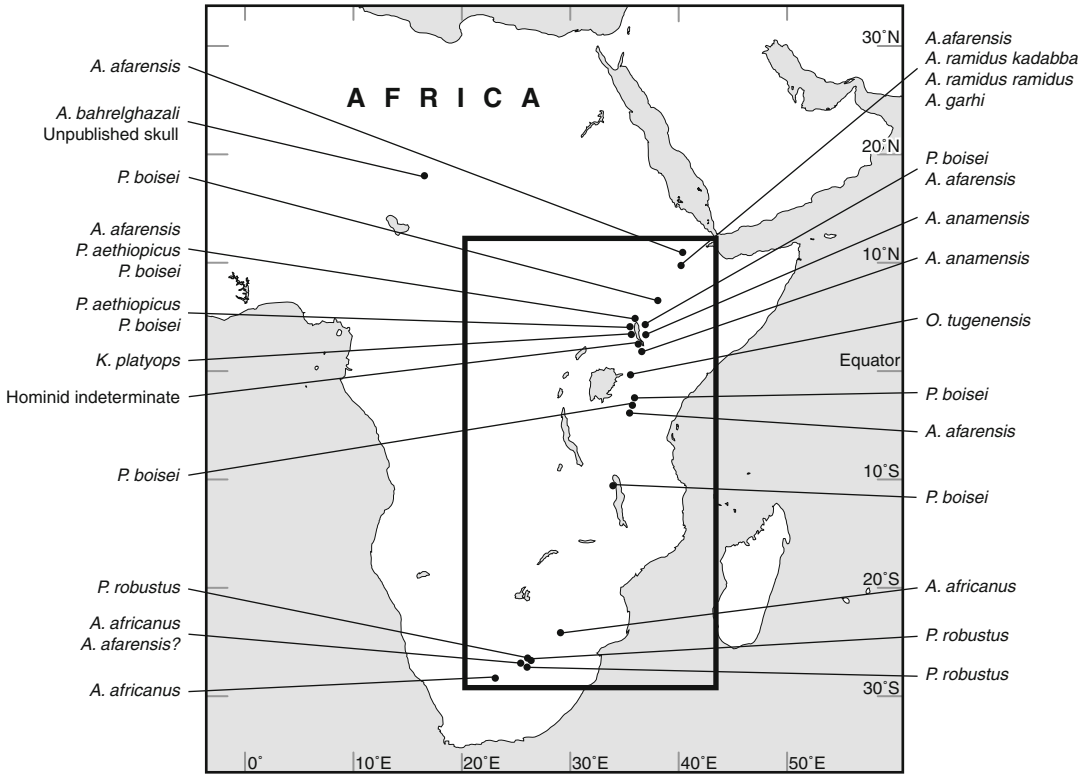

Human Evolution: Theory and Progress, Fig. 1 Map of Africa showing the locations where key hominin species have been found

Rutherford and Bertram Borden Boltwood indicated that the predictable decay of radioactive elements could be used to keep track of time. Not only did it confirm the earth to be billions years old, it provided the earliest empirical time scale for the fossil record. Common chemical elements used in dating include Argon, Carbon-14 (radiocarbon), and Uranium (Fig. 2). Which elements researchers use depends on how quickly they decay. For example, Carbon-14 dating is extensively used to date organic finds 60 Ka and younger as it has a relatively short half-life (the time it takes for one half of the atoms in Carbon-14 to disintegrate) of about 5,730 years. It has allowed us to accurately document the origins of agriculture, around 12 Ka ago, by dating the remains of animals and plants (Zeder 2011). Argon in contrast has a longer half-life and is extremely useful in dating finds older than 10 Ka. Argon-Argon dating has been used to date many of the fossil sites in East Africa and was also used to date hominin remains at Dmanisi in Georgia to 1.8 Myr old (Garcia et al. 2010).

Paleomagnetism uses the direction of magnetic particles in layers of sediment and compares these to the known shifts in the Earth's magnetic field over time. These shifts can be full reversals when the north magnetic pole suddenly becomes the south magnetic pole, or smaller changes in direction due to the magnetic pole wandering and variations in magnetic field strength. Most fossils are found in sedimentary rock which can be difficult to do date using radiogenic isotopes, and this is where paleomagnetism is a powerful alternative. Paleomagnetism was used to date *Sivapithecus*, a genus of extinct primates and probable ancestor to orangutans, to 12.5 Ma (Kappelman 1993). In this case, the

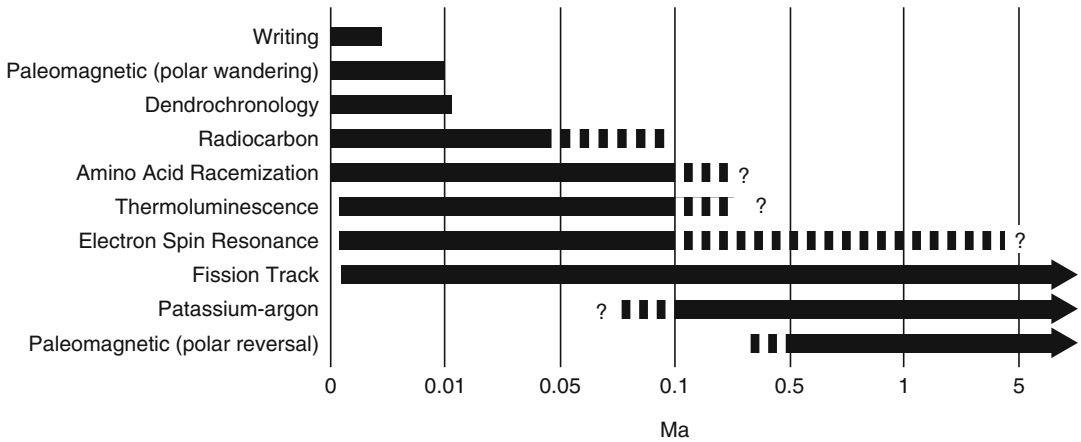

Human Evolution: Theory and Progress, Fig. 2 Effective ranges of major dating methods relevant to human evolution studies

paleomagnetic resolution exceeded the typical 5 % error rate associated with radiocarbon (potassium-argon) dating.

Thermoluminescence and electron spin resonance (ESR) measure the amount of electrons that get trapped inside a rock or fossil over time. First developed in the 1950s, thermoluminescence works on the basis that crystals, such as quartz, trap electrical charges (electrons) at a known rate over time. If this crystal, for example, a flint blade, is heated, these electrons are liberated, emitting a measurable amount of light. This allows researchers to determine when an object was last heated. What is actually determined is the amount of elapsed time since the sample had previously been exposed to high temperatures. It is used to date volcanic materials and meteorite impact craters, but can also directly date past human activity such as when ceramics or flint materials were heated to improve strength and durability (Richter 2007). ESR also measures electrons trapped in the lattice, but unlike thermoluminescence, it does not destroy the sample being tested; this allows samples to be dated multiple times. ESR mostly tests calcium carbonate in limestone, coral, fossil teeth, molluscs, egg shells, quartz, and flint. Both methods are typically used to date samples from the last 300,000 years though theoretically they could be used on much older samples.

Genetic Revolution

Since the 1960s, the field of evolutionary genetics has arguably made the greatest impact upon human evolutionary studies. Advances in technology such as the development of the polymerase chain reaction (PCR) have been instrumental allowing, for example, the analysis of ancient DNA taken from Neanderthal fossils (Green et al. 2010). Allan Wilson, Emile Zuckerkandl, and Linus Pauling pioneered the use of molecular approaches, which examined evolution at the scale of DNA and proteins showing that relationships among living and extinct primates can be inferred from genetics as well as fossils. Genetics too can be used as a "clock," which compares the amount of genetic differences (mutations) between living organisms. Since mutations have predictable rates of change over time, they can be used to estimate how long ago a living species shared a common ancestor. The molecular clock cannot assign concrete dates and must be calibrated against independent evidence, such as the fossil record. Nevertheless, taking together the transdisciplinary evidence, we now have a robust understanding of the relationships between humans and apes. For example, we know that humans and chimpanzees split from their common ancestor approximately 4–8 Ma (Sarich & Wilson 1967; Gagneux & Varki 2001) and that the

genetic difference between humans and chimpanzees is miniscule at about 1.2 %.

Genetics has also confirmed that living humans have a limited genetic diversity indicating a series of population bottlenecks (temporary, drastic reductions in population size and therefore genetic variability, caused by earthquakes or disease, for example) and a limited ancestral gene pool (Foley 1994; Manica et al. 2007). Studies of genetic variation reveal that the greatest diversity can be found in African populations. This combined with evidence from female (mitochondrial DNA) and male (Y chromosome) specific histories confirms an African origin for our species and suggests our ancestors migrated out of Africa about 70–40 ka (Cann et al. 1987).

In addition to helping researchers identify phylogeny, demographic history, and dispersal patterns, we can also identify areas of the human genome influenced by natural selection. Functional genes, such as those involved in infectious disease resistance; life history patterns; diet; skin, hair, and eye coloration; human cognition; and even language, have revealed areas of the genome that have been influenced by natural selection in humans (Enard et al. 2002; Tishkoff & Williams 2002; Lao et al. 2007; Preuss 2012).

Key Issues/Current Debates

The contemporary science of human evolution is an interdisciplinary endeavor encompassing anatomy, anthropology, archaeology, botany, climate sciences, ecology, genetics including ancient DNA studies and geogenomics, geology, history, linguistics, paleoanthropology, paleontology with related subdisciplines, phylogeny, physiology, primatology, and a number of different disciplines specializing in dating. All these disciplines contribute with data and interpretations. They are also, however, contributing to making human evolutionary studies a theoretically heterodox field. One of the main challenges, therefore, is to correlate data and results from different fields, while managing the differences in perspectives and theoretical traditions.

The increasing theoretical and practical complexity and the abundance of new data have overturned a number of simple scenarios of human evolution, leaving a far more multifaceted understanding of the past 6–7 million years of the human story. This aspect has had a great impact on the key questions in human evolution. Traditionally, in classic studies from the late nineteenth and early twentieth centuries, the main events could be summarized to terrestriality, bipedalism, encephalization, and civilization. Opinion was divided as to the order and importance of these key events, but the general consensus was that understanding what really happened in human evolution depended upon solving these four questions.

Following the increased theoretical complexity, the number of key questions has multiplied and now involves a thorough interdisciplinary understanding of the evolution and functions of adaptation, behavior, bipedalism, brain size, chronology, climate, common descent, evolutionary constraints, culture, dispersal and migration, diet, diversity, ecosystems, extinction, genetics, geography, language, lineage, morphology, ontogeny, phylogeny, species concept, technology, and variation. The answer to these questions includes a number of theoretical assumptions about time, selection pressures and mechanisms, inheritance, speciation, convergence, continuity, and discontinuity.

Take, for example, our changing perception of *Homo habilis* (dating between 2.1 and 1.5 Ma). First identified at Olduvai Gorge in Tanzania by Mary and Louis Leakey in the mid-1960s in the same general area as Oldowan stone tools, this was classified as the earliest member of the *Homo* lineage. Specifically, its name means, "man the handyman." In the 1960s, the existing evidence base and predominant view that tool making was unique to the *Homo* genus was a key factor in how these fossils were classified. In addition to tool use, *habilis* had more "modern" (derived) characteristics, including a relatively larger cranial capacity (680 cm^3), weaker brow ridges, smaller teeth, a higher forehead, and postcranial fossils, suggesting beyond doubt that it was fully bipedal. The reduction in so-called ancestral

characteristics tipped the balance and led paleoanthropologists to classify it as *Homo*.

Since the 1960s however, more fossil and archaeological evidences have raised doubts about handyman's place in the hominin family tree. New evidence shows that *Australopithecus afarensis* was already using stone tools at 3.4 Ma more than a million years before *habilis* existed. It is also clear that tool making is ubiquitous across the primate order and not confined to *Homo* (Bentley-Condit & Smith 2010; McGrew 2010). Taken alone handyman's characteristics such as the larger brain and smaller teeth were deemed to be more derived traits. However, as more australopithecine species (especially *Au. garhi*) were discovered, the overall body size and shape, locomotion, the masticatory system, and dental wear analyses suggested that *habilis* had an adaptive strategy more similar to australopithecines than later *Homo* (Kuykendall 2003). For these reasons, some paleoanthropologists argue that *Homo habilis* should indeed be *Australopithecus habilis*. Whether or not this is valid depends not only on the fossil evidence, but how a genus is defined and whether phylogeny (evolutionary relationships) should be given precedence over adaptive strategies when defining a genus (Wood 2009; Arsuaga 2010).

As the transdisciplinary evidence base expands, it is not uncommon for (phylogenetic) models to change and whether we assign *habilis* to the genus *Homo* or *Australopithecus* has far-reaching effects in our interpretation of the fossil record as a whole. Indeed a similar debate surrounds the classification of chimpanzees, with some primatologists and geneticists arguing that *Pan* and *Homo* should be considered subgenera of *Homo* (e.g., *Homo homo sapiens* and *Homo pan troglodytes*) on the basis of how we interpret the fossil, archaeological, genetic, and behavioral evidence (Goodman et al. 1998; Aiello & Andrews 2000)

The specific nature of data, evidence produced within specific disciplinary frameworks, and the consequences of using different methods and evolutionary models thus shape our interpretation of the evolutionary evidence.

Role of Theory

Theory has played a central role in the development of our understanding of hominin evolution. By creating theories based on the then current evidence, new sources of evidence can be found with which to test the existing theories. Environmental pressures have long been assumed to play a key role in hominin speciation and adaptation (Maslin & Christensen 2007). The *savannah hypothesis* implicates the long-term trend toward increased aridity and the expansion of the savannah as a major driver of hominin evolution. As opposed to long-term directional trends, the *variability selection hypothesis* advocates the role of environmental unpredictability in selecting for behavioral or ecological flexibility (Potts 1998). However, these hypotheses, which emphasize long-term trends toward either a drier or more variable climate, do not explain the pulsed nature of hominin speciation and migration events. Two alternative hypotheses, however, try to account for the discrete and episodic nature of hominin evolutionary events. The *turnover pulse hypothesis*, developed to explain discrete patterns in ungulate speciation, suggests that acute climate shifts drive adaptation and speciation (Vrba 1988). However, the evidence for this hypothesis is equivocal as the stacked benthic foraminifera $\delta^{18}O$ record, which is thought to represent global climate, does not contain the temporal signatures associated with key events in hominin evolution. A region specific hypothesis, the *pulsed climate variability hypothesis*, highlights the role of extreme wet-dry climate cycles specific to East Africa in driving hominin evolution (Maslin & Trauth 2009).

This last hypothesis is based on the distinct geologic and climate conditions of East Africa. The East African Rift System (EARS), one of the most extensive geological features on the Earth's surface, runs north–south for around 4,500 km from Syria through East Africa to Mozambique. The formation of the EARS had a profound effect on the long-term climate of East Africa. Evidence from carbon isotope records from both soil carbonates (Fig. 3) and biomarkers (*n*-alkanes) extracted from deep-sea sediments provide clear evidence of a progressive vegetation shift from C3 (~trees and shrubs) to C4 (~tropical grasses)

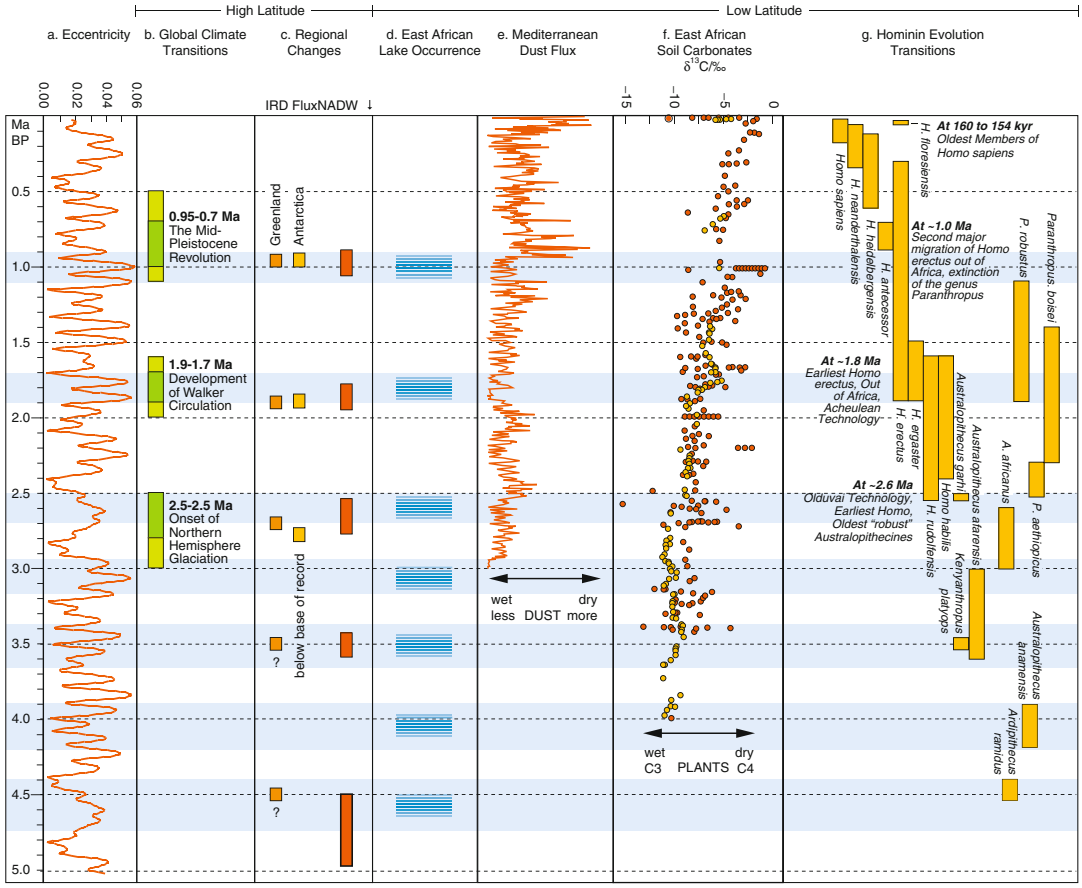

Human Evolution: Theory and Progress, Fig. 3 Environmental context of human evolution in Africa. Comparison of eccentricity variations (*a*) with global climate change (*b*), high latitude climate variations (*c*) with East African lake occurrence (*d*), Mediterranean dust flux (*e*), Soil carbonate carbon isotopes (*f*), with Hominin Evolution Transitions (*g*) (Adapted from Trauth et al. (2007))

plants during the Plio-Pleistocene. This shift has been ascribed to increased aridity due to the orographic barrier produced by the progressive rifting of East Africa during this period and supports the savannah hypothesis, which attempts to explain the appearance of bipedalism.

The progressive formation of the EARS also led to the production of isolated basins within which lakes could form (Fig. 3). Southward propagation of rifting and magmatic activity resulted in the formation of lake basins first in the northern parts of the EARS. For example, fluviolacustrine history of the Afar, Omo-Turkana, and Baringo-Bogoria Basins in the north began in the Middle and Late Miocene, whereas the oldest lacustrine sequences in the central and southern segments of the rift in Kenya and Tanzania are found in the Early Pliocene. Despite the southward progression of tectonic processes in East Africa, ephemeral deep-water lakes seem to occur in separate basins at approximately the same time, suggesting a climatic control (Maslin & Trauth 2009). There is growing evidence that during each of these major lake phases, the large fresh-water lakes appeared and disappeared on a precessional timescale, and is associated with repeated periods of extremely wet and arid conditions within the EARS (Fig. 4). Up to and including 2.6 Ma, these lakes track 400 ka eccentricity cycles. Subsequently, these lake phases still occur at the peak eccentricity forcing but only at 1.8 Ma and 1.0 Ma, with the most

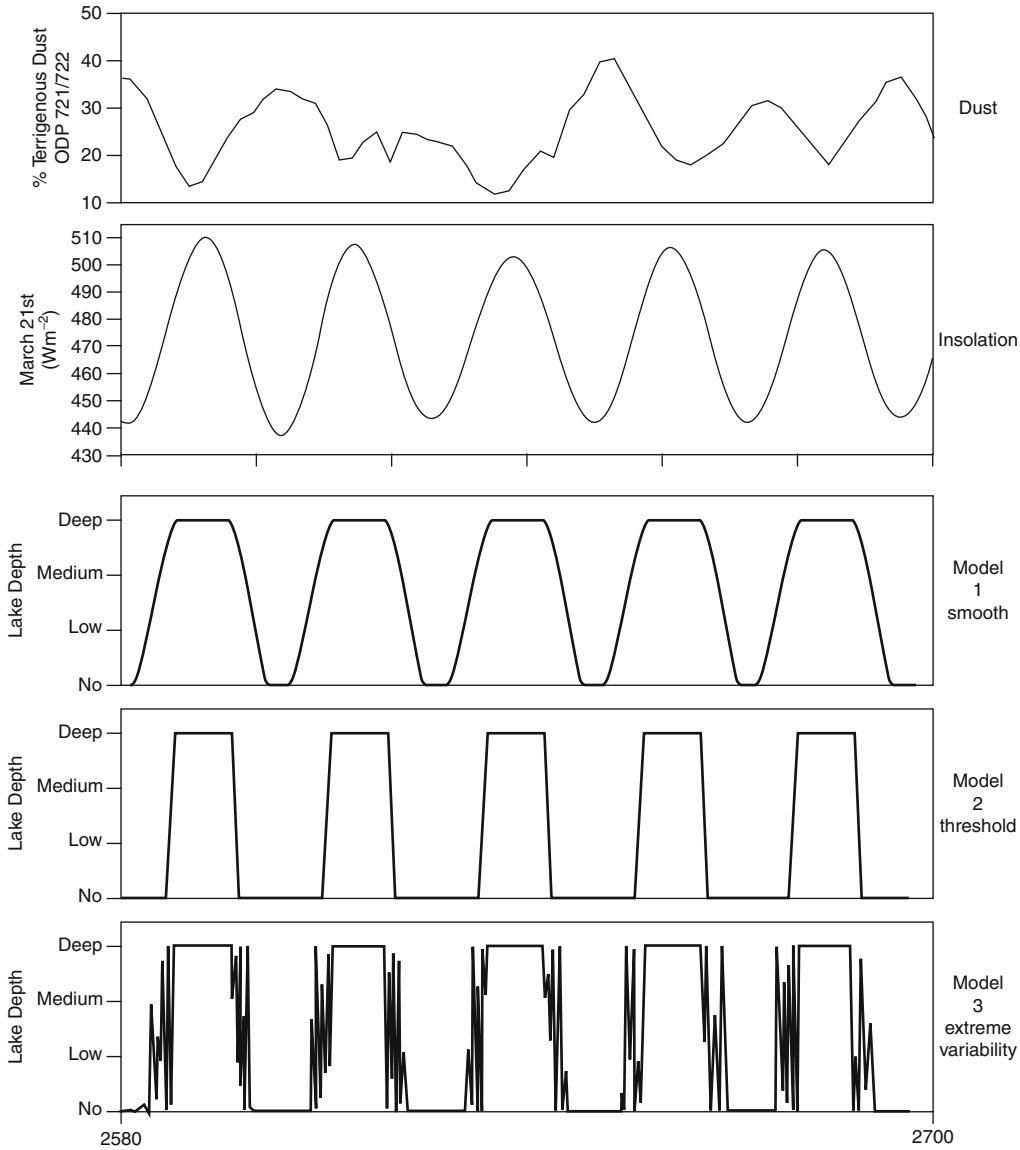

Human Evolution: Theory and Progress, Fig. 4 Three theoretical models of possible lake changes in East Africa during the Plio-Pleistocene and their implications for the causes of human evolution. 4e Model 1 suggests that there is a relatively smooth and gradual transition between periods with deep lakes and periods without lakes. If this "smooth" model is correct, there may have been prolonged periods of wet or arid conditions, which may invoke the Red Queen Hypothesis or the Turnover Pulse Hypothesis (*TPH*) as possible causes of evolution. Red Queen Hypothesis suggests that continued adaptation is needed in order for a species to maintain its relative fitness among co-evolving systems and that biotic interactions rather than climate are the driving evolutionary forces. While the extreme dry periods would support the TPH which suggests that during arid conditions, selective evolution toward larger, more juvenilized descendants in the bovid lineages and hominins would have occurred. Model 2 envisages a "threshold" scenario whereby ephemeral lakes expand and contract extremely rapidly, producing the very rapid onset of extremely dry conditions required by deMenocal's (1995) "aridity hypothesis." Model 3 is an elaboration of the threshold model in which there is "extreme climate variability" during the rapid transition between deep-lake and no-lake states. Such a model would invoke extreme short-term variability that could drive speciation and extinction events, especially if this climate change occurred over a large geographic region. This would produce the widespread environmental variability as required by the "Variability Selection Hypothesis" of human evolution

significant lake phase at 1.9–1.7 Ma, corresponding with the intensification of the Walker circulation (Trauth et al. 2005). At this time, the E-W sea surface temperature gradients in both the Pacific and Indian Oceans increased intensifying the E-W moisture transport in the tropics, which greatly increased rainfall variability both on a precession and an ENSO (El Niño Southern Oscillation) timescale. The best example of the *pulsed climate variability hypothesis* is the most profound period of hominin evolution at about 1.9 Ma; when there is the highest recorded diversity of hominin species, *Homo (sensu stricto)* appears with brain expansion of up to 80 % and migration out of East Africa into Eurasia occurs for the first time. During this key period, ephemeral deep-fresh-water lakes appeared along the whole length of the EARS, fundamentally changing the local environment. However, it must be stressed that this theory is just one of many in a long history and the more paleoclimate and paleoanthropological data is collected, the theories will continue to evolve.

Environmental theories however can only go so far to explaining why some species thrived and managed to migrate across the globe. The application of environmental determinism should be done with great care especially with hominins for whom at some stage 'social' attributes and behaviours may have influenced morphological evolution. Insights into hominin behavior, mate choice, parental investment, foraging behaviors, and social cooperations which come from the behavioral sciences are thus essential to understand the full range of human evolution. Anthropology, behavioral ecology, economics, primatology, and neuroscience tell us that human life history has evolved gradually, humans are highly cooperative, and reproduction is communal (Tooby & DeVore 1987; Boyd & Richerson 2005).

International Perspectives

Evidence for human evolution is scattered far and wide. The record is certainly not complete overall, but nor is it completely poor. In locations such as the Turkana Basin in east Africa (*Australopithecus, Paranthropus, Homo*), Atapuerca in Spain (*H. antecessor*), and the recent finds on the Indonesian island of Flores (*H. floresiensis*), researchers have collected abundant amounts of fossils and constructed a very in-depth local record. To see human evolution across deep timescales of millions of years however, it is essential to combine multi- and transdisciplinary evidence from all over the world. An excellent example of evidence coming together from all parts of the world is illustrated by evidence for an adaptive shift with *Homo* at around 2 Ma.

This major adaptive shift coincides with *Homo erectus* (1.8 Ma–300 Ka) and we now know that in addition to significant increases in brain size, changes in body shape (relatively elongated legs and shorter arms) which indicated a loss of tree climbing adaptations, innovations in tool technology (earliest handaxes), an ability to walk and possibly run long distances, *H. erectus* had a growth rate similar to that of a great ape with delayed juvenile development, indicating extended periods of learning as well as evidence for care of elderly and weak. They were also the first globetrotters, dispersing beyond Africa, across the Middle East and into Asia (Fig. 5).

However, when *H. erectus* was first unearthed in the form of a skull cap by Eugene Dubois in 1891 in Indonesia, it was the most primitive and smallest brained of all known early human species. This long skull, with a flat forehead, distinct browridges, and saggital keel, was initially placed in a separate genus. Not until the 1950s, by which time many more fossils were uncovered, was it placed into the *Homo* genus. Further discoveries of similar skull caps were made in Zhoukoudian in China and they were initially clearly confined to Asia. It explains the importance of taking the historical context of fossil finds into consideration. At the time, these early fossils were the most primitive known with only Neanderthal specimens in Europe for comparison until the 1920s and 1930s when *H. heidelbergensis*, *Australopithecus africanus*, and *Paranthropus* discoveries started to hint that the human family tree was more complex.

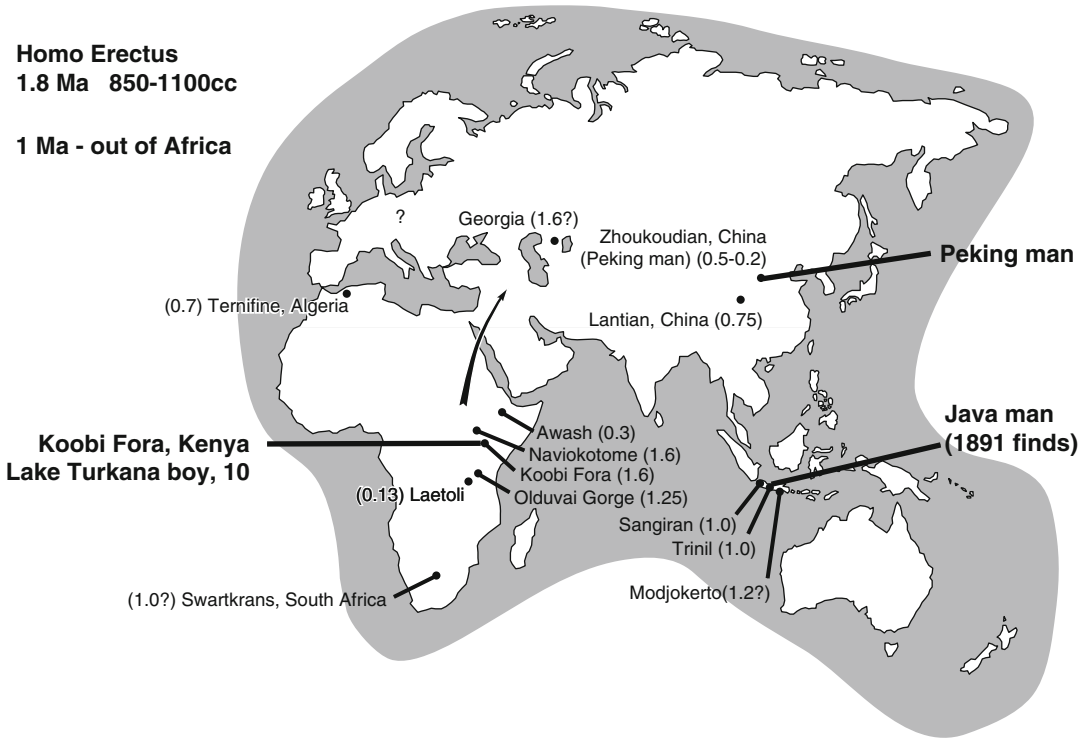

Human Evolution: Theory and Progress, Fig. 5 Dates and location of early *Homo erectus* finds

The fact that we now associate *erectus* with a major shift in the adaptive complex from earlier Australopithecines shown in cranial and dental morphology, behavior, and technology would perhaps startle earlier paleontologists (Wood & Collard 1999; Foley 2002). It demonstrates that human evolution is neither the result of a single revolutionary event nor a smooth accumulation of increasingly modern human features. Instead it is a cumulative process, with novel adaptations arising and disappearing in response to environmental pressures.

A lot more information about erectus body size, shape, and growth patterns came to light in 1984 with the discovery of the Turkana Boy from Kenya. Dated to 1.6 Ma, this near-complete skeleton (sometimes assigned to *Homo ergaster*, it is typically described as the "African erectus") of an 8-year-old male standing relatively tall at 1.60 m suggested that *H. erectus* was not nearly as primitive as previously thought (Fig. 6). A large cranial capacity (880 cm^3 compared to 1,300 cm^3 in modern humans) and tall stature illustrated a dependence on bipedalism, a growing rate (and probable adolescent growth spurt) similar to modern humans. The Turkana Boy made it clear that *H.erectus* originated and persisted in East Africa but left many questions on how, why, and when this species was able to disperse widely not only across Africa, but also in China and Java by 1.8 Ma, though it should be noted that this date is continually revised and it may have occurred slightly later. Evidence is now available from a plethora of fields and provides a solid empirical base to describe and explain the life course of this versatile, global traveler.

H. erectus thrived in a period of major climate change. Combining data from carbon isotope records from soil carbonates and biomarkers extracted from deep-sea sediments, paleo-geologists, -chemists, and physicists have put together a paleo-environmental model which illustrates a progressive vegetation shift form C3 (trees and shrubs) to C4 (tropical grasses) plants during

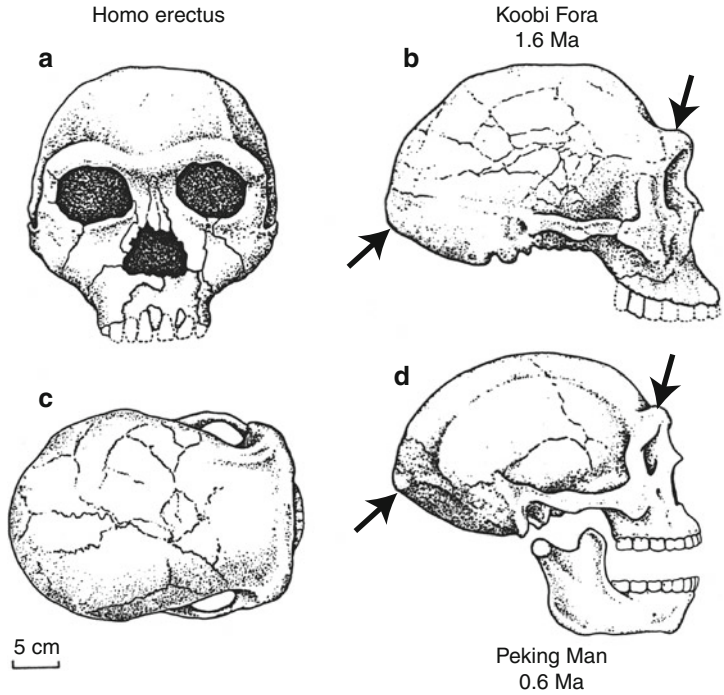

Human Evolution: Theory and Progress, Fig. 6 Comparison of *Homo erectus* skulls of Turkana boy (Kenya) and Peking man (China)

the Plio-Pleistocene. Previously semiarid areas became moister with denser vegetation and more lakes (King & Bailey 2006), making it easier for *H. erectus* to migrate from East Africa into Asia via the "Levant Corridor" through northeast Egypt, Israel, Lebanon, Syria, and Turkey.

In addition to teams from across the world comparing fossil evidence and compiling an environmental narrative in which *H. erectus* evolved, anatomists, primatologists, and ecologists were bringing in their own theoretical paradigms to build up a picture of how *H. erectus* would have survived. Since body size influences a range of physiological traits including energy requirements, choice of food, reproductive strategies, predation risk, range, and locomotor style, paleoanthropologists can learn a lot by comparing *H. erectus* specimens to those of living species. Estimates suggest that *H. erectus* specimens would have been 50 % heavier than australopithecine females. The consequent energetic costs of reproduction, which can be extrapolated based on what we know of human and chimpanzee females, suggest that daily energetic requirements of gestation and lactation would have been significantly higher for erectus females (Aiello & Key 2012). Human biologists suggest that shortening the inter-birth interval would reduce these costs and increase reproductive output. These changes in life history will have necessitated changes in behavior, for example, increased cooperation and the division of labor. An ability to do so may have been facilitated by language, and evidence from the cervical vertebrae of *H. erectus* fossils from Dmanisi in Georgia shows that they are well within the normal human range, illustrating that erectus was probably able to regulate its breathing and produce complex sounds.

Another way to meet energetic requirements would be to eat energy-dense foods such as meat and technology advances such as the hand ax would have aided *H. erectus* in procuring such foods. The earliest evidence for fire is also associated with erectus fossils, this is significant because cooking food increases the energy availability in foods (Carmody & Wrangham 2009). Alternatively, you could offset the cost of metabolically expensive tissues, such as the brain,

with a reduction in energetic cost somewhere else. The so-called expensive tissue hypothesis is based on comparing gut size across mammals. Anatomists have shown that gut size is highly correlated to diet and shown that the human gut is significantly smaller than expected for an animal of our body size. The expensive tissue hypothesis argues that we have managed to cut energetic costs by reducing gut size because species like *H. erectus* made the move toward hunting or scavenging high-energy and easily digestible meat products (in comparison to plant materials). This allowed an energetic cost saving by reducing the gut size which no longer needed to work so hard. Combining anthropological observations of the Hadza, traditional foragers in Tanzania, with evidence for the erectus' climate-driven adjustments in female foraging and food sharing practices, and longer lifespans, others argue that new social behaviors, such as grandmothers taking care of daughter's offspring, allowed *erectus* to thrive (O'Connell et al. 1999).

Using transdisciplinary evidence from paleoanthropology and primatology to anatomy and biology in combination with the fossil evidence from across the globe, we are now in a position to grasp anatomical, behavioral, and cognitive shifts that accompany the Plio-pleistocene hominins.

Future Directions

There are exciting developments in all fields that are contributing to the understanding of human evolution. We are increasing our understanding of the fossil record and must be prepared for additional surprises such as the discovery of *Homo floresiensis*. In the field of paleoclimate, we understand more and more about the landscape in which our ancestors evolved and how variable it may have been. In the last few years, of all the new fields, genetics has probably had the biggest impact on human evolutionary studies. However, if anything has been learnt from the past, it is that our understanding of human evolution can only occur by combining evidence from multiple fields of study. This way, new theories can be developed and then tested with evidence.

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- ▶ Darwin, Charles R.
- ▶ Dating Techniques in Archaeological Science
- ▶ Dubois, Eugène
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
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Human Evolution: Use of Fire

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Introduction

Fire is a resource of nature that has been harnessed by humans in their technology in such a wide-ranging and far-reaching way that it must be seen as a force in the evolutionary shaping of humanity. Fire use is difficult to investigate because in most cases it leads to no definite artifact, and most of its traces are easily lost to erosion and decay. Nevertheless, traces of burning are known from a surprisingly high number of early sites, and there is no doubt in some cases that they record fire use under human control.

Definition

Fire in Nature

Fire is a natural resource widespread in nature. Although it can be created by volcanoes, friction, or spontaneous combustion of matted vegetation, most of it is created by the many thousands of lightning strikes which occur each year. Thunder storms occur most intensively in the tropics and least commonly towards the Arctic Circle, but the highest "take-up" in bushfires and forest fires occurs in the subtropical semiarid zones and in temperate forests. Fires occur seasonally, often starting when the first lightning of an early season storm comes ahead of the main rainfall. "Fire weather" is well known in some regions and has generated its own literature in forestry research. Although some authors regard fire use as requiring advanced cognition, many animals, especially birds, make use of it in "fire following." Bush fires expose or drive prey in the form of insects, birds, nests of eggs, lizards, and small mammals, as well as revealing or cooking plant resources such as roots. Animals are often less disturbed by fire than implied by classic stories such as Kipling's Jungle Book, and recently, savanna chimpanzees have been observed to show a situation awareness of fire's behavior.

Key Issues/Current Debates/Future Directions/Examples

Patterns of Human Fire Use

Human fire use can be set in three broad categories. First, opportunistic – a simple fire following geared to harnessing the most obvious resources; second, tethered, where fires are kept burning and perhaps moved to favored localities; and third, kindled or mastered fire, in which fire can be made and used at will. Of course these are arbitrary categories, not a necessary universal progression. Sometimes, they might be used side by side, and people (such as the San in southern Africa) who know how to kindle fire might prefer to operate via tethered fire, either because of religious prohibitions or for ease. The Hadza in East Africa sometimes keep the same fire burning for months at a time. Animal dung provides a convenient slow-burning material for tapers and is easily transportable. Australian aborigines have sometimes been known as "fire stick farmers" because they use selective burning to manage resources on the landscape. The ability to kindle fire greatly increases the flexibility of fire use, and the skills involved demonstrate advanced cognitive capacities, particularly the knowledge that something entirely new (fire) can be released from materials which are not burning at all. Before the invention of modern means, fire was generally made by striking selected stones together and catching the spark on prepared tinder or, by friction, using hard and soft wood. Greater rotational speed could be given to a fire drill by the use of a bow and string. The earliest shell beads with pierced holes

suggest that cord was in use at least 100,000 years ago, but use in fire-making is not directly attested until the last few thousand years.

The Earliest Fire in Africa

The oldest archaeological evidence for fire comes from three sites in East Africa – Koobi Fora, Chesowanja, and Gadeb. All have burnt material in close conjunction with archaeological finds. At Chesowanja, burnt clay was found in a concentrated series of lumps among artifacts. At Koobi Fora, patches of burn sediment were found. The associations have been doubted on "taphonomic" grounds, but the doubt is not in the physical association but in the lack of necessary causal connection between the burnt material and the artifacts. The burnt patches could come from natural fires, and the artifacts are not specifically tied to fire use.

In southern Africa, the most valuable evidence comes from the cave sites of Swartkrans and Wonderwerk. At Swartkrans in Member 3, burnt bone has been found in numerous places and layers. At Wonderwerk, there is extensive evidence of charcoal fragments in one layer, and microanalysis tends to rule out bush fires. Claims of dates greater than one million years are not fully substantiated for these sites, but they certainly date to at least 800,000 and together demonstrate early human fire use with near-certainty.

Somewhat later is the Acheulean site of Kalambo Falls in Zambia. There, the late Desmond Clark excavated numbers of charred wooden artifacts, and a probable hearth was found. The site could be as old as 400,000 years.

The Earliest Fire in Eurasia

In Asia, charred bone was found at Bogatyri north of the Black Sea dating to 900,000, but the best known site with fire evidence is Gesher Benot Ya'aqov in Israel, dating to about 700,000. Here, charred plant material has been found from multiple levels and also "ghost hearths" marked out by tiny fragments of burnt flint. Part of the case for human control is the repeated nature of the burning in a lakeside context. Natural fire caused by lightning tends to occur spasmodically and usually on exposed slopes. Also well known is the cave of Zhoukoudian in China, where fire evidence has been recognized since the 1920s but remains controversial. Although some dark material has been shown not to be charred, but mineral stained, burnt bone is testified from the site at about 500,000 years.

Western Europe has provided some of the most convincing evidence for early fire use within the last half-million years. Beeches Pit in eastern England dates to the Hoxnian interglacial at about 400,000. Here, there is a series of hearths. Beside one of them, an individual knapped a flint hand ax, and two of the series of 30 pieces which can be refitted fell forward into the hearth area and became burnt bright red. The knapping provides a direct connection with the fire, and the extreme selectivity of the burning disproves the idea of any wider natural fire. Again, as at Gesher Benot Ya'aqov, the site is by the side of water. Similarly, at Schoningen in Germany, of similar age and very well known for its preserved wooden spears, hearths are preserved, and in one a wooden stave found that is part-burnt. It may have been used as a hand-spit for roasting meat. Again, the direct association of burnt artifact and hearth provides incontrovertible evidence of the human context.

In the last 200,000–300,000 years, evidence of fire use becomes much more common. Many caves have sequences of hearths, for example, et Tabun in Israel or Bolomor in Spain. Bolomor is interesting, because it shows Neanderthals making small fires for cooking small animals such as rabbits. Elsewhere, such as Abric Romani in Spain or the earlier Beeches Pit, fires were large, more than a meter across. They may have been used for cooking larger animals such as pig or deer, and their fuelling implies some division of labor. Neanderthals certainly achieved a high degree of fire control. At Königsaue in Germany, they prepared pitch from resin, which can only be done by keeping high temperatures over a long period. In Israel, Middle Paleolithic people learned to fire gypsum plaster. In both cases, the material can be used to fix a stone tip to a wooden haft. It is notable that in several of our earliest cases of fire use, there is a link between the fire and fireside technology.

Hypotheses About Fire

Archaeology has the task of testing the balance between two different perspectives on fire use. The first of these is a general modelling view, taking into account biological, ecological, and psychological disciplines. It argues that human fire use began at an early stage, probably around the time of the first brain expansion in *Homo*, and that it played a major role in changing diet. The second view is much more cautious, depending on the fire evidence actually preserved on archaeological sites, and requiring definite traces of hearths or other burning of artifacts as its primary evidence. The philosophies of these approaches are different, although they can grade into one another. They leave us with views that fire use began as early as 1.7 million years ago or as late as 400,000 years ago. But considering that there can be different grades and types of fire use, the results could be less incompatible than they appear.

The cooking hypothesis has been championed by Richard Wrangham and colleagues.

Early hominin ancestors living in environments where fruit sources were limited would require access to other carbohydrates, as in roots. But starch is indigestible, and greater inputs of meat also require predigestion for a creature without an ancestral history of carnivory. Archaeological evidence does not prove that cooking provided the answers, but the general case and the regular association of burnt material with archaeological sites is strongly suggestive. The greatest puzzle is lack of fire evidence in the north, where fire would be most desirable – but also least available from nature. African cave sites have fire evidence, but so far, early European cave sites such as Arago do not, although humans were present and butchering animals. Possibly at this stage, fire was used only in particular places on landscapes.

It can remain hard to distinguish natural fire and human fire in the past record, because their patterns often overlap. Temperature of burning is not a good indicator – both natural and controlled fires will frequently burnt in the range 200–600° C – but repeated burning in one place strongly indicates human use. Hearths provide good evidence but can sometimes be mimicked by natural features. Microscopic thin section studies can help to distinguish the type of burning. Selective burning of artifacts provides the strongest evidence for human control.

The Role of Fire

How important was fire in human evolution? Arguably, it was one of the most crucial technologies, raising the quality of diet and so helping humans to acquire and maintain the large and expensive brains that had such great social implications. Once set in hearths, fire was also the focus of both social and technical activity. It allowed humans to gain a longer day and to alter their circadian rhythm so that they are awake more hours per day than other animals. Our peak alertness is in the early evening, when the apes are retiring to bed. The additional hours could be used for preparing food, making or repairing tools, or simply in conversation. Many technologies depend on fire, combined with time, patience, and skill. Apart from the pitch and gypsum already mentioned, one early use was the warming of stones so that they were more tractable for knapping, a practice observed at Pinnacle Point cave in South Africa about 120,000 years ago. Other uses of fire have multiplied greatly in recent times – in the late Paleolithic of France, water in small pits was heated by "pot boiler" stones for cooking; in the Upper Paleolithic of Moravia, small clay animal figures were baked; and in the Far East, true pottery goes back at least 20,000 years. Open fires have a temperature limit of about 800° centigrade. Within the last 5000 years controlled drafts were introduced, allowing temperatures to be greatly raised. Smelting of metals and production of glazes and glasses were among the results.

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- ▶ *Homo sapiens*
- ▶ West Asia: Paleolithic
- ▶ Zhoukoudian, Archaeology of

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Human Impacts on Ancient Marine Ecosystems

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Brief Definition of the Topic

Understanding human impacts on ancient marine ecosystems is an area of archaeological research focused on the interactions between ancient

peoples and marine environments and organisms. Falling under the rubric of historical ecology (Crumley 1994; Kirch & Hunt 1997), studies of human impacts on ancient marine ecosystems are interdisciplinary, drawing on history, biology, paleobiology, and other fields. This research is being performed by scholars around the world on a variety of different ecosystems (coral reefs, kelp forests, estuaries, etc.) and focused on different scales of human economic and social organization (e.g., hunter-gatherers, maritime agriculturalists, and states). The toolkit used to investigate this topic is equally diverse, relying on zooarchaeology, stable isotope analyses, ancient genetics, and geoarchaeology. Coastal archaeological studies are now a key component within the emerging field of historical ecology, helping provide a deeper context for contemporary environmental problems and ecological restoration efforts.

In studying human impacts on ancient marine ecosystems, researchers have focused on several key questions. When did people first settle along a particular coastline? What was the nature of ancient human subsistence economies in coastal areas and how did these vary across space and through time? Did people have an impact on marine resources or ecosystems in the past? What can ancient human interactions with and impacts on marine ecosystems tell us about contemporary environmental problems facing the ocean?

From North America's Pacific and Atlantic coasts to the North Sea, tropical Pacific and Caribbean islands, Mediterranean, Africa, and beyond, ancient peoples settled along the coast in the distant past. Humans have harvested coastal resources for over 150,000 years in southern Africa and ancient human migrations to Australia, Pacific and Caribbean islands, and beyond crossed hundreds or even thousands of kilometers of open-ocean. Along with natural climatic and other environmental changes, ancient peoples often had an impact or influence on local marine ecosystems – some extending back tens of thousands of years. These impacts vary considerably through time and across space. In some cases, archaeologists are just beginning to understand the patterns and processes of human overexploitation of marine resources versus cases of long-term and potentially sustainable harvest of coastal ecosystems. Examples of ancient human impacts on marine organisms and ecosystems include: (1) resource depression or overexploitation of key species, including seals, sea lions and sea otters, shellfish, finfish, and seabirds; (2) predation pressure that results in a decline in the size and/or change in the age structure of marine shellfish and vertebrates; and (3) human-induced trophic cascades, where human exploitation of one or more keystone species can result in cascading changes to the structure and function of an ecosystem.

While archaeologists have gathered substantial evidence that suggests that many ancient peoples, including hunter-gatherers and agriculturalists, had a strong impact on marine ecosystems, there is also growing evidence that some ancient peoples harvested resources sustainably over the long term. Some marine ecosystems also appear to be relatively resilient – able to withstand human exploitation while retaining the same basic structure – to certain thresholds of human harvest. There are also a few examples where people actively enhanced the productivity of specific marine ecosystems or organisms. These include cases of ancient aquaculture in Asia, Europe, North America, and the Pacific Islands, where engineering of streams and other waterways was used to create or enhance fish ponds or the "clam gardens" of the Pacific Northwest (e.g., Caldwell et al. 2012).

More recently, archaeologists have used data on ancient human impacts on marine ecosystems to help inform the management, restoration, and conservation of modern marine ecosystems, fisheries, and organisms. Today, the world's oceans are rapidly being degraded by anthropogenic activities that include overfishing, nutrient over-enrichment, pollution, wetland destruction, climate change, and invasive species introductions. Archaeological data provide important baselines and historical ecological context on how marine ecosystems have changed over long time scales (e.g., centuries or millennia), with and without human influence. When placed

in the context of historical, paleobiological, and modern records of the long-term natural and anthropogenic influences on marine ecosystems, archaeology is a powerful tool for helping better understand contemporary environmental problems.

Today, coastal archaeological sites around the world are increasingly threatened by accelerated sea level rise and erosion, development and construction projects, looting, and many other processes. As research into human impacts on ancient marine ecosystems continues to grow, we also need to work to conserve the fragile and disappearing global coastal archaeological record that is the foundation for this research.

Cross-References

- ▶ Environmental Archaeology and Conservation
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Ichthyoarchaeology
- ▶ Pacific Ocean: Maritime Archaeology

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Human Migration: Bioarchaeological Approaches

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Introduction

Migration is one of the key characteristics of humanity, and population movements are as varied as human culture itself. Identifying migration in the past represents one of the most critical questions that archaeologists address because it affects nearly every aspect of life, like the availability of sufficient land, food, and marriage partners. Archaeologists traditionally use material objects to recognize ancient societies, which makes identification of population movement a difficult endeavor. When does a change in material culture represent an influx of new people into a region, and when does it reflect new trade goods or ideas? Some of the most critical changes in human history, such as the transition from hunting and gathering to farming, hinge on the answer to this question. Advances in biogeochemical research methods like isotopic and DNA analyses have resulted in significant

advances toward resolving some of these longstanding dilemmas.

When applied within an integrated research strategy, bioarchaeological approaches to human mobility provide a unique set of data that illuminate facets of the past not otherwise obtainable by the archaeologist. For example, a contextual analysis of seasonal and geographic mobility of livestock excavated from a large, urban center provides information on a society's economy, social organization, and use of its environment. The precise "origin" of the animals matters less than how patterns might differ between house compounds, quarters of the city, and market areas. In this entry, we attempt to capture the diversity of questions archaeologists ask about ancient mobility using bioarchaeological approaches.

Definition

A bioarchaeological approach does not imply a specific analytical technique, but a suite of anthropological research questions. The term "bioarchaeology" may refer to the analysis of anything biological recovered from an archaeological site, or only of *human* skeletal material. North American use of the term denotes an integrated, multidisciplinary research strategy that focuses on archaeological human remains to reconstruct life histories and population structure (Buikstra & Beck 2006). However, human skeletal remains do not represent the full range of materials that archaeologists use globally to investigate migration in past societies. Analyses may also include population genetics of modern humans and archaeological fauna as proxies for human mobility.

What is migration, and how do archaeologists attempt to identify it? Archaeologists have traditionally focused on one-way, long-distance movements where a group colonizes an uninhabited area or displaces an existing population (e.g., Rouse 1986). However, human mobility is far more complex, and this limited perspective excludes most types of population movement throughout history (Anthony 1990). Individuals or groups may change residence seasonally to herd livestock. Or an individual may relocate more than once, either within a political entity or across a regional or national boundary. Relocation may also be involuntary, as in the case of the slave trade. Migration includes each of these types of movement, as neither the distance nor the reason for the move form critical parts of the definition.

Historical Background

Diffusionism provided the initial framework that archaeologists used to explain cultural evolution. During the late nineteenth and early twentieth centuries, scholars generally made a direct connection between changes in artifact styles and ethnically distinct groups, using migration to explain social change. At the same time, studies of human skeletal variability relied on racial typologies, with migration and admixture figuring prominently in the influential work of Hrdlička and Hooton (Armelagos & van Gerven 2003).

During the 1960s, the theoretical and methodological shift of processual archaeology seriously challenged the role of migration (and invasion) as an explanation for past sociocultural change and decoupled a simplistic linkage between artifacts and people. The emergence of a biocultural approach in analysis of human skeletal remains reflected these trends, and incorporated population movement and relatedness. However, processual archaeology marginalized migration as an explanatory framework, and it only reemerged during the 1980s (see detailed discussion in Trigger 2006).

Currently, research focuses not only on reconstructing patterns of population movement, but also on how mobility articulates with aspects of social organization and identity (e.g., contributions to Knudson & Stojanowski 2009). Archaeological analyses used to reconstruct human mobility fall into three general categories: osteological, biogeochemical, and genetic (Table 1). None of these techniques provide simple "answers" about mobility or

Human Migration: Bioarchaeological Approaches, Table 1 Bioarchaeological techniques used to reconstruct ancient mobility

Category	Techniques	Evidence for mobility
Osteological	• Biodistance Cranial/ postcranial (including dental) metric and nonmetric variation	• Genetic relatedness – kinship and mate choice • Regional variation in cranial or dental modification/ decoration
Biogeochemical	• "Light" isotopes: carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), oxygen ($\delta^{18}O$), and sulfur ($\delta^{34}S$) • "Heavy" isotopes: strontium ($^{87}Sr/^{86}Sr$) and lead (Pb) • Trace elemental ratios: Sr/Ca and Ba/Ca	• Regional differences in diet • Differences in diet and water isotopic composition show geographic mobility
Genetic	• mtDNA • Nuclear DNA • aDNA • Polymorphisms in other biomolecules other than DNA Blood factors: ABO, Rh, HLA, etc.	• Population history/phylogeny • Emergence of new alleles (e.g., lactase persistence)

relationships between past peoples. Each method incorporates certain assumptions that may result in more than one possible explanation for the same data, which limits the types of questions archaeologists can ask. Archaeologists cannot address mobility in the same ways that modern anthropologists, demographers, and geographers can. Therefore, multiple lines of evidence are fundamental to understanding past human mobility.

Osteological approaches are characterized by macroscopic examination of archaeological human remains and form an essential core of approaches to past mobility through biological and genetic distance analysis. So-called biodistance studies are based on measurement of cranial or dental metric or nonmetric traits. Mobility is inferred from deviations from regionally defined averages and has been used to consider gender-specific postmarital residence patterns, as well as regional gene flow and interaction (Buikstra & Beck 2006). Although current research emphasizes population genetic-based perspectives, there is some concern that typological (i.e., essentially "racial") approaches persist (Armelagos & van Gerven 2003).

Biogeochemical approaches to mobility take advantage of differences in isotopic signatures in human tissues that reflect systematic environmental variability. Trace element ratios, specifically strontium and barium, also are used to evaluate mobility (Burton et al. 2003). Early analysis of isotopes in archaeological material focused on paleoclimate and dietary reconstruction. Recognition that strontium isotope ratios ($^{87}Sr/^{86}Sr$) could be used to examine past human residence patterns (e.g., Ericson 1985) shifted the perspective of isotope techniques to include mobility. Oxygen isotopes ($\delta^{18}O$) from skeletal phosphate or carbonate have been used extensively by archaeologists to identify prehistoric mobility, as have other isotope systems such as nitrogen ($\delta^{15}N$), lead ($^{204,\ 206,\ 207,\ 208}Pb$), and sulfur ($\delta^{34}S$). In fact, multi-isotope studies are becoming increasingly common. Biogeochemical analysis has also been used with archaeozoological material to investigate mobility of pastoralists, as well as strategies used by hunter-gatherers (see Table 2).

Genetic techniques first investigated variation in discrete biological factors (Cavalli-Sforza et al. 1994). Frequencies of particular alleles, such as ABO blood types, were then visualized geographically. The advent of DNA sequencing and the measurement of mutation rates allowed researchers to add divergence times between populations to this analysis. Cann and colleagues (1987) used differences in mitochondrial DNA (mtDNA) to suggest an African origin for modern humans 100,000 years ago. Improvements in technology allow researchers to focus on genetic diversity in modern populations around the globe.

Human Migration: Bioarchaeological Approaches, Table 2 A sample of research using bioarchaeological methods to understand migration in various world regions

Archaeological questions	Region/locality	Bioarchaeological techniques	References
Dispersal of modern humans	Eurasia	• mtDNA and Y chromosomes • aDNA	Renfrew & Boyle (2000), Weaver & Roseman (2008)
Spread of agriculture	Global	• mtDNA and Y chromosomes • aDNA genetic markers • $^{87}Sr/^{86}Sr$ • $\delta^{18}O$ • Craniometry	Myles et al. (2005), Haak et al. (2008), Pinhasi & von Cramon-Taubadel (2009)
Peopling of the Americas	East Asia Americas	• Craniometry • Dental analysis genetic markers • mtDNA and Y chromosomes	Schurr (2004), Pitblado (2011)
Pastoral mobility	Eurasia	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$ • $\delta^{13}C$	Bocherens et al. (2001), Balasse et al. (2002)
Lifetime mobility	Eastern Mediterranean	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$	Mitchell & Millard (2009)
	Imperial Rome		Prowse et al. (2007)
	Bronze Age Britain		Evans et al. (2006)
	Egypt	$\delta^{15}N$ $\delta^{34}S$	Dupras & Schwarcz (2001)
	Mesoamerica	• $^{87}Sr/^{86}Sr$ • Biodistance	Scherer (2007), Price et al. (2008)
New World slave trade	Yucatan Barbados	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$	Price et al. (2008), Schroeder et al. (2009)
Sacrificial burial	Mesoamerica South America	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$	White et al. (2007), Tung & Knudson (2008)
Kinship, postmarital residence	Neolithic Europe Thailand American Southwest	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$ • aDNA	Ezzo et al. (1997), Bentley et al. (2007), Haak et al. (2008)
Identity and social hierarchy	Japan South America	• $^{87}Sr/^{86}Sr$ • $\delta^{18}O$ • $^{206/204}Pb$, $^{207/204}Pb$, $^{208/204}Pb$ • Dental ablation	Kusaka et al. (2009), Turner et al. (2009)

Key Issues

Using Bioarchaeological Techniques to Reconstruct Migration

Archaeologists attempt to situate evidence of past mobility within a larger contextual framework, but the nature and scale of major research questions varies considerably. At the broadest level are questions concerned with transformational dispersals in human history – from hominins leaving Africa to the spread of agriculture – that frequently utilize genetic analysis to elucidate the structure of past human migration and interaction. Conversely, the most specific seeks to understand how mobility

articulates with local or regional social processes of economy, identity, and ritual. Research at this scale involves direct analysis of archaeological skeletal remains and may focus on the life histories of specific individuals. Biogeochemical data at this scale only pertain to the period of formation of the sampled skeletal tissue (i.e., period of tooth formation). Table 2 outlines some recent applications of bioarchaeological methods to identify different types of mobility; it is by no means comprehensive, but provides some examples of current research.

Bioarchaeological approaches to migration are currently limited by a number of factors. First, most biodistance studies are based on similarities in morphological traits, which can result from environmental influences as well as shared genes. Incomplete skeletal remains also require estimation of missing data, which may greatly reduce the sample size, a common problem in archaeological studies.

Second, recognition that isotope variability does not necessarily correspond to cultural regions – and that neighboring regions may display similar values – has stimulated debate about the best way to differentiate "local" from "nonlocal" individuals. The potential for diagenetic alteration of archaeological materials also affects both biogeochemical and genetic analyses. Critiques of nearly every study involving aDNA note the possibility that the results include modern DNA, despite efforts by geneticists prevent contamination. Researchers increasingly prefer to sample tooth enamel, which is less subject to alteration in the burial environment. Each study presents different taphonomic and laboratory challenges. One of the best solutions is to use multiple lines of evidence to reconstruct population movement and interpret its meaning. One such example comes from intensive research on a Neolithic mummy in Central Europe that used a combination of bioarchaeological techniques to reconstruct the life history of a single individual.

Case Study: The Tyrolean Ice Man

In 1991, hikers discovered a 5,200-year-old frozen mummy in the Ötzal Alps: who was "Ötzi," and where did he come from? None of the artifacts found with the body could be used to determine his origin, so scientists used isotopic, osteological, and genetic methods to identify Ötzi's homeland and to understand how he lived and how he died.

Where did Ötzi live? Strontium, lead, and oxygen isotope values in his bones and teeth show that he probably spent most of his life less than 60 km from his place of death (Müller et al. 2003). Analyses of his last meals, sampled from his intestinal tract, show that he traveled from lower elevations shortly before he died.

Who was he? Ötzi's mtDNA closely resembles that of modern populations living in the Ötzal Alps region (Rollo et al. 2006). Healed rib fractures and skeletal pathologies show that his lifestyle was active and, at times, dangerous (zur Nedden et al. 1994). It is possible that tattoos on his legs, back, and hands were not simply decoration, but evidence of therapeutic treatment for his arthritis and other ailments (Renaut 2004).

Was Ötzi a migrant? Ötzi may have lived in a different village as an adult than as a child, but he was not a long-distance migrant. He may have moved seasonally, or traveled throughout the region as an adult, but he was not far from his place of birth when he died. The circumstances of his death have prompted speculation that he was fleeing his home: an attack shortly before he died left an arrowhead lodged in his shoulder region (Gostner & Vigl 2002) (Fig. 1).

Nearly every possible biogeochemical analysis has been conducted on Ötzi and his belongings, but archaeologists still need contextual information to interpret the results. In this case, there is no burial or site information. Studies conducted on individuals buried in tombs or households provide more in-depth information, especially if written texts also are available.

One example is the life and migration history of the Maya king K'inich Yax K'uk' Mo' from the Classic period site of Copan. Bioarchaeological, isotopic, textual, and archaeological data suggest that he moved multiple times during his life, and that his nonlocal origin was an important factor in his role as ruler. Other migrants have been identified at Copan (Price et al. 2010), as well as other sites in the region, which allows researchers to place this study in a broader regional context and

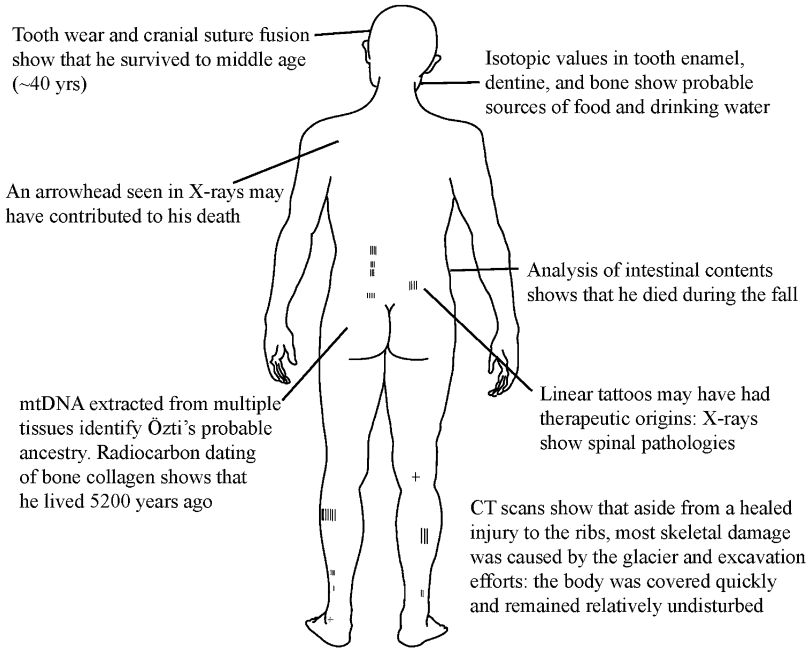

Human Migration: Bioarchaeological Approaches, Fig. 1 Bioarchaeological techniques used to reconstruct Ötzi's life history (Adapted from Renaut 2004)

to suggest that migration was a common phenomena in the Maya lowlands.

Future Directions

Archaeologists will need increasingly specialized and sophisticated knowledge to be producers of bioarchaeological data. Collaboration with specialists will continue, but archaeologists themselves must gain greater expertise in biogeochemical and genetic techniques to better apply those using anthropological frameworks.

New techniques and isotope proxies also continue to enhance bioarchaeological aims. For example, emergence of 3-dimensional morphometric techniques will refine biodistance analysis (Buikstra & Beck 2006), as well as incorporation of GIS applications (Relethford 2008). Investigation of other isotopes in skeletal material, such as sulfur and lead, may provide new proxies for mobility (e.g., Richards et al. 2001; Müller et al. 2003). Pursuit of more detailed understanding of the nature and scale of isotopic and genetic variation will clarify relationships between biological and environmental variations (e.g., Bentley 2006).

Such advances will prove crucial to archaeological studies of migration in coming years. A more in-depth understanding of the human genome and how genetic markers relate to osteological variability will help to identify migration within human populations. Larger datasets also will prove useful in identifying broader patterns of mobility, and reanalysis of existing collections at archaeological sites and museums will increase. Ultimately, even the most advanced techniques are limited by biology, environmental variability, and the nature of the archaeological record. Even with these limitations, the ability of archaeologists to identify past mobility and place it within a larger social context is stronger than ever.

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Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archaeology as Anthropology
- ▶ Bioarchaeology in the Roman Empire
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone: Chemical Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Isotope Geochemistry in Archaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Peopling of the Americas

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Human Remains in Museums

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Introduction

Human remains have long been acquired for study and display in public and private museums and those of universities and learned societies worldwide. They are today to be found in a range of collections, but particularly those associated with anatomy and the medical sciences, archaeology, anthropology, ethnography, and natural history. They have also, historically, been located in phrenology museums and were subject to acquisition as curios whether within small private collections or the larger cabinets of curiosity compiled by prominent individuals and monarchs of renaissance Europe. The contents of some of these curiosity cabinets are now to be found in museums today, and indeed sometimes formed the basis of their initial collections.

Definition

All types of human remains have been acquired by museums, including ancient and modern

skeletal and soft tissue as well as remains crafted into (or incorporated within) objects. Some museums contain many different types of human remains, but, in general, the type of remain acquired depended upon the disciplinary interest and/or research focus of the collector or collecting institution. Thus, to provide a few examples, human remains of normal or pathological structure are generally found in the collections of anatomy, pathology, and the medical sciences; archaeologically excavated human remains are usually to be found in archaeology units or relevant university departments; and remains from non-European cultures that have been in some way changed by the action of humans are often to be found in ethnography museums. Of course, in the larger regional or national museums, different types of human remains may have been obtained by different departments within a single institution.

Over the history of scientific interest in human remains, relevant disciplines have emerged and become redundant or are now taught in different ways and have a different research focus, and these changes have had consequences for the future and location of associated collections. Thus, for example, in the early nineteenth century, phrenological societies acquired crania and cranial casts in order to demonstrate that examination of head shape could determine individual and so-called racial character (MacKenzie 1820; De Guistino 1975). But as phrenology increasingly lost credibility and entered the realm of pseudoscience, the contents of some of these museums were absorbed into the expanding comparative anatomy (later termed physical anthropology) collections of the mid-nineteenth century. Thus, for example, the large collection of the Edinburgh Phrenological Society was transferred to Edinburgh University's Anatomy Department during this period. The skulls collected by phrenologists then became the focus of race-based science which sought to describe and understand "racial" diversity and origins, a central research interest for many anatomy departments at that time. These "race" collections were in the majority composed of crania (because it was thought that the skull most clearly exhibited racial characteristics) and commonly formed significant components of large and imposing anatomy museums that were architecturally and pedagogically central to medical schools during this period (Alberti 2011a).

"Race" collections account for a large number of curated human remains, and were compiled between the late eighteenth and early twentieth centuries to represent the diversity of humankind. In the United Kingdom, the majority of remains in these types of collections are European in origin but a large component was taken from geographical locations worldwide. Museums wishing only to display representative so-called racial types only acquired small numbers of crania, but those with a strong research agenda in this area compiled extensive collections for measurement and analysis that could number in the multiple thousands. At that time, the scientific significance of a collection was dependent upon its size and geographical diversity.

Remains were obtained from all the different places that the dead can be found. While the majority were taken from burial grounds, either through excavation or chance recovery, remains were also acquired before burial, such as from sites of violent death, and prison or hospital morgues. There is a small but significant number of individuals who were killed or executed for their part in resistance to colonial expansion and their skulls or preserved heads sent back to the UK (Turnbull 2002; Fforde 2004). Institutions in Europe used extensive collecting networks to obtain remains from around the globe. Thus, for example, universities were sent remains by past students, army medical museums relied on medical officers serving abroad, and learned societies utilized their international membership. Private collectors relied more heavily on purchase as well as expending considerable effort creating relationships with potential collectors "in the field." Associated documentation (e.g., donor correspondence and museum catalogs) can provide some indications of the historical responses of those whose dead were removed. Whether couched in terms of collectors having to be clandestine in the removal of remains, descriptions of unease and fear shown by local

people at the disturbance of graves, overt warnings and threats to collectors, requests for remains to be returned, or outright opposition, the historical record contains ample evidence of local concern and resistance.

The nineteenth and early twentieth century research undertaken on these remains was deeply embedded in the race paradigm and consequently deeply racist in nature. Such research reified incorrect and preconceived notions of racial hierarchy that had been present for centuries. The so-called Order of Mankind, ranked different "races" on an hierarchical ladder which normally placed the European male at the top and others in descending order below, with typically Australian Aboriginal people or Tierra del Fuegians at the bottom. After the introduction of Darwin's evolutionary theory, human remains were increasingly investigated for "evidence" of the evolutionary "stages" through which Europeans had passed (Haller 1971). Thus, for example, work was undertaken on skeletal remains to investigate the "lowly" physical characteristics of Aboriginal people (e.g., Duckworth 1908; Berry & Roberston 1911) and to identify physical and cultural "evidence" in the "lower" races to show that they were the modern representatives of past European populations (Sollas 1911). The legacy of this type of research, and the influence it had on the development of deeply oppressive legislation which impacted on colonized people, was to become a significant element in the concerted calls by various Indigenous peoples for the return of their ancestral remains which began in earnest in the 1980s (see below).

By the mid-twentieth century (and particularly in response to the atrocities of Nazi Germany), the scientific profession increasingly abandoned race as a valid biological concept (Reynolds & Liberman 1996) and moved on to different research questions that needed well-provenanced remains excavated with archaeological techniques. This combination of criteria was rarely found in the old "race" collections which became largely redundant during this period, as did the large pathology collections and those illustrating normal anatomy. This lack of use, coupled with the development of new teaching techniques and acute pressure for space, saw many anatomy museums dismantled. Their contents were either transferred to other museums or placed in store where they remained largely forgotten until indigenous interest in reclaiming the bones of their ancestors drove significant research into locating and provenancing collections in the 1990s.

The complex history of acquisition and transfer of collections is well illustrated by that of the Royal College of Surgeons of England. The College's new buildings in Lincoln's Inn Fields, London, were opened in 1813 and incorporated a central museum, the nucleus of which was formed by the anatomical collection of distinguished surgeon John Hunter (1728–1793), which had been purchased by the British Government in 1799. Published and unpublished catalogues of the collection chart rapid growth during the nineteenth century. Significant components included a substantial series of human remains from around the world (its "Human Osteology" series) as well as a large number and variety of pathological and anatomical preparations of humans and animals. The College relied largely upon the work of individuals collecting overseas, as well as obtaining remains acquired by scientific expeditions, by purchase from auction houses in London, and through international trade and exchange programs with other museums, such as The Auckland War Memorial Museum in New Zealand (Fforde & Hubert 2006; Tapsell 2005). It also purchased two significant "race" collections: that of the Anthropological Society in 1890 (approximately 300 skulls), and that of private collector Joseph Barnard Davis in 1867 (approximately 1,540 skulls). The College collection is typical in its composition. The majority of the remains in the osteological series were from Europe but a large proportion were from other countries, and most were represented by crania, although the museum also acquired a much smaller number of full and part skeletons as well as some soft tissue remains. By the time its 1907 catalogue had been published, the College probably contained the largest "race" collection in Britain, and perhaps in Europe (Flower 1907).

Interest in studying the collection declined in the first half of the twentieth century, and in 1941, the Museum received a direct hit in a bombing raid of London. Although a significant portion of the museum was destroyed, over 6,300 items in the "race" collection survived, with a subsequent report indicating that damage was geographically selective (Cave 1941: 8). After the war, the surviving "race" collection, with the exception of those remains that had once been part of John Hunter's museum, was transferred in stages between at least 1947 and 1955 to the Natural History Museum in London. The College's Hunterian Museum continues to curate human remains obtained for anatomical, pathological, and medical research over the past century.

Key Issues

Over the past 30 years, there has been increasing attention paid to the ethics of human remains in museums. The "race" collections of old have been the subject of intense debate, driven by the campaigning of various Indigenous groups (particularly in Australia, North America, South America, Scandinavia, and New Zealand) for the return of their ancestral remains removed so many years ago. Their requests, which articulate strongly held spiritual beliefs and obligations as well as deep concern about the theft and misuse of their ancestors' remains, were initially denied by almost all holding institutions which argued instead for continued retention based on scientific importance. The resulting debate was high profile and often contentious and became known as the "reburial" or "repatriation" issue (Layton 1989; Fforde et al. 2002). In some countries, it has driven change in museum and professional practice and policy and slow but increasingly successful rates of returns to Indigenous groups worldwide (Hubert 1989; Watkins et al 1995; Watkins 2003; Fforde 2004; Hole 2007; Hemming & Wilson 2010). Campaigning by Indigenous groups and their supporters has meant that many in the archaeology, museum, and anthropology disciplines have closely scrutinized the history and practice of their professions and developed new policy in relation to contested human remains and cultural heritage (Phillips & Allen 2010). There has also been intense discussion about the ethics of display of Indigenous human remains and of human remains in general (Swain 2002; Alberti et al. 2009; Sayer 2010: 95-109).

The question of ethics has also arisen in relation to anatomy and pathology collections of less than a hundred years old, of which the work of the Human Tissue Authority (HTA) in the UK is an example. However, with the decline of the great anatomy museums of the nineteenth and early twentieth century, a perhaps more prominent issue has been the future of the large number of anatomical and pathological specimens that they once housed. No longer in high demand for teaching use, such items take up space and, if wet specimens, are costly to maintain. For these reasons, many pathology collections were destroyed in the late twentieth century, although some have been retained for teaching purposes and to illustrate medical history. Emerging research in the development and history of medical museums provides important context and information about the potential future of the human remains they contain (e.g., Reinarz 2005; Alberti 2011a, b).

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

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Human Remains Recovery: Archaeological and Forensic Perspectives

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Introduction and Definition

Forensic archaeology involves the application of archaeological theory to scenes of crime, usually in the search for, and recovery of, buried human remains and associated evidence (Hunter & Cox 2005; Blau & Ubelaker 2009). This transfer from more conventional archaeology is not straightforward: there are a number of operational, legal, and procedural divergences from the parent

Human Remains Recovery: Archaeological and Forensic Perspectives, Fig. 1 The photograph shows the formation of buried layers representing sequences of events

which makes forensic archaeology a discipline in its own right. All archaeology involves the study of the shallow substrates; it bases its methodology on the principles of stratigraphy which are empirical. By nature, archaeology is an invasive and destructive process.

Stratigraphy is the result of formation processes by which surface deposits will accumulate, often unperceivably, over time in a given place. These deposits can reflect both human (cultural) or natural changes. Examples of cultural changes can include layers resulting from construction, fire, occupation, digging and filling pits, demolition, agriculture, and so on; examples of natural changes can include silting, movement of soil downhill, geological movement, erosion, or peat and soil formations. All these, individually or in combination, can result in the development of layers of various thicknesses, characters, and properties. Interpreting what activities these layers reflect and the order in which they were created is the basis of archaeological study. Interpreting what the layers signify allows us to create a statement of what went on in a given place; examining the sequence of those layers provides us with a time line of their relative formation (Fig. 1). They all occur in past time, and it makes no difference to their study whether that was 10,000 years ago or yesterday morning – the same principles of investigation apply.

If a grave is dug into the ground, it creates an additional layer (i.e., the grave) in the statement of what went on in that place, and it adds a new point in the time line. In other words, the grave has a context in time and space. The grave also has boundaries – the grave walls, base and top of the grave fill. It needs to be viewed three-dimensionally as a sealed unit (rather like a coffin) inside which is contained the individual victim, material associated with the victim (clothes, jewellery, contents of pockets, etc.), and any evidence which may link the offender to the digging and infilling of the grave itself (e.g., hair, fibers, or anything deposited in the grave for concealment purposes). In many respects, the grave should be viewed as a mini crime scene. It makes no difference whether this is a single victim grave or a mass grave containing large numbers of victims. However, once human remains become removed from this burial context, all these associated evidences are, at best, minimized in value and at worse, lost completely. The burial context (the totality of the grave) is not only key to the integrity of the body and its

associated materials but also fundamental to the veracity of evidence presented in court.

Unfortunately, most buried human remains are discovered accidentally during construction work, drainage, or even gardening, often being pulled out of the ground by the finder or the police. Instructions to police forces are to leave them where they are and *not* to remove them. This allows an archaeologist to evaluate the context of the grave in relation to surrounding layers. Sometimes this can be simple, for example, when a skeleton is located under a house foundation of known date, or more difficult when there are no clearly defined or identifiable layers surrounding the burial on which to base a context or relative date. Sometimes human bones are found scattered on the surface with no context at all. In such cases, it needs to be ascertained whether they were originally buried (i.e., with a context) and have been brought to the surface by scavengers or whether they belong to a surface deposition. This involves a wider landscape analysis in order to identify disturbances or other remains respectively. Formation processes occur all the time and are just as relevant to modern as to historical graves. Sometimes local events (e.g., ditch clearance, gravel spread, or reseeding) can have recorded (or remembered) dates that will give the grave a *terminus ante quem* (time before which); often perpetrators may attempt to disguise graves with paving or similar surfaces or by "importing" soils from elsewhere. All these activities leave discernible traces in or on the ground.

Key Issues

Locating Buried Human Remains

Locating remains below the ground surface is one of the cornerstones of archaeological practice. Over the years, archaeologists have adapted, developed, and honed various techniques in order to achieve this. The majority of methods are non-invasive (often referred to as "remote sensing") and have advantages and limitations according to environment, landscape, and operational conditions. Different techniques and strategies can be adapted according to merit depending on the character of location – these can vary from a small back garden to open moorland; they also depend on the questions being asked in a particular enquiry. It is sometimes forgotten that the application of these techniques in the discovery of buried human remains can differ from the same techniques used in the discovery of conventional archaeological remains such as buried walls, ditches, and pits. This difference is brought about by the decay dynamic of the buried human body. This decay process is well documented, but the speed at which it occurs varies according to, *inter alia*, the buried environment, climate, wrapping/clothing, and other factors, and as such the decomposition stages at which the effects of certain techniques may be optimized or minimized (e.g., liquidification, heat emission, skeletalization) may vary enormously (Boddington et al. 1987; Vass et al. 2002).

The main techniques used in landscape search and analysis are well documented and only need outlining here (Killam 1990; France et al. 1997; Ruffell & McKinley 2008; Cowley 2011). Aerial methods include photography, satellite imagery, and Lidar (see below). All have their advantages and limitations, but all of them (with the exception of thermal imaging) will be detecting not the buried body per se, but the disturbance made in burying it (i.e., the grave). When a grave is dug and filled in again, it can present a different base for surface vegetation simply because the fill of the grave tends to be looser, more aerated, and contains a mixture of all the soils lying adjacent in undisturbed ground. As a result, the surface vegetation may differ from the surrounding flora: Its growth may be enhanced or stunted, and it may attract different species or follow a differing flowering regime. The disturbance itself may have drawn distinctive subsoils to the surface such as chalk or colored clays.

Aerial imagery uses light (shadow), crop variation, and soil marks to locate disturbances; it may pick out topographical expressions caused by slight mounding on the ground surface or a sinking of the ground when the infilled soils of the grave begin to consolidate. Detecting these features depends on angle of light, season, and

crop regime. If the conditions are not appropriate, the evidence of disturbance might be missed. On the positive side, this kind of evidence can be long term, which is why archaeological remains hundreds of years old can still be detected from the air providing the conditions are favorable.

Larger targets, particularly those of significant vegetation change such as mass graves, might also be detected by satellite imagery, depending on pixel resolution, using the same principles. Many mass graves, notably those in the former Yugoslavia from the 1990s, are approximately 3 m wide (roughly the bucket width of the mechanical excavator used in their construction), typically some 10–20 m in length, and are of appropriate size for vegetation change to be detected by satellite. Lidar is a relatively new asset and involves producing a digital terrain model (DTM) by firing multiple radar pulses from an aircraft in flight. Depending on the number of points per meter reflecting from the ground, this may be able to identify subtle topographic change on the ground surface and can even penetrate tree canopies. The application is novel but has potential.

On the ground, geophysical survey has a role to play in targeting; it has the ability to detect shallow anomalies below the ground surface. It will not define what those anomalies represent, and it requires a relatively "quiet" and consistent geological background in the immediate surrounding area in order for the anomaly to be observable. The techniques used tend to be electrical (e.g., resistivity), magnetic (e.g., magnetometry), or electromagnetic (e.g., radar); they all respond to different characteristics of the substrates and are not substitutes for each other. Like other techniques, they all have advantages and limitations depending on environment and context. Ground penetrating radar (GPR) has become a popular choice for the simple reason that it has the ability to penetrate solid surfaces (e.g., patios, driveways, swimming pools) and can deliver data in "real time" (i.e., during the survey itself). All search methods share two common features: None of them are infallible, and the output is only as good as the person who interprets it.

Search assets are best used in combination and in a defined sequence. Search is as much about elimination as about discovery, and the cadaver dog can have a powerful role to play in this process. The cadaver dog, for example, can find a useful role in being directed to anomalies detected by GPR as a secondary source of validation. Targets will require venting (i.e., probing the ground to facilitate release of any gasses), and if the dog responds, the anomaly can be excavated or investigated further. A negative dog response can normally allow the anomaly to be eliminated. Neither GPR nor dog (or any other search asset for that matter) can be used with 100 % confidence, but if they are used in combination, the probable likelihood of error is reduced to an acceptable level. Cadaver dogs can be used in a similar way to investigate freshly turned soils in a suspected garden or potential targets identified from aerial imagery. Although dog work requires venting probes to enter the ground, the technique is only mildly invasive. The use of complementary or sequential assets such as this is a realistic and practical operational procedure.

More invasive but more effective for larger areas of search is the technique of mechanical stripping. The use of heavy machinery to investigate a site can be very useful in cases where an allegation has been made of a burial located within an area that can only be generally defined or where an area needs to be eliminated with 100 % confidence. The process requires the upper surface of the ground to be stripped off horizontally using a wide toothless ditching bucket, working on the principle that the disturbance caused by the grave digging will be visible within otherwise disturbed natural soils below (Fig. 2). Normally this can be achieved, and land eliminated, at a depth of around 0.3 m depending on conditions, but the process is invasive and has the potential to strip off some of the grave fill evidence as well. It is a compromise between, on the one hand, the need for speed and the efficient use of resources and, on the other hand, the necessity of discovering the body/ies. That said, mechanical stripping is a very effective tool and can be manipulated sensitively by an experienced operator.

Searching for human remains is a special exercise: in addition to assessing information provided by witnesses, it can involve the analysis of

Human Remains Recovery: Archaeological and Forensic Perspectives, Fig. 2 Machine stripping of a suspect area to detect disturbances brought about by a clandestine burial

landscape, topography, and the definition of features on a landscape. The starting point for this is the map in its many forms. Maps provide basic landscape data, but other data sources such as surface geology and land use (which can inform feasibility of burial) also need to be incorporated if target areas are to be defined. The use of geographical information systems (GIS) has a major contribution to offer here in allowing the landscape to be converted into a DTM over which different layers of information can be draped (e.g., Orengo 2008). Not only can it incorporate layers such as geology and land use but it can also be used to generate view sheds and hence zones of the landscape which offer concealment from roadways or nearby houses. As a result of this, GIS can also be used to target particular landscape zones or to prioritize one zone over another on the basis of practical factors. Moreover, the results from geophysics, line search, and dog deployment, etc., can also be added to the model to show, for example, areas covered and the degree of search thoroughness. GIS data can be repeatedly interrogated, or items added or deleted.

Excavating Clandestine Graves

Identification of the grave allows an archaeological strategy for recovery to be designed. All clandestine depositions are different and, although there is no "by-the-book" methodology, every recovery process will recognize common stratigraphic principles, the destructive nature of the process, and, as a result, the importance of making adequate records (Hanson 2004; Cheetham & Hanson 2009; Hunter 2009). An offender digging a grave will undertake three processes, usually in quick succession: the digging of a hole (the grave) and the depositing of spoil on the adjacent ground surface, the deposition of the victim in the grave, and the backfilling of the grave. The archaeologist will address the grave in reverse order, first by emptying (excavating) the grave and recovering evidence within the grave and the fill, then removing the body, and then recording the grave itself. In order to understand *how* the offender filled in the grave, it is often standard practice to excavate a half-section first: this involves excavating the grave from one half of the grave only; it allows the creation of a profile through the grave and shows, for example, tip lines, the presence of additional layers introduced to the grave fill, or any attempted concealment layers introduced by the offender. Sections provide a vertical view of the formation process which cannot be obtained in any other way.

Human Remains Recovery: Archaeological and Forensic Perspectives, Fig. 3 The sides of the grave need to be followed carefully in order to avoid contamination and to record implement markings

Most grave fills are a mixture of the layers through which the grave has been dug. Excavation normally involves removing one layer at a time and recording each one individually by unique numbering and with a detailed description of its color, characteristics, and mineral inclusions. In a mixed grave fill, this is normally carried out by defining arbitrary layers as "spits," typically 10 cm deep, but recording each in the same way as a "real" layer. Objects which are recovered from the excavation can be associated with the layer or "spit" from which it derived. This allows a coarse reconstruction of where they were deposited in the grave fill. A more sophisticated method of recording can be achieved by electronic means, by deploying a total station electronic distance measurer (EDM) which can record points accurately and allow the shape of the grave and any associated objects to be reconstructed in three dimensions. It offers immense advantages but is not always viable in crime scene conditions located within enclosed spaces or where there are sight-line obstacles such as trees or buildings.

The edges of the grave need to be followed carefully using small hand implements (Fig. 3). This is not simply to ensure that the fill of the grave is not contaminated but also to preserve any implement marks. Often, especially in plastic soils such as clays, there may be impressions or tool marks surviving in the grave walls, or even footprints impressed into the grave floor. In some excavations of mass graves, the approach taken is to excavate a trench all around the grave giving a pedestal effect in order to facilitate access (Cox et al. 2007). This has its advantages, but it also has the effect of destroying marks in the grave wall. In deeper or larger graves, one solution is to dig a small platform to one side of the grave once the excavation has reached a depth of about 30 cm and the exposed part of the grave wall has been recorded, then continuing the process in stages until the excavation is complete. This allows any impressions in the grave wall to be recorded fully and also facilitates operational access to the grave itself.

Because excavation is a destructive process, it often requires specific forensic questions to be asked. These vary according to circumstance but can typically relate to the manner of grave creation and the implements used, whether the grave was dug in a hurry or carefully prepared, if there were any objects or trace evidence within the grave fill, or if the grave contained any foreign material that might lead the enquiry to a different location. There are also questions relating to the identity of the victim and the manner/cause of death, not to mention the overriding question as to who killed the victim. The answer to the last question may not be readily apparent from excavating the grave, but the evidence contained within the grave may provide new information that will contribute to an answer.

Archaeology is an interrogative exercise: The range of questions that need to be asked in a particular enquiry will inevitably influence the methodology. Finding the body is only a part of the process; being able to answer key questions such as these is why experienced archaeological input is so essential. Once a body has been lifted from a grave, the evidence has been largely destroyed and the opportunity lost. The need for formal recording systems is therefore paramount. This is not just a matter of written records per layer but also of detailed photography and of plans drawn to scale. These constitute the primary field record of work carried out and underpin both the archaeologist's account and the evidence given in court.

Soils and other material removed from the grave may need further investigation according to questions being posed by the enquiry and according to potential survival (e.g., Janaway 2008). Sieving, for example, may be used for the collection of any small items (including bones) that may have been missed at the scene. Sieving according to layer or "spit" will ensure that any such items can be identified with a particular part of the grave. Depending on the state of the soils, sieving can be undertaken dry (i.e., by riddling through a mesh) or wet, whereby a jet of water is used to break down thick soils or clays through a grid. Mesh sizes vary according to what is been searched for: A 5–10-mm mesh will capture most larger objects, but smaller mesh sizes will be needed for tiny articles such as very small bones. The recovery of trace materials (e.g., human hair and fibers from the perpetrator which may have entered the grave fill) will require a more subtle approach, controlled laboratory conditions, and sieving down to levels of microns. Both hair and fibers are known to survive for variable lengths of time in buried environments, according to conditions.

The report of the excavation will incorporate all these evidence types measured against the methodology employed and the answers to specific questions asked. It will be open to cross-examination, and the archaeologist will be required to support his or her findings and interpretations on the basis of the records made. Once a grave has been excavated, there is no going back to do it again.

Cross-References

- ▶ Archaeology: Definition
- ▶ Excavation Methods in Archaeology
- ▶ Forensic Anthropology: Definition
- ▶ Spatial Analysis in Field Archaeology
- ▶ Surface Survey: Method and Strategies

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Human Skeletal Remains: Identification of Individuals

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Introduction and Definition

Identification is defined as the act of establishing an identity that makes an entity definable and recognizable (Black 2007). While identification may be important in cases involving the living (e.g., Blau et al. 2006: 387; Black et al. 2010), in archaeological and forensic cases, identification involves attributing a correct name to human remains. There are various circumstances where there may be a requirement to establish the identity of a deceased individual: following an unexplained natural death, homicide, suicide, or accident; in cases of death following political, ethnic or religious violence, and mass disaster incidents. The attempted identification of historic figures has also been pursued (Stone et al. 2001; Bogdanowicz et al. 2009; Clark 2011).

While the cause and manner of death can be determined independently of identification, the absence of the name of the deceased person means there is no way to know who to talk to collect information about the person when they were alive (ante-mortem data) and therefore confirm or deny identification. The identification of a deceased person is important for a variety of legal, religious, cultural, and ethical reasons (Blau & Hill 2009). In fact, it has been argued that "[i]dentification of human remains is . . .as important as the collection of evidence for criminal investigations. It is a duty of investigators, in recognition of the right to know of concerned families, as enshrined in international humanitarian law" (Tidball-Binz 2006: 389). Essentially, "human beings have the right not to lose their identity after death. . ." (Interpol 1996).

Key Issues

Identification Methods

The identification of a deceased person, whether an historic figure, or recovered from a forensic context, is complex and often time consuming. The process involves comparing information obtained from the analysis of the deceased person (post-mortem data) with information obtained about the person when they were alive (ante-mortem data).

The forensic sciences play an integral part in the identification of deceased individuals. Decisions about which specific techniques to use in the identification process will, however, be

influenced by variables such as the preservation and condition of the remains. Accurate and professional recovery of the remains is therefore paramount to ensure that as much information as possible is available to aid the identification process. In addition, the accuracy and quality of the ante-mortem information are also important variables in the identification process.

Positive Identification

International standards promote the positive identification of individuals. A positive, that is, confirmed identification is achieved when it can be demonstrated that there are enough unique data markers to conclude that the ante- and post-mortem records are from the same individual. The primary methods of identification (or unique data markers) include fingerprints, DNA, and dental comparison.

Presumptive Identification

In cases where no adequate ante-mortem records exist (e.g., in countries where people rarely visit a dentist or where fingerprints records are not routinely collected), it may only be possible to establish a possible or presumptive identity (e.g., Simmons & Skinner 2006). While no single factor alone justifies the identification, information such as age at death, sex, stature, associated clothing, jewelery, and documents when considered together are sufficient for a possible identification.

Exclusion

There will be some cases where the post- and ante-mortem information do not match resulting in an exclusion. For example, human remains are located in an area near where missing person's files indicate that a 15-year-old girl was last seen alive. An analysis of the human remains indicates the individual was an elderly male. Thus, the results of the analysis allow the investigators to exclude the hypothesis that the remains are those of the missing teenager and seek other evidence to form a new proposition for identification.

Variables that Influence the Identification Process

It is important to recognize that the identification process is influenced by a number of variables:

- *Quality of the recovery of remains (completeness)*: In cases where the body is badly decomposed or fully skeletonized, unprofessional recovery may result in incomplete remains where essential parts for analysis and comparison (e.g., teeth) are missing.
- *Preservation/condition*: While the remains may be complete, differential preservation and the condition of the remains will affect the methods which can be considered for identification. Different techniques will be used depending on whether the individual is recently deceased (fresh body) or whether significant time has passed (fully skeletonized). For example, it is not possible to use fingerprints for identification when the individual is fully skeletonized. Post-mortem and/or peri-mortem trauma may affect the condition of the remains: in the case of a bomb blast with associated fire, it is possible that the dentition and DNA may be affected.
- *Quality and amount of ante-mortem data*: There may be cases where only general information such as the age and sex of the person is available, which does not provide enough detail for individualization. The nonexistence of, or inability to locate medical, and/or dental records may also make it impossible to reach a positive identification. In many instances, there will be no available information about what the deceased person was last wearing, i.e., their clothing and/or, personal belongings.
- *Open or closed case*: A closed case refers to a situation where the exact number of missing individuals is known. An example is a plane crash where details of the number and names of people on the plane would have been submitted prior to flight departure. Following the disaster (whether accidental or human induced), it is therefore possible to define the exact number of missing people and formulate a list of names of victims for which to obtain ante-mortem data. In contrast, an open case implies the exact number of individuals lost as a result of the disaster or atrocity is unknown because no manifest of missing persons exists. Terrorist bombings, tsunamis, earthquakes, and public transport and ferry disasters are all examples of open cases. In general, the

number of persons reported to authorities as missing will exceed the actual number involved in the incident.

Cases Where Remains Cannot Be Identified

There will be instances where remains cannot be identified at the time of the investigation whether as a result of inadequate or absent ante-mortem data or a lack of resources which result in the inability to form an identification hypothesis. Decisions must then be made by the institution/organization responsible for the remains as to how to appropriately store the remains securely until new information or resources become available.

Summary

The identification process involves the evaluation and integration of all available information. A successful outcome may be achieved through a multidisciplinary approach in which an assessment of the contextual information is taken into account. Whether resulting in a positive or presumptive identification or an exclusion, all available information must be assessed by the relevant experts. The choice of method used to identify an individual will depend on the context of the death of the person, preservation of the deceased, access to ante-mortem information and available resources (e.g., DNA capabilities) (Blau & Hill 2009).

Cross-References

- ▶ Age Estimation
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Facial Approximation and Craniofacial Superimposition
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Time Since Death in Bioarchaeology and Human Osteology

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Hunter-Gatherer and Midrange Societies: Uluṟu

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Introduction

Uluṟu (also known as "Ayers Rock" or "The Rock") is a sandstone monolith in the center of Australia. Uluṟu is located within the Uluṟu-Kata Tjuṯa National Park approximately 350 km

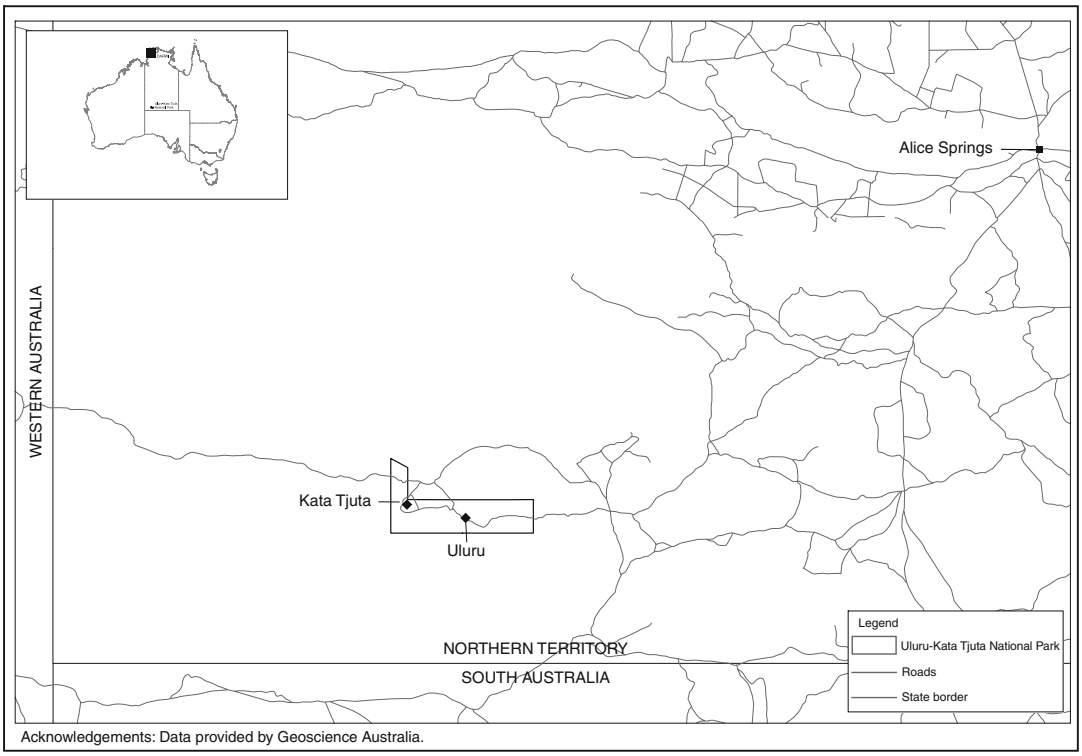

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 1 Map of Australia indicating the location of Uluṟu-Kata Tjuṯa National Park, with kind permission of Uluṟu-Kata Tjuṯa National Park

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 2 Changing colors of Uluṟu, with kind permission of Uluṟu-Kata Tjuṯa National Park

southwest of Alice Springs and 4 km from the Ayers Rock Resort in the township of Yulara (Figs. 1 and 2). The surrounding environment consists of an extensive system of sand plains, dunes, and alluvial desert (Austral Archaeology 2006: 5). This landscape contains extensive archaeological sites and cultural material including numerous rock art sites, artifact scatters, camp sites and

areas of occupation, grinding grooves, scared trees, and sites of historical significance. Uluṟu is an extremely significant and important place for the local Aboriginal group of Aṉangu people, who are guided by their *Tjukurpa* (traditional law) and continue to live there in the nearby community of Mutitjulu. Aṉangu means "people" in Yankunytjatjara and Pitjantjatjara and is how the people within Uluṟu-Kata Tjuṯa National Park refer to themselves (Austral Archaeology 2006: 8).

Definition

The site of Uluṟu is a sandstone monolith, 9.4 km in circumference and in excess of 340 m high (Department of Environment 2008). The site obtains its name from the local Aṉangu people, who have practiced their culture, and continue to do so, in and around the site for millennia. Uluṟu is also commonly known as "Ayers Rock" on account of the first European to sight it and who named it, thus, the explorer William Gosse in 1873. Located within the Uluṟu-Kata Tjuṯa National Park (UKTNP), Uluṟu is in an area of Central Australia on the southwestern margins of the Lake Amadeus sedimentary basin (Hardy & Johnson 2006: 22). Thirty-two kilometers to the west of Uluṟu lie the 36 sandstone domes of Kata Tjuṯa (meaning "heads many" in the local language of Pitjantjatjara). This site is also known as "The Olgas" as referenced by Ernest Giles in 1872 after the then Queen of Württemberg. UKTNP was inscribed on the World Heritage List in 1987 for outstanding universal natural values and in 1994 for outstanding universal cultural values (Department of Environment 2008). This site was also listed on the National Heritage List of Australia in 2007. Both sites will be referred to by their Aṉangu names only throughout the rest of this entry.

Key Issues/Current Debates/Future Directions/Examples

This following information provides particulars about the site of Uluṟu – the environmental setting, the Aṉangu people, and the archaeological landscape. While this information is thorough, references are also contained below for additional and more comprehensive details.

The Environmental Setting

The landscape surrounding Uluṟu is dry and harsh due to the semiarid environment it lays within, containing complex dune systems, alluvial plains, abundant wildlife, and numerous vegetation species. UKTNP itself covers an area of approximately 1,325 km^2 (UKTBoM & Parks Australia 2000: 3). The environmental context of the area is best described with discussion of the geological features, soil landscapes, climate and hydrological data, and the presence of specific vegetation, flora, and fauna species (Fig. 3).

The geological features of both Uluṟu and Kata Tjuṯa are classed as surface expressions of Mt. Currie conglomerate of Cambrian age, an arkose variant of the conglomerate, feldspar-rich sandstone (Hooper, Sallaway et al. 1972). Local outcrops of calcrete are found in the area and stone sources suitable for flaked tool manufacture including quartz, silcrete, and quartzite are also regionally available (Hardy & Johnson 2006).

The landscape around Uluṟu contains three primary land systems as described in Allan (1984), while only two of these are detailed in Hooper and Sallaway et al. (1972). The first of these is the Gillen Land System, consisting of the sandstone ranges, their narrow gorges, gullies and creek lines, and associated gently sloping fans and alluvium of coarse-textured soils. These are surrounded by the Karee Land System that consists of the gently sloping plains fringing the fans and alluvium of the Gillen Land System. The final major land system covers most of the UKTNP and is the Simpson Land System, consisting of sand plains and dune fields (Austral Archaeology 2006; Hardy & Johnson 2006).

The climatic conditions and subsequent hydrology surrounding Uluṟu are what is to be expected within a semiarid environment. The average rainfall is around 220 mm in a year, and there is no predictability in the variation from year to year (Hardy & Johnson 2006). It is not

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 3 Flora and fauna found within the UKTNP, with kind permission of Uluṟu-Kata Tjuṯa National Park

unknown for rainfall to be over 500 mm for 3 years in a row and then 100 mm for the next 3 year period (Latz 2004). As the annual rainfall is quite low, movement of surface water is localized to within the park (Hooper et al. 1972).

As Uluṟu lies within the Great Sandy Desert bioregion of the Northern Territory (Connell Wagner 2004), the vegetation present is one that exhibits tolerance to a semiarid environment. Austral Archaeology (2006: 5-6) lists a number of references for the floristic and vegetation patterns around Uluṟu. These include examples from Buckley (1981a, b), Allan (1984), Griffin (1984), Saxon (1984), and Reid et al. (1993). The vegetation present changes with the soil landscapes, moving from sandy to heavier red earths and the alluvial fans and plains. The majority of vegetation present is within the sandy soil landscape and reportedly includes species such as spinifex (*Triodia basedowii* or hard spinifex, *T. pungens* or soft spinifex, and to a lesser extent *Plectrachne schinzii* or feathertop spinifex), desert oaks (*Allocasuarina decaisneana*), umbrella bush (*Acacia lingulata*), sandhill wattle (*A. dictyophleba*), honey grevilleas (*Grevillea eriostachya* and *G. juncifolia*), desert hopbush (*Dodonaea viscosa*), cassia (*Senna artemisioides*), long-leaved desert fuchsias (*Eremophila longifolia* and *E. willsii*), and the parrot pea (*Crotalaria cunninghamii*) (Austral Archaeology 2006). Within the other soil landscapes there are also numerous species of mulga present (*Acacia aneura* and related species, as well as sandhill mulga (*Acacia ammobia*)), mallee eucalyptus, bloodwood (*Corymbia opaca*), corkwood (*Hakea suberea*), and witchetty bushes (*Acacia kempeana*), as well as witchetty bushes, native fuchsias (*Eremophila gilesii* and *E. latrobe*), native currant (*Canthium latifolium*), cassia (*Senna artemisioides*), woolly butt (*Eragrostis eriopoda*), prickly wild tomato (*Solanum quadriloculatum*), caustic bush (*Euphorbia tannensis*), and a variety of grasses (Austral Archaeology 2006).

Faunal species present around Uluṟu include numerous species of reptiles, kangaroos and other mammals, birds, and insects. A total of 46 species of native mammal are known to have existed in the area of UKTNP, although this is now reduced (Hardy & Johnson 2006). Currently the range of fauna within the park includes 178 birds, 77 recorded species of reptiles and amphibians – including 60 lizards, 13 species of snakes, and four frog species – and 21 mammal species (Department of Environment and Heritage 2012). A full list of mammal, reptile, and bird species present within the UKTNP and information (including Aṉangu names) can be found at http://www.environment.gov.au/parks/uluru/nature/fauna.html.

Aṉangu: The People and the Park

The Aṉangu are the local indigenous inhabitants of the area within and around Uluṟu-Kata Tjuṯa National Park. They are the traditional owners of the area and site custodians of the many sacred and special places located around the base of Uluṟu. Many live in the nearby Mutitjulu community,

located on the eastern side of the great monolith and not far from the park headquarters and visitors center on the southwestern side. They also speak Pitjantjatjara and identify with the Pitjantjatjara/Yankunytjatjara language group, with connection not only to this country but also to that to the west and south of the park in the "Aṉangu Pitjantjatjara Yankunytjatjara (APY) Lands."

Long-recognized for their connection to the country, the following extract for the UKTBoM Plan of Management (2000: xx) illustrates this:

> As a cultural landscape, the Park as we know it today, represents the work of Aṉangu and nature throughout thousands of years. The landscape of the Park has been managed over this time using traditional Aṉangu methods governed by Tjukurpa, which is Aṉangu law. The Park contains some outstanding examples of the habitats of rare desert flora and fauna as well as the major geological features of Ulu̱ru and Kata Tju̱ta.
>
> Aṉangu believe the Park landscape was created at the beginning of time by ancestral beings and Aṉangu are their direct descendents and have lived here ever since.

Aṉangu take seriously their responsibility to look after the country. The history of the park has been one of struggle and survival, as they battled with many areas of government to manage their own country. In 1985, through their determination, their rights were acknowledged with the then governor-general formally granting title to the park to the Ulu̱ru-Kata Tju̱ta Aboriginal Land Trust (UKTBoM 2000: 9). Today, the park is leased back to the Australian government in a joint management arrangement between the parties.

Underpinning this arrangement is the vision of the Board of Management and this guides all of the work undertaken within the park (UKTBoM 2000: x):

> The Ulu̱ru-Kata Tju̱ta landscape is and will always be a significant place of knowledge and learning. All the plants, animals, rocks and waterholes contain important information about life and living here now and for all time.
>
> Aṉangu grandparents and grandchildren will always gain their knowledge from this landscape. They will live in it the proper way. This is Tjukurpa. . .
>
> Together we will apply Aṉangu Tjukurpa and practice and relevant Pi̱ranpa [nonindigenous] knowledge to:
>
> - Keep Tjukurpa strong
> - Support a healthy Aṉangu culture and society
> - Look after country and protect a national symbol
> - Protect World heritage natural and cultural environments of the Park in harmony with Australian social and economic aspirations

The responsibility in caring for the country is innate for Aṉangu and with this comes the knowledge relating to resources and the use of certain areas for different activities. Resource variations can be identified by the different zones categorized by Aṉangu and include *pu̱li* (rocky country, e.g., Ulu̱ru), *pu̱ti* (shrub land), *karu* (creek lines and runoff plains), *tali* (sand dunes), *pila* (spinifex plains and low areas between sand dunes), and *nya̱ru* (recently burnt country) (DEH 2006 in Hardy & Johnson 2006).

Management of the landscape relates to these zones and the vegetation types found within them. With practices proven over thousands of years, sites are looked after and managed with intricate fire regimes, the cleaning of waterholes, and other land management practices that help to control the environment and keep the land healthy (Hardy and Johnson). The use of fire is an integrally important part of maintaining the country, and Aṉangu are taught the correct way to burn and manage fire by their grandparents according to Tjukurpa (Mu̱titjulu Community 1996: 49).

Aṉangu knowledge also enables people to travel through the landscape, utilizing resources as they move vast distances. Hardy and Johnson (2006) list the known uses of plants and resources in the area that have included:

- Food – seeds, fruit, greens, saps, and tubers
- Medicine
- Wood for making implements
- Water
- Resins/glues
- Fiber
- To aid in hunting/poison
- Ceremony and art
- Decoration
- Toys
- "Native tobacco"
- Shelter

Cultural traditions are strong within UKTNP and are still practiced today by Aṉangu people. The principles guiding this culture are known as

"Tjukurpa." It is not restricted to dreaming stories or places. It is all encompassing and includes, but is not restricted to, language, rules of behavior, kinship systems, and the general guiding principles needed for life. Tjukurpa surrounds you when visiting, working, or living in UKTNP.

Tjukurpa is central to life at Uluṟu – it is the law, it is the dreaming, the story, and the message (*pers. comm*. Mick Starkey 2006). Aṉangu see Uluṟu and Kata Tjuṯa as part of a cultural landscape and reference is given to the spiritual meaning of the park, and spiritual interpretation of the landscape, including geological features such as rock faces, boulders, and waterfalls, contains spiritual meaning. All plants and animals derive from the creative period of Tjukurpa as well (Austral Archaeology 2006).

Johnson (2006) writes that there is much evidence of Tjukurpa within the rock art sites around the base of Uluṟu. This includes representation of the stories of *Kuniya* (Woma python) and *Liru* (poisonous snake), as well as *Kurpany* (the spirit dog). Other motifs at public sites, such as those along the Mala Walk on the western side or near the Mutitjulu Waterhole on the southern side, include symbols for traversing waterholes in the surrounding country, as well as tracks of different types of animals such as the *mala* (rufous hare wallaby), *malu* (kangaroo), and *kaḷaya* (emu) (Figs. 4 and 5). *Piti* (large wooden bowl) and other manufactured goods are also evident. Through the process of working together, the piranpa (white people) can learn about Tjukurpa from the Aṉangu rangers and traditional owners, all guiding and learning from each other about their ways. There are a number of cultural protocols to work within the sites to ensure that Tjukurpa is looked after (Johnson 2006).

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 4 Tourists visiting the Mala Walk near The Climb, with kind permission of Uluṟu-Kata Tjuṯa National Park

The Archaeology

It is rather surprising that, however enchanting Uluṟu may seem, it has been the focus of only a limited amount of archaeological research and these have predominantly been in the form of archaeological surveys either for UKTNP reference (Haskovec & Sullivan 1987; Haskovec 1989, 1991) or commissioned in response to development within certain sections of the park and required for management considerations (Thorley 2000; Austral Archaeology 2004, 2006; Hardy & Johnson 2006; Gunn 2007). This in part has been due to the concerns Aṉangu have expressed regarding archaeological excavations in their country both within and outside the park boundary, as this practice is not in keeping with Tjukurpa. The resulting research undertaken has focused solely on surface material culture remains and this is what is discussed here.

The types of sites recorded around Uluṟu have included rock art (paintings and petroglyphs), artifact scatters, campsites, and isolated artifacts (Thorley 2000; Austral Archaeology 2004, 2006; Hardy & Johnson 2006). The majority of artifacts recorded have been made of quartz and were flakes, cores, and flake fragments with isolated instances of silcrete, sandstone, and "tuff" flakes also recorded (Hardy & Johnson 2006: 31). All of the studies in question identified areas of high

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 5 Rock art on the Mala Walk, with kind permission of Uluṟu-Kata Tjuṯa National Park

archaeological potential in and around the base of Uluṟu. Discussions with Aṉangu also indicated specific patterns of occupation and land use that included the area between the base of the rock (including shelters) and the first row of dunes (Austral Archaeology 2004). The resulting predictive general distribution model implies that occupation would have been focused on the areas at the base of the rock due to the available water and shelter from the weather and that this would have led to a greater density of artifacts being deposited, with the areas of the sand plains and dunes beyond used for hunting and foraging, potentially resulting in the deposition of a smaller number of artifacts in discrete activity focused areas (Hardy & Johnson 2006: 31).

Looking further afield to obtain a regional context, excavations have been undertaken in the MacDonnell Ranges near Alice Springs providing evidence of occupation in the Australian Arid Zone for minimally the last 22,000 years as evidenced by the presence of flaked stone artifacts, intact hearths, charcoal, grindstones, ochre, and emu eggshell (Austral Archaeology 2006). This excavation recorded periods of intensified occupation approximately 6,000 years ago with the periods of most intensive use in the upper layers dating to post 1,900 years ago (Smith 1987: 10 in Austral Archaeology 2006).

There continues today strong cultural connections between Aṉangu and the Arrernte people of the Central Desert and other communities to the north, south, east, and west. This is illustrated in shared stories, such as those of ancestral beings that have travelled in and around Uluṟu. This site, and that of Kata Tjuṯa, not only represents a meeting point, but both are important nodes in a great web of Tjukurpa paths (Breeden 1996: 19). Respectively, these paths have come from and spread out across the landscape linking the Aṉangu and Uluṟu-Kata Tjuṯa National Park to the wider communities and surrounding landscapes (Austral Archaeology 2006).

These stories are seen as part of the living landscape around Uluṟu in the form of the rock art present at locations such as the Mutitjulu waterhole and along the Mala Walk (Fig. 6). The battle between Kuniya and Liru is played out on the walls of the waterhole and retold in the paintings at the rockshelter nearby (Fig. 7). Kurpany also appears here, and at other locations along the Mala Walk, as his travels took him around the rock. There are images of other Tjukurpa stories, maps for travelling through country from waterhole to waterhole, and one shelter referred to as "The Old Folks Home" where the elders used to sit with the young ones and teach them (*pers. comm.* Starkey 2000). The paintings have been recorded in detail most

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 6 Mutitjulu waterhole, with kind permission of Uluṟu-Kata Tjuṯa National Park

Hunter-Gatherer and Midrange Societies: Uluṟu, Fig. 7 Rock art at Mutitjulu, with kind permission of Uluṟu-Kata Tjuṯa National Park

recently by Gunn (2000) and Johnson (2001), and UKTNP undertakes a cultural heritage maintenance program with Aṉangu rangers leading the way, guided by their cultural knowledge and that of the elders, and learning the western scientific conservation and management strategies to support it.

Despite the acknowledged importance of Uluṟu by Aṉangu, other indigenous groups, and nonindigenous people of Australia, archaeological research in and around Uluṟu as well as the greater UKTNP is limited. Under the guidance of Aṉangu and in keeping with Tjukurpa, further research is required to

investigate land use patterns around Uluṟu and Kata Tjuṯa, as well as the broader landscape.

Acknowledgments The author would like to thank the Aṉangu people for the privilege of working on their country, for sharing their knowledge, and for providing guidance; the staff of UKTNP (past and present) in particular Mick Starkey, Nyinku Jingo, and Kerrie Bennison; as well as all of the senior Miniyma and Tjilpi who have passed away since I first began working there in 1999.

Cross-References

- ▶ Australian Rock Art
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage Areas
- ▶ Heritage Landscapes
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Kakadu National Park: Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art Sites: Management and Conservation
- ▶ Smith, Mike
- ▶ Sullivan, Sharon
- ▶ Veth, Peter M.

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Hunter-Gatherer Settlement and Mobility

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Introduction

The study of hunter-gatherer mobility operates at the intersection of archaeology and social

anthropology, with much information to be gained from both individual ethnographies and syntheses that extract recurrent relationships between the mobility pattern and, for example, the subsistence base. For reasons of brevity this entry focuses on insights obtained from the latter, though the reader is encouraged to consult original studies of particular societies, particularly when such societies do not appear to fit the generic patterns described. Hunter-gatherer mobility operates at various scales, and although it is motivated primarily by the need to gain adequate food and water, it is also shaped by the presence of other resources such as raw materials and of other human groups in the landscape.

Definition

For the purposes of this entry, hunter-gatherers can be defined as individuals who obtain most of their food from the hunting of wild animals and the gathering of wild plant foods. That the previous sentence reads *most* and not *all* is primarily due to the post-contact situation in which hunter-gatherers may live on *reservations*, receive government rations, or trade or exchange goods with neighboring agricultural populations. Mobility is here understood widely to include movements of individuals around a camp, movements of whole groups between camps, and forays into lands inhabited by related but distant groups of hunter-gatherers for purposes of trade, exchange, or knowledge acquisition. These three scales of mobility (which may in fact frequently overlap) are defined here as the micro-, meso-, and macroscales, respectively.

Historical Background

The study of hunter-gatherer groups by anthropologists dates back to at least the nineteenth century, while the modern era, making explicit the study of modern hunter-gatherers as a means to elucidate aspects of the human past, was initiated by the seminal 1968 *Man the Hunter* volume, edited by Richard Lee and Irven De Vore (Lee & De Vore 1968; see Myers 1988). The studies of Lee's Harvard group among the !Kung San of the Kalahari, many of which were reported in this volume, examined the hunter-gatherer way of life as a phase in the prehistory of all human groups and thus adopted an implicitly (and occasionally explicitly) evolutionary approach to the study of hunter-gatherer mobility. The evolutionary approach has persisted in the form of socioecological analyses and applications of optimal foraging theory, whereby models of the mathematically derived *optimal* behavior in given situations are compared to actual behaviors in those situations. Evolutionary approaches have been particularly effective in allowing for the formation of general rules about hunter-gatherer adaptation that can be applied to analyses of the archaeological record.

Man the Hunter established an archetypal picture of hunter-gatherers in which males hunted, females gathered, and food was transported back to a *home base*, where it was shared among families or between close kin. This pattern of a sexual division of labor and the transport of food to a home base for sharing was quickly assimilated by archaeologists, particularly in M. D. Leakey's hugely influential publication of the earliest archaeological sites from Olduvai Gorge, Tanzania. Leakey developed a site typology for the Olduvai material in which one of the four site types, labeled the *living floor*, was a direct equivalent of the anthropologically documented *home base*. This typology was modified for the material at Koobi Fora (Kenya) and was then amplified into Isaac's (1978) *home base hypothesis*, which extrapolated from the site typology to suggest that many of the social facets documented among the !Kung were in fact present among two-million-year-old human ancestors.

The *home base hypothesis* attracted many detractors due to its extrapolations from the archaeology. Foremost among these was Lewis Binford, whose attempts to discredit Isaac's ideas led him to focus on the development of ways to relate the static patterns observed in the archaeological record to the dynamic processes in past societies that generated those patterns. A key element of this research program was

ethnoarchaeology – the conduct of essentially anthropological fieldwork by archaeologically trained practitioners. Although Binford and many others had noted the value of published ethnographies, they were also aware that ethnographers were unlikely to collect data in forms amenable to comparison with archaeological data; specifically, the pattern-process link was absent, with ethnographers focusing relatively little on the use of everyday artifacts. Binford's studies of hunter-gatherers were conducted with a view to documenting archaeologically salient information and ushered in a new enthusiasm for hunter-gatherer studies among archaeologists.

Key Issues

Microscale Mobility

One of the enduring legacies of Binford's ethnoarchaeological work among the Nunamiut (Inuit) of northern Alaska was the establishment of the forager-collector continuum to describe differences in hunter-gatherer microscale mobility patterns. Foragers and collectors in Binford's (1980) terms were distinguished primarily by their settlement systems and therefore by the types of sites they would leave in the archaeological record; however, these systems also reflected fundamentally different types of mobility in terms of the way those site types articulated with the available subsistence resources (Grove 2010). Foragers are associated with high *residential mobility*, in which the whole group is moved from one camp to another, whereas collectors often practice higher levels of *logistical mobility*, in which task-specific subgroups disperse to collect resources that can be transported back to the camp. This distinction is often summed up by suggesting that foragers move people to resources, whereas collectors move resources to people (see Fig. 1).

Binford based his forager pattern on the Gwi San and his collector pattern on the Nunamiut, two groups living in very different, though equally extreme, environments. However, these groups were intended to represent ends of a continuum of hunter-gatherer adaptation rather than a dichotomy, and have found parallels in other, related schemes. In particular, Woodburn's (1982) distinction between immediate and delayed return foragers is an independently devised scheme that mirrors Binford's, and in

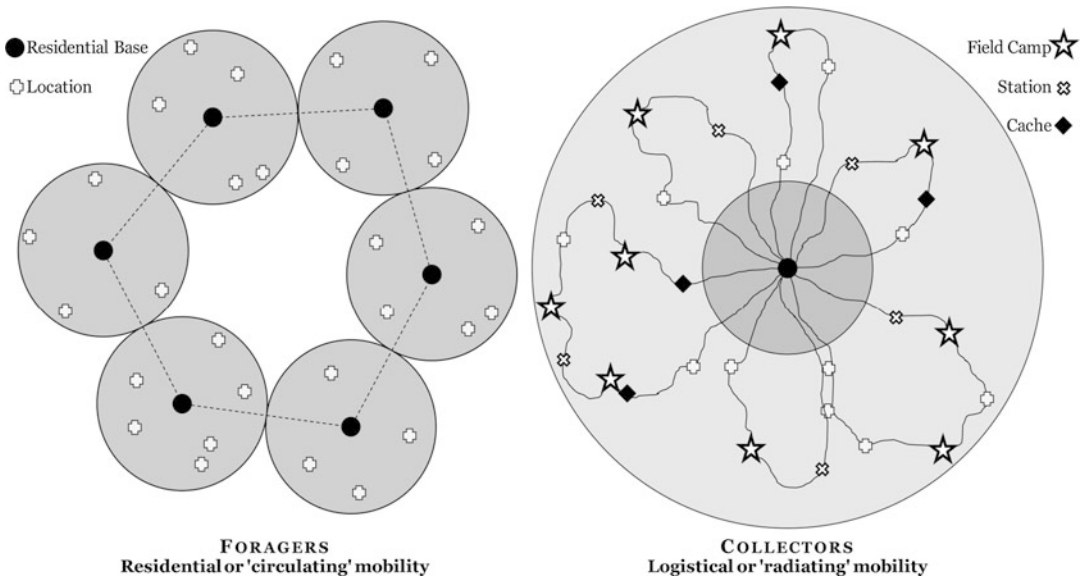

Hunter-Gatherer Settlement and Mobility, Fig. 1 Schematic of Binford's (1980) distinction between foragers and collectors. The figure shows part of a *seasonal round*; note that collectors produce three additional site types during their logistical movements away from the residential base

Paleolithic archaeology, the distinction drawn by Lieberman and Shea (1994) between circulating and radiating mobility is based directly on Binford's (1980) work. Of particular relevance to archaeological applications of the collector/forager model is Binford's assertion that collectors will create a series of distinct site types that will not be created by forager systems. Both collectors and foragers create *residential bases* – the equivalents to the home bases identified by Lee and De Vore and employed in archaeological reconstructions by Leakey and Isaac. Both also create *locations* – places where particular extractive tasks are carried out, though Binford notes that collector locations may be more visible to the archaeologist than forager locations due to the tendency for logistically organized groups to gather larger amounts of a given resource in a single trip. In addition to residential bases and field camps, collectors create the three additional site types, designated by Binford as *field camps*, *stations*, and *caches*.

A field camp is a temporary base for a group engaged in a logistical foray that keeps them away from the residential base for at least a single night, while a station is a site where a special-purpose task group would locate itself while gathering information on, for example, movements of game. The importance of information about the wider environment to hunter-gatherers is discussed further below. Finally, caches are relatively self-explanatory, being temporary stores of resources located away from the residential base. Note that the structured storing of food is exclusive to collectors and again parallels Woodburn's (1982) notion of a delayed return economy. Binford's (1980) critical insight regarding these site types, as they relate to the microscale mobility continuum from foragers to collectors, is that given locations may serve multiple purposes, being, for example, sequentially field camps, locations, and caches. Given that collectors produce a greater number of generic site types and that the site types a system produces can be combined in potentially any sequence, collectors should be identifiable in the archaeological record via greater intersite variability. Given this signature of a collector system, most archaeological uses of Binford's system have suggested that collectors do not appear until the Upper Paleolithic. In one contradiction to this pattern, Lieberman and Shea (1994) suggested that Neanderthals in the Near East practiced radiating mobility, whereas later modern humans resorted to circulating mobility as a result of climatic deterioration.

Mesoscale Mobility

While microscale mobility describes the way in which a hunter-gatherer group organizes itself to ensure adequate resources are transported to the residential base, mesoscale mobility involves the movement of that base when resources are depleted. Micro- and mesoscale strategies are closely related since increasing logistical mobility at the microscale will tend to reduce residential mobility at the mesoscale. However, there is a qualitative difference between these two scales of mobility since the latter will involve relocation of the residential base, the main anchor of the group to the territory. The frequency and distance of residential moves will have profound consequences for the maintenance of material culture, with generic least-effort criteria suggesting that investment in site maintenance and structure will be reduced in highly mobile groups. Furthermore, toolkits of highly mobile foragers will either be streamlined, with only the most vital tools carried, or reduced to expedient manufacture, with simple tools made as and when they are needed. It is at the mesoscale that the fundamental assemblage variability of the residential base articulates with the mobility pattern.

As with microscale mobility, the foundational work on mesoscale relocation patterns was by Lewis Binford, in his seminal 1982 paper *The Archaeology of Place*. The fundamental advance of this paper was that it proposed three idealized relocation patterns – the half-radius continuous, complete-radius leapfrog, and point-to-point patterns – that, together with the microscale considerations discussed above, could be used to develop a relatively complete classification of hunter-gatherer mobility. The idealized patterns Binford proposed sought to directly link the quality of an environment (the richness of its

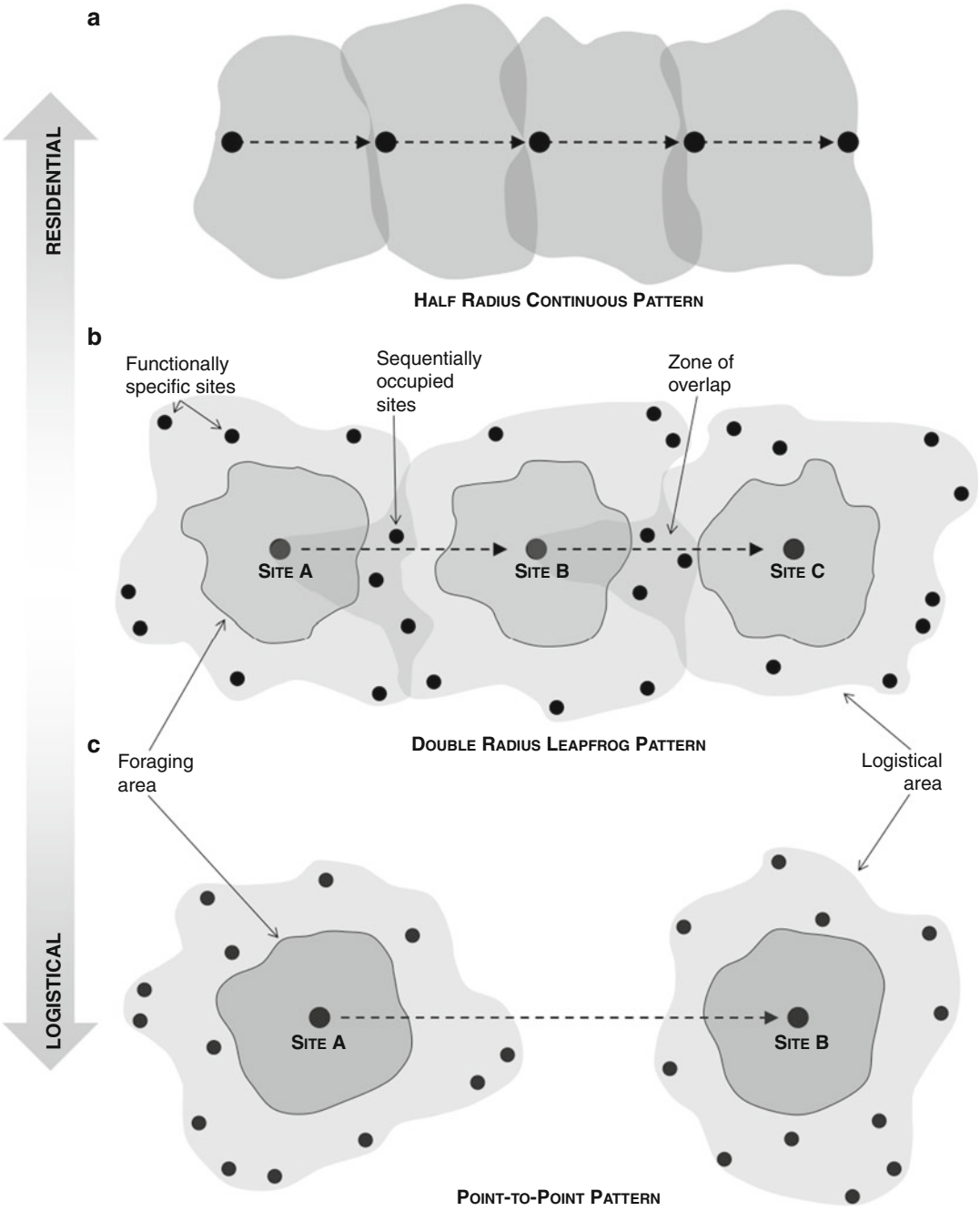

Hunter-Gatherer Settlement and Mobility, Fig. 2 Three modes of mesoscale mobility, after Binford (1982:10). Dashed arrows represent residential moves; see text for further details and discussion

resources) to the level and type of mobility practiced by the hunter-gatherers inhabiting it. Figure 2 shows the three patterns Binford (1982) proposed, each of which is briefly explained below. Each of the patterns is based around a simple idea of *economic zonation* around sites, with a nearby foraging zone and a more distant logistical zone which is exploited

only partially from each site. The need to relocate is driven primarily by the depletion of resources within the foraging zone; when it is no longer energetically efficient to search for resources within this area or, equivalently, when this area has become so large that transport costs are prohibitive, it is time to move the residential base. The simple geometric theory developed by Binford (1982) suggests that the minimum distance the group should move would be twice the radius of their foraging area, thus ensuring that they do not traverse land from the new base that has been depleted during occupation of the old (see Fig. 2).

The first of Binford's patterns, the half-radius continuous pattern (Fig. 2a), is characteristic of high mobility groups (in the sense that they move the residential base often, rather than far) who do not develop the logistical radius to any great extent. The double-radius leapfrog pattern (Fig. 2b) is in many ways the quintessential expression of the geometric theory, with the size of the current foraging zone determining the distance of the next residential move. Note that while foraging zones, which are exploited intensively, must never overlap, logistical zones frequently do overlap, since they may contain limiting resources (e.g., sources of water or flint) that are nondepleting or recurrent. While the double-radius leapfrog pattern is common among hunter-gatherers in high-quality environments, an alternative known as the point-to-point pattern (see Fig. 2c) is more common in lower-quality habitats. When considered relative to the microscale patterns of mobility discussed above, it is suggested that there is continuum from half-radius continuous forager groups to point-to-point collector groups, though this relationship is anything but rigid. In both the double-radius leapfrog pattern and the point-to-point pattern, residential bases are located in areas that afford access to vital resources such as water, food, and fuel; however, in lower-quality habitats, the confluence of these key resources is rarer, requiring hunter-gatherers to engage in longer residential moves and to prospect beyond the logistical zone for future residential locations.

The geometric pattern of hunter-gatherer mesoscale mobility, as expressed ideally in Binford's complete-radius leapfrog pattern (see Fig. 2b), allows for the delineation of a number of basic hypotheses about the distances hunter-gatherer groups should move depending on their size, the duration of site occupation, and the quality of the habitat surrounding the site. With all else equal, the foraging zone could be expected to increase with increasing group size, increasing duration of occupation, or with decreasing habitat quality; furthermore, given the relationship between the area and radius of a circle and the requirement that a group should move at least twice the radius of the foraging zone, the form of these relationships can be quite accurately predicted (Grove 2009). Concentrating on mobility-specific variables, the average move distance – the first key index of mobility – can be expected to increase in proportion to the square root of average occupation duration (media object) or group size (or to decrease similarly in proportion to the square root of habitat quality). Similarly, since the average number of moves per year – the second key index of mobility – is simply 365 divided by average occupation duration (in days), we can expect average move distance to decrease in proportion to the reciprocal of Media object (see Fig. 3).

In testing these relationships with a large body of hunter-gatherer data, Grove (2009) found that habitat quality was by far the most important variable in determining mobility patterns, with occupation duration of importance only to groups heavily dependent on meat. This last result is likely due to the increased danger of insect-borne infection created by the buildup of carcass-processing detritus and, in certain environments, the risk of such detritus attracting potentially dangerous scavenging carnivores. Group size was found to have little effect on move distances, though this is in fact because group size variability is mediated in hunter-gatherers by frequency rather than distance of movement. As a generic characterization, larger groups move similar distances but move more frequently than smaller groups. In a detailed examination of data on the Dobe area !Kung

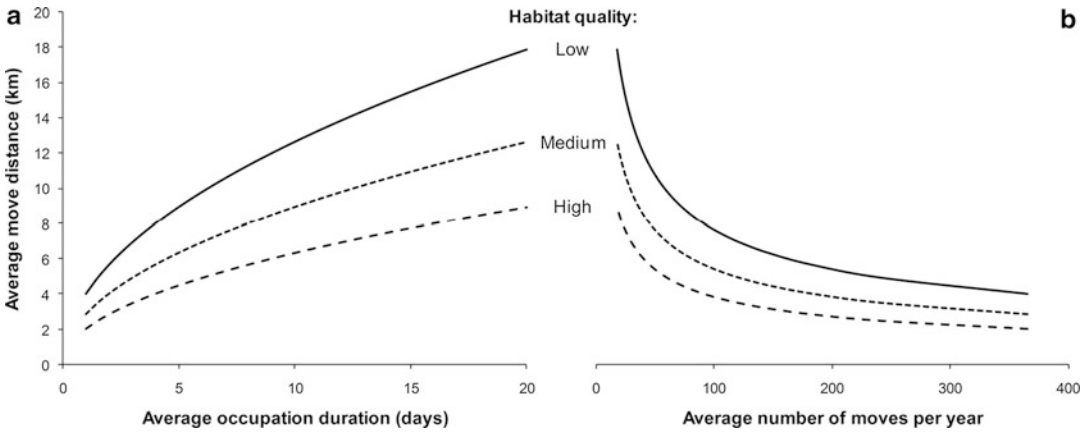

Hunter-Gatherer Settlement and Mobility, Fig. 3 Graph (**a**) shows the relationship between average occupation duration and average move distance as predicted by Binford's complete-radius leapfrog model for three arbitrary levels of habitat quality. Assuming that the average number of moves per year is equal to 365 divided by average occupation duration, graph (**b**) shows the relationship between this variable and average move distance (After Grove (2009: 224))

collected by Yellen (1977), Grove (2009) was able to show that, at a finer scale, the size of the site (measured as the limit of the main artifact scatter) is determined by group size and occupation duration, the size of the foraging radius by habitat quality, and the size of the logistical radius by the percentage reliance on meat and the extent of logistical mobility. Thus, Binford's (1982) notion of *economic zonation* continues to be of considerable value in studies of hunter-gatherer mobility.

Macroscale Mobility

In addition to the relatively local foraging and logistical zones outlined by Binford and discussed above, hunter-gatherers range over vast areas of land and forge links with distant bands for the purposes of trade, exchange, and what we might loosely call *insurance*. Since the work of Wobst (1974), there has been considerable interest in such long-distance relationships between hunter-gatherer groups, and this interest has frequently extended into archaeological applications. Early ethnographers often sought to classify hunter-gatherer groups into hierarchically inclusive series, with several families forming a band, several bands forming a clan, and so on up to the level of the tribe. The latter has traditionally been considered to equate to a language boundary; all those who speak a given language (or distinct dialect) belong to a given tribe, to the exclusion of those who speak other languages. This formation of boundaries sets up a situation in which tribes themselves (to the extent that they are genuinely coherent entities) may maintain equitable or hostile relations with neighboring tribes. In fact, hunter-gatherer mobility is for the most part facilitated by relatively equitable bonds, particularly where notions of common descent are reinforced by shared aspects of material culture. It should be noted, however, that before extensive contact with agriculturalists, some hunter-gatherer groups, notably aboriginal Americans, did reach population densities sufficiently high to lead to violent disputes over land and resources.

Archaeologists have examined patterns of prehistoric hunter-gatherer trade through the movement of artifacts, particularly in the Upper Paleolithic of Europe. Gamble (1982) suggested that the wide distribution of particular symbolic artifacts acted as a bonding mechanism such that groups traveling far, at low density, and encountering each other rarely would have some common ground with which to mediate social exchanges. From a different perspective, Vanhaeren and d'Errico (2006) attempted to map ethnolinguistic (i.e., tribal) boundaries in

early Upper Paleolithic Europe by examining the areas associated with specific assemblages of bead types. Thus, hunter-gatherer mobility at this macroscale is characterized by a combination of both rigid and permeable boundaries, with archaeologists such as Gamble (1999) suggesting that the evolution of human society has in large part revolved around the establishment of equitable bonds with ever more distant groups, binding local bands into ever more inclusive networks. Records of the transport of artifacts and raw materials studied by several authors have broadly supported this thesis, with materials traveling further and further during the progression of the Paleolithic.

Though trade and exchange are valuable facets of macroscale hunter-gatherer mobility, they may in fact be undertaken merely to lubricate the more enduring, socioecological process of bond maintenance for *insurance* purposes. Binford has suggested that beyond the logistical zone is a much larger and more thinly exploited zone referred to among the Nunamiut as the *visiting* zone. Behavioral ecologists are beginning to realize that information about the surrounding habitat – including, crucially, the locations of conspecific groups within that habitat – is a vital currency for all animals. Among humans this need for knowledge is paramount and is reflected in the establishment of information-gathering *stations* among logistically organized groups. One undeniable difference between modern hunter-gatherers and other primates (and presumably, many of our hominin ancestors) is the tendency to transport food and other resources rather than relying on a feed-as-you-go subsistence pattern. Highly logistical collecting patterns are the antithesis of the generic primate pattern, but they rely on securing a great deal of intelligence about an ever larger area of habitat, and, with the risk of subsistence failure an ever-present concern, they rely also upon the need to develop equitable bonds with neighboring groups.

Whallon (2006) has argued that a vital purpose of long-distance mobility among modern hunter-gatherers is the establishment and maintenance of extended social networks that not only provide information about surrounding habitats but also act as *safety nets* in times of local resource scarcity. Whallon terms this *nonutilitarian mobility*, in recognition of the fact that it has an immediate energetic cost but may have a benefit only in times of crisis; such *insurance* may rarely be used, but if needed, it could be the difference between starvation and survival. Whallon (2006) makes a series of predictions about the value of nonutilitarian mobility to hunter-gatherers in specific situations which follow logically from ecological theory (Fig. 4). The boundary points can be summed up by noting that hunter-gatherer bands have most to gain from establishing equitable bonds with bands from adjacent regions when the correlation of resource availability *between* regions is low and resource availability *within* regions is unpredictable; on the contrary, when resources within a region are predictable or fluctuations in neighboring regions are in synchrony, there is little to gain from *nonutilitarian mobility* directed towards adjacent regions. Put simply, if the nascent region is highly predictable, there is little need to rely on distant neighbors, and if those neighbors experience temporally synchronous periods of resource stress, there will be little chance that they can help. In the latter case, hunter-gatherers may be forced to establish bonds with groups that are sufficiently distant to ensure asynchrony in resource fluctuations.

Harnessing Resources

As well as the three scales of mobility discussed above, a number of general findings that relate hunter-gatherer mobility to specific axes of regional ecology have been reported. Hunter-gatherers have often been divided into classes based on the extent of their mobility; for example, Murdock (1967) distinguishes between fully nomadic, seminomadic, semisedentary, and fully sedentary groups. Using a measure of *effective temperature* to classify environments into different types by habitat, Binford (1980) was able to show that hunter-gatherers in tropical forests and the extreme arctic tend to be highly mobile. By contrast, in temperate forests

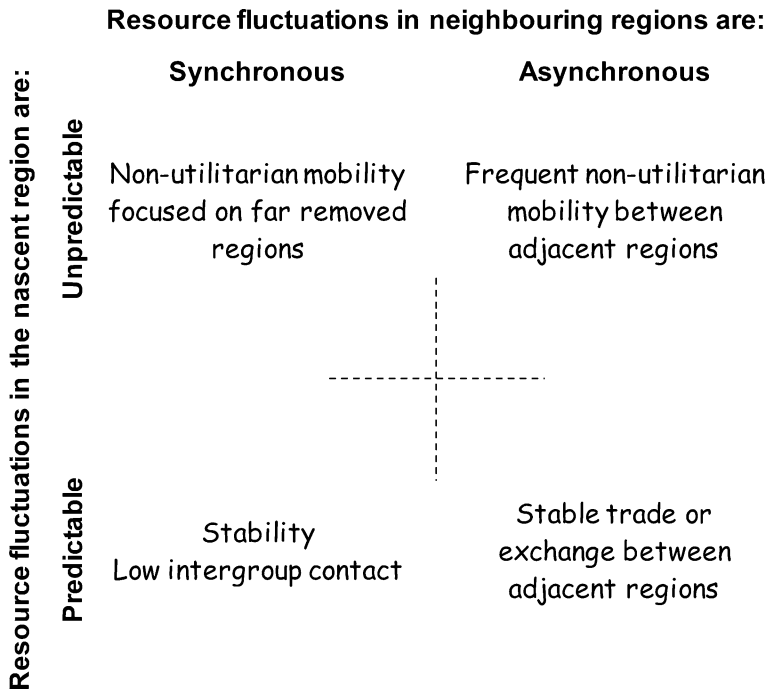

Hunter-Gatherer Settlement and Mobility, Fig. 4 Expected patterns of *nonutilitarian* mobility among hunter-gatherers in relation to synchrony of resource fluctuation between regions and predictability of resource fluctuations within regions (Modified from Whallon (2006: 264))

and deserts hunter-gatherers are spatially constrained by seasonally limiting resources (in particular water) and are therefore forced to rely on food storage as a substitute for mobility. This reliance on a particular limiting resource in a particular location has been referred to as *tethered nomadism* (Taylor 1972), with Kelly (1995) suggesting that most contemporary hunter-gatherers follow this pattern.

A further complex of ecologically based findings relevant to mobility, and with applications of particular importance to the archaeological record, revolves around the relationship between the position of hunter-gatherers within the *trophic pyramid* and its interaction with latitudinal gradients in productivity. The trophic pyramid, an idea due originally to ecologist Charles Elton, describes the fact that primary biomass (essentially plants; level 1 of the pyramid) is assimilated by herbivores (level 2), some of which are in turn predated upon by carnivores (level 3). Due to various factors, some energy is lost at each level, meaning that there will be lower biomass at each higher level. For example, the weight of all the herbivores in a given area will be substantially less than the weight of all the plants in that area, but substantially more than the weight of all the carnivores in that area. Seen in terms of foraging, this relationship implies that carnivores must travel further to secure the requisite amount of food and that, consequently, they must live at lower real densities.

Although all humans are omnivores, one basic relationship that follows from the logic outlined above is that hunter-gatherer groups reliant on extensive hunting (i.e., those towards the top of the trophic pyramid) will need to cover larger territories in order to fulfill their energetic requirements (Kelly 1995). The problem with hunting is that it is a risky strategy; there is a substantial probability that on any given day, any given hunter will fail to make a kill. The element of risk leads not only to a focus on the sharing of hunted foods but also to a heavy reliance on low-risk plant foods to supplement hunted foods whenever possible. At low latitudes, most hunter-gatherers derive the vast majority of their calorific intake from

low-risk, gathered plant foods. However, at higher latitudes, where effective temperatures are lower, edible plant foods are less available, with the knock-on effect that herbivores tend to be larger and more dispersed (Grove 2010). Thus, at higher latitudes, hunter-gatherers are forced to rely on greater proportions of meat and are simultaneously forced to cover much larger territories due to the low densities of their prey. This latitudinal relationship would have had profound effects on the mobility patterns and population dynamics of Paleolithic hunter-gatherers emerging from sub-Saharan Africa to colonize higher latitudes.

Given the latitudinal gradient in subsistence practices and its relationship to mobility patterns, it seems remarkable that hunter-gatherers today can exist in such extreme environments as, for example, north-western Alaska or the Siberian steppe. Whether these environments are suggestive of prehistoric hunter-gatherer adaptations in general is discussed further below, but one thing they do highlight is the possibility of specialization on particular kinds of food resources to lessen the burden of high mobility. Two types of prey provide consistent exceptions to the positive correlation between high latitude and high mobility among hunter-gatherers: migratory ungulates and aquatic resources. In the case of migratory animals such as reindeer, mass kills at natural *topographical funnels* such as river crossings or mountain passes, followed by storage of substantial quantities of the acquired meat, can mediate the need for high mobility for at least part of the year. Aquatic resources can be profitably harvested from a small number of localities, provided the area of water accessible to those localities is sufficiently large; unlike the case with hunting, catching fish in one place today does not reduce the probability of catching fish in that place tomorrow. In both these cases, hunters are effectively shifting the burden of high mobility onto their prey. Both Kelly (1983, 1995) and Grove (2010), using different datasets, have shown that groups reliant on a large proportion aquatic resources are far less mobile than groups heavily reliant on hunting at similar latitudes.

Current Debates

A debate persists in hunter-gatherer studies about the extent to which modern hunter-gatherers are suitable models for the humans of the Paleolithic. Of course the outcome of this debate does not affect the value of studying hunter-gatherers simply to learn more about them, but the fact remains that a lot of the research performed on hunter-gatherer datasets is designed to shed light, via archaeological studies, on our prehistoric ancestors. The lasting critique of Wobst (1978) has largely set the agenda for this debate, laying stress on the fact that surviving hunter-gatherer societies tend to exist only in areas that are not suitable for agriculture, and may therefore be quite dislocated from their traditional habitats. Furthermore, this process of isolation in *marginal habitats* leads to an ignorance of the spatially extensive structures that must once have characterized hunter-gatherer society, with Wobst suggesting that such ignorance is compatible with the (equally dubious) focus in archaeology on the site as the unit of analysis. Effectively, the encroachment of agriculturalists has led to a disproportionate bias against the recovery of information on macroscale mobility patterns.

Wobst's (1978) observations are particularly germane given the increasing understanding that humans are quite unique in the scale of their social relations and that this expansion beyond the social scales experienced by our primate relatives may have come relatively late in human evolution (Gamble 1999). The study of primate groups has provided an interesting counterpoint to studies of modern humans, with many of the basic microscale structures found to be similar in hunter-gatherers, agriculturalists, and certain nonhuman primate species. In particular, the hierarchically nested groupings (with several families forming a band, several bands forming a clan, and so on) described by the likes of Murdock (1967) occur in a number of primate species, with more fluid patterns of aggregation

and dispersion being relatively common, particularly among the great apes. The debate concerning which group or combination of groups (and, crucially, from which environmental setting) provide the best models for reconstructions of various periods in human evolution will doubtless continue alongside the hunter-gatherer studies of the future.

Future Directions

Hunter-gatherer mobility is a vitally important subject and will continue to be so, not least because mobility is to many researchers the fundamental characteristic of hunter-gatherers. Following the critique of Wobst (1978), archaeologists have attempted to reconstruct prehistoric mobility patterns from site distributions and have hypothesized about the evolution of trade and exchange in prehistory. Yet without hunter-gatherer data to ground such hypotheses, they remain essentially untested. Substantial collections of data on hunter-gatherer mobility patterns have been assembled, notably by Murdock (1967) and Binford (2001), and these remain as powerful resources for model building and generalization. The greatest challenge remains to accurately reconstruct the extent of precontact social interaction; evidence of this remains not only in the current macroscale mobility patterns but also in the evidence of oral testimony and folklore. The application of modern quantitative techniques such as network analysis to data on mobility, trade, and exchange should produce substantive insights into hunter-gatherer society, both prehistoric and modern.

Cross-References

- ▶ Binford, Lewis R. (Theory)
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Site Formation Processes

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Hunter-Gatherer Subsistence Variation and Intensification

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greater awareness of the social, historical, and symbolic aspects of diet and human–animal interactions and have advocated for increased contributions by and collaborations with indigenous groups. Feasting events, food sharing and storage, prestige foods, tabooed animals, circumscription, costly signaling, transmission of knowledge, trade, globalization, identity, individual agency, landscape use, and power and dominance are among the topics addressed from this diversity of perspectives using hunter-gatherer subsistence data.

Introduction

Approaches to hunter-gatherer subsistence have progressed significantly in recent decades. Stereotyped views of hunter-gatherers as simple, even backward representatives of an early stage of human social evolution have given way to more nuanced ones that reflect a growing recognition of the tremendous variation among hunter-gatherer groups (Kelly 2007). Since the 1960s, studies of hunter-gatherer subsistence have increasingly broadened their focus from men's role as hunters and sole providers, acknowledging the importance of plant foods, fish and shellfish, and women's contributions to the diet (Kelly 2007: 65). The 1966 "Man the Hunter" conference in Chicago, organized by Richard Lee and Irven DeVore, was pivotal in this regard, demonstrating empirically – and in stark contrast to all previous work on the subject – that hunter-gatherers were no less "affluent" than agricultural and pastoral societies (Finlayson 2012) and that gathering provided a substantial portion of the diet. The years since "Man the Hunter" have also seen a shift from preoccupation with social evolutionary stages and descriptive cultural histories toward identification and explanation of the processes that account for variation within and between hunter-gatherer societies, often approaching social organization and subsistence technologies from an ecological or evolutionary perspective. Postprocessual and revisionist scholars have contributed to our understanding of hunter-gatherer subsistence

Definition

Simply put, *subsistence* refers to the ways people meet their basic needs, particularly the procurement and processing of food. In practice, though, subsistence is tied to local ecologies, technology, sociopolitical organization, and connections to external groups, for example, and so has implications well beyond sustenance. Addressing such complex subsistence-related topics as gender division of labor and emergent inequality requires a clear presentation of related definitions, theoretical concepts, and methodological approaches to hunter-gatherer subsistence.

Key Definitions for Hunter-Gatherer Subsistence Studies

Hunter-gatherers are defined in various ways, most often in terms of their subsistence economy, social organization, or ideology (Jordan 2009: 448). Here, we define hunter-gatherers as those people whose subsistence economies are based on wild (i.e., undomesticated) plants and animals (but see Key Issues/Current Debates, below). Prior to approximately 12,000 BP, the entire human population relied on some form of hunting and gathering. Meta-analyses of hunter-gatherer subsistence variation indicate strong correlations between environment and diet and attempt to quantify them using measures of primary production (PP) and effective temperature (ET) (see Explaining Variation, below) (Kelly 2007: 66-71). For example, in high-latitude regions such as the Arctic, where PP is low and much of

the plant biomass inedible for humans, local human groups tend to rely heavily on meat. Conversely, in equatorial and lower latitude environments including tropical forests and temperate deserts, PP is higher and more of it is available to humans, resulting in generally greater reliance on plants. Aquatic resources are more often staples in colder climates such as coastal areas in northern latitudes than at lower latitudes even if they are similarly accessible (Kelly 2007: 71).

Anthropologists have used a variety of concepts to further categorize subsistence variability among hunter-gatherers. Woodburn (1980) distinguishes between immediate- and delayed-return hunter-gatherers on the basis of their consumption patterns. Immediate-return hunter-gatherers consume food shortly after they acquire it and rarely depend on any form of storage. Delayed-return hunter-gatherers typically live in seasonally variable environments and rely on storage technologies to survive the season(s) of low resource availability. Similarly, Lewis Binford's (1980) definition of *foragers* and *collectors* identified relative dependence on storage, combined with kind and degree of mobility, as a key distinction between hunter-gatherer groups. Foragers "move consumers to food," so to speak, exploiting the resources within a reasonable radius around a base camp until depleted and then moving the entire group to the next such location. Conversely, collectors tend to establish base camps in places with access to a variety of resources, perhaps located farther from camp than in the previous scenario, and rely on "task groups" to move food resources to consumers in a sometimes extensive system of logistical mobility. Some authors consider forager-like hunter-gatherers *resource diversified* and collector-like hunter-gatherers *specialized* (Chatters 1987), since the former are search oriented and take a wide range of resources on encounter while the latter deliberately pursue particular species.

Resource intensification is an important concept in hunter-gatherer subsistence studies. Boserup (1965) defined intensification as a process of extracting more energy (e.g., kilocalories) per unit of land in response to population growth and increasing resource competition. For Boserup, an economist interested in agricultural development, this equates to increased cropping frequency and use of multi-cropping tactics. Applied to hunter-gatherers, Boserup's intensification model predicts expanding diet breadth to include lower-ranked resources, such as small mammals or seeds. In both applications, intensification *increases* total productivity, but *decreases* productive efficiency, since it requires more intensive labor per unit energy extracted.

Optimal foraging models, initially developed in sociobiology and reframed by human behavioral ecologists to study human foraging behaviors, are an increasingly common tool for identification and explanation of resource intensification in the archaeological record (Kelly 2007). The "fine-grained prey" or "diet breadth" model is particularly useful for understanding resource intensification. In this model, resources are ranked according to their post-encounter energetic return rates (energy gained relative to energy expended in handling) and taken on encounter if they are a member of the optimal set – those resources that produce the optimal rate of energetic return (greatest energy per unit time). Diets broaden to include lower-ranked resources when search costs for higher-ranked ones are high (i.e., they become scarce relative to human foragers). Broughton and colleagues (2011) showed recently that prey body size and return rate are strongly positively correlated, legitimating the common practice of using body size as a proxy for resource rank. Thus, an increase in small mammals or seeds – ostensibly low-ranked resources – in an archaeological record is often interpreted as evidence of decreased foraging efficiency. More specifically, an archaeological shift from reliance on hunting to plant-based subsistence is usefully viewed in light of Boserup's and more recent discussions of intensification. The intensification process has also been productively studied in reference to technological change that rearranges rankings of prey species. The best examples of this are associated with the evolution of Mesolithic fishing and grain harvesting and Northwest Coast maritime adaptations (Hayden 1981).

Archaeological Analyses of Subsistence

Subsistence practices can be interpreted through a variety of archaeological materials. For example, zooarchaeologists analyze animal remains recovered from archaeological deposits, identifying bones, teeth, shell, and other faunal materials to skeletal element and taxon. Cataloging the kinds and quantities of different skeletal parts and taxa, zooarchaeologists can address a variety of subsistence-related questions including dietary breadth and the relative importance of particular taxa, seasonal use of resources, gender division of labor, feasting behavior, trade (e.g., foraged resources exchanged for cultivated ones), and resource intensification, as well as changes in these behaviors through time.

In recent decades, paleoethnobotany has emerged as a vibrant field of study, able to address many of the same questions mentioned above and extending beyond them to include specific interactions between people and plants, environmental catalysts for dietary change, medicinal practices, plant resource domestication, and the transition to food production. Macrobotanicals, such as charred seeds and plant parts collected using the flotation method, and microbotanicals such as pollen and phytoliths, extracted from soil samples chemically or through ashing, are identified to taxon and their relative frequencies used to interpret prehistoric subsistence behaviors.

Both zooarchaeology and paleoethnobotany are aided by the relatively new and growing field of archaeochemistry, which produces valuable data previously unavailable through traditional archaeological methods. Archaeochemists extract anthropogenic residues from soils, coprolites, lithic tools, ceramics, and fire-cracked rock to reconstruct prehistoric diets and environments.

Conventional methods of addressing hunter-gatherer subsistence remain important as well. The spatial and temporal distributions, relative frequencies and kinds of projectile points, ceramics, basketry, storage features, and diagnostic site types, combined with ethnographic and ethnoarchaeological interpretations, form the foundation of many subsistence studies.

Historical Background

Enlightenment notions of progress and misinterpretations of Darwinian concepts, which at the time were still very new to science, led progressive social evolutionary theorists of the late nineteenth century to describe hunter-gatherers as modern representatives of a primitive human condition – the lowest rung on the human evolutionary ladder, at the top of which was nineteenth-century industrial Europe. Evident in the writings of Lewis Henry Morgan and E.B. Tyler, for example, is the resultant tendency to ignore variation in hunter-gatherer subsistence practices; treating, for example, all hunter-gatherers, living and prehistoric, as if they were cut from the same cloth. Viewed as socially backward and intellectually inferior, hunter-gatherers were pitied: Unable to achieve agriculture and its attendant social advances, hunter-gatherers' existence was characterized by "continual fear and starvation, a perpetual and barely adequate search for food" (Kelly 2007: 16). Subsistence differences between groups, when entertained at all, were attributed to contacted with more "civilized" neighbors.

At the turn of the twentieth century, ethnographer Franz Boas rejected the progressive social evolutionary notion of parallel evolutionism. He cultivated the opposing school of historical particularism – based on the idea that cultural traits including hunting and gathering are the product of groups' unique histories rather than of stages in an inevitable, stepwise evolutionary progression – and generated a large and prolific group of graduate students. Two such students, however, Clark Wissler and Alfred Kroeber, observed that, despite their particular histories, certain culture traits tended to cluster geographically, coincident with major food resources (i.e., bison in the Plains, salmon in the Northwest, and wild seeds in the Great Basin) (Kelly 2007: 40).

It may have been this vaguely ecological description of "culture areas" that led Julian Steward, a student of Kroeber's, to explore the relationship between society, technology, and environment, an approach he dubbed "cultural ecology" (1969). Steward took a comparative

approach to the ways societies extracted energy from their environments. He believed that the interaction between technology and environment determined subsistence behavior and that, while common environments might lead to common subsistence behaviors, technology, as a product of groups' particular histories, made for important differences.

Lewis Binford and other "new archaeologists" of the 1960s were likewise interested in environmental explanations of hunter-gatherer subsistence. Binford in particular argued that all behavior was governed by lawlike principles that could be understood through scientifically rigorous methods, and many of his explanations of cultural change observed in the archaeological record were tied to evidence of environmental change.

While many of these interpretations were eventually rejected as environmentally deterministic, the new archaeologists – also referred to as processualists – spawned a distinct area of study, the focus of which was interpreting dynamic human behaviors (especially subsistence behaviors) from the static archaeological record. This "middle range" body of theory included studies of taphonomy, which are now a crucial means of distinguishing human from natural influences on the archaeological record of subsistence behaviors. It was also at this time that ethnoarchaeology became a mainstay of middle range research, applying ethnographic methods specifically to the study of behaviors that leave material residues (e.g., butchery and discard). For example, Binford's own observations of Nunamiut butchering gave archaeologists a "frame of reference" for interpreting patterned faunal remains.

In applications not entirely dissimilar to middle range theory in their attempt to reconstruct behaviors from patterns in the archaeological record, anthropologists of the 1980s and 1990s began to adopt models developed in sociobiology, establishing a new explanatory framework for the study of humans known as human behavioral ecology (HBE). Human behavioral ecologists use mathematical and conceptaul models to explore human decision-making in terms of particular currencies (e.g., kilocalories) and constraints (e.g., resource availability). Optimization models including diet breadth, patch choice, and central place foraging reduce complex human behaviors to a tractable number of variables, providing testable predictions that sometimes lead to surprising insights to human subsistence behaviors.

Optimal foraging models have also been at the forefront of intensification studies. Research of this kind got its start in California where archaeologists hypothesized that resource depression occurred during the precontact period prior to c. 1,000 BP due to high population densities and competition for resources. It was not until populations declined due to drought during the Medieval Warm Period (c. 1,000–1,300 BP) that key resources rebounded. By the time Spanish explorers reached the central coast of California some 200 years later, the region seemed to be teeming with high-ranked game. This perception of precontact California persisted even among archaeologists until researchers including Terry Jones and William Hildebrandt used faunal evidence to challenge it, demonstrating there was indeed depression of high-ranked sea lions and fur seals and intensive use of more evasive harbor seals and sea otters. Jack Broughton also found evidence of depression and intensification of resources in the San Francisco Bay during the late Holocene evidenced through decrease of large sturgeon and increase of low-ranked fishes through time.

Postprocessual and revisionist scholars reject the idea embraced by new archaeologists and human behavioral ecologists that cultures evolved simply as a way to adapt to the surrounding environment and that there are lawlike mechanisms governing human behaviors. Postprocessualists argue that intra-community dynamics tied to politics, socioeconomics, and ideology are also important variables that shape societies; cultural evolution is historically contingent. From this perspective, subsistence studies must go beyond strictly materialist, ecological, or environmental influences, to consider such things as social stratification and unequal access to resources within communities, feasting and other rituals tied to food, and food symbolism.

Key Issues/Current Debates

Hunter-Gatherer Subsistence Variation

Use of Ethnographic Data

Ethnographic and ethnoarchaeological methods have improved dramatically since the pioneering work of Franz Boas and his students, sometimes incorporating sophisticated technologies and techniques designed to capture invisible or elusive – but critical – aspects of foraging behavior. For example, Pacheco-Cobos and colleagues (2010) use global positioning systems and biotelemetry to track foraging pathways, energy expenditure, and overall foraging efficiency among men and women of an indigenous Mexican community. Yet even modern studies may fail to accurately characterize subsistence regimes; time-limited observations can mask important variation in daily, seasonal, and supra-annual foraging goals and decisions, for instance. When incorporated into broader comparative studies, mischaracterizations can obscure causes of subsistence variation.

Technology and technique may continue to close gaps in our knowledge of hunter-gatherer subsistence, or they may be outpaced by ethnographic subjects' adoption of "nontraditional" tools and practices, which, some might argue, would make them "inauthentic," inappropriate models of past behaviors. This may be a slippery slope, however, since it is clear that even relatively recent prehistoric innovations – including the bow and arrow – fundamentally changed foraging practices. Moreover, even some apparently "pristine" ethnographic hunter-gatherers (e.g., Kalahari Bushmen) shifted subsistence foci – from hunting and gathering to farming or herding and back again – several times in the past (Ames 2004), leaving students of subsistence variation caught between the impropriety of strict reliance on ethnographic data and an archaeological record that is often woefully incomplete. Yet, "there is no alternative to using our knowledge of modern peoples to help us penetrate the past" (Ames 2004: 366); success requires a body of theory equipped to manage the respective shortcomings of both records (see Explaining Variation, below).

Defining "Hunter-Gatherer"

Some amount of reported subsistence variation is semantic. Definitions of "hunter-gatherer," for example, differ in their tolerance of 'inauthentic' behaviors, including market participation or trade for agricultural products, the tending of small gardens, or keeping of wild animals for milk or eggs, even whether a group engaged in these activities at some time in the past (see above; Ames 2004). What is more, some studies define "hunter-gatherer" in terms of social organization rather than subsistence economics, classifying variation along social dimensions such as group size and flexibility of membership, power structure, and the distribution of wealth.

Hunter-gatherers, however they may be defined, are often further distinguished based on the relative importance of particular foraging strategies (e.g., hunting versus gathering) or contributions of major food classes (e.g., terrestrial game, fish). Currently, there are no standards for these subdivisions, and dietary contributions, for example, are as often reported in terms of net weight as in kilocalories, if they are quantified at all. Moreover, economic relationships with other groups can artificially inflate the importance of hunting, for example, if some portion of hunted resources is traded for carbohydrates (Kelly 2007).

Consensus among anthropologists may be untenable. Still, while explaining hunter-gatherer subsistence variation does require coherent classifications, internal consistency may be sufficient, and some bodies of theory are no less fruitful for their deliberate agnosticism toward prescriptive categories.

Explaining Variation

Two primary schools of thought approach hunter-gatherer subsistence variation in fundamentally different ways. Historicists focus on groups' particular histories, viewing subsistence in a sociocultural context, with the aim of documenting variation and describing its historical origins. Conversely, materialists often take a comparative approach, viewing subsistence in an ecological or evolutionary context, with the goal of distilling and explaining subsistence differences.

These perspectives produce very different assessments of hunter-gatherer subsistence variation.

The historical approach is fine-grained and particularistic, accounting for exceptional cases that do not fit materialist generalizations about subsistence and environment. However, particularistic studies also "maximize heterogeneity and mask similarities" between groups and, ultimately, lack explanatory power (Ames 2004: 370). While some historicists claim that the alternative, materialist perspective is callously reductionist and environmentally deterministic in its drive to explain variation, this is not necessarily so.

Materialists start from the premise that the global history of subsistence similarities is unlikely to be purely coincidental. Within the materialist school, however, there are various approaches to explaining these similarities, including ones that are, in essence, environmentally deterministic (though few anthropologists would self-identify as such). Leaving aside definitional inconsistencies, hunter-gatherer diets have reliably been shown to correlate with environmental variables. Effective temperature (ET) – an estimate of regional seasonality and productivity derived from the mean temperatures of the warmest and coldest months of the year – and primary productivity (PP) – net annual aboveground plant biomass – seem to account for much of the variation in subsistence foci (e.g., percent reliance on hunting; Binford 1980; Kelly 2007) and have been interpreted as the primary explanation for that variation. However, simply recognizing patterns and identifying important environmental variables falls short of explanation, particularly since strong correlations sometimes emerge only after a number of outlier groups are removed. It is also true that ET and PP are much better predictors of groups' reliance on plants than on animals (Kelly 2007) and that, alone, they simply cannot predict which of all available food items in an environment are exploited, when, how, and by whom, the important intercultural differences masked by the approach.

Human behavioral ecology capitalizes on documented patterns of diet–environment co-occurrence and attempts to address the very subtleties that a purely environmental approach cannot. Despite its strongly cohesive Darwinian paradigm, HBE permits considerable range in subsistence models. Historically, optimal foraging models have dealt in kilocalories, but the last 10 years have seen the inclusion of alternative currencies including nutrient complementarity and prestige. Recognition that hunter-gatherers may be hunting (or gathering) for social reasons rather than strictly for sustenance has led to both innovative research and heated debates.

Other areas currently generating interesting research are within-group specialization, particularly sexual division of labor; how an individual forager's diet breadth can change over the course of a single foraging bout and what effect this might have on long-term, material records of foraging; and the effects of cultural transmission on cross-cultural variation in tools, foraging techniques, and dietary composition, all of which are key to understanding subsistence variation.

Critics have argued that HBE models, designed to predict individuals' behaviors, may not be appropriate for archaeological analyses, which most often deal in population-level data, generated over long time spans and muddied by taphonomy. Models are deliberate simplifications of complex relationships between people and resources, and if the archaeological record represents "average" behaviors, HBE models can still be used to test hypotheses of prehistoric foraging. Ripe for development are models that predict the effects of group hunting, sharing, and tolerated theft on the material record and the range of subsistence behaviors not evident in the ethnographic record.

Intensification

Study of the process of intensification is primarily the province of archaeologists and historians. Unfortunately, intensification – particularly incipient intensification (e.g., flood irrigation, fertilization, swiddening) – is not always clear in the archaeological record. Even quantifiable aspects of dietary change, such as isotopic signals of increasing cultigen consumption, can be

controversial since in situ intensification cannot always be distinguished from trade.

Though sometimes materially ambiguous, intensification is theoretically tractable in light of HBE: foragers should invest in activities that increase productivity per unit area when doing so improves overall subsistence returns. Importantly, foraging theory predicts that people may stop intensifying, perhaps returning to a previous state of unintensified hunting and gathering, if the initial pressure to intensify is relaxed. While HBE provides an explanation for intensification, it invites exciting research on proximate causes (e.g., environmental change, circumscription, *perceived* resource scarcity, technological adaptations) that will have important historical and cultural components.

International Perspectives

Subsistence studies remain at the forefront of hunter-gatherer research throughout the globe. In Australia, subsistence research utilizes optimal foraging theory to address adaptations to desert environments and resource intensification among Aboriginal communities during the late precontact and contemporary periods. Bird and Bleige Bird (e.g., 2005) use OFT to address food sharing, use of fire to improve foraging yields, and differential hunting strategies among men, women, and children. On a broader scale, O'Connell and Allen (2012) consider demographic pressure, climatic instability, and depletion of high-ranked resources as potential causal factors for the initial colonization of Sahul (Australia and New Guinea) by populations that traveled from the Asian mainland and through Wallacea c. 44,000–46,000 years BP.

Since the 1960s, hunter-gatherer research in Africa has generated both cutting-edge data and considerable controversy. Richard Lee's work among the Kalahari Bushmen challenged the long-held progressive social evolutionary notion that hunter-gatherers were forever toiling to eke out a living, while agriculturalists, through food production and relative independence from the whims of the environment, freed themselves to engage in intellectual pursuits. The !Kung data suggested instead that hunter-gatherers spend far less time in food procurement than agriculturalists, even making them the "original affluent society" (Jordan 2009). Further controversy was generated in the 1990s when a group of "revisionist" anthropologists argued that the Kalahari Bushmen were inappropriate models of a "pristine" hunter-gatherer lifeway given their long and complex history of interactions with neighboring agropastoralists and European colonists (Wilmsen 1989; see also Key Issues/Current Debates, above). Like Lee's work during the 1960s, modern studies among African hunter-gatherers are on the cutting edge of subsistence research, incorporating research designed to probe more deeply into foraging costs and returns and food sharing, for example (Mitchell 2002).

Subsistence has been a primary focus of Americanist hunter-gatherer research for many decades, and the range of subsistence questions addressed is truly impressive. As one of the last major colonization events, the peopling of the New World has been an active area of study since the discipline's beginnings and so has generated a large body of theory and data, much of which is subsistence based. The so-called Clovis-first hypothesis indicates that small groups of hunter-gatherers followed herds of Pleistocene megafauna (e.g., mammoths) across the Bering Land Bridge to the New World, perpetuating the stereotype that hunter-gatherers subsist primarily on meat procured by men. However, more recent research suggests not only that people may have colonized the New World via the coast, and so would have diets that included marine resources, but also that even fully "terrestrial" Paleoindians had rather broad diets. Indeed, the earliest widely accepted site in the New World, Monte Verde in Chile, shows extensive use of large and small animals, terrestrial plants and seeds, and seaweed. As more early sites like Monte Verde and the Gault site in Texas yield convincing evidence of very broad Paleoindian diets, our understanding of early Americans' subsistence behaviors will be refined. Many South Americanists also remain committed to understanding subsistence

variability in relation to ethnic group identity (e.g., Cornejo & Sanduezar 2011).

Domestication of plants and animals has dominated subsistence research in the Near East at least since the 1960s. Recent investigations provide morphological evidence for plant domestication by 10,500 cal BP, and evidence for active management of wild plants and animals predates domestication by a 1,000 years or more (Zeder 2011). New data indicate that domestication of plants and animals occurred simultaneously in different areas throughout the Near East rather than originating solely in the southern Levant. For example, domesticated einkorn, emmer, and pulses, as well as sheep, pigs, cattle, and potentially goats, appear to have originated in the central Fertile Crescent, near the upper portions of the Tigris and Euphrates Rivers (Zeder 2011: 230). It is now clear that human groups in the Near East combined hunting and gathering, cultivation of domesticates, and management of wild crops and animals for approximately 4,000 years before developing subsistence economies based mainly on domesticated crops and animals.

Notable research in Eurasia investigates anatomically modern *Homo sapiens* and *Homo neanderthalensis* adaptations during the Pleistocene (Stiner & Kuhn 2006). Data imply that subsistence behaviors changed little during 200,000 years of the Middle Pleistocene; large-bodied prey species, as well as animals susceptible to over-predation, such tortoises, were hunted consistently. Nonetheless, hunting pressure appears not to have influenced prey population densities (i.e., animal frequencies do not change in the archaeological record) because *H. sapiens* and *H. neanderthalensis* populations were insufficiently large. During the transition to the Upper Paleolithic, however, there appear to have been localized depressions in both large and smaller mammal populations, perhaps due to increased human populations and overhunting. Another significant area of Eurasian subsistence research has concerned adaptations to high-latitude environments. Russian scholars have offered important insights into the world's earliest arctic adaptations. For example, the Yana RHS site in Siberia, which dates to c. 27,000 BP, demonstrates that people were adapted to high Arctic environments much earlier than previously assumed, with diets that included mammoths, horse, reindeer, bison, and hare (Pitul'ko et al. 2004).

Future Directions

Several lines of research will continue to move us beyond simple description and reductionism toward an ever more holistic understanding of hunter-gatherer subsistence variation. Continued development of technologies designed to track concealed aspects of the foraging calculus (e.g., energy expenditure, nutrient complementarity) will hone quantifications of relevant costs and benefits. Behavioral models of subsistence will be improved by incorporation of these data as well as by persistent attention to potential alternative currencies and constraints. Emergent research on cultural and historical learning biases that help shape hunting technologies, approaches to storage and methods for improving nutrient bioavailability, for example, will surely help to explain subsistence variation among hunter-gatherers living in similar environments. Command of models that incorporate learning biases will be enhanced by attention to the findings of behavioral research laboratories that use game theory to understand strategic decision-making and to those in psychology and cognitive neuroscience aimed at understanding human perceptions and motivations.

Common to all of these research endeavors is the integration of historicist and materialist perspectives; it is clear that both are necessary to explain subsistence variation. Although archaeological applications are still few and fairly simple, there is a growing recognition that cultural transmission theory (CT) offers a principled means of uniting the two approaches. Like HBE, CT deals in mathematical models, formalizing the effects of culture and history (e.g., technology and subsistence practices) on the adaptive equation, but CT has the advantage of being able to connect individual behaviors with population outcomes by looking at different spatial and

temporal scales. A truly modern approach to hunter-gatherer subsistence will incorporate both social and environmental variables to understand cross-cultural variability in foraging tools and practices, food preferences, labor specialization, and long-term subsistence change.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Behavioral Archaeology
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mesoamerica: Subsistence Strategies by Region

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Hunter-Gatherers, Archaeology of

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Introduction

The study of hunter-gatherer societies remains fundamental to archaeological research around the globe. Hunting and gathering societies have existed in virtually every environment from the extreme (e.g., arctic, subarctic, subantarctic, alpine, and desert) to the more benign (e.g., temperate interior forests and coasts). Hunting and gathering as an economic strategy dominates human history, given the relatively recent development and expansion of domesticated food production systems. Indeed a number of the world's regions (e.g., North American and Eurasian Arctic and Subarctic, Australia, Tasmania, Patagonia) were peopled by hunter-gatherers until colonization by European groups in the most recent centuries. Archaeologists engage in hunter-gatherer research to address many topics including human evolution, population movements and peopling events, ecological adaptation, forager-farmer interactions, social change, indigenous history, and socio-ideological landscape structure. The archaeology of hunter-gatherers is a dynamic field of study as exemplified by a wide range of research agendas and debates among its major practitioners. This entry draws from recent works summarizing the current state of the art in hunter-gatherer archaeology (Bettinger 1991; Kelly 1995; Lee & Daly 1999; Binford 2001; Panter-Brick et al. 2001; Barnard 2004; Jordan 2008; Sassaman & Holly 2011) to outline current definitions of hunter-gatherers, historical perspectives, critical debates, international views, and future directions.

Definition

Hunter-gatherers are recognized as a highly diverse set of societies occupying every continent with the exception of Antarctica. However, scholars have struggled over a proper definition for hunter-gatherer. A common view is that hunter-gatherers represent the original human society. Social Darwinists viewed hunter-gatherers effectively as the basal rungs on a ladder of cultural progress (Bettinger 1991). The definition of hunter-gatherer as original human society was evident in neoevolutionary frameworks (e.g., egalitarian band), and later, "pristinist" views asserting some hunter-gatherer groups such as the Ju/'hoansi are in effect survivors from the Paleolithic (Kelly 1995).

A common approach has been to couch definitions in ecological terms primarily in reference to food. Discussions at the "Man the Hunter" conference in 1966 led to a portrayal of hunter-gatherers as people surviving on foods acquired from their

surrounding environment. Subsequent research demonstrated that hunter-gatherers employ a diverse array of strategies to acquire, process, and consume those resources. Some hunter-gatherers move groups to food sources, acquire and consume the food, and then move on. In contrast, other hunter-gatherers send task groups from more stable home bases to acquire large quantities of food to be stored and consumed later. Recognition of these differences led to new types, known to James Woodburn as immediate and delayed return hunter-gatherers and Lewis Binford as foragers and collectors (Kelly 1995).

Scholars have also defined hunter-gatherers in sociopolitical terms, typically classifying them as people who live in small, egalitarian social units, typically families or "family bands," lacking formal defended territories, and maintaining flexible residential group membership (Lee & Devore 1968). Marxian scholars identified a "hunter-gatherer mode of production" whereby hunting and gathering was merely the "glue" holding together the wider package of characteristics (Lee 1988; Panter-Brick et al. 2001). Archaeologists also recognized significant diversity in social organization among hunter-gatherers, leading to an additional typological distinction between generalized and complex hunter-gatherers (Price & Brown 1985).

Typological approaches have been critiqued on a number of grounds. Definitions emphasizing predation of non-domesticated food resources or lack of genetic manipulation of prey populations have not always held up well in the face of realities lived by many societies identified as hunter-gatherer. Some hunter-gatherers rely on nearby agriculturalists for some foods and tools by producing special products such as honey, rattan, or large game meat for trade. Some work part time for nearby farmers and pastoralists. Others maintain gardens, growing domesticated crops during certain seasons of the years. Finally, a few groups maintain herds of domesticated animals. Panter-Brick et al. (2001) suggest, however, that the actual percentage of those cultivated products in diets of hunter-gatherers is generally very low.

Critiques of typological definitions of hunter-gatherers have recently come from archaeologists in two distinct theoretical camps. Evolutionary archaeologists argue that social types are essentialist and do not reflect that fluid nature of human cultural evolution where change is constant (O'Brien & Lyman 2000). The primary goal of study within this framework is gaining an understanding of evolutionary origins of variability in cultural characters ranging from technologies to foraging strategies.

Archaeologists espousing a social theoretical framework have been more explicit in their critique of hunter-gatherers as ahistorical types (Sassaman & Holly 2011). These archaeologists argue that hunter-gatherer societies as reconstructed from archaeological data or witnessed in the ethnographic record are the outcomes of history and thus continuously variable. While they have so far avoided some of the excesses of the "Revisionist" school of hunter-gatherer studies (Jordan 2008), they still seek to identify the impacts of historical contingency and individual/group agency on the history of small-scale human groups traditionally identified heuristically as hunter-gatherers.

Historical Background

Archaeological perspectives on hunter-gatherers have changed significantly over the past two centuries. In reviewing historical change in archaeological perspectives, it is critical to recognize that current perspectives are highly diverse, with many archaeologists still engaged in research drawing from older theoretical views. Social Darwinist views generally held that human societies were locked into particular stages of cultural evolution by mental constraints (Kelly 1995). If this was the case, then modern groups committed to such practices as residential mobility, foraging for non-domesticated foods and mandatory food sharing could be labeled survivals from the ancient past, held in place by their inherent inability to rise to a "higher" status. Change could only come with evolution of the brain or by replacement by another group existing at a different cultural level. While most twentieth-century scholars rejected the racialist and

ethnocentric elements of social Darwinism, the presumption that historically recent hunter-gatherers represent survivals from the ancient past remained viable. Ethnoarchaeologists, for example, seeking analogies between the present and the past sought out examples of modern people still living in a state close to the Paleolithic. Practitioners of human behavioral ecology in archaeological research today have been critiqued for making such assumptions (Lee & Daly 1999).

The neoevolution and cultural ecology theoretical paradigms brought different perspectives on the nature of change in hunter-gatherer societies. While hunter-gatherers were still viewed as the original form of culture, there was a new perception that cultural change did not necessarily require biological evolution. Now change was driven by "prime movers" forcing hunter-gatherer groups into new, and sometimes less comfortable, modes of existence (Kelly 1995; Jordan 2008). A favorite topic was the transition from hunting and gathering to agricultural modes of existence. Some processual archaeologists influenced by these theoretical models looked to external causal factors such as population packing and environmental change, while others looked to internal processes such as technological innovation (Bettinger 1991; Kelly 1995).

The "revisionist" school painted hunter-gatherers as embedded in complex global web of relationships between human populations with widely varying political and economic interests. In accomplishing this, it offered a significant critique of so-called "pristinist" and "generalist" theories (inclusive of cultural ecology, neoevolution, processual archaeology, and human behavioral ecology). In its most radical form, the revisionists argued that the hunter-gatherers are the rural poor, the losers of Colonial and post-Colonial era struggles. Revisionist theorizing led to a significant new range of archaeological studies, not aimed at defining in situ change but looking at larger scale interactions and impacts of culture contact (Schrire 1984). However, the perception that modern hunter-gatherers were simply marginal survivors of the colonial era was not satisfying to all and led to significant debate, particularly over the interpretation of Kalahari hunter-gatherers (Jordan 2008).

An important outcome of the revisionist debate was the recognition among archaeologists that hunter-gatherers played a more active role in their own histories than had previously been given credit. Sassaman and Holly (2011) outline several means by which hunter-gatherers may be viewed as political actors interacting with wider social, political, demographic, and ecological forces to affect their own histories. Most fundamentally, these social theorists allow hunter-gatherers agency, positioning themselves for social, economic, and political gain. They also recognize the potential for hunter-gatherers to engage in alterity or practices designed to write and rewrite their own histories. T.R. Kidder's studies of Poverty Point, a massive residential and ceremonial site occupied by hunter-gatherers in the southern United States, make this point particularly well.

Evolutionary archaeologists are not entirely at odds with the positions taken by social theorists. Both recognize the roles of agency and context in the development of history. Their goals differ in the sense that evolutionary theorists seek to understand the evolution of cultural characters, in essence ideas manifested in material things. Social theorists remain more interested in the motivations and practices of the cultural actors. Both seek to understand variability in hunting and gathering societies. Indigenous archaeology has brought additional views of hunter-gatherer variability (Lee & Daly 1999).

Key Issues/Current Debates

Several research issues are actively debated among hunter-gatherer archaeologists today. A fundamental issue that is now hotly debated concerns the evolution of *Homo sapiens* and the development of recognizably modern hunter-gatherer cultural patterns. While all researchers recognize that this process happened in Africa during the past 300,000 years, scholars differ in their opinions on the processes of change and the

very definition of modernity in hunter-gatherer contexts. Two positions seem to have emerged. One suggests that the culture of modern hunter-gatherers, as characterized by the Upper Paleolithic of Africa and Eurasia at c. 10–50,000 years ago, could only evolve with biological changes to the brain between about 300,000 and 50,000 years ago. The opposing model suggests that the modern human brain was likely in place by c. 200,000 years ago, with the implication that the emergent Upper Paleolithic pattern was largely the result of cultural evolution.

Hunter-gatherers are at the center of research and debates over many of the world's great population expansions, including the dispersal of early *Homo sapiens* out of Africa, peopling of the Americas, and the movement of Thule Inuit groups across the North American Arctic. Common issues debated in each case concern timing and number of movements, group identities, and causal factors. Outcomes of New World research programs are pointing to complexity in the number, nature, and timing of the major movements. Social/agency theorizing has actually led to some breakthroughs, for example, in Thule Inuit archaeology. Scholars now recognize that the initial movement was probably driven primarily by individuals and groups seeking new sources of iron in the eastern portion of the Canadian Arctic rather than simply seeking to enhance their subsistence base (McGhee 2005).

Subsistence variability and intensification remain prominent topics in the literature, particularly associated with western North America, the eastern Mediterranean, and portions of East Asia. Debates have centered the economic and social logic behind prey choice decisions (Broughton & Cannon 2010). Scholars generally favor economic rationality as best understood using the diet breadth model of human behavioral ecology. However, an increasing number of researchers are offering alternative social perspectives. A good example of this is the debate over the role of costly signaling in the record of ungulate predation by hunter-gatherers of the desert west in North America. Another good example is the research and discussions associated with hunter-gatherer subsistence intensification in the millennia preceding the development of agriculture in the eastern Mediterranean region.

Emergent social complexity has been a central debate among hunter-gatherer archaeologists since the 1980s (Price & Brown 1985). The largest number of scholars seeks covering law-type explanations to the development of social inequality. Processual archaeologists look to underlying resource inequities between groups. Human behavioral ecologists base their models on adaptive decision making regarding optimum use and control of resources using sophisticated mathematical models. Political ecologists and evolutionary psychologists link emergent inequality to the agency of persons with particular personality types (e.g., aggrandizers). Some social theorists and evolutionary archaeologists have proposed historical models arguing that inequalities arose in some places as historical accidents (Sassaman & Holly 2011). Inequality in hunter-gatherer contexts has been studied and debated most heavily in North America's Western Arctic, Pacific Northwest, California Coast, and Southeast regions, along with portions of Europe, the Near East, and East Asia.

International Perspectives

International scholars have a long history of contributions to hunter-gatherer studies in archaeology (Barnard 2004). Marxian perspectives on hunter-gatherers have been prominent across much of Eurasia (particularly Spain, Russia, and China) during the past century. Western perspectives (e.g., processual archaeology) have been important in the research of scholars in Western Europe, India, and Japan since the 1960s. Processual archaeology has also been influential in Australia and a number of South American countries. In the past two decades, international theoretical perspectives on hunter-gatherers have undergone a significant change with the rise of post-processualism in Western Europe and the development of indigenous archaeology in a number of other places. The rise of indigenous hunter-gatherer archaeologies has been

particularly prominent in Australia, South Africa, and North America (Lee & Daly 1999) and has offered the opportunity for archaeological researchers to combine best elements of Western science with traditional knowledge of indigenous groups.

Empirical contributions are widespread around the globe. African scholars have for decades offered critical insight into the human evolution and the development of the world's earliest foraging societies. South Africa has also been the place where the most intense debates over the nature of historical hunter-gatherer societies have taken place (Lee & Daly 1999). European hunter-gatherer research continues to offer significant contributions to human evolution, currently addressing issues of Neandertal adaptations and extinction, Upper Paleolithic variability, and later hunter-gatherer interactions with early farmers. Asian scholars continue to offer new insight into forager-farmer transitions, maritime adaptations, and early Arctic adaptations and population movements. Australian researchers have pushed back dates of Australian colonization and have made important strides in understanding migrations, desert adaptations, and sacred landscapes. South Americanists continue to offer insight into hunter-gatherer engagements with rainforest ecosystems, adaptations to remote isolated environments (Patagonia), early use of marine resources, emergent social complexity, and early population movements in the Americas.

Future Directions

Archaeological discussions of hunter-gatherers will continue to emphasize the solving of major problems associated with human origins, migrations, subsistence variability, and social identity and change. However, these discussions will be increasingly impacted by a number of additional theoretical and political undercurrents.

Hunter-gatherer archaeology will benefit from a close consideration of commonalities between social/agency and evolutionary schools of thought (Jordan 2008). Each offers significant opportunities for insight into variability in hunter-gatherer societies, with a common focus on history of human cultural practices. Human behavioral ecology will also want a seat at this table given its interest in defining the microeconomic logic of human decision making. An important outcome of these discussions will be a demonstrated utility in expanding our understandings of particular histories of indigenous hunter-gatherer groups. Ecological researchers need to pay particular attention to strategies used by indigenous hunter-gatherers to actively manipulate resources within their environments. The time of ancient hunter-gatherers as passive users of nature's offerings should be long gone.

Gender archaeology will be increasingly critical for comprehensive reconstructions of the past. Defining gendered activity variability in the archaeological record remains a daunting task, particularly when working with very ancient materials (e.g., Paleolithic). Recognition of gendered activity differences is more easily accomplished in later dating contexts where ethnographic analogies are more easily made. For example, on the floors of late precontact Pacific Northwest houses, it is possible to recognize spatial distinctions between hearth- and bench-associated activities, respectively, linked to female and male tasks. However, archaeologists have made significant advances to the point that discussions are even underway regarding changes in gendered activity structure between Middle and Upper Paleolithic camps.

Landscape archaeology will become central to reconstructing hunter-gatherer belief systems, land use practices, political relationships, and economic systems. As an increasing number of archaeologists are recognizing, hunter-gatherer landscapes carry meaning that goes well beyond that of ecology to include a wide range of sacred and spiritual connections. While ancient religions of hunter-gatherers have in many ways remained beyond archaeology's grasp, analysis of symbolic systems across landscapes offers the potential for significant new insights. This will provide more opportunities for archaeologists to advance our understanding of hunter-gatherers beyond ancient economists to more fully engaged

human beings equivalent in cultural complexity to those of agricultural societies.

Achieving a comprehensive understanding of past hunter-gatherers will require knowledge beyond the standard training received by many archaeologists. Indigenous archaeologies offer the opportunity to gain new insight into aspects of the archaeological record (e.g., symbols, sacred connections, and traditional practices) not always recognized. Engagement by and with those with traditional knowledge can lead archaeology into entirely new worlds of the past. Indigenous archaeology also offers the opportunity for indigenous people offer their own conclusions about their past, something long overdue in many parts of the world. Archaeology thus becomes not just a science of the past but also a tool for cultural heritage research and education.

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification

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Hunting and Hunting Landscapes

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State of Knowledge and Current Debates

There is an increasing recognition that the study of human-animal-landscape interactions, as reflected in the zooarchaeological, artistic, and historical record, can provide important information about how people engaged with and perceived their surroundings as well as each other. Human responses to wild animals in particular have been shown to reflect individual, social, and cultural attitudes to the "natural world." Some of the most pivotal moments in the human story have been characterized by shifts in the relationship between humans and wild animals. For instance, the concept of domestication not only

Hunting and Hunting Landscapes, Fig. 1 Male fallow deer (*Dama dama dama*) (Photo: author)

gave rise to the category of "wild" but also meant that it was no longer *necessary* to hunt in order to obtain meat. Yet people continued to do so. In some periods, hunting was a rare occurrence; in others, it became a frequent pursuit central to popular culture, evidenced by the art and literature of the time.

This entry seeks to review the evolution of hunting and hunting landscapes from the Epipaleolithic of Anatolia to the medieval period of England. Such a wide chronological and geographical remit clearly runs the risk of producing extremely superficial analysis, but conversely, by breaking down artificial spatiotemporal boundaries and considering the evidence from a wider viewpoint, it is hoped that new perspectives will emerge on a subject that has traditionally been compartmentalized by period and region (Cummins 1988; Birrell 1992; Barringer 2001; Hamilakis 2003; Atici 2009; Sykes 2011; Sykes et al. 2011; Arbuckle 2012). In an attempt to give focus to what could easily become an unwieldy subject, this entry concentrates specifically on the evidence relating to the European fallow deer, *Dama dama dama* (Fig. 1). Despite its name, this deer species is not of European origin: it is native to Anatolia but over the last 10,000 years has been transported by people around the world. As such, the cultural biogeography of fallow deer provides a unique opportunity to explore a variety of different hunting landscapes, created as this "wild" species passed gradually from being a free-living element of the fauna of its native range to an exotic species maintained in parks across northern Europe.

Definitions and Datasets

Given that the terms "landscape," "hunting," "wilderness," and "wild" are some of the most nuanced and contested in archaeological and anthropological discourse, it is perhaps best to start by making clear the definitions.

Here landscape is defined not simply as physical geography and environmental conditions, although these are important elements of landscape, but rather as how people perceive and understand their surroundings as a result of their engagement with them. This definition sees landscape and worldview as inseparable, each serving to constitute the other. Movement and mobility are also suggested as vital components of both landscape and worldview: the sayings "travel broadens the mind" and "fear of the unknown" are of direct relevance here. In general terms, mobile groups who travel across, and are familiar with, wide spatial ranges

or those communities involved (directly or indirectly) in long-distance trade/exchange will have a different perception and understanding of their worlds than those who live a more sedentary or insular lifestyle. Insular sedentism allows intense engagement with, and very detailed knowledge of, local surroundings, but as movement reduces, so mental geographies contract, giving rise to infrequently traversed and unfamiliar landscapes beyond the "known realm."

Often these outer realms are conceptualized as the "wilderness." This term is used here not to suggest some primordial landscape untouched by humans; instead, wilderness is defined according to its original meaning: etymologically it comes from the Old English *wildeoren*, meaning *wildern* (wild or savage) and *deor* (animal), denoting an area where wild animals are found in greater numbers. Of course, the term "wild" is also problematic, frequently set in opposition to the other problem child "domestic." This is not the place to deliberate over these two words; suffice to say that, for the purpose of this entry, wild animals are categorized as those that are acquired through hunting.

In terms of hunting, Cartmill's (1993: 197) definition is employed: that hunting is the killing of a special sort of animal, in a specific way, for a particular reason. Cartmill stresses that this killing must be premeditated, preceded by deliberate tracking/stalking under circumstances where it is theoretically possible for the animal to evade its pursuer, and that the death is brought about by direct human violence, without mediation by trap or snare. Such a definition is flexible enough to allow tame or even domestic animals to cross the boundary and become conceptually "wild" through the activity of hunting – e.g., as was seen at Neolithic Durrington Walls (UK) where several domestic cattle and pig bones had flint arrow/spear tips embedded in them, leading Albarella and Serjeantson (2002: 44) to suggest that these domesticates were ritually hunted.

Unfortunately, in the absence of skeletal evidence for weapon-inflicted injuries, it is almost impossible to separate the archaeological remains of animals that were hunted from those that were obtained through other mechanisms. It is, therefore, important to view the zooarchaeological data presented in Table 1 with caution. These data, which review the representation of European fallow deer (*Dama dama dama*) across space and time, need not represent the remains of hunted animals – some of the individuals may have been tamed and dispatched as though they were domesticates, and we cannot be certain that they were hunted. There are other problems with this diachronic dataset, most notably, that it takes no account of inter-site variations in preservation or recovery. With these caveats in mind, however, the evidence in Table 1 can be examined to gain a broad-brush impression of the rise and fall of hunting cultures, the timing of the westward diffusion of fallow deer from Anatolia through the Mediterranean and mainland Europe, and the associated shifts in the status of the species.

In order to gain greater insights into hunting decisions and issue of seasonality, the demographic composition of the fallow deer assemblages is also considered, where possible. Fallow deer are highly sexually dimorphic, and therefore, osteometrics, derived from the online *Deer Bone Database* (n.d), have been employed to examine male-female ratios as well as variations in the physical conformation of deer, which itself is related to landscape and environment.

To some extent, environmental conditions – geology, baseline vegetation, temperature, and aridity – are preserved in the very chemistry of the bones, and isotopic analyses of archaeological fallow deer remains can help to reconstruct human-animal-landscape interactions. Genetic analyses may also be useful in this respect, informing on population dynamics and episodes of translocation. At present, however, data from such scientific investigations are of limited availability, and although some reference will be made to them here, more emphasis is placed upon the historical and iconographic record. Artistic and textual evidence is patchy for the periods and regions under consideration but is available for the Bronze Age Aegean (Yannouli & Trantalidou 1999), Archaic, Classical, and Hellenistic Greece (Yannouli & Trantalidou 1999; Barringer 2001), some areas of the Roman Empire (Reinken 1997),

Hunting and Hunting Landscapes, Table 1 Fallow deer representation as a % of the total NISP (number of identified specimens) for mammals, by geographical region, site, and period

No	Anatolia	Dating information	*n*	% dama	References
1	Karain B1	19,478–19,203 BP	10	0.05	Atici 2009
1	OK1	19,842–19,002 BP	1191	27.8	Atici 2009
1	Karain B2	19,275–18,965 BP	0	0	Atici 2009
1	OK2	18,015–17,069 BP	297	1.8	Atici 2009
1	OK3	15,706–15,118 BP	1015	6.8	Atici 2009
1	Ok4	14,722–14,053 BP	222	10.3	Atici 2009
1	OK5	14,056–13,710 BP	363	26.1	Atici 2009
2	Bademağacı	ENI 7,035–6,705 BP	15	0.9	DeCupere et al. 2008
2	Bademağacı	ENII	116	2.5	DeCupere et al. 2008
2	Bademağacı	EN	3	2.3	DeCupere et al. 2008
3	Ilıpınar	X c. 6100–5600 BCE	176	10.2	Buitenhuis 2011
3	Ilıpınar	IX c. 6000–5600 BCE	215	14	Buitenhuis 2011
3	Ilıpınar	IX–VIII 6000–5600 BCE	200	4	Buitenhuis 2011
3	Ilıpınar	VIII–VII 5900–5600 BCE	38	3.4	Buitenhuis 2011
3	Ilıpınar	VI/VA 5800–5400 BCE	623	14	Buitenhuis 2011
3	Ilıpınar	VB	19	7	Buitenhuis 2011
4	Fikirtepe	Neolithic	256	5.2	Boessneck & von den Driesch 1979
2	Bademağacı LN-ECh	LN-ECh	15	2.2	DeCupere et al. 2008
5	Kumtepe A	4805–4370 BCE		14	Gündem 2010
5	Ulucak	Chalcolithic	247	12.4	Gündem 2010
5	Ulucak	EBA	228	19	Gündem 2010
6	Küllüoba TP	3300–3000 BCE	3	0.6	Gündem 2010
5	Kumtepe B	3370–2910 BCE	6	2	Gündem 2010
6	Küllüoba EBA I	3000–2700 BCE		0.8	Gündem 2010
5	Kumtepe C	Troy I		1	Gündem 2010
5	Troy I	2920–2550 BCE	161	1.5	Gündem 2010
6	Demircihüyük	EBA 3100–2400 BCE	2085	2.9	Rauh 1981
7	Yenibademli	EBA II/Troy I	680	10	Gündem 2010
6	Küllüoba EBA II	2700–2400 BCE		0.7	Gündem 2010
5	Troy II	2550–2250 BCE	161	4.8	Gündem 2010
5	Troy III	2250–2200 BCE	99	6.5	Gündem 2010
2	Bademağacı	EBAII	9	2.7	DeCupere et al. 2008
6	Küllüoba EBA III	2400–2000 BCE		0.7	Gündem 2010
5	Troy VIII	Hellenistic	2570	24.6	Fabiš 2003
	Mainland Greece	**Dating information**	***n***	**% dama**	**References**
8	Sitagroi	Neo I	2	0.1	Bökönyi 1986
8	Sitagroi	Neo II	1	0.01	Bökönyi 1986
8	Sitagroi	Neo III	15	0.1	Bökönyi 1986
9	Dhimitra	MN	2	0.3	Yannouli 1994
9	Dhimitra	Final Neolithic	6	0.3	Yannouli 1994
10	Makri	5500–4000 BCE	51	9.7	Curci & Tagliacozzo 2003
11	Vassilika	LMN-LLN	26	0.4	Yannouli 1994
11	Thermi	LLN	2	0.08	Yannouli 1994
8	Paradeisos	Late Neolithic	12	0.7	Larje 1987
8	Sitagroi	Neo-EBA (IV)	95	2.2	Bökönyi 1986

(*continued*)

Hunting and Hunting Landscapes, Table 1 (continued)

	Mainland Greece	Dating information	*n*	% dama	References
8	Sitagroi	EBA	149	1.6	Bökönyi 1986
12	Pentapolis	EBA	33	1.8	Yannouli 1994
13	Kastanas	BA	100	11	Becker 1986
13	Kastanas	BA	4865	39.6	Becker 1986
9	Dhimitra	LBA	2	0.7	Yannouli 1994
	Greek Islands	**Dating information**	***n***	**% dama**	**References**
14	Kalithies, Rhodes	Neolithic (I)	14	5.4	Halstead & Jones 1987
14	Kalithies, Rhodes	Neolithic (II/III)	56	9.9	Halstead & Jones 1987
15	Agios Petros, Sporades	E-M Neo	3	0.3	Schwartz 1985
15	Agios Petros, Sporades	M-L Neo	3	0.3	Schwartz 1985
15	Agios Petros, Sporades	Neo	1	0.5	Schwartz 1985
16	Skala Sotiros	EBA	60	0.5	Yannouli 1994
17	Knossos, Crete	Neolithic	2	0.01	Harris in press
17	Knossos, Crete	BA	19	0.5	Harris in press
17	Agia Triada EM, Crete	2700–2000 BCE	0	0	Wilkens 2003
17	Agia Triada MM, Crete	2000–1570 BCE	1	0.4	Wilkens 2003
17	Agia Triada MM3, Crete	1750–1570 BCE	2	0.9	Wilkens 2003
17	Agia Triada LM, Crete	1570–1150 BCE	7	2.2	Wilkens 2003
17	Chania (Ayia Aikaterini), Crete	LBA	195	6	Harris in press
17	Chania (Odos Daskaloyannis), Crete	LBA	227	12	Harris in press
17	Chania (Mathioudaki), Crete	LBA	18	5	Harris in press
17	Prinias, Patela Temple, Crete	Iron Age	11	2.4	Wilkens 2003
17	Kavousi, Kastro, Crete	Iron Age	12	0.4	Harris in press
17	Knossos (sanctuary Demeter), Crete	Iron Age	1		Harris in press
17	Gortyn, Crete	Byzantine	3	0.1	Wilkens 2003
	Roman Europe	**Dating information**	***n***	**% dama**	**References**
18	Settefinestre, Italy	First century BCE–CE	16	0.3	Carandini 1985
19	Castagna, Sicily	Second century	1	1.6	Johnstone 1998
19	Castagna, Sicily	Fifth–sixth century	2	2.3	Johnstone 1998
20	Fishbourne	First century BCE–CE	7	0.08	Allen & Sykes 2011
20	Fishbourne	First–second century	17	0.2	Allen & Sykes 2011
20	Fishbourne	Second–third century	5	1.9	Allen & Sykes 2011
20	Fishbourne	Third–fourth century	10	0.3	Allen & Sykes 2011
21	Monkton, Isle of Thanet	Second–fourth century	9	0.5	Sykes et al. 2011
22	Sparsholt	Third–fourth century	12	0.5	Weinstock *pers. comm.*
	England	**Date**	**n**	**% dama**	**References**
23	Carisbrooke Castle, Isle of Wight	Eleventh century CE	13	0.8	Ayton 2011
23	Carisbrooke Castle, Isle of Wight	Twelfth century CE	11	0.9	Ayton 2011

(*continued*)

Hunting and Hunting Landscapes, Table 1 (continued)

	England	Date	n	% dama	References
26	Launceston Castle	Twelfth century CE	1	0.5	Albarella & Davis 1996
27	Guildford Castle	Twelfth century CE	3	1	Sykes et al. 2005
27	Guildford Castle	Twelfth–thirteenth century CE	4	1	Sykes et al. 2005
23	Carisbrooke Castle, Isle of Wight	Twelfth–fifteenth century CE	5	1.8	Ayton 2011
27	Guildford Castle	Thirteenth century CE	89	7	Sykes et al. 2005
26	Launceston Castle	Mid-thirteenth century CE	2	1.3	Albarella & Davis 1996
26	Launceston Castle	Late thirteenth century CE	65	4.2	Albarella & Davis 1996
27	Guildford Castle	Thirteenth–fourteenth century CE	31	9	Sykes et al. 2005
28	Okehampton Castle	Pre-thirteenth century CE	48	3	Maltby 1982
28	Okehampton Castle	Fourteenth century CE	322	28.4	Maltby 1982
27	Guildford Castle	Fourteenth–fifteenth century CE	25	6	Sykes et al. 2005
26	Launceston Castle	Fifteenth century CE	324	9.5	Albarella & Davis 1996

and medieval northern Europe, in particular England (Sykes & Carden 2011). Anthropological studies are also employed, not as direct parallels for archaeological societies but rather as a mind-stretching exercise, to provide alternate perspectives on landscape, environment, and social attitudes to hunting (Cartmill 1993; Helms 1993; Ingold 2000; Willerslev 2007). By bringing these sets of evidence together and integrating them with wider archaeological knowledge, it is possible to examine how hunting and hunting landscapes varied across time and space.

The Hunting Landscapes of Epipaleolithic and Neolithic Anatolia

Current zooarchaeological evidence suggests that, as a result of the last glacial maximum (c. 20,000 years ago), the distribution of fallow deer became restricted to Anatolia (Masseti 2002). Certainly it is from this region that we have the best available dataset for analyzing human-dama-landscape relationships in the early postglacial period. Atici's (2009) examination of seven Epipaleolithic assemblages from two neighboring sites (Karain B and Ökuzini caves) in the western Taurus mountains provides a rare insight into the landscapes of the hunter-gatherers who occupied the area between 19,800 and 13,700 cal BP.

These broadly contemporary assemblages, situated just one kilometer apart (Fig. 2), reveal an interesting variation in fallow deer representation: while *Dama* are abundant at Ökuzini, comprising 27.8 % of the mammalian material, they are almost completely absent from Karain B, where the assemblage is 99 % caprine (Table 1). Admittedly a small number of fallow deer remains are represented at Karain B, but they are all antler fragments, so not direct evidence of hunting. Environmental conditions and topography alone cannot account for the inter-site variation, since both sites occupy the same ecotone with access to a variety of microenvironments – mountain slopes, valleys, the travertine plain, as well as areas of open grassland, marshes, and forest – and an equally wide range of prey. This led Atici (2009) to conclude that the differences in assemblage composition most probably reflect cultural preferences linked to seasonal hunting and mobility strategies. Aging data from the two sites suggest that, at least in the early postglacial phases (Karain B1/2 and OK1), occupation was seasonal,

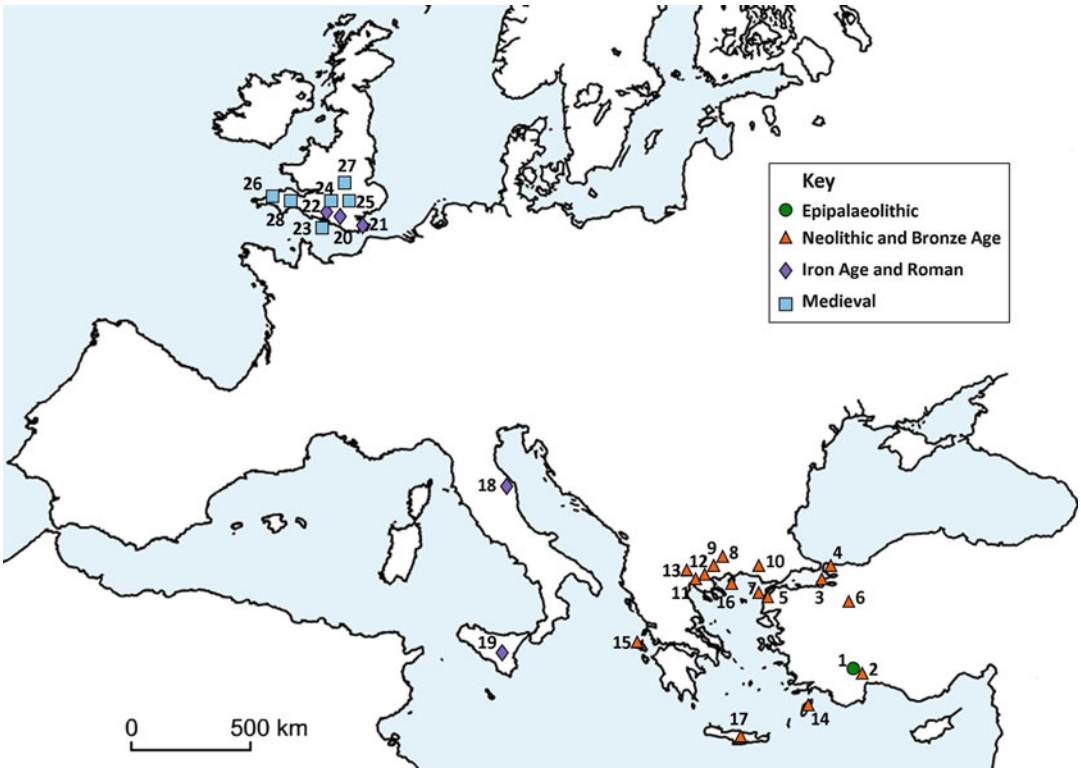

Hunting and Hunting Landscapes, Fig. 2 Map showing the location of the sites mentioned in Table 1

probably from late spring/early summer to October. The caprine mortality profiles also make clear that, although animals of all ages were represented, those between 2 and 4 years were targeted preferentially.

These data indicate that the Epipaleolithic hunters not only were highly skilled in their abilities to select out particular species and individuals but, perhaps more importantly, were taking a conscious decision about which animals *not* to kill. For instance, given the close proximity and environmental setting of Karain B and Ökuzini, we may assume that similar ranges of taxa were available at both sites; however, at Karain B, fallow deer appear to have been deliberately and persistently avoided throughout the site's 500 years of occupation. Assemblages such as Karain B are usually interpreted in economic terms, as "specialist sites" established to maximize returns from available resources. No doubt, effectiveness in hunting was a concern to the Epipaleolithic hunters, but the idea that optimal foraging was their main concern seems at odds with anthropological evidence pertaining to modern hunter-gather groups.

Across cultures, studies have demonstrated repeatedly that hunter-gatherers tend to perceive their landscape and environment not as economic resource but, in familial terms, as a parent who actively provides for them so long as the hunter-gatherers behave appropriately (Ingold 2000: 67; Willerslev 2007: 42). For instance, they should take no more than they need, are required to share out the resources they receive, and should ensure that they treat the animals with respect at all stages of their interaction – during hunting, butchery, consumption, and disposal (Ingold 2000: 67; Willerslev 2007: 35). If humans behave accordingly, the animals will give themselves up freely to the hunter, and once their soul has been released and reclothed with flesh, it will return to him in the future. However, poor treatment – such as overkilling, unnecessary violence, or

wastefulness – ensures that the animals do not return and the hunter is never again successful. In order to coax animals into sacrificing themselves, hunter-gatherers frequently practice mimesis to "become" their quarry so they might better seduce them into giving themselves up. Based on the experiences of modern hunter-gatherers, the idea that fallow deer hunting at Ökuzini, and indeed caprine hunting at Karain B, took the form of an intense interpersonal dialogue is not unreasonable. This would suggest that hunting was controlled and restrained in ways different to those of an optimal foraging strategy. If mimesis was employed, the hunting landscape may even have been seen through the eyes of the quarry – a very different perspective on the world (Willerslev 2007: 106).

Such a situation is easier to comprehend for a period before the arrival of domestic dogs, which are absent from Anatolia before the twelfth millennium BCE (Arbuckle 2012: 210). Without the distraction of dogs, mimesis would have been easier to maintain, an important point given that this form of shape-shifting is often deemed dangerous, potentially leaving the hunter trapped in animal form (Willerslev 2007: 93). Even successful hunting is not without risk however. It is frequently reported, again cross-culturally, that hunters feel deep guilt about their kill and are fearful that the "animal masters" – the spirits who protect the animals – will seek vengeance (Willerslev 2007: 44,79). If hunting in Epipaleolithic Anatolia was felt to incur a spiritual debt and overkilling was not acceptable, it stands to reason that deliberate non-killing (e.g., the avoidance of fallow deer at Karain B) would have been a prudent statement of respect. The need not to waste hunted animals could equally account for the high levels of bone fragmentation, indicative of intensive processing, seen at both Karain B and Ökuzini (Atici 2009: 22).

Taken together, the data from these sites can be interpreted as follows: that similar to modern hunter-gatherers, Epipaleolithic groups had an intimate relationship with their environment, their hunting landscapes constituted by specific, long-term, and repeated human-animal interactions that occurred at particular times and places (e.g., the seasonal hunting of caprines and fallow deer at Ökuzini and just caprines at Karain B). It seems feasible that these interactions were central to human culture – in the form of songs, dance, and stories – that, together with the group's mobility, ensured knowledge of and relations with the environment were maintained (Ingold 2000: 56-7).

It is clear from the later phases at Ökuzini that human mobility gradually reduced as occupation became longer in duration, evidenced by faunal indicators of seasonality (Atici 2009: 34). The zooarchaeological data also demonstrate a steady increase in the range of species that were hunted, with fallow deer, roe deer, and wild boar becoming better represented through the chronological sequence. This move towards sedentism and the hunting of a wider range of prey, undertaken from a single settlement base, indicates a change in human-animal-landscape relationships that must have altered the way that people perceived their environment. Knowledge of the site's immediate surroundings would have intensified, allowing far deeper relationships with their locality but at the expense of other places that were previously part of the group's familial landscapes. As mobility reduced and people "lost touch" with areas beyond their day-to-day range, these more distant areas presumably became unfamiliar, perceived as the dangerous dwellings of ancestors and spirits (Ingold 2000: 43).

The emergence of sedentary farming communities can only have accelerated the contraction of landscape knowledge and engagement. To some extent this is reflected by the zooarchaeological data for the Near East and Mediterranean: surveys of faunal representation show a gradual drop-off in wild animal representation from the ninth millennium BCE, with wild animals becoming scarce in zooarchaeological assemblages from about 7500 BCE (Vigne & Helmer 2007: 34; Arbuckle 2012: 217). Certainly this is the case at Bademağacı Höyük, an early Neolithic to Bronze Age settlement located approximately 30 km northeast of, and in an similar environmental setting to, Ökuzini and Karain B. Table 1 shows that, in contrast to the high frequency of fallow deer at Ökuzini,

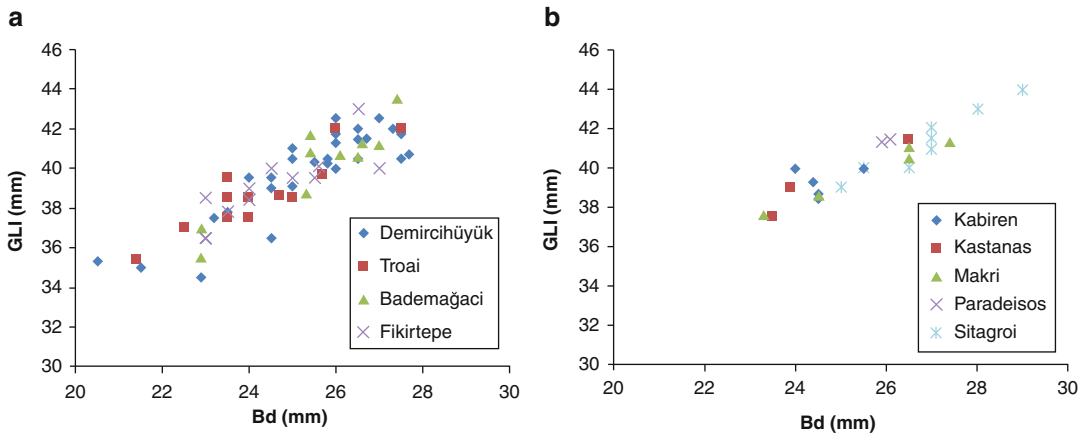

Hunting and Hunting Landscapes, Fig. 3 (**a**) Plot of astragali measurements – greatest lateral length (*GLl*) against distal breadth (*Bd*) – for fallow deer from Anatolia. (**b**) Plot of astragali measurements – greatest lateral length (*GLl*) against distal breadth (*Bd*) – for fallow deer from mainland Greece

D. d. dama remains constitute just 0.9 % of the earliest Neolithic assemblage from Bademağacı. If it is accepted that zooarchaeological assemblages reflect human-animal-landscape interactions, the Epipaleolithic to Neolithic decline in wild animal representation can be taken as evidence for a fundamental change in human experience and environmental engagement. An increasing focus on domestic animals and landscapes created something new: the "wild," which now existed beyond the Neolithic settlements and their daily activities. De Cupere et al. (2008: 383) concluded that hunting played only a minor role in the subsistence of Bademağacı's occupants and that the deer were probably hunted locally on the plain surrounding the settlement. Recent carbon and nitrogen isotopic analyses of the fallow deer from Bademağacı ($n = 34$) may confirm localized hunting, the results being more tightly clustered (suggesting similarity of baseline environment) than has been observed for any other *D. d. dama* population analyzed to date (Sykes et al. 2011; Madgwick et al. in press).

The low frequencies of fallow deer (and other wild animals) in Neolithic assemblages should not, however, be equated with a lack of social importance. Indeed, as wild animals and their habitats became less familiar to the Neolithic populations, the significance of both may actually have increased. Within farming societies, hunting is usually about more than the acquisition of meat – it is a special activity, often a ritualized expression of identity (be it status, religious beliefs, ethnicity, gender), power, authority, or landownership (Helms 1993; Hamilakis 2003; Sykes 2007a). The value placed upon hunting derives from its unpredictability and danger, with hunters traveling beyond the comfort of their settlements into unknown landscapes to confront unknown beings. In her analysis of traditional societies, Helms (1993: 153-7, 211) demonstrated that, across cultures, geographical distance is equated to supernatural distance and that the hunters' ability to successfully negotiate "outer realms" is frequently regarded as a sign of shamanic status or supernatural authority. Given this association, together with the fact that hunting requires violent engagement with potentially dangerous wild animals, it is unsurprising that hunting skill is often deemed an important trait of male leadership in warrior societies (Cartmill 1993; Helms 1993; Hamilakis 2003; Sykes 2011: 336).

The possibility that there was an association between hunting and masculinity in Prehistoric Anatolia is perhaps discernible in the zooarchaeological record. Fig. 3a shows clearly that fallow deer bucks were preferentially hunted at Bademağacı, the distribution of astragali measurements suggesting a male-female ratio of 4:1.

Male fallow deer are also overwhelmingly predominant at Neolithic Fikirtepe (Turkey) where very few females are represented (see Fig. 3a; Boessneck & von den Driesch 1979). From an economic perspective, these male-dominated assemblages could be interpreted as evidence for optimal foraging, the hunters targeting animals with larger carcass weight. However, given the considerable anthropological evidence for hunting communities, it seems more likely that these sex ratios reflect the role of hunting as an expression of masculinity: men deliberately seeking to confront the larger and more violent male of the species.

Under such circumstances, the role of dogs as hunting companions is more logical. Rather than representing a distraction, as was suggested for the Epipaleolithic period, dogs would have been valuable assets for macho-based hunting, offering both assistance in tracking quarry and companionship but also protection if needed. Work by Bartosiewicz (1990) has demonstrated a positive correlation between the frequencies of dog and wild animals in Neolithic assemblages from Europe and the Near East, suggesting that the two are directly associated. No such trend is apparent for Bademağacı, for although dogs are represented throughout the site's occupation, their frequency does not increase in parallel with the remains of wild animals: Table 1 shows that the representation of fallow deer at Bademağacı increases to over 2 % from the ENII phase onwards. Several other Neolithic and Chalcolithic sites – notably Ilıpınar, Fikirtepe, Kumtepe, and Ulucak – demonstrate even greater frequencies of *D. d. dama* bones. Interestingly, this upsurge in fallow deer hunting corresponds with the period in which fallow deer began to be transported, by people, outside their natural range.

Hunting Landscapes of the Aegean: Diaspora of Fallow Deer and a Common Aristocratic Culture

Reviews by Yannouli and Trantalidou (1999) and Masseti (2002) highlight that dama remains have been identified in Neolithic assemblages from the islands of Rhodes, Crete, Chios, Lesbos, the Cyclades, and Sporades. Fallow deer are not part of these islands' native fauna and so must have been imported from Anatolia as part of the Aegean-wide trading/communication network that developed during the period (Masseti 2002: 163-4; Barker 2005).

According to Masseti (2002: 164 Barker 2005), fallow deer were exported specifically for hunting purposes, and it seems likely that their transportation was accompanied by the establishment of a common hunting culture across the Aegean. Certainly, a Neolithic to Early Bronze Age increase in wild animal representation has also been widely observed for mainland Greece (e.g., Hamilakis 2003), and research by Yannouli (1994) has highlighted that, for sites in Macedonia at least, this is coincident with the emergence of fallow-focused hunting. At Sitagroi, for instance, *dama* are very poorly represented in the earliest Neolithic levels (0.01–0.1 %) but become the dominant cervid species at the advent of the Bronze Age, accounting for 1.6–2.2 % of the mammalian assemblage (Table 1). Metrical analysis demonstrates that, as in Anatolia, hunting strategies were highly selective, with an overwhelming predominance of fallow deer bucks at both Sitagroi and Paradeisos (Fig. 3b). If, as has been argued above, male-dominated assemblages reflect social rather than economic concerns, this would seem to support Hamilakis's (2003: 242) argument that hunting was becoming an important arena for the negotiation of power and gender roles, in particular masculinity, associated with the rise of warrior identities. The hunting of fallow deer, a species that was beginning to unite distant parts of the Aegean, may have enhanced further the significance of the activity. By allowing hunters to engage in a common, yet simultaneously exotic, set of cultural practices, the participants became active members of a world beyond the local – a situation that would have allowed mental geographies to enlarge.

Bronze Age perceptions of hunting landscapes are difficult to fathom, but the introduction of horses must have transformed the way in which hunts were conducted and experienced: expeditions could now take place at speed with participants afforded a new vantage from their position

within a chariot or on horseback. It is clear from iconographic evidence that both horses and hounds were important components of Bronze Age hunting, one of the earliest and most detailed depictions of this association coming from the LCI site of Ayia Irini (Kea). Here miniature friezes are painted on the walls of what is thought to be a large banqueting hall (Marinatos & Morgan 2005: 120). Horses and chariots are shown adjacent to scenes where a fallow deer being chased by a hunting dog and another where a male helmeted hunter is shown carrying a dead deer slung from a pole. The rest of the fresco appears to illustrate men carrying drinking paraphernalia and cooking over tripod cauldrons. The relationship between these different scenes has been interpreted as evidence that, in the Bronze Age period, hunting and feasting went hand-in-hand (Wright 2004: 169).

In terms of landscape, the majority of Ayia Irini's frescoes provide considerable details of the surrounding sea, coast, marsh, plants, rocks, and sky. The one exception is the hunting scene, which is set apart by its barrenness: the dog and deer are painted on a plain background of yellow ochre. Marinatos and Morgan (2005: 120) argue that this juxtaposition represents the remote landscape of the deer hunt, suggesting that it took place away from the settlement and beyond the vision of the eye. The naturalistic style of the deer's representation led Marinatos and Morgan (2005: 121) to speculate further about the season of the hunt. The deer is shown to have a penile brush distinctive of a buck, but the lack of antlers, which today are shed in April, together with the illustration of the animal's spotty summer coat indicates a May-to-October setting. Is it possible that male hunters of the Bronze Age chose the summer months to hunt in the sparse wilderness before returning to feast?

This is certainly the interpretation of Koehl (1986) whose integrated analysis of the highly decorated Chieftain Cup recovered from Agia Triada (Crete) enabled him to speculate that Minoan boys were required to undergo a maturation ritual whereby they spent 2 months hunting in the wilderness before their reintroduction to society as men. On their return the initiated youth would be rewarded with three gifts symbolic of their new warrior status and their induction to the adult world of religion and banqueting: weapons, a sacrificial ox for feasting, and a drinking cup (Barringer 2001: 13). Koehl (1986) argues that the Chieftain Cup represents all three gifts: its decoration showing both the awarding of arms to a young man and the skins of the sacrificed oxen, while the object itself represents the third gift of the drinking vessel. Admittedly, this coming-of-age ritual is not documented until the fourth century BCE, but at this point, it was understood to be a long-standing ritual of Crete (Barringer 2001: 13), and the suggestion is not out of line with the iconographic evidence (Marinatos & Morgan 2005) or that from the zooarchaeological record. By example, Table 1 shows that hunting took place at Agia Triada, where fallow deer are the best-represented cervid and their frequency gradually increases through time, perhaps reflecting population growth following the species' introduction to the island.

Frescoes from Agia Triada suggest that the Bronze Age population viewed fallow deer as something other than just quarry: one fresco fragment appears to depict a woman leading two fallow deer to an altar (Yannouli & Trantalidou 1999: 279). The possibility that more complex relationships with fallow deer gradually began to emerge is perhaps indicated by the zooarchaeological record. Several sites in Anatolia (e.g., Troy I–III), Greece (Kastanas), and Crete (Chania) show high frequencies of fallow deer (Table 1); however, by contrast to the Neolithic and Early Bronze Age assemblages, metrical analysis indicates a more equal male-female ratio (Fig. 3a, b; Harris in press). This shift in hunting strategy may simply be a product of more intensive hunting, but it could equally suggest that across the Aegean, and at approximately the same time, the status and significance of fallow deer were diversifying – no longer was buck-hunting the sole focus of human-dama relationships. Credence is added to this suggestion by the Linear B tablets of Pylos which list different kinds of deer: those that are wild, those that are domestic, and those used in games or for

sacrifices (Yannouli & Trantalidou 1999: 254). The possibility that some deer were being tamed or even maintained in parks (Hamilakis 2003: 344) would have created new kinds of landscapes where people, presumably the elite, could regard deer at close quarters. Indeed, it is possible that emparked deer were used in staged hunts as a demonstration of elite power and authority, as was common in contemporary Anatolia and Mesopotamia (Arbuckle 2012: 217).

The role of deer hunting as an ideological and power-generating resource is widely accepted for Mycenaean societies, where depictions of deer and hunting scenes are amongst the most common themes in iconography (Hamilakis 2003: 243-4; Wright 2004: 160). The themes are very similar to those of Minoan iconography: the frescoes from Mycenaean Pylos (hall 46) are very reminiscent of those from Ayia Irini, again showing men and dogs hunting deer but also carrying tripods for cooking meat (Wright 2004: 160). The idea that hunting and feasting continued to be closely associated and central to elite culture finds support from the zooarchaeological record: several sizeable fallow deer assemblages from Chania (Crete) were recovered from large pits that also contained quantities of dining and drinking vessels, typical of feasting deposits (Table 1; Harris in press).

The zooarchaeological record for Crete suggests that the end of the Bronze Age brought a decline in fallow deer hunting: according to Table 1, *D. d. dama* frequencies drop off through the course of the Iron Age. The only site where they are well represented is Prinas, but here it should be noted that all the specimens came from temple contexts (Wilkins 2003: 86). A similar situation is true for the Iron Age remains from Knossos, which were recovered from the sanctuary of Demeter (Table 1).

Cultic significance may explain why fallow deer persist as a common iconographic motif, Yannouli and Trantalidou's (1999) detailed review demonstrating their continued representation through the Iron Age, Archaic, Classical, and Hellenistic periods. Barringer's (2001) study of hunting in Archaic and Classical Greece also highlights fallow deer as a frequently depicted quarry on Attic vases. She notes a strong association between the themes of hunting and warfare, a connection that apparently intensified around 520–510 BCE when a number of changes occur in both the design and form of the vessels. First, there is a shift in the ceramic forms on which hunting is depicted, the imagery becoming restricted almost exclusively to cups and other drinking paraphernalia typical of the aristocratic male symposium (Barringer 2001: 16). In terms of design, the traditional hunting weapons – spears and tridents – are replaced by depictions of swords, weapons less conducive to hunting but typical of the period's military gear (Barringer 2001: 19). At approximately the same time, illustrations of communal hunts become less frequent, and the hunters appear more heroic in their stance and costumes (Barringer 2001: 32). Depictions of landscape also become more prominent, which Barringer (2001: 18) suggests may have been designed to emphasize the wild location of the hunt. Taking all these changes together, Barringer (2001: 16) argues that they reflect the aristocracy's attempts to deploy the symbolism of hunting and heroism in order to maintain power and social control at precisely the point when both were diminishing with the advent of democracy.

While fallow deer hunting continued to be aligned with masculinity and warfare – a theme reflected in the literature of Xenophon, Aristotle, and Plato (Barringer 2001: 11) – the Archaic and Classical period also saw fallow deer coming to represent women and children. This presumably resulted from the fallow deer's growing association with Artemis, the goddess of hunting, whose identity developed through the syncretism of Anatolian and Greek antecedents (Fischer-Hansen & Poulsen 2009: 12). This well-known connection between fallow deer and Artemis is often expressed artistically from the Archaic periods onwards (Yannouli & Trantalidou 1999: 258), and it is also from this point that votive deposits of dama bones are more common within cultic contexts. For instance, approximately 60 fallow deer astragali were recovered from the Korykeion Antron near Delphi, a cave associated with the cult of nymphs who were thought to

protect children. A further 11 dama astragali were recovered from the Kabireion sanctuary at Thebes, and interestingly, metrical analysis indicates that all are from female individuals (see Fig. 3b). This is an important find suggesting that, by contrast to the buck-hunting of the Neolithic and Early Bronze Age, female deer were specifically targeted, perhaps with these particular rituals in mind.

If not already common in Anatolia, the concept of hunting fallow deer for cultic purposes may have been exported back to the species' homeland during the Hellenistic period. Table 1 shows that exceptionally high frequencies of fallow deer remains were recovered from the Greek phase of Troy (VIII) and, according to Fabiš (2003: 267), the majority came from sanctuary contexts. Again, Fabiš (2003: 274) stresses the links between fallow deer and Artemis, citing examples of iconographic evidence from the region that confirm the association. Given that the cult of Artemis was one of the most popular and widely established in antiquity (Fischer-Hansen & Poulson 2009), it seems plausible that this was the very motivation for the human-assisted spread of fallow deer across the Roman Empire, an issue to which we now turn.

Roman Europe

The association of fallow deer with Artemis, or rather her later incarnation as the Roman goddess Diana, has been explored in depth by not only Yannouli and Trantalidou (1999) but also Reinken (1997). It is clear that the goddess and fallow deer are intimately linked; however, this relationship has actually obscured whether the cult was responsible for the spread of the species. This is because body parts, rather than living deer, appear to have been transported over considerable distances for use in ritual, magic, and medicine. For instance, fallow deer foot bones have been recovered from the Temple of Diana in Augst (Switzerland), and isotopic analyses of shed antlers and foot bones from a variety of north European contexts have returned values that indicate these body parts were imported from the Mediterranean or Anatolia (Madgwick et al. in press). Nevertheless, isotopic studies have also confirmed that the Roman period saw breeding populations of fallow deer established across the western Mediterranean and as far north as England. In the majority of cases and following Neolithic and Bronze Ages practices, the deer were introduced to islands: notably Sicily, the Balearics, and the Isle of Thanet, located in the English Channel (Masseti 2002; Sykes et al. 2011). These sea-bounded areas would have served as natural game reserves, large enough for the deer to roam free and be hunted as "wild" animals, as they were on Rhodes and Crete. Iconographic representations from the famous fourth-century mosaics of Piazza Armerina (Sicily) depict wide-ranging hunts with deer being driven into nets by hunters on horseback (Dunbabin 2004: 146). The villa's *Mosaic of the Small Hunt* combines this imagery with scenes of votive offerings to Diana but also feasting, whereby the hunters picnic on the products of the hunt. According to Dunbabin (2004: 146), hunting scenes emerged as a popular motif from the third century onwards, when the possession of productive estates, hounds, horses, and leisure time were the defining traits of elite identity – hunting serving as the nexus through which all could be communicated.

The Roman period saw, therefore, not only the amalgamation of landownership, status, and hunting but also the use of this tripartite as an important motif in visual culture. It is perhaps no coincidence, then, that the first unambiguous evidence for the establishment of private game parks, known as *vivaria*, also dates to the Roman period (Sykes 2010).

In Italy, there is some suggestion that such a park may have been constructed at the grand villa of Settefinestre, built around 75 BCE near the costal colony of Cosa (Carandini 1985). The villa was set in a large estate that included orchards and a variety of walled gardens, spaces that could certainly have housed the fallow deer whose remains were recovered from the site (Table 1). More definitive evidence for the establishment of game parks is found at another lavish villa, Fishbourne Palace

on the south coast of England. This site has produced the largest collection of *D. d. dama* remains from Roman England, but as Table 1 highlights, their remains are still very rare ($n = 38$). The exotic status of these animals was confirmed through strontium isotope analyses (a geochemical provenancing technique) of the available *D. d. dama* teeth from Fishbourne. This identified the presence of an individual that was imported to the site as a juvenile, perhaps a gift from across the empire; however, another deer was shown to have been born and raised at the palace (Sykes et al. 2006). More recent studies of bone chemistry (carbon and nitrogen isotope analyses) to examine the deer's diet have highlighted that most of the animals likely grazed close to the palace, perhaps within the formal gardens, but others must have been managed in the more "natural" southern garden, an area that gave the deer access to the nearby salt marsh, indicated by exceptionally high nitrogen values (Madgwick et al. in press).

The management of deer within enclosed areas marks a transition in the *dama*-human relationship, to a situation more akin to domestication. The paradoxical nature of parks, landscapes in which wild animals were maintained as domesticates, reveals something of the period's cultural ideology. *Vivaria* represent a landscape-based statement of human dominion over nature, reflecting the mindset of the Romans who saw it as their spiritual duty to bring the wilderness to order (Cartmill 1993: 52). This is a key point which would seem to separate the Roman worldview from that of the preceding Iron Age, when no such concept of dominion existed. Indeed, it would seem that in the Iron Age, the wilderness was viewed a sacred space with cultural taboos placed on the hunting, trapping, and harvesting of all wild resources (Sykes 2010: 23-4).

Why such differences existed between Iron Age and Roman England can, most probably, be linked to inter-period variations in mobility, long-distance trade, and geographical knowledge. By contrast to the Roman period, Iron Age England was parochial and insular, and the areas beyond settlements seemingly represented the unknown outer realm, where votive deposits, sacrifices, and funerary rituals took place (Sykes 2010: 24). Increasing trade with the continent during the Late Iron Age and Roman period, followed by the arrival of new peoples and things, would have blown apart existing geographical knowledge, the "exotic" replacing the wilderness as the new outer realm. It is probably for this reason that, in the Roman period, exotic goods become common votive offerings whereas wild animals appear to lose their sacred status; their remains are found increasingly in domestic food deposits, particularly from elite sites (Sykes 2010: 28).

The hunting culture brought to England by the Romans was not to last however. Withdrawal of the empire in CE 410 and the associated decline in international trade saw a reversion to Iron Age attitudes to hunting and the wilderness.

The Hunting Landscapes of Medieval England

The Early Anglo-Saxon period (fifth–seventh century CE) saw the return of taboos over the exploitation of wild resources with little evidence for hunting (Sykes 2011: 331). This is not to suggest that belief systems were identical to those of the Iron Age, as the avoidance of wild resources may reflect a new perception that the wilderness was a scary, rather than sacred place, inhabited by supernatural beings and monsters such as *Beowulf*'s Grendel. For whatever reason hunting declined, all the evidence, including new genetic data, suggests that fallow deer also went extinct in Anglo-Saxon England (Sykes & Carden 2011).

After a hiatus of several centuries, hunting gradually began to reemerge as a trait of elite male identity (Sykes 2011: 336). Evidence from documents, place names, and the zooarchaeological record indicates that woodland areas were increasingly set aside as private hunting reserves. It is uncertain whether these landscapes were enclosed by ditches or fences, but structures known as *haga* or *hai* were erected to ensnare deer, particularly roe deer, which were driven into them by trained hunting dogs and then dispatched with swords and knives (Sykes 2011: 341).

There is some evidence to suggest that Saxon hunting also took place on horseback (Sykes 2011: 341), although this form of long-distance hunting became common only after the Norman conquest of 1066, when the victorious Normans utilized hunting as an important mechanism for displaying their martial supremacy and control over the defeated Saxon population (Sykes 2007a: 96-7). Zooarchaeological evidence confirms that frequencies of wild animals increase dramatically on elite sites dating to the postconquest period to levels far higher than was seen in the Roman period (Sykes 2007a: 65). Low-status sites demonstrate no such increase, a fact that must be associated with the introduction of new hunting laws and landscapes – forests, chases, and parks – that restricted hunting to the monarchy and aristocracy (Sykes 2007a). Forests were not necessarily densely wooded areas, as might be imagined, but rather legal spaces that were superimposed on top of the existing domestic landscape. Both forests and chases were unenclosed areas where the elite asserted their hunting rights over common waste and land owned by other people. As such, these hunting landscapes were unprecedented; for although landownership and hunting were conflated during the Roman period, this was not in any legal sense – the lower classes were still entitled to hunt. By forcibly restricting hunting to the elite, the Normans overturned the very "chain of being" central to Christian thought, placing the rights of wild animals and their habitats above those of the peasants and their fields, who were relegated down the chain to the lowly level of domestic (Sykes 2007b: 97).

The (re)introduction of parks to England imposed not only legal but also physical barriers to exclude the lower social echelons from hunting. Again, as in the Roman period, fallow deer were directly responsible for the reappearance of this new landscape, as is clear when the frequencies of parks and fallow deer are compared. The Domesday Survey of CE 1086 recorded just over 30 parks in England, but by CE 1300, this number had risen over 3,000; the zooarchaeological representation of fallow deer grew in parallel, Table 1 showing low numbers in the earliest Norman contexts (e.g., 0.8 % from eleventh-century Carisbrooke Castle, Isle of Wight) but large quantities on later medieval sites (e.g., 28 % from fourteenth-century Okehampton Castle, Devon). Current evidence suggests that the inspiration for both parks and the fallow deer that stocked them came from Sicily, another island conquered by the Normans in CE 1060. At this point, Sicily had a preexisting culture of pleasure parks, developed while the island was under Arabic influence (Sykes 2007a: 74, 2007b: 59). It is reasonable to assume that the culture contact between two Norman kingdoms of England and Sicily encouraged the importation of parks and *D. d. dama* to Britain. However, it is important to recognize that the character of the earliest Norman parks would have been very different to those of the later medieval period. For the first few decades after their introduction, fallow deer would have been a great rarity to be observed and admired rather than chased and eaten. Presumably many of the early "parks" actually functioned as menageries, such as Henry I's park at Woodstock (Oxfordshire) that was said to contain all manner of exotic animals gifted by members of the foreign elite as a symbol of political allegiance (Sykes 2007b: 59).

As fallow deer stock grew, so too did the size of some parks, particularly those in royal possession. These large areas could feasibly have supported a hunt on horseback, similar in form to those undertaken in unbounded landscape. That said, the majority of parks were far smaller, typically 100–300 acres, which would have dramatically limited the hunting experience. Many of these small parks were not only too small for full-scale hunting, but they were also of an inadequate size to support their stock: a plethora of medieval records detail the starvation of park deer (Birrell 1992). Lack of available nutrition may account for the significant size reduction seen for medieval fallow deer (compare Fig. 4 with Fig. 3a, b). Alternatively, this could equally reflect genetic change brought about through controlled breeding, as it is in the medieval period that we see the first iconographic evidence for coat-color variation (notably black and white

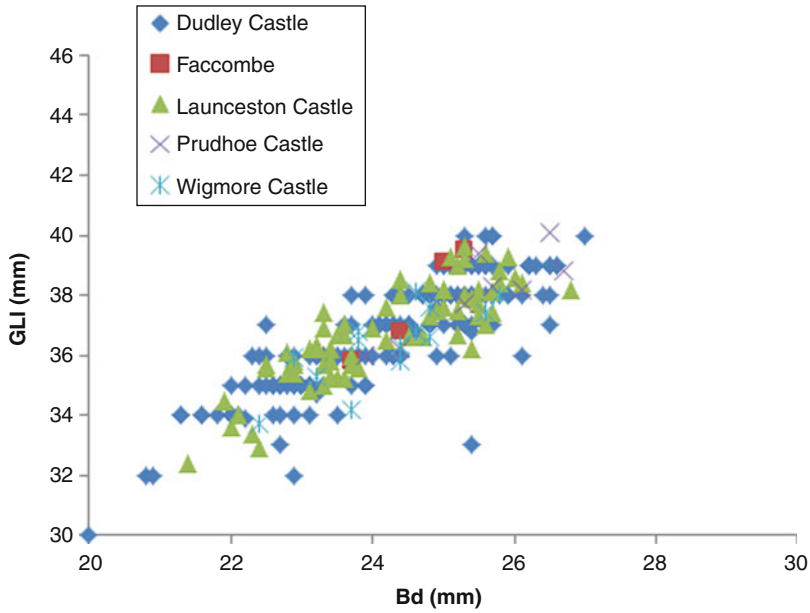

Hunting and Hunting Landscapes, Fig. 4 Plot of astragali measurements – greatest lateral length (*GLl*) against distal breadth (*Bd*) – for fallow deer from medieval England

fallow deer) which is usually a trait of domesticates (Masseti 2002: 140).

The fact that parks were stocked with captive, diminutive, selectively bred fallow deer has raised debate about the purpose and function of parks – were they really arenas for masculine hunting, status symbols of the landed elite, or simply game larders where venison could be stored on the hoof? In all probability parks served to provide all these social and economic purposes; however, increasingly, it is being recognized that parks were important hunting landscapes but for elite women, rather than men (Sykes 2007b: 54).

The level of female involvement in medieval hunting has been the subject of some controversy, with debate surrounding the medieval iconography that depicts women hunting. Some of the images are clearly jokes, ridiculing the idea that women could possibly take center stage in deer hunting, but others appear more realistic. In particular there are a number of manuscript illuminations that show women shooting arrows at deer (Sykes 2007b). Significantly, the cervid depicted in association with women is almost invariably fallow deer, identifiable by their distinctive spotty coat, palmate antlers, and prominent penile "brush." While it is unwise to read medieval images at such a superficial level, it is interesting that women are so clearly associated with the species that was maintained within parks. Irrefutable evidence that parks were female-hunting landscapes can be found in the historical record. For instance, in John Coke's *Debate Between the Heralds* (cited in Cummins 1988: 7), the English herald states:

> we have also small parkes made onely for the pleasure of ladyes and gentylwomen, to shote with the longe bowe, and kyll the sayd beastes.

That parks were hunting spaces for elite women is perhaps unsurprising at a time when hunting was an important part of popular culture but also when courtly societies emphasized the seclusion of young aristocratic women. In order to ensure female chastity and purity, so essential to patrimony, their mobility and visibility were restricted in public arenas – parish churches, banquets, and even travel between households. It is highly unlikely that young women would have been encouraged to hunt in the wider landscape; more probable, it was within the confines of the park that ladies gained an education in hunting without fear of observation (Sykes 2007b: 54).

The situation in medieval England could not be further removed from that of Prehistoric

Anatolia, but the contrast between the two exemplifies how human-animal-landscape interactions offer insights into the cultures under examination.

Discussion and Conclusion

From Epipaleolithic Anatolia, when the concept of "wild" did not exist because it was *all* that existed, to medieval England, where semidomestic deer were housed in equally tame parks, the history of fallow deer and the landscapes in which they were hunted can be viewed as a record of social and cultural change. The journey between these two extremes was not, however, a linear evolution. It has been argued that the dynamics and social significance of hunting are connected to cultural worldview and wider attitudes to nature, which in turn correspond to the ebb and flow of human movement and/or long-distance contact.

It can be no coincidence that periods characterized by insular sedentism – notably the Iron Age and Anglo-Saxon periods of England – indicate an avoidance of wild animals and the "wilderness," with no obvious attempts to control or own elements of the natural world through the movement of exotica or the creation of parks. This contrasts dramatically with those periods characterized by movement, trade, or diaspora – the Epipaleolithic of Anatolia, the Neolithic and Bronze Age of the Aegean, or the Roman and Norman Empires – which are also those characterized by hunting cultures, many of which were responsible for the translocation of fallow deer. In these periods, mental geographies were broad and the wilderness was conceptualized as something to be engaged with, either as a statement of familiarity (e.g., for hunter-gatherers of Okuzini and Karain B) or to emphasize power, authority, and, particularly for the two Empires, control. However, even in periods where the prevailing worldview was one of human dominion over nature, wild animals were not perceived as inferior to people, far from it. The status attributed to hunting derived from the fact that the quarry and the landscape in which they dwelt were unpredictable and would not necessarily yield to an unworthy hunter. That respectfulness was key is reflected by the votive offerings of fallow deer and other wild animals, noted across the Bronze Age and later Aegean as well as the Roman Empire. The association between wild animals and ancient deities, most notably Artemis – goddess of wild animals – is in many respects similar to the "animal masters" of many modern hunter-gatherer groups; indeed, the ancestry of the goddess Artemis can most likely be traced back to the beliefs of Paleolithic hunter-gatherers (see Fischer-Hansen & Poulsen 2009: 12).

Remarkable continuity is apparent in the cross-cultural associations between hunting, masculinity, and warfare. The relationship becomes evident for the first time during the Neolithic and Bronze Age of both Anatolia and the Aegean, but the same concepts are then found recycled in Archaic, Classical, and Hellenistic Greece, reemerging after a hiatus in the later Roman and medieval periods. Contemporary literature and, in particular, iconography highlight that the choice of hunting landscape is an integral part of this association: from the Minoan frescoes of Ayia Irini, through the representation of deer hunting on fifth-century BCE Attic pottery, to the fourth-century mosaics of Piazza Armerina (Sicily), all stress the "wildness" of the hunting landscape, setting it in opposition to, and away from, that of the domestic world. As much as scholars have critiqued the utility of binary oppositions (e.g., male-female, wild-domestic, outside-inside), they appear highly relevant in the context of hunting. Indeed, for Bronze Age and later Greek societies, there is some suggestion that it was only through spending time hunting, away from the domestic world, that boys were transformed into men capable of bearing arms. Here the killing of wild animals is clearly important, but the vital element of this rite of passage is the "outside" setting of the hunting landscape.

Confirmation of these binary oppositions is found by examining the evidence for later medieval England. As soon as fallow deer were enclosed within parks, they were no longer fitting quarry for men who continued to hunt "real" wild

animals (red deer and roe deer) across unbounded forests and chases – there is little medieval iconography depicting aristocratic men hunting fallow deer, and literary references are also scarce (Birrell 1992: 122; Sykes 2007b: 52). Instead, parks with their domestic inhabitants became important hunting landscapes for aristocratic women. Within the confines of the pale, young ladies were able to ape Artemis and Diana, the virginal goddesses with whom fallow deer had become so closely associated.

The link with Artemis, in her various incarnations, seems to have been an important driving force for the diffusion of fallow deer from Anatolia. Paradoxically, however, anthropogenic transportation and emparkment of these deer gradually destroyed the very human-animal-landscape relationship that was initially sought for replication – the wild was tamed and the sacred became secular, a sad fall from grace for such a beautiful and culturally important species.

Cross-References

- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Social Zooarchaeology
- ▶ Zooarchaeology

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Hydraulic Engineering: Geoarchaeology

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Introduction

Water is a fundamental structuring agent in the landscape, but unfortunately, the geoarchaeology of hydraulic installations and their deposits is an under-investigated topic, little mentioned in standard geoarchaeological texts. This entry summarizes key diagnostic features of water extraction and delivery systems, before providing examples of the resultant deposits and soils. In order to fully understand how water supply systems and their associated deposits developed, it is necessary to investigate them through long periods of time, not simply according to the "time slices" that are frequently the norm in academia. We are then able to tackle the long-term history and "evolution" of water systems as well as to relate them to the duration of sedimentary deposits associated with them.

The following approaches contextualize the geoarchaeology of hydraulic engineering:

(a) The geomorphological context which frames the development of irrigation systems. This includes riverine floodplains, alluvial fans, the terrain below or downstream of springs, areas of high water tables, enclosed basins, valley slopes, and so on. Not only does this "framing geoarchaeology" provide the physical context for hydraulic installations, it also supplies the opportunities for communities to develop different types of water supply systems as well as creating hazards that initiate episodic change such as floods, crevasse splays, and avulsions.

(b) The resultant deposits and soils. These include the deposits (or lack of them) which derive from the sediments transported and deposited by various water supply systems. On the one hand, these consist of sediments that clog irrigation systems (but which also deliver nutrients for agriculture), as well as deposits that are deliberately built up to form the medium for cultivation (e.g., terraces and check dams). In addition, deposits include chemical precipitates associated with water supply, particularly carbonate deposits (travertines) and salts.

Because human actions underpin hydraulic engineering works, the nature of these actions and the associated social processes must be considered as well. By no means all hydraulic works are planned or deliberately engineered; many remarkably large systems began as small-scale systems and then were increased in size by gradual additions (Denevan 2001: 148), in which case it would have been necessary to increase the flow capacity.

Two broad levels of organizational scale are recognizable:

1. Those systems that show evidence for "bottom-up" development and which grew incrementally as a result of the actions of communities who built on preexisting natural circumstances to form initially small-scale systems. These organic systems can be argued to develop by way of niche construction as argued by evolutionary biologists and anthropologists (see below).
2. On the other hand top-down management tends to be associated with systems that are

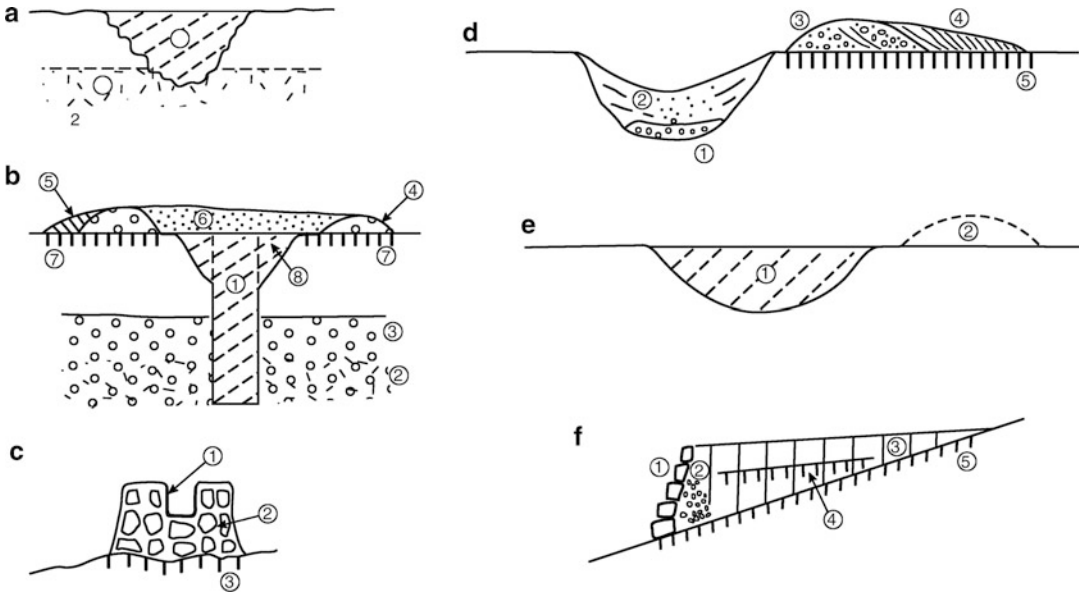

Hydraulic Engineering: Geoarchaeology, Fig. 1 Schematic sections of various types of water installation in the Middle East: (**a**) water hole, (*1*) fill, (*2*) water table (chemically reduced soil); (**b**) well, (*1*) fill within shaft, (*2*) water table within gravel (chemically reduced), (*3*) gravel, (*4*) initial gravel upcast, (*5*) clean out silts, (*6*) wind-blown sand, (*7*) buried soil, (*8*) cone of collapse; (**c**) masonry open channel, (*1*) waterproof plaster, (*2*) masonry with large cobbles, (*3*) buried soil; (**d**) earthen canal with spoil banks, (*1*) sand and gravel channel fill, (*2*) subsequent fills, (*3*) primary spoil from initial excavation, (*4*) secondary silt from cleaning out, (*5*) buried soil; (**e**) canal with spoil banks deflated, (*1*) fill, (*2*) location of deflated spoil banks; (**f**) terraced field, (*1*) terrace wall, (*2*) wedge of stones for subsoil drainage, (*3*) accumulated terrace deposits, (*4*) weak palaeosol, (*5*) pre-terrace palaeosol (Modified from Wilkinson 2003: Fig. 4.1)

larger in scale but were not necessarily developed in one operation. They were often planned and "engineered" and their administration was partially controlled by a king or imperial ruler. Nevertheless, there is no direct relationship between authority, state formation, and the scale of irrigation systems. However, in the Middle East, with the expansion of the later empires, dating from the rise of the Assyrians around 1000 BCE, we see the proliferation of large-scale and frequently engineered systems that represent classic examples of top-down systems.

Definition

This entry primarily focuses upon water supply features: canals and other water channels, dams, terrace walls, wells, and reservoirs as well as their associated deposits and soils. Before describing these, however, it is necessary to define the geoarchaeological signatures of the features themselves as well as their state of survival in the landscape.

Diagnostic Features of Canals and Water Supply Systems

Fig. 1 shows some basic water supply features in the Middle East together with their associated deposits. Although the functional part of such installations is frequently the void, either the canal that conducted the water flow or the well or qanat shaft that accessed the water table, the upcast deposits are frequently the most informative deposits, especially when sampling schemes need to be designed (Fish 1994: 57-61). Residual deposits were often dumped in sequence according to the history of excavation. Consequently those soils removed first were dumped initially upon a buried soil and were then followed by the products of the different geological strata encountered

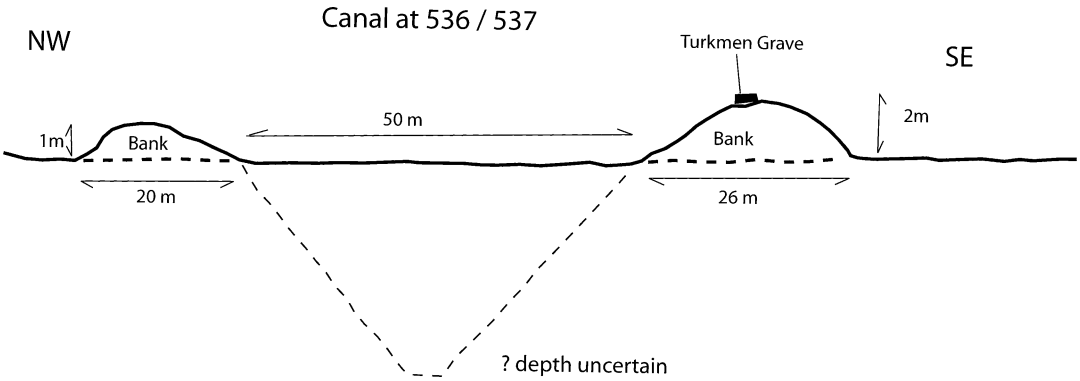

Hydraulic Engineering: Geoarchaeology, Fig. 2 Sketch section of a canal in NE Iran showing how the depth of the canal influences the scale of the canal cross section

as the feature was dug to deeper levels. Finally, in the case of canals that transported a significant sediment load, the primary deposits were followed by secondary accumulations of silt, clay, and organic materials cleaned out of the canal itself. Very similar types of sequences can be recognized in both Old and New World canal deposits (Fish 1994: Fig. 3.2; Wilkinson 2003: 49).

Remote sensing methods are an indispensible tool for the geoarchaeological analysis of hydraulic systems especially for the recognition of canal spoil banks. Satellite remote sensing is becoming increasingly useful as high-resolution and multispectral images are becoming more cost-effective and archive images such as those of the CORONA series dating from the 1960s and 1970s become available. In addition, Shuttle Radar Topographic Mission (SRTM) data have been used to graphically illustrate a range of water supply networks including levees of canals and river channels that bifurcate across the seemingly flat plains of southern Mesopotamia.

A major challenge presented by early hydraulic networks is how to establish their date of use. Channel floor deposits can be of help, especially if they contain molluscs, bones, or charcoal that can be dated radiometrically, but because canals are frequently cleaned out, the channel deposits might only be the latest members in a long history of use (Purdue et al. 2010).

In lowlands, canals can form the most imposing features in the landscape, but their sheer scale can give a misleading impression of the size of the actual canal contained between the spoil banks. This is illustrated by a sketch section across a canal in NE Iran (Fig. 2). The 50 m wide canal trace gives the impression that the canal itself was equally large. However, because we know that in the area in question the water supply (the Gorgan River) was some 10–12 m below ground level, it is clear that a large quantity of upcast would have been created to enable the canal to attain the water source at river level. In other words, the scale of the upcast is a product of the dimensions of the canal channel *and* the depth of the water source. In the case of this particular canal (Fig. 2), the volume of upcast and the width of the canal at the surface diminished downstream as the canal channel approached the ground surface in the vicinity of the fields.

An important contextual feature of canals, dams, reservoirs, cisterns, and tanks is the presence of associated and functionally related installations such as kilns for the burning of lime used in the manufacture of cements and plasters. Not only are kilns of intrinsic technological interest, they also provide valuable materials in the form of charcoal or fired bricks that can be dated, by radiocarbon, OSL (Optically Stimulated Luminescence), or thermoluminescence. Such associational dates can be exceedingly valuable because they provide a date estimate for the initial phase of construction of the hydraulic feature or at least the first use of plaster and cement.

Hydraulic Engineering: Geoarchaeology, Fig. 3 Canal trace at Pamukkale Turkey showing thick accumulations of calcium carbonate

In addition to being recognized by their upcast deposits, some canals are evident as fossilized traces, the best examples being those of the Tehuacán Valley of Mexico which were fed by calcium carbonate-enriched spring waters. As a result of their resistance to erosion, these "travertine encrusted" canals stand up to 2 m above the surrounding ground surface (Doolittle 1990: 58-59). In the Middle East a remarkable series of such travertine encrusted canals, probably of Byzantine date, occur near Pamukkale in Turkey (Fig. 3). Although such features are not common, when they do occur, they can then be dated by Uranium series or radiocarbon methods.

The Geoarchaeology of Preservation

As a result of their location near to water courses, especially major rivers, engineered hydraulic systems are vulnerable to destruction or burial.

Canals that take their flow from fluvially dynamic rivers such as the Gorgan River in NE Iran (Fig. 4) are particularly vulnerable to riverine erosion, and the assessment of the relative completeness of canals and conduits is a major challenge for geoarchaeologists. In fact, in the Middle East complete water supply systems are relatively scarce, one of the rare examples known to the writer being the Abbasid period (c. ninth century CE) open channel *falaj* at Arja in northern Oman. This shows the complete sequence from the water capture area within a perennial wadi, the transport section downstream, as well as the irrigated fields and even a water mill (Wilkinson 2003: Fig. 9.12). In contrast, most water supply conduits leading to early Islamic Siraf on the Iranian coast have been expunged by the erosive rivers that surge down from the neighboring Zagros Mountains.

Despite their vulnerability to erosion, if water systems were constructed in relatively stable arid landscapes, specific installations can remain for long periods. Particular good examples are the water installations in the Wadi Ghuweir in the Jordanian desert where the combination of geomorphological stability and the absence of subsequent phases of cultural activity has left these PPNB water-gathering bunds relatively intact over some 10,000 years (Fujii 2011).

Historical Background

Geoarchaeological studies of ancient irrigation deposits extend back well before the term geoarchaeology was coined. For example, the classic studies of southern Arabian irrigated landscapes by Caton-Thompson and Gardner (1939) and Bowen (1958) provided a firm foundation for later studies. For Mesopotamia, the volume *Soils and Soil Conditions in Iraq* by the Dutch soil

Hydraulic Engineering: Geoarchaeology, Fig. 4 CORONA image of the same canal system as illustrated in Fig. 2. Note the spoil banks to north and south and the large chunks of canal eroded by the meandering Gorgan River (CORONA image courtesy of US Geological Survey)

scientist, Peter Buringh (1960), went well beyond the cover title to provide insights into irrigated agriculture and the physical and cultural landscape which remain relevant today. Particularly important for an understanding of anthropomorphic soils of Central Asia are Soviet-era studies which were being published as early as the 1930s (Kovda & Lobova 1968). These monographs are not simply of historical interest, rather they demonstrate how thorough empirical studies of soil archives can provide significant insights into the long-term development of anthropomorphic soils. In the New World, although studies of early terraced fields extend back to the article by Cook published in the National Geographic in 1916, geoarchaeological studies of hydraulic landscapes and their deposits really picked up speed from around 1961 (Denevan 2001: 4-9).

Key Issues

Whereas, geoarchaeology conventionally concerns itself with geological applications to archaeological questions, the analysis of ancient hydraulic installations necessitates the inclusion of human agencies and community actions. Specifically, the management and development of water supply systems relates to the scale of the communities using or administering the systems, which, in turn, influences the scale of the installations as well as their deposits (although not necessarily in a linear way). In contrast to the earlier models of Wittfogel which see major hydraulic schemes as being a driving force behind early state development, many archaeologists now consider small-scale actions by household size groups to be fundamental to hydraulic and other landscapes (Erickson 2006). This bottom-up perspective may encompass concepts such as "human niche construction" which provide a useful way of viewing the development of early small-scale water management systems.

This set of concepts, which developed out of evolutionary biology, incorporates the capacity of organisms including humans to modify their environment (e.g., via irrigation systems in Bali) in such a way as to influence their own evolution (Lansing & Fox 2011). This is illustrated for southern Mesopotamia where Buringh (1960) has suggested that by taking advantage of breaks in the banks of river levees, prehistoric communities manipulated the overflow waters that created crevasse splays so as to provide water for small irrigated gardens. These small-scale

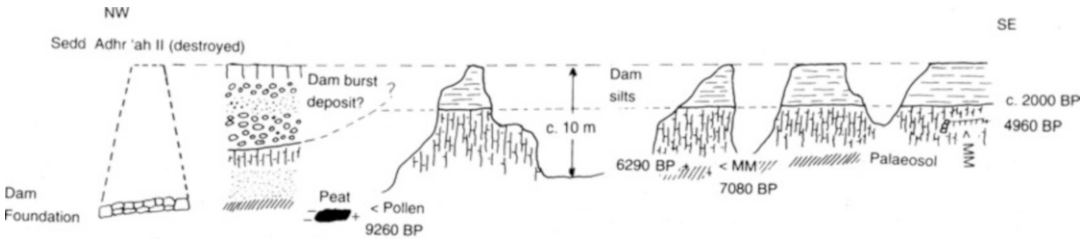

Hydraulic Engineering: Geoarchaeology, Fig. 5 Long section through a deep sequence of mainly anthropogenic fills and soils. Sedd Adhra 'ah, Yemen

channels and patches became scaled up to eventually form much larger patterns of "herring-bone" irrigation canals capable of supporting much larger populations than the original riverine environment.

Similarly, the point where rivers flowed out of mountains to preferentially deposit their sediments upon alluvial fans provided an ideal location for early prehistoric settlement. However, such situations, as described by the prehistorian Andrew Sherratt, could also result in the burial of both irrigated fields and associated occupation sites. Consequently, where human settlements developed in locations ideal for both irrigation and sedimentation, the landscapes can be referred to as "self-consuming."

In the Middle East, the growth of archaeological sites in areas of coalescing alluvial fans has probably severely retarded our understanding of the development of early irrigation settlements and such sites are relatively scarce. However, at Dar Khazineh and related sites in Khuzestan, SW Iran, small Late Susiana sites (c. 4800–4300 BCE) have been unveiled by intensive gully erosion from beneath a thick stratum of overlying sediments washed from the Zagros foothills. These investigations suggest that an unknown number of small agro-pastoral sites probably reliant on flood-recession cultivation lie buried within this sedimentary cover (Alizadeh et al. 2004).

Alternatively, where Hohokam settlements (CE 300 and 1500) developed on the alluvial piedmont zone (*bajadas*) of the Tucson basin of Arizona, they are much more visible. These sites, which occur at "gully-mouth fans" on *bajadas*, occur in analogous locations to Ak-Chin settlements farmed by historic Hopi communities (Waters 1992: 171-75). But because the Hohokam farmers located their settlements in areas suited to floodwater farming, their settlements also became buried as the gullies shifted position. In other words, in very different parts of the world and at different dates, very similar locations were selected for settlement and agriculture. However, the preservation of much larger numbers of Hohokam settlements in the SW USA has major implications for the development and demography of prehistoric settlement elsewhere. The comparative study of settlement in self-consuming landscapes is therefore an important priority for geoarchaeological research.

In the Yemeni highlands, where mountain valleys exhibited hundreds of walls and other built structures designed to intercept, redirect, and collect water downstream, long-term aggradation has been amplified by such programs of sediment interventions. For example, at Sedd Adhra 'ah, near Dhamar, some 6 m of anthropogenic sediments have buried a small check dam (dated by C-14 to c. 3000 BCE) and were later followed by sediments accumulated behind a major relict dam some 1,500–2,000 years old (Figs. 5 and 6). This sequence demonstrates how small-scale features eventually "scale up" to be succeeded by larger hydraulic features that reinforce earlier patterns of aggradation as well as how the cultural and sedimentary records coevolve in such deeply cultured landscapes (Wilkinson 2003).

On the other hand, engineered systems, often but not necessarily constructed by state-level rulers, can result in the construction of large-scale canal networks such as the Sasanian Nahrawan canal (Iraq: Adams 1965) or the Chicama-Moche

Hydraulic Engineering: Geoarchaeology, Fig. 6 Detail of the valley floor check dam at the SE end of the Sedd Adhra 'ah sequence being cleaned for soil micromorphological samples

inter-valley canal, constructed by the Chimú state (Peru: Denevan 2001: 152-57). Similarly, their deposits can be large in scale as well: for example, the cross profile of the Nahrawan canal is evident on SRTM topographic images (Hritz 2010). However, in this case radar images distinguish several features: a broad levee perhaps of a preexisting river, which appears to have been taken advantage of by the canal engineers to form the foundation for the canal; a second more modest levee resulting from the canal itself; and third smaller distribution canals. Such top-down systems appear to be more amenable for satellite image analysis than those of smaller scale.

Where such large-scale canal networks derived their water from sediment-rich rivers, they create irrigated soils and associated deposits that blanketed virtually the entire landscape. These accumulations are well defined on soil maps, such as the FAO soil map of Khuzestan, Iran, where the surveyors distinguished between landscapes with "thick," "thin," or "absent" irrigation cover. Such maps are of immense value in identifying areas where archaeological sites may be obscured from view or as a starting point for geoarchaeological investigations.

Sediments and Soils Derived from Riverine Irrigation

Engineered hydraulic systems, be they large or small scale, play a fundamental role in sediment delivery, specifically by acting as huge sediment traps. However, the amount of sediment trapped depends upon catchment geology, land cover, and vegetation, as well as the nature of the water source. Whereas runoff systems or canals supplied by turbid rivers can be associated with significant long-term aggradation, hydraulic systems fed by springs or groundwater exhibit low sediment loads and limited aggradation but can be associated with significant amounts of chemical precipitates.

Irrigation-induced sedimentation is well known from southern Arabia with Marib (Yemen) supplying the best example. There, highly turbid waters diverted from the seasonal floods (*sayl*) of Wadi Dhanah by the first millennium BCE Marib Dam have created accumulations of up to 30 m of irrigation silts which extend over between 8,000 and 9,600 ha (Hehmeyer 1989). These deposits, which accumulated between 2000 BCE and 1000 CE, provide sedimentary archives containing evidence for the associated land use, including root casts of plants (probably date palms), circular impressions of bowls of fruit trees, as well as casts of fine root hairs of garden crops, cereals, and fodder plants (Hehmeyer 1989: 41). A characteristic feature of these irrigation silts is their distinctive rectilinear gullies eroded along less-resistant sand-filled irrigation channels which define the pattern of relict fields (Fig. 7).

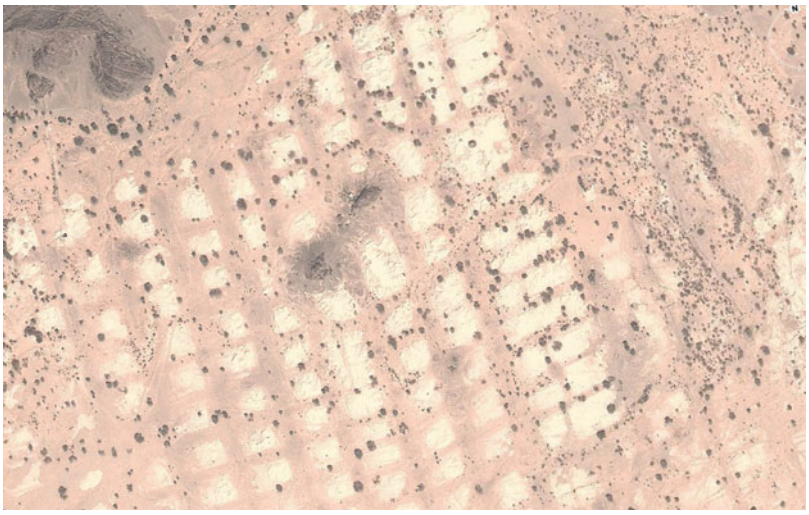

Hydraulic Engineering: Geoarchaeology, Fig. 7 Rectilinear erosion defining canals and field plots in Yemen (Courtesy of Google Earth). The east–west extent of the fields is roughly 700 m (north to top), and each rectangular parcel measures c. 50 m east–west × 35–40 m north–south. *Dark masses* are outcrops of igneous rock

Even more extensive spreads of relict irrigated soils cover most of the Mesopotamian plains in southern Iraq, but lacking the rectilinear erosion patterns, these are much more difficult to recognize. These riverine cultural landscapes form a complex mosaic of river/canal levees, levee slopes, and intervening flood basins or intermittent marshes (Buringh 1960).

Altogether, southern Mesopotamian landscapes result from both cultural and physical processes, which contribute to the coevolution of human practices of irrigation in association with anastomising river networks. So intimate is the connection between the human and physical systems that many Mesopotamian low sinuosity "rivers" are indistinguishable from canals (indeed the Sumerian language fails to make this distinction). Moreover, despite the extremely low gradient terrain, the distribution of irrigation water is made possible by directing water down levee slope canals that derive their water from the levee crest channel. Such levee slope canals, being steeper, are better for distributing irrigation waters than the gentle longitudinal gradients of the plains. Ironically, levee aggradation within this coevolutionary cultural landscape appears to have made irrigation much more sustainable in the long term.

Like their counterparts in central Asia, both the South Arabian and Mesopotamian landscapes reflect complex interactions between riverine, cultural, and aeolian processes. In southern Arabia, both lowland and highland soils have received long-term additions of aeolian silt, but in the immediate vicinity of eroded fields, sand dunes predominate as a result of the erosion of the silt beds. On the other hand in southern Iraq, aeolian dunes are composed of silt/clay aggregates (*parna*), as well as fragments of mollusc shells and small fragments of pottery and burned brick. The geoarchaeological cycle in these decidedly cultural landscapes is not simply one of progressive aggradation. Instead, aggradation appears best developed where irrigation with turbid waters resulted in a steady input of sediment. However, where or whenever such input of water and sediment ceased, the landscape became desiccated resulting in a renewed cycle of aeolian degradation. Consequently, whereas parts of the landscape aggraded, other parts experienced aeolian degradation thereby resulting in a complex vertical or horizontal patterns of accumulation (Wilkinson 2003: 80-85). In addition, salts, ultimately derived from the irrigation waters, accumulate within the sediments and seriously depress crop yields especially in lower, less well-drained terrain.

Similar deep accumulations of irrigated soils occur in South America, Central Asia, and China. In Peru, the Palpa Valley in the hyperarid coastal desert received irrigation water from sediment-laden rivers over some 3,500 years (Hesse & Baade 2009). The 4 m accumulation of

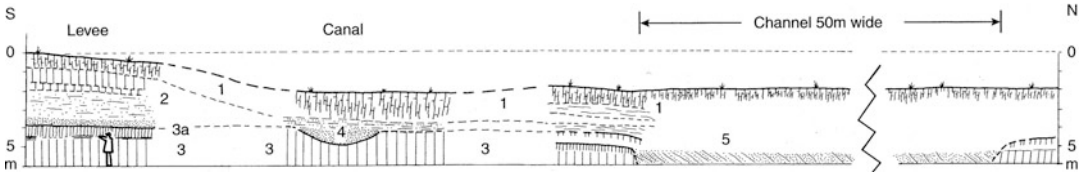

Hydraulic Engineering: Geoarchaeology, Fig. 8 Section through a Mesopotamian levee showing levee deposits (*2*) overlain by a late (Sasanian–Islamic) irrigated soil (*1*). The pre-4000 BCE palaeosol (*3*) leads up to a water channel of similar date (*5*) (From Wilkinson 2003: Fig. 5.4b)

fine-grained irrigation deposits contain well-defined irragric anthrosols defined by the following characteristics: (1) absence of bedding or laminations; (2) common presence of artifacts or charcoal; (3) high loss on ignition, poor sorting, and high clay to silt ratios; and (4) presence of clods from agricultural turbation. These characteristics are similar to equivalent horizons in southern Mesopotamia, where irrigated soils not only blanket the entire terrain (Fig. 8) but are recognizable by their prismatic soil structure, gray-brown color, and inclusions such as broken shell fragments and artifacts.

Gorbunov's classic descriptions of irrigated soils of Central Asia demonstrate that natural soils were transformed by three main processes: (1) eluviation as a result of additions of water, (2) formation of a new "agro-irrigational" soil horizon by the intake of suspended particles and dissolved substances contained in the water, and (3) increased biological activity within the soil because of cultivated crops and farming practices (Gorbunov 1968: 35). These processes, operating over centuries or even millennia, resulted in the incremental accumulation of distinctive irrigation horizons which also included earthy materials from canal deposits, old mud brick materials, as well as potsherds, small fragments of burnt brick, charcoal, and bones. Such horizons have been reported from the ancient oases of Khwarizm, Bukhara, Samarkand, and Murgab (Gorbunov 1968: 39). Owing to the variety of natural environments encountered in central Asia, no single type of soil resulted from such anthropogenic processes; hence, they were classified into a number of types which include meadow oasis soils, takyr oasis soils, serozem oasis soils, and so on (Gorbunov 1968: 43).

The Geoarchaeology of Runoff Agriculture

Investigations of runoff agriculture have resulted in a number of classic hydrological and geoarchaeological studies (e.g., Bruins 1986). Runoff agriculture can also be argued to have developed as a result of "niche construction" because it builds upon an elemental model that occurs in nature (the source–sink model). This model perceives desert land surfaces as comprising a mosaic of patches, some of which shed water and others which receive the water that is shed (Wilkinson 2003: 154-155, with references). Water accumulated in the sinks promotes denser vegetation, increases litter, and raises organic matter, which, in turn, can reduce runoff. Ancient communities scaled this process up, so that the water shedding and receiving areas became larger. The end product of this source–sink model includes the water supply cisterns of Islamic Arabia as well as the runoff systems of the Negev and southern Arabia (Wilkinson 2003: 154-55). This process of scaling up from small-scale features with small runoff areas to much larger contributory basins results in a continuum of features ranging from rain-fed terraces to the largest-scale diversion dams with catchment to field ratios in excess of 1:100. Because runoff and run-on areas are functionally and intimately connected, they form examples of geoarchaeological anthrosols or anthropic sediments in which physical and cultural factors are again intertwined.

Agricultural Terraces

Agricultural terraces, which belong to the lower end of the runoff spectrum, can result from the accumulation of colluvial deposits on hillslopes as a result of localized runoff,

although some are engineered, planned, and built up by soil introduced from elsewhere. However, they are generally a product of the efforts of thousands of households who constructed vast numbers of walls to accumulate and thicken the soil to grow crops, a system of intensification often known as *landesque* capital (Erickson 2006). Whereas most examples of terraced fields in the Middle East were constructed in relatively moist regions where rainfall exceeded 400 mm per annum, in South America they tend to be built in semiarid regions and therefore required irrigation to maintain crop growth (Denevan 2001: 173). As with irrigation sediments, such accumulations behind terrace walls provide a rich archive of sedimentary history and soil formation (Fish 1994: Fig. 3.1). The complexities of terrace classification and construction are beyond the scope of this entry, but overall, terraced fields provide thicker soil horizons capable of holding more moisture and providing greater rooting depth. Although they play a role in soil conservation, this is probably a secondary effect.

Illustrative of the role of terrace accumulations in soil improvement are the terraces of the Peruvian Andes. In the Colca Valley terrace soils differ significantly from their non-terraced counterparts (Denevan 2001: 192-93): A horizons are thicker and phosphorous, nitrogen, and organic carbon levels are higher, as are earthworm activity, friability, and water capacity. These differences result from centuries, or more than a millennium, of agrarian use which includes the application of fertilizers, manure, hearth ash, garbage, and crop residues (Denevan 2001: 193; Sandor & Eash 1995).

Terraced fields and associated soils represent a fragile resource, in part because they must be maintained by a large, industrious population. Any change to this demographic, or perhaps to the climate or cultivation techniques, can destabilize the system so that the accumulated soils become gullied, terrace walls eroded, and the landscape fabric weakened (Pietsch & Mabit 2012). One outcome of terrace degradation is that more sediment is delivered to valley floors and drainage channels thereby contributing to the development of valley fills (Butzer 1982).

The Geoarchaeology of Drained Landscapes

Hydraulic engineering is not only limited to water supply, it has also played a crucial role in the drainage of both coastal and interior wetlands, especially in NW Europe. Although the Fenlands of eastern England were probably not drained during the Roman period (Rippon 2000: 76), examples of Roman drainage and associated sediments come from the coastal lowlands along the Severn Estuary, UK. This top-down and piecemeal land management and drainage system, together with its geoarchaeological archive, shows wide-ranging evidence for sedimentary structures and soil drainage in the form of "ripening" (Allen & Fulford 1986).

Paddy Soils

Rather than being a specific soil type, the term "paddy" refers to the land use associated with the growing of wet rice. Nevertheless, the associated soils have a long history extending back to the Chinese Neolithic c. 6000 BP. For example, at Chuodon in the Yangtze river, valley fields were associated with paddy soils, ridged boundaries, and irrigation ditches. Phytolith and soils analyses demonstrate that the Neolithic paddy soils exhibited increased organic carbon, total N, P, and S, all of which were higher than peat or moss of the same age (Lu et al. 2006).

As with many Asian soils which experienced agricultural intensification, paddy soils and their staple crop of rice underpinned agricultural and population expansion, first with the development of gley soils on the lowlands and later on to sandy soils and Pleistocene terraces (Barnes 2010: 330-31). However, according to estimates of future sea level rise, the "rice basket" of the Japanese coastal plains is at risk of being diminished if not lost, thereby forcing agriculture on to higher slopes and terraces. Along with other examples of intensively

cultivated hydraulic soils, paddy soils have played, and continue to play, a crucial role in provisioning and sustaining human communities.

International Perspectives

Despite the high-quality research conducted by Soviet-era and other soil scientists during the early twentieth century, the later part of the century witnessed only sporadic investigations of irrigated anthrosols. This was despite the fact that the term geoarchaeology was coined at this time. Nevertheless, a recent upsurge in research on anthrosols of various types promises to improve matters, because as the examples from Japan and China illustrate, a wide range of soils developed under intensive cultivation are under investigation. Unfortunately the irrigated soils of southern Arabia and Iraq together with associated terrace soils have benefitted from only sporadic geoarchaeological investigations. In contrast, equivalent features in Latin America have received significant and growing attention; therefore, just as the anthrosols of the Amazon basin have garnered justified interest, we should now expect to see increased research on irrigated and other anthropogenic soils.

Future Directions

The geoarchaeology of hydraulic structures and associated soils and sediments should be a major priority not only for their intrinsic interest but also because of the understanding they contribute to sustainable agriculture. Of course, limited access to soil resources in conflict-ridden countries such as Yemen and Iraq will probably continue to inhibit research. Moreover, assessment of the associated landscapes is inhibited because agricultural activities over the last 40–50 years (or more) have expunged many diagnostic features such as canals and scrambled the associated soils so that they are less recognizable than hitherto. Nevertheless, the existence of high-resolution satellite images of the CORONA program dating from the 1960s and 1970s provides a record of what has been lost. Consequently more use should be made of integrated programs of landscape assessment that combine satellite imagery with fieldwork down to the scale of soil micromorphology.

Dating techniques such as AMS radiocarbon dating and OSL should continue to be important, and the latter technique, still underused, promises to contribute increasingly to the dating of sedimentary sequences. As is evident from studies such as Hesse and Baade (2009) and Sandor and Eash (1995), "conventional" techniques of soil analysis continue to yield important results and demonstrate that irrigated and anthropogenic soils have played a key role in the rise and sustenance of early states.

Because the landscape archaeology of ancient water management has been rather neglected (but see the journals *Water History* and *Geoarchaeology*), the framework of hydraulic engineering and the geoarchaeological context has also been under-investigated. Nevertheless, the situation is changing rapidly, and this topic should be much more thoroughly understood and appreciated in future. Finally, it is crucial to appreciate that the soils described here result from the coevolution of humans with their "natural" environment. Consequently concepts such as human niche construction need to be harnessed in order to bring a theoretical perspective to what continues to be a very empirical field of investigation.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Geoarchaeology

▶ Landscape Archaeology
▶ Paddy Soils: Environmental Analyses
▶ Rivers: Environmental Archaeology

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Hypothesis Testing in Archaeological Theory

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Introduction

In 1962 there was a "revolution" or paradigm shift in American archaeology, which became known as new or processual archaeology. At the forefront was Lewis Binford, closely followed by his colleagues and students, particularly Sally Binford, James N. Hill, William Longacre, Kent Flannery, Patty Jo Watson, Steven LeBlanc, Charles Redman, and others. Their works became classics, including James N. Hill's seminal article on Broken K Pueblo (1968). The five major tenets of this novel approach, especially in contrast to traditional or "old" archaeology, are the following: (1) the questions archaeologists ask – how and why in addition to what, when, and where, that is, the study of cultural process in addition to culture histories; (2) the theories used to explain past lifeways (vs. a list of traits that represent beliefs, ideas, and societal norms), especially cultural ecology and the assumption that culture is the extrasomatic means of adaptation; (3) use of the scientific method – that is, testing hypotheses with independent data; (4) the assumption that variation and change are perceived as representing adaptations to changing environmental conditions vs. the traditional view of innovation and diffusion; and (5) going beyond detailing stratigraphy, classifying artifacts, dating and emphasizing norms at the expense of explaining variability, and using regional survey, systematic excavations, sampling, statistics, etc. This entry focuses on the third tenet, the scientific method, specifically hypothesis testing, and by doing so highlights how it can be used apart from new or processual archaeology for its own sake since it can strengthen any approach or theoretical explorations of past societies.

Definition

Theory is a broad level of explanation (e.g., theories about evolution). Middle-range theory, another concept coined by Binford, is the step-by-step process and justifications of a research design that connect data and theory to avoid leaps of logic. Method is the strategy used to explicate and support a theory, and one such means is the hypothesis testing method composed of "if… then…" statements, arguments of relevance, and test implications. For example, if Structure X served as a kitchen, then we should find evidence for cooking, storage, and serving activities. The argument of relevance is that throughout the world, people cook, store, and serve food in kitchens. Test implications include finding an oven or hearth, wide-orifice jars or containers used for cooking (burned on bottom, carbonized remains inside vessels) and storage (no burning), nonporous narrow-orifice jars or pitchers used for storing and pouring liquids, possible ladles and other stirring and serving implements, and bowls, dishes, and plates for serving the prepared foods.

By following this step-by-step procedure, others can replicate methods and come to the same results; in this case, that Structure X did or did not serve as a kitchen. How archaeologists explain the place of Structure X in their interpretative framework varies depending on their interests, research problem, and/or theoretical leanings.

Archaeologists generate hypotheses or expectations often through using ethnographic analogy; for example, we use bowls to contain hot or cold liquid comestibles such as soup, ice cream, punch, cereal with milk, and so on. This deductive reasoning stands in contrast to inductive reasoning, whereby one collects data, somewhat indiscriminately, and generates conclusions (i.e., inductive inferences; Hempel 1966: 10-11) once data are classified. That said,

inductive reasoning can make deductive reasoning easier since some conclusions in turn become hypotheses; after all, patterns often are revealed while one counts and classifies data. Deductive reasoning takes ideas to the next level by generating questions and testable hypotheses that are tailored to support or disprove the patterns in the data or generated from external ideas via the ethnographic record, ethnoarchaeology, experimental archaeology, current practices, and even Eureka moments. Hypotheses are set up in such a way to be supported (rather than proven) or disproven; in other words, they are falsifiable. In addition, hypotheses can always be supplanted by better ones as methods and techniques improve and ideas advance. It is a way to verify, or not, ideas that are generated to support or explain broader research questions.

A further way to strengthen theories or arguments is through generating and testing multiple or alternative hypotheses, which serves two major purposes: (1) shows peers that one is not invested solely in one idea; and (2) the hypotheses may turn out to explain different aspects of the research question or problem. Then of course there is the null hypothesis, which is a hypothesis completely opposite of what is actually expected, which only supports the main hypothesis if it is disproven. Alternative hypotheses also prevent biases and the collection of data that promotes one idea over another, not to mention promoting thoroughness (Chamberlin 1965[1890]). For example, using the kitchen hypothesis above, a null hypothesis would go something like this: if Structure X did not serve as a kitchen, then we would expect to find non-kitchen items (ritual objects, sleeping areas, public iconography, etc.). Alternative hypotheses could be, for example, the following: (1) if Structure X served as a storage room, then we would expect to find storage containers and no windows; (2) if Structure X served as a religious building, then we would expect to find ceremonial and religious paraphernalia (e.g., altar, incense burners), iconography, and seating; and (3) if Structure X served as a residence, then we would expect to find diverse ceramic/container types, sleeping, living, and cooking areas/furniture and utensils, etc.

No matter which hypothesis is supported (or refuted), one still has to explain it since data reflect human behavior and archaeologists are asking basically humanistic questions (Praetzellis 2000). For example, in a study on assessing ceramic variability in ancient Maya hinterland households to assess wealth and status (Lucero 2001), one of the original hypotheses was that elite residences should have larger and a greater number of vessels reflecting larger households consisting of family and nonfamily members. However, some of the smaller, commoner, houses had more vessels (though not necessarily larger vessels). This unexpected finding was explained by the fact that some commoner residences house more people to pool their labor and resources (this inference would have served as an excellent alternative hypothesis as well).

Using the hypothesis testing method prevents the collection of data just for the sake of collecting data; it requires scholars to start with a problem and devise hypotheses to address the problem, which in turn structures the type of relevant data to collect and process.

Historical Background

Walter W. Taylor in his 1948 *A Study of Archaeology* critiqued traditional archaeology (1983[1948]), and rather than leave it at that, he suggested that archaeologists should take a "conjunctive approach" that combined the best of archaeology and anthropology. While he focused on American archaeology, the implications were international. He called for a well-rounded interdisciplinary approach to reveal past lifeways, including focusing on settlement patterns; subsistence; social, religious, and political organization; and diet through rigorous excavation and recording techniques. It was only through taking such an approach that archaeologists could present a fuller picture of past societies. Taylor's call to arms was not taken up until the 1960s with the advent of new archaeology advocated by Lewis Binford and his intellectual entourage.

In 1962, Lewis Binford published his now classic article, "Archaeology as Anthropology," in which he details the goals of what soon would be referred to as new archaeology. Archaeology's goal should not be to compile data just for the sake of compiling data without a framework to guide collecting strategies. Past societies are not comprised of artifact lists; rather, artifacts are the remnants of once-living people who no longer have a voice. Artifacts are not history; they reflect the behaviors of the people who made them, which in turn reflects how people/society adapted to their particular environment, practiced their faith, and organized their economy, social interactions, and political systems – in other words, how they lived. It is up to the archaeologist to come up with the means to not only give voice to the past, but to do it in such a manner where peers can both understand and replicate results. Hypothesis testing accomplishes this goal.

Key Issues, Current Debates, and International Perspectives

There was a backlash to processual archaeology beginning in the 1980s, and critics absolved themselves of anything having to do with new archaeology (Earle & Preucel 1987). Some criticisms were valid, especially those regarding new archaeology's theoretical constructs (e.g., environment is the *key* factor) and some of the techniques used (e.g., statistics alone, models from the hard or physical sciences) (e.g., Hodder 1982, 1985, 1986). In doing so, however, some archaeologists have left themselves open to claims of fictionalizing the past, which is not the intent of sound scholarship. Using the hypothesis testing method allays this problem because it is about *replicable research*; it is about ideas that one attempts to confirm, but cannot prove. Other scholars should be able to use the same methods and come up with the same results; of course how people interpret those results is another matter entirely and depends on their theoretical interests. When a backlash occurred, many archaeologists were too ready to throw the baby out with the bathwater – specifically, the use of the hypothesis testing method because they did not evaluate it independent from processual archaeology rather than evaluating it as a method on its own merit. However, sound scholarship requires a degree of accounting to colleagues and peers, and hypothesis testing is critical for this end.

This point is illustrated using two recent papers: one on Classic Maya commoner cosmology and the other on ancient Maya witches.

A recent article (Lucero 2010) on Classic Maya commoners, summarized here, focuses on rituals that took place in the home to reveal the materiality of cosmology in the built environment. In the ethnographic present, Maya domestic ceremonies revolve around life, death, and renewal, which are reflected in the importance of dedication, ancestor veneration, and termination rites. Dedication ceremonies animate new houses and include the caching of objects under house floors. Ancestor veneration rites honor and thank ancestors and involve interring deceased family members with or without grave goods in house floors. Some Maya refer to children as *kexol*, or "replacements," signifying the connection between the living and the dead (Schele & Miller 1986: 266). Grave goods tell us much about the deceased family member; for example, among the Zinacantecos of Chiapas, grave goods "are said to possess the soul of their owner" (Vogt 1998: 28). Termination ceremonies deactivate or deanimate houses, thus releasing their soul before renewal, and include breaking objects, partially destroying houses, and burning incense. Renewal is necessary after the death of a family member when life must begin anew. The Maya conduct these ceremonies in memory of ancestors that all could witness, family and nonfamily alike.

Hypothesis: If pre-Columbian Maya practiced dedication, ancestor veneration, and termination rites in the home, then we should find caches, burials, and broken artifacts in the home. Argument of relevance: since these rites come from a long-standing tradition that is still practiced at present, the Maya likely practiced them in the past. Test implications (Table 1): caches should be found beneath floors consisting of burned or unburned whole objects such as jade items, obsidian, grounding implements, eccentrics, and ceramic vessels; burials, typically with

Hypothesis Testing in Archaeological Theory, Table 1 Revealing commoner ritual in the home

Hypothesized ritual	Test implications
Dedication	Whole objects sealed under floors
Ancestor veneration	Burials in floors with or without grave goods
Termination	Broken and burned items on floor surface

grave goods, should be found under house floors, and deposits should be found on floor surfaces consisting of broken and burned items, such as ceramic vessels.

These test implications are evaluated at the ancient Maya minor river center of Saturday Creek, Belize. The Maya lived in this community from at least 900 BCE to 1500 CE in dispersed farmsteads consisting of solitary mounds and mound groups or *plazuelas* (Lucero 2006). A ball court, temples up to c. 10 m tall, and elite compounds comprise the site core. Archaeologists excavated two solitary mounds or commoner residences (SC-18 and SC-85), an eastern structure of an elite compound (SC-78), and a temple ball court (SC-3). This focus here is on the two smaller residences, which the Maya occupied from c. 400 to 1150 CE.

Under the floors in fill, archaeologists recovered obsidian blades, mano and metate fragments, polished bone and stone, bone needles, modified and unmodified marine shell, chert cores, spindle whorls, a celt, a bark beater, faunal remains, figurine fragments, ceramic discs, and a few small jade and hematite inlay or mosaic pieces. Twelve burials were recovered from the commoner houses, most with grave goods. Several deposits of smashed and burned vessels were found on floor surfaces. Evidence supports the hypothesis that the pre-Columbian Maya practiced dedication, ancestor veneration, and termination rites in the home.

Any archaeologist would recover the same materials and, by using the hypothesis testing method, come up with the same results – that the Maya cached items in floors and sealed them, interred the dead into house floors, and burned and broke items before putting down a new floor with its own caches. History and ethnography reveal that these ritual behaviors reflect dedication, ancestor veneration, and termination practices at Saturday Creek throughout the entire occupancy of the houses, over 600 years – from c. 400 to 1150 CE. Interpreting these results, however, can vary depending on the questions asked. The article's focus on materiality, memory, and cosmology shaped interpretations. Briefly, the Maya performed traditional rites for over a millennium, and they conducted them for family and members of the community to acknowledge a family's loss – and new beginning. People interred the dead to create ancestors who remained involved in the lives of the living. Domestic ceremonial practices, by their materiality, solidify inhabitants' ties to family and community. Building and destroying houses was closely tied to the life history of ancestors. Memory and place were created in the cycle of dedication, ancestor veneration, and termination rites. In fact, Maya occupied most houses continuously for centuries, suggesting that they became "a key element in the maintenance of cultural memory" (Chapman 2000: 4).

Another example of the hypothesis testing method concerns exploring ancient Maya witchcraft persecution (Lucero & Gibbs 2007), summarized here. Throughout the world, witchcraft persecution occurs in times of stress, including untimely deaths, drought, floods, famine, or disease. Witches are people who are blamed and punished, often violently, for perceived or real problems by community census.

There are various forms of witchcraft in the Maya ethnographic present, as was the case during the Colonial period. For example, among the Zinacantecos of highland Chiapas, Mexico, when people come to the Ceremonial center from different villages for major rituals, "There is always the danger… that harmful witchcraft rituals may be carried out by envious members of other lineages" (Vogt 2004: 44). Witchcraft accusations also take place within communities, and "If someone has sinned and is condemned by his kinsmen and neighbors as a witch…, public denunciation and ritual neglect may characterize

the funeral, and the soul is banished to *K'atin-bak*" – a "place warmed by bones" and "a deep hole inside the earth" (Vogt 1998: 29). In Chiapas, animal spirits or companions are associated with sorcery, and combat between them brings misfortune and disease. In the Yucatán, it is believed that people can turn themselves into animals at night for evil purposes – that is, witchcraft.

People respond against witchcraft with violence. Spanish chroniclers noted that elderly Maya women were selected by villagers as scapegoats in times of trouble and stoned to death. For the Tzeltal Maya of Amatenango, Chiapas, of the 36 homicides recorded for one year in the late 1960s, over half had been accused as witches, and most were men ($n = 19$ or 53 %). And of the nine *curanderos* (traditional healers) on the list, all had been accused of practicing witchcraft. In an Associated Press release dated September 16, 2002, a recent attack is detailed: "Unidentified gunmen burst into the home of an alleged practitioner of witchcraft in... Chiapas and shot to death four adults and wounded five other people, including two children." The same release also stated that there have been several "witches" killed in the past decade in Chiapas, a practice that also occurs throughout the rest of Mexico and Central America.

Evidence from ethnohistoric and ethnographic records also suggests a long history of the belief in witchcraft's association with openings in the earth. Caves, for example, are portals to the underworld or Xibalba and thus are sacred but dangerous places. Bishop de Landa in colonial Yucatán noted that people, particularly young boys, were sacrificed when the rainy season was overdue or during a famine; victims were thrown into *cenotes*, natural sinkholes – another portal to the underworld. In general, infants, children, and young adults may have been sacrificed as innocents, whereas some adults may have been killed/sacrificed as evildoers – that is, witches. In Zinacantan, people associate caves with witches and believe that witchcraft ceremonies take place within them. "Soul loss can... occur when an evil person performs a witchcraft ritual in a cave to "sell" the inner soul to the Earth Lord, who then uses the person as a servant" (Vogt 2004: 30). In the 1990s at the height of the paramilitary killings in Zapatista Chiapas by *cortacabezas* or head-cutters, two male teenagers from San Pedro Chenalhó who had bragged about being Zapatista supporters were stoned to death for bringing disharmony to the community. The Maya unceremoniously dumped their bodies in a crevice, another kind of opening in the earth. In another case that took place in 1648 in Guatemala, people witnessed a battle between animal or spirit companions (a puma and jaguar) of two Pokomchi Maya. One died of his wounds, while the other eventually was hanged for the "murder," and his neighbors placed his body in a ditch in a shallow grave rather than in a church-sanctioned cemetery. These and other cases illustrate the belief in witchcraft and its association with violent death, non-funerary treatment, and openings in the earth, especially caves.

Lucero and Gibbs propose that witch killings have a long, pre-Columbian history. Witch killings actually might have been a community response in times of extreme stress where people felt they had no other choice but to sacrifice someone, usually a member of the their own community. It was not enough to kill witches; as dangerously animated items, they were deposited in dangerous places, safely away from the living – that is, in caves.

The challenge, however, is to distinguish ancestors and sacrificial victims from witches. This feat is particularly challenging since caves likely entombed ancestors, sacrificial victims, *and* witches. In fact, witches and sacrificial victims in one sense can be perceived as one and the same. People can be sacrificed for the same reasons witches are killed – to restore order. Sacrificial victims, however, are accorded respect after death, so they can enjoy the afterlife in paradise. Witches, in contrast, are malevolent and thus are treated differently after death.

Hypothesis: If ancient witches existed, then we should expect to find evidence of this in *peri-* and *postmortem* treatment of certain people. Specifically for the Maya case, if human remains in caves show evidence for violence and non-funerary treatment, then they might represent

Hypothesis Testing in Archaeological Theory, Table 2 Defining the dead

Hypothesized classification	Test implications
Ancestor	Buried, positioned, grave goods, no evidence of trauma
Sacrifice	Buried, positioned, grave goods or not, evidence of trauma
Witch	Not buried, not positioned, no grave goods, evidence of trauma

killed witches. Argument of relevance: since witches are typically violently killed and not buried with non-witches worldwide and in the Maya area at present, we should expect to find the same to have been the case in the past. Test implications (Table 2): distinguishing witches from sacrificial victims and ancestors in caves is possible through an analysis of the context of remains (buried or not), disposition of bodies (e.g., evidence of binding, proper placement), evidence for trauma, and the presence or absence of grave goods. Ancestors were buried in orchestrated positions with grave goods and without trauma, sacrificial victims were buried with or without grave goods with trauma, and witches were neither buried nor positioned, did not have grave goods, and show evidence for trauma.

Briefly summarized here is the context of skeletal data from two caves that represent the majority of lowland Maya cave deposits – Actun Tunichil Muknal and Actun Uayazba Kab in central Belize. They were predominantly used during the Classic period, especially in the Late Classic or 700 to 900 CE. Major differences between the two caves are the context of remains – surface or subsurface and presence or absence of trauma and grave goods. Most individuals in Actun Uayazba Kab, a shallow cave/rockshelter, were carefully placed and *buried* beneath a plaster floor, along with offerings. In contrast, Actun Tunichil Muknal goes deeper – 5 km – into the mountain, that is, closer to the sacred, and dangerous. Half of the 14 individuals, all found unburied, show evidence of cranial trauma. After they were killed, the Maya left the remains on the surface – without offerings. Evidence supports the hypothesis that ancient Maya witches existed.

Actun Uayazba Kab demonstrates more evidence for funerary rites and the creation of ancestors, who were kept relatively close to the living in a "lineage mountain" nearby a small center. In Actun Tunichil Muknal, the dead were not accorded traditional burial rites. By killing a witch, the Maya deactivated their evil power. The living left dead witches exposed to the elements or the perilous underworld without any protection. By offering such individuals, the living condemned their spirits to the malevolent gods of the underworld in hopes of restoring order.

The purpose of this exercise has been to demonstrate the importance of using the hypothesis testing method in archaeology. Methods are replicable, though interpretations can and do vary. Rigorous methodology is a must in a field where we give voice to the people of the past. Insulting their memory with insupportable claims is poor and irresponsible scholarship. Embracing new ideas, theories, and thinking outside the box are vital to give voice to the past. Giving power to that voice requires us to work largely inside the box, methodologically anyway.

Future Directions

It is critical that archaeologists, and all social scientists and humanists, teach their students the importance of using replicable methods; this will allow their peers to follow, step by step, how one obtained their results. This is what scholarship is all about; revealing to our best abilities the voices that have been quiet too long. This is a serious endeavor and one that requires rigorous methods. In fact, many archaeologists use hypothesis testing, whether or not they use the "terminology" or are even aware of it.

No matter one's theoretical interests (e.g., see Preucel & Mrozowski 2010), the undeniable fact (not a theory) is that archaeology deals with the material world into which archaeologists are attempting to breathe history and life. Archaeology is always borrowing theories and ideas from other disciplines, which is a critical component of fulfilling the goal of bringing the past back to life. But how one accomplishes this can be contentious unless peers are able to replicate results.

The hypothesis testing method is such a method and its use allays this problem. Facts can be filtered through replicable methods to obtain results that will only enhance interpretations.

Cross-References

- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Field Method in Archaeology: Overview
- ▶ Middle-Range Theory in Archaeology
- ▶ Processualism in Archaeological Theory

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Iberia: Medieval Archaeology

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Introduction

Medieval archaeology in Iberia is a relatively young discipline that aims to study the societies of the Hispanic landscape during the millennium spanning from the fifth to the fifteenth centuries (the traditional key dates remain the fall of the western Roman Empire in 476, and the conquest of the Nasrid dynasty of Granada and the discovery of the Americas, both of which occurred in 1492) (Fig. 1). From its very beginnings (in Iberia), archaeological study has been oriented toward the study of the material manifestations of Islamic society (*andalusí* archaeology) and Christian society (early medieval archaeology and feudal archaeology). The three characteristics that define its practice are: its underdeveloped academic profile; the role that rescue archaeology has acquired in recent years; and a notable atheoretical quality which has manifested itself via a striking dependence on the paradigms and approaches favored by medievalists working with textual sources, as well as a lack of epistemological and methodological reflection.

Definition

Medieval archaeology in Iberia encompasses many "archaeologies" with different chronological and thematic concerns, all of which are the result of diverse conceptual and historiographical approaches and have had, until recently, different academic trajectories.

After the collapse of the Roman Empire, various Germanic groups occupied *Hispania* in the fifth century, although only the Sueves (in the northwest of the peninsula) and the Visigoths managed to establish stable kingdoms. Archaeological analysis of these early medieval centuries has given rise to a specific "archaeology of the Visigoths" which is profoundly marked by cultural historicism. Alternatively, the study of the origins of Christianity and its early monuments has produced a paleochristian archaeology characterized by art-historical concerns. All of these trends have been supplanted in the last three decades by "early medieval" archaeology, which has been oriented toward the social aspects of landscape study, and based upon data provided by numerous excavations in cities, monumental spaces, and rural areas.

One of the principal particularities of the Iberian peninsula during the Middle Ages is the coexistence, over many centuries, of feudal political formations alongside Islamic state-based polities, after the conquest of the Visigothic kingdom in 711. The historical development of the

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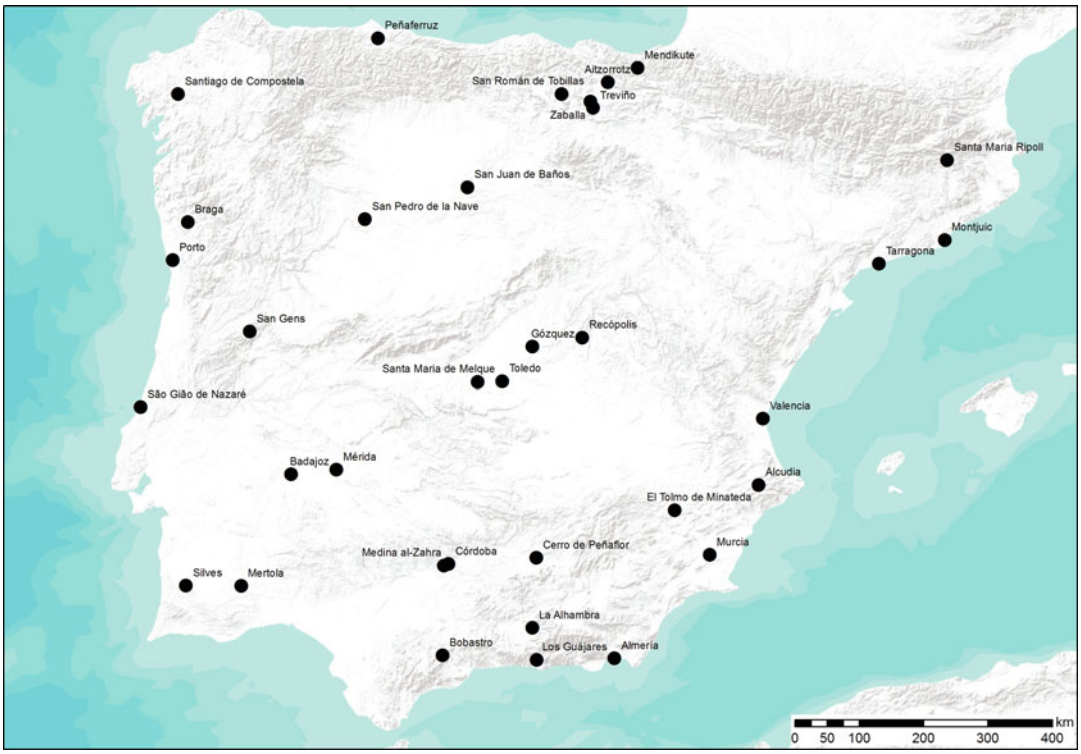

Iberia: Medieval Archaeology, Fig. 1 Principal sites mentioned in the text

territory dominated by the Islamic states, known as al-Andalus (in classical Arabic ﻟﺲ), took the course it did in part as a result of the growing pressure exercised by feudal powers to the north (a process traditionally known as *reconquista*), and in part because of internal historical dynamics, which ultimately led, at the very end of the Middle Ages, to the defeat of the Nasrid Kingdom of Granada. *Andalusi* archaeology has been concerned primarily with the study and characterization of the state and society of al-Andalus.

Furthermore, the study of the northern kingdoms and their territorial expansion has been undertaken within the methodological context of feudal archaeology, which has explored the similarities and contrasts between medieval societies, focusing particularly on themes such as the formation of villages, the emergence of seigneurial powers, the process of *incastellamento*, the role of castles, and the study of medieval urbanism.

Such a division, in truth, is arbitrary and inexact, given that it marginalizes minority groups (Hebrews, Mozarabs ["Arabised" Christians] and *Mudéjares* [Muslims in Christian territory]) and, above all, fails to reflect the complex and changing reality of territorial control. On the other hand, although in academic circles, there has existed a profound disjunction between feudal and *andalusí* history and archaeology, a significant number of researchers have made use of this great diversity, employing comparative methods in order to overcome a certain idealized historicist backdrop and develop more complex theoretical insights. The influence of Italian medieval archaeology has played a key role in providing medieval archaeology in Iberia with a sound theoretical and methodological background.

The limited presence of medieval archaeology in the university sector (taught in only a dozen institutions in Spain and Portugal) has meant that museum-directed work and rescue archaeology

have been fundamental in the study of medieval urban and rural contexts. In 1985, the Law of Spanish Historical Heritage and the Law of Portuguese Cultural Heritage were promulgated, which have provided a solid platform for the development of rescue archaeology. The frenetic pace of urban building activity and the enormous number of public building projects undertaken in Iberia in the last 20 years have brought in their wake the excavation of a high number of medieval settlements, and even led to the discovery of a new type of settlement, known as the peasant farmstead and the peasant village. And although the majority of these findings remain unpublished, the qualitative leap to which the last few years have borne witness is striking.

On the other hand, the quantity of well-preserved medieval architectural monuments and the high number of restorations undertaken on these former has meant that in Iberia and Italy, the archaeological study of architecture has gained importance in recent years. The so-called Archaeology of Architecture, which supports its own specialist publication, has been applied both in the realization of studies that precede the restoration of buildings, and in the documentation and intensive study of groups of buildings, such as the early medieval churches of Spain.

Historical Background

The origins of medieval archaeology in Iberia can be found in the second half of the nineteenth century and the first decades of the twentieth, when the first antiquarian studies (largely numismatical and epigraphical) were undertaken, as were the first studies of monumental architecture, occasionally as part and parcel of restoration programs. These were years in which a certain arabism developed, closely linked to a romantic fascination with an exotic orientalism, and in which archaeological practice was closely identified with the history of art, and – more precisely – with the history of architecture. At the end of the nineteenth century and the beginning of the twentieth, the first excavations were carried out in places such as Medinat al-Zahra, Bobastro, or the Alhambra in the south, as well as in castles, monasteries, and necropolises in the northern areas of the peninsula (e.g., Mendikute, Aitzorrotz, Pamplona, Santa María de Ripoll), and from 1912, courses in Arabic archaeology were offered in the Central University of Madrid. However, the consolidation of History of Art as a discipline in its own right, and a burgeoning change in theoretical approaches, meant that by 1920, this first phase of medieval archaeology in Iberia was losing momentum, coinciding, in this regard, almost exactly with a similar process seen in Italy.

During the dictatorships of Salazar and Franco, medieval archaeology was strictly limited to that which focused on searching for signs of Visigothic presence in Spanish territory, and this outlook would dominate medieval studies until the 1970s and 1980s, while in Portugal, a great number of medieval monuments were restored in order to exalt the glory of the "national" past. Furthermore, during this period, architects like L. Torres Balbás or F. Hernández undertook studies of monumental *andalusí* complexes, such as the Alhambra or Madinat al-Zahra. It was with the arrival of democracy, both in Spain and Portugal, that the foundations of modern medieval archaeological study were laid. Among the reasons which help to explain this change, one can point to a process of renovation with regard to theoretical and epistemological approaches to medieval Hispanic societies, a growing sensitivity toward the postclassical heritage – which was especially affected by restoration work and urban archaeology – and which constituted the precedent for the legislation of the 1980s, and the emergence of a new generation of researchers who began to build their careers in the margins of the ever-dominant classical and prehistoric archaeology.

In Spain, the first meeting of medieval archaeologists took place in 1980 and this provided a platform for the foundation of the Spanish Association of Medieval Archaeology in the following year. The Association played a major role in the early years, given that it also oversaw the creation of the journal (*Boletín de Arqueología*

Medieval, 1986) and the organization of national congresses in Medieval Archaeology held in Huesca (1985), Madrid (1987), Oviedo (1999), Alicante (1993), and Valladolid (1999). Nonetheless, the institutionalization of archaeology in the universities and the emergence of rescue archaeology in the 1990s posed a challenge to which the Association has been unable to adapt, and for this reason, it has now lost its function and purpose.

Throughout the early stages of medieval archaeology in Portugal, the achievements of some university lecturers (C. A. Ferreira de Almeida, H. Catarina o R. Varela) have been notable, as have initiatives from beyond the academic sphere, among which that led by C. Torres at the Mértola's Archaeological Site stands out (alongside its house journal *Arqueología Medieval*, published since 1992). In the 1990s, a whole series of congresses were held which allowed for the systematization of the archaeological study of the ceramic record (Tondela, 1992–2000), castles (Palmela, 2000), and Christian monuments (Lisbon, 1992), each of which was broached from a wide geographical and theoretical framework; the first studies of a certain stature were also produced in this period.

During the 1980s, the majority of studies were oriented toward the systematization of the ceramic record, the analysis of settlement patterns, and the creation of inventories within a wider framework of regional archaeological studies. Since the 1990s, substantial archaeological projects have begun to take place, as have intensive regional studies across the peninsula, which has allowed for the creation of a significant research agenda.

The publication in 1988 of the M. Barceló book under the provocative title of *Arqueología Medieval. En las afueras del medievalismo* marked a true turning point. This text, defined by the author as a "methodological reflection," aims to draw attention to the most theoretical and conceptual aspects affecting the growth of medieval archaeology, and affords methodological aspects of the discipline a secondary role. A strong denunciation is made of the way in which archaeology finds itself outside of mainstream "medievalism" (understood as the academic approach to medieval history), and relegated to the status of an auxiliary discipline, illustrative of thematic concerns raised in earlier times. On the other hand, the book reflects the notable influence that historical materialism has enjoyed in studies of medieval societies since the 1980s, and as such proposes an investigative program of conceptual complexity in which the archaeology of peasant society is proposed as one of the major research concerns. This was a time in which the practice of rescue archaeology (characterized by a notable empiricism, itself a reflection of the weak influence of academic training among archaeologists) truly took off.

During the 1990s, *andalusí* archaeology has experienced significant development in both Spain and Portugal, as can be evidenced by the convocation of a high number of meetings and the publication of the journal *Arqueología y Territorio Medieval* (Jaén 1993), with the result that works there from have begun to form part of a wider European debate on medieval societies.

Similarly, the profound innovation signaled by the application of the archaeology of architecture to churches such as San Juan de Baños, San Pedro de la Nave o São Gião de Nazaré, and the practice of urban archaeology in centers, such as Valencia, Tarragona, Recópolis, Mérida, Mertola o Braga, has had a profound impact upon the archaeological study of early medieval societies. In the last 15 years, the contribution of rescue archaeology has been equally decisive when it comes to the study of early medieval rural society.

Conversely, the emergence of the archaeological study of feudal societies has been slower, taking place over the last decade. The majority of these analyses have focused on the process of the formation of lordships, paying little attention to the later Middle Ages.

Key Issues

The Archaeological Study of *andalusí* Society: The Process of Islamisation

One of the principal contributions of Iberian medieval archaeology has been the study of the formation and articulation of *andalusí* state and

Iberia: Medieval Archaeology, Fig. 2 The city of El Tolmo de Minateda (Albacete, Spain), according to Sonia Gutiérrez Lloret

society. Spanish historiography before the 1980s had questioned and underestimated the Islamic character of *andalusí* societies and a few scholars even went as far as denying that the Islamic conquest ever took place. The difficulties supposed by Arabic source material for most "medievalists," together with the pervasive strength of nationalist conceptual frameworks, help to explain these limitations.

There are two major explanatory factors behind the subsequent renovation: On the one hand, we have the anthropological studies of P. Guichard, undertaken in the 1970s, which underlined the qualitative differences between Arabic and Berber tribal societies in al-Andalus, and Christian societies; second, the analyses of M. Acién delineated a process of transition during the Emiral period (755–929) which could be explained by way of reference to competition between various modes of production (tribal, feudal, and Islamic), and which was resolved by the imposition of a strong and hegemonic state in the tenth century (the Umayyad Caliphate, 929–1031) that prevented the consolidation of regional lordship in al-Andalus.

Building upon these suppositions, regional landscape studies have been undertaken in Granada, the Guadalquivir valley, and the Levante region, which have analyzed the transformation of rural settlements, cities, and the twin phenomena of production and circulation (of goods and peoples) throughout the period of Islamicisation. And although consensus has yet to be reached with regard to the weight of continuations (e.g., the persistence of feudal trends throughout the Emirate, the roots of which can be traced to the late Visigothic landowning class), it has been established that the Islamic invasion brought with it a profound social, economic, and political break. S. Gutiérrez has shown how numerous urban centers occupied in the Visigothic period were radically transformed during the Emirate (El Tolmo de Minateda (Fig. 2) and Recopolis are two such examples), only to be abandoned in the tenth century when other urban centers emerged to support the fiscal structures of the Caliphate (such as Murcia, Badajoz, and Almería). Other cities survived, like Mérida, Valencia, or Córdoba, but were notably transformed in architectural and urbanistic terms as complex multilevel dwellings ordered around a central patio were built, as can be seen in the Saqunda neighborhood of Córdoba. This urban network was articulated by a strong state-directed socio-political system that was most unlike that which we call the "feudal system." Rural settlements were also profoundly modified, thanks to various processes including the occupation of hill-top sites by peasant communities.

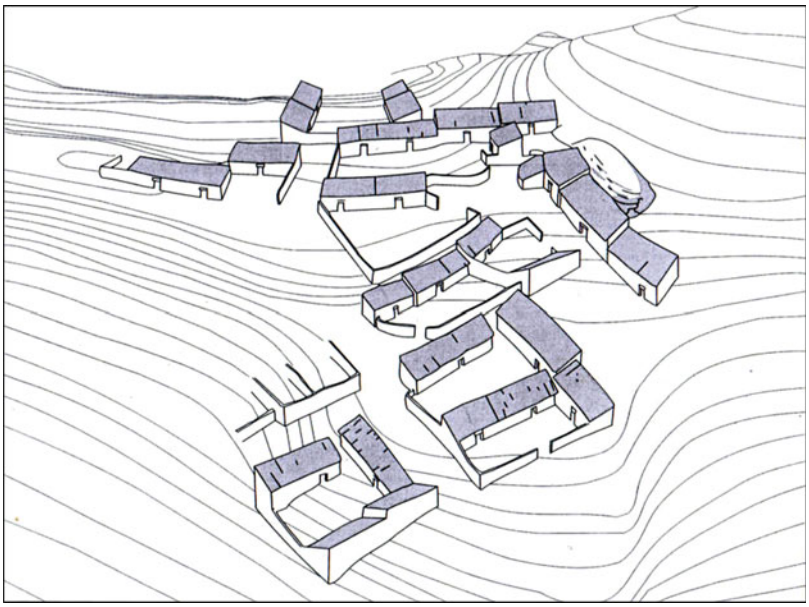

Iberia: Medieval Archaeology, Fig. 3 El Cerro de Peñaflor (Jaén, Spain)

A second key factor in the archaeological study of *andalusí* society has taken the form of the analysis of rural landscapes, with the aim of shedding light on the fiscal system upon which the Caliphate and, later, the *taifa* kingdoms were built; thus, the material bases of *andalusí* society might be better understood. Insofar as the study of rural spaces is concerned, great attention has been afforded, in methodological terms, to extensive place-name analysis and intensive excavation; in practice, both habitational spaces and irrigated farm systems have been studied.

Since the 1980s, preeminence has been given in the eastern peninsula to the dual phenomena of *huṣûn* (fortifications) and *qurà* (*alquerías* or concentrated residential areas), which have been considered key elements in the organization of the rural population. *Huṣûn* did not enjoy lordly associations, but were rather the fortifications of peasant communities or central points within a network of state-organized defensive structures. We are faced, therefore, with a society without lords. *Alquerías*, still poorly understood, were perhaps an expression of unequal peasant communities which were nonetheless characterized by strong internal cohesion, as we have seen in Los Guájares (Granada) or at the Cerro de Peñaflor (Jaén) (Fig. 3).

Furthermore, the study of irrigated land and the social practices which developed around the process of managing the water supply has been another fundamental theme of *andalusí* archaeology. M. Barceló has argued that horticultural products were impossible to store in large quantities and thus commandeer as rent, instead being consumed by peasant cultivators, and that this prevented the taking of rent by lords.

The Formation of Villages and Medieval Farmland

Until relatively recently, peasant areas of habitation and production in medieval Iberia were practically invisible. Only a few settlements characterized by dwellings with stone plinths or foundations, or irrigated cultivable plots, together made up the limited evidential base with which attempts to understand the medieval peasantry were made. On the other hand, Iberian medievalism has assumed – following the paradigm of R. Fossier – that early medieval rural society was disperse and quasi-nomadic, and that, accordingly, it was only with the implantation

of feudalism in the eleventh century that sedentary social structures came about, as the peasant landscape was reordered under seigneurial lordship.

Nonetheless, the boom in rescue archaeology that has taken place since the mid-1990s, especially in the outskirts of large cities like Madrid and Barcelona (Fig. 4), allied to the carrying out of large-scale excavations, has obliged us to acknowledge the existence of significant village settlements, visible by way of structures excavated in the substrate (silos, sunken featured buildings, wells, enclosed areas) and constructions with stone foundations which represent the dwellings of peasant communities. Similarly, it has been possible to recognize spaces which can be characterized as "intermediate areas," lacking in archaeological material, which have been identified as farmland. In places like Galicia, Asturias, or the Basque country, it has been possible, moreover, to identify terraced areas and farmland from the medieval period, thanks to extensive excavation and the analysis of the material from these agrarian sites (Fig. 5).

The formation of villages in the Iberian peninsula took place in the early Middle Ages, although there are important regional differences to bear in mind. The creation of village networks was the result of the emergence of a new post-imperial political order that is visible in parts of the Meseta (where Visigothic power structures were at their strongest) or in parts of Catalonia (around cities like Barcelona). We lack, on the other hand, networks of stable villages in other parts of Iberia where the influence of local and central powers is clearly marked. It was from the eighth century, in wide sectors of the northern peninsula, that village structures underwent consolidation, in accordance with the formation of emergent proto-statist realities. In other parts of Iberia, like the Upper Mondego in Portugal, the formation of such villages has only been verified from the tenth century (Fig. 6).

By exploiting various mechanisms and processes, sociopolitical elites dominated these villages, either though the collection of rent, the domination of community resources, or, lastly, dominance over people. A correspondence between the distribution of village networks and centers of power has also been noted.

The Archaeology of Feudalism

Once the lack of correspondence between the process of village formation and the affirmation of territorial lordships had been recognized, an archaeology of feudalism developed with the objective of discovering, via the archaeological record, the social mechanism by which new forms of lordly power was established in the post-Carolingian period. The main sites in which this archaeological practice has been developed have been centers of power, in particular castles or churches, although in the past few years, it has been possible to analyze the transformations that took place in peasant villages, which latter present the most fruitful landscape for the analysis of the social action of elites.

In several areas of the north of the peninsula, it has been possible to observe the formation, from the eighth and ninth centuries, of centers of local power articulated around castles (such is the case of Peñaferruz in Asturias) or private churches whose owners have important resources (such as San Román de Tobillas in Álava). The capabilities of these local powers differ from territory to territory, in such a way that they seem to be much stronger in Asturias or Galicia when compared to the Castilian, Aragonese, or Catalan areas. From the tenth century, it is possible to trace a certain process of the growing strength of local aristocracies able to control entire peasant communities and to alter the landscape. In areas such as Álava, it has been possible to see how, at this time, private churches, such as that at Zaballa, were built in the heart of peasant villages and took on roles as centers for the collection of rents, thereby altering the built environment of the village. The castle of Treviño was also built in this century, bringing together a peasant community within a walled area dominated by a lordly residence where rents were collected, following a classical pattern of Mediterranean *incastellamento*. Likewise, sufficient indications

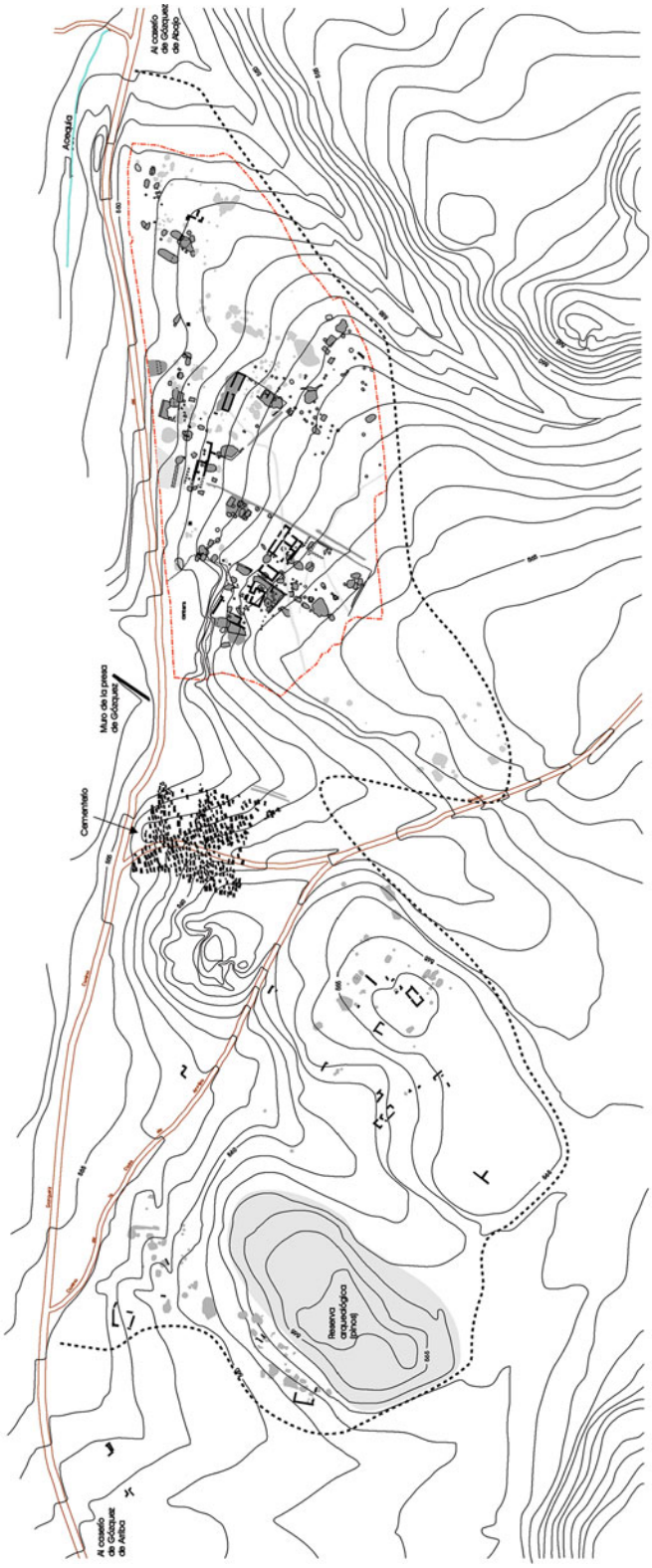

Iberia: Medieval Archaeology, Fig. 4 Village of Gózquez (Madrid, Spain)

Iberia: Medieval Archaeology, Fig. 5 Tenth-century agrarian spaces of Zaballa (Álava, Spain)

Iberia: Medieval Archaeology, Fig. 6 San Gens (Upper Mondego, Portugal)

exist to speak of *incastellamento* or even of forms of concentration of peasant settlement around churches and their sacred spaces, in a framework of *ensangrerament* (Fig. 7).

Another line of research that has acquired notable importance has been the analysis of the process of transformation of *andalusí* landscapes after the feudal conquest. In particular, very detailed studies have been carried out on the modifications of the urban fabric in centers such as Murcia via the analysis of the disarticulation of Islamic dwellings, the creation of great avenues and communal spaces, the establishment of ecclesiastical centers or the organization of urban spaces. Additionally, the processes by which hydraulic systems were adapted to new social and productive logics by means of the introduction of hydraulic mills and the dismantling of irrigated lands in the east of the peninsula have also been studied.

Iberia: Medieval Archaeology, Fig. 7 Castle of Treviño (Burgos, Spain)

Future Directions

Perhaps the main challenge presented by Iberian archaeology in general, and medieval Iberian archaeology in particular, is that of confronting the study and the publication of the many archaeological contexts that have been analyzed via the prism of rescue archaeology in the last 15 years. In this period, thousands of archaeological interventions have taken place every year in medieval contexts, although we lack precise details regarding their number. The logic of the market has meant that priority has been given to interventions that have concentrated on the documentation of sites prior to their destruction, allowing only on very few occasions the undertaking of projects that maximize the value of the potential information that might be drawn from such sites. Now that the financial crisis has practically put an end to the progress of rescue archaeology in the last 15 years, the time has come to produce publications about the numerous interventions that have been carried out. We lack monographs and a critical mass of studies proportional to the work done during recent years and, thus, this is one of the main priorities for the next few years in many parts of Iberia. Moreover, this initiative should bring about the publication of a great number of studies.

The second course of action that must be promoted in the future is that of Science Archaeology. By way of example, although there have been some exceptions, there have not been many studies undertaken in recent years from the perspective of environmental archaeology. This is one of the fields in which the distance between the practice of historical archaeology in the north and south of Europe seems most evident. The lack of sophisticated programs of sampling and of a dense network of geoarchaeologist and bioarchaeologists working in medieval archaeological contexts explain these shortfalls. The scarcity of studies in fields, such as archaeobotany, archaeofauna, or physical anthropology, also explains the reasons why we currently lack monographs and territorial syntheses of substance. This tendency is reversing, thanks, in part, to the academic training of post-docs and researchers from abroad who are revitalizing our methodological outlook. Nevertheless, the de facto lack of Science Archaeology in Iberian universities greatly limits the speed with which change occurs.

Medieval Archaeology in Iberia is also defined by its atheoretical character, which is due, in turn, to the absence of debate regarding the construction of the archaeological record, and even to an explicit refusal to engage in

theoretical reflection. The strong imprint of cultural historicism (which has marked the practice of "Visigothic archaeology"), an excessive dependency on the paradigms and concerns raised by the practitioners of medieval history, and the empiricism that in many occasions has led rescue archaeology, helps to explain this state of affairs. It is true, as has been pointed out here, that historical materialism and certain processual schools of thought enjoyed significant development in the 1980s and 1990s, with the creation of an archaeology of the state, and of the peasantry, although their influence has nowadays been severely limited. Post-processual approaches, on the other hand, continue to be a clear influence on the work of new researchers, although this tendency is in large measure determined by Anglo-Saxon trends. A critical reconsideration of how to interpret the archaeological records in its current context (characterized by the implosion of many post-processual schools of thought and the collapse of a particular way of doing archaeology in the light of the developments of the last few decades) remains the fundamental challenge facing medieval archaeology in particular, and all archaeology in general.

In thematic terms, we can talk without exaggeration of a substantial research agenda, given that there are many projects currently underway. We do not yet have a detailed synthesis on the social and territorial transformations that took place in Portugal in the early Middle Ages, and this is in fact one of the few territories that C. Wickham did not include in his monumental work *Framing the Early Middle Ages*. Iberia remains, moreover, one of the most fertile territories of Europe when it comes to studying the process of state formation in the early Middle Ages, although we still lack a theoretical starting point and the empirical data with which to frame our analyses. We have sound studies at our disposal, as well as social theory, regarding the origins of the *andalusí* state, but analysis of the emergence of Asturian, Castilian, or Navarrese proto-state formations in northern areas, to cite only a few examples, is still underdeveloped. The study of the archaeology of centers of power is, undoubtedly, one of the best strategies to adopt as we continue to analyze these processes. Equally, the emergence of peasant communities that can be observed in large areas of Iberia between the fifth and eighth centuries contrasts markedly with the relative "silence" that characterizes other regions. Further to this, archaeology of the peasantry is allowing us to overcome the anachronistic ethnic approach that is still characteristic of the practice of "Visigothic archaeology."

Insofar as studies of *andalusí* society are concerned, one must concede that the high level of theoretical debate that had characterized research in the 1990s has now diminished as a result of the segmentation of research debates. Among the themes awaiting in-depth analysis, it would be useful to address the study of nonirrigated lands in the production processes of peasant communities, and the articulation of the city-*alquería* relationship; also useful would be intensive analyses of the inhabited and exploited spaces during the emiral and Caliphal periods, which might allow for the creation of analogies with insights which have already arisen from the study of urban centers.

There remains much to do with regard to the analysis of feudal societies. In diachronic terms, the study of the high Middle Ages (thirteenth to fifteenth centuries) continues to be penalized by an ingrained prejudice that has it that its greater wealth of written sources makes the use of archaeology unnecessary or too expensive, in spite of the fact that there exist urban records of great quality. For this reason, the focus of attention has fallen upon the study of the formation of feudal society in the high Middle Ages via the analysis of themes such as the formation of villages, the study of centers of power or the phenomenon of "*incastellamento*." The archaeological study of monastic lordships, the analysis of the forms of power over people and resources via the bioarchaeological record, research on grazing lands, or the extensive study of mountain areas through resources such as LiDAR are some of the themes in which work has begun and from which significant innovations may result in the next few years.

Moreover, another line of investigation which has been developing in recent years, although it has yet to be adequately systematized, is the archaeological analysis of minorities. For example, the archaeological study of Jewish settlements in Iberia now enjoys a great deal of evidential support, such as funerary sites at Montjuic (Barcelona) or Pamplona, Jewish quarters such as those of Lorca and Estella, or synagogues such as those of Alcudia at Elche, or Santa María la Blanca at Toledo. Nevertheless, we still lack adequate syntheses which go beyond empirical analyses to approach themes such as the exclusion and social articulation of these communities.

Cross-References

- ▶ British Isles: Medieval Archaeology
- ▶ Europe Incastellated: Medieval Archaeology
- ▶ France: Medieval Archaeology
- ▶ Italy: Medieval Archaeology
- ▶ Medieval Archaeology

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Iberian Mediterranean Basin: Rock Art

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Introduction

Under this designation, a list of 757 sites located in the Mediterranean side of the Iberian Peninsula was declared World Heritage in 1998, as "the largest group of rock-art sites anywhere in Europe," "providing an exceptional picture of human life in a seminal period of human cultural evolution" (Criterion III: http://whc.unesco.org/en/criteria/). Today the list has been updated and it includes more than 800 rock art sites.

The nomination refers to the main post-Paleolithic rock art tradition of this region, also known as Levantine rock art (LRA). Nevertheless the sites on the list also contain rock art motifs of two other major post-Paleolithic rock art traditions known as Macroschematic and Schematic rock art. To be consistent with the UNESCO declaration, this entry will focus on Levantine rock art.

Definition

LRA is one of the three main post-Paleolithic rock art traditions depicted in open-air sites located along the major river basins of the Mediterranean side of the Iberian Peninsula.

LRA was scientifically documented in 1903, several years after the discovery of Altamira Paleolithic paintings, when the Spanish archaeologist Juan Cabré discovered some naturalistic red deer at La Roca dels Moros site (Calapatá, Teruel). More than a 100 years later, the number of sites has significantly increased to expand along a wide region of the Mediterranean side of Spain: from the Pyrenees to Almeria (Fig. 1).

In a broad term the corpus of Levantine art includes mainly painted, and rarely engraved, motifs depicting naturalistic animals (deer, wild goat, bulls, wild boar, horses, insects, and so on), humans (male and female and occasionally children), and their equipment (bows, arrows, different sorts of bags or baskets, clothing and adornments, and so forth) (Fig. 2).

Contrary to Paleolithic rock art, where internal details are depicted (such as eyes, mouth, and animal coat), LRA artists chose to depict flat silhouettes with very fine and modelling strokes. The species and sometimes the sex (especially for humans and deer) are identified according to the characteristic profile of their silhouettes.

Breast, skirts, and wide pants are usually interpreted as female wear, whereas their absence or the presence of weapons (bows and arrows) is considered characteristic of males, even when the sex is not explicitly represented.

Compared to Paleolithic rock art, LRA uses an exiguous number of painting techniques: solid infill, parallel-line infill, contours, and single brushstroke. The colors used are mainly red, black, and white, with a significant prevalence of the former. In the last few decades, bichrome paintings and engravings have also been discovered, although these two techniques are still uncommon and restricted to a limited number of sites and regions (Domingo 2012a).

From the point of view of composition, LRA is mainly an art of scenes, although examples of other compositional patterns also occur, such as several known cases of exclusive and isolated bulls.

Key Issues/Current Debates/Future Directions/Examples

Despite more than one hundred years of research on this art, key issues such as the main subject matter, the chronology, the identity of the authors,and the sequence of this art still inform major ongoing discussions.

For decades LRA has been characterized as dealing primarily with hunting scenes (Fig. 3).

Iberian Mediterranean Basin: Rock Art, Fig. 1 Carabasses site (Vilafranca, Castellón) (Photo by I. Domingo)

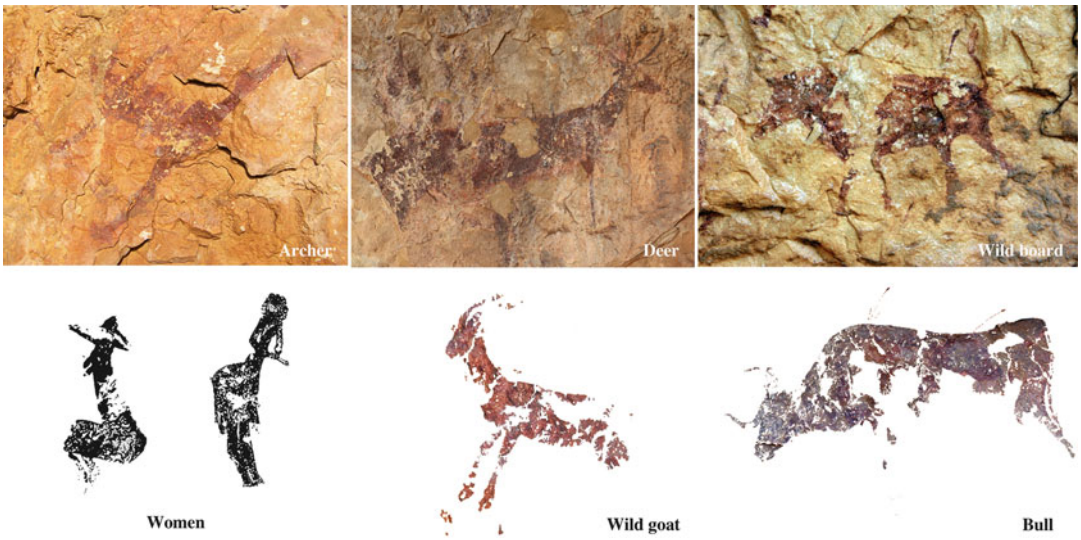

Iberian Mediterranean Basin: Rock Art, Fig. 2 Main motifs depicted in Levantine rock art panels (Photos by I. Domingo)

However, hunting scenes are but one among a wide variety of subject matters which include different sorts of social activities: warrior parades and conflicts, humans collecting honey, climbers, and maternity scenes. Furthermore, recent studies have demonstrated that the former representations of humans in LRA are not linked to hunting activities and that hunting scenes emerge only in the middle part of the sequence.

Chronology

LRA was originally dated to the Paleolithic and described as a regional variant of the Franco-Cantabrian rock art from Eastern Spain.

Iberian Mediterranean Basin: Rock Art, Fig. 3 Hunting scene (Cova dels Cavalls site, Valltorta Gorge, Castellón) (Martínez & Villaverde 2002)

However, in contrast to the Paleolithic cave art, LRA was depicted in open-air rockshelter sites. Similarly, while Paleolithic rock art mainly depicts naturalistic animals, LRA includes both naturalistic animals and dynamic human figures interacting in all sorts of narrative scenes. Currently, it is accepted that these significant differences between Paleolithic and LRA are not due to regional but chronological differences. Superimpositions of LRA over Macroschematic rock art, with parallels in Early Neolithic ceramic decorations, provide a minimum date for this tradition or at least for some of the chronological phases identified within this tradition (Martí & Hernández 1988). Thus, it is widely accepted that Levantine rock art was produced during the Neolithic. Whether the artists were the last local hunter-gatherers marking their landscapes as a response to the arrival of Early Neolithic farmers from the Middle East or they were the newly arrived farmers exploring and marking their new landscape to secure access to new resources is still under discussion (for a further discussion, see Marti & Juan-Cabanilles 2002; Martí 2003; Utrilla & Martínez 2007a; Cruz & Vicent 2007; Villaverde et al. 2012).

Sequence

LRA sites are palimpsests, with motifs and scenes of different styles and sizes gradually added to the same panels along different periods. Superimpositions and important variations in style, techniques, patterns of composition, and

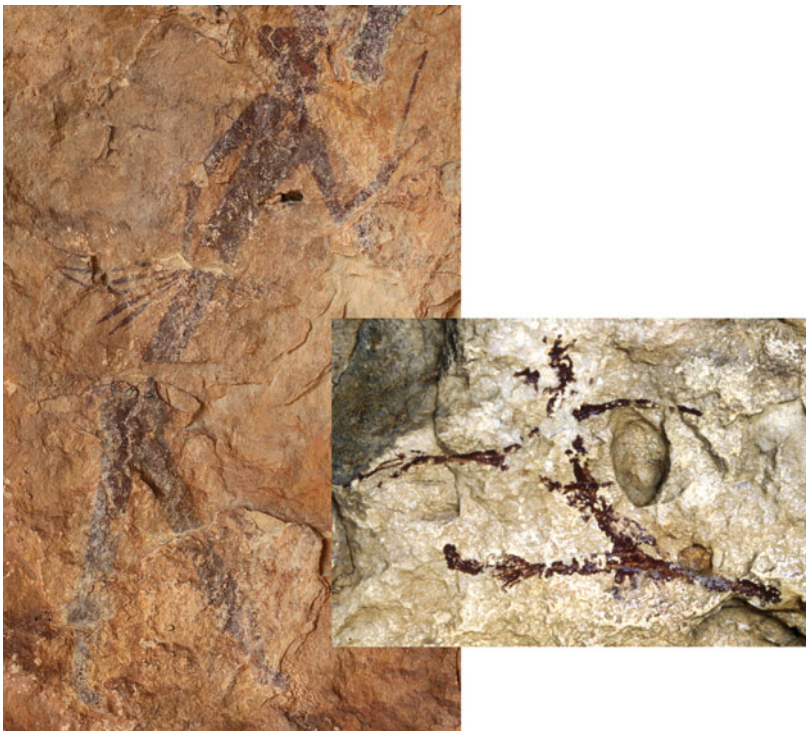

Iberian Mediterranean Basin: Rock Art, Fig. 4 Humans change significantly along the sequence, starting with naturalistic figures (*left*) (Tortosilla rockshelter, Ayora, Valencia) (Photo by I. Domingo) and ending with small linear ones (*right*) (Cingle de la Mola Remigia rockshelter, Ares del Maestre, Castellón) (Photos by V. Villaverde)

subject matter provide an order of styles, evidence of a complex and lasting tradition.

Contrary to human figures, the naturalism of animals remains more or less consistent throughout the Levantine sequence. Thus, humans are key to analysing the evolution of this rock art tradition.

Formal variations of humans from the Valltorta-Gasulla complex of sites show an evolution of at least five stages, starting with large, naturalistic humans, with body volume, accurate proportions, and all sorts of adornments (bracelets, bags, headdresses), and ending with small, schematic figures which lack body volume and which are out of proportion (Domingo 2005) (Fig. 4).

Similar schemas have been also defined in other Levantine territories, such as Aragón (Utrilla & Martínez 2007) or the High Lands of the Segura River (Mateo 2006).

These five stages also reflect certain thematic patterns within the Levantine sequence. Interestingly, there is an absence of hunting scenes in the initial stylistic episode, focused on different sorts of social activities (human parades, maternity scenes, wounded individuals, death scenes) (Fig. 5).

When hunting is depicted later on in the sequence, it starts from the specialized hunting of a deer. Only later in the sequence, we observe a broadening and diversification of the species (deer, wild boar, and wild goat). At the end of the sequence, both social and hunting activities are depicted but also other new themes such as scenes with people collecting honey and climbers.

In the same way, mapping the geographic distribution of specific motifs, techniques, or subject matters allows us to identify different schools or territorial behavior. For example, while bulls are especially significant in Castellón, Teruel, and Albacete provinces, wild boars are almost unique to "el Maestrazgo" (Domingo et al. 2003). So common traits do not mask regional specificities and different rhythms of change throughout the Levantine territory.

Thus, talking globally about LRA in the twenty-first century is to accept that a common

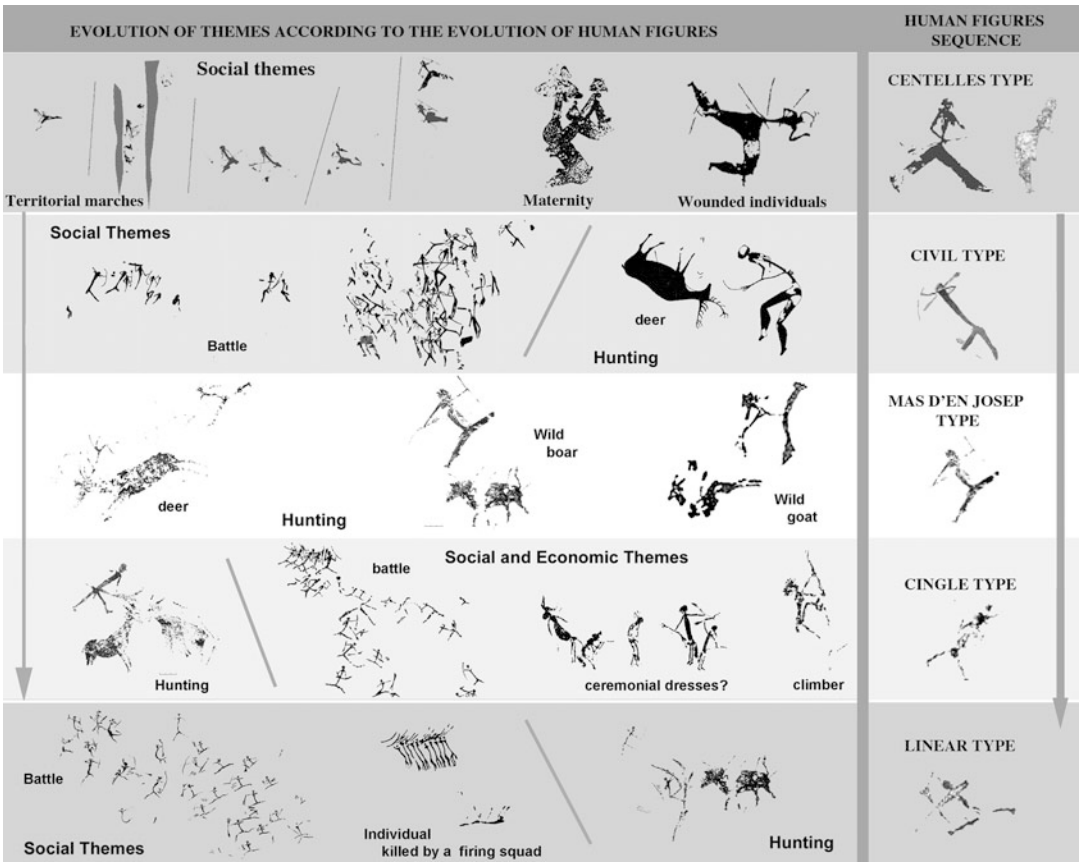

Iberian Mediterranean Basin: Rock Art, Fig. 5 Evolution of subject matters according to the stylistic sequence of human figures (Domingo 2012b)

tradition spread along a wide territory of the Iberian Peninsula, but time and the territorial behavior of the human groups caused gradual changes within this tradition.

Levantine rock art should be described as a network of artistic territories resulting from different rhythms of change and adaptation.

Cross-References

- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Europe: Paleolithic Art
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Ichthyoarchaeology

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Introduction

Fish remains include bones, otoliths, teeth, and scales, but their analysis has been a comparatively recent development within zooarchaeological research. Given their generally small size and the large taxonomic diversity fishes exhibit, the late implementation of adequate retrieval techniques and a general lack of reference collections no doubt contributed to that effect. Fish studies provide crucial evidence to address a variety of paleoenvironmental and paleocultural issues and have recently helped raise awareness about the importance of historical and prehistoric fish assemblages to contribute to the conservation and management of aquatic resources.

Definition

The analysis of fish remains from archaeological sites for the purposes of reconstructing the paleoecology of former aquatic environments and the paleoeconomy of past human populations.

Historical Background

The earliest studies of archaeological fishes were carried out by zoologists around the mid-nineteenth century. The papers by Herman Schlegel on the fishes from medieval Dorestad

(1842) and of Japetus Steenstrup on those from the Ertebølle culture, around 1850, are credited as the pioneer works. During the ensuing century, and except for work done on French Magdalenian sites (Sauvage 1875) and the review by Clark (1948) on prehistoric fishing in Europe, archaeological fish studies remained the *Cinderella* of zooarchaeology.

During the 1950s and 1960s, papers that one could label ichthyoarchaeological were mostly written by paleontologists and ichthyologists with scarce interest for anthropological issues. These studies dropped sharply after the 1970s and have always been of restricted value to archaeologists. The exception was Flannery's 1968 paper on the Broad Spectrum Revolution, where fishes were taken as evidence for a broadening of the human predatory niche starting with the Upper Paleolithic.

The 1970s witnessed a profound change in this state of affairs. Largely through the efforts of scholars such as Desse in France and of Johannes Lepiksaar in Sweden, fish remains became the focus of interest of archaeologically minded scientists. Casteel's 1976 handbook, mostly concerned with methodological issues, contributed further but it was the birth of the Fish Remains Working Group in 1981 that helped to consolidate ichthyoarchaeology as a subdiscipline within zooarchaeology. The 16 meetings of the FRWG, held between 1981 and 2011, have insured a fostering of cooperation among scholars and constitute the yardsticks where new analytical tools have been introduced and ideas confronted. There are now well over one hundred ichthyoarchaeologists in the world representing some 40 countries. These have proved instrumental for grounding fishes firmly within the theoretical framework of archaeological research programs.

Key Issues/Current Debates

Retrieval and Sampling

Few fishes feature large bones, most remains reaching only to a few centimeters. Such contingency precludes retrieval by hand. Indeed, hand-collected samples produced the biases that lurk behind some of the old "paradigms," like Roman fish-salting installations being exclusively devoted to the processing of tunas or fishing in Denmark during the Mesolithic being just focused on pike.

Although sieving is necessary to insure an effective recovery of remains and experiments have shown that species richness and diversity increase significantly when sediments are sifted through meshes of 3–1 mm (Zohar & Belmaker 2005), the decision as to what kind of mesh size to use will depend on the fishes one is likely to encounter, the type of sediment, and the state of preservation of the remains. Bødker-Enghoff (2005) evidenced that only a mesh size of 0.6 mm was capable of retrieving significant amounts of remains from the smallest fishes, as is the case of the smelt (*Osmerus eperlanus*). In general, ineffective retrieval of material can be ascertained through the high percentage of identifiable remains, a preponderance of the most robust elements (e.g., vertebrae), and their large average size.

Given the nonrandom distribution of remains that many fish assemblages exhibit, sampling constitutes a crucial issue. An adequate sampling strategy requires knowledge of various kinds. During Roman times, for example, the processing of tunas on the beaches where the animals were landed meant that most of the skeletal remains never reached the salting factory. If ever to gain knowledge about Roman tuna catches, the archaeologist should thus insure surveys of the coastal zones around those factories, to spot and eventually excavate such "fish cemeteries" along with the excavation of the site proper.

Taphonomy

Taphonomic data are crucial to correctly frame the analysis and interpretation of an archaeological fish assemblage. Although at most inland sites man has traditionally been credited as the main accumulator of fish remains, such is not necessarily the case at coastal deposits. Many piscivorous animals, in particular marine birds, accumulate large numbers of fish remains (Erlandson & Moss 2001). Likewise, natural

deaths, including episodic mortalities along a seashore or deaths resulting from the drying out of isolated pockets of water, are documented at both the local and regional scale to produce fish accumulations. Setting apart such "background faunas" from the archaeologically meaningful ones is far from straightforward and involves a combination of actualistic data (e.g., documenting those species of fish that suffer these episodes or are the targeted prey of certain predators) and taphonomical analyses proper, including micro-spatial studies of remains in situ, conditions of preservation, and presence of articulated specimens. Gnaw marks and traces of digestion often prove ambiguous, given their limited potential to provide species-specific signatures.

Fishes taken by humans exhibit many kinds of manipulative marks. In general, biostratinomic (i.e., pre-burial) signatures, associated with angling, gutting, de-fleshing, or cooking, are not that common. Often, it is to post-consumption processes that the analyst turns in order to gain information about the history of the fish deposit. These processes include trampling, scavenger attack, and fossil diagenesis (i.e., post-burial events). Only in industrial settings, where large numbers of fishes undergo a similar mass processing, or in large fishes, where butchering often implies hacking, can the analyst find clear signs of how were fishes handled prior to consumption.

Analysis of the sediment may prove helpful in explaining the taxonomical and/or skeletal composition of a fish assemblage. Barrett (1995) found that a pH of 8 was the threshold below which otoliths were unlikely to survive in a deposit. These kinds of data are more useful as predictors of survivability when combined with ethnographic and contextual information. There also exist biological phenomena that dictate differences. Ossification is very different in the two main groups of fishes (i.e., bony and cartilaginous) but also in the different elements of a skeleton. Here, lipidograms may provide rough blueprints as to what one may expect in terms of relative abundances. Idiosyncratic features, such as the calcium resorption taking place in the cranial bones of salmonids when in freshwater, have led to remarkable misinterpretations (i.e., the pseudo-hypothesis of the beheading of salmons). Such contingencies, along with others such as how rapidly remains were buried after discard or how active were the fungi and bacteria of a particular soil, create skeletal and taxonomic abundance profiles that have little to do with human behavior. Provided with the adequate tools, the analyst should nevertheless manage to "read in between the lines."

Identification

Some 95 % of the bones in a fish skeleton are not diagnostic and most remains survive only as fragments. Even diagnostic elements exhibit such anatomical and taxonomic variability to render identification an extremely laborious task (Fig. 1). Identification of fish remains needs to be carried out with an adequate reference collection, but what adequate means is not always clear. Indeed, since the ranges of most marine species have experienced dramatic shifts in the past (Kettle et al. 2010) and many species have been traded over long distances, building up a reference collection often requires incorporating species not present in the particular area one intends to investigate. It also proves useful to incorporate specimens of different size from the same species, given that size implies morphological differences in certain elements. Reference collections for the purposes of ichthyoarchaeology are still uncommon in museums, and this has forced many analysts to build up their own collections.

No practical alternative exists for the reference collection. Atlases and equivalent publications are rare and often not that useful, except perhaps for the experienced analyst. There exist logistic reasons for this being so (e.g., the impossibility of providing a comprehensive survey of taxa and elements), but more often these reasons have to do with practical considerations (e.g., fragments are never depicted). Fish bone morphology is a size-dependent variable so that one species may exhibit different morphologies with different sizes. This is a general phenomenon for vertebrates that grow throughout life.

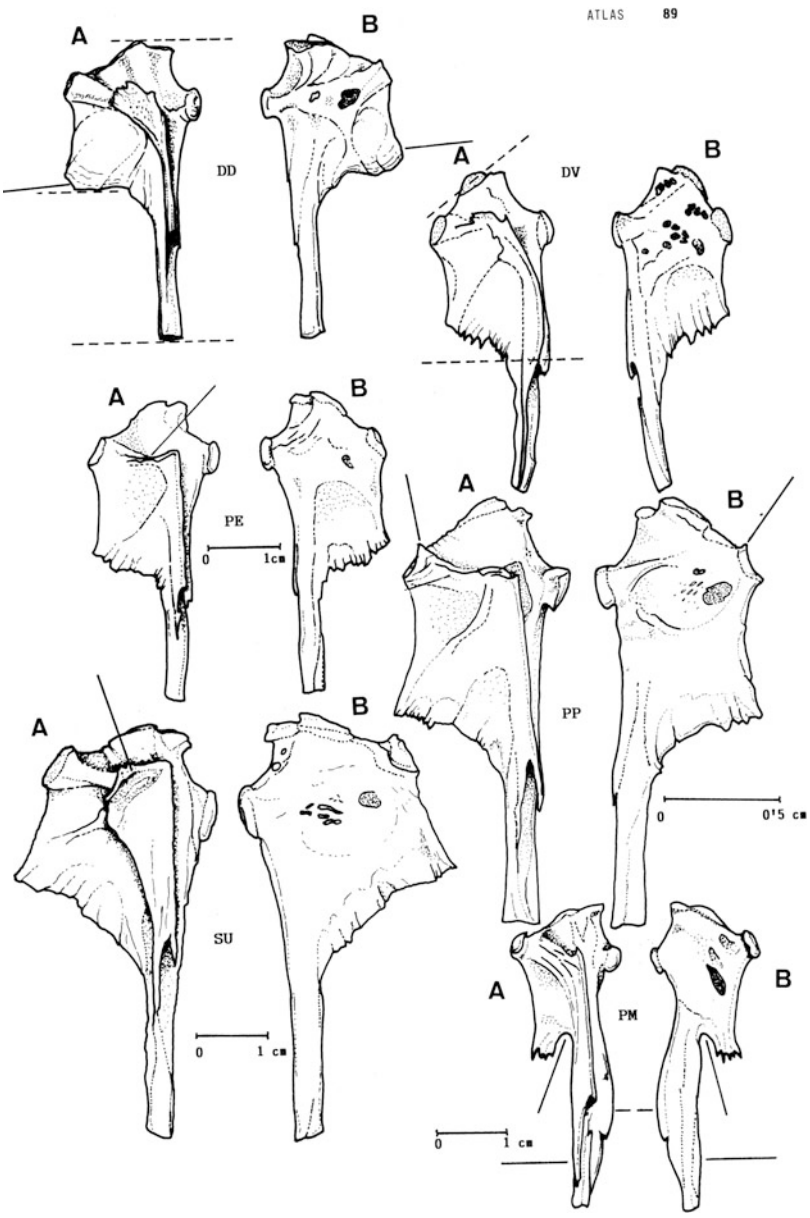

Ichthyoarchaeology, Fig. 1 Hyomandibular bones of Mediterranean sea breams (Sparidae) and a grunt (Haemulidae, *lower right*). Although most of the diagnostic fish bones are quite easy to assign to Family or even to Genus level, assignment to species relies on very subtle differences that are often lost in the fragmented bones one retrieves in archaeological deposits (Taken from Roselló 1989)

In other instances, closely related species exhibit diagnostic morphologies only above a certain size threshold so that identification of juveniles only proceeds down to the level of Genus or Family. These often prove far too coarse to provide data of interest, given the marked differences at the level of diet, distribution, and behavior that closely related species exhibit.

Among the alternative identification methods, frontal X-radiographs of vertebrae have proved of value in some cases (e.g., salmonids, gadids), less so in others (e.g., catfishes, characins). Radiographs are also impractical for reasons having to do with logistics and safety and have been essentially abandoned although from time to time they resurface at the front line of research.

Current genetic methods enable highly specific identification from modern fish, yet ancient DNA studies are still in an incipient stage despite having provided spectacular results

in some groups (Yang et al. 2004). One major drawback is that, due to conditions of preservation at many sites, success rates of DNA recovery are low (i.e., 2–5 %). Although aDNA cannot be taken as a viable alternative to osteology, it may often help address issues where the precise identification of certain remains could be of great relevance. Another promising technique has targeted at the "molecular barcode" of the collagen protein. *Zooarchaeology by Mass Spectrometry* (ZooMS) measures the differences between peptide masses in the collagen protein through mass spectrometry, identifying fish species in much the same way as DNA fingerprinting does (Collins et al. 2009). Given that sequences can be rapidly and cheaply identified, that collagen persists in most archaeozoological samples, and that the specificities of its signatures are highly diagnostic, ZooMS should soon witness an explosive development (being unfeasible on burned remains only constitutes a minor drawback).

Estimating Abundance and Importance

Of the major estimators of abundance, only the NISP (i.e., the number of identified specimens) and the MNI (i.e., the minimum number of individuals) have been regularly used by ichthyoarchaeologists. Given the large differences in the total number of elements among the various groups (i.e., vertebral counts range from 24 to 150) and that some species feature far larger numbers of diagnostic elements than others (e.g., up to 500 spines in the porcupine fishes), the MNI or its equivalent alternatives, such as the MNE (i.e., the minimum number of elements), are to be preferred to the NISP. But this is only possible provided that samples are of a reasonable size (i.e., $\geq$500). When collections are small, interdependence presumably becomes less of a problem and use of the MNI deflates specimen counts to ludicrously low values. Under such circumstances, analysts often turn to the NISP despite all of its inherent weaknesses.

Numerical abundance is but one way of assessing importance. Another estimator of importance is weight, far too variable in fishes to prove of help. Cultural indicators of importance, such as food avoidance behaviors, alternative names given to a particular species, or the prices species command on the market, depend on the availability of ethnographic and documentary records, neither of which proceed beyond Classical Antiquity. In the case of fishes, one should also stress that social importance is not necessarily a reflection of economic importance, many species being esteemed only on account of their rarity, large size, or some extraordinary feature (e.g., poison).

Size Estimation

Given that fishes grow throughout life, fish size reconstruction is a valuable provider of information in ichthyoarchaeological studies. The method is based on the relationship that exists between a particular dimension of a bone and the various lengths (i.e., standard, fork, or total) of the animal. Matching archaeological specimens with their equivalents of known body size, either visually or through measurements, is the most straightforward procedure but requires large reference collections. The absence of precise equivalents renders the method unfeasible or turns it into a dangerous exercise of extrapolation. Another alternative is the power curve equation, using the least squares regression or an equivalent method. This is done by plotting specific bone measurements from specimens of known size against the original fish length. This is a laborious method that requires the preparation of a large number of specimens covering the whole size range of a species, not an easy task nowadays in the case of the largest animals. Regression equations describing such relationship are available for most of the main bones from most of the archaeologically relevant species. Large numbers of archaeological bone measurements can thus be converted into estimates of length, and these, in turn, be used to calculate statistical parameters, such as the mean and standard deviation. These data provide the basis for reconstructing the size-frequency histogram which represents the prehistoric fish catch (Fig. 2). It should be stressed that isolated values here represent only estimations. For this reason, it is advisable to allocate them within size

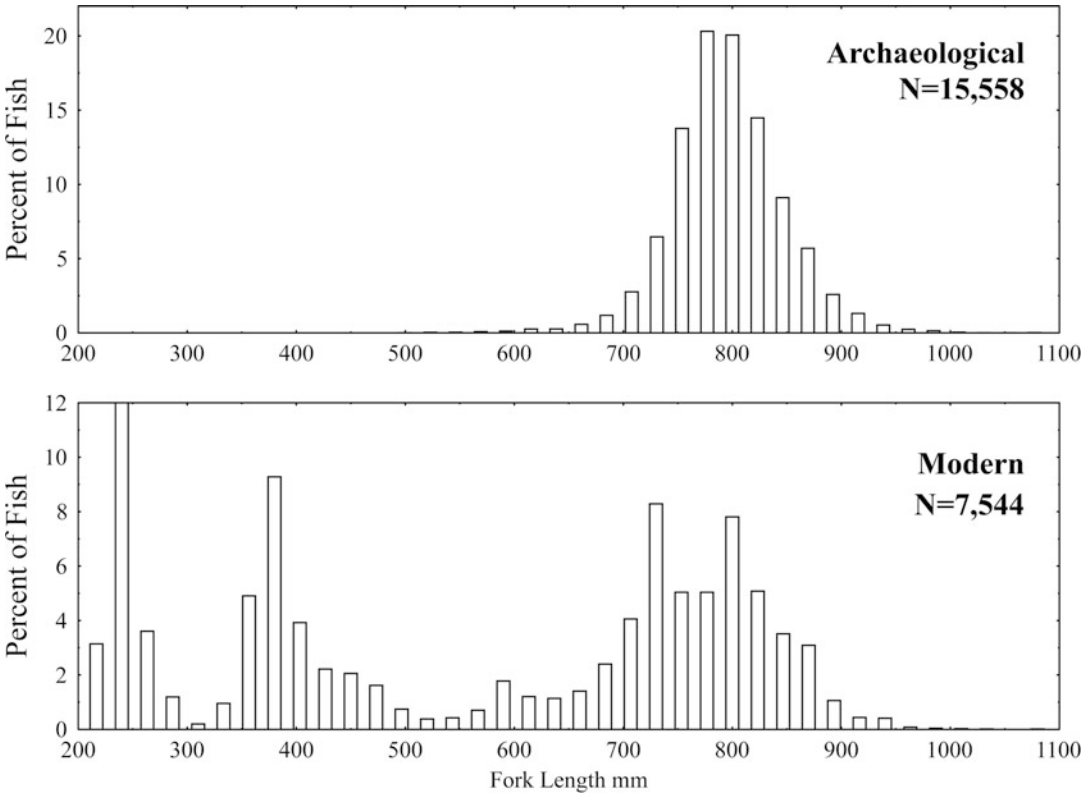

Ichthyoarchaeology, Fig. 2 *Upper*: Size-frequency histogram of Barracouta (*Thyrsites atun*) fork lengths from the site of Long Beach (Otago, New Zealand) based on 15,558 bones. *Lower*: A modern trawled catch of Barracouta from New Zealand. These data indicate that the prehistoric catch targeted only the largest specimens of the population (Taken from Leach 2006)

classes that, depending on the size of the species, range from less than one to more than 10 cm.

The estimation of weight follows the same procedures as those of size but is far less accurate, since depending on their condition, the time of the year, etc., fishes of identical size can have very different weights. Weight-frequency histograms are therefore built on weight classes with far larger range than those for size.

The size of fishes provides crucial information not only about human choice, fishing technology, and selective behavior but often about the environment from where the fish assemblage was taken.

Seasonality

Fish remains have been said to document whether a site was occupied on a permanent or a seasonal basis. However, in most cases, what the analyst manages to reconstruct is the scheduling in the catch of this specific sector within the overall animal exploitation strategy. This is possible because fishing is often a seasonal practice modulated by the migration of species during a particular time of the year, or the restriction, for human populations in the past, of marine navigation to the spring and summer months.

Seasonality can be documented by the presence of certain species, the size distribution of the archaeological population, and through skeletochronological techniques. These procedures rest upon actualistic studies that require a sound knowledge of the biology of the animals and how this changes from place to place (Fig. 3). Only well-dated levels, representing short-lived episodes, are likely to provide clear seasonal

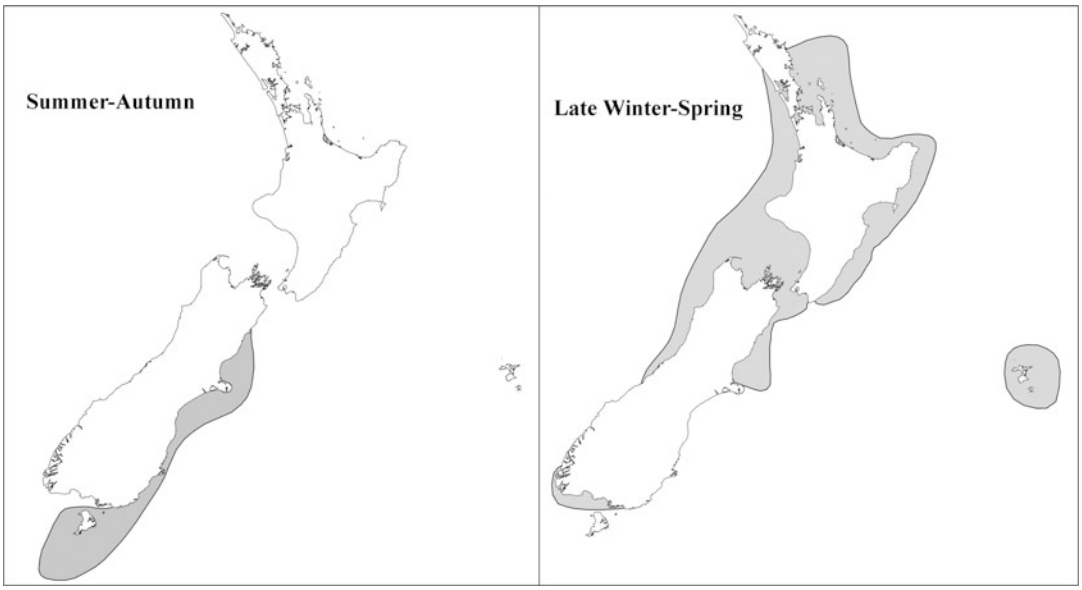

Ichthyoarchaeology, Fig. 3 The seasonal pattern of Barracouta catches in New Zealand waters today. These maps provide the baseline to decide whether a particular coastal site was occupied at a specific time of the year or not (Taken from Leach 2006)

signatures as these tend to fade away when levels represent pooled averages from many episodic and non-episodic fishing events.

Seasonal fishing is exemplified by the presence of anadromous fishes, such as salmon and sturgeons, at inland sites. Equally informative are marine fishes such as sardines and tunas that approach the shore with the onset of spring or summer. The best "bioindicators" are those species appearing only during a very short time (e.g., 1 or 2 weeks), such as the smelt. In general, the higher the latitude, the more concentrated the presence and the more reliable "bioindicators" are. The analyst only needs to insure that local fishing, not import, has been the reason for that presence. To this end, skeletal spectra, evidencing the presence of complete specimens, often prove helpful.

When fishing is conducted on a nonseasonal basis, fishes of many different sizes within the same species stand a chance of being collected. This creates a bell-shaped distribution of size classes (i.e., age groups or cohorts) devoid of marked peaks. Seasonal fishing, on the other hand, tends to concentrate on specific cohorts, producing size class histograms with discrete peaks of abundance (i.e., non-normal distributions).

Within the realm of ichthyoarchaeology, skeletochronology, the study of the growth rings produced by organic structures, also aims at determining the moment of capture. Given that one can only assess this through the thickness of the last (i.e., outermost) growth ring and that most archaeological specimens are eroded on their margins, the method is often of restricted value. These estimations suffer from the small sample size of archaeological collections and also from a lack of comparison of data with modern samples to validate results. The few analyses carried out on modern otoliths evidence that the timing of the seasonal changes in the edges of these calcareous concretions is extremely variable, so that data from just one or very few elements is useless as a seasonality indicator. Even on large archaeological assemblages, determining seasonality is impossible if the fishes were not captured during their period of fast growth. Given these problems it should come as no surprise that skeletochronology is no routine procedure for ichthyoarchaeology.

Trade and Processing

Throughout the Paleolithic, fishes were consumed at the spot they were fished. This pattern held during the earlier part of the Holocene although it has been postulated that the village of Dalma in SE Arabia (5000 BCE) could represent the earliest fish processing center in the world (Beech 2004). The earliest evidence of marine fishes being transported inland in this area dates from the Iron Age (Rafaq, Oman peninsula, first millennium BCE), and a few hundred years later, the first unequivocal evidences of fish trade (i.e., fish remains in amphorae) appear in the Mediterranean. Such trade has been postulated to be a side effect associated with surpluses that resulted from improvements in fish catching methods (e.g., boats, seine nets) and methods for meat preservation (e.g., oil and vinegar).

Once fish trade becomes firmly established, fish assemblages deriving from subsistence fishing need to be set apart from those resulting from fishing for export. Although no single signature is sufficient to set apart the two groups, the combined use of parameters such as the total NISP/MNI per site, the diversity of species (higher in "subsistence sites"), the representation of elements, balanced in subsistence settings and skewed in industrial settings (e.g., the "heads stay vs. tails travel" model of cod trade circuits), and a normal distribution of sizes (subsistence) versus a clustering around specific values (export) often allows the analyst to accomplish that. At sites where commercial fishing for export was practiced, one often finds highly standardized treatment of the fishes. This may involve cut marks on the same portion of a particular element or the removal of some diagnostic portions of the skeleton as was often the case for the pectoral girdle in herring that were gutted prior to salting.

Molecular methods have more recently allowed ichthyoarchaeologists to reveal the provenience of specific fish products. Polymorphisms on the mtDNA control region of *Clarias gariepinus*, for example, define regional haplotypes that have allowed analysts to determine that imports of this catfish into the Roman city of Sagalassos, Turkey, originated on the Lower Nile (Arnt et al. 2003). Likewise, through stable isotope analyses ($\delta^{13}C$ and $\delta^{15}N$ typing) of cod populations from the NE Atlantic, Barrett and collaborators managed not only to reveal the provenience of specific cod bones at various northern European sites but also to determine that the onset of long-distance trade for cod did not start until the thirteenth century CE (Barrett et al. 2011).

The presence on archaeological sites of fishes imported from distant lands has been often considered an indicator of high status. Recent research on the subject, while not denying this possibility, stresses the need to be careful with simplistic interpretations given that many products, as was the case of some of the lower quality fish sauces in the Roman world, were readily accessible to all levels of society (Van Neer & Ervynck 2004).

Fish Catching Methods

Fish catching methods can rarely be inferred from the fish assemblage because many species can be taken in a variety of ways (i.e., the problem of equifinality), whereas a hook of a given size and shape can take a large number of species (Morales 2010). Fishing gear provides less ambiguous information but, except for items such as weights and hooks, executed on stone and metals, tackle made from perishable plant fibers is often lost. Even when present, such gear might be easily missed for lack of an appropriate analogue. It is for such reasons that documentary and ethnographic records often prove instrumental for a correct interpretation of the evidence.

Occasionally, one is able to spot shifts in the fishing strategy through changes in the diversity of species or their size distribution. As a rule, people started to fish on shallow waters and later moved to less accessible zones. In the prehistoric Mediterranean the most littoral taxa, such as the groupers (Serranidae) and the sea breams (Sparidae), were targeted previous to the Neolithic and afterward pelagic groups, such as clupeids and scombrids, are documented systematically (Fig. 4). Such a rise in the number of fish taxa undoubtedly reflected improvements in fishing and navigation technology through time, but it often proves difficult to link both datasets causally.

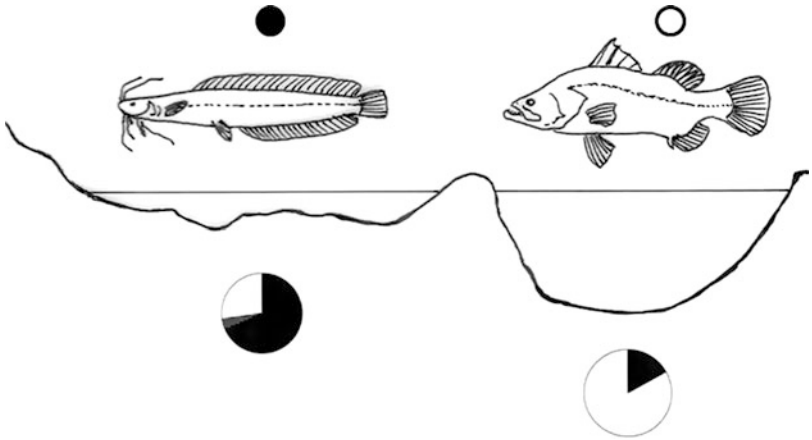

Ichthyoarchaeology, Fig. 4 The development of fishing in the Nile witnessed an early stage when species that inhabit the more readily accessible waters of the floodplain, such as the catfish, *Clarias gariepinus* (*black circle*), were preferentially taken. Later, as fishing technology and navigation improved, species inhabiting the main river channel, such as the Nile perch, *Lates niloticus* (*white circle*), are recorded in far greater numbers in the deposits (Taken, with modifications, from Van Neer 2004)

International Perspectives

From total neglect to full integration into archaeological research, a series of "methodological stages" can be defined in the development of ichthyoarchaeological research for any given area on the basis of output. Interest in fishes without the implementation of the adequate retrieval methods, for example, results in extremely poor and heavily biased samples of scarce scientific value where fish remains often are listed as *Pisces indet*. Once the problem of retrieval is solved, the lack or inadequacy of the reference collection is manifested in that bone reports can rarely proceed beyond the level of Family, being also of quite restricted value. This stage is often associated with areas where the potential number of ichthyoarchaeologically meaningful species is high (e.g., coral reefs, tropical freshwaters) and many species are difficult to set apart from each other. Only when fine retrieval produces large, contextually and temporally well-defined, samples and a good reference collection is at hand can the full potential of ichthyoarchaeological research come to effect.

From a geographical standpoint, only when the number of good, local, studies reaches a certain threshold can the analyst look for patterns that integrate data into regional models. Very few areas in the world, mostly in the temperate latitudes, have reached such a level of integration. As regional trends emerge throughout the world, one could foresee a time when these would merge into an all-encompassing worldwide picture. This would allow for a better framing of variability from both the vertical (i.e., temporal) and horizontal (i.e., spatial) standpoint. Researchers would then be in a more adequate position to explore how the interaction between fish populations and people contributed to shape human evolution and that of aquatic environments.

Future Directions

Ichthyoarchaeology has been traditionally addressing archaeological questions and it seems that it will keep that way in the future. However, fish remains from archaeological sites represent an important source of knowledge for researchers in the life sciences, and it will only be a matter of time before a systematic collaboration between the two fields emerges. Researchers and

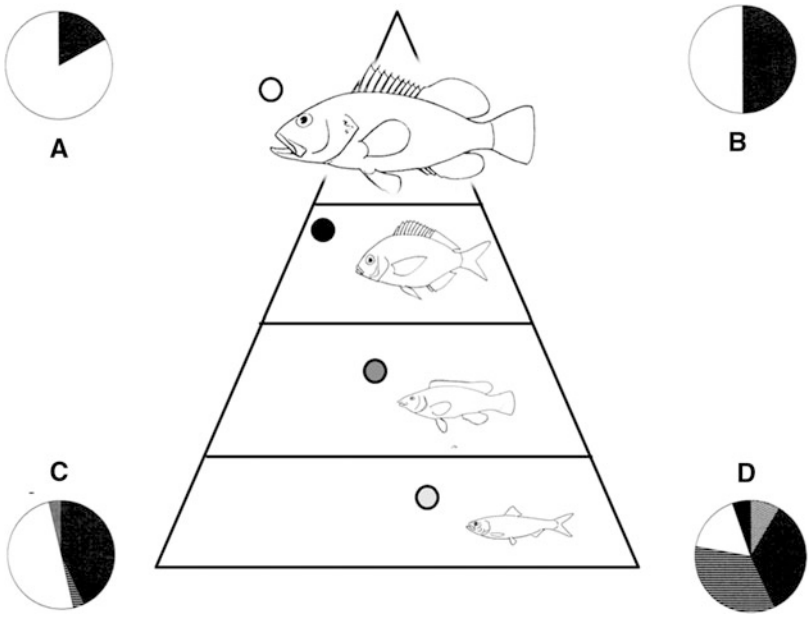

Ichthyoarchaeology, Fig. 5 "Fishing down the food web" is a popular theory on the development of fishing that has lately gained ground within ichthyoarchaeologists. This hypothesis maintains that, in the "pristine" environments of the Upper Paleolithic, people tended to concentrate their fishing on large, predatory, fishes such as the salmons and the groupers (*black circle*; condition depicted in (**a**), and as these stocks became (locally) depleted, they (progressively) turned to species lower down the food chain, thus more abundant (*white* and *gray circles*; conditions depicted in **b**, **c**, and **d**). While there exists historical evidence testifying to the validity of some of these postulates, it is equally true that the idiosyncratic variability most sites exhibit demonstrates that there is a lot more to species shifts in the past than a mere human-dictated directional trend and also that absences of small-sized species at the base of the food chain (*light gray*) may even represent instances of not sieving with the appropriate mesh size

policy makers in the life sciences require adequate baselines to issue guidelines for the appropriate conservation of species and a sustainable use of resources. The research likely to emerge from that collaboration would benefit from the fact that ichthyoarchaeology has the potential for providing a far deeper time scale, thus baselines closer to the original (i.e., "pristine") conditions, than the time frame available for researchers and policy makers thus far.

One field where ichthyoarchaeology has already made some progress is that of fisheries research. Given that systematic catch statistics are only available for the past century or so, these contributions focus on determining the antiquity of intensive exploitation of commercial stocks. Large-scale fishing has been loosely documented throughout the Mediterranean since c. 1000 BCE, but the work by Barrett et al. (2004) has been the first to demonstrate that in England the clearest changes in marine fishing occurred rapidly around CE 1000 (i.e., the so-called fish event horizon) and that these involved substantive increases in the catches of cod and herring. Still, most of these studies do not often proceed beyond qualitative terms (Fig. 5). In order to address the impact of past fisheries quantitatively, large numbers of well-excavated, primary deposits covering the appropriate time intervals and featuring large assemblages of fishes will be required. These assemblages should produce high-resolution catch composition if they are able to provide statistically relevant data about size ranges and other biological parameters such as sex (Fig. 6).

A second area where ichthyoarchaeology is likely to make a meaningful contribution is that

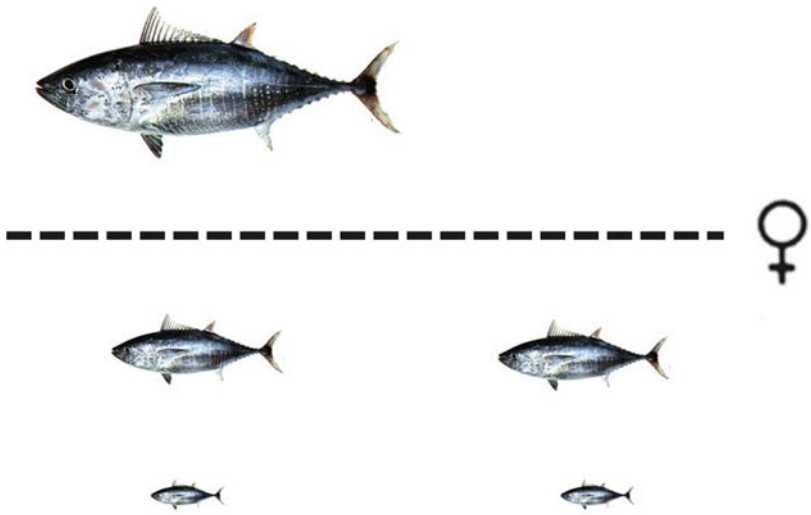

Ichthyoarchaeology, Fig. 6 Many fish species change sex as they grow. In protandrous species – i.e., those where males turn into females after reaching a particular size (*dotted line*) – a systematic removal of the largest specimens can have dramatic consequences for the viability of the stocks unless the animals are able to accommodate their ontogeny to the fishing pressures

of conservation. Fish distributions changed radically in the past as a result of environmental shifts but also due to human interference, including overexploitation of the stocks, translocation of species, pollution, and civil engineering works. These changes have been occasionally recorded, either as faunal turnovers, such as that of pollution-tolerant eels and cyprinids replacing salmonids in the rivers around the Middle Age cities of Europe, or simply through the extinction of different species. Seldom have these data been of use in fish habitat restoration efforts though the few contributions in this field look very promising (Butler 2011).

From the standpoint of methods, the explosion about to take place will involve the mass deployment of molecular techniques, including stable isotope and geochemical analysis, in addition to the DNA and collagen analyses now in use. Such deployment will not only allow for the identification of many as yet unidentifiable remains but also help in the resolution of past biogeographic patterns and the recent evolution of fishes.

In terms of conventional identifications, online atlases, such as that available at the Archaeological Fish Resource site (http://fishbone.nottingham.ac.uk), though still in an incipient stage, are bound to become essential tools. One can foresee a time, as digitized images allow for the rotation of the elements, incorporate fragments and bones from animals with different sizes, etc., when digital atlases will take the place of the conventional reference collection. This would enhance the labor of researchers in the field and of those forced to identify samples in their countries of origin.

Cross-References

- ▶ Biometry in Zooarchaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ Isotope Geochemistry in Archaeology
- ▶ Zooarchaeology
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)

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Iconography in the Roman World

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Introduction

The Roman world was populated by images. They could be encountered everywhere, in both public and private areas, as decorative aspects of

buildings or decorations on individual objects, during shows, and on enduring monuments. These images carried political, cultural, and ethical messages that were relevant for the public discourse, which promoted in a propagandistic way values that were depicted as building blocks of the collective identity. They were also relevant for the private discourse for their contribution to the illustration of the personal interests of owners and consumers. The Roman culture was a visual culture, the interaction between image and spectator was very close, and images were one of the most direct and efficient communication channels.

Definition

For this entry, we have chosen to consider as "Roman iconography" the ensemble of images and figurative representations that were popular in the Roman world of the Republican and Imperial periods. The use of a more specific definition to narrow the investigation to topics considered more authentically Roman, in other words without immediate and recognizable Greek precedents (state-level ceremonies and portraiture), would be misleading. In fact it is very difficult to draw a distinction between the two iconographic traditions; it would be impossible to reconstruct the imaginary of an era and its political, cultural, and social evolution. Nevertheless, the studies of Paul Zanker on the creation of the new visual language in the Augustan period constitute an exemplary body of work (Zanker 1987).

When we deal with iconography in the Roman world, we have to face the problem of the close relationship between reality and representation, the key role of images in the preservation of memories related to an event or a person, the indissoluble connection between an image and its model, and the ability to recreate the illusion of the presence of a person by means of a static statue. Consequently, an image could evoke strong reactions in spectators (Gregory 1994). The power of the image widens beyond its religious and propagandistic meaning, as demonstrated by the various ways in which images have been condemned in the Roman society. Here we can recall the sanctions against memory (referred to by scholars as *damnatio memoriae*) imposed on the names and images of unpopular emperors, disgraced family members, and usurpers for reasons of politics and ideology (Varner 2004).

Romans themselves were conscious of the importance of images in their society; the Greco-Roman culture of the Imperial period focused its attention on the meaning of images with the conviction that they covered a role of primary importance for the *paideia*. The idea that the role of imagination (*phantasia*) could bring the artist closer to the poet was shared by intellectuals. The description of images (*ekphrasis*) became an autonomous genre in the second century BCE; several authors adopted it as their subject such as Philostratus the Elder and Philostratus the Younger and Callistratus. Their works offer a very interesting summary of ancient iconographic and iconological thought and of its exegetic methodology (Abbondanza 2008).

Another important field of investigation is the ancient reaction to pantomime and the meaning of the mythological *tableaux vivant* performed by dancers: Plutarch, Lucian, and most of all Libanius (*Orationes* 64.118) have in fact described the connection between pantomime and images, granted by the analogy between durable iconographies, represented through monuments, buildings and objects, and ephemeral iconographies, visible at theatrical performances, rituals, and public ceremonies.

Key Issues

A Ceremony That Generates Images: The Triumph

In public art, the interaction between the reality of state's ceremonies and their idealized representation was constant as we can deduce by a brief analysis of the triumph, a ceremony capable of generating a wide iconographic repertoire (La Rocca & Tortorella 2008). The triumph itself was a sumptuous and multimedia scenographic show; images had a prominent role in

this scenario: statues and paintings were exhibited in the parade (the so-called *tabulae pictae*, painted panels representing the highlights of military campaigns, together with the personifications of defeated populations and the artworks taken away from the enemy) together with real *tableaux vivants* composed by the prisoners wearing their national costumes (Fig. 1c) or by the triumphator driving the *quadriga* (chariot) wearing the characteristic triumphal clothing, especially the *toga picta* (Fig. 1b–f).

The Roman triumph was also a subject for iconography. The parade was part of the standard repertoire of Roman public art, the ceremony could have been depicted in its entirety (cf. the processions illustrated in the "small friezes" of the Arches of Titus and Septimius Severus in Rome and the Arch of Trajan in Benevento (Fig. 1e)), or just some of the main monuments of the parade became subject of iconography (the two reliefs illustrating the exhibit of the war chest (Fig. 1d) and the *quadriga* of Titus (Fig. 1a) located in the *fornices* of the Arch of Titus provide a good synthesis of Jewish triumph in 71 CE). Besides, the triumphator could have been depicted wearing his triumphal costume (cf. the statues of the *triumphali ornatu* and the use of the triumphal crown) and the *tabulae pictae* could have been transformed into monuments.

The historical reliefs depicting the Parthian war of 198 CE on the Arch of Septimius Severus are probably the marble copy of the paintings sent to the senate by the emperor together with the written reports of the military campaign (Herodian *Ab Excessu Divi Marci* 3.9.12). The transposition of these images on the triumphal arches erected along the very same itinerary followed by the ceremony increased the sense of correspondence between reality and representation, highlighting also the themes of eternality and universality of Rome's victory. The iconography of the Roman triumph exploited the qualities of images to communicate a message and the relationship between reproduction of a specific and unique ceremony and the symbolic meaning of its never-ending repetition in the many triumphs celebrated in Rome for centuries.

Costumes and Statuesque Types in Portraiture

Another key ceremony that helps to understand the connection between reality and representation in the Roman world is the funerals of nobles; they had an important role in the transmission of gentilician memory since the Republican period. As has been reported by ancient historians (Polybius *Historiae* 6.53.6-8; Diodorus Siculus *Bibliotheca Historica* 31.25.2), during funeral processions, actors represented the deceased's ancestors, wearing costumes (*habitus*) that recalled the public role of the ancestors at the peak of their political career while also wearing a mask depicting their features. In Roman society, in fact, social, political, public, and private status were expressed through clothing; accordingly, matters related to costume were often at the center of public debate as shown by the identity meaning attributed to the toga in opposition to the Greek cloak/*pallium* (Cadario 2010).

The creation in portraiture of a language related to the bodies of statues comes from the close relationship between costume and social identity/*status* and from the relation between choice of the statuary type and the motivations behind the dedication of a statue (Fejfer 2008; Cadario 2011). This language was based on the functional distinction between the statue's face that had to depict features and character of the person and its body that had to give more "objective" information about public role, career, and deeds. This language of bodies was codified between the end of the Republic and the beginning of the principate. It was based on a conventional repertoire of statuary types; often of Greek origin, it was changed in its format, costume (*habitus*), posture, gestures and "attributes" (*insignia*), and objects held by the subject (patera, scroll, lituus, wand, globe, lightning, weapons) or used as support located at the side or underneath a foot (armor, shield, *rostrum*, barbarian prisoner). Colors could also give important information; for example, they could help in distinguishing various kinds of toga while the choice of the statuary kind was done taking also into account the location, an

Iconography in the Roman World, Fig. 1 The iconography of triumph. (**a**) Titus on triumphal quadriga (relief, Rome, Arcus of Titus). (**b**) Octavian on triumphal quadriga (Denarius struck by Octavian). (**c**) Triumphal procession with prisoners (relief, Rome, Museo Nazionale Romano). (**d**) Triumphal procession with spoils (relief, Rome, Arcus of Titus). (**e**) Trajan on triumphal quadriga ("small" frieze, Benevento, Arcus of Trajan). (**f**) Marcus Aurelius on triumphal quadriga (relief, Rome, Musei Capitolini)

essential part of the symbolic evaluation of the statue's dedication.

The diffusion of imperial statues and their frequent reunions displaying cycles of various members of a dynasty in power led to a clearer standardization of the bodies' language and an increasing internal diversification of repertoire to be able to express through the statuary types the internal hierarchies among the honored as much as their specific merits and public roles. The buyers were taking into account the reciprocal hierarchy and the meaning of each statuary type when they had to establish the modalities to honor the person.

The formats of Roman portraits, recalled also by Pliny the Elder (*HN* 34.18-20) in hierarchical order, included statues on cart (*quadriga* or *biga*) and equestrian statues (Fig. 2a), in sitting position (Fig. 2g) and standing. To these full-figured images we have to add the so-called abbreviate (*imagines clipeatae* (Fig. 2i), busts, herm) formats; in this case, more importance was given to the face, and the size of these statues offered the advantages of handiness and cheapness and they were mainly used in private funerals. For what concerns male costumes in portraits, at least in the western part of the empire, they were toga, armor, and nudity, respectively, symbolic of civilian, military, and "heroic" conditions. Other costumes, such as the *pallium* (the Greek cloak), were excluded from the public image in Rome, but not in the Greek cities, where they continued to illustrate the condition of good citizen; others, such as statues with Lupercus's or hunting clothes were much more rare. On the other hand, when it comes to female portraits, statuary types gave little importance to the realism of the costume (with a few exceptions: vestal portraits and those where the subject was wearing a *stola*); they rather prefer to take inspiration from the repertoire of Greek sculpture masterpieces to emphasize qualities (fertility or beauty) or virtues (chastity) and sometimes to give to the subject the appearance of a goddess.

Toga was the Roman civilian robe by excellence at least at official ceremonies, it was symbol of citizenship, complex distinctions of rank, class, and age (children wore an amulet around the neck (*bulla*), while triumphal statues wore the *toga picta*, identifiable by the colors). Accordingly, the statue with a toga was the most diffused and appreciated at all social levels; it was adopted by both *élites* to indicate their career and "provincials" to show their new status of freeing or citizenship. The costume changed over the centuries; its drapery evolved depending on fashion, political, social, and cultural reasons (Fig. 2b, c).

The cuirassed and naked statues, both borrowed from the Hellenistic world, if compared to the ones with togas, gave less specific information about the rank and career of the subject honored, but they assigned him warrior charisma and a superhuman aura. The cuirassed statue (Fig. 2d), born as a royal costume, was mainly used to highlight duties and military merits, its main public use was progressively limited to emperors and imperial family members. This statuary type also offered the advantage of using the armor's surface for decorations illustrating typical topics of military propaganda; in this way, the cuirassed statue became a very efficient figurative *medium* such as in the breastplate of Augustus' statue from Prima Porta; the restitution of Crassus' legionary standards to the Roman people (20 BCE) has been placed in a cosmologic contest coherent with the beginning of the new golden age granted by the Augustan peace (Fig. 2h).

Nudity has been considered a costume that did not belong to the Roman tradition until the second century BCE when the prejudice against athletic nudity was overcome. After this, weapons were exhibited to add military charisma to the representation. The message, in naked or semi-naked portraits, was symbolized by the objects carried by the subject or used as a support and by the drape of the cloak; the drape could suggest heroic or divine characteristics. Statues with the cloak worn around the hips (*Hüftmantel*) (Fig. 2e) were more prestigious if compared to those that were completely naked (Fig. 2f). These considerations over the meaning of the costumes chosen are valid for statues as well as for images with the toga, *lorica*, or nudity included in reliefs, coins, or paintings.

Iconography in the Roman World, Fig. 2 Language of bodies in Roman portrait. (**a**) Equestrian statue of M. Nonius Balbus from Herculaneum (Napoli, Museo Archeologico). (**b**) Republican togate statue, the so-called Arringatore (Florence, Museo Archeologico). (**c**) Togate statue of Augustus from Via Labicana (Rome, Museo Nazionale Romano). (**d**) Cuirassed statue of Drusus Maior from Caere (Rome, Musei Vaticani). (**e**) Hip-mantle nude statue of Divus Claudius (Ancient Olympia Museum). (**f**) Nude statue of Gaius Caesar (Ancient Corinth Museum). (**g**) Seated togate statue (Rome, Museo Nazionale Romano). (**h**) Breastplate of Augustus' cuirassed statue from Prima Porta (Rome, Musei Vaticani). (**i**) Imago clipeata with a togate bust from Cuma (Museo Archeologico dei Campi Flegrei)

"Roman" Iconographies: Public Ceremonies, Ludi, and Scenes of Work

The tendency to create a repertoire common to the entire empire is also present in another important aspect of Roman art (Elsner 1998: 27-51). The representation of significant historical events and the reproduction of main ceremonies and institutions typical of the public life constitute a key component of Roman art and iconography (Alfoldi 1999; Holliday 2002). A single historical event could have been represented to amplify, through its replica, its meaning in the political competition. When the Numidian king Bocchus delivered Jugurtha to Sulla in 105 BCE, he had the scene engraved on the ring that he then used as a seal; in 91 BCE, Bocchus represented the event with a statuary group, the *monumenta Bocchi*, erected in the *area Capitolina*; Marius tried to destroy it, while Sulla restored it (82–80 BCE). Finally, Faustus, Sulla's son, reproduced

Iconography in the Roman World, Fig. 3 Denarius struck by Faustus Cornelius Sulla

again the handover of Jugurtha on a coin minted in 56 BCE (*RRC* 426) (Fig. 3), probably copying the image originally created for the signet ring. The same iconography was replicated through different *media*, in both private and public contexts, in two or three dimensions, for almost 50 years covering an important role of propaganda during the first half of the first century BCE.

The ceremonial and military functions of the state usually celebrated the commitment of the emperor, the army, and that of the most important state magistrates, all the while carrying a propagandistic content. The language used was cultured due to the level of the clients. The most frequently attested iconographies (scenes of triumph, battle, clemency and barbarian subjection, speech to troops (*adlocutio*), return and departure for the war (*adventus et profectio*), sacrifice, civilian oration, food distribution, apotheosis, etc.) were represented through various figurative media and realized at various scales according to the space available. Coins in particular provide an excellent source of information since they reproduce on a small scale a basic version of the same iconographies of the official historical reliefs together with legends that nowadays can be almost used as captions of the reliefs, too. So the legend *decursio* on a Neronian *sestertius* representing a single galloping horseman(*RIC*[1] 145) explains also the two horsemen "carousel" scenes located on the panels at the base of the Column of Marcus Aurelius, next to the apotheosis of Antoninus Pius and Faustina Maior: these two reliefs represent only a more elaborate version of the same subject.

A ceremony could have also been represented in a symbolic way, for instance, reproducing just the objects used during the ceremony and/or one or more categories of the participants. The iconographical scene of the sacrifice is a good example of this (Ryberg 1955). The various phases of the Roman ritual had been carefully selected to attribute to each one of them a direct or indirect easily recognizable iconography (Huet et al. 2004). The images of the procession of victims (Fig. 8) and musicians recalled the preliminary rituals (*praefatio*); libation was illustrated by the figure of the officiant of the ceremony pouring the contents of the *patera* over the altar; the killing (*immolatio*) and examination of the victim's viscera were represented by the *victimarius* depicted in the act of striking the figure of the already dead animal; only the final banquet was not represented. Usually more actions, consecutive during the ritual, were represented in the same scene as shown by the Altar of the *Qurtii* from Angera (Fig. 4): libation was located at the center to highlight the figure of the ceremony's officiant or sponsor; the figures of some of the assistants, such as the flautist and one of the sacrificial victims, were used to refer to the previous and successive scenes of the ceremony (*praefatio et immolatio*).

Other iconographies were part of this official repertoire, they did not describe specific ceremonies, and consequently, they could be used in various scenes to introduce a reminder of the Roman ideology of victory. Those are images of trophies, often accompanied by winged victories, and prisoners of war. Images of prisoners, wearing different ethnic costumes to distinguish eastern and northern barbarians and depicted at the moment of defeat or clemency, and finally the images related to the personification of subdued populations and provinces were useful to mark the geographical extent of the empire.

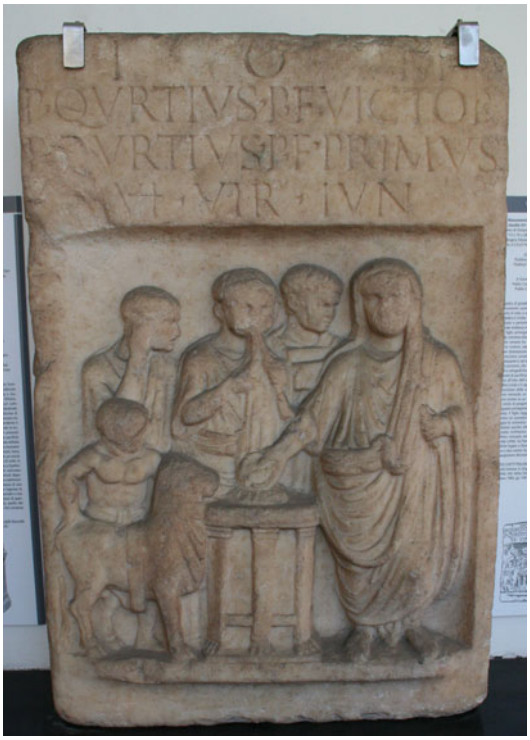

Iconography in the Roman World, Fig. 4 "Ara" of the Qurtii from Angera (Milan, Museo Archeologico)

Other images, usually excluded from official art, show salient moments of civilian life. The people who promoted the games (*editores*) were often those who started this iconographic tradition with the intention to immortalize their generosity (*liberalitas*). The procedure was similar to the state's ceremonial but simplified; an iconographic *koiné* was created for each *ludus*, and it was realized through various figurative media and constituted by the representation of the show by a selection of its most relevant moments: *munera gladiatoria* were represented by the duels between gladiators, with different contexts and participants according to the specialty (Fig. 5a). In the *venationes* (scenes of hunting), the moment of the fight against the animal was depicted (Fig. 5a); circus games were represented by the initial processions and racing *quadriga*, and the background was often the one of the architectonic and sacred landscape of the Circus Maximus in Rome (Fig. 5b). The athletic games were summarized in the sequence of the three most violent matches: boxing, *pankration*, and wrestling; these events reminded viewers of the earlier Greek iconographic tradition (Fig. 5c).

Finally, we have to recall the "public" repertoire of iconographies related to the lives of common people, often depicted with a more simple and "popular" language (Clarke 2003). The representation of people in funeral contexts was in fact not just the privilege of the elite, as demonstrated by the discussion of the tomb of the literary character Trimalchio, who was a freedman (Petronius *Satyricon*, 71.5-8). The representation of various scenes of work depicted the person who died performing actions related to his or her profession (*res gestae*) (Zimmer 1982); these iconographies provide us with information about daily life in the Roman world. The biographical sequences depicted on sarcophagi were similar, as they represented the life of the deceased through a selection of meaningful episodes: scenes of the daily life of women or children, comedic scenes, and convivial scenes that updated the Greek iconography of the symposium through the introduction of new contexts, the *triclinium* first and the *stibadium* afterward (Dunbabin 2003).

The creation of these new images often happened through a process of transformation (or Romanization) of Greek models and figurative types, adapted to the new contents and socio-political context by including appropriate details. The iconography of hunting in the Hellenistic period was usually reserved for the image of the king, mostly in Macedonian contexts (e.g., Alexander the Great) to illustrate the courage (*areté*) that justified his role. This aspect is present in Rome in rare images of aristocrats or emperors hunting, such as the eight circular reliefs (roundels) of the Hadrianic period that decorate the Arch of Constantine. In the iconography of *venationes*, the Hellenistic tradition had been deeply transformed by the new context of the amphitheater; extraordinary creativity was displayed by the variety of prey hunted by the *venatores* (cf. the mosaics of the Zliten villa (Libya) or the relief from Obzor (Thrace), today in Sofia, Bulgaria) and the cruelty of death

Iconography in the Roman World, Fig. 5 The iconography of the ludi. (**a**) Amphiteatral games: munus gladiatorum and venatio (funerary relief from Pompeii). (**b**) Circus games (picture from a mosaic in Luni). (**c**) Athletic games (sarcophagus, Rome, Museo Gregoriano Profano). (**d**) Damnatio ad bestias (mosaic from El Djem, Thysdrus)

sentences executed by beasts (*damnatio ad bestias*) (Fig. 5d).

Another activity apparently marginal as the capture and transportation of exotic beasts has been the object of a complex and detailed representation attested by some of the mosaics of the Imperial Roman villa in Piazza Armerina, Sicily (Fig. 6). The repertoire of the iconography of hunting in the Roman world was very complex and efficient in its illustration of hunting roles in society at that time.

"Greek" Iconographies: Divinities and Images of Myth

A substantial portion of the images of the Roman repertoire derived from Greek models; in this way, the Classical world often shows a millenary iconographic continuity. The transmission of this

Iconography in the Roman World, Fig. 6 Capture of beasts (mosaic from Piazza Armerina's Roman villa)

heritage to Rome started during the Archaic period, facilitated in part by Etruscan influence, and continued during the Late Republic, when Rome itself gradually became one of the main artistic centers of the Hellenistic world (Pollitt 1978). The authority attributed to the Greek culture influenced the iconography of the Roman pantheon (from cult statues to votive images) and the main cults (such as the Dionysiac cult) and myths; these images of Greek origin were often used in new contexts, thereby gaining new meaning. For instance, the many Roman copies of Greek masterpieces, used as statuary ornaments in villas and *domus*, are examples of statues that were meant to be displayed in temples, sanctuaries, theaters, and agorai, but often ended up in private spaces. The athletes' images were used in many villas to reproduce Greek gymnasia on a small scale; for example, in the peristyle of the Villa of the Papyri in Herculaneum, the two statues representing runners at the start of a race, copies of an original dated between the end of the fourth century BCE and the beginning of the third century BCE, were meant to recreate the atmosphere of a competition in the space between the arcade and the big *natatio* (Romano & Warden 1994). The original meaning was consequently changed by the new context.

For what concerns mythological scenes, their repertoire, originally from Greece, was increased by the new iconographies in the Roman world (e.g., images of Roman myths such as the nursing of Romulus and Remus or the romance of Dido and Aeneas). These images related to myths were also modified by the new context of use and progressively became "cultural icons" (Zanker 2002). Their symbolic meaning was connected with the person who commissioned them to decorate the walls of his residence or to the deceased who chose them for his funeral monument. Their naturalism could attract the observer and induce him to believe to be living in the imaginary world of the Greek myth, or it could recall a series of intellectual connections to understand a decorative plan usually based on the combination of different myths. This phenomenon was related to painting and sculpture and it led to new iconographies related to the reinterpretation, often sophisticated, of Greek myths (such as the eight reliefs of the Palazzo Spada (Fig. 7), executed for a villa in the second century CE (Newby 2002)).

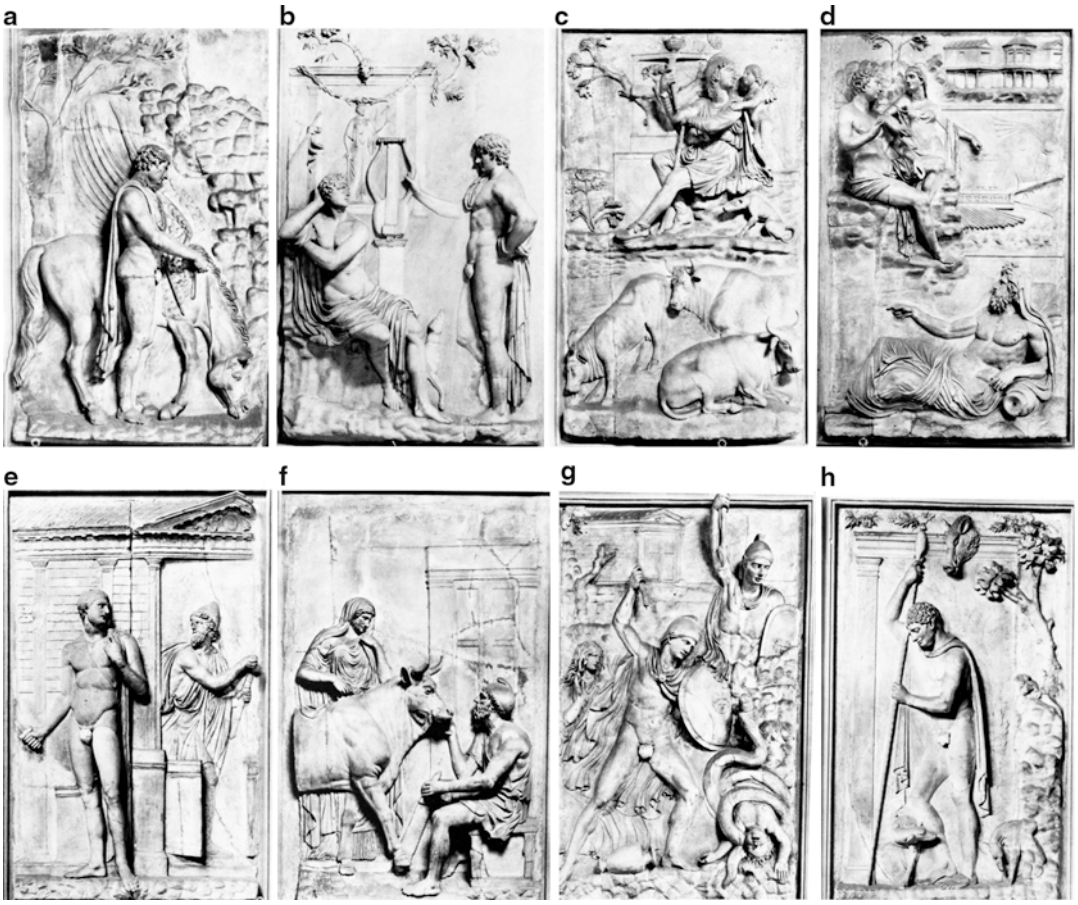

Iconography in the Roman World, Fig. 7 The reliefs from Palazzo Spada (Rome, Palazzo Spada). (**a**) Bellerophon and Pegasus. (**b**) Amphion and Hermes (?). (**c**) Paris and Eros. (**d**) Paris and Oenone. (**e**) Diomedes and Odysseus. (**f**) Pasiphae and Daedalus. (**g**) Death of Opheltes. (**h**) Dying Adonis (?)

The most interesting result of this recontextualization was the new biographical cycles of gods and heroes, such as the one imagined by Longus (*Erotica* 4.3.2) in a temple of Dionysus in Mytilene (on the island of Lesbos) depicting the god in a series of consecutive scenes. The combination of the creation of a visual language and its inclusion into a narrative dimension is an important development introduced by the Romans in the iconography of mythology. In the exemplary case of Achilles, the existing images of various episodes of his life, often of Classical or Hellenistic origin and represented through different figurative meanings in the Imperial period, were little by little reunited into a very articulated biographic cycle (birth, *paideia* with Chiron, life at Scyrus, and the Trojan War) in Late Antiquity. New scenes were introduced to fill the voids in the figurative reconstruction of the hero's life. This repertoire had been replicated with different typologies of objects (Ghedini 2009). The figurative cycle of Mithras was new in its contents and iconographies; it described the deeds of the god next to the big tauroctony scenes.

Images of Context

As has been observed, Roman iconography provided a variety of subjects that helped construct important relationships between images and memories, as well as events both actual and

Iconography in the Roman World, Fig. 8 The iconography of the suovetaurilia. (**a**) Suovetaurilia procession in the so-called Altar of Domitius Ahenobarbus (Paris, Louvre). (**b**) Tetrarchic Decennalia Base with suovetaurilia scene (Rome, Forum). (**c**) Relief of Marcus Aurelius celebrating a suovetaurilia (Rome, Arcus of Constantine). (**d**–**f**) Scenes representing suovetaurilia in the Trajan's column frieze (Rome)

mythical; these iconographies serve to guarantee the messages and provide other meaningful characteristics. The standardization of this repertoire is a general phenomenon that concerns state-level ceremonies, the images of games (*ludi*), and mythological scenes as well as a general tendency to include these images in brief cycles, usually composed of a series of scenes separated one from the other. The iconography was in fact also influenced by the patterns of narration in which it was included since they could modify the scheme (Brilliant 1984). A long continuous frieze, such as the exceptional one depicted on the Column of Trajan, had a size that made the difference in the representation if compared to the narration through separate scenes/panels or

to single reliefs; on the other hand, the space available in sarcophagi was often a composition of sequences where various scenes were arranged into a hierarchical order.

The introduction into different narrative forms could change, even deeply, the iconography: the *suovetaurilia* (Vermarseren 1957) was a Roman ritual of purification; its distinctive element was the presentation of the three sacrificial victims (pig, ram, and bull). They usually are presented in a sequence, as in the Altar of Domitius Ahenobarbus (Fig. 8a) (the order is reversed in this case) or as in a relief of the base of the Decennaliain the Louvre in Paris (Fig. 8b) (with the three victims in the "correct" order). On the Column of Trajan, the *suovetaurilia* is represented through three different scenes, each one placed at the beginning of one of the years of the Dacian war; if we look at all of them at the same time, we see the progressive advancement of a procession around the *castra* (Fig. 8d–f). The Trajanic frieze, using a bird's-eye view, could show the itinerary of the procession and recall that the ritual had the aim of purifying the participants within it. The limited space of the panel of one of the Aurelian reliefs reused on the Arch of Constantine led to a different composition again; the three animals are almost overcome by the procession, depicted illusionistically as if they are advancing from the back of the relief ground (Fig. 8c). The same iconography has led to interpretation and compositions each very different one to each other due to the narrative form. These solutions gave different information to the spectator: for instance, the emphasis of the itinerary of the procession around the *castra* of the Column of Trajan clarified that the ritual of purification, conducted by the emperor, concerned the military.

Finally, we have to mention the importance of where the images were located; their location was regulated with the aim to achieve a correspondence with the buildings and the rest of the decorative plan. Vitruvius (*Arch.* 7.5.6) promoted the relationship between the statuary type and the functions (*proprietates*) of their location. The location in a public or private context could influence even deeply the iconography: for instance, the increasing violence in scenes depicting *venationes* and *munera gladiatoria* between the second and the fourth centuries CE and their location in high-class villas and houses. These were private spaces designed for pleasure (*otium*) that evidently was nourished also by the memory of the bloodshed during the *ludi*; the kind of space where the images were located led to the major cruelty visible in the images (Papini 2004).

Future Directions

It is possible to fully understand the meaning of an image only if the image exists within a context (Rose 2010); the context is not just the physical context of use (buildings or objects) but also the social and cultural context where the image was created and produced. If images do not have a dialogue with what surrounds them, they are mute: we must consider the iconographic tradition of their context, the formal language chosen for their representation, their relationship with the literary tradition, the function of the figurative media adopted, the material context in which they were produced and circulated, the kind of clients and public that will enjoy them, taking into account a different perception of the images according to the social class and cultural competence of the viewer.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Amphitheater
- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Ceramics, Roman Imperial
- ▶ Economy, Roman
- ▶ Iconography in the Roman World
- ▶ Infrastructure in the Roman World: Roads and Aqueducts

▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
▶ Maps, Cartography, and Worldview in the Roman World
▶ North Africa, Roman
▶ Numismatics, Roman Imperial
▶ Numismatics, Roman Republican
▶ Romanization
▶ Topography of Rome

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Iconography, Etruscan

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Introduction

The Etruscan culture lasted from c. 1000 to c. 30 BCE. The prehistoric and protohistoric period, also known as the Proto-Villanovan (final Bronze Age) and Villanovan culture (Iron Age), lasted from c. 1000 until c. 700 BCE and the historical period from c. 700 BCE until the reign of the Roman emperor Augustus (r. 31 BCE–CE 14). The artistic and artisanal output of the Etruscans, who lived mainly in *Etruria*, the area between the Arno and Tiber rivers, in the Po valley and in parts of Campania, is enormous. Vases, wall paintings in tombs and temples, stone reliefs, bronzes, terracottas, sarcophagi, funerary urns, and pieces of minor art (engraved mirrors, appliqués, gems, scarabs, ring stones, *bullae*, molds, stamps, coins) yield thousands of figurative scenes from the quotidian, magisterial, funerary, and mythological domains. They raise many questions. Were they intended as merely decorative or as meaningful? Did they have only one meaning or were they polysemantic? What is the origin of the mythical scenes? How and why were they chosen? Which non-Greek, typically Etruscan iconographic phenomena can be detected? Until the 1970s, some scholars presumed that the Etruscans did not understand and therefore banalized Greek myths. Recent research, however, makes clear that though some scenes may show evidence of misunderstandings or conflations (see below), most others make sense and frequently harbor a moralistic, ideological, propagandistic, or possibly political meaning (Krauskopf 1974; Massa-Pairault 1992; Menichetti 1994; Massa-Pairault 1999; van der Meer 2004).

Definition

Iconography is not taken as image, portrait, statue, or the description and interpretation of images here but rather as iconology. The latter term means the study of images on all levels, in widening circles, that is in relation to the image bearers (monuments or artifacts), their micro-context (in the case of a poly-scenic iconographical program), function and macro-context (city or settlement, sanctuary, necropolis, tomb), and period, society, group, patron, and artist (style). Most images are the products of elite and middle class society, while few can be related to the lower classes. Changes in society and politics are often reflected by art and image, although some themes like those of the banquet and symposium attest to tradition and homeostasis in elite contexts, from prehistory to the first century BCE.

Historical Background

The oldest figurative scenes on artifacts of the prehistoric period can be dated after c. 800 BCE. They are rendered in a local geometrical style, mostly on biconical funerary urns, in weapons, and in the minor arts, showing symmetrical scenes of leave-taking or meeting (shaking hands), hunting, ritual dances, and weaving, often gender-related. The hunting of a boar by a lone man may be an example of self-representation and heroization. Human figures are rendered in profile or in frontal view. Contacts with the Greek Euboean colonies Kumai and Pithekoussai in Campania after c. 750 BCE led to the introduction of the Greek geometric style, resulting in the appearance of mythological scenes of Greek origin during the Orientalizing period (c. 700–600 BCE). Sources of inspiration for these scenes included imported ceramics, itinerant Phoenician and Greek artists, and oral tradition. The immigrant Euboean potter Aristonothos depicted a Greek myth (Odysseus and Polyphemos) on one side of a vase but an Etruscan sea battle on

the other side, thereby conforming to the wishes of his Italic patron. In the following Archaic period (c. 600–480 BCE), Etruscan gods, some with names of Italic origin like Menerva, were rendered for the first time in anthropomorphic fashion as statues or images, primarily due to the adoption of representations seen on imported Corinthian, Attic, and other Greek vases. The fifth century BCE was a period of crisis, especially along the Tyrrhenian coast, whereas the fourth century heralded a kind of artistic rebirth, with strong influences from Greek southern Italy, especially Apulia. The gradual reduction of the Etruscan states by Rome, between 396 and 240 BCE, did not result in immediate Romanization and Latinization. The importation of artists from Greek areas to Rome and Etruria in the Hellenistic period (c. 330–30 BCE) caused the introduction of successive, stylistic, and compositional models from Tarentum, Pergamon, Rhodes, Athens, and Rome itself. Distinct Etruscan art and imagery disappeared around 30 BCE, around the time when Latin replaced the Etruscan language. Although Etruscan iconography is heavily indebted to Greek art, countless scenes show a process of adaptation, reinterpretation, and original creativity.

Key Issues

Etruscan images, both originals and those (often partly) copied directly or indirectly from Greek archetypes and transmitting models, exhibit interesting characteristic phenomena which are presented in the following overview. The phenomena, some of which partly overlap, follow an internal chronological order.

Self-Representation and Identification

As stated above, self-representation is already visible in prehistoric artifacts. In the seventh century BCE, non-mythical scenes portray quotidian activities and funerary rituals. Some of them evidently have more than one meaning. A famous Etrusco-Corinthian jug dated to c. 620 BCE from a grave at Tragliatella, a settlement near Cerveteri, depicts the meeting between an Etruscan warrior and his wife (*Ammarce* (which should perhaps be read as *Mamarce*) and *Thesathei*), a cavalry engagement of two men in a labyrinth (*truia*), two couples making love, seven identically armed marching or dancing warriors, and the abduction of a woman overseas (*ThesCRA* I, s.v. Processions, Etr. 34; van der Meer 1986: 169, Fig. 1). There is consensus now that some scenes of the narrative are influenced by the adventures of Theseus and Ariadne. This implies that the deceased wished to present themselves as heroic aristocrats. The *truia* vase shows that the iconographic program is the result of a creative, eclectic process.

Since several other scenes of Greek origin (e.g., Odysseus, the Argonauts) occur on Etruscan vases and on an ivory *pyxis* (round toilet box) from Pania near Chiusi, the choice of Greek myths may also have been influenced by the fascination for heroes traveling overseas, which is understandable since the Etruscans were first-class seamen and pirates.

The need for comparison and identification is present in later centuries too. The painted program of the François Tomb at Vulci, dated to c. 340–310 BCE (Massa-Pairault 1992: 119, Figs. 104–108), shows that the deceased Vel Saties and his companion compared themselves to or identified themselves with Greek heroes, namely, the wise Nestor and his friend, Phoinix. Symmetrical scenes showing men from Vulci slaughtering a king of Rome, thus representing sixth-century BCE history on one wall, and Achilles slaughtering Trojan prisoners on the opposite wall suggest that men from Vulci in the past and present are intended to be compared to successful Greeks on the one hand and the defeated Trojans with the Romans *cum suis* on the other hand. The *heroon* of Aeneas at Lavinium (Latium), dated to c. 330 BCE, proves that the Romans connected their own origins with the city of Troy. Apart from reproducing the glorious past, the visual program of the François Tomb betrays wishful thinking, understandable in light of Rome's threatened conquest of Vulci. Identification is also seen in the names of supposed founders of Etruscan cities, who are always Greeks. This creation of roots probably

Iconography, Etruscan, Fig. 1 Volterran urn showing Orestes and Pylades twice (Volterra, Museo Guarnacci, inv. 345; photo Dainelli, Volterra)

originated in the fourth century BCE. Elite families also chose their own Greek hero. Laris Pulenas, a *haruspex* (seer) represented as a male figure on the lid of a Tarquinian sarcophagus dated to c. 250 BCE, presents the famous Greek seer Polles, called *Pule* in Etruscan, as his ancestor in his funerary inscription, something akin to a modern resumé. Daidalos (Etr. *Taitale*; *Taitle*), the famous inventor, served as a popular example for artisans and craftsmen. His images are common on artifacts from the seventh to the first century BCE (van der Meer 1977/8: 65; 108–9, Figs. 30–33). They testify to a *longue durée* identification, which persists until Late Antiquity.

Identification or association is also shown in incised images that appear on mirrors, like one from Perugia showing *Lasa Achununa* (Lasa (the) "Achu-nian") and *Atunis* (Adonis), which was found in the necropolis of a family called *Achu*. *Lasa*, assistant of *Turan* (Aphrodite), is a good example of another frequent phenomenon on mirrors: substitution (van der Meer 1995: 195, Fig. 93). The famous Bronze Liver of Piacenza, dated to c. 100 BCE, shows a similar replacement. In the inscribed pantheon, Lasa is mentioned but Turan is absent (Maggiani 1982 [1984]: 55–7, Fig. 1). The question of whether archaic terracotta statue groups (Massa-Pairault 1992: 61–2, Fig. 43) and reliefs of temples in Rome and Latium representing Herakles and an armed goddess (Athena?) attest to an identification wished by a king (such as that of the tyrant Peisistratos in Athens) has not yet been satisfactorily answered (Lulof 2000). More personal objects like fifth-century BCE scarabs show a plethora of Greek heroes with inscribed Etruscanized names, but Krauskopf's hypothesis that the bearers identified themselves with heroes is not convincing since men like Kapaneus were "bad guys" (Krauskopf 1999: 405–21).

Moralizing Images

One of the earliest examples of a moralistic narrative can be found in the painted program of the Tomb of the Bulls at Tarquinia, dated to c. 540 BCE (Brendel 1978: 167, Fig. 109). The frieze on the rear wall of the second room shows a heterosexual group in action and the erotic union of two homosexual men. In the first scene, a recumbent cow lies quietly, her back turned to the group; in the second, an aroused bull with a bearded man's face, which looks like the head of the libidinous Greek river god Acheloös, is about to attack the two men. So, evidently, at least in this funerary context,

heterosexuality was seen as reproductive and homosexuality as non-fertile and therefore undesirable.

The roofs and pediments of Etruscan temples were decorated with terracotta statues or groups in the archaic and classical period, so-called *antepagmenta* (rectangular plaques in a pediment) and antefixes (vertical roof tile covers). A fascinating *antepagmentum* belonged to temple A at Pyrgi, the harbor city of Cerveteri (Brendel 1978: 234–35, Figs. 163–164). The temple, now dated to c. 470 BCE, was probably dedicated to the Aurora-like *Thesan*, whom ancient Greek writers assimilated with the Greek goddess Ino/Leukothea (Polyaenus, *Strategemata* 5.21). The tympanum plaque features the Seven against Thebes in overlapping groups. Zeus strikes one of them with his lightning bolt, and Athena withdraws the potion of immortality which was destined for one of the Seven, because of his cannibalistic behavior. The theme was probably chosen to show the *hybris* (recklessness; pride) of warriors and the punishment of bad behavior by the gods. Apart from the moralizing warning, the link with Thebes may have been important: Ino/Leukothea, goddess of light, was strongly worshipped in Thebes.

In the Hellenistic period, four scenes of the Theban Seven are also visible in the northern, completely filled pediment of the temple of *Tina* (Zeus) at Talamone, dated to c. 150 BCE (van der Meer 1977/8: 104, Fig. 19 (drawing); *LIMC* I,1 s. v. Amphiaraos 45 (photo)). Here too the tragic consequences of a battle between brothers is shown, obviously with a message: the bad men, Oedipus' sons, kill each other, and a good man, Amphiaraos, a seer, is saved by Zeus from death by letting him disappear into the earth. Oedipus' sons and Amphiaraos also appear in the paintings of the François Tomb mentioned before. In addition, the funerary urns from Chiusi, Volterra, and Perugia dated to the second and first centuries BCE, with schemes similar to those at Talamone, also frequently show Theban scenes. They may have been chosen because of the Etruscan fascination for chains of successive, fatal events. Steuernagel (1998) presumes that the urn images encouraged the elite to stick to the old aristocratic sacrificial rituals and values (cf. Stevens 2010: 77–110).

A terracotta *akroterion* from the top of the pediment of a small temple in the sanctuary in the Cannicella necropolis at Orvieto, dated to c. 480 BCE, shows Orestes killing his unfaithful mother Klytaimnestra, a theme which is also present on some bronze mirrors. In both contexts, we may assume that the images contain a warning against the consequence of adultery (Stopponi 1991: 1103–61, Fig. 17; 25–7). On an alabaster urn from Volterra (c. 200 BCE; Fig. 1), the matricide is shown in two scenes, like Etruscan inscriptions which are read from right to left, Orestes (inscribed *Urste*) and Pylades (*Puluctre*) about to kill Klytaimnestra (*Clutmsta*) and her lover Aigisthos, and their kneeling on an altar, threatened from below by two Underworld demons, *Charun* (derived from the Greek Charon) wielding a hammer and *Vanth*, his female colleague, holding a torch. This sequence proves a rather good knowledge of successive episodes of one Greek tragedy. The type of altar and the Etruscan demons lend the scenes a local flavor. The asylum-seeking eventually brings about the salvation of the avengers (for possible literary or theatrical influences on urn reliefs, see below).

Some bronze mirror engravings may harbor a moral message, too. One dated to c. 450 BCE shows a standing, almighty *Turan* (Aphrodite) and a seated, boyish Alexandros (Paris) trying to seduce Helena, who is lying in bed with her baby Hermione (*LIMC* IV,1, s.v. Helena/Elina 5 (with fig.)). The sphinx hovering over the scene foretells the disastrous consequence of adultery and abduction: the Trojan War.

Domestication

In many mythological scenes, the core is Greek with inserted or added figures of Etruscan origin. The addition and consequent hybridization mean that Greek myths were reinterpreted by Etruscan artists, in other words, the scenes received an Etruscan flavor (van der Meer 1995; de Grummond 2006). In scenes on mirrors showing the birth of *Menerva* (Athena) from the head of *Tina* (Zeus), the upper god is assisted by Etruscan

Iconography, Etruscan, Fig. 2 Volterran urn depicting the assault on Thebes (Volterra, Museo Guarnacci, inv. 370; photo Dainelli, Volterra)

goddesses like *Thanr* and *Thalna* in the role of midwives (*LIMC* II,1, s.v. Athena/Menerva 218 (with photo)). The embracing of *Tina*'s belly by *Thalna* as if he were giving birth like a sitting woman, an activity which does not appear in comparable Greek vase scenes, proves that the engraver inserted the local delivery practice, thereby showing that he had understood the myth. Many fourth- and third-century BCE mirror scenes of Greek origin show another frequent form of domestication, namely, the insertion of the façade of a house, palace, or temple into the background, a decor which is absent in comparable older or contemporaneous Greek representations (van der Meer 1995).

Hellenistic stone urns from Volterra and Perugia show a similar domestic element. The assault of the Seven takes place against a Thebes represented with an Etruscan city gate instead of a Greek one, thus situating the tragic attack in a local context (Fig. 2).

Actualization

Images are products of their time. A shift in the rendering of a theme is an indication of a changing custom. Etruscan banquet and symposium scenes initially show the participants sitting down (Tuck 1994), whereas after c. 580 BCE, they are reclining on wooden beds. The change is due to the imitation of the Greek custom, which became in vogue in the same period. The schemes may have been copied from depictions of *klinai* (dining couches) on imported Greek vases, among others, because young male assistants carrying wine to reclining couples are rendered nude, whereas in reality they were dressed (Diodorus Siculus, 5.40).

Even military events may have left traces on artifacts. It has been suggested that bronze mirrors dated to c. 470–450 BCE showing Eos with her dead son Memnon in her arms (*LIMC* III,1, s.v. Eos/Thesan 23–25 (with fig.); cf. Brendel 1978: 287, Fig. 203) may reflect the loss

of young soldiers during the fatal naval battle of the Etruscans and Greeks from Syracuse off Kumai in 474 BCE.

The theme of Achilles killing Trojans on Etruscan stone sarcophagi is often related to the cruel slaughtering of Roman soldiers by the Tarquinians in 356 BCE, described by Livy in his *Ab urbe condita* 7.15.9-10 (van der Meer 2004: 32–3).

In painted banquet/symposium scenes in archaic and classical period tombs at Tarquinia, women recline with their husbands, but at the end of the fourth century BCE, they are depicted sitting at their husbands' feet (Brendel 1978: 340, Fig. 265). This change may be due to Rome's conquest of Tarquinia. The Etruscan elite was probably forced to change a custom that was not considered acceptable in Roman society.

The effects of historical events are visible on Hellenistic urns too. Two urns of *marmo alabastrino*, still present in the Tomba della Pellegrina at Chiusi belonging to the *gens* Sentinate (c. 250–230), depict a battle between Celts and others, possibly a reminder of the fierce battle at Sentinum (in Umbria) between Celts, assisted by Umbrians and Etruscans, and Romans in 295 BCE. The Sentinate family may have originated from Sentinum, where their ancestors may have participated in the battle won by the Romans (Maggiani 1990: 207, Fig. 16; pl. 4, 4).

The enormous number of terracotta urns from Chiusi featuring the historical Athenian farmer Echetlos or an Etruscan farmer fighting with his plow against enemies is often assumed to reflect and symbolize the battle of farmers against the agrarian reforms of the Gracchi in the second century BCE (*LIMC* III,1 Echetlos 2; de Grummond 2006: 199, Fig. VII.28).

Symmetry

Symmetry is a frequent phenomenon from prehistory onward. It is found on Villanova ash urns showing two humans sitting opposite one another, right above the remaining handle. Similar compositions are found in archaic tomb paintings, e.g., mourners to the left and right of a fictive door to the Underworld (Brendel 1978: 169, Fig. 110); Castor and Pollux, both with a horse (e.g., Brendel 1978: 192, Fig. 127); and thematically related scenes (dance, procession, sport) on the long walls leading toward the eye-catching rear wall. The thematic symmetry in the François tomb has already been mentioned. Some bronze mirrors exhibit a similar phenomenon. The most instructive example is the famous *Athrpa* mirror, now in Berlin (Brendel 1978: 366, Fig. 284). In the center stands a winged woman labeled *Athrpa* (Atropos) holding a small hammer in her right hand. Above her the head of a boar is visible. On the left are *Turan* and *Atunis* (Aphrodite and Adonis); on the right is another couple, *Meliacr* and *Atlenta* (Meleagros and Atalanta). In ancient Greek literature, these couples are never mentioned together. The engraver combined them intentionally because the two men, Adonis and Meleagros, were killed in confrontations with boars. Atropos ("the Irreversible") is one of the three Greek *Moirai*, the goddesses of fate, who announce death. In Greek art, she uses scissors as one of three goddesses of fate but on the mirror a hammer, probably to pin the boar's head to an invisible wall. For *Athrpa*, the engraver used an exchangeable scheme; he copied her from Greek Nike, goddess of victory, as represented on silver coins from Syracuse, dated to c. 310 BCE. On these, Nike carries a hammer and is about to attach spoils to a *tropaion*, a bare trunk, which indicates the turning point in a battle. In a similar way, the Aphroditic goddess *Lasa* holding a scroll, a *liber fatalis*, stands between two Greek heroes on another mirror (van der Meer 1995: 222–7, Figs. 105–106; Harari 1995: 103–111).

Thematic symmetry is also present on several stone relief sarcophagi, dated to the end of the fourth century BCE. A sarcophagus from Torre San Severo near Orvieto – decorated on all four sides – for instance, shows Achilles killing Trojans on one long side and Achilles' son Neoptolemos killing the Trojan princess Polyxena on the other side, both in similar schemes. Not only do these scenes have a common theme, but they also represent a chain of fatal events. The short sides show successive stories pertaining to Odysseus: his

visit to Kirke and his sacrifice to the spirits of the deceased in order to gain information from the shade of the seer Tiresias as to how he could return to his home in Ithaka (van der Meer 2004: 29–39, Figs. 7–8, Fig. 30). The latter sequence has a positive message: salvation. Rescue scenes are common on Hellenistic urns too, the most popular themes being the recognition of Paris and the sacrifice of Iphigeneia (see below).

Some symmetries seem to be gender-related. The famous sarcophagus with Amazonomachies painted on all four sides which belonged to an elite woman shows losing Amazons on two sides but victorious ones on their opposite sides (Brendel 1978: 342, Fig. 266; 384 Fig. 296; *LIMC* I,1 Amazonae etruscae 29 (photo)). Amazon victories are absent from Greek visual art.

Symmetry is also common on sarcophagi and urns bearing a so-called heraldic scheme: a *patera* flanked by griffins or sea monsters. The wine cup may hint at the joys of the symposium which awaits those who travel to the Blessed Islands in the Underworld (van der Meer 2004: 111–8).

The most recent mirrors without inscriptions, found in third-century BCE male graves, very frequently show Castor and Pollux in a mirrored scheme, indicating a hero of mortality and one of immortality. The image probably represented the hopes of an eternal afterlife.

Conflation

Conflation may have been the consequence of the artist's amalgamation of elements from two myths or parts of two or more models. This happened when stories had a similar content or heroes played a similar role. The best example of this is an engraved scene on a now lost inscribed mirror (Fig. 3) featuring from left to right *Mine* (Minos), *Menrva* (Athena), *Vile* (Iolaos), *Ariatha* (Ariadna), *Hercle* (Herakles), and *Thevrumines* (the Bull (*thevru*; from Greek *tauros*) of Minos (*Mine*): Minotauros). In Greek myth and art, it is Theseus who kills the Minotaur. The engraver made the error because he also had vague knowledge of Herakles slaying a bull (van der Meer 1977/8: 85). Female names

Iconography, Etruscan, Fig. 3 Drawing of a lost bronze mirror showing Herakles and the Minotaur (from *BABESCH* 52–3, 1977–78, 129, Fig. 100)

Ariadna and Klytaimnestra are transformed so that they end like Etruscan female first names do, on – *tha/ta*: *Aria-tha, Clutms-ta*. The transition from *Clutum-* to *Clutm-*, evidence of the syncopation that took place after c. 460 BCE, is a strong indication that the owners of mirrors, usually women, liked to converse about myths.

The Transmission of Themes and Schemes

Etruscan images are mono- or poly-scenic. Polyscenic scenes, like Odysseus's escape from Polyphemos' cave and his getting past the dangerous Skylla, a barking sea monster, on the ivory *pyxis* mentioned before (Krauskopf 1974: pl. 2–3), are quite exceptional because the combination of two successive, narrative scenes has no parallel in contemporaneous Greek visual art. While the escape scene occurs on Greek vases, the Skylla scene is absent. This may imply that the ivory carver also had oral information about the myth, ultimately based on Homer's *Odyssey*, and thus created his own little narrative, cyclic representation.

Places where Etruscan and Greeks met frequently were in the first place sanctuaries near the harbors of Tarquinia and Cerveteri. Myths and rituals, e.g., of Adonis, were introduced by Greek merchants from Ionia, the Greek islands, and Athens but reinterpreted by the Etruscans. Although there was a language barrier, they must have talked about myths. The frequent Atunis (Adonis) scenes on fourth-century BCE mirrors have elements in common with images on two gilded, red-figure *hydriai* of the Athenian Meidias Painter dated to c. 410 BCE featuring the beautiful heroes Adonios and Phaon, vases which were found in the tomb of a priestess of Turan (Aphrodite) at Populonia: the presence of musical instruments, a magic bird (a wryneck; *iynx*) and a *rhombos* (magical turning wheel). Comparison shows that the mirror engravers added non-Greek elements like an *alabastron* (perfume vase) and a spatula, objects not present on the Meidias vases but which obviously belonged to the Etruscan *mundus muliebris* (Brendel 1978: 364, Fig. 364). The comparison does not mean that engravers saw Meidias's vases but Meidias's motifs may have been transmitted by memory, textiles, or other image carriers.

The phenomenon of presenting successive scenes from a single myth also occurs on so-called stone hall sarcophagi from the fourth and third century and urns from the second and first century BCE, particularly those depicting Trojan and Theban stories (Brendel 1978: 385, Fig. 297). There are some indications that papyri illustrated with successive epic scenes were used. An alabaster urn from Volterra bears two successive scenes from the *Iliad* books 3 and 4 that are also visible on a marble plaque (the so-called *Tabula Iliaca Capitolina*) which illustrates the main scenes of the 24 books of the epic in small panels furnished with Greek texts (Squire 2011). The *Tabula* dates to the period of Augustus. Since the makers of the urn and the *Tabula* cannot have seen each other's work, a common source must be postulated. The back of the *Tabula* bears an acrostic which is similar to that of Eudoxos in an illustrated, astronomical papyrus, dated to c. 165 BCE. This coincidence suggests that a multi-scene papyrus or another, similar image carrier functioned as a model for both the maker of the urn and the maker of the *Tabula* (van der Meer 1977/8: 77–8; 120, Figs. 72–75; for cyclic scenes, see also Maggiani 2000: 9–18).

Many urns from Volterra and Perugia depict themes which are present in Roman tragedies of the second century BCE, especially those of Ennius, who used tragedies of Euripides but added realistic Roman elements. On many urns from Perugia showing the Sacrifice of Iphigeneia, one of the soldiers, probably Achilles, is about to cast a stone, a detail present in Ennius' *Iphigenia* but not in Euripides' tragedy (van der Meer 1991: 119–36, Fig. 1, pl. 36). It seems likely that Etruscans performed tragedies based on Roman versions, since the stone theater in an extra-urban hill sanctuary in Castelsecco, near Arezzo, dates from c. 150 BCE, a period when the Etruscan language had not yet been replaced by Latin. In addition, stone theater-like tribunes in front of tombs, and many terracotta masks found in tombs, suggest that theater plays were not only performed in sanctuaries but also in necropoleis.

Current Debates

Elucidating the semantic content(s) of images is a fascinating research challenge. More theoretical and methodical reflection is needed in order to avoid the danger of overinterpretation (Spivey 1994: 213–5; as for theory, see Junker 2005: 108–18). The introduction of an "internal combinatory" method by de Grummond (2006: 15–8), implying the comparison of series of similar Etruscan images, is a step forward, but it should not be applied without paying attention to possible Greek sources. The current debate is focused on the possibly polysemous character of many images, especially those that have been borrowed from Greek sources. Another aspect concerns the way schemes and themes were transmitted: by itinerant artists, imported artifacts, visual models (textiles, papyri, parchments, and molds), memory, and oral information and possibly by literary sources, tragedies, or even performed stage plays.

International Perspectives

For further iconological research, it is a conditio sine qua non that the *Corpus Speculorum Etruscorum (CSE)* and the *Corpus delle urne etrusche di età ellenistica (CUE)* should be completed. Modern research like microscopic analysis, the use of databases, statistics, and the study of the metal composition of artifacts, e.g., of mirrors (see Wiman 1990), will add information on artistic centers, workshops, engravers, and their modus operandi. In addition, more collaboration between experts of different disciplines, especially the exact sciences, languages, epigraphy, art history, and the archaeologies of Egypt and the Near East, is needed.

Cross-References

- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Iconography in the Roman World
- ▶ Terracotta Architectural Sculpture in Classical Archaeology
- ▶ Tombs, Etruscan

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Ideology and Materiality in Archaeological Theory

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Introduction

The notion of ideology has been wielded by a vast range of archaeologists studying every conceivable period and subject, and it has been defined in an equally vast range of forms. In various hands, ideology looms as instrumental misrepresentations of objective reality, a structured body of ideas imposed on a group of people, or a general worldview shared by a society. It is not necessary or even desirable to develop a single definition of ideology, but many analyses of ideology risk reducing it simply to generalized ideas and practices, and others detach it from any concrete power relationships. This entry focuses on scholarship that defines ideology as a body of representations that mystifies and masks concrete power relationships, typically to promote the interests of a particular social collective. This approach situates ideology squarely within relations of inequality, assuming that dominant representations of reality rationalize, disguise, and distort lived inequalities, and it focuses on how archaeologists can examine the ways goods and material discourses are defined and contested as ideological mechanisms. The interests of dominant collectives are opposed in modest and consequential ways to the interests of other social collectives, and ideology always is embedded in (and attempting to rationalize and reproduce) those power inequalities. Certainly nothing could be more material than such power, so archaeological scholarship on ideology has powerful potential to examine how goods are implicated in systems of inequality, variously reproducing them, negotiating inequality, or being wielded against dominant interests.

This entry places emphasis on the political implications of archaeological research on ideology. Nearly all scholarship on ideology is rooted in a critical philosophical tradition that views analysis of ideology as having contemporary political import, if not activist implications, so much of this archaeological scholarship consciously positions itself as a critique of contemporary ideologies as well as their historical precedents. Some archaeologists do that by stressing the many different ways humans have organized societies and power relations over millennia, others examine inequality in broadly defined complex societies, and still other scholars do it by tracing the concrete historical precedents of the contemporary world since the emergence of colonization. Regardless of context, ideology in any archaeological case study is significant as a critical framing mechanism that calls into question any representation of the relationship between consciousness and experience. By nearly any account, an archaeological focus on ideology provides a powerful framework to interpret the representation of inequality and relationships between materiality, structuring social systems, and representation of social life.

Key Issues/Current Debates/Future Directions

Relationship Between Power and Reality

Few archaeologists dispute the realities of inequality over the full breadth of complex

societies, although that inequality encompasses a range of contextually distinct power relationships ranging from profound exploitation to socially condoned systems of privilege and rank. Ideology is a body of beliefs that represents inequality and attempts to rationalize it or otherwise represent it in ways that aspire to reduce if not eliminate resistance. Some ideologies are dubbed "vulgar" in the sense that they are clearly rooted in one dominant group, obvious in their messages and intent, and likely visible to a vast range of people. However, attention here is focused on ideologies that are more accurately described as "non-vulgar" in their tendency to be marked as "common sense" assumptions beyond any critical apprehension. This breaks from the simplistic caricature of ideology simply as a vulgar "false consciousness" in which the masses are depicted as irrationally and more or less completely accepting the contrived class interests of the bourgeoisie.

The term ideology occasionally appeared in archaeological scholarship throughout the twentieth century, but it routinely referred to a general body of core beliefs or the broader world of ideas (cf. Eagleton 1991; Bernbeck & McGuire 2011: 45). Most contemporary definitions of ideology build on or are at least indebted to Marxian theory, where ideology is defined as an imagined relationship between consciousness and reality (Bernbeck & McGuire 2011: 17-9). In the 1980s a series of archaeological scholars began to use the notion of ideology to describe discourses of mystification, borrowing a belief most closely linked to Frankfurt School critical theorists. Critical theories tend to acknowledge that all perceptions of the relationship between reality and consciousness are mediated by ideology (Bernbeck & McGuire 2011: 24). Frankfurt School critical theory approaches scholarship on ideology as a contemporary intervention that raises consciousness of inequalities, reveals ideological fallacies, and fosters political action against such inequalities.

The most persuasive 1980s definitions of ideology firmly root it in relations of power and conflict and stress the connection between ideologies in the past and present. For instance, Mark Leone's archaeological analysis of ideology in the colonial Chesapeake borrowed from the French structural Marxism of Louis Althusser as well as Frankfurt School critical theory. Leone argued, following Althusser, that ideology was "those things that are taken by a society as given" (Leone 1984: 25). Those assumptions in Leone's formulation were class-interested representations of colonial elite that obscured the profoundly exploitative nature of inequality in the eighteenth-century Chesapeake. Leone argued that the elite's ideological representations of their power were designed to "naturalize and thus mask inequalities in the social order," with the intention to "disguise the arbitrariness of the social order, including the uneven distribution of resources, and it reproduces rather than transforms society (Leone 1984: 26)." Leone deployed this framework in an analysis of Chesapeake formal gardens and subsequently extended it to everyday commodities (Leone et al. 1987), arguing that the elite struggled to define artifacts of all scales in ways that reproduced inequality and their existing dominance. He argued that the gentry built Chesapeake formal gardens in the 1760s and 1770s to display their mastery of natural law and rationalize their material wealth and claims on political power. Some scholars are skeptical that nonelite accepted such representations of class power, and Leone (2005: 82) contends that it "did not matter whether slaves, free African Americans, or poor white people believed in the ideas on display, but it did matter whether middle- and upper-class people were impressed." Gardens viewed this way were mechanisms of ideological class consolidation rather than emulative models for the masses.

Leone asserted that such scholarship on inequality could be used to illuminate how contemporary capitalist inequalities have developed over more than 250 years. Many scholars examining ideology agree that self-reflection and consciousness promote activism against ideological inequalities. This sort of critical Marxian scholarship is often referred to as emancipatory. Dean Saitta (2005) argues that Marxism offers a powerful framework for an archaeology of

tribal societies that is both explanatory and emancipatory; i.e., there is a concrete explanatory rigor in Marxism as well as a dimension that fosters critical self-consciousness leading to change that might be considered emancipation. Saitta advocates examining tribal societies (e.g., Mississippians) as class societies in which surplus labor is appropriated in many different ways that range from collective to exploitative appropriation that was rationalized ideologically in many different forms. Yet he underscores that there is potential emancipatory impact in an archaeological picture of class in tribal societies that reveals the vast complexity in the ways societies produce and distribute social surplus. For Saitta, much of the power in an analysis of ideology is its power to erode widely accepted but largely unexamined assumptions about complexity and class by both archaeologists and contemporary constituencies.

Archaeologists have sometimes expressed skepticism that such ideologies were embraced by all consumers, casting doubt on the extent to which ideology determines everyday agency. Archaeological material culture certainly reveals widespread resistance to and breakdowns in ideological practices. Michel de Certeau (1988) stressed human agency within dominant ideology, laying a theoretical groundwork for archaeologists that resists the most deterministic notions of ideology. Certeau argues for "two logics of action" that he refers to as the strategic and the tactical. Tactics are opportunistic spontaneous actions, operating free in space, that subvert dominant strategic discourses. Tactics introduce plurality and individual creativity in the construction of meaning and action within an oppressive system, but they subvert that system through their ability to redefine what a commodity means and how it is used.

Archaeologists interested in such a picture of everyday life have often focused on the contradictions between ideological representation and everyday life practices. Archaeological scholarship on race and consumption, for example, has probed how African Americans resisted racist representations by literally buying into consumer culture. African Americans acquired commodities and embraced the role of consumer as a mechanism to defy racist stereotypes that assumed African Americans were not racially capable of participating in consumer culture (Mullins 1999). The challenge in such research is that the consumption of marginalized racial and ethnic collectives countered blatant ideological misrepresentations of those groups, but consumption demanded a commitment to wage labor inequalities, and goods brought with them social assumptions about behavior and identity that were not wholly empowering. James Symonds (2004) examines how archaeologies of urban working-class life in the United Kingdom, United States, and Australia collectively reflect the ways everyday life broke sharply from the poverty "myths" favored by contemporary observers and persistently misrepresented in heritage discourses. In similar ways, Rebecca Yamin's (2001) work in the Five Points neighborhood of New York City aspires to demonstrate how working peoples' lives were radically unlike the class-interested caricatures of social reformers who ostensibly hoped to contain poverty if not eliminate slums.

Most of these archaeologists share an interest in using archaeological material culture to bridge between past and present and counter historical narratives that reproduce if not perpetuate ideological distortions. Some scholars call this the archaeology of the "contemporary past," eliding the facile division between past and present and focusing on the ways historical narratives distort past experiences and their connection to the contemporary world. Laura McAtackney (2011), for instance, investigates the origins of Belfast, Ireland, in the seventeenth century, examining how walls have partitioned the city in particular ways over the subsequent centuries and remain boundary markers in the contemporary world. Since the 1960s, temporary walls have been used to divide ethnic and nationalist collectives in Belfast, often at the behest of those Belfast communities, but McAtackney argues that they pass largely ignored. Inelegantly known as "peace lines," these walls are ideologically designed to be expressions of control, and McAtackney examines how wall murals are used

to both reaffirm and challenge social and political control. McAtackney concludes that walls and their memorial murals permit communities to maintain identity distinctions, but at the same time they perpetuate longstanding tensions and hinder communication across lines of spatial and social difference. Such studies that aspire to bridge between past and present often illuminate ideologically laden heritage narratives and use materiality to erode dominant narratives. For instance, Adrian Myers' (2008) analysis of German concentration camps argues that the heritage of the camps inevitably cannot include the voices of the scores of prisoners who perished, and he advocates a material analysis to temper narratives that ignore the voices of the subaltern. Myers reasons that much of the material record of everyday goods reworked by prisoners or camp graffiti reveals the complicated range of ways prisoners resisted and negotiated imprisonment.

Archaeological scholarship on ideology aspires to underscore how society represents itself to its members, illuminating the ways that distinctions in privilege, power, and structural inequalities are explained. Many of these legitimizing and masking explanations are accepted very broadly in societies. But over time many of them erode as well, because rationalizations of inequality are constantly under fire and rarely accepted wholesale. Archaeology provides especially powerful material examples to illuminate how such ideological discourses are represented in symbolic and material form, revealing the ways various social agents accept ideologies as well as how some members reject ideological claims. The central thread in perhaps all the archaeological scholarship on ideology is its ambition to illuminate contemporary social inequality, sometimes by examining the many different ways past societies have represented inequalities and sometimes by revealing the very historical roots of contemporary ideological practice. It is difficult to fathom any scholar of complex societies and inequality ignoring the powerful framework ideology provides to analyze the representation of inequality and social life.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Materiality in Archaeological Theory
- ▶ Power and Knowledge in Archaeology

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I

Ikawa-Smith, Fumiko

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Basic Biographical Information

Fumiko Ikawa-Smith is an anthropologist and prehistorian (Fig. 1). She is an Emeritus Professor at McGill University, Canada. She was born in 1930 and is the eldest daughter of the Buddhist historian Ikawa Joukei. Under the oversight of her mother, who was a high school teacher, Fumiko began studying English at an early age. She graduated from Tsuda College in 1953. Her graduate thesis was on critical essays by the British poet T. S. Elliot. Taking advantage of her proficiency in English, she was able to get a clerical position under ethnologist Oka Masao in the Department of Sociology at Tokyo Metropolitan University. She gained a strong interest in anthropology while assisting Oka with his lectures and research. In 1954 she resigned her position and began studying anthropology as a graduate student at the same university, with the focus on the ancient civilizations of Central America. At the same time, she met anthropologist Clyde Kluckhohn who was in Japan leading a series of seminars on American Studies. Through Kluckhohn, she gained direct contact with American anthropology, and with the help of Kluckhohn's wife, Ikawa took a leave of absence and obtained a Fullbright Scholarship to study at Harvard University. Though the study abroad was intended to last only 1 year, Ikawa has continued to study in the North America to this day.

At Harvard, Ikawa initially aimed to specialize in Central America under Gordon Willey but switched to the study of Early Paleolithic cultures in East Asia after studying with Hallam Movius. At the same time, more material for the study of the Paleolithic in Japan was becoming available. In 1959, she married the prehistoric archaeologist Philip E. L. Smith whom she met at Harvard University. After the birth of their child, they moved to Canada where Philip was to teach at the University of Toronto. In 1962–1963, she accompanied Philip on his excavation in Egypt, and upon returning to Canada, she was responsible for organizing the artifacts. Following that, she served as a Lecturer in the Department of Anthropology at the University of Toronto. They moved to Montreal in 1966, where Philip taught at l'Université de Montréal while Fumiko at McGill University. After a few years of part-time teaching, she was appointed Assistant Professor of Anthropology in 1970, Associate Professor in 1974, and Professor in 1979. In the meantime, she obtained a doctorate from Harvard University in 1974 for her dissertation on the Early Paleolithic cultures of Japan. Before her retirement in 2003, she served as the Chair of the Anthropology Department, 1975–1980; Director of the Centre for East Asian Studies, 1983–1988; and Associate Vice-Principal (Academic) of the University in 1991–1996. In 2005, she was awarded the Japanese national decoration of The Order of the Sacred Treasure, Gold Rays with Rosette, for distinguished contribution to the cultural interaction between Canada and Japan. She is currently Professor Emerita at McGill University.

Ikawa-Smith, Fumiko, Fig. 1 Fumiko Ikawa-Smith at Vladivostok in 2003 (© Robert E. Ackerman)

Major Accomplishments

One of Dr. Ikawa-Smith's greatest contributions to global archaeology was to provide a linguistic

bridge between Japan and the rest of the world in the decade that followed WWII. She played a major role in stimulating interest in the study of the Paleolithic period in Japan and emphasized Japan's unique capacity to fill in the knowledge gap between the Paleolithic period in China and the colonization of the Americas. Due to language barriers, little progress had been made in the 10 years following the first discovery of a Paleolithic site in Japan in 1949 at Iwajuku. It was in light of this that in 1960, along with Chosuke Serizawa, Dr. Ikawa-Smith coauthored an English language paper that introduced the available material for the study of the Paleolithic period in Japan and its position in East Asia (Serizawa & Ikawa 1960). This paper was highly regarded throughout the Americas. Because of her unique position, progress began to be made. Additionally, Dr. Ikawa-Smith also tried to bridge Japan's more historical approach to archaeology with America's anthropological approach. All of this was made possible by her archaeological education in the United States as well as her contact with Chosuke Serizawa, who encouraged a wider view of the world.

Dr. Ikawa-Smith's activities were not limited to spreading information from Japan to the rest of the world, however. Archaeology within Japan was stimulated by her paper in 1976 that introduced into Japanese Paleolithic studies the perspective of processual archaeology (Ikawa 1976). The work of her husband Philip, who tried to clarify the cultural origins of farming using an archaeological approach based on cultural anthropology, may have had an influence on her interest in the food habits of Paleolithic hunter-gatherers. In addition to this, Dr. Ikawa-Smith's work promoted discussions on research into the Paleolithic and Jomon periods in Japan from the perspectives of gender and national identity.

In 1973, Dr. Fumiko Ikawa-Smith organized the symposium "The Early Palaeolithic in Southeast Asia" to assist in disseminating information on East Asian archaeology to the West. Later, she worked alongside Gina Barnes and Sarah Nelson, both of whom also specialize in the study of ancient East Asia, to establish a research network for the study of East Asian archaeological data. In 1996, this group established the Society for East Asian Archaeology. Dr. Ikawa-Smith's broad range of international activities have had a profound influence on Japanese researchers, including but by no means limited to Junko Habu who graduated from McGill University with a doctoral degree in Jomon Culture and who now a professor in the Anthropology Department at the University of California, Berkeley.

Acknowledgment Special thanks to Mr. Robert Condon for basic translation.

Cross-References

- ▶ East Asia: Paleolithic
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Movius, Jr., Hallam L.

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Basic Biographical Information

After double majoring in History as well as Classical and Near Eastern Archaeology at Bryn Mawr College (USA), Salima Ikram received her M. Phil. (in Museology and Egyptian Archaeology) and Ph.D. (in Egyptian Archaeology) from Cambridge University (UK). Today she is Professor of Egyptology at the American University in Cairo. Although Dr. Ikram initially trained as a general archaeologist, she moved to focusing on mortuary archaeology and archaeozoology, as well as being actively involved in museological projects.

Major Accomplishments

Dr. Ikram directed the Animal Mummy Project, codirected the Predynastic Gallery Project, the Egyptian Museum Chariot Project, as well as being involved in several exhibitions at the Egyptian Museum Cairo and consulting and working on exhibitions at other museums in Egypt, Europe, and the United States. She has participated in several excavations in Egypt where she has worked at sites from Alexandria to Aswan in various capacities. She has also worked in the Sudan and Turkey; in Turkey, she was chief archaeozoologist at the site of Kinet Höyük, ancient Issus. In Egypt, her focus has been on mortuary and ritual sites, with an increasing emphasis on animal mummies, one of her specialties, and a subject that has enjoyed a renaissance as a scholarly and popular focus due to her research. Dr. Ikram also codirects the North Kharga Oasis Survey in Egypt's Western Desert. This project has widened her interests to include environmental archaeology, rock art, and the protection and presentation of large-scale archaeological sites in Egypt's Western Desert, with a pilot heritage management project being carried out at the site of Qasr el-Lebekha. In addition to archaeological and museological work, she has taught at the American University in Cairo since 1995 and has been instrumental in establishing an M.A. program in Egyptology and Coptology there.

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► Cat: Domestication
► Dog: Domestication

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Ileret Footprints

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Introduction

The Koobi Fora Formation, located in the Turkana Basin of northern Kenya, is one of the richest and most famous hominin fossil beds in east Africa (Harris et al. 2006). Two footprint sites have been excavated in this basin to date.

Key Issues/Current Debates/Future Directions/Examples

The older at ~1.52 Ma was reported in 2009 at a site close to the village of Ileret within the Okote Member of the Koobi Fora Formation (FwJj14E; lat 4°18' 18' 44"N, long 36°16' 16' 16"E; Bennett et al. 2009). They are younger than the mid-Pliocene (3.66 Ma) Laetoli prints, but are the oldest in the world that are attributed to the genus *Homo* (Leakey & Hay 1979). The footprints are found in association with animal prints at two main stratigraphically separate levels. The upper surface contains three hominin footprint trails comprising two trails of two prints and one of seven prints, as well as a number of isolated prints (Fig. 1). Approximately 5 m below, the lower surface preserves

Ileret Footprints, Fig. 1 Example of one of the Ileret footprints. Partial left foot showing the toe pads and forefoot

one trail of two prints and a single isolated hominin print. Subsequent excavation to that reported in 2009 at this level has uncovered additional prints laterally to the main site and at intermediate stratigraphic levels (B.G. Richmond, *pers. comm.*). The footprints occur within a 9 m thick sequence of fine-grained, normally graded, silt, and sand units accumulated as over-bank flood deposits with evidence of paleosol development. Inter-bedded within this succession are three fluvially reworked volcanic ashes; the upper ash (Northern Ileret Tuff) forms a prominent landscape benchmark that correlates with other nearby sites where traces of hominin activity have recovered (Harris et al. 2006) and is unconformably overlain by the Galana Boi Formation of Holocene age (Feibel et al. 1989). The ash layers have been correlated geochemically to dated tuffs within the Turkana Basin thereby providing an age of 1.51–1.52 Ma for the upper tuff and 1.53 Ma for the lower tuff (Bennett et al. 2009).

The second footprint site 45 km to the south was first reported in Behrensmeyer and Laporte in 1981 (Behrensmeyer & Laporte 1981) and consists a single trail of poorly defined prints which were imprinted subaqueously (GaJi10; lat 3°44’ 44’ 15”N, long 36°55’ 55’ 48”E). The footprint surface occurs below a prominent tuff, sampled and correlated by Bennett et al. (2009) to the Akait Tuff and dated to 1.435 Ma. Re-excavation of these prints by Bennett et al. (2009) uncovered four of the original seven prints; the two best-preserved examples are comparable to those at FwJj14E. Further excavation in adjacent areas has so far failed to uncover additional hominin footprints but has revealed an extensive surface of animal footprints dominated by prints of swimming hippopotami.

Modern human footprints reflect the unique anatomy and function of the human foot, which is characterized by a fully adducted hallux, large and robust calcaneus and tarsal region, a pronounced medial longitudinal arch, and short toes. Footprints reflect the pressure distribution as the foot makes contact with a substrate mediated by the sediment’s geomechanical properties. During normal walking, the heel makes first contact with the ground. This is followed by contact with the lateral side of the foot and metatarsal heads, after which weight transfers medially along the ball of the foot with peak pressure under the medial metatarsal heads, and finally ending with toe-off pressure under the hallux. The distribution and pattern of depth within a footprint generally reflects this typical pattern of weight transfer, although will appear different when corrections are being made for balance. This allows biomechanical inferences to be made from sets of footprints. The prints at Ileret have (Bennett et al. 2009) the following: (1) a well-defined hallux which is in line with the lateral toes, (2) visible lateral toe impressions that vary in depth of indentation, (3) a well-defined ball beneath the first and second metatarsal heads, and (4) a visible instep reflecting a medial longitudinal arch.

The angle of hallux abduction, relative to the long axis of the foot, averages 14° compared to 8° for modern prints and 27° for the Laetoli prints (Bennett et al. 2009). The morphology of the Ileret prints suggests that the feet of these hominins had functional medial longitudinal arches and a modern humanlike toe-off mechanism and therefore operated in a biomechanical fashion akin to that of modern humans.

Most of the Ileret prints are similar in length to modern adult human prints, although one of the isolated footprints on the lower level is significantly smaller, despite a similar gross anatomy, and may represent a subadult. Although precise foot length to stature ratios is unknown for early Pleistocene hominins, Bennett et al. (2009) estimated the print makers' height using a ratio developed for Australian Aborigines and corroborated it using a ratio calculated from a small sample of native Kenyans of the Dassanech tribe who are indigenous to Ileret. Using this relationship, they estimated the average height of the upper surface print makers to be 1.75 ± 0.26 m and 1.76 ± 0.26 m for those of the lower surface, excluding the potential subadult which gives a height of 0.92 ± 0.13 m. The large stature and mass estimates derived from the Ileret prints compare well with those of *Homo ergaster*/*erectus* based on postcranial remains (where available) and are significantly larger than stature and mass estimates for *Paranthropus boisei* and *Homo habilis* (Bennett et al. 2009). Consequently it has been tentatively suggested that the prints were made by *Homo ergaster*/*erectus* individuals. A similar conclusion was reached by Behrensmeyer and Laporte (1981) for the slightly younger site (GaJi10) 45 km to the south.

While one cannot conclude with certainty what hominin species made the footprints at FwJj14E or GaJi10, their modern characteristics in combination with the large size of the prints are most consistent with the large size and tall stature evident in some *Homo ergaster*/*erectus* individuals. The Laetoli prints contrast with those of Ileret both in size and in the degree of modern humanlike foot function (Bennett et al. 2009). These comparisons are ongoing and remain challenging due to the difference in substrate and paleoenvironmental contexts of the Ileret and the Laetoli footprint sites. The significance of the Ileret footprints lies in the fact they provide evidence of a modern foot function on one side of the transition from the *Australopithecus* to *Homo* genus which is one of the most significant transitions in human evolution (Ruff et al. 1993; McHenry & Coffing 2000; Pontzer 2007). Longer lower limbs and lower energetic cost (Pontzer 2007) are archaeological indications of activity in a much wider variety of ecological settings, and transport of resources over long distances is consistent with a transition to endurance walking and running.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Australopithecines
- ▶ Fossil Records of Early African *Homo*
- ▶ Geoarchaeology
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ Lucy
- ▶ Stature Estimation
- ▶ Taphonomy in Human Evolution

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Imaging Techniques in Bone Analysis

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Introduction

The main medical radiological imaging techniques used for forensic examination of skeletal material may be summarized as follows:

Radiography: The term "radiography" is generally used to describe a static or "still" image produced by means of a single exposure to X-rays (an energy form of ionizing radiation). Such images are now usually recorded and stored digitally but were previously recorded photographically on X-ray film.

Fluoroscopy: The term "fluoroscopy" is used to describe an image directly visualized in real-time motion produced by a continuous exposure to X-rays.

Computed Axial Tomography: CAT or CT scanning employs a computerized X-ray machine that uses an array of photoreceptors to detect minute differences in attenuation of X-rays emitted by an X-ray tube as it rotates around the body or body part. A computer generates an image of the body part in the axial or cross-sectional plane and modern multi-detector (MDCT) scanners permit multi-planar, multidirectional sectional images to be displayed and/or reconstructed as three-dimensional images.

Definition

The examination of skeletal material should be divided into two general categories: *macro-* and *microradiography*. Historically, plane radiographs were examined by placing the film on an illuminator or viewing box. A hand lens may have been used to magnify a particular region of interest, but generally the structures under consideration were large enough to be easily demonstrated without magnification. Today, the resolution available with computed tomography (CT) is sufficient to provide two-dimensional sections and three-dimensional images that also do not require magnification. For the purpose of this entry, images that can be viewed without the need of magnification have been categorized as *macroradiography*.

Microradiography has a long history. With contact microradiography, the object under examination, usually less than a centimeter in diameter, is placed directly on the image receptor and the resulting image is primary view under magnification (Conlogue & Marcinowski 1986). Today, micro-CT has expanded the possibilities and eliminated the need to physically section an object in order to demonstrate internal structure.

Key Issues

Application of Macroradiography Techniques

Radiological imaging has the advantage of enabling the examination of remains in a variety of states of decomposition from fully fleshed to completely skeletonized. As such, it affords the opportunity to obtain a considerable amount of data without the need to clean and/or completely

deflesh the remains. It provides the investigative team with a rapid method of triage and classification by answering a number of fundamental questions:

Establishing Context

Human Versus Nonhuman In most cases involving nonhuman (animal) bones, a simple visual examination is all that is necessary for the trained anatomist or forensic anthropologist (or osteologist) to determine nonhuman characteristics. In some cases, however, the most distinctive parts of the bones, the articular surfaces, may be missing due to fragmentation, decomposition, or animal activity, and in such cases, radiographic examination of the bone structure and trabecular pattern can be useful to determine human remains from nonhuman remains (Chilvarquer et al. 1987; Brogdon 2011a).

Recognition of Commingling In cases involving large amounts of fragmented remains, remains may be commingled and mixed with large amounts of debris and artifacts. Physical examination of such remains, particularly in cases involving exhumation or fire damage where there is a uniformity of discoloration of all samples retrieved, is both difficult and time consuming. In such cases, radiological examination can prove useful to the forensic pathologist and/or anthropologist both in determining the presence of one or more individuals but also in identifying and locating small body parts, which may otherwise be overlooked in the absence of a thorough and time-consuming fingertip search.

Location and Retrieval of Artifacts/Evidence In the same way, X-ray imaging can be utilized to detect and retrieve various objects that have been recovered together with the remains during excavation or body recovery. This can be helpful especially when body fragmentation is extensive and has proved particularly useful in mass fatality incidents (Viner & Lichtenstein 2011) or where the body has been exhumed. In the latter case, it may also be useful to radiograph the associated debris excavated with the body in order to detect small items such as jewelry or other personal effects which may have become disassociated from the body during decomposition – a technique referred to by Wessling as "The third method of Sieving" (Tonello 1998; Viner 2008; Wessling & Loe 2011) (Fig. 1).

Human Identification

Establishing the Biological Profile (Age, Sex, Stature, and Ancestry) In the same way that a physical examination of the defleshed skeleton allows the forensic anthropologist and/or odontologist to estimate age at the time of death, so can skeletal radiography deliver the same information in the case of less decomposed remains by analysis of the state of maturation of dental structures, ossification sites, and degenerative changes. Similarly, radiologic examination of the pelvis, skull, and mandible can assist in the differentiation of sexes in cases where direct physical examination and measurement is not possible (Brogdon 2011a).

Estimations of stature are often made by direct measurement from unfleshed human remains. The same measurements can be made radiographically, provided that correction for magnification is made (Brogdon 2011a). This can either be achieved by means of an adapted radiographic technique, applying a simple correction factor or utilizing modern imaging techniques such as CT scanning and digital radiography. CT scanners and digital X-ray systems can be calibrated to undertake this correction calculation automatically, thus allowing measurements to be made directly from the image. In the case of CT scanning, a scanogram is performed using the scanner to undertake an automated version of the manual process described above. Digital X-ray machines using a slit beam can also be used to take direct measurements, and many other direct digital X-ray machines can be calibrated so as to render accurate anatomical measurements from the resultant images.

Similar methods to those used by forensic and physical anthropologists to make an assessment about ancestry from skeletal remains can be applied radiographically with fleshed remains. In particular, examination of the skull and

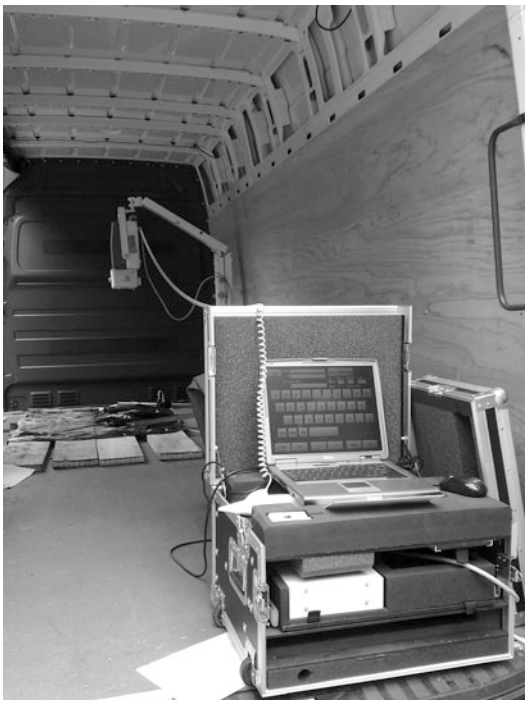

Imaging Techniques in Bone Analysis, Fig. 1 A portable direct digital X-Ray system being used on-site to examine remains. In this particular case, the unit is located in the back of a van and is being powered by a small generator. Image provided by kind permission of Reveal Imaging Ltd

mandible, the distal end of the femur, and the ratio of long-bone length can be useful in determination of population ancestry (Brogdon 2011a).

Positive Identification of Individuals by Comparison of Antemortem and Postmortem Radiological Data Radiological identification of human remains requires specific and unique findings on postmortem images to be matched exactly with antemortem images of the individual. In some cases, identification can be made from a series of relatively common or nonspecific pathological anatomical changes that appear in identical locations in ante- and postmortem images. In other cases, a single unique feature is sufficient (Brogdon 2011b).

Medical imaging has long been used for the identification of human remains and is well documented. Radiology is used extensively in anthropological and odontological assessment of postmortem and antemortem radiographs, records or other images for concordance as they represent an excellent source of data for comparison of anatomical features (Fig. 2). Many specific cases have been reported in which radiology has played the leading role in the identification of human remains (Kahana & Hiss 1997; Viner & Lichtenstein 2011).

Analysis of Injuries

Interpretation of Trauma Radiology can be used to assist in determining the manner of death or the extent and mechanism of trauma. In cases of extensive trauma, individual demonstration of all fractures present after a fatal accident may be a time-consuming process and radiological examination simplifies the procedure. In addition, some fractures are difficult to demonstrate and are more adequately demonstrated using radiological methods such as X-ray or CT scanning.

Radiological examination may yield far more than simply demonstrating the presence of fractures. It may be able to demonstrate the nature of the trauma that caused the fracture by determining the direction and impact of the force and in some cases may enable a fracture that has been caused by an assault to be differentiated from trauma sustained following an accidental fall (Fig. 3). MDCT scans and surface-scanning techniques may also allow three-dimensional modeling to identify directions of impact and size and shape of weapons used to inflict trauma (Buck et al. 2011; Nather et al. 2011).

Radiology may also be of significance in proving the infliction of injury at various times by demonstrating healing and fresh fractures and such evidence is essential to the concept of systematic abuse or torture (Brogdon et al. 2003). In some cases, it may be particularly useful to identify peri-mortem trauma as fresh callus formation may be used for stable isotope analysis to determine the geographic region in which the deceased was living in the time leading up to their death by means of analyzing the bone mineral content.

Imaging Techniques in Bone Analysis, Fig. 2 Healed fractures such as this fracture of the tibia can enable an identification to be made via comparison of antemortem and postmortem images. Two projections of any fracture site, in the anterio-posterior (**a**) and lateral (**b**) should be made during post mortem examination. These are standard projections that are used in orthopaedic radiography to assess the healing fracture and post-mortem films can thus be compared with any ante-mortem images that may be available

Imaging Techniques in Bone Analysis, Fig. 3 "Defence fracture" of the ulna caused by blunt force trauma to the forearm. Image provided by kind permission of the United Nations International Criminal Tribunal for the Former Yugoslavia

The most obvious use of X-rays in cases of suspected homicide is to demonstrate the presence of bullets and other missiles within the body. Projectiles may be found some considerable distance away from the entry site and radiography can be used to locate these. The deployment of a dynamic imaging method, such as fluoroscopy, will accelerate the process of retrieving ballistic material. This is particularly true when the body is partially decomposed, subjected to fire, or has been exhumed. In such cases, physical examination and location of ballistic material is often hindered by uniform discoloration and can be a time-consuming process. Even if the projectile is recovered without the aid of radiography, fragments of bullets or of bomb casings or contents can easily be missed in an unaided dissection and important information for the ballistic expert may be lost.

The determination of other causes of death is also assisted by the use of X-rays. Of significance is the radiography of the larynx in cases of strangulation in which fractures of the thyroid cartilage or hyoid bone can be demonstrated, particularly if the cartilages are calcified (reference), a process which increases with age. Radiology has proved particularly useful in assessing and documenting trauma in mass fatality incidents (Alexander & Foote 1998; Harcke et al. 2002; Viner & Lichtenstein 2011) and

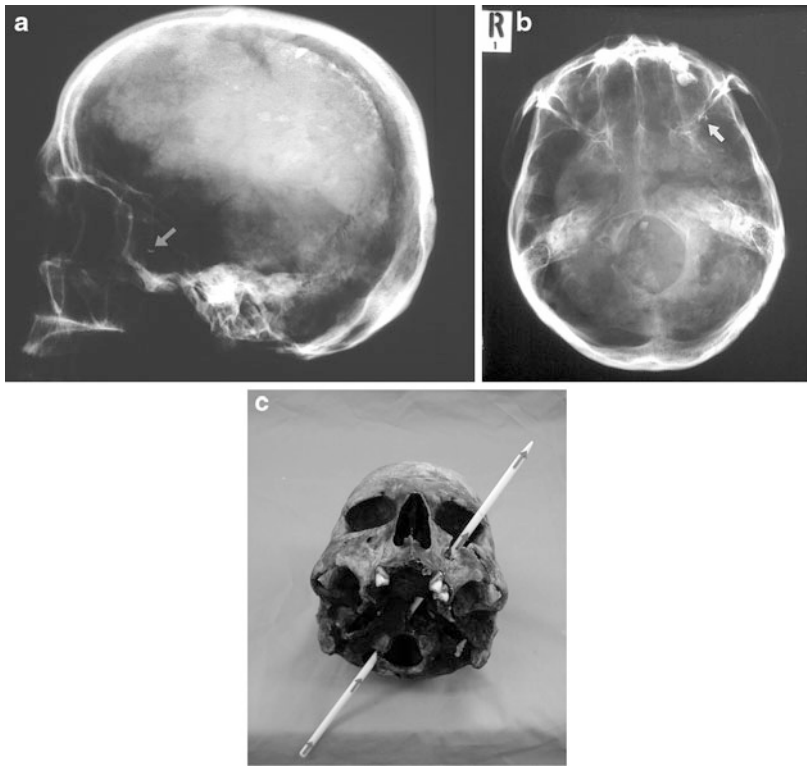

Imaging Techniques in Bone Analysis, Fig. 4 Lateral (**a**) and submento-vertex (**b**) projections of the skull reveal ballistic traces within the skull in the area of the left orbit, confirming the path of a bullet from its entry site in the occipital bone to its exit through the left orbit (**c**). Image provided by kind permission of the United Nations International Criminal Tribunal for the Former Yugoslavia

radiological methods have also been employed extensively in the investigation of war crimes and human rights abuses involving the exhumation of buried human remains where radiology will assist in the location of ballistic material, the evaluation of gunshot and/or explosive injuries, and the investigation and documentation of any antemortem trauma (Tonello 1998; Viner 2008) (Figs. 4, 5).

Examples

For all its disadvantages, film is still the recording media of choice under certain circumstances, e.g., a sample consisting of a few small objects. Choices of recording media are not limited to medical radiographic film and indeed, film intended for industrial applications has several advantages over its medical counterpart. Although it requires more radiation, the film provides greater resolution and a longer scale of contrast, more shades of gray. In addition, since X-ray and light are both forms of electromagnetic radiation, various types of sheet film or paper employed in photography are capable of providing satisfactory results. Until 2009 when manufacturing ceased, Polaroid^{Tm} 8” × 10” types 804 and 805 produced excellent results (Fig. 6). Ilford^{Tm} photographic paper loaded in a screen cassette and in a non-screen film holder both provided images with exceptional detail resolution and contrast (Conlogue & Beckett 2010).

With only a few images to process, large tanks normally used to manually process exposed film are not necessary. Photographic trays typically employed to process photographic prints can serve to process radiographic film as large as 14” × 17” (35.6 × 43.2 cm). For smaller size film, disposable plastic containers are inexpensive and available at large food or discount stores.

When the size of the sample or object to be examined is large, digital radiography becomes the more realistic option for several reasons. Firstly, manually processing more than a few large format (14” × 17” [35.6 × 43.2 cm]) films

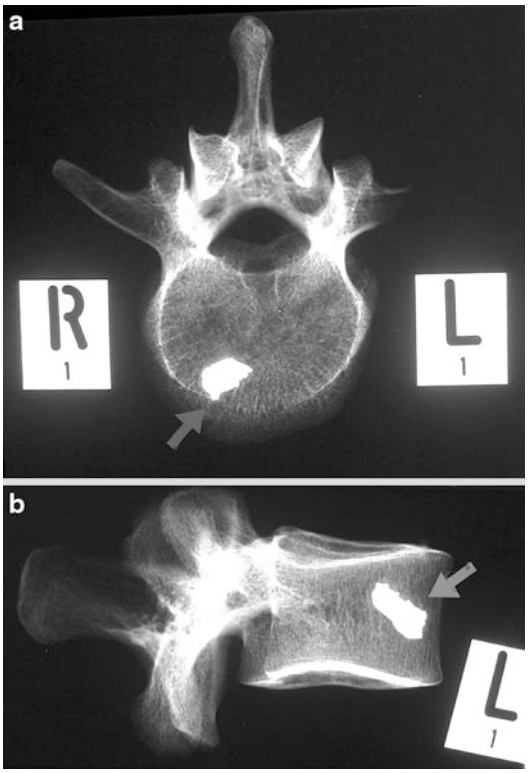

Imaging Techniques in Bone Analysis, Fig. 5 Initial x-ray examination of human remains revealed a ballistic fragment in the spine. This was further documented and localised by radiography of the lumbar vertebra prior to retrieval. Localisation is facilitated by two projections taken at 90°; in this case supero-inferior (**a**) and Lateral (**b**) projections. Image provided by kind permission of the United Nations International Criminal Tribunal for the Former Yugoslavia

Imaging Techniques in Bone Analysis, Fig. 6 A severed bound foot of a Chinese woman from the Mütter Museum, College of Physicians of Philadelphia, Philadelphia, Pennsylvania recorded on Polaroid Type 804 film

is a cumbersome undertaking. Secondly, a large film requires at least five gallons (22 l) of water to be considered thoroughly washed prior to drying.

In the medical arena, film has gradually been replaced by a digital recording media. Although the initial outlay is expensive, the advantages of the digital approach, such as post-processing of the image, therefore eliminating the need to repeat an exposure, have reduced patient exposure and increased patient throughput.

Digital radiography can be divided into two categories: direct digital radiography (DR) and computed radiography, (CR). With DR, the imaging plate is either directly or remotely connected to a computer. Within seconds of the exposure, the image will appear on the computer monitor. In most systems, the X-ray unit is an integral component and therefore increases the overall cost. In the case of CR, any X-ray source can be used. Following an exposure, the imaging plate is placed into a device called a reader in which the imaging plate is scanned by a narrow laser beam that transforms the X-ray energy trapped within the surface of the plate into visible light and then to an electrical signal and finally an image on the computer monitor. Because the CR process has several steps, the resulting image may be as long as two minutes following the exposure.

Each system has advantages and disadvantages. The principal advantage of DR is the short duration between the exposure and appearance of the image. With less time between exposures, more images can be acquired in a day. For example, during a 9-day radiographic examination of skeletal remains under St. Bride's Church in London, a total of 1,192 exposures were made, averaging 132 images per 6-h day or 22 exposures per hour. Similar types of studies using film had a much lower number of images per day. In Guanajuato, Mexico, films were taken of mummified remains in the Museo de Mumias and transported three times a day to be processed at a local hospital located 30 min away. Working 8-h days over a 5-day period, a total of 196 radiographs were taken. Unfortunately, either the temperature of the chemistry in the automatic processor or a fluctuation of the electricity supply to the X-ray unit changed between the second and third batch of film because the entire third batch had to be repeated.

Another advantage of DR is that the object does not need to be moved to process the image. If the image shows a less than optimal position, a slight adjustment of the object can be achieved within a minute or so of the first exposure. Even when a study is conducted in an imaging facility with an automatic processor in the next room, a repeat of a radiograph taken with film would take much longer. In order to process the image, the object would need to be removed from the cassette. The cassette is then brought to the darkroom and the film placed into the processing unit with possibly a 90 s wait until the processed image can be examined. If a repeat exposure is necessary due to poor positioning, it is less likely to be easily corrected because the object was removed in order for the film to be processed.

A third advantage is demonstrated if a repeat is necessary due to a poor exposure setting. Since the raw data from the plate is digitized prior to processing by the computer, algorithms within the computer software can manipulate the data, within limits, to insure an acceptable image.

There are several disadvantages of a DR system, the principal drawback being cost. As previously indicated, most systems require the X-ray source to be integrated into an entire DR system. In addition, the X-ray tube support that is designed for mobile radiography will add about another 80 lbs (36 kg) to the overall weight of the system. If the study is in a remote location, the additional weight can become problematic. Another cost related disadvantage is the expense for replacing a damage imaging plate. Once the plate is damaged, no more images can be acquired until the plate has been replaced.

The DR system cannot permit a multiple exposure to be taken on a plate before it is processed. The system is designed to transmit the data as soon as an exposure has been taken. However, there are certain situations when multiple exposures are necessary. If the object to be radiographed is sufficiently dense to require an exposure that exceeded the maximum output of the X-ray unit and film is the recording media, multiple exposures can be taken with an adequate interval between exposures to insure that the X-ray tube will not be damaged. Multiple exposures may also be necessary in a situation where the distance between the X-ray source and the image receptor is great. Because the X-ray beam diverges from the source, if the distance is doubled to the image receptor, four times the exposure is required. In a study of 18 mummies at the Detroit Science Museum, a 168-in. (427-cm) distance between the X-ray source and the image receptor was required for the X-ray beam to cover the entire individual. Since the study area was in a warehouse, there was no restriction due to the ceiling height and the X-ray tube was attached to the tines of a forklift (Fig. 7). The resulting radiographs, recorded on film, were digitized and electronically "stitched together" to produce a single image of each mummy.

Computed radiography (CR) is the less costly alternative to DR and the plates can be used when multiple exposures are need. An additional advantage is that there are CR systems for both medical and industrial applications. The medical systems require less radiation to produce a satisfactory image; however, the industrial systems not only have increased resolution but also more algorithms or mathematical manipulations of the raw data.

Imaging Techniques in Bone Analysis, Fig. 7 The tines of a fork lift truck were used to support the x-ray tube (*A*) above the mummy (*B*) to achieve the distance necessary to radiograph the remains in a single radiograph

A single "seamless" image of a mummified individual in the Mütter Museum at the College of Physicians in Philadelphia, Pennsylvania, provides an excellent example. To image the individual known as the "Soap Lady mummy," four Fuji^{Tm} industrial CR plates were taped to a sheet of chipboard. Once in place, the plates were exposed to fluorescent light for 30 min to insure there was not residual energy on the plate surface and then the board with the attached plates was covered with black gardening plastic. A total of 12 exposures we made using 86 kVp at 34 mAs. In a makeshift darkroom, the plates were removed from the board, placed into a light-tight box, and transported for processing approximately 200 miles to the Fuji^{Tm} Research & Development testing facility in Stamford, Connecticut. The images were downloaded onto a DVD and later stitched together using a photographic enhancing program to produce a single image of the entire mummy (Conlogue et al. 2010).

This example demonstrates another advantage of the CR approach. The plates can be taken to a location exposed and then transported to another site to be processed by the reader. Less than 24 h elapsed between the exposures in Pennsylvania and the time the plates were placed into the reader in Stamford, Connecticut. In another study, a Konica^{Tm} medical CR plate was used to image a lateral skull of a formalin-preserved cadaver where the arterial vessels were injected with a barium- and gelatin-based contrast media. Two plates were exposed using identical technical factor; one was processed immediately, the other approximately 2 weeks later. Although visually the images appear almost identical, the numerical representation of the exposure, known as the "S" value, indicated the plates were losing the charge over time (Fig. 8).

The ability to correct a poor exposure is incorporated in both DR and CR algorithms that are used to generate an image. An example is demonstrated by an underexposed lateral chest image of a mummy captured on a Fuji^{Tm} industrial radiography CR plate (Fig. 9). If film had been the recording media, the only option would be a repeat. If this was the appearance of a batch of films processed, the entire group would need to be repeated and possibly an entire day of work lost.

Everything discussed to this point represents two-dimensional imaging. The primary disadvantages of this approach are superimposition of structures and magnification. Because of superimposition, at least two images at right angles to each other must be obtained to determine the relative position of structures within an object. Objects, such as skulls, necessitate multiple images in order to understand complex internal structures. Similarly magnification is inherent to all radiographs regardless of the recording media. The further a structure is away from the image receptor, the greater the magnification. Therefore, without knowing the distance an internal structure is above the receptor, it is not possible to obtain an accurate measurement of the structure. The process is more complex if the internal structure of interest is not parallel to the image receptor. The portion of the structure closer to the imaging plane will be less magnified than regions

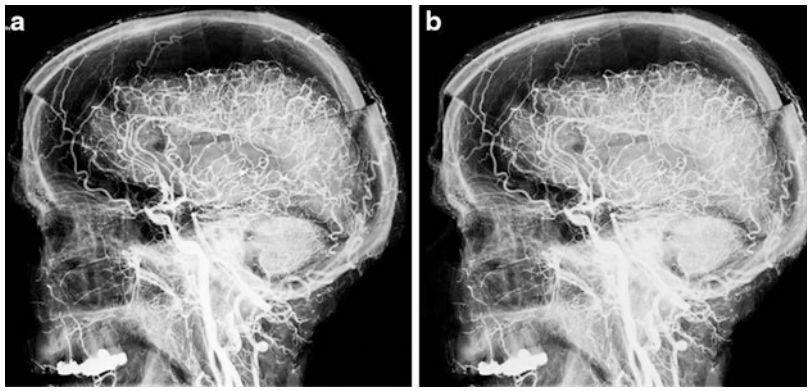

Imaging Techniques in Bone Analysis, Fig. 8 Two lateral skull projections of a formalin preserved individual with the arterial system filled with a barium gelatine compound. An S value of about 200 indicates a satisfactory exposure (**a**). As the S value increases, it indicates an under exposure (**b**). However, the algorithm employed to process the data will make adjustments, within limits, to insure the resulting images look similar

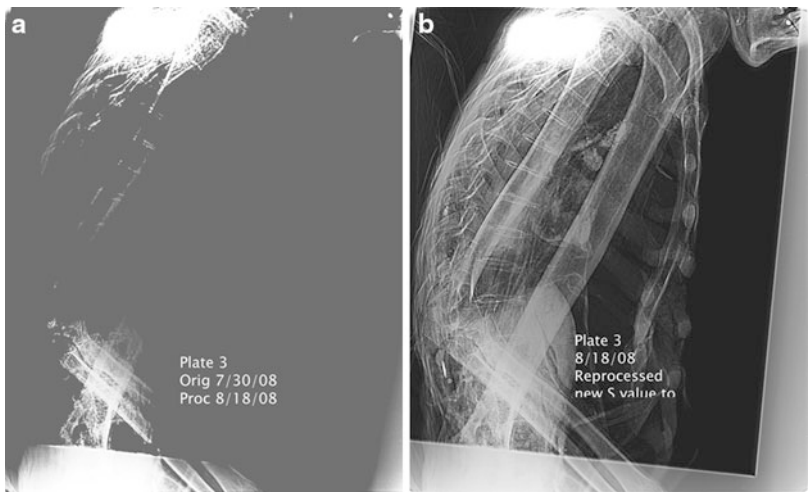

Imaging Techniques in Bone Analysis, Fig. 9 (**a**) A lateral chest radiograph of a mummy identified as George/Fred that was processed 20 days following the exposure. (**b**) The original data reprocessed to produce an acceptable image

farther away. This will result in unequal magnification, more correctly termed distortion. Since it is very difficult to get an internal structure parallel to the image receptor, distortion of some structures within a complex object is always present in two-dimensional (2D) imaging.

Computed tomography eliminates both superimposition and magnification. Identical to DR and CR, because the data are processed by a computer, the appearance of the image can be modified by post-processing manipulation. However, unlike all 2D radiography, where the X-ray beam covers a large area, for example, a 14 × 17 in. (35.6 × 43.2 cm) plate, the beam emitted from the CT X-ray tube is very restricted or collimated, in certain systems as small as 0.5 mm, to expose only a narrow array of detectors. The result of this highly collimated beam is the ability to differentiate tissue with only slight differences in density, such as white and gray matter of the brain.

Possibly one of the most important aspects of CT is that the data is quantitative rather than qualitative. Prior to being displayed, all the data is standardized to a known density, and water is assigned a CT number, also termed a Hounsfield Unit (HU), of "0." All tissues less dense than water have a negative value. Air has an assigned value of −1,000. Tissues more dense that water

have a positive value. With this innovation, it is now possible to characterize tissue and get the same CT number regardless of the unit it was scanned on. On a living patient, a decrease in cortical bone density might suggest osteopenia.

Future Directions

Radiology has a wide range of applications in the identification and analysis of skeletal remains and associated artifacts and personal effects. It is an invaluable aid in the initial examination of suspected remains and related debris, enabling context to be established and facilitating the rapid identification and retrieval of small skeletal elements and artifacts.

Its applications for human identification and analysis of trauma are especially valuable in situations involving partially decomposed remains or those which have been subjected to fire or fragmented by explosion. From assisting the determination of a biological profile, through to determining a positive identification through comparison of antemortem and postmortem images, radiology is an essential tool in the analysis of human remains and its application and deployment should be readily accessible.

Access to modern cross-sectional radiological techniques such as MDCT and Micro-CT scanning is steadily improving as the technology becomes both more economical and widely available. Greater levels of accuracy and the ability to examine subjects and display images in three dimensions offer an increasingly wide range of applications to the forensic investigator.

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Bone Differentiation (Human and Nonhuman) in Archaeological and Forensic Contexts
- ▶ Bone, Trauma in
- ▶ Burned Remains in Forensic Contexts
- ▶ Commingled Remains: Field Recovery and Laboratory Analysis
- ▶ Dental Anthropology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Forensic Anthropology: Investigating Human Rights Violations
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition
- ▶ Stature Estimation
- ▶ Taphonomy: Definition

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Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes

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Introduction

Archaeological sites and landscapes exist across the globe at every scale and in every environment, from urban to desolate desert. They include sites with aboveground ruins, ones without visible traces of human occupation or activity, and others that have been occupied and built upon time and again through to the present day with constructions in service to tourism and development. Archaeological sites and landscapes represent the layering of history and transformations of the land by human use, and among all the categories of heritage under threat, they are a resource that is increasingly in jeopardy. Since time immemorial, archaeological sites have been exploited for treasure, looted for objects, destroyed in idle curiosity, and mined to recycle their materials for new construction. So great are the remains of ancient cultures as to seem literally inexhaustible. Not only do we know now that all resources can be depleted but, with population growth, global climate change, and rising sea level, a tipping point may be coming with ultimate consequences that cannot be predicted. Is consumption of the archaeological heritage any different? Our ability in modern times to obliterate what came before us is formidable and belies the notion of inexhaustible archaeological heritage.

Beyond the spade and trowel approach to revealing buried remains, archaeologists have long realized that understanding the past requires consideration of all physical scales, from the microlevel of pollen analysis to landscapes and regions, and have developed techniques and the necessary interdisciplinary methods to study this continuum. In tandem with this holistic research method, preservation and management of archaeological sites have evolved in a similar and increasingly integrated manner, based on broad considerations of the site in its larger archaeological and natural context, as well as in its contemporary social context of use for tourism, recreation, and education.

Conservation is a catchword in ecology and biodiversity. The concepts and methods of these fields need to be integrated thoroughly with site and landscape preservation, for lost sites, like extinct species, can never be regained, and landscapes, like ecological habitats, are the appropriate scale at which to address preservation. This sturdy belief in the connectedness of the natural and cultural heritage worlds has yet to be fully translated into reality by planners and decision-makers.

Increasingly, archaeological sites and landscapes have also come under the purview of urban planners through the realization that they are not isolated, immovable "artifacts," but are a part of the urban fabric and may also be connected with the local community, such as the African Burial Ground National Monument in New York City. The lack of integrated conceptual thinking among various professionals (archaeologists, ecologists, urban planners, conservators) and stakeholder constituencies (cultural descendants, local communities, regional and national governments) remains a distinct challenge in protecting and preserving this heritage.

Definition

An archaeological site exists in a setting, usually a landscape, either natural or created. Considered as a whole, an archaeological site and its landscape comprise a repository of information about activities of people over time and their effect on the natural environment. Physical scales vary, and either site or landscape may dominate. On the one hand, the site and landscape may be of the same scale, as, for example, at Angkor in Cambodia; on the other, the site may be a rock overhang with painting in an extensive natural landscape, as is the case for rock art sites throughout the world (Fig. 1). From a preservation perspective, it is important to regard both as one. Site and landscape have relational values – topographic and geomorphological features, ecological attributes, archaeological resources, and research potential. It is the role of the archaeologist to define the extent of both site and landscape. The field of landscape archaeology is premised on landscape being important to archaeology's goal (Anschuetz et al. 2001). Archaeological sites and landscapes may themselves be considered a subset of cultural landscapes (Fowler 2003).

Historical Background

Threats to archaeological sites and landscapes in the contemporary world come from many sources, and the approaches to preserving them have become commensurately complex and wide-ranging. In the 1970s, mainly in response to the destruction of archaeological resources from uncontrolled development pressures, there began to emerge a philosophy of conservation, referred to as the "conservation ethic," first put forward by William Lipe (1974). The approach heralded a paradigm shift in the conduct of archaeological research, in which a conservation model was advocated to replace the "exploitative model," based on excavation that had guided the practice and theory of archaeology and was now seen as a contributor to the loss of archaeological heritage.

The conservation ethic argued for the use of nondestructive techniques of investigation over excavation of sites. When excavation does take place, it advocated that priority should be given to sites that are threatened, research-based excavation be limited to the minimum necessary to answer research questions, and excavation proceed slowly, with time and staff devoted to specialist's studies and retrieval techniques that enhance the quantity and quality of information. These practices have become fairly standard in archaeology. They can be seen in the growth of contract archaeology in the 1970s and 1980s, spurred on by the passage of legislation requiring impact assessments prior to development, and they are evident in the use of tools such as GIS (geographic information systems) and various remote sensing techniques such as aerial photogrammetry, laser scanning, satellite imagery, and multi- and hyper-spectral data collection (Cowley & Sigurðardóttir 2010). Research excavation has been curtailed in many parts of the world, with a much greater emphasis on conservation of the resource. Along with more limited excavation, there has also come stricter enforcement of mandatory conservation and publication by the archaeologist who seeks to excavate. Against this backdrop arose the allied field of archaeological heritage management (or cultural resource management), whose precepts are reflected in the *ICOMOS Charter for the Protection and Management of the Archaeological Heritage* (1990).

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 1 Traditional owners guiding visitors to rock art sites in the tableland above the floodplain at Gunbalanya, Arnhem Land, N.T., Australia, help ensure a sustainable future for the sites and community (Photo: 2012, J. Paul Getty Trust)

Key Issues/Current Debates

Values of the Archaeological Heritage

Values are the raison d'être for conservation. Archaeological sites and landscapes in all their diversity have multiple values. These values have been enumerated by many authors who stress authenticity and integrity as essential attributes when discussing conservation and management (e.g., Lipe 2009). It is acknowledged that values are ascribed by society and thus may be expected to differ between cultures; they are not immutable and may shift in response to societal changes. In contemporary thinking, social values broadly writ (associative, symbolic, educational, spiritual) have come to take precedence as societal use of sites (and the economic benefits derived from using them) have become a form of legitimization and justification for preservation and as the claims of descendant communities for a stake in their ancestral places have been voiced.

For archaeologists, historians, and scholars whose professional lives depend on archaeological sites, historical and artistic values have been enduring core values. More than other categories of cultural heritage, archaeological sites are repositories of information and artistic creation essential to understanding and interpreting the past. For this reason alone, historical and artistic values, which have been central to informing conservation decisions in the past, will continue to be of fundamental importance to guide decision-making.

Also of fundamental importance is research value. This is the potential of a site to yield new information and answer research questions. Research value is often not considered adequately when making decisions about the future of a site or landscape. There is a tendency to plan for and manage sites based on their revealed or known values, but it is equally important for many types of archaeological sites to be protected and managed for their future potential to yield information. Among these, for example, are wetland sites which may preserve organic remains and archaeological landscapes such as battlefields and cemeteries. Sites with high research potential often need protection against looting, poor excavation strategies, erosion, agricultural activity, and so forth, or need prioritization for excavation if threatened.

The visual values of an archaeological landscape may be among its most important attributes (Fig. 2). The past tendency to focus on the site to the exclusion of its setting has changed in recent times and the 3-dimensional nature of the landscape, its topographic features, scenery, and ecology, now receives more attention. This includes the sky, as, for example, at Chaco Culture National Historical Park, where the night sky is interpreted by staff and volunteers as an aesthetic

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 2 Pueblo Bonito, one of the several "great houses," is set an exceptionally beautiful and archaeologically rich landscape at Chaco Culture National Historical Park, New Mexico (Photo: 1993, J. Paul Getty Trust)

and educational value for city dwellers and the young, some of whom may never have seen a night sky without light pollution.

Conservation and Management of the Archaeological Heritage

The practice of archaeology with a conservation ethic contributed significantly to protecting and preserving archaeological sites and landscapes, but cannot address the full spectrum or magnitude of threats. War and its frequent fellow-traveler looting, and natural threats from fire, flood, tsunami, and earthquakes, being immediate, can devastate sites, while the slower processes of pollution, weathering, and erosion take their toll (Fig. 3). To these threats may be added the effects of climate change, which are certain to be severe. Contributing to deterioration has been the post-excavation neglect of sites, especially in parts of the world where archaeological sites have extensive architectural remains, such as the Mediterranean, Near East, Central Asia, China, the southwestern United States, Mexico, and Central America. With few exceptions, only those sites with proven touristic potential have been provided with a modicum of maintenance and protection. These sites are a minority and they are not immune from causes of deterioration and from the unintended consequences of mass tourism.

Conservation science and technology and increasingly sophisticated methods of site stabilization and treatment have made real strides in recent decades, but are sometimes seen as the panacea that will save for the future what is precious and valued today, if only the resources could be mustered to undertake the necessary conservation programs. The sad truth is different however – all cultural resources deteriorate no matter what is done. The best that can be hoped for is that rates of loss can be slowed by preventive measures, by wise use, by appropriate interventions and custodianship, and by prioritization for protection and treatment. Regional surveys are the most fruitful approach to assess risk and establish priorities for protection and conservation, as, for example, in the survey of megalithic art in the Galicia region of Spain (Carrera Ramírez & Fábregas Valcarce 2003). True integration of conservation into the research and excavation plan at the outset remains a goal to be achieved, but notable exceptions, exemplified at the site of Tell Mozan/Urkesh in Syria (Buccellati 2006), demonstrate the benefits for archaeology, the site, and the local community (Fig. 4).

Management of archaeological sites is essential to long-term care and sustainable use of sites. Like science in the service of conservation, management is a tool for preservation. Underlying

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 3 An excavated structure at the site of Joya de Cerén, El Salvador, that was buried in volcanic ashfall. Structures are "wattle and daub" type and suffer from drying at the top and excessive moisture at the bottom (Photo: 2001, Richard Ross, photographer, J. Paul Getty Trust)

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 4 The site of Tell Mozan/Urkesh in northern Syria, with its mudbrick walls protected and interpreted by fitted tarpaulin covers, exemplifies excavation working hand in hand with conservation (Photo: 2006, IIMAS – The International Institute for Mesopotamian Area Studies)

the management approach is a reductionist process. It is powerful because it allows one to understand how things work – as it does in scientific investigation. From the reductionist analysis is derived the management plan. It determines the values; examines the significance to various interest groups and constituencies (including the obligation to future generations); assesses threat and risk; determines causes of deterioration and their rates wherever possible and derives a prognosis; develops a conservation strategy (which may include development for display or education; or reburial); considers constraints and side effects of proposed technical interventions; communicates the written plan to stakeholders; and implements the program, with assurance that documentation, management, future monitoring, and maintenance have been secured. Also, it should not be forgotten that when sites are lost or damaged, the final line of defense should be the survival of their documentary record. Each of the elements in the analysis requires its own specialized field of expertise. Essentially, the preservation and management of sites require a vision that is encompassing and holistic (Demas 2002). Various charters have sought to promote this; the *Burra Charter* (the *Australia ICOMOS Charter for Places of Cultural Significance*) may be mentioned as one of the most effective.

The interface between a site and its management with stakeholders and traditional owners, both local and more broadly defined as the "public," is often crucial to sustainability of desired outcomes (see, e.g., Fig. 1). Numerous examples have shown how understanding the "social landscape" of a place is as important as its archaeological and natural landscape (Egloff 2006), but stakeholder relations may also be fraught when, as is frequently the case, conflicting interests bear upon access, use, benefit, and so on. Patient negotiation, understanding of different objectives, and time are needed for satisfactory resolution, as in the cases of the Côa Valley Archaeological Park, Portugal (Batarda Fernandes et al. 2008), and the "flagship" monument of Stonehenge, which endured many years of planned improvements without resolution (Baxter & Chippindale 2002). The unwise assumption of officials, on the other hand, that local communities are irrelevant has led to vandalism of one of the most important heritage sites in Zimbabwe (Taruvinga & Ndoro 2003).

Monitoring and maintenance of an archaeological site and its landscape are fundamental management responsibilities. Maintenance is a routine activity, whose absence constitutes one of the greatest and least recognized threats to long-term preservation. Analysis of the failure of maintenance at the large site of Herculaneum and the structured public/private partnership designed to meet the conservation and management challenges exemplifies the problem (Thompson 2007).

Monitoring is not an end in itself. Its purpose is to provide information on the condition of the heritage place, or the quality of the visitor experience, or effectiveness of management itself, in order that certain necessary actions should follow. Yet, systematic monitoring does not have a good track record. Why should this be so? More to the point: what explicit link in the design of monitoring is made between monitoring as an activity and the follow-through to redress a threat or to halt continuing damage? How often do monitoring reports end up on the shelf because no mechanisms or management policies have been established to act upon the findings and recommendations?

This point is not trivial when one thinks about the sequence: monitoring data and information require processing and assessment, followed by a decision as to what action should be taken; next is the identification and garnering of resources (human and financial) to act upon the decision, followed by implementation to reverse or halt the situation. The process is then repeated with a new cycle of monitoring. Too often there is a break in the chain and the only result is inaction. Monitoring programs need to be conceived integrally and coupled directly with mechanisms for implementation. This is a perceptual and management problem. With the many threats to cultural and natural heritage areas becoming more acute, it is no longer good enough to think of monitoring as an "exercise" – it is a vital need. Natural

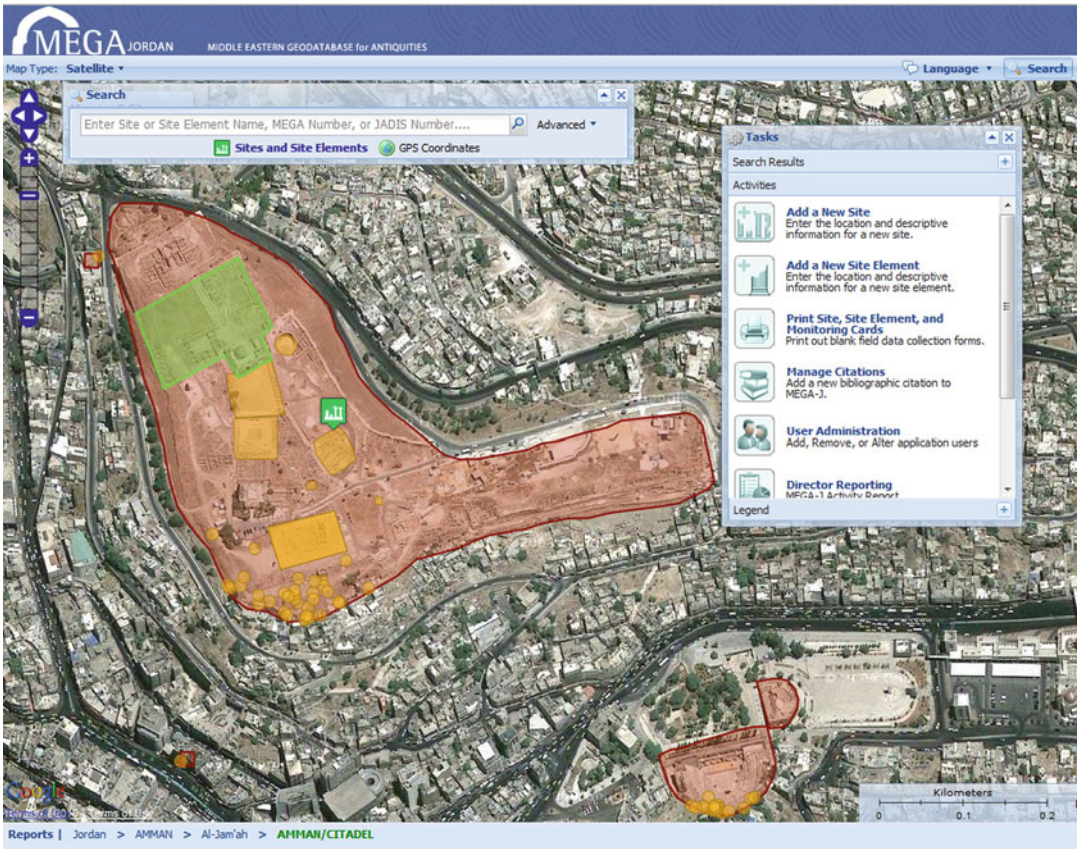

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 5 The MEGA-Jordan web user interface, utilizing open source software and Google Earth satellite images, displays a site's recorded boundary and site elements and data for site planning and monitoring (Photo: 2012, J. Paul Getty Trust)

areas have been generally more effectively monitored than cultural ones, ultimately as a result of greater awareness and support from the profession and the community at large. Monitoring must progress from reactive to proactive mode – it cannot continue to remain the orphan of heritage management (UNESCO World Heritage Centre & ICCROM 2004). At the scale of the landscape, satellite imagery and GIS (Fig. 5) have become essential planning and monitoring tools (Hernandez 2004).

Buffer zones as protection for heritage sites are important where encroachment, development, and competing land use are threats. A buffer zone is required for World Heritage list inscription, though it is not a formal component of the property. A buffer zone should be larger, but is often smaller, than the known extent of an archaeological site. Under the best circumstances, the zone may enhance the site and landscape and protect its visual catchment and function as a refuge for the natural environment and ecological diversity. Nonetheless, a number of important constraints have emerged in the application of buffer zones that reveal complexities of what is a seemingly straightforward concept. These may be inaccessibility to the site of surrounding community engendering a sense of exclusion, not participation, leading to alienation and hostility; management by different jurisdictions under different sets of regulations; resentment when competition for land use is

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 6 Daming Palace Archaeological Park in Xi'an, Shaanxi Province, in its urban context. Residents and factories were relocated to allow development and interpretation of the site (Photo: 2012, J. Paul Getty Trust)

strong; and poor understanding at the local level of the buffer zone's purpose. The term itself is not apposite, implying a reactive attitude to buffeting by extraneous forces ranged against those of preservation. These matters have been well dealt with in a number of studies of the operational constraints of buffer zones (Foster & Linge 2002; Martin & Piatti 2009).

Impact of Urban and Rural Development on the Archaeological Heritage

Urban development and rural development have had enormous consequences for archaeological sites and landscapes in the post-WWII period. This era of large-scale development impacts on archaeological sites and landscapes began with the Aswan High Dam and the UNESCO led international mission to rescue the Abu Simbel temple. This level of international cooperation has never been repeated. Along with population growth, tourism and its requisite infrastructure, rising sea level, and greater competition for water and arable land are all likely to lead to greater impacts on sites. Consequently, construction of water storage and distribution engineering works are to be expected in an attempt to meet economic growth. The impacts on sites and landscapes will be immense. Already we have seen the effects on sites and monuments of the Three Gorges Dam on the Yangtze River (Wang 2008) and the Zeugma dam project on the Euphrates in Turkey (Kennedy 1998). In Western Australia, the extensive petroglyph landscape on the Burrup Peninsula has been the subject of protracted and bitter struggle between preservationists and developers (Bednarik 2006).

Among key issues facing decision-makers are large-scale archaeological sites in heavily populated urban areas. Sites of great significance across the broad sweep of China's long history, such as Neolithic Liangzhu in Zhejiang province and the Qin, Han, and Tang dynastic remains in Xi'an (Fig. 6), pose challenges because of their great extent and the social and socioeconomic impacts of conserving them. Moreover, the absence of visible aboveground remains means that when excavated and protected, a new landscape requiring interpretation is created. Liangzhu, in the Yangtze River basin within the municipal area of modern-day Hangzhou, with remains dating from 3000 to 2000 BCE, is important for study of the late Neolithic period and the development of Chinese culture. Heavily populated, in a country undergoing rapid development and urbanization, the site, covering an area of 60 km^2, is threatened by construction, earth moving, and other large-scale development works. Balancing the needs of the inhabitants

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 7 Visitors to the Valley of the Kings on the West Bank of Luxor preparing to take electric vehicles from the visitor center to the tombs in the distance (Photo: 2003, J. Paul Getty Trust)

with protection will result in constraints on activities, including industry and agriculture and some relocation of population to newly planned townships. Local inhabitants are reportedly ambivalent about preservation of the site, hoping, but skeptical, on the one hand for benefits from tourism but fearful about restrictions on their way of life and relocation (Chen 2006). In the case of Xi'an, efforts to preserve parts of the immense ancient landscape include incorporating significant elements into the urban fabric, returning land to use for farming after trial excavations, and demarcating parts of protected sites for nonintrusive public recreation by local residents, many of whom were displaced to create a protected zone.

In recent years, a consortium of professionals has begun to look for viable models for preserving threatened urban sites in situ rather than resorting to salvage archaeology. Like so many currents today, this initiative involves expertise from a wide range of subject areas and a concerted effort to establish a research framework within which questions can be answered, and while starting in a European context, it has become increasingly more international in scope (Kars & van Heeringen 2008).

Impacts of Tourism on the Archaeological Heritage

To the twin threats of construction and human development pressures, mass tourism may be added to the devastation matrix for the archaeological heritage. Tourism in its various guises is one of the largest industries in the world. Tourism to archaeological sites, notably those with World Heritage status, has burgeoned, while shifting from one region to another during crises, whether from political unrest or epidemics. When stability returns, tourist numbers rapidly rebound. The impact of mass tourism on sensitive sites and their surrounds degrades the cultural resource and the visitor experience. Iconic sites bear the brunt of the relentless flow of often one-time visitors: one thinks of Machu Picchu, Stonehenge, Angkor, and the Valley of the Kings (Fig. 7). The multiple impacts of tourism on the site of Angkor and its environs have been intensively studied. Among the many problems resulting from the great increase in tourism over the past 10–15 years have been developments that service international tourists, pollution, sociocultural deterioration resulting from benefits not accruing to local population, and rising land prices that force people out.

Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes, Fig. 8 Theban mountain and archaeological landscape of the West Bank of Luxor, showing the Valley of the Queens and Deir el-Medina in the center of the image and some of the Qurna village houses below (Photo: 2007, J. Paul Getty Trust)

The economic benefit cycle is largely in favor of foreign and local business elites. This situation equates to exploitation of the site and of the local inhabitants. There are some positive developments, however: traditional crafts promotion, organic farming, and forest regeneration, but these may be too little, too late to counter the influences of development and mass tourism (Miura 2007).

Egypt exemplifies the forces of uncontrolled development, population pressures, mass tourism, and poverty on iconic archaeological landscapes. Encroachment and population pressure at the Giza plateau, as visitors to the pyramids can attest, has overwhelmed the setting to the extent that Egypt's national authority, the Supreme Council of Antiquities, has constructed a wall to limit further advances. At Qurna, on the West Bank at Luxor, the situation is somewhat different. Here the Qurnawis have lived above the Tombs of the Nobles for generations and were famed as tomb robbers, which may have been true in the late nineteenth and early twentieth centuries, but this can scarcely be said of them today. Instead, they now provide skills and labor to archaeologists and the SCA and offer trinkets to tourists. For decades they have successfully resisted efforts to be moved from the site. Periodic attempts to move them have led to bloodshed and deaths until recently when through temptation (new housing located to the north) and coercion (demolition of their houses), the population has been mostly moved leaving a few mudbrick structures on the hillside to provide a visual backdrop for tourists on the way to the Valleys of the Queens and Kings (Fig. 8). The connection between community and culture has been broken here, and the livelihood of a traditional community that lived in proximity to and in context with the ancient archaeological landscape has been greatly diminished (van der Spek 2011). What remains is rubble on a bulldozed hillside.

Tourism is a juggernaut fueled by the forces of economic growth and often is justified as a means of poverty alleviation by development agencies, without due consideration for the negative impacts on local communities and archaeological sites, especially in contexts where regional planning and coordination among agencies are inadequate to nonexistent. Ranged against these forces are national and local preservation authorities who generally have inadequate power to balance the scales. Guidelines and tools to limit visitor capacity exist but are often not applied or cannot be validated by adequate study and

scientific data to show the degradation to the site and its setting. Better methodologies and flexible policies need to be developed, building on concepts such as the limits of acceptable change developed for natural sites (McCool & Cole 1998). Natural sites can regenerate when allowed to by closure of damaged parts; but cultural resources such as archaeological remains cannot do so – all damage is irreversible and cumulative. Restoration of damage at archaeological sites is a poor substitute for preservation of the original, and over time, with repeated repairs, the sites' authenticity is inevitably degraded.

International Perspectives

Countries may differ markedly in the particular threats to their heritage and in the approaches to protection and preservation. Countries struggling under the burden of poverty are severely hampered by inadequate budgets and with few trained, motivated professionals cannot cope well with the demands of cultural resource management. Many such countries are rich in archaeological heritage. It behooves wealthier countries to provide assistance, and many do, through UNESCO and various national and private programs and aid agencies and development banks. Some successful models exist, but often these are focused on high-visibility sites with less emphasis on prosaic, intangible though essential needs such as inventory, documentation, and training. Ultimately, however, it is the national authority that must provide direction and coordination and establish priorities and policies within which agencies and individuals can work toward a common purpose.

Despite a number of shortcomings in protecting its archaeological heritage, China has shown some ways forward. It has an exemplary national inventory process that continuously identifies and records sites; an ambitious program of surveying, documenting, and nominating for World Heritage listing sites, landscapes, and monuments on a regional scale, such as the ancient Silk Road, the Great Wall, and the Grand Canal; and a national policy to prioritize salvage excavation and a research and planning strategy to deal with its so-called big-scale archaeological sites, such as Xi'an and Liangzhu as part of state-level 5-year planning. There are fault lines in these strategies but they constitute a pragmatic attempt to deal with big-scale problems employing nationally constructed solutions that seek to balance the strong desire to preserve their past and the needs of contemporary society to develop. What has not yet been tackled in any meaningful way is mass tourism, reaching crisis levels at some archaeological sites and created in part by a national policy that identified tourism as a pillar industry (Sofield & Li 2011).

Although the example of China presents a different context and utilizes different strategies, it has parallels with efforts undertaken in the United States in response to destruction of archaeological sites due to development. In the USA, passage of the National Environmental Policy Act (1969) requiring impact assessments and public input to the process, growth of private contract archaeology services, restriction on excavation by public agencies, development of cultural resource management policies, and theoretical developments within the academy, all emerged in the decades of the 1960s and 1970s. The US model is an eclectic mix of national and private efforts, whereas China is a top-down approach, but both aim to address large-scale problems and establish priorities for protecting sites.

Egypt exemplifies an archaeological heritage at the mercy of unsustainable development, human population pressures, poverty, and mass tourism, coupled with weaknesses in civil institutions, which has forced the national and site authorities into a reactive position. Archaeologists have long been part of the problem, driven by their narrow, individual objectives, but they have begun to become part of the solution, willingly or not, as they take on conservation responsibility for their excavations, find alternatives to large-scale excavation, and rally to the defense of local populations and preservation of the resource beyond their archaeological "concessions." While individual missions and archaeological schools can achieve considerable results when working in a coordinated fashion, it is clear that

research, planning, and policy development on the one hand and interagency cooperation on the other are required at the regional and national level to address the many challenges at hand.

Future Directions

As the threats to the archaeological heritage become more complex, interconnected, and larger than any one profession can handle, so too must the responses be equal to the task. It is clear that more holistic thinking and integrated regional and urban planning and working across disciplines in unfamiliar territory are where the future lies. National surveys to identify, document, inventory the resource, and establish priorities for salvage and research excavation are still sorely lacking in a field accustomed to setting its own research priorities based on very different criteria of the academy.

Appropriate approaches need to address the greatest threats. Globally archaeological sites are being lost to development on an unprecedented level. In the absence of systematic inventory in many countries with a rich heritage, sites may simply disappear without record or trace. Prosaic matters of inventory, investigation, documentation, monitoring, and maintenance are low on the priority list in many countries. Archaeology would be well served by seeking out broader partnerships to bring to bear the new technological tools for recording and to engage with environmentalists, ecologists, tourism, and wider stakeholder bases in the management and wise use of sites.

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Cross-References

- ▶ Aerial Archaeology
- ▶ African Diaspora Archaeology
- ▶ Archaic *Homo sapiens*
- ▶ Architectural Sites: Monitoring
- ▶ Australopithecines
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Battlefield Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Burrup Peninsula
- ▶ Cambodia: Cultural Heritage Management
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ China: Cultural Heritage Management
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Native Americans
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Areas
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: History and Context
- ▶ Historical Ecology in Archaeology
- ▶ Indigenous Peoples, Working with and for
- ▶ Intangible Cultural Heritage
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Landscape Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)

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▶ Machu Picchu: Geography and Culture
▶ Nonstructural Sites: Monitoring
▶ Peru: Cultural Heritage Management and Education
▶ Prehistoric Human Footprint Sites
▶ Recording in Archaeology
▶ Sacred Site Conservation and Preservation
▶ Sacred Sites in Indigenous Archaeology
▶ Site Formation Processes
▶ Sustainability and Cultural Heritage
▶ Trackways in Archaeological Conservation and Preservation
▶ Zoning: Boundary Areas and Buffer Zones

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Imperial Cult, Roman

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Introduction

Although there was a strong and ancient tradition in Roman culture of honoring the spirits of the dead (*Manes*), prior to the third century BCE, the Romans did not deify mortals. They did honor the *Genius* of a living man (just so, the *Juno* of a woman); these terms, however, denoted a divine force present in every human but at the same time distinct from him, and their worship should therefore not be considered equivalent to the worship of deified humans. The actual deification of individuals only came into practice following contact with Hellenistic cultures as the empire expanded; the concept of worshiping the emperor as a deity seems generally to have been an outgrowth of the Greek practice of deifying heroes and Hellenistic kings. The development of those earlier cults of heroes and kings, as well as later divine honors offered to prominent Romans (as discussed below), has been seen by modern scholars as adaptation by the Greeks of the cults of their traditional Olympian gods in order to express their relationship to new types of power.

Definition

The terminology "imperial cult" is used by modern scholars to refer to the practice in the Roman Empire of worshiping the emperor and certain members of the imperial family. There was no cult designated by that name in antiquity. Nevertheless, worship of the emperor, which began with the deification of Augustus in 14 CE and continued throughout the imperial period, was an important aspect of the religious and political life of the empire, and it is convenient to assign it a name in order to facilitate discussion.

Historical Background

The first Romans for whom we have evidence of divine honors were M. Claudius Marcellus, for whom a festival was established in Syracuse, Sicily, (212 BCE) and, in the East, the consul Titus Quinctius Flamininus (c. 191 BCE), on whom honors were bestowed in Greece. Importantly, although the Greeks occasionally offered temples in addition to divine honors to Roman dignitaries and officials (Cicero (106–43 BCE), for example, refused such an offer), there is no evidence that any were actually built. The Senate voted a cult and a *flamen* (that is, a priest – in this case, Marcus Antonius) for C. Julius Caesar (100–44 BCE) a short time before his assassination, and Caesar was officially deified after death; those divine honors served as models of appropriate behavior toward the emperors throughout the imperial period. Augustus (r. 27 BCE–CE 14) was offered divine honors from the eastern provinces of Asia and Bithynia while living, which he accepted with the stipulation that the cult include Roma as a partner goddess, a precedent that was followed by several of his successors. Augustus refused deification in Rome itself during his lifetime, but permitted the establishment of a cult of the *Genius Augusti* by 12 BCE (see especially Taylor 1975). Following his death in 14 CE, Augustus received honors similar to those bestowed on Julius Caesar, including a temple, a *flamen*, and the establishment of a college of priests for his cult, the *sodales Augustales*, whose members were drawn from the ranks of the Senate.

Technically speaking, the emperor could only become a god (*divus*) and be the recipient of an

official cult after his death, following an apotheosis as declared by a decree of the Senate (note, however, that *divus*/*divi* is still distinct from *deus*/*dei*, the term for the traditional gods). In practice, this rule was only ever observed in Rome and some of the western provinces (see below). In contrast, in the Hellenized provinces from the time of Augustus, the living emperor could be referred to as a *theos*, the Greek term for a god. From its beginning, the emphasis of the imperial cult in the East was heavily oriented toward the current, living ruler, with little regard for the official lists of *divi* issued by the Senate.

An important aspect of the imperial cult was its political nature. Emperor worship was seen by provincial populations as an opportunity to display their allegiance to the ruler in a formalized civic fashion. Some emperors no doubt encouraged it as a means of symbolically illustrating their power far from the capital, and it seems that institution of the cult at a provincial level was an important step in the development of new provinces, especially in cases in which they had been "wild" at the time of their accession by the empire (Fishwick 1987: 148). Further, the cult provided a system within which local aristocracy could relate to Rome and publicly prove their loyalty as well as achieve recognition and social status through participation in the imperial priesthood. By the third century, Cassius Dio (51.20.7) was able to consider worship of the emperor to be one aspect of religion shared by everyone in the empire. Such a factor could potentially prove a very powerful tool for generating a sense of commonality among the peoples of far-flung territories who observed a wide range of religious practices. Judicial and military oaths were sworn to the *Genius* of the emperor, and, in some instances, the cult was used as a litmus test to prove the loyalty of Roman subjects or to ascertain whether they were adherents of other cults considered inimical to the Roman state. In particular, the requirement that individuals offer prayers to or for the emperor in the presence of a government representative was used to discover or prove the identities of Christians, a process discussed in the letters of Pliny the Younger (c. 61–112) to Trajan (*Epist*. 10.96) and elsewhere. These political aspects of the cult should not, however, be understood to lessen or negate the religious content of imperial worship.

We are particularly well informed about the political significance of the cult in the Greek East, where it provided a framework for negotiating the relationship between the dominant Hellenized culture – which was organized on a city-based system – and the centralized power of Rome. Leagues of cities called *koina* were a feature of the Hellenistic world, and in the imperial period, many of these leagues were organized around participation in the imperial cult. These *koina* competed among themselves for the honor of hosting imperial cult temples, and the cities that won the honor served as the caretakers or wardens of those temples for the entire *koinon*. From the time of Hadrian (r. 117–38 CE), the term *neokoros* (temple-warden) was used as a regular, honorific civic title claimed by those cities that had an imperial temple at which a provincial festival took place. (The term appears earlier but its meaning was standardized during Hadrian's reign.) To be *neokoros* brought a city great prestige, and the title was vaunted in inscriptions and on coinage, a fact that aids us in assessing the range and location of the cult (see especially Burrell 2004).

In general, though individual emperors had different preferences and also had to be aware of implications for the specific political climate in which they reigned, the tendency to accept divine honors while living became more common as the imperial period progressed. Though always more popular in the eastern provinces, altars and temples were dedicated to the living emperor in the West as well, beginning perhaps with a foundation in honor of Claudius (r. 41–54 CE) (at Camulodunum in Britain) but certainly by the reign of Vespasian (r. 69–79 CE) (at Tarraconensis and (probably) Lusitania in Spain, and possibly at Narbo in Gallia Narbonensis). As Beard, North, and Price have shown (Beard et al. 1998), whether a particular area of the empire chose to worship the living emperor or to follow Rome in worshiping only deceased and formally deified rulers had less to

do with geographical location than with conceptual closeness to Rome. Thus, for example, cults to the living emperor were established in the West in Germany among the un-Romanized tribes following their conquest by Rome. In addition, practice was dependent on the status of the worshipers who established a particular cult center, especially in the early years of the empire. Therefore, Roman citizens in areas outside Rome, both in colonies and in the provinces, followed Roman tradition in worshiping the emperor, whereas noncitizen subjects of Rome followed local custom. Thus, the Roman citizens in Ephesus in the Augustan period worshiped at a temple dedicated jointly to Divus Julius (Caesar) and the goddess Roma, while noncitizens were free to pay cult to the living emperor. This distinction between worship by Romans and non-Romans later blurred as citizenship became more common in the provinces.

The standard process of establishment of the cult also differed in the East and the West. In formerly Greek areas, the impetus to establish a cult and an altar or temple was almost always local, with the emperor choosing either to accept or reject offers as he deemed appropriate. In the West, though there is some evidence of local initiative in establishing the cult in certain cases (e.g., the temple of Augustus at Tarraco in Spain, granted under Tiberius), Rome was more heavily involved in its development and content, and in some areas seems even to have imposed the cult.

Imperial worship included features of cult rites generally seen in the Roman system. Temples and altars were consecrated to deified emperors and family members. Eleven of the latter were established in the first half of the first century but their number then decreased markedly, with only four being established after that point. Priests were appointed, drawn from the elite citizenry of the cities in which the cult was celebrated (Fig. 1). The bulk of surviving evidence for the priesthood consists of honorific inscriptions noting that individuals had attained the office and specifying the details of their munificence toward their community in providing sacrifices, feasts, and games in connection with the cult. Otherwise, evidence for the range of priestly functions is limited. Their position was one of political as well as religious prestige, as suggested by their appearance in lists of ambassadorial groups and embassies to the emperor. Priestesses served in the cults of the female members of the imperial family, although in one example from Aphrodisias, a woman held the priesthood of the emperors, indicating that the gender division was not strict. The titles of some other imperial cult actors are also known from inscriptions, including in the Greek world the *prothytes*, an official of unknown responsibilities related to sacrifices whose title is found only in the context of this cult. Important civic bodies perhaps (as suggested by their name) associated with the cult were the *Augustales*, often

Imperial Cult, Roman, Fig. 1 The head of a priest of the imperial cult in Ephesus in Asia Minor. (First century CE, now in the Ephesus Archaeological Museum, Selçuk). He wears a crown decorated with busts of the imperial family, a common feature of imperial cult priest regalia that is also known from literary descriptions. The heads of the busts were almost certainly destroyed intentionally, probably by Christians (Photo: author)

understood by scholars to have been associations of ex-slaves who seem to have held responsibilities toward the deified imperial family that included sponsorship of games, building repair, and erection of statues. Though they were active mainly in the West, fraternities of *Augustales* are also attested in some Roman colonies in the eastern parts of the empire. Beard, North, and Price have urged caution in defining them as associated specifically or exclusively with the imperial cult, and have shown that their membership included freeborn as well as freedmen (Beard et al. 1998: 358).

Imperial cult worship included prayers addressed and hymns sung to the *divi*, often accompanied by a range of traditional sacrifices, including offerings of wine or water, ritual cakes, incense, and live animal victims. Oxen were the normal victims offered to a divinized emperor, cows being appropriate for imperial women. Inscriptional evidence indicates that animal sacrifices took place within the cult on a scale up to and exceeding a *hekatomb*, the Greek word for a sacrifice of approximately 100 bovines, though this must have been an exceptional occurrence. The sacrifices took two forms: offerings made directly to the living emperor (or to him and his predecessors as a group) and offerings made to other gods on behalf of the emperor (*pro salute*) in order to ensure his health and continued reign. Of particular importance in the latter category were yearly *vota* offerings performed on January 3 in both Rome and the provinces in order to petition the gods for the well-being of the emperors. Interestingly, surviving literary and epigraphical evidence includes only one instance of sacrifice *to* the emperor being performed by a priest of the imperial cult; all other instances of sacrifices performed by imperial cult priests are noted as being completed on the emperor's behalf. In general, it seems that sacrifices to the emperor were less frequent than those directed to other deities for his benefit.

Celebration of the cult was often carried out in the context of imperial festivals. These events, which were held on a regular schedule and could happen monthly, yearly or, for major festivals, biennially or quadrennially, included games and contests as well as processions, sacrifices, and accompanying feasts that often lasted for several days. In the eastern parts of the empire, almost all gladiatorial competitions and wild animal fights were staged within the context of the imperial cult. Festivals were commonly linked to important days in the life of the honoree including birthdays, ascension days, and occasions of good news communicated from Rome to the cities of the empire (e.g., a military victory or the birth or coming-of-age of an imperial heir). A visit by the emperor to a city also resulted in cult celebration (as did, beginning in the third century, the arrival of his image). In some cases, an imperial visit led to the foundation of a new cult sanctuary or provided an opportunity for the consecration of a previously constructed sanctuary by the emperor for whose cult it was built.

The activities of the imperial cult also included Mysteries, about which we have less information. That they formed a regular part of worship within the cult is evidenced by a surviving cult calendar inscribed on an altar of the imperial choir of Augustus and Roma at Pergamum in Asia Minor, on which the Mysteries appear as one of the four most important annual cult festivals. It is also clear on the evidence of this inscription, which includes some details of expenditures on items for the celebration of the Mysteries, that those rites included small-scale sacrifices of incense and cakes. The specification that lamps be provided for the proceedings suggests that the cult image of the emperor was dramatically revealed from the darkness at some point during the ceremonies, an aspect known from other similar Greco-Roman contexts such as the Eleusinian Mysteries (Friesen 2001: 115). The title *sebastophant* (compare the *hierophant* at Eleusis and in other mystery cults) is known from inscriptions, but his duties are not specified.

The imperial cult endured as an important aspect of the Roman religious landscape throughout the imperial period, though it did not remain static. Generally speaking, from the birth of the cult under Augustus, a general pattern has been noted: a gradual shift from cults of individual

emperors toward generic cults of the collective emperors, with Caracalla (r. 198–217) being the last emperor for whom we know of an individual temple or priesthood. Price (1984a) has convincingly interpreted this gradual development as a strengthening of the institution of the imperial cult rather than as a decline in willingness to deify individual rulers.

The end of the cult is difficult to trace. The political and financial unrest of the third century CE affected not only the construction of new sanctuaries but also the celebration of established festivals, which were very expensive to organize. The heavily centralized government instituted at the end of that century by Domitian and the Tetrarchy must also have strongly impacted the practice of the cult, particularly in provinces in which impetus for cult celebrations was primarily driven by local devotion. The rise of Constantine (r. 307–337 CE) and the increasing political power of Christianity altered the nature and structure of the cult. Constantine's view of the cult is perhaps illustrated by the fact that he allowed a group of towns in Umbria to build a temple in honor of his family, but forbade them to offer sacrifices there. Scholars have noted, however, the continuation of certain aspects of the cult in Byzantine court ceremonial, as well as in royal ceremonies of other monarchies through the medieval period, such as those of the Frankish kings.

Key Issues and Current Debates

Much modern scholarship on the imperial cult, especially prior to the last decades of the twentieth century, focused on the question of whether the imperial cult should be considered *religio*, and cult actions therefore understood as expressions of authentic religious belief, or whether it was a purely political construct in which ritual actions expressed only fealty. The apparent need to understand the two as mutually exclusive arises from Christianizing notions of religious faith as something separate from earthly concerns and, especially, from political thought. An important byproduct of this earlier scholarship was the erroneous notion that the imperial cult, with its apparently "faithless" political nature, was a symptom of the decline of classical Greco-Roman religion leading to the eventual "triumph" of Christianity (see especially *contra* Price 1984a). More recently, scholars have preferred to view the development of the cult as one element of a general restructuring of the Roman religious system at the time of the early Principate (Beard et al. 1998).

Another debate involves the nature of the Roman emperor's divinity: Was he considered a god while living, or only after his death? Questions of individual belief are notoriously tricky and ultimately un-resolvable, but it is possible to interrogate to some degree the concept of the deification of the emperor as expressed in official language (see especially Price 1984b) and illustrated in details of cult ceremonial. In brief, the dual nature of the types of sacrificial rites practiced in the cult (that is, the fact that they were offered both directly *to* and *on behalf of* the emperor) suggests that the living emperor occupied a role between that of men and that of the gods.

Archaeological Evidence for the Imperial Cult

Worship of the emperor took a variety of forms in different areas of the empire, and archaeological evidence has helped clarify the practice and meanings of the cult within various communities in Roman society. Evidence for the cult is rich and varied but also fragmentary, particularly so for the tumultuous third century. The remains of several cult temples have been identified, especially in the eastern provinces of the empire, as have cult statues of imperial family members. Further evidence for temples and cult statues is found in the form of images of both struck on coins. In addition, thousands of inscriptions related to the imperial cult have been recovered, ranging from records of temple dedications to lists of cult regulations. Most of the latter date to the time of Augustus and his early successors. Although the evidence is inconclusive, it is likely that the cult was eventually present in every province of the empire.

Physical evidence for the cult is richest in Asia Minor (modern Turkey), where the results of survey and excavation campaigns carried out since the late nineteenth century have clarified both the broad picture of the spread and penetration of the cult and details of its rites and role in the eastern provinces. Surveys conducted in the area show a very wide diffusion of the cult as measured in epigraphical attestation of temples, altars, and priests. The general pattern of the evidence also strongly suggests that the cult was primarily urban and was practically nonexistent in rural areas. This is probably a byproduct of the fact that the cult was largely perpetuated and administered by the elite (though there is ample evidence for the participation of individuals from all levels of society). It also highlights the extent to which the cult was derived from and dependent on Greek culture (which emphasized the importance of the city as an institution), reflected a reciprocal relationship with Rome, and required civic organization to function. All of those elements were absent from the more remote areas of the eastern provinces.

Cult Buildings

Following the precedent set by Augustus's construction of a temple to the deified Julius Caesar after his death, nine temples for deceased emperors (sometimes shared with their deified spouses) were constructed in Rome itself. Of these, the best preserved is the temple of Antoninus Pius (r. 138–61 CE) and his wife Faustina the Elder in the Forum, which was converted into the church of San Lorenzo in Miranda sometime prior to the eleventh century. Elsewhere in the western part of the empire, temples and altars dedicated to the emperors were constructed from an early date. The first of these was a large and lavish altar to Rome and Augustus consecrated in either 12 or 10 BCE in Gaul at Lugdunum (modern Lyon, France); its appearance is known from local coinage and from limited archaeological remains, which include columns from a later update of the altar under Hadrian that were reused in the eleventh century as supports for the cupola of the Church of St. Martin in Ainay. The altar is notable not only for its scale and opulence but also because of its role as a potent political symbol: it served as a location for 60 Gallic tribes to pledge their allegiance to Rome on a yearly basis. A similar foundation in the Two Germanies at modern Cologne followed shortly. The cult is also attested in Spain by the reign of Tiberius (r. 14–37 CE) and in Africa Proconsularis under Vespasian, although the dates for the first appearance of the cult in those provinces are unclear. The discovery at Narbonne in 1888 of a fragmentary bronze tablet bearing regulations pertaining to the provincial imperial cult there under Vespasian, a text now known as the *Lex Narbonensis* (*CIL* 12,6038 = *ILS* 6964), provided some specific details such as the cult's festal calendar. It also confirmed the establishment of a cult that included both the Julio-Claudian rulers and the founder of the new Flavian dynasty.

One hundred fifty-six temples and shrines in Asia Minor have been identified from extant remains, inscriptions, and numismatic and literary evidence, including 52 major neokorate temples in 35 cities. In general, the construction of temples (referred to as *Kaisareion* or *Sebasteion* in the East) reached an apogee in the first half of the second century, which reflects a general increase in civic construction empire-wide during that period. The number of epigraphically attested temple constructions decreases greatly for the second half of the second century and especially for the unsettled third century, though because the foundation date of a significant number of temples cannot be determined, scholars should be cautious of drawing broad conclusions from the evidence. The forms of the shrines ranged from simple buildings to grand temples on the model of those of traditional gods. Most held images of the emperor and other members of the imperial family (below).

In addition to individual imperial cult constructions, cult buildings or sacred areas could be associated with sanctuaries of traditional gods, though the imperial *divi* were usually subordinated in some way to those deities. The deified emperor and his family sometimes shared the space of such temples with their traditional

occupants, in which case the *divi* appeared either as statues inside the temple itself or in their own building within the bounds of the temple complex. There is evidence in several cases that traditional temples were altered or received structural additions in order to accommodate imperial areas. In other cases, the emperor was associated with the traditional gods in subtler ways, such as through dedicatory inscriptions mentioning both, or by representation in decoration on the exterior of temple buildings.

Epigraphical evidence is key to our knowledge of imperial cult sanctuaries. It is not, however, always possible to confirm the evidence of inscriptions by means of archaeological remains. In some instances, it seems likely that the right to construct a temple was granted to a city or province as indicated by an inscription, but that changing political winds prevented its construction. We are on firmer ground when considering inscriptions that have a high likelihood of having been dedicated or placed after a temple was completed. For example, bases for statues commissioned to celebrate the dedication of a neokorate temple and inscribed with information about the donors of the statues (often civic or provincial bodies commemorating the granting of a temple to a neighboring body, at least in the case of imperial cult foundations in the Hellenistic East) have been discovered in several cities in Asia Minor. Unfortunately, in many cases, the inscriptions are no longer in situ and therefore cannot indicate the location or secure the identification of the temple structure.

Numismatic finds are helpful in filling the gaps in our evidence, often indicating which temples were actually constructed and, in some cases, providing details of their appearance. Again, the evidence is particularly rich in the East. Because the granting of a neokorate temple was a high honor for a city or province, it was common for coinage to be issued featuring the new title of the city (*neokoros*) and, often, an image of the temple itself. In some cases, however, minting of coins may have preceded the actual construction of a temple by a considerable amount of time, meaning that the appearance of temples depicted on coins may be either standardized or based on other existing temples in the area. As with epigraphical evidence, it also seems to be the case that coins were issued for neokorate temples that were never constructed.

The imperial cult was not confined to the precincts of temples. Often, areas for imperial cult ceremonial were installed in civic structures such as (in the East) council houses. Other sites for imperial cult worship included gymnasia, stadia, theaters, and baths. In the East, some cult-related athletic competitions may have taken place in gymnasia, following the Hellenistic model in which competitions in honor of the kings were conducted there. The cult was similarly associated with stadia, which served as sites for athletic and musical competitions and animal fights staged as part of cult festivities. It is difficult, however, and in many cases impossible to separate archaeological evidence for imperial cult-related events that occurred in gymnasia and stadia from evidence for activities staged as part of other festivals. Literary evidence for sacrifices to the imperial family in theaters and for the placement of their images there is corroborated by the discovery of imperial statues in a theater on Thera, and of a decorative frieze with sacrificial and imperial imagery from the theater at Hierapolis in Asia Minor. Porticoes were also sites of significance for the cult. Some porticoes were in fact purpose-built for the imperial cult, sometimes adjoining a *Sebasteion*. Although this was most common in the Greek East, it is also seen in Italy and North Africa.

In Asia Minor, there is evidence that some type of imperial cult-related activity was carried out in dedicated areas in bath complexes. Dubbed *kaisersäle* ("imperial halls") by archaeologists, these spaces range from small rooms to large, richly decorated halls. Particularly fine examples have been excavated at Ephesus and Sardis (Fig. 2). Their identification as *kaisersäle* has been deduced primarily from the presence of inscriptions referring to the *Sebastoi*, and several have niches that probably held images of the imperial family. At least ten of these rooms have been identified so far, one

Imperial Cult, Roman, Fig. 2 View of the central section of the so-called *kaisersaal* in the baths at Sardis in Asia Minor, with a niche for an imperial statue(?) above a doorway (Photo: author)

(at Ephesus) with an intact altar, but none with which a surviving imperial statue can be firmly associated. Their function remains a matter of debate.

Cult Images

Imperial cult images took several forms and were displayed in a variety of ways. Some cult temples arrayed a range of figures along the walls. Additional images could be added as necessary, with the scope of the representation in some cases even including members of several dynasties. Others shrines exhibited a limited number of colossal figures. Archaeological evidence for cult images includes actual statues and fragments thereof, as well as inscribed bases and numismatic representations.

As in the cults of the traditional gods, images of the emperor and the imperial family served as loci for their veneration. Cult images could portray the emperor in a variety of forms, following the standards of Roman portraiture. The objects of cult could be shown cuirassed, nude, or in civilian clothing (that is, the Roman toga or,

Imperial Cult, Roman, Fig. 3 Head and arm of a colossal imperial cult statue of Domitian or Titus, from the Flavian temple at Ephesus. (First century CE, now in the Ephesus Archaeological Museum, Selçuk) (Photo: author)

more rarely and only in the East, in Greek dress). In some cases, the emperor was depicted with covered head (*capite velato*), offering sacrifice as a priest in his own cult; a few imperial temples in Asia Minor had cult statues of this type. Though it is sculptures that have survived in the archaeological record, we know from textual sources that paintings of the imperial family also served as cult images, especially in instances when the imperial image needed to be carried to a location for veneration. Cult images ranged in size from busts to colossal statues measuring 7–8 m in height (Fig. 3). In addition to examples located inside temples, imperial cult images were displayed in public areas and carried in procession on important occasions and during imperial cult festivals.

Future Directions

Although many details of the imperial cult remain unclear, archaeological and literary evidence indicates that it was an important part of the fabric of political and social life in the imperial period. Excavation and publication of numerous related sites throughout the empire continues, as does new study of literary and epigraphical evidence for the cult. In addition to shedding light on ritual practice and its relationship to imperial power, future study of the cult may help clarify aspects of the process of power negotiations between Rome and her provinces.

Cross-References

- ▶ Aphrodisias, Archaeology of
- ▶ Baths and Bathing, Greek
- ▶ Baths and Bathing, Roman
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ North Africa, Roman
- ▶ Religion, Greek, Archaeology of
- ▶ Religion, Italo-Roman, Archaeology of
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In Situ Preservation of Shipwreck Artifacts

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State of Knowledge and Current Debates

Introduction

One of the consequences of adoption of the 2001 UNESCO Convention on the Protection of Underwater Cultural Heritage is that the convention's strong emphasis on nonintervention on the site of an historic shipwreck can at times lead practitioners and heritage managers down to a very narrow management path (UNESCO 2001). The argument that there is a sufficient body of knowledge on naval architecture as to render detailed site recording obsolete misses the point of maritime archaeology as a discipline. If work on in situ corrosion surveys of shipwreck sites is precluded on the basis that even this form of minimalist intervention is not essential, the loss of data about the present and long-term corrosion of metals on a shipwreck site will condemn management into making misinformed judgements. The arguments put forward in the body of this chapter make a compelling argument as to why the corrosion and concretion matrices on artifacts present a highly valuable data set of unique cultural insight into the fabrication, use, and decay of the variety of elements that make up a shipwreck. Judgements made without full evidence of site formation and disintegration processes are prone to systematic errors which will ultimately hasten the demise of the wreck site and with it much of the loss of cultural information. To disregard this record of deterioration is akin to cultural vandalism.

Analysis of Corrosion Profiles to Provide Site History

All metals used in the construction of ships and their fittings were commonly mined as oxides,

sulfides, chlorides, and carbonates. Metals are formed when chemical reducing agents, such as charcoal or coke, react at high temperatures and transfer electrons into the minerals and so create the parent metals. The inherent reactivity of elements is modified by alloying them with other metals, in the case of formation of bronzes from copper and tin making objects more able to be cast or fashioned into functional objects (Tylecote 1977). Addition of unreactive carbon to iron results in a vast array of functional alloys ranging from wrought iron, cast irons, to structural steels. A variety of heat treatments can alter the microstructure of the iron-carbon alloys which in turn affects not only their hardness and ductility but also the rate at which phases with dissimilar composition corrode. Preferential corrosion reactions are most commonly manifested in the form of graphitization of cast iron, where the outermost parts of the surface have lost all or most of their iron content. It is the preservation of this layer that is vital for conservation of cast iron artifacts since all foundry marks are retained in the degraded matrix. These layers also provide an accumulation index of the corrosive forces on the wreck site (MacLeod 2006).

When metals are fabricated through hammering, drawing, and rolling, the underlying microstructure changes, and if the imparted stresses are not relieved by heat treatment after fabrication, stress corrosion will manifest itself as a series of finely etched lines on copper fastening bolts or as cracks around the heads of drifts and clinch rings. Corroded silver coins can show up corrosion stress patterns imparted by defects in the rolling phases if the coins are circulated in an unannealed state after manufactures (North & MacLeod 1987). However, practitioners have cause to be grateful for the varying degrees of technical skill associated with artifact manufacture since preferential corrosion along stress or compositional gradients produces decay patterns that enable rapid nondestructive analysis of the methods of artifact manufacture. All metals on shipwreck sites have a variety of different phases of varying corrosion resistance which are very sensitive to changes in the amount of water movement across a site which can result in banded layers of corrosion products. The varying depth of archaeological sediment on the wreck of the American China Trader *Rapid* (1811) resulted in preferential corrosion of the copper-rich alpha phase in exposed conditions and corrosion of the ($\alpha + \delta$) eutectoid when the bronzes were corroded in a low-oxygen microenvironment under several centimeters of sediment (Taylor & MacLeod 1985). When metals of significantly dissimilar electrochemical potential (voltage) are contiguous, the more reactive metals, such as iron alloys connected to copper alloys, will be preferentially corroded which often results in the complete mineralization of the iron phases and cathodically protected copper alloys. This form of reaction most commonly occurs with iron clappers in bronze bells and with iron frames connected to bronze rudder fittings in composite shipwrecks – the archaeological advantage of such processes is that the concreted iron fittings can be replicated through creating cast replicas of the interior of the concretion, while the protected components typically need one-tenth the amount of treatment time as identical alloys from other shipwrecks (MacLeod 1987) (Fig. 1).

Proximity corrosion is galvanic coupling through the matrix of artifacts, ballast mounds, and marine concretions found on historic shipwreck sites and on offshore production platforms and can be used to explain apparently anomalous corrosion performance of ordnance (North 1989). Cannon on the *Rapid* (1811) wreck site at Point Cloates in Western Australia exhibited corrosion rates up to three times higher than that observed on guns in a similar archaeological profile owing to the proximity of thousands of copper nails, drifts, and spikes in the carpenter's store (Carpenter & MacLeod 1993). Galvanic corrosion can be more subtle in its effect for when the relative corrosion rates of the boiler water feeder heater, with its attached copper heating coil, were compared with the engine, which was in a similar burial and current microenvironment, the cast iron water heater was corroding at 0.196 mm. year^{-1} which is double that of the engine whose long-term corrosion rate was 0.094 mm. year^{-1}(MacLeod 1990). Sixteen corrosion layers of the copper (I) sulfide Cu_2S chalcocite found on

In Situ Preservation of Shipwreck Artifacts, Fig. 1 Bronze dovetail fittings from the wreck of the *Rapid* (1811) showing differences in corrosion mechanism between partially aerobic (*vertical fittings*) and fully aerobic (*horizontal*) burial microenvironments (Photo: Patrick Baker, Western Australian Museum)

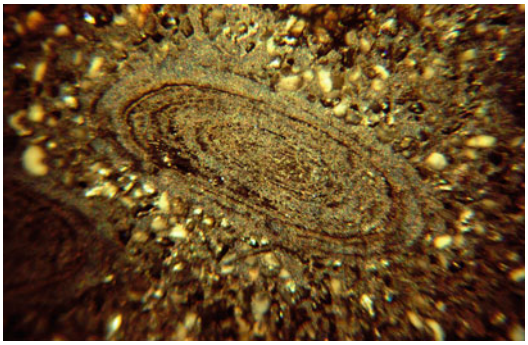

In Situ Preservation of Shipwreck Artifacts, Fig. 2 Corrosion bands on a brass tallow oil pot from the *Xantho* (1872) wreck showing chalcocite (Cu_2S) bands formed when the engine was reburied every seven years (Photo: Western Australian Museum)

a brass tallow pot followed the Liesegang pattern of periodic precipitation covering the 112 years of immersion, i.e., an average of a 7-year cycle. The wreck site of the SS *Xantho* (1872) is subject to changes of ± 2 m in the sediment depth; thus, the corrosion bands are due to anaerobic corrosion when the engine is periodically buried since the normal cathodic protection provided by the cast iron engine is lost under the impact of the sediment on the Penn horizontal trunk engine (MacLeod et al. 1986) (Fig. 2).

In Situ Corrosion Measurements and Development of Site-Specific Data

In situ corrosion studies provide data to give an insight into the past and present rates of deterioration of the metallic components. Information pertaining to the corrosion potential (E_{corr}), the pH, and the profile thickness of the combined layers of corrosion and concretion (t_{mm}) provide a remarkable insight into the decay processes. Corrosion of metallic artifacts, including whole iron and steel ships, is dominated by the reaction between the underlying metal and the amount of dissolved oxygen that is passing the concreted metal surface. Marine concretions consisting of an admixture of metal corrosion products and the reaction products of these compounds, with the calcareous substrates deposited by encrusting marine organisms, are electrically conducting. This matrix provides a path for electrons to move from the corroding metal to the dissolved oxygen in the immediate vicinity of the artifact. The voltage of the corrosion cell (E_{corr}) depends on the nature of the underlying metallic object and the flux of dissolved oxygen to the concretion interface. In anaerobic environments the corrosion potential still depends on the oxidation of metal and but it is the reduction of water and not that of dissolved oxygen which is the cathodic process. The voltage is normally measured using a platinum electrode and a reference electrode such as silver/silver chloride (Ag/AgCl) which is separately calibrated to correct for sites which have different temperatures and salinity of the seawater. Details of the methodologies involved in drilling through the concretion and corrosion layer have been previously reported (MacLeod 1989, 2006).

Entrained water reacts with metal corrosion products underneath the protective cover of the concretion to produce a series of mixed chloride and hydroxide species and free hydrogen ions. There is a direct relationship between the underlying metal corrosion rate and the pH of the metal interface which is measured directly after the concretion layer has been drilled through (MacLeod 1995, 2006). Different alloys have their own characteristic pH values so data from different wreck sites need to be grouped according to the same type of basic composition. After decades of immersion, metals can be considered to be corroding at a quasi-equilibrium rate and that the pH relates to the local corrosion

cell, whereas the E_{corr} value can be a reflection of a larger area where structural components are electrically connected to each other with sound metal to metal bonds. A corollary of the common nature of the composition of the concretion layer is that thicker total concretion and corrosion thickness or t_{mm} values reflect underlying differences in the local corrosion rate. Data obtained on the wreck of the USS *Arizona* (1941) in Pearl Harbor (Johnson et al. 2006) and from the shallow water wreck of the breastwork Monitor-style warship HMVS *Cerberus* (1926) in Port Phillip Bay (MacLeod & Steyne 2011) has shown that that thicker concretions correlated well with more anodic (more corrosive) values of E_{corr} and with lower pH or more acidic microenvironments due to increased corrosion rates. Thus, protuberances on the sides of iron ships, irregular lumps on cannon, and other artifacts are due to the effects of localized or pitting corrosion of the underlying metal which act as indicators of where not to attach lifting bags during recovery operations.

Effects of Temperature, Salinity, and Stress on Iron Corrosion Rates

Iron shipwrecks provide a wealth of cast iron fittings from which it is possible to obtain a series of corrosion profiles, after removal of the concretion layer and drilling into the graphitized zone of the artifact and the recording of the corresponding pH and E_{corr} data. Linear regression analyses of the data show that the logarithm of the corrosion rate, measured in mm year^{-1} of immersion, is directly proportional to the E_{corr} values in the form of Eq. 1:

$$log\ d_g = a\ E_{corr.} - b \qquad (1)$$

where d_g is the corrosion rate of the graphitization depth in mm (hence the subscript g) divided by the time lapse between the date of wrecking and the date of recording the data. The value of b depends on the amount of water movement on the wreck site which is also dependent on the water depth and wave action. The constant a is determined by the concentration of dissolved oxygen, which in turn is dependent on both the temperature and the salinity of the water, as reported by MacLeod in 1995. The value of a is given by relationship shown in Eq. 2:

$$\partial log\ d_g / \partial E_{corr.} = 10.33\ log\ [O_2] - 4.57 \qquad (2)$$

where the concentration of oxygen is recorded in cm^3 dm^{-3}. This equation enables the impact of any seasonal differences in salinity and temperature to be calculated and incorporated into the interpretation of the in situ corrosion data. The shift in the value of E_{corr} needed for a tenfold increase or decrease in corrosion rate is the reciprocal of a, the value of which ranges from 420 mV at 28 °C to 327 mV at 18 °C. Within the accuracy of ±0.002 V for repeated measurements of the same object over several years, a change of only 3 mV equates to 1.6 % for the warmer site and 2.1 % for the cooler site.

The Japanese iron shipwrecks in Chuuk Lagoon in the Federated States of Micronesia provide a series of corrosion experiments where the impact of the site deposition processes can be assessed through the way in which the corrosion rates vary according to the wreck orientation. Since most of the wrecks were created during "Operation Hailstone" bombing raids in 1944 (Jeffery 2004), there are major parts of the hull plates that are still electrically connected to each other which makes the interpretation of the E_{corr} values difficult. However, this is not the case with the pH values which showed there were linear correlations between the log of the annualized depth of corrosion, d_g, and the pH of the concreted metal. In the case of cast iron fittings on the torpedoed wreck of the *Fujikawa Maru*, the relationship took the form of Eq. 3:

$$^{Fujikawa\ Maru}\log d_g = 0.758 - 0.260\ \text{pH} \qquad (3)$$

Thus, analysis of the pH values of the corroding hull plates provides heritage managers and archaeologists with an insight into the materials performance and the consistency of the corrosion microenvironment. Similar correlations between the pH and the depths of graphitization have been found for iron cannon from the Cromwellian shipwreck *Swan* (1653), but in this case, the

strong currents associated with the ebb tide in the Sound of Mull and the higher concentration of dissolved oxygen in the colder Scottish waters meant that the corrosion rates were much higher than in the sheltered very warm waters of Chuuk Lagoon (MacLeod 1995).

Effect of Water Depth on Corrosion Rate

Although MacLeod had previously developed equations that indicated that the corrosion rate for historic iron shipwrecks in the open ocean fell off as a quadratic function of increased water depth (MacLeod 1998), the elimination of so many of the site variables in the Chuuk shipwrecks enabled a new understanding to be developed. The Japanese shipwrecks sunk in 1944 all followed the same logarithmic relationship between the corrosion rate and the water depth over the first 20 m, as given by Eq. 4:

$$^{\text{Chuuk } 0-20 \text{ m}} \log d_g = -0.731 - 0.0181\, d \quad (4)$$

with the corrosion rates (mm/year) determined through the extent of graphitization of cast iron elements on the wrecks and d is the depth (meters) at which the depth of graphitization was measured. The R^2 value for this relationship is 0.9849, which is a remarkably good fit given the very different nature of the sites and the errors associated with determining average long-term corrosion rates. The slope of -0.0181 ± 0.0010 for the logarithmic corrosion plot means that the corrosion rate falls by approximately 4.2 % per meter. The intercept, i.e., the corrosion rate at the seawater–air interface, had a value of -0.731 ± 0.012, which equates to an annual corrosion rate of 0.186 ± 0.005 mm/year for wrecks laying half in and half out of the water. The logarithmic drop-off in corrosion rate with increasing water depth makes good sense in terms of the rate at which wave action and thus the flux of dissolved oxygen fall off with increasing water depth. When the data from open-ocean shipwrecks was replotted, there was also a linear relationship between the logarithm of the corrosion rate and water depth, given by Eq. 5:

$$^{\text{Open-ocean}} \log\, d_g = -0.630 - 0.0156\, d \quad (5)$$

The corrosion Eqs. 4 and 5 make intuitive sense since the decay mechanism of corrosion is being controlled by the flux of dissolved oxygen which is not unexpected as the basic relationships should be very similar in both these types of environments. With the acquisition of corrosion data from the wrecks of the USS *Monitor* (1862) and the submarine HMAS AE2 (1915), both at a depth of 72 ± 2 m, it was found that Eq. 5 predicted the corrosion rates to within 5 % of that which was experimentally measured with ultrasonic metal thickness gauges (MacLeod et al. 2008; MacLeod 2010a). Because the data is empirical, all the natural variations in colonization, water temperature, dissolved oxygen, and water movement have all been integrated into the observed corrosion profiles (Fig. 3).

The differences between the Chuuk slope (Eq. 4) and the open-ocean slope (Eq. 5) are statistically significant which means that the corrosion rate for shipwrecks in Chuuk Lagoon decreases 16 % more than for open-ocean wrecks per meter of increased water depth. The lower corrosion rate of the Chuuk sites is due to the more sheltered nature of the lagoon waters which also has a low diurnal tidal range. The differences in the intercept values of the equations equate to Chuuk wrecks having a 21 % lower corrosion rate for wrecks in the splash zone. Previously torpedoed and repaired vessels, such as the *Shinkoku Maru* and the *Yubae Maru*, appear to be corroding faster than vessels that had no previous history of physical damage. It is likely that stresses in the steel, from the accumulation of either stress from having been blown up and repaired or the stresses associated with the catastrophic shipwrecking processes, are being reflected in elevated corrosion rates.

Concretion Microenvironment

After many years of hydrolysis of corrosion products underneath the protective concretion cover, the interstitial solutions become rich in chloride ions and hydrogen ions as the concretion acts like a semipermeable membrane (North 1976). The bore solution from a sealed iron cannon recovered from the turbulent *Zuytdorp* (1712) site had zero dissolved oxygen and

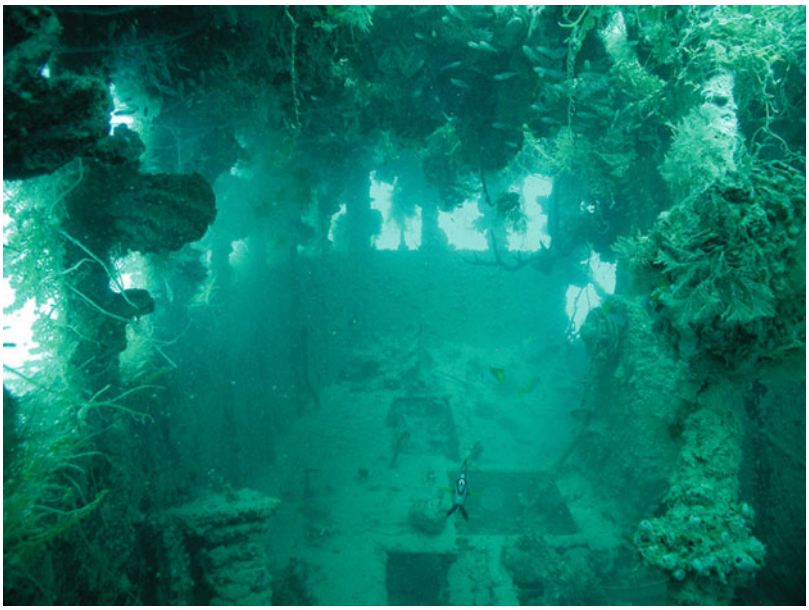

In Situ Preservation of Shipwreck Artifacts, Fig. 3 View from interior of bridge on the *Fujikawa Maru* in 2002 during initial corrosion survey (Photo: Bill Jeffery)

a chloride content of 54,593 ppm, which is nearly three times as much chloride as in normal seawater (MacLeod 1996). The concentration of $FeCl_2$ solution was 1.54 M, and the pH of 4.8, due to the hydrolysis of the ferrous chloride primary corrosion products, is consistent with the species distribution reported by Man-Seung (Man-Seung 2004). As the corrosion products diffuse away from the metal surface and approach the cathodic outward surface, the residual oxygen concentration increases to allow the formation of green rust of the general formula $\{Fe^{II}{}_3Fe^{III}(OH)_8\}^+\{Cl.H_2O\}^{-1}$, but these products exert minimal influence on the corrosion mechanism. Analysis of the pH data from the *City of Launceston* wreck showed that certain parts of the wreck were corroding at a faster rate and that these zones correlated with localized turbulence associated with the currents in and around the high profile of the intact clipper-styled iron steamship. Measurement of residual metal thickness of the hull plates in these zones confirmed that the pH values were indicative of long-term corrosion trends (MacLeod 2002).

Monitoring Changes on Wreck Sites

Through periodic assessments of shipwreck sites, it is possible to determine if there are any changes occurring that are otherwise not readily discerned by a diver swimming across a wreck site. During an 18-year program on the wreck of the *City of Launceston* (1865), the cessation of scallop dredging resulted in a 22 % drop in corrosion rate, due to improvements in water clarity which lead to more effective covering by marine growth. Allocation of extra resources to a 2-year program of detailed mapping of the wreck site resulted in an unanticipated increase of 43 % in the corrosion rate, slightly exceeding the value when the scallop dredging was active. It was extensive hand clearing of the weed like marine growth from the surface of the vessel that caused the increase in corrosion rate. It took an extra 4 years before the site settled down to its previous lower corrosion rate (MacLeod 2010b) (Fig. 4).

Over a 5-year period, a series of in situ conservation surveys were performed on a selected number of World War II Japanese wrecks located in Chuuk (Truk) Lagoon. The biodynamic relationship between the concretion thickness, the nature of the colonizing organisms, and the concomitant effect on the underlying metal corrosion rate showed that the amount of light falling on a canted side of a shipwreck had a measurable effect on the extent of corrosion. The impact of the corals being the dominant

In Situ Preservation of Shipwreck Artifacts, Fig. 4 Zinc anode connected to frame amidships lying on the deck of the *City of Launceston* (1865) (Photo: Heritage Victoria)

sedentary epifauna on the sunny side meant that the branching nature of the corals causes localized increases in turbulence and hence corrosion rate (MacLeod et al. 2007). While the protective nature of the concretion cover is still beneficial, the changes in rugosity, or surface roughness, have a direct bearing on the corrosion mechanism and the intensity of the corrosion process. The differences in colonization result in systematic differences in the corrosion potentials and the pH of the iron underneath the concretion (Figs. 5 and 6).

A previously undisturbed small fishing vessel was located in 2006 adjacent to a WWII dock on Tonoas Island and reported to the Chuukese authorities. The unnamed vessel, called the *Tonoas dock boat*, was used as a yardstick in the evaluation of the combined impacts of natural deconcretion events, due to typhoon damage, and the impact of "dynamite fishing" on the popular dive wrecks of the *Fujikawa Maru* and the *Susuki* patrol boat. Analysis of the concretion thickness on the *Susuki* patrol boat and the *Fujikawa Maru* showed that there were multiple layers of marine growth, with some areas having a series of up to five terraces representing marine concretion of varying ages on the *Fujikawa Maru*. While differences in the phosphorus content of the structural steels can account for some of the variations in thickness value t_{mm} of the concretion and corrosion matrix (MacLeod 1988), the most likely explanation is due to the impact of "dynamite fishing" which causes localized disbondment of the concretion as the explosion shock waves hit the surface (MacLeod et al. 2011).

When the *Fujikawa Maru* was originally inspected in 2002, it had a different corrosion mechanism to all other historic iron shipwrecks in that the slope of the Pourbaix or E_{corr} versus pH diagram was −0.059 V/pH instead of −0.028 ± 0.002 V/pH (Pourbaix 1974; MacLeod 2005). When the site was revisited in 2006, the corrosion mechanism had changed over to that of other iron wrecks. The initial relationship between E_{corr} and pH on the *Fujikawa Maru* is probably a reflection of the low stress microenvironment of the wreck, with its keel firmly supported by the seabed, whereas all the other wrecks were lying on their sides, upside down or on sloping substrates. Thus, the precise physical orientation of an iron shipwreck exerts a major influence on the way in which the vessel will corrode (MacLeod 2006).

In Situ Preservation of Shipwreck Artifacts, Fig. 5 Undisturbed marine concretion on the *Fujikawa Maru* just below gunwale (Photo: Earthwatch Foundation)

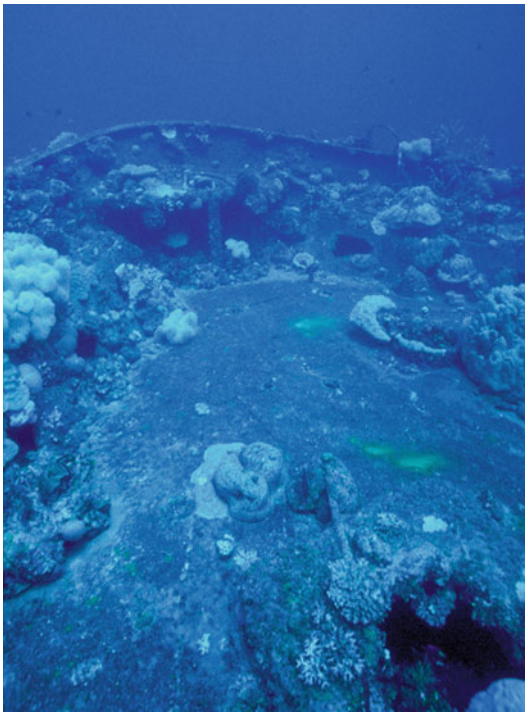

In Situ Preservation of Shipwreck Artifacts, Fig. 6 The bow denuded of protective cover after an episode of "dynamite fishing" in 2004 (Photo: Bill Jeffery)

The Impact of Explosions and Anchoring on Corrosion Rate

In order to determine the impact of human activities such as the use of explosives on wreck sites and the indiscriminate use of the wrecks as tie off points, the general Chuuk Lagoon corrosion equation (Eq. 4) was used to convert E_{corr} values from the *Tonoas* dock boat, the *Susuki* patrol boat, and the *Fujikawa Maru* into corrosion rates: the results are summarized in Table 1. When this information was meshed with local stories of when the wrecks had been last dynamited, it was possible to discern how long it takes before a wreck begins to recover from such events. Chuukese heritage professionals gave unofficial reports that the *Susuki* patrol boat was relatively undisturbed before the initial site inspection in 2002. Some time prior to the measurements in July 2006, there was a "deconcreting" event, but by the time the site was assessed, some recolonization of the wreck had taken place.

Around July or August 2006, a deconcreting event had taken place which caused an increase in the corrosion rate. In addition to the damage from "dynamite fishing," the *Susuki* patrol boat is also

In Situ Preservation of Shipwreck Artifacts, Table 1 Summary of observed and predicted corrosion rates for the three Chuuk shipwrecks

Wreck	Mean depth m	Mean depth graphitization mm	Calculated corrosion rate, mm/year	Observed rate mm/year	% corrosion rate over expected on depth
Fujikawa Maru	15.4	8.3 ± 2.4	0.098	0.143	46
Tonoas dock boat	14.4	5.0 ± 1.7	0.102	0.081	−20
Susuki patrol boat	7.2	10.0 ± 3.4	0.138	0.161	17

heavily impacted by novice divers during day- and nighttime visits since the dive supervisors regularly report that tourists break off corals as they adjust their buoyancy and try to hold on as they adjusted their buoyancy. By the time of the final set of measurements in August 2007, the site had begun to recover, and so the E_{corr} values had fallen from their dangerously high levels to somewhere approaching the original 2002 values. This oral history from the Chuukese staff shows that the wreck sites are in a dynamic equilibrium with the marine environment and that when damage occurs there can be relatively rapid recovery to pre-disturbance levels, but the continued practice of "dynamite fishing" results in permanent damage to the longevity of the wreck. The data from the three wrecks provides a direct comparison of the way in which the corrosion rate varies in response to the combination of damage from boat moorings, from divers breaking off the corals, and from the large impact of "dynamite fishing" on the corrosion rate (MacLeod et al. 2011) (Fig. 7).

The corrosion rate of the *Fujikawa Maru* is 46 % above that calculated using the Chuuk shipwreck corrosion Eq. 4, while the *Susuki patrol boat* is 17 % higher. Both of these vessels have suffered from increased corrosion as a result of multiple deconcretion episodes. The location of the *Fujikawa Maru* in the shipping channel results in a higher dissolved oxygen flux over the site which also leads to a great number of fish. This combination makes the *Fujikawa Maru* more prone to being hit by "dynamite fishing" activities than the more sheltered *Susuki* patrol boat site which has less abundant marine life. In addition the *Fujikawa Maru* is the most popular wreck site in the lagoon and is thus subjected to inadvertent diver damage. The damage to the concretion is consistent with physical impact of either shockwaves from dynamite fishing or from severe tropical storms. It is likely that most of the dozen wrecks from which data had been collected had all been subjected to "dynamite fishing" events during their history since 1944. Because the general corrosion equation for Chuuk Lagoon was developed before the *Tonoas* dock boat site was found, the observed corrosion rate was 20 % less than predicted.

The net effect of the episodic localized loss of this protective layer of marine concretion from the surface of the vessels is increased corrosion and loss of the underlying metal corrosion products which removes the archival record of the microenvironment and causes increased stress on the wrecks. Based on results from corrosion data collected in 2008, many of the wrecks in Chuuk Lagoon will begin to undergo significant collapse in the next 4–9 years. This has major implications for the management of the sites and for the safety of divers undertaking penetration dives. In addition, there is the risk of perforation of fuel bunkers on some vessels, possibly releasing petrochemicals into the fragile ecosystem potentially causing significant environmental damage in Chuuk Lagoon.

Impact of Intense Weather Events: The Case of Cyclone Yasi and the SS *Yongala* (1911)

A total of 122 passengers and crew perished in the wreck of SS *Yongala* (1911), and with the

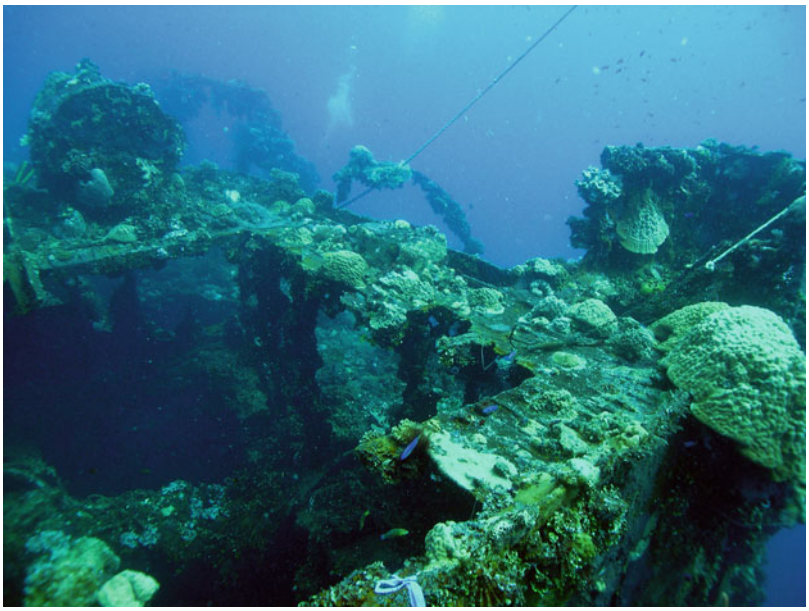

In Situ Preservation of Shipwreck Artifacts, Fig. 7 Collapse of the *Fujikawa Maru* bridge structure (August, 2007)

advent of charter boats and popularization through social media and diving networks, the wreck has become one of the top ten "must see" dive sites in the world. Until the introduction of proper mooring buoys, there was significant anchor damage to the protective concretion on the *Yongala* by more than 1,400 diving charters each year to the site which lies in the open waters of the Great Barrier Reef Marine Park off the Queensland coast (MacLeod & Viduka 2010). The heavily concreted shipwreck rests in 27–30 m of water, sitting approximately 14 m above the seafloor. The high physical profile of an intact iron steamship, warm tropical waters, and characteristic two-knot current that flows throughout the year have resulted in a veritable cornucopia of marine life. The initial assessment in 2005 was followed by intense wave action resulting from Cyclone *Larry* which partially deconcreted the stern in 2006 and exposed new holes in the remaining deck "plate." Three sets of in situ measurements were collected in 2007 which indicated that the wreck was beginning to recover from the impact of the previous cyclone. There was increased thickness of the concretion layers over previously damaged areas. Analysis of the corrosion potential, pH, and plate perforation data confirmed that the superstructure deck and hull plates are all highly corroded and that the most extensive corrosion is on the portside gunwale. The high corrosion rates found at the forward end of the forecastle deck and at the stern near the rudder are consistent with the exposed locations which lie proud of the seabed where there is significant water movement across the site (Fig. 8).

The naturally occurring cyclonic damage has resulted in accelerated corrosion of the wreck in much the same fashion as the "dynamite fishing" in Chuuk has accelerated the decay of the Japanese WWII shipwrecks. The 2007 data showed that the *Yongala* bow was corroding at a higher rate than the stern and that its unsupported nature placed increased stress on the hull and this manifested itself in increased corrosion on the residual metal structure. Changes in the souring have also been significant factors in accelerating the corrosion of this historically significant iron shipwreck. The impact of a second cyclone was dramatic when cyclone *Yasi* hit Queensland coastal communities and hinterland in February 2011. Although the center of the intense cyclone was hundreds of kilometers north of the site, deep ocean waves wrenched massive amounts of concretion from the wreck, and the bow has collapsed and

In Situ Preservation of Shipwreck Artifacts, Fig. 8 *Yongala* bow after the impact of cyclone Yasi (Photo: Museum of Tropical Queensland)

dropped several meters to rest on the seabed. The *Yongala* moved from about 60°~ before the storm to 80°~ from the vertical, after the extreme weather event. The concreted hull plates have collapsed in sections and this has opened up the interior of the wreck to direct action of the prevailing currents. Without direct intervention and active site management, the wreck will now undergo a relatively dramatic change in its physical form as elements begin to become disconnected and move across the site. The lesson from the in situ corrosion studies on the *Yongala* is that such data can lead to the development of predictive models of site collapse that can also be reverse engineered into determining the likely causes of wreck formation processes on other historic shipwrecks.

Sacrificial Anodes and Artifact Stabilization

Although the successful in situ treatment of historic shipwreck cannon and anchors, marine engines, and even the remarkable steam-driven submarine *Resurgam* has been reported by Gregory and MacLeod (Gregory 1999, 2000; MacLeod 1992, 1996), some elements of the shipwreck community remain skeptical about the efficacy or efficiency of such processes. Conservators and maritime archaeologists need a method of determining how an in situ treatment is progressing and when it will be finished. Recent work by the author has shown that the Cartesian (arithmetic) product of the pH and corrosion potential is dependent on the burial environment. This data provides a special insight into the state of decay of the objects since all aerobically corroded iron artifacts have a common value when the two in situ parameters are multiplied together. The wreck of the *Swan* (1653) at Duart Point, Isle of Mull, Scotland, is instructive as the site has seen the successful application of anodes to several cannon after the pre-disturbance corrosion survey was conducted. When the treatment data is plotted on a Pourbaix diagram, all the guns had a common slope with an average value of −0.087 V/pH which is consistent with the following corrosion reaction taking place, during the treatment phase, viz.,

$$Fe + 2H_2O \rightarrow HFeO_2^- + 3H^+ + 2e^- \qquad (6)$$

Equation 6 has a predicted slope of $-{}^3/_2$*0.0568 or –0.085 V/pH at a seawater temperature of 13 °C. The data strongly suggests that the underlying passive corrosion process produces the hydrogen ferrate ion $HFeO_2^-$ and not the normal ferrous ions associated with corrosion in the absence of anodes. The corrosion process is no longer controlled by the oxidation of iron to produce $FeCl^+$ species (Man-Seung 2004) but the underlying corrosion process is the very

slow oxidation of iron under alkaline conditions. In other words, the monitoring of the in situ corrosion parameters has shown that the iron is in a passive state, the desired outcome of all conservation treatments (Fig. 9).

Determining the End Point of an In Situ Treatment

Analysis of data from pre-disturbance surveys on iron artifacts indicates that the common solution microenvironment underneath the concretion consists of $FeCl^+$ in equilibrium with a small percentage of $FeCl_2$ and a trace of $FeOH^+$ (Man-Seung 2004). For the convenience of discussion, the Cartesian product of the pH and E_{corr} can be described as a "corrosion indicator" (CI) which has a median pre-disturbance value of -3.6 ± 0.4 from wreck sites which range from the wreck of the *Swan* in 1653 through the USS *Monitor* (1862) turret, the hull of the Civil War submarine *H. L.Hunley* (1864), to the anchors and cannon from the HMS *Sirius* (1770), and the hull plates of the *City of Launceston* wrecked in 1865 in Port Phillip Bay, Victoria, Australia (MacLeod 2010b). The site variables such as temperature, the dissolved oxygen content, and the salinity all impact on the pH and E_{corr} values, but these factors essentially cancel out each other to provide the basis for a common value which simply reflects the common corrosion mechanism. By monitoring the E_{corr} and pH through routine visits to the wreck sites, the CI value of artifacts undergoing treatment can be determined. A detailed discussion of how the end point of the treatment value for the corrosion indicator was developed has been previously reported (MacLeod 2013), but when the end point CI value of -7.3 ± 0.2 is reached, the bulk of the chlorides have been removed from the object, the surface pH has become more alkaline than the surrounding seawater, and the overall corrosion rate has fallen to quite low values. One impact of the knowledge of the end point for in situ treatment of iron artifacts is that it became apparent that the *Cerberus* gun barrels were completed after approximately 3 years of stabilization with zinc anodes. The short treatment time is due to the fact that they had only been exposed to general marine atmospheric corrosion while located in their twin turrets on the 1870s built Monitor-style warship (MacLeod & Steyne 2011).

In Situ Preservation of Shipwreck Artifacts, Fig. 9 Diver attaching a zinc anode to a cannon on the *Swan* wreck site, Sound of Mull, Scotland (Photo: Colin Martin)

Artifacts corroding in a buried or partly buried marine microenvironment have a different corrosion mechanism to those objects lying proud of the seabed. Under low-oxygen or anaerobic conditions, the principal corrosion product is magnetite Fe_3O_4 and the cathodic process involves reduction of either hydrogen or water. The different mechanism is reflected in different pre-disturbance values of the corrosion indicator. Examples of this type of microenvironment are found for the wrecks of the Australian WWI submarine HMAS *AE2* (1915) in the Sea of Marmara and the submarine *Resurgam (*1880) off the coast of North Wales where the median CI value for the two submarines was -4.6 ± 0.1, which is typical for a partly stabilized aerobically corroded iron artifact (Gregory 2000; MacLeod 2010b).

Although the SS *Xantho* was periodically buried and exposed, all the pre-disturbance values relate to the extended aerobic microenvironment with a CI value of −3.3 for the historic Penn of Greenwich engine (MacLeod 1986; McCarthy 1988). The value of the product of E_{corr} and pH changes during in situ conservation treatment with sacrificial anodes and reaches a minimum at which point the treatment is completed, i.e., the end point. Treatment times vary according to the water depth and are more rapid on shallower sites and shorter for more extensively corroded artifacts. The model was developed using data from the corroded guns on the wrecks of the pinnace *Swan* (1653), the Monitor-styled warship HMVS *Cerberus* (1926), and a series of wrecks in Australia and the United States of America (MacLeod 2013).

Treatment Kinetics for Cannon on the *Swan* (1653)

Data collected by Gregory and MacLeod on the *Swan* wreck site has been of significant value in determining the factors that control the rate at which the artifacts are going to be treated by the anodes (Gregory 1999; MacLeod 2013). Because the efficacy of anodes depends on the ratio of the surface area of the object to the anode, changes in the pH and E_{corr} values during treatment cannot normally be compared owing to the different surface area of object to anode ratios used on different sites. Since all the anodes used on the cannon on the *Swan* had very similar surface area ratios, the data from the changing values of the corrosion indicator provided some useful clues to the overall kinetics of the treatment process. As electrons flow into the cannon and anchors, the unbound hydrogen ions are reduced to hydrogen gas, with a concomitant increase in the pH. The cannon showed a linear increase in pH with time, and the slopes of the pH versus time plots are dependent on the d_g values or the annualized long-term corrosion rate according to Eq. 7:

$$\partial pH/\partial t = 4.47\, d_g - 0.007 \qquad (7)$$

The linear regression for Eq. 7 had an R^2 of 0.9315, and the standard error associated with the slope was ±0.54 (12 %) and the intercept error was ±0.086. When the E_{corr} data from the *Swan* was combined with the pH during treatment, it was found that the corrosion indicator value became increasingly negative as time increased according to Eq. 8:

$$CI_{Duart} = -3.35 - 0.72\, t \qquad (8)$$

where t is the treatment time in years and the R^2 value of 0.9602 was associated with the linear regression equation number eight which shows a very good correlation of the data. If the amount of time for completing the in situ conservation of the object(s) is required, then substitution of the end CI value of 7.4 into the above equation gave a predicted treatment time of 5.65 years. Thus, through periodic measurements of the normal in situ corrosion parameters, it is possible to determine the percentage of the conservation program that has been achieved by the artifact(s). Since the predicted treatment time for the guns and anchor at the *Swan* wreck site is now well past, the in situ conservation treatment will have been completed, and the site kept in a state of suspended animation until there is a compelling need for additional excavation and a home for the conserved artifacts are established as part of a properly curated exhibition in a venue that fits for the purpose. The archaeological director reports that the anodes are now corroding away at a much reduced rate which also supports the understanding that the conservation process has been completed (C.J.M. Martin, *pers. comm.* 2011).

Similar analyses of data on the speed at which the corrosion indicator moved toward the end value of −7.4 ± 0.3 were conducted for the *Sirius*, *Xantho*, and *Cerberus* sites and showed that the corrosion indicator moved faster toward the completion value as the depth (d) became shallower in accordance with Eq. 9:

$$\partial CI.y^{-1}/\partial d = -1.39 + 0.18\, d \qquad (9)$$

This relationship means that in situ conservation treatments will work fastest at shallower depths since increased wave action, brought about by wind driven events, will increase the

flux of dissolved oxygen to the corroding anodes and make them work more efficiently. This relationship enables conservators, site managers, and maritime archaeologists to predict how fast the artifacts can be treated based on the water depth in meters.

Methodologies for In Situ Preservation of Organic Materials

One critical factor in modelling the preservation of objects from an archaeological site is the applicability of data recovered from post-burial environments of model artifacts. It is a problem common to all of corrosion and archaeological sciences, but so long as data is compared with other appropriate subsets from a similar microenvironment, then the conclusions drawn have a reasonable chance of being valid. Although the literature abounds in numerous reports of such activities, the work at the National Museum of Denmark and at the Western Australian Maritime Museum are instructive and complement the data from the Marstrand Reburial and Analyses of Archaeological Materials (RAAR) project in Sweden as they are all pointing practitioners down on more sustainable paths.

The concept of reburial of ship timbers in the marine environment was established by the Dutch pioneer De Jong and by Kirsten Jespersen in Denmark, but the effectiveness of the methodology was not fully developed, so the impact of the reburial on archaeological timbers was poorly characterized. This lack of detailed understanding was overcome by Gregory as he developed a methodology using standard modern oak and a cellulose-based canvas as means of assessing deterioration in the first stages of decay. If the initial rapid decay of artifacts can be effectively modelled and understood, it makes the task of predicting the long-term future much more attainable. Since most degradation mechanisms by molds, fungi, wood-boring molluscs involve the organisms respiring in an oxygenated environment, the first samples were located at the oxygenated seawater interface, the next cohort just below the surface at a depth of a few centimeters and below 50 cm to gauge the change in mechanism of going to a completely anaerobic microenvironment. His work pointed out the many pitfalls of attempting to interpret short-term field experiments on standardized timber coupons, but it did show that the least degradation was obtained on samples buried deeper than the 50 cm layer of sediment (Gregory 1998). The impetus for the determination of the optimum reburial microenvironment for the National Museum of Denmark was the presence of more than 5,000 Iron Age wooden artifacts in a waterlogged meadow site, Nydam Mose, located in Southern Jutland, Denmark. To treat all of these materials was questionable in terms of the capital and maintenance costs of the collection and the fact that when left undisturbed and maintained in a stable anoxic aqueous microenvironment, the timber artifacts appeared to have excellent preservation. Monitoring the dissolved oxygen levels, the redox potential, and the quantities of salts has provided good insights into the major role of erosion bacteria in controlling the biodeterioration of the waterlogged organic remains and of the importance of maintenance of the water table (Gregory et al. 2001). Recent work in England on finding the correct turning point for burial depth of organic remains indicates that depths in excess of 2 m may be required to ensure that the overall rate of all bacterial attack, both aerobic and anaerobic, on the structural components of the wood is at a minimum (Hogan et al. 2001).

The shipwreck *James Matthews* (1841) in Cockburn Sound near Fremantle had for many years been in a stable burial environment under at least a meter of sand, but it was being subjected to a combination of natural erosion and increased industrial activity, since it is located next to a retrieval jetty for harvesting dumped shell materials for a local cement works. The systematic approach shown by Richards and her team in establishing the pre-disturbance conditions for the microbiological, electrochemical, and physical oceanography of the site shows the depth of knowledge that is needed before informed decisions can be taken on the efficacy of reburial in situ conservation plans (Godfrey et al. 2005). The wreck has been able to be stabilized through the use of sediment-filled road

crash barriers, covered with geotextile to minimize loss of sediment during storm surge (Winton & Richards 2005). A long-term approach to monitoring the efficacy of interventions on a wreck site has proven to be very useful in that data collected over a period of more than 5 years has shown the complex relationships between the natural balance of microbiological populations and a variety of wood-boring molluscs and marine fungi (Fig. 10).

Richards work on assessment of changes wrought by various interventions is highly regarded for its direct relevance since samples of the ships timbers were able to be taken for destructive analysis rather than using modern test specimens of timbers pertaining to the period of construction of the vessel which had only been exposed for a few years. Through direct engagement with the maritime archaeological site manager, a unique insight into site degradation and formation processes has been able to be developed. It is only through all the data from sediment cores, microbiological assays, analysis of the wood degradation mechanisms, and the microelectrodes that quantified the variations in dissolved oxygen and redox potentials that the total picture can be obtained. Richards clearly established that canvas-based sandbags were useless and that the partially filled synthetic sandbags need to be carefully chosen for the stability of the parent polymer, but they were nevertheless useful in providing temporary protection of the site. The additional data gathered after the initial study into the use of road crash barriers strongly supports this form of site stabilization. It is important to remember how to weigh up initial capital cost with the outcome which is the preservation of a unique historic wooden sailing vessel that once took African slaves to the plantations in the Americas (Richards et al. 2009).

Following industrial pressures of seabed dredging to improve harbor and ferry access through a series of archipelagic channels which would profoundly affect a series of shipwreck sites, the Marstrand reburial project was born in which it was bravely heralded that the research design would be transgenerational in that

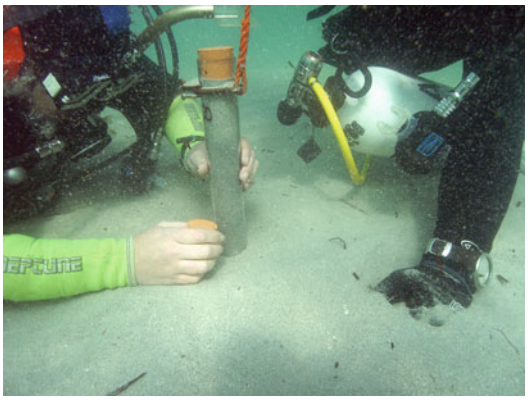

In Situ Preservation of Shipwreck Artifacts, Fig. 10 In situ assessment of hull timbers on the *James Matthews* (1841) wreck (Photo: Jon Carpenter)

50 years of data would be needed to fully ascertain the efficacy of the proposed methods of in situ stabilization. The findings of the first 3-year analysis of the data indicate, somewhat surprisingly, that reburial is not a good option for glass and fibrous materials but indications are that it is an option for some metals and inorganic matrices such as porcelain, stoneware, and clay pipes as well as for wood (Nystrom et al. 2009). The RAAR project has already achieved some significant milestones in that it has demonstrated the viability of collecting localized microenvironment physical chemical parameters of dissolved oxygen, pH, and redox potentials in that they provide comparable data with that obtained from fixed data loggers operating underwater in situ. The data has also produced a very sound set of guidelines about the precise location and positioning of samples of different types of materials found on historic shipwrecks, but in this instance simulated by modern coupons made from representative alloys or wood samples. Although funding for the continuation of the project is somewhat problematic, the data already reported is of considerable value as it points out all the pitfalls of reburial projects which are of immense assistance to heritage managers in determining which artifacts should be recovered and conserved (Nyström Godfrey 2009).

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Australia: Maritime Archaeology
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Dating Techniques in Archaeological Science
- ▶ Ship Archaeology

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Basic Biographical Information

Jale İnan was born in 1914 in İstanbul. Her father, Aziz Ongan, who was one of the very first archaeologists born in Turkey, was the cofounder and a long-term director of the İzmir Archaeology Museum. After her graduation from Erenköy High School for Girls in 1934, with a scholarship from the Alexander Von Humbolt Foundation, Jale İnan went to Berlin, Germany, to study archaeology. A year later, she was awarded the Turkish Republic Scholarship and overcame severe hardships during World War II to complete her undergraduate education. Under Prof. Dr. Rodenwalt's supervision, she finished her Ph.D. dissertation entitled *Art Historical Study of The Sacrificial Action on Roman Coins*. Inan returned to Turkey in 1934 and before the Classical Archaeology Department was established, she began to assist Prof. Dr. C. Bosch in the Ancient History Department.

The Classical Archaeology Department was formed in 1946 and Jale İnan became Arif Müfid Mansel's assistant. Along him, she helped to build the new department and establish a tradition of excellence. She was promoted as associate professor in 1953 and as professor in1963. Inan become the head of the Classical Archaeology Department in 1975 and retained status quo until her retirement in 1983.

Major Accomplishments

Since 1946, Jale İnan participated in the excavations of Side and Perge led by Arif Müfid Mansel where she served as vice director. Afterward she took charge of excavations at Side between 1974 and 1980 and Perge from 1974 to 1980. She also carried out salvage excavations in ancient sites as Kremna and Pamphylia Seleukeia (1970–1979). Inan also chaired the excavation and restoration studies in the Temple of Apollo, Side. In addition, she played a major role in the repair and restoration of Side's Roman bath construction as a representative museum. She wrote numerous significant articles and books on the art of ancient sculpture.

Jale İnan's publications filled in major gaps in the study of Roman and Early Byzantine portraiture and are important reference sources. Her research in Europe resulted in identification of the fragments of statues from Side/Perge ancient sites and was integral in having them brought to Turkey and restored and displayed.

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► Hellenistic and Roman Anatolia, Archaeology of
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Inca State and Empire Formation

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Introduction

In 1532, when Francisco Pizarro's rag-tag band of conquistadors captured and executed Atahuallpa, the last independent Inca emperor was overlord of the largest native civilization to develop in the Americas (Fig. 1). Although Atahuallpa had recently turned the might of the Inca military machine away from a grueling expansion campaign on the northern frontier to contend with his half brother, Huascar, for the imperial title, the Incas were still in the process of territorial expansion and provincial consolidation when the foreign invasion interrupted their dynasty. Tawantinsuyu, the Inca "Realm of the Four Quarters," had a population comparable to that of Spain at the time, one that spoke dozens of languages and dialects and lived across some of the planet's most diverse landscapes. The conquering Spaniards did not stop to ponder what factors enabled Inca imperial unity, or to reflect on the rapidity of the Inca military achievement (much of the empire's territory had been annexed in the lifetimes of the oldest living informants). A generation later, the chronicler Juan de Betanzos recalled (1996[1550s]: 3) that the Spaniards "paid less attention to fact finding than to subduing and acquiring the land and... because they were unaccustomed to dealing with the Indians... they did not know how to make inquiries and ask questions because they lacked an understanding of the language. Moreover, the Indians were afraid to give them a full account."

Definition

The question of Inca origins is saturated with ideologies of imperial self-justification found among Incas and Spaniards in the late sixteenth and early seventeenth centuries. Inca informants and Spanish writers alike sought to colonize the past to promote their own immediate interests – to see the rise of the Incas as the realization of the ideals of civilization, or as a descent into tyranny and demonically inspired depravity. Although archaeology is constrained by its own incompleteness and bias, recent decades of research have established independent evidence of the remains of the Andean world at the time of Inca origins. Today, Inca scholars are in a position to offer a much more solid narrative on the origins of this impressive society.

The Incas were not the first Andean civilization, but their state formed during uncertain times, when many Andean societies had turned away from political hierarchies and central institutions. As climatic conditions fluctuated around CE 1000, most highlanders focused on social networks that could labor across a diverse set of resources, and they defended their homes, pastures, and fields from local rivals as populations grew to strain resource availability. Rather than manage risk through diversity, the Incas and a few of their neighbors focused on surplus production, and as populations grew their leaders organized the construction of new irrigation canals and agricultural terraces to cultivate maize and other crops. Inca society eventually grew to be larger and more hierarchical than its neighbors, and its leaders began to establish formal ties to groups across the Cuzco region, relationships that brought labor tribute and turned the growing city of Cuzco into a ceremonial center where labor was reciprocated through rituals and festivities. Whereas marriage allies augmented labor available for royal projects, Inca enemies became targets for conquest, and a century or more saw Inca armies reduce many groups to tributary status, opening up new lands for intensification and royal estate construction. The Incas raided their most powerful rivals for generations before finally conquering them on the eve of the first imperial campaigns.

By CE 1400, the Inca ruler was the most powerful lord in the central highlands, and the state controlled a large population that provided

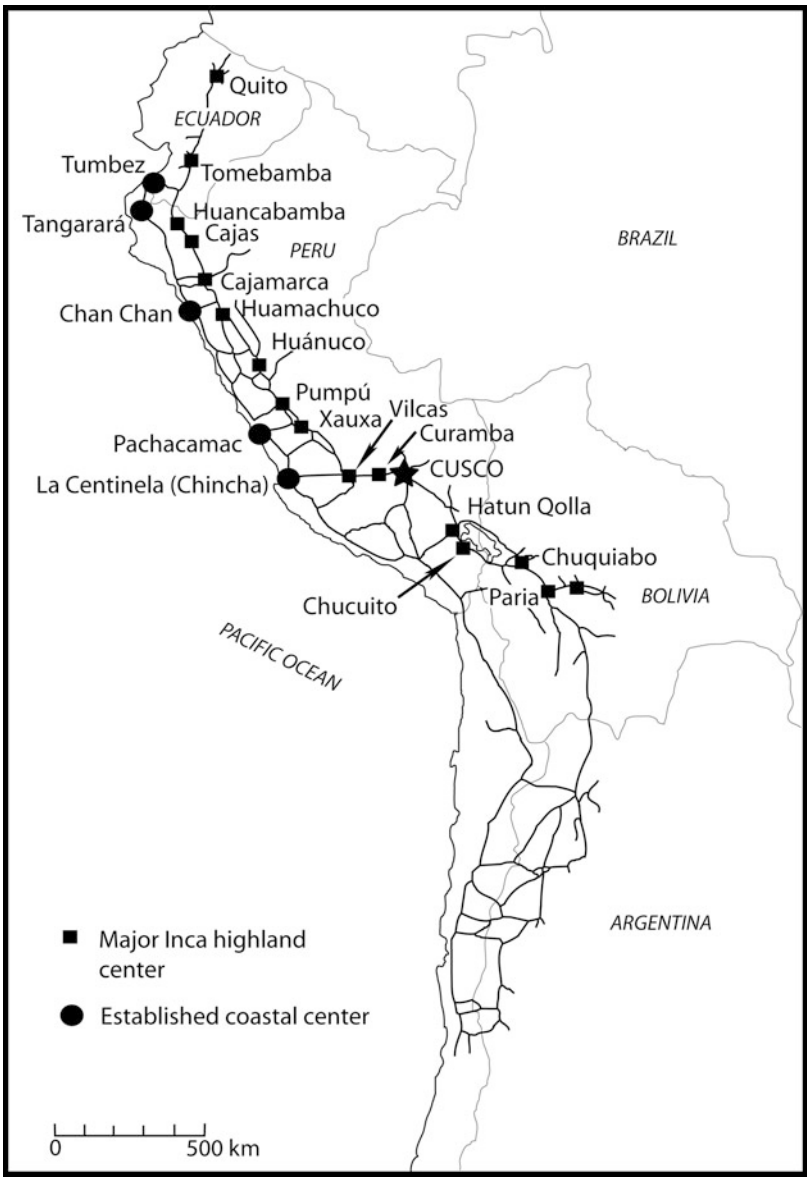

Inca State and Empire Formation, Fig. 1 Map of Inca territory at the time of the European invasion

labor on improved farmlands to produce massive surpluses for state functions and religious offerings and to supply large armies on extended campaigns. A state conquest ideology would have been necessary to justify imperial entanglements beyond the Cuzco region, and the ruler who wished to lead Inca armies beyond traditional boundaries would need charisma and political savvy to encourage Inca nobles and commoners to labor harder and risk their lives to support expansion. Undoubtedly, this is where stories of external threats, challenges to the Inca paramount title, and assertions of divine patronage would have been influential, but these claims alone were not sufficient to launch the juggernaut of empire.

Historical Background

The Spanish crown only began to address the question of Inca origins seriously in the 1550s, as part of a debate over whether military conquests in

the Americas were just (Covey 2006a). To collect narratives of the Inca past, chroniclers turned to indigenous informants, including members of royal Inca lineages who provided particularly detailed narratives of their ancestors' feats. The Incas did not preserve their histories in writing prior to the European invasion; instead, they relied on the memories of oral history specialists – who were aided by the *khipu*, a collection of knotted cords that could be used to record some information – as well as periodic ceremonial performances that celebrated a ruler's conquests. Private histories of the Inca nobility served as the basis for "official" state accounts that periodically purged and reorganized the master narrative. Inca elites approached the transcription of Spanish accounts of their dynasty as a comparable project, one that offered a means of solidifying their status on the emerging colonial landscape.

The corpus of colonial Inca sources is a complex collection of archival documents and published chronicles that can be divided roughly into four principal periods (Table 1). It is important to recognize that many sources available for study today were not published until the nineteenth or twentieth century. Eyewitness accounts written before 1550 generally show limited regard for Inca history, emphasizing the military exploits of Spaniards during the conquest and subsequent civil wars of the 1540s and early 1550s. Spaniards wrote the first detailed narratives of the Inca dynasty in the 1550s (e.g., Betanzos, Pedro de Cieza de León, Bartolomé de Las Casas), but these were generally not published at that time. By the 1560s, the Spanish crown began to assert control over publications about the Inca past, decreeing that a royal chronicler be sent all manuscripts so that an official account could be kept. The creation of an "official" Inca chronicle – the unpublished 1572 account of Pedro Sarmiento de Gamboa – and censorship of other sources established Spanish royal control over the Inca past, which only relaxed after the death of Philip II in 1598. The first indigenous accounts of the Inca past were written in the early seventeenth century, and some of the earliest manuscripts finally found their way into publication in secondary sources that excerpted them, often without attribution. Few scholars consider materials produced after the 1650s to be part of the body of primary documents.

Inca State and Empire Formation, Table 1 Key periods of Inca historiography (dates approximate)

Dates	Sources
1532–1550	Eyewitness accounts
1550–1565	Early dynastic histories
1565–1600	Crown-controlled histories
1600–1650	Indigenous and secondary accounts

Considering the diverse corpus of Inca chronicles and the different contexts under which different sources were written, the discussion of Inca origins requires attention to a number of interrelated questions that colonial documents and archaeological data address in different ways. Early colonial writers were most concerned with understanding when "civilization" and "good government" were first established in the Andes, and with establishing how far back into the past the Inca dynasty could be credited with imperial conquests. This entry addresses these highly political colonial-era themes in light of a large body of archaeological data collected in recent decades.

Key Issues/Current Debates

The Incas claimed to be the first and only civilization to develop in the Andes. After the time of creation, the first ancestors emerged onto the wild landscapes of the region, taming them and establishing the trappings of human life. Indigenous chroniclers recount that the land eventually became overpopulated, leading people to abandon good farmland and seek mountaintop fortresses as conditions of universal warfare descended on the Andean world – Felipe Guaman Poma de Ayala (2009[1615]) called this time "The Age of the Enemy" (*aucapacha*) (Fig. 2). Inca order brought the fighting to an end, establishing civilized government and permitting people to return to the places that their ancestors had selected to settle.

Archaeologists have known for more than a century that the material record contradicts the

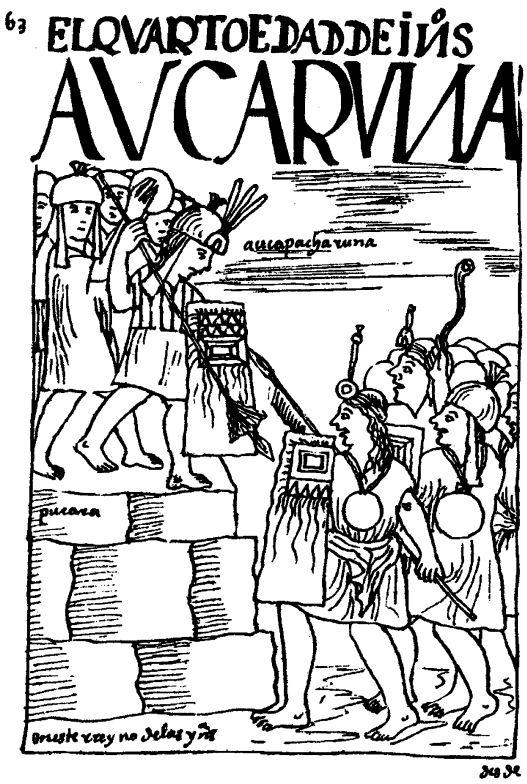

Inca State and Empire Formation, Fig. 2 Guaman Poma de Ayala's depiction of universal warfare before the Incas established the first and only Andean civilization

indigenous Andean account of the rise of civilization. Excavation work on the Pacific coast and in the highlands has identified urban centers that predate the Incas by centuries, and archaeological data offer detailed reconstructions of earlier states, such as Moche and Chimú on the coast, and Wari and Tiwanaku in the highlands. Because Inca expansion was so rapid and subsumed the core territories of all states that came earlier, some scholars have pondered the extent to which the Incas inherited or appropriated the institutions of their predecessors. The emergence of the Inca dynasty as a leading power in the Cuzco region followed a period of more than 200 years of balkanization after the disintegration of the Wari and Tiwanaku states. Although the Incas may have retained some practices regarding labor coordination and agricultural intensification that Wari colonists brought to the Cuzco region from CE 600 to 1000, Inca religion, economy, and state infrastructure are different in many ways from the practices of earlier states.

Despite recognizing the flaws in the indigenous story of creation cycles and the rise of Inca civilization, archaeologists have often invoked the Andean concept of universal warfare when describing the archaeological evidence from the central highlands after CE 1000. With the onset of more arid and fluctuating climatic conditions around that time, most highland populations abandoned intensive agricultural practices in favor of mixed farming and herding. Local economies emphasized kin-based production of diverse resources as a principal risk management mechanism, and many communities settled in locations offering maximum local environmental diversity, as well as natural defenses against predation of the resources needed to survive. Many highland regions saw a shift to hilltops and ridges, with settlement hierarchies indicating an absence of centralized political administration. Population growth from CE 1000 to 1200 in many parts of the highlands attests to the adaptive success of this new economic regime, but extensive subsistence practices required large catchment areas, and some societies became victims of their own successes – increased conflict marked the final years before Inca conquest. Radiocarbon dates suggest that warfare escalated in frequency and scale in many regions after CE 1200 or so, and fortifications (*pucaras*) are common across the central highlands during this time. Thus, indigenous chroniclers such as Guaman Poma de Ayala are correct that the Inca empire emerged on a densely populated, decentralized highland landscape that was plagued by frequent raiding and warfare; but these were the long-term results of successful social adaptations tied to the collapse of earlier states, rather than the progression from a natural condition to a civilized one. It is noteworthy that the Cuzco Valley and some nearby areas represent a rare exception to the *aucapacha* model – the most powerful groups in the region lived in large valley-bottom settlements in close proximity to fertile maize lands.

The general trends in highland settlement patterns in the Late Intermediate Period – diversity-oriented economies, defensive settlements, and

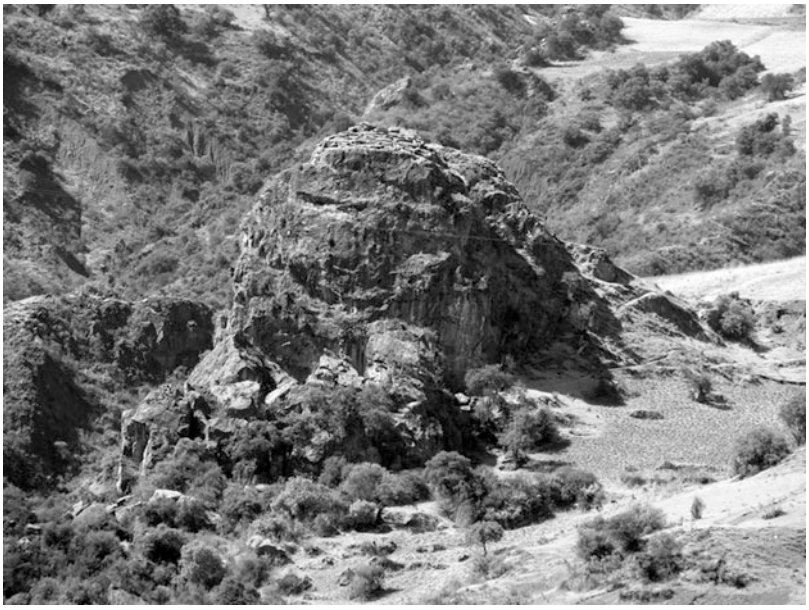

Inca State and Empire Formation, Fig. 3 The rock of Poma Orqo, celebrated in imperial times as the place of emergence of the first Inca royal ancestors

regional decentralization – offer a context for considering Inca accounts of their ancestral origins. Inca nobles claimed that their ancestors had been present for universal creation, making particular links to the celebration of regional pilgrimages in the Lake Titicaca region (Bauer & Stanish 2001). At a more local level, they claimed that the ancestral male–female pairs who founded their dynasty had emerged from a cave in a place called Pacarictambo, located to the south of the Cuzco Valley (Bauer 1992) (Fig. 3). The Inca ancestors journeyed northward in search of fertile maize lands where they could settle, conquering local groups and establishing shrines along their route. It is said that Manco Capac, the first king, knew to settle in Cuzco when a golden staff that he carried sank into the deep soil of the valley (Sarmiento de Gamboa 2007[1572]: Chap. 13). Indigenous accounts of the first Inca (e.g., Garcilaso de la Vega 1966[1609]: Book I, Chap. 18) identify prominent counterparts – other rulers with the kingly title "capac" – living to the northwest and southeast of the Cuzco Basin.

Although the Inca ancestral origin story contradicts key archaeological facts, it preserves some important truths that are borne out in the settlement pattern data. The Incas were valley-bottom maize farmers, as were their most powerful early rivals. As Fig. 4 shows, there is an axis of large valley-bottom settlements occupying some maize-producing areas in the Cuzco region, which includes the Cuzco Basin and the areas where Inca myths identify rival kings. These communities lack evidence of defensive works and suggest that surplus maize production was a key risk management strategy. This subsistence pattern is virtually nonexistent elsewhere in the Andean highlands at this time.

International Perspectives

Inca narratives of imperial origins present a paradoxical stance regarding threats from rival polities – on the one hand, the Incas claimed to be the only Andean civilization; but on the other hand, they justified the expansion of their empire as a strategy for defending themselves from the imperialistic designs of rival groups. Just as archaeologists have been willing to build interpretive models around the flawed account of universal warfare in the pre-Inca Andes, many have accepted the Inca claim of defensive imperialism, which was allegedly catalyzed by the invasion of the Cuzco region by Chanca armies in the early fifteenth century. Viewing Inca imperial origins

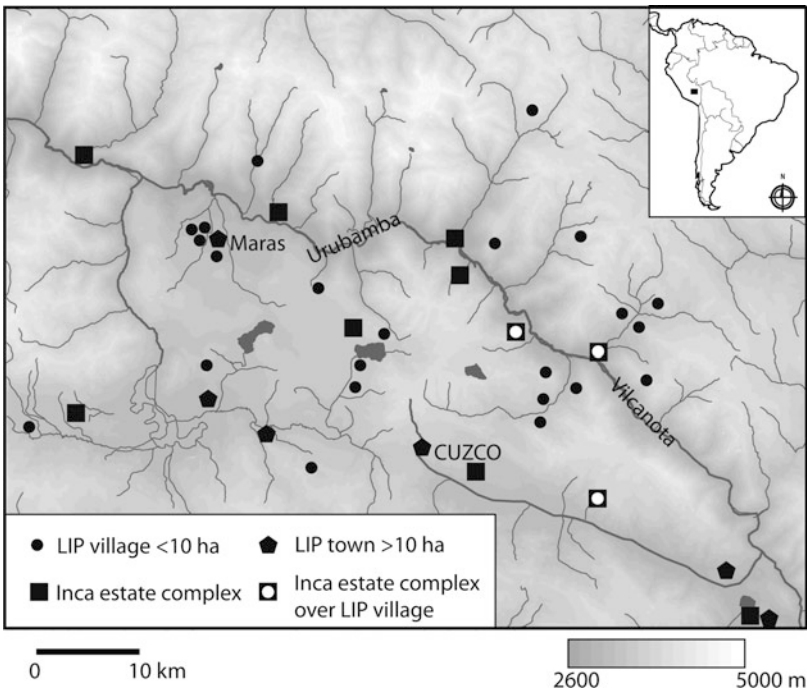

Inca State and Empire Formation, Fig. 4 Important settlements of Late Intermediate Period (CE 1000–1400) Cuzco. The Incas and their most powerful rivals were valley-bottom farmers living in large communities

as the outcome of a single battle lends itself to a historicist reading of Inca imperial origins, where a single charismatic ruler named Pachacutic Inca Yupanqui repelled the invading Chancas and then proceeded single-handedly, and without precedent, to create imperial institutions and to lead campaigns of conquest.

This interpretation of Inca origins owes much to the pioneering work of John H. Rowe (e.g., 1945), who identified Pachacutic as the Inca who founded the empire and who established a dynasty whose exploits can be largely treated as historical. Rowe accentuated the historicity of the imperial Inca rulers – Pachacutic, Tupa Inca Yupanqui, Huayna Capac, Huascar, and Atahuallpa – by promoting calendar dates from the 1586 chronicle of Miguel Cabello Balboa (a source that is otherwise largely ignored for its content). The year 1438, said to be the accession of Pachacutic, came to mark the sudden florescence of the Incas as an imperial society – and their emergence from the shadows of legend into the historical realm.

Although archaeological data are better suited to addressing processes than historical events, recent research in the Andean highlands has revealed the Inca claim of defensive imperialism to be a chimera, invented as part of the imperial conquest ideology. The homelands of the groups said to have threatened the existence of Inca society have been found to be far less powerful than described in the sixteenth century. Regional settlement patterns in the Chanca homeland exhibit defensive settlement and regional decentralization that are common across most parts of the Andean highlands during the Late Intermediate Period (Bauer et al. 2010). The same is true for the Colla region of the Titicaca Basin – although Inca informants claimed that their early campaigns there were motivated by the imperial designs of the Colla ruler, their descriptions of expansionist kingdoms are utterly at odds with the archaeological evidence (Arkush 2011).

Rowe's historicist paradigm was based on the writings of early colonial Spanish writers who thought about history in terms of dynastic lists and who approached the question of Inca imperial origins by asking which king created the empire and led the Incas out of Cuzco on their first imperial campaigns. Explaining the unprecedented and meteoric rise of a great man led many writers to

invoke supernatural explanations that modern scholars would not take at face value. For example, Pachacutic won his victory over Chanca invaders not as a general commanding Inca troops, but with the aid of an army of fieldstones that were transformed into human warriors and armed by the creator, Viracocha, who had appeared to the young Inca prince before the battle to promise him victory and imperial success. Today, many scholars emphasize a sudden flourish of Inca imperial power under Pachacutic, but they downplay the acts of divine intervention that the colonial sources employ to explain that transformation.

Contrasting with writers who were preoccupied with a single great man, the early colonial jurist Polo de Ondegardo framed the issue in terms of social transformations and changes in the balance of power in the Cuzco region. To answer how the Incas had conquered the Andean region in just a few generations, he wrote in 1571 (1916: 51) that "these Incas conquered through violence and warfare... and thus the only difficulty was in conquering those neighboring polities of the Cuzco region, because afterwards, all the conquered groups went with them [the Incas], and it was always a much larger force than the others [i.e., opposing local groups]." If the key to Inca success was the conquest and consolidation of the Cuzco region, many chronicles fall short of explaining these processes. Indigenous chronicles claim that Manco Capac, the founder of the Inca dynasty, unified the Cuzco region under Inca ruler during his lifetime, allowing the Incas to expand as an empire from the earliest generations. This claim cannot be reconciled with the archaeology of the Andes in the centuries before the Spanish conquest, a fact that motivated Rowe to propose a later origin for the empire. The chronicles that describe imperial origins through the heroic accounts of Pachacutic (or his father, Viracocha Inca) focus on supernatural forces instead of social power, also falling short of a convincing explanation. In recent decades, new archaeological data and a process-based reading of the chronicles have developed a more nuanced sense of the processes of Inca state formation and the development of the institutions and strategies that enabled rapid imperial expansion.

Multiple Inca dynastic narratives describe how the Incas came to dominate the Cuzco region during the three or four generations before the first imperial campaigns. By studying Inca state formation as a long-term process affecting the Cuzco Valley and neighboring areas, the documentary record can be studied alongside the regional archaeological database, which offers coarse-grained perspectives on settlement pattern changes before and after Inca conquest (Bauer & Covey 2002; Covey 2006b). The chronicles describe several important ways that Inca society changed in the generations leading up to territorial expansion beyond the Cuzco region. Among these are royal marriage alliances, intensification of agricultural production, and military conquest. Whereas the first three or four Incas took their principal wives from villages in the Cuzco Basin, the generations that followed made strategic alliances with groups living in the surrounding region. These marriages consolidated the labor tribute owed to the ruler and his wife (or wives), which royals invested in new agricultural canals and terraces that they passed on to their descendants. The earliest known royal estate resources are found in the Cuzco Basin, but military conquests in the surrounding region brought new development opportunities in the neighboring Vilcanota-Urubamba Valley, where at least six generations of Inca rulers established valley-bottom maize lands (Covey 2006b). The chronicles describe military engagements developing into logistically sophisticated campaigns that conquered multiple holdout communities and reduced them to tributary service.

The archaeological evidence from Late Intermediate Period Cuzco augments documentary perspectives on Inca social transformation. Pre-Inca settlement patterns include scattered high-elevation villages like those seen across most of the highlands from CE 1000 to 1400, especially to the north and south of the Cuzco Valley (Bauer 1992; Covey 2006b). The Inca impact on these regions varied. To the south, the royal celebration of the Pacarictambo origin myth led to the construction of a new installation at Maukallaqta, associated with the Poma Orqo rock outcrop and the places mentioned in the ancestral migration to

Cuzco. Despite the royal promotion of this new pilgrimage route, local settlement patterns remained largely unchanged, with existing villages simply connected by roads. In the Sacred Valley to the north of Cuzco, however, major resettlement occurred as the focus of population shifted from mountains and ridgetops to country palaces and scattered small settlements located around new valley-bottom fields built by royal lineages. Royal estate construction in the Sacred Valley began after the conquest of local populations, which is said to have occurred prior to the first imperial campaigns.

Contrasting with the highland pattern of decentralized and defensive settlement, the Cuzco Basin and areas to the east and west constitute an axis of large valley-bottom settlements located near fertile maize lands. Settlement in these areas was more nucleated and hierarchical, and presumably focused on surplus agricultural production on improved farmlands. The Inca impact across these areas was not uniform. Some areas show evidence of widespread site abandonment, such as the Maras area to the northwest of Cuzco, where the settlements of a significant Inca rival were replaced by facilities associated with royal estates. In other parts, such as the area around the town of Anta, where honorary Inca groups lived, large villages exhibit settlement continuity from the first millennium BCE through the Inca period. A third pattern of valley-bottom occupation involved resettlement of areas lying between Inca territory and the lands of powerful rivals, which were presumably too dangerous to occupy and farm during conflicts with neighboring groups. This has been observed in the Oropesa Basin to the southeast of Cuzco (Bauer & Covey 2002).

Future Directions

Together, the chronicles and archaeology describe Inca origins as a regional process that affected Cuzco's different groups to varying degrees. A centralized state government was established in the Cuzco Basin well over a century before the first imperial campaigns, and the combination of marriage alliances, military campaigns, royal intensification projects, and resettlement of local populations increased the population providing labor service to Inca rulers, while also honing military tactics and ideological justifications for conquest warfare and subsequent economic intensification. The final consolidation of Inca rule over the Cuzco region coincided with the first imperial campaigns around CE 1400.

Although much progress has been made toward reconciling the documentary and archaeological records from the Cuzco region, there are still important avenues for future research to clarify aspects of Inca origins. Cutting-edge climate science in the south-central Andean highlands is reconstructing the environmental conditions under which the maize-farming Incas expanded into the lands of their neighbors, and modeling settlement pattern shifts with changing environmental conditions is a significant interdisciplinary task that lies ahead. Archaeological data are scarce in the areas lying immediately beyond the Inca imperial heartland, making it difficult to reconstruct and date the degree to which the conquest of the Cuzco region corresponds to the timing of the first imperial expansion campaigns. Finally, there is much to be learned about daily life in the Cuzco region before and after Inca unification of the region, and more domestic excavations are necessary to understand the true impacts of Inca rule on everyday life.

Cross-References

- ▶ Landscape Archaeology
- ▶ Machu Picchu: Geography and Culture
- ▶ South American Rock Art

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India: Historical Archaeology

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Introduction

The roots of Indian historical archaeology rest in late eighteenth and early nineteenth century antiquarian research, a collaborative enterprise driven mostly by questions of historical interest for which archaeological evidence played an important role. The results of these investigations brought India's rich history, ancient and diverse literary traditions, and spectacular archaeological sites and monuments onto the world stage. They also gave India's colonial government its main rationale for direct involvement in archaeology and the creation of early national policies concerning archaeological sites and monuments.

India's archaeological horizons expanded considerably in the twentieth century as research revealed the temporal depth and richness of its past. By mid-century, the focus turned increasingly to work on questions of prehistory and protohistory, which now consume far greater attention and resources than historical archaeology. The latter subfield, however, will play a larger role in twenty-first century Indian archaeology as the nation addresses such issues as heritage conservation, tourism development, and identity in a rapidly changing and diverse country.

Indian historical archaeology today faces many of the same challenges as other countries. The sites and monuments that are the primary archaeological objects of its research are often either part of crowded urban landscapes; highly visible and, consequently, vulnerable features of the rural countryside; or are still in active daily use. As elsewhere too, these sites are being destroyed at a rapid rate (Fig. 1). On the historical research side of the picture, India shares with other former European colonies the problem that many primary documents relevant to historical archaeology do not reside there, but are in Europe, principally in British archives. The effects of these challenges are compounded by India's recent rapid economic growth, its significant urban and rural infrastructure problems, its complex central and state government bureaucracies, and its population density, which is growing at a rate that, if sustained, will result in India overtaking China as the world's most populous country by 2021.

India: Historical Archaeology, Fig. 1 The recent past is just as endangered as that which is thousands of years old. This unique early twentieth century roadside shrine, which has Mysore State constables for door guardians, is threatened by simple benign neglect and encroaching urban developments (Photo by Barry Lewis)

Definition

In common with most European countries, India takes a broad view of the domain of historical archaeology. As practiced, it is best defined as the study of that part of the archaeological record for which there exists contemporary documentary evidence. Such evidence spans most of the last 3,000 years (Chakrabarti 2006: 287, 315), but the boundary between Indian history and prehistory is a fuzzy one.

Elsewhere, notably in parts of the Americas and Australia, the term "historical archaeology" is increasingly associated with the period of European colonial expansion, or roughly the past 500 years (Orser 1996: 23-8). While India has much to contribute to the latter research, this represents only one theme in a large and more complex research field (Fig. 2).

Historical Background

Late eighteenth and early nineteenth century antiquarians in India were committed to the Enlightenment belief in the interpretive value of reason as the primary means to understand the order of a knowable world. And there was plenty to know in India, for ruined cities, ancient monuments, art, undecipherable inscriptions, epic poems, and diverse literary traditions in a host of languages seemed to present themselves at every turn. Challenged by the evidence of India's past, these early scholars sought to construct an understanding of Indian history that mapped ancient texts and other documentary evidence onto the archaeological record (Chakrabarti 2010: 4-5, 9).

Questions about India's past attracted little government interest and support, except in such specialized areas as legal systems and land tenures. Antiquarian research was centered in a few scholarly organizations, the most famous of which was the Asiatic Society of Bengal, which formed in early 1784 under the leadership of William Jones. In South India, the less formally organized, but productive research of Indian and European philologists and antiquarians such as Colin Mackenzie and other members of the "Madras School of Orientalism," turned equally fertile ground (Trautmann 2009).

Brilliant and committed though the antiquarians were, their work did not directly result in the creation of a distinct scholarly discipline of archaeology. They lacked a clear understanding of how old the "past" may be, practical methods that would enable them to reconstruct the past from archaeological evidence and relate it to the relevant documentary evidence, and essential concepts of time, space, and culture upon which to build basic interpretive frameworks for this past.

The creation of the Archaeological Survey of India (ASI) in the early 1860s marked the beginning of direct government involvement in

India: Historical Archaeology, Fig. 2 In rural India, the material remains of the past weave in and out of the present. This isolated tree and the carved stones placed against its trunk are a modern Naga shrine, which was created with *nagakal* (snake stones) recycled from an old shrine (Photo by Barry Lewis)

archaeology, the first professional archaeologists, and the first steps toward a national policy concerning historical sites and monuments. Most research continued to emphasize historical questions, but archaeology's role was typically as a "handmaiden to history" (Trautmann & Sinopoli 2002: 499, 501), which often amounted to little more than illustrating history books with interesting photographs, drawings, and descriptive details.

The first half of the twentieth century was a high water mark for the ASI and for Indian archaeology generally. ASI announcement in 1924 of the discovery of the Indus civilization astounded the archaeological world and pushed back the dating of the emergence of urban society by several millennia. Although the nature and complexity of Indus society continues to be the object of considerable discussion, the discovery ensured that Indian archaeology had a seat at the table of international inquiry into the origins of civilization (Paddayya 2002: 143). It also pulled resources away from research on the historical periods and contributed in some respect to the growing sentiment of Indian nationalism and the push for independence.

Archaeology in the mid-twentieth century turned increasingly to research on protohistory and prehistory, sometimes to the near exclusion of questions of historical interest (Chakrabarti 2003: 1, 9). The focus shifted again in the late twentieth century when renewed interest in historical archaeology began to develop and expand its role as an active partner in the construction of historical perspectives (Trautmann & Sinopoli 2002: 517-8). This trend has opened a continuing dialogue as archaeologists, historians, politicians, and the public alike address fundamental questions such as who owns the past, the role of the past in modern identity politics, the public representation of the past in everything from heritage sites to school textbooks, and what should be national priorities and policies for the conservation of the archaeological record in a rapidly changing country.

Key Issues/Current Debates

India faces several challenges that have significant implications for historical archaeology, if not the entire discipline. These challenges include the impact of modern political agendas and religious fundamentalism on historical archaeology, the need for strong professional archaeological leadership, and the development of a sense of shared stewardship for India's past. Each challenge is considered briefly in turn, below.

Indo-Aryan Debate

Discovery of the Indus civilization had a strong impact on Indian national identity. The effects of this discovery were so great that, following Independence in 1947, when the most famous Indus sites became part of the new nation of Pakistan, Indian archaeologists launched major research efforts to discover comparable sites within the redefined boundaries of India (Chakrabarti 2003: 1; Rajeeve 2006). Fortunately, while it was an instance of archaeological research motivated mostly by national pride, it was also quite productive.

Recent examples of the sociopolitics of Indian archaeology have not been so simple or easy to work through. Current hot button issues include the language of the Indus script, the "Aryan Migration," the relationship between the Indus civilization and the Vedas, and the interpretive value of India's most ancient writings as historical texts.

Strictly speaking, the Indus civilization does not fall within the purview of historical archaeology. Although authorities generally agree that it was a literate society, its script is undeciphered and may remain undecipherable given the few data at hand. Nevertheless, the many attempts made to read the Indus script have also fed a long-standing controversy about the origins of Indian civilization, whether it was a largely indigenous development or one that can be explained by the migrations of Indo-European speakers (the so-called Aryans) into the subcontinent (Trautmann 2005; Chakrabarti 2008). DNA evidence, which could potentially clarify the issue, has, thus far, proved to be equivocal.

The debate is further complicated by controversy that surrounds the possible relationship between the Indus civilization and ancient texts called the Vedas. Did the Indus civilization rise and fall before the Vedas, or was it the Vedic civilization (Trautmann 2005: xxxvi)? And, do the ancient texts possess interpretive value? Scholarly opinions of the value of the Vedas as historical texts range from positive to nil. Answers to these questions have implications for major issues in national politics, religion, and Indian identity (Chakrabarti 2008). They have even spilled over into heated controversies about how such topics are treated in school textbooks (Viswesvaran et al. 2009). These issues have no easy resolution, and historical archaeology is caught in the middle of the debate.

Archaeological Leadership and the ASI

The Archaeological Survey of India (ASI) celebrated its 150th year of operation throughout 2012. The ASI is India's key archaeological institution and one of the world's largest archaeological agencies. Founded in 1861, its government mandate and budget place the ASI at the center of Indian archaeology. Most states have archaeology departments, but their budgets, staff training, and priorities vary greatly within the limits set by state antiquities and monument legislation and appropriations. At least 25 universities also have archaeology programs, often as part of history departments. While some of these programs, such as that at Deccan College, enjoy international research reputations, others lack the support necessary to maintain active fieldwork (Chakrabarti 2006: 510-3).

ASI leadership, which should be of the highest quality, faltered over the past couple of decades (Lahiri et al. 2002). No single reason adequately explains the lapse. For more than 12 years, the ASI director general, who reports to the Ministry of Culture, was not an archaeologist, but a career civil servant deputed from the ranks of the Indian Administrative Service. Many ASI staff and line positions went unfilled. Few excavations and other research were published. The ASI handling of the Ayodhya controversy, the flashpoint of which was the destruction of a sixteenth century mosque by a mob in 1992, also left it open to criticism at several levels (Guha 2005; Chadha 2010: 230-1).

The ASI is working to reclaim its former leadership role. The current ASI director general is a qualified professional archaeologist, and recent changes in the upper echelon of the organization ensure that qualified candidates can now realistically aspire to the top ASI post. Moribund publications such as *Ancient India* and *Epigraphia India* have been relaunched, and the entire run of the journal *Indian archaeology – a review* has

India: Historical Archaeology, Fig. 3 Political party slogans and other graffiti deface a late medieval fort gateway at Mudgal in northern Karnataka. Cultural heritage education in the schools may help to curtail such vandalism by instilling in students a conservation ethic and a sense of stewardship of the past (Photo by Barry Lewis)

been placed online. The ASI website has become a useful and frequently updated information source, and the various ASI circles, or regional divisions, have implemented their own websites. ASI-administered financial assistance to state archaeology departments and universities was announced in late 2011 by the Ministry of Culture, which also proposed to create archaeological fellowships for young scholars.

Heritage and the Commitment to Stewardship

India needs a comprehensive, feasible national policy for the care of its cultural heritage, one that encourages the development of a widely shared sense of stewardship of the past (Fig. 3). Its rapidly growing population and the attendant sprawl of cities and towns, industrial development, and even changes in agricultural technology are destroying archaeological sites in every part of India. It is unquestionably true that the prosperity and well-being of today's India is of far greater concern than the care of its ancient sites, but, while it is easy to concede this point, it is equally clear that the destruction of the nation's cultural heritage must be controlled as much as possible for the public good and for the understanding of India's past by future generations.

On the legislative side, the Indian government recently took several measures to support heritage conservation. Several new initiatives encourage active cooperation between the ASI, state archaeology departments, universities, and nongovernmental organizations like the Indian National Trust for Art and Cultural Heritage (INTACH). Government also announced the creation of a National Mission on Monuments and Antiquities in 2007. Its mandate is to construct a cultural heritage database of sites, monuments, antiquities, and art treasures and actively promote a national awareness of India's cultural heritage (Fig. 4). In 2010, a major amendment to The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act of 1958 created the National Monuments Authority, which adds teeth to existing legislation that protects the immediate vicinity of national monuments and sites from unauthorized encroachments.

More than anything else, education will help to ensure that citizens become proactive stewards of the past for the sake of future generations. Promotion of a conservation ethic and pride in India's diverse cultural heritage in the classroom, a concerted effort by archaeologists to communicate what they do to local audiences and in local

India: Historical Archaeology, Fig. 4 Remains of the tomb or *samadhi* of an early Chitradurga king rest largely forgotten in the middle of a cultivated field. Like hundreds of thousands of sites, it has yet to be documented in state or national databases (Photo by Barry Lewis)

languages, prompt publication of research, encouraging the awareness of regional heritage priorities, and programs among local bodies such as village panchayats – all of these activities can make a difference.

International Perspectives

Archaeology was a European invention in India (Paddayya 2002: 119), and there is a long tradition of international collaboration, research funding, and training. In the best examples of international participation, such as the interdisciplinary project centered for more than 20 years around the ruins of the late medieval city of Vijayanagara (Fig. 5), the nation, its citizens, the historical and archaeological resources, and world archaeology derive considerable benefit from the relationship (Trautmann & Sinopoli 2002: 513-5). Regrettably, there are also counter-examples of international collaboration, which generate hard feelings in a country where the inequities of colonialism are still part of living memory (e.g., Chakrabarti 2003).

The future of international involvement in Indian archaeology clearly depends on the forging of long-standing research commitments in which Indian scholars are engaged in full collaborative partnership and where the international team brings skills, technology, or perspectives that are not readily available within India itself. While the *information* about India's past (about every country's past) may be said to belong to the world, Indian scholars must remain the primary creators of this information.

Future Directions

After decades in which prehistory and protohistory dominated Indian archaeology, historical archaeology is again emerging as an important research focus. However, its proper domain is now considered to be much broader than the fabled cities, palaces, and dynastic histories that interested the antiquarians of two centuries ago (Settar & Korisettar 2002: xvi). The breadth of current research responds in part to the widely perceived need for perspectives of the past that speak equally to every Indian without prejudice, rancor, or disrespect. It is only then that researchers can expect the public to fully appreciate their cultural heritage, the value of archaeology, and why archaeology may deserve their support (Fig. 6).

Historical Evidence Is More than Texts

Indian history is based mostly on the authority of sources such as ancient texts, dynastic lists,

India: Historical Archaeology, Fig. 5 Kota Shankara gateway at Vijayanagara, Bellary district, Karnataka. An ASI protected monument and UNESCO World Heritage site, the central core of Vijayanagara covers more than 25 km^2; archaeologists estimate that its fortified "metropolitan region" is roughly 600 km^2. Immense archaeological sites like Vijayanagara pose extraordinary heritage conservation challenges (Photo by Barry Lewis)

inscriptions, coins, and the like (Chakrabarti 2010: 1-3). Historical archaeology's often-mentioned "handmaiden" role in the construction of history is due in no small part to its ready acceptance that this is the best part that archaeology can play (Ray & Sinopoli 2004). These constraints are largely self-imposed.

There are good reasons to cast widely for new types of sources that meet the criteria of valid and reliable primary evidence. For example, among nonliterary textual sources for precolonial and colonial India, historical archaeologists may find much of research value in relatively unexplored village-level records such as the *kaditas* or "black books" of the South (Hatti & Heimann 1991), *khanasumari* or house census records (Peabody 2001), and the archives of monasteries and *mathas*. Even the ocean floor is yielding valuable historical archaeological evidence as researchers investigate maritime and drowned terrestrial sites along India's thousands of kilometers of coastline (Gaur &Vora 2011).

Among other major sources that most researchers have yet to tap, historical cartography and high-resolution digital aerial imagery of India's landscape hold extraordinary promise for historical archaeology. As recent as the 1990s, it was hard to acquire aerial imagery in India, and inexpensive global positioning system (GPS) devices were no more accurate and precise than within tens of meters. Now, Google Earth and other spatial websites can show detailed images of most places on Earth at the expense of a few mouse clicks, and readily available GPS technology offers submeter accuracy. For those archaeologists who master the necessary technical geographic information systems (GIS) skills or whose research budgets can afford to pay for this expertise, a whole new world of historical archaeological spatial studies lies at their feet.

For their part, historians also have an important part to play in the creation of archaeological evidence. Harding's (1997–1999) exhaustive study of East India Company smallarms is a good example of historical research that has significant archaeological implications. By limiting his research to firearms, a category of material culture that played an important role in the establishment of British hegemony in India and elsewhere, Harding succeeds in placing it into social, political, and technological context in a way that earlier researchers could only imagine. Now, archaeologists and historians alike, when they walk the field at Assaye or the fort walls at

India: Historical Archaeology, Fig. 6 A "hero stone" or *virakallu* that vandals uprooted and left abandoned among the ruins of a fourteenth century fort. It may eventually find its way into a local museum or collection or enter the pipeline that feeds the world market of stolen antiquities (Photo by Barry Lewis)

Srirangapatna, have a much more robust basis with which to evaluate the documented contribution made by infantry to these battles.

Historical Archaeology and the Rules of Evidence

Historical archaeology often gets little respect among historians, and even among some archaeologists, partly because its results sometime merely reaffirm that which we felt we already knew, and partly because these results often appear to be only weakly supported by convincing evidence that permits no other interpretation.

In historical archaeology, as in every research field, the power of an explanation, interpretation, or claim rests on the quality of the evidence that supports it. Many historians everywhere take a skeptical view of archaeological interpretations because they often appear to be based on little more than conjecture and personal bias (Henige 2005). This view can change only when it is standard practice for historical archaeologists to demonstrate unequivocally the validity and reliability of their research results. Each claim must meet the rules of evidence of both history and archaeology; such rules are not trivial, nor do they vary with the race, ethnicity, religion, gender, or political views of the researcher. If an interpretation fails to meet the rules of evidence, then it must be discarded. There is no middle ground.

These comments about the rules of evidence are particularly relevant to the situation of historical archaeology in India today (e.g., Guha 2005). Is archaeological evidence to be determined by political or religious ideologies or by the same standards and conventions that scholars demand of each other in the rest of the world? The answer will determine much of the future of Indian historical archaeology.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Archival Research and Historical Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Historical Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ Nationalism and Archaeology
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Indian Ocean: Maritime Archaeology

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Introduction

The Indian Ocean is the Earth's third largest oceanic division and covers approximately 20 % of its surface, with an estimated area of 28,350,000 mile^2 (73,427,795 km^2). It is bounded by three continents – Asia to the north, Africa to the west, and Australia to the east – and shares its southern boundary with the Southern Ocean and Antarctica (Fig. 1). At its widest point, the Indian Ocean extends nearly 6,200 miles (9,977 km) between the southern tips of Australia and Africa. Small islands dot the Indian Ocean's continental rims, and several island nations, including Madagascar, Sri Lanka, and Mauritius, as well as the Maldives, Seychelles, Comoros, and Indonesian archipelagos, either border or are included within its waters. The Red Sea and Persian Gulf are both considered extensions of the Indian Ocean.

All of the world's earliest civilizations, including those in Mesopotamia, ancient Egypt, and the Indian subcontinent, developed around the Indian Ocean. Its waters are considerably calmer than those of both the Atlantic and Pacific Oceans, and characterized by powerful monsoons with prevailing winds that undergo predictable alternating seasonal shifts. As a consequence, the Indian Ocean hosted some of the world's first maritime trade networks, including those that developed between Mesopotamia and the Indus Valley c. 2500 BCE. Over the course of subsequent centuries, vessels embarked from ports in such diverse locales as Greece, Egypt, India, Persia, Indonesia, China, Portugal, the Netherlands, France, and Great Britain to engage in voyages of commerce, exploration, colonization, and warfare throughout its vast waters (Rais 1986: 13-36). Evidence of these and other cultures, and their interactions with one another and the larger Indian Ocean maritime landscape, are represented by a wide array of cultural heritage, including shipwrecks, submerged settlements, inundated landscapes, and abandoned infrastructure.

Definition

Keith Muckelroy (1978) originally defined the discipline of maritime archaeology as "the scientific study of the material remains of man and his activities on the sea." This has subsequently been expanded and refined to include "human interaction with the sea, lakes, and rivers through the archaeological study of material manifestations of maritime culture" (Delgado 1997: 259). Using these explanations as a benchmark, maritime archaeology in the Indian Ocean may be regarded as the efforts of individuals and organizations to conduct scientific investigation of the material remnants of the Indian Ocean's maritime past, including – but not limited to – evidence of trade, commerce, exchange, conflict, water transport technology, seafaring, coastal settlement, port and harbor infrastructure, and inundated landscapes.

Historical Background

At present, maritime archaeological studies have either occurred, or are ongoing, within Indian

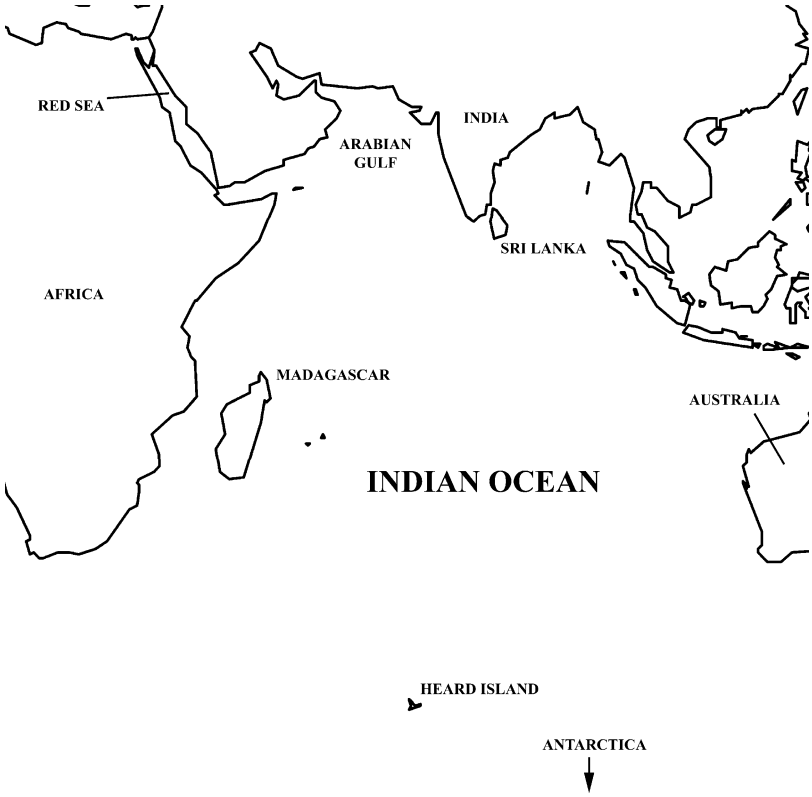

Indian Ocean: Maritime Archaeology, Fig. 1 Map of the Indian Ocean, showing its geographical boundaries (author)

Ocean waters or coastal zones in the following places: Australia, Heard Island, India, Sri Lanka, Yemen, Egypt, Sudan, Eritrea, Kenya, Tanzania, the Seychelles, Mozambique, Madagascar, Mauritius, and South Africa. This number represents only 15 of the 44 nations and territories that share one or more coastlines with the Indian Ocean, and a very small overall percentage of the potential archaeological sites that are believed to exist within the oceanic division as a whole. Nonetheless, the discipline has clearly undergone significant expansion and development in the region over the past four decades, as evidenced by the research projects outlined below.

Australia and the Australian Antarctic Territory

Maritime archaeology in the Indian Ocean has its roots in the 1963 discovery of the shipwrecked United Dutch East India Company (VOC) vessels *Batavia* (1629) and *Vergulde Draeck* (1656) by recreational divers in waters of the Australian state of Western Australia. In the wake of extensive looting of cultural material from these sites, the finders of *Vergulde Draeck* transferred ownership of the wreck to the Western Australian Museum (WAM), which in turn pressed for protective legislation of all historic shipwrecks within the state's waters. Significantly, this action led to the development of a research-based maritime archaeology program at WAM, as well as federal legislation (the *Historic Shipwrecks Act* 1976) intended to protect historic shipwreck sites throughout Australia. Since the early 1970s, WAM researchers have conducted maritime archaeological investigations within coastal and offshore waters bordering Western Australia, and have assisted other Indian Ocean nations with the development and expansion of their own maritime archaeology programs and research (Staniforth 2011: 562-4, 576).

In the 1980s, a series of archaeological surveys were initiated at Heard Island, located

Indian Ocean: Maritime Archaeology, Fig. 2 Trypots and tryworks associated with sealing activities at Heard Island between 1854 and 1877 (Image courtesy Eric J. Woehler, University of Tasmania)

within the sub-Antarctic region of the southwest Indian Ocean. Managed as part of the Australian Antarctic Territory, the island enjoys UNESCO World Heritage status and features a wide array of maritime heritage associated with sealing activities that occurred there between 1854 and 1877 (Fig. 2). Systematic investigation of these sites continued into the mid-2000s and included in situ documentation of artifact scatters, building foundations, tryworks, and a sealer's cemetery (Woehler 2004).

India

The emergence of maritime archaeology in India began with efforts to locate submerged elements of the ancient city of Dwarka in the late 1970s. Discovery of port infrastructure and several large stone anchors in the zone immediately offshore of the site's terrestrial components prompted a comprehensive investigation of these and other underwater features. It also served as a catalyst for the establishment of India's Marine Archaeology Centre (MAC) within the National Institute of Oceanography in 1981. In subsequent years, two other maritime archaeology centers were established at Tamil University and Andhra University, and an Underwater Archaeology Wing was created within India's national archaeology institute, the Archaeological Survey of India (Tripati et al. 2004).

Since the 1980s, maritime archaeological surveys and excavations have focused on several locations dotting India's coast, including Poompuhar and Mahabalipuram. These sites include the remnants of ancient submerged ports established during India's early Christian era (seventh and eighth century CE). Features encountered at Poompuhar in both the intertidal and immediate offshore zones include remnants of brick structures, terracotta ring wells, and ceramics. Investigations at Mahabalipuram have revealed substantial submerged structural remains, including a portion of collapsed wall, dressed stone blocks, and an architectural assembly comprising steps and an associated platform (Sundaresh & Gaur 2011). These features may be associated with ornately carved stone temples reportedly observed near Mahabalipuram's shoreline by the first Europeans to travel to the region. Today, only one of the "Seven Pagodas" remains and was declared a UNESCO World Heritage Site in 1984. If their identity is confirmed, submerged elements of the site would be conferred the same

Indian Ocean: Maritime Archaeology, Fig. 3 Fragments of Chinese porcelain recovered from the seventeenth-century shipwreck site at Sunchi Reef, India (Image courtesy of Sila Tripati, Marine Archaeology Centre, National Institute of Oceanography)

status and degree of protection as their terrestrial counterparts, which would make Mahabalipuram the world's first – and currently only – World Heritage Site to specifically include underwater cultural heritage.

Historic shipwrecks have also been a focus of Indian maritime archaeology, and include efforts to identify and assess a number of wreck sites within the waters surrounding the historic port city of Goa (Tripati 2011). One of the more notable examples was discovered during a survey of Sunchi Reef, near the entrance to Goa Harbour. Archaeologists affiliated with MAC encountered the remains of a wooden-hulled vessel containing a variety of artifacts, including firearms, cannons, Chinese ceramics, and elephant tusks. Analysis of these items indicates the site represents an early seventeenth-century ship engaged in Indo-Portuguese trade and commerce (Fig. 3).

Sri Lanka

The 1963 discovery of an early eighteenth-century shipwreck at Great Basses Reef near Galle on the southwest coast of Sri Lanka was perhaps the first instance in which that nation's potential underwater cultural heritage was considered or even acknowledged; however, it was not until the early 1990s that the Sri Lankan government undertook an initiative to develop a program in maritime archaeology. With the advice and assistance of staff affiliated with WAM, a series of archaeological investigations have been carried out in Galle Harbour since 1992. These efforts resulted in the discovery, assessment, and identification of a wide range of maritime heritage sites, including Indo-Arabian stone anchors, the seventeenth-century VOC shipwrecks *Avondster* and *Hercules*, and wrecks of a number of nineteenth-century iron steamships (Anderson et al. 2007).

In an effort to extend Sri Lanka's maritime cultural heritage management capacity, a national Maritime Archaeology Unit (MAU) was established in 2001. Its first major initiative was to excavate *Avondster*, as portions of the site were increasingly exposed and vulnerable to a variety of potentially destructive site formation processes. Between 2001 and 2004, MAU excavated sections of the vessel, surveyed and recorded its exposed remains, conserved collected artifacts, and prepared the latter items for display at the National Maritime Museum in Galle. The *Avondster* Project also served as a training program for MAU staff members, who received instruction in maritime archaeological methods and artifact conservation from experts affiliated with WAM, the Amsterdam Historical Museum, University of Amsterdam, James Cook University, and the Mexican Institute of Anthropology and History (Parthesius et al. 2005).

The Western Indian Ocean and Red Sea

In the Western Indian Ocean, the earliest systematic archaeological investigation of an underwater site is that of *Santo António de Tanná* (commonly referred to as the 'Mombasa Wreck'), a Portuguese frigate that sank while assisting in the defense of Fort Jesus, Mombasa Island (Kenya), in 1697. Recreational divers discovered the wreck in the 1960s, recovered a handful of artifacts, and brought them to the attention of the Fort Jesus Museum (FJM). An exploratory investigation of the site was organized by FJM in 1970, and artifacts recovered during this project confirmed its identity. In 1976, FJM requested assistance from the Institute of Nautical Archaeology (INA) at Texas A&M University to conduct a more comprehensive visual survey and assessment of the wreck. The results of this project, coupled with the significance of the material culture recovered during the 1970 investigation, motivated the National Museums of Kenya (NMK) to pursue further survey and excavation of the site. At NMK's urging, *Santo António de Tanná* was the subject of four seasons of field research organized by INA between 1977 and 1980. A conservation laboratory was established at FJM to treat over 6,000 finds recovered from the wreck site, and remains the only facility of its kind in East Africa (Piercy 2005; Lane 2012: 10-4).

In the same year *Santo António de Tanná* was identified, WAM maritime archaeologists conducted a survey of the remnants of an early European shipwreck at Boudeuse, a low-lying cay near Admiral Island in the Seychelles. Fishermen located the site in the early 1970s, and by the time it was archaeologically surveyed, it had been subjected to extensive salvage that severely damaged its remaining hull structure and resulted in the recovery of at least 30 cannon and other artifacts, the majority of which have ended up in private collections. Despite these issues, enough evidence was collected to tentatively identify the wreck as *Santo António*, a Portuguese *nau* lost in 1589 (Lane 2012: 16).

For much of the 1980s, maritime archaeology in the Western Indian Ocean effectively ground to a halt; however, interest in the region and its underwater cultural heritage revived as a consequence of projects undertaken by organizations in Europe and the United States, as well as local institutions (Lane 2012: 31). In 1987, archaeologists affiliated with the French Department of Marine Archaeological Research located remnants of *Sussex*, a British East India Company vessel that sank near Bassas d'India in the Mozambique Channel in 1738. Subsequent investigations at the site resulted in the recovery of portions of the ship's Chinese porcelain cargo and other artifacts, while a survey of the surrounding reef led to the discovery of a cannon and two anchors that may be associated with *Santiago*, a Portuguese carrack lost at Bassas d'India in 1585 (Lane 2012: 19).

In 1990, scientists conducting a marine biology survey in Tanzania's Mafia Archipelago relocated an historic shipwreck that had been discovered by recreational divers near Juani Island in 1977. Among the many objects associated with the site were ten bronze cannons, three anchors, and a bronze bell bearing the inscription "H. . .&B H Co. 180_." Although now located within the boundaries of Mafia Marine Park, the shipwreck is yet to be comprehensively surveyed and identified (Lane 2012: 16).

Recreational divers were also responsible for the 1995 discovery of a shipwreck at Black Assarca Island off the coast of Eritrea. The mound of amphorae and scattered ceramics that comprise the site were investigated by INA in 1997, with support from the Eritrean Ministry of Marine Resources and the British Institute in Eastern Africa (BIEA). Based on comparison of the wreck site's ceramic assemblage with comparable pottery from terrestrial sites in Eritrea, Ethiopia, and Egypt, it has been tentatively dated to between the fifth and seventh centuries CE (Pedersen 2008; Lane 2012: 15).

INA archaeologists were also instrumental in the investigation of an Ottoman period shipwreck near Sadana Island, located along the Egyptian Red Sea coast. Excavations at the site between 1994 and 1998 resulted in the recovery of over 3,500 artifacts, one-third of which comprised Qing dynasty porcelain intended for the Middle Eastern market. The wreck's surviving hull

remains are indicative of a large, three-decked vessel of Muslim ownership and likely Egyptian origin. In many respects, the Sadana Island site compares favorably to another shipwreck excavated near Sharm el-Sheikh in the early 1970s (Blue 2011: 504-5).

Between 1996 and 1999, a series of preliminary shipwreck surveys were initiated in the waters surrounding Ilha de Moçambique, a UNESCO World Heritage Site that was settled by Swahili peoples from the beginning of the first millennium CE until the late fourteenth century, after which it functioned as a shipbuilding center, trading port, and naval base for the Portuguese until the 1800s. Archaeologists affiliated with Eduardo Mondlane University organized and initiated the project with support from Brown University and the U.S. National Park Service. A number of historic shipwreck and other submerged sites were discovered as a consequence of these efforts (Lane 2012: 16-7).

In the early 2000s, maritime archaeology in Kenya was revived in a series of research projects undertaken by the University of Ulster's Centre for Maritime Archaeology (CMA) in collaboration with the NMK's Coastal Archaeology Unit, Tanzania's Department of Antiquities, the National Corporation of Antiquities and Museums of Sudan, University of Khartoum's Department of Archaeology, and the BIEA. The first of these involved systematic surveys of Mombasa Island and Harbor utilizing an integrated, interdisciplinary maritime landscape approach. Subsequent investigations included a marine geophysical survey of the Zanzibar Channel off Tanzania, and maritime landscape-based investigations of the medieval town and port of Suakin on Sudan's Red Sea coast (Breen & Lane 2003; Lane 2012: 27-8).

Excavations at Myos Hormos and Berenice (Islamic *Queseir al-Qadim* and *Medinet-el Haras*, respectively) on the Egyptian Red Sea coast have provided valuable insight into harbors and their role in the facilitation and development of maritime commerce between Roman Egypt and trading centers in Arabia and India. Features encountered at Myos Hormos include part of a late first century BCE to early third-century CE Roman waterfront, jettisoned first-century CE amphorae near the entrance to the harbor, and a late first-century BCE or early first-century CE wharf or jetty comprised of numerous amphorae arranged in rows and buried beneath a packed earth surface. Functionally similar structures encountered at Berenice that comprise several large, linear coral blocks have been interpreted as seawalls or quays. These would have been used as moorings for vessels visiting the harbor and were constructed during the first and fifth centuries CE (Blue 2011: 499-500).

Recent archaeological investigations on Eritrea's Buri Peninsula have resulted in evidence for early human activity and adaptation in coastal environments. For example, at Abdur on the eastern side of the Gulf of Zula, Paleolithic handaxes and other stone artifacts dating to the Middle Stone Age were discovered in association with discarded marine mollusks and crustaceans – some of which appear to have been harvested and processed on site. Subsequent excavations at Asfet, Gelalo, and Misse East in 2005 and 2006 revealed early-middle Holocene occupations characterized by Later Stone Age artifacts discovered in association with marine shell. Taken as a whole, these studies provide evidence of early human exploitation of marine food resources, as well as some of the earliest coastal migrations of humans out of Africa (Beyin 2011; Blue 2011: 497).

Madagascar has hosted two maritime archaeology projects in recent years. The first, conducted in conjunction with terrestrial-based research that addressed the island's eighteenth-century Antandroy Kingdom, resulted in the discovery of four cannons and an anchor in shallow waters near Belitsaky on the southern coast. These objects are believed to represent *Degrave*, a British vessel that wrecked in 1703. In 1999, the wreck of a wooden vessel believed to be HMS *Serapis*, a British warship captured by American naval commander John Paul Jones during the American Revolution, was located at Île Sainte Marie. A team comprising American maritime archaeologists and researchers at the University of Madagascar conducted an excavation at the site in 2004 (Fig. 4); material culture recovered during these investigations was analyzed and conserved at the University of

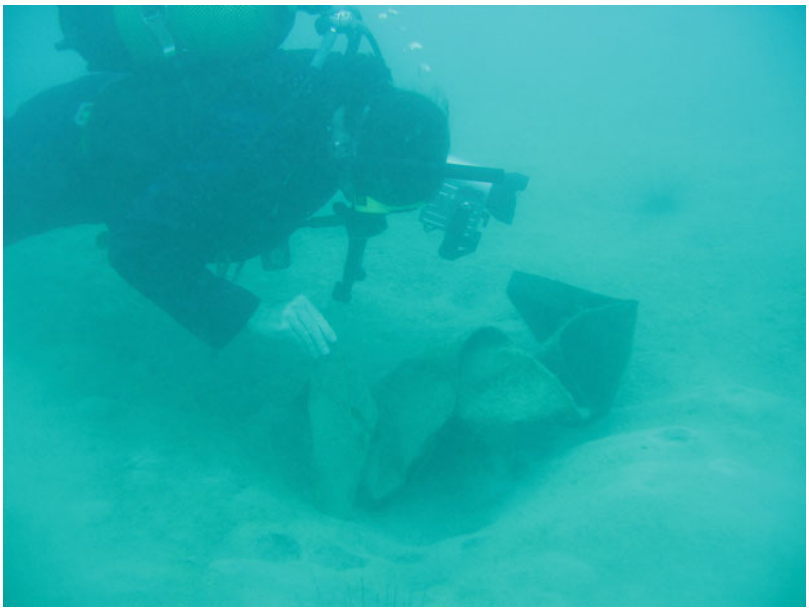

Indian Ocean: Maritime Archaeology, Fig. 4 A maritime archaeologist inspects a section of copper hull sheathing associated with the suspected HMS *Serapis* shipwreck site in Madagascar (Image courtesy of Michael Tuttle, Serapis Project)

Antananarivo's Museum of Art and Civilization (Lane 2012: 20-1).

Between 2006 and 2008, researchers affiliated with the French not-for-profit organization Groupe de Recherche en Archéologie Navale located and investigated *L'Utile*, a ship owned by France's *Compagnies des Indes Orientales* that wrecked near Tromelin Island in 1761 while en route from Madagascar to Mauritius. The project was part of a broader UNESCO initiative to research the history of slavery in the Western Indian Ocean. Remnants of the wreck site comprised a widely scattered artifact assemblage, including iron cannons and anchors. In conjunction with the shipwreck survey, excavations were conducted on Tromelin Island in an effort to locate *L'Utile*'s survivors' camp (Marriner et al. 2010; Lane 2012: 20).

South Africa

Maritime archaeology has existed as a discipline in South Africa since the late 1980s; however, most research until very recently has focused on historic shipwrecks. While the vast majority of these studies have been restricted to the waters around Cape Town and along the nation's Atlantic (west) coast, a handful of wreck sites have been investigated in coastal areas that border the Indian Ocean. These include the British East India Company vessel *Arniston* (1815) and Royal Netherlands Navy ship *Amsterdam* (1817), lost on the south coast near Waenhuiskrans and at Algoa Bay, respectively. Remains of the Dutch warship *Bato* (1806) and British vessel *Brunswick* (1805) have been located and investigated at False Bay, as has an as-yet unidentified nineteenth-century wreck site embedded in the beach at Plettenberg Bay (Werz 2011: 482).

Recent investigations at a handful of locations along South Africa's southern coast have expanded maritime archaeology's application and capacity to answer questions about the nation's earliest inhabitants. These sites comprise large shell middens associated with Middle to Late Stone Age occupations. Significantly, their material culture assemblages have provided evidence of shellfish extraction and use as an important subsistence and tool manufacturing strategy among pre-farming communities (Steele & Klein 2008; Lane 2012: 33).

Key Issues/Current Debates

Perhaps the most imminent issue currently confronting maritime archaeology in the Indian

Ocean is the threat posed by commercial salvors to historic shipwreck sites within its waters. As noted previously, damage to the region's underwater cultural heritage at the hands of both recreational divers and treasure hunting concerns is by no means a recent phenomenon, and in many countries served as the catalyst for the creation of viable maritime archaeology projects and/or programs. In some locales, promotion of maritime archaeology and research-based initiatives has led to the complete, or near-complete, eradication of commercial activities.

Other nations, by contrast, have followed a very different path. One notable example is Mozambique, where a Portuguese salvage company has entered into an exclusive agreement with the nation's Ministry of Culture to conduct surveys and excavations of shipwreck sites around Ilha de Moçambique and along the adjacent mainland coast. Despite claiming to be a legitimate archaeological research organization, the company has insufficiently published results of its findings, limited access by other researchers to the sites it has investigated, and engaged in the sale of recovered artifacts (Lane 2012: 17-9). In addition, the scope of "research" it has carried out appears to be limited to European vessels that carried valuable commodities, and many of the sites it has salvaged have been abandoned without follow-up efforts at stabilization or preservation.

Another major issue facing maritime archaeology in the Indian Ocean has been the failure of all but one nation in the region to accept or ratify the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage* (CPUCH). The lone exception, the Islamic Republic of Iran, has not yet conducted maritime archaeological research in the Persian Gulf, although a 2007 collaborative project between Iranian and British archaeologists to investigate submerged portions of the sixth-century CE Wall of Tammishe in the Caspian Sea holds promise for similar projects elsewhere in Iranian waters (Rekavandi et al. 2008). There is a clear need among Indian Ocean nations to revise their existing heritage legislation and/or adopt CPUCH. Doing so could enable each country in the region to create and/or develop its own maritime archaeology capacity, confront existing and emerging threats to its maritime heritage, and provide a framework for regional and international collaboration among relevant governmental agencies and research institutions.

Potential threats to the Indian Ocean's maritime heritage from significant seismic events and other natural phenomena, while infrequent, are nonetheless a very real concern and warrant brief mention here. In December 2004, an earthquake-generated tsunami that originated in Indonesia devastated coastal areas in several Indian Ocean nations. Among those affected was Sri Lanka's MAU, which lost its office and conservation facilities, equipment, archived site data, and numerous artifacts – including several conserved examples from *Avondster* that were being prepared for exhibition. Thankfully, no fatalities occurred among MAU staff and volunteers, and the unit's functional capacity was restored in a relatively short amount of time.

International Perspectives

As the birthplace of maritime archaeology in the Indian Ocean, Australia has assumed a leading role in promoting the discipline's development throughout the region. Australian maritime archaeologists conducted one of the first shipwreck investigations in East African waters, were instrumental in the establishment of Sri Lanka's MAU and Galle Harbour's maritime heritage survey, and provided assistance to the Sri Lankans in the wake of the 2004 tsunami. Heritage legislation created in Australia for the protection of historic shipwrecks and other maritime archaeological sites has in some cases provided a model for similar laws enacted in Indian Ocean nations. Similarly, Australian maritime archaeologists have advised their regional colleagues in the development and application of maritime heritage guidelines and statutes.

In 2009, the Maritime Archaeology Program at Flinders University in South Australia hosted an Australian Leadership Awards fellowship program that instructed practicing archaeologists

Indian Ocean: Maritime Archaeology, Fig. 5 Members of the 2009 Australian Leadership Awards fellowship program in maritime archaeology and underwater cultural heritage management participate in a magnetometer survey training exercise at Sceale Bay, South Australia (Image courtesy of the Maritime Archaeology Program, Flinders University)

from the Asia-Pacific region in underwater cultural heritage legislation and management and maritime archaeology field methods (Fig. 5). Included among the participants were individuals from three nations – Sri Lanka, Indonesia and Thailand – that share a border with the Indian Ocean. Australian maritime archaeologists were also instrumental in organizing the inaugural Asia-Pacific Regional Conference on Underwater Cultural Heritage. This meeting, held in Manila in 2011, counted maritime archaeologists from India, Sri Lanka, Tanzania, Kenya, Thailand, and Indonesia, among its attendees.

Future Directions

Australia, India, and Sri Lanka continue to develop their existing governmental and academic programs in maritime archaeology, and have embarked on efforts to conduct comprehensive surveys to inventory and assess maritime heritage under their purview. In the Western Indian Ocean and Red Sea regions, the Antiquities departments of Tanzania, Mozambique, and South Africa are being assisted by the Netherlands' Centre for International Heritage Activities to establish a regional Maritime and Underwater Cultural Heritage program and promote the development of maritime archaeology within these countries. Initiatives spearheaded by this collaborative effort include dive training, practical courses in maritime archaeological methods and legislation, and the development of designated underwater sites for heritage tourism. NMK recently created a position for a "marine archaeologist" at the Fort Jesus Museum, maintains an inventory of historic shipwrecks in Kenyan waters, and is currently collaborating with the Chinese government and the School of Archaeology and Museology at Peking University to search for shipwrecks and terrestrial sites associated with the fifteenth-century voyages of Admiral Zeng He to East Africa (Lane 2012: 32).

Another collaborative venture that continues to gain traction is the work of CMA staff and students to apply maritime cultural landscape approaches to the inventory and investigation of maritime archaeological sites in Kenya, Tanzania, and Sudan. University of Ulster doctoral students have conducted maritime landscape studies in the Mafia Archipelago, and among several settlements along the Kenyan and Tanzanian coasts. In Eritrea, a joint effort organized by the University of Southampton

and Eritrea's University of Asmara has utilized maritime landscape perspectives to investigate Adulis, a Red Sea port occupied by both the Romans and the Aksumite Kingdom during ancient times (Blue 2011: 503; Lane 2012: 28-31). Recently, the Institute for Arab and Islamic Studies at the University of Exeter has embarked on a three-year, multidisciplinary, multi-period project that focuses on the maritime traditions of the peoples of the Red Sea and Arabian-Persian Gulf. The past two years have witnessed the commencement of underwater archaeological surveys in the waters surrounding the island of Réunion. This project, coordinated by the French *Institut National de Reserches Archéologiques Préventives*, is being carried out as part of a larger archaeological resources assessment of the island, and is among the latest in an increasing trend of maritime archaeology initiatives in and around the Indian Ocean.

Cross-References

- ▶ Australia: Maritime Archaeology
- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Conservation in Museums
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ East Africa: Museums
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Islamic and Maritime Archaeologies
- ▶ Maritime Landscapes
- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Red Sea: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ South Africa: Maritime Archaeology
- ▶ Southern Africa: Historical Archaeology
- ▶ Southern Ocean and Antarctic Maritime Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Indigenous Archaeological Organizations

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Introduction and Definition

Indigenous archaeological organizations can be divided into three categories: those explicitly dedicated to supporting community-based and Indigenous archaeology, groups that are smaller sections of larger archaeology or anthropology professional societies, and organizations that have an explicit concern with Indigenous people in archaeology and historic preservation. Each supports Indigenous archaeology in different ways. What the organizations have in common is supporting the engagement of Indigenous people in archaeology and the value that these communities bring to understanding the past.

Examples

Organizations Devoted to Indigenous Archaeology

Closet Chickens

A mentoring and support organization called the Closet Chickens was formed in 2001 to provide a place for discussion among Native American archaeologists. The group was formed after a conference at Dartmouth College, titled "On the Threshold: Native American Archaeologist Relations in the Twenty-First Century." At the conference, discussions centered on the ideas and perspectives participants had about being Native American archaeologists. Afterward, the conversation continued via e-mail and resulted in the decision to continue discussions as a more formal group. One of the group's major goals is to increase Native American participation in all levels of archaeology. The group includes members who are not Native American but support Native American inclusion in archaeology and approach archaeology from a collaborative perspective (Fig. 1).

Community-Based and Indigenous Archaeology Association

The Community-based and Indigenous Archaeology Association (CIAA) is a scientific organization founded by professional archaeologists with the central goal of advancing the interests and visibility of Indigenous peoples within archaeology. CIAA represents members that are involved in academic institutions; museums; and tribal, state, and local governments. The organization is committed to helping communities make use of their expertise on issues related to repatriation cases, documenting connections between Native Peoples and the past, and facilitating disputes with museums and other agencies. The organization encourages partnerships between Indigenous communities and archaeologists with the aim of conducting

Indigenous Archaeological Organizations, Fig. 1 Members of the Closet Chickens present at the Society for American Archaeology 2011 Annual Meetings in Sacramento, California (Photo credit: Marge Bruchac)

community-based archaeological projects. The CIAA utilizes research, scholarship, and media to increase the visibility of Indigenous perspectives through publications and advanced seminars as well as within the mass media through press releases and public statements.

Overall, the goals of Indigenous archaeological organizations and most specifically CIAA are to provide assistance to communities and protocols and best practices, regular conference, scholarships. They are fulfilling a gap between a need by tribal communities for good work that archaeologists and anthropologists can provide, but with a better understanding and perspective of the inherent value Indigenous communities bring to any collaborative undertaking.

Sections of Larger Organizations Concerned with Indigenous Archaeology

Committee on Native American Relations

The Committee on Native American Relations (CNAR) within the Society for American Archaeology (SAA) was formed in 1995 and is charged with bringing information to the Board of Directors about issues of concern to Native Americans (Watkins 1995). The committee promotes understanding within Native communities about the value and relevance of archaeology. The committee fosters better working relationships between Native American communities and archaeologists. The CNAR assists the SAA in being active rather than reactive to Native American issues, works with other SAA committees on Native American issues, and encourages Native American involvement in SAA to the greatest extent possible. The committee attempts to reflect regional and national representation and can include Native Americans who are not professional archaeologists as committee members. The committee emerged when the Executive Board felt that the work of the Task Force on Native American Relations should continue. The CNAR works with the Indigenous Populations Interest Group (described below) to host an annual reception for Native participants at the Annual Meetings of the Society.

Indigenous Populations Interest Group

The Indigenous Populations Interest Group (IPIG) within the Society for American Archaeology exists to promote the involvement of Indigenous communities in archaeologically

driven research. As an interest group, membership is open to any interested member of the SAA, Native American, or non-Native American. The IPIG raises funds through a modest membership fee and this money is applied toward the annual reception described above.

Organizations Explicitly Supporting Indigenous Archaeology

The World Archaeological Congress (WAC) is a nongovernmental, not-for-profit organization and is the only representative worldwide body of practicing archaeologists. The WAC's code of ethics commits to social justice for Indigenous communities, notes the obligation of its members to Indigenous peoples, describes how Indigenous cultural heritage belongs to Indigenous communities; the special importance of human remains and sacred sites; and the authority of Indigenous communities with regard to interpretation, study, exhibition, curation, and management of Indigenous cultural heritage. In addition to an Indigenous representative on the Executive Board, WAC has an Indigenous Council, composed of eight representatives from Indigenous communities worldwide. The WAC code of ethics begins by WAC members are expected to view Indigenous peoples as the proper experts on Indigenous culture and are required to accord these people respect. Two accords, the Vermillion Accord on Human Remains and the Tamaki Makau-Rau Accord on the display of Human Remains and Sacred Objects, provide guidance for members on how to work with human remains and sacred material. The WAC membership is global and a large percentage of members Indigenous. The 2005 WAC Inter-Congress in Auckland, New Zealand, was notable because the majority of the participants were Indigenous.

Other Organizations Supporting Indigenous Archaeology

A number of other organizations include a significant number of participants that support Indigenous archaeology, but have other primary focuses. Two such organizations are the Association for Indigenous Anthropologists (AIA), found within the American Anthropological Association, and the National Association of Tribal Historic Preservation Officers (NATHPO).

Cross-References

- ▶ Closet Chickens
- ▶ Community Archaeology
- ▶ Society for American Archaeology (SAA)
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

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Indigenous Archaeologies

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Introduction

With the recognition that archaeology has been used as a colonial and imperialistic tool, archaeologists worldwide have begun to redefine archaeological methods and theories to include multiple voices in the interpretation of the past (Preucel 1991). The last 30 years has seen an

increase in the incorporation of Indigenous descendant communities as well as other marginalized populations in all stages of archaeological research. Indigenous Archaeology stems from this self-reflexive task and attempts to decolonize research agendas to acknowledge issues such as power, control, and authority in archaeological interpretation. Indigenous Archaeology practitioners state that Indigenous people *must* have a seat at the research table because their participation creates a more inclusive and nuanced depiction of the past (Nicholas & Andrews 1997; Smith 1999; Watkins 2001).

Definition

Indigenous Archaeology was first defined by George Nicholas in 1990 as "archaeology done with, for and by Indigenous people" (Nicholas & Andrews 1997: 3). Since that time a number of scholars have attempted to expand and identify its basic theoretical tenets and methods. Claire Smith and Martin Wobst (2005: 15) see Indigenous Archaeology "as an archaeology that is informed by indigenous values and agendas. Archaeological research is not *about* Indigenous peoples but is conducted *with* and *for* Indigenous peoples. Indigenous community members need to conduct and interpret the archaeological data for themselves but not at the exclusion of non-Indigenous researchers." Indigenous Archaeology "moves indigenous concerns to the center and orients archaeology to Indigenous systems of knowledge and power" (Smith & Wobst 2005: 15).

Wobst (2005: 29) further sees Indigenous Archaeology as a "decolonized archaeology that helps indigenous people obtain control over their material patrimony and where non-indigenous people can learn to use non-colonizing, non-statistic, non-capitalist ways of interacting with artifacts." An Indigenous Archaeology approach removes the lines between nature and culture and artifact and non-artifact in order to orient archaeology to an Indigenous perspective. Indigenous Archaeology embraces the study of the nonmaterial, incorporating such subjects such as folklore, oral history, music, and dance. These nonmaterial subjects "may include stars and alignments, fauna and flora, geomorphology, and landscapes, colors, sounds and smells. We will have to allow for the 'natural' (that is 'non-artefactual') and 'cultural' (that is, 'artefactual') variables to be enculturated, to be significant to human action, and to articulate, like artifacts, with social life" (Wobst 2005: 28).

Nicholas (2008: 1660) defines Indigenous Archaeology as including eight principle characteristics: "(1) The proactive participation or consultation of Indigenous peoples in archaeology (2) A political statement concerned with issues of Aboriginal self-government, sovereignty, land rights, identity, and heritage (3) A postcolonial enterprise designed to decolonize the discipline (4) A manifestation of Indigenous epistemologies (5) The basis for alternative models of cultural heritage management or stewardship (6) The product of choices and actions made by individual archaeologists (7) A means of empowerment and cultural revitalization or political resistance (8) An extension, evaluation, critique, of current archaeological theory."

Indigenous Archaeologies

In recent years, a number of scholars have begun to use the term "Indigenous Archaeolog*ies*" to signal that there is no single coherent theory or set of methods used within an Indigenous Archaeology approach. Instead, the term Indigenous Archaeologies reflects the "different experiences and approaches that have manifested themselves in a range of different practices" (Atalay 2008: 29). Each person and community interacts with the world around them differently, and these interactions are dynamic; they have changed, and continue to change, through time and space. "The plural form acknowledges the fact that different materialities exist around the globe and through time; and all these materialities are important building stones and points of reference toward theories of human materiality" (Wobst 2010: 18-9). Thus, the methods and tools used within an Indigenous Archaeologies paradigm will be influenced and controlled by an Indigenous perspective that is shaped by their experiences, history, and beliefs.

Historical Background

From archaeology's beginning as a discipline, Indigenous populations have been involved in its practice: as willing participants providing information on the location of archaeological sites, by practicing archaeology themselves (e.g., Arthur C. Parker), or through their objections to the wanton destruction of their community's traditional cultural places and items (e.g., Deloria 1969). As many minority and marginal communities worldwide attempted to fight for their basic human and civil rights in the 1960s and 1970s, Indigenous peoples questioned the relevancy of the archaeological research being mined from their communities. Some scholars have argued that academic studies have historically been used to support governmental policies that limited, removed, and suppressed Indigenous and other marginalized communities' rights and expressions of culture (Arnold & Hassman 1995; Fawcett & Kohl 1995; Lurie 1999: 108).

Spurred by postmodernism, feminist and Marxist thought, and changing political and social contexts worldwide, scholars started to review the production and reproduction of knowledge and power in archaeology. They questioned the obvious silence, or purposeful silencing, of Indigenous and other marginalized communities' perspectives in academic disciplines and governmental structures and policies (Deloria 1969; Smith & Warrior 1996). Scholars also started evaluating the impacts their research had on the communities under study and their own role as scholars in contributing to this silence. Indigenous Archaeology developed as a response to the academic appropriation of Indigenous pasts and to "address the need for decolonization…the lack of Native people in the ranks of professional archaeology (even though the discipline in North American thrives on the pasts of their ancestors), and Indigenous communities' desire to protect, manage, and even study their own heritage" (Silliman 2010: 218).

Postcolonial critiques further called for the decolonization of archaeological research and the creation of agendas that respond to Indigenous goals with Indigenous communities directing that research (Smith 1999: 142). L. Smith (1999: 142) lists 25 "projects" that Indigenous communities should be engaged in that supports the "reclaiming, reformulating, and reconstituting" of Indigenous cultures and languages. The projects speak to themes such as "cultural survival, self-determination, healing, restoration, and social justice" (Smith 1999: 142).

Current Debates

Although a number of scholars are applying an Indigenous Archaeology approach to their work, others have questioned its usefulness. In his article "Aboriginalism and the Problems of Indigenous Archaeology," Robert McGhee argues that Indigenous Archaeology "assumes that Indigenous societies and cultures possess qualities that are fundamentally different from those of non-Aboriginal peoples" and that this "bears little resemblance to any reality" (McGhee 2008: 579). He sees an Indigenous Archaeology approach as a way to "appease Indigenous opposition" and that "such efforts are not only theoretically unsound, but are detrimental to both archaeology and to Indigenous communities" (McGhee 2008: 580). In particular, he argues that "proponents" of Indigenous Archaeology are essentializing Aboriginal communities by assuming that members of Indigenous populations have "unique qualities and abilities … and have a special relationship with and understanding of the natural world" (McGhee 2008: 583). McGhee also questions Indigenous Archaeology's sharing of authority and control over the use and interpretation of archaeological resources. He argues that by appeasing Indigenous community's claims to their "ethnically based rights," it strips archaeology of its "scientific attributes that make it a particularly powerful narrator of the past" (McGhee 2008: 591, 595).

Stephen Silliman (2010) and other Indigenous Archaeology practitioners who have shaped its development (e.g., Colwell-Chanthaphonh et al. 2010; Wilcox 2010) have criticized McGhee's position as a mischaracterization of the origins, objectives, and contributions of Indigenous

Archaeology based on his limited review of a small number of academic writings on the subject. They argue that McGhee assumes that including Indigenous views (which he thinks are based in religious faith) into the practice of archaeology would exclude all other, and particularly scientific, perspectives. They collectively argue that if McGhee had delved further into the literature, he would find many successful and scientific examples of Indigenous Archaeology projects that contribute to the understanding of the Indigenous past without the exceptionalism that he fears. Indigenous Archaeology at its very core is community-based archaeology, one that "attempts to tell useful, respectful, and peopled histories that resonate with communities' senses of themselves, their pasts and futures, and their particular needs" (Silliman 2010: 218).

Colwell-Chanthaphonh et al. (2010: 232) reminds McGhee that Indigenous populations do have special rights to their participation within archaeological practice due to the numerous treaties, laws, and mandates that dictate such involvement. These rights are not ethnically based rights, "but long-established legal rights derived from the unique political status Indian tribes have in the United States formed over the centuries" (Colwell-Chanthaphonh et al. 2010: 232-233). Additionally, Colwell-Chanthaphonh et al. (2010: 233) contend that sharing authority with Indigenous communities does not change scientific attributes, but "merely asks people to recognize the impact that the practice of archaeology has had on descendant groups and the implications of perceiving Western science as the only 'real' way to explain things."

International Perspectives

The incorporation of Indigenous perspectives into archaeology is not solely limited to the discipline as it is practiced in the United States, Canada, and Australia. It is a worldwide movement as Indigenous peoples come forward to share their experiences interacting with archaeologists in their home countries and demand their voices be heard (see Smith & Wobst 2005; Bruchac et al. 2010 for numerous examples). Many are fighting for their basic human rights as they attempt to protect the bones of their ancestors and their cultural heritage.

Through its congresses and inter-congresses, the World Archaeological Congress (WAC) provides an international forum in which Indigenous and non-Indigenous people can exchange the results of their archaeological research; provide or obtain professional training and public education for disadvantaged nations, groups, and communities; help to empower and support themselves and members of Indigenous groups; and discuss strategies to conserve and protect archaeological sites. Since 1989, WAC has provided rich discussions about the ethics and treatment of the dead, the politics of the past, and the relationship among Indigenous people and archaeology (Smith & Wobst 2005: 5). Most importantly, WAC provides a network of well-attuned Indigenous scholars and like-minded individuals that Indigenous community members can turn to for professional advice, support, and encouragement.

Future Directions

The future of archaeology lies in the acceptance, incorporation, and integration of the multiplicity of voices to narrate the stories of the past. Archaeology cannot and should not support separate but equal research agendas with "scientific archaeology" running parallel to "Indigenous archaeology" or "feminist archaeology" (Martinez 2010: 219). Rather, archaeology needs to become a *communilog*: an area for discussion where all stakeholders participate and are self-critical to ensure that their research will not adversely affect the archaeological or descendant communities' rights (Martinez 2010: 219). There is room for everyone to participate in Indigenous archaeology. Indigenous Archaeology is just good archaeology (Martinez 2010: 219).

Changing Archaeological Pedagogy

In order to make Indigenous Archaeology mainstream, changes in current archaeological pedagogy are needed. Archaeologists need to "see themselves

linked to the past that they are interpreting. Rather than seeing themselves removed from their research, they [should] see themselves as the end product of this historical process" (Benavides 2001: 2360). An archaeologist cannot speak ethically about a community's past if they do not engage its present and understand their role in it.

A number of archaeology field schools, initial training ground for future archaeologists, have begun to incorporate Indigenous perspectives into their syllabi by not only inviting Indigenous leaders and community members to discuss how archaeological projects impact their lives but also, and most importantly, having them as equal research partners who shape the research questions, participate in data collection, interpretation, and publishing (e.g., see Parrish et al. 2000; Silliman 2008; Martinez 2012). Exposure to working with Indigenous communities will allow students to understand the political and social context that they find themselves while practicing archaeology in their home country. They will also be exposed to the history and cultural setting of the Indigenous community whose material they will be working with.

Training Indigenous Archaeologists and Indigenous Community Members in Archaeology

Training Indigenous community members in archaeology to serve in the academy and/or to more actively participate in the cultural resources management process is essential to bringing an Indigenous Archaeology approach forefront. More indigenous archaeologists will help to create better working relationships between Indigenous communities and archaeologists by forcing archaeologists to confront and address Indigenous perspectives every day. While professors train Indigenous students in archaeology, Indigenous students in turn expose the professor to Indigenous issues and viewpoints. As Indigenous students move through the academy and become professors themselves, they will be able to train the next generation of archaeologists.

With government-mandated consultation for development projects becoming more common worldwide, Indigenous nations have become overwhelmed with the number of technical anthropological reports submitted to them for review and comment. Although some Indigenous community members have had "on the job training" in archaeological methods and theories, many lacked the background to decipher the archaeological reports given to them. Indigenous community members trained in archaeological method and theory and the numerous national, state, and local cultural resource laws (with particular attention understanding the specialized jargon) are empowered to participate on an equal footing with academically trained archaeologists. It is imperative for Indigenous community members to be able to translate documents into their community's language (traditional or otherwise) so that the community can more effectively articulate potential project impacts to sites, places, and practices important to the Indigenous community.

None of these future paths can be obtained unless archaeology recognizes that Indigenous Archaeology should not be solely applied to and done by Indigenous populations, but by, with, and for *all* of the communities that they study.

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- ▶ World Archaeological Congress (WAC)

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Indigenous Archaeologies in Archaeological Theory

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Introduction and Definition

Indigenous archaeology comprises a broad set of ideas, methods, and strategies applied to the discovery and interpretation of the human past that are informed by the values, concerns, and goals of Indigenous peoples. It has been defined, in part,

as "... an expression of archaeological theory and practice in which the discipline intersects with Indigenous values, knowledge, practices, ethics, and sensibilities, and through collaborative and community-originated or -directed projects, and related critical perspectives" (Nicholas 2008: 1660). This multifaceted approach to heritage has multiple goals in addressing a wide range of topics (Table 1) – from differences between Indigenous and Western epistemologies, to inequalities in representation, decision making, and benefits flow, and to challenges relating to indigeneity and racialism – and assumes different forms and strategies in a variety of circumstances.

Indigenous archaeology has a dual, sometimes contradictory nature since it may utilize the spectrum of methods employed in archaeology, ethnoarchaeology, ethnohistory, and related fields while also challenging them as an exclusive means to discover and interpret past lifeways. Although explicitly acknowledging the contentious, colonialist history of Indigenous peoples' relations in so-called settler states, a history that resulted in the loss of land, rights, and sovereignty for many groups, Indigenous archaeology lacks a single pan-indigenous perspective. Indeed, it clearly lacks a cohesive set of goals, practices, and ideals. However, one commonality is that Indigenous archaeologists seek to mobilize knowledge about the past by ensuring that (a) archaeological practices are respectful of local values, including treatment of ancestral remains; (b) local definitions of "significance" are employed in the identification and protection of heritage sites; and (c) the results of archaeological investigations are relevant to the living community. Indigenous archaeology does not necessarily reject the tenets of scientific inquiry, but does challenge the legacy of scientific colonialism and the hegemony of Western knowledge.

Indigenous archaeology both reflects and articulates with a variety of theoretical approaches in archaeology and heritage studies, ranging from the interpretative to the reflexive to the transformative. These include Marxist theory, cultural relativism, feminist theory, and postcolonial theory, as well as explicitly Indigenous constructs and practices. These various strategies are important in addressing the nature of "heritage," the degree to which it is integrated into people's lives, who benefits from it, and who controls access to it.

Indigenous Archaeologies in Archaeological Theory, Table 1 Some topics of interest in Indigenous archaeology

Material culture
Past and present environments and ecology
Ethnicity and ethnogenesis
Indigeneity
Materiality
Relationships between tangible and intangible heritage
Sacred places, the cultural landscape
Intellectual property issues
Role of oral history and traditional knowledge
Decolonization
Power relations and the legacy of scientific colonization
Stewardship and heritage management
Bioarchaeology and genetics
Reburial and repatriation
Agency

Historical Background

The emergence of Indigenous archaeology in North America, Australia, and elsewhere by the 1980s is associated with a series of political events, cultural revitalization movements, and both lay and legislative efforts to reclaim land and religious freedom at the local and national levels. It does have a much longer developmental history (see W/N Historical Development). In the United States, for example, the American Indian Movement of the 1970s drew attention not only to the social and economic distress encountered by American Indian groups but also to the inequitable practice of archaeology in relation to American Indian cultural and human remains. National Repatriation Legislation of the 1990s (the National Museum of the American Indian Act of 1989 and the Native American Graves Protection and Repatriation Act of 1990) is derived largely from the American Indian Religious Freedom Act of 1978.

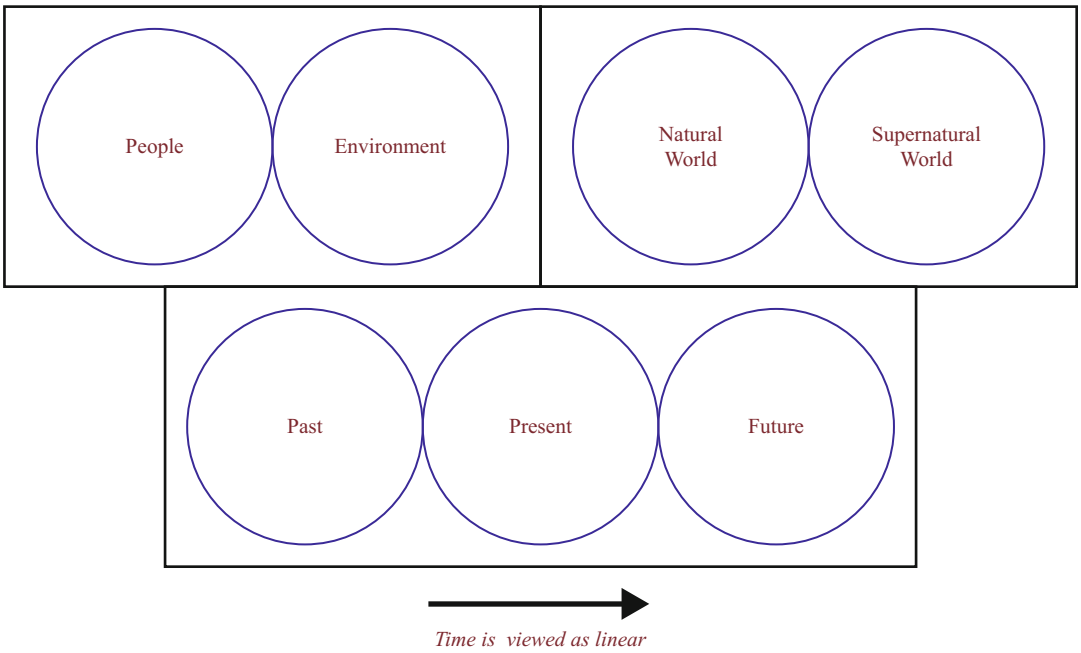

Indigenous Archaeologies in Archaeological Theory, Fig. 1 Idealized Western worldview

Coincident with these events was a series of developments in anthropology that included a shift toward a more subjective and critical orientation (e.g., Hymes 1974; Marcus & Fischer 1986) and increasing interest in applied anthropology. These trends were soon also apparent within archaeology and especially by the emergence of postprocessual archaeology in the 1980s (Hodder 1991). The particularistic, reflexive, and agency-directed orientation of this new approach marked a significant expansion of archaeological thought and practice, one that both extended and challenged the descriptive, normative approach of cultural history and the more science-orientated search for generalizations about human behavior and middle-range correlations between material culture and activity through processual archaeology. Postprocessual archaeology soon developed into a suite of somewhat like-minded strategies – interpretive, critical, structural, Marxist, feminist, and Indigenous – that were relativistic and self-critical and recognized that archaeology was neither politically or culturally neutral. Somewhat ironically, the development of this humanistic enterprise was aided by David Clarke's (1978) concerted attempts to make archaeology more analytical (and self-critical) and was furthered by his student Ian Hodder's efforts to relate material culture to ethnoarchaeological research on ethnicity, amongst other topics.

The development of Indigenous archaeology must also be viewed in relation to Indigenous values, histories, worldviews, and ontologies (cf. Watkins 2000). There may be fundamentally different conceptions of heritage, for example, coupled with the absence of the familiar dichotomies that comprise Western worldview (Fig. 1). Thus, for Indigenous communities the "real" and "supernatural" may be part of the same dimension (Fig. 2), meaning that ancestral beings are part of this existence, not a different realm. This helps to explain why issues of reburial, repatriation, and the protection of the cultural landscape are so important to Indigenous peoples, and has substantial implications for CRM/heritage management. Furthermore, individuals in many Indigenous communities believe that they do not need archaeology to tell them what they already know about the past through other means.

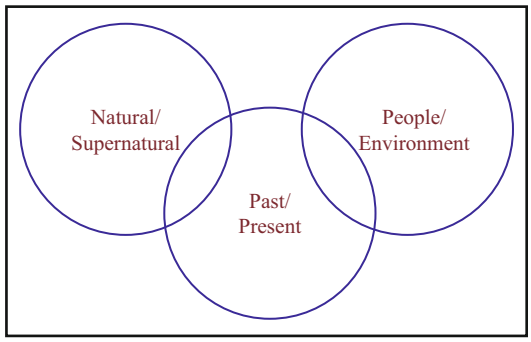

Indigenous Archaeologies in Archaeological Theory, Fig. 2 Idealized Indigenous worldview

Thus, Indigenous archaeology represents the convergence of two different paradigms, one based in Indigenous epistemology and the other in the Cartesian empiricism of the West, as well as the intersection between identity, politics, religion, and science at the local, regional, and global scale.

Key Issues

Theoretical Resonances

Characterizing the theoretical nature of Indigenous archaeology is not easy, given its multiple, sometimes contradictory goals and applications. Nevertheless, there are a number of theoretical orientations and influences, clearly overlapping, that are significantly linked to or resonate strongly with Indigenous archaeology. These are Indigenous epistemologies and ontologies, and interpretive, Marxist, critical, feminist, and postcolonial theory and practice (Nicholas & Hollowell 2007):

- Indigenous epistemology and ontology is concerned with ways of knowing based on local explanations and worldview. It is difficult to generalize the wide range of Indigenous epistemological concepts, but many groups seem to share similar viewpoints that integrate the concepts of stewardship toward nature with one of shared use. Stories of creation often characterize humanity's relationship to the environment as an interactive one. That is, in creating the world, the animals established relationships with humans that gave humans responsibilities for maintaining a balanced world. Nature was often seen not as something to be "conquered" or "tamed," but something to be aware and a part of. Humans were not outside of nature, but rather an active participant within it. In contrast to Western science, native science (see Cajete 1999) does not necessarily try to identify "universal rules" for how things operate but rather focuses on situations of immediacy to particular groups of people. Observation over generations creates an intimate knowledge not only of plants and animals that exist but also the local ecological factors that influence the locations and actions of these communities, the local weather and seasonal patterns, and the interactions between those communities and the human ones. Each human group, therefore, is tied to its relationships with its local ecology that does not necessarily govern its roles and responsibilities, but one which deeply influences the ways that the community integrates social, religious, and cosmological aspects of its culture with that of its environment. Local populations utilize resources in such ways that contribute to the maintenance of those resources, and acknowledge the integration of nature and culture and of past, present, and future.
- Interpretive archaeological theory, the cornerstone of postprocessualism, acknowledges that interpretation is a subjective exercise influenced by contemporary cultural values and historical contingency. It thus foregrounds reflexivity, dialogue, multivocality, and recognition of relative and situated nature of knowledge in seeking meaning in the archaeological record. For Native Americans "there is a direct link between these calls for interpretations in archaeology and reburial issues, land claims, public archaeology, the presentation of the past, and so on" (Hodder 1991: 16). Phenomenological approaches, focusing on the experiential, are sympathetic to Indigenous perceptions, values, and actions relating to objects, places, and spaces.

- Marxist theory provides a broad pallet of ideas of interest to archaeology. Those focusing on economics, cultural materialism, and cultural evolution generally are of little interest here. What is pertinent instead are Marxism's goals of knowing, critiquing, and changing the world by exposing power relations and inequalities, for example, and then identifying the means for social change through praxis—theoretically informed action (McGuire 2008). Marxism's interest in the dialectic, defined by oppositions or contradictions, both reveals and helps to explain the tensions encountered in the practice of archaeology. For example, we can view archaeologists as the bourgeoisie, monopolizing the means of knowledge production and being the primarily beneficiaries, and Indigenous peoples as the proletariat, still with limited means to, and benefits from, that knowledge production.
- Critical archaeology, strongly aligned with Marxism, offers a cogent critique of the past (historical, archaeological) and of our knowledge of it and questions the political neutrality and class-based structure of science, history, and archaeology (e.g., Leone 1998). Like interpretive archaeology, it offers a critical analysis of historical ideological influences on the production of knowledge and the construction, presentation, and use of the past. Such analyses have emancipatory potential for marginalized and disenfranchised peoples by questioning both the circumstances in which their histories have been created (by others) and the assumptions made about their lifeways, actions, and motivations.
- Feminist archaeology also challenges inequality and bias and evaluates knowledge claims relating to another marginalized group, women. Ambiguity and role of partial and/or situated knowledges are acknowledged, as is the fact that cultural systems are contingent and negotiated (Conkey & Gero 1997). Feminist archaeology promotes less hierarchical structure in fieldwork and the incorporation of multiple interpretations into the analysis. An early application of feminist practice in Indigenous contexts is Janet Spector's (1993) landmark study of a Wahpeton Dakota Village. Mainstream archaeology's reaction to Indigenous archaeology has been similar to its reaction to feminist archaeology. There are striking parallels between the two in terms of their developmental history, the critiques they offered, the body of new methods and theory that each developed, and their persistent marginal status within the discipline, rather than as approaches that are broadly transformative (Conkey 2005).
- Finally, postcolonialism incorporates elements of the theoretical positions already noted, situating them explicitly in the context of colonialism and its consequences (see Lydon & Rizvi 2010 for examples). Indigenous archaeology is in fact very much a response to colonialism, which is responsible for the application of "indigenous" adjective that collected many distinct peoples into a single identity defined in contract to Europeans. Topics of interest to or incorporated by Indigenous archaeology include hybridity and continuity, identity, nationhood, resistance, and diaspora. Research relating to these and other topics has connected Indigenous peoples to other colonized peoples elsewhere in the world.

Indigenous archaeology resonates very strongly with these, although connections can easily be found with other archaeological approaches, such as symbolic and structural archaeology (which some include within postprocessualism). Structural approaches, for example, utilizing ethnohistoric and contemporary Indigenous sources relating to worldview have been used in the interpretation of household space and settlement patterns in Canada (Oetellar 2000). Not surprisingly, to date there have been generally very few explicit examples of Indigenous archaeology's connections with processual, evolutionary, or behavioral archaeology, all of which tend to operate at the scale of populations and which are seen to contribute little to the goals of Indigenous archaeology or to the needs of descendant communities. Indigenous archaeologists often utilize many of the basic tools of traditional (i.e., inductive, culture history

oriented) archaeological inquiry in locating, describing, dating, evaluating, and interpreting heritage sites, but these may be customized to local conceptions of heritage or augmented by oral histories.

Realms of Application and Practice

There are four primary categories within which Indigenous archaeology can be seen to operate – reactive, interpretive, reflexive, and transformative – in which theory intersects with practice. This overview is illustrative, not exhaustive.

Reactive

Much of the earlier manifestations of Indigenous archaeology were "reactive" against Western science and its applications through archaeology. Vine Deloria, Jr. (1969) was the first to call attention to anthropology's impact on American Indian groups in his landmark volume *Custer Died for Your Sins: An Indian Manifesto* shortly thereafter, archaeologists such as Thomas King, Eldon Johnson, and Roderick Sprague began calling attention to the issues American Indians were raising in reaction to the practice of archaeology: the suppression of Indigenous minorities included being distanced from their heritage. Many anthropologists and archaeologists provided supportive information for Indigenous land claims in the United States, Canada, and Australia in the twentieth century, but the Indigenous groups involved, those with a vested interest in the outcome, felt especially obliged to actively participate in the process, especially in relation to heritage preservation, education, community history and traditional knowledge, cultural revitalization, and repatriation of knowledge and objects of cultural patrimony.

In more academically focused questioning, Indigenous communities have demonstrated concern over the biases or limitations associated with traditional archaeological survey and site sampling methods, as well as with the adequacy of site significance evaluations and predictive models (especially when the latter are seen or believed to contradict community knowledge of traditional or precontact land-use practices) developed by archaeologists and presented as somehow more valid than those of the contemporary Indigenous populations. In addition, Indigenous groups have often questioned archaeology's claim to "stewardship" over the archaeological heritage, as well as the arbitrary divisions between "prehistoric" and "historic", and "archaeology" and "history." Reactions to the limitations of traditional archaeology have also included extensive and concerted efforts by Indigenous groups to achieve greater participation in archaeological practice and in decision making about site significance in cultural resource management.

Interpretive

Indigenous archaeology projects frequently seek a congruence of oral histories, ethnohistorical sources, and archaeology, albeit not necessarily with equal levels of emphasis. This is illustrated in the contributions of Robert Hall, an Indigenous scholar whose collection of essays, *An Archaeology of the Soul: North American Indian Belief and Ritual* (1997), brought a new understanding of ancient ceremonialism informed by Native American beliefs and provide a foundation for more recent studies of Hopewell ritual. Oral histories have been especially important in defining heritage objects and places, including entire landscapes (e.g., as evident in the American Southwest and throughout Australia), but also connect Indigenous archaeology to the realm of landscape archaeology (David & Thomas 2008). Some scholars have challenged the use of oral histories in interpreting the archaeological record (e.g., Mason 2006) on the basis of subjective bias and other issues. Notably, validation of indigenous knowledge by archaeological methods and data may not be important to local communities who are satisfied with their knowledge of the past through other means.

Political issues aside, Indigenous archaeology has in some cases forced archaeologists to reevaluate their interpretations of material culture or to consider alternative explanations informed by oral histories, folklore, traditional knowledge, and religious beliefs that may previously have been overlooked. Likewise, greater awareness has emerged as to the "tyranny" of

Western values imposed upon ancient lifeways in the interpretation of archaeological remains. Alternative explanations of the past, informed by indigenous sensibilities, can be construed as multiple working hypotheses that offer scholars ideas they might not otherwise have considered.

Reflexive

The emphasis on subjective perspectives and local values in Indigenous archaeology has, in some regards, helped to engage archaeological practice with descendant communities by emphasizing ethical and culturally appropriate behavior at all stages of research. This relates to a more extensive movement worldwide, championed by Maori scholar Linda Tuhiwai Smith, amongst others, to replace the methodologies of Western-based research with those more appropriate to Indigenous communities by asking: "Whose research is it? Whose interests does it serve? Who benefits" (1999: 10). Increasing benefit sharing, community participation, and flexibility in the research process, along with recognition of the subjectivity of science, are prominent features of both indigenous and feminist archaeology.

Indigenous archaeology is necessarily reflexive in its nature as practitioners seek to identify the tools of Western science most conducive to their needs or personally evaluate what they're involved with in cross-cultural contexts. It is necessarily very collaborative, generally guided by strong community direction in setting project goals and identifying appropriate methodologies (e.g., Spector 1993; Atalay 2012). These often include standard archaeological survey, testing, and excavation methods that may be adjusted to local needs and coupled with ceremonial activities to honor ancestors and placate spiritual beings. Respect and trust are essential in the cross-cultural collaborations that are such a frequent element of Indigenous archaeology.

Transformative

Indigenous archaeology has been transformative in two substantive ways. The first is that it has provided Indigenous communities with a set of concepts and tools derived from Western science that can aid in identifying, protecting, and promoting aspects of their heritage in ways that are relevant to them. Here, the popular notion of archaeology for the sake of new knowledge from old things is eclipsed by an archaeology done for the sake of bettering people's lives. This challenges the lasting legacy of scientific colonialism by ensuring that descendent communities are the primary beneficiaries of research conducted on their heritage. It is a project very much directed to the goal of decolonizing the academy by confronting long-standing imbalances regarding who makes decisions and who benefits, although often the rhetoric of "decolonization" has offered little practical means to achieve its goals.

The second transformation has been an appreciable broadening of the scope of archaeological theory and practice as a result of engagement – sometimes voluntary, sometimes forced – with the ideas, values, interests, and needs of Indigenous peoples. Coupled with ideas drawn from other flavors of postprocessual archaeology, many archaeologists have sought a more complete and critical understanding of the nature of archaeological knowledge and scientific objectivity that they want to activate through praxis (see McGuire 2008: 80). As a result, archaeology has gradually become more representative and responsible, with increased attention to ethics and issues of social justice, which is evident in the goals, structure, and code of ethics of the World Archaeological Association.

Current Debates and Future Directions

Indigenous archaeology is today part of the archaeological landscape but remains very much a project under development. It came into being during a time of social and political turmoil as economic and social minorities questioned the status quo of the governments and academies around them and soon after became engaged with discussions about the nature of archaeological knowledge and questioned Western conceptions of "the past." Always positioned at the margins of mainstream research, it has unfolded in such a variety of ways in different contexts that some contend it

is rightly pluralized – "Indigenous archaeologies." As an element of postprocessualism, but also in its own right, Indigenous archaeology has contributed to a broadening (and challenging) of archaeology theory and practice in ways that have been culturally enlightening and politically challenging.

Formed as it was during this time of social (and intellectual) unrest, it emerged in response to the needs of Indigenous peoples to regain control over their own affairs and heritage as well as ideas emerging from within archaeology. It brings together Indigenous worldview, political ideas, and socioeconomic thrusts for self-governance with a suite of archaeological ideas drawn from alternative approaches to archaeology. The result is an approach to archaeology that foregrounds multiple non-Western interests and values and respects (indeed requires) multivocality while integrating existing methodological ideas and interpretative universes. The questioning of basic principles and goals in archaeology, not limited to Indigenous contexts, has strengthened archaeology while also making it more relevant to descendant communities.

There have been a growing number of practitioners of Indigenous archaeology since its inception. While not all those who practice this are themselves Indigenous, the increase in the number of Indigenous persons attaining training in archaeology (experiential as well as academic) has led to a growing number of individuals who are trained to be able to integrate Western scientific methodologies with an understanding of Indigenous concepts about the natural world and humanity's place within it. These individuals are now aided by the immediacy of contact and knowledge exchange through the internet and electronic listservs (such as the Closet Chickens) that allow knowledge and experiences to be shared on a previously unknown global scale.

Indigenous archaeology has, and continues to face, a variety of challenges. Some critics have claimed it is a non-scientific exercise in political correctness or leveled charges of exceptionalism and theoretical bankruptcy (McGhee 2009). Others have suggested that it eschews empiricism and embraces an extreme form of relativism. Some of these charges, especially relating to the lack of scientific goals or rigor, are reminiscent of early criticisms of feminism and postprocessualism and harken back to the issues brought to the forefront by Trigger (1980) in his call for recognition that archaeology has never been neutral or apolitical. Some explanations by Indigenous peoples of how things were in the past are, in fact, embedded in religious belief and thus do fall outside the realm of Western notions of science and history. What often has gone unacknowledged is that processual archaeology and postprocessualism may have more in common than recognized (Van Pool & Van Pool 1999) and simply operate at different scales. Furthermore, Indigenous archaeology may represent an extension of traditional archaeological methods conducted with, for, or by communities in CRM surveys; a pursuit of land claims; or supplementing or validating traditional histories.

Should Indigenous archaeology retain an identity separate from the mainstream or should it be integrated? While this same question continues to be debated in feminist archaeology, it is complicated here by differences between Western and Indigenous values, worldviews, and so forth. Willie Ermine's (1995) consideration of the metaphysics of "inner space" allows for a more subjective insight into one's relationship with the scientific world. He offers the notion that an individual's experience through inward exploration, enhanced by working with elders and practitioners, can lead to a personal context within which to gain knowledge, as another way that Indigenous research paradigms can operate. His discussion of the space between these knowledge systems can provide a mechanism for Indigenous peoples who want to participate in archaeology but who feel uncomfortable or unwelcome in other settings. At the same time, Indigenous archaeology must have a presence in the broader discourse relating to both archaeological theory and practice.

The rise of Indigenous Studies programs in North America and other formerly colonized nations has also increased the reach of programs such as Indigenous archaeology. The availability of college-educated individuals provides not so

much "experts" on Indigenous ideas and issues as much as individuals who possess the sorts of credentials recognized by administrators outside or the community. In this regard, the development of Indigenous Studies programs provides more nuanced perspectives that can influence a wider body of students than previously; the individuals from Indigenous backgrounds who attend such programs are exposed to role models and ideas that expand upon Western concepts and integrate alternative means of understanding and talking about things under discussion.

Conclusions

Indigenous archaeology, as a recognized approach to interpreting, presenting, and discussing the human past, is growing stronger as more and more people become active in practicing the methodologies it proposes. However, as various subdisciplines and approaches to the study of the human past arise, practitioners must question the extent to which approaches might purposefully or inadvertently contribute to a weakening of the discipline through essentialism and Balkanization. To prejudge one perspective over another, regardless of the intent or purpose, creates an artificial hierarchy that threatens not only scientific exploration but also the development of alternative means of understanding how worldviews intersect or clash. Yet, with the growth of alternative means of knowing the lives and cultures of those who have gone before, Indigenous archaeology offers contemporary peoples alternative and more nuanced perspectives on the global past.

Cross-References

- ▶ Indigenous Archaeological Organizations
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Postcolonial Archaeologies
- ▶ Sacred Sites in Indigenous Archaeology

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Indigenous Archaeologies: Australian Perspective

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Introduction

Indigenous archaeologies within Australia (also referred to as "prehistory" of Australia) have emerged as a response to the historical inequalities of traditional archaeological research – establishing Western chronological time frames and models of occupation. Although the meaning of "Indigenous archaeologies" is debated internationally (see Nicholas & Andrews 1997) in the Australian context, it acknowledges that there are varying ways to undertake "Indigenous archaeology" with communities. Further, the exact constituents forming Indigenous Australian archaeologies are still in a process of discussion, debate, and transformation as more Indigenous peoples became actively involved in education, training, and research in archaeology and cultural heritage. Similar to gender, feminist, and queer archaeologies, Indigenous archaeologies are both ideological and methodological in approach and draw from a diverse range of theoretical frameworks. Within Australia, some of the critical issues that have been debated include repatriation of human remains and cultural objects; culturally appropriate archaeological methods from collecting institutions and practices; ethical standards and codes of ethics; intellectual and cultural property rights; cultural heritage management and legislative frameworks; as well as the impact of development and mining on cultural and archaeological sites of significance.

Definition

Indigenous Australian archaeology emerged from the field of "prehistory" or the study of

"Aboriginal and Torres Strait Islanders" (also Indigenous peoples [although the term "'Indigenous peoples" may be grammatically incorrect, it acknowledges the diversity of Indigenous peoples, communities, cultures, and traditions within Australia]) before the "historical era"(prehistory, a term often used by archaeologists [especially in Europe], is used to denote time prior to European history and writing – it implies that Indigenous peoples did not have a legitimate history prior to colonization and is therefore not appropriate to use in Indigenous archaeologies). Today, it forms a large subfield of Australian archaeology in addition to maritime and historical archaeology which inform cultural heritage management practice in Australia. More specifically, Indigenous archaeologies in Australia should properly involve the study of Aboriginal and Torres Strait Islander people through their cultural and material remains and consider Indigenous peoples' knowledge as crucial to the broader archaeological inquiry.

In practice, Indigenous archaeologies consist of a broad spectrum of approaches. This may include non-Indigenous archaeologists practicing "consulting archaeology" that involves Indigenous sites, teaching Indigenous archaeology to students, and archaeological research in Indigenous communities. More recently, this practice has also involved Indigenous peoples/archaeologists actively directing investigations of their own past. It can be practiced by both non-Indigenous and Indigenous peoples; however, it is usually undertaken in conjunction with the descendant community whose past is being considered. Ideally, Indigenous archaeologies should be conducted within a methodological framework that engages in complex theoretical issues, adopts standard ethical guidelines in Indigenous research (see, e.g., the Australian Institute for Aboriginal and Torres Strait Islander Studies [AIATSIS] Guidelines), has negotiated its aims and objectives with the community, and has beneficial outcomes for Indigenous people (see Roberts 2003; Wilson 2007).

Indigenous archaeologies are central to the broader "decolonization project" in Indigenous research which considers a range of sociocultural issues that are often addressed by applying interdisciplinary approaches to highly politicized questions. These approaches have global significance for Indigenous rights more broadly and are often developed using models from Indigenous researchers and more recently by Indigenous archaeologists themselves (Indigenous peoples who are formally trained in archaeology). This includes the examination of creation knowledge, oral histories, lived experiences, and non-Indigenous written texts (i.e., ethnographic, historical, and anthropological texts) to complement the archaeological record and interpretations of the past. Indigenous archaeologies in Australia will draw from various disciplines including anthropology, history, linguistics, politics, sociology, and cultural studies to form a more comprehensive version about the past that does not continue to oppress Indigenous Australians and/or dispossess them from cultural and material remains. Indigenous archaeologies hold a fundamental view further, Nicholas (2010) has suggested that:

- Archaeology is only part of the cultural resources spectrum.
- Oral narratives, lived experiences, and stories of creation and knowledge transmission influence research and management practice.
- Intellectual and material aspects of the past are not separate from each other.
- It provides non-Indigenous archaeologists with a tool for engaging in the broader "decolonization project."

This position engages in a broader objective to reclaim Indigenous people's human rights through cultural heritage and identity reaffirmation in a process of decolonization. Furthermore, it is achieved by developing in-depth theoretical frameworks and research agendas that consider rigor, validity, and professionalism that translates into a "Western" framework and mode of inquiry.

Historical Background

In Australia, archaeology has been traditionally practiced through a positivist lens, whereby

archaeologists were initially concerned with "prehistory," "discovering" the earliest evidence for human occupation in Australia and establishing a "date for arrival" for the "first Australians" (see Mulvaney 1960). It is widely accepted that Norman B. Tindale, an ethnologist/anthropologist working from the South Australian Museum, undertook the first "scientific" archaeological investigations in the 1920s at Devon Downs (Ngaut Ngaut) and Tartanga along the River Murray in South Australia (see Roberts et al. 2010). The development of Australian archaeology as a discipline, however, did not occur until much later (c. 1950s) with the first university program in "prehistory" being established at the Australian National University in the 1960s. By the 1960s, processual archaeology adopted radiocarbon dating to provide more absolute dates for human occupation extending this evidence to c. 40,000 years ago (this included sites such as Rottnest Island, Nauwalabila, Malakanunja, Devil's Lair, and Lake Mungo). During this time, Indigenous peoples were strongly advocating for basic human rights and were officially recognized in the Australian constitution during the 1967 Referendum (the 1967 Referendum meant that laws could be made [for the better or detriment] on behalf of Aboriginal and Torres Strait Islander people and that they could be counted in the census). Although this was a symbolic gesture, ideologies about the "extinction" of "traditional" Indigenous people were still prevalent. By the 1970s, archaeological research conducted by some researchers moved beyond "scientific" explorations of the past to post-processual approaches, which drew on critical theory and interdisciplinary approaches to investigating questions of ethnicity, gender, and class in the archaeological record whereby critical theory and analysis was widely adopted. Trigger (1998: 15-6) writes:

> Critical analysis provides an intellectual structure and rationalization for an interest-driven examination of archaeological interpretation. At the same time the realization that archaeological interpretations are subjective and influenced by the social milieus in which archaeology is practised has become much more widely accepted as a result of the study of history of archaeology.

Although archaeological practice in Australia seemed to be shifting away from processual archaeology to one that supported a postmodern position, the hegemonic characteristics often contested "postmodern" of the discipline produced ongoing conflict and debate between archaeologists and Indigenous peoples. This, of course, is not the case within all Indigenous communities, but rather an observation supported by some archaeologists and the absence of Indigenous peoples formally trained in archaeology.

Within Indigenous archaeology, this included a focus on the changing environment and its impact on Indigenous peoples. This socioeconomic focus provided the basis for discussions about social complexity and sophisticated systems of communication, trade, and procuring resources later termed by Harry Lourandos as "intensification" (Lourandos & Ross 1994). By the late 1970s, cultural heritage management (CHM) became more prominent as legislative requirements under various state and federal heritage acts forced legal processes upon mining companies and developmental plans. Although the legislation varied between states and territories, the focus was engagement in "good practice," and as a result, consulting archaeology began to emerge within Australia, significantly changing the relationships between archaeologists, cultural heritage managers, and Indigenous communities. More recently, Indigenous peoples have become more engaged in archaeology through CHM and formal training which has started to challenge traditional archaeological practice, particularly in relation to archaeological interpretations of the past and its impact on Indigenous communities today.

The issues of "ownership over the past" within Australia also began to emerge in the 1970s which were brought to the forefront of archaeological discourse by Langford (1983) who posed the question "Who owns the past?". This question and the discussions to follow laid the groundwork for forging the relationships between archaeologists and Indigenous peoples. As pointed out by Smith and Jackson, there have been some significant developments in Indigenous archaeologies through the process of decolonization.

These were identified as deconstructing archaeological discourse to transform language, obtaining permission for fieldwork from Indigenous communities, involvement of Indigenous colleagues, access to sites and knowledge, control over publications, and dissemination of knowledge. Several key organizations and documents were produced including the Australian Archaeological Association's (AAA) Code of Ethics and the Guidelines for Ethical Research in Indigenous Studies by AIATSIS that began to shape archaeological research and "best practice." The AAA developed roles on the executive for Aboriginal "representatives," but over the last two decades, there has been little active involvement in the association as there have been no Indigenous peoples to fill the positions. In 2011, the Australian Indigenous Archaeologists Association was established marking the first Indigenous executive/organization whose core business is archaeology and cultural heritage.

Key Issues

Archaeology as a discipline has become extremely useful for Indigenous Australian communities in asserting the depth of history and their association with culturally significant places (Jones & Allen 1970; Bowdler 1984; O'Connor 1999; McNiven 2003). However, it has been argued that it is problematic to undertake archaeological research with Indigenous peoples who have experienced the effects of colonialism and Aboriginalist constructions of heritage and culture, particularly in southeastern South Australia (see Hemming et al. 2010). Within Indigenous archaeologies, the politics of representation and the relationships between archaeologists and Indigenous peoples has been explored (see Riches 2004; Roberts 2003). This relationship which began as early as the 1930s with Indigenous peoples as "informants" (Hale & Tindale 1930) and slowly progressed to involving Indigenous peoples throughout all aspects of the research process including the research design, consultation, ethics, fieldwork, and dissemination of information. It is this relationship and its development that continues to be a topical issue. Smith et al. (1994: 13) suggest that the traditional strength of Australian archaeology has been the analysis of sociopolitical issues including the relationships between archaeologists and Indigenous peoples and the change in power and control Indigenous communities have reclaimed over their cultural heritage. This type of Indigenous archaeology which has also been termed "community-based archaeology" in Australia (Greer et al. 2002; Harrison & Williamson 2002) began to shape much of the standard of archaeological research within Australia. During the 1980s and 1990s, debates related to ethics and the repatriation of "Old People's" remains placed pressure on disciplines such as anthropology and archaeology to become more culturally inclusive with research practices and ethics which included the deconstruction of past processual practices and decolonizing archaeology itself (see Creamer 1975; Smith 1999; Smith & Wobst 2005). Some of the key issues that continue to be debated include:

- The repatriation of human remains and cultural objects from collecting institutions
- The process of archaeological research, practices, and ethical standards
- Intellectual and cultural property rights
- Cultural heritage management and legislative frameworks
- The impact of mining, industrial waste and natural resource management, and housing development on cultural and archaeological sites of significance

International Perspectives

The experiences within Australia are similar to those internationally and much of what has been developed in regards to Indigenous archaeologies was adapted from Native American, Aboriginal Canadian, and Maori archaeologists. Indigenous archaeologies have been defined by Nicholas and Andrews (1997: 1) in North America as "archaeology with, for and by Indigenous peoples." It is a complex discipline which continues to broaden both theoretically and

practically as Indigenous peoples progressively engage and thus transform archaeological theory and methods. Nicholas (2008: 1660) presents the broad scope of Indigenous archaeology in the following way:

> Indigenous archaeology is an expression of archaeological theory and practice in which the discipline intersects with Indigenous values, knowledge, practices, ethics, sensibilities, and through collaborative and community-originated or-directed projects related critical perspectives. Indigenous archaeology seeks to (1) make archaeology more representative of, responsible to and relevant for Indigenous communities; (2) redress real and perceived inequalities in the practice of archaeology; and, (3) inform and broaden the understanding and interpretation of the archaeological record through the incorporation of Aboriginal worldviews, histories, and science. In its broadest sense, Indigenous archaeology may be defined as any one or more of the following: (1) the active participation or consultation of Indigenous peoples in archaeology; (2) a political statement concerned with issues of Aboriginal self-government, sovereignty, land rights, identity, and heritage; (3) a post-colonial enterprise designed to decolonise the discipline; (4) a manifestation of Indigenous epistemologies; (5) the basis for alternative models of cultural heritage management or stewardship; (6) the product of choices and actions made by individual archaeologists; (7) a means of empowerment and cultural revitalisation or political resistance; and (8) an extension, evaluation, critique, or application of current archaeological theory.

Indigenous archaeology is more than "just" an investigation of the past by archaeologists. It is a social, cultural, and political movement that can be a powerful tool for Indigenous peoples in redressing wrongs of the past, reclaiming cultural identity, reaffirmation, cultural revitalization, and maintaining heritage. On the other hand, it may also be exploited by non-Indigenous archaeologists whose research agenda only seeks to undertake "pure research" and thus "chooses" not to engage or address the broader political issues involved in their practice. As described by Yellowhorn (2006), internalist archaeology has reconceptualized archaeological practice from an Indigenous perspective which reclaims the archaeological record and connections to land through oral narratives in the local archaeological record (Yellowhorn 2006: 137).

The Indigenous research agenda described by Maori academic Linda Tuhiwai Smith (1999: 116-17) has helped inform the way in which many Indigenous peoples are approaching archaeology in Australia. Smith's (1999) "Indigenous Research Agenda" privileges Indigenous epistemologies and acknowledges that Indigenous researchers also have a responsibility to ensure that research is conducted in culturally appropriate ways. Such an agenda ensures that elders or senior leaders are not simply entering into a process of "negotiation," but rather have complete control over the research process including proposals, development, methodology, interpretations, and the dissemination of information back to the community in a culturally appropriate and comprehensive manner. This approach considers complex issues relating to power imbalances and thus draws upon critical theory, postcolonial theory, standpoint theory, and a decolonization of research practice (Langton 1994; Lippert 1997; Smith 1999; Watkins 2000; Million 2005; Smith & Wobst 2005; Atalay 2007; Nakata 2007). Therefore, it is an Indigenist framework developed for and by Indigenous peoples that is theoretically situated within post-processual and interpretative archaeologies – which ultimately reject a positivist view of science in search of new meanings and interpretations of the past. The issues that "Indigenous archaeologists" encounter in the research process are experiences discussed by many North American archaeologists (i.e., Watkins 2000; Million 2005; Nicholas 2010) and are critical for understanding relationships between the researcher and the "subject" in any research project involving Indigenous peoples.

Furthermore, Atalay (2003, 2007) has discussed the use of Indigenous archaeologies for broader contexts. She highlighted the importance of "community-based participatory research" in Turkey, which involved archaeologists working closely with local people in understanding their cultural heritage. Atalay (2007: 253) argues that "Indigenous archaeology" is on the periphery of mainstream archaeological practices and is essentially a "practice that foregrounds knowledge and experiences of

Indigenous peoples to inform and influence Western archaeologies as part of the decolonisation of the discipline." It is an approach that has global implications and can extend beyond Indigenous communities (i.e., local communities) – such as how it was applied by Atalay at Catalhoyuk, Turkey. It is evident through her research that some key components of this approach include identifying her privileged position, foregrounding local knowledge and experiences, the practicing of socially just research that has positive effects on contemporary communities, collaborative archaeology and the incorporation of worldviews, positive processes of decolonization, long-term goals and programs, working with communities to develop research questions based on community needs, using local knowledge about the best way to conduct research, and a flexible research plan and strategy. All these components are key to any research project regardless of ethnicity and therefore challenge the concept of "Indigenous archaeology" (Colwell-Chanthaphonh & Ferguson 2008).

Future Directions

After 50 years of archaeology being practiced more than professionally in Australia, there is still a gross underrepresentation of Indigenous peoples participating in the discipline. Increasing participation and retention of Indigenous peoples in archaeology, cultural heritage management, and environmental sciences is therefore of critical importance. The representation of Indigenous archaeologists across all year levels (undergraduate through to research higher degree) must occur, as well as in all sectors that involve care, management, protection of Indigenous cultural heritage, as well as intellectual engagement through academic and community-driven research projects. In the latest *Profiling the Profession Survey* undertaken by the Australian Archaeological Association (AAA), Sean Ulm (2010 *pers. comm.*) reported that "there were under ten members of AAA who identified as Indigenous at the time of the survey and three people who identified as Indigenous archaeologists." All three of whom had a B.A. (Hons) degree and one person had a coursework Masters degree. Only one of these was a member of AAA and the other two were not members of any archaeology-related organisation."

During the late 1980s and 1990s, Isabel McBryde, who was the head of the Department of Archaeology at ANU at the time, hosted the first major cohort (approximately 10) of Indigenous students undertaking archaeology in the early 1990s (Kellie Pollard 2010 *pers. comm.*). Many of these students completed their undergraduate degrees and constituted the largest group of Indigenous Australians to receive academic training as archaeologists. Other issues that continue to be evident are that there have only been a small number of Indigenous peoples who have completed degrees in the 20 years since this period. Secondly, very few have engaged in postgraduate studies, and lastly, none have completed doctorates. Although the reasons for this have not been clearly identified and there have been no studies to address the issues to date, there are several reasons including the immediate employment of Indigenous graduates in government agencies and other organizations, the attractiveness of private consulting, and the commitment that Indigenous people already have in regards to caring for country as well as the fact that there may be few opportunities to leave current cultural and family obligations to undertake full-time studies.

Since this period, one would expect a gradual rise of the number of Indigenous peoples engaging in archaeology following growth in mining exploration throughout Australia. What is evident from my own experiences (as an Indigenous scholar and archaeologist) is that Indigenous people engaging in the research, management, and protection of cultural heritage within their communities do not have the time or resources to leave the community to pursue academic scholarship – particularly the sustained study that is required for a doctoral thesis. What is required is a stronger commitment to

training cultural heritage "caretakers" through the implementation of archaeology and cultural heritage scholarships, cadetships, and research awards that plan for success across all degree programs from undergraduate to doctorate level. One of the key strategies to obtain such a goal is through the Australian Research Council's (ARC) Discovery Indigenous Researchers Development Scheme (DIRD) which aims "to encourage participation in and to improve the standard of research conducted by Aboriginal and Torres Strait Islander people through developing the research expertise of Indigenous Australian researchers to a level which is competitive with mainstream funding." The scheme supports research across all fields of study and has been in operation since 1996. In the first year, 45 applications were received, but there has been a decline in the number of applications during the decade of the Scheme's operation. In 2005, only eight applications were received, though the quality of applications was high. As well as concerns about this decline in applications, there are some concerns about the Indigenous knowledge base of those assessing applications.

As noted above, in 2010 the Australian Indigenous Archaeologists Association (AIAA) was established with the support from the Australian Archaeological Association (AAA). Although the association is in its developmental phase, this is a new beginning for Indigenous archaeologies within Australian where a mechanism has been initiated for Indigenous archaeologists to actively engage with broader issues that concern their community and their past. Until this occurs, Indigenous archaeologies in Australia will not continue to progress with the critical and constructive voice of Indigenous peoples themselves.

In summary, Indigenous archaeologies within Australia have undergone significant change, transformation, since the criticism excavations undertaken by Norman B. Tindale in the 1920s and initial development of Australian archaeology as a discipline in the 1950s. Although there is greater public awareness of the importance of Indigenous people, culture, and knowledge in Australia, mining exploration and urban development continue to impact on Indigenous cultural heritage and archaeological places of importance to our shared history. The complexities of these issues continue to be discussed and debated, and what becomes apparent is the continuos struggle for Indigenous recognition in a period of great political uncertainty for Indigenous communities who continue to feel the impact of colonialism. There will continue to be challenges for Indigenous archaeologies in Australia until issues of nationalism and representation of Indigenous peoples as a First Nation are negotiated.

Cross-References

- ▶ Atalay, Sonya
- ▶ Australia: Indigenous Cultural Property Return
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working with and for
- ▶ Lippert, Dorothy T.
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Submerged Indigenous Sites
- ▶ Ucko, Peter (Indigenous Archaeology)
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ Watkins, Joe (Indigenous Archaeology)
- ▶ Yellowhorn, Eldon

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Indigenous Archaeologies: North American Perspective

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Introduction

"Indigenous archaeology" can be conceived of as a response to the legacy of colonialism in archaeology, while also reflecting a broadening and reconstitution of existing theory and practice designed to make the discipline more relevant and satisfying to descendant communities. It is an entity that is also defined by its engagement, often simultaneously, with issues relating to identity and ethnicity, the nature of knowledge, the flow of benefits derived from archaeological research, the indivisibility of tangible and intangible heritage, and different ways of knowing the world. Indigenous archaeology, depending upon who is involved and in what context, may be as much about the recovery of objects and information about past lifeways as it is about the sociopolitics of the endeavor and equally as much about community direction and involvement as it is about the decisions and choices of those individuals involved. It is thus very much a multifaceted and reflexive endeavor in which Indigenous epistemology(ies) intersect with archaeological practice in sometimes controversial, frequently challenging, but ultimately always enlightening ways (Fig. 1).

Definition

The term "Indigenous archaeology" and what it represents as an alternative means of examining the archaeological record are relatively recent developments, although there is some overlap with long-standing attempts toward archaeology's more open engagement with its various publics/constituents (e.g., "community," "vernacular"). The earliest known use of the term referred simply to the Aboriginal (vs. European) component of a North American archaeological site (Dewhirst 1980), which is coincidentally the primary usage still in Australia. The term was not used with some consistency in its modern connotations until the late 1990s, with Nicholas and Andrews' (1997a: 3, note 5) reference to "archaeology with, for, and by Indigenous peoples." It was subsequently popularized by the publication of Joe Watkins' volume, *Indigenous Archaeology: American Indian Values and Scientific Practice* (2000), which critically explored late-twentieth-century relations between archaeologists and Native Americans, particularly in the context of reburial, repatriation, and cultural resource management. More recently, Nicholas (2008) offered the first full definition, which is (in part) as follows: "Indigenous archaeology is an expression of archaeological theory and practice in which the discipline intersects with Indigenous values, knowledge, practices, ethics, and sensibilities, and through collaborative and community-originated or -directed projects, and related critical perspectives." Indigenous archaeology has now become a common-enough presence to warrant frequent mention in archaeology textbooks, despite the fact that some critics, Indigenous or otherwise, dismiss it as political posturing.

Indigenous archaeology is distinguished from other forms of archaeology that engage directly with descendant communities by its commitment to a particular, ethnically defined population. In this it is similar to feminist archaeology, which also has a comparably selective focus, but importantly both include practitioners who are not Indigenous or female, respectively. Of course, the notion of "indigeneity" is fundamental to Indigenous archaeology. The question of "who is Indigenous" is always situational, necessarily framed in opposition to another entity, which historically has most often been a more dominant, colonizing society. "Indigenous" thus generally refers to (formerly) disempowered, disenfranchised, or colonized peoples, although this is not the case in some parts of the world where indigenes may represent the state. Arguments that the people of

Indigenous Archaeologies: North American Perspective, Fig. 1 Davina Two Bears (Navajo Nation) is one of a growing number of Indigenous archaeologists now pursuing a career in archaeology (Photo courtesy of Davina Two Bears)

Ireland, China, or India, for example, are "Indigenous" do have merit, but this falls outside of the realm of "Indigenous archaeology" as the term is employed here.

Historical Background

Indigenous archaeology generally refers to projects and initiatives associated with and especially those initiated by Aboriginal peoples in the United States, Canada, and Australia, but it also may include others (e.g., African Americans) who might be classified as "descendant communities." However, expressions of Indigenous archaeology also appear widely elsewhere, including in parts of Africa (e.g., South Africa, Kenya), New Zealand, and the Pacific Islands; northern Europe; Siberia; and Central and South America (e.g., Nicholas 2010; Gnecco & Ayala 2011). This has created discussion around "Who is 'Indigenous'?" and why some individuals do not consider themselves as such. In Central America, for example, only a small percentage of the native-born population currently self-identifies as "Indigenous," clearly reflecting important political and social issues regarding identity and self-representation.

The history of anthropology has been intertwined with the West's interest/fascination with the "Other," and foremost here were Indigenous peoples, especially in Africa, the Americas, and the Pacific. Many of the first "modern" anthropologists were also directly involved with archaeological pursuits, which led them to work closely with members of Aboriginal communities in the late nineteenth through early-to-mid-twentieth century. In North America, they included Franz Boas, Harlan Smith, Jesse Fewkes, Frank Cushing, Alanson Skinner, Arthur C. Parker (of Seneca descent), Julian Steward, and William Duncan Strong. Much of the impetus for these studies was aligned with the notion of procuring information before traditional lifeways were lost to "progress" and the ethnographic, archaeological, linguistic, and biological data obtained have proved to be of immense value to anthropology.

At the time, the community members who aided anthropologists and archaeologists did so primarily as paid or volunteer guides, laborers, and so forth. Only much later did the information gleaned from these studies come to have great value to those communities, sometimes a century or more later, to restore or augment traditional knowledge that no longer flowed from generation

to generation. Nonetheless, Indigenous communities have generally benefitted little from these interactions. Furthermore, there was little, if any, opportunity to comment on the type of research being conducted on their cultural heritage, or involvement in decisions regarding the objects and information obtained. Indeed, throughout the twentieth century, increasing complaints were raised that anthropology and archaeology were continuing the colonial legacy of earlier times and that these disciplines were harmful and disturbing to many and were of little relevance or value to contemporary Indigenous populations.

By the 1960s, the increasing move toward Aboriginal cultural revitalization and politicization, coupled with a rapidly approaching postcolonial, postmodern world order and changing public attitudes in the wake of the Vietnam War and other events, contributed to the emergence of Indigenous archaeology in North America. Comparable situations emerged elsewhere, including the outstation movement in Australia and the independence of Zimbabwe (formerly Rhodesia) in Africa. Indigenous peoples were not only demanding restoration of their lands and their rights but also more control over their own affairs, including those relating to archaeological sites and other aspects of their cultural heritage (Fig. 2).

Indigenous Archaeologies: North American Perspective, Fig. 2 Robert Hall, of Stockbridge Mohican descent, here pictured a Smithsonian Institution River Basin Surveys in 1947, would later integrate Indigenous histories and religious knowledge into archaeological interpretation (Photo courtesy of Robert Hall)

During the latter part of the twentieth century, major changes took place in the relationship between Indigenous peoples and the dominant society. In the Americas, demands for tribal recognition, land rights, national sovereignty, and/or acceptance of ethnic identity and values were often as much inspired by cultural heritage issues as they were by calls for social justice and restitution. In the United States, for example, Vine Deloria Jr. clearly articulated aspects of Native American dissatisfaction, questioning the legitimacy and practice of anthropology and archaeology and the callous treatment of ancient human remains by scholars and museums. Following a decade of growing social and political dissatisfaction, the emergence of the American Indian Movement in the early 1970s brought national attention to many of the concerns of Native Americans, which ranged from issues of poverty, unemployment, and living conditions to what was seen as the desecration of ancestral remains and places of cultural significance by both archaeology and land developers. Increasing political clout and support from a sympathetic public resulted in the passage of federal legislation such as the *American Indian Self-Determination and Education Assistance Act* (1975) and the *American Indian Religious Freedom Act* (1978) in the United States. In other parts of the world, comparably significant federal legislation or court rulings on Indigenous rights were passed in New Zealand (*Treaty of Waitangi Act* [1975]), Australia (*Mabo v Queensland* [1992]), and Canada (*Delgamuukw v Regina* [1997]).

Key Issues

In Boasian historical particularistic fashion, there can be no one history of the development of

Indigenous archaeology. However, three themes have figured prominently in its emergence: (1) the treatment of ancestral remains (and sacred objects and places), (2) participation (or not) in archaeological/heritage management, and (3) cultural heritage and legislative concerns about the ownership of cultural and intellectual property. The examples provided for each are necessarily illustrative, not comprehensive.

Proper Care of Ancestors and Ancestral Remains

Perhaps the most contentious aspects of archaeology in the view of many Indigenous peoples have been the treatment of human remains and burial sites. From a scientific perspective, these are of immense scientific value, which led to the collection and study of skeletal remains by eighteenth- and nineteenth-century antiquarians and anatomists and later by archaeologists. Both ancient and recent skeletal remains were routinely sought and collected, including even the bodies of warriors who had died in battle with US military forces. These attitudes and practices were (and remain) a direct affront to their fundamental values, beliefs, and worldviews of living Native Americans.

In the 1970s, the American Indian Movement and various groups and individuals took direct action against archaeologists investigating human remains, but with little lasting effect. Reburial and repatriation issues subsequently rose to national and international prominence in the 1990s in response to the highly publicized looting of the Slack Farm site in Kentucky (1988) and similar events. The discipline examined its relationships with Indigenous populations in response to charges that it continued to exist within a structure of scientific colonialism and attitudes toward Aboriginal rights began to change from an institutional perspective. The adoption of the Vermillion Accord on Human Remains by the World Archaeological Congress in 1989, and the passage of the *National Museum of the American Indian Act* (1989) and the *Native American Graves Protection and Repatriation Act* [NAGPRA] (1990) in the United States directly addressed Indigenous concerns about the treatment of the dead, with scientific values no longer being the primary point of reference (Fig. 3).

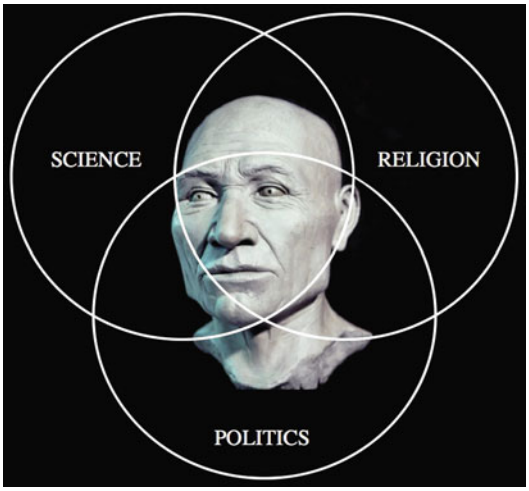

Indigenous Archaeologies: North American Perspective, Fig. 3 The controversy involving Kennewick Man (the "Ancient One") exemplifies different value systems between Western and Indigenous cultures (Composition by George Nicholas; base image courtesy of James Chatters)

For perhaps the majority of archaeologists, the reburial and repatriation "controversy" was largely unexpected and caused great consternation and confusion within the discipline. Some very vocally wondered if NAGPRA marked the end of archaeology at the expense of political correctness, while others seemed oblivious to it. In the years following the passage of NAGPRA, there was (and continues to be) widespread discussion about the goals and benefits of the scientific quest for knowledge relative to the need of descendant populations to have at least some control of their own heritage. This debate rose to international prominence with the Kennewick Man (the "Ancient One") case (1995–2005), which was significant not so much for revealing differences in attitude toward research involving human remains *between* scholars and descendant communities but especially so *within* each of those groups. Over the last decade, much of the rhetoric has softened as cooperative, and in some cases, collaborative projects with Indigenous communities have developed that involve ancestral sites and human remains (and which may

include radiocarbon dating and aDNA analysis). No less important has been increased dialogue between archaeologists, between Indigenous peoples and archaeologists, and within Aboriginal communities as to the nature of archaeological research and the questions of what constitutes "heritage" and who benefits from research in this realm – an often-challenging discourse but one that always yields valuable (if often unexpected) outcomes.

CRM and Heritage-Related Developments

The care of ancestral sites has figured prominently in both the origins of and goals of Indigenous archaeology. By the mid-1960s, the preservation of archaeological sites was increasingly a focus of attention of CRM and heritage legislation in North America and elsewhere (e.g., *National Historic Preservation Act*, US (1966); *Australian Heritage Commission Act* (1975); and the *Canadian Environmental Assessment Act* (Reference Guide of Physical and Cultural Heritage Resources) [1996]). Such legislation was aimed at broad public values, but did not specifically address the concerns or desires of the Indigenous minority whose ancestors created the vast majority of archaeological sites in formerly colonized countries and who lacked the authority to make decisions about the preservation and management of their own heritage.

Some of the earliest instances of direct and meaningful involvement of tribal peoples in archaeology occurred in the Unites States. For example, Wendorf et al. (1956: II-IV) detail the manner by which the Navajo Nation may have given contract or salvage archaeology its start. From 1950 to 1953, El Paso Natural Gas paid for the archaeological work required for a gas transmission line from northwestern New Mexico across Arizona, directly employing five archaeologists and Navajo labor assistance as needed on salvage excavations. The program provided another benefit when the New Mexico District Engineer of the Bureau of Public Roads proposed and then supported the development of a similar archaeological program in connection with road construction in New Mexico, which led to the establishment of Highway Salvage Archeology in New Mexico on April 15, 1954 (Wendorf et al. 1956: VII).

Formal tribal involvement in archaeology in the United States subsequently began with the Zuni Archaeology Program (in 1975) and the Navajo Nation Historic Preservation Department (in 1978) as the first major initiatives to address specific concerns of Indigenous peoples relating to CRM and also to provide archaeological training. During the 1980s and 1990s, state government agencies and Indigenous organizations began to establish programs to train community members to monitor CRM projects. College- and university-level archaeology programs provided new opportunities for Indigenous people to gain access to important tools.

In recent years, changes in heritage legislation in North America now may require that archaeologists consult with Indigenous governments and organizations, and to adhere to established protocols and permitting systems for field and research projects in their territory or for studying human remains. While well meaning, this consultation is sometimes severely hampered by the ability of Indigenous groups to respond to multiple requests to review reports, comment on actions, or even to answer information requests owing to limited human resources and other priorities confronting the community (e.g., inadequate housing, unemployment). For some, consultation does not go far enough, and what is considered desirable are more collaborative ventures in which the communities are equal partners in project development, operation, evaluation, and decision making (e.g., Dowdall & Parrish 2003). Others contend that Indigenous peoples should even take the lead in caring for their own heritage. In British Columbia, a significant number of First Nations have established their own heritage permitting systems (that the province acknowledges), along with many First Nations individuals now working as archaeologists.

Access to and Control over Tangible and Intangible Heritage

Throughout the early parts of the twentieth century, Indigenous peoples have been able to achieve greater and more meaningful control

over tangible and intangible cultural heritage through various avenues, although there have been regular setbacks when legislation has been changed or legal precedents overturned. New or broadened legislation has ensured greater direct Aboriginal involvement, such as the requirement for First Nations in British Columbia, Canada, to review archaeological permit applications (*Heritage Conservation Act* 1996). In the United States, a 1992 amendment to the *National Historic Preservation Act* has allowed tribes to establish their own Tribal Historic Preservation Offices, enabling direct tribal involvement in heritage preservation on tribal lands.

A larger question involves who has access to, controls, and benefits from information derived from archaeological research and the control of traditional knowledge, especially for Indigenous peoples and other heritage-based communities who have historically had limited control over their heritage. The appropriation, commodification, and unwelcome or inappropriate use of objects, images, and information relating to artifacts, sites, rock art, and other iconography is of great concern to Indigenous peoples, especially those who do not distinguish between tangible and intangible heritage, or even between cultural and biophysical heritage. The costs to individuals, clans, and communities may be very high (e.g., loss of control over proper care of heritage, diminished respect for the sacred, the commercialization of cultural distinctiveness, improper/dangerous uses of special or sacred symbols by the uninitiated). In these examples, efforts to exercise control over tangible items define these conflicts less so than divergent views concerning the validity and appropriate applications of knowledge.

These issues are not restricted to modern times, but extend back well over a century in some cases, such as the case of ethnographer Frank Cushing who published information he obtained as an initiated member of the Zuni Priesthood of the Bow. Rights to intellectual property (from ownership of songs and images to control of traditional knowledge), as well as the recognition that tangible and intangible heritage may be one and the same, have long been integral elements of Indigenous societies. Such customary laws and values influence or direct Indigenous archaeological initiatives today. This may be evident in community specific and/or situational notions of appropriate care for/stewardship of heritage and indeed what constitutes "heritage." In the context of evaluating and protecting archaeological and heritage sites, Indigenous archaeology proponents may thus seek criteria for "site significance" different from those of more traditional CRM policy and practice.

Current Debates

Some aspects of Indigenous archaeologies remain controversial, even in jurisdictions (such as the United States, Canada, and Australia) where real progress has been made in some sectors. The continuing debates over the fate of Kennewick Man indicate that issues related to the control by Indigenous groups (or by governments) of access by archaeologists to sites, objects, and human remains are still very much alive. A recent exchange in *American Antiquity* (see McGhee 2008, 2010; Colwell-Chanthaphonh et al. 2010, among others) explored many related concerns but focused on McGhee's arguments about two core issues: (1) Indigenous communities' power to control access and (2) the basis on which Indigenous peoples were accorded rights not held by other members of society. McGhee's concern was that such power could be used against science and, as a result, that society as a whole would be diminished because accounts different from those advanced by Indigenous communities would be suppressed. These are important issues with no easy answers: such control might be seen to be a continuation of the way the system has operated in the past, but merely with the population controlling the resources reversed.

A second issue, relating to this, concerns the recognition of specific descendant communities in the codes of ethics of the main archaeological organizations in North America. The first principle of the Society for American Archaeology's Code of Ethics (Stewardship) notes that

"Stewards are both caretakers of and advocates for the archaeological record *for the benefit of all people*" (emphasis added) but fails to acknowledge any special connection that Native Americans have to that record. By contrast, the Canadian Archaeological Association fully acknowledges that distinction in its "Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples," which identifies consultation, Aboriginal involvement, sacred sites and places, and communication and interpretation as necessary considerations for ethical practice. The recognition (or not) of the historical connections of descendant communities to the archaeological record, and the rights and responsibilities embedded in those connections, continues to be much debated in the context of Indigenous archaeology.

Another issue is the continuing effort to identify and address inequities that have long existed within the discipline, which have limited the ability of Indigenous peoples to have some control over their heritage and to benefit in the flow of research benefits. This follows the initial discourse on the sociopolitics of archaeology that first emerged in the 1980s in the context of critical and feminist archaeologies and that subsequently expanded with the concerns raised by Indigenous peoples and others regarding: (1) their absence or exclusion as participants in archaeology and (2) the persistent legacy of scientific colonialism in the discipline. Questions have subsequently been raised as to the role of archaeologists as gatekeepers of knowledge of the past, who not only controlled the flow of information but who generally were also its primary beneficiaries. It became evident that descendant communities were often shut out of decisions made as to their ancestral sites and received little social or economic benefits from research on their heritage. Despite the greater participation today of Native Americans and First Nations in academia and CRM, it is very difficult to effect meaningful progress in these areas because most archaeologists are unwilling to share or relinquish decision making, even when they support the increased participation of Indigenous peoples in archaeology.

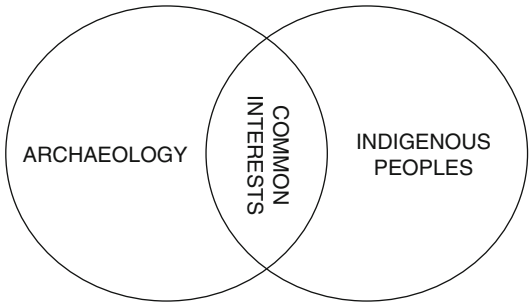

Indigenous Archaeologies: North American Perspective, Fig. 4 Common interests between traditional archaeology and Indigenous peoples may be less common than many realize

Finally, there is the outstanding question of whether Indigenous archaeology should be distinct from "mainstream" archaeology or part of a more inclusive, less balkanized archaeology (Nicholas 2008). The development of Indigenous archaeology has followed a course quite similar to that of feminist archaeology, and although each today is recognized as distinct entities, both remain on the margins of "mainstream" archaeology. While this has the advantage of offering a safe haven for those who promote strategies and perspectives influenced by Indigenous epistemologies and largely postprocessual methodologies (see Nicholas & Watkins, IA theory entry), this positioning lessens the contributions of Indigenous archaeology to the discipline and ghettoizes it, so that its practitioners frequently tend to be "preaching to the converted." Indigenous archaeology will likely continue to have a dualistic presence, as would be illustrated in a Venn diagram that includes a partial overlap with the discipline (Fig. 4).

Future Directions

Indigenous archaeology grew out of efforts by marginalized peoples worldwide to challenge the imposition of archaeology on their lives and heritage. It has in a relatively short time developed into a distinct body of methods and theory(ies) designed to promote ethical and inclusive practices that will further broaden and democratize

Indigenous Archaeologies: North American Perspective, Fig. 5 The first all First Nations CRM crew in Canada, directed by Nola Markey (O-Chi-Chak-Ko-Sipi First Nation). Spences Bridge Crew, British Columbia, 2006: Rhonda Billy, Mary Suchell, Brian Michele, Crystal Swayze, Matilda Abott, John Shackelly, Vince Wilson, Josie Billy, Bernice Garcia, Nola Markey, Basil Wilson (Photo courtesy of Nola Markey)

the discipline and stimulate new ideas that will significantly increase the scope of archaeology as a socially relevant, responsible, satisfying, and still scientifically sound discipline.

A growing number of archaeologists now make concerted efforts to include indigenous perspectives within archaeological practice and interpretation. Initial volumes that tried to include Indigenous voices were generally collections of individual perspectives (Nicholas & Andrews 1997b; Swidler et al. 1997; Dongoske et al. 2000). More recent publications describe interactions between archaeologists and Indigenous groups (Ferguson & Colwell-Chanthaphonh 2006; Kerber 2006) and offer examples of active collaboration between archaeologists and underrepresented Indigenous populations indicative of the expanding approach to involving communities at the very heart of archaeological practice (Colwell-Chanthaphonh & Ferguson 2008; Silliman 2008).

International discussion on the situation among archaeologists and Indigenous communities (see the entry on ▶ Indigenous Archaeologies: Australian Perspective in this encyclopedia) is flourishing. Recent edited volumes such as Smith and Wobst (2005), Phillips and Allen (2010), and Bruchac et al. (2010) indicate that Indigenous archaeology is not a localized movement, but rather a global one. This has been aided by the political and educational accomplishments of Indigenous governments, organizations, and communities in many parts of the world, often after countless years of struggle, as well as by developments within the fields of anthropology and archaeology, which are more responsive and inclusive than ever before. There are also today an increasing number of archaeologists who are Indigenous. Nicholas' (2010) edited volume of autobiographical accounts of 37 Indigenous archaeologists is but a sampling of a much larger and growing number. In their capacity as university professors, community heritage managers, or full or part-time CRM archaeologists, they are making substantial contributions by making archaeology more representative, by bridging different worldviews and legal regimes, and by serving as role models for others (Fig. 5).

The participation of Native American and First Nations peoples in the process of archaeology, and increasingly in setting its direction, has been a crucial step in helping archaeology move beyond the legacy of colonialism by ensuing the participation of descendant communities in meaningful and satisfying ways. As a result of what has now been achieved, we can no longer refer to "Indigenous peoples and archaeologists" without acknowledging that the latter category now includes a growing number of Indigenous archaeologists and archaeologists of Indigenous heritage in North America and elsewhere.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Cultural Heritage Management and Native Americans
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Peoples, Working with and for

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Indigenous Collaboration in Archaeology Education

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Introduction

During the last decades, several indigenous peoples and archaeologists worldwide have committed themselves in the development of indigenous archaeologies. While engaging in reciprocal cooperation and exchange, they have triggered new investigation prerogatives in field research and in the interpretation and spreading of archaeological data and heritage management. Some indigenes have also acquired academic formation and became researchers of their own historical vicissitudes, assessing archaeological methods, techniques, and data storing and interpretation. Indigenous oral history, cosmology, values, and knowledge have been incorporated within the construction of knowledge on the past. It may be said that, within their variegated manifestations, indigenous archaeologies are establishing themselves as critical and alternative approaches to traditional archaeological practices. Consequently, the parameters of archaeology education should be rethought and re-elaborated for the twenty-first century.

Definition

Indigenous archaeologies are carried out with, for, and by indigenous peoples. Research is not merely performed on them but aims at the production of knowledge with, for, and by indigenes. The following aspects must be taken into account: (1) the collaboration and dialogue with indigenous populations so that critical commitment and interactions could be achieved during the whole process involving the construction and broadcasting of archaeological knowledge, (2) the development of research issues and programs that would benefit indigenous population and would be approved by them, (3) the incorporation of indigenous perspectives in the investigation and interpretation of archaeological reports through the construction of mutual education between archaeologists and indigenous communities, (4) the respect towards local cultural rights for the management of cultural heritages, (5) the coupling of indigenous modes with the Western scientific type of approach, and (6) an assessment of how archaeological practice influences the populations' cultural dynamics (Hamilakis & Anagnostopoulos 2009; Bruchac et al. 2010). As all pedagogical scholarships in archaeology in a wide sense, archaeology education will be strongly affected by these modes of archaeological practices.

Key Issues/Current Debates/Future Directions/Examples

As from the 1950s, archaeology has been transforming itself deeper and deeper, especially through postcolonial criticism, with an impact on the theoretical and methodological debate in the human sciences which triggered a gradual revision and redefinition of their practice from the perspectives of new ethical and scientific parameters. Among other items, multivocality

and reflexivity as basic components of archaeological practices may be highlighted as from the elaboration of the project up to the publishing of research findings (Habu et al. 2008). It is highly important to salient the defense of archaeological theories, methods, and practices that merge Western and non-Western knowledge and principles in the building of knowledge on past events and, at the same time, take into account differences and diversities of the points of view of the subjects involved in archaeological heritage management with more inclusive and democratic policies. Archaeological practices would also consider the complex interrelationships (social, cultural, political, economical, and ideological) between agents and archaeological material at the local, regional, national, and world levels (Meskell 2009).

The "decolonization of archaeology" is experienced worldwide and within different research contexts in Australia, New Zealand, the United States, Latin America, and Africa (Smith & Wobst 2005; Colwell-Chanthaphonh & Ferguson 2008; Liebmann & Rizvi 2008; Silliman 2008; Phillips & Allen 2010; Gnecco & Rocabado 2010; Silva et al. 2010, 2011). New archaeological practices forward very different types of development and results. In fact, they reveal the possibility of several archaeologies and multicultural perspectives on the archaeological report. Contrastingly to archaeological research without interlocutors, in which archaeologists fail to build a dialogic relationship between them and the local community and in which bureaucratically established aims need not be changed, indigenous archaeologies redefine the several aspects of research, interpretation, and archaeological heritage management and thus the parameters of archaeological education.

Within the present perspective in which several archaeological heritage appropriations are performed, archaeologists are the main agents of the archaeological record's valorization. Their expertise is of paramount importance in debates on the management of cultural heritage, the preservation of the environment, and the identification of historical and meaningful places. Their professional activities develop towards public policies, and frequently, they are invested with the role of facilitators or mediators in the relationship between the different stakeholders involved in issues on cultural heritage (Fairclough et al. 2010).

Twenty-first century archaeologists should be prepared in theory and methodology to comply with their profession's new demands. The teaching and learning of archaeology should be adapted to these paradigmatic changes in archaeological practices. The future of archaeology during the twenty-first century will surely be defined by its commitment by the explanation of different cultural trajectories and processes within the context of identity and cultural heritages in the past and in the present.

Cross-References

- ▶ Indigenous Peoples, Working with and for
- ▶ Multivocality and Archaeology
- ▶ Postcolonial Archaeologies

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Indigenous Intellectual Property Issues in Archaeology

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Introduction

Interests over heritage and intellectual property (hereafter IP) of indigenous peoples have arisen over the past 25 years in response to the increasing empowerment of indigenous societies. This empowerment has emanated, in different degrees and context, from the spread of democracy, the strengthening of the rule of law, the reinforcement of human rights, and more inclusive political scenarios around the world. The issue of IP has then interested both indigenous populations exercising their rights in such a context and legal researchers and social scientists, especially archaeologists, who monitor and interpret these developments (Anderson 2009, 2010; Nicholas et al. 2010). On a broader perspective, sociologists have advanced the idea of the persistent imperial forms in Western democratic states which continue to affect, more than any other group, indigenous populations by imposing formal laws in detriment of native laws (Tully 2000; Simpson 2009: 517).

Definition

The main issue in IP rights is claiming control and ownership of objects, values, and traditions which are at the core of indigenous societies' cultural heritage. Indigenous groups have initiated processes of reclaiming and restoring their traditions and ways of life. The initial movements were inward focused on cultural survival strategies and were followed by externally focused efforts to prevent loss of traditional knowledge (also known as folklore; hereafter TK), traditional cultural expressions (hereafter TCE), sacred sites, etc., using the tools of the dominant society and the international courts – property laws and conventions. Overall, these cultural survival movements were aimed at controlling the IP rights of the material and immaterial traditions at the heart of their society. Both stages are a result of community empowerment built on the often tense relationship between the observers (Western researchers and government enforcers) and the traditionally "observed" indigenous groups. Yet, despite these tensions and power imbalances, indigenous populations are experiencing increasingly favorable conditions as they move to secure rights to their IP (Anderson 2005).

Over the last several decades, processes of archaeological site protection and museum heritage repatriation (in the USA) and mutual understanding processes between indigenous groups and museums (in Canada) were pursued in earnest for the benefit of indigenous populations. At another level, new treaties (in Canada) were pursued to resolve the land rights of indigenous groups. The latter are essential: landscapes embody an important component in preserving and developing traditions. This is particularly difficult when indigenous communities have to confront with extractive industries

eager to exploit their lands. At the most basic level, this process entails establishing a legal defense strategy for their creations and knowledge. At a higher level, it implies defending their ancestral lands (which are often under government control until the treaties are drawn).

Intellectual property is a central concept in today's Western society built on the idea that intellectual creations are the property of the creator (individuals or corporations). As such, IP laws entitle creators of assets such as songs and written works, either published or unpublished, to be copyrighted. In addition, other IP assets can be patented (technical inventions, in the realm of tangible assets) or trademarked (words, phrases, or logos that represent a brand).

Key Issues/Current Debates

What is the current IP status of TK in indigenous societies? Traditional knowledge is the broad and varied range of traditions and expressions that define the cultural makeup and dynamics of indigenous groups. This knowledge includes songs and rhythms, signs and icons, medicinal plant potions and food recipes, rituals, ceremonies and dances, oral poetry, stories and legends, and handicraft techniques created by ancestors and transmitted through generations. However, in most cases this knowledge is not published and copyrighted (let alone patented as IP). Traditional knowledge includes then a broad range of cultural products that are witness to the long-timed and fruitful cultural endeavors of indigenous groups. Most indigenous groups consider themselves caretakers of community knowledge rather than owners of knowledge. In the Western sense of property, TK is considered to be "owned" by the group rather than by the individual. Yet this notion of group ownership has one practical issue quite alien to Western mores: TK is often inalienable – not to be sold or given away by an individual.

In Western as well as in indigenous societies, intangible and tangible assets are tightly linked in the creative process. The ideal scenario is for creators to be able to control the reproduction, distribution, and consumption of their creative work and usufruct the gains or royalties from its sharing, rental, or sale. In this sense IP is defined here to include both types of assets: the ideas or concepts that result in material goods produced by the standards and procedures intrinsic to an intellectual asset. For example, the making of the hallucinogenic potion *Ayahuasca* requires a set of ritual, social, and technical skills devised and transmitted in secrecy by the shamans of Amazonian groups. On one hand, protections should exist to cover the rules and concepts that drive the production and consumption of the potion, and on the other hand, laws should exist to protect the potion itself. The complete process would fall into the realm of IP rights and would be proprietary to the group. The question is if *Ayahuasca* is as well protected as Coca-Cola. This is not the case.

In a debate involving IP rights, Michael Brown asked the important question: "Can Culture be Copyrighted?" (Brown 1998). Today Western cultural creations are widely copyrighted, trademarked, or considered trade secrets, with defined terms of limitation for certain creations (e.g., a literary work vs. the recipe for Coca-Cola). How should twenty-first century societies with considerable advances in the issues of equal rights and ethnic self-determination (more so in the so-called First World countries) deal with indigenous societies that have a longer tradition in the use of their creations?

These are societies where knowledge is transmitted in an active legacy mode, within the community and without contracts or wills. Brown was skeptical about the IP proposals for indigenous groups (that is to say, IP rights in a Western mold) but eager to explore "basic mechanisms for the compensation of native peoples for commercial use of their scientific knowledge... and artistic creations" (Brown 1998: 204). Indeed, many of the legal disputes and grievances by indigenous groups are related, for example, to the patenting of medicinal and agricultural plants discovered, domesticated or used for centuries. This said, Brown thought that a broad debate about securing ethical standards for cultural appropriation was

not very propitious as it would set further apart indigenous circles from Western ones (Brown 1998: 195). Clearly, this is indeed what many wish to achieve while securing control of their IP. Brown is not sure about inherent, permanent right of cultural ownership and rather proposes to look into scenarios of joint stewardship. Is there a possible common ground to the needs of Western and indigenous societies to control their IP? Yes, but this ground diverges when "business" models might be considered to exploit IP. The international trend is slowly moving toward the more difficult stand: complete control of the IP by their indigenous creators (Conway-Jones 2005). However, much reticence to this trend comes from institutions such as museums which seem to endlessly depend on their inalienable possession of artifacts (while opposing the inalienability of indigenous property).

The challenges indigenous groups face are related to legal issues in Western bureaucracy (Barrera-Hernández 2010). Why is it more difficult for indigenous groups to defend their intellectual rights? Why are their IP and their wish for self-determination (often leading to physical isolation) seldom accepted by Western society? Is their rebuff of the endless creativity cycle and drive to innovation proper to Western societies a problem? The indigenous realm will have, in most cases, the social backup and a tight network to pursue traditions flourished from decades of knowledge of their landscape, to recreate their vision of the world and their native identity and therefore own their traditional knowledge. What is it that they need to secure their IP and the survival of their cultural structures?

The Legal Background

Intellectual property law intersects with the discipline of archaeology across a full spectrum of activities: research, analysis, interpretation, curation, and repatriation. Archaeology will often rely on both tangible and intangible forms of indigenous knowledge. Throughout the world, indigenous knowledge, traditions, and sacred sites are at risk due to past and contemporary archaeological practices (see Oguamanam 2006; Yupsanis 2012). Current IP laws, international conventions, and academic traditions (by archaeologists) are primarily aimed at protecting artifacts, structures, and human remains. Indigenous IP has very limited protections.

The full recognition of IP rights in Western societies is backed by important legal instruments that guarantee to creators or inventors a degree of exclusive rights (with a set of time limits) and control to a wide range of tangible or material assets. These rights would also include assets such as music or recipes which in many cases – when ingredients, notes and lyrics are not published – would be considered intangible or immaterial property. However, despite that Western and indigenous societies have creations in the intangible realm, it has been extremely difficult for the latter to attain the same level of control of intellectual creations in the former societies.

Intellectual property law has its origins in the Statute of Anne of 1710 in Great Britain. This British copyright law was based on eighteenth-century European concepts of property, labor, and ownership centered on the individual. Early copyright laws were oblivious to indigenous cultural knowledge or traditional customary laws (Nicholas et al. 2010: 119; Torsen & Anderson 2010: 14). Since then IP laws have evolved based on distinct policies by nation-states with limited consideration and often ignoring indigenous concerns (Torsen & Anderson 2010: 20). While copyright laws are applicable and vary by nation, the Berne Convention establishes minimum standards of protection between states. More specifically, the 1995 Agreement on Trade-Related Aspects of Intellectual Property (TRIPS) provides multilateral protection for copyrights, trademarks, and patents (IP laws). Most countries are bound by TRIPS as members of the World Trade Organization (Torsen & Anderson 2010: 23). The 1996 World Intellectual Property Organization Copyright Treaty extends copyright protections further to compilations of data in digital form such as databases.

Intellectual property laws define the owner, author, user, and creator of works and expressions providing exclusive rights to the owner. Copyright laws provide protections for literary and artistic creations focusing on the form of

expression rather than the content of the works. As such, indigenous knowledge and TCEs recorded in written, audio, or visual forms by archaeologists, often without informed consent, become the protected property of the archaeologist or the institution for which they work with no rights or benefits attributed to the traditional or indigenous community from which they were appropriated. Even when traditional knowledge is exchanged by indigenous people to facilitate the repatriation of their ancestors and cultural materials, there is a risk of losing their rights to the TK if it is not clearly indicated that is confidential information that belongs to the community.

An additional concern with copyright law is that it does not prevent people from copying an idea, style, or method derived from an indigenous work. Copyright law only prohibits the copying of the actual work or TCE. Thus, TCEs in the form of stories, images, and material culture (tangible and intangible heritage) shared by archaeologists through public outreach, reports, and conferences can be misappropriated by non-indigenous people and transformed into consumer products, promotional materials, or other forms of expression without the consent of indigenous communities. TCEs are both cultural and economic resources for the community, and benefit from the use of TCEs should go to the community.

Copyright laws also make it very difficult for indigenous people to gain access to traditional knowledge and TCEs embedded in copyrighted materials. Most indigenous peoples do not own the collections stored in museums and other institutions. These collections often contain secret, sacred, or restricted information that may be subject to customary laws and practices (Torsen & Anderson 2010: 11). Without ownership rights, indigenous communities may be prevented from gaining access to audio, visual, written, and digitized representations of TCEs and TK that are important to the cultural survival of their communities. In some cases, access to copyrighted material is negotiated between owners and indigenous communities. This process is often time consuming and expensive for indigenous communities as original property owners may now be deceased, difficult to reach, or may speak a foreign language (Torsen & Anderson 2010: 10).

Patent laws also pose problems for indigenous communities. Patents provide exclusive rights for a new product or process or a new technical solution to a problem. Traditional knowledge about biocultural materials and DNA/genetic information derived from indigenous peoples can be patented by corporations without benefit to indigenous peoples.

United Nations Organizations Conventions

Despite the problems that IP Laws pose to the tangible and intangible heritage of indigenous peoples, several UN conventions have been adopted that recognize indigenous values, knowledge, and rights to cultural survival.

The UN International Labor Organization (ILO) Convention of 1957 first recognized "indigenous and tribal" populations (usually minorities) as citizens of nations. Yet, this same ILO instrument promoted as well a destructive policy of integration and assimilation of these minorities into dominant societies. In contrast, the ILO Convention of 1989 promoted pluralism, self-sufficiency, group identity, and collective rights of indigenous peoples (Anaya 2004: 58–59). This convention also affirms that indigenous peoples are entitled to a harmonious relationship with natural resources following traditional patterns of use and land tenure (Anaya 2004: 144). Moreover, this last document encourages governments to work with indigenous peoples to protect their rights, their integrity, and reject their discrimination. This UN declaration has been instrumental in the preservation of sacred sites in Australia and enabling indigenous people to gain access to sacred sites and burial grounds in Canada (Anaya 2004: 39–140).

The 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP or The Declaration) includes provisions expressed as rights: when put into effect by signatory countries, they extend protection for intangible cultural heritage. These provisions include indigenous peoples' rights to (1) "revitalize,

use, develop, and transmit to future generations their histories, languages, oral traditional philosophies. . . and to designate and retain their own names for communities, places, and persons"; (2) "maintain, protect, and develop the past, present, and future manifestations of their cultures, such as archaeological and historical sites, artifacts, designs, ceremonies, technologies, and visual and performing arts and literature"; and (3) "maintain, control and develop their IP over such cultural heritage, traditional knowledge, and traditional cultural expressions" (Nicholas et al. 2010: 123).

The 2007 UNDRIP and the 1989 ILO Convention both provide for the rights of indigenous people to be consulted and involved in activities that impact their heritage, traditional territories, lifestyles, and identities (Nicholas et al. 2010: 123). This is one of the most important instruments in the process of empowerment. However, it is a non-binding convention in UN member countries.

Finally, the Convention on Biological Diversity (CBD) provides protection for natural resources and genetic diversity which are critical to the continuity of indigenous cultural practices and the cultural survival of indigenous peoples. This convention has a direct impact on bioarchaeology research and the study of skeletal remains with the aim to understand health and demographic issues. While not directly related to conventional issues of IP, this is important research for the history of indigenous populations but more importantly has been stopped in North America for ideological and ritual reasons.

Case Studies on Cultural Affiliation, IP, and TK

Indigenous populations challenge issues on IP in different spheres (see Mikkelsen 2012). Indigenous populations have sought ways to secure IP over their material and immaterial traditions, and they have also confronted situations that put that very same IP at risk. These issues are often the result of the historical circumstances of overtly imperialistic strategies in the last two centuries.

The conflict of indigenous groups claiming property to their IP occurs in different degrees around the world; that is, today indigenous groups confront different issues and have adopted different strategies to their problems. Western powers dominated the world, starting and ending at different periods of time, with somewhat different imperial institutions. The different historical pathways and the distinct dominating strategies of the Spanish, British, and other empires have led to a diverse status for indigenous societies. This historical background is central to explaining the different challenges faced and acknowledged by indigenous populations. Indeed it will explain often their different attitudes toward their heritage and traditions: for example, some indigenous groups are worried about their material culture while others are not. Archaeologists, who work, say in British Columbia or in Bolivia, would witness these distinctions in the field: the challenges and demands by local groups in each region will be distinct. Indeed, their concern of IP over cultural material assets will differ: the issues of repatriation and research of indigenous sites, artifacts, and remains that are essential to North American groups are not a concern for a great majority of Andean South American groups. These issues are of more concern for minority groups in the Amazonian basin, who are attempting to stop the encroachment of their territories aimed at the extraction of goods and resources (Huertas Castillo 2004). Again, the attitudes toward their cultural heritage and concerns with ancestry will relate to historical issues, namely, the degree of integration into the mainstream society. In the case of Peru and Andean indigenous populations, they are today immersed in a market-oriented, Westernized, and neoliberal society, with some remnants of community-oriented tasks at the local level. Their level of *integration* with the current national society is an indicator of their concerns over heritage.

In the United States, archaeological site protection and resource protection laws were primarily focused on the rights of institutions rather than indigenous populations until the passage of the Native American Grave Protection and Repatriation Act (NAGPRA) in 1990. This Act was enacted to facilitate the repatriation of indigenous human remains, funerary objects, sacred objects, and objects of cultural patrimony

from federally funded US museums. The Act had the important participation of indigenous people within the US borders yet it contains ambiguous language and unfinished regulations that lead to sometimes contentious situations in the repatriation process.

The implementation of NAGPRA required two things, namely, (1) a thorough documentation of the artifacts in museums before the repatriation of the cultural assets to the descendant populations and (2) that federally recognized Tribes and Native Hawaiian organizations must demonstrate cultural affiliation with their ancestors. This puts indigenous people in the difficult position of sharing TK and IP and the ritual and sacred meaning of artifacts with institutions and government agencies; it affects the very issue of IP control (Brown & Bruchac 2006). It implies that indigenous people must demonstrate kinship to the individuals or affiliation to the objects which were obtained decades or centuries earlier often under coercion to their ancestors. The proof of kinship is compared with the names and places recorded by the original collector many generations ago. There is an imbalance in these repatriation process by putting the burden of proof in the ability of indigenous groups to demonstrate such ancestral links and cultural continuity and uninterrupted transmission, when, unfortunately, the social cohesion of these groups have been undermined by decades of neglect and social problems. In this scenario, museums, often with the participation of archaeologists, maintain possession and control of the photographic, descriptive, and audio records (say, of traditional songs) of their collections.

By example, in February 1996, the mayor of Providence, Rhode Island, announced the sale of a carved wooden spear rest then in the possession of the city-run Museum of Natural History. From the museums' perspective, the utilitarian spear had been used on war canoes in the South Seas. However, from the perspective of *Hui Mālama I Nā Kupuna O Hawai'i Nei* (group caring for the ancestors of Hawaii) and the Office of Hawaiian Affairs (OHA), the spear was an idol from the Sandwich Islands, the name given to the Hawaiian Islands in the 1770s by Captain James Cook. Both institutions wrote to the mayor of Providence disagreeing: "The fact that the ki'i lā'au was designed to hold, guard, and protect the spears of a kaua ali'i does not mean that it is utilitarian and therefore secular, having no religious significance. Such statements reveal a fundamental misunderstanding of the ki'i lā'au as well as the Western tendency to create differentiations where none exist" (Hui Mālama 1996). So they claimed that the item is a *ki'i lā'au*, an object of cultural patrimony and a sacred object, which probably belonged to a warrior chief and possibly a ruling chief. Such an item would be an *'aumakua* image created by the *kaua ali'i* for the purpose of housing an ancestral spirit to care for his spears (Hui Mālama 1996).

Hui Mālama and the OHA urged a halt to the sale, claiming that the item fell under the protection of NAGPRA. Despite a brief period of consultation where culturally sensitive information was exchanged by the indigenous participants, the Museum formally rejected the NAGPRA claims. The dispute was vented in 1997 in the NAGPRA Review Committee meeting. Once again, the indigenous representatives shared culturally sensitive information about their ancestors, spiritual beliefs, as well as prayers and songs (National Park Service 1997a). The review committee agreed that the *ki'i lā'au* is a ceremonial object and recognized the reasonable kinship and cultural relationship between the OHA and *Hui Mālama* and the native Hawaiians who created and used the carved wooden figure. Yet, the NAGPRA Review Committee took a narrow view of property law and determined that "there was insufficient information presented regarding the circumstances of the acquisition of the carved wooden figure to make an advisory finding concerning right of possession to the object as defined by NAGPRA" (National Park Service 1997b). The review committee recommended that the city of Providence reconsider its determination as the item is considered a sacred object under NAGPRA. Ultimately, the case was settled in 1998 with the Hawaiian organizations negotiating with the city of Providence to return the *ki'i lā'au* to Hawaii for permanent display.

This case raises many issues with the use of NAGPRA as a tool to repatriate culturally sensitive items. Fear of NAGPRA violations may convince reluctant museums to consult with federally recognized tribes and native Hawaiian organizations. Yet, implementation of NAGPRA is based on variable interpretation of cultural meaning and affiliation coupled with tight interpretation of property laws by museums and the US federal government. In addition, the unequal exchange of information required to facilitate the repatriation process places TK and indigenous IP at risk. Many questions are left unresolved by this case: who gets to determine if an item is utilitarian or sacred? Can an item be both utilitarian and sacred, changing meaning based on its context of use? How can indigenous people demonstrate their cultural affiliation to their ancestors and culturally significant items without losing their IP rights?

In the case of sacred sites, natural resources, and landscapes, problems also arise when Western archaeological knowledge is used as a tool to restrict indigenous rights and contradict indigenous knowledge. By example, in a case from southeastern Australia, archaeological reports and interpretations of cultural landscapes were privileged over local indigenous knowledge in the construction of the Hindmarsh Island Bridge (Hemming & Treverrow 2005). The Ngarrindjeri nation is the traditional owner of this territory. In an effort to halt construction, Ngarrindjeri elders shared their TK about the cultural sensitivity of the area to be developed to protect the traditional Goolwa landscape. The authenticity of Ngarrindjeri knowledge was contested by local government council, which chose to rely on a natural resource management plan to avoid sites of significance. The council claimed that Ngarrindjeri people were no longer traditional and had devalued their knowledge of cultural landscapes and practices. The protests of the Ngarrindjeri people were ignored and the development of the bridge resulted in the desecration of a Ngarrindjeri burial site.

In this case, the Ngarrindjeri leaders aimed to change the way non-indigenous people behave toward indigenous communities and traditional knowledge, namely, by privileging indigenous knowledge over Western archaeological. Rather than prosecute the council under the Aboriginal Heritage Act 1988 (SA), the Ngarrindjeri elders negotiated an agreement with the council that included an apology to the Ngarrindjeri people and changes to the way archaeology is practiced in the region.

An important case of the joint work between indigenous populations and "managers" is the grassroots resource preservation project in Kyrgyzstan (Pyburn 2009). The objective of the "Silk Roads" project, funded by IPinCH, has encouraged a public conversation about IP and cultural heritage in Kyrgyzstan. Indeed, its positive advances led to the inclusion of the Silk Roads sites on Kyrgyzstan's tentative list for UNESCO World Heritage status. This is an excellent case of a regional scale project involving several sites. Again, the importance of the historical context: today's scenario of low awareness on heritage and traditions is the result of Soviet-era policies of creating a multiethnic nation with a Russian overarching tradition. In this case, Kyrgyz stakeholders from various backgrounds designed a series of small-scale, sustainable community-based projects aimed at the preservation and educational use of IP and cultural heritage. One of the projects along the road wished to improve the protection of a cultural heritage asset: an ancient temple with a strong local spiritual significance. The site was left unprotected after research and was in dire need of a plan to save it. The steps applied in the task were designed by the site director with the informed support of the people of Uzgen who debated and approved the measures. Arguments in the process included the cultural and spiritual importance of the site. Again, remember that these post-Soviet societies turned from an atheist society toward the rediscovery of traditional religions. The structure represents that long-appeased past.

Future Directions

The issues of controlling a group's IP also involve the management process that integrates indigenous populations and outsiders (mostly

researchers). In many cases the TK of indigenous communities is shared with archaeologists to aid in the protection of cultural landscapes and resources. The sharing or full protection of traditional knowledge is the prerogative indigenous societies have once they are in full control of their IP; it is not unlikely that parts of that knowledge will be kept private as occurs with rituals and legends. The involvement of archaeologists is sometimes problematic, as they are made privy of this TK. Archaeologists can address this issue by choosing not to report or publish information related to TK or report on tangential outcomes after consulting with indigenous communities regarding what information is shared with the governments and the public. Another option is to coauthor reports with indigenous communities, enabling the communities to determine the appropriate level of disclosure of cultural information. In all cases, indigenous-centric archaeology protocols should be developed to supplement limited IP protections as nonlegal instruments to guide research and management, as has happened for the case of repatriation of indigenous artifacts in Canada. The examples have shown propitious room for arrangements away from the formalities and contradictions of the legal system.

Where are indigenous populations heading with their contentious but logical issues regarding the IP of their heritage? They are headed toward scenarios where they are able to legally contest, transmit, and uphold their concerns to the society at large. Increasingly, indigenous populations are gaining allies among archaeologists, heritage professionals, ecologists, economists, and global organizations who share a common interest in the protection and preservation of indigenous tangible and intangible heritage. While the motivation for joint research varies, this process has produced a more balanced approach based on a new gauging of indigenous and Western prisms in the study of indigenous societies. Yet, at the local and national level, indigenous populations continue to fight for cultural survival and sovereignty on a daily basis.

In many regions, there is still incomprehension among Western-trained archaeologists, heritage professionals, and governmental organizations, let alone society at large, as to why indigenous populations deserve the privileges of self-governance (in the best case scenario) and why they aim to block governmental decisions that would not only benefit them directly but also benefit society at large in financial terms. However, the crux is in the benefit to their IP and TK on the long term or, put plainly, the endurance of society and landscape. Rather, any *financial* benefits, in more discreet but sustainable fashion, could be obtained from working with indigenous populations on the development of biodiversity initiatives, ecotourism, archaeotourism, and indigenous arts and crafts programs that would benefit local and national economies.

Put into a historical context, current resistance to indigenous IP rights equates with the same suspicion which led the British Empire to forbid traditional rituals such as the potlatch, viewed as an incongruent waste of riches "not befit to British subjects," as it was put at the time. To put it in today's perspective, I refer to the planned building of pipelines cutting through pristine forests and ancestral lands of British Columbia. The lack of long-term vision toward ecological and cultural issues stems from a short-term dominant market economy focus, with limited financial benefits and significant risks for the very society at large.

Recently, in contested situations where it is too time consuming or expensive for indigenous populations to fight for their IP rights in the courts, many groups are turning to the development of cultural protocols as nonlegal means of protecting cultural landscapes, knowledge systems, and intellectual properties. Cultural protocols are sets of guidelines developed by indigenous communities with the involvement of outsiders (archaeologists, scientists, business people, and government officials) to increase cultural sensitivity and understanding of cultural traditions, landscapes, and/or biocultural resources. Many archaeologists have worked with indigenous populations to develop cultural protocols and research protocols for the protection of sacred sites and TK. The goal is to acknowledge and protect indigenous IP while

changing behaviors and attitudes among outsiders, ultimately benefitting indigenous populations and the society at large. Although protocols are often non-binding, they provide a flexible mechanism for advancing indigenous populations interests in controlling access to tangible and intangible heritage while renegotiating unequal knowledge-sharing practices (Bannister 2009: 287;Torsen & Anderson 2010: 76).

The issue of indigenous IP is embedded in a long link of themes from the survival of ecosystems to the reproduction of cultural traditions. All the links are intertwined in the deeply ritual world vision of indigenous populations, and as such the very subsistence of pristine forest trickles down to the survival of those traditions. The historical context of the early twenty-first century is on the side of indigenous populations, but not without important obstacles to surmount.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Intangible Cultural Heritage
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)

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Indigenous Knowledge and Traditional Knowledge

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Introduction

Over time, Indigenous peoples around the world have preserved distinctive understandings, rooted in cultural experience, that guide relations among human, nonhuman, and other-than-human beings in specific ecosystems. These understandings and relations constitute a system broadly identified as Indigenous knowledge, also called traditional knowledge or aboriginal knowledge. Archaeologists conducting excavations in Indigenous locales may uncover physical evidence of Indigenous knowledge (e.g., artifacts, landscape modifications, ritual markers, stone carvings, faunal remains), but the meaning of this evidence may not be obvious to non-Indigenous or non-local investigators. Researchers can gain information and insight by consulting Indigenous traditions; these localized knowledges contain crucial information that can explain and contextualize scientific data. Archaeologists should, however, strive to avoid interference with esoteric knowledges, sacred sites, ritual landscapes, and cultural property. Research consultation with local Indigenous knowledge-bearers is recommended as a means to ensure ethical practice and avoid unnecessary harm to sensitive sites and practices.

Definition

Traditional Indigenous knowledge can be defined as a network of knowledges, beliefs, and traditions intended to preserve, communicate, and contextualize Indigenous relationships with culture and landscape over time. One might distinguish "knowledge" as factual data, "belief" as religious concepts, and "tradition" as practice, but these terms are often used imprecisely and interchangeably to describe Indigenous epistemologies. Indigenous knowledges are conveyed formally and informally among kin groups and communities through social encounters, oral traditions, ritual practices, and other activities. They include oral narratives that recount human histories, cosmological observations and modes of reckoning time, symbolic and decorative modes of communication, techniques for planting and harvesting, hunting and gathering skills, specialized understandings of local ecosystems, and the manufacture of specialized tools and technologies (e.g., flint-knapping, hide tanning, pottery-making, and concocting medicinal remedies).

Indigenous communities have devised distinctive methods of encoding useful data within philosophies of thought and modes of activity that are linked to particular landscapes. This data includes geographical, genealogical, biological, and other evidence that maps human relations to flora and fauna, land and water, and supernatural forces. Knowledge is often passed on through regular Indigenous performances – including oral traditions, song, dance, and ceremony – that convey both literal and metaphorical truths about these relations. Skilled individuals and families are entrusted to maintain these traditions; some are specialists who protect esoteric knowledges. Although many aspects of traditional knowledge have been identified and recorded through ethnographic and ethnohistorical research, some are still unknown to outsiders.

Individual ethnic and tribal communities, in different regions of the world, have preserved different versions of traditional knowledges. While these knowledges might share some things in common, they do not comprise a single (or simple) tool kit. Indigenous knowledges can be envisioned as an hereditary system of learned awareness and skill that enables wisdom to be gained and tools to be constructed, as needed, from the materials at hand. These knowledges are rooted in a particular place or ecosystem, but they are not necessarily static or fixed. Religious knowledges, for example, are quite portable and can be used to mediate human encounters with ancestral spirits and other-than-human beings, wherever these encounters might take place. Ecological knowledges are also portable, in that they call for reliance upon local resources and careful observations of the interactions between living beings and natural processes within an ecosystem (any ecosystem) to ensure human survival (Fig. 1).

Indigenous Knowledge and Traditional Knowledge, Fig. 1 Roger Paul (Passamaquoddy), shown constructing the frame for a Wampanoag *wetu* (shelter) beside the Penobscot River in Maine, during a Wabanaki Writers retreat in 2009 (Photograph by Margaret M. Bruchac)

Knowledge Keepers

Some traditional understandings are common knowledge, shared by all members of a tribal community, ethnic group, kin network, or family. Many of these are learned through phenomenological experience and everyday activities. More specialized types of information are preserved by gatekeepers (e.g., tribal leaders, ritual practitioners, medicine people) who have vested interests in, deep experience with, and long-standing connections to significant sites. Keepers of oral traditions are often carefully trained to link parts of traditional narratives to specific events and locales, and cultural coherence is ensured by regular repetition (Vansina 1985). In Native American communities, these people are often selected as children and carefully trained up by elders. In Australian communities, there are gatekeepers identified as "Traditional Owners" who may inherit this role within a family line; it is their responsibility to monitor and mediate human interactions with the ancestral landscape (Smith & Wobst 2005). Among the Maori, specific categories of specialized, protected knowledges are entrusted only to select members of a group (Smith 2012). In general, Indigenous knowledge-keepers and traditional elders are

afforded considerable respect in their home communities; in the academy, however, they have not yet gained the same degree of status afforded to scientific knowledge-keepers.

Traditional Ecological Knowledge

Traditional ecological knowledge (also called traditional Aboriginal knowledge) can be defined as practical applied Indigenous knowledge of the natural world. This is more than a mere collection of primitive survival tactics; it is a system of awareness that offers both moral guidelines and practical advice. Local practitioners conduct their activities (e.g., plant medicine, shelter construction, hunting skills, craft manufacture) using natural materials; they must rely upon intimate understandings of local flora and fauna to collect the necessary resources. Traditional ecological knowledges emerged from environmental understandings shaped over time by incremental learning (including trial and error and experimentation), and they crosscut the scientific disciplines of biology, botany, geography, and cosmology (Augustine 1997; Berkes 2012). Some evidence suggests Indigenous overuse of fragile environments, but in general (in the pre-colonial era), Indigenous peoples endeavored to maintain traditional landscapes. They did not depend upon large-scale resource extraction and development; instead, they maintained unique floral and faunal communities through measured harvests and ritual activities that emphasized reciprocity (Apffel-Marglin 2011). Among many Indigenous groups, proper attention to local spirits is believed to be an essential element of long-term lifeways (Berkes 2012; Smith 2012). The religious tenets of ecological awareness (identified as sacred ecology) were encoded in instructive narratives and dynamic interactions with local environments, intended to ensure long-term survival (Berkes 2012: 219). Human health was a natural by-product of environmental health.

Stephen Augustine (*Mi'kmaq*) identifies traditional knowledge as a system that derived from the survival tactics that Indigenous peoples perfected over generations, preserved in collective memory and community teachings:

> This knowledge is exercised within the context of the social values and philosophies of the tribe. . .The fact that Native science is not fragmented into specialized compartments does not mean that it is not based on rational thinking, but that it is based on the belief that all things are connected and must be considered within the context of that interrelationship (Augustine 1997: 1).

Gregory Cajete (*Tewa*) identifies this expansive mapping of knowledge as "Native science":

> Native science is the collective heritage of human experience with the natural world; in its most essential form, it is a map of natural reality drawn from the experience of thousands of human generations. It has given rise to the diversity of human technologies. . .in profound ways Native science can be said to be "inclusive" of modern science, although most Western scientists would go to great lengths to deny such inclusivity (Cajete 2000: 3).

Traditional ecological knowledge, as a system, links sophisticated philosophies with practical measures as a means to mediate and moderate human interactions with ancestral landscapes. Some of the archaeological evidence from remote areas, where subsistence lifeways are the norm, suggests ancient continuities with the far distant past (see discussions of *Dene, Inuit,* and *Gwich'in* archaeology in Nicholas & Andrews 1997). Some ancient Indigenous stewardship practices appear to be equivalent with (if not superior to) modern conservation approaches (Nicholas & Andrews 1997; Apffel-Marglin 2011; Sillar & Fforde 2005).

Traditional ecological knowledges can inform everyday and ritual activities, in public and private venues. Some ritualized activities aim to combine the knowledge and phenomenological experiences of multiple individuals for maximum effect. For example, in preparation for hunting, individuals may prepare their tools in a traditional location. The movements of the stars, measured by means of standing stones, may be used to predict the appropriate time and season to hunt. Traditional knowledge-bearers may utilize forms of divination, and a group might join together in dance to call the game. The products of the hunt may be selectively offered as reciprocal gifts to the forest or ritually shared at a community feast. The people who

engage in these activities are not naively requesting favor from unseen forces; their actions are guaranteed success only if participants are keenly aware of the relevant ecological data (e.g., season, weather conditions, and general health of animal populations) before they begin. Evidence of these activities, in markers left on the landscape – piles of debitage, stone carvings, dance circles, and bone collections – may be encountered in later archaeological investigations (Fig. 2).

The precepts of traditional ecological knowledge can thus provide context and explanations for artifacts, site modifications, and evidence that might otherwise appear mysterious. As examples, consider two geographically different cases: Inuit hunters in the Arctic, who learn to respect the potential animacy (and inherent danger) of certain weapons and tools in an extreme climate; and medicinal practitioners in the Amazon rainforest, who develop exquisite senses of smell to distinguish among many different varieties of potentially poisonous plants. One might encounter archaeological remains reflecting these different knowledges: a tool scratched with symbols and a bundle of leaves. In their time, these distinct regional knowledges shaped the circumstances of survival; in our time, an awareness of these knowledges provides a crucial framework that situates and explains these people from the past.

In summary, traditional ecological knowledges include sophisticated site-specific and culture-specific instructions, embedded in the landscape and evidenced in unique skill sets, activities, and localized knowledges. If followed properly, these instructions are intended to ensure both short-term survival and long-term human health, community sustainability, and preservation of unique ecosystems (Apffel-Marglin 2011; Berkes 2012).

Indigenous Knowledge and Traditional Knowledge, Fig. 2 Maritime archaic toggling harpoon point, housed in the collections of Memorial University, St. John's, Newfoundland, Canada (Photograph by Margaret M. Bruchac)

Oral Traditions

Oral traditions, whether communicated as historical narratives or mythical stories, constitute a form of traditional knowledge that can teach, carry, and reinforce other knowledges. Among Indigenous groups, oral traditions serve as the collective memories of ethnic, tribal, and kinship groups, a formal "corpus relating to the whole society" (Vansina 1985: 19). Oral traditions can blur the boundaries of narrative and performance in that they are both product and process, object, and experience. Although they may be characterized as fragile or malleable, these traditions are not simple hearsay or personal reminiscence; they are community memories, regularly recounted and periodically verified by knowledgeable elders.

Indigenous oral traditions often contain insightful explanations that focus on details: origin stories referencing natural and constructed features of the landscape, descriptions of the beings that inhabit this landscape, articulations of the reciprocal relations among these beings, and traditional beliefs that guide human interactions with place. Oral traditions can also include supernatural data: stories of encounters between human and nonhuman beings in the distant past, messages delivered by animal intelligences, and spiritual visions and transformations (Cajete 2000; Bruchac 2005; Vizenor 2008). Some of the most ancient oral traditions record the actions of other-than-human beings who moved glaciers, rivers, and rocks, actively sculpting the Indigenous homeland. Some of the more recent ones explain distinctive place names that map and mark human geographies.

This information is typically passed on through acts of storytelling that are both literal and metaphorical, as they verbally reconstruct connections with the past (Bruchac 2005; Johnson 2007; Vizenor 2008). As Gerald Vizenor (*Anishinaabe*) articulates it, oral traditions in the hands of a skilled teller – a storier – can evoke elemental realizations:

> Native storiers of survivance are prompted by natural reason, by a consciousness and sense of incontestable presence that arises from experiences in the natural world, by the turn of the seasons, by sudden storms, by migration of cranes…by the favor of spirits in the water, rimy sumac, wild rice, thunder in the ice, bear, beaver, and faces in the stone (Vizenor 2008: 11).

"Survivance" is more than mere survival; it is the active continuation of traditions that preserve the knowledges of these connections, including regular discourse with the ancestors to maintain a conscious "sense of presence over absence" (Vizenor 2008: 1).

Indigenous peoples may combine the narration of these traditions with other activities and symbols – ritual practice, dance, music, art, rock carvings, and mock combat – that ritually reenact or engage with ancestral beings or other creatures. Since many of these characters are represented in symbols or totems, archaeologists should familiarize themselves with kin groups and social markings of the population under study. Particular plots, characters, symbols, or other elements of traditional narratives may appear in ethnohistorical records that can shed light on archaeological remains (Bruchac 2005).

In Native American contexts, some individuals were destined from birth to become oral tradition-keepers, historians, and interpreters (Vizenor 2008: 12). In African communities, *griots* learned to recount geo-biographical narratives that recorded the lineage of key family groups and the length of residence in particular regions (see, e.g., discussions of Kenya and other African locales in Sefa Die et al. 2000). Oral traditions may speak of a particular family, lineage, language, or region or serve as markers of distinct Indigenous identities. From the colonial era to the present, oral traditions have also been employed as a means of identification and a form of resistance to colonial domination (Bruchac 2005; Johnson 2007; Vizenor 2008).

Oral traditions can have both practical and ritual aspects. On a practical level, Indigenous peoples have developed technologies that enable successful hunting and gathering. Yet, they recognize that animals, birds, and other beings have agency and traditions of their own. They expect to interact with these beings not only in the flesh but also through dreaming and ritual encounters (Apffel-Marglin 2011; Augustine 1997; Johnson 2007). Ritual activities provide a means of communicating with elemental spirits and worldly beings that have intelligences of their own (Apffel-Marglin 2011). Narratives of these encounters remind us that human relationships are inextricably intertwined with these beings and places.

Oral traditions, as products of human expression, may seem too ephemeral in locales where Indigenous agents are absent or silent. Yet, as a potential source of data, they should not be overlooked. Even when collected at a distance in time and space, local stories may still contain crucial data (e.g., site descriptions, explanations of practices, memories of social activities) that can map and mark a significant Indigenous site (Bruchac 2005).

Historical Background

Indigenous knowledges that predate colonialism were once regarded as primitive and unsophisticated; this cultural bias historically obscured both the structure and practice of these knowledges. Western practitioners posed a serious threat to the integrity of Indigenous cultural traditions and territory, by regarding them as public scientific property. Archaeologists conducted investigations in destructive and ethically questionable ways. The damage included desecration of burial places, theft of cultural property, imposition of nationalist ideologies, interference with traditional activities, damage to local ecosystems, misrepresentations in museums, and general disrespect for Indigenous culture and property.

During the early years of archaeology, scientists were largely unaware of the validity of Indigenous knowledges, and intellectual exchanges between Indigenous and European knowledge-bearers were less than ideal. Indigenous peoples were largely treated as objectified subjects rather than participatory colleagues. Indigenous beliefs and traditions were regarded as religious superstitions when compared to both imperialist ideologies and larger organized religious movements. In North and South America, Australia, and New Zealand, Indigenous peoples were politically disempowered and living in a hostile atmosphere that made it difficult for traditional communities to maintain cohesion. Among the Maori, colonization directly interfered with the authority of traditional leaders and traditional knowledge, stripping away Maori control of their land and destiny (Smith 2012: 175).

Broadly speaking, all human knowledges are rooted in traditions passed on from one generation to the next, one community to another. In this regard, scientific approaches to archaeology could be considered a body of traditions that emerged from the distinctive social relations and exercises of power that developed in the environments of modern European academies. Within those academies, a mode of research was devised – the scientific method – that is prized for its presumed objectivity. The data collected is, however, catalogued and classified in ways that are somewhat detached from practical and sensory experience (Apffel-Marglin 2011; Smith 2012). Scientific models of thinking and organizing rely upon disciplinary divisions that segregate the natural world and products of human experience into disparate parts that do not reflect their places of origin (e.g., the use of Latin names for flora and fauna). Indigenous knowledges, by comparison, are inherently holistic and integrative, being rooted in sensory awareness and human experience of the complex relationships among multiple organisms in distinct ecosystems (Augustine 1997; Apffel-Marglin 2011; Smith 2012). Indigenous knowledge is not wholly unscientific, and concepts of "science" and "tradition" need not stand in opposition, since these are potentially complementary ways of organizing human understandings and interactions with the natural world.

For much of the nineteenth and twentieth centuries, anthropological studies of Indigenous knowledge largely focused on data that was useful to Western scientists. Ethnographic studies recorded biological identifications, hunting activities, naming practices, and linguistic structure as discrete bodies of data, without full consideration for the Indigenous philosophies that guided complex relationships among these forms of knowledge. During the early twentieth century, Native American individuals often served as informants and assistants at archaeological sites, but the relations between these individuals and the actual keepers of sacred knowledges are still open to question. Archaeological sites were particularly vulnerable to pot-hunting by amateurs (and some professionals) who disarticulated remains and removed cultural objects in the search for valuable specimens. These interferences damaged the integrity of sites and destroyed some of the evidence of Indigenous knowledges. As archaeologists moved to professionalize, national organizations pressed for legislation to protect the scientific value of Indigenous sites (e.g., the American Antiquities Act of 1905). Despite this effort, Indigenous consultation was not routine in the practice of archaeology until human rights issues came to the fore in the 1970s.

Key Issues/Current Debates

The fraught relationships between Indigenous peoples and archaeologists have shifted dramatically in recent decades, as a direct result of increasing attention to the ethics of practice and the inclusion of Indigenous people as research partners (Nicholas & Andrews 1997; Smith & Wobst 2005; Schmidt 2009; Nicholas 2010). Practitioners of Indigenous archaeologies have often insisted that Indigenous knowledges be placed foremost when excavating Indigenous sites. Indigenous activists have also called for corrections to the many distortions of oral

traditions and local knowledges that have influenced both public views of the Indigenous past and Indigenous views of themselves (Nicholas 2010; Smith 2012). As Linda Tuhiwai Smith (*Maori*) explains, these distortions are ideologically laden with colonial influences and have trapped people within a vision that "does not connect with either our oral traditions or our lived reality" (Smith 2012: 172).

In some regions, Indigenous people are exerting influence as sovereign nations to challenge the presumed exclusivity of state control and scientific ownership of heritage. Archaeologists can no longer assume sole authority in the field, and they should be prepared to encounter and negotiate potential disputes, not only over the ownership of sites and materials, but over the application of differing forms of knowledge (Smith & Wobst 2005; Atalay 2012). Indigenous ecological knowledges are likely to be called out as evidence in disputes over development or archaeological research in sensitive sites.

Among Native American and First Nations people in the United States and Canada, the continuation of traditional practices (e.g., ritual activities, seasonal hunts and harvests) may provoke conflicts with state and national conservation agencies and policies. Conservationists typically privilege romantic visions of uninhabited wilderness, rather than Indigenous visions of sustainable hunting, fishing, and harvesting (Apffel-Marglin 2011: 23). South American Indigenous activists face similar struggles in protecting traditional landscapes and practices. Traditional sites need protection and verification (which can sometimes be provided by archaeological surveys), but exposure may invite cultural and economic exploitation (bio-prospecting, bio-piracy, tourism, development). There is also the risk that exposure and development may interfere with the delicate balance of natural world forces (weather, water, climate, spirits) that ensure community safety (Apffel-Marglin 2011).

In recent decades, there has been considerably more awareness of Indigenous knowledge and more effort to ensure community involvement (Sillar & Fforde 2005; Menzies 2006; Atalay 2012). Traditional knowledges have informed archaeological studies of Indigenous religions, rock art, ritual, and sacred landscapes, improving the accuracy and complexity of these fields of study (Berkes 2012). Archaeological evidence of sustainable ancient practices not only testifies to long-term Indigenous habitation; it can also inform future policies in cultural resource management (Nicholas & Andrews 1997).

In some cases, however, the stereotypes (e.g., the paradigm of simplistic practice) persist, obscuring the evidence of subtle yet significant activities (Apffel-Marglin 2011). Oral traditions that record the details of sacred landscapes and ceremonial complexes may be missed by scientists in search of more recognizable evidence of human constructions. In the Andes, for example, channels constructed for the ritual conveyance of water spirits may be misunderstood as simple irrigation lines (Apffel-Marglin 2011). In Aboriginal Australia, cultural landscapes with minimal modification that house potent spirits and inspire instructive dreamings (see examples of *Barunga* and *Ngarrindjeri* lands in Smith & Wobst 2005) may not be recognized by outsiders as sacred.

As decolonizing scholars have noted (e.g., Augustine 1997; Smith & Wobst 2005; Nicholas 2010; Apffel-Marglin 2011; Smith 2012), the inclusion of Indigenous knowledge is not without controversy. Critics have questioned the veracity of Indigenous knowledges, challenged the qualifications of community experts with no apparent scientific training, and questioned the degree to which Indigenous peoples should be allowed to exert control over scientific research. Some wonder whether knowledges indigenous to one locale have any usefulness outside of that limited sphere (Ellen et al. 2000: 17). These concerns suggest that Indigenous knowledges deserve closer study and better analysis. Anthropological and Indigenous scholars are addressing these concerns by codifying the tenets of Indigenous knowledge (e.g., Cajete 2000; Sefa Die et al. 2000; Smith & Wobst 2005; Berkes 2012; Smith 2012). They are also demonstrating that, in many cases, scientific knowledges can be

expanded and improved through articulations with the perspectives and substance of Indigenous knowledges.

International Perspectives

In the postcolonial era, traditional knowledges are providing more than just explanations for past practices; they are informing many of the new protocols and agreements designed to govern the protection of Indigenous natural resources, cultural knowledge, and intellectual property. Not surprisingly, the new level of respect afforded to traditional knowledges roughly parallels the increase in collaborative Indigenous archaeologies. The protection of Indigenous rights (including guaranteed access to traditional landscapes and more conscientious cultural resource management) is now a crucial area of concern in international environmental law (Ellen et al. 2000; von Lewinski 2004; Menzies 2006). Concepts of intellectual property have been extended to include oral traditions, folklore, ecological knowledge, Indigenous languages, and traditional names.

In diverse locales (e.g., forest management in India, rubber production in South America, controlled fires in the Philippines), state officials are now relying upon Indigenous peoples to use traditional knowledges to identify and prevent future environmental threats (Ellen et al. 2000). In Latin America, many Indigenous peoples are exerting local knowledges as a means of reinterpreting the past and reclaiming control of ancient landscapes. In Amazonia, Bolivia, Colombia, Mesoamerica, and elsewhere, marginalized communities are collaborating with archaeologists to reassert their identities and reframe problematic state representations of their past (Gnecco & Ayala 2011). This suggests the need for a wholesale decolonizing of knowledge while rethinking our relationships with natural phenomena (Gnecco & Ayala 2011: 34).

Efforts in some regions have been more collaborative than others. In Canada, mainstream scientists have reached out to Aboriginal knowledge-keepers and First Nations tribal leaders to develop joint strategies to address climate change, habitat loss, and other damages caused by unchecked resource extraction and modern development. Both Indigenous and non-Indigenous communities stand to benefit from efforts that encourage sustainable use of local resources. In the Aboriginal Provinces of *Nunavut* and *Nunatsiavut*, for example, governmental agencies such as the Renewable Resources Division strive to develop policies that deliberately integrate Indigenous and scientific approaches to site preservation and wildlife conservation. Traditional landscapes are recognized as potentially fragile ecosystems, but they are also seen as living homelands for Aboriginal people who can be trusted to continue their traditional lifeways (including seasonal harvests and hunting) in a responsible manner that considers the health of future generations.

In recent decades, as a direct result of increased political engagement with Indigenous communities around the world, states and institutions have devised protocols to mediate relations among Indigenous peoples and scientists. The 1991 World Archaeological Congress code of ethics, for example, unambiguously acknowledges Indigenous peoples as the originators and owners of their traditional knowledges and cultural heritage (World Archaeological Congress 1991). The United Nations' *Declaration on the Rights of Indigenous Peoples*, adopted by the General Assembly on September 13, 2007, recognizes Indigenous ownership and validates traditional practices as contributors to "sustainable and equitable development and proper management of the environment" (United Nations 2008). Articles 11 and 31 identity these rights as follows:

> *Article 11.*
>
> 1. Indigenous peoples have the right to practice and revitalize their cultural traditions and customs. This includes the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies. . .
>
> *Article 31.*
>
> 1. Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional

Indigenous Knowledge and Traditional Knowledge, Fig. 3 Peter Jemison (Seneca), tribal Faithkeeper and member of the Haudenosaunee Standing Committee on Burial Rules and Regulations, rolling up a modern version of the traditional Two-Row Wampum belt (Photograph by Margaret M. Bruchac)

> cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.

The Declaration also indicates that states are expected to provide restitution in instances where traditional culture and cultural manifestations have been taken without consent (United Nations 2008).

In Oceania and in the Americas, tribal leaders and tradition-bearers are reaching out to non-Indigenous peoples (including the scientific community and state agents), offering to share traditional knowledges to ensure mutual survival (see examples in Smith & Wobst 2005; Nicholas 2010; Atalay 2012; Smith 2012). As one such example, the *Haudenosaunee* (also known as the Six Nations Iroquois, a tribal confederacy in the northeastern United States and Canada) are re-awakening the agreement known as the "Two-Row Wampum." This diplomatic tradition invites two disparate cultures to coexist, side by side, without undue interference with one another. This ideal parallels some of the current efforts to integrate scientific and Indigenous knowledge. Caution is still needed, however, since archaeological applications of Indigenous knowledge (when used to locate sensitive areas, identify material culture, or map future developments) should be conducted in ways that protect the security of traditional landscapes and lifeways and avoid further damage to the Indigenous (Fig. 3).

Future Directions

Archaeologists have much to gain from recognizing the data and philosophies preserved within Indigenous traditional knowledge. Oral traditions can preserve records of ancient landscapes, and traditional ecological knowledges can explain human interactions with those landscapes. Wisdom gained in one locale may be used to interpret a related locale or to articulate linkages among past, present, and future generations. Indigenous ways of knowing are not, however, static fossils or reinvented memories. Despite the damage (and, in some cases, outright destruction) caused to Indigenous ecosystems and cultures by European colonization, many traditional practices have persisted with a surprising degree of coherence (e.g., Augustine 1997; Apffel-Marglin 2011; Smith 2012). A considerable volume of data has been retained within Indigenous languages and philosophies. Indigenous peoples have also devised modern applications

for traditional knowledge in the wake of colonization, by utilizing new resources (including manufactured and recycled materials) to produce traditional tools and crafts. Indigenous knowledges that emphasize experiential awareness can be helpful in multiple settings, since they readily allow for the incorporation of new data in response to new environments.

Indigenous people are increasingly being recognized, not just as cultural informants or site monitors, but as intellectual partners in the archaeological enterprise. Dozens of Indigenous people have become professional archaeologists (some of their work can be glimpsed in Smith & Wobst 2005; Schmidt 2009; Nicholas 2010). Their collective insistence upon collaboration, consultation, and respect for cultural tradition (reinforced by new legal protocols) has altered the routine practice of archaeology among the Indigenous and promises to inspire better understandings (e.g., Schmidt 2009; Nicholas 2010; Gnecco & Ayala 2011; Atalay 2012). The insights that emerge from these collaborations will continue to inform, expand, and complicate scientific understandings of the Indigenous past and present.

Cross-References

- ▶ Community Engagement in Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeologies
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation: Overview
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Stakeholders and Community Participation
- ▶ United Nations Declaration on the Rights of Indigenous Peoples (2007)

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Indigenous Peoples and the Challenges of Genetic/DNA Studies

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Introduction

All human societies have developed ways of explaining the natural world around them, resulting in different belief systems that also provide a framework for sociopolitical structures and physical and spiritual connections. Archaeology examines material evidence of the past, and archaeological methods have arisen through theoretical and technological science-based endeavor. Genetic analyses probe the essential molecules of organisms that are templates for life, presenting personal and societal challenges. Indigenous knowledge includes scientific knowledge acquired by experience and application to the needs and circumstances of communities that are not necessarily grounded in the ways of western science. Indigenous peoples have lived through recent histories of colonization while retaining much of their culture and belief systems which is a tribute to resilience, survival, and an indication that western-based science should not and does not always replace those belief systems. Indigenous perspectives from the living descendants of the first Australians serve to exemplify the contrast between traditional belief systems and the challenges presented by western science. The issues that arise are similar to those experienced by other indigenous peoples but also take on specific meaning for regional groups depending on their experience and exposure to the dominant culture of the colonizers.

The western scientific method of explaining the natural world is to propose ideas or hypotheses and test them by the acquisition of evidence

that can be analyzed and evaluated. Using the methodologies of the time, data emerge, accumulate, and provide material for intellectual interpretations that in turn gives rise to new or revised hypotheses. These dynamic principles have become the hallmark of *western science*. Technological advances have arisen from scientific endeavor and, in turn, provide tools for the ongoing process of investigation. Technologies that allow biological investigation of living and past organisms have developed very quickly over the last 300 years. The scientific basis of *ancestry-related genetics research* is embedded in an evolutionary paradigm that assumes that all living organisms evolved over millions of years. That paradigm in itself is based on scientific evidence of the history of our planet derived from many disciplines, especially geology, paleontology, and chronology. Gene technology improvements have accelerated over the last 50 years, allowing detailed description of the essential building blocks of life, DNA, in living organisms and the genetic diversity that abounds within and between species. However, just how the vast, accumulating databases from DNA studies help us to know biological systems and how they react with environmental influences in time and space is only partly understood. The applications of genetic research may be directed at conservation biology, veterinary science, evolutionary biology, developments in primary industry, and, in the case of human genetic studies, forensic investigation, the probing of ancestral relationships and in medical research.

An indigenous perspective of the Australian past is drawn from a tradition of deep oral history and spiritual connection to country, language, traditional ties, and social structure. Among Aboriginal Australians, there is a commonly held view that ancestors originated in Australia; therefore, any alternative explanation of origin, including views held by different religions, presents a conflict. However, there is a growing acknowledgement and appreciation of western science within the Australian Aboriginal community. The imposition of western scientific methodology provided different tools, so that a plethora of ethnographies and linguistic and archaeological studies eventuated that demanded evidence of human habitation and forced dates upon the story, not required for indigenous concepts of origin. Over the last 200 years, accumulated scientific information shows strong support for a very long human presence in Australia but not of an in situ origin, recognizing that Australian Aboriginal peoples are one of the oldest living cultures on earth outside sub-Saharan Africa. Genetic studies support archaeological evidence, demonstrating that anatomically modern humans were living in Australia, the world's largest island continent, while Neanderthals and ancient Asian peoples were in Europe, Asia, and islands to the north. Within the social milieu of Australia today, many Aboriginal and Torres Strait Islander people enjoy their heritage and reconcile it with knowledge acquired through science, while others find it difficult.

Over several decades, scholars have studied skeletons of Australian Aborigines and developed theories that have tested models of human evolution and at the same time created confusion for many indigenous people. In several instances, the skeletal remains of the Australian Aboriginal people have been at the center of the human evolutionary debate. Biological data collected from skeletal remains are deemed important in linking anatomically modern humans (AMH) to *Homo* lineages of the distant past and understanding how ancient peoples were dispersed throughout the globe. In more recent times, DNA analyses on both the living and the dead have also been used to inform us of the human evolutionary story, and this development has presented additional challenges. These DNA studies are for the most part controlled by western-based research. The technology that enables these studies has accelerated the accumulation of genetic data about skeletal material and living humans that impact on the lives of indigenous peoples who may not be ready to see beyond the perceived risks, to the benefits that may flow.

Are these contrasting approaches reconcilable? This entry reflects on the contribution made by science-based research about skeletal material from Australian Aboriginal people as well as DNA studies from the living and the

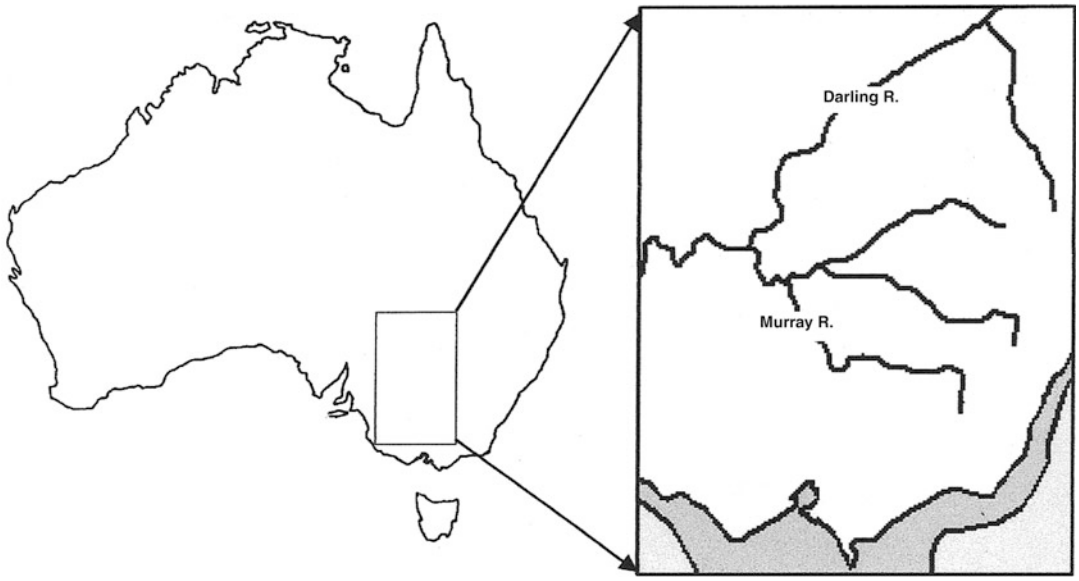

Indigenous Peoples and the Challenges of Genetic/DNA Studies, Fig. 1 The enlarged area shows the Murray-Darling region of southeastern Australia discussed in the text. Aboriginal Australians have been involved with western scientists in research that includes genetic, anthropological, archaeological, and linguistic studies. Details of those studies and many others from the Australian continent can be accessed through the references provided

insights that have been gained from the collected data. Importantly, the discussion includes an indigenous perspective that explores the understanding held by living Aboriginal people regarding their ancestors from a geographical region in southeastern Australia (Fig. 1). By so doing, we obtain a guide to an indigenous perception of the importance that these data hold for people. A particular concern is to address the challenges that genetic research has for Australian indigenous peoples in the context of multidisciplinary investigations of past peoples, their relationship with their ancestors and with contemporaneous neighboring groups, and their place among other people of the world. It is an area needing the input of Aboriginal and Torres Strait Islander Australians, and it is timely for these challenges to be discussed appropriately.

Definition

Indigenous peoples are those deemed to be the earliest (first) inhabitants of a geographic region and in the current global context, before the intrusion of recent incoming peoples (for Australia 1788).

Archaeology endeavors to recover the material remains of past and present populations and study and interpret the remains, the activities, and the cultural practices that relate to the people who were responsible for the items and/or belief systems.

Genetic/DNA studies examine the molecular structure of deoxyribonucleic acid (DNA), the molecule that provides a template for life (cross-reference). DNA is inherited over generations, for an individual from both parents (nuclear DNA) and also maternally (mitochondrial DNA). Studies of variation and patterns in DNA may be used to explore questions of past and living populations.

Historical Background

Australia's archaeological record from many studies (see, e.g., Bowler et al. 1970; O'Connell

& Allen 2004) set the scene for population genetics in the 1980s by showing the richness and diversity of the continent's habitation history. Discovered and studied skeletal material shows variation in morphology ranging from extremes of ruggedness to comparative "gracility" that has added to the debate about origins, namely, whether the extremes represent descent from different ancestors or whether they simply fall within the range of normal variation. Indigenous Australians, including indigenous archaeologists, also recognize the physical variation between peoples and are aware that morphological features of some Australian Aboriginal cranial material have attracted scholars from both sides of the academic divide. While understanding the two models that have been hotly debated for the greater part of the last 30 years or more, some indigenous scholars and respected Elders have come to hold the view that by using whatever technical tools available, benefit flows to indigenous people by helping nonindigenous people to understand the history, richness, and essence of "indigeneity." For Aboriginal and Torres Strait Islanders, the notion of ancestors coming from somewhere over the sea is not so removed from that derived from western science. How people got to Australia is one of the greatest journeys about men, women, and children of the ancient past venturing into new lands. Respect for both the traditional and contemporary views can coexist, so that an indigenous person can believe that use of techniques such as DNA analysis is of value and see it as a useful gift of the modern world. So in Australia today, indigenous opinions vary, some believing only that they originated in Australia while others think that their world is here in Australia and also believe in descent from a hominid cradle in Africa. In many ways, contemporary Australian Aboriginal society has been brought to life through these works, and DNA studies complement and enrich the continuing story. It will be through further research, including genetic studies, that the journey of Aboriginal Australians to the continent will be understood and hence contribute to the greater story of hominid movement around the globe.

The foundations for human ancestry-related genetic analyses were derived from population studies in many other species that demonstrated the remarkable heritability of genetic material and, once the structure of DNA became known, established sound methodologies for studying diversity within and between species. The earliest genetic evidence of the genus *Homo* (Cann et al. 1987) and many studies that followed supports the idea that humans evolved in Africa and spread throughout Eurasia before dispersing into all other parts of the populated world. Recent genetic evidence confirms previous work that supports the contention that Aboriginal Australians of today descend from the earliest humans to occupy Australia and therefore represent one of the oldest continuous populations outside Africa (van Holst Pellekaan 2011). The timing for human dispersals remains contentious. Genetic studies that include Aboriginal Australians are not representative of the whole continent but are valuable because they confirm the presence of very ancient Australian maternal lineages, some of which have ancestral connections with people from Papua New Guinea and others are Australian specific indicating that Australia was settled very early in the diasporation of modern humans (van Holst Pellekaan et al. 2010; van Holst Pellekaan 2011). Genetic signatures indicate that people may have entered at different parts of the northern shores around similar times, moved on, and then underwent a period of relative genetic isolation when sea levels rose. Importantly, some of the participants in these genetic studies belong to the Darling River region, part of a well-studied area that is useful to consider as an interface between western science and indigenous involvement, which has increased significantly in heritage management over the last two decades.

A Regional Study Area Example from Australia

By examining the experiences of a well-studied geographic region encompassing present-day northwest Victoria, western NSW, and South Australia (see Fig. 1), the impact of western science on the living descendants of the first

Australians serves to illustrate how belief systems can accommodate different ways of explaining the world. The region is important, firstly, because early exploration of Australia resulted in valuable written observation and ethnographic records exemplified in Blandowski's work of 1841 (Allen 2010); secondly, archaeology has revealed and dated many sites (Ross 1981; Pardoe 1995; Grist 1995); and thirdly, human skeletal morphology and *genetic studies* have included participation from strong family lineage members (Pardoe 1995: 697; van Holst Pellekaan et al. 2010). These studies have served to demonstrate that the region was rich in resources during the Pleistocene and into the Holocene supporting many inhabitants. Soon after European colonization, around 1850, the occupants were from many language groups in the area whose descendants now identify as, for example, the Nyeri-Nyeri, Yitha-Yitha, Wemba-Wemba, Mutti-Mutti, Letyi-Letyi, Maraura or southern dialect of Paakintji, and linguistically more distantly related Nyemba. Hercus (2010) names three distinguishable language subgroups in the country around the Murray-Darling junction: the Kulin languages of Victoria, the Murray River languages, and the Paakintji or Darling River languages within which many related dialects have been identified, despite the losses resulting from colonization.

Explorers' observations from the 1830s (see also Hope 1998 and references therein) provided general observational reports about inhabitants of the broad region. Perhaps one of the most informative is the 1841 illustrated narrative by William Blandowski, some of which is recently republished (Allen 2010) and highly valued among people of the area. Reproductions of Blandowski's illustrations provide an extensive visual description of people, customs, and lifestyles. Blandowski showed the presence of fully developed hunter/gatherer societies with well-established boundaries between neighbors. It is important to understand that while specific names of Aboriginal people pictured are usually unknown, their regional and, in some cases, specific language affiliation (e.g., Nyeri-Nyeri) are acknowledged. For descendants of these people, this provides a personal link (Dugay-Grist 2010). For the Nyeri-Nyeri descendants who retain stories of named old people that have been handed down over 200 years, a link between traditional stories and the present is strengthened, connecting to land, in turn to other country and their people. Despite the colonization experience, these links contribute to the conduct/management of lives today.

Archaeological richness abounds in the area along and to the east of the Darling River including sites at Lake Mungo and within the broader Willandra World Heritage Area. Dozens of scholars and indigenous people have been involved in working together after the discovery of Lake Mungo burials that have been variably estimated to be 40,000–50,000 years (Bowler et al. 2003) and ~62,000 years old (Thorne et al. 1999) and which include the oldest known cremation in the world. Skeletal material shows morphological variation and there is evidence of changing resource management as the ephemeral lake system, once a rich and wet environment became more arid (Hope 1981). As in other parts of the world, changing conditions during the Pleistocene influenced the rate of population growth, also likely to have varied across the Australian continent (O'Connell & Allen 2004). At the south of the Murray River in northwest Victoria, over almost a quarter of a century, substantial mapping, protection, and recording of important sites within the region specified have contributed to our overall understanding of the human occupation within Australia and furthered our understanding of the journey to Australia by the Australian Aboriginal people (Pardoe 2006). Within the region identified, there are Holocene sites and others within a few thousand years of the terminal Pleistocene.

DNA from living Aboriginal Australians from the Darling River country has contributed greatly to knowledge of genetic diversity in Australia (van Holst Pellekaan et al. 2010) complementing this already powerful background of a Pleistocene presence in the Darling River area from archaeology. Participant families from the Paakintji, Nyemba, and Mutthi-Mutthi language clusters contributed DNA samples that

have been extensively studied for maternal ancestry (mitochondrial/mtDNA) and genome diversity (van Holst Pellekaan et al. 2010; McEvoy et al. 2010). The results provide genetic evidence of maternal ancestry that are strong signatures of the past likely to represent descent from early lineages in Australia who made their way into the region, further diversity being generated into branches of a regional "tree." Direct maternal lineages shown by mtDNA are called "haplotypes," and where they show shared characteristics demonstrating common ancestry further back in time, they are called "haplogroups," more clearly thought of as "superfamilies." In the region described in this entry, these haplogroups/superfamilies are called M42a, S1a, P4b, and some that are not easily defined without representation from a broader area. It is suggested that at least eleven maternal lineages from mt haplogroup P4b descend from founders in the Darling region, reflecting an ancient local presence and are distinct from other P haplogroups in northern Australia and New Guinea. Most of these lineages are from several Paakintji-related language groups, and one haplotype (14) is thought to have been from the Wangkumara language group, traditionally located considerably further to the northwest. Cautiously taking all dating methods into account, even a conservative estimate supports an ancestral presence for ~25,000–30,000 years. M42a is very strong and includes representatives from both Nyemba, Gurnu, and possibly western Wiradjiri peoples, and ancient S1a is part of a superfamily seen in southern Paakintji, Tasmania, central and northern Australia (van Holst Pellekaan et al. 2010; van Holst Pellekaan 2011). Anecdotally supported, there are likely to be members of this lineage in South Australia but participation has not yet occurred.

A more extensive study using some of the Darling River samples examined variation across the complete biparentally inherited genome (McEvoy et al. 2010). These data support a model of some connection with people of Papua New Guinea but are harder to interpret locally because of the complexities of biparental inheritance and post-colonization mixing with Europeans. The value of these data for future disease-associated studies is yet to be appreciated fully because the data sets need to be explored in many ways along with phenotypic information and with other sample groups if they become available. In summary, the mtDNA studies from the Darling River region show how valuable they are for exploring the relationships between Aboriginal people and the dispersal of peoples within Australia, and if genetic data from other Australian regions, especially of near neighbors, were to become available, another contribution can be made to the story of the past.

Key Issues/Current Debates

- *One legacy of the past* is an entrenched perception for many Aboriginal Australians that western scientists are intent on showing a hierarchy of peoples where indigenous groups are at the bottom. The effort of many researchers over recent decades has been to show that this attitude of the past does not drive research today and is neither accurate nor useful, and yet the perception persists. Unhelpfully, the presentation of the Human Genome Diversity Project (HGDP) to indigenous Australians in 1997 perpetuated this perception and that of the notion that indigenous people are "vanishing" peoples. It is so well remembered today that the experience and publicity that it generated is frequently raised and has set back the efforts of many Australian scientists who have worked hard with Aboriginal organizations and individuals to present the benefits of genetic research, to involve participants in projects and to deal together with the negative concerns.
- *Uneven responses from Aboriginal and Torres Strait Islander peoples*. Aboriginal people have been involved with professional organizations such as the Australian Institute of Aboriginal and Torres Strait Islander Studies and the Australian Archaeological Association in the development of guidelines for ethical conduct in research for some decades (AAA 2004; AIATSIS 2011). In the case of

genetic research, response is also uneven. The value of work already done is not disputed by the Aboriginal people involved or seeking inclusion, and there are a growing number of indigenous groups in Australia making use of DNA and attempting to use this data to better understand their ethos and how they are placed within a global context.

"It is the view of my people that we are now in a golden age with technology and as such we enjoy, appreciate and employ people to carry out studies in consultation with us regarding our heritage" (Dugay-Grist, *pers. comm.*).

However, there is still resistance to genetic research by others, many of whom are reluctant to take the opportunity to engage in dialogue. If this resistance persists, the extra richness contributed to history by western science may never reach many of those to whom it is bequeathed by ancestors. Presently many Aboriginal societies of Australia are lacking knowledge of the views and studies of academia relating to their ethos.

- *Ancestry-focused genetic research* may be seen as a threat to traditional belief systems, and it must be acknowledged that for all peoples, contrasts between science and religion present challenges. In Australia, these conflicts began with the impositions that included the conversion to other religions during colonization. In practice, many Aboriginal Australians show an ability to accommodate their sense of creation by ancestral beings in the natural world, known as the Dreaming, scientific knowledge, and spiritual experiences into their belief system. Conflict of this nature has not arisen in many research projects where scientific evidence is used to reinforce and emphasize the ancient history of Aboriginal people in Australia.
- *Is ancestry-related genetics separate from genetics for health*? Not essentially, because although the focus of studies may be centered around specific questions, the data that are generated from DNA studies can be interrogated for separate questions. This issue has become more relevant as complete genome studies become available. Thus, the raw data from a study such as that by McEvoy et al. (2010) confirms deep ancestral history and connection with other peoples from Papua New Guinea, but with further work, the results of the study should also be useful for exploring genetic variation in regions of the genome relevant to health and well-being. Aboriginal Australian people are not being *singled* out in genetics research but are being *left* out of medical epidemiological studies, and this may constitute another form of disadvantage. Until we understand the extent of genetic diversity in all populations, we will not know if there are specific variations in the genomes, resulting from a long period of adaptation to conditions and lifestyle that we need to understand for relevance to health. Since colonization, a different lifestyle was foisted on people, diet, and activity, and social circumstances changed dramatically. Both human settlers and introduced animals brought different pathogenic organisms, the adverse effects of which were influenced by social degradation and disadvantage. Fundamental understanding of genetic variation, ancestral and present, is a baseline step to working out details of cellular mechanisms, influenced by aspects of the social and physical environment that in turn influence wellness and illness.
- *Identity*, *rights*, *and connectedness*. For some, there is a fear that genetic research might produce results that *erode identity*, especially where colonization has imposed separation of families, mixed partnerships, and forced relocation. There is concern for some that native title claims might be threatened by genetic research (not part of the criteria for claimants). The inclusion of admixture estimates in published reports has raised comments from several critics, who again raise the issue of a potential return to classification of people based on blood quotient or genetic quotient estimates. A paucity of indigenous control or involvement in genetic projects that tend to be proposed by scientists from western style institutions is one reason

why lack of accurate information tends to exacerbate these concerns. The long-term *custody* of samples, data, and confidential information in relation to DNA studies requires resolution.

Challenges for Western Scientists

- These include lack of experience and understanding of indigenous issues on the part of researchers trained strictly in science subjects that do not include social perspectives, and difficulty in explaining complexities of DNA, inheritance patterns, and technical and analytical methods. There is a need to report results in a culturally sensitive manner that does not compromise accuracy. Reporting may not give results that "suit" expectations. For example, skeletal DNA may be studied at the request of communities who are wondering if the remains can be shown to be closely related or ancestral remains. A potential conflict of interest can be avoided if the community/families understand what sort of outcome might be expected and realize that negative or "non-matches" do not necessarily exclude relationships that are generated nonbiologically, highlighting the need for clear explanation before projects are undertaken.
- Western scientists are also working in a research environment that requires success in funding submissions to cover costs of research and time frames that do not always allow for lengthy delays. Thus, Aboriginal people who become involved in research projects also have a responsibility to respond to requests and agreed tasks in a timely manner if research is supported. Lack of or negative response from indigenous organizations who act as "gatekeepers" does not always equate with wishes of participants and may result in loss of hard-earned funding.
- *Data sharing*. The secondary use of data that is generated from projects goes beyond the immediate published reports that emanate from discrete projects. The expectation within the scientific and academic communities that results be made available to other legitimate researchers has resulted in large databases that are accessible also to the public. There are strong arguments against this policy from many quarters and the issue is not resolved.

International Perspectives

Indigenous peoples in all continents, with familiar experiences of colonization by the now dominant "others," have been included in archaeological and genetic studies, enriching the story of human dispersal. Many of the issues that are raised by Aboriginal Australians have parallels elsewhere, and there are similarly uneven responses to research. Two contrasting cases from the north American continent were addressed by McInnes (2011) describing the positive experiences of one study that investigates cardiovascular conditions in a Canadian First Nations community who have played an active role in developing the research. Canadian guidelines for researchers are extensive and freely available as models for ethical conduct in any context, stressing respect, partnerships, and collaboration. Even with good intentions on the part of researchers, projects can founder as in the case of the Havasupai v. Arizona State University (McInnes 2011) where original consent was broad, apparently including the study of causes of "behavioral/medical" conditions, but it would seem that discussions with communities centered on diabetes research which became the part well understood. When other projects used the same samples, the community felt wronged, stigmatized, and offended. This unfortunate situation resulted in a well-intended research project foundering and the institution taken to court by the indigenous community.

Future Directions

- Researchers need to *understand the concerns of indigenous peoples*, acknowledge the hurts of the past, take time to study their culture, show respect for indigenous knowledge, and refrain from inappropriate language such as telling them that they will "vanish."

We are all a product of mixed ancestry through different pathways. Indigenous Australians, like other indigenous populations, are deeply spiritual people who hold on to their creation stories and believe that much of their landscape is due to good and evil events of great import. DNA studies can easily fit into both the spiritual and everyday part of indigenous people's lives. Within most cultures, there is nothing that excludes such studies as long as it is done in consultation with those peoples and respect is shown for the wishes that may arise.

- Successful strategies are *preparedness to engage personally* with communities by close contact throughout planning and implementation of projects, where possible including indigenous personnel in the team. Building trusting relationships with clearly understood rights and responsibilities for both researchers and indigenous participants is essential. It is abundantly clear that, for consultation and negotiation to succeed, researchers need to demonstrate willingness and ability to meet with and engage Aboriginal people and organizations frequently, in their own place, on their own terms, and with appropriate explanatory documents. In turn, reciprocal respect from Aboriginal people should include honoring arranged consultations and responses to researchers in a timely manner.
- *Appropriate explanations* to outline the project, benefits, and risks are more successful if researchers enlist the assistance of indigenous people in the development of documents, diagrams, and dissemination of results. Information that states clearly the intention and possible outcomes of the research needs to be available in language suited to the needs of people with different education experiences, as well as conforming to the expectations and demands of the law and institutional and regional ethics committees. This may require sets of information at different levels of language that at the same time give the essential accurate information, and it may mean frequent repetition of verbal explanations. It is a long-term commitment, as ongoing progress reports to the communities and individual participants are necessary to maintain trust between parties.

Genetic heritage and belongingness: The history written in our genes tells us about immediate genealogies and also distant relationships that are far deeper than those defined by shared cultures, language, or local community. Genetic diversity reflects a great time depth because it is not generated as quickly as language and cultural diversity, yet our sense of "belongingness" identifies with these more recently acquired attributes. It is not necessary to allow concerns about global origins obscure the value of exploring indigenous connections within Australia. Surely these are of interest to people, for whom remembered stories about connections with neighbors may be explored with DNA technology. Aboriginal Australians will be enriched if they locate more of the ancestral remains in institutions throughout the world and in the Australian landscape in conjunction with the relevant Aboriginal community to appreciate the value of the human evolutionary story that complements the connection to land.

> The human colonisation of Australia stands as an ever unfolding global saga. It provides the virtual bookend to the world's greatest migration story, a story that illuminates the very nature of what it means to be human. In that context, for myself of latter-day European descent, it constantly poses that challenging question "Who am I" in this strange land. The answer to that question can only be sought by placing my own ancestral origins in the total context of that mega-migration event that changed the face of Australia some 50-60,000 years ago.
>
> Jim Bowler (*pers. comm.* July 2008).

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia's Archaeological Heritage
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ First Australians: Origins
- ▶ Human Migration: Bioarchaeological Approaches

▶ Indigenous Archaeologies: Australian Perspective
▶ Indigenous Archaeologies: North American Perspective
▶ Indigenous Intellectual Property Issues in Archaeology
▶ Indigenous Knowledge and Traditional Knowledge
▶ Stakeholders and Community Participation

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Indigenous Peoples, Working with and for

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Introduction

It is a universally acknowledged fact that archaeology has a very deep colonial heritage, especially in the former colonized regions of the world (Shepherd 2002; Watkins 2005; Atalay 2006; Smith & Jackson 2006; Schmidt 2009). Indeed, the roots of archaeology as a discipline can be traced to nineteenth-century Europe where the emerging middle classes got fascinated with their past (Trigger 1984). When the colonial project escalated from the nineteenth century resulting in the colonization of most of the world by European powers, European men and women got enchanted with the history and past of the colonized (Pwiti & Ndoro 1999). In the case of Africa, it was only a few colonial officials and peripatetic scholars who were involved with the study of the past. As with other regions such as North America and Australasia, this early development of archaeology had little to do with the interests of indigenous people. The information generated was often used to control and better govern the colonies as well as provide some entertainment and amusement for the colonizers (Chirikure & Pwiti 2008). Clearly, in colonial times, archaeology was hardly conducted for indigenous peoples.

A comparative study of the archaeology that was practiced during the colonial times, irrespective of geographical location in the world, exposes cadastral points that map well into Bruce Trigger's colonialist archaeology (Garlake 1973; Trigger 1984). The discipline was practiced by the colonizers and their dependants with little meaningful involvement of the local people, who were thought to be uninterested in their past. An archival study of early excavations carried out in different parts of Africa has unearthed photographs which captured identical moments in the history of our discipline in colonial Africa. Most Africans were employed as laborers in the excavation of prominent sites such as Great Zimbabwe (Caton-Thompson 1931) and Mapungubwe (Fouche 1937) as well as some Swahili towns of east Africa. The same can be said of West and North Africa. The National Museums and Monuments of Rhodesia, a body tasked with the administration of archaeology, only employed blacks as assistants for most of the twentieth century. Black archaeologists only joined the organization at independence in 1980.

Local people were only valued for their labor and historical knowledge such that their names did not even feature in site reports (Shepherd 2002; Chirikure et al. 2010). For example, in his Great Zimbabwe excavation report, Robinson (1961) states that he was assisted by six Africans, of which the most intelligent was a Rozwi one. Because their names were not recorded, we do not know them, but the resulting publications have immortalized Robinson's name. To make matters worse, the same archaeologists were "knowledge parasites" for they depended on locals for interpretive leads. In fact, Caton-Thompson (1931) made it clear that it was impossible to interpret Great Zimbabwe as an outsider without understanding the African value system, but luckily for her, she got most of the inside information from the unsung heroes – her laborers. These indigenous people were not considered as consumers of the past, neither were they seen as knowledge producers – they were just mere assistants. This lack of meaningful involvement has created a fundamental problem that haunts archaeology to this day – that is, the failure to attract indigenous archaeologists.

In fact, most postcolonial archaeologies are all meant to redress this (see Schmidt 2009). Atalay (2006) has identified the same problem in the United States where Native Americans seem to lack an interest in the subject.

Bureaucratic structures were also created to administer the protection of the past, its study, and display. Legislations were established that institutionalized archaeology as a discipline and also established museums as administrative centers. By 1969, South Africa had improved earlier antiquities legislations and promulgated the 1969 National Monuments Act, which also led to the establishment of the National Monuments Council. Other countries such as Rhodesia and Botswana also followed and established similar laws. The colonial legislation had no place for indigenous communities or their values. In fact, the laws criminalized the use of archaeological places by local communities (Chirikure & Pwiti 2008). Although the legislation in South Africa and Botswana has since been amended, colonial legislation is still in operation in Zimbabwe, where the only amendment was the name change from Rhodesia to Zimbabwe. There is no big difference between the new legislation and the old because the rights of local communities and indigenous groups are limited. Besides, the same bureaucratic infrastructure operates in independent countries, which is why recruiting indigenous people into archaeology in countries such as South Africa has been an uphill task (Schmidt 2009).

Colonialism destroyed the fabric of communities through the imposition of borders and boundaries. Land alienation also had the same effect which was not reversed at independence (Pwiti & Ndoro 1999). This resulted in different indigenous groups being exposed to the heritage of other groups which they had no relationship with. Because it was not their past, they simply ignored or disrespected the archaeology of others. Post-independent Zimbabwe saw an upsurge in black archaeologists who are now employed in most countries in southern Africa. Botswana and Kenya have also witnessed this development just as Nigeria and Senegal in West Africa. The archaeology is still practiced along the colonial lines; what is changing is the color of archaeologists. As such, there is a need for massive programs in decolonizing African archaeology, its methodologies, and its outputs (Schmidt 2009). Lane (2011) has lobbied for the production of multiple archaeologies to make sure that all voices, both dominant and dominated are heard. Given the dominance of the academy which appropriates heritage for its own purposes, there is need for a seismic shift towards practicing an archaeology that is for, with, and by the local people (Atalay 2006). That way, archaeologists will be working with and for indigenous peoples. This contribution seeks to discuss the concept of working with and for indigenous peoples from an African perspective. It also outlines some of the inherent structural challenges and suggests some paths to be navigated as the present unfolds into the future.

Definition

Who Are Indigenous Peoples? Are They Identical Across the Whole World?

A question that elicits different responses from archaeologists in the different continents is what is indigenous archaeology? According to Watkins (2005), indigenous archaeology is that which is done by, with, and for indigenous people. This definition makes strong sense if the colonial ancestry of archaeology is considered. Archaeology had no place for indigenous peoples who despite providing knowledge that was used to interpret the past were often challenged for being unscientific. Thus indigenous archaeology is a form of archaeology premeditated to restitute and empower the indigenous people to control their own destiny (Schmidt 2009). Indigenous archaeology seeks to tilt the balance of power in world archaeology in the direction of the previously colonized and marginalized peoples. It seeks to achieve this through doing archaeology by, for, and with indigenous people. The most important issue in indigenous or postcolonial archaeology is the definition of the concept of indigenous.

Watkins (2005) presents a number of definitions on what does it means to be indigenous.

He draws from the International Labour Organization definition which states that people may be "regarded as indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present State boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural, and political institutions". There are four general distinguishing factors for indigenous people: descent from the "first comers" on the land, lack of economic and political power, cultural uniqueness or non-domination, and some form of group identity (Watkins 2005). The issue of indigenous has political connotations for it implies marginalization, disempowerment, and lack of independence. In many ways, indigenous peoples are treated as second-class citizens on account of their ancestry and political and economic inferiority.

A global identification exercise would list the Sami of Northern Europe, the so-called First Nations of Canada, Native Americans, Aborigines of Australia, the Maori of New Zealand, the San and Khoisan of southern Africa, the Pygmies of Central Africa, and Hadza and Dorobo of East Africa as the quintessential indigenous peoples. This identification of who is indigenous is very problematic for sub-Saharan Africa. In regions such as southern Africa, the precolonial populations consisted of black agriculturalists who occupied the summer rainfall areas. These practiced sedentism, cultivated seasonal crops, worked metals, and made pottery. Then, there are also the so-called hunter-gatherers who were mobile, non-sedentary, and subsisted on hunting and gathering. In the Cape region of South Africa and Namibia, there are also the Khoisan and Damara-Nama peoples who were pastoralists. The archaeologist Huffman (2007) clearly makes the point that this division of African groups prevailed at the time of contact and has deep roots. For example, the black agriculturalists are believed to have migrated from North West Africa, populating southern Africa by the first millennium CE. This means that when colonialism began, these groups were on the landscape for close to a 2000 years. They had complex relationships with hunter-gatherers, lived with them, and traded with them (Schmidt 2009). Among many sites, the Iron Age settlement of Bosutswe in Botswana seem to have been occupied by both farmers and hunter-gatherers. If we revisit the criteria used to identify who is indigenous, we realize that because Europeans found hunters and gatherers on the landscape at contact, they also thought that they were marginalized and culturally pristine. This way of thinking is ethnocentric and was shown to be untrue by Wilmsen (1989), Hall and Smith (2000), and Manyanga (2007) who encountered archaeological sites that have hunter-gatherer and farmer material culture. It therefore means that any definitions of indigenous that privileges the so-called minorities and ignores the farming majority are missing the point. In fact, how can people who have lived in an area for 2000 years or more not be regarded as indigenous? By failing to view all Africans both farmers and hunter-gatherers, as indigenous we will be imposing a western worldview which dichotomizes nature (bushman) and (culture) farmers. In any case, in a region such as southern Africa, the division between hunter-gatherers and farmers has disappeared in the last century such that if indigenous archaeology is to be successful, it has to consider all the nonwhite people as indigenous. This is the premise adopted by a collection of essays in Schmidt (2009).

Controversial as this may sound, there are very few black archaeologists in countries such as South Africa, and to push for an archaeology that favors only the Khoisan and San descendants would turn the already dire situation into a crisis of cataclysmic proportions. Thus, if indigenous archaeology is to develop in Africa, the definition of indigenous must be broadened up and the rest of the world must see the situation from the complexities of Africa and not from the lenses of their own areas.

The people of sub-Saharan Africa have all been marginalized in the production of the past such that including all sections of the previously disadvantaged will decolonize the discipline and

take it forward. In any case, the concepts of indigenous archaeology in places such as Australia do not look at which Aboriginal group was dominant in precontact times; Aborigines are Aborigines. While groups such as the San should not be neglected wherever they still exist; attention should not only be solely focused on them. Such a broad-based approach will create a conducive climate for the successful takeoff of indigenous archaeology in Africa.

Historical Background

Working with and for Indigenous People

Although there is a union of thought between the different practitioners of indigenous archaeology with regard to the need to meaningfully bring the marginalized into the center of archaeology knowledge production and dissemination, a number of approaches have been developed to realize this end (Chirikure & Pwiti 2008). The approaches differ from country to country and continent to continent. The most common method of working with indigenous people is that of collaborations in archaeological research and heritage protection. This working together is often precipitated by legal requirement which make it mandatory for researchers to demonstrate a strong local community component in their research teams. This will also produce in some cases the joint ownership of results. According to Nicholas (2001: 163), in British Columbia, "consultation with the appropriate First Nation is now a prerequisite for obtaining an archaeological permit. This requirement occurred in response to demands for greater Aboriginal representation, and overall, has had a positive impact on the discipline as it makes archaeologists more responsive to contemporary needs and their work more relevant." The Secwepemc Ethnobotany Project that ran between 1991 and 1998 in Canada also had representatives of indigenous people in the design of the project and gave them some ownership of the results. In Australia, Smith and Jackson (2006) also meaningfully collaborated and worked with the Barunga-Wugularr communities of the Northern Territory and the Ngadjuri people of Burra, South Australia. This working together involves joint project design and control over the results of the research. Nicholas (2001) also discusses the importance of workshops between indigenous communities and academics which bring the worldview of the local people into consideration. All these are successful cases of working with and for indigenous people.

Indigenous worldview – the set of beliefs, values, knowledge, and behavior by which people make sense of the world around them – is critical in knowledge production. Such a worldview is a necessary guide not just for interpretation but also for managing the heritage. The Clanwilliam Living Landscape Project directed by John Parkington of the University of Cape Town in South Africa uses indigenous people to interpret sites as well as to earn a living through their traditional crafts. Although Parkington acts mainly as the fund-raiser, indigenous people run the project and gain immensely from economic opportunities created through interpreting and protecting their past. This is a strong example of working for the indigenous peoples because they control knowledge production and benefit socially and economically from it.

In Mozambique, archaeologists conscious of the lack of involvement of indigenous peoples in the protection of sites have worked with spiritual and traditional leaders to protect the sites. Jopela (2011) discusses the use of spirit mediums in protecting the rock art sites of Chinyamapere in Mozambique. The spirit medium organizes people and controls access and thus hold custodial rights on behalf of the community. Archaeologists are also working as advisers to local communities. The archaeologist Peter Schmidt of the University of Florida, Gainesville, is advising indigenous people in areas that he carried out research in Tanzania to develop archaeological tourism in the country. The archaeotourism project is directed by the indigenous people, and they consult Schmidt when the need arises. After working with indigenous people, he is now working for them.

Training and publications are two of the areas that are crucial in developing indigenous

archaeology and indigenous peoples. Nicholas discusses a robust training program of indigenous people in Canada. Many First Nation peoples are getting graduate degrees which place them at the nexus of knowledge production. There are also publications which are designed to give voice to indigenous peoples. There is the *American Indian Quarterly* which publishes important studies on indigenous archaeology and related subjects. The journal *Archaeologies* which is owned by the World Archaeological Congress also publishes works which support indigenous views of the past. However, such outlets are very few in Africa which deprives indigenous archaeologists of opportunities to disseminate their archaeological results which may not necessarily be, in tandem with established positions (Schmidt 2009).

The use of language which respects and does not denigrate indigenous people is one way of working for indigenous communities. For example, while other researchers do not give the names of their informants, Schmidt has always provided the names of Tanzanian master smelters and has respected the knowledge contained in their oral traditions. This respect for local people and local knowledge is very important in empowering indigenous communities. Thus, working with and for the indigenous people requires well-meaning endeavors in decolonizing the practice of the subject, thereby making sure that local people meaningfully participate, benefit, and play a meaningful role in protecting their past.

Key Issues/Current Debates

Regardless of how colonialism developed in the different parts of the world, the common denominator is the fact that archaeology developed as a western curiosity with no meaningful involvement of the local communities. Furthermore, archaeology developed very closely with the colonial states, often creating information which was used to suppress and dominate local populations. Not surprisingly, in many postcolonial contexts, it is important to redress the omissions of the colonial period through collaborating and working with local communities. This collaboration must be meaningful and not half hearted. Extremists may argue that even in colonial times, archaeologists in regions such as east and southern Africa and North America were using oral traditions and ethnographies to understand the past (see McGhee 2008). Schmidt's well-known study of iron working in Tanzania is just but one of the many examples (see Schmidt 2009). Similarly, Huffman's work (2007) combines Shona history, anthropology, philosophy with Portuguese documents, and Venda anthropology to understand the spatial organization of the elite Zimbabwe settlements. Schmidt (2009) has realized that although he was using oral traditions to incorporate indigenous perspectives into the study of the past, more was needed in the form of collaboration. This is no wonder why he is helping communities to chart their own destiny as far as the study and use of the past is concerned. This is a very beneficial way of working with and for the communities.

Then, there are some who still view archaeology as a science which produces general laws for predicting human behavior. Such works, although they draw from oral histories, ethnographies, and the so forth, challenge the same sources for being unscientific. Obviously, there are so many colonial overtones to this kind of approach which unfortunately still dominate southern African archaeology. Lane (2011) has criticized such approaches for perpetuating images of a timeless and unchanging Africa under the guise of science. Ironically, if indigenous people write their own perspectives, they are criticized heavily and rebutted, but it is fine for the dominant approaches to use interviews from such people. This means that indigenous people cannot write about their past, but they must provide information to the dominant to write it for them. This is one reason why it is very difficult to develop an indigenous archaeology in southern Africa. This is a fundamental point missed by McGhee (2008) in his critique of indigenous archaeology. To say that indigenous people must be meaningfully involved in knowledge production and dissemination is not to say that nonindigenous peoples must not write about the past of indigenous people. There is

a fundamental flaw in the status quo where there are very few indigenous archaeologists. What proponents of indigenous archaeology are saying is that we must make sure that we involve indigenous people and train them in the study and writing of the past in order to bring their perspectives to the fore. This is tantamount to decolonization of the discipline.

There is nothing new in this argument; in contexts such as mining, companies are now creating partnerships with host communities and indigenous groups to develop and empower those communities. Gone are the days when areas around mines remain underdeveloped while their resources are enriching other regions. As such, it is important to make sure that those who work with communities transfer some benefits. Of course, the resources that archaeology has are not comparable to those of mining houses, but it is important for us to do our part with the little that we have.

For working with and for indigenous people to be fully established as a way of studying the past, there is need to train a number of indigenous archaeologists. This can promote a decolonization of the discipline. Countries such as Zimbabwe, Tanzania, Nigeria, and Kenya have trained indigenous archaeologists who are giving different perspectives on the past. The only problem, however, is that they are part of the academy; they publish in international journals which may not publish results that are thought to be radical. There have been recent cases of situations where big international journals have made defendants of established positions referees of papers that are revisionist in nature and motivated by indigenous experiences. Because the indigenous perspectives challenge the dominant position, often they are not published because experts do not like them. This means that indigenous peoples cannot establish research agendas; they are conditioned by the thoughts of the experts. Although, there are some journals which welcome different viewpoints and are a source of hope, this scientific autocracy is perhaps one single most important factor that stunts the growth of indigenous perspectives in southern Africa.

International Perspectives

The definition of who is indigenous and who is not is very crucial because in sub-Saharan Africa, the way indigenous is defined has potential to include and exclude some local groups of people. This is where local contexts and histories are crucial in understanding the cultural development of a region. In regions such as southern, eastern, and central Africa where there are minorities such as the San, the Pigmies, and the Hadza, adopting a narrow definition will make these people the only indigenous ones. And yet, there are other groups particularly those practicing a pastoral or mixed agricultural way of life who also have a deep history in these areas. The Bantu people have been resident in sub-Saharan Africa for a very long time. There are also indications that often if people had lost their animals, they could become hunter-gatherers. All this indicates the fluid nature of the division between who is indigenous and who is not. As such, for indigenous archaeology to take place in Africa, it must be applied to all black people that way people can identify with it. This is no wonder why Watkins (2005) failed to find many examples of indigenous archaeology in Africa. The most important point therefore is that the definition of indigenous differs from context to context and continent to continent. In Africa, virtually all black people were colonized and suffered the excesses of colonialism. These people were all excluded in the production of their past. It is important to have them on board in the researching of the past.

There are some researchers who may feel that archaeology is a science and the production of the past must follow scientific principles (Huffman 2007). Therefore, methodologically, if local communities cannot fit into a researcher's methodology, then they must be excluded. Research is all about making predictions and validating them with data. An extension of this view argues that indigenous archaeology privileges one group of people at the expense of others in the study of the past (McGhee 2008). These standpoints miss the point that indigenous archaeology is restitutional in letter and spirit. It seeks to empower groups of people who were historically marginalized from

the production and consumption of their past. This is an ethical standpoint which aims to bring more people into the study and communication of the past. There are very few black archaeologists in sub-Saharan Africa who are writing the past from their own point of view. The majority lack access to high-profile publications which silences their thoughts. It is not that they agree with narratives that were written by colonialists to their ancestors' total exclusion; often, their ideas are challenged for being unscientific. If archaeology is to transform so that it can be sensitive to the needs of local people, archaeologists must work with and for local people. As such, one can practice scientific archaeology but still work with and for local people. What is ethically inappropriate is that as researchers we profit in terms of career development but without involving any of the communities we work for. Colonialism in Africa lasted for many years, and it will take a longer time to reverse some of its excesses. Indigenous archaeology is one of those ways in which local people can be empowered to master their own destiny. That way, we will be able to incorporate different versions of the past rather than those informed by what we think is important as scientists.

Future Directions

One of the major goals of postcolonial archaeology is to transform archaeology from an elitist, almost colonial discipline into a decolonized practice where multiple perspectives flourish. One way of achieving this is to work with and for indigenous peoples. Working with and for indigenous people is not a one-way traffic; it needs the commitment of the indigenous people, the archaeologists, and all stakeholders. Collaboration in research projects and control of access are some of the ways used to ensure that archaeologists work for and with indigenous people. This has created some good results in Canada, Tanzania, South Africa, and Australia. The only challenge appears in issues such as copyright and publications. Is it possible for a researcher working in a community to coauthor the resulting publications with all the members? Is coauthorship an issue or what matters is whether the author has deposited the material in communities? Some archaeologists distribute their books in the communities which they work and this helps, but there would be need for more information storage. Given that archaeology is often seen as a luxury, who will build local storage facilities? Publications are also an important issue, indigenous people do not have control, and as such, multiple perspectives may be ruthlessly strangled in cases where researchers seek dominance at the expense of studying the past. Despite the challenges, the outlook for postcolonial archaeology and its emphasis on working with and for indigenous communities is bright.

Cross-References

- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Indigenous Archaeological Organizations
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
- ▶ Indigenous Peoples, Working with and for

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Indonesia's World Heritage

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Introduction

The Republic of Indonesia counts around 17,000 islands and a rich cultural heritage that bears clear traces from a long history of trade and exchange across the archipelago and with the wider Indian Ocean region. Until 2012, the country's cultural world heritage sites – Borobudur Temple Compounds (1991), Prambanan Temple Compounds (1991), and Sangiran Early Man Site (1996) – were all located in Central Java. Another 19 sites, more spread across the main islands, are on UNESCO's Tentative List.

Historical Background

Most of Indonesia's cultural world heritage sites so far are located in the central part of Java, the fifth largest and most populated island of the archipelago (including the capital, Jakarta). The earliest signs of habitation in this fertile volcanic area are prehistoric. In the 1930s, the German paleoanthropologist Gustav von Koenigswald started a systematic geological survey of Java. At Sangiran, nearby the city of Solo (Surakarta), this led to the discovery of over 50 fossils of *Meganthropus paleo* and *Pithecanthropus erectus* ("Java man," now reclassified as part of the species *Homo erectus*). The outstanding hominid fossils and artifacts found nicely illustrate the development of *Homo sapiens sapiens* from the Lower Pleistocene to the present. For this reason alone, Sangiran has become one of the world's key sites for the understanding of human evolution.

From the seventh century CE, Central Java was dominated by Hindu and Buddhist kingdoms. This led, in the mid-eighth century, to the construction of Borobudur, the lower terraces of

which have the typical trademarks of Javanese Hindu architecture. While the basic plan was kept, during the construction phase builders changed it from either a prehistoric Indonesian or Hindu monument into a Buddhist shrine, with 2,672 relief panels, 504 Buddha statues, and a central dome on top. Seen from the air, the structure looks like a giant Buddhist mandala. Not far from Borobudur, near the village of Prambanan, a large group of Hindu temples was erected. The complex, one of the largest in Southeast Asia, was consecrated in the mid-ninth century, after a construction period of around 25 years. One century later, the Hindu court and most of the population moved to east Java, and the 224 temples were left behind. The structures themselves collapsed during an earthquake in the sixteenth century. Borobudur was abandoned around the same time, too, probably after a series of eruptions from nearby Mt. Merapi, and lay buried for centuries under layers of volcanic ashes.

Islam, coming mainly via India, gained ground in the inner areas of Java during the sixteenth century. The Dutch began to colonize the archipelago in the early seventeenth century. Cornelis A. Lons, an officer of the Dutch East India Company who made an excursion to Prambanan in 1733, reported about the damaged statues he found among the piles of stone blocks. During the brief British presence on the island under Sir Thomas Stamford Raffles (1811–1816), a full survey of the ruins was commissioned. Raffles, who had a personal interest in Javanese antiquities, also ordered the excavation of Borobudur. The work was started by the Dutch engineer Hermann Cornelius and continued for many decades by the Dutch East Indies government. The public appreciation of Borobudur and Prambanan, however, developed rather slowly. For a long time, colonial residents carried off sculptures for garden ornaments or "souvenirs," while local villagers used foundation stones for construction material, and "trophy hunters" and thieves tried to make a profit out of what they could take away from the monuments.

Indonesia's legal framework for cultural heritage preservation and management goes back to the colonial period (Kagami 1997). In 1901, the Committee for Archaeological Research on Java and Madura was set up by the then Dutch East Indies government. In 1931, an ordinance on monuments (Monumenten Ordonnantie S. No. 238: 1931) was established, with the aim of preserving historical monuments (mainly within the colonial domain). Even though the intentions were different, these policies were taken over by the Indonesian government after independence in 1949. While the colonial government had adopted such policies to demonstrate and justify its presence as the preserver of Indonesian cultural heritage, the Indonesian government does it mainly to assert its sole sovereignty over its "national patrimony." Indonesia signed the 1972 UNESCO World Heritage Convention in 1989. Shortly afterwards (in 1992), a new law concerning items of cultural property was enacted to replace the former ordinance (Ministry of Culture and Tourism 2003).

Key Issues/Current Debates

UNESCO Involvement

Barely 2 years after independence (in 1951), a UNESCO Office was established in Jakarta. Although serving the wider Southeast Asia region, the office helped in bringing Indonesia's magnificent cultural heritage under global attention. In 1972, UNESCO launched a 25 million USD safeguarding campaign to restore Borobudur (the second action of its kind after the 1960s operation in Egypt to relocate Abu Simbel). Concurrent with the elevation of Borobudur and Prambanan to world heritage sites in 1991, UNESCO collaborated with UNDP and the former Indonesian Directorate General of Tourism in the ambitious Cultural Tourism Development Central Java-Yogyakarta Project (1991–1994). The intergovernmental organization has also been involved in the rehabilitation of the structurally damaged Prambanan Temple complex after the 2006 earthquake and the recent cleaning up of volcanic ashes at Borobudur caused by multiple eruptions of nearby Mt. Merapi.

UNESCO's involvement has not always been perceived positively at the local level, mainly because people feel left out in the conservation of the sites, leading to conflicts as "classical"/high culture is preserved over vernacular/low culture (Wall & Black 2004). At Prambanan, for example, there is an ongoing conflict with the local community regarding the name of the complex. While it was inscribed on the world heritage list as "Prambanan Temple Compounds" (No. 642), the people of Prambanan village have always referred to it as *Candi Rara* (or *Loro*) *Jonggrang* (Javanese for "temple of the slender maiden"). This refers back to a popular legend relating that the statue in the north chamber of the central Shiva shrine does not represent the Hindu goddess Durga but the Javanese princess Loro Jonggrang. The tensions recently intensified when, in accordance with Article 268 of UNESCO's Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO 2008: 69), the text "Candi Rara Jonggrang" on a newly placed signboard was replaced by "Candi Prambanan." Through initiatives such as the 2008 Prambanan Camp for World Heritage Volunteers, which enabled to increase the heritage awareness of local youth, the negative perception of UNESCO was somewhat adjusted.

Tourism

Tourism is not much of an issue at the archaeological site of Sangiran (and its nomination as world heritage has not really brought any substantial change in that respect). At Borobudur (the single most visited tourism attraction in Indonesia) and Prambanan, in contrast, the challenges related to tourism are ongoing. Much has to do with the ways in which both sites are managed. The park surrounding the monuments and the related infrastructure (ticket booths, interpretative services, and parking lots) is administered by PT Taman Wisata, a state-owned enterprise. Souvenir stands, food stalls, and other tourism-related structures outside the main grounds fall under the control of the Provincial Tourism Office of the province in which they are located (Borobudur is located in Central Java, while Prambanan is in Yogyakarta). The actual monuments, however, resort under the responsibility of the National Archaeology Department of Indonesia (and, with the ongoing process of regional autonomy, increasingly the provincial archaeology departments). Not surprisingly, this fragmented distribution of authority leads to multiple problems, including the development of ill-planned tourism infrastructure (Salazar 2010a). As there is no limit on visitor numbers, vandalism is a serious issue at both Prambanan and Borobudur. There is little if any on-site interpretation available, and the general disrespect for the site is a major problem among domestic tourists, who comprise around 80 % of all visitors. In addition, local tour guides have a hard time handling the increasingly diverse group of international tourists (Salazar 2008, 2010b). Tourism development at both sites has been severely criticized for not including the local community (Hampton 2005).

Environment

Indonesia's cultural world heritage sites are located in an environmentally fragile area, known as the Pacific Ring of Fire, where a large number of volcanic eruptions and earthquakes occur. In fact, Mount Merapi (25 km from Prambanan and 28 km from Borobudur) is one of the most active volcanoes in the world. In 2010, Borobudur was heavily affected by a 2.5-cm layer of acidic volcanic ash falling on the complex. In addition to the numerous earthquakes, causing stones to fall down and arches to crumble, the soft soil and heavy rains have led to the destabilization of the structure. The main complex at Prambanan was badly damaged during the 2006 earthquake, with large pieces of debris, including carvings, scattered over the ground and the structural damage being more extensive than originally thought. Only in 2010, the main temples were reopened to the public.

Economy

Indonesia's world heritage generates both benefits and costs (Hampton 2005). Over time, there have been remarkable shifts in the (economic) value attached to the country's patrimony (Salazar

2011). In preparation for Prambanan to become recognized as world heritage, the Indonesian authorities removed the market that had sprung up near the temple and transformed the surrounding hamlet and rice paddies into an archaeological park. Villagers, however, benefit economically from the souvenir stalls at the entry of the park, by their work inside the complex (as guides, watchmen, cleaning personnel, etc.) and by participating in the Ramayana Ballet, which is performed every night at the open-air and indoor stages on the west side of the complex. Borobudur has a similar history of challenges and opportunities. In 2003, for instance, the local community heavily protested against a provincial government plan to build a three-story art mall, known as "Java World," next to the protected monument because this would take away even more from their scarce benefits. The values of tourism for economic development, preservation of a cultural icon, and social justice for hundreds of poor hawkers brutally clashed in the controversy over Java World (Silver 2007). At both Prambanan and Borobudur, there is a continuous problem with vendors harassing visitors inside the park to buy their trinkets. Unregulated, predatory commercialization forms a serious threat to the cultural assets of the sites.

Religion

Indonesia is the country with the largest Muslim population in the world. Islam stands as a religion quite different from the religions of the Javanese people during the pre-Islamic period. The fact that Prambanan and Borobudur are located in what is now a predominantly Muslim area adds to the complexity of managing, maintaining, and interpreting the temple compounds. In 1985, Muslim fundamentalists who viewed Borobudur as a symbol of Indonesia's pre-Islamic pagan past bombed nine stupas on the upper terrace. The militants perceived the government's renovations of the site (largely for purposes of tourism) as emblematic of the state's refusal to embrace Islamic law. They therefore selected Borobudur as a target and, in response, the government made it clear that all temples on Java were to be considered as heritage monuments, not religious or sacred sites where ritual activities are held (or, according to the ICOMOS description, as "religious complexes"). Recent Islamic terrorism attacks have mainly targeted tourism infrastructure (e.g., Bali bombings), not heritage sites.

In order to accommodate the religious needs of the many Muslims working at and visiting the sites, a *musholla* (small building where Muslims perform their religious duties) was built right next to the entry gates. It is odd that, while visiting either Prambanan or Borobudur around prayer time, one can hear the Islamic call to prayer far into the compound. In contrast, the restoration of Borobudur and Prambanan has led to a revival of both sites as places of worship and pilgrimage for Buddhists and Hindus, respectively. Indonesia's official state policy (known as *Pancasila*) remains one that promotes religious freedom. Ironically, the ongoing process of democratization, started after the fall of Suharto in 1998, has facilitated the spread of Muslim fundamentalism and increased the calls to have Muslim heritage such as the Great Mosque of Demak (since 1995 on the tentative list) included on the world heritage list. It remains to be seen which influence religious fundamentalism will have on the archaeological excavation site and museum of Sangiran.

Politics

It is no coincidence that most of Indonesia's cultural world heritage sites are situated on Java. After all, it is the central government in Jakarta that proposes candidates to UNESCO. During Major General Suharto's New Order era (1966–1998), the government (led by Javanese) strongly favored Central Java in their (re)invention of Indonesia, promoting it as the cultural heart of the nation (Dahles 2001). This serves as a reminder that, ultimately, a world heritage site is the product of agency at the national level. Besides, the Indonesian government has its own heritage politics and national list of heritage conservation. The politics of heritage and the tensions between local, national, and international stakeholders have been at play across the archipelago. The case of the Tana Toraja settlements in the highlands of Sulawesi, on UNESCO's Tentative List, painfully illustrates

that cultural heritage sites are often not the newly threatened landscapes of tradition they are imagined to be (Adams 2003). An even more problematic example is that of Pura Besakih, Bali's most celebrated temple complex, which underwent three failed attempts (mainly due to strong local protests) to establish it as world heritage (Hitchcock & Darma Putra 2005). More generally, the democratic reforms and the shifting of power from the central government to the local level during the last decade have fueled an intense new "localism" that has had direct (and often negative) implications on cultural preservation (Silver 2007).

Future Directions

The Indonesian government has successfully managed to use the most iconic historical monuments within the country for tourism development while at the same time trying to intervene in their management in the name of their preservation as part of the nation's patrimony. These processes do not take a single course, but, rather, proceed in parallel, mutually influencing each other. Short-term gains in both must be assessed against long-term consequences. The promotion of the development of national culture has been one of the most crucial tasks of the Indonesian government since independence, as is clearly stated in Article 32 of the Constitution: "the Government shall develop the National Culture of Indonesia." However, the ongoing process of political decentralization (started in 2001) is adding to the number of political stakeholders involved and, consequently, making the management of world heritage sites even more complex than it was before (Salazar 2010a).

With a view to enhancing the capacity of the Indonesian national and local authorities to improve the state of conservation (management) at Borobudur, the World Heritage Centre has recently developed a technical cooperation project under the Netherlands Funds-in-Trust with UNESCO. As long as such initiatives leave out the local communities as active stakeholders, they are doomed to fail. A reason for the lack of sufficient safeguards to protect the cultural values of sites is to be found in an underdeveloped understanding and therefore lack of appreciation of the value of these cultural resources by both the local community and the tourist alike. The UNESCO "Community Empowerment Through Heritage Education" program at Indonesia's three world heritage sites is a good step in addressing this issue. Finally, increased attention will be needed to address the fact that Indonesian world heritage sites, despite their proclaimed universal value, have different meanings for different groups of visitors (Salazar 2008).

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Holographic Epistemology: Native Common Sense
- ▶ South and Southeast Asia: Historical Archaeology
- ▶ UNESCO's World Heritage List Process
- ▶ UNESCO World Heritage Convention (1972)
- ▶ World Heritage Objectives and Outcomes

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Indo-Pacific Prehistory Association (IPPA)

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Basic Information

The Indo-Pacific Prehistory Association (IPPA) was founded in 1976 at a meeting of Indo-Pacific scholars held during the 9th Congress of the *Union International des Sciences Préhistoriques et Protohistoriques* (UISPP) in Nice, southern France. The association, however, has much earlier antecedents and traces its origins back to a meeting organized in 1929 by P.V. van Stein Callenfels during the Fourth Congress of the Pacific Science Association in Batavia (now Jakarta). Its immediate antecedent was founded, as the Far-Eastern Prehistory Association (FEPA), at a meeting in Manila in 1953.

Major Impact

With the creation of the current Indo-Pacific Prehistory Association in 1976, a number of goals were outlined:

1. To promote cooperation in the study of the prehistory and related subjects of eastern Asia and the Pacific and prehistorically related areas.
2. To help maintain direct communication among scholars working in the field of east Asian and Pacific prehistory through periodic congresses, regional meetings, colloquia, symposia, and the publication of the IPPA Bulletin. East Asia here includes Pakistan and north from there roughly along the line of 70° longitude and to the east.
3. To uphold and improve legal and scientific methods of prehistorical and related research in the field and in the laboratory and to help the countries in the IPPA area prevent illegal excavation and illegal trade in antiquities.

During the 35 years that have passed since that momentous gathering in Nice, IPPA has addressed itself without pause to the production of its annual Bulletin and its congresses (Pune, India, 1978; Dunedin, New Zealand, 1983; Peñablanca, Philippines, 1985; Tokyo and Guam 1987; Yogyakarta, Indonesia, 1990; Chiang Mai, Thailand, 1994; Melaka, Malaysia, 1998; Taipei, Taiwan, 2002; Manila, Philippines, 2006; Hanoi, Vietnam, 2009). The next conference will be at Angkor in Cambodia in 2014. Delegate enrolment at the most recent congress, in Hanoi, was over 600.

However, the second part of our third goal, that of preventing illegal activities, has never been developed until now, partly because the voluntary staff of IPPA have never had time or resources to invest in a problem that now threatens the survival, in some parts of the world, of any meaningful archaeological record at all. It is intended that this will become

a significant role for IPPA in the future, as part of a move for IPPA to engage with the cultural heritage management sector.

Structure and Funding

The constitution of the association specifies a president, a secretary-general, and an executive committee of eight members. The latter must contain at least one member from each of the four general areas covered by IPPA: Northeast Asia (the former USSR territories east of 70° longitude, with Korea, Japan, and China), Southeast Asia (including Madagascar), South Asia (India, Pakistan, Sri Lanka, Bangladesh, Nepal, and Bhutan), and Oceania (Australia, New Zealand, and the Pacific Islands).

In 2010, Ian Lilley was appointed secretary-general to replace Peter Bellwood, who had held the position (originally as secretary and editor) since the Pune conference of IPPA in 1978. A new committee of eight has been elected (2010), and the editorship of the IPPA Bulletin is now in the hands of Peter Lape and Ben Marwick at the University of Washington in Seattle. IPPA has played a major role in the past in bringing students and younger archaeologists from the IPPA countries to its conferences, and in helping these scholars publish their research in the IPPA Bulletin for an international audience. In future, the publication effort will be integral to IPPA's stronger role in regional cultural heritage management.

IPPA is funded only by membership fees and IPPA Bulletin sales and has never had major institutional financial support. The Australian National University has assisted in the past through the provision of an association web site, a URL for the IPPA Bulletin (which is now being moved to Seattle), an email address, and a taxation-exempt university account to hold membership and conference income. A number of international foundations such as Ford, Wenner-Gren, Chiang Ching-kuo, and the Asian Cultural Council have helped to fund attendance at conferences by scholars from developing countries in the past.

Conclusion

IPPA has had no cultural heritage function until now, but future plans will see the organization support initiatives in cultural heritage management throughout its area of responsibility, beginning with a focused workshop at the 2014 Congress in Cambodia.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ East Asia: Paleolithic

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Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology

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Introduction

Inductively coupled plasma-mass spectrometry (ICP-MS) is a multi-elemental analytical method with very good sensitivity. It is able to determine the concentrations of almost all the elements in the periodic table except hydrogen, carbon, nitrogen, oxygen, some of the halogen elements, and a few others. Limits of detection are below the ppb level for sample solutions and in the range of

ppm or below depending on the element when connected to a laser ablation (LA) system for the direct analysis of solid samples. ICP-MS with introduction of acid digested samples can be considered as a bulk analytical method, while LA-ICP-MS is punctual and capable of targeting a very specific region on the surface of an object. The micro-sampling performed with a laser ablation system leaves no visible trace at the surface of the artifact, making LA-ICP-MS virtually non-destructive. ICP-MS with sample solution or LA has opened up new avenues of research in archaeology based on trace element fingerprinting.

Key Issues

Description of the Instrumentation

An ICP-MS is comprised of two main parts: (1) the inductively coupled plasma, which decomposes, atomizes, and ionizes the material to be analyzed in a very hot environment (temperatures can reach 10,000 K) that is sustained with a radiofrequency electric current produced by an induction coil wrapped around a series of concentric quartz tubes called the plasma torch; (2) the mass spectrometer, which filters the ions according to their charge-on-mass-ratio. For elemental analysis in archaeology, three types of mass spectrometers are typically used. Quadrupole and magnetic sector mass spectrometers are, by far, the most widely spread even if a few archaeometry laboratories are now equipped with time of flight (TOF) mass spectrometers.

Quadrupoles are composed of four metallic rods arranged so as to leave a free path between them. Voltages are applied to these rods. For given voltages only ions with a certain mass-on-charge ratio travel down the central path between the rods before reaching the detector. All other ions are deflected. Voltages vary so as to scan the entire mass range.

In a high-resolution magnetic sector MS, ions are accelerated by a high voltage and pass through a series of ion optics, an electrostatic analyzer (ESA), and finally a magnet. By varying the strength of the magnet, the ions are separated according to their mass-on-charge ratio. They travel through a slit into a detector, which records a small atomic mass range at a given time. By varying the magnet and ESA settings, the entire mass range can be scanned within a relatively short time.

A TOF mass spectrometer permits the simultaneous detection of a full mass spectrum in approximately 30 μs, whereas quadrupole and high-resolution magnetic sector mass spectrometers are sequential analyzers. With TOF-MS, a pulsed electric field accelerates the ions to the same kinetic energy with the velocity of the ions depending on their mass-on-charge ratio. The time it takes for the different ions to reach a detector is then measured, the lighter particles moving faster than the heavier ones.

To avoid ions colliding with other molecules, the mass spectrometer is kept in a vacuum. An interface insures the transfer of the ions from the plasma at atmospheric pressure to the mass spectrometer maintained in a low pressure environment. The difference of pressures between the plasma and the mass spectrometer creates a supersonic jet, and the ions are accelerated as they go through the interface. They are then focused by a series of lenses and mirrors before entering the mass spectrometer.

Either liquid or solid samples can be analyzed with ICP-MS. In the first case, a few milligrams of the material to analyze is dissolved with ultrapure concentrated acids. To improve the process, it is sometimes necessary to use a microwave digestion system, which is a device that heats (under pressure) the acid solutions. After dilution, by means of a peristatic pump, the acid solution containing the dissolved sample is aspirated through a nebulizer with high velocity argon, forming a fine mist. A spray chamber removes and drains the larger droplets and only the smallest ones reach the plasma.

Laser ablation (LA) is used for the direct introduction of solid samples in the ICP-MS. In a standard setting, the object to analyze is placed in a chamber without any specific preparation. The size of the chamber limits the size of the objects. The chamber is usually a cylinder with a diameter of 5–6 cm and a height of 5 cm. A CCD camera connected to a computer allows

the visualization of the surface of the sample. The laser beam interacts with the surface of the objects, vaporizing a small quantity of material that is flushed by a gas carrier, which is generally argon or helium. The parameters of ablation depend on the material and on the instrumentation. The diameter of the laser beam ranges from about 50 to 100 μm. The trace left at the surface of the object by the laser is generally invisible to the naked eye. A pre-ablation is set up to clean the surface of the object in order to remove contamination and to avoid eventual corrosion, which affects the results of the analysis.

Quantitative Results

To obtain reliable quantitative results, the use of internal and external standardizations is imperative with ICP-MS or LA-ICP-MS. To improve the reproducibility of measurements, an internal standard is required to correct possible instrumental drifts or changes in the sample introduction system's efficiency. For solutions, the internal standard, an element absent in the sample, is spiked in each sample and standard solution. For solid samples, the internal standard has to be an element already present in the material since no addition is possible. The chosen element has to have a relatively high concentration in each sample so its measurement is as accurate as possible. In order to obtain absolute concentrations for the analyzed elements, the concentration of the internal standard has to be known. Its concentration is either measured with another analytical technique or calculated assuming that the sum of the concentrations of the measured elements, in weight percent, is 100 % (Gratuze 1999).

Quantitative results are obtained by comparing the signal intensity measured for a given element in a sample to the signal intensity for the same element in a standard solution or a standard reference material (SRM) with certified concentrations. To prevent matrix effects, the compositions of the standards have to be as close as possible to those of the samples.

In an unknown sample, when using LA-ICP-MS, concentrations in weight percent of element or of oxide are calculated assuming that the sum of their concentration is equal to 100 % (Gratuze 1999):

$$\%Y = \frac{\frac{I_Y}{I_{(Int\ Std)} * K_Y}}{\sum \frac{I_X}{I_{(Int\ Std)} * K_X}} \qquad \%Y_mO_n = \frac{\frac{I_Y \times \alpha_Y}{I_{(Int\ Std)} \times K_Y}}{\sum \frac{I_X \times \alpha_X}{I_{(Int\ Std)} \times K_X}}$$

I_y, I_x, and $I_{(Int\ Std)}$ are the signal intensities corrected from the blank measured for the internal standard (Int Std) and elements Y and X in the sample. α_y and α_x are the conversion factor from element to oxide for element Y and X. K_y and K_x are the response coefficient factor for element Y and X, calculated as follows:

$$K_Y = \frac{I_{Ystd} \times [\text{Int Std}]_{std}}{I_{(Int\ std)std} \times [Y]_{std}}$$

I_{Ystd} and $I_{(Int\ std)\ std}$ are the signal intensities corrected from the blank measured for the internal standard (Int Std) and elements Y in the SRM and $[Y]_{std}$ and $[Int\ Std]_{std}$ are the concentration of the internal standard and element Y in the SRM. This approach assumes that the oxidation state of each element is known and ignores the presence of elements such as sulfur or the presence of water.

Other factors affecting quantitative results are the presence of isobaric (two isotopes at the same mass) and polyatomic (oxide, argide, etc., at the same mass as an isotope of interest) interferences and laser-induced elemental fractionation causing the preferential ablation of some elements. Several strategies are available to avoid interferences such as, for example, choosing a non-interfered isotope or operating the mass spectrometer at a higher resolution to resolve two peaks with close masses. Some quadrupole ICP-MS are equipped with a collision/reaction cell where polyatomic species are eliminated through collision or reaction with gases such as helium, oxygen, ammonia, and so on. Fractionation will depend on the sample matrix but also on the laser wavelength, ablation parameters, and acquisition time.

Applications

Applications in the field of archaeology involving ICP-MS began being developed in the 1980s. However, it is only after LA attachments came

into use, giving archaeologists a virtually nondestructive analytical tool, that the full potential of this analytical approach was explored for the study of ancient materials (Gratuze et al. 1993; Telouk 1993). One of the difficulties is that, if ICP-MS can measure bulk compositions for materials as heterogeneous as ceramics or soils, the microscopic sampling performed with a laser is only representative of the artifact providing it has a fairly homogeneous composition. Another difficulty regarding quantitative analysis with LA-ICP-MS is the need for matrix matched standard reference materials (SRM). Archaeological samples have compositions that can be extremely complex due to the use of non-refined raw materials. They contain a wide range of elements not always present in modern materials.

Natural and synthesized glasses are reasonably homogeneous materials, and several SRM containing a wide range of elements of interest for archaeological study are available prompting the rapid multiplication of LA-ICP-MS analysis of glass. Trace element compositions have been shown to be vital for distinguishing several primary glass production workshops (Dussubieux et al. 2009).

If LA-ICP-MS provides the best results with such a material as glass, metals are more challenging. Ancient gold was the first metal to be investigated extensively with LA-ICP-MS due to its value and its high potential for revealing aspects of ancient economies. By determining major and minor elements, gold fineness can be easily assessed. Determining trace elements can help in tracking changes in ore supplies (Guerra & Calligaro 2004). The presence of inclusions of platinum group elements in gold objects can give clues about the provenance of the metal, but also is a source of heterogeneities that can affect measurements with LA-ICP-MS. To overcome this challenge, elemental ratios rather than absolute concentrations are taking into account (Jett et al. 2007). Silver and iron-based artifacts have raised less interest, but several articles demonstrate the feasibility of determining their composition using LA-ICP-MS. Technical issues regarding iron (Devos et al. 2000) and silver (Sarah et al. 2007) artifacts were addressed using LA-ICP-MS, and authenticity verification for silver objects was performed (Devos et al. 1999). The development of a LA-ICP-MS protocol for ancient copper alloys is more recent. The presence of thick layer of corrosion at the surface of copper-based artifacts and the immiscibility of some elements, such as lead in copper, may affect LA-ICP-MS measurements. Performing a "cleaning" ablation with a larger diameter beam prior to the ablation undertaken for the measurement of the composition of the objects is usually sufficient to reach the uncorroded metal (Dussubieux et al. 2008). A basic knowledge of metallurgy is necessary for an accurate data interpretation.

Ceramic study plays a central role in many archaeological projects, because of the ubiquity of this material. The elemental composition of ceramic samples may reveal the provenance of the artifacts when data about possible clay sources are available or at least indicate whether a unique source or a variety of sources were used for ceramic procurement at a given site. Instrumental Neutron Activation Analysis (INAA) was, for years, the analytical technique of choice to measure the composition of ceramics, because of the large number of elements it could determine and its good sensitivity. However, this method suffers from major inconveniences: it requires access to a nuclear reactor, it produces radioactive material as a byproduct, and artifacts are irremediably damaged or destroyed. In more and more instances, LA-ICP-MS is proposed as an alternative to INAA for ceramic analysis. The use of laser ablation for sampling instead of acid digestion to dissolve a small quantity of ceramic saves the long and tedious process of sample preparation but faces many challenges due to the heterogeneous nature of the material. In many cases, ceramic compositions as measured by INAA and LA-ICP-MS lead to similar groupings providing that only clay is targeted unless the temper is extremely fine-grained and indistinguishable from the clay. The composition of the ceramic is calculated from the average of the multiple measurements carried out on each sample after elimination of any "abnormal" measurements due to the ablation of temper grains or from any other heterogeneity in the ceramic fabric under the sample surface (Dussubieux et al. 2007;

Vaughn et al. 2011). Any contribution from the temper that may subsist will appear in the composition causing a dilution effect of the clay composition that can be corrected using a dilution correction (Harbottle 1976; Mommsen 2007).

While glass, metals, and ceramic are now materials routinely analyzed using LA-ICP-MS, other materials need to be considered on a more case-by-case basis such as stones, soils, or biogenic materials. Speakman & Neff (2005) proposed a range of applications including the materials mentioned above as well as jade, chert, pigments, and human dental enamel. Since then, the list of materials investigated with LA-ICP-MS keeps getting longer and longer (Resano et al. 2010).

Current Debates and Future Directions

The use of laser ablation with ICP-MS in archaeology has permitted a range of applications that keeps expanding as the laser technology itself improves with the increasing availability of lasers with shorter wavelengths (213 nm, 193 nm) and, more recently, the use of femtosecond lasers. These lasers, with improved ablation characteristics, limit or eliminate fractionation problems encountered with some matrices (e.g., metals).

The size of the chamber of the laser ablation system commercially available limits the size of the objects that can be analyzed nondestructively. Rather than placing the objects into a cell, different experimental solutions were proposed to ablate directly the surface of a large object placed under an open ablation cell (Wagner & Jędral 2011). More recently, direct atmospheric sampling was tested successfully on some ancient artifacts eliminating some of the problems that may occur when attaching an open ablation cell on especially fragile objects (Kovacs et al. 2010).

As portable analytical methods are gaining more and more ground in the toolkits of the archaeologists, efforts are currently being made to design a portable laser ablation system for in situ sampling of artifacts that cannot be taken to a lab (Glaus et al. 2012).

If the laser itself is important, the way it is used for sampling can be modulated to the specific need of the artifact to be investigated and the questions to be addressed. Composite artifacts can be analyzed with LA-ICP-MS by targeting with the laser areas that look visibly distinct. However, in certain cases, when different compositions do not yield visual changes at the surface of the object or when surface and core compositions are different, the standard sampling approach using single point or scan sampling will fail giving an accurate compositional picture of the object. The difficulty of mapping an artifact or portion of an artifact lies first in the large quantity of data generated that needs to be processed. A simplified calculation approach was developed for glass, and the results are displayed in a meaningful way using software specially designed for this purpose (Triglav et al. 2010). Depth profile analysis faces different challenges. One of them is fractionation that occurs for some elements after several minutes of ablations. A standardization procedure with calculation of the concentrations is used to offset the fractionation effects on the concentrations. Memory effects are limited by the design of small volume cells.

On the ICP-MS front, the future will certainly see more and more applications dealing with isotope analysis (Resano et al. 2010). Indeed, in many cases, information provided by elemental analysis is not sufficient to be able to provide any provenance hypothesis. The measurements of isotope ratios of elements, such as lead or strontium, have been successfully used in the past to source raw materials; however, it requires a labor and cost intensive sample preparation as well as high-resolution mass spectrometers. Some laboratories are exploring the use of LA-ICP-MS for isotope analysis as a nondestructive alternative for some applications that do not require the highest precision.

Conclusion

Over the past 20 years, new areas of research have been developed and explored in the field of archaeology, based on the trace element signature of artifacts and raw materials determined with ICP-MS. ICP-MS, when used in conjunction with laser ablation, combining minimally destructive sampling with high accuracy, good

precision, and low detection limits, is an extremely attractive analytical method to archaeologists. Being a relatively low cost analytical method with a high sample throughput, large numbers of objects, up to several hundreds, can be studied. This permits a more comprehensive temporal and spatial sampling of a given type of artifact. The large bodies of data generated are also better tools to reveal patterns in connections with trade and exchange when examined using appropriate statistical treatments.

Cross-References

▶ Ceramics: Scientific Analysis
▶ Provenance Studies in Archaeology

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Industrial Archaeology

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Introduction

The earliest periods of human history are still defined by the archaeological evidence for fundamental changes in the materials from which people made objects and the increasingly refined methods they used to make them. The importance of conserving and studying the evidence for these changes is universally accepted as a legitimate archaeological activity. From the medieval period onward in Europe, innovations in the use of mechanical energy as well as extended commercial activity created the conditions toward the end of the eighteenth century for an equally fundamental change in the methods of manufacturing objects, resulting in an economic and social transformation sufficiently rapid and profound as to deserve the term "industrial revolution." This signified the beginning of a historical phenomenon that has affected an ever-greater part of the human population, the landscape, and even the climate of our planet and continues to the present day.

However, at least in the western hemisphere, it was not until the physical evidence for the innovations that triggered this change – water- and steam-powered machines, mills and factories, iron furnaces and pottery kilns, canals and railways, and the houses in which the workforce lived – came under threat in the middle of the twentieth century that much attention was paid to the need to study, record, and even conserve them. Unlike most pre-medieval industrial sites, much of the physical evidence was still above ground, although in many cases rusting away or becoming ruinous. As a result, industrial archaeology, as the discipline embracing such activity came to be called, was from the beginning as much about saving what was under threat as studying this material culture to further our understanding of the causes and consequences of industrialization. Obviously, the two aspects come together: it is impossible to conserve and interpret industrial structures and objects unless they are understood through archaeological and historical study. Yet the popular and even the professional conception of industrial archaeology has tended to adopt its meaning as a movement to conserve the industrial past, which would be better termed "industrial heritage," rather than its meaning as the study of the ways people worked in the recent past. This emphasis on conservation and preservation of sites currently distinguishes industrial archaeology from both post-medieval and historical archaeology and has, until recently, hindered its acceptance among professional archaeologists. On the other hand, industrial heritage preservation has always attracted a great deal of interest and support from the voluntary sector as well as public bodies with an interest in their tourist potential. However, the increase in archaeological work on brownfield sites as part of developer-funded archaeology has begun to redress this balance; in the first decade of the twenty-first century, roughly 30 % of all professional archaeology done in the UK examined archaeological deposits that included material from the classic period of industrialization, and industrial archaeology is now widely recognized as a legitimate archaeological activity and not just a form of heritage conservation (Fig. 1).

Definition

Some early practitioners of industrial archaeology argued that the discipline was a thematic rather than a chronological one and could range from the prehistoric to the modern period (Raistrick 1972). However, the rapid decline of many traditional industries and the growing recognition of the historic value of textile mills, iron works, and transport networks have led to a general acceptance that industrial archaeology involves the systematic study of standing as well as subsurface structures of the classic period of industrialization from the early modern and modern periods, mainly the early eighteenth to

Industrial Archaeology, Fig. 1 Museum of London Archaeology excavated in 2011 the remains of the impressive hydraulic accumulator used for goods lifting between the floors of at the Somers Town Goods Yard near St. Pancras Station (©MOLA)

the twentieth century. What characterizes this period is capital investment on a large scale in both buildings and equipment and the organization of the labor force to maximize production. It is with these developments that industrial archaeology is largely concerned, although it must be recognized that "industrialization" began earlier in some industries than others and that therefore an interpretation of a particular site or industry may need to go back to the sixteenth century or earlier. Equally, it is clear that the domestic or home-based method of production continued to coexist with large-scale factory-type production well into the nineteenth century, albeit with many changes in the lifestyle of the workforce (Barnwell et al. 2004).

Industrial archaeology is necessarily an interdisciplinary activity, requiring familiarity with normal archaeological techniques such as landscape surveying, artifact recognition, measured survey, and excavation. However, the discipline has its own needs and skills driven by the material culture of industrialization. These include some knowledge of the technology and science of the period, an understanding of the contemporary documentary material available to augment archaeological fieldwork, and the ability to record standing industrial buildings and structures and to understand their function within what is often a sequence of industrial processes (Palmer & Neaverson 1998; Palmer et al. 2012).

Historical Background

Industrial archaeology as a discipline originated in the United Kingdom in the 1950s, after the postwar preoccupation with renewal had led to the destruction of much of the landscape associated with early industrialization. It is generally agreed that the term was first used in print in 1955 by Michael Rix, staff tutor in architectural history in the University of Birmingham's Department of Extramural Studies, where the surrounding Black Country was witnessing some of the worst of the devastation. Although the efforts to save industrial buildings and structures might more appropriately be termed "industrial heritage," Rix emphasized the importance of an archaeological approach to industrial sites: "the prime task of the industrial archaeologist at the moment is an archaeological one and that is in fieldwork." He also posed a challenge to the archaeological community: "industrial archaeology serves as a useful reminder to the whole archaeological world that the *terminus post quem* of archaeological research is not 55 BCE nor CE 410. The *terminus post quem* of archaeological research is today" (Rix 1967: 18). The cause was taken up by the Council for British Archaeology, which itself had been founded in 1944 in response to wartime devastation and had established its role as a forum for representing the views, ideas, and policies of British archaeology to government, the media, and the public. The statutory bodies, however, failed to respond

Industrial Archaeology, Fig. 2 Copper mining and smelting have dominated the Norwegian town of Røros since its foundation in the late seventeenth century. Below the slag heaps are the ramshackle wooden workers' houses with their grassed roofs, while the company town is dominated by the late eighteenth-century Baroque church. Mining continued in Røros well into the twentieth century, but the importance of the town's historic remains was carefully conserved and accorded World Heritage status in 1980

to the call to record and save industrial monuments, with the notable exception of Northern Ireland where a publically funded survey had been set up as early as 1956 (McCutcheon 1980). As a result, the early surveys of industrial monuments in the rest of Britain were undertaken largely by volunteers. Their records were collated by Dr. Angus Buchanan at the University of Bath from the mid-1960s, eventually being taken over as part of the National Monuments Record, and many published gazetteers of industrial sites by county followed (Buchanan 1972; Cossons 2000).

Similar inventory work on industrial sites followed in Europe, generally with more professional and less amateur involvement than in the UK. Although French historians had for a long time been interested in industrial history, little notice was taken of the industrial sites themselves until the 1970s, and it was not until 1983 that the *Inventaire Générale* began to include industrial sites with the foundation of an industrial heritage group within it, the *Cellule du Patrimoine Industriel*. A long-term project to create a national database of French industrial sites was initiated in 1986, and a similar database project was begun in the Netherlands where responsibility for the industrial heritage passed to the Netherlands Federation of Industrial Heritage, formed in 1984. In Belgium, various categories of industrial buildings were surveyed, particularly watermills and windmills, and a national survey published by Patrick Viaene in 1986. The Scandinavian countries have an important industrial heritage, particularly in mining of copper and iron (Fig. 2), which largely through the efforts of Marie Nisser were increasingly recognized as significant by their governments, while in Denmark, industrial sites, including those of the twentieth century, have been recorded by its National Culture Heritage Agency.

In areas of the world with a shorter written history than Europe, the discipline of historical archaeology was taken to embrace the study of industrial sites and artifacts. It was pointed out in *Australian Pioneer Technology*: *Sites and Relics* (Birmingham et al. 1979) that the use of the term "industrial archaeology" in Australia was inappropriate since the time span of British industrial archaeology embraced the whole of Australian history since European settlement. In the USA,

Industrial Archaeology, Fig. 3 Suffolk Mill, Lowell, Massachusetts, on one of the many canals which power turbines for water power for cotton manufacture throughout the city. Built in the 1830s by the Suffolk Textile Company, the mill was taken over by the Wannalancit Textile Company but closed in 1981 and is now in use as both university premises and offices

too, many historical archaeologists did not see the need for a different term for the study of industrial sites, since again the majority of their work was concerned with the post-1492 colonial era although generally dealing only with subsurface structures and buried artifacts. Nevertheless, surveys of engineering structures in the USA had been carried out since the 1930s by the Historic American Buildings Survey (HABS), set up as a means of providing work for unemployed architects during the Depression. A pioneering survey of New England textile mills was undertaken by HABS in 1967–1968 (Fig. 3). This was followed by the creation in 1969 of the Historical American Engineering Record (HAER) under the aegis of the National Park Service. The records of these two bodies are maintained by the Library of Congress in what is termed "preservation by documentation" and are among the most heavily used collection in its Prints and Photographic Division. In Australia, the Australian National Trust published lists of industrial sites from the 1960s and went on to conserve many of them at state level, notably the important mining landscapes of gold, copper, and silver at Moonta and Ballarat.

In Britain and Europe, above-ground remains undoubtedly formed the basis of most industrial archaeology in the first half century of its existence as a discipline, and the material culture of the workforce, which might have been obtained through systematic excavation, was neglected. The economic historian Walter Minchinton stated confidently in 1983 that "Industrial Archaeology is not primarily about excavation. The aim of industrial archaeologists is to identify structures, buildings and artifacts early enough to ensure their preservation before they are demolished or destroyed" (Minchinton 1983: 125). On the other hand, Donald Hardesty, in his classic *The Archaeology of Mining and Miners*: *a View from the Silver State* (1988), pointed out that so often the standing buildings, machinery, and landscape features characteristic of many British industrial sites did not survive on US mining sites but "they are rich in trash dumps, residential house foundations, privies and other remains of the miners themselves" and that therefore excavation was essential. As he suggested, early industrial archaeology concentrated on the technological analysis of specific industrial sites and areas and failed to consider the behavioral aspects of material culture or the processes of culture change. This justifiable criticism began to be remedied in the 1990s and 2000s, when post-processual approaches in archaeological interpretation led to increasing concern with questions of power and inequality, labor relations, and class formation which are central research themes for industrial archaeology, as in Paul Shackel's *Culture Change and the New Technology*: *an Archaeology of the Early American Industrial Era* (1996).

Industrial Archaeology, Fig. 4 The man engine and spoil heaps of the Allihies copper mines on the west coast of County Cork in Ireland. The landscape demonstrates the quantity of process residues usually found on such sites which can reveal considerable evidence about the nature of the activity on such sites

This development clearly brought industrial archaeology into a much closer relationship with the existing subdiscipline of historical archaeology, as already practiced in North America and Australasia. In the UK, too, the excavation of industrial sites and the subsequent classification and identification of recovered artifacts has now become standard practice among professional and even many volunteer archaeologists.

Key Issues/Current Debates

Although the discipline of industrial archaeology has developed a great deal over the past two decades, there are still key issues to be resolved. These can be divided into the largely positive and the largely negative, although each impinges on the other.

On the positive side, the debate over whether anything can be learnt from the excavation of industrial sites has been largely resolved and is now part of normal archaeological practice on brownfield sites. There are, though, several problems that distinguish the excavation of historic-period industry from earlier industries and landscapes, namely, the scale of such sites, the formation processes involved, the contamination encountered, and the presence of standing buildings. The typical large-scale manufacturing processes of the industrial revolution have all left substantial foundations of the process buildings involved, containing, for example, working floors, furnaces, and kiln bases, and substantial foundations for power systems such as wheel pits, engine houses, boilers, and flues. The excavation of such sites frequently produces large quantities of process residues which can be bulk sampled for scientific analysis as part of a program of research that answers questions about the date, origin, and use of such materials and by implication the nature of the activity from the sample area (English Heritage 2006) (Fig. 5). The availability of labor and the arrival of steam-powered and later combustion engine-powered earth-moving machinery meant that many industrial-period manufacturing sites saw extensive earth-moving which radically changed the look of many preindustrial landscapes; often these changes can only be recorded by combining landscape survey data with the excavation evidence. A major health and safety concern on excavations involving historic industries is contamination, and suitable precautions need to be taken as part of a risk assessment. The cost of large-scale

Industrial Archaeology, Fig. 5 Linares in the Andalusian province of Jaén in Spain became an important center in the nineteenth century for the mining and smelting of lead. The Cornish engine houses on this site of La Tortilla demonstrate the transfer of mining technology, which was replicated in many other parts of the world

excavations of industrial sites is often very high, but even so many city center sites in the UK have been excavated by professional archaeologists, such as the lengthy project at Hungate in York which contributed a great deal to the understanding of working class housing.

One of the outcomes of developer-funded archaeology, however, has been the fragmentation of archaeological study and the consequent lack of synthesis, which is as true for the industrial period as for earlier periods of archaeology. One solution to this in the UK has been the development of both period-based and regional research frameworks which help to establish the significance of sites and set them in some sort of context. The Association for Industrial Archaeology produced such a research framework which dealt with a range of approaches to the study of industrial sites and structures and also proposed a list of questions which might be considered when such sites are treated archaeologically, to help further our understanding of the process of industrialization (Gwyn & Palmer 2005). The Historical Metallurgy Society followed with a research framework in 2008 (Bayley et al. 2008), while English Heritage has published its own thematic research strategy for the historic industrial environment (Falconer 2010). Such research frameworks help to combat the tendency among industrial archaeologists to interpret sites in terms of technological paradigms and encourage them to see their sites in a wider context, both nationally and internationally.

One of the negative issues on a global front is a decline in new entrants into work on industrial archaeology, even in the UK where the industrial heritage is generally recognized as a key element of Britain's contribution to world culture. Many university-based archaeology courses now include some industrial archaeology, usually under the broader term of historical archaeology, but there are few staff members who have the necessary knowledge to acquaint students with the fundamental principles of the discipline. Even at the postgraduate level, there are few courses available. The pioneering master's degree course at the Ironbridge Institute in the UK now concentrates more on general heritage management, although with an industrial bias, given its location in the UK's first industrial World Heritage Site. The Master of Science in Industrial Archaeology at Michigan Technological University in the USA is one of the very few which trains students in the archaeology of

industrial sites, while the Institute of Industrial Archaeology, History of Science and Technology at the German Technical Museum of Freiburg concentrates more on the aboveground structures in its bachelors' and masters' courses. Professional archaeologists in most areas have, therefore, to develop the skills necessary for industrial archaeology in the course of their working lives, or through distance learning or continuous professional development courses, which remain few in number.

Finally, standing structures are frequently found on industrial sites, and the study and understanding of the buildings of industry have formed a central feature of industrial archaeology since the inception of the subject. Since industrial buildings and process structures tend to be spread over a large area, it is necessary at the outset to identify the types of buildings surviving on a site and to prioritize the recording appropriately. It is important to be able to recognize the significant features of industrial buildings which indicate their past functions as well as the remains of the long-gone fixtures and fittings (Richards 1958). As in the case of excavation of industrial sites, this is an acquired skill for which training is needed and the Council for British Archaeology's *Industrial Archaeology*: *a Practical Handbook* provides a helpful guide (Palmer et al. 2012). However, traditional industries continue to contract and the future for many of these buildings lies in their adaptive reuse. Large industrial buildings are particularly difficult to adapt for modern purposes, while the sheer scale of some historic industrial processes, such as mining, quarrying, and mass production, can be a conservation challenge in itself. In England, English Heritage identified the industrial heritage as the theme for its 2011 Heritage at Risk program, pointing out that nearly 11 % of grade I and II* industrial buildings are at risk, far higher than the 3 % of grade I and II* buildings of other types which are at risk in England (English Heritage 2011). The high costs of conversion and, in some cases, decontamination remain a deterrent to many developers, particularly if the buildings are in areas of low property values. Nevertheless, there are many examples of successful reuse around the world, even such difficult sites as iron furnace complexes at Sloss in Birmingham, Alabama, USA, and Duisberg in the Ruhr district of Germany. Where adaptive reuse proves impossible, then preservation by record remains the only option, and it is essential to ensure that this is done before demolition.

International Perspectives

In 1983, the journal *World Archaeology* devoted a volume to industrial archaeology (Vol. 15. No. 2, 1983). In his overall survey of world industrial archaeology, Minchinton suggested that industrial archaeology had been one of the more successful British postwar exports but that he hoped that a similar survey in 10 years' time would be able to report on a more extensive geographical activity, a widened topical scope, and a greater professionalism in industrial archaeology throughout the world (Minchinton 1983: 134). On the whole, these three objectives have been achieved. The Web site of the International Committee for the Conservation of the Industrial Heritage, TICCIH, founded in 1978, includes a list of those countries undertaking recording of the industrial heritage. For example, the Society for Industrial Archaeology in the USA, formed in 1971, and the Association for Industrial Archaeology in the UK, dating from 1973, both seek to promote the study and practice of industrial archaeology, as do the *Comité d'information et de liaison et de promotion de l'archéologie industrielle* (CILAC) in France, founded in 1978, and the *Asociación Vasca de Patrimonio Industrial y Obra Pública* (*AVPIOP*) in Spain, founded in 1984. The narrow concentration on the archaeology of production which marked the early years of industrial archaeology has been considerably widened to include the archaeology of consumption, with consideration of the significance, use, and distribution of the artifacts of the period as well as the social context of their manufacture. Finally, as suggested earlier, the rapid decline of traditional industry, especially in the western hemisphere, has led to a far greater participation by

Industrial Archaeology, Fig. 6 The Ironbridge across the Severn Gorge in Shropshire, the world's first iron bridge, cast in Abraham Darby's Coalbrookdale foundry in 1777 and erected in 1779. Now in the care of English Heritage, the bridge was originally saved by the Ironbridge Gorge Museum Trust and is the centerpiece of an industrial landscape accorded World Heritage status in 1986

professional archaeologists on historic-period industrial sites, especially in the context of developer-funded archaeological excavation. However, individual countries tend to concentrate on their own particular sites and products, and more comparative studies are needed to explore the importance of technology transfer and the impact of global trade (Palmer & Neaverson 2000) (Fig. 5). TICCIH, as the recognized advisor to ICOMOS on industrial heritage, could do more to facilitate this. The Nizhny Tagil Charter, passed by the assembled delegates at the triennial National Assembly of TICCIH held in Moscow on 17 July, 2003, concentrates more on industrial heritage than the comparative study of industrial archaeology, which is anyway necessary for site interpretation (Nizhny Tagil Charter 2003).

The international value of the industrial heritage has, however, been recognized through the designation by the United Nations Educational, Scientific and Cultural Organization (UNESCO) of more than 60 World Heritage Sites since 1978 whose significance is mainly industrial. The distribution of these on a global basis is uneven, depending on when specific countries became members of UNESCO or, in some cases, withdrew from the organization for political reasons; the USA was not a member from 1985 to 2003, for example. The sites range from Røros Mining Town in Norway, inscribed in 1980; the Ironbridge Gorge in the UK, including the world's first iron bridge of 1779 (Fig. 6), which was inscribed in the first tranche of UK World Heritage Sites in 1986; the UK's pioneering textile sites of the Derwent Valley, New Lanark, and Saltaire in 2001; the Humberstone and Santa Laura Saltpeter works in the Atacama desert of Chile, inscribed in 2005; and the Iwami Ginzan Silver Mine and its Cultural Landscape in Japan in 2008. The pace of such designations has decreased in recent years with the recognition of the need to ensure adequate management of inscribed sites, especially industrial ones, where the balance between heritage value and modern redevelopment is often difficult to maintain.

Future Directions

Industrial archaeology has been extremely successful in achieving what its pioneers set out to do – achieve recognition for the importance of the remains of the industrial past and where possible their survival in the contemporary landscape. Nevertheless, as the 2011 English Heritage

"Industrial Heritage at Risk" initiative has shown, the industrial heritage remains at risk from many quarters, not just neglect and redevelopment. The global recession has led to massive funding cuts which impact on archaeological services, and it is not clear how far current levels of protection for archaeological sites within the planning process will be maintained.

Nevertheless, the discipline has matured in the half century of its existence, moving away from technologically dominated explanations of the remains of the industrial past toward a greater concentration on the social context of industrialization, with, for example, studies of workers' housing and the spatial analysis of mills and factories to try to understand how people and machines functioned as a whole (Fig. 7). Studies of industrial landscapes have explored ways in which these not only manifest the physical remains of industrial processes but also embody evidence for past hierarchical power relations in the layout of settlements. The dawn of a new century has also led to a greater interest in the industrial remains of the twentieth century, particularly in countries where industrialization came rather later than in the UK where concern for the eighteenth-century structures dominated the early years of the discipline.

Industrial Archaeology, Fig. 7 Blind-back housing in the Kartuizerlaan beluik in Ghent, Belgium. Built as workers' housing in between cotton mills in the nineteenth century, many of the beluiks have been adapted for modern gated housing

Nevertheless, industrial archaeology remains a discipline in tension, which seeks to maintain a balance between investigative archaeological techniques which can lead to destruction of sites and the preservation of sites and structures for posterity (Fig. 8). It will doubtless continue to do so, and its vigor lies in both the continuing participation of volunteer activists like those who saved industrial sites in the middle of the twentieth century and valuable work of professionals who have increasingly undertaken recording and excavation of industrial sites as part of their normal routine.

Industrial Archaeology, Fig. 8 Pozo n° 5 at La Reunión, a coalmine worked in the past by the railway company MZA (Madrid-Zaragoza-Alicante) and located in Villanueva del Río y Minas in the province of Seville, Andalucía. The ornamental tower is an electricity generating station dating from 1926. The site is listed as "Bien de Interés Cultural," the highest category in Spain, but there is currently no conservation being undertaken

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- ▶ Arqueologia Industrial
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Council for British Archaeology (CBA)
- ▶ Historical Archaeology
- ▶ Historical Metallurgy Society Ltd.
- ▶ Industrial Heritage in Archaeology
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Landscape Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ Museos de Real de Monte
- ▶ Palmer, Marilyn
- ▶ Post-Medieval Archaeology
- ▶ Society for Industrial Archeology (SIA)
- ▶ Volunteers in Archaeology
- ▶ World Heritage Objectives and Outcomes

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Industrial Heritage Association of Ireland (IHAI)

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Basic Information

The present Association was formed in 1997, although there had been a similar grouping of persons with an interest in industrial heritage operating in the 1970s. The focus of the Association is based on making the general public more aware of their industrial heritage, of assisting them in understanding the importance to future generations of conservation, preservation, survey, and identification of important sites, and to this end aims to recruit members and identify those who would actively participate and inform on industrial heritage throughout the island of Ireland. The Association was incorporated into a limited liability company in 2005. An Executive Committee, comprising the Officers of the Association (president (Brendan Delany in 2013), vice-president, secretary, and honorary treasurer) and up to ten ordinary members, elected by members at the Annual General Meeting is responsible for administration of the Association and its affairs.

Major Impact

Since the Association was formed, it has organized excursions to industrial heritage sites, and its members have conducted surveys and contributed through a regular newsletter to matters of industrial interest. Its members are provided with a forum on its website www.ihai.ie to enable them to discuss industrial heritage matters, and various papers have been written by members and those associated with industrial archaeology and presented at conferences held at irregular intervals (see Further Reading).

The Association held an important Networking Conference in conjunction with the Heritage Council, which was held at Dublin Castle in November 2006. In this the Environment and Heritage Service (Northern Ireland) and the Office of Public Works participated. The results of the Conference have provided some understanding in government circles of Ireland's industrial heritage and its importance in tourism and in cross border connections. A Working Heritage Report was adopted by the Heritage Council, but regrettably the report has not yet been acted upon to any significant extent.

The issues which emanated from this Report constitute some of the current aspects that are so important for further progress towards an assimilation of the subject by responsible bodies:

- Raise awareness of the work done by many groups and agencies.
- Promote an integrated approach to the conservation of industrial heritage.
- Involve all parties in debate, discussion, and policy formation.
- Identify the main issues facing the sector.
- Encourage a survey of industrial heritage, to add to the Northern Ireland survey.
- Become an umbrella to represent the sector, be a channel for enquiry, and be a referral point.

The Association has enlarged its membership and widened its publicity towards representation on industrial heritage. It now, with the help of other interested parties, plans to provide a platform for industrial archaeological studies in conjunction with leading technological companies, who are aware of the importance of the past that made their future possible, and are prepared to address and support the Association's activities.

In today's world new technology becomes old even more quickly, and the Association intends to continue to archive material from past industries.

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► Association for Industrial Archaeology (AIA)
► Industrial Archaeology

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Industrial Heritage in Archaeology

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Introduction and Definition

Industrial heritage by definition encompasses a broad array of objects, structures, landscapes, and historical practices. Simply put, industrial heritage includes all of the social and material culture directly or indirectly related to the people engaged in the creation of infrastructure and the production and distribution of raw materials, objects, and energy. Industrial archaeology (IA) is the documentation and study of this social and material culture. As a practice, IA began with a distinct focus on identifying and documenting Industrial Revolution era sites and structures, but as the field matured into a discipline, it grew to encompass much broader temporal and thematic domains including domestic sites and twentieth-century landscapes, broader topical areas such as technological evolution and environmental destruction, and broader contributing disciplines including architecture, sociology, and heritage tourism. In all, however, material culture and people were always at the center of the study whether it be documenting a 4-0-4 steam - locomotive, preserving mill town terraced housing, analyzing a waste slag dump, or understanding the people and their families who built, designed, operated, managed, financed, remediated, or provided goods and services to the production and distribution of objects, energy, and infrastructure. Further, from the very beginning of the field, the practice enjoyed the engagement of a steady stream of keenly interested public participants.

The International Committee for the Conservation of the Industrial Heritage (TICCIH), the body designated to advise the International Council on Monuments and Sites (ICOMOS) on industrial heritage, defined the field in 2003 as:

> *Industrial heritage* consists of the remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education.
>
> *Industrial archaeology* is an interdisciplinary method of studying all the evidence, material and immaterial, of documents, artefacts, stratigraphy and structures, human settlements and natural and urban landscapes, created for or by industrial processes. It makes use of those methods of investigation that are most suitable to increase understanding of the industrial past and present.
>
> The *historical period* of principal interest extends forward from the beginning of the Industrial Revolution in the second half of the eighteenth century up to and including the present day, while also examining its earlier pre-industrial and proto-industrial roots. In addition it draws on the study of work and working techniques encompassed by the history of technology (TICCIH 2003).

Historical Background

Industrial archaeology began in Britain in the 1950s. At the core of IA was the recognition that from the 1750s, profound technological,

social, and economic changes spread across Britain completely altering the fabric of life, the environment, and the physical and financial well-being of vast number of people. This change, highlighted by the reorganization of power, production, technology, and labor, became known as the Industrial Revolution which was distinctly British at its start but quickly spread across the world through various means of transfer. While the debate continues as to whether the Industrial Revolution was actually revolutionary in its time scale or whether it truly began in the 1750s or had its roots much earlier, the mid-eighteenth century was the point that the physical industrial record became more prominent and cultural changes, which continued to have a profound legacy in the mid-twentieth century, came more rapidly. Further, while this period included the ever-greater amassing of corporate documentation with some companies leaving copious business records, few documents traced the changing welfare of early industrial workers or the incremental technological advancements made primarily by craftsmen who possessed an inherent understanding of certain industrial processes but had little incentive to physically record their efforts. The evidence for and understanding of these earlier periods could only be captured through the study of the physical remains of industry and industrial societies often enriched by documentary sources. With this focus on the remains of industrial practice and material culture, the discipline of industrial archaeology was born.

The TICCIH definitions cited above came after 40 years of debate, both internal and external, about what IA was, what it should be, and where it was going. Like other archaeological and historical disciplines, industrial archaeology began as an amateur pursuit led by interested individuals. IA's avocational roots were propagated reacting to changes in the British landscape and the loss of cultural resources from the industrial era as new, postwar construction was encroaching on former industrial areas, and redundant structures, some several hundred years old, were being demolished with little reverence for their histories. Public reaction escalated from these dramatic cultural landscape changes and led to stronger identification, recognition, and protection programs for the extant material evidence of this earlier economic era. Neil Cossons, former director of Ironbridge Gorge Museum Trust and later chair of English Heritage, wrote in 1987 in the revised second edition of the *BP Guide to Industrial Archaeology* (originally published in 1975) that "IA was born, not out of a detached or academic interest but on a wave of emotional enthusiasm and a less defined but clearly deep-seated feeling that a vital part of the past was being destroyed. . .The postwar years, dominated with a preoccupation with renewal and a new foundation for future prosperity, saw the destruction of much that was old" (Cossons 1987: 11).

The roots of the phrase "industrial archaeology" can be traced to comments made by Donald Dudley in the early 1950s and formally published by Dudley's colleague Michael Rix in 1955 (Hudson 1979: 1). The adoption of the title by amateurs documenting standing structures, however, caused certain consternation among professional archaeologists reacting to the lack of true excavation and the perceived lack of academic rigor (Hudson 1979: 1). Some went so far to refer to the work as not simply unprofessional but "antiprofessional" (Foley 1968: 67). Initially, the field was primarily concerned with the documentation, recordation, and to some extent preservation of structures and machines of the Industrial Revolution era and was executed mainly by amateur British historical societies and clubs. Despite its avocational lineage, the field grew in stature with the broader recognition that the loss of material culture, even one so modern in British terms, of a clearly definable period constituted a significant loss of data and heritage. This understanding led the Council of British Archaeology (CBA) to institute a standardized documentation card system for individual sites that the societies and clubs would use to further their documentation efforts and ensure that consistent information was collected at each site. By 1965 that card system would become the National Record of Industrial Monuments and would be complimented by the

later Industrial Monuments Survey sponsored by the then Ministry of Public Buildings and Works (Cossons 1987). For several years the CBA took a formal leadership role with subcommittees dedicated to industrial heritage until 1973 when the Association for Industrial Archaeology (AIA) was formed in the UK and, in 1976, began publishing an increasingly academic journal, *IA Review*.

By 1979, Kenneth Hudson, a former BBC correspondent who wrote a number of works on IA including the seminal publication *Introduction to Industrial Archaeology* (1963), observed that IA was entering its third developmental phase. Stage one, he wrote, was the formation period in the 1950s bringing the plight of industrial heritage to the attention of a wide audience. Stage two, which lasted through the 1960s and 1970s, entailed a sizable portion of volunteers identifying extant heritage, filling out CBA cards, and creating national lists. Stage three, Hudson argued, developed from the realization that there was an enormous collection of materials generated in stage two in need of a more structured analysis (Hudson 1979: 2-3). This stage became especially international as IA had spread across Europe and North America in the 1960s and 1970s and was engaging a more academic and professional community organized through societies and presented through journals and conferences.

A key trigger of Hudson's stage three was the realization that stage two documentation programs produced considerable data on places but not much context which further ignited the clamors of heritage professionals unhappy with the perceived lack of professionalism (Hudson 1979). However, as IA approached its third stage, it grew with the recognition of a broader need to understand the effects these places had on the people they engaged and the broader patterns of development beyond technological operation and identification. In 1979 Hudson stated that industrial archaeology had four aims. First was to understand the conditions of and reactions to the work being studied during a particular period; second to understand how each actor benefited or was affected by activities being studied; third, to understand how a job was done; and fourth to record the physical environment in which the activities were performed (Hudson 1979: 13-4). Neil Cossons wrote in 1987, demonstrating that IA was evolving a much more rigorous approach to understanding industrial heritage, that:

> Industrial archaeology is a cultural archaeology, the study of the culture in which industry has been dominant and in particular its physical manifestations and the light they shed upon our understanding of industrial society (Cossons 1987: 10).

In the USA, industrial archaeology was born in the 1960s, but its early proponents tended to come from more professional backgrounds with museum curators, engineers, archaeologists, and historians comprising its first practitioners. Its aims, like those in Britain, were to document and record significant industrial sites, many faced with growing threats because of rapid highway building. Unlike early British IA, the Americans approached the material with a stronger early push for greater contextual understanding of the sites and processes being documented (Vogel 1967: 379). Fostered by thematic studies in the 1960s, the US National Park Service formed the Historic American Engineering Record (HAER) in 1969 as a companion to the Historic American Buildings Survey which was founded to document disappearing historic architectural works with unemployed architects during the Great Depression. HAER, as its name implies, was established to document engineering and industrial sites. In general HAER projects started with a broad regional survey to identify standing structures and landscapes often on a statewide basis. These usually led to short one- or two-page documentary histories of important sites augmented with a photograph or drawing. For historically significant sites, when funding could be arranged, HAER would dispatch a summer team of architects, photographers, and historians to more fully record the site, its structures, and its processes and develop a more lengthy history which, along with drawings and photographs, would ultimately be housed in the US Library of Congress (See HABS/HAER n.d.) (Figs. 1 and 2).

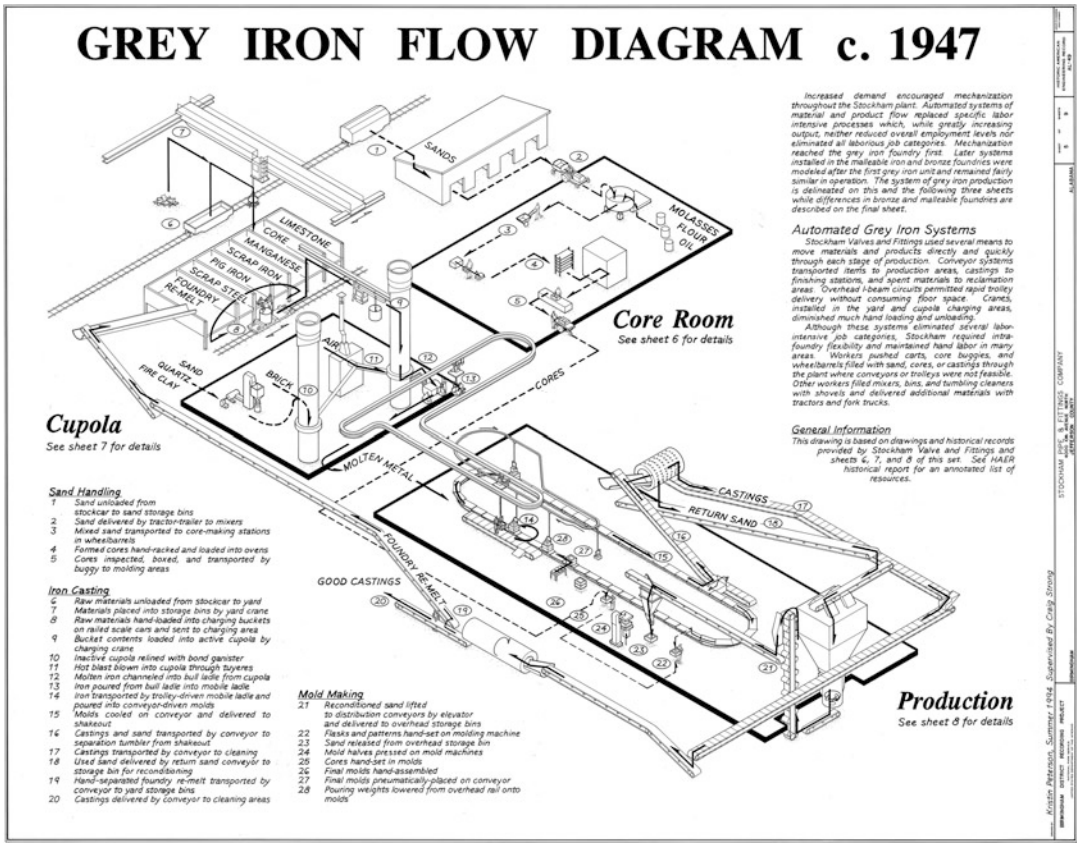

Industrial Heritage in Archaeology, Fig. 1 Typical HAER architectural rendering of an industrial process showing the "Gray Iron process c. 1947" at Stockham Valves and Fittings foundry in Birmingham, Alabama. (Delineator Christen Peterson, 1994. US National Park Service, Historic American Engineering Record)

Industrial Heritage in Archaeology, Fig. 2 HAER image of Stockham Valves and Fitting foundry in Birmingham, Alabama, titled "Interior View with Iron Pourers Filling Completed Molds on Grey Iron unit No. 1 Mold Conveyor." HAER ALA,37-BIRM,45A-20. (Jet Lowe photographer, 1994. U.S. National Park Service, Historic American Engineering Record)

In 1971, a dedicated group of US archaeologists, museum curators, and historians met in Washington, D.C., and establish the Society for Industrial Archeology (SIA) to "promote the study, appreciation, and preservation of the physical survivals of our industrial and technological past" (SIA n.d.). Its mission would be:

> to encourage the study, interpretation, and preservation of historically significant industrial sites, structures, artifacts, and technology. By providing a forum for the discussion and exchange of information, the Society advances an awareness and appreciation of the value of preserving our industrial heritage (SIA n.d.).

With annual conferences and a multivolume journal like its British counterparts, the SIA provided a forum for the presentation of academic work and a platform to promote the conservation of industrial heritage. A significant component of the SIA conferences and study events was, and still is, its tours to active industrial sites and industrial heritage locations to encourage the full understanding of the effects of industrialization and, ever more, deindustrialization that continue to play an important role in defining American and global culture.

In addition to the SIA, the roles of US professional engineering societies also impact IA. The American Society of Civil Engineers (ASCE) and the American Society of Mechanical Engineers (ASME) each have history and heritage committees and landmark programs to identify and honor key works, and the Institute of Electrical and Electronics Engineers (IEEE) maintains a history center and historic preservation program. However, even with HAER and the engineering societies, industrial archaeology in the USA still maintains a significant public or avocational involvement. While the formal lists and documentation projects tend to be handled more professionally, the public tends to focus on educational involvement from ardent interests in historical and industrial topics and in a more activist role promoting preservation and museums.

As IA spread to other countries, it tended to take one of two forms. First was the bottom-up grass roots approach, initiated by amateurs and nonprofessionals like the British model, or second a more top-down centralized approach initiated by professionals like the US model. Walter Minchinton cites IA developments in Belgium, Italy, and the Netherlands that took a grassroots approach while Australia, France, and Russia took a more centralized approach (Minchinton 1983: 130). With the international growth of IA came the realization that despite countries' various differences and implementations, they often shared a common industrial lineage tied to the spread of industrialization from the mid-eighteenth century and an increasingly common deindustrialization pattern in the late twentieth century as substantial industrial economies were growing in China, India, and Brazil. Starting with a meeting held in Ironbridge (UK) in 1973, the International Congress on the Conservation of Industrial Monuments formed and started holding triennial congresses aimed at international issues. In 1978, the group was renamed the International Committee for the Conservation of the Industrial Heritage (TICCIH) which in 2000 entered into an agreement with ICOMOS to consult on industrial world heritage and the promotion of industrial heritage in Europe (ICOMOS and TICCIH 2000). TICCIH:

> is the international organisation for industrial archaeology and the industrial heritage.
> Its aim is to study, protect, conserve and explain the remains of industrialization (TICCIH n.d.).
> [TICCIH was] established for the primary purpose of achieving cooperation at an international level in the preservation of industrial monuments and artefacts and in fostering an understanding between nations of the historical, scientific and educational value of mankind's industrial heritage (ICOMOS & TICCIH 2000).

During Hudson's third stage in the 1980s and early 1990s, IA became a more codified practice with the creation of academic programs in industrial archaeology, not all still active, at Rensselaer Polytechnic Institute (NY), University of Birmingham's Ironbridge Gorge Institute (UK), West Virginia University (WV), Michigan Technological University (MI), and later programs in Leicester (UK) and Manchester (UK) universities. These programs, led by progressive academics

working in and continually defining (and redefining) the field, began with a stronger focus on asking more critical questions about places, practices, and industrialization's effects on human conditions and to provide formal training to new professionals entering the field.

Key Issues and Current Debates

However, with the formation of a more formal discipline came internal debates and conflicts. The two primary debates that have existed in the field and continue to surface relate to whether the discipline should approach its subject as a thematic or period study and whether the discipline has enough academic rigor, or more broadly stated, whether the discipline is primarily engaged in preservation activism or asking more critical questions of the material. The period versus thematic debate centered on whether IA should be study-based focusing on the process and activities of industrialization, broadly defined, or on a specific period of industrialization, namely 1750 onwards. The periodic argument, which tended to have a more historical archaeology base, was primarily interested in the broad cultural changes that the Industrial Revolution as defined had on Western and more increasingly Eastern culture. The thematic argument, which tended to be more anthropology-based, largely argued that industrialization was a series of evolving processes that had their roots very early in human development and that the Industrial Revolution was not a revolution at all but rather a continuation and concentration of prior industrial developments, and as such IA should not limit itself temporally (Palmer 1990: 275). Although this debate began early in the field and a somewhat compromise statement is reflected in the TICCIH definition above, the issue was still being discussed in 2012.

The second main debate centers on the field's broad interest groups and the perceived extent of academic rigor. Perhaps more than other discipline, industrial archaeology encompasses a broad array of professions including archaeologists, historians, architects, museum professionals, and engineers each with a particular expertise and interest brought to bear on industrial remains, and a very active nonprofessional or avocational contingent. This eclectic mix tended toward discursive objectives as opposed to disciplines of like-trained professionals following a uniform methodological approach. As we have seen, IA has its roots in nonprofessional documentation efforts, but from the beginning, this avocational involvement has brought on criticism from professional organizations that claim that this group does not follow standards of similar or related fields. This debate shows up in questions of whether this is an archaeological field or a preservation field, whether it is an academic field or an activist field, and whether it is a course of study or primarily a documentation practice. This issue, however, was largely addressed in the 1990s during Hudson's phase three with the demonstration that amateur groups were quite capable of providing quality work and the growth of academic programs, conferences, and journals with a clear commitment to pursuing more academic questions (Cossons 2007: 13). By the late 1990s, the field largely stopped defending its rigor and began, like other disciplines exiting their formational stages, debating which questions should ultimately be asked of the material (see Casella & Symonds 2005).

These latter evolutions of the field, however, did not eliminate or marginalize the nonprofessional. It is true that the creation of lists slowed down as the number of undocumented sites shrank effecting a similar slowdown in the traditional role for the nonprofessional. However, new roles, especially in the creation and promotion of heritage, opened for them. Heritage interpretation and preservation had always been an important part of IA, and many of the British societies and clubs worked to not only document sites but make them available for public tours and educational experiences; those key experiences were primarily volunteer-led museum or education-related (Linsley 1980: 43). However, with the growing understanding that not every significant site can be converted into a museum and that some sites are significantly large and prohibitively expensive to

Industrial Heritage in Archaeology, Fig. 3 Aerial image of Park Fundidora, Monterrey, Mexico, developed as a large state-municipal park and recreation space with a steel museum located in and around the former blast furnace number three. Image shows the large enclosed amphitheater, partial remains of the former steel mill, and view of the city. (Bode Morin Photographer, 2010)

conserve yet important enough to keep led to the need to find alternative uses for some of them. This approach was augmented by the growth of heritage tourism and the promotion of World Heritage sites, sociological studies into community memory and identity, and the need to broaden the experience of traditional museum goers or expand the industrial heritage constituency to include other members of the community who may not be as topically inclined. This newer movement, though usually including traditional educational and interpretive experiences at historic sites, increasingly included new arts and entertainment experiences – some on a grand scale.

From the late 1970s and into the 1990s, adaptive reuse of former industrial sites became a popular and economically attractive means to conserve large sites. In Europe, this type of development was often enhanced with significant state incentives tied to national identity, while in North America the process tended to be on a municipal or private level. Sloss Furnaces in Birmingham, Alabama, for example, arguably the first large-scale industrial heritage conservation project in the world, included a stage in one of its former cast sheds for concerts and maintains an active arts and festival program in addition to their history-education experiences. The former extensive Bethlehem Steel plant (PA) was being redeveloped with a casino, shopping mall, and concert venue. Park Fundidora in Monterrey, Mexico, which preserved parts of one of the largest Latin American steel mills, also included open parkland, an amphitheater, and hotels and is connected to the city center with via a man-made river way (See Fig. 3). The Tate Modern Gallery in London and the Capitoline Museum, Centrale Montemartini, in Rome were both installed in former power plants, and the Musee d'Orsay was installed in a former train station – each with much of the original fabric of their former uses intact. Further, throughout North America and Europe, former industrial buildings have been converted into lofts and office buildings or have even simply been left on the landscape and become welcome subjects for an increasing interest in industrial ruins (Cossons 2007: 17). TICCIH, the SIA, and the AIA all refer to preservation as a key component of their work and increasingly promote adaptive reuse projects (Fig. 3).

In the late 1990s and 2000s, IA entered a fourth period, the Industrial Heritage phase. While IA had always had a strong preservation component and academic programs and journal articles continued to ask critical questions of the material culture,

there was a strong and growing new emphasis on adaptive reuse, as noted above, with greater values placed on memory and identity, environmental conservation, and sustainability. In addition to new industrial heritage developments and experiences, this trend was supported by several new academic graduate programs which were developed with a broader focus on heritage management topics including adaptive reuse, museum studies, and conservation planning. The Ironbridge Institute now offers graduate courses in Heritage Management and Historic Environment Conservation, and the University of Leicester offers graduate degrees in Museum Studies Interpretation, Representation, and Heritage. Michigan Technological University's master's program in Industrial Archaeology has grown to include a Ph.D. in Industrial Heritage and Archaeology. Erasmus Mundus, a joint program with the Sorbonne (France), Évora (Portugal), and Padua (Italy) universities, offers a master's degree in "Techniques, Heritage, and Industrial Landscapes (History, Enhancement, Education)" and a Ph.D. in Applied History HTPS (History, Technology, Heritage, Sustainability). Vrije Universiteit, in Brussels, has a course in "Industrial Archaeology and Industrial Heritage," and the Conservatory of National Arts and Crafts (Paris) offers courses in the history of technology and the conservation of industrial heritage (TICCIH n.d.).

The growth of heritage tourism in the United States and the expense of creating new national parks have encouraged the formation of National Heritage Areas, which with National Park Service support are largely local efforts to identify participating historic sites within a specific geographic area that contribute to a particular theme. The independent heritage areas then develop branding, economic development, and heritage experiences to encourage visitors to travel through their particular area. Of the 48 US heritage areas in 2011, at least 17 had industrial themes including MotorCities (Detroit), Rivers of Steel (Pittsburgh), National Aviation (Dayton), National Coal (WV), and the Oil Region (PA) (National Heritage Areas n.d.). More specific to industrial heritage, the European Route of Industrial Heritage (ERIH) was developed with common branding and experiences but on a much larger scale. ERIH encompasses more than 850 sites in 32 countries with 13 regional routes and 77 anchor sites (European Route of Industrial Heritage n.d.). Further, in the role of heritage activism, TICCIH has been a strong proponent of identifying and promoting industrial sites for inclusion in the UNESCO World Heritage List. Of the 725 cultural properties in 153 countries on the World Heritage List of 2011, at least 39 are identified as having industrial components or themes (UNESCO n.d.). TICCIH, through its role with ICOMOS, has been a strong proponent of World Heritage and has expanded attention of industrial heritage of "Outstanding Universal Value" (Martin 2011: 30) (Fig. 4).

Industrial Heritage in Archaeology, Fig. 4 The Big Pit, National Coal Museum part of the Blaenavon World Heritage Site, Blaenafon, Torfaen, Wales. The site offers underground tours, interpreted educational experiences, and conserved mining structures meeting the condition of outstanding universal value. (Bode Morin photographer, 2006)

The reuse role of former industrial structures is further reflected and enhanced by the greater inclusion of developers, architects, and landscape

architects in international heritage conferences, showcasing not just specific conservation projects but redevelopment and tourism enhancement projects. At the 2009 TICCIH world congress in Germany, 19 of the 29 sessions of the scientific program dealt specifically with heritage issues of preservation, redevelopment, and reuse. The program included the sessions "Creative Re-Use: Industrial Heritage, Building Assessment, Real Estate and Brownfield Redevelopment"; "Industrial Heritage Tourism"; "Management of Cultural and Environmental Areas"; and "Large Scale Industrial Heritage Projects – Concepts and Problems" (TICCIH 2009).

Concurrent with the broad growth of heritage and, in many ways, the maturation of the preservation side of the field, the academic side of IA continued to evolve and tackle bigger questions with an expanded documentary, archaeological, or historical methodology to understand the human and cultural experiences of industry, but with new emphases. Until the 1990s, much of IA focused on the productive side of industry with many articles exploring how industry worked and the effects of growth and expansion on culture. Many museum exhibits also tended to be more celebratory or explanatory. Newer studies influenced by trends in historical archaeology, for example, began to focus on Marxist approaches of class and status, gender, and resistance demonstrated in industrial site material culture (Palmer 2005). Further, with the growth of the fields of environmental history and envirotech studies, several new studies began exploring the material evidence for the broader effects of industrial activity, namely, environmental destruction, waste generation, and the long-term effects of toxic chemicals (see Quivik 2000). Museums too started to explore issues of contamination and regeneration at former industrial sites and the broader effects of industrialization on communities (see Shrinking Cities n.d.).

Future Directions

The field today seems to be focusing more clearly on these dual roles. On the one hand, the academic side is continuing to evolve and ask serious questions of the material culture. On the other hand, the heritage side can be argued to be flourishing, as far as development money is available for reuse projects, and reaching a broader more popular audience. From the UNESCO World Heritage List to the US National Trust for Historic Preservation, which recently included several industrial heritage sessions at its 2011 conference, the greater appreciation of industrial heritage is demonstrated among nonindustrial archaeologists and others not necessarily inclined to appreciate industrial sites and histories. But this new appeal is centered on a newer appreciation for heritage and reuse projects that have broad community benefits but do not necessarily reflect renewed interest in traditional forms of IA. While this could be a symptom of general deindustrialization, the declining need for nonprofessional documentation services, or simply a means to attract a larger audience to the field, it may be seen as diluting the broader historic and scientific focus of the field. Or maybe IA has simply fulfilled its first mission to recognize significant industrial sites, document the most important of those, and argue for a broad preservation plan and is now focusing on using those sites being preserved in new ways and settling in on more complex ways to understand the material culture and its effects on contemporary culture.

Cross-References

- ▶ Association for Industrial Archaeology (AIA)
- ▶ Capitalism: Historical Archaeology
- ▶ Cultural Heritage and the Public
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Museums and the Public
- ▶ Historic Building Conservation: Current Approaches
- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ Ironbridge Gorge Museum Trust (IGMT)

▶ Ironbridge Institute
▶ Regional/Site Museums
▶ Society for Industrial Archeology (SIA)

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Infrastructure in the Roman World: Roads and Aqueducts

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State of Knowledge and Current Debates

Roads in the Roman World

Introduction

The Roman road system, together with the sea transport network, represents one of the essential structural means, *moles necessariae* (Plin. *HN* 30.75), through which the Roman state at first established itself and then maintained its empire. In the meanwhile, the Roman civilization, thanks in part to its road system, succeeded in assimilating, merging, and transforming even the most dissimilar and distant cultural and economic influences and contributions; all of them helped the Roman civilization to take on that character of universality which enabled it to endure (Quilici 1990: 11, 22). The construction of Roman roads is governed by a strong process of abstraction which simplifies the complexity of landscape in order to get an environmental model and tool able to organize and manage space. The land is deprived of its natural features and is isolated from its context. The "milestones of nature," such as trees, rivers, hills, rocks and so on, are no longer suitable to fix a point in space, due to their continuous transformation; thus, they give way and are replaced by the well-defined milestones of the Roman state. They are stone markers set up on a roadside to indicate the

distance in miles. A milestone fixes once and for all a point in space and thus it also marks time. This way, huge territories take on for the first time a definite outline; permanent military and economic landmarks and travelling times are fixed more precisely (Cat. *Orig*. 1.6; Dion. Hal. *Ant*. Rom. 2.49; Strabo 5.2.10: 20-25). The measurement of distances and the fact to have well-defined/certain points of reference on the soil is the basis of an effective planning of political, military, economic, and administrative activities. This approach of the Romans to the awareness and organization of territory arises from a complex scientific system, resulting from a mixture of geometry, engineering, geography, ethnography, and economics: this approach enables them to coherently redefine and contextualize space, by adapting it to the needs of the Roman state.

Historical Development

Rome's position at the main ford of the lower course of the river Tiber situates it near to important routes of human transhumance (Quilici 1990: 13). These overland routes linked the populations of Latium, Sabina, Etruria, and Campania along the valleys of the Tiber, Anio, Sacco, and Liri rivers. Rome became in turn an important hub, thanks to its favorable position (Cic. *de re pub*. 2.4-6; Liv. 5.54.4). Already in the fifth century BCE, the laws of the Twelve Tables regulated, in a special paragraph, the road size (Paul., Fest., 508.22). The Roman road system passed in a short time from a series of roads radiating from its center to the near cities, which were called with the name of the city to where they led (*Via Ostiensis* leading to Ostia, *Via Ardeatina* leading to Ardea, *Via Tiburtina* leading to *Tibur*, *Via Collatina* leading to *Collatia*, and so on), to a long-distance and really extended road network. At the end of the fourth century BCE, that was going to become a long-distance and remarkably vast route. The construction of roads started at the end of the fourth century and continued for all the third century BCE following step by step the territorial expansion of the Roman state and, above all, the creation of strategic bases such as the *coloniae maritimae*. These settlements needed to be linked to Rome to answer in full the military, economic, and trade requirements of both colonies (*coloniae*) and allied cities (*socii*). *Tarracina Anxur*, founded in 329 BCE, was connected to Rome by the *Via Appia* in 312 BCE, while *Cosa*, a colony of 273 BCE, was connected to Rome by means of the *Via Aurelia*. From the third century BCE, the *Appia*, *Latina*, *Tiburtina* and *Valeria*, *Salaria*, *Flaminia*, *Aemilia*, *Postumia*, *Aurelia*, *Cassia*, and *Clodia* roads, along with the two roads called *Popilia*, played primary roles in the unification of the Italian peninsula. In particular, the most important roads in military, colonial, and economic terms were the great roads leading to the Etruscan territories between the third and the second centuries BCE (the *Via Aurelia* coast road, the *Via Amerina*, *Via Clodia*, and *Via Cassia*) and the pathways built towards northern Italy: the *Via Flaminia*, probably built by Gaius Flaminius during his censorship in 220 or 219 BCE, that was the axis for the colonization of the *Ager Gallicus* and for the conquest of *Gallia Cisalpina* that led to *Ariminum*; the *Via Aemilia*, built by the consul *Marcus Aemilius Lepidus* in 187 BCE, linking *Ariminum* to *Placentia*, on which the land divisions of the fertile territories of the Po valley were based; and the *Via Postumia*, which established the boundary line between the Roman world and the subalpine regions around the second half of the second century BCE, when it was built by Spurius Postumius Albinus. This road connected *Genoa* to the Ligurian sea and *Aquileia* at the northern end of the Adriatic. Finally, the *Via Popilia* road, built in 132 BCE between *Ariminum* and *Padua* by P. Popilius and finished by T. Annius, led to the southern end of peninsula (Quilici 1990: 17). From a building viewpoint, the first roads were a mere adjustment and integration of previous routes, and they did not possess the permanence that would be the distinguishing feature of the Roman roads for centuries, that is, the paving with *lapidibus perpetuis*, according to the well-known definition of the *lex Iulia municipalis* of the first century BCE (*CIL* I, 206). The presence of such paving demonstrates the existence of a codified building technique that complied with standard procedures.

As the building techniques developed, roads become "living beings" (Quilici 1990: 11) and soon began to be surrounded not only by spontaneous settlements but also by elements at the basis of civil life and organizing territories such as *castella*, *conciliabula*, *fora*, and *vici* (Becker 2002; Gros & Torelli 2007). Roads, in the Roman world, created a community. Towards the end of the Republic, the road system connected Rome to all the main cities of the peninsula. Two important routes, the *Via Domitia* and the *Via Egnatia* (Fasolo 2005), led to the farthest western territories of the Roman Mediterranean. In the imperial period, the road system became widespread also across the provinces as it was across Italy, with an overall extension of more than 120,000 km.

Law System

In the Republican age, the skills about the construction of public roads, *viae publicae* and *militares*, fell within the competence of the Senate (Pekàry 1968: 75), which allocated funds from the public treasury (*aerarium*) necessary for the upkeep of the infrastructure. Later, funds coming from public revenues were used (S.H.A. *Pertinax*, 9; Suet. *Aug*. 30.3; *CIL* V 8102, 8103, 8106). Evidence coming from milestones as well as from the historical and literary sources suggests that the magistrate in charge generally was a consul or a *praetor* and later a proconsul, that is, a magistrate having *imperium* who, as Ulpian points out, had the *ius publicandi*, that is, the power to dispossess people of lands and properties for public needs (Pekàry 1968: 49; Radke 1971: 41; Suet. *Vesp*. 5; Plin. *HN* 18.11; Ulp. *Dig*. 43.8.2.22; *Thes. Ling. Lat*. 4.571). Of course, the construction of roads could be also authorized by a law, such as *Lex Sempronia viaria*, issued by the tribune Caius Gracchus (Plut. *CG* 7; App. *Bell. Civ*., 1.23). Romans classified roads according to the juridical or administrative use they made of the same: *privatae*, that is, built by private citizens on their own lands (Ulp. *Dig*. 43.8.2.21-23); *publicae*, if all the people were allowed to pass through (*publice ire*), to transport goods (*publice commeare*), and if it had been constructed on public soil by a public authority (*publice munire*) (Fest. 508.20; Sic. Flac. *De Cond. Agr. Gromat*. 1.146.2; Ulp. *Dig*. 43. 8.2.21; Isid. *Or*. 15.16.5); *militares*, that is, very strategic roads that crossed regions, not only public but also of great public interest, having special features (Rebuffat 1987: 52-67); and *vicinales*, connecting rural villages (*vici*) among them and to the main routes, as they depended, from an administrative viewpoint, on the local authorities. Similar to the latter were also the *Viae agrariae* (Ulp. *Dig*. 43.8.2.22), the *Viae rusticae* (Ulp. *Dig*. 43.8.2.22), and the *Viae paganicae* (Chevallier 1997: 33). Traffic on the aforementioned roads was free. Quite strict rules were imposed to safeguard the integrity and the use of such infrastructure. It was forbidden to occupy a road, to widen or to narrow it, to modify its level, to pave it or vice versa to remove the existing pavement (Ulp. *Dig*. 43.11.1-2), to unload earth (Ulp. *Dig*. 43.7.2; 8.10.2) or litter it, or anyway to damage it (Ulp. *Dig*. 43.8.2.35). Some traders, such as blacksmiths, were permitted to show and advertise their handicrafts, such as wheels, along them or, in the event of *fullones*, to spread out linen along the route, provided that this did not hinder circulation (Ulp. *Dig*. 43.10.4).

Construction

The ancient epigraphic, historical, and literary sources, though providing a quite wide range of phrases to indicate the construction of a road such as *viam innovare*, *instituere*, *munire* (Cat. *Agri*. 2.4), *sternere*, and *struere*, generally give a few indications without providing a detailed description of the road building technique. Only the first-century CE poet Statius (*Silv*, 4.3.40 ff) gives a description of the coast road between the mouth of the river *Volturnus* and *Puteoli*, the *Via Domitiana*. Other details may be inferred by analogy from some selections of Vitruvius (*Arch*. 7.1) and Pliny the Elder (*HN* 36.186), devoted to building paving systems. Most of the information used to reconstruct the Roman road technique comes from the archaeological research carried out on surviving routes (in particular from the documentation of some portions of the *Viae* Salaria, Appia, Flaminia,

Aemilia, and Postumia). We have to assume that the road builders studied the soil, paying special attention to the stability of foundations. One of the aspects taken into due consideration by road builders was the one linked to the protection of roads from superficial water seepage, which could cause instability. Roads were designed, and the road construction sites were superintended, by civil or military architects and engineers, often called back to service, *evocati* (Vitr. *Arch.* 1.praef.2); *Firmitas*, *utilitas*, and *venustas* (solid, useful, able to endure the passing of time, beauty, graceful) were the three inspiring principles of their school. The implementation of works, performed according to circumstances, with or without the contribution of the cities involved in the route, was committed to troops, thus rescued from idleness (Liv. 39.2.3); to subject populations (Tac. *Ann.* 1.20.1; Cic., *Pro Plancio* 8.17); or to manpower found by private contractors. Works were supervised by *quaestores* (treasurers) and *praefecti fabrum* (supervisors of craftsmen). The task of defining the route was committed in particular to land surveyors, who used precision instruments and procedures known also in other fields (Blume et al. 1848–1852). The final route was fixed on the ground by means of further alignment of points along which two parallel trenches were carved. The Romans generally tried to reach their various destinations by the most direct and inexpensive means, by avoiding to modify the soil's morphology but also avoiding dangerous sites which could jeopardize the same route (i.e., valley bottoms that were subject to flooding). Due to this, the Romans had sometimes to remarkably extend the routes (Quilici 1990: 20-3). The allowed radiuses of curvature were small, probably because of the structural features of chariots. Yet, soil sometimes imposed special solutions as well as the unavoidable implementation of special engineering works. Some of them, for example, many bridges, still arise admiration and are perfectly working still today (Galliazzo 1994–1995). The most frequent cases were linked to the crossing of marshy areas and to the overcoming of natural gradients and obstacles: bridges, some of which remain in use, in the most suitable passageways; road embankments; viaducts; or, where it was not possible to build them, wooden structures, road substructions downhill, retaining walls uphill, soil removals, performance of cuttings in the rock, or drilling of galleries (Quilici 1990: 22). As regards the real route, the reconstructed building sequence contemplated, as a first step (*primus labor*), the delimitation of the route's edges by means of two parallel furrows in the soil (*inchoare sulcos et rescindere limites*). A ditch was excavated inside them that reached a basis solid enough to bear the weight of the road surface (*alto egestu penitus cavare terras*). With a procedure very similar to the one described by Vitruvius for the casting of concrete, the ditch or *gremium* was then filled up, *mox haustas alter replere fossas*, with layers of material, usually four in number; yet, their number, shape, contents, and thickness were affected and determined by the specific soil conditions as well as by the available building materials. The entire filling procedure of the ditch, whose overall depth could even exceed 1.5 m, should ensure uniformity to the road surface, by preventing the creation of chasms and collapses (*ne nutent sola*, *ne maligna sedes / et pressis dubium cubile saxis*). The foundations consisted of a layer of at least 30 cm thick, similar to *statumen*, that was made up of medium- to large-sized stones aimed at consolidating the natural soil. Over it, the *rudus*, that is, a mass of cobblestones, bound with clay, (seldom with mortar) was cast, hammered with maces in order to be made firmer, and arranged on horizontal layers. This layer of finer material, which was aimed at drainage, was covered in turn by the *nucleus*, made up of ballast with large gravel smoothed by means of pile drivers (*fistucatio*) and rollers (*ingenti aequanda cylindro*), and whose ridge was slightly bent in order to accompany the laying of the *summum dorsum*, *crusta*, or *pavimentum*. This way, the rainwater flowed in the bumps alongside the road, immediately after the pavement or *crepidines* that sometimes came alongside it. The *pavimentum* could be made up of mere dirt (and in that case it was called *Via terrena*), of gravel or crushed stones (and in that case roads were called *Viae glarea stratae* or

glareatae), of polygonal and uneven slabs of basalt, or, if available, of limestone, smoothed in the upper part and wedge-shaped in the lower part, accurately laid (*Viae silice* or *lapidibus stratae*). The paving procedure was called, for sake of precision, *silice sternere; lapide, saxo quadrato sternere*. Statius celebrates with pride the *ingenti plaga marmorata dorso*. Sometimes, especially on steep routes, some parallel ruts were excavated in the pavement to lead the wheels of vehicles, by preventing thus their going off the road, in particular in case of ice. The width of the *Via publica*, unlike the private one (whose minimum width was established by law), depended *quantum ratio utilitatis permittit* upon the various conditions and needs, just like the pavements which sometimes came alongside it. Width was extended in the busiest areas and at all events it was such as to allow the transit of vehicles. The construction was followed by the laying of stones which delimited the route and of milestones and mounting blocks which made getting on and off a horse easier.

Milestones

Distances along the route were indicated by large boundary stones up to 3 m high and with a diameter of 60–80 cm, driven into the ground beside the road at the distance of a Roman mile from each other (1,478.5 m) and therefore called "milestones." The earliest known milestones date between the third and second century BCE (*ILLRP* 1277; *CIL* I^2 21; *CIL* I^2 22, 617, 618, 619, 620) and have a cylindrical shape. Generally speaking, a milestone carries the name of the person who laid it down and this name may not coincide with the road builder or restorer, as well as his office and the distance from the beginning of the road or from a nearby center and, in case, the reason why that road had been constructed or restored. According to Strabo (5.3.8), the habit of signalling with regularity the distance covered or still to be covered was a Roman innovation, introduced or at least made official and mandatory in the second half of the second century BCE by means of the *Lex Sempronia viaria* of Caius Gracchus (Plut. *C. Gracc.* 7).

Management

It was only a strong organization system that allowed the Roman road network to remain in use for such a long time. In the Republican period, after the conclusion of the construction works, the *aediles* living within ten miles of Rome were in charge of the management of roads (*Lex Iulia municipalis*, FIRA, I, n. 12. *CIL* I^2, 21, 22, 829). In any event, such tasks, together with other administrative functions, were also within the discretion of the ordinary magistrates having *aedilicia potestas*. The extension of the road system soon implied the creation of some officers specifically devoted to the care of roads, called *curatores viarum*, who appear in the sources from the first century BCE. At the end of Republic, the activity of such *curatores* went along with the evergetism of some renowned public personalities. Marcus Agrippa restored the entire Roman road system at his own expense and Augustus restored the *Via Flaminia* in 27 BCE. The creation of the duty of *cura viarum* is attributed to Augustus in 20 BCE; this fell under the direct purview of the *princeps* (Suet. *Aug.* 37). He gave directions to a *collegium* of *curatores*, whose number was unknown. They were selected at first from among the *praetores* (*CIL* I^2, 200, 744, 751, 808, Plut. *Caes.* 7; Cic *ad Att* 1.1.12; Appian. *Bellum Civile* 2.27). Later, the *curatores viarum* reported to the praetorian prefect. As they were fully responsible for the complex management of the road system, their duties included the control, maintenance, and restoration of roads and annexed works; property protection; and the enforcement of the police regulations. Their office also included financial duties. With regard to scope, it could range from one or more roads to the whole road system. The mandate of *curatores* was more prolonged and more variable in time when compared to that of the other magistrates; it could be extended up to 11 years, and it was clearly influenced by specific needs in order to ensure a proper exercise of their functions. In the provinces, the *cura viarum* was entrusted to governors. Starting from the second century CE, the *cura viarum* changed from *honores* into *munera*, thus becoming a basic stage of the *cursus honorum*.

The *Cursus Publicus*

The relationship between the central government and the provinces of the Empire was kept by means of a state service that ensured the land and sea (*CIL* 14.2045; Sen. *Ep*. 67) transmission of all information and of the land mail, the *cursus celer* or *velox* (Amm. 21.9.4), as well as the transport of people and goods *ex causis necessariis* (of public interest), the *cursus tardus* or *clabularis* (*Cod. Theod*. 8.5.62). The service took place thanks to an organization widespread all over the Empire, hinging on *mutationes*, *mansiones*, *praetoria*, and *palatia* able to provide full assistance along all the routes (Cuntz 1929: 130; Seek 1846–1851; Holmberg 1933; Pflaum 1940: 189-390; Pekáry 1968; Quilici 1990: 92; Uggeri 1995: 140-144). Scholars agree upon the origin of the wide administrative plan conceived and started by Caesar and implemented by Augustus already in the first years of his kingdom. Caesar mentioned a system he himself devised, with horse soldiers, *dispositi equites* (Caes. *bell. civ*., 3,101; Liv. 27.43), who, placed at a certain distance from each other, had the task of quickly conveying the news of his victories; yet, a similar structure probably already existed long before. Under Augustus, such horse couriers became more numerous; they were called *iuvenes* and their most difficult task, in addition to the mere delivery of correspondence, was that of informing the emperor of the events occurring in the provinces. The main roads were equipped with *stationes*, which is to say places to stop and change horses and draught animals; the local populace supported the cost of these *stationes*.

The main sources to reconstruct the structure of the cursus publicus (corsive) in the Augustan period are a passage from Suetonius (*Aug*. 49.3), the edict of Sextus Sotidius Strabo Libuscidianus, quoted in an inscription found in Burdur (*S.E.G*. 26, 1979, n. 1392) and a reference to such measure that can be found in a passage from Procopius (*Arc*., 30, 2). In the light of the above-mentioned documents, the Augustan institution seems to be the first of all not only a mail service but rather a true information service and a transmission of directions by means of couriers, *ut adnuntiari cognoscique posset* (Suet. *Aug*. 49.3), that was essential for the security of State. According to the edict of Sextus Sotidius, the main users of such a service were travellers for reasons of State provided with a special permit referred to as *diploma* (Tac. *Hist*. 2.54; Plin. *Epist*. 10.45, 46, 64, 120, 121), a written authorization bearing the imperial seal (Suet. *Aug*. 50). To such travellers, listed in the edict according to a hierarchical order, cities and villages had to supply up to ten chariots and as many mules (a number that could be doubled in case of donkeys). Users had to pay for the services supplied for a precise distance (that in the edict at all events did not exceed 40 *stadia*). No one could benefit from free-of-charge vehicles. Private citizens, especially if they were merchants transporting goods for private purposes, could not be supplied by these means. The members of the *comitatus*, those who supplied their services in the provinces, together with the *liberti*, the Emperor's servants and animals, could benefit from the free accommodation in the *mansio*. In the Imperial period, the granting of permits to use the service, called *evectiones*, was progressively extended to soldiers as well as to the wives and sons of the people having the right, thus becoming a privilege difficult to be both granted and controlled. As a consequence of this, there was also an increase in the number of abuses and outrages to the detriment of local communities, which had heavy duties and obligations for the management of the service. Thus, emperors such as Trajan, under whom the definition of such service as *cursus publicus* appeared for the first time, had to intervene in order to curb such abuses. Also the future emperor Pertinax (SHA *Pert*. 1.6) was forced to continue his journey on foot, as he was found unprovided with any permit. Under Nerva the operational costs became the charge of the imperial tax office. Under Hadrian, the *cursus publicus* became widespread throughout the Empire. In the Constantinian period, the *clerici* of the *ecclesia catholica* began to use the *cursus publicus* both on the occasion of events such as councils, synods, and consecrations and when they had to take part in the most various official celebrations, within the framework of a progressive increase in privileges and exemptions. Also in this case, the achievement of

evectiones and *tractoriae*, which is to say food during journeys, degenerated into abuses. The *clerici*, Ammianus Marcellinus remarks (Amm. 21.16.18), crowded the roads on the pretext that they had to attend to councils at the expenses of State from one hand to another of the Empire. We do not know in detail the structure and regulations of such service. At first, the management was undertaken by Augustus, who entrusted two *praefecti* of *praetorium* also with the task of supervising and controlling the *liberti*. With Hadrian, the figure of the *praefectus vehiculorum* was introduced, who had the task to supervise the overall progress of the service and the conditions of roads and of *stationes*. Within this organizational structure, the post houses, *mutationes*, and *mansiones* were essential for the efficiency of service. They were subdivided into premises for accommodations, stables, and warehouses; there were also very often bathing facilities. In the late Republican period and during the principate, their management was committed to the contractors who won the public bidding. Contractors, which in the first three centuries of the Empire managed the *stationes*, were replaced in the Constantinian period by the *mancepes* or *praepositi mansionum*. The praepositus was generally a curial and a member of a city council that was equivalent to the Roman Senate, having religious, administrative, and financial duties, particularly wealthy and, for this reason, obliged to comply with his obligations towards the city and the State. Among the main duties of the *praepositus* were the procurement of animals, their custody and care, their recovery in the case of theft, the obligation to assign them to authorized travellers, and the control that no more than five of them (i.e., the eighth part of the equipment of each *statio*) could go out from the *mansio* daily. Letters kept in leather bags were delivered by the *tabellarii* (Cic. *Phil*. 2.31; *Att*. 12.1; Plin. *Ep*. 10.64), assisted by *cursores*, *speculatores*, *veredarii*, and couriers who carried the most urgent messages on horseback. Similar tasks were carried out in this field of the imperial administration by the *frumentarii* and, with Constantine, by the *agents* (*Cod. Theod.* 6.27.1-3), who transmitted the imperial autographs, and the *principes agentium*, who performed supervision and control. Under Constantine, the compliance with regulations was verified by *curiosi* (inspectors). For the performance of their tasks, the *mancipes*, the *curiales*, or even the *praepositi mansionis* availed themselves of *stationarii*. The care of draught animals was remitted to the *stratores* and to the *muliones*. The *hippocomi* had the task of accompanying travellers from a *statio* to another and of taking vehicles back. In addition to them, there were the chariot drivers or *carpentarii*; the people in charge of the care and transport of luggage, the *bastagarii*; and for the most burdensome tasks, the *catabolenses*. Special escorts protected travellers from *latrones* and *grassatores* who swarmed in the roads. There were essentially two kinds of journeys permitted by the service: the *cursus celer* or *velox*, for which light coaches (*redae*) were used, and the *cursus tardus*, for which heavy coaches were used, suitable for the freight of goods. Private citizens, on the contrary, used their own couriers (*tabellarii* and *cursores*) or they resorted to the trade flows to forward goods and correspondence.

Speed

The sources reveal some hints on travelling times in the ancient world that, at all events, were not always the same, due to a series of variables. While a traveller on foot generally covered a distance of 20–25 miles (30–35 km) *per diem*, the horse couriers of the *cursus publicus* usually managed to average 5 miles per hour, totalling 50 miles per day (75 km). We learn from Ovid (*Trist*. 4.5.1-8) that it took 9 days for a letter to go from Brundisium to Rome, which were 365 miles distant, one from the other. We also learn that it took 9 days for a letter to reach Trajan from Bithynia in Asia Minor. According to Plutarch (*Cato Maior* 14.4), Cato was certainly faster if compared to such averages, since in 191 BCE, he covered the distance between Brundisium and Rome in 5 days, by averaging 80 miles a day (about 120 km). Caesar was even faster, as in 58 BCE he reached Geneva (800 miles from Rome) in 8 days (Plut. *Caesar* 14.4), just like Tiberius, who rushed in 24 h from Pavia to Thuringia, a distance of 200 miles, in order to see his dying

brother, Drusus. Journeys with chariots were obviously longer (Plin. *HN* 7.84; *Val. Max.* 5.5.2). The *carruca* averaged 5 miles per hour. It took 7 days for Cicero (*Att.* 5.4-6) in 51 BCE to cover the distance of *Via Appia* from Beneventum to Tarentum, presumably by chariot. Until the route reached Venosa, the mountain route forced him to average 19 miles a day, whereas in the plain he managed to average 32 miles *per diem*. Horace, instead, covered the distance between Rome and Brundisium, by passing through the future *Via Appia Traiana*, in 15 days. Cicero (*Pro Rosc.* 7.19) covered 56 miles (83 km) separating Rome from Amelia along the *Via Cassia* and *Via Amerina* in a 10-h night journey using a light chariot.

Aqueducts

Aqueducts, constructed on high arcades (*arcuationes*) which still today cross the Roman countryside, are among the most impressive and original creations of Roman architecture and civil engineering. The Romans inherited the technical achievements about water conveyance techniques that were very popular in the Mediterranean area and in the Near East (the aqueduct of Jeruan Ninive, the hydraulic works of Jerusalem in 700 BCE, the tunnel of Eupalinos of Megara in Samos in 530 BCE, the Hellenistic works of Patara and Pergamon). Above all, as many classical authors remind, the Romans were the followers of the great Etruscan engineering. In fact, the Etruscans implemented the first hydraulic works in Rome (the reclamation of the Roman Forum, the construction of the Cloaca Maxima under Tarquinius Priscus and Tarquinius Superbus), besides the huge reclamation and canalization works implemented in their own country and in the Po valley. Varro maintains that water divining, originated in Etruria (Varro *Men.* Frag. 444); the Romans created an awareness of water as a public asset. The first urban water distribution network they created was made up of architectural works, urban spaces, and works of art. This network was able to ensure citizens a *per capita* quantity of water that was the double of the quantity available to a modern Roman citizen. In the territories of the Roman Empire, aqueducts numbered about 200 (at Antioch on the Orontes, Merìda, Ephesus, Berenice, Tarraco, Segovia, Carthage). Such monuments are kept until nowadays and sometimes used to feed some fountains of the modern Rome. A series of historical, literary, and technical written sources (Frontinus, Pliny, Vitruvius, Procopius) are the basis of our reconstruction of the building techniques used by Romans.

The first step for the creation of an aqueduct was the search for and the determination of a rich spring. The methods used were the examination of the soil geomorphology and of vegetation (Vitr. 8.1). After detecting the presence of water, the latter was then subjected to an organoleptic test so that its salubrity as well as its limpidity of the water could be assessed, by taking the health of the inhabitants living very close to the spring into consideration. Nevertheless, Frontinus remembers, the discovery of the spring of *Aqua Virgo* occurred casualty. A young girl – hence the name *Aqua Virgo* – is said to have indicated certain water veins to some soldiers, involved in looking for springs. When they followed these up and dug, they found an enormous quantity of water. The event was recorded by a painting in a small shrine set up near the source (Frontin 1.10).

The water collection procedures varied. In some cases (*Anio Novus*, *Marcia*), springs were collected in a masonry tank coated with a waterproof layer of *opus signinum*. They flowed then into a *piscina limaria* (settling tank) from which the canal (*specus*) branched off.

The conveyance of water to its users, sometimes over great distances, was performed by means of an open conduit system, which is to say, by exploiting the force of gravity. Water flowed thanks to the force of gravity in a canal to which the Roman engineers ensured a suitable slope (*declivitas*) preventing water from reaching a speed that could jeopardize the stability of that structure, in the presence of a constant slope. Thanks to this criterion, the height of the aqueduct progressively decreased from the spring along its route, by forcing the route to meander.

It was essential to maintain slopes *mensura declivitatis*, that is, the optimal required slope, so that the topographic drop may enable water to flow without excessive or poor speed between

the spring and the place where water was used (Vitr. VIII, 6,1). This was attained thanks to some topographic tools such as *chorobates*, but also the *dioptra* and the *libra acquaria*, as well as the use of arches. The oscillation of slopes of the Roman aqueducts is remarkable and sometimes diverges very much from the theoretical directions of Vitruvius who suggested slopes not lower than 5 %, of Pliny, and Frontinus, respectively.

The water flow was funneled to a masonry canal, called the *specus*. When it was underground, especially far from cities, or in other tunnels, such a canal had some vertical wells, *lumina*, at regular intervals, which linked it to the surface.

The walls of the canal were built either with stone (i.e., tufo). The conduit covering could be, in the same aqueduct, sometimes flat and some other times a sloping roof or an ogival arch. The width of the canal section was proportional to the flow and at all events it sometimes varied for no apparent reason.

Some settling tanks were arranged at regular intervals along the route, where there were often the massive structures of *dividicula* or *castella* which enabled the collection of water.

When the aqueduct had to cross rivers or valleys, and at all events to ensure the required slope, the engineers resorted to the typical structures of Roman architecture, that is, the arch with a series of arcades, often multilevel. In the Segovia aqueduct, the arches reached 50 m in height, whereas in the *Anio Novus* in Rome, they reached 32.3 m in height, for 9.593 km of length. The material most commonly used was *peperino* and only centuries later it was reinforced with some restoration works in concrete and masonry.

The Aqueducts in Rome

Aqua Appia (312 BCE) The most ancient aqueduct of Rome carried water from the springs of the *Prenestini* mountains; prior to its construction, the city had relied upon wells and the water of Tiber river. The aqueduct covers a route of about 16 km, most of it subterranean, and could carry an estimated 73,000 m^3 of water per day.

Anio Vetus (272 BCE) The *Anio Vetus* followed a course of about 64 km from the Anio river to Rome and carried 176,000 m^3 of water per day.

Aqua Marcia (144 BCE) The *Aqua Marcia* stretched from the springs of the Anio valley to the Capitoline Hill, covering a route of about 91 km and carrying 187,000 m^3 of water per day.

Aqua Tepula (125 BCE) The *Tepula* carried 18,000 m^3 of water per day from its springs to Rome; the water is warm at its source in the Alban Hills, thus explaining its name.

Aqua Julia (33 BCE) It came from the territory of Tusculum, with a route of 22 km, and it provided Rome with about 48,000 m^3 of water per day.

Aqua Virgo (19 BCE) It provided 100,000 m^3 of water per day after a route of about 20 km from the Alban Hills. It was restored in 1453 CE and today still feeds the Trevi Fountain in Rome.

Aqua Alsietina (2 BCE) It was probably built to feed the *Naumachia* shows, which took place in Trastevere. Its length was about 33 km and its flow 16,000 m^3, carrying non-potable water.

Aqua Claudia (38–52 CE) It is the most impressive aqueduct as it stretches for 16 km on 64 big arches. It carried 184,000 m^3 of water per day from the valley. It fed the lake of the emperor Nero's *Domus Aurea*.

Anio Novus (38–52 CE) With its route of 86 km from the Anio valley, partly shared with that of the *Aqua Claudia*, it provided Rome with 190,000 m^3 of water per day.

Aqua Traiana (109 CE) The aqueduct that fed the Baths of Trajan collected the water coming from springs of the area of Lake Bracciano after a route of about 32 km.

Aqua Alexandrina (226 CE) The last of Rome's aqueducts, it fed the Severan public baths (*thermae*) with a superelevated route, coming from the springs of Pantano Borghese.

Cross-References

- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Romanization
- ▶ Topography of Rome

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Inner Ionian Sea Archipelago: Archaeological Survey

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Introduction

Meganisi and its satellite islands lie in the Inner Ionian Sea Archipelago, a relatively short distance from Aetoloakarnania and Lefkas (Fig. 1). The abundance of top-quality flint and the

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 1 Map showing the area of study, the Inner Ionian Sea Archipelago in west Greece, delimited by the mainland Greece (Aetoloakarnania), Lefkas, and the northern tips of Kefallinia and Ithaki

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 2 Panoramic view of the Inner Ionian Sea Archipelago taken from east Lefkas (Photo courtesy of Costas Zissis)

presence of small wetlands and karstic cavities were the first points that attracted our attention to this corner of western Greece. But there was something more. In the Pleistocene, the short distance between these islands and the neighboring Lefkas and Aetoloakarnanian coast, combined with the shallow seabed in this area, meant that changes in sea level during glacial and interglacial periods would have caused the islands to become alternately connected to and isolated from the larger landmasses. Thus, over time, new living conditions and environments were constantly created for the Paleolithic communities of southeast Europe, which responded to these in their turn. The islands of the archipelago form fragments, the higher tips, of the original Pleistocene landscape, a large part of which now lies submerged under the sea. It was only after the first millennia of the Holocene that the coastline assumed its present form and offered to the communities of late prehistoric and historical times a new set of insular attractions (Fig. 2). Marine and fresh water resources have been bountiful, and it is no coincidence that the coastline of our research area is today protected by Natura 2000. From a diachronic perspective, then, Meganisi and its neighbors posed a methodological challenge for the realization of a hybrid island archaeology – alternating as it was between mainland and islands, passing points, and landing places – on a small and viable spatial scale.

Key Issues

The project was a University of Crete initiative undertaken in collaboration with the Greek Ministry of Culture. It had two main objectives: (1) the study of the archipelago's prehistoric and historical trajectories and links to the trajectories of the larger landmasses to the east and west (*regional* scale) and (2) the identification of prehistoric sites that could be further tested by excavation in the future (*site* scale). The *project design* comprised *archaeological survey* to shed light on human activity through time and space as well as *archival and anthropological research* to reconstruct natural and cultural landscape history. It was guided by interdisciplinary collaboration of archaeologists working with specialists in geology, geography, oceanography, biology, social anthropology, and architecture.

The *archaeological survey* was conducted in Meganisi, Thilia, Kythros, Petalou, Nisopoula, Formikoula, Atokos, and Arkoudi in two field seasons in summers 2010 and 2011. A geographical information system (designed in ArcGIS 9.3) provided the platform for the work in the lab and the field. At the outset, multiple layers of *cartographic information*, in the form of topographic maps (1:5,000), historical maps (Fig. 3), geological maps, and satellite images, were compiled, superimposed, and consulted. As surface inspection progressed,

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 3 A 1729 map of the survey region by Santo Semitecolo (Map courtesy of the Lefkas Historical Archive)

data on finds, sites, and monuments was also gradually integrated. The larger islands were divided into 100 × 60 m transects with a numeric designation (Fig. 4a); the smaller islets were explored as individual transects. Information on place names, landscape features (e.g., a doline, a cave), and structures (e.g., a threshing floor), collected by local informants or through surface exploration, was mapped on transects and guided the priorities of research.

Surface exploration proceeded in *transects* by teams of 5 fieldwalkers spaced at 12-m intervals. Team members walked in parallel lines, each scanning the ground to right and left (Fig. 4a). They collected and bagged all artifacts seen on the surface and recorded visible structures or architectural remains. Each team worked with a coordinator, an experienced archaeologist responsible for positioning his/her team in the field with the aid of a portable GPS, compass, satellite, and topographic maps of the day's plan of coverage. Upon completion of a few transects, the teams stopped for evaluation. At this point coordinators wrote in the day book, made plans of any notable structures, and sorted finds. Leaving behind the natural flint debris was necessary since students were often unable to distinguish those from artifacts in the course of ground scanning. Under a tree or in the open air, these stops for inspection, find sorting, and evaluation were opportunities to teach students the archaeology fundamentals and the nature of the materials.

Sites were designated on the basis of three criteria set up by the pioneering work by Cherry et al. (1991) at Keos Island: high artifact *density*, *continuity* in artifact distribution over a contiguous area, and *discreteness*, that is, the

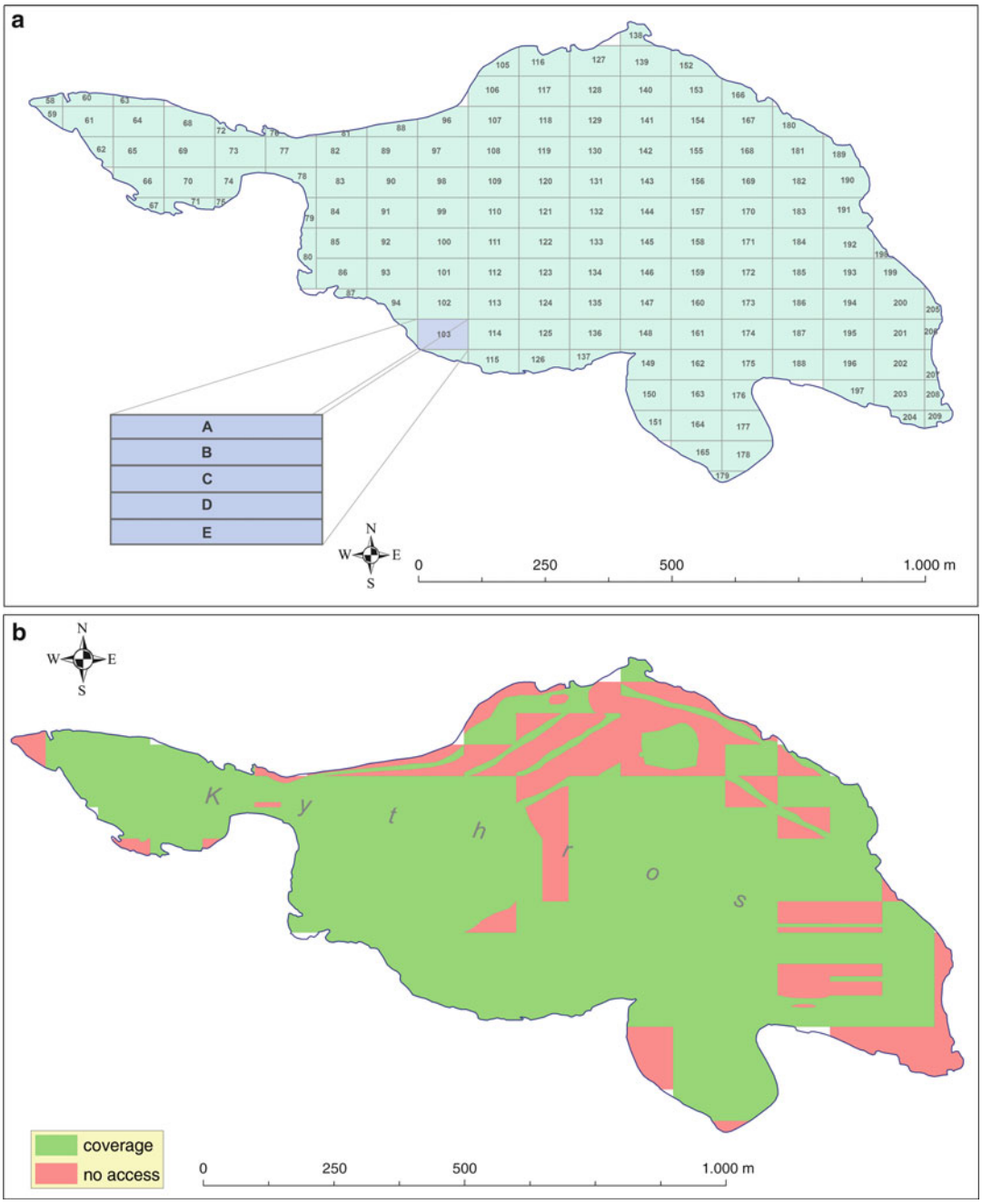

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 4 *Top*: the Kythros grid. *Bottom*: map showing the coverage at Kythros (*green*) and the areas with no access (*brown*)

area has a distinct edge, beyond which artifact density falls of markedly. Site coordinates were recorded with a portable GPS and transferred to the GIS database.

The original plan was to cover one third of the archipelago's 30 km^2. In practice, a little less than 7 km^2 was examined. Vegetation, steep relief, and seabird habitats proved to be

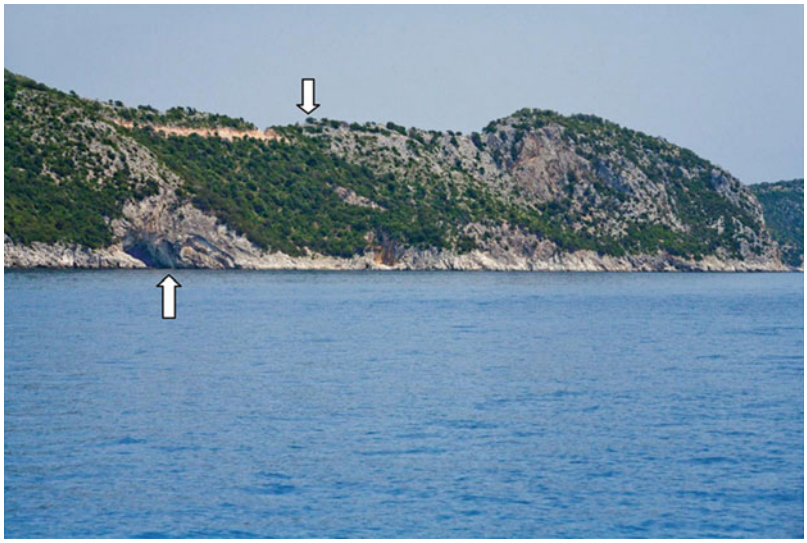

Inner Ionian Sea Archipelago: Archaeological Survey, Fig. 5 The steep relief at southwest Meganisi. *Arrows* showing a coastal cave with submerged floor and a multiperiod site on *top* of a limestone cliff near the recently opened road

the major obstacles to meeting our original coverage plan (Figs. 4b, 5). Although team coordinators were prepared for the topographic and accessibility conditions of the next day's assigned units of work, more often than not the satellite images (even those only a few years old) were depicting a landscape that had changed dramatically due to either vegetation overgrowth (western Greece receives more rain than any other part of the country) or intense construction activity and road opening especially along the coastal areas of Meganisi. In the smaller islands covered by thick and thorny vegetation, fieldwalking could only take place along paths created by grazing animals or water erosion.

Future Directions

However the results were positive. The survey recovered 20,000 artifacts and 30 sites dating from the Paleolithic to the twentieth century, with a hiatus between Late Antiquity and the eighteenth century. The finds bridge the gap between the archaeological record of the Ionian Sea and that of mainland Greece (e.g., Bailey et al. 1997; Forsén & Tikkala 2011; Wiseman & Zachos 2003). More importantly they lend themselves to discussing and interpreting the island record in terms of cultural and natural events that are distinctive to the coastal areas of Western Greece. Working on very small islands in a geologically active part of the world, we have been aware that archaeological site preservation and visibility is largely dependent upon eustatism, tectonic movements (including coastal uplift or subsidence and local sea-level rates of change) and high-energy events (including wave action and tsunamis). Thus although the Inner Ionian Sea Archipelago survey begun on land, we have developed a special interest in the sea and in the information still locked up on the drowned prehistoric landscapes of the Ionian shelf.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Environmental Reconstruction in Archaeological Science

▶ Glacial Landscapes: Environmental Archaeology
▶ Greek Islands (Excluding Crete), Archaeology of
▶ Island Nation Sites and Rising Sea Levels
▶ Submerged Prehistoric Landscapes
▶ Surface Survey: Method and Strategies
▶ Survey Archaeology in the Greek Aegean World

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Institute for Archaeologists (IfA)

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Basic Information

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Mission Statement: "We advance the practice of archaeology and allied disciplines by promoting professional standards and ethics for conserving, managing, understanding, and promoting enjoyment of heritage."

The Institute of Field Archaeologists (IFA) was founded in 1982 in order to facilitate self-regulation within archaeology and related disciplines through the setting of ethical and quality standards in archaeology, www.archaeologists.net. Over the last 27 years, the Institute's *Code of Conduct*, *Standards and Guidance* and Registered Organizations scheme have become the benchmarks of professional practice in archaeology in the United Kingdom. In 2009, IfA changed its name to the Institute for Archaeologists to better reflect its range of membership, which includes curators, contractors, consultants, and academics working in all areas of the historic environment. The Institute is governed by an elected Council, supported by

a range of voluntary committees, area and special interest groups, and a small number of dedicated staff.

The Institute for Archaeologists provides a range of services for its members, and most importantly a voice for the sector. It represents around 3,000 individuals and 70 Registered Organizations that have shown their commitment to meeting IfA standards. Individual membership is awarded at five grades: Student, Affiliate, Practitioner, Associate, and Member. The last three are corporate grades and membership is assessed by a committee of peers on the basis of a portfolio of evidence demonstrating technical and ethical competence. Members agree to be bound by the *Code of Conduct* and by-laws of the Institute and a disciplinary procedure is in place to deal with allegations that the *Code* has been breached. A compulsory Continuous Professional Development scheme allows for ongoing assessment of members' skills and competence and ensures that these are kept up to date.

The IfA also operates a quality assurance scheme for organizations – the Registered Organization scheme. Those organizations who are registered with the IfA (identifiable by their use of the IfA kitemark) have formally resolved to carry out their work in line with the IfA *Code of Conduct* and other by-laws. The work is controlled by a full Member (MIfA) of the IfA, their status as a Registered Organization is reviewed regularly by the Institute, and any complaints are investigated and appropriate action taken. Anyone wishing to secure the services of an archaeologist is strongly recommended to contact a Registered Organization.

Major Impact

The Institute for Archaeologists exists to advance the practice of archaeology and allied disciplines by promoting professional standards and ethics for conserving, managing, understanding, and promoting enjoyment of heritage.

As well as accrediting individuals and organizations, the IfA continues to develop and promote standards and good practice guidance and has a vital role in promoting the interests of archaeology and archaeologists to government, policy makers, and industry. In particular, IfA works closely with other sector bodies to lobby government on key areas of legislative and policy change. The IfA publicizes the work that it does through its in-house magazine *The Archaeologist* and Yearbook, through a range of professional practice papers, and through an annual conference. For more information, see ► http://www.archaeologists.net/publications.

IfA's suite of *Standards and Guidance* covers the majority of activities concerned with recovering information from the historic environment. These documents are widely used as a quality measure within the archaeology sector in the United Kingdom and further afield. The full suite of *Standards and Guidance*, along with other IfA Codes and by-laws, can be downloaded from the IfA website at http://www.archaeologists.net/codes/ifa.

IfA's technical and ethical standards underpin the practice of cultural heritage management in the United Kingdom. Its Code of Conduct and Standards and guidance provide the basis by which quality is assured across the sector through published standards for person (IfA membership, organizational registration) or for process and product (Standards and guidance).

Cross-References

► Cultural Heritage Management Quality Control and Assurance

Further Reading

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- n.d. Codes, standards and guidelines. Available at: http://www.archaeologists.net/codes/ifa.

I

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology

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Introduction

The history of human settlement in Southeast Asia, which stands at the crossroads of a huge Asian continent and multiple archipelagos that open the way to the Pacific world, is a history of geography – *lato sensu* – and of chronology. The two dimensions of time and space indeed take on a particular significance in this region, as it has been demonstrated since the great scientific revolution of the second half of the nineteenth century. Bearing testament to this, in particular, are the concurrent works of Darwin on evolution and natural selection and of Wallace on the areas of geographic distribution of living species, but also of the geologist Lyell, whose major contribution was to anchor the evolution of species in time.

This history involved multiple actors, especially during the last millions of years. Of the two principal actors, geotectonic, in particular, has modeled a chain of nascent mountains near the contact zone of tectonic plates, many of which became island arcs with or without volcanic activity. We must also take into account the major climatic cycles (alternating glacial-interglacial), which profoundly changed the morphology of the region according to the variations in sea level that could exceed 100 m. It is clear that such fundamental changes, relative to the functioning of the Earth system, resulted in a number of transformations in the landscape, in the rhythm of monsoons, and, thus, the nature and extension of ecosystems. Some were definitive, others reversible or cyclic, but all are, to varying degrees, at the origin of biogeographic situations that can be observed today, or that research seeks to reconstruct in the past.

This history is thus primarily about time, climates, and environments, punctuated by the emergence of lands, the extension of the continental shelves in turn emerging and submerging, by the establishment and the more or less long durability of contacts and corridors between the latter and the archipelagos. Evidently, and beyond the purely physical elements, the passages and biogeographic barriers were for many constituted by the expansion and fragmentation of vegetation formations, such as mangrove forests or humid tropical forests.

Humans have no more escaped the environmental constraints nor their perpetual evolution than any other living creatures. This observation seems particularly well founded with respect to the earliest phases of human settlement in these lands. Human evolution, adaptation, and endemism must thus be envisaged clearly from the biogeographic perspective that directs other naturalist studies. The genus *Homo*, however, remains a special case. Notably, due to its complex social organization, it possesses the means to adapt its technical and subsistence behaviors and to not see its existence as dependent upon the presence of a limited number of well-defined environments, as is the case for many other living beings.

The meaning of Prehistory in Southeast Asia is remarkable in many regards. Firstly, it reflects an important part in the history of the descendants of the first representatives of genus *Homo* outside of Africa, called *Homo erectus* in Asia. Having travelled in the southern part of Eurasia, these hominids, for the first time, crossed the Equator southward. They were also the first, in the history of humanity, to become islanders.

But this Paleolithic human adventure in Southeast Asia, so strongly influenced by its biological as much as its geographical context, still recounts and holds numerous events associated to the emergence of endemic forms of

hominids. Researchers give them a special taxonomic status and see the coexistence, even the cohabitation, of groups intended for near extinction with the first *Homo sapiens* who conquered the archipelagos. They also ascribe to the *Homo sapiens* the command of natural processes such as the "taming" of animals and useful plants, which probably developed in a very early way in the archipelagos.

Definition

Although research, notably since the 2000s, has seen a revival in activity in continental Southeast Asia, the majority of data relating to the earliest phases of Prehistoric chronology concentrates on the archipelagos connected to the Sunda plateau (Fig. 1a), i.e., the southeastern end of Eurasia, partly submerged today by shallow seas (the South China Sea, the Java Sea).

Along the Sunda block, which includes the large western Indonesian islands (Sumatra, Java, and Borneo), the Malay and Indochinese peninsula as well as Thailand, island arcs (external non-volcanic arc, internal volcanic arc) mark the subduction zone of the Australia-Indian Ocean plate under the Eurasian plate. To the southeast lies the Sahul shelf, which includes New Guinea and Australia. Finally, the northeastern region, which includes the island of Sulawesi, the islands of eastern Indonesia, and the Philippine archipelago, is marked by a very complex geotectonic activity, particularly bringing into play the Philippine and Pacific plates.

This configuration is partly the origin of the biogeographic provinces such as Wallacea. The latter is limited to the east of the Sunda block by the Wallace Line, passing through the Makassar Strait, which connects the Celebes and Java seas. Measuring only about 15 km in its width, this straight can reach depths of more than 2,000 m.

Geotectonic activity is extremely important, as indicated by the speed at which plates can move, as this can exceed 10 cm/year, as well as the large number of still active volcanoes. It is within the context of this dynamic interplay that we need to consider the different phases of settlement across the region: For example, the internal volcanic arc of Sunda (Fig. 1a), which includes the island of Java, has most likely functioned in its current configuration for the last 2 million years (Ma). The vast majority of ancient fossil sites are linked to its activity.

The intention here is to cover the largest part of the Quaternary, beginning with the Gelasian, around 2.6 Ma, naturally considered under the aspect of climate chronology, which best illuminates the changing geography of the region. This is particularly demonstrated by the establishment of cycles of duration close to 100,000 years at the beginning of the Middle Pleistocene (c. 0.8 Ma). A climatic optimum and high sea levels are found at the beginning of the Upper Pleistocene (which begins around 130,000 years, at the isotopic stage 5 -MIS 5 – of the marine isotopic chronology). The regional "Paleolithic" continues into the Holocene (well after the deadline conventionally set at 11,700 years).

These classic boundaries take on all their meaning here, because the eustatic oscillations are linked to them. Within the order of a few tens of meters in the Lower Pleistocene, they were able to reach 120 m as early as the beginning of the Middle Pleistocene (Fig. 1b). The geographic consequences were immense, affecting the land surface (the opening of land bridges connecting the islands, connecting the archipelagos to the mainland) as much as the volume of water subject to evaporation in the intertropical zone, hence clearly influencing precipitation.

Historical Background

The sites involved mainly include:

- In the areas with high tectonic and volcanic activity, or high subsidence, thick (volcano-) sedimentary series, as is the case on the island of Java (Fig. 2a).
- Alluvial systems formed along the major rivers which, it must be noted, are often more favorable to the conservation of stone tools than fossils, whether they are alluvial terraces or flood plain deposits. These alluvial systems

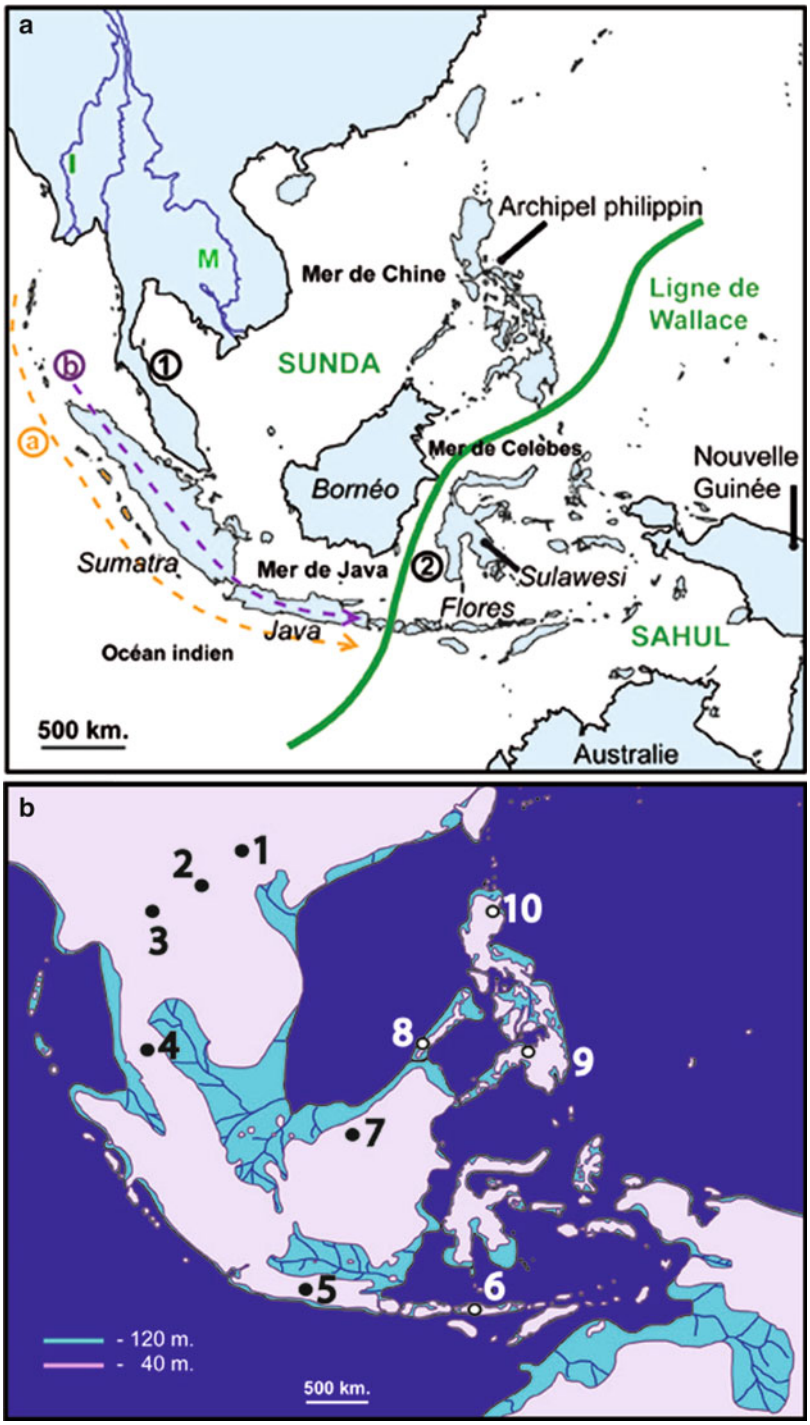

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 1 (**a**) Map of Southeast Asia. *a* – External non-volcanic arc. *b* – Internal volcanic arc. *1* – Isthmus of Kra. *2* – Macassar Strait. *I* – Irrawady. *M* – Mekong. (**b**) Land Bridges. *1* – Tham Khuyen –Northern Vietnam. 2 – Tam Pa Ling – Northern Laos. *3* – Thum Wiman Nakin –Northern Thailand. *4* – Moh Khiew – Southern Thailand. *5* – Sangiran – Java (Indonesia). *6* – Liang Bua – Flores (Indonesia). *7* – Niah – Sarawak (Malaysia). *8* – Tabon – Palawan (Philippines). *9* – Mindanao (Philippines). *10* – Callao – Luzon (Philippines) (© Bathymetric limit according to Voris 2006)

are equally found in mainland Southeast Asia (Mekong and Irrawady valleys (Fig. 1a)) as in the islands (the archipelagos of Indonesia and the Philippines).

- Karstic massifs, widely represented, within which a number of types of deposits can be found, such as classic cave fillings (Fig. 3), with their sediment having undergone some

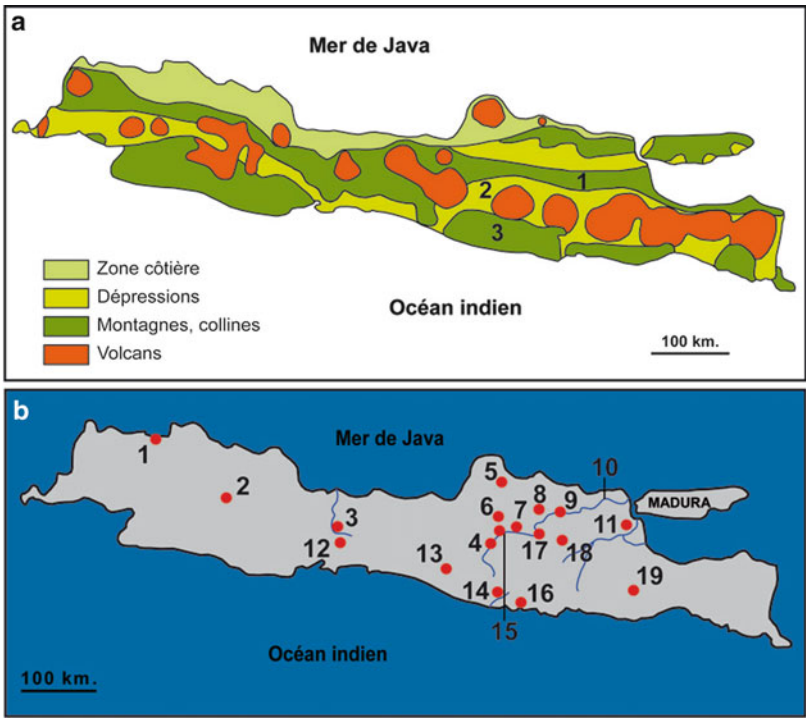

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 2
(**a**) Geological Map of Java. *1* Kendeng Hills. *2* Sangiran Dome. *3* Southern Mountains. (**b**) Location of prehistoric sites in Java. *1* Jakarta. *2* Bandung. *3* Bumiayu. *4* Solo. *5* Pati-Ayam. *6* Miri. *7* Sambungmacan. *8* Ngawi. *9* Ngandong. *10* Solo River. *11* Mojokerto. *12* Semedo. *13* Yogyakarta. *14* Punung and Baksoka River. *15* Sangiran. *16* Pacitan. *17* Trinil. *18* Kedungbrubus. *19* Wajak

solifluxion or even been transported by the racking at a lower level of the karst; alluvial deposits trapped in the cavities; archaeological soils under porches, positioned as rockshelters; fillings of fissures and accumulation of fossils where often one can discover mainly teeth because of the destructive activity of hystricidés (porcupine), these last fillings being able to be cemented in breccias etc.

The Ape-Man of the Sunda Islands

Human paleontology was, in fact, born in Southeast Asia in the late nineteenth century. The historical context of research has thus been guided, since its inception, by the search for human fossils. Influenced by the ideas of Darwin and Wallace as professed by Ernst Haeckel, the Dutch medical anthropologist Eugene Dubois undertook, as early as 1887, research in Sumatra of the "missing link" between an ape ancestor and a human, known to have lived in the forests which are now home to the great anthropoid apes such as *Pongo* (derived from the name "orangutan," meaning the man of the forest in Malay). Only a few discoveries of Neanderthals were known – and debated – at the time.

These first discoveries of fossils – notably elephants – in the caves of the island demonstrated, to the eyes of the European scientific community, that a passage really existed in the past between the islands and the continent. Dubois was then notified of the discovery, in a karst massif in eastern Java (Wajak near Tulungagung (Fig. 2b)), of a highly mineralized skull which proved to belong to our species, *Homo sapiens*.

Later on, he drew inspiration from the recounting, in classic Javanese literature, of the discovery of many bone fossils in sedimentary horizons associated with the chain of hills known as Kendeng (Fig. 2a), which crosses the central and eastern parts of the island from west to east.

These fossils were related to the remains of victims of the great mythical battles in the Hindu tradition. The Javanese painter Raden Saleh (1811–1880), who spent a long time in Europe, even organized excavations near Kedung Brubus. He subsequently sent his discoveries to

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 3 The cave of Song Terus (Java). Traces of human presence since 350 ka, occupation of the cave since MIS 5. (**a**) Excavation of cave (burial appears in K9 square). (**b**) *Homo sapiens* burial *c. 9300 BP*. Objects associated to the burial: (**c**) face of *Trachypithecus* (cercopithecid). (**d**) Tiger's upper jaw bone. (**e**) Elephant's milk molar (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

Karl Martin, a Dutch geologist, who had already noted the relatedness with the Indian fossil deposits of the Siwaliks, in the foothills of the Himalayas, where Richard Lydekker had described a maxillary ape.

Between 1889 and 1891, Dubois also discovered a fragment of human mandible at Kedung Brubus, then during extensive excavations on the site of Trinil (Fig. 4), in ancient volcano-sedimentary layers, a skullcap (first attributed to a gibbon), and then a human femur. In 1894, Dubois published the discovery of *Pithecanthropus erectus*, human's ancestor, and the fossil of Trinil (conserved in the NCB Naturalis in Leiden) since became the holotype of *Homo erectus*.

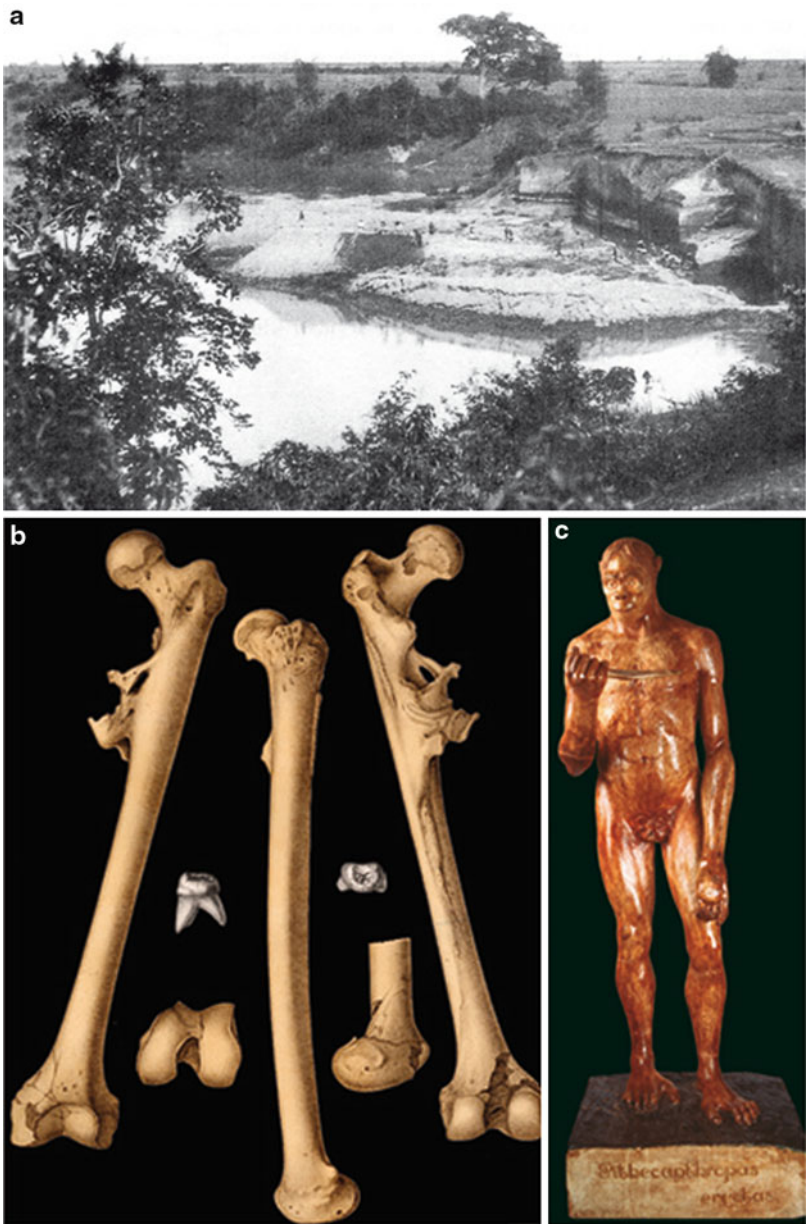

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology,
Fig. 4 Trinil and the excavations of Eugène Dubois. (**a**) Eugène Dubois excavation. (**b**) The femur of *Pithecanthropus erectus*. (**c**) Reconstitution of "Pithecanthropus" from Java by Eugène Dubois in 1900 (Documents NCB Naturalis, Leiden)

Multiple Paleoanthropological Discoveries

Homo erectus

The heated debates that followed the publication of Dubois aroused new research, directly in Southeast Asia as well as in other regions. The first half of the twentieth century thus saw the rise of diverse hominid taxons, such as *Australopithecus africanus* (1924) and *Sinanthropus pekinensis* (1926, Chinese *Homo erectus*.). Naturally, research intensified in Southeast Asia.

In Java, the Dutch colonial office of mining research encouraged some of its members to continue work on stratigraphy and paleontology, and recruited someone who would become one of the major figures of human paleontology and prehistory in Southeast Asia, Ralph von Koenigswald. Thus were brought to light, in east Java, during the 1930s, human fossils of the Solo river, near Ngandong (a series of 11 skullcaps associated with some postcranial fragments, whose brain is much more

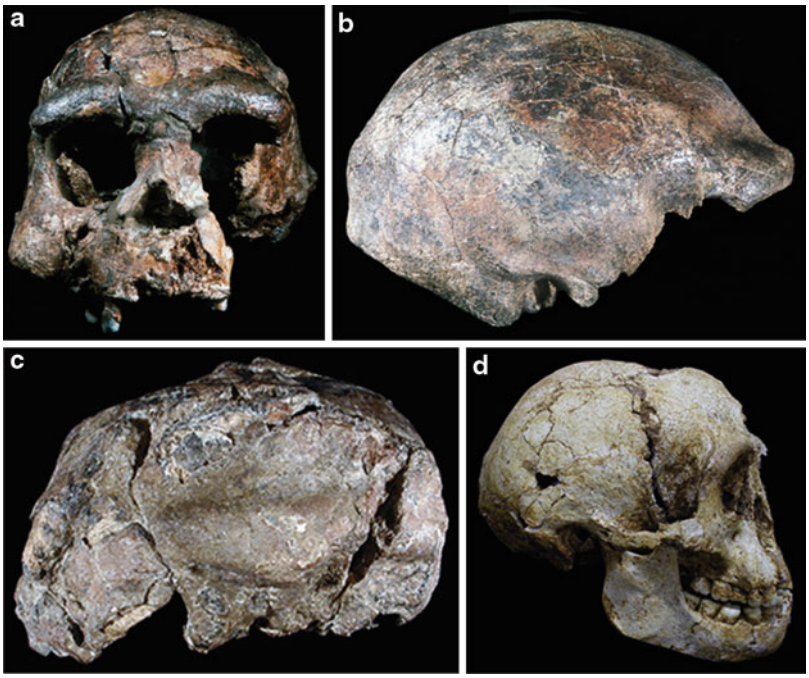

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology,
Fig. 5 *Homo erectus* of Java – *Homo floresiensis*. (**a**) Sangiran 17. (**b**) Sambungmacan. (**c**) Sangiran 31. (**d**) *Homo floresiensis* (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

developed than the fossil of Trinil, Grimaud-Hervé 1997) and also the Mojokerto juvenile skull.

During the same period, Von Koenigswald initiated his surveys in the Sangiran dome (Central Java), which much later (1996) became included on the World Heritage List. He discovered, within a few years, the first reference points for a series of *Homo erectus* ranging along the Lower Pleistocene, including the most robust and archaic fossils, originally called *Meganthropus palaeojavanicus*, such as Sangiran 4 and Sangiran 31 (Fig. 5c) and of the Middle Pleistocene (fossils similar to the Trinil specimen, such as Sangiran 2 and Sangiran 17 (Fig. 5a)).

It is in this way that very rapidly, the island of Java alone brought information on the very long existence of the taxon *Homo erectus* in island environments. Several sites have been discovered since the Second World War (Pati-Ayam, Sambungmacan, Ngawi, Miri, Semedo). The current dates place the totality of fossils between 1.5 Ma (the most archaic fossils of Sangiran, Mojokerto) and the end of the Middle Pleistocene (or even the first half of the Upper Pleistocene for the late *Homo erectus* of the Solo river, of Ngawi and Sambungmacan (Fig. 5b)). Between these two groups a homogenous population (nearly 50 % of the inventory known) takes place, whose characteristics are very similar to those of the holotype, which dates from the late Lower Pleistocene and early Middle Pleistocene (near 0.8 Ma).

It is natural that the paleoanthropological record is not as developed east of the Wallace Line (Bellwood 2007), although archaeological evidence of human presence exists (it was probably *Homo erectus* who crossed the filter of the straits during periods of very low sea level at the beginning of the Middle Pleistocene, Morwood et al. 1999). They were the possible ancestors of *Homo floresiensis* (Fig. 5d (cf. *infra*)). More surprisingly, the exploration activity in mainland Southeast Asia, and notably in the Indochinese peninsula, was not successful despite the active search for old human fossils since the beginning of the twentieth century. Only very fragmentary remains, whose nature or stratigraphic position remains contested, were published (Zeitoun et al. 2008). The "best" reference point between the "*Sinanthropus*" and the "*Pithecanthropus*"

remains the presence of teeth (cf. *Homo erectus*) discovered in the breach of the Tham Khuyen cave in North Vietnam, in Lang Son province near the Chinese border, dated to around 0.5 Ma, and in Thum Wiman Nakin (in the center-north of Thailand, probably toward the end of the Middle Pleistocene).

Homo Sapiens, But Also Other Humankinds?

Homo sapiens, which were probably the only hominids to have, thanks to their social organization, the ability to organize ferry crossings, populated Australia in the Upper Pleistocene, more than 50 ka ago (O'Connell & Allen 2004). The research of their traces in mainland and island Southeast Asia thus represents a challenge for researchers. Sites appear scattered throughout the zone. Among the most famous discoveries, from a historical perspective, are those of Wajak (East Java), Niah (*deep skull*, Sarawak, Borneo, whose ancient age – c. 40 ka – has been recently confirmed, Barker et al. 2007), Moh Khiew (Thailand, Malaysian peninsula, around 28 ka), and Tabon (Palawan, Philippines, Dizon et al. 2002 (Fig. 6)), of which some fossils seem associated with archaeological horizons older than 30 ka.

Beyond the discoveries or new fossil studies, at stake is the anatomic and taxonomic characterization of those which are not directly related to Homo sapiens (late *H. erectus* or endemic forms) as well as their precise dating (Yokoyama et al. 2008). The latter depends on the establishment of a convergence between, on the one hand, direct analyses, such as ^{14}C dating, uranium series (U/Th), combined analyses by uranium series/electron spin resonance (ESR), which often open a debate on the model of incorporation of uranium or about the meaning of dosimetric measures in the environment, and on the other hand, analyses carried out on their context (^{14}C, OSL, ESR etc.).

All fossils dating from 100 ka until the first part of the Holocene (before 6,000 years) reflect the rare elements of a puzzle which corresponds to a possible early arrival of our species in Southeast Asia (from southern China to the archipelagos). Its expansion took place during the second part of the Upper Pleistocene (including the recent discovery of Tam Pa Ling in Laos, c. 46 ka, Bacon et al. 2012) and the last glacial maximum (LGM). Then, a redistribution of groups occurred during the rise of sea levels at the beginning of the Holocene (Détroit 2002).

Also included in this fossil register are the remarkable discoveries published in the last few years, concerning the sites of the Upper Pleistocene such as that of *Homo floresiensis* (Liang Bua, Flores, Morwood et al. 2004) or that of Callao cave, in the north of the island of Luzon, in the Philippine archipelago, whose metatarsal would come within the limits of morphological and dimensional variability of *Homo habilis* and *Homo floresiensis*.

With the oldest fossils reputed to belong to the *Homo sapiens* species, these last discoveries open a debate relating to the coexistence, particularly in island environments, of the last *Homo erectus* and the first *Homo sapiens*.

Humans and Animals

The separation between biogeographic provinces of Indochina and Sunda takes place at the level of the Isthmus of Kra (Fig. 1a), a barrier which could have had a southern position before the Upper Pleistocene (Tougard 2001).

Since the beginning of research in the islands of Southeast Asia, it appears that the understanding of complex phenomena that led to the colonization of the region by the hominids, from the chronological as well as the paleoenvironmental aspects, passed by the interpretation of associated fauna, most notably continental mammals.

The dispersals of these mammals seem to have followed two routes according to the period, the route called Siva-Malayan (India-Malaysia) and the one called Sino-Malayan (China-Malaysia). These migrations have so far never included, for obvious paleoenvironmental reasons, families such as the equine, camelids, or giraffidae.

According to the period and the degree of exondation on the plateau, the animals were able to reach the archipelagos either by chance, or by crossing modest straits, or by way of real corridors. Dispersals and endemism were thus responsible of the nature of fossil assemblages in the deposits.

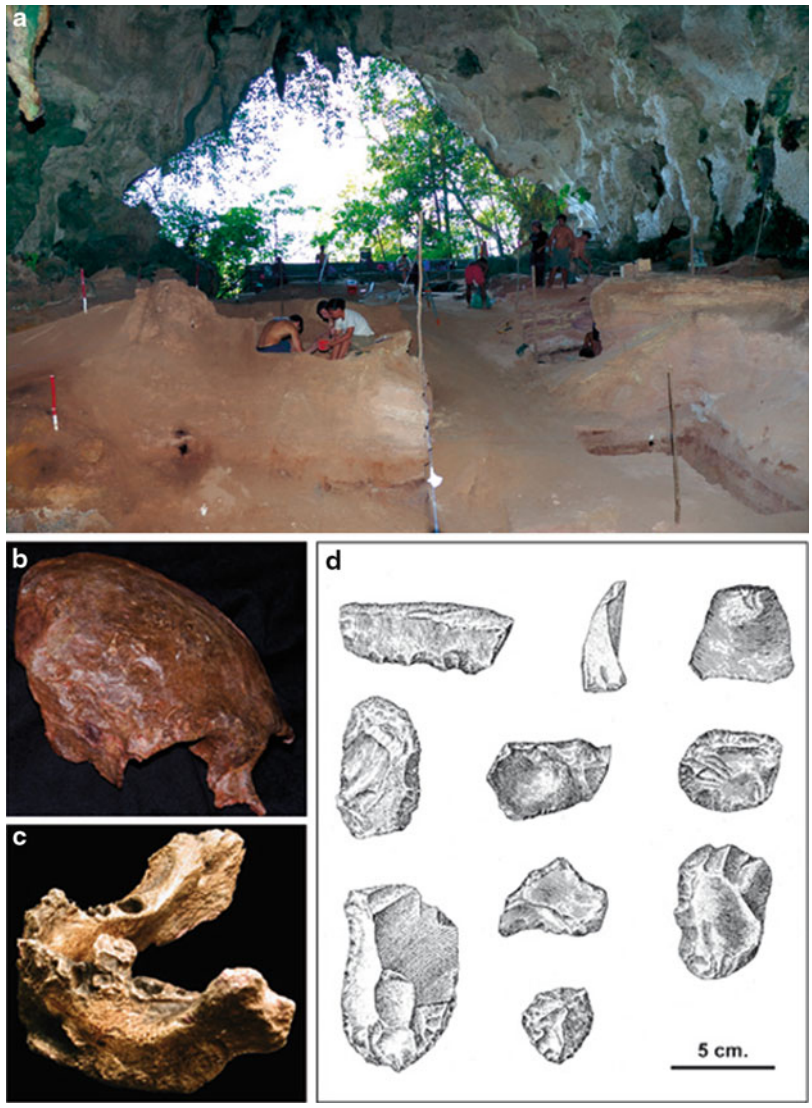

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology,
Fig. 6 Tabon Cave (Lipuun Point, Palawan, Philippines). Occupation of archipelagos by *Homo sapiens* since 35 ka. (**a**) Cave. (**b**) Human frontal. (**c**) Human mandible. (**d**) Lithic tools (© National Museum of the Philippines)

The first biostratigraphic schemes established before absolute dating methods were implemented, distinguished, in Java: Lower, Middle, and Upper Pleistocene, in the form of a classic triptych created by von Koenigswald and including fauna called Djetis, Trinil, and Ngandong. Stemming from stratigraphic localities discovered in East Java, these associations applied to sites in central Java were used to define the stratigraphy of the sites such as the dome of Sangiran (which, in turn, used until recently the toponyms of the eastern part of the island: formations of Pucangan, Kabuh and Notopuro).

The 1980s allowed for the reevaluation of this biostratigraphy by taking into account the paleobiogeographic aspects (de Vos et al. 1982) and definition of several horizons, named:

- Satir, near Bumiayu (central Java), typical island fauna including the *Mastodon* (c. 1.5–2 Ma)
- Ci Saat (same region), later in the Lower Pleistocene (Fig. 7), but reflecting the arrival of carnivores, of *Stegodon* and probably *Homo erectus*

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 7 Hexaprotodon sivalensis (Sangiran, Java, c. 1.2 Ma). (**a**) Original fossil. (**b**) Reconstitution of the hippopotamus after casting (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

- Endemic fauna of Trinil, dating from the end of the Lower Pleistocene
- The association of Kedung Brubus, at the very beginning of the Middle Pleistocene (large exchanges with the continent, marked notably by the arrival of *Elephas*), followed toward the end of this period by the Ngandong fauna
- The fauna of Punung (beginning of the Upper Pleistocene), including species adapted to the tropical rainforest (such as *Pongo*, *Helarctos* and *Symphalangus*).

These horizons, with the exception of the fauna of Punung, mainly reflect an Indian origin until the beginning the Upper Pleistocene.

The situation becomes more complex for the islands located to the East of the Wallace line, sometimes due to a lack of documentation on the faunal groups themselves (either in representativeness, or from a chronological point of view), but more often because of the evident multiplicity and the complexity of the dispersal events. In fact, in these islands, evolution was often synonymous with endemism as was the case for the fauna of Sulawesi, or of relative poverty, like in the Philippines, which deliver, in a remarkable fashion, dwarf forms.

A Cultural Register to Construct

The archaeological aspect of the regional Paleolithic is considered in the context of another entry in this volume, but it is important to note here that a number of available reference points have been discovered since the beginning of the twentieth century. Von Koenigswald was in this regard a pioneer in his quest for the culture of the "*Pithecanthropus*" of Java, which he searched for, in the 1930s, in the chains of hills surrounding sedimentary basins where fossils were found. He thus brought to light the lithic assemblage of Patjitan (Fig. 2b), in the Southern Mountains of Java, as well as a small flake industry in the dome of Sangiran. Other discoveries followed, emphasizing the succession of migrations from the mainland to the islands, and between the islands themselves. The chronology of this story is still the subject of debates. Among the latter are the discoveries, in the 1950s–1970s, of the Cabalwanien, which was identified north of the island of Luzon (possible relation with fossils of the Middle Pleistocene) and Theodor Verhoeven's finds in Flores (Eastern Indonesia), which have contributed to revealing that *Homo erectus* was able to cross the Wallace line from west to east.

Key Issues and Current Debates

Current Challenges Linked to Human Evolution

These issues were, for the most part, outlined above and remain a central concern of researchers (Widianto & Simanjuntak 2010):

- It is striking to note that the age of the first islanders (c. 1.5 Ma) is only slightly younger than the age of the most ancient fossils known outside of Africa (e.g., Dmanisi, Georgia) and that the oldest island *Homo erectus* present quite specific characteristics (cf. notably the robustness of the mandicatory system), whose connection with a possible adaption in colonized environments would be appropriate to study.
- Exchanges with mainland Asia occurred during different periods, in the same way for humans as for fauna, and were particularly intense at the dawn of the Middle Pleistocene. At this time, the hominids were probably able to cross, with several faunal taxa, the Wallace line. However, the fossil register of the Southeast Asian mainland is almost nonexistent and no human fossil has yet been unearthed in eastern Indonesia. Comparative studies, either between mainland and island *Homo erectus*, or within the register of *Homo erectus* dating between 1 and 0.7 Ma in island environments, should make it possible to find traces of these mainland-archipelago contacts (Kaifu et al. 2008).
- The end of the middle Pleistocene and the Upper Pleistocene also poses important questions about the causes of extinction for the latest *Homo erectus* (a phenomenon no doubt comparable, in certain respects to the extinction of the Neanderthal lineage in Western Europe). This extinction should be seen in parallel with the arrival of the first modern humans and also with the evolution of particular forms of hominids (cf. *Homo floresiensis*).
- Finally, there now exists a scientific synergy between different regional scientific programs, which can identify the mosaic of developed settlements since the beginning of the Holocene in the region, after the sharp rise in sea level that completely reallocated the territories.

Stratigraphy and Geochronology

These disciplines aim to describe the context of the distribution of hominids and the major archaeological sites, for which (cf. *infra*) the resolution power of biostratigraphy is insufficient. The long stratigraphic references are few and, for many, draw on fundamental work carried out before the Second World War. The precision of the chronological framework today involves the implementation of diverse methods, including the following:

- Paleomagnetism.
- Argon, fission tracks or luminescence (OSL) methods when volcanic effluents are present and we can evaluate the penecontemporaneity of the analyzed material and of the sedimentary matrix. This is not always the case in very actively volcanic regions, where deposits regularly reshuffle older volcanic elements, stemming from the volcanic cones themselves.
- ESR dating on quartz grains bleached by sunlight and combined U/ Th- ESR analyses on fossil teeth.
- For more recent times, particularly in karst environments, the dating of speleothems (U / Th) and radiocarbon can be added.

The progress achieved in recent decades provides more accurate chronologies, but the complexity of the dynamics of the deposits (cf. example of volcanic effluents above) involves the simultaneous implementation of all possible methods.

The Reconstruction of Landscapes

The major goal is here to identify, in the sedimentary and diagenetic dynamics, the climatic events that have affected the region. The phases of expansion and fragmentation of the forest have had a very important impact on the evolution and behavior of hominids and are linked, beyond climate change, to the tectonic (synorogenic erosion) and volcanic (the overload of rivers with eruptive material) evolution of the region (Sémah et al. 2001).

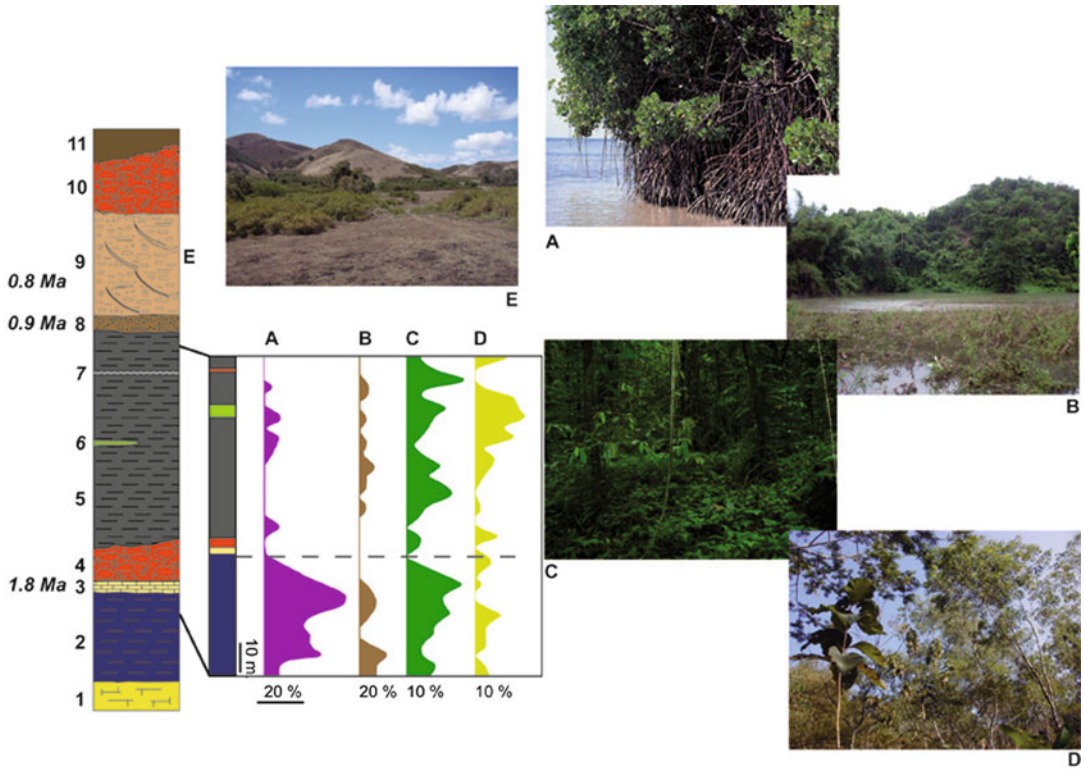

Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology, Fig. 8 Vegetal Paleoenvironments of the Sangiran Dome (Java). *1* Kalibeng – yellow marl. *2* Kalibeng – blue clay. *3* Transition limestone. *4* Lower Lahar. *5* Pucangan – black clay. *6* Diatomites. *7* Tuf. *8* Grenzbank. *9* Kabuh. *10* Notopuro – upper Lahar. *11* Terraces. (**a**) Mangrove. (**b**) Swampy forest. (**c**) Rainforest. (**d**) Seasonal forest. (**e**) Savannah. According to pollen studies (A.-M. Sémah) (Photographs: A.-M. Sémah)

Beyond these classic sedimentological descriptions, paleobotany (continuous pollen records (Fig. 8) and phytoliths study) is combined with paleopedology (micromorphological analyses addressing shorter periods clearly more scattered in time).

The records enable to follow the progressive emersion of reliefs in Java (the filling of lagoons, the development of mangrove forest) as well as the dynamic distribution of vegetal formations. In this way, it appears that the tropical rain forest dominated during the Lower Pleistocene, even though it was subject to repetitive destructions because of volcanic eruptions. The opening of the landscape during "glacial" periods (especially during the Middle Pleistocene) restricted the rain forest to galleries along the watercourses. At certain times (marked by pedogenic formations), the fragmentation of the forest could even leave room for open, savannah-like patches. These "dry" episodes are underlined by the importance of sedimentation phases, the opening of the forest allowing more severe erosion during the rainy season (seasonality persisted during "glacial" periods).

At the regional level, the reconstruction of the landscapes that may have existed on the Sunda shelf during the maximum exondation (e.g., beginning of the Middle Pleistocene and LGM) is crucial to provide us with information about the migration of fauna and hominids. Particularly here, the hypothesis on the past existence of a "savannah corridor," which might have developed along the principal rivers draining the waters from the great massifs of Java, Borneo, and Sumatra, favoring migrations in this way, awaits

confirmation. Similarly, the description of the intense development phases of the rainforest (MIS 5–125 ka, Holocene climatic optimum around 8 ka) is also fundamental to understanding human migrations.

The Biostratigraphic Framework and the Meaning of Taphonomic Assemblages

The study of vertebrate faunas has been the object of a special effort. The current landmarks in Java can be qualified as solid. In fact, they are based on collections harvested with a good stratigraphic control and an approach that is in line with the regional naturalists' concerns: integrating paleoecological reconstructions, phenomena of dispersals and migration, adaptation as well as evolution in isolated environments (endemism, vicariance). Their results are coherent with the climatic and paleoecological history of the region, particularly demonstrating (de Vos et al. 1994):

- Narrow passages to the south and southeast of the Sunda shelf during the Lower Pleistocene
- More sustained exchanges with the mainland during the installation of the climatic conditions of the Middle Pleistocene (climatic contrasts actually started with the MIS22 stage (Sémah & Sémah 2012), c. 0.9 Ma) when major climatic cycles acquired a length of about 100 ka
- Significant changes in the composition of faunal assemblages during the Upper Pleistocene, with an association perfectly adapted to the rainforest during stage MIS 5, then relative impoverishment of fauna during the last glacial maximum, followed by a new adaptation to a forest environment at the beginning of the Holocene

These landmarks, however, constitute only an incomplete framework that requires the reconstruction of its history with a temporal resolution as fine as possible: Only ongoing fieldwork can bring an answer here, by developing and using a register backed up by statistically representative collections (Moigne et al. 2004). Similarly, the nature of the relationship between the archipelagos on both sides of the Wallace Line (van den Bergh et al. 2001) should be described more accurately, for example, with regard to the number and duration of endemic periods in Sulawesi (an island which occupies a central place in the zone under study) and the different routes which facilitated colonization of the Philippine archipelago (passage from south toward the north via Borneo and the Palawan ridge or passage via the chain of southern islands near Mindanao). Comparative research between Pleistocene fossils in the Indochinese and Sunda provinces is now starting to produce a dynamic vision of their borders, suggesting in particular the late onset of the Isthmus of Kra operating as a biogeographic barrier during the Quaternary.

Such results are fundamental to understanding the ecological constraints which weighed on human groups and animals (animals' level of dependence on ecosystems being higher).

Modern methods of taphonomic study are developing today in Southeast Asia. They help to better understand the significance of collected palaeontological assemblages, and also illustrate, in the archaeological horizons or those that are derived from them, the behavior of the hominids with respect to their faunal environment.

International Perspectives

Beyond the concern to conduct research at the international level, the focus on conservation is certainly a major issue at all levels. Multiple factors related to the limited number of researchers or the difficulties of the terrain mean that the sites of Southeast Asia are still very far from having been discovered or exploited to their true value. Sites that are known, sometimes for over a century, have shown all the potential that further research may still bring to their interpretation.

International meetings organized under the auspices of UNESCO clearly show that there are few properties that meet all the criteria required for registration, either through the World Heritage framework or through more thematic programs.

The direct access to scientific information is often put in danger:

- At the level of sites, due to the mere fact of very active erosion in tropical region and of significant development (e.g., public infrastructures) carried out there
- At the level of movable heritage, through the great dispersion of collections

Objects and data collected during the colonial era, for example, are scattered within museums in many countries. However, some states still lack the resources for heritage management, which underlines the international responsibility on the matter. Initiatives taken by regional governments should thus be optimized by a genuine dynamic cooperation, allowing for the sharing of experience and access to data, which have a significant impact on foreseeing the scientific research programs.

This perspective of conservation cannot be separated, in the long term, from questions relating to the preservation of ecosystems and the biodiversity in a zone not only subjected to important development initiatives, but also to a number of major risks, including global climate change.

It is important to complement this reflection on the preservation of existing environments with the memory of an exceptional history, built over nearly a million and a half years ago by conquest, migration, coexistence, adaptation, or resilience of different groups of hominids.

Future Directions

Southeast Asia, when considered as a bridge between mainland and archipelagos, represents a fantastic natural laboratory for the study of biodiversity, as much in its current configuration as in the long term, within which human adventure plays a very special part.

Expected orientations for research involve the integrated construction of an interdisciplinary framework, which would definitely place human evolution (*lato sensu*) within a naturalist and cultural perspective. As such, there is much to be expected from the development of archaeological research in a real paleobiogeographic perspective, including from the cross-sectoral perspective of linking prehistory to biology. The chronological approach to the fragmentation of the rainforest, for example, as a result of climate forcings, could explain the diversification of some populations, or initiate new hypotheses on some speciation. A similar approach can be implemented, in coastal areas, by identifying in the records the oscillations of sea level. In contrast, work on the biological diversification based on current populations could help interpret some human replacements recorded on prehistoric sites.

The desired effect of synergy should thus result from the intersection of data relating to the evolution of climate and of environments, as indicated by mineral, biological and cultural markers in the sedimentary records, with data provided by diverse approaches of extant populations on the other hand (analysis of patterns of endemism, of population and habitat fragmentation, and cytogenetic studies).

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Central Asia: Paleolithic
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ Insular Southeast Asia in the Lower Paleolithic
- ▶ Island Southeast Asia: Neolithic
- ▶ Island Southeast Asia: Rock Art
- ▶ South Asia: Paleolithic
- ▶ West and Central Asia: Early *Homo* Fossil Records

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Insular Southeast Asia in the Lower Paleolithic

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State of Knowledge and Current Debates

Introduction

Since the end of the nineteenth century, the "Pithecanthropus" of Java (*Homo erectus*) profoundly marked the history of science and definitively rooted Southeast Asian prehistory in

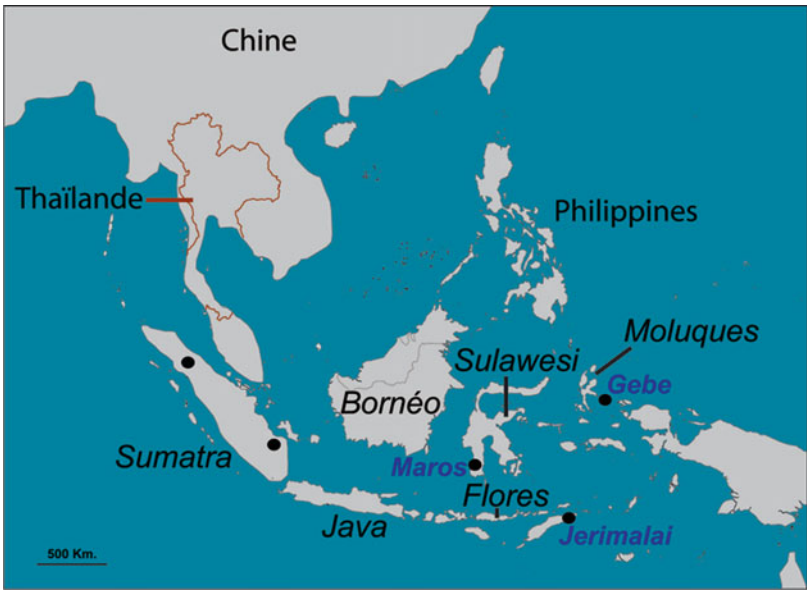

Insular Southeast Asia in the Lower Paleolithic, Fig. 1 The islands of Southeast Asia, map of localization of sites

a paleobiogeographic perspective (Fig. 1). Any approach to the Paleolithic period is thus linked to issues of adaptation to the different natural environments encountered by hominids.

The latter, evidently, followed identical migration routes to those of continental vertebrate fauna originating from the Asian mainland whose affinities, according to the period, were Indian or Chinese.

One of the major issues that arise is, of course, distinguishing a possible "human" special feature within these episodes of dispersion which, for the most recent periods, reflect an organization that allows the use of the term "migration." Resolving this question involves the study, and then the connection, of several archaeological records appropriately integrated into the paleoenvironmental framework.

However, it should be recognized that only around a dozen or more suitably documented records are available, a number which should be seen within the context of the immensity of the region under consideration (more than 20 million km^2). The sites under investigation are moreover spread over a history which began in the Lower Pleistocene, some 1.5 Ma ago, with the arrival on the island of Java of the first islander in the history of humanity, and which ended with the dissemination of Neolithic traditions coming from continental Asia in the archipelagos a few thousand years ago.

This history has featured successively but also sometimes concomitantly:

- *Homo erectus* belonging to very different groups: the latest forms from the Solo River, which were extinct at the end of the Middle Pleistocene (or, according to some researchers, during the Upper Pleistocene), differ considerably from robust and archaic forms of the Lower Pleistocene (see "Meganthropus"); these *Homo erectus* were able, on certain occasions, to cross biogeographic boundaries as shown by the early population on the island of Flores in east Indonesia.
- *Homo sapiens* distributed between (1) the very first immigrants who could have arrived in the region at the beginning of the Upper Pleistocene; (2) populations who occupied not only the Indochinese province but the entire Sunda region, emerged during the Last Glacial Maximum, and spread across it owing to the creation of vast zones of circulation on the subcontinent; and (3) groups which occupied the islands during the great geographic upheaval which took place at the beginning of

the Holocene, with the submersion of vast stretches of the mainland.

- Other hominids (see *Homo floresiensis*), still mysterious in many respects, stemming from a very localized endemic evolution, which could not have occurred on the island of Flores alone.

Faced with such geographic, chronological, and evolutionary diversity, the few available archaeological records today must certainly be treated with caution, without relinquishing the pursuit of research on how their characteristics may reflect a regional phenomenon.

Definition

It seems relatively easy to speak of the "Lower" Paleolithic in the islands of Southeast Asia, the use of the term being made easier when the archaeological discoveries were linked to a context where only *Homo erectus* would have been able to intervene. In the current state of research, this qualifier can be used for sites dating to the Lower Pleistocene and the Middle Pleistocene.

By contrast, going further in the periodization proves to be very tricky. Earliest attempts at calculating the prehistory of Southeast Asia, whose mosaic characteristics appear more evident every day, or to construct a cultural chronology similar to that of Western Europe, have proved erroneous and unsuccessful. It is thus appropriate here to banish the terms "Middle Paleolithic," "Upper Paleolithic," or "Mesolithic," which, by the way, often pose problems for researchers: thus, the frequent usage, for lack of a better term, of "preneolithic" can be found to describe some features from the beginning of the Holocene and prior to contact with Austronesian groups or with other carriers of Neolithic traditions.

Rather than end with a "periodization," the current work has thus as its principal aims:

- To clearly show the relationship between an archaeological horizon and a particular hominid (a sometimes difficult task during the first part of the Upper Pleistocene)
- To search for solid chronological records to better situate the wide diffusion of practices such as the development of habitats in caves or the systematic use of fire
- To stress important innovations linked to *Homo sapiens*, such as the construction of sophisticated tools in hard animal materials, the concretization of symbolic behaviors, or even the practice of organized sea crossings

Thus, in the present article, the upper chronological limit of the corpus will remain somewhat vaguely defined, but in order to reflect the current state of research and its orientation, it will mention several deposits in the second half of the Upper Pleistocene.

In such a configuration, a number of archaeological assemblages retain from the time of their discovery a name based on a toponym. Rare are those that, following the example of Hoabinhian discovered on the continent (North Vietnam), represent a regionally meaningful cultural facies. Following the example of Anyathien defined in the Irrawaddy valley in Burma, we also speak of "Patjitanian," "Cabengian," or "Cabalwanian" in the Southeast Asian islands. These designations do not contribute substantially to studies, and the latter must focus rather on the meaning of assemblages in given geographic and paleoecological contexts.

It is necessary to recall in the last resort that in Southeast Asia, and perhaps more than anywhere else, the description of "Paleolithic" features should not refer to only stone tools, which unfortunately are often the only ones preserved, particularly in alluvial sites which are the most frequent. Although the technical and subsistence strategies of human groups would naturally use lithic materials whenever available, it is far from being the only one used. Several publications have, for example, evoked the importance since the Paleolithic of bamboo, almost ubiquitous grass trees.

Historical Framework

Interest in the behavior of hominids in insular Southeast Asia has been aroused since the end of the nineteenth century with the discovery by Dubois of the *Pithecanthropus erectus* (today the holotype of *Homo erectus*). The reconstruction presented by the discoverer during the Exposition

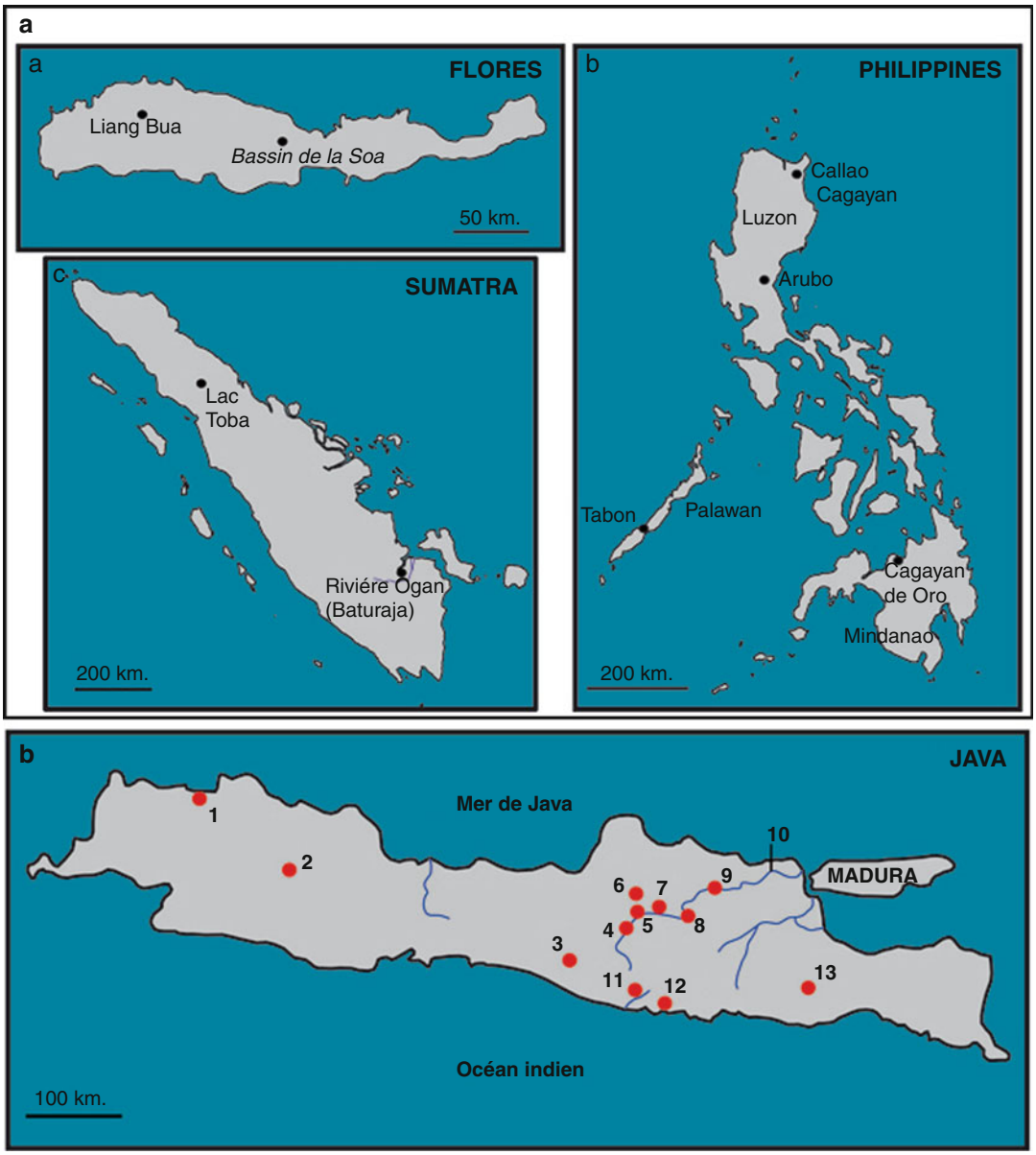

Insular Southeast Asia in the Lower Paleolithic, Fig. 2 (**a**) Detailed localization of sites. (*a*) Flores, (*b*) Sumatra, (*c*) Philippine Archipelago. (**b**) Location of sites in Java. (*1*) Jakarta, (*2*) Bandung, (*3*) Yogyakarta, (*4*) Solo, (*5*) Sangiran, (*6*) Miri, (*7*) Sambungmacan, (*8*) Trinil, (*9*) Ngandong, (*10*) Solo River, (*11*) Punung and Baksoka River, (*12*) Pacitan, (*13*) Wajak

Universelle in Paris in 1900 shows this hominid looking intently at the tool he is holding in his right hand.

However, during this time, the archaeologists working in the Indonesian and Philippine archipelagos mainly concentrated their attention on the tools that appeared the most meaningful, such as polished Neolithic axes. Neither the initial excavations at Trinil site (Fig. 2b) nor those developed at the beginning of the 1900s, during the great pluridisciplinary expedition of Selenka, were able to draw sufficient attention to the taphonomy of the explored horizons, and many behavioral data may thus have escaped the researchers.

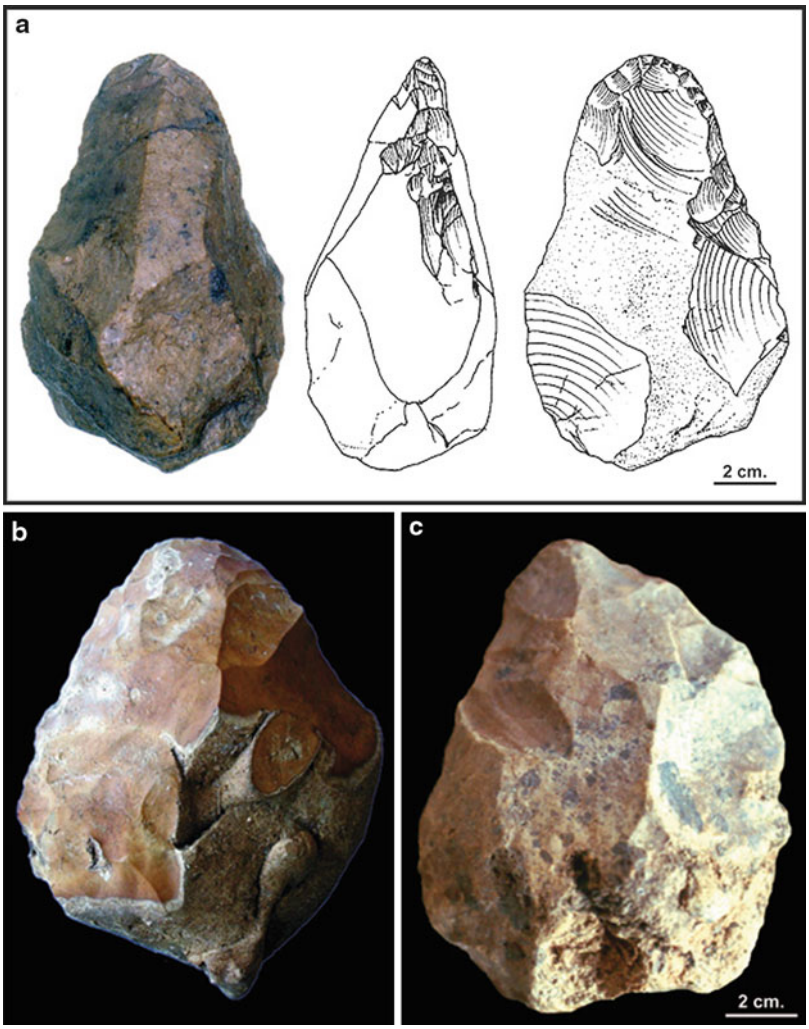

Insular Southeast Asia in the Lower Paleolithic, Fig. 3 Handaxes of Indonesia and the Philippines. (**a**) Arubo (Luzon, Philippines), (**b**) Koboran (Punung, Pacitan, Indonesia), (**c**) Baksoka River (Pacitan, Indonesia) (© a Alfred Pawlik; © b, c Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

At the end of the 1920s, Ralph von Koenigswald very quickly associated the search for artifacts with his paleontological and paleoanthropological work in Java. As a result he discovered, in the upper valley of the Baksoka River (in the Southern Mountains of eastern Java), the so-called Patjitanian industry (Fig. 3b, c) on pebbles and large flakes (Bartstra 1976), which, being encouraged in this direction by Pierre Teilhard de Chardin, he was to attribute to *Homo erectus*. Similarly, he highlighted an industry of small flakes in the Sangiran dome (in the center of the island of Java, the richest site of hominids in Indonesia), called the "Sangiran flakes," the majority of which is made of allochtonous rocks, coming from the Southern Mountains of Java (von Koenigswald & Gosh 1973).

Robert van Heekeren, in his review of the prehistory of Indonesia in 1957, also mentioned the isolated discovery of bolas at the Sangiran site and described several pieces (including a bone industry) recovered in the eastern part of Java (Watualang), renowned for being contemporary to the "Solo river Men". However, the lack of documentation on the context of these objects does not permit any firm correlation with the site of Ngangdong, which yielded 11 fossils (mostly skullcaps) of derived *Homo erectus* (nevertheless, the presence of bolas in the sedimentary

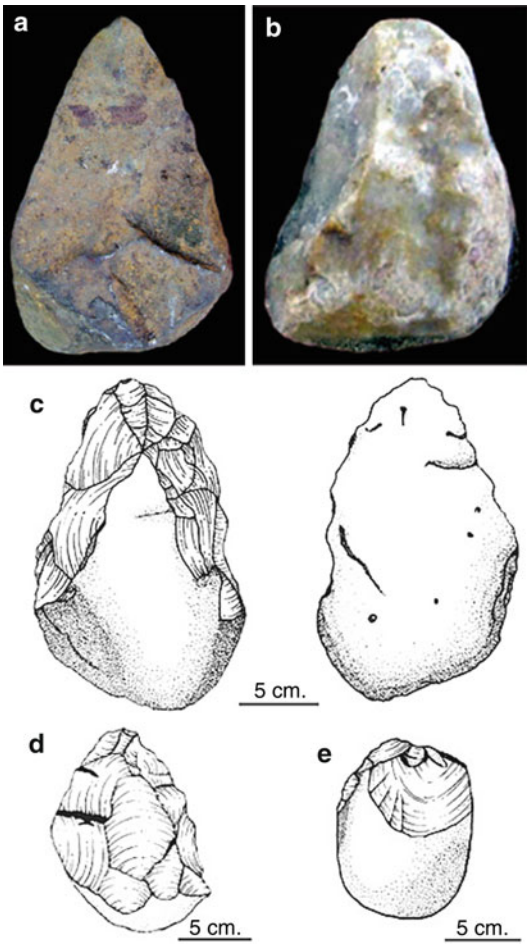

Insular Southeast Asia in the Lower Paleolithic, Fig. 4 Artifacts from the Lower Paleolithic in the Philippines. (**a** and **b**) Cagayan (Luzon), (**c**, **d**, and **e**) Cagayan de Oro (Mindanao) (© University of the Philippines – ASP)

horizons excavated at this time in Ngangdong has now been proven).

The discoveries have multiplied in Indonesia and the Philippines (Figs. 1, 2a/c, 3a, and 4a–e) since the end of the Second World War, particularly with the characterization of Cabalwanian pebble tools in Cagayan Valley in the north of the island of Luzon, but also with the find of pebble tools and flakes in the collection assembled during the 1920s by Henry O. Beyer in the southern part of the island, or even with the industry of Cabenge discovered in the valley of Walanae in Sulawesi. Owing to the difficulty in obtaining radiometric dating at the time, their age gave rise to debates, often poorly argued, in the scientific literature, sometimes making a similar techno-complex oscillate between the Lower Pleistocene and the start beginning of the Holocene!

These discoveries were also addressed, in a quasi-systematic way, by taking into account the theory of Hallam Leonard Movius (1944), according to which east Eurasia stood out as much by the absence of bifaces as by the persistence of choppers and chopping tools. It is not possible here to address the question in detail, but rather than the controversy surrounding the "Movius Line" for several decades, one must remember that the reflections that it aroused on the meaning of the lithic assemblages proved rewarding at the level of Eurasian prehistory as a whole.

The Hoabinhien was brought to light as early as the 1920s in the eponymous province of North Vietnam by Madeleine Colani and then accepted as characteristic Paleolithic during the 1st Congrès préhistorique d'Extrême-Orient in Hanoi in 1932. Its extension toward the archipelagos was recognized by Pieter Vincent van Stein Callenfels, highlighting the numerous "sumatralithes" (unifacial pebble tools) in the shell middens in the north of Sumatra.

Finally, it is worth recalling, sidelining the subject of the "Lower Paleolithic" discussed here, that the archaeological record recognized at an early stage includes characteristics formerly called "Mesolithic." Indeed the van Stein Callenfels' excavations in Sampung Cave in East Java grounded the research concerning the beginning of the Holocene period during the first half of the twentieth century. Although the reduction by-products were not collected then, in preference for more elaborated pieces, the Sampung site marks, however, the era during which the importance of man-environment relationships in the prehistory of the archipelagos was highlighted. This site has shown the emergence of an industry made on hard animal materials and enabled the first description of fauna from this period, which would become the subject of several studies developed today.

Major Questions or Debates

The Question of Origins

Many discoveries, mainly in alluvial formations, can be described as "Lower Paleolithic." However, because of the weakness – or lack – of stratigraphic control, debates about their age most of the time prevent accurately situating the arrival of the first islanders during the Lower Pleistocene. At Bukit Bunuh, in the Lenggong valley (Malaysian peninsula site), the presence of knapped lithic elements dating to a very ancient period (1.8 Ma) has been indicated, but, nonetheless, characterizing these pieces is tricky due to discoveries their position trapped in a breach of impact (suevite). The same authors subsequently described an assemblage on this site dating between around 300 and 600 ka.

The site that has yielded the greatest number of "archaic" *Homo erectus* is to this day the Sangiran dome, at the center of Java. These are associated with fossil-bearing sedimentary layers (called Pucangan or Sangiran, dated between 1.8 and 1 Ma) primarily deposited in marshy environments, and where no archaeological horizon (in place or reworked) could be observed.

Only rare behavioral clues have been published on these first islanders, relating to marks on fossil bones that may have possibly been linked to the use of tools made of shell or to the analysis of dental micro-erosion of hominid fossils.

It is toward the end of this Pucangan period, that, in the mid-2000s, several "Sangiran flakes" were discovered in conglomerate lenses at the Dayu site; they are today the oldest lithic artifacts known in Java (Widianto 2006). The latter are also found in the upper conglomeratic layers which mark the end of the Upper Pleistocene (*Grenzbank* zone of von Koenigswald). The Grenzbank largely corresponds to the synorogenic erosion deposits linked to the last uplift of the hills ranges which frame the Solo depression (Kendeng hills to the north and Southern Mountains). It is expected, considering the deposition environment, that the flakes present the patina and wear linked to fluvial transport. Naturally, their size is identical to that of the sediment matrix, and therefore, we cannot know if these were transported artifacts or if they were manufactured locally from available small blocks of raw material.

At the same time, the layers that folded during the last uplift of the Kendeng hills have yielded some poor quality limestone artifacts as well as fossils at Miri (Kedung Cumpleng site) in an alluvial delta environment. This reflects the milieu of life for hominids on reliefs emerged at the end of the Lower Pleistocene, not long before the central region of Java acquired its current tectonic configuration.

The Beginning of the Middle Pleistocene in Java

The settling of climatic conditions that characterizes the Middle Pleistocene, from the isotopic stage MIS 22 for the earliest, marked a major stage in the paleobiogeographic evolution of the region and correlatively in the history of its peopling. It is in fact during this period that the largest land-bridges on the Sunda plateau were exposed, the nature of fauna evidencing important exchanges between the continent and the archipelagos. Accordingly, the dispersion of hominids has thus been facilitated by:

- The opening of the landscape, generally considered as favorable to the development of human groups.
- But also the balance which was established in the geographic configuration of the Sunda shelf. Waters flowing from the emerged massifs (Java, Sumatra, Borneo) joined and structured the corridors along important rivers, bordered by gallery forests providing to the shifting humans vital resources, catering for their subsistence and technical needs.

Many deposits within the Sangiran dome yielded in situ or very slightly reworked archaeological horizons, such as the site of Ngebung (Fig. 5). Others (Pucung, Grogolan Kulon (Fig. 6)) derive from the direct destruction of archaeological soils and thus enable, particularly in the case of Pucung, a representative and qualitative approach of these despite a disturbed spatial distribution. Worth noting in these horizons is the simultaneous occurrence of faunal remains showing traces of human activity, sometimes the remains of the hominids themselves, traces

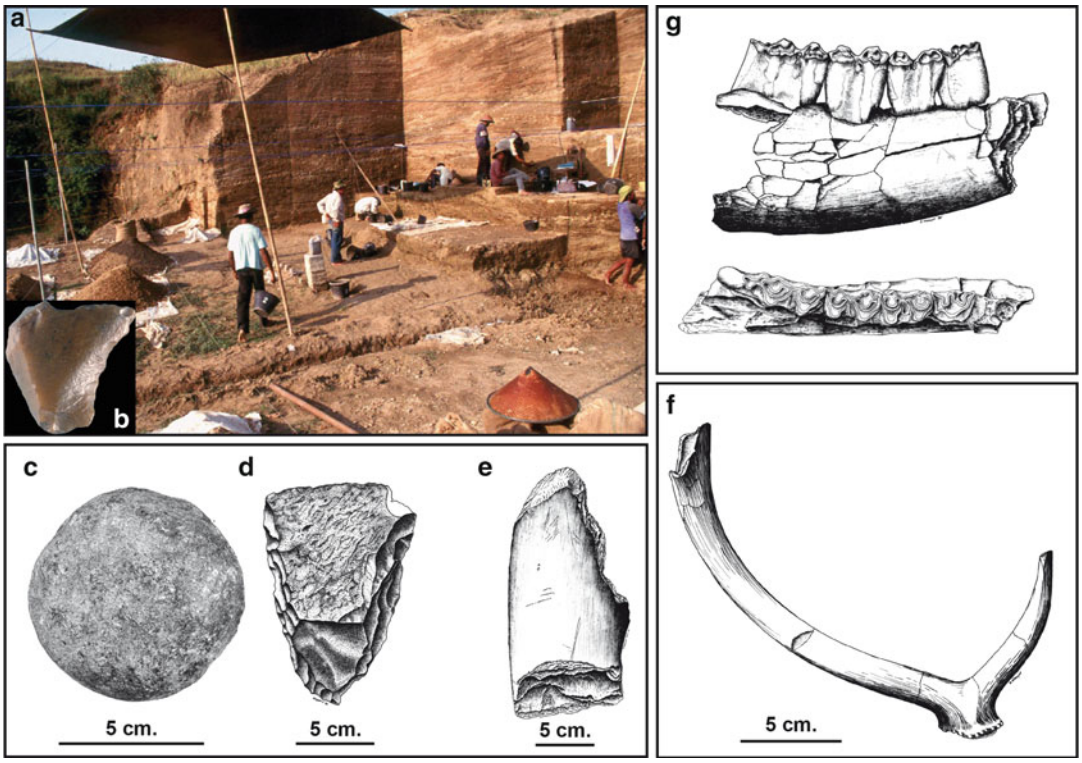

Insular Southeast Asia in the Lower Paleolithic, Fig. 5 Ngebung site (Sangiran Dome, Java, 800 ka). (**a**) excavation, (**b**) flake on chalcedony, (**c**) bola, (**d**) cleaver in andesite, (**e**) Probably utilized *Stegodon* tusk large flake, (**f**) *Axis lydekkeri ngebungensis* (Cervidae), (**g**) bovid mandible (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

of plant elements (bamboo casts in clay formations), and stone tools.

They are included in the layers known as of Kabuh – or Bapang – whose age corresponds to the very beginning of the Middle Pleistocene. Some dating of volcanic effluents such as pumice gives a more remote age (Lower Pleistocene), but the primary character of the dated elements remains subject to debate. Efforts to date the sites thus combine several approaches: comparative dating methods by potassium argon on pumices but also on potassium rich mineral grains collected from tuffaceous layers contemporary to eruptions, dating by electron spin resonance (ESR) of bipyramidal quartz of volcanic origin, and dating by combined uranium series (U/Th) and ESR on tooth enamel of large herbivores.

Lithic tools, are represented by "Sangiran flakes" (including small cores and retouched pieces) on allochtonous rocks, with different degrees of patina and wear (from very fresh to very rolled). This observation, made in the 1990s, and confirmed by the discoveries of Dayu mentioned above, closed the debate on the age of the "Sangiran flakes" as defined by von Koenigswald, whose dating was often questioned in the literature: these fragments, regardless of their geographic origin, are indeed the work of *Homo erectus*.

Extensive use was made of rocks available nearby; at Ngebung there appear numerous pebbles of andesite of poor quality, probably collected from the river levels eroding the lahars. These pebbles were used for some of them as simple manuports, for others trimmed

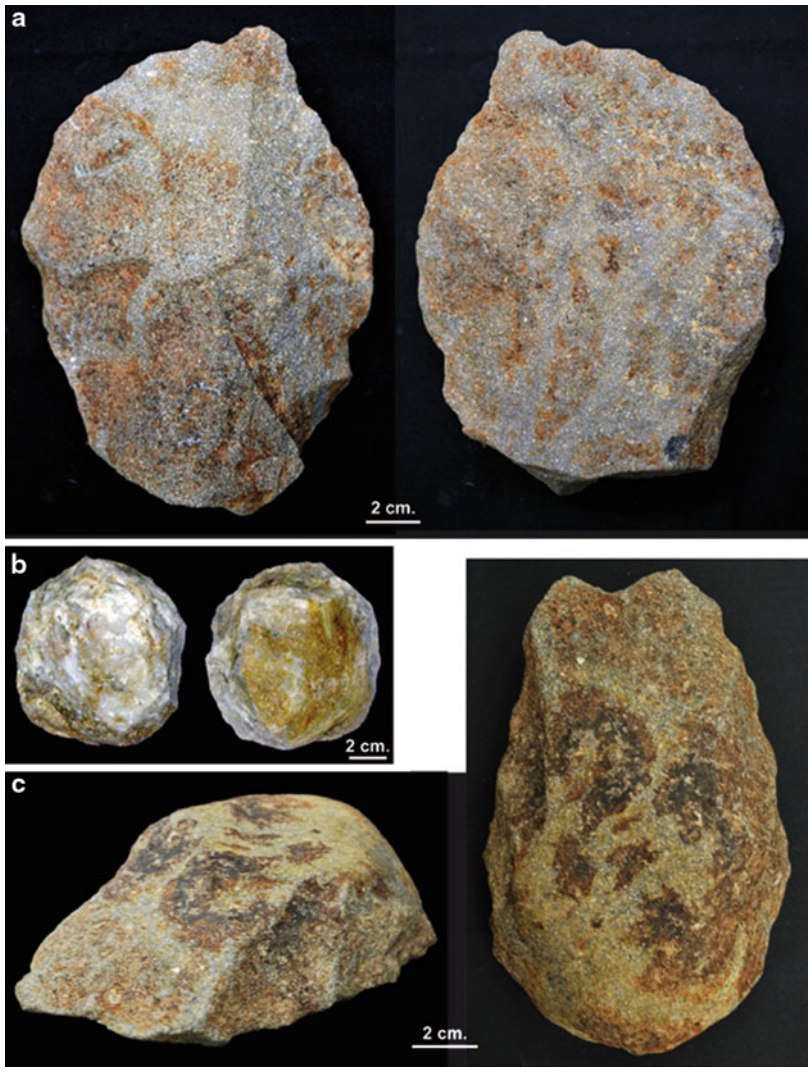

Insular Southeast Asia in the Lower Paleolithic, Fig. 6 Grogolan Kulon site (Sangiran dome, Java, Early Middle Pleistocene). (**a**) large flake, (**b**) polyhedron quartzite, (**c**) pebble tool (Photographs by Truman Simanjuntak)

by knapping into "horsehoofs" or shaped along a chain of operations whose products ranging from polyhedrons to the perfect bolas (Fig. 5c) through more or less regular spheroids.

In the 1970s, R.P. Soejono discovered, in a test pit excavation in Ngebung, a chopper on metamorphic rock. The group of sites known today regularly yields artifacts in quartz, quartzite, and hard fine-grained andesite which were made on blocks whose size sharply contrasts with the granulometric size of the surrounding deposits in the Kabuh layers. The location of the outcrops provides a good idea of the extent of the territories in which the raw material was harvested, whose radius could probably be up to 25 km.

These imported materials were used as hammers and as supports in making choppers and chopping tools or bolas (sometimes not pecked, notably on fine-grained quartzite). But we also find sharp tools like cleavers on large flakes (including a large Kombewa-type flake). In Ngebung, a large flake in proboscidian ivory (Fig. 5e) was also found (Sémah et al. 1992).

Behavioral differences appear between the sites, which remain to be analyzed with more

precision, such as the average mass of bolas, which varies by assemblage between 350 and more than 800 g, or the raw materials used to make them.

These are key sites. They are the oldest which offers a new insight, unknown up until the end of the twentieth century, on the lifestyle of the "Pithecanthropus" of Java, their subsistence and technical behaviors (hunting seems certain) and the extension of their territories. Similarly, it is important to mention a recent study on the ancient collection made by Eugène Dubois in Trinil, which shows the high probability of exploitation of aquatic resources (notably mollusks) by *Homo erectus* from the end of the Lower Pleistocene.

Diffusion of the Acheulean Toward the Archipelagos

The recurrence of lithic pieces described above, in excavations undertaken in Sangiran, appears today to indicate diffusion toward the archipelagos of the Acheulean tradition at the dawn of the Middle Pleistocene. While the presence of bifaces is substantiated in East Asia (China and Korea), reference points are still lacking between the Acheulean sites of India such as Attirampakkam (around 1.5 Ma) and the Southeast Asian archipelagos. The few discoveries made in northern Thailand remain contested from a chronological point of view and hardly distinctive from a typological perspective.

The deposits of the Sangiran dome raise the question of the distribution of the "Large Flake Acheulean" (Mishra et al. 2010) and imply addressing anew a number of discoveries made in alluvial environments (and still poorly dated) such as tools on large flakes and bifacial pieces found within the Patjitanian industry in the valley of the Baksoka River in East Java. Several distinctive pieces (handaxe, cleaver on flake) were also mentioned in South Sumatra (Fig. 2a/b), in the alluvia of tributaries of the Ogan River (karst massif of Baturaja).

This perspective can also be taken beyond the Wallace Line, from the Walanae River terraces in Sulawesi (Cabengian assemblage) all the way to the Soa basin in Flores (Fig. 2a/a), where in 1970 Theodor Verhoeven drew attention to shaped pieces associated with ancient fauna (assumed to belong to the Middle Pleistocene).

Von Koenigswald quickly brought them together with the "Sangiran flakes." The intensification of research in the Soa basin allowed for the identification of several sites (Mata Menge, Boa Lesa, Wolo Sege) dated between 0.8 and 1 Ma by argon methods and fission tracks (Brumm et al. 2010).

The tools collected include, besides pebbles, mainly medium-sized flakes resulting from the reduction of blocks, and easily transportable from where they were produced with the possibility of being retouched thereafter. A comparable behavior was noted in the horizons where the *Homo floresiensis* fossil was discovered (Liang Bua, Upper Pleistocene), which allowed the authors to assume some continuity in acquisition strategies and the treatment of raw materials in Flores throughout the Middle and Upper Pleistocene (this hypothesis supports that of a long endemic evolution on the island).

The Philippine sites still lack chronological data and notably include the unifacial pebbles of Cagayan (Cabalwanian, north of Luzon island (Fig. 4a, b)), the "Acheulean" pieces from the Arubo site (central part of the island, biface and "horsehoof" (Fig. 3a), and the pebble tools of Huluga (Cagayan de Oro, north of Mindanao island (Fig. 4c–e)) (Dizon & Pawlik 2010).

The data collected, notably in Flores, implies that *Homo erectus*, during the establishment of the specific paleogeographical conditions of the Middle Pleistocene, was able to cross the narrow channels of sea in order to populate the eastern islands. Many speculations accompany this assertion, such as the visibility of reliefs (volcanoes) which could have represented an incitement to cross. This adventure seems surprising if we refer to the reliability of the Wallace Line considered as a biogeographic boundary. However, it is no more spectacular than what the first *Homo erectus* experienced about 1.5 Ma ago, as they successfully passed the filters separating the continent from the first hospitable reliefs appearing on Java.

The Industries at the End of the Middle Pleistocene

The sites from the Lenggong valley in Peninsular Malaysia (Majid 2001), recently classified on the World Heritage List, represent a potential link with the above mentioned sites. In Bukit Jawa, during the construction of a highway, the identification of a workshop became the object of rescue excavations on the periphery of a relief formerly surrounded by a lake. It yielded a very high number of artifacts on pebbles and large flakes, often knapped on an anvil, and its age could be as old as 200 ka. The Kota Tampan site, where stone knapping workshops were also excavated, occupies a comparable geomorphological position and presents a more sophisticated lithic industry but involving comparable reduction methods.

Made by knapping on an anvil or by direct percussion, the tools on pebbles or flakes (mainly notches and denticulates) show the use of quartz but also the search for good quality quartzite. The overlying layers at some archaeological horizons were dated (luminescence, OSL) to more than 70 ka, linking the abandonment of the site with the major eruption of the Toba volcano in North Sumatra (Fig. 2a/b). The Lenggong valley also contains many other sites that are more recent.

Several other lithic assemblages on flakes were discovered in alluvial systems of east and west Indonesia and are attributed to the Middle or Upper Pleistocene. The majority, however, lack precise stratigraphic and chronological context, owing as much to the rarity of research as to the difficulty of finding well-defined stratigraphic horizons in highly dissected alluvial layers, most often reduced to the state of geomorphologic berms. In particular, mention must be made of the presence of some knapped pieces, including a chopper on a large andesite flake, on the site where the Sambungmacan skullcap was discovered in 1973, belonging to the late *Homo erectus* group from the Solo River.

In the karst massif of Punung (east of Java island), the Song Terus cave (Fig. 7) was the object of a study on its deep filling which demonstrated an old opening onto the neighboring valley. The filling of the cave thus trapped alluvial layers which contained abundant artifacts and some fossils (Sémah et al. 2004). This alluvial series could be dated back to more than 300 ka (dating combining U/Th and ESR methods) in its deepest area. It ends with isotopic stage MIS 5 (the U/Th speleothem dates are between 120 and 85 ka), with the disappearance of all fluvial influence and the outlining of the oldest occupied surface in the cave known in the region studied, toward 85 ka.

The lithic industry associated with these deep levels is homogenous throughout the entire period. It is characterized by the opportunistic production of flakes of medium or small size, an important proportion of which (including cortical flakes) was retouched. The tools include typically denticulated scrapers, as well as notches, becs, scrapers, and borers. Composite tools are common. Tools on pebbles, cores, or large flakes are rare, probably because of the limited granulometric size of the encasing alluvial layer.

Homo sapiens of the First Part of the Upper Pleistocene

These sites open up perspectives on the period during which *Homo sapiens* conquered the archipelagos, but the association between techno-complexes and human fossils remains too tenuous to be able today to claim a detailed description of the behavior of the first representatives of our species. Some continuity reflected by lithic technology appears notable but still requires interpretation. Such is the case of the karst of Punung in East Java (until the end of MIS 5), where it is difficult to attribute the very first occupation floor in the cave to the last *Homo erectus* or to the early arrival of *Homo sapiens*. Similarly, in the valley of Lenggong in Peninsular Malaysia, where, as mentioned above for Flores, continuity in lithic reduction modes could well have been dictated by nature and the locations of raw material sources. One of the characteristics of these tools in the region of Punung, from the end of the Middle Pleistocene until the Holocene, is the frequent recycling of older artifacts, either by resharpening or their use as cores.

Diversification seems to be more evident at the end of MIS 3 and during MIS 2, possibly linked to

Insular Southeast Asia in the Lower Paleolithic, Fig. 7 Song Terus cave (Punung, Pacitan, Java, Indonesia). Human presence for more than 300 ka; occupation floors from 85 ka. (**a**) excavation, (**b**) tool on bone (Holocene), (**c**) tool on shell (Holocene), (**d**) core (Holocene), (**e** and **f**) retouched flakes of the Terus level (Late Middle Pleistocene) (© Centre archéologique national d'Indonésie et Muséum national d'histoire naturelle)

the ease of circulation on the emerged corridors, crossing of the narrow straits toward the eastern islands, and the variety of tropical ecosystems which humans began exploring and exploiting. The data accumulated during recent decades are still scattered but contribute to stressing the importance of research efforts in the field, combining archaeology and chronology. They clarify diverse aspects relative to the movement and adaptation of modern humans in the archipelagos, such as the specific exploitation of environments in Sarawak (island of Borneo, Niah Cave; Barker et al. 2011), the apparent occasional use of caves as short-term shelters and, more rarely, workshops in the karst massif of Punung in Java (Forestier 2000). Beyond the Wallace Line, it is worth mentioning the likely presence of a Levallois reduction in South Sulawesi (Maros karst (Fig. 1), Leang Burung 2; Glover 1981); a human presence to the north of Luzon island (Callao Cave (Fig. 2a/c)) nearly 60 ka ago; the occupation of the Tabon Caves (Palawan Island (Figs. 2a/c and 8)) nearly 35 ka ago, as hearths and associated flake assemblages (Patole-Edoumba et al. 2012); the traces left by the first navigators passing through the Moluccas archipelago (caves of Golo and Wetef on the island of Gebe; Bellwood et al. 1998); or in East Timor (Jerimalai shelter, O'Connor et al. 2011 (Fig. 1)), where the oldest traces of deep sea fishing can be found.

International Perspectives

The ideas expressed by Movius on the regions situated beyond the "handaxe limit" seem obsolete today. However, it is undeniable that the perspective that it opened during the 1940s on early prehistory of Eurasia led to genuine incentives for the development of research (Simanjuntak et al. 2010).

A "continental" point of view continues to guide some work, notably research into the mechanisms of diffusion and local specialization of the Acheulean tradition, as well as research for older evidence of systematic fire use. But it seems difficult today to follow Movius's idea in his perception of the whole region under study as a simple isolate or even as an evolutionary cul-de-sac.

On the contrary, the chronological and geographic mosaic of settlements in the Southeast Asian islands during the Pleistocene has already confirmed its potential. The region contains some of the earliest evidence of adaptation to tropical, continental and aquatic environments and their exploitation during the Lower Pleistocene. At the dawn of the Middle Pleistocene, clearly, the question of the modalities used to cross the straits, resulting in the installation of groups on the Lesser Sunda islands, begs an answer. The second half and end of the Upper Pleistocene are rich in innovations which would contribute to the debate of "cultural modernity". As, for instance, the organized navigation, these innovations concern the understanding and mastery of a number of natural processes (Bellwood 2007). They enabled the colonization of new lands and a targeted exploitation of their resources, prefiguring in many cases the domestication of the environment.

Future Orientations

The practical orientations for research are modeled on the statement of the potential of sites, which has been summarized here.

The question of technical behavior and subsistence of the oldest *Homo erectus* which populated the archipelagos involves going through the same approach for formations such as the deposits of Pucangan in Sangiran as that which could have taken place within the volcano-fluviatile layers of the end of the Lower Pleistocene. The first direction to follow is certainly that of paleontology and taphonomy in order to obtain a real view of the content and the mechanisms for the deposition of the richest fossil-bearing strata.

The second perspective concerns the entire documented archaeological record from the beginning of the Middle Pleistocene to the beginning of the Holocene. The natural tendency, as a result of the small number of studies and their dispersion, is always to give a particular meaning to a determined point in space/time, especially in terms of adaptation to very local conditions. Testing the solidity of such preliminary models requires a multiplication of quasi-synchronous markers in the same region, the careful description of the

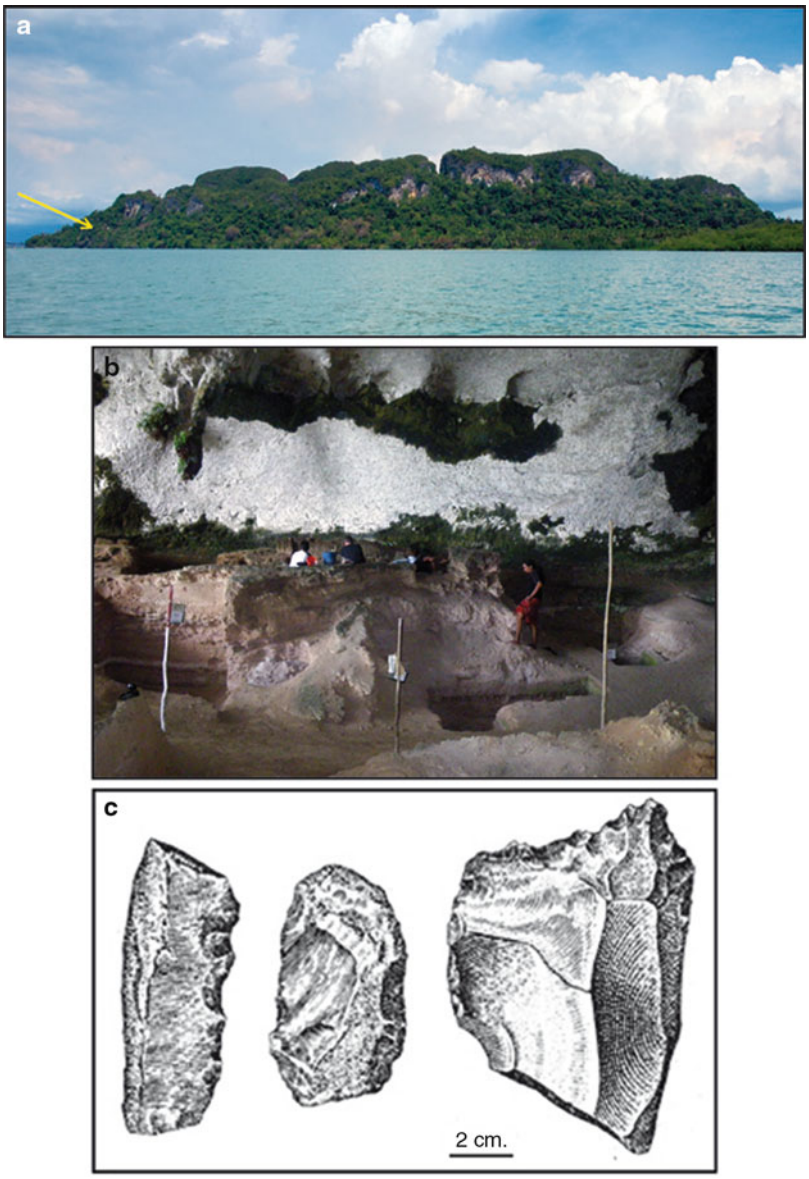

Insular Southeast Asia in the Lower Paleolithic, Fig. 8 Tabon cave (Lipuun Point, Palawan, Philippines). (**a**) Lipuun point, (**b**) excavation, (**c**) flake tools (according to Fox, 1970) (© Euzebio Dizon – National Museum of the Philippines)

differences in context between them, and an attempt to find the constants in terms of adaptation or cultural choices (Simanjuntak et al. in press).

Taking into consideration international perspectives, these future orientations must also enable, at the level of the whole region, the implementation of a common policy of conservation and interpretation, which could easily take the form of thematic nomination (and not of isolated sites) to the World Heritage List. Such an appreciation of prehistoric heritage will go beyond its scientific interest. As a true narration of entire chapters of human history, it will echo the discourse, very often ancestral, which local communities have developed in order to substantiate deep cultural roots in their territories.

Cross-References

► Acheulean Industrial Complex
► Central Asia: Paleolithic

▶ East Asia: Early *Homo* Fossil Records
▶ East Asia: Paleolithic
▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
▶ Island Southeast Asia: Neolithic
▶ Island Southeast Asia: Rock Art
▶ South Asia: Paleolithic
▶ West and Central Asia: Early *Homo* Fossil Records

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Intangible Cultural Heritage

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Introduction and Definition

In its most literal form, intangible cultural heritage (ICH) can be defined as heritage that has no material form, such as a belief system transferred through word of mouth, like a song of creation or a language without written form. However, the destruction of tangible heritage physical can have

an effect on these more ephemeral heritages (for instance, landscape cues used in the singing about the creation of the land, local mountains, and river bends) and leaves the stories more open to dispute. In such ways the intangible is directly connected to the tangible.

The emergence and relevance of ICH is linked to philosophical traditions such as those of Bourdieu, Heidegger, and Merleau-Ponty that eventually found their way into archaeology and anthropology in the twentieth century. This more holistic approach toward cultural heritage and its management grew out of the *interpretative tradition*. Specifically, the part is understood within the whole from which it originated, and the whole is understood from the part in which it finds expression (Droysen 1977: 35 in Johnson & Olsen 1992: 421). Such approaches led to questioning the unnecessary division between nature and culture. In the same way, the tangible in heritage cannot be understood without the intangible, for they are all part of the larger system of human experience which is heritage.

Key Issues/Current Debates/Future Directions/Examples

There are many useful papers tracking the history of the adoption of ICH from different angles within UNESCO (including Aikawa 2004 and Munjeri 2004) and from without (Francioni 2004; Ahmad 2006). These also discuss the different aspects of the final UNESCO convention on ICH. This entry will focus on how ICH came into the consciousness of the modern international political arena, as highlighted by these and other papers.

In 1971, UNESCO drafted its first international instrument related to ICH (document B/EC/IX/II-IGC/XR.I/15). It aimed at establishing the protection of folklore (Aikawa 2004: 138). Francioni (2004: 2–3) showed that the international legal interest in such protection actually stemmed from World War I and became more fully manifested after World War II. In 1948, the United Nations (UN) *Universal Declaration of Human Rights* upheld that "the concept of human dignity":

> includes peoples' entitlement to the respect of the cultural heritage that forms an integral part of their identity, history and civilization. Destruction or desecration of *symbolic* objects and sites that *are essential to the enactment of a people's culture* (Francioni 2004: 4; fn 7,8,9 for full referencing of this declaration).

Importantly, the above statement affirms the relevance and importance of intangible and tangible values and behaviors for humanity as a collective as well as its deconstructed cultural parts. Thus, *all* people and their cultural *behaviors* and *places* matter. Significantly, *living* aspects of culture matter, not only those that were created in the past and bestowed to us by our forebears. Such agreements have "provided the foundation for the gradual building up of a movement toward the recognition of a distinct and enhanced status of indigenous peoples" (Francioni 2004: 3).

From 1971 on, several years of debate ensued on how to protect ICH either through a separate normative instrument or via Intellectual Property Rights (Francioni 2004: 15; Aikawa 2004: 138). In 1989, the Recommendation on the Safeguarding of Traditional Culture and Folk Law was published. Unfortunately it was not binding and UNESCO and others struggled with how to define ICH, what kinds of things should/could be protected, and how to create explanations of how to protect what (Francioni 2004: 15–6; Aikawa 2004: 139–41).

From 1990 on, many other influences were brought to bear on the creation of a more holistic CHM identity and strategy. *The United Nations Convention on Biological Biodiversity* (1992) was responsible for highlighting the significance of ICH further through emphasizing the significance of traditional, indigenous knowledge and practices upon the conservation and sustained use of biodiversity. This, along with The United Nations Draft Declaration on the Rights of Indigenous Peoples, had two major effects. They were catalysts of winning support for the recognition of the ICH of indigenous peoples and highlighted the significance and relevance of

cultural diversity and the engagement of "the many" in decision making.

In the years up to 1998, as well as in the same year, intergovernment meetings were debating the notion of heritage and the limitations of seeing it as synonymous with the tangible. The *Intergovernmental Conference on the Cultural Policies for Development* (Stockholm, 30th March–2nd April, 2008, P16 Recommendation Objective 3.3) recommended that states renew "the traditional form of heritage", namely that which "must be understood as all natural and cultural elements, tangible versus intangible, which are inherited or new." This is/was seen as indigenous peoples' holistic conception of heritage.

Cultural diversity and engagement of "the many" are social forms of "plurality," the significance of which has been much debated in political/social philosophy. Plurality in these forms is now seen as a fundamental working principle for environmental health globally (biodiversity) as well as for the notion of cultural heritage (cultural diversity) and its management. In 2001, UNESCO adopted the *Universal Declaration on Cultural Diversity*. This provided strength of argument that the future of cultural heritage can only be decided by many voices and is seen as pivotal to humanity's survival and strength as a whole.

Despite these constant "reawakenings," progress was generally slow through the second half of the twentieth century. This can be seen as a result of a very fundamental social phenomenon in itself. European and other highly urbanized societies' ideologies changed in the mid-twentieth century to the mid-1980s. It was during this time that processual philosophy was strong (understanding society as a series of processes) and science and the tangible held sway. Things could not be "true" or confirmed if they were not material, so perhaps we could only be certain about material heritage. It was during the 1980s that a large number of individuals began to debate the dominance of the positivist view of the world (post-processual) and things that were physically created by people as opposed to the "natural" in CHM and archaeology.

Linked to these ideas, Munjeri points out that CH practitioners, thinkers, and the public tended to see CH as a stable and static "authentic" entity (2004: 13). Heritage was qualified and reduced to "types" where authenticity was identified only through physical qualities like its "authenticity of materials" or design. Such value judgments place these forms of heritage into the past and associate their past visible value with the current visible value.

To further understand how it took so long for these ideas to become a central UNESCO canon during these times requires a solid study of the documentation that came out of the various UNESCO and other international meetings. This is recommended for those readers who wish to understand in what ways the representatives of various countries saw and understood things differently from each other, including the importance of the protection of ICH. Many of these differences are retained today. So altogether, lack of recognition, political and philosophical wrangling and issues surrounding authenticity, slowed the progress of the understanding, adoption and use of the intangible in heritage. Regardless, the *Operational Guidelines for the Implementation of the World Heritage Convention* have progressively encompassed intangible aspects embodied in natural and cultural sites.

In the late twentieth century, works appeared that emphasized the place and importance of nature and/or critiqued those traditions that have devalued it or felt that its "form" has been misunderstood (Vogel 1996). Further, the understanding of the notion of special places as nonphysical entities (being special due to the practices that were held there), and the acknowledgement of the significance of living cultures as part of the heritage of humanity, led away from "European" ideologies of grandiose structures and concentration on the past (Munjeri 2004: 14–16). In the last 20 years, some CH specialists see ICH as enveloping the tangible or indeed that the tangible is the physical manifestation of the intangible. Others describe it as the framework within which the tangible takes shape and significance. Munjeri upholds that heritage is a tripartite whole that he calls the equilateral triangle of natural, cultural, and spiritual and that these are parts of the greater whole in which ICH is enmeshed.

In a world debating ideas like these, several countries requested UNESCO to develop a *new international normative instrument related to ICH*. In 1999, the *Global Assessment of the 1989 Recommendation* revisited the 1989 instrument and examined the efficacy of its application among Member States (MS). By 2003, the MS found enough common ground to adopt an *International Convention for the Safeguarding of the Intangible Cultural Heritage*. This document contains the current definition of ICH by UNESCO (article 2):

> The "intangible cultural heritage" means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity. For the purposes of this Convention, consideration will be given solely to such intangible cultural heritage as is compatible with existing international human rights instruments, as well as with the requirements of mutual respect among communities, groups and individuals, and of sustainable development (UNESCO 2003).

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Cross-References

► Convention for the Safeguarding of Intangible Cultural Heritage (2003)
► Tangible Heritage in Archaeology

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Intellectual Property Issues in Cultural Heritage (IPinCH) Project

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Basic Information

Description

The Intellectual Property Issues in Cultural Heritage (IPinCH) Project is an international, multidisciplinary research project examining

intellectual property (IP)-related issues that are emerging within the realm of heritage, especially those affecting Indigenous peoples (Fig. 1). These include complex and often difficult questions about who has rights to and responsibilities relating to use of and benefits from tangible and intangible cultural heritage, including artifacts, archaeological sites, and associated traditional knowledge (e.g., images, songs, stories) and values (Nicholas & Bannister 2004). To address these issues, IPinCH was designed to assist scholars, institutions, descendant communities, policymakers, and other stakeholders in negotiating equitable, appropriate, and successful research policies and practices involving cultural heritage, including archaeology. The project is also generating insights on the nature of knowledge, extending understanding of IP, and contributing to scholarly discussions of culture-based rights claims.

IPinCH is a collaboration among scholars, researchers, and Indigenous groups from across the globe. Team members from diverse fields – including anthropology, archaeology, ethics, ethnobiology, Indigenous studies, heritage management, information management, law, and museum studies – work with professional and community practitioners and policy makers from agencies and institutions operating at local, national, and international levels. A critical aspect of the project is the involvement of Indigenous partners and organizations from Canada, the United States, Australia, New Zealand, South Africa, Botswana, Japan, and Kyrgyzstan. The project is based at Simon Fraser University (Canada), with George Nicholas as project director.

The conception of IPinCH emerged from discussions in the early 2000s between archaeologist Nicholas, cultural anthropologist Julie Hollowell, and ethnobiologist Kelly Bannister, and was influenced by Michael Brown's seminal article "Can Culture Be Copyrighted" (1998) and Catherine Bell's Project for the Repatriation of First Nation Heritage in Canada (2000-2009) (Bell & Napoleon 2008; Bell & Paterson 2009), as well as by conversations with colleagues who were encountering intangible heritage-related issues in their work. A 7-year grant was awarded by the Social Sciences and Humanities Research Council of Canada to support the project from 2008 to 2015 as part of its Major Collaborative Research Initiative program.

Intellectual Property Issues in Cultural Heritage (IPinCH) Project, Fig. 1 The IPinCH Logo. "Perpetuation," was designed by lessLIE (Leslie Sam), a Coast Salish artist who works at the interface of traditional and modern values, modes of expression, and social and political inequities. The image is used with the permission of the artist who is a project affiliate

Project Organization and Research Methodology

At the core of the project is a steering committee composed of Nicholas, Hollowell, Bannister, legal scholar Catherine Bell, and archaeologists Joe Watkins and John Welch, who provide direction and oversight, assisted closely by a student representative and project staff. A grounded critical theory orientation aims for ongoing evaluation of the project's responsiveness to the varied needs of team members and partners, and to changing circumstances affecting the research environment. A project ethnographer provides feedback on communication and knowledge flows within the project to aid IPinCH in meeting its goals and setting priorities. Guidance at the broader level is provided by an international project Advisory Board. Communication and outreach tools include a project website

(www.sfu.ca/ipinch), newsletter, monthly digest, and variety of social media for sharing news within the project and with the broader public.

Three project components comprise the main mechanisms for research, analysis, and information exchange: an online KnowledgeBase; Community-based research initiatives; and thematic Working Groups:

1. The *KnowledgeBase* is an online, full-text searchable repository and archive of items related to IP issues in cultural heritage, consisting of publications, literature reviews, global case studies, research protocols, and other resources relevant to our research foci. The public can access the KnowledgeBase to conduct bibliographic searches, while team members can log on to access full records.
2. Twelve IPinCH-funded *Community-Based Initiatives* are situated within Indigenous communities around the world (Hollowell & Nicholas 2009). Each project is codeveloped with community partners who are fully involved in developing research questions, methods, and outputs, and review project data before being made public. These community-based initiatives target a wide range of issues, including developing protocols to work with ancestral remains, creating tribal IP review boards, establishing protocols for outsiders who work with culturally sensitive sites or information, integrating traditional cultural principles and ways of knowing in local management decisions and government consultations, developing means to repatriate and restore to community knowledge from materials in museum collections, and creating comanagement plans with state agencies to protect the intangible values of culturally significant places. In general, these initiatives are self-sustainable, culturally appropriate, and community-embedded projects that address the preservation and educational use of IP and cultural heritage. In a number of these projects, elders and youth are working together to collect, inventory, and preserve traditional knowledge.
3. Nine thematic *Working Groups* explore the theoretical, practical, ethical, and policy implications of IP issues in cultural heritage through research, writing initiatives, and workshops. There is necessarily some overlap between the group themes, which are as follows: (1) Bioarchaeology, Genetics, & IP; (2) Collaboration, Relationships, & Case Studies; (3) Commodification; (4) Cultural Tourism; (5) Customary, Vernacular, and Legal Forms of IP; (6) Digital Information Systems & Cultural Heritage; (7) IP & Research Ethics; (8) Sourcebook & Community Tool Kits; and (9) Guide to Community-Based Cultural Heritage Research. These groups use grounded, case-based, empirical data to inform collective analyses of theory, practice, policy, and research on IP issues in cultural heritage and to explore implications for research ethics, human rights, sovereignty, open access, and cultural commodification.

Approximately one quarter of the IPinCH project budget is committed to student support and training. Research fellowships support graduate students and postdoctoral scholars in investigating specific IP issues. Students, scholars, and others interested in these issues have the opportunity to become IPinCH Associates and participate in working groups and other project initiatives and events.

Major Impact

The IPinCH project is an unconventional academic research project that seeks a more complete understanding of the complex IP issues that increasingly affect Indigenous knowledge systems and research relationships. It offers assistance and resources to diverse stakeholders to better understand and address these concerns. The insights gained through collaborative projects developed with Indigenous partners help to catalyze new theoretical insights, policy development, and more accountable research relationships. These promote better understanding both the nature of Indigenous intellectual property and notions of heritage in which tangible/intangible "property" and nature/culture are indivisible. This research has also revealed substantial challenges in funding

community-based studies through conventional academic channels that foreground university interests, with considerable time and effort directed to implement ethics reviews and grant transfers and to ensure that community partners retain ownership of research results.

Through 2015, the IPinCH project is working toward its goals of contributing to policy and practice relating to tangible and intangible cultural heritage, building capacity for community-based heritage research in Indigenous communities, and offering real-world experience to the next generation of young scholars.

Cross-References

- ▶ Community Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Indigenous Archaeologies
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Indigenous Peoples, Working With and For
- ▶ Intangible Cultural Heritage
- ▶ Nicholas, George P.
- ▶ Stakeholders and Community Participation
- ▶ Tangible Heritage in Archaeology

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Interculturality and Archaeology

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Introduction

Interculturality results when people from different cultures come together in the same place and interact. In a perfect world, the members of diverse cultures would be able to coexist in harmony, learning new ideas and innovative ways of doing things from one another. History has demonstrated, however, that the actual circumstances of cultural contact often result in conflict and control as one culture (typically the more technologically

sophisticated) seeks to assert domination over cultures they regard as inferior. Archaeologists, especially historical archaeologists who have the advantage of working equally with excavated and textual information, have been adept at examining the details of interculturality by investigating cultural transmission and rejection in terms of moveable (e.g., ceramics, clothing) and immovable (e.g., houses, plazas) material culture.

Definition

On the most basic level, cultures are composed of individuals who share ways of doing things, general religious beliefs (such as monotheism), language (even dialects of the same language), dress, and so forth. Much culture is based on tradition, or "the way things have always been," even though cultures inevitably change through time. Interculturality occurs when groups with different cultural traditions come into direct, sustained contact. As members of distinct cultures, the various individuals can constructively interact for the betterment of all or they can come into conflict.

Constructive interculturality might be termed "positive interculturality." Regrettably, however, interculturality has been difficult to effect when one of the cultures in contact perceives itself as more powerful, wiser, or divinely unique. Significant problems can arise because of a culture's preconceived ideology of superiority. Many of the beliefs about superiority/inferiority are based on what most people refer to as "race." Anthropologists determined long ago that race does not exist as a biological fact. Rather, peoples in different genetic populations share the same physical attributes because of the complex interactions between genetics, environment, and climatic conditions. Nonetheless, people tend to believe that they perceive distinct human "races" because of the racialization process, and so the process has played a historical major role in making positive interculturality difficult to put into practice in many situations. The racialization process constitutes an element of what might be termed "negative interculturality."

Examples

The racialization process has made interculturality difficult to sustain in living populations, particularly during the nineteenth-century diasporas that took millions of immigrants to the United States. The unfair conditions the immigrants faced, however, does not mean that they did not coexist with other immigrants and learn from them despite the cultural differences between them. In this sense, positive and negative interculturality can occur side by side in any social environment in the same way that views about interculturality can exist through time as cultural tradition.

Interculturality marked the late nineteenth-century history of New York City, for example, even though the different nationalities (representing distinct cultures) often lived in their own neatly demarcated neighborhoods, worshipped in their own churches (often using native languages in their liturgies), built social organizations designed to protect the neighborhood and to promote ethnic pride, and even created gangs for the purposes of organized crime. Interculturality was constantly practiced in a multicultural place like nineteenth-century New York City. Millions of immigrants entered the city during the nineteenth century, with the largest European in-migration occurring during the last half of the century. The earliest unwilling immigrants, of course, were enslaved men and women who arrived either directly from Africa or from Africa by way of the Caribbean and who were imported as chattel. These individuals labored along the docks, served dinners in elite restaurants, and helped their masters get dressed in the morning. Archaeologists have repeatedly demonstrated the ways in which interculturality was enacted in plantation and urban settings as European American slave owners, overseers, merchants, and artisans learned from African craftspersons, midwives, healers, and cooks. At the same time, individuals of African descent and heritage adopted European languages, housing forms, and religion, even as they may have modified each custom to create new "creolized" cultural expressions that openly proclaimed new social identities. New York City experienced a huge influx of

European-born immigrants in the late nineteenth century, first principally from Ireland (as families fled the horrors and deprivation of the Great Famine of 1846–1850) and Germany (as individuals fled the oppression that followed the failed 1848 revolutions). Before the end of the century, so-called "new" immigrants arrived from southern and eastern Europe as well as from other countries that were experiencing difficult economic circumstances or tense political climates. Many people went to the United States simply to find a better way of life, even though the reality seldom fit the dream.

Throughout the nineteenth century, thousands of Chinese and Japanese immigrants also entered the western United States to find labor with mining companies or with the railroads. These immigrants initially settled in large urban centers like San Francisco but steadily moved east, eventually arriving in New York City and other eastern cities. Interculturality during mass migration was made difficult in the United States because of perceived differences between "race" (individuals of African and Asian descent had physical characteristics that were different than those of the upper-class, elite, "white" Brahmins who ruled the nation), religion (Irish, Italians, some Germans, and others professed the Roman Catholic faith rather than the Protestantism of the ruling class), and tradition (Jews, Lithuanians, and others dressed in ways that were perceived as "foreign" to the elite). During this era, elite, well-educated whites created a number of exclusionary organizations formed around the principles of limiting immigration of "foreign undesirables," denying opportunities for advancement to immigrants, and denigrating the Catholic faith. These actions were explicitly designed to implement negative interculturality on a national scale. Their efforts were successful to a point, but positive interculturality nonetheless occurred as different peoples interacted in the course of everyday life in the crowded environment of New York. New York City tenements were important physical sites of interculturality as people from diverse cultures lived tightly packed in adjacent apartments. Tenements were small, poorly ventilated, and badly built, and the residents of the various apartments were collectively forced to use a small number of outdoor privies built in the tiny backyards. Families from diverse parts of the world commonly lived in the same buildings, and given the thin nature of the walls, the members of the various cultures could experience other cultures without perhaps even realizing it. Even though some neighborhoods could be demarcated as "belonging" to Russian Jews, former Irish nationals, or southern Italians, members of each culture could reside in the same tenement. For example, writing in 1900, one person intimately knowledgeable about the conditions of New York's tenements observed that as many as 70 families could live in a single building.

An important archaeological project focused on New York's tenements was conducted in 1991–1992 by archaeologists from Historic Conservation and Interpretation, Inc. The project was designed to salvage information from the historic Five Points district of lower Manhattan on behalf of the General Services Administration who was overseeing the construction of a new federal courthouse. The archaeologists collected almost one million artifacts from the excavation. Archaeologists working with John Milner Associates, led by Rebecca Yamin, conducted the laboratory research, interpreted the materials, and prepared the seven-volume site report. Historical research conducted in conjunction with the excavation supports the contention that tenements were sites of interculturality. For example, in the one block that was the focus of the project, researchers discovered that Irish immigrants (from almost every part of Ireland), Jews from Czarist Russia and Poland, Italians, and African Americans all lived in the block's tenements during the nineteenth century. The historical records were so rich that the researchers were able to pinpoint the location of different families and even to demonstrate the great amount of transition in the buildings through the years.

Cross-References

- ▶ Ethnic Identity and Archaeology
- ▶ Holographic Epistemology: Native Common Sense

▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
▶ Local Discourses in Archaeology
▶ Multicultural Archaeology
▶ Multivocality and Archaeology
▶ Overseas Chinese Archaeology
▶ Plantation archaeology
▶ Race in Archaeology
▶ Social Identity in Historical Archaeology
▶ Social Memory in Archaeological Theory
▶ Urban Archaeology
▶ Urban Archaeology at Five Points
▶ Urban Archaeology in Twenty-First Century Perspective

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Interculturality and Political Action in Undisciplined Archaeology

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Introduction

Multivocality and Interculturality

Multivocality, as an orientation within postcolonial archaeology, is based upon several key assumptions of multicultural relativism. The call to multivocality often fails to address key underlying problematics rooted within the hegemonic epistemic framework from which archaeological practice is ethically justified as a pluralistic practice. By encouraging practitioners to embrace difference without also necessarily acknowledging the mutually constitutive relationships between frequently unequal partners, this risks producing a form of inclusion that potentially hinders both the counter-hegemonic vocality of dissident voices and political agency outside of the framework of multiculturalism. In such a way, archaeological practice risks reproducing the very privileged position multivocality attempts to undo, reproducing, in turn, epistemological suppositions about what inclusion necessarily entails. In this entry I intend to dig deeper into the character of the intercultural relationship of archaeological knowledge and disciplinary practice. Focusing upon the conditions of political action resistant to postcolonial intervention and the construction of counter-hegemonic intersubjectivities, I will discuss the mutually constitutive character of thought in the context of work in the Kolla territory of Catamarca, in the northwest of Argentina.

Key Issues/Current Debates

Social and Scientificist Archaeologies

It might seem usual that an archaeologist wonders about the sense of archaeology, particularly about its social sense. What is it useful for, the researcher asks her/himself, eager to find a way to justify her/his science, her/his practice, and her/his life, in terms of utility for the society in which she/he lives. The value of knowledge by itself, of history as teacher of life (*magistra vitae*), and of the archaeological as cultural patrimony and significant identity, the transformation of the past and/or the archaeological in the pursuit of development, or the pure and simple amusement of those who practice it and the curious interest of the public are various. And these values are independent of the reasons, senses, or utilities that archaeologists have elaborated to give their science a place in the present time, as if it did not yet well belong here as a sociocultural

artifact. Those more compromised with the present society qualify their science with some very appropriate phrases: social, socially useful, and with social commitment. In my opinion, every justification of *social archaeology* characterized by applying the science to a project of social intervention with an ostensibly altruist goal frequently recapitulates the very colonial logics it seeks to elude, because the interventions into new social contexts works to conceal and ultimately naturalize its own former social relationships. As with s*ocial archaeologies*, also *scientificist archaeologies*, justifying science as a value in itself prey on the denial of the social relationships from which they inevitably emerge, although they do not deform such denial by pretending a commitment to the society with which they were already related by hiding their structural relationships. These scientificist archaeologies produce colonial discourses which, put into projects by other archaeologies or by non-disciplinary agents, end up in joining their political practice to the already mentioned social archaeologies.

Beyond the good or bad intentions of the archaeologist, and beyond more or less explicit or active social commitments, the archaeological project carries the violence of placing in the objects, the archaeological "thing," within the space of metaphysical rupture according to which colonial subjectivity is constituted as hegemonic event in culturally heteroglossic contexts (Haber 1999). That is, archaeology reproduces its basic assumption – object and method – through which the colonial difference in the subjectivity of the archaeologist, but also of the descendants and the public, is taken to the objective world, consolidating a division between knowledge and social relationships (Haber 1999). Colonial difference (Walsh 2006), a power differentiator attendant to the difference in the nature of peoples, is placed within the nature of objects – particularly those objects that signify and mark the nature of peoples. Colonial epistemic violence originally exerted over people is transposed to the world of objects, objectified, naturalized, manipulated, and methodologically modulated.

Colonial/Modern Epistemes and Knowledge/Power

As an example, I transcribe some paragraphs from a 1904 field report by Carlos Bruch, entomologist in La Plata Museum, Argentina, detailing an 1898 archaeological expedition to Hualfín, in the province of Catamarca (Bruch 1904). This is the first text published on the archaeology of Hualfín, later to become an area of choice of Argentine archaeologists, being in time referred to as the *valle maestro* (master valley) because, due to the seriation of the sepulchers existing there, a historical-cultural sequence was elaborated that was, at its turn, the master sequence then extended to the rest of the Andean provinces in Argentina (González & Cowgill 1975).

Bruch's language is characteristic of the archaeology of the early twentieth century. For instance, descriptions abound and some expressions now considered politically incorrect are not hidden. But behind the appearances, what I find of interest in Bruch's text, as with any early text in general – written when the disciplinary habitus had not yet been institutionalized – is that they show with certain clarity the literary procedures through which objects of knowledge are incorporated into specific semantic networks, which, later, turned into a formalized disciplinary language, survive in more naturalized ways (Haber 1995). That is, in this text there is an antiquated flavor, but that is not what strikes my attention here. What is actually of critical importance, behind the anachronistic language, is the kernel of present discourse: the relationships between objects and agents that exist here are the same ones that exist between knowledge and society in current archaeology. Returning to the report of Bruch, Bruch writes:

> On the 18th January I arrived for the second time in Hualfín. The poplars and the willows, characteristic of Catamarca's towns, form there the fences of vast properties and farms extending both sides of the river; the far-off hills and the Colorado hill showing itself over the fluvial terraces as an immense fortress; everything contributes to give the arid and monotonous landscape a picturesque aspect which the traveler remembers in awe after his visit.

> And if you later look at the properties around, you soon discover the ruins and cemeteries, last vestiges of the primitive owners; remains of a numerous tribe: old Hualfines.
>
> Helped by a labourer, my guide and companion during the trip, I started excavation on the following day, the results of which I will mention in the order in which they happened.
>
> Over the small terrace on the right and next to the house of Mr. Leguizamón, there are some ruins of stone walls, next to which I observed various ovals, formed by stone lines of regular size half-buried. Assuming they could be tombs, I excavated the first and I tripped on the surface of a quantity of fragments of clay pots, mixed with rocks and the bones of a skeleton, the skull of which I found 50 cm below the surface. Then I discovered a big clay pot and next to it a well-preserved skeleton.
>
> The sepulcher was 80 cm deep and had been lightly built of a wall of oval-shaped stones marked in the surface by other stones (Fig. I).
>
> The pot (N° 1) is 60 cm tall; its surface is rough, not well polished, made of well-cooked brick-colored clay, with two small rounded and wide hands, and horizontally placed almost in the top third portion. Below the mouth there is a face represented in relief: the strips running irregularly in vertical direction are painted in black. I found an empty pot covered with a lid which must have probably been the bottom part of another very similar to this I described, that is, a *puco* or bowl (Bruch 1904).

Bruch then follows with the rest of his findings, sepulcher by sepulcher, pot by pot. As a sample perhaps this was enough. The description of what Bruch finds in the sepulchers is his way to get to know the past of Hualfín, with an old-fashioned style but a modern epistemic frame: material remains are a means to know the past: a past already gone and which can be known with the study of its "last vestiges," the remains and ruins. These remains and ruins allow Bruch to know, they are here telling him that, in the past, there stood the former populated tribe of the Hualfines, owners of the land of Hualfín. The relationship of the Hualfines with Hualfín, which Bruch enunciates as that of past inhabitation and ownership, turns out to be analogous to another such relationship, the one Bruch sees from the top of a hill, and which is signaled by the rows of poplars and willows, limits of the properties in Hualfín when Bruch conducts his field research. Two social relationships happen one after the other in time, although Bruch does not tell us how or why. A succession in time does not mean anything but the time passing; there is nothing to indicate the influence linking Bruch with the Hualfín, and there is no relationship of knowledge articulated, no matter the social relationships with the owners and between them. Let us observe the end of Bruch's text:

> In order to grasp at least a tiny graphic idea of the Quechua population inhabiting the Calchaqui regions today, a population which can be considered descendants of that civilized nation, we represent, in picture IV, two sketches which I had occasion to draw in Hualfín, in the house of Mr. Leguizamón.
>
> Number 1 is a well-developed thirteen-year-old girl. The head is pretty big and round, the hair is black and stiff, irregularly cut and extending long through the forehead, where it forms an irregular limit. No artificial deformation of either the forehead or the occiput is noticed, or of the scalp in general. The groove of the eye is small; the mongolic fold well pronounced, the lacrimal caruncle being the most part of the upper eyelid. The base of the nose is very wide, but not too low; the side wide and straight; the tip quite wide, rounded; nostrils visible from the front. The mouth and the jaw, in general, are salient; lips somewhat thick. Of the ear we can distinguish only a little, being quite disfigured by a mange eruption.
>
> Number 2 is a middle-aged man, robust and well-developed. The scalp is of interest, mainly due to it characteristic hypsicephalic shape. The forehead goes obliquely backwards; occiput quite perpendicular upwards. The narrowness of the cerebral capsule and of the whole scalp, compared to his height, is surprising. It is always interesting to observe in the living this scalp shape, which we are used to see only in the dead material. Not taking this into account, the considerable height and the pronounced narrowness are a distinctive feature of this individual's head.
>
> Going through the details, the hair is black, well developed; the forehead is very narrow and relatively high; the limit of the hair is irregularly lost.
>
> Supra-orbital arches of the frontal bone do not come out. The groove of the eyes is oblique, very narrow, thus the pupil, very deep in the orbit, is not so visible. This impression is even more pronounced in the base of the nose -which is very high- and by the very salient zygomatic arches.
>
> The nose is of medium to small proportion, the right side with a little elevation at the half.
>
> The mouth part is not salient; lips being narrow and the upper lip very well arched. Cheeks are deep-set.

> Over the upper lip there is a slight inflammation and in the middle part of the inferior lip, a small lock of hair (*mosca*); over the chin a true goat beard.
>
> The ear is totally stuck in the scalp and the antehelix comes out a little in the middle; but apart from this there are no specificities.
>
> Reserved, taciturn physiognomy" (Bruch 1904).

Almost at the end of his report, Bruch brings other objects, this time subjects-objects that, in Bruch's words, are related to the past in a different way to knowledge: they are the descendants of the former owners. Are these, then, the inheritors of Hualfín? Well, not exactly, and here is an unspoken relationship. Descendants appear in the text as objects assisting knowledge of the past "in order to give us at least a hint of what they were like" (Bruch 1904), that is, their link with Hualfín is in the order of knowledge, not in the order of society. They are not the agents who own the lands divided by the rows of trees, but the objects appearing to help us know their ancestors, the former owners. That is why they do not speak, and they do not even have a name, because Bruch's interest in them is not in what they say as agents of history, but in what they are as objects of history, a history that can be known and told by observing and describing the remains and ruins of their ancestors, as Bruch says, "the last vestiges."

Between mute descendants and ancestor-owners, there is a gap, a metaphysical rupture, which can only be mediated by knowledge or, more specifically, by a particular kind of knowledge, the study of the mute material remains. This metaphysical rupture between history and the descendants is what makes them irrelevant as agents of history or as agents of society: the land of their ancestors taken by colonial violence; they are also deprived of the word about their relationship to their ancestors, to the remains and ruins, by an epistemic violence (Spivak 1988) that Bruch, and this tradition of archaeology as a whole, institutionalized.

Knowledge of the history of Hualfín that Bruch begins is heir to a tradition that, 25 centuries before, was started by Herodotus of Halicarnassus, who established as a theoretical-methodological basis of Western historiography, a hierarchy of the sources of knowledge in which the testimony in their own language on the gaze over others prevails (Abercrombie 1998). For Herodotus, only those testimonies based on direct eyewitness were valid and would be considered, subordinating thus other sources of knowledge, such as oral memory. History was, moreover, a business run by members of the same linguistic-cultural region (also a political-military region); it had to do with war relationships between this and the barbarians that, by virtue of their linguistic and cultural difference, were the object of war rather than dialog, the peoples without language. Combining these two structures, the logical result is that the history of the war against the Persians excluded the voice, the look, and the memory of the Persians and that history inhabited a particular dwelling, "ours," that of the victorious conqueror, and from this dwelling history was written, even when it was ostensibly written as a mere knowledge relationship of the facts of the past.

Bruch relates himself to the remains and ruins in the same way as he relates with descendants: material remains and descendant remains are there, and Bruch is here to know the past through them. The fact that the remains are in Hualfín, as well as the descendants, does not affect Bruch except as a knower, that is, by taking the role of a knower he denies any other ontological or social relationship between the living and the dead (Haber 2009). It is not that Bruch should be held responsible for the colonial violence exerted over the ancestors of the descendants, but that his delimitation of the relationship in terms of a knowledge relationship, that is, not a social one, also delimits the social relationship between ancestors and descendants: between those who suffer the consequences of colonial horror that he describes as mute, reserved, and taciturn objects and those who enjoy the benefits of those same consequences, the landowning elite who hosted him in their houses, whose dividing tree rows he observes, and whose laborers posed for his photographs and excavated the sepulchers of their ancestors. This is a delimitation that archaeology naturalizes not in its theories or its thematic contents, but in its disciplinary frames:

the subject matter – the long gone past – and the method, material remains, mute, and inert matter. This marks a delimitation which excludes the social and ontological relationship existing between ancestors and descendants and which ultimately perpetuates the present consequences of colonialism.

Bruch seems safe from the machinery that builds subjectivities divided from history. I say "seems" because the sin of *hubris* is soon discovered by the inhabitants in the Olympus, who claim which all mortals should know: archaeology, even as a business aimed at knowledge, must be justified for the present society. Bruch's last phrase reveals himself trapped in the hegemonic erasure of history: "Of course there is a lot to be found out about those regions, which yet hide the richness of *our* prehistory" (Bruch op.cit., italics added).

Bruch enunciates prehistory in the first person plural, including himself in a "we" that relates then, to the past of Hualfín, in ways which, delimited or not by knowledge, are enough to define a collective "we," an agent of prehistory, unveiling thus the metaphysical character of the fracture, that is, the colonial subjective difference transposed to the objective world, because a collective of knowers – the collective of archaeologists – is not under consideration here, but of a social collective, the Argentinians, who consider themselves agents of a history they describe as object. The same as Herodotus with his methodological premises, Bruch, and archaeology after him, uses his premises in such a way that, under the pretext of knowing a past, he constitutes his own identity, his own home address: archaeology unveils the historical richness of the liberal Argentine nation that, at the same time, recapitulates European colonization and Western civilization.

What Bruch's text illustrates is the procedure by which the modern archaeological discipline incorporates and reproduces the specific place from which it develops as a discursive practice of the histories and cultures of the others; this is not just in the choice of one or another theory, one or another paradigm, but in the delimitation of its subject matter and its basic methodology. A place whose representation under universal interests of knowledge is nothing but a mystification of concrete social relationships, a cared-for blindness towards their own social and historical conditions. The fact that, from then on, archaeology is considered a purely scientific practice is nothing but the remark of this modern discipline. From this point, from that particular social and historical place of which it is blind, archaeology intends to instrumentalize itself towards intervening in the transformation of social situations, thus the activation of such discourse in a colonial project. But in order to understand the circumstances in which such a process of post-disciplinary instrumentalization of archaeology works, it is necessary to research deeper into the postcolonial context in which life's discipline gives birth to its regulation, because state and science do not discipline social relationships now so much as they modulate them (Lazzarato 2006). That which modernity had enthroned as the primary relationship with the world, that is, knowledge, is reconsidered in postcolonial moments as the pole of hegemonic normality from which science and state modulate social relationships. Life, permeated now more than ever, faces the penetrating strength of the free market.

Archaeology, in effect, functions to discipline the relationship with history and the ancient world; so long as it is posited in terms of rigorous knowledge, the metaphysical and essential break between history and its consequences has produced agents estranged from memory as well as mute, methodologically easy-to-manipulate material objects, not linked to social relationships. Agents and objects distanced from each other through a Cartesian discipline are reconnected when incorporated as agents and objects of an emergent neoliberal faith, according to which the free market replaces Christ and the reason as poles of hegemonic normality, re-magnetizing and reorienting preceding discursive and disciplinary regimes.

Archaeologies oriented to tourism development, to the production of new market goods, and to the growing market integration of farming and/or indigenous peoples, and the administrative regulation under the scheme of impact

assessments of colonial megaprojects such as those of the mining and extractive industries, proliferate nowadays in the ever expanding field of social archaeologies, a space which was formerly taken by archaeologies oriented towards spreading in society the creed of disciplinary knowledge. It is not that archaeology has stopped its tribute to the expansion of colonial borders, but it renews its services as this border rearticulates under new mechanisms directed to old goals: the land of the blood and the blood of the land.

Having reached this seeming endpoint, the question arises: over what and whom is that border growing? If upon each side of this emergent border the same denomination existed, there would not be any sense in talking about a border, about new markets or different developments. On the other side there is that which maintains more or less manageable links with the forces of the free market, that which is to a great extent dominated and contained, and that which is designated by the hegemonic place of power and science, which Bruch describes as reserved and taciturn. What knowledge is it that the reserved ones keep to themselves? From what/who are they withholding? If they are taciturn, what is the implicit message in this silence? For colonial figures such as Bruch, what could barbarians talk about, can they enter within the epistemic field, and when their speech manifests as noise? This tacit place of withholding is a discursive space marking a critical point of entry for the genealogical examination of power at work in archaeological practice.

Undisciplining Archaeology in the Puna de Atacama

From the mid-1980s, I started research in the region of Antofagasta de la Sierra, in the Puna of Atacama. Early research concentrated on understanding the ethnography of the relationships between local population (mainly adult males) and flock animals (sheep and llama), pastures, as well as vegetation and landscape. Back then my aim was to pursue ethnography as a means for archaeological interpretation, inserted into what processual archaeology understood as ethno-archaeology (Haber 2001). Only a few of the assumptions guiding this initial program remained in the wake of being confronted with local knowledge. None of the avenues for the observation of reality (e.g., economic strategies) or the enunciation of categories for the objects under research (e.g., shepherds) manifested in the conversations I had with my field teachers. Waste management, for instance, would have only been superficially and acceptably considered within the pattern of bone disposal, objects, people, and their movements seemed to obey to logics completely unrelated to the strategies and logistics I was initially determined to discover as a contribution to my discipline. All of this made me, progressively, leave aside the restrictive aspects of archaeological practice which had been imposed upon me. The discipline was not in the least prepared to listen to the people or to question disciplinary assumptions from the local perspective and/or indigenous knowledge that confronted a great deal of institutional disciplining. I was forced to academically distance myself once I began to question the assumptions then held (and still existing) on the domestication and pasturing of llama, taking into consideration instead the meaning frames provided by the Aymara and Quechua languages and by the semiosis of local practice in relating with these animals (Haber 2001).

Through the 1990s I undertook my doctoral research, in the same region but in a different area – Antofalla. I intended to examine the past by putting into play theoretical-methodological resources which would not presume an economic-liberal logic, an evolutionist linearity, or a history determined by external forces such as evolution and empires. I believe the most valuable feature of this research was to put, in a house I excavated in, the place from where to look at the world and tell the history. And history, seen and told from that house, had a very different flavor to that with which was being told at the time. The histories of that time highlighted the continuities of farming life over the succession of cultures, periods, and stages of growing complexity. From the house, the smell of food, the shovel with which ditches had been dug to water crops, and

what the talk on the neighbors was were more important than the domination of humans over animals, empires over towns, and functions over meanings. This was also, to a great extent, a disciplinary research, in that its aim was to know the remote past through its mute objects and their relationships. When I put those objects in conversation, I did it, when I could, through my dialogs with local knowledge, but I also kept within myself and took strength as interpreter and mediator, intentionally not listening to local memory techniques. This research also had the virtue of incorporating local theories to the relationships between beings in the world confronted by Western theories, but even so, I continued as a mediator between local knowledge and the archaeological. I obtained my Ph.D. with this research and then I was ready to learn.

One of the main sites of learning for me was the public hearing held in Antofagasta de la Sierra in October 2002, in which the government of the province of Catamarca put forward the project for the creation of Las Parinas National Park for the consideration of the local population. A couple of years before, the project of creating the park was being prepared, but I did not take part in it nor was I invited to do so, as I believe, because I did not clearly express myself in favor of the idea when I was consulted by the senator who promoted the initiative. Some weeks before the public hearing in Antofagasta de la Sierra, there was a meeting at the National University of Catamarca in which technicians and officials of the Secretary of the Environment of the Province of Catamarca presented the project. A group of students from Antofagasta living in the city had been invited to the meeting, and my suspicion about the project and its future grew when I could confirm that in Antofagasta no one was aware of it.

Several researchers were invited to the public hearing, including the four directors of archaeological research teams in the area where the park was to stand; some biologists, ecologists, and ornithologists; as well as officials from the National Park's Administration. In the group of technicians and academics, voices were heard clearly from those in favor of the park, to those worried about the lack of awareness on the part of the locals. Among the locals, on the other hand, there was great mistrust expressed in fears as to landownership and the possibility of the field being fenced. As I saw it, these fears were easily defused by the project creators, but the distress remained without the people being able to express it.

With two colleagues, I took part in an informal meeting held in a private house, where some of the most well-known elders in town were congregated. They said they disagreed with the project and mistrusted it: "if we are the ones who give protection, why do we have to see them come and tell as how we have to do things?" The place from where their rejection of the park emerged was the same local theory of relationality that appeared in my ongoing research. According to such a theory, appropriate relationships between beings are always reciprocal and asymmetrical and consist of a complex mixture of upbringing, respect, love, and fear, all occurring at once. Thus, ownership and love, caretaking and breeding, and agriculture and ritual are enacted as part of the same kind of appropriate relationships. Conversations evolved, comparing the local vision to the vision of the promoters of the park (which could be called a *modern* one), according to which the land is there to be known by the scientists, who determine how to manage it. This transformation that can seem obvious for an academic context, so natural as a hegemonic practice, is not as intuitive for those who are debating resistance to modernizing discourses from the other side of the colonial border. Revealing and moving as the knowledge about the local theory of upbringing of life seemed to me, in that context, putting into words academic assumptions as to their link to the environment in terms of a theory was also enlightening, because enunciating the hegemonic position can produce its detachment from its presumed site of normality (Castro-Gómez & Grossfoguel 2007). Protection and breeding (local) relationships were compared to biopolitical hegemonic (state) relationships, these being the ones that gave substance to projects centered around the production of life.

Local vocality was strongly expressed in the following public meeting: the park was rejected by the population, which adopted, apart from that,

other meaningful political gestures – such as spitting at the French ambassador who had politically promoted the National Park, because of an international touristic project involving his own company, and ultimately throwing him out of the town. It was witnessing these 2002 events that allowed me to understand the extent to which local frameworks were intimately intertwined with the reproduction of local life and the particular quality of suffering when life was at risk due to colonial projects. I also examined how politically positioned academic disciplines are, and among them archaeology, certainly functioning as a key part of the colonial arsenal. From there, I noticed the urgent need not just to deconstruct the disciplinary framework in terms of a critique of possible knowledge conditions as I had done thus far, but the need to take such a deconstructive project in the direction of my current work, a positive project of disabling the colonizing aspects of disciplinary practice and knowledge (see Haber 2009). And this is a collective task, not simply because of the quantity of people involved, but because it is a task of decolonial activation since it is collaboratively done with populations affected by colonial projects.

Where does archaeology stand in these postcolonial encounters? As I have stated so far, archaeology occupies a privileged place in the colonial arsenal. That is why it is necessary to deactivate it, in addition to locating and delimiting its work. And for archaeology, there is no better medicine than local interlocution, that is, to make archaeology have a conversation with the silenced voices over which it has been built. That is precisely what I intend to do in different fields of activity. With my students of "research design," we try to structure archaeological research as having dialogs with local contexts and voices, having the archaeologists communicate with the locals in their terrain, but firstly with their own town. In the 2006 edition of the course, I was guiding my student Daniela Fernández to begin researching methodological procedures and assumptions in the studies of archaeological impact. My guiding rationale in the context of best field practices was that by raising the quality and standards of such projects to the levels equivalent to those of the home countries of mining companies, including ethnic-relevance criteria and not just academic ones for the consideration of the affected cultural patrimony, and making impact studies easily controllable by the interested parties, then at least one of the aspects of large-scale mining could be controlled that which is concerned with cultural patrimony. Daniela then gave her vision of the issue as an inhabitant of Andalgalá, the town soon to be significantly impacted by a large-scale mining project whose 3.6 km wide open pit will be set only 20 km from the town: the sense of cultural patrimony disappears if the heirs of that patrimony disappear. Who is the archaeologist to say where our patrimony is located, Daniela asked, to say what is worth saving and what is not? Who is the archaeologist to intervene in safeguarding our patrimony in the procedure by which he gives a permit to a project, the same that will lead us to death? Why do they measure the impact over my patrimony of a project that will terminate my offspring? Archaeological patrimony and cultural patrimony are not different from the land or the community; you cannot save one of them by destroying the other. Again archaeology, construed from the local viewpoint, loses the commonsensical autonomy that justifies its modes of intervention, be it as discourse or as project, in local life. This circumstance, as Wilhelm Londoño suggests, is the starting point of an alternative definition (*pers. comm.* 2012), another way of calling what I am naming here "intercultural."

As the reading of Bruch's text informed by local conversations shows us, the discourse of cultural patrimony goes hand in hand with the denial of the patrimonial relationship between ancestors and descendants of the same land. That is why the epistemic de-linking work (Walter Mignolo and Catherine Walsh) as well as the task of distinguishing the thought not from the contents but from the terms in which Western thought is contained; I repeat, the epistemic de-linking work is just the visible tip of the iceberg. Such a de-linking exists only if it occurs in conversation with local knowledge, because they are the ones intimidating epistemic safety, shaking the basis, and questioning not just of

thought categories (the coloniality of knowledge) but the ontological place of thought (the coloniality of being). However, knowledge presupposes a de-linking from modern categories, as a leap into the void, and it is a thought located from places-other, already attached to the place, to the land. Thus, de-linking, if it occurs while listening to the Other in the field (developing social relationships) and not just interpreting the Other in an office (developing knowledge relationships), implies a relinking from a place which is not the border itself but the other side of it, the other side of the metaphysical rupture.

The archaeological-it, for example, is on the Other side something linked to local vital relationships, although by following a relationship of networks and theories completely different to the disciplinary ones. With those assumptions, my relationship to Antofalla advanced along local political strategies of presentation before the government as an indigenous community which claimed the communal property of their land. Following this, what archaeology considers its subject matter of study, and that in an intercultural dialog would lead to de-linking, is, in Catamarca's local communities, already linked to life-in-relationship; it is an integral and vital part of the territory, this last taken not only as a geographical space where a community is located but as the time-space that interacts as an agent which is sensitive, protective, powerful, and demanding of hierarchical reciprocity obligations with a collective of people.

I saw myself involved in local political strategies, neither as researcher or militant, because both roles instrumentalize the relationship, the link, following their own aims, of knowledge and ideology. This happened more due to the fact that my role of inhabitant makes me a part of these relationships, and from there my interest could be put with (i.e., composed together with) those of the community, as I am an active part of the processes. The times of these processes cannot entirely be managed by me; they are, on the contrary, as in any relationship formed by different people, very uncertain. The community has its own times and processes, many times different to mine and even opposite to my own political logic.

Can I say I have a social commitment to this community? No. What I have, or, better, what we have, are social relationships. Of mutual knowledge, of interests sometimes shared, of comradeship, mostly of friendship. I feel that friendship with actual people is what moves me, more than the objective of improving the people's life. I do, instead, feel politically committed to decolonize my own place, to decolonize myself, or subordinate, as well as subordinating relationships. In this way I understand archaeology as a political practice. I am not interested in moving my academic and intellectual resources to reach politically defined aims, but intercultural interlocution politically moves my academic and intellectual resources to the point of demanding political, cultural, and ontological positions.

Many of the relationships of the communities with the meaningful lives in their territories have suffered colonial extirpation politics. The judicial apparatus of the state, with its regulations for mining and for fauna, environment, and cultural patrimony protection, together with migratory and customs politics, establishes as a felony the relationships of Antofalla people with minerals, *vicuña*, birds and their eggs, the ancient, and the Chilean and Bolivian, recapitulating the legal and political context of Spanish dominion, when relationships with the gods and the language were also repressed. Taking all of this into account, almost everything people practice as culturally meaningful engagements with local cosmologies and landscapes necessarily enters into what the state typifies as a felony. Since the phonetic resemblance between the English language *de-linking* and the Spanish language *delinquir*, i.e., to commit an offence punished by law, I would like to play here with a possible alternative meaning of epistemic de-linking. Some years ago I met one of my peasant teachers while he was gold panning in an abandoned mine whose archaeology I was researching. Even as I was the intruder in his land, I had state permits for the excavation, while he hadn't any legal protection for the gold panning. As it is the case when someone hunts for a *vicuña* either to make an offering to *Pachamama* or Holy Mother Earth, or feed the earth, or receive the souls and feed them, or

celebrate the ancients that grant treasure, this was a situation in which de-linking implied the separation of the judicial and the disciplinary categories for the enunciation of the world, from the things as they are presented in the world which implied a crime or, at least, an active complicity in the illegal. A couple of years later, I came across Andrés (Fictitious name) and we had a conversation in which he asked me if I could tell him the truth – given the fact that I was an archaeologist and university professor – whether or not the ore vein grew at night. His question demanded from me a political, epistemic, and ontological repositioning. Being an academic and thus forced to be permanently serving the truth, I understood the enormous degree of demand the question implied. The appropriate care and feeding relationships with the ore vein to make it develop, and at the same time give origin to rights that, far from being made objects in titles, are intersubjectively constituted: the protector is the owner, that is, he loves his creature, who at the same time breeds the breeder and is, finally, his owner. Andrés was asking me about my position in relation to local theory and as to the colonial differential in that theory whose rights are subordinate, and another theory, the state and science theory, which establishes physical-chemical and property relationships, sustained in mercantile acquisition. I often remember this situation because it eloquently exemplifies the circumstance by which there is no neutral place for archaeology, and that being already constituted in the field of power, it cannot be separated from its origin without linking it at the same time to a network of meaningful relationships. These, even when local, can also be mine to the extent to which the intercultural practice has as a precondition the opening towards transformation, to inhabiting the conversation. The immense literary task of archaeology, perhaps the most politically significant of all that can be proposed, consists in narrating the departure from one's own home address of thought and writing.

And it could not be otherwise. Because undoing that which had been sustained in the denial of intersubjective communication, as in the case of archaeology, means entering the conversation, having a dialog with the objective world where the difference that constitutes colonial subjectivity had been transposed as if it were a metaphysical rupture, sooner or later, moves that subjectivity. Intercultural research consists in a conversation about biopolitical techniques for the disciplining of relationships with the gods and people, and that is why it is a conversation that moves our relationship with them. To move the home address of writing is as much an effect as an effectuation of intercultural archaeology, as much a description of the place of the thought and the practice as a political provocation of my own ignorance.

In addition to describing my place in archaeology, I could describe it as undisciplined, intercultural, and subjunctive. It is *undisciplined* of its most basic and permanent disciplinary assumptions, its objects and methods. It is undisciplined with regard to its assumptions about inert materiality and temporal linearity as the prime organizing modalities of the archaeological past. It is *intercultural* because it develops in open transformative conversation between frames of meaning and cultural assumptions, in a conversation which is in charge of the power differential historically built, a conversation as much inter as intra-subjective, because in postcolonial contexts we are all diglossic. It is *subjunctive* because it does not intend for the indicative description of an external reality, but it acts on as much internal as external a reality.

Future Directions

Now I would like to finish as I started, and for that I would have to emphasize that the description of some of my practices does not try to be a justification of my archaeology in terms of a commitment to the well-being of anyone, but nor is my field practice based in an aseptic commitment to an imagined truth of the object. If such a commitment exists, it does so with inhabitation. Inhabiting is always-already local and relational; it happens in a place and in conversation. The necessary location of

inhabitation makes it impossible for me to theorize beyond the locality of my home address, but it is in that scale that the conversation seems relevant to me. A conversation in which other times and other spaces knit their voices, they are located. Being an inhabitant, being there, bringing up the local life, all these define to a great extent my way of doing archaeology. No science can ask for a complete justification in an unfair world. I may be interested in other mythologies; they can propose versions of the world to me that originate the inside of things and give myself and my world some good and necessary subversions. At moments in which faith in the free market seems to replace faith in reason (which in time replaced faith in salvation), a return to the land feels necessary. Intercultural archaeology becomes a conversation which feeds an emergent counter-hegemonic, decolonial, and anti-capitalist sensibility. An old-fashioned conversation emerges, one outside any one normal framework, one fundamentally constitutive, a conversation with that thirteen-year-old girl and that middle-aged man whose teachings Bruch did not acknowledge in Hualfín, with their ancestors and ancient gods, those who survived protected by the shadows, buried in sands and bushes, named in silence, and fed in secret.

Cross-References

► Culture in Archaeology
► Multicultural Archaeology
► Postcolonial Archaeologies

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International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)

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Basic Information

The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM; www.iccrom.org) was established in 1959. Its creation was agreed upon at the 9th

UNESCO General Conference in New Delhi in 1956 at a time of mounting interest in the protection and preservation of cultural heritage and in the spirit of the 1954 *Hague Convention*, the first UNESCO Convention on the protection of cultural heritage in the event of armed conflict. In line with its mandate to promote the conservation of all types of cultural heritage, both movable and immovable, ICCROM has always considered archaeology as one of its most substantial fields of interest. Such a tenet is reflected in the variety of professional archaeologists who have directed the organization over the years (Cevat Erder, Nicholas Stanley-Price, Mounir Bouchenaki, and Stefano De Caro). Harold Plenderleith, a British chemist and former Keeper of the Restoration Laboratory at the British Museum, was the first Director of the "Rome Center," as it was then called. This was thanks to his heavy involvement in the conservation of important archaeological material from such sites as Tutankhamen's tomb and Ur, in addition to his scholarly publications such as his comprehensive book, *The Conservation of Antiquities and Works of Art: Treatment, Repair, and Restoration* (1957; revised with A.E.A. Werner in 1971). ICCROM's statuary functions focus on training, information, research, advocacy, and cooperation.

Major Impact

Since its inception, ICCROM has been heavily involved in training and capacity-building in the field of conservation. The active participation of Plenderleith in the International Campaign to Save the Monuments of Nubia in the early 1960s, together with eminent Italian experts such as Paolo and Laura Mora, helped lead to a fruitful collaboration between the Rome Center and Italy that resulted in the establishment of specialized courses launched in 1968 on mural paintings conservation, organized jointly with the *Istituto Centrale per il Restauro*.

Archaeology, understood in terms of ancient architecture in a central hub of the ancient world such as Rome, has also constituted an essential component of the courses on architectural conservation that have formed the core of training launched by ICCROM: the international course on Architectural Conservation (ARC) from 1965 until 1998 and the international course on the Conservation of Built Heritage, organized on biennial basis since its launch in 2007. Archaeology was also a key component of the conceptual reading of Italian and European historic cities and as a tool for their conservation. It was one of the main topics of the "Urbanological International Seminar," held in the town of Jesi, in the Italian Marche region, in 1969 (Fig. 1).

International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation), Fig. 1 ICCROM logo

Based on a proposal of the then Director of ICCROM, Bernard Feilden and Vassos Karageorghis, Director of Antiquities of Cyprus, and at that time, Vice-President of the ICCROM Council, a conference on "The Conservation on Archaeological Excavations" was organized in Cyprus in 1983. The main aims of the conference were twofold: to review responsibilities in the field of conservation, with particular reference to the 1956 UNESCO *Recommendation on International Principles Applicable to Archaeological Excavation*, and to discuss the basic principles of conservation at an excavation. Fifty-six delegates, including representatives of UNESCO, ICOM, ICOMOS, and those from the

Departments of Antiquities of many European and Near Eastern countries (Cyprus, Egypt, Greece, Israel, Italy, Jordan, Arab League (Libya), Portugal, and Spain), took part in the discussion on the principles of conservation. The proceedings of the conference include recommendations on the topic promulgated by the twelfth session of the General Assembly of ICCROM, held in Rome from 10 to 12 May 1983 (Stanley-Price 1984). The Conference of 1983 laid the foundation for a series of initiatives that have developed over time, addressing specific issues related to the conservation of archaeological heritage.

Regarding mosaics, the international course on the Safeguarding of Archaeological Mosaics (ICCROM, Rome, 18 September–13 October 1989) is a forerunner of a program that was later developed during a forum on "Conservation of archaeological sites. Techniques, strategies and tools: the case of mosaics" (ICCROM, Rome, 30 November 1992). The theme was taken up again in 2007, when the first planning meetings for the MOSAIKON program were carried out by ICCROM, in collaboration with the Getty Conservation Institute (GCI) and the International Committee for the Conservation of Mosaics (ICCM).

In parallel, as part of its activities at the regional level, ICCROM has been developing integrated programs for managing sites of cultural interest, involving specialized training and broader capacity building. In November 1997, as a result of the collaboration on PAT96 (the first Pan-American Course on the Conservation and Management of Earthen Architectural and Archaeological Heritage), the International Centre for Earth Construction – School of Architecture of Grenoble (CRATerre-EAG), the GCI, and ICCROM established the collaborative initiative, named Project Terra. It was under the auspices of Project Terra and in partnership with the INC-LL (*Instituto Nacional de Cultura-La Libertad* (INC-LL), a regional agency of the *Instituto Nacional de Cultura del Peru*) that the *Segundo Curso Panamericano sobre la Conservación y el Manejo del Patrimonio Arquitectónico Histórico-Arqueológico de Tierra*, PAT99, was hosted in Trujillo, Peru, in late 1999.

The ATHAR program on the conservation of archaeological heritage in the Arab Region (initially in Syria, Lebanon, and Jordan) was launched through a coordination/planning meeting on "Education and Curricula Design in the Field of Heritage Site Conservation," held in Beirut, Lebanon, from 16 to 17 September 2004. The program has since expanded to other countries and has recently established a Regional Centre for the Management and Conservation of Cultural Heritage in the Arab States and based in the Emirate of Sharjah. For the establishment of the ATHAR Centre, an Agreement of Implementation was signed between the Government of Sharjah, UAE, and ICCROM on 11 September 2011.

In the same period, a series of training initiatives were launched in Southeast Europe, starting with an introductory course in Archaeological Conservation, held in Belgrade, Serbia and Montenegro, from 4 to 6 December 2004. This pilot initiative was followed by a series of regional courses on Archaeological Conservation in Southeast Europe, held in Serbia and Montenegro (2006) and in Albania (2007).

In Asia, ICCROM contributed to the "Training Course on Preservation and Restoration of Cultural Heritage in the Asia-Pacific Region – Archaeological Research Methodology and Analytical Methods of Ancient Remains." The course, held in Nara, Japan, from 23 October to 3 November 2004 was jointly organized by the Asia-Pacific Cultural Center for UNESCO (ACCU), ICCROM, and the National Research Institute for Cultural Properties in Japan. In April 2006, ICCROM contributed to the International Conference on "From Concept of the Past to Practical Strategies: The Teaching of Archaeological Files Techniques," held at Beijing University, China. The following training activities subsequently took place in the region: "Training Course on Cultural Heritage Protection in the Asia-Pacific Region – Research, Analysis and Preservation of Archaeological Sites and Remains," organized by ACCU in collaboration with ICCROM and held from

9 Sept to 9 Oct 2008 in Nara, Japan; the CollAsia 2010 International Course on "Conservation of Underwater Archaeological Collections," Manila and Subic Bay, Philippines, 7–25 September 2009; and the "Training Course on Cultural Heritage Protection in the Asia-Pacific Region – Research, Analysis and Preservation of Archaeological Sites and Remains," Nara, Japan, 7–10 September 2010.

In the Mediterranean, ICCROM activities pertaining to archaeology and conservation have involved numerous initiatives. These include technical missions, such as that to aid in the evaluation of conservation tests at the Archaeological Park of Foz Côa, in Portugal, 15–19 May 2006; the 18th Conference on Archaeology and Cultural Heritage in the Arab Region, held by ALECSO from 19 to 21 November 2007 (this included a special session on training in the conservation of World Heritage sites in the Arab Region organized by the ATHAR program and collaboration between ICCROM, ALECSO, and the World Heritage Centre); the Fifth International Conference on Science and Technology in Archaeology and Conservation in Baeza, Spain, 8–10 July 2007; a Seminar on Archaeological Site Management organized by the Aristotle University, Thessaloniki, Greece, from 1 to 3 February 2008; the Sixth International Conference on Science and Technology in Archaeology and Conservation in Rome, Italy, on 9 December 2008; a seminar on archaeology and education, "Creating Links of the Past to the Future: Cultural Heritage and Civil Society," in Barcelona, Spain, 31 March–1 April 2011; and the ICOMOS Hellenic and ICAHM Regional Conference on "The Future of Protection Heritage Management for Archaeological Heritage in Times of Economic Crisis," held in Athens, Greece, 23–25 May 2012.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Heritage Conservation Training
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Museums)
- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Jokilehto, Jukka

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International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Museums)

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Basic Information

The decision to found the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) was made at the 9th UNESCO General Conference in New Delhi

in 1956, at a time of mounting interest in the protection and preservation of cultural heritage. ICCROM was subsequently established in Rome in 1959 at the invitation of the Government of Italy. It is the only institution of its kind with a worldwide mandate to promote the conservation of all types of cultural heritage, both movable and immovable. ICCROM aims at improving the quality of conservation practice as well as raising awareness about the importance of preserving cultural heritage. It contributes to preserving cultural heritage through five main areas of activity: training, information, research, cooperation, and advocacy.

ICCROM is an intergovernmental organization (IGO), existing to serve the international community as represented by its member states. Its intergovernmental status and constantly updated network of specialized conservation institutions and experts enable it to collaborate closely with organizations such as UNESCO and its World Heritage Committee, to which it is an advisory body. It is governed by a General Assembly consisting of delegates from all its member states, now numbering 129. The GA determines the general policies of ICCROM; it approves its biennial program of activities and budget, elects the council members, and appoints the director general. Other functions include approving reports on council and secretariat activities, determining member state contributions, adopting ICCROM's financial regulations, and approving changes to the statutes. The general assembly meets in ordinary session every 2 years.

The ICCROM Council has 25 members elected by the General Assembly. The members of council are chosen from among the best-qualified experts in the field of conservation and restoration of cultural property, taking into consideration the desirability of achieving equitable representation of the major cultural regions of the world and an appropriate coverage of the different fields of specialization relevant to the work of ICCROM. The secretariat of ICCROM consists of the director general and staff. The director general is responsible for the execution of the approved program of activities.

Major Impact

ICCROM has always devoted particular attention to interdisciplinary collaboration in conservation, involving scientists, conservators, restorers, archaeologists, art historians, curators, architects, engineers, city planners, and other allied professions. Exploring conservation issues in research meetings and seminars has led to publications, guidelines, and international training programs. The Center has established an international library and documentation center, which has become an indispensable resource of reference for research and training.

Regular Rome-based activities have increasingly been complemented by long-term international and regional programs. Together, these form a worldwide platform, combining technical cooperation with research, training, provision of information, exchanges of personnel, and raising awareness about heritage conservation. The development of long-term programs in collaboration with several partner organizations has increasingly emphasized the sustainable management of heritage resources and the strengthening of institutions in member states to this end. New Strategic Directions were adopted in 2010 and the Center will be moving to new up-graded premises in 2013. Further information is available on the website www.iccrom.org.

Cross-References

► International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)

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International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)

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Basic Information

The International Scientific Committee on Archaeological Heritage Management (ICAHM; http://www.icomos.org/icahm/) was established in 1990 by means of the ICAHM charter. This charter is the only international document that deals exclusively with archaeology, save the UNESCO *Recommendation on International Principles Applicable to Archaeological Excavation* of 1956 (New Delhi). The ICAHM charter is binding for the professional members of ICOMOS. The New Delhi recommendation, on the other hand, is to be honored by all state parties of UNESCO and grew out of the *Cairo Act* of 1937 of the League of Nations and earlier recommendations of the League of Nations Assembly of 1932.

In 1985, the Nordic countries convened an organizational meeting in Stockholm to prepare a draft charter for archaeological heritage management. The first draft was presented to the ICOMOS membership in 1987 at the 8th General Assembly in Washington, D.C. In 1990, at the 9th General Assembly in Lausanne, ICOMOS accepted ICAHM's 1990 ICOMOS Charter for the Protection and Management of the Archaeological Heritage, which not only defined for the first time the aims and the role of archaeological heritage management internationally but made ICAHM one of the ICOMOS scientific committees. The charter stressed the integration of archaeological programs and planning, the creation of inventories, the importance of in situ preservation, and, when this is not possible, the responsibility of developers to ensure that proper archaeological investigations take place. Its influence is seen in the 1997 Code of Practice of the European Association of Archaeologists and in the 1992 European Convention on the Protection of the Archaeological Heritage (the Malta Convention) from 1992.

Of the almost 1,000 sites on the World Heritage List, approximately 80 % are inscribed because of cultural values. Many of these (e.g., Petra, Machu Picchu, Pompeii, Angkor) are explicitly seen as archaeological sites, but all contain valuable archaeological components. In every historic city, there is a "city beneath the city," an archaeological trove. Further, many sites inscribed on the World Heritage List due to their outstanding natural resources also contain archaeological sites. Therefore, ICAHM has become perhaps the most active of the scientific committees.

Major Impact

ICAHM is primarily concerned with the implementation of Article 5 of the World Heritage Convention in regard to archaeological sites. Article 5 charges each signatory to the Convention to develop the capacity to manage, conserve, and preserve natural and cultural resources within state boundaries. ICAHM has focused on the following:

- To establish, promulgate, and encourage adherence to high standards and best practices for (a) management of archaeological sites and resources, (b) archaeological research, and (c) aspects of cultural resource management
- To develop and enhance a network of professional archaeologists and archaeological site managers for the purpose of transmitting theoretical and practical skills and encouraging high standards and best practices for (a) management of archaeological sites and

resources, (b) archaeological research, and (c) aspects of cultural resource management
- To organize conferences and workshops, to produce publications, websites, and other mechanisms utilizing a variety of media to promulgate high standards and best practices for (a) management of archaeological sites and resources, (b) archaeological research, and (c) aspects of cultural resource management
- To provide the best qualified ICAHM Expert Members for desk audits and site visits to archaeological sites that have been nominated for inscription on the World Heritage List
- To provide the best qualified ICAHM Expert Members for monitoring of condition of archaeological sites that are inscribed on the World Heritage List
- To encourage the nomination of appropriate archaeological sites to the World Heritage List and to assist in nominations by contributing to comparative studies, giving advice about the preparation of nomination dossiers, management plans, or other relevant steps

In 2008, with the adoption of the Eger-Xi'an Principles, the role assigned to scientific committees in the work of ICOMOS was enlarged substantially. In response, ICAHM has greatly expanded membership, reinstituted international symposia, and has begun a publication series in collaboration with Springer Press, entitled *Multidisciplinary Studies in Archaeological Heritage Management*.

Before 2008, ICAHM had held two international symposia. The first was held in Stockholm from 12 to 16 December 1988, titled *Archaeology and Society: Large Scale Rescue Operations—Their Possibilities and Problems*. Edited by Gustaf Trotzig and Gunnel Vahlne, the papers were published in 1989 by the Nordic Secretariat of ICAHM. The second ICAHM symposium, *Archaeological Remains: In Situ Preservation*, was held in Montreal from 11 to 15 October 1994. The papers were edited by Claire Mousseau and published in 1996 with support from the Ville de Montréal, Canadian Heritage, Hydro-Québec, and the Government of Québec.

In December of 2011, ICAHM held an international symposium in conjunction with the ICOMOS General Assembly Meeting in Paris, entitled *The Archaeology of Interdependence*. The papers are being published in the ICAHM publication series under that title. ICAHM sponsored the First International Conference on Best Practices in the Management of Archaeological World Heritage Sites in Menorca, Spain, in April of 2012. Selected papers from that conference are in press. The conference also produced the Menorca Statement, which promulgates ICAHM's intent to develop best practices for the management of archaeological sites and to refer to these when reviewing nominations of archaeological sites to the World Heritage List. The Statement also suggests that nomination dossiers include a plan, timetable, and estimated cost for developing adequate management capacity if this capacity is not fully in evidence. The nomination can then be used to generate necessary support for capacity building from a wide range of institutions beyond UNESCO.

Much of the concern about inadequate management capacity stems from damage at archaeological World Heritage Sites that results from a lack of visitor flow management and rapid site development. The first of four ICAHM Springer publications dealing with this was released in 2012, entitled *Tourism and Archaeological Heritage Management at Petra: Driver to Development or Destruction?* The subsequent three will examine this issue at Angkor, Machu Picchu, and Pompeii.

Mapping Archaeological Landscapes From Space: In Observance of the 40th Anniversary of the World Heritage Convention was published in the ICAHM/Springer series in 2013. ICAHM seeks to encourage nondestructive archaeological research methods and will nurture development and application of such technologies. It has cosponsored several training courses and workshops on these technologies in collaboration with NASA at the University of California, Berkeley; Johns Hopkins University; and Pontifical Catholic University of Peru, in Lima.

ICAHM has been vocal on many issues since 2008 by means of press releases and letters to

International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation), Fig. 1 ICAHM logo

concerned parties. Among these are the looting of archaeological sites; the production of popular television shows that celebrate looting, such as the Spike TV series *American Diggers* and National Geographic series *Diggers*, enforcing international agreements that forbid or discourage the trade in looted artifacts; and the need to provide benefit to communities near archaeological sites as opposed to international hotel and restaurant chains.

Providing assistance to States Parties nominating or wishing to nominate archaeological sites to the World Heritage List is an important ICAHM program. ICAHM has provided assistance to specific sites, such as Poverty Point in the United States and the Jomon sites in Japan, and has begun an Africa Initiative that will work with States Parties in Africa to identify candidates for inscription.

ICAHM held an international conference in Cuzco, Peru, 27–30 November 2012, with the theme: *The UNESCO World Heritage Convention on its 40th Anniversary*. Over 100 papers were presented, and selected papers will be published in several volumes of the ICAHM Springer series (Fig. 1).

Cross-References

- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

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International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)

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Basic Information

ICAHM is an International Scientific Committee (ISC) of ICOMOS. It was founded in 1987 at the 8th ICOMOS General Assembly in Washington, DC. The idea to develop such a body took a decade to bear fruit and was advanced by the UK's Henry Cleere and Sweden's Margareta Björnstad in particular. After ICAHM was established, key members drafted the *Charter for the Protection and Management of the Archaeological Heritage*, which was ratified in 1990 by the ninth ICOMOS General Assembly in Lausanne, Switzerland. Until 2008, the activities and membership of ICAHM were highly restricted by ICOMOS rules, as they were for all ISCs. In 2008, ICOMOS adopted the Eger-Xi'an principles for the International Scientific Committees. These principles dramatically freed up both membership eligibility and the range of

activities the ISCs could pursue. ICAHM now has well over 200 members and is involved in initiatives in many parts of the world.

Major Impact

ICAHM was established to assist ICOMOS in advising the UNESCO World Heritage Committee on the management of archaeological heritage. This involves providing input to World Heritage Committee discussions concerning the inscription of archaeological resources on the World Heritage List, monitoring the physical condition of listed archaeological heritage and identifying listed properties that are in danger of being delisted because their condition has been allowed to deteriorate beyond acceptable limits. ICAHM's mandate also includes improving the management of all archaeological resources around the globe, whether or not they are World Heritage sites or even potentially eligible for listing. This is because the World Heritage Convention requires its signatories to help preserve the world's cultural and natural heritage, not just the sample of places that is on the World Heritage List.

ICAHM is especially concerned with the quality of work in archaeological heritage management in large projects in developing countries. For that reason, the committee not only continues to help develop standards and best practices but also discusses with various professional groups around the world ways in which professionalism can be advanced. On that basis, ICAHM collaborates with an array of international, regional, national, and local organizations that pursue related goals. ICAHM is unique among them in its focus on the development and propagation of effective and efficient *international* archaeological resource management standards and practices.

ICAHM's formal mandate covers three areas of activity: the management of archaeological sites and resources, archaeological research, and aspects of cultural resource management. In these three connections, the committee's functions are to:

- Establish, promulgate, and encourage adherence to high standards and best practices
- Develop and enhance a network of professional archaeologists and archaeological site managers for the purpose of transmitting theoretical and practical skills and encouraging high standards and best practices
- Organize conferences and workshops, to produce publications, websites, and other mechanisms utilizing a variety of media to promulgate high standards and best practices
- Provide the best qualified ICAHM Expert Members for desk audits and site visits to archaeological sites that have been nominated for inscription on the World Heritage List
- Provide the best qualified ICAHM Expert Members for monitoring of condition of archaeological sites that are inscribed on the World Heritage List
- Encourage the nomination of appropriate archaeological sites to the World Heritage List
- Assist in nominations by contributing to comparative studies, giving advice about the preparation of nomination dossiers, management plans, or other relevant steps

There are four categories of membership. Experts include members selected by each national ICOMOS committee, who are voting members, as well as members of ICOMOS who have shown to the satisfaction of the ICAHM Executive Committee that they are competent in archaeological heritage management with a reasonable degree of professional experience, sufficient educational training, and, most importantly, a willingness to participate in ICAHM activities. Associates are members of ICOMOS who wish to build up their interest and expertise in the field of archaeological heritage management through participation in ICAHM activities. Institutional members are sought by the executive committee on a case-by-case basis. Affiliates are not members of ICOMOS but, in keeping with the Eger-Xi'an principles, are able to satisfy the executive committee that they would otherwise qualify as either an expert or associate. As encouraged by ICOMOS, the ICAHM executive is also creating a network of individual and institutional corresponding members who are

engaged in relevant but not directly heritage-related activities.

ICAHM's *raison d'etre* is to advance heritage management in general by promoting *archaeological* heritage management in particular. This is an important role in a world often dominated by the interests of architecture and art history.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Cleere, Henry
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

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International Committee on the Underwater Cultural Heritage (ICUCH)

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Basic Information

The International Committee on the Underwater Cultural Heritage ICUCH (http://icuch.icomos.org/) is the committee of the International Council on Monuments and Sites (ICOMOS) that addresses issues relating to the (international) protection and management of underwater cultural heritage. As such it is both an ICOMOS International Scientific Committee and ICOMOS's taskforce for the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001). ICUCH has a global membership of professionals and has the mission to assist UNESCO in promoting the protection and sound ethical management of underwater cultural heritage. It focuses on international cooperation, legislative issues, and quality standards for interventions and training and closely cooperates with regional and topical NGOs in raising public awareness and counteracting the detrimental PR and activities of the treasure-hunting industry.

Major Impact

ICUCH was established in 1991 with the specific purpose of defining minimum standards to which future dealings with the world's underwater cultural heritage should answer. There was a need for these as the underwater world was rapidly opened up and explored, which led to many activities that would not befit archaeology or heritage management on land (Henderson 1993). Legal disputes had arisen and although lawyers had addressed some of the issues and their possible solutions in organizations such as the International Law Association (ILA), they could not refer to a doctrinal text that could be supported by archaeologists and heritage professionals worldwide. Graeme Henderson, director of the Western Australian Maritime Museum, was commissioned by ICOMOS to find and invite the first 18 ICUCH members from 18 different countries around the world and agree their membership with their respective national committees. The working group thus formed prepared the text that was adopted at the eleventh General Assembly of ICOMOS in Sofia, Bulgaria in 1996 as the Charter for the Protection and Management of the Underwater Cultural Heritage.

Since then, the Charter has had great impact. In 1997, UNESCO's General Conference decided that an international convention should be elaborated, which, after complicated negotiations to which ICUCH assisted on ICOMOS'

behalf, led to the adoption of the Convention on the Protection of the Underwater Cultural Heritage in 2001. The principles of the Charter have been incorporated in the Convention. The Convention entered into force in 2009.

In the meantime, the original group of 18 had been refreshed through elections and extended to 24. In 2009, ICUCH saw a major restructuring. New statutes were adopted and a wider membership is presently envisaged. Nevertheless, ICUCH membership is not as open to all ICOMOS members as membership to other ICOMOS International Scientific Committees. The reason for this is as unfortunate as it is real: People with connections to treasure hunting in maritime archaeology aspire to enhance their credibility by membership of a committee such as ICUCH and as such, membership must be controlled. An intricate ballot system is therefore in place which among other things requires public and recognized adherence to the 1996 Charter, which implies standing free from involvement in or promotion of funding of activities through the sale of artifacts. Decisions on membership are made by the Bureau. Another issue is regional representation. It is the basis for ICUCH's credibility as a global organization and is therefore considered important. The Bureau has nine members, with the proviso that these include at least one member from each of the five UNESCO regions. Three of the nine bureau posts are up for election every year. As the number of well-qualified professionals in underwater archaeology and heritage management is still limited, some regional distortion in the general membership nevertheless occurs. Of the 49 members in mid-2012, only five represent Africa and four are from the region of Arab States, against 10 from Asia and the Pacific Region, 20 from Europe and North America, and 10 from Latin America and the Caribbean. The priority in accepting new members lies with underrepresented regions and non-represented states, especially states that have ratified the 2001 Convention.

ICUCH is a formal advisor to the Scientific and Technical Advisory Body of the Meeting of States Parties of the 2001 Convention and assists the UNESCO secretariat in regional meetings and in training programs. The establishment of curricula and handbooks and operating as a clearinghouse for information and quality control is a role it can play thanks to close cooperation with topical and regional organizations such as the International Congress of Maritime Museums (ICMM), the Nautical Archaeology Society (NAS), the Advisory Council on Underwater Archaeology (ACUA), the Society for Historical Archaeology (SHA), the Australasian Institute for Maritime Archaeology (AIMA), the UK-based Joint Nautical Archaeology Policy Committee (JNAPC), and many others.

Recent publications for which ICUCH's input has been crucial are a Training Manual for the UNESCO Foundation Course on the Protection and Management of Underwater Cultural Heritage in Asia and the Pacific (Manders & Underwood 2012) and a Manual on the Operational Rules in the Annex of the 2001 Convention (Maarleveld et al. 2012).

Cross-References

- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
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International Conventions and Charters and Archaeology Presentation

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Introduction

Public Interpretation and Presentation as Important Mechanisms and Facilitators of Conservation and Protection

Beginning in the 1930s, and accelerating as the expanding concepts of heritage and heritage conservation progressed into the late twentieth century, an evolving list of international documents, conventions, and charters has led to more recent discussions and debates about resource significance. Concerns for relevancy, community engagement, and inclusion led to calls for the promulgation of principles of interpretation and presentation. Today, effective interpretation is described in terms of creating opportunities for people to form tangible/intangible links to resource meanings, values, and attributes of authenticity. Going beyond a recitation of facts, modern interpretation and presentation programs seek to connect resource meanings to audience experiences, demonstrate relevancy, and promote public stewardship.

As a specialty within the sphere of public archaeology and cultural heritage management, the public interpretation of archaeological and cultural sites has become an essential component in the conservation and protection of cultural heritage values and sites. Beginning in the 1960s and 1970s in the United States, and developing later in other parts of the world, legal frameworks emerged to identify and protect cultural heritage assets. The resultant rapid accumulations of archaeological and historical site information and artifact assemblages led to heightened public and professional awareness and concern for protection and preservation. In the face of an increasing public interest and demand for information, archaeologists and their cultural heritage colleagues began to more actively collaborate to devise the effective strategies for public presentation and interpretation. Until the 1990s, publications on public presentation and interpretation strategies and standards were rare and largely obscured in isolated accounts and academic gray literature.

By the latter part of the twentieth century, many archaeologists were addressing the contemporary context of their research as part of a growing practical and ethical awareness. The 1990s saw the emergence of greater energy and funding devoted to the public interface of archaeology as the professional community realized that intellectual introversion was no longer acceptable and that more attention should be paid to the mechanisms, programs, and standards of public interpretation and presentation. Inspired by visionaries such as Freeman Tilden (1957), interpretation practitioners increasingly rejected programs and presentations that did not attempt to go beyond a recitation of

facts. Only programs that facilitated and provoked emotional and intellectual connections of the audience to meanings inherent in the resource were deemed acceptable (Jameson and Baugher 2007).

By the early twenty-first century, the mechanisms and processes of public interpretation had reached a heightened level of sophistication and effectiveness. In North America, the U.S. National Park Service (NPS) and the National Association of Interpretation (NAI) took the lead in standards development. NPS, through its Interpretive Development Program (IDP), promulgated a multifaceted, delivery-mode specific, employee training program (Jameson 1997; Jameson 2007). NAI, a nongovernmental and nonprofit, independent organization, provides a number of training and certification opportunities and is a major advocacy group for standards development among both government and nongovernment organizations and agencies. The NAI annual Interpreters Workshop and International Conference are major conference events among professional interpreters.

The evolving philosophies of NPS, NAI, and similar advocacy groups have emphasized that, at historic sites, monuments, and parks, the process of effective interpretation allows each visitor to find an opportunity to personally connect with a resource or place. Each individual may connect to the place in a different way, and some may not connect immediately, but everyone should have an opportunity to explore how that special site or place is meaningful to him or her. The goal of interpretation, then, is to increase each visitor's enjoyment and understanding of the site, monument, or park, and to allow visitors to care about the parks on their own terms. Many have argued that such personal connections are crucial in gaining public support for conservation.

In the international arena, leading organizations have emerged that are carrying the banner of interpretation principles for access, inclusion, and respect for multiple points of view. The NAI International Conference, held annually in different parts of the world, promotes international partnerships and instigation of interpretative facilities to enhance tourism experiences, benefit local economies, and sustain sensitive interpretation of heritage resources. Interpret Europe, an independent organization established in 2010, espouses similar best practice principles in making interpretive programs locally relevant and sensitive to differences of culture, age, and gender, and in organizing complex networks and maintaining a database of best practices (Interpret Europe 2011). National organizations such as Interpretation Australia have been leaders in establishing communication networks and online access to information on best practices guidelines and case studies.

The International Council on Monuments and Sites (ICOMOS) is a global nongovernmental organization associated with UNESCO. Its creation in 1965 is the logical outcome of the first interviews that architects, historians, and international experts began early in the twentieth century and that materialized in the adoption of the Charter of Venice in 1964. Its mission is to promote the conservation, protection, use, and enhancement of cultural heritage monuments, building complexes, and sites. Through numerous charters, studies, conferences, symposia, and discussions since 1965, ICOMOS has gradually evolved a more holistic philosophy of cultural heritage protection and interpretation. ICOMOS expert members participate in the development of doctrine, evolution and distribution of ideas, and advocacy. As the Advisory Body of the World Heritage Committee for the implementation of the World Heritage Convention of UNESCO, ICOMOS reviews nominations for World Heritage Site status and ensures the conservation status of properties. Through its national committees and international scientific committees (ISCs), ICOMOS provides leadership and example for best practice in cultural heritage conservation and presentation (ICOMOS 2011).

Definition

Terminology and Categories of International Documents

For the uninitiated, and even for the more experienced, the vast labyrinth of international

heritage conservation documents can be daunting to comprehend. In an attempt to provide clarity of terminology, some definitions and explanations are warranted.

Created within sources of legal authority, "conventions" and "recommendations" derive from intergovernmental organizations such as UNESCO, the Council of Europe, and other governmental and international agencies. Once conventions are signed and ratified, they are binding for the member states. "Recommendations," though not binding in terms of force of law, can nevertheless represent highly recommended management guidelines of public authorities and other stakeholders. "Conventions" and "recommendations" are invariably subjected to meticulous preparations and comprehensive consultations between states to ensure the widest possible consensus (Luxen 2004).

"Charters," "principles," and "codes of ethics," on the other hand, represent moral rather than legal authority. These documents commonly establish principles, definitions, and codes of conduct that professionals and specialists set for themselves as guidelines for best practice. This self-regulatory, collective approach provides flexibility and adaptability to change. To acquire strong moral credibility, these norms need to be the outcome of very broad consultations involving as many professionals as possible from all regions of the world.

An inducing relationship has sometimes developed between charters and conventions and other documents of varying origins and scopes. Commonly, later documents and charters have built on, expanded, and been inspired by earlier documents of related themes. For example, the ICOMOS Venice Charter (1964) codified internationally accepted standards of conservation, and precipitated, with expanded definitions of concepts such as "heritage" and "authenticity," the UNESCO World Heritage Convention (1972) and the ICOMOS NARA Document on Authenticity (1994). Another example is the ICOMOS Charter on Underwater Cultural Heritage (1996) that precipitated UNESCO's Convention on the Protection of Underwater Cultural Heritage (2001).

All of these categories of documents form a considerable corpus of norms that complement national and regional legislative mandates in each country.

Key Issues/Current Debates/Future Directions/Examples

History of International Conventions and Charters Related to Archaeological Heritage Conservation

To understand the advance of archaeological heritage interpretation and presentation standards and guidelines, it is useful to review the historical development of documents and philosophies that reflect incrementally expanding concepts and definitions of cultural and archaeological heritage, its components, meanings, and attributed values (Getty Conservation Institute 2009).

Historically, beginning in the nineteenth century, there are a great number of international conventions, charters, policies, and recommendation documents that have addressed the treatment and protection of archaeological objects and information. The Principals of the Society for the Protection of Ancient Buildings as Set Forth upon its Foundation (The SPAB Manifesto) of 1877 championed preservation of original fabric versus poorly conceived restorations. The Recommendations of the Madrid Conference (1904) emphasize the importance of minimal intervention in dealing with ruined structures and of finding a functional use for historic buildings, or adaptive reuse in modern parlance. Both of these documents addressed preservation of architectural remains.

The Charter of Athens (1933), significant in that it advanced concepts that are today referenced as elements of "intangible heritage," promoted the preservation of urban architectural heritage and defined the built heritage as possessing spiritual, cultural, and economic values.

The Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954) echoed international sentiments following World War II to prevent theft and vandalism

of cultural institutions and property (not just buildings) during armed conflicts. It established an "International Register of Cultural Property under Special Protection." The UNESCO "Recommendation on International Principles Applicable to Archaeological Excavation" (1956) called for states to create a licensing or monitoring authority to document activities and finds. Significantly for this discussion of the development of presentation and interpretation guidelines, it also called for states to undertake educational efforts to promote respect for remains of the past.

The ICOMOS Venice Charter, "International Charter for the Conservation and Restoration of Monuments and Sites" (1964), is important in that it codifies internationally accepted standards of conservation practice relating to architecture and sites. It sets forth principles of conservation based on the concept of authenticity and the importance of maintaining the historical and physical context of a site or building. The Venice Charter states that monuments are to be conserved not only as works of art but also as historical evidence. It also sets down the principles of preservation, which relate to restoration of buildings with work from different periods. The Venice Charter, together with the UNESCO World Heritage Convention of 1972, continues to be a crucially influential international conservation document.

Council of Europe's "European Convention on the Protection of the Archaeological Heritage" (1969) calls for the application of scientific methods to archaeological research and an end to illegal excavations as two important principles for safeguarding archaeological heritage. It makes a number of recommendations, including the creation of "reserve zones" for preservation of evidence to be excavated at a later time, preparation of inventories of publicly and privately held archaeological objects, and exchange of these materials where possible for scientific and educational purposes (Council of Europe 2012).

The UNESCO "Convention Concerning the Protection of the World Cultural and Natural Heritage" (World Heritage Convention), adopted in 1972, promotes an international perspective on cultural heritage by inviting member states to submit an inventory of properties forming its national cultural and natural heritage to be included in a list of World Heritage sites. The convention encourages national efforts at protecting cultural and natural heritage and promotes international recognition and cooperation in safeguarding worldwide heritage sites. The Operational Guidelines for the Implementation of the World Heritage Convention outline the criteria to be met by sites on the World Heritage List.

More recently, the "Charter for the Protection and Management of the Archaeological Heritage" (1990), created by the ICOMOS International Committee on Archaeological Heritage Management (ICAHM), was inspired by the success of the Venice Charter. It was created in response to the increasing threats to archaeological sites worldwide from looting and land development. The Charter attempts to establish principles and guidelines of archaeological heritage management that are globally valid and can be adapted to national policies and conditions. It lays out general principles for investigation, maintenance, and conservation as well as architectural reconstruction. It also notes the importance of high academic and professional standards in relevant fields of expertise and the need for international cooperation.

The Promulgation of International Presentation and Interpretation Guidelines

International documents that specifically addressed the presentation and interpretation of archaeological heritage did not take shape until the late twentieth century. The ICOMOS Charter on Cultural Tourism of 1999 encouraged the development of measurable goals and strategies relating to the presentation and interpretation in the context of their preservation and conservation.

The ICOMOS Australia National Committee's Charter for the Conservation of Places of Cultural Significance (The Burra Charter), first issued in 1979 and revised significantly in 1999, is a national charter that establishes principles

for the management and conservation of cultural sites in Australia. The Charter is particularly significant for its definition of cultural significance and the standards it outlines for using cultural significance to manage and conserve cultural sites. It provides an example of how international principles can be adapted to the values and needs of a particular nation or particular cultural groups within that nation. Significantly, it contains a definition of interpretation (Article 1.17): "Interpretation means all the ways of presenting the cultural significance of a place," with an explanatory note: "Interpretation may be a combination of the treatment of the fabric (e.g., maintenance, restoration, reconstruction); the use of and activities at the place; and the use of introduced explanatory material." Article 24.1, "Retaining associations and meanings," states that "Significant associations between people and a place should be respected, retained and not obscured. Opportunities for the interpretation, commemoration and celebration of these associations should be investigated and implemented." Article 24.2 states that "Significant meanings, including spiritual values, of a place should be respected." Article 25, "Interpretation," states, "The cultural significance of many places is not readily apparent, and should be explained by interpretation. Interpretation should enhance understanding and enjoyment, and be culturally appropriate."

The Council of Europe's Convention on the Value of Cultural Heritage for Society (Faro Convention of 2005) went into effect in 2011. It expands on the notions of heritage protection and conservation to pose the questions of why, and for whom, the heritage values are transmitted. Drawing on the United Nations' "Universal Declaration of Human Rights," it promotes the idea that knowledge and use of heritage are part of a citizen's right to participate in cultural life. The text presents heritage both as a resource for human development, the enhancement of cultural diversity, and the promotion of intercultural dialogue, and as part of an economic development model based on the principles of sustainable resource use (Council of Europe 2012).

The ICOMOS Charter on Interpretation and Presentation of Cultural Heritage Sites (2008)

Unquestionably, the most important international document to date relating to interpretation and presentation of archaeological heritage sites is the 2008 "ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites," sometimes referred to as the "Ename Charter," referring to the place in Belgium where the first drafts of the charter were prepared. Largely avoiding the questions of the "how and when" of interpretation, as emphasized by NPS and NAI, the Charter lays out seven principles, or key ingredients, of interpretation and presentation in reference to the conservation, education, and stewardship messages that represent the transcendent humanistic values of the resource. The seven basic principles for interpretation provide an outline of professional and ethical standards. The principles place emphasis on the essential roles of public communication and education in heritage preservation and are presented under the following basic headings: Access and Understanding; Information Sources; Context and Setting; Authenticity; Sustainability; Inclusiveness; and Research, Education, and Training.

On the surface, the principles are generally commonsensical in terms of conditions and prescriptions for effective public interpretation. Just how the principles are articulated at local settings, however, will determine how well they are received in international circles and whether they are considered desirable, practical, and feasible. In countries with little or no tradition of multiculturalism, poor human rights histories, and poorly developed infrastructure, practical applications of the Charter are especially challenging (Jameson 2008).

The Ename Charter, to avoid appearances of being overly prescriptive and culturally or linguistically biased, does not address methodology, or the content of interpretive messages, or suggest philosophical approaches other than those implied by the Principles. Rather, it attempts to consciously avoid interpretive content descriptions, particular narratives, or educational and technological constructs. Originally drafted and promoted by the Ename

Center for Public Archaeology and Presentation in Belgium, and subsequently revised under the auspices of the ICOMOS International Committee on Interpretation and Presentation of Cultural Heritage Sites (ICIP), the Charter continues to be scrutinized by the international community of interpretation experts.

The ICIP, in addition to promoting the development, adoption, and application of the Charter principles, studies the evolving techniques and technologies of public interpretation and presentation, evaluating their potential to enrich contemporary historical discourse and to heighten sensitivity to the universal values and particular modes of human expression embodied in cultural heritage sites. The work of the committee explicitly focuses on the experiential dimension of visits to cultural heritage sites, particularly by means of various media and methods of public communication (ICIP 2010). The business of formulating best practices in interpretation and presentation at a particular cultural setting, country, or institution is one of the chief activities of ICIP-sponsored events. The sessions, seminars, and workshops organized by ICIP members, in association with interdisciplinary colleagues, serve as experiments in formulating best practices (Silberman 2009: 7-8).

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Avocational Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management Technology and Training
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ Maritime Historic Site Management for the Public
- ▶ Petra, Archaeology of
- ▶ Plimoth Plantation: Public Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Reflexive Approaches in Archaeology, Development of
- ▶ Silbury Hill: Environmental Archaeology
- ▶ Space Heritage Protection
- ▶ Sustainability and Cultural Heritage
- ▶ US National Park Service and World Heritage
- ▶ UNESCO's World Heritage List Process
- ▶ United States: Cultural Heritage Management Education
- ▶ United States: Cultural Heritage Management
- ▶ Volunteers in Archaeology
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management
- ▶ World Heritage Education, Training, and Capacity Building
- ▶ World Heritage List: Criteria, Inscription, and Representation

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International Conventions Pertaining to Heritage Policy: Introduction

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Introduction

Efforts to develop policies for the protection of cultural heritage at the international level are dominated by six major conventions that have entered into force during the half century between 1956 and 2006. Each convention is dedicated to protecting cultural heritage either of specific types or under specific conditions: heritage at risk during armed conflict (1954 Hague Convention); cultural objects threatened by theft, looting, and other illicit movement (1970 UNESCO Convention, 1995 UNIDROIT Convention); cultural and natural sites of "outstanding universal value" (1972 World Heritage Convention); underwater cultural heritage (2001 Underwater Convention); and intangible heritage (2003 Intangible Heritage Convention). All of these treaties were adopted under the auspices of UNESCO, the United Nations Educational, Scientific and Cultural Organization, with the exception of the 1995 UNIDROIT Convention, which was developed at the request of UNESCO by UNIDROIT, the International Institute for the Unification of Private Law. (For texts of the conventions and related commentary, see Prott and O'Keefe (2010) and the website of the UNESCO's Culture Sector (UNESCO n.d.)).

In international law, conventions are treaties, legal agreements between nations that give their consent to be mutually bound. The process of developing a convention that is approved by multiple states is normally a lengthy and challenging enterprise that follows a specific framework within international law, including procedures and terminology that may be baffling to a nonspecialist (Forrest 2010: 32-56). Nations that ratify conventions are known as *States Parties*. *Signature* and *ratification* of a convention are not necessarily the same thing: in some treaties, like the 1954 Hague Convention and its protocols, signature means approval of the adopted text, an intention to move towards ratification, and a pledge not to thwart the goals of the convention pending ratification. So, for example, both the United States and the United Kingdom signed the convention on armed conflict in 1954; however, the United States did not ratify it until 2009, and the United Kingdom has yet to ratify it, although it has declared its intention to do so. In the remaining UNESCO cultural heritage conventions, signature was not required at the time of adoption of the convention text. In all cases, *ratification* signals a nation's formal agreement to be bound and is evidenced by the deposit of *instruments of ratification*. In addition to ratification, the terms *accession*, *acceptance*, and *approval* may also be used to signify a state's agreement to be bound to the terms of a convention; there may be slight differences of meaning among these terms from convention to convention, but in the end, they all denote ratification.

When States Parties deposit their instruments of ratification, they may (unless specifically

prohibited by the terms of the convention itself) make unilateral declarations that limit, qualify, or interpret certain aspects of the convention. These *reservations* sometimes have a profound effect on the implementation of the treaty. For example, when the United States announced its "acceptance" of the 1970 UNESCO Convention on the illicit movement of cultural property, it published one reservation and six "understandings" (O'Keefe 2000: 106-9). These statements were considered to qualify the US acceptance of the convention so drastically that some have questioned whether it has even implemented the convention (Prott & O'Keefe 1989: 794-6).

International conventions do not go into effect, that is, are not binding on assenting nations until a specified number of States Parties have ratified. *Entry into force* is specified in the text of each convention. For example, the 1954 Hague Convention on armed conflict entered into force in 1956, three months after the ratification of the convention by the fifth state. The Intangible Heritage Convention was adopted in 2003 and entered into force in 2006, three months after the ratification by the 13th nation.

Although the six cultural heritage conventions constitute an impressive body of international law, they do not comprise a comprehensive or coherent system of either heritage protection or policy. Each was developed in response to particular concerns during a specific period of recent history. Given the multiplicity of national legal systems, interests, and perspectives that were involved during the creation of the various conventions, it is not surprising that there is no unitary vision of what cultural heritage is or how it should be protected. Even the terminology relating to what we term "cultural heritage" differs from convention to convention and reflects evolving perspectives on the notion of tangible and intangible heritage. For example, both the 1954 Hague Convention and 1970 UNESCO Convention use "cultural property," but in the earlier treaty, the term refers to "movable or immovable property of great importance to the cultural heritage of every people" (Article 1), while the later convention defines the same term in a more nationalistic sense as "property which, on religious or secular grounds, is specifically designated by each State as being of importance. . ." (Article 1). The 1972 World Heritage Convention and the 2001 Underwater Convention both use "cultural heritage," while the 1995 UNIDROIT Convention prefers "cultural objects."

Key Issues/Current Debates/Future Directions/Examples

Armed Conflict

The earliest of the cultural heritage conventions also has the deepest roots. The 1954 Hague *Convention for the Protection of Cultural Property in the Event of Armed Conflict*, along with the simultaneously adopted *Protocol to the Convention for the Protection of Cultural Property in the Event of Armed Conflict* (now known as the First Protocol), sought to prevent a repetition of the unprecedented destruction, plunder, and vandalism of cultural sites and objects during the Second World War. But its antecedents reach back to the eighteenth century, when an evolving customary law of war among European nations recognized the importance of protecting cultural sites from destruction and cultural objects from looting. Despite the excesses of state-sanctioned cultural plunder by Napoleon's armies, and indeed partly because of them, the notion that cultural heritage should be respected and immune from plunder achieved normative status among Western armies during the nineteenth century. In the Annex to the 1907 Hague *Convention IV Respecting the Laws and Customs of War on Land*, a revision of an 1899 convention, all pillage was outlawed and special provisions were included to spare cultural sites, including historic monuments, during sieges and bombardments. Both attackers and defenders had duties in this regard: the attackers were obliged to take "all necessary steps. . . as far as possible" to spare cultural sites, while the defenders were required to identify cultural sites with "distinctive and visible signs," give notice of their locations beforehand, and refrain from using them for military purposes (O'Keefe 2006: 22-34).

Building on these dual obligations – that of both attacker and defender – the 1954 Hague Convention attempts to strengthen protection of both movable and immovable cultural property (using the term employed in the convention) by promoting the safeguarding of, and respect for, cultural property (O'Keefe 2006: 92-201; Forrest 2010: 78-108). Safeguarding means that nations prepare in times of peace for the possible effects of war on cultural property in their countries. Respect means both refraining from use of cultural property for purposes that might expose it to damage or destruction during wartime and refraining from any act of hostility towards cultural property. These measures to protect cultural property, however, are liable to be waived for the sake of imperative military necessity. In addition, States Parties agree to prevent theft, pillage, misappropriation, or vandalism of cultural property as well as reprisals against the same and to cooperate with local authorities to protect cultural property during occupation of the territory of another states party. The convention also allows for the granting of "special protection" – the designation of refuges or shelters for certain movable or immovable cultural property.

One of the anachronistic features of the 1954 Hague Convention is the notion that cultural property may be designated with a "distinctive marking" – the now familiar "Blue Shield" emblem. Officials responsible for the protection of cultural sites and objects may also wear the emblem. The notion of marking cultural sites in wartime goes back to the nineteenth century, but in the modern age of remote, long-distance bombardment when even ground forces may not be in direct visible contact with targets, the effectiveness of such markings for protecting cultural sites is problematic. In addition, the changing nature of warfare itself – characterized in recent decades by insurgencies, guerilla operations, and terrorist actions, all of which employ asymmetric methods of conflict – has rendered the very concept of identifying one's important cultural sites to one's enemy problematic. Despite its often horrific violence, the nineteenth-century warfare among "civilized" nations was pursued by standing armies led by generals who often communicated with one another and shared a common interest in certain civilities, including the protection of churches, museums, and monuments. In recent conflicts, cultural sites have sometimes been deliberately targeted for ideological reasons, so that advance notification of their location may actually invite attack. Some belligerents have also deliberately used cultural sites for military purposes precisely because they are counting on their first-world foes to refrain from attacking such sites.

Recent conflicts in Iraq during the First Gulf War (1991) and in the Balkans during the 1990s highlighted several inadequacies in the protective regime envisioned by the 1954 convention and led to the adoption in 1999 of the *Second Protocol to the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict* (O'Keefe 2006: 236-301; Forrest 2010: 110-237). The Second Protocol attempts to restrict the circumstances when military necessity may override the protection of cultural property; emphasizes the principle of proportionality in military actions that may affect cultural property; provides for new system of "enhanced protection"; strengthens the protection of cultural property during occupation; and provides for criminal enforcement of violations. Despite these efforts, the problems evidenced in the Second Gulf War – including looting of the Iraq Museums and other institutions, the plunder of archaeological sites, and the use of cultural sites for military purposes (Elia 2008) – demonstrates that we are far from achieving success in this area (see also Renfrew and Farchakh-Bajjaly, this volume).

Illicit Traffic

Two cultural heritage conventions attempt to deal in tandem with the problem of the illicit movement of cultural heritage through theft, looting, illegal export, and illicit transfer. As early as 1960, archaeologically rich countries such as Mexico and Peru were petitioning UNESCO to develop an international agreement that might stem the flow of illicit cultural materials out of their countries and into developed, art-market

nations like the United States and United Kingdom. The result, adopted in 1970, was the UNESCO *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property* (Prott & O'Keefe 1989: 726-801; O'Keefe 2000; Forrest 2010: 166-196). This celebrated and influential convention was an imperfect instrument, and, in 1984, UNESCO asked UNIDROIT, the International Institute for the Unification of Private Law, to develop another treaty to address some of the inconsistencies and omissions of the 1970 convention. In 1995, the UNIDROIT *Convention on Stolen or Illegally Exported Cultural Objects* was adopted and entered into force in 1998 (Prott 1997; Forrest 2010: 196-223).

The 1970 UNESCO Convention identified the illicit movement of cultural property as "one of the main causes of the impoverishment of the cultural heritage of the countries of origin" (Article 2). In early drafts, a relatively straightforward scheme of international cooperation in the area of export and import controls was envisioned. Exporting countries were required to introduce a certificate to accompany the legal export of cultural property and to prohibit the exportation of cultural property unless accompanied by a certificate. This provision survived in Article 6 of the convention, but its companion piece – a requirement that importing countries recognize the export certificates of States Parties and prohibit import of cultural property without them – was removed from the final text, largely by the efforts of the United States, eager to protect the free-trade practices of its thriving art trade, including dealers, private collectors, and museums (O'Keefe 2000: 57). In its place was substituted a highly restrictive set of rules that only required nations to take necessary measures, "consistent with national legislation," to prevent museums from acquiring illegally exported cultural property; in addition, States Parties were required to prevent the import of cultural property stolen from a museum or institution in another State Party if properly documented or inventoried (Article 7).

Another provision of the 1970 convention allows a State Party "whose cultural patrimony is in jeopardy from pillage of archaeological or ethnological materials" (Article 9) to request assistance from other states and to help control the export and import of specific materials if warranted. This highly restrictive approach to addressing the global problem of archaeological site looting ensured that a steady stream of plundered, undocumented archaeological material would continue to flow into the antiquities market, largely unimpeded by the 1970 convention. Thus, although the compromise text of 1970 was accepted because it was considered essential to have the support of at least one major art-importing nation (i.e., the United States, which ultimately ratified the convention in 1983), there is no doubt that the overall effectiveness of the 1970 regime was thereby seriously diminished. While some importing countries, such as Australia (O'Keefe 2000: 102-6), interpreted the 1970 convention in a broad sense – effectively agreeing to follow the export rules of other States Parties – most art-market states that have ratified the convention in recent years, including the United Kingdom, Switzerland, and Japan, have followed the narrow interpretation of the convention favored by the United States, by requiring States Parties to make formal requests for assistance, which may take the form of bilateral agreements that restrict the import of specific categories of cultural objects. Currently, the United States has 13 bilateral agreements made under Article 9 of the 1970 convention.

The 1995 UNIDROIT Convention is complementary to the 1970 UNESCO Convention and addresses several important issues that were not adequately covered in the earlier treaty, including the ability of private owners to seek the return of stolen or illegally exported cultural objects (the 1970 convention is a public-law treaty, requiring state-to-state relations); rules relating to protection of bona fide, third-party purchasers; and the appropriateness of payment of compensation to them. UNIDROIT's effort was complicated by the need to harmonize fundamental differences in the traditional practices of civil

law systems and common law systems. Common Law jurisdictions generally do not allow thieves or third-party purchasers to obtain good title to stolen objects nor do they favor the payment of compensation to good-faith purchasers. In civil law systems, however, bona fide purchasers may obtain good title after a specified period of time or, if they must return a stolen object to an original owner, may be entitled to compensation. The 1995 UNIDROIT Convention attempts to resolve this quandary through compromise. On the one hand, it enunciates the Common Law principle that "the possessor of a cultural object which has been stolen shall return it" (Article 3(1)); on the other hand, it also adopts the civil law notion that bona fide purchasers are entitled to reasonable compensation if they exercised "due diligence" in acquiring an object (Articles 4(1) and 6(1)). The convention also sets time limits within which claimants may seek the return of stolen cultural objects.

The UNIDROIT Convention distinguishes between two categories of cultural objects and creates different rules for their return. First are "stolen cultural objects," which include archaeological materials that have been illegally excavated or legally excavated but illegally retained, in accordance with the law of the state where the objects were found. Including the products of illegal excavations in the category of stolen cultural objects is significant and contrary to the views of free-market proponents, who generally distinguish between an inventoried object stolen from a museum and the products of clandestine excavations that are classified as merely "illegally exported." The second category of cultural objects in the convention is "illegally exported cultural objects," which must be returned to a requesting state if their removal significantly impairs the physical condition or context of the object; the integrity of a complex object; the preservation of information; or the traditional or ritual use of the object by a tribal or indigenous community.

Also significant is the convention's articulation of the elements of "due diligence" – the reasonable efforts made by the possessor of a stolen cultural object at the time of acquisition. Absent due diligence, the possessor is not entitled to reasonable compensation for the return of the object.

Considered together, the 1970 UNESCO and 1995 UNIDROIT conventions may seem to be exclusively concerned with efforts to ensure the return, restitution, and repatriation of illicitly removed cultural objects. Indeed, these are important issues in the two conventions, but one should not lose sight of their fundamental purpose: to prohibit and prevent (both verbs are present in the title of the 1970 convention) the behavior that results in the illicit movement of cultural objects. Their primary goal, therefore, is not to return illicitly removed cultural objects but to prevent their removal in the first place. Although the 1970 convention has serious flaws, it has dominated discussions about cultural heritage since its adoption and is a milestone in the evolution of museum acquisition policies. And the UNIDROIT Convention, for all the opposition it has engendered from pro-market forces, has forced collectors and dealers to address explicitly their behavior relating to due diligence and investigations of provenance.

World Heritage

The 1972 UNESCO *Convention Concerning the Protection of the World Cultural and Natural Heritage* aims to protect cultural and natural sites of global importance as the common heritage of humanity (Francioni 2008; Forrest 2010: 224-86). It creates a system to promote international cooperation to assist nations to identify, protect, and manage sites of "outstanding universal importance" in the face of increasing threats from decay as well as social and economic conditions. The World Heritage Convention enjoys the widest participation of all the cultural heritage conventions, with 188 States Parties as of November 2011 (World Heritage n.d.).

Central to the World Heritage Convention is the World Heritage List, an inventory of the world's most important cultural and natural sites, which enjoys broad support and recognition throughout the world. States Parties wishing to nominate sites for the list must demonstrate that they have taken effective measures to ensure their

protection, conservation, and management. An intergovernmental Committee for the Protection of the World Cultural and Natural Heritage considers nominations and decides whether or not to inscribe nominated sites on the World Heritage List; it also acts on requests for international assistance, including financial assistance. Currently, there are 936 sites inscribed on the list, including 725 cultural, 183 natural, and 23 mixed located in 153 countries (World Heritage n.d.). The Committee also maintains a List of World Heritage in Danger, which consists of properties on the World Heritage List that are determined to be a serious risk of damage or destruction. Currently, there are 35 sites on the list in danger (World Heritage n.d.).

The World Heritage Convention is more than a commemorative list of globally significant sites. Its emphasis on heritage rather than property, on immovable sites rather than movable, and on its combination of cultural and natural heritage sites, including cultural landscapes, which highlight the close, often intangible interactions between humans and their environment, reflect an important evolution in thinking about heritage. Although rooted in a pragmatic reliance on national systems for identification, nomination, and protection, the World Heritage Convention promotes the need for international cooperation for heritage protection in the common interest of humanity.

Underwater Cultural Heritage

In 1985, a team of explorers led by Robert Ballard located the wreck of the RMS *Titanic* in international waters at a depth of more than 4,000 m. The discovery signaled the opening of the deep seas for shipwreck exploration, not only for scientific purposes but also for treasure hunting and commercial exploitation. Indeed, the *Titanic* itself soon became the focus of a controversial, multiyear commercial project. Concerned that underwater cultural heritage in international waters might become the target for the same types of destructive exploitation that had plagued shipwrecks and other submerged sites in the territorial seas in recent decades, in 1994, the private International Law Association developed a draft convention to protect underwater cultural heritage. In 1997, UNESCO decided to promote an underwater convention and, after 4 years of discussions among governmental experts, produced the *Convention on the Protection of the Underwater Cultural Heritage*, which was adopted in 2001 (O'Keefe 2002; Forrest 2010: 287-361).

The Underwater Convention creates a complex and cumbersome regime for the protection of underwater cultural heritage, focusing on the maritime zones beyond the territorial seas, especially the Exclusive Economic Zone (EEZ)/Continental Shelf (up to 200 nautical miles wide) and the "Area," that is, the seabed below the high seas beyond the continental shelf and coastal state jurisdiction. It seeks to balance multiple, often competing interests, including national security, sovereign interests in submerged state vessels and aircraft, and the interests of groups involved in salvage, treasure hunting, sport diving, archaeology, and recreation. The convention takes as its starting point the 1982 *United Nations Law of the Sea Convention* (UNCLOS), which dealt with submerged cultural resources only in a marginal and confusing manner. UNCLOS did, however, establish the principle that states have a duty to protect submerged cultural heritage, should cooperate in that effort, and that "all objects of an archaeological and historical nature found in the Area should be preserved or disposed of for the benefit of mankind as a whole…" (Article 149).

Instead of attempting to determine issues of ownership of underwater cultural heritage in international waters, the 2001 convention focuses on rules to ensure that underwater sites will be protected and that activities directed towards them will be conducted according to preservationist principles and archaeologically sound practice. Key principles include the goals of protection and preservation for the benefit of humanity international cooperation, in situ preservation as a first option, long-term preservation and curation of recovered heritage, prohibition of commercial exploitation, respect for human remains, and reasonable public access. The convention requires that activities directed

towards underwater cultural heritage be consistent with a set of rules for archaeological best practice based largely on, but not identical to, a document developed by the International Council of Monuments and Sites as the Charter on the Protection and Management of Underwater Cultural Heritage.

The main protective regime envisioned by the 2001 Underwater Convention involves a series of rules for reporting submerged heritage and enforcement actions in two zones – the EEZ/Continental Shelf and the Area. In both zones, States Parties that discover or intend to undertake activities involving underwater cultural heritage must report their findings or intentions. In the EEZ/Continental Shelf, the coastal state has certain rights to protect submerged sites as well as to authorize or prohibit actions directed towards underwater cultural heritage. In the Area, these responsibilities are more diffuse, and all interested States Parties may become involved in protective efforts in cooperation with a "Coordinating State." To protect sites from unauthorized activities, removals, and looting, States Parties are given a number of enforcement tools to prevent and deter illicit activities. They may prevent the entry into their territory, dealing in, and possession of underwater cultural heritage that has been illicitly recovered and/or illicitly exported. They may seize and dispose of underwater cultural heritage that was recovered in violation of the convention. States Parties may also prohibit the use of their territory, including ports and facilities, in support of any activities directed at underwater cultural heritage in contravention of the convention, and they may take measures to ensure that their nationals and flag vessels do not engage in activities in contravention of the convention.

These tools, in addition to provisions aimed at promoting international cooperation, information sharing, public awareness, and training in underwater archaeology, make the 2001 Underwater Convention a potentially significant tool for protecting underwater sites and diminishing the plague of looting and other unauthorized destruction. To be effective, however, the convention needs broader participation (there are currently 40 States Parties) from countries with active salvage economies and treasure-hunting enterprises, such as the United States and United Kingdom.

Intangible Cultural Heritage

UNESCO's 2003 *Convention for the Safeguarding of Intangible Cultural Heritage* marks a significant departure for international cultural heritage law and policy (Forrest 2010: 362-87). All earlier conventions dealt with tangible cultural heritage, whether movable or immovable, above ground or below the sea. The 2003 convention deals with a difficult and challenging concept of intangible cultural heritage, which it defines in such a way that it also includes some elements of material culture: "The 'intangible cultural heritage' means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith-that communities, groups and, in some cases, individuals recognize as part of their cultural heritage" (Article 2(1)). The purpose of the convention is to safeguard the intangible cultural heritage; to ensure respect for it; to increase awareness of, and appreciate for, intangible cultural heritage at local, national, and international levels; and to provide for international cooperation and assistance.

The Intangible Cultural Heritage Convention is rooted in a growing awareness of the need to protect and promote cultural diversity and traditional practices and ways of knowing among the world's peoples, including individuals, indigenous peoples, and ethnic, religious, and linguistic minorities. Its structure follows the approach taken in the 1972 World Heritage Convention, namely, to encourage sovereign states to identify and nominate intangible cultural heritage present in its territories. As in the 1972 convention, an intergovernmental committee is established to register nominated examples of intangible cultural heritage in an inventory, called the Representative List of the Intangible Cultural Heritage of Humanity. Corresponding to the 1972 convention's List of World Heritage in Danger is the new convention's List of Intangible Cultural Heritage in Need of Urgent

Safeguarding. The intergovernmental committee also handles requests for international cooperation and assistance and for funding.

Since 2008, a total of 213 "elements" of intangible cultural heritage have been inscribed on the Representative List. Examples include acupuncture of traditional Chinese medicine, the chant of the Sybil on Mallorca (Spain), the Kirkpinar Oil-Wrestling festival in Turkey, the gastronomic meal of the French, and traditional Azerbaijani carpet weaving in Azerbaijan. A total of 16 elements of listed intangible heritage are currently on the list in need of urgent safeguarding, including wooden movable-type printing in China; the Mongol epic tradition known as the Mongol Tuuli; and the Sanke mon, a collective fishing rite among the Sanke people of Mali.

Conclusion

The international law of cultural heritage continues to evolve as it faces challenges of consistency, definition, and consensus. Threats against both tangible and intangible cultural heritage continue to diminish the common heritage of humanity. The six cultural heritage conventions described in this entry were developed over more than 50 years. They reflect a multitude of interests, concerns, and approaches that continue to change and evolve. Much of the criticism that has been leveled against the cultural heritage conventions has focused, with good reason, on their imperfect effectiveness. Armed conflict still destroys cultural sites; looting still rips ancient artifacts from their archaeological contexts; and the inexorable forces of development and construction continue to destroy cultural sites and disrupt living traditions and cultural practices. Despite these problems, however, the cultural heritage conventions remain the starting point for any discussion of cultural heritage preservation and policy at the international level. Although their implementation may be imperfect, they express normative standards relating to the value and importance of cultural heritage as the common legacy of humankind. Despite the many differences among the individual conventions, they all promote three consistent themes – that cultural heritage is important for peoples, nations, and the world; that cultural heritage is deserving of safeguarding and protection; and that international cooperation and efforts should be devoted to that purpose.

Cross-References

- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ UNESCO (1972) and Malta (1992) Conventions

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I

International Council for Archaeozoology (ICAZ)

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Basic Information

The International Council for Archaeozoology (ICAZ, http://www.alexandriaarchive.org/icaz/) is devoted to the study of human-animal relationships over time using archaeological evidence. Archaeozoologists have contributed to studies of human impact on the environment on a national level. However, international comparisons between sites are indispensable in such projects. Research questions and methods need to be carefully coordinated. ICAZ is dedicated to promoting communication between archaeozoologists worldwide, coordinating policies of recovery and analysis. International cooperation has been a key to understanding, e.g., past impacts of climate change or cultural diversity in ancient diets.

Major Impact

Archaeozoology began in the mid-nineteenth century in Europe: in 1851, Japetus Steenstrup and his team established the artificial nature of prehistoric shell middens in Denmark. For a century, archaeozoologists operated in relative isolation. The "Great Generation" emerging in the 1950s, predominantly in Central Europe, were natural scientists whose efforts were rarely integrated with archaeological inquiry traditionally concerned with historical interpretations. During the 1960s, New Archaeology in the English-speaking world and concern with environmental issues stimulated archaeozoological research within archaeology.

The first major meeting of archaeozoologists took place as Session IV of the Third International Congress of Agricultural Museums in Budapest (1971). Seventy-five attended, most from European countries (Matolcsi 1973). They represented both sides of the Iron Curtain, a remarkable phenomenon after the failed 1968 "Prague Spring" in Czechoslovakia. However, thanks to political tolerance at the time, Hungary became equally accessible to archaeozoologists from Eastern Europe and those from the west. Crucially, many attending already had personal contacts before. Some were separated by the Berlin Wall only after 1961. Sándor Bökönyi, a Hungarian organizer, had already built British and US contacts working in Yugoslavia and Iraq (Bartosiewicz & Choyke 2002). The informality of personal conduct and keen awareness of the need to crosscut political boundaries have become traditional strengths of ICAZ. It was decided that international conferences should be held every four years alternating between Eastern and Western Europe. Meetings thus followed in the Netherlands, Poland, and Great Britain. Although the pattern was abandoned in 1986 by holding a meeting in France, political changes in Europe soon made the East-West distinction irrelevant. The 1990 conference in Washington DC was a breakthrough in ICAZ history: it was the first international conference held in the New World, right after the political transformation of Europe. It served as a forum for scholars in North America and countries from the former Soviet Bloc who had previously been quite isolated.

Along with growth, diversity increased. Regional representation varied in the international conference proceedings, the best proxy for the scholarly activity of ICAZ. Figure 1 shows ICAZ activity in print. There is an increase in scholars from outside Europe, mostly North America. On the margins of the graph, welcome contingents from Africa, Asia, Australia/New Zealand, and Latin America began appearing over a decade ago. Standardized publication data have not been available for recent conferences: output is spread among conference sessions. The high contribution of local participants in Fig. 1 has highlighted an important aspect of conferences: the publicity provided by hosting meetings. This benefit was foreseen by the founders when alternating East-West venues were planned.

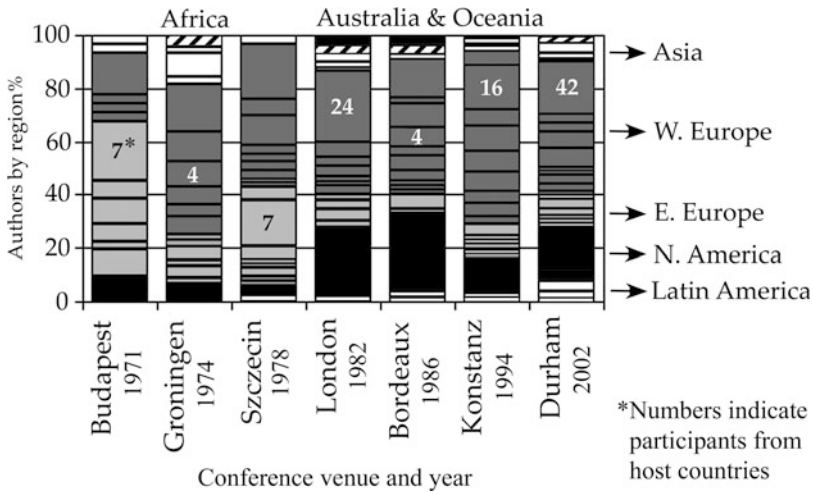

International Council for Archaeozoology (ICAZ), Fig. 1 Regional representation as reflected in international conference proceedings. After 1990 Eastern Europe includes former Soviet Bloc countries except for East Germany

Since then ICAZ has grown into a global organization. International conferences should be held on a different continent every four years in an effort to guarantee access. Additional international conferences held in the Americas included those in Canada (1998) and Mexico (2006). The 2014 meeting is planned for Argentina. The 2010 International Conference in Paris was devoted to promoting archaeozoology in Central and Eastern Europe. Not all archaeozoologists in large countries such as China, India, or Russia have had full access yet to ICAZ membership. The Paris conference was of special importance in including colleagues from areas outside the usual geographical range of ICAZ membership. It mustered 714 registered participants from 56 of the 61 countries represented in ICAZ, a spectacular increase since 1971 (Budapest: 75 participants, 18 countries).

As a consequence of growth, subtopics within archaeozoology began attracting attention and working groups formed within ICAZ. These are loose, autonomous groups with meetings organized every two to three years. In 2012, a dozen such groups were registered, some specializing in regions (e.g., SW Asia), others by taxonomic groups (e.g., fish). In addition to diversification, the dynamic development of working groups is also evident as many functions are devolved from the overgrown international conferences.

Transforming ICAZ into a membership-based professional organization was initiated at the 1990 Washington DC meeting. By 2003, a dues-paying membership was created, most of the income being redistributed every four years to support conference participation for those most in need and other communication costs. Organizing international conferences with a global outreach has become a heroic task both financially and logistically. In addition to geographical affiliation, the age and employment status of potential participants have been consistently considered in funding (Vigne & Lefèvre 2010).

ICAZ is committed to its founding goal of fostering communication within the diverse archaeozoological community. Although Europe became politically united, other tensions create what are politely referred to as "visa issues." Access to conference venues is not equally guaranteed to everyone, and the wisdom of ICAZ founders would be needed to outwit political forces beyond the power of an academic organization. Solidarity and personal trust among members remain fundamental assets in best handling such inevitable situations.

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International Council of Museums (ICOM)

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Basic Information

The International Council of Museums (ICOM; icom.museum), since its inception in 1946, is the world organization for museums and museum professionals, committing to the promotion and protection of natural and cultural heritage, the present and future, tangible and intangible. With over 30,000 members in 137 countries, ICOM is a network of museum professionals acting in a wide range of museum- and heritage-related disciplines (Fig. 1).

International Council of Museums (ICOM), Fig. 1 ICOM logo

Major Impact

Maintaining formal relations with UNESCO and a consultative status within the United Nations Economic and Social Council, ICOM takes part in the development and the implementation of international conventions that play a crucial role in the protection and the promotion of cultural heritage: the 1954 Hague Convention *for the Protection of Cultural Property in the Event of Armed Conflict* and its two Protocols, the 1970 Convention *on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*, the 1972 Convention *Concerning the Protection of the World Cultural and Natural Heritage*, and the 2003 Convention *for the Safeguarding of Intangible Cultural Heritage*. ICOM has also initiated close partnerships with the UNESCO Memory of the World Program.

ICOM partners other organizations such as the World Intellectual Property Organization (WIPO), INTERPOL, and the World Customs Organization, in order to carry out its international public service missions. Together, ICOM and its partners strive particularly to make awareness-raising efforts highlighting the importance of protecting the cultural heritage of civilizations against illicit traffic, assist museums through alternative dispute resolutions in the process of complex negotiations, and provide support and risk prevention tools for cultural institutions facing conflict situations or natural disasters.

In the field of relief response for heritage, ICOM is a founding member of the International Committee of Blue Shield (ICBS). This equivalent of the Red Cross for Heritage relates to the

UNESCO Hague Convention (1954) to protect cultural goods during armed conflicts. In this regard, the International Committee of the Blue Shield (ICBS) works to protect world cultural heritage threatened by natural and man-made disasters.

ICOM's commitment to culture and knowledge promotion is reinforced by its 31 international committees dedicated to a wide range of museum specialities, who conduct advanced research in their respective fields for the benefit of the museum community. ICOM has therefore the ability to mobilize experts in cultural heritage worldwide responding to the challenges museums face around the globe.

A leading force in ethical matters, ICOM adopted its *ICOM Code of Ethics for Museums* in 1986, a reference tool that sets standards of excellence to which all members of the organization must adhere. The *ICOM Code of Ethics for Museums*, translated into 36 languages and revised in 2006, establishes values and principles shared by ICOM and the international museum community. These standards of self-regulation by museums include basic principles for museum governance, the acquisition and disposal of collections, and rules for professional conduct.

ICOM provides for its members various resources to foster their professional network and expertise: the UNESCO-ICOM Museum Information Centre, the *ICOM News* magazine, a monthly e-newsletter with information on events within the ICOM network, and ICOMMUNITY, an online collaborative platform for ICOM members to exchange and share information more easily.

Finally, ICOM organizes a wide range of events for all museum lovers and professionals. Since 1977, each year ICOM has organized the International Museum Day, an event held worldwide around the 18th of May to promote greater diversity and intercultural dialogue amongst the international museum community. Furthermore, academic events take place internationally as ICOM's committees hold annual conferences and symposiums revolving around themes relating to their expertise and specialities, with the gathering of high-ranking specialists. Finally, the ICOM General Conference is held triennially as an opportunity for the international museum community to come together and engage in professional discussion on the issues facing museum professionals today. Different countries host this conference: Seoul in 2004, Vienna in 2007, Shanghai in 2010, and Rio de Janeiro in 2013.

Cross-References

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- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
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- ▶ Ethics of Collecting Cultural Heritage
- ▶ International Council of Museums (ICOM): Code of Ethics
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I

International Council of Museums (ICOM): Code of Ethics

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Introduction

The International Council of Museums (ICOM) (http://icom.museum/), created in Paris in 1946, is an international organization of museums and museum professionals whose mission is the conservation and transmission of natural and cultural heritage, present and future, material and immaterial. This mission demands the acceptance of the Ethical Code, for the museums and the professional members of the ICOM, which was adopted during the organization's 15th General Assembly in Buenos Aires, Argentina on November 4th, 1986. This code, which was last revised in 2006, establishes the common values and principles of the ICOM and of the global museum community in English, French, and Spanish.

The Code of Ethics of the ICOM is presented as a series of principles and rules which govern professional practices for the museums and their staff and thus established professional standards applicable to all members. These norms play a quasi-legal role in countries where legislation is lacking or unclear regarding professional practices to adopt. They can also serve as a basis for responding to local requirements or to other queries of museum staff.

The Code of Ethics of the ICOM (http://icom.museum/professional-standards/codeof-ethics/) consists of eight chapters which outline each principle and related articles.

Key Issues/Current Debates/Future Directions/Examples

1. *Museums preserve, interpret, and promote the natural and cultural inheritance of humanity*

Cultural property of which museums interpret and are responsible for, are not only significant elements for the definition of cultural identity, both nationally and internationally, but they also often provide essential evidence to many disciplines in the humanities or natural sciences, thereby representing an important contribution to knowledge.

To achieve this mission, the regulatory authorities, in their management, must have authorization documents clearly stating the legal status of the museum, its mission, duty, and non-profit character (1.1 to 1.2); premises that are secured against most risks, while providing an appropriate environment that is accessible to all; and housing the collections, staff, and visitors in compliance with all relevant health, safety, and security provisions (1.3 to 1.8).

Still under the regulatory authority, the funds coming from public or private sources or income-generating activities must comply with the norms of the museum and the public and be used for the realization and development of the institution's activities (1.9 to 1.10); and in compliance with museum policies and legal and regulatory procedures, the skills of all the staff and volunteers are used in the context of an ethical conduct of the highest rigor and a professional approach offering possibilities for continual training in order to maintain efficiency (1.11 to 1.18).

2. *Museums that maintain collections hold them in trust for the benefit of society and its development*

The museum is defined as an institution that acquires, conserves, researches, communicates, and exhibits the tangible and intangible heritage of humanity and its environment.

Within the framework of acquisition, disposal, protection, and utilization of collections, the museum must adopt a charter under the direction of the regulatory body, prove their diligence in establishing the complete history of the object from its discovery or its creation, and ensure that the object possesses a valid title; that it was not illegally obtained in, or exported from, its country of origin or any intermediate country in which it might have been legally owned (2.1 à 2.3); and that

its acquisition did not involve the unauthorized, unscientific, or intentional destruction or damage of monuments, archaeological or geological sites, or species and natural habitats (2.4).

The acquisition should be based on an ethic where the choice of values was not imposed but was freely chosen by the responsible authorities. Moreover, concerning the collection, research, and exhibition of collections composed of human remains or sacred objects, it is recommended to treat this sensitive material with respect and in accordance with the interests and beliefs of members of the community, ethnic, or religious groups (2.5, 3.7, and 4.3).

Similar provisions are realized for biological and geological specimens (2.6) and living organisms (2.7) whose acquisition and conservation must respect the relevant legislation associated with the protection of species, nature, and the environment. For living animals, the museum assumes total responsibility for their health and well-being and should prepare and implement a safety code approved by an expert in the veterinary field (2.25).

Nevertheless, it is possible that the institution acquire objects in exceptional circumstances without an attested provenance and outside the museum's stated policy. For these exceptional acquisitions, the regulatory authority can take into consideration the advice of professionals, without national or international bias, the specific interests of the object for its preservation, and the legality of the title of ownership (2.9 and 3.4). It can also authorize the museum to act as a repository for objects illegally collected from the territory in which its lawful responsibility has been established (2.11).

The removal, just like the acquisition, of an object is subject to legal conditions and obligations. The museum can definitively dispose of an object or specimen from its register and collection by donation, transfer, exchange, sale, repatriation, or destruction of infested and deteriorated objects. It is up to each institution under the authority of its governing body, and in conjunction with the director of the museum and curator of the collection, to decide the procedure to follow in similar cases, to ensure that the money or benefits obtained are employed for the benefit of the collection, and to prevent members of the museum staff as well as their families or close associates from purchasing the objects from the collection for which they are responsible (2.12 à 2.17), or making personal use of objects from the collection of the museum (2.26).

To ensure its service, the collections are entrusted to qualified personnel. The documentation should meet accepted professional standards: full identification and description of each item, its associations, origin, condition, treatment, and present location in the museum. The collected data, to be used for securing, preventative conservation, or restoration, should be kept in a secure environment and managed by documentation retrieval systems enabling access to the information by the museum personnel and other legitimate users who are likely to consult them in the context of the museum's development (2.18 à 2.20).

A strategy should aim at protecting collections from disasters (armed conflicts and other human-made or natural catastrophes), guaranteeing the confidentiality of information, and to prevent any risks relating to the conservation of objects in an inappropriate environment during storage, display, or transit. This strategy must be developed by the museum responsible for monitoring the condition of object to determine when an object may require professional restoration (2.21 to 2.24).

3. *Museums hold primary evidence for establishing and furthering knowledge*

As institutions of general interest, museums possess collections that are primary evidence dedicated to knowledge. In this regard, the collection and all associated information should be made accessible and document the complete history of the object since its discovery. Field collection and research undertaken by museum staff should be carried out in accordance with the scientific norms, national and international legislative obligations, as well as with respect and consideration for the views of local communities within the missions and goals of the museum (3.2 to 3.5). The nature of collections means that members of the museum profession can share their knowledge and experience with researchers and students in relevant fields. The investigations carried out in

this context should promote the use of information relating to collections and prevent all activities that could lead to the loss of scientific data which would be useful to develop within the framework of a necessary cooperation with other institutions sharing the same interests and collecting practices (3.6 to 3.10).

4. *Museums provide opportunities for the appreciation, understanding, and promotion of the natural and cultural heritage*

The proliferation of exhibitions mainly intended for the public's enjoyment and to reach a wider audience should take into account the ethical aspects relating to the mission, beliefs, and discretions accorded to some objects. The museum should be aware of the demands for the removal of objects coinciding with the sensitivities of a community, ethnic, or religious group from whom the object originated, or simply objects of questionable origin or lacking provenance information, which can be perceived as an encouragement for the illicit trafficking of cultural goods (4.1 to 4.5). For its educative mission, the museum should only publish accurate information and give consideration to the academic disciplines, societies, or beliefs presented (4.6). Finally, the presentation of collections inviting the public to participate in knowledge and culture must respect the integrity of the original and signal replicas, reproductions, or copies as facsimiles (4.7).

5. *Museums hold resources that provide opportunities for other public services and benefits*

The museum has the ability, through its identification service or that of another museum, to carry out this activity without it being considered as work benefiting them. If the identification and authentication reveal that objects are suspected of having been illegally acquired, this should not be made public until the appropriate authorities have been notified (5.1).

The estimation of monetary value, when it is undertaken by a museum in order to insure its collections, should only be given in response to an official request by other museum authorities or other appropriate authorities. However, when the museum itself may be the beneficiary, appraisal of an object or specimen must be undertaken independently (5.2).

6. *Museums work in close collaboration with the communities from which their collections originate as well as those they serve*

The ICOM encourages museums to promote the sharing of knowledge, documents, and collection, to develop partnerships, and to engage in dialogue with museums and other cultural organizations from the countries that have lost a large part of their heritage with a view to return cultural property (6.1 and 6.2).

Claims for restitution, which are regularly made for cultural property, concern all specimens or objects that appear to have been exported or otherwise transferred in violation of the principles of international and national conventions, or bought or acquired from an occupied territory disregarding the laws governing the importation, exportation, and transfer of cultural or natural materials.

Museums must conduct activities in close cooperation with the communities from which their collections originate as well as the communities they serve. The respect for concerned communities should prevail over all other activities (collecting, searching for funds) carried out by the museum aiming to use its collections (6.3 to 6.8).

7. *Museums operate in a legal manner*

Museums should define their role and act with regard to a concerted ethical conduct in accordance with local and national laws in their location (7.1); they must direct their policy according to international legislation which serves as the standard for the interpretation of the ICOM's Code of Conduct, namely, the principle conventions listed in article 7.2:

- UNESCO Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague Convention, First Protocol, 1954, and Second Protocol, 1999)
- UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)
- UN Convention on Biological Diversity (1992)

- UNIDROIT Convention on Stolen and Illegally Exported Cultural Objects (1995)
- UNESCO Convention on the protection of the Underwater Cultural Heritage (2001)
- UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003)

8. *Museums operate in a professional manner*

Professional conduct compliant with ethical standards should dictate that all members of the museum institution have a good understanding of relevant legislation to protect them from deviant behavior (8.1), to distance them from practices that are contrary to professional ethics (8.2), and to encourage them to conform to the terms of the Code of Ethics of the ICOM and to know all the other codes or policies concerning museum work (8.3). Members of the museum profession are scientifically and intellectually responsible for all activities that may lead to the loss of information. They also have other obligations, such as never participating to illicit traffic (8.5), or protecting all confidential information related to their activity or possessed by the institution concerning the collection or the security of locales (8.6 to 8.7). The exception to the obligation for confidentiality involves goods which are illegally acquired and which are the object of police or legal investigations (8.8). Private or professional activities, as well as work relations conducted internally and externally to the museum, cannot be separated from those of their institution and should enable professionals to carry out their services efficiently and to a high standard in consultation with colleagues within or outside the museum (8.9 to 8.11).

Members of the museum profession should take into account the conflicts of interest that may arise from the benefits that could be offered to them because of their function (8.12), the specialist activities undertaken by them outside the institution (8.13), their direct or indirect participation in dealing (buying or selling for profit) natural or cultural heritage (8.14), maintaining relationships with dealers leading to the acceptance of gifts and donations in whatever form (8.15), and collecting objects privately that could compete with their institution (8.16).

Finally, ICOM requests all members to not use the same acronym or logo of the organization to promote or endorse any for-profit operation or product (8.17) and encourages them, in all other conflicts of interest between a person and the museum, to keep the interests of the museum prevailing (8.18).

Conclusion

The code of ethics for museums does not have a legal value in a strict sense but it states the precepts of conduct that set a high moral value to which each member of the ICOM is committed. Within the organization, the Ethics Committee is responsible for ensuring compliance with the code, to consider all matters pertaining to professional ethics to museums, to ensure its execution, and to propose to the Executive Board any changes or supplement to the code (ICOM n.d.). The committee is called upon by the Executive Council as well as by various national and international organizations to study the codes of ethics developed by other bodies of the organization (Internet Museum n.d.).

Cross-References

- ▶ Conservation in Museums
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Human Remains in Museums
- ▶ International Council of Museums (ICOM)
- ▶ Museum Security Network (MSN)
- ▶ Stakeholders and Community Participation

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I

International Council on Monuments and Sites (ICOMOS) (Ethics)

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Basic Information

Committed to neutral and sustainable monitoring of archaeological sites, especially during periods of social crisis or instability, the International Council on Monuments and Sites (ICOMOS) is a nongovernmental, professional organization dedicated to the conservation and protection of historic monuments, sites, and places throughout the world. Its website is at www.icomos.org.

History

COMOS was founded in Warsaw in 1965 as part of the 13 resolutions adopted in 1964 by the Second Congress of Architects and Specialists of Historic Buildings, which aimed in part to form an ethically responsible and globally recognized principle for the treatment of historic monuments. The first resolution, the Venice Charter, created the International Charter for the Conservation and Restoration of Monuments and Sites. ICOMOS was established in order to carry out this resolution. The Venice Charter traced its doctrinal roots to the 1931 Athens Charter on historic buildings. The pioneering Athens Charter put forth a fundamental definition of international cultural heritage and acknowledged the importance of creating globally accepted policies that reflect the ethical treatment of internationally recognized cultural heritage sites.

Major Impact

Advisory Body to the World Heritage Committee

In 1972, UNESCO named ICOMOS one of three official advisory bodies to counsel the World Heritage Committee on candidates for inclusion in the World Heritage List. ICOMOS considers individual monuments, sites, and places for nomination. The fundamental quality for consideration, as outlined by the World Heritage Convention, is "outstanding universal value" (OUV) (Jokilehto 2008). ICOMOS evaluates three additional primary criteria: authenticity, management, and conservation.

The necessarily broad definition of cultural heritage embodies a dynamic range of approaches to the conservation and protection of monuments, sites, and places. Various charters and memoranda have continued to reshape the mission of ICOMOS in identifying potential candidates for the WHL. One of the most important documents in the development of the notion of cultural heritage is the Florence Charter, an addendum to the Venice Charter. This 1982 doctrine was created in order to include living entities as candidates for World Heritage Sites, in this instance, the gardens in the historic center of Florence. A second document should also be mentioned. As part of the 2005 World Heritage Convention, the Vienna Memorandum clarified the potential candidacy of entire cities (or Historic Urban Landscapes) for inclusion in the WHL (Araoz 2008). Such reevaluations of conceptual criteria underscore the vigorous, collaborative objectives of ICOMOS in defining and protecting world heritage.

International Committee of the Blue Shield, Risk Management

ICOMOS maintains at least one principal function in addition to advising the WHC. ICOMOS is one of five nongovernmental organizations that comprise the International Committee of the Blue Shield, founded in 1996. The Blue Shield emblem, the cultural counterpart of the Red Cross, was first issued as a result of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. This particular function of the Blue Shield and, by extension, ICOMOS calls for the protection of historic monuments, sites, and

places in areas of crisis. The committees advising the Blue Shield aim to stop the destruction of internationally recognized cultural heritage during periods of violent conflict. In 2011, Blue Shield emblems were issued for armed conflicts in Egypt, Libya, and Syria.

A second Blue Shield statement on Syria was issued in 2012. An extension of ICOMOS' role advising the International Committee of the Blue Shield is its commitment to risk management in crisis situations. From January 7 to 8, 2013, an ICOMOS International Scientific Committee, the International Scientific Committee on Risk Preparedness (ICORP), led an e-learning course for professionals in cultural heritage currently living in Syria. This reflected a collaborative effort with ICOMOS-ICORP, UNESCO, ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property), and the DGAM (Directorate-General of Antiquities and Museums of Syria). This particular endeavor sought to improve the multi-level of preparedness of Syrian cultural heritage experts in various aspects of risk management and emergency response, in moments of conflict, and in the aftermath.

Committees, Membership, and General Assemblies

ICOMOS is comprised of two main branches, the Executive Committee and Secretariat, which are based at the international headquarters in Paris and individual or institutional members of National Committees. A third component, the International Scientific Committees, was comprised of 26 committees in January 2013. At that time, membership count was listed as approximately 12,100 members worldwide. National Committees are active in 110 countries. Each National Committee, regardless of the number of members, is allocated a maximum quota of 18 votes at general assemblies. Each National Committee operates within its own rules of procedure, although these must adhere to the basic premises of ICOMOS. Eligibility for membership is contingent upon the applicant's professional involvement in a field concerning cultural heritage. This definition includes, inter alia, professionals working in various aspects of conservation (scientific, technical, and administrative), and it may also include those working in disciplines such as archaeology, ethnology, and town planning. Membership is contingent upon adhering to an Ethical Commitment Statement currently comprised of 15 articles, each of which requires the active personal and professional involvement of members in various aspects of cultural heritage preservation. This statement is intermittently reviewed by members in order to ensure that it reflects contemporary ethical and methodological concerns in cultural heritage. A significant element of ICOMOS' general mission is for its doctrine to evolve as new situations arise that require nonpartisan council. Therefore, membership is contingent upon individual commitment to promoting and engaging with each of the 15 articles in current situations. Article 4, for example, requires that ICOMOS members stay apprised of "contemporary conservation philosophy, practice and techniques" and whenever applicable that members share and exchange such information (*Ethical Commitment Statement for ICOMOS Members* 2002).

ICOMOS operates via international general assemblies. By the end of 2011, there will have been 17 general assemblies, during which representatives from Executive and National Committees meet to vote on and evaluate doctrinal issues. Records of the general assemblies (starting in 1965) as well as ICOMOS executive and advisory committee meetings (starting in 2006) are published on the ICOMOS website (ICOMOS n.d.).

International Day for Monuments and Sites

In 1983, UNESCO approved the ICOMOS proposal to make April 18th the International Day for Monuments and Sites, in order to annually promote different aspects of cultural heritage. The theme successfully nominated by ICOMOS in 2011 was the "Cultural Heritage of Water," which reflects the

expanding awareness and definition of cultural heritage (McIntyre-Tamwoy 2011). Previous themes include Religious Heritage and Sacred Spaces (2008) and twentieth Century Heritage (2002).

Cross-References

- ▶ Blue Shield
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ World Heritage List: Criteria, Inscription, and Representation

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International Council on Monuments and Sites (ICOMOS) (Museums)

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Basic Information

The Second International Congress of Architects and Specialists of Historic Buildings, meeting in Venice in 1964, adopted 13 resolutions, the first one being the Venice Charter and the second, put forward by UNESCO, provided for the creation of the International Council on Monuments and Sites (ICOMOS). Its statutes set out the aims and activities of the organization, the composition of membership, its administrative structure, and its legal status. It is one of the three formal advisory bodies to the UNESCO World Heritage Committee and is a representative on the International Committee of the Blue Shield, the cultural equivalent of the Red Cross. ICOMOS is an association of professional experts that currently brings together over 12,000 members throughout the world, organized through National Committees. It is interdisciplinary and works for the conservation and protection of cultural heritage places. It is the only global nongovernment organization of this kind, which is dedicated to promoting the application of theory, methodology, and scientific techniques to the conservation of the architectural and archaeological heritage.

The General Assembly, which meets every 3 years, is the sovereign body of ICOMOS comprising all its members worldwide. It elects the President, the Vice-Presidents, the Secretary General, and the Treasurer General, who together make up the Bureau. It also elects the 12 members of the Executive Committee. The General Assembly determines the program and the budgetary orientations for the triennium to come and sees that the objectives of ICOMOS have been met. Parallel to the elections and

the statutory proceedings, a major international symposium is held on a different theme each time.

The Advisory Committee comprises the Chairs of the National Committees and International Scientific Committees. It meets once a year and its function is to advise the Executive Committee by bringing forth suggestions and recommendations on program priorities and orientations. The Executive Committee is the managing body of ICOMOS. It has 12 members, in addition to the members of the Bureau and 5 co-opted members. Demonstrated professional qualities are a requirement for these members, who represent every major region of the globe. The Executive Committee prepares the program and budget and oversees their implementation; between sessions it is the Bureau that ensures the program is implemented. The International Secretariat, located in the headquarters in Paris, is managed by an operational team led by a director and coordinates the implementation of the program. It has three divisions: Administration, World Heritage, and Documentation (UNESCO-ICOMOS Documentation Centre).

Major Impact

ICOMOS has established 28 International Scientific Committees (ISCs) on various cultural heritage themes. Members consist of international renowned expert specialists in each subject and are designated by their own National Committee. The ISCs are ICOMOS technical bodies. They undertake research; develop conservation theory, guidelines, and charters and foster training for better heritage conservation; promote international exchange of scientific information; and carry out projects. They elaborate their own programs and publish an annual report subject to the approval of the Executive Committee. ICOMOS has adopted a number of charters, resolutions, declarations, and other technical studies all of which are available on the website: www.icomos.org.

Cross-References

- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

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International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

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Brief Definition of the Topic

ICOMOS is the International Council on Monuments and Sites. It is an international nongovernmental organization of professionals concerned with the conservation of historic/archaeological monuments and sites around the world. Quoting from its website (http://www.icomos.org/en/about-icomos/mission-and-vision/mission-and-vision):

> ICOMOS works for the conservation and protection of cultural heritage places. It is the only global non-government organisation of this kind, which is dedicated to promoting the application of theory, methodology, and scientific techniques to the conservation of the architectural and archaeological heritage. Its work is based on the principles enshrined in the 1964 International Charter on the Conservation and Restoration of Monuments and Sites (the Venice Charter).
>
> ICOMOS is a network of experts that benefits from the interdisciplinary exchange of its members, among which are architects, historians, archaeologists, art historians, geographers, anthropologists, engineers and town planners.

> The members of ICOMOS contribute to improving the preservation of heritage, the standards and the techniques for each type of cultural heritage property: buildings, historic cities, cultural landscapes and archaeological sites.

ICOMOS refers to "cultural internationalism" in its discussion of its history, in other words, an international concern with the promotion and protection of the tangible cultural heritage. An early impetus toward achieving ICOMOS' aims began in the post-World War I climate that saw the creation of the League of Nations and that climaxed in the immediate post-World War II years following the devastation not just to millions of people but also to the built environment of Europe. The Athens Charter of 1933 had addressed the restoration of historic buildings. The United Nations was created in 1945. UNESCO was created in 1948. The First Congress of Architects and Specialists of Historic Buildings was held in Paris in 1957 and advocated for the protection of historic buildings and membership in the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM). The Second Congress of Architects and Specialists of Historic Buildings in Venice in 1964 produced the important Venice Charter and the birth of ICOMOS.

ICOMOS emphasizes the global coordination role of this organization, directed at establishing an international effort for the preservation and the appreciation of the world heritage of historic monuments. Specifically, the ICOMOS mission is to

- Bring together conservation specialists from all over the world and serve as a forum for professional dialogue and exchange
- Collect, evaluate, and disseminate information on conservation principles, techniques, and policies
- Cooperate with national and international authorities on the establishment of documentation centers specializing in conservation
- Work for the adoption and implementation of international conventions on the conservation and enhancement of architectural heritage
- Participate in the organization of training programs for conservation specialists on a worldwide scale
- Put expertise of highly qualified professionals and specialists at the service of the international community (http://www.icomos.org/index.php/en/about-icomos/mission-and-vision/icomos-mission).

The 1972 UNESCO World Heritage Convention specifically names ICOMOS as one of three formal advisory bodies to UNESCO's World Heritage Committee. (The other two are the World Conservation Union, IUCN, and the International Centre for the Study of the Preservation and Restoration of Cultural Property, ICCROM). ICOMOS's most important task is to evaluate all nominations of cultural sites that are submitted by the States Parties (the countries that have ratified the World Heritage Convention) to the World Heritage Committee. Among ICOMOS' many scientific committees, ICAHM/International Committee on Archaeological Heritage Management now plays a crucial role in assisting those countries seeking advice on the nominations process, among its other functions. ICAHM is currently working on standards of professional performance (see http://www.icomos.org/icahm/orgchart/ICAHM_Function_OfficesandDuties.pdf) and recently launched a publication series called "Multidisciplinary Perspectives on Archaeological Heritage Man agement" with Springer Publishing. ICAHM is also concerned to communicate its activities to the general public in the hope of raising awaren ess about site management, the proper conduct of which furthers ICOMOS' overall goal of site preservation.

The other ICOMOS scientific committees are: Analysis and Restoration of Structures of Architectural Heritage; Documentation of Cultural Heritage; Conservation/Restoration of Heritage Objects in Monuments and Sites; Cultural Itineraries; Cultural Tourism; Earthen Architectural Heritage; Economics of Conservation; Fortifications and Military Heritage; Historic Gardens and Sites; Cultural Landscapes; Historic Towns and Villages; Intangible Cultural Heritage; Interpretation and Presentation; Legal, Administrative and Financial Issues; Pacific Islands; Polar Heritage; Risk Preparedness; Rock Art; Shared Built Heritage; Stained Glass; Stone; Theory and

Philosophy of Conservation and Restoration; Training; 20th Century Heritage; Underwater Cultural Heritage; Vernacular Architecture; Wall Paintings; and Wood. Obviously, not all of these ICOMOS scientific committees are concerned with the archaeological past.

Cross-References

- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation

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International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)

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Introduction

Around the world local, regional, and international tourism has grown significantly in importance since the end of World War II. Tourism is now a major employer in rural and urban areas across the world. In many communities, it is now one of the largest sources of economic activity. The numerical growth of the middle class in many emerging economies coupled with the emergence of mass-market air travel means that a greater proportion of the global population is now able to enjoy leisure travel than ever before. Similarly, the spread of mass communication media, such as television and cinema, combined with improved education in most countries has stimulated a desire in many people to visit other places and to experience other cultures.

While the early years of postwar mass tourism often concentrated on outdoor leisure pursuits and relaxation, the last 30 years have witnessed a fragmentation and diversification of the tourism industry. Consumer, adventure, family, sport, cultural and eco-tourism are now recognized sectors of the industry and they, too, contain further subsectors. If we understand culture in the way that anthropologists do – as the way of life and shared values of a particular community – then all tourism is cultural. Even a beachside holiday takes place in the context of a certain way of life and specific shared values. So the various forms of tourism rarely exclude a mixture of objectives on the part of travelers and visitors. Beach holiday makers may include in their holiday plans a visit to a historic site or museum. People who are primarily interested in experiencing the arts, heritage, or historically significant sites may also want to spend time in a resort or on the ski fields.

Tourism operators, too, usually cater to varying needs. There are many ways to experience any tourist site. When we talk, then, of cultural tourism, it is a category that differs from other types of tourism in its emphasis and prioritization of the cultural aspects of the visitor experience. Almost all travelers are cultural tourists in some sense or at some time.

Cultural tourism can, however, be an area of contention because many sites, objects, and practices of cultural significance were never intended to host large numbers of visitors. When poorly managed, tourism can cause irreparable damage to cultural places or artifacts. The desire to attract visitors must be balanced by the need to preserve artifacts, traditions, or sites for others. It is also important that visitors respect and seek to understand the cultures of other people. Conflicts between ideas of individual and group ownership

of cultural artifacts, sites, and traditions also need to be taken into consideration. While cultural meaning and significance is created by groups of people, individual items or places may rightfully belong to individuals whose rights and interest may conflict with those of the wider community.

Cultural tourism is a growing sector, and demand for tourist experiences with a cultural focus is expected to continue growing (OECD 2009). This growth is in part a reflection of today's demand for cultural authenticity. Visitors to culturally significant sites want firsthand experience of significant artifacts and places (Schouten 2007). This desire, however, also creates challenges for custodians and managers of cultural and environmental heritage. Just as the sheer number of visitors to heritage and culturally significant sites may threaten some of them, so, too, the demand to experience "the real thing" poses challenges for their preservation, especially when the effects of age-related deterioration, exposure to environmental damage, and changing cultural understandings are taken into account. Once again, a careful balancing of the demands of visitors and of preservation is required (ICOMOS 1994). The Charter has at its heart the objective of balancing these different interests.

Definition

Cultural tourism is a term that refers to tourism that has as its primary focus the experience of artistic, historical, or ceremonial aspects of places, artifacts, or practices.

The International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999) was adopted by the International Council on Monuments and Sites (ICOMOS) at its twelfth General Assembly in Mexico in October 1999.

ICOMOS was called into being in 1964 in response to a proposal from the United Nations Educational, Scientific and Cultural Organization (UNESCO). It is an international, nongovernment, membership-based organization most of whose members are professionals in the heritage, architecture, archaeology, and historical sectors. ICOMOS advises UNESCO and national governments on matters of world, national, and local heritage, and it has adopted a range of charters, resolutions, and declarations concerning aspects of cultural and environmental heritage protection and management. It has various scientific committees including one for cultural tourism.

Key Issues/Current Debates/Future Directions/Examples

The International Cultural Tourism Charter (1999) consists of six principles, seven objectives, and an introductory statement of its ethos. This opening section explains the thinking behind the document and provides examples of cultural and natural heritage. It also makes clear that the Charter takes a universalist position on culture and cultural heritage. This position asserts that cultures share certain universal values and that heritage "belongs to all people." It is, though, a position that reflects Western Enlightenment ideas about the universality of human experience and culture and is one that is not shared by some other intellectual traditions.

The Introduction to the Charter further makes it clear that we live in an increasingly globalized world. Globalization is often seen as a threat to local cultural traditions and in recent years a number of international initiatives have been implemented with the aim of protecting the diversity of cultures around the world (UNESCO 2005). The Charter Ethos argues that "people everywhere" are challenged to preserve cultural diversity and conserve, present, and interpret cultural heritage. The Charter, nevertheless, recognizes that at the practical level these tasks normally fall to local communities. One of the principal aims of the Charter is to provide guidance to the people of these communities.

A further objective is to encourage the tourism industry to "respect and enhance" the culture of host communities. In many respects, cultural tourism brings with it inherent conflict potential,

particularly between the interests of visitors and tourism operators on the one hand, and local communities and cultural custodians on the other. The third of the Charter's objectives is to foster dialogue between "conservation interests and the tourism industry." One of the desired results of this dialogue is the development of management plans that sets goals and strategies for the "presentation and interpretation of heritage places and cultural activities," and this is encouraged in the fourth of the objectives.

The first of the principles contained in the Charter notes the importance of cultural tourism for cultural exchange and calls for the conservation of cultural heritage so as to provide visitors and host communities with firsthand experience of cultural sites. The four subsections of Principle 1 deal with the contemporary significance of natural and cultural heritage, the need for the explanation and interpretation of cultural and natural significance, the fostering of the awareness needed to ensure the survival of heritage and the diversity of cultural meanings attributed to some places.

Principle 2 addresses the potential for conflict between the competing demands made on heritage sites. Its first subsection deals with cultural heritage as a source of "cultural diversity and social development." It calls for policy measures in a range of fields to ensure the protection of cultural manifestations. Later subsections deal with questions of authenticity, conflict resolution, the use of local materials and traditions in conservation programs, the development of management plans, and the implementation of evaluation programs to assess the impact of tourism on sites of cultural significance.

In many cases, the concerns of host communities and visitors to places of cultural interest can be in conflict. For a long time visitors to Uluru in Central Australia thought a visit to this iconic site was best capped with a climb up the famous rock. Many people would still like to do so. But climbing on Uluru conflicts with the cultural importance of the site for the local community – as well as causing environmental damage – and, hence, visitors are discouraged from doing so. In other places, host communities require visitors to dress in a manner appropriate to the meaning of a site, to remove their shoes, to refrain from taking photographs, to maintain silence, and so on in efforts to ensure that tourism does not harm the cultural traditions and meanings of a site or to minimize physical damage. Balancing these requirements with the legitimate interests and desires of visitors is one of the key objectives of the Charter, and one that is embodied, in particular, in subsections 2.2 and 2.6.

The authenticity of the visitor's experience is a crucial element for most cultural tourists. Indeed, the search for cultural traditions and practices that are considered more "authentic" than their own is a key element of cultural tourism for many people, particularly in Western countries. But when considered more closely, authenticity becomes a contentious concept. The materials used in many historically important buildings are prone to natural deterioration and may need to be replaced. The actual wood we see when we visit a centuries-old Asian temple today may actually be quite recent. Similarly, in many European cities, numerous historic buildings were reconstructed in the aftermath of World War II and while they may appear much older, they are not strictly "authentic" or particularly old. In recent years, this feature of cultural heritage conservation has taken on new dimensions in Berlin where there has been a lively debate about reconstructing the Baroque palace (Stadtschloss) after it was damaged during the war and its ruins removed in 1950. Few people would argue that the resulting urban wasteland should remain unused. But the idea of rebuilding from scratch a (pseudo) Baroque palace is in itself an interesting commentary on the contemporary thirst for "heritage" even if it is not genuinely authentic. Subsections 2.4 and 2.5 of the Charter call for the "retention of the authenticity of heritage places" (2.4) and for infrastructure developments at heritage sites to use local materials while respecting local traditions and styles in architecture.

The third of the six principles deals with the visitor's experience at places of cultural tourism. It contains four subsections each of which gives guidance on ways in which the visitor's

experience can be enhanced. It is essential for the economic success of cultural tourism that visitors find a particular experience rewarding, authentic, and well managed. Visitors are usually discerning and well-informed people who will quickly turn elsewhere if their experience of a particular heritage site, practice, or artifact is artificial, disrespectful, or exploitative. They also have myriad needs that vary from person to person and they generally value experiences that offer visitors flexibility and individuality. Subsection 3.2, thus, calls for visitors to be able to pace their visit to a heritage site at their own discretion, while subsection 3.1 calls for visitors to be provided with "high-quality information" on the significance of a particular item of heritage.

The Charter stipulates the various elements of a cultural experience that visitors should be able to expect. They also have responsibilities, though. Successful cultural tourism is able to balance the desire of visitors to experience places, artifacts, and practices of cultural significance with the right of host communities and the interest of all parties in the preservation and conservation of natural and cultural heritage for posterity.

The rights of host communities who are involved in cultural tourism are the focus of principles 4 and 5. In particular, these principles call for the rights of communities to restrict access to sites, cultural practices, and artifacts to be respected. Cultural tourism has a strong universalist element. Western Enlightenment thinking holds that cultural traditions, sites, and practices should be universally and equally accessible to everyone. It rejects the idea of knowledge that can or should be restricted to certain people based on community membership, religious faith, or gender. But more recent ethical debate has led to a realization that Western thinking cannot reasonably be imposed on peoples and communities that do not share its tenets.

Subsection 4.1 deals with the rights of host communities and traditional owners to contribute to management plans, policies, and protocols concerning places of cultural tourism. Making host communities the primary beneficiaries of cultural tourism is at the heart of Principle 5. When well managed, the benefits of cultural tourism can be numerous and substantial. They extend beyond the purely economic and can include employment, educational, intercultural, and intergenerational dividends. Subsection 5.2 even advocates for gender equality in the distribution of benefits that accrue to local communities from cultural tourism. The reinvestment of a proportion of revenues earned from cultural tourism in the protection and conservation of places of significance is the central objective of subsection 5.3.

The interpretation of cultural heritage and its presentation to visitors is a critical element of successful cultural tourism. It may also be an area of debate and controversy. Sometimes the cultural significance of a site, artifact, or practice may no longer be fully understood. In such cases, interpretation may be largely speculative and it may be difficult to separate fact from fiction and mythology. Recent research may even challenge or contradict long-cherished understandings and interpretations. In other cases, the same site or artifact can have different and even conflicting meanings to different communities. Former battlefields, for example, may represent the site of a famous and nationally important military victory for one community while arousing painful memories of defeat, loss of life, and national subjugation for another community. Sensitive, respectful, and balanced interpretation of such sites is vital if they are to contribute to the peaceful coexistence of communities and nations in our time. These examples all attest to the central role played in cultural tourism by cultural interpreters. Subsections 5.4 and 5.5 of the Charter deal with interpreters and call for them to be drawn from host communities so as to develop skills among community members and to promote interest among local communities in their cultural heritage and its preservation.

The sixth and final of the Charter's principles deals with the protection of natural and cultural heritage in the context of cultural tourism. It calls for controls on excessive visitor numbers at sites of cultural tourism and proposes that host communities encourage visitors to take a wider view of the region in which a particular attraction is

located. The subsections also call for host communities to encourage appropriate behavior among visitors by ensuring that the information provided deals with the heritage of a place or community in a responsible fashion.

The International Cultural Tourism Charter is, by dint of its legal status as charter, not an enforceable legal instrument. It sets out principles of good practice but is, in essence, aspirational.

The Charter is narrow in its understanding of cultural tourism. Its primary focus is clearly on cultural and natural heritage sites. Cultural tourism involving intangible heritage, such as performances, ceremonies, and rituals, is not explicitly covered in the Charter. Nor does the Charter deal explicitly with movable cultural artifacts. These features reflect the Charter's own parentage as a document produced by the International Council on Monuments and Sites.

The Charter makes occasional reference to the protection and conservation of natural heritage, but does not make clear the difference between the two.

The Charter is available in English, French, Spanish, Greek, Mandarin, and Dutch and can be accessed via the ICOMOS website at http://www.international.icomos.org/charters.htm.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ UNESCO (1972) and Malta (1992) Conventions

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International Heritage Conservation Principles: Historical Overview

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Introduction

To keep and maintain what we value and to hand it down to future generations is an aspect intrinsic to human development and deeply rooted in all cultures worldwide. Modern times saw the development of the concepts of heritage and conservation, which, as an inseparable part of building and preserving the cultural identity of a group, today have been established as critical elements of national culture. International principles on preservation and conservation try to build a bridge for conservation efforts worldwide and aim to establish a common understanding on what to preserve and how, and more generally, on the meaning of heritage for society as a whole.

Definition

The term "International Principles of Conservation and Preservation" is mostly used to describe

internationally recognized and collaboratively developed doctrines and standards relating to the protection, care, and treatment of heritage resources, both movable and immovable (cf. Jokilehto 2002).

Considering the cultural and natural heritage as irreplaceable and precious, the responsibility of all to safeguard the common heritage of mankind and transmit it to future generations "in the full richness of [its] authenticity" constitutes the principal doctrine of the international conservation movement (cf. ICOMOS 1964, *The Venice Charter*, Preamble). In guiding countries and their experts in the practical implementation of this doctrine, international principles of conservation and preservation have been developed over time, all of them basically identifying and defining:

1. The subject of conservation (what)
2. The meaning/content and aim of conservation (why/for whom, the relevance of context)
3. The rules/methods of conservation (how, scientific and technical aspects)

International conservation practice covers a broad range of tangible and intangible subjects, and in its laid down principles, categories such as historic monuments (ICOMOS 1964, *The Venice Charter*, Art. 1) or cultural and natural heritage (UNESCO 1972, *The World Heritage Convention*, Art. 1) are more closely defined. In this respect, conservation practice is restricted to the subjects of conservation identified and defined in the various international agreements. However, definitions keep on widening in their scope and there is international recognition that, principally, every place that is of value to people can be subject of conservation and preservation (Petzet 2005: 8).

The definition of aim and content of conservation is intrinsically connected to the theoretical discourse on "the true meaning" of conservation. This discourse underlies the entire history of the development of (international) conservation principles and, naturally, its arguments shaped their content and meaning over time. Traditionally, the restoration movement employed and propagated the approach that restoration was about bringing back the "ideal" or "true" state of an object or place, based on "objective" and scientific knowledge. Today, there is international consensus that the discipline of conservation/preservation/restoration in general aims to retain a place because it is culturally significant, this cultural significance needing to be defined anew for every place or object (De La Torre 2002: 3; *The Venice Charter*, Art. 1 and Art. 3; Australia ICOMOS 1999, *The Burra Charter*, Art. 2.2). Hence, at the heart of the modern conservation movement, featuring principal protagonists such as John Ruskin (1819–1900), William Morris (1834–1896), or Alois Riegl (1857–1905), lies the concept of values and the recognition of the relativity of values (Jokilehto 2002: 18, 174-244). According to the *Burra Charter* (ICOMOS 1999, Art. 1.2), the concept of cultural significance can be defined in the following way:

> Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.
>
> Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.
>
> Places may have a range of values for different individuals or groups.

Beyond the doctrines on the subject, content, and aim of conservation, there are principles defining the approaches and methods for retaining a place in its full meaning. The fundamental principle is the concept of authenticity, according to which an object is to be conserved in its authentic "truthful" state, this state being defined within its cultural context and not according to certain objective standards (UNESCO 1994; cf., section "Key Issues/Current Debates"). In order to respect and conserve a place in its full authentic meaning, conservation interventions should change "as much as necessary but as little as possible," giving the principle of "constant care and maintenance" primacy over any other conservation method (*The Venice Charter*, Art. 4; *The Burra Charter*, Art. 1.5, 3.1). There is a variety of terms for the methods or principal measures of conservation, encompassing for instance preservation, maintenance, restoration, renovation, and reconstruction. These different conservation methods are most often formulated as "rules," indicating

which method should be best employed, how and under which conditions. A set of definitions is given, for instance, in Art. 1.4–1.8 of *The Burra Charter*, and *The Venice Charter* lays down a multitude of principles or "rules," that is, "Wherever the traditional setting exists, it must be kept" (Art. 6).

Even though the principles in *The Venice Charter* are internationally recognized, conservation methods are understood and used differently in different parts of the world. However, all conservation practice is based on the general principles outlined above and hence grounded in a common understanding of conservation theory and practice as a discipline that aims to preserve what is of value to people (Clark 2010).

Sources of international conservation principles are documents developed and agreed upon within an international discourse and through international collaboration of countries and conservation experts worldwide. In establishing this collaboration, international key organizations for the conservation of the cultural and natural heritage are instrumental.

The International Council on Monuments and Sites (ICOMOS) as the international forum for professional dialogue is the platform on which most of the international charters and guidelines on heritage conservation and preservation are developed. The fundamental conservation guideline is the *International Charter for the Conservation and Restoration of Monuments and Sites* (*The Venice Charter*) from 1964, which was the basis for the so-called *Burra Charter* (*The Australia ICOMOS Charter for Places of Cultural Significance*, 1999), drafted by Australia ICOMOS and highly influential and recognized outside Australia. There are further charters developed by ICOMOS, covering a range of conservation subjects, for example, the *Charter for the Protection and Management of the Archaeological Heritage* (Lausanne, 1990). Agreed upon and adopted by expert individuals, charters and the principles expressed by them are legally not binding, yet highly relevant in international heritage discourse. Each country should apply the international principles within the framework of its own culture and legislation.

A legally binding source of international conservation principles are multilateral treaties negotiated on an intergovernmental level. Usually initiated in the international framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO) or, on a European level, in the framework of the Council of Europe, international treaties are agreed upon by the signatory states and put into force after ratification by a certain number of signatory states, as defined in detail in every treaty. The UNESCO *Convention Concerning the Protection of the World Cultural and Natural Heritage* (*The World Heritage Convention*, 1972) is the most well-known and successful international treaty and the first installing a common protection system for culture and nature (UNESCO World Heritage Centre 2007). Since then, a wide range of international conventions have been drawn up, constituting an important source for international heritage conservation and its principles, including for instance the UNESCO *Convention on the Protection and Promotion of the Diversity of Cultural Expressions* (2005) or the *European Convention on the Protection of the Archaeological Heritage* (Valetta, 1992).

Historical Background

Principles of preservation and conservation are nothing permanent, but in continuous development, and so are the associated practices and methods. They very much reflect the time of their conception. Most often, conservation principles evolve as a reaction to major transformations in the sociopolitical, cultural, or economical context of life. The historical perspective on international preservation principles shows that new principles seek to respond or to adapt to new needs. Central concerns or key issues in the field of heritage conservation continue to shift, while the terms that are at the core of preservation principles are regularly redefined.

While the general history of heritage conservation has its roots in antiquity, a development of international preservation principles began only in Modernity, by the end of the nineteenth

century. In their combination of political issues, history, social sciences, law, philosophy, ethics, and others, preservation principles are a particularly complex matter. However, as they are by definition a form of international public law, a primary approach to their historical background is through the history of law.

As a matter of fact, international principles are essentially based on the preceding forms of national, communal and local laws for heritage conservation. The earliest documented legal acts of that kind are from Roman law (cf. Poulot 2001) and concern the local protection of moveable and immovable objects which were valued as monuments (cf. Choay 1996). A major advancement in the general development of preservation principles followed in the course of the fourteenth and fifteenth century with numerous edicts and laws passed in various Italian republics which, for the first time, explicitly stated public interest as a motivation for protecting cultural heritage assets. Still, these laws focused mainly on built or material heritage, second most important for the advance in international preservation principles were the consequences of the French Revolution and secularization throughout Europe. The idea of a common, public heritage generated a new form of collective consciousness: the nation (cf. Babelon & Chastel 1994). With an inherent notion of public responsibility for heritage, conservation became increasingly institutionalized, or, in other terms, nationalized: Cultural heritage had finally assumed a fundamental importance for preserving collective cultural identity. The foundation for this understanding of heritage as an expression of collective identity and associated conservation philosophy had been laid by the late eighteenth century's concept of historical time: the insight that any man-made object belongs to a certain time and place, that it cannot be repeated in another (Schmidt 2008), and that it therefore uniquely "represents" its context. By the end of the nineteenth century, heritage conservation had become an essential element in the building of nations and the legal organization of the nation-state (Jokilehto 2002). In this view, the first and foremost preservation principle of protecting national values also entered the first models of international public law, namely, the Hague Conventions of 1899 and 1907, which as laws of war included first paragraphs referring to the special treatment of foreign cultural property in armed conflict, acknowledging thus the essential importance of heritage property for peoples. After the Second World War, these early considerations were finalized in the *Hague Convention on the Protection of Cultural Property in the Event of Armed Conflict* (1954); a second protocol to this convention was added in 1999. Alongside the fundamental principle to protect cultural heritage assets from the danger of violent destruction or loss as in times of war, from the early twentieth century onwards, the development of international principles for heritage conservation gained momentum. The *Athens Charter on the Restoration of Historic Monuments* (1931) was groundbreaking in this regard because it included a first call for establishing international organizations for restoration on operational and advisory levels. Consequently, in the 1950s and 1960s, a series of international bodies for cultural and natural heritage and for the development and implementation of international preservation standards and principles were founded: the UNESCO in 1946, followed by ICOM (International Council of Museums, 1947), the IUCN (International Union for the Conservation of Nature and Natural Resources, 1948), and ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property, 1956), as well as ICOMOS in 1965. The three last-named organizations operate as advisory bodies to the UNESCO. These inter- and nongovernmental institutions and associations deal with educational, legal, and technical issues of conservation from an international to a local level, contributing thereby to the worldwide dissemination and implementation of international preservation principles. With growing international attention for preservation, consequently also the importance of those international public bodies, along with a number of internationally operating private institutions, is growing.

A turning point in understanding cultural heritage as being of international public interest was the *Convention Concerning the Protection of World Cultural and Natural Heritage* (UNESCO 1972), which designated for the first time heritage as universal, concerning all nations alike, that is: humankind (UNESCO World Heritage Centre 2007). Through the *World Heritage Convention*, the concept of a universal, world heritage became codified and the "outstanding universal value" of the heritage protected under its schemes is acknowledged through its protection instrument on an international level, the World Heritage List (*The World Heritage Convention*, Art. 11.2).

Meanwhile, the steady evolution of the definition of heritage contributes to a significant enlargement of the subject of preservation principles. Limited in their origin to historic monuments, international preservation principles gradually were extended, first to other forms of material heritage, such as sites, while subsequent conventions included the protection of historic gardens (*The Florence Charter*, ICOMOS 1981), historic towns, and urban areas (*The Washington Charter*, ICOMOS 1987), as well as the *Protection and Management of Underwater Cultural Heritage* (UNESCO 1996), and of landscapes (*European Convention on Landscapes*, 2000). In accordance with the widened subject of interest, the reach of preservation principles was also enlarged: In addition to protection, international conventions increasingly relate to questions of management, most clearly so in the *International Cultural Tourism Charter* (ICOMOS 1999) *for Managing Tourism at Places of Heritage Significance*. In the year 2004 another crucial turn in understanding the notion of heritage and hence preservation principles became manifest with the UNESCO *Convention for the Safeguarding of Intangible Cultural Heritage* (2003). The *Nara Document on Authenticity* (UNESCO 1994) and in particular the Australia ICOMOS *Charter for the Conservation of Places of Cultural Significance* (*The Burra Charter*, 1999), testified to the primary recognition of the immaterial aspect of the concept of heritage, arguing that it merited equal protection to material heritage. From Europe, one of the latest international preservation principles is the *Council of Europe Framework Convention on the Value of Cultural Heritage for Society* (*The Faro Convention*, 2005). This convention regards the significance of heritage and for the first time provides an understanding of the heritage community, namely, the "people who value specific aspects of cultural heritage which they wish, within the framework of public action, to sustain and transmit to future generations." The constant heritage discourse and the regular revision of central international documents such as *The Burra Charter* and the *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO, 2011) ensure an evolution of international conservation principles according to contemporary needs and concepts.

Key Issues/Current Debates

A key issue in international heritage conservation is the role and meaning of values (Avrami et al. 2000; De la Torre 2002; De la Torre et al. 2005; Clark 2006). Conserving what is culturally significant until recently meant expert-defined decisions on the identification and treatment of places worthy to be preserved. There was a focus on values identified and defined by experts, such as historic or scientific value and, in a traditional, Western view, on values attributed to the material fabric of places. Accordingly, the main focus of conservation principles was on technical and scientific rules relating to form, material fabric, and the prevention of change (Clark 2010: 90). With increasing recognition of conservation as a "complex social practice," there is now a democratization of conservation theory and practice: Value categories expand and their relative, ever-changing nature becomes more and more recognized, all of this challenging traditional conservation processes (Avrami et al. 2000: 3). Values being important for the public, such as social value attributed to places – first recognized by the principles of *The Burra*

Charter – or intangible concepts of significance, most often employed in non-Western countries, inevitably lead to new perspectives on heritage and its conservation and management, often conflicting with traditional value sets.

Conservation faces the challenge to find approaches towards identifying and negotiating these conflicting sets of values and to integrate the often different objectives towards conservation and its results into holistic conservation processes. Nationally and internationally, the discourse on conservation and its principles is shifting from being focused on preserving places and their fabric to the management and use of heritage (Araoz 2009). How to use the past in the present, as part of sustainable community development and without compromising the tangible places, is one of the key issues of conservation in the twenty-first century and requires a better understanding of the nature of values and their role in conservation.

The prerequisite to perceiving cultural heritage assets as witnesses or historical evidence of the past is the notion of their authenticity, in a general sense their being true and real. Focusing on the documentary function of the monument, as in historical science, the first international preservation principles put the main emphasis on conserving the historic fabric. According to the *Venice Charter* (1964), authenticity was to be preserved by allowing no changes to its "original material," that is, the physical entirety and/or setting of the monument, unless required for its safeguarding, and only to be executed by restoration specialists. This interpretation of authenticity as a (physically) unaltered, historic status became dominant in the course of the following decades, not least because the *Operational Guidelines for the Implementation of the World Heritage Convention* saw authenticity/integrity as conditions for World Heritage nominations, to be evaluated according to the attribute's design, materials, workmanships, or setting. Only in the 1990s was this concept challenged when a revision of the World Heritage Convention criteria led to the Nara conference and the *Nara Document on Authenticity* (UNESCO 1994). This document defines the concept of authenticity as rooted in specific cultural contexts according to which it should be judged; hence, it shifts the focus from the historic, physical fabric to a more comprehensive understanding of the essence of cultural heritage assets. The current debate on "tolerance for change" in conservation practice – where conservative criticism (mis) interprets "tolerance" as a freeway to uncontrolled alteration and destruction, while the term actually implies acceptable variations on a given object, preserving its authenticity, that would hence have to be defined exactly in every single case – illustrates that the contest between these two main concepts continues.

International Perspectives

Naturally, the existence of international preservation principles and the essential international discourse on heritage conservation do not imply that heritage conservation is practiced in the same way all over the world. First and foremost, there are evident differences in the key subjects of heritage protection according to regional realities and cultural contexts. For example, mountainous regions might be less concerned with underwater heritage or intangible heritage, a minor issue in countries with a traditionally strong focus on built heritage and material fabric. Second, it has been argued that the concept of heritage and its need for preservation is original only to Western thinking but has since then been globalized. Nevertheless, it can be acknowledged that it is through international discourse that international agreements in preservation standards and norms have been established which at present are influencing regional development in heritage preservation (cf. Vinson 2009). More important, it is international exchanges in the theory and practice of heritage preservation that, particularly in the wake of significant anniversaries, produces continuous critique and revision of international documents, hence also of their often limited context and possible imbalances. Finally, while the ongoing development of heritage definitions has brought to light the basically unlimited variety of heritage assets, an international understanding is

gradually taking shape that realizes the value of heritage for the individual and for society to be an essential, universal part of human culture; hence, it is the responsibility to protect, and the right to participate in, cultural heritage that need to be universally, internationally promoted.

Future Directions

Sustainable development is the key phrase for all activities relating to the human environment, hence also for conservation of the cultural and natural heritage. Not yet explicitly mentioned in most of the international conventions and charters concerning heritage conservation, the interrelation of heritage and sustainable development is internationally acknowledged and can be defined the following way:

"The protection and conservation of the natural and cultural heritage are a significant contribution to sustainable development." (Para. 6 *Operational Guidelines for the Implementation of the World Heritage Convention;* cf. also: Preamble, Art. 9 and 10 of *The Faro Convention*)

How heritage can be used wisely in order to benefit the sustainable development of our society, be it in economic, social, or environmental terms, is the major challenge ahead for the conservation movement. One important issue in this context, dominating debate and research on heritage and environment, is global climate change and its effects on the material and immaterial heritage (ICOMOS 2008; Long & Smith 2010). Global climate change as defined in Article 1.2 of the *United Nations Framework Convention on Climate Change* (1992) endangers heritage on a global scale and in a variety of ways. According to ICOMOS, the "main climate change parameters affecting cultural heritage are temperature change, atmospheric moisture change, sea level rise, wind, desertification, pollution and biological infestation" (ICOMOS 2008: 194). The effects these parameters have on tangible heritage are starting to be recognized and investigated in detail, and international recommendations on adaptation to climate change developed, emphasizing the relevance of tools such as monitoring, research, preventive maintenance, and training and advocacy with regard to global climate change and risk preparedness (ICOMOS 2007). In fact, there is a focus on the preservation of material fabric and on technical, site-specific approaches to adapt to the threats climate change is posing to buildings and structures. Developing a more comprehensive understanding of climate change as a threat to culture and intangible heritage, in fact to livelihoods, as well as an understanding of "the power of culture" as a tool helping to adapt or even mitigate climate change, will be of growing importance in the future (Long & Smith 2010: 184).

With the growing weight of heritage preservation in international politics, another major issue on the rise is human rights in heritage conservation. Research in political analysis has highlighted the arguably critical potential of heritage as a practice of social oppression and exclusion (Smith 2006; Díaz-Andreu García 2007), and in this context the dominance of Western scholarship in international heritage conservation has received overdue critique. While the UNESCO *Convention for the Safeguarding of Intangible Cultural Heritage* from 2004 is generally acknowledged as a first important measure to amend this imbalance, as it explicitly relates to the Universal Declaration of Human Rights (United Nations, 1948), the challenge remains of how to reconcile the concept of heritage, defining a collective cultural identity, with fundamental but individual rights. The *Fribourg Declaration on Cultural Rights* is breaking ground here by declaring cultural rights as intrinsic to human rights (*Fribourg Declaration on Cultural Rights*, 2007). Likewise, the *Faro Convention*, that is, the *Council of Europe Framework Convention on the Value of Cultural Heritage for Society* (Council of Europe 2005), is not only "recognizing the need to put people and human values at the center of an enlarged and cross-disciplined concept of cultural heritage" (*Faro Convention*, Preamble), but explicitly states that "rights relating to cultural heritage are inherent in the rights to participate in cultural life, as defined in the Universal Declaration of

Human Rights" (*Faro Convention*, Art. 1). In this regard, the growing impetus of critical research on the political aspects of heritage preservation (Smith 2004; Fairclough et al. 2008; Tunbridge 2008) contributes to exploring the potential of heritage preservation principles to employ the fundamental power of cultural heritage for identity and community building, based on the principles of democracy, social justice, and equal rights. Recent studies on the international status quo of cultural rights indicate also their growing importance for international heritage principles (Shaheed 2010).

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Cultural Heritage and the Public
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: Public Perceptions
- ▶ Stakeholders and Community Participation
- ▶ UNESCO (1972) and Malta (1992) Conventions
- ▶ World Heritage and Human Rights

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International Journal of Cultural Property

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Basic Information

The *International Journal of Cultural Property* is an interdisciplinary peer-reviewed journal focused on cultural property and heritage law and policy. It is currently published quarterly by Cambridge University Press and is available worldwide both in print and online. The website is http://journals.cambridge.org/action/displayJournal?jid=JCP, and the editorial office may be reached by email at culturalproperty@cambridge.org.

Major Impact

Founded in 1992 by John Henry Merryman of Stanford Law School as the journal of the International Cultural Property Society, the *IJCP* quickly established itself as the leading journal in the emerging field of art and antiquities law. Over the years, it has expanded its scope to include a full range of topics related to "cultural property" and heritage studies, though with its particular distinction being its continued emphasis on those subjects' legal and policy dimensions (Bauer 2005). As a result, it enjoys wide readership and regularly features contributions from those in policy arena such as the United Nations Educational Scientific and Cultural Organization (UNESCO), the International Council on Monuments and Sites (ICOMOS), and the World Intellectual Property Organization (WIPO). As of 2010, the *IJCP* has published 17 annual volumes, with a hiatus during 2003 and 2004. Over that time, it had three editors in chief: Norman Palmer (1992–1995), Patty Gerstenblith (1996–2002), and Alexander Bauer (2005–present).

The *IJCP* has published several articles and special issues that have been widely recognized for their importance in the field of cultural heritage. Articles include Lyndel Prott and Patrick O'Keefe's (1991) "'Cultural Heritage' or 'Cultural Property'?," John Henry Merryman's (1994) "A Licit International Trade in Cultural Objects," John Boardman's (2000) "The Elgin Marbles: Matters of Fact and Opinion," and Michael F. Brown's (2005) "Heritage Trouble: Recent Work on the Protection of Intangible Cultural Property." Special issues and sections have included "Cultural Heritage of Indigenous Peoples," edited by Robert K. Paterson and Patrick O'Keefe (1999); "Museums and the Pacific," edited by Haidy Geismar (2008); "Decoding Implications of the Genographic Project for Archaeology and Cultural Heritage," edited by Julie Hollowell and George Nicholas (2009); and "Spoils of War v. Cultural Heritage: The Russian Cultural Property Law in Historical Context," edited by Patricia Kennedy Grimsted (2010).

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ World Heritage Journals

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International Journal of Heritage Studies

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Brief Definition of the Topic

Founded in 1994, this is the leading referred journal in international heritage studies. Published as seven issues a year, by Routledge, the *International Journal of Heritage Studies* (IJHS) includes original research articles, review articles, short reports or discussion pieces, and book reviews. The remit of the journal is to encourage the development of heritage studies as both an area of academic enquiry and as an area of public policy and practice.

Heritage studies became a recognizable area of academic enquiry during the 1980s. The study of heritage was itself initiated by the surge of national and international policies and legal instruments that were enacted around the globe during the 1960s and 1970s in an attempt to conserve and protect the built environment, archaeological sites, artistic works, and significant material culture as heritage. Although heritage studies developed out of the professional practices concerned with heritage management and architectural and art conservation, heritage studies is not confined only to the development of technical issues and practice. IJHS is dedicated to the theorization of heritage as a cultural phenomenon and aims at fostering international and interdisciplinary debate about the nature and meaning of heritage with particular emphasis on how heritage links to memory, identity, and sense of place.

Thus, the remit of the Journal is to publish articles contextualized within the growing field of heritage and museum studies and which contribute to debate about the theorization of

heritage as cultural, political, and/or social experiences as well as articles that critically address technical, professional, or policy issues (i.e., cultural heritage management). In fostering the development of heritage studies, the journal also supports the development and activities of the Association of Critical Heritage Studies, the inaugural conference for which was held in 2012 at the University of Gothenburg, Sweden.

Contributing authors come not only from the interdisciplinary area of heritage and museum studies, but also from the disciplines of history, tourism, sociology, anthropology, cultural geography, law, cultural studies, archaeology, architecture, and interpretation and design. During 2010, the journal published 32 articles (volume 16) exploring policy, theory, and practice in 17 different countries.

The founding editor of the Journal was the geographer Peter Howard (1994–2007), then at the University of Plymouth (UK), he was followed by Fiona McLean (2007–2008, then at Glasgow Caledonian University), and the Journal has been edited since 2009 by Laurajane Smith (Australian National University) assisted by Emma Waterton (University of Western Sydney). The current book review editor is Steve Watson (York, St John University, UK). The editorial Board, consisting of 40 members, is made up of academics and practitioners from a range of disciplinary and national contexts. The URL for the Journal is http://www.tandf.co.uk/journals/routledge/13527258.html.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Heritage Theory
- ▶ Heritage: History and Context

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International Journal of Historical Archaeology

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Brief Definition of the Topic

The *International Journal of Historical Archaeology* is a professional, fully refereed quarterly published in March, June, September, and December. Charles E. Orser, Jr., developed the journal in 1996 in collaboration with Eliot Werner, who was then the anthropology/archaeology editor at Plenum (now Springer).

By the early 1990s, the practice of historical archaeology was expanding throughout the world, but much of the research results were known only to archaeologists working or living within the particular region of the research. In addition, a significant proportion of worldwide research in the field was being conducted as agency-sponsored projects, research that typically includes the preparation of manuscripts of limited distribution. The original plan of the journal was thus to extend the reach of historical archaeology by publishing articles by professional archaeologists throughout the world regardless of their location. The underlying belief was that a broader appreciation of important research taking place outside North America and Western Europe – locations already well served by professional journals – would enormously benefit the discipline by allowing archaeologists to widen the scope of their comparative knowledge.

The journal defines historical archaeology in two ways: (1) as a general method that employs materials from archaeological excavation and textual information in the study of the past and (2) as the use of this multidisciplinary method to examine specifically the post-1500 CE world. Most of the articles published as of this writing conform to the second meaning, but the *IJHA*

accepts manuscripts focused on all issues pertinent to contemporary historical archaeology regardless of temporal focus, provided the author uses textual materials (broadly defined) in some fashion.

Cross-References

- ▶ Archaeological Record
- ▶ Community Engagement in Archaeology
- ▶ Critical Historical Archaeology
- ▶ Critical Theory in Archaeology
- ▶ Global Archaeology
- ▶ Historical Archaeology
- ▶ Landscape Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Social Memory in Archaeological Theory

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International Organization for Quality Management of Cultural Heritage (HERITY©)

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Basic Information

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HERITY©, International Organization for Quality Management of Cultural Heritage (www.herity.org), was launched in 1994 on initiative of DRI (Italy) as an international forum. The name derives from the union of the two words *Heritage* and *Quality* in order to define the mission of the organization: managing our common Cultural Heritage with principles of Quality helping managers to better manage the assets they are in charge of and informing the public on the situation of an asset in a more complete way.

The first HERITY© International Committee was formalized in 2002 after the Calamosca Declaration (1998) and the Barletta Resolution (2001), which stated that Cultural Heritage is the collective memory of Humankind; Cultural Heritage is a non-renewable resource; Quality Management of Cultural Heritage should be oriented to its preservation, in the context of sustainable development.

Thus, Cultural Heritage initiatives must be very carefully planned since they are implemented for a development sector not yet consolidated. In addition, Cultural Heritage initiatives often contain significant differences regarding their contents and strategies and initiatives to sustain Cultural Heritage carried out through cooperation involve problems concerning normalization of processes and satisfaction of all the stakeholders. Cultural Heritage initiatives must be managed professionally, be interdisciplinary and need strong local support. HERITY© was created to answer these needs, mainly through its HERITY Global Evaluation System (HGES) which allows certificating the management of Cultural material assets (museums, monuments, sites, libraries, and archives).

The HGES takes in account four main areas which have to be managed at a site, starting from the point of view of the public, both residents and the tourists:

1. *Value*, the material and immaterial importance generally attributed to a site, regardless of reason
2. *Conservation*, the existence of conditions for the creation, maintenance, and growth over time of the aforementioned perceived value
3. *Communication*, the set of initiatives taken towards the dissemination of knowledge and awareness of the aforementioned

4. *Services*, all those direct or indirect activities which foster the optimum appreciation of the value of the cultural heritage site under consideration

The certification, which is valid for 3 years, is based on the study of different perceptions and data, at different levels. The main sources are:

(a) The property and the managers of the cultural asset examined
(b) The HERITY© specialists
(c) The public and other stakeholders (e.g., sponsors, controlling institutions, professionals)

All the information is collected by HERITY© and restituted after elaboration to those who asked for the certification, together with some instruments and documentation produced for them to use. At the end of the process, a certificate, a report, and a plaque with the resulting Target are given.

Major Impact

The Target is the symbol used by HERITY© to make it possible to understand the situation of a site in a glance: on a scale from one to five, the level of Value, Conservation, Communication, and Services is described. The HERITY© Target makes it possible to compare different situations, allowing the public to choose which place is better to visit according to their own needs/convictions and different levels of interest in each criterion. For this, every place has a chance, independent of its reputation (Fig. 1).

The HGES started to be applied in Italy in 2004. In 2011 more than 240 properties were already assessed in Italy, Spain, Portugal, and Brazil, and the dialogue with other countries (in particular, Bahrain, Canada, Chile, Croatia, Cuba, Czech Republic, Dominican Republic, France, Greece, Hungary, Iran, Latvia, Libya, Lithuania, Malta, Oman, Peru, Romania, Saudi Arabia, Senegal, South Africa, Sri Lanka, Sweden, Turkey, United Arab Emirates, United Kingdom, United States of America, Taiwan, The Netherlands, The Vatican, Yemen, Uzbekistan) was enforced by the International Committee in the same span of time, both for the application of the system and the launching of National Commissions.

On August 24, 2004 official contacts with the UNESCO World Heritage Center were started, followed by technical meetings in 2004 and 2005 to spread the system at World Heritage Sites. After this, the World Heritage Center declared *"HERITY's analyses on the management quality of the World Heritage Sites are an important contribution to the setting and assessment of the national and local conservation policies and to the improvement of the services offered to the public."* In 2006 the first results of the HGES at these sites were presented to 160 delegates from different countries at the 30th World Heritage Committee. World Heritage Sites where the HGES is applied include important art cities such as Rome, Florence, and Naples as well as huge archaeological complexes such as Serra da Capivara Park (Piauí, Brazil).

The First International HERITY© Conference in 2006 marked a further milestone in the cooperation between HERITY© and Intergovernmental Organizations. As a result, in addition to the UNESCO-WHC partnership, in 2008 those with the World Tourism Organization and the ICCROM were defined.

In addition to the application of the HGES HERITY© also undertakes other activities in order to spread the awareness of the importance of Quality Management in Cultural Heritage:

- The HERITY© Universities program, which is aimed at meeting future requirements of specialists and increasing the quality of the Cultural Heritage Management teaching under a defined and recognized label.
- The HERITY© Schools program, which is aimed at encouraging primary and high schools students to look at Cultural Heritage as a common responsibility while improving students' critical skills.
- The HERITY© Cities program, reserved to those places where the HGES system was applied on a large-scale basis in their territory and which want to take advantage of this through specific campaigns.
- The HERITY© Intellectual support program, which involves recognized people from very different fields in supporting the scope of HERITY© through their intellectual contribution.

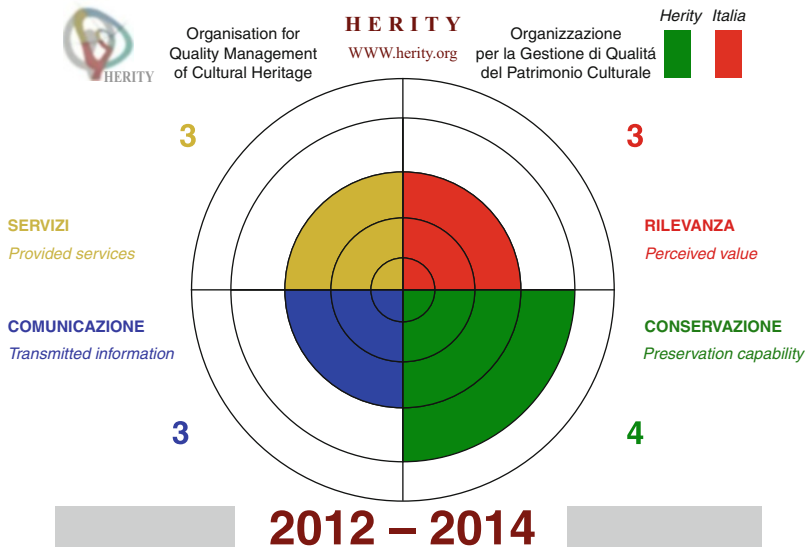

International Organization for Quality Management of Cultural Heritage (HERITY©), Fig. 1 The HERITY target

- The HERITY© Sponsorship program which makes it possible to enforce and enlarge the activities of HERITY© with personalized technical, financial, or communication agreements made with companies and other private entities which, in turn, can receive practical and image benefits on the basis of a transparent policy.
- The HERITY© Public Advocacy program is aimed at launching special events to involve the public and keep people's attention high regarding Cultural Heritage issues.

Through today, many interested parties take advantage of the HERITY© work:

(a) Site managers to highlight their efforts and to know how other interested parties perceive their asset
(b) Politicians to understand the situation at a glance for decision-making
(c) Tour Operators to know the situation of cultural sites for designing their itineraries
(d) Public agencies to inform travelers
(e) Properties to plan budgets and to promote the sites
(f) Banks and other stakeholders to verify the real improvement made possible by their financial support
(g) Publishers of guides to enrich their offer to customers

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Heritage Areas

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International Scientific Committee for Documentation of Cultural Heritage (CIPA)

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Basic Information

CIPA is ICOMOS's (International Council on Monuments and Sites) Scientific Committee for Documentation of Cultural Heritage (CIPA),

International Scientific Committee for Documentation of Cultural Heritage (CIPA), Fig. 1 Logo of CIPA

established in 1968 in collaboration with ISPRS (International Society of Photogrammetry and Remote Sensing). Its web site is at http://cipa.icomos.org/ (Fig. 1).

Major Impact

CIPA's main purpose is the improvement of all methods for recording, documentation, and information systems of heritage places, specially through the synergic effects gained by the combination of methods; particularly, the special consideration of digital surveying with all its aspects is an important contribution to recording and perceptual monitoring of cultural heritage, to conservation and restoration of any valuable architectural or other cultural monument, object or site, and as a support to architectural, archaeological, and other art-historical research.

ISPRS and ICOMOS created CIPA because they both believed that a monument can be restored and protected only when it has been fully measured and documented and when its development has been documented again and again, i.e., monitored, with respect to its environment, and stored in proper heritage information and management systems.

CIPA holds an International Symposium every two years, either in conjunction with a major conference of the two parent organizations or as a special CIPA event. Often, accompanying these Symposia are specialist workshops dealing with specific topics. The proceedings of the Symposia are also published, either as a journal or on CD-ROM, and some papers are available through the CIPA web site. CIPA also maintains a discussion list, where the experts associated with CIPA provide advice and information on problems and solutions. It also supports other heritage recording initiatives internationally.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Buildings Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Management Technology and Training
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Heritage Conservation Training
- ▶ Historic Building Conservation: Current Approaches
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ International Conventions and Charters and Archaeology Presentation
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)

▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
▶ International Heritage Conservation Principles: Historical Overview
▶ Surface Survey: Method and Strategies
▶ UNESCO World Heritage Convention (1972)

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International Slavery Museum

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Introduction

The display galleries at the International Slavery Museum (ISM) opened on August 23, 2007. Not only was 2007 the bicentenary of the Abolition of the Slave Trade Act but also a day designated by UNESCO as Slavery Remembrance Day, the anniversary of an uprising of enslaved Africans on the island of Saint-Domingue (modern Haiti) in 1791. Each year, National Museums Liverpool commemorates Slavery Remembrance Day with a series of events culminating in a traditional libation on the world famous Liverpool waterfront. The day pays homage to the many lives lost as a result of transatlantic slavery; it remembers Liverpool's role as the main British slaving port and also celebrates the survival and development of African Diaspora cultures.

The main objectives of ISM are the following: (1) to inform and help visitors understand the history of transatlantic slavery and the wider issues of freedom and injustice; (2) to challenge preconceptions, prejudice, and ignorance; (3) to encourage visitors to regard transatlantic slavery and its consequences as a shared history with shared responsibility for addressing its legacy in the modern world; and (4) to interpret, in an open and honest manner, Liverpool's role in the transatlantic slave trade and its impact on the economic and cultural growth of the city.

ISM has three permanent galleries: *Life in West Africa* looks at the area from which the majority of enslaved Africans were stolen and explores Africa's long and complex cultural history; *Enslavement and the Middle Passage* covers the economics of slavery, particularly focusing on the Liverpool merchants that were at the forefront of British involvement, plantation life, and slaving voyages; *Legacy* examines slavery as a contemporary phenomenon – global inequalities, cultural transformations, racism and discrimination, and the lives and achievements of members of the African Diaspora.

In 2013–2014, a new state-of-the-art education and research center will be opened in the building adjacent to the current ISM display galleries and will accommodate a resource center, collections center, and education and community spaces. The resource center will give visitors access to slavery-related digital archives as well as Black British and human rights multimedia and documentaries. It will also enable visitors to research family and local history. The collections center aims to exhibit all accessioned ISM collections in a publicly accessible and interactive storage and display area.

The Museum aims to enhance the understanding of the past and how its legacies affect people's daily activities, opportunities, and aspirations. One of the ways in which ISM aims to achieve these goals is by being an active supporter and vehicle of social change, as well as a political campaigner in the field of human rights. Marstine (2006: 2) explains that "Museums are not neutral spaces that speak with one institutional, authoritative voice. Museums are about individuals making subjective choices."

Definition

Terminology can often be problematic when dealing with issues around slavery, such as the use of the word "trade" in transatlantic slave trade. This is seen by several commentators to excuse the process of slavery and enslavement on the basis of regarding humans as cargo, commoditizing the enslaved Africans. Whereas "transatlantic slavery" to some degree humanizes the subject, it places human agency and action at the center of the phenomena, however objectionable this might be.

Key Issues/Current Debates

African Diaspora Archaeology

ISM demonstrates the value of the archaeology of slavery within museums and how archaeology can speak on behalf of certain (at times forgotten) African Diaspora communities. The museum is currently involved with several slavery-related archaeological projects. The St. Kitts-Nevis Digital Archaeology Project seeks to give a voice to the enslaved Africans and their families, investigating the lives of enslaved Africans through excavation and interpretation of the material remains they left behind. The project will digitize and deliver web information for three eighteenth century plantations and their slave villages, two located on Nevis and the other on St. Kitts. The result will be a first-of-its-kind digital collection of fully searchable archaeological and historical data from multiple slave village sites in the Caribbean and will be accessible on the ISM website, one of several information portals (http://www.liverpoolmuseums.org.uk/ism/slavery/archaeology/).

The museum is also collaborating with archaeologists and the St. Helenan authorities on loaning archaeological material and designing an associated exhibition relating to excavations undertaken in Rupert's Valley, St. Helena, as part of the cultural heritage mitigation for the island's forthcoming airport. The works were carried out by a team of professional archaeologists from the United Kingdom, supported by a number of St. Helenan and non-Saint volunteers. The location formed part of the burial grounds for Africans freed from slave ships by the Royal Navy, West Africa Squadron, in the mid-nineteenth century. Much of the valley is occupied by these unmarked graveyards, and the excavations only uncovered a very small proportion of the total number of burials that are known to exist. Prior to this project, no archaeological work had taken place on St Helena, and so the team broke new ground in every respect. In all, over 300 bodies were excavated, in single graves and from multiple internments. Rupert's Valley contains one of the few graveyards of Africans rescued directly from the slave ships, hence the immense cultural and heritage significance of this remote valley (Pearson et al. 2011).

Museums have to be mindful of the words of Joseph (Joseph 2011: vii) who notes how activist archaeologists are exploring "the meaningful connections between artefacts from the earth and living communities." One has to put this into context with regard to the archaeology of slavery and its depiction in a museum. A key point to understand is the value of archaeological research and partnership work for ISM and museums in this field generally. Working with archaeologists whose research covers aspects of the archaeology of slavery aids collection development and object research and offers academic credence to the museum. It offers the opportunity to include material culture relating to sites and individuals which will broaden the understanding of a subject matter and to work with African Diaspora communities in countries where archaeological research is taking place (e.g., St. Kitts and Nevis and St. Helena).

The breadth of archaeological slavery-related material within a museum environment should demonstrate a broad degree of material culture not just from a European perspective, such as goods related to the economics of slavery or implements of enslavement such as physical restraints, whips, and shackles, objects more traditionally associated with slavery. These types of objects are almost overwhelmingly made in Europe, and although interesting and rare themselves, a museum of slavery should, in addition,

display and research objects that were either made or owned by enslaved or free and emancipated Africans. Disciplines such as plantation archaeology and African American archaeological studies on lifeways can offer the public a greater awareness of the subject of the African Diaspora and indeed transatlantic slavery and its consequences through related objects (see Singleton 1999).

ISM has a Cultural Transformations section within the Legacy Gallery which shows examples of material culture and cultural traits which might have traveled with Diaspora groups from Africa to locations such as the United States, South America, and the Caribbean. Merriman (1999: 49) notes how there are two methodological approaches to carrying out research on African American lifeways. One recognizes the archaeological patterning of slave sites, using these as markers or signals, whereas the second focuses on "the search for objects with physical or behavioral links to Africa's west coast, has moved beyond the simple transfer of objects and ideas across the Atlantic to a more refined focus which integrates behavior with material culture." In essence, this approach demonstrates how the archaeological record can show that cultural traditions within new environments could be modified, using material at their disposal, rather than simply transferred from Africa.

However, it should be noted that Fennell (2011: 2) observes that there are a host of "theoretical constructs and interpretative frameworks employed in African diaspora archaeology projects and comparative studies in the historical archaeology of sites in Africa." The subject of slavery, both in a historic and contemporary setting, is expansive and diverse, and although the core of the International Slavery Museum is transatlantic slavery and its legacies, future developments will include facilities to carry out further research in areas currently not covered in great depth in the display galleries but which fall within the museum's remit. This might include slavery and enslavement within prehistory, the classical era, and the Islamic world; 'the Gulag' in the former USSR; or the system of indentured labor.

Agency

Agency and ownership need to be carefully considered when designing galleries and planning collection strategies. These discussions were central to the development of one of the more disconcerting yet constructive juxtapositions displayed in the International Slavery Museum: the relationship between the Ku Klux Klan outfit and the Black Achievers Wall. As soon as one walks into the Legacy Gallery, it is difficult not to catch a glimpse of the Black Achievers Wall which has a central, prominent position. It sits close to the Ku Klux Klan outfit but is not dominated by it – achievement versus oppression. This juxtaposition lends itself to the words of Little (2010: 4) who observes, "Our experiences with our histories can leave us both heartened and dismayed, sometimes simultaneously."

In various community consultation sessions arranged prior to the opening of ISM in August 2007, a recurring theme was that the museum had to carefully balance the horror and often visceral presentation of transatlantic slavery with a backdrop of resistance and African and Black achievement. The Black Achievers Wall shows Black achievement across the arts, sciences, and sporting world, constituting one of several attempts at challenging the visitor not to leave ISM associating African and Black history exclusively with transatlantic slavery or negative perceptions of history. The Black Achievers Wall is intended especially for those visitors of all ages, who know very little about the subject of transatlantic slavery or African history. It is an eclectic portal into African achievement which is often, although not solely, born out of oppression.

The visually emotive Ku Klux Klan exhibit challenges stereotypes, comic caricatures, and romanticized portrayals of the confederacy and the Ku Klux Klan in popular culture, such as *Gone with the Wind* (1939) and *Birth of a Nation* (1915). The fact that the ISM outfit was worn by a Ku Klux Klan member from Orange County in New York State also highlights the fact that this racist organization was nationwide in the United States and not restricted to the southern states.

Future Directions

Within an archaeological framework, there are a number of areas which the museum could develop further, for example, maritime slavery studies and the support of excavations for the next *Henrietta Marie* (see Cottman 1999) or research focusing on the material culture of both slave ships and indeed the Middle Passage.

There is also an opportunity to expand slavery-related studies and to focus on more African-centered aspects of the narrative such as life in West Africa and the cultural processes which existed prior to encounters between Europeans and Africans and research on contact sites outside of the coastal region, including defensive walls around settlements and shrines or abandoned settlements depopulated by slave raiding. It would also make sense to build on previous archaeological preservation work and research at slave forts such as Cape Coast Castle as well as on free slave settlements and indeed the archaeology of the suppression of slave raiding and trading post abolition – focusing on British-built hinterland forts (see MacEachern 2005: 457-548; Kankpeyeng 2009).

ISM is currently developing one of the world's first permanent collections on the subject of contemporary slavery, including bonded labor, early and forced marriage, forced labor, slavery by descent, trafficking, and child labor. The focus of this collection is individuals' experiences of being enslaved. The collection, focusing on associated objects, will be used as an interpretive tool to ignite discussion and dialogue about contemporary slavery and to support campaigns and raise awareness. Moreover, the museum also supports exhibition proposals from external organizations, which actively campaign against all forms of contemporary racism, discrimination, and slavery.

This new collection stands alongside several other collections. The Diaspora Collection focuses on social history material relating to the Black Diaspora, both historical and contemporary, from countries that have a link to transatlantic slavery, and in particular the Black presence in the United Kingdom. The curatorial team is particularly interested in Liverpool's social history, actively sourcing collections that reflect the experiences and identities of Liverpool's Black community, their relationship with the city, and the impact of social, political, and economic change on their lives.

The Legacy Collection covers two main areas. Racist memorabilia is a collection of manufactured items that depict racist imagery and racist stereotypes of people of African descent. This material is usually American or British in origin and is often referred to as "Americana" or "Black memorabilia" – not wholly appropriate titles. The Global Inequalities collection reflects the political, economic, and environmental issues associated with global inequalities and fair trade. The domination of world trade by Western markets is considered by many to be a form of economic imperialism, a legacy of the colonial era, and a source of present inequalities. The collection seeks to show these inequalities through case studies and objects from countries such as Haiti, Sierra Leone, Brazil, and Guyana.

It was a steep learning curve for the museum to create one of the few, if not the only, permanent contemporary slavery collections. The first accessioned object within the strand was the artwork *Missing* (2007) in 2009 by the artist Rachel Wilberforce. It consists of a series of photographs depicting scenes of a slave trade which still thrives. Photographed in urban and suburban Britain, the images depict sex trafficking and prostitution and the interiors and exteriors of working or derelict flats, brothels, and so-called massage parlors (Wilberforce 2011).

Following this visually evocative work, in 2010 the museum acquired several slavery-related ankle bracelets from the collections of Anti-Slavery International. One of the bracelets was "worn" by a young girl in Niger who was subjected to a form of descent-based slavery. Descent-based slavery occurs in some countries where people are either born into or are descended from a group perceived by other groups as suited for slave labor. The bracelets represent the importance of the work of ISM in developing its collections in contemporary

slavery and campaigning to fight it. The ISM curatorial team understood that it was important to display the ankle bracelets alongside the personal stories of the wearers, to challenge the visitor who believes slavery to be an issue of the past rather than the present. Indeed, there was discussion about referring to the objects as "bracelets" which tends to conjure up images of physical adornment for personal vanity reasons rather than a tool of enslavement. Ultimately, it was decided to use the title given by Anti-Slavery International but to recognize that this subject may need to be addressed at a later stage.

Added to this is the way we might begin to archaeologically frame, among other methodologies, the material culture of contemporary slavery, which will add a whole new ethical dimension to the archaeology of slavery. Even though enslavement, forced labor, and the quest for freedom are broad thematic classifications, there is the possibility for them to become tangible archaeological strands within a museum of slavery. Kevin Bales – President of Free the Slaves points out (Bales 2005: 40) that contemporary slavery has social and economic characteristics, which although difficult, are not unachievable to trace within an archaeological framework.

The conceptual and critical approaches to contemporary slavery are wide ranging with the ability to cover a broad spectrum of material culture from personal items of the enslaved individuals (keepsakes, belongings) to related landscapes, such as places of enforced work (brothels, factories) and domestic life in general.

Conclusion

Lowenthal (2003: 187) noted "the fact that the past is no longer present clouds knowledge of it with uncertainty." The statement has less validation when one includes objects of contemporary slavery. Their meaning is validated by personal interaction and experiences with them; they are most definitely not what Lowenthal calls "*beyond reach*." Not only is the collecting of contemporary slavery an innovative and challenging strand for the museum, but the related archaeology takes the archaeology of slavery to a new level and opens up new research possibilities that are only now beginning to take shape. Through the development of archaeological research and the displaying of archaeological material, the museum can increase visitors' understanding of the significant role archaeology has to play in slavery studies and museum development generally.

As the museum's contemporary slavery collection grows and as its partnerships with human rights organizations develop, ISM will have difficult decisions to make about how much and to what we expose the museum's visitors. Allison and Gwaltney (1991: 69) point out, "most visitors are collecting impressions and experiences that will 'make sense' later in conjunction with other experiences and activities in their lives." ISM recognizes the fundamental need for social issues to be challenged and addressed and can become a place where visitors and community members not only "make sense" but "get involved" with subjects and campaigns that ISM champions through its programming and collections.

Cross-References

- ► Ethics of Collecting Cultural Heritage
- ► Heritage Museums and the Public
- ► Museums and Memory Experiences

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International Symposium on Archaeometry

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Basic Information

The International Symposium on Archaeometry (ISA) is a biennial meeting organized to promote the development and use of scientific techniques in order to extract archaeological and historical information from the cultural heritage and the paleoenvironment. It involves all natural sciences and all types of objects and materials related with human activity. ISA's website is at http://www.ims.demokritos.gr/ISA/.

The beginning of the ISA can be retraced as early as to the 1960s, when the applications of natural sciences in archaeology started to gain more and more importance. While during the early years, the main focus of the meetings was on archaeological prospection by geophysical methods, by now, all topics in the field of archaeological sciences are covered. Such topics include: characterization of inorganic and organic materials, objects and monuments for the identification of provenance and technology, absolute dating, paleoenvironment and paleoclimate investigations, bioarchaeology, field archaeology, etc. The meeting is usually organized as a 5-day conference presenting sessions on standard topics as well as special theme sessions on selected specific topics. Parallel sessions are avoided for the sake of the interdisciplinary character of the symposium and the need of the participants to be informed on the status of the research in all aspects of archaeological sciences. A very important aspect of the symposium is the poster sessions, which attract the largest number of papers and which generate ample discussion during the specially designed long poster sessions and during the breaks.

Two prizes are offered in every conference for the two best student posters, named *Martin Aitken* prizes after the founder and the first chairman of the symposium. In addition, two more prizes for best student posters are offered by the international Society of Archaeological Sciences (SAS), named *R. E. Taylor* prizes.

The subjects covered by the symposium are generally grouped in the following topics which form the regular sessions in which both oral and poster papers are presented:

- *Technology and Provenance I* (stone, plaster, and pigments)
- *Technology and Provenance II* (ceramics, glazes, glass, and all vitreous materials)
- *Technology and Provenance III* (metals and metallurgical ceramics)
- *Archaeochromometry* (dating techniques, dating and interpretation strategies, cultural phase analysis, etc.)
- *Biomaterials and Bioarchaeology* (DNA, human diet, health, mobility, demography, organic residues, zooarchaeology, archaeobotany, etc.)
- *Remote Sensing, Geophysical Prospection, and Field Archaeology* (All kind of techniques applied to study archaeological sites from the surface, sampling, field walking strategies, site monitoring, in situ observations, etc.)

International Symposium on Archaeometry, Fig. 1 *ISA, Leuven 29 May 2012*: Reception for the celebration of 50 years of ISA. From *right*: Patrick Degryse (Local Organizer), Martin J. Aitken (First Chairman of ISA), Michael S. Tite (Second Chairman of ISA), and Yannis Maniatis (Present Chairman of ISA)

- Occasionally *Integrated Site Studies*, designed for archaeologists reporting combined archaeological and scientific results and interpretation of excavation data, materials, and paleoenvironmental information are presented, either by invitation or by participants initiative.

Special sub-sessions are frequently introduced and different emphasis may be given to one of more of the above sessions from venue to venue. Special theme sessions are also organized in every venue on subjects that reflect recent trends in the field of archaeometry or related to particular interests in the region or country where the symposium takes place.

The submitted abstracts are reviewed by a board of international convenors to confirm that they are within the scope of the conference and also to be assigned as oral or poster presentation according to the nature and extent of research, subject, and general interest. Papers that deal with weathering and deterioration of archaeological objects or monuments are welcome, provided they are relevant to one of the main themes of the symposium.

The symposium is usually attended by an international audience of several hundred scholars from diverse fields, such as physics, chemistry, materials science, geology, biology, conservation science, computer science, archaeology, anthropology, art history, etc. Since the 1980s, the symposium is taking place in an alternating mode at locations in Europe and in the Americas organized by respective local organizing committees.

In order to ensure the continuity and maintain the standards, the organization is managed by the Symposium *Standing Committee* composed of past meeting organizers. The first Chairman of the S.C. was Martin J. Aitken (1961–1986) of Oxford University who was succeeded by Michael S. Tite (1986–2004) also from Oxford University. Since 2004, the Standing Committee is chaired by Yannis Maniatis of National Centre for Scientific Research "Demokritos," Athens (Fig. 1).

The official numbering of the symposium was introduced by I. Scollar, the organizer of the Bonn meeting in 1978. Since his area of expertise was magnetic surveying, he started the sequence with the London meeting on "Prospection in Archaeology by Geophysical Methods" in 1961. During the early years, the symposium was focused exclusively on archaeological prospection using geophysical methods. After the first meeting in London in 1961, the symposium was organized during the following years at the Research Laboratory for Archaeology and the History of Art (RLAHA) at the University of Oxford. It was initially designed as a 1-day user meeting for archaeologists using proton gradiometers for prospection. In 1969, the scope of the symposium was extended to other subjects apart from archaeological prospection. The name was accordingly changed to "Symposium on Archaeometry and Archaeological Prospection."

With a larger program, the symposium was expanded to a 2-day meeting in 1970 and to a 3- to 4-day meeting during the following years. In 1976, the symposium left RLAHA in Oxford, its permanent place until then, and started its everlasting journey across the world. Its first stop in 1976 was at the University of Edinburgh which was the hosting institution. Since 1980, the official name of the meeting is *International Symposium on Archaeometry*. Usually, it is hosted in a kind of alternating mode either in Europe or in the Americas and it comprises a 5-day program, including oral presentations and poster sessions. From 1984, the symposium is organized on a biennial base.

In May 2012, during the 39th meeting at Leuven, the Symposium celebrated its 50 years anniversary (Fig. 1).

Major Impact

ISA is a unique symposium as it provides the only international forum for all activities in Archaeological Sciences, both individually and integrated. In this conference, one can meet experts and learn of their research in dating, geophysical methods, field studies, palaeoenvironment, biomaterials, ceramics, glass, vitreous, metals, lithics, plasters, pigments, textiles, paper, and so on. New inventions of techniques and novel applications targeting specific archaeological problems are presented. The accumulated information on archaeological objects and materials is compiled and presented in a unified way in order to complete the history of mankind and fill in the gaps in the human history and culture.

Therefore, ISA with its unique character and the fact that is organized alternatively in Europe and the Americas has a global impact on Archaeological Sciences and consequently on archaeology. This impact will be further enhanced in the near future as it has been decided by the Standing Committee to include in future symposia special sessions on global issues relating to major changes and developments in human behavior on a universal level.

Cross-References

- ▶ Aitken, Martin
- ▶ Archaeometry: Definition
- ▶ Dating Techniques in Archaeological Science
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Field Method in Archaeology: Overview
- ▶ Geoarchaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Pigment Analysis in Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Society for Archaeological Sciences (SAS)
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)

Further Reading

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Internet, Archaeology of the

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Introduction

By the time you read this, it will be out of date – a fundamental issue when attempting to study the archaeology of the Internet. Readers of Ceruzzi's (1986) contribution to *Imagining Tomorrow* would have been amused by its account of the late 1940s, when experts seriously believed that there would never be more than ten computers in the United States. Yet Ceruzzi himself had no inkling of the World Wide Web (which we now often refer to as just "the Internet") that would emerge in embryo only three years later. William Gibson (2012) notes the error in his Sprawl novels of the 1980s which coined the term "cyberspace" – there is no mention in them of cellular phones. Similarly, the account of the archaeology of the Internet in Graves-Brown (2009) is also out of date.

The "Internet" is amorphous and ephemeral. If we considered it in ruination, as some future archaeologist might do, it would consist of a mass of cables, computers, satellites, manuals, and other artifacts, where any system would have to be inferred (Cubitt forthcoming). Conversely, we could consider the archaeology of the "living" Internet, but even here we could not ignore the vast web or mesh of infrastructure that underpins it. For example, it has been estimated that Internet data centers consume 30 gigawatts of electricity per annum, roughly equivalent to the output of 30 nuclear power stations. Similarly, the physical devices involved, which are increasingly mobile in themselves (tablets and smart phones) incorporate a wide array of raw materials, such as rare earth metals, sapphires, or lithium, that are sourced from all parts of the world. Finally, given the obsolescence built into the technology, there are vast numbers of redundant computers and cell phones, many of which cannot be practically recycled and thus become waste (Slade 2007).

Historical Background

The Internet began with the ARPA or DARPANET, a small group of computers in military and academic sites in the USA (although its ancestors were the telegraph, telephone, and teleprinter). The Advanced Research Projects Agency, in turn, had its origins as the Eisenhower administration's reaction to the perceived threat posed by the launch of Sputnik 1 in 1957. As a parallel development, commercial computer networks soon began to appear, most notably CompuServe, founded in 1969. All of these systems depended in part on the modem, a device for dialing up an occasional inter-device connection on the telephone network, which had its origin in teleprinter technologies of the 1920s. As these networks gradually spread across academic institutions and business, the next major step in Internet history was the rapid adoption of personal computers, marked by the appearance of the Apple Mac and IBM PC in the early 1980s. These in turn had their origins in work by Douglas Engelbart (the mouse) and Alan Kay (the GUI and local area networks; Kay 1977). Through the use of local area networks and the first dial-up connections, personal computers began to be used for communication and exchange of information through systems such as Usenet (1979) and FidoNet (1984) and other bulletin board systems that emerged in the mid to late 1980s. The first automatic modem, manufactured by Hayes, was marketed in 1982. What we now call the Internet is, effectively, the result of the gradual integration of separate government, academic, and commercial networks as each adopted the Internet protocols (TCP and IP). Thus, for example, the UK JANET was set up between British universities beginning in the 1970s, but only adopted IP in 1991.

Whilst these systems had users numbering in the tens or hundreds of thousands, it was the work of Tim Berners-Lee and Robert Cailliau, beginning in 1989, that turned the net into a global phenomenon (Reid 1997; Berners-Lee 1999). Initially intended as a document-sharing system for academic scientists, the HTML protocol was rapidly adopted for a wide variety of purposes,

especially when Marc Andreessen and his colleagues at the National Center for Supercomputing Applications developed the Mosaic browser in 1993. Crucially, Andreessen incorporated the < IMG > tag into HTML, which enabled web pages to include pictures. It can be convincingly argued that from this point, pornography became one of the significant drivers behind the spread of Internet use, despite the attempts of the newly founded World Wide Web Consortium to prevent this (Berners-Lee 1999; Channel 5 2007). Other protocols for Internet data sharing lacked this graphical content. Gopher (developed by Mark P. McCahill), the only serious competitor for WWW, was hampered by the licensing requirements imposed by the University of Minnesota (Reid 1997).

Alternatives to the Internet/www *did* exist. The French Minitel system, launched by PTT in 1982, was based on simple video text terminals that were leased for free to telephone subscribers. The system provided an online phone book, mail order, and travel ticket purchasing and at its peak had over nine million subscribers. By the early 1990s, it had spawned the kind of online shopping and quasi-dot com start-ups that would only appear 10 years later on the web. Although adopted in a number of other countries, the system was only successful, outside of France, in Belgium, largely because other providers tried to charge too much for the service and/or the leasing of terminals. Only in 2012 was the Minitel service finally terminated.

The later 1990s witnessed the so-called browser wars and early attempts to commercialize the Internet, particularly following the development of SSL (Secure Sockets Layer) protocols in 1995, which enabled secure financial transactions across the Internet. For several years, Microsoft's Internet Explorer and Andreessen's Netscape attempted to dominate the web, and here it is worth noting that the business model adopted by Netscape, that of trying to build a web-based "platform" on top of the (Windows) operating system, failed at the time, but is rapidly coming to fruition (see discussion of cloud computing below). By 2001, early attempts to monetize the Internet ended in the so-called dot-com bubble, precipitated by excessive speculation and the failure of entrepreneurs to understand how the Internet could be used for business. In particular, it became apparent that the web itself, at the time, could not be a means of making money, but only as the platform upon which commerce could take place.

The subsequent decade has been marked by the emergence of several major strands of activity, in particular, online shopping, media downloads/streaming (music and film), advertising, and social networking, often dominated by those companies such as Amazon, Google, and eBay, which had survived the crash of the dot com bubble. At the same time, there have been claims for the emergence of a Web 2.0, typified by Creative Commons' activities such as Wikipedia and, to a more limited extent, Facebook, YouTube, MySpace, Twitter, or SoundCloud (O'Reilly 2005). The growth of Internet usage, particularly in the late 1990s, had been marked by anarchic and often utopian approaches to the future of networked activity (e.g., Rheingold 1994). Whilst it is true that no entity, national or commercial, has succeeded in completely controlling Internet activity, it is certainly the case that there is a growing asymmetry between users and providers, symbolized by the fact that the dominant DSL protocol for broadband is asynchronous, i.e., that downloading and uploading are separate processes with increasingly asymmetric speeds (Kleiner & Wyrick 2006). Equally, it can be argued that users increasingly perform unpaid work in creating content that companies, such as social networking sites, exploit for profit.

Recent years have been dominated by the mobilization of the Internet, initially through laptops and PDAs, but increasingly through the use of smart phones that have Internet capabilities. Although the concept dates to the early 1970s, the first Internet-enabled phones appeared in the late 1990s, and the prevalence of such devices is probably marked by Apple's iPhone of 2007. In as much as the cell phone has largely bypassed landline-based systems in the developing countries of Africa, it seems likely that the same will become generally true of Internet usage. From an

archaeological/material culture point of view, then, the Internet will have at least two ages: its wired and wireless eras, which would require quite different characterizations that might be termed, respectively, sedentary and nomadic. Here, whilst the utopians of the 1980s and 90s envisaged a virtual reality like Gibson's "consensual hallucination," the actuality is increasingly an interpenetration between the virtual and "real" in an augmented reality.

Key Issues

Software Archaeology

Although it might be thought that software programs or applications are analogous to documents, their dynamic characteristics imply a more artifact like quality (Graves-Brown 2009). Whilst they only exist as quantum states in millions of transistors, programs can print information on paper or launch nuclear missiles. The very iconography of graphical user interfaces implies an artifactuality; there are buttons and sliders and objects to be dragged or stretched. The soft Internet can be approached at several levels. We may, for example, examine the history and development of the actual code, as in the genealogy of the web browser, beginning with Berners-Lee and Cailliau's command-line browser, through Mosaic, Internet Explorer, Netscape, and Mozilla Firefox (all based on the same basic code) and other browsers such as Opera, Safari, and Google Chrome which have arisen more recently and (to some extent) independently (Graves-Brown 2009).

At another level, archaeologists can also study the various "artifacts" created on the Internet, particularly in the variety of virtual "worlds" and online games, such as Second Life or World of Warcraft (and increasingly in game environments associated with social media such as Facebook). Whilst the utopian vision of an immersive cyberspace has not entirely come to pass, virtual worlds are now used by millions of people and include objects that can be made, owned, and sold as if they were physical goods. As Harrison (2009; see also Guest 2007) has pointed out with respect to Second Life, such virtual artifacts can also come to have a history and be regarded as a form of virtual heritage. In a similar way, the role of virtual artifacts in the augmentation of reality can be studied.

What distinguishes virtual from physical artifacts is their so-called non-rivalrous nature. Every copy of an image or MP3 is identical and does not in any way detract from the "stock" of the original. This in turn leads to quite different concepts of ownership, typified by the concept of Creative Commons, since items can be freely shared by their creators at no cost to themselves. However, the concepts of copyright, license, and subscription are increasingly important areas of contestation as capitalism attempts to monetize the Internet.

Politics

The politics of the Internet revolve around access and ownership. There are still large segments of the populations of both developed and developing countries that are disenfranchised by a lack of access to the Internet. Similarly, governments are increasingly attempting to control access and traffic, as in the case of the so-called "Great Firewall of China" by which the PRC has attempted to filter its citizens' access to information. In extremis governments may simply seek to "turn off" the Internet and mobile phone networks. This is clearly becoming critical in the light of events surrounding the Arab Spring of 2011, where use of social media is said to have been crucial in mobilizing opposition to dictatorial governments. Elsewhere, so-called democratic governments have sought ways to control and or monitor Internet activity. These range from the V-chip incorporated into US televisions to filter content to the ECHELON interception system that has been implicated in both political and industrial espionage by western nations. At the end of 2012, the UK government was attempting to extend its powers to monitor Internet traffic, supposedly in order to counter terrorism. However, in contrast to this paranoia-inducing activity, it should be noted that contemporary methods of encryption (such as PGP, developed by Phil Zimmerman in 1991) are virtually impenetrable, even with the use of supercomputers.

The second aspect of the politics of the Internet that may be of interest to archaeologists concerns its exploitation by capital. At the macro level, this concerns the extremely free movement of capital facilitated by Internet communication, which through tax havens and other activities, has become implicated in the financial crisis that began in 2007–2008. At a more local level, as noted above, the ownership of virtual and physical property is increasingly crucial. At the physical level, this is characterized by attempts to control and monopolize copyrights and patents, as in the case of Google's purchase of Motorola and the numerous patent infringement suits surrounding smart phones in 2011–2012. At the virtual level, issues of ownership of content have arisen, typified by the (apparently apocryphal) controversy surrounding Bruce Willis' iPod (Willis 2012). Unlike physical books or audio recordings, the purchaser does not own the "thing," so much as a license to use it. The question then arises as to whether such items are property and whether Bruce Willis' children can inherit the content of his iPod.

At another level, the emergence of so-called cloud-based software/data storage brings us back to the Microsoft/Netscape conflict of the late 1990s. Thus, for example, the presentation application Prezi (unlike Microsoft PowerPoint) is not sold under license but as a subscription, based around the cloud sourcing of content. Unlike the earlier model, the user does not own, but must continually subscribe to the virtual artifact. Thus, in effect, cloud sourcing shifts the platform from the physical to the virtual, where a "new" method of monetizing usage can be deployed (as Netscape had originally attempted in the late 1990s). Here, it may be argued that the cloud model of networked computing is in fact a reversion to the earlier model of mainframe computers served by so-called thin terminals, i.e., devices that are little more than a keyboard/mouse and a screen.

Future Directions

The Internet can be studied by archaeologists at a number of levels. These include both its physical and virtual infrastructure and the virtual artifacts of all kinds created by and through this infrastructure. The nature of the Internet is always changing, at times in apparently cyclic patterns. Thus, the use of mobile devices and cloud computing may see a return to a model of information technology not dissimilar to that found in mainframe computers of the 1960s, 1970s, and 1980s. With the consolidation of data centers, it might not be too farfetched to foresee a time when there *are* only ten "computers" in the United States! These processes are driven by both global/national politics and the desire of capital extract profit from the Internet, countered by those who retain the utopian ideal of free "peer-to-peer" exchange of information.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Cultural Heritage in the Digital Age
- ▶ Industrial Archaeology
- ▶ Intangible Cultural Heritage
- ▶ Modern Material Culture Studies
- ▶ Non-Places in Archaeology

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Internment and Prisoners of War in Historical Archaeology

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Introduction

The archaeology of prisoners of war, including both the sites of their incarceration and the artifacts they used and produced during confinement, has recently developed into a major element of historical archaeology, linked to the broader fields of conflict studies and confinement studies. While many prisoner of war camp sites retain no above-ground features, others still have some upstanding buildings. Only a few camps have thus far been excavated, but many artifacts that never entered the archaeological record are retained by private collectors and museums, often because of their craft qualities and evidence of human ingenuity in difficult circumstances. Another major source of information comes from the study of graffiti, often found on the walls of buildings in major camps, but also in other temporary prisons or buildings converted during wartime to hold prisoners of war.

Definition

Prisoners of war are military personnel or civilians who have been incarcerated without trial during a conflict between two nation states. Prior to the eighteenth century only small numbers of active military officers were captured and held to ransom, the other ranks being enslaved, massacred, or allowed to flee. As armies and navies became larger, and the threats increased of captured forces returning to fight for the opposition following release, each nation tended to retain control of such prisoners until an exchange for its own captured forces (Mytum & Carr 2013a). However, from the Napoleonic wars onward such exchanges were less frequent, and so the concept of a military prisoner of war camp developed. In the Boer war at the end of the nineteenth century the British considered that civilians were a threat, and this was the first occasion when significant numbers of noncombatants were forcibly interned for the first time.

One of the important factors in the development of prisoner of war camps is the creation of xenophobic stereotypes of the "other" generated between nations at times of war. Whereas until the early nineteenth century officers of all sides could be expected to behave in an honorable way and not attempt escape from parole in the community, as mass media and more technologically advanced methods of warfare altered the attitudes to conflict it became necessary to isolate the captive aliens to prevent escape, sabotage, espionage, and unrest among the native population.

Prisoner of war camps should not be confused with concentration camps, where extermination of the inmates either by execution or forced labor

Internment and Prisoners of War in Historical Archaeology, Fig. 1 Photograph of World War I civilian German internees at Douglas Camp, Isle of Man (Photograph courtesy of Manx National Heritage)

was the purpose, or with any forms of detention during a civil war or totalitarian regime where individuals of the same nation were being held, though some sites are hard to place as either prisons or camps. For example, the sites of incarceration of the Mau Mau in Kenya, Republicans in Ireland, or Guantanamo Bay in Cuba would be seen as prisons for criminals by one side and camps for captured combatants on the other, and their assignment indicates the political relevance that this type of research entails (Myers & Moshenska 2011). These are all alid topics within confinement archaeology (Casella 2007) and can be grouped along with examination of asylums, workhouses, prisons, and other institutions designed to control marginalized groups in society. While prisoner of war archaeology may be placed within the field of conflict archaeology, because internment only took place because of war, in many respects the types of physical control and managerial structures, as well as inmate experiences, more often mirror those found in other institutions that facilitated confinement (Beisaw & Gibb 2009). The harshest prisoner of war camps were only marginally better than concentration camps, and the most tolerant, especially when for civilians, resembled relatively benign institutions albeit surrounded by barbed wire (Fig. 1). Some camps were created out of existing buildings, especially in the eighteenth century when castles and military establishments were converted, but from the Napoleonic period onward temporary sites were increasingly popular. Early efforts at managing the prisoner of war numbers involved the use of hulks – old ships without their masts – but these were unhealthy and difficult to manage. The Napoleonic prisoner of war camp at Norman Cross, near Peterborough, England, sets a new standard of organization and control (Mytum & Hall 2013), subsequently copied or independently invented elsewhere. Most prisoner of war camps were constructed with limited life spans in mind, and while the majority have since been erased from the landscape, a surprising number of structures still stand, often being reused for agricultural or industrial purposes. The artifacts produced by prisoners with their large amounts of spare time survive in remarkable numbers as they were both sold outside the camps as a form of income generation or retained by prisoners as keepsakes on release.

Historical Background

Research into prisoners of war was initially an interest of historians, with the first studies in the early twentieth century (Abell 1914) in the UK and USA (Hesseltine 1930). Until the later

twentieth century, archaeologists only noted prisoner of war phases as part of a site sequence, as at Portchester Castle (Cunliffe & Garrett 1995), but at this point those researching aspects of the American Civil War began to include the prisoner perspective alongside that revealed at battlefields and barracks. Significant programs commenced in the 1990s at Camp Ford, Texas (Thoms 2004), and Johnson's Island, Ohio (Bush 2000), with other fieldwork linked to public interpretation at the most infamous camp of Andersonville and at Fort Pulaski, both in Georgia (Jameson 2013). Research also began at about the same time on later prisoner of war camps, notably World War II Camp Hearne, Texas (Waters et al. 2004), and at the Japanese American camps including Manzanar (Burton et al. 1999). Parallel with the archaeological work, the artifacts made in the camps were studied from an anthropological perspective (Dusselier 2008). The impact of the Boer War has been researched from many different viewpoints, and this has included archaeological work on both African and Afrikaans internment (Dreyer 2001).

Archaeological research on prisoner of war sites and material in the UK and Europe only began in the twenty-first century, although it is now being actively pursued in many countries (Myers & Moshenska 2011; Mytum & Carr 2013b). One strand has been from academics and museum curators from a wide range of disciples interested in the creativity of prisoners (Carr & Mytum 2012) and the links between these products and others – Trench Art – made by soldiers during wartime (Saunders 2003). There has also been increasing interest from heritage managers who are now recognizing camps as valuable and significant archaeological sites. They are seen as important in terms of national and regional memory yet are fragile parts of the landscape because they were made for short-term use. Thus far, only a few prisoner of war camps are protected by any legislation, but there have even been excavations of such sites in advance of development (Early 2013). In Australia, there has been some survey to assist in the development of management strategies, but as yet no significant further research. Important camps survive, however, from both the First and Second World Wars, and in some cases museums hold important artifact collections associated with these sites and their inmates.

Key Issues/Current Debates

Many of the ethical and interpretive issues are similar to those within the wider field of conflict archaeology, but often prisoners of war were aliens in closer contact with home noncombatants than was normally the case in wartime, and this creates additional issues of memory, guilt, blame, and forgetting (Burström 2009). Often prisoner of war archaeology is part of a painful heritage that makes it both significant and dangerous.

Prisoner of war archaeology often reveals guilt, not only of the losers in war but also of victors whose treatment of those in their care was often inappropriate. The materiality of Japanese American camps for interned civilians, and their study by academics and the US National Park Service, has given literally concrete evidence and reminders to reinforce the claims of survivors and their descendants (Burton et al. 1999; Dusselier 2008; Mytum & Carr 2013b). While responsibility for the forced labor camps for prisoners of many nationalities established across Europe by the Nazis can be separated from those alive today, there is a hidden legacy that research reveals. The work of these prisoners was often to the benefit of local residents, with improved infrastructure and profitable contracts for local firms. Archaeological survey and excavation can reveal injustices and oppressions buried beneath a generation or more of forgetting (Burström 2009). The complexities of the past are revealed, with the simplistic nationalistic narratives of allies and enemies, of stoical home front and heroic warriors, challenged and undermined. The extent to which this past is usefully unearthed, and what is then to be done with it, provides archaeologists in academia and in heritage management with dilemmas that are not

always easy to resolve; this is evident in much current research (Myers & Moshenska 2011; Mytum & Carr 2013b).

The confinement in camps was primarily a physical, embodied experience, and under these extremes some of the cultural perceptions of the body, privacy, and self-worth are both revealed and challenged. How this was managed and coped with, again often using the material world of the camp and the impoverished range of objects within it, gives archaeologists great opportunities to study underlying attitudes that lie buried within more normal situations. The agency of those imprisoned can be compared and contrasted with that of the captors, and both had to formulate new structures of authority and management for these abnormal conditions. Moreover, most camps were single-sex institutions, and so many social structures, values, and behaviors had to be reworked in these partially domestic situations. Just as national identity was highlighted in war, so gender roles had to be renegotiated within the camps, a theme in a number of recent studies (Carr & Mytum 2012; Mytum & Carr 2013a).

Identity is a major theme linked to prisoner of war archaeology and other cultural studies in this interdisciplinary field (Carr & Mytum 2012). Internees were in that situation because of their own or other's perception of their identity as aliens within conflict. This is often then revealed in the material culture produced and used within the camps, as their occupants struggle to come to terms with their situation, and placement within what during wartime at least was an antagonistic milieu. Despite close observation and controls over access to resources, many acts of resistance can be identified from the most obvious such as escape tunnels, to more subtle indicators of national identity through use of symbols and language (Carr & Mytum 2012; Mytum & Carr 2013b). Many items of material culture survive as memory works from the camps and are in the possession of local museums or descendants of the internees (Fig. 2). Excavated evidence, however, or graffiti on structures still standing can also reveal the same processes.

Internment and Prisoners of War in Historical Archaeology, Fig. 2 Cigarette case made from a mess tin by a World War II Italian prisoner of war (Author's photograph)

International Perspectives

All archaeological studies have an element grounded in local situations, but as products of international conflict, prisoner of war archaeology always has an international dimension. However, what is drawn from the evidence of prisoners and their camps varies greatly with context. The issues can be considered from an international perspective in terms of particular global conflicts – how civilian or military personnel were interned in many different countries, from the Boer War onward (Mytum & Carr 2013b). Some conflicts that were internal – such as the American Civil War – also reveal how the creation of the "other" was a product as well as a cause of war and could lead to a cycle of increasingly inhuman treatment of enemy captives (Hesseltine 1930). In contrast, for many conflicts there was considerable effort to make the camps meet international humanitarian standards, often because of the nation's fear of reprisals against its own capture held in the enemy's camps. The comparative study of site organization, management of security, hygiene, food, and clothing reveals remarkable similarity across both time and space. How far this was through learned experience and how far it was based on managerial deductions in independently assessed cases is still unclear.

Internment and Prisoners of War in Historical Archaeology, Fig. 3 Eden Camp Modern History Museum, North Yorkshire, England, originally constructed to house World War II Italian, German, and East European prisoners of war (Author's photograph)

Heritage bodies in all parts of the globe have been slow to recognize the cultural significance of prisoner of war camps from past conflicts, but this is now rapidly changing. While the USA has taken the lead in both researching, protecting, and presenting parts of this heritage (Burton et al. 1999; Jameson 2013), many state heritage organizations in Europe and Australasia are now identifying sites, creating policies, and implementing albeit often limited plans for protection and management.

Future Directions

The interdisciplinary nature of prisoner of war research is still in its infancy, and there is great potential for scholars, heritage managers, and field practitioners to work together on the wide range of sources that survive for this subject. Only recently have scholars working independently in their own disciplines realized that parallel and complementary research is taking place by others (Carr & Mytum 2012). Prisoner of war archaeology can provide an important contribution to this evolving interdisciplinary dialogue, not only because of the technical skills inherent to the discipline but also because of experience in working with descendant communities, communicating with the public, and awareness of the difficulties as well as opportunities that revealing the past can bring.

Interdisciplinary collaboration also brings prisoner of war archaeology to the fore in a range of topics where previously archaeologists may have been marginal. Camps, as tourist attractions or parts of a landscape to be preserved, lie within the spectrum of what is termed dark tourism, and a few are now preserved as visitor attractions (Fig. 3). The same site can have many different meanings and values to a range of visitors, from a place of personal or family suffering, to a symbol of victory over the enemy, to evidence of a past conflict with which the observer has no strong attachment. Archaeologists are only beginning to consider these issues, though some American Civil War sites are the most advanced at the moment in this regard (Jameson 2013).

Fieldwork, and particularly excavation, has been limited to date, yet relatively restricted work on a variety of Japanese American camps in the USA (Mytum & Carr 2013b) reveals both the site-specific and wider comparative value of such investment. From trial work on the UK Napoleonic site of Norman Cross (Mytum & Hall 2013) to the extensive developer-led excavations at La Glacerie World War II camp in Normandy, France (Early 2013), it is evident that further excavation on UK and European sites would be highly rewarding. The combination of excavation data, surviving curated material culture, official and personal documents, and oral testimonies can create a rich source which is only just being appreciated and studied.

Cross-References

- ▶ Battlefield Archaeology
- ▶ Confinement and Detention in Political and Social Archaeology

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Further Reading

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Interpretation (Including Historic Reenactments): Current Approaches

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Brief Definition of the Topic

Archaeologists make their inferences about the past using basically three methods: the direct historical approach, analogy, and by experiment. Once these interpretations have been made, how does the public find out about them? Traditionally, the public could find out

from the horse's mouth by visiting archaeological digs and speaking to the archaeologists. However, opportunities for this type of interaction are limited and the archaeologists often resent the intrusion into their digging time. The results are usually better when archaeologists work with professionals who are trained to deal with the general public. Today the ways that the majority of the public typically learns about archaeological interpretations are through television programs, museum exhibits, and living history reenactments.

Williamsburg is a public attraction built on archaeology, literally. Every historic building rests on an archaeological site. The discoveries of the archaeologist are directly interpreted on the reconstructed site in the form of architecture, artifacts used at the structure, and the characters portraying the site's residents. It is a popular and effective way of communicating the past to the present and one gets a sense of what eighteenth century living was like (if they had Occupational Safety and Health Administration standards and modern sanitation codes).

The Jorvik Viking Centre in York, England (Jorvik Viking Centre n.d.) circumvents the sanitized version of the past by taking visitors through a recreated Viking settlement in a moving cart. The visitors see animatronic Vikings going about their business and experience the sounds and smells of their daily life. The Disneyesque ride ends with a tour through the exposed archaeological site and a narration explaining the connection between the archaeology and the interpretation.

Archaeologists from the University of Massachusetts have opted for a somewhat different approach to archaeological interpretation to the public. They have employed critical theory to examine ideologies of the past that have resulted in social inequality in Annapolis (Potter 1994). They then attempt to show how our perceptions of the past influence our actions in the present. Feedback from the tours suggested that the public was engaged when the relevance of the archaeology was made explicit.

The last case study combines elements of museum interpretation with living history and adds television specials and interactive web resources into the mix. The Jamestown Rediscovery project (Jamestown Rediscovery n.d.) boasts ongoing digs, an Archaearium (a museum specifically tied to the archaeology) and proximity to a more traditional museum and living history recreation of Jamestown and a Native American village. The elements all intermesh to provide the public with an immersive historical archaeological experience.

Not all archaeologists are onboard with living history interpretations of their work. Some feel this presents a skewed vision of the past based on the present and smacks of edutainment. Whatever the bias, the public clearly enjoys this type of interpretation. And if the purpose of the archaeological interpretation is to inform the public, they have to be listening first.

Cross-References

- ▶ Activism and Archaeology
- ▶ Annapolis: Historical Archaeology
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage and the Public
- ▶ Heritage Values and Education
- ▶ Historic Jamestowne
- ▶ Jorvik Viking Centre
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Nationalism and Archaeology

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Interpretation in Archaeological Theory

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Introduction

The concept of interpretation in archaeology can be understood in many different ways. At one level, it is a general term used to describe the construction of archaeological knowledge about the past from evidence surviving in the present; as such, many archaeologists use the term interchangeably with others, including explanation where no defined qualities are ascribed to either. However, the term "interpretation" also carries more specific connotations which distinguish it from explanation, premised on a different perception of what counts as knowledge. This distinction can be traced back to the nineteenth century and a separation in German scholarship made between the natural and human sciences as involving two different methods and types of knowledge. Archaeology has always occupied an uneasy position in this separation, and although on the whole its roots lie within the humanist tradition, archaeological interpretation rarely explicitly contrasted itself against explanation until the 1980s with the emergence of post-processualism. This was largely as a reaction to the equally explicit development of the concept of explanation under New Archaeology and processualism in the 1960s and 1970s. As the battle between processualism and postprocessualism has faded out and more accommodating yet diverse theoretical positions have become the norm, it is questionable how far the distinction between explanation and interpretation remains a viable one.

Definition

The concept of interpretation, understood in its specific sense as a mode of knowledge production within the humanities, emerged under a philosophical stream called hermeneutics, which was initially a reflection about the interpretation of meaning in ancient texts. In traditional European scholarship, it was thus closely linked to three different concerns: philology, biblical exegesis, and the law (Bleicher 1980). In the nineteenth century, however, hermeneutics developed into a more general philosophical method in Germany, especially through the pivotal influence of Friedrich Schleiermacher. In Kantian fashion, Schleiermacher attempted to systematize hermeneutics by defining the possibility and limits of textual interpretation; at the basis of his approach was the importance of highlighting the reciprocal relationship between authorial intention and the wider linguistic context. That is, to understand a particular word or phrase in any given text, one needed to relate the author's ideas as expressed in that particular instance, with other parts of the text and even the language as a whole.

Although pivotal, Schleiermacher was only the prelude to the more important figure of Wilhelm Dilthey who used hermeneutics to provide a theoretical foundation to the humanities as a whole and in doing so underlined a distinction between the natural and human sciences. Dilthey took the Kantian model to its ultimate conclusion in his unrealized project of a *Critique of Historical Reason*, which replaced the transcendental (i.e., universal) categories of Kant's pure reason with the psychological and historical context of particular individuals. In short, human understanding and knowledge is always mediated by its particular personal and social context. At the core of Dilthey's philosophy lies the concept of interpretation (*verstehen*) as the methodology of the human sciences (*Geisteswissenschaften*). Dilthey characterized interpretation as a form of knowledge which emerges from a first-person perspective on the world – that is, the world as seen from a human being's point of view as they are immersed in the world. For Dilthey (and others before him like Giambattista Vico and Alexander von Humboldt), such a first-person perspective underlined the fact that we can understand other people because we are one of them. It gives us an

insider perspective. He contrasted this with explanation (*erklären*) which adopted a third-person perspective, as exemplified in the natural sciences (*Naturwissenschaften*). Here, one understands trees or rocks in a different way; because we are not trees or rocks, we can only ever understand them from an external or outsider's point of view.

To illustrate this, consider a person standing by the side of the road hailing a taxi. One way to understand this situation is in terms of cause and effect between external objects – the raised arm, the directed gaze of the person, and the shape, color, and markings of the vehicle that stops. This would be an example of explanation. For Dilthey this was a very limiting way to understand what is happening; in contrast, we can see this event from the point of view of the person by the roadside or sitting in the taxi. In this context, the raised arm needs to be understood not as a cause but as an intention (e.g., "Taxi, stop!") and the taxi stopping understood as the taxi driver reading that intention. The cause and effect approach only really offers us a *correlation* between two events – the raised arm and a vehicle of a certain type stopping; to fully understand that correlation, we need to grasp the intentions and meanings inscribed into these events, and this requires adopting an internal or first-person perspective on the event. This is what is also meant by empathetic understanding – not some kind of subjective or psychological projection of myself onto another, but simply to recognize the meaningfully constituted context of those events in the world which involve human beings.

Although Dilthey developed the concept of interpretation in this way in the nineteenth century, it was popularized by the sociologist Max Weber in the early twentieth century and used to promote an interpretive sociology which was to contest the French positivist sociology of Comte and Durkheim. The French sociological tradition, unlike the German, adopted a much less divided view on the relation between the natural and social sciences, seeing them more as sharing a similar methodology and philosophy. However, the German hermeneutic tradition, especially after Weber, impacted the way sociologists and anthropologists saw their disciplines, and by the middle of twentieth century, many scholars within the social sciences in the Anglophone tradition increasingly reflected on the special character of their methods and forms of knowledge. One of the earliest studies was Peter Winch's investigation into the nature of social science, linking Weber to Wittgenstein and which had a massive impact on subsequent social theory (Winch 1958). It provided the philosophical foundations to the interpretive turn in many of the social sciences such as anthropology represented in the work of Clifford Geertz from the 1970s and archaeology through Ian Hodder from the 1980s.

Concurrent with this interpretive turn was the emergence of a new wave of philosophical work in hermeneutics associated with writers like Emilio Betti, Karl-Otto Apel, Hans-Georg Gadamer, Jürgen Habermas, and Paul Ricoeur, many of whose ideas were taken up within the social sciences, including archaeology. Gadamer in particular is discussed further below, but the key development marked by his work among this group is the extension of interpretation away from being simply a methodology of the human sciences toward a way of defining human existence. If Dilthey expanded Schleiermacher's concept of interpretation from being about texts to defining a method for all human sciences, Gadamer took it one step further and generalized the concept as a definition of human understanding and, indeed, human being. In this, Gadamer was heavily influenced by (and was a student of) Heidegger; just as Dilthey's concept of *verstehen* had influenced Husserl (the founder of phenomenology), Heidegger's phenomenology later transformed this original concept into something much broader. It is thus important to note the close historical connections between the hermeneutic and phenomenological traditions, a connection which one also sees developed in archaeology through the work of Bjørnar Olsen, Christopher Tilley, and Julian Thomas. On that note, let us now turn to the more particular historical background of how the concept of interpretation has been used within archaeology.

Historical Background

Archaeologists rarely if ever explicitly referenced the hermeneutic tradition discussed in the last section – not until the advent of postprocessualism and the reaction to the logical positivist models of archaeological knowledge espoused by the New Archaeologists. However, this is not to say that archaeologists working in the early and mid-twentieth century did not share many of the same assumptions connected to this tradition; indeed the term interpretation was widely used and was probably the most common term for the process of archaeological reasoning. The Egyptologist Flinders Petrie, for example, explicitly paralleled archaeological interpretation with the legal process, as did the historian and archaeologist R. G. Collingwood. Such perspectives on archaeological interpretation show a clear link with the humanist tradition and textual interpretation, especially in the case of Collingwood who developed his own particular brand of historical interpretation modeled on the hermeneutic concept of *verstehen*. However, archaeology always occupied an uneasy position within academic disciplines, straddling a widely held division between the natural and social sciences. Commonly perceived as a very young discipline (especially compared to history), its status remained ambiguous; at the same time, for some like Petrie, it was precisely because of this that archaeology could counter the increasing tendency toward what C. P. Snow was later to call the two cultures (Petrie 1904: viii).

There was, however, another dimension to this ambiguity. This was in the recognition that archaeology is not a completely unified discipline, but rather exhibited a major fracture between prehistoric and (proto-) historical archaeologies, the former lying closer to the natural sciences and the latter to the humanities. Historically this is well attested as the emergence of prehistoric archaeology in the mid-nineteenth century was closely aligned with natural scientists like geologists as against the humanist background of those working in classical and medieval archaeology. This schism was addressed in depth by the British archaeologist Christopher Hawkes in the mid-twentieth century (Hawkes 1954). Drawing a distinction between text-free and text-aided archaeology, he defined different modes of archaeological cognition or interpretation depending on whether textual sources existed alongside archaeological ones (parahistoric/telehistoric) or not (antehistoric). For Hawkes these represented very different types of interpretation, one historical and the other "processual," and he linked them to his famous ladder of inference. Ultimately of course, even though he was a prehistorian, Hawkes saw historical interpretation as the richer one because it dealt with what was more *human* in human societies.

Hawkes' views were widely shared by many of his contemporaries, especially in Europe, who, while recognizing the importance of natural sciences to archaeology, preferred to see their discipline as part of the humanities, not the natural sciences. Jacquetta Hawkes vociferously argued that the ultimate goal of archaeology was historical reconstruction and that while the natural sciences formed a part of archaeology, their role was largely methodological, not theoretical. Her views were stimulated as a response to the growing influence of New Archaeology within Britain and the opposite stance which it represented: the subsumption of historical interpretation to styles of explanation modeled on the natural sciences. In Britain, this shift is more abrupt, but in North America one can see the transformation taking place more gradually during the preceding decades. For example, archaeologists like John Bennett and Walter Taylor in the 1940s explicitly defined interpretation as the ascription of functional or historical meanings to archaeological data, which Taylor considered as a penultimate stage in the processing of archaeological data, prior to more generalizing steps such as the construction of chronologies, culture historical syntheses, or cross-cultural comparative generalization (Taylor 1983). Indeed, sometimes one can see the interpretative stage as an incipient version of middle range theory, pertaining to the understanding of the archaeological record in terms of the particular events which created it as opposed

to more generalized syntheses. This is reinforced by Ascher's later discussion of analogy which aligns analogy with the interpretive stage of archaeological work, after data collection but prior to synthesis.

Thus, what for Hawkes and many archaeologists, both in Europe and North America, was the ultimate goal of archaeology – historical reconstruction – was for a growing number of North American archaeologists only a middle stage toward a grander goal of scientific explanation, conceived as cross-cultural generalization. This shift was however gradual, and as a result, the concept of interpretation became increasingly ambiguous in North America. Thus, while some authors used the term interpretation to cover *all* aspects of archaeological reasoning, from typologies to historical reconstruction, Willey and Philips used the term processual interpretation as the particular *archaeological* form of scientific explanation (1958). In Britain, the leading exponent of New Archaeology David Clarke similarly used the term *interpretive theory* to refer to a natural science model of explanation which capped a whole series of lower-level theories relating to archaeological reasoning (Clarke 1973: 17). It is only with Binford and the New Archaeology in the 1960s that interpretation seems to almost disappear from North American archaeological vocabulary to be replaced by explanation, a shift that is very emphatic in Binford's seminal paper "Archaeology as Anthropology" (1962). This of course is linked to the adoption of logical positivism and the desire to model archaeological knowledge after philosophies of the natural sciences.

Britain, alongside Scandinavia, was somewhat exceptional in Europe in terms of its reception of the ideas of New Archaeology. While such theoretical changes from the other side of the Atlantic were noted, they were nowhere near as influential as in Britain, no doubt in part due to a shared linguistic and cultural heritage. As a consequence, archaeology and archaeological interpretation remained closely connected to history, most clearly exemplified in the German tradition which from the 1950s developed concepts and methods of source criticism and which still forms the dominant disciplinary matrix today. However, it was precisely because of the stronger reception of New Archaeology in Britain and the denigration of historical interpretation that when postprocessualism emerged in the 1980s, the concept of interpretation was not only revived but given extended and explicit discussion in a manner that it had never received before. This is especially striking in contrast to Germany, for example, where much greater theoretical emphasis focused on control of data quality through source criticism than interpretation per se, a legacy of the entanglement of Nazism and archaeological interpretation from the 1930s.

The earliest postprocessual writings which engaged with the concept of interpretation varied in the attention they gave to it. With Hodder, for example, usage was initially fairly vague, largely because he drew his main inspiration from the work of Collingwood and his method of empathetic understanding, which Hodder felt had been misunderstood (Hodder 1986: 94). For Hodder, Collingwood was simply underlining the importance of acknowledging the *meaning* content of events or material culture in the past. Although Hodder uses the term interpretation, it is by no means a frequent use – it does not even occur in the index to the first edition of his key theoretical text *Reading the Past* (1986), unlike the second and third editions. In contrast, Shanks and Tilley devoted a chapter on hermeneutics and interpretation in their *Re-Constructing Archaeology* (1987), where they affirm their role as an alternative to positivism and explanation. They argue that interpretation moves in a circular or spiral fashion in that archaeologists always bring certain assumptions or analogies from other contexts into their understanding of archaeological data, and it is through a dialectical interplay between data and preconceptions about that data that interpretation develops and moves forward (Shanks & Tilley 1987: 104-5). Drawing on the work of Gadamer, they emphasized the interpretive basis to human experience, anticipating later articulations by Olsen and Thomas (see below).

Apart from this brief but important discussion by Shanks and Tilley, the concept of

interpretation within the early postprocessualism of the 1980s remained very much underdeveloped. As a response to this, the Norwegian archaeologist Bjørnar Olsen with Harald Johnsen published an important paper addressing the gap, specifically focusing on Hodder's contextual archaeology in relation to hermeneutics (Johnsen & Olsen 1992). They highlighted many of the parallels between Hodder's theory and hermeneutics, especially the emphasis on an "inner" understanding of material culture, but they also criticized what they saw as an outdated conception of meaning and pointed out inconsistencies and contradictions within Hodder's writings. In ending, they argued for the need to engage with more recent and theoretically sophisticated hermeneutic writings, singling out Gadamer as the key figure. They argued that archaeology needs to appreciate better the dialectical relation between past and present, that our study of the past should act back on our perception of ourselves, and that modern hermeneutic philosophy can provide a stronger basis for understanding the production of archaeological knowledge. Their paper was published at one of those ironic moments, for after it had been written but before it was published, Hodder, as if anticipating this critique, published a paper in the same journal addressing exactly these concerns (Hodder 1991). In a postscript, Johnsen and Olsen acknowledge this, and while unable to comment at length, they do question Hodder's characterization of hermeneutics as a method as opposed to a philosophical theory about human existence. This is as aspect taken up later by Julian Thomas (see below).

Hodder's paper "Interpretive Archaeology and Its Role" engaged with the hermeneutic tradition in a more direct and explicit manner than his previous texts (Hodder 1991). In part this was driven by Hodder's need to distance himself and his brand of postprocessualism from the excesses of post-structuralist archaeology which many critics from within the processual core were lambasting as a descent into pure relativism, crippling archaeology from making any kind of authoritative statements about the past. For Hodder, the recent hermeneutic philosophy from Betti, Gadamer, Habermas, and Ricoeur provided a way to counter these criticisms, avoiding, as he saw it, the excesses of both positivism and post-structuralism. Archaeological data thus provided a *guarded objectivity* insofar as they represent a reality partially independent of our interpretation and can resist as much as agree with such interpretations. At the same time, our interpretation of such data is not guided by external methods of validation but needs to adhere to a principle of *internal* coherence between any particular part and the whole – which includes seeing archaeological remains as the product of human intentionality and agency. Additionally though, interpretation should also be *reflexive* and *critical* of the wider set of background assumptions and traditions within which archaeologists make their interpretations. These three facets of interpretive archaeology – objectivity, coherence, and reflexivity – combined to make a powerful alternative to the processual concept of explanation.

During the 1990s, Hodder's contextual archaeology thus morphed into an interpretive archaeology; indeed one might talk more generally of an *interpretive turn* within postprocessualism during the last decade of the twentieth century. Two volumes appeared making explicit reference to this development: one called *Interpreting Archaeology* (Hodder et al. 1995) and the other called *Interpretative Archaeology* (Tilley 1993). Shanks and Hodder suggested that the label interpretive archaeologies supersede postprocessual archaeology as a way of avoiding polarization in debate. The concept of interpretation was elaborated further in both volumes, in both similar and different ways. Ironically though, neither volume gave much explicit attention to hermeneutics but rather remained closer to a mix of post-structuralist and Marxist theory.

In the later volume, Shanks and Hodder defined interpretation as the understanding of meaning; this process of understanding, they emphasized, is a dialogue in which both sides (the archaeological record and the archaeologist) are active. As a process, it is also always ongoing; it never reaches a conclusion or closure.

Indeed, even those statements which appear factual or uncontroversial are still interpretations; only the interpretive aspect has been black boxed. This in itself is necessary to enable interpretation to move forward, but at the same time such statements are potentially open to revision, like any other interpretation. In the earlier volume, however, Tilley took quite a different view. Tilley gave a broad definition of interpretation as an activity undertaken only in situations where we are unsure, where something is not immediately obvious. If one sees a figurine of a frog, one does not *interpret* it as a frog – it is just perceived directly as a frog. If the figurine exhibits an ambiguous form on the other hand, we might say it looks like a frog to me, and in that case, we are interpreting the object. For Tilley, this is why interpretation always remains open to change, lacking finality, and its "truth" remains dependent on agreement between people rather than on the evidence – in other words, the figurine is a frog if we *all* interpret it as a frog.

Tilley's volume occupies an important moment within postprocessual archaeology, subtly marking the transition from post-structuralism to phenomenology as a guiding philosophy for its two leading contributors, Tilley himself and Julian Thomas. In many ways, it also marks the end of explicit discussion on interpretation within postprocessual archaeology; though short-lived, the series of papers and volumes mentioned here from the first half the 1990s effectively comprise most of what has been written on interpretation in archaeology in relation to the hermeneutic tradition. The fact that little has been written since is perhaps largely due to the fact that epistemic issues in archaeological theory in general have greatly diminished in importance, at least for those working out of the postprocessual tradition. Concerns have rather shifted more toward questions of ontology (Olsen 2010), reflected not only in the emergence of phenomenology from the mid-1990s within postprocessualism but also in the ontological twist given to the hermeneutic concept of interpretation, as alluded to by Johnsen and Olsen (1992) and later developed by Thomas (2004a; see below).

Key Issues/Current Debates

As suggested at the end of the last section, the concept of interpretation has more or less ceased to generate any new theoretical reflection since the mid-1990s, so there are no real current debates to speak of. Nonetheless, in this section, I will elaborate on two key issues which relate to the concept of interpretation and have engendered divided opinion: the hermeneutic circle and the double hermeneutic. The first has been more central to archaeological discussion, while the latter has only received very brief attention. In the first, I will explore the tension between those who view the circle as a method and those who see it in ontological terms, defining something central about human beings and understanding. In the second, I explore the assumption that would separate the human/social sciences from the natural sciences based on a conception of reality that is divided, between a human-centered, inner world of meaning and a material, outer world of objects.

The Hermeneutic Circle

The concept of the hermeneutic circle extends back to the origins of hermeneutic theory with Schleiermacher and Dilthey, who conceived it on the lines of a part-whole relation, chiefly in relation to textual interpretation. Parts can be anything from words to text sections, while wholes can be anything from sentences to a language. The circle describes the necessary working back and forth between the two so that an accurate understanding of meaning can be achieved. Thus, to understand an unusual word in an ancient text may require not only assessing it in the context of its sentence but also how the word is used in other sentences and how this usage might differ between different authors, literary traditions, and even time periods. It is an ever-widening circle but one that is also always a back and forth between part and whole. Expressed this way, it describes a method of interpretation, and it was this part-whole relation that Hodder adopted in his uptake of hermeneutics and which he illustrated so clearly in his interpretation of a Neolithic

enclosure (Hodder 1999: 32-40). In this case study, he narrates how his interpretation of the excavation changed over seasons as it shifted back and forth between the evidence and his expectations based on prior knowledge of such sites. He describes this process not as a circle but a spiral, to emphasize that the interpretive process is always forward moving, not locked as in a closed loop, a point also made earlier by Shanks and Tilley (1987: 104). In a sense, this captures the same idea as the notion of a widening circle mentioned above. At the same time, however, in the process it is not only the interpretation of the site that has changed but also the general background knowledge about such sites and perhaps the Neolithic in general. This is why Hodder (and others) often also describes the process as a *dialectic*, because in moving back and forth between part and whole, *both* are transformed in the process.

However, one of the points made by Johnsen and Olsen in their review of hermeneutics and Hodder's version of it is that interpretation is not simply an epistemological concept about the method of knowledge acquisition, but it is an ontological concept defining something fundamental about human beings. This was taken from Gadamer's philosophical hermeneutics which blended Heidegger's phenomenology with the hermeneutic tradition. For Gadamer, Heidegger marks a turning point in the theory of interpretation, transforming the hermeneutic circle from a methodological concept to a metaphysical or ontological one. In *Being and Time*, Heidegger described the process of interpretation in terms of the relation between fore-understanding and understanding, where fore-understanding represents our implicit way of seeing the world inherited from the particular historical tradition we were raised in. In one sense, Heidegger *temporalized* the hermeneutic circle – instead of being about the part-whole relation of words to texts, it became a past/future-present, temporal relation between fore-understanding/expectation and interpretation. Gadamer adopted this stance in his key work *Truth and Method*, using the term prejudice for this fore-understanding.

Julian Thomas developed this ontological view of the hermeneutic circle, citing Gadamer who characterizes humans as *interpreting beings* (Thomas 2004a: 24). For Thomas, interpretation is thus something we are always doing and it applies to all experience; thus in Tilley's example cited earlier, when we unhesitatingly see the figurine as a frog, this is just as much an interpretation as when we consciously decide it is a frog. All acts of experience are enframed within a pre-understanding – we always see things *as* something, there can be no raw, unprocessed or uninterpreted experience. Even if we are uncertain it is a frog, we at least see it *as* a figurine. For Thomas, this aspect of human existence, what Heidegger called the as-structure, contradicts Hodder's notion of even a partial or guarded objectivity. Quoting Gadamer, Thomas argues that interpretation is a circle we cannot escape; however, it is not necessarily a vicious circle. While implicit pre-understanding always informs any experience, any explicit act of interpretation can also alter that pre-understanding and thus alter our experience of the world. This is a basic issue of contention with the hermeneutic circle; some see it as a vicious circle, allowing no grounding in any stable or solid point; it is another version of the post-structuralist play of endless difference. However, the position taken by Gadamer and Thomas is that the circle actually *enables* understanding or interpretation in the first place.

The Double Hermeneutic

The concept of the double hermeneutic was coined by the sociologist Anthony Giddens as a way to characterize a particular consequence of interpretation in the social sciences as distinct from those in the natural sciences. The notion of a double hermeneutic captures the idea that while social scientists interpret a particular society, those interpretations can be taken up by the society being interpreted and thus constitute a second or doubled interpretation (Giddens 1984: 284). For example, a hypothetical tribal society will have its own interpretation of a certain ritual it performs, which constitute what might be called a first-order interpretation

(e.g., sacrifice to the gods for a fertile harvest). The anthropologist studying them, however, will typically create a second-order interpretation to explain this ritual (e.g., releasing social tension); without this second-order description, it would hardly be anthropology. The same applies to any social science, including archaeology, where material culture patterning associated with a ritual incorporates aspects of how people in the past interpreted the ritual themselves. The doubling occurs however when these second-order interpretations are incorporated by the people being studied so that they become first-order interpretations. For example, early anthropological accounts of societies may be taken up by later descendents and integrated into their own sense of tribal identity.

Giddens' articulation of the double hermeneutic makes explicit the dialectical interplay between two frames of meaning – the sociologist and the people being studied, and how translation and interpretation from one to the other runs in both directions. When Giddens originally articulated this, it was contrasted with the natural sciences where, he argued, the object world does not answer back. This is highly debatable given recent perspectives within science and technology studies, but it is interesting that Shanks and Tilley adopted and modified Giddens double hermeneutic into a fourfold hermeneutic – but in such a way that actually bears no resemblance to Giddens concept of it. For Shanks and Tilley, archaeology was involved in a quadruple act of interpretation, by which they effectively meant the overcoming of four levels of distanciation: from our own disciplinary matrix, from our own social context, to an alien cultural context, and to a past cultural context (Shanks & Tilley 1987: 107-8). This was a somewhat befuddled attempt to expand Giddens's original notion, and few have actually adopted it in archaeology (but see Leone, in Hodder et al. 1995); indeed a faithful reading of Giddens' original articulation would ironically have excluded archaeology from the double hermeneutic, aligning it with the natural sciences.

On the other hand, it raises a problem which Shanks and Tilley perhaps should have addressed, namely, the question of whether objects do answer back. There are two issues here; the first concerns the potential of any object of study to be transformed by the act of study itself. This is a common enough property of any science, from quantum physics to archaeology. The second, more equivocal issue concerns a separation of meaning (humans, society) from materiality (objects, nature) as two different orders of phenomena. This separation of course can be traced right back to Dilthey and Weber who argued for two forms of knowledge and science, one which looked at reality from an external, causal perspective (natural science/explanation) and the other which looked at reality from an internal, meaning perspective (social science/interpretation). The distinction also lay at the basis of Hodder's contextual archaeology and adoption of Collingwood's approach to interpretation as empathetic understanding. In assuming this separation, Giddens was inevitably led to argue that only when the object of study has the same ontological status as the scientist, i.e. social phenomena, is there any possibility of answering back. Yet if one avoids the separation of reality into two orders, then no distinction between a single and double hermeneutic is necessary. Any science exhibits the dialectical characteristics of the double hermeneutic, but more importantly, the very term is perhaps redundant insofar as the concept of hermeneutics presupposes the distinction of two realities – meaning and materiality.

Future Directions

What is the future of archaeological interpretation? For some, interpretation has come to carry a somewhat negative connotation, whereby it implies nothing is ever what it seems: meaning is always hidden, always beneath the surface, and always one step away. In Freudian terms, a pipe is never just a pipe. This hermeneutics of suspicion (Olsen 2006), of depth (Thomas 2004b: 154-7) is largely the product of a post-structuralist influence on the concept of interpretation, whereby all meaning becomes completely unhinged from

the materiality of the world as it is experienced and is one reason why interpretation itself has now become suspect. But the concept as originally formulated does not necessarily need to imply such a connotation. On the other hand, arguably the word interpretation today is often used loosely and interchangeably with explanation, as it once was before the processual-postprocessual wars of the 1980s and 1990s. This suggests two not necessarily unrelated possibilities: either people are just bored of epistemic subtleties or that the basis for the distinction between explanation and interpretation is simply no longer plausible. Is there really a divide between the natural and social sciences in terms of their forms of knowledge or orders of reality? Instead of just two sciences, many now argue for a more heterogeneous disunity to the sciences, while conversely, others in emphasizing the performative quality of the natural sciences reveal a continuity between science and other forms of cultural production. This is most apparent in work that comes under the rubric of postphenomenology, specifically the work of Don Idhe (Idhe 1999, 2009). In archaeology, this shift has manifested itself through the recent rise of interest in a concept of materiality that does not separate itself from meaning, but as this literature reveals, the dichotomies generated from the last century are hard to shake off.

It may be some time yet before we see a resolution to this issue, but either way, the concept of interpretation is unlikely to remain unchanged. The extent to which Hodder's original adoption of the distinction between an internal and external type of understanding remains a valid one is hard to maintain today. Indeed, Hodder's later articulation of interpretation tended to focus more on the process or operation of the part-whole relation than this internal-external distinction, which is why some have suggested a greater commonality between interpretive and explanatory archaeologies. In many ways then, the concept of interpretation, as described in this chapter, is perhaps already redundant; if it has a future, it may not be one that separates it from explanation at least.

Cross-References

- ▶ Hodder, Ian (Theory)
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory

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Iran: Heritage Preservation and Tourism

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Introduction and Historical Background

This entry seeks to provide empirical evidence concerning heritage preservation in the Islamic Republic of Iran. A brief description of the country's tourism industry is also presented as this relates to the cultural heritage.

Until 1935, Iran was historically referred to as Persia when Reza Shah Pahlavi formally announced to call the country by its *native* name, Iran. Under the leadership of Ayatollah Khomeini, the current Islamic Republic of Iran was founded in 1979. Iran has an impressive history and fascinating culture. The Iranians are very proud of their culture and history. It is important to note that Iran is not an Arab country. Iran comes from the word "Aryan" with its official language being Farsi, an Indo-European language. Although Iran is portrayed in the media as a society of purely Islamic fundamentalists, the country is also comprised of people practicing other religions making it, in reality, a multicultural national entity.

Iran's heritage is very represented on the UNESCO World Heritage List with 13 cultural sites. Clearly, Iran has an abundant wealth of cultural assets of the pre-Islamic and Islamic eras and thus great potential for tourism. Although tourism to Iran is restricted or difficult due to its political situation and strict Islamic practice, Iran nevertheless has recorded a significant increase in its inbound tourist arrivals. More than 1.6 million international visitors were generated in 2004.

Key Issues

Heritage Management, Policy, and Laws

The *Iran Cultural Heritage, Handicrafts, and Tourism Organization* (ICHHTO) is an organization in charge of the protection of Iranian monuments. Apart from that, the agency is also responsible for overseeing the country's heritage and tourism movement. All projects concerning the protection of monuments in Iran must be in accordance with the provisions of the law and must be approved by ICHHTO. However, I have not identified the specific law concerning this protection.

All nominated properties to the World Heritage List are protected under the Iranian legislation since 1932. Apparently, according to the current law, special protection provisions are in place for the property, the buffer zone and for a wider area called the "landscape zone." The High Technical Council of ICHHTO is responsible for the management of these protected monuments by allocating funding for major conservation works. Minor works and maintenance is ensured by a steering committee (Table 1).

It is complicated and difficult to distinguish the differences in functions and status between the ICHHTO, ICTHO, and ICHO. O'Gorman, McLellan, and Baum (2007), in their article on central control and indigeneity of tourism in Iran, state that the growing links between tourism and the protection of Iran's national cultural heritage were reinforced in 2005 with the merger of *Iran Touring and Tourism Organization* (ITTO) and *Iran Cultural Heritage Organization* (ICHO) to

Iran: Heritage Preservation and Tourism, Table 1 Organizations responsible for the management of heritage and tourism in Iran

Iran Tourism and Touring Organization (ITTO)
Iran Cultural Heritage, Handicrafts, and Tourism Organization (ICHHTO)
Iranian Cultural Heritage Organization (ICHO)
Cultural Heritage and Tourism Organization (ICHTO)
Research Center for Conservation of Cultural Relics
Iran Heritage Foundation (IHF)
ICHO Anthropology Research Center
Technical Office for Preservation Projects of ICHO
Research Center of the Traditional Arts

form the *Iran Cultural Heritage and Tourism Organization* (ICHTO). It is interesting to note the way heritage and tourism is viewed based on the formation of these organizations. It appears that the country is aware of the significance of tourism and recognizes the importance of preserving heritage and cultural sites for that sector.

Another organization identified is the *Iranian Cultural Heritage Organization* (ICHO), which is also a governmental agency responsible for carrying out research, conservation, rehabilitation, presentation, and education concerning the cultural patrimony of Iran. It was mentioned earlier that this organization has been merged with ITTO to form the ICHTO. However, it is still very complicated to understand the heritage management of the country. Initially, the agency is responsible in formulating policy for cultural and heritage of Iran. It was also mentioned that the subdivision of ICHO, the *ICHO's Anthropological Research Center*, is made up of four research departments: social anthropology, ecological anthropology, ritual anthropology, and traditional arts. Their main responsibility is to carry out research in the various domains of Iran's intangible cultural heritage.

There is also another organization which, if not carefully read, may be mistaken as the earlier organization mentioned above, and it is unclear at this moment if both exist. *Iran's Cultural Heritage, Tourism and Handicrafts Organization* (ICTHO) is an agency responsible for the establishment and development of tourism in Iran. ICTHO is an educational and research institution overseeing a variety of museum complexes throughout Iran. Established in 1985, it is administered and funded by the government of Iran.

The *Iran Heritage Foundation* (IHF) is a nonpolitical UK-registered charity with the mission to promote and preserve the history, languages, and cultures of Iran. It can be assumed here that this may be a nongovernmental and nonprofit agency which is aimed at organizing diverse activities of cultural or scholarly merit which include academic research, publishing, and fellowships. IHF initiates a wide range of activities intended to facilitate the study of Iran's history and culture, both among academics and the wider community. Their main source of funding is the annual contribution pledged by trustees and patrons as well as fund-raising events. They encourage business and individual sponsorships but they accept no financial support from any government organizations or lobbying groups.

Iran Stolen Heritage

The *Iran Heritage* site (http://www.iran-heritage.org/index.htm) is a resource for anyone interested in preserving the heritage of Iran. The main goal of this site is to document stolen properties which have been transferred to locations and museums worldwide. These archaeological finds belong to Iran and its people. According to the UNESCO Convention of 1970, legal actions can be taken to return the stolen properties to Iran or Iranian museums anywhere in the world. The association listed three stolen Iran heritages worldwide on their website. The first one was found at the New York Metropolitan Museum of the United States. Another stolen heritage was reported in the Los Angeles County Museum of Art. According to the site, the museum paid $40 million to a private collector to purchase the stolen Iranian Heritage. The last reported stolen heritage was found at the Louvre Museum in Paris, France, and the British Museum, London, England – but no information was available on this. Another important purpose of this site is to raise the awareness of Iran's culture and natural resources.

World Heritage Sites

At present, there are 13 cultural sites of Iran listed on the World Heritage List. The table below provides the list of Iran's cultural properties listed in the World Heritage Sites. Out of those, one is listed as site in danger: Bam and its cultural landscape (Table 2).

Meidan Emam, Esfahan, was the first Iranian site inscribed on the UNESCO World Heritage List (in 1979). Known for its Royal Mosque, the site is an impressive testimony to the level of social and cultural life in Persia during the Safawid period (UNESCO). The center of the city was dominated by a vast Royal Square and so large that it was called "the image of the world."

Persepolis was also inscribed in 1979. It was built on an immense half-artificial, half-natural terrace, where the "king of kings" created an impressive palace complex inspired by Mesopotamian models.

Another cultural property inscribed that same year is the *Tchogha Zanbil*, which is the ruins of the holy city of the Kingdom of Elam.

The archaeological site of *Takht-e Soleyman*, situated in a valley set in a volcanic mountain region, has an important symbolic significance and an outstanding ensemble of royal architecture situated in Azerbaijan province. Located about 750 km from the capital city of Tehran, the site is well known for heritage tourism among international visitors.

Pasargadae was the first dynastic capital of the Achaemenid Empire. Its palaces, gardens, and the mausoleum of Cyrus are outstanding testimonies of the Persian civilization. The property was inscribed in 2004 based on criteria I, II, III, and IV.

Soltaniyeh, situated in the northwest province of Zanjan, is another important achievement of the Persian Islamic architecture. The property has been described as "anticipating the Taj Mahal." It is believed that the site was occupied at least from the first millennium BCE.

Bisotun is located along the ancient trade route linking the Iranian high plateau with Mesopotamia. The site includes remains from prehistoric times to the Median, Achaemenid, Sassanian, and Ilkhanid periods. The principal monument is a bas-relief ordered by and featuring Darius I, the Great, when he ascended to the throne of the Persian Empire in 521 BCE.

Iran: Heritage Preservation and Tourism, Table 2 World Heritage Sites of the Islamic Republic of Iran

Sites	Nature of sites
Meidan Emam, Esfahan	Cultural, 1979
Persepolis	Cultural, 1979
Tchogha Zanbil	Cultural, 1979
Takht-e Soleyman	Cultural, 2003
Bam and its cultural landscape	Cultural, 2004
	Sites in Danger
Pasargadae	Cultural, 2004
Soltaniyeh	Cultural, 2005
Bisotun	Cultural, 2006
Armenian Monastic Ensembles of Iran	Cultural, 2008
Shushtar Historical Hydraulic System	Cultural, 2009
Sheikh Safi al-din Khānegāh and Shrine Ensemble in Ardabil	Cultural, 2010
Tabriz Historic Bazaar Complex	Cultural, 2010
The Persian Garden	Cultural, 2011

Source: UNESCO World Heritage List. Available at: http://whc.unesco.org/en/list.

The *Armenian Monastic Ensembles of Iran*, situated in the northwest of the country, consists of three monastic ensembles of the Armenian Christian faith: St Thaddeus and St Stepanos and the Chapel of Dzordzor. *Shushtar Historical Hydraulic System* was inscribed at the same time.

Sheikh Safi al-din Khānegāh and Shrine Ensemble in Ardabil incorporates a route to reach the shrine of the Sheikh, divided into seven segments and constituting a rare ensemble of elements of medieval Islamic architecture.

The *Tabriz Historic Bazaar Complex* is one of the most important commercial centers on the Silk Road. The complex has been one of the most important international places for commercial and cultural interchange. It was officially protected in 1975.

The Persian Garden includes nine gardens in nine provinces of Iran. As explained in the UNESCO website, "They exemplify the diversity of Persian garden designs that evolved and adapted to different climate conditions while

retaining principles that have their roots in the times of Cyrus the Great, 6th century… [and] influenced the art of garden design as far as India and Spain."

Heritage in Danger: Bam and Its Cultural Landscape

Bam and its cultural landscape is the only property of Iran inscribed to the World Heritage List as heritage in danger. It is situated in a desert environment on the southern edge of the Iranian high plateau and was known for the production of silk and cotton garments. The site was submitted to UNESCO in 2004 after it was affected by the 6.2 magnitude earthquake in 2003, which destroyed most buildings of the city and killed more than 26,000 people. The Citadel was also seriously damaged. The government is still gathering efforts to revive this significant heritage property. According to the official tourism website, this site receives substantial number of tourists every year. Being listed as heritage in danger does not mean the site will result in poor visitation. In fact, it would give more reasons for people to visit a site.

Properties on Tentative List

Iran has more than 50 sites submitted to UNESCO Tentative List! Most of these sites are cultural sites. In 1997, Iran submitted seven sites to UNESCO and is still awaiting approval into the premier list: Mosque Esfahan, Historic ensemble of Qasr-e Shirin, and Firuzabad Ensemble just to name a few. The government believes that the Tentative List will help them maintain sites of significance from further destruction and damage. In 2007, Iran submitted 40 cultural and natural sites to be listed as World Heritage Sites of UNESCO. Eleven more sites were submitted in 2008 making the total altogether 56 tentative sites.

Iran as a Tourism Destination

Tourism is undoubtedly an important industry for economic development of Iran. Before 1979, Iran was a well-known destination due to its impressive history and ancient civilization. Its attractive natural and historical sites are rated among the top ranked in the world (ITTO). The 2005 20-year Tourism Development Master Plan with the assistance of World Tourism Organization (WTO) is one effort indicating how serious the Iran government was on investing in tourism. UNESCO ranks Iran seventh in the world in terms of possessing historical monuments, museums, and other cultural attractions. This is a positive indication of how Iran can explore its tourism potential and attracts more international tourism. However, it has been a rather difficult process for tourism to flourish in Iran. Poor advertising, internal and international political instability creating an image of Iran as an unsafe country, and its negative public image in some parts of the world have hindered the growth of tourism. Perhaps a greater difficulty is that of getting an entry visa. At present, countries with no visa entry requirements are Bosnia-Herzegovina, Croatia, Japan, Turkey, and Saudi Arabia (ITTO).

In addition, the prohibition of alcohol and the strict Islamic women's dress code discourage tourism from the West. It is reported that tour operators in some countries are unwilling to promote Iran due to these circumstances. Yet many tourists from outside the Islamic world are undiscourage and Iran has somehow strategize its tourism campaigns to countries willing to accept these strict regulations.

Tourism will help enhance Iran's image internationally and, perhaps, change people's perceptions of its country.

In its further effort to promote tourism, Iran has established a *Special Economic Zone* and a *Free-Trade Industrial Zone*. These free zones are designed as an incentive for foreign investments. These zones provides facilities such as proper employment regulations, 15 years tax exemption, national and international banking facilities, no currency restrictions, abundance of energy sources, labor of all skill levels, no visa entry requirements, and tourist attractions (WTO 2002). The incentives provided in these zones have attracted many foreign investments.

Approximately 1.8 % of national employment in Iran is generated in the tourism sector which is slated to increase to 10 % in the next

five years. In 2009, tourism attracted 2.3 million people to Iran. The tourists' arrival data or statistics are not available on Iran's leading tourism website. Countries such as Japan, Germany, and Turkey, that have good relations with Iran, are some of their main target markets. A study by Vafadari and Cooper (2007) on Japan and Iran's relationship in tourism reported that the Japanese with strong interest in heritage tourism constitute one of the most important tourism markets for Iran. Iran plans to have 20 million tourists annually by 2015. Cultural and heritage attractions constitute the focal point of Iran tourism promotion and marketing. According to their official tourism website, Iran Travel and Tourism Organization (online), 70 % of Iran's tourists are from Europe. However, it was reported that tourists' arrivals in Iran faced a decline in 2008. Iran has been criticized as having a negative image internationally due to its political tension with the western governments. The country also has a reputation for supporting various elements of Islamic extremism.

Domestic tourism in Iran, however, has remained strong despite the decline in international arrivals in 2008. Many domestic trips reported were among the religious visits or visiting family and friends (VFR).

Safeguarding Intangible Cultural Heritage and Developing Ecotourism

Although this encyclopedia is concerned with archaeology, when dealing with cultural heritage and world heritage the intangible must also be recognized. Moreover, ecotourism immediately implicates Iran's living cultural heritage.

One area considered for further expansion in the tourism sector in Iran is ecotourism. Iran has an established image of its heritage attractions and this has attracted many visitors with such interest. In expanding its tourism and exploring further potential in tourism, Iran has recently showed interest in investing in ecotourism. An initial project to realize this plan was to develop and preserve Masuleh, a village rich in tangible and intangible heritage. Masuleh is located in a scenic valley surrounded by snow-capped mountains in northeastern Iran. The village is a site of the UNESCO and the Iran Touring and Tourism Organization (ITTO) project in Iran. Notable for its traditional wooden buildings, clustered on the northern slopes of the valley, Masuleh is registered as national cultural and natural heritage in Iran. The project is aimed at encouraging community participation in the area's tourism development and helping to generate employment opportunities.

Iran: Heritage Preservation and Tourism, Table 3 List of laws and acts about Iran's effort in protecting their intangible heritage

Act/laws
National laws and regulations giving rise to a number of organizations, ministries, or other governmental bodies
Iranian National Copyright Law of the year 1969, to support authors, composers, and artists
The Fourth Economic, Social, and Cultural Development Law, for the period 2005–2009
Establishment of the Iranian Cultural Heritage Organization Law, 1985
Constitution of the Iranian Cultural Heritage Organization Law, 1988

In its effort to safeguarding intangible heritage, the government of the Islamic Republic of Iran has passed several laws pertaining to aspects and the manner in which intangible heritage should be preserved. The following table provides the list of laws and acts about Iran's effort in protecting their intangible heritage (Table 3).

The Intangible Cultural Heritage list is composed of intangible heritage elements that concern communities and require urgent measures to keep them alive (UNESCO 2003). UNESCO defines intangible heritage as living traditions that are passed on from one generation to another. These include spoken traditions, festivals, performing arts, social ceremonies, and cultural knowledge. Inscriptions on the list help mobilize international cooperation and assistance for stakeholders to undertake appropriate safeguarding measures (Table 4).

Future Directions

Iran is a large country with numerous attractions that appeal to tourists particularly its rich heritage

Iran: Heritage Preservation and Tourism, Table 4 Intangible Heritage of Iran listed during the 5th session of the Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage, Nairobi, Kenya

Intangible cultural heritage
The music of the Bakhshis of Khorasan
The Pahlevani and Zoorkhanei rituals
The ritual dramatic art of Ta'zīye
Traditional skills of carpet weaving in Fars
Traditional skills of carpet weaving in Kashan

and cultural assets. Apart from its economic potential, tourism and cultural exchange will promote prosperity and understanding of other countries towards Iran. The 2005 Tourism Development Master Plan (WTO 2002) has in many ways helped justify Iran's tourism direction and attracted many stakeholders, foreign expertise and investors to boost up the country's tourism industry. Iran's potential in becoming a leading tourism destination is very strong considering the amount of heritage sites the country own and is maintaining.

The country receives great attention from UNESCO on preserving its heritage. Despite some of the major issues and challenges facing its tourism industry, Iran continues to receive tourists particularly interested with its cultural, history, and heritage endeavors. Iran is now gradually dealing with its challenges and limitations facing its tourism industry. Issues such as the use of "hijab" among women tourists and prohibiting alcohol have invited much debate over the years. The government is also planning to extend its free-trade zones to the main land instead of just limiting it to the Iranian islands in order to distribute an equal share of its tourism economic benefits. The government has also taken measures to facilitate inbound tourism by easing visa issuance on arrival to many nationalities.

Historically, the war with Iraq impacted the country's tourism growth and a major decline in tourism arrivals was reported for Iran. Despite such turndown in tourism, Iran has instead focused its policy on selective markets with emphasis on its Islamic-Iranian civilization. Tourism policy was formulated with the aim to achieve Islamic unity among the Muslim nations through tourist exchanges. Although the policy was not aimed to attract tourists on a global scale, it was enough to boost tourism for Iran.

In recent years, the negative image of Iran imposed by international media has also played a major factor in the declining international tourism arrivals. The Middle East is often described as an unsafe place for tourists in general. In its effort to support tourism in the country and internationally, Iran's government has also given substantial responsibilities to the private sector in developing the industry particularly to preserve and restore historical monuments, cultural, and heritage products and tourism facilities, limiting its own role to tourism policy making and strategic planning (WTO 2002).

Apart from efforts in tourism, it is also important for Iran to enrich its management efforts of its heritage sites. This will require further research over the existing situation of Iran's heritage management and the impacts tourism may bring to the country's heritage sites.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Heritage Values, Communication of
- ▶ Iran: Islamic Archaeology

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Iran: Islamic Archaeology

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Introduction

Islamic archaeology is a discipline characterized by an inaccurate and problematic definition. The chronological and geographical extent of Islamic history and the cultural, ethnic, and religious peculiarities of the territories ruled by Islamic authorities prevent the imposition of a conclusive definition – to the extent that this problem has become an object of research in itself. In the case of Islamic archaeology in Iran, additional issues relate to the nature of the birth and development of Islamic archaeology and the cultural peculiarities of the country, including its historical–political vicissitudes. For example, we must take into consideration the privileged role of the pre-Islamic past in shaping the national identity of Iran, as well as the historic influence of Westerners in the country.

Definition

Islamic archaeology in Iran involves the exploration of landscapes and excavation of archaeological sites as well as the study of monuments and artifacts that have been produced since the Islamic conquests. The Islamic expansion started in Iran in the seventh century and is conventionally accepted as having ended with the defeat of the Sasanian Empire in 641. Research into the Islamic period relates to elements and structures (such as mosques, madrasas, graveyards and funerary monuments, government buildings, monetization) that directly represent Islam as a religious and institutional entity or elements and structures (such as the water supply system, communications network, agricultural exploitation, production and commercialization of goods) that involve the socioeconomic organization of urban and rural territories, connected with either the Muslim majority or minor religious groups such as Christians, Zoroastrians, Jews, and minor Islamic sects such as the so-called Assassins.

Historical Background

An interest in the antiquities of Iran's Islamic period is demonstrated by the documentation of monuments and sites by occasional Western travellers since the seventeenth century, becoming more widespread in the late nineteenth century

stimulated by the antiquarian appeal of the artifacts shown at Universal Exhibitions in Europe and America (mostly in Paris in 1867, 1878, and 1889). The antiquities market's growing demand for these artifacts led to excavations, generally authorized by the government, in search of objects of commercial value. Antiquarians themselves conducted such excavations. Among them were many Europeans, such as C. Vignier and G. Demotte, and Armenians such as the Kelekian and Kevorkian families. Excavations were also carried out illegally. These lucrative commercial activities had harmful effects on archaeological sites: Nishapur, Rayy, Sirjan, and Sava are among those damaged by such activities (Vernoit 2000). The commercial value of the artifacts also led to forgery, such as the case of some of Rayy's "Buyid" textiles.

The close relationship between antiquarians and art historians, together with the supremacy of history of art over archaeology in the academic context of the time, favored a historical–artistic approach to the study of artifacts of the Islamic period. This approach focused on decorative motifs, iconography, and the presence of inscriptions on decontextualized objects and legitimized the unscientific excavation of archaeological sites. In addition, this approach was contaminated by the ethnocentric and colonial tendencies of the cultural and political climate. The assumed superiority of Indo-Europeans over Arab Semites had long-term consequences in archaeology, for instance, in the preconceived attribution to Iran of stylistic and technical innovations in ceramic production.

The principal concern of the first archaeologists in Iran was to excavate the many important sites of the pre-Islamic period. Islamic strata encountered during excavations were usually ignored and often left unrecorded. Accordingly, it is not surprising that Islamic archaeology in Iran had difficulties in establishing itself as an autonomous discipline and that scientifically conducted archaeological excavations of Islamic sites started relatively late.

Between 1885 and 1931, when France had a monopoly over the awarding of concessions to excavate in Iran, the most excavated archaeological site was Susa, located in the southwest of the country. Archaeological surveys were carried out by the *Délégation archéologique française en Perse* (subsequently renamed *en Iran*, DAFI) since its foundation in 1897 and continued with few interruptions until 1979. The task of these surveys was to collect as many archaeological finds as possible. There was no interest in stratigraphy or context. Moreover, the search did not address the Islamic period. Nevertheless, the high number of Islamic ceramics found attracted the attention of experts, including G. Migeon, M. Pézard, and R. Koechlin.

Research on monuments conducted without excavation by scholars such as F. Sarre (1901–1910) and E. Diez (1918) provided a scientific basis for the development of Islamic archaeology in Iran at the beginning of the twentieth century. Particularly relevant is the publication of the monumental *A Survey of Persian Art from Prehistoric Times to the Present*, edited by A.U. Pope and P. Ackermann (1938–1939), which includes studies on architecture and artifacts of the Islamic period in Iran by authors including Godard, Herzfeld, Monneret de Villard, Schmidt, Schroeder, Siroux, Smith, and Wilber; the publication offers a complete overview of scientific research conducted in the region. The first specialized journals appeared in the same period, such as *Āthār-é Īrān* (Service Archéologique de l'Iran, 1936–1949, founded by Godard) and the *Archäologische Mitteilungen aus Iran* (Berlin, 1929–1937 and 1968–), publishing articles that contributed to the evolution of the discipline.

The Metropolitan Museum of New York started its first archaeological excavation of a site of the Islamic period in the 1930s, at Nishapur in Khorasan (conducted by J. Upton, W. Hauser and C.K. Wilkinson; see below). Other excavations that aimed to understand the pre-Islamic and succeeding phases were conducted by the Metropolitan Museum at Qasr-i Abu Nasr, close to Shiraz (from 1932); furthermore, E. Herzfeld started excavations at Istakhr, which were continued by E.F. Schmidt (1932–1937; see below) who was also working at Rayy (1932–1936). The archaeological results

concerning these sites' Islamic levels have been published scarcely or not at all; their publication has been restarted recently but has not been completed for all sites (for Qasr-i Abu Nasr, see Whitcomb 1985; for Rayy, see Keall 1979; for the other sites see below).

The excavations at Nishapur investigated several *tepe*s, the most important of which are Tepe Madrasa, Sabz Pushan, "Vineyard" Tepe, and Qanat Tepe, uncovering houses, mosques (the *mihrab* always having a rectangular section), and *hammam*s. Almost all of these features have been dated between the ninth and twelfth centuries (Wilkinson 1987). The remains of architectural decoration are remarkable, particularly the mural paintings (these include ornamentations of animated vegetal motifs, imitations of marble panelling, and depiction of characters such as a knight and an attendant), the carved and painted stucco facing, and the baked-brick panels. Many houses had small *mihrab*s set into the walls and rooms set around a central courtyard, often with a colonnade. In subsequent phases, many of the rooms were divided. Water was supplied through canals. A mosque with a (later) minaret of octagonal section was brought to light at Tepe Madrasa, and various phases of this rectangular-planned mosque, with courtyard, were identified. Numismatic evidence indicates a *terminus post quem* of 785 for the earliest phase. An architectural complex composed of various profusely decorated rooms was also located at Tepe Madrasa. This was probably a palatial or governmental structure (despite the lack of a normally typical symmetrical framework). The finding of ceramic fragments spanning the eighth to the fourteenth centuries in the remains of a pavilion with dome shows continuity in the use of the complex in this tepe after the Mongol invasion. At Qanat Tepe the excavations brought to light a mosque of at least the tenth century, with rectangular plan and two central pillars, a *hammam* with an octagonal *calidarium*, and remains of mural painting probably of Seljuk date.

Archaeological research on the city of Istakhr in the region of Fars has investigated the transition from the Sasanian period to that following the Islamic conquest of the seventh century. The results confirm that the city was prosperous during the ninth to tenth century and almost totally abandoned at the beginning of the eleventh century (Whitcomb 1979). During the seventh century, the urban center had been moved within the broad city walls that surrounded the Sasanian city. The new urban installation was characterized by the same orientation as the seventh-century congregational mosque. The hypostyle mosque had been built with spoliated stone material probably of the Achaemenid period and had columns with tauriform capitals and a painted *mihrab* decorated with stucco. The excavations also uncovered a row of bazar shops and three private houses, the houses having a narrow entrance with rectangular buttress and rooms over the central court, and a productive area with kilns. The interactions between the urban site and surrounding territory as well as agricultural exploitation and water supply in the region have been investigated by mean of surveys in the Marvdasht valley.

The systematic documentation of Iran's archaeological sites through aerial photography was undertaken by E.F. Schmidt and his wife M. H. Warden and published under his name only in 1940 (Schmidt 1940). This publication is still important and includes some Islamic sites.

Following a break due to World War II, renewed archaeological activities in Iran showed greater awareness of historical enquiry, applying excavation techniques to investigate the phases following the Islamic conquest and increasing the accuracy of their documentation. The 1960s and 1970s were a time of important excavations, bringing a considerable increase in knowledge about different Islamic periods in Iran, in particular that corresponding to Seljuk sovereignty. The most significant work saw renewed interest in Susa and Takht-e Sulayman, Siraf, the Friday Mosque of Isfahan, and Ghubayra (see below). In the same year, the publication of two major journals began: *Iran* (British Institute of Persian Studies, 1963–) and the *Cahiers de la Délégation Archéologique Française en Iran* (1971–).

Research in Susa recommenced in 1946 and was directed by R. Ghirshman until 1967. During this period, methods of excavation and recording

were modified in order to consider the Islamic period. Archaeologists specializing in the Islamic period that undertook research under the direction of J. Perrot between 1967 and 1979 include M. Rosen-Ayalon, C. Hardy, M. Kervran, and A. Rougelle. The study and publication of the Islamic phases of some areas of the site and associated materials was commissioned (Hardy-Guilbert 2005). Continued use of the site is testified by the private and public buildings of the seventh century, in the three terraced *tepe*s called Apadana, Royal City, and City of the Craftsmen, according to the Achaemenid remains. The private houses became progressively bigger towards Apadana's *tepe* and are characterized by a central court that can have a colonnade or one or more *iwan* according to the socioeconomic status of the family; bathrooms and lavatories were connected to a sewage system. Motifs on stucco-decorated columns and in niches and apertures occurred in the grander buildings. The Friday Mosque, built in 639, had a court with columns around three sides and a prayer room without *mihrab*, which formed part of the significant enlargement that occurred around 700, to which also belonged the architectural decorations in carved stucco and baked brick with inscriptions in kufic. A minaret was also found during the excavations.

A large building was located close to the mosque, probably a *khangah* (monastery). It contained two structures at the sides of the entrance and a rectangular central court with access to the various rooms. A significant quantity of ceramics dated from the beginning of the eleventh century indicates that the building had been used as a dump since this time. The growth of the city between the end of the ninth century and the beginning of the tenth century included the integration of the residential areas into the urban fabric following an orientation determined by the Achaemenid buildings. Susa was already equipped with a public *hammam* at this time. During the tenth century, the Apadana and the Royal City were abandoned, although the areas to the east and west continued to be inhabited until the thirteenth century. Much of the evidence was linked to the productive economy of the city, mostly related to ceramic and glass manufacturing and to sugar production from the tenth to the thirteenth century.

The German Archaeological Institute conducted excavations of the Ilkhanid site of Takht-e Sulayman in Azerbaijan from 1959 to 1978 (Naumann 1976). This included excavating the Ilkhanid palatine complex, which was built during the reign of Abaqa Khan (1265–1282), as indicated by finds of dated tiles, near a water basin on the site of a Sasanid Zoroastrian sanctuary. The remains of the Ilkhanid period, including the city walls (built over the Sasanid walls) and the palatine complex, are characterized by a north–south axis. The palace was built around the water basin. It had four *iwan*s with the throne hall located behind the northern *iwan*. The architectural decoration revealed stuccoes (including *muqarnas*), paintings, and, above all, tiles of various shapes, decorated with figurative motifs using techniques such as lustre and *lajvardina*. The tiles were combined according to complex geometrical schemes to produce high dadoes. The Ilkhanid court occupied the complex only periodically, regularly moving from place to place, using temporary campsites.

From 1966, the British Institute of Persian Studies undertook an excavation, among the most fruitful in terms of results and publications, of the port city of Siraf on the Persian Gulf, directed by Whitehouse until 1973 (see the reports published in *Iran* from 1968 to 1974; also Whitehouse 1980). The excavations revealed several areas with private houses, a bazar, small mosques, the congregational mosque, and the remains of city walls and highlighted the evolution of the urban structure over the period of the city's prosperity until the twelfth century. The most ancient phase of the Friday Mosque (dated to the early 9th c. according to numismatic evidence) took the form of a hypostyle prayer room, with a rectangular *mihrab*, and a courtyard with colonnade and a minaret. Various extensions, mostly concerning the prayer room, characterize the subsequent phases of the building's use, dated to the ninth or tenth century. The findings indicate the use of decorations in stucco, such as sawtooth crenellations decorated with vegetal motifs.

Of great interest are the private houses, dated up to the eleventh century and generally provided with a central court onto which the rooms open; the richest houses, mainly in residential areas, have a quadrangular plan with buttress, the internal walls often covered in plaster and stuccoes. Wells and tanks guaranteed the water supply, and the houses were equipped with sewage systems. The excavated area also included a large public building the date of which seems to be prior to the mid-eleventh century. This building did not have a central court but probably had a second storey; however, its function is still unknown. Metallic production waste and the discovery of an area with kilns and structures for ceramic production provide a better understanding of the city's economy, while various finds of Chinese and Southeast Asian fragments of ceramics tell us something about its commercial role (Tampoe 1989; see also Priestman & Kennet 2002 for studies of ceramics from this and other sites in the region).

W. Kleiss conducted research in Iran from the 1960s with the aim of locating monuments (including bridges and dams); his various articles were published in *Archäologische Mitteilungen aus Iran*. The architectural documentation and research undertaken by R. Hillenbrand is of great relevance, the object of his investigation being the identification of regional styles of the Seljuk period (articles published in *Oriental Art* 1972 and *Iran* 1972, 1976, 1987). Also important was the finding of two important funeral towers in Kharraqan (dated to the end of the eleventh century) by D. Stronach and C. Young in northwestern Iran (1966). The various field surveys undertaken include W.M. Sumner's research in Fars, through which he created an archaeological map that is still of fundamental importance for the Islamic period (*Tell-i Malyan and Chronology of the Kur River Basin*, 1972); the archaeological surveys conducted by A. Williamson in southeastern Iran, who also excavated small trenches (e.g., at Sirjan), aimed at the investigation of commercial and distribution routes for ceramics during Islamic periods (see Williamson 1987; Morgan & Leatherby 1987).

Excavations were conducted in Ghubayra, southeastern Iran, from 1971 to 1976 (Bivar 2000). Italian restorers from the *Istituto italiano per il Medio ed Estremo Oriente* (IsMEO, later IsIAO) were in charge of restorations, undertaking research at the same time, sometimes including the excavation of sondages, in order to conduct more accurate conservation. They worked mainly on religious monuments of the Seljuk period and various monuments of the Safavid and Qajar periods, mostly in Isfahan and the provinces of central Iran (among others, the mosque of Bersian, Ali Qapu's palace, Chehel Sotun's pavilion, and the door of the great bazar of Isfahan; see Zander 1980). The restoration of the Friday Mosque of Isfahan conducted by Galdieri (1973) from 1970 led to the identification of various pre-Seljuk phases, such as the Buyid and two Abbasid phases. These results indicated the need to proceed with detailed archaeological investigations, which were conducted by U. Scerrato from 1972 to 1978. Preliminary reports on what is considered to be the most representative monument of the architectonical and artistic evolution of Islamic Iran were published in the journal *East and West* (Scerrato 1973–1979). Research identified the various phases of construction but also found a Sasanid or proto-Islamic settlement and a more ancient mosque with an orientation different to that of the present. The earlier building can be dated to 772 based on historical sources. Excavations brought to light the *qibli* wall with a rectangular *mihrab*, both covered with decorated stuccoes, as well as some of the baked-brick columns that confirm the building's hypostyle structure. In the same area, one level down, a column covered in stucco with decorations in Sasanid style was found. It has a different orientation again but no evidence has been found of the nature of the building to which it belonged. The first mosque was destroyed in 842 and replaced with a wider building with a different orientation, comprising a hypostyle plan and central court with colonnade. All subsequent alterations had this building as their starting point: the addition of a row of baked-brick pillars resulted in a smaller court in the Buyid period (tenth

century); two big pavilions with domes were built between 1088 and 1092 during the reign of the Seljuk sultan Malik Shah. Investigations revealed that the first pavilion, located in the north on the same axis as the mosque, was initially outside the building. At a later time, it was linked to it through hypostyle rooms. The second pavilion, located in the same area as the *mihrab*, was built after the demolition of the previous prayer room; this pavilion was also originally an independent structure. After these alterations, the four *iwan*s were added.

Important excavations conducted in the 1970s include finding the Ilkhanid astronomical observatory in Maragha, commissioned by Hülägü in 1258 at the request of the scholar Nasir al-Din Tusi (excavations 1972–1976; Vardjavand 1979); the excavations in Sultaniyya, the new capital founded by Ülgiaytü in 1307 (Gandjavi 1979); and excavations at Gurgan, on the Caspian Sea, where various buildings were found, including a mosque dated to the beginning of the thirteenth century, a Seljuk *hammam*, and kilns for the production of metal, glass, and mostly ceramics (Kiani 1984).

Key Issues/Current Debates

In recent decades archaeological work in Iran has been forestalled by social and political disruption. The Islamic revolution of 1979 called a halt to archaeological surveys conducted by foreigners in Iran, while the consequences of the Iran–Iraq war prevented the rise of Iranian archaeology for a long time. Both circumstances began to change in the 1990s with the appearance of Iranian teams (such as the excavations conducted by Moussavi in Nishapur, 1995–2005) and the first cooperative projects between foreigners and Iranian archaeologists. Examples of such collaborations include documenting and archiving the finds from the archaeological survey conducted at the Friday Mosque of Isfahan in the 1970s (codirected by U. Scerrato in 2000 and by B. Genito from 2002 to 2010; Genito & Saeidi Anaraki 2011), the French excavations in Nishapur (codirected by M. Kervran, 2005–2006; Fouache et al. 2011), and the German excavations of the Friday Mosque of Golpayegan (codirector L. Korn; Korn in press).

Collaborative activities are strictly dependent on the variability of political and diplomatic relations between countries and as such can be limited. In terms of projects excavating sites of the Islamic period promoted by Iranian institutions, these are few and difficult to access (the few publications, in Persian, are spread among the various but not very widely disseminated Iranian archaeological journals). The excavations conducted in the Ismaili fortress of Alamut (directed by H. Chubak) revealed a reception room with a small *iwan* opening onto a room characterized by a central depression (maybe a pool? Chubak 2009). The excavations of the palatine complex of Sarvestan, east of Shiraz (conducted by A.R. Askari), are also relevant. This site is now attributed to the ninth century, rather than to the Sasanian period, according to the ceramics found (Askari Chāverdi 2009–2010; see also Bier 1986 with previous bibliography).

Up to the present day, the main focus of archaeological surveys in Iran has been urban areas, particularly religious buildings. The relatively low number of such archaeological sites that have been investigated means that our knowledge is restricted to the limited data collected and to analyses of the different regional contexts of the various sites. In addition to these sites, it is important to recognize others that are mostly pre-Islamic but have later phases that have not been examined in depth, as well as a number of relatively minor sites (Rugiadi 2005). Taken together, these represent an essential base for future research. Many religious monuments, especially those built since the Seljuk period, have been the focus of architectural-stylistic studies instead of archaeological excavations. However, the continuous and often drastic repairs conducted on most of the monuments, especially the religious ones, make research on these structures particularly difficult.

Archaeological surveys in rural areas and studies of the dynamics of landscape utilization at regional level, including the analysis of

communications and exploitation of water resources, are still underdeveloped (Williamson 1987); some data can, however, be obtained from archaeological surveys focusing on evidence of the various pre-Islamic periods (such as Sumner 1972). One of the most stimulating topics connected with Islamic archaeology in Iran, for which further research is necessary, concerns the evolution that occurred in urban, architectural, historical, and artistic areas after the Islamic conquest.

Cross-References

- ▶ Aerial Archaeology
- ▶ Bam: Archaeological and Social Investigations After the Earthquake
- ▶ Ceramics, Southeast Asian and Chinese Trade
- ▶ Iran: Heritage Preservation and Tourism
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Islamic and Maritime Archaeologies
- ▶ Military Activity in Islamic Archaeology
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Sasanian Empire, Archaeology of the
- ▶ Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

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Iraq: Archaeological Heritage

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Brief Definition of the Topic

The archaeological heritage of Iraq comprises antique remains, including sites, architectural features, and artifacts, for which excavations, surveys, and remote sensing are the main methods of discovery. Broadly speaking, archaeological heritage constitutes traces of past human existence, bearing witness to various forms of past social life. To date, more than 10,000 sites and monuments have been designated as part of the archaeological heritage of Iraq, and many more sites exist that have not yet been excavated.

The archaeological heritage of Iraq includes sites in the modern Republic of Iraq, which comprises Mesopotamia proper, that is, the region between the rivers Euphrates and Tigris, where much archaeological research has concentrated in the past. In addition, sites in Western Iraq, bordering Syria, and in the autonomous region of Iraqi Kurdistan (Northern Iraq) are included among those that constitute the archaeological heritage of Iraq. This heritage attests to the earliest forms of sedentary life in the Late Neolithic period, dating from the 8th to 5th millennia BCE. Younger sites are subsumed under the period of "written history" or "recorded history," the beginnings of which are marked by the development of the earliest written languages, Sumerian and Akkadian, in the 4th and 3rd millennia BCE. The period of written history gave rise to the first cities and city states, while later archaeological materials date to the Assyrian and Babylonian Empires. In addition, the archaeological heritage of Iraq also includes material remains from the Achaemenid, Seleucid, Parthian, Roman, Christian, and Sassanid periods. Today it is moreover commonly understood that sites dating later than the Arab Islamic conquest are also part of the archaeological heritage of Iraq. This refers to the time period from the seventh century CE until Iraq fell under rule of the Ottoman Empire in the sixteenth century CE.

Of the archaeological sites in Iraq, UNESCO has inscribed three major sites into the World Heritage List: Samarra Archaeological City is officially a World Heritage site since 2007, Ashur/Qal'at Sherqat since 2003, and Hatra since 1985. Ashur and Samarra are also placed on the World Heritage List in Danger. Ten archaeological sites are found on the Iraqi Tentative List for World Heritage. These are the sites of Ur, Nimrud, Wasit, and Thilkifl; the ancient city of Nineveh; the fortress of Al-Ukhaidar; the sacred complex of Babylon; Erbil citadel; Wadi Al-Salam cemetery in Najaf; and Amedy city.

The fact that the archaeological heritage of Iraq includes endangered sites bespeaks the problem of the management and protection of the archaeological heritage of Iraq, which is seriously threatened by looting and illicit trafficking in antiquities due to high levels of violent conflict since the early 1990s (Brodie et al. 2006). While the Persian Gulf War (1990–1991) caused comparatively little damage to archaeological sites and monuments in Iraq, instances of illegal

trade in antiquities were documented at the time. According to Iraqi authorities, some 4,000 archaeological objects disappeared following the war in the early 1990s. In 2003, in the context of the US-led war against Iraq (the Second Gulf War), events of large-scale looting and the destruction of archaeological sites but also of museums (such as the Baghdad Museum) and libraries (such as the Iraq National Library and Archive) occurred. An increase in the illicit trading of antiquities from Iraq on a global scale was also reported. During the war, sites of archaeological heritage often served as military bases for the coalition forces (Babylon, e.g., housed the US military base "Camp Alpha"), causing substantial damage.

Receiving much attention in Western media outlets, the public and the archaeological community bemoaned the destruction of a "universal cultural heritage" in the wake of the Iraq War and the loss of cultural objects signifying what has come to be understood as "the cradle of civilization." At the same time, this sparked a scholarly debate highly critical of arguments that placed the concepts of a universal heritage and of the cradle of civilization at the center of efforts to safeguard Iraq's archaeological heritage. In response, the expression of the cradle of civilization was deconstructed as a paternalistic and colonialist trope that suggests "that these countries of the Middle East have never surpassed their early glories and that the torch of civilization has since passed to Europe" (Meskell 2005: 140). The criticism of the notion of a world cultural heritage was directed against the use of universalizing language. It was argued that this language elevated Western legal-moral categories of ownership, access, and inheritance to global values, thus ignoring local or regional understandings of cultural heritage (Bahrani 1998).

Since the official end of the Iraq War on December 18, 2011, cultural institutions such as museums and libraries in Iraq have begun to rebuild, but the situation at archaeological sites often remains problematic. Even before the official end of the war, several heritage conservation initiatives were launched, some of them specifically designed to restore and conserve damaged archaeological sites in Iraq, such as the Iraq Cultural Heritage Conservation Initiative (a cooperation between the Getty Conservation Institute, the World Monuments Fund, the Iraq Ministry of Culture, and the Iraq State Board of Antiquities and Heritage). Some of these efforts focused on fighting the illicit trade in antiquities, successfully recovering around 5,000 missing Iraqi artifacts. In addition, Iraq established a national entity responsible specifically for the surveillance and protection of archaeological sites called the Force for the Protection of Sites (FPS), which operates under the umbrella of Iraq's Ministry of the Interior. While no national tourism strategy has yet been formulated, many of the efforts directed at the protection and restoration of Iraq's archaeological heritage also target the development of the country's cultural and tourism sector. As outlined in the "UNESCO Country Programming Document for the Republic of Iraq 2011–2014," the goal is to design strategies for the management of the archaeological heritage of Iraq that are sustainable and can benefit the local community.

Cross-References

- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage and Archaeology
- ▶ World Heritage Objectives and Outcomes

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Ireland: Archaeological Museums

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Brief Definition of the Topic

History

Prior to the Anglo-Irish Treaty of 1921, the whole island of Ireland was part of the United Kingdom with a single National Museum in Dublin which initially had collections of industrial and decorative arts material, ethnographical material, and natural historical specimens. The National Museum was established by law in 1877 and was for a long time considered a branch of the South Kensington Museum in London (now the Victoria and Albert Museum) which ensured that a portion of acquisitions by the London museum were diverted to Dublin. It did not have a fully developed archaeological department until the transfer to it in 1891, under certain conditions, of the Museum of the Royal Irish Academy (founded 1785) with an archaeological collection of considerable size and value built up by the voluntary efforts of the academicians with the occasional support and intervention of government. The Academy's collection had been in formation almost since its foundation and it had managed to acquire many of the finds made in major drainage projects and railway building. Creating an enviable collection of organic materials, mostly bog finds and funerary pottery, and spectacular collections of prehistoric bronze weapons and utensils, gold ornaments and early-medieval personal ornaments, and religious objects, the Academy's collection was remarkable for its depth and comprehensiveness. In 1851, the Academy was granted the privilege in Ireland of administering the ancient crown right of Treasure Trove. In 1857, parts of a notable catalogue of the collection organized on Linnaean lines and written by William Wilde were published. The transfer of 1891 gave the new National Museum of Ireland a ready-made archaeological department with an internationally famous collection. In the 1920s, the importance of the archaeological collections to a sense of national identity was recognized, and the collection was given greater prominence in public display. Thereafter, all Directors of the National Museum to date have been archaeologists or closely associated with archaeology.

After independence of the greater part of the island in 1921, the National Museum continued to collect throughout Ireland. In 1930, the National Monuments Act regulated archaeological activity in the state and gave statutory responsibilities to the museum which continue in force with a significant strengthening in the 1990s to extend its rights to claim all archaeological objects found in the jurisdiction. The collections in the National Museum allow it to maintain object-rich exhibitions of Irish prehistory and history. In addition to Irish material, it has modest classical and Egyptian collections and superb early ethnographical collections especially from the Pacific and Africa, the latter not generally on display. In recent years development-led excavation has produced an enormous volume of

archaeological material which will be housed principally in the National Museum.

Key Issues: Centralization

The new Irish state was highly centralized and continues in many respects to be so. The overwhelming majority of all archaeological finds are controlled by it. As a result, local professional museums were slow to develop, one in the 1940s and another in the 1970s but with increasing frequency in the 1980s and 1990s. However, with rare exceptions, these museums' archaeological displays contain only modest selections of artifacts lent by the National Museum. Museums with significant autonomous holdings include the Cork Public Museum and the Galway City Museum. The independent Hunt Museum, Limerick, has a noteworthy, originally private, collection of archaeological material. The Waterford Museum contains substantial amounts of material from the Viking and Medieval strata of the city which it holds and manages by arrangement with the National Museum and displays elegantly. The question of overcentralization in such a small country has never been properly addressed, and fundamental issues of access are raised by that centralization. In addition, the centralization of all archaeological material poses a challenge to the National Museum which may prove to be an unsustainable burden.

Current Challenges

Among the challenges facing the National Museum and other Irish museums is declining government support since the economic and fiscal crisis of 2009. Staff shortages and the threat of deferred maintenance jeopardize major programs of registration. Investment in a major new storage and study facility for archaeological finds and collections will require continuing support. In addition the respective remits of the monuments service and the National Museum overlap in ways unintended by legislation, and clarity of roles and spheres of activity is urgently needed. The failure to realize the potential of the ethnographical collections is disappointing. However, despite the adverse economic circumstances, museum professionals are developing public services and maintaining a notable profile in archaeological research and publication.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Ethnic Identity and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Nationalism and Archaeology
- ▶ Uses of Heritage

Further Reading

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Ireland: Investigations in Advance of Motorway Construction

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Introduction

In the late 1990s, the Republic of Ireland decided to upgrade, develop, and expand its motorway network. Unlike other countries in Western Europe, Ireland's motorway network had been largely undeveloped, with limited works in the 1980s and 1990s. Under Irish legislation and associated government policy, archaeological sites are afforded protection and there is a duty on developers to minimize their impact on archaeological sites through either avoidance, preservation in situ, or, as a last resort, preservation by record (i.e., by scientific archaeological excavation).

Key Issues/Current Debates/Future Directions/Examples

The original strategy for dealing with archaeological sites on the early motorway projects was that known sites identified during the environmental impact assessment (EIA) would be excavated prior to construction while the discovery of previously undocumented sites would be left to monitoring during the main construction works, the subsequent excavations thus impeded the progress of the road-building program. Such an approach was unsatisfactory for several reasons. Archaeologically, it meant significant sites might not be discovered until construction had commenced, with archaeological layers being truncated and damaged by the heavy plant and machinery, and perhaps leading to a loss of archaeological sites. It also resulted in claims from the construction companies arising from delays and additional costs relating to their work program.

Cognizant of these challenges and the need to address archaeology in a responsible manner, the National Roads Authority and the Minister for Arts, Heritage, Gaeltacht and the Islands developed a code of practice in 2000 which created a framework for the treatment of archaeology on national road schemes. As a consequence, Project Archaeologists were appointed as members of road design teams to advise on the archaeological implications of decisions as they happened throughout the lifetime of the project. The code of practice also set out the duties and responsibilities of both parties as well as the Project Archaeologists themselves (http://www.nra.ie/Publications/Downloadable-Documentation/Archaeology/file,3476,en.PDF).

One of the first initiatives of the Project Archaeologists was to commission archaeological works to begin as soon as practicable ahead of the main construction works. For instance, during the design of the M3 and the M7/M8 motorways in the early 2000s, extensive archaeo-geophysical surveying was undertaken of the entire route, and the line of the route was altered to minimize its impact on potential archaeological sites (Fig. 1). Another initiative was for a detailed program of advance archaeological works to be undertaken to ensure early identification and full excavation of previously unknown sites. Consequently, the entire road corridor would be investigated by tracked machines excavating centerline trenches with offsets under close archaeological supervision; typically more than 10 % of the route would be sampled in this fashion. Commencing these works early on also afforded opportunities to redesign routes (e.g., at Woodstown, Co. Waterford, thus avoiding a newly discovered Hiberno-Norse enclosed settlement).

In the intervening period since the adoption of the code of practice, there has been considerable archaeological work undertaken on national road schemes. Over 1,000 km along the routes of planned roads have been investigated providing a significant sample (skewed, for the most part, to avoid known archaeological sites) for the study of the archaeology of Ireland. In the course of these archaeological works, it has become apparent that the previously unknown archaeology is every bit as rich as the monumental archaeology that so often characterizes Ireland, with over 2,000 sites being discovered, excavated, reported on, and published from absolutely every period from the very earliest settlement of the island up to the modern period (Fig. 2).

This work has fundamentally changed our view of Ireland's past. Taking just one example, previous studies depicted the Iron Age in Ireland as a blank period about which very little was known other than limited high-prestige artifacts and high-profile royal sites; however, recent research from the University of Bradford using the results from the archaeological works on national road schemes paints a picture of widespread and ubiquitous activity throughout this period (Becker et al. 2010).

Another key aspect of motorway excavations in Ireland has been the emphasis on communicating the results of these works not only to fellow archaeologists but especially to the Irish taxpayers who ultimately pay for this work to be conducted. As a consequence a comprehensive strategy has been developed for communicating the results through site tours, exhibitions,

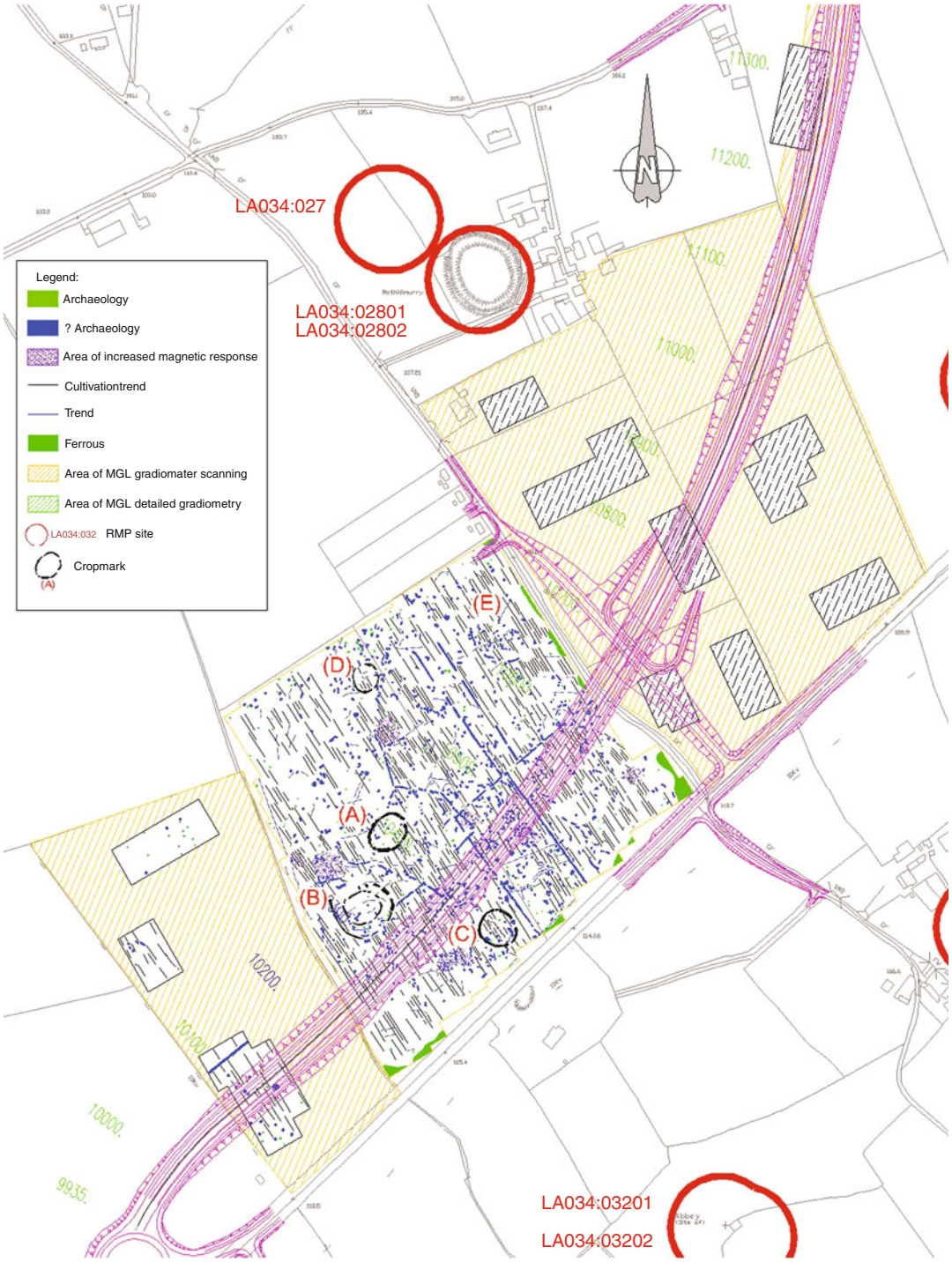

Ireland: Investigations in Advance of Motorway Construction, Fig. 1 M7/M8 Portlaoise-Cullahill which was moved to avoid impacting on archaeological sites discovered during archaeo-geophysical surveying (Illustration: Margaret Gowen & Co. Ltd)

Ireland: Investigations in Advance of Motorway Construction, Fig. 2 Neolithic Trackway which dates from 3640 to 3370 BCE (Wk-20960) discovered Edercloon, co. Longford during the advance archaeological excavations on the N4Dromod-Roosky scheme (Photograph: CRDS Ltd)

conferences, websites, on-line databases, magazines, periodicals, and books (e.g., O'Sullivan & Stanley 2008; Deevy & Murphy 2009).

The approach adopted by the NRA to archaeology on national road schemes provides a model which has ensured that archaeological goals and objectives can be achieved while still providing the essential national transport infrastructure.

Cross-References

- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management: Project Management
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Excavation Methods in Archaeology
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Publication in Field Archaeology
- ▶ Trackways in Archaeological Conservation and Preservation

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Irish Post-Medieval Archaeology Group (IPMAG)

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Basic Information

The Irish Post-Medieval Archaeology Group (IPMAG) was formed in 1999 and is a cross-border organization dedicated to fostering interest in the archaeology of Ireland from the period 1550 to the present. The stated aims of the group include undertaking initiatives that will help raise the profile of post-medieval archaeology within (and beyond) Ireland; fostering greater contacts between those individuals engaged in researching the archaeology, history, and culture of post-1550 Ireland; and lobbying for increased academic attention to be paid to the post-medieval period in Irish universities. The group held its first conference in Belfast in February 2001, and annual conferences have followed each year, at venues throughout the island of Ireland. The group publishes an ad hoc newsletter, maintains a web site with a range of resources relating to historical

archaeology in Ireland (http://www.science.ulster.ac.uk/crg/ipmag/), and has an active program of publishing its conferences as monographs. IPMAG has also been proactive in lobbying respective governments in relation to adequate protection for post-medieval sites, landscapes, and materials. Yearly field trips are also organized by the group to explore post-medieval sites and landscapes in Ireland, north and south. The membership is international in composition.

Major Impact

Prior to the establishment of IPMAG, there was little organized support for historical archaeology within Ireland, north and south. The contested nature of Ireland's early modern and modern history, in relation to the extension of British control over the island, had long dampened interest in the period as being worthy of archaeological attention. The establishment of the group therefore provided a forum for those interested in the period and legitimacy for the subject. Now, all of the major universities on the island teach some form of historical archaeology, and the number of post-graduates pursuing related research continues to increase each year. IPMAG has also played a central role in encouraging the broader reach of Irish historical archaeology through the publication of four major monographs *The Post-Medieval Archaeology of Ireland, 1550–1850* (2007); *Plantation Ireland* (2009, with the Group for the Study of Historic Irish Settlement); *Ireland and Britain in the Atlantic World* (2009, with the Society for Post-Medieval Archaeology); and *Crossing Paths, Sharing Tracks, Future Directions in the Archaeological Study of Post-1550 Britain and Ireland* (2009 with the Society for Post-Medieval Archaeology and the Association for Industrial Archaeology).

Cross-References

- ▶ Archaeology and Politics
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Historical Archaeology
- ▶ Horning, Audrey
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- ▶ Plantation Archaeology

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Ironbridge Gorge Museum Trust (IGMT)

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Basic Information

The Ironbridge Gorge Museum Trust (IGMT) (http://www.ironbridge.org.uk/about_us/ironbridge_gorge_museum_trust/) is an educational charity founded in 1967 within the New Town of Telford, Shropshire, in the English West Midlands. The Trust is one of the largest independent museums in the UK, hosting over half a million visitors every year and generating over £20 million income for the region (IGMT n.d.). IGMT specializes in the preservation and interpretation of the remains of the earliest phases of the industrial revolution based on the presence of two monuments critical to the development of industrial-scale iron smelting and mass production of cast iron: the Darby Furnace, site of the first

smelting of iron ore by coke in 1709, and the world's first cast iron bridge (1779; Cossons & Trinder 2002). The significance of these sites was recognized in 1986 when the Ironbridge Gorge was designated as a World Heritage Site.

Major Impact

From its earliest times, IGMT has been instrumental in preserving and conserving the industrial heritage of the Ironbridge Gorge and holds 36 historic properties, some of which are accessible to the public through the museums. Increasingly, there has been a realization that these monuments are located in a historic landscape that still remains largely in place and that the whole landscape is an area of deep significance that is still in need of detailed exploration, although earlier studies have been undertaken that have highlighted some of these significances (Alfrey & Clark 1993; Trinder 2005). Other key monuments in the care of the IGMT include the Darby Houses and Quaker Burial Ground, Coalport China works, Bedlam Furnace, Broseley Pipeworks, Jackfield Tile Works, and the Tar Tunnel. The museum trust also operates the Museum of the Gorge, based in a Victorian riverside warehouse, the Museum of Iron, and Enginuity, a science and technology museum, both based on the Coalbrookdale site within the former buildings of the Coalbrookdale Iron Company. IGMT's principal attraction is the site at Blists Hill which takes the existing historical elements of the site (a brick works, canal, incline plane, clay mine, and blast furnaces) and presents them as the core elements of a recreated Victorian town comprising shops, a pub, and a post office alongside historic buildings relocated from elsewhere in modern Telford, including a squatters cottage and a turnpike toll house designed by Thomas Telford. The town is populated by costumed interpreters who demonstrate the trades and industries of the period and engage with the public to explain the technologies and processes of the day. This has led to the development of a significant expertise in the creation of historic costumes which are in demand from other museums within the UK especially for use in interactive displays allowing children to "dress up" in historic costume or use modern costume based on historic examples to explain how former garments operated (as with corsets made from modern materials to demonstrate the body-altering use of such garments).

In addition to the popular attractions presented by the IGMT, it holds nationally and internationally important research collections which have a designated status with the UK government through the Department of Culture, Media and Sport (DCMS). The most significant collections are the archives of the Darby family which are held alongside those of the Coalbrookdale Iron Company, which the Darby's founded, and the Elton Collection. This last comprises prints, drawings, paintings, books, ephemera, and artifacts relating to the industrial and transport revolutions and their social impact in Britain and abroad to a much more limited degree (Vanns 2003). Further research collections include books, prints, and papers relating to the Great Exhibition of 1851 and the life of Thomas Telford, the engineer. Other collections relate to the museums where they are located, as with the unique collection of tiles and plaster molds of decorative tile and ceramic building materials held in the original Craven Dunnill factory at Jackfield, the collection of Caughley and Coalport porcelain held at Coalport China Museum, and the decorative ironwork of the Coalbrookdale Iron Company held at the Museum of Iron. The Broseley Pipeworks hold the last surviving collection of clay smoking pipes and molds still in their original manufactory.

Cross-References

- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Historic Jamestowne
- ▶ United Kingdom: Archaeological Museums

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Ironbridge Institute

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Basic Information

The Ironbridge Institute (now the Ironbridge International Institute for Cultural Heritage) (Coalbrookdale, Telford TF8 7DX; http://www.birmingham.ac.uk/schools/iaa/departments/ironbridge/index.aspx) is a postgraduate research and teaching institute founded in 1981 as an equal partnership between the Ironbridge Gorge Museum Trust (IGMT) and the University of Birmingham. It is based in museum buildings within the Coalbrookdale valley, Shropshire, UK, adjacent to the IGMT administrative buildings. Teaching and research initially focussed on industrial (i.e., historical) archaeology, building on the collections and activity of the IGMT in rescuing the relics and investigating the remains of the industrial revolution in Britain. Ironbridge staff and students under its first directors, Michael Stratton and Barrie Trinder, were instrumental in developing the methodological approaches to historical archaeology epitomized by thematic surveys of the automobile industry in Britain (Collins & Stratton 1993) and extensive survey's of key industrial structures such as the model farm complex at Leighton, Powys, in conjunction with the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW). Their early work in promoting The International Committee for the Conser vation of the Industrial Heritage (TICCIH) following the founding congress of the organi zation at Ironbridge in 1973 led to the production of the first global survey of industrial heritage (Trinder 1993). Barrie Trinder in particular was also instrumental in demonstrating the value of oral history in the recording of the experiences of former workers in the many industries within the Gorge (Trinder & Cox 1980), a program that he pursued using local people who themselves went on to carry out extensive research into the past histories of the working communities of the area (Jones 2009). In this work, they were aided by the presence of the IGMT's active commercial archaeological unit, Ironbridge Archaeology, that was able to pursue the ongoing recording of the industrial archaeology of the buildings owned by the museum, within the immediate area of Telford and Shropshire and elsewhere in Britain.

Major Impact

From 1989, Heritage Management (equivalent to Cultural Resource Management) was added to the institute's portfolio, the first program of its kind in the UK. This has become the mainstay of the institute, and distance learning versions have been added since 2005. The industrial archaeology program has been replaced since 2006 by one in Historic Environment Conservation that offers practical training in built environment conservation within a framework of legislative and ethical practice. In all more than 1,000 students have been trained at Ironbridge, and graduates are to be found all over the world. Research conferences on World Heritage (Ironbridge

Gorge became a World Heritage Site in 1986) and on early industry have been published (White & Carman 2007; Belford et al. 2010), reflecting the continuing role of the institute in fostering high-level research in its areas of interest. World Heritage will become the driving force behind future developments as Ironbridge Institute seeks to develop its educational role in training and management of World Heritage Sites. The annual Ironbridge Lecture offers an opportunity to engage the academic community and the public with recent speakers including Sir Neil Cossons and Adam Hart-Davies.

Cross-References

- ▶ Association for Industrial Archaeology (AIA)
- ▶ Heritage and Higher Education
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Historic Building Conservation: Current Approaches
- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ Marketing Heritage
- ▶ Oral Sources and Oral History
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United Kingdom: Cultural Heritage Management Education
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Isaacson, Ken

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Basic Biographical Information

Ken Issacson, Waanyi man, is Indigenous Australian archaeologist from the gulf region, north of Mt. Isa, Queensland, Australia.

Major Accomplishments

Ken Isaacson is an Indigenous Australian archaeologist with over 25 years of experience in the field. He traces his Aboriginal ancestry though his Waanyi mother and grandmother from the gulf region of Queensland, north of Mount Isa (Isaacson 2010). Throughout his career, Ken has reached both national and international standing within Indigenous studies and has remarkably done so without institutional support from a university or government body.

Ken was educated in Mount Isa, leaving school at age 14 to join the post office, first becoming a telegram officer and then a postman. He then worked a variety of jobs until finding himself in Tambo, Queensland, at the age of 18 where he visited his first Aboriginal art site (Blacks Palace). Ken found the heritage site which also contained Aboriginal burials in a bad state of repair, and it was this experience that set him on the path of becoming an archaeologist. Having left school early, Ken realized that taking the path of a traditional university student was not for him, but he

was not deterred. With the encouragement of his mother and grandmother, he set out recording and photographing archaeological sites, working both at home in Queensland's gulf country and Australia wide. Ken is passionate about documenting and preserving cultural heritage so that it can be passed on to future generations and has devoted his life to this cause.

Ken initially learned about heritage sites from station workers (both Aboriginal and non-Aboriginal) who gained an intimate knowledge of the land while mustering cattle. In other instances he learned about archaeological sites and stories from Indigenous elders. Ken's cultural knowledge eventually came to the attention of archaeology departments in Australian universities, which led to him taking students to visit the sites he was managing (now over 1,500 rock art and burial sites). Through Ken's exchanges with the universities, he learned new techniques to use in his work while simultaneously teaching students about Aboriginal culture and heritage.

As his networks within the university system expanded, Ken has become involved in archaeological seminars presenting his papers "bushman style." He has been a member of the World Archaeological Congress for 15 years, as well as having been involved with a number of other international conferences. Ken's work includes the presentation of a paper at the Fulbright-sponsored symposium "Indigenous Cultures in an Interconnected World" in Darwin, a trip to Borneo organized by the World Wildlife Fund to visit the Dyak people, as well as trips to visit rock art sites in South Africa and the United States.

Ken has drawn on his heritage (having an Indigenous mother and father of English and German heritage) to explore the relationship between archaeology and Indigenous peoples. This has led to a particular focus on ways for Indigenous people to become more involved in their own sites, while working together with non-Indigenous archaeologists (Isaacson 2010). In *Looking Forward—Looking Back: Shaping a Shared Future*, Ken argues that archaeological theory and practice should be grounded in the recognition of the rights of contemporary Indigenous peoples over their heritage. He challenges archaeologists to work with Indigenous youth and giving them "pride in their past, self-esteem in their present and some hope for the future" (Isaacon & Ford 2005: 242).

Ken's experiences have led him to a unique position from which to articulate the need for archaeologists and Indigenous peoples to work together. He argues that archaeologists making long-term commitments to Indigenous groups can foster trust and respect and create more than just a working relationship, but a personal relationship (Isaacson & Ford 2005: 340). Ken has identified that many Aboriginal communities have immediate needs beyond those of archaeological sites which could be addressed in joint projects with archaeologists. For example, he argues that archaeologists can assist Indigenous communities in lobbying government and mining companies for support in heritage matters and to assist communities in enterprises such as developing cultural tourism ventures. Ken notes that although archaeology cannot provide all the answers or solve all the problems, in long-term relationships with Indigenous groups, the archaeological profession can be shaped into one in which profound benefits are available to Indigenous people, helping Indigenous people and cultures survive.

Ken's published works include chapters in *Indigenous Archaeologies: Decolonising Theory and Practice* and *Being and Becoming Indigenous Archaeologists*. Ken has also been involved in cross-cultural awareness programs that simultaneously teach new mine employees about Indigenous culture while cultivating respect for it. Ken is currently on the board of Southern Gulf Catchments as Director for the Greater Mount Isa Indigenous sector where he works to identify Indigenous projects in need of funding, while continuing his work mentoring archaeology students.

Cross-References

- ▶ Indigenous Archaeologies
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Peoples, Working with and for

References

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Islamic and Crusader Archaeologies

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Introduction and Definition

The disciplines of Islamic and Crusader archaeology, despite sharing some common chronological and geographic frameworks within what can generally be termed the *medieval archaeology of the Levant*, have largely taken separate paths since the advent of archaeology in the nineteenth century. "Islamic Archaeology" is a generalizing term that refers to the study of the material culture produced by and/or for Muslims (specifically on the *archaeology of Islam*, see Insoll 1999: 1-9), as well as of non-Muslims living under Islamic rule (perhaps better denominated the *archaeology of Islamic lands*, encompassing a large geographical body spreading from Spain and North Africa as far as the Far East). "Crusader Archaeology," however, is a term of a narrower scope, both in time and space. It is identified with the study of the cultural remains produced during the Crusades by the Crusaders, as well as with the associated Frankish settlement. This division of research has proven inefficient at times, especially as archaeological periodization might refer to historical periods in which both Islamic and Frankish rules overlapped. For example, how precise can the archaeologist be in defining whether an excavated context in Jerusalem dates to the Crusader or Ayyūbid periods, unless provided with precise finds such as inscriptions, coins, or imports, given that Jerusalem was in Crusader hands from 1099 to 1187 and then again from 1229 until 1244?

Historical Background

The division between the two disciplines is historical and has its roots in a colonialist and Eurocentric society. Crusader archaeology had already become a focus of interest to Westerners in the early nineteenth century, partly following the nationalist appropriation of the Crusades by countries such as France, Germany, and England (Ellenblum 2007: 18-31). In addition, concern towards the Christian community and its monuments in the Levant following the massacres in Lebanon and Syria in 1860 gave further impetus to this interest in Crusader heritage (Kennedy 1994: 2).

The first reason, nevertheless, seems to have been pivotal. One of the first architectural treatises to deal with the ancient Levant was Melchior de Vogüé's (1848–1910) *Les Églises de la Terre Sainte*, pinpointing the interests of French academics and the public at that time. But to demonstrate how difficult it is to disconnect Crusader and Islamic archaeology, de Vogüé's description of the Temple Mount in this very volume (Chap. 6, "Le Temple," de Vogüé 1860: 266-291; quote below is on p. 266) is the earliest modern account of the important Muslim buildings on the Ḥaram al-Sharīf of Jerusalem – al-Aqṣā and the Dome of the Rock – even if he justified their inclusion in his book on the mistaken premise that al-Aqṣā was a Justinianic church taken over by the Muslims and on the fact that the various buildings also served the Crusaders (Fig. 1):

> On ne s'étonnera pas de trouver dans un travail consacré aux édifices chrétiens de la Terre Sainte, la description de deux mosquées célèbres, Lieux-Saints de l'islamisme. L'un de ces monuments fut primitivement construit en l'honneur de la sainte Vierge [i.e. al-Aqṣā, which according to de Vogüé was erected by Justinian]; c'est une des plus

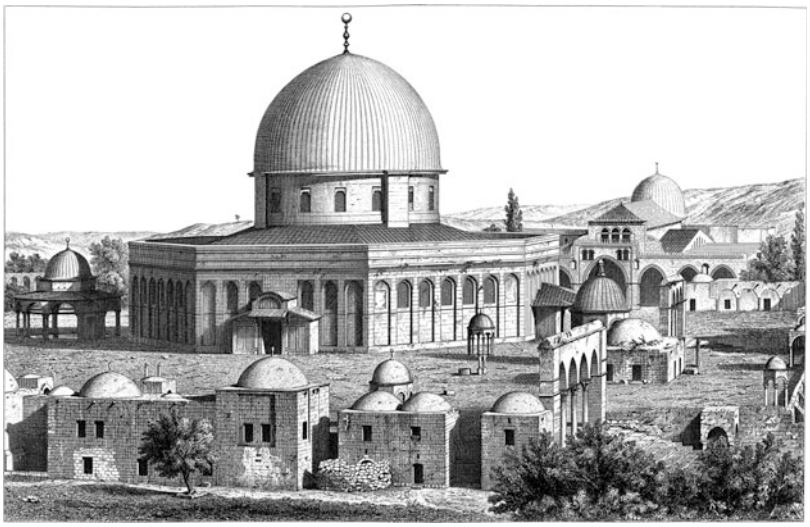

Islamic and Crusader Archaeologies, Fig. 1 The Temple Mount in Jerusalem during the mid-nineteenth century (M. de Vogüe 1860: plate between 266 and 267, after photograph by A. Salzmann)

> anciennes et des plus belles églises de Jérusalem, usurpée par les disciples du Koran. L'autre, quoique d'origine musulmane [the Dome of the Rock], fut, pendant un siècle, consacré au culte catholique [*Templum Domini*]; il s'élève sur l'emplacement du "saint des saints"; son nom, porté avec éclat par un ordre fameux de chevalerie [Templars], est resté célèbre dans les annales du moyen âge chrétien. . .

It is also worth acknowledging that even in the more encompassing and balanced work of Charles Clermont-Ganneau (1846–1923), *Archaeological Researches in Palestine during the Years 1873–1874*, the first chapter of the first volume deals with an important subject in the field of Crusader Archaeology, being entitled "Introductory Remarks on the Distinctive and Specific Character of Crusading Masonry" (Clermont-Ganneau 1899: 1-47).

Another example of the nationalistic background for the first archaeological enterprises in the Levant is the German excavations at Tyre conducted by J.N. Sepp, B. Sepp, and H. Prutz in 1874. They were financed by Otto von Bismarck, the Imperial German chancellor at that time, and were motivated by the unfulfilled desire to find Barbarossa's tomb within what was mistakenly believed to be the remains of Tyre's cathedral (Ellenblum 2007: 35-6).

But it was perhaps the magnitude of the Crusader castles encountered in Syria, Lebanon, Palestine, and Jordan that moved Western researchers most, as they best represented Western culture and power in the east. So while de Vogüé was busy studying Crusader churches, his friend and compatriot Emmanuel Guillaume Rey (1837–1916) dedicated his efforts to record to the best of his capacities the castles of the Latin Kingdom. His *Étude sur les monuments de l'architecture militaire des Croisés en Syrie et dans l'ile de Chypre* (1871) is the first scientific work on this topic from which later studies were launched (Fig. 2).

During the French Mandate in Syria and Lebanon (1921–1946), Crusader archaeology continued to flourish, "especially as the presence of Franks in the area in the twelfth and thirteenth century could give a sort of legitimacy to their presence in the twentieth" (Kennedy 1994: 5). Camille Enlart's (1862–1927) *Les Monuments des Croisés dans le royaume de Jerusalem: architecture religieuse et civile* (1925) resulted from an official commission, as did Paul Deschamps's *Les Châteaux des Croisés en Terre Sainte* (1934–1973).

For many decades thereafter, Crusader archaeology remained largely focused on castles and churches (the latter field in clear independence from Byzantine archaeology), as they best expressed the deeds of the great heroes of Europe. A more general approach to the Crusader remains

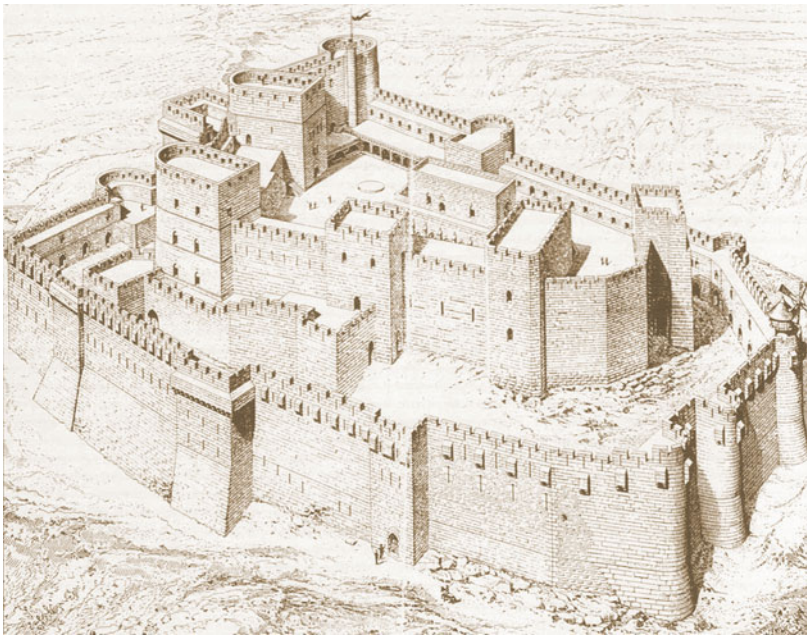

Islamic and Crusader Archaeologies, Fig. 2 Reconstruction of Krak des Chevaliers (After Rey 1871: Pl. VII)

in the Levant, including the study of rural and domestic life, developed much later, mainly in the 1970s and 1980s, under Israeli historians J. Prawer (1917–1990) and B.Z. Kedar (b. 1938). Archaeology only started reflecting this holistic approach from the 1980s onwards, best represented by fieldwork undertaken by D. Pringle of Cardiff University, R. Ellenblum of the Hebrew University of Jerusalem, and A. Boas of the Hebrew University and later the University of Haifa.

Islamic archaeology developed in an altogether different manner. It was not overtly driven by nationalistic or by religious sentiments (though S. Vernoit (1997) stresses how the excavations at Qalʿat Banū Ḥammad in Algeria and those in Madīnat al-Zahrāʾ in Spain served the colonialist motivations of France and Spain, respectively), but rather by the rising discipline of Oriental Studies in Europe and to a certain extent by Westerners' attraction to the "exotic" as nurtured by nineteenth-century Orientalism. Yet as argued by M. Rosen-Ayalon (2006: 11), the development of the field was delayed even after the end of the colonial period:

> The various Muslim countries maintained a similar archaeological policy for several decades. There was a race to discover ancient civilizations: the Egypt of the Pharaohs, Hittite Turkey, Achaemenid Persia, as well as [Iraq's] Sumer, Akkad, Babylonia, and [Lebanon's] Phoenicia.

One of the most valuable contributions to the field of Islamic archaeology of the late nineteenth to early twentieth century was Max van Berchem's (1863–1921) *Corpus inscriptionum arabicarum*, the volumes of which contain inscriptions surveyed by the author during his trips to Egypt, Palestine, and Syria between 1887 and 1914. Beyond its contribution to the field of Arabic epigraphy, this corpus is a major pillar of Islamic archaeology, due to van Berchem's discussions of archaeological/architectural findings relating to various monuments and sites as well as associated historical sources.

Yet the event which for many years and to a great degree shaped the perception of Islamic archaeology was the publication of *Ḳuṣejr ʿAmra* by Alois Musil (1868–1944) in 1902 (Fig. 3). Its impact in Europe was of a totally different nature to that made by publications of Crusader castles. This well-preserved small Umayyad bathhouse, with figurative frescoes – some of them including seminude women and

Islamic and Crusader Archaeologies, Fig. 3 Quṣayr ʿAmra (A. Musil, c. 1901. Library of Congress Prints and Photographs Division Washington, DC, call number LOT 11356-34)

men – covering most of its standing surfaces, confused those who still believed in the "unlawfulness" of painting in Islamic art (see K.A.C. Creswell's "The Lawfulness of Painting in Islamic Art," 1946). *Quṣayr ʿAmra*'s frescoes ignited the romanticism regarding the first Islamic dynasty, in which the Umayyad aristocracy was seen as a class of irredeemable Bedouins, always drawn to the desert life – the *bādia* – and its pleasures. This discourse was best represented by the biblical scholar and orientalist J. Welhausen (1844–1918), in his *Das arabische Reich und sein Sturz* (1902), later translated into English (1927).

Not long after the publication of Musil's *Ḳuṣejr ʿAmra*, the first fieldwork at an Islamic city was carried out at Sāmarrāʾ on the Tigris. This site was first visited by E. Hertzfeld in 1903, who published a series of studies on Sāmarrāʾ from 1907 to 1948 (Fig. 4). Capital of the ʿAbbāsids between 836 and 892, at over 58 km^2, this is the largest Islamic site known to date. It holds important examples of religious and secular early Islamic architecture, many of them embellished by stucco work fashioned in three main styles, a varied repertoire of unglazed and glazed pottery and other wares. Most of all, it is famous for the 53 m high spiral minaret of al-Mutawakkil's Mosque (849–851). The rich finds from Sāmarrāʾ further contributed to – and expanded – the romantic view of Islamic archaeology, which unlike the Crusader archaeology of churches and castles developed so as to emphasize the concepts of wealth and exotica. The excavations of the Umayyad palace at Madīnat al-Zahrāʾ next to Cordoba in Spain, which commenced in 1911 directed by the architect Ricardo Velázquez Bosco (*Medina Azzahra y Alamiriya*, 1912), only added to this romantic view.

Despite the above, one cannot claim that Islamic archaeology developed around an "archaeology of palaces," in the same way that Crusader archaeology developed both as an "archaeology of castles" and an "archaeology of churches." In fact, the next exposure of an Umayyad palace – that at Khirbat al-Minya on the northwestern shore of the Sea of Galilee – was an archaeological misinterpretation by the German archaeologist A.E. Mader, who in 1932 started excavations at the site in the belief that it was a Roman fortress. Only in 1937, after a small mosque and a large hall had been exposed in the building's southern wing, was the site finally understood as having been originally built as an Umayyad castle (*qaṣr*, *pl. quṣūr*). At that time, the Umayyad palace at Khirbat al-Mafjar, north of Jericho, was already being uncovered (1934–1948). This monumental complex of palace-bath-mosque was rich in finds, including a small piece of marble containing an

Islamic and Crusader Archaeologies, Fig. 4 Excavation of Samarra (Iraq): view of the Great Mosque of al-Mutawakkil, 1911–1913. Panorama of 3 photographic prints, 8.7 × 29.2 cm (The Ernst Herzfeld papers, Freer Gallery of Art and Arthur M. Sackler Gallery Archives, Smithsonian Institution, Washington, DC: A.6 04.20.123)

inscription referring to Hishām b. ʿAbd al-Malik (r. 724–743). This artifact provided archaeologist D.C. Baramki and later R. Hamilton with a clear chronological framework for the erection and use of the palace (today it is accepted that Hishām's nephew, al-Walīd II, was the actual patron of the palace while still heir to the throne). As in the case of Quṣayr ʿAmra and Sāmarrāʾ, Khirbat al-Mafjar's unique planning and rich decoration, including many figural sculptures and the famous lion-gazelle mosaic, gave rise to further romanticization of early Islamic life in the Levant (as indicated by the title of Hamilton's 1959 publication, Khirbat al-Mafjar: an Arabian Mansion in the Jordan Valley), supported by contemporary works on the Umayyads such as H. Lammens' *Études sur le siècle des Omeyyades* (1930).

The posthumous publication of J. Sauvaget's (1901–1950) *Châteaux Omeyyades de Syrie* in 1968, in which the author highlighted the economic background for the erection of the palaces and dismissed the previous romantic approach of scholars of the late nineteenth and first three decades of the twentieth century, was a landmark in Islamic Archaeology. It not only changed the paradigm by which Umayyad palaces had so far been investigated but also established new standards by which historical sites should be interpreted. The excavation at Qaṣr al-Ḥayr al-Sharqī east of Palmyra in Syria between 1964 and 1971 is a good example of a project which adopted Sauvaget's "agricultural model," even if not in its entirety (Grabar et al. 1978: 162-3).

Another important contribution by Sauvaget to Islamic Archaeology is his publication on Aleppo's urban development (1941). Following his archaeological survey of the city in 1935, under the auspices of the local Service des Antiquités, Sauvaget not only created a remarkable record of a medieval city (Fig. 5) but also laid the foundations for the much-discussed topic of the "Islamic City." To this field he also contributed his studies on Latakiya (1934) and Damascus (1949) in Syria.

Key Issues

The study of early Islamic settlements and urban development has been central for Islamic archaeologists. In addition to Sauvaget's and Herzfeld's contributions, others have created a field abounding with views and reviews on the subject: research on North African cities both by W. Marçais (in his famous "L'Islamisme et la vie urbaine" of 1928) and by G. Marçais ("La conception des villes dans l'Islam" from 1945), on Fusṭāṭ in Egypt by G. Scanlon ("Housing and Sanitation. Some aspects of medieval Islamic public service," 1970) and W.B. Kubiak (Fustat, Its Foundation and Early Urban Development, 1988), on Ayla in Jordan by D. Whitcomb ("The misr of Ayla: Settlement at ʿAqaba in the early Islamic period," 1994), on Sāmarrāʾ by A. Northedge (*The Historical Topography of Samarra*, 2005), as well as many other case studies of urban archaeological sites (see Whitcomb 2010 for

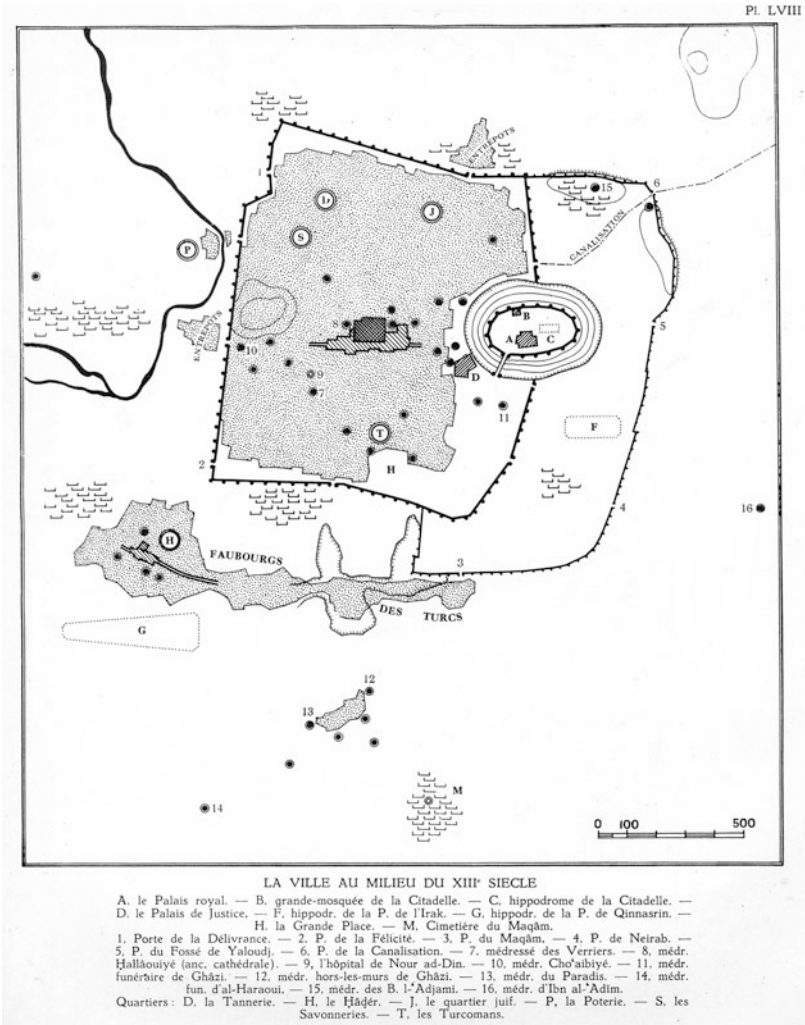

Islamic and Crusader Archaeologies, Fig. 5 Reconstruction plan of the city of Aleppo during the thirteenth century (After Sauvaget 1941: Pl. 58)

a representative listing of urban sites). A. Hourani and S. Stern's *The Islamic City* (1970), H. Kennedy's "From Polis to Madina – Urban Change in Late Antique and Early Islamic Syria" (1985), J. Abu-Lughod's "Historic Myth, Islamic Essence, and Contemporary Relevance" (1987), P. Wheatley's *The Places Where Men Pray Together* (2001), and more recently S.K. Jayyusi et al.'s *The City in the Islamic World* (2008) as well as important summaries such as those by Walmsley (2007: 71-112) and Milwright (2010: 75-96) are essential readings for those interested in this topic.

Research on Crusader cities, on the other hand, is of a different kind. As A. Boas writes in his *Crusader Archaeology* (Boas 1999: 12):

> There was no need for the Franks to establish new cities in the East. They occupied existing cities, expanding them . . . Within the cities they built new public and private buildings and converted others to suit their own needs.

One of Jerusalem's earliest excavations, undertaken by C. Wilson in the Muristan (south of the Church of the Holy Sepulchre) in 1867, exposed evidence for Crusader-era urban changes in Jerusalem, in this case the Hospitallers' quarter, while searching for remains of the Herodian Second Wall (Wilson & Warren 1871: 270-73). Since then much has been learned about Crusader Jerusalem (Boas 1999: 13-24) but even more about Akko in northern Israel, which was first studied by Rey in 1879 (*Étude sur la*

topographie de la ville d'Acre au XIIIe siècle) and which has been intensively excavated since 1990, with Crusader levels being found under the remains of the Ottoman city (Boas 1999: 32-41).

Within the framework of the urban archaeology of both Islamic and Crusader periods, the study of churches and mosques, or of religious institutions in general, has been cardinal. As mentioned above, "church archaeology" has played a central role in Crusader archaeology since its outset (e.g., the early excavations at Tyre), and those interested in the period can only benefit from D. Pringle's *The Churches of the Crusader Kingdom of Jerusalem* (4 vols. 1993–2009). Unfortunately there is nothing to parallel Pringle's work in "mosque archaeology," perhaps due to the much wider chronological and regional scope of the latter. Yet mosques have always been of central interest to archaeologists and historians of Islamic art, being discussed in all monographs on Islamic art and architecture including Creswell's *Early Muslim Architecture* (1932-1940), Ettinghausen and Grabar's *The Art and Architecture of Islam 650–1250* (1987; updated in 2001 with Jenkins-Madina), and R. Hillenbrand's *Islamic Architecture: Form, Function and Meaning* (1995). A few syntheses have developed this theme, most notably the monographs by D. Kuban (series on *Muslim Religious Architecture*, 1974, 1985), T. Insoll's chapter in his *The Archaeology of Islam* (Insoll 1999: 26-59), and J. Johns' article "The 'House of the Prophet' and the Concept of the Mosque" (1999). Important discussions on the development of the mosque have appeared since the 1980s, such as D. Whitehouse's report on Siraf's Congregational Mosque (*The Congregational Mosque and Other Mosques from the Ninth to the Twelfth Centuries*, 1980), D. Sack's monograph on the great mosque of Rusafa (1996), M. Rosen-Ayalon and R. Grafman's article on the proposed plan of Umayyad al-Aqṣā's ("The Two Great Syrian Umayyad Mosques: Jerusalem and Damascus," 1999), A. Walmsley and K. Damgaard's archaeological report and discussion on the mosque of Jarash (2009), and the current author's work on the congregational mosque of Tiberias (2009).

But while focusing on the main trends and differences in approach between Islamic and Crusader archaeology, one has also to be aware of the many converging points between the two, sometimes making it almost impossible to separate the disciplines. In light of Boas' words quoted above ("They occupied existing cities…"), it is futile to study a Crusader city without understanding its pre-Crusader phases, while to study Ayyūbid and Mamlūk architectural and urban programs without examining the monuments and archaeological vestiges left by the Franks is also ineffectual. The Crusader interventions at the Temple Mount in Jerusalem and more specifically at al-Aqṣā mosque which served as palace and later as headquarters for the Templars, for example, can only be analyzed (and even then not with ease) in light of the background of architectural development during the early Islamic period. The same can be said for the changes and additions that followed the Battle of Ḥiṭṭīn in 1187 and the reinstatement of the building as a mosque (Hawari 2007: 192-3). This is also true regarding the erection of churches and their post-Crusader use (see St. Anne's church in the northeastern section of the city, e.g., which was transformed into a madrasa by Ṣalāḥ al-Dīn; Pringle 2007: 142-55, Hawari 2007: 187-8), the erection of public establishments such as markets and their expansion during the Mamlūk period (e.g., the Cotton Merchants' Market), and the improvement of city defenses (the Mamlūk-Ottoman citadel of Jerusalem is basically an improvement of the Crusader fortifications; Boas 1999: 17-9, based on archaeological reports by C.N. Johns).

Yet the task of a trained archaeologist or historian of art is not always easy. The Romanesque style which developed during the twelfth century, as well as certain building techniques, survived into the Ayyūbid (1187–1260) and early Mamlūk periods (1260–1310s). Unless a building consists of a dated structure, with a clear religious identity and minor later changes (e.g., St. Anne's church), identifications might be contested for generations, as in the case of al-Aqṣā's gate which uses Crusader elements. Some will argue that the slender columns, the typical capitals, and

the elaborate molded archivolt with chevron, cavetto, and cyma-recta moldings are in situ and thus evidence for a Crusader monumental gate. Others will argue that this is a typical case of spoliation. Yet the presence of two Ayyūbid inscriptions, one over the archivolt attesting to the erection of the portico's façade by al-Muʿaẓẓam ʿĪsā in 1217–1218 and the other on the central bay's dome attributing construction to the same ruler (d. 1227), leaves little doubt as to the date at which the earlier – Crusader – arrangement was replaced (Hawari 2007: 161-3).

Another converging point of the two disciplines is found in rural archaeology, where it is often difficult to discern the nature of a twelfth- to thirteenth-century settlement – Muslim, Christian, Frankish, or mixed – unless characterizing material finds allow such an identification. Typical ceramics of the period – such as slipped and glazed wares produced in Beirut or unglazed geometric painted handmade vessels – can be found all over the region (Avissar & Stern 2005: 88-90, 113-6). Other subjects, such as "Sugar Archaeology," are common to the Crusader, Ayyūbid, and Mamlūk periods and should thus be studied as a single unit. Sugar production, known in the Levant since the early Islamic period, was "industrialized" by the Franks during the twelfth century and persisted in the region up to the fourteenth century. The evidence at Khirbat Manot in northwest Israel, Ṭawāḥīn al-Sukkar in southern Jordan, and Kouklia in Cyprus is best preserved (Boas 1999: 81; Milwright 2010: 70-3), while excavations at Khirbat al-Minya on the northwestern shore of the Sea of Galilee have shown that the Franks took possession of the abandoned Umayyad palace (see above) and transformed it into an industrial plant, which seems to have persisted in use up to the Mamlūk period.

Future Directions

In conclusion, despite the different motifs and definitions which guided the first 100 years of Islamic and Crusader archaeology, in too many ways they join paths. The multiphased sites – urban or rural; military, religious, or secular – demand from archaeologists a broad knowledge of the material culture of the Middle Ages. Today the "archaeology of castles and churches" is much more encompassing, with interest in the communities which they served and the culture they nurtured. The same applies to the "archaeology of palaces and mosques," which has evolved to search for patterns of settlement, of land use, and of the Islamization of pre-Islamic lands.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Islamic Industry, Archaeology of
- ▶ Medieval Archaeology
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Orientalism: Islamic Archaeology and its Colonial Context
- ▶ Postcolonial Archaeologies
- ▶ Sugarcane: Origins and Development

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Islamic and Maritime Archaeologies

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Introduction

Islamic archaeology and maritime archaeology are two relatively recent subdisciplines to have emerged within archaeology, reflecting technological innovation and new theoretical trends and avenues of inquiry. The advent of SCUBA technology has, since the 1950s, facilitated investigation of submerged sites, leading to innovative techniques in underwater survey and excavation. Meanwhile, a growing interest in "non-European" archaeologies has contributed to an increasing appreciation of past Islamic societies as a legitimate object of investigation.

Definition

As with many adjectives applied to the word archaeology, "maritime" and "Islamic" are fluid shorthands that are ultimately inadequate to the task of defining rich and complex areas of investigation. Conceptually, maritime archaeology has broadened from a relatively narrow focus on shipwrecks (Muckelroy 1978: 3–10) to cover not only archaeology done underwater but also the archaeology of all maritime-related material culture. Equally, the term "Islamic" can be taken to mean the material remains of Islam as a religion (Insoll 1999: 1–15) or defined by cultural-historical criteria, thus incorporating societies over which a political élite professing Islam held sway (Milwright 2010: 1–11), or indeed minority Muslim communities living among non-Muslims.

Key Issues

Shipwrecks

Maritime archaeology's early encounter with Islamic remains was in the form of shipwrecks. In 1973, the Turkish sponge diver Mehmet Aşkin showed a wreck at Serçe Limanı on the Turkish Aegean coast to George Bass of the Institute of Nautical Archaeology (INA). Bass led excavations at the site from 1977 to 1979, revealing an early eleventh-century CE merchantman operating between Byzantium and the Fatimid Caliphate (Bass 2004). The vessel was the earliest known example of frame-first construction and had been rigged with two lateen sails. The cargo included around 3 t of glass cullet, acting as ballast, perhaps bound for the glassworks of Constantinople.

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Islamic and Maritime Archaeologies, Fig. 1 Divers from the Institute of Nautical Archaeology excavate an Ottoman wreck at Yassıada, Turkey (Image: Cemal Pulak, Institute of Nautical Archaeology)

Over 80 intact glass vessels were also excavated. Ceramics included 110 Byzantine amphorae, water jugs that are probably from Egypt, glazed wares, and Levantine cooking pots, alongside Fatimid coins and coin weights. The wreck exemplifies well the problems of definition: Although much of the cargo was from the Islamic realm, faunal remains show the crew ate pork, suggesting they were Christian. The wreck is thus suggestive of Christian-Muslim exchange in a period of Fatimid-Byzantine détente.

Also in Turkey, Bass and his team discovered a sixteenth-century CE Ottoman vessel at Yassıada, partly overlying a fourth-century CE Roman wreck on which they were working (Fig. 1). Excavations in 1982–1983 revealed a largely empty hull containing a small amount of Ottoman sgraffito-glazed bowls elsewhere associated with military contexts, as well as cannonballs (Fig. 2). The vessel, originally around 20 m long, was interpreted as a naval supply craft. The lack of cargo, even ballast, gave rise to the theory that the vessel had become stuck on the adjacent reef before sinking, allowing the cargo to be salvaged (Pulak 2005).

It was not until the 1990s that further ostensibly Islamic wrecks were investigated. Starting in 1994, archaeologists embarked on an underwater survey of the Tantura lagoon, in modern Israel, led by Shelley Waschsmann of INA and Yaakov Kahanov of the University of Haifa. Tantura was a rare sheltered lagoon of the ancient Palestinian coast, and work there has revealed seven vessels dating from the fifth to the ninth centuries CE. The earliest of the Islamic-era wrecks, Tantura F, dates from the early eighth century. This 15-m-long flat-bottomed cargo vessel was made frame-first with Anatolian timber. Finds included pottery, metal anchors, and organic materials (Barkai & Kahanov 2007). Another wreck, Tantura B, dates from the early ninth century CE. This flat-bottomed hull was again built frame-first and has been interpreted as a coaster, war galley, or even Nile rivercraft (Khalilieh 2005).

All three of these vessels share their frame-first construction method with a practice found throughout the Mediterranean during the early medieval period. The tradition stands in contrast to the shell-first, and often sewn, traditions of the Islamic western Indian Ocean region, demonstrating that shipbuilding technologies do not necessarily reflect an Islamic/non-Islamic dichotomy.

Islamic and Maritime Archaeologies, Fig. 2 Glazed bowls from the Yassıada Ottoman wreck, Turkey (Image: Cemal Pulak, Institute of Nautical Archaeology)

Islamic and Maritime Archaeologies, Fig. 3 Excavating the Ottoman-era Sadana Island shipwreck in the Egyptian Red Sea (Image: Institute of Nautical Archaeology)

Archaeological evidence for putatively Islamic vessels in the Indian Ocean is sparse. The only medieval wreck discovered in the region is of a ninth-century CE sewn "Arab" vessel, found by fishermen off the Indonesian island of Belitung (Flecker 2001). The wreck was salvaged under license from the Indonesian government by the German company Seabed Explorations, and a comprehensive archaeological record was not made. The cargo comprised Changsha pottery from the late Tang Dynasty (618–906 CE) and imperial-quality Chinese ceramics including Ding white-ware and Yue-ware from Zhejang. While none of this cargo is identifiably "Islamic," the sewn planking of the hull led to the vessel being identified variously as "Arab," "Persian," or perhaps "Indian" and so indicative of long-distance trade in prestige goods between the Islamic world and China.

The only Islamic-era shipwreck to have been archaeologically excavated in eastern waters with license from the state is the eighteenth-century CE Sadana Island wreck, an Ottoman vessel found off Egypt's Red Sea coast and excavated by INA under the direction of Cheryl Ward (Ward 2001) (Fig. 3). The 50-m-long hull contained an assemblage of Chinese Qing Dynasty ceramics designed for Islamic markets, as well as coffee, aromatic resin, spices, and tobacco-smoking paraphernalia belonging to the crew (Fig. 4). While historical accounts of Indian Ocean commerce in the period tend to focus on European trade with east Asia, the Sadana wreck is indicative of a more local trade, particularly in coffee, conducted within the Ottoman empire, albeit one with connections to China. Little data on the hull construction has been published, although the vessel is secured with iron fittings, and not sewn.

Ships' Timbers

Apart from wrecks, timbers from Islamic-era ships have also been found reused in on-land contexts, giving further insights into past nautical technologies. Evidence of sewn ships' timbers has been discovered at al-Balīd in Oman, dating from the tenth to the fifteenth centuries CE, as well as at Quseir in Egypt, from between the late twelfth and early fifteenth centuries CE

Islamic and Maritime Archaeologies, Fig. 4 Chinese Qing dynasty porcelain from the Sadana Island shipwreck in the Egyptian Red Sea (Image: Institute of Nautical Archaeology)

(Blue 2006; Belfioretti & Vosmer 2010). Along with the evidence of the Belitung wreck, medieval historical descriptions such as that of the Andalusian pilgrim Ibn Jubayr, and ethnographic evidence from as late as the twentieth century CE, the sewing together of planks as part of a shell-first construction technique can be seen to constitute part of a distinct Indian Ocean shipbuilding practice lasting much of the Islamic era but also predating it: It is also mentioned in the first-century CE *Periplus Maris Erythraei*. Both the al-Balīd and Quseir timbers show the use of wooden dowels to edge-join the planks, with coconut coir rope then used to bind them. A similar technique is seen in twentieth-century vessels in the Yemeni Hadramaut and Oman as well as southern India.

Reconstructions

Archaeological and historical evidence has inspired two large-scale attempts to "reconstruct" sewn-planked medieval sailing craft, both in Oman. In 1980, a team led by Tim Severin completed the building of *Sohar*, a 24-m-long vessel that he and his crew sailed from Muscat in Oman to Canton in China (Severin 1982) (Fig. 5). More recently, from 2008 to 2010, Tom Vosmer directed the building of the *Jewel of Muscat*, a sewn reconstruction based on the Belitung wreck (Fig. 6). It sailed from Qantab in Oman to Singapore. These projects not only allowed an experimental appreciation of past technologies within the navigational landscapes in which they occurred but also provided a vehicle for Oman's self-representation as a maritime nation.

Islamic and Maritime Archaeologies, Fig. 5 Craftsmen in Sur, Oman, work in pairs to sew together the planks of Tim Severin's *Sohar* using coconut coir cordage (Image: Severin Archive/Sindbad Voyage)

Ethnographic Research

While archaeological finds have so far yielded a relatively modest set of data on "Islamic" seafaring, ethnographic research into vessel types of the Islamic world has contributed a complementary strand of inquiry. The approach is used to understand contemporary boatbuilding practices in their own right and also to use this as a basis for the analogous interpretation of archaeological remains. It was not until the early nineteenth century CE that the Spanish spy Domingo Badia y Leblich, and later in the

Islamic and Maritime Archaeologies, Fig. 6 The *Jewel of Muscat*, an Omani reconstruction of an ocean-going sailing vessel made from sewn timbers, based on the remains of the ninth-century Belitung wreck (Photograph by Alessandro Ghidoni. © Ministry of Foreign Affairs Oman 2009)

Islamic and Maritime Archaeologies, Fig. 7 Close observation of a large fishing *hūrī* at Khor al-Ghureira, Yemen, during asurvey conducted in 2009 by the University of Exeter's MARES Project (John P. Cooper/MARES)

century the French Admiral Pâris, began to make detailed scale drawings of vessels from the region. Among English-language scholars, the term "dhow," once referring to a specific vessel type, was adopted to signify all larger "Islamic" craft of the region. Since the early twentieth century CE in particular, western scholars such as James Hornell (1942) have sought to establish a typology of regional "dhows." Color photographic books on regional craft appeared in the 1960s and 1970s, while scholarly works by Dionisius A. Agius (2008), Yacoub al-Hijji (1989), Erik Gilbert (2004), and Sheriff (2009), among others, have sought to study social, economic, cultural, and linguistic dimensions of the vessels and their use, partly as a response to the rapid decline in the use of these vessels. More recent research has included the University of Southampton's Huri Project, led by Lucy Blue, recording the *hūrī* logboats of the western Indian Ocean; the University of Exeter's MARES Project, led by Agius, investigating the traditional craft of the southern Red Sea (Agius et al. 2010) (Fig. 7); as well as individual efforts by Norbert Weismann and Piotr Dziamski in the Gulf. All have sought to make a more detailed illustrated record of the remaining vessels of the region. Meanwhile Julian Whitewright (forthcoming, 2012) has tracked the emergence of the lateen/settee rig in the Indian Ocean through iconography and text, demonstrating that this rig, today seen as quintessentially Arab, has a much older, pre-Islamic, provenance in the Mediterranean and is in fact a more recent introduction to eastern waters.

Port Archaeology

The emergence of Islam prompted an upsurge in international trade in the Indian Ocean region, and despite periodic conflicts with Christian powers, trade in Eastern luxury goods across the Mediterranean was, until the Portuguese discovery of the Cape route, also overseen by Islamic powers. The Indian Ocean became an Islamic *mare nostrum*, in which mariners harnessed the region's monsoon winds to pursue transoceanic trade. Within this system, African ports supplied slaves and raw materials such as tortoiseshell and wood; Indian ports provided textiles, timber, and food; while Middle Eastern ports exported dates and manufactured goods such as ceramics, metalwork, and carpets.

Siraf, in modern Iran, was in the ninth century CE, the Persian Gulf's main entrepôt for luxury goods and ceramics made in China or the Abbasid heartlands. Excavations conducted between 1966 and 1973 by the British Institute of Persian Studies revealed that Siraf had existed already in the Sasanian period (Whitehouse 2009). By the early Islamic period, it served the inland trading center of Ardashīr Khurra. The elaborate carved teak architecture of its buildings speaks of the port's mercantile prosperity and overseas connections. Iraqi, Sirafi, and Chinese wares found on the Lamu archipelago in Kenya and Banhore in Pakistan may well have emanated from the port. A devastating earthquake in 976 or 978 CE, combined with a weakening of the local Buyid dynasty, led to decline: Visiting it in the early thirteenth century CE, the geographer Yaqut described it as a small and poor town.

In the Egyptian Red Sea, separate expeditions by the University of Chicago, led by Donald Whitcomb and Janet Johnson (1982), and the University of Southampton, led by David Peacock and Lucy Blue (2006), have shed light on the Ayyubid and Mamluk port of Quseir, which occupied the site of the long-defunct Roman port of Myos Hormos. Quseir was connected to the Nile by a pack-animal route through the Wadi Hammamat, this being the shortest connection between sea and river in Upper Egypt. The excellent Roman-era harbor was extensively silted by the medieval period, but a small embayment remained at the lagoon mouth. Quseir was involved in the trade in spices and textiles with India, in Chinese ceramics, and in more local networks within the Red Sea region (Fig. 8).

Islamic and Maritime Archaeologies, Fig. 8 Indian resist-dyed fabric with elephant design from the medieval Islamic port of Quseir, Egypt (Image: University of Southampton)

In 1985, soon after the Chicago excavations began at Quseir, archaeologists from the Middle East Cultural Centre in Japan led by Mutsuo Kawatoko began excavations at the site of the medieval and early modern port of al-Tur, on the Gulf-of-Suez coast of the Sinai peninsula. Al-Tur was an important harbor for both Christian and Muslim pilgrims, bound for Mount Sinai and Mecca, respectively. Its Islamic heyday was between 1379 CE, when the alternative *hajj* route via the southern port of 'Aydhab was abandoned, and the end of the fifteenth century, when the Portuguese discovered the cape route to the Indian Ocean. The medieval town has been extensively excavated: Finds reveal contact with China and Southeast Asia; Turkish and European ceramics, pilgrim flasks, and glassware; and Arabic documents from the fifteenth and sixteenth centuries.

The medieval lake-island site of Tinnis in Lake Manzala, in Egypt's northeast Delta region,

has been the subject of archaeological study by the Egyptian Antiquities Service since 1978 and by Alison Gascoigne of the Universities of Cambridge and Southampton since 2004. The site's island status has largely preserved it from modern urban encroachment. It comprises the remains of a largely brick, walled city, its maritime infrastructure including the remains of at least one intramural canal harbor, and the water gate protecting it. Tinnis probably has a pre-Islamic foundation, but its heyday was Fatimid, where it was famed for its high-status textiles industry (Gascoigne forthcoming). Its sheltered position within Lake Manzala and onward connection to the Damietta branch – avoiding the dangerous Damietta mouth – made it a navigationally attractive location. The city was eventually abandoned in the twelfth century following a series of Crusader attacks. Geophysical investigation of the site has identified the extent of the largest of the intramural harbors. Archaeological finds on the surface suggest onward connections with China, Persia, and the wider Mediterranean region.

Outside the Islamic heartlands, archaeological investigations by Mark Horton in 1980 at Shanga, an abandoned coastal trading settlement on the Lamu archipelago, Kenya, sought to address processes surrounding the appearance of Islam along the Swahili coasts (Horton 1996). The location of the archipelago placed it ideally at a terminus of transoceanic monsoon trade; local resources such as mangrove timber and water added to its attraction. The earliest evidence of settlement is from the eighth century CE, by the end of which a small number of inhabitants were Muslim and the first wooden mosque had been built. From pottery and glass evidence, they already had contact with the Gulf region. In the tenth century, a new style of building, using coral, was adopted and used in a new mosque. A further, larger, mosque was built from this material in the eleventh century CE, suggesting a majority Muslim population by this stage. By the late eleventh–early twelfth centuries CE, pottery included Indian and Chinese Longquan imports. By the late thirteenth century, trade connections appear to have realigned to South Arabia. The site appears to have been abandoned after a violent attack in the early fifteenth century CE.

Archaeological investigation into a more recent port settlement has been conducted by the University of Copenhagen at the site of al-Zubara in northwest Qatar. Al-Zubara was a large walled town of stone buildings which reached its zenith in the eighteenth–nineteenth centuries CE, when it was an important pearling center and processor of imported dates. Archaeological work to date has mapped the extensive remains of the urban area, which was abandoned in the twentieth century (Walmsley et al. 2010). Underwater survey work is being conducted offshore by the University of Birmingham.

In Oman, recent archaeology directed by Axelle Rougeulle of the Centre National des Recherches Scientifiques has focused on the site of Qalhat, a port city founded in the early twelfth century CE that became the second capital of the kingdom of Hormuz between the thirteenth and fifteenth centuries (Rougeulle 2010). Work so far has focused on the urban layout of the town and the identification of key structures. Excavations have revealed large proportions of Indian ceramic imports, Yemeni mustard ware, and, from the thirteenth to fourteenth centuries CE, Chinese imports.

Current Debates

Given its rich textual heritage, the Islamic world raises compelling issues regarding the relationship between archaeology, history, and art history. This is nowhere truer than within maritime studies. Few archaeologists still regard themselves as embarked on a purely "scientific" inquiry into past human existence. Nevertheless the discipline continues to shed an alternative light on past societies that is not constrained by the cognitive bounds and interests of the largely urban élites who authored the majority of written works surviving from the past. Arabic sources are, for example, surprisingly limited in their descriptions of past watercraft: The level of detail disclosed by even the few archaeological and ethnographic boat studies conducted so far is vastly greater than anything surviving in written sources.

At the same time, the nature of maritime studies is such that written accounts from the past – complemented by modern disciplines such as meteorology and oceanography – can provide valuable insights in areas where archaeological methods are not so revealing. Historical accounts of maritime journeys, trade practices, and military campaigns can shed light, for example, on the seasonality of maritime life surrounding archaeological sites and landscapes, such as ports and maritime routes.

The relationship between maritime archaeology and art history is a complex one. Shipwrecks can, as with the example of the Belitung ship, be the very places where whole, pristine, and excellent examples of Islamic decorative art of the kind favored by art historians are preserved for centuries. But, as in the case of Belitung, it is also from such submerged locations that artifacts attracting aesthetic appreciation can be extracted and traded for profit. Nevertheless, submerged Islamic sites do offer the prospect of preserving a wider range of artifacts, given the often better preservation of organic materials in low-oxygen environments, than those attracting the attention of art historians. Thus, maritime archaeology has the potential to contribute its own perspective on long-distance contacts enjoyed by Muslim societies, on the ordinary lives of seafaring Muslims, and on the material culture of Muslims that art-historical inquiries do not.

Both maritime and Islamic archaeologists have in the past faced a struggle to win respect for their work as either methodologically rigorous or legitimate forms of archaeological inquiry and to shake off associations with emphatically non-archaeological practices such as treasure hunting. The non-archaeological recovery of items from underwater for profit has a long history worldwide. In some Islamic-world locations, colonial exploitation and postcolonial institutional weakness have increased the problems of non-archaeological extraction. Controversy over treasure hunting has already erupted: Seabed Explorations broke no Indonesian laws when it worked under license on the Belitung wreck. But the high-prestige ceramics it brought to the surface were subsequently sold to the Singapore government for $32 million, and no comprehensive archaeological record of the excavations was published: In 2011, the Smithsonian Institute shelved plans to hold an exhibition of finds from the wreck after vociferous objections to a show based on traded heritage.

Future Directions

For many maritime archaeologists working on the Islamic world, the key to overcoming problems of treasure hunting is institutional capacity building. A new Centre for Maritime Archaeology was established in 2009 at the University of Alexandria, Egypt; it is the first in an Arab country. Efforts are under way to establish capacity and extend education elsewhere in the Islamic world, particularly the Gulf.

Maritime archaeological inquiry in the Islamic world is often limited, and enabled, by the availability of resources and the disposition of funding bodies. Future investigation there is likely to be sporadic, with issues of political stability, international diplomacy, national priority, and funding likely to skew activity towards countries, such as those in the Gulf, with the resources, institutional capacity, and inclination to support archaeological work.

Any archaeological investigation of Islamic subjects cannot hope to remain outside contemporary politics. On a practical level, political and security issues impinge on the ability of maritime archaeologists to access sites for investigation. On a theoretical level, the often hegemonic ideologies of Orientalists, religious conservatives, and secular nationalists, constructing insular notions of the Islamic or national past, stand to be challenged by the findings of archaeology, not least that found underwater, as well as in ancient maritime trading settlements.

Cross-References

► Archaeology and the Emergence of Fields: Maritime
► Bass, George Fletcher

▶ Experimental Maritime Archaeology
▶ Indian Ocean: Maritime Archaeology
▶ Islamic Archaeology
▶ Islamic Archaeology and Art History
▶ Orientalism: Islamic Archaeology and Its Colonial Context
▶ Red Sea: Maritime Archaeology
▶ Swahili Archaeology
▶ Underwater Archaeology

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Islamic Archaeology

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Introduction

Islamic archaeology is concerned with the investigation of the material culture and historical record of Muslim peoples and societies. As an area of academic inquiry and as a practical part of

heritage management, Islamic archaeology is growing as the role of Islam in the world increases both as a political force and in terms of its financial resources. There are a number of conceptual difficulties with the term "Islamic archaeology" which will be discussed below, but for the present it is used in broad inclusive fashion to encompass any archaeology where Islam is a significant factor in the history or heritage of the region or theme under consideration. It will be clear that just as the Islamic world covers a large area and a significant proportion of the world's land surface, so the archaeology of Islam will incorporate considerable diversity in terms of ethnicities, beliefs, environments, languages, histories, politics, and economics. One of the problems or tensions within this area of inquiry is the reconciliation of such diversity and the question of the coherence of the subject as a whole.

Definition

As an academic field of inquiry, Islamic archaeology can be interpreted in many ways from an archaeology narrow focus on the religion of Islam to a much broader investigation of the material culture of societies where a significant proportion of the population was Muslim. In some cases the term may even be extended to non-Muslim societies where there was either a Muslim minority or significant interaction with the Muslim world. At this point it might be worth comparing Islamic archaeology to Christian or Hindu archaeology where the focus of research is firmly on the religious aspect of those societies, whereas other aspects of these societies (trade, economy, conflict) may be outside the remit of the study. Islamic archaeology is generally construed to have a wider remit partly because the religion of Islam is a structuring principle for all aspects of a society and individual's life. Thus, trade, politics, warfare, and social relations are all within the scope of Muslim religious life. Secondly from its inception in the nineteenth century, Islamic archaeology has not placed particular emphasis on Islam as a religion and has used the adjective "Islamic" as a general term to refer to cultures where Islam was the dominant religion.

The term "Islamic Archaeology" was first used in the late nineteenth century to refer to the investigation of archaeological sites where the material remains of predominantly Muslim settlements were excavated and objects retrieved for display in museums or private collections. Medieval Islamic remains were intimately linked with the present, and in the nineteenth and early twentieth centuries, there was often a tendency to see Muslim society as either static or in an inexorable decline. There was therefore little to be gained from an archaeological study of Muslim society as the trajectory of development was already known, and the only value that could be derived was from the excavation and retrieval of decorative objects. During the twentieth century the meaning of the term shifted away from the concept of object retrieval to the idea of archaeology as a means of understanding past societies. In many ways this change mirrors developments elsewhere in archaeology. However, because Islamic archaeology was overwhelmingly carried out by outsiders from Europe or America, the change from acquisition of objects to understanding of the development of societies was intimately linked to ideas of Orientalism as defined by the renowned Palestinian Egyptian scholar Edward Said (1978). While excavating objects and removing them to a distant location may be interpreted as a refined form of theft, the collection of information to construct narratives could be seen as part of a colonial/Orientalist attempt to appropriate the past history of peoples seen as somehow inferior. In this case archaeology was a method of control and according to Said an integral part of the colonial apparatus. Of course this does not apply exclusively to Islamic archaeology, and in the scheme of things, Islamic archaeology had a relatively minor role in relation to Egyptology, Assyriology, and Biblical Archaeology. It should also be noted that a crucial component of the archaeology of many of these pre-Islamic civilizations was a conscious effort to disassociate the glorious ancient civilizations from contemporary Muslim cultures.

Historical Background

Islamic archaeology may be divided into two distinct phases: (1) the late nineteenth and early twentieth century and (2) the second half of the twentieth century up to the present day. The first phase is characterized by European colonialism, a preoccupation with major urban sites and a Middle Eastern focus. The second phase is characterized by differing national agendas, a shift toward regional survey and widening geographical focus beyond the boundaries of the Middle East.

1880–1945

Although Islamic remains had been found in Middle Eastern excavations of ancient sites during the early and mid-nineteenth century, they were not the objective of these projects and were generally either discarded or ignored. The specific targeting of Islamic-period sites and remains began in the latter part of the nineteenth century and was part of a growing interest in the development of art and architecture. The term "Islamic archaeology" did not occur until the 1890s when the concept of Islamic civilization was first adopted as a term to describe the culture and history of Muslim peoples. The philosophy behind the use of the term "Islamic" derived from the ideas of Auguste Comte and William Robertson who viewed religion from a comparative cultural and secular perspective rather than as a matter of faith and spirituality. The first use of this terminology in relation to material culture was the 1893 exhibition of Islamic antiquities in Paris which had the title "Exposition d'Art Musulman" (Exhibition of Islamic Art) rather than more usual terms of Persian or Arab art (Vernoit 1997). The new terminology was rapidly adopted, and the first excavations to be carried out as Islamic archaeology occurred in diverse locations such as Qal'a Bani Hammad in Algeria and Samarqand in the newly annexed Russian provinces of Central Asia. In both of these cases, the excavations were linked to colonial expansion and an attempt to create heritage and histories which would support European domination. Even the excavation of the Spanish Umayyad site of Madinat al-Zahra in 1910 has been linked to that country's colonial ambitions in Morocco which was made a joint French/Spanish protectorate in 1912. The same colonial interest is less evident in the German excavations at the ninth-century site of Samarra in Iraq during the years immediately preceding the First World War. As capital of the Abbasid state and the world's largest recognized archaeological site (45 km N-S), Samarra was a fitting setting for one of the first major scientific excavations of an Islamic site. Unfortunately the excavation and survey work was curtailed by the First World War; however, the results of this fieldwork are still being analyzed and continue to produce important new information (Northedge 2008). Samarra was particularly significant because it was regarded as the earliest expression of many features which were later considered to be characteristic of Islamic art including the three types of stucco decoration (carved, bevelled, and molded) and several distinct pottery types including cobalt blue-painted white ware and lusterware.

Following the collapse of the Ottoman Empire at the end of the First World War and the signing of the Sykes-Picot Agreement, large areas of the Middle East and North Africa came under European control pending eventual independence. During this period excavations at Islamic sites were seen as a way of connecting people with their own national histories and as a way of training local archaeologists. For example, the Iraqi archaeologist Fuad Safar excavated the early eighth-century Umayyad city of Wasit in southern Iraq between 1936 and 1942. In Palestine Dimitri Baramki working for the Department of Antiquities of Palestine excavated the eight-century Umayyad palace at Khirbat al-Mafjar between 1938 and 1942. The principal building at Khirbat al-Mafjar was a monumental bathhouse with magnificent mosaic decoration and sculptures (Hamilton 1959, 1988). The most surprising feature of the decoration was the presence of figural sculptures of semi-nude women which adorned the wall of the bathhouse. Although similar figures had been found as paintings in the bathhouse at Qusayr 'Amra in Jordan, the most

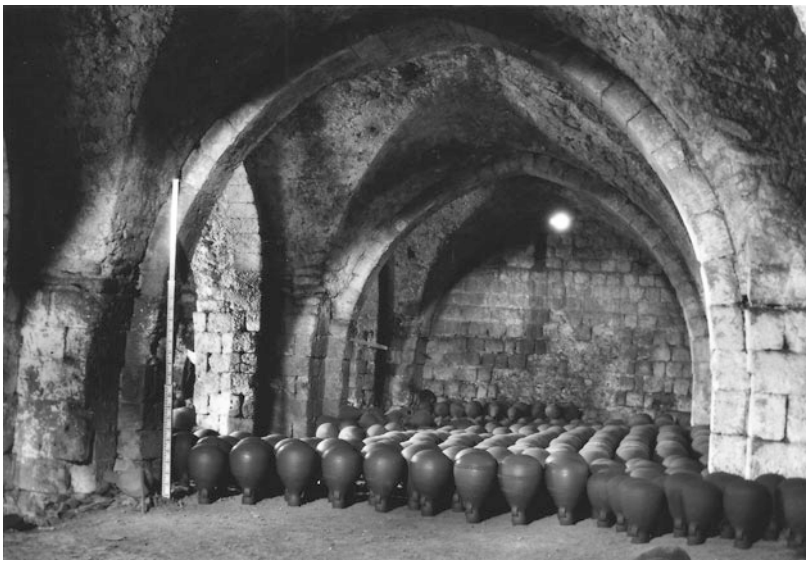

Islamic Archaeology, Fig. 1 Khan al-Idham in Ramla, Israel. This medieval khan or caravanserai was probably built in the fourteenth century and was later reused as a pottery factory. The photograph taken in the early twentieth century shows recently made jars being allowed to dry prior to firing

unusual aspect of the Khirbat al-Mafjar figures is that they were three-dimensional statues – a form of artistic creation which was generally regarded as forbidden within Islam.

At this point it is worth mentioning the role of architectural survey within the growing field of Islamic archaeology (Fig. 1). For many centuries the architecture of the Islamic world had been admired and studied by Europeans, and it is known that there was considerable interchange of architectural ideas during the period of the Crusades. However, the recording and measurement of Muslim buildings as ancient monuments did not start until the late nineteenth century and was motivated by the same concerns which saw the excavation of Islamic sites. One of the earliest buildings to be documented was the early eighth-century Umayyad bathhouse at Qusayr ‘Amra discovered and recorded by the Czech anthropologist Alois Musil in 1908. The site is chiefly famous for its frescoes which include the earliest depiction of the night sky painted inside a dome. The architecture of the bathhouse in Qusayr ‘Amra is relatively modest when compared to the immense fortified palatial structure of Al-Ukhaidir first recorded by Gertrude Bell in 1909 and later published as monograph under the title *Palace and Mosque at Ukhaidir* (Bell 1914). As a British aristocrat and later administrator for the newly created state of Iraq, Gertrude Bell was firmly in the Orientalist tradition of archaeologists. However, the most famous historian of Islamic architecture and one of the most important figures in Islamic archaeology K.A.C. Creswell was not from such a privileged background and always remained slightly apart from the colonial establishment. Creswell started his work in the field by writing reports on Islamic architecture for the Palestine Mandatory Government in the years following the end of the First World War. He later developed as an independent scholar through a commission to write an account of Islamic architecture in Egypt and ultimately became Professor of Islamic Archaeology at the American University in Cairo (Grabar 1991). Creswell’s achievement was to establish a firm chronological base for the development of Islamic architecture and to pioneer a systematic empirical method of recording more akin to archaeology than art history (Creswell 1932, 1940, 1952, 1959).

It will be apparent that most of the interest and fieldwork in Islamic archaeology during the early twentieth century was concerned with the first three centuries of Muslim rule and that remains from the medieval period to later were

seldom investigated. Jean Sauvaget was one of the first scholars to investigate medieval and later Islamic remains with his work on Damascus (1932) and Aleppo (1941). Sauvaget's approach was markedly different from Creswell's relying on historical documents, inscriptions, and a profound knowledge of local topography rather than meticulous measurements. Another scholar who made a major contribution to the archaeology of both the medieval and early Islamic periods was the Swiss Orientalist Max van Berchem (1863–1921). Van Berchem's primary expertise was recording, translating, and analyzing Arabic inscriptions although he was careful to see them in context and often made a full study of the monument in which they occurred (see, e.g., Van Berchem 2001). Van Berchem's legacy continues both in his publications and in the Fondation Max van Berchem created in 1973.

1945–The Present

The Second World War marked a shift in the political makeup of the Middle East and North Africa which had a profound impact on archaeology. The European-dominated colonial and mandatory regimes were gradually replaced by independent though rarely democratic governments. The new governments were interested in developing their national identities, and archaeology was increasingly used to support these agendas. Although nationalist presentations of archaeology do not generally appear in academic accounts of excavations, the presentation of sites in popular literature and heritage may be used to re-enforce perceptions of national identity. For example, in Iraq Samarra was used by the Saddam regime to portray the glories of Iraqi civilization, while in Jordan the Umayyad desert castles were used to reenforce the nation's Arab identity. Despite these nationalist agendas foreign (European, American, and latterly Japanese) teams were still permitted to work in these countries; these projects had to be in collaboration with archaeologists from the countries concerned. Such regulations led to an increasing internationalization of Islamic archaeology with sharing of skills and resources.

One of the most important joint projects was the excavation of the Iranian coastal city of Siraf by the British Institute of Persian Studies and the Iranian Archaeological Service (Whitehouse 1970). The city which flourished between the mid-eighth and early twelfth century was important as a major city and one of the principal ports on the Arabian/Persian Gulf. Beyond its immediate findings in relation to the city and port, the Siraf project was important for Islamic archaeology as a whole. In the first place the large-scale excavations were important for the quantity of ceramic finds which overlapped with those of Samarra. Because Samarran pottery was encountered in many places, the Siraf finds were able to provide a corrective to the dating of many of these wares (Mason & Keal 1991). Secondly the Siraf project drew attention to the Indian Ocean trade of which it formed a central part with ceramics from the Gulf region found as far afield as Japan and South Africa.

The Indian Ocean connection is an aspect of Islamic archaeology that has seen increasing interest in the latter part of the twentieth century with excavations in places such as Pakistan (Banbhore), Sri Lanka (Mantai), and East Africa (Kilwa, Mantai, and Shanga). The geographical scope of Islamic archaeology was further increased from 1992 when the collapse of the Soviet Union opened much of Central Asia and the Caucasus to international teams. Although Soviet (and previously Imperial Russian) teams had been working on Islamic sites from the late nineteenth century, the results of this work were not well known internationally partly because of language problems and also for ideological reasons. Significant initiatives in this area include the International Merv Project focussing on the eastern capital of the Abbasid caliphate. In addition to the direct results of excavations, such projects also encourage and enable the translation and wider dissemination of information about the archaeology of the region. Other regions outside the traditional areas of research that have seen archaeological projects focussed on Islamic remains include West Africa (Timbuktu, Gao, and Tadmeka) (Insoll 2003), South East Asia (Lape 2005),

Islamic Archaeology, Fig. 2 Date-palm garden and fortified residence at Umm Salal Muhammad in Qatar. Date palms have a long association with Islamic culture and are often used to shelter other crops

and even Australia where evidence has been found of seventeenth-century Indonesian Muslim fishermen (Russell 2004).

In addition to an expansion in the geographical range of Islamic archaeology, there has also been an increase in the range of techniques used with an increasing emphasis on regional survey. One of the first regional survey projects which incorporated the Islamic period was Robert Adams' survey of the Diyala basin which used regional survey to investigate rural and urban settlement patterns in the vicinity of Baghdad (Adams 1965). Regional surveys are by their nature multi-period and interdisciplinary and have been instrumental in setting Islamic sites within their wider environmental and chronological context. Regional survey has also led to a greater interest in rural sites throughout the Middle East and North Africa (see, e.g., De Meulemeester's 2005 article on granaries in Morocco and Iberia; Figs. 2 and 3). One of the largest rural excavations was the Khirbat Faris project in Jordan which took place between 1988 and 1994 (McQuitty & Falkner 1993). The excavation of this small village revealed more than 1,000 years of Islamic occupation, and the publication of this site will be a major contribution to our understanding of a typical rural village economy.

Current Debates

A number of theoretical concerns can be identified within Islamic archaeology which can be placed into three main categories: religious concerns, questions of scope, and the relationship with art history.

Religious concerns are focussed on the characterization of archaeology as "Islamic." While this question is discussed more fully in the entry on the Archaeology of the Islamic Religion, it is important to outline the main areas of contention which include (1) whether the excavation of Islamic sites should be restricted to Muslims; (2) whether Islamic archaeology should concern itself with the excavation of pre-Islamic remains pertinent to the origins of the religion; (3) in what circumstances and by whom a Muslim grave can be excavated; and (4) what role practitioners of Islamic archaeology should have in promoting intercultural understanding.

Practical problems include the definition of the scope of Islamic archaeology. While there is

Islamic Archaeology, Fig. 3 Twelfth- to thirteenth-century stone water-jar stand from Egypt or Syria. Water is extremely important in Islamic culture and was used as a decorative feature in gardens, mosques, and houses

a general acceptance that remains from the early Islamic period in Saudi Arabia, Syria, or Jordan can be included within this field of inquiry, how far can this term be applied? For example, is it legitimate to use the term to describe excavation of an eighteenth-century Ottoman village in the Balkans? Similarly can the term "Islamic" be applied to industrial remains or the investigation of recent material culture? With increasing levels of globalization from the sixteenth century onward, different terms may be more appropriate to convey complex interactions between different societies and religions.

Islamic archaeology is unusual because art history had a formative influence on the development of the subject. Many of the first archaeological excavations of Islamic remains were organized to retrieve objects of aesthetic interest to collectors and museums. Because of this art history has continued to have considerable influence over the development of Islamic archaeology despite having very different aims and methodologies (Canby 2000). In some cases this has led to problems; thus, art-historical approaches have led to concentration of interest on glazed ceramics to the detriment of studies of coarse wares which have always made up the bulk of material on archaeological sites (Fig. 4). Similarly art historians have tended to focus on high-status buildings such as palaces, mosques, and mausolea, while ordinary housing and small village shrines have been barely noticed.

International Perspectives

By definition Islamic archaeology has an international perspective with the field of study encompassing much of Asia, Africa, and parts of Europe. Each country has its own approach to Islamic remains influenced by political, cultural, and religious factors. There are, for example, some European countries such as Spain and Portugal which were once major centers of Muslim civilization but are now overwhelmingly Christian or secular in outlook. For many years there was a negative attitude toward the Islamic history in these countries resulting both from colonial encounters and internal politics. However, recently there has been a willingness to accommodate and celebrate the Muslim heritage of both Spain (Borrás Gualís et al. 2000; De Meulemeester 2005) and Portugal (Torres & Macias 2001) seen in the publications of the organization *Museum With No Frontiers*. In other Christian countries, however, the situation

Islamic Archaeology, Fig. 4 Fourteenth-century fritware ceramic cenotaph (grave marker) from Central Asia. In addition to vessels many objects in the Islamic world were made of ceramic material including mihrab niches, grave markers, and wall decoration

is not so positive; thus, there has been very little attempt to investigate the Islamic archaeology of Malta despite a rich and deep Islamic heritage.

In Israel the situation is more complex partly because of the contested nature of the international borders, and also because even within Israel, there is a sizeable Muslim population. As a state Israel sees Jewish heritage and culture as predominant and has been reluctant to recognize any Palestinian (Christian or Muslim) culture as important. However, Israel also has a very positive approach to archaeology which has meant that there have been a number of excavations of important Muslim sites as well as numerous contract excavations of smaller sites (Petersen 2005). In Saudi Arabia the situation is reversed with a great deal of support for Islamic heritage and culture yet a lingering suspicion of archaeology.

Future Directions

Archaeology is becoming more important in Muslim countries partly as a way of developing tourism and partly because people may feel more interest in the development of their own culture and religion than in the distant past. It is, for example, notable that the Gulf states are now investing in archaeology as a way of reenforcing a sense of identity and heritage which is challenged by the rapid urbanization and development of these countries. It is likely that in the future these countries may well lead the way in supporting and developing Islamic archaeology not only in their own countries but further afield in Muslim countries with fewer resources.

The Balkan wars of the 1990s demonstrate how the presence of Muslims in Europe can still cause controversy. More recently controversies over the depiction of Islam by right-wing radicals have ignited debates about the integration of Islam into European society. While archaeology may generally be seen as remote from these debates, it can play a part in demonstrating the longevity of the relationship between Europe and Islam. Moreover, archaeology can shift the focus from violent interactions such as the Crusades to the more peaceful interactions such as trade and cultural exchange (see, e.g., Petersen 2008).

It is noticeable that during the twentieth century the majority of Islamic archaeology projects and excavations were focussed on the early Islamic (631–1000) and medieval (1000–1500) periods. However, recently there has been a growing interest in the post-medieval period influenced by the theories and concerns of historical archaeology. It is likely that this interest will develop particularly as it helps our understanding of the relationship of Islamic society with the rest of the world.

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- ▶ Cyprus, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ India: Historical Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ North Africa: Historical Archaeology
- ▶ Ottoman Archaeology: Localizing the Imperial
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology

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Islamic Archaeology and Art History

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Introduction

The discipline of Islamic art history is connected inextricably with that of archaeology, for reasons of both history and philosophy. Each field of study examines the material culture of the Islamic world and utilizes many of the same sources, particularly in the premodern period.

The principal methodologies of the fields differ in their approaches to the objects, with archaeology – in principle – privileging all materials equally and being concerned primarily with the relationships between and among excavated objects, while art history has an overriding interest in the objects themselves.

Yet although art history is primarily concerned with form and content, it is certainly and deeply informed by context. The increasing emphasis in the discipline on visual culture has resulted in greater attention to, and emphasis on, the cultural milieux in which the objects were produced.

Key Issues

The nature of Islamic art history is connected intimately with the physical situations of available objects. The relative lack of grave goods in Islamic burials, combined with the deposition of "masterpieces" in numerous shrines and treasuries, provided a wealth of extant, unburied artifacts that in many cases became the original materials for Islamic art history in its infancy as a discipline. Some of the most celebrated examples of such objects include the Shroud of Saint Josse (Fig. 1) and the Pisa Griffin (Fig. 2), both of which have been in European hands since the medieval era and the subjects of myriad studies.

On the other hand, the widespread practice of the commercial excavation of Islamic sites, as well as academic investigations, provided a supply of material culture for museums and universities that formed the basis of numerous canonical collections. (Regrettably, this also included widescale looting of sites and trafficking in illicit antiquities – practices that are, shamefully, ongoing today).

Certainly the plethora of portable arts – ceramics, stucco, metalwork, etc. – found in archaeological contexts informed their increasing inclusion into the field of Islamic art history and even their "legitimization" as objects of serious study. A series of catalogues devoted to exhaustive collections – private or public – of specific media have been very commonly cited and useful reference works in the field (Ettinghausen 1962; Baer 1983; Grube 1994).

The practice of "collecting history" of the Islamic world reached a climax in the late nineteenth and early twentieth century, when a combination of factors – including a number of excavations of Islamic sites – provided a wealth of materials for the archaeologist and the art historian. In many ways the studies of this period were quite similar across the two disciplines, with scholars in both fields devoting more attention to the more aesthetically pleasing objects for purposes of initial collection as well as later study and display. One such example is the Metropolitan Museum of Art's excavations at Nishapur in the 1930s and 1940s, in which the oft-cited, and indisputably useful, tome on pottery nonetheless represents only a small portion of the ceramics at the site (Wilkinson 1973). The "best" of these were selected for initial collection, as well as later publication, study, and exhibition (Fig. 3).

Certainly pottery, perhaps more than any other medium, has benefitted from its common and widespread availability in archaeological settings as well as its treatment in art-historical studies. Forms and fabrics have long been included as part of standard descriptions of ceramics in art-historical texts, and collaborations between and among colleagues in art history and archaeology have resulted in intriguing new observations on both forms and functions (Golombek et al. 1996).

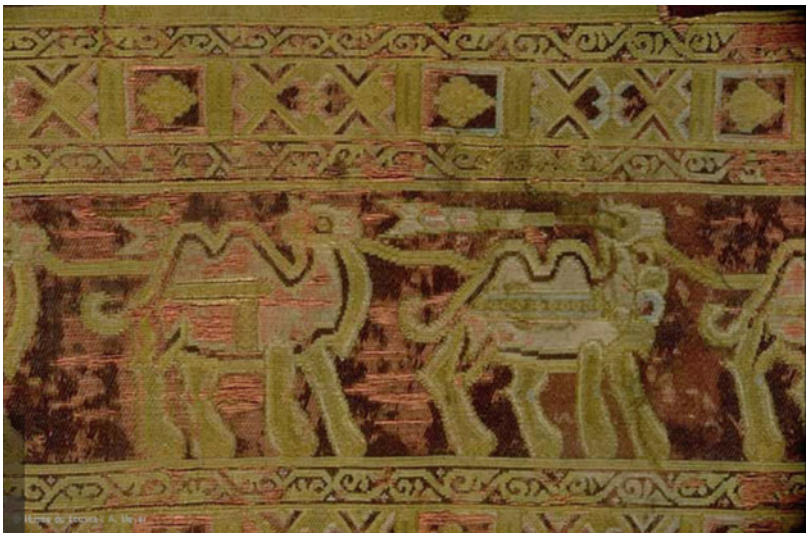

Islamic Archaeology and Art History, Fig. 1 Shroud of Saint Josse, pre-961 CE (Musée du Louvre, OA:7502)

Islamic Archaeology and Art History, Fig. 2 Pisa Griffin, eleventh century CE, Pisa Cathedral Museum (The Pisa Griffin Project)

Islamic Archaeology and Art History, Fig. 3 Nishapur Ware, tenth century CE (Metropolitan Museum of Art, 40.170.23)

Additionally, examinations of standing as well as excavated architecture and its decoration contributed significantly to the formation of the field. Both Qusayr ʿAmra (Fig. 4), which was not excavated, and Khirbat al-Mafjar, which was (and continues to be), provide important information to the archaeologist as well as the art historian on Umayyad art and architecture, including patronage, audience, and memory. Both structures were initially examined via, and restricted to, a "sub-antique" designation, which has only been corrected with recent and careful scholarship (see Fowden 2004) – treatments that are at the forefront of reexaminations of the canon of Islamic art history.

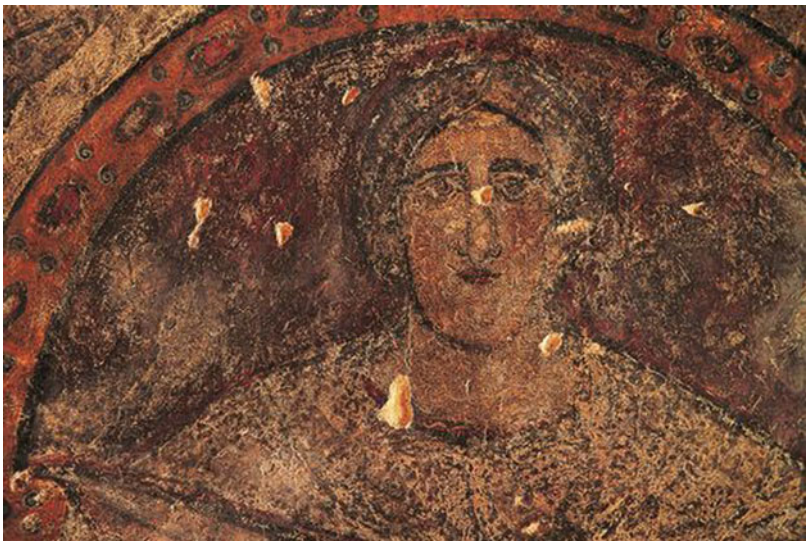

Islamic Archaeology and Art History, Fig. 4 Qusayr ʿAmra, eighth century CE, Jordan (UNESCO World Heritage Centre)

This closely knitted history between Islamic archaeology and art history has resulted in a great privileging of the early centuries of Islamic art, as Grabar noted in his observations on the field: "The concentration of scholarly effort on the early centuries of Islam, with its concomitant emphasis on the Arab world, reflects in part the earlier concern of scholarship with unraveling and explaining the beginnings of Islamic culture and in part the influence of archaeology, a technique far more at ease with early monuments than with recent ones" (Grabar 1983: 7). Current emphasis is redressing this imbalance, with attempts to pay greater attention to later centuries and less-studied sites and their material culture (Vernoit 2000; Komaroff 2000).

Current Debates

Islamic art history has been concerned with the cultural setting surrounding and necessitating the production of visual culture for many years. In the 1950s the eminent Islamic art historian Richard Ettinghausen reminded his colleagues that: "We have to study the monument's function, or the object's use, the conditions of life, work and trade under which it was made, and all the associations that helped to create the work, whether they were derived from religious, magical, astrological, literary or folkloristic concepts" (Ettinghausen 1951).

This is perhaps too little known outside the field of art history, with frequent assumptions that there is an over-reliance on aesthetics and connoisseurship at the heart of the discipline. Yet visual culture certainly has a materiality to it, recognized in the study and practice of art history and with a meaning both in and across time. Therefore a shift to the examination of material culture in art history – with visual culture as one part of a greater cultural world – prioritizes the place of art, but definitively within its cultural setting.

Additionally, certain characteristics of Islamic society – including the collecting of calligraphy, the commissioning of fine buildings that are palpably different from mere shelters, or championing a series of objects made in precious substances or imitating those substances – are clearly art-historical aspects of material culture, at least in part, and therefore bear examining under that lens.

Future Directions

Both formalism and contextualism have significant roles to play in art history, and in the field of Islamic art history, this has great importance for

the role that museums, in particular, play in presenting and interpreting the material and visual cultural of the Islamic world to the public. The term "Islamic" can be problematic, encompassing as it does a wide range of explicitly secular works produced by and for a variety of peoples of disparate faiths (Grabar 1973). One very recent development is the decision by the Metropolitan Museum of Art to reject the designation of "Islamic Art" for its renovated galleries in favor of geographic designations.

In recent years a number of significant collections of Islamic art have been inaugurated or reorganized, reopening the questions surrounding the choices made in collecting and displaying Islamic art. These are even more charged in the current political climate, creating a greater role but also much greater responsibility, for the Islamic art historian.

Additionally, the expansion of Islamic art history to incorporate lesser-studied elements of the Islamic world – whether by media, temporality, or geographic location – has led, rather unsurprisingly, to a greater specialization among Islamic art historians. In the course of one or two generations of scholars, an "inclusive" expert on topics as wide-ranging as Nasrid ceramics to contemporary Turkish architecture has been steadily replaced, for reasons of the rapidly growing depth and breadth of the field, by scholars increasingly focused on a narrower range of media, times, and places.

It therefore seems logical that at some point in the near future, the overemphasis on the early centuries of Islam, and its heavy reliance on archaeology, may be lessened or even superseded. While unfortunate, it would also point to the great strength of the partnership between Islamic archaeology and art history that created the foundations for such exponential growth and development.

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- ▶ Buildings Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Regional/Site Museums
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions

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Islamic Industry, Archaeology of

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Introduction

Industry in the medieval and post-medieval Islamic world was most commonly associated with urban environments, where it was predominantly organized and specialized in nature.

Production sites, in locations from Baŷŷāna, southeast Iberia (Acién Almansa et al. 1990); al-Basra, North Africa (Benco 1987; Benco et al. 2002; Robertshaw et al. 2010); Raqqa on the Euphrates (Henderson et al. 2004: 440-1) to Merv, Central Asia (Herrmann et al. 1997: 10-3), provide examples of industrial complexes. Such sites are key to our understanding of industry; however, the range of goods they produced, found on a greater number of consumption sites, also provide vital evidence of manufacturing. This entry will examine industrial production from the standpoint of artifacts, with evidence drawn from a range of contexts, predominantly medieval in date, in which those objects were made and used.

Definition

An industry is identified either by the presence of the site of manufacture, such as a kiln, or by a groups of artifacts, sometimes spread over a wide geographical area, that adhere to a particular morphology or technological style. Ceramics are the most intensively studied industrial product from most archaeological contexts and, along with metal and glass objects, represent the most common range of artifacts recovered during archaeological investigation. Both artifacts recovered from excavations and those held in museum collections as examples of Islamic art can shed light on key issues pertaining to industry. These include, for metal, the complexity and level of organization of production; for glass, the important technological change in production; and for ceramics, the vast range of types and the diffusion of styles. Exploration of these issues will allow consideration of how patterns of production and distribution of those artifacts can inform our understanding of industry. The focus of this discussion, owing to the length of this entry, will be Iberia, the Mediterranean, and the central Islamic lands.

Historical Background

Sināʿa, or the occupation of and production by artisans, was strictly governed by *hisba*, a set of moral codes often written in manuals, which were particularly associated with markets and enforced by an official known as a *muhtasib* (Milwright 2010: 143-4). *Hisba* documents provide key dated records of market conditions and the organization of industry. Both archaeological and historical evidence indicate, however, that the guidelines given in *hisba* documents were not always strictly adhered to. Excavation of urban settlements provides evidence that polluting industry was not always located away from centers of population, for example. During the early Islamic period, in the Syrian cities of Jarash and Baysan, ceramic kilns were located close to the urban center (Walmsley 2007: 117-9). Evolution in the organization of industry can be indicated by historical documents. By the fifteenth and sixteenth centuries CE, for example, court documents indicate that the role of the *muhtasib* was in decline, as many of its functions were supplanted by newly emerging guild structures that grouped and organized pre-existing craft associations (Hama 2008).

The Geniza documents provide arguably the best source of information on the organization of industry, albeit limited to the Mediterranean region. They indicate that the division of labor resulted in craftsmen specialized in industries ranging from the production of kohl sticks to house mats (Goitein 2003: 33-48). It was the textile industry, however, which represented the most significant production (Ashtor 1976: 95-7) but one which is rarely evidenced in the archaeological record, as such organic artifacts only survive in contexts where conditions permit their preservation. Even without the presence of textiles, production can sometimes be identified archaeologically, through tools such as loom weights, as at Baŷŷāna (Acién Almansa et al. 1990: 156). Important textile production centers such as Tinnīs, where fabrics embroidered with honorific titles referred to as *tirāz* were produced, provide examples of manufactories which served and were controlled by ruling authorities (Ashtor 1976: 150-2). Records from the Ottoman court, dating to the late fifteenth and sixteenth century CE, provide another example of impetus from the ruling classes which lead to industrial-scale

production, here associated with products such as Iznik pottery. Iznik products, in common with *tirāz* fabrics, were also consumed beyond courtly circles, as evidenced most strongly by their patterns of distribution (Atasoy & Raby 1989: 264-8; Barker 1995: 52-63).

Most recently, studies of an Arabic dictionary of crafts, written in Damascus between 1890 and 1905, have provided detailed textual accounts of a total of 437 artisanal activities, from pottery production to blacksmithing (Milwright 2011). Relating to the medieval period, treatises are amongst the documents that provide details of the processes of industrial production. For example, texts written by al-Kindī during the ninth century CE describe steel and iron manufacture, particularly in relation to swords (Allan 1979: 85-6), at centers including Merv (Herrmann et al. 1997: 12). For the early fourteenth century CE, a treatise by Abu al-Qasim of Kashan provides key information on the production of highly decorated pottery, such as lustre wares (see below). Here the recipe for ceramic "stonepaste" bodies is described as comprising ten parts quartz, one part crushed glass, and one part white clay (Watson 2004: 24-6). Texts on the objects themselves are another important source of evidence. For example artifacts such as inlaid brass objects, often in museum collections and classified as Islamic art, can provide evidence of the place and date of manufacture, sometimes in conjunction with a named patron or even artist (see Figs. 1 and 2). It is through such evidence that the diffusion of style and designs on inlaid brass objects has, in part, been defined. As a result, late twelfth-century CE Herat has been identified as the point of origin (within the Islamic world) of inlaying on brass before transmission to Mosul and then on to a number of centers, most notably Si'irt or Konya, Damascus, Cairo, and Fars (Ward 1993: 71-93).

On ceramics, inscriptions have allowed some of the best examples of lustre and polychrome *mina'i* pottery, produced in Kashan during the late twelfth and early thirteenth centuries CE, to be associated with a craftsman called Abu Zaid (Watson 2004: 55). However, it should be noted that a single name or signature may in fact refer to

Islamic Industry, Archaeology of, Fig. 1 Brass casket (O.2-1908), inlaid with gold and silver with a later copper and brass rim strip and iron clasp, 1366–1368 CE, probably made in Cairo. Given by the Rev. T. Hewitt, 1908.© The Fitzwilliam Museum, Cambridge

a workshop, or group of workshops, rather than an individual, as has been suggested for ceramics (Milwright 1999: 507). The name or symbol of the patron can lead to association with a specific location. For example, an enamelled mosque lamp from the collection at The Fitzwilliam Museum bears the name of its patron, the Mamluk Amir Shaykhu al-Nasīrī (Fig. 3). This object was almost certainly produced for his mosque complex in Cairo, which was completed between 1349 and 1356 CE (Fitzwilliam Museum 2005: 129). The following sections will consider predominantly archaeological artifacts recovered from known contexts but with reference to museum objects to explore key issues relating to their manufacture.

Key Issues

Metalworking

The range of materials used, the complexity of their extraction, and the vast array of techniques

Islamic Industry, Archaeology of, Fig. 2 Detail of brass casket (O.2-1908) inlaid with the name of the patron, who was a secretary in the Mamluk government. Given by the Rev. T. Hewitt, 1908.© The Fitzwilliam Museum, Cambridge

Islamic Industry, Archaeology of, Fig. 3 Enamelled mosque lamp (C.4-1949) made using clear glass with *blue*, *red*, *white*, and *black* enamel, c. 1335 CE, probably made in Cairo. Given by the National Art Collections Fund. © The Fitzwilliam Museum, Cambridge

employed to produce finished objects make metal artifacts one of the most complex object types produced on an industrial scale in the Islamic world. With the exception of copper, metals produced were predominantly alloys, made from more than one raw material.

Brass (an alloy of copper and zinc) was one of the most popular metals employed to produce utilitarian and decorative objects, using techniques from casting to sheet working (for the latter, see Ward 1993: 30-4). These objects reached their most spectacular form from the late twelfth to fifteenth century CE, when increasing numbers of brass objects were produced with inlaid designs using metals of contrasting color, such as silver and gold (Ward 1993: 71-121; for an example, see Figs. 1 and 2). Copper (with very low levels of alloying components such as zinc, lead, and tin) was also used to produce utilitarian objects, such as cooking pots and buckets, but these vessels may be under-represented in many archaeological assemblages, as when broken, they were probably recycled (Ponting 2008: 55). Similarly, only rare examples of precious metals survive probably because of their intrinsic and re-melting value, although rare finds from hoards including Nahavand and Harari provide evidence of Central Asian production from the late tenth to twelfth centuries CE (Allan 1982: 14-6). Ternary alloys with varying quantities of copper, zinc, lead, or tin were also used to produce largely utilitarian cast objects, while iron, sometimes alloyed with carbon to produce steel, was often used to make bladed objects from household scissors and knives to weaponry and armor (Allan 1979: 52, 66-82).

The raw materials to produce these metals were obtained through both open-cast and underground mining, which took place on an industrial scale, sometimes requiring ventilation shafts and drainage devices (al-Hassan & Hill 1986: 235-44). Given that copper was a key ingredient in the production of the most commonly occurring metal objects (see above), it is perhaps not surprising that there is considerable evidence for the extraction of copper. For example, significant copper mines, smelting sites, and other industrial activities dating to the early

Islamic period have been identified in the Timna Valley, in the rural hinterland of Ayla, as evidenced by underground galleries measuring up to 3 km length and extensive slag deposits (Walmsley 2007: 119-20).

The transformation of mined ores into finished objects was a complex process, which often occurred at two or more locations, sometimes with considerable distance between the source of raw material and the workshop where the final product was manufactured. At Saltés, an island at the confluence of three rivers close to Huelva in the southern Iberian Peninsula, polymetallic minerals were processed into bars of metal, following transport from relatively distant sources in the Sierra Morena Mountains (Bazzana & Trauth 2008). Once processed at sites such as Marandet or Saltés, metals could be exported to workshops elsewhere, where they were fashioned into objects. At Merv, for example, a workshop dating to the ninth or tenth centuries CE produced steel in refractory crucibles by fusing non-local supplies of iron (Herrmann & Kurbansakhatov 1994: 70; see Fig. 4). The resulting steel was doubtless used to produce the weaponry for which the settlement was famed (Herrmann et al. 1997: 12). At Tiberias, a Fatimid-period metalwork shop similarly employed non-local resources. The presence of that workshop is witnessed most prominently by a significant hoard, which included a range of artifacts (from lamp stands to bowls), made in a variety of metal types (copper, brass, high-tin bronze, and ternary alloys), as well as 200 kg of scrap metal, predominantly copper, in the form of broken objects, lathe turnings, and folded packets (Ponting 2008). This metalwork shop probably carried out limited casting of base metals but clearly focused on the repair of brass and ternary alloy objects and the collection of scrap copper, possibly for recycling through re-melting at another location (Ponting 2008: 59-60). Although this pattern of production of metal objects can readily be identified, it should be noted that there is also evidence of variation. Al-Basra provides just one example of a site at which, during the ninth to twelfth centuries CE, a full range of metalworking, from smelting of raw materials to the production of finished objects, took place at a single location (Benco et al. 2002).

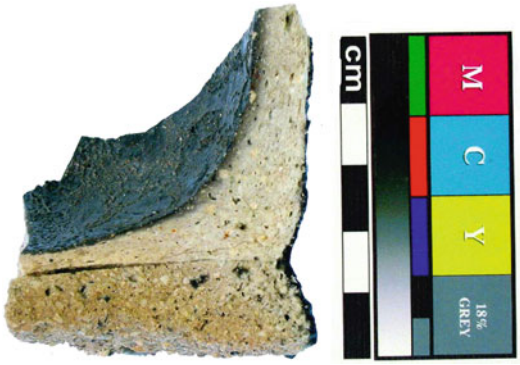

Islamic Industry, Archaeology of, Fig. 4 Crucible used to produce metals at Merv (Published with kind permission of Ann Feuerbach)

As evidenced by the processes described here, the production of metal objects necessitated high levels of organization and considerable specialist expertise. Developing an understanding of those processes of production is relevant to other object types, in particular glass, which could also be produced in multiple stages and locations, as well as being re-melted following initial production or the breakage of objects.

Glass

Silica (often either quartz pebbles or coastal sands) along with a soda flux (either natron or plant ash) and lime (calcium oxide, present either in shell fragments or plant ash) can be combined, through heating, to form glass (for the methods and range of production, see Henderson 2013). As with other forms of material culture, decisions involved in the manufacture of glass objects, from the selection of different types of raw material to methods of decoration, form part of the *chaîne opératoire* of production reflecting not only industrial processes and availability of materials but also the society in which they are made. Soda-lime-silica glasses predominate in the medieval Islamic world, although lead could also be added, probably to make softer material that could be cut or ground (Carboni & Whitehouse 2001: 28). Raw glass could then be blown or molded and decorated with a plethora of

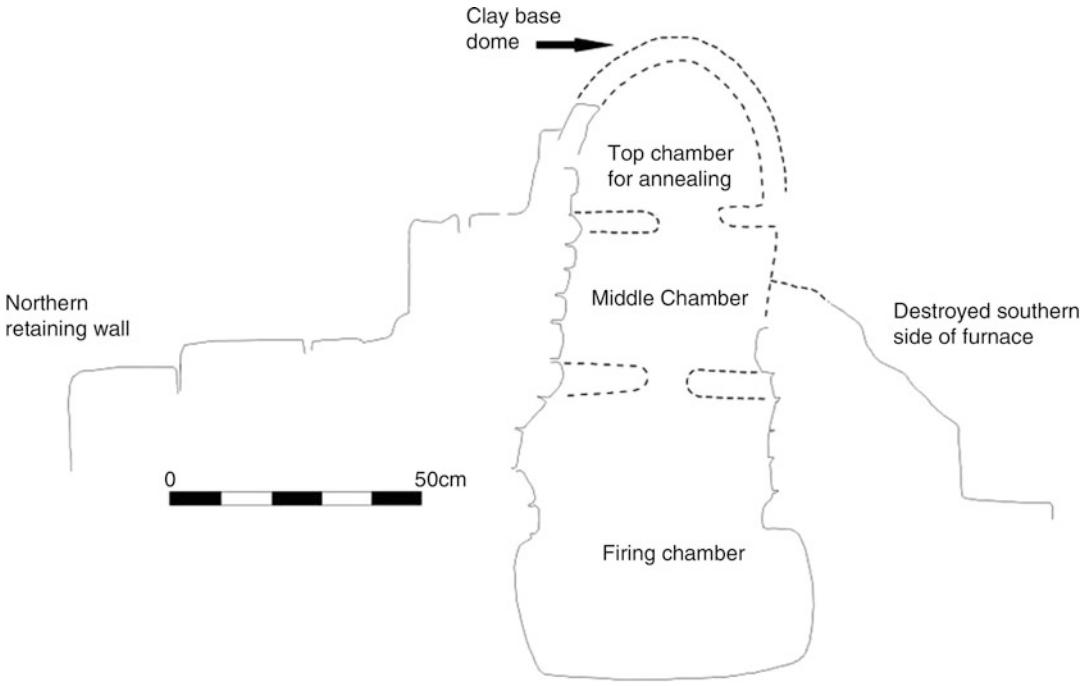

Islamic Industry, Archaeology of, Fig. 5 A north-south section through an eighth- to ninth-century bee-hive-shaped glass furnace found at Tell Zujaj, one of the three production sites excavated. (Published with kind permission of Julian Henderson)

techniques from filling and scratching to enamelling and gilding (for discussion of working and decorating techniques, see Carboni & Whitehouse 2001).

The evolution in technology, which occurred between the ninth and eleventh centuries CE in the eastern Mediterranean, is the most important issue that has emerged recently in relation to industrial production of glass. During that time, the type of soda flux and as a result the source of silica used in glass production underwent a significant period of change and experimentation. Around the ninth century CE, the mineral natron, long used as a flux in glass production in the Levant and Egypt, began to be replaced with plant ash from halophytic plants that grow in coastal, salt marsh, or desert areas, using a recipe similar to that long employed in Central Asian glass production (Tite et al. 2006: 1284-5). This change probably occurred due to political instability in the region of the Egyptian Delta, the most important source of natron (Shortland et al. 2006), combined with a massive increase in the demand for natron in general (Tite et al. 2006).

Experimentation in glass production during the early Islamic period is evidenced through scientific analyses of glass found at production sites, such as that located outside the city of Raqqa on the Euphrates (Henderson et al. 2004). Within that complex, a glassworking area, dating to the late eighth to ninth centuries CE and referred to as Tell Zujaj (Fig. 5), has yielded four different types of glass made with ash from different plant types combined with either quartz or sand from varying locations, as well as the addition of recycled natron glass (Henderson et al. 2004). During the early Islamic period, the difficulty of combining these new ingredients is evidenced at Bet She‘arim in the Levant, where failed attempts to produce glass are evidenced by a flawed slab (Walmsley 2007: 118). By the tenth or eleventh century CE, glassmakers had begun to overcome the difficulties of making plant-ash glass, as witnessed at Tyre, where an industrial

complex comprising four tank furnaces has been identified (Aldsworth et al. 2002).

Many centers in the central Islamic lands were capable of producing their own glass vessels (Walmsley 2007: 118; Carboni & Whitehouse 2001: 14-24). Nevertheless, the pattern of procurement of the raw materials to make those vessels was complex. From specialized production centers such as Tyre, glass chunks were exported to locations including Cairo (Aldsworth et al. 2002: 65). Yet Fustāt (Old Cairo) also manufactured glass from raw materials during the early years of its foundation (Carboni & Whitehouse 2001: 17). The picture is further complicated by evidence for recycling glass cullet from the Serçe Limanı wreck (Brill et al. 2009). In addition, although the fragility of finished glass objects must have made trade in raw glass easier, small objects such as bangles and beads were traded (Robertshaw et al. 2010: 375-6) and larger, highly decorated and presumably prestigious, items were also exchanged. Enamelled glass (see Fig. 3) provides an example of such a prestigious product, made at centers in Mamluk Egypt (notably Cairo) and Syria and distributed widely.

To summarize, owing to the relatively limited range of ingredients used in glass production, the process of manufacture was not as complex as metal, but it did undergo an important period of experimentation in the early Islamic period. As already noted in relation to metal and as discussed in the context of ceramics, the distribution of glass was similarly complex and highly organized, an issue that will be considered further below.

Ceramics

Ceramics are the most commonly encountered artifact produced in the Islamic world with an immense variety of forms and decoration. Clay, the common ingredient in the body, was largely locally sourced but could also be transported in a raw state (Milwright 1999: 507). Although clay always remained a key ingredient in ceramic bodies, by the eleventh century CE, potters adopted a new recipe for ceramic production, possibly to negate the less predictable qualities of material sourced from different locations (Tite et al. 2011). Referred to as "stonepaste," it contained only relatively small quantities of clay combined with quartz and glass (as described by Abu al-Qasim, see above). In contrast to predominantly locally sourced clays, recent analyses of glaze types have indicated that their lead content sometimes originated in regions distant to their production (Wolf et al. 2003).

The vast majority of ceramics in the Islamic world were thrown on a wheel. In the context of Iberia, during the late ninth and tenth centuries CE, the readoption of throwing on a fast wheel in association with the use of ceramic glazes is equated with the "Islamization" of the population (Gutiérrez Lloret 1992). Nevertheless, other types of production did occur, most notably during the twelfth and thirteenth centuries CE in Bilād al-Shām, where handmade geometrically painted ware (HMGPW) dominates ceramic assemblages from rural settlements. Contrastingly, wheel-thrown pottery was made and used at towns and cities, possibly indicating a social and economic divide between urban and rural populations during that period (Johns 1998). Such evidence of technical differentiation must be viewed in light of the economic and social context but can also be informed by ethnographic studies of the production of handmade pottery types (Milwright 2010: 154-6). The vast majority of Islamic pottery, with the exception of types such as HMGPW, was produced in updraft kilns, with a fire pit and chamber for pottery separated by a grill. Such kilns have been identified across the medieval Islamic world, with some of the most recently identified examples, dating to the late seventh to ninth centuries CE, present at the Merv Oasis (Herrmann et al. 1999: 13-5).

The great variety of ceramic types produced can be roughly divided into two categories: highly decorated vessels and coarser, utilitarian objects with little or no decoration other than perhaps a monochrome glaze. Highly decorated forms, both of ceramics and other artifact types, are often regarded as specialized products, made at a few centers and traded widely. As a result of its longevity of manufacture, lustre ware,

characterized by distinctive shiny and metal-like surface decoration, provides an ideal case study through which such patterns of production can be illustrated. Owing to the complexities of its manufacture, lustre ware was a specialized product, probably only made by a relatively small number of craftsmen through whom the technique may have been transmitted to a number of different centers over time (Watson 2004: 38-40). Recent analyses have unlocked the chemical process of lustre production, revealing that it is a nanocomposite metal glass layer, formed during a second firing as a result of a process of ionic exchange between copper or silver oxide paint and the surface glaze (Pradell et al. 2008). This complex production process was first employed in Basra, Iraq, where it was associated with the "Abbasid court," then transferring to Fatimid Cairo, where it was produced for the first time on stonepaste bodies (Tite et al. 2011). During the twelfth century CE, production of lustre ware moved once more, this time to Syria at sites including Tell Minis and Raqqa (Milwright 2010: 150). Further east, Kashan became the dominant production center making lustre and other highly decorated ceramics until the fourteenth century CE, with a cessation in the decades immediately following the Mongol conquest (Watson 2004: 56-7). Scientific analyses (largely ceramic petrology) support this transfer of technology (most recently see Tite et al. 2011).

A survey of ceramic material gathered from Iranian sites, dating to between the ninth and eleventh centuries CE, supports evidence of specialized and centralized production of lustre, while pointing to the more pervasive manufacture of slip-painted wares at multiple urban centers (Williamson 1987). Nevertheless, chemical analyses of lustre wares dating to the mid-twelfth to late thirteenth centuries CE from the Syrian site of Gritille do not support this hypothesis of centralized production, instead indicating that this pottery type may well have been manufactured at multiple, provincial centers in medieval Syria (Redford & Blackman 1997). This evidence concerning highly decorated pottery is, therefore, beginning to provide some clues that multiple production sites making similar wares might, at least in some cases, have been the reality. In contrast to highly decorated pottery, coarse, undecorated wares are often considered to have limited distribution except in the case of storage jars used to contain traded products. For example, amphora dating to the late eighth and early ninth centuries CE, and associated with the wine-making industries of Middle Egypt, was widely distributed in the eastern Mediterranean (Vogt et al. 2002). Furthermore, recent analysis of archaeological assemblages is beginning to indicate the diffusion of other undecorated wares; for example, cooking pots dating to the Almohad period made just outside Seville were distributed at a regional level, in this case to settlements as distant as Mértola on the River Guadiana and Écija on the River Genil (Bridgman 2007; see Fig. 6).

The picture that emerges of ceramic production is, therefore, as varied as the different types of this artifact category, with manufacture probably not following any one set pattern or model. It is no longer possible, therefore, to merely assume that decorated pottery was always a highly specialized and widely distributed product or that plain utilitarian vessels were only made for local consumption. Instead, a picture of pottery production that varied within regions, or even ceramic types, should be posited.

International Perspectives

Centers of Production and Consumption

At many urban centers, industrial complexes produced glass, metal, and pottery objects. Already discussed at Raqqa, glass was made in quantity (Henderson et al. 2004) but this was also accompanied by ceramic production (Milwright 2010: 148). At Merv, evidence for steel smelting and ceramic production has been identified (Herrmann et al. 1999: 13-5; Herrmann et al. 1997: 10-13), while al-Basra's industrial complex manufactured a range of goods including pottery (Benco 1987), glass (Robertshaw et al. 2010), and metal artifacts (Benco et al. 2002). Links with other industries are also evident at al-Basra, with bone waste from animal butchery (which

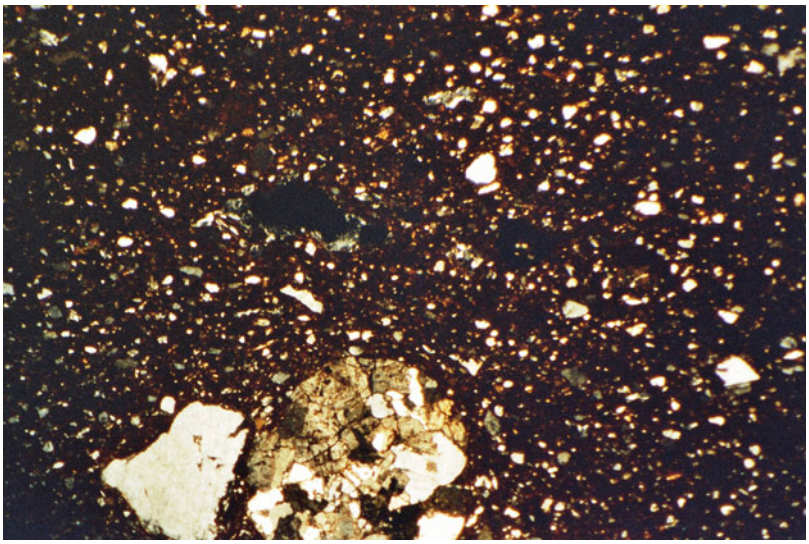

Islamic Industry, Archaeology of, Fig. 6 Seville Fabric VI, photomicrograph, identified at sites distant from the city, including Écija and Mértola

probably took place nearby) used by metalworkers both as fuel for kilns and as tools for smoothing and burnishing finished metal products (Benco et al. 2002). At Baŷŷāna, the industrial complex incorporated ceramic and glass production, alongside textile manufacture (Acién Almansa et al. 1990). Even where industrial sites have not been identified, it seems most probable that most major urban settlements were capable of producing for their own basic needs, at least in relation to the three artifact categories discussed here. At Nishapur, ceramic kilns have been identified (Wilkinson 1974: xxxvii-xl) and although there is no direct evidence of metal (Allan 1982: 22-3) or glassworking (Kröger & Brill 1995), a large quantity of such objects were recovered from the site, indicating production of all these artifact categories.

If the urban centers discussed here were capable of producing the artifacts required by their populace, then what of the specialized production and trade of goods associated with the medieval and post-medieval Islamic World? Scientific analyses are central to developing understanding of what was doubtless a complex, and most likely differentiated, economic landscape. Analyses of ceramics are at the forefront of such studies, largely due to the range of scientific techniques (for a summary of techniques in relation to Islamic pottery, see Milwright 2010: 152-3), which have long facilitated understanding of their production and consumption. Unlike ceramics, analyses of glass and metalwork are complicated by the multiple stages of production; the possibility of exporting processed materials, such as glass chunks or metal ingots; and the potential for re-melting and mixing of ingredients. Nevertheless, groundbreaking work is increasingly allowing the diffusion of metal and glass objects to be reassessed or identified for the first time. For example, metal lampstands made in a style classified as Egyptian, recovered from Denia and Tiberias, have recently been subject to trace element and isotopic analysis leading to their re-attribution to Syrio-Palestine workshops such as Damascus (Ponting 2008: 58-9). Additionally, the cargo of glass cullet from the shipwreck site of Serçe Limanı, which provides clear evidence of the long-distance trade of this material, has recently been subject to chemical analyses leading to its attribution to a production center at Tyre or possibly Caeseria (Brill et al. 2009). Most recently, strontium isotope analysis of glass objects has proven a particularly useful tool in assessing the origin of the plants used as an alkali flux (Henderson et al. 2009). Such work,

when combined with chemical analyses, is now proven to facilitate identification of regional production signatures for both natron and plant-ash glasses (Leslie et al. 2006). Developments in the field of scientific analyses thus have the potential to broaden significantly our knowledge of the diffusion of manufactured goods on an international scale.

Future Directions

Archaeological research, incorporating excavation of industrial sites and analyses of manufactured goods, thus provides important and unparalleled clues to the levels of organization and specialization in Islamic industries. Artifacts themselves found in consumption contexts provide probably the most plentiful source of evidence on the complexity of industry, demonstrating the range of products produced, evolution and changes to industry, as well as on the diffusion and trade of objects. That evidence combined with studies of industrial complexes is central to the future directions of research on Islamic industry, which should further address the patterns of industry, identifying the extent to which many urban centers produced the goods they consumed, as well as their reliance on a limited number of large, specialized manufactories. Importantly, further investigation of this question will not only develop our understanding of artifacts found in archaeological contexts, and provide possible answers to wider questions of economy and society, but also help us better understand the many examples of Islamic art displayed in museum contexts for which the original provenance is often lost.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Material Culture and Education in Archaeology

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Island Nation Sites and Rising Sea Levels

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Introduction

Island nations around the world face major challenges to protect their heritage in the twenty-first century as sea levels rise, flooding low-lying

coastlines and damaging or destroying significant cultural sites. Many countries surrounded by seas are affected by inundation with some low-lying Pacific islands with coasts only a few meters above sea level already damaged or partially abandoned. Traditional ways of life have changed as people try to protect their homes, lands, gardens, and cultural sites, or abandon them to move to higher ground. Rising sea levels have severely disrupted some island cultures but rejuvenated others as people forge stronger kinship links to cope with climate change.

Rising sea levels and storms, cyclones, tsunamis, and tidal surges have filled island bays, lagoons, rivers and eroded banks, beaches, deltas, headlands, and peninsulas along coast lines where many people live closer to the water, rarely more than 3–4 m above average sea levels (Henry & Jeffery 2008: 13). Significant cultural sites have been washed away, waterlogged, damaged by salt, or submerged. These include landscapes, buildings, monuments, temples, graveyards, and middens. Iconic World Heritage cultural sites such the City of London and Timbuktu and natural places such as surf beaches, fishing and hunting grounds, tropical rainforests, and coral reefs are also threatened.

Definition

Vulnerable island nations include both large continental islands and archipelagos and small island and atoll states in Europe, Africa, Asia, the Middle East, and Oceania. Countries identified at the greatest risk of inundation have been identified using data from scientific studies based on United Nations predictions of sea level increases in the twenty-first century by the UN's fourth Intergovernmental Panel on Climate Change (Core Writing Team et al. 2007: 44-6) and confirmed after five years by the United Nations Framework Convention on Climate Change (UNFCCC 2012) at the Doha Climate Change Conference. The countries at risk include Australia; New Guinea; New Zealand; Britain; Bali, Indonesia; Cebu, Philippines; Chuuk; Eastern Island, Chile; Hainan, People's Republic of China; Hawaii, United States; Jejudo, South Korea; Loyalty Islands; the Maldives Islands; the Marshall Islands; Tuvalu; Tokelau; Kiribati; Phuket, Thailand; Prince Edward Island, Canada; Riau Islands Province and Western Province; and the Solomon Islands.

> Coasts have been modified and intensively developed in recent decades and thus made even more vulnerable to higher sea levels. Developing countries with their weaker economies and institutions face the gravest risks, but the low-lying coastal zones of developed countries could also be seriously affected. Given the present degree of protection, a sea-level rise of one metre would cause estimated land losses of 0.05 % in Uruguay, 1 % in Egypt, 6 % in the Netherlands, 17.5 % in Bangladesh, and up to about 80 % for Atoll Majuro in the Marshall Islands (UNFCCC 2012).

Even a large continental island such as Australia faces a threat to its indigenous and historic sites caused by erosion from rising seas. Australian researchers have found that Aboriginal sites on the foreshores of Middle Harbour, in Sydney's heart, are among places that face devastation, with possibly a quarter of all sites likely to be damaged or destroyed by rising sea levels and wave wash (McIntyre-Tamwoy 2008: 7). As Henry and Jeffrey (2008: 13) point out:

> Surrounded as they are by vast expanses of ocean, it is clear that small island states are at the forefront of the vulnerability in relation to the potential adverse effects of climate change, including sea level rise in sea surface temperature and increased intensity and frequency of extreme weather events.

Key Issues/Current Debates/Future Directions/Examples

Natural Climate Change and Sea Level Rise in Prehistoric Times

Sea levels have risen and fallen periodically due to natural causes throughout the Earth's history, flooding and exposing coastlines and damaging heritage sites. The International Geosphere-Biosphere Programme (IGBP) has reported that new records from Israel, Tasmania, Alaska, and Greenland for the last centuries to millennia showed that sea levels responded to moderate

climate changes during the Medieval Climate Anomaly (c. 950–1300 CE) and the Little Ice Age (c. 1450–1850 CE). The IGBP stated that:

> During the last interglacial (c. 125,000-114,000 years ago) – at a time when climate was a few degrees warmer and overall sea level several metres higher than today – new coral data from the Bahamas indicate that rates of sea-level rise were significantly faster than during the late Holocene (the past three millennia). This suggests that the ice sheets were less stable in conditions slightly warmer than today (IGBP 2011: 20).

The land bridges between Australia and New Guinea were submerged during the Holocene, cutting off close contact between Australian Aborigines and neighboring New Guinea tribal groups to the north and south, a separation that led to social changes as interaction across borders was reduced and cultural diffusion slowed (Mulvaney & Kamminga 1999: 261). The disruption to the flow of ideas, beliefs, genes, tools, and technologies led the separated Australian and New Guinean societies to develop strategies to preserve cultural contact. Long-distance trade journeys by canoe between Australia and New Guinea across the Torres Strait helped to maintain kinship ties, encourage trade, and reinvigorate cultural values. "Some parts of the [Australian] continental shelf were so low-lying and had such a low gradient that during periods of accelerated sea level rise the shoreline migrated inland at the phenomenal rate of one metre per day" (Mulvaney & Kamminga 1999: 273).

Contemporary Human Activity and Climate Change

In the past millennia, human activity including the development of intensive agriculture, establishment of cities, and the industrial revolution has been shown to contribute to climate change. Island nations have had to draw on their experiences of natural climate change during prehistory to deal with the outcomes of anthropogenic activity that have warmed the planet. Polar ice caps and land-based ice sheets have melted further and ocean water has expanded, raising sea levels still further. "The climate of our planet is changing. The climate has always been variable, but today there is a growing concern over climate change issues, perhaps because the magnitude of the change seems to be unprecedented but, more importantly, because there is strong evidence to suggest that humanity might be directly responsible for climate change," the United Nations Educational, Scientific and Cultural Organization (UNESCO 2007: 12) has found.

Forest clearing, burning fossil fuels, farming, and industrial development during the past millennia have allowed the release of more greenhouse gases including carbon dioxide and methane into the atmosphere, trapping heat on the planet's surface, melting ice caps, and warming oceans. The International Geosphere-Biosphere Programme has warned: "In addition to the large carbon sink, scientists now know that deforestation is responsible for emitting 2.9 billion tonnes of carbon per year – an exchange that had not been quantified in the past because of a lack of data. For comparison, total emissions from fossil fuels are currently above eight billion tonnes of carbon per year" (IGBP 2011: 21).

United Nations Concerned Deltas and Small Islands Vulnerable

The United Nations' Intergovernmental Panel on Climate Change (IPCC) has suggested that deltas and small island states are particularly vulnerable to sea level rise caused by both thermal expansion and ocean volume. The 2007 Fourth Assessment Report (AR4) by the IPCC indicated that during the twenty-first century, sea levels are expected to rise another 18–59 cm (7.1–21 in) (Core writing team et al. 2007: 44-6). "Anthropogenic warming and sea level rise would continue for centuries due to the time scale associated with climate processes and feedbacks even if GHG [Greenhouse Gas Concentrations] were to be stabilized" (Core writing team et al. 2007: 44-6).

Sea level changes caused by human activities have been proven to result in environmental, humanitarian, or economic losses to small island states. The IPCC has forecast that thermal expansion will cause most of the increase in sea levels during the twenty-first century; however, other factors not directly related to climate change can also raise or lower sea levels. Subsidence,

tectonic forces, submergence, and postglacial rebound too affect sea levels (Rowland 2008: 24).

ICOMOS Develops Strategy to Protect Cultural Heritage

The International Council on Monuments and Sites (ICOMOS) has developed a strategy to protect global heritage sites from the effects of climate change by giving priority to sites that can be saved and those which are considered unlikely to be salvageable, which can be documented or have archaeological salvage and research carried out. The ICOMOS Scientific Council Symposium on Cultural Heritage and Global Climate Change (2008: 1-3) described the issues as "managing static remains in a dynamic landscape" . . . climate change accelerates and magnifies the dynamism of the landscape."

The Scientific Council identified 13 areas where cultural heritage would be affected: polar heritage, earthen architectural heritage, stone, fortifications, structural stability, twentieth-century heritage, archaeological sites, vernacular, historic villages and cities, training, cultural tourism, intangible heritage, cultural landscapes, and heritage ensembles and interpretation. "All of these examples underline an important dimension of global climate change as it impacts cultural heritage, namely, that it is often about loss and destruction as much as preservation. In the cases where the loss of cultural heritage resources cannot be prevented or mitigated, its significance actually transforms itself from that of tangible to intangible heritage. Monuments or natural features documented before their destruction become cultural memories" (ICOMOS 2008: 4).

United Nations Cites World Heritage List Sites at Risk

The United Nations Educational, Scientific and Cultural Organization (UNESCO) report, Case Studies on Climate Change and World Heritage, has highlighted the dangers posed by rising sea levels and flooding to sites on the World Heritage List in Europe, Africa, and the Middle East and the need for international action to prevent further damage. The Director General of UNESCO, Koïchiro Matsuura, stated that the international community generally agreed that climate change would be one of the twenty-first century's major challenges and a coordinated approach to issues such as environmental preservation and sustainable development was needed (UNESCO 2007: 5).

UNESCO has warned that rising sea levels and flooding could devastate buildings and historic settlements and cities, citing the World Heritage places of the City of London and other European sites, Timbuktu and Mali in Africa, and, in the Middle, East Ouadi Qadisha and Lebanon's Forest of the City of God. These sites are vulnerable to the aftereffects of flooding such as a buildup of salt on buildings which damages decorations including paintings and frescoes, while rises and falls in ground level destabilizes buildings as changes weaken foundations and crack walls. Conservators and restorers face the complex task of dealing with the interactions between the natural, cultural, and social elements of conservation (UNESCO 2007: 52, 53).

Rising Sea Levels Threaten Traditional Island Cultures

Chuuk, in the Federated States of Micronesia, faces major challenges from rising sea levels that threaten to cover its many small outer coral atolls and islands, disrupting traditional ways of life as many people live on the coast close to the ocean close to their land. Hezel observed that land and life were inextricably tied together for Melanesians who regard ownership as part of being fully human. "If land was life for traditional Melanesians, then loss of land was a form of death: in Chuuk, according to one author (Parker 1985) it was lamented with the cry "I am no longer alive" (Hezel 2001: 34-5).

In traditional island societies, land ownership and kinship systems are closely tied. Damage caused by climate change to significant natural and human-made places can have profound effects on cultures, leading to changes in social structures and customs, language, knowledge, traditions, and mythology. The loss of traditional lands for islanders has profound consequences for their societies with some people forced to try to protect cultural sites by building sea walls or even to abandon them and move to higher

ground. Societies have adapted to the effects of weather and climate change to protect themselves from harm caused by such events as floods, storms, and droughts. However their ability to cope with the increasing impact of rising sea levels may be stretched beyond their ability to cope (Core writing team et al.: 2007 56).

Island governments have now recognized that to counter the effects of rising sea levels on Pacific islands, strategies need to be integrated with social and economic factors such as development and humanitarian issues to create effective regional responses rather than being driven by central administrations (IGBP 2011: 18). Some island states have to deal with a combination of such factors as large populations in coastal areas prone to hazards and a limited capacity to respond effectively to disasters. "Vulnerability and related assessments in the Pacific are now better aligned with the realities of the circumstances of small islands," according to the International Geosphere-Biosphere Programme (IGBP 2011: 18).

Paradoxically, loss of significant heritage sites submerged by rising seas may also spur renewal of island cultures. Traditional ties to land broken by dispossession can be strengthened by forging new social connections to survive change and by drawing upon historical knowledge.

> In terms of indigenous cosmologies too, there exists narrative knowledge of the dynamic nature of island formation in the past and local acceptance of the possibility of such environmental change – stories of islands disappearing into the sea, or either being either thrown down 'fished up' by various ancestral beings or culture heroes (Leasa 1961, in Henry & Jeffrey 2008: 13).

In traditional societies, a past strategy that helped to renew cultural ties during times of turbulent change was to strengthen kinships and exchange networks between low-lying coral atolls and neighboring high islands. "... Loss is also a productive notion, creative of heritage values celebrating social practices and tenure regimes, indigenous knowledge, economic and political institutions, exchange networks that become key tools for resilience and adaptation" (Henry & Jeffery 2008: 17). Islands surrounded by seas have found ways to integrate their culture and changing maritime environment by conceiving of them as positive elements in social development. Rainbird (2004: 53) describes social flows as being linked to "heritage values of a cultural landscape constructed in terms of movement, so that rather than being a barrier, the sea is conceptualized as a 'way' or 'pathway' of connection."

Conclusion

In summary, the extent and effects of sea level rise on island states and nations are still being studied and the outcomes may not be known for many years. Damage or destruction of heritage by inundation has a significant effect on traditional cultures, which are closely tied to land ownership and linked through kinship systems. The experience of the loss of lands, homes, and important places from rising seas in the past is deeply embedded in the memories of traditional societies, and the lessons learned have developed their resilience, ability, and determination to survive. The ability of island societies to revitalize their traditional cultures during times of major change by celebrating indigenous social practices can also have a protective effect and help them to overcome the sense of loss and develop a new identity.

Cross-References

- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Disaster Response Planning: Earthquakes
- ▶ Disaster Response Planning: Fire
- ▶ Disaster Response Planning: Flood
- ▶ Disaster Response Planning: Tsunamis
- ▶ UNESCO World Heritage Convention (1972)

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Island Southeast Asia: Neolithic

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Introduction

Island Southeast Asia (ISEA) comprises the tropical islands lying in between mainland East Asia and Taiwan to the northwest and Australia and New Guinea to the southeast. The western islands lie on a shallow continental shelf, the Sunda Shelf, and were connected to mainland East Asia during the Pleistocene. The eastern islands that have been separated from the mainland and from each other by deep marine troughs include the Philippines (east of Palawan), Sulawesi, northern Moluccas, and the Nusa Tenggara ("southeast") islands. Accordingly, human colonization of eastern ISEA, leading to the colonization of Australia and New Guinea (by 50,000 years ago), would have required watercraft capable of transporting groups of people numerous enough to establish viable daughter colonies. All of the large islands and many of the small islands of ISEA were extensively settled by 5000 years ago, on the eve of the Neolithic (Bellwood 1997).

The Holocene climate of ISEA is generally monsoonal, or permanently wet near the equator which is impacted by both the northern and southern hemisphere monsoons. Across most of ISEA, even in rain-shadow localities, access to fresh water is adequate, apart from pockets (especially in Nusa Tenggara) that face a chronic danger of drought. The long coastlines of ISEA provide many of the inhabitants access to abundant marine, littoral, and mangrove resources, but terrestrial resources are unevenly distributed. For instance, floral diversity and the opportunity for extraction of forest produce generally correlate with rainfall, while native mammalian diversity is highest on the largest islands on the Sunda Shelf and low across Nusa Tenggara.

The period of ethnographic contact began in the sixteenth century when competing European powers intervened in ISEA's maritime trade, notably the Moluccan spices. By this time, the great majority of ISEA's inhabitants spoke languages belonging to the Malayo-Polynesian branch of the Austronesian family. Reliance on iron metallurgy was firmly established across ISEA, associated with a variety of subsistence regimes that ranged from intensive wet rice agriculture to swidden horticulture and specialized maritime and/or terrestrial foraging. As in mainland East Asia, iron and bronze metallurgy had been introduced to societies that were essentially ancestral to the indigenous inhabitants at ethnographic contact. The ISEA Neolithic can therefore be thought of as the period when many of the

fundamental aspects of ethnographic ISEA were established, prior to the technological, subsistence, and sociocultural changes that followed the introduction of metallurgy.

Definition

ISEA is defined here as the triangle of islands lying between the Philippines, Aru (southern Moluccas), and Sumatra, excluding the Malay Peninsula. As explained by Spriggs (2011), the Neolithic of ISEA is defined by the appearance of earthenware pottery and, less consistently, stone artifacts polished over much or all of their surface. Another defining aspect of the Neolithic is the absence of metal, including the bronzes and local iron metallurgy present in ISEA by 2000 years ago or slightly earlier (Bellwood 1997). In broad terms, the period of ISEA's Neolithic was 4,500–2,000 BP ("before present"), but with considerable local variation in the chronological expression of Neolithic phenomena. For instance, pottery was absent from the archaeological sequence across most of the northern Moluccas until about 2,000 BP, when pottery-producing groups probably immigrated from the New Guinea region (Bellwood et al. 1998).

Historical Background

Early archaeologists working in ISEA followed the chronology of successive "ages" established by John Lubbock for Europe and so recognized Neolithic ("New Stone Age") sites on the basis of adzes and other tools of polished stone (Van Heekeren 1972). With the development of radiocarbon dating, chronological guesswork on the antiquity of the Neolithic was replaced by radiometric determinations in Malaysian Borneo, the Philippines, and East Timor during the 1950s and 1960s and finally Indonesia in the 1970s (Bellwood 1978). Two of the most famous archaeological sites in the region, Niah Cave in Sarawak (excavated by Tom and Barbara Harrisson) and the Tabon Caves in Palawan (excavated by Robert Fox), yielded mortuary remains that considerably influenced archaeologists' understanding of the ISEA Neolithic. In the 1980s, as a greater number of sites were dated, archaeologists began to realize that the appearance of pottery rather than polished stone tools was the touchstone for recognizing the Neolithic in ISEA (Spriggs 1989).

Early archaeologists speculated on an association between the early expansion of Austronesian speakers and ISEA's Neolithic, a view made intellectually respectable by Bellwood (1978). Some association of the ISEA Neolithic with the spread of people with "Mongoloid" physical features and an agricultural subsistence was also widely aired; an early statement of this proposition was provided by Van Heekeren (1972: 203). In the 1980s, Bellwood (e.g., Bellwood 1984–1985) synthesized these various trends of thought within a scenario that identified the ISEA Neolithic with the expansion of Austronesian-speaking Mongoloid farmers, from a homeland in Taiwan, into a region previously inhabited by "Australo-Melanesian" foragers. This scenario has emerged as the dominant paradigm for understanding the ISEA Neolithic, even though it is based predominantly on historical linguistics, relying as it does on terms for rice and other agricultural items in the reconstructed language of the ancestral Malayo-Polynesian speakers, rather than the patchy archaeological evidence for ISEA Neolithic agriculture (Bellwood 2011).

From the 1960s to the 1980s, archaeologists dated the origins of the ISEA Neolithic to the sixth millennium BP. Spriggs (1989) trimmed the initiation date back to 5,000 BP by rejecting dates on freshwater shell in limestone regions and other dates from clearly insecure contexts. Subsequent rejection of dates from rockshelter contexts with a small number of pottery sherds, probably displaced downwards from the overlying Neolithic levels, led to an even more conservative estimate of 4,000 BP for the appearance of the Neolithic in ISEA. By this chronology, the polished stone adze, shell adze, and shell jewelry, associated with a preceramic burial in Duyong Cave (in the Tabon Caves) dated to c. 5,000 BP, were of pre-Neolithic antiquity (Bellwood 1997; Spriggs 2003). However, a difficulty facing this

late chronology was the fifth millennium BP dating of Gua Sireh, Sarawak, obtained both from rice husk extracted from pottery and from charcoal at the same stratigraphic level. There have been various attempts to resolve this anomalously early date: attribution to an expansion of early Austroasiatic speakers from mainland Southeast Asia into Borneo prior to the Malayo-Polynesian incursion, attribution to a precocious Austronesian migration that was subsequently swamped by the Malayo-Polynesian dispersal, and the proposal that it reflects maritime interaction unrelated to linguistic expansion (Bulbeck 2008; Bellwood 2011).

The archaeologist most responsible for developing a large empirical basis to address the ISEA Neolithic is Peter Bellwood. Working with counterparts in Indonesia, Malaysia, and the Philippines, Bellwood led a series of ambitious field projects in northern Sulawesi, Sabah (northeastern Borneo), the Moluccas, and the Batanes Islands (between Luzon and Taiwan) between the 1970s and the 2000s. Bellwood also supervised postgraduate students from Indonesia, Sarawak, the Philippines, and Taiwan, whose projects have resulted in major contributions to our knowledge of the ISEA Neolithic. Amongst the projects that have involved Bellwood, the most recent, in the Batanes, is arguably the most critical. It adopted a "landscape" approach that sought a range of open Neolithic sites in addition to the more easily locatable rockshelters and shell middens, it targeted an area that appears to have been free of pre-Neolithic occupation, and its 4,500–4,000 BP chronology for the onset of the Neolithic sits neatly between the earlier dates in Taiwan and the (generally) later dates elsewhere in ISEA (Bellwood & Dizon 2005). The full report on the Batanes project, due for publication soon, will stand as a landmark in the documentation of the ISEA Neolithic (Fig. 1).

Archaeologists based in research institutions in ISEA have also made major contributions to understanding the ISEA Neolithic. Robert Fox strongly believed in developing local expertise. As a result a succession of Filipino archaeologists, including Wilfredo Ronquillo, Victor Paz, and Armand Minares, have made important contributions to understanding the Neolithic archaeological record in the Philippines. Indonesian archaeologists have a very wide agenda – some 2 million years of prehistory and numerous Hindu-Buddhist historical sites – which has reduced their attention given to the Neolithic. However, in recent decades Truman Simanjuntak and his colleagues have focused on establishing an "Austronesian" (Malayo-Polynesian) foundation for appreciating Indonesia's history and present-day society (e.g., Simanjuntak 2010).

A fair variety of ISEA Neolithic sites have now been professionally documented, providing archaeologists with a reasonable insight into the diversity of the inhabitants' lifeways. In addition to the cemetery at Niah Cave, minor Neolithic burial assemblages have been reported from Lubang Angin (another cave in Sarawak), Arku Cave in Luzon (Bellwood 1997), and several rockshelters in Java, including the hematite-coated skeleton from Hoekgroet (Storm 1995). Neolithic habitation has also been reported from many caves and rockshelters: examples include Torongan Cave in the Batanes; Rabel Cave in Luzon; Leang Tuwo Mane'e in the Talaud Islands; Uattamdi in the northern Moluccas; Gua Sireh in Sarawak; Lubang Payu and Liang Kaung in Indonesian Borneo, the latter including cave paintings in a tradition locally established by the early Holocene; Ulu Leang 1 and Leang Burung 1 at Leang-Leang in southwestern Sulawesi; Pondok Selabe 1 in Sumatra; Gua Braholo and Song Keplek in Java; Liang Bua in Flores; and the Uai Bobo, Bui Ceri Uato, Macha Kuru, and Lene Hara rockshelters in East Timor (Bellwood 1997; Bellwood & Dizon 2005; O'Connor 2006; Bulbeck 2008; Simanjuntak 2010). Particularly with the sites on the larger islands, occupation of rockshelters into the Neolithic is often attributed to the continued presence of the original foragers, who obtained pottery and farmed produce from their Austronesian neighbors through trade.

The Austronesian presence is more convincingly illustrated through the variety of Neolithic open sites, which contrast with a relative paucity of early Holocene open sites in ISEA. The banks of the Cagayan River in northern Luzon are lined with freshwater shell middens containing a Neolithic phase, including Andarayan, with rice chaff

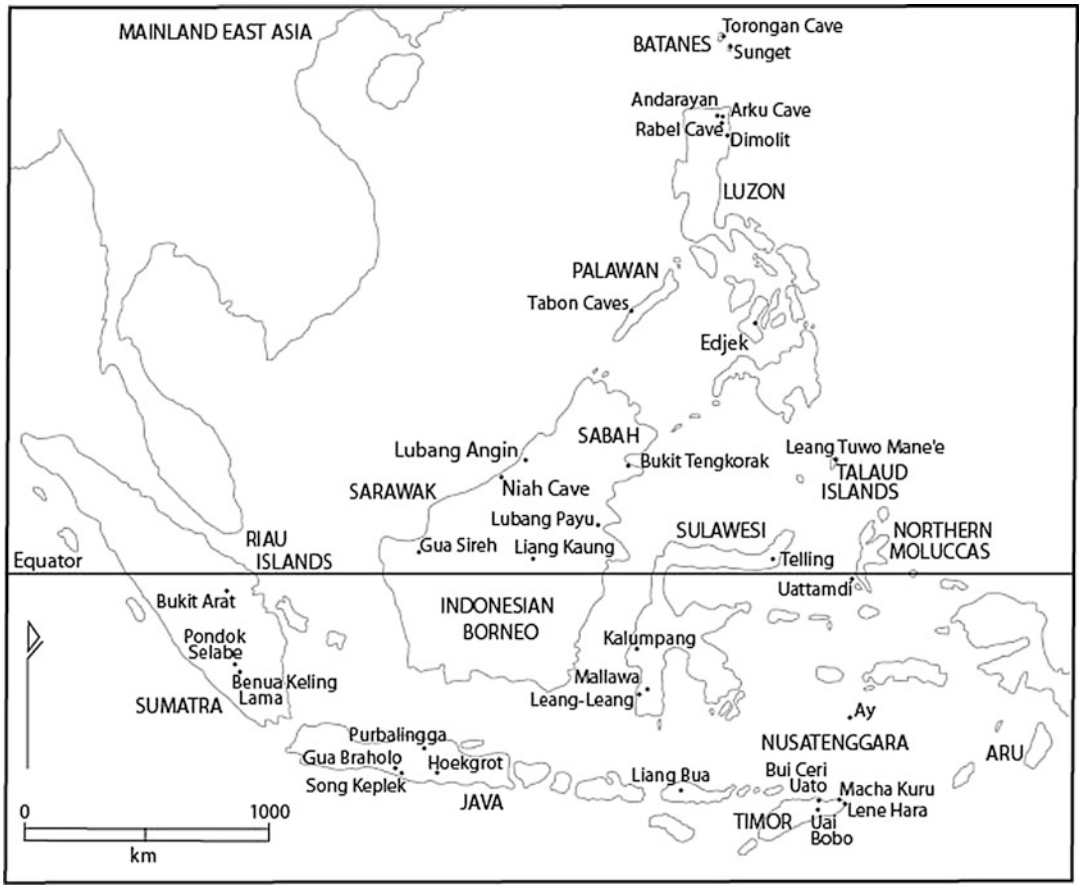

Island Southeast Asia: Neolithic, Fig. 1 Island Southeast Asia: places and Neolithic sites mentioned in the text

from pottery dated to around 3,500 BP (Bellwood 1997; Bellwood & Dizon 2005). Other open Neolithic sites include the Sunget Main Terrace in the Batanes, the house floor remains from Dimolit in Luzon, Edjek in the central Philippines, Ay in the Bandas, Telling in northern Sulawesi, the Kamassi and Minango Sipakko hamlets at Kalumpang in western Sulawesi, Mallawa in southwestern Sulawesi, the Bukit Tengkorak workshop in Sabah, Bukit Arat and Benua Keling Lama in Sumatra, and Purbalingga in Java (Bellwood 1997; Bellwood & Dizon 2005; Simanjuntak 2010).

Key Issues/Current Debates

Historically, the main opposition to the dominant paradigm of a Neolithic immigration of Austronesian-speaking, Mongoloid farmers has come from Bill Solheim's "Nusantao" hypothesis. As explained in a late statement of his views, Solheim (2006) saw ISEA as the center of a prehistoric maritime trade network that extended from China and Japan in the north to New Guinea in the east and the Indian Ocean in the west. The Nusantao, the mobile boat people who carried the trade, developed proto-Austronesian as their trade language in the region of Taiwan and ISEA. The importance of advanced sailing technology for the spread of the Malayo-Polynesian languages is not in doubt, but there is considerable dispute as to whether the Malayo-Polynesian languages could have achieved their dominance in ISEA primarily on the basis of trade (Bellwood 2011). Nonetheless, Solheim's emphasis on maritime interaction

and exchange has served as the influence for other scholars who have also questioned the dominant paradigm on the ISEA Neolithic.

An important development is the recognition that many of the important tree and root crops in ISEA, such as bananas, sago, sugarcane, and the greater yam, were probably first domesticated in the New Guinea region and the domesticates then introduced to ISEA. The archaeological signature for the prehistoric exploitation of these crops in ISEA is slight, but historical linguistic evidence suggests that they were encountered by early Malayo-Polynesian speakers during their expansion southwards (Donohue & Denham 2009; Blench 2012). On that basis, small-scale agriculture would have been practiced in ISEA prior to the Neolithic.

Extraction and analysis of DNA from the bone samples of the important ISEA domesticates have also indicated multiple origins. The domesticated pig, *Sus scrofa*, appears to have been introduced as two strains, with the most widely dispersed strain arriving from mainland Southeast Asia and a minor strain brought from Taiwan to the Philippines (Piper et al. 2009). Several strains of the domesticated chicken (*Gallus gallus*) appear to have been introduced to ISEA from multiple locations on the adjacent mainland (Liu et al. 2006), while the source for the domesticated dog (*Canis familiaris*) brought to ISEA remains unknown.

Bulbeck (2008) argues that a crucial distinction of the ISEA Neolithic from the early Holocene was its intensification of the dispersal of useful animals and plants, technology, and status goods across the archipelago. The identifiable dispersal zones vary considerably; for instance, spindle whorls and jade ornaments then reached the Philippines from their Taiwan source, but no farther. As another example, paddle-impressed pottery technology (from the mainland) reached as far as Sumatra, Java, and Borneo, chronologically overlain (in places) by the red-slipped pottery, distributed widely across the eastern archipelago, introduced by potters from a Taiwan homeland. Multiple source regions are indicated, not just outside of ISEA (as with the cases described above) but also within the archipelago. For instance, a rock art style dubbed the "Austronesian Painting Tradition" probably originated in Nusa Tenggara before appearing in Neolithic or later contexts to the northwest (Bulbeck 2008). O'Connor (2006) points out that shell ornaments and fish hooks, whose appearance in ISEA has traditionally been attributed to their introduction by early Malayo-Polynesians from Taiwan, were being manufactured in East Timor by the early Holocene. Donohue and Denham (2009) and Blench (2012) present linguistic evidence that the ISEA languages incorporated local pre-Neolithic substrata, consistent with a model in which the early Malayo-Polynesians' central role in Neolithic maritime trade underwrote the Malayo-Polynesian linguistic expansion.

The extent of biological support for a Mongoloid migration into ISEA during the Neolithic is strongly contested. The Neolithic skeletal record is generally sparse, and so attempts to place and date the origin and dispersal of genetic variations (based on extant populations) currently provide the best insight. One study (Hill et al. 2007) estimates that, maximally, 20 % of the mitochondrial DNA of present-day ISEA peoples can be attributed to a Neolithic migration from Taiwan. However, other investigators prefer a higher estimate.

International Perspectives

The ISEA Neolithic was to a large degree ancestral to the human colonization of Micronesia and Polynesia. Lapita pottery, which appeared in the Bismarck Archipelago (Papua New Guinea) around 3,300 BP, traces its origins to the red-slipped pottery of eastern ISEA. The earliest sites in Melanesia east and south of the Solomons, and in western Polynesia, are Lapita sites. Beyond these generally agreed statements, other details are debated. Some archaeologists see a role for the "Lapita culture" in the colonization of Micronesia, while other archaeologists hold that western Micronesia was directly settled from Neolithic ISEA as an immediate precursor to the appearance of Lapita pottery in Papua New Guinea. There is also debate on the degree to which the first settlers of Western Polynesia practiced

a farming subsistence, in view of archaeological evidence for the arrival and dispersal of Polynesia's major domesticates after potting activities had ceased (for recent reviews, see Bellwood (2011) and Spriggs (2011)).

Peter Bellwood is renowned internationally as one of the architects of the farming-language dispersal theory. This theory attributes the spread of the world's major language families to the expansion of early farmers from the few locations where the transition from foraging to farming occurred (e.g., Bellwood 2005). Bellwood's practical archaeological research in Polynesia and, later, ISEA served as the nursery for his applying this perspective on a global scale.

Future Directions

The equatorial zone of ISEA remains under-researched for its prehistoric archaeology generally, including its Neolithic phase. The most intensive field projects have been undertaken either north of the equator, for instance, northern Borneo, the Talaud Islands, and the Philippines, or to the south of the equator, notably in Java, southwest Sulawesi, and East Timor. Linking the perspectives obtained from research in these monsoonal locations will require greater attention in the future to central Sumatra, the Riau Archipelago, southern Borneo, and north-central Sulawesi.

Further, open-air sites buried coastal alluvium should provide the vital evidence for revealing population movement and maritime interaction associated with the spread of agriculture, pottery manufacture, and polished stone technology across ISEA. Bellwood (2011) hypothesizes that the discovery and excavation of these sites will provide the currently missing archaeological evidence for the Neolithic dispersal of rice farmers from Taiwan, who would have predominantly settled in well-watered coastal locations. These sites also have the potential to produce evidence on the hypothesized pre-Neolithic dispersal of tree and root crops from the New Guinea region or, as already demonstrated for shell beads (Bulbeck 2008), fish hooks of shell in pre-Neolithic contexts more widely than Timor.

Cross-References

- ▶ Bananas: Origins and Development
- ▶ Farming-Language Dispersals: A Worldwide Survey
- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Niah Cave (The West Mouth)

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Island Southeast Asia: Rock Art

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Introduction

Until the late 1990s Indonesia and more generally Island Southeast Asia were rarely quoted as a rock art locations in the general scholars' literature describing – or trying to explain – the development of art, from prehistoric to recent times. However, important rock art did exist and had in some places been surveyed, sketched, or mapped, by the end of the nineteenth century (Fig. 1). This is the case for instance in part of the northwestern coastline of West Papua, which presents kilometers of huge painted limestone cliffs. Also in Timor as much as in the small island of Kei Kecil, caves or cliffs with paintings had been observed for some time. Some miles toward the west, the island of Sulawesi contains also at least three places far away from each other with important and significant paintings.

A similar situation, although happening later, i.e., after WW II, is the great mouth of Niah Cave (in the northern Sarawak province of Malaysia), a gigantic and actually most important site for the archaeology of the region with a backyard gallery

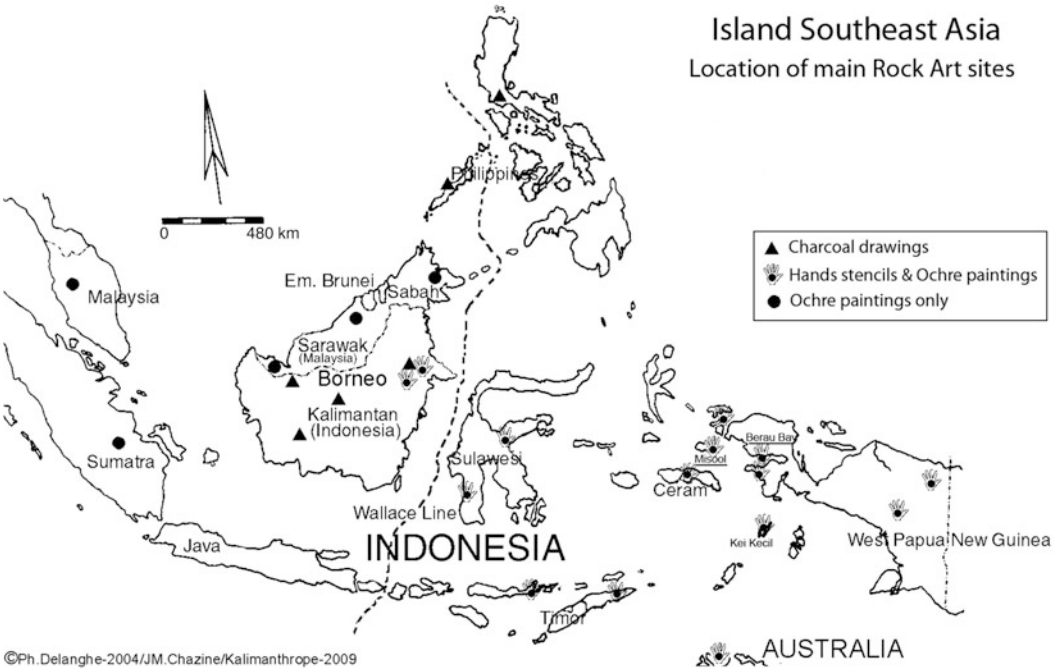

Island Southeast Asia: Rock Art, Fig. 1 Island Southeast Asia, location of main rock art. @Ph. Delange - 2004/J.M. Chazine/ Kalimanthrope 2009

of paintings linked to funerary process (Solheim II 1983). Less important but as significant are the figures painted in a large gallery besides Gua Sireh Cave, also in southern Sarawak (Bellwood & Datan 1993). The latter were nevertheless considered as not very ancient, with an estimated age of up to 2,000 years old only.

All of these paintings, although more or less locally recognized, did not appear as important as those which had already been identified and displayed worldwide which are those by the Australian Aborigines.

And the others, mere charcoal sketches, which had been only quoted in South Kalimantan or discovered later in the south Philippines (Palawan island), appeared of too little importance to have great weight in the appreciation of rock art in Island Southeast Asia.

Definition

Apart from the simple aspect of paintings, their representations, styles, and contents, which would explain that relative disdain, the age corresponding to these painting must be considered. Australian Aboriginal paintings associated with a community, which at the time were considered by the majority of the world as almost sole surviving from the prehistory, were attracting enough and could be nearly compared with the first attested prehistoric paintings from the main European Franco-Cantabric caves.

Historical Background

Knowledge of actual communities from Southeast Asia was far from well-known and their prehistory even less. Therefore, it is not surprising that their rock art is found difficult to elicit the slightest interest. Moreover, for Indonesia, the first specialists were convinced that in any case, it would have been the Aboriginal influence, which would have spread from Papua through Timor and Sulawesi, being stopped by the Wallace Line separating the east from the west. At that time, no painting at all had been

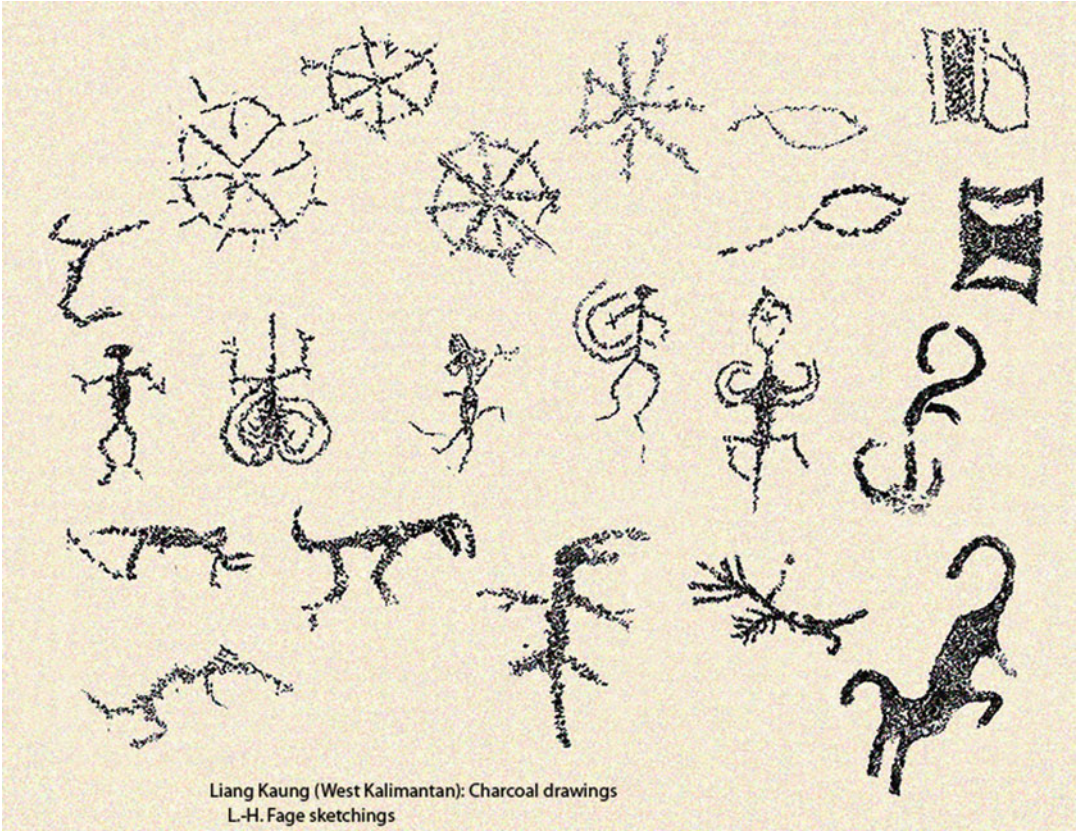

Island Southeast Asia: Rock Art, Fig. 2 Liang Kaung (west Kalimantan): Charcoal drawings. L.H. Fage sketchings

observed in Java, Sumatra, as much as in the Indonesian Borneo, i.e., the Kalimantan provinces nor continental Malaysia, Philippines, or Thailand. Therefore, Wallace Line could be considered also as a cultural frontier for a retroverse influence of a specific Aboriginal practice (Heekeren 1958).

Recently some geometric red paintings presenting seemingly ethnic designs have been observed in Harimau Cave, South Sumatra (Simantjutak 2010). Their scarcity does not change the general absence of "archaic" paintings in central and western Indonesia.

Although in 1988 a French team of cavers observed an unknown charcoal panel in Liang Kaung in the central Müller Range (Fig. 2), when trekking across Borneo from west to east, these charcoal drawings were similar in conception to the other charcoal designs found in the area.

Yet, the surprise was complete when in 1992, a Franco-Indonesian team, linked to the previous one, venturing into the deep karst of East Borneo discovered the very first paintings rather ancient if not completely "archaic." Of course, the question of the age of these supposed prehistoric paintings has been debated from the very beginning of their study and still occurs. Although dating processes have enhanced their possibilities and results, many cases are still resistant to direct dating, forcing indirect estimations.

In the case of that really new and somehow puzzling discovery, it is the presence of hand stencils (also called "negative hands") which would attest of the antiquity of their authors. Almost everywhere in the world, stenciled hands are present, and as they appear from the very beginning in the oldest attested ornate caves or shelters (up to 30,000 year BP), they are considered as clues for a relative antiquity.

Island Southeast Asia: Rock Art, Fig. 3 Decipheration of male/female hands stencils from the Gua Ham's frieze, showing a strict sexual division of space

In fact this assumption has to be nuanced because there are also clues of relatively recent if not contemporary examples of hand stenciling practices and not only in Australia. That kind of practice would then be more that one of a cultural stage or a particular cosmogonic relation with the world than a real proof of dated antiquity. Nevertheless both considerations may complete each other, and if they can be isolated from others, they may induce differences. This is the case for the East Kalimantan paintings, which until now are the only ones which present hand stencils all over the whole Borneo Island.

From that discovery and once assumed that a rock art did exist in that part of Borneo, further surveys completed these primary observations, and up to more than 30 ornate caves have been checked (Fage & Chazine 2010). Including geomorphologic observations, it was obvious that all the painted caves were in the highest levels of fossilized galleries, in the most remote and near-unreachable places, and far from the usual treks of remaining local hunters and bird nests' collectors. Moreover no occupation remains could be found in these ornate caves. Archaeological evidence of dwellings could be found (and as possibly excavated) only in the basements of cliffs or, more rarely, in the first level of galleries.

Thus, it became interesting and even necessary to check if comparisons, similarities, obvious differences, and contents would be worthwhile for a general overview of the rock art in the region. Communications and publications in different congresses in order to get subsidies for research enhanced a larger interest for Borneo's prehistory and more generally for Indonesian rock art.

Added to that is the fact that a particularly high number of stenciled hands have been checked (over 2,000 altogether with near 1,000 in 4 caves only) where they were sometimes applied on ceilings (Fig. 3), up to 8 and even 14 m. Another exceptional fact is that some of these negative hands are linked together and in many cases are also overpainted with different motifs (Fig. 4). Moreover, there are two cases where there are only and numerous stenciled hands (over 2 × 130 of them). This latter occurrence led thus to consider differently the practice of hand stenciling and tries to elaborate some practical explanation to that specific practice and materialization.

In fact, the possible desiphering of the hand stenciling principle, may make it possible to apply it to the different cases encountered in the area and more precisely to the Indonesian examples.

The case of the twin caves called Gua Masri I and II (from the guide's name) containing only hands and absolutely no other motifs would be the "Rosetta Stone" to express the function (at least in Borneo's cases) of hand stenciling. Considering that the author(s) did not need to "complete" the painted panels with other motifs, it may be deduced that this action would have been sufficient and would have completely

Island Southeast Asia: Rock Art, Fig. 4 The Tree of Life (or Family?) representation using hands stencils in Gua Tewet' shelter. TEW017, Borneo 1999. Photo: Luc-Henri Fage, Le Kalimanthrope

answered their expectations. Apart from all the explanations, which have been proposed since the beginning of rock art studies in the early twentieth century and which are not convincing in Borneo's cases, there is at least one clue, which would fit with that context: the ethnographic observation of some of the healing process still practiced in many traditional cultures, with the applying of hands, the breathing of revitalizing energy, and the spitting of magico-therapeutic substances, is nothing but identical to the hands stenciling process on the caves walls.

As it has recently been proposed, a shamanic environment may have been in action in the ornating of prehistoric caves (Lewis-Williams 1993; Clottes 2004), thus healing process would have been active in the same and single way. Of course, considering the very difficult access to the Borneo's ornate caves, it would have been an indirect procedure, a simulacra or an allegoric way of mastering forces or powers, would they be from ancestors or Nature's spirits. Pushing the hypotheses further, it became possible, once knowing, then using what is called Manning's

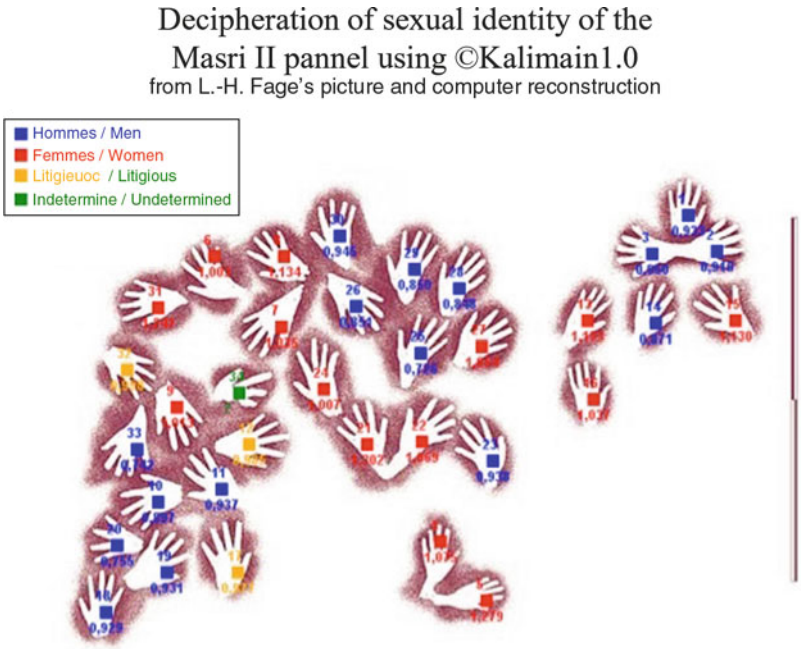

Island Southeast Asia: Rock Art, Fig. 5 Analysis of the sexual identity of artists who produced the Masri II panel, using @Kalimain1.0 from L.H. Fage's picture and computer reconstruction

ratio, which is able to decipher men and women's hands from the length ratio between forefinger and ring finger to find also women's hands (Fig. 5) in the different panels of caves from different parts of the world (Chazine & Noury 2009). Throughout the world, healers are either men or women and this observation fits with the deciphered hands, which have been observed in the ornate caves up until now.

And this is the case for Indonesian rock art where each site of minimal importance contains at least a couple of hand stencils.

These converging clues provide a kind of basic lecture grid. Once it is admitted that what is called rock art would have corresponded to some specific rituals practiced by still animist communities, for whom schematically, the whole of nature with its powers includes and also is related to all the human condition, one is able to prepare a more acute model to explain the different cases encountered.

Related to this latter point is the fact that stylistic expressions are present. In some cases they are materially visible, like overimpressions, scrapings for new designs, or clear changes, and move toward more realistic and expressive figures. This is supposed to be linked to a very important and deep change, which occurred with the arrival of the Austronesian migration, 5,000 to 3,000 years BP, which spreads all over the Indo-Pacific area. Bringing new technologies, new beliefs, and thus new funerary practice, they also brought new aesthetic expressions (Bellwood 1997). It seems that in some cases, it drew a halt to rock art expressions, while in others, it provoked some significant changes and lasted, but slightly transformed, until the end of the pre-European periods.

When the two influences became intermixed, it is often difficult to separate the different periods, and sometimes it seems that the Austronesian has itself also adopted a pre-Austronesian core and adapted it to its needs.

This may be observed in the different sites holding rock art, which are to be found from central to eastern Indonesia, i.e., West Papua, Timor, Moluccas, Sulawesi, and Borneo.

West Papua: The northwestern shores of West Papua have been visited since the mid-sixteenth century for the traffic of the West Indies Company, and many navigators or visitors have been already able to see some

paintings along the cliffs of its northern tip, i.e., mainly the McCluer Bay and its surrounding capes, small archipelagoes, and tributaries of rivers. But in fact, it is not before the German Frobenius expedition in 1937–1938, and thanks to Röder's engagement in surveying it as completely as possible that the real riches of its rock art heritage could be appreciated (Röder 1959). Hundreds of sites containing altogether thousands of paintings or motifs have been surveyed and checked. As the publication of the final report had to be postponed until after WW II, not many could appreciate or evaluate the importance of his observations, and one must practically wait until a UNESCO project led to the launching of a book (Delanghe & Arifin 2004) presenting as many as possible pictures and descriptions of that impressive although sometimes strange core of rock art.

Although the first enquiries were made before WW II, with still traditionally living communities, not much ethnographic data could be gathered, giving thus the status of archaeological remains to these paintings and obliging hypothetic assumptions concerning their age, interpretations, functions, and authors.

Most of the paintings that appear inside pre-Holocene sea wave groove galleries were dug in the cliffs 3–8 m above the mean sea level (msl). Sometimes paintings have been executed as high as 30 m or so and thus are now unreachable. In whole, it is still difficult to relate them to actually living communities, which in some places do not even recognize them as theirs, themselves affirming their somehow foreign origin. This latter point relates to the spread of the Austronesian impact over the whole Insulinde has permitted to some researchers to develop hypothesis linking the paintings to an Austronesian original core (Ballard 1992), using between others convincing linguistic clues. The diversity of situations cannot be restricted to one single explanation and shows that conditions of development of the painting process associated with differentiating rituals happened also differently all along more or less pre- and protohistoric periods.

Although it is difficult to produce firm results for this mass of painted motifs (Delanghe & Arifin 2004: 59-225), some main directions of expressions may be outlined.

Key Issues/Current Debates

First, the most common rock art is comprised of hand stencils that are similar in their diverse representations (more or less with the arm or the fingers, i.e., so-called mutilated, corresponding also effectively to a vanishing Papuan tradition forcing widows to cut out one or more of their phalanx). More seldom are stenciled fishes, lizard, leaves, feet, and more or less recognizable artifacts like combs, boomerangs, sticks, masks, headdresses, crescents, or ornaments (supposed to be a moon representation).

Second, many fish some of which are stenciled (the biggest local fishes like tuna, sharks, or barracuda) are represented with the particularity to be in vertical position, which is a quite unnatural and obviously a deliberate symbolic choice.

Then anthropomorphic figures, which depending of the site, bear different names that could correspond to a variety of ancestors, spirits, or deities. The most known and leader ancestor of most of the local communities is the Matutuo figure with a general shape of a lizard with a human face and sometimes a conic headdress. Near these representations are tattoo designs, which also have a strong correspondence with ancestors and kin groups.

Also present at almost every site are what is for modern observers, undeterminable/undetermined more or less complex circular, concentric, curvilinear, or even simple geometric figures. These probably correspond to symbolic representations and thus to possible ritual or ceremonial purposes.

At a distant and by side notice, it must be quoted that glyphs from Sosorra-weru designed by Röder (Delanghe & Arifin 2004: 74) have since disappeared. They would nevertheless correspond to some meta-logs of the long travel of Tanawa-Maui, quoted by Erathosten 200 C.E. (Fell 1975).

Now that Indonesian rock art has begun to demonstrate its importance, there is no year and

Island Southeast Asia: Rock Art, Fig. 6 One of the numerous panels from Misool sunken karst (Raja Ampat-Indonesia) representing marine fauna

no place where a new set of more or less ancient paintings or drawings would not be observed. For instance, 200 km away in the western vicinity of Berau Gulf area, southeast of Misool Island, a new complex of painted panels on karstic cliffs dropping straight into the sea were recently surveyed (Chazine 2011).

Although similar motifs (mostly vertical large fish stenciled hands and fish symbolic circular designs, or maze drawings) are present (Fig. 6), some motifs are unique. In particular, one large panel with a stenciled "Yoni" (another one was identified by Walsh in Carnarvon Gorge, Australia) with a negative hand besides identified as feminine, then five stenciled round mats or basketry sets (Fig. 7). But what was even more interesting is that it could be deduced that the locations of the painted panels on the cliffs had been selected for geomorphological reasons. Practically paintings appear only on large cliffs

Island Southeast Asia: Rock Art, Fig. 7 Panel with a unique "Yoni" and some circular openwork basketwork stencils from Misool's karst (Raja Ampat-Indonesia)

in association with a large colored (from yellow to brown) strip coming out – or into – a more or less large cave, cavern, crevice, or dark hollow. Whatever the surrounding state of the rock might be, there are – or not – paintings if these three parameters linked together are, or not, present. Therefore, the precise choice of these places seems established and would thus permit some interpretations. As suggested before, painting practices were probably a complementary part of the expressions of rituals and ceremonies, be they shamanic, initiatic, or healing procedures. Here, the analogy between the natural geologic aspects of the cliffs suggest associations with chthonian forces, feminine wombs, and thus fecundity or fertility longings. Moreover, this particular area is remote from the main island (more than 1-h dugout canoe), isolated, without possible settlement facilities. Further surveys have shown that if these combined parameters were present but disassociated there was no painting, indicating a very specific choice for the sites, which cannot be seen one from the other.

International Perspectives

Using these interpretative clues for other rock art sites may provide some help in deciphering the original grounds for such a large variety in individual designs and common if not universal, expression of trends and leanings.

Figures and designs, which have been observed and studied in Timor, are basically similar to those from Berau Bay and its vicinity, but in many points they provide more complex figures, which following the local "sacred site" keepers should remain secret but would be somehow equivalent to the Matutuo principle: a complex figure of a supra-deity overwhelming the whole world. Significantly for dating assumptions, there are almost no negative hands, and many paintings present realistic moving human figures or in contrary very simple S shape or reduced to broad large lines. The presence of some boats surrounded by men carrying artifacts: tools or weapons, dance, or ceremonial sticks (?), and obvious narratives, which are clearly represented, would correspond to rather recent periods.

Future Directions

Thus, the dispersal and variety of paintings and representations provide a clear image of the complexity of human settlements over the time on this island. Although clues exist of a very

ancient peopling (up to 30,000 BP) occupying the island (O'Connor 2003), it is not definitely clear when or if the first settlers made paintings. What is sure is that many of other last Austronesian newcomers did practice – and still do – secret rituals associated with paintings. Contemporary ethnographic data could provide stimulating clues for understanding how rock art could have been linked to sociocultural practices in the past.

Cross-References

- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Rock Art, Forms of

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Isotope Geochemistry in Archaeology

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Introduction

Isotope geochemistry is an important scientific technique that has made a significant contribution to archaeological research. Isotope techniques measure the relative abundance of a number of nuclides of the same (or derivative) element as a means of investigating a variety of natural processes. Both stable (H, O, C, N, Ca, Sr, Cu, Pb, S) and unstable (U, Th, K, Ar) isotope systems are analyzed as part of archaeological investigations.

Isotopes (often referred to as a nuclide in the singular) are variants of a particular element, which share the same number of protons but have varying numbers of neutrons. Isotopes are referred to as stable or unstable, depending on whether they undergo radioactive decay. Some nuclides are primordial, meaning they have existed since the beginning of the universe, while others are the product of the decay of other elements. Isotopes of the same element generally share the same chemical behavior.

Stable isotopes can be applied to studying a variety of processes with their applicability to specific problems depending on the mechanism by which one nuclide becomes naturally enriched or depleted. The basis of the application of some stable isotopes is that the variation in their atomic mass leads them to behave differently during processes such as evaporation, precipitation, freezing, photosynthesis, and incorporation into the body. Another approach is based on taking advantage of the varying abundance of some stable isotopes within different geological units to allow proveniencing of various materials. This can only be achieved if the isotope ratios remain unchanged after incorporation into the sample.

Unstable isotopes are most commonly used as a geochronological tool for establishing the age of materials such as organics, calcium carbonates, and igneous rocks. Unstable nuclides that have either too many or too few neutrons spontaneously transform by beta decay, alpha decay, or spontaneous nuclear fission. The decay speed can be calibrated to time and is usually expressed as a "half-life." On the basis of a known decay rate and original abundance ratio, the comparison of the relative abundance of a stable nuclide to an unstable nuclide can provide an age estimation of the material studied. In the case of radiocarbon dating, the abundance of ^{14}C in the sample is compared to modern levels of ^{14}C.

Isotope analysis can be performed directly on archaeological materials or on geological materials to provide a context for archaeological sites. A particular advantage of using isotopic methods in archaeological investigations is that it provides quantifiable information that can be compared to the material culture record.

Definition

Isotope geochemistry is the measurement of the relative abundance of different species of the same element that have the same number of protons but varying numbers of neutrons. A wide range of elements and materials can be analyzed to provide insights into age, diet, mobility, climate, and provenience with important implications for archaeology.

Key Issues/Current Debates/Future Directions/Examples

A wide (and increasing) number of isotope systems can be applied to archaeological questions. This entry introduces each isotope system that has been applied in archaeological research and discusses the rationale for its use.

Hydrogen has two stable isotopes: ^{1}H and ^{2}H (often known as deuterium). Isotope results for this element are usually reported as δD that represents $^{2}H/^{1}H$ compared to the Vienna Standard Mean Ocean Water standard. This method, which is suitable to the analysis of collagen, has been used to determine paleoclimate (Leyden et al. 2006) and diet (Reynard & Hedges 2008) for archaeological samples. This technique works on the basis that hydrogen isotope ratios of precipitation vary according to climate and geography. Hydrogen in plant tissues, particularly from shallow-rooted plants, is generally sourced from leaf water derived from growing season precipitation. There is no fractionation of hydrogen during water uptake by terrestrial plants and the δD composition of herbivore tissue correlates to that of their diet, providing a time-averaged composition over their lifetime. δD values are fractionated with trophic level, with an increase of 30–50 ‰ from herbivores to omnivores and 10–20 ‰ from omnivores to herbivores, and are not influenced by other parameters, such as those which influence $\delta^{15}N$ (Reynard & Hedges 2008). As a result, this method can be used for sample provenience (using existing maps of δD), to examine changes in precipitation regime or to measure trophic level.

Oxygen has three stable isotopes: ^{16}O, ^{17}O, and ^{18}O. Results are commonly reported as $\delta^{18}O$ which reflects the ratio of ^{18}O to ^{16}O compared to a known isotope standard such as Standard Mean Ocean Water. Oxygen isotopes are fractionated by a variety of processes with the heavier ^{18}O being preferentially precipitated or frozen and the lighter ^{16}O being preferentially evaporated. Oxygen isotope analysis of tooth enamel can be focused on the oxygen atoms from either the phosphate or carbonate portion, although phosphate is traditionally favored as it is considered more resistant to post-burial diagenesis.

The oxygen isotope analysis of marine carbonates or ice cores allows the global ice volume to be estimated through time. This led the Quaternary to be divided into Marine Isotope Stages, which provide a broad framework for climate variation between glacial and interglacial periods. These changes are driven by Milankovitch cyclicity, in which the eccentricity, obliquity, and precession of the Earth's orbit vary on a regular timescale. The Marine Isotope Stage changes have had a significant effect on plant, animal, and hominin biogeography. The oxygen isotope composition of mammal tooth and bone reflects the $\delta^{18}O$ of ingested water and macronutrients in food (Sponheimer & Lee-Thorp 1999). Ingested water has a composition similar to meteoric water, which is sensitive both to temperature and precipitation. The water in shallow-rooted plant stems and roots reflects meteoric water, although the value from leaves is enriched in ^{18}O. The effect of mammalian diet and physiology on isotope composition is poorly understood, although the relative proportion of oxygen derived from food or water may be significant. Overall, oxygen isotope analysis is a very commonly applied technique in archaeological research that has frequently been used as a proxy for climate or diet.

Carbon isotopes, reviewed by Lee-Thorp (2002), can be applied to archaeological biogenic minerals to determine the nature of vegetation included in diet. The method works on the basis that ^{13}C is strongly discriminated against during photosynthesis; however, the degree to which this occurs varies between different photosynthetic pathways. The C3, C4, and CAM photosynthetic pathways have distinctly different levels of ^{13}C, with C4 plants ranging between 9 ‰ and −16 ‰ and C3 plants ranging between −22 ‰ and −34 ‰. C4 plants are principally grasses which are predominant in areas with higher levels of solar radiation. The carbon isotope composition of biominerals such as bone, teeth, and shell will reflect the plant material in diet. Carbon isotopes have also been applied to determine the proveniencing of

archaeological marble. Carbon isotope composition may also reflect the degree of marine resources within an individual's diet, as there is a significant difference in the isotopic composition of dissolved ocean bicarbonate and atmospheric carbon dioxide which is reflected in plant values (Richards & Trinkaus 2009).

Radiocarbon dating, a derivative of carbon isotope analysis, measures the amount of ^{14}C (which has a half-life of 5730 years) in a sample and compares this value to the level in modern systems. The dating technique, which is suitable for organic materials, is ubiquitous in archaeology due to its relatively low cost and accurate and precise results. More effective sample pretreatment methodologies and the use of accelerator mass spectrometry instruments has recently allowed a wider range of materials and smaller samples to be analyzed. The principal disadvantage of this method is that the amount of ^{14}C becomes too small for statistically robust analysis after ~40,000 years. Dates from radiocarbon are usually presented as "years before present" (BP) in which 1952 is taken to be present or as "calibrated years before present" (Cal BP). Calibrated years before present recognizes that the level of atmospheric ^{14}C has varied over time which is adjusted using a calibration curve constructed based on samples dated by other methods, such as dendrochronology or stratigraphy.

Nitrogen has two stable isotopes, ^{14}N and ^{15}N, the analysis of which in terms of archaeological studies is reviewed by Hedges and Reynard (2007). ^{15}N is progressively concentrated at higher trophic levels as shown by an increase in $\delta^{15}N$ values of 3–5 ‰ for each iteration. Nitrogen may also provide insights into weaning behavior (Schurr 1998). Bone and teeth are amenable to analysis for nitrogen isotope composition. There are however a number of complicating factors, including effects from temperature and aridity, which mean that nitrogen isotope results must be interpreted within geographic context.

Calcium isotopes, reviewed by Reynard et al. (2010), are utilized in archaeological investigations on the basis that they reflect some parameters of an individual's diet including trophic level and level of dairy consumption. Calcium isotope results are usually reported as $\delta^{44/42}Ca$ or $\delta^{44/40}C$. There appears to be a significant fractionation between diet and bone but little fractionation between diet and soft tissues.

The application of strontium isotopes as a provenience tool in archaeology is summarized by Bentley (2006). Strontium has four naturally occurring isotopes including ^{84}Sr, ^{86}Sr, ^{87}Sr, and ^{88}Sr of which the relative abundance of these isotopes is invariant and they are essentially stable on archaeological time scales. The analysis of the strontium isotope composition of archaeological materials can provide important information about the mobility of a range of mammals, including humans. The basis of this method is that, prior to any post-burial diagenesis, the Sr^{87}/Sr^{86} ratio of bone and teeth reflects the geological environment from which food and water were sourced while these biominerals were forming. Teeth are particularly amenable to tracing the geographic origins of humans as they mineralize during the first 12–13 years of life and do not subsequently change strontium composition after this time. Strontium isotope analysis can be used to determine if individuals are local or nonlocal by comparison to the isotopic composition in and around their burial location. In order to quantify the extent of faunal mobility, the strontium isotope composition of biominerals from fossil samples needs to be compared with a regional map of values obtained either from local faunal material or from analysis of the bioavailable component of strontium from plants, regolith, or bedrock. Knudson et al. (2010) recently introduced the use of $\delta^{88/86}Sr$ as a measurement of trophic level, on the basis that ^{86}Sr is preferentially incorporated into biological systems.

Copper isotopes have been infrequently utilized in archaeological research; however, potential exists for this method to be utilized as a tool for metal provenience studies (Gale et al. 1999). The stable isotopes ^{63}Cu and ^{65}Cu are usually measured relative to the copper isotope composition of the NIST SRM 976 standard and are reported as $\delta^{65}Cu$. Copper isotopes have not been widely utilized in the past because of the

challenge of overcoming problems of incomplete ionization using traditional TIMS instruments, a short coming made redundant by the use of plasma source ionization and multi-collector instruments. Copper isotopes (in combination with iron isotopes) have been used in archaeological bone to discriminate between sexes, on the basis that male bone iron is depleted in ^{56}Fe and enriched in ^{65}Cu relative to female (Jaouen et al. 2012).

Lead isotopes, reviewed by Stos-Gale and Gale (2009) are used as a provenience tool in archaeological investigations. Four stable lead isotopes exist (^{204}Pb, ^{206}Pb, ^{207}Pb, ^{208}Pb) of which all except ^{204}Pb represent the ultimate product of element decay chains from uranium or thorium. The ratio of these isotopes varies between ore bodies and is not affected by anthropogenic processing, allowing them to be used to define the source of archaeological metals. Lead isotope ratios are most commonly reported as ^{206}Pb/^{204}Pb, ^{207}Pb/^{204}Pb, and ^{208}Pb/^{204}Pb. Lead is present in a range of archaeological metals including silver, copper, bronze, and brass. Lead may also substitute for calcium in biominerals such as teeth, bone, and ivory with its composition reflecting the isotopic composition of the geological environment where these materials formed.

Sulfur isotopes, reviewed for archaeological applications by Richards et al. (2003), provide information about both the provenience of biominerals and the relative contribution of freshwater and marine materials to diet. There are four stable isotopes of sulfur (^{32}S, ^{33}S, ^{34}S, ^{36}S), and archaeological investigations usually report measurement of the two most abundant isotopes (^{32}S and ^{34}S) as δ^{34}S with reference to the meteorite standard Canyon Diablo Troilite. The δ^{34}S of bedrock locally, in combination with rivers and precipitation, controls this value in soil and water and hence plants and animals. The offset between sulfur source and isotopic composition in consumer is very small. There is a significant variation between δ^{34}S values of marine (+17 ‰ to +21 ‰) and terrestrial (−7 ‰ to +8 ‰) plants (Privat et al. 2007).

The uranium series technique (which utilizes the isotopes ^{234}U, ^{238}U, and ^{230}Th) is used to date both biological and geological calcium carbonate materials. This technique can provide minimum ages for samples up to an upper limit of ~500,000 years. The basis of this method is that carbonate materials are free from ^{230}Th when formed; however, it will accumulate over time due to the decay of uranium. As ^{230}Th is itself unstable, it will also decay until dating is no longer possible when these isotopes reach secular equilibrium. U-series dating has been widely applied to "closed system" samples such as corals and speleothems in which uranium is present at the time of formation and has also been used for "open system" biominerals such as bone or teeth which contain no premortem uranium. Open system samples are particularly prone to postformation accumulation of ^{234}U, which is enriched compared to ^{238}U in surface waters and groundwaters. The use of laser ablation systems allows domains of different ages to be located with spatially resolved analysis in the same sample, which have been demonstrated to yield very heterogenous age results for open system samples (Grün et al. 2008). Uranium series can also be used to enhance the accuracy of electron spin resonance dating of tooth enamel by constraining the uranium uptake history of these samples. This approach can dramatically improve the age estimations of this method, particularly in samples with high uranium concentration (Grün et al. 1988).

The K-Ar/Ar-Ar technique is used to date igneous rocks, with a particularly focus on tuffs in archaeological investigations. Unstable ^{40}K, which decays with a half-life of 1.2 x 10^{10} years to form ^{40}Ar, is abundant in volcanic minerals and glasses. All argon is excluded from the samples by high temperatures associated with igneous processes, and so, all ^{40}Ar present in these minerals must derive from radioactive decay. This argon cannot escape from the crystals as long as the sample is not reheated. In K-Ar dating, the relative abundance of ^{40}K and ^{39}Ar is measured directly, and in Ar-Ar dating, neutron activation is used to form ^{39}Ar by neutron capture on ^{39}K. The extension of this method beyond the limits of radiocarbon and the presence of many tuffs have made this technique important for determining the chronology of the East African Rift region.

A range of instrumental approaches are utilized within the discipline of isotope geochemistry. Light elements such as H, O, C, and N are measured using gas source isotope ratio mass spectrometry. In this method, the material of interest is converted to a gas, ionized, and the relative abundance of the elements relative to a standard of known composition by using magnetic analyzer. Heavy elements such Ca, Sr, Cu, Pb, S, U, and Th are usually measured using thermal ionization mass spectrometry (TIMS) or multi-collector inductively coupled plasma mass spectrometry (MC-ICPMS). In TIMS analysis, samples are heated leading to ionization before being focused into beams by an electromagnet. The more recently developed technique of MC-ICPMS allows the measurement of a greater range of isotopes and has a significantly higher sample throughput compared to TIMS. Direct sampling methods such as laser ablation analysis and ion microprobe allow spatially resolved, minimally invasive, high-resolution sampling of a range of materials and has the added advantage of avoiding the need for chemical sample preparation facilitating high sample throughput.

In the future, isotope geochemistry is likely to be applied far more frequently in archaeology due to the greater availability of analytical instruments and the higher throughput of samples, made possible by MC-ICPMS and direct sampling. Additionally, isotope systems that have not been applied in archaeological research may yield interesting results in the future.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone: Chemical Analysis
- ▶ Chemical Survey of Archaeological Sites
- ▶ Dating Techniques in Archaeological Science
- ▶ Electron Spin Resonance (ESR) Dating in Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Molluscs (Isotopes): Analyses in Environmental Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)

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Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

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Introduction

The introduction of stable isotopes into archaeological research began in the 1970s and revolutionized the ways in which several key issues are studied, including early hominin diets, subsistence and spatial organization of forager societies, and individual life histories (Price & Burton 2011; Schwarcz & Schoeninger 2011). Isotopic analysis of bones, teeth, and other organic tissues is a tool for the quantitative reconstruction of past human diets, providing an archaeological measure of subsistence that complements studies in zooarchaeology and archaeobotany.

Isotopic research is based on the premise that "you are what you eat", in other words, that the isotopic composition of an organism's tissues is a function of the composition of its diet. Nevertheless, isotopic values do not have direct dietary meaning and need to be analyzed in an environmental context. The isotopic values for the vegetal and animal foods potentially available for forager populations in a given environment, known as the "isotopic ecology," provide the context for the interpretation of past foragers' diets.

Definition

The different chemical elements that constitute all organic tissues (e.g., carbon, nitrogen, oxygen) are defined by the number of protons in their nucleus, which varies among elements and is unique to each of them. For example, carbon has six protons, nitrogen seven, and oxygen eight. An isotope is a variety of a chemical element defined by the number of neutrons in its nucleus. For instance, carbon has three isotopes used in archaeology: ^{12}C, ^{13}C, and ^{14}C, possessing six, seven, and eight neutrons in the nucleus, respectively (Fig. 1). These carbon isotopes have different atomic masses that condition whether isotopes are stable, like ^{12}C and ^{13}C, or radioactive, like ^{14}C. Stable isotopes do not change in abundance through time after an organism dies, whereas radioactive isotopes decay at a constant rate and are therefore useful as a radiometric-dating tool.

Stable isotope values are a ratio between the heavier and the lighter isotope of each element ($^{13}C/^{12}C$, $^{15}N/^{14}N$). Since absolute abundances of these isotopes are very small, this ratio is

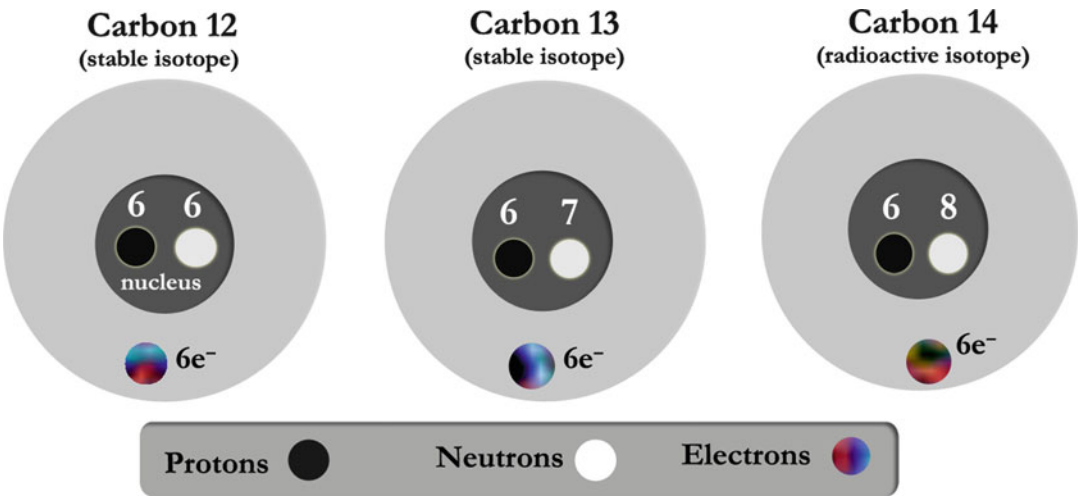

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 1 Atoms of the three carbon isotopes used in archaeology

standardized by comparison to international reference material (Vienna-Peedee Formation *Belemnitella americana* -V-PDB- for ^{13}C and atmospheric N_2 -AIR- for ^{15}N), producing δ values, and then multiplied ×1,000 (‰) as follows:

$$\delta(‰) = [(\text{Rsample}/\text{Rstandard}) - 1]\ 1,000$$

R is the ratio of the heavier to the lighter isotope.

Isotopic Fractionation

The process of incorporating and metabolizing nutrients involves chemical reactions in which nutrients are the dietary input or "substrate" of the reactions, an organism's tissue (e.g., bone) is the "product," and the excreta (urine, feces) are the output. Lighter isotopes of a given chemical element undergo reactions at faster rates than heavier isotopes, since bonds between the lighter isotopes are broken more easily than those between the heavy isotopes: for example, ^{12}C reacts faster than ^{13}C. In the case of animals, the differences in reaction rates produce a concentration of molecules of the lighter isotopes in the excreta, resulting in impoverished $\delta^{13}C$ values, while the tissues that constitute a living organism are enriched in the heavier isotope (Wolf et al. 2009). This effect is called "isotopic fractionation" and produces a systematic isotopic enrichment in every step along trophic chains. In the case of $\delta^{13}C$, fractionation is on the order of +1.5‰ and +3‰ for $\delta^{15}N$, although there is interspecific variability (Schwarcz & Schoeninger 2011). Isotopic fractionation provides the basis for assessing paleodiets. Without it, all the organisms inhabiting a region would have the same isotopic abundances and thus provide no paleodietary information. This is actually the case with chemical elements with large atomic weight and small inter-isotope differences, characterized by negligible fractionation (e.g., $^{87}Sr/^{86}Sr$, see below).

$\delta^{13}C$: A Marker of Photosynthetic Pathways

Photosynthesis allows plants to synthesize nutrients, including carbon, from sunlight and atmospheric carbon dioxide (CO_2). There are three alternative photosynthetic pathways (Ehleringer & Cerling 2001). The C_3 or Calvin-Benson pathway synthesizes CO_2 in the form of molecules with three-carbon atoms, with an average $\delta^{13}C$ value of −25‰, which ranges between −34‰ and −20‰. Diverse factors produce variation in these values, such as the existence of carbon reservoirs in closed forested environments, known as the "canopy effect".

C_3 plants include most species from temperate and subarctic regions and high-altitude settings in general. The C_4 or Hatch-Slack pathway synthesizes atmospheric CO_2 as four-carbon molecules with an average $\delta^{13}C$ value of −12‰ and a range of −10‰ to −14‰. This pathway is characterized by a smaller isotopic fractionation and a more efficient use of nutrients, part of a physiological adaptation to arid and warm climates. C_4 species include maize, sugarcane, and tropical grasses. Finally, the Crassulacean Acid Metabolism (CAM) pathway is characterized by the facultative capacity to alternate between the C_3 and C_4 mechanisms according to prevailing circumstances, producing an isotopic range that overlaps with that of both C_3 and C_4 plants. It includes a small number of taxa, such as succulents from desert environments.

Herbivores' $\delta^{13}C$ values are positively correlated with those of their diet, providing evidence of the plants consumed and, based upon this, paleoecological conditions. On the other hand, marine algae and plankton obtain their carbon from dissolved inorganic carbon, enriched by 7‰ with respect to atmospheric CO_2. Therefore, tissues of marine animals are enriched in comparison to those from terrestrial ecosystems.

$\delta^{13}C$ values can be obtained from two main components of bone: organic, or collagen, and inorganic, or apatite. Experimental work has demonstrated that the collagen isotopic signal reflects an average of the sources of protein consumed (e.g., meat), while the apatite signal reflects an average of the total diet (proteins, carbohydrates, and lipids). The integration of $\delta^{13}C$ values from collagen and apatite provides additional dietary information (Ambrose & Norr 1993).

$\delta^{15}N$: A Marker of Trophic Position

In terrestrial ecosystems, nitrogen is ultimately derived from soils. Soils from cool and moist areas, such as forests, tend to have low $\delta^{15}N$ values, whereas soils from warm and dry ecosystems, such as deserts, have high $\delta^{15}N$ values. These values are passed on to herbivores, plus c. 3‰ due to isotopic fractionation. The stepwise increase in $\delta^{15}N$ values marks every step within a food web and thus provides important data on the trophic position of animals.

The $\delta^{15}N$ values of marine plants are about 4‰ higher than those of terrestrial ones. Additionally, marine food webs are usually longer than those from terrestrial ecosystems, providing more opportunities for isotopic fractionation and trophic enrichment. Globally, marine animals tend to have much higher values than terrestrial animals.

Foragers and Isotopic Studies

The definition of foraging societies is not free of ambiguity and discrepancy, given the inherent complexity of human organization of subsistence, and divergent theoretical views. Nonetheless, it can be stated that foragers' subsistence relies to varying extents on gathering plants and hunting and fishing animals (Fig. 2). They do not control the reproductive cycle of the resources they consume to any great extent when compared to farming and herding societies. Generally, this is equivalent to the "hunter-gatherer" category (Kelly 1995; Politis 2007).

The combined use of $\delta^{15}N$ and $\delta^{13}C$ values provides a means to quantify the main food classes consumed by foragers in various local contexts around the world. Most importantly, it provides subsistence data on the scale of the individual, an analytical target that is usually hard to reach, providing access to issues such as subsistence variation by age and gender. In addition, subsistence can be studied at the population level as well. Stable isotopes have contributed to assessments of the dietary role of vegetal foods (C_3 or C_4); terrestrial animals occupying diverse trophic positions; marine animals including shellfish, fishes, and mammals; and freshwater resources. On this basis, it is possible to evaluate variation across time and space in behaviors along the foraging spectrum (Kelly 1995).

Historical Background

Vogel and van der Merwe (1977) conducted the first stable isotopes study in archaeology,

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 2 South American foragers: (**a**) Hoti family returning from a fishing and gathering trip (Venezuela); (**b**) Nukak man fishing with a bow and harpoon (Colombia) (Photographs courtesy of Gustavo G. Politis)

presenting an assessment of carbon isotopes in collagen from human bones from the Woodland period in Eastern North America. Around the same time, DeNiro and Epstein (1978) presented an isotopic study of organisms fed controlled diets, lending definitive support to the assertion that the diet determines the isotopic composition of animal tissues. Tauber (1981) developed the first isotopic test case for the consumption of marine foods by foragers, focusing on the Danish Mesolithic and Greenland Eskimos. Following these pioneering studies, isotopic research began to gain wide acceptance and, since the end of the 1980's, has grown in scholarly scope, as well as in geographical extent. The series of *Advanced Seminars on Paleodiet* beginning in 1986 witnessed and encouraged much of the methodological and theoretical growth visible in the archaeological field today (see references in Further Reading). Analysis of stable isotopes has become a routine worldwide.

Key Issues/Current Debates

Isotopic Ecology: Studying the Foragers' Menu

Isotope data from human remains must be interpreted in the context of the values of the potentially consumed foods or the isotopic ecology. This is an integral part of the paleodietary study of forager societies, because the values of human samples do not carry a precise dietary meaning per se. For example, a $\delta^{13}C_{collagen}$ value of −15‰ from a human sample indicates an enriched signal, which may suggest the consumption of a certain amount of protein from marine mammals, fluvial fishes, or some terrestrial herbivores, among other likely explanations. Interpretations must be adjusted by placing human values in the context of isotopic ecology. Usually, samples of archaeological origin are analyzed as well as modern samples, in order to widen the taxonomic range, in particular for plants. When modern samples are included as part of the context, it is fundamental to assess whether the organisms may have ingested foods that were not available in prehistoric times (e.g., agricultural forage, domestic animals). It is also necessary to correct the $\delta^{13}C$ values of modern samples for the so-called "industrial" or Suess effect (c. +1.5‰), which has altered global isotopic ratios by introducing carbon derived from fossil fuels, depleted in ^{13}C, to the atmosphere.

A first step for building an isotopic ecology is to define the foragers' potential menu on the basis of zooarchaeological and archaeobotanical evidences from the study area. This involves considering foods that might be unrecorded archaeologically, which is especially important for items with poor preservation potential (e.g., plant foods). Indeed, one of the merits of stable isotope research is that it permits inferences of past feeding behaviors that might otherwise be invisible.

The isotopic ecology must be local in terms of the archaeological problem at hand, since all vegetal and animal isotopic values vary with regional and local conditions – climate, nutrient availability, type of substrate, the existence of marine or terrestrial isotopic reservoirs, and physiological adaptations (Koch 2007). There is no "magic number" of samples providing a confident reconstruction of the isotopic ecology of a given region. The goal is to accurately characterize the isotopic variation of each of the main food resources available for foragers, since the use of inaccurate average and dispersion isotopic values for the foods eaten by humans will lead to wrong dietary interpretations. As a rule of thumb, the more complex the ecosystems where foragers make their living, the more extensive the isotopic ecology sampling should be.

A large-scale project directed by Andrzej W. Weber at the Lake Baikal region of Siberia, Russian Federation, provides an exemplary case of isotopic reconstruction of a complex ecological system intended to frame a regional study of forager populations inhabiting the area during the Middle Holocene (Weber et al. 2011). Two main food webs are present in the region: (a) a *terrestrial food web* composed of C_3 plants consumed by herbivores (elk, red deer, hare), in turn consumed by carnivores (black bear, fox, dog), and (b) a *freshwater food web* of great complexity, as the Baikal is one of the largest freshwater ecosystems on Earth. The latter includes different groups of detrivorous and omnivorous fishes, fed on by seals (Fig. 3).

Plots (a) and (b) from Fig. 3 represent the terrestrial food web, and plots (c) and (d) depict the aquatic food webs from fluvial and lacustrian contexts. The $\delta^{15}N$ data show that most of the aquatic species are enriched with values above 10‰. On the other hand, most of the terrestrial species have $\delta^{15}N$ values below 10‰ with two exceptions: the herring gull, which includes fish in its diet, and the dog. As the authors suggest, "Since in most prehistoric societies, dogs are expected to feed mostly on human leftover food, dog stable isotope signatures are frequently accepted as a good measure of human diet at a group level…" (Weber et al. 2011: 542). The Baikal freshwater isotope ecology is extremely complex, in particular regarding $\delta^{13}C$ values. High variability in lake bathymetry, sunlight access, and availability of nutrients all produce a wide isotopic range (Fig. 3c) that stands in sharp contrast to the homogeneous C_3 terrestrial environment (Fig. 3a).

To summarize, the success of the Baikal isotope ecology project lies in having thoroughly characterized the isotopic ranges of the alternative food classes available for foragers from terrestrial and freshwater ecosystems. On this basis, the authors are able to discriminate two main types of diet, "Game-Fish" and "Game-Fish-Seal," each related to different ecosystems. This study accentuates the need for archaeologists to determine the foraging menu via consideration of available food items; these provide the isotopic ecological context from which past forager diets can be reconstructed.

Isotopic Visibility of Feeding Behaviors: How Much is Enough?

Isotopic results from human samples provide an *average* of the values of the foods consumed during a given period of time. Therefore, isotopes do not provide a record of rare feeding events. Beyond this, it is fair to ask how much of a given food must be eaten for it to be visible in the isotopic record. Currently, some of the main variables that determine the isotopic visibility of ancient feeding practices are known, while others remain unknown. The target of isotopic analyses is usually that of classes of foods grouped by similarities in their $\delta^{13}C$ and $\delta^{15}N$ isotopic ranges (e.g., C_3 or C_4 vegetal species, ungulates from open vs. forested environments, marine vs. terrestrial protein). This is a kind of taxon-free approach like that applied in Paleontology, where the relevant variable is the niche that a species or population occupies. Correspondingly, the scale of analysis of isotopic research does not usually reach the level of individual species, since different species occupying similar niches may present similar isotopic signals, as recorded for Baikal fish (Fig. 3d).

Figure 4 illustrates a simple dietary reconstruction with two stable isotope systems

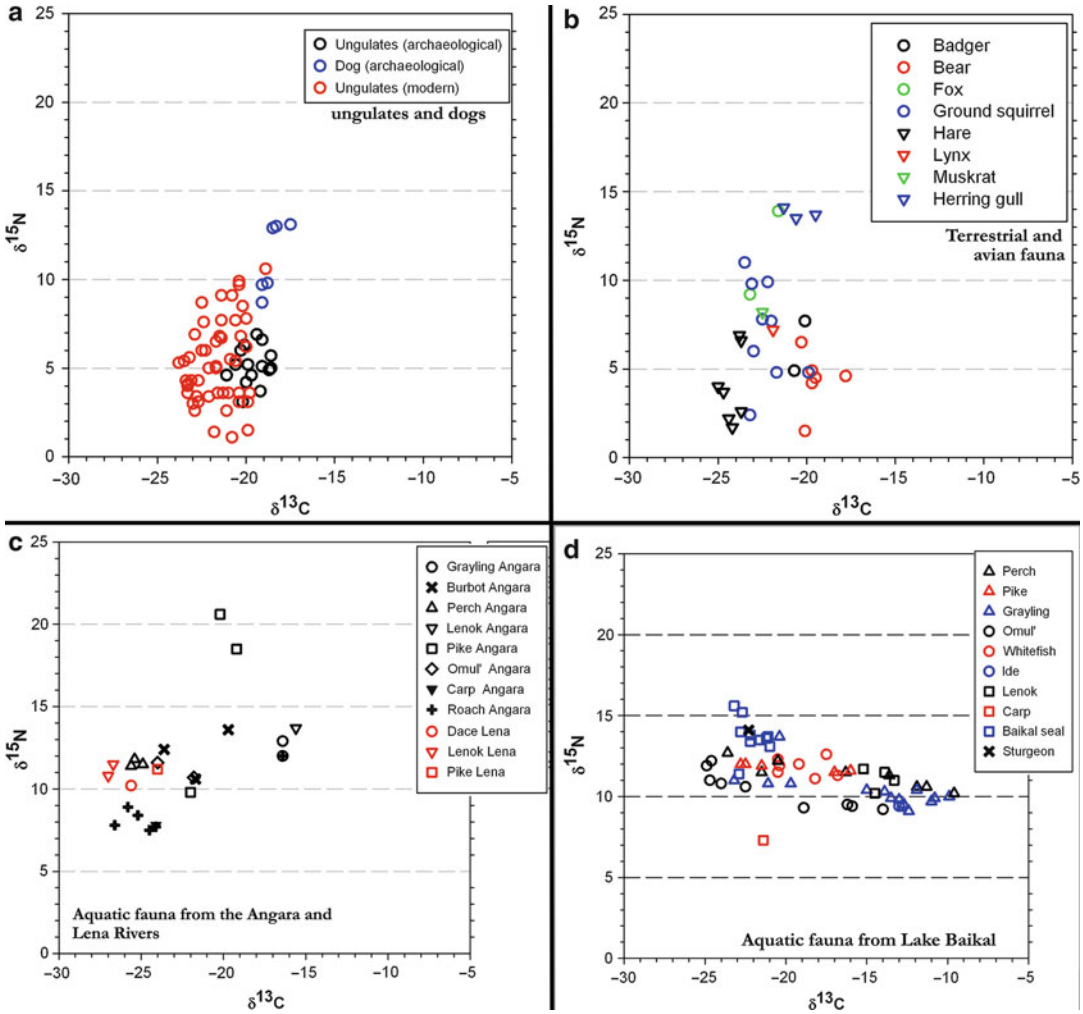

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 3 Isotopic ecology of the Baikal Region (Source: Weber et al. 2011: Fig. 2. *Journal of Anthropological Archaeology* 30 (4). Reprinted with permission from Elsevier. Courtesy of Andrzej W. Weber)

($\delta^{13}C$ and $\delta^{15}N$ from collagen) where two classes of foods are present: proteins from marine and terrestrial mammals. It shows that three individuals consumed these two dietary sources in the following proportions: (A) 100 % terrestrial protein, (B) 50 % terrestrial and 50 % marine protein, and (C) 100 % marine protein. In a simple situation such as this, with only two classes of food (usually termed "isotopic end members") that are isotopically distinct, a Linear Mixing Model can be used. Basically, the closer one sample falls to an end member, the larger the dietary importance of that end of the continuum (Schwarcz et al. 2010).

The $\delta^{13}C$ and $\delta^{15}N$ values of sample A represent consumed terrestrial protein, plus the isotopic fractionation affecting the relation between substrate and product (diet and bone collagen in this case). The same occurs with sample C, which points to a 100 % marine-based diet. Finally, sample B falls halfway along the theoretical mixing line, as might be expected for a diet combining both sources of protein in equal proportions. If isotopic variation

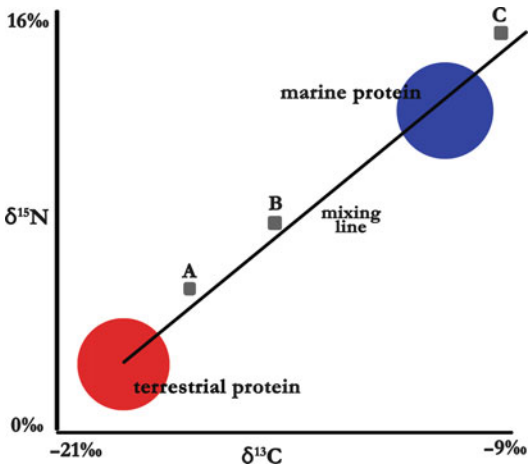

Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches, Fig. 4 Dietary reconstruction based on a "Linear Mixing Model" with two end members: terrestrial and marine protein

of the terrestrial and marine isotopic end members were small and the spacing between them large, as in Fig. 4, a relatively small proportion of either type of protein in the total diet (e.g., 15 %) would be isotopically visible. As isotopic variation of the end members increases, the spacing between them decreases, and larger inputs of the minor protein source are necessary in order to be visible. Therefore, the answer to "How much is enough?" depends on the local isotope ecology, which provides the average and dispersion values for the isotopic end members.

In real cases, usually there are more than two dietary sources present, increasing the complexity of the isotopic ecology and therefore of the study of forager paleodiets (Weber et al. 2011). The use of several isotopic proxies from organic and inorganic bone phases increases resolution. Recently developed dietary models, such as *IsoSource* or *SIAR*, contribute to research on the diversity of dietary combinations that can produce given isotopic values (Wolf et al. 2009).

Early Hominin Foragers

Enamel tissue may preserve an isotopic signal of diet over millions of years. This has made possible the reconstruction of the subsistence of several species of early hominins including Mio-Pliocene fossils (*Ardipithecus*), Plio-Pleistocene gracile and robust australopiths (*Australopithecus*, *Paranthropus*), and early members of the genus *Homo* (*Homo habilis*, *H. neanderthalensis*). Carbon isotopes provide information on the amount of C_3 vis-à-vis C_4 vegetal foods eaten by early hominins, suggesting the type of environments inhabited, ranging from closed forest settings with a pure C_3 isotopic signature to open savannas with a mixed C_3/C_4 signature. In conjunction with data on dental microwear, this information contributes to assessing the timing and geographic patterning of the evolution of arboreal and pedestrian adaptations by early hominins. Current information indicates wide subsistence variability, challenging some long-held views in paleoanthropology (Ungar & Sponheimer 2011). Additionally, isotopic data from Middle and Late Paleolithic foragers are beginning to provide quantitative information on the consumption of terrestrial, marine, and freshwater foods by *Homo neanderthalensis* and early *Homo sapiens*, allowing assessment of changes in dietary breadth and their relationship to demographic processes (Richards 2009).

Forager Diet, Mobility, and Settlement

In forager societies, subsistence is tied to mobility and geographical organization (Kelly 1995; Politis 2007). In this context, isotopically based dietary studies may offer spatial insights, in particular in cases that involved the consumption of foods with a spatially circumscribed availability and a distinct isotopic signature. This is the case with marine mammals and fishes, usually enriched in both $\delta^{13}C$ and $\delta^{15}N$ (Schwarcz & Schoeninger 2011). In some regions, this is also the case for fluvial or lake-dwelling mammals and fishes, enriched in $\delta^{15}N$ and usually depleted in $\delta^{13}C$, as shown in Baikal seals (Fig. 3d; see Weber et al. 2011).

In a classic article, Sealy and van der Merwe (1986) tested a hypothesis that suggested a seasonal round between the coast and the hinterland for forager societies inhabiting the Cape of South Africa during the Late Holocene.

This "seasonal model" of spatial organization – inspired by historic records – would produce a homogeneous isotopic signature mixing marine and terrestrial foods. Isotopic analyses of human samples from both ends of this alleged seasonal round showed at least two different types of diet: people from coastal sites with marine-based diets and inland people who consumed negligible amounts of marine resources. This not only contradicted the expectations derived from the seasonal model but also suggested the existence of restricted ranges of mobility for foragers consuming marine foods. Similar patterns of isotopic coastal-inland differentiation have been recorded for regions of Australia, Peru, Argentinean Patagonia, and the Northwest Coast of North America. These cases highlight the attraction of productive coastal settings to foraging societies, leading to spatially restricted home ranges and high demographic densities. On the other hand, wide territories integrating the coast and the hinterland have been suggested for Mesolithic Denmark, among other cases. This information is well suited for the analysis of catchment areas via the application of patch choice models derived from foraging theory.

The Baikal Lake offers another important case where different aspects of forager mobility and settlement have been assessed. Evidence indicates that Middle Holocene forager ranges were smaller than those suggested by ethnographic data. In addition, there appears to be a marked temporal stability in foraging patterns, despite the changes documented in the culture history and paleoenvironment. To summarize, a web of diverse movements connecting the microenvironments of the Baikal is recorded. This geographic net is asymmetric, since some areas received large numbers of migrants, whereas others did not (Weber et al. 2011).

The results of these case studies help place dietary information into a geographic context. Isotopic reconstructions of forager diets are currently being developed to integrate diverse aspects of cultural geography such as territorial organization, foraging ranges, and logistical spheres of mobility. This is enhanced by the use of other isotope systems described below.

Future Directions

Overcoming Analytical Limitations: Compound-Specific Isotope Analyses

Isotopic analysis at the level of specific compounds of bone, including amino acids, fatty acids, and cholesterol, is a new technique that allows a high-resolution alternative to bulk tissue analysis of $\delta^{13}C$ and $\delta^{15}N$ (Evershed et al. 2007). Compound-specific studies provide a means to assess the dietary contribution of particular food classes, overcoming some limitations of forager paleodietary reconstruction, such as the $\delta^{13}C$ overlap of C_4 plants and marine resources and the ^{15}N enrichment prevalent in arid environments. Bone cholesterol in particular has been shown to reflect the whole diet, playing an analogous role to apatite and contributing to assess its preservation.

Dietary Changes and Life History

Stable isotope analyses can be performed on different organic tissues: bone, teeth, and soft tissues such as hair and nails. Bones are remodeled throughout life, whereas teeth, hair, and nails have incremental growth patterns and do not remodel once formed. The isotopic signal retrieved from each tissue reflects an average of the diet during the period of its formation. In the case of bones, the remodeling process is on the order of a decade and is active until the death of the individual, offering an isotopic signal that averages the diet during the last years of life. Teeth, on the other hand, form only during the first years of life, providing an evidence of diet during different stages of childhood. Hair and nails form rapidly and incrementally, providing dietary information on very brief periods of life, offering monthly dietary resolution. In fact, the incremental formation of tooth dentine, hair, and nails allows production of serial dietary reconstructions (Schwarcz & Schoeninger 2011).

The combined analysis of different tissues from a single individual provides the basis for a life history approach to dietary studies (Katzenberg 2008). On this basis, several key issues of forager social organization and subsistence have been addressed, particularly age of

weaning, life history traits by gender, and changes in subsistence throughout the life of foragers.

Isotopic Signatures of Forager Geography: Oxygen Isotopes and Trace Elements

Following the lead of research on complex societies such as the Maya and Tiwanaku, recent studies of forager subsistence are progressively including isotopic markers of geographic residence (Bentley 2006; Schwarcz et al. 2010; Price & Burton 2011). Two isotope systems are at the forefront of this methodological advance: oxygen isotopes ($^{18}O/^{16}O$) and trace elements like strontium ($^{87}Sr/^{86}Sr$).

The use of $^{18}O/^{16}O$ ratios as markers of place of origin is based on two central facts: (a) Isotopic ratios in meteoric precipitations vary geographically according to altitude, humidity, temperature, and distance from the ocean and (b) isotopic ratios in human tissues depend on the water imbibed and, to a lesser extent, oxygen in air and food sources. Thus, oxygen values from human remains contain an averaged record of the places where a person lived during the period of time represented in the sampled tissue.

Strontium isotopes (^{87}Sr and ^{86}Sr) have large atomic masses and differ little from each other. Therefore, rates of chemical reaction are very similar and isotopic fractionation between substrate and product is negligible. In this case, all of the organisms in a given region present the same isotopic abundances determined by the chemical signatures in the local geology, which are passed on to soils, circulating water, plants, animals, and humans (Bentley 2006).

These two isotope systems must be used in the context of different frames of reference: isotope values in water sources in the case of $\delta^{18}O$ and biologically available Strontium in the case of $\delta^{87}Sr$. The natural variation in isotopic abundances between different regions will determine the resolution that can be achieved in archaeological reconstructions (i.e., which regions have an isotopically distinct signature). Since these isotope systems are independent from each other and may offer complementary insights, their combined use is the best strategy.

Since their introduction in Archaeology 35 years ago, stable isotope analysis has provided a tool for the quantitative reconstruction of forager subsistence, thereby enlarging the range of topics addressed. Currently, the isotopic field has grown to include studies of isotopic ecology in complex ecosystems, forager diet, and geographical issues including foraging ranges, territories, and migrations, with a potential resolution reaching the scale of individual life histories. The theoretical and methodological limits of the isotopic revolution in archaeology lie still far ahead.

Cross-References

- ▶ Bone: Chemical Analysis
- ▶ Bone Chemistry and Ancient Diet
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Isotope Geochemistry in Archaeology
- ▶ Isotopic Studies of Husbandry Practices

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Isotopic Studies of Husbandry Practices

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Introduction

Assessment of husbandry practices in ancient times has long been made from analogy with (sub) contemporary traditional herding systems. Although these are still extremely useful for encompassing the range of possibilities, analogy may today be replaced by direct evidence.

Probably from the early steps of domestication processes in the Near East, in the early Pre-Pottery Neolithic, and certainly from the time when the first domesticates were diffused and acclimatized outside of the area of domestication, pastoral communities have developed husbandry strategies involving great zootechnical skills to insure the survival of their stock and enhance the exploitation of subsistence products. In prehistoric times, with the exception of rare and sometimes ambiguous iconographical sources, the only direct evidence of husbandry practices is constituted by animal skeletal remains. In particular, valuable information may

be retrieved from the isotopic composition of the elements that make up bones and teeth. In historical periods, many written and iconographical accounts may inform on herding practices. However, because such sources may not always reflect the actual management of husbandry and spatial variability on a local scale, direct investigation from bone remains is also commonly conducted on assemblages from antiquity and medieval times.

Definition

Husbandry practices are essentially related to animal diet and breeding. Management of domestic animals' diet may start from their very young age with control of weaning, and includes a range of possibilities, depending notably on the scale of the husbandry: from the choice and management of pasture areas, including seasonal to interannual mobility between pastures, to the supply with forage in periods of food shortage. In mixed farming systems, the fodder may be a by-product or a product of cultivated crops. Management of animal reproduction includes the choice of mates and control of the mating period and duration of lactation.

Most of these zootechnical parameters may be approached by isotopic studies of bone and teeth. Among elements, the most commonly targeted for this purpose are carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), oxygen ($\delta^{18}O$), and strontium ($^{87}Sr/^{86}Sr$), whose isotopic compositions are primarily related to – and therefore inform on – environment (climate, geology, soil history, vegetation cover) and plant and animal physiology. The list may be enlarged in the future with other major or trace elements currently under consideration for possible applications in this field. Most of the time, these elements are extracted from bone and tooth collagen and bioapatite, less commonly from individual bone collagenous amino acids and fatty acids (Copley et al. 2004).

Under high and middle latitudes, husbandry and related tasks are strongly punctuated by the seasonal cycle, driving both availability of plant and water resources and animals' biological cycle. For this reason, an important place is henceforth given to reconstitutions of animals' isotopic history at the infra-annual scale. This is made possible by studies involving serial sampling in teeth. Still, studies involving bulk analysis of bone and teeth remain very informative in many instances.

Key Issues/Current Debates/Future Directions/Examples

Animal Diet

Proximity of the Herd to the Settlement: The Example of Pig Husbandry

Management of animal diet has consequences for the degree of commitment and organization of labor within pastoral communities and may indirectly inform on the scale of husbandry. The closeness of the flock to the settlement, as opposed to extensive husbandry, may be assessed through the position of domestic animals in the anthropic ecosystem, with trophic chains possibly including by-products from animal exploitation and/or land cultivation. This point is particularly relevant for pig husbandry. Domestic pig is characterized by a great plasticity in terms of feeding behavior. When herded extensively in woodland, domestic pigs would have a diet similar to that of their wild counterparts, mainly herbivorous. Proximity of pigs to the settlement and human activities may result in its scavenging on consumption refuses, including animal products, which would raise it to an omnivore to carnivore level in the trophic chain. The relative position of the pig in the trophic chain may be inferred from the analysis of bone collagen $\delta^{15}N$. The principle used is the stepwise enrichment in ^{15}N along the trophic chain. Crucially, given that $\delta^{15}N$ of plants, at the first level of the trophic chain, are primarily defined by local soil parameters (and physiology), pig $\delta^{15}N$ values rarely speak by themselves. They must be compared to $\delta^{15}N$ values measured in other animals of the same ecosystems, including unambiguous representatives of herbivores and carnivores (Ervynck et al. 2007).

Integrating Agricultural Resources into Animal Diet

In mixed farming systems, the interweaving of animal husbandry with plant cultivation may sometimes be detected from the analysis of bone collagen $\delta^{13}C$. This applies especially when the cultivated crop is a C_4 plant in a wild environment heavily dominated by C_3 plants, the difference in $\delta^{13}C$ between these two photosynthetic pathways being inherited by the consumers. This is the case, for example, in China, where millet, a C_4 cereal, was cultivated from the Early Neolithic. At Xipo, a Middle Neolithic site in the Yellow River basin, a substantial contribution of C_4 plants, most probably millet, was shown in the diet of domestic pigs, emphasizing the interdependence of husbandry and agriculture in these societies (Fig. 1a). A system where agricultural products are redistributed between animals and humans depending on fluctuations in agricultural yields and wild resources was described as a key to the stability of the subsistence strategy (Pechenkina et al. 2005). Another domestic crop representative of the C_4 photosynthetic pathway is maize. Its contribution to camelid pastoralism was demonstrated in the first millennium CE at the site of Conchopata in the Peruvian highlands (Finucane et al. 2006). From their bone collagen $\delta^{13}C$ values, camelids at the site could be separated into two groups (Fig. 1b) possibly corresponding to two different species: one group of camelids (llamas?) kept by the settlement and supplied with maize fodder and one group (alpacas?) fed pure C_3 diet, kept on highlands grasslands.

Exploitation of Estuarine and Marine Resources

Coastal and marine ecosystems are characterized by isotopic values different than those measured in continental areas. This specificity was sometimes used to highlight the exploitation of estuarine and marine resources by herders for their stock. The exploitation of estuarine salt marshes to graze cattle and caprines is still a common practice in Northwestern Europe and is widely described by historical accounts from medieval times. In England, the antiquity of this practice was confirmed by an isotopic study using the principle that salt-marsh plants have significantly higher $\delta^{15}N$ ratios than other terrestrial plants. Comparing bone collagen $\delta^{15}N$ values of cattle and caprines from Bronze Age sites in the Southwestern coast of England, Britton et al. (2008) were able to show that they were significantly higher than those measured in inland sites, reaffirming the hypothesis of salt-marshes exploitation previously suggested by other archaeological evidence, including cattle and sheep/goat footprints tracks and the presence of halophytic plant remains in herbivore coprolites found at the sites.

The use of marine resources – including fish, shells, and seaweed – to feed domestic cattle, caprines, horse, and pig is also a widespread practice, which can be detected through stable isotope analysis. Plants and animals from marine ecosystems tend to have higher $\delta^{13}C$ values than those measured in terrestrial C_3 plants-dominated ecosystems. Additionally, because food chains are extended in marine ecosystems, most marine animal resources have higher $\delta^{15}N$ values than those encountered in terrestrial animals. The introduction of marine fish in the diet of domestic animals can therefore be detected by a concomitant raise in bone collagen $\delta^{13}C$ and $\delta^{15}N$ values compared to what would be expected for a terrestrial diet. Guiry et al. (2012) conducted isotopic analyses on pig remains from seventeenth century fishing stations in Newfoundland and were able to highlight the presence of two clearly distinct groups of pigs with spectacular differences in both $\delta^{13}C$ and $\delta^{15}N$ values. The pigs with higher $\delta^{13}C$ and $\delta^{15}N$ values were most probably those raised locally with great access to marine-derived food, in contrast to their European counterparts raised on terrestrial diet.

The feeding on marine seaweed may in the same manner be reflected by $\delta^{13}C$ values higher than those measured in animals grazing on terrestrial C_3 pastures. The use of marine seaweed as fodder for cattle, sheep, and horse is a common practice in the Northwestern Atlantic area, attested from historical sources from Early Middle Ages on. In humid insular contexts, particularly, where terrestrial pastures are

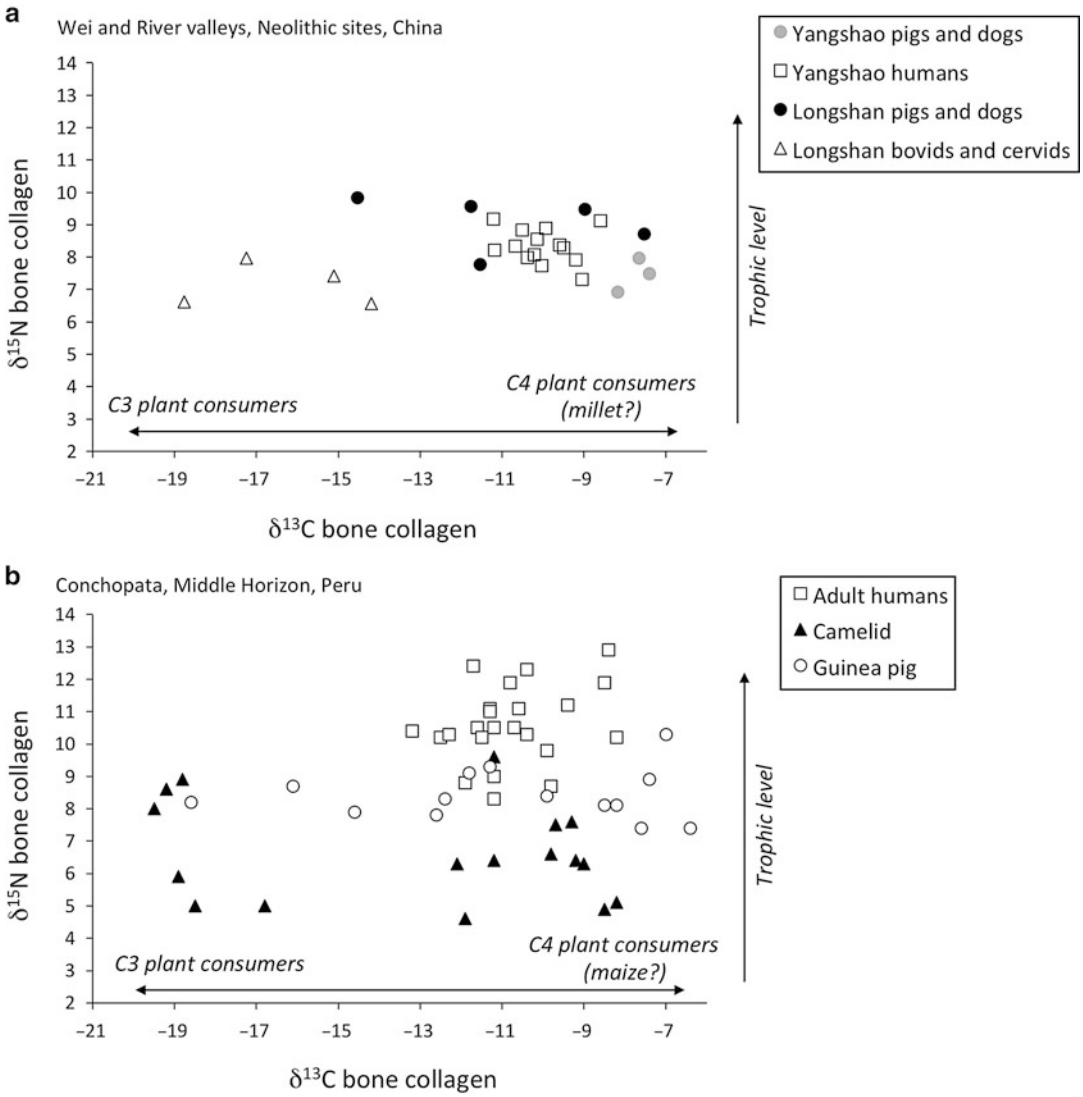

Isotopic Studies of Husbandry Practices, Fig. 1 Detection of the introduction of C_4 plants in the diet of domestic animals through analysis of stable carbon isotope composition ($\delta^{13}C$) of bone collagen. (**a**) Introduction of millet in the diet of domestic pigs in Neolithic China (Data from Pechenkina et al. 2005); (**b**) introduction of maize in the diet of domestic camelids in Middle Horizon culture in Peru (Data from Finucane et al. 2006)

reduced in the winter while climatic conditions prevent the constitution of dry fodder, seaweed may be a valuable resource to complement the flocks over the bad season. Because this practice is often restricted seasonally, the greatest opportunity to detect it is by performing sequential sampling in tooth enamel. Concomitant analysis of enamel bioapatite $\delta^{13}C$ values, reflecting diet, and $\delta^{18}O$ values, reflecting climate, permits to access seasonal changes in diet and to highlight a potential contribution of seaweed resources in the winter (Fig. 2c). This principle was used to demonstrate a recurrent significant contribution of seaweed to the diet of sheep in the Neolithic site of Holm of Papa Westray (third millennium BCE) in the Orkney archipelago.

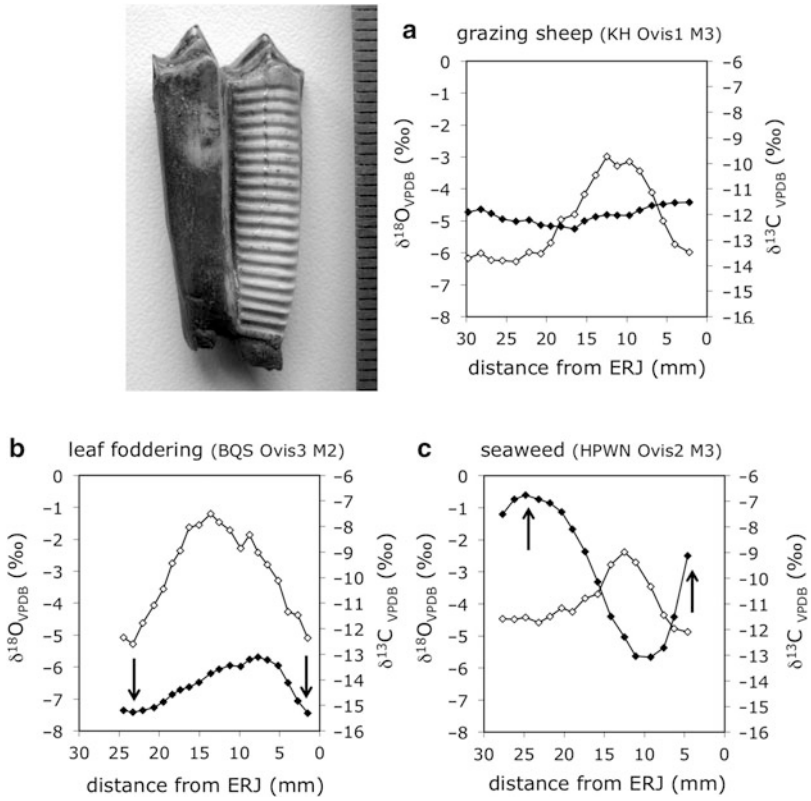

Isotopic Studies of Husbandry Practices, Fig. 2 Detection of seasonal changes in diet, through sequential sampling (here on a sheep second lower molar) and sequential analysis of stable carbon ($\delta^{13}C$, *black symbols*) and oxygen isotope compositions ($\delta^{18}O$, *open symbols*) of tooth enamel. (**a**) Expected values for a sheep grazing in terrestrial pastures (Data from Balasse et al. 2006); (**b**) evidence for winter leaf foddering (Data from Balasse et al. 2012); (**c**) evidence for winter seaweed consumption (Data from Balasse et al. 2006)

The contribution occurred in the winter and in the form of fresh seaweed, so it could not be said whether sheep were intentionally fed this resource by the herders or if this resulted from the gathering by the animals of a fully accessible resource washed ashore by storms (Balasse et al. 2006).

Leaf Foddering

Compensating for restricted availability of grass during dry summers or snowy winters and/or over periods of stalling sometimes involves the use of tree leaves. The practice was widespread in Europe until recent history from Norway to the Mediterranean area. It is directly evidenced at middle Neolithic sites, where botanical remains including twigs and leaves have been retrieved in cattle and small stock dung deposits. Unfortunately, the retrieving of dung layers with good preservation of botanical remains is exceptional in archaeological contexts. Alternatively, the practice of leaf foddering can be investigated through the analysis of $\delta^{13}C$. Plants grown in closed forests are marked by the canopy effect resulting in a lowering of $\delta^{13}C$ values. Those are passed onto animals feeding on them (Fig. 2b). At the Middle Neolithic site of Bercy, France (fourth millennium BCE), previous archaeobotanical studies demonstrated the presence of a dense oak tree forest on the alluvial terraces nearby the site, exploited for firewood and partly cleared for agricultural purposes. Seasonal feeding on plants marked by the canopy effect was suggested by low $\delta^{13}C$ values in sheep and cattle tooth enamel, suggesting that the forest was also exploited for winter leaf foddering (Balasse et al. 2012).

Herd Mobility and Trade

In extensive pastoralism, the search for good quality pastures all year round involves compensating for seasonal fluctuation in resource

availability through altitudinal or longitudinal mobility. Altitudinal mobility sometimes implies a change in vegetation types and plant species available for graze. Particularly in subtropical regions, due to an altitudinal gradient in the relative proportion of C_3 and C_4 plants, with C_4 grasses dominating in low-altitude grasslands and C_3 grasses becoming more abundant to dominant in highlands pastures, altitudinal mobility may be reflected in $\delta^{13}C$ values mimicking changing proportions of C_3/C_4 plants in the diet throughout the year. However, when assessing mobility from changing proportions of C_3/C_4 plants in diet, one might also have to deal with two potentially interfering factors: plant selectivity by herbivores – especially as far as cattle are concerned – and seasonal changes in the proportion of C_3/C_4 plants at the local scale (Balasse et al. 2002; Balasse & Ambrose 2005).

Longitudinal mobility can be addressed through strontium isotopic analysis, the most commonly used tool to assess mobility and migration in the past (Bentley 2006). Sr isotopic signatures are mostly inherited from eroding geology through soils and waters into the food chain. The Sr isotopic signature from the geological material depends on the nature and age of bedrock and therefore varies on geographical scales with local parameters. In coastal areas, the local Sr isotope signature may be considerably influenced by the marine signal through sea spray. Other factors including a dust component may be taken into account. Mobility between areas with different geology and/or soil history and between coastal and inland areas may be reflected in changes in Sr isotope ratios. This principle has occasionally been applied to domestic animal assemblages with the aim of investigating mobility at the seasonal scale or mobility during the lifetime, potentially related to trade (Balasse et al. 2002; Bentley & Knipper 2005; Viner et al. 2010; Sjögren & Price 2012). The most difficult prerequisite of this method is to evaluate accurately the range of variation of the local Sr isotope signature. It is recommended to define the local archaeological signature from archaeological teeth of animals with a restricted range of habitats (Bentley 2006).

Animal Reproduction: Seasonality and Season of Birth, Weaning, and Duration of Lactation

Domestication has lead to the attenuation or suppression of some of the physiological expressions of seasonality, including seasonality of the breeding cycle. However, the reproductive patterns of domesticated small ruminants are still strongly driven by the photoperiodic cycle, while the breeding cycle of other domesticates like cattle and pigs, when raised extensively, tends to be synchronized with the vegetation development cycle. The herder may directly influence this reproduction pattern, essentially through management of diet and mating, in order to extend or conversely to reduce the breeding period. Birth management strategies are mainly influenced by herd size, residential mobility, and, in more recent times, market timetable (Balasse et al. 2003). For all these reasons, although it is most likely that breeding in prehistoric herds was seasonally restricted, the duration of birth period and distribution of birth over this period (with a possible bimodality) need to be inferred from the archaeological record.

Assessment of birth distribution may be performed through the analysis of tooth enamel $\delta^{18}O$. The $\delta^{18}O$ value of tooth enamel is related to that of ingested water, mainly reflecting local surface water and precipitation. Seasonal variations in precipitation $\delta^{18}O$ are recorded in enamel during tooth mineralization and can be reconstructed through sequential analysis along the axis of tooth growth. Seasonality of birth may be investigated through a study of interindividual variability in the sequence of the seasonal cycle tracked in a given tooth. The assessment is performed by a comparison of the position in the tooth crown where the lowest and/or highest $\delta^{18}O$ values are measured (Fig. 3). This principle was applied, for example, on the Late Stone Age site of Kasteelberg in Southwestern Cape (South Africa), where it was used to highlight two lambing seasons for sheep, in agreement with descriptions by European observers of the Khoekhoe husbandry systems at the beginning of the eighteenth century. This result suggested either females lambing more than once a year or

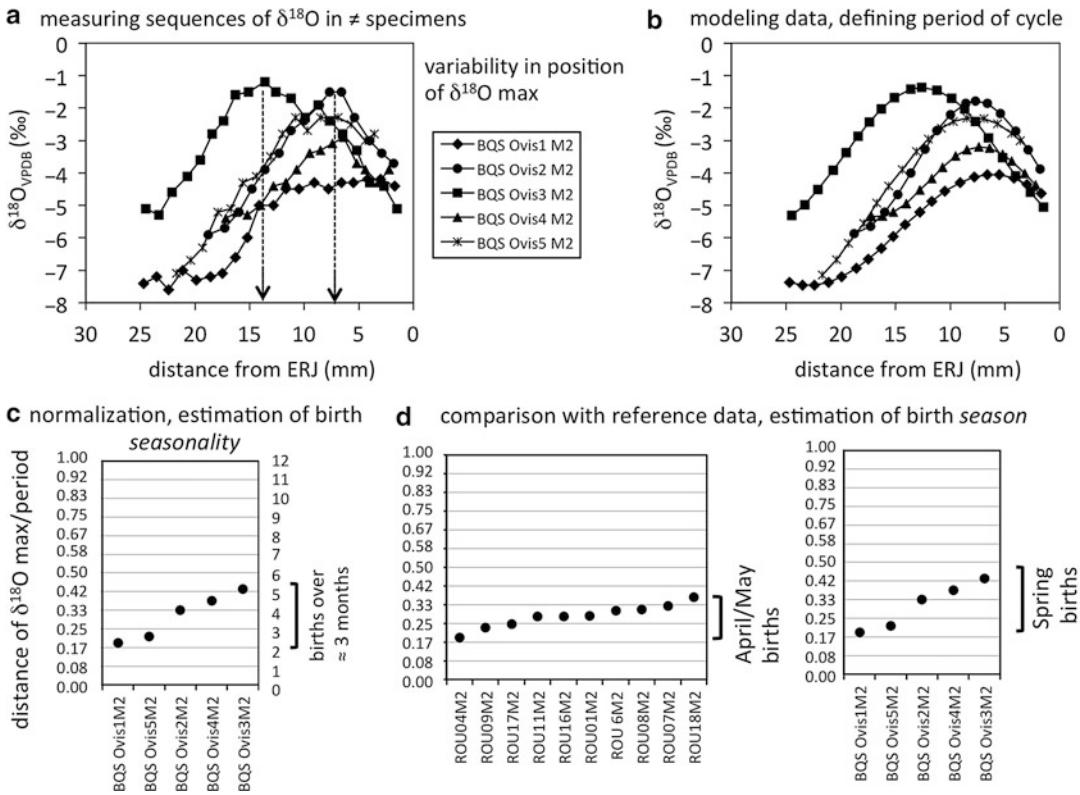

Isotopic Studies of Husbandry Practices, Fig. 3 Investigation of seasonality and season of birth in past herds, through analysis of tooth enamel stable oxygen isotope ratios ($\delta^{18}O$). (**a**) Birth spacing is reflected in interindividual variability in the position of the highest $\delta^{18}O$ values in the tooth crown (ERJ: enamel-root junction). This variability may also reflect differences in tooth size and timing of growth. (**b**) Modeling of data permits estimation of the period of the cycle (1 year record) and normalization of the distance by this period, in order to eliminate the tooth size effect. (**c**) Normalized data is used to infer birth spacing (or birth seasonality). (**d**) Estimation of the season of birth implies comparison with modern reference sets obtained on animals with known birth season (Data from Balasse et al. 2012)

subdivision of the flock and births scheduled at different times of the year. Several implications could be drawn on the role of sheep in the subsistence economy, residential mobility strategy, and the use of sheep mortality profiles for interpretation of season of occupation of the site. Similar analytical protocols were developed in order to investigate birth seasonality in cattle (Towers et al. 2011; Balasse et al. 2012) and pig (Frémondeau et al. 2012).

The season of birth cannot be inferred from the pattern of intra-tooth variation in $\delta^{18}O$ values alone until the time resolution of the isotope signal in enamel bioapatite, influenced by the duration of enamel mineralization, is clearly established. Comparison of results must be made with modern reference sets (Fig. 3c, d).

In contexts where milk exploitation is attested, because lactation is initiated with the offspring's birth, seasonality of birth and duration of lactation influence directly the seasonal availability of milk. Duration of lactation may be approached indirectly through weaning age. The change of diet occurring during the weaning process is also a step down the trophic chain: the young mammal stops feeding on milk, a product elaborated by its mother. This change is recorded in tooth dentine. The $\delta^{15}N$ of dentine collagen reflects the trophic

level at time of tooth formation. It is possible, by performing sequential sampling of dentine along the tooth, to observe the decrease in $\delta^{15}N$ of collagen at weaning time. Results from a study conducted on cattle teeth from the Middle Neolithic site of Bercy (France) suggested early weaning, possibly reflecting a shorter lactation for Neolithic cows, compared to modern improved breeds. This kind of result is a step toward a better estimation of the capacity of prehistoric dairy husbandry, which may help in the future to evaluate the role of milk in subsistence economies (Balasse & Tresset 2002).

Future Directions

Isotopic studies of husbandry practices have naturally focused on the analysis of animal skeletons. Analysis of botanical remains might also prove very relevant to the subject. Recent stable isotope studies of charred remains of domestic crops have shown how the practice of manuring could be highlighted through the analysis of $\delta^{15}N$, opening a new window on the interweaving of animal husbandry and crop cultivation in mixed farming systems which may have existed from the Early Neolithic in Europe (Bogaard et al. 2007; Fraser et al. 2011).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeometry: Definition
- ▶ Bone: Chemical Analysis
- ▶ Bone Chemistry and Ancient Diet
- ▶ Isotope Geochemistry in Archaeology
- ▶ Organic Residue Analysis in Archaeology
- ▶ Zooarchaeology

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Israel: Museums

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Introduction

With over 230 museums, the State of Israel has the most museums per capita in the world. These range in size and sophistication from small house museums to those representing state-of-the-art contemporary museum design, such as the Yad Vashem Holocaust History Museum. Israel's diverse assortment of museums covers time periods spanning prehistory to the present day. Not all museums are concerned with archaeology and many focus on other topics as varied as military history, grain, computers, sport, clandestine immigration, founding figures, visual art, folklore, and transport.

Definition

Museums that contain archaeological exhibits are of four main types. Small museums found in *kibbutzim* mainly focus on aspects of local history and can include geological, botanical, and zoological exhibits along with archaeological material. Regional museums such as the Hula Valley Regional Museum in the Upper Galilee can be more comprehensive, specializing in a particular subject such as prehistoric settlement. Site museums are connected to outdoor

archaeological sites such as Masada or urban excavations such as the Burnt House or the Davidson Excavation and Virtual Reconstruction Center in Jerusalem. Large public museums such as the Eretz Israel Museum in Tel Aviv often incorporate art and ethnographic displays along with archaeological material. It is the latter type of museum, housing prominent archaeological collections, which will be covered here in chronological order according to their date of establishment.

Key Issues/Current Debates/Future Directions/Examples

Archaeology plays a significant role in the foundation narrative of the State of Israel, linking contemporary Israelis to both the ancient Israelites and the Jewish nation in ancient Palestine (Petrovato 2006). Archaeological excavation of biblical sites has been described as a "veritable form of prayer" (Ben-Yehuda 2007) and archaeological collections within museums, particularly objects dating to the First and Second Temple periods – the Iron Age, Persian, Hellenistic, and early Roman periods, considered the era of the original Jewish community in Israel – assume a religious aura when appearing to substantiate the biblical account. This functions, to an extent, to legitimize the repatriation of the Jewish diasporic community to its biblical homeland, encourages public support for the Israeli nationalist enterprise, and renders Palestinian (often referred to by the more generic term "Arab") culture less visible (Petrovato 2006). The museums of Israel are more than simply sites of nationalistic narrative however, containing, as they do, a vast range of artifacts of immense importance to the history of the Levant as well as the wider Eastern Mediterranean and beyond.

Rockefeller Museum, Jerusalem

Originally known as the Palestine Archaeological Museum, the Rockefeller Museum in East Jerusalem was established with the aid of a donation by American philanthropist, John D. Rockefeller, Jr., on the initiative of archaeologist and director of the Oriental Institute in Chicago, Henry Breasted. Designed by British architect, Austen St. Barbe Harrison, in a style incorporating elements from Eastern and Western architecture with sculpted reliefs by British artist Eric Gill and decorative tiles by the Armenian artist, David Ohanessian, the museum opened in 1938. The Rockefeller Museum was the first building constructed specifically as a national museum in Palestine in which material from excavations would be exhibited locally, rather than being exported to foreign museums. The museum houses a collection of antiquities from excavations conducted in Palestine during the period of the British mandate (1919–1948) (Ibrahim 2006). John Henry Iliffe, British archaeologist and first keeper of the museum, initially planned to include an ethnographic exhibit displaying local Palestinian culture but was overruled by Breasted and Rockefeller. In line with Rockefeller's original stipulation, the museum consequently focused solely upon archaeology, excluding historical, biological, and ethnographic exhibits (Baruch & Kudish-Vashdi n.d.). Arranged in chronological order, the exhibit displays material ranging in date from the prehistoric era to the beginning of the eighteenth century CE. The two main galleries contain finds from major excavations in Palestine conducted in the early twentieth century, while several smaller exhibition rooms are organized thematically, containing Egyptian material, decorative features and statuary from Hisham's palace near Jericho, carved wooden elements from both the Al-Aqsa Mosque and the Church of the Holy Sepulchre, coins, jewelry, and examples from Talmudic-period Jewish culture. Outdoors, within the arcades surrounding the pool, architectural elements, sculptures, and stone sarcophagi are displayed. The museum also houses the offices and storerooms of the Israel Antiquities Authority.

Eretz Israel Museum, Tel Aviv

Founded in 1958 as the Haaretz Museum, the Eretz Israel Museum is situated in northern

Tel Aviv, next to the Philistine archaeological site of Tel Qasile. Organized in a series of pavilions spread over the site, the museum was initiated by Tel Aviv resident, Dr. Walter Moses, who bequeathed his archaeological collection and library to the Tel Aviv municipality with the proviso that it build a museum in which to house it. Beginning with the inauguration of the glass pavilion in 1959, which houses vessels dating to between 1500 BCE to 1500 CE, subsequent pavilions would be built over the years. The Numismatic Pavilion was inaugurated in 1962 and chronicles the history of coinage and monetary systems. This was followed in 1963 by the Ethnography and Folklore Pavilion, focusing on the Jewish ritual year. The Ceramics Pavilion, installed in 1966, features ceramic objects dating to between the Chalcolithic and Classical periods from Israel, Cyprus, Egypt, and Greece, as well as material from Africa and Central America. In addition, the pavilion houses objects from Tel Qasile, one of the first archaeological sites excavated within the new State of Israel, as well as the important cult furnishings from the Yavneh favissa excavated in 2002. The Man and his Work Center, displaying objects related to agriculture, crafts, domestic work, and rustic decorative arts, was established in 1982. This was followed by the Nechushtan Pavilion in 1983, devoted to metalwork and containing material from the excavations at the copper mining site of Timna in the southern Negev, including the components of an Egyptian-Midianite temple. The Alexander Pavilion of Postal History and Philately, founded in 1998, focuses on the evolution of the mail service from the mid-nineteenth century CE to the establishment of the State of Israel in 1948. Finally, the Rothschild Center, inaugurated in 2006, documents the activities of Baron Edmond Benjamin James de Rothschild who was instrumental in financially supporting the development of Jewish settlements in Palestine between 1882 and 1934. The museum also includes a complex housing olive presses, one of which dates to the Iron Age II, while outdoor sites such as Mosaic Square display mosaics from a Samaritan prayer house discovered on site, as well as others from Beit Guvrin and Tiberius. In addition, the museum incorporates the excavated remains of Tel Qasile, dating to the twelfth century BCE, which include the remains of temples and a street lined by workshops, storerooms, and houses.

Israel Museum, Jerusalem

Situated on the famous Museum Row in Givat Ram near the Knesset (Israeli parliament) buildings, the Israel Museum was founded in 1965 as a collection dedicated to archaeology, fine art, and Jewish art and life. It was initially established with the help of American funds from publishing sales of Cold War propaganda in Israel and a land grant from the Israel government. The Israel Museum is a nonprofit company whose shareholders consist of the Ministry of Education, the Hebrew University, the Municipality of Jerusalem, the Bezalel School of Art, the Friends of the Bezalel Museum, and the Jewish Agency (Weyl 1995). The archaeology wing of the museum was established in 1965 by the children of Canadian businessman and philanthropist, Samuel Bronfman, to commemorate his 70th birthday and was renewed in 2010 as part of the refurbishment and expansion of the entire museum (Snyder 2010). Displaying material mainly discovered within Israel, the museum's permanent collection of archaeology contains 6,000 artifacts, spanning the periods from prehistory to the Ottoman period. The collection primarily consists of provenanced material deriving from controlled archaeological excavations, on loan from the Israel Antiquities Authority. A smaller proportion derives from donations by private collectors (Dayagi-Mendels 2010) as well as material confiscated from dealers and looters (Blum 2002). The museum is not without its share of controversy. In 1986 the museum bought the collection of military leader, politician, and notorious looter, Moshe Dayan, for US $1,000,000, incurring protests and criticism from the Israeli archaeological community as such objects technically did not belong to a private individual to sell (Kletter 2003). In 1988 the museum paid $550,000 for an ivory pomegranate thought, on the basis of its inscription, to come from the Solomonic Temple in

Jerusalem but which was later discovered to be a Bronze Age object with a fake inscription (Watzman 2005).

The archaeological collection of the Israel Museum is displayed in seven separate galleries organized chronologically. "The Dawn of Civilisation" incorporates the Early Stone Age/Lower Paleolithic period, "The Land of Canaan" focuses on the Early Bronze Age, and "Israel and the Bible" features material ranging from the Early Iron Age, the Late Iron/First Temple/Destruction and Exile period, to the time of Persian rule. "Greeks, Romans and Jews" is devoted to the Hellenistic period, including Herod's reign and the Early Roman/Second Temple period and Revolt and Destruction, and "Under Roman Rule" covers the Late Roman period. "The Holy Land" includes the Byzantine period, and "Muslims and Crusaders" covers the Medieval and Late Islamic periods up to the end of Ottoman rule of Palestine in 1917. The museum also features galleries devoted to neighboring cultures such as Anatolia, Lebanon, Syria, Cyprus, Mesopotamia, Persia, Egypt, Southern Arabia, Greece, and Italy. Other galleries focus on the Islamic Near East, glass, coins, and early Hebrew writing (Dayagi-Mendels 2010). The grounds of the Israel Museum also incorporate the Shrine of the Book, a highly symbolic building housing the Dead Sea Scrolls, material from the Essene community at Khirbet Qumran, and other rare and unique biblical manuscripts such as the Aleppo Codex. Funded by the Gottesman family of New York and designed by architects Armand Bartos and Frederick Kiesler, the structure evokes the shape of the jars in which the scrolls were found, while a black basalt wall contrasts with the white dome of the shrine symbolizing the scroll of the *War of the Sons of Light Against the Sons of Darkness* (Weyl 1995).

Hecht Museum, Haifa

The Hecht Museum, situated at the University of Haifa, was established in 1984 and is based around the private archaeological collection of wealthy industrialist, Reuben Hecht, founder of the Dagon Silos and member of the University of Haifa Board of Governors. A new wing of the museum, inaugurated in 1998, consists of artifacts donated by the Hecht family, objects on loan from the Israel Antiquities Authority, and material from archaeological excavations conducted by the University of Haifa. The museum's permanent archaeological collection is designed to showcase material from the Israelite period and is divided into two sections: one laid out in chronological sequence covering the time span from the Chalcolithic to Byzantine periods and the other organized both chronologically and thematically. The thematic display includes material from Egypt, Cyprus, Etruria, Achziv (an archaeological site on the north coast of Israel), and Jerusalem. It incorporates an important collection of West Semitic seals, as well as weights, Jewish coins, oil lamps, games and toys, jewelry, and the biblical "Seven Species." Also included in the collection are examples of Phoenician material culture, an exhibit devoted to ancient crafts and industries and the Ma'agen Mikhael ancient ship. The museum also houses a collection of French Impressionist painting and Jewish art from the mid-nineteenth to early twentieth centuries.

Bible Lands Museum, Jerusalem

Located on Museum Row, the Bible Lands Museum was established in 1992 and primarily consists of material from the private collection of its founder, Dr. Elie Borowski (Westenholz & Romano 2002). Intended to provide background for the *Bible*, the museum situates biblical Israel within its wider Near Eastern context, both regionally and chronologically. This is echoed in its floor plan in which the gallery dedicated to Israel is situated in the center of the building, while the other galleries encircle it. The museum contains twenty galleries arranged in chronological order and thematically titled, beginning with "From Hunter to Urban Dweller" focusing on the prehistoric era. This is followed by "The Coming of Civilisation" dedicated to southern Mesopotamia in the late fourth millennium and "Symbolic Communication" containing seals. "Literate Voices: The Beginning of Writing" focuses on cuneiform and hieroglyphic scripts, and "The Pre-Patriarchal World" concentrates on religious

life and commerce in the ancient Near East of the third millennium. Next in the sequence are "The Sumerian Temple" and "Old Kingdom Egypt," followed by a gallery displaying Middle Bronze Age weapons. This precedes "The Age of the Patriarchs" outlining the religions of Mesopotamia, Syria, Canaan, and Egypt at the beginning of the second millennium and intended to provide a backdrop for Abraham, and this is followed by a gallery dedicated to the Exodus. Galleries displaying material culture of the Sea Peoples, Kassites, Arameans, and Assyrians flank the central gallery, "Israel Among the Nations," with the galleries assigned to the Persians, the Hellenistic period, Rome and Judea, Roman and Coptic Egypt, and Sassanian Mesopotamia completing the plan.

National Campus for the Archaeology of Israel, Jerusalem

The National Campus for the Archaeology of Israel is an ambitious project scheduled for completion at the end of 2014. Situated on Museum Hill near the Israel and Bible Lands Museums, the National Campus is a 350,000 sq. foot complex designed by Israeli architect, Moshe Safdie. Incorporating design components evocative of the landscape of archaeological excavations in Israel, the proposed building includes an enormous canopy referencing the ubiquitous black shade cloths used at Israeli excavations, and the floors are numbered from the top downwards in the manner of stratigraphical levels. Intended to house the "Archaeological State Treasures" (antiquities excavated in Israel including the most comprehensive collection of the Dead Sea Scrolls), the National Archaeological Library, the National Archaeological Conservation and Restoration Laboratories, and the headquarters of the Israel Antiquities Authority (IAA), it will function as the national center for the storage, conservation, restoration, curation, and publication of archaeological material excavated in Israel. It is envisaged that the center will attract international researchers, provide public education, as well as function as a tourist attraction. To this end, it will house a 250-seat theater, an education center, exhibition galleries, and a rooftop exhibition garden. With an emphasis on accessibility, the building is designed so as most of its space will be visible, including the conservation and restoration laboratories and antiquities storerooms. The IAA scientific archives and the archaeological library will also be open to the public. Financed primarily by private donations, the project also receives some assistance from the Israel Ministry of Finance (Friends of the Israel Antiquities Authority n.d.).

The Occupied Palestinian Territories

Gaza Museum of Archaeology

It is a museum established from the private antiquities collection of Gaza resident and construction company owner, Jawat Khoudary. Attached to a hotel and cultural center situated on the coast near the Shati refugee camp north of Gaza City, the museum opened in 2008. It houses 350 objects dating from the Bronze Age to 1967 and the ending of Egyptian administration of Gaza and is intended to showcase the history and multiculturalism of the Gaza Strip (Al-Mathaf n.d.).

Palestinian Museum

The Palestinian Museum will be situated within the campus of Birzeit University near Ramallah on the West Bank. Designed by Irish architects, Heneghan Peng (also responsible for the Grand Egyptian Museum project), it is intended that the museum will function as the principal authoritative source of awareness and understanding regarding Palestinian history, culture, and contemporary life. Structured around thematic galleries, the museum will focus upon both past and present-day aspects of Palestinian culture. Although based in Palestine, it will also function as a transnational museum with links to international Palestinians centers. The museum will be constructed in two phases, the first expected to be completed by 2014 (E-Architect n.d.; O'Connor 2011).

Cross-References

▶ Authenticity and the Manufacture of Heritage
▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology

▶ Ethnic Identity and Archaeology
▶ Museums and the Distortion of Archaeology for Political Purposes
▶ Nationalism and Archaeology
▶ Regional/Site Museums

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I

Israel: World Heritage Sites

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Introduction

Since accepting the UNESCO World Heritage convention in 1999, Israel inscribed six sites to the World Heritage list (UNESCO 2006: 35). The sites inscribed in the World Heritage list, alongside the sites listed in the tentative list – which numbers 19 additional sites – represent diverse conceptions of national memory. It is possible to divide the sites into three categories: sites reflecting the Zionist modern Jewish heritage, sites reflecting the heritage of minority and non-Jewish groups within Israeli society, and sites reflecting natural heritage. An examination of the various sites demonstrates a common denominator, one that depicts different aspects of the ongoing attempt to form a unified Israeli heritage.

Historical Background

An Attempt to Form a Unified Israeli Heritage

In the first decades after its foundation, Israeli society stood against internal and external threats: the country was in constant military conflict with the neighboring Arab countries and desperately attempted to cope with the overwhelming numbers of Jewish immigrants (tripling the size of the original prestate population) arriving at the country's doorstep – many of them penniless. Israel faced a dire need to coalesce the myriad groups of differing ethnic backgrounds into a united nation adhering to shared ideologies and objectives through the use of unifying symbols. In many cases, archaeological sites and artifacts served as such symbols, allowing the promotion of a new homogenized national ethos (Elon 1997: 37; Hallote & Joffe 2002: 86-7; Feige 2007: 281). However, this process of unification also excluded various minority and marginal groups within Israeli society, Jewish and non-Jewish, from taking an active role in the construction of the new shared identity.

In recent years, with the development of second- and third-generation children of the former immigrant groups and of the original Palestinian population and following Israel's integration of international processes of globalization and social privatization, many minority groups demanded to reconstruct Israeli identity so as to encompass the diverse historical narratives of all segments of society. Moreover, in an ever more globalized society, the ideological need to prove a historic shared identity made way to the utilization of national heritage symbols as economic assets, better adapted to the growing market of global tourism (Bauman 2004; Baram 2007). An examination of the World Heritage list, which – according to its convention – calls for state parties to enlist sites that contribute to a universal heritage (UNESCO 1972), highlights the complex processes that characterize the development of Israeli heritage, maneuvering between the need to empower particular segments of society, the need to preserve a unified cohesive heritage, and the need to depict Israeli heritage as part of a universal one.

Key Issues

Sites Reflecting the Zionist Narrative

Masada

The site, located in the Judean Desert on the rugged cliffs overlooking the Dead Sea, was inscribed in 2001. It was first built as one of the many architectural enterprises that King Herod of Judea (73–4 BCE) planned and built. According to the Roman historian, Josephus Flavius, Masada was also the site where the last stand of the great Jewish revolt against the Roman Empire (66–74 CE) was staged. The siege camp that was built by the Roman army in order to subdue the rebels constitutes the most complete Roman siege camp to have survived to contemporaneity. According to Flavius' report, when the Roman army broke into the stronghold, they found that all the Jewish rebels committed suicide so as to ensure they would die as free men. During the Byzantine period the site served as a Christian monastery of a highly ascetic nature. It is one of the earliest known Christian monasteries (Netzer 1993). In Israel's formative years, the ethos of Masada served as the core for one of the Zionist movement's most significant symbols of the courage and selflessness needed to establish a national home for Jews, characteristics that were presented as contradictory to the passive and homeless exilic Jew (Zerubavel 1995). When inscribed as a World Heritage site, Masada was noted not only for its important role in the construction of a national heritage in Israel's early years but also for its importance in the understanding of the Roman world, both through the examination of Herod's architectural feats and through the knowledge obtained regarding the Roman army through the examination of the siege camp. The site was inscribed to the World Heritage list according to criterions 3, 4, and 6 (UNESCO 2000).

The White City of Tel Aviv: The Modern Movement

Inscribed in 2003, the site consists of the historic core of the city. Generally acknowledged as "the first modern Jewish city of the Zionist movement," Tel Aviv is often described as one of the main symbols of the new Jewish Israeli culture. Accordingly, both the urban plan and the

architectural influences that shaped the city testify to the important dialogue that developed between the Jewish architects who built it. Their dialogue allowed a merging between Modernist architectural styles into a distinct style reflecting the Zionist ideals predominant between the 1920s and 1940s. This had a great impact not only on Tel Aviv's architectural plan but on other cities in Israel as well. To date, Tel Aviv is acknowledged internationally as the city with the largest concentration of buildings built in one of the Modernist styles (Bauhaus) of the first half of the twentieth century CE. The decision to inscribe the city as a World Heritage site was based on criterions 2 and 4. It emphasizes the city's importance as a cultural center of the Zionist community, while relating to Tel Aviv's international importance as one of the only existing concentrations of modernist architectural styles (UNESCO 2002).

The Biblical Tels: Megiddo, Hazor, and Beer Sheva

Inscribed in 2005, the archaeological tels of Megiddo, Hazor, and Beer Sheva are considered as most important in terms of their Biblical heritage. Since the early days of Israel, these sites became an important part of the Zionist narrative representing a yearning for the Jewish return to the Land of Israel. The tels – having been resettled time and again due to their strategic locations – span a time period of at least 3,000 years. Most important are the strata dated to the Bronze Age and the Iron Age – generally acknowledged as the time periods in which the biblical period occurred. While the strata dated to the Bronze Age are assumedly attributed to the Canaanite period, the strata dated to the Iron Age are attributed to the biblical Jewish Kingdom of Judah. In recent years, all three sites have been at the focus of a public and scientific debate regarding the reliability of the Biblical stories. This debate has become especially fierce following the introduction of the "low chronology" theory – claiming that archaeological evidence does not support the claim that a united Kingdom of Israel existed as described in the Bible (Finkelstein 1996).

As the three sites are connected to many biblical stories that serve as cultural pillars of all monotheistic religions, they were inscribed as World Heritage sites not only due to their importance in Jewish tradition but also due to the role they play in monotheistic religions. In addition, they were also inscribed due to their stratigraphy which exemplifies the cultural continuity that existed between the Bronze Age and the Iron Age. The sites were inscribed according to criterions 2, 3, 4, and 6 (UNESCO 2003).

Tentative Sites

Sites appearing in the tentative list that reflect the Zionist narrative are the ancient triple-arched gate at Dan; early synagogues in the Galilee; Degania and Nahalal; Bet Shearim; Mt. Zion, Jerusalem; Timna; and the region of the caves and hiding (UNESCO 2010: 10-60).

Sites Reflecting the Heritage of Minority Groups

The Old City of Acre

Inscribed in 2001, Acre was added to the World Heritage list due to the exquisite conservation of the city built by the Crusaders (1104–1291) and during the Ottoman period (1517–1917). Although Acre has been inhabited for the last 4,000 years, only during the Crusader period and the Ottoman period did the city serve as an economic and political center.

During the Crusaders period the city was first captured by Baldwin 1st, king of the Crusaders, Kingdom of Jerusalem. The city quickly became an important port city connecting the Kingdom of Jerusalem with the European commercial centers. In its heydays it was second in importance only to the capital Jerusalem. Following the debacle at Karnei Hittin, when the Crusaders were vanquished from the country by the Muslim armies of Saladin (1174–1193), Acre was destroyed only to be built again 4 years later as the capital of the Second Crusaders kingdom following its recapture by King Richard I (Lionheart) (1189–1199). After the Mameluke conquest of the land of Israel, Acre was again destroyed and abandoned until the Ottoman Empire conquered the region. During the eighteenth century Acre became an important political and economic center and continued to serve as such until the British

conquest of the region in 1917. In today's Israel, Acre became one the most important mixed, Muslim and Jewish, urban centers.

The site was inscribed to the World Heritage list according to criterions 2, 3, and 5. Its importance lies in the rare preservation of cities built during the Crusaders period and the Ottoman period and the rare integration between the architectural styles of both periods. Moreover, the archaeological excavations conducted in the city demonstrate the use the Ottomans made of the remnants of the Crusaders city in order to build their own one (UNESCO 2001).

The Baha'i Holy Places in Haifa and the Western Galilee

The site was inscribed in 2008. The region of the Western Galilee, and especially the cities of Haifa and Acre, is the location of the most holy places for the Baha'i religion, which was founded in 1844. Most notable among them are the shrines of the two founders of the faith: the Shrine of the Bahá'u'lláh in Acre and the shrine of the Báb in Haifa (Smith 2008). The site is divided into 11 distinct areas in Haifa, Acre, and the Western Galilee. Each area includes a varying number of sites. Due to the fact that the Baha'i religion is relatively new, it is possible to examine different stages in the religion's development. Thus, the conservation of the site can be understood as important not only to the followers of the faith but to all of mankind. The site has been inscribed under criterions 3 and 6 (UNESCO 2008).

The Incense Route: Desert Cities in the Negev

The site was inscribed in 2005. It includes the northern segment of the Incense Route which connected between the Arabian Peninsula and the Mediterranean Basin. It was used mainly for the transportation of frankincense and myrrh – aromatic resins which were processed into prestigious perfumes (Amar 2003). The urban and economic growth that occurred during the Hellenistic and Roman periods and peaked during the Byzantine period, in Palestine, allowed for the growth of prosperous desert cities along the Incense Route (Fabian 2005). In the past, their construction was attributed to the Nabataeans, a nation of nomads whose center was in Petra. Their knowledge concerning methods of survival in the barren desert assumedly allowed them to monopolize the northern and most important segment of the Incense Route. In a relatively short period, they abandoned their nomadic lifestyle in favor of a sedentary one, quickly becoming an important political and military force (Negev 1979). During the first decades after Israel's foundation and despite their possible representation of a past heritage of the native Bedouin population, these sites became an important model of the Zionist effort to resettle the barren desert, often describing the Nabataean culture as a continuation of a previous Judean civilization (Shiff 2011). Although contemporary research questions whether the Nabataeans had the political organization required for the control of a territory spanning between Damascus and the Sinai Peninsula (Elliott 1996; Fabian 2005), the four desert cities – Avdat, Mamshit, Shivta, and Haluza – along with other military fortresses along the Incense Route have been inscribed as part of the World Heritage site according to criterions 3 and 5, emphasizing the opinion that these cities serve as a testimony to an extinct Nabataean civilization (UNESCO 2005).

Tentative Sites

Among the sites named in the tentative list reflecting the heritage of minority groups in Israel are several connected to the history of the Christian religions (the Journeys of Jesus and the Apostles; Sea of Galilee and its ancient sites) and other that are related to the Muslim and Crusader period (Hurvat Minnim; Arbel; White Mosque in Ramle; and the Crusaders Fortresses) (UNESCO 2010: 10-60). Within this category there are also the prehistoric sites of extinct civilizations such as Ubeidiya, Gesher B'not Ya'acov, Sha'ar Hagolan, and Mt. Carmel; Bet Shean/Decapolis; Caesarea; and the frontiers of the Roman Empire.

Sites Reflecting Natural Heritage

Israel has not yet inscribed any natural heritage sites. Nonetheless two sites are listed in Israel's tentative list: the birds' migratory routes in the

Hula Valley and the unique geological formations of the Makhteshim region (UNESCO 2010: 10-60). The lack of sites in this category is perhaps symbolic of the way Israel – a land rich in diverse geographical and natural phenomena – is seen, both internally and by the international community, as one whose heritage is primarily dominated by ideological and historical characteristics.

Future Directions

The sites comprising the Israeli World Heritage list are an edifying test case to the continuing efforts of the Israeli society to reconstruct its national memory and heritage according to changing ideologies and aspirations. While in Israel's formative years its national heritage was constructed through the use of sites that promoted a homogeneous memory, the World Heritage list serves as a testimony to an attempt of diversifying society's national heritage and to contend with the processes of globalization and privatization of the public sphere. However, the examination of the World Heritage sites and of the people comprising the Israeli World Heritage Committee can also alert to the many groups – such as Israeli Palestinians but also different Jewish ethnicities – that still have no active role in the discourse regarding the changes that should conspire in Israel's heritage in the coming years. As Israeli society continues to develop, a continued examination of the changes in the sites comprising the Israeli World Heritage list may be most edifying as to the changes occurring in Israeli society.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Heritage and Archaeology
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Heritage Tourism and the Marketplace
- ▶ Marketing Heritage
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Italy, Sicily, Malta, and the Lipari Islands: Prehistory

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Introduction

The peninsula of Italy stretches from the Alpine mountain regions of the north to the emphatically Mediterranean maritime and mountainous regions of the south. In the presence of the Apennine mountain range, the full length of the peninsula added an important element of verticality that distinctively affected the response of prehistoric peoples. A further geographical variation was provided by the different sizes of the three island groups of Sicily, Malta, and the Lipari islands. Thus, Italy provides a good geographical cross-section against which to measure human response.

Definition

The choice of Italy as a separate geographical region is in many ways modernist. The unity of the Italian peninsula dates to the Roman Republic and the reestablishment of that unity to the Unification of 80 BP (where BP is the standard fixed point of 1950 in all radiocarbon chronologies appropriate for prehistory the subject of this essay). During prehistory, the peninsula is one of three major southern peninsulae in Europe that cut through a regional diversity, based on environmental variation in early prehistory and emerging political identities in later prehistory. To this we can add the islands of Sicily, Malta, and the Lipari islands which have similarly slipped in and out of the definition of what constitutes Italy.

Prehistory can be defined in Italy as starting some 800,000 years BP on the peninsula, but on the islands only in the late Upper Paleolithic (Sicily) or the Neolithic (Malta and the Lipari islands). In many regions, prehistory effectively continues up to and into the period of the Roman empire, because writing about many peoples, and not only the Etruscans, took the form of an external "ethnography" by the Romans and Greeks. However, in conventional terms, most Italian archaeologists see prehistory ending with the Bronze Age, or at the very latest the first Iron Age, that is at about 2700 BP, reinforced and symbolized perhaps by the foundation of the famous pre-colonial settlement of Pithekoussai (Ischia) by the Greeks. For this reason, this contribution does not cover in any detail the last four millennia Before Present, since they are

generally inserted within protohistory by Italian archaeologists.

The chronological definition of prehistory has traditionally been based on the phases of material culture employed elsewhere in Europe (with the addition of the term Epipaleolithic). These material culture schemes have only been gradually replaced by more absolute methods of dating, particularly in the fourth to second millennia BP where typological studies tethered in historical dates have been employed. For the fourth to second millennia BP, the gradual implementation of dendrochronology largely outside the immediate Italian area has gradually affected the traditional dates based on imports. In the Italian peninsula, the Lower Paleolithic marked by the employment of the earliest human tools can probably be dated to something in the order of 800,000 years BP. More complex industries, generally characterized as Mousterian, developed in Italy over the period 250,000–28,000 years BP. This is, in turn, followed by Upper Paleolithic blade-dominated industries and a major feature of the Italian peninsula, Epipaleolithic industries, that generally replace the designation Mesolithic in other parts of Europe.

Key Issues and Current Debates

Hunting and Gathering

There are two sources of evidence for the early occupation of the peninsula: skeletal remains and stone tools. The earliest hominid remains in the Italian peninsula have been dated to 900,000–800,000 years BP at Ceprano (Frosinone), at a similar date to finds in Spain. However, the earliest human pebble artifacts from Monte Poggiolo (Forli) have been somewhat controversially dated to as much as one million years BP. Many secure Acheulean hand axe sites follow in locations such as Venosa (Basilicata), Fontana Ranuccio (Lazio), Marina di Camerota (Campania), and Castel di Guido (Lazio). A particularly well-research site dating to 700,000 years BP is that of Isernia la Pineta (Molise) characterized by more varied stone assemblages (such as denticulates) and faunal remains of animals of varied size (elephant, rhinoceros, bison, deer, bear, and hippopotamus) on possible living surfaces. This site points to relatively systematic and organized hunting activities even at this early date.

The Mousterian industries are marked by some initial regionalization of styles, whose study has tended to dominate research to the detriment of the study of economic and other issues. Two stylistic provinces have been noted north and south of the modern city of Rome. To the north, there were industries rich in razors and to the south a so-called Pontine micro-industry employing pebbles as raw materials. These regional traditions appeared to have become more uniform over time, with the employment of more denticulates, grading into forms more typical of the Upper Paleolithic (burins, scrapers, etc.). In some Ligurian sites, there was the beginning of the evidence of raw material procurement from sources of as much as 50 km away, a tendency that became much more emphatic in the subsequent Upper Paleolithic. All this related strongly to increasing sizes of hunting territories and social communication.

Some evidence has emerged of structured activities for this period. At the Mousterian site of Grotta di Fumane (Verona), a spatial correlation has been shown between hearths and faunal remains, suggesting a systematic process of animal consumption. At Riparo di Molare, a possible hut associated with animal bones and stone tools has been located in one level and in another the deliberate placement of a bison head, which the excavators suggest related to ritual activity.

The arrival of anatomically modern humans probably occurred in the Italian peninsula at about the same time, 40,000 years BP, as in the rest of Europe. In other parts of Europe, the Chatelperronian industry appears to have been a stone tool industry which responded to the encounter between Neanderthal and these new populations. The Uluzzian industry of burins, razors, lunates, and scrapers may have taken that role in the Italian peninsula, although the precise chronology has not yet been established. The density of human occupation

within the peninsula was nevertheless still very low, so low that it would have been subject to disruption by early Vesuvian volcanic activity at 36,000 years BP.

The full early Paleolithic or Aurignacian in Italy has been divided into three regional styles accompanied by increased population density and increased exchange of raw materials above 100 km from the source: one centered on the Veneto, a second "classic" type, and a third located more towards the south. Uncontroversial hut structures with hearths have been found in the Grotta di Fumane, and some possible art of the human form dating to as early as 36,000 BP has been also found in the same deposits. The subsequent Gravettian is best known from the site of Grotta Paglicci in the Gargano of southern Italy. The changed lithic styles were accompanied by poorly provenanced female figurines, from both the north and south of the peninsula, and a well-provenanced incision on stone of a wild goat from Grotta Paglicci. These changes in material culture were built on a diversification of economic activity, with regional specializations such as shellfish collecting (e.g., Riparo Mochi (Liguria) or bullrush processing (e.g., Bilancino near Florence).

From about 20,000 years BP, much of the Mediterranean, including Italy from the Veneto to Liguria, Lazio, and Puglia, was characterized by the Epigravettian, in two forms, one dominated by foliates (leaf-shaped tools) and another by *cran* (shouldered) points. This style of lithics continued right down to 10,000 years BP, characterized by geometrics, notably from the Grotta Romanelli of the Salento area. These late Upper Paleolithic lithic styles are contemporary with a considerable increase in formal burial, accompanied by shell headdresses, and multiple inhumation burials, most notably in the Liguria region, but also at Grotta Paglicci in Puglia. The same period in Italy was accompanied by a veritable explosion in portable art incised on bone and stone that extended throughout the peninsula, depicting both human and animal forms. Engraving on cave walls is best known in Sicily both from the Palermo area (Grotta dell'Addaura on Monte Pellegrino) and in the far west of the island in the Cala dei Genovesi caves. The same range of explanations have been advanced for these expansions of artistic expression as for the classic cases of continental Europe, but the main underlying reasons are probably the macro-context of increasing population densities (requiring statements of identity) and the micro-context of more personalized locales of rites of passage which, when taken together, had the effect of making creativity more visible and apparent, even if the biological capacity had been long standing.

Agriculture

The transition towards agriculture is traditionally preceded and sometimes paralleled by Mesolithic industries in much of Europe – although this terminology is largely replaced by the Epipaleolithic or Epigravettian in Italy, some of the same changes are visible in important sequences such as Grotta dell'Uzzo in Sicily. In this sequence, a broad spectrum of hunted and gathered resources including deer, wild boar, and shellfish but also open water fish have been identified. In the north, seasonal variations by altitude have been detected in the Adige valley, concentrating on various mammals and perilacustrine fish, eggs, and turtles in the winter months, while hunting upland deer and wild goat in the summer. All these changes were accompanied by much greater population densities drawing on a wider range of resources. These changes were accompanied by an increasing need to mark territorial identity that showed material form in the continued high frequency of burials in locations such as the Trento region, a high-altitude (2000 m.a.s.l) burial in the Veneto region at Mondeval de Sora, and Grotta dell'Uzzo (at least 10 burials).

The adoption of agriculture is generally equated with the appearance of pottery as a proxy for other developments. In broad terms, our understanding is based on radiocarbon measurements in the same context as early impressed pottery styles. Employing these data, the Adriatic and Ionian seas were the main arenas for interaction with the Eastern Mediterranean that led to earlier development in Sicily, southern

Italy, and the Adriatic coast of the peninsula (late ninth millennium BP) than the northern Tyrrhenian coast, Sardinia, and Corsica (early eighth millennium BP) or northern central areas of the peninsula (later eighth millennium BP). The main concentrations of early agriculture were to be found in the coastal plains (assisted by lower sea levels), peri-lacustrine zones, and alluvial fans that had lighter workable soils and higher water tables. As agriculture developed in sophistication and diversification, more permanent occupation of upland areas became possible. There has been much debate over the process of take-up of agriculture ranging from externally derived innovation to local development. After a phase of emphasis of locally derived models based on sites such as Grotta dell'Uzzo in Sicily, the balance appears to be moving towards an emphasis on externally derived innovation. As radiocarbon dating develops in sophistication, evidence is emerging at a European level that the adoption of agriculture may have been more perilous than initially thought, accompanied by phases of boom and bust. This pattern may also have applied to the Italian peninsula.

The early Neolithic of the south of Italy is dated by radiocarbon dates to 8050–7750 calibrated BP on the basis of sites in central/southern Apulia (Torre Sabea, Pulo di Molfetta), Basilicata (Rendina and Trasano), and Calabria (Favella). There is also some evidence of penetration into the fertile plain of the Tavoliere (Masseria Candelaro and Coppa Nevigata) at this early date. Among the pottery, there is some distinction into coarse and fine forms, with a prominence of both footed and round-bottomed forms, of often ovoid or tronco-ovoid shape, frequently decorated with impressions of finger, nail, and shell (hence the term impressed pottery). The lithics are blade industries showing strong affinities with Mesolithic-type microlithic traditions. Crops include einkorn and barley. Ovicaprids appear to be dominant among the domestic animals, particularly at sites such as Torre Sabea in Apulia. At other sites like Favella, while there is a similar prominence of ovicaprids, there is a significant presence also of wild animals, species from wetlands and fish. The flint mine of Defensola demonstrates that resource procurement was increasingly organized on a more systematic basis. The internal organization of sites such as Torre Sabea and Rendina included enclosures for animals and hut structures for humans. In the ritual sphere, there is some evidence of intra-settlement burials and figurines.

The later phases of the early Neolithic of southern Italy (c. 7650–7350 BP) show a differentiation of styles perhaps suggestive of the emergence of regional identities, named, in traditional mode, after the main excavated sites (e.g., Lagnano, Masseria La Quercia, and Matera-Ostuni). These regional identities were accompanied by increased exchange activity (notably of Lipari obsidian), increased size, and boundedness of sites (e.g., Lagnano da Piede reaching 5 ha in size with five enclosure ditches). By contrast, burial practices remained relatively low key, at least in their material remains, taking the form of small numbers of inhumations in structures such as ditches and pits, although some limited collective burial has been found at Diga di Occhito (12 individuals).

The early Neolithic of central Italy follows that of southern Italy with a time lag of some half a millennium, commencing on the coast (c. 7550 BP) and then reaching the inner basins of the peninsula. In the later phases such as Catignano on the Adriatic coast, decorative styles became more regionally distinctive. Catignano itself remains one of the more extensively excavated sites over an area of some 200 m^2, revealing superimposed square huts of reasonable size (70–80 m^2). The site is also typical in the presence of a small number of burials in ditches. The Tyrrhenian side of the peninsula was characterized in this early period by impressed and linear pottery as well as by the less decorated Sasso-Fiorano forms. Settlement organization is best known from the two interdisciplinary studies of Marmotta on Lake Bracciano and San Marco on an alluvial fan in the enclosed intermontane basin of Gubbio; both point to the importance of lacustrine and riverine resources in these early periods. At the same time, the two sites show the

substantial presence of domesticated species but also that local communities drew on a wider range of both hunted and collected wild resources.

The early Neolithic of northern Italy was not substantially different from that of the center, although some of the coastal Ligurian sites of Arene Candide may have had an earlier presence of c. 7750 BP. Some regional styles such as that of Vho were distinctive, whereas others such as Fiorano shared elements with the central peninsula. One particularly well-preserved settlement is that of Lugo di Romagna, detected under 14 m of alluvium. Wattle and daub structures were uncovered belonging to a 70 m^2 rectangular structure, with flooring and hearth intact, as well as a dog's foot which may have been a foundation deposit. There is some evidence of expansion away from the primary lowland zones most suited to early agriculture. In the Alpine foothills, at altitudes of up to 800 m, open and rockshelter sites of the Gaban style have been discovered that combine cereal, legume, and sheep/goat with deer.

The Middle Neolithic of southern Italy is denoted by the very distinctive painted and plastic (handle) styles of Scaloria and Serra d'Alto that was followed in the later Neolithic by the Diana (indicated broadly by a red color and trumpet handles) into the later seventh millennium BP. The Tavoliere plain shows the trends towards larger and more densely distributed ditched enclosures. The occupied part of the largest Passo di Corvo enclosure was of at least 28 ha (although estimated to contain an upper limit of only 300 individuals). In addition, this central enclosure was surrounded by much more extensive ditched boundaries which must have required considerable manpower to construct. Rectangular household structures within had an area of about 30 m^2. These trends towards larger settlement areas were accompanied by the first deliberately constructed funerary structures. The most notable of these is that of Arnesano where a small tomb was cut from the bedrock to house a crouched inhumation accompanied by a rare figurine where identity was focused on a rudimentary head. These more formal funerary practices were broadly contemporary with the structured use of caves (painted walls and deliberate deposits), such as Porto Badisco, which were most probably employed for male (?) rites of passage.

The Middle Neolithic of central Italy (from c. 6450 BP) was characterized by the distinctive Ripoli style of pottery on the Adriatic coast, parts of Umbria, and Lazio accompanied also by the presence of arrowheads. The later Neolithic of central Italy, although present, appears to lack the definition or density of other regions. The Middle Neolithic of the north was marked by the distinctive Square Mouth Pottery style (Bocca Quadrata) that also brought a denser occupation of both higher-altitude and wet lacustrine areas (most notably Fimon-Molino Casarotto).

The islands surrounding the Italian peninsula generally followed similar trends during the Neolithic, and many of smaller islands (Malta, Lipari) were first occupied during this phase. Until about 5950 BP, the stylistic trends of Corsica, Sardinia, Sicily, Malta, and Lipari could be fairly closely linked into those already observed for the peninsula itself. The ditched villages of eastern Sicily had a different cultural name, Stentinello, but the populations of the plain of Catania exhibited a similar phenomenon of increasing density and boundedness to those already noted for the plain of the Tavoliere. However, Sardinia had already begun to exhibit trends towards a separate regional identity in the Bonu Ighinu and Ozieri styles, a development that was only noted emphatically elsewhere within Italy in the Copper Age. In these phases, distinctive figurative art and funerary culture began to emerge that indicated the construction of new identities taken to an even greater extreme by the island of Malta in the late sixth and early fifth millennium BP.

Emergent Identities

In the Chalcolithic, in spite of the name of the period – Copper Age – it is not so much the use of copper, which is almost invisible archaeologically, but the prominence of funerary evidence over settlement evidence that is most pronounced. A series of local identities emerge, more distinctive and materially more visible in some locales, than in others.

In some islands, notably Malta and Sardinia, ritual complexes emerge. In Malta, this takes the form of large complementary monumental complexes for the living and the dead, reaching a climax in the early part of the fifth millennium BP before falling into a disuse apparently decided by the local populations themselves, possibly under some ecological stress, rather than a response to invasion from outside as some early models suggested. In Sardinia, the monumental complex of Monte d'Accoddi in the north of the island dating from about 5650 BP is the most conspicuous example, among a broader proliferation of largely funerary ritual. On the island of Sicily, there are regional styles, principally known from funerary evidence because of the emphasis of scholarly research, such as San Cono-Piano Notaro, Conzo, Piano Conte, Serraferlicchio, and Malpasso, but the fluorescent ritual complexes were not so prominent. Field survey when undertaken such as in the uplands around Troina has found the corresponding evidence for settlement, but this remains under-researched. At the transition between the Chalcolithic and the early Bronze Age, the presence of Bell Beakers added to the range of emergent identities.

On the peninsula itself, the traditional substantially funerary styles can be reinterpreted as nodes of identity focused on differentiated variations of performative action, which principally, but not exclusively, materialize in death rituals. In the south, there is the fundamentally funerary identity of Laterza. In the area around Paestum and more broadly the region of Campania, there is the funerary identity of Gaudo, distinguished by small collective tombs with leather-like skeuomorphic vessels and large daggers in flint and copper. In central Italy, there were the collective tombs of Rinaldone, containing copper daggers and thin-necked ceramic vessels. In the Brescia region of northern Italy, there were the collective tombs of Remedello, containing another codified ritual of inhumations with flint and copper daggers. This was not the only expression of identity in precisely defined locales. In the Trento region (e.g., at Arco), in the Aosta region, and in the Luni region of northern coastal Tuscany, there were concentrations of menhir figures depicting human identities, and in the Val Camonica and Valtellina regions, rock art that filled a similar role. In one unique case, we have a well-preserved survival of one individual, the iceman who moved in these worlds giving a detailed but not necessarily representative insight into the lifestyles of populations in the course of transition between the world of the Neolithic and that of the Metal Age. The arrival of more widely used metal brought an end to this type of display of identity and brought another that was based much more on economic fundamentals, accumulation, and corresponding deprivation, a form of expression of identity that took a good millennium or more to put in place.

New Economies

The development of the full Bronze Age in the course of the fourth millennium BP brought a new type of both portable wealth (bronze itself) and wealth tied to the land (the arboriculture of Mediterranean polyculture (grain, vine, and olive)). Both these features took off relatively slowly compared with the Eastern Mediterranean and more slowly in central Italy than in the south. The terramare of northern Italy did exhibit an intense development in the first half of fourth millennium BP, but at about 3150 BP, the population appears to have suffered a substantial decline. The greater storage of wealth may partly explain the more prominent materialization of nuraghi in the Bronze Age of Sardinia and the distinctive cultural phases of Sicily. A further factor was increased connectivity with the Eastern Mediterranean. Sardinia was clearly in regular contact with Cyprus at least by the recent Bronze Age as shown by the prominence of ox-hide ingots. In Sicily, the settlements of the Thapsos phase which succeeded the villages and cemeteries of Castelluccio were clearly in contact with the Mycenaean world. However, central Italy was substantially outside the range of these developments, and only in the Final Bronze Age did a vibrant village life take off in a substantial way, with considerable mobilization of bronze technology. It was this

momentum that continued into the periods of state formation that followed, resisting the colonization that affected southern Italy and the surrounding islands. Recent work has shown the fundamental importance of the Final Bronze in establishing the sociopolitical context that was receptive to entanglement with other parts of the Mediterranean in the early stages of the third millennium BP.

Future Directions

Overall Trends and Debates

The key issues and current debates that transcend these chronological stages center on the reconstruction of subsistence, the measurement of interaction, and the emergence of regionalism, first as a statement of identity and then as a projection of political hierarchy. Until the 1980s, much work on Italian prehistory was focused on the construction of local culture histories. In the current century, much work is emerging which is making major strides on all these issues. Our understanding of subsistence can now follow the transitions from hunting and gathering through the differential take-up of agriculture to the political orchestration of Mediterranean polyculture at the close of prehistory directed towards feasting on the one hand and the less recognized mobilization of infrastructural support of large urban populations on the other. In parallel, scholars can follow the increasing potential levels of interaction as the use of the sea around the peninsula (and the major rivers through the peninsula) moved from simple technologies that carried relatively small quantities of material while hugging the coast to large-scale transport of subsistence products often moving out of sight of land. During the course of these technological developments that included the incorporation of the production and use of bronze and iron, the massively increased infrastructural support led to the emergence of regional differences, specializations, identities, and ultimately political divergence. In the south of the peninsula and the major islands, interaction with Greek and Phoenician communities became a substantial part of the political dynamic. In the center and north of the peninsula, independent but entangled urbanisms emerged that rivaled the size and political power of those from the East. One of these, the Latin and then Roman, ultimately became master of much of Europe, by a more effectively implemented political trajectory that combined superior centralization, incorporation of subgroups, and physical force.

Cross-References

► Nuragic Culture and Architecture (Bronze Age to Iron Age)

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Italy: Medieval Archaeology

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Introduction

Modern medieval archaeology in Italy developed around the journal *Archeologia Medievale*. This was founded by Riccardo Francovich and Tiziano Mannoni in 1974, in collaboration with historians and geographers. Within the academy, the discipline merged with Christian Archaeology in 1999; the field of Christian Archaeology dates from the nineteenth century. The status of research can be evaluated not just from the many issues of the journal, but also from the proceedings of the six conferences organized by the *Societa' degli archeologi medievisti italiani* (Society of Medieval Italian Archaeologists).

Definition

In Italy, a variety of research fields collectively constitute "Medieval Archaeology": urban archaeology, archaeology of architecture, archaeology of settlements, archaeology of landscapes, archaeology of churches, and burial archaeology. These are fields of research that can be united through transdisciplinary and diachronic perspectives to constitute the more general field of "Postclassical Archaeologies," which also happens to be the name of a journal founded in 2011.

Key Issues/Current Debates/Future Directions/Examples

The key issues in the medieval archaeology of Italy have been determined in collaboration with historians. Indeed, historians have arguably dictated the main lines of research, and to a degree still continue to do so; there has been limited engagement in medieval archaeology in Italy with archaeological theory, although recently, inspired by English archaeology, there has been some debate about processual and postprocessual archaeologies. Those key issues or themes might be listed as follows:

(a) The study of abandoned settlements (especially popular in the 1970s), inspired by English research on "deserted villages": This line of study has been developed especially in Tuscany by Riccardo Francovich, particularly through his research on "second-generation" (tenth-twelfth century) castles.
(b) The transformation of the city between Roman times and High Middle Ages: This was the subject of lively debate between historians and archaeologists in the 1980s, and the debate continued during the following decade within the *Transformation of the Roman World* project, conducted under the auspices of the European Science Foundation.
(c) The "late-ancient" fortifications (fifth-sixth centuries) of eastern Italy and the High Medieval fortifications (sixth-eighth centuries) of southern Italy, which are connected to these topics, have been topics of debate on the militarization process in High Medieval society.

(d) Land-exploitation systems, from the villas of the Roman period to the medieval villages, and their relationships to the evolution of aristocracies.
(e) The different rituals of death, from an interest in burials with grave goods to a more inclusive analysis of the medieval funerary world, especially in relation to the new populations (such as the Goths and Longobards who settled in Italy between the fifth and sixth centuries) and to variations of the social organization right through the middle ages.
(f) The processes of Christianization, especially with respect to the distinctions between institutionalization (the creation of Episcopal centers and the network for the healing of souls in the countryside) and private euergetism (private funerary chapels, eremitism).
(g) Trade as manifest especially in ceramics (types of amphora and sigillata) between East and West, and regionally.
(h) The transformation of architecture from the end of Roman period to the High Middle Ages huts, with a special focus on the revival (between the eleventh and twelfth centuries) of residencies of quality; relevant periodicals include *Archaeologia dell' architettura* (from 1996) and *Arquelogia de la Arquitectura* (from 2002).
(i) Craft and technology, especially in diachronic perspective.

The Transformation of the Roman World project has been especially important in Italian medieval archaeology. Current thinking, for example, deriving from that project and subsequent research, is that the end of the period of Roman villas and the emergence of High Medieval villages can be interpreted in two ways. According to the first interpretation, an early development of the villages by free farmers took place starting at the end of the sixth century following a phase of radical deconstruction of the Roman system between the fifth and the middle of the sixth centuries (Francovich & Hodges 2003; Valenti 2004). The second interpretation is more complex, as it presents the survival of the scattered settlement next to more centralized settlement, all in a context of strict control of the territory and within the creation of new *central places*, especially the castles of the "first generation" (Brogiolo & Chavarria 2005; Volpe & Turchiano 2005). Another topic, stimulated by Michael McCormick's (2001) view of Venice as one of the most important pole of trade between East and West in the High Middle Ages, pertains to the role of Italy in the trans-regional economic system; new excavations in Ravenna, Comacchio, and Venice have allowed new hypotheses to be advanced about the quantitative values of the trades between Byzantines on the coasts and the people of the hinterland of the Lombardic Kingdom (Augenti 2010). Medieval archaeologists have also made a remarkable contribution to the study of the Medieval Church (Chavarria Arnau 2009), specifically through work at places like San Salvatore di Brescia and San Vincenzo al Volturno, and through their participation, together with other national partners, in the *Corpus Architecturae Religiosae Europeae*.

The systematic application of archaeometrical, zooarchaeological, and paleobotanical techniques, the development of physical-anthropology research (including DNA analysis), and the emergence of new remote sensing technologies (such as LiDAR) have the potential to enrich the study of medieval archaeology in Italy.

Cross-References

- ▶ Architecture, Roman
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Churchyard Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Europe Incastellated: Medieval Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Urban Archaeology

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Jaffa and the Jaffa Cultural Heritage Project

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Introduction

Jaffa (Canaanite *Yapu*; Heb. *Yafo*; Gk. *Joppa*; Ar. *Yafa*) is situated south of the modern city of Tel Aviv on the coast of Israel between Caesarea Maritima and Gaza, about 60 km northwest of Jerusalem. The site consists of an ancient tell of approximately 3 ha built on a kurkar sandstone ridge overlooking the Mediterranean Sea and during various periods also featured a sprawling lower city of as much as 6 ha. As Jaffa is an important site and port along the coast of the southern Levant, its occupation reflects nearly every major period from the Middle Bronze Age to the present, while the lower city experienced intermittent periods of substantial growth from the Hellenistic period onward.

The mound's stratigraphy was accessible following the abandonment of buildings in the center of the town during the British Mandate (1917–1947). The Ottoman period buildings on the upper part of the mound were destroyed or fell into ruins as a result of the British counterinsurgency in 1936 known as Operation Anchor (Fig. 1). Consequently, the abandonment of structures on the mound of Tel Yafo permitted archaeological exploration, which began in 1948 under the auspices of the Israel Department of Antiquities and Museums and has continued to the present by various research institutions including the University of Leeds (1952), Tel Aviv University (1997, 1999), and the University of California, Los Angeles (UCLA), in partnership with the Israel Antiquities Authority (IAA) under the auspices of the JCHP (since 2007). Owing to antiquities legislation salvage excavations since 1985 have also been carried out by the IAA (and more recently also by subcontracting Israeli universities) primarily along the mound's northern, eastern, and southern slopes in what is properly characterized as the lower city.

Taken together these excavations reveal a number of important discoveries connecting Jaffa's cultural heritage with that of the coastal plain, highlands to the east, and the Mediterranean basin as well as Europe. The earliest evidence for occupation at the site is dated to the late fourth millennium or the early Bronze I (c. 3500 to 3000 BCE), which consists of ceramic remains. It is possible that some of these ceramics are also indicative of the transition from the late Chalcolithic. During the Middle Bronze Age (c. 1900 to 1530 BCE), the site was inhabited by a population characterized as Amorite, who constructed the site's first defenses, an earthen rampart crowned by a mud-brick wall. Following the transition to the Late

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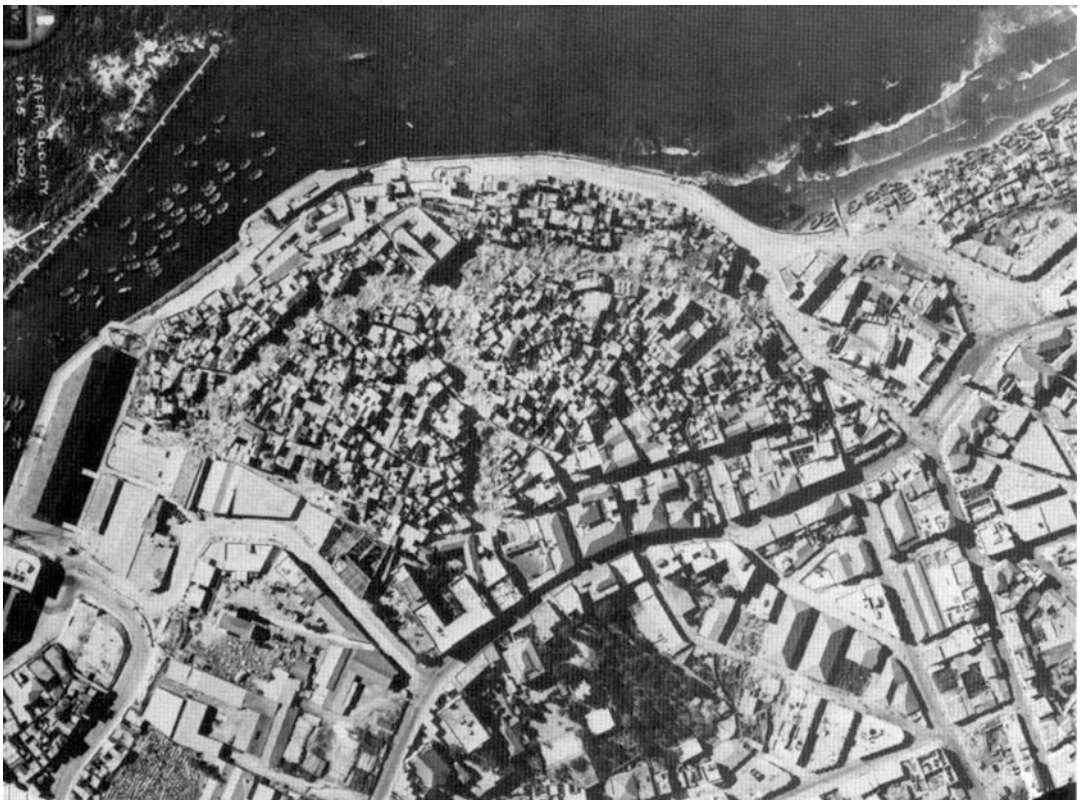

Jaffa and the Jaffa Cultural Heritage Project, Fig. 1 Aerial photograph of the Jaffa's old city illustrating the effects of Operation Anchor, 1936. Note that the shape of the destroyed area on the mound resembles an anchor

Bronze Age (c. 1530 to 1460 BCE), the site was inhabited by an Egyptian garrison from c. 1460 to 1130 BCE (Late Bronze to Iron I; Burke 2011b). Textual evidence from Egypt is now amplified by Egyptian New Kingdom material culture including both imported and local Egyptian ceramics, epigraphic finds such as inscribed architectural fragments and scarabs, as well as other *Aegyptiaca* (Burke & Lords 2010). While the evidence for the Iron Age in Jaffa is piecemeal both on the mound and in the lower city, perhaps owing to the extensive and disruptive building efforts of the Persian Period, a robust collection of ceramics from the Iron I, including Philistine bichrome, and successive phases of the Iron II (c. 980 to 539 BCE) suggest a maritime port very likely playing the role mentioned in the Solomonic narrative of the Hebrew Bible, notably, as an entrepôt to inland polities such as Judah and those in Transjordan. In contrast to the Iron Age remains, the Persian Period (c. 539 to 332 BCE) in Jaffa is the first period during which both the mound and lower town were intensively occupied with nearly every excavation area yielding architectural remains from this period. These remains suggest, as at contemporary ports to the north, such as Dor, and to the south, such as Ashkelon, that the port played an important commercial role during the Persian Period, notably from the mid-fifth century when the city fell under Sidonian control.

Of comparable grandeur and physical extent, the remains of Hellenistic Jaffa reveal a cosmopolitan city caught in the struggle between Hasmonean rulers waging an insurgency against Seleucid rule during the second century BCE as evidenced in destruction levels of this period (Notley 2011). The early Roman period saw Jaffa's importance as a port eclipsed by Herod's construction of major port facilities at

Caesarea Maritima on the coast to the north of Jaffa. Nonetheless, the city persisted and even maintained a Jewish identity, which may have emerged during the Hellenistic period, if not earlier. This is suggested by, among other things, the remains of a Jewish patrician's home, which was identified on the basis of the remains of Judean stone drinking vessels. Ample evidence of Jaffa's continuous and robust habitation during the Late Roman and Byzantine periods is present throughout Jaffa (Foran 2011).

During the early Islamic period, the site was a fortified coastal site and functioned as the port for the regional capital of Ramla located to its east. Fragmentary architectural remains as well as ceramics have been recovered predominantly from the lower town to the east but also attested on the mound. During the Crusader period, ample ceramic remains reveal the interconnections of the city with various regions within the Mediterranean including Cyprus and Italy (Boas 2011; Burke 2011d). Evidence of the Crusader fortifications of the city can be found on both the northern and southern sides (Peilstöcker 2006). Following the Crusader period, the city experienced a low point in terms of size and archaeological evidence during the Mamluk period (Burke 2011e), after which the Ottoman period witnessed a lengthy period of rebuilding and expansion of the town to the east as it served as the principal port to European interests in the Holy Land (Kark 2011).

The repeated themes in the historical legacy of Jaffa, which impinge upon its archaeological heritage, include its role as principal port to the central coast of Israel in most periods and the role that this port played as a zone of cultural interaction between Mediterranean cultures and those of the southern Levant. Whether through the residue of ceramics and artifacts left by the various ethnic groups inhabiting Jaffa or the institutions of pilgrimage established in the city Jaffa was regarded as home to a wide range of ethnic groups from Amorites and Canaanites to Egyptians, Greeks, Jews, Arabs, Europeans, and Armenians. Such a legacy therefore requires a cultural heritage program that is able both to support and to integrate such diverse lines of research by leveraging its resources in an efficient manner under a shared framework for research as, for example, outlined by the Jaffa Cultural Heritage Project (JCHP).

Definition

The JCHP was founded in 2007 by its codirectors, Aaron A. Burke and Martin Peilstöcker, to address the renewal of archaeological research of Jaffa and the stewardship of its archaeological heritage. The project's founding institutions include UCLA and the IAA. Additional members include Johannes-Gutenberg Universität, Mainz, and the Old Jaffa Development Corporation (OJDC). The project's directors define a fourfold program (Burke & Peilstöcker 2011) to address the needs of research (Peilstöcker 2011), publication (Peilstöcker & Burke 2011), presentation, and conservation (Strul 2011) of Jaffa's cultural heritage (Fig. 2). The project builds upon earlier efforts, especially the extensive archaeological excavations carried out by Jacob Kaplan (Burke 2011a) whose work as the municipal archaeologist of Tel Aviv-Jaffa led to the development of the first plan for Jaffa's preservation (Fig. 3) against efforts to construct new buildings on the mound (Ajami 2011).

Key Issues/Current Debates/Future Directions/Examples

An early success of the JCHP's integrated design is evident in the recognition of the importance of the excavations conducted by Jacob Kaplan between 1955 and 1974 (Burke 2011c). A number of studies have emanated from this work (Burke & Lords 2010; Keimer 2011; Burke & Mandell 2011; Tsuf 2011), as well as the renewal of excavations by the JCHP on the mound in 2011. A central element of the effort is the project's integration of data via geographic information systems (Pierce 2011), which permit not only the integration of plans from different excavations but likewise data

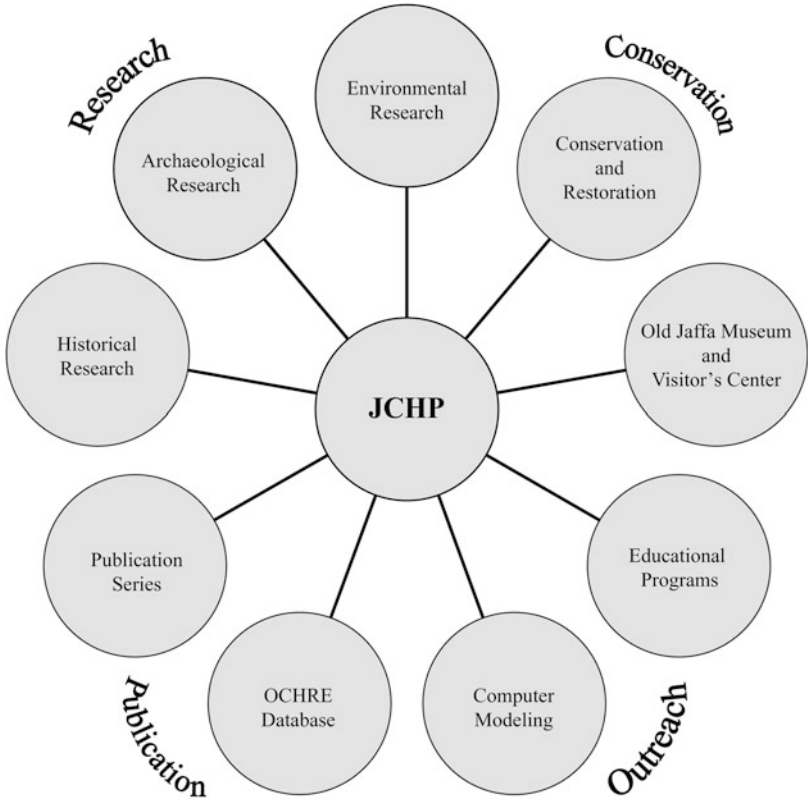

Jaffa and the Jaffa Cultural Heritage Project, Fig. 2 The JCHP's organizational framework

from a robust set of historical maps dating back to 1799 (Shacham 2011).

While the project serves as a model for the planning of a long-term research project intended to meet the needs of both research and conservation, a number of issues pose considerable challenges to the continued success of this and similar projects. In the first place, operating within an urban environment is exponentially more expensive than conducting archaeological and cultural heritage work in nonurban areas. Additionally, the sheer cost of conservation of architectural remains has meant that such elements of the original plan remain to be realized at a future point in the project's work. Similarly, the conservation work that has been undertaken is in actuality only infrequently undertaken in collaboration with the Jaffa Cultural Heritage Project's efforts and consequently often has not reflected the project's collective knowledge of Jaffa's historical or archaeological heritage. Related to this concern is the reality that development efforts by organizations such as the OJDC place emphasis upon the need for immediate touristic development, although this cannot be properly considered until sufficient archaeological research has been completed and more importantly synthesized, as toward publication. Despite the many decades of archaeological research in Jaffa that preceded the foundation of the JCHP and the project's efforts to analyze and publish earlier investigations, the project experiences continuous pressure to consider touristic development of its excavation areas well prior to its own renewal of exploration of these areas. Consequently, such attitudes toward the JCHP have meant a considerable appropriation of its resources by agencies ostensibly coordinating their efforts with the project, which limit further the available funding for archaeological research and thoughtful conservation and presentation of the site. Nonetheless, within a mere five years of its existence, the project has established itself as the de facto arbiter of Jaffa's archaeological heritage.

Jaffa and the Jaffa Cultural Heritage Project, Fig. 3 Legally defined archaeological zones of preservation of Jaffa's heritage. Zone 1, the mound; Zone 2, buffer zone around tell; Zone 3, area of lower city during Ottoman towns that falls outside Zones 1 and 2

As the project looks beyond its first five years of activity in Jaffa, several areas of additional work remain to be engaged as part of the project's overall objectives. Among these is the initiation of a maritime survey of the port and its facilities, as well as a geomorphological analysis of coring samples from the area of the lower city, which may assist in the identification of the site's original port that is thought to have lain to the east of the mound. Additionally, a formal conservation survey must be undertaken of the lower city in order to determine its conservation needs, which would then be followed by the drafting of a conservation plan and the pursuit of legal means for its enforcement. With the assistance of the local development company and municipal agencies, greater public presentation of Jaffa's historical, architectural, and archaeological heritage will be presented through improved signage and personal multimedia devices. The primary limitations faced in Jaffa remain, however, universal challenges to cultural heritage projects with more than expeditionary research interests: sustainable funding and municipal support. Once such support is consistently provided the initial efforts of the JCHP can be assessed in the light of other cultural heritage efforts, rather than viewed through the restrictive lense of the accomplishments of traditional archaeological research expeditions.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: International Practice and Regional Applications

▶ Cultural Heritage Outreach
▶ Experiencing Cultural Heritage
▶ Heritage: History and Context
▶ Heritage Research and Visitor Planning
▶ Heritage Tourism and the Marketplace
▶ Heritage Valuation: Paradigm Shifts
▶ Intangible Cultural Heritage
▶ Marketing Heritage
▶ Tangible Heritage in Archaeology

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Jameson, John H.

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Basic Biographical Information

John H. Jameson is a senior archeologist and program lead, interpretation and outreach, for the Southeast Archeological Center, U.S. National Park Service.

Major Accomplishments

Dr. Jameson's 30-plus years of public service have encompassed a broad range of projects in cultural heritage management, preservation, and interpretation in several regions of the United States and overseas. At NPS, John has led important initiatives in public interpretation, education, and outreach. Beginning in the 1990s, he managed the Center's Public Interpretation Initiative, a long-term outreach program, international in scope, that involved numerous government-sponsored symposia, training workshops, seminars, exhibits planning and development, website development, and publications on the topic of public education and interpretation of cultural heritage. A recognized national leader in public archaeology programs, he is a key player in the organization and development of training courses for park rangers and cultural heritage specialists in the effective interpretation of archaeological and cultural heritage resources. As NPS curriculum coordinator and Interpretive Development Program (IDP) certifier, he evaluates professional interpretation and education programs in the National Park Service. In the late 1990s, he organized and coordinated an interdisciplinary task group in developing the Archeology Interpretation Training Module (NPS IDP Module 440). He has extensive international experience, including invited critiques of heritage interpretation programs in the United Kingdom, Ireland, Australia, Canada, China, Poland, and Ukraine. In November 2005, he received the coveted Sequoia Award for significant, long-term contributions to interpretation, education, and partnerships in the National Park Service. He has served as member and chair of numerous professional society committees and is frequently a keynote and plenary speaker at international conferences. In recent years, he has served as founding member and vice president of methodology and policy, International Committee on Interpretation and Presentation of Cultural Heritage Sites (ICIP), ICOMOS.

Cross-References

▶ Cultural Heritage and Communities
▶ Cultural Heritage and the Public
▶ Cultural Heritage Management and Submerged Sites
▶ Cultural Heritage Outreach
▶ Ethics in Archaeology
▶ Heritage and Public Policy
▶ Heritage Museums and the Public
▶ Heritage Research and Visitor Planning
▶ Heritage Tourism and the Marketplace
▶ International Conventions and Charters and Archaeology Presentation
▶ Interpretation (Including Historic Reenactments): Current Approaches
▶ Multivocality and Archaeology
▶ North America (USA): Historical Archaeology
▶ Public Archaeology, The Move Towards
▶ "Public" and Archaeology

▶ Site Visitation and Interpretation: Management
▶ Stakeholders and Community Participation

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Japan: Cultural Heritage Management

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Introduction

"Cultural heritage" (*bunka isan*) is a relatively new term and concept in Japan. It became popular only after Japan's accession to UNESCO's Convention Concerning the Protection of the World Cultural and Natural Heritage in 1992. Prior to that, the term "cultural property" (*bunkazai*) was predominantly used in both official and everyday language. Today, the two terms are used almost interchangeably, and while "cultural heritage" is increasingly in use, especially in relation to World Heritage, "cultural property" is still prevalent and more familiar to most Japanese people.

It is important to note that cultural property in Japan is legally and officially defined. On the national level, the Law for the Protection of Cultural Properties (*Bunkazai Hogohô*) generally defines eight categories of cultural properties (see below). The designation of cultural properties of national importance is made with reference to this law. In addition, all prefectures and most municipalities have laws that build on the Law for the Protection of Cultural Properties, and according to them cultural properties of prefectural and municipal importance are defined and officially designated. Cultural properties are thus made *from above* by the government, be it national or local. This can be contrasted with cultural heritage, which, as many critics have convincingly argued (Lowenthal 1998; Howard 2003: Chapter 6; Graham & Howard 2008), is essentially made through people's identification with it and as such does not necessarily require legal and official designation.

That cultural property precedes cultural heritage both as a term and a concept can explain why "Cultural Heritage Management" in Japan is often understood as the management of legally defined cultural properties. In this sense, Cultural Heritage Management in Japan is strongly characterized by its legal and official nature.

Definition

Legal and Official Definition of Cultural Properties in Japan

Although in English-speaking countries "Cultural Heritage Management" – or CHM – is sometimes equated with the management of archaeological resources, the extent of cultural heritage is clearly far greater than that of archaeology. This is particularly the case in Japan, where intangible aspects of culture have long been considered and officially recognized as cultural properties. Considering this, it is useful to briefly summarize what is defined as cultural

properties in Japan, before focusing on the management of archaeological resources.

The Law for the Protection of Cultural Properties regulates all aspects of the nation-level management of cultural properties in Japan (Agency for Cultural Agency 2007, 2010). It generally defines eight categories of cultural properties: (1) tangible cultural properties, (2) intangible cultural properties, (3) folk cultural properties, (4) monuments, (5) cultural landscapes, (6) groups of traditional buildings, (7) buried cultural properties, and (8) conservation techniques for cultural properties (Clauses 2, 92, and 147). Archaeological resources are mostly concerned with "buried cultural properties (*maizô bunkazai*)", which in practice apply to archaeological materials buried in the ground. In addition, excavated archaeological objects that have significant value may be designated as "important cultural properties" or "national treasures" under the category of "tangible cultural properties", and excavated archaeological sites that have significant value may be designated as "historic sites" or "special historic sites" under the category of "monuments."

Key Issues

The Management of Buried Cultural Properties

There are approximately 460,000 registered archaeological sites (legally called as "areas containing buried cultural properties") in Japan. The Law for the Protection of Cultural Properties requires that those who propose an investigative excavation or development work on a known archaeological site notify the commissioner of the Agency for Cultural Affairs in advance. After receiving the notification, the commissioner can instruct the excavator/developer on necessary measures to take for the protection of the site. If the proposed development work is considered to inevitably destroy the site, "rescue excavation" is implemented to archaeologically record finds from it before destruction – this practice is called "preservation by record" (*kiroku hozon*). Objects retrieved from rescue excavation must be given to police unless their owner is identified. Judgment is then made as to whether they are officially recognized as cultural properties. If the objects are indeed recognized as cultural properties and if they still remain ownerless, they then become property of the prefecture in which they were discovered.

It is conventionally accepted that the costs of rescue excavation before construction of a private home for non-profit purposes are to be borne by the local and/or national government. When rescue excavation takes place prior to development work for any other purposes, its costs are to be paid by the "polluter," namely, the developer, be it a public or private body. These costs include the expenses for excavating the site, processing the finds, and publishing the excavation report. The Law for the Protection of Cultural Properties does not clearly stipulate the principle of "the polluter pays" (Tanaka 1984: 84); its clause 93–2 only states that when there is a "particular need" to protect the buried cultural properties that are going to be affected by development works, the commissioner of the Agency for Cultural Affairs can specify "necessary measures to be taken." It is generally accepted that these "measures" include asking the developer to pay the expenses of rescue excavations. However, there is no specific obligation for the developer to pay those expenses, as the "measures" constitute merely administrative direction. This issue, recurrently raised by developers, is one of the major problems in the Law for Protection of Cultural Properties.

In the fiscal year 2010, 35,467 proposals were made for construction works to be implemented in areas containing registered archaeological sites. These proposals resulted in 7,951 rescue excavations (Hayashi 2011: 50). Meanwhile, 428 research excavations were undertaken in the fiscal year 2009 (Hayashi 2011: Fig. 2). From these figures one can infer that approximately 95 % of all archaeological excavations in Japan are carried out in the sector of rescue archaeology, where 5,963 archaeologists – officially referred to as "specialists in charge of buried cultural properties" (*maizo bunkazai tantou senmon shokuin*) – work today (Hayashi 2011: 47).

The nationwide management system for buried cultural properties developed rapidly from the mid-1960s onward (Agency for Cultural Affairs 2001: 263), reflecting the fast growth of the nation's economy and the concomitant increase of development work across the country. From the 1960s, archaeologists working at the boards of educations (*kyôiku înkai*) of local governments became in charge of rescue excavations. In 1965, there were only eight experienced field archaeologists employed in boards of education, but this number rose to 35 by 1968 (Tsuboi 1992: 3). As archaeologists were increasingly employed and positioned at local governments all over the country, a nationwide administrative system for managing buried cultural properties was gradually established, first at prefectural and then municipal levels, under the national government's supervision. Some local governments set up "semipublic" self-governing foundations specializing in archaeological investigation. This was driven by economic considerations – the foundations could ask the developers to pay for the costs of rescue excavations including the salaries of archaeologists, and thus the local governments could avoid the financial burden of hiring archaeologists as direct employees (Tanaka 1984: 83).

As Japan's economy continued to expand rapidly, the number of rescue excavations increased exponentially from the 1970s to the mid-1990s. The great majority of these excavations were funded by the developers, and the employment of archaeologists at local governments and semipublic archaeological foundations increased accordingly. Some prefectures, municipalities, and foundations established within themselves "centers for buried cultural properties", which took charge of excavation, analysis and storage of archaeological finds, and dissemination of archaeological knowledge and information in a systematic manner (Tsuboi 1992: 10; Agency for Cultural Affairs 2001: 272-73).

Thanks to the stable operation of the nationwide management system for buried cultural properties, the number of archaeological sites destroyed without being investigated and recorded before development work has decreased considerably. It is worth remembering, however, that the recorded sites have rarely been preserved after the termination of rescue excavation (Tsuboi 1992: 5). Archaeologists working in the sector of rescue archaeology hardly broach the subject of site preservation in situ, because of their entire, or at best partial, dependence on the developer to fund rescue excavations. Only archaeological sites of significant historical or scientific importance are physically preserved through the amendment of development plans or their designation as "historic sites" – the latter often requires purchase of the land by the national or local government (Tanaka 1984: 83; Tsuboi 1992: 5-8). Except for these rare cases, the majority of sites are preserved only "by record" and thus transformed into over 2,000 excavation reports annually (Agency for Cultural Affairs 2001: 284).

Archaeologists working at the boards of education and semipublic archaeological foundations are not only in charge of the implementation of rescue excavations but also the protection and restoration of archaeological sites in each prefecture or municipality, as well as the dissemination and publication of information gained from archaeological investigations for educational purposes. One of the popular educational activities that they organize is *gensetsu*, an abbreviation of *genchi setsumekai*, which literally means "explanation meeting on the site." *Gensetsu* aims to present the results of the excavation to the public at the site. *Gensetsu* was first held in 1956 at the excavation of Asuka Temple in Nara, and has been widespread throughout the country since the mid-1970s (Agency for Cultural Affairs 2001: 290). Today, *gensetsu*, usually held on weekends, are announced in newspapers and on television prior to the selected date and sometimes draw thousands of visitors (Okamura 2000: 62).

Current Debates

Current Challenges to the Management System for Buried Cultural Properties

The current management system for buried cultural properties is faced with two major

challenges: the effect of the nation's long-term economic crisis and the pressure for the privatization of rescue archaeology (Okamura & Matsuda 2010: 104-106). In the second half of the 1990s, Japan began suffering from a long economic downturn, which led to the considerable reduction of development work all over the country. The decrease of development work itself should probably be welcomed, as it implies fewer rescue excavations and, hence, less destruction of archaeological sites. However, the situation is far more complex in reality because the current system for buried cultural properties functions on the basis of certain supposed amounts of development work.

The amount of money spent for rescue excavations was 132 billion yen at its peak in 1997, and it diminished to 69 billion yen by 2010 (Hayashi 2011: Fig. 3). Effects of this can already be seen in the number of archaeologists employed at local governments and semipublic archaeological foundations: it hit its peak at 7,111 in the fiscal year 2000 and dropped to 5,963 in the fiscal year 2010 (Hayashi 2011: Fig. 1). The decrease of archaeologists working in the sector of rescue archaeology suggests that the management system for buried cultural properties in Japan has heavily relied on the nation's healthy economy. Hit strongly by the Great East Japan earthquake and tsunami in 2011, Japan's economy is likely to remain stagnant for another several years, if not longer. While it is still unclear how exactly this will affect the management system of buried cultural properties in the long term, it is likely that the emphasis that the system has placed on the protection and preservation of buried cultural properties will gradually move to their utilization, in particular so they can generate some income for local communities.

The pressure for the privatization of rescue archaeology poses another big challenge to the current management system for buried cultural properties. Private archaeological units have already been in operation for a few decades, particularly in the Kanto region, but most of them were small in size and led by professional archaeologists. In contrast, newly emergent private units are established at the initiative of, and within, construction companies, and today they are growing fast and increasingly demanding for the privatization of rescue archaeology. For these construction companies – private developers – rescue archaeology offers a new attractive business market, especially because they need to counteract the effect of the recent recession in the construction industry. Some fear that the marriage between private developers and private archaeological units might lead to the poorer quality of rescue excavations, while others are more optimistic. Currently, debates are going on as to how to ensure the quality of rescue excavations.

Cross-References

- ▶ Heritage: History and Context
- ▶ Japan: Cultural Heritage Management Education

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Japan: Cultural Heritage Management Education

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Introduction and Definition

In Japan, the term "cultural heritage" is becoming better known due, in part, to a rise in interest in World Heritage Sites among travel enthusiasts initiated by a popular TV program just after the Japanese government signed the Convention Concerning the Protection of the World Cultural and Natural Heritage in 1992. However, the term is not used to refer to domestic "heritage" sites, and has not yet taken the place of the traditional term, "cultural properties."

Cultural properties or heritage in Japan is managed by various organizations. Though museums have played a central role in its promotion, a number of educational activities are also conducted by archaeological units.

At present, Japan, a country inhabited by 128 million people, has over 440,000 registered archaeological sites. The number of rescue excavations in Japan increased exponentially from the 1970s to the mid-1990s, reflecting the rapid growth of the nation's economy over that period. Today, despite a recession, approximately 7,000 rescue excavations are carried out yearly across the country, and account for approximately 95 % of all archaeological excavations in Japan. As of 2008, the total number of field archaeologists was 6,255 and all 47 of Japan's prefectural governments and over 65 % of municipal governments (1,192 out of 1,834) have cultural properties sections. This high ratio of active units of field specialists clearly indicates the importance of maintaining CHM across Japan.

Key Issues

Preservation and Use of Cultural Properties

As the current CHM system in Japan was established at and developed by regional boards of education under the national government's supervision, archaeologists working at these public sectors are generally involved in a variety of educational activities; not solely archaeological, but sometimes architectural and other tasks related to heritage. All these activities are carried out under the title of bunka-zai no hozon to katsuyo (Preservation and use of cultural properties). This is an official policy and is also used as an administrative maxim for CHM in Japan. A good example of such activities in archaeology are the open days (genchisetsumeikai, or simply gensetsu: public site explanation), during which the results of the excavation are presented to the public at the site. Gensetsu, usually held on weekends, are announced in newspapers and on television prior to the selected date. Sometimes gensetsu draw thousands of visitors, not only archaeological enthusiasts but also local lay people. In addition to gensetsu, public lectures and symposia on archaeological subjects are frequently held, and interested people can read reports on recent archaeological discoveries or listen to professional archaeologists.

Some prefectures, municipalities, and foundations have even established "centers for buried cultural properties," which are in charge of the excavation, analysis, and storage of archaeological finds, and the dissemination of archaeological knowledge and information in a systematic manner.

Heritage Studies in School and Higher Education

As a part of elementary school curricula, students at the age of 12 are expected to go to

museum to study local history and archaeological sites in order to appreciate cultural heritage. Local cultural heritage is sometimes used for off-school activities or as an integrated learning program for years 10–12. For instance, every year the Osaka Museum of History conducts an outreach program with elementary schools in Osaka City to excavate the Naniwa Palace site. This kind of hands-on activity is becoming popular in heritage education across the country. In junior and senior high school curricula, the subject most usually linked with cultural heritage is history.

In higher education, Nara University first set up its Department of Cultural Properties in 1979, which integrated studies on cultural heritage to train heritage managers and conservators, and to meet the then urgent demand of researchers for rescue excavation. Kyoto Tachibana University also set up a Department of Cultural Properties in 1997 which will be converted into the Department of Historical Heritage in 2012. The number of universities with departments or courses entitled "cultural properties" or "cultural heritage," including "World Heritage," has been increasing recently and now totals over 20.

A recent interest in archaeological qualification has remodeled educational programs at some universities. Issues surrounding qualifications had been discussed in the past, but development did not take place until late 2000 after the "Japan Association for Preservation of Cultural Properties," consisting of 76 private companies for excavation, air survey, analysis, conservation and others, initiated its own qualification examination in 2007. The National Agency for Cultural Affairs (Bunkacho) started investigating the need for excavation qualifications in 2008 and the Japanese Accreditation Board for Archaeological Researchers was founded in 2009. Presently, Waseda University and other eight universities are offering educational programs to enable students to become qualified as an "archaeological researcher" by the Board. More universities may join this movement in the future, as "qualification" generally attracts students.

Museum curatorial qualification can be gained at 344 universities (April, 2009) and this system will be intensified from 2012 to help further develop curatorial skills and knowledge. However museum positions are quite limited and, for example, in 2007 only 61 out of 10,427 qualification holders could were able to find a job in a museum.

As for professional training for heritage managers at local governments, every year the Nara National Research Institute for Cultural Properties offers a variety of courses to develop knowledge and skills for cultural heritage. For instance, in 2011, there are 14 courses covering a wide range of topics including research method for architectural features, stone artifacts handling, building conservation and restoration, scientific chronology, conservation science (metal and wooden objects), environmental research, survey mapping, recording and GIS, photography, site report, and site management.

Future Directions

Firstly, there are a small number of experts who specialize in heritage studies, management, and education in comparison to the demand for their teaching. Secondly, there is poor exchange of information between teachers, and heritage managers and archaeologists. Finally, since information on educational activities and curriculum for CHM is divided between a number of organizations such as local authorities, museums, and archaeological units among others, and has not been organized in a systematic manner, it is difficult to grasp the overall outline and to access the right information.

A national storehouse is need for the exchange of information about programs and curriculum development, and for education in archaeology.

Cross-References

▶ Japan: Cultural Heritage Management
▶ UNESCO (1972) and Malta (1992) Conventions

Further Reading

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Japan: Field Archaeology

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Brief Definition of the Topic

Principles

The basis for archaeological intervention in Japan is the *Law for the Protection of Cultural Properties* inaugurated in 1950 and updated regularly since. Archaeological resources underground are designated as "buried cultural properties (*Maizou Bunkazai*)." Since then every excavation has to be notified to the responsible government department, traditionally the Board of Education. Most archaeological fieldwork takes the form of *rescue excavation* (CRM) in advance of development rather than research projects. Universities do undertake excavations for academic purposes, but these are overwhelmingly exceeded by rescue work, both in number and budget. Academics are required to obtain permission to excavate from the local authority (who may not give it).

On the principle that it is better for buried cultural properties to be preserved underground than to be destroyed, the initiator of the development is required to pay for excavation of archaeological deposits in advance of their destruction. This principle was challenged in the courts in the late 1970s and the early 1980s, when private development companies sued for the losses caused by covering these costs. But the High Court of Tokyo found in favor of government and ruled that developers should cover the cost of excavation but with the condition that there should be the limit defined by an "appropriate level of investigation." Not all remains of the past are eligible for record: according to government advice dated 1998, only remains dating back to the Middle Ages and earlier are mandatorily subject to investigation.

Methods

Nondestructive field methods may be used at the evaluation stage, although rescue archaeology mostly uses *test pits* to determine and estimate the depth of cultural layers, as well as the anticipated structures and their likely date. This information also allows an estimation of the cost and duration of the intervention, which is then fed into the *project design*. The project design forms the basis for negotiation with the developers. Once fixed, archaeological contractors tender for the work, comprising the necessary equipment and the required labor force. Payment is usually calculated according to the volume of soil to be removed or the numbers of workdays required.

A mechanical excavator ("jumbo") is used to remove top layers, and then digging switches to human labor using hoes and the other tools. Narrow trenches are first dug at the edges of the area to be excavated to reveal sections through the deposit. These trenches provide drainage, and their sections are used as a guide to the excavators, who peel back from them, layer by layer. Excavators use a versatile trowel hoe on a long handle, which can pick, cut, slice, and create a smooth surface (Fig. 1). The spoil is removed using electrically driven belt conveyors. When the surface of the layer is clean, those features showing in it are recorded by photography and drawing. Features and collected artifacts are located in three dimensions using a grid system connected to the national and world geodesic systems. A new departure is the recording of excavations using overhead photography from a helicopter or a crane supporting a cage. The photographs are used to generate measured drawings, which are then checked on site.

Japan: Field Archaeology, Fig. 1 Excavations in progress in Nara, 2012. Tools in use (By courtesy of Nara National Research Institute for Cultural Properties)

Japan: Field Archaeology, Fig. 2 Excavations in progress: use of conveyor (By courtesy of Nara National Research Institute for Cultural Properties)

Once excavations are complete, all artifacts will be washed and marked with a serial number to identify date and location of discovery. Broken pieces are refitted, drawn, and photographed. This is often done by part-time workers. Comprehensive excavation reports are prepared containing all the information collected during the excavation. The public are invited to view the excavations' open days. This usually includes a safe route overlooking the excavated and a few tents, one for reception and others for exhibiting artifacts (Fig. 2).

Archaeological work in advance of development is big business. A recent example of a large-scale urban project is the 2nd Keihan Highway project, which involved a national expressway and a bypass about 27 km in length. The section crossing Osaka was about 16.1 km and had 18 potential sites ("areas known to contain cultural properties"). Agreement for trial excavations was negotiated between the different agencies and authorization given to the contractor, in this case the Osaka Center for Cultural Heritage (OCCH), a nonprofit foundation partly invested by Osaka Prefectural Government. After completing trial excavations in 1996, the area in need of excavation was estimated as about 450,000 square meters. In 2000, the full-scale excavations started at Tsudajo site in Hirakata City, and all excavations were completed in January 2010.

Reflections

Privatized contract work needs appropriate surveillance, or it can simply become "the cheapest option." This must be avoided: to record sites properly requires the application of a certain standard, for example, by the issue of licenses, which has been under discussion for the past few years. A second concern is the usage of the new knowledge that is being generated. Many reports are not well researched nor accessible to the

public. Some have been kept long in the archive without ever being conscbulted. We also need to rethink the role of archaeologists in the public sector. It is probably a good moment to discuss opening up field archaeology in Japan to wider involvement.

Cross-References

▶ Field Method in Archaeology: Overview
▶ Japan: Cultural Heritage Management

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Japan: Indigenous Occupation

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Introduction

Ainu people and culture have been marginalized in the colonial politics of Japan. Their existence as an Indigenous people was denied over a long period, and many Japanese remain ignorant about this ethnic group (Weiner 1997). On the other hand, the Ainu people gathered much attention as direct descendants of the Indigenous inhabitants of the Japanese Archipelago, who were pushed off to the north by the agricultural ancestors of current Japanese since the Yayoi period. Early investigators proposed a Caucasian ancestry as the origin of Ainu, but this theory was rejected by later anthropological studies.

It has often been assumed that the Ainu people are direct descendants of the Jomon people, but the relationship between the Ainu and the Indigenous population of Japan is not so simple. Recent genetic analysis has confirmed that the Ainu people in Hokkaido and the native Okinawan people share similar characteristics in spite of their geographic distance (Japanese Archipelago Human Population Genetics Consortium 2012). This supports the hypothesis that the Ainu and Okinawan people descended from the Indigenous population of Jomon period, Japan, with little genetic influence from the immigrants who came to Japan from the continent in and after the Yayoi period.

Ainu place names remain in the northern part of Honshu, the main island of Japan, indicating that the Ainu-speaking people once lived there before retreating to Hokkaido. Archaeological evidence and historic documents of the Ainu are scarce before documents in the fifteenth century. However, the Ainu culture seems to have developed from the Satsumon Culture (7th to 13th century CE) with an influence from the Okhotsk Culture (Sato et al. 2007).

Definition

The Ainu are an Indigenous people who inhabit the northern part of the Japanese Archipelago. Official estimates of the population are around 25,000 based on the 2006 census in Hokkaido, while the unofficial number is estimated at up to 200,000 (Poisson 2002). Ainu languages were spoken by Ainu people in Hokkaido as well as in the southern half of the island of Sakhalin and the Kuril (Chishima) Islands, but only the Hokkaido variant survives today.

Key Issues

The subsistence diet of the Ainu people was based on fishing, hunting, and gathering, as well as the cultivation of wheat, millet, buckwheat, and beans. They obtained rice and metal through trading with Japanese in the south. However, their relationships with the Japanese became increasingly fraught and resulted in a series of battles between the Ainu and the Japanese: the Battle of Kosyamain in 1457, the Battle of Syaksyain in 1669, and the Battle of Kunashiri-Menashi in 1789. The Ainu was defeated in each of these battles, and fell completely under the

control of the Japanese after the Battle of Kunashiri-Menashi.

The traditional religion of the Ainu is animism, in which everything in nature is believed to have a *kamuy* (spirit or god) on the inside (Honda 1993). The bear is considered to be very special in the Ainu worldview. Ceremonies for sending back the spirits of bears is a well-known Ainu tradition called *Iomante*.

There is no particular reservation for the Ainu. Many Ainu people live in Nibutani, Biratori Town, Hokkado. The place name "Nibutani" is derived from the Ainu word "Niputai," meaning the wooded place. Dr. Neil Gordon Munro, a prominent researcher of the Ainu, opened a doctor's office in Nibutani in 1930 and had taken care of many patients for free until his death in 1942. Shigeru Kayano, who became the first Ainu member of the Diet in 1994, was from Nibutani.

Current Debates

The Ainu people have suffered under discriminatory policies and forced assimilation for more than a century since the Meiji restoration (1868) when the Japanese government included Ezo as part of Japan and changed the name to Hokkaido. At this time, the Ainu people were registered in the Japanese census and were compelled to use Japanese last names. Their language and cultural practices were prohibited. In 1875, Japan and Russia signed the Treaty of St. Petersburg based on the proposal that Russia should control Sakhalin and Japan would claim the Kuril Islands (Okada 2012). The Ainu people had to choose their citizenship, and some of them were forced to leave the homeland.

The Law for the promotion of Ainu Culture and the Dissemination and Advocacy of Knowledge in Respect to Ainu Traditions (Ainu bunka shinko-ho) was passed in 1997. Until this time, the government stated there were no ethnic minority groups in Japan. In 2008, the Japanese government finally recognized the Ainu as Indigenous people of Japan.

Because of such long-term political oppression, many Ainu people have tried to hide their ethnic backgrounds and/or to marry Japanese to lessen the chances of discrimination against their offspring. As a result, many Ainu are indistinguishable from their Japanese neighbors today and the Ainu language is moribund. The number of "pure" Ainu was recorded as 300 in 1966.

Today, however, there are a number of people who are interested in traditional Ainu culture and trying to revive Ainu culture and language. Oki Kanō is an Ainu Japanese musician who plays *tonkori*, an Ainu stringed instrument and performs traditional Ainu music and other styles of world music. There are some Ainu *kotan*, meaning Ainu village, in Hokkaido as tourist sites. The largest of such *kotan* is near the hot springs resort area at Akanko. Interactions between the Ainu and other Indigenous peoples in the world have also become much more frequent.

Cross-References

- ▶ Holographic Epistemology: Native Common Sense
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Torii, Ryūzō
- ▶ Tsuboi, Shogoro

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Japan: World Heritage

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Introduction

Until 2010, Japan has 11 cultural heritage site inscribed on the World Heritage List. Considering that Japan accepted the World Heritage Convention since 1992, the process of identification, nomination, and inscription of World Heritage Site is quite speedy. A close examination of those sites allows the observation that each site can be seen as a case study presenting one or several issues that deserve an in-depth analysis. In the following discussions, I will elaborate these cases on the issues of cultural and spiritual values, tourism and impact of tourism, interpretation and political contestation, modernization, commercialization and authenticity, indigenous community, etc. A brief examination of the heritage laws and regulations of Japan follows, and finally a general discussion sums up this entry.

Examples

Buddhist Monuments in the Horyu-ji Area

Horyu-ji Area is located at Nara, the place where Japan claimed as the terminus of Silk Road. Since 206 BCE, Silk Road became an important trade route for traders, merchants, pilgrims, missionaries, nomads, and soldiers from Ancient China, crossing the Ancient India, Ancient Tibet, and Persia to Mediterranean countries for about 3,000 years. The extensive interconnected network gradually evolves to be a cultural communication channel that greatly accelerated transmission and convergence of different cultures. The World Heritage Site Buddhist Monuments in the Horyu-ji Area well manifested the application of new religion Buddhism and advanced wooden architecture construction technologies imported from China. However, with the purpose of de-emphasizing Japan culture as an affiliate of Chinese culture, the official website of Osaka and Nara stresses the cultural influence of Europe and North Africa and accentuate the distinctive style of Japanese architecture (Osaka & Nara 2010).

With the arrival of Buddhism, Nara flourished. Between 710 and 784, capital city of Japan – Heijokyo – became the center of Japanese cultural with numerous number of buildings, books, and assets settled in Nara and passed down to today. Nara has the largest number of buildings designated as National Treasures in Japan. Although with abundance of cultural tourism resource, Nara is overshadowed by its more famous neighbor Kyoto. For time-pressed group travelers, Nara is often omitted on the itinerary.

Buddhist Monuments in the Horyu-ji Area are known as the world's oldest wooden building structures in the world; however, few tourists know that all the buildings have been rebuilt, reconstructed, or remodeled in historical times except the Hoki-ji temple. This issue raised the question of how to determine an authentic wooden building structure in terms of preserving the values authentic to its history.

Gusuku Sites and Related Properties of the Kingdom of Ryukyu

The site is located in Ryukyuan Okinawa, a chain of islands that are detached from the mainland Japan and present a considerably different culture formulated during Ryukyuan Dynasty (the twelfth to seventeenth century). Before being invaded in 1609, Ryukyu Kingdom was a tributary state of

imperial China. In Ming and Qing Dynasties (the seventeenth to nineteenth century), the political power in Okinawa still paid tribute to the Chinese emperor (Baidu 2010). From the late nineteenth century, Ryukyu Okinawa became a target of territory dispute between China and Japan. During this historical period, China suffered from internal corruption and colonial occupation and was too weak to send soldiers to a remote island; instead it made diplomatic objections and asked former United States President Ulysses S. Grant to arbitrate. Grant stood behind Japan and allowed Japan to rule the islands in their favor. The superpowers paid no attention to indigenous islanders. From the beginning of the twentieth century, compulsory Japanese education was enforced on the Ryukyu children, whereby they were taught Japanese language, culture, and identity. The use of their native language was strictly forbidden. Military activity on the island, before and during World War II, had a devastating effect on Okinawan people and their cultural heritage. After World War II, under the San Francisco Peace Treaty, US military controlled over Okinawa from 1945 to the year 1973, when sovereignty was given back to Japan. China signed the Potsdam Declaration in 1945, which claims that Ryukyuan Okinawa should be given back to China, but with the eruption of inner war during 1945–1949, China never really puts it power on Ryukyuan Okinawa.

The territory dispute never ended. In 2010, Japan seized a Chinese fishing boat and once again intensified dispute that has lasted for several centuries (TVNZ 2010). There are also reports about the protesting activity of indigenous, showing their anger towards Japanese political sovereignty especially on the issue of allowing so many American soldiers to be stationed on the islands instead of the mainland, and call for the independence of their land (Baidu).

With all of the above observations of the historical problems associated with Ryukyuan Okinawa, it is interesting to look into Gusuku sites and related properties as embodied manifestation of Kingdom of Ryukyu (the twelfth to seventeenth century), which exists in a time period that is relatively independent of other political powers. The site presents a complex social structure of disappeared Ryukyu Kingdom in the form of ruins of castles, fortresses around the settlement, and the sacred tombs. Although these building structures present a mixture of many influential cultures, they still reserved their cultural uniqueness that can only be found in Ryukyuan Okinawa. None of the Japanese travel website, both official and nonofficial, mentions a word about the turbulent history of this particular site and erased the information about the damage of site caused by World War II and restoration in recent decades.

Another fascinating observation is that the most important castles in the site – Shuri Castle – was reconstructed in 1992. The reconstructed gigantic mansion is featured by colorful ceilings and pillars, while the other four castles inscribed are ruins with only brick walls and groundwork left by wars. The Shuri Castle looks quite isolated and awkward in a complex of ruined monuments and sites. It is apparent that Japanese government wanted to de-emphasize the history of Ryukyuan Okinawa, especially the memories associated with the World War II.

Himeji-jo

Himeji-jo is the early seventeenth-century Japanese castle comprising of 84 buildings with highly developed defense system and protection device. Dating back to 1500s, the Himeji-jo is the biggest castle in all of Asia. With the wooden walls stocked with fireproof white plaster, unwelcomed visitors will be attached by firing guns and shooting arrows and also for pouring boiling water or oil (World Heritage Site Organization 2010).

Himeji-jo is an exemplar of an age of militarism, an important principal of expansionism. I consider that the expansionism – the desire to maintain a strong military capability – and aggressively invading other countries for the country's own national interest are the main reason for the eruption of WWII and should be mentioned and warned to the domestic and international visitors. From the online resources, there is no evidence of the availability of such information.

The site can be easily accessed by train or bus. From Tokyo, one Nozomi train per hour runs through to Himeji, and it takes about 3 h to get visitors to the site. For this reason, the site is extremely crowded in cherry blossom season when the grounds are full of blooms. Some popular travel-guiding websites suggest the international visitors to peak season to avoid the domestic visitors' flow.

Hiroshima Peace Memorial (Genbaku Dome)

The Atomic Bomb Dome is a skeletal-domed building in Hiroshima City which still stands to commemorate the dropping of the atomic bomb. The atomic bomb, dropped for the first time in history, exploded some 580 m above Hiroshima City. The only survival built structure – Genbaku Dome – was intentionally preserved immediately after bombing and eventually became famous symbol of the bombed city. ICOMOS site in danger 2006/2007 addressed the issues surrounding the proposed high-rise building near the dome, in the UNESCO world heritage buffer zone. The case triggers the thought about the integrity of heritage and the threat of modernity on the memory of ruthless war.

Take a closer look at the site, it can be easily recognized that the official guidebooks and the online site museum focus on historical fact and the suffering of Japanese people after war, with no comments about the role of Japan in World War II and any information about the miseries the countries invaded by Japan (The Outline of the Hiroshima Peace Memorial Museum 2010). By positioning Japan as a victim, both domestic and international tourists are misled by a one-sided picture of World War II and the dropping of atomic bomb in Hiroshima. This can potentially decrease the value of Hiroshima Peace Memorial as a place for people to look retrospectively at the war in the history and pray for peace in the future.

Historic Monuments of Ancient Kyoto (Kyoto, Uji, and Otsu Cities) and Historic Monuments of Ancient Nara

The two sites are both ancient capital cities in Japan and designated as the UNESCO World Heritage Site with similar reasons. However, as formerly discussed, Nara is shadowed by Kyoto and received less visitation.

Kyoto is nestled in the mountains of Western Honshu. Designed as a scaled replica of the Chinese Tang Dynasty capital Chang'an, the city became the seat of Japan's imperial court since 794 until Meiji Restoration of 1868, when the capital was moved to Tokyo (City of Kyoto and Kyoto Tourism Council 2010). With roughly 2,000 temples and shrines, including 20 % of Japan's National Treasures and 14 % of Important Cultural Properties, Kyoto receives over 30 million tourists annually (Kyoto City Local Government 2010). During its time at the center of Japanese power, cultural, and religion, Kyoto accumulated a large collection of palaces, temples, and shrines and was luckily escaped from the bombings of WWII. In modern times, the city is undergoing modernization with some of the older buildings replaced by modern architectures, such as the notorious Kyoto Station complex. The first time visitor to Kyoto would be surprised by the ultramodern glass and steel station and the urban environment all around. Tourism composed a large sector of Kyoto's economy, being constantly visited by school groups from across Japan and many foreign tourists around the world. In a regional brand survey, Kyoto is chosen as the second most attractive city in Japan.

Nara was the capital of Japan from 710 to 784. As formerly discussed, this period of time is when Japanese national government first being consolidated and Buddhism reached a great prosperity. Nara is left with abundance of Buddhist temples, Shinto shrines, and the excavated remains of the great Imperial Palace, all of which serve as vivid examples of a broad picture of the profound political and social change in eighth-century Japan.

Both Kyoto and Nara are facing the problem of urbanization as a threat of preserving authentic ancient appearance of the cities. With UNESCO world heritage monuments isolated in ultramodern urban environment, the harmony and integrity of sites of Nara are in threat.

Historic Villages of Shirakawa-go and Gokayama

The historic villages are located in a mountainous region that was cut off from the rest of the Japan mainland for a long time and developed their own housing construction technique. The architectural style unique in the villages is called gassho-zukuri, also known as prayer-hands construction. The thatched and steeply slanting roof resembling hands joined in prayer are exceptionally strong that can withstand the region's heavy snowfalls in the winter. The reason for inscription is attributed to the simple life spirit deeply embedded in the traditional village. The lose touch with nature together with traditional cultivation and silkworms rearing economic system manifests the ideal picture of arcadia.

The designated group of historic buildings is composed of 117 houses and seven other structures. In those buildings and structures, no one actually live there. However, tourists can find a family-operated inns within or nearby these villages to spend a night or two in traditional gassho frame house to experience the life of locals. It is worth to think about the meaning of emptied homes without any residents in these traditional villages. Without the ongoing repairing of homeowners, it is likely that the architecture structure will accelerate their degradation. More importantly, the memories associated with the domestic living and unique social relationships in these traditional villages will be lost.

Itsukushima Shinto Shrine

Itsukushima Shinto Shrine is located on an island in Seto Inland Sea. It has been regarded as a holy place since the sixth century. It was meant to protect people from sea disaster and wars. Painted in red, the shrine contrasts the surrounding mountains and sea environments and illustrates the Japanese concept of scenic beauty, which is a harmonious combination of the power of nature and human.

The most distinguished architecture structure of this shrine is the Torii and Shaden, the symbolizing gate to the shrine and shrine pavilion, both of which are located in the sea. When the seawater is at low tide, it is possible to walk out to the gate.

Like other most visited World Heritage Sites in Japan, the Shinto Shrine is extremely crowded in its peak season, which greatly disturbed the tranquility of its sacredness. How to keep a balance between high visitor density and the serenity of the site and its surrounding environment is a central management issue in Itsukushima Shinto Shrine.

Iwami Ginzan Silver Mine and Its Cultural Landscape

The site is a cluster of silver-bearing mine in the southwest of Honshu Island. The mine reached its peak production in the early seventeenth century of approximately 38 t of silver a year which was then a third of world production. UNESCO considers that the mine contributed to the overall economic development of Japan and Southeast Asia and prompted the mass production of silver and gold in Japan in the sixteenth to twentieth century. The mining area is now heavily wooded, because the silver production from the mine fell in the nineteenth century and eventually closed for low productivity.

The ICOMOS evaluation of the property report (2004) recorded some potential hazards that can have negative impact on the sites. For example, the rural communities are emptied due to low economic vitality. Losing population posed the issue of ongoing conservation of the towns and viability of community. The modern constructions of concrete wharfs and boat rams on the ports changed the authentic appearance of the heritage site.

Sacred Sites and Pilgrimage Routes in the Kii Mountain Range

The site is set in the dense of forests of the Kii Mountains overlooking the Pacific Ocean. The three nominated sacred temple and shrines together with the pilgrimage route linking the sites reflected the fusion of Shito, the ancient local tradition with Buddhism, and the imported religion from China and Korean peninsula. The surrounding environment has a variety of natural beauty, with abundance of streams, rivers, and

waterfalls. The site is visited more by domestic tourists, especially the locals, for religious purposes and hiking. The site receives 15 million visitations annually. According to ICOMOS advisory body evaluation (2009), the development surrounding the site is sufficiently controlled by existing law. However, environmental change should be envisaged so that possible damage of typhoons, heavy rains, or landslide can be controlled.

Shrines and Temples of Nikko

Nikko is a small town located in the north of Tokyo and can be easily accessed by trains. A world heritage pass is available for a round-trip to Nikko, including both the transportation pass and the admission to shrines. Therefore, the World Heritage Site in Nikko is an attraction that received high visitation.

The temple at Nikko is famous for its architecture and decorations. Different from other temples and shrines in Japan, it is exceptionally gaudy and decorative, with a strong Chinese decorative style. In 1616, the dying Shogun Tokugawa made his final wish that he would like to be enshrined as a god in Nikko to guard the peace of the land forever.

As shrines and temples, the site received a large number of visitations for the purpose of religion. There is no information about if there is any collision between mass tourism and religious pilgrims. It could be an interesting nice site to investigate the issue.

Heritage Law and Regulations in Japan

Japan has a comprehensive network of legislation for protecting, preserving, and classifying its cultural patrimony. The Law for the Protection of Cultural Properties (1950) is the main legal framework. It protects all the building structures and the area around them. Any alteration to, or activities with adverse effects on the existing condition of, cultural properties designated under the Law for the Protection of Cultural Properties is only permitted with prior permission from the Commissioner of the Agency for Cultural Affairs. When the site is closed surrounded by natural settings, such as the case in Sacred Sites and Pilgrimage Routes in the Kii Mountain Range and Shrines and Temples of Nikko, the Law on Forests, the Law on Rivers, the Law on Sand Control, and the Law on Natural Parks apply. In addition to the national laws, each municipal has its directives in purpose of protecting the assigned areas. The law system is considered by ICOMOS as comprehensive protective measures, serving a carefully developed management plan.

The key cultural sites in Japan are designated as National Treasures or important cultural properties. The National Treasure system is designated by the Agency for Cultural Affairs (a subsidiary of the Ministry of Education, Culture, Sports, Science, and Technology). The national treasure can be buildings and structures or fine arts and crafts, showing outstanding workmanship, a high value for world cultural history, or exceptional value for scholarship. Approximately 20 % of the National Treasures are structures such as castles, Buddhist temples, Shinto shrines, or residences). The Agency for Cultural Affairs provides advice on restoration, administration, and public display of the properties.

Discussion

Heritage produces national identity when it receives recognition from official practices. "The moment a place receives official recognition as a heritage site, its relationship with the landscape in which it exists and with the people who use it immediately changes – a place/object/practice 'outside' the everyday" (Harrison 2010: 11). When designated as a World Heritage Site, a place became an essential element of national representation, creating symbolic foundations upon which a sense of belonging is based. Therefore, visiting World Heritage Site by domestic tourists is a symbolic mechanism through which national belonging can be constructed and communicated.

In the case of Gusuku sites and related properties of the Kingdom of Ryukyu, the inscription of this particular site located on the land that received intense territory dispute can be seen as an official declaration that Ryukyu tangible assets in the

forms of ruins and monuments, together with the symbolic meanings and spiritual embodiment, are a part of Japanese history and culture. By de-emphasizing the turbulent history of Ryukyu Kingdom as an independent country, or a tributary state of imperial China or a military base for US military, Japan is declaring its control over the land in the past and in the future.

We have taken for granted that each country embodies its own distinctive culture and society so that the terms society and culture are routinely simply appended to the names of nation-states (Gupta & Ferguson 1997). However, national boundaries do not emerge by themselves, but are invented and imposed on a place. Domestic tourism visiting Gusuku sites, a World Heritage Site of Japan, would naturally get the impression that Ryukyu is always a part of Japanese and Ryukyu culture embedded in the site belongs to Japan cultural system. Cabeza (2006) pointed out that heritage is supposed to express the diversity of land and its people not just the heritage linked to the power groups. It is the responsibility of Japanese government to present a full picture of the history and cultural diversity in Gusuku.

Nuryanti (1996) stated that heritage is the carrier of historical values from the past, while tourism is a modern consciousness. The interaction between the two brought the results in a reinterpretation of heritage. In postmodern societies, tourism is conceptualized a series of production-related activities. The central challenge in linking heritage and tourism lies in reconstructing the past in the present through interpretation. Ename charter addressed the need to define the basic principles of interpretation and presentation as essential components of heritage conservation (Silberman 2009). It at the first time addressed the social, economic, and educational dimensions of heritage interpretation. It also defines the interpretation as a complex public exercise of historical reflection among many stakeholders. As such, it attempts to overt the largely one-way mode of communication from experts or professionals to the public at large, but promotes ongoing interpretive process that could and should be carried out by visitors, locals, associated community groups, as well as other stakeholders. In contested sites, as the Hiroshima Peace Memorial (Genbaku Dome), it is particularly important to integrate different interpretations and allows an ongoing discussion of history and future. Projecting Japan as a victim and avoiding the fact that it is also an invader is not only inappropriate but can create dangerous results in the future.

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- ▶ Ethics of Commercial Archaeology: Japan
- ▶ Japan: Cultural Heritage Management Education
- ▶ Japan: Cultural Heritage Management
- ▶ Japanese Archaeological Museums

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Japanese Archaeological Museums

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Introduction and Definition

The definition of a museum by ICOM is "a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment" (ICOM 2012).

In Japan there are 5,775 museums covering such diverse fields as science and technology, art, general exhibitions, as well as zoos, aquariums, and botanical gardens. As of 2011, there are 3,327 historical museums in Japan. With only 1,746 municipalities, every city in Japan averages almost two historical museums within their borders (Ogata 2012). These numbers show the Japanese people's enjoyment of historical exhibitions which provide an emotional connection to the past and to the land on which people lived.

Japanese Archaeological Museums, Table 1 Number of excavations and museums with years

Number/year	1970	1987	2005	2011
Number of excavations (year)	1,726 (1976)	7,007	8,741	7,934 (2010)
Number of historical museums	473	1,324	3,200	3,327

Japanese historical museums display archaeological artifacts as part of their collections. Since 1970, many historical museums, including archaeological and site museums, have been constructed in line with the increase of archaeological excavations as a result of infrastructural development (Table 1). The current economic crisis has caused difficulties for the management and administration of many museums, including archaeological site museums in Japan.

This entry reviews the present situation of Japanese archaeological museums and their history and discusses the leading principal institutions of Japanese archaeological museums, distinctive archaeological site museums, and city museums with significant archaeological collections.

Historical Background

Before the adoption of the European and American concept of museums during the Meiji Restoration, the Imperial Court, shrines, and temples played a pivotal role in the preservation and administration of precious and religious items. However, these items were not open to the public, only being casually maintained for society. During the Edo period, members of societies such as Sekitei Kinouchi and Kenkado Kimura displayed collections of rocks of unusual shapes or colors including artificial ancient stone instruments, stone accessories, and archaeological remains (Okada 2012).

In the last days of the Late Edo period, the Tokugawa shogunate and the Satsuma han (clan) sent delegations to the Paris and London International Expositions. They visited the British Museum and other important museums in Europe during the 1860s. The concept of "museums" returned to Japan with these delegations. However, instead of establishing permanent museums, the Meiji government opted for expositions for industrial development.

In 1870 the Meiji government established the "Department of Products" to oversee the exhibition of industrial products in Tokyo. The government, which was concerned about the preservation of cultural heritage, enacted *the Preservation of Antiquities Act* in 1871. In accordance with this law, many cultural properties, including archaeological remains, were brought into the custody of the department. Later, these archaeological remains were utilized as propaganda to promote the history of the Imperial family.

In 1871 the Department of Museums for the Vienna International Exposition was established. The government expected that the objects collected from around Japan for the Vienna International Exposition would become a useful founding collection for a future museum in Japan. Before being sent to Vienna, the articles were exhibited to the Japanese public at Yushima in 1872. The exhibition was an immense success. At that time the idea of founding a museum was part of a political strategy for the promotion of industry in order to catch up with the West. Thus, the first Japanese museum, based upon the principles of the British Museum in Japan, came about.

In 1875 the Department of Museums was divided between the Ministry of Home Affairs, responsible for promoting industrial development, and the Ministry of Education, Science and Culture, which oversaw school education. When the Ministry of Agriculture and Commerce was established in 1881, the jurisdiction changed once again, and the Department of Museums was transferred to the new ministry. In 1882 a museum simply called "the Museum" was opened in Ueno, which would eventually evolve into the Tokyo National Museum of today. In 1885, the Department of Museums was transferred to the jurisdiction of the Ministry of the Imperial Household to strengthen the protection of cultural properties and art, including archaeological remains, in order to support propaganda promoting the glorious history of Imperial family. The Museum was renamed the Imperial Museum in 1889. At same time, the Imperial Kyoto Museum and the Imperial Nara Museum were founded for same purpose as the Imperial Museum in Tokyo (Seki 2005).

In 1887 the Ministry of Education, Science and Culture also founded a museum in Ueno as the Educational Museum which is now the National Science Museum.

The enthronement of Emperor Showa in 1928 and the anniversary of the 2600th year of the accession of Emperor Jimmu accelerated the construction of museums throughout Japan, both public and private, such as the Museum of Kokugakuin University and the Yamato Japanese Historical Museum (the Museum, Archaeological Institute of Kashihara, Nara Prefecture later).

In 1951, after the World War II, the laws on museums were reformed and the Japanese Association of Museums joined ICOM in 1952. The construction of museums became popular to showcase economic growth (Okada 2012).

With economic boom following the 1970s, many archaeological museums including site museums were constructed to house and display new discoveries found in large-scale excavations brought about by the nationwide development of infrastructure for transportation. The trend continued until the 1990s.

This boom in museum construction was also stimulated by the announcement by the Agency for Cultural Affairs of the "Project of Fudoki-no-Oka (historical park)" which designated vast areas for archaeological and historical monuments in 1966. Sixteen areas, such as Sakitama, Shimotsuke, Omi, Chikatsu Asuka, Kii, Usa, and Saitobaru, were incorporated as historical parks with archaeological museums. The Agency for Cultural Affairs encouraged prefectures and municipalities to establish centers for archaeological excavation (Maizo-Bunkazai Center) to

protect areas from the rapid increase in the number of excavations caused by development and infrastructure construction in the 1970s and 1980s. There are now more than 60 Maizo-Bunkazai Centers. Although they are not museums, most have exhibition rooms and showcase what archaeology is and how excavation is carried out.

Key Issues

Principal Institutions of Japanese Archaeological Museums

Museums are regulated by the Museum Law of 1951. Museums designated by that museum are facilities for social education. Archaeological museums are also regulated by the 1951 law. There are three types of museum: (1) registered museums, (2) facilities which comply with the appropriate standards, and (3) facilities which resemble these. Registered museums under the jurisdiction of the boards of education of local governments must have a curator and be open more than 150 days a year. Facilities compliant with the standards must be certified by the prefecture, have an associate curator, and be open more than 100 days a year. Facilities modeled on these are not regulated by the law.

The national museum system consists of four museums, the Tokyo, Kyoto, Nara, and Kyushu museums which possess massive archaeological collections. They are not subject to the Museum Law, as they are ranked as facilities for the conservation of cultural properties and so regulated by the Agency for Cultural Affairs (Hamada 2012).

The number of the registered museum is small, with other classes of museum making up the majority. Museums related to archaeological sites are classified as facilities of the third type. These are not regulated by the law. The construction of archaeological site museums is, in most cases, triggered by a new discovery of importance or by the development or the improvement of significant archaeological sites in historic parks. Since the aim of these projects is the development of tourism rather than education, the expense of construction relies on subsidies from the Ministry of Land, Infrastructure, Transport and Tourism together with the Ministry of Education, Culture, Sports, Science and Technology.

Archaeological museums, as well as general museums, have faced financial difficulties, because municipalities have largely adopted the Designated Manager System to reduce annual expenditures. This system has forced head curators to make exhibitions, to conform to popular tastes, and to reduce the number of curators.

With the inclusion of museology in university curricula, many universities have established museums or integrated museums to enable hands-on education in museology and management of museums. Kokugakuin University, Meiji University, Kyoto University, and Kansai University are well-known for their archaeological museums.

Distinctive Archaeological Museums

Museums Put the Word "Archaeology"

Few archaeological museums put the word "archaeology" in the museum's title and display only archaeological remains. These strictly archaeological museums include:

- Ichikawa City Archaeological Museum in Chiba
- Yamanashi Prefectural Museum of Archaeology in Yamanashi
- Hokuto City Archaeological Museum in Yamanashi
- Matsumoto City Archaeological Museum in Nagano
- Kyoto City Archaeological Museum in Kyoto
- Hyogo Prefectural Archaeological Museum in Hyogo
- Tatsuuma Archaeological Museum (private) in Hyogo
- The Museum, Archaeological Institute of Kashihara, Nara Prefecture
- Kurashiki Archaeological Museum (private) in Okayama
- Shimonoseki City Archaeological Museum in Yamaguchi
- The Archaeological Museum Matsuyama in Ehime
- Tokushima Archaeological Museum

Japanese Archaeological Museums,
Fig. 1 The Museum, Archaeological Institute of Kashihara, Nara Prefecture

- Saitobaru Archaeological Museum in Miyazaki
- Ibusuki Archaeological Museum in Kagoshima
- Kagoshima City Museum of Archaeology in Kagoshima

These museums mainly exhibit archaeological remains that show the historical sequence of events in the area in which they are located.

Among these, the Museum, Archaeological Institute of Kashihara, Nara Prefecture (Fig. 1), is the most distinctive, displaying objects from the Paleolithic to the Medieval period in Nara, an area which played a central role in Japanese political development from the Kofun period (third century CE) to the Nara period (eighth CE). This museum shows how Japan developed as a state and its connection to East Asian countries with archaeological remains excavated over all of Nara prefecture since 1938. This museum was established in 1939 and is the oldest archaeological museum in Japan. Impressive pieces in the collection include:

- Jomon Dogu (earthen figures), the important cultural property, from the Kashihara site (Late Jomon). "Jomon" needs an accent which I haven't got on my computer.
- The drawing on the pottery from the Shimizu Kaze site (Middle Yayoi).
- Prestige objects and gigantic cylinder "haniwa," an important cultural property, from the Mesuriyama mound tomb (Kofun).
- Gorgeous grave goods, a national treasure, including a set of harness, a crown, shoes, and swords from the Fujinoki tomb mound.
- Narrow strips of wood on which messages were written from the Asuka Palace site.
- A bronze epitaph of Ono Yasumaro who edited "Kojiki (Records of Ancient Matters)," an important cultural property.

Yamanashi Prefectural Museum of Archaeology is located in the Kai Fudoki-no-Oka historical park where the Kai-Choshizuka tomb mound and Maruyama tomb mound were constructed late in the fourth century with other small tomb mounds. This museum displays the history of Yamanashi prefecture from the Paleolithic to the Edo period, displaying the remains of the Ichinosawa site, an important cultural property, from the Middle Jomon period and the remains from the Kai-Choshizuka tomb mound and the Maruyama tomb mounds.

Hyogo Prefectural Archaeological Museum is located beside the Onaka site, Yayoi period. This museum also displays the history of Hyogo prefecture from the Paleolithic to the Edo period. The integration of exhibits for children plays an important role at this museum.

Japanese Archaeological Museums, Fig. 2 The Osaka Prefecture Chikatsu Asuka Museum

Saitobaru Archaeological Museum in Miyazaki prefecture is located at Saitobaru Fudoki-no-Oka historical park, where more than 311 tomb mounds exist. This is an archaeological site museum featuring a cluster of Saitobaru mounds designated as a national special historical park and exhibits archaeological remains to introduce the history of Miyazaki prefecture from the Paleolithic to the Edo period. The main focus of this museum is to display archaeological remains related to trade between Miyazaki and East Asia.

Ibusuki Archaeological Museum in Kagoshima prefecture is a municipal museum which displays the history of the southern Kyushu "Hayato" area with archaeological remains and emphasizes the Hashimurekawa site which was buried as a consequence of volcanic eruptions of Mt. Kaimon in the Jomon period and the Yayoi period.

Tatsuuma Archaeological Museum is a private museum which was established by the Hakutaka sake brewer. The collection of *Dotaku*, a bell-shaped bronze vessel of the Yayoi period, is its centerpiece.

Museums for Specific Periods

There are large-scale archaeological museums which exhibit archaeological remains of specific periods, such as the Museum of Yayoi Culture in Osaka, the Osaka Prefecture Chikatsu Asuka Museum, and Kumamoto Prefectural Ancient Burial Mound Museum.

The Museum of Yayoi Culture in Osaka is the largest museum of its subject period in Japan showing the evolution of the Yayoi clan that constructed large tomb mounds in the transition to the Kofun period.

The Osaka Prefecture Chikatsu Asuka Museum (Fig. 2) in the Chikatsu Asuka Fudoki-no-Oka historical park centers on the Kofun period, displaying a diorama of how the largest tomb mound called Daisen tomb mound (or Nintokuryo-Kofun) was constructed.

Kumamoto Prefectural Ancient Burial Mound Museum concentrates on tomb mounds with decorative murals, drawn on the walls of their stone chambers around sixth century CE. This kind of tomb was commonly constructed in northern Kyushu and provides visitors with a special impression of the tomb mounds.

Other Museums

As of 2011, there were 5,775 museums in Japan, of which 3,327 are historical in scope, and most of these display archaeological artifacts. While belonging to the third category and not regulated by the Museum Law, they are nonetheless important for the preservation of Japanese culture in the face of the modern construction which endangers the remains of our past.

There are 1,746 municipalities in all, with about 3,000 historical museums in Japan today. Among the many museums, mainly the displaying distinctive archaeological remains of their locality are the Hokkaido Museum of Northern Peoples, the Tohoku History Museum, the Osaka Museum of History, the Hiroshima Prefectural Museum of History, the Shimane Museum of Ancient Izumo, Kyushu Historical Museum, and the Okinawa Prefectural Museum. Every prefecture has founded museums to preserve their history and to display archaeological remains from all periods up to the Edo period to inform their visitors of the historical past.

The Hokkaido Museum of Northern Peoples is located in Abashiri, in northern Hokkaido, and preserves the Okhotsk culture which flourished around the seventh and eighth century. Discoveries from Moroyo shell midden are impressive and show the cultural exchange between this area and northern East Asia.

The Tohoku History Museum in Miyagi is located in a suburb of Sendai and displays archaeological remains from the ancient culture in the Tohoku region. This museum focuses on the system of ancient administration during the Nara period around the eighth century.

The Hiroshima Prefectural Museum of History focuses on the life of the people of the Setouchi area, with the archaeological remains of "Kusado Sengen," a medieval port town covered by a river. A life-size reconstruction of street life in "Kusado Sengen" recreates a summer evening during the Muromachi period and is popular with visitors.

Archaeological Site Museums

There are many archaeological museums which were constructed as guidance facilities to archaeological sites which are preserved in archaeological parks. Most site museums are constructed as atonement for destruction of the sites by development. Distinctive archaeological site museums include:

- Tokoro Iseki no Yakata (Tokoro Site Museum) in Hokkaido
- Sannai Maruyama site (Sannai Maruyama Exhibition Hall) in Aomori
- Goshono site in Iwate
- Tomizawa site (Chitei no Mori Museum) and the Historical Museum of Jomon Village Okumatsushima (Satohama shell midden) in Miyagi
- Iwajuku site in Gunma
- Shibayama tomb mound (Shibayama Kofun Haniwa Museum) in Chiba
- Otsuka-Saikachido site (Yokohama History Museum) in Kanagawa
- Shakado site (Shakado Museum of Jomon Culture) in Yamanashi
- Togariishi site and Hiraide site (Togariishi Museum of Jomon Archaeology) in Nagano
- Toro site (Shizuoka City Toro Museum) in Shizuoka
- Nishitani tomb site (Izumo Yayoinomori Museum) in Shimane
- Mawaki site in Ishikawa
- Saiku site (Saiku Historical Museum) in Mie
- Karako-Kagi Archaeological Museum and Heijo Palace site in Nara
- Myokenyama tomb mound (Onishi Fujiyama History Museum) in Ehime
- Hirabaru site and Mikumo sites (Itokoku History Museum) in Fukuoka
- Haranotsuji (Iki City Ikikoku Museum) in Nagasaki
- Oji site in Kagoshima

The Tokoro Iseki no Yakata no Mori Park (Tokoro Site Museum) is located in Kitami City in northern Hokkaido. At the Tokoro site, there are more than 10,000 archaeological features consisting of 2,500 pit houses, which date from 2,000 BCE to 1,000 CE. This is one of the largest pit house sites within a single autonomous area in the world. The park is divided into four parts: a site, a municipal museum which displays remains from all over this city area, a municipal

Japanese Archaeological Museums, Fig. 3 Shakado Museum of Jomon Culture

research center with a repository open to the public, and the Tokyo University Tokoro Site Museum displaying remains from excavations conducted since 1957.

The Sannai Maruyama site was designated as a special national historical site in 2000 and is one of the largest archaeological parks in Japan. Excavations carried out since 1992 have brought uncovered dwellings, pillar-supported structures, graves, storage pits, clay mining pits, and road refuse disposal pits with large numbers of artifacts. There is an exhibition hall called "Jomon Jiyuukan," and numerous Jomon houses, storage pits, and six-pillared buildings are reconstructed in the park.

The Tomizawa (Chitei no Mori Museum) site is located in Sendai, Miyagi. This museum allows visitors directly to see excavated lithics and traces of bonfires in woodland from the Paleolithic period and feel the atmosphere of the forest of 20,000 years ago.

The Shakado Museum of Jomon Culture (Fig. 3) in the Shakado site is located in Fuefuki City, Yamanashi Prefecture. Most of the site was destroyed with construction of the Chuo Expressway, but the Shakado Museum of Jomon Culture was constructed to show the greatness of the site which flourished, about 5,000 years ago, in the Middle Jomon period. As this museum is located beside the Shakado service area, visitors can get to the museum with only a 3-min walk. The museum exhibits magnificent Jomon clay figures with over 1,116 pieces on display and beautiful Jomon pottery designated as important cultural property. The museum also has a wonderful view of the Southern Alps.

The Togariishi Museum of Jomon Archaeology is located beside the Togariishi site from the Middle Jomon period (3,000 BCE). The museum exhibits over 200 splendid archaeological artifacts. There are two outstanding clay figures, "the Jomon Venus," a national treasure, and "the Venus of Mask," an important cultural property, exhibited as special-featured items. Outside the museum there are six pit dwellings excavated at the Yosukeone site and reconstructed to show the Jomon village landscape.

The Shizuoka City Toro Museum (Fig. 4) at the Toro site designated as a special national historical site is located in the center of Shizuoka City.

Japanese Archaeological Museums, Fig. 4 Shizuoka City Toro Museum and the reproduction of the rice cultivation in the Yayoi rice paddy fields

Japanese Archaeological Museums, Fig. 5 Mawaki Jomon Museum

The site and the museum are surrounded by modern houses due to urbanization. The Toro site was discovered in 1943 and was largely excavated from 1947 to 1950 and from 1999 to 2004. Through the excavations, a Yayoi-era village consisting of pit dwellings, elevated rice storehouses, and about 8 ha of rice fields with various water facilities was unearthed. Many pottery and wooden vessels, utensils, and farm implements were also discovered. The museum in Toro not only displays archaeological artifacts from the site but also features activities allowing visitors to get a real feel of what life at the site must have been like. Staff of the museum provide activities for visitors, such as cultivating rice fields, making a fire, weaving cloth, and making a pottery.

The Mawaki Jomon Museum (Fig. 5) is located in Noto Town in Ishikawa and introduces the Mawaki site. This site was a village from the Early to the Latest Jomon period (6,000–2,200 years ago). Remains including pottery, wooden objects such as oars, pillars as a totem pole and vessels, plant knitting and ropes, and animal bones from dolphins, fish, deer, and wild boars were found. Beside the settlement area, there was a wooden circle which consisted of huge pillars and graves. The museum in the Mawaki site displays artifacts to indicate a rich Jomon life.

Japanese Archaeological Museums, Fig. 6 Tokyo National Museum

A wooden circle has been set up as a symbol to express a ceremonial connection to the Jomon people in the Mawaki site.

The Heijo Palace site designated as a special national historical site in Nara was the capital of Japan 1,300 years ago, from 710 to 784. In the early eighth century, Japan established very powerful centralized bureaucratic government by adapting the highly developed Chinese constitution. The ancient Heijo Palace was located in the northern center of the capital. It was surrounded by earthen walls. In the palace, there were an Imperial residence and the government administrative buildings. The Heijo capital was modeled after Chang'an, the capital city of the Chinese Tang dynasty. There are two museums at the palace site. One is an open air museum showing the royal buildings after the excavation. The other one shows the life of the palace. The remains of the palace and the surrounding area were designated as a UNESCO World Heritage Site in 1998.

The Myokenyama tomb mound, located on the top of a hill in Imabari City, Ehime Prefecture, was constructed in the late fourth century, when the Yamato clan was spreading their power over Japan. Its mound is a keyhole-shaped tomb mound covering two stone burial chambers with vertical access as the place for interments. A Chinese bronze mirror accompanied the dead. The Onishi Fujiyama History Museum was founded at the Myokenyama tomb mound and only displays remains from that tomb. Visitors can easily understand how the dead were disposed and view the burial chambers through glass windows on the top of the tomb mound.

City, University, and Other Museums with Significant Archaeological Collections

City Museums

City museums are noted for their large-scale exhibitions designed to attract the public. These museums have been able, with their substantial budgets, to collect important archaeological material. City museums with important archaeological collections include:

- Tokyo National Museum
- National Museum of Japanese History in Chiba
- Osaka Museum of History in Osaka
- Kobe City Museum in Hyogo
- Fukuoka City Museum in Fukuoka
- Kyushu National Museum in Fukuoka

The Tokyo National Museum (Fig. 6), as Japan's oldest museum, has an extensive and excellent collection built largely before the national expansion of museums from the 1960s. There are many designated "national treasures" and "important cultural properties" on display.

Jomon clay figures called "Dogu" of various types and periods show beautiful postures such as

Japanese Archaeological Museums, Fig. 7 The Kyoto University Museum

the Dogu from the Shimpukuji shell midden in Saitama and the Kamegaoka site in Aomori. Many bell-shaped bronze vessels of the Yayoi period called Dotaku are shown including a Dotaku with decorative animal and human motifs from Kagawa; these objects are famous for understanding agricultural ceremonies in the Yayoi period. A collection of bronze mirrors from the Kofun period aids people in understanding the formation of ancient Japanese political systems. Objects from Eta Funayama tomb mound such as a sword with a silver inlaid inscription are indispensable archaeological evidence for understanding East Asian history. From the Asuka period around the sixth century, ritual objects used in the consecration of the building site of a five-storied pagoda at Horyu-ji temple are important not only for religious studies but also as evidence of the technical art of the time. The Kobe City Museum in Hyogo possesses bronze objects from the Sakuragaoka site in Kobe. These bronze objects consist of 14 Dotaku with crossed-band and running water designs and seven bronze halberds. This collection is essential for study of the Yayoi society.

University Museums

University museums have a different role from the city museums but also preserve large and significant archaeological collections. The Hokkaido University Museum, the University of Tokyo Museum, Kyoto University Museum, the Meiji University Museum in Tokyo, the Kokugakuin University Museum in Tokyo, the Kansai University Museum in Osaka, and the Tenri University Sankokan Museum in Nara possess large collections for research and education.

The Hokkaido University Museum possesses archaeological objects from all over Hokkaido before the arrival of the Ainu and material of the Okhotsk culture.

The Tokyo University Museum possesses a fine collection of archaeological objects from all over the world, especially East Asia, West Asia, and South America where the university has sent research expeditions. This university's collections from the Jomon and Yayoi period are outstanding and demonstrate how archaeology developed as an academic field in Japan.

Kyoto University Museum (Fig. 7), the first university where archaeology was accredited as a subject in Japan, has a great collection of archaeological remains collected through many excellent excavations in West Japan, such as the Karako site in Nara; the Ikisan-Choshizuka tomb mound in Fukuoka; the Tsubai-Otsukayama tomb mound in Kyoto; the Shikinzaka tomb mound, the Kyozuka tomb mound, and the

Minami-Tenpyozuka tomb mound in Osaka; and the Ishiyama tomb mound in Mie.

The Kansai University Museum possesses the collection of Mr. Hikoichi Motoyama, former president of the Mainichi Newspaper Company, from among others, the Koho site in Osaka, Jomon pottery from the Korekawa in Aomori, and a stone pillow for the dead, Early Kofun period, from the tomb attributed to Andonyama (Sujin Emperor) tomb mound.

The Tenri University Sankokan Museum in Nara possesses a large number of archaeological objects from Japan, China, Korea, West Asia, and South America. The most varied collection among them are the archaeological remains from the Furu site, which were connected to the ancient powerful clan "Mononobe" and are important in understanding ancient power structures.

Other Museums

There are many more museums affiliated with shrines and temples possessing archaeological remains as religious treasures. One of the most important archaeological collections is in the Munakata Taisha Shinpokan (Munakata Shinto Shrine) in Fukuoka. There are relics from the Okitsumiya shrine in Okinoshima Island on the Genkainada of the Japan Sea. The Okitsumiya shrine belongs to Munakata Taisha and was excavated in the 1960s.

Future Directions

Since the establishment of the Tokyo National Museum in 1882, many Japanese archaeological museums have been founded and have grown as historical museums. Land development and transportation infrastructure construction increased the number of excavations nationwide as new and magnificent archaeological artifacts were discovered. Many archaeological site museums have been constructed with tourism in mind. However, the economic crisis has placed museum managers and museums generally under stress. Museums have to think about how to survive this new economic climate while still serving their communities and missions.

Cross-References

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Java Man

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Introduction

"Java Man" is the informal name given to Pleistocene *Homo erectus* inhabitants of Java. The fossil discoveries on the island include the first for this extinct species, which is now known to have been widely distributed across the temperate and tropical zones of the Old World.

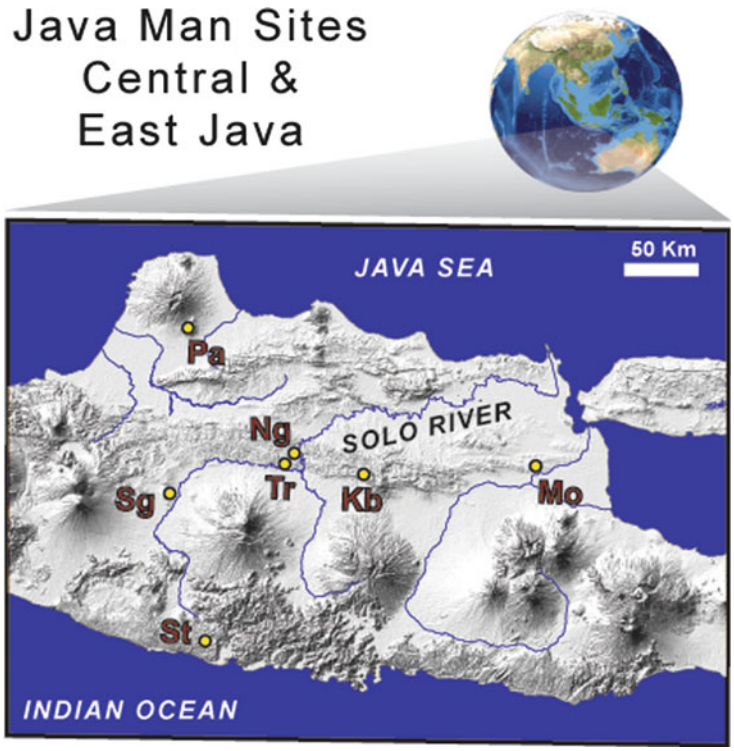

Java Man, Fig. 1 The Java Man (*Homo erectus*) fossil localities described in the text: Ngandong (Ng), Mojokerto (Mo), Patiayam (Pa), Sangiran Dome (Sg) and Trinil (Tr); Song Terus cave (St) has Paleolithic artifacts but no *Homo erectus* fossils (After Huffman et al. (2012). © Frank Huffman, Univ. of Texas)

Today, more than 100 skeletal specimens have been attributed to this species from localities in Central and East Java (Fig. 1; Indriati 2004). No other confirmed specimen of *Homo erectus* is known from elsewhere in Southeast Asia.

It is unclear how *Homo erectus* communicated: whether they "spoke" in any manner, or if they used gestural communication. Nor do we know how meaningful a twenty-first-century person would find the facial expressions of Java Man. We also have not resolved how *Homo erectus* social groups were organized, how they divided labor among group individuals, or how exactly they subsisted. On the other hand, the physical attributes of Java Man are reasonably well established. The average *Homo erectus* stood about 1.7 m (5 ft., 6 in.) tall, and had a lanky torso with long, well-muscled limbs and nimble hands. Java Man's brain was about three-quarters of the size of a modern human's brain (1,000 cm^3 versus 1,350 cm^3, respectively). *Homo erectus* individuals had flattened foreheads with prominent brow ridges (Fig. 2). The rear part of the skull (occipital bone) was curved sharply inward toward its base and had a massive ridge (transverse torus) where strong neck muscles attached. The lower jaw was nearly chinless. The face was massive, giving the head more of a forward projection (prognathism) than *Homo sapiens*. Java Man's teeth, on the whole, were only slightly larger than those of modern humans, and their incisors were "shovel shaped" on the tongue side. Despite this human-like appearance, Java Man would have stood out in a crowd of our contemporaries.

Definition

"Java Man" refers to representatives of *Homo erectus* that inhabited Java, Indonesia, during the Pleistocene. In the early 1890s, the Trinil site produced the holotype fossils of *Homo erectus* (the specimens that constitute the prime reference material used in defining *Homo erectus* taxonomically).

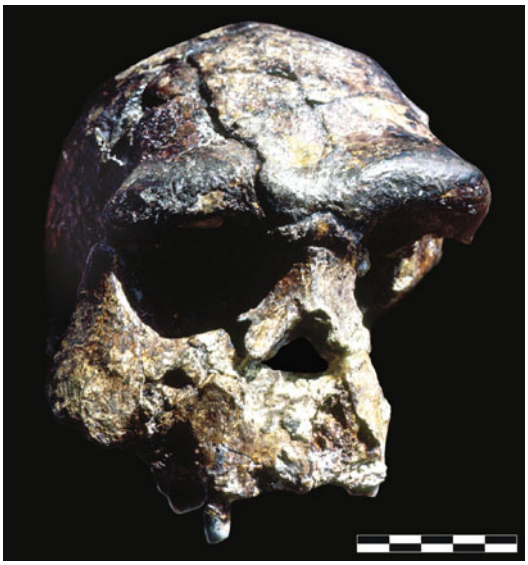

Java Man, Fig. 2 Sangiran 17, the most complete cranium of Java Man (*Homo erectus*) (© Russell L. Ciochon, Univ. of Iowa)

Java Man, Fig. 3 Trinil I, the first cranium (skull cap) of Java Man discovered by Eugene Dubois (© Russell L. Ciochon, Univ. of Iowa)

Key Issues/Current Debates/Future Directions/Examples

In the following paragraphs, we describe the best-known Java Man sites of central and eastern Java (Fig. 1), and use them to highlight the current scientific issues concerning *Homo erectus*.

Trinil

The Trinil discovery was the result of the only deliberate search for a fossil ape-human "missing link" in the nineteenth century. Eugène Dubois, a Dutch doctor who was strongly influenced on the subject of evolution by the German biologist Ernst Haeckel, hypothesized that fossils of the ape-human lineage could be found in Southeast Asia. Dedicated to testing his hypothesis, Dubois joined the Dutch Army as a surgeon stationed in the Dutch East Indies (present-day Indonesia; Shipman 2001). In 1888, he began scouring caves and outcrops of volcanic-rich sedimentary rocks known to have produced mammalian remains (de Vos 2010). Within 2 years, during August 1891, while digging in vertebrate-fossil-bearing sandstone exposed along the Solo River at Trinil (Tr on Fig. 1), his field crew discovered a large, fully fossilized, ape-like skullcap (Fig. 3). The following year, the field workers unearthed a human-like adult thighbone (femur) about 15 m away from where the skullcap had been found and in the same meter-thick bonebed. Dubois asserted that the two specimens were from the same individual (although this assessment is still in doubt). Based on the two fossils, Dubois defined a new species, *Pithecanthropus erectus* (meaning "upright ape-man") – the very kind of creature he went to the East Indies to find. In the 1940s, *Pithecanthropus erectus* was subsumed into the human lineage as *Homo erectus,* after anatomical comparisons with other known hominin fossils made it clear that the Java finds were more human-like than ape-like.

Excavation of the Trinil discovery bed (sometimes referred to as the Hauptknochenschicht or Trinil HK) ultimately produced thousands of strongly fossilized bone fragments of animals that had lived alongside *Homo erectus* in the local Pleistocene paleoenvironment. Most of the fossils represent extinct forms of cattle, water buffalo, deer, *Stegodon* (an elephant-like proboscidean), pig, rhinoceros, and tiger (de Vos 2010). Also present were denizens of large lowland rivers and estuaries, such as crocodiles and turtles (Joordens et al. 2009). The Trinil bonebed, which has not been dated using radiometric methods, is often attributed to the late early-Pleistocene (c. 900,000 years ago) on the basis of the correlation of its fauna with similar species at the Sangiran Dome (see below). Despite having contained multiple *Homo erectus*

fossils and thousands of other large fossils, the Trinil discovery bed produced no stone tools.

Ngandong

In 1931–1933, the Geological Survey of the Netherlands Indies uncovered 12 cranial and two tibial (shin-bone) fossils of *Homo erectus* along with more than 25,000 nonhuman fossils at Ngandong (Ng on Fig. 1). The fossils were unearthed across an excavation of about 4,600 m^2 from gravelly sand (Huffman et al. 2010). This discovery bed is about a half-meter thick in a stratum near the base of flat-lying river-terrace deposits having a stratigraphic thickness of about 3 m (Ciochon et al. 2009). The fossils were predominantly disarticulated and fragmented, with extinct cattle being the most common among the numerous other mammal, turtle, and crocodile species.

Ngandong is notable among global paleoanthropological sites because, not only is it extraordinary to encounter the fossilized remains of so many hominin individuals in a single river-laid deposit, but *Homo erectus* at this site appears to have been contemporaneous with anatomically more evolved *Homo* species from mainland Eurasia and Africa. Ngandong has been dated using paleontological and geological relationships, as well as radioisotopes. Paleontologically, the Ngandong nonhuman fossil assemblage includes more living taxa than was found at Trinil, indicating that Ngandong is the younger of the two accumulations, but the Ngandong assemblage also has extinct elements that do not occur in the modern fauna of Java, or even in the youngest premodern assemblages (de Vos 2010). Geologically, the Ngandong deposit is flat lying, rather than being structurally tilted in the way that other *Homo erectus* formations in central and eastern Java normally are. On the other hand, the bonebed accumulated along the Solo River streambed before it entrenched to its present-day level, some 20 m below the site. Radioisotopic age estimates range from 50,000–25,000 years (Swisher et al. 1996) to older than 70,000 years (Yokoyama et al. 2008) and younger than 500,000 years (Indriati et al. 2011). The 1931–1933 *Homo erectus* discovery bed was re-excavated in 2008 and 2010 in an effort to help clarify its age and explain how so many human individuals came to be embedded in the Solo River sands at this one locale (Ciochon et al. 2009; Frankel 2010).

The bones of *Homo erectus* and the other animals were probably deposited during a flood on the Solo River that originated in rainfall on a stratovolcanic mountain >50 km away; the flooding followed a mass death of large mammals that had aggregated along the Solo River (Huffman et al. 2010). The Ngandong event was one episode in an apparently consistent million-year-long paleogeographic pattern: the well-watered river valleys of the stratovolcanoes sustained recurring or continuing habitation of *Homo erectus,* cattle, deer, *Stegodon* and other large-bodied herbivores, while rapid volcaniclastic deposition, at times following eruption-related death, promoted quick burial and preservation of skeletal remains (Huffman et al. 2012).

Mojokerto

The Mojokerto site was discovered in 1936 approximately 125 km east of Ngandong and Trinil (Mo on Fig. 1). Unlike the previous finds, the Mojokerto site was a small excavation and produced just one, though considerably important, specimen attributable to *Homo erectus*. The fossil is the cranium of a juvenile, a rare occurrence in early hominin sites. Also, the Mojokerto child skull was embedded in conglomeratic sandstone deposited by a river flowing through marine delta, making it the only sea-coast geological context known for *Homo erectus* (Huffman et al. 2006). Finally, a probable early Pleistocene age places it among the earliest hominin specimens from Asia. Despite the potential value of establishing an exact absolute date for Mojokerto, radioisotopic and paleomagnetic investigations have so far not achieved this objective.

While the accurate dating of Mojokerto and many other Java *Homo erectus* finds remains a scientific challenge, recent research on the discovery sites improves our understanding of one characteristic of the *Homo erectus*' presence

in eastern Java. Andesitic sand and gravel largely makes up the *Homo erectus* formations, and forms the matrix around the Ngandong, Mojokerto, and Trinil *Homo erectus* specimens (as it does for many finds from Sangiran Dome, described below). The paleogeographical implications, especially clear in the 125-km-long formational outcrop belt that connects Trinil to Mojokerto, are that the eastern Java sites record hundreds of thousands of years of human existence along large rivers flowing off of stratovolcanic peaks in a paleolandscape that was quite similar to eastern Java today (Huffman et al. 2006, 2010, 2012; the volcanic peaks form highest elevations in the Digital Terrain Model that is used as the base map in Fig. 1). The stratovolcanoes of the *Homo erectus* period, like those in modern Java, often generated perennial river discharge (continuous flow fed by the mountainous concentration of rainfall) as well as periodic eruptions of voluminous volcanic material; the runoff and sediment combined to produce volcanic-derived sedimentary pulses, including slurries and sandy-gravelly floods that ravaged the river valleys for many kilometers downstream (Huffman et al. 2012).

Sangiran Dome

Vertebrate fossils had been collected since the mid-nineteenth century at the Sangiran Dome (Sg, Fig. 1), 65 km west of Trinil, but it was not until 1937 that G.H.R von Koenigswald, a paleontologist with the Geological Survey of the Netherland Indies, made the first of many *Homo erectus* finds there. Today, more than 80 specimens, or over 77 % of all Indonesian fossil humans, derive from Sangiran Dome (Larick et al. 2001; Indriati 2004). Among the specimens is the most complete skull of Java Man known (Sangiran 17; Fig. 2). The word "Dome" in the name of the discovery area refers to the ovoid 4 by 8 km geological uplift (a structural dome) that exposes the fossiliferous beds. Many sites and stratigraphic discovery levels occur here, in contrast to the Ngandong, Mojokerto, and Trinil sites, where each discovery came from a single bed extending laterally less than a few hundred meters. Because the finds from Sangiran Dome are so important to the paleoanthropological record of Asia, UNESCO added the "Sangiran Early Man Site (Indonesia)" to the World Heritage List in 1996.

Sangiran Dome continues to yield both new *Homo erectus* finds and scientific insights into the evolutionary history of the species. We highlight three examples. First, a 1.5 million-year-old *Homo erectus* upper-jaw bone (Fig. 4) from Sangiran Dome, when compared to *Homo erectus* material from China, Africa, and Georgia (western Asia), as well as with *Homo habilis* remains from Africa, seems to indicate that *Homo erectus* in East and Southeast Asia came from two separate populations. Evidently, there was an early influx that reached Java and a later one that populated China (Zaim et al. 2011). Second, Sangiran Dome has been the site of a series of excavations in the last 40 years, and one of these (Ngebung) revealed several lithic artifacts and cut-marked bones along a Pleistocene ground surface (Semah & Semah 2006). This discovery is the best evidence yet of how Java Man used stone tools (Fig. 5). Equally, the finds serve to underscore how rare lithic artifacts and cut-marked bones are in *Homo erectus* beds of eastern Java, even in the prolific bonebeds excavated at Ngandong and Trinil. Third, because the geology of Sangiran Dome has been studied more intensely than other hominin-producing outcrop areas, it offers unique perspectives on the paleoenvironmental context of Java Man. The nature of the ancient soils and carbon isotope studies indicate that the earliest *Homo erectus* at Sangiran Dome encountered a low-relief lake-margin landscape dominated by moist grasslands with open woodlands in the driest landscape positions, while later in the Pleistocene, the hominin landscape had more riparian forests, local savanna lands, and open woodland (Bettis et al. 2009; see also Semah & Semah 2012).

Several other sites in eastern Java help to show the extent of early hominin occupation in eastern Java. Hominin fossils were found with typical Pleistocene fauna at Patiyam, 90 km north of Sangiran Dome (Pa on Fig. 1). Paleolithic artifacts (but no hominin fossils) occur near Java's Indian Ocean coast in Song Terus cave,

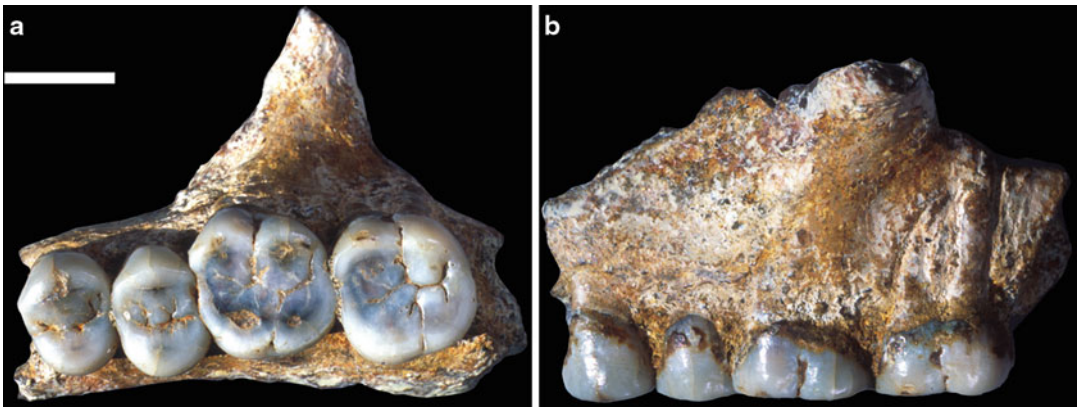

Java Man, Fig. 4 The Bapang maxilla from Sangiran, the earliest firmly dated fossil evidence of Java Man: (**a**) Occlusal view; (**b**) Lateral view (Zaim et al. 2011) (© Russell L. Ciochon, Univ. of Iowa)

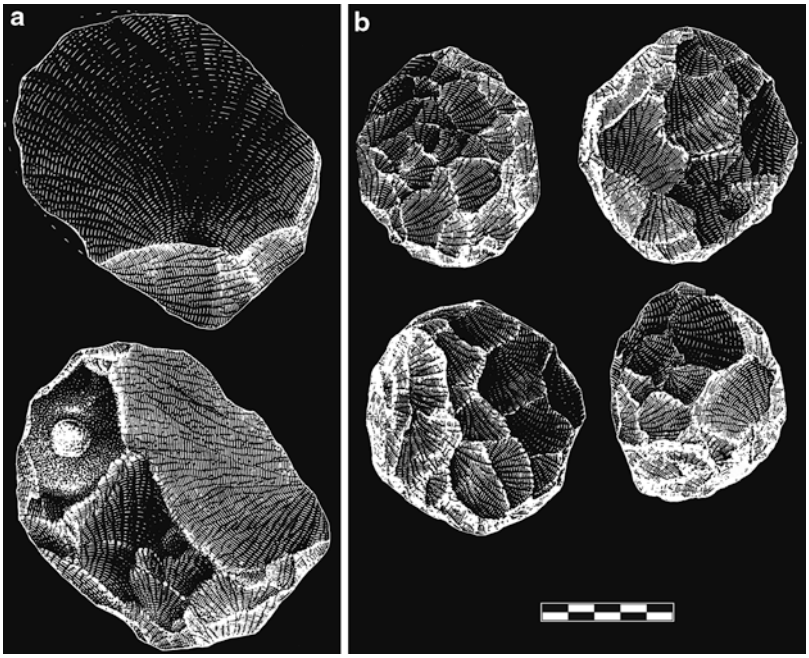

Java Man, Fig. 5 Stone artifacts from Ngebung, Sangiran: (**a**) Retouched flake; (**b**) polyhedron tool (Courtesy of © by Francois Semah, CNRS, France)

75 km southeast of Sangiran Dome (St on Fig. 1; Semah & Semah 2006).

Summary

Both the origin and extinction of Java Man are subjects of continuing research. An East Asia source for Java Man was the leading scientific theory until the ascendency of African paleoanthropology during the 1960s. After that, the inferred origins and taxonomy of *Homo erectus* focused on Africa. Java Man represented one endpoint of an African-sourced dispersal. Interest now rests in a balance between African and Eurasian paleoanthropologic evidence. Particularly influential have been the discoveries of *Homo erectus georgicus* at Dmanisi, Republic of Georgia, *Homo floresiensis*, the "hobbit," of Flores Island, 1,000 km east of Java, and the Denisovan populations of Northeast Asia. *Homo erectus* or related ancestors inhabited western Asia more than 1.8 million years ago, as indicated by the fossils of this age at Dmanisi.

Homo erectus likely reached Java by 1.6 million years ago upon evidence from the Sangiran Dome and possibly Mojokerto (Larick et al. 2001; Zaim et al. 2011). Even if Java Man emerged from an eastward-dispersing population of African origin, *Homo erectus* on the whole might have been most numerous in western and southern Asia with Java Man being one component of this widespread population. Whether Java Man was contemporaneous with *Homo sapiens*, as it dispersed out of Africa to Southeast Asia and Australia at around 40,000–60,000 years ago is not resolved. Firm dating of the Ngandong *Homo erectus* offers one opportunity to test this possibility.

Cross-References

- ▶ Dmanisi Hominins and Archaeology
- ▶ Dubois, Eugène
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ *Homo erectus*

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Jenne-Jeno, Archaeology of

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Introduction

Jenne-jeno is an ancient city in the Middle Niger floodplain of the Niger River in present-day Mali. It was the first indigenous city recognized in Africa south of the Sahara, contradicting the long-held assumption that African cities were initially colonies of or in some way stimulated by Greco-Roman, Punic, or Egyptian urbanism north of the desert. Jenne-jeno is one of scores of specialist-occupied settlements, separate but clustered together in an original city plan labeled the Jenne-jeno urban cluster. Notable also is the lack of evidence to date for kings, state apparatus, and indeed for a hierarchical power structure. Although other Middle Niger cities are coming to light that apparently predate this site's third-century foundation, Jenne-jeno serves for Africanists as the type site for heterarchical (nonhierarchical) authority at an early city.

Definition

Early African city lacking expected evidence of kings and hierarchical power apparatus, all things once thought to be necessary to bind together the inhabitants.

Key Issues/Current Debates

Jenne-jeno rises 7 m high over Mali's Middle Niger floodplain (Fig. 1), a *tell* that would not be out of place in Mesopotamia. Jenne-jeno's descendant town, Jenne, lies 3 km away; its present-day inhabitants walk about on 9 m of ancient city deposits. Within 4 km are 70 tells in total, apparently all occupied contemporaneously with Jenne-jeno, and most abandoned at the same time, around CE 1400 (McIntosh 1998, 2005). Many were founded simultaneously with Jenne-jeno in the third century BCE. In fact, in the 55,000 km^2 of the seasonally inundated Middle Niger floodplain, there are many hundreds of similar mounds. In the roughly 170,000 km^2 that were flooded yearly within the past four to five millennia (much now in the deepest Sahara), there are hundreds of tells more. Yet, as recently as the mid-1970s, this was not recognized as an urban landscape.

During Colonial times, multiple archaeologists walked over the site (Mauny 1961), missing entirely its age and significance because utterly lacking on the surface were palaces, temples, and other indicators of "civilization." As we shall see, Jenne-jeno is indeed a "city without citadels" – and that is its greatest importance to world prehistory. Later, in the late 1970s, archaeologists came armed with new theory and excavation and survey methodologies that allowed them first to recognize and then to plumb the evolution, not just of city Jenne-jeno, but of what we now call the "Jenne-jeno urban complex." As large and as heterogeneous as the principal site was, it was only a part of a 70-site cluster that, together, provided urban services and manufactures to a hinterland of many thousands of square kilometers – and ultimately to the sister city of Timbuktu over 400 km downstream at the Saharan fringe.

From its foundation, Jenne-jeno served as the focus of long-distance trade networks that linked gold and forest goods producers far to the south with those who brought the semiprecious stone and salt of the Sahara (and, eventually metal goods, beads, and books from North Africa). The growth of the town is a story of ever growing numbers of craftspersons adding value to the raw materials brought by traders and building a vast exchange covering large parts of the Middle Niger and western Sahel. The relative homogeneity of the ceramic assemblages over this vast area attests to the commercial strength of the town (McIntosh 1995), a dominance that appears not to have been matched by any political hegemony.

Archaeologists once denoted a city by its citadel and palace, the associated residences of the elites, and the splendid temples in which kingship

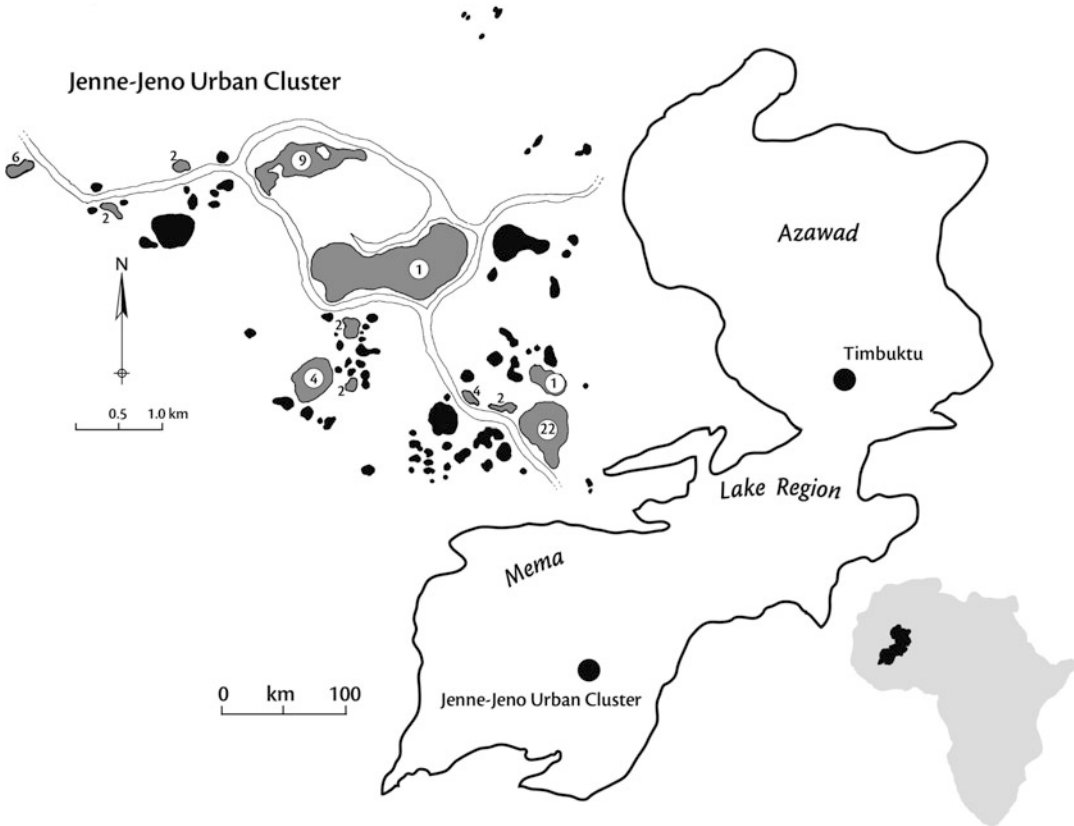

Jenne-Jeno, Archaeology of, Fig. 1 Location of Jenne-jeno and of the Jenne-jeno urban cluster in the Middle Niger of Mali, West Africa. Numbers associated with sites of the clusters denote numbers of units excavated (e.g., 22 = Jenne-jeno)

and its relation to the gods were celebrated (Yoffee 2005). Curiously, at Jenne-jeno, no elite residences and no public architecture nor monuments, much less a king's palace have been located despite extensive excavation. What the site does provide in ample volume is evidence of multiple occupations, multiple manufacturing areas, and multiple "identity groups" as indicated by a great diversity of contemporaneous burial practices. After some 35 years of controlled stratigraphic excavations at some 22 units spread over the 33-hectare area of the site, we have a plot of how that occupational and identity diversity burgeoned from the relatively simple (yet quite large at 20 hectare) community at its founding in the third century BCE. Note that sinking so many excavation units, some as large as 10 m by 6 m, into the 7-m (and more)-deep deposits is absolutely necessary when one is investigating the emergence and evolution of complex society and the complex mix and dynamics of interactions of multiple corporate groups (defined as self-identified groups that hold real or symbolic property in common).

A complication to the archaeologist's tasks is the tight clustering of nearby settlements in a density that roughly decreases with distance from the principal site. What does clustering mean? One way to answer that question is to surface collect artifacts and surface features (burials, house foundations, etc.) from all the sites in order to ask the question: Are there anomalous concentrations of certain artifacts or features compared to the range and relative proportions at Jenne-jeno that reveal special activities concentrated at different locales? Take the

case of iron smelting. This is a dirty, hot, and noisy activity, one that is today locally associated with the production of highly dangerous occult power. Not something one wants next door. Through the Jenne-jeno sequence, we see the migration of smelting from the focus site to multiple satellites. Adding to the tasks of sampling the activities at the main site, the urban archaeologist also must study the activities in each of the satellite sites. Already in the first season of surface collection in the Jenne-jeno urban complex, we detected a pattern of mutual exclusivity, or near exclusivity, of activities at satellites.

A considerable degree of concentration of activities (especially iron working, various styles of fishing, hunting aquatic mammals and snakes, weaving) continues to be the best explanation for the nonuniform, nonrandom distribution of surface and stratified artifacts in the Jenne-jeno urban complex. What does this clustering mean and what does this landscape say, potentially, about the distribution of power and authority within the larger community?

Some three and a half decades of research in the Jenne region allows us to say several things, with considerable confidence, about how this society was structured. First, clustering appears to have been a solution to the problem of how different specialist corporations might maintain and display their distinct identities, while at the same time having immediate access to other providers of needed goods and services and access to those to whom they themselves provide materials (Trigger 1972). One needs, at the same time, to answer the question: "Who monitors or controls the exchange of those manufactures and services?" An older theory of the nature of cities would have answered: "The king and his administration, backed up by force, of course." However, in the case of the Jenne-jeno urban cluster, we appear to have an exchange system that functioned organically through the relations of reciprocity forged among corporate groups. If corporate groups were defined unambiguously, and expectations and rules of reciprocity, including consequences if the rules were transgressed, the urban system would not have required a vertically hierarchical control structure – which in fact we do not see. Rather, corporate ownership of individual mounds by members of an occupationally defined/kin group is indicated by the archaeological data indicating near exclusivity of occupational debris at each of the satellite sites.

Second, we have no hard evidence of a state-like, top-down, elite-driven political engine powering this kind of urbanism through time. We find no indications of kings, citadels, palaces, or indeed any obvious elites. The political and economic organization of late first millennium BCE and later urbanism in the Middle Niger seems heterarchical. That is, one identifies separate, if sometimes overlapping, domains of authority, all functioning in an interactive field, not a vertical hierarchy of kings and subjects and unidirectional flows of information.

Recent research reveals cities even earlier than Jenne-jeno and especially a "pre-urban" landscape in the northern reaches of the Middle Niger (Méma, Lakes Region, and Timbuktu) (Togola 1996; Park 2010) and further north into the (Mauritanian and Malian Azawad) Sahara (MacDonald 2011) that was potentially several millennia in the making. This "pre-urban" landscape includes the creation of specialized sites and activities in a regional economy (a self-organizing landscape in the language of complex systems, McIntosh 2005). This landscape displayed great resilience in a challenging environment as the Sahara transformed from a well-watered savanna (with vast lakes) as late as the fourth millennium BCE to its present condition by the late third or early second millennium.

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- ▶ West Africa: Islamic Archaeology
- ▶ West Africa: Museums
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Basic Biographical Information

Jesse D. Jennings was born in Oklahoma City July 7, 1909, and died at his home in Siletz, Oregon, on August 13, 1997. Married for some 60 years to Jane Chase Jennings, he left behind two sons, David and Herbert, and three grandchildren. The son of hard-scrabble dirt farmers, Jennings worked his way through Montezuma College in Hot Springs, New Mexico, graduating in 1929 and entering the University of Chicago graduate program the same year. There he supported himself by working on the campus grounds crew, as a hospital orderly, as a campus policeman, as an archaeological field worker, and ultimately as a holder of the Anthropology Department's coveted Ryerson Fellowship. After beginning with Robert Redfield and others in cultural anthropology, Jennings was drafted by department head Faye-Cooper Cole to serve in Chicago's archaeological field school, where he progressed rapidly into a supervisory role at sites in Illinois, the Southeastern USA, and beyond. This set him on the archaeological track that he followed the rest of his life (Jennings 1994). His Chicago Ph.D. dissertation, completed during WWII when he was serving as a Naval Officer in Newfoundland, was *The Site Kaminaljuyu and Its Contribution to Certain Problems of Mesoamerican Prehistory* (Jennings et al. 1946).

For some years after WW II, Jennings worked in the realm of archaeological stewardship for the US National Park Service in the American Southeast, Southwest, and Plains, during the early developmental phase of what we now call Cultural Resource Management (CRM) archaeology. In 1948, he joined the Department of Anthropology at the University of Utah, a position he held until his 1986 retirement at the rank of Distinguished Professor Emeritus. Jennings moved in his later years to the Oregon Coast, where he and his wife lived near their son Herb and his family, and for many of these years taught a hugely popular Spring seminar to worshipful graduate students of the University of Oregon Department of Anthropology (Fig. 1).

Major Accomplishments

Jennings distinguished himself early on, and throughout his highly active career, by a strong

Jennings, Jesse D., Fig. 1 Jesse D. Jennings

emphasis on strategically conceived and rigorously executed excavation, meticulously documented. His interpretive paradigm, applied over a long career to researches in the American Midwest and Southeast, Guatemala, the North American Plains, Southwest, and Great Basin, and the Pacific Islands, was firmly based on ethnographic analogy and a direct historical approach that yielded him rich historical and ecological perspectives in all these settings.

Jennings' research at Danger Cave, a deep, dry grotto overlooking the final Pleistocene shoreline of Pluvial Lake Bonneville in far western Utah, was path-breaking in its execution and dramatically rich in its conclusions, and remains today his single greatest contribution to our understanding of North American prehistory (Jennings 1957). Making comparisons among the well-preserved material culture, flora, and fauna of Danger and other dry cave sites, and calling attention to many thoroughgoing congruencies between archaeological inventories and ethnographic accounts all across the region, Jennings described a Great Basin Desert Culture that was widespread, ancient, and stable in its fundamentals, maintaining the same basic adaptive patterns from about 10,000 years ago down to the nineteenth century.

The evidence and argument Jennings marshaled established a conception that will forever influence archaeologists' thinking about prehistoric hunter-gatherer cultural ecology in the American Desert West, and similar situations elsewhere on the planet. Jennings' original presentation was broad and generalizing, but more closely focused applications of the same ecologically informed approaches are today also yielding important insights into more closely defined regional and local social economies across the same region.

Another major Jennings accomplishment was his focal role in creating the University of Utah Museum of Natural History, an effort that spanned in all more than 20 years. With the museum at last installed in the fine old campus library in 1973 and legislative funding assured for its continuance, he resigned as director, passing the job on to his long-time curator of exhibits. The museum has continued to flourish as a world-class research facility and contributor to public education, and as this is written, the University of Utah has just moved it into a new multimillion dollar building on its upper campus that magnificently expands and carries on Jennings' legacy.

In another aspect of his archaeological career, Jennings entered early into the writing and editing of synthetic archaeological volumes directed to peers and students (Jennings 1968, 1986). *Prehistoric Man in the New World* (1964), coedited with Edward Norbeck, and *Prehistory of North America* (1968), gave students and teachers two of the first textbook syntheses of the continent's archaeology, each continuing through three editions. In addition, *The Prehistory of Polynesia* (1978) brought together under his editorship synthetic essays by more than a dozen prominent students for a first-time summation of this vast area's long human history. It is Glen Canyon (1966) and Prehistory of Utah and the Eastern Great Basin brought together decades of work he conducted with generation of students.

Professional Awards and Honors

Editor of *American Antiquity* 1950–1954; Executive Board of the American Anthropological Association 1953–1956; Viking Medalist in Archaeology 1958; President, Society for American Archaeology 1959–1960; Vice-president and Section H Chairman, American

Association for the Advancement of Science 1961, 1971. University of Utah Distinguished Professor 1974, Doctor of Science 1980. National Academy of Sciences 1977. Society for American Archaeology Distinguished Service Award, 1982. Distinguished Service Award, Society for Conservation Archaeology 1982. Plenary session speaker at the Society for American Archaeology 50th Anniversary Celebration, 1985. Jesse D. Jennings Prize for Excellence established by the Great Basin Anthropological Conference, 1990. A.V. Kidder Medal for Achievement in American Archaeology 1995.

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Jericho Archaeological Site

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Introduction

Usually subsumed under the poorly defined and overgeneralizing rubric of the *Neolithic Revolution*, the transition between foraging and food-producing economies from the Levantine Late Natufian through to the Pottery Neolithic embodies profound changes in subsistence practices and economy and is widely recognized as representing a crucial threshold in human prehistory. As seen with the excavations of Jericho, it is this period that we see the emergence of the first villages, explosive population growth who settle down in these villages occupied on a year-round basis, and the reorganization of the processes and structures by which human social interactions occurred. This is most noticeable with the development of large community structures, such as the large Neolithic tower of Jericho excavated by K. Kenyon, and densely packed villages of rectangular mud brick houses that came to characterize residential architecture since this point.

Definition

Tell el-Sultan, better known as the ancient site of Jericho, is situated in the Palestinian Autonomous Authority, north of Wadi el-Mafjar on a moderately sloping plain formed by the Late Pleistocene Lisan Lake. Rising as a mound some 26–39 ft (8–12 m) above the current landscape, the site of Jericho covers an area of at least 30,000 square yards (25,000 m^2) and is oval shaped, with its long axis oriented along a north-south line.

Key Issues/Current Debates/Future Directions/Examples

As a historical, biblical, and archaeological location, the settlement of Jericho provides insight into the appearance of the world's first villages in the Neolithic period, development of early Neolithic agriculture, the forager-farming transition of the Ancient Near East more generally, and the emergence of Bronze Age urbanism. Originally intrigued by the biblical tale of the walls of Jericho, many early archaeologists undertook biblically oriented excavations at Jericho. The earliest of these archaeologists was C. Warren, who excavated a series of deep, and remarkably unsafe, shafts into the mound in 1873. Following this, E. Sellin and C. Watzinger (1907–1908) opened up a series of trenches and were followed by the extensive excavations of J. Garstang (1930–1936). Focusing on the Early and Middle Bronze Age occupation, these researchers demonstrated that in the Bronze Age Jericho was surrounded by an extensive defensive wall system with a number of elongated rectangular towers. Jericho appears to have been continually occupied into the Middle Bronze Age, indicated by the extensive cemetery, with vertical shaft tombs and underground burial chambers. In the Middle Bronze Age, the town was expanded with the construction of glacis defensive fortifications. The elaborate burial offerings placed in some of the tombs of this period may reflect the emergence of local rulers. After destruction in the Late Bronze Age, Tell el-Sultan no longer served as an urban center.

The early excavations at Jericho also revealed something totally unexpected: evidence for a Neolithic preagricultural village as well as preagricultural settlement of what we now know to be sedentary people living on wild plants and animals. Sellin and Watzinger and, later, Garstang uncovered remains of an earlier Neolithic settlement. Intrigued by these materials, Dame K. M. Kenyon undertook large-scale excavations of the pre-pottery Neolithic occupation at Jericho from 1952 to 1958 (Kenyon 1957, 1981). Kenyon's excavations demonstrated that Jericho was originally founded by sedentary foragers/collectors in the Natufian period (12,800–10,500 BP), living in large semisubterranean oval stone structures, although it is unclear how extensive this occupation was. With the introduction of domesticated plants in the Pre-Pottery Neolithic A period (PPNA) (c. 11,700–10,500 cal. BP), Jericho mushroomed into a large regional agricultural community, covering an area of some 300 square yards (25,000 m^2). Villagers, like those of the nearby sites of Netiv Hagdud and Gilgal I, lived year-round in roofed, oval semisubterranean dwellings and engaged in long-distance trading of Anatolian obsidian and shells from the Mediterranean and the Red Seas (Kuijt & Goring-Morris 2002). Living on domesticated and wild plant crops as well as hunting of wild game, adult individuals were buried in single graves, frequently with their cranium later removed to secondary locations.

Excavations at Jericho illustrated that this early Neolithic communities consisted of several hundred people, with systems of food storage and with sufficient labor to construct large community facilities. Kenyon's excavations of the PPNA layers at Jericho uncovered a spectacular large circular tower situated just inside of a 12-ft-high (3.6-m-high) perimeter wall (Fig. 1). Made of field stones, the tower was 28 ft (8.5 m) in diameter, preserved to a height of 26.5 ft (8 m), and had an internal staircase (Fig. 2). Kenyon argued that the tower and walls comprised an early defensive system. O. Bar-Yosef (1986) has questioned this view, arguing that the tower and perimeter wall served as a water diversion system to protect the PPNA occupants from winter floods. It is also possible that the western wall, which does not totally surround Jericho, facilitated the ponding of water so as to support agricultural and a waterfowl habitat. Elsewhere, Kuijt (1996) points out that at a later point, the tower was abandoned and the internal staircase was used for burials. It is puzzling to note, however, that even with the stairway being blocked off, the tower continued to have stood 5 or more

Jericho Archaeological Site, Fig. 1 Pre-Pottery Neolithic A period tower of Jericho in trench I and squares FI and DI. Note the height of the tower, illustrated by excavators standing on top of and below the building, the square entrench to the staircase that goes to ground level, and the upper surface of the tower illustrate that the building was built in two periods and the outer surface was covered by mud (From Kenyon 1981, Plate 5)

meters above the ground surface and existed as a major building visible from some distance.

Over the last 10 years, research at several archaeological sites, such as Göbekli Tepe, Dhra', and WF 16, has illustrated that early villagers created corporate structures for food storage, meeting locations, and perhaps even shrines or temples. There is active debate among researchers of how representative these structures are of life within villages and how they would have been used as physical locations for human action. Excavation of Neolithic Jericho provides important insights into the question of the construction, use, and frequency of community buildings. For example, given that Kenyon opened up a surface area of less than 5 % of the total surface area of Jericho (and this is probably an overestimation), it is entirely possible that the tower she found is not the only tower now covered up at Jericho. When she started excavations in 1952, none of the tower was visible from the ground surface, and she had no idea what was below the ground surface. In light of the total surface area of the mound, it is entirely possible that there are another four or so Neolithic towers buried at Jericho. Even if this is the only tower at Jericho, the construction of this building represents a major input of community labor that was far beyond the labor required to construct an individual home or the harvesting of plants. What this shows us, in brief, is that Jericho was not only a village of individual households who pooled labor for seasonal agricultural tasks: it was a village where household members cooperated in the construction of one or more monumental buildings. This is all the more surprising when one realizes that these people were cultivating wild plants and hunting wild animals.

With the appearance of domesticated goat and sheep in the Pre-Pottery Neolithic B period (PPNB) (10,500–8,700 cal. BP), significant changes occurred at Jericho and the rest of the Levant (Kuijt & Goring-Morris 2002). The village was expanded, with a greater number of residential buildings placed in relatively close proximity to each other and with the development of new ground and chipped stone technologies. The rectangular buildings were free standing, and with fences, walls, and alleyways, and would have created a complex village pattern with single-story mud houses, courtyards, areas for stock, and potentially homes for several hundred people. The PPNA tower and perimeter walls were abandoned, and villagers now built rectangular (4 by 8 m) houses with painted red and white lime plaster floors (Kuijt 2000) (Fig. 3). Displaying continuity with earlier burial practices, PPNB villagers buried their dead in a wide range of locations within the settlement in general and around their homes in specific. Burial practices often included skull removal as part of an elaborate and highly complex system of defleshing and secondary interment of part of the human body. Villagers often cached multiple human skulls beneath house floors and courtyard areas and probably as

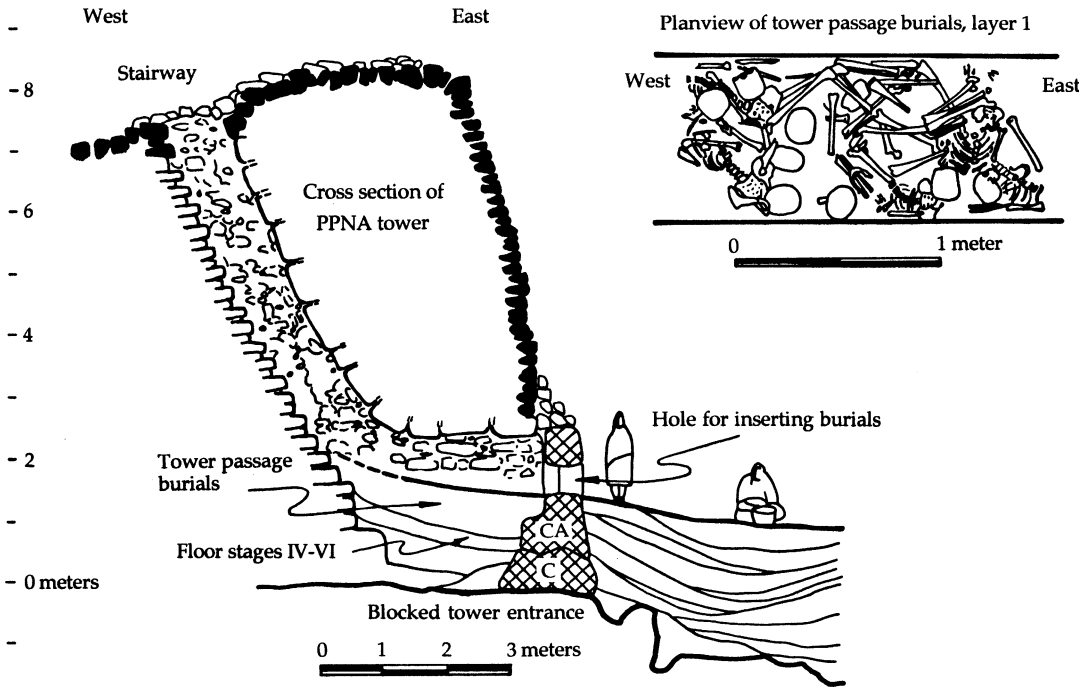

Jericho Archaeological Site, Fig. 2 Cross section of the Pre-Pottery Neolithic A period tower of Jericho (From Kuijt 1996). Note how steep the stone stairway is and size of the tower

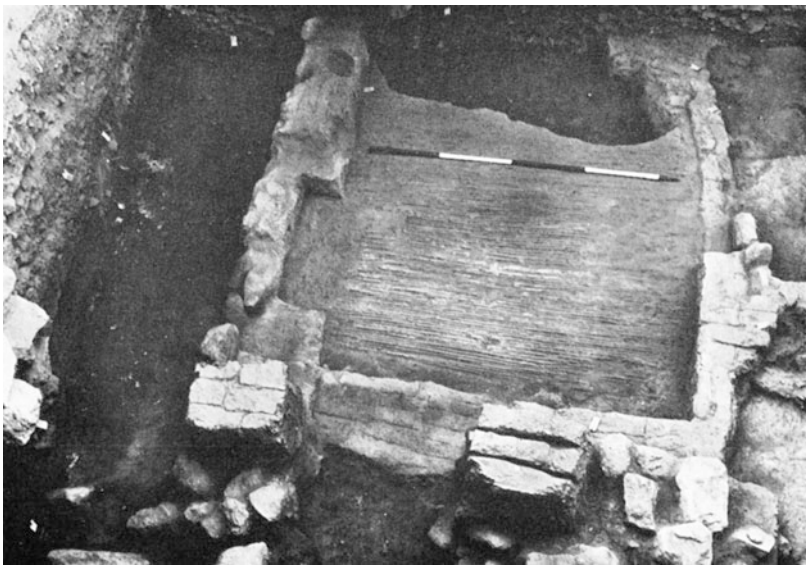

Jericho Archaeological Site, Fig. 3 Floor plan of partially preserved Pre-Pottery Neolithic B rectangular house of mud bricks of phase DI.xlii, showing reed foundation for plaster floor. The walls are made of hand-formed mud bricks that were stacked on top of each other to make an upright wall (From Kenyon 1981, Plate 49b)

individual skulls in a wider range of locations. Evidence of these plastered human skulls, at times with inset saltwater shells for eyes and painted representations of hair and other facial features, clearly indicates the practice of a complex form of ancestor worship and the emergence of more complex social and ritual organizations. Villagers also developed new ways of making chipped and ground stone tools, including the expanded use of pressure flaking to

make new projectile point forms and the development of naviform core reduction to systematically create blanks for tools, and developed new ways of manufacturing grinding stones to facilitate the grinding of domesticated plants. Other important stone tool technologies involved the production of ground stone beads and other stone ornaments.

Kenyon's excavations of the Neolithic deposits clearly demonstrated that as one of the earliest and most important agricultural villages in the Jordan Valley, Jericho existed as a regional focus for the trade of exotic goods and agricultural products and possibly as a major location for ritual. As one of the, if not the most, extensively reported Neolithic sites in the southern Levant, our archaeological knowledge of Jericho serves as the foundation for understanding Neolithic cultural chronology, the emergence of agriculture, and the development of complex social organization in the Levantine Neolithic period.

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- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Plant Domestication and Cultivation in Archaeology

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Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of

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Introduction and Definition

Jerusalem القُدس ירושלים (UTM: 31°47′N 35°13′E) sits at the heart of the highlands that run down the center of Palestine, bounded by the Syro-African Rift in the east and the limestone foothills of the Shephelah and the coastal plain to the west. A Mediterranean climate characterizes the Judaean hills, with wet cool winters strongly contrasting with hot very dry summers. The limited rainfall is augmented in Jerusalem by the existence of the prolific Gihon spring, whose difficult topographical location has long influenced the layout of the city. Jerusalem is spread over several hilly spurs, with the Kidron Valley on the east and the Hinnom Valley on the west. The city is divided by the Tyropoeon Valley with Mount Moriah on its eastern side.

Jerusalem has a history of six millennia, one of the most ancient continually settled cities in the world. Jerusalem has been Judaism's holiest city and spiritual center since the Iron Age; it is the site of the crucifixion and resurrection of Jesus Christ and the destination of the night flight (*Miraj*) of Mohammed. Mount Moriah, Jerusalem's acropolis, has formed the locus for

religious tradition and worship from the time of the Canaanite tribe of Jebus, through its role as the Temple Mount upon which two Jewish temples were both built and destroyed, as the site of the Roman temple of Jupiter Capitolinus, and as the location of the Noble Sanctuary (*el-Haram es-Sharif*) that contains the Dome of the Rock and the el-Aqsa Mosque, the last of which is outside the temporal framework of this entry. In addition to its place in the Old Testament, Jerusalem is important to Christians for its central place in the life of Jesus, especially for the events of the last week of his life. As a result of these events Jerusalem became the site of some of the most important shrines of Christianity.

Key Issues/Current Debates

The Hellenistic and Early Roman Periods: Second Temple Jerusalem

After Alexander the Great conquered the Persian Empire in 333–332 BCE, Jerusalem fell under Seleucid and Ptolemaic control and cultural influence. Disputes concerning the influence and imposition of Hellenism culminated in rebellion. As a result of the Maccabean revolt Jerusalem became the capital of the independent Hasmonean Kingdom for some hundred years, till a dynastic dispute led to Roman intervention and Judaea becoming an autonomous Hasmonean province. After the Romans appointed Herod as a client king around 19 BCE, he proved to be a dominant ruler whose work in the city influences the urban form of Jerusalem even today. Herod renovated the Temple, constructed major additions to the surrounding complex, and built new streets and walls. After Herod's death in 4 BCE, Judaea came under direct Roman rule and was governed by Roman procurators and Herod's successors until the Jewish population rebelled in 66 BCE. The future emperor Titus, leading the tenth Roman Legion Fretensis, reconquered and destroyed much of Jerusalem, including the Temple in 70 CE, an event commemorated on the Arch of Titus in Rome.

In the mid-second century BCE, the Hasmoneans encircled the Temple Mount, the City of David, Mount Zion, and the western hill with defensive walls that incorporated earlier walls of the Iron Age. The line of the new wall, known as the "First Wall," reached the Hippicus Tower, at the site of the medieval citadel. Sections of this wall have been excavated at a number of sites. In the first century BCE the "Second Wall" was built to enclose a new neighborhood between the Gennath Gate and the Antonia fortress, but it excluded Golgotha, the future site of the crucifixion, which was outside the city walls. In the first century CE King Agrippa enclosed Bezetha, an extramural suburb north of the city, within the "Third Wall," including the Psephinus Tower. The latter wall was only completed shortly before the Great Revolt (Fig. 1).

Dominating the Temple Mount was the Antonia fortress, which Herod constructed over an earlier Hasmonean fortress known as the Baris. The Antonia was a tetrapyrgion, a heavy rectangular building with four corner towers. On the opposite western edge of the city was a citadel incorporated within the walls and comprising three massive towers known as Hyppicus, Phasael, and Mariamne. To the south of the citadel was Herod's magnificent palace, for which Josephus provides detailed description of its opulent decoration. Its retaining walls have been exposed.

On the western hill, known as the Upper City, an elite residential quarter for the temple priests was set. Excavated palatial mansions consist of multistoried courtyard houses decorated with mosaic pavements and walls covered with colorful frescoes in Pompeiian style. Ubiquitous ritual baths (*miqve*) essential for Jewish ritual purification were found in all of these structures. A further mansion has been exposed in the lower Tyropoeon Valley; it shows that aristocratic dwellings were common within the city walls.

The growth of Jerusalem was guaranteed by the supply of water to the city through two sinuous aqueducts. These brought water from sources located 20 km to the south to the Tower pool near the citadel and the many cisterns cut below the Temple Mount. Additional spring water continued to fill the Siloam pool in the south, while runoff was collected in a pool beside the Antonia

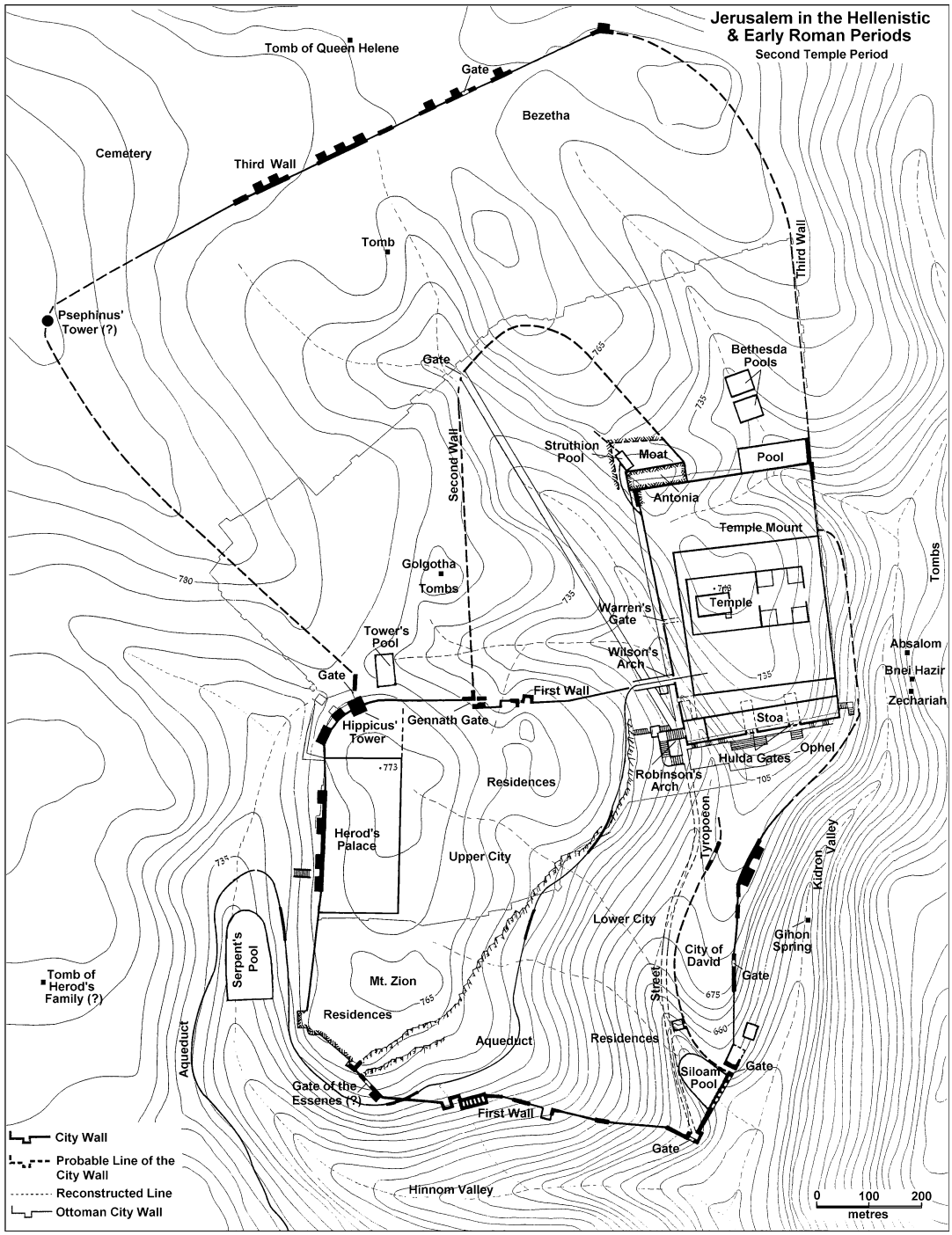

Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of, Fig. 1 Jerusalem in the Hellenistic to early Roman periods during the Roman period (third century BCE–70 CE)

fortress from the Bezetha stream and in the nearby Bethesda pool.

The Temple prior to King Herod seems to have been relatively small. Thereafter, royal sponsorship of a massive new temenos, a raised platform and a magnificent temple glorified Herod's name and dominated the urban structure of the city. Herod's builders greatly increased the area of the mount by building huge and splendid supporting walls around a rectangular area of 15 ha. At the center, on the rock of Mount Moriah, stood the Temple itself. Although no exposed remains survive, it is described by Josephus Flavius as a large tri-cameral structure of white marble fronted by an altar. On the southern edge of the Temple Mount a huge administrative Royal Stoa was added. Archaeological finds that survived the Roman destruction of 70 CE have been located, including inscriptions, architectural details, and the outer temenos walls.

Below the western retaining wall of the Temple Mount was the main thoroughfare of Jerusalem. The road led from the Siloam Pool in the south and extended beneath the stairs over Robinson's Arch, which rose up to the Royal Stoa, and under Wilson's Arch, which carried traffic along a viaduct from the Upper City. South of the Temple Mount was a massive staircase that led to the Huldah Gates, the main entrance to the compound. Numerous public ritual baths in the vicinity were utilized by pilgrims prior to their ascent to the mount, while shops along the roads would have provided sacrificial animals, change for the temple tithe, food, and other services.

An extensive necropolis surrounded the city on all sides, including typical family burial chambers with loculi and secondary internment in stone ossuaries. Monumental aristocratic tombs with pyramidal roofs, colonnaded porches, and classical decoration suited to the Jewish religious requirements prohibiting images were found in the Kidron and Hinnom Valleys and to the north of the city. The most famous tombs are those named for Absalom, Bnei Hazir, and Queen Helena of Adiabene.

Roman Jerusalem: Aelia Capitolina

After the sacking of the city in 70 CE Jerusalem came under direct Roman rule. Close to the second Jewish revolt of 135 CE the Roman emperor Hadrian renamed the city Aelia Capitolina, laying it out as a Roman colony. Jews were excluded from the city. Major works included the establishment of a new urban plan, the founding of a large Roman legionary camp, and the building of a pagan temple on the site of the former Jewish temple (Fig. 2).

Considering the abundance of archaeological data and written sources concerning other periods, the dearth of both for the Roman city is striking. This requires us to rely greatly on the information imparted by sources of the sixth to seventh centuries that still express the layout of the Hadrianic founding. These portray a classical city divided into seven quarters, covering some 100 ha and populated by a number of major structures. The expulsion of Jerusalem's Jewish residents left the city lightly populated, a situation only partially rectified by the encouragement of settlement by veterans and Hellenic groups living in *Provincia Palaestina*.

The present shape and even road layout of the extant Old City of Jerusalem is a survival of the plan originally set out in the Roman colony. It accords with accepted planning concepts common to contemporary cities of the Roman East. In general, the city can be split into two sections. The southern part, which corresponds to the present Armenian and Jewish Quarters, was, in the view of many, the site of the camp of the Tenth Roman Legion Fretensis. The northern part was used for Jerusalem's civic and municipal buildings.

Controversy concerns the defense of the city, especially whether or not Jerusalem was surrounded by a wall or whether it relied on remains of fortifications left after the destruction of the Second Temple period city. Excavations do not provide evidence of a reconstructed wall for Jerusalem until the beginning of the fourth century when a wall raised for Jerusalem's defenses was established on a line that mostly continues till the present on the north and east. By contrast,

Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of, Fig. 2 Aelia Capitolina during the Roman period (early fourth century CE) (After: Tsafrir 1999a. Map in back cover)

recent studies have proposed moving the initial northern limit of the city to the line of the northern "Third Wall," until the late third to early fourth centuries.

The road network of the city was based on straight Roman streets crossing at right angles. Their exact paths were dictated by the hilly topography and the overshadowing remains of the Temple Mount left unscathed by Titus. At the northern extreme was a monumental gate that now forms the base of the Damascus Gate, with a dedicatory column to its south. Two colonnaded cardines stretched from the gate to the south, and they were crossed at their center by a *decumanus*. Sections of the western *cardo* have been uncovered east of the Holy Sepulchre, including columns of the arcade that flanked the street itself. The *cardo* was laid as far as the south-western hill, to the legionary camp, while the southern section of the *cardo* was only laid in the Byzantine period by Justinian, a conclusion challenged by those who give a Roman date for the entire street. Of the eastern *cardo* a large portion has been uncovered just south of the crossing with the *decumanus*.

The main streets would have led to four gates, of which only the northern has been excavated. The other gates stood in the general area of what are now known as the Jaffa, Lions, and Zion Gates.

The magnificent northern free standing triumphal arch of the Roman colony, possibly known as Porta Neapolitana, was built with the founding of the city. The remnants below the sixteenth century Damascus Gate have exposed a gate of three entrances flanked by two huge towers. Set over the entrances was the fragmentary inscription dedicated to the *decuriones* of the Colony Aelia Capitolina. Only with the construction of the northern city wall in the late third or early fourth centuries was this arch included in the city's defensive line. Similar triple triumphal arches were also built inside the city – near the forum (Ecce Homo), east of the Holy Sepulchre, and maybe even in the south of the city. Discovered north of the Damascus Gate on the road out of city were architectural elements of a possible further gate that may have been integrated into the northern wall on the line of the earlier "Third Wall."

A major development of the hydrological supply was the construction, or at least renovation, of the high level aqueduct. This aqueduct includes a 2.5 km section enclosed in a stone pipe siphon constructed by the Tenth Legion Fretensis. Furthermore, water collected from the Gihon spring entered the Siloam pool, which was now surrounded by colonnades on all sides.

After the taking of Jerusalem in 70 CE the Tenth Legion Fretensis was stationed in the city till its transfer by Diocletian at the end of the third century. According to a view held by most scholars the camp was located on the south-western hill, as indicated by the presence of many stamped tiles of the legion found in excavations in the area. The command of the legion was most probably garrisoned in the Herodian towers that were left standing by Titus.

The gateway to the legionary camp probably opened into the compound on the line of the present Christian Quarter Street, which probably bisected the camp through its center. However, the lack of permanent garrison structures, clear finds usually associated with legionary camps and obvious fortifications on the south-western hill have led some scholars to doubt the identification and to suggest alternative locations to the south of the Temple Mount.

The public amenities and civic structures of Jerusalem included two *fora* and a number of temples. The main *forum*, beside the corner of the western *cardo* and the *decumanus*, included a basilica and probably the Temple of Venus-Aphrodite or of Jupiter. The eastern forum was situated north of the Temple Mount. Its triumphal arch, known as the Ecce Homo, was placed on its western edge and spanned the eastern part of the *decumanus*.

A sculpted relief, associated by the excavators with the cult of Aesclepius-Serapis, was uncovered close to the Bethesda Pool. Furthermore, a temple dedicated to the Capitoline triad of Jupiter, Juno and Minerva together was possibly established on the Temple Mount, along with two statues of the emperor Hadrian. Some scholars prefer to identify this Capitolium with the temple

located in the central forum, on the site that would later be occupied by the Holy Sepulchre.

Byzantine Jerusalem

In 326 CE Helena, the mother of Constantine identified the site of the burial of Christ under the Temple of Venus, instigating a renaissance for Jerusalem. At the instruction of Constantine the construction of a huge church began at the site. Jerusalem would develop to become a major city of Christendom and, from 451 CE, the seat of an independent Patriarchate. Within the walls and in adjacent areas outside them a series of important Christian edifices and monastic establishments were built under the auspices of imperial sponsorship and private donation. Church building would continue throughout Byzantine rule, with a short hiatus between 361 to 363 CE when Julian the Apostate encouraged the rebuilding of the Temple by the Jews. The end of Byzantine rule was preceded by the brutal Persian incursion of 614 CE, though the reported damage does not seem to be mirrored in the archaeological evidence. The Umayyad occupation of 638 CE brought the city under Muslim rule. Even with the commissioning of the Dome of the Rock over Mt. Moriah and the al-Aqsa Mosque in the southern part of the Temple Mount, the city's Christian character would only slowly change over the coming two centuries (Fig. 3).

With the adoption of Christianity as the state religion the Capitoline triad ceased to be honored, a transformation commemorated by the use of the official name Aelia for the city until the mid-fourth century, at which point the name Jerusalem was once again typically used. In marked contrast to the previous era, the Byzantine period is served by a plethora of sources, especially by the writings of Church fathers and pilgrims' itineraries that provide detailed descriptions of the history and topography of the city.

Beside ecclesiastic construction there was also extensive municipal and civic expansion, opened by the rebuilding of the defensive wall probably during Constantine's reign. Residential quarters filled the intermural area of 120 ha, spilling beyond the wall to the north and west to include new monasteries and commercial structures. The influx of Christian pilgrims from many nations raised the population to around 50,000, speaking a variety of languages.

The Byzantine town plan, as represented on the Madaba mosaic map of the seventh century, preserves the layout of the Roman city. It shows Jerusalem to be surrounded by a wall, towers, and gates and to be dominated by the Roman St. Stephens (Damascus) Gate on the north, the two colonnaded cardines, the *decumanus*, and the new monuments that defined the city's Christian topography – the Church of the Holy Sepulchre, the Zion Church, and the Nea. The complete refortification of Jerusalem has been illuminated by numerous excavations around the circumference that included the renovation of earlier walls. Sections of the wall have been found in the Ophel, the Kidron Valley on the eastern slope of the City of David, around the Siloam pool, across the Tyropoeon Valley, on the western side of the city in the Armenian Garden and the Citadel, and then along the line of the northern wall of the Old City including the Damascus Gate. Wall sections associated with Empress Eudocia were also found along the southern slope of Mount Zion. The date of the fortification has been debated, with some dating it to the late third to early fourth century, and others proposing a date a century later.

The continuity of the urban structure of Jerusalem from the previous period has already been emphasized. With the abandonment of the legionary camp, the south-western hill was ready for development. The western *cardo* was extended as a magnificent colonnaded street to Mount Zion, probably as part of Justinian's plan to connect the Holy Sepulchre with his newly constructed Nea Church. The eastern *cardo* was also renovated, and its southern sections dating to this period continued down to the Siloam Pool. New routes more closely following the topography in a haphazard organic development rather than the conventions of Roman planning, which had previously been used, were created. During the sixth century, both public and private buildings began to encroach onto open spaces, including the *fora* and even onto the public pavements that flanked the cardines. This encroachment reached its zenith in the following periods.

Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of, Fig. 3 Jerusalem during the Byzantine period (After: Tsafrir 1999b. Map in back cover)

Numerous private dwellings, many of them prestige residences, were uncovered in the City of David and on the slopes of the Tyropoeon Valley flanking the streets down to the Siloam Pool; in the Ophel, where large houses surrounding courtyards were accompanied by a substantial bathhouse west of Robinson's Arch; on the southwestern hill; and on Mount Zion. A characteristic difference between the Byzantine city and the Roman city was the deterioration of functional divisions, whereby public and private zonal separation disappeared. Homes, commercial buildings, civic monuments, and religious institutions could now be found side-by-side.

Byzantine Jerusalem was dominated by ecclesiastical institutions representing both the events of the life of Christ and the numerous national communities that found their home in the city. Both the earliest and the most important church in Jerusalem was the Church of the Holy Sepulchre, built in the early fourth century on the instruction of Constantine, at the site identified by Eusebius as the locus of the crucifixion, burial, and resurrection of Jesus Christ. The new structure, built in place of a temple in the main *forum*, was entered from the *cardo* through an atrium that integrated part of the entrance of the dismantled Roman basilica and temple. One then proceeded through a large basilical church or *martyrium* of four aisles and a wide central nave with a single apse facing westward toward the tomb, a *triportico* that included the rock of Golgotha, and a rotunda or *Anastasis* with three apses that enclosed Jesus' tomb in an aedicule at its center. Ancillary buildings, including a baptistery, monasteries, and other structures were certainly located beside the church.

Mount Zion was home to the Church of Holy Zion built in 340 CE, and repaired in the fifth century. The church was built on the site identified with the Last Supper, the gathering of Jesus with the Apostles, the dormition of the Virgin Mary, and other traditions. The church was located on the southern end of the road that had bisected the legionary camp and was used as a processional way between the Holy Sepulchre and Mt. Zion. The limited remains enable a reconstruction of a basilica with four aisles and a nave leading to one of three external apses.

Emperor Justinian's huge Nea Church of Mary Theotokus was dedicated in 543 CE on Mount Zion. This church was the second largest basilica in Jerusalem, occupying a topographically dominant position above huge terraced retaining walls that enclosed a massive underground reservoir. In the south of the city, a church consecrated in the fifth century, probably by the empress Eudocia, opened to the colonnaded Siloam pool dedicated to the miracles of Christ at the pool (John 9: 1–12).

Other churches of note within the walls were the trefoil Church of John the Baptist, the Church of Saint Mary of the Probatica, which was set above the dividing wall between the two pools previously associated with the Roman cult of Aesclepius-Serapis, and the church of Peter in Gallicantu on the southern slope of Mt. Zion.

We learn of the monasteries of Jerusalem both from the written sources and from the results of excavations. Jerusalem was home to many monastic foundations, many of them connected to national groups and to the many *conoebia* and *laura* that populated the Judaean desert.

The status of the Temple Mount during the Byzantine period is a matter of some controversy. Certainly its very physical presence was the dominant feature of Jerusalem's topography, both structurally and as an important focus of the urban plan. Some insist that the whole area was left undeveloped as a testimony to Christianity's triumph over Jewish ambitions to rebuild the temple, while others suggest limited construction on the Mount. Without excavation these proposals remain speculative.

The peaceful conditions and safety enjoyed under Byzantine rule created public confidence to establish rich monastic institutions, residential neighborhoods, commercial districts, and cemeteries outside the city walls. These were concentrated to the west, north, and east of Jerusalem, especially along the routes out of the gates, and at sites of pilgrimage. To the west of the city a bathhouse fed from water from the high aqueduct was located on a commercial street of shops on the road leading directly out from the Porta David (Jaffa Gate).

North of the Damascus gate a closely clustered group of monasteries was discovered around the basilical church dedicated by Eudocia to St. Stephen in 460 CE. Nearby further monasteries were established, including institutions associated with the Armenian church. Among the many ecclesiastical institutions in the area of the Mount of Olives were those excavated at Gethsemane, those at the Tomb of the Virgin Mary, Viri Galilaei, Dominus Flevit, the circular Church of the Ascension built in the fourth century, and the Eleona Church built by Constantine.

The area surrounding the city, which had served as the necropolis of Jerusalem since earliest times, continued to be utilized for burial, at times though the reuse of burial caves cut in earlier periods. The cultural transition from the Roman to Christian period is not illuminated by clear markers, beyond the initial entry of Christian symbols that would later unambiguously denote the change into the Byzantine period. A number of burial types have been identified. These include cist burials, shafts leading to a sealed chamber, a stepped dromus before a burial chamber with arcosolia cut into the rock, elaborate catacombs, and rows of graves in the crypts of the monasteries.

Cross-References

- ▶ Architecture, Roman
- ▶ Israel: World Heritage Sites
- ▶ Post-Second Temple Judaism Archaeology
- ▶ Second Temple Judaism Archaeology
- ▶ Urbanism in the Ancient Near East
- ▶ Urban Planning, Roman

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Jiahu: Agriculture and Domestication

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Introduction

The Jiahu site is located in the Huai River Valley, Wuyang County, in Henan Province in North China. The site denotes the earliest development of the Peiligang culture in China, which is considered to be one of the worldwide centers of agricultural origins. The site was dated with conventional ^{14}C to between 9,000 and 7,800 cal BP (Henansheng 1999; Zhang et al. 1999).

Definition

Jiahu lies east of Mount Funiu in Henan Province. The Ni River currently runs south of the site; however, in ancient times, the Sha River ran to the north of the site (Li et al. 2003: 32). The site was initially excavated in 1962 and was excavated six times between 1983 and 1987 (Zhang et al. 1999). The most recent excavations were in 2001 (Zhang & Pan 2002). The site is 5.5 ha in size and includes several multiroomed houses (Henansheng 1999; see Liu 2004: 75 for an English summary). Three phases were identified at the site, phase one 7,000–6,600 cal BCE; phase two 6,600–6,200 cal BCE; and phase three 6,200–5,700 cal BCE (Henansheng 1999: 515). These dates were confirmed by TL and IRSL dating (Yang et al. 2005). These phases correspond to the early, early/middle, and middle Peiligang culture, respectively.

Key Issues/Current Debates/Future Directions/Examples

The significance of the Jiahu site is derived in part from the evidence of symbols or possible early writing (Li et al. 2003) and the early development of music including a crane-bone flute (Zhang et al. 1999; Zhang et al. 2004). Stone tools and pottery appear to have been locally produced (Liu 2004: 78). Residues from pot sherds at the Jiahu site were found to contain an early type of alcohol made from rice and honey as well as other ingredients (McGovern et al. 2004).

Jiahu also has evidence for early pig domestication by 8,600 cal BP (Cucchi et al. 2011). Pig husbandry is thought to have occurred c. 8,000 BP in the Yellow River region, with suggestions of early domestication at Zengpiyan in Guangxi Province now discarded (Yuan 2006; Yuan & Flad 2002). New models of pig domestication support multiple independent centers of domestication (Cucchi et al. 2011: 11). Aside from Jiahu, early pig domestication sites such as Kuahuqiao, in Zhejiang Province, exhibit tooth crowding and tooth size reduction (Zhejiangsheng 2004: 252-69), and Xinglongwa in Jilin Province displays human-pig interactions in the form of pig burials in human graves (Yuan 2006). Based on second molar phenotypic traits, Cucchi et al. (2011) suggest that pigs at Jiahu display a shift towards domestication around 6,600 BCE. This concurs with stable isotope data from human bones; a shift towards increased animal protein consumption is evident from the first to second phase of occupation at Jiahu (Hu et al. 2006). The main plant components of the diet at Jiahu were C3 plants such as rice (Hu et al. 2006: 1328).

One of the most hotly debated issues stemming from the Jiahu site is the question of

early rice cultivation (Liu et al. 2007). In the past debate has focused on whether this rice is domesticated or morphologically wild (Chen & Jiang 1997; Zhang & Wang 1998; Jiang & Liu 2006; Fuller et al. 2007; Liu et al. 2007). Claims for rice being in an early stage of domestication (Chen & Jiang 1997; Jiang & Liu 2006; Liu et al. 2007) are debated by Fuller et al. (2007), with debate related to the definition of early or later stage domestication. The rice at Jiahu is outside the modern geographical range for wild rice (Chen & Jiang 1997) although it is unclear whether it was outside the range for early Neolithic wild rice as well. This is especially difficult to determine given the climatic and environmental changes across the region over the past 9,000 years. Most recently, Zhijun Zhao, the paleoethnobotanist who examined the grains, has suggested the rice exhibited a large range of sizes indicating it was probably in the early stages of domestication (Zhao & Zhang 2009: 88, 93). The presence of large numbers of rice grains at the site at least indicates cultivation, if not domestication. Zhao and Zhang (2009: 93) also suggested that the numerous grains of soybean (*Glycine soja*) at the site were cultivated although they were morphologically wild.

The subsistence spectrum from Jiahu is similar to sites such as Hemudu and Kuahuqiao from Zhejiang Province in South China, where rice was cultivated and a range of tubers and water plants were present in the waterlogged deposits (Liu et al. 2007). Other plant remains at Jiahu included acorns (*Quercus* sp.), water caltrop (*Trapa* sp.), lotus root (*Nelumbo nucifera*), walnut (*Juglans* sp.), and wild grapes (*Vitis* sp.) (Zhao & Zhang 2009).

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication: Definition and Overview
- ▶ Peiligang: Agriculture and Domestication
- ▶ Pig: Domestication
- ▶ Plant Domestication and Cultivation in Archaeology

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Johnson, Matthew (Historical Archaeology)

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Basic Biographical Information

Matthew Johnson, one of the leading theoreticians working in the archaeology of the late medieval and modern worlds, was born in Austin, Texas, in 1962 and has held joint US-UK citizenship since his birth. One of his formative archaeological experiences was the period which Johnson spent between September 1981 to June 1982 with the Norwich Survey, when he was involved with the post-excavation analysis and archive preparation of pottery and small finds from the late Anglo-Saxon to postmedieval periods from urban sites in Norwich, England. He would also spend an important and influential season working in Annapolis, Maryland in 1985 as part of Mark Leone's Annapolis research program. Johnson's undergraduate and graduate degrees were all awarded by St. John's College, Cambridge University between 1985 (BA) and 1990 (Ph.D.); his doctoral dissertation was on the subject *A Contextual Study of Traditional Houses in Western Suffolk, AD 1400–1700*.

Following his Ph.D., Johnson became Lecturer in Archaeology and Prehistory at the University of Sheffield (1988–1989), and was then appointed as a University of Wales Research Fellow in the Department of Archaeology at what was then still St. David's University College, Lampeter (1990–1991). In 1991, he was appointed Lecturer in Archaeology at the University of Durham, where he would remain until 2004, rising to the position of Professor of Archaeology before his departure. He was appointed Professor of Archaeology at the University of Southampton in 2004, becoming Head of Archaeology between 2005 and 2008; he was Deputy Head of School of Humanities (Research), between 2009 and the end of 2011. In January 2012, he took up a new professorial post at Northwestern University in Evanston, Illinois, though he remains a Visiting Professor at Southampton. He has also held Visiting Fellowships at the University of California at Berkeley (1995), the South African Centre for Science Development (1997), the Centre for Medieval and Renaissance Studies, University of California at Los Angeles (1998), the Centre for Cultural and Environmental History, University of Massachusetts at Boston (1998), the University of Cambridge (2001–2002), Flinders University, Adelaide, Australia (2003–2004), Ruprecht-Karls-Universität, Heidelberg, Germany (2005), and the University of Pennsylvania (2008). He was elected a Fellow of the Society of Antiquaries of London in 2002.

Major Accomplishments

Matthew Johnson is a one of the few historical (or postmedieval) archaeologists whose approaches to archaeological theory, particularly as regards the archaeology of capitalism, are widely known – and have been influential – outside of the subdiscipline of historical archaeology. Notwithstanding his dual British-American citizenship, he is the most important and influential theoretician working in the British postmedieval tradition. His books *The Archaeology of*

Capitalism (Johnson 1996) and *Archaeological Theory: An Introduction* (Johnson 2010) form the centerpiece of his international reputation; the latter has been translated into Spanish, Chinese, Serbian, and Korean; Japanese and Turkish translations are potentially forthcoming. *The Archaeology of Capitalism* is a particularly important book for its study of the transition from feudalism to capitalism in Britain. While in some cases this builds on work by influential American historical archaeologists such as Mark Leone (e.g., Leone 1995) and James Deetz (e.g., Deetz 1996), Johnson does so via a British-centered but internationally aware archaeological approach that roots the development of capitalism in the transformation of the British countryside in the late medieval period. This has helped to broaden both the geographical and disciplinary reach of archaeologies of capitalism internationally.

Alongside his theoretical work, Johnson has also made important and influential contributions to archaeological studies of British architecture and landscape of the period c. 1300–1800. Important works here include *Housing Culture: Traditional Architecture in an English Landscape* (Johnson 1993), *Behind the Castle Gate: From Medieval to Renaissance* (Johnson 2002 – nominated for the biennial Archaeological Book Prize), and *Ideas of Landscape* (Johnson 2006 – selected by Margaret Drabble as one of her books of the year). Among this work's influential strands has been what Johnson himself has – with full knowledge of the phrase's broader archaeological implications – termed a "loss of innocence" (Johnson 1997) in archaeological studies of British vernacular architecture through the consideration and integration of such topics as historical change, regional variation, and the application of theoretical approaches to buildings archaeology.

Johnson's most recent research projects build on both these theoretical and architectural/landscape strands. Johnson is currently leading a research project on Bodiam Castle in the south of England. This late medieval castle is one of the most iconic in England thanks to its evocative moated landscape. Johnson's research seeks to understand Bodiam not just in local and regional context, but also as a castle and landscape that formed part of a lived experience that encompasses such themes as social identity and political economy. In the field of theory, Johnson is currently working on the vernacular experience of archaeological theory; or how archaeologists think while practicing archaeology at an everyday level. In order to provide this work a geographic focus, Johnson is examining the practice of archaeology within the Wessex region of southern England, which encompasses such iconic sites as Stonehenge, Maiden Castle, and Salisbury. Johnson's trans-Atlantic background means that the archaeological community can also no doubt look forward to thought-provoking work on the archaeology of the Atlantic world, both in terms of trans-Atlantic archaeological theory and the actual archaeology of trans-Atlantic colonial settlement.

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Buildings Archaeology
- ▶ Critical Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historic Building Conservation: Current Approaches
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Post-Medieval Archaeology (Europe)

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Johnson, Matthew (Theory)

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Basic Biographical Information

Known for his contributions to archaeological theory, medieval archaeology, and the archaeology of landscape, Matthew Johnson is one of the leading historical archaeologists of his generation (Fig. 1). Born in 1962 in Texas, he grew up in Norwich, England, and enjoys a dual US and British citizenship. Johnson received his B.A. in 1985, his M.A. in 1989, and his Ph.D. in 1990 from St. John's College, Cambridge University, under the direction of Ian Hodder. Johnson served as a Lecturer in Archaeology and Prehistory at the University of Sheffield from 1988 to 1989. Johnson was a University of Wales Research Fellow in the Department of Archaeology at St. David's University College, Lampeter, from 1990 to 1991. Johnson was a Lecturer and then Professor in Archaeology at the University of Durham from 1991 to 1998. Johnson became Professor of Archaeology at the University of Southampton in 2004 and Head of Archaeology from 2005 to 2008 and was then Associate Dean of the Faculty of Humanities from 2009 to 2011. Johnson is currently Professor of Anthropology at Northwestern University.

Johnson completed his graduate studies at Cambridge just at the time that postprocessual archaeology came of age. Johnson was both an enthusiastic advocate of this new movement and a sharp critic. This is well demonstrated in his engagement with the popular concept of agency. Johnson observed that while postprocessual archaeology placed great emphasis on the role of the individual as an active social agent, there was little focus on the individual in practice (Johnson 1989). For example, in his review of Mark Leone's (1984) famous study of William Paca's garden, he pointed out that Leone failed to consider how the interpretations of those who visited the garden varied across class, gender, and ethnicity lines. Johnson also noted that the discussions of agency often neglected a consideration of structure, which was problematic since agency exists in a dialectical relationship with structure. Different sorts of social structures produce and are produced by different sorts of agency (Johnson 2000: 213). This insight caused him to propose the idea of a "historicity of agency," whereby models of agency are constructed appropriate to different epochs or periods.

Johnson, Matthew (Theory), Fig. 1 Matthew Johnson (courtesy of Matthew Johnson)

Major Accomplishments

Johnson's early work used domestic houses and castles as a means of understanding the transition between feudalism and capitalism from the later Middle Ages to the beginnings of the Industrial Revolution. One of the most distinctive indexes of this transition is the "process of enclosure," the appropriation of common rights to an individual usually represented physically by hedges, fences,

and walls demarking fields (Johnson 1991: 160). The process of enclosure, however, led to both intended and unintended consequences. It facilitated innovation and the rise of farming for profit. But it also let to the breakdown of community ties and the rise of class relations. In *Housing Culture* (Johnson 1993), he adopted the structuralist approach of Henry Glassie and James Deetz to argue that the structure and organization of domestic architecture relates not only to economic considerations but also to ideological ones as well. Indeed, he suggests that it is impossible to separate them out.

Johnson builds upon this research to contribute to an archaeology of capitalism, a field of growing interest in historical archaeology. Capitalism refers to a set of social relations linking landowners and patrons with workers and laborers. These social relations are classically unequal in the sense that laborers do not control the fruit of their labor, rather this is controlled by the landowners. Johnson (1996: 3) regards enclosure and commodification as emergent structures that unfolded in the late medieval period and achieved their full realization in industrial capitalism. They are not limited to a single domain, rather they cut across a range of spheres such as religious, agrarian, public, and domestic and are part of the genealogy of a disciplinary society.

More recently, Johnson has developed a sophisticated critique of landscape archaeology. In his book *Ideas of Landscape* (Johnson 2006), he observes that landscape archaeology especially as it is practiced in Britain is undertheorized. It is largely based on the work W. G. Hoskins (1955) and grounded in the ideas of English Romanticism. The Romantic tradition gives rise to an empirical approach based in field walking. Johnson argues that meaning does not just emerge from the landscape by itself. It is created and shaped as much by ourselves in the present, through our own habitual practices and ways of seeing, as it is by the activities of people in the past. His key insight is that we need to question the assumption that there is only one way of looking at and responding to landscape.

Johnson is well known for his general syntheses of archaeological theory. His book *Archaeological Theory: An Introduction* (Johnson 1999) set out to demystify theory. As the screenwriter Richard Curtis might say, theory, actually, is all around. It underpins everything we do – from where we go to dig to what we choose to record – and to how we interpret what we find. Johnson writes with an engaging self-reflexive style to draw students into the complex debates about epistemological dilemmas, ethical stances, and political realities. Before they know it, they have become fluent in the language of archaeology and, equally importantly, are able to generalize this specialized form of knowing to other related domains.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Leone, Mark P. (Theory)
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of

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Jokilehto, Jukka

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Basic Biographical Information

Jukka Jokilehto was born in 1938 in Helsinki, where he graduated from the Polytechnic in architecture and town planning in 1966. After a decade working in architectural practices in Finland, he took part in a number of courses on the conservation and restoration of historic structures around Europe, notably those on the restoration of monuments and sites at ICCROM (International Council for the Study of the Preservation and Restoration of Cultural Property) in Rome and on the conservation of historic structures at IoAAS (the Institute of Advanced Architectural Studies) at the University of York, where he was awarded the degree of Doctor of Philosophy (D.Phil.) in 1986.

Major Accomplishments

In 1972, Jukka Jokilehto joined the staff of ICCROM, becoming responsible in the following year for its program in architectural and urban conservation. Over the next two decades, he trained many hundreds of architects, planners, and conservators from every continent, with all of whom he has maintained close contact. Visits to sites and monuments formed an essential component of these ICCROM courses, and as a result, Jukka became familiar with the concepts and practices for conservation and restoration across the whole gamut of human cultures. He remained with ICCROM until his retirement in 1998 after 6 years as Assistant Director-General. During his long years of service, he represented ICCROM at many meetings around the world, notably those of the UNESCO World Heritage Committee and those leading up to the 1999 Second Protocol of the 1954 UNESCO Convention for the Protection of Cultural Property in the Event of Armed Conflict (the Hague Convention). He is currently Special Advisor to the Director-General of ICCROM.

After his retirement from ICCROM, he also worked closely with ICOMOS (International Council on Monuments and Sites) as an advisor on World Heritage (2000–2006), as President of the International Training Committee, and as a member of the International Committee on the Theory and Philosophy of Conservation and Restoration. He is currently Professor at the University of Nova Gorica (Slovenia), jointly with the UniversitàIuav di Venezia. His wide consultancy portfolio is mainly directed toward the preparation of nominations to the UNESCO World Heritage List, management and urban conservation plans, and lecturing on the history and theory of conservation and on the management of the built heritage at universities around the world.

The last sentence of the Preface to the *Festschrift* published by ICCROM in 2008 admirably summarizes the esteem accorded to Jukka Jokilehto by colleagues and students alike over his long career: “May these essays give as much pleasure and inspiration to Jukka as he has given to so many others.”

Cross-References

► Authenticity in Archaeological Conservation and Preservation
► Buildings, Archaeological Study of
► Conservation and Management of Archaeological Sites
► Heritage Conservation Training

► International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)

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Jones, Rhys Maengwyn

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Jones, Rhys Maengwyn, Fig. 1 Rhys Jones (Courtesy Betty Meehan)

Basic Biographical Information

Rhys Maengwyn Jones (1941–2001) (Fig. 1) was born in Wales on 26th February 1941. He died in Canberra, Australia, on 19th September; 2001. Jones received his primary and secondary education in Wales, where he grew up. He received a Master of Arts from Cambridge University, England, in 1966. After that he moved to Australia. In 1972 he was awarded a Ph.D. in archaeology from the University of Sydney. In 1969 Rhys Jones joined the Australian National University as a Research Fellow with the Research School of Pacific Studies. In 1993, he was awarded a personal Chair.

Rhys Jones was a prolific academic writer who published more than 200 articles and books. His research on Australia established him as a scholar of international standing. Universities in Europe, South East Asia, South America, Canada, North America, and the Pacific hosted his lectures on human evolution and archaeology. In 1995–1996, he held the prestigious Chair of Australian Studies, Harvard University, and in 2001 he became an Honorary Professor at the Scarab Research Centre at the University of Wales, Newport.

Along with colleagues such as Jack Golson, Betty Meehan, and Peter White, he played a key role in the professionalization of Australian archaeology in the 1960s and 1970s and in the establishment of the Australian Archaeological Association. He served on Faculty Boards and on advisory, research committees, and councils at the Australian National University and was an elected member of the Council of the Australian Institute of Aboriginal and Torres Strait Islander Studies. He was Vice-President of the Australian Academy of the Humanities from 1984 to 1987. His professional service to archaeology includes being a co-editor of *Mankind*, the

Journal of the Anthropological Societies of Australia, from 1965 to 1972, and being President of the Australian Archaeological Society from 1977 to 1979. His contributions to Australian archaeology were recognized by the Australian government in 2003, when he was posthumously appointed an Officer of the Order of Australia, "for service to archaeology, particularly in the areas of research and teaching, and as a leader in matters relating to world heritage, conservation and indigenous social justice issues" (Smith 2003: 51).

Major Accomplishments

Rhys Jones was an outstanding archaeologist whose seminal works shaped critical research directions at a time when Australian archaeology was in its infancy. He was a member of a generation of intellectuals with European pedigrees who moved to Australia and established archaeology in this country in the late 1960s and early 1970s. Jones' research focus was on the antiquity of human occupation of the continent and the complex archaeological signature of human-environment relationships across the Pleistocene-Holocene transition. His influence extended far beyond his own research projects. He supervised successive generations of Australian students as they attempted to answer the most pressing questions of the times – the first colonization of the Australian continent, human evolution and land use, and the complexity of Indigenous settlements.

Rhys Jones' scholarly publications attest to his eclectic interests within archaeology. His interest in sociocultural evolution is evident in his doctoral study of the origins and evolution of Tasmanian Aboriginal people. This thesis is still considered a landmark study for its thoroughness, intellectual scope, and complexity of approach to archaeological theory and method.

Over a career spanning 40 years, Rhys Jones produced scholarship on the antiquity and significance of some of the most important finds in Australian archaeology. His involvement in the recording, salvage, and research of the oldest recorded human burials in Australia at Lake Mungo led to seminal publications on the significance of these remains to theories of human evolution (Bowler et al. 1969). Although a trained scientist Jones understood and respected the local Indigenous community's reaction to the research into human remains at Lake Mungo, and in 1991 he was involved in the repatriation of these remains for reburial.

An important focus of Jones' research was the antiquity, land use, and settlement patterns of Aboriginal people in the Arnhem Land and Kakadu regions in northern Australia. In 1981 he directed a major interdisciplinary archaeological expedition to Kakadu National Park. Along with his life partner, Betty Meehan, he worked in remote Aboriginal communities in the Northern Territory in the 1980s. As a result of his experiences there, Jones was active in establishing a new frontier of knowledge in an Australian context: ethnographic approaches in Australian archaeology. Jones and Meehan's work inspired a spate of ethnographic studies among archaeologists in diverse geographic and environmental contexts in Australia.

Along with colleagues such as Jack Golson, Jim Allen, and John Mulvaney, Rhys Jones initiated research into the interrelationships between environment, ecology, and Indigenous peoples in the Australasian region. Jones' seminal paper, "Firestick Farming" (Jones 1969), broke down the perception of Aboriginal people as "unchanging people in an unchanging landscape" and is still cited extensively, while his paper "Why Did the Tasmanians Stop Eating Fish?" (1978) became a central resource in debate on the impact of cultural conservatism in Indigenous societies. In addition, Jones was a leader in advocating a scientific approach to Australian archaeology, expressly through the use of new scientific methods in dating rock art and investigation of the potential of paleoclimatic for the analysis of occupation deposits.

Rhys Jones' fieldwork with Aboriginal people in remote parts of northern Australia taught him much about Indigenous people's relationships to land. His standing with the Aboriginal people with whom he worked can be gauged by the Aboriginal Honours that were bestowed on him. He was invited to attend Kunapipi ceremonies in Arnhem Land in 1972 (twice) and 1986. Moreover, he was co-recipient of Rom ceremonial regalia in 1982. He was given the kinship designation (skin name) Wamut with the Galamagondidja Baparru clan of the Gidjingarli people, Arnhem Land, Northern Territory, Australia.

Rhys Jones accomplishments in Australian archaeology spanned all current and developing theories and methods in archaeological scholarship and related fields. He published independently and with colleagues on archaeological research in Europe, the Middle East, South East Asia, Oceania, and his native country of Wales. He was a prolific academic writer, publishing more than 200 articles and books, and spoke fluent Welsh and French. Over a forty-year period he attended, organized, and delivered seminars, debate sessions, public and university lectures, workshops, symposia, and conferences for which he produced more than 60 publications about human evolution and the colonization of the Australian continent.

Rhys Jones was a public intellectual whose views helped to shape the Australian public's appreciation of their past. He had a deep knowledge of Australia's Indigenous heritage and a rare ability to engender enthusiasm for this subject in both students and members of the general public. His career spanned 30 years in film, television, and radio documentaries, some of which he co-produced and appeared in, and in newspaper articles. Jones made major contributions to the quality of Australian society through enhancing a broad community understanding of Indigenous cultures. He gave frequent presentation on the cultural history of Tasmania and once gave a lecture aboard the *Icebird*, an ice-breaking ship travelling to Antarctica to resupply scientific personnel.

Much of Jones' research and public outreach was conducted in Tasmania. Jones' research on human evolution and occupation antiquity in Tasmania revolutionized popular perceptions of the sophistication and complexity of Tasmanian Aboriginal social organization and culture. The film that he co-wrote and appeared in, *The Last Tasmanian*, won first prize at the Adelaide Film Festival, the 1978 Logie for the best Australian documentary, and a silver medal at the Commonwealth Film Festival 1978, Cyprus. However, the film proved to be controversial as it was interpreted in the popular media as denying the existence and survival of Tasmanian Aboriginal people.

One of Rhys Jones' most significant accomplishments in this area was the World Heritage Listing of archaeological sites on the Franklin River (Kiernan et al. 1983). Jones' scientific research was fundamental to the nomination and subsequent listing of this area and his public engagement essential to lifting the public profile of the region. In 1981 he directed the discovery and archaeological excavations of the Kutikina Cave (formerly Fraser Cave), Franklin River, southwest Tasmania. His analysis of archaeological finds at Kutikina Cave in Tasmania established the antiquity of human occupation in Tasmania, contributing to the nomination of the nearby Franklin River to the World Heritage List. Working with colleague John Mulvaney, Rhys Jones played a critical role in the preservation of archaeological sites under threat by the damming of the Franklin River. Along with international colleagues Jones and Mulvaney took out a full-page newspaper advertisement affirming the significance of Kutikina Cave and the Franklin area as part of the world's cultural heritage.

Rhys Jones had an extraordinary intellect and capacity to reach out to diverse peoples. He was a natural linguist and could converse in Gu-jingarliya with the Anbarra people of Arnhem Land and in Tok Pisin with the people of Papua New Guinea. He was literate in Italian, Spanish, German, and Renaissance Latin.

His scholarship established new directions in Australian archaeology.

Rhys Jones' outstanding contribution to Australian archaeology was honoured in the volume *Histories of Old Ages*: *Essays in Honour of Rhys Jones* (Anderson et al. 2001). The Australian Archaeological Association recognizes his enduring contribution each year in its award of the Rhys Jones Medal for academic excellence in Australian archaeology.

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Jorge, Vítor Oliveira

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Basic Biographical Information

Vítor Oliveira Jorge (Fig. 1) is a Portuguese archaeologist. Born in Lisbon in January 1948, he was awarded a degree in History (with a dissertation on Paleolithic archaeology) from the Faculty of Arts of the University of Lisbon in 1972. After being a lecturer at the University of Luanda (Angola), a territory where he had carried out several field research projects, he moved to the University of Porto, in the north of Portugal, where he taught from 1974 until 2011. His Ph.D. dissertation was awarded in 1982 on the basis of his analysis of passage graves (megalithic monuments) in the north of Portugal, in the fourth and fifth millennia BCE. The same theme was the object of his "aggregation" (public examination as a professor) in 1989. Vítor Jorge became a full professor of his faculty and university in 1990. He has been a member of the Department of Cultural Heritage Sciences and Techniques of the Faculty of Arts of the University of Lisbon since its creation in 2007. He is also a member of the research group of Centro de Estudos Arqueológicos das Universidades de Coimbra e Porto (CEAUCP/CAM), an archaeological research unit that includes archaeologists and heritage specialists from the universities of Porto and Coimbra and from the Mertola's Archaeological Camp.

Jorge, Vítor Oliveira, Fig. 1 Vítor O. Jorge

In addition to being an archaeologist, Vitor Jorge is a poet, who has published around 20 books, and an essayist.

Major Accomplishments

The archaeological career of Vítor Oliveira Jorge, who has kept active after his retirement in 2011 (both as a field archaeologist and as a researcher), has covered a range of themes. Until 1972, one of his interests was the Paleolithic archaeology of southern Portugal, namely, the Early and Middle Paleolithic, with a particular concern with the pebble tool industries. In 1973 and 1974, he conducted research on the archaeology of the southwest of Angola prior to Portuguese colonization, especially in the Huila Plateau and in central Angola. From 1975 to 1994, he studied the Neolithic (megalithic) mounds of northern Portugal (namely, in the area from the border with Galicia to the river Douro to the south), with an emphasis on spatial and social archaeology, trying to focus on necropolis and their settings, rather than on isolated monuments, and showing the polymorphous character of these monuments.

From 1989 until the present, he has focused on Copper Age and Bronze Age hill sites (third to second millennia BCE) in the high Portuguese Douro basin (Vila Nova de Foz Côa region), as a continuation of his interest in prehistoric architectures and their relationships with the territories where people settle. He is one of the directors of the excavation of the hill site of Castanheiro do Vento (1998–2012), an important Chalcolithic monument located in the territory of the Foz Côa municipality. This research has changed the way archaeologists currently look at these kinds of sites, wrongly named "fortified settlements." Vítor Jorge contends that they probably were not the common places where people lived but ceremonial and symbolic devices connected with the constitution of local community identities and the emergence of elites.

In 1994 and1995, when he was Dean of the Faculty of Arts of the University of Porto, Vítor Jorge took a public position in favor of the conservation of the rock art complex of the Côa valley in the northeast of Portugal (not far from the area he studied as a field archaeologist). In 1995 and 1996, he was the head of the Commission that prepared the installation of the Côa Valley Archaeological Park, and in 2001 the President of the Portuguese Republic granted him the Merit Insignia for his actions to protect Portuguese cultural heritage. After his retirement in 2012, the Faculty of Arts of the University of Porto, where he has taught for 37 years, conferred him its Golden Medal, in a public ceremony where a book in his honor was presented.

Professor Vítor Jorge has organized and published the proceedings of many scientific meetings, namely, the I (Porto, 1993) and III (Vila Real, in collaboration with the local university, the University of Trás-os-Montes e Alto Douro) Congresses of Iberian Archaeology (the proceedings of these congresses were published by SPAE and ADECAP, 8 volumes and 10 volumes, respectively). He is the head of two nonprofit scientific associations, the Sociedade Portuguesa de Antropologia e Etnologia (SPAE) and the Associação para o Desenvolvimento da Cooperação em Arqueologia Peninsular (ADECAP). From 1998 to 2011, this latter association published a journal in English, the *Journal of Iberian Archaeology*.

Lately, Professor Jorge has developed an interest in philosophical issues connected to his research themes in archaeology and cultural anthropology, namely, the relationships between culture and nature, humans and animals, objectivity and subjectivity, history and temporality, space and place, gender, and Lacanian psychoanalysis. These issues have driven him to study and to give short courses on the work of critical authors such as Giorgio Agamben and Slavoj Zizek. Since his youth, Vítor Jorge has struggled for a more intimate connection between archaeology (especially the so-called prehistoric archaeology) and the problems raised by contemporary thought, a connection that he thinks is crucial for the development of archaeology itself as a mature discipline.

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► Archaeological Theory: Paradigm Shift

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Jorvik Viking Centre

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Basic Information

The Jorvik Viking Centre opened in York in 1984, following a 5-year excavation by the York Archaeological Trust. This "Viking Dig" (Hall 1984) had revealed that up to 9 m of archaeological deposits had built up in the Coppergate area of the city and that these moist organic-rich deposits contained the remains of wood, thatch, and many thousands of artifacts. The anaerobic nature of these deposits meant that textiles and leather were all well preserved. In total the dig recovered 250,000 pieces of pottery, 5 t of animal bone, and 40,000 other objects. The dig demonstrated that Jorvik had grown dramatically in the late ninth and tenth centuries, with new streets, a new arrangement of development plots, and new types of urban buildings. All of this was fuelled by craft production and trade. This discovery allowed the York Archaeological Trust to rewrite the history of town life in England, showing how this period was not an era of looting, or destruction, as many had thought, but one in which the foundations of medieval urban prosperity had been laid.

Major Impact

The Jorvik Viking Centre (http://www.jorvik-viking-centre.co.uk/) has welcomed over

Jorvik Viking Centre, Fig. 1 A capsule car at Jorvik

17 million people through its doors since 1984 and today has about 400,000 visitors a year. The attraction contains a ride-based experience where visitors are carried around the replicated site of the Viking site on capsule cars that carry six people each. Visitors are able to see reproductions of the Viking houses where they stood over 1,000 years ago, see animatronics depicting the Viking inhabitants, and witness the sounds and smells of the time, including the world's famous Viking "man on the toilet." The ride is complemented by a series of gallery spaces which give visitors a variety of perspectives on Viking age life (Fig. 1).

Cross-References

- ▶ Urban Archaeology
- ▶ Urban Heritage
- ▶ York Archaeological Trust

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Joukowsky, Martha Sharp

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Basic Biographical Information

Martha Sharp Joukowsky is an archaeologist who has worked in numerous parts of the world, including Lebanon, Hong Kong, Turkey, Italy, Greece and, most extensively, Jordan. Her research encompasses studies of the domestication of plants and animals, the advent of Middle East urbanism and the varied cultural developments in Anatolia, Syro-Palestine, Iraq and Iran, from prehistory to the Roman periods. Her doctoral work (Ph.D. Paris I-Sorbonne 1982), published as *Prehistoric Aphrodisias* (1996), engaged with the Neolithic through Bronze Age periods at the site of Aphrodisias in Turkey.

Joukowsky is a 1958 graduate of Pembroke College, the then coordinate women's college to Brown University. Until her retirement, she was Professor of Old World Archaeology and Art and of Anthropology at Brown, where she also serves

as Trustee Emerita; she was recognized with the honorary degree of Doctor of Humane Letters by Brown in 1985. Joukowsky was elected President of the Archaeological Institute of America (AIA) in 1989, serving a 4-year term; the AIA's Distinguished Service Award bears her name and that of her husband, Artemis A.W. Joukowsky. The pair was presented with the AIA's Bandelier Award for Public Service to Archaeology in 2010.

In 2004, Brown University established the Joukowsky Institute for Archaeology and the Ancient World which is dedicated to promoting the investigation, understanding, and enjoyment of the archaeology and art of the ancient Mediterranean, Egypt, and Western Asia, through active fieldwork projects, graduate and undergraduate programs, and public outreach activities.

Major Accomplishments

Joukowsky directed a near 20-year long archaeological campaign at the Great Temple at Petra (southern Jordan), which has led to numerous detailed publications, student research projects and widely viewed documentaries and other public presentations. The excavation, sponsored by Brown University, revealed an impressive structure built, from the local "rose red" sandstone, on an artificial terrace along the city's main colonnaded street between the late first century BCE and the first century CE. The multi-level design of the 'temple' (its precise range of functions is sometimes debated) is especially noteworthy for its large porticoed courtyard, 120 columns (topped by elephant-headed capitals) and a small theatral area inserted into the structure's interior. The Brown University Great Temple team also explored a huge cistern, bath system and Residential Quarter. Almost completely buried at the project's inception, the complex today has been conserved and substantially restored, and is a major visual landmark in the Petra city center. Joukowsky also used the Great Temple as a laboratory for introducing a range of scientific techniques, many pioneering for their time in Jordan, including the use of Ground Penetrating Radar (GPR) and 3D modeling and visualization studies. All Great Temple data are currently available through Open Context of the Alexandria Archive Institute.

Apart from her substantive publications deriving from fieldwork, Joukowsky is credited with writing one of the most influential handbooks in the field, *A Complete Manual of Field Archaeology: Tools and Techniques of Field Work for Archaeologists* (1980), which went through eight editions before going out of print. Among her several other books is *Breaking Ground: Pioneering Women Archaeologists* (2004), co-edited with Getzel Cohen, which examines the lives of several pioneer female archaeologists in the early days of the discipline. This project was also expanded into a web-based encyclopedia, *Breaking Ground: Women in Old World Archaeology*, co-edited with Barbara Lesko.

Cross-References

► Petra, Archaeology of

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Journal of Archaeological Method and Theory

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Brief Definition of the Topic

The *Journal of Archaeological Method and Theory* (*JAMT*) is a quarterly publication of Springer Science + Business Media publishers (Springer). *JAMT* presents method- or theory-focused papers covering issues that are at the cutting edge of the discipline. The leading journal in its field, *JAMT* also includes topical syntheses that critically assess and integrate research on specific subjects in archaeological method or theory as well as examinations of the history of archaeology. The journal actively recruits "theme" issues where groups of authors address a particular theme often using regional case studies to illustrate method- or theory-related topics. Authors of *JAMT* articles include scholars from around the world, and each submission undergoes a rigorous peer-review process that insures articles published in the journal are of the highest possible quality. Articles that are accepted for publication are aimed at an international audience of archaeologists, students of archaeology, and practitioners of closely related disciplines. The journal's Editorial Board includes distinguished archaeologists with worldwide knowledge of the past (the Americas, Asia and the Pacific, Europe, and Africa) and expertise in an extensive range of methodological and theoretical issues.

The founding editor of the journal, Michael Brian Schiffer, noted in the Introductory Statement in the first volume (Schiffer 1994: 2) that the "journal will be a home for substantial syntheses" as well as "contributions to the history of archaeology, method- or theory-focused case studies, and significant explorations on the frontiers of method and theory." The journal's genesis can be traced back to 1978 with *Advances in Archaeological Method and Theory*, a yearly edited volume published by Academic Press. The goal of that publication, which continued with Academic Press for 11 volumes and later with the University of Arizona Press for 5 volumes, was the presentation of topical syntheses usually solicited by the editor. The series filled an important need as theoretical papers during that time often had difficulty finding a publishing outlet. By the early 1990s, Schiffer decided to shift from yearly publications to a quarterly journal, its present format. Schiffer continued as editor until Vol. 6 in 1999, and James Skibo and Catherine Cameron became coeditors in 2000. Since the beginning of their tenure, they have alternated between senior and junior coeditor. Their editorship coincided with the transformation in academic journal publishing from a reliance on individual and institutional subscriptions of hard copies of the journal to a dominance of electronic publication and downloads of individual articles. With the guidance of Teresa Krause (Senior Editor, Social Sciences) of Springer, journal readership expanded dramatically and currently there are tens of thousands of downloads each year from all over the globe. Although the journal has always been international in scope, the number of international authors and reviewers has also increased.

The major accomplishment of *JAMT* since its inception has been to serve as an outlet for the latest innovations in the field of archaeology. Tracking *JAMT* articles over the years illuminates how archaeology has developed theoretically, ranging from efforts to build on commonly used theoretical approaches to dramatically divergent approaches that take archaeology in startlingly new directions. *JAMT* has also been the first to publish important methodological advances. Since our articles are aimed at a worldwide audience, the new methods proposed by our authors are generally those that could be (and have been) applied to the archaeology throughout the world. Traffic on the online version of the journal shows that in addition to

downloads of the most recently published articles, many older articles are also frequently downloaded, indicating that *JAMT* has published a number of "classic" articles in the field that continue to be cited even years after publication. Another accomplishment of the journal has been to highlight the work of younger scholars who often are at the forefront of theoretical and methodological developments in archaeology. Both the journal's founding editor, Michael Schiffer, and its current editors have made efforts to help young scholars develop their ideas into valuable, publishable papers. Finally, the *Journal of Archaeological Method and Theory* has developed an active and experienced Editorial Board whose members serve as both springboard and sounding board for the latest ideas published in *JAMT*.

In 2009, the journal began to be covered by the ISI Social Science Citation Index, significantly heightening its profile. *JAMT*'s impact factors are high and are projected to increase in years to come as the journal expands its scope and audience. As a result of the increased size and international scope of our authors, reviewers, and audience, the journal has experienced a significant expansion of the number of papers it receives each year. Importantly, we are part of Springer's *Online First* system which allows our papers to be published online as soon as they have been accepted and copy edited. They are later placed into one of our quarterly issues, but until then our subscribers have access to the most current research available. In order to stay in close touch with the most current developments in our field, we periodically enlist new, energetic Board members to help us to recruit the latest high-profile studies. *JAMT* promises to be a leading journal in archaeological method and theory well into the twenty-first century.

Cross-References

► Archaeological Theory: Paradigm Shift
► Schiffer, Michael Brian (Theory)
► Site Formation Processes

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Journal of Cultural Heritage Management and Sustainable Development

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Brief Definition of the Topic

JCHMSD was launched in 2011. Just the first issue has been published when these notes were under writing. In this case, more than investigating actual contents and distinguishing features as they appear from various volumes, the only thing to do is to look at the declared strategies by the editors.

The journal is calling firstly for papers on immovable cultural heritage, though also intangible heritage will be involved. In any case, a distinctive focus is the issue of sustainability, one of the more problematic elements in the field of heritage. The bridging between heritage discourse and sustainability is underlined as one of the distinguishing features of the journal.

Also, a variety of approaches are encouraged, from theory to practice. In any case, an emphasis on practices, on their improvement or the development of innovative practices can be pointed out (the call for paper refers to "positive contribution"). Needless to say, a strong interdisciplinary attitude is called for, and an international focus is at the base of the journal.

Each article is 2,000–5,000 words in length, which once again underlines the nature of the journal as addressed to an audience of practitioners, or in any case to experts and scholars that have substantive interests in the field, more

than abstract theoretical concerns. In other words, it seems to look for kind of phenomenon-driven rather than theory-driven research.

Submitted articles are subject to double-blind review. The journal is published by Emerald.

Cross-References

- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Sustainability and Cultural Heritage

Further Reading

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Journal of Heritage Tourism

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Brief Definition of the Topic

There is widespread recognition of the growing importance of tourism based on living culture and built heritage resources. Many places depend almost entirely upon the cultural past for their tourism-based economies, resulting in many political, social, ecological, and fiscal implications. This condition has resulted in considerable academic interest in heritage tourism since the early 1990s. While cultural heritage tourism specialists have published for many years in a wide array of social science journals, the *Journal of Heritage Tourism* (JHT) was established in 2006 to provide an international, peer-reviewed outlet for the dissemination of scholarly research specific to the subfield. JHT publishes full-length research articles, shorter pieces/research notes, and book reviews of tomes relevant to all aspects of culture and heritage. As a transdisciplinary journal, it provides a venue for the consolidation of theoretical and empirical knowledge about cultural heritage and visitor use from a multitude of perspectives.

JHT was originally published by Channel View Publications in Bristol, England, one of the premier contemporary tourism studies publishers. JHT was sold to Taylor and Francis in 2008 and is now published by Routledge four times per year. Information about the journal and submissions guidelines can be found at http://www.tandf.co.uk/journals/rjht. The journal is wide in scope and encourages creative social science research on all visitor- and resource-related topics pertaining to the human past and cultural present. The journal is edited by Professor Dallen J. Timothy of Arizona State University. The editorial board is comprised of scholars from a range of disciplines, all of whom are well-recognized researchers or up-and-coming scholars in the field. Board members represent social scientists, ICOMOS team members, and UNESCO officers from all over the world, known for their expertise in heritage management, conservation, and tourism. The journal is indexed in CAB Abstracts; Cambridge Scientific Abstracts; Current Abstracts; EBSCOhost; Global Health; Leisure, Recreation and Tourism Abstracts; Leisure Tourism Database; OCLC – Environmental Sciences and Pollution Management; Reuters Web of Science; and World Agricultural Economics and Rural Sociology Abstracts.

Some of the most prominent themes appearing in the journal include personal and national identity, diasporas, cultural landscapes, religious sites and pilgrimages, interpretation, visitor management, economic impacts, policies, authenticity, and nostalgia. The journal also publishes special theme issues once per year. Since its foundation in 2006, theme issues have focused on Managing World Heritage Sites, Anthropological Perspectives on Identity and Representation in Ethnic Tourism, and Natural Heritage: Tourism and

Biodiversity. Future theme issues will include Tourism and Heritage Cuisines, Heritage Tourism in the Caribbean, Heritage Tourism and the Mexican Borderlands, Intangible Heritage, Sport Heritage, and Heritage and Geopolitics.

Cross-References

- ▶ Heritage Tourism and the Marketplace
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

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Journal of Human Evolution

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Basic Information

The *Journal of Human Evolution*, known to all paleoanthropologists as JHE, is the leading technical outlet for articles and news notes in human and nonhuman primate evolution, Paleolithic archaeology, and geochronological, taphonomic, and faunal studies related to those topics. It was founded in 1972 by Brunetto Chiarelli of the Anthropological Institute at the University of Florence, Italy. He produced 14 volumes through the end of 1985, with a wide view of "human evolution" including most of physical anthropology and some allied disciplines. A laxity of the reviewing process among other factors led Academic Press, which actually owned the journal (as does its successor Elsevier), to seek new editors.

Peter Andrews (London) and Eric Delson (New York) reorganized JHE, adding a new board of Associate Editors with the express plan that they would coordinate review of all standard submissions (other than brief notes and book reviews), combining three external reviews with their own comments for final decision by an editor. New manuscripts began to be received in December 1985, and after two issues of papers accepted by Chiarelli, the first issue under the new editorship appeared as volume 15, number 3, with a cover date of March 1986. Unfortunately, in part due to the unavailability of most manuscripts submitted to the previous editor, this issue actually was published near the end of 1986, and with no backlog of submitted papers to draw on, publication dates were delayed. This anachronistic situation persisted for several years, so that each article actually contained the month of publication (as well as dates of article submission and acceptance), through late 1988, when the September 1988 issue appeared that month. In the meantime, Chiarelli started a competing journal, *Human Evolution*, which never made much headway and appears to have ceased publication now.

JHE continued to expand in popularity, eventually moving to 12 issues per year in 2 volumes, with 700–800 pages each. Numerous special issues have appeared, beginning with one in the December 1986 issue (published September 1987) drawn from contributions to a conference in honor of Desmond Clark (guest edited by J. W. K. Harris

and John Yellen); others have covered such topics as primate systematics and evolution (from an early meeting of the Willi Hennig Society), primate locomotor evolution, several on behavioral ecology and/or paleontology of various primate groups, site-focused issues such as those on Atapuerca and the Turkish Miocene site of Pasalar, the *Homo floresiensis* material, "Paleoanthropology Meets Primatology," and most recently (August 2012) "Five Decades after Zinjanthropus and Homo habilis: Landscape Paleoanthropology of Plio-Pleistocene Olduvai Gorge, Tanzania".

The pattern of two coeditors has been retained since 1986, with a retiring editor remaining "in harness" for a final year to complete production of articles she/he has handled. Following Andrews and Delson, 7 additional editors have served an average of 6 years, with the two current (2011) editors in their 3rd and 1st year, respectively. Following the tradition set by Delson and Andrews, coeditors are often from the USA and elsewhere, generally the UK, but currently the editors are Canadian and American. The number of Associate Editors (AEs) has risen from 26 to 37, in part due to the conscription of past editors as permanent AEs; others are appointed for terms of 3 years and often reappointed once. There is a strong international flavor to the editorial board, with AEs from the USA, UK, Canada, Japan, South Korea, Israel, Germany, Spain, Tanzania, and India.

Major Impact

The number of papers received has increased steadily, with 220 submitted and 121 published in 2011 (78 regular articles, the remainder shorter News & Views and other items.) The rejection rate is about 50 %, but JHE has a tradition of working with authors to assist revision so that many "rejected" articles are actually published after reworking. The average time to online publication is about 11 months. The majority of articles concern Plio-Pleistocene hominins and archaeology, but there is also strong representation from primate anatomy, primate evolution, geology and related fields, and the behavior of living primates. About 50 % of published articles have corresponding authors from North America and 36 % from Europe. At 4.08, the journal has the highest 5-year impact factor of any journal in anthropology, in the top third of all journals in the evolutionary biology group. Numerous articles published in 2005–2008 have already been cited over 60 times, and there were over 320,000 downloads of articles in 2011.

Cross-References

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Journal of Material Culture

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Brief Definition of the Topic

The *Journal of Material Culture* is a peer-reviewed publication that ranks highly in the field of cultural studies (2011 Journal Citation Reports 2012). Material Culture is a term used to describe the physical components in cultural studies. Objects made or modified through human behavior are considered an important source for archaeological interpretation. Knowledge gained from the study of artifacts and their

social identity requires the application of theoretical models and sound methodologies. The *Journal of Material Culture* encourages an interdisciplinary approach to examine the associations between artifacts and social relations, "...irrespective of time or place" (Aims and Scope 2013). These relationships are considered important to the understanding of cultural construction and practice.

To go beyond established disciplinary limits, the *Journal of Material Culture* aims to "...promote and develop a general comparative and international perspective by publishing papers on theory and methodology, interpretive strategies and substantive studies of key themes and issues" (Aims and Scope 2013). Academic specializations include anthropology, archaeology, design studies, history, human geography, museology, and ethnography.

First published in 1996, the *Journal of Material Culture* is a quarterly production. The journal is supported by a global board of editors under the editorial management of Ludovic Coupaye and Adam Drazin, both from the University College of London, United Kingdom. The *Journal of Material Culture* is published by SAGE Publications as a printed and electronic work and is available by subscription or online at http://mcu.sagepub.com.

Cross-References

- ▶ Journal of Archaeological Method and Theory
- ▶ Material Culture and Education in Archaeology

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Journal of Social Archaeology

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Brief Definition of the Topic

The *Journal of Social Archaeology* (JSA) is a fully peer-reviewed international journal covered in the ISI Arts and Humanities Citation Index. The journal promotes interdisciplinary research focused on social approaches in archaeology, opening up new debates and areas of exploration. It engages with and contributes to theoretical developments from other related disciplines such as feminism, postcolonialism, social geography, literary theory, politics, anthropology, and cognitive studies. JSA is explicitly global in outlook with temporal parameters from prehistory to recent periods. As well as promoting innovative social interpretations of the past, it also encourages an exploration of contemporary politics and heritage issues.

The idea of journal devoted to social approaches in archaeology developed in 1998, and the first issue was published in 2001. The editorial panel includes high-profile archaeologists, as does the larger advisory board which also features leading figures in the humanities and social sciences. The constitution of the board reflected the journal's aims for global coverage and a full temporal scope from the deep past to the contemporary world, linking past and present, the local and the global.

JSA encourages papers from a variety of theoretical perspectives, being inclusive and innovative rather than policing the boundaries of a single academic position. At its inception, one particular aim was to break the divide that then separated American and European archaeology, and this was also reflected in the composition of the editorial panel as well as the scope of the papers and interviews solicited in the early issues. It was generally felt that archaeology had

experienced a rather dull patch since the mid-1980s, and it would be particularly timely to challenge the current status quo, by being openly theoretical, interdisciplinary, and global, and blurring the boundaries between British and North American traditions. But it would also encourage theoretical and social approaches from other national and regional traditions: Latin America, Australasia, the Middle East, and South Asia.

Looking back a decade later in 2011, clearly archaeology is changing: our networks, collaborations, and the perceived centers of expertise have shifted considerably since the 1990s. Many of today's most exciting directions in archaeology are not necessarily generated in either Britain or the United States or by debates over what constitutes good science or good theory. Some of the most exciting work to come out of JSA has been conducted by Spanish, South African, Swedish, Colombian, Greek, and Australian archaeologists.

The journal has attempted to foster intradisciplinary exchange by bringing together widely separated discourses and traditions. Regional specializations are now subject to wider global dissemination. The journal aims to break down those arbitrary and hegemonic boundaries between North American, Classical, Near Eastern, Mesoamerican, European, and Australian archaeologies, for example. Typically these regions are never considered together. Egyptologists, Classical archaeologists, and Mesoamericanists each have their own narrow journals. JSA thus provides a forum in which archaeologists working on common issues in different areas can engage with each other over questions of theory. The central requirement of all published work is that a serious attempt is made to engage the social as not merely epiphenomenal but central to an understanding of past and present identities and meanings.

JSA represents a major effort to combine a host of theoretical orientations, diverse time periods, and geographical areas and bridge the divide between American and British archaeologies. Just as predicted in the first editorial for JSA in 2001, we have gone on to publish a suite of different contributors from Bangladesh, Iran, Zimbabwe, Australia, Turkey, Brazil, Palestine, and Cuba. Social topics published have included sociopolitics, identity, gender, postcolonialism, representation, landscape, mortuary studies, ritual, household studies, and material culture, among others.

The challenge for social archaeology is to be committed to understanding past societies in terms of their social contexts and lived experiences while, at the same time, to remain cognizant of how the knowledge of the past that we produce is used in the present. One avenue to accomplish this goal is to move from conceptualizing society as an object to thinking of society in terms of social relations that constitute the core of any analysis. Archaeologists can then examine how material culture is continuously implicated in webs of signification in the processes of creating meaning.

Reflecting on the first decade of JSA, it is striking to see the enormous diversity of articles published to date and the balance of exciting young scholars, many still students, combined with very established figures in the field. There has also been remarkable disciplinary scope in journal submissions that engage with linguistics, genetics, chemistry, art, philosophy, ethnography, and ethics. This is very much in keeping with our original editorial mission crafted in 2001 to situate archaeology within wider discourses across the humanities and the social and natural sciences.

We can now track the changing landscape of social archaeology. While the 1990s were so concerned with issues of identity, agency, and landscape, today there is a greater emphasis on heritage ethics, archaeological responsibilities, and multidisciplinary fieldwork. This is not to say that social archaeology has jettisoned its mainstream focus on spatiality, materiality, embodiment, biography, ritual, and difference. On the contrary, JSA has featured numerous articles devoted to architecture, memory, phenomenology, power, and practice that attest to the vibrancy of these topics and the new ways

in which they are being explored. In the last decade single issue polemics have been replaced, in the main, by more complex and multistranded analyses. Rather than simply targeting ethnicity or gender, for example, recent archaeological work aims to embrace a wider set of social determinants in the lives of historically situated individuals by pursuing multiple lines of inquiry.

The journal remains committed to a very broad remit that includes our understandings of the deep past, contemporary archaeological practice, and engagements with the recent past.

Cross-References

► Social Archaeology

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Joyce, Rosemary

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Basic Biographical Information

Rosemary Joyce (Fig. 1) is a prominent anthropological archaeologist widely known for her work on the archaeology of gender, sexuality, and embodiment, based on visual culture of pre-Columbian Central America. Born in Buffalo, New York, in 1956, she was the sixth of eight children of Thomas Joyce, a steelworker, and Joanne Poth Joyce, a homemaker. Joyce was educated at the Mount Saint Joseph Academy. She received her bachelor's degree in 1978 from Cornell University and her doctorate in anthropology from the University of Illinois at Urbana-Champaign in 1985 studying under David Grove. She is married to the ethnohistorian and archaeologist Russell Sheptak, with whom she has collaborated on many research projects.

Joyce, Rosemary, Fig. 1 Rosemary Joyce (Photo by Russell Sheptak)

Joyce was appointed Assistant Curator of pre-Columbian Archaeology at the Peabody Museum, Harvard University, in 1985, and made Assistant Director in 1986. Concurrently, she held the positions of Assistant and Associate Professor in the Department of Anthropology. In 1994, Joyce was hired as the Director of the Phoebe Hearst Museum of Anthropology (1994–1999) and as an Associate Professor of Anthropology at the University of California, Berkeley. She was promoted to Professor in 2001 and served as Chair of the Department (2006–2011). She was appointed the Richard and Rhonda Goldman Distinguished Professor in the Social Sciences in 2009 and made the Associate Dean for Social Science, Graduate Division in 2011.

Joyce is the recipient of many national fellowships and honors. She has held a Bunting Institute Fellowship at Radcliffe College, Harvard University (1992), University of California Humanities Research Institute Fellowship (1999), and a Center for Advanced Study in the Behavioral Sciences Fellowship at Stanford University (2001). She was selected as the Distinguished Lecturer by the Archaeology Division of the American Anthropological Association in 2003. She served as President Elect (2009–2011) and

President (2011–2013) of the Archaeology Division. She was awarded a John Simon Guggenheim Memorial Foundation grant (2010) to study the history of Central American collections in European museums. Most recently, she was appointed by President Obama to the Cultural Property Advisory Committee of the US Department of State in 2011.

Major Accomplishments

A self-described field archaeologist who has carried out survey and excavations at sites spanning the full range of pre-Columbian and Colonial period occupation in Honduras since 1977, Joyce has made important contributions to practice-based theoretical approaches to interpreting the archaeological record. Her commitment to theoretical advancements that are solidly grounded in empiric data has resulted in a series of studies that not only advance understandings of issues of gender, embodiment, materiality, and agency but also contribute new ways of studying the material record.

In her book, *Cerro Palenque: Power and Identity on the Maya Periphery* (1991), she introduces the idea of an "archaeological ethnography," or "archaeography," to account for the dual project of archaeology – the observation of material remains in order to make inferences about the past and the construction of written accounts of the past based upon these observations. For her, archaeological ethnographies have the same epistemological status as interpretations as standard cultural ethnographies. Although they are dependent upon observations of material culture patterning rather than behavior, they share the goal of explicating culture defined as those meanings specific to a particular time and place.

Joyce was one of the first archaeologists to consider women and more broadly gender as legitimate topics in Mesoamerican archaeology. Her initial focus was on the contrast among three lines of evidence: the representation of women in Maya monumental art, the representation of gendered activities in small-scale representations such as figurines, and the presence or absence of women in the ethnohistoric documents (Joyce 1993, 1996). Her analyses led her to argue that although gender was a definite part of differentiation within Mesoamerican societies, the kinds of difference created were not (or not only) hierarchical in some simple framework. Thus, men and women were often shown in complementary forms of action, and the kinds of action that gendered figures engaged in differed depending on social location (at home, in public) and in terms of social class. In a careful effort to distinguish between representation and actual practice, Joyce has contrasted and compared burial practices with artistic representations. In an important reanalysis of the burials from Tlatilco, a Central Mexican Formative period site famous for its rich burial offerings in a household context, Joyce (2001b) not only highlighted the care with which women were buried but used the distribution of burials to argue for continuity over time in kinship and social relations.

Drawing on the work of Judith Butler, Joyce (1998, 2001a) views gender and sex as socially constructed and shaped. This led her to a concern with embodiment, in which a real, corporeal body is nevertheless understood not as some natural entity but as something shaped, even sexed, by social and cultural views. Joyce (2005) has argued strongly that bodies are better understood as sites of lived experience than as appearances or images to be "read." She and Lynn Meskell have demonstrated the value of this approach, which emphasizes habitual actions and dispositions as much as image, ornamentation, or representation (Meskell & Joyce 2003). Her analysis of Playa de los Muertos figurines, produced in Honduras during the Formative period, exemplifies the value of her approach (Joyce 2003, 2008). Through a detailed examination of the depiction of gestures, hairstyles, size, and other factors, Joyce argued that the female body (these figurines are all of women) was a site of display and modification that reflected socially constructed identities that were both personal and social, tied not only to gender but to age as well.

Joyce is particularly interested in the semiotics of representation. In her book *The Languages of Archaeology: Dialogue, Narrative, and Writing* (Joyce 2002), she offers a critical study of the rhetorical practices archaeologist use to create representations of the past. Central to her study is a critical engagement with the dialogic model of the literary theorist Mikhail Bakhtin. This model emphasizes the concepts of heteroglossia and polyphony or multivocality as a means of textual interpretation. Joyce suggests that these concepts can be used to clarify questions of how and why multivocality is typically suppressed in the writing of archaeological narratives and why it matters that archaeologists attempt to recapture multivocality in the construction of archaeological knowledge. She suggests that thinking about the perspectives of multiple actors in the past as well as multiple audiences in the context of experimental writing offers a new opportunity to go beyond the constraints of disciplinary boundaries and standard notions of time-space relations.

As evidenced by her theoretical interests, Joyce is a committed anthropological archaeologist. She helped organize an American Anthropological Association panel that resulted in a special publication entitled *Archaeology is Anthropology* (Gillespie et al. 2003b). As she notes, in her concluding chapter (Gillespie et al. 2003a), it is possible to turn around the question of archaeology is anthropology or it is nothing, to ask "what kind of anthropology is archaeology." This shifts the issue away from tedious disciplinary debates to a concern for archaeological theory building and practice. She concludes that whether or not archaeology formally splits off from anthropology, it will remain anthropological because it is integrative and concerned with the big questions of who we are, where we came from, how we got here, and where we are going.

Joyce's research is characterized by the focus on people's engagement with the material world at multiple social scales, from that of the individual body, the household, the community, and the larger landscape which these groups inhabit. Her interest in these issues has allowed her to develop a far more nuanced picture of Mesoamerican social relations even as it has led her to propose ways of interpreting the past of interest to scholars across the discipline.

Cross-References

- ▶ Engendered Archaeologies
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Materiality in Archaeological Theory
- ▶ Meskell, Lynn
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Semiotics in Archaeological Theory

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Kakadu National Park: Rock Art

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Introduction

Kakadu National Park, located in the top end of the Northern Territory of Australia, covers 19,804 km^2 of diverse tropical ecosystems. This vast area includes mangroves, mudflats and floodplains, major rivers, savanna woodlands, monsoon forests, sandstone escarpments, and rocky plateaus. Most importantly, Kakadu is an Aboriginal living cultural landscape. There are many different clan groups within Kakadu with each caring for their "country" and sharing in joint management of the park with the Commonwealth Government of Australia. Kakadu is universally acknowledged as one of the world's great rock art provinces. Internationally recognized through UNESCO World Heritage List for both its cultural and natural heritage, Kakadu has one of Australia's largest concentrations of rock art sites. Rock art played a vital role in Kakadu, achieving world heritage status, with particular mention made of the antiquity, concentration, temporal span, and diversity of the art as well as its links to continuing cultural traditions (Fig. 1).

Key Issues

Characteristics

It is estimated that there are over 15,000 rock art sites of varying ages within Kakadu. While this is only a fraction of Australia's rock art, sites contained within Kakadu represent a highly significant and diverse suite within a protected national park. The rock art is overwhelmingly paintings; however, stencils also feature heavily. Less frequent are prints, engraved motifs including cupules, and beeswax figures pressed onto the rock surfaces. Paintings, stencils, and prints are made using natural ochers and white pipe clay sourced locally and traded across Kakadu and neighboring regions. In the late 1800s and early 1900s, Reckitt's Blue washing powder was occasionally used to depict traditional and new subject matter.

Chronology

Rock art dating is one of the biggest challenges in rock art research so few images have been directly dated. Consequently, we do not know how old much of the art is, but there is a range of evidence to suggest that the oldest surviving rock art, including paintings of large naturalistic animals, is over 15,000 years of age and possibly as much as 30,000 years. G. Chaloupka has argued some rock art could be even older and that Kakadu has "the world's longest continuing art tradition" (Chaloupka 1993: 15). Certainly, the rock art illustrates significant environmental, technological, and stylistic change over time and

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Kakadu National Park: Rock Art, Fig. 1 Most rock art in Kakadu adorns the surfaces of open-air rockshelters rather than cave systems such as those in Spain or France

a number of sequential styles have been identified in the art by studying the superimposition of individual paintings and comparing this across many hundreds of sites so far studied (see, e.g., Lewis 1983, 1988; Chaloupka 1984, 1993; Figs. 2 and 3). These studies have largely used the depiction of extinct animals and a wide variety of artifacts, clothing, and recent subject matter to mark the changes in style from the pre-estuarine, estuarine, freshwater, and historic periods (Figs. 4 and 5).

Research

The first record of rock art in (what is now known as) Kakadu was made by explorer Ludwig Leichhardt in 1845; however, it was not until the 1960s that rock art studies gained some momentum. The earliest work was undertaken by W. Arndt (1962) with his published interpretations of paintings at three sites. In the late 1960s, J. Jelinek (1978) carried out intensive recording of the Ubirr sites during the Czechoslavakian Expedition to Arnhem Land. These fleeting studies were then followed by more significant work in the late 1960s and 1970s, largely concentrating on artistic styles and establishing relative chronologies. E. Brandl (1968, 1973) was the first to systematically analyze the rock art of the region through an examination of changes in technology reflected within superimposed motifs.

The most widely recognized rock art recorder (and key advocate for the protection of rock art in Kakadu) was G. Chaloupka who, in 1984, produced a stylistic chronology of the Arnhem Land plateau rock art that incorporated four broad artistic periods: pre-estuarine, estuarine, freshwater, and contact (Chaloupka 1984, 1985). He defined the sequence by combining the evidence of superimpositions, differential weathering, defined styles, and changes in the range of depicted animal species and their environmental contexts. This work both expanded upon and departed from Brandl's earlier work. Chaloupka believed the key to major stylistic changes was significant environmental change, particularly

Kakadu National Park: Rock Art, Fig. 2 The changing environment of this region is reflected in the rock art of Kakadu

Kakadu National Park: Rock Art, Fig. 3 Stencils of material culture (such as this boomerang) can be found across Kakadu and help to fill gaps in our understanding of materials that do not survive in the archaeological record

Kakadu National Park: Rock Art, Fig. 4 Paintings of extinct animals such as the thylacine (Tasmanian tiger) provide important clues as to the age of rock art in Kakadu

Kakadu National Park: Rock Art, Fig. 5 One of the most common subjects in Kakadu rock art is fish and other animals depicted with internal organs showing (x-ray)

sea level fluctuations, experienced in the region during the late Pleistocene and early Holocene.

The late 1970s and 1980s saw a peak in the level of rock art and archaeological research occurring within Kakadu, associated both with mining exploration and the establishment of Kakadu as a national park and World Heritage site. This included research by D. Lewis (1977, 1983, 1988), P.S.C. Taçon (e.g., 1987, 1988, 1989a, b), J. Jelinek (1989), and R. Gunn (e.g. 1987). Throughout the 1980s, G. Chaloupka, R. Gunn, I. Haskovec, and H. Sullivan undertook a number of cultural surveys within the park which included community consultation (e.g., Chaloupka et al. 1985; Chaloupka & Kapirigi 1981; Gunn 1987; Sullivan & Haskovec 1986, 1987, 1988). These reports, as well as Taçon's Ph.D. thesis (1989b) and related publications, contain important ethnographic information relating to rock art and rare firsthand accounts from Aboriginal rock artists.

Collaborative rock art research continued in the early 1990s, particularly by Tacon (e.g., 1992, 1993 and with Chippendale & Taçon 1993, 1998; Taçon & Chippendale 2001, 2008;

Taçon et al. 1996), Gunn (1992), and Chaloupka who in 1993 published "Journey in Time: the World's Longest Continuing Art Tradition." This detailed publication provides a summary of his extensive research into the art sequence of Kakadu over the preceding decades. Since the mid-1990s, the level of rock art research occurring throughout Kakadu National Park has largely declined. Some Aboriginal people in Kakadu felt overrun by archaeologists and rock art researchers and desired to better control access to their country and to participate more equally in the documentation of sites for management (KCHS 2012).

Alongside of rock art management and conservation programs run by staff of the Natural Cultural Programs Unit in Kakadu, two major rock art research projects, both initiated by local Aboriginal organizations, are currently underway in Kakadu. The first is led by the Jawoyn Association and relates to Jawoyn country in the south of Kakadu and beyond, and the second is associated with the Gundjeihmi Aboriginal Corporation and focuses on Mirarr country including the Jabiluka Leasehold area and surrounds.

Continuing Artistic Traditions

For local Aboriginal people, rock art is just one part of a much wider and more complex cultural system that interweaves land, cultural law, other art traditions, ancestral beings, people, and other creatures. While we may try to ease our understanding by separating out the strands, in essence, one component of "culture" cannot be fully understood without the others. Some rock art imagery is intimately linked with ceremony, other designs to storytelling, and training in cultural law. Many sites simply relate to the everyday activities of past and present men, women, and children. The role that rock art plays in Aboriginal cultures is best described by local Aboriginal people and information should only be shared in line with cultural protocols determined by different clan groups within Kakadu.

The rock art of Kakadu National Park is one of the world's great treasures, an immense source of pride for local Aboriginal groups, and an irreplaceable resource for understanding Australia's past.

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- ▶ Australian Paleoart
- ▶ First Australians: Origins
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of

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Kanaseki, Hiroshi

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Basic Biographical Information

Hiroshi Kanaseki is a Japanese archaeologist and an Emeritus Professor of Tenri University (Fig. 1). He was born in Kyoto in 1927 as the second son of the famous anthropologist, Takeo Kanaseki. Takeo learned archaeological methodology at Kyoto University from Kosaku Hamada, who is regarded as the father of archaeology in Japan, while he worked as an Assistant Professor of the Department of Anatomy of the university. Takeo Kanaseki submitted a doctoral thesis on the anthropological study of Ryukyu people in East Asia, three years after Hiroshi was born, and then moved to Taipei to become a Professor of the former National Taiwan University. Hiroshi Kanaseki joined his father on the island in 1936. During his teenage years in Taiwan, Hiroshi often

Kanaseki, Hiroshi, Fig. 1 Hiroshi Kanaseki (*left*) with Claire Smith and Katsu Okamura at WAC Inter-Congress, Osaka, January, 2006 (© Hidetaka Bessho)

accompanied his father to help at archaeological excavations.

After returning to Japan in 1946, Hiroshi Kanaseki finished the science course in Matsue High School (in the old system of education, equal to the half stage of undergraduate studies in the present educational system) and then started studying archaeology at Kyoto University. The main material that he investigated at that time was Chinese bronze objects of the Warring States period. In 1953, he received his Bachelor of Arts from Kyoto University. In 1956, after several years of postgraduate study, he became an assistant specializing in drawing archaeological materials at the Nara National Research Institute of Cultural Properties. During his time at the Institute, Hiroshi Kanaseki joined in the excavations of cemeteries of the Yayoi period in Western or Southern Japan, including Doigahama and Hirota, where considerable data was collected on prehistoric mortuary practices. In addition, he excavated some of the oldest Buddhist temples, dating to sixth century CE, in and around Osaka, including Asuka-dera and Shiten'no-ji.

From 1959 Hiroshi Kanaseki worked as a member of the academic staff of Tenri University, and from 1965 onwards he started his expeditions of archaeological research in Israel. In that same year, he was asked to direct a large-scale excavation of a Yayoi village in Osaka, named Ikegami-Sone. Following his contribution to this excavation and continual advice of wisdom for the local government which succeeded to conduct the series of excavations there, Hiroshi Kanaseki asked to be the Director of the Osaka Yayoi Museum (1991–2012), which is built beside the traces of what is assumed to be large shrine of Ikegami-Sone site. In 1992, he founded the Department of Archaeology at Tenri University, which included study of the discipline of folklore. He retired the university in 1997.

Professor Kanaseki played a key role in the internationalization of Japanese archaeology through his support for the World Archaeological Congress' Inter-Congress of the topic of "Kyosei-no-koukogaku: Coexistence in the Past – Dialogues in the Present," which was held in Osaka in January, 2006. In 2013, his contribution to world archaeology, particularly to breaking down barriers between archaeology in Japan and in the outside world, was recognized when he received the Inaugural President's Award of the World Archaeological Congress.

Major Accomplishments

Professor Kanaseki became very experienced in excavation during his stay in Taiwan with his father. This attracted him so much as to lead him to the discipline of archaeology. Moreover, since his childhood, the wide range of acquaintance with leading scholars basically through his father's connections continued to help him to accumulate his immense knowledge on ancient human life. However, his considerably broad knowledge of archaeology and its surrounding disciplines within the global scale emerged in the latter half of his career in archaeology. For example, while he worked as a Professor at Tenri University, he was involved with so-called Biblical archaeology in Israel, contributing to excavations at Tel Zeror and directing excavations at Ein Gev. This research seems to have made him consider the relationships between archaeological activities and the religious and political aspects of the modern world.

Professor Kanaseki's research has provided much insight into religious beliefs in the prehistoric and protohistoric periods in Japan, but his chief concern lies with the Yayoi period, the time when domestication was first introduced, from the early first millennium BCE to the third century CE. He has tried to increase the systematic understanding of Yayoi culture by paying more attention to the aspect of past beliefs, the subject of which has been almost untouched among most Japanese archaeologists because of the difficulty to approach this topic. Professor Kanaseki has researched a range of archaeological materials such as figurines, images drawn on objects, and grave goods and used a range of information sources from literature and folklore. One of the outstanding results of his investigation is his discussion of bird spirit worship, based on his analysis of wooden bird objects found at Ikegami-Sone. Professor Kanaseki argues that this belief was introduced in the Yayoi period along with agricultural practice and that it derived from the ancient Chinese civilization. He says that the essence of archaeology is not only to examine materials and analyze data but also to create something new that arises from the integration of past materials and the mind.

Professor Kanaseki's erudition and extensive knowledge together with his affectionate nature have allowed him, for a long time, to supervise various projects relating to ancient cultures, to organize many symposia and academic meetings, to edit a number of books, and to be invited to be the Director of a number of museums. The standing of his contributions to international archaeology is recognized in the Inaugural President's Award of the World Archaeological Congress.

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► Periodization in Japanese Prehistoric Archaeology
► World Archaeological Congress (WAC)

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Basic Biographical Information

Sönmez Kantman was born in İstanbul in 1940. He died in 1999. He got his degree from Robert College, Istanbul. Afterward, he studied law in Switzerland and then continued his education in the Department of Protohistory and Near Eastern Archaeology at İstanbul University, Turkey.

Kantman was a Renaissance scholar with wide-ranging interests. Besides his scientific research, he was interested in art studies and literature. He wrote a play in French, named *Patira*, and he translated thirteenth century Japanese haikus into Turkish in preparation for a book called *Kokinşiu*.

He participated in excavations and survey studies early in his career, but in his later career concentrated his research efforts on the theory of practicing archaeology. His book *Analytic Archaeology* is a result of this research.

Major Accomplishments

Sönmez Kantman's name is on the verge of being forgotten. However, he should be remembered and honored for his remarkable study *Analytic Archaeology* which he coauthored with Ali Dinçol.

In the 1960s, around the world, the social sciences stream was strongly influenced by developments in new approaches and thinking systems. In the field of archaeology, new concepts such as archaeometry and processual archaeology were much discussed by academics. In Turkey, two young researchers Sönmez Kantman and Ali Dinçol who were in their early 20s undertook a study of both theoretical and practical methods in archaeology. This study emerged to contest the excavation-based archaeological tradition in Turkey. Kantman and Dinçol aimed to generate a discussion about the problems of practicing archaeology in Turkey and to offer a systematic approach to archaeological theory and method. Their interdisciplinary work was published under the title of *Essays on Analytic Archaeology*.

However, their work was ignored by the conservative structure of academy. After this, Sönmez Kantman gave up his career in archaeology and continued his career in a completely different field, while Ali Dinçol became a philologist.

However, their work had a significant impact on the next generation of archaeologists, suggesting avenues for research that are beyond the normal focus on excavations. While Sönmez Kantman and his work *Analytic Archaeology* did not find the response that they deserved at the time the work was published, this volume did open up a new area of discussion area and encouraged young researchers to generate new ideas that went beyond the traditional focus on excavations in Turkish archaeology.

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▶ Excavation Methods in Archaeology
▶ Practice Theory in Archaeology
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Karstic Landscapes: Geoarchaeology

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Introduction

Karstic landscapes are found over 12 % of the Earth's terrain. Due to their physicochemical (e.g., high alkalinity) and physiographical (e.g., caves, dolines, poljes) characteristics, they preserve some of the most impressive evidence of human evolution and behavior as well as good continental palaeoenvironmental records. It is perhaps due to these reasons that karstic landscapes have seen some of the earliest applications of geoarchaeology (e.g., at the Haua Fteah cave in McBurney 1967). In spite of recent attempts (e.g., Reeder 2011), a full overview on the geoarchaeology of karstic landscapes that goes beyond the study of caves is still missing in textbooks and review articles. The need for a more comprehensive definition and systematization is apparent from the rising number of dedicated conference papers and publications and the integration of geoarchaeology in research clusters and institutes focusing on the interdisciplinary study of karstic landscapes. The present contribution thus aims at drafting a broader definition of this potential branch of archaeological and palaeoenvironmental research, stemming from scientific archaeology, environmental archaeology, and human ecology, in view of possible future developments.

Definition

The broad geographical distribution of karstic regions, together with the potential they show for archaeological preservation, means that they have provided much evidence to virtually all the current relevant questions in archaeology and human palaeontology. In this sense, a definition of the geoarchaeology of karstic landscapes needs to be made in the broadest possible sense, especially concerning its resolution in terms of the scales of approach and methods implied. Thus, the geoarchaeology of karstic landscapes is no different from geoarchaeology as a whole, in that it contributes to issues related to both human-environment interaction and archaeological site formation and preservation, employing a hybrid multi-scalar methodological and theoretical framework with contributions from archaeology and the geosciences. However, geoarchaeological applications in karstic regions need to take into account the peculiarities of such landscapes in terms of their origin, distribution, taxonomy, and taphonomy.

Karstic regions offer the possibility for geoarchaeological applications in two main contexts, namely, subterranean and surface karst (Fig. 1). Cave deposits preserve long sequences of human occupation where micromorphology and microarchaeology find some of their most fruitful applications. As for palaeoenvironmental reconstructions within caves, the isotopic study of speleothemes currently offers some of the records with highest resolution. As for surface karst, superficial wetlands offer the

Karstic Landscapes: Geoarchaeology, Fig. 1 Examples of geoarchaeological contexts in surface and subterranean karstic landscapes. (**a**) Historical watermill hanging from the side of a karstic canyon in Istria (Croatia), note the stark contrast between the dryness of the watercourse (photo was taken in summer) and watermarks on the artificial water channel. (**b**) Neolithic coastal site near Liznjan in Southern Istria (Croatia) being eroded away by Holocene sea-level rise. (**c**) Sampling speleothemes at Cova Murada, Menorca. A megalithic Bronze Age wall used to close the entrance to the cave, where dozens of burials were excavated in the early twentieth century. (**d**) Cyrene (Libya, UNESCO World Heritage site since 1982), a Greek colony of Thera founded in 630 BCE, romanized in 74 BCE. The photographs show the damages of an earthquake on the bathing quarters of the city known as the *Aqua Augusta*. Classic writers attest two major earthquakes affecting Cyrene in CE 262 and in CE 365

best-preserved and more continuous sedimentological sequences with preserved proxies for palaeoenvironmental reconstructions and for studying trajectories of long-term interaction between humans and this particular kind of landscape. While archaeological preservation is often poor in surface karst, the study of the distribution of surface archaeological evidence in connection with regional physiographical traits (through remote sensing, geomorphology, pedology) is key to understanding human occupation strategies and impact within these environments.

Origin and Distribution of Karstic Landscapes Worldwide

The solid geology of most of our planet (c. 70 %) is made of highly soluble sedimentary calcareous rocks, such as limestone, dolomite, and aragonite, formed at the bottom of the sea during different geological periods (Ford & Williams 2007). Karstic landscapes are formed within these carbonate geological formations through meteoric dissolution, a process referred to as karstification. Across latitudes karstic regions give origin to contrasting landscapes (from barren ground to rain forest) in different climatic zones (from circumpolar to temperate and tropical).

The distribution of karstic regions, from Malaysia to Cuba and from Alaska to New Zealand (Fig. 2), makes them most interesting for archaeologists and human palaeontologists. Karstic landscapes are often distributed along tectonically active regions (e.g., Alpine and Himalayan systems). In addition, karstic regions coincide with some of the main intercontinental corridors and bridges (e.g., Sinai, East Africa, Indonesia, Central America). As a result, karstic regions are ideal places for studying trends in human evolution and dispersal. Besides, they show some of the highest concentrations of human population, past and present (e.g., Egypt, Mesopotamia, North and Northwest India).

Taxonomy of Karstic Landscapes

Most karstic features and landscapes were first observed in SE Europe, and their geomorphological definition derives often from Slavic languages. Karst is the German modification of the Croatian word *krš* (rock). In common language, the word was originally employed to indicate the bare stony ground of the limestone regions of western Slovenia. The term karst has now become part of the geomorphological lexicon to define a "terrain with distinctive characteristics of relief and drainage, arising primarily from a higher degree of rock solubility in natural waters than is found elsewhere" (Jennings 1971: 1).

Karstic landscapes may be classified into two major groups, each generating a variety of landforms: surface and subterranean (Ford & Williams 2007). Surface landforms (exokarstic) include dissolution features such as poljes, karrens, dolines, sinkholes, cenotes, bridges, and towers. Due to the high permeability of carbonate rocks, surface karstic landscapes are

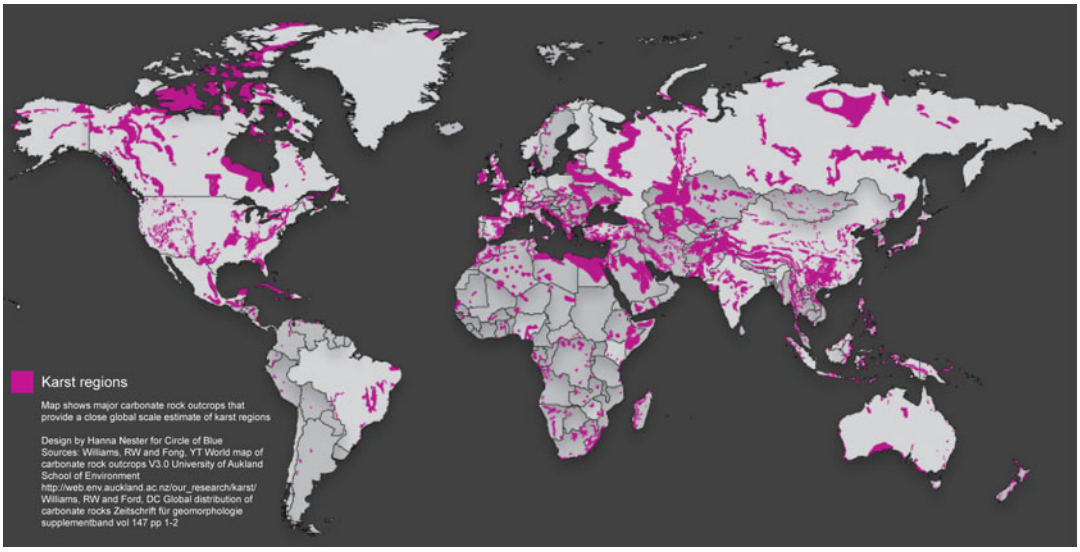

Karstic Landscapes: Geoarchaeology, Fig. 2 Karst regions of the world. Available at http://www.circleofblue.org/waternews/2010/world/chinas-karst-region-infographics/ (accessed 22 May 2012)

characterized by low water retention and scarce surface waterways. In surface karstic landscapes, most water penetrates rapidly through sinkholes or diffusely through the permeable calcareous bedrock generating extensive subterranean drainage systems and a variety of subterranean landforms (endokarstic), mostly vadose and/or phreatic conduits of different scale, caverns, and caves.

Taphonomy of Karstic Landscapes

Despite being by definition more easily accessible, surface karstic landforms have received much less attention in archaeological and geoarchaeological research than subterranean ones. This is mainly due to the "aggressiveness" of the soils and sediments found on surface karstic landforms. The high alkalinity (low pH) of carbonate rocks and derived soils, combined with weathering, leads to the rapid dissolution of bone collagen and organic materials in surface karstic landforms. Even phytoliths, among the most resistant plant fossil remains, suffer from higher dissolution rates in archaeological assemblages from surface karstic landforms, where lithic remains are often the only evidence preserved (Andel & Runnels 2005). However, in specific cases, past surface karstic landforms (e.g., palaeosoils, limnic deposits, fluvial sequences) have been preserved within karstic depressions, buried under later alluvial, colluvial, and anthropic deposits, or in waterlogged conditions. In such cases, preservation of palaeoenvironmental proxies in sedimentary sequences and anthropic features in archaeological contexts has been maintained (e.g., Siart et al. 2010; Palomo et al. 2011). Geoarchaeology can therefore be applied in exokarstic landscapes in both archaeological and non-archaeological contexts, providing an insight into human-environment interaction and past socio-ecological systems. Archaeological deposits provide evidence relative to the use of surface karstic environments for settlement and sustenance, while sedimentary sequences provide information relative to environmental change at the local, regional, and global scales (Balbo et al. 2006; Balbo 2009; Iriarte et al. 2011).

Subterranean karstic landforms have been a critical source of archaeological and geoarchaeological information worldwide (Rapp & Hill 1998; Goldberg & Macphail 2006). Caves and rockshelters provide a protected environment and have been occupied throughout human history for different activities. Endokarstic landforms show much less diurnal and seasonal variation in terms of moisture and temperature than exokarstic ones. In addition, caves and rockshelters favor burial, increasing the potential for preservation. In some exceptional cases, e.g., when cave entrances have been sealed rapidly after human occupation, materials as fragile as human hair have been found (e.g., Bronze Age deposits found at Cova d'es Càrritx, Menorca, in Wellman 1996). Although artifacts and fossil accumulations may be preserved, taphonomic histories of these types of deposits are often complicated. Site formation processes are eclectic due to the characteristics of the bedrock and the complicated depositional, erosional, and occupational processes involved. Both clastic and chemical depositions occur. Clastic deposits include debris produced by human and animal occupation, washes, fluvial, and aeolian deposits, as well as rockfalls. The most common chemical precipitates are calcite depositions such as flowstone or dripstone. While preserved from weathering, bone deposited in karstic caves is exposed to calcification, often resulting in poor collagen preservation. Exceptional situations exist where good DNA preservation has permitted a first sequencing of the Neanderthal genome (Green et al. 2010). As a result of such taphonomical advantages and limitations, cave stratigraphies constitute intriguing depositional systems. They have played an important role in archaeology, and they are still a critical source of chronostratigraphic and artifactual data. Again, in these contexts geoarchaeology may contribute in terms of understanding human-environment interaction based on a combination of evidence from archaeological deposits and specific sedimentary features such as stalagmites, providing high-resolution palaeoenvironmental information through isotopic analysis (McDermott 2004).

Key Issues/Current Debates

Archaeology of Karstic Landscapes

Karstic landscapes worldwide are intertwined with major questions in archaeology and human palaeontology including human origins and dispersal, human environmental behavior, and the emergence of early civilizations.

Human Origins, Evolution, and Dispersal

Karstic caves have provided key archaeological and palaeontological evidence of hominin and modern human origins, evolution, and dispersal. Some of the most spectacular discoveries of hominin fossils were made in the past decades in the karstic landscapes of the South Cape province, South Africa, e.g., at Sterkfontein, Swartkrans, and Kromdraai (Martini & Kavalieris 1976; Dirks et al. 2010). Zhoukoudian cave in China gave one of the earliest examples of hominin presence in Asia 1 Ma (Goldberg et al. 2001). The karstic complex of Atapuerca offers the most continuous fossil record of Europe with dates ranging from c. 1.5 Ma virtually to the present-day (Carbonell et al. 2008). Blombos cave in the South Cape province (South Africa) has provided some of the earliest fossils and artifacts attesting to the origin of anatomically and behaviorally modern humans (AMH) before 100 ka (Fisher et al. 2010; Henshilwood et al. 2011). The worldwide dispersal of AMH has been documented in karstic caves and landscapes in Israel (e.g., the disputed case of the Qafzeh in Niewoehner 2001), Borneo (Niah cave in Barker et al. 2007), and SE Alaska, where karstic caves bear evidence of AMH migration into the American continent crossing the Laurentide ice sheet (Dixon et al. 2001). Karstic islands and wetlands have also offered evidence concerning the role of boats and seafaring for human dispersal and the spread of agriculture (Marangou 2003; Papageorgiou 2009). The demise of Neanderthals in Europe (e.g., Gibraltar in Finlayson et al. 2006) and their possible presence in Africa (e.g., Benzú in Ramos et al. 2008) have also been the subject of extensive archaeological research in karstic landscapes. More recently, findings from the Island of Flores, Indonesia, question the lone existence of AMH on Earth since the extinction of Neanderthal. Fossils of Homo floresiensis found in tropical karstic caves provide evidence of karstic landscapes supporting species other than our own as late at 15 ka (e.g., in Aiello 2010).

Human Environmental Behavior

A large proportion of rock paintings and carvings have been found in karstic caves. Similarly, numerous portable decorated objects have been found in karstic caves and in surface karstic landscapes. Such depictions of zoomorphic and human figures as well as plants offer evidence of the fauna and flora that characterized karstic environments before their extensive transformation through intensive hunting, domestication, and urbanization. Examples of rock art and portable art in karstic landscapes include Altamira (Valladas et al. 1992) and Fumane (Peresani et al. 2011) in Europe, as well as controversial sites such as Pedra Furada in Brazil (Santos et al. 2003).

Early agricultural and pastoral societies settled karstic landscapes in regions as different as the Mediterranean and subtropical China. Within the semiarid strongly seasonal Mediterranean climate, karstic wetlands seem to have acted as major attractors for foraging and farming communities alike through glacial and interglacial cycles (Balbo 2009). Some of the major present-day European pastoral communities are still found in karstic landscapes in the Alps, the Pyrenees, and the Dinarides (Angelucci et al. 2009). On the other side of the world, in a completely different climatic setting, the humid steamy to subtropical conditions that characterize the South China karst have contributed to the formation of spectacular landscape features such as stone pinnacle forests, cone and tower karsts, huge sinkholes, natural bridges, and caves. It is within these settings that some of the earliest evidence of rice agriculture in Asia has been discovered within the framework of "The early rice agriculture and pottery production project."

Megalithism, Urban Contexts, and Early Civilizations

A significant portion of European megalithic archaeology is found in karstic landscapes. Stonehenge is but one of the best-known examples. Less-known examples, also from the British Isles, include the Burren uplands, a karstic landscape located on the midwestern coast of Ireland and the karstic landscapes of Western Britain. Other cases of early megalithism in karstic landscapes come from Mediterranean Islands (Corsica, Sardinia, Malta, Cyprus, the Balearic Islands to cite but a few) (e.g., Cassar 2010; Feeser & O'Connell 2010). Karstic landscapes have provided the raw material to some of the most impressive early urban civilizations, for architecture and statuary work in Egypt (e.g., the Saqqara step pyramid), Europe (e.g., the Acropolis in Athens, the Minoan palace in Knossos), and Central and South America (e.g., buildings parts and decorations in Teotihuacan and Tikal) (e.g., Haviland 1970).

Geoarchaeology of Karstic Landscapes

Geoarchaeological applications in karstic landscapes contribute to some of the questions in archaeology and human palaeontology discussed above. Introduced along with a whole new array of field and laboratory archaeological methods in the 1950s, geoarchaeology has been formally defined in the 1970s as one of the latest developments within the archaeological sciences and environmental archaeology (Renfrew 1976). Mediterranean karstic landscapes have been a kind of testing ground for the discipline, with some of the earliest examples of geoarchaeological applications (e.g., Haua Fteah in McBurney 1967) (Fig. 3).

The geoarchaeological tradition in Mediterranean karstic regions has been continuous ever since (Barker & Bintliff 1999). Geoarchaeological applications are by definition multi-scalar, based on methods spanning from space-born observations through remote sensing for physiographical characterization and archaeological site detection (e.g., Lasaponara & Masini 2011) to the sedimentological study of alluvial and colluvial sequences and cave fills for palaeoenvironmental reconstructions (e.g., Brown 1997; Woodward & Goldberg 2001; Balbo et al. 2006; Iriarte et al. 2011; Marriner et al. 2012), site preservation assessment and formation processes of stratified archaeological deposits (e.g., Angelucci 2003;

Karstic Landscapes: Geoarchaeology, Fig. 3 Resuming excavations at the Haua Fteah karstic cave in 2007 half a century after Charles McBurney made here some of the first systematic applications of geoarchaeology in the 1950s

Araujo et al. 2008; Mallol et al. 2009; Iriarte et al. 2010), and the micromorphology of specific anthropic features (e.g., Wadley et al. 2011) as well as palaeosoils and ancient field systems (e.g., Fuchs & Lang 2004; Sedov et al. 2008; Puy & Balbo 2013). More recently, coastal and submerged archaeology in karstic regions is opening new horizons for the application of geoarchaeology underwater, e.g., in the context of Central American and Caribbean archaeology (e.g., Faught & Donoghue 1997; Beeker et al. 2002).

Geoarchaeology of Subterranean Karst

Among the different geoarchaeological specialties, micromorphology has been widely applied in karstic caves (Goldberg & Berna 2010). Beside the assessment of site formation and taphonomical processes (Angelucci 2003; Araujo et al. 2008; Mallol et al. 2009; Iriarte et al. 2010), micromorphology (Stoops 2010) and microarchaeology (Weiner 2010) have been used to put under scrutiny some of the earliest evidence for the use of fire at Zhoukoudian cave 1 Ma (Weiner et al. 1998). On the other hand, based on the same methods, Berna et al. (2012) recently demonstrated cooking capabilities among hominins 1.2 Ma at Wonderwerk Cave, Northern Cape province, South Africa. On a similar note, microscopic techniques have been used in the karstic cave of Klisoura (Greece) to identify the earliest example of clay hearths 34 to 23 ka (Karkanas et al. 2004). One of the best-understood features in cave micromorphology in connection with animal domestication and husbandry is that of spherulites, carbonatic nodules found in ovicaprid dung that is found in great quantities in caves that have served for animal keeping (Canti 1997). Shahack-Gross (2011) has recently proposed an overview of microscopic features related to animal husbandry that find application in most Holocene anthropic karstic cave deposits.

Karstic rockshelters and caves also provide archives of past environmental change that can be analyzed using methods integrated in the geoarchaeological approach (Woodward & Goldberg 2001). The isotopic study of speleothemes provides key information on past environmental and climatic change (McDermott 2004). In Sicily, speleothemes have provided highly resolved continental records of Holocene climate in connection with the spread of agriculture (Frisia et al. 2006). Frumkin et al. (2009) provide an example of how geochronology (Walker 2006) and isotopic analysis of speleothemes were used to reconstruct long-term cave stratigraphy within the Qesem karst system in Israel.

Geoarchaeology of Surface Karst

Geoarchaeology allows the combination of physiographical characterization (through remote sensing and geomorphology) and archaeological survey in surface karstic landscapes. This hybrid approach is necessary to fully understand the significance of the archaeological and palaeontological record preserved in caves within its broader environmental and socio-ecological context. Gaps in the often ill-preserved surface archaeological record can then be critically read in function of the preservation biases involved. Within karstic regions, this approach has revealed large numbers of open-air archaeological sites from the Pleistocene and Holocene periods (e.g., Runnels et al. 2004; Andel & Runnels 2005; Balbo 2009). In some instances and in spite of the generally poor taphonomical conditions, exceptional preservation has been maintained within archaeological sites found in surface karst landscapes. The Lower Palaeolithic site of West Stow, found in a depression within the chalk karst region of West Anglia, provided evidence of the use of fire in Europe as early as 450 ka (Barendregt et al. 2005; Preece et al. 2006). Micromorphology and isotopic studies have been used in the region to reconstruct past climatic settings (Candy 2009).

A recent review by Coxon (2011) provides an insight into issues concerning the impact of agriculture on karst terrains and their management. Geoarchaeology has provided support to research on early agricultural adaptations and impact within the main foci of plant and animal domestication (e.g., the Levant) as well as in peripheral

areas (Thomas 1990; Homburg & Sandor 2011). Using ground penetrating radar (GPR), Munro-Stasiuk and Manahan (2010) and Gunn et al. (1995) studied ancient Maya field systems in the karst terrains of Northern Yucatan, Mexico. Geoarchaeological methods (mostly coring and geophysics) are among the main tools deployed in the "Early rice agriculture and pottery production project" to study early rice agriculture in tropical karstic China. Apart from the definition of irrigation and terrace field systems, the geoarchaeological approach to the study of agricultural systems in karstic landscapes involves the reconstruction of the environmental settings prior to the introduction of the new agricultural order through the analysis of the underlying palaeosols and nearby sedimentary sequences. Examples are found across the Holocene, from Neolithic agricultural soils in the Levant (Iriarte et al. 2011) to the complex irrigated terrace systems of Medieval Al-Andalus (Puy & Balbo 2013) and SE Asia, where clusters of terrace fields such as those of Ifugao (Philippines) have been inscribed in 2001 in the UNESCO list of world heritage in danger.

Within open karstic landscapes, karst depressions are perhaps the best archives for geoarchaeologists to find past environmental proxies preserved and propose reconstructions of human-environment interaction (Siart et al. 2010). Karstic wetlands function as refugia and transitional (buffer) zones and have acted as attractors for mobile hunter-fisher-gatherers, herders, and settled agriculturalists (Coles 1984; Gams et al. 1993; Nicholas 1998).

In some instances karstic wetlands have given geoarchaeologists exhaustive continental palaeoenvironmental sequences (e.g., Giraudi 2001; Lawson et al. 2004; Balbo et al. 2006), more complete and less biased by human action than those usually found in cave contexts. Likewise, wetlands have provided some of the best contexts for the application of geoarchaeology in waterlogged conditions within karstic regions. It is within the mixed karstic and volcanic landscape of the shore of the Sea of Galilee (Israel), the lowest freshwater lake of the world, that perfectly preserved remains of bedding were studied microscopically within the 23 ka fisher-hunter-gatherer camp of Ohalo II (212–213 m below mean sea level) in occasion of a rapid drop of the water level in the lake (Nadel et al. 2004). Velušćek (2004) provides an overview of lake-dwelling sites found in the karstic region of Slovenia. Another example, currently under investigation, is the Neolithic lake dwelling of La Draga (Spain), where micromorphology is employed in a multidisciplinary approach to clarify site formation and taphonomical processes and lakeshore sediment and pedological analyses are used to reconstruct past environmental change (Palomo et al. 2011).

Early Civilizations, Geohazards, and Submerged Geoarchaeology

Megaliths have been the focus of much archaeological research. Focus has been put on their value as ritual and astronomical centers for early agricultural societies. More recently, the involvement of geoarchaeologists in the study of their immediate environment has revealed salient aspects of the surrounding landscape, indispensable for a full understanding of these early building complexes (Pearson et al. 2008).

Geoarchaeology is becoming more and more integrated in the study of early civilizations, some of which are located in regions predominated by karstic landforms, as discussed above. Geoarchaeological applications within and around archaeological contexts in the tropical karst of Yukatán have focused on the impact Maya had on the local environment, their use of space within settlements, and their use of cenotes as sources of freshwater (Gilli et al. 2009; Hutson et al. 2009). In Egypt, sedimentology and geomorphology have been used to define palaeoenvironmental and landscape dynamics (Ghilardi & Tristant 2012 and references therein). Within ancient urban contexts located in tectonically active karstic regions, geoarchaeology has been used to detect and date past geohazards, e.g., along the Dead Sea fault where earthquakes had devastating effects on the Late Byzantine communities of Syria (Marco 2008). The occurrence, impact, and media coverage of recent geohazards have

inspired ever more geoarchaeologists to study the effects of such events as earthquakes, volcanic eruptions, and tsunamis (many of which happen to affect karstic regions) on past societies using sedimentology, micropaleontology, archaeology, and geochemistry (e.g., Reinhardt et al. 2006; Goodman-Tchernov et al. 2009). On a similar note, geoarchaeology has found significant applications in the understanding of the dynamics of site abandonment of karstic coastal areas due to submersion following sea-level rise in the Holocene (e.g., Florida in Faught & Donoghue 1997). Some of the karstic caves submerged following sea-level rise in the Pleistocene-Holocene transition have given remarkable rock art as well as important palaeoenvironmental information, e.g., the Cosquer cave off the shore of Marseille (France) (Collina-Girard 2004).

International Perspectives

The international presence and visibility of the geoarchaeology of karst landscapes in conferences and research institutes is briefly discussed in view of a possible more consistent future definition.

The Geoarchaeology of Karstic Landscapes at International Conferences

In general, geoarchaeology is gaining weight at international conferences on geosciences and archaeology. European Geosciences Union (EGU) Assembly in April 2011 had a full session dedicated to "Late Quaternary environments and societies: progress in geoarchaeology." At the International Quaternary Association (INQUA) congress in July 2011, "Geoarchaeology: palaeoenvironments and human interaction" was the most extended session. Similarly, international conferences on archaeology have also seen a steep rise in geoarchaeological contributions in recent years. The Society for American Archaeology (SAA) conference in April 2012 dedicated a general session to "Geoarchaeology and Geophysics." In contrast, the European Archaeological Association (EAA) conference in August–September 2012 had no specific session dedicated to geoarchaeology.

Although several geoarchaeological case studies presented at international geosciences and archaeology conferences have been developed in karstic landscapes, a fully dedicated session has not yet been organized. Likewise, at specialist conferences and sessions dedicated to karstic landscapes, geoarchaeology plays only a little part, e.g., at the International Association of Sedimentologists (IAS) meeting in September 2012, where a full session on "Karst, cave sediments and speleothemes" was devoted to karst formation, cave deposits, geochemistry, chronology, and climatic reconstruction. Similarly, although focusing on geoarchaeological applications in karst-dominated Mediterranean landscapes, the International Colloquium on Geoarchaeology in September 2011 did not have a session fully dedicated to geoarchaeological applications in karstic landscapes.

Dedicated Institutes and Research Clusters

Institutes dedicated to karst landscapes exist worldwide (Veni 2011). However, few of them explicitly include geoarchaeological research among their activities. Existing research clusters and institutions dedicated to karst landscapes are located in the hearth of emblematic karstic regions. The Department of Geography, Environment and Planning at the University of South Florida, has a research cluster on "Karst and wetland environments," including a specific research line on the geoarchaeology of karst landscapes in Belize, Israel, Poland, and Spain. The Centro de Estudos em Geografia e Ordenamento do Território (CEGOT), Faculdade de Letras, Universidade de Coimbra (Portugal), includes a "Karst research group" focusing on cave deposits, palaeoclimatic reconstructions, and cave and rockshelter geoarchaeology in Portugal, Italy, and France. Outstanding international initiatives include the "Interdisciplinary studies of karstic landscapes (INTERKRAS)," an EU-funded project within the "Long

life learning program (ERASMUS-IP)." INTERKRAS includes geoarchaeology among its approaches to training students to the integrated long-term study of karstic landscapes, viewed as a combination of natural and cultural heritage.

Future Directions

Major questions in archaeology and human palaeontology involve the study of deposits found within karstic regions. The integration of methods from archaeology and the geosciences in geoarchaeology provides the tools for a multi-scalar approach to such issues as the construction of the domestic environment (e.g., control of fire, construction of floors, and beddings) and the transformation of the surrounding environment (e.g., construction of field and irrigation systems). Micromorphology and geomorphology provide an insight into formation and taphonomical processes. Sedimentology and pedology allows proposing palaeoenvironmental, climatic, and land-use reconstructions.

In spite of recent attempts at drafting a synthesis of new directions in karst geoarchaeology (e.g., Reeder 2011), a comprehensive overview including karstic landscapes as a whole, i.e., subterranean and superficial karst systems, is still missing. Historically, the main focus of karstic geoarchaeology has been on caves and shelters. However, it is within exokarstic depositional environments that geoarchaeology is likely to bring a greater contribution to karstic landscape archaeology in the coming years. It is within superficial and submerged karstic deposits that most univocal evidence of human activity in karstic landscapes is likely to emerge in the near future, from poljes, dolines, incised river valleys, and submerged coastlines. Geoarchaeology provides the necessary framework to maximize information found in these environments.

An increasing number of centers interested in archaeology and socio-ecological systems are applying geoarchaeological approaches in karstic landscapes. Although research tools are ever more refined, the promotion of a coherent teaching framework is still lacking. Innovative future teaching resources will benefit from an exhaustive review and systematization of information scattered online, in print, and in class. The outcome of such review could span from specific textbooks to conference sessions as well as university and online courses on the geoarchaeology of karstic landscapes. An international commission of experts focusing on the geoarchaeology of karstic landscapes, possibly clustering as a web community stemming from the present initiative, would bring great benefit to the definition of a discipline apt to solving major issues in archaeology.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Cultural Ecology in Archaeology
- ▶ Environmental Sampling in Mediterranean Archaeology
- ▶ Europe: Prehistoric Rock Art
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Human Evolution: Use of Fire
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Niah Cave (The West Mouth)
- ▶ Niah Caves: Role in Human Evolution
- ▶ South American Rock Art
- ▶ Stratigraphy in Archaeology: A Brief History
- ▶ Taphonomy in Human Evolution

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Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon

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Introduction

Complex hunter-gatherers depart from the traditional model of hunter-gatherers as small relatively egalitarian groups, engaged in frequent residential moves, employing little formal storage and consuming a very broad diet drawn from non-domesticated food sources (Lee 1968). In contrast, complex hunter-gatherers often live in large groups, are typically characterized by social status distinctions, move residences somewhat infrequently, rely upon storage, and typically specialize in select non-domesticated food sources (Sassaman 2004). Archaeologists have been interested in better understanding variation

in the evolution and organization of these societies. The archaeological record of complex hunter-gatherers is widespread and includes such archaeological entities as the Middle Jomon culture of Japan, the northern European Mesolithic, the Natufian of the Near East, the Thule Eskimo tradition of North America's Western Arctic, the Marpole phase of British Columbia's southern coast, and the Lillooet Phenomenon of Interior of British Columbia. The Lillooet Phenomenon is best represented by two important archaeological sites known as Keatley Creek and Bridge River (Fig. 1). These sites have become particularly important for their fine-grained data reflecting development of socioeconomic and political complexity in this region of North America (Prentiss & Kuijt 2012).

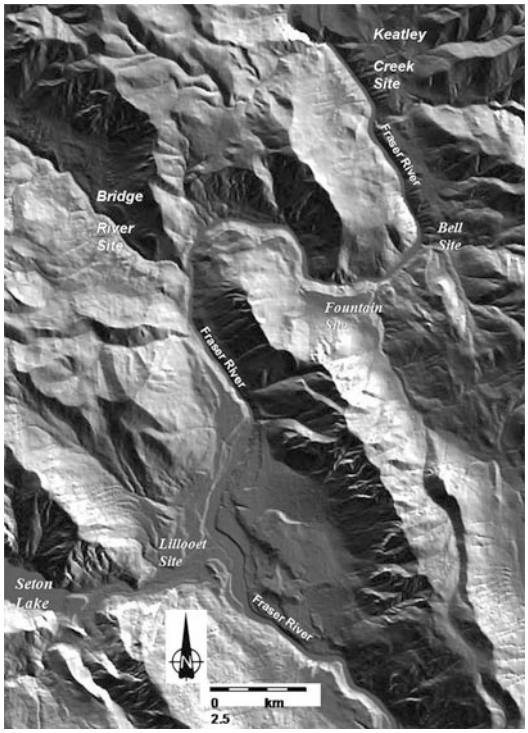

Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon, Fig. 1 Map of Middle Fraser Canyon showing approximate locations of Bridge River and Keatley Creek sites (Map created by Guy Cross)

Definition

The Keatley Creek and Bridge River sites are housepit villages (Figs. 2 and 3) located in the vicinity of Lillooet, British Columbia, and densely occupied during the period of approximately 1,800 to 200 years ago (Prentiss & Kuijt 2012). Housepits are semi-subterranean dwellings with large wooden superstructures and earthen caps. Entrances to the dwellings could be on the side, or in larger structures, down a ladder made from a hollowed tree trunk, through a hole in the roof. Normally, one or more extended families resided in the houses, and the largest structures could hold 50 or more people. Keatley Creek and Bridge River are particularly large villages, containing, respectively, 115 and 80 housepits. At peak size each site may have been occupied by groups in excess of 600–800 persons (Hayden 1997; Prentiss et al. 2008).

Archaeological research at the Keatley Creek and Bridge River sites began during the late 1960s with Arnoud Stryd's Lillooet Archaeological Project. Stryd visited Keatley Creek and conducted limited test excavations at Bridge River. His primary focus, however, was a somewhat smaller village known as the Bell site. Excavations at Keatley Creek began in 1986 under direction of Brian Hayden, whose research at the site continues to the current period (Hayden 1997). Anna Prentiss excavated at Keatley Creek in 1999–2002 (Prentiss et al. 2007). She then conducted mapping, geophysical studies, and excavations at Bridge River from 2003 through 2012 (Prentiss et al. 2008, 2012).

Archaeological investigations at Keatley Creek and Bridge River have had a number of significant outcomes. All archaeological interpretations in the Middle Fraser Canyon have been enhanced by an excellent ethnographic and ethnoarchaeological record (Hayden 1992). Indeed, partnerships between archaeologists and indigenous groups have led to a range of creative studies and interesting conclusions about the recent and more remote past (Prentiss & Kuijt 2012).

The housepits of Keatley Creek and Bridge River have outstanding stratigraphic records and preservation of organic materials including wood and basketry in some contexts. It has been

Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon, Fig. 2 Photograph of Keatley Creek site showing core area with greatest density of housepits

Keatley Creek and Bridge River: Complex Hunter-Gatherer Villages of the Middle Fraser Canyon, Fig. 3 Photograph of Bridge River site showing a portion of the core area with highest density of housepits

possible to chronicle many details of the life histories of particular households. The Bridge River site has proven particularly productive as many housepits feature stratified sequences of buried floors. Housepit 54, for example, included a sequence of 13 distinct clay floors and seven roof deposits. These contexts provide the rare opportunity to examine household histories (Ames 2006) that sometimes span hundreds of years at a level of resolution rarely available to archaeologists working with complex hunter-gatherers (Prentiss et al. 2012).

The combination of fine stratigraphy, excellent preservation of materials, frequent house features, and abundant artifacts has permitted archaeologists to conduct fine-grained analysis of the evolution and organization of the complex societies that resided at these places. Brian Hayden's (1997) research emphasized intra- and inter-household variation in artifacts, food remains, and storage features as indicators of inter-household ranking at Keatley Creek. He sought to demonstrate that largest houses were able to accumulate more nonlocal goods

such as shell jewelry and jade and soapstone tools, along with large quantities of high-quality food such as Chinook salmon. This permitted him to argue that during the time of peak occupation, social life was organized around a system of elite-dominated manipulation of debt capital, manifested in elaborate feasts and potlatches similar to those of the nearby Northwest Coast groups. Prentiss and colleagues (Prentiss et al. 2012; Prentiss & Kuijt 2012) recognized markers of similar behavior at the Bridge River site as manifested in part by evidence for feasts featuring young dogs, salmon, and deer, along with differential accumulation of prestige goods such as copper jewelry and jade tools.

A final significant contribution of archaeological research in the Middle Fraser Canyon has been the recognition of a range of ritual behavior in housepits. Evidence for feasting is known from Keatley Creek and Bridge River. However, recent studies by Hayden and colleagues (Hayden & Adams 2004) have also revealed small houses on the periphery of the Keatley Creek village with evidence for a variety of ritual activities including the possible activities for special social groups and shamans. Research at these places is ongoing, and it remains to be seen whether they are related to the larger occupations in the core village. Regardless, they provide a window into an aspect of behavior among hunter-gatherers rarely available to most archaeologists.

Key Issues/Current Debates/Future Directions/Examples

There are several issues debated in Middle Fraser Canyon archaeology centered on chronology, socioeconomic change, political evolution, and village abandonment. Archaeologists differ over the founding of the large Middle Fraser villages (Prentiss & Kuijt 2012). Brian Hayden has argued for early dates in excess of 2,600 years ago, while Prentiss, drawing from more recent excavations and radiocarbon dating, argues for a start date of less than 1,800 years ago. Archaeologists also differ on interpretations of socioeconomic and political history. In brief, Brian Hayden (1997) contends that once present, the villages changed little in basic economy and political organization. In contrast, Prentiss and colleagues (Prentiss & Kuijt 2012) have presented new data suggesting that the Keatley Creek and Bridge River villages grew as much as 300 % between 1,800 and 1,200 years ago. During that time, subsistence economies remained dominated by salmon, but the role of mammals gradually increased in importance, particularly after 1,200 years ago when salmon fishing apparently became less productive. Prentiss also argues that it was under the latter period that social status differences became obvious in the villages. Thus, drawing from Bridge River and Keatley Creek data and in contrast to Hayden, Prentiss contends that material wealth-based inequality was not obviously present in the early history of the villages. A final source of debate concerns the abandonment of the villages at around 1,000 years ago (Prentiss & Kuijt 2012). Brian Hayden and colleague June Ryder argue for an abrupt abandonment due to a massive landslide. This argument has been critiqued by Ian Kuijt who points out that there is no firmly dated evidence for such landslides. Prentiss & Kuijt (2012) contend that dense human populations and local depression in terrestrial food resources could be a more likely cause.

Future archaeological research in the Middle Fraser Canyon will seek to test alternative hypotheses offered by Hayden and Prentiss. In addition, archaeologists should explore a number of other critical issues. How were the Keatley Creek and Bridge River villages organized sociopolitically during their earliest occupations? How and why did life in these villages change over the following centuries? In particular, what were the conditions that favored the rise of archaeologically obvious socioeconomic and political competition? What was the role of this socially competitive process in the demographic decline and abandonment of the villages? Application of new research approaches will be essential to advancing knowledge of the ancient cultures of the Middle Fraser Canyon. Geophysical remote sensing techniques have been very productive for mapping

subsurface features (Prentiss et al. 2008). Studies of paleo-DNA have been initiated and have shown promise, particularly in the identification of salmon species and recognition of domesticated dog lineages. Finally, researchers will need to develop more advanced studies of organic residues on tools and in floor sediments in order to resolve questions regarding the roles of many plant foods, particularly geophytes (plants with edible roots).

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of

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Basic Biographical Information

Bennie Carleton Keel is an American archaeologist and government official. He grew up in Panama City, in Florida and graduated from Bay County High School in 1952. He completed one year of college before enlisting in the US Army (1954–1957) and serving as a military policeman with the 11th Airborne Division at Fort Campbell, Kentucky. After military service, he completed undergraduate studies in anthropology and sociology at Florida State University where he received B.S. (1960) and M.S. (1965) degrees. He undertook graduate studies in anthropology and quaternary studies at Washington State University in Pullman where he received a Ph.D. (1972).

Early in his career, Bennie Keel worked on several government-sponsored archaeological projects including the Weiss Reservoir in

Alabama, the Town Creek Indian Mound in North Carolina, and the Marmes Rockshelter in Washington. He was the archaeologist at the Research Laboratories of Anthropology at the University of North Carolina in Chapel Hill (1964–1967; 1969–1973), taught at St. Andrews Presbyterian College (1971) and Wright State University (1973–1976), and worked on compliance projects in Ohio.

In 1976, Dr. Keel was hired by the National Park Service (NPS) to lead its Interagency Archeological Services Division in Atlanta, Georgia. In 1980, he was promoted to head the division's headquarters in Washington, DC, and serve as the Department of the Interior's Departmental Consulting Archeologist. In 1983, he was promoted to serve as Assistant Director for Archeology and continued as Departmental Consulting Archeologist. In 1990, he transferred to the NPS Southeast Archeological Center in Tallahassee, Florida, serving as Regional Archeologist (1990–2007) and Director (2007–2008) until his retirement.

Major Accomplishments

Bennie Keel's career in archaeology, spanning five decades, was coterminous with a period of significant change in American archaeology. During this time, many federal laws were passed, and presidential executive orders were issued calling on federal, state, and local governments and Indian tribes to preserve and protect the nation's archaeological resources. It was a time when the federal government was establishing its approach to managing these important resources. Bennie Keel was in a unique position to do groundbreaking work, and he had a profound influence on the direction the government took. He played a key role helping establish the framework for the federal archaeology program that exists today.

Dr. Keel brought a fresh approach to contract management in the southeastern United States in the 1970s. Most importantly, he instituted transparency in archaeological contracting. He insisted that contracts not only were academically justifiable, they also were fiscally responsible and in the public interest. He promoted the concept of treating large-scale federal undertakings as single archaeological districts to optimize and rationalize decision-making and insisted that major projects produce popular publications.

Dr. Keel oversaw development of regulations and guidelines of major impact nationally in the 1980s. The *Protection of Archaeological Resources: Uniform Regulations* (18 CFR 1312, 32 CFR 229, 36 CFR 296, 43 CFR 7) help federal land managers preserve and protect resources under their jurisdiction or control. The *Curation of Federally-Owned and Administered Archeological Collections* regulation (36 CFR 79) helps agencies care for their collections. The *Abandoned Shipwreck Act Guidelines* help government owners comprehensively manage shipwrecks. Dr. Keel also promoted development of the National Archeological Database and the NPS Cultural Sites Inventory, reported to Congress on federal archaeology (Keel et al. 1989), highlighted federal program accomplishments (Keel 1988), and encouraged peer review (Keel et al. 2007), archaeological resource protection (Keel 1991) and cultural conservation (Loomis 1983).

Dr. Keel developed a long-range plan (Keel et al. 1996) to help 64 southeastern NPS units identify their archaeological resources. He directed or coordinated projects at Cane River Creole National Historical Park (Keel 1999), Charles Pinckney National Historic Site, Fort Raleigh National Historic Site, Great Smoky Mountains National Park, and Timucuan Ecological and Historic Preserve. The Ravensford land exchange work (Keel 2007) at Great Smoky Mountains was the largest single Cherokee archaeology research project in North Carolina and set new standards for fieldwork.

Dr. Keel has received numerous awards for his contributions to the profession including the Department of the Interior Superior Service Award (1979), the Society of Professional Archeologists Distinguished Achievement Award (1993), the Southeastern Archaeological Conference Lifetime Achievement Award (2008), and the Society for American Archaeology's Lifetime Achievement Award (2012). A symposium

recognizing his contributions to the development of North Carolina archaeology was held in 2008 (Davis 2010).

Early in his career, Bennie Keel gained renown for his pioneering research into Cherokee origins, and his book *Cherokee Archeology: A Study of the Appalachian Summit* (1976) remains the most comprehensive analysis of late prehistoric archaeology in this area.

Cross-References

- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Management: Project Management
- ▶ United States: Cultural Heritage Management Education
- ▶ United States: Cultural Heritage Management

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Kennewick Man Case: Scientific Studies and Legal Issues

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Introduction

The human skeletal remains that have come to be referred to as the "Kennewick Man" or the "Ancient One" were found in July 1996 below the surface of Lake Wallula, a section of the Columbia River pooled behind McNary Dam in Kennewick, Washington. The discovery was made by a pair of college students wading in the shallow water along the southern lake bank. Most commentators and reporters described the legal controversy that developed and swirled around the Kennewick remains in rather super-heated rhetoric pitting the interests of "science" against those of Native Americans. This characterization ignores the detailed, intensive, and wide-ranging scientific investigation of the Kennewick remains undertaken by scientists and scholars as part of the government team's effort to determine the facts relevant to the questions in the case. Many news reports inaccurately suggested that scientific study of the Kennewick remains did not occur, or that studies were hidden from the American public. In fact, this is quite untrue. A number of studies were conducted (McManamon 2013). These studies have been

easily and publically accessible since shortly after their completion between 1998 and 2000. Several are summarized and most are cited in this essay. The government team responsible for trying to resolve the case successfully also organized and carried out a series of consultation meetings with representatives of the Indian tribes. These meetings, outlined in Table 1, were attempts to find common ground between the need to study the remains and the general opinion of tribal representatives that no studies were needed. The consultations also were justified on the grounds that if the Kennewick remains were found to be "Native American," consultation with possibly culturally affiliated Indian tribes would be required for compliance with the Native American Graves Protection and Repatriation Act (NAGPRA). The combination of scientific studies and consultation with the tribal representatives reflects the balanced approach to resolving the case that characterized the overall approach of the government agencies involved.

Historical Background

From the end of July 1996, when the remains were discovered until early September, whole and fragmentary human skeletal material that eventually proved to be a single, nearly complete, and ancient human skeleton that came to be called the Kennewick Man were gathered in shallow water from the bottom of Lake Wallula in Kennewick, Washington. The collection was made by James Chatters, a local archaeologist working for the county coroner. He recorded some information about the remains and showed the remains to a few other individuals who inspected them briefly. Based on these limited, cursory inspections, many simple facts were unclear. For example, were these the remains of one or more than one individual and what was the age of the remains? Were these the remains of a Euro-American settler or a "Native American," in which case, because they were found on land administered by the US Corps of Engineers (CoE), a federal agency, NAGPRA would apply. Radiocarbon testing of a piece of bone from the skeletal remains resulted in a very early date of about 8400 BP. When the date and other preliminary interpretations were announced at a press conference in August, the controversy about how the Kennewick remains should be treated became more pronounced and more widely known. Over 350 separate pieces of unarticulated human bones were gathered during several weeks by repeatedly wading in the water and picking up bones observed on the river bottom (Nickens 1998; Chatters 2000: Fig. 3). We now know that the remains eroded from the river bank near the area where they were found. These remains were recovered from an extremely disturbed context, bones were collected, piece-by-piece, from beneath the shallow lake water with only general recording of their locations and spatial relationships (Nickens 1998). The archaeological context, typically so informative concerning behavioral, chronological, and cultural interpretations, was lost completely after the remains eroded into the riverbed. The skeletal remains were handed over to the CoE in early September 1996. Apart from brief notes made available in the fall of 1996, no further reporting about the collection activities and spatial distribution of the Kennewick remains at the discovery site was provided until 2000 (Chatters 2000). The CoE did not allow further study of the skeletal remains from that time until the government team studies that began in February 1999.

Despite the scanty information that was available at the time, individuals and organizations took steps to try and resolve the controversy that quickly developed concerning the proper treatment of the remains. Claims for repatriation were made by Indian tribes whose historical traditional territories overlapped the discovery site. Members of the scientific community called for full scientific study of the remains. The local CoE office began procedures to repatriate the remains in early September to the local tribes who claimed them. This attempt was challenged in the federal court in October. In order to have time to address the legal complaint against

the CoE, the court ordered the agency to halt its planned repatriation.

Reviewing the CoE activities during this period, the federal magistrate ruling on the case determined that the agency had not used adequate information to resolve the matter. In June, 1997, he ordered the CoE to reconsider its decision making and report to the court quarterly on its progress in resolving the matter. At this point, the CoE and the Department of the Army (DoA) turned to the Department of the Interior (DoI), which had expertise in both archaeology and the implementation of NAGPRA, for assistance. A series of discussions ensued involving officials from these departments and the Department of Justice (DoJ), which was representing the CoE in the case. In March 1998, the Secretary of the Interior agreed to assist the Secretary of the Army in resolving the issues related to the human remains found in Kennewick, Washington. The Secretary agreed to have experts at the DoI assist in the case by:

1. determining if the human remains found in the Columbia River near Kennewick, Washington, are "Native American" within the meaning of NAGPRA; and,
2. if these remains are found to be "Native American", determine their appropriate disposition under the terms of the statute and its implementing regulations.

Within the DoI, the Departmental Consulting Archeologist (DCA) and National Park Service (NPS) were assigned to develop and carry out a program to resolve the issues at hand. Although one of the questions raised by the court was whether or not NAGPRA applied in this case, the NPS also undertook, from its earliest involvement, consultation with the Indian tribes that had come forward to claim the remains when they were found. Officials from the NPS, as well as representatives of the CoE and the DoJ, which was overseeing the legal case, met with tribal representatives six times between 1998 and 2000 to ascertain the tribal perspectives on the case and to discuss the approach to the scientific studies, the rationale for such studies, and the results of the investigations (Table 1). The consultations all were held in the state of Washington at locations central to the locations of the tribes involved. The face-to-face meetings usually lasted for a day and gave officials of the agencies involved the opportunity to describe their plans to resolve various aspects of the case and listen to the concerns of the tribes. Officials considered many suggestions of the tribal representatives to fashion the studies that the officials believed were necessary to address the case in ways that were as inoffensive as possible for the tribal members yet without compromising the methods and techniques essential for conducting the necessary historical and scientific research. Tribal representatives frequently expressed their frustrations with the process and the agencies' positions, but at least the meetings provided a context for communication.

Kennewick Man Case: Scientific Studies and Legal Issues, Table 1 Consultations with claimant Indian tribes and scientific examinations and studies

Date	Topic	Location
Consultation Meetings with Tribal Representatives		
May 1998	Proposed approach for DoI investigation	Walla Walla
July 1998	Draft multiphase DoI investigation plan	Walla Walla
July 1999	Plans for bone sampling and C14 testing	Walla Walla
October 1999	Plans for cultural affiliation investigation	Walla Walla
February 2000	Plans for bone sampling for DNA testing	Walla Walla
July 2000	Cultural affiliation investigation/ interpretations	Spokane
Scientific Physical Examinations and Studies		
February 1999	Examination, documentation, measurement	Burke Museum, Seattle
September 1999	Bone extraction for C14 tests—2 samples/split	Burke Museum, Seattle
April 2000	Taphonomy investigation; microsampling bone for aDNA analysis	Burke Museum, Seattle

Consultation with tribes played a major role in the DoI's involvement. NAGPRA requires consultation with tribes that have or may have a cultural affiliation with the human remains of objects covered by the law. The statute directs

that consultations should start soon after any discovery of remains on federal land and should address issues related to excavation, documentation, analysis, recording, and ultimate deposition of the remains or objects in question. Compliance with NAGPRA requires consultation with tribal representatives, not consent of the tribe, except in cases where the discovery is on tribal lands.

The Kennewick case presented a situation, not uncommon when remains that may be subject to NAGPRA are found accidentally, in which facts and evidence were needed in order to make determinations of whether NAGPRA applied and if so, what disposition was appropriate. In such cases, both scientific and historical investigations frequently are necessary to establish facts about the remains and answer basic questions. The studies necessary must be developed and conducted in concert with consultations with representatives of the tribes who were potentially culturally affiliated with the remains, although, as noted above, except for discoveries on tribal lands, the consent of tribe(s) is not a requirement.

To resolve some of the factual matters in the Kennewick case and answer the interpretive questions asked by the federal court, the DCA organized and conducted three physical scientific examinations of the Kennewick remains (Table 1), as well as several background research investigations that did not involve direct examination of the Kennewick remains. The historical and scientific background research included anthropology, archaeology, biology, history, linguistics, and traditional oral histories. 21 nationally and internationally recognized scientists and scholars conducted this variety of historical and scientific examinations, analyses, tests, and studies (Table 2; McManamon 2013).

The initial scientific examination and recording of the Kennewick skeleton, conducted at the Burke Museum, University of Washington, in late February 1999, was designed to be nonintrusive, that is, no physical samples of the remains were removed. The skeleton was physically examined, measured, and recorded using current and standard scientific methods and techniques. Sediments adhering to the bones and trapped within bone cavities were examined,

Kennewick Man Case: Scientific Studies and Legal Issues, Table 2 DOI/NPS Kennewick Man scientific investigations[a]

Investigations and dates	Scientists and institutions[b]
1. *NPS Research Design: Approach to Documentation, Analysis, Interpretation, and Disposition of Human Remains Inadvertently Discovered at Columbia Point, Kennewick, WA*	Dr. Francis P. McManamon; Peer reviews by: Dr. Bruce Smith, Smithsonian Institution and Dr. Clark Larsen, University of North Carolina
November–December 1998	
2. *Physical Examination of the Kennewick Remains*	Dr. John Fagan, Archaeological Investigations Northwest, Portland; Dr. Gary Huckleberry, Washington State University; Dr. Joseph Powell, University of New Mexico; Dr. Jerome Rose, University of Arkansas; and, Dr. Julie Stein, University of Washington
February 1999	
3. *C14 Dating of Kennewick Remains*	Dr. Douglas Donahue, University of Arizona, NSF Radiocarbon Lab; Mr. Darden Hood, Beta Analytical Laboratory; and, Dr. R. E. Taylor, University of California, Riverside
September–November 1999	
4. *Cultural Affiliation Report*	Dr. Kenneth Ames, Portland State University; Dr. Daniel Boxberger, Eastern Washington University; Dr. Steven Hackenberger, Central Washington University; and, Dr. Eugene Hunn, University of Washington
November 1999–February 2000	
5. *Physical Examination of Kennewick Remains; Analysis of Organic Content of Bone Samples; Sample Selection for Ancient DNA Analysis*	Dr. Clark Larsen, University of North Carolina; Dr. Joseph Powell, University of New Mexico; Dr. Phillip Walker, University of California, Santa Barbara; Dr. David Glenn Smith, University of California, Davis; and, Dr. R. E. Taylor, University of California, Riverside
April, 2000	
6. *Tests of Bone Samples for Ancient DNA*	Dr. Frederica Kaestle, Yale University; Dr. Andrew Merriwether, University of Michigan; and, Dr. David Glenn Smith, University of California, Davis
June–September 2000	

(*continued*)

Kennewick Man Case: Scientific Studies and Legal Issues, Table 2 (continued)

Investigations and dates	Scientists and institutions[b]
7. *Potential for DNA Testing* December 1999	Dr. Connie Kolmon, University of Florida and Dr. Noreen Tuross, Smithsonian Institution

[a]Copies of reports of all of these investigations can be found in McManamon (2013) and accessed in tDAR (the Digital Archaeological Record; tDAR PROJECT ID 6325)
[b]Individuals are listed with the professional affiliations they had when the investigations were conducted in 1999–2000. Dr. Phillip Walker is deceased

described, and analyzed for similarity with the soil sediments in the vicinity of the discovery of the skeletal remains. The stone projectile point embedded in the skeleton's pelvis was described and analyzed.

The physical anthropological examination by Powell and Rose (see the chapter by Powell and Rose in *Report on the Non-Destructive Examination…* in McManamon 2013) indicates that the Kennewick skeleton represents a male who died between 45 and 50 years of age. He was about 5′ 9″ tall and well muscled indicating a life of rigorous physical activity. His teeth have extremely worn surfaces, but no caries. Evidence of arthritis is minor and his joints were in excellent shape for a man of his age and activity. Early in his life, probably when he was still a teenager, he was involved in an accident or conflict in which a projectile point became embedded in the right iliac blade of his pelvis. His bones indicate that he recovered completely from this wound without any infection or disability and lived for many years afterwards. Like other ancient American skeletons, the Kennewick remains exhibit morphological features not found in modern populations. For all craniometric dimensions examined, the Kennewick remains do not resemble any modern populations. Powell and Rose noted that this is not unexpected given that the Kennewick remains date over 8,000 years earlier than the modern samples used for most of the comparative analyses. The Kennewick cranial measurements were most similar to populations from the South Pacific, Polynesia, and the Ainu of northern Japan, a pattern observed for other crania with such very old dates from North and South America. This similarity does not mean that the Kennewick Man is an ancient Polynesian voyager who made his way up the Columbia River. Rather, the differences in cranial morphology observed probably reflects the complex events and different migrations of human populations into North America from 20,000 BP onwards and the long ancient history of interaction among populations in the region since the original colonization of the continent (e.g., see Brace et al. 2001; Schurr 2004; Dillehay 2009).

The noninvasive examination included the removal, description, and analysis of soil sediments from the skeletal remains. Our original hope in using the sediments was that enough organic material from the original burial context of the remains could be obtained from the sediment adhering to the skeleton for a radiocarbon date to be made on it. However, during analysis it could not be determined with sufficient reliability that the sediments were not from the river or that they were not older sediments into which the Kennewick remains had been buried (see Huckleberry and Stein chapter in *Report on the Non-Destructive Examination…* in McManamon 2013). Both possibilities created contextual problems that made radiocarbon dating of the sediment an unreliable proxy for the age of the skeletal remains.

The 1999 investigation of the Kennewick remains included a careful examination of the lithic object lodged in right pelvic bone. The object, which probably is a projectile point, was examined, documented, and analyzed in place. CT scans were essential to this part of the investigation. The descriptive information could not have been determined in any other nondestructive manner. They revealed that the object is at least 5.6 cm long and 2 cm wide at widest end, tapering to 3 mm wide at narrowest end. The object has two convex faces with a wide, rounded base and a narrow tapering tip. There is no evidence of notches or stem. The exposed portion of the object, around the middle, is 6–5.5 mm thick. Based upon comparative analysis with other specimens in collections at the Burke Museum

and the Oregon State Museum, Fagan infers that the size, shape, and raw material give the object the appearance of a Cascade projectile point. However, these characteristics are not exclusive to Cascade points (see Fagan chapter in *Report on the Non-Destructive Examination…* in McManamon 2013). The possibility that this object is a Cascade point is particularly interesting because archaeological sites containing such points are common throughout the Pacific Northwest. These site components often are associated with deposits of volcanic ash that originated during the eruption of Mt. Mazama approximately 7,600 years ago.

The 1999 physical examination provided the basic description and detailed documentation of the remains that is required by the Archaeological Resources Protection Act (ARPA), NAGPRA, and other resource management and protection laws and regulations. The characteristics of the skeleton, the nature of the sediments embedded in and on the bones, and the attributes of the stone artifact in the pelvic bone all suggested an individual living a life way consistent with an 8,000 year date.

The information derived from the noninvasive studies, however, was not adequate to determine whether or not the remains fit the definition of "Native American" for purposes of NAGRPA, as understood by the DoI officials at the time. Therefore, in order to make a reasonable decision about the age of the skeleton, which was considered at the time an essential aspect of making the "Native American" determination, the DoI officials decided it was necessary to conduct additional tests, specifically radiocarbon dating of small samples of bone from the remains.

Following review and consideration of the results of the February examination, it was decided that two bone samples would be extracted from the Kennewick remains for radiocarbon dating. In September, bone samples were taken and sent to several radiocarbon dating labs to check and confirm the ancient date for the remains. Four C14 dates were obtained from these samples. The samples were processed and dated by Beta Analytical, Inc. (BA), of Miami, Florida, the Radiocarbon Laboratory of the University of California, Riverside (UCR), and the NSF-Arizona AMS Facility of the University of Arizona. Two of the four new dates were in substantial conformance with the initial radiocarbon date of the portion of the metacarpal dated by UCR in 1996. All the carbon samples showed very low carbon content which slowed the processing of the samples and extended the time required to interpret the results.

The BA date (Beta-133993) gave a conventional radiocarbon age of 8410 +/− 40 BP. The equivalent calibrated radiocarbon age (using the two sigma, 95 % probability) in years BP is cal BP 9510 to 9405 and cal BP 9345 to 9320. The bone sample used for this date was approximately half of the right metatarsal, one of the load-bearing bones of the foot. The UCR lab processed and dated two of the Kennewick bone samples. Like the BA sample, both of these were very low in carbon content. Due to the low carbon content and the lack of clear collagen-like characteristics of the extracted carbon, the dates were reported as "the apparent C14 ages" for each sample. One of the samples was dated as 8130 +/− 40 BP (UCR-3806/CAMS-60684), slightly different from the BA date, but not inconsistent with it. These two samples, in fact, are from the same bone, the right first metatarsal. Both of these dates (Beta-133993) and (UCR-3806/CAMS-60684) are consistent with the earlier C14 date (from the 1996 test) obtained from a portion of the 5th left metacarpal. The BA date, in fact, is almost identical to the first C14 date. Much more about the radiocarbon dating is available (see Memorandum: *Determination that the Kennewick Skeletal Remains are "Native American"…* in McManamon 2013).

The C14 chronological information added to other information about the remains that supported the determination that the Kennewick skeletal remains should be considered "Native American" as defined by NAGPRA. All the dates obtained from the Kennewick Man samples predate 6000 BP and are clearly pre-Columbian. Two of the dates match closely the C14 date

obtained in 1996 on another bone fragment believed to be from the skeleton. This chronological information, along with the results of the earlier documentation, examination, and analysis of the remains themselves, led the DoI to conclude that, for the purposes of NAGPRA, the Kennewick remains should be considered as "Native American," thus subject to the provisions and procedures of the law.

With this initial determination made, the government team next had to resolve the question of whether or not the Kennewick remains could be "culturally affiliated" with any of the Indian tribes who were claiming the skeleton as their ancestor. The DCA organized and coordinated the preparation of a series of scholarly reports by experts summarizing archaeological, biological, historical, linguistic, and traditional information that could be used for determining the cultural affiliation of the Kennewick remains (see *Cultural Affilation Report Kennewick Man…* in McManamon 2013). In April 2000, as part of the effort to determine the cultural affiliation of the Kennewick remains, an additional physical examination of the remains was conducted and samples were taken to conduct tests for the detection of ancient DNA in the bones. Physical anthropologists Clark Larson, Joseph Powell, and Phillip Walker conducted macroscopic and microscopic examinations of the Kennewick skeleton to determine the suitability of specific skeletal elements for DNA analysis (see *Report on the Skeletal Taphonomy, Dating, and DNA Testing Results of the Kennewick Human Remains…* in McManamon 2013).

The 2000 taphonomic examination confirmed the conclusion of Powell and Rose, based on their 1999 examination that these are the remains of a single individual who was interred at the site, not one whose remains decomposed on the surface of the ground or who was incorporated into the deposit through some catastrophic hydrologic event. This conclusion is supported by the completeness of the skeleton and the absence of any clear indications of carnivore scavenging of the remains.

Micro-samples were taken from the most suitable skeletal elements. The samples were analyzed by ancient DNA laboratories at the University of California–Davis, the University of Michigan, and Yale University. Each lab attempted to isolate and amplify ancient DNA from the skeleton; however, none of the tests were able to isolate and examine any ancient DNA (see *Report on the Skeletal Taphonomy, Dating, and DNA Testing Results of the Kennewick Human Remains…* in McManamon 2013).

In September 2000, the Secretary of the Interior Bruce Babbitt recommended to the Department of the Army that the Kennewick remains could be culturally affiliated with the claimant tribes. His decision was controversial both within the DoI, where a different interpretation was advocated by some of the officials involved in the case, and outside of the department (a copy of Babbitt's letter and attachments justifying his recommendation is in McManamon 2013).

The DoI determination that the Kennewick remains were culturally affiliated with the claimant tribes was rejected by the US District court in a decision released in 2002. The judge commented that the scientific evidence argued against such a determination and was not adequately taken into account in the Secretary's determination. The District court also ruled that NAGPRA did not pertain to the Kennewick remains because the available evidence did not show a clear link between the remains and the claimant Indian tribes. The DoI and DoA accepted the first determination of the court, i.e., that cultural affiliation between the remains and the tribes was not supported by a full consideration of the evidence. However, DoI and DoA appealed the District court ruling that NAGPRA did not apply to the 9th Circuit Court of Appeals.

The Kennewick Man case, which began in October 1996, reached its legal conclusion in February 2004, when a three-judge panel of the Ninth US Circuit Court of Appeals issued an opinion supporting the earlier decision of the District Court in Oregon (Gould 2004). The Circuit Court decision emphatically agreed with

the District Court opinion that in order for NAGPRA to apply to a set of Native American human remains, the remains must "…bear some relationship to a *presently existing* tribe, people, or culture to be considered Native American" (emphasis in original; Gould 2004: 1596). The Circuit Court, again in support of the District Court, stated that the facts about the Kennewick Man skeleton could not reasonably be construed to provide such a link to any of the modern tribes or Indian groups who claim a relationship with the remains. The Court went on to generalize from the specifics of the Kennewick case, noting that the scientific excavation, investigation, and, study of ancient human remains that are unrelated to modern American Indians are neither a target of the law, nor precluded by NAGRPA (Gould 2004: 1598).

The Circuit Court provided some detail, albeit brief, about the kind of a relationship that might serve as a threshold for other situations. In other words, how much of a relationship and what kinds of relationships should exist for a set of remains to pass into the "Native American" category and thus be subject to NAGPRA. The opinion notes,

> …though NAGPRA's two inquiries have some commonality in that both focus on the relationship between human remains and present-day Indians, the two inquiries differ significantly. The first inquiry [i.e., asking whether human remains are Native American] requires a general finding that [human] remains have a significant relationship to a presently existing 'tribe, people, or culture,' a relationship that goes beyond features common to all humanity. The second inquiry [i.e., asking which American Indians or Indian tribe bears the closest relationship to Native American remains] requires a more specific finding that [human] remains are most closely affiliated to specific lineal descendents or to a specific Indian tribe (Gould 2004: 1599).

Key Issues/Current Debates

Opinions differ on the interpretation of evidence and the law in the complex and unusual case of the Kennewick Man. This case has been surrounded with controversy from the very beginning. Whether one agrees or disagrees with the various decisions and positions as this case worked its way through the federal court system, the thoroughness and objectivity of the government scientific investigations, the expertise of the investigating scientists, and the value of the information obtained should not be ignored.

In addition to the analyses and interpretations about the skeletal remains, the Kennewick case generated discussion and written opinions regarding the study and treatment of human burials and remains from archaeological sites, the appropriate balance between humanistic, cultural, and scientific investigation, and the appropriate interpretations of ARPA and NAGPRA (e.g., Swedland & Anderson 1999, 2003; Owsley & Jantz 2001; Watkins 2003; Bruning 2006; Burke et al. 2008).

Future Directions

The Circuit Court reviewed the evidence collected and used by the government in the case, more specifically, the conclusions that the Secretary of the Interior had drawn from the evidence. The Court found that the Secretary's interpretation had inadequate factual support for the remains being either Native American or culturally affiliated with the claimant tribes (Gould 2004: 1603 ff.). The Court noted that the Secretary overlooked evidence for a lack of connection or cultural continuity between the ancient remains and the modern tribes that his own experts had pointed out. The Secretary relied upon interpretations of tribal oral history accounts to reach his decision that the Kennewick remains were both Native American and culturally affiliated. The Court recognized the legitimacy of the investigation of oral histories as one kind of evidence used to answer the inquiries that NAGPRA poses. However, in this case, the Court concluded

> . . .that these accounts are just not specific enough or reliable enough or relevant enough to show a significant relationship of the Tribal Claimants with Kennewick Man. Because oral accounts have been inevitably changed in context of transmission, because the traditions include myths that cannot be considered as if factual histories, because the value of such accounts is limited by concerns of authenticity, reliability, and accurate, and because the record as a whole does not show where historical fact ends and mythic tale begins, we do not think that the oral traditions. . .were adequate to show the required significant relationship of the Kennewick Man's remains to the Tribal Claimants. (Gould 2004: 1607)

Following the conclusion of the legal case, the Corps of Engineers worked with the plaintiffs, whose request to study the Kennewick remains was approved by the federal court, to develop a study plan that would be as unobtrusive as possible to the remains.

Researchers associated with the plaintiffs in the federal case examined the Kennewick Man remains in July 2005 and February 2006. Reports about these examinations and subsequent analysis of the measurements and observations have not yet been produced and distributed. The most accessible and detailed descriptions, analyses, and interpretations of the Kennewick Man remains and related information can be found in tDAR (the Digital Archaeological Record) tDAR Project 6328, *The Archaeology of Kennewick Man* (McManamon 2013).

Legislation was proposed by the Senate to amend NAGPRA to ease the need to demonstrate clearly that Native American human remains or objects are affiliated with a current, federally recognized tribe in order for the remains to be subject to the law and regulations in 2004 and 2005. The NAGPRA Review Committee annual report for 2006 endorsed this approach. However, in the House of Representatives, a bill designed to focus the intent of NAGPRA on remains for which clear tribal affiliation could be determined was introduced in 2006. Neither of these legislative approaches to clarifying appropriate implementation of NAGPRA on this matter moved any further in Congress.

Cross-References

- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Paleoindians
- ▶ United States: Cultural Heritage Management

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Kent, Susan

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Basic Biographical Information

Thoroughly engaged in anthropology, ethnoarchaeology, and social activism, Susan Kent (1952–2003) was born on 26 June 1952 in Oakland, California, and passed away on 12 April 2003 while attending the annual Society for American Archaeology meeting in Milwaukee, Wisconsin. Educated at the University of Southern Colorado, Pueblo, Colorado (B.S. in Anthropology, 1973), and Washington State University (M.A., 1975; Ph.D., 1980, both in Anthropology), she held visiting faculty appointments at the Universities of New Mexico, Iowa State, and Kentucky before joining the faculty at Old Dominion University, Norfolk, Virginia, in 1986. In 2000, Old Dominion honored Kent as Eminent Professor of Anthropology.

Major Accomplishments

From the outset of her career, Kent challenged herself, as well as her colleagues, to think across disciplinary boundaries and theoretical perspectives and to value the insights such intersections could produce. Indeed, she sought to communicate with and involve notably diverse groups – anthropologists and other social scientists, as well as architects, medical practitioners, people who set government policies, and multiple publics. For presenting her arguments, she set great store by the power of sound statistical analysis, necessarily grounded in carefully gathered evidence sets and critically assessed (1984). At the same time, she appreciated the importance of qualitative differences within and between cultures and the impact of social, political, and economic circumstances on both observer and observed. Kent had a pronounced positive impact in and beyond her field. An edited volume honoring her life and legacy offers a multivocal critical review of her diverse career-long contributions and continuing influence (Ashmore et al. 2006).

The research for which she is best known is ethnoarchaeology, the study of living peoples and their customs with special attention to the archaeologically observable material traces of these societies and cultures. Originally treated by most as a methodological tool to improve the reliability and richness of archaeological inference, ethnoarchaeology has become much broader as a field of intellectual and practical inquiry. In this scientific and interpretive blossoming, Kent was long a recognized leader.

Initially, her work focused on ethnoarchaeological study of spatial organization, especially in activity areas. Drawing from her research on domestic spatial arrangements in three present-day cultures of New Mexico (1984), she became a strong advocate for cross-cultural and interdisciplinary inquiries and for developing theory and methods for activity area studies (1987). These early books remain critical sources for ongoing research in ethnoarchaeology and spatial studies. By 1987, she was already conducting research in the Kalahari, among the Bajarwa ("bushmen," San), laying the interpersonal and scientific foundations for her enduring close involvement with people and cultures of southern Africa.

Kent viewed her studies of life among the Bajarwa in Botswana, Navajo, Hispanic, and Euro-American communities in the western United States, and with other peoples and cultures, as yielding insights for a broad range of significant social, medical, anthropological, and archaeological questions. These include, but are

far from restricted to, the social meaning and implications of domestic spatial organization (1990); the causes and structure of sedentism and residential mobility (1989, 1996); the articulation of sedentism, diet, demography, and health (Stuart-Macadam & Kent 1992); the impetus and constraint to gender differentiation in distinct societies, especially in Africa (1998); and a wide array of topics on social justice (2002). Prominent among her enduring concerns were efforts to recognize and rectify inequalities in health, gender relations (1998), and relations between hunter-gatherer and farming societies, especially as these are now further encompassed in modern nation states (1989, 1996, 2002).

Working directly with hunter-gatherer and middle-range societies, Kent actively fomented debate on such critical issues as the autonomy and subordination of hunter-gatherers today and the diversity of customs within and between groups, now and in the past. Egalitarianism and sedentism are recurring themes in her published statements. The foregoing concerns are evident consistently in her numerous articles and book chapters and more especially in the volumes she edited, calling on colleagues with varying perspectives to engage cross-culturally the issues she posed (1989, 1996, 2002). Although not all her colleagues agreed with her every argument, Kent was undeniably a key contributor to the research discourse and dedicated to bringing out the best models and inference from the collective research endeavor, especially for benefit of the people from whom scholars and policy makers learned.

As Rosen and colleagues note: "She staunchly believed in the equality of all peoples and in the dignity of individuals—most especially those who for decades informed her work and enriched her life.... [she contended that] anthropologists should lead the way in informing policy-makers about the plight of indigenous populations who might not be granted a voice of their own" (2006: 1). As archaeologist, ethnoarchaeologist, anthropologist, and activist, Susan Kent was an original thinker and prodigious researcher, beginning new high points in her productive career when her work came to an abrupt, unforeseen halt. Kent's final research project returned her to archaeological fieldwork about Middle-to-Late Stone Age activity areas and paleoenvironment in South Africa; a book manuscript on avoiding pitfalls of incautious statistical inference was under review; and the new book in progress at her death was a decade-long review of egalitarianism and sedentism in Botswana.

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- ▶ Activism and Archaeology
- ▶ Archaeology and Anthropology
- ▶ Engendered Archaeologies
- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ Spatial Analysis in Field Archaeology

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Kewibu, Vincent

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Basic Biographical Information

Vincent was born on January 28, 1972, in Didiwa village in the Rabaraba District of Milne Bay Province, Papua New Guinea (PNG).

He is the second born son of John and Joyce Kewibu who are subsistence farmers. His paternal grandfather (Lawrence Irimoai) died during WWII while working as a carrier for the Australian forces primarily between Buna and Kokoda. He attended Korkoyabagira Community School before moving to Martyr's Memorial High School in Popondetta (Oro Province).

He finished his Grade 12 exams at Sogeri National High School in 1991 before entering undergraduate studies in Education at the University of Papua New Guinea (UPNG) in Port Moresby. After having completed his first year at UPNG, he switched across to archaeology and completed his B.A. in 1995. While studying at UPNG, he participated in research projects investigating trade and exchange at Woodlark Island with Simon Bickler and agriculture in the highlands of PNG at Kana with John Muke and Jack Golson. In 1997, he was awarded a scholarship to study archaeology at La Trobe University in Melbourne, Australia.

Major Accomplishments

During his candidature he participated in a number of research projects including the survey for European gold rush and contemporary Aboriginal archaeological sites at the Howqua Hills in Eastern Victoria with Susan Lawrence and Richard Cosgrove. He also participated in excavations at the Marki Alonia site in Cyprus run by David Frankel and

Jenny Webb. He graduated from La Trobe University with a B.A. (Honors) in 1999. His Honors project focused on notions of trade and exchange as they apply to the archaeological predicates of the ethnographically recorded Hiri trade and exchange system that existed on the Papuan Coast of PNG.

Upon completion of his undergraduate studies, he returned to UPNG to take up a position as Tutor in Archaeology. During this time, he participated in survey and excavations in the Talasea region of West New Britain Province, PNG, run by Robin Torrence (Aust Mus), Peter White (U of Syd), and Jim Specht (Aust Mus). This project was broadly focused on prehistoric human adaptations to natural disasters.

In 2001, he was promoted to Lecturer in Archaeology at UPNG. At this time, his attention turned to cultural heritage management issues related to the dissemination of archaeological research into village-based rural communities. Between 2001 and 2003, he contributed to three separate workshops held across the New Guinea Islands region in Kavieng, Lorengau, and Buka coordinated by Glenn Summerhayes (Otago).

In 2004, he was awarded another scholarship, this time to attend the Australian National University (ANU) in Canberra. His research focus returned to issues of trade and exchange; however, this time, his case study was the Massim region of SE Papua (PNG). In particular, he focused on establishing an archaeological connection between the Trobriand Islands and mainland New Guinea by undertaking investigations on the D'Entrecasteaux Island Group, specifically, West Fergusson, Dobu, and SE Goodenough Islands.

Upon his return to UPNG in 2006, he has participated in various projects. These include investigations into the paleoenvironment of the Port Moresby region with Simon Haberle (ANU). The Port Moresby Region Hilltop Survey Project based at UPNG, for example, seeks to investigate when and why populations appear to have used these apparently less hospitable locations. He also participated in the ongoing Caution Bay Project (a collaboration between Monash University and UPNG) that seeks to investigate notions of the Motuan expansion along the Papuan Coast and subsequent rise of the Hiri trade and exchange network.

Cross-References

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- ▶ First Australians: Origins
- ▶ Mandui, Herman
- ▶ Mangi, Joseph Tumbe
- ▶ Oceania: Historical Archaeology
- ▶ Torrence, Robin
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- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

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Khok Phanom Di, Archaeology of

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Introduction

Khok Phanom Di is a deeply stratified prehistoric mound located on the eastern margin of the Bangkok Plain in Thailand. Excavations in 1984–1985 in an area of 100 m^2 revealed a stratigraphic sequence 7 m-deep. The cultural buildup incorporated shell middens, occupation and industrial remains, and human inhumation graves. The radiocarbon determinations indicated that the site was occupied between approximately 2000 and 1500 cal. BCE (Fig. 1).

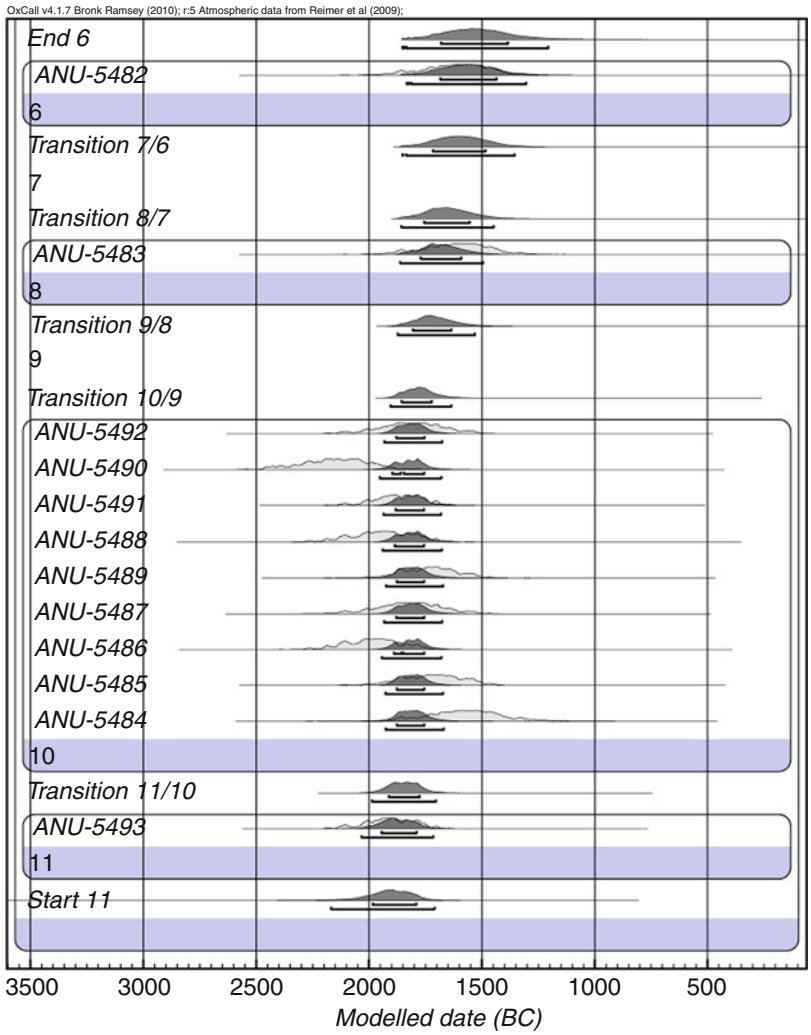

Khok Phanom Di, Archaeology of,
Fig. 1 The calibrated radiocarbon determinations and spans based on charcoal from Khok Phanom Di, following the application of an outlier model which specifies charcoal and gives an exponential tail to the data, saying effectively that it is more likely to be older than younger

Definition

The second millennium BCE was a most significant period for Southeast Asian prehistory. In 2000 BCE, the area was occupied by hunter-gatherers whose ancestors had arrived from an African homeland at least 50,000 years ago. Over the ensuing five centuries, the indigenous hunter-gatherers interacted with intrusive groups of rice and millet farmers expanding south from the Yangtze and Yellow River valleys of China (Rispoli 2008; Zhang & Hung 2010). In the eleventh century, the now established farming communities entered the Bronze Age, and social changes took a dramatic turn (Higham et al. 2011).

Key Issues

Khok Phanom Di is a key site in illuminating what happened during the first half of this second millennium BCE. The unusual survival of organic remains, linked with the flotation to recover plant and microfauna, has led to the reconstruction of a detailed environmental history. The first occupants occupied an estuary when the sea rose significantly above its present level. The analyses of the plant remains, forams, ostracodes, and shellfish are unanimous in reconstructing a mangrove shore that persisted through the first three of seven mortuary phases (Fig. 2) that demarcate the site's cultural

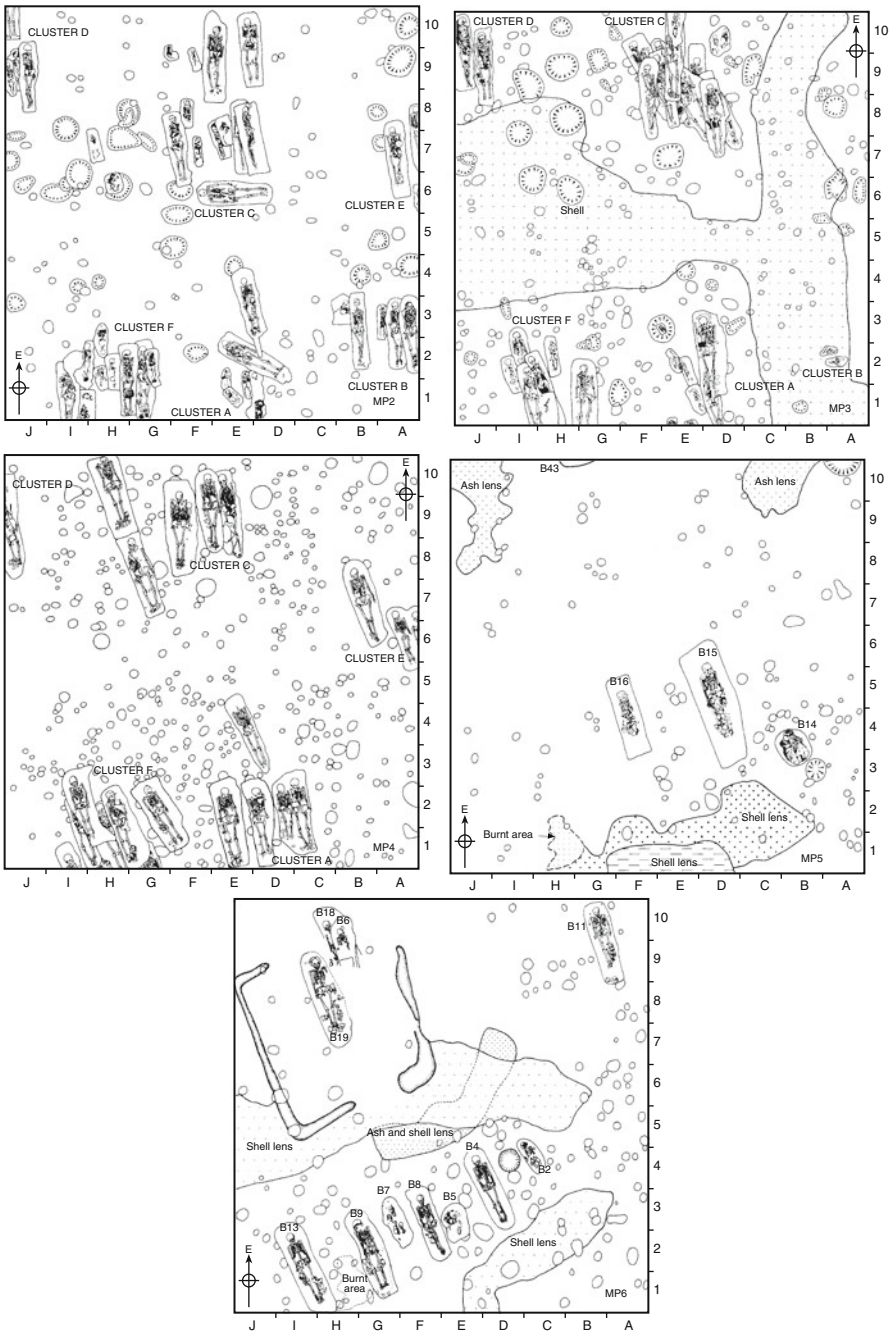

Khok Phanom Di, Archaeology of, Fig. 2 The layout of the mortuary phases 2–6 at Khok Phanom Di

sequence (McKenzie 1991; Mason 1996; Thompson 1996). The tropical estuary is one of the richest habitats known in terms of bioproductivity, and during this period, the occupants of the site harvested the fish, crabs, and shellfish but showed no signs of cultivating plants or maintaining domestic animals. In a word, they were coastal hunter-gatherers. However, a few exotic potsherds were tempered with rice chaff, which might have come from a domestic plant.

With mortuary phase 3B, there was a dramatic change in the environment, involving a sharp rise in freshwater indicators compatible with a decline in the sea level. At this juncture, we find that some women came to the site from a different habitat (Bentley et al. 2007), while rice harvesting knives and granite hoes were used. The remains of partially digested food found in the stomach area of a woman contained domestic rice chaff and freshwater fish scales and bones. This period, which probably dates to the eighteenth century BCE, clearly witnessed the establishment of rice cultivation, which persisted into mortuary phase 4. However, with mortuary phases 5–7, marine conditions returned, and no further harvesting knives or granite hoes were found.

The rapid accumulation of cultural remains at the site, which included the deposition of thick shell middens, has resulted in a remarkable mortuary sequence in which the dead were interred over the ancestors. This has allowed the reconstruction of about 20 generations over a period of five centuries, leading in turn to a detailed exposure of social changes over time. The earliest occupants of Khok Phanom Di buried the dead in shallow graves, within their middens. A child was found interred in a fetal, crouched position, while two men and a woman were placed extended, on their backs with the head directed to the east, one accompanied by a handful of shell beads. Two of the adults and the child exhibited bone conditions that suggested that they suffered from a blood disorder that, while shielding the individual from malaria, caused anemia. This genetic disorder may well reflect many generations of survival in a malarial environment (Tayles 1999).

The second mortuary phase reveals a marked change in the treatment of the dead, for they were now interred in tight clusters, laid out on a checkerboard pattern, still with the head to the east. In some cases, mineralized wood under the skeleton suggested that they were placed on a bier, and to add to the increasingly complex rituals that attended funerals, bodies were sprinkled with red ocher and wrapped in a shroud of asbestos sheets. Mortuary offerings now included brilliantly polished and decorated pottery vessels. One man stood out for his lavish ornaments that included 39,000 shell beads. Cowrie shells were also found as mortuary offerings, as well as a rhinoceros tooth and bangles fashioned from fish vertebrae. The layout of the burial clusters was complemented by a thick shell midden that ran between them and even turned at right angles, as if it had accumulated against a structure of some sort. This, combined with the presence of the holes that would once have held the upright posts of a building, strongly suggests that there had once been mortuary buildings to contain the dead.

The study of the bones themselves reveals a very high proportion of newly born infants. The adults, many of which continued to exhibit symptoms of anemia, had well-developed bones with robust musculature, which Tayles (1999) has suggested might have been the result of such activities as paddling canoes, or kneading and converting clay into pottery vessels.

The third mortuary phase continued in the established tradition of interment in tight groups lying over the ancestors, associated with finely made pottery vessels and shell jewelry. Half of all graves also continued to contain newly born infants. However, during the course of this phase, there were also a series of important changes seen in the adoption of rice cultivation. A few dog bones were also found, but no other domestic animals. The presence of the dog is significant, for it must have been brought into Southeast Asia from an exotic source, probably China.

During mortuary phase 4, the freshwater indicators continued, and there was a marked drop in infant mortality, but four of the five children encountered had suffered from severe anemia. Men were physically less robust than their predecessors, and they were increasingly distinguished from women when interred: men were found with large, fractured ornaments fashioned from turtle carapaces, whereas women were accompanied by the anvils and burnishing stones used to manufacture and decorate pottery vessels. But with the reversion to marine hunting and

Khok Phanom Di, Archaeology of, Fig. 3 Burial 15, of mortuary phase 5. This woman was interred with a remarkable amount of shell jewelry including over 120,000 shell beads

gathering during mortuary phase 5, there was a profound change in the rituals of death. In place of the traditional groups, we find a single grave far larger than was necessary to contain the body of the woman within it (Fig. 3). She had been interred in upper garments embellished with over 120,000 shell beads. There were shell discs on her chest, shell ear ornaments, and a shell bangle. Her body had been covered in red ocher and laid under a pyramid of clay cylinders destined to be converted into pottery vessels. Several completed vessels, each a masterpiece, were laid beside her, and by her right ankle, there was a potter's anvil and a shell containing two well-used burnishing stones. This staggering mortuary wealth was matched by that associated with an infant, not yet two years old at death, in an adjacent grave. Again, there were clay cylinders heaped over the body with thousands of shell beads, a shell bangle, fine pots, but also a miniature clay anvil placed beside the infant's right ankle. It is hard not to identify this woman as a master potter, particularly given the strong musculature of her wrists, and the infant as her daughter, a future potter who suffered a premature death. Her wealth might well have been due to her expertise in manufacturing vessels for exchange that brought to the site, exotic shell from a coralline environment.

Although the absolute amount of wealth fell back with the ensuing phase 6, rituals were still intense, for two women and a child were found buried within a raised mortuary chamber with clay wall foundations and floor. They wore thousands of shell beads and again, were accompanied by their clay anvils. In front of them, however, enclosed within a wooden building, was a row of graves containing men and women, as well as newly born probable twins, with much more modest offerings. A lively discussion could be generated from this information, as to whether this hunter-gatherer society was now divided into rich and poor social groups. However, after a handful of scattered burials representing mortuary phase 7, the sequence spanning perhaps as many as 20 generations came to an end.

Current Debates

The interpretation of this site is controversial. In reviewing alternatives, it is essential to appreciate that between 12,000 and 5,000 years ago, the sea level rose dramatically from a base of about 120 m below its present position to rise about 2 m above it. This drowned ancient Sundaland, inundating an area the size of India. The excavators have concluded that the initial inhabitants were descended from the coastal hunter-gatherers who had long been adapted to a marine environment; and through being largely sedentary in their warm and rich environment, had developed a sophisticated ceramic industry; and used polished stone tools to fashion their houses and sea going craft (Higham & Thosarat 2004).

This portrayal of Southeast Asian hunter-gatherers contrasts sharply with the upland Hoabinhian groups who had for millennia occupied rockshelters, leaving a distinctly poorer material culture. The inhabitants of Khok Phanom Di were in constant exchange contact with inland groups. We find marine shell ornaments moving north and fine stone adzes reaching Khok Phanom Di. It was during the third phase that such trade involved some women coming to the site permanently, presumably as marriage partners, from established Neolithic rice farming sites. Their descendants displayed in their mortuary rituals, a remarkable degree of wealth and status expressed in fine ceramic vessels and shell jewelry.

On the other hand, the presence of the sophisticated ceramics and polished stone adzes has encouraged some authorities to suggest that the inhabitants of Khok Phanom Di were immigrant rice farmers who, on reaching a coastal habitat that was not conducive to cultivation, became hunter-gatherers (Bellwood & Oxenham 2008). This fails to take into account several key issues. The first is that the material culture in the earliest layer at Khok Phanom Di is a mirror image of that from an earlier coastal settlement of Nong Nor, located only 22 km to the south, and dated to the mid third millennium BCE. This is too early to be associated with intrusive rice farmers. Then the basal layers at Khok Phanom Di contain no dog bones, an animal that would surely have been introduced by early farmers. The people of Khok Phanom Di suffered from anemia linked with the gene to inhibit the effects of malaria. This would, it is thought, have taken centuries to be adaptive in ancestral coastal hunter-gatherers. Perhaps the solution to this debate will 1 day be found in the DNA of those who first settled Khok Phanom Di, but so far the bones have stubbornly refused to yield any.

Future Directions

No comparable site to Khok Phanom Di is known. Only a tiny fraction of the mound has been excavated. Future research should be directed to finding more settlements along the raised shoreline of the Gulf of Siam, while opening up by excavation more of Khok Phanom Di to identify its internal structure and layout.

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▶ Complex Hunter-Gatherers
▶ Hunter-Gatherer Subsistence Variation and Intensification

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Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union

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Introduction

Kiik-Koba grotto and its finds, including Neanderthal remains, occupy a special place not only in the Crimean Paleolithic. Their significance for Paleolithic studies in East Europe and the former Soviet Union in general is impossible to exaggerate. Its excavations in the 1920s and subsequent publication had a significant influence on trends in Paleolithic archaeology in this part of the Old World for many years (see Bonch-Osmolowski 1940), due to the scientific rigor of Gleb A. Bonch-Osmolowski of then Leningrad. According to Gladilin, his scientific works "entered into the Golden Fund of Soviet and World-wide archaeological science and till now remain exemplary" (Gladilin 1985).

The grotto is situated on the right bank of the Zuya river 120 m above the river's modern water level, in a rocky massif of Jurassic limestone, within the northern spurs of Dolgorukovskaya Yaila, part of the first ridge of the Crimean Mountains in Eastern Crimea, about 25 km east of Simferopol and 7 km south of Zuya. The grotto's niche (Fig. 1) is quite large: 11 m wide, 9 m deep, and 9 m high and faces southeast.

Key Issues/Current Debates/Future Directions/Examples

Discovery, Excavations, and Stratigraphy

The grotto was discovered by Bonch-Osmolowski in 1924 but known to local Tatars as "Kiikin-Kobasy" (Savage's Cave) or "Kiik-Koba" (Wild Cave). The latter name was chosen by Bonch-Osmolowski.

Excavations were carried out in 1924 and 1925, while 1926 was devoted to two trenches on the slope outside the drip line, where Paleolithic artifacts were rare or absent. During a test excavation (1.5 m^2, see Fig. 1 – sq. 2), two brownish-gray/almost black *hearth layers* (stratigraphic layers IV and VI or upper and lower archaeological layers, respectively) with flint artifacts and animal bones were identified within a sequence less than 1 m thick. The deposits were mainly clayey and loamy with a varying number of limestone *eboulis*. The *lower hearth layer* was near bedrock, separated from it only by thin clayey layer VII. The dark color of *hearth layers* was due to multiple overlapping of hearths/fireplaces from different human occupation events and subsequent ablution and mixture during human activity into dark ashy depositional components. After the test sondage was dug, the site was spatially mapped using a 1 × 1 m^2 numerical grid system (Fig. 1) and several datum points were established for elevation measurements. Two Neanderthal burials were discovered in 1924. The 1925 excavations concentrated documentation of the stratigraphic and structural features of the two archaeological layers over as large an area as possible. In total an area of 60 m^2 was excavated. Limits of each arcaheological layer within the grotto were identified, enabling Bonch-Osmolowski to consider many aspects of human settlement. The excavations concluded with sample collection for later laboratory studies: charcoal and burnt bone fragments and a sediment column sequence (0.2 m wide and almost 1 m thick) from square 41. All lithics and

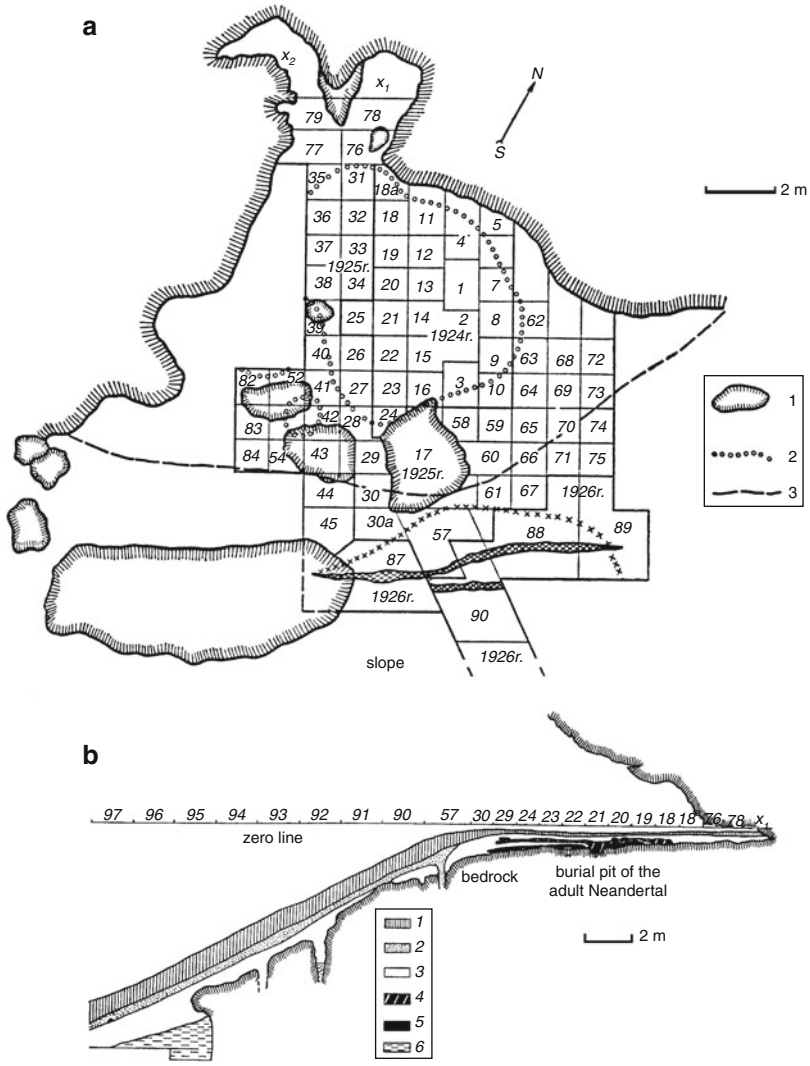

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 1 Kiik-Koba grotto. Plan and stratigraphy. (**a**) Excavation plan (Modified after Bonch-Osmolowski 1940: Fig. 10) *1* – limestone blocks in modern lithological layer I; *2* – limits of lithological layer II; *3* – the grotto's drip line. (**b**) The grotto's longitudinal stratigraphical profile from northwest to southeast through the grotto's central line (Modified after Bonch-Osmolowski 1940: Fig. 11) *1* – Holocene lithological layer I; *2* – gray limestone loamy sand with some "Tardenoisian" finds; *3* – lithological layer III; *4* – lithological layer IV (upper hearth layer); *5* – lithological layer VI (lower hearth layer); *6* – clay lenses

animal bones, including the smallest items collected by dry sieving through 1-cm mesh screens, were transported to Leningrad. Many stratigraphic profiles and sedimentary features were drawn and photographed. Indeed, the Kiik-Koba excavation documentation is quite similar to modern standards, with description cards for nearly all excavated squares and recording of stratigraphic and planographic data. This information allowed Bonch-Osmolowski himself, many of his contemporaries, and later colleagues to propose various interpretations of different aspects of the site.

Archaeology and Chronology

Many archaeological and chronological interpretations of the archaeological layers at Kiik-Koba have been proposed over the more than 80 years since the site's first excavations.

Lower Layer

Bonch-Osmolowski (1940) considered the layer's assemblage, with almost 13,000 flints, (Fig. 2) as "an amorphous stage of Pre-Chelleen," finding that "the most similar … assemblages appear only far away in the West, in the lower layers … of La Ferrassie, La Micoque and Le

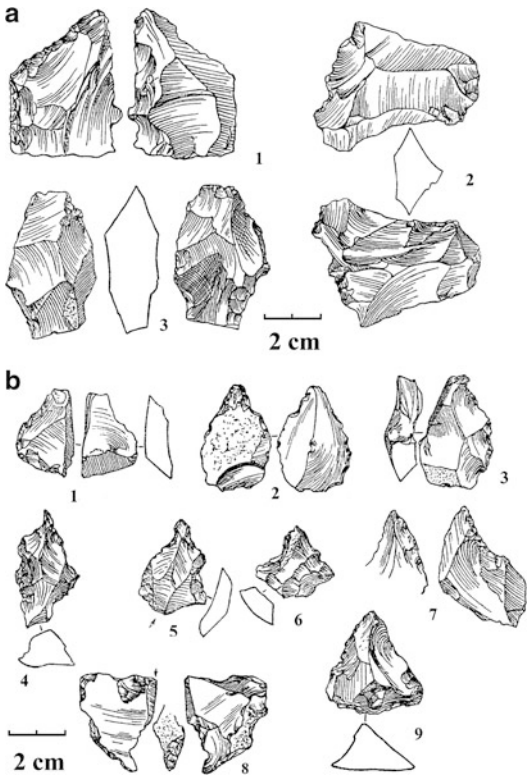

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 2 Kiik-Koba, lower archaeological layer. Flint artifacts. (**a**) Cores – *1* – *2* – primitive parallel cores; *3* – discoidal core (Modified after Bonch-Osmolowski 1940: Table I). (**b**) Tools – *1–2* – retouched pieces; *3*, *7*, *9* – denticulates with Clactonian notches; *4–6* – Tayacian points; *8* – burin + perforator (Modified after Bonch-Osmolowski 1940: Tables I, VI - IX)

Moustier," as well as the lower layer at Tabun Cave in Palestine and "numerous . . . horizons of alluvial find spots with Pre-Chelleen, Old Clactonian, 'Tayacien' and other atypical artifacts" having "the same absence of definite tool types, connected to a primitive variety of both the same massive primitive debitage and rough, denticulated edge retouch." With respect to dating, Bonch-Osmolowski first attributed the lower layer to the "Last Interglacial epoch" (1934) but then proposed a considerably older position in "an Interglacial period preceding the Maximum (Riss) Glacial time" (1940) or even the "beginning of Mindel-Riss" (1940).

At the start of the 1950s in Soviet archaeology, the layer was considered to be Late Acheulian–Early Mousterian.

Since the late 1960s, Gladilin viewed this assemblage as a sort of Tayacian-like Denticulated Micro-Mousterian (Gladilin 1966, 1976, 1985). Also, given the presence of only Upper Pleistocene animal species, the lower layer was attributed to the end of Riss/beginning of Riss-Würm or Riss-Würm/beginning of Würm in the mid-1960s. Gladilin (1976) later noted stadial period sediment and pollen for both lower and upper layers at Kiik-Koba and proposed two chronological phases for the lower layer – "either . . . Riss II or . . . an initial phase of Würm I." Since the early 1970s, the Denticulated Micro-Mousterian industrial attribution became widely accepted among Paleolithic archaeologists.

It was only in the early 2000s that another assemblage similar to the Kiik-Koba lower layer was found in the Crimea: Starosele, level 3 after the 1990s excavations (Demidenko 2003–2004). Starosele, level 3, is geochronologically attributed to the Lower Pleniglacial of the Last Glacial (MIS 4), c. 70,000 BP (Chabai 2004), which also appears comparable to the pollen data for the Kiik-Koba lower layer. Such comparisons between Kiik-Koba and Starosele have opened new doors for research on this Early Last Glacial Middle Paleolithic industry type in Crimea.

Upper Layer

Bonch-Osmolowski (1940) compared this assemblage, with c. 4,700 flints (Fig. 3), to the Micoquian from the eponymous French site and chronologically attributed it to the end of the Lower Paleolithic/beginning of Mousterian (Middle Paleolithic in modern terminology). He connected it to the "Late Micoquian, . . . very end of the Acheulian stage on its transition into Mousterian" (Bonch-Osmolowski 1934) or to the "end of the Acheulian or . . .to the transition from Acheulian to Mousterian" (Bonch-Osmolowski 1940). In his view, there was a group of similar Late Acheulian complexes in the Old World (e.g., La Micoque, upper layer in France, Okiennik and Nad Galonska in Poland, Koesten and Klausennische in Germany, Tabun Cave,

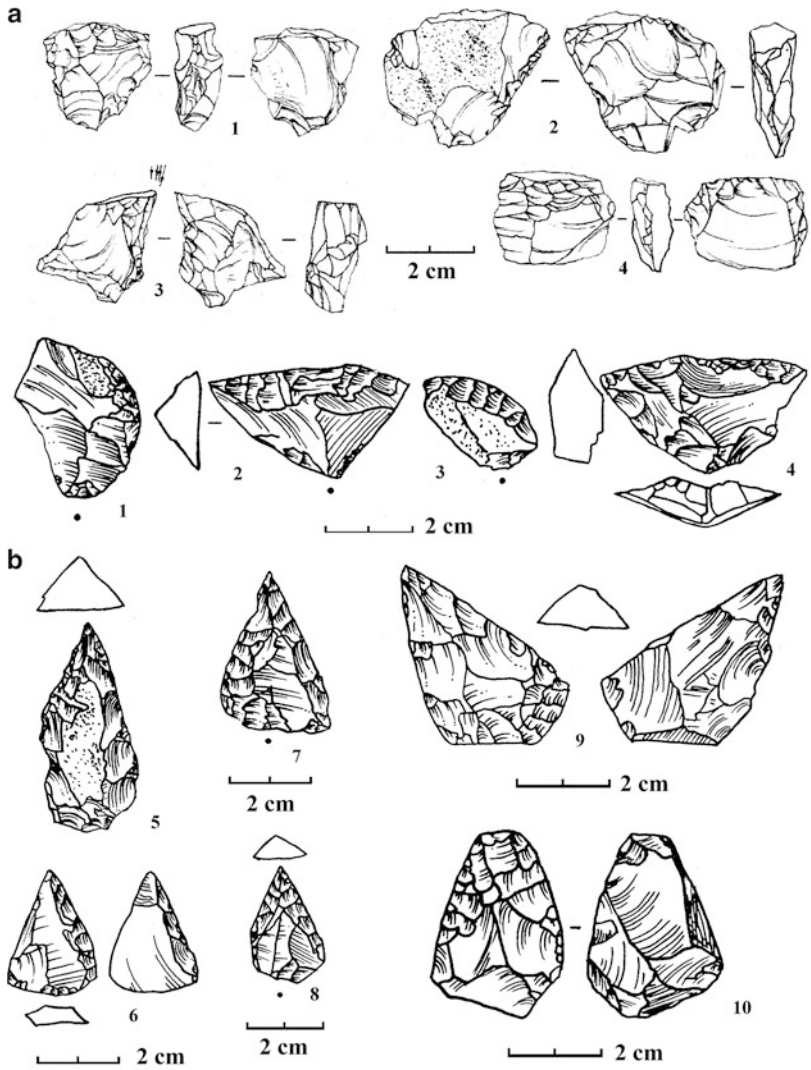

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 3 Kiik-Koba, upper archaeological layer. Flint artifacts. (**a**) cores – *1* – discoidal core of triangular shape; *2* – orthogonal core of triangular shape; *3* – conventionally parallel transverse core of triangular shape/angle burin; *4* – conventionally parallel transverse core of rectangular shape (After Demidenko et al. 2013). (**b**) Tools – *1* – simple convex sidescraper; *2* – transverse convex sidescraper; *3* – transverse convex oblique sidescraper; *4* – convergent sidescraper; *5–8* – unifacial points; *9* – bifacial point; *10* – bifacial sidescraper (Modified after Bonch-Osmolowski 1940: Tables XI – XIV, XVI – XVII)

layer E in Palestine) with "a combination of Mousterian unifacial tools and bifacial hand axes of Late Acheulian type" (Bonch-Osmolowski 1940). Similar complexes were also identified by him in the Crimea (Volchiy grotto, Chokurcha, Adzhi-Koba Cave, lower layer) and in the Northern Caucasus (Ilskaya). Initially, Bonch-Osmolowski attributed the upper layer "to the end of the Last Interglacial or to the beginning of the Last Glacial" (1934) but then considered it to be much older – to "a dividing line" between Mindel-Riss and Riss (1940).

In the 1950s, however, Soviet colleagues attributed the upper layer assemblage to the Mousterian and even to a sort of Mousterian with Acheulian Tradition.

Since the mid-1960s, based on lithological, faunal and pollen data, the geochronology of the Kiik-Koba, upper layer was discussed in terms of the Upper Pleistocene: either the beginning of Würm or end of Riss-Würm/beginning of Würm.

Gladilin first proposed a "Micro-Mousterian with Acheulian Tradition variant" attribution (Gladilin 1966) but concluded by arguing for the "Kiik-Koba culture of Mousterian period in Crimea" within the "Bifacial Micro-Mousterian variant" (Gladilin 1976, 1985). This was done on not only on the basis of clear differences between

the "Bifacial Mousterian in the Russian Plain and Crimea with sites of Mousterian with Acheulian Tradition in France" but also a major culture paradigm shift in Soviet archaeology in the 1970s for understanding all Paleolithic periods (Gladilin 1976). Based on lithological data, Gladilin attributed the upper layer to a stadial period, which is "not older than the first half and not younger than the second half of Würm I," quite congruent with Bonch-Osmolowski's (1940) reconstruction of the prehistoric landscape around the site based on fauna species composition: "a dry grassy steppe with a rather harsh continental climate."

The existence of a "Kiik-Koba Mousterian culture" in Crimea was supported by Yu.G. Kolosov (see in Demidenko 2004; Demidenko et al. 2013) in the 1970s and 1980s, after his excavations at Prolom I in the 1970s and comparison of the Prolom I material with Bonch-Osmolowski's and Gladilin's data for the Kiik-Koba, upper layer assemblage. The Kiik-Koba upper layer was attributed by him to the "end of the Early Mousterian, in geological age close to the end of Early Würm I."

The cultural paradigm for the Kiik-Koba materials was developed by V.N. Stepanchuk in the 1990s and 2000s (see in Demidenko 2004; Demidenko et al. 2013). Using the paradigm's concept in which each tool was made intentionally, each Neanderthal tribe had its own industrial tradition, territory, hunting habits, etc.; he constructed the Kiik-Koba culture with a "distinct and syncretic tradition" of either a "para-Micoquian or Charentoid para-Micoquian" or an "atypical Charentian with features of a Micoquian influence" reflecting a "para-Micoquian Kiik-Koba industrial tradition" in the 1990s. Chronologically, the Kiik-Koba culture complexes were placed by him in the 1990s based on the following Last Glacial interstadial period intermittent sequence: Brörup (Kiik-Koba grotto, upper layer) – Moershoofd (Prolom I grotto, lower layer) – Hengelo (Prolom I grotto, lower layer) – Denekamp (Buran-Kaya III grotto, level 7: 2), lasting from c. 100,000 BP to c. 30,000 BP, about 70,000 years for the Middle Paleolithic. In the 2000s, he radically changed the culture's chronology. After obtaining several new C14 dates for Kiik-Koba and Prolom I, the Kiik-Koba culture chronology became much shorter: the Stadial preceding the Denekamp interstadial and the Arcy interstadial (c. 35–28,000 BP), cultural characteristics remaining unchanged.

Since the mid-1990s a new approach for understanding Crimean Micoquian Tradition sites and find complexes, including Kiik-Koba, upper layer (Chabai et al. 2000; Chabai 2004; Demidenko 2004), was proposed. The Crimean Micoquian Tradition includes three traditionally defined industry types (Ak-Kaya, Kiik-Koba, Starosele). The industry types have the same primary flaking processes (a combination of radial, discoidal, multiplatform and parallel reductions without the Levallois method) and tool types, but tool type proportions differ by industry. Typological differences are connected to different human activities taking place at different sites, related to fauna processing and lithic reduction, as well as distances to high quality flint outcrops. As a result of the highest rates for human activities and the most distant location from flint outcrops, the Kiik-Koba lithic assemblages feature the highest indications of reduction with a medium amount of bifacial tools (c. 15 %), an abundance of points among the unifacial (c. 40 %) and bifacial (c. 50 %) tools, a rather low frequency of simple sidescraper types (c. 20–30 %) among unifacial tools, as well as mostly small (less than 5 cm long) bifacial and unifacial tools, which is why the industry was often attributed to the Micro-Mousterian.

Complex reanalyses of the 1920s Kiik-Koba, upper layer lithic assemblage and fauna were recently realized (Demidenko et al. 2013), clarifying the features of this industry type. A chronological position has been proposed in the stadial preceding the Arcy/Denekamp interstadial (Chabai et al. 2000; Chabai 2004; Demidenko 2004; Demidenko et al. 2013).

Kiik-Koba Grotto: Neanderthal Burials

The first burial of a child (Bonch-Osmolowski 1940) was found "in sq. 13, in 30 cm distance to the North from northern corner of another grave pit, which is from head of the adult human." The 5–8-month-old child "was lying in a so-called

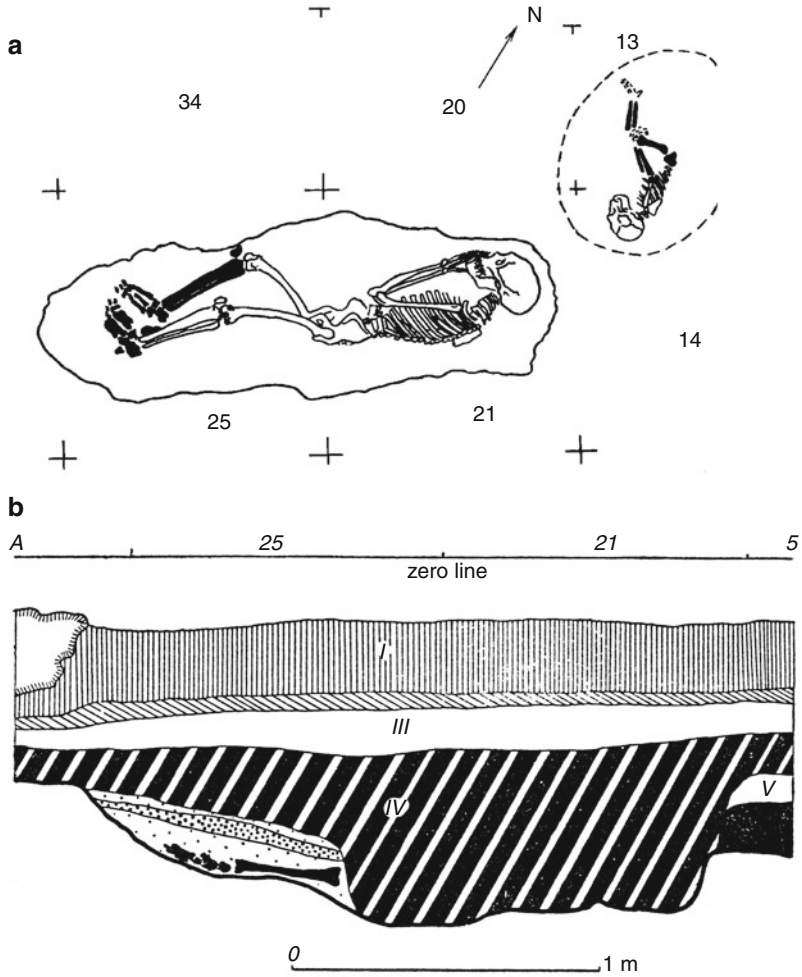

Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union, Fig. 4 Kiik-Koba. Neanderthal burials. (**a**) Human burial plans where *shaded* skeleton parts do indicate the ones found during the 1920s excavations (Modified after Smirnov 1991: Fig. 57; Chabai 2004: Fig. V-4). (**b**) First host/economic pit in sq. 21 and 25 of upper archaeological layer that considerably destroyed the lower layer's adult human burial (Modified after Bonch-Osmolowski 1940: Fig. 33b)

uterine position, at left side, almost at very bedrock. . . . The skeleton was positioned in a lower portion of VI layer being 15 cm thick at this place. Above, being unclearly separated from it, a so-called inter-hearth layer (Yu. D. –lithological layer V) is not present here, was distributed upper hearth layer, also c. 15 cm thick" (Fig. 4a). The child's "bone preservation is very bad." It was possible "to extract only part of skeleton bones, although most of them were in a defective condition" and "any skull and even teeth were absolutely missing." The grave pit was not traced during excavations. At the same time, the Pleistocene age was definitely established for the skeleton, taking into consideration "non disturbance of all lithological layers above the upper hearth layer and fossilization degree for the child bones." But because "in this place the inter-hearth layer was absent and the upper cultural layer was directly resting on the lower cultural layer, to define stratigraphically the belonging of the child skeleton to one or another layer was not possible." Thus, the layer to which the child burial belonged remained an open question for Bonch-Osmolowski. In the 1980s, Yu.A. Smirnov, using Bonch-Osmolowski's unpublished field notes, reconstructed the stratigraphy of sq. 13 and 14 in detail, showing that the child burial "was done during the existence of IV upper hearth layer and already after deposition of about half of its thickness" and that it was dug into the underlying lower archaeological layer – "in a clay, . . . in one of sublevels of lithological layer VII" (Smirnov 1991). No indisputable grave goods were identified with

the burial, although some unassociated lower layer flints were found when the grave was dug. The Neanderthal morphology for the child skeleton has established (Yakimov & Kharitonov 1979; Trinkaus 2008). As a result, Neanderthals appear to be the makers of the Kiik-Koba industry type of Crimean Micoquian Tradition.

More well-known Kiik-Koba hominin remains were found in another burial, also Neanderthal, but an adult 40–45 years old (Yakimov & Kharitonov 1979). Unlike the child burial, the adult burial had clearer stratigraphic and spatial features (Bonch-Osmolowski 1940). Although the grave pit was damaged for c. two thirds of its area by a host/economic pit, it had clear ovoid configuration with northeastern–southwestern orientation and size: 2.10 m long, 0.80 m wide, and 0.45 m deep (Fig. 4a–b). The pit was not only stratigraphically related to lower archaeological layer but it was also "cut into the grotto's bedrock," where it was "partially deposited both in a solid limestone and clay pockets." Taking the bone leg position, the human body was placed into the grave "on the right side with slightly bended legs" and by its head to northwest (Fig. 4a). The main problem was the burial's stratigraphy relation to either upper or lower archaeological layer's human occupation. The difficulty was caused by the pit, destroyed much of the grave. Initially, Bonch-Osmolowski (1940) was sure that the burial was made by lower layer humans – "the seemingly clear covering by lower hearth layer of human bones in not disturbed grave pit's part, that has been authentically stated by photo pictures, alongside with common find characteristics, did not leave no doubts that the burial was realized by lower hearth layer people" (see Fig. 4b). But then in the same 1940 book, Bonch-Osmolowski changed his opinion connecting the adult burial to upper layer humans. "Indeed, it very hardly agrees with a common conception on a historical development of Old Paleolithic Man in combination with such the primitive material culture and such the perfect burial type. The burial seems to be more appropriate for upper hearth layer humans." Moreover, in doing so, Bonch-Osmolowski (1941) also suggested that Kiik-Koba child burial also belongs to upper layer because of "general considerations on a simultaneous burial probability for mother and child" close one to another at Kiik-Koba grotto. All these Bonch-Osmolowski's contradictory notes and hypotheses were in details analyzed by V.N. Gladilin. He certainly concluded that the initial Bonch-Osmolowski's opinion was correct and the adult burial belongs to human occupation of lower layer (Gladilin 1979).

So, now it is almost universally accepted among the ex-USSR archaeologists that the adult burial is related to lower layer and the child burial is associated with upper archaeological layer at Kiik-Koba grotto. And again, all the 1970s and 1980s new analyses on the Kiik-Koba human burials were only possible thanks to the detailed published and unpublished Bonch-Osmolowski's field observations.

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Basic Biographical Information

Nam C. Kim received a Ph.D. in Anthropology from the University of Illinois at Chicago, a M.A. in Political Science from New York University, and a B.A. in International Relations from the University of Pennsylvania. Prior to a career in anthropology, he worked in the private and nonprofit sectors. He is an anthropological archaeologist in the Department of Anthropology at the University of Wisconsin-Madison.

Major Accomplishments

Much of Dr. Kim's work has been dedicated to ancient state formation, social complexity, and various factors for social change including warfare, trade, and various leadership strategies. He has performed fieldwork in Belgium (Neolithic village fortifications of the Linearbandkeramik culture), the southeastern USA (historic Native American Creek site), and Mesoamerica (postclassic and historic Mayan sites).

Most recently, his research has been geographically focused on East and Southeast Asia, specifically Vietnam, and he has been conducting investigations at the site of Co Loa in the Red River Delta of northern Vietnam. Kim was the first foreigner allowed to collaborate on excavations at the site, codirecting investigations with colleagues at the Vietnam Institute of Archaeology of the Vietnam Academy of Social Sciences. Nam Kim is an honorary member of the Vietnam Institute of Archaeology.

The Co Loa Middle Wall and Ditch Project (2007–2008) was the first full-scale, systematic investigation of the site's monumental system of earthen enclosures. The collaborative research at Co Loa is ongoing and aims to augment an overall understanding of the site's emergence as an early urban center and political capital for proto-Vietnamese civilization during the Iron Age. The research has been funded by various institutions and organizations, including The Henry Luce Foundation, the American Council of Learned Societies, the American Philosophical Society, the National Science Foundation, the George Franklin Dales Foundation, the University of Illinois at Chicago, and the University of Wisconsin-Madison.

The investigations at Co Loa have provided new data that Kim has presented at a variety of conferences and invited lectures in the USA and Asia, including the Society for American Archaeology, the Association for Asian Studies, the Indo-Pacific Prehistory Association, and the Archaeological Institute of America. Research findings have also been disseminated through journals such as *Antiquity*, *Journal of Archaeological Research*, and *Khao Co Hoc*. The research will also be featured in a book currently being written by Kim on the origins of the ancient state in Vietnam. Kim is also working with colleagues in Vietnam's Conservation Center for the Co Loa and Hanoi Citadels (also known as the Hanoi Ancient Wall-Co Loa Vestiges Preservation Center) in efforts related to cultural heritage management. Objectives include obtaining UNESCO World Heritage Site status for Co Loa, as well as the

promotion of education, outreach, and global understanding regarding the site's history and cultural significance for Vietnam.

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Basic Biographical Information

John Kinahan was born in Mutare, Zimbabwe, but is a resident and citizen of Namibia, where he and his wife, Jill Kinahan, have worked as archaeologists for more than 30 years. He studied archaeology at the University of Cape Town and completed his Ph.D. at the University of the Witwatersrand in 1989. Kinahan was employed as Curator of Archaeology at the National Museum of Namibia until 1996. He is currently Director of the Namib Desert Archaeological Survey, a long-term, field-based research project primarily funded through contract surveys for mining projects. He has published more than 70 articles, including peer-reviewed papers, chapters in books, edited volumes, and one book. His research interests are broad, ranging from post-Pleistocene hunter-gatherer archaeology to rock art interpretation, nomadic pastoral settlement and land use, as well as the history of archaeology and the links between archaeology and related fields such as human and animal ecology.

Apart from his work in Namibia, John Kinahan has also carried out field surveys and excavations in Botswana, Mali, Angola, and Tanzania and completed a major survey and excavation project under contract to the Government of Ethiopia, in the Gilgel Gibe valley in the south of that country. In addition, he has served as a visiting lecturer at universities in Australia, Germany, the United Kingdom, Sweden, and South Africa. He is an Honorary Research Fellow of the Rock Art Research Institute in the School of Geography, Archaeology and Environmental Studies at the University of the Witwatersrand. He has presented his research at many regional and international conferences and has collaborated in a number of regional projects, serving as country coordinator in the Swedish Sida-SAREC-funded program of archaeological cooperation linking nine African countries with common research interests in the archaeology of human responses to environmental change.

Major Accomplishments

John Kinahan's early work in the Namib Desert formed the basis of a revised mid-Holocene to recent archaeological sequence which challenged the regional orthodoxy of successive ethnic migrations, by showing that local transformation in hunter-gatherer economies provided a better account of the evidence. He later extended this research into the archaeology of recent desert communities and established concrete links between the rock art and archaeological evidence

for economic and social change and the archaeological basis for ancestral land ownership claims.

In his more recent involvement with contract archaeology, Kinahan has developed practical methods for the assessment of archaeological significance and vulnerability as an empirical basis for sensitivity mapping. He has developed GIS-based methods of rapid field survey using the varying desert landscape associations of archaeological sites. Kinahan pioneered rural community-based site management in Namibia, laying the basis for financially self-sustaining rock art tourism. Kinahan served as consulting archaeologist and principal author of the nomination dossier for Namibia's first listed World Heritage site, Ui-//aes or Twyfelfontein.

Cross-References

- ▶ Cultural Heritage Site Damage Assessment
- ▶ Rock Art Sites: Management and Conservation
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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King, Thomas F.

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Basic Biographical Information

Thomas F. King was born October 20, 1942, in Atlanta, GA, to Theophilus T. (Ted) King and Helen Fulling King. He grew up in Petaluma, California, where he graduated from Petaluma High School. He became interested in archaeology at a young age. After serving in the United States Navy (1962–1964), he enrolled in San Francisco State University, where he received his undergraduate degree in Anthropology (1968). Majoring in Anthropology at the University of California, Riverside, he earned his doctorate in 1976. In addition to pursuing his Ph.D., between 1968 and 1975, Tom oversaw the UCLA Archaeological Survey and the UC–Riverside Archaeological Research Unit, and helped found the Society for California Archaeology. He conducted archaeological research in California's Sierra Nevada, the North Coast Range, the Mojave and Colorado Deserts, and along the Pacific coast, and took part in political activities, court cases, and administrative actions interpreting newly enacted and developing state and federal environmental and historic preservation laws. After Governor Ronald Reagan vetoed legislation to create a California Archaeological Survey, King moved to New York where he oversaw contract archaeological program for the New York Archaeological Council (King *pers. comm.* 2 May 2011).

He was recruited by the National Park Service's (NPS) Division of Interagency Archeological Service to develop regulations for the Archaeological and Historic Preservation Act (Public Law 93-291) in 1975. In 1977, he was detailed by the NPS to the Trust Territory of the Pacific Islands to establish historic preservation programs (King 2006). As Consultant in Archaeology and Historic Preservation to the High Commissioner, he was instrumental in building the historic preservation programs of the emerging island nations of Micronesia. Partly as a result of his experience in Micronesia, his horizon broadened from archaeological resources to include concerns with the protection of structures, rural landscapes, neighborhoods, the spiritual places of Indian tribes and Pacific Island groups, and places that are important for their association with the beliefs and ways of life of living communities, for which he and NPS anthropologist Patricia Parker coined the name "traditional cultural properties" (Parker & King 1990).

Returning to the states in 1979, he joined the Advisory Council on Historic Preservation's (ACHP) staff as Director of the Office of Cultural Resource Preservation, for the next 9 years. Although the National Historic Preservation Act (NHPA) had been in effect for more than a dozen years, Federal agencies were still grappling with provisions of the Act, especially the Section 106 review process overseen by the ACHP. King oversaw staff efforts to coordinate and provide guidance to federal agencies in implementing their Section 106 responsibilities.

After resigning from the ACHP in 1989, he became and continues to be engaged as a consultant to Federal, state and local agencies, Indian tribes, Pacific Island groups, and private clients providing guidance and training related to historic preservation. He has also authored, coauthored, and edited eight textbooks dealing with historic preservations issues, together with one trade book (*Amelia Earhart's Shoes*, King et al. 2004), and one work of fiction (*Thirteen Bones*, King 2009) based on his work as Senior Archaeologist with The International Group for Historic Aircraft Recovery (TIGHAR) is its research into the fate of aviation pioneers Amelia Earhart and Fred Noonan.

Major Accomplishments

Dr. King's major contributions consist of his books and articles (some critical of the bureaucracies and practitioners) that provide direction and guidance in the art of cultural resource management. See further readings for a selection of his work.

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Kirkman, James

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Basic Biographical Information

James Spedding Kirkman (OBE, FSA) was born in 1906. After graduating from Cambridge in 1928, he worked in various outposts of the British Empire including Borneo (as an administrative officer) and Ceylon (as a tea planter). His plans to work in Iraq were interrupted by the Second World War, during which he served as a rear gunner with the RAF. He was posted to the Middle East during the war, becoming fluent in Arabic and afterward worked briefly at the Iraqi embassy in London, later joining the External Services of the BBC (Croome 1989; *The Times* 1989).

Between his stints in Ceylon and Iraq, Kirkman had worked as a volunteer at the Castle Dove and later the Maiden Castle excavations (under Mortimer Wheeler) in the early 1930s. He also spent three years excavating in Palestine. This along with his World War II posting kindled an interest in Islamic culture (Croome 1989). He returned to archaeology in 1948 when, following an inquiry to Louis Leakey, he was appointed as the Warden of the Gedi National Park in Kenya. This marked the beginnings of an archaeological career in East Africa that spanned 24 years. His work was initially carried out under the auspices of the national parks but later was transferred to Kenya Museums (Anonymous 1990). He retired to Cambridge in 1972 where he continued to publish on the Indian Ocean World, edited the *International Journal of Nautical Archaeology*, and served as board member of the British Institute in Eastern Africa. He passed away in 1989 at the age of 82 (*The Times* 1989; Anonymous 1990).

Major Accomplishments

In a research context in which most scholarly attention was lavished on the Early Stone Age and human origins, Kirkman can be regarded as a pioneer of East African archaeology of the later periods, focusing on the Swahili towns of the Kenyan coast and later the Portuguese-built Fort Jesus. Kirkman spent 10 years excavating at Gedi, mapping the site and establishing a chronology based on finds such as imported ceramics (Kirkman 1954). In addition, he worked at a number of other Swahili sites including Kilepwa, Takwa, Mnarani, and Ungwana (Kirkman 1966).

His monographs contain detailed descriptions of the excavation layers and the finds, allowing later researchers to use his notes, even when they disagree with his findings.

In 1958, Kirkman was appointed to oversee the archaeological investigation and historical conservation of Fort Jesus (a Portuguese fort) when it was declared a national monument. Thus, he oversaw its transformation from a colonial-era jail to a museum and monument. This can be regarded as a seminal historical archaeological project on the East African coast. Kirkman worked at the site for 11 years, publishing *Fort Jesus: A Portuguese Fortress on the East African Coast* in 1974. Today the fort is a popular attraction and a World Heritage Site.

In addition to producing a number of detailed archaeological monographs, Kirkman also wrote a book – *Men and Monuments on the East African Coast* (1964) – accessible to members of the general public.

While some of his findings and interpretations may be criticized today and it has been shown that many of the levels and indeed the history of Islam on the East African coast date to an earlier time period than he had envisioned, undoubtedly James Kirkman laid the foundation upon which successive researchers such as Neville Chittick, Peter Garlake, and Mark Horton (Anonymous 1990) and a new, younger generation of local scholars, including Chapurukha Kusimba, have built. His contribution to East African archaeology was recognized by the Festschrift *From Zinj to Zanzibar: Studies in History, Trade and Society on the Coast of East Africa* (Allen & Wilson 1982).

Cross-References

- ▶ East Africa: Museums
- ▶ Leakey Family
- ▶ Modern World: Historical Archaeology
- ▶ Swahili Archaeology
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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Klejn, Leo

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Basic Biographical Information

Lev Samuilovich Klejn, known as Leo Klejn, is an internationally acclaimed Russian archaeologist. He was born in 1927 in Vitebsk, Belarus. Klejn studied philology at the Grodno Pedagogical Institute (1946–1947). He later moved to Leningrad State University where he studied archaeology under the supervision of Mikhail Artamonov and Russian philology and folklore under Vladimir Popp. Klejn remained inspired by semiotics, cognition and epistemological concerns, and Russian structuralism, which significantly contributed to the

development of his intellectual profile. He graduated in archaeology in 1951. After working as a librarian and high school teacher and after postgraduate studies (1957–1960), he obtained a position of Assistant Professor of Archaeology in Leningrad State University in 1962. He defended his Ph.D. dissertation *The Origin of the Donets Catacomb Culture* in 1968. In 1976 he was promoted to the position of Associate Professor. In 1981, he was arrested by the KGB, expelled from the university, deprived of his academic grade and title, and sentenced to prison for alleged homosexuality. The sentence was overruled, but he remained without a position for ten years. He spent this time taking classes at Leningrad State University. In 1994 he submitted a new dissertation and was awarded a second doctorate. In the same year, Klejn helped found the European University at St. Petersburg University, teaching there as a Full Professor until his retirement in 1997. He has been visiting professor at numerous universities, including Durham, Berlin, Vienna, Copenhagen, Tromso, and Washington.

Major Accomplishments

Leo Klejn's international prominence is largely due to his contributions to archaeological theory. His major interests comprised theory, epistemology, methodology, and typology. He conceptualizes the nature of archaeology as a mature discipline with a solid empirical basis independent from the disciplines of history and anthropology (Trigger 2006). His program of theoretical archaeology was long in the making. Their elements were presented in details in numerous publications. This innovative and original proposal has emerged in reference to critical assessment of the existing schools of archaeological thought in the second half of the twentieth century, including Marxism, historical materialism, processualism, and post-processualism (Klejn 1977).

Archaeology is arguably a source-studying discipline applying solid and explicit methodological and interpretive procedures. It has the form of an applied science akin to criminology. Theoretical archaeology, as defined by Klejn (2001), aims to define the algorithm of archaeological research and provide foundations for all facets of the discipline. It comprises three major groups of theories. The first group is called intra-archaeological and includes theories of interrelated issues dealing with archaeological material such as its processing, interpretation, and extracting historical information from it. This also includes theories of classification and typology. The second group of theories is called meta-archaeological. These include philosophical, cognitive, scientific, and logical aspects of archaeology and its practice. They determine the subject matter of archaeology, its methodological nature, and the character of facts and theory. The third group is called para-archaeological and comprises theories originating from other disciplines like anthropology, sociology, linguistics, or geography. They make possible to conceptualize the laws of functioning the past communities and include such categories as culture, ethnos, society, migration, and historical process.

According to Klejn, the aim of archaeology is to restore historical process by applying a set of coherent, explicit, and well-defined methods and procedures. This makes it possible to decode information in material objects and overcome the break between the past and contemporary culture. The major element in this project comprises the archaeological sources. A wide range of sources, including artifacts, features, or structures, need to be conceptualized in the form of archaeological typologies. Hence, Klejn stressed a need of building typologies and captured a fundamental difference between classification and typology. A range of diverse sources is needed to write a comprehensive account about the past to facilitate a complete history. Klejn also developed the system of archaeological categories and notions used in archaeological process and the system of archaeological reasoning and explanation. The ultimate aim of Klejn's project is to generalize historical process and formulate historical laws by using different sources. However, the archaeologists' task to restore historical process is

inevitably compromised by the incompleteness of archaeological sources.

In seeking the foundations for a bold and independent discipline of archaeology, it is necessary to grasp circumstances defining the conditions of its practice. In particular, its constitutive elements comprise the origin and significance of theory and the character of methodological frameworks including laws, models, analytical procedures, axioms, parallels, and analogies. Klejn reminds us that theory is not chosen freely but is developed within the general framework and takes into consideration the nature of archaeological sources. Similarly, the building of workable typology involves conceptualization of the foreknowledge.

Klejn (2013) is also interested in history of archaeology, and archaeological thought both in Russia and beyond. Soviet archaeology has been presented not as a monolithic entity but as composed of numerous schools and traditions, all embedded in Marxism. His other interests comprised works on the Neolithic, Bronze Age, Scythians, Sarmatians, Slavs, and Norsemen. Klejn worked extensively on the Bronze Age Donets Catacomb culture. He remains interested in ethnic issues including the origin of Indo-Europeans, especially Indo-Aryans, Greeks and Phrygians, and Slavs. He has also contributed to the debate of the origin of Russian state in the Middle Ages and the role of the Vikings in this process. Klejn was also an active member of numerous field projects in Russia, Ukraine, and Belarus including Bronze Age sites, Scytho-Sarmatian barrows, and early medieval towns. Klejn is also an acclaimed author of numerous philological works including studies of Homer and Homeric epic, especially Iliad. His interests in cultural anthropology comprised mainly folklore.

Klejn has published 18 monographs and more than 500 articles and has edited a few collections of articles. The most important of his theoretical works comprise *Archaeological Sources* (1978 - Russian), *Archaeological Typology* (1982 - English; 1991 - Russian), *Principles of Archaeology* (1991 - Russian), *Metaarchaeology* (2001 - English), *New Archaeology: Critical Analysis of the Theoretical Direction of Western Archaeology* (2009 - Russian), and *History of Archaeological Thought*, 2 vols (2011 - Russian). His newest book *Soviet Archaeology: Trends, Schools, and History* will be published in English in 2013. Klejn has also written *The World Turned Upside Down* (1993 - Russian), a personal account of his years in prison in the 1980s. A history of his life was presented in the book *It's Hard to Be Klejn: Autobiography in Monologues and Dialogues* (2010 - Russian). Three other major books: *A History of Anthropological Ideas* (Russian), *Time in Archaeology* (Russian), and *Culture and Evolution. Theoretical Studies* (Russian) are in preparation.

Cross-References

- ▶ Archaeological Record
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory

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Klithi Site: Excavating a Rockshelter in Northwest Greece

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Introduction

Klithi is a limestone rockshelter on the right bank of the River Voïdomatis in Northwest Greece (Fig. 1). Between 1983 and 1989, archaeological excavations here directed by Geoff Bailey brought to light a sequence of Upper Paleolithic deposits exhibiting remarkable uniformity in their artifact and faunal assemblages. Hunter/gatherer groups of the late glacial period had used ibex and chamois for food, leather, and bone artifacts. They had collected flint pebbles from the nearby river banks to manufacture an Epigravettian industry dominated by backed bladelets which were employed in hunting. Small endscrapers and other tools were employed in the working of hides and bone. Klithi is a low-diversity site and now features among other specialized ibex-sites that are typically found at high altitudes in or near the sort of rugged terrain that was the habitat of ibex herds.

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 1 Klithi rockshelter on the right bank of the River Voidomatis in Vikos Gorge (Photo courtesy of Costas Zissis)

Key Issues

The *project design* combined on-site excavation aimed at producing data with high precision chronological and spatial resolution, with off-site work intended to place Klithi within its local (NW Greece) and regional (SE Europe) geographical and cultural context. To this end, detailed archaeological survey and paleoenvironmental and paleogeographic research were conducted in parallel with excavation.

The excavation program sought detailed insights into patterns of change and variability in the excavated record, vertically across stratigraphic layers and horizontally in space. Prior to excavation, the shelter floor was cleared of the materials accumulated due to recent herding activity. It was then mapped on a 1 × 1 m grid with an alphanumeric designation and the major topographic features were projected on it (Fig. 2). Each grid was further subdivided into four quadrants, 50 × 50 cm each, and for the most part, these quadrants were excavated in 5 cm spits as the minimum provenance units to which all finds are referenced. Beyond this arbitrary three-dimensional coordinate system, all excavated finds were also stratigraphically referenced in terms of the geological and archaeological features into a two-tier system: *contexts* defined as the smallest units of stratigraphic provenance identified during excavation on the basis of lithology, texture, and color and *strata*, used (at Klithi) to denote groups of layers combined at post-excavation stage to represent a site-wide time unit. Small brushes and shovels were the main excavation tools (Fig. 3). Horizontal plans

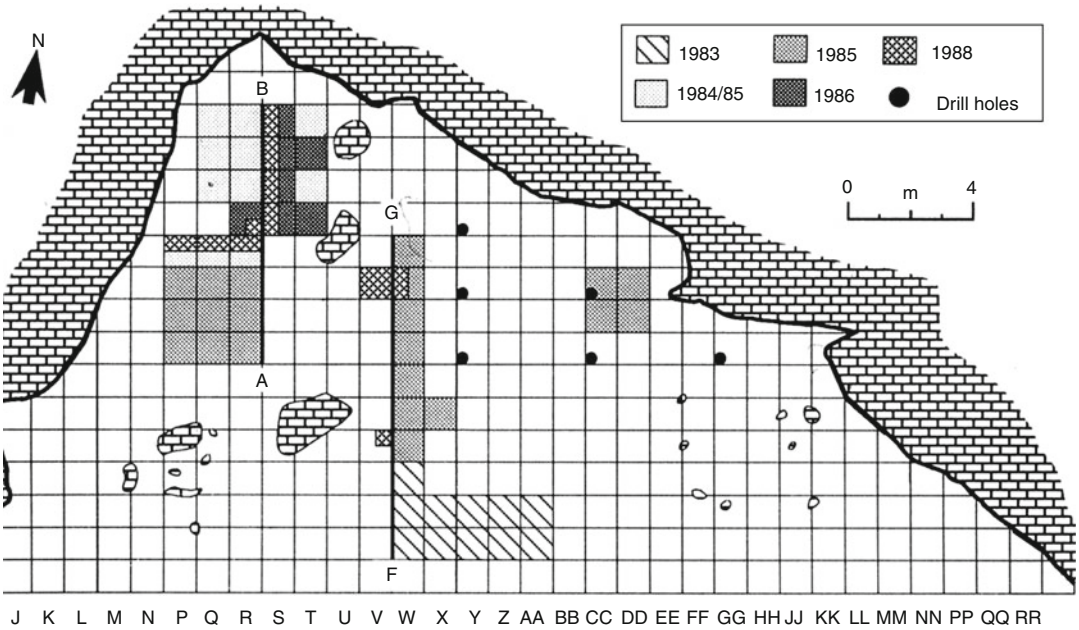

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 2 Klithi site plan, showing coverage by excavation year (Reproduced by permission of the MacDonald Institute for Archaeological Research)

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 3 Excavating at Klithi with a small brush and a shovel. The excavator kneels on wooden plank and a foam cushion. The high density of artifacts is visible in the exposed surface (Photo courtesy of Geoff Bailey)

of the deposit featuring specimens larger than 5 cm were systematically drawn throughout. Excavated sediments were routinely dry-sieved and water-sieved (screened) in the river. Sorting, cataloguing, and study of artifacts and bones took place in the open air in the Vikos Gorge, on a river terrace under the plane trees, a magical spot indeed for archaeologists to set up their laboratory.

The *excavation strategy* evolved in the course of the project. First and foremost, a deep sounding was opened at the front of the shelter, reaching a depth of 2.8 m, to preview the stratigraphy and establish the total time span of occupation (1983). Excavation later continued across a horizontal area in order to examine the spatial distribution of finds and

features (1984, 1985), following the principles of French "grands décapages" with detailed three-dimensional piece plotting of each specimen to its nearest centimeter. This procedure was eventually abandoned in view of the extremely high densities of archaeological material encountered – on average 26,424 lithic artifacts and 4,472 identified bones per cubic meter. Subsequent experiments with quadrants or miniquads (25 × 25 cm) (1986) were applied but were still slow, and it was evident that better scientific design could only come from knowing the character of the total deposit in advance. Hollow steel tubes 1 m long and 60 mm diameter were used to sample the deposit in six boreholes drilled in various parts of the shelter floor, including both excavated and unexcavated areas (1986, 1988). The deposits were relatively loose and unconsolidated scree sediments, with relatively small clasts and high proportions of finer sediment. The maximum depth of scree deposits reached some 7 m in places, but the dense cultural material was confined to the upper 2 m. These 2 m of anthropogenic sediment corresponded to a mode of animal and lithic resource exploitation that remained stable for 3,500 years.

Refitting of lithic artifacts and quantitative analyses of spatial patterns were recruited to establish the spatial integrity of the deposits. Klithi, like other caves, contained a palimpsest of cultural material from overlapping occupations, a so-called time-averaged deposit, in which some redundant patterns of stable site structure were observed. A single major hearth area at the back of the shelter represented a complex stratigraphy of superimposed open hearths that was in use throughout the span of human presence on the site (Fig. 4). The repetitive use of the hearth area suggests a long-term familiarity of the Klithi inhabitants with the site and its physical features. One possible interpretation of this is that the rockshelter was in a remote part of the territory of a single group, which returned to the site periodically, relatively briefly, probably during late spring or early summer, and re-used the existing facilities.

Klithi Site: Excavating a Rockshelter in Northwest Greece, Fig. 4 The hearth area at Klithi with tags marking the superimposed layers corresponding to open hearths. The strings mark the site grid used for planning (Photo courtesy of Geoff Bailey)

Future Directions

The expedition was completed in 1997 with the publication of an integrated two-volume report, which described the research questions, the methods adopted, the findings, and their interpretations step by step. Over the course of five field seasons, excavation at Klithi exposed 51.5 m^2, representing approx. 1/5 of the total floor area available to the Upper Paleolithic occupants. The remaining 4/5 now lie intact, awaiting the archaeologists of the future to return to Klithi with refined recovery methods and a new set of questions.

Cross-References

- ► Floors and Occupation Surface Analysis in Archaeology
- ► Karstic Landscapes: Geoarchaeology
- ► Spatial Analysis in Field Archaeology
- ► Switzerland: Upper Paleolithic Living Floor Investigations

Further Reading

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Kondo, Yoshiro

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Basic Biographical Information

Yoshiro Kondo left an enduring influence on Japanese archaeology through his Marxist-inspired approach to the study of the Yayoi (c. eighth/sixth century BCE to third century CE) and Kofun (meaning "mounded tomb") (c. third century to sixth century CE) periods of Japan. He was born in Tochigi prefecture in 1925. His academic career started as an Assistant Professor at Okayama University. He was promoted to full Professor in 1972 and continued to work at Okayama University until his retirement in 1990. He passed away in 2009.

Major Accomplishments

One of Yoshiro Kondo's major accomplishments in archaeology was the construction of a sophisticated model of social evolution as part of the emergence of the state in Japan. This model was based on his analysis of excavations of settlements, production sites (including salt- and iron-making sites), cemeteries, and mounded tombs of the Yayoi and Kofun periods. Some of Yoshiro Kondo's most important research draws upon, albeit tacitly, the Marxist concept of the "Asiatic mode of production" and builds on the Japanese Marxist tradition of his predecessors, such as Akira Misawa (pseudonym of Sei'ichi Wajima), who had been politically purged under the militaristic-imperialistic regime before and during World War II period (see, e.g., Watabe et al. 1936). Using a Marxist theoretical approach, Yoshiro Kondo put forward a model whereby the process of social stratification culminated in the establishment of an ancient state through which kin-based communities – clans and lineages – were transformed but, importantly, preserved (Kondo 1983). This model emphasized the importance of mediation through the communal leader to ease the intra- and intercommunal/kin-group tension that arose from ever-increasing conflicts of interest arising from the constant development of the forces of production. Kondo argued that the authority and power accorded to the leader, who conducted ancestral-agricultural-communal rituals, functioned to mediate and ease these tensions and to maintain communal collaboration in the face of increasing fragmentation due to the growing autonomy of communal segments. This led to a situation in which the leader and his/her immediate kin members came to "float" above other kin-based communities, with this situation normalized by the community as a whole through ritualistic mediation. Kondo's model resembles the famous "epigenetic model" of social evolution put forward by Friedman and Rowlands (1977) in its explanation of the formation and transformation of the "Asiatic state," in particular. However, Kondo's model provides a more nuanced and believable explanation of the prolonged preservation of kin-based communities in the process of social stratification.

In the early 1950s Yoshiro Kondo pioneered the mass involvement of the general public in archaeological practice and knowledge production in Japan. This can be characterized as an early attempt at public archaeology. While the aim of his excavations was to verify his stratification model, Yoshiro Kondo organized the excavation of the Tsukinowa tumulus so as to involve the general public in the process of archaeological knowledge production. The Tsukinowa tumulus is a round tumulus with a small rectangular terrace attached to the main mound and dates from the early fifth century CE, situated in the Yanahara (presently Misaki) township of Okayama prefecture (Kyodo-kenkyu Tsukinowa kofun henshu-bu 1960; Kondo 1985). More than

10,000 volunteers were involved in the excavation that took place in 1953. These were mainly, but not entirely, from the Yanahara township and included schoolteachers; primary school, middle school, and high school students; university students; and Koreans in Japan. Through these excavations the entirety of the cobble-covered mound was revealed for the first time in the history of Japanese archaeology. Excavations were undertaken by the main mortuary facility situated on the top of the mound, comprised of two clay-packed dug-out log coffin burials and another clay-packed dug-out log coffin burial on the rectangular terrace. The objective of these excavations was clearly stated, thus to reveal the character of the power of the local despotic ruler and the mechanism of its development. However, they were also aimed at encouraging the general public to learn their local history, think about the origin of the emperor system, and reflect upon its ideological implications in contemporary politico-economic/social situation (Kyodo-kenkyu Tsukinowa kofun henshu-bu 1960). Together with the local people, Yoshiro Kondo organized seminars on this important history.

The Tsukinowa excavations had many characteristics which can be described as precursors to today's public archaeology. Evaluation of the achievements of this project should be undertaken in the light of the politically instigated (communist-leaning) mass-movement called *Kokumin-teki rekishi-gaku undo* (movement for the establishment of the history of the Japanese people), which rose as the post-World War II reformation movement was reaching its peak.

Deriving from the success of the Tsukinowa excavation, Kondo also founded *Kokogaku kenkyu-kai* (The Society of Archaeological Studies) in 1954. Its journal was originally called *Watashitachi no kokogaku* ("Our Archaeology") and featured reports and essays from amateur enthusiasts as well as professionals and academics. However, as the post-World War II reformation movement ceased, postwar economic difficulties were overcome and rapid economic development began. The movement for establishing a community-engaged history of the Japanese people ceased with disillusionment. The editorial policy for the journal *Watashitachi no kokogaku* changed towards the aim of transforming the journal into a professional academic journal, and its name was changed to *Kokogaku-kenkyu* ("The Quarterly of Archaeological Studies") in 1960. Though much transformed in its outlook, *Kokogaku kenkyu-kai* (The Society of Archaeological Studies) still retains its original spirit of promoting socially responsible archaeological practice.

Around this time, Kondo's research increasingly focussed on excavations which sought to identify the prototype of the Kofun keyhole tumulus in order to elaborate his model by revealing the process of transition from the Yayoi to the Kofun period. Through these excavations Kondo revealed that the Kofun keyhole tumulus emerged as a consequence of social hierarchization and its ideological-ritualistic mediation. These excavations no longer involved the general public.

During the 1980s, Yoshiro Kondo organized and led a major project that compiled a compendium of all the known keyhole tumuli across the archipelago and arranged them into the ten-phase relative chronology which is accepted today as a standard chronological framework of the Kofun period (Kondo 1991 – 2000). In 1983, Kondo published the seminal work *Zenpo-koen-fun no jidai* ("The Age of the Keyhole Tumulus"), which is one of the finest and most influential archaeological historiographies ever produced in Japan.

The trajectory of Yoshiro Kondo's research career reflects the transformation of post-World War II Japanese society and archaeology. His remarkable efforts in public archaeology in the 1950s were ahead of their time and gave way to a self-conscious professionalization of the discipline in the 1960s. Kondo's model of continuity in kin-based communities as part of the process of social stratification was the dominant research paradigm in the archaeological study of social stratification and state formation in Japan during the 1960s–1980s and remains highly influential today.

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▶ Marx, Karl
▶ "Public" and Archaeology
▶ Public Archaeology, The Move Towards

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Kondoa Rock Paintings: Traditional Use

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Introduction

There are approximately 1,500 rock painting sites situated in the semiarid area of Kondoa District, located within the Dodoma Region in Central Tanzania. These sites are found primarily in granite and gneiss rockshelters. The majority of these sites have rock paintings, with only two exceptions having been reported: rock engraving sites to the west of Kondoa at Usandawe. Common painted motifs are animals, human, and various geometric designs. These rock painting sites do not only contain rock paintings but also have a rich archaeological record dating from the Middle Stone Age (MSA) right up to the Iron Age (Masao 1979; Kessy 2005). Some of the rockshelters, notably the *Mongomi wa* Kolo shelter and its surrounding environments, are also connected to living heritage. This site and its landscape have been used by local people, the Warangi and Waasi, for traditional ritual ceremonies (Leakey 1983; Chalcraff 2005; Bwasiri 2011).

Kondoa sites are National Monument under the Antiquities Act of Tanzania (1964 as amended 1979). In July 2006, UNESCO declared the rock paintings of Kondoa as a World Heritage Site under criteria iii and vi (see Antiquities Division 2004). This is an acknowledgement of its international significance, its authentic beauty, and its living heritage. This entry discusses and describes four types of researchers who have worked on the Kondoa rock paintings and provides a brief speculative discussion on age of the paintings. The management and cultural tradition of the sites are also discussed.

Key Issues/Current Debates/Future Directions/Examples

Group 1: Amateur Recorders

Amateur recorders have included colonial administrators and officials who discovered rock paintings in the course of their duties (Bagshawe 1923; Aitken 1948; Fozzard 1959). Reports from these amateur recorders were generally descriptive and discussed the location and content of the paintings. Some reports categorized rock paintings according to style and pigment color to establish typologies (Aitken 1948; Fozzard 1959). For example, Aitken (1948) found that

red- and purple-colored figures were older than any others in all cases of superimposition. These two colors and associated naturalistic style which include human, animal, and few geometric figures were linked to Stone Age people. A similar observation was made by Leakey (1936). Both Aitken and Leakey recognized that the white and black colors were relatively recent. They suggested the Bantu-language speakers or Pastoralists were the authors of the rock art in Kondoa but the specific group responsible for the rock paintings is unknown.

Group 2: Early Research

The earlier reports were improved and refined by subsequent studies undertaken by a number of professional archaeologists (Masao 1979; M. Leakey 1983; Anati 1986). Mary Leakey is the one who made Kondoa paintings known worldwide. She conducted a comprehensive survey and documented dozens of painting sites which had never been reported previously. A total of 186 rock painting sites were surveyed and recorded, 43 sites were traced, and over 1,600 figures were recorded. In her work, the book entitled *Africa's Vanishing Art* described the rock painting of Kondoa (see Leakey 1983: 1). From this later research, a system of categorizing the paintings according to style and pigment color was adopted. Scholars in this phase also considered subject matter, technique application, and social economic activities (Masao 1979). The color of the paintings provided the primary variable by which styles were divided. They identified phases of rock painting styles and analyzed the placement of these styles within the complex superposition sequences found in many of the larger Kondoa sites.

Masao (1979) produced four chronological cultural sequences that were based on color, subject matter, and technique of application. He defined the kinds of stylized representations into four distinct categories: "naturalistic, semi-naturalistic, silhouette, and abstract/geometric." Masao's naturalistic paintings were the oldest and belong to the indigenous people of the area (Fig. 1). These represent the work of ancestors of modern hunter-gatherers of Kondoa District conspicuously Hadza and Sandawe click speakers (Masao 1979). M. Leakey (1983) produced nine style bases from 186 sites, while Anati (1986) identified six styles which were thought to represent the chorological sequences and economic activities of the artists. This group of researchers similarly identified that the finger-painted black (Fig. 2) and white (Fig. 3) images are recent and can probably be attributed to Pastoralists or Bantu-language speakers, while red motifs are the oldest forms. While providing more empirical basis, these descriptions and formal classifications failed to provide a clear understanding of which ethnic group was responsible for which traditions within the Kondoa rock paintings sequence. This created a major problem for understanding the Kondoa rock paintings.

Group 3: Ethnographic Approaches

A third group of researchers attempted to establish the meaning of the paintings by considering the relationship between the paintings and the ritual beliefs of the indigenous people. The idea of understanding rock paintings through ethnography had already been effectively used in southern Africa to study San rock art (Lewis-Williams 1986).

The use of ethnography to interpret rock paintings of Kondoa was initially used by Ten Raa. Ten Raa (1971) recognized three categories of rock paintings made by Sandawe, namely, casual, magic, and sacrificial rock paintings. Casual rock paintings are made without ritual association but painted on a particular occasion such as an unsuccessful hunt, when an accident occurred or where there was sickness in the family. Magic rock paintings were associated with hunting rituals and practices before a hunt. In their hunting rituals, the Sandawe performed rites of inductive magic with the hunter making an effigy of the animal he hoped to kill. Sacrificial rock painting involved sacrifices to clan spirits on hills in clan property. The sacrifice was performed away from the residence, mostly at the foot of a large bolder or overhanging rock. Ten Raa linked some paintings to the specific Sandawe ritual of *simbo̓* (Ten Raa 1971).

Kondoa Rock Paintings: Traditional Use, Fig. 1 Example of rock art created by indigenous people

Kondoa Rock Paintings: Traditional Use, Fig. 2 Example of rock art with finger-painted black images, attributed to pastoralist or Bantu-speaking people

Lewis-Williams (1986), using Ten Raa's writings describes *simbó* as a spirit control cult. According to Lewis-Williams, *simbó* is the ritual of being a lion. During *simbó* Lewis-Williams suggests that *simbó* dancers are believed to turn into lions rather than being possessed by spirits. *Simbó* dancers fight off evil spirits. Lewis-Williams, drawing from San trance dances, suggests that both *simbó* dancers and San medicine men attribute the ability to know things from afar to extra-earthly travel. Lewis-Williams' analysis suggests ways of studying hunter-gatherer paintings by considering specific features in the rock painting in relation to the Sandawe ritual *simbó*.

Like Lewis-Williams, Imogene Lim (1992) undertook research on Kondoa rock paintings in the Usandawe area. Lim attempted to interpret the rock paintings by combining both the physical environment and the social context of the site using "a site-oriented approach to rock art." This approach focused on the relationship between the rock paintings and sites, sites and the landscape, and the landscape and the

Kondoa Rock Paintings: Traditional Use, Fig. 3 Example of rock art with finger-painted white images, attributed to pastoralist or Bantu-speaking people

community. Lim concentrated on understanding the Sandawe beliefs and how these beliefs were linked to the rock paintings. She recognized that most of the Sandawe sacrifices were held on the hill; therefore, she considered hills as important points in a symbolic landscape. From this observation, Lim suggested that the hill is the second object in the process of studying rock paintings, while the belief system is the first. According to Lim, the meaning and the potency of a place are produced through ritual activities (1992).

Lim also participated in a Sandawe traditional ceremony associated with the birth of twins, which is known as *iyari*. The ceremony is conducted in order to protect both the mother and her twins from lightning. Combining the painting analysis, oral traditions and *iyari* ceremony gave her confidence to link the ceremony practices to the production of some of the rock painting images in the Usandawe area (Lim 1992). The works of Ten Raa (1971), Lewis-Williams (1986), and Lim (1992) form the basis for understanding of the original meaning of the paintings through traditional ritual practices.

Age of the Paintings

While the issue of authorship and meaning is not yet resolved, the age of the paintings is also still a source of speculation. Using stylistic sequences, subject matter of the paintings, and history of the groups inhabited in Kondoa, Anati (1986: 24) suggested that the paintings might date as far back as 40,000 years ago. The Anati's date was not supported by any archaeological evidence and it was questioned by other researchers. Mabulla (2005: 20) suggested that the surviving paintings probably date to between 20,000 and 1,000 years ago. Other researchers place a maximum age of 10,000 years (Coulson & Campbell 2001), while Masao (1979: 55, 92) using archaeological deposits from Kandaga rock painting site and *Mongomi wa Kolo* sites suggested an age range of 3,500 years for early paintings and 200 years ago for recent paintings.

Although the age of paintings in Kondoa is still controversial, the oldest known date for African paintings was calculated from 15 radiocarbon dates, taken from occupation layer in Apollo 11 cave in southern Namibia. It dated back at least to 27,000 years (see Wendt 1976). Another early date, from Matopos in Zimbabwe, is from a flaked spall of the painted wall in the Cave of Bees which was incorporated in the archaeological deposit. Charcoal from the relevant layer was dated to about 10,500 BP (Thackeray 1983). The exact age of the paintings is unlikely to be resolved until direct dating of exposed parietal paintings is available.

Group 4

A fourth group of researchers (including myself) focus on management of rock painting sites and associated living heritage. The genesis of this approach commenced in 2000 when the Antiquities Department of Tanzania asked the World Heritage Site committee to inscribe the Kondoa rock paintings onto World Heritage List. Inscription onto the World Heritage List required the implementation of various important management measures for Kondoa rock paintings. This started with a lengthy nomination process where expert heritage management consultants evaluated the paintings and associated living heritage (see Chalcraft 2005). The Chacraft findings showed some sites (particularly *Mongomi wa* Kolo) have living heritage associated with local people. The living heritage of sites needs protection in addition to rock paintings (Bwasiri 2011). The process involved seminars and meetings between the heritage authority and the local associated community. As part of the nomination process, the Department of Antiquities also constructed a new Kolo office in 2002, to accommodate the Antiquities staff and to provide a place for interpretative displays. The Kolo office now has four staff members (including the author) and two trained guides who are custodians of the Kondoa rock paintings' World Heritage Sites.

Traditional Use of Some Kondoa Rock Painting Sites

African archaeological sites including rock art in precolonial and the early colonial periods were managed by Africans without any written law. Many archaeological sites had traditional custodians who managed the sites through a series of taboos, rituals, and restrictions. The traditional custodian was chosen from the clan which used the site for their activities and rituals. Custodians decided who had the right to enter a site. Custodians usually fell under a traditional authority system made up of headmen and chiefs. All sections of this system had commitments and responsibilities for the protection and maintenance of cultural heritage. If a problem occurred, all levels would be held accountable and action would be taken. At Kondoa rock paintings particularly *Mongomi wa Kolo* site and surrounding sites Kolo BII and BIII, there was a complex system of traditional management made up of *mwenese* who is head of the land from the Warangi and *hapaloe* head of land from Waasi (Bwasiri 2011). Apart from traditional use of the sites, *Mongomi wa* Kolo and Kolo BII and BIII are also an interpretation focus for both school children and tourists.

The three rock painting sites have religious and spiritual associations with the local communities from nearby villages such as Waasi and Warangi (Bwasiri 2011). The Waasi is a Southern Cushitic group who arrived Kondoa perhaps 2,500 years ago (Bower 1973) before Warangi, while the Warangi is a large group of Bantu-language speaker who arrived in Kondoa about 600 years ago (Kessy 2005). Both groups interact and have cooperated and shared rituals such as rainmaking under their leadership *hapaloe* and *Mwenesi* (Fosbrooke 1958). The Waasi and Warangi continue to use *Mongomi wa* Kolo rock painting sites for traditional ritual. The diviners, healers, and rainmakers use the site and surrounding environment to conjure up visions and communicate with the spirits. Oral tradition from one of the traditional healers said that she visits the site five times a month with goats/sheep or chickens for curing sick people. She is *mwenese* who practices ceremonies at *Mongomi wa* Kolo (Fig. 4). Her clients come from Arusha, Dodoma, Kondoa town, and the neighboring villages (Bwasiri 2011).

Rainmakers from a nearby village also practice rituals at *Mongomi wa* Kolo three times a year. These rituals are scheduled at the start of the year (November/December when the first rains come), a second time to ask the spirit to bring good rains at the end of February, and a third, when the cereal crops have matured, to thank the spirit for giving a good harvest. The rain ceremony is controlled by the *hapaloe*. Along with diviners, healers, and rainmakers, individuals also come to *Mongomi wa Kolo* for divination. Oral traditions indicate that *Mongomi wa* Kolo is more powerful than other spiritual places in and around Kondoa (Bwasiri 2011). However, nowadays local people are restricted by Antiquities staff because some rituals

Kondoa Rock Paintings: Traditional Use, Fig. 4 Traditional healer who practices ceremonies at *Mongomi wa* Kolo

(such as splashing water) deteriorate the paintings. Such rituals continue but are by necessity performed in secret. The current management system does not facilitate the living heritage, and local people connected with the art were excluded from management and decision-making about these sites (see Bwasiri 2011).

Conclusion

The Kondoa paintings are important because they retain unique cultural heritage resources both tangible and intangible. The indigenous people around the area continue to use the site for ritual practices of rainmaking and healing, and there is potential for educational and economic values for the local community and the country as whole. While the sites are recognized nationally and internationally, there remains the challenge to establish the painting chronology: authorship and meaning are still contested. The exclusion of living heritage and associated peoples into management and decision-making on the sites also is a challenge and this requires urgent resolution.

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Kono, Toshiyuki

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Basic Biographical Information

Toshiyuki Kono is professor of law at Kyushu University, Japan. He received his LL.B. and LL.M. from Kyoto University, Japan.

Major Accomplishments

Between 1997 and 1999, Toshiyuki held the position of secretary general of ICLAFI (ICOMOS International Scientific Committee on Legal, Administrative and Financial Issues) and, since 2010, has been vice president of Japan ICOMOS. Other positions include are vice president and titular member of the International Academy of Comparative Law, chairman of the Committee for Intellectual Property and Private International Law, and chairman of the Committee for Cultural Affairs of the UNESCO National Commission, Japan.

His main research fields are private international law, international civil litigation, and heritage law, including international enforcement of intellectual property right and litigation and economic analysis of conflict of laws. He also served as a member of an experts group to draft a Convention for Safeguarding Intangible Cultural Heritage, and of Japanese Delegation and Convention for the Protection and Promotion of the Diversity of Cultural Expression. He currently serves as a member of Intergovernmental Committee of the Intangible Heritage Convention to draft its Operational Directives.

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Kosova: Archaeological Heritage

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Introduction

Since the prehistoric period until today, people in the present territory of the Republic of Kosova have developed their cultural heritage. They left to their descendants abundant material sources on cultural values. Therefore, Kosova has a rich diversity of architectural heritage (cultural monuments, ensembles of buildings, architectural conservation areas), archaeological heritage (constructions, structures, and groups of buildings, monuments of various kinds and their contents, found on land or under water, cultural landscapes), and movable heritage (objects that are the expression or evidence of human creativity or of natural development, distinguished by values of historical, archaeological, artistic, scientific, or spiritual importance and interest).

So far, approximately 3,200 sites with monumental values are known in Kosova, 427 of which are protected by law and as such, are registered on the "Central Register of Monuments of The Republic of Kosova Cultural Heritage." Other objects of cultural heritage, which are to be declared as historical-cultural monuments, should be added to this rich potential of cultural heritage. A great advance in this direction was made with the inscription of the Monastery of Deçan on UNESCO's World Heritage List in 2004.

Cultural heritage is among the first victims in any conflict. The war in Kosova is no exception. In the territory of Kosova during the war of 1998–1999, 1,025 objects of cultural heritage were destroyed. Among them, 150 were mosques and teqes and 56 churches and monastries. For the protection of cultural heritage, the application for Protection Zones was ratified according to the Law of Kosova's Cultural Heritage and the plan of Martti Ahtisaar. The experience has confirmed difficulties in harmonizing all positions related to the establishment of zones and particularly in defining the mechanism for the management of the zones.

"The Evidence of Cultural Heritage" is an important process in the protection of cultural heritage, especially intensively from 2001 until today. The evidence has been gathered by the central and regional institutions of the Protection of Cultural Heritage of Kosova, assisted by international institutions. During the period 2001–2005, approximately 2,800 objects of cultural heritage were recorded. The greatest part of these were created during the Ottoman period (1389–1912). The others belong to the Illyrian-Dardanian, Roman, Paleochritsitian, Byzantine, and Serbian Periods.

Despite limited financial means in the Republic of Kosova, special attention is paid to Prehistoric, Antique, and Medieval archaeology. According to political circumstances, this heritage has been and still is instrumentalized. It is worth emphasizing the inadequate treatment of archaeological localities after excavation, which normally should be associated with archaeological conservation, publication, maps, presentation, parks, and signage for localities.

Historical Background

The archaeology of Kosova dates from the nineteenth century with the work of Sir Arthur Evans (1851–1941): his "Antiquarian Researches in Illyricum." Other prominent figures of the period were the Austro-Hungarian scholar Felix Philipp Kanitz (1829–1904), the Hungarian archaeologist Buday Árpád (1879–1937), Camillo Praschniker (1884–1949), Arnold Schober (1886–1959), Walter Jesse Fewkes (*Bulletin of American School of Prehistoric Research* 9, 1933), Anton Von Premerstein (1869–1935), Nikola Vulić (1872–1945), and Alfred Von Domaszevsky (1856–1927). The archaeologist Domenico Mustilli (1899–1966) wrote a brief monograph in Italian language regarding the archaeology of Kosovo. The first archaeological excavations in Kosovo were carried out by Austro-Hungarian troops at

Neprebisht, near Suhareka during World War I. The Catholic priest Shtjefën Gjeçovi, a pioneer of the archaeology of Kosova, also carried out excavations in the Has region near Prizren until his murder in 1929 (Elsie 2011: 30).

After World War II, with the founding of the Museum of Kosova (1949) and the Institute of Kosova for the Protection of Cultural Monuments (1949), archaeological research was completed in a more adequate manner. Later on, these two central institutions were accompanied by the foundation of regional institutions such as the Institutes for the Protection of Monuments based at Pristina, Prizren, Mitrovica, and Gjakova. In addition, the Institutes for the Protection of Monuments based at Peja and Gjilan, and in 2003, the Archaeological Institute of Kosova, with its first director Jahja Drançolli were founded. It should be emphasized as well the importance of the professional and scientific staff of the above-mentioned institutions and their partners such as Adem Bunguri, Dragoslav Srejović, Draga and Milutin Garašanin, Emil Čerškov, Fatmir Peja, Fejaz Drançolli, Gëzim Hoxha, Jovan Glišić, Kemajl Luci, Luan Përzhita, Muzafer Korkuti, Naser Ferri, Nikola Tasić, Skënder Anamali, Selim Islami, Slobodan Fidanovski, and above all Zef Mirdita, who gave their assistance in the prosperity of the archaeology of Kosova. Besides special archaeological editions, the results of the above-mentioned authors from the field of archaeology are published in the following journals of Kosova: Glasnik Muzeja Kosova/Buletin i Muzeut të Kosoves/Bulletin du Musée de Kosovo et Metohie, Starine Kosova i Metohije/Antikitete të Kosovës e Metohis/Antiquités de Kosovo et Metohija, Gjurmime Albanologjike: Seria e Shkencave Historike, Recherches Albanologique, Kosova Archaeologica/Kosova Arkeologjike, Buletin i Fakultetit Filozofik-Prishtinë/Buletin of Philosophyc Faculty, etc. After the fall of Yugoslavia at the beginning of the 1990s, the tendency to politicize the science of history was obvious, including here the politicizing of the archaeological heritage.

At the beginning of 1999, an exhibition was held in Belgrade, prepared by the Museum of Prishtina and the Serbian Academy of Sciences and the Arts. This exhibition served as a pretext for the 1,247 exhibits from Kosova to be held in the capital city of Serbia, which are still held through today with the intention never to be returned to Kosova. From the stolen exhibits, 677 were from the archaeological heritage. The only one to be returned to its hometown was the Goddess in Throne in 2003 (Fig. 1). After the settlement of international administration in Kosova in June 1999, the Museum of Kosova has been virtually empty. In the absence of implementation of international laws and conventions referring the return of cultural heritage, the empty shelves of the Museum of Kosova after 1999 are being filled with new artifacts discovered in recent excavations.

Kosova: Archaeological Heritage, Fig. 1 Goddess on the throne. Tjerrtorja, Prishtina

The archaeological heritage both movable and immovable in the present territory of the Republic of Kosova dates from the Neolithic period

onward. Also present are Eneolithic, Bronze and Iron Ages, Dardanian (Illyrian) and Roman Antiquity, Early and Late Middle Ages and Ottoman Period. With the support of the archaeological excavations, so far certain archaeological centers as well as movable monuments of Kosova have become known. We must distinguish prehistoric habitats of Hisar and Reshtan near Suhareka; Vlashnje near Prizren; complex of Ulpiana near Graçanica; Municipium DD at Soçanica near Mitrovica; Gradina of Peja (hillfort of Peja); Early Christian Mausoleum of Bajica near Peja; Roman Necropolis Vendenis near Podujeva; Fortress of Harilaq (by Procopius *Aria*, near Fushë Kosova); and Novobërdo and Pogragja near Gjilan. Here we must also include the complexes of the Paleochristian monuments of the cult which, under the impact of the politics, are called today only complexes of the Orthodox Serbian cult monuments and public access to them is not allowed. Many other movable archaeological artifacts such as *The Runner of Prizren*, which is preserved in the British Museum of London (Fig. 2); Neolithic Goddesses from "Tjerrtorja" of Prishtina, Bardhosh near Prishtina; Varosh near Ferizaj; Laterculi of Cerca near Istog; Dardanian woman from Baja e Kllokotit near Vitia (Fig. 3); and epigraphic monument of the Dea Dardaniae from Smira, etc., are also known.

Kosova: Archaeological Heritage, Fig. 2 The Runner of Prizren. British Museum, London

Kosova: Archaeological Heritage, Fig. 3 Marble bust of a Dardanian woman. Second–third c. CE. Baja of Kllokot, Vitia

Key Issues/Current Debates/Future Directions/Examples

Prehistory: Neolithic Period

Kosova was rich with agricultural and farming civilizations from the Neolithic Period (6000–3500 BCE), which were located in the plains along the river courses, and fertile pasturelands ideal for their livestock. The agrarian societies in Southeast Europe first appeared by c. 7000 BCE, and among the earliest cultural complexes of this area are included the Early and Middle Neolithic – Starçevo, Vinça cultural group (c. 6000–5000 BCE), and Younger Neolithic – Vinça cultural group (c. 5000–3500 BCE).

The Early and Middle Neolithic societies practiced extensive farming and stock breading. However, the development of neolithic industry, manufacture of ceramics, and especially adoration of baked clay human-shaped small statuettes provide us with relevant information on their economical and spiritual world. The Early Neolithic culture is well represented by sites such as Runiku I near Skenderaj (Rudnik I), "Fafos" and Zhidkovaci near Mitrovica, Rakosh near Istog, "Tjerrtorja" of Prishtina, etc. The Middle Neolithic is well known and represented by the excavations in the Reshtan settlement by the phases know as Runiku III–IV (Rudniku III–IV), Badoc and Glladnica near Graçanica, Kllokot near Vitia, Prishtina hospital area, Varosh near Ferizaj, Vlashnje, Rakosh, etc. *The Middle Neolithic* of Kosova is included within Vinça cultural group although it forms a clear variant in terms of its anthropomorphic clay sculpture. Connections are also evident with the Middle Neolithic of Albania (Kolsh II and Dunavec cultures) as well with the cultures of Adriatic Middle Neolithic of Danilo type (Korkuti 2006: 2).

Young Neolithic is represented in Kosova with exceptional distinctive anthropomorphic figurines that are counted among the most beautiful examples of prehistoric plastic art in Europe. Affluent cultural life and a sentiment for artistic shaping are also reflected in the parts of architectural plastics ornamented with geometric motives or figural images. The appearance of new technology in pottery making clearly separates it from Starçevo culture. The abundance of anthropomorphic and zoomorphic forms related to cults (Magna Matter – Mother Goddess), biconical bowls, high-footed goblets, and prosopomorphic lids mirror the prosperity of social, economical, and religious Late Neolithic society. The main Vinça recorded sites of Kosova are Bardhoshi (near Prishtina), Zhitkovci, "Fafos" and Vallaçi near Mitrovica, Reshtan, Runik, "Tjerrtorja," etc. Mentioned locations of the Vinça culture are typical for the realm of Kosova. As such, they are identified like "the variant of Kosova of the culture of Vinça." There is abundant and well-known evidence regarding this cultural group in Kosova (Maletić 1973: 83).

Eneolithic Copper Age

Eneolithic Copper Age (c. 3500–2200 BCE) is a transitional period from the use of stone to the use of metals. One of the most important developments of this period was the appearance of craftsmen engaged in the mining and working of copper. Main sites are Hisari, Gadimja, Glladnica, etc. Hisar near Suhareka and its material culture are of crucial importance in terms of looking at ethnocultural features of the eneolithics and Early Bronze Age. This site experienced cultural development and expansion during the Eneolithic – Hisar I and Early Bronze Age – Hisar II and it is considered among the most important prehistoric centers of the Central Balkans. During this period, mutual relationships with Bubanj Hum and Baden Kostolac cultural groups were evidenced in eneolithic sites in Kosova, particularly in Hisar, based on the typology and analogy of ceramics (Drançolli 2006: 11–19).

The Bronze Age

Archaeological excavations in Gllareva near Klina revealed swords and daggers of the Bronze Age of Mycenaean import which characterize a social differentiation and the formation of aristocracy. The phenomenon of bi-ritual burial (cremation and inhumation) was practiced in Kosova during the Bronze Age (2200–1150 BCE). Main sites of Bronze Age in Kosova are Gllareva (fourteenth–thirteenth century BCE), Vallaç, Karagaç near Mitrovica; Glladnica, Lower Bërnica near Prishtina; Boka of Përçeva near Klina; Burial Mound in Rogova near Gjakova; Upper Gadime (Gadime e Epërme) near Lipjan; Cërnica (near Gjilan), etc. Late Bronze Age – Bërnica Cultural Group (fourteenth–tenth centuries BCE) is one of the most characteristic period in Kosova. Cremation was the dominant burial ritual, where the cremated remains of the deceased person were placed in urns and buried in graves. During the transitional period from Late Bronze to Early Iron Age, tumuli and burial mounds were accompanied with grave goods and grave offerings that were typical feature for the Illyrian population such as Dardanians, an Illyrian tribe, which

Kosova: Archaeological Heritage, Fig. 4 Illyrian tumuli. Gjinoc near Suhareka

lived in the present territory of the Republic of Kosova. In most cases, central graves were built from stone structure and surrounded in circle by other graves based on hierarchy of the persons that were buried in the same necropolis (Fig. 4).

The Iron Age

The Iron Age (1200 BCE–fourth century BCE) is a particular period which is characterized by hillfort settlements and tumuli graves. Unlike the first phase of this period, the second phase, respectively, the early halshtat, according to J. Reineck B 3/C I – D, signals a general stability. This period is characterized by the strengthening of the tribal aristocracy and the appearance of the ethnic name Illyr in the Central Ballkans. The ethnocultural stability of this zone, which is expressed in the material culture was not destabilized by the penetration of the foreign ethnic elements. In the realm of Kosova, this ethnic element appears in Shiroka and Dubiçak of Suhareka; therefore, it is named "the group of Suhareka" (Mirdita 1997: 170–1). In this context, the necropolises with tumuli are also included: Llashtica near Gjilan (Fig. 5), Upper Gadime, Romaja near Prizren, Rogova, Përçeva, Baja of Peja, etc.

Approximately 15 km west of Pristina, Bellaçevc hillfort settlement is situated. It was naturally protected from three sides and only from the eastern side, it was shielded by defensive ditch. The hillfort is of trapeze shape and covers an area of 70 × 50 m. Dardanian ceramics decorated with grooves and dotted lines, discovered on the plain of Kosova, appears as "the Janjevo pantry" (seventh–eighth c BCE). Since the findings of this cultural group are from metal, like horse equipment, they cannot belong to necropolises. On the other side, a location of the necropolis type with tumuli that attracted attention of many scholars is Baja e Pejës, which is located approximately 12 km on the west from Peja, on the road leading to Mitrovica. A Dardanian prince pair was buried there. The bases of the grave construction were rectangular in shape, with rounded sides. The cemetery inventory consisted of 3 typical Illyrian bronze helmets, 2 silver fubule with an arched body, 2 silver fibulae and omega shape, 2 large silver buttons, 4 large bronze buttons, 2 large silver buckles, a large silver belt plate, 8 small bronze arrowheads, 4 two-handled clay vessels without complete black figures of the fourth century BCE, and some skyphos kantharos and hydria fragments (Fig. 6). The Illyrian cemetery in Baja of Peja is dated into the end of the sixth and the beginning of the fifth century BCE. In the first two phases the culture with traditional decorative elements is encountered, which testifies the autochthonous ethnocultural continuity. In the third and the fourth phase of the Iron Age

Kosova: Archaeological Heritage, Fig. 5 Illyrian tumuli. Lashtica near Gjilan

Kosova: Archaeological Heritage, Fig. 6 Silver and bronze grave goods from Baja of Peja. Museum of Kosova

(fifth– fourth centuries BCE) in Karagaç, Shirokë, Upper Gadime and Cërnicë near Gjilan, besides the domestic production, the imitation of Hellenic production is clearly noticed. This phenomenon is testified almost in all of the Dardanian territory (Mirdita 1997: 171; Korkuti 2006: 11).

Antiquity-Roman Period

Romans conquered Dardania at the end of the first century BCE. During the reign of Emperor Tiberius – Roman Period around the year 15 CE – Dardania was included in the Upper Moesian Province. Only during the reforms of Emperor Diocletian, in 297 CE, Province of Dardania was formed. Roman urbanization of the province was conducted by development of settlements, which were certainly accompanied by construction of roads, evidenced by the milestones, and old maps indicating their existence. The spiritual life of the population was represented mainly by monuments dedicated to the Roman pantheon. The present territory of the Republic of Kosovo represented the nucleus of the Roman Province of Dardania that included Southern part of Serbia, Northeast part of Albania, and Northwest part of Republic of Macedonia.

Municipium DD

The first settlement of Romans in today's territory of the Republic of Kosovo is dated from the end of first and beginning of the second century CE, a time when they are found predominantly in the rich-in-mine areas of Kosova. Important mining center of this area in ancient times are Municipium DD and Ulpiana. These centers have been built along the settlements of the native people, whose remains have not been sufficiently investigated. Above-mentioned centers were the imperial estates, and as such have had their

money on which was engraved METALLUM ULPIANUM and METALLUM DARDANICA. Metallum Ulpianum included the mines in Kishnica near Prishtina, Janjeva, Novoberda. The Metallum Dardanica refers to the Municipium DD and other centers in Kopaonik and Rogozno (Mirdita 1997: 172).

One of the most researched Roman cities is Municipium DD (Dardanorum), which is located in the vicinity of Soçanica, 25 km north from Mitrovica. It obtained the status of Municipium in the second century CE. At that time, the Roman population colonized these regions because of their rich mines of lead, zinc, and gold. At the end of the fourth century CE, the town was deserted. Archaeological systematic excavations which were carried out in one part of the village found forum, basilica, parts of thermae, details of smaller buildings, as well as necropolises and discovered epigraphic monuments, where the formulation Municipium DD was written. Based on the researched material and characteristics of buildings, life in the municipium DD of Soçanica, we consider that it existed during the period from the second century CE until the first half of the fourth century CE (Çershkov 1973: 81–187).

Municipium Ulpiana

Municipium of Ulpiana is situated in the area of the Graçanica municipality, 7 km southeast of Prishtina. It was raised to the rank Roman municipium at the time of Emperor Trainaus (98–117 CE). In the late antiquity, it became episcopal center. The relevant sources mention the first Christian martyrs of Dardania: Florus and Laurus, stonecutters from Ulpiana, who gave their lives as result of religious persecution in the second century CE. A catastrophic earthquake in 518 CE destroyed Ulpiana, which was witnessed and written in Chronicon by Comes Marcelinus. The Municipium of Ulpiana was completely rebuilt and renamed in Justiniana Secunda in tribute and respect of Emperor Justinian I. It is very important to highlight that the Emperor Justinian I was born in the Province of Dardania, as claimed by the author Procopius Caesariensis. In his book, *De Aedificiis*, Procopius informs us about the building activities that were carried out directly by the emperors' orders and marks 69 fortress in the Province of Dardania, 61 renovated and 8 newly built.

The first archaeological excavations in Ulpiana were conducted in 1953. Archaeological excavations during 1953–2010 uncovered stratums of inhabitations and other monuments from the Eneolithic up to the seventh century CE. The city, together with a *castrum*, suburb, places of worship, and a graveyard, occupies a surface of 120 ha. The first archaeological excavations revealed four graves which are known as "northern necropolis." Further archaeological excavations were mainly focused in northern part of the settlement and the most significant discoveries are the construction of the basilica type, parts of Roman bath, parts of temple, city road with sewage, North Gate, and rampart of the city. Among the three buildings, the appearance of Northern Memory building with a huge marble sarcophagus is especially worth mentioning (Fig. 7). During archaeological excavations, in Northern Gate of Ulpiana, two horseshoe-shaped fortified towers (kullas) were identified, which were built above two kullas existing before. Some of the parts are evident nowadays, too. The city was encircled by the 3-m-thick ramparts. From the outside, the towers are of the semi-arc form whereas inside the fortified walls, they are of the irregular rectangle form or of the horseshoe or abse form. Much importance is devoted to research of the paleochristian church (Basilica). It is possible that this object of cult is built above the graves of Florus and Laurus. It is worth mentioning that in the altar of the basilica, a grave was discovered, which is chronologically older than the basilica. In addition, older than the basilica is the white and dark gray mosaic discovered under the older layer of the floor of this cult monument. Parts of a mosaic are also encountered in the porch of the Memory building. Both of these mosaics are realized according to the "opus tessellatum" technique.

Aside from its architectural inventory and burial structures, many artifacts of archaeological movable heritage were discovered: Sculptures of Apollo, Mercury, and Mercury with Pluto,

Kosova: Archaeological Heritage, Fig. 7 Late Roman Period. Memoria, Ulpiana

Iuppiter Ulpianensis (Melcid), head of the man, head of Eros, votive plaque bearing the representation of the Thracian hero, pieces of weapons, jewelry and others, the jewelry from the so-called Gothic grave or cruciform gold-plated fibulae, etc. (Popović & Čerškov 1956: 319–26; Fidanovski 1984: 38–9). The economical development enabled the rich cultural life in Ulpiana. Therefore, the discovery of the theatrical masks in this municipal center testifies about the development of the theater there. A certain form of romanization is expressed not only in its urbanism and infrastructure but also in its religious life. Apart from Ulpiana, but not so far, in "Geography" of Ptolomey is also mentioned Arribantium (47° 30′ and 42° 00′), one of the four biggest centers of Dardania, which not only is unexplored, but it remains unknown up to today (Kozličić 2006: 21–36).

In the first decade of the twenty-first century, Ulpiana became more attractive for archaeological research, not only for the institutions of Kosova but also for major archaeological centers of Europe. In this context, it is neccessary to mention the contribution of the researchers of German Archaeological Intitute (Deutsche Archäologisches Institut) who accompanied by the Archaeological Institute of Kosova and The Museum of Kosova, always using interdisciplinary investigations did the recording of more than fifty acres of land without physical intervention. These results encourage the intensified cooperation with international experts who successfully would fullfill the deficit of the home experts staff.

Unlike works at Ulpiana, investigations of the neighboring Roman station Vindenis had the character of test excavations. Vindenis is one of few road stations mentioned in ancient maps that describe the ancient trans-Balkan road Naissus-Lissus. It is positioned near Gllamnik approximately 6 km to the southeast of Podujeva. Many different objects were found there: jewelry, ceramic pots, glass and terracotta goblets, etc. In the remnants of a villa, a room was found with a floor mosaic presenting the image of Orpheus.

Gradina of Peja

Along with the above-mentioned excavations in the territory of the Plain of Kosova, archaeological excavations also in the region of the basin of Drini i Bardhë river were also carried out, that pervades Rrafshi i Dukagjinit and a part of the Northeastern Albania. The river has a length of 175 km and a basin surface of 4,956 km^2. The surveys between 2000 and 2005 in the region of Drini i Bardhë (Pejë, Deçan, Klinë, Rahovec, Prizren, Dragash, Suharekë e Malishevë) recorded 264 archaeological sites, a part of which were new

discoveries belonging to different periods from the Neolithic through to the Early Middle Ages. As an example, we can emphasize the researches in Bajica near Peja; Batusha, Bellacerka, Doblibar, Jahoc, Kusar, Marmullë, Moglica, Rakovina, Ratkoc, and Rogovë near Gjakova; Çifllak, Gegjë, and Zatriq near Rahovec; Dërsnik and Zllakuçan near Klina; Hereq near Deçan; Hisar of Suhareka and Hisar of Kasterc near Suhareka; Fortress of Prizren, Korishë, Tupec, Vërmica, and Vlashnje near Prizren, etc. (Korkuti 2006: 7–8).

Unlike Kosova basin settlements where agriculture was secondary compared to the mining, in the settlements along the Drini i Bardhë basin, agriculture represents the primary branch of the economy. From these archaeological sites, the archaeological site in the village Bajicë should be particularly mentioned. Its importance is well known since the work of Arthur Evans in 1885. This is a unique archaeological finding, almost the only one in the Balkans. On the basis of a large crypt, the funeral function of the building is testified which is assumed to represent

Kosova: Archaeological Heritage, Fig. 8 Necropolis of Graboc i Ulët, Fushë Kosova view from the excavations

a Paleochristian mausoleum (Jovanović 1967: 121–5). During the survey of this site in 2005, we found traces of archaeological immovable and movable objects of Late Antiquity.

We should mention that on the occasion of the opening of the foundation of the factory of accumulators in the field of Peja in 1978, the remains of a big complex were found. From this complex, only three architectonic objects were discovered, one epigraphic monument (which is preserved in the Ethnographic Museum of Peja), and a considerable number of coins. From this excavation only, the results for the epigraphic monument have been published so far (Mirdita 1980: 187, T.1/3, Mirdita 1981: 251, No. 235 (34)). The documentation of the excavation, which was preserved in Institute of Kosova for the Protection of Cultural Monuments, was stolen by the Serbian forces during the war of 1998–1999. Hungarian archaeologist Buday Árpád, while doing the survey in 1917, encountered epigraphic traces and rich architectural material as well as the ruins of the fortress on the left side of the Bistrica river. After his survey in Peja, Árpád left an archaeological map of the region of Peja, a sketch of the fortress of Peja, some photos of the terrain, and some photos of the epigraphic monuments, which were transcribed carefully by him (Buday 1918: 8–25, 77–83).

All this rich archaeological material, especially with the epigraphic plates that were discovered in it, proves that Gradina of Peja ranks immediately after the complex of Ulpiana according to their importance. Here in this big archaeological complex, a search should be conducted for the Seperunt of Ptolomey (Çershkov 1973: 50). On a part of this important archaeological complex a factory was built, whereas the remaining part was almost covered entirely with the building of the private houses. All this proves that more research is needed.

Medieval Period

Archaeological research regarding the Middle Ages Period in Kosova does not possess a long tradition. However, the discovery of a considerable number of monuments and findings created the conditions that this cultural heritage attracts the attention of Middle Ages archaeologists and scholars from other fields. The first archaeological researches in this field were amateurish. But from 1950 on, the research of localities and monuments is a study object not only for professional archaeologists but also for architects, historians, and historians of art.

Kosova: Archaeological Heritage, Fig. 9 View of Novoberdo Fortress

Research conducted so far offers mostly results for the Late Middle Ages Period and the Ottoman Period, whereas we have less information regarding the Early Middle Ages Period. In general, tens of monuments of cult of the Middle Ages Period such as the complex of Studenica Monastery were discovered, which was built on the ruins of a Paleochristian basilica of Studenica village near Istog, the complex of Patriarchanne of Peja, also built on the ruins of a Paleochristioan cult monument, Deçani Monastery, Monastery of Graçanica, Monastery of Banjska near Mitrovica, Cathedrale church of Novobërda, and the Cathedrale church Saint Prena in Prizren, and any other church or basilica discovered within the walls of fortress. In addition, some necropolises such as those in Matiçan near Prishtina, Çeçan near Vuçiterna, Vërmica and Gjonaj near Prizren, Graboci i Ulët near Fushë Kosova (Fig. 8), Përçeva, etc., were discovered. A considerable number of Paleochristian and Medieval necropolises were also discovered within the complexes of churches and monasteries. Besides the monuments of cult, special attention was paid to the fortresses of Late Antiquity and Middle Ages. Of great monumental value is the multilayer complex fortress of Novobërda (Fig. 9), Prizren, Zveçan, Harilaq (http://archaeology-in-europe.blogspot.com/2005_07_01_archive.html#112265100443716126; Fig. 10), Pogragja of Gjilanit, Kaçanik, Vuçiterna and Korisha (Figs. 17, 18). The surveys held during the period 2000–2005 in the region of Drini i Bardhë also evidenced a considerable number of fortresses of Late Antiquity and Middle Ages such as that of Brrut near Prizren; Cermjan and Kusare near Gjakova; Gegja and Zatriqi near Rahovec; Jabllanica e Madhe and Radac near Peja; and Dollc, Pogragja, Ujemir, and Volujak near Klina (Drançolli 2006: 167–73; Korkuti 2006: 8).

Kosova possesses a great number of objects from the Ottoman cultural heritage. Of great importance are the mosques, such as the Mosque of Sultan Mehmed II-Fatih in Prishtina (fifteenth century) and the Mosque of Sinan Pasha in Prizren (seventeenth century). Besides the mosques, the hamams, cemeteries, teqes, and their architectural objects are present. This heritage, until 1999, was not an object of archaeological explorations but was treated only as a subject of the general cultural heritage.

Kosova: Archaeological Heritage, Fig. 10 Fortress of Harilaq, Fushë Kosova view from the excavations

Cross-References

- ► Central–Eastern Europe: Historical Archaeology
- ► Cultural Heritage Management and Armed Conflict

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Kostenki: Geography and Culture

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Introduction

Kostenki is the name of a village on the Don River in the Russian Federation where more than twenty open-air Paleolithic sites are known. Several more sites are found at the village of *Borshchevo*, which is located about 5 km downstream from Kostenki. The sites are assigned to the Upper Paleolithic and yield skeletal remains of modern humans (*Homo sapiens*). Artifacts were found in association with the remains of extinct mammals at Kostenki in 1879 and were among the first discoveries of IceAge people in Eastern Europe. By the 1930s, the sites at

Kostenki and Borshchevo had produced a rich record of middle and late Upper Paleolithic occupation, including large feature complexes with traces of suspected dwelling structures. The excavation and study of the occupation floors had a significant impact on theory and method in archaeology during the Soviet period. In the years following the Second World War, substantial evidence of early Upper Paleolithic occupation was discovered at Kostenki, adding another important dimension to these sites. The recent discovery that several sites contain occupations that underlie a 40,000-year-old volcanic ash provided evidence of the earliest known Upper Paleolithic remains in Eastern Europe. Field research continues today at Kostenki and Borshchevo, and the results continue to have an impact on world archaeology.

Definition

Kostenki is located on the Middle Don River near the city of Voronezh in the Russian Federation at 51° 40′ North and 39° 10′ East. The village lies on the west bank of the river and the eastern margin of the Central Russian Upland at an elevation of approximately 125 m above mean sea level. The village of Borshchevo is situated several kilometers southeast of Kostenki. The area is within the modern forest-steppe zone and experiences a continental climate with mean July and January temperatures of 19 °C and −8 °C, respectively. Precipitation averages 520 mm per year.

A total of 21 stratified Upper Paleolithic open-air sites have been investigated at Kostenki, and five or more sites have been discovered at Borshchevo. Although several sites are found in the main valley, most are situated at the mouths or in the upper courses of large side-valley ravines that are incised into the high west bank of the Don River. Springs are active today in the ravines, and primary carbonate deposits in the sites indicate that they were active during Upper Paleolithic times as well (Holliday et al. 2007: 217–219). The sites are found primarily on the first (10–15 m) and second (15–20 m) terrace levels (Lazukov 1982: 21–35).

Mammoth bones were known from Kostenki centuries ago and evidently account for the name of the village (*kost'* is the Russian word for bone), but archaeological remains were first discovered in 1879 (Klein 1969: 29). Major excavations began in the 1920s and 1930s, and these were focused primarily on middle and late Upper Paleolithic occupations (especially the large Eastern Gravettian component in Layer I at Kostenki 1 (Efimenko 1958)). Early Upper Paleolithic remains were investigated in the lower layers at Kostenki 1 and other localities prior to World War II (e.g., Kostenki 6), but most research on the early occupations was initiated by A. N. Rogachev in the late 1940s (Rogachev 1957; Klein 1969: 231–2).

The high west bank of the Don Valley, which represents the eastern margin of the Central Russian Upland, is composed of Cretaceous marl (chalk) and sand (Lazukov 1982: 15–7). Upper Paleolithic sites are buried in fill deposits of the first and second terraces of the Don River. The terraces are found in both the main valley and in portions of the large side-valley ravines incised into the west bank of the valley. The terraces are composed of alluvium, which unconformably overlies the pre-Quaternary units, capped with a complex sequence of eolian, slope, and spring deposits (Lazukov 1982: 15–22; Holliday et al. 2007: 182–4).

The uppermost alluvium is interstratified with coarse slope deposits derived from the Cretaceous bedrock (Lazukov 1982: 21). Above these deposits lies a sequence of alternating thin lenses of silt, carbonate, chalk fragments, and organic-rich loam (Holliday et al. 2007: 184–6). At many localities, they are subdivided by the volcanic tephra horizon, which has been identified as the *Campanian Ignimbrite* (CI) Y5 tephra, derived from an eruption in southern Italy and dated to c. 40,000 cal BP (Pyle et al. 2006; Anikovich et al. 2007). Traditionally, the lenses below and above the tephra have been termed the *lower humic bed* and *upper humic bed*, respectively (Rogachev 1957; Klein 1969). The humic beds apparently represent a complex interplay of colluviation, spring deposition, and soil formation (Holliday et al. 2007). At some sites, more

typical soil profiles developed, including a weakly developed soil (*Gmelin soil*) that formed during the early stages of the LGM (Last Glacial Maximum) and dates to c. 26,000–25,000 cal BP. Above the Gmelin soil lies loess-like loam of LGM age, which is capped with the modern chernozem (Lazukov 1982; Holliday et al. 2007: 219).

Key Issues/Current Debates/Future Directions/Examples

The earliest occupation levels at Kostenki and Borshchevo underlie the CI Y5 tephra and date to 42,000–41,000 cal BP or older (Anikovich et al. 2007; Hoffecker et al. 2008). There is continuing debate and discussion about the age and cultural affiliation of these occupation levels. In the early 1950s, P. I. Boriskovskii (1963) excavated a level below the tephra at Kostenki 17 (Layer II), which yielded burins, large retouched blades, end scrapers, and microblades. Other items included bone awls and point fragments and various ornaments. A similar assemblage was recovered from below the tephra level at Kostenki 12 (Layer II). These assemblages have traditionally been labeled as a local early Upper Paleolithic industry without clear links to others in Western or Eastern Europe (*Spitsyn culture*).

A somewhat different assemblage has been found below the CI tephra in the lowest level (Layer IVb) at Kostenki 14 containing bladelets, burins, end scrapers, and several bifaces; non-stone artifacts include antler mattocks, bone points, perforated shells, and a carved ivory piece that may represent the head and neck of a (unfinished) human figurine (Hoffecker et al. 2008).

Several strikingly different assemblages have been excavated from below the tephra at Kostenki 6, Kostenki 12 (Layer III), and other sites. These occupations contain end scrapers and Middle Paleolithic flake tool types, such as sidescrapers, small bifaces, and triangular points; non-stone tools, ornaments, and art are totally absent (Rogachev 1957; Praslov & Rogachev 1982; Anikovich et al. 2008). Traditionally, they have been assigned to an East European industry known as the *Strelets culture* (Anikovich et al. 2007: 236–40). An alternative view is that these assemblages, which are often associated with evidence for killing and butchering large mammals (primarily horse, mammoth, and reindeer), represent a functional subset of the other industry (i.e., kill-butchery tools and weapons) (Hoffecker et al. 2010).

Human skeletal remains in these layers are confined to a third molar from Kostenki 17, Layer II and the crown of a deciduous tooth from Kostenki 14, Layer IVb. Both are tentatively assigned to modern humans, which are widely assumed to have produced all of the artifacts below the CI tephra at Kostenki and Borshchevo (Gerasimova et al. 2007).

Less controversy surrounds the classification of assemblages that lie above the CI tephra, but below loess-like loams deposited during the LGM, and date to the later phases of the early Upper Paleolithic. At Kostenki 1, Layer III contains an artifact assemblage widely classified as *Aurignacian* and comprising large blades with scalar retouch, carinate scrapers, backed bladelets, and other diagnostic items (Anikovich et al. 2007: 228–33; Anikovich et al. 2008). An older Aurignacian assemblage is associated with the tephra layer at Kostenki 14 (Sinitsyn 2003).

Another group of artifact assemblages dating to this interval contains a high proportion of end scrapers, as well as typical Middle Paleolithic forms (e.g., sidescrapers, points), and a varied assortment of bone artifacts. Among the bone artifacts are diagnostic "shovels" and the oldest known eyed needles. These assemblages are found in the upper portion of the upper humic bed at Kostenki 14 (Layer II) and the lower portion of the upper humic bed at Kostenki 15 (Praslov & Rogachev 1982); both are associated with evidence for the killing and butchering of a group of horses (*Equus latipes*) (Hoffecker et al. 2010). A similar assemblage is thought to be deposited with the Streletskaya assemblage in Layer I at Kostenki 12, and the assemblage in the lower part of the upper humic bed at Kostenki 14 (Layer III) is sometimes considered part of this group (Praslov & Rogachev 1982). These assemblages are assigned to the *Gorodtsov culture*

(Rogachev 1957; Efimenko 1958), which is recognized at several other East European sites (e.g., Mira in the Dnepr Valley) but unknown in Western and Central Europe (Anikovich et al. 2007: 248–65).

Skeletal remains assigned to modern humans are associated with these assemblages at Kostenki 15, which yielded the partial skeleton of a child in a burial pit, and at Kostenki 12, Layer I (Gerasimova et al. 2007: 102–5). A complete modern human skeleton also was excavated from a burial pit in Layer III at Kostenki 14 (Rogachev 1957); although mid-Holocene dates on the human bone were reported several years ago, the most recent date is more than 30,000 cal BP and consistent with the stratigraphic context of the upper humic bed. Analysis of ancient DNA from this skeleton indicates that it belongs to mtDNA haplogroup U2 (Krause et al. 2010).

At Kostenki 11 (Layer V) and Kostenki 12 (Layer Ia), the lower upper humic bed contains assemblages with diagnostic triangular bifacial points, typical Middle Paleolithic artifact forms (points and sidescrapers), and also some end scrapers and burins; non-stone artifacts are absent. Similar artifacts are found in the upper portion of the upper humic bed at Kostenki 12 (Layer I). Traditionally, these assemblages have been assigned to a younger phase of the *Strelets culture* (Anikovich et al. 2007: 236–48; Anikovich et al. 2008); they also have been interpreted as functional variants related to large mammal kill-butchery (Hoffecker et al. 2010).

Yet another industry is represented in the upper portion of the upper humic bed at Kostenki 8 (Layer II). This assemblage is dominated by backed bladelets and points and is widely considered an early form of the *Gravettian technocomplex*, other sites of which are common above the upper humic bed and its stratigraphic equivalents in Eastern Europe (Anikovich et al. 2007: 233–6; Anikovich et al. 2008). Associated human remains at Kostenki 8 include skull fragments (Gerasimova et al. 2007: 90–1).

The archaeological remains for which Kostenki is most famous are those of the Eastern Gravettian (middle Upper Paleolithic) dating to the early phase of the LGM (~25,000 cal BP). They include, most notably, the large feature complexes at Kostenki 1, Layer I, and associated remains at the nearby localities of Kostenki 13 and 18 on the north side of the mouth of Pokrovskii Ravine (Efimenko 1958; Praslov & Rogachev 1982; Anikovich et al. 2008). The feature complexes comprise a linear arrangement of hearths surrounded by pits of varying size that contain large mammal bones and artifacts. Diagnostic artifacts include "Kostenki points," "Kostenki knives," and examples of "Venus figurines" carved in ivory and marl. The assemblages also contain burins, end scrapers, microblades, and a variety of bone and ivory implements. As in Central Europe, there is evidence for Gravettian fired ceramic technology (Praslov & Rogachev 1982). The assemblages are similar to those of comparable age (and associated with similar feature complexes) at Avdeevo and Zaraisk, and sometimes placed in a local *Kostenki culture* within the broader Eastern Gravettian entity (Anikovich et al. 2008).

Faunal remains associated with the Eastern Gravettian occupations at Kostenki are dominated by mammoth and smaller fur-bearing mammals (wolf, fox, and hare). Many of the mammoth bones and tusks are weathered, and these may have been collected from natural occurrences for use in construction of dwellings and other structures or for raw material. Most of the fuel at these sites appears to have been bone (trees were either scarce or absent during this interval), and many of the remains of large mammals hunted by their occupants may have been consumed in the hearths. At least some of the pits may have been dug to the permafrost level during warmer months and used like Inuit "ice cellars" to keep the bone fresh and flammable.

There appears to be a hiatus in settlement at Kostenki during the cold peak of the LGM (roughly 23,000–22,000 cal BP). Later Upper Paleolithic occupations include examples of oval mammoth bone houses similar to those of comparable age in the Dnepr-Desna Basin (e.g., Mezhirich) at Kostenki 2, Kostenki 11 (Layer Ia), and probably Borshchevo 1 (on the first terrace level) (Praslov & Rogachev 1982). These occupation levels date to the interval following the

LGM cold maximum, before the end of the Pleistocene (19,000–14,000 cal BP), as do the more widespread mammoth-bone houses in the Dnepr-Desna Basin, although several investigators believe that they are older (e.g., Lazukov 1982).

At Kostenki 11, the mammoth-bone structure has been left in situ on the excavated floor of Layer Ia; a portion of the exposed excavation is enclosed in a museum building at the south end of the village of Kostenki. The collapsed mammoth-bone structure measures 7–8 m in diameter and is composed primarily of mandibles, scapulae, pelves, and long bones. A minimum of 36 individual mammoths are represented. Around the former dwelling, to the north, west, and south, are large pits, filled chiefly with bone debris. At Kostenki 2, a bone-lined pit burial is associated with the mammoth-bone dwelling structure (Praslov & Rogachev 1982; Anikovich et al. 2008).

Cross-References

- ▶ Art, Paleolithic
- ▶ Bone Tools, Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Prehistoric Rock Art
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ Geoarchaeology
- ▶ *Homo sapiens*
- ▶ Human Remains in Museums
- ▶ Macphail, Richard I.
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Site Formation Processes
- ▶ Social Archaeology

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Kow Swamp

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Introduction

Kow Swamp is the name given to the largest Late Pleistocene cemetery thus far found in Australia. Site excavations led by Alan Thorne in the late

1960s and early 1970s revealed skeletal material belonging to more than 40 individuals with ages ranging from infant to adult. All but one were male. The morphological character of the material presented an important challenge to existing evolutionary theories of human settlement in Australia. Amid controversy, in 1991, the collection was repatriated to Aboriginal people and subsequently reinterred, heralding a significant shift in the ethics of conducting archaeological research to include a greater involvement with Indigenous Australians.

Key Issues

Early Humans in Australia

As the largest group of Late Pleistocene fossils found in Australia, the Kow Swamp material substantially increased the body of evidence from which archaeologists and physical anthropologists could theorize about a range of complex issues such as the biological origins and transformations of human populations in Australia (Thorne 1971). As with other skeletal material found on the continent, the collection was generally poorly preserved, and only twelve of the best preserved and most complete individuals were recorded in detail. The collection generally was deemed morphologically "robust" but found to be relatively young with radiocarbon dating of shell, bone, and charcoal providing age estimates ranging between 9,000 and 15,000 years ago (Thorne 1976). The collection challenged any simple evolutionary framing of the origins and transformations of humans in Australia, whereby a robust population preceded but subsequently transformed to produce morphologically gracile humans. The robust morphology but relatively young age of the Kow Swamp material led to two possible explanations that Kow Swamp represented either the descendents of one (of multiple) colonizing populations or the descendents of a single colonizing population that subsequently diversified (Thorne 1971; Thorne & Macumber 1972). The proposition that multiple founding populations entered Australia was preferred at the time, but contemporary reinterpretation favors a single founding population entering Australia that later diversified to produce the considerable variation evident in the human skeletal record (see, e.g., Pardoe 2006). Both explanations are theoretically possible. While the Kow Swamp collection has been significant in debates relating to the peopling of the Australian continent, it also played an important role in shaping contemporary archaeological practice in Australia, in relation to Indigenous Australians.

Repatriation Controversy

Indigenous opposition to the Kow Swamp excavations had been voiced since the early 1970s and a formal attempt made to halt excavations (which had by then ended) by the Aboriginal Legal Service issuing a writ to the authorizing institution, the then named National Museum of Victoria (Griffiths 1996). Subsequent removal of the Kow Swamp material from archaeological possession was made possible some time later by legislative changes in 1984 to the Victorian *Archaeological and Aboriginal Relics Preservation Act 1972* (Mulvaney 1991). These made display or possession of skeletal material illegal without permission from the Secretary of the Department of Planning and Environment. The Victorian Aboriginal Legal Service learned from Aboriginal employees of the National Museum of Victoria that one of the Kow Swamp crania was to be exhibited at a high-profile exhibition *Ancestors: Four Million Years of Humanity* at the American Museum of Natural History which ran from April 13 to September 9, 1984 (Tattersall et al. 1985). The Victorian Aboriginal Legal Service then applied under the act to have the material removed. Just days before it was due to be exhibited, the cranium was withdrawn and the entire collection held by the National Museum of Victoria until the eventual repatriation.

The Australian Archaeological Association (AAA) responded to the removal and the legislative changes that facilitated the event by forming a committee, chaired by Alan Thorne. They prepared their first ever position paper drawing on and closely following the reburial policies of similar societies in the USA and Canada

including the Society for American Archaeology, the American Association of Physical Anthropologists, and the Canadian Association for Physical Anthropology (Meehan 1984). The AAA also wrote letters to both state and federal government ministers. These professed sympathy for Aboriginal views generally and "welcomed" their "first time" "interest" in "prehistoric sites." The AAA also fully supported the reburial of individuals who were *known* to living Aborigines. However, the paper remained opposed to the reburial or cremation of other skeletal material highlighting the "scientific importance" of the Kow Swamp fossils to archaeology and related disciplines. The paper's proposed solutions for addressing tensions around the reburial issue included training Aboriginal people as archaeologists and museum curators, establishing "keeping places" (buildings made to securely house material under Aboriginal control such as that already planned for Lake Mungo), and initiating joint projects between Aboriginal people and archaeologists (Meehan to Walker, in Meehan 1984).

The AAA committee and individual archaeologists and physical anthropologists expressed great concern for the future study of skeletal material in the state of Victoria, and elsewhere (e.g., Brown in Meehan 1984). Victorian institutions held the largest share of prehistoric skeletal collections found in Australia (Lewin 1984). At the time, it seemed that all skeletal material held by these could be subject to claim. The Victorian Aboriginal Legal Service making the claims clearly expressed their clients' preference that "everything must return home, to be reburied" (Lewin 1984: 393). In that same year, using the same legislation, the Victorian Aboriginal Legal Service had applied to have repatriated from the University of Melbourne's Anatomy Department, the Murray Black skeletal collection which consisted of some 800 individuals. Also in 1984, Tasmania, another Australian state, announced its intentions to return all publicly housed skeletal material to Aboriginal people. It was expected that all would be cremated. At the time, the AAA committee expressed a deep concern that the potential removal and reburial of all Victorian and Tasmanian skeletal material would effectively end all scientific study of prehistoric human biology in Australia (Meehan 1984).

The AAA dedicated a special session of their annual conference to the issue in that same year. The Victorian Aboriginal Legal Service also sought to explore the issues by holding a conference on an Aboriginal Skeletal Remains Conference in Melbourne, and representatives from the AAA and Victorian Government attended. Specific responses from individual archaeologists at the time were varied but largely unsupportive of Aboriginal claims. More extreme responses to the removals and eventual repatriations included claims that the actions were "criminal," "racist," and potentially heralded the "death" of the discipline (see, e.g., Lewin 1984; Meehan 1984; Mulvaney 1991). Interviewed for an article on the issue in *Science*, Thorne noted that "the speed of recent developments has taken the scientific community by surprise, and there is a great deal of uncertainty about what will happen now" (quoted in Lewin 1984: 393). Aboriginal views were largely absent from the public debate, and their feelings on the issues were often portrayed negatively in media reporting. Information regarding their views was largely based on speculation and gleaned from archaeologists directly involved in the repatriation claims (Bowdler 1992: 103). A full account of Aboriginal views on the Kow Swamp repatriation has never been published though it seems that Aboriginal requests for greater involvement in discussions involving the use and display of human remains by the museum led to internal disputes between Indigenous and non-Indigenous staff of that institution. These disputes contributed to the steadfast Aboriginal preference for reburial in that state (Turnbull 2010: 132).

While the Kow Swamp collection had been removed in 1984, its repatriation to Aboriginal people was difficult and lengthy. Negotiations extended over years until amended federal legislation was appealed to by Aboriginal legal representatives. This act, the *Aboriginal and Torres Strait Islander Heritage Protection Amendment Act 1987 (No. 39 of 1987)*, states that "the Aboriginal people of Victoria are the rightful owners of their heritage and should be given

responsibility for its future control and management" and that "where Aboriginal remains discovered in Victoria are delivered to the Minister, he or she shall: (a) return the remains to a local Aboriginal community entitled to, and willing to accept, possession, custody or control of the remains in accordance with Aboriginal tradition" (see Mulvaney 1991). This legislation facilitated the eventual repatriation of the Kow Swamp collection to the Echuca Aboriginal Cooperative, the organization representing local Aboriginal interests.

By the time the Kow Swamp collection was repatriated in 1991, archaeological opinion had shifted, and calls for respectful acceptance of Aboriginal claims of ownership were appearing (e.g., Webb 1987; Bowdler 1992). The controversy surrounding the removal of the Kow Swamp remains, combined with postprocessual attacks on the discipline in the 1980s, accelerated and intensified the political consciousness of archaeological practitioners in the creation and management of the past. Some though were famously hardened in their views. Australia's most senior archaeologist, Professor John Mulvaney, who became involved in the final years of negotiations, referred to the removal and reburial as "the most serious confrontation in Australian archaeology" (Mulvaney 2006: 428) and much later as his "career's most distressing episode." He was generally in favor of greater engagement with interested Aboriginal people and establishing "keeping places" for excavated material, but he remained opposed to reburying material and rejected the proposition that "the remote past can be 'owned' by a local clan" (Mulvaney 2006: 428); it belonged to all humanity. When the National Museum of Victoria repatriated the Kow Swamp collection in 1991, he resigned his (honorary) position at that institution in protest. Moreover, he exited the field of prehistory entirely feeling that his continued oppositional stance to reburial placed him in a "minority" position among his fellow archaeologists (Mulvaney 2006: 428).

Significantly, the removal and repatriation of the Kow Swamp material helped to prompt the development and adoption of a Code of Ethics by the Australian Archaeological Association (McBryde 1992). Based on the World Archaeological Congress' own Code and with input from Australian Indigenous input, Association members discussed and adopted a Code at their Annual Meeting in 1991. Designed to formalize "obligations" to Australian Indigenous peoples and guide appropriate conduct of archaeologists when their work concerns Indigenous heritage, it states that:

> Members agree to acknowledge the special importance of indigenous ancestral human remains, and sites containing and/or associated with such remains, to the indigenous people [and that] members shall not interfere with and/or remove human remains of indigenous peoples without the written consent of representatives authorised by the indigenous people who cultural heritage is the object of investigation (Australian Archaeological Association 1991).

Archaeological Identity

The repatriation of the Kow Swamp collection made plain the differing sociocultural values held by archaeologists and Indigenous people in relation to the human fossil record, and the idea that what archaeologists refer to as "prehistory" also represents personal and collective Indigenous history. Debates over the Kow Swamp repatriation also demonstrated not just the significance of the collection to Aboriginal identity but to *archaeological* identity (Lahn 2007). In doing so, it exposed archaeology as a contemporary practice, situated as much in the present as it is concerned with the past. The "loss" to archaeology of the Kow Swamp material remains important as it signaled a (perhaps momentary) reshuffling of power. This required listening to Aboriginal opposition to an archaeological monopoly over the definition and use of heritage. Archaeology has had to redefine its relationship to those objects upon which its livelihood depends. Reshaping this relationship has required closer attention to the processes (of object creation) than just to the product (archaeological objects), and with this, the realization that heritage is not given but produced. Finally, far from representing the "death" of archaeology in Australia, the repatriation of the Kow Swamp

material helped provoke the opening of a space for new archaeological endeavors with Indigenous people including collaborative research, and an evolving conversation about the appropriate conduct of archaeology that is respectful of the views of Indigenous people on whose lands archaeologists work.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Indigenous Archaeologies: Australian Perspective

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Kristiansen, Kristian

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Basic Biographical Information

Kristian Kristiansen (Fig. 1) is the leading European Bronze Age archaeologist of his generation and has helped make Europe into a key anthropological case in the comparative study of complex societies. He received his Ph.D. from Aarhus University in 1975 and continued there as a postdoctoral research fellow until 1979. Then until 1994, he directed the Archaeological Monuments Division in the National Agency for Nature, Monuments and Sites in the Danish Ministry of the Environment. He became Professor of Archaeology at the University of Gothenburg in 1994 and served as Chair from 1994 to 2010. His lasting contributions to European prehistory and world archaeology include a major reconceptualization of Bronze Age Scandinavia and Europe, the internationalization of Bronze Age studies, the formulation of model field research projects that combine diverse scientific and humanist approaches, and a reconceptualization of heritage work within Europe.

Kristiansen, Kristian, Fig. 1 Kristian Kristiansen

Major Accomplishments

Kristiansen's work on Bronze Age Europe has been published in two foundational books published by Cambridge University Press: *Europe before History* (Kristiansen 1995) and *The Rise of Bronze Age Society* (Kristiansen & Larson 2005). Developing various theoretical themes on materiality, he has focused on the social roles of cultural materials from swords to houses to rock art for materializing local institutions, establishing social identities, and making distant connections. Perhaps most original has been his concern with relationships in shaping the broadest connections across Europe and into Asia. Previously conceived simply in terms of migrations, acculturation, emulation, or trade, he has developed a highly sophisticated view of distant relationships as international travels and linkages built strategically to formulate broad-scale networks of chiefs, warriors, priests, and craftsmen. His first formulation of these international relationships relied on an adaption of world systems theory to prehistory (Rowlands et al. 1987). He has replaced rather unsatisfying concepts of extensive "influences" with a robust model of human agency in a highly interactive and extensive social world. He has built his model with a comprehensive knowledge of the

archaeology literature and museum collections and with a thorough understanding of the ethnographic literature. Bringing together an impressive array of scientific (ancient DNA, wool, and copper analyses) along with humanitarian approaches to identity, his career trajectory has received support from a European Research Council Advanced Grant for his capping project: "Travels, transmission, and transformation in temperature northern Europe during the 3rd and 2nd millennium BCE: The rise of Bronze Age societies."

As a modern academic chief, Kristiansen has built an impressive network of friends among the prehistorians across Europe and many anthropological archaeologists of Anglo-American academia. He initiated the formation of the European Association of Archaeologists with its successful *European Journal of Archaeology*. He helped found the Humanities Centre at the University of Copenhagen, which became a locus for international visits to Denmark by many archaeologists and anthropologists. A who's who of theoretical archaeologists came as guests to his apartment in central Copenhagen, creating a nexus of extraordinary intellectual interchange. The result has been his frequent visits internationally to conferences and many chapters in classic edited books (Kristiansen 1982, 1984, 1987, 1991). From this network of scholars, he wove his own eclectic theory of society based on many intellectual threads often seen in opposition to each other. The result has been an original formulation that blends the best of processual and post-processual thought (Kristiansen & Rowlands 1998).

A major contribution by Kristiansen has been his organization of international and interdisciplinary projects that have systematically integrated a diversity of intellectually themes and field research strategies. Starting in 1990, he organized the *Thy Archaeological Project*, initially bringing together diverse theoretical ideas from Denmark (Kristiansen and Jens-Henrik Bech), England (Mike Rowlands and Nick Thorpe), and the United States (Earle and John Steinberg). Probably the most significant contribution of that project was a reconceptualization of field methods that united research strategies of American archaeologists, the long paleoenvironmental tradition of Danish researchers, and a commitment to integrate academic and rescue studies. Research involved developing methods for pollen sampling, settlement survey including phosphate sampling and plowsoil sampling, and household excavations with full screening and bone recovery and systematic soil sampling for macrofossil remains. Although each part of the research design had been used previously in Europe, the Thy project provided a uniquely integrated approach to long-term sociopolitical change from the Neolithic through the Bronze Age. The Thy Project then provided a model for a massive comparative, international study *The Emergence of European Communities: Household, Settlement and Territory in Later Prehistory* (3200–300 BCE), funded by the Swedish Riksbanken Jubieumsfond and the Marie Courie European Council Grant. This unprecedented comparative work included three new field projects in Tanum, Sweden, Százhalombatta, Hungary, and Monte Polizzo, Sicily, and involved primary researchers from 6 countries and 10 universities. Each project retained the same basic theoretical approaches and diverse field methods to provide comparable data. The result has been a long string of doctoral dissertation, publication, and a major overview book *Organizing Bronze Age Society* (Earle & Kristiansen 2010).

Kristiansen has sought many ways to bring academic research and rescue archaeology together. Although all too often operating separately, he has had the vision to try to integrate the common interests of the two endeavors, the funding of each reinforcing the goals of the other. His attempts have involved creative project design by the Danish Ministry, joint excavations in Denmark, funding of special work in Hungary, and the large-scale investigation of the World Heritage sites in Tanum. European graduate students have been encouraged by Kristiansen to use the rapidly expanding data from rescue investigations for doctoral dissertations and major articles. Kristian Kristiansen is remarkable for his energy, creativity, and vision. He has had

the ability to bring diverse researchers together, energize and help fund their joint research, and use his personal charm to overcome frequent intellectual differences and personal conflicts. His non-doctrinaire theoretical approach is both creative and inclusive, creating a complex and realistic understanding of the human experience.

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► Earle, Timothy
► World-Systems Analysis

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Kryder-Reid, Elizabeth

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Basic Biographical Information

Elizabeth Kryder-Reid is an associate professor of Anthropology and Museum Studies in the IU School of Liberal Arts, at Indiana University Purdue University Indianapolis (IUPUI). She trained as an anthropological archaeologist at Harvard University (A.B.) and Brown University (M.A. and Ph.D.).

Major Accomplishments

Dr. Kryder-Reid has worked across the fields of museum studies, public history, art and architecture history, and archaeology with a particular focus on landscape studies. In addition to excavations of Chesapeake landscapes and public program development with Archaeology in Annapolis, Dr. Kryder-Reid has also been a research associate and contributor to *Keywords in American Landscape Design*, a long-term interdisciplinary reference project sponsored by the Center for Advanced Study in the Visual Arts, National Gallery of Art. Her current research focuses on the California mission landscapes and their role during Spanish colonization and in the construction of public memory in the nineteenth and twentieth centuries. Her teaching areas include cultural heritage, historical and landscape archaeology, and museum studies courses. Dr. Kryder-Reid directed the Museum Studies Program at IUPUI from 1998–2013 and was instrumental in establishing its M.A. program and creating the Public Scholars of Civic Engagement initiative. She is currently the director of the IU School of Liberal Arts' Cultural Heritage Research Center.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Heritage Landscapes
- ▶ Historical Archaeology
- ▶ International Council of Museums (ICOM)
- ▶ Landscape Archaeology
- ▶ Mission Archaeology in North America

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Kuk Swamp: Agriculture and Domestication

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Basic Site Overview

The multidisciplinary evidence for Kuk Swamp has established the island of New Guinea to be a place of early and independent agricultural development and plant domestication (Golson 1977; Golson & Hughes 1980; Denham et al. 2003). Kuk Swamp is located at 1,560 m AMSL in present-day Western Highlands Province, Papua New Guinea. The site forms part of extensive wetlands on the floor of the Upper Wahgi valley, which is one of several, large inter-montane valleys that occur along the highland spine of the island (Figs. 1–3).

In 1969, during initial drainage of the swamp to establish the Kuk Tea (subsequently agricultural) Research Station, which has now been abandoned, several wooden tools associated with much earlier cultivation of the swamp were dug up. From the early 1970s to the 1990s, Professor Jack Golson of the Australian National University supervised a series of archaeological excavations at Kuk – including my own in 1998 and 1999 – designed to investigate the antiquity of agriculture in the highlands of Papua New Guinea. Similar excavations have occurred at several other wetlands in the highlands from the mid-1960s, but the archaeological sequence at Kuk is the oldest, the most complete, and the best investigated.

Evidence of Early Agriculture

Late Pleistocene occupation is indicated by a c. 30,000-year-old hearth at Kuk and burning of the lower montane rainforest on the valley floor from at least 20,000 years ago.

Kuk Swamp: Agriculture and Domestication, Fig. 1 Location of Kuk Swamp on a map of Papua New Guinea (showing provincial boundaries)

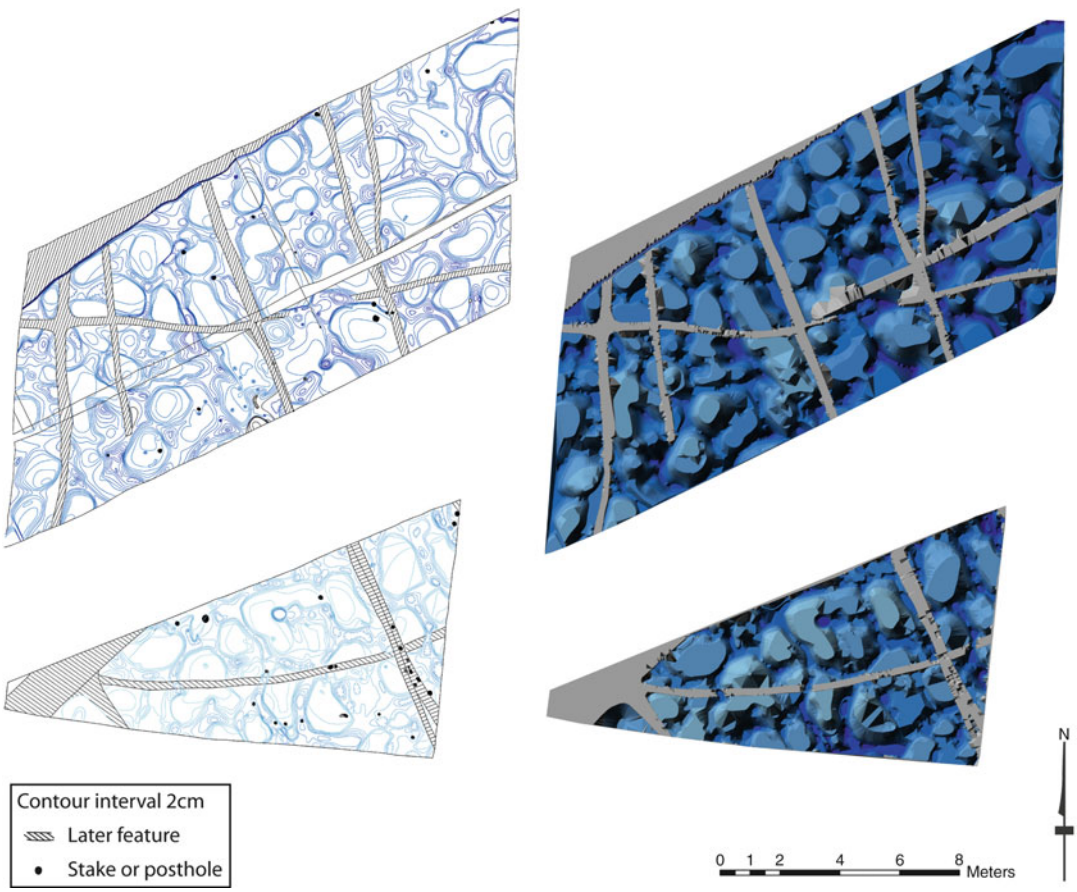

Kuk Swamp: Agriculture and Domestication, Fig. 2 Bases of former mounds used for cultivation dating to c. 7000–6400 cal BP at Kuk Swamp: (*left*) *contour lines* and (*right*) *shaded* (Denham & Haberle 2008)

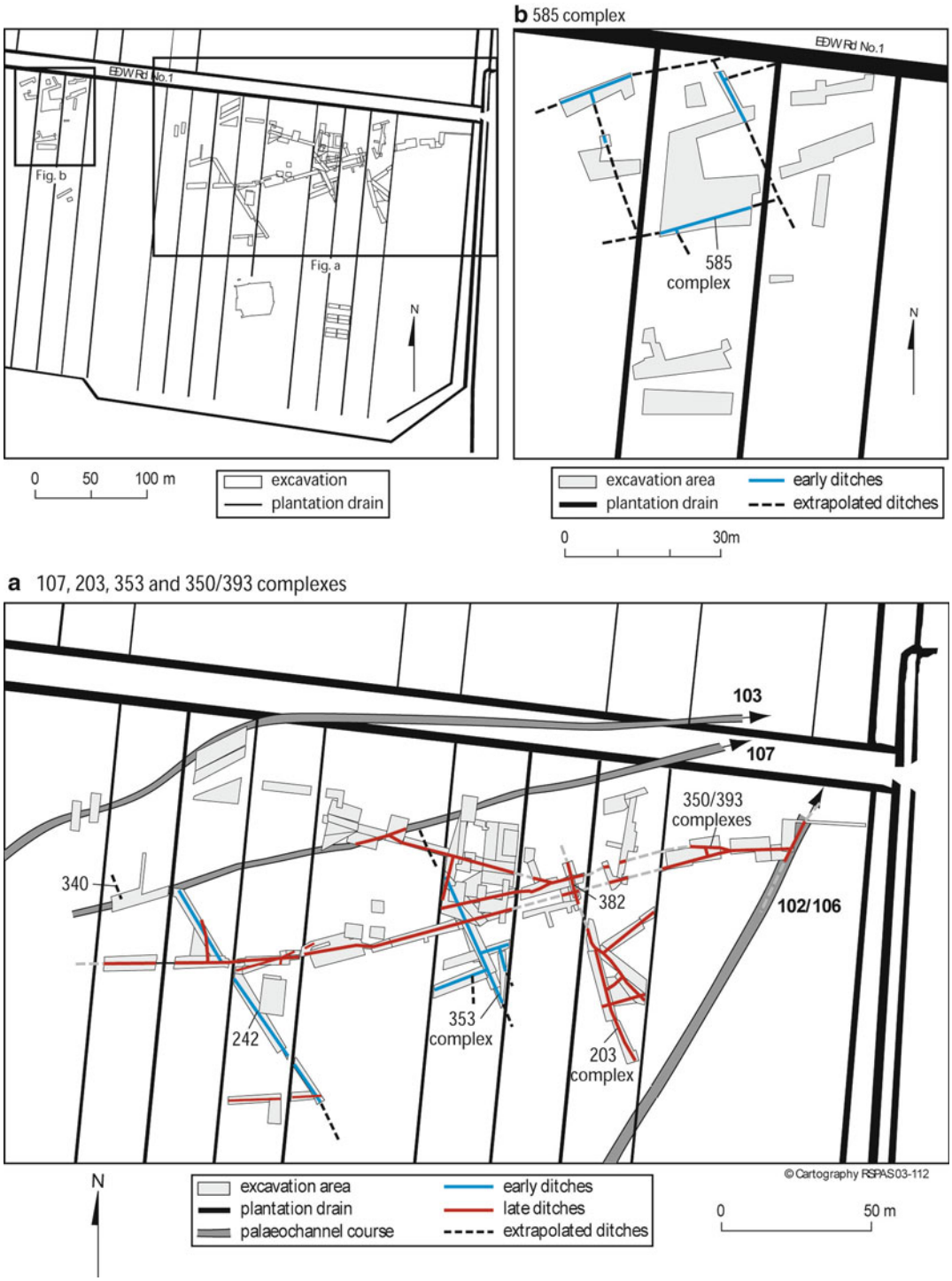

Kuk Swamp: Agriculture and Domestication, Fig. 3 Plan of the earliest ditch networks at Kuk Swamp: (*upper left*) southeast portion of Kuk Swamp showing excavation trenches and inset locations; (*upper right*) plan of "early" enclosure and (*lower*) plan of "early" and "late" networks. In this context, "early" ditches date to pre-4350–3980 cal BP, and "late" ditches to pre-2730–2360 cal BP (Denham et al. 2003)

Although unclear, the pattern of periodic burning and opening up of the forest canopy are suggestive of a human contribution to the disturbance signal. Similar anthropic contributions to Late Pleistocene forest disturbance occur in other highland valleys on New Guinea.

There is clear evidence for wetland manipulation and exploitation of tuberous plants (including a yam and an aroid) at Kuk around 10000 cal BP. The multidisciplinary evidence is suggestive of vegetation clearance, digging, staking of plants, microtopographic manipulation, and plant exploitation during a short-lived dry period on the wetland margin. The significance of these finds is unclear, although they may indicate foraging activities as opposed to cultivation.

From c. 10000–7000 cal BP, there are sparse in situ archaeological remains of former plant exploitation at Kuk. However, palaeoecology and archaeobotany indicate continued human disturbance to the montane rainforest and exploitation of tuberous plants, as well as periodically high frequencies of banana phytoliths, which may indicate planting locally. These signals have been interpreted to represent shifting cultivation within the Kuk catchment (Denham & Haberle 2008).

At c. 7,000–6,400 years ago, there is clear evidence for former cultivation at Kuk. The bases of former mounds used for planting are preserved, and these are inferred to have enabled the cultivation of plants with variable edaphic requirements. Different types of archaeobotanical evidence suggest multicropping including bananas (phytoliths) and potentially root crops (starch grain residues). At this time, the montane rainforest was effectively cleared in the Kuk vicinity; these grasslands were maintained by periodic burning and cultivation until the first Australian-based gold prospectors and colonial officer entered the valley in 1933.

From c. 4500–4000 cal BP up to the recent past, sequential ditch networks were dug to drain the wetland at Kuk for cultivation. Early ditch networks are of multiple forms, including rectilinear, although the characteristic rectangular or gridded pattern of gardens in the Upper Wahgi valley today originated perhaps less than 2,000 years ago. It is unclear whether periods of drainage and abandonment documented locally represent spatially variable cultivation of the wetland through time or represent broader-scale responses to climatic, environmental, or social stimuli. Various settlements dating to the last c. 1,000 years have also been mapped and excavated at Kuk.

Numerous wooden digging sticks and spades similar to those still being used in 1933 have been found in archaeological contexts at Kuk and other sites in the Upper Wahgi valley. Most are less than 2,500 years old. The oldest wooden agricultural implement is a c. 4,600–4,100-year-old wooden spade reported by Jack Golson and colleagues from an ancient ditch at the Tambul High Altitude Experimental Station in the Upper Kaugel valley.

The archaeological evidence at Kuk is old on a world scale and has established New Guinea as one of the few places in the world where agriculture arose from wild-plant gathering and land management practices (Denham 2011). In most other regions of the world, early agricultural development was based on the planting of seed for cereals, legumes, and other crops; for example, consider the planting of wheat and barley in Southwest Asia, rice in southeast China, and maize in Mexico. By contrast, early agriculture in New Guinea, like much practiced today, is based on the vegetative propagation of plant parts, whether a tuber, stem cutting, or sucker. Indeed, people living on New Guinea are considered to have used vegetative practices to domesticate several food crops, which are important across the world today for both subsistence and cash cropping, including bananas (*Musa* spp.), sugarcane (*Saccharum* spp.), some taro cultivars (*Colocasia esculenta*), and some yam species (*Dioscorea* spp.). Thus, the early farmers of New Guinea – whose activities are documented at Kuk – have given the world a major agricultural legacy.

As well as being the most intensively investigated archaeological site in Papua New Guinea, the traditional landholders – the Kawelka – are one of the most intensively studied Indigenous

groups in the country. The Kawelka have been instrumental in the inscription of Kuk as Papua New Guinea's first World Heritage Site (Muke et al. 2007). Ongoing management and preservation of the site for future generations would not be possible without the willingness and support of local Kawelka tribesmen, provincial and national authorities, as well as the sustained efforts of a small group of dedicated professionals, both national and international.

Cross-References

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- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Bananas: Origins and Development
- ▶ Niah Caves: Role in Human Evolution
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Basic Biographical Information

Vicky Kynourgiopoulou received her Ph.D. (2004) in Architectural History and Urban Planning at the University of Edinburgh in Scotland. She holds an M.A. (1999) in Cultural Heritage Studies from University College London and B.A. (1998) in Archaeology from the University of Southampton, both in the U.K.

Major Accomplishments

Dr. Kynourgiopoulou is currently teaching archaeology and cultural heritage studies at Arcadia University, Center of Global Studies in Rome, affiliated with Roma Tre University, Italy. She is a consultant for European Union and UNESCO heritage projects. Her archaeological fieldwork has concentrated on North Africa and the Middle East where she specializes in sustainable tourism development and heritage preservation in underdeveloped and developing countries. She has published in the area of architectural history authenticity and cultural heritage management and conservation. Her current research focuses on the use of cultural patrimony for the creation of identities in times of crisis. Her main research areas are cities that were "crossroads" of civilizations like Rome, Athens, Istanbul, and Pella where she examines the integration, rejection, and/or transformation of identities and their cultural heritage in order to create homogenous urban centers. Her fieldwork also has concentrated on the sustainable development of archaeological sites that can contribute to the economic and social viability of different regions. She is currently researching transnational crime and the looting of antiquities in the Mediterranean in

times of economic crisis. She was Editor in Chief of *Edinburgh Architecture Journal,* the research journal of the Department of Architecture at Edinburgh University, and Secretary General of the Society for the Protection of Ancient Buildings in Scotland and has created several undergraduate and graduate programs for US and European universities in Rome, Athens, and London.

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- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Sustainability and Cultural Heritage

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Kyrgyzstan: Cultural Heritage Management

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Introduction

The Kyrgyz Republic has a very rich and varied cultural heritage which has to be preserved for future generations. State management of cultural heritage is realized by the Kyrgyz Republic through the Ministry of Culture and Tourism, local government administrations, and local self-governments. To this effect, the Ministry operates a special department known as the Republican Inspectorate for Registration of Historical and Cultural Heritage. The National Academy of Sciences, research and educational institutions, and museums may conduct research at sites of historical and cultural heritage, and to do expert evaluation of their scientific value. Public organizations and associations, enterprises of different ownership and membership, in cooperation with government agencies and academic institutions, and local authorities have to help in the protection and preservation of historical and cultural heritage, organize and take public control of protection of historical and cultural monuments, and carry out awareness-raising and outreach work among the population.

Historical Background

The concept of historical and cultural heritage in the Kyrgyz Republic started to introduce from eighteenth to nineteenth centuries in the limits archaeological science of the Russian Empire and later Soviet Union.

The history of investigation of archaeological monuments, their preservation, conservation, and documentation can be divided into the following stages:

- Accumulation of fragmented information about antiquities (to 1880s)
- Starting of classification of archaeological monuments (to 1930s)
- Starting of conservation and restoration works (from 1936s to 1980s)

The first work on the preservation and restoration of archaeological monuments in the country were carried out within the framework of archaeological research. The Soviet era saw the restoration and conservation of such historical and architectural monuments as the Ak-Beshim Buddhist temples (I, II), Burana Tower (medieval city of Balasagyn), caravanserai Tash-Rabat, Uzgen complex, Buddhist temple of

Krasnorechenskoe city, and gumbez (mausoleum) of Manas (Kolchenko 2005: 132–3). As a result, most of the restored objects have lost their historical authenticity, but at the same time they were preserved for future generations and can be used as tourist attractions.

Key Issues

Legal Regulations

After the collapse of the Soviet Union, the Kyrgyz Republic inherited a strong legal basis for the preservation, conservation, restoration, and use of historical and cultural heritage. Since independence, the Law on Protection and Use of Historical and Cultural Heritage has been extended. This law was adopted by the Jogorku Kenesh (Parliament of KR) in June 29, 1999, with amendments and additions introduced in 2006 (Karymshakova 2010: 29). The law satisfies the fundamental requirements of the UNESCO convention concerning the Protection of World Cultural and Natural Heritage.

Article 3 of the law defines historical and cultural heritage as all historical and cultural monuments associated with historical events in the life of the people, the development of society and state, and material and spiritual works of art, and having historical, scientific, artistic, or other value. Under Article 4 archaeological monuments are considered as a kind of historical and cultural heritage and viewed as historical and cultural sites, regardless of who owns them.

The System of Registration and Documentation

According to the state accounting and classification system, archaeological sites are divided into sites of local, national, and international significance. Lists of historical sites of local significance must be approved by local governments on the basis of their presentation by territorial bodies for the protection of sites, in coordination with the state body for the protection of sites. Lists of historical and cultural sites of national significance are established by the Kyrgyz government on the basis of reports from the state body for the protection of sites. Sites of international significance are represented by sites which already are sites of national significance and included on the list of sites under UNESCO protection. Lists of historical and cultural sites of international significance are made public by the authority for the protection of monuments according to international standards. On official recommendation following a competent scientific evaluation, a list of sites nominated for inclusion on the World Heritage List will be submitted by the Government of the Kyrgyz Republic to the World Heritage Committee and other international organizations.

There is also a category of newly identified sites, a list of sites that is constantly replenished through the discovery and recording of new historical and cultural heritage sites. Before making the list, monuments in this category of sites also are still considered under Article 21 to be under state protection as objects of historical and cultural heritage. There is a separate list of monuments of historical and cultural heritage under threat.

Currently, the database of the Republican Inspectorate registers 583 monuments of national significance and 1,269 monuments of local significance. Among them are 335 archaeological monuments. This list was compiled and approved by the Government in the form of resolution (The Resolution of Government of KR on August 20, 2002, No. 568). In reality, however, there are no archaeological monuments which actually distinguished and protected by preservation measures. Most sites, even well-known ones included on the list of monuments of national significance, have been privatized and lie in economic and business zones (Kolchenko 2005: 142). Usually, this happened because most officials simply do not know about the historical and cultural significance of these places.

Government Programs

Since the 1990s, the Kyrgyz Ministry of Culture and Tourism declared several programs for the protection and preservation of historical and cultural heritage. In 2004 a plan "About Protection

and Use of Historical and Cultural Heritage" was approved by the Ministry till 2010. The most recent one, concerning the "Culture of Kyrgyzstan," was prepared for the period from 2011 to 2013.

UNESCO

The National Commission for UNESCO in Kyrgyz Republic has a connection with the main office of UNESCO. The Commission prepares a list of monuments for UNESCO and monitors sites which are already under UNESCO protection. The museum complex "Sulaiman-Too" was the first monument in Kyrgyz Republic to be entered onto the World Heritage List. In 2011, several projects in Osh oblast (one of the regions of the Kyrgyz Republic) were realized under the aegis of UNESCO. The main goal of these projects is to inform local administrations and state bodies about objects of historical and cultural heritage in their districts (Bostonbaeva 2001: 7).

Projects for Conservation and Restoration

Since independence from the Soviet Union, three projects on conservation of cultural heritage have been completed with funding from different international organizations. These are the Cholpon-Ata Rock Art complex, the Mausoleum of Shah-Fazil, and the complex of the cities of Krasnaya Rechka, Ak-Beshim, and Burana. The restoration and conservation works were realized by the Kyrgyz scientific, research, and project bureau *Kyrgyzrestavraziya* (nauchno-issledovatelskoe proektnoe byuro). The *Kyrgyzrestavraziya* is the entity under the Ministry of Culture and Tourism (Karymshakova 2010: 29–30). Unfortunately recent expert evaluations of these projects results, both local and international, have not been positive.

Problems

Despite progress since independence, many problems remain in the protection and preservation of Kyrgyz historical and cultural heritage. Potential solutions to these problems depend on many factors. The first problem is a lack of funding, which affects the organization of research, monitoring sites, and other essential matters. Without support from the state, almost all financial problems related to the preservation of cultural heritage have been put onto the shoulders of experts. Their sources of funding include private universities, museums (mostly state historical institutions), private organizations, and grants from international organizations. Recent financing or rather its absence means heritage management efforts fall short in current socioeconomic conditions, as such efforts been traditionally relied on state financial support, which is now offered only on a residual basis.

Another problem is the training of specialists in the field of historical and cultural heritage. There is no clear government strategy for training young researchers and specialists. Poor financial support of science in general also strongly impacts upon this issue, as the nation's young people choose to study what from their point of view are more prospective specialties. As a result, the staff of the Republican Inspectorate for Registration of Historical and Cultural Heritage – the key state agency regulating the issues of conservation – consists of two persons. In the whole country, there are no more than ten archaeologists.

The most important problem is the lack of coordination among organizations concerned with the protection and management of cultural heritage (Amanbaeva 2010: 93).

Future Directions

Despite the availability of government programs designed to create effective mechanisms for management of cultural heritage, the painful process of gradual loss of cultural heritage continues. There is no agreed scheme of work that is based on legal regulations or traditions and which clearly identifies the competencies and responsibilities of each interested party, such as the Institute of History and Cultural Heritage, the *Kyrgyzrestavraziya* under of the Ministry of Culture and Tourism of KR and the National Commission for UNESCO. These three organizations have to collaborate more effectively.

Their collaboration must be based on clear regulation of the work so each body understands its role in the larger process.

The government cannot solve all these problems alone. Mechanisms to ensure the preservation of cultural heritage for future generations needs radical reform, in a context in which cultural heritage management will at least partially have to justify itself economically. To achieve the change required, government bodies, heritage specialists, tourist agencies, and local people will have unite in an effort to protect our common heritage.

When we get the big problems more under control, we will be better able to address the many more minor problems needing attention, such as updating cultural heritage lists, conducting of salvage excavations, and popularizing archaeological monuments among local people and potential tourists, among many others.

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- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Kyrgyzstan: Saving Archaeological Sites

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Kyrgyzstan: Saving Archaeological Sites

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Introduction

Archaeological sites play a significant role in the spiritual and intellectual development of any society. This is the case in Kyrgyzstan where there are great many historical and archaeological sites, representing periods from the Stone Age onwards, that contribute to the country's heritage. However, public perceptions of the past and objects from the past are often seen as "old things" with little connection to contemporary society. There are insufficient laws, organizations, and communication to help protect the country's cultural patrimony and as a result many sites have been destroyed and many more are in danger of being lost as a result of privatization of national lands, looting, and commercialization of the past. Although progress is

being made with respect to public understanding and appreciation of the past, organizational infrastructure to help facilitate inventory, site monitoring, conservation, and certification have a long way to go.

Key Issues

The public perception of archaeological sites in Kyrgyzstan is a significant issue. The perception of archaeological sites as old things and museums as warehouses of old things prevails. In archaeological collections we can see metal objects made by skilled craftsmen 3000 years ago which in many cases cannot be replicated by modern jewelry designers. We can see unique inscriptions on stone written by our ancestors from the Middle Ages that are compromised by commercialization that is more interested in financial value than the importance of these artifacts to our collective heritage. It is not unusual for archaeologists to be asked the monetary worth of a stone sculpture that may originate from an ancestor's tomb from 50 to 55 generations ago. This is compounded by the fact that when Kyrgyzstan was under a Soviet Republic, the past of the Kyrgyzstan people was overshadowed by other interests that glorified the Great Patriotic War. As a result, monuments to Lenin and sites such as Uzgen and Burana were the priority for the Society for the Protection of Monuments of History and Culture. Today this organization is no longer in existence, and as a result the accounting, preservation, and monitoring of monuments and sites are no longer carried out, and hundreds of monuments have been destroyed in Kyrgyzstan.

The fact that a number of medieval fortresses and mounds of nomadic people are in the hands of private owners makes the protection of sites difficult, even though current law requires archaeological research prior to any new construction or building. While the need to protect sites and the specifics of the law have been discussed in the mass media for the past two decades, there is still incomplete information regarding archaeological sites, for instance, those that have been destroyed at places such as hydropower stations, and a lack of information on the existence of underwater archaeology. The picture is not all bleak. Under the influence of quasi-scientists, sites such as the Mausoleum at Manas Gumbez have been examined.

Since the late 1980s, when funding for archaeological sites was eliminated, some studies have been conducted but only in association with anniversary celebrations. However, state support of archaeological activity associated with these jubilee events was curtailed at a time when Kyrgyzstan was celebrating its 2,200th anniversary (in 2003). Nowadays, although the Ministry of Culture and Information has a small department, they are not able to work on the in situ conservation of monuments and their certification. That is why today in Kyrgyzstan we propose to employ best practices as utilized by other countries to organize a special permanent service of archaeological protection in Kyrgyzstan in an effort to save our heritage before it is too late. We propose that it be similar to the Ministry of Emergency. This Ministry of Emergency should consist of professional staff that would continue the monitoring of archaeological sites and objects begun in the mid-1980s. This would include carrying out work on the identification, certification, and registration of all archaeological sites within the country. Sites would receive full documentation, and their condition evaluated, and some sites given legal protection under a "site passport" scheme.

It must be recognized that even with the help of outside organizations such as UNESCO in conjunction with town leaders, archaeologists, regional administrators, agriculturalists, inspectors, administrators, school historians, and others, it may not be possible to save all the crumbling archaeological sites. But it is critical that we make an effort to establish strong working relationships to help identify and effectively manage archaeological sites and to convey the importance of our heritage to current and future generations. It is possible that if sites are taken care of by this generation, our heritage will help contribute to the spiritual and intellectual development

of future generations. This is effectively taking place in other countries around the world, providing examples of how this can be done in Kyrgyzstan.

Based on current archaeological field experience in Kyrgyzstan, the protection of sites may well be assisted by individuals in local villages where commissioners and lovers of antiquities work together to protect the past, including the establishment of school museums. However, such museums often lack trained personnel and are often neglected or destroyed after the retirement of the organizer. Museums would be significantly enhanced by programs of study that provide education and training in how to preserve and respect sites in the region. The activities of such programs could also include specialized archaeological training and the production of manuals, handbooks, and books on local history. In particular, publications directed at young people are essential, to help establish cultural-historical values for contemporary times – such works should tell interesting stories of the nation's past to facilitate interest and help students understand the importance of preserving the sites of their ancestors. Alongside these measures, the creation of exhibitions, public lectures in the field, publication of scientific and popular literature, and albums of site types, especially in the Kyrgyz language for local residents, would contribute towards a public understanding of the importance of heritage. This would go a long way in protecting sites that are currently being destroyed and would build on interest among local school teachers and residents, witnessed by the authors during our archaeological research. Many enjoy the achievements of our ancestors together with archaeologists. In this regard we try to enhance the experience of our work with local people to preserve the historical heritage and raise awareness. The protection of sites from the ravages of time and vandalism is an urgent task in Kyrgyzstan today, and embedding an understanding of the importance of these sites is fundamental.

It is very important for us that we employ professional contacts, such as those established with Indiana University and personally with Professor K. Anne Pyburn since 2004, in the field of preservation and the establishment of local museums. Her experience in communicating the need for archaeological observation to local communities and presenting heritage in a museum context has been especially significant for Kyrgyzstan.

Future Directions

Conclusion and Recommendations

Since the funding for archaeological sites was stopped in the late 1980s, many sites are under the threat of destruction. This has been compounded by the disbanding of the Society for the Protection of Monuments of History and Culture and the dismissal of regional inspectors and managers of heritage, resulting in a lack of monitoring and preservation of sites and artifacts. Adding to this situation is the fact that many sites and monuments are on private land and not available to archaeological inquiry. Consequently, valuable artifacts are sold within the context of an illicit archaeology, which of course is not archaeology at all.

Given the current circumstance for archaeology in Kyrgyzstan, there are number of areas of work that will improve the situation. The following is a proposed list of actions:

- Save the archaeological sites by means of creating a mobile, technically upgraded, archaeological service with legal authority.
- Regenerate the regional departments of historical, archaeological, and cultural services.
- Renew the passports of archaeological sites, giving them legal protection.
- Set aside reserved land (historical reservations) for objects of heritage.
- Use broadly and actively the punitive law against violators of legislation of the Kyrgyz Republic "On protection and use of historical and cultural heritage" with new additions.
- Formulate and define the article of criminal law in order to ban treasure hunting in the area of archaeological sites and the trade in archaeological and numismatic

artifacts, for instance, in antique shops. Place a ban on the advertisement and promotion in the media of illegal treasure hunting. Introduce criminal liability for violation of this law.
- Include the problem of preservation of historical and cultural heritage in plans for urgent actions of the Council of National Security, Ministry of Interior, the Prosecutor's Office, Customs Service, and State Register of the Kyrgyz Republic.
- Increase the advocacy for the preservation of sites and monuments among students and public communities.

We believe that it is important to establish a fund or association which will contribute to the preservation and study of archaeological sites. This should effectively facilitate the following tasks:
- Support and assist public and professional groups in their efforts to save and protect archaeological sites in the territory of the Kyrgyz Republic.
- Implement the state orders for the preservation and study of archaeological sites.
- Provide assistance for archaeologists in registration of archaeological sites and legalize the archaeological passports of monuments of the Kyrgyz Republic.
- Fund and organize urgent archaeological research into monuments which are under threat of destruction and archaeological sites which are in dangerous or unstable zones.
- Investigate archaeological sites located in areas of construction, mining or industrial processing.
- Organize joint international archaeological expeditions to explore archaeological sites, which are under threat of destruction and disappearance.
- Help archaeologists, conservators, and local authorities in the preservation and study of material objects, including the production of written records and conservation where needed.
- Develop field studies of ethnographic collections for the sake of preservation of ethno-archaeological materials, local creativity, and intangible heritage.
- Support and organize ethno-archaeological and interdisciplinary expeditions and research.
- Assist in the training of scientists in Kyrgyzstan in archaeology, ethnography, epigraphy, restoration, and conservation.
- Assist in the creation of community museums and school museums.
- Organize joint seminars and activities around archaeological sites with the participation of local experts and professionals from abroad.
- Facilitate access to archaeological sites which are in private territories.
- Promote the protection of the archaeological heritage of the Kyrgyz Republic and the proper protection of archaeological works.
- Prepare guidance documents and publications in the field of archaeological heritage in the areas of construction and design work.
- Support the educational, scientific, and educational activities in secondary schools and universities.
- Create albums, maps, and handbooks on archaeological sites in Kyrgyzstan.
- Publish the materials related to the archaeological heritage and the results of their research in the areas of building, design, and construction.
- Prepare an archaeological map of all of the regions, districts, and counties of the Kyrgyz Republic, with details of all known archaeological sites.
- Prepare special archaeological expositions and visual guides on local history for all schools of Kyrgyzstan.

Cross-References

▶ Cultural Heritage and the Public
▶ Cultural Heritage Management Quality Control and Assurance
▶ Cultural Heritage Outreach

▶ Environmental Assessment in Cultural Heritage Management
▶ Experiencing Cultural Heritage
▶ Heritage and Higher Education
▶ Heritage and Public Policy
▶ Heritage Areas
▶ Heritage Museums and the Public
▶ Heritage Research and Visitor Planning
▶ Heritage Valuation: Paradigm Shifts
▶ Heritage: History and Context
▶ Heritage: Public Perceptions
▶ Intangible Cultural Heritage
▶ Marketing Heritage
▶ Tangible Heritage in Archaeology
▶ UNESCO (1972) and Malta (1992) Conventions
▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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La Draga: Environmental Archaeology

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Introduction

La Draga (Banyoles, Girona Province) is one of the most important sites of Iberian later prehistory. It is well known for being the only lakeshore settlement that has been identified so far in Spain. The site was discovered in 1990 and, from then until today, several archaeological excavations have taken place under the scientific supervision of the Museu Arqueològic Comarcal de Banyoles and the Centre d'Arqueologia Subaquàtica de Catalunya/Museu d'Arqueologia de Catalunya. A second phase is now being undertaken with the additional collaboration of the Universitat Autònoma de Barcelona and the Consejo Superior de Investigaciones Científicas (Bosch et al. 2000, 2006, 2011).

The settlement is located at the eastern side of Lake Banyoles, 170 m. a.s.l. (Fig. 1). Nowadays, the biggest part of it is in the dry land, but part of the site is under water. It is thought that the original settlement was around 8,000 m^2, but archaeological work has focused on a smaller area, of around 3,000 m^2, where the site seems to have remained better preserved. La Draga is characterized by the exceptional preservation of wood and other plant remains, which together with the charred remains of fuel consumption makes this an exceptional site to see how the landscape was in time when the site was occupied. The studies of fauna and plant remains have been one of La Draga's most consistent contributions, thanks to the huge quantity of samples, as well as their variety.

Three main areas have been excavated (Fig. 2): sector A, of approximately 284 m^2; sector B, of 126 m^2; and sector C, of 310 m^2. Sector A is on the eastern part, where the water table is around 70 cm below the archaeological layer, which means that waterlogged conditions have not prevailed until the present and the organic material of the archaeological layer has disappeared. Only the tips of the wooden posts, which still are in waterlogged conditions, have been recovered. Sectors B and C have maintained the waterlogged conditions ever since the Neolithic period. Recently a new area of 58 m^2 is being excavated, sector D.

As far as the chronology is concerned, the latest information comes from a batch AMS radiocarbon dates, which consistently place the two archaeological levels of La Draga in the Neolithic Cardial culture. The initial phase can now be situated between 5,324 and 5,000 cal BCE and the second between 5,210 and 4,980 cal BCE (Tarrús 2009; Bosch et al. 2011).

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La Draga: Environmental Archaeology, Fig. 1 Location of the settlement of La Draga

Key Issues/Current Debates/Future Directions/Examples

The Landscape and Wood Resources

The pollen data, coming from the site itself and from the sediments of the lake, show that the forests in the surrounding area were composed of oaks (*Quercus* sp. deciduous), fir (*Abies* cf. *alba*), pines (*Pinus* spp.), evergreen oak (*Quercus* sp. evergreen), linden (*Tilia* sp.), maple (*Acer* sp.), juniper bushes (cf. *Juniperus*), and wild olive/Phillyrea type (*Olea*/*Phillyrea*) forming a mosaic of vegetation. These records highlight also the importance of riparian vegetation, represented by species such as hazel (*Corylus* cf. *avellana*), ash (*Fraxinus* sp.), elm (*Ulmus* sp.), alder (*Alnus* cf. *glutinosa*), poplar (*Populus* spp.), willow (*Salix* spp.), and elderberry (*Sambucus* sp.). The presence of bushes,

La Draga: Environmental Archaeology, Fig. 2 Archaeological works and overview of the Archaeological Park of La Draga (Photo: J. Casanova)

between them shrub heath (cf. *Erica*) and boxwood (cf. *Buxus sempervirens*), is poorly represented in quantitative terms. Therefore, the environment of the settlement is dominated by forest formations that have provided a variety of resources to the settlement (Burjachs 2000).

The study of charcoal and wood remains shows more precisely the composition of forests and how these were exploited by the inhabitants of La Draga. The study has allowed identifying a minimum of 22 taxa (14 among charcoal and 17 among the wood remains). All of them could have grown in the vicinity of the settlement. Among the species that are well represented are those gathered in riparian forests: laurel (*Laurus nobilis*), elm, ash, hazel, willow, alder, elderberry, poplar, clematis (*Clematis clematis*), and dogwood (*Cornus sanguinea*). Also well represented are sub-Mediterranean taxa: maple (*Acer* sp.), boxwood, oaks (deciduous), linden (*Tilia* sp.), *Prunus* sp., *Pomoideae*, pine (*Pinus nigra-sylvestris*), and yew (*Taxus baccata*). Their presence at the site confirms that oak forest, growing at low altitude, was predominant in the area. Finally we have also found typical Mediterranean vegetation with evergreen oak (*Quercus* sp. evergreen) and the strawberry tree (*Arbutus unedo*); however, these species are in the minority. Both taxa may form mixed forests in sunny and dry areas. The results obtained from the analysis of wood and charcoal suggest that, during the occupation of La Draga, the regime of temperatures and humidity have enabled the development of low-altitude deciduous forests (Piqué 2000; Bosch et al. 2006).

The study of wood charcoals scattered in the archaeological level shows that main woods used as fuel were oak (deciduous), laurel, and boxwood. About 94 % of the fragments analyzed correspond to these taxa. They represent the bulk of waste identified and therefore, we believe they are indicators of preferential use by the community. The remaining taxa were used in a more minimal way.

Among the wood used for the manufacture of tools, certainly boxwood is the best represented taxon (Fig. 3), both in terms of the number of objects and categories of object. 48 % of items and up to 10 different types of objects were manufactured with this wood. Oak was also used, but with less intensity, as it only represents about 12 % of the objects. However, we point out that most of the hundreds of poles used in construction of buildings were of oak.

La Draga: Environmental Archaeology, Fig. 3 Tools made from organic materials: *left*, sickle haft (*Buxus sempervirens*); *right*, digging stick (*Buxus sempervirens*) (Photo: Project La Draga)

Woods were used according to their properties and many of the objects had been partially damaged by fire. The hardwoods of both *Quercus* (deciduous and evergreen), *Arbutus unedo, Juniperus* sp., *Pomoideae*, *Cornus* sp., *Buxus sempervirens*, and *Acer* sp. have been used to manufacture a total of 15 categories of objects. They included handles of adzes of various sizes, angled sickles with collectors, twin-pointed digging sticks, and arrows, as well as cooking

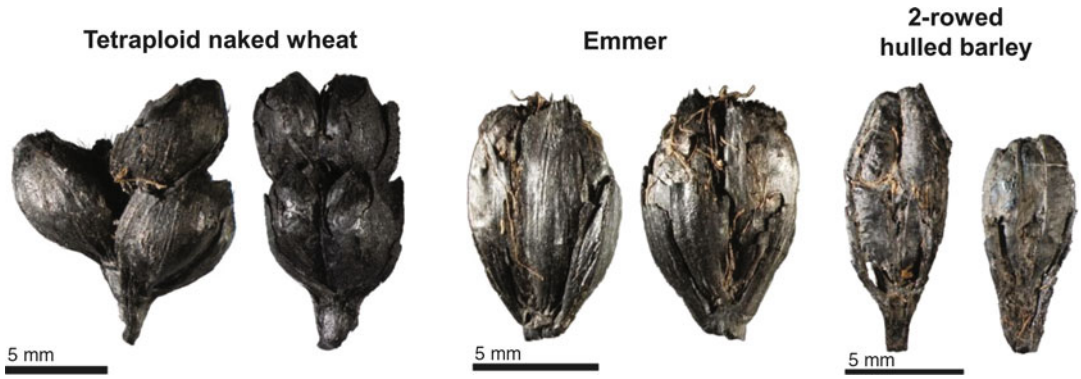

La Draga: Environmental Archaeology, Fig. 4 Carbonized cereals from the Neolithic site of La Draga: tetraploid naked wheat, emmer wheat, and two-rowed hulled barley (Photo: F. Antolín)

utensils (bowls, ladles, scoops, spatulas), items for furniture (hooks), building (wedges), and weaving (twin-pointed spindles, combs). The flexible and softwoods were used in the manufacture of a lower number of object categories. These species were used for the production of basketry (*Corylus avellana*), string (*Tilia* sp., *Clematis* sp.), and bows (*Taxus baccata*).

Agriculture and Wild Foods

The agricultural production system of La Draga's inhabitants appears to have been quite complex and varied. Huge numbers of carbonized grains were recovered during the excavations, mostly associated both with combustion structures and burned-down grain stores (Buxó et al. 2000). All remains were in waterlogged conditions when recovered. Nevertheless, the largest part of the assemblage has survived in a charred state (Fig. 4). The vast majority of these grains are thought to belong to tetraploid naked wheat, based on the morphology of chaff remains (Buxó 2007; Antolin & Buxó 2011).

Fifty-seven taxa have been identified. Five of them belong to potentially cultivated cereals and two cultivated pulses. The cereal species are naked wheat (*Triticum aestivum/durum/turgidum*), which represents the 99 % of all the grains and the main crop at the site, while all the other cereal species, such as barley and naked barley (*Hordeum vulgare* and *Hordeum vulgare* var. *nudum*), and hulled wheat as emmer (*Triticum dicoccum*) and einkorn (*Triticum monococcum*) types only make up 1 % of the total. Chaff remains were relatively abundant. Of these, 30 % are rachis fragments which coincide with the morphology of *Triticum durum/turgidum* type (tetraploid naked wheat). Only in very few structures, cereals other than naked wheat seem to be quantitatively significant. In the majority of these cases, the second better represented cereal is hulled barley, but there is one structure where naked barley yielded more than 1,000 remains (E-52).

Pulses are represented by broad bean (*Vicia faba*) and peas (*Pisum sativum*), although in small numbers. In addition, poppy (*Papaver somniferum/setigerum*) is one more taxon that may possibly have been cultivated in La Draga. It is not entirely certain whether it was a weed among the crops or a plant specifically cultivated during the Neolithic on the Iberian Peninsula, as appears to be the case in the rest of the Mediterranean Basin.

Gathering of fruits and berries in the woods nearby is well documented at La Draga. There is a wealth of hazelnuts, acorns, pine nuts, blackberries, sloes, wild apples or pears, and wild grapevines. Among the wild fruits, cherry pits, some of which were perforated for use as pendants, have been found in abundance in recent excavations.

Charred remains of wild plants are very scarce and made up of several communities. Some are to segetal and ruderal weeds: *Cerastium* sp., *Chenopodium album*, *Lolium* sp., *Papaver*

rhoeas/dubium, *Polygonum lapathifolium*, *Polygonum* cf. *persicaria*, *Valerianella* cf. *dentata*, and *Verbena officinalis*; others are more related to aquatic/lakeshore vegetation: *Alisma plantago-aquatica*, *Alnus glutinosa*, *Cladium mariscus*, *Eupatorium cannabinum*, *Lycopus europaeus*, *Vitis vinifera* subsp. *sylvestris*, and *Potamogeton* sp.; a few examples may be related to deciduous woodland areas, such as a *Cornus sanguinea*, *Crataegus monogyna*, *Prunus avium, Quercus* sp., *Moehringia trinervia*, and *Tilia platyphyllos*, and woodland borders/ruderal areas: *Prunus spinosa*, *Sambucus* cf. *ebulus, Rubus fruticosus* agg., and *Hypericum* cf. *perforatum*; and finally, some of the taxa may be found in more than one of these ecological groups: Brassicaceae, *Carex* sp., *Galium* sp., *Silene* sp., *Stachys* sp., *Ranunculus* sp., and *Rumex* sp. The presence of a few charred remains of *Galium* sp., *Lolium* sp., *Papaver somniferum/setigerum*, *Cladium mariscus*, and *Verbena officinalis* is the only evidence of clear weed plants.

Durum wheat would have been grown as a monocrop and harvested close to the ground. The most common harvesting technique for naked wheats in the Near East is reaping ears and straw together by cutting low on the straw. This type of harvesting technique is inferred for La Draga, according to the results of lithic artifact use-wear analysis (Palomo et al. 2011). Functional analysis of lithic artifacts provides a more complete understanding of cereal processing in La Draga. Around 25 % of these artifacts seem to have been used on cereals, both for harvesting and for cutting straw close to the ground. Two types of blade insertion have been observed, parallel or oblique to the handle. Some of them have been used for cutting green stems of plants, which could be related to early harvesting of crops or other types of nonwoody plants (Palomo et al. 2011). Analysis has confirmed the position of the flint cutting teeth in the grooves of the wooden sickle handles. It has also highlighted the possibility that there may have been a second reaping of the cereal crops close to the ground to take advantage of the straw; this would account for the marks on the tools caused by hitting stones. The first harvesting would obviously have been to cut the spikes with the grain at the top of the plant. Straw then could be reused for other purposes such us construction material, fuel, fodder, or even basketry.

After this type of double reaping (spikes and straw), the selection of grains was carried out by hand beating without a thresher (perhaps by treading with animals), followed by winnowing and sieving. Once washed, the grain was stored in pottery vessels or baskets, which were probably placed in stone-floored granaries. Some of the grain would have been toasted in order to consume it directly, although most of it was used to make flour using small hand mills.

It is important, then, to consider consumption possibilities when only *Triticum durum/turgidum* type is identified in a site and seems to be its main crop such as in our case. Bulgur production could have taken place in La Draga, but the very few pre-charring fragments of caryopsis are not enough evidence for such a process. One possible good way to detect *frikke* production is the presence of significant quantities of non-charred grains with charred apical parts, which is a typical consequence of this practice. No such findings can be reported from La Draga, even though green stems are known to have been cut with lithic artifacts. Huge concentrations of charred grain around hearths of sector A have also risen the possibility that they represent grain roasting inside big pottery containers.

The grains of barley, emmer, and einkorn may not have been dehusked. Considering the low percentage that they represent in the assemblage and the presence of some pre-charring caryopses fragments belonging to these taxa, it is probable that they were accidentally harvested and processed with naked wheat and survived the different processing stages.

Animal Exploitation

The faunal analysis addresses, in addition to the taxonomic determination, to approach other aspects such as the model of stockbreeding exploitation and the importance of hunting in the immediate environment of the lake or in

more distant areas such as the forests or mountains that surround the site (Saña 2000; Saña 2011). The faunal remains recovered and analyzed so far show the exploitation of at least different animal species, 46 wild and 5 domestic species.

Number of faunal remains classified in each of the various categories of animals indicates that most ($N = 14.468$) are mammals. Follow, in order of quantitative importance, the remains of molluscs (4.9 %), birds (0.7 %), chelonians (0.7 %), and fish (0.09 %). The exploitation of the animal biomass of aquatic environments and in particular the lake itself is a specific activity or sporadic. This feature is also evident if we consider the number of specimens of fish (eels, barbells, catfish, and roaches), turtles (*Emys orbicularis*), and freshwater molluscs acquired, with very few individuals represented for most species. The exploitation of the marine environment as a food source was not recurrent. Among the 14 species of marine molluscs documented, only rock mussel was potentially destined consumption. A similar dynamic is documented for birds, with little more than two individuals representing each of the 14 species of birds identified. As well as the cormorant, we now have ducks (the common goldeneye and the ferruginous duck) and rails (coots or water hens), as well as cranes, woodcocks, wood pigeons, rock and red-legged partridges, quails, Passeriformes, and birds of prey, such as the osprey. Some of these animals, sometimes found quite whole, may have reached the site naturally, but in the majority of cases, their presence can be attributed to their having been hunted for their meat or feathers.

The role of hunting and obtaining of animal proteins was still of great importance in La Draga, despite the relative abundance provided in this area by domestic cattle (Fig. 5). In addition to the large mammals, such as aurochs or wild bulls, wild boar, red deer, roe deer, and wild goats, we have been able to determine the presence of rabbits and a wider range of small carnivores (fox, badger, marten, and wildcat), probably also appreciated for their skins. One is struck by evidence clearly showing that wild bulls existed in great numbers, alongside boars, rabbits, roe deer, and wild goats. These last two species tell us that what was the hinterland of La Draga, in the strict sense, began to expand considerably when hunting extended as far as the high mountains that marked the limits of the lacustrine basin.

La Draga: Environmental Archaeology, Fig. 5 Horns of domestic ox (Photo: Project La Draga)

From hunting and gathering, cattle raising was extensively practiced for the different Neolithic occupations of La Draga. If we look at evidence concerning the domestic cattle of the period, there was a marked presence of the ox and the pig, alongside the traditional sheep and goats. These animals were exploited in two ways, to judge from the range of ages we have detected: they were kept in order to provide both meat and milk, including cream derivatives of the latter (butter, cheese). There is also some slight but interesting evidence that dogs were

kept, as was usual in other settlement of the Old Neolithic, both on the peninsular and central Europe. The presence of the domestic dog is confirmed by the remains of two individuals, one of 3–6 months old and another more than 12 months old.

Stockbreeding was, above all, aimed at obtaining meat and milk, although there appears to be evidence that older oxen (Fig. 5) were used for agricultural tasks. From paleopathologies bone, some oxen have made regular overwork, something that can be related to its use for different tasks (loading, wood transport, agricultural tasks, etc.). In these cases the repeated mechanical pressure on the hard parts of the skeleton of the animal can cause bone deformities. In La Draga it has been found that most of pathologies found in the animal's foot, consisting in deformations and different degrees of bone spurs (Lladó et al. 2008).

The meat in all the domestic species (ox, pig, sheep, and goat) was obtained from young animals once they had reached their optimum usable body mass. The relative abundance at La Draga of the remains of animals only a few months old (calves, suckling pigs, lambs, and kid goats) or even newborns, perhaps due to the difficult conditions of the period, does not detract from the general pattern of slaughtering noted. Obviously, some males were reserved for the reproduction of each species, as well as adult females (cows, sheep, and nanny goats) for the provision of milk.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Environmental Sampling in Mediterranean Archaeology
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la Hausse de la Louvière, Philippe

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Basic Biographical Information

Philippe la Hausse de la Louvière received his B.S. in Natural Sciences, specializing in African fisheries ecology. He is General Manager of Les Moulins de la Concorde Ltd, an agro-industrial enterprise, and Director of other food-producing companies in Mauritius.

Major Accomplishments

He is founding President of the Mauritius National Heritage Trust and of ICOMOS Mauritius, President of Friends of the Environment, and former President of the Société de l'Histoire de l'Ile Maurice. He has also served in various positions with the Mauritius Museums Council, the National Environmental Advisory Council, and the Aapravasi Ghat Trust. Additionally, he was Member of ICOMOS Executive Committee (2006–2008), elected Member (2008–2011), and has served as Treasurer General since 2009. He is founding Vice-President of the ICOMOS International Scientific Committee on Fortifications and Military Heritage. His primary interests and projects involve heritage site restoration, archaeological programs, cultural tourism initiatives, and historic building restoration projects.

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► Fortifications, Archaeology of
► International Committee on Archaeological Heritage Management (ICAHM) (Conservation and Preservation)
► International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
► International Council of Museums (ICOM)

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La Riera Cave: Geography and Culture

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Introduction

La Riera is a small cave in the karstic complex of La Llera ridge on the coastal plain of eastern Asturias, in Posada de Llanes, halfway between Santander and Oviedo (northern Spain). Other nearby Paleolithic and Mesolithic sites include Cueto de la Mina, Bricia, Coberizas, Tres Calabres, Balmori, Quintanal, Fonfría, Arnero, and several others. In particular, the deposits in La Riera both overlap and complement the important culture-stratigraphic sequence in the adjacent rockshelter of Cueto de la Mina, which covers the periods between the Aurignacian and the Asturian. La Riera, Cueto de la Mina, and the other sites were discovered and excavated in the 1910s by the Conde de la Vega del Sella, whose palace is located in the vicinity. His monographs on Cueto de la Mina, La Riera, and Balmori (Vega del Sella 1916, 1930), supplemented by Hugo Obermaier's observations thereupon in *Fossil Man in Spain* (1924), provided information of extraordinary quality and value for the period. In 1917–1918, La Riera yielded a series of layers pertaining to the Solutrean, Lower and Upper Magdalenian, Azilian, and Asturian. The site was heavily looted in subsequent years (and has again been recently, despite closure with iron bars). In 1969, as part of his doctoral research on the Asturian Mesolithic culture, G.A.Clark sampled the concreted shell midden (*conchero*) and excavated a small test pit in front of the cave (1976, 1983). The site is strategically located in the center of the narrow coastal strip, 1.75 km south of the present shore (9.7 km from the Pleniglacial shore) and 1.5 km from the Sierra de Cuera escarpment, a coastal hill range that rises to 1,315 m above sea level to the north of the Picos de Europa (maximum elevations: 2,500–2,600 m). Facing south at only 30 m above sea level, the cave is sheltered by La Llera ridge from winds off the Atlantic. The resources of the coast, the coastal plain, and the steep, rocky slopes of the Sierra de Cuera were all easily accessible from the site.

Definition

Between 1976 and 1979, Clark and L.G.Straus excavated remnant intact deposits in the interior of La Riera, uncovering the same sequence of periods as had the Conde. The results of this research were fully published in a substantial interdisciplinary monograph (Straus & Clark 1986a). In an early attempt to date the occupations independently of the artifacts, they obtained 28 conventional radiocarbon assays. Several levels were dated by more than one assay. Despite several stratigraphic inconsistencies and a few dates that are patently too young, the Solutrean levels (defined by the presence of characteristic foliate and shouldered points) can be placed (in uncalibrated radiocarbon years) between c. 20 and 17 ka, the Lower Magdalenian between c. 17 and 15 ka, the Upper Magdalenian (defined by a round-section antler harpoon) between c. 13 and 11 ka, the Azilian (with a flat-section harpoon) between c. 11 and 9 ka, and the Asturian (with cobble picks found by Vega del Sella and Clark in the *conchero*) between c. 9 and 6.5 ka. These ages were basically confirmed by a series of reservoir-corrected dates obtained on mollusk shells by A. Craighead (1999).

Key Issues

The fundamental aims of the 1970s re-excavation of La Riera were to determine whether/to what extent there were correlations between climatic and faunal changes throughout the sequence,

whether/when there were changes in the human use of the cave through time, whether correlations could be found among faunal and artifact assemblages and suites of activities, and whether there were relationships between traditional, normative cultural designations (e.g., Solutrean, Magdalenian, Azilian, Asturian) and major adaptive shifts in the Cantabrian region. The key focus of the research was on the investigation of change through time both in the use of this cave, and in the human exploitation of the surrounding environment as the latter was changing in relation to widespread Last Glacial climatic changes, including sea level, temperature, precipitation, and vegetation. Considerable emphasis was placed on environmental reconstruction (as well as "dating" via radiocarbon-informed climatic correlations with better-known regional sequences in SW France), as monitored through sedimentology (Laville 1986), palynology (Leroi-Gourhan 1986), and micromammals (Altuna 1986).

While these higher-order questions were largely successfully addressed, other findings had equal or perhaps even greater significance. Notably, it was shown that (1) the classic diagnostic artifact types of the so-called Upper Solutrean were found at the bottom of the dated sequence of Solutrean levels, (2) there was a smooth transition in terms of artifact assemblage composition between the Solutrean and Lower Magdalenian with a gradual substitution of foliate and shouldered points ("desolutreanization") by antler projectile points sometimes barbed/edged/tipped with backed bladelets (see Straus 1983), (3) there was a clear trend toward subsistence intensification through both specialized predation on red deer and ibex, including a higher incidence of juvenile animals over time and overall diversification to include more dangerous or elusive ungulate game and smaller, avian (Eastham 1986) and aquatic foods (fish [Menéndez de la Hoz et al. 1986], shellfish, echinoderms, and crustaceans [Ortea 1986]), with the beginnings of a broad-spectrum adaptation well in advance of the Holocene Mesolithic. The exploitation of marine mollusks in significant numbers in certain Solutrean (Last Glacial Maximum) levels at La Riera, when the shore was a 2-h walk from the site, pushed back the known inception of systematic exploitation of littoral resources in Cantabria by several millennia from its previously thought commencement in the Lower Magdalenian at sites like El Juyo (Cantabria) (cf. Freeman 1973; Straus 1977). Indeed, size decreases in limpet shells beginning even before the Holocene could be attributed to human overexploitation of this resource, probably because of (seasonal?) food stress resultant from regional demographic pressure in the narrow coastal strip between the ocean and the Picos de Europa. The oxygen isotope analyses of limpets by M. Deith and N.J. Shackleton (1986) represented another "first" for this region and indeed Iberia itself. Other studies that were pioneering in the Spanish context included reconstruction of lithic raw material procurement using petrographic analysis (Straus et al. 1986) and of lithic technology (including indicators of changing systematic reduction patterns) by application of a standardized typology of cores and *débitage* and multivariate analyses for inter-assemblage comparison (Clark et al. 1986; Straus & Clark 1986b).

While on the one hand, La Riera yielded impressive series of traditional diagnostic lithic and osseous (González Morales 1986) artifacts (notably projectile points), the overall study revealed considerable general continuity, but also a degree of inter-level alternation in "substrate" (often "archaic") artifacts (e.g., sidescrapers, denticulates, notches) and more "classic" Upper Paleolithic types (backed bladelets, endscrapers, burins, perforators). These type characteristics can probably be attributed to variation in lithic raw material availability (e.g., and especially quartzite vs. flints and radiolarites); the latter are relatively scarce and geographically restricted in the bedrock lithology of eastern Asturias. In short, a significant part of the lithic component of the La Riera sequence can be related to changes in lithic procurement patterns, artifact and site functions, and human activities – not necessarily to traditional culture-stratigraphic constructs. This finding challenged some of the fundamental tenets of Upper Paleolithic and Mesolithic archaeology in Cantabrian

Spain, as the site monograph included explicit syntheses for the entire region (Clark & Straus 1986; Straus & Clark 1986c).

Although subsequent restudies of La Riera by numerous doctoral students (and others) have questioned (but not disproven) specific attributions of certain levels to the Solutrean, Lower Magdalenian, or Azilian culture constructs, challenged the human population pressure explanation for limpet size decrease, or rejected certain radiocarbon dates (which is entirely possible), the original research has stood the test of time in terms of documenting subsistence intensification and changes in site use, while (together with the late 1960s excavations of the Middle and Early Upper Paleolithic deposits in Cueva Morín in Cantabria [González Echegaray & Freeman 1971, 1973]) helping to launch a new level of interdisciplinary, scientific prehistoric archaeology in the classic Cantabrian region, in large part because of the extensive and explicit nature of the site monograph. La Riera has thus twice risen to the status of a reference site in the Cantabrian region, first in the early and then in the late twentieth century. More important, perhaps, the 1970s excavations in this relatively small cave were significant for the ideas that were proposed, tested, and debated, as new generations of prehistorians continue to propose their differing visions of the Upper Paleolithic and Mesolithic past as registered in La Riera's deposits.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ El Miron Cave: Geography and Culture
- ▶ Geoarchaeology
- ▶ *Homo sapiens*
- ▶ Human Evolution: Use of Fire
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic
- ▶ Radiocarbon Dating in Archaeology

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Labor Archaeology

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Introduction

The rise of industry transformed labor and impacted landscapes, gender roles, and living conditions. Today, in most of the Americas and across Europe, the evidence of these industrial signatures is found in the form of rusting factories, abandoned buildings, deserted mines, scarred landscapes, and decaying cities and towns. These are all reminders of an economy that was once dominated by industrial capitalism for more than a century. While most of the factory production has moved to Asia, many communities in the Americas and in Europe debate about how to use and interpret these abandoned industrial properties. Archaeologists are involved in documenting the industrial past, and this work ranges from recording the engineering and technological feats to studying labor and working-class conditions.

Definition

Labor archaeology is about examining issues of power, resistance, and the affects of industrialization from the perspective of the laboring classes.

Historical Background

The archaeology of the industrial era has for a long time and continues to document and popularize the technological side of industrial archaeology. A major part of industrial archaeology has explained phenomena related to technological development, the economy of industry, and the industrial revolution. In many of these

cases, labor is not mentioned, or it serves as a secondary thought when discussing industrial technology and landscapes at these sites (Shackel 2004).

The study of labor from an archaeological perspective has been influenced by the development of a "new" social history and the "'new' labor history" in the 1960s and 1970s, where the emphasis of study is the worker. Labor history was heightened with E. P. Thompson's (1966) groundbreaking work – *The Making of the English Working Class*. The new labor history – from the 1960s onward – focuses on the questions of class consciousness, providing a voice for the people who have been neglected, oppressed, and considered outcasts (Dubofsky 2000: 21). Thompson (1966) wrote that he wants to rescue the worker from the enormous condescension of prosperity. Included in this new labor history is the emphasis on the study of ethnicity, shop-floor history, the relationship between the work world and family life, and class as a cultural, rather than economic, construction (Brody 1979). Historical and anthropological perspectives on labor help to define issues related to the impact of changing technology on workers and their families.

Key Issues/Current Debates

Labor Archaeology: On the Domestic Front

One way to humanize working-class households is to examine workers' housing and examine how industry affected the daily lives of workers and their families. For instance, during the early industrial era, many companies provided housing for their workers. Industrialists dictated working conditions and processes and they controlled workers' behavior away from the factory by creating housing regulations. The archaeology at Lowell, Massachusetts, stands as an important study that shows how this paternalistic control operated. The early-nineteenth-century industrial town contained rows of similar-looking boardinghouses that stood close to the factory. All of the boardinghouse rooms were the same size, thereby creating an atmosphere of egalitarianism (Mrozowski et al. 1996). The control over behavior and the standardization of the built environment created individuals who were part of the larger industrial complex. The workers needed to conform to a standardized behavior in the factory as well as in the boardinghouse. While necessary for the operations of the factory system, they also became replaceable.

Not all industries operated in a fashion to create an environment that reinforced standardized behavior. For instance, at Harpers Ferry, a government-operated town that developed from the last decade of the eighteenth century, workers built their own houses and their families expressed their own personal identity within their individual homes. The domestic landscape of Harpers Ferry appeared haphazardly built, unlike the standardized boardinghouses found in the industrial Northeast. The archaeological record shows that armory workers occasionally practiced their craft at home until about 1841, when the military took over control of the facility and made all workers abide by a standard factory discipline. After this date armory work was no longer performed in a domestic context and the federal government began to build standardized housing for its workers (Shackel 1996).

There is also an example whereby working-class families showed displeasure with the new work conditions on the domestic front. While many workers in the USA responded to industrialization by participating in a new consumer culture – a new status symbol – the armory workers' families at Harpers Ferry did not. A domestic assemblage dating to the military control of the armory contains material culture that was unfashionable for the time. It would be easy to use an economic model to say that with the industrialization of the factory, these workers lost considerable purchasing power. The households acquired out-of-date material culture as a type of silent protest. They acquired goods that were fashionable when artisans had control over their means of production (Shackel 1996: 129-43).

Community, Memory, and Politics and Power

There are costs as well as the benefits with the development of the new industrial revolution, and we should be cautious about not being too celebratory over industrial technological achievements (Hindle & Lubar 1988). Labor historian David Brody (1989: 7-18) brings to our attention that scholars studying labor need to look more closely at issues related to politics and power. It is clear that tensions between labor and capital continue to exist and these tensions play out in the everyday politics of commemoration of the working class. For instance, archaeologists, conservationists, and environmentalist are fighting to protect the memory of labor history at Blair Mountain, located in the southwestern portion of Virginia. The battle of Blair Mountain is the largest armed labor insurrection in US history. In 1921, approximately 10,000 coal miners participated in a battle against law enforcement officers and Baldwin-Felts Detectives, resulting in the intervention of the US military to suppress the uprising. The archaeology performed at the battle site located the areas of conflict on the landscape, and the information enabled archaeologists to list the place on the National Register of Historic Places. However, politicians who favor mountaintop removal successfully delisted the site from the National Register, and its delisting remains controversial. The Massey Energy Company is now planning to conduct mountaintop removal operations on Blair Mountain and destroy the archaeological signature that enabled the original listing on the National Register because of the event having national significance (Nida & Adkins 2011). It is clear that preservationists and the coal company are at odds on how to treat this landscape that is important to the labor movement. The removal of the battle field is an attempt to remove this episode of labor strife from the national public memory.

The archaeology in the Pullman community, on the south side of Chicago, is a story about how a community has embraced its working-class history and has been successful in promoting this history. Pullman was developed in the late nineteenth century to support workers and their families who were involved in the construction of rail cars on the south side of Chicago. It was dubbed "The World's Most Perfect Town" for 14 years straight, although this utopian image came to a crashing halt during the 1894 Pullman Strike. Wages were cut by Pullman during the economic depression, while he kept rents on the company-owned houses steady. The strike devastated the model community and the paternalistic relationship between Pullman and his worker deteriorated. After the Pullman Company closed in the 1950s, community activists and preservationists came together to save their community from urban renewal projects. Archaeology is helping to revive the community's working-class history, which is now found in visitor center films, tour presentations, docent training guides, and museum exhibits (Baxter & Bullen 2011).

The Hampden Community Archaeology Project is a public archaeology project in a former textile mill neighborhood in Baltimore, Maryland. Since the early 1990s, the area has been gentrifying thereby creating two distinct communities – the older, working class and a newer, upper middle class. The archaeology program created a critical public dialog with local citizens, which created an awareness of the town's past and its relation to issues of labor, class consciousness, and community identity as the community deals with concerns about gentrification and the consequent dislocation of longtime residents (Gadsby & Chidester 2007).

Finding Workers' Resistance

The struggle for control over the work process occurs in many industries and workers continually fought to control the work process. Workers protested by work slowdowns, strikes, working on their own projects in the factory, and theft (Scott 1990; Bruno 1998: 5, 11-9). The imposition of rules, regulations, and industrial discipline often met various forms of resistance. At the John Russell Cutlery Company on the Green River near Greenfield, Massachusetts, archaeologists discovered a large quantity of inferior or imperfectly manufactured parts related to interchangeable manufacturing near the former cutting room and trip hammer shop. While it would be easy to

conclude that these artifacts form a typical industrial waste pile, archaeologists looked at the larger context of nineteenth-century industrial labor relations and they concluded that this assemblage is a reflection of workers' displeasure with the new industrial work system. The higher than usual proportion of wasted materials is an indication that workers intentionally damaged goods because of their dissatisfaction with the work process (Nassaney & Abel 1993).

Another story of workers' sabotage is associated with the bottling works associated with the Harpers Ferry brewery. Archaeologists found more than 100 empty beer bottles stashed behind the wall lathing in the former bottling room and another 1,000 beer bottles in the basement of the bottling works' elevator shaft. The poor working conditions, long hours, and the higher speeding of machinery resulted in worker dissatisfaction. The archaeological evidence suggests that workers drank the owners' profits and concealed their subversive behavior by disposing the otherwise reuseable bottles in walls and dropped others down the elevator shaft. The brewery was also burned on 1897, 1906, and 1909, dates that coincide with labor unrest in the brewery industry (Shackel 2000: 104-13).

Striking is a significant form of resistance and the archaeology at the Ludlow Tent Colony Site in Colorado focuses on this form of resistance. The Colorado Coal strike ignited a yearlong cycle of violence and retribution beginning in 1913 and culminating when the militia charged the tent colony and set fire to the tents, killing 2 women and 11 children. The UMWA ran out of funds to support the workers and the strike was soon over. The workers received few concessions for their struggle. The archaeology examines the formation of temporary communities, protest labor movements, and government and military intervention. With the support of the United Mine Workers of America, the archaeology is raising the visibility of this bloody episode in labor relations and it is helping to make this incident part of the broader public memory (Walker 2003; Saitta 2007; Larkin & McGuire 2009).

In 2010 an archaeological survey was conducted at the site of a labor massacre in Lattimer, Pennsylvania. The massacre was the culmination of a monthlong strike by immigrant coal miners from eastern and southern Europe who sought better wages and safer working conditions. On September 10, 1897, a group of 400 miners marched to close all of the mines owned by the Pardee Company. On their way to Lattimer, a scuffle broke out between the sheriff and a few of the workers. The sheriff's posse then opened fire on the unarmed men. As the striking men ran from the scene, the posse continued to shoot them down. The majority of the 25 miners who died were killed by gunshot wounds to the back. This archaeology project began with a metal detector survey of the massacre site itself. Locating bullets and shell casings related to the massacre provides two things. First, the evidence furnishes information to a story that had various witness with different accounts, depending if they were sympathetic to the strikers or the sheriff. While the court transcripts are missing, the material evidence has brought attention again to the events of the massacre. Importantly, this archaeology is connecting the community to a painful past with the goal of creating some type of reconciliation to heal the divides that have existed in the community for over a century (Shackel et al. 2011).

International Perspectives

The protection and commemoration of these industrial sites occur on the local, national, and international levels. For instance, UNESCO's World Heritage mission helps to protect significant cultural sites and encourage the nomination of sites and the development of management plans. The organization has been instrumental in recognizing important places related to work and industry throughout the world. Today there are over 800 World Heritage Sites and 33 are related to the heritage of industry. England has the more industrial-related sites listed as World Heritage Sites than any other country. The Derwent Valley, which includes 6 communities along a stretch of 15 miles, is known as the "cradle of the new factory system."

UNESCO recognizes the area for the well-preserved factory buildings. It is also the place where the Arkwright water frame was first introduced. The machinery aided in the deskilling of the workforce. It allowed for the continuous spinning process and it could be operated by machine tenders rather than skilled operatives. The invention revolutionized the British economy and changed the conditions of labor. As a result, factory owners created housing for their workers and exerted a form of corporate paternalism. By the early to mid-nineteenth century, planned villages began to be constructed by the mill owners, like the UNESCO World Heritage Site – Saltaire, England. The village was developed in 1853 with mills and workers' housing built in a harmonious style of high architectural standards. Sir Titus Salt provided considerable recreation opportunities as well as a library, although he had strong paternalistic control over his workers. The town's urban plan survives intact (http://whc.unesco.org/sites/industrial.htm).

While European countries have the majority of UNESCO's industrial sites, they are also found in China, India, Bolivia, Brazil, and Mexico. None have been designated in North America. Many of these industrial sites are included on the UNESCO list because of engineering feats such as bridges, canals, irrigation systems, aqueducts, railways, mines, ironworks, and resource extraction. Many districts include the well-preserved domestic housing for workers such as the City of Potosi in Bolivia and the remarkably well-preserved example of the small-scale rural industrial settlements associated with pulp, paper, and board production at Verla Groundwood in Finland. Crespi d'Adda in Italy is an outstanding example of the nineteenth- and early-twentieth-century company towns built in Europe and North America by enlightened industrialists to meet the workers' needs. The city of Røros, Norway, is associated with the copper mining industry that developed in the seventeenth century and lasted until 1977. The city has about 80 wooden houses dating to the seventeenth century, most of them standing around courtyards, providing a medieval appearance in the town (http://whc.unesco.org/sites/industrial.htm).

While many of these sites mentioned above have been recognized as World Heritage Sites because of architecture and engineering feats, it is important to begin looking at places within the context of the new labor history. The inclusion of labor history at industrial sites can follow the development of other new radical traditions, such as the Civil Rights Movement, the feminist movement, and the American Indian Movement. The new labor history emphasizes workers and their families and it allows for the search for agency and resistance. Archaeologists working in industrial contexts can look at issues related to the impact of new innovations at the workplace and effects on the worker. The industrialization of the workplace not only affected work but also domestic lifestyles and health conditions. Studying workers and their families only humanizes the study of the industrial era, and it provides more in-depth understanding of laborers' work habits, their domestic life and interactions within the community, as well as their leisure activities. Labor archaeology is part of this tradition to humanize industrial labor and working-class life.

Future Directions

The study of industrial slavery is poorly documented in history as well as in archaeology. While there are documented cases of industrial slavery in the past, this phenomenon continues in many countries today, in developed as well as developing nations. Enslaving people to work in factories continues today, mainly because of the lack of labor laws and/or the enforcement of labor laws. There are about 27 million people in the world who are enslaved – in the sense that they are physically confined or restrained and forced to work. In the twenty-first century, slavery is far from over. In the United States, the Department of the State estimates that 20,000 people are illegally trafficked into the USA every year, and the total number of people enslaved in America is estimated at about 100,000 people, many who work in sweatshops. These workers are cut off from any support system and they live in fear of deportation (Shackel 2007). Perhaps an

archaeology of industrial slavery can highlight this social injustice and make it part of the dialog to change working conditions among the working class.

Labor archaeology should examine the health conditions at industrial sites and towns. For instance, many mining sites endangered the health and life of workers. Work sites were often unstable, machinery often malfunctioned, pollution and harmful fumes contaminated the air, and workers often put in exhaustive work hours. Until about the mid-twentieth century, industrialists paid little attention to the impact that factories had on the surrounding environment until workers, scientists, and environmentalists brought these issues to the public's attention.

Archaeologists have demonstrated the effectiveness of using soil samples from the area in and around factories and dwellings to search for toxins to examine general health conditions. Privy samples at workplaces may reveal the presence of parasites and other toxins, indications of poor health and resistance to paternalism. Pollen and macrofloral samples may also supply some indication of the changing landscape and its relationship to changing ideals related to industrialization. The impact of industrial pollution has had a devastating impact on human populations and it is important that these issues are made part of the story of industry and labor (Shackel 2007).

Conclusion

There is a growing call by scholars to focus on issues related to labor. For instance, A. Bernard Knapp (1998: 2) wrote that it is important to recognize that technology in an industrial context must also take into consideration labor and understand how people could negotiate social, political, and economic relationships. Eleanor Casella and James Symonds (2005) also note that as archaeologists we should look at the larger implications of the industrial era and start thinking about people and how they worked and lived in industrial society.

Performing an archaeology that celebrates labor does not come easy. A labor archaeology will, most probably, unveil a history that has been buried all too long. Tensions exist between labor and capital regarding how to represent the past. However, community programs that focus on labor can also develop a form of reconciliation within and between communities. Initiatives to create an inclusive history are at times difficult, at best.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Modern World: Historical Archaeology

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Laboratory for Archaeological Chemistry (University of Wisconsin)

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Basic Information

The Laboratory for Archaeological Chemistry (LARCH) at the University of Wisconsin-Madison was established by Dr. T. Douglas Price (director of the laboratory until 2009) with a grant from the National Science Foundation in 1987. He was soon joined by Dr. James H. Burton as associate director. Burton is the current director of the laboratory.

Major Impact

In the quarter century since its establishment, LARCH has played a significant role in advancing archaeological and archaeometric research, developing new techniques of investigation, and training both graduate and undergraduate students.

Much of the work done at LARCH has focused on the use of inductively coupled plasma (ICP) atomic emission spectroscopy, ICP-optical emission spectroscopy, and ICP-mass spectroscopy, but they also have worked collaboratively with other laboratories to explore other analytical modalities including neutron activation analysis (with the University of Wisconsin Nuclear Reactor Laboratory); X-ray diffraction (with the Bailey X-Ray Diffraction Lab at the University

of Wisconsin); stable isotope ratios such as ^{13}C, ^{15}N, and ^{18}O (with the University of South Florida Archaeological Science Laboratory, the University of Arizona Environmental Isotope Laboratory, and the Department of Geology at the University of Illinois-Urbana-Champaign); and heavy element isotope ratios (with the Department of Geological Sciences, University of North Carolina-Chapel Hill, the Department of Geology at the University of Illinois-Urbana-Champaign, and the Institute of Geology at the University of Copenhagen) to name a few.

Early research at LARCH focused on paleodietary studies of human bone, examining relationships between alkaline earth elements and trophic level. Along with archaeological studies of human burial populations on several continents, LARCH staff conducted extensive studies of contemporary natural environments and food chains to better elucidate the relationships between environmental factors, soil-plant interactions, and diet on alkaline earth ratios and trophic level. In addition they also conducted extensive studies of diagenetic factors and their implications for bone chemistry and paleodietary reconstruction. Both of these later studies had significant implications for our understanding of paleodietary analysis and human bone chemistry. Compositional analysis of ceramics for the identification of compositionally similar groups of ceramics derived from the same production loci was another early project at LARCH.

In the early and mid-1990s, LARCH added isotopic studies to their repertoire. Their early efforts included the use of strontium isotope ratios in cortical bone and tooth enamel to study residential mobility. These studies spanned the globe and resulted in significant insights into past population movements, both in the distant past (e.g., European Bell Beaker, Teotihuacan) and the more recent past (e.g., Colonial Period Mexico). Studies of residential mobility continue to be an important focus of research at LARCH.

Many of the studies undertaken at LARCH were based on protocols developed or improved by LARCH staff. The previously mentioned ceramic compositional studies were based on a weak-acid extraction technique that was rapid, inexpensive, and very sensitive to producer-based variables that made it possible to identify actual production groups as opposed to geological sources of clays. LARCH also developed protocols for the characterization of anthropogenic chemical activity residues on house floors and exterior surfaces for the identification of patterns of organization of activities (this also used a weak-acid extraction technique).

The research done at LARCH over the years has generated a considerable scholarly output, much of it by collaborators with the laboratory as well as laboratory staff, in professional journals, conferences, edited volumes, books, theses, and dissertations. At least as important as the scholarly work done at the laboratory is its impact on the education of both graduate and undergraduate students. Several dozen graduate students at the University of Wisconsin have done all or part of their dissertation research at LARCH, and most of these have gone on to productive careers in academia (including the author of this article). Many more graduate students from other institutions have done key work for their dissertations at the laboratory through collaborative arrangements or grants issued by LARCH. Finally, an undergraduate course on "Archaeology in the Laboratory" has served as a model for teaching archaeological science at many other institutions.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Ceramics: Scientific Analysis
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology

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Lake Mungo, Archaeology of

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Introduction

Lake Mungo came to the attention of the international paleoanthropological community during the early 1970s following the widely publicized discovery of what were then, and still are, some of the oldest, well-dated traces of human activity on the Australian continent, including the oldest known ritual human burials (Bowler et al. 1970; Barbetti & Allen 1972; Bowler & Thorne 1976; Bowler et al. 2003). However, these are only a few of the thousands of activity traces preserved in the 33-km-long transverse, crescentic dune (lunette) that bounds the eastern margin of Lake Mungo; Lake Mungo is only one of seventeen large and numerous smaller overflow lakes that together cover an area of approximately 2,400 km^2 on the southeast margin of the continent's arid core (Fig. 1). These lakes are now dry, but at times in the past when temperatures and evaporation were reduced, they were filled via a distributory of the Lachlan River, which is one of three major river systems draining the western divide of the Australian Alps. During the Pleistocene, the Lachlan and, its now defunct distributory, the Willandra Creek periodically brought large volumes of spring melt water into this cascading lake system, filling the basins from north to south and creating vast expanses of freshwater in an otherwise xerophytic landscape (Fig. 2).

The Willandra Lakes are widely regarded as Australia's foremost Pleistocene archive, a potential treasure trove of information about the settlement of an initially un-peopled and unfamiliar landscape and about the strategies people developed in response to the dramatic changes in landscape and environment that were initiated within a few thousand years of their arrival. The perceived research potential of this area is based, in part, on the long time-span of its record, which extends from c. 45000 years ago until the establishment of the pastoral frontier during the 1860s, and in part on the characteristics of the archaeological record itself. It is an unusual record, being made up primarily of small, discrete clusters of debris that arguably represent single events, like the cooking of a small marsupial and the manufacture of a few tools from a nodule of silcrete (Fig. 3). The vivid images these evoke of the distant past fire the public imagination, although they present archaeologists with all the interpretive conundrums inherent in studying "landscape palimpsests" (Bailey 2007). Those activity traces are preserved in sediments that record prevailing conditions in the adjacent lake, which, in turn, reflect the impact of regional and global climates, thus establishing a direct link between the record of past environmental change and the record of human activity.

The middens, burials, and fireplaces preserved in the Mungo lunette came to the attention of the scientific community when Jim Bowler was investigating the lake's depositional and environmental history (Bowler 1970). In 1968, he discovered what were then some of the world's earliest evidence for systematic exploitation of inland aquatic resources, as well as the cremated remains of Mungo Lady (Bowler et al. 1970) and, in 1974, the ochre-stained burial of Mungo Man (Bowler & Thorne 1976). Initial archaeological

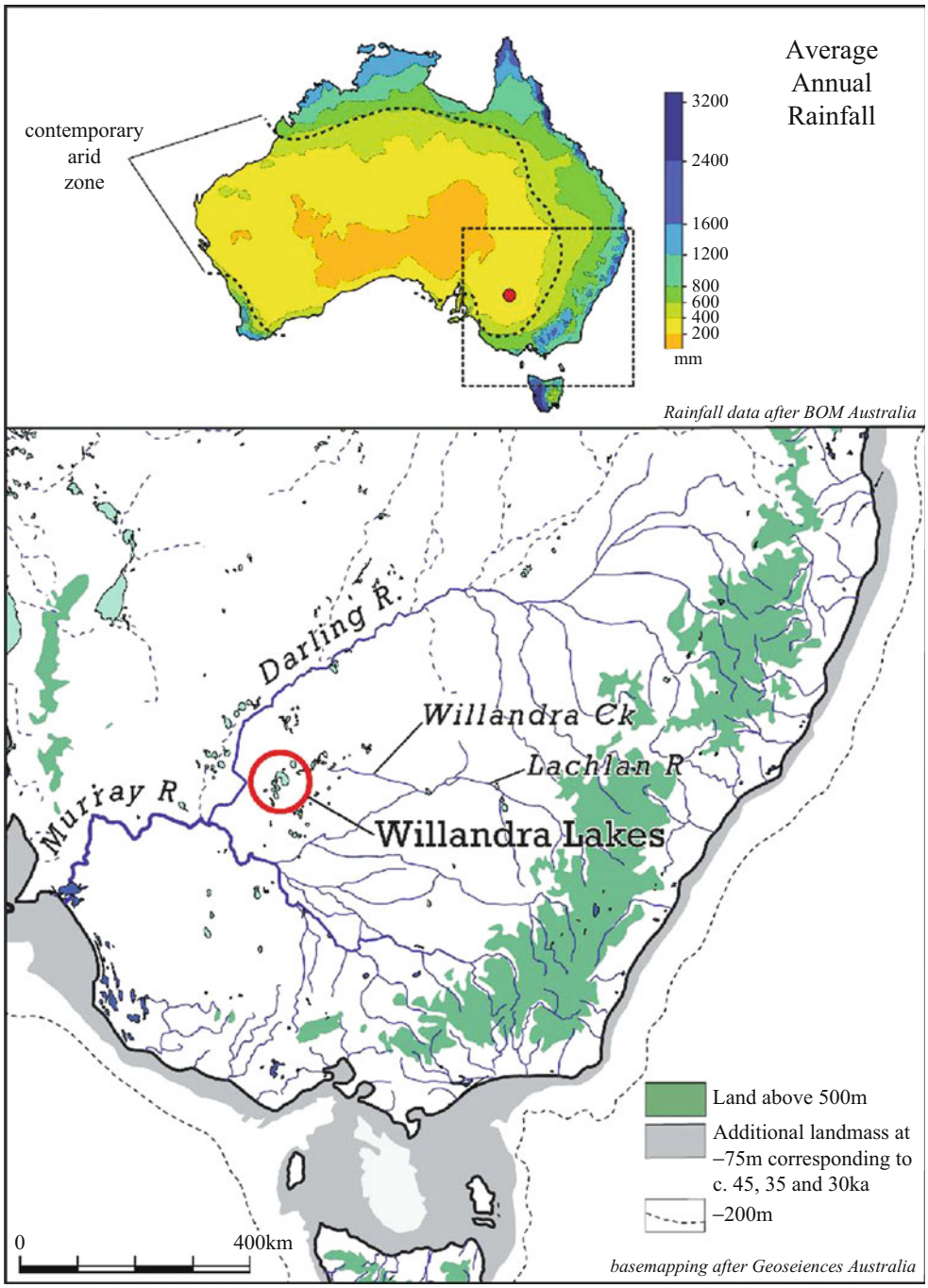

Lake Mungo, Archaeology of, Fig. 1 The Willandra Lakes lie on the sensitive margin of Australia's arid core, in the southwest corner of the Murray-Darling Basin, which drains more than a million square miles of country in the southeast of the continent. At times of reduced temperatures and evapo-transpiration, large volumes of spring melt-waters flowed from the southeast highlands and into these overflow lakes via the Lachlan River and its distributory, the Willandra Creek

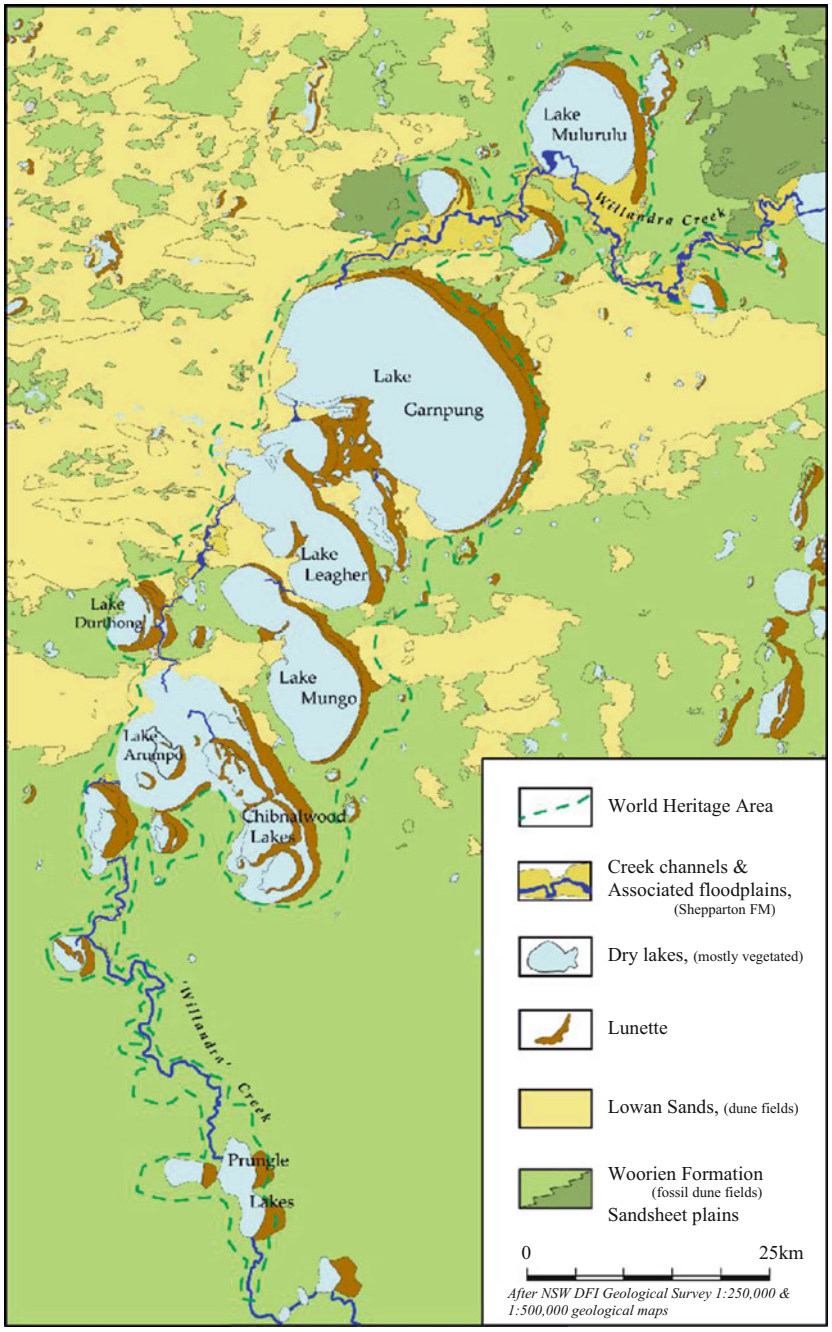

Lake Mungo, Archaeology of, Fig. 2 The Willandra Lakes are nestled within vast sand plains made up of east/west trending and irregular dunes fields that were initially formed about 400000 years ago under dry, windy conditions. During periods of more effective precipitation, five major and at least a dozen smaller lake basins were filled via spring melt-waters carried by the Willandra Creek; the exception to this was Lake Mungo, which filled via an overflow channel from Lake Leaghur. This map shows the names of the major lake basins, the location of the Willandra Creek, and the boundary of the Willandra Lakes Region World Heritage Area

Lake Mungo, Archaeology of, Fig. 3 A baked sediment hearth containing the burned bones of a bettong (rat kangaroo), a broken cobble of silcrete, and the scatter of stone artifacts struck from that cobble. The hearth lies in a thin layer of clean quartz sand that accumulated toward the end of the Last Glacial Maximum, which reflects a periodic pulse of freshwater down the overflow system (Photo: Rudy Frank, Mungo Archaeology Project)

work focused on activity traces preserved in the vicinity of Mungo Lady (Bowler et al. 1970); Fig. 2. The in situ and surface stone artifacts that were collected became the springboard for presenting the first formal description of the types of stone tools made and used in Australia during the Pleistocene (Bowler et al. 1970). The studies made of the food remains recovered from hearths in Lower Mungo sediments at the southern end of Lake Mungo (Bowler et al. 1970), together with a dozen hearths and middens of varying ages from across the Willandra (Allen 1972), established the idea of long-term continuity in diet and foraging activities (Allen 1974, 1998), not just in the Willandra, but across the continent's arid core (Allen & Holdaway 2009). It also contributed to the perception that settlement of the Willandra was more intense when the lakes were full of freshwater and that people shifted to the river systems when the lakes dried out (e.g., Allen & Holdaway 2009).

Lingering doubts about the origin and age of the surface artifacts, together with the desire to uncover an intact living surfaces, subsequently led to the excavation of broad, deep trenches through undisturbed lunette sediments (Shawcross & Kaye 1980; Shawcross 1998). These excavations uncovered stone artifacts and hearths from undisturbed strata and these remain among the oldest, well-dated archaeological traces in the Willandra (Bowler et al. 2003).

The initial flurry of research in the Willandra established its potential for generating a detailed record of past climate change on the sensitive, arid margin of the world's driest inhabited continent, as well as its potential for illuminating the long history of human settlement in the area. This potential underpinned the inscription of the Willandra Lakes on the world heritage register in 1981, the first such area to be nominated on the basis of both cultural and natural values (Mulvaney & Bowler 1981).

In the decades since, research in the Willandra has focused primarily on stratigraphy, dating, and burials (Johnston & Clark 1998). As a result, surprisingly, little is known about the changing pattern of people's lives in this area, despite the dramatic changes in landscape and environment that have been documented (Bowler 1998; Bowler et al. 2011).

Key Issues/Current Debates/Future Directions/Examples

Depositional History and Paleoenvironments

Each lake in the overflow system has a unique history that is recorded in the lunette bounding its

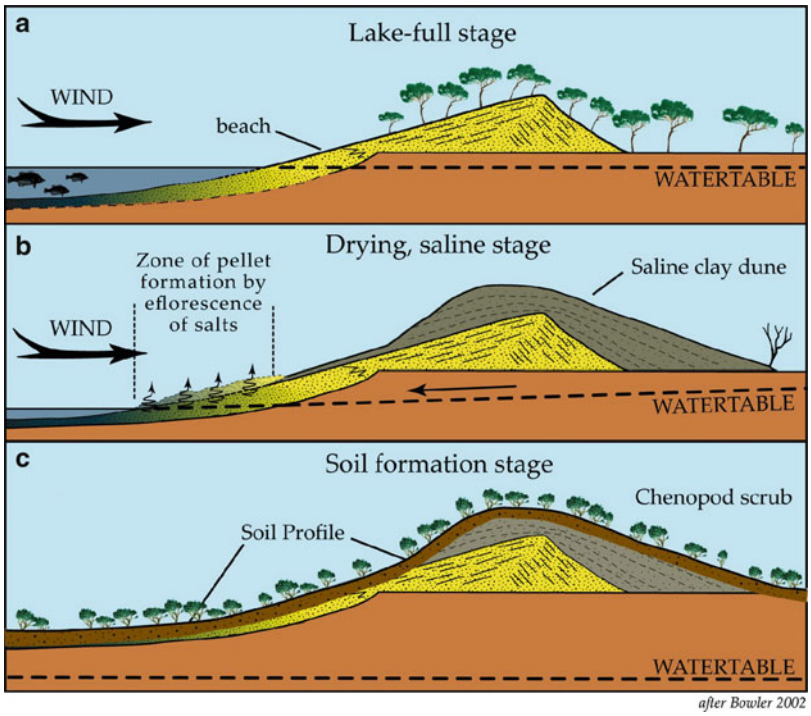

Lake Mungo, Archaeology of, Fig. 4 Lunettes built up around the eastern margins of the Willandra Lakes under the influence of the prevailing southwesterly winds. (**a**) When the lakes were full, sands were washed to the eastern shoreline and blown up into quartz-rich lunettes. (**b**) When lake levels were low, efflorescence of salts broke up the clays on the exposed lake floor, creating pellets that were draped across the surrounding landscape to form low angle, clay lunettes. (**c**) Soils formed when the accumulation of sediment was interrupted. This happened when the lakes first refilled and there was no immediate sediment supply or when the lakes were dry and the landscape was vegetated

eastern margin, the sediments that accrued on its floor, and the desert dunes that built up downwind (Bowler 1976, 1998). The lunettes are particularly rich archives of past environmental change because their formation was tied closely to prevailing hydrologic conditions in the adjacent lake, and the lakes were extremely responsive to changes in effective precipitation in the catchment area. Recent, severe erosion of some lunettes has exposed their internal stratigraphy, opening a window onto their past (Bowler 1998).

When the lakes were full, waves driven by the prevailing southwesterly winds washed sandy sediments to the lake edges to form quartz-rich sandy beaches that were backed by low, vegetated, transverse crescentic dunes, known as lunettes (Fig. 4a). During periods of low but fluctuating lake levels, salts precipitated from saline groundwater effloresced on the exposed lake floors, breaking up the sediments and forming sand-sized clay pellets. These were blown across the adjacent quartz dune to form pelletal clay lunettes (Fig. 4b; Bowler 1971, 1998). As a result, beach gravels and quartz sands record lake full conditions, while pelletal clays indicate low lake levels and saline waters. Alternating horizons of quartz-rich sand and pelletal clay record fluctuating lake conditions, as regular influxes of freshwater recharged the system. Soils formed when the landscape was stable, either as a result of regional drying or when there was a temporary cut-off in sediment supply following the re-filling of a lake (Bowler 1998; Bowler et al. 2011).

Bowler (1998) has identified 4 stratigraphic units, each made up of lake margin, beach, and

Lake Mungo, Archaeology of, Table 1 Summary of the sedimentary characteristics of the stratigraphic units described by Bowler (1998) and the archaeological traces they contain (Clark 1987; Bowler 1998; Allen & Holdaway 2009; Stern et al. 2013)

Stratigraphic Unit	Age (Ka)	Sediment characteristics	Palaeoenvironment	Archaeological traces
	<19	Weakly developed brown soil on unconsolidated sands	Lake dry, landscape vegetated; episodes of reworking of dune sediments	Stone artefact scatters with refits, hearths
Zanci	21–19	Greyish yellow, unconsolidated laminar sands	Regional drying	Stone artefact scatters with refits, hearths, occasional small clusters of shell
Arumpo	C. 22–20	Weak brown soil with secondary carbonates; laterally discontinuous	Brief return of high water levels	A varied array of hearths containing both terrestrial and lacustrine resources; clusters of burned animal bone; stone tool-making debris with refits; shell tools & grindstones
	C. 22	Greyish yellow laminar sands, dominant, some alternating sands and pelletal clays	Fluctuating lake levels, increasing aridity	
Upper Mungo	C. 30	Thin sandy soil	Brief return to high water levels	Archaeological traces abundant and varied, including hearths containing terrestrial &/or lacustrine resources, stone tool-making debris, patches of burned bone, shell tools & grindstones
	C. 40–30	Olive to greenish-grey laminar pelletal clays and clayey sands	Increasing continental aridity, fluctuating lake levels	
Lower Mungo	C. 40	Dark brown to dark grey with organics and secondary carbonates	Landscape stable and densely vegetated; onset of continental aridity	Hearths containing terrestrial & lacustrine resources and associated stone tools
	C. 55–40	Beach gravels and well sorted clean quartz sands	Lake filled, predominantly high lake levels	Hearths & artefacts from 45 ka A few artefacts in sediments accumulated between 50 & 46 Ka.
Golgol	> 120	Strong red calcareous soil with massive crystalline calcrete boulders	Stable, vegetated landscape	No archaeological evidence
		Pelletal clays with prismatic jointing	Fluctuating lake	
		Quartz sands	High lake levels	

lunette deposits that represent three cycles of lake filling, fluctuating, and drying over the past 60000 years, as well as a much older (>120000 years) and less well-defined lacustrine episode (Table 1). These units represent major lake transgressions and soil forming events but they also include smaller-scale events that have also left their mark on the sedimentary record.

This stratigraphic summary is based on detailed investigation of three sections at the southern end of the Mungo lunette and two through the Outer Arumpo lunette that provide a link between lake and lunette sediments. Not all these stratigraphic units have been or will be found all along the Mungo lunette (or any other lunette), reflecting variation in the timing and rate of net sediment accumulation resulting from variations in lake floor topography, prevailing lunette morphology, the height of successive lake levels, and minor shifts in the orientation of prevailing winds.

Traces of past human activity were incorporated into the lunettes as they built up, including burials, hearths, food remains, and the debris from tool-making and food preparation (e.g., Bowler et al. 1970; Shawcross 1998; Johnston & Clark 1998). The oldest well-documented archaeological traces lie in the upper levels of the Lower Mungo unit (i.e., from c. 45 ka) and occur in varying abundance throughout the upper part of the lunette sequence. They are also found in more recent sands formed through the reactivation of Pleistocene dunes (personal observation) and in sediments that accumulated around seasonal soaks on the lake floor and along the banks of creeks and billabongs since the lakes dried out (Johnston & Clark 1998).

The Human Burials

Lake Mungo is renowned as the site of the earliest "Australians," but it is salutary to remember that Indigenous Australians and scientists have quite different worldviews that influence their respective approaches to the study of burials. The worldview of Indigenous Australians is shaped by the "Dreaming," an interwoven tapestry of knowledge, beliefs, and rituals that includes an explanation of how the world came into being. However, it is not simply a story of origins: the Ancestral Beings who inhabit the Dreaming and carried out the deeds that created the country are now embedded within it and each generation experiences the Dreaming anew through ritual and ceremony (Stanner 1953 (1987)). It is, therefore, a timeless concept that establishes the enduring presence of people in the country.

In contrast, scientists employ a linear concept of time and trace the origin of the First Australians using data that describes variation in the morphological characteristics of skeletal remains and/or variation in the mt-DNA or Y-chromosomes of living populations. The Willandra figures prominently in these discussions because it preserves the largest known sample of Pleistocene burials on the continent: More than 130 burials have been documented in sediments that built up between c. 40000 and 15000 years ago (Webb 1989, 2006). The burials vary in form, completeness, state of preservation, and in the precision with which they can be placed in time (Webb 1989, 2006; Bowler et al. 2003; Westaway & Groves 2009; Grün et al. 2010). The best dated are the burials of Mungo Lady (WLH 1) and Mungo Man (WLH 3); bracketing OSL dates places both in the time range between 38 and 42 k.y.a. (Bowler et al. 2003), which is consistent with OSL dates of 41 $\pm$ 4 ka on the sands filling the grave of Mungo Man (Olley et al. 2006; Fig. 5).

Phylogenetic analysis of the morphological characteristics exhibited by 26 individuals from the Willandra and 19 specimens of early modern humans from SW Asia and Africa suggests a close resemblance (Westaway & Groves 2009). This is consistent with mt-DNA and Y-chromosome data indicating that Sahul, the Pleistocene landmass made up of Australia, Tasmania, and New Guinea, was settled by descendants of the one of the founder groups of modern humans, early in their dispersal (Hudjashov et al. 2007; Reich et al. 2011). Genome-wide SNP diversity data, together with data on the genetic diversity of *Helicobacter pylori* (a human bacterial parasite), suggests a single founding population that subsequently diversified and remained relatively isolated, with any later migrations having limited impact on population genetics (McEvoy et al. 2010).

The documented burials provide insights into some of the ritual practices of the Willandra's Pleistocene inhabitants, although these insights are limited by the fragmentary nature of burials exposed through erosion. Tooth avulsion has been identified on some individuals (Webb 1989, 2006), a ritual usually associated with the attainment of specific age or social status. Adults of both sexes as well as subadults were cremated, but internment in the ground was the most common form of burial. Rare instances of individuals buried in a seated position have also been recorded.

Footprints

Perhaps the most captivating traces of past human activity in the Willandra are the hundreds of footprints preserved on the surface of a hardpan that lies between modern, shifting sands in the low-lying country between Lakes Garnpung and Lake Leaghur. Bracketing OSL dates show that the footprints were impressed into the muddy surface of a low-lying depression, sometime between 21 and 19 k.y.a (Webb et al. 2006).

More than 700 prints are preserved in a thin horizon of clay and together Elders, researchers, and Pintubi trackers have identified 23 individual track ways, including 12 that may have been left by a single group who crossed the muddy depression together. However, not all the prints result from a single afternoon's activities and some are preserved on different bedding planes. They include the tracks of six men who ran across the muddy depression in the same direction, apparently in pursuit of prey as the surface also preserves a groove left by a spear that bounced

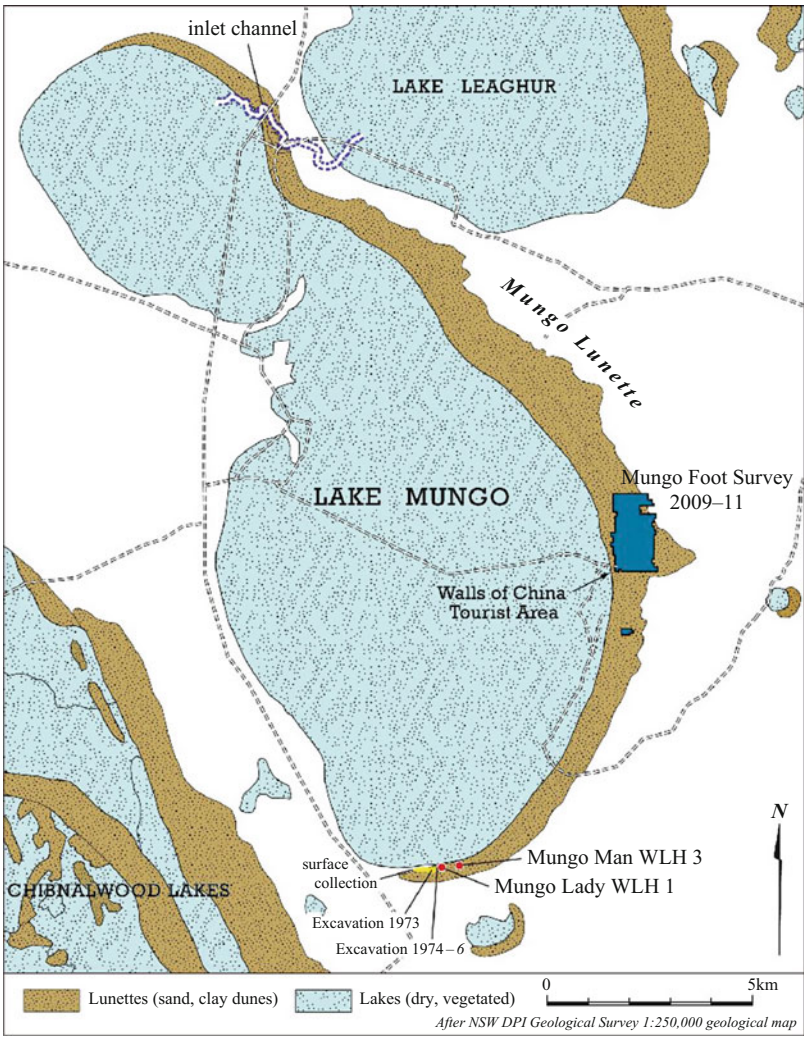

Lake Mungo, Archaeology of, Fig. 5 A map of Lake Mungo, showing the locations of Mungo Lady and Mungo Man, the trenches excavated by Mulvaney in 1973, by Shawcross in 1974–6, the surface grid area that was collected repeatedly over the same time period, and the "Walls of China" tourist area. It also shows the areas in which the first systematic surveys of archaeological traces preserved in the Mungo lunette were undertaken by the author between 2009 and 2011

across the ground when it was thrown underarm. Most of the trackways lie at right angles to those of the hunters and include the prints of a one legged man who hopped across the mud with the aid of a pole, the imprints of blunted spears made when the men who carried them paused to rest, the prints of an adult who was accompanied by four children as well as those of two women accompanied by a young child who circled away from the adults before rejoining them (Webb et al. 2006; Webb 2007).

Fireplaces, Food Remains, and Tools

Only a few of the myriad of archaeological traces preserved in the Willandra have actually been documented, reflecting the difficulties of studying archaeological remains scattered through vast landforms with complex depositional and erosional histories, but which are also part of an active landscape. Those landforms are made up of sediments representing successive paleolandscapes, and each paleolandscape is made up of inter-locking, three-dimensional sedimentary bodies that represent a variety of paleotopographic settings. Lateral variation in the timing, rate, and amount of sediment that accumulated along the lunette, and in the amount of sediment removed by pene-contemporaneous and later erosion, means that the stratigraphic and paleotopographic context of archaeological

traces can only be established by mapping exposures and three-dimensional sedimentary relationships at a much finer scale than is the usual geological practice.

The scatters of archaeological debris strewn across the surfaces of the eroding Mungo lunette are the outcome of two processes that sometimes act in concert: the removal of encasing sediment to create lag deposits and the displacement of material down the rill and gully systems to create transported assemblages. The complex relationships that exist between stratigraphic boundaries, paleotopography, and modern topography mean that these surface scatters rarely derive from the sedimentary envelope on which they lie and, in many settings, could be derived from any of the sediments that accumulated since the lakes last filled, c. 55000 years ago.

However, the record also includes thousands of archaeological features and isolated finds whose precise stratigraphic and paleotopographic origin can be documented either because they are still partly embedded in sediment or because they lie in a discrete cluster on the surface, indicating that they have been exposed only recently. The pace of ongoing erosion is such that most features weather, disperse, and disintegrate within 12–36 months of exposure.

These activity traces include a variety of cooking hearths, the debris from stone-working activities, clusters of burned food remains, grindstones, and other tools. Most of these arguably result from a single activity, like the preparation and cooking of a meal or the striking of a few tool blanks from a core. These provide remarkable insights into individual meals and knapping episodes, but to build an understanding of the food-gathering strategies or technological systems that prevailed during particular time intervals under particular paleoenvironmental conditions, archaeologists must aggregate the activity traces found in the sediments making up the corresponding paleolandscape. Thus, the significance of this record lies not with one particularly spectacular or ancient occurrence, but with the information that can be generated from thousands of activity traces with well-defined paleotopographic and paleoenvironmental context.

Fireplaces and Food Remains

There are two long-standing, perceptions about life in the Willandra that are not borne out by scrutiny of the current database, despite its limitations. The first of these is the oft-repeated idea that people were attracted to the Willandra lakes when they were full of freshwater and that they went there to catch fish and crayfish and to gather shellfish (e.g., Mulvaney & Kamminga 1999: 197). The second is the idea of long-term continuity in diet and foraging activities that grew out of the initial study of hearths (Bowler et al. 1970; Allen 1972, 1974, 1990).

The food items recovered from hearths preserved in the same horizon as Mungo Lady, together with those from a dozen hearths and middens of widely scattered age and location, were found to be the same as those consumed by the Barkindji from the Darling River (100 km to the west) during the late nineteenth century (Bowler et al. 1970; Allen 1972, 1974). Initially, this was thought to indicate remarkable continuity in diet until the final drying of the lakes c. 15000 years ago, when seeds were introduced to compensate for the loss of lake resources (Allen 1974). This interpretation relied on ethno-historical observations to flesh out the remote past with limited consideration given to justifying whether, and how, those observations could be applied to archaeological data (Allen & Holdaway 2009). Such consideration is critical given that many of the recorded taxa have broad bio-geographic distributions, given the significant paleoenvironmental changes that have been documented, and given the small number of hearths studied compared to the scale of the landscape and the time depth of its history. Not surprisingly, this interpretation has been subject to critical reevaluation by its original proponent (Allen 1998; Allen & Holdaway 2009).

Although the data needed to investigate shifts in diet and foraging activities, and their relationship to changing paleoenvironmental conditions is yet to be acquired, it is apparent

that lake resources were not always preferred over terrestrial resources. Shell middens in the Willandra are rare and generally small (Johnston 1993). Furthermore, dates for otoliths (fish ear bones) and freshwater mussels are restricted to periods when southeast Australia was particularly cold, arid, and windy, although the conditions that prevailed within the Willandra at these times are yet to be established (Bowler et al. 2011). On first consideration, this may seem counter-intuitive; however, when the lakes were full, every creek and billabong on the open plains would also have held water, lifting a critical constraint on where and how far people could go to gather food and other resources and to meet up with other social groups. Nor is it counter-intuitive if the amount of time and energy required to harvest shellfish is compared to the returns obtained (Allen & Holdaway 2009).

Thus, lake resources may have been fall-back foods and much of the time, dietary protein may have been obtained primarily from small mammals, birds, eggs, and reptiles, together with large macropods, although the relative import of these, and the way in which they were acquired, almost certainly changed over time.

Long Distance Movement of Material and Social Networks

Despite the currently sparse database, a number of exotic materials that originated outside the region and which provide some measure of the extent of people's social networks (e.g., Veth et al. 2011) have been found at Lake Mungo. Two pieces of evidence suggest that social networks may have been quite extensive during the earliest phase of human settlement in the Willandra. One is the ochre that covered the body of Mungo Man, which is thought to have originated in the Barrier Range, some 250 km to the northwest (Bowler et al. 1970; Johnston & Clark 1998), although this is yet to be established through trace element analysis. The other is the presence of *Turbo undulata* shells in Lower Mungo sands (personal observation). This is a marine species, commonly encountered on rock platforms along the southeast Australian coast, the nearest portion of which lies 400 km to the south.

All the raw materials used to make the chipped stone tools, grinding stones, and edge ground tools found on the Mungo lunette were carried in as stone does not occur naturally in such a setting. Most of the chipped stone tools were made from a fine-grained silcrete with relatively poor flaking qualities, numerous sources of which occur within the Willandra Lakes and adjacent areas; some were made from a higher-quality quartzite, which outcrops in the Manfred Range to the north of Lake Mulurulu and at least one location on the sand plains to the west. Many of the grindstones were made from sandstone slabs that could have been obtained from outcrops in the Manfred Range or from quarried outcrops on the surrounding sand plains (Dowling 1985). An edge ground hatchet collected from the surface of the Mungo lunette during the 1970s was made from an amphibole hornfels that might have originated near Mt Camel, >600 km to the southeast (Clark 1987). It is assumed to be late Holocene in age, as are all the ground edge hatches from dated contexts in southern Australia (e.g., Mulvaney & Kamminga 1999: 221).

Future Work

A new generation of archaeological and interdisciplinary research is currently underway in the Willandra and is designed to identify the shifts in diet, food-gathering strategies, technologies, and social networks that were developed in response to the dramatic changes in environment that characterized this climatically sensitive region (http://www.visitmungo.com.au/research). Electronic data recording systems solve many of the practical difficulties of studying scattered traces of past human activity dispersed through vast, stratigraphically complex, eroding landforms, which proved such a constraint to earlier research (Shawcross 1998). This work is being undertaken in close collaboration with the Elders from the Three Traditional Tribal Groups of the Willandra Lakes Region World Heritage Area, the Barkindji/ Pakaanjti, Mutthi Mutthi, and

Ngyiaampa, who share the researchers' goal of enhancing the flow of information from this iconic Australian site.

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Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ First Australians: Origins
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Basic Biographical Information

Annette Laming-Emperaire (1917–1977) was born in Russia in 1917. She grew up in France, where she lived all her life and developed a fruitful career at the *Centre National de la Recherche Scientifique* (CNRS), later becoming director of the *École Pratique des Hautes Études*, in Paris. She started her research career with rock art, becoming an influential member of the group of structuralist Paleolithic art scholars led by André Leroi-Gourhan. Her doctoral thesis (Laming-Emperaire 1962) was a major contribution towards the development of structuralism in rock art. Later, she became involved with South American prehistory, initially by following her husband, Joseph Emperaire, who was sent by Paul Rivet to the outskirts of the South American continent in the search of the early peopling of the New World. In South America Annette Laming-Emperaire soon found her own vein, and she became deeply involved with local research interests, working mostly in Chile and Brazil. She died in Brazil in 1977.

Major Accomplishments

Annette Laming-Emperaire was an eclectic investigator, full of curiosity about several domains of prehistoric archaeology. With a solid humanistic formation, her research interests were wide, from rock art to lithic analysis and her large fieldwork experience based on a very open mind towards interdisciplinarity, especially as regards Quaternary geology and cultural anthropology.

It is in the sphere of the beginnings of Brazilian archaeology, throughout the 1950s to

the 1970s, that Mme. Emperaire (as she was fondly called by her Brazilian friends) became a decisive actor. At that time several academic scholars were starting to turn their attention to archaeology, but there was no academic research or schooling established in the country. Annette Laming-Emperaire became a regular visiting researcher, studying a broad range of material from ceramic Tupi-Guarani sites in the hinterland to *sambaquis* (shell mounds) on the coast, from rock art in hilly remote places to lithic analysis from Paleo-Indian sites at Minas Gerais. In doing this work, she was never alone but encouraged local disciples to learn, by practice, every different activity in which she was involved. Her teaching talents were matched by a strong leadership quality (she took part on the French *Résistance* during the Second World War) and the rigorous field methodology developed by French archaeologists around that time. Even more, she taught extensively at Brazilian universities and organized seminars on rock art and lithic analysis methods. In this sense, she was of paramount importance to a whole first generation of Brazilian archaeologists, leaving as heritage establishment of the basis for an academic archaeological tradition in Brazil that bears from her both a strong reliance on stratigraphic excavations and a meticulous structuralist analysis of artifacts and parietal representations.

Her insights towards the archaeological significance of her study subjects reveal the accuracy of her perspicacious mind. She was the first person to correlate rock art from different regions of the country, suggesting relationships that had not been suspected before but which were proven true by later studies. As regards coastal archaeology, she produced the first reflections on shell mound construction (on what we would call today "site formation processes"), describing accurately these as *sites à accumulation rapide*, or fast accumulating deposits, despite their very long chronology (Laming-Emperaire 1975; refer also to Gaspar's entry on coastal shell mounds in Brazil in this encyclopedia). One of her last works, about which she was really enthusiastic, was an expedition to study a recently contacted Indian group, the Xetá, who lived in the backlands of Paraná and who still chipped stone implements. This study was published posthumously (Laming-Emperaire et al. 1978).

Her tragic death in an accident, in Curitiba (southern Brazil), left several disciples and friends who became prominent archaeologists in the next decades and prompted many mournful obituaries to be written by friends and colleagues, both in Brazil and in France (Leroi-Gourhan 1978; Pallestrini 1978; Lavallée 1978), from which this entry has drawn deeply. A bibliography of her publications can be found in the *Journal de la Société des Américanistes*, listed below.

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- ▶ Leroi-Gourhan, André
- ▶ Prous, André
- ▶ Sambaquis Shell Mounds, Archaeology of
- ▶ South American Rock Art
- ▶ Structural Archaeology

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Lanciani, Rodolfo

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Basic Biographical Information

Rodolfo Amedeo Lanciani (Rome, 02.01.1845 – 21.05.1929) was one of the greatest figures of Italian archaeology of the late nineteenth and early twentieth centuries. His contributions are so significant that his teaching and his extraordinary scientific output still affect, both in method and in substance, the studies of the historical topography of Rome and Lazio.

After a technical degree, Lanciani's archaeological training took place in Rome and Ostia in the wake of the great scholars of the period (Giovanni Battista de Rossi, Pietro Ercole Visconti, Carlo Ludovico Visconti, Pietro Rosa, and John Henry Parker), who facilitated his early inclusion in the Archeologica Commissione Comunale di Roma of which Lanciani was Secretary from 1872 to 1890; the assumption in the Direzione Generale Antichità e Belle Arti (1876) is also due to the support of Giuseppe Fiorelli.

The presence of Lanciani in local and national archaeological institutions occurs in the years of the radical urban transformation of Rome itself; his long stay in the University (Professor of Ancient Topography at "La Sapienza" of Rome, 1878–1922) coincides with the modern disciplinary definition of archaeological teaching; his political action is exercised during the difficult period of World War I (Senator from 1911; City Councilor, Head of the Department of Antiquities and Fine Arts, vice-Mayor of Rome, 1914–1920).

Major Impact

Overall, the scientific, academic, institutional and political activities of Lanciani fall in the crucial half-century between Roma Capitale (1871) and the affirmation of the Fascist regime (1922). This was the period of the greatest enhancement of the urban monuments of Rome under a nationalist perspective; and of the elaboration of legislation concerning the protection of Italy's historical-cultural heritage.

The double training, technical and philological, allowed Lanciani to deal with every aspect and period of history and archaeology of Rome and Lazio, with particular efforts in the reconstruction of the topography of ancient Rome and in the study of its millenary urban history, from the Archaic period to the Renaissance.

The bibliography of Lanciani includes over 630 titles (see Ashby 1928): manuals on Roman archaeology; reports of excavations and discoveries in urban and suburban areas; studies of individual monuments; topography of Rome, suburbs and Campagna Romana; studies on ancient literary and iconographic sources (with particular reference to the Severan marble plan or *Forma Urbis Romae*); epigraphy; sculpture; collections; museography; studies on the medieval and the renaissance history, topography and documents; biographies; reviews; articles of scientific dissemination.

In this multifaceted scientific production stand out the monumental *Forma Urbis Romae* (Milan 1893–1901) and the *Storia degli scavi di Roma e notizie intorno alle collezioni romane di antichità* (4 vols., Rome 1902–1913). Lanciani's voluminous output in English is also fortunate; he published 10 monographs between 1888 and 1925, on the archaeology and history of ancient, medieval and modern Rome, an extraordinary and innovative experiment in scientific communication addressed to the international cultivated audience.

Lanciani's unpublished archive is deposited in the Vatican Library (Cod. Vat Lat. 13031-13047 and 15216-15229) and the "Appunti Lanciani" in the Library of the Istituto Nazionale di Archeologia e Storia dell'Arte in Rome (for further documents: Palombi 2006, 2008, 2009).

Cross-References

▶ Ashby, Thomas
▶ Topography of Rome
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Landmarks Foundation: Protecting Sacred Sites Globally

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Basic Information

Landmarks Foundation is operated as a 501(c)(3) in New York, 1997–2011. It relocated from New York to Massachusetts, following death of its founder, Sam Green, in 2011. The website is at http://www.LandmarksFoundation.org.

Major Impact

Because we believe that religious intolerance causes so much grief in the world, Landmarks Foundation celebrates all religious beliefs, past and present. We believe that the tolerance of religious differences is fundamental to human existence, as all religions are an attempt at communication with the divine. The Landmarks Foundation identifies, protects, and preserves sacred sites and landscapes around the world which are tangible focal points for the beliefs, rituals, and religions that define human societies. Landmarks Foundation directs funding and technical expertise to local groups that cannot protect their sacred cultural heritage without assistance. Selection of specific projects is based on cultural significance and degree of jeopardy.

Identified and/or Protected and/or Restored and/or Preserved

The Moai of Easter Island
Santa Catarina Church, Sierra Madré, Mexico
Temple at Patara, Turkey
Ani, Turkey
Sajama Lines, Bolivia
Stone Spheres of Costa Rica
Huichol Sacred Sites and Landscapes, Mexico
Baneshwar Temple, Indore, India
Kaleshwar Temple Complex, Indore, India
Akhtamar Church, Lake Van, Eastern Turkey
Gangteng Monastery, Bhutan
Balyan Church, Istanbul, Turkey
Slat al Qahal synagogue, Essaouira, Morocco

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► Sacred Site Conservation and Preservation
► Sacred Sites in Indigenous Archaeology

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Landscape Archaeology

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Introduction

An ever-present characteristic in any definition of landscape archaeology is that it refers to a varied and somewhat heterogeneous field of archaeological research. A number of approaches to the archaeological record may be included under this label, which in essence share one common interest: the analysis, through material culture, of the spatial dimension of human activity; in other words, exploring how human communities have related to a geographic space through time in terms of how they appropriated this space and/or transformed its appearance through work and its significance through cultural practices.

There are two main reasons that explain why landscape archaeology is a wide-ranging concept today – firstly, the general changes in the theoretical foundations of the archaeological discourse that have occurred through time, especially since the middle of the twentieth century, and secondly, the different theoretical perspectives, both past and present, regarding the central concept of landscape that have been developed not only within the archaeological literature but in other fields such as geography or anthropology.

Definition

While running the risk of oversimplification, it can be said that the use of landscape in archaeology has been understood in three different ways, which sometimes have been complementary to each other and at other times mutually exclusive:

- As a context to better signify and understand the material record (for instance, by analyzing settlement patterns or off-site archaeology).
- As an objective, as something that archaeological research aims to positively reconstruct, by creating images of how ancient landscapes would have looked at any specific moment in the past (for instance, through environmental reconstruction).
- As a research object, considering that the landscapes we see today should themselves be considered as an archaeological record as a whole. Current landscapes would be the more obvious "artifacts" produced by human groups through time.

Historical Background

From a historiographical point of view, the origin of most of the concepts and proposals upon which landscape archaeology has been built are to be found in geography. Since the end of the nineteenth century, geographers such as Ratzel, Hettner, Slütter, or Vidal de la Blache began to stress the importance of analyzing the interaction between humans and their environments. Although from different (and even conflicting) backgrounds, they paved the way for the first schools of regional geography. It is true to say that at this stage, their direct influence on archaeology was by no means significant. However, they are important because two traditions that would have a major impact on archaeological interest in the landscape were developed after them: on the one hand, the incorporation of the proposals of Vidal de la Blanche into the theoretical framework of the French Annales School and, on the other, the development of the so-called cultural geography, in particular the remarkable work of Carl O. Sauer (Berkeley School) in the United States (Fig. 1).

The first, the Annales School, would have a major impact in the Mediterranean area, especially in France, where a significant and long-lasting archaeological tradition developed. This is a type of archaeology mainly focused on analyzing the formation of rural landscapes, identifying the forms of ancient agrarian landscapes and reconstructing of the social processes behind their formation. The study of ancient

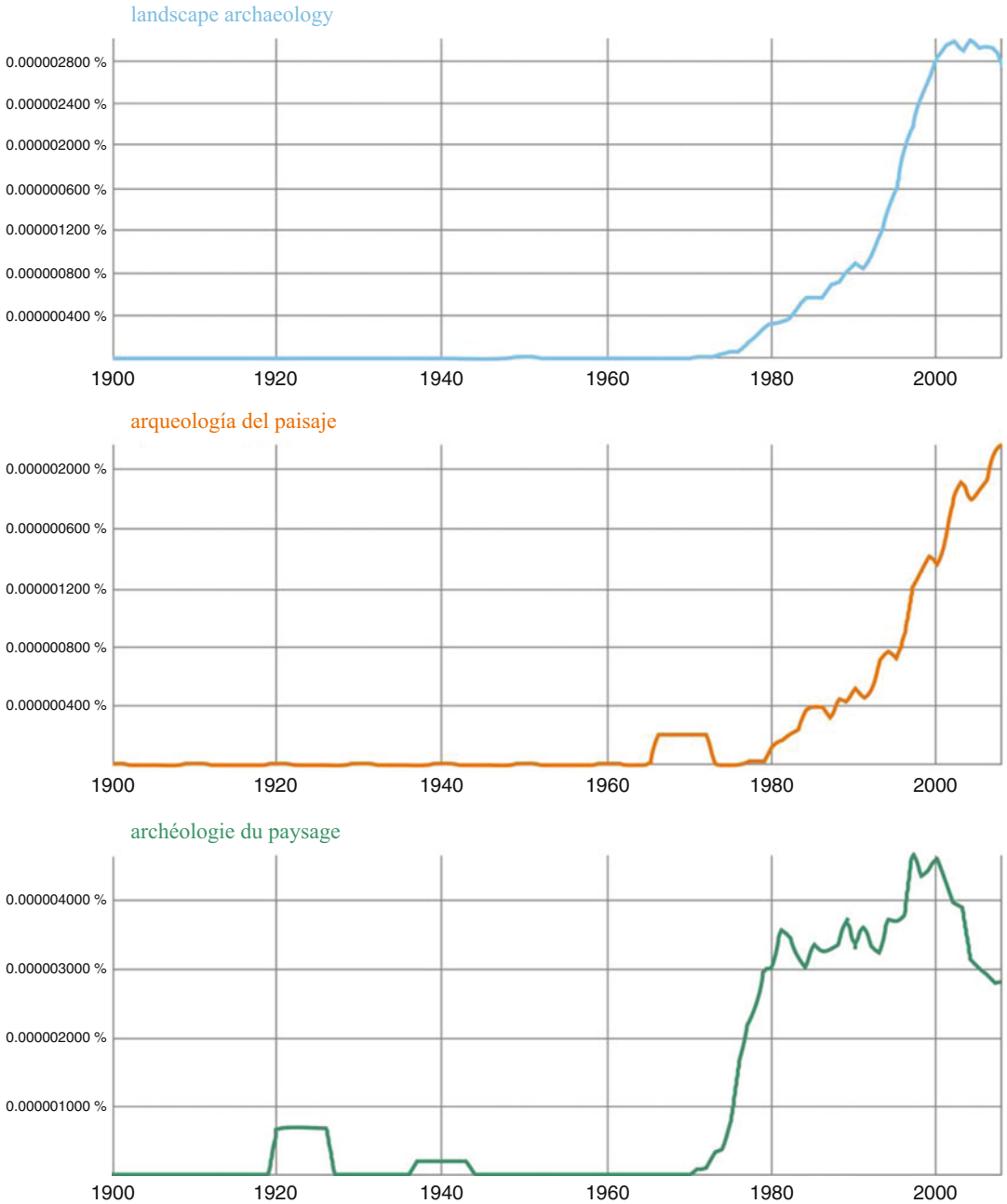

Landscape Archaeology, Fig. 1 Relative occurrence of the expression "landscape archaeology" in books published throughout the twentieth and start of the twenty-first centuries in English, Spanish, and French (Data obtained from Google Ngram Viewer (accessed 2 September 2011)). Vertical scales are different in each case

cadastres is among their most widespread manifestations. This archaeological tradition is based on the detailed reconnaissance and documentation of ancient structures currently visible in the landscape, with an intensive use of information sources such as aerial photography, whose popularization in archaeology is closely related to the development of this tradition.

Quite often, this is complemented with the use of documentary sources, such as historical cadastres. A large amount of archaeological research has been carried out within this framework, making it possible to reconstruct the forms of ancient agrarian spaces, especially for historical periods such as Roman or Medieval times, for which complementary written sources are abundant.

In turn and rooted in cultural geography, the first proposals concerning the relevance of the spatial dimension for a comprehensive understanding of the archaeological record developed in British and American contexts. The book by Aston and Rowley (1974) is typically mentioned as the first to refer to the concept of landscape archaeology as something specific, different to the study of rural landscapes that had been carried out by geographers or historians (with the work of W. Hoskins being especially influential in the British context).

From the 1960s and especially the 1970s, interest in the spatial dimension of the archaeological record flourished, in close contact with the development of the new archaeology and the environmental archaeology. This processual movement, with its strong emphasis on methodology, opened the door for the incorporation into archaeology of methods and techniques developed in other disciplines, notably Geography (such as locational analysis and site catchment analysis). Also, concepts such as space or the environment became central to archaeological research at that time. All of these innovations were aimed at analyzing the relationship between human groups and their environments in a widely adaptive, economic perspective.

From the 1990s onwards and in relation with the emergence of post-processual approaches, the concept of space, as used in previous years, was challenged for being deterministic, modern, and aculturally rational. As a result, it was argued that applying it straightforwardly to cultural contexts other than the contemporary Western world does not make any sense, which applies to most of the contexts in which archaeological research is interested. As an alternative, authors mainly from the British context argued for a reformulation of the concept of landscape: as opposed to an external environment, prior to humans, it is argued that it should be understood as a social and cultural construction, something shaped, handled, appropriated, and ordered in both material and conceptual terms. Despite a large number of publications on the subject, C. Tilley's *A Phenomenology of Landscape* is considered the landmark, where these ideas were developed in detail for the first time from an archaeological perspective. This is well in line with conceptual trends that emerged quite earlier in time in other fields of the social sciences, such as perception studies in Geography or Planning (for instance, Lynch 1960) that also challenged the positivist paradigm. The relationship between humans and the landscape was no longer described in terms of adaptation or exploitation but using different notions such as perception, experience, or engagement. And, in so doing, an opposition between the concepts of space and landscape was developed, with the former being something neutral, alien to human experience, and the latter something appropriated, experienced, and perceived (Fig. 2).

Those proposals achieved a degree of success during the 1990s and onwards, although they have also been widely accused of being too speculative at times, negligent with data and evidence, or lacking a solid methodology. In any case, although they had a substantial impact in some areas, they had little influence in others, where alternate theoretical traditions held sway. This is the case of France, where the main trends in landscape archaeology remained aligned with tradition that was based on or inspired by the Annales School, which remains alive elsewhere (for instance, Bintliff et al. 2007). This is not the case in either Italy or Spain where, within quite varied and heterogeneous traditions, it is interesting to note the influence of historical materialism in the development of a socially oriented landscape archaeology, a tradition that has been also successful in Latin America.

Key Issues/Current Debates

A few issues can be highlighted in the current practice of landscape archaeology. The first

Landscape Archaeology, Fig. 2 *Cerritos de indios* in the Uruguayan region of Rocha. Landscape archaeology has been especially interested in the analysis of landscapes defined by different types of artificial features, such as funerary monuments. Photography by Camila Gianotti (Reproduced with permission)

concerns theoretical and conceptual questions. As mentioned above, the 1990s were arguably the period when landscape archaeology reached the zenith of its success and popularity. To a great extent, this was associated with the coexistence of a range of different approaches and, consequently, a boom in the number of publications. A good part of the academic literature (especially the most influential) gravitated around the possibilities for the development of a phenomenology-inspired approach to landscape. A major field for discussion has developed around the actual viability of these approaches. Among others, special mention should be made of Fleming's criticism (2006) due to its impact. This field of discussion is still alive and kicking today and affects the theoretical foundations of landscape archaeology and the very concept of landscape that is, or may be, behind it (for instance, a recent contribution is Barrett & Ko 2009).

In close connection with this, some approaches have been made to a significant question that post-processual archaeologies somehow left unattended: the development of original methodologies and fieldwork procedures, suited for the kind of theoretical proposals and research objectives that were being produced. Although no claims for maturity and solid advances have been made so far, it has constituted an interesting field of activity in recent years (for instance, Hamilton et al. 2006).

In a totally different direction, recent years have seen a boom in scientific approaches to environmental analysis, such as geoarchaeology. As an example, in the recent volume edited by B. David and J. Thomas (2008), 24 out of a total of 65 contributions are included in the section "Characterising Landscapes," broadly falling within this scope. To some extent, this has been boosted by some technological improvements: a significant increase in the availability of more numerous and refined tools, techniques, and analytical procedures to assist archaeological research and to extract information from the material and environmental record (for instance, Reindel & Wagner 2009). The possibility to gather much more information on a larger scale and at the same time with increasing levels of detail and accuracy pose challenging problems for data management and processing. But at the same time, this means that the possibilities of overcoming the limited analytical scale of the single site and carrying out comprehensive research at the landscape scale are multiplying (Fig. 3).

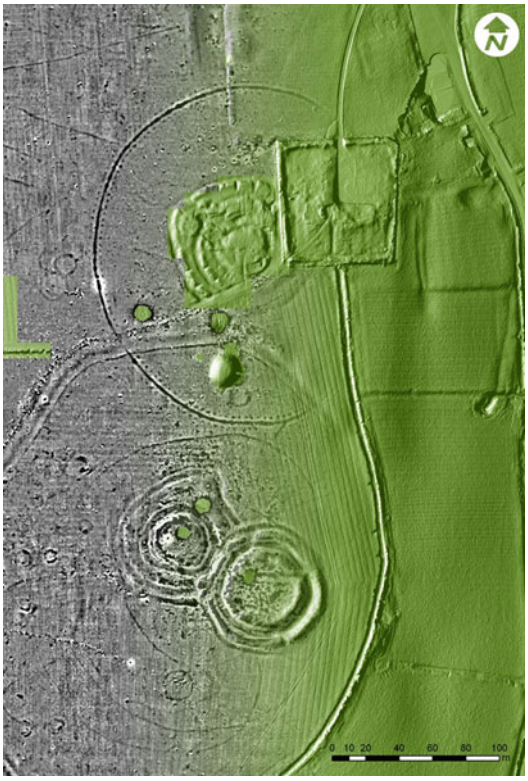

Landscape Archaeology, Fig. 3 The development of geo-spatial technologies is enabling the highly detailed documentation of large-scale landscapes like never before. Integration of geophysical survey and high-resolution Lidar of the Hill of Tara, Ireland. (© The Discovery Programme, 2011. Reproduced with permission (many thanks to Anthony Corns))

However, we have not just witnessed a leap forward in technological terms. It is also important to take into account the inclusion of archaeologists in long-range discussions, such as those concerning global change. The natural disposition of archaeology for analyzing change in the long term and its intimacy with the study of human impact on the environment have returned the analysis of environmental change to the forefront for some practitioners of a landscape-related archaeology (for instance, Redman et al. 2004). This has made it possible to incorporate archaeological perspectives into wider debates, where a vision of the landscape in socio-ecological terms prevails, and to complement it with more culturally balanced views (for instance, McAnny & Yoffee 2009) (Fig. 4).

The incorporation of archaeology into the environmental debate has had an additional dimension in terms of practical applicability. In the last few decades, environmental management policies have increasingly taken into consideration human effects as something that is difficult to be limited in space and more complex than a simple question of physical impact. Archaeology, as long as it is involved with cultural resource management, has had an increasingly visible role within this field (for instance, Jones & Slinn 2006). More specifically, the use by landscape archaeology of some relevant concepts and categories has allowed it to have a visible influence in the development of dominant paradigms.

Beyond environmental management, this influence is visible in the major relevance recently acquired by the concept of cultural landscapes (although the concept itself was originally coined by Carl O. Sauer back in 1925). Two parallel roads have helped to spread the concept. On the one hand, UNESCO defined it as a key concept for the management and protection of the Cultural Heritage in the Operational Guidelines for the Implementation of the World Heritage Convention (1992). On the other hand, the approval by the Council of Europe of the European Landscape Convention (ELC) in 2000 laid the foundations for the incorporation of the landscape as a legal figure throughout Europe and beyond. The ELC uses a self-sufficient concept of landscape, without any additions: it is something holistic that integrates the natural and the cultural, the environmental, and the social. This is well in line with what landscape archaeology had been discussing and makes it possible to understand why it has become increasingly involved in the fields of practical characterization and management (Fig. 5).

Finally, the landscape, like any other central concept in archaeology, has been challenged from the series of theoretical positions that can broadly be defined as postcolonial. Once again, this is a field of discussion that is not only archaeological but has strong links with other disciplines, especially anthropology. Criticism has been levelled against most dimensions of archaeology as a Western-driven and Western-oriented form of knowledge and

Landscape Archaeology, Fig. 4 Pre-Hispanic irrigation channels in the extremely dry landscape of the Alto Loa region, in the margins of the Atacama Desert (Chile). Geoarchaeological approaches to landscape have gained new impetus in recent years, focusing on the analysis of environmental change and human impact

a discourse of power, which includes the concepts and practices of most of landscape archaeology. What is demanded is "to visualize the archaeological practice and landscape studies as an open arena in which different actors, interests and themes could be achieved and worked in a collaborative performance accounting also for the geopolitics of knowledge production" (Curtoni 2009: 15). A concept that comprehensively expresses and summarizes these visions is that of contested landscapes (Bender & Winer 2001). Debates within this arena affect Landscape Archaeology not only as a discipline for the study of the past but also, and remarkably, as a discourse related to the construction of Cultural Heritage in the present (for instance, Schofield 2009).

International Perspectives

Landscape, as a word, has been in and around archaeology for a long time. But not every use of landscape, as a word, implies the use of landscape, as a concept. For a landscape Archaeology to properly exist as a field of research and practice on its own, it should fulfil a series of basic conditions: to have a delimited object of study, a series of shared theoretical concepts, and its own (though not exclusive) set of well-defined methods and techniques. In the authors' opinion, what gives landscape archaeology its essence is neither the consideration of the archaeological record on a wide spatial scale nor adherence to a specific theoretical paradigm but the existence of an explicit, underlying concept of landscape. And this concept implies that landscape, in the words of David and Thomas, is not considered "simply a unit of analysis over and above the "site" [. . .] (but) an object of investigation in its own right" (2008: 27). Landscape, as an object of investigation, could be defined as the materialization of the social practices in spatial terms. Landscape archaeology would then be concerned with analyzing the processes of construction, function, signification, and valorization of that material medium through time. Boundaries with other disciplines dealing with the landscape can be sometimes diffused, but, in that respect, the specificity of landscape archaeology is the fact that it is archaeology, i.e., it is concerned with the material.

It is not by chance that the consolidation of a concept of landscape as a holistic category, integrating the environmental, the social, and the symbolic, as currently understood by many landscape archaeology practitioners, coincides

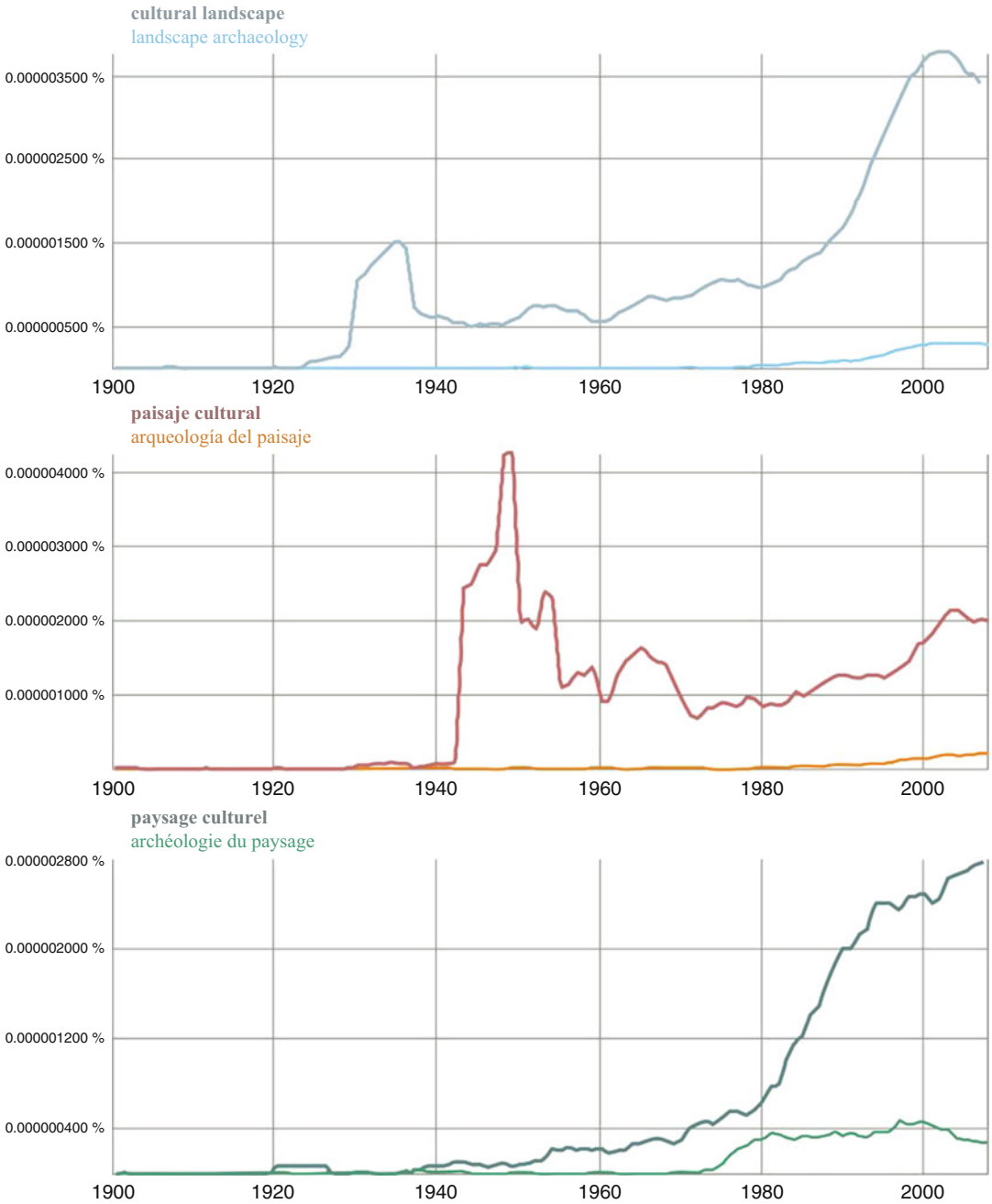

Landscape Archaeology, Fig. 5 Relative occurrence of the expressions "landscape archaeology" and "cultural landscape" in books published throughout the twentieth and early twenty-first centuries in English, Spanish, and French. (Data obtained from Google Ngram Viewer (accessed 2 September 2011)). Vertical scales are different in each case

with the consolidation of the landscape as a legal entity (and, consequently, a political entity). Landscape archaeology can aspire to play a relevant role in the politics of sustainability. This means that archaeological landscapes should also be considered as cultural resources, something that cannot only be studied but also managed and signified. In turn, archaeology can

be enriched with the perspective provided by other disciplines that also deal with the landscape, such as geography, anthropology, or ethnography, making it possible to go beyond materiality to contribute towards a participative construction and management of landscapes as cultural heritage.

Future Directions

Although somewhat diminished after a period of significant activity some years ago, debates on the concept of landscape and the very idea of what landscape archaeology should be are sure to continue. In an overtly simplified way, we would say that on the one hand, although solid and alive, processual approaches towards the landscape have arguably shown themselves to be incapable of comprehensively accounting for the full dimensions of the construction of landscapes in the past. On the other hand, phenomenology-inspired proposals have developed a strong theoretical corpus, although they have failed to attract many followers due to being considered as an interesting proposal that is barely applicable to the archaeological record. To what extent both approaches remain incompatible and mutually exclusive, or can converge in novel ways, is something that deserves attention in the future.

At a slightly different level, the debate concerning the relationship between academic archaeology and alternate voices and actors will continue to affect the ways in which landscapes, their sense and meaning, should be constructed. How can archaeology deal with the current and flowing construction of meanings and values over past landscapes? Are "scholarly archaeology" and "popular claims over the past" compatible to any extent? Are differences and oppositions ethical, theoretical, or even ontological? A number of scholars have successfully argued about "the historically contingent nature of the Western concept of landscape and, in particular, its complicity with colonialism" (Lydon 2008: 654). If that is to be agreed, the only possible solution will be to account for ideas of landscape that overcome this "historical contingency" and make way for alternate visions and voices, agents, and interests. However, the question remains as to how and especially to what extent this is possible. Some of these challenges are quite similar to those faced by phenomenological or hermeneutics-oriented perspectives, as they imply going beyond traditional, processual views of the landscape, both at theoretical and practical level. But even beyond this, what would happen if we consider that the concept of "Western landscape" is itself a tautology? Will the concept of landscape be still valid to describe those multiple community contexts where there is no formal, conceptual separation between people, things, and the land?

Elsewhere, another direction points towards the relationship between landscape archaeology and geographic information science or, more extensively, the wider field of computing. The increasing incorporation of these fields within the archaeological agenda has led to a number of well-known and fruitful improvements, such as in the fields of mapping or prospecting. However, this can lead to a misleading impression:

> There is no denying that the use of information systems is allowing us to obtain new insights, but these remain far in between, marginal in scope, and seldom championed by archaeologists themselves. This is because the use of information systems is still reduced to a desirable technical skill that some archaeologists manage to "add-on" to their bag of tricks. There is little recognition that the intersection of information systems (computers primarily) and archaeology provides new paradigms and/or research venues (Llobera 2011: 25).

So far, computers and information technologies have been conceived as external tools that can sometimes be applied to working processes in archaeology that are already well established. A possible direction for future developments lies in dealing with the implications of all of these in conceptual and theoretical terms, in exploring how the construction of digital landscapes is not only a way of reproducing the real world but also a new framework of reference for approaching and exploring it in different, novel ways (Fig. 6).

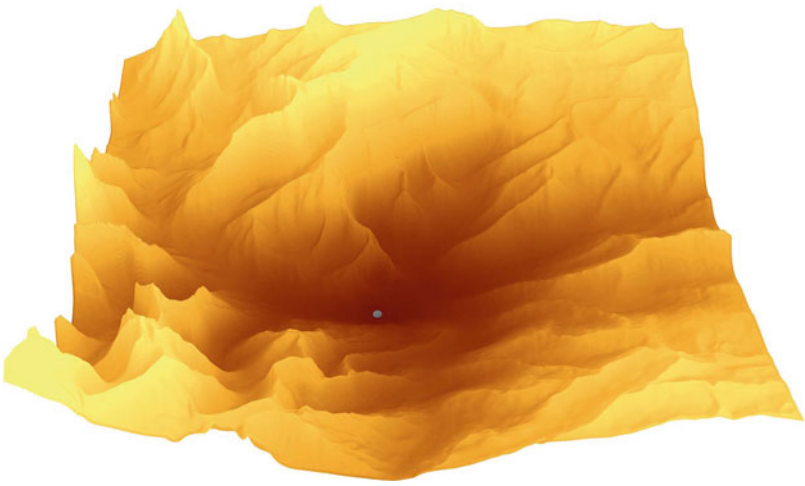

Landscape Archaeology, Fig. 6 Digital landscapes are not just a way of reproducing previously existing ways of working. They can provide a new framework of reference to approach and understand archaeological landscapes. The figure represents movement as a "2.5D" topography: valleys represent least-cost areas for movement towards the destination point pictured as the *gray dot* located at the "steam of the funnel," see Llobera et al. (2011)

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Geoarchaeology
- ▶ Phenomenology in Archaeology
- ▶ Spatial Analysis in Field Archaeology
- ▶ Urban Landscapes: Environmental Archaeology

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Landscape Domestication and Archaeology

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Introduction

The term "landscape domestication" has become increasingly visible within the last decade or so. Some find this use of "domestication" to be inappropriate, however, as domestication is often associated with Charles Darwin and his theory of evolution. A glance at a dictionary dispels confusion, as there are no mentions of evolution or selection or genetics in the definitions. The term comes from the Latin *domesticäre* to dwell in a house, to accustom (Harlan 1992). A house is a built environment and has been part of our experience since people started constructing their own shelters from the elements. The house in the countryside is surrounded by a garden, which also has a dump heap, both of which are intimately involved in the domestication of plants. Hence, there is a strong relationship between landscape domestication and plant or animal domestication, as pointed out by Rindos (1984), although he preferred the "developing agroecology" to landscape domestication.

There is, however, a relationship with evolution. Both domestication and evolution are processes. In evolution, natural selection is the primary agent, while in landscape domestication, culture is the primary agent. As geographer Carl Sauer (1925) wrote, "The cultural landscape is fashioned from the natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result." Hence, "Human actions over time are manifested in landscapes that retain physical evidence of cultural practices, decisions, and ideas" (Crumley 1994: 9). It is now well accepted that hunter-gatherer societies consciously and unconsciously manage individual plants and plant populations in the landscape, as well as managing groups of animals and taming individuals (Harlan 1992; Harris 2012). These actions leave traces that can be read in the landscape, the physical evidence mentioned by Crumley. Sometimes, hunter-gatherer societies altered the course of streams by changing local relief, generally with temporary effect but occasionally with more durable results (Harris 2012). These actions also leave traces. As food production became more important during the Holocene and farming societies emerged in many parts of the world, the degree and tempo of landscape domestication increased, generating a strong positive feedback loop with human population expansion (Rindos 1984; Tudge 1998). These actions leave even more traces, which landscape and other archaeologists use to study the origins, development, and spread of food-producing societies (Piperno & Pearsall 1998; Zeder et al. 2006).

When local societies expanded, nature contracted; when local societies contracted, nature returned, but landscapes maintained the imprint of previous human domesticatory actions, making them more attractive for the next local expansion. It follows that "Landscapes are the infrastructural legacies of past human action and contain cultural or social 'capital' to be exploited by succeeding human populations" (Erickson 2003: 456). As our species spread across the planet, we preferentially occupied the richest landscapes and then continually more marginal ones, domesticating and redomesticating landscapes to greater or lesser extent as time went on. It follows that landscape domestication has much to teach us about the human endeavor since the appearance of *Homo sapiens* and perhaps even earlier.

Definition

Landscape domestication is a process in which human intervention in the landscape and manipulation of landscape components result in changes in landscape ecology and in the demographics of its plant and animal populations, resulting in a landscape more productive and congenial for humans (Clement 1999: 191-2). Human intervention is initially unconscious, mere presence being an intervention, but becomes conscious when humans remain in a landscape and start to manipulate its components (Rindos 1984). It is important to recognize that humans do not set out to domesticate their landscapes; rather, they concentrate on opening space for themselves, e.g., camps and settlements, and enhancing the spaces of their plants and animals, both native to the landscape and introduced from elsewhere.

Since domestication is a process and the intensity of intervention and manipulation may vary considerably, there is a continuum of change from pristine to a city. It is worthwhile to identify some sections of the continuum for analytical convenience. See Clement (1999) for supporting references.

Pristine – a landscape in which humans have not intervened or manipulated plant or animal populations.

Promoted – a landscape in which desirable plant populations and individuals are encouraged through seed dispersal, minimal ecosystem clearance, e.g., around campsites and along trails, and expansion of the edges between ecosystems, as ecotones tend to be more productive. Fire is frequently an important tool for these activities. Even though there may have been a low level of human manipulation, the biotic components of this landscape may remain modified long after humans have abandoned the area, e.g., when

humans introduce new species or expand populations of useful species. Promoted landscapes differ mostly in their biotic composition and may be difficult for archaeologists to identify without the aid of botanists and ecologists, although increased charcoal abundance may offer a clue. It is in this category of landscape domestication that Rindos (1984: 154-8) hypothesized that the incidental domestication of plant populations begins.

Managed – a landscape in which the abundance and diversity of food and other useful plant populations is further encouraged through partial ecosystem clearance by burning, expansion of ecotones, transplanting of desirable individual plants or planting of individual seeds, addition of amendments to enhance plant growth, reduction of competition from non-useful plants, and management of water via irrigation. Again, the biotic components of this landscape may remain long after humans have abandoned the area. The difference between promoted and managed is one of degree, with more conscious application of certain practices. As with promoted landscapes, managed landscapes may be difficult for archaeologists to identify without assistance but are becoming increasingly studied in the context of pre-domestication cultivation in Southwest Asia (Harris 2012) and forest management in the Neotropics (Peters 2000) and Southeast Asia (Michon 2005). It is in this category of landscape domestication that Rindos (1984: 158-64) hypothesized that the specialized domestication of plant populations begins.

Cultivated – a manipulation that involves the complete transformation of the biotic landscape to favor the growth of one or a few selected food plants, both domesticated and not, and other useful plant and animal populations, through ecosystem clearance and burning, localized or extensive tillage, seedbed preparation, weeding, pruning, manuring, mulching, fencing, and irrigation in any combination. These dramatic manipulations create a landscape that has little relationship with the surrounding ecosystem, so that it may be called an artificial construct. The biotic components of this very artificial landscape do not survive long after human abandonment because the changes that favor the growth of the human selected populations also favor the growth of weeds and the invasion of other pioneer species; however, it takes a long time to return to a natural state. The abiotic transformations practiced in this landscape often survive for long periods, e.g., earthworks for irrigation or planting, such as mounds and furrows. Other activities may also leave clear evidence for archaeologists, such as charcoal from the clearing and burning of the original ecosystem, soil modifications due to tillage, long-term management, including creation of anthropogenic soils (Woods et al. 2009), and phytoliths from cultivated plants (Piperno & Pearsall 1998).

Swidden/Fallow – this analytical construct is the combination of cultivation and management, in that order. The swidden is a cultivated landscape, which yields well for a few years but becomes progressively more difficult to weed and tend as soil fertility declines. Useful weeds and volunteer or transplanted shrubs and trees are managed at progressively lower intensities until a managed secondary forest results (the fallow) (Denevan & Padoch 1988). This is the most visible sequence of indigenous landscape domestication in the tropics today. The managed fallow remains long after humans have abandoned it and is easily identified by the abundance of useful tree species. Archaeologists can also easily identify these domesticated landscapes, as charcoal and phytoliths of useful plants tend to be abundant.

Settlements – as in the cultivated landscape, this manipulation involves the elimination of a section of a preexisting ecosystem, followed by the construction of the settlement, be it a camp or a city. This landscape is constructed from locally available materials, including wood, earth, and stone and often involves considerable reworking of the local relief. It also includes gardens and dump heaps. This type of landscape has been intensively studied by archaeologists since the birth of the discipline, thus needing little explanation here.

Historical Background

The domestication of landscapes has attracted a wide range of scholars for a long time, although

with widely varying terminology. Cultural landscapes have been studied since before Sauer's (1925) classic article on the morphology of landscapes. Harlan (1992), Denevan (2011), and Harris (2012) provide good reviews of recent work. Both Harlan and Harris examine the topic as a component of the origins of food-producing systems, while Denevan argues that the process has been under way so long that it is difficult to identify pristine landscapes in any part of the world where humans have lived for any appreciable time, even the Neotropics where our species arrived only 20–15,000 yB.P. Rindos (1984) and Tudge (1998) would have agreed with Denevan.

Key Issues/Current Debates

Perhaps the most important current debate is the extent of landscape domestication in different biomes. Denevan's (2011) argument about the myth of the pristine is questioned in Amazonia, for example, where ecologists and archaeologists argue that preconquest human manipulation of Amazonian landscapes was variable across the biome, with negligible modification of interfluvial forests (Bush & Silman 2007), hence of the basin in general. The definitions provided above help explain why archaeologists have difficulty finding evidence of landscape domestication away from the settlements along rivers. Additionally, too many ecologists fail to consider preconquest manipulations of landscapes as explanations for unexpected abundances of useful species. Historical ecologists are more likely to correctly interpret these signatures in the landscape. Stahl (2008) reviewed Amazonian studies that demonstrate how the cumulative historical impact of small bands of hunter-gatherers is probably greater than that of traditional farmers, although the latter also manipulate the forests available to them near their settlements. Contemporary hunter-gatherers are sophisticated and dynamic managers of forest landscapes, subtly thinning some areas to make space for their preferred resources, creating "wild orchards" (Politis 1996: 508). They exploit temporary gaps, disperse fruit trees and palms, and move their camps regularly, concentrating resources at preferred locations over wide areas of forest landscapes. Over thousands of years, the results are dramatic, but the forests look mature, untouched, pristine to the untrained eye.

The current debate seems to be driven more by the limitations of methods than by the lack of signatures in the landscape, because a careful look is quite likely to identify a signature. For example, McMichael et al. (2012) looked for charcoal and phytoliths along the central section of the Purus-Madeira interfluvial and concluded that human impact was negligible, but Levis (2012) examined the useful tree and palm communities in forests along the central and northern section of the same interfluvial and found considerable evidence of increased abundance of useful species, whose abundance declined as the distance from the river edge increased, as hypothesized by Bush & Silman (2007), but extended further into the interfluvial than expected by McMichael et al. (2012). Levis' study essentially supports Stahl's (2008) review, although Levis did not study hunter-gatherers themselves, only the signatures that they and others left in the forest landscapes of the interfluve. These signatures are typical of those expected in promoted landscapes, which is why they were not detected by McMichael et al.'s methods for studying cultivated landscapes. As Stahl (2008: 9) concludes,

> Any conditions that are appropriate for supporting human population increase are to be found as physical signatures within the landscape, which represent the historically accumulated capital of previous human generations. It is the human landscape which can create the conditions that can promote human population growth. It is precisely this historical capital that we should be studying.

Another current debate is about the nature of progress in human history and, by extension, in analysis of domesticated landscapes. The sequence of categories of landscape domestication defined above can be read as progress from simple manipulations to more complex manipulations, requiring more knowledge, more energy, larger populations to supply the energy, and producing more food to fuel the population growth. The same is true of the sequence of plant

population domestication (Rindos 1984; Clement 1999), as plants become continually more coevolved with their human mutualists. Many theorists assume that human populations progress from simple social systems, with simple food procurement strategies, to complex social systems, with sophisticated food production systems. As Rindos (1984) was careful to point out, however, evolution is not about progress, but about change for better adaptation to shifting environments, including landscapes that humans have domesticated to any degree. Modern food-producing societies, such as those that support academics, view the sequence of landscape domestication presented here and concomitant plant and animal population domestication as progress. Is this necessarily true of all human societies? Rival (2007) argues convincingly that this is not true, that some human societies prefer to keep it simple. Many of the examples of hunter-gatherers cited by Harlan (1992), Stahl (2008), and Harris (2012) support Rival's analysis. What are the consequences of these decisions across landscapes? It appears obvious that a mosaic of landscapes with different degrees of domestication should be expected. And, in fact, this is what is found on all continents with human societies. Members of modern food-producing societies look down upon members of societies that only promote or manage landscapes, while members of these landscape managing societies wonder why the food producers want to be slaves to their domesticated plants, animals, and landscapes. What does this mean for archaeology? It means that archaeologists must also learn to read the signatures of promoted and managed landscapes, rather than concentrate only on cultivated landscapes and settlements.

International Perspectives

Although the terminology varies, landscape domestication is being intensively studied on all habitable continents, although emphasis is placed on cultivated landscapes, since these came to support modern food-producing societies. Australia provides an emblematic contrasting case study, since Native Australians extensively domesticated their landscapes without domesticating plants or animals (Harlan 1992; Harris 2012), and provides the examples that justify distinguishing conceptually between landscape domestication and plant population domestication, even though native peoples do not recognize the distinction (Clement 1999). Harris (2012) provides an up-to-date introduction to this Australian literature.

The humid forests of Southeast Asia and near Oceania are also the subject of increasing investigation, parts of which are also analyzed by Harris (2012). However, in this region, two intertwined traditions exist: a tradition that developed efficient open-field food production systems and a tradition that developed complex forest food production systems. Michon (2005) provides an introduction to these two traditions, concentrating on the forest resources, rather than the open-field systems, which provides a welcome difference in focus. While the open-field systems came to dominate world food production (Harlan 1992; Harris 2012), numerous less-dominant societies throughout the world humid tropics appear to have developed more complex systems, similar to the intertwined systems of Borneo and adjacent areas of Southeast Asia and near Oceania. The large number of fruit trees and palms domesticated in Amazonia (Clement 1999) suggests that something similar occurred there. Worldwide, there are an increasing number of studies examining tree crops and this trend will certainly continue.

This short entry is not the place to review the growing worldwide literature on landscape domestication, so the reader is directed to Harlan (1992), Denevan (2011), and Harris (2012), references therein, and Further Reading (below).

Future Directions

The study of landscape domestication by existing and prehistorical societies worldwide is expanding.

Given the definitions presented here, it seems self-evident that archaeologists need to expand their collaborations even more than has been the case recently (e.g., Zeder et al. 2006). Landscape and other archaeologists need to recognize that human manipulation of the landscape does not cease at the edges of settled and cultivated landscapes but continues through managed landscapes into promoted landscapes. With increased attention to subtler modifications, the extent of landscape domestication practiced by prehistorical societies will be clearer and may push back the beginning of the Anthropocene from 1750 CE to much earlier, as suggested by Certini and Scalenghe (2011) based on anthropogenic soils, a component of settled and cultivated landscapes.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Complex Hunter-Gatherers
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Harris, David Russell
- ▶ Historical Ecology in Archaeology
- ▶ Human Evolution: Use of Fire
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Landscape Archaeology
- ▶ Midden Cultivation
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ People as Agents of Environmental Change
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Southern Africa: Origins and Development of Agriculture

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Landscape Mapping at West Heslerton

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Introduction

Archaeological research at West Heslerton, Yorkshire, England, began in 1978, following the chance discovery of Early Anglo-Saxon burials during sand quarrying (Powlesland et al. 1986). Subsequent excavations in advance of quarrying and plowing covered some 35 ha of the Vale of Pickering, exposing prehistoric, Roman and Anglo-Saxon settlements and cemeteries (Figs. 1 and 2). Revealing a portion of ancient landscape at such a large scale emphasized that the narrative of human occupation was expressed by a continuum of activity rather than

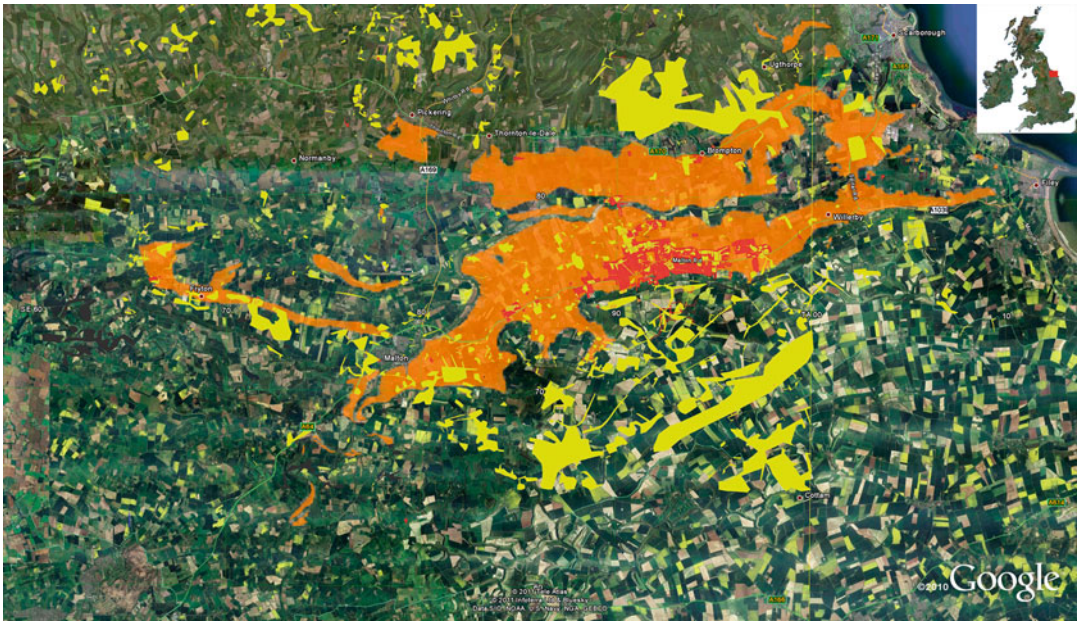

Landscape Mapping at West Heslerton, Fig. 1 The Vale of Pickering viewed in Google Earth with overlays showing the distribution of sands and gravels in *orange*, areas with crop-marks in *yellow* and areas covered by geophysical survey in *red*

by a number of dispersed sites of different ages. It also raised the question of the wider context of the excavated area and the nature of the landscape of which it formed a part. The Landscape Research Centre (LRC) was created to map the total archaeology of the Vale of Pickering, testing and developing methods of remote mapping and analysis. Now in action for more than the 30 years, the LRC has recorded over 1,000 ha of contiguous settlement in unprecedented detail.

Key Issues/Current Debates/Future Directions/Examples

The 1980 research design argued that a proactive campaign of archaeological survey was necessary both to provide a context for the excavations and to identify the scale, complexity, variability, and levels of preservation of the archaeological resource. The preliminary area to be examined was a transect 1-km wide and 10-km long laid at right angles across the varied terrain of the valley. Two packages of remote mapping methods were applied, the first from the air, the second on the ground.

Crop-marks are sensitive to conditions that vary with the seasons and from year to year, so that most discoveries in England are made by chance. To improve the viability of total coverage, LRC initiated a program of intensive and repeated aerial survey flying over the same fields again and again, and documenting crop-marks that were only visible from the air for a few days at a time. New technology in the form of airborne multispectral imaging offered the potential to record crop-marks in wavelengths beyond the visible parts of spectrum, particularly from infrared and thermal wavelengths. A research experiment funded by the Natural Environment Research Council (NERC) in 1994 provided an opportunity to test the viability of multispectral imaging for landscape scale crop-mark mapping, to test the potential for identifying crop-marks in nonvisible wavelengths in fields under permanent pasture and in fields that had no prior crop-mark record. The 1994 NERC flight combined conventional large format vertical color photography

Landscape Mapping at West Heslerton,
Fig. 2 Plan showing the excavated Anglian Settlement and associated cemetery at West Heslerton

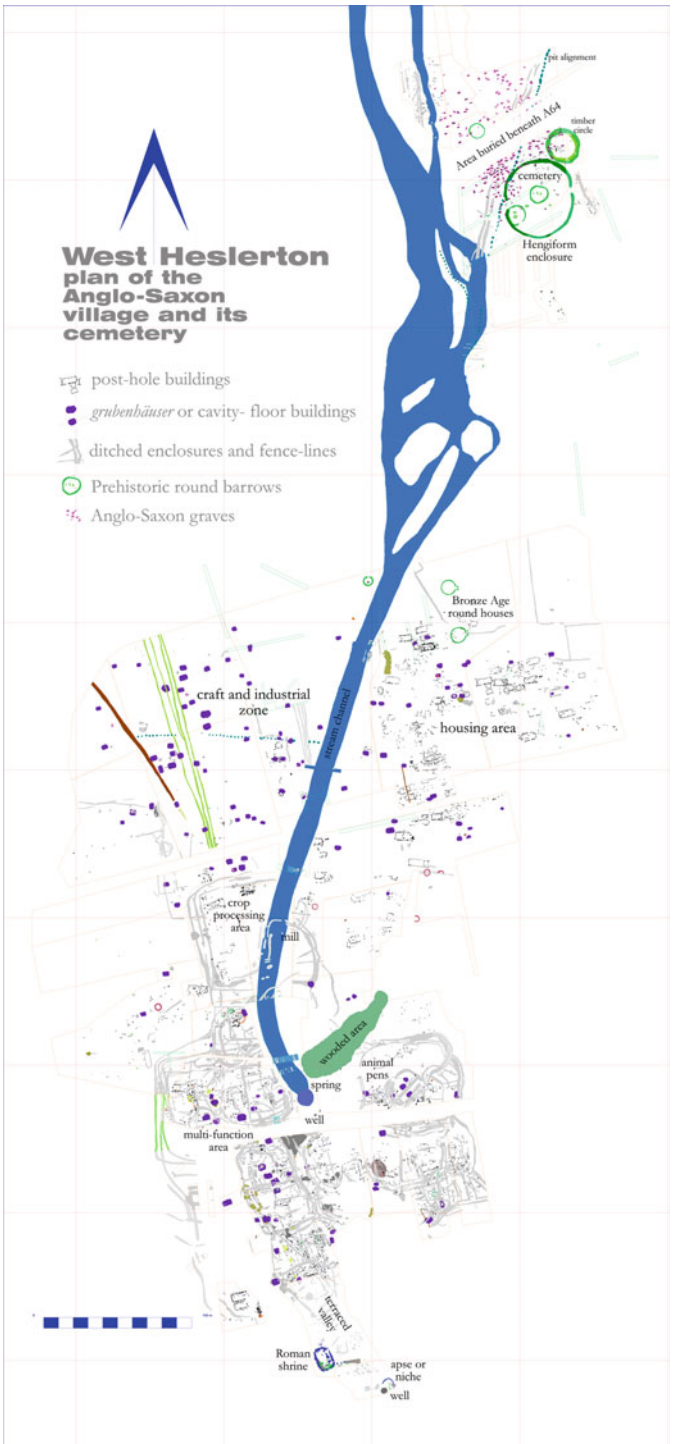

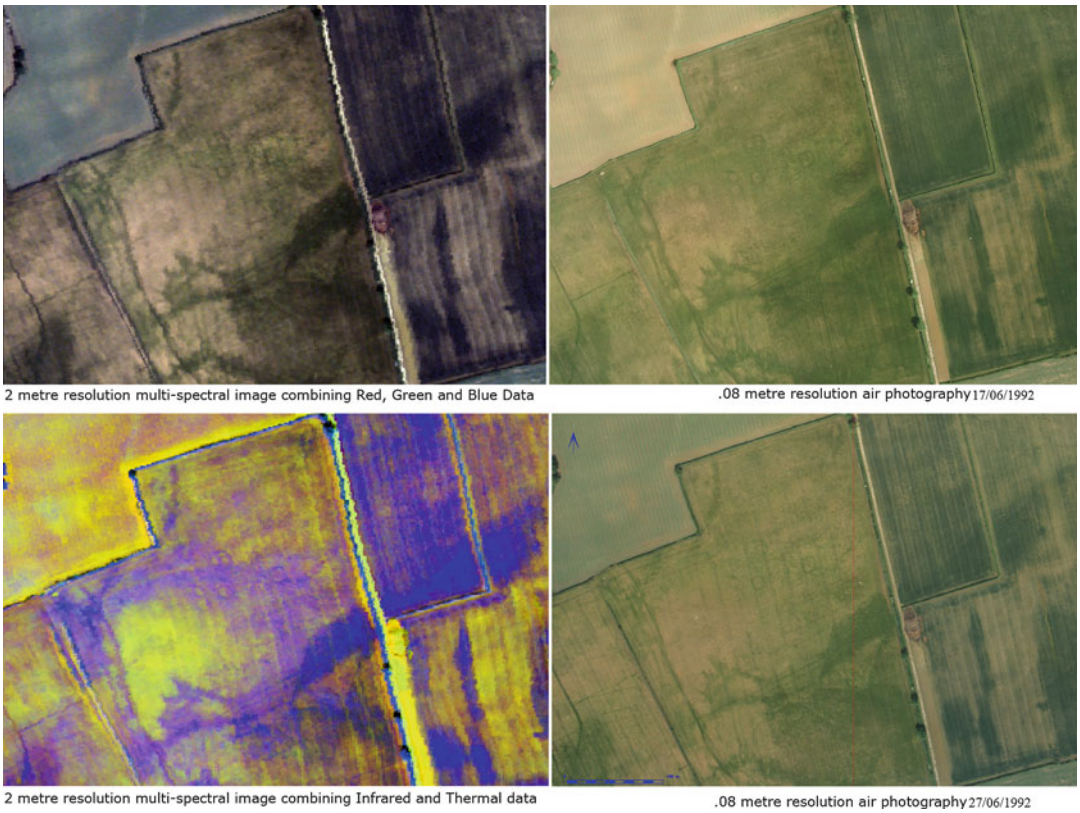

Landscape Mapping at West Heslerton, Fig. 3 *Four views* covering an area of crop-marks derived from multispectral and high resolution airborne imaging. Showing the limitations imposed by resolution and the difference in crop-marks only a few days apart

with digital imaging using the Deadelus 12 band multispectral scanner; by chance, the flight was undertaken at a perfect time when a very large number of crop-marks were visible (Fig. 3). The vertical photographs from this single survey included a large percentage of the features identified over many years of ad-hoc air photography. The scientific test to identify features using wavelengths beyond the visible part of the spectrum was confirmed, but the limited resolution of the Deadelus scanner generating images with a ground resolution of 2.0 m rather than the .08 m per pixel resolution of the photographs meant that the returns from the multispectral imaging were diminished (Powlesland et al. 1997).

Another NERC supported flight undertaken in 2005 collected LiDAR data. The LiDAR survey, despite its relatively low ground resolution of 2.0 m per pixel, provided an accurate surface model covering c. 80 km^2 around West Heslerton Village. It was quickly realized that the LiDAR surface model was imperfect in that it represented the current rather than ancient topography. The current landform has been radically altered by desiccation of the extensive peat deposits in the center of the Vale as a consequence of climate change, man-made drainage, and agricultural effects.

Attempts to identify buried archaeology using ground-based remote sensing in the early 1980s initially produced poor results, a consequence both of the available hardware and local conditions. With the support of English Heritage, a program of large scale and contiguous geophysical surveys designed to cover multiple adjacent fields was begun in 2001 and continued for nearly a decade; these completely transformed the

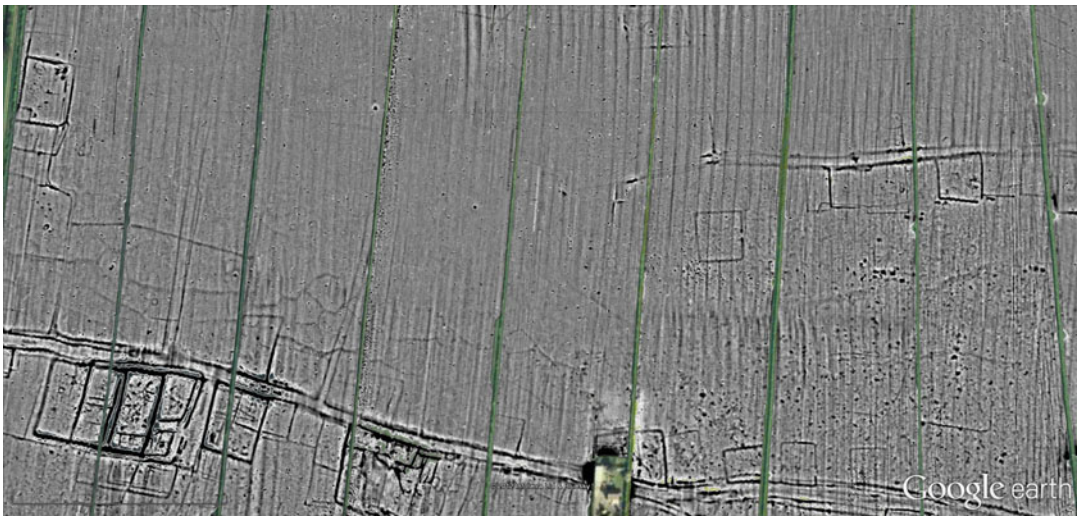

Landscape Mapping at West Heslerton, Fig. 4 A section of the LRC landscape scale geophysical survey covering a 1-km strip on the southern side of the Vale of Pickering revealing evidence of prehistoric, Roman and Anglo-Saxon domestic activity in addition to major trackways and probable cemeteries

picture of past activity in the area (Fig. 4). Survey was first targeted on an area of c. 350 h a between the villages of Sherburn and East Heslerton; work began using a single Geoscan FM16 fluxgate gradiometer, collecting data over thirty meter squares walked at 1-m intervals, recording points at .25-m intervals on a north-south axis with a field team of two. The sandy soils of the southern side of the Vale of Pickering both to the east and west of West Heslerton proved to be exceptionally responsive to geomagnetic prospection in particular. The initial 350 h a target area was sufficient to expose an extraordinary number of archaeological features but was insufficiently large to give an understanding of the underlying structure of the prehistoric and later landscape or develop a long-term management strategy.

In order to increase the rate of area coverage, a Bartington 601 dual gradiometer, with two probes set 1 m apart, was purchased; this significantly reduced the amount of walking required to cover each area. The limitations in single or dual probe survey employing manually established 30 m grids were recognized at an early stage of the large area surveys; it was difficult to secure high quality and uniform results at a rate of more than 2 h a per day. By the mid-2000s, new instruments employing multiple probes mounted on carts were developed by English Heritage in the UK and a number of geophysicists in Europe. In 2007, we began to use a Foerster Kartograph which carried four probes with a .5 m separation between them and collected magnetic values at .1 m intervals in the direction of travel; a Real Time Kinematic GPS mounted on the cart meant that each point collected was precisely positioned with an accuracy of less than 5 cm. The increased density of the collected data greatly improved the resolution of the mapped magnetic anomalies, revealing features that would not have been observed in lower resolution data, and made interpretation of the results more reliable. The use of the onboard GPS meant that there was no need to manually lay out a traditional survey grid and, by using a 2 m wide cart, larger areas could be covered in a day.

The integration of the geophysical and airborne remote sensing results within the LRC's geographic data management system employed the same approach as was applied in the excavations. Each identified feature is individually identified, documented in a database, and digitized as a filled polygon to produce an

interactive map which can be viewed and interrogated at any scale. Conventional GIS software, while well suited to multiscalar data, rarely supports the sort of 3D imaging needed to appreciate the landscape setting of the evidence and, more significantly, the fourth dimension, time. This challenge was addressed using Google Earth as the platform for a digital atlas incorporating the results; this resolved the three primary issues – the delivery of the integrated results of the research using the Internet to nonspecialist and specialist audiences, the delivery of the interpreted data within an interactive 3D landscape, and the facility to scroll and animate the results through time. This represented a significant breakthrough in terms of the publication of a landscape dataset; the time depth of the data was addressed through the design of the underlying database, which indicates the active period for each identified feature (Powlesland 2012).

The detailed feature dataset now comprises over 30000 features ranging from individual small pits to trackways running for many kilometers. This densely utilized landscape has challenged established models of population density and land use from the Neolithic to Medieval periods in England. It has also brought home the character of the archaeological resource as a continuous historic environment.

Cross-References

► Landscape Archaeology
► Medieval Archaeology

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Langford, Rosalind

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Basic Biographical Information

Rosalind (or Ros) Langford (Fig. 1) was born Rosalind Atkinson on September 18, 1946, in Leeton, a Riverina town in New South Wales, spending her early years on the Flats in Mooroopna, Victoria. Her mother was a Yorta Yorta woman, born on Cummeragunja mission. Rosalind moved to Tasmania when she married in the early 1970s and has raised four children in the Tasmanian Aboriginal community. She died suddenly of a heart attack on August 8, 2012.

Major Accomplishments

Rosalind Langford was instrumental in starting the Aboriginal Information Service (AIS), the first Aboriginal organization in Tasmania, and was elected as its first State Secretary from 1972-1975. This was at a time when the state of Tasmania accepted Commonwealth money for Aborigines but denied their existence. From that base Ros worked to raise the profile of Aborigines in Tasmania. One of her earliest initiatives was to attend the first Aboriginal Legal Services conference in Canberra in 1973 and successfully

Langford, Rosalind, Fig. 1 Rosalind Langford

put the case for a grant to operate a proper Aboriginal Legal Service in Tasmania. In 1977 the AIS became the Tasmanian Aboriginal Centre. Rosalind was elected its State Secretary several times over the next 20 years and most memorably in 1982 – the year of the Franklin River Campaign – during which simmering tensions between Aborigines and archaeologists over the control of Aboriginal heritage came to a head.

With respect to the Australian archaeological community, Rosalind's major impact was an intervention contained in an address to the Australian Archaeological Association's 1982 Hobart Conference with the seminal work *Our Heritage – Your Playground* (Langford 1983). This presentation, delivered on behalf of the Tasmanian Aboriginal community, confronted archaeologists, who relied on an unquestioning acceptance of their scientific prerogative to freely dig up, remove, and pronounce on Aboriginal heritage, with the fact that this was the culture and heritage of a living people. The presentation strongly asserted that scientific professions were underpinned by the cultural values of white supremacist imperialism and maintained by the self-serving denial of the rights over heritage, and even the continuing existence, of indigenous people. Aborigines required archaeologists to take practical steps to acknowledge Aboriginal ownership and control of their past as a precondition for any future working relationship. In response, the AAA voted at its annual general meeting following the conference to acknowledge Aboriginal ownership of their heritage and to build consultation with Aborigines into all research funding projects.

Perhaps the most widely quoted passage is this:

> From our point of view, we say – you have come as invaders, you have tried to destroy our culture, you have built your fortunes upon the lands and bodies of our people, and now... want a share in picking out the bones of what you regard as a dead past. We say it is our past, our culture and heritage and forms part of our present life. As such it is ours to share on our terms (Langford 1983: 2).

This entry of 1983 has been, and continues to be, widely cited by archaeologists and scholars in other areas such as general heritage studies (Creamer 1990: 137), indigenous heritage studies (Rigney 2006: 37), and law (Harris 1996: 32). It has influenced not only archaeologists and other white researchers but also Aboriginal people and not just in Tasmania (e.g., McNiven & Russell 2005: 188). Russell (2001: 50) refers to the entry as "an important milestone in Australian Aboriginal Studies."

Rosalind later worked as State Area Manager for the Aboriginal Development Commission and also chaired the Tasmanian Aboriginal Education Unit. She has lectured on Aboriginal Culture and Aboriginal Political issues at the University of Tasmania, in Adult Education and in schools throughout Tasmania.

Ros is also a celebrated artist, using symbols and motifs in a contemporary style and medium. In 2010 she graduated from the University of

Tasmania with a Fine Arts Degree, with a double major in Print Making and Painting. The Tasmanian Museum and Art Gallery purchased one of her major pieces of work, a blanket screen printed with ochre depicting her Yorta Yorta heritage and her connection to Tasmanian Aboriginal people.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Archaeology and Politics
- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Australia's Archaeological Heritage
- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Peoples, Working with and for

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Laos: Cultural Heritage Management

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Introduction

Cultural heritage management in Laos is largely concerned with the management of monumental archaeological sites, historical architecture, and more recent sites and objects related to the communist regime. Lao heritage management has its roots in the time when Laos was part of French Indochina and is characterized by its colonial legacy, with additions from Buddhism, communism, and a currently growing business of alternative tourism.

Definition

The definition of national heritage in the Lao PDR Law on National Heritage established in November 2005 says,

> National Heritage refers to items produced by mankind or formed by nature that have outstanding cultural, historical or natural value, thereby becoming precious assets and property of the Lao national community, some of which are adopted as regional and world heritage. National heritage consists of cultural, historical and natural heritage existing in the form of tangible objects, intangible items, moveable or immoveable property, and living or non-living organisms, reflecting the history of the Lao nation and the Lao people in each different era. National heritage includes items existing in the country and abroad (Law on National Heritage 2005, article 2).

It is a standard modern definition of national heritage, which links objects and sites that are considered to be of outstanding value to the essence of the Lao people and the creation of the Lao People's Democratic Republic.

The cultural heritage of Laos is defined by law as both tangible and intangible. Some efforts have lately discussed and encouraged the

Laos: Cultural Heritage Management, Fig. 1 Plain of Jars visited by a group of ecotourists in November 2007

preservation of intangible heritage, but apart from those discussions, it is mainly tangible historical sites and artifacts that are subject for cultural heritage management in Laos. Two sites are inscribed on the UNESCO World Heritage List: the former royal *town of Luang Prabang* (inscribed 1995) and the ancient temple complex of *Vat Phou and Associated Ancient Settlements within the Champasak Cultural Landscape* (inscribed 2001). These two sites attract a major part of the attention and resources for cultural heritage management in Laos, along with the Plain of Jars (Fig. 1) where investigations are being done by UNESCO and Lao archaeologists in preparation for an application to have the site inscribed as world heritage.

There are other prehistoric sites that are also recognized as important national heritage. These include sites with ancient standing stones (Hintang) in two northern provinces and a very limited number of excavated sites that have no monuments above ground, like cave sites dated to the Paleolithic and all through the Stone Age, and the prehistoric ritual site Lao Pako (Källén 2004). Over the last decade, development works for infrastructure, dams, and mining have led to a series of development-led archaeology projects across the middle and southern part of the country, where new prehistoric and historic sites have been found and investigated.

The prehistoric archaeological heritage is, however, but a minor part of Laos' cultural heritage. The main focus and national attention is on the built historical heritage and particularly ancient temple structures and monuments connected to early forms of Hinduism and Buddhism and early political entities such as Dvaravati, Khmer, and the first Lao kingdom of Lane Xang. Colonial architecture from French Indochina is also considered part of the built historical heritage.

A third category of national heritage in Laos is the sites and artifacts from the early days of communism. These sites and artifacts often have a strong personal connection to communist heroes such as the leader of the revolution Kaysone Phomvihane and "The Red Prince" Souphanouvong. The heritage objects in this category are defined by their genealogical connections to heroism. They consist mainly of museum artifacts and war-related sites like the caves in Viengxay (Fig. 2) that worked as strategic center and shelter for the Pathet Lao leaders in the war against the US-supported Royal Lao Army, more widely known as the Vietnam War.

More recent objects such as textiles and weaving patterns, instruments such as the *khean*, and food such as sticky rice are also defined as cultural heritage by law.

Legislation

Since 2005, heritage sites and objects in Laos are protected by the Law on National Heritage. Compared with other areas of cultural politics in Laos, heritage has a remarkably clear definition and a strong protection by law. The first article says that the law "determines the principles, regulations and measures for the administration, use, protection, conservation, restoration, and rehabilitation of the national heritage, and also determines the rights and duties of the State, social

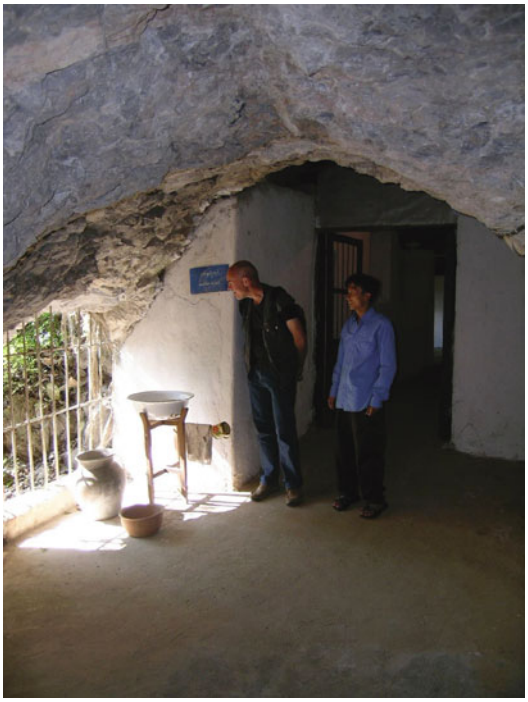

Laos: Cultural Heritage Management, Fig. 2 The caves in Viengxay, Hua Phan Province, where the Pathet Lao leaders took shelter and built the strategic center of the 1970s revolution, have recently been opened to visitors

organisations and individuals to preserve the value of the national cultural, historical and natural heritage, with the aims of educating citizens with a conscious love for their nation and fine national traditions that is deeply embedded in their hearts and of assuring the elements for prosper sustainability of the nation"(Law on National Heritage 2005, article 1). The outlines and contents of this law, consisting of 73 articles, have great similarities to heritage legislation in most other countries. It defines cultural heritage sites in Laos and objects that originate from the Lao territory, as the property of the Lao people and nation, and decides that it is an obligation for the state, its citizens, and visitors to protect the Lao heritage, and it sets the rules for who do what when such sites and objects are moved or altered with. What sets it apart from legal documents for cultural heritage in Western democracies is the outspoken aims to use it for education of the citizens to "love their nation, to be unified and proud of historical efforts, to be creative, to bravely struggle, and to be united as one…" (Law on National Heritage 2005, article 40) that it forbids the creation of new monuments and religious places without permission from the Ministry of Information, Culture and Tourism (article 31) and the definition of Buddha figures as an extraordinary category of heritage object, surrounded by specific rules and regulations.

Government Offices for Cultural Heritage Management

The government office responsible for cultural heritage management is the Ministry of Information, Culture and Tourism (MICT) and there, in particular, the Department of National Heritage. Most of the official responsibilities regarding heritage protection, conservation, display, and knowledge production lie with the Department of National Heritage. It is a comparatively small office with only a few permanent members of staff. The registration of new heritage objects and the granting of all permits for research, excavation, analysis and display, and equally for artifact sales and exchanges is therefore in the hands of only a couple of individuals, which is unusual in a current global perspective. Other government offices such as the Ministry of Education and the Lao National Tourism Administration (LNTA) are occasionally involved in heritage-related issues, but the responsibilities for key operations lie with the MICT Department of National Heritage. The MICT also has provincial, regional, and local offices with the delegation to control the practical heritage work on a regional and local level.

Archives

There are no national archives for heritage management in Laos, nor is there any national database for heritage sites. Information about sites and heritage objects can only be found in publications and reports or by contact with the MICT Department of National Heritage.

Museums

There are a number of museums with national importance in Laos. The Lao National Museum

in Vientiane has displays of objects and narratives of the national past, from dinosaurs to post-revolution times. It was established in 1980 as a Revolutionary Exhibit Hall, in the former premises of the French *Hôtel du commissariat*, and changed name to the Lao Revolutionary Museum in 1985. In the year 2000, its name was changed once again to the Lao National Museum, but the displays of heroic struggles against imperialists remain more or less intact on a large part of the first floor and half of the ground floor. The remaining half of the ground floor has displays of prehistoric and early historic archaeology, and in a smaller part of the first floor are displays of the customs and crafts of ethnic minorities. The National Museum also houses some smaller collections of excavated prehistoric and early historic material. In addition to the National Museum, there is in Vientiane a big memorial museum over the national hero Kaysone and a number of historically important temples, in particular Wat Ho Phra Keo and Wat Sisakhet (Fig. 3), that have displays and function partly as museums. In addition to these, there are several smaller museums and private showrooms for display of the Lao textile craft and tradition. On a regional level, the two World Heritage Sites in Vat Phu Champassak and Luang Prabang have several larger museums of local character. There are also smaller museums on a regional and local level with particular local displays of, for instance, a dinosaur fossil, an ancient temple site, or a cave used for shelter that was bombed during the war.

Laos: Cultural Heritage Management, Fig. 3 Collection of Buddha figures in Wat Sisakhet in Vientiane

Conservation

Conservation has no particular unit in the national heritage administration. It is involved in most practical work on prehistoric and historic sites and buildings and is typically done by foreign experts hired by larger projects with international funding.

Training

There has until very recently not been any basic professional training in cultural heritage management available in Laos. The heritage management staff at the MICT and other heritage institutions therefore had their training by scholarships abroad. Among the older generation, many were trained in the Soviet Union or other Eastern European countries and a few in France, India, Japan, or Australia. In the younger generation, most have their training from Thailand or Vietnam. Only recently, the National University of Laos, Faculty of Architecture, has started an education program involving archaeology and heritage management.

Research

Research on cultural heritage in Laos is generally controlled by the MICT. It is often done practically by the Department of National Heritage staff, in larger projects with international funding and in cooperation with international experts. There is also the National Academy of Social Sciences, the Institute of Cultural Research, and the Urban Research Institute, which are separate research institutes in collaboration with the MICT.

International Actors

Although all heritage management is controlled by the MICT, international organizations and international cooperations in research or practical heritage projects are key to the field of cultural heritage management in Laos. The MICT has virtually no funding resources of its own and is entirely depending on foreign funding. Major international actors are UNESCO, the French École française d'Extrême-Orient, the Japanese MOFA, and the Asian Development Bank. There are also a number of smaller international research funds involved in heritage projects and international companies for development-led archaeology working with road and mining projects.

Historical Background

While the objects for cultural heritage management in Laos date from all between the Paleolithic and the twentieth century, the history of heritage management itself begins with the French incorporation of Laos in French Indochina in 1893. The three kingdoms that preceded French Indochina had complex administrations based on a system of *mandalas*. But the basic administrative structure of Laos as a centralized modern nation state was invented and implemented by the French in collaboration with Lao civil servants (Stuart-Fox 1997; Evans 2002). The definition of heritage as connected to national essence and a teleological historical narrative is characteristic for nineteenth-century European discourse. It was applied to Laos by the French and later adopted in postcolonial nation building along with the general definition and administration of Laos as a modern centralized nation state. The concept of cultural heritage, such as it is defined today in Laos by law and official practice, is thus rooted in European discourse from the nineteenth and early twentieth century.

The first systematic documentation and research of Laos' cultural heritage was done by archaeologists from the French École française d'Extrême-Orient (EFEO) based in Hanoi, who made surveys and documented (mainly monumental) prehistoric and historic sites. Two of EFEOs most renowned archaeologists, Henri Parmentier and Madeleine Colani, both worked with and published extensively on the cultural heritage of Laos (Colani 1935; Parmentier 1954). Parmentier, who was a trained architect, represented the principal line of archaeological research at EFEO and was oriented toward art history and epigraphy, focusing on historic architecture, monuments, and art. Colani, who was a trained geologist, represented a minor branch of archaeology at EFEO with her interest in prehistoric archaeology and her orientation toward ethnography and craniology (Clémentin-Ojha & Manguin 2001). Both these branches of archaeological research are still present in the practice and narratives of cultural heritage management in Laos.

The first two decades of independence, after the dissolution of Indochina in 1954 and up until the revolution and victory of the communist Pathet Lao in 1975, were characterized by political instability and war. Heritage management was not a priority, but one of the key texts defining Lao history and heritage was produced during this time. Maha Sila Viravong's classic *History of Laos* (in English translation, Viravong 1964) is an interesting combination of a modern Western type of narrative focused on origin and racial essence, with a characteristic Lao narrative based on stories of mythical heroes and their connections to places, objects, and groups of people, often involving spiritual elements. Viravong's *History of Laos* is still found in school curricula and is without competition the most influential domestic source of history knowledge in postcolonial times.

In the years immediately after the revolution and victory of the Pathet Lao in 1975, a new category of cultural heritage was defined; very recent sites and objects related to communist heroes or the people's struggle against the imperialists. For almost two decades following the revolution, Laos diminished the contacts with the Western world and nurtured the relations with other communist and socialist states. During this time, the pre-communist heritage was of no

official concern. The relevant history started at the revolution (Pholsena 2006).

Around the mid-1990s, there was a turn toward a softer communist politics, and Laos began to open up for political relations and visitors from the West. At about the same time, there was also a turn in the politics of heritage. In 1997 came an important presidential decree on the preservation of a national heritage, and a year earlier, one of the archaeologists at the Ministry of Information and Culture, which has recently been renamed Ministry of Information, Culture and Tourism produced a booklet with the title "The Prehistory of Laos" (Sayavongkhamdy 1996). Both used the basic definition of cultural heritage that had been introduced by the French administration but emphasized the ideals and objects of Buddhism and communism to create a unique definition of cultural heritage for the Lao PDR.

Key Issues/Current Debates

The open attitude to visitors in the first decade of the twenty-first century has resulted in a dramatic increase in tourism since the turn of the millennium. This increase has also had a big impact on the politics of heritage. If the main purpose of heritage as it is defined by law is to make the Lao people feel strongly and proudly for their nation, the most important practical purpose of cultural heritage in Laos today is to attract foreign visitors and generate income. As the country began to open up, it first attracted mainly backpackers. The government in collaboration with foreign experts began to develop ecotourism and other forms of alternative tourism, in order to attract a clientele with more resources to spend and with more sensitive interests in the country's nature and culture. It has proven a very successful strategy, and Laos has been referred to as a model country for the development of alternative tourism (Harrison & Schipani 2007). The knowledge and sensitive consumption of heritage are a major concern for ecotourists, and the Lao National Tourism Administration is therefore a main actor in cultural heritage management in Laos today. The two World Heritage sites Luang Prabang and Vat Phu are key tourist magnets and appeal to ecotourists as well as backpackers. Monumental archaeological sites, temples, and historical architecture are generally marketed for ecotourists, while sites related to communism and war seem to attract more backpacker visitors. Non-Western tourists, mainly from Thailand, Vietnam, and China, are also a large and growing group of visitors, which the tourism industry in Laos are likely to adjust to in the near future.

The softer communist politics over the last couple of decades has also opened up an appreciation of cultural heritage with associations to the royal history of the country. Lao communism has always has a strong unusual connection with Buddhism. Buddhist buildings, objects, and traditions have therefore also kept a strong position as national heritage. Recently, there has also been a renewed interest in the royal past, with celebrations of kings' anniversaries and other important royal events. Along with this development, the buildings, objects, and stories of former kings and royal families have also gained status as important national heritage (Evans 2009).

International Perspectives

From an international perspective, cultural heritage management in Laos is interesting as an example of an unusual union between communism, a colonial legacy, Buddhism, and an increasingly important royal past.

The cultural heritage of Laos also provides an interesting example of the complex relations between materiality and spirituality in a Buddhist context. The different attitudes to materiality and spirituality, in Buddhism on the one side and common heritage management on the other, are part of the mundane reality for heritage management in Laos, but it can be fundamentally challenging for a strong international discourse of heritage preservation where the values of material authenticity and originality are often taken for granted (Karlström 2009).

Future Directions

The current tendency for the cultural heritage of Laos is to have it more involved as objects to be consumed by the growing tourism industry. Both in terms of tourism and other international relations that bring necessary funding to heritage management and all other sectors of society in Laos, less is now coming from the West and more from China, Vietnam, Japan, and other Asian states. If this tendency continues, it may well have profound consequences for the future cultural heritage management in Laos.

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- ▶ Cambodia: Cultural Heritage Management
- ▶ China: Cultural Heritage Management
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage: History and Context
- ▶ Indo-Pacific Prehistory Association (IPPA)
- ▶ Intangible Cultural Heritage
- ▶ Local Populations and Global Heritage
- ▶ Marketing Heritage
- ▶ Tangible Heritage in Archaeology
- ▶ Thailand: Cultural Heritage Management

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Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador

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Introduction

At the end of the Pleistocene, the Las Vegas people developed an adaptation focused on a wide variety of marine, estuarine, and terrestrial resources in the Pacific littoral of today's Ecuador. While they may be classified as broad-spectrum foragers, hunters, and fishermen, they initiated an enduring pattern of plant cultivation, figured among the earliest cultivators in America,

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Table 1 Radiocarbon dates for the study of Las Vegas history

Geological and cultural periods	Age in radiocarbon years before present (RCYBP)	Calibrated RC age (BP)
Late Las Vegas	8,000–6,600	9,000–7,300[a]
Early Las Vegas	10,000–8,000	11,000–9,000[a]
Pre-Las Vegas	10,840–10,510	13,820–10,850[a]
Clovis in North America	11,500–10,800	13,500–13,000
Monte Verde in Chile	12,500	13,800–14,800
Early Holocene (EH)	10,000–7,000	11,500–7,800
Terminal Pleistocene (TP)	12000–10000	13900–11500

[a]Two-sigma dendrocalibrated age ranges

and participated in the domestication of useful plant species in the Neotropical region while progressively intensifying both fishing and horticulture. The Las Vegas adaptation has been reconstructed from a wide variety of evidence found in 32 archaeological sites in the western part of the Santa Elena Peninsula (SEP).

The chronological framework for interpreting Las Vegas evidence is based upon 30 radiocarbon dates (Stothert et al. 2003; Table 1). These form a coherent series, and agree well with independent stratigraphic interpretations. Deep preceramic midden in Site 80 permitted the identification of a little known Pre-Las Vegas occupation, as well as two Las Vegas phase dated to the Early Holocene period (EH) (Stothert 1985, 1988). All dates are stated in radiocarbon years before present (RCYBP), but some calibrated dates are included (Table 1). The use of calibrated dates has the effect of lengthening the period in which Vegas sites were occupied.

The earliest known inhabitants of the coast of Ecuador occupied the Las Vegas type site, known as Site 80 or CT M5 A3-80, located at 2°13′ S, 80°52′W on the SEP (Fig. 1). Scant evidence from the deepest levels of this site indicates that people visited Site 80 between 10,840 and 10,100 RCYBP; substantial archaeological remains from Site 80 and Site 67 (located 15 km further east) are evidence of more intense human occupation spanning the EH. Both sites are characterized by deep midden and human burials.

Today's Ecuador is a small country (270,000 km^2) characterized by a large number of compressed terrestrial zones with impressive variations in altitude and rainfall from region to region (Fig. 2). The tropical lowlands of the coastal zone include the environmentally diverse slopes of the Andes, a seasonally wet coastal plain dominated by the great Guayas river system, and the Pacific littoral which today is semiarid in the south but characterized by seasonally dry and very wet tropical forest in the north. This environmentally complex coastal region is 700-km long, and has a maximum width of only 200 km. Adequate rainfall and good soils predominate in most of this environmental mosaic, but the subhumid SEP has limited agricultural potential.

The Santa Elena region constitutes a tropical ecotone characterized by a mosaic microenvironment and impressive biological complexity and an important interface with the sea. The shallow coastal waters of Ecuador are rich in pelagic fish, economic crustaceans, and mollusks. The terrestrial environment that was characterized by seasonally dry tropical forest in the nineteenth century is now an anthropogenic desert caused by recent deforestation. The main cause of aridity is the concentration of precipitation in one short season, followed by at least six dry months: This is the effect of the cold current along the southwest coast of Ecuador and the north coast of Peru (Stothert et al. 2003). It is likely that the SEP and northern coastal Peru were moister in the EH because of the more southerly position of the warm Equatorial Counter Current.

Las Vegas camps are known only from the western extreme of the SEP (Fig. 3) where people apparently occupied Site 80 repeatedly for as much as 5,000 calendar years. Most known Vegas sites are small campsites that facilitated the exploitation of a range of resources (Stothert 1988: 225-36). Although evidence is lacking, it

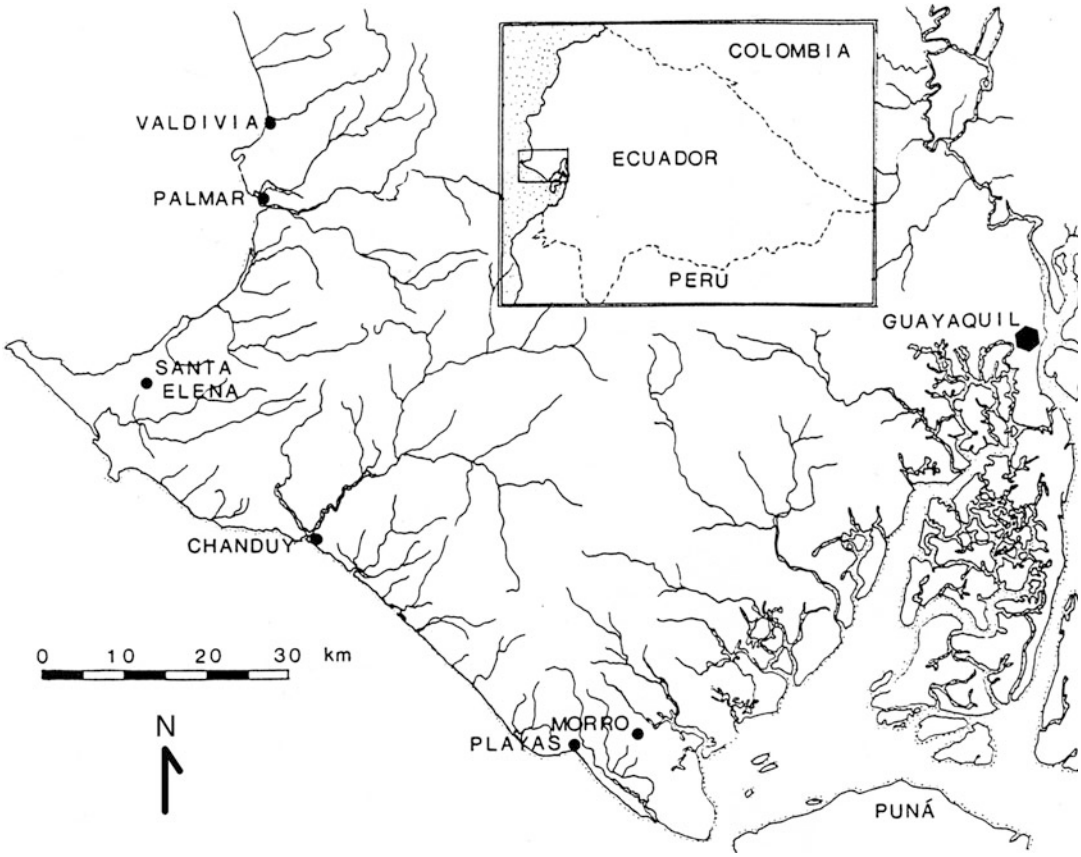

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 1 Location of several modern towns and seasonal rivers of the Province of Santa Elena, also showing the city of Guayaquil (*black hexagon*) on the mangrove estuary of the Guayas river system. Narrowly defined, the Santa Elena Peninsula (SEP) is the area west of a line between Palmar and Chanduy

seems probable that many Vegas sites are lost or submerged on the continental shelf, and that Las Vegas groups once settled throughout the tropical lowlands of Ecuador, and carried on social relations with other peoples in northwestern South America.

Definition

The western portion of the Santa Elena Peninsula (SEP) lies west of a line drawn from Chanduy to Palmar (Fig. 1), but the subhumid lands lying south of a line between Guayaquil and Santa Elena belong to the greater Peninsula of Santa Elena and El Morro.

The early preceramic people in America (sometimes called Paleoindians) were immigrants from the Old World, who, by the end of the Pleistocene, had occupied both North and South America, developing myriad regional cultural adaptations. In Ecuador, the term "preceramic" refers to the period and cultures dated before the beginning of the Valdivia phase, characterized by the use of ceramic pottery dated as early as 5,000 RCYB (c. 6,400 calendar years BP).

Phytoliths are the inorganic, silica structures that form inside some kinds of plant cells. When recovered from sediments, they provide evidence of plants that decayed in ancient times. These microfossils permit the identification of some

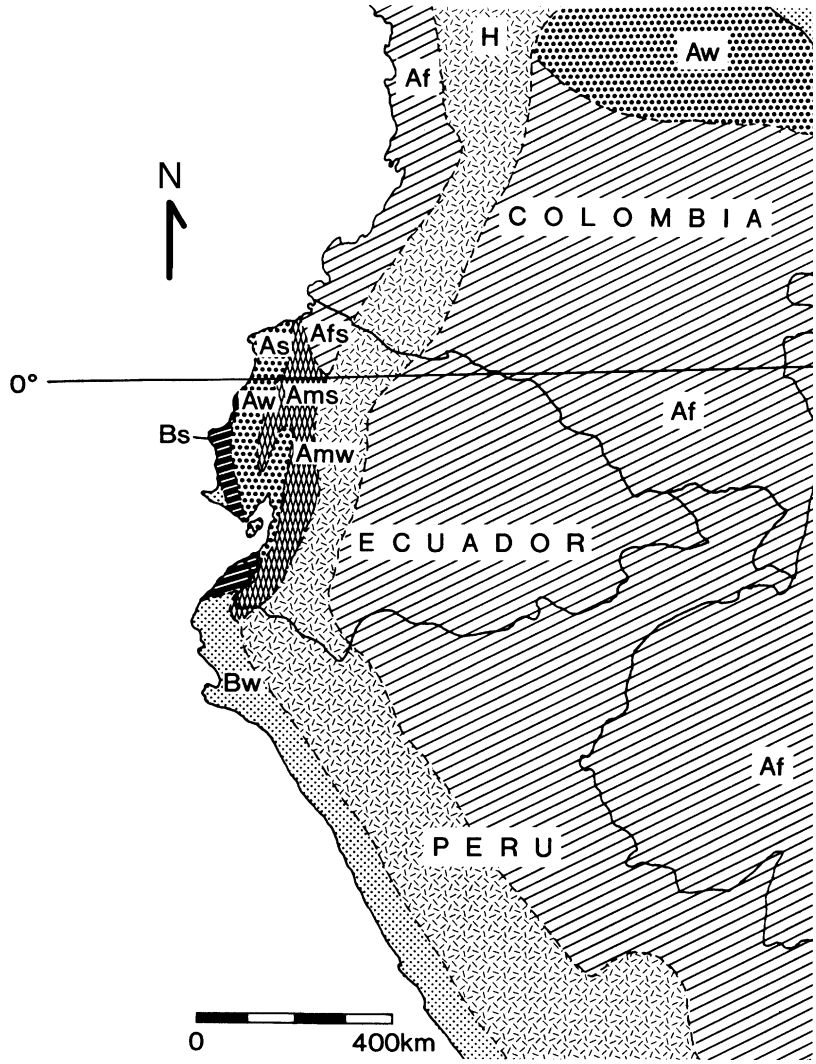

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 2 Northwestern South America showing the exceptional compression of distinct environmental zones in coastal Ecuador (Stothert 2011: 357, Fig. 15.2). *Af* tropical wet; *Afs* tropical wet with precipitation distributed seasonally; *As* tropical wet-and-dry; *Aw* tropical wet-and-dry with an emphatic dry season; *Ams* tropical wet with two yearly precipitation maxima; *Amw* tropical wet with a strong dry season; *Bs* semiarid; *Bw* arid or desert; *H* undifferentiated highlands. The western portion of the SEP is classified today as *Bw*

wild and domesticated plants, and they may be dated directly by the AMS radiocarbon method or by their association with other datable archaeological materials.

Key Issues/Current Debates

Peopling America and Early Coastal Adaptation

By 10,000 RCYBP, groups of foragers with distinct adaptations and variable technologies occupied most of the South America (Dillehay 2000), but archaeologists have not recognized any clear or simple pattern of entry and dispersal through the heterogeneous environments of the TP. The evidence of early coastal adaptations in Peru and Ecuador supports the idea that all Pleistocene people were not big game hunters (e.g., Sandweiss et al. 1998; Sandweiss 2008; Dillehay 2011) and offers an alternative to the traditional view that the first Americans were Clovis hunters who walked across Beringia into America.

Coastal research has recently grown in importance, and it is now thought that Old World people, long adapted to both coastal

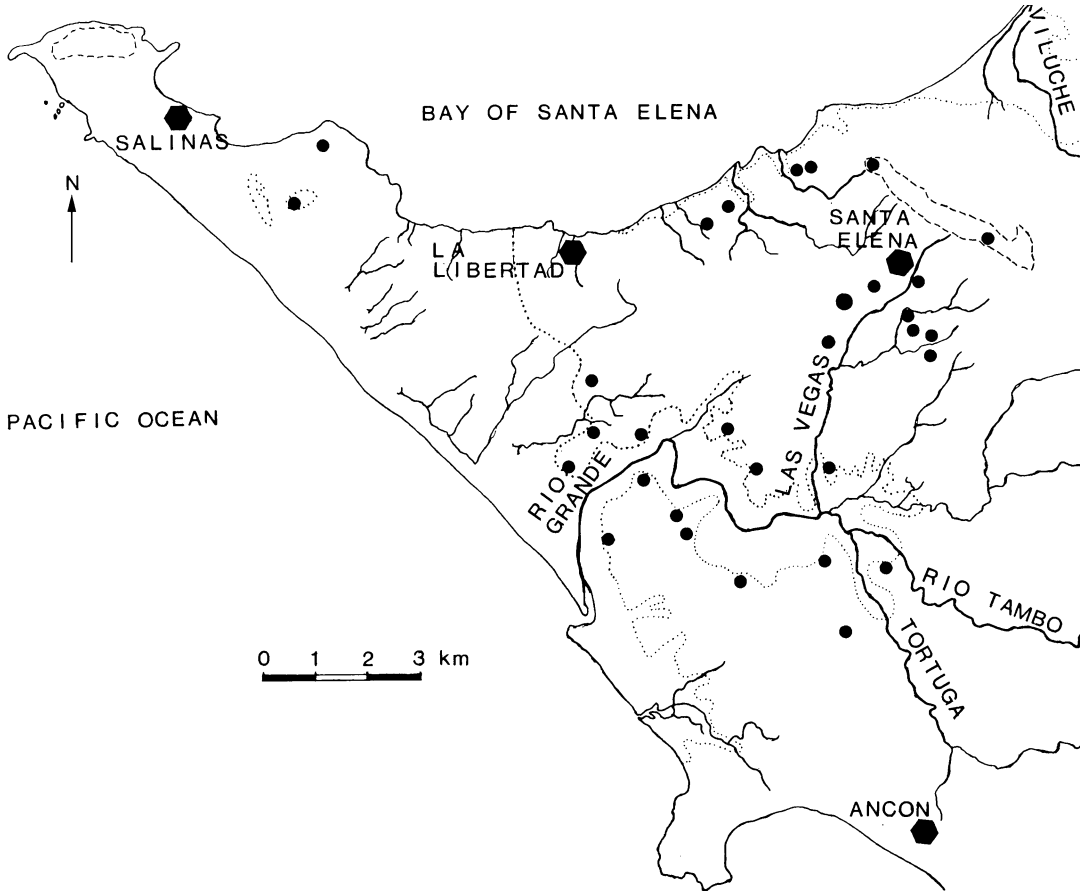

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 3 Map of the western portion of the SEP showing the distribution of Las Vegas preceramic sites; the modern drainage pattern; the modern 10 m contour line (*dotted line*); modern towns (*hexagons*); Las Vegas Site 80 (*large dot* near the town of Santa Elena); and 30 other Las Vegas campsites (*small dots*)

environments and seafaring in East Asia, dispersed into America and down the Pacific coast of South America by boat before Clovis times (Erlandson 2002; Faught 2008; Davis 2011). Evidence from Chile's Monte Verde site (recognized as the earliest settlement in the New World) indicates that marine resources were important to the broadly adapted people of that site before 12,000 years ago (Dillehay 2000: 160-8; 221). Because no North American coastal sites predate Clovis, the issue of initial peopling of South America by hunters from the north continues to be debated. Las Vegas data inform recent research on the antiquity of human use of the world's coastal habitats and marine resources (Stothert 2011).

Climate and Paleoenvironmental Change

Any discussion of the Las Vegas adaptation depends upon an understanding of the effects of climatic and environmental change on terrestrial and marine resources. Independent paleoecological data have not been generated from any location on the SEP; nevertheless, ancient environmental conditions can be inferred from evidence recovered in archaeological midden and the growing evidence concerning paleoenvironments in South America (Fig. 4).

The late Pleistocene environments of tropical America were characterized by dry, cool climates and vegetation and faunal communities that differed substantially from those seen today (Piperno & Pearsall 1998: Chapter 2).

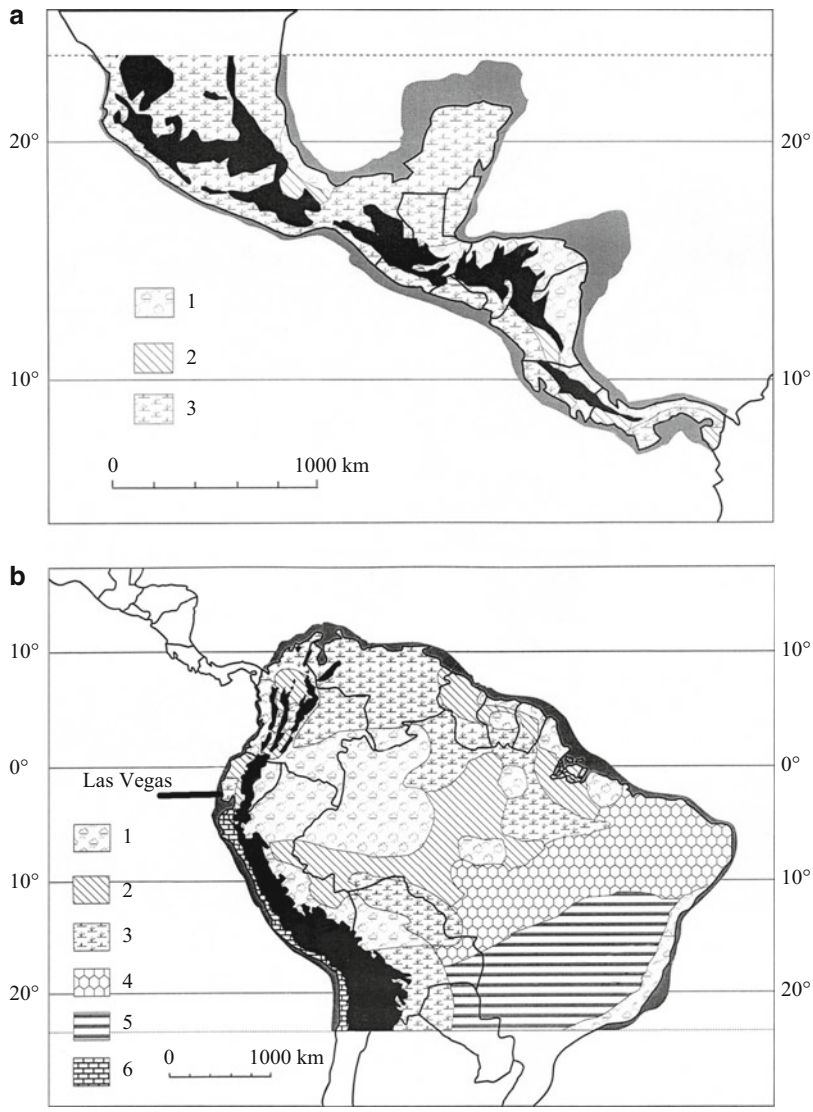

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 4 Reconstructed vegetation of lowland tropical Central America (**a**) and South America (**b**) between 20,000 and c. 10,500 RCYBP (Piperno 2006: Fig. 7.4). (1) Moist forest; (2) dry forest; (3) thorn woodland, low scrub, and savanna; (4) dry and open, few trees; (5) open forest and semi-evergreen forest; (6) desert/cactus scrub. The SEP may have had terrestrial vegetation classified as (3)

Poorly dated Ice Age paleontological finds from the Santa Elena Peninsula and the north coast of Peru show Ice Age creatures who grazed, browsed, and paddled in environments characterized by open grasslands with gallery vegetation along the river courses, and rainfall apparently maintained a high water table, standing pools of water, and vegetation along drainage courses. Rainfall in Santa Elena and in northern Peru apparently was not sufficient to support forests between the rivers (Stothert et al. 2003).

Probably EH people in South America were challenged by "gradual and oscillating climatic amelioration" after which there were "greater seasonal extremes in temperature and moisture" that resulted in "substantial changes in the communities of plants and animals." As ecological conditions changed, edible resources would have been in a "constant state of spatial and temporal flux" (Stahl 1996: 11). Human responses to these challenges are of great interest to researchers today. Vegas midden deposits are

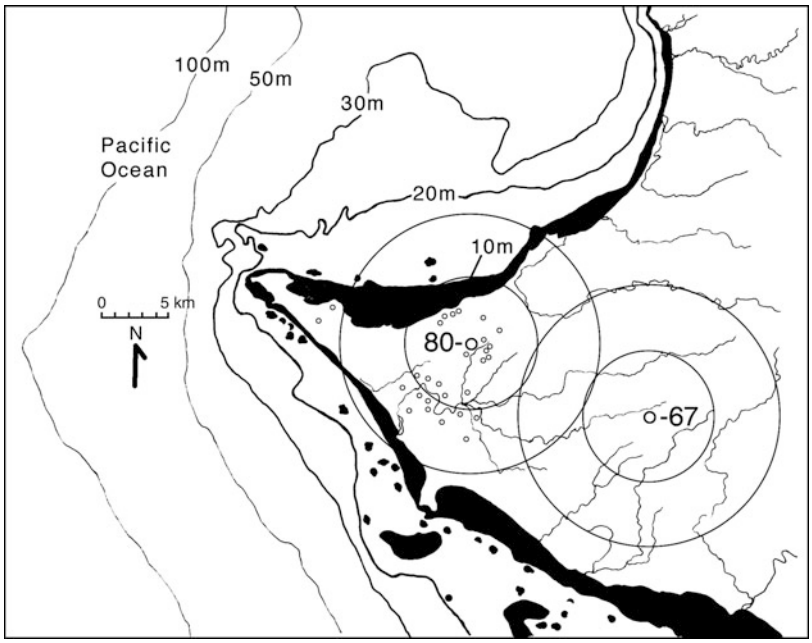

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 5 Changing coastline of the SEP as inferred from bathymetric readings of the modern sea floor. When sea level was depressed 30 m, the ancient coastline may have approximated the 30 m isobath, and the continental shelf between the contour line and the present coast may have been dry land. The area between the 10 m isobath and the present coastline is marked in *black* and models the terrestrial zone at 7,000 RCYBP. Small circles represent small Las Vegas sites, and Sites 80 and 67are shown with their respective 10 km and 20 km catchment areas

too compressed to allow the documentation of climate processes and minor oscillations, but apparently, Vegas people adapted well to both long- and short-term environmental variations in the EH.

Marine Transgression

Conditions along the Santa Elena coast were very different in the past and varied through time due to postglacial changes in sea level involving marine transgression and regressions as well as dramatic local tectonic uplift that caused geomorphological and associated ecological alterations. There is little information about the timing and extent of these changes; however, the isobaths drawn in Fig. 5 reflect modern coastal topography and may also be employed to model ancient conditions. About 10,000 years ago, mean sea level was depressed circa 30 m below its modern position which would have exposed about 600 km^2 of land and lengthened the interface between the land and the sea. A diverse landscape of mangrove formations and estuarine zones may have existed at that time (Stothert et al. 2003; Table 2).

Several pulses of glacial melt water between 10,000 and 7,000 BP affected coasts in various ways, and the great amplitude of short-term sea level oscillations in the EH tapered off through time: As sea level fluctuated, Vegas people witnessed the creation and destruction of coastal habitats until stabilization c. 6,000 years ago (Bird 1993). At the beginning of the Late Las Vegas phase, around 8,000 BP (c. 8,600 cal. BP), Site 80 might have been located 12 km from the north shore of the peninsula, but people would have taken advantage of some 360 km^2 of land, as well as estuaries and mangrove formations, that are submerged today.

The most important implication of modeling the Early Holocene littoral is that the ancient configuration of coastal resources was constantly changing. Even without specifying which

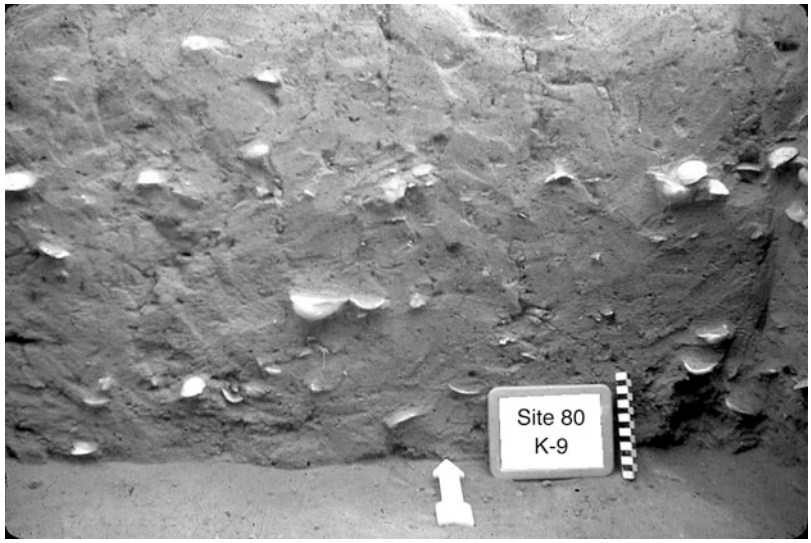

Las Vegas: Environmental Archaeology of an Early Site in Coastal Ecuador, Fig. 6 The excavated north wall of Quadrant K-9 in Site 80 shows the compressed Las Vegas midden that preserves faunal remains and plant microfossils deposited by Las Vegas foragers and cultivators in the Early Holocene

physiographic changes took place precisely when, plant and animal communities living along the coasts would have been affected by both sea level fluctuations and tectonic uplift. We may infer that these processes affected water table levels, river gradients, sedimentation rates, and settlement patterns in the terrestrial zone. These phenomena might have taxed the Las Vegas people by destroying traditional resources, but at the same time other resources were created, presenting opportunities to increase productivity by adjusting subsistence strategies. A deep-sea core from off the coast of Ecuador reflects conditions on the continent and provides evidence that mangrove vegetation reached its maximum development between 12,000 and 7,000 years ago (Heusser & Shackleton 1994: 223). In fact, mangrove clams (*Anadara tuberculosa*) that were well represented in Early Vegas assemblages declined in relative importance in Late Las Vegas assemblages (Stothert et al. 2003; Table 4). These numbers may track a long-term decline in the extent of mangrove formations on the peninsula, but the pattern probably reflects sociocultural change as well.

Paleoenvironmental Reconstruction

Fauna

Both floral and faunal remains have been used to reconstruct past environments and to chart long-term changes in the history of the Vegas culture. The bones and shells of animals that accumulated for over 3,000 years in Sites 80 and 67 were well preserved by alkaline soils (Fig. 6). In the early 1980s, the study of a small faunal sample identified 25 taxa of fish from offshore, in shore, estuarine, rocky, and beach habitats; three taxa of cosmopolitan amphibians; a few turtles, lizards, and snakes; parrot bones; a rare marine mammal; and an array of cosmopolitan mammals, including deer, fox (*Lycalopex* sp.), opossum, rabbit, weasel, peccary (rare), rats and mice, other rodents, anteater, squirrel, and a feline (Stothert et al. 2003; Table 5). New research, based on 100 % of the excavated remains, has resulted in the recognition of more birds from wetland habitats.

Evidence indicates that the same species of fish taken from near-shore waters in Vegas times are available today on the SEP, although shallow bays, shoals, lagoons, estuaries, and mangroves were distributed differently in the ancient environment. Apparently, the changes in Early Holocene ocean currents dramatically altered the distribution of marine faunal species further south in Peru, but did not affect the marine biotope of Santa Elena, although local mangroves were decimated in the twentieth century.

Analysis of small samples of vertebrate animals has led to the suggestion that Late Vegas people

acquired half of their animal food from marine and estuarine environments, while the other half came from the land. Terrestrial vertebrate remains show that the western SEP was always subhumid and characterized by seasonally dry forest and savannas. Vegas people probably enjoyed somewhat moister conditions than today, with rainfall more evenly distributed throughout the year, but monkeys and other species characteristic of moist tropical forests are missing from Vegas faunal assemblages. By exploiting a wide variety of species, Vegas people enjoyed a constant supply of animal protein.

A comparison of faunal assemblages in Site 80 has shown a subtle evolution in exploitation patterns from Early to Late Vegas times (Stothert 1985: 620, 1988: 193-5): The earlier people concentrated on land animals, principally deer, while the later people apparently intensified their fishing activities.

Large mangrove clams dominate the molluscan remains from Site 80, but crabs and 19 other species of shellfish from a variety of inshore ecosystems are also present. Few species were acquired from deep waters. The surprising number of fresh water snails (*Pomacea* sp.) in the Early Vegas levels supports the notion that the ancient SEP received more rainfall and that Early Vegas people visited ponds of standing fresh water.

Based on a calculation of the minimum number of individuals (MNI) represented in samples of molluscan remains, it has been shown that the percentage of mangrove clams declined substantially in Late Las Vegas midden, and rock-living species were much more frequently sought in the Late Vegas period (Stothert et al. 2003; Table 4). While rocky points may have become more accessible in the Late Vegas period, mangrove habitats may have decreased in extent. This reduction might track an increased use of marine fish in the Late Las Vegas period. The increased emphasis on fish may have been encouraged by improved technologies that made fishing more efficient, or by a reduction in available meat from terrestrial sources, or the desire to produce surpluses of dried, salted, or smoked fish for social purposes.

Flora

Pollen and macro-plant remains were not preserved in Vegas soils, but the presence of microfossils, including starch grains and phytoliths, has revolutionized the interpretation of Vegas environments and cultural practices. Phytoliths from grasses and shrubs are evidence that the ancient environment was characterized by thorn scrub and wooded savanna vegetation in the Early Holocene (Piperno & Pearsall 1998: Chapter 2 and 183-99, Fig. 4.1a, b). Palm phytoliths, found commonly in archaeological soils in moist tropical habitats, do not appear in Vegas assemblages.

The study of microfossils at Site 80 shows a progressive development in the use of plants from Early to Late Vegas times (Piperno & Pearsall 1998: 183-99; Stothert et al. 2003; Piperno 2006). Early Vegas farmers cultivated bottle gourd (*Lagenaria siceraria*) as early as 9,000 BP, and phytoliths from this species continued in later archaeological levels. Bottle gourd, a plant always cultivated in America, may have been a source of seeds or fruits that can be used as containers, netfloats, or rattles. The diagnostic phytoliths from various kinds of squash seeds (*Cucurbita* sp.) are ubiquitous in the midden. Phytoliths from the seeds of *Calathea allouia* (a plant called leren) also appeared in a 9,000 BP context and became common in later levels: Today this plant is cultivated for its starchy root in northern South America and the Antilles. Edge-ground cobbles and small grinding stones may have been used to process this root food or a variety of seeds. *Zea mays* phytoliths that indicate a primitive form of corn were present in the latest midden level at Site 80 but do not represent a staple food. Maize seeds, originally from West Mexico, were widespread among preceramic peoples in Central America and northwestern South America by 7,000 years ago. A long dry season in Santa Elena would have favored the cultivation and storage of maize and other seeds crops. It is likely that Late Vegas people also cultivated beans, cotton, peanuts, and other tropical root crops because these were present in contemporary archaeological contexts in neighboring regions (Dillehay 2011; Piperno 2011a, b).

Cultivation and Domestication

The seasonally dry environments of Central and South America have drawn scientific attention because the wild ancestors of many plants that eventually were domesticated in America were found there, and because archaeological evidence indicates that people in today's Panama, Colombia, Ecuador, and Peru were cultivating and modifying the genetic makeup of plants by the beginning of the EH (Piperno 2006, 2011a). The idea that plants were cultivated and domesticated at the beginning of the EH is now widely accepted. Cultivation of genetically modified plants may be seen as a successful adjustment to fluctuating environmental conditions and shifting resource availability in a seasonally dry tropical zone. Cultivation was innovated in many localities, and not in just a few centers.

Vegas people probably harvested wild fruits and nuts from trees, and a variety of annual plants as well as roots and tubers, which famously store starch for the dry season. Foraging for wild resources, however, may not have been as energetically efficient as cultivation, especially as populations increased and mobility decreased. In Central and South America, as EH people began to cultivate plants, some responded positively resulting in more attractive, domesticated forms. Women might have been interested in reducing their mobility and increasing their per capita productivity by selecting certain improved species for cultivation, increasing the local availability of a valued resource.

Vegas people living in a seasonally dry ecotone were among the early cultivators of plants in northwestern South America: Phytoliths and starch grains from domesticated plants constitute evidence that the Las Vegas people began to manipulate economically important species between 9,000 and 10,000 BP. These data support the inference that both seed plants (squashes and bottle gourd) and a root crop (leren) were cultivated in alluvial soils on the SEP by 9,000 BP.

Measuring the squash phytoliths found in sediments at Site 80 has shown how the ancient seeds and fruits evolved through time (Piperno & Pearsall 1998: 194-5; Piperno & Stothert 2003). This pattern tracks the progressive domestication of the squash plant, supporting the argument that cultivation was underway by 9,000 BP in Santa Elena, and providing evidence for independent domestication of squash species in lowland tropical South America during the earliest Holocene.

In modeling the origin of cultivation in the tropics, Piperno and Pearsall (1998: Chapters 1-4; Piperno 2006, 2011a) argue that broad-spectrum collecting developed as human groups found more energetically efficient adjustments to the changing resource patterns: because Pleistocene people operated in an ecosystem poor in starchy wild plants, they would have found it desirable to introduce more calories into their diet. Furthermore, in seasonally dry tropical forested biomes, plant cultivation is a more energetically efficient subsistence activity than wild plant collecting. Evidence from several regions supports the idea that plant cultivation was a low-cost subsistence strategy. Not surprisingly, horticulture developed in Central and South America before 9,000 BP, during a period when there was much more environmental instability than was experienced by people later in the Middle Holocene.

Reconstructing Intangible Culture

By Late Vegas times, animals from both aquatic and terrestrial environments were used as symbols in the Vegas ideological system (Stothert 1988: 133-70). Human burials at Site 80 were associated with offerings of teeth from the desert fox (*Lycalopex* sp., formerly *Dusicyon sechurae*). These canids may have been evoked as psychopomps. Also, shells of various species were used to construct a bed for the burial of an infant, and other mortuary offerings were manufactured from shell: These include ornaments of nacreous shells, dish-like artifacts that served to protect the joints of the dead, a container for ground red ochre, a conch trumpet, and two carefully perforated immature valves of *Malea ringens* that are functional whistles but might have been employed as

containers for snuff. Shell is a useful raw material, but shells are often brilliant in color, and associated with spirituality, immortality, water, life, and fertility.

Marine and Terrestrial Resources

The Vegas case is important because it reveals a durable foraging adaptation of people focused on marine, estuarine, and terrestrial resources and who also participated in the domestication of useful plant species and progressively intensified both their efforts in fishing and horticulture for more than 3,000 years. The long-lived Vegas way of life was enabled by local conditions: Aquatic resources enabled sedentary life and underwrote experiments in plant cultivation, while the development of small-scale farming meant that people could maintain their residence by the sea and coastal wetlands and enjoy a balanced diet.

The study of the well-preserved (mineralized) skeletal remains of c. 200 individuals buried in Sites 80 and 67 between 8,250 and 6,600 BP proves that Late Las Vegas people were relatively long-lived and enjoyed very good health, with a low incidence of anemia and caries (Stothert 1988; Ubelaker & Newson 2002). This pattern of good health manifests a successful adaptation underwritten apparently by the mosaic of resources of the SEP, and sustained by the capacity of Vegas people to continuously adjust their foraging and farming practices.

Long- and short-term changes in the climate and biogeography of the Santa Elena Peninsula were factors that shaped the Las Vegas adaptation, and long-term demographic growth may have been another selective pressure. In order to model change successfully, paleoenvironmental studies of the peninsula are required, and only the discovery of more Early Las Vegas sites will generate information about demographic and socioeconomic change.

The Vegas case contributes a corpus of data to the study of the origin of horticulture in the Neotropics and supports the notion that cultivation originated as foragers, familiar with a wide variety of species within their complex tropical ecotone, experimented with cultivation. Their early experiments with horticulture and domestication were enabled by their access to predictable aquatic resources whose natural fluctuations were in part independent of the changing patterns of rainfall that affected the plant and animal communities of the terrestrial zone.

Late Las Vegas people, compared to their ancestors, consumed more fish, trapped fewer small animals, hunted large animals, and cultivated improved squash, root crops (like lerén and perhaps manioc), and eventually maize. Perhaps Late Vegas Period men hunted deer as before, but also parties of kinsmen developed ways of fishing together, improving the productivity of their lines and nets. Women may have gardened in the bottomland of seasonal rivers, an activity viewed as more productive than foraging in the bush. If Las Vegas women traditionally were responsible for collecting plants and small animals, then their growing specialization in cultivation may explain the decrease in the utilization of small animals in the Late Las Vegas phase.

Logistical collecting and relatively sedentary settlement may have been favored because of the economic benefits of exploiting both predictable terrestrial and marine/estuarine resources. During the long EH, the Las Vegas people became progressively more committed to feeding themselves with garden products while exploiting the rich aquatic resources of Santa Elena. Their farming and fishing strategies proved to be successful adjustments to a dynamic, complex tropical, coastal ecosystem. Late phase Vegas people undertook some social changes, including the development of elaborate communal burial activities. The mixed farming and fishing strategy of the Late Vegas people was well suited to the SEP: It can be seen as a preadaptation for the development of fully agricultural, village life in coastal Ecuador in the Valdivia ceramic period, and it continued to be the basis of life during the entire aboriginal period in what is now coastal Ecuador.

Social Complexity in the Late Las Vegas Period

Las Vegas men and women might have changed their behavior and reallocated their labor in

order to optimize productivity and minimize risk in the dynamic environmental context of the EH, and their increasing efficiency in exploiting fish (harvested from a huge inshore biomass) and their ability to produce abundant plant food seasonally may have created the opportunity to grow the local community and undertake sociocultural change. Plants figure widely in human exchange activities, as do salt, and dried or smoked fish and shellfish. People may have invested labor in order to build alliances, engage in reciprocity with other people and with their ancestors, and undertake regional and extra-regional exchange – activities that characterize more complex social life.

The founding of cemeteries in the deep midden at the two largest known Vegas sties indicates a greater degree of settlement stability and social complexity in the Late Vegas period. Funeral practices are evidence that people invested more time and effort in community social activities. One imagines that groups of families developed integrative mechanisms, such as complex mortuary rituals, that perhaps helped them to share food on a regular or irregular basis, and reminded them of the relationships that allowed the fielding of larger work groups and the defense of the resources of their territory. Ceremonial gatherings imply both the consumption of special foods and the giving of food as gifts. Growing food and producing quantities of fish in order to share is another way that people ensure themselves against resource fluctuation. Food sharing is a strategy for minimizing risk. The intensification of both fishing and farming may have underwritten the development of ceremonial activities, alliance building, and reciprocal exchange. Amerindians have a long history of maintaining robust patterns of interaction with near and distant neighbors.

International Perspectives

Research in the last 40 years has brought to light the existence of TP and EH archaeological sites in almost every country in South America, and key issues are now discussed across modern national boundaries. Innovative research tools developed by archaeologists, climatologists, botanists, zoologists, geneticists, and linguists are now employed throughout the tropics in order to better understand issues related to the development of culture in the New World.

Future Directions

Although most of the analyses of excavated evidence took place 30 years ago, research on phytoliths and starch from Vegas sediments, artifacts, and human teeth has proceeded continuously, and recent and proposed restudies of Vegas materials will yield improved interpretations.

New data are needed to facilitate the archaeological investigation of the initial peopling of coastal Ecuador, early horticulture, and the development of more complex social behavior. This will require the discovery of additional sites in all regions of Ecuador, but especially in the great Guayas River Basin and at points along the coast where the present shore is not too far removed from the ancient high tide line. Recently discovered preceramic sites in the Guayas Basin may result in expanding knowledge of the prehistory of Ecuador's coastal lowlands. Fortunately, the ongoing study of the domestication of native plants in the Neotropics will continue to generate invaluable evidence and interpretations.

Crucial is the long-term preservation of sites and excavated remains: This will require the commitment of individual archaeologists and governmental and private institutions in assuring that the archaeological record continues to be available for investigation. Recent restudies of curated remains illustrate the importance of applying current methods to answering today's research questions. Site 80 is now the campus of the regional museum in Santa Elena, where a portion of the ancient midden is protected for future scientific investigation.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Archaeobotany
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Phytolith Studies in Archaeology
- ▶ Squash: Origins and Development
- ▶ Submerged Prehistoric Landscapes
- ▶ Zooarchaeology

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Late Antique Anatolia, Archaeology of

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Introduction

Together with Syria-Palestine, Anatolia, otherwise known as Asia Minor, in Late Antique and Early Byzantine times belonged to the more populated and dynamic regions of the Roman Empire. Both cities and countryside continued to prosper at least until the middle of the sixth century. There is much inconsistency in the use of the terms Late Antique and Early Byzantine. Here, the first period is considered to have started in 324, the year Constantinople was founded as the new Roman capital, and to have ended in 527, the beginning of the reign of Justinian. The Early Byzantine Empire ends in 640, when the internal structures of the Roman state were dramatically changed in response to the Arab conquests.

Definition

Anatolia is situated in the westernmost part of the Asian continent, roughly corresponding to the Asian territory of modern-day Turkey, between the Aegean and the Euphrates (Fig. 1).

The region was bordered by the Black Sea in the north, the Aegean Sea in the west, and the Mediterranean Sea in the south. Just as it had in previous centuries, the eastern border with the Persian Empire was constantly changing.

The richest provinces of the region were situated along the fertile Aegean and Mediterranean coasts and the great river valleys starting on the Anatolian plateau. Due to their easy access to water transport, these areas were well connected to the Mediterranean economy. They were also the most densely occupied by villages and cities, despite imperial efforts to foster greater administrative and fiscal efficiency by creating cities on the central plateau of Anatolia. The interior of the region was separated from the coastal strip by the Pontic mountains in the north and the Taurus mountains in the south, which begin on the Lycian coast and run all the way to the Euphrates. The nature of the inland plateau is harsh and rugged overall, rendering it fairly marginal to the Roman Empire. The Taurus Mountains also separated the provinces of Isauria and Cilicia from the rest of Anatolia. This was acknowledged in the past when these provinces were assigned to the diocese of Oriens. The remainder of Anatolia was divided into the diocese of Asia and the diocese of Pontica. Even in Late Antique and Early Byzantine times, various peoples populated Anatolia. Their internal differences and diverse historical and cultural backgrounds were acknowledged in the provincial division under the tetrarchy, which was still based on ancient tribal units and kingdoms (Roueché 2000: 572).

Historical Background

In 324, Constantine established his imperial capital at Constantinople. The city, which reached full development after Theodosius I took permanent residence there, counted a population of 300–400,000 in the fifth century, and around 500,000 by the time of Justinian. The concentration of people and power in this corner of Anatolia had far-reaching political, social, and economic consequences for the entire region.

The location of the city was strategically chosen at a crossroad of sea and land routes, and it was well protected from attacks over land by Greece and Thrace to the west and Syria, Armenia, and Anatolia to the east. Anatolia itself was well protected by natural borders. The most important threats came from the east, where the mountainous districts of Armenia and the Caucasian kingdoms formed a vital frontier region with the Sassanid Persian Empire (Fig. 2).

Not only were these regions densely populated and rich in natural resources; the Caspian Gates in the Transcaucasus provided a barrier against the incursions from the north. For instance, the Huns who harassed Anatolia between 395 and 398 invaded through Transcaucasia.

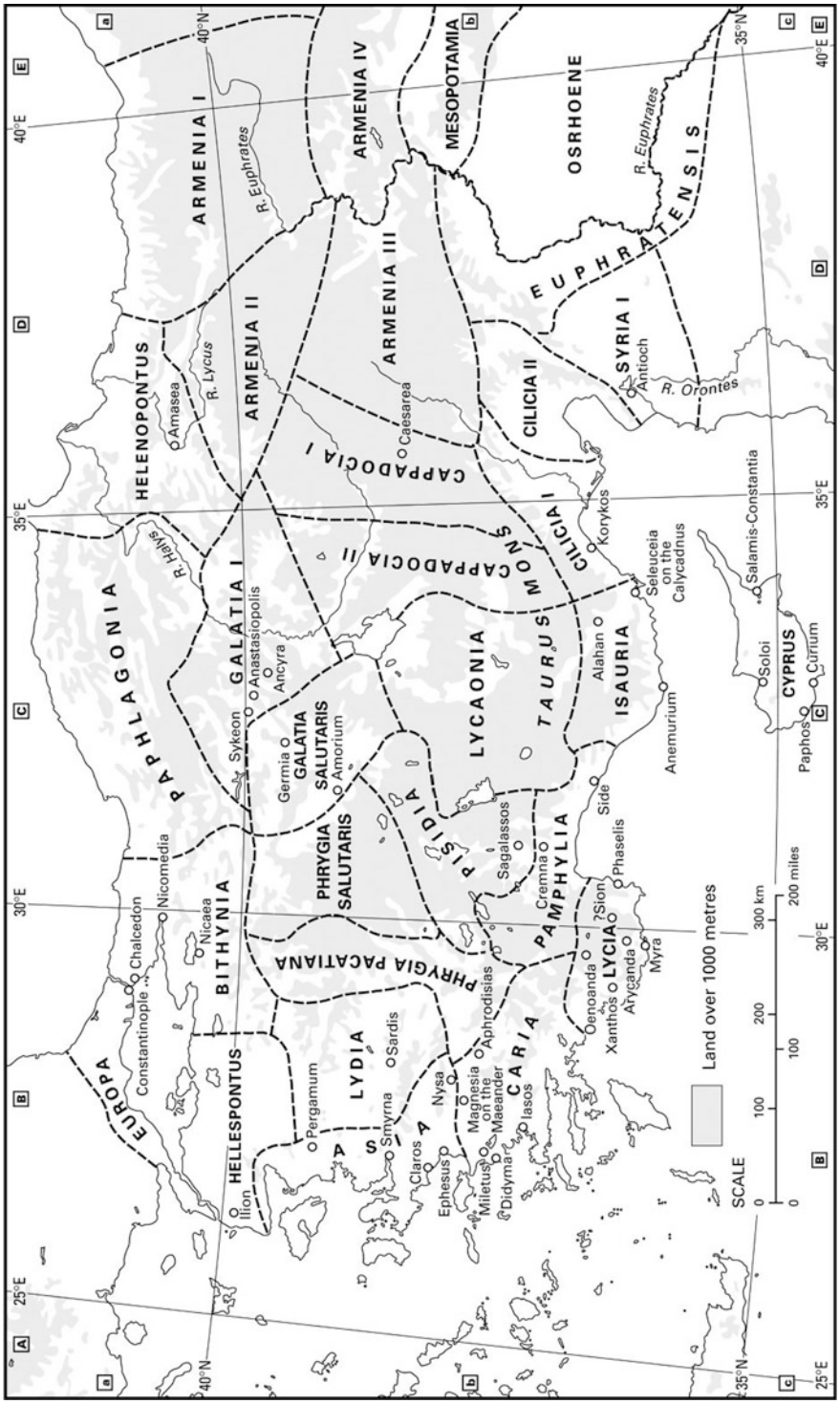

Late Antique Anatolia, Archaeology of, Fig. 1 Map of the provinces in Late Antique Anatolia (Roueché 2000: Map 14)

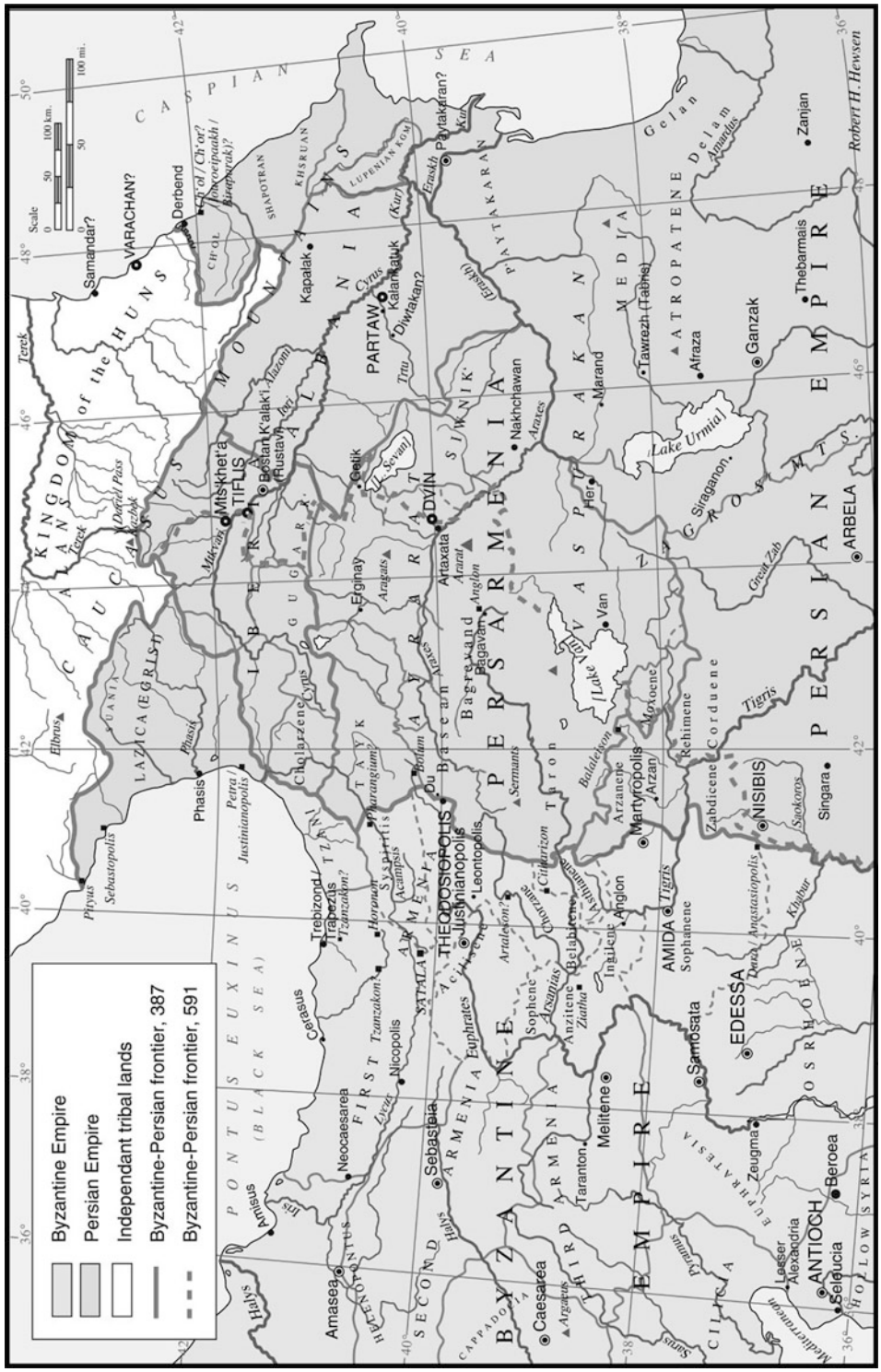

Late Antique Anatolia, Archaeology of, Fig. 2 Map of the Roman-Persian frontier in Armenia and surrounding regions (Greatrex & Lieu 2002: Map 3)

Consequently, both Romans and Persians attempted to impose their authority on this broad frontier zone until the Arab conquest. Overall, the Persians dominated the eastern Caucasus and at times succeeded in extending their power as far as the Black Sea. Roman emperors frequently turned down requests for financial and military assistance in guarding the passes across the mountains, which resulted in more armed conflicts between the two Empires. The various local people – the most important group being the Armenians, the Iberians, and the Lazi – were in many respects culturally indebted and politically influenced by Iran, but their adoption of Christianity strengthened their loyalties to Rome. They frequently changed sides in this never-ending conflict (Greatrex & Lieu 2002).

The largest internal threat for Anatolia came from the province of Isauria, whose inhabitants were notorious for their raids on neighboring areas. They had already revolted in the 270s, and their activities further escalated during the fifth century, when they were reported to have attacked settlements as far away as Cappadocia and Pamphylia. The region was only pacified under Anastasius in 498.

According to a law decreed in 534, the provinces of the Greek islands, of Caria and of Cyprus were made suppliers of the Balkan frontier, a ruling which suggests that the countryside of these provinces was still rich and prosperous. This may have changed when the Great Plague arrived in Anatolia in 541/2. It is generally assumed that the population of the Empire dropped drastically due to recurrent outbreaks of the disease (Little 2007).

Anatolia then took on a vital role in the final conflict with Persia, as it became the base of operations for Heraclius and his army from 610 onward. In 626, Constantinople was besieged by Persians, Avars, and Slavs. In a counteroffensive, Heraclius prompted the Persian nobility to overthrow their king in 628. However, the ongoing war had weakened both Empires, so much so that neither was able to resist by the time the Arabs began their conquest in 634. By 641, the Roman Empire had shrunken to the Aegean, parts of the coasts of Greece, and Anatolia to the west of the Taurus mountains (Haldon 1990: 41-53). State control was weak, and small-scale brigandage and robbery had become frequent hazards.

As seen elsewhere in the Roman Empire, the Christianization of Anatolia happened quickly but inconsistently. Although civic temples were deserted and had begun to crumble from the fourth century onward, educated elites still held on to their pagan and mythological past. In certain localities, cults survived far into the sixth century, even longer in some cases. Aphrodosias especially, in Caria, had a strong pagan presence until the late fifth or early sixth century and was the location of a Neoplatonist school centered on Asklepiodotos of Alexandria. He and others like him traveled throughout the eastern Mediterranean studying and encouraging pagan religious practice. Likewise, though Christian shrines could be found in the countryside of regions such as Galatia, Cappadocia, Paphlagonia, Pontus, and Armenia Minor from the fourth century onward, John of Ephesus still claimed to have baptized 80,000 pagans in Asia, Caria, Lydia, and Phrygia in the 540s (Mitchell 1995: 62, 68-9).

Key Issues/Current Debates

Archaeology of the City

Although our knowledge of the city in Anatolia is fairly advanced, there are still many uncertainties. First, Late Antique remains suffered severely from deficient excavation techniques and from the excavators' wish to expose the attractive classical city. Second, larger urban centers such as Ephesus or Aphrodisias have traditionally attracted much more attention than smaller towns. Moreover, the interior, the east, and the north have been far less explored than the Aegean and the Mediterranean coasts. On the whole, there is little evidence for urban activity in these regions after the early fourth century. Third, details about the civic government are more obscure than in previous centuries because the epigraphic record was largely reduced to verse inscriptions composed in honor of imperial officials, usually provincial governors (Mitchell 1995: 120-1, 336).

Late Antique Anatolia, Archaeology of, Fig. 3 The late antique city gate at Blaundos (Lydia)

For the most part, Late Antique and Early Byzantine undertakings were of a more modest nature than their predecessors. This change was brought about by the profound restructuring of imperial and municipal institutions, which began under Diocletian, and the subsequent lack of money, at least in the smaller cities of the provinces. Building projects in provincial capitals still testify to the larger number of resources concentrated in the hands of the governor. Nevertheless, the reuse of architectural fragments also proliferated here from the fourth century onward. As the urban fabric of cities in Anatolia had already been saturated by the third century, building anew was less frequent than renovation and repair works. The money for these interventions came from municipal funds. Private benefactions had become rare and modest but were still commemorated with pride. Thus, when parts of the portico of Tiberius at Aphrodisias collapsed in the sixth century, the western side was reconstructed by one generous donor, while several others contributed to the restoration of the south side. Imperial funding remained limited to the capital and larger pilgrimage sites (Jacobs 2012: 482-535).

The level of activity in Late Antique and Early Byzantine times was, however, far from constant. After an initial quiet period, construction suddenly became more extensive after 350, first in provincial capitals and also in smaller cities around the 400s. These decades were primarily characterized by widespread construction of civic fortifications, which often reused earlier Hellenistic wall stretches, even when the city had grown in the meantime (Fig. 3).

New major monuments – such as the Martyrium of St. Philip at Hierapolis and suburban quarters such as the Paktolos suburb at Sardis – were located outside the walls, suggesting that the climate was not too hostile.

The most elaborate achievement was the Theodosian defensive system of Constantinople, which enclosed a surface of 650 ha. Some of these walls show signs of later repairs. Another significant change taking place was the deconsecration of temples. In the following decades and centuries, most of them would be dismantled. However, temples on central locations had often already been converted into churches by the first half of the fifth century, as at Sagalassos or Aizanoi, or by the second half, as at Aphrodisias. The first newly built churches in this period were established in imposing positions that often held significant associations, such as the Church of St. John at Ephesus.

Despite the changed religious climate, cultural activities largely continued. Odeia, and especially theaters, remained major meeting places, in addition to providing a venue for mimes, pantomimes, and games, even into the sixth century. Traditional *thermae* were repaired, whereas smaller, asymmetrical baths proliferated.

Late Antique Anatolia, Archaeology of, Fig. 4 The fourth-century Tetrastoon at Aphrodisias (Caria)

Constantinople possessed 153 of them by the early fifth century as well as 8 *thermae* complexes. Small baths were also built in Didyma, Priene, Ephesus, Samos, Perge, Side, and Anemurium. Stadia such as those of Aphrodisias and Perge came to house an amphitheater at one of their ends. Gymnasia went out of use, maybe as the result of an altered vision on agonistic culture, maybe because the maintenance of such large complexes was no longer possible. They were dismantled and encroached upon by either houses and workshops, similar to what happened to the gymnasia at Salamis-Constantia and Anemurium, or by churches, which was the case with at least two abandoned gymnasia at Ephesus.

In contrast, the city's colonnaded streets and agorae remained highly frequented areas. At the beginning of Late Antiquity, new imperial fora and other large and smaller plazas were still laid out at Constantinople. New agorae also appeared in the larger cities of the provinces, such as Pisidian Antioch and Aphrodisias (Fig. 4; Lavan 2006).

Even though some existing agorae went out of use and were encroached upon by houses and workshops (the most famous being the State Agora at Ephesus) or by churches (e.g., the Lower Agora at Xanthos and the agora at Phaselis and Iasos), most of them survived as political, social, and commercial centers into the sixth and sometimes even into the seventh century. Colonnaded streets were still built and renovated in both large and small cities (e.g., Constantinople, Ephesus, Aphrodisias, Sardis, Aizanoi) (Fig. 5).

With the exception of those at Aphrodisias, a city with a long-lasting local quarrying and stone carving tradition, both the colonnades and street pavements were now composed of varied spolia. The offices, shops, workshops, and restaurants housed behind the colonnades continued to draw a large number of visitors. Already by 400, their commercial function was extended even further when permanent structures with a commercial and/or artisanal character encroached underneath their colonnades (Jacobs 2012: 625-37).

Finally, the fourth and also the first half of the fifth century saw the construction of large and lavishly decorated urban mansions in cities such as Ephesus, Sardis, Aphrodisias, Halikarnassos, Xanthos, Sagalassos, Paphos, Salamis, and so on (Uytterhoeven 2007: 82-5). They comprised both public areas with reception and dining halls as well as private areas with bedrooms, kitchens,

Late Antique Anatolia, Archaeology of, Fig. 5 The late antique colonnaded street at Aizanoi (Phrygia)

and sometimes a bath complex. Some of them can be identified as official residences of provincial governors, bishops, or other officials. The elaborate town houses to the north of the Hippodrome at Constantinople could be identified as the palaces of Lausus and Antiochus, both *praepositus sacri cubiculi* of the early fifth century (Mundell Mango 2000: 950).

On the whole, the period after the mid-fifth to early sixth century was less eventful in the field of secular construction – though there are exceptions such as the city of Amorium that flourished under the reign of Zeno. Instead, this period saw the invasion of the city center by numerous churches, monasteries, *martyria*, and welfare establishments. Whereas many of the earliest churches resulted from conversions of temples and secular monuments, churches were now mostly constructed anew, following a simple basilical plan with three aisles preceded by a peristyle courtyard. The church exterior was kept simple and monotonous, though the interior was lavishly decorated with marble and mosaic floors, marble chancel and ambo plates, and wall paintings and wall mosaics. Only ecclesiastical foundations in Cilicia and Isauria possessed lavishly decorated exterior facades, as did those in other provinces of the Oriens diocese. Although the construction of lavish private houses apparently stopped after the mid-fifth century, the *episkopeia* that could be identified at Ephesus, Miletus, Side, and so on belong to the first half of the sixth century or later.

With the exception of the diocesian capital of Ephesus, the cities of Anatolia received little attention during the reign of Justinian. The emperor's activities were instead concentrated on Constantinople – where he constructed or rebuilt a senate house, a forum, a seaside promenade, a bath complex, a vast cistern, six hospices, and four palaces, as well as 33 churches including St. Sophia – and along the eastern frontier zone. In Pontos, Lazica, and Armenia, both Anastasius and Justinian established or refortified strongholds, such as Petra in Lazica, Theodosiopolis in western Armenia, and Martyropolis in highland Armenia, and further endowed these settlements with sizeable churches (Mitchell 2007: 339).

From the second half of the sixth century onward, the appearance of cities in Anatolia quickly deteriorated, and human actions became purely functionally motivated: statuary was thrown in limekilns, fountains were converted into water tanks, dilapidated colonnades were no longer reerected, and garbage dumps appeared in the center of the city. By the late sixth or early seventh century, even most churches showed few traces of continuing activity, save for the intramural necropoleis developing around them.

These events, which would transform towns into rural villages, occurred several years, or even decades, before the Persian incursions. They had largely concluded before cities such as Ephesus, Sardis, Sagalassos, Aphrodisias, Phaselis, and Magnesia began constructing smaller fortification walls in the course of the seventh century. The positions of these *kastra* were primarily chosen for defensive reasons, with little or no respect for the earlier city (Jacobs 2012: 96).

The Countryside

Surveys of the countryside, which have been carried out since the 1950s, are starting to provide a more detailed picture of the settlement patterns in Anatolia. At the Marmara coast of Bithynia and in Cappadocia, large, often senatorial, landowners could be found. The church also acquired vast landholdings, and its landownership grew substantially in the sixth century, most notably in the development of monasteries on the outskirts of villages. Elsewhere, estates were mostly controlled by a city-based aristocracy. Only on the eastern Anatolian plateau (Pontos, Cappadocia) may there have been more isolated rural estate centers present (Morrison & Sodini 2002: 182). Rural life was therefore mainly confined to peasants, both landowning and dependent, who were living in villages or farmsteads.

Villages started to develop in the third century and flourished until the end of the sixth. The center of gravity was located along the coastal regions of southern Asia Minor, where cities and villages alike could profit from their position on the shipping routes from Alexandria, Syria, and Cyprus to the Aegean and Constantinople. Surveys in central Lycia as well as around Kyaneai near the coast show a Late Antique expansion in the number of villages, farms, and farmed terraces, probably dating to the fifth/sixth century. In Cilicia and Isauria, new villages developed from the fourth century onward. But also in inland regions, such as Pisidia and the Konya plain, new settlements were established and existing communities expanded. Byzantine Cyprus saw the widespread proliferation of Late Roman sites. Whereas rural settlements again disappear from the map in the course of the seventh century, demographic expansion on Cyprus continued during the sixth and early seventh century.

Villages ranged in size from small hamlets to larger settlements that hardly differed from cities. Although a formal street plan was mostly lacking, they were commonly equipped with agricultural installations and storage buildings. Spacious village houses and bathhouses, and from the early fourth century onward also at least one church, often substantially built, testify to sizeable capital outlay by these small communities (Fig. 6; Morrison & Sodini 2002: 176-7; Chavarria & Lewit 2004: 18).

The money probably came from inside the local community, though powerful landowners and *kouratores* of imperial estates sometimes also functioned as patrons (Wickham 2005: 461).

Surprisingly, whereas inscriptions in the cities were disappearing, in inland Cilicia and Phrygia, they suddenly became more numerous from the fourth century and continued throughout most of the sixth. For instance, in the commercial entrepot of Corycus in Cilicia, nearly 600 individuals, including olive and wine merchants, shipowners, shipbuilders, sailmakers, and potters, organized into guilds, recorded their professional status on their sarcophagi (Mitchell 1995: 338). This wealthy settlement was provided with fortifications. In contrast to other regions in the East, within Anatolia, there is indeed more evidence of the existence of rural sites with towers and walls and small fortified villas (Sodini 1997: 479-82).

Novelties in the settlement pattern of Anatolia were the ecclesiastic foundations. Self-sufficient communities following the monastic rule of Basil the Great rose up in the city, and even more so in the countryside, with the greatest concentration in and around Constantinople. Even though the first, such as that of Dalmatios in Constantinople, were founded around 380, the largest growth was situated in the late fifth and sixth centuries. They were often endowed with luxurious liturgical fittings, including patens, chalices, lamps on stands, chandeliers, and other lighting devices. Christian communities, sometimes with their own fortification and water supply, also developed around

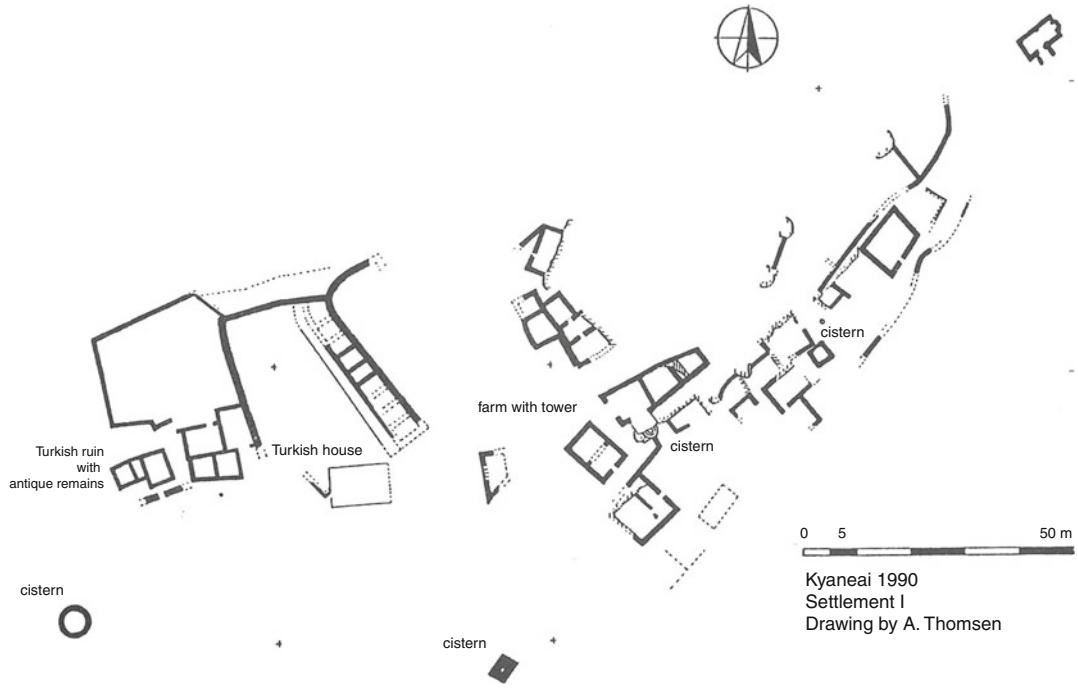

Late Antique Anatolia, Archaeology of, Fig. 6 Small settlement (Siedlung I) near Kyaneai (Lycia) (Thomson 1993: Fig. 19)

church complexes established by rich landowners, such as the "Basileias" outside Caesareia. The same occurred around important pilgrimage centers, such as the Martyrium of St. Thecla at Meriamlik, that of St. Theodore at Euchaita, and also around the tomb of St. John on the Ayasoluk Hill at Ephesus (Mitchell 1995: 113-16), which were often endowed with imperial benefactions.

Production and Exchange

Mining of metals in Anatolia continued until the end of antiquity. Armenia and the Caucasus were rich in gold mines. Ore sources of silver can be found both in the Black Sea region and in the Taurus mountains. The first was probably transported to Constantinople; the second was likely to have been worked locally at Tarsus and Antioch. Manufacture took place both in private workshops and workshops controlled by the *comes sacrarum largitionum*. Objects produced were intended primarily for trade, both within and outside the Empire, with finds in northern Europe and Central Asia (Mundell Mango 2009). Copper continued to be quarried both in local and in industrial mines on Cyprus. Iron was extracted from the Taurus mountains near Caesareia, the location of an imperial arms factory. The largest of these establishments, which provided armor and weapons for the entire diocese, was located at Sardis. Finally, even if there were tin mines in Asia Minor, they probably did not have sufficient output to meet demands. The nearest alternative source was Britain.

The marble quarries of Proconnesos (Island of Marmara), Ezine in the Troad, and Dokimeion-Iscehisar, which were located in a favorable position for providing the new capital with building materials, came to dominate production and trade in the whole Mediterranean during the fifth and sixth centuries. Proconnesian gray-striped marble, which lay in imperial hands, became the main building stone for the construction projects in Constantinople. Half-finished columns, capitals, bases, and chancel screens were exported all over the Mediterranean, even reaching inland

Late Antique Anatolia, Archaeology of, Fig. 7 Head of Eutropius found in the Marble Street at Ephesos (Kunsthistorisches Museum Wien)

sites in the Negev desert. Part of the distribution can be connected to imperial building projects or gifts from emperors or higher officials, for example, to influential patrons such as Julianus Argentarius and Theoderic the Ostrogoth in the West. Furthermore, much was produced and sold in terms of commerce (Waelkens 1999: 560-1). Cities within Asia Minor – in particular Constantinople, Ephesus, and Aphrodisias – also remained centers of marble statuary production, especially of small-scale statuettes and of portrait statuary (Fig. 7).

In the mid-fourth-century *Expositio*, the province of Asia Minor is mentioned as a producer of grain, wine, and olive oil. It is assumed that most cities produced at least enough foodstuff to be self-sufficient. Only Cappadocia may have depended on grain imports from neighboring provinces (Decker 2009: 246-8). In contrast, Constantinople had become a consumer of such enormous magnitude that a system of provision based on that of Rome had to be created.

The origin of the products lay in Anatolia, at least partially. In Lycia, granaries and other storage facilities have been found in several coastal settlements (Foss 1994). Although the diocese of Oriens is especially known for its olive oil production, the evidence from Late Antique and Byzantine oil installations in southern Anatolia are sizeable enough to indicate surplus production. Presses were particularly numerous in Aperlae, a site with an extremely rugged and truncated hinterland whose survival depended on its place in sea trade. Scattered amphora evidence and textual fragments further suggest that local economies in Cyprus, Cilicia I–II, Isauria, and the Lycian coast heavily depended on oil production (Decker 2009: 163-4).

Transport of foodstuff occurred mostly in locally produced amphorae. The production of Late Roman 2 (LR2) amphorae is associated with, among others, the island of Chios in front of the west coast of Anatolia. Furthermore, in several locations along the west coast of Anatolia, amphorae of the Late Roman 3 (LR3) type were produced. They have been found in cities such as Ephesus, Pergamon, and Sardis, but also in *castella* along the limes. More important were the Late Roman 1 (LR1) amphorae, which were manufactured from the fourth to the seventh century. The smaller subvarieties initially were intended for wine, while larger types carried wine and oil and likely other regional products as well. It now seems that production started along the coast of Cilicia, with Cypriotic production sites appearing in the late fifth or sixth century (Pieri 2005). LR1 amphorae were exported to every coastal region of the Mediterranean, the Black Sea, the Danube, and the Euphrates frontier, and as far away as western Britain and Nubia. They also represent the most common amphora import in Constantinople, which once again suggests that the capital's (wine) supply derived from Cilicia and Cyprus rather than from Palestine and Egypt.

Within Late Antique Anatolia, two major international fine tableware groups were present which no doubt profited from the new dynamics created

Late Antique Anatolia, Archaeology of, Fig. 8 The distribution of Phocaean Red Slip Ware in the Eastern Mediterranean, based on data assembled from published literature (© Rinse Willet, Philip Bes, ICRATES project)

by the founding of Constantinople. In the area between Pergamon, Phokaia, and Pitane, Phocaean Red Slip Ware, also known as Late Roman C (LRC), was produced between the late fourth and the late seventh century. LRC was found throughout the Aegean and the Near East, but was also common on Crete and in Cyrenaica (Fig. 8).

In addition, from the mid-fourth century onward in south Asia Minor, Cyprus and the central Levant, Late Roman D (LRD), or Cypriot Red Slip Ware, became the most common fine ware. It may very well have developed on the back of LR1 amphorae. Both ceramics types are currently thought to have continued into the 8th century (Poblome & Fırat 2011).

There were also several smaller active tableware manufactories, operating on different scales, with a more restricted distribution pattern which as yet remains unknown. For instance, Sagalassos produced a fine ware with a regional distribution; Sardis, though only located some 100 km on a river inland from Phokaia, always had predominantly local wares, as had other inland sites such as Aphrodisias. Especially in the second half of the sixth century, such inland sites depended on regional wares, even though imports remained frequent at the coast.

The road network of Anatolia, used for short- and medium-distance trade, was well maintained until the sixth and even seventh century. Its spinal

cord was the great road running across the region from Constantinople to Ankara and further to Syrian Antioch. However, the largest part of transport and trade took place overseas. The main ports on the west coasts included Smyrna, Miletos, and especially Ephesus. In the south, the Pamphylian ports Attaleia, Perge, and Side were essential. They were supplemented with numerous smaller ports. The capital itself was equipped with four harbors, the youngest of which was built under Theodosius I. Constantinople maintained contacts with all parts of the known world through a dense network of sea-lanes, which, as is testified by pottery, coins, shipwrecks, and hagiographical texts, remained dense up to the seventh century (Avramea 2002: 83-5).

Products derived from Anatolia were found all over the Mediterranean, and they even reached the Atlantic via the Strait of Gibraltar. LR1 and LR3 amphorae as well as LRC have been found in Britain and Ireland, where their content was probably traded for tin and silver. African Red Slip Ware made in Africa Proconsularis and lamps from Byzacena testify that produce from the West was also imported, both to Constantinople and the rest of Anatolia. To the East, Anatolian products reached India by way of the Red Sea and Central Asia by land. Though the sea routes were partially in Byzantine hands, the land routes were dominated by the Sassanians. They imposed tolls of 25 % on silk imports (from southern China), precious metals, gems, and spices coming into the Roman Empire. From the early fifth century onward, there were only three custom ports: Nisibis in Mesopotamia, Artaxata in Armenia – which was replaced by Dubios (Dwin) in the mid-sixth century – and Callinicum on the Euphrates. The long distance trade of luxury goods between the Roman Empire and Far East was supervised by imperial functionaries here, but elsewhere it was prohibited. Conversely, everyday goods freely crossed the frontier in both directions. The problem of heavy levies on silk was partially countered in 551, when the secret of silk production was brought to Constantinople by missionary monks (Morrison & Sodini 2002: 210-12; Mitchell 2007: 341-3).

Future Directions

Present-day archaeological research in Anatolia has moved beyond the exposure of monumental city centers. Reconstruction of everyday life has come to the forefront of attention, with research topics such as middle- and lower-class housing, artisanal manufacture, and everyday objects of use. In addition, attention has been extended to the suburbia and settlement patterns in the hinterland. Further exploration of the countryside still needs to clarify whether or not rural settlements in the fifth and sixth centuries grew at the expense of the cities, as it is clear that activity was dwindling at some urban sites during the sixth century. Likewise, the role of ecclesiastical foundations as new social and economic centers needs to be assessed in archaeological remains. Moreover, the country estates known through literary sources remain archaeologically unexplored.

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Late Antique Egypt, Archaeology of

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Introduction

The archaeological study of late antique Egypt is a relatively recent field of study. Excavations at key settlements such as Alexandria, Antinoopolis, Abu Mina, Berenike, Kellia, Naqlun, Sketis, Tebtunis, Thebes, Sinai, and the oases illustrate the diverse settlements available for analysis. The archaeology of late antique Egypt is significantly impacted by the introduction of both ecclesiastical monumental architecture and monastic settlements. The earliest presence of new architectural forms is evident in the fourth century with churches built in older Roman urban centers and then alongside newly designed monastic

settlements. Ostraca and the papyrological corpus in Greek, Coptic, and eventually Arabic provide a rich body of evidence for reading alongside the diverse archaeological record. Methodological choices from the fields of late antique studies, landscape archaeology, and the archaeology of religion contribute to a wide array of interpretations for explaining Egypt's transition from the late Roman Empire to the Islamic caliphate.

Definition and Historical Background

Defining the historical limits for what constitutes late antique Egypt is difficult. The late antique period in the Mediterranean generally signals a transformation or adaption of the classical world to a world shaped by Christian and Islamic theology and the empires led by their respective emperors and caliphs. Late antique studies now have a 40-year history as an accepted field of study, which is, in its very nature, multidisciplinary and interregional. Although linked to the political changes of the Roman and its successor empires, the periodization of late antiquity is intentionally non-imperial and does not favor a particular religious society or culture. Instead, the name evokes a deliberate impression of continuity with the classical Mediterranean world with a focus upon regional variations from Gaul to Asia Minor, to Palestine, and to Egypt. Dates for late antiquity vary depending upon the region.

Egypt in the third century CE was an important province of the Roman Empire. As an agricultural boon for Rome, possession of Egypt afforded a stable food supply and revenue. Political events which usher in late antique Egypt are usually defined by two events tied to Diocletian in 284 CE: first, his division of the Roman Empire into two regions, which permanently secured Egypt's place in the eastern empire, and second, Diocletian's religious persecutions of Christians. The latter event was significant enough for the Egyptian Christians to begin using his accession date as the start of a new Christian calendar Anno Martyrum, Age of the Martyrs. Frequently inscriptions and dipinto in archaeological contexts include this dating.

The archaeological evidence of a third-century legionary shrine within the pharaonic Luxor Temple shows the importance of Egypt's monumental architecture, especially under Diocletian. The ancient temple was enclosed by a Roman wall and formed the core of a legionary fortress. In 2009, the American Research Center in Egypt (ARCE) finished conservation of the Roman wall paintings, which show Roman senators before the imperial throne. This monument is a rare example of Diocletian's decorative program and illustrates the common practice of adapting existing architecture for new functions. The practice of adaptive reuse will be continued and expanded by monks and Christians in the building of new communities and churches.

The most significant change in the archaeological record of late antique Egypt is the introduction of Christianity with the building of churches, monasteries, and pilgrimage centers. As a social, cultural, and religious institution, Christian monasticism flourished and provided substantial archaeological evidence for new settlements and the expansion of Christianity into abandoned landscapes. The ascetic lifestyle motivated a new Christian demographic to seek unique locations for habitations, as monastics sought to build new urban settings dedicated to ascetic living. Frequently the settlements were located on the borders between arable lands and the sharply rising limestone cliffs that line the agricultural fields along the Nile. Monastics also adopted long deserted pharaonic temples, quarries, and tombs for convenient habitations. The building of churches in ancient pharaonic temples such as the Karnak Temple, Abydos, Luxor Temple, Medinet Habu, and Ramesseum highlights the importance of continued sacrality of older religious monuments. Additionally there is a dramatic increase in monastic settlements and the building of new monumental churches throughout the Nile Valley.

The end of late antique Egypt is frequently tied to the military conquest of the Delta, with the capture of Babylon (modern Cairo) and Alexandria in 641 CE. However, the shift to a fully Arabized territory is not evident until the mid-eighth century. As a result of the long transitional

period, late antique Egypt spans to the eighth century. After this period, scholars speak of the post-conquest period. This designator seeks to moderate the presumption of immediate conversion or assimilation to Islam as the caliphates negotiated how to manage a predominately Christian territory.

The challenge in defining the period is evident in many of the published archaeological monographs over the last two centuries. Sites are interchangeably described as late Roman or early Byzantine and later as Coptic or Islamic. These labels frequently evoke different periods or interpretative assumptions about religious populations depending upon one's specialization. To identify artifacts as Coptic, for example, suggests the item is likely Christian, as the name is an etymological derivative of the Arabic and then earlier Greek name for indigenous Egyptians. For the Muslims, Copt or qibt was a convenient designator for Egyptians who were predominately Christian in the seventh century. Coptic also refers to the language that became dominant in the third and fourth centuries. The script is Greek, with the addition of several letters to represent Egyptian letters not found in Greek. For much of late antiquity, Greek and Coptic were used, and in the eighth century, Arabic became prominent.

Archaeology of Late Antique Egypt

The largest and most significant city of late antique Egypt is Alexandria. Located on the Mediterranean coast, equipped with two major harbors, and connected to the Nile via canals, Alexandria was the gem of the Mediterranean world. The Hellenistic city thrived under the Ptolemies and became a site for agricultural commerce, maritime trade, shipbuilding, and an intellectual center for medicine, philosophy, physics, and eventually Christian theology. Its rich heritage with a large Macedonian and Greek population, a large Jewish Diaspora, and a robust international trade with the Western empire and India (via the Red Sea ports) made Alexandria a cosmopolitan city. The architectural character of the city changed by the fourth century with many Christian churches built to rival the hundreds of temples as well as the museum, theater, Serapeum, amphitheater, Pharos lighthouse, and several instructional institutions. The city was the central aim of Amr ibn al-As in 641 CE when he captured the city from the Byzantine forces for the Islamic caliph Umar.

The archaeological evidence of late antique Egypt is seen in select areas of the modern city, which continues to thrive as the second largest city in Egypt and is its largest maritime center. Since the 1960s, a Polish mission has excavated and conserved a Roman and Byzantine section of Alexandria at the site of Kom el-Dikka. The site includes a series of public and private buildings, which provide a valuable indication of late antique urban settlement. A series of public buildings, primarily in use from the fourth to seventh centuries, include a small theater, a multi-roomed bath complex large cisterns, and sixth-century lecture halls (auditoria). A collection of domestic residences, villas, private baths, and artisan workshops date to the period. The residential sections are understood to have shops on the first floor and then residences on the second storeys. Mosaics and wall paintings, showing Christian iconography, reflect late antique artistic preferences. Elsewhere in the city are several famous catacombs from the Greco-Roman period (Kom el-Shoqafa is one), but few have substantive evidence for late antique use. Salvage archaeology work at Gabbari has recovered Ptolemaic burials, which were reused in the fourth and fifth centuries by Christians. Extensive underwater excavation by the French Center for Alexandrian Studies has recovered primarily Ptolemaic material that was already submerged by the late antique period.

Equally significant is Abu Mina (about 45 km southwest of Alexandria), a vast Christian pilgrimage site in late antique Egypt whose building additions increasingly accommodated visitors. The earliest structure at Abu Mina is the fourth-century tomb of St. Menas, now covered by the Martyr Tomb Church. The central building for the city is the late fifth-century stone Great Basilica, which was built and remodeled twice. The Great Basilica is part of a martyr complex and abuts a later sixth-century tetraconch Martyr Tomb Church of St. Menas, a baptistery, and

residences associated with the healing cult of the saint. Several pilgrimage flasks, or ampullae, from Abu Mina bear the image of St. Menas. The flasks are found throughout the Mediterranean world, reflecting the importance of the city for late antique Christian religious tourism. Evidence of the saint's popularity is found throughout Egypt and along the trade routes that conveniently provided transport to the shrine.

After leaving Alexandria, individuals and goods would travel south to the military installation of Babylon (modern Old Cairo). The Roman fort built on the Nile just south of ancient Heliopolis was equipped with quays for easy transfer of goods from the Red Sea and Mediterranean and facilitated the monitoring of movements through Egypt along the Nile and the canal that connected the Nile to the Red Sea. The architecture of the fort, still visible today by the Coptic Museum, in fact dates to the late third century. The fort was abandoned between the seventh and tenth centuries. The building of a new Muslim military camp surpassed Babylon. For the last eighty years, archaeologists have worked to excavate the extensive Muslim city of al-Fustat, founded in the late seventh century and abandoned by the eleventh century. Al-Fustat and Babylon would eventually become the core of Old Cairo.

Babylon directly linked the Nile to the Red Sea ports via canals and desert roads. The ports, in turn, provide evidence for the extensive Egyptian trade networks which connected the Roman Empire to the empires of the Indian Ocean and the East African coast. Berenike, Myos Hormos, and Clysma are the three most important harbor towns for the Roman and Byzantine periods. Strong prevailing north winds made the Suez site of Clysma less suitable for the seasonal transport of goods, which were more commonly found at the southern ports of Myos Hormos and Berenike. Once at port, the imports and exports then moved across the Eastern Desert along to the Nile and then down to Babylon's harbor (Old Cairo). The final leg of the journey led to Alexandria and then the Mediterranean. Demand for Indian goods in the Roman world explains why the port cities were so active during the third through sixth centuries.

Berenike, located on the Red Sea coast, is perhaps the most well-known of the ports from the Ptolemaic and Roman periods. The port ceased to function by the mid-sixth century and had periods of minimal activity in the fourth century. The rich documentary evidence from middens, ceramics, and archaeobotanical remains testify to Berenike's active role in interregional trade via the Indian Ocean. Beads from East Java, mats from India, peppercorns in Indian-produced ceramics, and cotton textiles provide tangible clues to the multicultural nature of Berenike. Eleven different languages appear in the ostraca, papyri, and inscribed monuments recovered from the port including Tamil-Brahmi, Greek, pre-Islamic South Arabian, Latin, and Palmyrene.

The port served as a gateway between the seafaring community and the desert-road trade routes of Egypt. Artifacts recovered represent a wide range of goods imported from the Indian Ocean trading circles and items exported from the Roman and Byzantine Empire. Peppercorn is perhaps the most significant and largest quantity of Indian imports. Additional food goods from India and Southeast Asia appear in excavation layers including rice, coconuts, mung beans, and amla. By the fourth century, construction patterns included the use of coral, which is more commonly diagnostic of architecture in sites along the East African coast and in the Indian Ocean. Timber from the Mediterranean and India (teak, bamboo, Boswellia, cedar, and fir) indicates the wide realm of contacts for Berenike.

By the middle of the sixth century, residents of Berenike were more desert-road travelers. Their diet had shifted from a diverse selection of fish, pork, and beef to consist solely of sheep and goat. The material remains also reflect the diminishing importance of the port, which excavators attribute to a variety of factors including the silting up of the harbor, a plague in the mid-sixth century, and more efficient transport further north along the Red Sea coast, such as Clysma with its canal.

Myos Hormos is a port located north of Berenike and near the modern city of Quseir. The earliest evidence of settlement is Roman, although its occupation does not extend beyond

the third century. The settlement shares many similarities with Berenike in being a multicultural port with several languages in use and the presence of teak from India. However, the site was substantially smaller than Berenike, and excavators believe that the more favorable winds to the south made Berenike preferable for docking than at Myos Hormos.

Clysma (known also as Cleopatris/Arsinoë and later Qolzoum) emerged as the most important port on the Red Sea by the end of the late antique period, supplanting Berenike and Myos Hormos. Its location near modern Suez reflects the importance of this pathway as a more efficient route from the Red Sea to the Mediterranean by way of a canal connected to Babylon. Clysma was first excavated in the 1930s and now a new project is using satellite images, topographical mapping, and sedimentological analysis to document the extant remains of the ancient port.

Several cities throughout the Nile Valley point to the stable economy of late antique Egypt. The site of Hermopolis Magna in Middle Egypt typifies the process of Christianization of a major urban city. The city reflects both Greek and Egyptian religious temple complexes, and by the mid-fifth century, Hermopolis Magna hosted one of the largest Christian basilicas in Egypt with a circular apse, tombs of bishops, and a baptistery. Late antique houses and middens are found throughout the site. Across the river from Hermopolis Magna is Antinoopolis, an ancient site rebuilt by Hadrian in the second century. The site was selected by Diocletian to be a district capital for the Thebaid and held garrison troops. Italian excavations, active since the 1960s, have identified several late antique burials and several churches. Some monastic residences were built in and around the city for apparently distinct female and male communities. Literary evidence highlights the city as an important center for the veneration of Sts. Claudius and Colluthus. A nearby southern suburb called Ansina contains a significant late antique community. Dating from the fifth to eighth century, the site contains impressive mud brick walls preserved to over 8 m, churches, chapels, a tower, and several residences. The site was recently surveyed and mapped by a British team to establish a record of this architectural rich and unexamined late antique city.

Further north along the Nile, the site of Oxyrhynchus, 180 km south of Cairo, is known primarily for the late nineteenth-century recovery of the largest collection of Ptolemaic, Roman, and Byzantine papyri. The site was a prominent city in late antiquity with a bishopric and several monasteries. British and Italian excavations recovered parts of the city with the largest theater in Egypt, cemeteries, and several examples of late antique sculpture. Excavations are ongoing but are overshadowed by the still ongoing analysis of the vast and rich documentary corpus written in Greek, Latin, Coptic, Arabic, and Persian. The texts cover almost every spectrum of society such as private sales, loans, private letters, and religious texts both for Greco-Roman and Christian traditions, plays, and imperial correspondence.

Kharga and Dakhla are the two central oases of Egypt's Western Desert. Both show signs of importance in the late Roman period, although their importance as urban centers diminished in late antiquity. Bagawat cemetery is in the northern region of Kharga Oasis and provides several examples of Christian burials with painted tomb chapels with scenes from the Old and New Testament, lives of saints, and lives of Paul and Thecla. A monastic site at Deir Mustafa Kashef includes the modification of a rock-cut tomb, a church, areas for visitors, and monastic quarters. An Australian mission recently surveyed the site and excavations will begin soon.

To the west of Kharga is Dakhla Oasis. Several excavations since the 1980s by Australian, American, and Egyptian teams have recovered the urban and monastic settlements of this oasis. Signs of late antique occupation appear at Ain el-Gadida, Deir Abu Metta, the cemetery at El-Muzawwaka, Kellis, and Amheida. Kellis was a significant Roman city. Excavations testify to the presence of churches, a nymphaeum, a bath house, domestic quarter with multi-roomed houses, and cemeteries. Textual evidence on papyrus and wood and written in Greek, Coptic, and Syriac describe religious and private life

within the city. Much of the evidence illuminates the Manichean community at Kellis. To the west is the late antique site of Amheida, currently under excavation by an American team. The discovery of a fourth century villa of Serenus preserves several wall paintings which provide evidence of secular iconography involving geometric and figural representations.

Monastic Settlements

While early monastic literature highlights the importance of physical isolation from non-monastic communities in the desert, the archaeological evidence points to several diverse locations for monasteries. Some communities elected to live along the edges of the Nile or in desert cliffs, which made the settlements quite visible and known to local communities. Some settlements were impressively purpose-built environments with their own unique architecture and site planning. More moderate settlements were made from modifications of quarries, ancient tombs, or natural caves nestled in the sharply rising cliffs which demarcate the Nile Valley. Other monks resided in areas that were far more difficult to reach or see; thereby their settlements reflected a greater desire to embrace a life of relative isolation. These settlements are often modifications of naturally forming caves in the wadis of the high desert or near trade routes. The documentary evidence from ostraca and papyri illustrates that the affinity for isolation espoused in the literary sources was not evident in daily living. The majority of monasteries in Egypt were agents of connectivity between local communities and elites in late antiquity.

The early twentieth century began with the unanticipated discoveries of two large monastic settlements which provided the basis for all initial studies into early monastic visual culture. The Monastery of Jeremias, for example, was built in the valley just south of the Step Pyramid at Saqqara. Excavated by the British Egypt Exploration Fund in the early twentieth century, the site provided a rich array of material evidence in stone of Coptic art which is now in the Coptic Museum in Cairo. The site was first occupied in the fifth or sixth century when monastics began a massive building campaign to construct three elaborate stone and mud brick churches, adjoining refectories, residences, chapels, a hospital, and a series of rooms for monks and pilgrims. At its height, the community supported communities for men and possibly women. Despite its close proximity to pharaonic tombs and mortuary structures, the monks did not occupy the abandoned buildings of the Old Kingdom but chose to build their own spaces constructed from materials gleaned from the surrounding area (both stone and mud bricks). Many of the cells contain monastic paintings which show a range of Christian iconographic themes: monastic saints, angels holding holy bread, galaktotrophousa lactans (Virgin Mary nursing Jesus), Abraham's sacrifice of Isaac, and Christ in Majesty.

In Middle Egypt is the site of Bawit, which was excavated in the early twentieth century by the French Institute of Archaeology in Cairo. Excavations revealed a complex settlement known as the Monastery of Apa Apollo. The site produced an unprecedented amount of late antique material to compare with the monastery at Saqqara. Additionally, papyri and ostraca recovered from Bawit document a monastic community with economic ties to a variety of smaller monastic settlements and neighboring cities. Recent French excavations and geophysical prospection have explored the massive site further. Results of geophysical survey document a densely occupied 40-ha settlement. Limestone sculpture, monastic paintings, carved wood, bone artifacts, and archaeobotanical evidence all contribute to the reassessment of this important late antique monastery. The domestic spaces may have served as oratories or as commemorative chapels for particular individuals. Many contained monastic paintings with images of Christ in Majesty, Mary flanked by Apostles, saints, monks, and representations of flora and fauna. The communities of Bawit and Saqqara therefore provided the foundation for the field of early Byzantine art in Egypt until the development of the field of late antiquity in the 1970s.

Monks frequently redesigned and adapted quarries and tombs for habitation. Several sites throughout Egypt contain evidence of Christian

occupation such as Sheikh Said, Der el Dik, Abydos, and Amarna in Middle Egypt; Abu Darag by the Red Sea; and Hagr Edfu in Upper Egypt. Ancient pharaonic tombs provided convenient, multi-roomed, spaces that could be easily modified for habitation. At Beni Hasan, Helwan, Wadi Sarga, Aswan, and the numerous tombs of the Theban area, monks often used a tomb as a foundation for a new settlement and then built out from the opening into the terraces with mud brick and timber additions. The occupants Christianized the residence with white plaster upon which they painted crosses, added multicolored Christian iconographic programs, and inscribed their Coptic prayers. Many sites contain ostraca in Coptic and late antique ceramic assemblages and, more rarely, monastic burials.

The most well-known example of the late antique adaptive reuse pattern is found in Thebes in the western hills. The Monastery of Epiphanius, a small sixth- and seventh-century residence, was excavated in the 1920s by the Metropolitan Museum of Art. The site typifies the extension of a monastery from a Middle Kingdom tomb onto the flat terrace of the surrounding cliffs, and excavations produced a collection of ostraca and papyri. Like many other modified tomb residences, the occupation does not usually span beyond a century of use. In addition to these examples of modest settlements, several sites included purpose-built structures specifically for monastic living. The sites were also large enough to be considered villages and rival the size of some smaller cities. The sites shared common features such as churches, domestic quarters, storage, wells, kitchens, areas of production, cemeteries, refectories, and housing for visitors.

Archaeological investigation into monastic sites resumed after a nearly 60-year hiatus with work at two of the most well-known monastic sites from Christian literature: Kellia and Scetis. The Apophthegmata Patrum, known as the Sayings of the Desert Fathers, recounts the deeds, sayings, and history of the first Egyptian monastics who were later used as inspirations for European monastic communities. Kellia, Scetis, and Nitria were often linked together in the didactic and hagiographic stories. While Nitria's exact location is still uncertain, Kellia and Scetis were definitively found in the deserts of the northwest Delta. Kellia, known as the Cells, consists of seventeen discrete areas or mounds of which five areas show a higher percentage of occupation than the others. Beginning in 1964, several decades of excavations by French, Swiss, and Egyptian teams have documented the extensive settlements at Kellia with at least 1,500 buildings. None of the settlement was walled and no central church has been identified, although several structures clearly functioned as churches, chapels, martyrium, and oratories. The buildings consist of a range of forms from two-roomed private residences for a solitary monk to 50-roomed buildings which could house over a dozen monks. The earliest structures do not date before the fifth century and the latest occupation is in the eighth century.

Although Kellia was eventually abandoned, Scetis has had a continuous monastic presence since its first occupation in the fourth century. Excavations at and near the four contemporary monasteries (Deir Anba Maqar, Deir Anba Bishoi, Deir al-Suryan, and Deir el-Baramous) and in between these sites illustrate that settlements originally began as unwalled residences. The monastic communities dot a low-laying wadi valley marked by several large natron lakes. With similar residential designs to Kellia, Scetis had hundreds of multi-roomed buildings that were scattered throughout the desert and clustered together as if to form small villages. It was only later, after a decline in numbers, raids from desert inhabitants, and environmental factors, that these communities diminished and were enclosed by a single wall so that by the medieval period, probably in the tenth and eleventh centuries, the four remaining monasteries resembled fortresses. The height of monastic occupation seems to be between the seventh and tenth centuries. On the northern end of Wadi Natrun, a Dutch excavation at Deir el-Baramous points to a late fourth-century founding of a community with a church, monastic residences, and kitchen facilities for feeding residents and guests. It was later abandoned in the fourteenth century. At the opposite end of the natron lakes, Deir Anba Maqar is

currently a walled monastery. However, recent survey work illustrates that it sits amidst a densely pocketed settlement with several buildings without defensive walls. Finally, a third site is the Monastery of John the Little (John Kolobos) which an American team is excavating and surveying. The map of the site shows over 80 residences with one being comparable in size to the existing Deir al-Suryan. Excavations include evidence of tenth- and eleventh-century monastic life with visually rich monastic paintings and dated painted inscriptions in the tenth century.

Late antique monastic settlements did not follow a standard site plan, but they do reflect a sensitivity to the environment and natural landscape in settlement design. In the Fayyum, for example, the monastic community at Naqlun is the best representative of a late antique settlement for this semi-oasis area. The settlement is 100 km south of Cairo and roughly 25 km west of the Nile. Under excavation by a Polish team since 1986, Naqlun is a settlement with two distinct components with rich archaeological material for monasticism. One region is the shale and limestone cliffs. Here the monastic community used the natural topography and geological features to construct 90 independent residences. Some residences were modest with four rooms extending from an open courtyard closed by a thin mud brick wall. Other residences included 18–19 rooms. Each seems to have enough space for housing two individuals. Habitation begins in the late fifth century, with new construction in the sixth century and after the seventh century. Occupation of the residences diminished after the post-conquest period, with only sparse evidence of Arabic inscriptions or pottery. The second area of the settlement, at the foot of the cliffs, dates to the end of the fifth and early sixth century. The plateau hosts a central church, several ecclesiastical buildings, a late antique cemetery, and a few remote residences. The burial shrouds from the cemetery indicate that the lay community used the cemetery, but not the monks. The documentary evidence from the residences indicates that the lay community visited the site regularly for medical and religious purposes.

A second settlement provides a unique example of variation. At the site of Esna, south of Thebes, a French excavation team discovered fifteen semisubterranean monastic dwellings in the 1960s. Esna is the only known example of a moderate-sized community that chose this style of building. The buildings are accessed by a staircase which leads down to a sunken open-air courtyard. Doorways were protected by short mud brick walls, which likely functioned as sand barriers. A series of sleeping quarters, oratories, and kitchens extend from around this natural atrium. The oratories in particular show significant signs of religious activity with numerous inscribed and painted crosses, petitions, and Christian iconography. The site was relatively short-lived when compared with the great monastic centers at Kellia, Scetis, Saqqara, and Bawit. Based upon ceramic and epigraphic evidence, the excavators concluded the site was established early in the fifth century and later abandoned by the middle of the seventh century without any sign of destruction, either natural or man-made.

Just north of Esna is the ancient center of Thebes, home to the mortuary tombs and temples of the pharaohs. The late antique settlements in this region represent the density of monastic settlements and their close proximity to lay communities, such as the town of Djeme, which was built directly within the walled temple of Medinet Habu. Textual and artifactual evidence illustrate a successful town in the late antique and early Islamic periods. The community had a large church built directly into the colonnaded court of Ramesses III. French, German, American, and Polish excavations in the last decades are producing remarkable evidence for late antique Thebes. Hundreds of monks resided in the monasteries such as the Monastery of St. Phoibammon, Deir el-Roumi, Deir el-Medina, Deir el-Bachit, Deir el-Bahri, and Gurnet Marai. Surveys currently in the Valley of the Queens and in the wadis into the Western Desert by French archaeologists show that the occupation is far higher than once thought. Monks remodeled tombs, built on escarpments, and located themselves in a variety of remote and very visible locations. The sites include invaluable ostraca

documenting monastic life, lease of cells, religious life, and economic activities with local communities. Monastic burials at Qurnet Marai, Deir el-Medina, and the Monastery of Epiphanius, for example, include men wrapped in linens and then clothed with leather aprons and leather hoods. Based upon ceramic, epigraphic, and artifactual evidence, the town of Djeme and many of the associated monastic communities were abandoned by 800 CE.

Finally, the most recent work at two monasteries in Atripe, modern Sohag, represents the importance of continued efforts to document and preserve late antique Egypt. The area was known in the fifth century as part of the large monastic White Monastery Federation led by a prolific author St. Shenoute. Over 3,000 pages of his writings to his community and to laity preserve the largest collection by a single author from late antiquity. Written in Coptic, Shenoute's writings touch on aspects of monastic living for men and women, how to host refugees, conflicts between monastic authority and urban elites, and religious life in the fifth century. Two central areas of his community still exist: the Monastery of St. Shenoute, known today as the White Monastery, and the Church of Saints Bishai and Bigol, known now as the Red Monastery.

Today the White Monastery includes the famous fifth-century church, which is one of the best preserved late antique Christian monuments and is still in use. Built of dressed limestone blocks, it includes a triconch apse and figural paintings. Its exterior bears similarities to ancient pharaonic temples. Several components of the site were excavated in the 1980s by an Egyptian team, but not published. An international team headed now by American directors has worked since 2005 to document the church and to record the surrounding archaeological remains of the monastic settlement which includes storerooms, a cistern, a refectory, public toilets, domestic quarters, kilns, and a cemetery. Recently the American team discovered a tomb chapel that they now identify as the tomb of St. Shenoute. The cliffs to the west show some indication of monastic occupation, but not substantial.

To the north is the Red Monastery, which is part of an ongoing American project to conserve and study the largest painted program from the late antique world. Over eighty percent of the existing church of the Red Monastery still preserves late antique paintings. Sculptural pieces also accentuate the uniqueness of this monument whose conservation by a team of Italian specialists demonstrates that Upper Egypt monastic sites had high-quality late antique art. A multidisciplinary publication of the paintings, inscriptions, and the architectural history will significantly restructure conversations about late antique Egypt, how scholars regard monastic art, and the importance of the sites for understanding Christian iconography more broadly.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Hellenistic and Roman Egypt, Archaeology of
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Latin America: Indigenous Peoples' Rights

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Introduction

The current Indigenous population of Latin America is estimated to be between 40 and 50 million, which represents approximately 10 % of the total population of the continent. However, these figures are inaccurate due to the different criteria and control mechanisms employed by countries in the region when carrying out Indigenous population censuses. More than 400 ethnic groups can be found within the current Indigenous population of Latin America including hunter-gatherer groups in the Amazon basin, peasant societies in the Andes and Mesoamerica, and urban dwellers.

Definition

Indigenous peoples have been identified as "the Indigenous communities, peoples, and nations that maintained a continuous relationship throughout history with the pre-colonial societies that developed on their territories, and consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal system" (Martinez Cobo 1986).

In the last few decades, the rights of Indigenous peoples have been widely recognized at the international level. This section will make particular reference to cultural rights, both individual and collective.

In multicultural nations, such as those in Latin America, the recognition of cultural rights is absolutely fundamental as Latin American societies have a variety of ethnic identities that should be equally respected. In this sense, cultural rights can be conceived as a subcategory of human rights.

The right to culture is the individual right to participate in the cultural life of the community and to enjoy the arts and the benefits of scientific progress and its technologies. Different categories of cultural rights can be identified: (a) copyright, (b) the right of cultural heritage, (c) the right of creation and artistic production, and (d) the right of creative and cultural industries (Harvey 2008).

A new category of cultural rights is collective rights, associated with peoples' rights to their own identity and to develop their culture (Pact of San José, Costa Rica). In this regard, it is worth noting the wide acknowledgment made in the United Nations Declaration on the Rights of Indigenous Peoples to establish that they are entitled to "maintain, control, protect and develop . . . their traditional knowledge . . . and the manifestations of their sciences, technologies and

cultures . . . and to maintain, control, protect and develop their intellectual property" (art. 31).

However, the protection of traditional knowledge at the international level has a number of shortcomings related to the lack of a clear and comprehensive definition of what traditional knowledge means, as well as of the need to determine which specific types or manifestations of traditional knowledge should be protected and with which legal mechanisms.

Traditional knowledge can be defined as all knowledge, creations, innovations, and cultural expressions that are owned or claimed by Indigenous and local communities and that have been passed from generation to generation. Although there is not an accepted and shared definition of "traditional knowledge" in various international instruments, reference is made to related concepts such as (a) knowledge, innovations, and practices of Indigenous and local communities that are incorporated into traditional lifestyles related to the conservation and sustainable use of natural resources and biological diversity; (b) the traditional knowledge relevant to plant genetic resources for food and agriculture; and (c) the cultural heritage, traditional knowledge, traditional cultural expressions, and manifestations of sciences, technologies, and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games, and visual and performing arts (OMPI 2008).

Historical Background

During the second half of the nineteenth and early twentieth centuries, the new Latin American nations consolidated their control over their territories, due to the need to develop large tracts of land for dedicated economic output, according to the agricultural export economic model that prevailed in the region (Halperin Donghi 1989: 309-312). Consequently, policies were put into practice to systematically dispossess, and even exterminate, Indigenous groups of their lands. These lands were owned, in some cases, by the state and sold freely and, in other cases, were divided into small units and given to their possessors, dissolving the community property system that had prevailed earlier.

Indigenous communities were no longer considered "Indian Peoples," entitled to a special legal system established during the Spanish colonial period. Indigenous groups thus became citizens of the new nations, although in some cases they did not enjoy full rights and were regarded as second-class citizens and, therefore, subject to state supervision. In practice, these policy reforms deprived the Indigenous groups of their ethnic identity and their ancestral property rights to common land and, far from improving their living conditions, led to greater social exclusion both culturally and economically. In some countries with significant Indigenous populations, the distinction between mestizos and Indians resulted in a strong social and political differentiation, as well as discrimination against the latter group.

During this time, positivism and social Darwinism had considerable influence on the intellectual elites of the new Latin American nations and served as justification for their national policies toward Indigenous groups. These racist ideologies considered them Indigenous an obstacle to progress and civilization (Politis 1995). The antiquity and richness of their past was denied, and a lack of Indigenous cultural continuity between contemporary and past Indigenous groups was assumed. Therefore, with these justifications, pre-European history and material culture were appropriated by the state (Macera 2000; Gnecco & Ayala Rocabado 2010).

In this period, several Latin American countries enacted their first archaeological heritage laws establishing the public domain of the state over archaeological sites, even if they were on private land (e.g., Mexican Law of 1897, Argentinean Law 9080 of 1913, Peruvian Law 6634 of 1929, Colombian Law 103 of 1931).

The emphasis on "national history" in schools and museums was used as a state policy to strengthen a model of national identity based on the idea of a homogeneous cultural melting pot or denying any ethnic differentiation that could generate geographical fragmentation. In this sense, it

can be said that in many Latin American countries, cultural genocides were committed (Gnecco & Ayala Rocabado 2010).

As a result of all these policies, some Indigenous descendants internalized the "stigma of being Indian" and tried to deny their condition. Others resisted due to the seeming impossibility of achieving fair treatment, which in some cases led to acts of violence.

Moreover, the study of human remains and material culture of Indigenous peoples became a matter of scientific interest since they were considered relics of past cultures and therefore should be collected before their presumably inevitable disappearance. Ethnographic and natural history museums were established to keep and display human remains and material culture of Indigenous societies, following the model of many European museums and the Smithsonian Institute in the USA.

In the first decades of the twentieth century, racist ideologies were challenged by various movements that occurred in different Latin American countries, such as Indigenismo, socialism, Hispanism, and nationalism. The idea of race was gradually replaced by the concept of class or social group (Helg 1990: 38). Each of these movements was influential in heritage management policies of each country.

The Indigenous movement was promoted by intellectuals and had a major boom in countries such as Mexico and Peru, contributing to the construction of a national history that had its roots in the pre-Hispanic empires (i.e., Aztec, Inca). An important milestone for the Indigenous movement was the organization of the Pátzcuaro Conference in 1940, as a result of which the American Indigenist Institute was founded. However, the Indigenist discourse had no major consequences in practice as it failed to improve the living conditions of rural Indigenous populations of those countries (Patterson 1995: 84).

By contrast, countries like Argentina, Chile, and Uruguay built a national history rooted in Hispanic and Catholic traditions, denying any possible Indigenous contribution or other influences (such as the African descendants in Argentina or the Portuguese and Brazilian in Uruguay) (Politis 1992). In the case of Brazil, the policy of denial to Indigenous peoples remained unchanged until the end of 1930, when they began to receive more attention from the state and some academics and intellectuals (Endere et al. 2010).

However, all countries showed interest in controlling pre-Hispanic sites as part of the national heritage. The laws of national monuments were popular in all countries, and the creation of institutes for research and/or management was implemented (National Institute of Anthropology and History of Mexico, 1939; the National Institute of Ethnology of Colombia, 1941; the National Institute of Tradition of Argentina, 1943; National Institute of Culture of Peru, 1971, etc.).

In the last decades of the twentieth century, especially after the return of democracy to the region, a social and political movement was consolidated in Latin America in response to the increasing demand of many Indigenous organizations with differing levels of organization and hierarchy. In the first instance, their demands focused on claims of historicity, that is, affirming their existence and preexistence in and to the new nation states. These claims shifted later to more specific issues related to the possession and ownership of land and improving livelihoods and living conditions.

The emergence and rise of Indigenous peoples as new political actors, favored by an international context more attentive to their demands, has allowed them to change their relationship with national governments and, progressively, gain recognition in the legal arena (see below).

As a result of the new demand and policies of positive or affirmative discrimination that arose in some countries, emerging identities were forged. In this context, the new Indigenous discourse is more elaborate and sophisticated since it is the product of the formation of a young educated elite of Indigenous descendants. This new discourse emphasizes ideological aspects (Stavenhagen 2004). Even though the new ideology is not completely comprehensive or consistent, there are some shared issues on the agenda such as the right to their own culture and cultural identity and the recognition of customary law and traditional forms of authority.

Current Debates

The recognition of the rights of Indigenous peoples has been on the political agenda in Latin America since the 1980s, although it has not always been reflected in the legal systems of the countries in the region. Latin American constitutions can be divided into three groups, according to an analysis made by Barié (2003: 87). The first group, consisting of the constitutions of Belize, Chile, French Guiana, Suriname, and Uruguay, is characterized by not making any reference to native peoples, either because their legal traditions are essentially Anglo or because they have not had substantial reforms in recent years. A second set of constitutions, formed by those of Costa Rica, El Salvador, Guyana, and Honduras, grants some specific protection to its ethnic minorities but "within a legal framework incomplete or poorly articulated." The third group, consisting of the constitutions of Argentina, Bolivia, Brazil, Colombia, Ecuador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela, made a wide recognition of Indigenous rights, due to reforms undertaken since the 1980s.

In the case of Chile, the Indigenous movement was strengthened in recent decades and has gained recognition in both political and academic spheres. As a result of this process, the Indigenous Law 19.253 was passed in 1993, and the ILO Convention 169 was recently ratified. Although the reform of the national constitution has been delayed, a draft of a new constitution was proposed at the congress that includes the Indigenous peoples' issue.

Uruguay has a very small Indigenous population, reduced to some descendants of Charrúas. In Belize, Costa Rica, El Salvador, Guyana, French Guiana, Honduras, and Suriname, the Indigenous population has little visibility and their organization into political groups is relatively recent. Thus, the Indigenous issue in general has been poorly studied and discussed in these countries.

The rest of Latin American countries have been declared multicultural nations, explicitly recognizing the preexistence of Indigenous peoples and giving them a set of rights, including those related to their cultural identity (e.g., culture, heritage, customs, linguistic heritage, and other identifying features) (Harvey 2008).

Bolivia's new constitution of 2009 is the most radical, since it supports a peasant Indigenous judicial system at the same level as the ordinary courts and recognizes the right to autonomy and self-government for Indigenous people, along with recognition of their territories and institutions.

Current Situation

Most countries in the region, particularly those identified as the third group, have passed Indigenous laws that grant legal recognition to Indigenous communities and recognize their rights in the national constitution. However, these rules do not always refer to some particular aspects of the Indigenous culture, such as those related to their cultural heritage. In general, the archaeological heritage remains governed by specific rules that do not mention, or vaguely mention, the Indigenous peoples' rights to participate in their management. They often are, as a result, not effective in practice.

On the other hand, Indigenous peoples are determined to recover and regain ownership of their ancestral lands, to preserve the environment in the areas where they live, and to improve their socioeconomic conditions, often by pressing their governments to comply with the provision of Indigenous laws. Conflicts between Indigenous organizations, local and national government authorities, and mining and logging companies are present throughout the region, which, in some cases, create social conflict and disputes.

The situation of the Indigenous population varies widely from country to country. While in Uruguay it is almost nonexistent and in Argentina they are just a minority without too much political power, in countries like Peru, Bolivia, and Ecuador, Indigenous people account for the majority of the population and have undisputed political clout. Indeed, in the last two decades, the Indigenous movement in Ecuador has achieved political recognition as part of the ruling coalition. A major milestone for the Indigenous movement took place in 2006 when the first Indigenous president in Bolivia's history came to power.

In general, the interest of Indigenous communities in heritage issues is relatively recent and of second order of priority for Indigenous people of the region. This interest has focused on the dispute over the control of the historical narrative exerted by archaeology and, in some countries, for the human remains of their ancestors. The Indigenous participation in the management of archaeological sites is, however, still exceptional.

For example, as part of the Indigenist political policy in Ecuador, a recovery of ancestral cultural identity was implemented. As a result, the pre-Hispanic past of the country was promoted as the origin of the modern state. It was considered necessary to write the history of the Indigenous peoples of Ecuador as an alternative narrative in order to replace the official history and to present the pre-Hispanic past, particularly the imperial Inca period, in an idealized manner and as the source of a Pan-American Indian community (Benavides 2005).

Claims for the restitution of human remains held by museums have been particularly significant due to their social and political impact in Argentina and Uruguay. In these two nations, the first cases of repatriation of the human remains of chiefs with a famous historical trajectory (e.g., Chief Inakayal (1994) and Chief Mariano Rosas (2001) in Argentina and Chief Vaimaca Pirú returned from France to Uruguay in 2003) were implemented. In all cases, the restitutions were ordered by special laws. Argentina also has a general repatriation law that recognizes the right of communities to claim the repatriation of human remains held in museums and requires the prior consent from Indigenous communities to any scientific research that deals with their Indigenous cultural heritage (Law 25 517, arts. 1 and 3) (Endere & Ayala Rocabado 2012).

In sum, the divorce between political discourse and practice and the lack of consistency between the Indigenous and cultural heritage laws have generally made the participation of Indigenous peoples in heritage management impracticable. Furthermore, the academic isolation of many archaeologists and researchers, as well as the lack of unity and coherence among the Indigenous groups themselves, prevents them from having one voice on the subject. However, following intense and heated debates, recent changes in professional ethics rules have begun to mobilize the academic community of these countries toward a more open dialogue and willingness to adapt their methods to make them compatible with respect to the rights of Indigenous peoples and their cultural heritage.

International Perspectives

In the second half of the twentieth century, after the decolonization process was consolidated in the world and the Universal Declaration of Human Rights of the United Nations (UN) came into effect, a process of recognition of the rights of Indigenous peoples was set in motion. Its first milestone was the adoption of Convention 107 concerning Indigenous and Tribal Populations by the International Labour Organization (ILO) in 1957. Another important milestone was the publication of a study on discrimination against Indigenous peoples made by rapporteur José Martínez Cobo in 1986, as well as the increasing presence of Indigenous organizations in international conferences where these issues were discussed (Barié 2003).

In international law, the issue of minority ethnic groups has been addressed, generally, from the point of view of individual human rights (e.g., the Universal Declaration of Human Rights [1948], the International Covenant on Civil and Political Rights, and the International Covenant on Economic, Social, and Cultural Rights [1976]). The most significant legal instruments regarding Indigenous rights are the Convention on the Prevention and Punishment of the Crime of Genocide (1948), the International Convention on the Elimination of All Forms of Racial Discrimination (1965), ILO Convention 169 (1989), the American Declaration on the Rights of Indigenous Peoples (1997), and the Declaration on the Rights of Indigenous Peoples (2007).

Human rights in Latin America have been recognized by the American Declaration of the Rights and Duties of Man (Bogotá, 1948) and the Protocol of San Salvador on Economic, Social, and

Cultural Rights in 1988, as well as the American Convention on Human Rights (ACHR), known as the Pact of San José, Costa Rica, 1969, which is the fundamental law of human rights in the Americas. In addition, many of the countries in the region signed the International Covenants on Civil and Political Rights and on Economic, Social, and Cultural Rights (Harvey 2008).

More than any other international agreement, ILO Convention 169 had a positive impact on the region for being legally binding and advancing key issues such as the right "to participate in the formulation, implementation and evaluation of plans and programs for national and regional development which may affect them directly" (art. 7, par. 1). It also asserted that the values of Indigenous peoples must be respected, including their social, cultural, religious, and spiritual needs (art. 5). Today this convention has been ratified by all Latin American countries except Belize, Panama, Uruguay, Guyana, French Guiana, El Salvador, and Suriname. Those nations that have not ratified it will, nevertheless, take this convention into account when reforming their constitutions.

The ethnic issue has gained importance in the discussions of the UN in the past two decades. As a result of that, the Declaration on the Rights of Persons Belonging to National or Ethnic, Religious, and Linguistic Minorities was adopted in 1992. During the period 1995–2004, also known as the International Decade of the World's Indigenous Peoples, the living conditions of Indigenous peoples were greatly improved. The adoption of the Declaration on the Rights of Indigenous Peoples in 2007 finally gave Indigenous groups human rights status.

It is worth noting that the declarations adopted by a resolution of the UN General Assembly can only have the status of recommendations and are not binding rules. However, the prevailing doctrine states the mandatory nature of the Human Rights Declarations, on the grounds that the rights recognized in them represent "general principles of law recognized by civilized nations" (one of the sources of international law admitted by the Statute of the International Court of Justice, Art. 38.1). For example, the declaration has been explicitly cited by the Inter-American Court in *Saramaka People v. Suriname* (IACHR judgment of 28.11.2007, Series C No. 172) implicitly recognizing the principles of international law embodied in the declaration (Rodriguez Royo Piñero 2010: 351).

The 2007 Declaration recognizes and comprehensively guarantees the human rights of Indigenous peoples, placing them as political subjects internationally and filling one of the big gaps in the international law of human rights (Montes & Cisneros 2010: 149). In terms of Indigenous cultural heritage, the declaration recognizes the right to control their movable and immovable assets; the right to the restitution of cultural, intellectual, religious, and spiritual heritage (art. 11); the right to the repatriation of their human remains and ceremonial objects (art. 12); and the right to protect intellectual property in their cultural heritage, traditional knowledge, and traditional cultural expressions (Article 31).

It is also worth noting that at the time of its adoption, all the Latin American countries voted in its favor with the exception of Colombia. Bolivia also transformed this declaration into national law in November 2007. Clavero (2010: 372) notes that the declaration "represents for Latin America the conclusion of the colonialism that Indigenous groups continued suffering due to the manner in which independence was obtained and the conditions under which the States of the region were made."

Future Directions

The widespread recognition of individual and collective rights of Indigenous peoples on the international stage, particularly with the recent adoption of the UN Declaration of 2007, has certainly given broad support to Latin American Indigenous movements and helped set the agenda for future policies in the region.

Countries that have recently amended their constitutions to incorporate Indigenous rights will face the challenge of operationalizing these rights through legislation. Chile is likely to advance in the same direction. The countries with the largest capacity to mobilize Indigenous

populations are more likely to expand their rights (e.g., Bolivia, Ecuador, Mexico, Panama, and Peru). In all other countries, the Indigenous question still seems uncertain.

A burning issue in Latin America is the lack of effectiveness of such policies: in some cases, they are merely declarative without providing mechanisms for their implementation. The laws are often enacted in order to end a claim or conflict in the short term, leaving a vacuum of political will to enforce them.

Overall, there have been major advances in the recognition of Indigenous peoples as entitled to individual and collective rights; however, there has not been substantial progress in the design of mechanisms to make these rights effective. One particular issue is the lack of protection of traditional knowledge, since national legislation on intellectual property and patents only considers individual rights.

Some countries in the region are discussing draft legislation or new policies regarding the protection of traditional knowledge (in some cases also addressing traditional cultural expressions or folklore) to save the loopholes in the matter. In this regard, it is worth mentioning Peruvian Law 27.811/2002, which establishes a protection regime for the collective knowledge of Indigenous peoples related to biological resources.

Cross-References

► United Nations Declaration on the Rights of Indigenous Peoples (2007)

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Latin American Social Archaeology

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Introduction and Definition

Social archaeology is both a theoretical and methodological practice emerging directly from Marxism. In particular, this occurs by the founding contributions of Soviet archaeology, as envisaged by the Australian archaeologist Vere Gordon Childe (Gándara et al. 1986; Bate 1990). At the core, social archaeology is the construction of a method of archaeological process analysis that is significant and scientific in the manner it connects past and present. According to one of its founders, archaeologist Luis Lumbreras (Lumbreras 1974), it was introduced in Peru in the 1950s by Emilio Choy to give the Andean process a coherent explanation. Its aim is to go beyond the explanations that are inferred by the ordering of archaeological materials, which lead to the development of productive forces to make comparisons between groups with similar characteristics and thus identify the levels of social hierarchy produced as a consequence of class struggle. In the mid-1970s, the adjective Latin American was added (Gándara et al. 1986) and subsequently Manuel Gándara in Mexico proposed to call it Ibero-American Social Archaeology (Gándara 1996), since it appeared primarily within Spanish social archaeological discourses. Key contributions have been made by archaeologists who have founded schools of thought developed in Marxism in Mexico, Venezuela, Peru, Cuba, and the Dominican Republic mainly where the state has been sympathetic to leftist ideas (Bate 1990, 1997). The idea of an archaeology that would serve as a liberation weapon lay in the possibility of discovering the historical roots of peoples and their character as exploited (Lumbreras 1974), the transience of institutions, states, social classes and behavioral patterns, and the articulation of social archaeology with the other social sciences demonstrating historical processual unity in general terms and in their regional and local characteristics (Sanoja 1982; Vargas Arena 1986; Patterson 1988). The essential feature of their ideology lies in the application of a type of Marxism which holds some influences with Hegelian, Leninist, and Stalinist traditions of the former Soviet school, whose strength lies in the integration with dialectical materialism and Neopositivism for explaining social phenomena.

Key Issues/Current Debates/Future Directions/Examples

Discussion

During the 1980s, two key meetings took place that allowed for the development of Social Archaeology: the Oaxtepec and Cusco meetings.

During these meetings, significant issues were discussed related to the construction of analytic categories, methodological theory, the interpretation of historical materialism, and a history of archaeological contexts and production data (Lorenzo 1976; Gándara 1996).

At the second meeting of Oaxtepec, some agreements related with the following concepts were reached: mode of production, socioeconomic training, and modes of life and culture, for the definition of a concrete society. In efforts to create a conceptual unification, the need to develop the elements for a historical periodization for social formations was observed. This was called primitive with its variants: the hunter gatherer and tribal. The former was developed through the work of Luis Felipe Bate (1990, 1996, 1998), and the latter related to tribal social developments was illustrated through the work of Iraida Vargas Arena (1986) and other researchers, such as Thomas Patterson, and it characterized equally complex social formations as the chiefdom and state societies (1998).

The contemporary context within which Social Archaeology was able to draw attention to archaeology's theoretical and methodological problems was the fall of the Soviet Union and the so-called real socialism. This became relevant to the discourse as Marxist ideas gave way to methodological theoretical positions relevant to discourses regarding other experiences and perception or interpretation of reality contrasted with the ambitious universal theoretical constructions of historical materialism (López Aguilar 1990).

The development of Latin American social archaeology was concurrently being represented within the American archaeological discourses through the work of Bruce Trigger (1992), Thomas Patterson (1988) and Randal McGuire (1992). In their discussions related to "culture" from a Marxist perspective, these scholars argued that the term "culture" should not be reduced to material production or symbolic systems; culture is more than ideology and political economy on the one hand and society on the other.

Despite efforts to unify criteria and categories of analysis, not all social archaeologists use the same categories in their explanations of the historical constructions of archaeological contexts they observe. Also important to keep in mind is the absence of a project in which the strength of the theoretical model may be tested against the relevance of the data. Social archaeology was also constructed contrasting methodological and theoretical positions as in the case of postprocessual and processual archaeology, led by the American school (Trigger 1992). Its current production is scarce and scarcely spread in the Latin American context. Not all social archaeologists share the terms and arguments raised in the essential categories and laws of dialectics on the social construction of reality they observe. The ontological diversity is difficult and problematic if the aim is to have a unified methodological view.

Current Status

The social construction of reality has given way to another kind of discourse that goes beyond the borders of the nation state and the symbolic power of its founding myths. The arguments which are developed by schools of archaeology in Latin America vary substantially from country to country. There are still the state institutions that flourished and were consolidated in the middle of last century which contribute to the need to protect such archaeological contexts. However, the fragmentation of academia, state, and civil society where public policies flow is still far from being organically integrated.

Although Marxist ideas are still part of some leftist discourses that are woven throughout the Latin American context, the need to draw more equitable public policies contrasts with a growth of urban, energetic, vial, mining infrastructure where interventions are needed to protect the cultural integrity of the social groups that may be affected by such growth. Much of the political strength of Marxists arguments has given way to environmental discourse, and has even reviewed the concept of nature in that ideology (Bate 1996, 1998). The tension between neoliberal ideas, the weakening of the state as a provider of essential public services, the decline of social values and social capital where Latin American nations'

daily life runs, continue to develop liberating creative and innovative elements, emerging from the tension inherent to the capitalist system. Several viable options that activate social cohesion have emerged, much like the Latin American Social Archaeology attempted when trying to reconstruct the social history of a diverse and complex region.

Cross-References

- ▶ Archaeology and Politics
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Power and Knowledge in Archaeology

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Latium Vetus, Latium Adjectum

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Introduction

Literary sources suggest that Latins and Romans had close cultural ties from prehistoric times (Alföldi 1965: 102-4); their shared identity being recognized in the use of the same language and the adoption of distinctive religious rituals and of converging mythical genealogies. Romans and Latins believed that their common "nation" had indeed formed in Latium, the region of Tyrrhenian central Italy located just south of the Tiber river. The fact that Latium was also the first region to be incorporated by the Roman state in its early expansion certainly reinforced this idea. This connection easily explains why the archaeology of Latium occupies a prominent place in the history of Classical studies, as it represents a point of entry into two crucial aspects of the Roman past: Rome's origins and its first steps in the creation of a Mediterranean Empire.

Since the pioneering work of G. Pinza (who in 1905 was the first to propose a systematization of the prehistoric material of Latium), the study of Rome's origins became the domain of Prehistorians and Etruscologists, who were captivated by the image of a *Lazio primitivo* evoked

by the ancient writers and so vividly reflected in the primeval aspect of many elements of the assemblage known in the literature as *cultura Laziale*, Latial culture. Classicists remained quite aloof from the debate on Roman origins, embarking on extensive mapping projects of the surroundings of Rome whose main goal was to record with particular detail the marks of Roman conquest in the region (e.g., roads and aqueducts, rural elite residences). Famous examples include R. Lanciani's unpublished map of the Agro Romano (1894–1906) and his architectural surveys at Ostia, Portus, and Hadrian's Villa near Tibur; T. Ashby's classical topography of the Roman Campagna (published in the Papers of the British School at Rome in the period 1902–1910); and the Forma Italiae project, relaunched in 1923, with the campaigns of G. Lugli in and around Tarracina and Circeii. Combined with the standing evidence from the main urban centers of Latium (e.g., the excavations of Ostia, resumed in 1909), the systematic documentation of these remains provided a basis to reconstruct the development of monumental architecture in the region and decisively informed early typological studies of Roman construction techniques (see Lugli 1957, a work already completed in 1939).

In the 1950s and 1960s Prehistorians and Etruscologists continued to refine the chronological sequencing of materials dating to the Late Bronze Age, Early Iron Age, and Archaic Period. H. Müller-Karpe and R. Peroni devised a systematic periodization of the Roma-Colli Albani facies, thus encouraging the production of synthetic works on the Latial culture, such as those by P. Gierow (1964, 1966; this is a companion to Gjerstad's work on early Rome, with which it shares a largely discredited methodology) and G. Colonna (1974, 1988). New large-scale excavation projects were started in primate centers of Latium (e.g., Lavinium, Gabii, Praeneste), whose particular emphasis on temples and sanctuaries remained in line with the tradition of architectural history in Classical archaeology. Extensive surface surveys also received a new impetus, after the involvement of the Italian "Centro Nazionale delle Ricerche" (CNR) in the Forma Italiae project (14 volumes published beginning in 1965, featuring among others Tibur, Praeneste, and Ardea).

New research agendas took off in the 1970s, following a wave of important discoveries made in sporadic rescue excavations in the suburban sprawl of Rome, which revealed extensive Iron Age cemeteries and settlement evidence (e.g., Osteria dell'Osa, Castel di Decima, La Rustica). Prehistorians and Etruscologists quickly realized the potential of this material for reassessing the archaeology of early Rome and promoted major museum exhibits (such as that on the *Civiltà del Lazio Primitivo* of 1976, whose catalog contains preliminary reports on the excavations of the Italian state archaeological service and unfortunately remains the only reference for many of the sites) and seminars (notably that on the *Formazione della città nel Lazio*, held in 1977 and published in 1980). For their part, Classical archaeologists were primarily concerned with whether the new evidence could confirm the literary tradition on the origins of Rome (see the 1981 museum exhibit on *Enea nel Lazio*).

This broader interest in the archaeology of the region set in motion significant developments, most notably the official institution of a dedicated branch of the CNR (Comitato per l'Archeologia Laziale, established in 1978), which sponsored a new series of surface surveys (the *Latium Vetus* program directed by L. Quilici and S. Quilici Gigli), along with outreach initiatives such as annual meetings. The latter provided a new forum for presenting not only the activities of the state archaeological service but also the preliminary results of a growing number of Italian and foreign research projects carried out in Latium (12 issues published in the journal *Quaderni di Archeologia Etrusco-Italica*, covering the period 1978–1995). After a brief hiatus, this program was relaunched by the Soprintendenza of Lazio in 2003 as the "Lazio & Sabina" series. This updates regularly on the progress of research activities at sites ranging from Prehistory to Late Antiquity. Furthermore, detailed archaeological guides (e.g., Coarelli 1982) and major general works (particularly on the early phases: Colonna 1988;

Bietti Sestieri 1992; Smith 1996; for the material culture of the mid-Republican period, *Roma Medio-repubblicana* 1973; for the late Republic, Coarelli 1987) offer widely accessible and helpful tools to contextualize current themes and approaches to the archaeology of the region.

Definition

Based on comparative linguistics, the ethnic name of the Latins (*Lătīni*) derives from the name of the region in which they were settled – *Lătium* (perhaps from *lātus*,wide, though a non-Indo-European root is also possible) and ethnic suffix *-īnus* – and is documented in Etruscan inscriptions as early as the seventh century BCE. Historic analogy suggests that the Etruscans chose this collective noun to name those communities living in the coastal region south of the Tiber, who in turn eventually adopted it (Colonna 1988: 425). Latin and Greek authors of the early Imperial period, however, make a clear distinction between Old Latium (*Latium Antiquum* or *Vetus*) and Greater Latium (*Latium Adiectum* or *Novum*) (Pliny *HN* 3.39, 3.46, 3.56 and 3.59; Strabo 5.3), a territory inhabited by non-Latin-speaking peoples which was "added" to Old Latium by the Roman conquest.

In geographical terms, Latium Vetus corresponds to the lands bordered by the river Tiber to the north and beyond the river Anio (modern Aniene, a tributary of the Tiber) up to the hills of Sabinum, the Apenninic formations of the Monti Prenestini and Tiburtini to the northeast, the upper course of the river Trerus (modern Sacco) to the east, and the Monti Lepini and Monte Circeo to the southeast. The core of Vetus Latium is occupied by the Quaternary volcanic district of the Alban Hills. In historic times annual pan-Latin festivals (*feriae Latinae*) were held on the second-highest peak (Mons Albanus, modern Monte Cavo), where the sanctuary of Iuppiter Latiaris was located. To the south of the Alban Hills, the marshy area of the Ager Pomptinus extended down to the Monte Circeo.

Latium Adiectum comprised the adjoining region of the middle and lower Trerus valley (originally inhabited by the Hernici), the Liris (modern Garigliano) river valley (inhabited by the Volsci), and the stretch of coast south of Monte Circeo, framed by the Monti Aurunci (a chain named after the people who originally settled in this area, the Aurunci or Ausones), down to Suessa (a town located on the left banks of the Liris mouth), which marked the boundary with Campania.

By the mid-Republican period both Latium Vetus and Latium Adiectum were part of a densely urbanized region formally integrated in the Roman state. Long-lived towns, generally situated on defensible locations on sites of up to 20–30 ha and with relatively small territories, dotted the slopes of the main volcanic edifice of the Alban Hills, the Tuscolana-Artemisio caldera (Aricia, Labici, Lanuvium, Tusculum, Velitrae). Hilltop sites also characterized the limestone region at the foot of the Apennine chain: the area crossed by the Anio (both Praeneste and Tibur had an acropolis detached from the lower town), the valleys of the rivers Trerus (Artena; the Hernican sites of Anagnia, Ferentinum Aletrium, Verulae) and Liris (e.g., Arpinum, Frusino, Aquinum, Atina; Roman foundations such as Fregellae, Fabrateria, Sora, Interamna), the Monti Lepini (e.g., Cora, Signia, Norba, Setia, Privernum), while most of the towns founded or refounded by the Romans south of the Monti Aurunci lay on flat land (Formiae, Fundi, Minturnae, Suessa). Larger sites in the 30–80 ha range coalesced around secondary craters at the periphery of the caldera (Gabii), on volcanic spurs outcropping in the coastal plain of Latium Vetus (Rome, Fidenae, Crustumerium, Ardea, Lavinium, Antium), and at the margins of the Ager Pomptinus (Tarracina, Satricum). In the Roman period, land communication between the cities of this region was made possible by a network of public roads radiating from Rome, in most cases resulting from the regularization of preexisting routes (the via Appia, crossing in a straight line the marshes of the Ager Pomptinus and the coast south of Tarracina, being an obvious exception): among the most prominent are the via Salaria, serving the district north of the Anio; the via Tiburtina, Gabina/Praenestina, and Labicana, connecting Rome with main tier urban

sites to the east; and the via Latina, climbing the Alban Hills up to Tusculum and then continuing in the Trerus-Liris basin to reach Capua in Campania. A system of secondary roads that bypassed Rome is also attested, such as the so-called via Cavona, stretching on a southernly course from Tibur and Gabii to Antium.

Latium Vetus constituted a culturally unified region since the Final Bronze Age. Despite a remarkable continuity in settlement patterns from the previous period, the archaeological record of this period shows the sudden, widespread, and simultaneous adoption of a standardized and highly distinctive set of burial practices, materializing new forms of cultural and political identity. The formation of regional cultures in neighboring areas during the Late Bronze to Early Iron Age transition can be detected in the radical changes in the distribution and density of sites but was less connotated ideologically, as suggested by the higher variability in mortuary patterns (Pacciarelli 2000). In chronological terms, the formative phase of the Latial culture has been dated archaeologically to the tenth century BCE (Period I), although ^{14}C data suggest a slightly earlier absolute dating (end of the eleventh century – beginning of the tenth century BCE, according to the revised chronology: Nijboer et al. 1999-2000).

The typo-chronology of the Early Iron Age is commonly articulated in three periods; each period has two phases, in turn divided in two subphases (Colonna 1974; Bietti Sestieri 1992; Smith 1996): Periods IIA1-2 and IIB1-2 (900 to 830 BCE and 830 to 770 BCE, respectively; approximately tenth and ninth century BCE according to the revised chronology); Periods IIIA1-2 (770–750 BCE; according to the revised chronology, the Period IIIA1 begins c. 830 cal BCE) and IIIB1-2 (750–730/720 BCE); Periods IVA1-2 (730–720 to 630–620 BCE) and IVB1-2 (630–620 to 580 BCE), also referred to as the "Orientalizing" period (divided into an Early, Middle, and Late phase) by Etruscologists and Mediterranean archaeologists in general.

With the end of the Archaic period (late sixth century BCE), the archaeological phases of Latium are defined after the conventional periodization of Roman history.

Historical Background

Many of the towns in Latium had their own foundation myths, but in the Roman version they figured as offshoots (Rome being the last one) of Alba Longa, a town established on the slopes of *Mons Albanus* by Aeneas' son Ascanius (Iulus), the founder of a dynasty of kings that ruled Latium from the twelfth to eighth century BCE (sources in Alföldi 1965: 102-4). The image of an urban society capable of carrying out a colonization program already in the Late Bronze Age is clearly an anachronism, but the primacy assigned to the Alban Hills' district by historical sources is in fact mirrored in the archaeological record by the outstanding quality and quantity of finds from the area dating to Latial Period I, which remain unchallenged even after the wave of systematic research of the last few decades. These finds reveal small-village-based communities controlling territories of 4–5 km^2, whose military and religious leaders were afforded formal burial according to a funerary ritual characterized by a strong symbolism (mostly male cremations in hut-urns with miniaturized grave goods, including armor). There is a tendency to interpret these territorial entities as the archaeological correlates of those 30 Latin *populi* who took part in the sacrifices on *Mons Albanus*, known from a list given by Pliny (3.5.69; see Colonna 1988: 447-8). As to the form of political organization and social structure of the *populi*, a fundamental disagreement exists, whether these were weakly differentiated tribal societies (Bietti Sestieri), the precursors of gentilitial clans (Peroni), or chiefdoms integrated in a complex regional polity (review of the problem in Carandini 1997: 228-38).

During Latial Period II (particularly in Period IIB), there are increasing signs of settlement nucleation and differentiation, leading to a shift in importance from the Alban Hills to the coastal plain and showing that other Latin communities were undergoing the same process of urbanization that brought Rome into existence. Surface finds attest a clustering of small sites on the same locations later occupied by the main Latin cities of the historic period (e.g., Gabii, Ardea,

Lavinium, Satricum, Crustumerium). This phenomenon is accompanied by the emergence of extensive burial grounds featuring hundreds of graves (e.g., Rome-Esquiline; Gabii-Osteria dell'Osa). Spatial analysis at the Osteria dell'Osa cemetery suggests that burials were grouped according to kinship (i.e., lineages composed of extended families: Bietti Sestieri 1992) or other forms of social organizations (Smith 2007: 166 with further reference).

If the presence of permanent social stratification already in the first phase of the Early Iron Age remains a contested issue, later cultural developments are unambiguously characterized by the display of ascribed status and economic inequality in the funerary sphere. The Latial Period III (when according to the tradition Rome would have been founded) witnessed an intensification of contacts with Etruria (as suggested by the increase in the distribution of metal objects) and Campania (early imports of Greek pottery), particularly by the mid-eighth century BCE. The luxury assemblages documented in the richest burials of Castel di Decima and Praeneste have been correlated with the emergence of ruling aristocracies that secured access to wide exchange networks. In current reconstructions it is maintained that conspicuous consumption and competition among these elites fueled craft specialization and trade, creating the preconditions for the development of political complexity and eventually leading to the formation of the archaic city-states, a process concluded in Rome and elsewhere in the region by the late seventh century BCE at the latest (Cornell 2000).

It has been estimated that at least 20 city-states existed in Latium Vetus by the end of the sixth century BCE (list in Cornell 2000: 213). According to the ancient tradition, in the course of the Archaic period, these came under the hegemony of Rome (whether a formal alliance had been already stipulated at this time is a debated issue; see Smith 2007: 171). The excerpt of an inscription from Aricia cited by Cato (*Origines* fr. 58 P) and a text of Dionysius of Halicarnassus (5.61.2), however, attest an organized coalition of Latin cities (29, in the list given by Dionysius), which waged war against Rome at the beginning of the fifth century BCE. Their defeat resulted in the establishment of a military alliance on equal terms between the league and Rome, known in the sources as the *foedus Cassianum* (493 BCE), soon followed by the incorporation of the Hernici (486 BCE). This settlement marked the beginning of Roman expansion in Southern Latium, which continued throughout the fifth century BCE with joint military campaigns against the Volsci and the Aequi. In newly conquered territory or when lost cities were gained back, Romans and Latins founded colonies (*coloniae Latinae*) that possessed the same rights enjoyed by Latin cities as regards to intermarriage (*conubium*), stipulation of legally binding contracts (*commercium*), and mobility (*ius migrationis*) (Signia, Velitrae, Norba, Antium, Ardea, Labici, and perhaps Cora; Vitellia, perhaps to be identified with Artena, Circeii, Satricum, and Setia in the beginning of the fourth century BCE; on the *ius Latii* see Cornell 2000: 220).

Already in the early fourth century BCE, however, Rome began to absorb cities of Latium Vetus, transforming them into self-governing communities of Roman citizens (*municipia*). Tusculum was the first to be annexed in 381 BCE, followed by most of the Latin members of an anti-Roman alliance that included also Volsci, Aurunci, Sidicini, and Campani (who engaged Rome in the so-called "Latin War", 341–338 BCE). Some (Ardea, Circeii, Cora, Gabii, Norba, Praeneste, Setia, Signia, Tibur) retained formal independence but had to cede part of their territories, while their rights to conduct reciprocal dealings were severely curtailed. In Latium Adiectum the Romans imposed partial citizenship (*civitas sine suffragio*), which required all the burdens and obligations of full citizens but without political rights (Fundi, Formiae, Privernum). In addition, a new program of Latin colonization was launched, which involved strategic areas of Latium Adiectum (e.g., Fregellae, Interamna Lirenas, and Suessa, 313 BCE), the upper Anio (Carseoli, 298 BCE) and upper Liris (Sora, 303 BCE) valleys. It is important to note that since the majority of the colonies founded

under this scheme was outside Latium, the term *colonia Latina* ceased to have an ethnic connotation, referring only to the fact that such communities possessed political institutions modeled on those of the cities of Latium Vetus. Colonies of Roman citizens (*coloniae civium Romanorum*) were founded at Tarracina (329 BCE) and then at Minturnae (296 BCE), on the example of the garrison established a generation earlier at Ostia.

During the late Republican period, many of the Latin towns, while still functioning as *municipia*, suffered a decline and contraction, which was accelerated by the simultaneous growth of nearby Rome as a capital city. Possible causes of this phenomenon include the effects of the civil wars of the 80s BCE (e.g., destruction at Praeneste and Norba; Fregellae had already been razed to the ground as a consequence of a short-lived rebellion in 125 BCE, the inhabitants being relocated to Fabrateria Nova) and the progressive concentration of estates into the hands of a few landowners (an issue that has recently seen controversy; see Witcher 2005, arguing for a rising rural population in the *suburbium* of Rome during the early Imperial period). Monumental building projects funded by Roman aristocrats with local connections are still attested in the late second and early first century. BCE (most notably the sanctuaries at Praeneste, Tibur, Gabii, Cora, Lanuvium: Coarelli 1987; these represent a discrete phenomenon that can be explained in terms of the long history of peer-polity interaction in the region). By the early Imperial period, what were once flourishing urban centers survived only on a much smaller scale (e.g., Gabii) or were completely abandoned (e.g., the coastal sites of Ardea, Lavinium, Circeii), in spite of repeated attempts by the Roman emperors to revive them. A notable exception is Ostia, which continued to thrive as Rome's main harbor town.

Key Issues/Current Debates

A brief summary of current archaeological research on Latium will suffice to show the intrinsic interest of the development of this region as well as its contribution for understanding the cultural and historical trajectory of Rome during the first millennium BCE and beyond.

The process of urbanization and state formation in central Italy represents perhaps the key theme, especially after the recent wave of sensational discoveries in the early levels of Rome. Because Rome was part of it, the wider Latin context has been increasingly taken into account to explain the rise of urban society in the region. The consensus is that urban status was achieved by the late seventh century BCE. Parallels from Latium are now found for all the major innovations that characterized this transition in the built environment of Rome: earthen fortifications or proper walls (e.g., Ardea, Gabii, perhaps Praeneste), public road construction (e.g., Satricum; Crustumerium), and religious architecture (Gabii, Satricum, Lavinium). These features betray an increased level of settlement planning and coordination and the formation of a communal identity. As in the case of Rome, the combined evidence of surface survey, limited excavation, and funerary data from main tier sites in the region (e.g., Gabii; Lavinium) suggests that this shift was the result of a long process of settlement concentration on strategic sites, which in some cases were first inhabited during Middle Bronze Age. In the course of the Early Iron Age (Periods IIA and especially IIB, see Pacciarelli 2000: 120-8), occupation expanded on the wider geomorphological units (plateaus) to which these hilltops sites were connected (e.g., Ardea, Lavinium, Satricum; similar developments are attested at Ficulea, Fidenae, Crustumerium). With the exception of the Alban Hills area, small isolated sites were simultaneously abandoned. New evidence from Lavinium, however, points to the possibility that the entire area later enclosed by the fortification walls was already occupied by the last phase of the Final Bronze Age or the very beginning of the Iron Age, suggesting that the chronological gap between Etruscan and Latin urbanization processes may have been significantly shorter. Despite the smaller scale of the phenomenon in Latium, a reconsideration of old data from Etruscan sites such as Veii and Tarquinia

(where occupation in the Final Bronze Age also seems to be limited to the acropolis) shows stronger similarities in the formation of these sites (recent review of the problem in Fulminante & Stoddart 2010). The reconstruction of the internal organization of these settlements is in most cases based on surface evidence alone, which obviously limits the level of resolution. A generalized pattern has been observed, whereby separate clusters of ceramic material are sparsely distributed over the plateaus. This spatial configuration has been interpreted as a sign that the groups involved in the process of settlement nucleation occupied separate habitation compounds and only gradually merged into a continuous fabric. Different models have been recently proposed to identify the corresponding social organizations into which early urban communities were articulated as direct predecessors of the historical-period *curiae* or clan structures that tried to maintain their social and cultural identity (see discussion in Terrenato 2011).

The archaeology of Roman colonization represents another topic which recent fieldwork and research is focusing on, particularly in the field of architectural history. Latium Vetus and Latium Adiectum were the subject of two distinct waves of colonial foundations: according to the historical tradition, 15 colonies were founded in the period between the late sixth century and 382 BCE; additional Roman and Latin colonies were established after 338 BCE. Important monumental remains are preserved from these sites, providing ample evidence to study the formative phases of Roman urbanism and town-planning practice. The absence of a standardized pattern in the urban layouts of *ex-novo* early Latin colonies (e.g., Norba; cf. Ardea) suggests that these sites were not founded according to a predetermined model, but only progressively acquired specific urban features (city walls, orthogonal layout), and this because they participated in wider cultural developments that influenced the region as a whole, particularly from the early fourth century BCE. The lack of standardization in these early foundations has led some to believe that their establishment was not centrally driven by Rome, but rather represented private enterprises resulting from horizontal mobility at the elite level. The function of these colonies within the regional settlement system has also come under scrutiny, given the impressive continuity of occupation from the previous period that systematic surveys have documented in their territories (e.g., Attema & van Leusen 2004), although in this case it is virtually impossible to distinguish between Latin and specifically Roman pottery assemblages.

Extensive investigations have been conducted in several colonies of the Middle Republican period (Ostia; Minturnae; later stages of occupation at Norba; Fregellae). Large-scale urban surveys at these sites (particularly Norba and Fregellae) have revealed the presence of orthogonal city plans, with a clear spatial articulation of public and private spaces. Excavation has been focused particularly on temples as well as on the civic architecture in the monumental cores (data collected by Lackner 2008), while domestic architecture has received far less attention. According to a recent reassessment of the evidence from Latin colonies in central Italy (Sewell 2010), a model of Roman colonial urbanism can be reconstructed on the basis of specific details of the urban form (e.g., fortification techniques, elongated proportions of the city blocks, disposition of the Forum within the street grid, architecture of political assembly places). These show the influence of contemporary Greek town planning, which in some instances was adapted to accommodate preexisting Roman traditions and conceptualizations (most notable is the rejection of stoa architecture). Considering the generalized lack of third century BCE archaeological evidence other than religious architecture in many of the Middle Republican colonies, the site of Fregellae stands out for the quality and quantity of data on early house design (though poorly published), decoration styles, and technologies (particularly the diffusion of "cocciopesto" and other decorated cement floors), as well as on innovative building types (e.g., public baths) and associated construction techniques. While the assemblage attested at Fregellae is commonly taken to reflect a contemporary Roman cultural package, the possibility should be allowed that at

least some of these features were independent developments, particularly because they consistently predate the earliest known examples from Rome. As the case of the Late Republican sanctuaries shows, political interaction and competition between the urban communities of Latium may well have been responsible for the transmission of cultural models to Rome.

An intense scholarly debate concerns the historiographical problem of the origin of the villa, both as an architectural and as an economic template. The extensive surface surveys conducted in the context of the *Forma Italiae* and Latium Vetus projects show an increase in site density during the fourth and third century BCE, with a predominance of the "small-farm" and "farmstead" settlement types. This phenomenon is usually associated with the emergence of free peasantry in the *suburbium* of Rome. Alternative models have been proposed for the interpretation of this pattern, based on the fact that in some areas these farms coexisted with older, much larger, and richer rural residences (of the kind archaeologically attested at the Auditorium site in Rome), perhaps connected in a system of patron-client relationships (Terrenato 2007). Medium-sized estates involved in cash-crops production become visible only later in the second centuries BCE, but the buildings associated with these estates were still modest in size and architectural refinement. More importantly, it seems that in the *suburbium* of Rome, the large luxurious villas of the late second and first centuries BCE did not grow from direct precedents, but were generally planted *ex-novo*, suggesting that the old elite residences may have served as a model for the construction of a new landscape of power. The presence and involvement of elites in the social life of the Roman countryside in any case remained a constant throughout the history of the region, even after the formation of vast imperial estates (unsurprisingly, many of the imperially owned villas including Hadrian's famous one at Tibur were built atop Late Republican precursors).

Research on the Imperial period, however, is not confined to elite manifestations. Knowledge of lower-class urban structures such as the *insulae* (multistory apartment blocks) is made possible at Ostia by the extraordinary level of preservation of its architecture. Ostia and Portus also provide unparalleled material to study the life of port towns, including issues of identity (which can be compared and contrasted with the rich datasets from the extensive excavations of the cemeteries) and mobility of nonelite groups. Current work seeks to assess more specifically the degree to which these communities were connected with the broader social, economic, and cultural fabric of the Roman Mediterranean.

International Perspectives

The international research community is actively involved in the actual production of archaeological data in the region, thus shaping to a significant degree research agendas in all areas of the current debate. Non-Italian universities are usually granted excavation permits by Italian authorities with no particular limitations. Foreign cultural institutions based in Rome (including the Deutsche Archäologische Institut (*DAI*), the British School at Rome, the École Française de Rome, the American Academy in Rome, the Dutch Institute, the Nordic Institutes) sponsor many of these projects, facilitating the collaboration with Italian parties on a regular basis (e.g., the *Lazio & Sabina* series).

A noteworthy trend in the context of this fieldwork has seen the adoption of large-scale approaches for the study of pre-Roman and Roman urbanism, in both primate centers (e.g., the Spanish excavations at Tusculum, the American excavations at Gabii, the Dutch excavations at Satricum) and colonial towns (German initiatives at Minturnae and Fabrateria Nova). Noninvasive methodologies have also been applied and progressively refined, including geophysics (particularly magnetometry, with work conducted by the British School at Rome at Portus, Fregellae, and Interamna Lirenas) and artifact-based field methodologies (e.g., the Dutch field survey in southern Latium).

Future Directions

Archaeological activity in the core region around Rome still has a lot to offer in terms of richness of data and interpretive potential. The renewed interest on the early phases of central Italian urbanism has already determined a significant shift from previous approaches based mainly on the interpretation of funerary evidence to research strategies that aim at the recovery of settlement data. A crucial problem that will have to be addressed in future excavations at primate sites is that of their internal organization during the early urban stages, so as to observe and date with much greater precision the alleged merging of hut clusters into a unified fabric. In addition, the fact that many of the Latin centers were relatively unaffected by the disturbances or destruction caused by concrete construction at sites that continued to be developed in the Imperial period should also increase the chance of recovering architecture of the Middle Republican period aside from temples and city walls, whose record at Rome and elsewhere in central Italy is not particularly rich.

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Lawyers' Committee for Cultural Heritage Preservation (LCCHP)

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Basic Information

The Lawyers' Committee for Cultural Heritage Preservation (LCCHP) is a not-for-profit organization that fosters the stewardship of the objects, places, and traditions that define us as societies, nations, civilizations, and even human beings. See http://www.culturalheritagelaw.org for more information.

Major Impact

The field of cultural heritage law (or cultural property law or cultural resources law) has grown considerably over the past decade, such that today it can properly be considered a "field" and not merely a practice area within some other field such as environmental law, art law, international law, copyright law, or federal Indian law. The number of attorneys working in the field has blossomed. In 2004, the Lawyers' Committee for Cultural Heritage Preservation ("LCCHP" or "Lawyers' Committee") was formed "to promote the preservation and protection of cultural heritage resources in the United States and internationally through education, research, outreach, and advocacy."

Although there are certainly other organizations promoting preservation and protection of cultural resources, the Lawyers' Committee is the first organization focused on legal education and advocacy to promote preservation both in the United States and internationally. The membership includes attorneys, law students, and interested members of the public. A member of the Board of Directors, however, must either have graduated from an accredited law school or must be a student currently attending law school. This gives the organization a unique perspective and the tools to influence cultural heritage preservation. Currently, 13 members serve on the Board of Directors and a part-time executive director manages the organization. The Board brings an array of expertise to the table: Many Board Members have backgrounds in either art or archaeology and work in academia, private practice, and government agencies. Their expertise ranges from domestic cultural heritage law, to the international illicit trade in antiquities, to the restitution of Holocaust art.

Education is central to the mission of the Lawyers' Committee. LCCHP actively works to inform the public about cultural heritage issues, raises the profile of cultural heritage law in our nation's law schools, and serves as a clearinghouse for employment and internship opportunities for law students and recent graduates. Each year, the organization sponsors a Student Writing Competition in Cultural Heritage Law for law students and works with the DePaul University

College of Law to sponsor the successful National Cultural Heritage Law Moot Court Competition. The organization also maintains a list of law school courses offered in the field nationally and a guide to internships and externships.

Since 2009, LCCHP has held an annual conference, open to both Committee members and the general public, and has periodically sponsored other public events. Topics for these events have included the following: cultural heritage, World War II, and the Pacific; the protection of underwater cultural heritage; international historic preservation in context with the National Historic Preservation Act; the US and the 1954 Hague Convention; free exercise, historic religious properties, and sacred sites; legal and ethical problems in art; foreign sovereign immunities; the trade in antiquities; and collecting Chinese art and antiquities.

As a legal organization, the Lawyers' Committee is also in an ideal position to be a successful advocate for the preservation of cultural heritage. That role is filled by the Committee's submission of comments on pending federal and state legislation that may impact cultural heritage and joinder with other preservationist organizations in the submission of amicus briefs in cases involving cultural heritage issues. For instance, the Lawyers' Committee partnered with a number of other organizations, including the US Committee of the Blue Shield and the Archaeological Institute of America, in providing testimony to the US Senate Foreign Relations Committee. The US Senate ultimately ratified the treaty in September 2008. LCCHP also comments on proposed bilateral agreements between the United States and other countries (including Italy, Cambodia, Cyprus, and Greece) to restrict the import of undocumented archaeological and ethnological materials.

Since its inception, the Lawyers' Committee has advocated for the protection of cultural heritage and has provided mechanisms for educating the public, archaeologists, and future attorneys. As the field of cultural resources law continues to grow and mature, LCCHP will be responsive in order to best assist in the preservation of global cultural heritage.

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Leakey Family

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Basic Biographical Information

The Leakey family is the world's most prolific paleoanthropologist family. Three consecutive generations have conducted research in Africa studying human origins.

Louis Seymour Bazett Leakey was born on August 7, 1903, in Kabete, Kenya, and passed away October 1, 1972. Louis' parents were British missionaries that lived among the Kikuyu tribe in Kenya of which he was an initiated member at an early age. At an early age, Louis showed an interest in stone arrowheads and tools. He studied at Cambridge University but took a leave of absence during which he undertook his first archaeological expedition which led to multiple fossil-hunting expeditions in East Africa. This was considered an unusual step as the widely accepted paradigm was that human ancestors derived from Asia. He had a son, Colin Leakey (a plant breeder who lives in London with his wife Susan and three daughters), with first wife Frida (divorced 1936). Louis later married Mary Nicol, an illustrator, in 1936. Besides his significant contributions to our understanding of human evolution, Louis influenced and mentored numerous researchers in many fields including Jane Goodall and Dian Fossey in primate behavior.

Mary Leakey was born on February 6, 1913, in London and had an early interest in art and archaeology. In 1930, she began auditing university courses in geology and archaeology. She established herself as a scientific illustrator and became knowledgeable on flint points. Mary first met Louis in 1933 and began illustration work for him. After his divorce from Frida in 1936, they married and had three sons: Jonathon (1940), Richard (1944), and Philip (1948).

Richard Erskine Frere Leakey was born on December 19, 1944. Richard participated in fieldwork at an early age and achieved independent success with his own discoveries. Serving as director of the National Museums of Kenya, Richard led an expedition to Koobi Fora in 1968 and expeditions to Lake Turkana between 1968 and 1989.

In 1989, Richard was appointed as head of Kenya Wildlife Service where he embarked upon combating rhino and elephant poaching. Unfortunately in 1993, Richard was involved in a plane crash resulting in bilateral below-knee amputations. In 1994, he left the Kenya Wildlife Service and served as secretary-general of Safina, a political party, and in 1997 was elected for a seat in the Kenya parliament. Richard's political career reached a pinnacle in 1999 when he was appointed the head of Kenya's Civil Service. He retired from political life in 2001 but continues the fight for political justice in Kenya. He is also involved in conservation projects.

Philip Leakey, born in 1949, was involved in Kenyan politics until 1992. He now runs a company, The Leakey Collection that sells Maasai crafts with wife Katy.

Meave Leakey (nee Epps) was born in London in 1942. Meave obtained joint honors in Zoology and Marine Zoology from the University of North Wales. Meave met the Leakey family the same year she commenced a Ph.D. in Zoology and took a position at the Tigoni Primate Research Center. She completed her Ph.D. in 1968. The following year, Richard Leakey invited her into the field at the Koobi Fora site. They married in 1970 and had two children, Louise and Samira. In 1989, Meave coordinated the National Museum's paleontological field research in the Turkana Basin. Meave's research interests also involve investigating how environments may have influenced hominin evolution.

Louise Leakey was born in 1972 and works alongside her mother Meave at the Turkana Basin Institute. She obtained her Ph.D. from London University, her dissertation focusing on climate change influences in fossil deposits between 3.5 and 1.5 million years ago. She is also a research assistant professor at the University of Stony Brook, Department of Anthropology, New York. Louise is heavily involved in the coordination of the Lake Turkana Basin and local programs aimed at education and health.

Major Accomplishments

The Leakey family centered their research in Tanzania, in particular Olduvai Gorge. It was not until 1948 that Louis made his first important discovery, a skull which he named *Proconsul africanus*, an ape like hominoid that lived over 14 million years ago. Louis attracted controversy at first; however, this and subsequent finds by the Leakey family supported early hominin finds of an earlier pioneer, Raymond Dart.

The Leakeys also uncovered a number of extinct animal fossils in the Olduvai Gorge. It was here that Mary made her first significant discovery, a fossil now known as *Australopithecus boisei* in 1959. In 1960, Leakey announced the discovery of a direct human ancestor, *Homo habilis*, otherwise known as the "handy man." Louise, Mary, and Richard have written a number of books relating to their life and work in Kenya.

Mary's next major achievement was the discovery of *Proconsul africanus* with Louis. She was also involved in the discovery of *Australopithecus boisei* (1959) and *Homo habilis* (1960). In 1979, she discovered footprints preserved at Laetoli. The footprints have been dated to about 3.6 million years old. The significance of this discovery was the proof that human ancestors were bipedal. Until her retirement in 1983, she continued to conduct fieldwork and make important hominid and animal fossil finds. She is also remembered for her meticulous and methodical approach to her work which laid the foundations for fieldwork today.

Jonathon Leakey born in 1940 left fieldwork to farm snakes but not before making his own *Homo habilis* discoveries in Olduvai.

Richard Leakey's success came in fossil hunting. He led expeditions in search of fossils, and in 1984, his team discovered a nearly complete skeleton of a young *Homo erectus* nicknamed Turkana Boy. The following year, he found a skull of *Australopithecus aethiopicus*. He has also written numerous books.

Meave Leaky attained success in her own right as coordinator of field research in the Turkana Basin. In 1994, her team uncovered a new hominid species, *Australopithecus anamensis*, possibly the ancestor to *Australopithecus afarensis*. The significance of this find was that there was evidence of bipedalism 4.2 million years ago. In 2000, Meave and her daughter Louise found fossils of both *Homo habilis* and *Homo erectus* dating 1.5 million years ago east of Lake Turkana leading to the suggestions that they coexisted for approximately 500,000 years signifying that evolution was more complex. Louise Leakey was credited with finding the skull and partial jaw of *Kenyanthropus platyops* and continues research in the Turkana Basin uncovering and exploring fossil deposits. She is also pioneering the use of 3D models as a way of exploring collections online.

The discovery of a new genus, *Kenyanthropus platyops*, by Meave and her team in 2001 revealed that this genus may also be a human ancestor.

Richard, Meave, and Louise continue to run the Turkana Basin Institute which is a private research facility that enables researchers to participate in research at Lake Turkana Basin.

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Leather, Archaeological: Conservation and Preservation

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Introduction

People's first efforts to collect and prepare animal hides to use for clothing and tools included their first efforts for preserving organic material

culture. Vegetable materials, tannins from tree bark, and even the brains of the slaughtered animal were effectively used to prepare hides for use. Leather artifacts excavated from land and dry cave sites and underwater excavations offer special challenges for conservation, based on complex environmentally driven chemical interactions and processes of biological and microbial deterioration. In the late 1980s, the addition of material science studies directed at the conservation of organic materials is contributing new insights and avenues for research in the field of leather artifact conservation. This entry discusses major concerns, issues, and avenues for research and advancement in scientific studies.

Definition

Many definitions describing the natures of conservation and preservation exist. For general discussion, we define processes of conservation as efforts undertaken to prevent the loss of artifacts using chemicals and other materials in an effort to prevent further loss or damage. Restoration is the more involved process of attempting to return deteriorated artifacts to a former state of physical completeness and stability. When chemical treatment strategies fail to stabilize an artifact, resulting in the loss of portions of an artifact, it may be desirable to restore the artifact by replacing missing portions to create a more complete artifact. Conservation involves minimally invasive processes designed to prevent the degradation and loss of an artifact. Preservation efforts often involve returning an artifact aesthetically to a previous state. Organizations such as the International Council of Museums, Committee for Conservation (ICOM-CC) offer extensive descriptions of ethical standards and practices for safeguarding the well-being of artifacts.

Key Issues/Current Debates/Future Directions/Examples

The physical nature of animal skins can be described as being composed of long protein fibers, known as collagen, and fiber bundles. Complex oils and fats that lubricate the fibers and prevent them from becoming rigid surround these fibers and bundles. Fats and oils, which are present in living skins, prevent fibers from shrinking and become fixed one to another. Processes of tanning are designed to chemically treat and lubricate skins and thus preventing fibers from sticking together, hardening, and shrinking.

Archaeological provenience affects the manner in which animal skins and leather artifacts become chemically compromised. Leather artifacts excavated from acidic soils often deteriorate differently than similar artifacts excavated from a marine environment. In extreme situations, leather components of a compound artifact (combining one or more differing components such as leather and a brass buckle) may be missing due to soil acidity or other biological contaminants in soils. Skin artifacts excavated in arid environments may be dry and desiccated, which renders the leather brittle and inflexible. Similar artifacts excavated from marine environments have diminished or depleted collagen and essential oils, causing the artifact to be fragile and structural compromise. The state of hides and leather artifacts is always dependent on a number of factors.

Red Rot and Brown Rot

Red rot readily occurs at pH values of 4.2–4.5. Sulfur dioxide, a common atmospheric pollutant, may convert to sulfuric acid and forms hydrogen peroxide. Hydrogen peroxide chemically reacts with tannins used to preserve the artifact, causing oxidation of proteins in the substrate of the leather. This chemical reaction may form ammonium sulfate and ammonium bisulfate. Red rot appears as powder deposits on the surface of the artifact. The presence of red rot indicates structural weakening of an artifact due to delamination.

Environmental Factors

Apart from sulfur dioxide (SO_2), other atmospheric pollutants including carbon monoxide (CO), ozone (O_3), lead (PB), nitrogen dioxide (NO_2), particulate matter (particle pollution), Methane (CH_4), Nitrogen Dioxide (NO_2), and Carbon Dioxide (CO) and Nitrogen Dioxide (NO_2),

other trace contaminants may be present. A general first step in the conservation of leather is to carefully rinse the artifact in baths of fresh water, to remove soluble salts and debris. If necessary, additional cleaning using a nonionic detergent (approximate 1 % solution) or sodium hexametaphosphate may be necessary. In all cases, it is essential to rinse the artifact thoroughly in baths of fresh water after cleaning using detergents (Hamilton 1996: 33). Even dust and dirt are abrasive to already-compromised artifacts. Similar to the abrasive nature of dirt in carpets, so too these contaminants can undermine the integrity of leather artifacts.

Microbial and Bacterial Activity

The skin consists of several layers of tissues, each acting to protect the body from microbial, bacterial, and physical damage. The main layers are epidermis (outer layer of skin), dermis, and hypodermis (deep tissues). The epidermis is a thin layer that acts as a barrier to UV light and contains hair follicles and melanin, which determines skin color. Left untreated, leather excavated from marine sites may appear to have swelled with the outer surfaces of the artifact appearing spongy in texture due to water absorption (water logging).

The dermis is tucked away between the epidermis and hypodermis. It is the layer that holds all the blood vessels, most nerves, hair follicles, collagen, and sweat glands. Collagen and amino acids associated with hair follicles act to keep the skin flexible, and they are responsible for stopping advances of bacteria that are present within the epidermis. Current research at the Archaeological Conservation Research Laboratory at Texas A&M University has determined that amino acids associated with hair follicles are conducive to polymerization or chemical complexing when combined with some forms of chemical treatment. This complex reaction acts to strengthen chemical bonds between the fibers of leather and the bulking agents being used to stabilize the artifacts.

Means of Initial Treatment of Skins

Geographically, the process of preparing animal skins differs from area to area. Skins can be "tanned" using minerals, tannins from the bark of trees, vegetable matter, and even the brains of the animal from which the skin is recovered. Salt, various oils, alum, smoke tanning, and even working a hide with saliva and chewing can be effective in softening and preserving an animal skin. To create harder, more durable skins, however, it is beneficial to not lubricate the fibers of a skin and use slow-drying methods to deliberately harden or stiffen the leather. Known as raw hides, these untreated skins have unique properties. Cut into long strips or formed into specific shapes, these raw hides are less supple than tanned skins and are easily fashioned into harnesses, ropes, and strong lashings used to tools and fasteners. Each treatment method directly affects stiffness or flexibility and other physical characteristics of the skin being treated.

Treatment Strategies for Brittle and/or Desiccated Leather

Leather excavated from archaeological sites offers the conservator a range of challenges, depending on the long-term provenance from which the artifact is excavated. Waterlogged leather from any type of wet environment should remain in wet storage until the artifact can be examined, evaluated, and treated in a laboratory. After excavation, the physical integrity of wet leather is always structurally compromised. Microbial activities, resulting from bacterium, fungus, protozoan, and viruses, are major concerns when determining the state of waterlogged leather. Even with the aid of microscopic evaluation, it is a challenge to determine damage caused by microbial activities. The result however is mechanical deterioration of the matrix of the artifact caused by disintegration of the collagen forming individual fibers and fiber bundles. Dried and desiccated artifacts, such as bookbindings and velum manuscripts, may show signs of deterioration due to mold, fungi, and other biological processes that compromise the artifact.

For decades, one standard for the treatment of desiccated leather has been the Smithsonian glycerin treatment. Glycerin acts as a lubricant and when combined with water, and a small amount of formaldehyde or other biocides, creates an

effective treatment that lubricates and protects the leather. Immersing brittle or desiccated leather in the glycerin/biocide solution makes leather more pliable and restores flexibility to leather. Glycerin, however, is hygroscopic (moisture absorbing) which many believe attracts microbial and bacterial activity (Hamilton 1996: 33).

Glycerol Treatments

In the past, leather from archaeological excavations has been treated using a solution of 30 % glycerol and 70 % ethanol. Glycerol is a colorless liquid obtained by the saponification of fats and oils. From a conservation perspective, saponification is the name given to the chemical reaction that occurs when the remnants of tanning agents such as vegetable matter or fats (brain tanning) react with alkali-forming conditions.

Glycerol treatments act to introduce lubrication into the damaged matrix of an artifact, replacing collagen and other depleted oils. Delicate leather artifacts may be difficult to conserve when they are stored in alcohol. Their strength capability in water is not as great as leather being stored and treated in ethanol. Alcohol tends to make leather stiffer, thus allowing the conservator to retain the physical characteristics of an artifact during treatment. After immersion in a glycerol/ethanol or glycerol/water solution for a minimum of 2 weeks, the leather is immersed in three successive solvent baths to dry the leather (after Hamilton 1996: 33). While glycerol treatments are not widely used, they can be effective for softening stiff artifacts for short periods of time. Glycerol treatments have been replaced by other leather dressings that create longer lasting, aesthetically pleasing results that attract less dust and airborne pollutants.

Leather Dressing

One successful treatment for leather is known as the British Museum Leather Dressing (BML). Because of the potentially volatile nature of some of the ingredients in this dressing, the conservator should work in a well-ventilated environment. To make BML, 200 g of anhydrous lanolin, 30 ml cedar wood oil, 15 g of beeswax (optional) are warmed while continuously mixing. This mixture is then poured into either 350 ml diethyl ether or 330 ml of hexane. Ether and hexane are flammable liquids so caution is necessary. When cooled, the leather dressing can be rubbed into the surfaces of the leather. It may be necessary to immerse hardened leather in a mixture of 1 part BML to 3 parts Stoddard solvent (Hamilton 1996). Stoddard solvent is a flammable liquid that smells like kerosene (CAS No. 8052-41-3 – generally considered hazardous). With gentle polishing, beeswax seals the surfaces of the leather and adds shine to the artifact. British Museum Leather Dressing is best used posttreatment to protect the surfaces of conserved leather and to create an aesthetically soft shine to the conserved artifact.

Polyethylene Glycol (PEG) and Freeze-Drying Methods

Before treatment, waterlogged leather must be stored in fresh water. For long-term storage, the addition of a small percentage of alcohol or an antimicrobial additive such as Dowicide 1 (biodegradation of o-phenyl phenol) had proven effective. No thorough studies on the possible deleterious effects of antimicrobial additives have been conducted. Accordingly, many conservators do not use them. Regardless of how long artifacts have been stored in water, it is advisable to thoroughly rinse them in several baths of fresh water to ensure removal of soluble salts and debris from the artifact. Insoluble salts and calcareous materials can then be mechanically cleaned using soft wooden dowels or dental tools. Chemical spot treatment of stains is possible. The conservator must proceed cautiously to determine the nature of spots on the artifact and the cause for their appearance. Often, extensive chemical cleaning can cause discoloration and damage to leather. Often, it is advisable to monitor the artifact closely to determine if aggressive cleaning is necessary. After any type of spot treatments, the artifact must be rinsed in additional baths of fresh water. In all cases, it may be better to err on the side of caution and not treat minor staining.

In the 1960s, waterlogged leather was often treated with PEG at elevated temperatures

between 80 °C and 85 °C. Also known as Carbowax, water-soluble PEG was thought to easily penetrate into the damaged cell structure of leather. It was inexpensive and readily available, making it the material of choice for many conservators. More recently, PEG treatments for leather artifacts are carried out at room temperature. A standard treatment might be to immerse the artifact in a low-percentage PEG/water solution, followed by 10 % increment additions of PEG and a final percentage of 30–40 %. This simple process has proven to be an effective conservation procedure for softening brittle or stiff leather. In most cases, the artifact is left in the PEG/water solution for several days after the final percentage solution is attained, and with occasional inspection, the conservator will note changes in stiffness. After treatment, leather is removed from the PEG solution, surface cleaned using soft cloths, and then allowed to slowly air dry in a humidity controlled environment.

Many forms of PEG are available. PEG 400 and PEG 1450 are used for immersion treatments of leather, and experienced conservators might blend numerous specific molecular weights of the bulking agent to create specific results.

Less commonly used, spot treatments using topically applied aqueous solutions of PEG can be effective in treating small areas of an artifact that show signs of dryness or surface flaking. After consulting the conservation notes from initial conservation of an artifact to determine what molecular weight PEG or blend of molecular weight PEGs were used for initial treatment, it is possible to carefully apply a similar combination of molecular weights of PEG to a small area of the artifact using a Q-tip. Spot-treated areas of the leather will appear darker in coloration. This will dissipate over time. One concern that may need to be addressed is why a particular area of leather requires spot treatment. If bacterial activity is apparent, the addition of PEG as a spot treatment may be detrimental in attempting to stabilize the artifact. Water associated with the topical PEG application may encourage additional bacterial activity. Always try to determine the nature of changes in leather artifacts. Small indicators may indicate that more aggressive re-treatment is necessary. In situations where badly degraded leather artifacts are not stable or self-supporting in aqueous solution of PEG, alcohol is substituted for water.

Prior to freeze-drying PEG-treated leather, the artifact can be pretreated in a solution of 15–20 % PEG 400. Freeze-drying, also known as lyophilization, has been a popular means of removing unbound water from the PEG-treated artifact. Because PEG is water miscible, the bulking agent contains water. Freezing PEG-treated artifacts in a vacuum environment forces water molecules to freeze and give off gas from the artifact. After as little as a few days, small artifacts will be relatively dry to touch, and the artifact can be removed from the vacuum freeze-dryer and allowed to stabilize in a controlled temperature and controlled humidity environment. To maintain stability, artifacts should be curated in an RH environment between 50 % and 60 % after freeze-drying.

Posttreatment, PEG-treated leather conserved using immersion methods is usually darker in coloration. The surfaces of these artifacts may feel damp to touch, and great care must be taken to store them in a controlled environment. With changes in humidity and temperature, it is not uncommon to see PEG migrate to the surfaces of the artifact, resulting in pooled materials that must be removed to maintain the aesthetics of the artifact. As PEG migrates to the surface of the artifact, the artifact may show signs of being unstable. Signs of instability may include a compressed look to the leather or stiffening. In the 1990s some conservators expressed concern that PEG is a carcinogenic chemical and deduced that respirators should be used in situations where long periods of exposure to the chemical are anticipated. The best citations for proper use of PEG are material data safety sheets (MSDS). Although PEG is generally thought to be safe, long-term exposure to PEG and elevated temperatures may cause irritation of skin and inhalation concerns for some individuals. PEG is noted as an irritant when in contact with skin and general inhalation.

In the early 1990, this author developed passivation polymers at Texas A&M University. Commonly referred to as silicone oil methods, these treatment strategies were initially met with

a lot of criticism from conservators because they were developed using polymer-based chemicals and well-established polymer chemistry. Many conservators observed that since the processes are not reversible, they should not be used for the treatment of artifacts. This is a valid concern. Many long-used conservation materials and methods however are also not reversible because they too are polymer-based chemicals (Smith and Hamilton 1998).

Silicone oil treatments rely on the removal of water from leather through the use of solvent baths. Solvent/water displacement is critical for these methods and materials to work. Like PEG mixtures, silicone oil mixtures are variable. Generally, to a volume of silicone oil sufficient to immerse the artifact, a 10 % by volume addition of methyltrimethoxysilane (MTMS) is added and mixed thoroughly. Some conservators are noted to use as much as a 70 % addition of MTMS to attain desired results.

Once leather is saturated with a solvent (acetone or alcohol), the artifact is rapidly immersed in the silicone oil/cross-linker solution and allowed to sit at room temperature until no off-gassing of solvent (bubbles) is noted. Dr. Helen Dewolf of the Conservation Research Laboratory, Texas A&M University, uses many different percentage mixtures of silicone oil and cross-linker, depending on the attributes she needs to impart on an artifact. Regardless of percentages used, when the leather is fully saturated with the polymer solution, it can be removed and allowed to drain off excess polymer solution. The next stage of this treatment is to expose the artifact to vapors of dibutyltindiacetate (DBTDA) tin-based catalyst. Depending on the size of the leather in treatment, vapor deposition using DBTDA may continue for 24 h or longer (Smith and Hamilton 1998). The last stage of silicone oil preservation is always exposing the treated artifact to fresh air. Atmospheric moisture acts to complete most polymeric reactions, and exposure to fresh air reduces lingering off-gassing odors.

Posttreatment, silicone oil-treated leather does not require specialized long-term storage, often called curation in conservation literature. Changes in temperature and humidity do not affect the stability of the leather. Additionally, atmospheric contaminants and changes in ultraviolet light emissions do not have deleterious effects on treated leather.

Conservation Dilemmas

Given the ever-advancing nature of conservation chemistry, many conservators have adopted a cautious approach to new innovations. Many conservators also elect to simply not conserve some artifacts they feel unqualified to handle. Artifacts in long-term storage may become a problem because even when stored properly, archaeological/waterlogged leather artifacts do deteriorate in a laboratory environment.

Yearly, many artifacts are lost because of a conservator's fear of committing to a conservation strategy and seeing that process through to completion. Many other artifacts are lost each year because of the lack of communication between conservators. In the twenty-first century, the cost of archaeological conservation is forcing conservators to prioritize which artifacts will and will not be conserved. In the past, artifacts were viewed as being equal in importance, especially for their information potential when viewing the corpus of information from a particular excavation. Accordingly, it was important to conserve everything. Alternative means of preserving information have become necessary, as funding is not readily available. Common artifacts such as scraps of leather and square iron nails may be photographed, sketched, and catalogued without undergoing full conservation. Laboratories such as the Wilder 3-Dimensional Imaging Laboratory make three-dimensionally scanned virtual images of artifact to augment assemblage records. Although in its infancy, this new form of photo documentation and rapid prototyping has proven to be an effective and cost-effective alternative to total conservation of an artifact.

Because polymerization is a natural process, conservators are rethinking the "old school" treatment strategies once thought to be reversible. Cross-linking between the materials used for bulking degraded leather and the matrix of the leather itself is a problem we scarcely understand.

Long-term storage of leather artifacts is a challenge, regardless of the methods and materials used for initial conservation. In general, conserved leather is usually stored in a dark, cool environment which may act to inhibit bacterial growth. While leather conserved with silicone oils is resilient to bacterial activity, it is best to curate these artifacts similar to artifacts conserved with other conventional methods.

Observations

With the exception of passivation polymer treatment methods, many conservation methods rely on the introduction of bulking agents as incremental additions in an aqueous solution. These methods are slow but effective. Over time, however, commonly used bulking agents attract atmospheric moisture and airborne contaminants from the museum environment.

The main set of governing principles for archaeological conservation has been the long-term well-being of artifacts. Conservators try to use conservation methods and materials that can be reversed when newer and better methods and materials are available.

During the late 1980s, material science studies and industrial chemistry laboratories expanded general knowledge of archaeological conservation chemistry. Focusing on archaeological chemistry, new scholars are expanding the discipline greatly. The practice of using polymers was once discouraged because conservators believed them to be unstable and unreliable. This is ironic since the mainstay of conservation strategies for archaeological leather is the use of polyethylene glycol (PEG) which, as its name indicates, is a polymer.

In spite of the many contributions archaeological conservators have made with the discipline of archaeology, artifact conservation is also reliant on artistry. As important as it is to understand archaeological chemistry, it is equally important to have knowledge of how material goods were originally made. The conservator must be a scientist, a historical archaeologist, an artist, and a scholar of historic literature.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Heritage Conservation Training
- ▶ International Council of Museums (ICOM)
- ▶ Mexico: Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Legislation in Archaeology: Overview and Introduction

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State of Knowledge and Current Debates

Introduction

Every country in the world has some form of law relating to its cultural heritage. These range from the draconian (and sometimes relatively ineffective: Cleere 1984: 130) to the more loosely formulated and generally respected. In between lies the majority, more or less complex and more or less complied with. Some are "homegrown" and reflect particular local circumstances; others elsewhere are copied from neighboring or more distant places; others again have been adopted from past rulers but remain in place nonetheless. Law has been very important to the development of the idea of preserving material from the past (Carman 2012): laws have always proved a key means by which that preservation was effected. Laws also serve to legitimize the idea of that preservation.

This entry will look at the different kinds of laws that apply to the material heritage in different parts of the world and how they operate. In doing so, it is an exploration and celebration of difference rather than similarity. The common thread, however, lies in the adoption of law – of whatever kind and however written – as the key method of dealing with the cultural heritage. It has been the promulgation of laws to preserve old things – whatever the motivation driving it – that turns a mere private or sectional interest into something like heritage management as we know it. In the current state of heritage management, laws are even more crucial to the preservation of our heritage: without them, it can be cogently argued, there is no heritage (Cleere 1989: 10). At the same time, these laws need to be overseen and put into effect by appropriately empowered agents, whether of the state or independent. These agents too have their powers and duties defined by the laws that govern them and the material on which they act. Accordingly, even in so-called "non-statutory" systems of heritage management, law is the underlying mechanism and the ultimate repository of authority.

The sections of this entry will offer introductory outlines to some of the forms which laws in this area can take, how they are organized and to be interpreted, and the relations between laws at the national and international level. The opening section will examine some of the justifications for laws in this area, a truly global discourse. A section on interpretation of laws will expose the clear differences that exist between legal systems and which necessarily affect our understanding of them and any attempt at international comparison: these include the legal structures of federal versus unitary states, laws derived from traditions of Roman (and other) law, and those grounded in English "Common Law." An overview of international regulation – global in nature but subject to interpretation at the national level – follows. The laws of national territories will then come under scrutiny, representing different systems of laws: those assuming the state to be the proper owner of material versus those where private ownership is held to be the ideal, those favoring direct intervention and control versus more indirect and administrative mechanisms, and so on. Overall, the paradox of the ubiquity of laws to achieve the same ends that take a remarkably diverse set of forms will become clear. A final section will review the effect the promulgation of legislative control has had on the field in terms of the development of professional agendas and associations, both national and international, and the ways these too regulate the practice of heritage management.

This aspect of heritage management is very well documented. This is partly inevitable: laws are usually written documents and to ensure compliance must be made widely available to their intended audience. The literature of heritage management, therefore, abounds with summaries and commentaries at the national level (for the UK, see Carman 1996; Pugh-Smith & Samuels 1996; Hunter & Ralston 2007; for the USA, US Dept. of the Interior 1989-90; for France, Rigambert 1996; for Austria, Hocke 1975; for German states, Dörge 1971; Eberl et al. 1975; for Switzerland, Hangartner 1981; for Mexico, King et al. 1980; etc.) and at the international and comparative level (Burnham 1974; Prott & O'Keefe 1984; Cleere 1984; Carman 2002: 68-76; and on underwater archaeology Dromgoole 1999).

The Role of Law

Despite the ubiquity of legislation as a foundational tool of heritage management practice, very little of the literature of the field concerns the purpose of such laws or, to put it another way, explains why we pass laws on this matter rather than tackling it in another way. McGimsey (1972), for instance, argues powerfully for legislation as a key component of a state preservation program but also argues against legislation alone since it would be an entirely "negative approach" (McGimsey 1972: 33, 46) lacking the necessary support from the wider public. Prott and O'Keefe (1984) go further: they argue that the dangers facing the archaeological resource are ever greater and that accordingly "some of them can only be controlled by governments" and therefore require legislation (Prott & O'Keefe 1984: 13). At the same time, they recognize the valuable role laws play in resolving key conflicts over material – especially issues of ownership and control – and the setting of policy aims, as well as the increasing requirements of national governments to comply with international treaties concerning the heritage (Prott & O'Keefe 1984: 14). None of these is, however, a reason for law *as such*: both McGimsey and Prott and O'Keefe offer programs of public education and the mustering of political support as alternatives (McGimsey 1972: 29-31; Prott & O'Keefe 1984: 145-15).

In so far as McGimsey does provide a reason for legislation, it must be as part of the requisite "administrative structure" (McGimsey 1972: 27) for such a program, which includes its establishment as a legally recognized authority with its own budget. Pickard (2001: 4-10), reviewing a sample of European states with a view to their response to new international agreements on cultural heritage, expands on this theme by presenting a number of areas where legislation has a valuable defining role:

- Of definition of the heritage, concerning the attributes and characteristics a heritage object should have or be deemed to possess
- Of identification of the heritage, especially the means available of inventory and recording, and the making of lists and schedules
- Of preservation and protection of the heritage, whether through systems of designation or by regulating development
- Of the philosophy of conservation in place, including attitudes to restoration and reconstruction
- Of appropriate sanctions against breaches of the law and the means – coercive or otherwise – to encourage compliance
- Of the integration of cultural preservation with other government policies and imperatives
- Of financial aspects
- Of the specific powers and duties of government and nongovernmental agencies in respect of the heritage
- Of educational and other aspects

From this functionalist perspective, the law in this area can be seen not so much as a mechanism of heritage management but as a facilitator for systems of heritage management to come into being: on its own, it seems, law does nothing but requires other agencies in order to put heritage management into effect. This is perhaps one reason law should so often emerge first in systems of heritage management: it provides the framework on which the other aspects of heritage management can hang. On the other hand, it would seem that other components of a heritage management system could exist independently of

legislation to put them into place. The question "why law?" remains.

Although in general sympathetic to heritage management as a practice (and whatever they may choose to call it), others have taken a more critical view of the role of law in this field. A study of English law in this area (Carman 1996) concluded that its main purpose was to give value to archaeological remains. Though a continually reductive process of selection of certain kinds of object from all the things in the world, subsequent categorization of those things into legal terms and allocation to particular agencies for a limited range of treatments, archaeological sites, and monuments would emerge with a new meaning and a new set of values placed upon them. In doing so, they became officially recognized as important and worthy of protection and preservation. This is a reversal of the usual understanding of the sequence, whereby things that are important are chosen to be preserved by law: here, it is the law that makes certain things important. A similar view was reached in respect of legislation to govern the heritage of indigenous populations in Australia and the USA (Smith 2004: 125-55). As Smith puts it, legislation "plays a key role in the management of Indigenous material culture, as. . . it establishes the need for management procedures and processes" (Smith 2004: 125). Such law therefore goes on to define who will manage indigenous culture and how those involved – archaeologists, indigenous people, and government agencies – will interact. This means law sets "the parameters of acceptable management practice. . ..[and] the scope of policy debate, and influences the way in which debate is conducted between the three actors" (Smith 2004: 125). Overall, "legislation provides governments and bureaucracies with terms, concepts and guidelines against which competing claims to material culture may be assessed" (Smith 2004: 126) and ultimately "provides the conceptual frameworks that must govern debates within" heritage management which "institutionalize and regulate the discipline [of archaeology] as a technology of government" (Smith 2004: 154). Similarly, Fourmile (1996) has reviewed the role of Australian legislation in denying the indigenous population any access to or control over their cultural heritage. These readings of the place of legislation in heritage management locate it at the service of requirements external to the discipline itself and closer to those of government. In other words, rather than law serving the needs of archaeology, archaeology is made to serve the needs of government.

Interestingly, however, it is not just those who are critical (or indeed suspicious) of law who see it in this light. Breeze (1996) – writing on the definition given in Scotland to the British legislative category of "national monument" – is clear that the purpose is "to ensure that all people have access to [Scotland's built] heritage [of all periods] and are able to enjoy it, regardless of their own origins and background" (Breeze 1996: 102). He also acknowledges that "preserving monuments. . . is not entirely an end in itself" and cites government reasoning behind it (Breeze 1996: 102). Accordingly, the idea of a "national" archaeological resource based in law is seen here not as a limiting and exclusive concept but nevertheless one that remains at the service of government agendas. This same idea is reflected in Knudson's (1986) review of cultural resource management practice in the USA. As a result of success in "persuading the major policymakers. . . of the public significance of archaeological resources. . .. the implementation of such policies will not leave anyone. . . out of the process of public accountability for the treatment of those resources," and "this will be conducted within the context of multiple public objectives" (Knudson 1986: 399). The public referred to here is taken to be the Euro-American population of the USA, excluding its indigenous population whose cultural works are under discussion. Accordingly, even though it is acknowledged that conservation of cultural remains is a globally endorsed project, the target of conservation practice in the USA and what flows from it is directed at a particular audience, at least partly the result of "a lack of genetic continuity between the dominant political community in the United States and prehistoric Americans" (Knudson 1986: 396). Here, as elsewhere, law drives the heritage management process rather than providing support for it.

In most writing on heritage management, a legislative basis for preservation practice is taken for granted. The literature is therefore for the most part descriptive rather than critically discursive and does not ask why laws are in place in such profusion. One reason is simply historical: it is "the way it is done." Other reasons emerge from a closer reading, however, whether from an overtly critical or a more sympathetic perspective: laws serve, as it turns out, not the needs of heritage management but rather the agencies – and in particular national governments – who promote them. This is not an issue of effectiveness, but may have an impact on the way heritage management is done in different contexts.

How to Approach, Read, and Interpret Laws

Laws are technical documents rather than discursive texts, which means they are not only written in a particular way but also designed to be read in a certain way (see, e.g., for the USA, Dickerson 1975; for the UK, Cross 1995; for Italy, Tarello 1980; for international comparisons, MacCormick & Summers 1991). Indeed, "reading" in its conventional everyday sense may not be quite the right word: they are usually designed to be used more like a technical manual than read as a linear narrative. Moreover, the particular manner in which such texts should be read varies from jurisdiction to jurisdiction so that an ability to operate in one legal system does not automatically imply an ability to so operate in a different one. The aim of this section is to outline some of the ways in which laws relevant to archaeology can vary from country to country across the globe.

As I have argued elsewhere (Carman 1996: 17; 2002: 102-3), to have a truly meaningful comparison between the practices of archaeological heritage management, it is necessary to take three factors into account:

- Differences between legal and regulatory systems
- Differences in the nature of the material record of the past between one territory and another
- Differences in the traditions and historical development of archaeology between one territory and the other

The first of these covers such things as the basic assumptions relating to the interests to be served by law, the degree of appropriate state control held to be applicable in an area, the weight to be given to private property laws, or the expected powers and duties of state and other agencies. All of these will differ between one territory and another, or one legal system (e.g., Common or Roman) and another. In the UK or USA, for instance, the usual style is to provide for legal protection without taking material directly into state ownership, but in other territories all archaeological remains and other heritage objects are held to be the property of the state. In the UK, the USA, and Australia, this reflects the ideological authority of private property upheld by a system of Common Law, as against the authority of the state more typical of systems deriving from the European continent. Here, the difference lies in expectations of what is right and proper and more fundamental social values. Where it is expected that heritage objects should belong to the state, the kind of system operated in the UK or USA makes no sense; in the UK or USA, the adoption of a system of generalized state ownership would be seen as an attack on private property. An attempt to assess the merits of one system against another therefore runs up against these fundamental differences in understanding of what laws can and should do and to whom legal authority should be given.

The second and third factors are linked. They concern the nature of the archaeological record and how it inevitably differs in different territories and the understanding given to the purpose and focus of archaeological research which will differ in one country from another, so that very different research traditions may exist, leading to a differential emphasis on types of material. In the UK, for instance, the treatment of different types of material is very often the same regardless of physical form or age. Prehistoric structures in the countryside can be treated in exactly the same way as medieval ruins in a city, and ancient monuments (a legal category that in England now includes some material from the twentieth century) can be placed upon a schedule, while standing buildings can be placed upon a list, both

of which offer some form of legal protection. There are other territories, however, where differences in age make a substantial difference. Material from a preliterate past may be treated very differently from material emanating from historical times, or one period of history – or material representing a particular way of life – may be more highly valued than another, making one subject to legal control and protection, while the other is abandoned to its fate. In the USA, for instance, buried remains of the indigenous population are subject to forms of federal legal control, while the remains of (sometimes contemporary) colonizing Europeans are excluded from this coverage. Such differences will make any direct comparison of UK and US laws rather meaningless, since they are grounded in very different historical circumstances, are driven by very different political and cultural imperatives, and concern significantly different categories of person. At root, therefore, UK and US legislation in this area do not concern the same types of material.

Any set of national laws will also need to be read in accordance with specific standards. These "rules of construction" are quite precise and are often themselves enshrined in law, ensuring that any law of the particular state will be interpreted in the same way as any other and thus guarantee consistency in application. These rules do not, however, cross territorial and jurisdictional boundaries. A brief introduction to some of the key differences that can exist is set out by Prott & O'Keefe (1984: 150-1) and another by Summers and Taruffo (1991: 501), but for specific advice on how to read laws in particular jurisdictions, more precise legal guidance needs to be sought. In particular, there are gross differences between the manner of interpreting laws between systems of legal Codes and the principles of Common Law. All start from the premise that laws are written and composed of words: the question arises as to how to understand the meaning and intent behind certain words and phrases.

Codification of Law: France

As conveniently summarized by Troper et al. (1991: 171), a distinguishing feature of French legal culture is that it is "one of written law. . .. to a large extent codified." The effect of codification is to offer a body of law that is complete and contains no contradictions or elisions: it therefore does not allow opportunities for avoidance or evasion, or for circumstances that are not covered by it. Accordingly, where the law is silent on an issue, it becomes the task of interpreters to fill that silence: either by simply not recognizing the omission or – more likely – by recognizing that the "gap" in legal coverage is a result of the legislator's inability to think of everything in advance and thus prevailing upon the interpreter to do so (Troper et al. 1991: 175-6). It is generally assumed that the legislators intend all laws to comply with the Constitution, and so laws will be interpreted to ensure this (Troper et al. 1991: 195), and that the administration works for the good of the common interest (Troper et al. 1991: 196) although laws restricting liberties are interpreted more strictly (Troper et al. 1991: 202).

Although as elsewhere in the world (see below) interpreters seek the "true" meaning of a law and the intention of the lawmaker, the materials they are allowed to draw upon are very wide rather than being constrained (as elsewhere) by tight legal rules (Troper et al. 1991: 184-9). These may include:

- The historical background to the law
- Documents used in drafting the law, including drafts and consultations
- Interpretations by users of the law, especially public officials
- The language of other, related, laws
- The language of laws amended by the one in question
- The history of legal terminology
- The effect particular interpretations would have in terms of the national Constitution or international treaty obligations
- Customary procedures and practices that would otherwise be affected

Interestingly, especially for comparison with the USA and UK (see below), interpretations by other courts are rarely drawn upon, although those of superior courts within the same hierarchy may be.

Overall, French law is seen as a unity that governs all those it rules. Interpreters of law – that is,

the courts – are seen not at all to make law but simply to seek the lawmaker's intention. Accordingly, in filling "gaps" not covered by a specific legal phraseology, they are seen only to be expressing the will and intent of the legislator rather than making new law or extending its coverage. All laws are interpreted in the light of the overarching Code of which they are a part: it follows that no French law "stands alone" but must be read as part of a coherent and cohesive system that effectively recognizes no differences of status or standing or of exception. As Summers and Taruffo (1991: 501) see it, in French law there are no genuine issues of interpretation, and only one meaning is ever possible, and it is this that interpreters must seek.

A Federal Common Law State: The USA

The French case is very different from that of the USA. While France is a single state, the USA is a federal one, divided into 50 jurisdictions governed by a federal Constitution. All laws of every state and federal law (a jurisdiction in itself) must ultimately comply with the Constitution: as in France, compliance will generally be assumed unless demonstrated otherwise (Summers 1991: 443-4). In the case where a state law is in conflict with a federal law, the federal law prevails, but a statute will prevail over administrative regulation and usually the Common Law which underpins all law (Summers 1991: 444-5). Whereas in French law gaps in legal coverage are acknowledged, in the USA such gaps are generally treated as if they are simple matters of textual interpretation (Summers 1991: 411-2): the issue is one of particular words and their meanings rather than attempts to meet the standards of an overarching Code.

The materials that a US court may draw upon in making interpretations are at once wider than that in other territories and more tightly regulated. Materials that must be taken into account include:

- The language of the text and any titles, subheadings, and other terms relating directly to it (compare with the UK, below)
- Dictionaries and grammars which set out the "ordinary" meanings of words under examination
- Any legal definitions of terms
- The text of other related statutes
- Any prior, repealed, or modified laws
- Any official history of the passage of the law
- Particular historical circumstances the law was intended to address, which may now have altered
- General legal principles
- Interpretations by similar or higher courts
- Interpretations by officials charged with administering the law (Summers 1991: 422-7)

In addition, interpreters are expected (but not required) to take into account interpretations by other (nonofficial) users of the law, by courts in other jurisdictions, and those of senior legal academics. There are also materials expressly forbidden from consideration, such as the testimony of legislators as to what they believed the law to be and nonofficial documentation relating to the history of the legislation.

By contrast especially with France, the US system is one that openly acknowledges the possibility of alternative readings of legal texts (Summers & Taruffo 1991: 501). It follows that US courts have more of a lawmaking role than their French counterparts. The prior interpretation by other courts has also a much more important role here than is evident in the French system, and the authority of officials over legal interpretation is much less evident. Similarly, no requirement exists to make the law fit part of a broader code despite the overarching commitment to constitutionality.

A Unitary Common Law State: The UK

The role of the courts in the UK is not to make law but, similar to their role in France, only to interpret it. Accordingly, it is not the place of the courts to fill gaps in coverage but to leave this to legislators (Bankowski & MacCormick 1991: 362). The law is not codified, and therefore, in large measure, each piece of legislation stands alone and separate from others except where connections are expressly drawn (Bankowski & MacCormick 1991: 363): the focus of interpretation is therefore very much upon the strict interpretation of particular words and phrases rather than seeking to contextualize the whole

(Bankowski & MacCormick 1991: 382). Interpretation is therefore an essentially pragmatic process of seeking the "ordinary signification" of words (Bankowski & MacCormick 1991: 382-6) rather than being driven by broader principle, as in France, or constitutionality, as in the USA. Nevertheless, there are certain underlying presumptions that guide the interpretive process: that absurdity is not an intent of legislators; that laws are designed to operate fairly; that laws do not (unless specifically indicating otherwise) operate retrospectively; and that existing laws remain unaffected unless the law specifically indicates otherwise (Bankowski & MacCormick 1991: 391-2). In the UK system, statutes will prevail over all other kinds of law but increasingly need to comply with laws made elsewhere, in particular EU legislation and certain international treaties (Bankowski & MacCormick 1991: 375).

As in the USA, interpreters may draw on certain materials, may use others or are barred from using others: however, the range of materials differs from that elsewhere. The primary source is the specific substantive language of the law itself, excluding any subheadings, titles, or marginal commentary which is only present to guide users to relevant texts and not to determine its meaning (Cross 1995) but including any "Interpretation" section which sets out the precise meanings certain words and phrases may carry. Any previous interpretation by a similar or higher court must also be drawn upon, together with any relevant subsidiary legislation which may bring the law into force (Bankowski & MacCormick 1991: 375). They may (but are not required) to refer to other laws on the same topic, government guides on good practice, any previous legal history of the terms, current usages of officials, and scholarly writings (Bankowski & MacCormick 1991: 376-80). Material expressly barred from consideration includes any information on the history of the law and economic or sociological data on the effects of particular readings (Bankowski & MacCormick 1991: 380-2).

In general, UK law is seen as a body of separate regulations, some of which stand entirely alone, and others which are grouped together, and are interpreted accordingly. Although general principles and assumptions guide the process, the focus is very much upon the specifics of individual provisions rather than the creation of a unified whole. Only those materials directly relevant to the point at issue are taken into account: extrinsic factors are barred because the courts would then be involved in making policy, which is not their role. The assumption – as in France – is that there is a single meaning lying behind a particular provision and the function of interpretation is to find it.

Differences in Reading Laws

These three examples offer a taste – albeit a small one – of how different sets of laws represent different legal ideologies and are therefore to be read differently from one another. In particular, the clear differences between laws that operate as part of a codified system and those that stand alone need to be taken into account, as do the specific materials that can be drawn upon for interpretation and those that cannot and the extent to which underlying principles regarding the presence of "gaps," absurdity, and contradiction may be applied. Although Summers and Taruffo (1991) take France and the USA as exemplary of opposed legal systems, here I have used them merely as examples, placed alongside a third, to illustrate diversity. An area not mentioned here has been international law, which is the topic of the next section.

International Laws and Their Coverage

Technically those materials referred to by (especially but not exclusively) heritage practitioners as "international law" in the field of heritage are not in fact law: rather, for the most part, they are sets of agreements between nation states whereby those states agree to a common standard of treatment for certain classes of object, either generally or in defined sets of circumstances. They may be agreements that are designed to operate globally – such as those promulgated by the United Nations or UNESCO – or regionally, such as those relating to Europe or the Americas. These laws are important in the field because they are taken to represent the global principles to which all those concerned with the heritage subscribe.

Legislation in Archaeology: Overview and Introduction, Table 1 Main international instruments relating to the cultural heritage

Date	Promoted by (international organization)	Title
1954	UNESCO (portal.unesco.org)	Convention for the Protection of Cultural Property in the Event of Armed Conflict (Hague Convention)
1970		Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Cultural Property (Paris Convention)
1972		Convention concerning the Protection of the World Cultural and Natural Heritage
2001		Convention on the Protection of the Underwater Cultural Heritage
2003		Convention for the Safeguarding of the Intangible Cultural Heritage
2005		Convention on the Protection and Promotion of the Diversity of Cultural Expressions
1971	RAMSAR (www.ramsar.org)	RAMSAR Convention on Wetlands
1995	UNIDROIT (www.unidroit.org)	Convention on Stolen or Illegally Exported Cultural Objects
1954	Council of Europe (www.coe.int)	European Cultural Convention
1969 (revised 1992)		European Convention on the Protection of the Archaeological Heritage
1985		European Convention on Offences Relating to Cultural Property
		Convention for the Protection of the Architectural Heritage of Europe
1976	Organization of American States (www.oas.org)	Convention on Protection of the Archaeological, Historical, and Artistic Heritage of the American Nations

Increasingly they are also taken as the basis for the passage of law at the national level. The main international laws in force at present are set out in Table 1.

Since they are promulgated by organizations composed of individual nation states, these international agreements are binding only upon the states acceding to them: they cannot be enforced against individuals or agencies unless they have also been incorporated into national laws, although this does not lift the responsibility from national governments to put in place appropriate arrangements to ensure compliance below the level of government. They are to be read and interpreted in a distinctive manner which reflects in many ways their purpose as setters of norms and guidance. Each such document begins with a preamble which sets out the conditions under which it was brought into existence and the purpose it serves: its specific provisions must be read in the light of these opening statements as to function rather than as stand-alone imperatives. This contrasts with the way in which laws are read at the level of some nation states which are binding on individual citizens and state and non-state agencies.

In addition to Conventions, the membership of international bodies such as UNESCO and the Council of Europe may also adopt Resolutions, which have much less legal force than a Convention but nevertheless provide guidance as to norms and expectations. These too are not binding upon individual and state and non-state agencies unless their provisions are adopted into

national law, but they may also provide the basis on which future Conventions are constructed. Other international organizations also contribute to international law in this area, in a more substantive manner. The European Union is concerned primarily with economic and political issues, leaving matters of culture to the broader membership of the Council of Europe, but recent changes in the EU have allowed it to consider cultural matters, and these may become more significant as time moves on. However, as part of its economic remit, it brought forward in 1992 two legal instruments relating to the movement of cultural items into and out of the EU and between member states. The terms of the Directive on the Return of Cultural Objects Unlawfully Removed from the Territory of a Member State will need to be incorporated into national laws before it takes full effect, but this must be done to a set timetable; the Regulation on the export of cultural goods – which places limitations on the export of such items outside the EU – had immediate and direct effect on member states and their citizens.

Like all legislative arrangements, some international instruments purport to relate to all aspects of heritage, such as the UNESCO World Heritage Convention, the European Cultural Convention, and the OAS Convention. Others concern all matters relating to particular types of heritage object, such as the RAMSAR Convention on Wetlands, the European Conventions which separately treat the archaeological and architectural heritage, and the UNESCO Conventions on underwater and intangible heritages. Others attempt to address particular issues that affect cultural objects, such as the UNESCO Hague and Paris Conventions, the UNIDROIT Convention, and the European Union measures in relation to the movement of cultural objects. The Paris and UNIDROIT Conventions and the EU measures all relate in particular to the issue of the illicit acquisition, movement, and transfer of cultural objects from one state to another: whereas most international law seeks to provide guidance and to set standards, these measures endeavor to go further by regulating behavior. In this way they are acting much more like national laws.

Not all states choose to accede to all international laws in this field. In some cases it will be because they consider they lack the resources to meet the standards required by that law; in others – particularly developed states in the West – that they already have laws and mechanisms in place that meet or surpass those of the particular instrument. In some cases it may be felt that the particular instrument – although perhaps introduced by the state in question – is aimed at the practices of other states who do not meet the standard set. In others it will be because it challenges or threatens a particular national interest, such as an economic interest. Failures to accede inevitably weaken the effect of such laws since they cannot be enforced against states that have not done so. In turn this may affect the capacity of the instrument to act as a measure of minimum performance and an international standard. At the same time, such laws have been criticized for adopting a specifically Western approach to ideas of cultural heritage, constructed around notions of the built and monumental heritage, rather than heritages of practice and belief. Such criticisms have led to a refocusing especially by UNESCO on such ideas as the "intangible heritage" and "cultural diversity," reflected in instruments promulgated in the early part of this century. These represent new approaches to the cultural heritage which can be expected to have influence at the level of the nation state, although not all Western states have yet acceded to these new principles.

National Laws and Their Differences

Although references in the literature of the field to international measures are extensive and such laws are invariably treated in the literature of the field as significantly influential (e.g., Cleere 1989; Skeates 2000; Carman 2002; Smith 2004: 106), nevertheless attempts to assess their effect on law and practice at the key level of the nation state are limited. A project by the Council of Europe nevertheless attempted to do this for the European Conventions relating to the archaeological and architectural heritage, by a process of comparison of how different states put the requirements of the Conventions into effect (Pickard 2001). As would possibly be expected, the range of 13 countries

from all parts of Europe – some well established, others newly emergent – provided evidence of a wide diversity of treatment, organization, and focus together with different levels of compliance with the Conventions. The project focused in particular on the following aspects of heritage management in each territory:

- Definition of the heritage, including systems of categorization and selection criteria
- Processes of identification and styles of inventories and recording
- Measures to protect, preserve, and prevent damage
- Conservation philosophy, including attitudes to reconstruction and refurbishment
- Sanctions for breach of regulations and coercive measures in place
- Integration of conservation with other planning and land-use regulation
- Financial provisions, including sources of funding, tax regimes, and economic development programs
- The role and structure of relevant agencies and organizations
- Provision for the education and training of staff

The discussion usefully highlights differences between individual countries but also indicates areas few or none have yet addressed, pointing to the future influence likely to be wielded by regional rather than purely national approaches (Pickard 2001: 4-10). Here, I wish to outline the areas where legislative provisions can take a different approach in different parts of the world. These areas are in particular:

- Ways of defining and specifying the object of such laws
- How different bodies of material are addressed in laws
- Issues of rights of ownership and control
- The kinds of sanctions which may be applied

Depending on the system of law in place, the approach taken in these areas will correlate quite closely.

Defining and Specifying Material

There are several ways in which the material covered by a law or a body of law may be described, set out by Prott and O'Keefe (1984: 184-7) as enumeration, categorization, and classification. *Enumeration* is a system of lists of the kinds of material to be covered: this is typical of US federal laws in this area (US Dept. of the Interior 1989-90) and has been to some extent adopted in the UK for the purpose of describing the kinds of objects that can be considered for the purposes of legal protection (Carman 1996: 120-4 & 187-92). The problem with this approach is that it leaves open the question of whether items not on the list but of a similar kind can be included: for example, if the list specifies "graves and burial sites," does this also cover aboveground disposal of the dead? *Categorization* is a looser approach whereby a broad description of types of material is provided, into which a range of particular objects may fall. The problem of this approach is that too narrow a definition may exclude objects of concern, while too broad a definition may include too much material. By contrast with both, *classification* is not concerned with the form of the object, but with actions taken towards it: in such a system, only those objects officially recognized and designated as such by a responsible authority can be granted protection. While convenient and transparent, the system has the flaw of only recognizing those objects that have been specifically designated, leaving others of similar nature to their fate. At the same time, it is worth noting that these different systems are by no means exclusive. It is possible to use them in combination, so that the list under an enumerative scheme may include categories, while a scheme of categorization may also enumerate particular types of object, and a classificatory scheme may operate in respect of items enumerated or categorized.

These differences represent contrasting approaches to the cultural heritage as a phenomenon as well as the structure of law. Where only designated material is covered by law, the emphasis is placed upon the relevant authority and its decisions; where material is enumerated, anything included is automatically covered, removing authority from agencies and placing it more generally; under schemes of categorization, a measure of interpretation is

required, placing some but not all focus upon agencies. An enumerative scheme assumes a solid understanding of the kinds of materials and places constituting the heritage: by its nature, anything not listed is excluded. A scheme of categorization has a greater capacity for the inclusion of new types of material, especially if the categories are drawn not on the basis of physical form or attributes (e.g., state of ruination or age) but on value ascriptions (e.g., "of architectural, archaeological, etc., interest or importance"). Paradoxically, the greatest flexibility may exist under a scheme of designation, so long as the capacity to designate is drawn widely: if it is limited by enumeration or categorization, then it is significantly less able to include new types of material.

Addressing Different Bodies of Material

The range of objects that can be classed as cultural resources is wide, ranging from individual moveable objects singly or in groups; to upstanding buildings in use, ruined buildings and structures, earthwork sites, buried features, scatters of material, and natural features used by humans; to entire landscapes, built and natural (Carman 2002: 30-57). Under systems of law, the ways of treating them may be as varied as the material itself. In some regimes, all cultural material of whatever kind is treated under the same body of law: while different objects may be treated in particular ways, the overall scheme is common to all classes of material. By contrast, others make a clear distinction between particular kinds of object, so they are not only treated differently but are also subject to different bodies of law. In those cases where a single, overarching national antiquities law covers all cultural objects, no distinction is drawn between individual bodies of material. Regardless of whether the object is a moveable object, a scatter of material, a ruin or a buried feature, an upstanding building, or a landscape, it will be subject to the same regime, effectively rendering them all a single class of object for legal purposes.

By contrast, other regimes make a clear distinction between particular kinds of object, so they are not only treated differently but are also subject to different bodies of law. Distinctions may be drawn on the basis of the physical properties or attributes of the material, so that moveable objects are differentiated from fixed monuments and sites, and the latter perhaps from upstanding buildings in use. While moveable objects are subject to laws concerning ownership and their placement in museums or other archives, fixed sites and monuments may be subject to official protection in the care of the state, while buildings in use are subject to controls on use and alteration. Alternatively, distinctions may be drawn on the basis of whose heritage the object represents: in states where an indigenous population may claim rights over its cultural material, such as the Americas or Australia, such material will be treated differently from the historic heritage of the incoming European population. Here, a distinction between prehistoric (i.e., pre-European contact) material and historic (colonial period) material is effectively drawn: but it is in fact not a distinction based upon age but upon putative cultural origin. European states – except those where an indigenous population dwells, such as in northern Scandinavia and Russia – and numbers of states in Africa and Asia (although not all), generally have no need of such a distinction, and material of all periods is capable of treatment under the same regime, although distinctions between different types of object may also be maintained.

Ownership Versus Control

As Prott and O'Keefe (1984: 189) point out, "it is not usually necessary to have ownership of [material] in order to regulate what may be done in relation to it." Nevertheless, as they go on to add (Prott & O'Keefe 1984: 191), a number of states across the globe do claim a right of ownership of certain classes of cultural material from the moment of discovery. While in most cases this right of ownership applies only to removable material – which will most likely find its way into a museum or archive – in some cases it applies also to the land on which they were found (Prott & O'Keefe 1984: 195). Alternatively, material and land may become subject to compulsory acquisition by the state unless certain

conditions (such as the deposition of material in a suitable archive) are met. This "nationalization" of the cultural heritage has a number of advantages:

- It is a coherent and transparent process applied equally to all.
- It ensures full control by appropriate agencies over the fate of material.
- It associates such material with the entire community as represented by the nation state.
- It is simple.

However, it rides roughshod over private rights and may encourage finders to fail to report or record finds.

An alternative to state ownership is to provide for the regulation of the treatment of cultural material while allowing private ownership of that material. This may involve drawing distinctions between material on the basis of its type and circumstances of discovery so that some material is the property of the state, while other material of similar kind is not: this is the case, for instance, with the laws of Treasure Trove and Treasure in England (Carman 1996: 55-61; Bland 2004). Alternatively, the "cultural" component of the material may become controlled by state agencies, while the object itself remains the property of another: this is sometimes the case with upstanding monuments, where the land on which it stands and in which it is rooted remains the property of the landowner, but the monument passes into state control; in such cases, the landowner continues to have use of the land but is subject to limitations on treatment of the monument. A third way is to place controls on the use of land either to prevent damage to existing archaeology or such that the presence of archaeology is so far as possible taken into account before the discovery of cultural material: decisions regarding the fate of any such material will therefore have been taken before any work commences, and where significant material is to be encountered, work likely to damage it may be completely prevented. In cases such as these, laws and administrative arrangements to put them into force will be more complex and potentially more costly but if effective can develop a measure of public support for the project of cultural heritage protection, limiting the problems of avoidance.

Public and Private Agencies

The role of state agencies will differ whether the laws provide for state ownership or state controls on private ownership of cultural material. In the first case, all authority over cultural remains will lie with the state. In the second, state agencies will need to interact and compromise with others who retain an interest in the material.

By far the most common approach is that of central regulation by state control, in which heritage objects are deemed to be the property and thus the responsibility of the nation state and its agencies. Under such a system, only those accredited by the state – frequently its employees but also those granted specific licences – are entitled to conduct archaeological or conservation work. Accordingly, excavation by anyone else is commonly a criminal activity. In theory at least, all building and other work will cease when archaeological remains are encountered and state-employed archaeologists will move onto the site. In practice, however, limitations apply on this potentially draconian system. Small developments will be allowed to proceed unhindered, government-sponsored projects may also proceed without the interference of an archaeologist, and, in many countries where such systems apply, lack of resources will result in incomplete coverage. Nevertheless, the ideal of such a system is a very powerful idea and dominates much thinking in the heritage field. It is the ideal assumed to exist by most international agencies such as UNESCO, and very often those territories or areas not applying this approach can be thought to be deficient. Here, archaeology is a cost carried out of taxation levied on the entire community in whose service it is deemed to exist.

The alternative system, which applies mostly in Anglophone countries such as the UK, USA,

and Australia, is that of a partially privatized archaeology. This is essentially a private enterprise system under a measure of regulation by state and state-empowered authorities. In general there will be no limitation on who may carry out archaeological work, although professional bodies will seek to encourage the employment of those accredited by them. Excavation itself will most often be carried out as a result of the need to mitigate the damage of archaeological remains by development projects. In the USA material of "scientific significance" may need to be retrieved or preserved; in the UK, the emphasis is theoretically upon preservation in situ but frequently results in rescue excavation and so-called preservation by record. Where development work reveals archaeological remains, the developer will be responsible for employing archaeologists to carry out appropriate work, monitored by the local authority to ensure proper standards of recording. Here, archaeology is a cost levied on the developer, treating damage to the heritage as a form of pollution and applying the principle of "the polluter pays" for restitution. This is archaeology as enterprise, although never completely unregulated, and much of the discussion of such systems turns upon issues of regulation and control rather than freedom of action.

Sanctions and Penalties

There are two aspects to the issue of sanctions and penalties applied for breach of laws relating to the archaeological resource: to what kinds of offences they relate and the types of sanction applied. Depending on the kind of regime in place – a state-ownership regime or a "privatized" regime – particular attitudes as to the severity of breach and what types of breach are more serious will prevail, reflected in the sanctions applied both theoretically and in practice. The range of sanctions available runs the full scale of penalties for breach of any kind of law: from prison terms through fines where breach is considered a criminal matter to civil remedies such as damages and carrying the cost of restoration and repair and the confiscation of material. Such penalties may be combined so that a person in breach may have to carry out reparation and pay a fine or serve a prison term. As Pickard (2001: 329) points out, however, such powerful sanctions tend not to be applied: prosecutions may be rare and the penalties awarded relatively light.

Where archaeological material is held to be the property of the state, criminal sanctions are more likely to apply to those who claim it for themselves. It is frequently a breach of criminal law to export such material without the proper authority, and sometimes any private appropriation of such material will be considered a form of theft. In some territories, although private ownership is allowed, penalties apply for the non-reporting of finds (Prott & O'Keefe 1984: 209-10 & 215-16). An alternative is to reward finders for reporting: they may be allowed to retain the find without penalty, or receive payment for its delivery to a suitable repository. Where private ownership of material is the accepted norm, specific provisions may apply to particular classes of material – either on the basis of its attributes, such as its form or material, or on the basis of its context of discovery, such as its location when found, or the process by which it came to light. Accordingly, for the bulk of archaeological material, normal rules for the allocation of ownership will apply, but certain material may become the property of the state. In such cases a need to report may apply to all material or only that owned by the state: in the latter case, provision may nevertheless be made for the voluntary reporting of finds.

Penalties also accrue to those who may damage or destroy archaeological sites and monuments and historic buildings. In some cases, where these are owned by or in the care of the state, the penalties will be criminal, involving fine or prison. In other cases they will be civil, such as reparation or damages. Where arrangements are in place for the control of construction and development work, archaeological remains may be included among those factors to be considered. In such a case, where the likelihood of

damage to archaeological remains is envisaged, the proposed work may be prevented altogether but is more likely to have controls placed upon it: for redesign to avoid affecting significant archaeological material, or for advance investigation of such material at the cost of the developer. Failure to comply may result in a fine or the imposition of further controls on development work. In similar vein, some Latin American states may apply sanctions to unsatisfactory excavators for poor quality archaeological work (Prott & O'Keefe 1984: 305): such penalties will involve the cancellation of licences to conduct work in the territory concerned.

Conclusion

It is likely that the kinds of differences between national laws outlined briefly here in some way correlate. Accordingly, where a single body of law applies to all cultural objects, they may also be subject to direct state ownership and control, allow for no non-state agency involvement, and apply at least theoretically strict criminal sanctions. Where distinctions are made between types of object, different ownership regimes may exist side by side, there may be a measure of non-state involvement in archaeology, and sanctions may be relatively light and civil rather than criminal. To date, however, and despite the work of Prott & O'Keefe (1984) and others (e.g., heritagelaw.org), no substantial work of this nature has yet been completed, so these suggested likely correlations remain only as plausible assertions. Nevertheless, whether or not these types of correlations exist in reality, the crucial point is that differences between legal regimes are not mere matters of administrative convenience: in the same way as the differences of legal interpretation covered above, they represent fundamental differences of ideology in terms of what law is for, where authority resides, and the nature of the cultural heritage. In thus approaching national laws, it is necessary to be sensitive to the kinds of ideology represented and the attitudes towards and expectations of both law and heritage they carry.

The Professionalization of Archaeology

The application of legislation in the field of archaeology and its regulation under law is one of the factors that has encouraged the increasing professionalization of the field. The regulatory influence of official organizations allows them to produce standard-setting documentation which influence practice and require to be met if work is to be granted to those at whom they are aimed: a number of state agencies accordingly have adopted such a nonlegislative approach to controls on archaeological work. Parks Canada, for instance, publish as part of their website (http://parkscanada.pch.gc.ca/library/PC_Guiding_Principles/) their *Cultural Resource Management Policy* setting out the principles guiding their treatment of the historic places in their care. In the UK, English Heritage seek to guide the conduct of publicly funded archaeological work by encouraging a particular managerial approach (English Heritage 1991). English Heritage were also responsible for producing the nationally applicable guidelines for local authorities on the treatment of archaeological sites under threat from development projects (DoE 1990), and their application and effectiveness is monitored by them. The message of such products – whether international or national – is that of the particular expertise of the people responsible for them, which in turn further encourages the professionalization of the discipline as a whole.

In combination with laws and regulatory procedures, systems of self-supervision and oversight create a climate where archaeology operates inevitably as part of systems of governance. Although not widely discussed in these terms (but see Smith 2004: 58-80), the point is recognized by others with an interest in the material remains of the past. Especially in those jurisdictions governed by a tradition of Common Law and private property rather than state control and ownership, those who object to giving control over the past to a "closed" profession, and despite their own inclination towards individualism, organize themselves into groups who may then propagate their

own codes of practice and standards of behavior, effectively "professionalizing" an anti-archaeologist stance. This is to some extent the situation in the UK in respect of amateur metal detectors and treasure hunters, many of whom work in association with archaeologists and others. The voluntary Portable Antiquities Scheme – whereby finds are reported and the information made publicly available (www.finds.org.uk; Bland 2004) – is given support by the code of practice of the National Council for Metal Detecting (www.ncmd.co.uk) among others.

Conclusion

The key points to note from this overview of law and regulation in archaeology are the variations in approaches to law in the field: these in turn represent not mere habit and local practice but real differences in ideology and approach. Where a system is based upon close control by central government, it represents a very different understanding of the purpose and role of archaeology in society from one where private ownership is upheld and regulations are looser and more flexible. These are differences that matter, especially in relation to study or work in an area new to one: ideas that are the norm in one territory do not transfer simply to another. Such differences are reflected in how archaeologists are trained and qualified, the relations between archaeologists and the state, relations between archaeologists, between archaeologists and others interested in the past, and between archaeologists and the wider public.

Cross-References

- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Australia: Indigenous Cultural Property Return
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ Conservation and Management of Archaeological Sites
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ European Convention on the Protection of Archaeological Heritage (1992)
- ▶ Florence Charter on Historic Gardens (1982)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ International Journal of Cultural Property
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Machu Picchu Artifacts: Repatriation
- ▶ Norms of Quito (1967)
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995)
- ▶ United States Domestic Archaeological Heritage Law

▶ USA and Mexico (1970): Bilateral Treaties and Patrimonial Property Restitution
▶ Vermillion Accord on Human Remains (1989) (Legislation)

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Lenihan, Daniel J.

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Basic Biographical Information

Daniel Lenihan grew up on the lower east side of New York City. He attended Guilford College in Greensboro, North Carolina, and graduated with a B.A. in Philosophy. His interest in Philosophy stemmed from a deep fascination for understanding human strategies for living, which had a profound impact on his future career choices.

After graduating, Lenihan taught fifth grade in the Virgin Islands. There, he was exposed to diving through a half-day course at a local dive shop. Dan dived with neighbor Alan Albright, who later became the South Carolina underwater archaeologist, and Alan's dive buddy, the Smithsonian's Mendel Peterson. After exposure to diving on cultural resources, in 1971 Dan enrolled at Florida State University for graduate school to study underwater archaeology but thought diving was more captivating than archaeology.

Lenihan spent his days at the University and his nights diving, often in sinkholes and caves, becoming a member of a group of expert cave divers in Florida, leading to his certification as one of the first instructors with the National Association for Cave Diving. In his coursework, Lenihan put more emphasis on studying anthropology than archaeology because he felt more of an intellectual draw to it, seeing it as a form of applied philosophy. From this, Dan developed his foundational belief that archaeology is a tool to explore human strategies for living, but that if archaeology is not anthropology, it's not living up to its potential. Later, after some time with the NPS, he added to that belief that if archaeology is not historic preservation, it is not satisfying its obligations.

In 1972, as a Teaching Assistant in graduate school, Dan began his work for the National Park Service (NPS) in a temporary position as an underwater archaeologist under the direction of George Fischer. Dan's roles on his first field project, a shipwreck survey at Gulf Island National Seashore, were archaeologist and dive supervisor. He enforced a strict dive program believing that the transition to working underwater was more than just a safety issue, and professional research divers, including archaeologists, could not simply adapt to working underwater, but rather had to work towards doing it efficiently and effectively.

He completed his M.A. in Anthropology in 1973 and continued to work as a temporary NPS archaeologist. In 1974 he moved to New Mexico and began working for Calvin Cummings, lead archaeologist for the Southwest Region, doing terrestrial archaeology with states and the military. He also developed the underwater program for the Southwest Regional Office and became the Regional Dive Officer.

Major Accomplishments

In the mid-1970s, increased reservoir construction revealed uncertainties about what effects inundation had on cultural resources. Federal bureaucrats wanted a resolution and in 1975, because of its preservation ethic, the NPS received funding for the National Reservoir Inundation Study (NRIS). Despite Lenihan's reservations about taking on such a project, Cummings convinced him that this was the gateway to a permanent underwater archaeology program for the NPS. In 1976, Lenihan and crew began fieldwork conducted throughout the western United States to investigate the impacts from inundation. The study was one of the first in underwater archaeology to do a scientific research design based on strict archaeological theory and method. Though Processual Archaeology was beginning to be widely accepted and used, the discipline of underwater archaeology was nascent and most other practitioners had not yet adopted that framework.

At the conclusion of the NRIS (see Lenihan et al. 1981a, b), the assets of the project became the Submerged Cultural Resources Unit (SCRU),

a national program of the NPS created to assist parks with underwater archaeological management. In addition, SCRU was the only team of underwater archaeologists in the federal government, and as a result, the team provided service for other agencies and nations as well.

In 1981, Dan suggested and helped organize the School of American Research Advanced Seminar on Shipwreck Anthropology, leading to a publication 2 years later. During the seminar, chaired by Richard Gould, professionals assessed the anthropological significance of shipwrecks and, in doing so, provided an introspective into the budding field of professional underwater archaeology. Dan insisted that solid concepts of research design, research strategy, and theory are critical to professional underwater research; however, he had not seen this framework used in the field and criticized colleagues for conducting projects without scientific methodology (Lenihan 1983: 48). His paper, still considered groundbreaking in the field today, concluded by providing a theoretical basis for the anthropological value of a shipwreck. Lenihan outlined hopes that archaeologists in 2030 would reflect on the development of the field in the late twentieth century, "wherein shipwreck studies where characterized by rich, interdisciplinary efforts conducted with the benefit of explicit research designs and a strong sensitivity for the fragile, nonrenewable nature of the resource" (Lenihan 1983: 64). Dan's critical understanding of an emerging field demonstrates why he did not have to wait 50 years for those three tenets to become the framework upon which most professional underwater archaeologists today build their research.

Dan spent the following 20 years as Chief of SCRU. He worked on numerous projects all over the country and territories from the Aleutians to the Dry Tortugas, and from the Great Lakes to Kosrae, the Virgin Islands, and Guam. He led the efforts on creating an intricate 3D model of the USS *Arizona* and provided the US Government information it needed to allow divers to explore the no longer radioactive test sites at Bikini Atoll.

On the day of his retirement from Chief of the SRC, Dan was working at the USS *Arizona* Memorial and came back the following day as an employee. He left his position with the NPS in 2009 after 37 years of federal service, but continues to volunteer for the Submerged Resources Center.

Among his greatest contributions to the field are some of the critical theoretical and methodological doctrines with which professionals conduct underwater archaeology. The job of the archaeologist, according to Lenihan, is to assess evidence left behind using a purely scientific approach, to acquire, describe, and explain data in order to understand human strategies for living on the planet. Archaeology is a tool that can aid in achieving the desired outcome of evaluating human decision making, and doing so underwater is especially challenging. Ultimately, historic preservation is the outcome of archaeology and the obligation of any archaeologist is to save the past and pass it down to future generations. While this ideal forms the basis of the enabling legislation for the NPS, it also forms the foundation upon which Lenihan built his career.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Archaeology as Anthropology
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Underwater Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Lentil: Origins and Development

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Basic Species Information

Lentil is the common English name of the cultivated legume, *Lens culinaris* Medik. The genus, *Lens*, is in the plant family Fabaceae, in the subfamily Papilionoindeae, and in the tribe Vicieae. Lentil ranks fifth in the world's production of seed legumes, after soybean (*Glycine max* L.), pea (*Pisum sativum*), chickpea (*Cicer arietinum*), and cow pea (*Vigna unguiculata*). It is grown worldwide and the largest producing country is Canada, followed by India, Turkey, and the United States (http:/faostat.fao.org). The global success of this crop is due largely to the high protein content of its seeds (25 %) and therefore its use as a common meat substitute (Zohary 1995). In addition to being a companion to a starch-rich diet of cereal-based agriculture, legumes are a valuable resource in restoring nitrogen to the soil as they are able to fix atmospheric nitrogen and replenish soil fertility (Zohary et al. 2012).

Lens culinaris was domesticated in Southwest Asia and spread from this region during the "first wave" of crop dispersals beginning in the Early Pre-Pottery Neolithic. It spread with the "founder" crops, which include wheat, barley, flax, pea, bitter vetch, grass pea, and chickpea (Zohary et al. 2012). The wild progenitor of the cultivated species has been identified as *Lens culinaris* subsp. *orientalis*. While this progenitor is distributed through much of Southwest Asia and patchily through Central Asia, genetic variation and archaeobotany point towards a more restricted subzone of domestication in the Fertile Crescent (Fig. 1). The genus includes five other annual wild species restricted to the Mediterranean Basin, Southwest Asia, northern Afghanistan, and Central Asia (Cubero 1981; Zohary et al. 2012).

Major Domestication Traits

The archaeobotanical evidence is most often in the form of charred seeds with only rarely the pods and pod fragments recovered. Lentil is the most commonly recovered pulse in archaeobotanical studies in the Near East which in part is due to its ability to survive carbonization better than fatter pulses. Seeds of lentil are identified based on morphology which is both

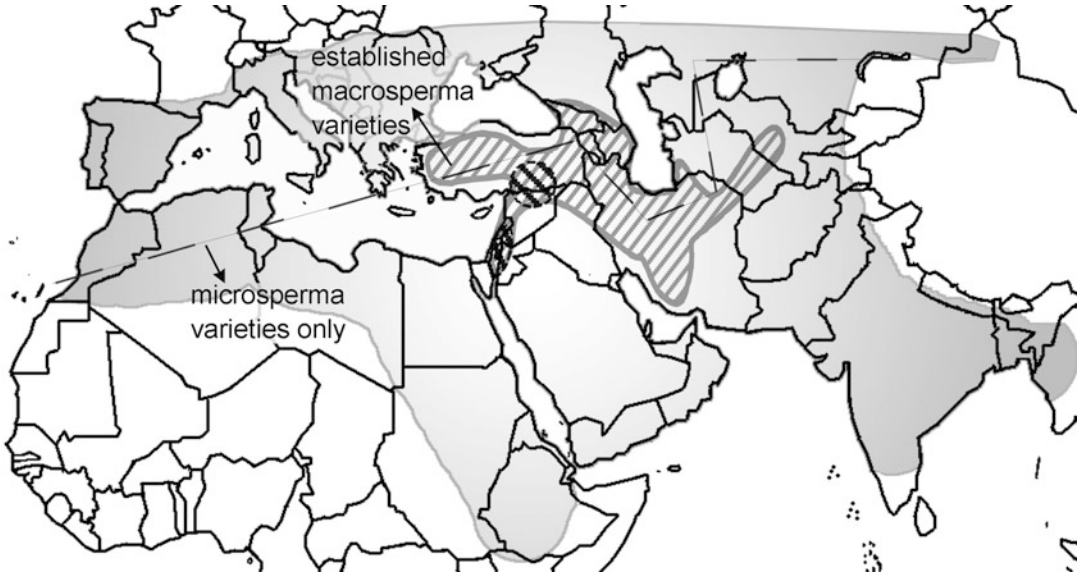

Lentil: Origins and Development, Fig. 1 Map illustrating the approximate maximal extent of traditional lentil cultivation, the range of the wild progenitor (gray diagonally hatched area), foci of earliest likely cultivation (two dark crosshatched areas), and the dividing line separating traditional *macrosperma* and *microsperma* landraces

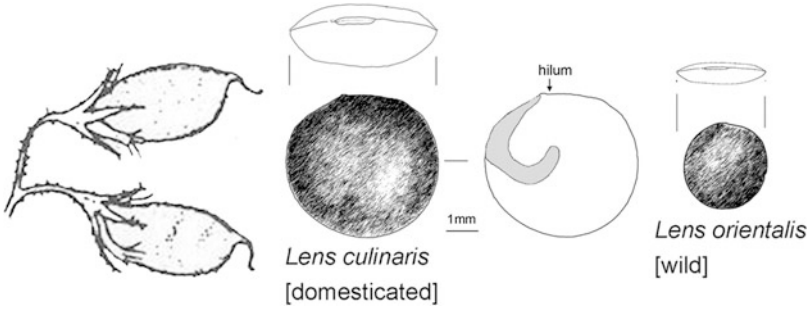

Lentil: Origins and Development, Fig. 2 Drawing of lentil pods and seeds, contrasting domesticated (*culinaris*) and wild (*orientalis*) seed sizes

flat and circular (Fig. 2). With domestication, seeds increase markedly in diameter (Fuller et al. 2012). The earliest archaeobotanical evidence for lentil comes from preagricultural sites located within the wild progenitor species' natural distribution including Epipalaeolithic Ohalo II (Kislev et al. 1992), Epipalaeolithic Abu Hureyra I, and Natufian Wadi Hammeh 27 (Fuller et al. 2012). Lentil cooccurs with cereals inferred to be under "pre-domestication cultivation" in the Pre-Pottery Neolithic A and Early Pre-Pottery Neolithic B in the southern and northern Levant (Fuller et al. 2011). In addition to evidence of the wild *L. culinaris* subsp. *orientalis*, there is evidence of the exploitation of wild *L. nigricans* from pre-farming sites in Greece, and this species may have been translocated as far west as Spain (Zohary et al. 2012; Fuller et al. 2012). By the Pre-Pottery Neolithic B phase, lentil is a common companion of cultivated wheat and barley with evidence of its spread to Cyprus. During the PPNB there is evidence for larger average diameters in comparison to Early Pre-Pottery Neolithic A specimens (Fuller et al. 2012). Lentils, along with wheat and barley, spread further westwards into Europe during the seventh and sixth millennia BCE, southwards to Egypt during the fifth millennia BCE, and eastwards to

the Indian subcontinent, apparently via Afghanistan (Erskine et al. 2011), by 4000 BCE. Lentils were widespread in the Indus Valley and began to be grown in the monsoon zone of India between 2500 and 2000 BCE and are particularly common in the second millennium BCE (Fuller and Harvey 2006). Lentils had reached southern Arabia, both the Yemen and the United Arab Emirates, by c. 2500 BCE (Boivin & Fuller 2009).

Like all of the founder crops, *Lens* is self-pollinated, which was an advantage during the process of domestication because self-pollinated species are able to more easily fix desired genotypes by creating a barrier between cultivated and wild populations. As a result many interfertile landraces have evolved. The two main varieties are subsp. *microsperma* and subsp. *macrosperma*. The *microsperma* have small pods with small seeds, ranging in diameter from 3 to 6 mm. All of the early prehistoric archaeological specimens of domestic lentil are attributed to this variety (van Zeist 1982), as are all traditional landraces that spread to the south and east of the Fertile Crescent. The *macrosperma* varieties have larger pods and seeds, with a diameter ranging between 6 and 9 mm. This larger variety is considered the more established cultivar, and archaeobotanical evidence suggests this type developed in the first millennium BCE and is mainly restricted to Europe and North Africa (Cubero 1981; Zohary et al. 2012).

The primary traits of lentil that evolved under domestication include the retention of the seed in the pod as opposed to separation of the seeds upon maturation. The advantage to the farmer of the seed remaining on the pod is that the seeds must then be harvested by the cultivator. Another trait that evolved under domestication is the loss of wild-type seed dormancy, which involves seed-coat thickness. In the wild the seed coats are thicker which enables the spread of seed germination over the course of several years by not allowing water to penetrate. The loss of this trait contributes to thinner seed coats which are more permeable to water and as a result all seeds germinate the same year they are sown, although this appears to be difficult to recognize in archaeological specimens (Zohary et al. 2012). Instead it is the increase in seed size, or the dispersal beyond its wild range, that testifies to domestication.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Barley: Origins and Development
- ▶ Chickpea: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Pigeon Pea: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Wheats: Origins and Development

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Leone, Mark P. (Historical Archaeology)

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Basic Biographical Information

American archaeologist Mark P. Leone (b. 1940) holds a B.A. in History (Tufts, 1963) and an M.A. and a Ph.D. in Anthropology (Arizona, 1966 & 1968). He worked at Princeton (Assistant Professor, Anthropology) before moving to the University of Maryland (Associate Professor then Professor, Anthropology; Chair of the Department of Anthropology; Chair of the College Park Senate) and has held positions and offices with the National Science Foundation Advisory Panel for Anthropology, the Governor's Consulting Committee on Historic Places in the State of Maryland, the American Association of University Professors, the Anthropological Society of Washington, the Society for American Archaeology, and the Council for Northeast Historical Archaeology.

Major Accomplishments

Leone's early work – on the prehistory of the southwestern United States – was within the New Archaeology tradition. However, during his time in Arizona, he began to follow an alternative path with a growing interest in questions of the contemporary role of archaeology. His move to Princeton brought with it an introduction to postmodern thought and, more importantly for him, Marxism and critical theory. In the latter, Leone found a means of theorizing the politics of archaeology – one which allowed him to build on rather than abandon his New Archaeology foundations. In parallel, a shift from prehistoric to historical archaeology allowed him to apply his craft to the study of the modern world, resulting in explorations of Mormon material culture, archaeological analyses of capitalism, and reconsiderations of African-American history.

In much of his work, Leone has combined theory and practice, most notably through the Archaeology in Annapolis project which he has directed since 1981. His consistent concern has been to question the dominant discourses of modern history and to construct alternative narratives of the recent past. His aim has been to expose archaeology as a medium of power and to contribute to a more participatory and democratic understanding of the past by combining scientific hypothesis examination with a reflexive stance and political intent (issues he has discussed in a recent interview: see Dalglish 2007). Mark P. Leone's contribution to the theory and practice of archaeology is widely acknowledged and his well-cited works include his writings on the William Paca Garden (Leone 1984), critical archaeology (Leone et al. 1987) and capitalism (e.g., Leone & Potter 1999). A number of his key works have been collected and published as *Critical Historical Archaeology* (Leone 2010).

Cross-References

▶ Annapolis: Historical Archaeology
▶ Capitalism in Archaeological Theory
▶ Capitalism: Historical Archaeology
▶ Critical Historical Archaeology
▶ Ideology and Materiality in Archaeological Theory
▶ Middle-Range Theory in Archaeology

▶ Modern World: Historical Archaeology
▶ New Archaeology, Development of
▶ North America (USA): Historical Archaeology

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Further Reading

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Leone, Mark P. (Theory), Fig. 1 Mark Leone (Photo by Ben Skolnik)

Leone, Mark P. (Theory)

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Basic Biographical Information

Mark P. Leone (Fig. 1) is an American historical archaeologist who has promoted the application of critical theory in historical archaeology. Leone was born in 1940 in Waltham, Massachusetts, historically a manufacturing town in the western suburbs of Boston. He studied history as an undergraduate at Tufts University, earning a Bachelor of Arts in 1963. Leone received his graduate training in anthropology at the University of Arizona in Tucson, earning a Master of Arts degree in 1966 and receiving his doctorate in 1968. He was an Assistant Professor at the Department of Anthropology at Princeton University (1968–1975). Leone joined the faculty at the University of Maryland College Park in 1976 and was promoted to Professor in 1990. He served as Chair of the Department of Anthropology (1993–2003) and Chair of the University Senate (2000–2001).

Leone has been extremely active in the profession and held numerous leadership positions. He served on the Governor's Consulting Committee on Historic Places in the State of Maryland (nomination panel for the National Register of Historic Places) (1978–1990). He was Secretary (1979) and then President (1980–1981) of the American Association of University Professors, College Park Chapter. He served on the Board of Managers, Anthropological Society of Washington, before becoming

President (1984–1985). He was Chairman (1986–1988) of the Government Affairs Committee of the Society for American Archaeology. He served as Treasurer-Elect (1988), Acting Treasurer (1989), and Treasurer (1989–1992) of the Society for American Archaeology.

Leone directs a long-term research project called "Archaeology in Annapolis," which was founded in 1981, and continues at the time of this publication. Many of Leone's accomplishments have been made possible by this project and its partnerships. Leone provides an excellent synopsis of this project in the preface to *The Archaeology of Liberty in an American Capital* (2005), and the book synthesizes the major discoveries in Annapolis. His more recent *Critical Historical Archaeology* (2010) is very much an intellectual autobiography providing insight into his scholarly objectives and methodology through a series of excerpts from his earlier works.

Major Accomplishments

Leone was highly influenced by Lewis Binford and is counted among the generation that founded the New Archaeology. Although Stanley South is most frequently recognized for bringing processualism into historical archaeology, Leone was also very active in this program, and he carried forward the imperatives for archaeology that were established by Binford during this period. He is also closely associated with postprocessual archaeology, both as a contributor and as a critic. His historical archaeology provided a fertile ground for the introduction and working out of concepts of ideology and power.

One objective of the New Archaeology was to establish greater social relevance by doing research that was engaged rather than detached from public life. Historical archaeology was one outlet for that engagement, since it held out the possibility of understanding the origins of modern society. During the 1970s, Leone found himself critical of the way in which historical archaeology articulated with modern belief systems. Those connections were especially visible in the commemoration and the nationalization of historical sites, which was rarely critical or reflexive, but instead sustained the master narratives of American ideology, especially the idea of possessive individualism, which Leone adopted from Russell Handsman (Leone 1982; Handsman & Leone 1995 [1989]).

Leone found a theory of ideology and its reproduction in the structural Marxism of Louis Althusser, as well as in the Frankfurt School philosophers, especially Jürgen Habermas and Georg Lukács. Marxist theory was virtually absent from the US academy following the McCarthy era and during the Cold War. Leone was exposed to Marxism by anthropologist Steve Barnett, who taught at Princeton University during Leone's appointment as Assistant Professor early in his career. Barnett was a student of David Schneider at the University of Chicago and authored *Ideology and Everyday Life* with colleague Martin Silverman (Barnett & Silverman 1979). Like Schneider, these scholars wanted to build an anthropology of American culture, and Leone's early focus on Mormonism contributed to this project (Leone 1979).

Leone began the Archaeology in Annapolis project in 1981, in partnership with Joseph Dent and Anne Yentsch. He also found an important partner in the Historic Annapolis Foundation, a preservation advocacy group that helped to connect Archaeology in Annapolis with excavation sites, exhibition space, and other resources. Leone's publications drew a number of graduate students to the project. Early research was directed at the ideological footings for merchant capitalism as expressed in the eighteenth-century formal landscapes and other material cultures. During the late 1980s the emphasis of his research shifted to African American heritage in the City of Annapolis. The project was focused especially on the cultural and economic strategies of African Americans in different areas of Annapolis following emancipation and the traces of spiritual practices that derive from African

tradition. In 2001 the project expanded into research sites on the Eastern Shore of the Chesapeake Bay in Maryland, including former plantations associated with Annapolis elites and communities established by African Americans following emancipation.

Throughout his career, Leone has argued that interpretations of the past are a site for political and ideological struggle and that archaeologists can, but frequently do not, play a role in the outcome of these struggles. He has been influential in the development of landscape archaeology (Leone 1984; Leone et al. 2005), as well as approaches to the origins of capitalism (Leone 1988, 1995; Leone & Potter 1999), and the archaeology of African Americans, particularly the identification of spiritual practices with African associations (Leone & Fry 1999; Ruppel et al. 2003). He was also an early proponent of public interpretation at excavation sites, along with Parker B. Potter Jr. (1994; also Leone et al. 1987).

Cross-References

- ▶ Annapolis: Historical Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Critical Theory in Archaeology
- ▶ Historic St. Mary's City
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Marx, Karl
- ▶ Multicultural Archaeology
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory
- ▶ Race in Archaeology
- ▶ Structural Archaeology

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Lepenski Vir: Geography and Culture

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Introduction

Only a few sites/regions in Europe exhibit uninterrupted sequences of occupation across the Mesolithic-Neolithic transition. Moreover, it is rare that one can document rich details of various aspects of life that can shed light on the character of these fundamental changes in the mode of production with concomitant changes in other aspects of life. The Danube Gorges region in the north-central Balkans with a number of settlements found along the Danube and covering the whole duration of the Early Holocene (c. 9600–5500 BCE) offers both the continuous temporal framework for this key period of European prehistory and the richness of evidence for architecture, mortuary practices, ritual, art, and various aspects of daily life. Lepenski Vir is the key site of this sequence, and it epitomizes most of the important elements that characterize the Mesolithic-Neolithic Danube Gorges as a whole, along with the recognition of the site's special character in the period of Mesolithic-Neolithic transformations.

Definition

Lepenski Vir is a settlement found on the right bank of the River Danube in the area known as the Danube Gorges or the Iron Gates on the border between present-day Serbia and Romania. The site became well known in the late 1960s after the discovery of a large forager settlement with standardized trapezoidal building floors associated with sculpted sandstone boulders, which had richly ornamented surfaces. In a number of cases, the boulders were depicting human-fish hybrid beings. The site plays a crucial role in discussions about the nature of forager-farmer interactions at the time of the Neolithic spread in southeast Europe.

Key Issues/Current Debates/Future Directions/Examples

Southeast Europe is the key region for studying the spread of the Neolithic economy and way of life into Europe due to its proximity to areas of the eastern Mediterranean with the earliest well-established and long-lasting Neolithic, agricultural settlements in Eurasia. Models that see the migration or diffusion of farming populations from Anatolia into southeast Europe have persisted in archaeological and popular narratives even though more nuanced scenarios, which see more active role for indigenous forager populations in southeast Europe, have also been suggested (e.g., Tringham 2000; Borić 2002; Whittle et al. 2002). Understanding processes lumped under largely inadequate label of the "Neolithisation" of southeast Europe is still hampered by the lack of evidence for more substantial Mesolithic forager presence across the region as a whole. There are few areas where available evidence documents the presence of the latest phase of the Mesolithic prior to the arrival of the so-called Neolithic package. These processes of subsequent change included wholesale or piecemeal adoption of ceramics, domesticates, ground stone tools, and macro-blade technology to name the most prominent aspects of the archaeological record. One exception to the general rule of scarce Mesolithic presence is the area of the Danube Gorges (Fig. 1). In the course of the rescue excavation project made in the region on both the Serbian and Romanian banks of the river Danube in the 1960s and 1970s, more than 20 sites were found with Mesolithic and/or the earliest Neolithic levels (e.g., Srejović 1972; Radovanović 1996; Bonsall 2008; Borić 2011). Importantly, many of these sites disclosed details of more or less continuous forager occupation of the region since the end of the Last Glacial primarily found in caves and rockshelters, while open-air sites started being occupied after the end of the Younger Dryas, i.e., from around

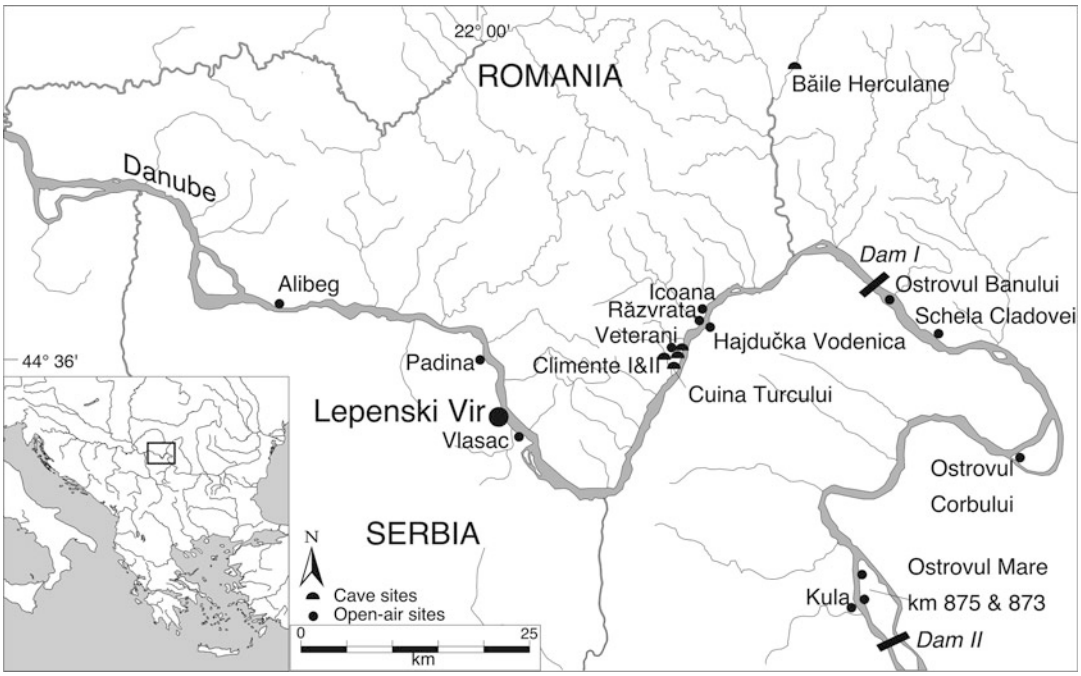

Lepenski Vir: Geography and Culture, Fig. 1 Map of the Danube Gorges with the location of Lepenski Vir and other Epipalaeolithic, Mesolithic, and Early Neolithic sites

9600 BCE. The archaeological evidence indicates that these forager communities might have been focused on fishing as the main subsistence base and that particular places in this landscape were utilized as places for specialized fishing in whirlpools.

The site of Lepenski Vir (Lepenski Whirlpool) was one such location found in the Upper or Gospodjin Vir (Lady's Whirlpool) Gorge of the Danube. The site was founded on a "terrace remnant" of the Danube consisting of finely laminated riverine sands in front of a strong whirlpool. Dragoslav Srejović conducted excavations at the site from 1965 to 1970 (Srejović 1972). The extraordinary features of Lepenski Vir brought the archaeological record of the site to the attention of archaeologists worldwide. However, in the decades following the excavation of the site, doubts raised about the precise dating and association of material culture, and Early Neolithic Starčevo pottery in particular, with the most dominant phase I-II, i.e., the phase of trapezoidal buildings (Fig. 2), limited the impact of this evidence on discussions about the nature of Mesolithic-Neolithic transformations in southeast Europe as a whole. The major stumbling block was the conviction of the excavator Srejović that Early Neolithic pottery and other typical Neolithic items of material culture (e.g., polished stone axes) were not associated with the occupation of trapezoidal buildings of phase I-II but intrusions from the overlying layer attributed to Early/Middle Neolithic phase III. In addition, at the time, a series of radiometric dates from Lepenski Vir that were made on charcoal, and available since the 1970s, were often dismissed as problematic. The reinterpretation of the site's stratigraphy and dating in the late 1990s (Borić 1999, 2002) along with new AMS dates on both animal and human bones associated with the occupation and abandonment of trapezoidal buildings (e.g., Borić & Dimitrijević 2007; Bonsall 2008; Bonsall et al. 2008; Borić 2011) have allowed for a more realistic dating of material culture associations at this site. In addition, it has now clearly been shown that Early Neolithic

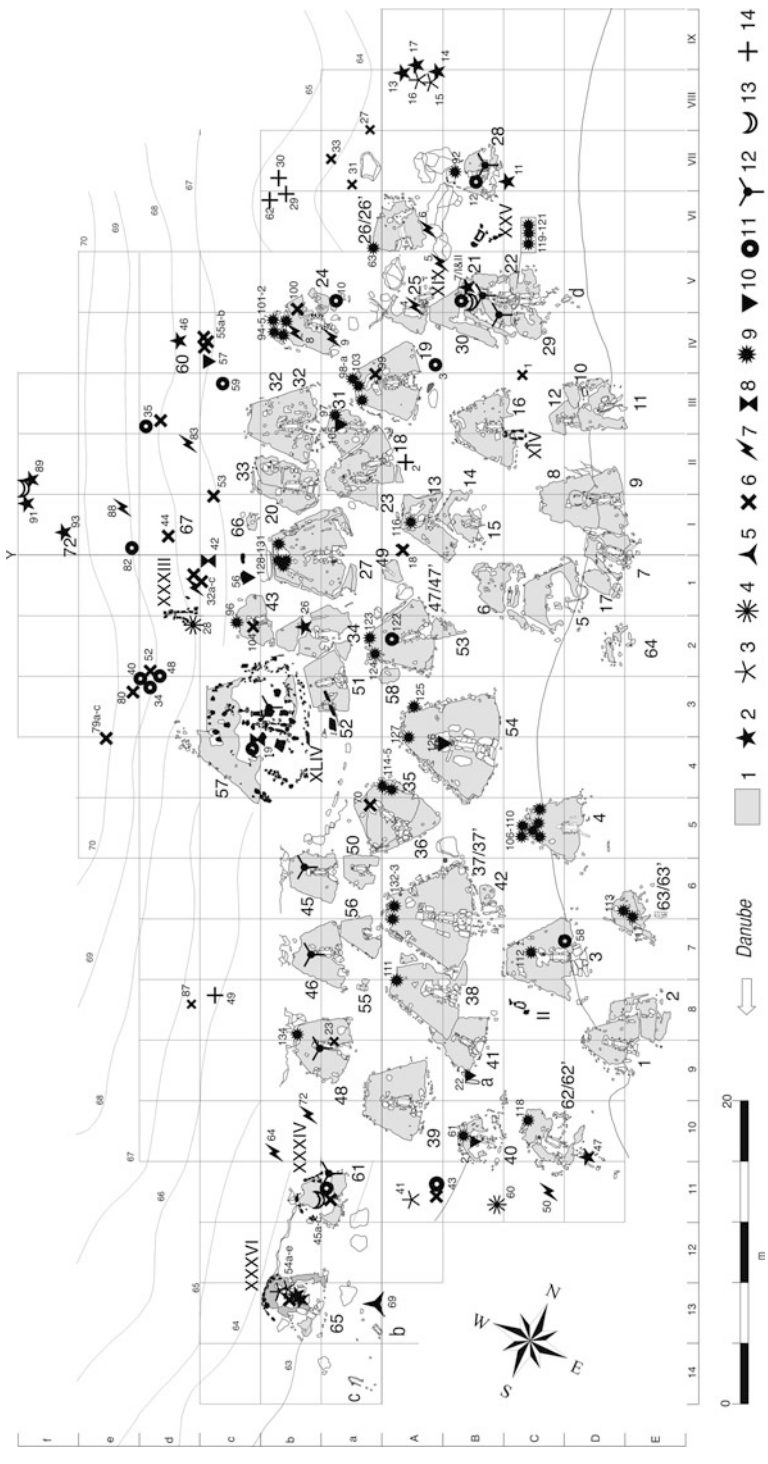

Lepenski Vir: Geography and Culture, Fig. 2 Plan of the excavated area of Lepenski Vir with trapezoidal buildings of phase I-II and burials from all phases represented as symbols. Key: *1* limestone floor, *2* extended skeleton placed on/dug through limestone floor or found outside buildings (parallel to the Danube – oriented downstream), *3* headless extended skeleton placed on/dug through floor and outside buildings (parallel to the Danube – oriented downstream), *4* extended skeleton, *5* seated skeleton with crossed legs, *6* disarticulated postcranial bones on/beneath floor and outside buildings, *7* contracted and flexed skeleton placed on floor or buried outside buildings, *8* headless contracted skeleton, *9* skeletons of neonates and children dug through floors (extended and contracted), *10* human mandible, *11* human skull, *12* red deer skull with antlers, *13* aurochs' skull with horn cores, *14* post-Neolithic burials

Starčevo pottery was associated with trapezoidal buildings contrary to the view held by the excavator of the site (Borić 1999, 2011; Garašanin & Radovanović 2001).

Currently, Lepenski Vir is one of the best absolutely dated sites of the period in southeast Europe with over 90 radiometric measurements. These dates have helped to revise the original stratigraphic division of the site and suggested realistic spans for particular phases (cf. Borić & Dimitrijević 2007; Borić 2011). The earliest phase at Lepenski Vir is known as Proto-Lepenski Vir, and it is currently dated to the regional Early and Middle Mesolithic (from the end of the tenth millennium BCE to the last centuries of the eighth millennium BCE). Due to significant disturbance in the course of later occupation at the site, the remains of this long period of occupation are only sporadically found as partially preserved stone constructions, concentrations of artifacts, occasional burials with human remains, and possibly also the earliest forms of rectangular stone-lined hearths. Burials dated to this earliest Mesolithic phase at Lepenski Vir can be characterized as single inhumations, mainly placed in supine extended positions, sometimes with flexed legs. In the course of what can in chronological terms be distinguished as the Middle Mesolithic period (c. 8500–7300 BCE), a particular burial rite is documented at this and several contemporaneous sites in this region: seated burials with crossed legs. It also seems that rectangular stone-lined hearths, which might have been the central part of light dwelling constructions, can also be associated with Proto-Lepenski Vir phase. On the basis of the preserved material culture dated to this period, there are no elements that can at the moment suggest a more fined-grained chronological resolution for this long duration of Proto-Lepenski Vir phase. Judging by the current distribution of radiometric dates and associated material culture, Lepenski Vir was not inhabited in the course of the regional Late Mesolithic (c. 7300–6200 BCE), i.e., for approximately a thousand years after the end of the Middle Mesolithic phase. On the other hand, the Late Mesolithic period in the Danube Gorges saw intense occupation at many other sites, including two sites neighboring Lepenski Vir: Vlasac, located 3 km downstream, and Padina, located 5 km upstream from Lepenski Vir.

A robust sample of radiometric dates indicates that Lepenski Vir was resettled again after 6200 BCE, in the course of the period that is in the stratigraphy of the site now referred to as phase I-II. This labeling differs from the one suggested by the excavator Srejović (1972) who assumed two separate phases: Lepenski Vir I with subphases a–e, characterized by trapezoidal plan buildings plastered with limestone floors, and Lepenski Vir II, characterized by assumed trapezoidal plan buildings made up of stone walls but without limestone floors. However, it has been shown that the two phases should be merged together since the stone walls of Srejović's phase II buildings overlap with the trapezoidal buildings of phase I, and hence, the limestone floors and the stone walls form part of the same buildings (Borić 2002, 2011). Hence, the label of this phase is I-II. I. Radovanović's (1996) more recent division of phase I as defined by Srejović into subphases 1–3 on the basis of stylistic differences, i.e., presence/absence of particular architectural elements, has also been called in question (Borić & Dimitrijević 2007). It also seems that phase I-II did not last longer than 200 years.

Phase I-II is the period during which the most intense building activity took place at the site with the construction of close to 70 semisubterranean buildings with trapezoidal bases furnished with limestone floors and with central rectangular stone-lined hearths (Fig. 3). The presence of such stone-lined hearths bespeaks of the regional cultural continuity with the previous Late Mesolithic period. Primarily in association with the hearths of trapezoidal buildings, on the floor level, there were over 90 sculpted and aniconic sandstone boulders (Fig. 4), some probably acting as mortars (Srejović 1972; Borić 2005). This large quantity of boulder "artworks" is unmatched for the region as a whole, and only at the sites of Padina, Hajdučka Vodenica, and Cuina Turcului were a few ornamented boulders also found. The reoccupation of Lepenski Vir at a particular historical moment and the outstanding features of this site not shared in character or scale with other

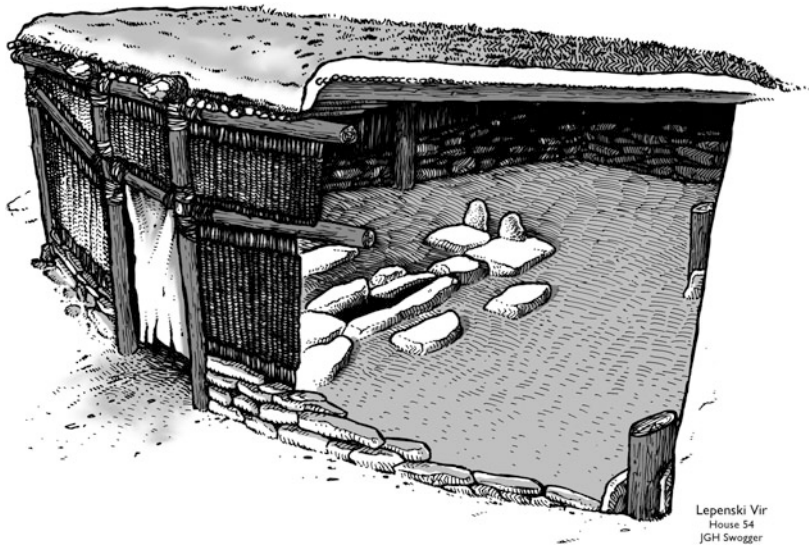

Lepenski Vir: Geography and Culture, Fig. 3 Reconstruction of building 54 from Lepenski Vir (Drawing: J.G. Swogger)

Lepenski Vir: Geography and Culture, Fig. 4 Boulders found in situ in building XLIV/57 at Lepenski Vir

contemporaneous sites in the Danube Gorges may suggest that this locale might have been of special interest to the autochthonous forager communities due to the site's particular position within the Danube Gorges' landscape. Namely, the site is situated directly across the Danube from the trapezoidal Treskavac Mountain, a prominent landscape feature in this part of the region. The importance of this landmark can be inferred on the basis of the shape of building floors, which mirrored the mountains trapezoidal shape.

It is also hardly a coincidence that this elaboration and building activity at Lepenski Vir in particular took place at the time when Early Neolithic farming communities became established across the northern areas of the Balkans (Whittle et al. 2002). It is likely that forager communities in the Danube Gorges were strongly emphasizing their cultural tradition as the consequence of increasing contacts with Early Neolithic groups while adopting a number of materialities (e.g., pottery, polished stone axes, new types of ornaments) coming from the expanding world of Neolithic farmers. Yet the adoption of the Neolithic traits at Lepenski Vir was piecemeal, and during phase I-II one finds no domestic animals associated with the occupation of trapezoidal buildings (Borić & Dimitrijević 2007). Moreover, burial rites changed little from the norm of Late Mesolithic burials found across the region and characterized by extended supine inhumations oriented parallel to the axis of the River Danube, with their heads most frequently pointing in the downstream direction of the river course. During phase I-II, burials were interred through limestone floors (Fig. 5) or placed over the floor area of abandoned buildings. Another unique feature of Lepenski Vir in comparison to other contemporaneous sites is more than 40 neonates found

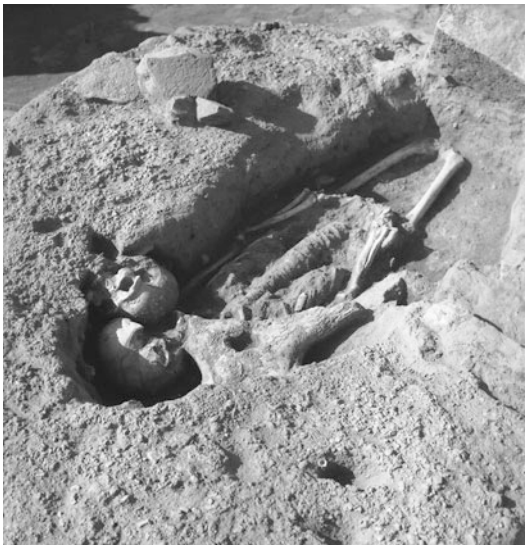

Lepenski Vir: Geography and Culture, Fig. 5 Limestone floor of trapezoidal building 21 at Lepenski Vir with extended supine burial 7/I interred through the building floor; this primary burial was associated with disarticulated human skull (no. 7/II) and an aurochs skull, while another red deer skull with antlers was found next to the deceased

buried beneath the rear, narrow areas of trapezoidal buildings (Borić & Stefanović 2004).

Neither revised stratigraphic evidence nor radiometric dates at present suggest a break in the occupation of Lepenski Vir between phases I-II and III (*contra* Srejović 1972). Yet, around or just after 6000/5950 BCE, there is a significant change in the pattern of occupation at the site. It seems that all or most of the trapezoidal buildings at Lepenski Vir were abandoned by this time, with some evidence that certain buildings, the floors of which were in some cases already covered with a layer of soil, were used for the interment of burials. The burial practices also change. While there remains a possibility that a few extended burials can be dated to this phase, the dominant burial rite during phase III between 6000/5950 and 5500 BCE are crouched inhumations, placed on their right or left sides, and with variable orientations. There are over 20 such primary burials in evidence, with a number of secondary or disarticulated burials found across the site. In one case, two crouched burials (nos. 8 and 9) were placed symmetrically one facing the other with opposite orientations over the floor of a trapezoidal building (no. 24), likely some time after its abandonment and backfilling. The crouched burial position characterizes the typical Neolithic burial rite across the Balkans and beyond (e.g., Whittle et al. 2002). Moreover, recent results of strontium isotope analyses indicate that a significant number of the individuals placed in crouched positions were migrants, originating in several geologically differentiated areas outside the Danube Gorges (Borić & Price 2013). A new feature, typical of various other Early-Middle Neolithic sites across the northern Balkans at this time, found at Lepenski Vir during phase III are a number of mostly irregular pits of various dimensions found across the settlement. These pits were filled up with large quantities of ceramics, stone weights, and burned daub fragments coming from destroyed walls made in wattle and daub construction techniques, and other cultural material. There is no clear evidence of aboveground dwellings during phase III, and this is a recurrent bias with regard to many other Early-Middle Neolithic sites in the wider region. There is also evidence of several domed ovens attributed to this period and found across the site. Four ceramic hoards have been associated with this phase. Hoard 1 contained a necklace made from Spondylus, nephrite, and *Columbella rustica* beads, Hoard 2 contained stone axes, while Hoards 3 and 4 contained blanks of the so-called "Balkan" or yellow-white spotted flint. This particular raw material at this time became abundantly used across the Balkans, with frequent production of large macro blades with steep retouch. A large quantity of such specimens were also found at Lepenski Vir. The most likely origin of this raw material are outcrops in northern Bulgaria, several hundred kilometers away from the Danube Gorges, indicating the existence of long-distance exchange networks during this period. Of special interest are also several beads and other items from copper minerals found at Lepenski Vir, and which can be associated with both phases I-II and III. The most likely place of origin for these minerals is the nearby mining site of Rudna Glava, which continued to be used in later prehistoric periods for the extraction of copper minerals.

On the face of the current radiometric evidence and archaeological remains from Lepenski Vir, it seems that the site was abandoned before 5500 cal. BCE. Many other sites used more or less continuously throughout the Mesolithic and the Early Neolithic phases in the Danube Gorges were also abandoned around the same time. The abandonment of, by this time, old Mesolithic-Early Neolithic locales along the Danube in this region may relate to another important, region-wide culture change taking place around this time. This change brought to archaeological visibility long-lasting agricultural and stockbreeding communities in the central Balkans known in terms of culture history as the Vinča culture groups. Important changes in settlement pattern and material culture styles were taking place in the century following 5500 cal. BCE, marking the beginnings of the Late Neolithic period in the central Balkans. For these successful agricultural communities, an agriculturally marginal region such as the Danube Gorges and places suitable for large-scale fishing seems to have held little importance. The first post-Neolithic presence at Lepenski Vir is marked by an Early Copper Age burial associated with the Salcuța culture, dated to around 4300 cal. BCE (Bonsall et al. 2008). Sporadically, Lepenski Vir was also used in Roman and Medieval times, with several buried individuals associated with these respective periods now directly AMS dated (Bonsall et al. 2008).

Stable isotope data are now available for a number of burials from Lepenski Vir and other sites in the Danube Gorges, providing important information on dietary practices of Holocene foragers and early farmers in this region (Cook et al. 2002; Bonsall 2008). Furthermore, the combination of isotopic research and AMS dating has suggested that throughout the Mesolithic significant intake of river fish and migratory sturgeon species, which come from a different ecosystem than the atmosphere, deposited "old carbon" in humans and domestic dogs, with both species abundantly feeding on fish. Such physiological processes affect radiocarbon measurements made on the bones of these species. In such instances, when $\delta^{15}N$ values are elevated (over 13.0 ‰ and with many burials at Lepenski Vir and other forager sites in the region exhibiting values of 15.0 ‰ and over), a substantial intake of fish protein in the diet of measured individuals can be inferred. Such insights prompted researchers to devise a correction factor specific to this particular region that can be applied to the obtained radiometric measurements before calibration of dates (Cook et al. 2002). While fish-dominated diet seems to have remained constant throughout the Mesolithic period in the Danube Gorges, a number of burials from Lepenski Vir also show less elevated values (around or below 10.0 ‰). Such burials with lower $\delta^{15}N$ are also consistently dated to the phase of Mesolithic-Neolithic transformations, i.e., Lepenski Vir I-II, as well as to the Early/Middle Neolithic, i.e., phase III. Moreover, a number of these individuals were buried in crouched positions, suggesting a correlation between Neolithic-style mortuary practices and a diet less dominated by fish. Combined with recent insights from strontium isotope analyses, this evidence suggests that in the course of transformational phase I-II and in particular during phase III, a significant number of first-generation migrants from Neolithic communities were mixing with the locals at Lepenski Vir.

While research efforts in the past decade or so clarified many aspects of the existing evidence from the site of Lepenski Vir, there still remains an important task of providing systematic and detailed publications of various strands of data that would disclose in full the richness of this extraordinary site for the students of European prehistory. Moreover, forthcoming DNA research on the large collection of human remains from this and other sites in the Danube Gorges will provide a unique opportunity for better understanding of population dynamics at the crucial point in the transition from the Mesolithic to the Neolithic social milieus in this key area of prehistoric Europe.

Cross-References

- ► Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ► Complex Hunter-Gatherers
- ► Demographic Transitions

▶ Europe: Mesolithic-Neolithic Transition
▶ European Mesolithic: Geography and Culture
▶ Hunter-Gatherer Settlement and Mobility
▶ Hunter-Gatherer Subsistence Variation and Intensification
▶ Hunter-Gatherers, Archaeology of
▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

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Basic Biographical Information

André Leroi-Gourhan was one of the greatest prehistorians of the twentieth century. He is well known for his significant contributions to archaeological method and theory and to the study of rock art. Born in 1911 in Paris, Leroi-Gourhan was orphaned very early and grew up with his maternal grandparents, who took him on frequent visits to the Natural History Museum in Paris. These visits awoke in him a fascination with the natural sciences. This fascination, along with the influence of his grandfather who was a member of the Naturalists' Association, converted Leroi-Gourhan into an ardent nature lover who soon came into contact with a range of prehistorians.

At first, Leroi-Gourhan was not a motivated student, and he left study when he was 14 years old to be apprenticed to a merchant. He soon changed jobs and met some of the people who would most influence him in the future. His godmother played an important role in his development by giving him the gift of a book by Marcellin Boule, *Les hommes fossiles*, and by introducing him to Paul Boyer, the administrator of the School of Oriental Languages, who would offer Leroi-Gourhan a post as assistant secretary and library helper. These positions allowed Leroi-Gourhan to continue his studies, and he finished a diploma course at the Sorbonne in Russian in 1931 and in Chinese in 1933.

Leroi-Gourhan embraced the study of ethnology, while working for the France Institute of London in the ethnography department of the British Museum. Two of Leroi-Gourhan's works were completed during this period: *Bestiaire du bronze chinois* (1936a) and *La civilisation du Renne* (1936b). That same year, he married Arlette Boyer, the daughter of Paul Boyer. As a research professor of CNRS (Centre National de la Recherche Scientifique) and the Collège de France, Leroi-Gourhan began working on two of the works that would become points of reference for the world of prehistory: *L'homme et la matière* (1943) and *Milieu et techniques* (1945). During the Second World War, Leroi-Gourhan was commissioned to watch over the security of some of the art objects evacuated from the Louvre Museum and that he took part in different activities with the French Resistance, which earned him several honorary decorations.

In 1946, while deputy director of the Museum of Man (Musée de l'Homme), Leroi-Gourhan was named Professor of Colonial Ethnology at the University of Lyon. This position allowed him to develop the teachings in comparative technology that would form the future foundations of his research and teaching in prehistoric ethnology. At this time, he completed his doctoral thesis, directed by Marcel Mauss and entitled *Archéologie du Pacifique nord et documents*

pour l'art comparé de l'Eurasie Septentrionale (1945). Later, he completed a second doctoral thesis *Les tracés d'équilibre mécanique du crâne des vertébrés terrestres et etude des restes humains fossiles provenant des grottes d'Arcy-sur-Cure* (1954). In 1956, Leroi-Gourhan was appointed to the Chair of General Ethnology and Prehistory at the University of the Sorbonne, and later, between 1969 and 1982, he was the Chair of Prehistory at the Collège de France.

Leroi-Gourhan received numerous awards and prizes for his contributions. In 1973 he was awarded the Gold Medal of the Centre National de la Recherche Scientifique in recognition of his outstanding contributions to archaeology, both nationally and internationally. In 1978 he received the Grande Prix of the national archaeology of the Ministry of Culture and in 1979 the Golden Medal of the Academy of Architecture, national prize of the Fissen fund, and the Legion of Honour. In 1980, he was elected in the Academy. Leroi-Gourhan died in 1986.

Major Accomplishments

Leroi-Gourhan's major accomplishments include a modernization of excavation methods in France, including the incorporation of multidisciplinary teams into archaeological investigation and the introduction of spatial studies, ethnographic concepts in Paleolithic studies, such as the *chaine operatoire* concept, and structural analysis in the study of prehistoric rock art.

Excavation Methods

Leroi-Gourhan was trained in a prehistoric archaeology that was more concerned with excavation to recover objects than in research for its own sake. However, possibly due to his ethnographic training, he became aware that objects without their context only contributed part of the information. That is to say, they provided the relative chronologies without an understanding of the ways of life. For this reason he developed excavation methods which focused on the quality of documentation and the area excavation of sites, with the objective of enabling the reconstruction of all aspects of the population that had lived there thousands of years before.

This approach meant that all archaeological remains were recovered, no matter how small or fragmented, so they could later be studied by a group of specialists from diverse disciplines. An example of this excavation methodology was the Magdalenian site of Pincevent, where for over 20 years (from 1964), Leroi-Gourhan educated many prehistorians in his passion to reconstruct the past through a multidisciplinary spatial analysis, which would lay the foundations of prehistoric ethnology.

Paleo-Ethnology: Technique and Culture

Leroi-Gourhan's ethnographic education formed the basis for all his work and effort in studying prehistory. This is well exemplified in his most famous publications *L'homme et la matière* (1943), *Milieu et techniques* (1945), and *Le geste et la parole* (1964b). Within this ensemble of investigations, it is worth highlighting his adaptation of the ethnographic concept of the operative chain (*chaine opératoire*) to prehistory (Balfet 1991). This deals with a theoretical concept that attempts to understand archaeological occurrences, be they physical or artistic, in terms of the sequence of technical operations implied in all phases of their production. This concept, reformulated in the 1990s, has been the basis for the development of technological studies, both in rock art and in the analysis of lithic industries.

Prehistoric Art

Leroi-Gourhan transformed the study of prehistoric art. In particular, he is accepted as being the first scholar to introduce structuralism to the analysis of rock art. Using ethnographic comparisons, he treated prehistoric art as an expression of a religion, or magical aspects, during the Paleolithic. This approach is especially evident in his work *Les religions de la préhistoire* (1964a). However, his greatest contribution to this field was to propose a progressive evolution of diverse styles of Paleolithic art, from the simplest to the most complex, published in his work *Préhistoire de l'art occidental* (1965).

During the twentieth century, methods for examining prehistoric art were completely reformed, thanks to Leroi-Gourhan's studies. His scrupulousness in the excavation process was translated to his analysis of painted walls, where the study of each figure in relation to its neighbors, and to the rest of the panel and the topography of the cavity, enabled him to develop the hypothesis that the panels were ordered in a relationship to the central figures and that in general a duality could be observed between man and woman in the images of bison and horses.

Leroi-Gourhan's proposal articulated the existence of four great stylist phases and became the model of reference in the field till the close of the twentieth century, when the direct dating of figures from diverse locations provoked a reconsideration of these hypotheses by some researchers, sparking off a widespread controversy that persists to this day (Alcolea & Balbin 2007).

Cross-References

- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Lithic Technology, Paleolithic
- ▶ Structural Archaeology
- ▶ Style: Its Role in the Archaeology of Art

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Lev, David N.

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Basic Biographical Information

David Natanovich Lev (1905–1969) was the leading investigator of the Stone Age in Central Asia, and a professor at the University of Samarkand.

In 1931, he graduated from Leningrad State University with an archaeologist specialty. From 1931 to 1942, David Lev worked in the Department of Archaeology of the Museum of Anthropology and Ethnography at the Academy of Sciences of the USSR in Leningrad as a researcher and then as head of the department. During this period, he published two guides on the Department of Archaeology and collections stored there relating mainly to the old mining. D.N. Lev had dedicated his Ph.D. dissertation (thesis) to the history of ancient mining. He graduated in 1945. He was a close disciple of P.P. Efimenko, and participated in Efimenko's excavations at Kostenki. At the same time, fate brought Lev together with another major archaeologist – V.A. Gorodtsov. Circumstances were that in the 1930s, when V.A. Gorodtsov was still full of strength and energy and seeking to

organize large archaeological expeditions, only two of his young scientific friends were true, selfless helpers: D.A. Krainov and D.N. Lev, together with Gorodtsov, excavated the Elizabethan settlement in the Kuban and the Ilsk Paleolithic site.

From 1944 to 1969, David Lev was the head of the Department of General History in the History Department at the University of Samarkand, where he led the preparation of extensive field research on the Paleolithic of Uzbekistan.

Major Accomplishments

David Lev's studies provided excellent results, especially those concerning the systematically excavated cave of Aman-Kutan near Samarkand and Samarkand late Paleolithic site. Aman-Kutan was widely known among archaeologists in the Soviet Union and abroad, and now, following Teshik-Tash and Obirakhmat, is one of the richest expressions of Mousterian cave settlements of Central Asia.

The excavations of Samarkand site, from 1958 to 1968, were very fruitful. Materials of late Paleolithic settlements are unique, because in the huge territory of Central Asia and Kazakhstan, they discovered for the first time the bones of an old man of the modern physical type of *Homo sapiens sapiens*. Samarkand revealed three cultural layers, separated by a sterile layer at a depth of 1.70–6 m from the ground surface. The deposits included stone products (over 800 items), fossil fauna, the remains of dwellings, ochre, and objects of art. The materials of the Samarkand site, published in a number of papers by D.N. Lev, certainly helped to resolve many important issues of the Stone Age, not only in Central Asia but also in Iran, Pakistan, India, and other countries.

The great discoveries of archaeological sites of Paleolithic Time were added with Mesolithic and Neolithic complexes so-called Sazagan culture in Samarkand region. The Sazagan antiquities were opened by O.I. Ibragimov, and investigated by D.N. Lev from 1966. These artifacts enabled identification of some features of the Neolithic inhabitants, and the evolution and continuity of the Stone Age cultures of Zarafshan.

David Lev is best known as the researcher of Paleolithic Uzbekistan (Mousterian cave site Aman-Kutan, Samarkand Upper Paleolithic), but his archaeological work was comprehensive and included analysis of the monuments of different archaeological periods. Lev surveyed and registered additional monuments almost every time he visited the Zarafshan Valley. His scientific publications are not very widely known among researchers, despite their undoubted importance. Most of the results of his research remained in his diaries, manuscripts, and archives of the Department of Archaeology in the History Faculty of Samarkand State University. Among these is a general report on his work, submitted for the degree of Doctor of Sciences on the theme: "*Research on the Paleolithic of Uzbekistan*" (1966).

The style of David Natanovich's scientific activity was the use excellent language and an absence of repetition. The abundance of empirical data, which he owned, provided material that would have allowed Lev to write much more than the number of his printed works (about 50 titles). Nevertheless, his materials on Paleolithic sites of Uzbekistan received world recognition.

Teaching activities have an important place in the biography of David Lev. The lectures of Lev had great success. He channeled all the passion of his inquisitive nature into his lectures. He sought to give the students not only large knowledge, but convey to them the thirst for investigation and joy of archaeological inspiration. He wanted not only to give his listeners certain information, but also to share his passion for archaeological research with them.

D.N. Lev was a founder of the Scientific Laboratory for the historical and archaeological study of settlement Afrasiab at Samarkand State University.

David N. Lev combined a deep knowledge on the Stone Age, mining, ethnography, and museum studies with teaching activity (1941–1969) at Samarkand State University. Unfortunately, the scientific and organizational creativity of

D.N. Lev is still not widely appreciated in archaeological literature, but this publication goes some way toward redressing this.

Cross-References

- ▶ Central Asia: Paleolithic
- ▶ Gorodtsov, Vasily A.
- ▶ *Homo sapiens*
- ▶ Kostenki: Geography and Culture
- ▶ Lithic Technology, Paleolithic
- ▶ Mousterian Industry Tradition
- ▶ Okladnikov, Alexey P.

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Lévi-Strauss, Claude

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Basic Biographical Information

Claude Lévi-Strauss was born on November 8, 1908, in Brussels and raised in Paris where his father worked as a painter. His upbringing in a secular Jewish family passionate for art gave him access to books, museums, flea markets, art galleries, and operas. During his years at the *lycée*, Lévi-Strauss became fascinated by geology, read Freud as soon as his books were translated in French, and was introduced by a family friend to the socialist movement and the works of Marx. In these three early intellectual interests, he found rational explanations for the seemingly illogical phenomena underlying the earth, the mind, and society. Lévi-Strauss passed the *agrégation* of philosophy in 1931 and became a high school teacher in Mont-de-Marsan. But, his desire to apply philosophical knowledge and thirst for new discoveries pushed him toward a career as an ethnologist.

In 1934, he was offered a position as a sociology professor on a French university mission to Brazil. Before embarking on the 20-day boat trip from Marseilles, he read, what would become standards for his own research, Robert Lowie, Franz Boas, and Alfred Kroeber. At the end of his first academic year in São Paulo in 1935, Lévi-Strauss set out on a 4-month expedition to the Caduveo and Bororo tribes. Three years later, a longer expedition sponsored by the *Musée de l'Homme* allowed him to spend almost an entire year in the Mato Grosso with the Nambikwara, Munde, and Tupi-Kawahib tribes. He returned to Paris with his ethnographic material in March 1939 but was immediately sent to the front at the start of World War II. Lévi-Strauss managed to escape to southern France before the invasion of the German army. However, after the Statute on Jews was adopted in October 1940, he lost his French citizenship and any chance of finding a teaching job. In addition, his request for a visa to return to Brazil was denied.

Promised to a brilliant career in his own country, Lévi-Strauss found refuge in the United States. With the help of Alfred Métraux, Robert Lowie, and his aunt Aline Caro-Delvaille in New York, the New School for Social Research (recently opened by the Rockefeller foundation) invited him to teach a course on South America. He would stay from 1941 to 1947 bringing with

him the notes and diaries, photographs, and maps collected in Brazil used to finish a classic ethnographic report and formal analysis of his earlier expeditions' results (1948). He also spent much time in the New York Public Library collecting information on kinship systems. While in the United States, he met American anthropologists such as Boas, Kroeber, Linton, Benedict, and Mead and became the friend and colleague of other exiled intellectuals like the Russian linguist Roman Jakobson, whose structural linguistics offered Lévi-Strauss the general inspiration for the analysis of his ethnographic data.

Major Accomplishments

It was in conversation with Roman Jakobson that Claude Lévi-Strauss developed the theoretical model for which he is now best known: Structuralism. Lévi-Strauss' structuralism studies human and social phenomena as diverse as kinship, mythology and rituals to discover the underlying structures by which meaning is produced within a culture. As Jakobson did with languages, in order to go beyond the simple accumulation of facts, Lévi-Strauss examined kinship as a set of relations. Having adopted this model, he completed his thesis in February 1947 and defended it a few months later upon his return to France. The results of his labor would be published as *Les structures élémentaires de la parenté* (1949), which, if recognized by some as a reference work, was criticized, especially within French academia, as too ambitious. Lévi-Strauss' book did offer an encompassing methodology to scientifically examine family organization. Rather than focusing on the relationship between family members itself, he considered the logical structures underlying them. The methodological direction Lévi-Strauss embarked upon in the 1940s would lead, less than two decades later, to the publication of *Anthropologie structurale* (1958) – a collection of articles written in the 1950s investigating kinship, myths, magic, and art. Extending beyond the disciplinary boundaries of anthropology, this manifesto of structuralism would have a lasting influence in all fields within the social sciences and humanities during the second half of the twentieth century.

While considered by some as his least "scientific" work, *Tristes tropiques* (1955), a memoir of the anthropologist's travels combining personal recollections, ethnographic insights, and philosophical meditations, brought Lévi-Strauss the most public recognition. In this autobiographical account, he revealed a critique of western civilization and its associated destructive forces. In 1952, Lévi-Strauss was asked by the UNESCO to write *Race et histoire*. Here again, the author critically examined the supposed benefits of such taken-for-granted notions as social evolution, technological progress, and cultural diversity. The 1950s also marked a transition in Lévi-Strauss' teachings from kinship to mythology. He published the four-volume *Mythologiques*, which follows a single myth in all of its variations from South to North America. Again, rather than focusing on the content of the stories themselves, he examined the underlying structures and relations between their different elements starting with the opposition between raw and cooked (1964). In *La voie des masques* (1975), Lévi-Strauss adapted this structural framework to consider the stylistic differences among Native American masks made in the Pacific Northwest.

Among the many honors received during his lifetime, Lévi-Strauss was elected to the *Collège de France* in 1959 and entered the *Académie Française* in 1974. After retiring from the *Collège* on October 1, 1982 (50 years to the day after beginning his first job in Mont-de-Marsan), Lévi-Strauss remained active publishing *La potière jalouse* (1985), a critique of Freudian interpretations of myths, and *Histoire de lynx* (1991), deploring the human and environmental catastrophes brought on by western colonialism. He also spent time travelling and gave many interviews to journalists. In *De près et de loin*, a book based on a series of conversation between Didier Eribon and Lévi-Strauss, approaching his 80th birthday, the anthropologist reiterated the paradox behind some of his philosophical

views – a pessimistic diagnosis of the destructive power of modern, western societies associated with an imperturbable faith in the totalizing power of science to understand cultural and natural phenomena. Claude Lévi-Strauss died in Paris on October 30, 2009, at the age of 101.

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► Structural Archaeology

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Lewis-Williams, James David

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Basic Biographical Information

David Lewis-Williams was born in 1934 in Cape Town, South Africa. He undertook his undergraduate studies at the University of Cape Town, graduating in 1956. He began teaching English and Geography at Selborne College in 1958, moving to Kearsney College in 1963. In 1965, he completed an honors degree at the University of South Africa. While at Kearsney College, he was active in running the student archaeology club. It was with students from this club that Lewis-Williams began exploring the Drakensberg mountains for San rock art. It was also during this time that he met John Argyle, an anthropologist at the University of Natal (now, the University of KwaZulu-Natal). Argyle encouraged Lewis-Williams to pursue his interest in San rock art by writing a Ph.D thesis. The thesis was completed in 1978 at the University of Natal and was then published in 1981. Entitled *Believing and Seeing: Symbolic Meanings in Southern San Rock Paintings*, the published thesis has become one of the landmark works on the symbology of rock art and has been widely cited (Lewis-Williams 1981).

In 1978, Lewis-Williams was appointed to the Department of Anthropology at the University of the Witwatersrand. While teaching in the department, he was exposed to the structural Marxist thinking that pervaded the social sciences and humanities at the time and that was so influential in South Africa's intellectual, anti-Apartheid circles. In 1982, he published the first Marxist paper on rock art, breaking radically from the functionalist interpretations of earlier and contemporary scholars (Lewis-Williams 1982). In 1980, Lewis-Williams was offered a position in the Department of Archaeology at the University of the Witwatersrand, where he would receive laboratory space for working on the hand-traced copies of large rock art panels that were beginning to become a feature of rock art research at the time. From this position, he received a grant to undertake the research and documentation of San rock art in the Harrismith District on the Maloti Mountains. On the strength of this project, Lewis-Williams established the Rock Art Research Unit, with a small dedicated team, to work on recording and researching San rock art. Later the unit became a center, and after Lewis-Williams' retirement in 1999, it

received the status of an institute. He was appointed as Professor of Cognitive Archaeology in the Department of Archaeology in 1987. At the end of 2012, he continues to be Professor Emeritus in the Rock Art Research Institute, where he is still actively researching and publishing.

Major Accomplishments

Following the success of *Believing and Seeing*, Lewis-Williams began an ambitious publishing schedule, regularly producing groundbreaking papers on the interpretation of San rock art. Influenced by the work of Victor Turner, the anthropologist, Lewis-Williams established the methodology by which San rock art could be interpreted by reading ethnography, most notably the now-famous 19 Bleek and Lloyd records. From the early 1980s, he added the use of literature on neuropsychology and altered states of consciousness as an additional tool for interpretation. Throughout the 1980s, a steady stream of publications saw the deciphering of previously enigmatic images in San rock art through the combination of ethnographic and neuropsychological evidence. Much of the art was shown to concern the San's ritual practices and religious beliefs about the spirit world. In particular, Lewis-Williams argued that the art was principally concerned with the practices of San shamans (known as owners of potency in their own languages), such as their healing and rainmaking activities. Moreover, Lewis-Williams, together with a colleague, Thomas Dowson, identified the use of natural rock features in the composition of some images; certain figures were observed to be composed in a manner that made them appear to be entering or exiting features such as steps and cracks in the rock surface (Lewis-Williams & Dowson 1990). Based on these observations, Lewis-Williams and Dowson argued that the rock surface acted as a veil between this world and the spirit realm. This observation became a significant one globally and sparked the recognition of the use of natural rock features in the composition of rock art images all over the world. By the mid-1990s, the rapid rate of publication by Lewis-Williams and his students had led to a significant body of interpretative material on San rock art in southern Africa. From this point onward, while continuing work on the San rock art of southern Africa, Lewis-Williams shifted his focus to Europe, to both the Upper Paleolithic and the Neolithic periods.

The starting point for Lewis-Williams's work on both the Neolithic and the Upper Paleolithic was the research on altered states of consciousness that had influenced his interpretative work on San rock art. Lewis-Williams, again with Dowson, argued that at least, some of the imagery in the Upper Paleolithic caves, was generated in altered states of consciousness and thus suggested that the art was made within a shamanistic context (Lewis-Williams & Dowson 1988). In 1996, Lewis-Williams, together with Jean Clottes, published the first major book arguing that Upper Paleolithic rock art was shamanistic (Lewis-Williams & Clottes 1996). This was followed by a trilogy of books, expanding Lewis-Williams's ideas on the Upper Paleolithic (Lewis-Williams 2002) and the Neolithic (2005, together with David Pearce) and on the origins of art and religion (2010). Throughout his long career, Lewis-Williams's work has a number of related threads that span his writing on San rock art, the Neolithic, and the Upper Paleolithic. These are as follows:

1. His focus on deciphering meanings of ancient images and artefacts with methods that are more than "gaze and guess"
2. His emphasis on understanding the mind and, as far as possible, the brain and how it works in creating meaning
3. His efforts to always situate the understanding of how meanings are created by the mind/brain within a social context

His research has left an enduring mark on the scholarship of the Upper Paleolithic and Neolithic periods, and his research on San rock art has defined and shaped the field for decades to come.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
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- ▶ Rock Art, Forms of

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Lightfoot, Kent G.

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Basic Biographical Information

Dr. Kent G. Lightfoot (b. May 23, 1953) (Fig. 1) is a North American archaeologist whose research transformed the relationship between history and prehistory and who developed widely adopted practices for collaborative relationships between archaeologists and Native Americans. Kent Lightfoot was educated at Stanford University (B.A., Anthropology, 1975) and Arizona State University (M.A., Anthropology, 1977; Ph.D., Anthropology, 1981). He taught at Arizona State University (1981), Northern Illinois University (1982), and State University of New York at Stony Brook (1982–1987) before moving to the University of California, Berkeley (1987–present), where he is currently professor of Anthropology and curator of North American Archaeology at the Phoebe Hearst Museum of Anthropology. He is a fellow of the California Academy of Sciences; has received over a dozen teaching awards, including the 2007 American Anthropological Association Award for Excellence in Undergraduate Teaching; and was honored with the Society for Historical Archaeology 2007 James Deetz Book Award for *Indians, Missionaries, and Merchants* (Lightfoot 2005) and the 2010 Society for California Archaeology Martin A. Baumhoff Special Achievement Award for *California Indians and Their Environment* (Lightfoot & Parrish 2009). In addition to numerous academic publications, he is the founder and frequent contributor to a long-running essay series, titled Archaeology and Indians, in the magazine *News from Native California*.

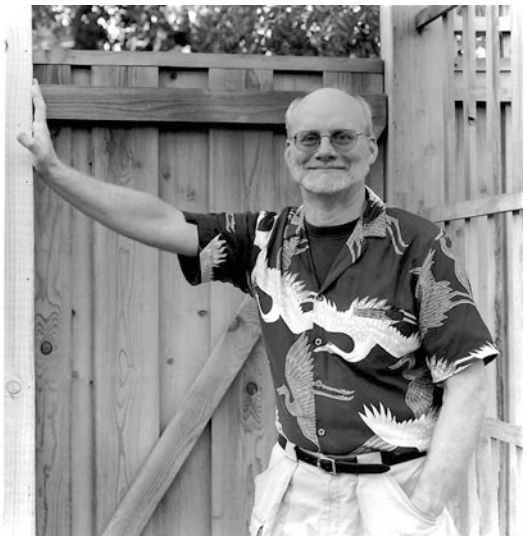

Lightfoot, Kent G., Fig. 1 Dr. Kent G. Lightfoot

Major Accomplishments

In North American historical archaeology, Lightfoot has been responsible for forging the study of culture contact in the archaeology of colonization, fundamentally transforming the perceived relationship between history and prehistory and developing practices for collaboration between archaeologists and indigenous communities. His landmark article, "Culture Contact Studies" (Lightfoot 1995), charged that the disciplinary division between prehistoric and historical archaeology created an ethnically segregated view of the North American past, in which Native American cultures are studied by prehistorians, and nonindigenous cultures, by historical archaeologists. As a result, present-day and historical Native American communities were used primarily as a source of analogy for prehistoric archaeology or were neglected altogether. Lightfoot critiqued the privileging of documentary evidence over archaeological evidence in the interpretation of colonial sites, as such documents rarely represented the Native American- and African-descendant laborers who were the majority of residents at most European colonial settlements in North America. Building on his prior research on cultural change in the US Southwest (Lightfoot 1984), Lightfoot argued that European colonial settlements must be studied within the long-term, comparative perspective afforded by the conjuncture of prehistoric and historic archaeology.

Lightfoot first implemented this approach through sustained research during the 1990s and 2000s at Colony Ross (also called Fort Ross) (Fig. 2), a Russian colonial settlement established on the Central California coast during 1812–1841. Russian colonial administrators conscripted Native Alaskan Alutiiq men to work as sea mammal hunters at Colony Ross and drew domestic and agricultural laborers from nearby villages of the Kashaya Pomo, the Native Californian tribe on whose ancestral land Colony Ross was founded.

Under Lightfoot's direction, research at Colony Ross followed several core principles that have now been widely adopted in the archaeology of colonization: (1) sustained collaboration with descendent communities, including adopting culturally appropriate research practices and field methods that minimize disturbance to archaeological deposits; (2) expanding the spatial framework of analysis from the central colonial compound to include labor encampments, task-specific sites, and regional networks of indigenous and colonial settlements; (3) integrating data from prehistoric and historic sites to facilitate long-term diachronic comparative analysis; (4) emphasizing multidirectional cultural exchange within the pluralistic demography of colonial settlements; and (5) concern with

Lightfoot, Kent G., Fig. 2 Dr. Kent G. Lightfoot during field research at Colony Ross, 1994

the long-term political and cultural consequences of colonization for present-day indigenous communities. Lightfoot's initial research at Colony Ross focused on the interethnic households formed by Native Alaskan men and Kashaya Pomo women under Russian supervision (Lightfoot et al. 1998). In contradiction to acculturative models of unidirectional cultural change, Lightfoot and his team found that despite intimate intercultural engagements, Russian, Alutiiq, and Kashaya residents of Colony Ross largely adopted only those cultural innovations that "fit" within their preexisting conceptions of what constituted proper behavior. Within the upheavals of colonization, there was great continuity between prehistoric and historic spatial patterns, material culture, and foodways. Subsequent studies at Colony Ross have investigated several Kashaya Pomo village sites, both near to and far from the colonial settlement, and task-specific colonial outposts such as ranches and boat docks.

In the book *Indians, Missionaries, and Merchants: The Legacy of Colonial Encounters on the California Frontiers* (Lightfoot 2005), Lightfoot expanded this research program to compare the long-term effects of Russian and Spanish colonization for Native Californian communities today. Using a methodology he terms holistic historical anthropology, Lightfoot drew on sources from ethnohistory, ethnography, native texts, and archaeology to compare multiple dimensions of colonization, including enculturation programs, resettlement programs, social mobility, labor practices, interethnic unions, demographic parameters, and temporal dimensions. He concluded that there were three basic processes of cultural change that unfolded in colonial-era California: indigenous political consolidation in the northern California regions affected by Russian colonization, massive Spanish-colonial resettlement programs in the central California missions, and modified relocation in the southern Spanish-colonial California missions. Significantly, Lightfoot determined that these differences in historical experience had far-reaching effects for Federal recognition of indigenous tribes in the present day, with those

Lightfoot, Kent G., Fig. 3 Dr. Kent G. Lightfoot with UC Berkeley student Ryan Posca during archaeological survey at Pinnacles National Monument, 2011

Indian descendants of the northern missions facing the most difficult task of proving political and cultural autonomy in the face of disruptive resettlements and ever-changing social and economic conditions.

Lightfoot's current research expands this diachronic, comparative methodology to archaeological studies of indigenous environmental management and historical ecology. With Kashaya Pomo elder Otis Parrish, Lightfoot coauthored the reference book *California Indians and Their Environment* (Lightfoot & Parrish 2009). Most recently, in collaboration with Mutsun Ohlone band member and environmental scientist Chuck Striplen, Lightfoot has directed a series of archaeological field research projects investigating indigenous environmental management practices on state-owned lands, in order to improve Native Californian access to traditional resources and to inform government land management strategies used by government agencies (e.g., Cuttrell et al. 2012).

Lightfoot has also made important advances to the prehistoric archaeology of the North American Pacific Coast, especially through synthetic analyses of existing research and new research on prehistoric mound-builders in Central California (e.g., Lightfoot et al. 2011) (Fig. 3). His career is also marked by continual attention to methodological innovation, from pioneering statistical analysis of archaeological survey methods and site detection probabilities to more recent efforts to develop minimally invasive and culturally sensitive field methods (Lightfoot 2006).

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage Management and Native Americans
- ▶ Indigenous Archaeologies
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Mission Archaeology in North America
- ▶ North America (USA): Historical Archaeology
- ▶ People as Agents of Environmental Change

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Lima, Tania Andrade

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Basic Biographical Information

Born in Rio de Janeiro, Brazil, Tania Andrade Lima graduated in Archaeology in 1979 at the Universidade Estácio de Sá (Rio de Janeiro, Brazil). In 1980, she received a specialization at the Universidade Federal do Rio de Janeiro, obtaining a doctorate degree in sciences (Archaeology) from the Universidade de São Paulo in 1991.

Currently, she is an Associate Professor at the Anthropology Department of the National Museum/Rio de Janeiro Federal University, and a researcher at the Brazilian National Council for the Scientific and Technological Development (CNPQ).

Major Accomplishments

Lima began her professional career in the 1980s as a pre-historian. Back then she was investigating a regional settlement system of fishermen/gatherers in the islands of Ribeira Bay, Angra dos Reis, for her Ph.D. research. It was precisely due to one of these shell-middens that she got interested in Historical Archaeology, and more specifically as a result of the presence of nineteenth-century remnants at their superficial deposits. At that time, Historical Archeology in Brazil was just giving its first steps by producing scarce and isolated researches.

Through observing and comparing the similarity of the material culture recovered from these investigations – usually considered apparently insignificant objects – Lima understood that she was standing before a phenomenon that configured a peculiarity in the Brazilian social formation: the rising of a bourgeoisie way of life yet during the slavery era that preceded the implantation of capitalism itself. The latter only took place with the consolidation of the republican regime and the industrializing process in the twentieth century.

Alongside the studies on prehistoric archaeology, Lima has devoted much of her attention to the study of the slow process of substituting the old mentalities for a progressively broader capitalist vision, focusing on the embryonic stage of capitalism in Brazil in the nineteenth century. Basically working with domestic units in both rural and urban environments, Lima has investigated the close relation between ordinary daily lives and the major economic, politic, and social changes taking place through unconscious, daily, and anonymous behaviors. She has also analyzed the symbolic aspects of domestic material culture and the statement that nineteenth-century society of Rio de Janeiro was making about itself by means of used objects in table rituals, hygienic body practices, children's plays, and also through the iconography of gravestones (Lima 1994, 1996, 1999).

Another approach considered by Lima to the perspective of embryonic capitalism in Brazil is the Archaeology of Slavery. She did so by excavating a slave house in a coffee plantation at Paraíba Valley and later by analyzing low social prestige trades performed by urban slaves in one of the main downtown squares in Rio de Janeiro (Lima 2008). Most recently, in a research drawn specifically toward this goal, she found the remains of Valongo at the seaport zone, which was the exclusive slave wharf in the first half of nineteenth century. This was the harbor that received the greatest number of Africans destined for slavery in the Americas. Along with these remains, an exceptional collection of objects related to personal and magical-religious use was found. As an African Diaspora Memorial, the Valongo site has been transformed into a monument of reference to African-descendants communities in Brazil, and a new

square has been specially considered to allow Valongo's presentation and its interaction with the public.

One of the most remarkable characteristics of Tania Lima´s work is her astonishing capacity of using oral and written language to create a story that seduces the reader by transforming archaeology into much more than a simple interpretation of the past.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Engendering Historical Archaeology
- ▶ Social Identity in Historical Archaeology

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Linearbandkeramik Site Excavation

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Introduction and Definition

The Linearbandkeramik (Linear Pottery culture, LBK) is the earliest Neolithic culture so far defined in Central Europe. At its maximum extent, it reaches from western Hungary (where it emerges around 5600–5500 cal BCE) to the Paris Basin, into Ukraine, and as far as the Northern European Plain. The LBK is characterized by a distinctive style of pottery (with linear bands) and monumental wooden longhouses flanked by pits. Enclosures and burial grounds also occasionally occur. In the earliest phase (until about 5300 cal BCE), material culture is more uniform, but this gives way to increasing regionalization until the LBK is finally replaced by a series of successor cultures, a regionally varied process completed by about 4900 cal BCE.

Key Issues/Current Debates/Future Directions/Examples

Finding Sites

Most LBK sites are located on fertile *loess* soils, on the terraces of river valleys. Loess is a windborne glacial sediment deposited during the Ice Age which turned to fertile black earth. Subsequent decalcification and brunification have since degraded these soils, a process which began before the Neolithic and continued to at least the Iron Age. It has resulted in the top *A horizon* becoming much more lightly colored, and this has obscured the top sections of any Neolithic features and parts of their stratigraphy. Degraded black earth also began to filter downwards through cracks, so that the cuts of features are now often indistinct and smudged.

After the Neolithic, but particularly after the Roman period, cultivation caused erosion in higher parts of slopes and the consequent deposit of colluvium in the river valleys. Where loess soils are still being plowed today, LBK sites are easy to locate from pottery on the surface, but generally at least half a meter of their deposit has been lost through plowing. Old ground surfaces and floor layers are thus not preserved, leaving only traces of cut features. Conversely, any sites in valley bottoms are now buried under colluvium. Bone is also not well preserved in many areas (Schalich 1988). One difficulty in digging a Bandkeramik site is hence to identify features which have virtually blended into the surrounding loess (and which may only become visible over time, or in specific weather conditions).

Excavation

The destruction of a large part of the Aldenhoven Plateau in the German Rhineland in the course of opencast lignite mining in the 1970s and 1980s first provided an opportunity to study a whole LBK landscape and has fundamentally framed the way we approach this culture. An entire valley comprising nine LBK settlements and one burial ground was excavated under rescue conditions in a project led by Jens Lüning, revealing hundreds of intercutting houses alongside pits and earthworks (Fig. 1).

The main challenge became to understand the chronological development and settlement structure of the sites. Sequencing was mainly achieved by pottery seriation and resulted in the definition of 14 chronological phases. On the basis of dated pits associated with house plans, it was shown that houses shifted within a circumscribed area of the settlement, termed a "yard" (Zimmermann et al. 2005). Contemporary houses were hence tens of meters apart from each other, while overlapping house plans were separated by several phases. The duration of each phase was estimated at around 25 years. In addition, on the basis of production waste, it emerged that the largest settlement in the valley, Langweiler 8, imported high-quality flint from the Netherlands, which was then passed on to other sites. Environmental analyses also indicated that the area was rapidly abandoned at the end of the LBK, when there was a distinct reforestation episode (Zimmermann et al. 2005).

Excavation method has usually employed the *spit*, where the deposit is lowered in an artificial horizontal slice c 10 cm thick (American *arbitrary layer*; here often called a *planum*, pl. *plana*). Pits may be *box-sectioned* (where the section is extended into subsoil), and all the material collected together and attributed to the feature. Otherwise a subterranean feature may be divided into *quadrants*, each excavated in artificial spits. Excavating alternate quadrants gives continuous orthogonal profiles through the feature fill (Fig. 2). Where layers are hard to distinguish visually or features are complex, the latter is the preferable method as it allows for both horizontal and vertical control. These approaches have their rationale in the difficulty of defining edges, the need to control untrained helpers and time constraints.

Future Developments

Although it is hard to overstress the range and quality of the previous work carried out under difficult conditions, newer projects have challenged many aspects of the original models. For example, at Vaihingen in southwest Germany, two pottery styles existed simultaneously and were associated with different yard clusters, termed "clans" and also defined by other material culture and economic preferences (Bogaard et al. 2011), and this spatial dimension may also be important in the Rhineland. Rather than self-sufficient households, there could have been factions within each LBK site, an aspect which can only be addressed by excavating large parts of a site and comparing artifact distributions in detail.

Future method should focus on obtaining more stratigraphic information and on the elucidation of formation processes. Layers can be hard to recognize, and how pit fills formed remains elusive. Was chronologically homogenous material deposited quickly, or are we dealing with mixed assemblages, perhaps in a secondary

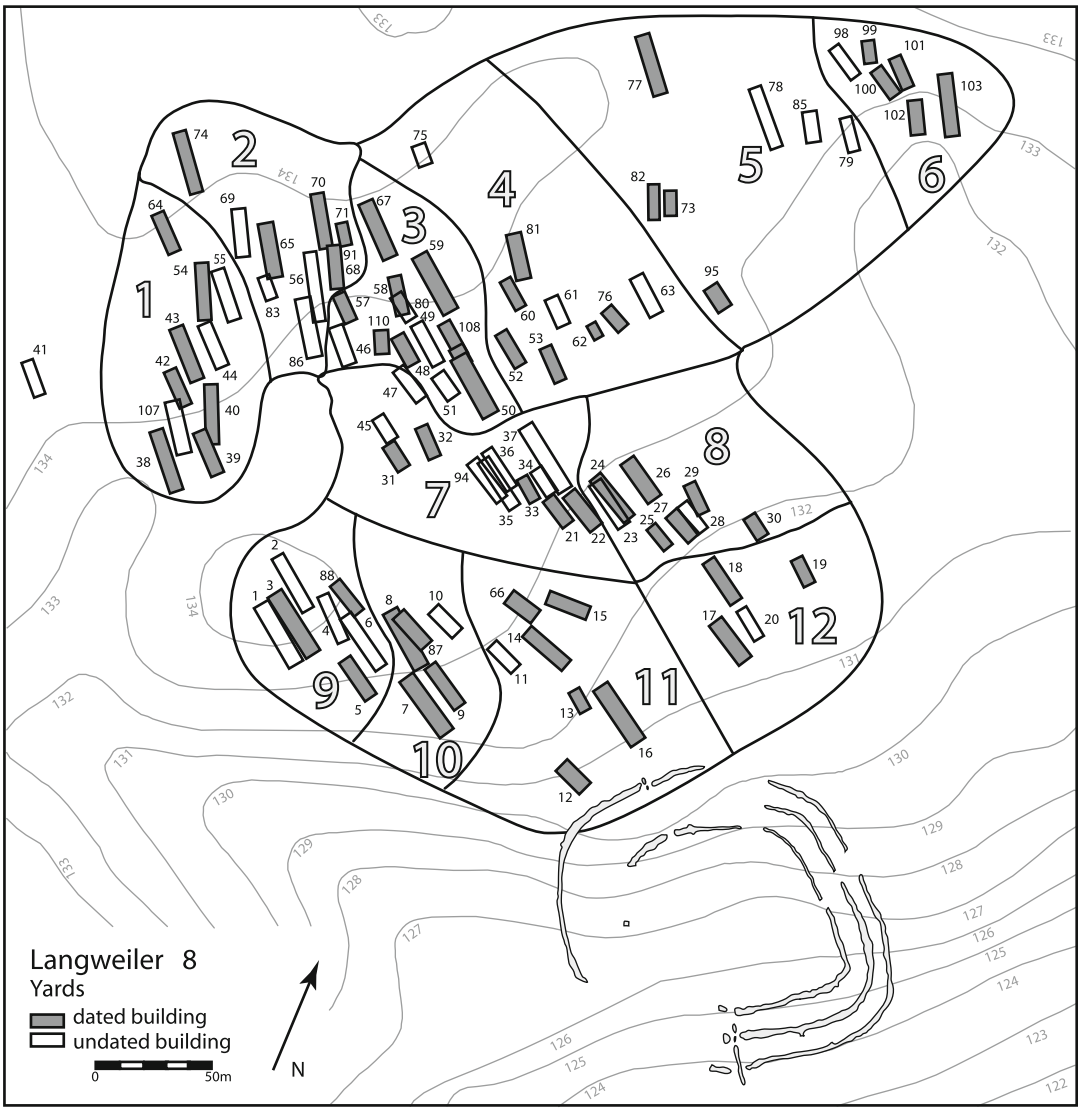

Linearbandkeramik Site Excavation, Fig. 1 Plan of the settlement of Langweiler 8 (After Stehli 1994: 87)

position? To answer these questions, material should at the very least be collected in artificial spits and investigated for refits, with additional methods such as micromorphology employed where possible. However, there is scope for stratigraphic excavation at some LBK sites, and this should be attempted where possible to better understand formation processes and sequence. As always, the methodology adopted must remain flexible and respond to the individual conditions of each project.

There is also much scope for further radiocarbon work. Many existing dates have been taken from the charcoal of long-lived species or from bulk samples. This is of doubtful value. As it is currently debated whether the "earliest" and subsequent phases of the LBK culture overlap, tighter dating frameworks are needed. The problem is even more acute for the beginning and ending of the LBK. Mesolithic groups could have coexisted with the LBK for varying durations, and it is unclear whether the transition

Linearbandkeramik Site Excavation, Fig. 2 Part of the Bandkeramik site of Wang (Lower Bavaria) under excavation, showing parts of a house and associated features (Photo: Alasdair Whittle)

to the post-LBK cultures was dramatic and rapid, or a slow mosaic process with several generations of coexistence.

Cross-References

- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Excavation Methods in Archaeology
- ▶ Neustupný, Evžen
- ▶ Radiocarbon Dating in Archaeology
- ▶ Zvelebil, Marek

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Lippert, Dorothy T.

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Basic Biographical Information

Dr. Dorothy T. Lippert (2-18-1967–) is a Native American archaeologist from the United States currently working as a Case Officer in the Repatriation Department at the Smithsonian Institution's Natural History Museum. Of Choctaw Nation decent, Dr. Lippert graduated from Lee High School in San Antonio, Texas, and was chosen "Outstanding Teen" in 1985 in a program sponsored by the San Antonio Express-News. She received a Bachelor of Arts from Rice University and a Doctorate from the University of Texas at Austin, both in Anthropology. Dr. Lippert currently lives in Arlington, Virginia, United States.

Major Accomplishments

Dr. Lippert is known for her participation in the indigenous archaeologies movement by

advocating for the repatriation of Native American remains and funerary items to their affiliated Native American communities. With other members of the Closet Chickens, an informal group of Native American archaeologists, Dr. Lippert has critiqued anthropology's sordid past researching Native American communities and their cultural remains. She has been instrumental in providing alternative methods to working with Native American communities, methods that recognize that Native American remains and cultural remains should be treated with respect, dignity, and humanity. Dr. Lippert is the Indigenous Representative to the Executive of the World Archaeological Congress and is a past member of the Board of Directors for the Society for American Archaeology. In 2011, Dr. Lippert was appointed by President Barack Obama to serve on the Advisory Council on Historic Preservation (ACHP), an independent United States government entity which promotes the preservation of historic resources. Important academic papers include "Echoes from the Bones: The Importance of Maintaining a Voice to Speak for the Ancestors" (Lippert 2010), "The Rise of Indigenous Archaeology: How Repatriation has Transformed Archaeological Ethics and Practice" (Lippert 2008), and "Remembering Humanity: How to include Human Values in a Scientific Endeavor" (Lippert 2005).

Cross-References

- ▶ Closet Chickens
- ▶ Indigenous Archaeologies
- ▶ Repatriation: Overview

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Lithic Technology, Paleolithic

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Introduction

Paleolithic stone tool technology extends over a period of close to 2.5 Ma and provides a unique dataset for the study of early hominin behavior. While it is safe to assume that technologies involving organic materials played a critical role in the adaptation and society of early humans, these materials rarely survive so archaeologists are forced to pull as much information as is possible from the study of lithic assemblages.

Historical Background

Archaeologists working in Eurasia tend to structure the Paleolithic into the Lower, Middle, and Upper Paleolithic, while Africanists use the terminology of Early, Middle, and Late Stone Age. There are a multitude of regional level subdivisions of these periods. Transitional industries – such as the Chatelperronian, which is found at the Middle to Upper Paleolithic transition in Western Europe, or the Fauresmith, which is associated with the transition from the Early to Middle Stone Age in Southern Africa – are often the focus of particular interest and debate. In an effort to cut across regional variation Grahame Clark defined five modes of stone tool production (Foley & Lahr 2003). Clark defined mode 1 as simple chopper and flake industries, mode 2 as the production of large flakes and shaped tools such as handaxes mode 3 as production of flakes from

prepared cores, and mode 4 as blade production and a diversified tool assemblage. For mode 5, Clark emphasized the development of microlithic tools, which he associated with the Mesolithic.

Key Issues/Current Debates

In the current state of the discipline, Clark's modes of tool production can be reformulated as a series of major themes that are central to contemporary research on Paleolithic stone tool technology (for another approach, see Shea 2012). The first question looks at the earliest stone tools and questions the complexity of production methods. Ultimately, the goal is to understand the evolutionary context for the appearance of stone tool technology in the hominin lineage. The next question looks at the transition to shaped artifacts, principally hand axes and cleavers, in relation to the evolution and dispersal of *Homo erectus*. The third issue is the emergence of prepared core technologies. Archaeologists are questioning the relationship of prepared core technology with changes in hominin cognitive capacity and exploring the significance of variability within these industries. A final question revolves around the origins and development of projectile technology during the later stages of hominin evolution. Increasingly experimental studies are shedding light on the performance of stone projectile tips and developing criteria for identifying hunting techniques.

The Origins of Tool Use

Ethological and experimental research on tool use by primates and other animals provides important context for the study of the earliest stone tool industries (Schick et al. 1999). The oldest known stone tools are found in the Hadar region of Ethiopia and are securely dated between 2.3 and 2.4 Ma ago based on argon ages on volcanic tuff layers (Semaw 2000). At the Hadar, the stone tool technology seems to be extremely simple, and tool types are restricted to flakes and choppers. Choppers are cobbles with a series of flake removals, often alternating off two faces of the cobble, along one edge (Fig. 1). The evidence from the Hadar suggests that stone tool technology emerged gradually and that hominins were simply striking flakes off the edge of a cobble. However, evidence from the site of Lokalalei in Kenya presents a very different picture of early stone tool technology. At Lokalalei, which is dated to 2.3 Ma ago, it was possible to refit flakes onto the cores from which they were removed. This analysis showed that core reduction involved long sequences, reaching as many as 50 removals from a single core, and that the knappers organized flaking based on a spatial model of the core (Delagnes & Roche 2005). In Southern Africa, the earliest known stone tool industries date to around 2 Ma ago and are found at Sterkfontein and a number of other sites in the Cradle of Humankind as well as at Wonderwerk Cave (Kuman & Clarke 2000). Although there are a number of large choppers at Sterkfontein, many of the tools at this site and at Wonderwerk are very small (<3 cm.), raising further questions about early stone tool technology.

Lithic Technology, Paleolithic, Fig. 1 Oldowan chopper from the Nile Valley, Egypt. The *arrows* indicate the direction in which flakes were removed. This figure was prepared based on a 3D scan of the chopper using Meshlab software (Copyright M. Chazan)

The Oldowan was first defined on the basis of the bed 1 industries found at Olduvai Gorge. Bed 1 is dated between 1.9 and 1.7 Ma ago and is thus over half a million years younger than the tools found at the Hadar. Opinions vary as to whether the Hadar and Lokalalei should be included within the Oldowan. In addition to cores and flakes, the Olduvai Gorge assemblages include polyhedrons and spheroids. It is not clear whether these are distinctive types of tools or simply forms of exhausted cores.

Lithic Technology, Paleolithic, Fig. 2 Hand axe from the early Acheulean of Wonderwerk Cave, South Africa. This figure was prepared based on a 3D scan of the hand axe using Meshlab software (Copyright M. Chazan)

Shaped Artifacts

The earliest stone tool industries involve removals along a single edge to form a chopper or the kind of exploitation of the volume of a cobble found at Lokalalei. Spheroids and polyhedrons are more extensively exploited, but there is little evidence that these are tools where the removals are deliberately organized to form the shape of a tool. The emergence of Acheulean technology marks the transition to the use of flaking to deliberately shape tools. The earliest Acheulean is found at the site of Kokiselei 4, Kenya, dated to 1.76 Ma ago (Lepre et al. 2011). The characteristic Acheulean stone tools are bifaces that are shaped by removals of both faces of a flat cobble or natural spall, or a large flake (Fig. 2). Handaxes are bifaces where the base is broader than the working tip, whereas cleavers have a wide working edge. Cleavers are mostly found in African Acheulean sites and are often made on very large flakes.

Following the pioneering work of Derek Roe, archaeologists have developed a wide range of methods to quantify the shape of handaxes. A major focus of research is to determine the degree to which variability in handaxe shape can be explained on the basis of characteristics of raw material. There is relatively little functional data on handaxes, and most archaeologists assume that these are multipurpose tools. There is limited evidence for use of handaxes in working wood (Dominguez-Rodrigo et al. 2001). One puzzling aspect of the Acheulean is that there are a number of sites at which bifaces are found in very large numbers, often estimated in the thousands.

The development of Acheulean technology is roughly contemporary with the first appearance of *Homo erectus*, but the significance of this association remains unclear. Surprisingly, the earliest hominin expansion into Europe found at sites such as Dmanisi, Georgia, and Atapuerca, Spain, is not accompanied by an Acheulean toolkit. The stone tool industries at these sites are very simple and are considered by some archaeologists to be pre-Oldowan. Bifaces are rarely found east of India, a geographical boundary known as the Movius Line. Recent discoveries of handaxes in the Bose Basin, China, dated to 800,000 years ago, limit the validity of the Movius Line (Yamei et al. 2000). In Europe, the earliest Acheulean industries date to 500,000 years ago.

There is a great deal of variation in Acheulean industries. At sites such as Gesher Benot Ya'akov in Israel, handaxes and cleavers are made on very large flakes struck from massive cores. While the earliest bifaces, such as those from Kokiselei 4, are quite crude, there is a trajectory overtime toward the development of more refined handaxes, many of which have a high degree of symmetry and display a high degree of technical skill. It appears that in some cases, a soft hammer was used for the final stages of shaping handaxes. It is important to emphasize that simple flake-based industries persist alongside the Acheulean, for instance, in the Clactonian industries found in Britain.

Prepared Core Methods

Prepared core methods involve careful control over the morphology of the core with the goal of producing detached pieces of a desired morphology. It is difficult to pinpoint when flint knappers began to have control over the shape of detached pieces or flakes. There is already a hint of this capacity in the core reduction found on the early site of Lokalalei, but the degree of control in this assemblage is very limited. One of the earliest prepared core methods is

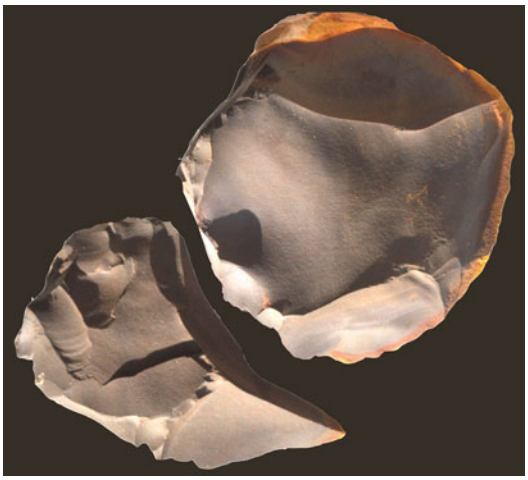

Lithic Technology, Paleolithic, Fig. 3 Experimental Levallois flake and core (Copyright M. Chazan)

the Victoria West method found on Earlier Stone Age sites in South Africa (McNabb 2001). This method involves shaping the surface of a large natural rock spall to prepare for the removal of a large flake that can be easily retouched to form a cleaver. Unfortunately, the precise age of the Victoria West method has not been determined, although it appears to be roughly 1 Ma old.

The Levallois method is among the most elaborate prepared core methods and has been the subject of intensive archaeological research (Fig. 3; Chazan 1997). This method is associated with Neanderthals in Europe and the Middle East and with modern humans in Africa and the Middle East (Qafzeh and Skhul Caves). Chronologically, these methods are characteristic of the Middle Paleolithic (Eurasia) and the Middle Stone Age (Africa). Typological definitions of the Levallois method focus on characteristic tortoise-shape cores and thin large flakes with a continuous cutting edge, often with a well-prepared platform. Technological definition of the Levallois method focuses on the conceptual model that underlies the use of the method. Five criteria are used in the technological definition of the Levallois method: (1) The core is constructing to consist of two surfaces that meet at a plain of intersection. (2) The surfaces are hierarchically related with one surface serving as a striking platform and the other as the surface for large flake removals. (3) The production face is organized so that the morphology of products is predetermined based on the management of lateral and distal convexities. (4) The removal of predetermined flakes is subparallel to the plane of intersection between the two faces. (5) The striking platform is organized so as to allow the removal of the predetermined flakes from the production surface.

The Levallois method allows the knapper a high degree of flexibility in determining the types of flakes produced. There is clear evidence for temporal and geographical patterning in the strategies adopted, which implies that flint knapping was a skill acquired through social learning. Among the types of flakes that can be produced using the Levallois method, depending on the choices made by the knapper in shaping the core, are triangular points, large ovate flakes, and elongated flakes.

In addition to the Levallois method, a number of other prepared core methods play a significant role in the Middle Paleolithic and Middle Stone Age archaeological record. These include the discoidal method in which the core is constructed with two surfaces but without a hierarchical relation between these surfaces, and the trifacial method where three surfaces are exploited. The use of prepared core methods implies a developed capacity for guiding technical action based on abstract concepts.

The analysis of Middle Paleolithic stone tool industries in Europe employs a highly developed typology based on the shape and location of retouched edges. Characteristic tool types are sidescrapers, notches, and denticulates. There is a significant debate over the significance of variability in retouch. François Bordes argued that the types found in an assemblage were characteristic of distinct cultural groups, while Lewis Binford held the position that the types of tools found on a site were the result of the activities that were carried out at that location. Harold Dibble has advanced the argument that variation in tool types reflects the intensity of tool use and resharpening.

Elongated flakes, defined as blades if their length is twice their width, play a particular role in Paleolithic archaeology as these types of tools

become prevalent in the Upper Paleolithic. Blade production has now been identified on sites dating as early as 500,000 years ago in Africa (Wilkins & Chazan 2012) and slightly later at Qesem Cave in Israel. Blade production is also firmly established as one aspect of Neanderthal lithic technology (Bar Yosef & Kuhn 2008). There are aspects of Upper Paleolithic blade production that are distinctive. Jacques Pelegrin describes Upper Paleolithic blade production as the exploitation of a volume rather than exploitation of surfaces that is characteristic of the earlier production methods. In many Upper Paleolithic industries, crested blades are used to shape the core and initiate blade removal sequences. By the later stages of the Upper Paleolithic, blade production methods, often involving the use of a soft hammer, developed to the point where the knapper was able to remove a long sequence of very regular and narrow blades. Upper Paleolithic blade technology is also characterized by a shift toward retouched tools that include end scrapers and burins. Burins are tools that are shaped by removing a long spall of the margin. Burins have a strong working tip as well as robust edges useful for tasks such as shaping bone and wood.

Projectile Tips

It is not clear that stone tools were used for hunting during the early stages of the Lower Paleolithic. There have been suggestions that Oldowan spheroids might have been used as bolas or that Acheulean handaxes might have been used as a throwing weapon, but both of these proposals remain speculative. It is likely that wood spears were used for hunting before the development of stone armatures. The discovery of a series of spectacularly preserved wooden spears from the site of Schöningen, Germany (Thieme 1997), dated to 400,000 years ago provides a vivid illustration of hunting tools that did not involve stone armatures (although stone tools would have been necessary to shape the spears). One interesting question is what the exact advantage is of stone projectile points with one study showing evidence that stone tips have only a slightly increased ability to penetrate a target (Waguespack et al. 2009).

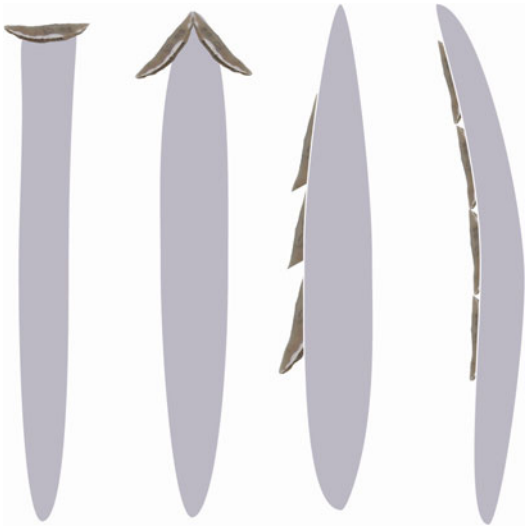

Lithic Technology, Paleolithic, Fig. 4 Examples of options for hafting microliths into a composite tool. From *left* to *right*: transversal arrowhead, pointed arrowhead, barbed point, and cutting tool (Copyright M. Chazan)

The criteria for identifying projectile points as opposed to pointed tools used for other tasks remain the subject of debate. There is very wide consensus that stone-tipped thrusting spears were used during the Middle Paleolithic and Europe and the Middle East and the Middle Stone Age of Africa. The discovery of a fragment of a Levallois point embedded in the vertebra of a wild ass at the Middle Paleolithic site of Umm El Tlel, Syria, and from Klasies River Mouth, South Africa, offers clear evidence that stone-tipped tools were in fact used for hunting. At Umm el Tlel, traces of bitumen hafting were also identified on Levallois flakes. There is emerging evidence that the use of stone-tipped spears likely dates back as far as 500,000 years ago.

Bladelets are small narrow flakes, usually smaller than 2 cm in length. Small blades and bladelets can be assembled to form a range of hafted composite tools (Fig. 4). The earliest strong evidence for the use of bladelets as elements of composite hunting tools comes from the Middle Stone Howiesons Poort industry of Southern Africa dated to c. 60,000 years ago (Lombard & Pargeter 2008). The Howiesons

Poort bladelets were often retouched into crescents and might have served as barbs in composite points. The discovery of complex bone tools at the site of Katanda, Zaire, dated to c. 75,000 years ago provides the earliest evidence of a developed bone tool industry that includes barbed points. It is interesting that these tools were likely used for capturing large lake fish.

The complex hunting tools found in the Middle Stone Age of Africa are not found in Europe until the Upper Paleolithic. The Aurignacian, the initial period of the Upper Paleolithic, is characterized by the presence of both bone points and standardized bladelets (Chazan 2010). Although the function of Aurignacian bladelets remains to be conclusively demonstrated, it is highly likely that they were barbs used on composite points. The Gravettian period sees innovation of a series of small point forms, and it is likely that the alt atl or spear-thrower is already in use in this period. The Solutrean is characterized by the use of fine pressure flaking both for small-shouldered points as well as large bifacial points. In the Magdalenian period, there is a return to bladelets, some of which are found embedded in bone points, and the repertoire of bone hunting tools becomes highly developed. The Epipaleolithic sees the development of highly developed microlithic industries. The bifacial projectile points that are characteristic of the archaeological record in the Americas are not found in Europe or Africa, although bifacial points are found in Siberia.

International Perspectives

The application of methods of analysis inspired by the concept of the *chaîne opératoire* developed by André Leroi-Gourhan has led French archaeologists to place an emphasis on understanding not only the form of tools but also the knowledge and skill involved in tool production and use (Tostevin 2011). At the same time, North American and European archaeologists have tended to emphasize quantitative methods, such as the scraper reduction model applied by Harold Dibble (1995) to the analysis of Middle Paleolithic scrapers. Quantitative research, often paired with the study of raw material sources, often takes place in a theoretical framework that considers stone tools as a component of the adaptations of mobile hunter-gatherers (Kelly 1988). At the same time, use-wear analysis and experimental replication are increasingly allowing archaeologists to determine the relationship between tool form and function (Odell 2001). Until quite recently, lithic analysis has been characterized by a polarization between researchers working from different research traditions. Thus, for example, there was significant debate of the relative value of low-power versus high-power microscopy for use-wear analysis. Similarly, debate between advocates of the *chaîne opé ratoire* and their American counterparts was often characterized by sharply discordant perspectives. However, the lines between research traditions are beginning to blur, and lithic analysts are coming to appreciate the value of adopting multiple perspectives in approaching Paleolithic stone tool technology.

Future Directions

Paleolithic lithic analysis is undergoing rapid development with the adoption of emerging digital imaging techniques that allow for the analysis of the three-dimensional morphology of tools and reduction sequences. Improved methods of trace element analysis using ICP-MS open new potential for sourcing raw materials used in tool manufacture, and developments in microscopy have the potential to renew the study of tool function. Methods of residue analysis are also bringing new opportunities for the study of tool use. A robust theoretical debate is sharpening perspectives on both the role of stone tools in hominin adaptation and the potential of stone tool analysis to provide insight into hominin cognitive evolution. Rigorous methods of fieldwork open up new potential for analysis of the spatial organization of lithic tool manufacture and use and allow lithic analysts to contribute to the study of social organization in the Paleolithic. However, as Glynn Isaac (1977) recognized, the challenge involved in "squeezing blood from stones" remains immense.

Cross-References

- ▶ Acheulean Industrial Complex
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- ▶ Europe: Paleolithic Art
- ▶ Handaxes and Biface Technology
- ▶ Mousterian Industry Tradition
- ▶ Oldowan Industrial Complex

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Little, Barbara J.

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Basic Biographical Information

Barbara J. Little graduated at Penn State University with a bachelor's degree in anthropology. She received a doctoral degree in anthropology from the State University of New York at Buffalo, in 1987, with a dissertation entitled *Ideology and Media: Historical Archaeology of*

Printing in Eighteenth-Century Annapolis, Maryland. She has a long history of federal service as an archaeologist in the Archeology Program, National Parks Service and teaches anthropology at the University of Maryland, College Park. Her areas of interest are public archaeology and public history; historical archaeology; method and theory; feminist archaeology; and North America and other parts of the British colonial world.

Barbara J. Little has served in committees for the Society for American Archaeology, and since 2009 she has served as editor of *CRM: The Journal of Heritage Stewardship*. Recently she was recognized by the University of Massachusetts Amherst Center for Heritage and Society as a 2011 honoree.

Major Accomplishments

Since the late 1980s, Barbara J. Little has been a prolific scholar interested in the links between documentary records and material culture in the United States (e.g., Little 1988). Little considers that historical archaeology is action archaeology, since research may address contemporary groups "that have close ties to the earlier peoples under study to help set research agendas that will both illuminate the past and contribute to the aims" of modern communities (Little 2007a: 23). Recently, Little emphasized her continuous interest "in civic engagement, public outreach, and the public relevance of archaeology and all aspects of heritage" (Little n.d.).

In *Text-Aided Archaeology* (Little 1992), Little gathers in a single-volume contributions exemplifying the use of documents, oral history, and material culture to address substantive and methodological questions. The relationship between history and archaeology, and especially their combined potential to help advance understanding of the ties between everyday experiences and larger structures of social change (Little 2007b: 17), has been a common denominator of Little's contributions.

An outstanding contribution to the field of historical archaeology is the volume edited by Shackel and Little on the *Historical Archaeology of the Chesapeake* (1994), one of the first regions of the United States studied from a historical archaeology perspective. The volume is an example of the balance between historical information and archaeological remains within an investigation of the recent past. Foremost, Little's essay advocates for a feminist archaeology approach to the study of muted groups who resisted dominant ideology, expressing themselves through particular choices of material culture in the 1770s (Little 1994: 196).

Little's book *Historical Archaeology: Why the Past Matters* (2007a), conceived as an introductory volume for students with a Marxist theoretical perspective, has been praised as a relevant survey of historical archaeology; the volume presents insights concerning social relations, power, and inequality "and the many ways in which the modern world has been shaped by colonialism, capitalism, and globalization" (Rotman 2008), using American case studies to illustrate the points discussed in the book.

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- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Critical Historical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Historical Archaeology
- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ North America (USA): Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Post-Processual Archaeology
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- ▶ Social Identity in Historical Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Litvak King, Jaime

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Basic Biographical Information

Jaime Litvak King (1933–2006) was born in Mexico City in the midst of a family of Eastern

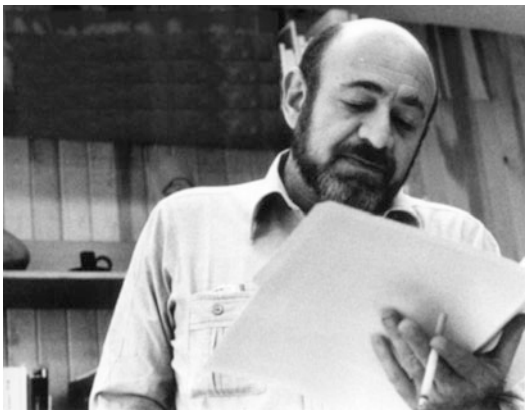

Litvak King, Jaime, Fig. 1 Jaime Litvak at his office, the early 1990s

European immigrants. As an undergraduate, he studied economics at Mexico City College, and from 1958 to 1962, he attended to the National School of Anthropology and History (ENAH), obtaining his masters degree in 1963. Later, in 1970, he earned a Ph.D. in anthropology at the National Autonomous University (UNAM). His dissertation illustrates the use of statistical methods applied to the research of settlement patterning in pre-Columbian archaeology. Founding the Institute of Anthropological Investigations at UNAM in 1973, he became as well its first director. Among the distinctions, he was honored in his lifetime with the Fray Bernardino de Sahagún Archaeology Prize awarded by the National Institute of Anthropology and History in 1971, the National University Award in 1996, and the Lifetime Achievement Award presented by the Society for American Archaeology in 2002. Two years later, in 2004, he was elected professor emeritus at UNAM (Fig. 1).

He was one of the first researchers in Mexico who incorporated quantitative methods, computer applications, and innovations in archaeological field methods. Through his life, he kept a continuous interest in pre-Columbian Mesoamerica. Yet, he was the first major Mexican archaeologist and maybe the only one who indeed recognized the importance of industrial archaeology and Mexican industrial heritage research, supporting both of them until the day of his death.

The first steps taken to support Mexican industrial heritage go back to the 1980s, when different individuals throughout the country started an effort in rescuing and reusing it. This latter was mostly expressed by turning industrial heritage sites into museums. In 1995, the Mexican Committee for the Conservation of the Industrial Heritage (CMCPI) was created, and in December 2006, the Mexican Section of The International Committee for the Conservation of the Industrial Heritage (TICCIH México) commenced as a result of the consideration that work to support industrial heritage needed to be reinforced.

In May of 1997, Litvak became a member of the CMCPI, offering his complete support, and this was a commitment that he kept until the day he passed away. He was the person in charge of publishing the CMCPI bulletins from 1997 to 1999, and in that same year, he included a section dedicated to the committee at the webpage of UNAM'S Institute of Anthropological Research. After 1999, Litvak became an academic consultant of CMCPI.

Major Accomplishments

In 1991, the Historical Archive and Mining Museum Civil Association (AHMM) proposed a research project for the rescuing and reusing of mining sites in Pachuca, Real del Monte, Mineral El Chico, and Mineral de La Reforma. This included mines and ore-processing plants dating from the eighteenth to the twentieth century. In 1998, industrial archaeology studies started, and from that moment on, Litvak became a teammate, actively collaborating with Iván Hernández Ibar who conducted the fieldwork. In 2000, the project was supported by a research grant on industrial archaeology issued by the Ignacio Zaragoza Research System–National Council for Science and Technology (CONACYT) with Litvak as the principal investigator.

Fieldwork was under the responsibility of Hernandez Ibar, and as a result of excavations, some steam boilers' ash boxes were uncovered. Further investigation in this area was prevented

during the second field season since Litvak, who managed and supervised the research project, insisted that the materials found during the excavations required deeper examination. As a result of Litvak's academic contacts and generosity, Hernández Ibar was able to analyze the materials at the Physics Department of the National University (UNAM) under the guidance of Dr. José Luis Ruvalcaba Sil (Hernández Ibar & Ruvalcaba Sil 2010).

Under the supervision of Litvak, in 2002, Hernández Ibar became the first student of the National School of Anthropology and History (ENAH) who graduated with a Bachelor's thesis on industrial archaeology. The following year, Yolanda Beltrán Aguirre wrote another thesis on the same subject. With this, Litvak not only demonstrated his interest and support for Mexican industrial archaeology (e.g., Litvak & Rodríguez 2003) but above all his commitment with the education of a new generation: the generation of industrial archaeologists. These students were indeed fortunate. They were opening a new field of research, contributing to the development of industrial archaeology, in a country where pre-Columbian archaeology has long prevailed.

The invaluable support provided by Jaime Litvak King to the industrial heritage of Mexico encompasses two main fields: first by training young archaeologists and second by promoting and disseminating this subject. Through the website he created, access was provided to the CMCPI Industrial Archaeology Bulletins – a small-circulation journal – in which he shared industrial archaeology studies both in Mexico and worldwide.

Litvak was an outstanding person, one of the great characters in Mexican archaeology. He was a "teacher everywhere and at all times" who stressed creativity and scientific rigor in archaeology (Schmidt Schoenberg 2008: 161-2). He was a man committed with his country, its history, and its people. Despite the few years that Litvak actively participated in the industrial heritage world and an active promoter of industrial archaeology, his personality and massive imprint will always be present.

Cross-References

- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Mexico: Historical Archaeology
- ▶ Museos de Real de Monte

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Living Communities: Local Communities in Site Management and Advocates for Site Preservation

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Introduction

Most archaeologically important sites are not static locations divorced from modern communities. Rather, as has been the case throughout

history, local communities live in or around, and participate in activities at, these important locales. Though one of many stakeholders, local, living communities are often imperative for the long-term preservation of archaeological sites because their active use and interaction with these places make them good stewards of such cultural heritage. Tourism, and its economic development, however, has often resulted in the sidelining or even outright relocation, of local communities, to the determinant of the communities as well as the archaeological sites themselves. More than ever, there is an urgent need to provide holistic strategies for the management of important archaeological sites that include the incorporation of local communities and that take into account the long-term socioeconomic impact of tourism on their daily lives.

In order to explore these important issues, this entry will present the specific case study of the UNESCO World Heritage site of Petra to illustrate how the past and the present can be better managed within cultural heritage schemes.

Definition

The Petra National Trust (PNT) is a nongovernmental organization dedicated to the preservation of the archaeology, cultural heritage, and environment of the UNESCO World Heritage Site of Petra. To implement its goals, PNT conducts projects in the preservation of the archaeological, natural, and cultural heritage, as well as programs to raise awareness among the youth of Petra, the future agents of site preservation, on the uniqueness and fragility of this site. In executing its projects and programs, PNT contracts with local and international specialists; it engages both local and international volunteers and employs skilled labor from among the different local communities in its conservation efforts.

Ultimately, to safeguard the significance and integrity of the site for coming generations against damage to the environment, the deterioration of monuments and the inevitable impact on the quality of life of the local communities, PNT finds that community-based participation is imperative to long-term sustainable preservation in that the local communities' continued involvement offers an enormous opportunity to further local stewardship and empowerment. It is in recognition of the importance of community participation that the PNT has expanded its work in Petra and has, since 2010, introduced the Petra Junior Ranger Program to its program activities in education and outreach.

The Petra Junior Ranger Program is an engaging and interactive 6-day workshop for children and youth that aims to instill a sense of identity and pride in Petra's cultural and natural heritage and inspire a commitment to preserving and protecting Petra's outstanding universal values.

Key Issues/Current Debates/Future Directions/Examples

Petra, Site, and History

Located in southwestern Jordan (Fig. 1), Petra has been a place for human habitation for over 200,000 years. Today, the residents of the Petra area live in modern stone and concrete hillside villages as well as Bedouin encampments. About 13 thousand years ago, an early seasonal village was established at Beidha, just north of Petra. The site was rebuilt and occupied year-round by a group of Neolithic farmers around 7000 BCE. In addition, the presence of mineral resources made the region important. Both bitumen and copper, one of the earliest metals to be manipulated by humans, have been mined and utilized since the earliest times.

Numerous cultures rose to prominence, beginning with the Edomites in the first millennium BCE. Edom gave rise to the nucleus of an Arab state, the Nabataean Kingdom, in the third century BCE. The Nabataeans made Petra the capital of their rich and powerful kingdom, filling it with spectacular buildings and carved facades and making water flow to every corner of the kingdom. In CE 106, Petra became part of the Roman province of Arabia. By the fifth century CE, Petra was the administrative center of the Byzantine province of Palaestina Tertia. During the seventh

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 1 Map of Jordan

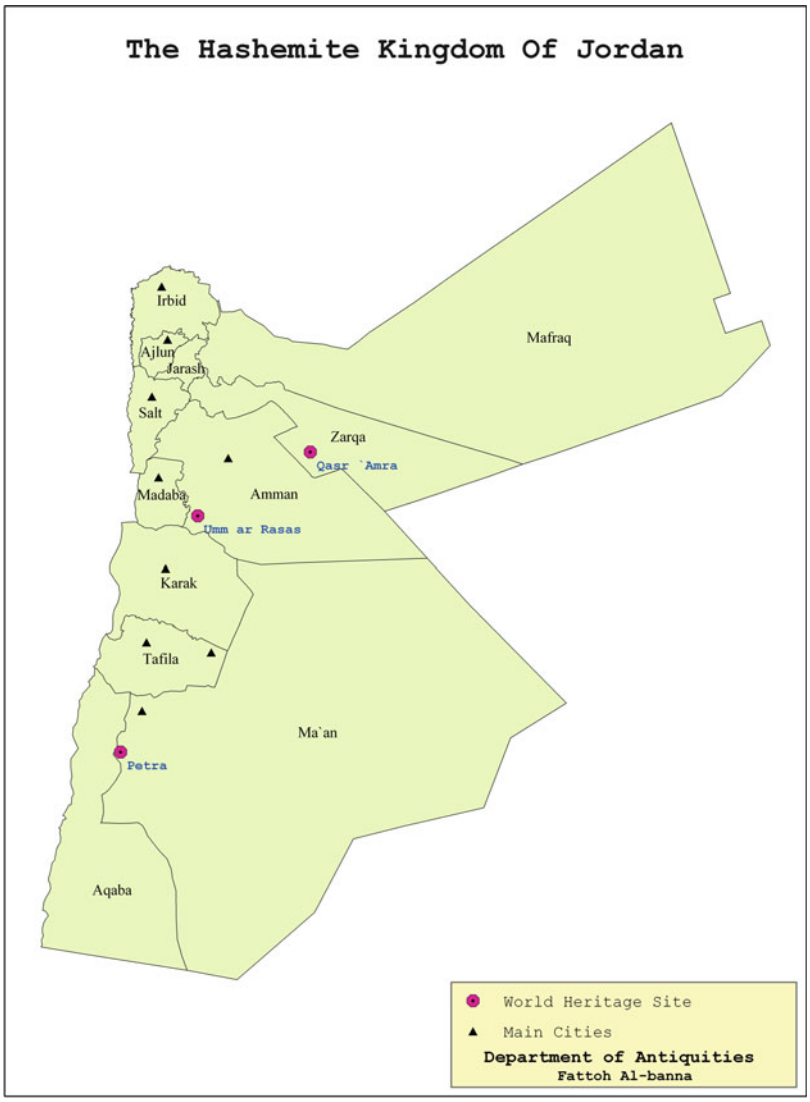

century, as a result of the Islamic takeover, trade routes were redirected and Petra declined in importance. In the twelfth century, the crusaders went across the rift valley from their capital, Jerusalem, to Petra. They later withdrew to the Mediterranean in 1189. It was not until 1812 that Petra was again visited, this time by the Swiss explorer Johann Ludwig Burckhardt. Travelers that followed suit give vivid description of its monuments and the conditions of the country during Ottoman rule. They describe the Huwaitat tribes and their roles in ensuring the security of caravans and the protection of the pilgrims. Under the Huwaitat, a Bedouin confederacy connected the tribes that now live in villages surrounding Petra: the Bdul, Layathneh, and Amarin tribes. Traditionally these tribes tended to their animals and undertook the seasonal planting of grains. Later with the arrival of tourism, in the twentieth century, they moved closer to the archaeological site and sustained a living by tilling the land, working on archaeological excavations, and guiding tourists.

Many still lived in caves in the vicinity of the monuments, the main inhabitants being the Bdul tribe. In 1985, Petra was inscribed on the list of

World Heritage sites. Based on the recommendation of UNESCO, the government relocated the Bdul people in two stages: first in 1985 and then again in 1987 to an adjacent area outside the Park boundaries overseeing the archaeological sites and having a very high visual, social, and economic impact. The social dimension of this relocation was addressed at the time in as much as it affected the antiquities. There was no socioeconomic plan to provide the community with agricultural lands in order to maintain their livelihood prior to the relocation. The increasing numbers of tourists, however, helped the Bdul in adapting to a more "settled" style of life. Furthermore, with the signature of the 1994 peace agreement with Israel, tourism figures spiked and, in parallel, triggered an increase in commercial activities improving the socioeconomic conditions of the communities, albeit, at the cost of preserving site significance and integrity.

Tourism in Jordan generates 12 % of the GDP. This impact, however, is accompanied by unplanned development, neglect, institutional weakness, noninclusion of major stakeholders, and illicit trading of antiquities, all of which can irreparably impact the World Heritage site for present and future generations.

Local Communities as Stakeholders

For stakeholders in the local community to become stewards of preservation, it is important that a comprehensive evaluation be undertaken of the site, the local communities, development conditions, and constraints. Several studies have been done in the past at a time when the subject was less urgent. The focus however, was on one community, the Bdul tribe, neglecting the study of the other main villages surrounding Park. The number of visitors to Petra has doubled since; this increase in visitation provided a pretext for the local owners of concessions to expand tourism services to the point where it is now negatively impacting site integrity.

More than ever, there is now an urgent need to update and expand the study of the socioeconomic factors that constitute and lead to the understanding of the human relations and different needs and economic benefits to include all the six surrounding communities. Only then can a holistic strategy for the management of the Park be defined and developed to incorporate the local communities.

The government authorities in Jordan recognize the importance of integration of the local communities in the overall management of Petra and incorporated it in the laws of the successive Petra management authorities of 1995, 2005, and in the current authority established in 2009. In practice, however, participation of the local communities has been minimal and inconsistent. Then and now, decision-making in the absence of the communities is a prominent source of unease among the communities and the governing body. More recently this has been evidenced during the so-called Arab Spring uprisings with demands of better inclusion in the management and decision-making process.

Today in the Petra region, the communities surrounding the Park mainly focus on the socioeconomic value of Petra through tourism; this is demonstrated, for example, by the number of souvenir kiosks, tea tents, restaurants, etc., that are located intrusively on the main thoroughfare referred to as the "Main Spine" that tourists traverse to visit Petra. The government licenses these vending outlets in an attempt to satisfy what the local community perceives as their entitlement.

Child labor selling items including finds and colorful rocks at the high price of their schooling is widely manifested throughout the areas visited by tourists. A great number of the complaints that the government receives from tourists regard the harassment they encounter by children. To increase the carrying capacity, different types of transportation as in vehicles and animals, for example, camels, horses, and donkeys, are seen throughout the Archaeological Park. In addition, the Petra Archaeological Park is now considering providing buses to transport visitors out of the site using the Turkomania road notwithstanding the negative impact on the monuments and the vegetation among other impacts. The intended beneficiaries of this transportation system will be the local communities. The anticipated economic benefit, to be derived from the proposed

transportation system, overrides the communities' interest in maintaining the site's legacy and its relevance to their cultural heritage and identity. Many do not realize that unless judiciously managed, tourism and the development of related facilities can negatively impact the significance and integrity of the property. This is partially explained by the discrepancy that exists between traditional tribal laws versus the modern laws that came into effect with the establishment of Jordan as an independent nation in 1946. According to the laws established after the independence, the government owns lands surrounding the Park as well as lands within the Park. In contrast, in the perception of the tribal communities, there are Miri lands that fall under tribal or customary law. The restriction of development and commercial activities on lands perceived by the tribal communities as belonging to its traditional owners is not an easy regulation to impose in a tribal society, and doing so continues to present a challenge to this date.

The Petra region does not lack economic assets, but they have not been developed adequately to benefit all the local communities. On 25th of November 2005, at UNESCO's headquarters in Paris, a 16-member international jury proclaimed The Cultural Space of the *Bedu* in Petra and Wadi Rum a masterpiece of the oral and intangible heritage of humanity. This proclamation gives international recognition, visibility, and fame to one of the great nomadic cultures of the world, that of the *bedu*, in the specific natural and historical contexts of two outstanding areas in the south of Jordan. It carries a enormous potential for the concerned communities in terms of preservation of their heritage and improvement of their livelihoods.

In turn the social and economic benefits these resources provide can vest in the local communities a sense of purpose. Recent tourism trends indicate that visitors to the region seek to expand their experience beyond the Archaeological Park proper; local communities should be encouraged to take advantage of this interest in their intangible heritage. Hence, there is a growing need for facets of local heritage to be explored. This development can enable local communities to reap Petra's economic benefits. Moreover, fostering interest in heritage will simultaneously encourage the preservation and protection of heritage.

Junior Ranger Program

It is in recognition of the importance of community participation that the PNT introduced to its programs activities in education and outreach: the Petra Junior Ranger Program in 2010. It is an educational program based on the paradigm of explore, learn, and protect. In its mission to preserve and protect Petra, PNT is seeking to develop an educational and stimulating program for the youth of Petra. The program introduces the culture (peoples, traditions, and practices) and history of Petra in an entertaining and engaging way by employing a hands-on learning approach for youth, that is, learning by doing, exploring, and discovering. It will allow children to interact with the site, feel its importance and uniqueness, explore and discover its archaeology and natural features, and participate in different activities that will teach them about the site. PNT believes that this can be achieved by instilling a greater understanding and appreciation of Petra and by integrating the interests of the local community into Petra's preservation efforts. The Petra Junior Ranger Program is an effective method to involve and engage the youth of the local community in sustaining the values that set Petra apart as a world heritage site. PNT believes that the youth of today will become tomorrow's stewards of this heritage.

Throughout the workshop, participants learn about Petra, its significance, and why and how to preserve it. The program fosters critical thinking skills and civic engagement, essential building blocks for a healthy civil society. The workshops conclude with a ceremony in which participants recite the Junior Ranger pledge and graduate as Petra Junior Rangers (Fig. 2). The program targets children and youth from the six villages of the Petra region: Beidha, Um Seyhun, Wadi Musa, Taybeh, Rajef, and Dlagha. The program is divided by age group: 7–9, 10–12, and 13–15 year olds. Each workshop includes 20 participants and five teenage volunteers from the Petra region. From January 2011 to February 2012, PNT has implemented five workshops for the

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 2 Pledging the junior ranges oath at the graduation ceremony, Petra Junior Ranger Program

7–9 year old age group and three workshops for the 10–12 year old age group.

The Junior Ranger curriculum focuses on the outstanding universal values (OUVs) that render Petra a UNESCO World Heritage Site. The program first addresses Petra's cultural value by introducing participants to the different peoples that contributed to their heritage. The type and depth of the activities expand with the age groups. For example, while the 7–9 age group studies four time periods: the Nabataean, Roman, Byzantine, and modern period, the 10–12 age group additionally studies the Neolithic period.

The activities focus on the different historic periods and their relation to modern times. Participants wear costumes to show the similarities between the attire then and now. In the classroom, participants dress up in Neolithic style costumes and use flint stones to make spark (Fig. 3).

Another classroom activity exposes participants to the round and square Neolithic houses; participants notice the similarities to modern houses, which help them to identify with this heritage. When participants visit the Neolithic site of Beidha, they do a bread-baking activity. First they see the oblong quern that Neolithic people used to grind wheat, and they compare it to rounded basalt querns that are still used today. Then they bake bread over fire, again in the way that Neolithic people used to do it. This activity further encourages participants to connect with their heritage (Figs. 4, 5, and 6).

Following the Neolithic period, in addition to costumes, participants are introduced to the Nabataeans through their fine and delicate pottery; in the classroom participants learn to make and paint their own pottery. The "Decorating My Wall" activity based on the Nabataean wall painting in biclinium 849 in Siq al-Barid that was conserved recently by PNT encourages the appreciation of cultural and natural heritage, preservation practices, and creative expression (Figs. 7 and 8). On a field trip to Siq al-Barid, the

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 3 Participants dressed up in Neolithic costumes

participants have the opportunity to appreciate firsthand the content of the painting which includes endemic plants and animals as well as figures from Greco-Roman mythology. The instructor also draws the participants' attention to "vandalism" that has caused extensive damage to this unique example of wall paintings and connects this example to protection of heritage and the general concept of the need for preservation.

The workshop ends with a graduation event where parents, siblings, government and Park officials, local parliamentarians, and sponsors and members of the Board of the Petra National Trust attend. The work of the participants is exhibited on this occasion, and the junior rangers take the pledge, "I promise to appreciate, respect and preserve Petra. I promise to share with others what I have learned and to help protect the archaeological, natural, and cultural heritage of Petra."

PNT plans to further expand the Petra Junior Ranger Program to adapt the Petra Junior Ranger program to other archaeological sites in Jordan. PNT will also use the momentum from the Petra Junior Ranger Program to launch further youth and adult engagement initiatives

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 4 Neolithic round and rectangular houses in the Neolithic settlement in Beidha, Petra

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 5 Modern rectangular house in Wadi Musa, Petra

Living Communities: Local Communities in Site Management and Advocates for Site Preservation, Fig. 6 Participants building their own habitat

to build a generation of aware, engaged, and active advocates for Petra.

Conclusion

In conclusion, a variety of factors threaten the world's rich and diverse cultural heritage. There emerges an exigent need to responsibly preserve this heritage for this and future generations. Moreover, cultural and natural assets can provide a path to development for local communities in Jordan. Whether from tourism or from investments in cultural heritage and related industries, there is ample potential to generate a broad scope of economic entrepreneurial activities that have the capacity to create wealth and cultivate pride and amelioration of level of comfort. In the case

Living Communities: Local Communities in Site Management and Advocates for Site Preservation,
Fig. 7 Recreating the wall painting on the ceiling of Biclinium 849 in Siq al-Baird, Petra

Living Communities: Local Communities in Site Management and Advocates for Site Preservation,
Fig. 8 Completing the wall painting on the ceiling of Biclinium 849 in Siq al-Baird, Petra

of Petra in Jordan, heritage manifests itself in everything from hospitality customs to traditional food serves to bolster tourists' experience in the region. Their heritage is what makes local communities more unique; expanded utilization of this heritage will bring socioeconomic benefits to Petra and other archaeological regions in Jordan. The challenge is galvanizing financial and other resources to invest in development of cultural heritage to bring benefits to the communities surrounding Petra and other heritage sites in Jordan.

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Local Communities and Archaeology: A Caribbean Perspective

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Introduction

Archaeology in the Caribbean has from its beginning in the early to mid-twentieth century been controlled by overseas universities and researchers. It is primarily academic-driven research that has and continues to produce excellent scholarship and impressive collections of cultural objects. It has also generated large amounts of information on the history and natural history of the islands. Management of data and collections is an ongoing challenge for many communities on the islands of the Caribbean.

Key Issues/Current Debates/Future Directions/Examples

Local Archaeology in the Caribbean Region

Despite more than a half century of research, only the islands of the Greater Antilles with large populations and universities have "local" archaeologists and departments of archaeology. The colonial French and Dutch Antilles also have resident archaeologists and departments of archaeology, but they are part of the European systems and the archaeologists are mostly from Europe. Regardless, academically focused archaeology is still at the forefront of research and excavations on those islands. In the independent islands of the former British colonies, archaeology is completely dominated by overseas academics from a large number of universities who visit annually for short periods of time. This discussion will refer specifically to the situation in the former British colonies of the Eastern Caribbean.

Most of the small islands have major economic issues, and archaeology and museum development have been and continue to be led by a few individuals who volunteer their time and resources for archaeology and heritage development. Sustainability is an issue although their efforts are well recognized by the development authorities and local governments on their various islands. Yet their efforts and projects including the safeguarding and management of their islands cultural relics and antiquities are grossly underfunded by their governments, if at all.

During the annual field seasons, archaeology field schools with new generations of archaeologists seeking to make their mark descend on the islands eager to recover the secrets and mysteries of the past. From their perspective they are providing a valuable service while gaining knowledge and recovering archaeological collections for study and publication. This is indeed admirable and welcome, but there is another side of the story. Many of the findings taken overseas for study and documentation are never returned to the islands. Most are lost in the basements and

closets of universities as the students graduate and memories and promises fade. Ironically, the vast body of data and cutting-edge information is also lost within the halls of academia as papers, theses, dissertations, and presentations are produced and presented to fellow academics. Very little of this knowledge will ever trickle back to the islanders and into their history books. On the other hand, there are academics that have sufficient time, funds and students to be able to extract their required data, photos, and analysis on the islands, and then leave behind their excavated collections in the hands of the local museums and avocational island archaeologists. To their credit they have done the right thing, except that most islands lack the resources and capacity to curate, manage, research, publish, and store the enormous collections that grow considerably every year. Throughout the islands there are collections that have been abandoned as their formerly well-labeled containers rot in the tropical heat. Plastic bags and bins dry and crumble, while insects and vermin, hurricanes, and vandalism contribute to the rapid destruction of cardboard, plastic, and wooden boxes and bins. Dedicated space for the storage of collections, primarily the bulk of non-diagnostic sherds, shells, soil samples, glass, and much more, is nonexistent. As the small nonprofit museums with untrained volunteers and staff struggle to cope with little-to-no resources, funding, or curation, the question will arise, "Why are we spending our limited resources on keeping this non-museum quality junk when we can't pay the utilities or improve the exhibits?" Before they can answer the question, its field season again and more archaeologists and their students descend on the islands.

So where does the academics' responsibility begin and end? Clearly the end of the field school museum day exhibition and meet-the-public day is not sufficient. Many academics try to build capacity by encouraging "locals" to come and dig alongside their students, but this too is an issue. While the academic has years of study, ethical responsibilities, and scholarship, the "local volunteer" will have only acquired the knowledge of how to find a site, where to dig, and what is of value. A little knowledge is indeed a dangerous thing, so this well-intended event could be the training camp for potential looters. Speaking from the perspective of a "local," it is strongly advised to use only committed museum staff, seriously interested older local students, and volunteers who are committed to heritage preservation.

The solutions to these issues begin with the academics. In the rush to find sites and lay claim to an island as one's research territory, the colonial mindset must be left behind. It is not "your site or artifacts or data." Before the excavations begin, one must start to develop capacity in the local communities and institutions that are responsible for the curation of the results of your work. While developing a research proposal, one must always include capacity building, training in curation and management of collections, and the values and ethical principles of archaeology. We must ensure that there are funds and space for sustainable long-term storage and that the organizations themselves are also sustainable and not solely dependent on a single individual for management or source of funds for survival.

Caribbean archaeology is growing in popularity, and recent projects on Antigua and Barbuda by CUNY have adapted this approach and developed close relationships with the museums (HERC 2011). A field station has been setup on Barbuda for a long-term commitment in research, museum development, storage, and training. They work in partnership with the museums on Antigua, and both organizations are benefiting from the new body of data, collections, and opportunities, an ideal case study in ethics and responsibilities.

Cross-References

- ▶ Caribbean Historical Archaeology
- ▶ Caribbean Maritime Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America

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Local Discourses in Archaeology

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Introduction

Archaeologists generally accept that they cannot leave their work to be used only by academics alone (e.g., Jeppson 1997; Little & Shackel 2007). Archaeologists also understand that there is a community outside of archaeology that has a vested interest in the outcomes of archaeological endeavors (e.g., La Roche & Blakey 1997; McDavid 1997, 2011; Leone et al. 2011). Many historical archaeologists support a responsibility to the public to meet their needs by explaining what they say about the sites and people being investigated (Edwards-Ingram 1997; Jeppson 1997). The difficulty, as an archaeologist, is developing a means to reach out to this community effectively. It may not be an easy task to identify this community and to draw the line between who is a part of it and who is not. Archaeologists engaging with stakeholders, which is how we define local discourses, consider these issues as they develop research designs for their projects.

Archaeology in Annapolis (AiA) has been working with the local community in Annapolis and with communities outside of Annapolis since its inception in 1981. AiA was formed out of a partnership between the University of Maryland and several local community groups in Annapolis, including the Historic Annapolis Foundation, the Banneker-Douglass Museum, and the Kunta Kinte/Alex Haley Foundation. Through these partnerships, AiA has excavated over 40 archaeological sites in Annapolis and has provided a variety of effective ways to teach residents and visitors about the lost, hidden, missing, or misinterpreted cultures of groups that were and continue to be important in Annapolis. Teaching, our basic definition of discourse, has been done through open public sites, news media, and public displays of artifacts. Public media allow local communities to receive updated news of the discoveries being made through archaeology in the city. Public access to sites provides archaeologists the means to demonstrate what they are doing, how they are doing it, and how it leads to their ultimate conclusions. However, not every site can be opened up for the public to visit, and newspaper articles and TV newscasts are not continuous. Archaeologists interested in engaging communities have to find a way to reach their audiences and not only provide information but also start and sustain a two-way dialogue that can constitute a local discourse.

Definition

It would seem that any conversation that an archaeologist has about a site with a related community could constitute a local discourse. However, this is not the operational definition of local discourses. As we use it for AiA, local discourses are the conversations that archaeologists have with the stakeholders of a specific project to obtain information and give information about a particular site or project so that both the general public and the archaeologists end with more information. Local discourses, by our definition, also engage the stakeholders and local community in the project, so that the project is not just

being done about a group, but for a group, with their interests and questions in mind as the research design is developed.

In the sociocultural anthropological contexts, local discourses have been defined as comparable to oral histories and have been used for the benefit of the anthropologist, as a way to gain more information about the subject under study (Agar 2005: 2). However, archaeologists typically do not see these discourses as solely for the benefit of the anthropologist.

Theoretically, our understanding of "discourse" is influenced by Jürgen Habermas (1981) and Michel Foucault (1969). Many of the problems archaeologists have had with local communities stem from a lack of communication, openness, trust, respect, and accountability, while many of the successes have come from an abundance of these (e.g., La Roche & Blakey 1997; McDavid 1997; Little & Shackel 2007). Habermas discusses the notion of the "ideal speech situation," that is, a situation in which all interested parties can come together to create and sustain a discussion, hear and be heard equally, participate in the discussion on equal footing, and weigh all of the options presented before being able to arrive at a general consensus (Habermas 1981). However, while striving to achieve Habermas' ideal speech situation, there are barriers which prevent archaeologists from achieving it, which in turn have ramifications for our understanding of local discourse. Central among these is archaeology's perceived authority to make statements of cultural fact (Jeppson 1997). Mostly located within academia, archaeologists use what Foucault introduced as the concept of knowledge/power, which asserts that there are hidden power relations embedded within any form of discourse in which one group possesses knowledge that it can use over another (Foucault 1969). Just as doctors have power over their patients and lawyers have power over their clients because they possess specialized knowledge and skills the other does not, archaeologists have power over the local communities in which they work. By ignoring this fact, power relations of the status quo are unwittingly maintained at the expense of the groups with whom archaeologists are supposed to be working. This is not to say that specialized knowledge is inherently bad. By recognizing the knowledge/power embedded within the practice of archaeology, archaeologists can take steps to change the way they relate to local communities and in doing so come closer to Habermas' ideal speech situation. Central to the attempts of archaeologists to work with local communities is a balancing act between trying to achieve Habermas' ideal speech situation while at the same time possessing Foucault's knowledge/power by acting as experts and authorities.

Key Issues/Current Debates/Future Directions/Examples

Engaging with the general public when doing archaeology presents several problems. The first is how to define a public. In some ways, it makes sense to define the audience as the people who live in the community surrounding the archaeological site being investigated. However, this can be problematic, especially when there is a descendant community with a vested interest in the site that is not necessarily local. In many cases, archaeologists end up having to deal with several different groups, who are not mutually exclusive, but who have different needs (McDavid 1997; Franklin & McKee 2004 in Brandon 2008), and "archaeologists have historically oversimplified our notions of 'community'" (Brandon 2008: 149). For example, when working at Wye House, there is a known descendant community living in Unionville, Maryland. During the Civil War, 18 slaves were removed from the Wye House plantation by the Union Army and promised freedom in exchange for military service. After the end of the war, they returned to the area and settled on Quaker land approximately three miles away from Wye House and developed the town of Unionville. When Mrs. R. Carmichael Tilghman invited Archaeology in Annapolis to excavate at Wye House in 2004, researchers from AiA went to Unionville to start a dialogue with this descendant community. Mark Leone went to the main church in

Unionville, St. Stephen's, and started talking to the prominent members of this community about the excavations at Wye House that he was going to conduct through Archaeology in Annapolis. One member indicated that she wanted to know if there was "evidence of slave spirituality" and "what the Lloyds had done for freedom." These two questions, combined with the early interest of the Lloyd descendants, shaped significantly the research design that led to seven seasons of excavations at Wye House.

As direct descendants of the community being investigated through the archaeological investigations of AiA, this descendant community clearly has an interest in the work and is an audience. But should this audience be given a higher priority or be more included in the decision-making process than another local community? We decided they should be and we made sure to consult with this community before excavations began at Wye House. This in some ways is less problematic than other descendant communities because the proximity of Unionville to Wye House allows it to be grouped within the "local" communities. However, we do encounter situations where the descendant community is not really a community, so much as a person, and that person lives on the other side of the country. In this case, the opinion of the descendant is solicited.

This was the case for one of the properties excavated in Annapolis, Maryland, where AiA members have worked directly with descendants of James Holliday to develop archaeological research designs. In the fall of 2009, a homeowner whose family had owned, and continues to own, the James Holliday House wanted to know more about her family than could be determined from historical records alone. James Holliday was a freed slave who was one of the first African-Americans to be employed at the US Naval Academy. He purchased a brick townhome just off of State Circle in downtown Annapolis in 1850. James Holliday and his descendants have owned the property ever since. This gracious homeowner agreed to let Archaeology in Annapolis excavate the yard and basement of the property for three summers, in exchange for any information the researchers could provide her about her family. The specific interests of the homeowner and the oral histories she has provided have significantly influenced the research design of this project. For example, the homeowner of this property is interested in the role her great-grandfather, James Holliday played at the US Naval Academy, and as a result, much of the research that has been done on this property has been focused on determining how the Holliday family's relationship with the Navy and Naval Academy influenced their standing within the Annapolitan African-American community. Two summers of archaeological investigation have led to the conclusion that the Holliday family was well established within the middle class and appears to conform, to some degree, to the previously established trends within the African-American community in Annapolis, in spite of their continued contact with these predominantly white institutions. Because this descendant homeowner does not live in Annapolis today, most of the information exchanged between the researchers and the homeowner has been done through phone calls and e-mails.

In their work at the African Burial Ground in New York City, La Roche and Blakey (1997) strove to create a project that both informed and was informed by the local community. Excavations began at the African Burial Ground in the summer of 1991 and continued into the summer of 1992 before a group of "influential and determined African-Americans, and others, combined to halt excavation, take moral responsibility, and seize intellectual power" (La Roche & Blakey 1997: 85). The burial ground is the largest and earliest example of an African-American burial ground in the United States and, as a result, is of great interest to both the academic community and to the descendant community. Local discourses surrounding this archaeological excavation were started largely as a reaction to the outraged local community, led by congressmen, senators, the New York City Landmarks Commission, journalists, artists, clergy members, and other concerned citizens. Their reactions and activism resulted in the project changing hands,

from the United States General Services Administration to a team of concerned academics, led by Michael Blakey at Howard University. According to La Roche and Blakey, the addition of the academics to this group of concerned citizens provided the "final necessary component" of intellectual power and technical expertise to the project (1997: 85).

La Roche and Blakey (1997) assert that understanding and sustaining local discourses requires not only an understanding of the specific project at hand but also an understanding of the larger scholarly and public concerns related to the topic, especially the related long-standing political debates. Most of the work of this project to establish and sustain conversation with the local community and interested stakeholders was done through the Office of Public Education and Interpretation (OPEI). OPEI opened in 1993 and was tasked with informing and educating the public about the ongoing progress of the African Burial Ground project, both on- and off-site (La Roche & Blakey 1997). In 2006, management of the OPEI was transferred to the National Park Service, who continues to interact with community members and volunteers through meetings, forums, the development of an interpretative center, and the dedication of a memorial (African Burial Ground 2007).

How does a project qualify as a local discourse? Is "local" anything that pertains to the site? For our project, we determined that all descendants, regardless of their physical location, should be included in the target audience that is consulted in our outreach. What happens when different factions within the same community have competing interests? Do you, as the archaeologist, take a stand and advocate for a particular side?

In an effort to deal with the problem of a large, spread-out audience and community, archaeologists have moved toward working with an online blog. This is easily accessed, easily updated by the archaeologist, and provides the opportunity to present research in an informal way that is more easily understood by the public. It also allows the public access to excavation sites that might otherwise be inaccessible due to size or privacy. For example, our excavations in the backyards of Annapolis households or the Wye House plantation are largely unavailable for the public. In order to open up a conversation about research, it is necessary for researchers to construct a space to share experiences and discoveries while allowing feedback from the community. A blog creates such a space in a digital environment and welcomes a discourse not only with the community that is physically local but also a dispersed community with a shared interest in the findings and interpretations of Archaeology in Annapolis. This informal medium is the ideal space in which to demonstrate a reflexive, multivocal, contextual, and interactive presentation of research because it shows the public the ongoing process of inquiry and analysis in archaeology and permits commentary and questions from any reader. Carol McDavid identified these attributes as the objectives for her Levi Jordan Plantation archaeological site, which she used to promote a collaborative project between archaeologists and the decedent community (McDavid 2004). In the development of a project website, McDavid brought the research on the Levi Jordan Plantation – a nineteenth-century site in Texas – into an environment of shared control with the African-American and European-American decedents. From the beginning stages of web design, interaction with the community was an important factor, leading to workshops with descendants to determine how the public would engage with the features of the site. The final product included a discussion forum, feedback forms, and questionnaires, which allowed users of the site to contribute opinions, ask questions, and begin conversations (McDavid 2004: 46). One of the goals of the project was that every stakeholder – the community members, family members, academics – had an equal and legitimate voice to add to the final website. Through a diversity of collaborators and the openness of the project, McDavid demonstrated a local discourse that leads to collaboration in "reciprocal, nonhierarchical, [and] mutually empowering ways" (41).

Due to the accessibility of the Internet, blogging has become a "spaceless" public sphere, where there exists a freedom of opinion, personal communication, and information exchange that

brings users closer to Habermas' "ideal speech situation" (Dakroury & Birdsall 2008). Blogging in archaeology allows the public access to the discussion of excavations and analyses without the constraints of uneven power relations, constructing a discourse where inclusion and the right to contribute knowledge within this online community are central.

The AiA Blog began this summer, in 2011, as an experiment in web-based outreach and provided access to a community that stretches the definition of "local" and demonstrated a few of the positives and negatives of an online discourse. The main aim of the blog was to engage the local communities connected to our Annapolis and Wye House sites, but the global nature of the Internet meant that our project was open to any party with web access. By virtue of making our blog public, we expanded our audience to include local residences, descendants who have relocated, other archaeologists, and any other readers who have an interest in our archaeological work. The main problem, however, is gauging how effective the blog is in reaching our intended communities. The anonymity of the Internet allows readers to offer comments or ask questions without identifying who they are. Some commenters on the blog declare themselves to be a local resident, while others make no mention of an affiliation. Additionally, it is difficult to assess the reach and readership of the blog simply from its comments, because a majority of visitors to blogs will read the content but not contribute to any discussion. It is both frustrating and gratifying to attempt a local discourse through an online medium. Opening up our work in the manner of a public blog takes a great deal of the control of information out of the archaeologists' hands and places it into the view of an at-times faceless audience. It creates an entirely different sort of community, one that is not confined by physical location.

Historical archaeologists have sometimes been invested in working with communities to not only inform their own investigations but also to incorporate stakeholder concerns into the research design. The information gleaned from excavations can be of benefit to everyone. Through conversations with the public, archaeologists work toward an "ideal speech situation," in which the researcher and the public participate in a dialogue. An added difficulty in engaging with a local discourse comes from the oftentimes nebulous definition of the "local" community. Simply drawing a line around the residents with physical proximity to the research area can be problematic, and outlying members of the descendent community or other members of the general public may have a vested interest in the archaeological findings. One solution has been to take the discourse out of the realm of the physical and into the digital, where blogs can work toward allowing an informal record of archaeological work and a conversation between interested parties in a "spaceless" public sphere.

Cross-References

- ▶ Activism and Archaeology
- ▶ African Diaspora Archaeology
- ▶ Archaeological Stewardship
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Outreach
- ▶ Decolonization in Archaeological Theory
- ▶ Heritage & Society
- ▶ Heritage and Archaeology
- ▶ Heritage Values, Communication of
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Media and Archaeology
- ▶ "Public" and Archaeology

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Local Populations and Global Heritage

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Introduction

In the 1990s, postmodern concerns with subjectivity, power relations, and pluralism gave rise to ethical interests in examining how people who live near and among archaeological remains understand, appropriate, and actively use them in sociocultural, economic, and political contexts. Since that time, scholars have designed projects to gain specific insights into how people use the material past to construct, perform, and maintain distinctive, "local" identities in an increasingly globalized world, the ways in which they contest, appropriate, and negotiate political and economic interests in relation to tourism and heritage management policies, as well as how they situate their pasts in relation to "world" history and human origins. As a result, the integration of "local" concerns, values, and beliefs has become a routine part of heritage management practices, especially at United Nations Economic Scientific and Cultural Organization (UNESCO) World Heritage Sites (WHS).

Interests in examining the power relations involved in "community" and "participatory" heritage management policies and practices in such contexts have also become prevalent in disciplines such as social and cultural anthropology, cultural geography, and sociology, where scholars are particularly concerned with how forms of "development" related to global heritage and tourism impacts on "local" cultural practices and social and political organization in the present.

This entry summarizes the historical significance of the rise of identity politics, postcolonial discourses, and the impact that both studies and processes of "globalization" have had on archaeology and heritage management practices. It discusses and defines the approaches, techniques, and practices that have come to characterize the relationships that "global" heritage institutions and their affiliated practitioners have with "local" people, in particular the practices in which they engage that attempt to take into account the values and concerns held by them which are directly affected by heritage management policies. Finally, it summarizes various critiques that have recently arisen within "global/local" heritage debates, including the paradoxical nature of the ways in which cultural practices can themselves become essentialized and instrumentalized as a result of pluralist strategies and "participatory" frameworks that are often adopted within contemporary global heritage management.

Definition

Within current heritage management policies and practices, the relationship between the "global," that is, aspects of archaeological and historic remains that relate to their "universal" values and significance in relation to human histories and origins, and the "local," that is, the *particular* assemblages of histories, traditions, and cultural practices in which those sites are embedded, is foregrounded as a particularly important and active dynamic in the ongoing lives of archaeological monuments.

Recent trends have emerged in academic discourse and heritage policy that are intended both to explore and "manage" this relationship. These include participatory strategies that draw on the values, knowledge, and beliefs of "local" populations in *collaborative* ways that aim to enrich archaeological understanding and to empower and include social actors whose interests had previously been obscured or marginalized within the production, management, and dissemination of archaeological knowledge. It also includes adopting frameworks that have "consultation" at their core, and that are employed to *mediate* tensions that have the potential to arise when a site's meaning and worth are defined by those who lay social, cultural, historic, and economic claims to them, while archaeologists, historians, and other heritage "experts" are given the authority to define how they are used and presented in official, legitimized terms. UNESCO has been particularly active in employing such research and practices within its World Heritage Site management policy guidance.

Concern with the "global"/"local" dialectics of archaeological sites as defined above can be traced to the convergence of several strands of research that have emerged across the humanities and social sciences over the last three decades. The impact of postmodern thought on archaeology led to a widespread movement termed "postprocessualism" during the 1980s, which led scholars to acknowledge and examine the subjective nature of archaeological interpretation (Trigger 2006). Appropriating approaches associated with a number of theorists and philosophers like Jacques Derrida, Michel Foucault, and Judith Butler, the assertions that characterized this paradigm included that archaeologists "read" the past in much the same way as texts (Hodder 1986) and that archaeological sites and objects are generally described and understood according to the subjective narrative experiences and identities of the discipline's practitioners. Such contentions evolved to include the interrogation of tendencies for archaeological remains to be presented to audiences as objective "facts" to be described and understood objectively by

experts, as well as explorations of the traditionally unequal power relations that characterize interpretive encounters.

More recently, postcolonial and feminist strands of postmodern thought raised further intellectual and practical challenges for archaeology and its practitioners throughout the late 1980s and 1990s. The World Archaeological Congress (WAC) was established during this era, becoming an important force for championing indigenous claims to the past, and questions also became common within archaeological discourse about the ways in which the construction of modernist metanarratives of human history had obscured and marginalized the voices of women and oppressed colonial societies whose pasts are the subject of archaeological scrutiny (Rowlands 1998).

Concurrently, scholars across the humanities and social sciences, particularly in Euro- American academic institutions, were becoming concerned with the increasing pace of "globalization" and its impacts on people's experience of identity and place (Appadurai 1986, 1996). Additionally, the collapse of Eastern European communism, the rise of neoliberal politics, and growing significance of international market economies and consumer capitalism also led scholars to become interested in changing cultural forms and the experience of everyday life in an increasingly mediated image- and knowledge-saturated world. As a result, studies of people's experience of tourism and travel, how "local" identities are "performed" for visitors and maintained for cultural survival in communities, as well as the instrumental use of "culture" within development agendas, all became commonplace in the academy.

Within these arenas of inquiry, a great deal of research focused on how, in particular, archaeological and historical "heritage" are used to construct politicized narratives of the past to serve nationalist agendas and political establishments in the present (see especially Handler 1988).

As a result, epistemological questions like "who owns the past?" "who decides what is preserved?" "who controls how the past is presented?" and "how do archaeological practices impact on those people who live near archaeological sites" became routinely raised in archaeological dialogues, eventually leading to widespread integration of reflexive research and practices within governmental heritage policy and legislation across the world.

Key Issues

The involvement of "local" populations in cultural resource and "heritage" management practices, as increasingly recommended by UNESCO guidelines at WHS, generally involves the adoption of various strategies and research methodologies from the social sciences, to establish insights into the values, beliefs, and knowledge that they hold about particular sites and landscapes. This, it is generally argued by its proponents, enables collaborative research themes to develop and grow *out of* the issues deemed important by local communities (often termed "stakeholders" and "descendant communities"), with the specific intention of encouraging and nurturing more equitable participation in the management process than previous exclusionary heritage practices had allowed. As Breglia (2005: 387) has recently pointed out, for "collaboration" to be successful or even possible within the realm of community and public archaeology projects, participation needs to be written into research project designs *from the outset*, so that the results are not simply "additions" to the existing expertise of archaeologists, but rather, *key in the production of knowledge about* archaeological remains.

The language that characterizes such methodological approaches is purposefully inclusive, and draws on active, "empowering" terms like "participation", "collaboration," and "action research". Although quantitative research is sometimes used to gain understandings of such values, it is generally forms of qualitative inquiry, including ethnographic approaches, experiential techniques, and qualitative interviewing, that have come to be the primary approaches used in this process (see Edgeworth 2006; Himilakis 2009), in order to gain nuanced views of people's knowledge and experience of archaeological sites.

The kinds of knowledge, values, and insights often identified as relevant to the heritage management process include historical traditions through which those sites are understood by local populations, like folkloric material, oral histories, and place names (Gazin-Schwartz & Holtorf 1999), as well as examining the role such traditions play in the construction of senses of place, authenticity, community itself, and ideas about the "rootedness" of identity to particular landscapes in the present (Jones 2004). Other spheres of knowledge with which such research tended to engage include how archaeological sites are represented within tourism media, the ways in which local economies and "sustainability" agendas are impacted by WHS management in both "developed" and "developing" nations (see Breen 2007 on WHS management in sub-Saharan Africa), as well as how the practices surrounding the sites themselves are appropriated and incorporated into "local" spheres of meaning and practice.

The knowledge gathered from such research exercises tends to be both *applied*, in that the results may be used within heritage management practices specifically to gain understanding of, and therefore better represent local interests within, the heritage management process, as well as *informing* archaeologists and heritage managers' understandings of how those people value heritage sites and the ways in which, for example, local identities, social structures, and views of the past are constructed in that process (see especially Breglia's account of traditions of inherited labor roles among Mayan communities at Chichen Itza WHS, and Muke, Denaham and Genuropa's 2005 investigation into the use of Kawelka traditional land tenure frameworks to denote conservation areas in order to better serve management of the Kuk WHS in Papua New Guinea).

Current Debates

Over the last decade, the recognition of the concerns, interests, beliefs, and values that local populations now receive as a matter of course in the context of "managing" heritage sites in countries across the world has given rise to new sets of critiques about the frameworks and processes through which this is achieved, whether the approaches outlined above lead to "successful" global/local dynamics at heritage sites and the complexities and contradictions that often surround these practices. Many of these discussions overlap, and relate specifically to the processes of "participatory" heritage management and the diverse ways it works "on the ground" at heritage sites, and others that critique the more abstract, philosophical positions that underpin the "global heritage/local populations" relationship as it is understood and played out in official institutional discourse.

Firstly, archaeologists who work or have worked with local populations and social groups in the context of local heritage that has global significance have begun to reflect on the outcomes of engaging in "participatory" frameworks. While there is much to recommend in terms of success in more equitable representational of local interests, scholars are increasingly aware that reflexive research in this area must not:

Reify tropes of the "local." If identity studies and reflexive methodologies emerging from the social sciences and humanities have taught us that cultures and landscapes are constantly in flux, who therefore decides which communities and interests are "local" in relation to heritage of global renown, what factors (geographic, historical) contribute to these "classifications," and which section of those societies' interests are foregrounded in heritage management processes? To reify the trope of "localness" simply reproduces the very exclusionary practices that the identity studies of the 1990s and 2000s sought to interrogate.

Represent community and "local" interests as secondary to traditional archaeological interpretation in global/local research and management. As Breglia (2005) has pointed out, archaeological interpretation that is truly collaborative must not treat local concerns as secondary to more traditional forms of the presentation of archaeological data in research reports, monographs, and

heritage policy agendas. This, she argues, needs to be reflected in the structure of research designs, as well as the representation of archaeological knowledge produced from such projects. Otherwise, true praxis cannot be achieved, and such efforts remain top-down endeavours, and thus not central to the production of archaeological knowledge (Breglia 2005). Using reflexive ethnographic techniques and creative approaches to writing and integrating local knowledge to research design are possible solutions to such issues.

A second sphere of debate about the local/global heritage dynamic centers around definitions of "value" and "significance" as they relate to historic and archaeological remains, and the ways in which definitions of these concepts are ultimately rooted in the histories and practices of the capitalist nation state (Samuels 2008; see especially Holtorf 2009).

Such values, they argue have traditionally been dictated by economic significance, as defined by the World Bank and related to notions of private property, as well as according to essentialist conceptions of culture as espoused by Western European ideas about citizenship and national identity. Such ideas continue to dictate how "heritage" is defined, produced, classified, and managed globally, despite recent attempts to integrate "local" values and to recognize the shifting center of identity that reflects the movement and immigration of people, knowledge, and practices associated with globalization. Any ethical treatment of heritage, then, must therefore center on dynamic processes of cultural change.

A third sphere of debate about global heritage and how it relates to local cultural practices, overlaps significantly with critiques of the conception of "value" as discussed above, and posits that the very concept of "global" heritage, especially as manifest in the UNESCO World Heritage List, privileges and legitimizes a modernist metanarrative of human heritage and its definitions. In an extensive critique of the concept of "World Heritage," Narkunas (2007) points out that the World Heritage agenda, as outlined by UNESCO, is underpinned by essentialist notions of culture that aspire to "normalize criteria" of culture in relation to the liberal democratic model of the nation state, which is underpinned by enlightenment ideas that aspire to objectivity and universal humanism. Such philosophical positions, especially in the context of defining what heritage is and how it should be managed and represented, "trump" the ways in which it may be defined and understood on smaller scales, preventing a truly ethical stance on providing equal weight to the knowledge and value systems of all concerned populations that have interests in heritage sites.

Future Directions

The relationship between global heritage and local cultural dynamics continues to be an important, growing area of inquiry, with a particular view toward discussing it in relation to morality and applied ethics. The ways in which the relationship of local knowledge and values to "global" heritage management practices is seen to engage with discourses of sustainability and waste (see McClanahan 2012 on conflicting moralities between "cultural" and environmental sustainability at WHS's), as well as in relation to the development of industrial heritage and contemporary archaeologies as appropriate fields for the discussion of current crises of global capitalism.

Cross-References

► Post-Processual Archaeology
► Post-Processualism, Development of

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Logan, William S.

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Basic Biographical Information

William (Bill) Logan completed a doctorate in 1981 in the field of urban geography with a thesis focused on the politics of housing, planning, and heritage conservation in inner Melbourne. He has long been on the faculty of Deakin University in Melbourne, Australia, where he has held numerous senior administrative positions including Dean as well as Research Director in the Faculty of Arts (1993–1998). He was awarded the Deakin University Researcher of the Year Award in 2002 and was made an Alfred Deakin Professor in 2004 for his contribution to the university's research profile. His research record includes numerous Australian Research Council and other grants.

Major Accomplishments

Dr. Logan has been involved in cultural heritage conservation since the early 1970s when he took part in the resident action movement in inner Melbourne. He has been engaged in teaching, research, and consulting on Australian and Asian heritage issues since then. He holds the UNESCO Chair of Heritage and Urbanism in the School of Humanities and Social Sciences.

Since 1986, Dr. Logan has been an International Expert for the UNESCO Division of Cultural Heritage in Paris, where his work has mainly been related to UNESCO's international campaigns to safeguard world cultural heritage sites in Pakistan, Sri Lanka, Bangladesh, Nepal, China, and Vietnam. He has also acted for the UNESCO World Heritage Centre at international meetings of experts in Vietnam, Indonesia, and Korea and has contributed to its "State of the World Heritage" Report (2005).

He is a member of Australia ICOMOS and was its president from 1999 to 2002. He has represented ICOMOS at international meetings in Japan and Korea. He has been a consultant to AusAID, the Australian Heritage Commission and Department of the Environment and Heritage, and the Victorian Department of Infrastructure, and he is a member of AusHeritage (including Board Member, 1998–1999).

He is a member of the Heritage Council of Victoria and fellow of the Academy of Social

Sciences in Australia. His involvement with international and national heritage bodies directly led to course innovations and research activities at Deakin University. Professor Logan introduced two courses in Vietnamese history and culture and instigated the development of an Asian Studies major. He led the establishment of the Cultural Heritage postgraduate program at Deakin in 2000. He is the immediately former Director of CHCAP/Cultural Heritage Centre for Asia and the Pacific, a research and training center that has UNESCO endorsement.

His research interests include World Heritage, heritage and human rights, heritage education and training, the heritage of war, heritage theory, and Asian heritage, especially of Vietnam. In addition to books, some of which appear below, Dr. Logan also has many articles in refereed and professional journals, as well as conference papers. His book, *Hanoi, Biography of a City* (2000), won the International Planning History Society Book Prize in 2002 and was republished in Vietnamese translation in Hanoi in 2010 as part of the city's millennial celebrations.

In addition to establishing heritage programs in several Victorian universities, he helped develop postgraduate heritage courses at Silpakorn University in Bangkok and the University of Santo Tomas in Manila. He has been member of the international advisory boards of the Academy of Irish Cultural Heritages at the University of Ulster, in the UK, and the Centre for Cultural Heritage Studies at the Chinese University of Hong Kong. He is a member of the editorial boards of Spatial Habitus, he is co-editor of the Routledge 'Key Issues in Cultural Heritage' book series and a series of monographs published by the University of Hawaii Press and the China Institute in America, NY; *International Journal of Heritage Studies*; and *Historic Environment*, the journal of Australia ICOMOS.

Professor Logan was an invited expert at the Consultative Meeting on Cultural Rights at the UN Human Rights Commission, Geneva, in February 2011 where he also addressed the Human Rights Council. He gave the keynote presentation at the 'Our Common Dignity: Towards Rights-Based World Heritage Management' seminar conducted by Norway ICOMOS, the Norwegian Centre for Human Rights and the Norwegian Helsinki Committee in March 2011 and in May 2012 he played a lead role in an interregional conference on 'Living with World Heritage' hosted by the Norwegian Ministry of Environment in Røros, also in Norway.

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage and Communities
- ▶ Heritage and Higher Education
- ▶ Intangible Cultural Heritage
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Looting and Vandalism (Cultural Heritage Management)

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Introduction and Definition

The looting of archaeological sites is today one of the major threats to the world's cultural heritage, second only to the intensification of agriculture and to urban development. Looting in this context may be defined as the unrecorded destruction of archaeological sites in order to provide artifacts for sale on the illicit market for antiquities. What is shocking is that it derives, in some senses, from the recognition of the value of these tangible components of the cultural heritage. But instead of encouraging the careful preservation of their context of discovery, the price that such collectibles can command leads to clandestine excavation and the sale of "unprovenanced" antiquities. Their true value, of course, lies in what, when properly understood in their context of discovery and fully published by competent researchers, they can tell us about the shared past of humankind. Their commercial value is what they can command on the market, sold by unscrupulous middlemen and dealers to unquestioning private collectors. What is particularly shocking is that some of the great museums of the world continue, to this day, to accept gifts or even to purchase "unprovenanced" antiquities (Gill 2011) which derive, often via auction houses like Bonham's in London (see Bonhams 2006) or Sotheby's in New York (Watson 1997), from the illicit trade.

Key Issues/Current Debates/Future Directions/Examples

It should be acknowledged that the collection of antiquities by the scholars of the Renaissance was the starting point for the princely collections of Italy and beyond which gave birth to the first great museums of the world before the discipline of archaeology came of age in the nineteenth century. Until the techniques of stratigraphic excavation and professional publication were developed by pioneers such as General Pitt Rivers or Flinders Petrie, the antiquities themselves were the prize rather than the information which controlled excavation can provide. But by the time that the Archaeological Survey of India was established in 1861, the importance of cultural heritage management was widely realized. From then on, looting and archaeological research could be separated clearly. From then on, the great museums, and increasingly the universities, led expeditions which laid the foundations for world archaeology, albeit at that time in a colonialist or imperialist mode. It was not until after the Second World War that UNESCO (the United Nations Educational Scientific and Cultural Organization, established in 1945) passed its 1970 *Convention on the Means of Prohibiting and Preventing the Illicit Import Export and Transfer of Ownership of Cultural Property* (reprinted in Askerud & Clément 1997). This proved a turning point. For although it requires ratification by participating nations to have legal effect, the individual national enactments do usually have significant consequences, such as the United Kingdom's *Dealing in Cultural Objects (Offences) Act* of 2003, which supports and extends the 1996 *Treasure Act* for England and Wales. The ratification of the 1970 UNESCO Convention by the United States of America and by Switzerland likewise brought important national legislation in each case (Gerstenblith 2003).

Despite these legal provisions, the looting of antiquities, which is illegal under most national legislations, continues unabated, and the looters are locally recognized by their own occupational names: *clandestini* in Italy, *archaiokapiloi* in

Greece, and *huaqueros* in Peru. The problem is internationally recognized (O'Keefe 1997; Brodie et al. 2001; Brodie & Tubb 2002), but many national and regional governments find it difficult to control, and national agencies (for instance, the Red Army in China) are sometimes complicit. The reality is that illicit excavation – i.e., looting – is difficult to control in the field.

If the supply end is difficult to restrain, the consumption – by dealers, collectors, and museums – ought to be easier to regulate, at least when the looted antiquities turn up as "unprovenanced" items in auction houses and museums. In reality the world's museums have been slow in learning to undertake proper "due diligence" (Brodie & Renfrew 2005). The University Museum of Pennsylvania in Philadelphia in 1970 was one of the first (Renfrew 2000: 118), and the British Museum in 1998 was the first of the great museums explicitly to formulate the "1970 Rule": "Wherever possible the Trustees will only acquire those objects which have documentation to show that they were exported from their country of origin before 1970" (Renfrew 2000: 125). The merit of this formulation is that it places upon the vendor or donor to the museum the onus of proving the lawful excavation and export of the antiquity in question and thus excludes the acquisition (even by gift or bequest) of those dubious "unprovenanced" antiquities which have so often proved to be the product of looting (Brodie & Renfrew 2005). After the scandals in various museums in the United States, as noted below, a strong version of the "1970 Rule" in their new acquisition policy was approved and published by the Trustees of the J. Paul Getty Museum in Los Angeles in 2007. Significantly the 1970 Rule was also adopted by the Association of Art Museum Directors of the USA in 2007 and by the Metropolitan Museum of New York after the retirement of the Director, Philippe de Montebello, in 2008.

These important decisions in the USA might not have come about had it not been for the diligence and persistence of the Italian Carabinieri Art Squad in pursuing looted antiquities and their cooperation with the Swiss authorities in seizing in 1995 the contents at the free port in Geneva of the warehouse of the Italian dealer Giacomo Medici (Watson & Todeschini 2006). The looted antiquities and the documentation then recovered ultimately persuaded the Metropolitan Museum that the notorious Euphronios vase (an Attic red-figure crater painted and signed by the vase painter Euphronios), purchased in dubious circumstances in 1972, should be returned to Italy (Silver 2009). Although the return was at first strongly resisted by the Museum's Director, Philippe de Montebello, he was constrained to agree to the restitution in 2008. The Italian authorities also initiated the prosecution of the Curator of Antiquities at the Getty Museum, Marion True, a prosecution which was allowed to lapse with the return to Italy of a number of antiquities including a remarkable marble sculpture of griffins, now known to come from Ascoli in southern Italy and to date from the fourth century BCE (Bottoni & Setani 2009; Renfrew 2010).

The last two decades have brought many scandals to light involving scholars, collectors, and illicit antiquities, sometimes with the attempted suppression of the evidence. One notable example was the attempt by University College London in conjunction with the Norwegian collector, Martin Schøyen (2005), to suppress the report which it had itself commissioned into his loan of a major group of Aramaic incantation bowls, very possibly looted from Iraq (Balter 2007). It may be that the spirit of the 1970 UNESCO Convention will yet prevail. But the prices of "unprovenanced" antiquities continue to rise on the open market. At present there is no doubt that the looting continues unabated.

Vandalism has a different motivation from the avarice which drives looting. In times of war, it is not uncommon for conflicting powers to seek to demoralize the enemy by laying waste to their cultural heritage. That has been true from biblical times, or indeed before, from the destruction of heathen images down to the "Baedeker" raids of the Second World War, named after the series of travelers' guidebooks to the artistic treasures of nations. Taking its name from the Vandals who, as legend has it, laid waste to Ancient Rome, it has its modern equivalent

in religious as well as ethnic bigotry. The destruction of the bridge at Mostar in Croatia in 1993 (Renfrew & Bahn 2008: 550) was the work of Croatian nationalists in the ethnic conflicts which convulsed the former Yugoslavia. The demolition by dynamite of the great figure of the Buddha at Bamiyan in Afghanistan in 2001 was all the more shocking as the work of the Taliban (Renfrew & Bahn 2008: 547) who, as the effective government at that time, had overall responsibility for the protection of the nation's heritage.

These are among the most flagrant recent examples. It is sad that religious divisions continue to result in damage to the cultural heritage. Looting, however, for financial gain, results in more widespread damage in nearly every part of the world. Fortunately it is to some extent countered by modern tourism which increasingly focuses upon cultural history. Governments which previously neglected the cultural heritage now see the benefits of a program of protection and conservation which encourages the tourist industry. Yet some of the world's major museums, like the Miho Museum in Japan or the Metropolitan Museum of Art in New York, continue to exhibit unprovenanced antiquities which have become known since the year of the 1970 UNESCO Convention. As long as they continue to do so, the incentives for the looters will be obvious.

Cross-References

► UNESCO (1972) and Malta (1992) Conventions
► Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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López Varela, Sandra L.

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Basic Biographical Information

In 1996, the University of London awarded her doctoral degree in archaeology on the basis of her dissertation on classification issues of Maya formative ceramics in northern Belize.

She completed her undergraduate studies at the Escuela Nacional de Antropología e Historia in 1987 and obtained a Master of Arts in Archaeology at the Institute of Archaeology of University College London. The Alexander von Humboldt Foundation awarded her a postdoctoral grant at the University of Bonn in 1996, where she specialized in archaeological sciences and brought together scientists from the Max Planck, the Freie Universität Berlin, and Leiden University. Since 1998, Sandra L. López Varela has been a full-time research professor at the Anthropology Department of the Universidad Autónoma del Estado de Morelos in Mexico.

Major Accomplishments

Her current research studies concentrate on the effects of social development policies and institutional economics to combat poverty on nonindustrial technologies, an interest that developed from her ethnoarchaeological studies of griddle making at Cuentepec, in the State of Morelos.

The transdisciplinary and international approach to her research has brought together scientists from apparently unrelated fields to archaeology and to contribute to modern social inquiry, a dialogue that awarded her the Friedrich Wilhelm Bessel Prize from the Alexander von Humboldt Foundation in 2012. Her international recognition to advance our knowledge of the past was recognized with her election to hold the Archaeology Seat of the American Anthropological Association (2011–2014) and to serve as President of the Society for Archaeological Sciences (2009–2011). She is also a member of the Mexican Academy of Sciences, Arts, Technology, and Humanities.

Her approach to archaeological sciences to learn about pottery making is expressed in her *Journal of Archaeological Science* publication, related to the detection of traces of use-wear on pottery sherds through microscopic analysis and experimental replication, coauthored with Annelou van Gijn and Loe Jacobs. In extending the use of chemical analysis to determine human activities, the *Journal of Archaeological Method and Theory* dedicated a special volume to address the innovations in this field of study by López Varela and her colleagues. Various publications refer to her commitment to protect Mexico's heritage by discussing the relevance of incorporating applied archaeology within the national heritage model, for example, in a recent book published by UNAM, honoring Jaime Litvak King, and in her edited book on the Archaeology of Morelos.

Since 2005, Dr. López Varela has been a Registered Professional Archaeologist (RPA) promoting applied anthropology in Mexico and to create innovative career opportunities for students in training. To protect Mexico's heritage, she has served as state advisor in land-use planning and development for the State of Morelos (2003) and scientific advisor to the municipality of Cuernavaca (2007).

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Cultural Heritage Management and Poverty
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Ethnoarchaeology
- ▶ Heritage and Public Policy
- ▶ Heritage & Society
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Technological Studies in Archaeological Science

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Loring, Stephen

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Basic Biographical Information

Stephen Loring was born on October 15, 1950, in Concord, Massachusetts (with his twin David), as the oldest of six children, to Victoria Harrington and Charles G. Loring. Growing up alongside the Concord and Assabet Rivers, he spent much of his spare time emulating the philosopher, naturalist, and antiquarian Henry David Thoreau by exploring his natural surroundings, searching for artifacts, learning about lore and history in the town's library, and catching turtles and taming raccoons. Completing high school in 1968, he went for an undergraduate degree in Anthropology at Goddard College in Plainfield, Vermont, graduating in 1973. That college allowed Loring to focus his interests on archaeology, with an internship at Harvard's Peabody Museum of Archaeology and Ethnology, fieldwork in Guatemala and Arkansas, and independent research on older New England artifact collections, particularly from Vermont. Loring's 261-page senior thesis *An Appraisal of Vermont Archaeology* was the first synthesis of northern New England prehistory using neglected avocational, museum, and historical society collections.

Between 1971 and 1974, with summers with the Arkansas Archaeological Survey in the American Southeast and falls in the Cree country along James Bay in northern Quebec, Canada, Loring realized that his true calling was the northern subArctic and Arctic. He was drawn there by the opportunity to learn in an unbookish way about the life of northern hunters. He befriended a number of Cree families who introduced him to their style of living and their lands and the serious problems they were facing in the path of gigantic hydroelectric schemes. That interaction taught Loring much more directly, intensively, and sensitively about the people past and present than the learned tomes of anthropologists had done until then. If he were to work there as an archaeologist, he better articulate archaeology with the real-life problems of northern Native communities.

His experience in the Boreal Forest and his interest in the Native history of the "Far Northeast" brought him to the attention of Bill Fitzhugh (Smithsonian Institution) who hired him in 1975 to join the archaeological and ethnohistorical survey of the Labrador coast he was directing. Infatuated by the knowledge, skills, and wisdom of many of the elders Loring got to know, he ended up focusing on pre- and post-contact Native history. Bill Fitzhugh encouraged Loring to go on for graduate training. As an erstwhile New England archaeologist, seeing no clear cultural or logical boundaries between New England and its Labradorian far Northeast, he entered graduate school in 1977 at the University of Massachusetts Amherst, with the New England archaeologist Prof. Dena Dincauze, obtaining his M.A. in 1981. While working on his doctoral dissertation, Loring also worked as Administrator of the Arctic Studies Program at

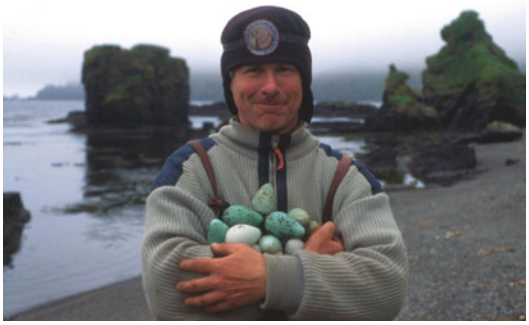

Loring, Stephen, Fig. 1 Stephen Loring with an arm load of Murre eggs (previously dislodged by a gang of ravens) taken from beneath the rookery on Agattu in the western Aleutians 1996 (Photograph: *Western Aleutian Archaeology and Paleoecology Project, Arctic Studies Center, Smithsonian Institution*)

Middlebury College (1983/4) and as instructor in the Anthropology Department of the University of South Carolina (1984–1990), interrupted by fieldwork in New England, Argentina, Labrador, and Alaska. He completed his doctoral thesis in 1992 (*Princes and Princesses of Ragged Fame: Innu (Naskapi) Archaeology and Ethnohistory in Labrador)*, with Dincauze as chair.

In 1991, Loring was hired as Museum Anthropologist and Arctic Archaeologist with the Arctic Studies Program of the Department of Anthropology at the Smithsonian's National Museum of Natural History in Washington, DC, a position he has occupied since then. At the Smithsonian, he helps curate the archaeological and ethnological collections from all across the North American Arctic (Fig. 1). Throughout that region, he regularly carries out ethnohistorical, archaeological, and archival research and curates and consults about exhibits that deal with or touch upon it. He is the human interface between the ethnographic and archaeological collections of the Smithsonian and the descendants of the people whose artifacts and archives the Institution curate. Loring has covered this topical area with more than 70 presentations at professional meetings, the organization of a large number of professional symposia, about 70 publications, and numerous grants and contracts. He is very active in professional associations and in the various contexts in which professionals can assist the populations who they publish about to deal with the serious problems they are facing today. A complete bibliography and CV are found at http://www.mnh.si.edu/arctic/html/about_staff.html.

Since 1981, Loring has been married to Prof. Joan Gero (emerita, Department of Anthropology, American University, Washington, DC). The two of them are considered by many of their colleagues as a model to emulate for their commitment to exert a positive influence on the profession and its relations to its subjects and to do battle for progressive causes in the discipline. In recognition, the two of them were jointly honored with the Lifetime Achievement Award of the World Archaeological Congress. The couple resides in Silver Springs, Maryland.

Major Accomplishments

Loring has translated more than forty years of interacting with northern community members in general, and the Innu and Inuit communities of Labrador specifically, into a pioneering project that has become known as community archaeology. It is based on the realization of the horrific conditions that Arctic communities have to deal with on a daily basis that include the disintegration of traditional social structures; loss of, or alienation from, traditional knowledges; outside encroachment on their traditional land and resources; glaring health and educational iniquities; and destructive rates of alcoholism and suicide, among others. For the archaeologist (and other scientists), this requires first to learn from the community members about their problems and then to develop with them a praxis that helps to remediate these problems.

Loring has been trendsetting in helping northern communities to reconnect with their material patrimony (and archival data) curated at the Smithsonian Institution, to facilitate the repatriation of knowledge and materials to descendant communities (and the archival safeguarding of that patrimony), and to honor the custodians of

traditional knowledge, by having them teach others with the help of this material patrimony (including the archaeologists). In the field, Loring has rethought archaeological field "schools," by sponsoring young community members to spend time on their traditional lands, to give them the opportunity to interact with their elders there on their knowledge, to strengthen their connection to community history and environment, to give them positive educational experiences, and to encourage them to become self-propelled learners about their community and its place in nature and history. In Loring's community archaeology, it is the community benefit that drives what is done with the cultural patrimony, not the research interests of the (usually non-community) archaeologists. That long-term commitment to community archaeology, of course, also makes Loring a forerunner, model, and frequent contributor to Indigenous Archaeology worldwide. In addition, he has been an important spokesperson on the side of Native groups, in defense of their cultural patrimony, as, for example, in the Kennewick case.

Loring expertise on the Native history of northern Canada and the American arctic is widely acknowledged. He controls northern technologies like few other non-Natives. In addition, Loring has contributed significantly to lithic technology, as, for example, in his publications on the Native history of lithic raw materials and how they relate to social and spiritual process. Finally, he has always remained an important contributor to New England archaeology, including to the archaeology of Concord, Massachusetts, where he spent his early years.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage Management and Native Americans
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Indigenous Archaeologies
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Oral Sources and Oral History
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology

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Lubbock, John

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Basic Biographical Information

John Lubbock was a key figure in the establishment of archaeology as a science and a strong advocate of Spencerian progressivism during the Victorian era. Lubbock was born in 1834, the son of Sir John Lubbock, third Baronet, a London banker. He grew up on the family country estate of High Elms near Downe in Kent, England. Serendipitously the estate was adjacent to the home of Charles Darwin. The great naturalist befriended the boy, guided him in studying insects and flora, and benefitted later by Lubbock's membership in a group of younger scientists within the Royal Society, the "X-Club," that proselytized evolution. Lubbock attended Eton to the age of 14. He then joined his father's bank and became a partner at the age of 22.

During the 1860s, Lubbock held a number of influential positions, including President of the Ethnological Society (1864–1865), Vice-President of the Linnean Society (1965), and President of the International Association for Prehistoric Archaeology (1868). In the 1870s, he held the position of President of the Royal Anthropological Society (1871–1873), as well as the position of Vice-President of the Royal Society (1871). He received honorary degrees from Oxford, Cambridge, Edinburgh, Dublin, and Würzburg in recognition of his scientific contributions.

Lubbock was active in politics, elected Member of Parliament in 1870 on his third attempt. As MP, he succeeded in his greatest claim to fame, the Bank Holidays Act of 1871 providing summer Monday holidays to give working people long weekends. A number of other legislative measures he initiated or espoused similarly benefitted the laboring class. Teaching science in schools was another of his campaigns, part of his enthusiasm for the idea that humans progress from savagery (ruled by superstition) to civilization enlightened by rational thinking freed from metaphysics. Darwin was his mentor in scientific work, especially entomology, but Herbert Spencer's mystical faith in Progress is more evident in Lubbock's books than Darwin's doggedly empirical evolution.

Major Accomplishments

Lubbock's *Pre-historic Times* (1865) is a compendium of several articles he published in *Natural History Review* following trips to view archaeological sites including Swiss "lake dwellings," Danish "kitchen middens," and Boucher de Perthes' Somme gravels. The book was a publisher's effort to profit from the popularity of Daniel Wilson's sold-out *Prehistoric Man* (1862). Wilson, from Edinburgh, was the first to use the term "prehistory" in English, in 1851. He taught that prehistoric archaeology should follow a geology model relying on stratigraphy and comparison of artifacts with contemporary versions viewed alive; for this, he spent summers on Lake Superior canoeing with Ojibwe Indians to observe living hunter-fishers in forests similar to ancient Scotland's. Lubbock, disliking primitive conditions, did not travel outside Europe. Thus, his book relies heavily on secondary sources. In contrast to Wilson's systematic, firsthand survey of primarily American First Nations' architecture and artifacts, respectful of the accomplishments they embody, Lubbock's book begins with a chapter on masterfully crafted bronze weapons and then moves on to stone artifacts, tumuli, the Swiss and Danish Neolithic sites, "Antiquity of Man" (on which

Charles Lyell accused him of plagiarism) and "North American Archaeology" (failing to cite passages lifted from Wilson), and finally "Modern Savages," for which he begs readers' understanding that the brutal ugliness depicted cannot be passed over. Two factors made *Pre-historic Times* very successful in England, going into seven editions through 1913. First, the book was promoted by Lubbock's many influential friends in London, whereas Wilson, from a poor Scottish family, lived in Toronto far from Britain's scientific circles. Second, Lubbock wrote with an optimism echoing the spirit of his own Victorian business class, moving into positions of power in industrializing imperial Britain.

Five years later, Lubbock published a sequel, *On the Origin of Civilisation* (1870), expanding upon the Savages section of the earlier book. Its political relevance jumps out in the first sentence: "The study of the lower races of men, apart from the direct importance which it possesses in an empire like ours . . .." He explains in this opening chapter that vestiges of savage or (next higher) barbarian cultures survive in ritual or folk customs and are, by implication, worth winnowing out. But more important than administrative guidance in the empire or divesting civilization of now-senseless vestiges is the realization that his stage-ordered comparisons of primitives and barbarians around the world clearly demonstrate that the human race is progressing, not degrading as some theologians held. He claimed that the reason that the lower races have not progressed like the White Man is biological and that adult savages remain remarkably like (civilized) children (p. 522). Understanding this, he says, "might have saved us many national misfortunes, from the loss of Captain Cook down to the Abyssinian war."

Lubbock was a gentleman of science, moneyed enough to travel comfortably in Europe and dine in exclusive clubs. Much more than that, he loved politics and energetically pushed for legislation and organizations that could ameliorate the condition of the British working class and London dwellers in particular (he was on the London County Council). His interest in archaeology culminated in sponsoring the 1882 Ancient Monuments Act, protecting them as national patrimony. A decade earlier he had purchased the huge henge monument Avebury, near Stonehenge, to preserve it from threatened destruction (a village sits in its middle). In 1900, the baronet was raised to the rank of Baron and chose the title Lord Avebury.

Lubbock's piquant eclecticism in his "archaeological" books (really treatises on Spencerian cultural evolution) met a very different mode of archaeology in the practice of Augustus Lane Fox, who took the surname Pitt Rivers upon inheriting a great-uncle's vast estate in the region that includes Stonehenge and Avebury. Pitt Rivers was an Army man meticulous in laying out grid excavations, keeping detailed notes, and logically constructing lines of progressive development in classes of artifacts culled from all over the world (preserved in the Oxford museum bearing his name). Lubbock, widowed, married Pitt Rivers' daughter in 1884. The father-in-law influenced the practice of field archaeology; the son-in-law helped preserve and popularize the archaeological record. Both men believed that archaeological remains illustrate the progress of mankind from bestial origins through an evolutionary force (Spencerian, not Darwinian) to the present pinnacle of educated Englishmen and likely on to greater perfection in the future. Both used archaeology didactically, Pitt Rivers welcoming tourists and Lubbock writing books, in the cause of promulgating Spencerian progressivism. In the case of John Lubbock, first Baron Avebury, his indefatigable politicking for liberal social laws and welfare organizations created his real contributions, more significant than the haphazard archaeology in *Pre-historic Times* and the racist aggregation of travelers' stories in *Origin of Civilisation*.

Cross-References

► Heritage: History and Context
► Histories of the Archaeological Discipline: Issues to Consider

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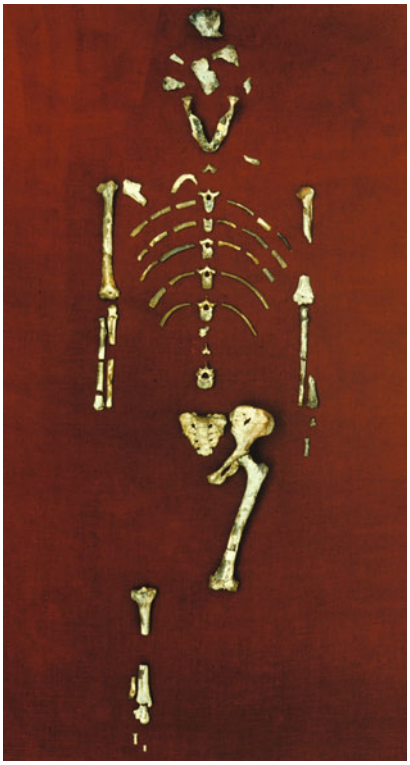

Lucy, Fig. 1 Lucy (A.L. 288-1 partial skeleton) (Image courtesy of the Institute of Human Origins, Arizona State University)

Lucy

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Introduction

Lucy is a famous fossil specimen of the extinct hominin species *Australopithecus afarensis* (Fig. 1) discovered in 1974 at Hadar, Ethiopia, by paleoanthropologist Donald C. Johanson. *A. afarensis* was a small-brained, large-jawed, bipedal hominin that has since been discovered at several other sites in Ethiopia, Kenya, Tanzania, and possibly Chad. The known time range of the species is c. 3.8–3.0 Ma. The discovery of Lucy changed perceptions about the timing and nature of the first appearance of traits that make us human.

Definition

Lucy is the nickname given to a partial skeleton (A.L. [Afar Locality] 288-1) recovered from the Hadar Formation, central Afar, Ethiopia, and attributed to the species *Australopithecus afarensis*. The skeleton is roughly 40 % complete and includes cranial fragments, the mandible, and a large proportion of the postcranial skeleton, including a complete sacrum, complete left pelvic bone, and complete left femur (Johanson et al. 1982a). Lucy is dated to 3.2 Ma ago based on single-crystal $^{40}Ar/^{39}Ar$ analysis (Walter 1994).

Key Issues/Current Debates/Future Directions/Examples

Donald Johanson and Tom Gray discovered Lucy in 1974 (Fig. 2) while surveying near the Kada Hadar tributary of the Awash River as part of the International Afar Research Expedition (IARE). The IARE was formed by Maurice Taieb, Donald Johanson, and Yves Coppens in 1973. Lucy was named after the Beatles' song, "Lucy in the Sky with Diamonds," which played in camp during celebrations the evening of the fossil's discovery (Johanson & Edey 1981). Lucy represents the most complete of numerous *A. afarensis* individuals recovered from the Hadar Formation. The 1973 IARE field season had yielded hominin lower limb bones with a knee joint consistent with bipedal locomotion (A.L. 128-1).

The discovery of Lucy and other *A. afarensis* specimens recovered on this expedition formed the first significant sample of hominins more than 3 Ma old (Kimbel & Delezene 2009). In addition to confirming that bipedalism evolved in humans before major expansions in brain size (Johanson & Edey 1981), the Hadar discoveries are in part responsible for the recognition that the hominin divergence from extant great apes occurred relatively recently – in the early Pliocene or late Miocene, rather than the middle Miocene – and have provided important insights for understanding the origins of bipedalism, the uniquely human pattern of life history, and hominin dietary adaptations (Kimbel & Delezene 2009).

Lucy's discovery was so remarkable and highly publicized that she quickly became a household name and a key figure in raising awareness about human origins and evolution among the general public.

Lucy had a brain just slightly larger than that of a chimpanzee (less than ~500 c.c.) and was small in stature – standing just over a meter tall – with relatively longer arms than legs. In many respects, Lucy resembled extant great apes. However, unlike extant great apes, Lucy did not have an enlarged, apelike canine honing complex (when the upper canines are sharpened against the lower third premolar) and walked on two legs.

Lucy, Fig. 2 Donald C. Johanson excavating Lucy's pelvic bone (Image courtesy of Donald C. Johanson/Institute of Human Origins, Arizona State University)

The morphology of the pelvis and lower limb bones reveals that Lucy walked bipedally in a striding gait. For example, the shape of the pelvis allows the hip muscles to control balance of the torso when standing on one leg (as we do when we walk). A prominent patellar lip on Lucy's distal femur keeps the patella (knee cap) from dislocating due to action of the thigh muscles on an inwardly angled femur, which is a unique feature of the human leg.

Paleoanthropologists know that Lucy is female, because of her small size compared to the nearly 400 specimens of *A. afarensis* now known from East Africa.

Lucy had relatively large, thickly enameled, low-cusped premolars and molars, and, generally, these dental features are associated with adaptations to consuming hard objects like seeds and nuts. The robusticity of *A. afarensis*' jaw is also consistent with a hard object diet. However, the frequency and morphology of pits and striations (i.e., dental microwear) on *A. afarensis* molars, including the mandibular molars of Lucy, are quite different from the pattern observed in extant primate hard-object feeders (Grine et al. 2006). These observations are true for *A. afarensis* specimens from different inferred paleohabitats and through time. It is possible that the morphological characteristics of *A. afarensis*' teeth and masticatory apparatus represent adaptations to "fallback foods" – resources of relatively low preference that are used seasonally when preferred foods are unavailable – rather

than the preferred and main component of the diet (Grine et al. 2006).

The Hadar Formation is divided into four members, from bottom to top, the Basal, Sidi Hakoma, Denen Dora, and Kada Hadar (Johanson et al. 1982b). Lucy was discovered in the lower levels (KH-1 submember) of the Kada Hadar Member. The sediments Lucy was recovered from lie just above a volcanic tuff named the Kada Hadar Tuff (KHT), which was dated by crystal $^{40}Ar/^{39}Ar$ analysis to ~3.2 Ma (Walter, 1994). Sediments near the top of the Kada Hadar Member date to ~3.0 Ma. Within the KH-1 submember, Lucy derives from sandy sediments known as the KH-1 sands that are up to 1 m thick in places and are situated between the KHT and a deposit known as Confetti Clay. The KH-1 sand represents a fluvial (i.e., stream or river) deposit, within a dynamic and cyclical fluvial and lacustrine (i.e., lake) depositional environment (Campisano & Feibel 2007).

Lucy's excellent preservation, which is rare in the early hominin fossil record, may be in part due to the high sedimentation rate at Hadar compared to other East African localities (Campisano & Feibel 2007). There is little evidence for carnivore damage, and the bones do not exhibit weathering prior to fossilization (Johanson et al. 1982b), suggesting that Lucy was deposited and buried relatively quickly after death, most likely in fine sediments near a water source.

Hadar was a wetter place when Lucy inhabited it than the arid desert it is today. There was a large lake with an extensive system of meandering and braided rivers and streams, which would have supported a mosaic environment with woodlands, shrublands, and grasslands, and a diverse mammalian population including pigs, hippos, and antelopes. The environment was not static, however. Paleoenvironmental reconstructions based on paleontological indicators show that the Hadar habitat fluctuated between more open, arid, grassy conditions and more closed, wetter, wooded conditions (Reed 2008). The Kada Hadar Member from which Lucy was recovered yields the highest number of ungulates, suggestive of a more arid environment than earlier in the Pliocene. As a species, *A. afarensis* appears to have inhabited a variety of habitats, and persisted through periods of dramatic climate change, suggesting that the species was adaptively flexible and able to tolerate a wide range of ecological conditions (Reed 2008).

While there is consensus that Lucy did walk bipedally, there is debate about the relative importance of bipedalism and tree climbing within her locomotor repertoire (Ward 2002). Some of the apelike features of *A. afarensis,* such as relatively longer forelimbs than hindlimbs and longer curved phalanges, are generally interpreted in one of two ways. First, these traits may represent retained primitive features that did not play a significant functional role in locomotion and were retained as vestigial traits rather than being favored by selection. Alternatively, these traits may have played a significant functional role and were subject to stabilizing selection because they enhanced the tree climbing ability of *A. afarensis*.

In primates, the degree of dimorphism between males and females is related to intrasexual competition and social behavior. Generally, taxa with frequent and intense male-male competition show increased male body and maxillary canine size compared to females, and monogamous and polyandrous taxa show less difference between males and females. *A. afarensis* shows a high degree of body size dimorphism, consistent with intense male-male competition, but a low degree of canine size dimorphism, consistent with monogamy or polyandry (Plavcan & van Schaik 1997). There are no extant analogs among primates for this pattern of sexual dimorphism, making it difficult to establish the nature of *A. afarensis* social behavior and how it may have differed from earlier and later hominins.

Intentionally manufactured stone tools are not known in the archaeological record until 2.6 Ma, after the last known occurrence of *A. afarensis*. Generally, the origins of the first known stone tool industry – the Oldowan – are associated with *Homo habilis*. However, 3.4-Ma-old fossil animal bones from the site of Dikika, across the river from Hadar, appear to exhibit deliberate cutmarks (McPherron et al. 2010). This finding suggests that *A. afarensis* might have used

unmodified stone tools with naturally sharp edges to process animal remains.

Lucy's partial skeleton is usually housed at the National Museum of Ethiopia in Addis Ababa. In 2007, the original specimen began touring across the United States as part of an exhibit called "Lucy's Legacy: The Hidden Treasures of Ethiopia." The tour is controversial because some paleoanthropologists were concerned about loss and damage, protesting the transport of the irreplaceable fossil (Gibbons 2006).

Cross-References

- ▶ African Stone Age
- ▶ Australopithecines
- ▶ Hominids, Earliest African
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ *Homo habilis*
- ▶ Human Evolution: Molecular Timescale
- ▶ Human Evolution: Theory and Progress
- ▶ Oldowan Industrial Complex

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Lumbreras, Luis Guillermo

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Basic Biographical Information

Lumbreras is one of the most influential Peruvian archaeologists of the second half of the twentieth century. He was born on the 29th of July in 1936 in the city of Huamanga, Ayacucho. Moving to Lima to complete his education, first in La Recoleta school, and later, in 1951, he continued his secondary education at Antonio Raimondi college. From the 4th year in secondary school, Lumbreras founded a study group with his classmates, dedicated to doing research and holding social gatherings and informative lectures on subjects of history and archaeology.

Lumbreras studied at the Universidad Nacional Mayor de San Marcos (UNMSM),

obtaining his Bachelor of Arts and Humanities in 1959 and his Doctorate in Arts with special mention in Archaeology and Ethnology in 1960. At the time of his university training, he had Raúl Porras Barrenechea, Luis E. Valcárcel, Jorge C. Muelle, and José Matos Mar as professors. The visiting professors he had the opportunity to work with were John V. Murra, John Rowe, and Juan Comas.

In 1960 Lumbreras joined the faculty of the recently reopened Universidad Nacional de San Cristóbal de Huamanga in Ayacucho. There he met César Guardia Mayorga, with whom he systematically studied Marxism. This phase represents the greatest part of Lumbreras' political and philosophical training, in which he matures his thinking due to the immersion in the Ayacucho reality, not only in the university, but also in the field and in political work.

In 1966 Lumbreras returned to Lima to teach in different universities, among them the UNMSM. In this same year, he began excavations in Chavín de Huantar where he would excavate its most important archaeological context, the *Galería de las Ofrendas* (Gallery of Offerings). During these years, his Marxist thinking matured, as it can be seen in the text he devoted to his excavations in Chavín (Lumbreras 1993). At this time, he masterminded what would to be an important analytical category of his work and of the so-called Archaeology as a Social Science school, *unidad arqueológica socialmente significativa* (socially significant archaeological unity).

In 1960 he published the book *De las Artes, los Pueblos y las culturas del Antiguo Perú* (translated by Betty Meggers in 1974 as *Peoples and Cultures of Ancient Peru*) (Lumbreras 1969), a classic text in which the influence of positivism and culturalism of his academic training is still notable. However, he also laid out a chronological sequence contrary to that of John Rowe, suggesting more evolutionary stages based on social processes.

In 1970, Lumbreras organized the symposium *Formaciones autóctonas en América* (Native Formations in America) in the 40th International Congress of Americanists, in Lima, aiming to unite the leftist intellectuals of Latin America. Already consolidated in the UNMSM, his Marxist position became more notorious and influential. It materialized in one of his most popular books *De los orígenes del estado en el Perú* (On the Origins of the State in Peru) (Lumbreras 1972). In that book, it is clear that what moved him towards Andean prehistory was, in a Marxist style, class struggle.

Based on notes he made for an archaeology course he taught at the University of Concepción in Chile, he published his most popular theoretical book, *La Arqueología como Ciencia Social* (Archaeology as a Social Science) (Lumbreras 1974). This text would inspire José Luis Lorenzo to organize the *Reunión de Teotihuacán* (Meeting of Teotihuacán) in 1975, establishing common lines of action in the historic materialist perspective that the participants were developing in their own countries. From that meeting and from the one he organized in Paracas, Peru, he crafted his book *Arqueología de la América Andina* (Archaeology of Andean America) (Lumbreras 1981), where he laid out culture-historical areas for this part of the American, influential in Andean archaeology to this date.

In the 1970s, and under the auspice of Juan Velasco Alvarado's military government, Lumbreras worked in providing the archaeological cultural material the Peruvian state needed (Tantaleán 2005). One of the most important positions he held was that of director of the Peruvian National Archaeology Museum between 1973 and 1979.

During the 1980s, his career would encompass teaching and research. In those years, he wrote extensively for the journal *Gaceta Arqueología Andina*, refining his chronological and cultural sequence of 1974 (Lumbreras 2005). In 1989, he was named professor emeritus at the UNMSM. The following year, he toured Europe, giving classes in Spain – Universidad Complutense de Madrid (1991) and Universidad Autónoma de Barcelona (1991–1994) – and Germany (1995–1996) where he continued

developing his Marxist approach, especially regarding the origins of the state (Lumbreras 2005: 192-229).

In 1996 he returned to South America. He spent four years in Brazil, teaching at the Universidade Estadual do Norte Fluminense, in Rio De Janeiro. Settled again in Peru in 1999, Lumbreras was appointed National Director of Culture, supporting Peruvian archaeology with regional projects, such as the symbolic *Qhapaq Ñan,* the purpose of which is to elevate the Inca road system to UNESCO's World Heritage List. Today, outside of government and university structures, Lumbreras continues to be active, publishing and lecturing in the Marxist approach that has provided him with a holistic and global perspective of the pre-Hispanic, historic, and contemporary Andean world.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Latin American Social Archaeology
- ▶ Marx, Karl
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Lydia, Archaeology of

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Introduction

Ancient Lydia is located in western Anatolia (modern Turkey, Fig. 1) and has long been famed for its wealth and legendary landscapes: the proverbially rich King Croesus; the gold-bearing Pactolus stream, where King Midas of Phrygia was said to have washed off his golden touch; the wise Mt. Tmolus, who judged the musical contest between Pan and Apollo; and the Gygean Lake, with its "everflowing" waters and neighboring burial mounds, among other noted features. The heyday of Lydian culture was the Archaic period (seventh–sixth centuries BCE), the rule of the Mermnad kings and their expansion of Lydian domination through most of western Asia Minor. But even after the Lydian empire fell to the Persians c. 545 BCE, Lydia remained a distinct cultural region within the Persian empire and, later, in the Hellenistic period and in the Roman empire. The Lydian capital, Sardis, retained prominence as the seat of a Persian satrap, the site of an important Hellenistic Temple of Artemis and, eventually, home to thriving Jewish and early Christian communities.

Definition

The heart of Lydia lies in the fertile valleys of the Hermus (modern Gediz) and Cayster (now Küçük Menderes) Rivers and their tributaries, surrounded by foothills and higher mountain ranges (Fig. 2). The Hermus and Cayster descend gradually from the edges of the central Anatolian plateau westward toward the Aegean coast, which was colonized by Greeks by the time of the Iron Age. Lydia's western neighbors were thus Ionian and Aeolian Greeks, while its other

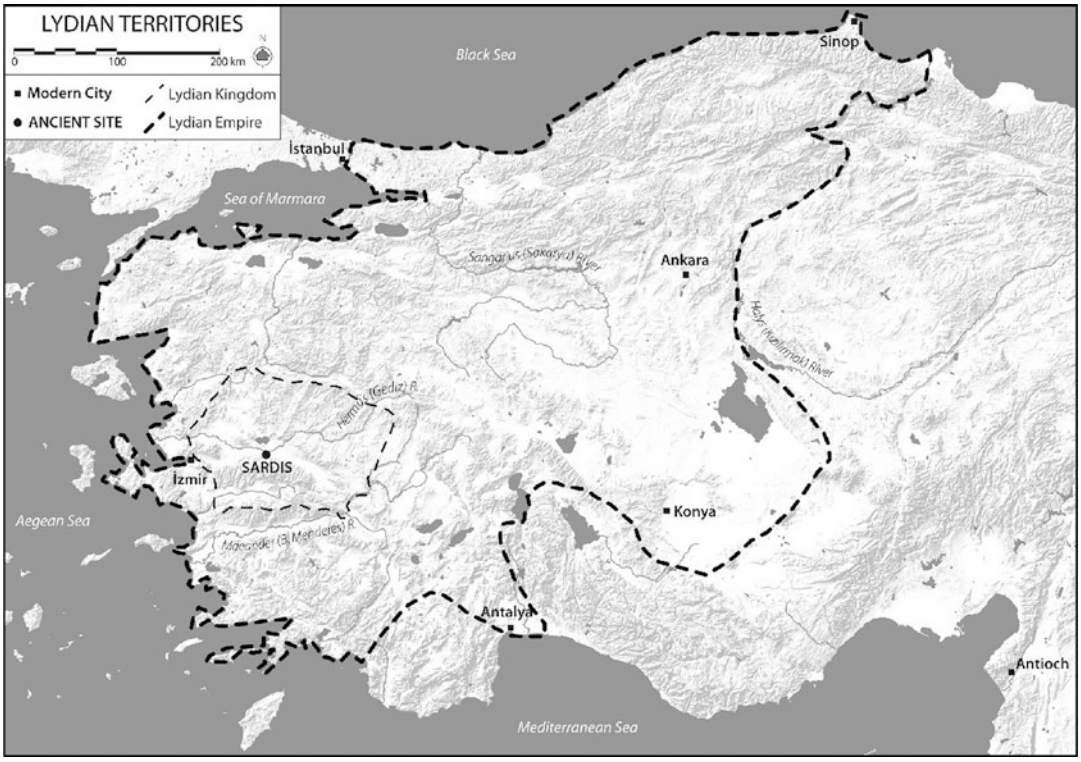

Lydia, Archaeology of, Fig. 1 Map of the Lydian Kingdom and Empire (C.H. Roosevelt)

borders were shared with other Anatolian populations: Mysians at northwest and north, Phrygians to the northeast and east, and Carians to the south. The kingdom of Lydia reached its greatest extent under King Croesus in the first half of the sixth century BCE. Croesus's father, Alyattes, had extended Lydian control toward both the west and the east, and Croesus succeeded in bringing the majority of western Anatolia under Lydian sway, all the way from the Aegean coast to the Halys River in Cappadocia. The Greek historian Herodotus tells the story of how Croesus's decision to push beyond the Halys into Median Persian territory led to the collapse of his vast empire.

The archaeology of Lydia encompasses the study of ancient sites in the region of historical Lydia both before and after the time of the Lydian empire, from earliest human occupation through the Roman era to the Ottoman period. It includes long-term excavation of the capital, Sardis; salvage excavations of looted burial mounds and other sites elsewhere in Lydia; and regional survey in central Lydia.

Historical Background

The discovery of ancient Lydia began with visits of European travelers to the standing remains of Roman-period buildings at Sardis, including the Temple of Artemis (Fig. 3), beginning as early as the fifteenth century. In the mid-nineteenth century, the conspicuous burial mounds of Bin Tepe, the royal cemetery of Sardis (Fig. 2), drew the interest of the Prussian consul at nearby Smyrna (now İzmir), Ludwig Spiegelthal. The first excavations in Lydia were carried out in 1853 by Spiegelthal at the largest of all the mounds in Bin Tepe, the tumulus of Alyattes. The massive mound had been associated with the Lydian king Alyattes, father of Croesus,

Lydia, Archaeology of, Fig. 2 View of Hermus Valley and Bin Tepe from atop the Tumulus of Alyattes, showing smaller tumuli and the Acropolis and Necropolis hills of Sardis in the foothills of the Tmolus range

since at least the time of Herodotus (in the late fifth century BCE). Spiegelthal was able to locate the finely built marble chamber but it, like most other Lydian tombs found to date, had already been looted of its original grave offerings (Ratté 2011: 69–72). Further explorations of Lydian tumuli were undertaken in the 1870s by Auguste Choisy and George Dennis (better known for his work on Etruscan tombs). More comprehensive excavations commenced with Princeton's expedition at Sardis in the early twentieth century, under Howard Crosby Butler (1910–1914 and 1922).

Work was halted by World War I and the Turkish War of Independence, but in keeping with excavation practices of the day, the team uncovered the entire plan of the Temple of Artemis and excavated more than 1,000 chamber tombs in the nearby "necropolis" hillside in those six seasons (Butler 1922) (Fig. 3). Starting in 1958, the Archaeological Exploration of Sardis, sponsored by Harvard and Cornell Universities, worked steadily to understand all eras of the city's long history, with particular emphasis on the Lydian fortification wall and a burned destruction level associated with the Persian conquest of Lydia c. 545 BCE (Hanfmann & Mierse 1983; Cahill 2010: 74–105). Still, it is estimated that by 2011 less than 2 of the total city has been excavated.

Investigations of Lydian sites outside of Sardis have been more limited but are now a focus of current research. Until recently, archaeological investigations were undertaken mostly for salvage operations or on an ad hoc basis, as were occasional surface surveys. The Central Lydia Archaeology Survey (Boston University) in 2005 commenced systematic study of the areas surrounding the Gygean Lake through both intensive and extensive survey methods. The resultant identification of many new sites, including a large, fortified Middle Bronze Age settlement, has significantly revised our understanding of early Lydia (Roosevelt in Cahill 2010: 37–73).

Key Issues/Current Debates

Early Lydia (Paleolithic–Bronze Age)

Human occupation began as early as the Middle Paleolithic period in the area that came to be known as Lydia, as evidenced by stone tools collected in surface survey in Bin Tepe and occasional finds elsewhere. The transition to settled farming communities in the Neolithic period may mark the advent of new people to this area (Roosevelt in Cahill 2010: 43–6). At least 12 Late Neolithic sites have been identified, but only one has so far been excavated

Lydia, Archaeology of, Fig. 3 Sardis, Temple of Artemis and Necropolis hill. The Pactolus stream runs between. Depressions in the side of the Necropolis hill mark the locations of collapsed chamber tombs

(Ulucak, near İzmir). Settlements grew in size and number through the Chalcolithic and Early Bronze Ages. Five Early Bronze Age (EBA) sites have been excavated in Lydia, and more than 100 have been identified through surface survey. The finds suggest connections with other West Anatolian EBA cultures and include pithos burials as well as cist graves, pottery, stone vessels and figurines, weapons, and jewelry made of various metal types, including silver and gold as well as bronze (Hanfmann & Mierse 1983: 16–20; Roosevelt in Cahill 2010: 40–51). Middle Bronze Age (MBA) Lydia is only now coming to light, with survey of fortified citadels of this era around the Gygean Lake. From the number of identifiable sites in this period, it appears that the population of Lydia contracted in this period from the many smaller villages of the EBA into centralized, fortified settlements of the Middle and Late Bronze Ages. The largest of these citadels is the site of Kaymakçı, at the west end of the Gygean Lake (Fig. 4), where surface survey and satellite images indicate a massive site with fortified lower town and upper citadel comparable to, yet much larger than, Troy VI. This site seems to have been a regional center in the Middle and Late Bronze Ages (Roosevelt in Cahill 2010: 51–3). By the

Lydia, Archaeology of, Fig. 4 Kaymakçı: Three-dimensional rendering of Quickbird satellite image of the citadel (© Central Lydia Archaeology Survey)

Late Bronze Age, this part of central Lydia was known to Hittites as the Seha River Land, and the Cayster valley to the south was known as the land of Mira. These place names are mentioned in Hittite texts, and Hittite-style rock reliefs in these areas (one near Ephesos, in a mountain pass connecting Lydia to Ionia, and another near Manisa) provide physical evidence for Hittite cultural connections in this period (Roosevelt in Cahill 2010: 53–6). In addition to traces of Late Bronze Age (LBA) occupation of sites around the Gygean Lake, an LBA level has been discovered in a limited exposure at Sardis (Hanfmann & Mierse 1983: 20–4).

Early Iron Age and Archaic Lydia

When Lydian-speaking peoples settled in this region is a matter of debate that may perhaps be solved through future excavations. The area was known as Lydia by at least the seventh century BCE, when it was mentioned in the annals of the Assyrian king Assurbanipal. This was the time of the beginning of the Mermnad dynasty under its first king, Gyges, also mentioned by name in Assyrian texts. According to Greek historical sources, an earlier dynasty (the Heraclids) had ruled for 22 generations after the founding of Lydia by one Lydus, son of Atys. This would place the beginnings of Lydia as a cultural entity right at the transition from the Bronze to Iron Ages. Archaeological evidence for this transitional period is at this point severely limited, but initial results of the Central Lydia Archaeology Survey do suggest an interruption or change in settlement patterns around the turn of the first millennium BCE, with the abandonment of large fortified sites, the establishment of new sites, and the use of different clay sources for pottery production. But whether these changes indicate the arrival of new, Lydian-speaking peoples to the area is still uncertain, as there is some continuity in place names from the Bronze Age and the changes could just as easily be explained by internal social and political factors (Roosevelt in Cahill 2010: 56–60).

It was in the Iron Age that Sardis seems to have emerged as a new regional urban center. Iron Age and early Archaic levels have been exposed only in limited excavation sectors at Sardis but reveal a thriving industrial/domestic quarter by the late seventh century BCE. In the area adjacent to the Pactolus stream, evidence shows that Lydians experimented with techniques of extracting pure gold from electrum, a natural alloy of gold and silver, and developed the world's earliest known gold refinery (Ramage & Craddock 2000). An altar of Kybele decorated with lions stood in the middle of this area. The minting of coins of pure gold and silver soon followed, and Croesus's lion-bull issues (Fig. 5, c. 561–545 BCE) represent the first known bimetallic system of coinage.

Lydia, Archaeology of, Fig. 5 Gold Croeseid stater from Sardis. The Metropolitan Museum of Art, Gift of The American Society for the Excavation of Sardis, 1926 (26.59.2). (© The Metropolitan Museum of Art)

The growth of the Lydian empire in the first half of the sixth century under Alyattes and Croesus is also linked with the monumentalization of Sardis, through the construction of finely built, ashlar terrace walls on the slopes of the acropolis, and a massive fortification wall enclosing the city center at the foot of the acropolis. The high terraces may have supported royal palace structures, yet to be found (Ratté 2011: 9–11, 99–107). The city wall was composed of mudbrick courses (at least 10 m high) supported on a wide stone base or socle (as much as 20 m wide), in some places reinforced with an additional sloping mud glacis enclosed by stone arms (Fig. 6) (Cahill 2010: 77–81). The fortification seems to have undergone several phases of construction before its fiery destruction in the Persian sack of the city c. 545, and the stone facings display a remarkable range of approaches to stone cutting. The masonry of the recessed area around the city gate at the north, on what was probably the main east–west travel route, is particularly fine, with variously colored sandstone ashlars and a variety of masons' marks in the Lydian alphabet, conspicuous and still not fully understood (Ratté 2011: 9–12, 108–112).

Lydian houses have been discovered in several excavation sectors at Sardis, both inside and outside the city wall. They generally have mudbrick walls on stone foundations with clay floors, though a house excavated beneath the later

(Hellenistic-Roman) theater had stone paving and a stone column (Cahill 2010: 86–90). Decorated architectural terracottas found in some areas probably adorned the wealthier houses, along the lines of a reconstruction made by the Harvard-Cornell team in the expedition compound (Fig. 7) (Ramage 1978). Within these Lydian houses, a wide range of domestic activities are attested: grinding grain and other foods, cooking, eating and drinking, spinning and weaving, cosmetics, gaming, and, in some cases, craft production (Cahill 2010: 90–9). Common pottery shapes include cups (skyphoi), pitchers (oinochoai), mixing bowls (kraters and lebetes), and amphoras, types associated with the mixing and serving of wine. Tall stemmed dishes were also popular, and a distinctive Lydian shape is a small round-bodied container with foot, known as a lydion and probably used for perfumed oil (Fig. 8). Types of decoration applied to these pottery shapes include monochrome gray and black-burnished wares, linear designs in black-on-red or "bichrome" styles, streaky glaze, and distinctively Lydian "marbled ware" (Fig. 8). More elaborate decorative styles (such as the "Sardis style" and the misnamed "Ephesian ware"), with a lively combination of animal, floral, and geometric motifs, are comparable with East Greek Orientalizing vase painting (Greenewalt in Cahill 2010: 106–24). Imports from eastern and mainland Greece are also found. These can be more firmly dated than local styles and are therefore crucial for establishing chronology. A series of dinner sets

Lydia, Archaeology of, Fig. 6 View of the Lydian fortification wall at Sardis (N. D. Cahill)

Lydia, Archaeology of, Fig. 7 Reconstruction of a Lydian mudbrick house with architectural terracottas, Sardis Expedition compound

Lydia, Archaeology of, Fig. 8 'Marbled Ware' lydion from Sardis, 6th century BCE. New York, The Metropolitan Museum of Art, Gift of The American Society for the Excavation of Sardis, 1926 (26.164.27) (© The Metropolitan Museum of Art)

(cup, pitcher, dish, knife, and pot or jug) deposited in a sixth-century residential/commercial quarter outside the city walls may represent ritual dinners or religious offerings of some kind, since the pot or jug usually contained a complete puppy skeleton (Greenewalt 1978).

The destruction debris that covered many of these houses has been linked with the Persian sack of the city c. 545 BCE by relative pottery chronology, since the latest securely datable pottery in the destruction level is dated c. 550 (Greenewalt 1992; Cahill 2010: 339–61). Analysis of the human victims found in the debris confirms the martial nature of the conflagration, since two of the skeletons showed muscle development compatible with a soldier's life—the left arm had habitually carried something heavy (like a shield) while the right arm indicated repetitive movement as would result from throwing or thrusting weapons (Cahill 2010: 348–52). Both also had sustained violent wounds. The neck of one victim showed signs of having carried heavy weight on the head, and a helmet made of iron and bronze was found nearby. Weapons found among the debris include a wide variety of arrowheads, slingstones, an iron saber, and an iron sickle of a type seen in some depictions of warriors from elsewhere in Anatolia.

Tombs and Burial Customs

Lydian graves ranged in form from simple cist graves to rock-cut chamber tombs, tumuli covering marble or limestone burial chambers or sarcophagi, and monumental built tombs (Roosevelt 2009: 135–83). Tumuli are found throughout Lydia and are one of the best indicators of settlement patterns, since so few occupation sites have been surveyed and excavated (Roosevelt 2006b). Rock-cut tombs are found only at Sardis and in a few other locations. Only the three largest tumuli at Bin Tepe (which means "thousand mounds" in Turkish, though the true number of mounds is closer to 130, see Fig. 2) probably belong to the Lydian era, before the Persian conquest. The smaller tumuli were probably built by Persian nobility and local elite in emulation of the earlier Lydian kings. The earliest datable chamber tombs at Sardis were used in the sixth century BCE, but the majority of them were used (or reused) in the Persian era and later periods, and later reuse may have obliterated traces of earlier burials. No tombs of the Iron Age or seventh century have yet been identified in Lydia.

In both tumulus chambers and in rock-cut tombs, burials were often placed on bed-like platforms, cut from bedrock or built of marble or limestone. The most elaborate examples are carved and painted to resemble wooden banquet couches of a type known in Greece as *klinai*. Along with the banqueting vessels that must have once completed many grave assemblages, to judge from looted finds, these couches may have served to identify the deceased as elite banqueters. Burials in terracotta and stone sarcophagi are nearly as common, however, and remains of wood and nails in some chamber tombs suggest that wooden coffins may have also been used, even in connection with rock-cut "couches." Grave goods include fine jewelry of metal, stone, and glass; sealstones and pendants; mirrors, combs, and cosmetic utensils; ceramic, stone, and metal vessels; utensils for serving and

consuming food and drink (cups, pitchers, dishes, strainers, ladles, etc.); and containers for perfumed oils, further accoutrements of banqueting. These items may be seen as expressions of wealth and indications of a leisure-loving lifestyle (Baughan in Cahill 2010: 273–304).

Set before the entrances to some rock-cut tombs and the edges of some tumuli were carved stone stelai with sculpted relief and/or Lydian inscriptions. Some of the reliefs represent doors, which may symbolize the home, the door of the tomb, or the final passage (Roosevelt 2006a). Other reliefs represent the deceased in a characteristic activity, such as banqueting (Roosevelt 2009: 156–62). The inscriptions usually identify the owner(s) of the tomb and warn potential violators of divine retribution.

Late Lydia (Persian, Hellenistic, Roman, Byzantine, and Islamic Periods)

Under Persian rule, Sardis became the capital of a province (satrapy) of the Achaemenid Persian empire. Physical remains of this period are limited at Sardis, where Roman builders often dug as far as Lydian levels when laying their foundations, but finds from tombs at Sardis and throughout greater Lydia reveal a thriving and probably multiethnic elite population during the Persian era. Among the many grave goods recovered from looted tumuli (since very few burials in Lydia have been found undisturbed) are sealstones carved with Persian motifs in local styles, gold clothing appliqués thought to be of Persian type, and precious metal banqueting sets with some local and some Persian vessel shapes and decorative motifs (Dusinberre 2003; Miller 2007). The "Lydian Treasure," looted from tumuli in eastern Lydia in the 1960s and recovered from the Metropolitan Museum of Art in the 1990s, offers the most famous assortment of luxury goods from Persian-period Lydia (Özgen et al. 1996). Recent studies of this and related material have stressed, however, that even "Persian"-style objects may have been produced in Lydia and have highlighted the role of Lydian craftsmen in the creation of an "international" Achaemenid style (Miller 2007).

It was early in the Persian period, c. 500 BCE, that the first altar of Kybele was built in the area that later became a sanctuary of Artemis and home to Sardis's most well-known standing remains (Fig. 3). The monumental stone Temple of Artemis, in the Ionic order, was begun in the Late Classical/Hellenistic period (c. 300 BCE) and was never finished. Construction resumed with a somewhat different plan in the Roman imperial era, when it served at least partly as a locus for imperial cult worship. Lydian dedicatory inscriptions carved at the bottoms of some of the reused columns attest to the continued importance of Lydian families and of the Lydian language more than two centuries after the collapse of the Lydian empire (Yegül in Cahill 2010: 362–88).

By the Roman period, Sardis held all the usual components of a city in the eastern part of the Roman empire: a theater and stadium, several temples, baths, a gymnasium with civic and commercial space, colonnaded avenues, and urban townhouses. A civic basilica was converted to a synagogue in the fourth or sixth century CE (Magness 2005), and several Christian churches were built at Sardis in the Byzantine era, when the acropolis was fortified. A thirteenth-century Islamic village has been identified around the remains of one of the churches, and Sardis remained occupied as a series of villages through the Ottoman period, with some continuity to the modern era suggested in the shared name of modern villages in the vicinity, Sart (Crane 1987). Other important Roman and Byzantine sites in Lydia include Thyateira (modern Akhisar), Philadelphia (modern Alaşehir), and Magnesia ad Sipylum (modern Manisa), though none have been explored to the same degree as Sardis.

Current Issues

One of the biggest problems in the archaeology of Lydia, with its many conspicuous tumuli, is illicit digging by treasure hunters. The destruction of archaeological context is permanent and irreparable, and the sale of looted artifacts on the black market is deplorable. Even when objects that end up in private collections or in museums can be reasonably associated with a Lydian provenance, their full context—for instance, location in a particular tomb or association with other objects—can never be known. Cultural heritage

management and community outreach are thus major concerns of current archaeological work in the region (Roosevelt & Luke 2006; Luke in Cahill 2010: 389–403). Other current issues include defining the borders of Lydia, investigating Lydian relationships with neighboring cultures, and understanding Lydian identities in Late Lydian periods. With more regional study and with more excavation of sites other than Sardis, we may in the future have a more holistic view of the archaeology of Lydia.

Cross-References

- ▶ Basilica in Classical Archaeology
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Imperial Cult, Roman
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Terracotta Architectural Sculpture in Classical Archaeology
- ▶ Urban Planning, Roman
- ▶ Urbanism in the Ancient Near East

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Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface

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Introduction

Since hominins started producing stone artifacts approximately 2.6 Ma ago (Semaw et al. 2003), millions of kilos of lithic artifacts must have been discarded on the world's surfaces. Most of that output survived in reworked contexts, on surfaces, and in lag deposits, abraded by transport and reworked from one sedimentary matrix into another. However, some of that lithic material became encased in sediments soon after primary deposition and is recoverable in its (near) original spatial patterning. A good example is Maastricht-Belvédère in the Netherlands. At this commercially exploited quarry, a complex of primary context sites from the early Middle Paleolithic has been excavated from fine-grained fluvial sediments since the 1980s (Roebroeks 1988; De Loecker 2006). The local deposits contained fully temperate faunas and could probably be attributed to the late Middle Pleistocene (MIS 7, see below). The material evidence generally seems to reflect very mobile, episodic, and short-term Neanderthal occupations of parts of the river Maas (Meuse) valley, at least 250,000 years ago (e.g., Roebroeks 1988; Roebroeks et al. 1992; De Loecker 2006). Yet, some data suggest that considerable time, energy and skill was invested at certain localities, in order to execute specific technology or food related maintenance and production tasks (De Loecker & Roebroeks 2012).

Definition

What follows is a brief summary of the local Pleistocene archaeology, focusing on the high residential mobility character of Early Neanderthals (Binford 1980). Data from more recent Maastricht-Belvédère studies is concisely integrated to illustrate the complexity of the artifact distributions. It will be argued that we are not dealing here with a "hit-and-run" record only.

Key Issues/Current Debates/Future Directions/Examples

The Maastricht-Belvédère Setting

The former Maastricht-Belvédère loess and gravel pit is located on the left bank of the river Maas, approximately 1 km north-northwest of the Dutch town of Maastricht (50° 52′09.40″N, 5°40′27.33″E, Fig. 1). Extensive fieldwork has focused on an interdisciplinary study of flint distributions, which occasionally were associated with faunal remains. Artifact scatters and patches (Isaac 1981) were generally preserved in primary archaeological context, in fine-grained sediments

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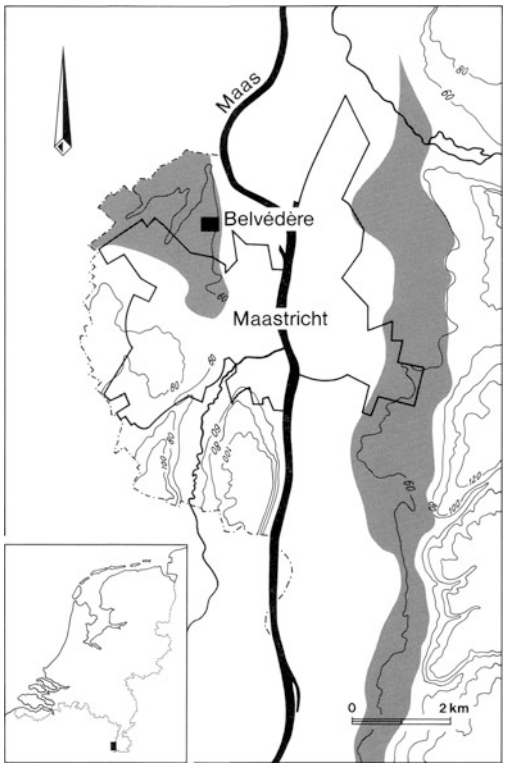

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 1 Location of the Maastricht-Belvédère quarry (The Netherlands). The shaded area shows the distribution of the Caberg Middle Terrace sediments. The Caberg plateau coincides with the western distribution of the Middle Terrace sediments of the local stratigraphy. (Figure after Roebroeks 1988: 1)

of the Middle Pleistocene River Maas. High rates of sedimentation created assemblages of a very limited time-depth (in Pleistocene terms) and enabled extensive refitting, spatial analyses, and interpretations beyond the site-level. By the end of 1990, excavations had uncovered a total of eight archaeological sites, together with a series of test pits (Tables 1 and 2). In total, a surface of 1,577 m^2 was excavated within an area of approximately six hectares of quarry (Roebroeks 1988; Roebroeks et al. 1992; De Loecker 2006).

The Middle Pleistocene river deposits yielded a full interglacial vertebrate fauna with 26 species (van Kolfschoten 1993) and a rich mollusc fauna containing more than 70 land as well as freshwater species (Meijer 1985). Both the terrace and loess stratigraphy and the mammal and mollusc biostratigraphical evidence indicate an age before the next-to-last glacial, i.e., prior to MIS 6 (van Kolfschoten et al. 1993). Thermoluminescence dating of heated flint artifacts yielded an age of 250 ± 20 ka (Huxtable 1993), and electron spin resonance dating of shells gave an age of 220 ± 40 ka, both corresponding to MIS 7 (van Kolfschoten et al. 1993). However, amino acid racemization dating of *Corbicula* shells from the interglacial deposits as well as biostratigraphically important elements of the mollusc fauna itself suggest an earlier, MIS 9 age for the Belvédère interglacial and its associated archaeology (Meijer & Cleveringa 2009).

Generally, the archaeological material from the main find bearing sediments, Unit IV, was recovered in the upper fine-grained part of a series of sediments deposited by a meandering river during MIS 7 (or possibly MIS 9). These fine-grained late Middle Pleistocene river deposits were subsequently covered by a thick sequence of Saalian and Weichselian silt loams (i.e., reworked and primary loesses).

Characterization of a "Veil of Stones"

The artifact distributions at Maastricht-Belvédère documented a number of well-preserved Early Neanderthal "on-site" activities which left a continuous artifact distribution on the paleo-surface (Roebroeks et al. 1992). Mainly because of the work of Isaac (1981) at Koobi Fora (East fTurkana, Kenya), it became clear that the classical high-density lithic patches, coined as sites by archaeologists, are mostly present against a background of low-density scatters, covering isolated or small sets of artifacts. In an effort to explain the spatial distributions at Maastricht-Belvédère and to overcome the "solitary site" ocus, Isaac's (1981) "scatters-between-the-patches" approach was used as a heuristical device. This resulted in the excavation of a "non-site," Site N. Here, 765 m^2 of the interglacial river deposits were meticulously excavated with the explicit aim of studying the character of the "background scatter" of flint artifacts and bones. The information from this

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Table 1 Maastricht-Belvédère. Comparison (basic count and density per square meter) of the Unit IV primary context lithic assemblages. For details, the reader is referred to De Loecker (2006). (After De Loecker 2006: 236)

Site	Area dug (m^2)	Total number of artifacts	Density per square meter						
			Total number of artifacts	Chips <30 mm	Flaked artifacts ≥30 mm	Flakes	Blade-like flakes	Chunks	Burned artifacts
A	5	80[b]	16.0/6.8	9.4	6.4	6.0	0.2	0.2	0.2
B	20	6	0.3	–	0.3	0.25	0.05	–	–
C	264	3,067	11.61	10.11[c]	1.5[c]	1.48[c]	–[d]	0.071[d]	0.5[d]
D	–	11	–	–	–	–	–	–	–
F	42	1,177	28.0	24.28	3.69	3.19	0.14	0.35	0.35
G	50[a]	75	1.5/1.22	1.06/0.89	0.44/0.36	0.4/0.32	0.02/ 0.016	0.02/ 0.016	–
H	54	270	5.0	3.33	1.66	1.55	0.055	0.055	0.018
K	370	10,912	29.49	20.96	8.27	8.01	0.17	0.091	1.66
N	765	450	0.58	0.47	0.11	0.11	0.0013	–	0.0013
July 1990	7	15	2.14	1.14	1.0	1.0	–	–	–
L	–	8	–	–	–	–	–	–	–
M	–	44	–	–	–	–	–	–	–
O	–	10	–	–	–	–	–	–	–
Site N, level X	–	29	–	–	–	–	–	–	–
Section finds	–	67	–	–	–	–	–	–	–

Site	Area dug (m^2)	Total number of artifacts	Density per square meter					
			Cores	Core trimming elements sensu sticto	Tools	Tools sensu stricto	Long sharpening flakes	Transversal sharpening flakes
A	5	80[b]	0.2	0.4	0.4	0.2	–	0.2
B	20	6	–	–	–	–	–	–
C	264	3,067	0.015[c]	0.05[d]	0.087	0.018	–	–
D	–	11	–	–	–	–	–	–
F	42	1,177	0.047	0.12	0.19	0.071	–	–
G	50[a]	75	–	–	0.16/0.13	0.06/0.049	–	0.02/0.016
H	54	270	–	–	0.19	0.074	–	–
K	370	10,912	0.25	0.27	0.37	0.3	0.0027	0.0027
N	765	450	0.0013	0.0026	0.033	0.016	–	–
July 1990	7	15	–	–	0.14	0.14	–	–
L	–	8	–	–	–	–	–	–
M	–	44	–	–	–	–	–	–
O	–	10	–	–	–	–	–	–
Site N, level X	–	29	–	–	–	–	–	–
Section finds	–	67	–	–	–	–	–	–

[a]The excavated Site G area together with the test pit measures 61 m^2.
[b]Within the excavated Site A area, only 34 artifacts were found.
[c]Site C figures, after Roebroeks (1988; n = 3,067).
[d]Site C figures, after Schlanger's sample (1994; n = 1,438).

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Table 2 Maastricht-Belvédère. A comparison (basic count and ratios) of the Unit IV primary context lithic assemblages. For details, the reader is referred to De Loecker (2006). (After De Loecker 2006: 239)

Area		Number of artifacts					Ratio			
Site	Area dug (m^2)	All tools and fragments	Tools and fragments sensu stricto	Cores	Flakes and chips	Total	Tool:waste	Tool sensu stricto:waste	Core:waste	Core:tool
A	5	2	1	1	77	80[b]	1:39	1:78	1:77	1:2
B	20	–	–	–	6	6	–	–	–	–
C	264	23	5	4	3,040	3,067[c]	1:132	1:609	1:760	1:6
D	–	–	–	1	10	11	–	–	1:10	–
F	42	8	3	2	1.167	1,177	1:146	1:389	1:584	1:4
G	50[a]	8	3	–	67	75	1:8	1:22	–	–
H	54	10	4	–	260	270	1:26	1:65	–	–
K	370	137	111	91	10,684	10,912	1:79	1;97	1:117	1:2
N	765	26	12	1	423	450	1:16	1:35	1:423	1:26
July 1990	7	1	1	–	14	15	1:14	1:14	–	–
L	–	–	–	–	8	8	–	–	–	–
M	–	3	2	–	41	44	1:14	1:21	–	–
O	–	–	–	–	10	10	–	–	–	–
Site N, Level X	–	–	–	–	29	29	–	–	–	–
Section finds	–	4	3	1	62	67	1:16	1:21	1:62	1:4

[a]The excavated Site G area together with the test pit measures 61 m^2.
[b]Within the excavated Site A area, only 34 artifacts were found.
[c]Site C figures, after Roebroeks (1988; n = 3,067).

low-density scatter was used to interpret the large-scale and continuous artifact distribution, both in low and high densities, referred to as a "veil of stones" by Roebroeks et al. (1992). A comprehensive lithic analysis showed that the main differences between the various sites, apart from differences in find densities, were to be found in fine-tuned typo-/technological variations (differences in percentages and ratios). At the same time, quantitative and qualitative refitting studies proved to be fundamental to study these subtle yet important differences (De Loecker 2006).

The individual "site-level" was transcended by integrating all the available data, recorded from the same fine-grained Unit IV sediments, into an "off-site" approach (Foley 1981; Isaac 1981). The archaeological relics are probably contemporaneous in Pleistocene terms, as they were discarded during a relatively short phase within the same warm-temperate interglacial period. Additionally, the find distributions were documented in a rather small area, which would suggest that they were formed under the "same" micro-environmental conditions, with no indications of significant changes in raw material availability. Precisely these research conditions inspired long-lasting field efforts and created the right setting for high-resolution analyses of a technological landscape.

Generally, two different kinds of find distributions can be distinguished within this spatial continuum. On the one hand, there are the "high-density patches" Sites C, F, H, and K. These are characterized by clusters of flint knapping debris, with high percentages of dorsal/ventral refits, realized during elaborate conjoining studies (Roebroeks 1988; De Loecker 2006). On the other end of the density scale are the low-density "off-site" distributions of Sites G and N. These predominantly consist of isolated and/or small groups of flakes and tools which yielded relatively few dorsal/ventral refits (Table 3) – a phenomenon that was present almost everywhere in the interglacial fluvial deposits. Tools are far more important in the scatters than in the patches. However, the prolific Site K stands out as relatively high numbers of sensu stricto tools (n = 111) were recorded here (Fig. 2). Eventually not one of these implements could be refitted into one of the extensive reduction sequences. Therefore, most of these tools (scrapers) may have arrived at the findspot as well-prepared finished (Levallois sensu stricto) products. The fact that they were produced on "nonlocal" finer grained flint points in the same direction. The high number of cores at Site K (n = 91), all produced on the spot, is also striking. That cores with considerable amounts of cortex were discarded in large quantities suggests that they were probably intended for local use only (De Loecker 2006).

At Site K, refitting resulted in the conjoining of 1,828 artifacts (16.8 % of the total amount artifacts), i.e., 60.4 kg (61.7 %) of the total weight of the flint assemblage (97.8 kg). These conjoinings, together with high percentages of cortex, indicate that several flint nodules entered the area without any (or hardly any) preparation, decortication, or testing (Fig. 3). Within the excavated area, the flint blocks were initially split into smaller units and decorticated. Intra-site spatial patterning shows that the individual parts or cores were subsequently transported to other zones within the excavated area. There further core-reduction and, finally, discard took place (De Loecker 2006). Although occasionally larger flakes were used as cores, natural flaws clearly played a major part in this initial "flaking" or splitting of the nodules. Together with some technological "flaking failures," this could indicate either an unselective choice of raw material or a lack of better quality raw material.

Like Sites F and H, the Site K assemblage is generally characterized by large dimensions and "few" but large dorsal negatives on both cores and flakes, with limited attention for core preparation. Usually the negatives of flakes from an earlier stage in the reduction process are used as striking platform. The elaborate refitting study shows a strategy in which long "uninterrupted" sequences of flakes were produced by means of a "unifacial" and/or an interchanging bifacial disc(oidal) core approach (Boëda 1993). Cores were constantly turned and twisted to maintain good flaking angles. As a result, the assemblage

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Table 3 Maastricht-Belvédère. Comparison (refitted data) of the Unit IV primary context lithic assemblages. For details the reader is referred to De Loecker (2006). (After De Loecker 2006: 248)

	Number of refitted artifacts				*Aufeinanderpassung* (production sequences)		*Aneinanderpassung* (breaks)		*Anpassung* (modifications)		*Einpassung* (inserts like heat damage)	
Site	n	%	Number of compositions	Number of connection lines	n	%[a]	n	%[a]	n	%[a]	n	%[a]
A	20	25.0	9	11	9	81.8	2	18.1	–	–	–	–
B	2	33.3	1	1	1	100.0	–	–	–	–	–	–
C	659[b]	21.5[b]	?[c]	?[c]	?[c]	?[c]	?[c]	?[c]	?[c]	?[c]	–	–
D	5	45.5	2	3	1	100.0	–	–	–	–	–	–
F	153	13.0	45	105	81	77.1	24	22.9	–	–	–	–
G	25	33.3	10	15	7	46.7	8	53.3	–	–	–	–
H	40	14.8	14	27	16	59.3	10	37.0	1	3.7	–	–
K	1,828	16.8	321	1,582	1,221	77.2	245	15.5	55	3.5	61	3.9
N	73	16.2	25	49	11	22.4	38	77.6	–	–	–	–
July 1990	4	26.7	2	2	2	100.0	–	–	–	–	–	–
L	–	–	–	–	–	–	–	–	–	–	–	–
M	–	–	–	–	–	–	–	–	–	–	–	–
O	–	–	–	–	–	–	–	–	–	–	–	–
Site N, level X	–	–	–	–	–	–	–	–	–	–	–	–
Section finds	–	–	–	–	–	–	–	–	–	–	–	–

[1]The percentages are calculated from the total number of refits.
[2]Site C figures after Roebroeks (1988; n = 3,067).
[3]No detailed data recorded (cf. Roebroeks 1988).

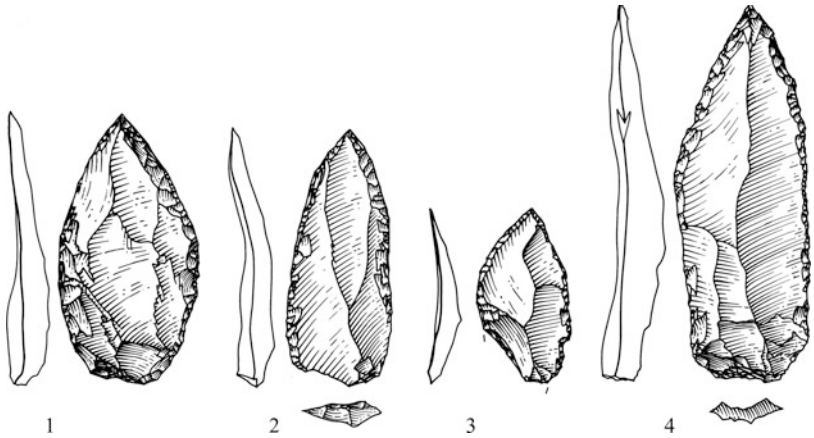

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 2 Maastricht-Belvédère Site K. Some of the tools sensu stricto (Mousterian points/convergent side scrapers) which could not be incorporated in one of the many refitted sequences from Site K. Scale 2:3 (Figure after De Loecker 2006: 507)

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 3 Maastricht-Belvédère Site K. Refitted composition shown from two sides (length = 253 mm, width = 330 mm, and thickness = 285 mm). The nodule weighs 9,286 kg (15.4 % of the total weight of all conjoined Site K artifacts) and consists of 160 artifacts. It represents nine separately reduced parts or cores. (Figure after De Loecker 2006: 41)

can be described as reflecting a continuous, sometimes radial, removal of flakes. This makes it very difficult, or even impossible, to distinguish separate groups of flakes as "waste" or as "desired" products. Generally, it can be concluded that these "high-density patches" are mainly characterized by an ad hoc (expedient) technology.

A completely different kind of "high-density" find distribution was excavated at Site C (Roebroeks 1988). Here, several "smaller" artifact clusters were situated close to each other. The Site C flint assemblage is characterized by "smaller" dimensions and a well-prepared core approach, with several "classical" Levallois flakes and the products of a *débitage Levallois recurrent* (Boëda 1993), produced on finer grained Raw Material Units (RMUs). Refitting showed that several cores (and tools and flakes), in various stages of reduction, were introduced at the Site C location to be further worked on. Moreover, the excavated spatial configurations seem to represent flint-working events of which the products were transported from one area to another, where they were then abandoned (i.e., exhausted cores) and where a new reduction

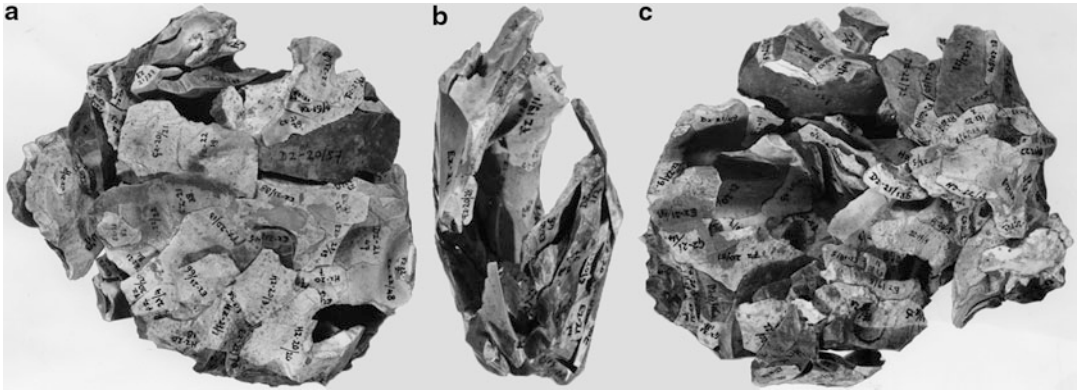

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 4 Maastricht-Belvédère Site C. Refitted composition shown from three sides (maximal dimension = 128 mm). The refitted composition consists of 162 elements and shows the flaking debris of a flat disc(oidal)-like core. The actual core was not recovered within the excavation boundaries, but must have been nearly exhausted. The initial flaking and decortication occurred previously outside of the excavated area. About 10 % of the elements were burned. (Figure after Roebroeks 1988: 53)

sequence of another RMU "started." Next, this new flaking sequence (or core) was transported to a "third" locus where its use-life again ended and where yet again a new one "started," etc. Subsequently, some prepared cores and flakes were transported away from the excavated area (Fig. 4). This is in clear contrast to Sites K, F, and H where most of the reduction sequences started and ended within the excavated area.

On the whole, the Sites C and K analyses indicate that at these "high-density patches," we are dealing with the remnants of two different, but related, technological strategies. On the one hand, a number of well-prepared (e.g., *Levallois recurrent*) cores, flakes, and tools, produced on finer grained flint, entered the excavated areas in already reduced forms or as "desired" products. This means that the initial flaking sequences were executed previously at other places in the landscape. Within the "site" boundaries they were, subsequently, further reduced, parts of the *chaines operatoires* or individual pieces were discarded on-the-spot, while reduced cores and produced flakes were transported to other locations (Roebroeks 1988; Roebroeks et al. 1992). On the other hand, a disc(oidal) core approach (Boëda 1993), with minimal attention for preparation, was used for the reduction of "locally procured," "coarser" grained, flint nodules. Most of the latter products were probably intended for ad hoc use only.

Between the large clusters of artifacts a diffuse artifact distribution was present all through the fluvial sediments at Maastricht-Belvédère. Segments of this low-density distribution have been excavated at Sites G and N (Roebroeks 1988; Roebroeks et al. 1992). No clear artifact concentrations were found. The mean artifact density was very low, ranging between 0.58 (Site N) and 1.22 (Site G) artifact/m^2 (Table 1). The highest percentages of tools were recorded at these scatters, with the tools recovered as stray finds and "worn out." Surprisingly a considerable number of larger and fragmented flakes (including *éclats debordants*, Fig. 5) were recorded as well. These implements are considered to represent the discarded parts of transported "toolkits." Only very few refits could be established, which represent small parts of spatially fragmentized reduction/retouching sequences, while more than half of the Site G and N conjoinings consist of broken artifacts. At Site N, a few small refitted flakes testify to the passing of a core (Fig. 6), while resharpening flakes indicated that scraper-like objects were brought to, and subsequently removed from, the excavated areas (cf. Sites A and G, Fig. 7). One discarded "worn-out" double concave/convex scraper at Site N shows

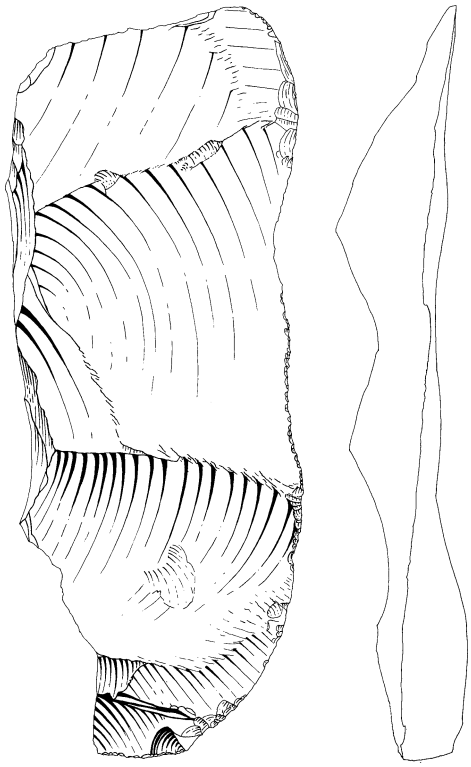

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 5 Maastricht-Belvédère Site G. Large flake with a sharp cutting edge and struck from the lateral side of a prepared core. This so-called *éclat débordant* is triangular in cross-section, shows a clear back (i.e., side of a core), and resembles a "backed knife." The implement could not be refitted to other excavated Site G lithic material. Scale 2:3 (Figure after Roebroeks 1988: 71)

evidence of previous resharpening behavior, elsewhere in the paleo-landscape (Fig. 8). Moreover, the flakes from these low-density scatters are larger than the ones from the rich sites. Apart from being voluminous, they have the highest mean number of scars and they show low cortex and flaw percentages. Their butts and dorsal surfaces are better or more often prepared, while the facetting indices are among the highest at Belvédère. The used raw materials show a large heterogeneity, which is also clear from the rather negative refitting results, i.e., dorsal/ventral refits. This seems to suggest that the "low-density" scatters reflect a series of non-related activities in the river valley landscape, separated in time and space, during various foraging trips.

All in all, compared to the "high-density" patches, these "low-density" scatters show distinct differences in the spatial patterning of the finds, in typology, technology, and in raw material composition (Tables 1–3, see also De Loecker 2006). Together with the flint rich sites, the low-density scatters represent the traces of a very flexible and highly mobile use of stone tools in the Maas river valley, at least 250,000 years ago.

Time, Energy, and Skill Investment

Besides flint knapping, other (more time consuming) activities may have been performed at the excavated Maastricht-Belvédère locales. It is impossible to indicate the exact nature of these other site functions, because of a number of analytical limitations. For instance, only limited amount of (usually badly preserved) bone material was recovered. This could simply mean that at certain localities (e.g., Site K) faunal remains were never present, or it could be an outcome of decalcification of the site-matrix. Post-depositional processes were also responsible for the virtual absence of unambiguous use-wear traces. Some artifacts did display microscopic traces of use, but weathering prevented determination of the exact type of former use (van Gijn 1988). However, there is some data indicative of the character of certain activities, e.g., food (meat) acquisition for Site C and especially for Site G (Roebroeks 1988).

The Middle Paleolithic record indicates that Neanderthals were continuously transporting lithic equipment across the landscape. At Belvédère a broad assortment of morphological forms, usually made on "nonlocal" materials, was part of the mobile toolkit, e.g., scrapers, (Levallois) flakes/cores (Roebroeks et al. 1992; De Loecker 2006). Understanding the initial choice and selection of raw materials for production of specific tools and cores and/or tasks is difficult. Contextual factors such as raw material quality, abundance, and accessibility, as well as thoughts about activities to be carried out in the future are among the determinants in raw material procurement and consumption

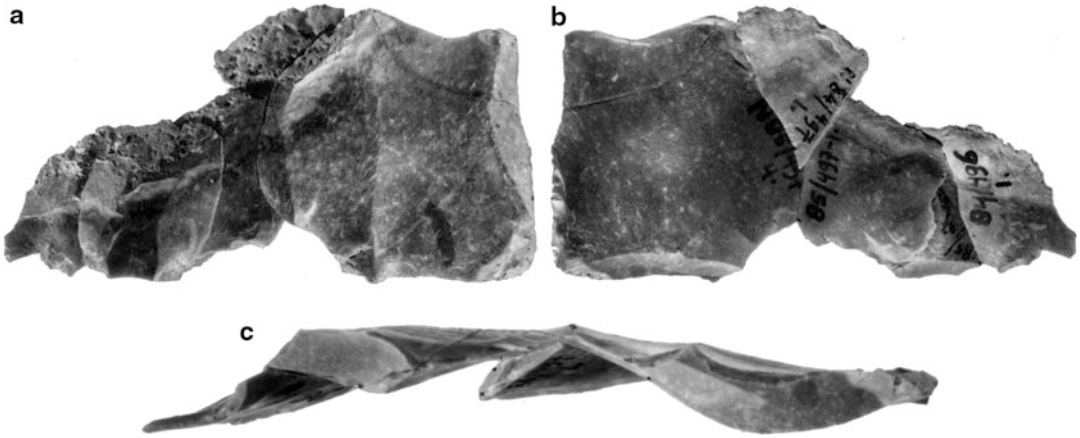

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 6 Maastricht-Belvédère Site N. A group of five refitted flakes (i.e., dorsal/ventral refits) indicating that a small knapping event (core-edge rejuvenation) was executed within the excavated area. Scale 2:3 (Figure after Roebroeks et al. 1992: 13)

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 7 Maastricht-Belvédère. Two "transverse sharpening flakes," which testify to the transient presence of scrapers. 1: Sites A. 2: Site G. Scale 2:1 (Figure after De Loecker 2006: 192, 208)

processes. Each type of raw material required a separate evaluation, or better a different "conceptual scheme," to predict its suitability for specific activities.

As mentioned before, there are striking differences in raw material quality between locally produced items (more "coarse" grained flint with abundant natural imperfections and flaws) and transported Levallois (-like) objects (predominantly "fine" grained flint). Since the Levallois technique has a complicated *chaîne opératoire*, it can be stated that time and energy

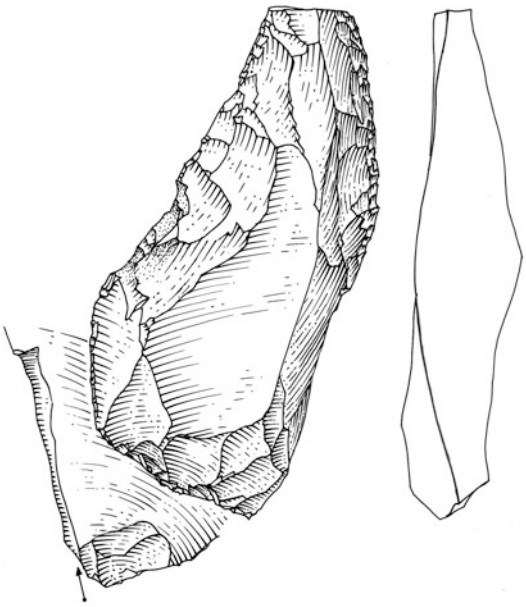

Maastricht-Belvédère: Interpretation of a Technological Paleo-Surface, Fig. 8 Maastricht-Belvédère Site N. "Worn-out" double concave/convex scraper which shows evidence of previous resharpening behavior, performed outside the excavated area. At its proximal part a "long sharpening flake" was removed to rejuvenate the cutting edge. Scale 2:3 (Figure after Roebroeks et al. 1992: 8)

were invested in the procurement and selection of suitable raw materials. In general, the Pleistocene gravel beds of the river Maas (Unit III in the local sequence) contain pebbles of several different types of flint; in that sense all Maastricht-Belvédère flints are "local," as the gravels also contained the finer grained flint. At all Maastricht-Belvédère Unit IV sites fluvially abraded cortex was present. This indicates that raw materials (i.e., large flint cobbles at Site K) were probably collected from nearby river Maas deposits, reworked out of chalk cliffs some kilometers to the south of the locale (Roebroeks 1988). According to paleoenvironmental reconstructions (Meijer 1985; Duistermaat 1987), the Unit IV archaeological sites were located at c. 100–200 m distance from the main river stream. This means that no gravel beds (raw material sources) were present within a radius of at least 100–200 m around Site K. This possibly also means that after procurement, energy and time was invested in transporting the large and "heavy" nodules, at least 97.8 kg in total weight (De Loecker 2006), over a minimum distance of 100–200 m, to the Site K locus. The fact that these nodules entered the area without any (or hardly any) preparation, decortication, or testing implies a rather opportunistic behavior, parallel to, or complementary to, the well-planned activities, suggested by proper-prepared mobile (Levallois) items. At least it can be assumed that Site K was of such importance to early Neanderthal foragers, that a considerable amount of energy and time was invested in carrying large and heavy flint nodules to the activity area. Together with the transported toolkit, this shows a capacity to anticipate needs and suggests that sometimes longer periods of time were spent at a certain location.

In addition, specific find categories (i.e., studies of hematite finds [Roebroeks et al. 2012], and spatial interpretation of heated artifacts [Stapert 1990, 2007]), suggest that some of the activities performed at Maastricht-Belvédère may have gone beyond the limits of opportunistic "15-minute" flint knapping episodes or short butchering events (Hallos 2005). Especially at Sites C and K, vast quantities of heated artifacts co-occurred with dense clusters of debitage, tools, and sometimes cores. Physical hearth structures were not recorded. Several analytical studies (Stapert 1990, 2007) resulted in the identification of possible "phantom" hearths for Sites C and K. This could indicate that maintenance and production-related tasks may have been associated with (inferred) anthropogenic fires.

The Site C (and Site F) excavation also yielded some dots of reddish hematite. Roebroeks et al. (2012) concluded that the red ochre stains did not belong to the natural sedimentary environment, but had entered the matrix after formation, with the nonlocal material introduced to the sites by early Neanderthals. A number of performed experiments suggested that the fine hematite material was originally concentrated in a liquid solution and that blobs of this ochre-rich substance became embedded in the sediments during use of the liquid, spilled on the soil surface (Roebroeks et al. 2012). Strikingly however, the

hematite was recovered at sites with evidence of fire and where subsistence- and maintenance-related tasks may have taken place. At the very least, the reported small hematite concentrates represent a very early case of red ochre use and manipulation, which minimally dates to MIS 7 (Roebroeks et al. 2012).

Conclusion

Large-scale excavations at the open-air sites of Maastricht-Belvédère and the subsequent typo-/technological, refitting, and spatial analyses allow detailed interpretations of late Middle Pleistocene Neanderthal behavior (Roebroeks 1988; De Loecker 2006). The sites are the outcome of episodic visits to a riverine landscape, where flint artifact discarding eventually resulted in a number of "high- and low-density" find distributions, with clear quantitative and qualitative variations. The early Neanderthals who created the archaeological record were definitely well-equipped foragers. At Sites C, G, K, and N, they entered the localities with finished tools, well-prepared initiated technological products (e.g., flakes and cores) as well as with raw materials (e.g., pieces of ochre), and, most importantly, the knowledge to put these items to good use in a wide range of environments. Stone artifacts probably played a major role in animal procurement and food processing. Beyond these subsistence-related activities, it can also be inferred that at the excavated locales, time was invested in the maintenance of technology. Moreover, the heated flint artifacts at the Sites C and K "high-density" patches could indicate the presence of former anthropogenic "phantom" hearths. At close range of these fires, a variety of tasks were executed, some of which may have involved the manipulation of red ochre (Roebroeks et al. 2012). Generally, these well-equipped late Middle Pleistocene foragers may have been attracted to the area by its diversity of natural resources, which included flint, fresh water, fuel for fires, and food supply. In addition, the spatial artifact distributions can be portrayed as fossils of their "foraging trails" in the landscape.

Each of the above mentioned "toolkit-elements" required special consideration, time investment, and a skilled control of raw materials. While equipped with tools produced elsewhere, these foragers also used locally available raw materials (collected at a minimum distance of about 100–200 m from Site K) to produce "situational gear" (De Loecker 2006). The "catchment area" of their technology, the know-how needed to produce fire, and in general terms their long-term survival in Pleistocene Europe are simple illustrations of a mobile adaptation which was based on a way of life which greatly surpassed the "15-minute cultures" (Hallos 2005), often envisaged for these hunter-gatherers. In that sense, we can picture these Early Neanderthals as highly experienced "rock stars," who used their skills constantly during "daily" foraging tours.

Cross-References

- ▶ European Middle Paleolithic: Geography and Culture
- ▶ *Homo neanderthalensis*
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mousterian Industry Tradition

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Machu Picchu Artifacts: Repatriation

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Introduction

In 1911, a professor of South American history from Yale University drudged through the Andean jungle and rediscovered the ancient Incan ruins of Machu Picchu. Hiram Bingham had received permission from the government of Peru to return to Yale with 40,000 artifacts to study over an 18-month period. The artifacts were, for the most part, shards and fragments of pottery, jewelry, and human remains. While they were valuable for scientific research, only 350 of the artifacts were of museum quality.

The 18-month period for study came and went, and Yale did not return the objects to Peru. The issue became one of international importance, and in 1916, Bingham wrote to the National Geographic Society regarding the human remains. He explained, "Now they do not belong to us but to the Peruvian government, who allowed us to take them out of the country on condition that they be returned in 18 months. . . The whole matter has assumed a very large importance in the eyes of the Peruvians, who

feel that we are trying to rob their country of its treasure" (Brice & Shoicet 2010).

Peru continued to demand repatriation of the objects, so Yale returned several boxes in 1921, presumably containing the fragments of human remains. However, Yale retained most of the objects, including the museum-quality pieces, which they housed at their Peabody Museum of Natural History. In the 1920s, Peru again requested the return of the remaining artifacts, but their requests were ignored.

For nearly 70 years, the issue lay dormant, until the year 2000, when Peru once again demanded the return of the remainder of the objects. Peru insisted that the loan agreement with Bingham applied not only to the human remains but also to the remainder of the 40,000 objects. Yale refused Peru's renewed request, claiming they had returned all lent objects, and the institution was the rightful owner of the objects remaining in their possession.

Peru would not relent, however, and the parties attempted to negotiate a settlement in 2007. They came to a contingent agreement that title to the objects would be granted to Peru, although many of the objects would remain at Yale for study and display. The following year, the agreement fell through, and Peru filed suit in a US federal court, demanding both return of all the objects and monetary compensation "far in excess of $75,000" for Yale's "wrongful retention" (Dibenedetto 2010).

Key Issues

From the beginning, the lawsuit faced two primary obstacles. First, in order for Peru to recover improperly removed objects, it would have to prove that its government was the legal owner of the objects when they were removed from the country. In a case involving the seizure by US Customs of 89 pre-Columbian artifacts from a private individual, the Central District Court of California found that Peru had only demonstrated national ownership of cultural property back to 1929, at the earliest (*Peru v. Johnson*, 720 F.Supp. 810 (C.D. Cal. 1989)). This means Peru's patrimony law (wherein the government lays claim to archaeological materials) would postdate Bingham's removal of the Machu Picchu objects from the country.

Another obstacle for Peru's lawsuit was that the statute of limitation or *laches* would have barred Peru's replevin action (a replevin action is a demand for return). Peru had made a formal demand for the return of the objects in the late 1920s and Yale refused. This refusal likely began the 3-year statute of limitations on replevin actions, yet Peru failed to file a claim for another 70 years.

While the case was being litigated, Peru mobilized a national effort to reclaim the artifacts. First, Peru publicly threatened Yale with criminal charges if the artifacts were not returned, although the basis of these criminal charges was neither stated nor apparent. Yale responded that while it respected "Peru's interest in archaeological material from Machu Picchu," Yale also owed "a duty to academic and cultural institutions everywhere to recognize their important contributions to the study and understanding of all the world's cultures" (Kennedy 2010). Peru's then-President Alan García Pérez then made a formal request for the intervention of US President Barack Obama, although no response was publicized.

Former President García mounted demonstrations in the cities of Lima and Cusco, where thousands of people marched to show unity and strengthen the country's demand for return of the artifacts. Peru solicited the support of Ecuadorian President Rafael Correa, who made a formal statement in support of Peru and said he would take this matter to the Union of South American Nations if necessary (Valencia 2010).

In the USA, nine runners in the New York marathon showed their support for Peru by wearing t-shirts demanding the return of the Machu Picchu artifacts. Former President García announced he had received a message of support from US Senator Christopher J. Dodd.

The public shaming had the intended result. In 2010, Yale sent representatives to Lima in an

attempt to negotiate a new settlement concerning the artifacts. Peru and Yale reached an agreement in which Yale agreed to return the museum-quality objects in time for the 2011 centennial celebration of Machu Picchu's rediscovery. Yale agreed to return the remainder of the objects to the Universidad Nacional de San Antonio Abad del Cusco ("UNSAAC"), the closest university to Machu Picchu, where continuing research would be conducted and public exhibitions will be held (Orson 2012).

The new settlement agreement provided that Yale would be able to access the artifacts for research purposes and work jointly with Peruvian counterparts at the UNSAAC – Yale International Center for the Study of Machu Picchu and Inca Culture (Taylor 2011). Former President García also promised to ask for additional funding from parliament to construct appropriate facilities to house the artifacts. Peru further agreed to loan some artifacts to Yale to display at the Yale Peabody Museum of Natural History, although title to the objects would be transferred to Peru.

Through this initiative, Peru has demonstrated that it wishes to share center stage in the international movement to repatriate cultural property to artifact-rich nations. Countries such as Egypt, Italy, and Greece use political influence to reclaim extant cultural property, even when there are no legal grounds to mandate repatriation. When Peru's attempts to use legal means to reclaim the Machu Picchu artifacts failed, the country turned to the methods sometimes employed by other artifact-rich nations. Peru's apparent success with these methods demonstrates that the ethics-based repatriation movement is still a viable means for artifact-rich nations to reclaim archaeological property held in foreign nations.

Cross-References

- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation: Overview

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Machu Picchu: Geography and Culture

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Introduction

Machu Picchu is an archaeological site known worldwide. Furthermore, it is the most emblematic site in the archaeology of Peru and in building national discourses. It has undergone a series of missions and "scientific" explorations since the late nineteenth century, such as Antonio Raimondi, Clements Markham, and Charles Wiener (Mould de Pease 2008a). Between 1868 and 1919, it was represented by the mapping done by these travelers. In 1874 it was recognized by the Peruvian government in official map drawn up by the German geologist Herman Göring (Mould de Pease 2008b; Gavazzi 2012: 42). In 1911, the American explorer Hiram Bingham claimed to have discovered this site as the "Lost City of the Incas." This would be the "scientific discovery" of Machu Picchu. Seventy years after this discovery, the site was declared by the Peruvian government as "National Protected Area by the State," and it was in 1983 when it was declared "World Cultural Heritage" by UNESCO. However, in 2011, this organization included it in its list of World Heritage in Danger.

Definition

The site of Machu Picchu amazes for the ability of its planners and builders, the Incas, to establish a monumental architecture within a natural environment so difficult. So, in this entry, the intimate relationship that Machu Picchu has between the geography inscribed in the nature of the area and the company of its designers, builders, and original users and their sacred status for this cultural group is going to be described.

Key Issues/Current Debates/Future Directions/Examples

Machu Picchu is located at coordinates 13° 9′ 47″ south latitude and 72° 32′ 44″ west longitude. Currently, it is part of the district of the same name, in the province of Urubamba, in the Department of Cuzco in Peru, about 2,430 m above the sea level. It is located about 80 km northwest of the regional capital and current ancient Inca capital, Cusco. Currently, the fastest way to get there is through land transport or train crossing the tracks that follow the natural path in the valley of Urubamba or *Sacred Valley* to the town of Aguas Calientes, renamed as Machu Picchu town. From this town, located in the valley, at kilometer 110 of the highway coming from Cusco, it is possible to ascend directly to the archaeological site. You can also reach the site on foot along the so-called long way which takes about 3 days. This trail starts at kilometer 88 of the highway in Qorihuayrachina located at the very bottom of Urubamba valley, but from there, you enter the mountainous area. This "long way" goes across the rugged Andes passing through a series of Inca settlements and sites reaching 4,250 m of altitude above sea level (Open Warmiwayñuska) where you have spectacular views of the mountains nearby like Salkantay, considered "apus" or tutelary gods of the ancient and modern inhabitants of the area. The Inca sites of Runkuracay, Sayacmarca, Phuyupatamarca, Wiñay Wayna, Intipata, and many more, apart from being ancient complex and agricultural terraces systems, complete the long route which ends at the site of Machu Picchu.

The site itself occupies mainly the top of the rocky outcrop known as Machu Picchu ("Young Mountain") and a natural backdrop to the north known as Huayna Picchu ("Old Mountain"), which also owns some buildings from the Inca period. Both hills are part of a large orographic formation known as Vilcabamba Batholith, composed of intrusive igneous rocks, particularly granite white to gray. The bases of both geological formations are on the left bank of the Urubamba River which almost entirely surrounds

it describing a closed *meander* around *them*. *This area of the valley* was formerly known as Picchu Gorge and is on the eastern slopes of the Peruvian Andes since the waters of this river flow into the jungle. The ruins of Machu Picchu are located approximately at 400 m above the bottom of the valley. Biogeographically, they are in the Peruvian Yungas ecoregion, specifically in the area known as mountainous forests of the eastern slopes of the Andes of Peru.

The floor area of the site, or *llacta*, is about 5 ha (Gavazzi 2010: 241). The site can be divided into two sectors according to type, number of architectural structures, as well as a straight wall that separates them. Thus we have the southeast sector dominated by terraces and systems that would be the agricultural zone and the northwest known as residential or monumental (Canziani 2009: 459). In turn, the residential sector is spatially divided into two parts by a large square. In typically Incas settlements, this division represented the biases called *Hanan* (top, higher) and *Hurin* (below, lower), a division with economic-political connotations besides ideological ones. This residential sector has 200 architectural structures which seem to have housed a thousand inhabitants (Gasparini & Margolies 1977: 96). The buildings are made of granite blocks taken from a nearby quarry and are known as *kanchas*, the basic unit of Inca architecture, and which are composed of a series of rectangular structures surrounding a courtyard which allow direct access. Also, there are open spaces with no construction such as plazas. In addition, of the buildings made of stone that were roofed with plant material which comprises the core of the site, much of the work was invested in the construction of terraces on top of the hill and on its lower slopes which allowed to stabilize the large concentration of buildings and better drainage of rainfall, as well as they were used for agricultural crops.

The consensus among scholars is that the site was built and occupied only during the Inca period. Also, different authors (Rowe 1990; Burger & Salazar 2004) agree, based on ethnohistoric references, that the city was built during the time of Pachacutec government (c. 1450), one of the most enterprising rulers of the Inca Empire. It has even been suggested that this site would have located his mausoleum. Beyond this, it is clear that the site was built in the place for its natural conditions and landscape, a widespread practice in different places where the Incas built their main buildings. Also, the distance from the capital of Cusco and its location in the natural route that goes to the high forest would provide a space away from the capital to the rest of the elite that was occupied and the development of specialized agriculture activities (e.g., growing corn (*Zea mays*) and coca (*Erytroxylum*) *coca*) and in a place that, like many of the Inca buildings in different ecological areas, established the employment of architecture in spectacular landscapes connected to land, sky and its stars, the sea, and other relevant elements in the scenery. The amount of ceremonial-based architecture is so high in comparison to domestic-like structures that the site may have mainly served for sacred and ceremonial activities.

The diversification in technology and structures, most of which unfinished, indicates that multi-technology skill builders, mainly from different areas of the Tahuantinsuyu, collaborated to the construction process. The unfinishing also shows that the site was abandoned at the time of the Spanish Conquest. These three elements – the ceremonial destination, techno- and typological diversification and the unfinished state – are coherent with the hypothesis that Pachacutec may have intended to reunite various religious and astronomical traditions in one site, to better integrate the expansion of the Tahuantinsuyu; his *panaca* (royal family) may have led the construction throughout time until the Spanish invasion.

As we saw, the site has a sacred character since the mausoleum of the Inca Pachacutec would have been built there, which would be located in the structure called the "Turret" (National Institute of Culture of Cusco 2005). In this mausoleum the Incas built three walls that serve to stabilize a granite block and are partly a natural ceiling of the cave, which would house the mummy of this ninth Inca, which would have been stolen during the colonial period and was held by the Spanish until it was

lost. The site also includes the classic Incas carved stone buildings, a number of elements that articulate internally with nature and the surrounding geography. For example, the system of canals that run through the site allows the existence of freshwater spring collection whose purposes were pragmatic and ritual (Mays & Gorokhovich 2010: 188). Also, a number of natural caves were modified and used as part of their ritual spaces. Additionally, some sculptures were carved in the rocky outcrops, as the one representing a bird, in what has been called the *Temple of the Condor*, and highlight the relationship that their designers and builders wanted to convey with regard to the nature and the symbolism which, for them, the sculptures involved. Also, another rocky outcrop known as the Intihuatana sculpted or the construction of buildings like the same *Temple of the Sun* or *Turret* that is around a large rocky outcrop links the site directly with the observation of the movement of the sun in the sky. Finally, the big rock carved or *Sacred Rock*, which mimics the horizon formed by the mountain called Yanantin, makes clear the link between the Inca culture and geography.

Regarding protection, Machu Picchu was declared an intangible territory by the Peruvian state and therefore is protected by the National System of Protected Natural Areas (SINANPE) which, in turn, is part of the National Park System under control of Peru's National Institute of Natural Resources (INRENA). Therefore, the area where the site is has been designated as Historic Sanctuary of Machu Picchu. The Historic Sanctuary protects a number of biological species in danger of extinction and several Incas establishments, including Machu Picchu which is considered the main one. In the Americas, Machu Picchu and the Mayan site of Tikal in Guatemala are the only two sites considered by UNESCO as a World Heritage inscribed with double category of Natural and Cultural.

At present, we can recognize four main themes in current national and international debates about the place: (1) the history of the discovery of Machu Picchu archaeological site (Aguilar 2011; Vilela & De La Puente 2011); (2) the use of the site as a tourist destination and its subsequent preservation and conservation (Martorell 2002; Lopez Lenci 2005); (3) the use of Machu Picchu as part of the generation of a local identity, regional and/or national, and the "institutionalization of memory" (Flores Ochoa 2004; Jallade 2012); and (4) the relationship of indigenous communities and property and/or enjoyment of the site for tourism (Zan & Lusiani 2011; Aguilar & Tantaleán 2012).

A better way to route all these talking points, archaeological, anthropological, sociological, and historical in-depth research are necessary; fortunately these have already been generated in the last decade. Also, these discussions need to be grounded in a reflection on the way we are managing the archaeological site, which has a neoliberal orientation, also adopted by the Peruvian state.

Also, within the cultural policies of the Peruvian state and international organizations related to the archaeological and cultural heritage, the communities associated with the site must be recognized as active agents of this management and enjoyment. Consequently, the state institutions that protect and manage the site will need to establish better channels of dialogue with the communities. Furthermore, it is expected that in the coming years the communities near Machu Picchu strengthen their processes of interference and ownership of the site. Finally, as we have seen, it is important to recognize that the site was inscribed on the landscape within an Andean rationality that should seek to be maintained, as far as possible, for which we need the commitment and involvement of the various political and economic institutions, private companies, and social groups involved.

Cross-References

- ▶ Andes: Prehistoric Period
- ▶ Cultural Heritage Management and Native Americans
- ▶ Inca State and Empire Formation
- ▶ UNESCO (1972) and Malta (1992) Conventions

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Basic Biographical Information

Richard Macphail first encountered soil science and soil micromorphology when studying geography and geology ("joint honors" 1973) at Swansea University, Wales. There, he received his first training under Mike Bridges (ex-Soil Survey of England and Wales), which led to him carrying out a soil survey of Brenig's ancient landscape, Denbighshire, Wales, for the Department of Ancient Monuments (which became English Heritage). An M.Sc. in Pedology and Soil Survey at Reading (1974) followed at one of the only two centers where soil micromorphology was taught in the UK. John Dalrymple (Reading) also acted as an advisor and examiner for his Ph.D. (CNAA, Kingston Polytechnic, 1979) entitled *Soil Variation on Selected Surrey Heaths*. By this time, Macphail was in the Department of Environmental Archaeology, Institute of Archaeology, University of London as the "English Heritage" contract soil scientist for England, being mentored by Helen Keeley. In this role he developed an integrated holistic approach to the study of archaeological soils and deposits.

During the 1980s his postdoctoral micromorphology training included:

- Regular visits for thin-section checking and discussion with Peter Bullock and Chris Murphy (Soil Survey of England and Wales, Rothamsted)
- Many trips to the Institut National Agronomique, Paris-Grignon, France, for thin-section manufacturing and discussion (Nick Fedoroff and Marie-Agnès Courty)
- Collaborations with John C. C. Romans (Macaulay Institute, Aberdeen) and Paul Goldberg (then at Hebrew University, Jerusalem, Israel)

At the same time, Macphail was also guided by Herman Mücher (Amsterdam), Georges Stoops (Gent), and other Europeans and received a prepublication copy of the multi-author "Handbook for Soil Thin Section Description" (Bullock et al. 1985). This methodology was thus applied systematically to English archaeological sites along with standard soil science methods from Macphail's earliest days in the subject. Also during the 1980s, Marie-Agnès Courty, Paul Goldberg, and Macphail worked together on the first textbook applying soil science and soil micromorphology to archaeology (Courty et al. 1989).

Macphail has worked mainly in England and Europe, especially in Italy and France (Macphail et al., 1997), with a more recent focus on Scandinavia. There have also been forays into the Caribbean and Africa for the US Navy, collaborations with Paul Goldberg in North American and Gibraltar, and site studies in the Negev, Israel, Imjin Valley, Korea, and Loess Plateau, China (Macphail & Crowther 2007). Research topics include paleoagriculture (cultivation and pastoralism), integrated microstratigraphic analysis employing soil micromorphology, microchemical, bulk soil, macrofossil and microfossil analyses, Dark Earth, occupation/floor deposits, inundation of archaeological sites, and experiments in geoarchaeology (Macphail et al. 2003). Numerous interdisciplinary collaborations have been developed with chemists (John Crowther, Lampeter, University of Wales; Johan Linderholm, Umeå University, Sweden) and botanists (e.g., G. M. Cruise)(Macphail et al. 2007).

The first workshop in archaeological soil micromorphology was initiated in 1990, and since that time, one to two international workshops have been held each year mainly in England and Europe, with Macphail in attendance as the ad hoc coordinator of these. From 2006 he has run intensive short courses in Archaeological Soil Micromorphology at the Institute of Archaeology, University College London, employing his wide reference collection and numerous case studies. This teaching employs fundamentals published in *Practical and Theoretical Geoarchaeology* (Goldberg & Macphail 2006).

Macphail was a *Professeur Invité* (Tours 2004) and visiting lecturer (Seoul National University 2010) and received the Geological Society of America's Rip Rapp Award for Archaeological Geology (2009). He is currently Senior Research Fellow at UCL, Fellow of the Geological Society of America, Associate Editor for *Geoarchaeology*, and with Paul Goldberg publishing reference studies (Macphail & Goldberg 2010).

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Geoarchaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

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Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology

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Introduction

Magnetic susceptibility is an easily measured property of soils and sediments with broad applicability in Environmental Archaeology. It is the first of a series of environmental magnetic techniques that can be applied to characterize magnetic minerals in natural and cultural environments. A strong connection exists between the goals of Environmental Magnetism and Environmental Archaeology. In both cases, magnetic measurements provide a means of exploring past environments and environmental change, including changes affecting and precipitated by humans.

Definition

Magnetic susceptibility is the ratio of the magnetization induced in a sample to the inducing (magnetizing) field, quantifying the degree to which a substance can be magnetized in a weak magnetic field similar to that of the Earth's field (i.e., 5–100 μT) (Banerjee 1981). It can be expressed either as a volume magnetic susceptibility (κ, dimensionless in SI units) or a mass magnetic susceptibility (χ, in SI units of m^3/kg) equal to the volume susceptibility divided by the bulk density of the sample.

Magnetic susceptibility depends on the concentration, composition (mineralogy), and size of magnetic grains in a sample. Grain size refers to the size-dependent magnetic domain state, ranging from thermally unstable ultrafine or superparamagnetic (SP) magnetic grains to stable single-domain (SD) and pseudo-single-domain (PSD) grains to large multidomain (MD) grains (Hunt et al. 1995).

Key Issues and Future Directions

Environmental Magnetism was formalized as an interdisciplinary science with the 1986 publication of a book of the same name by Roy Thompson and Frank Oldfield. This text not only summarized the behavior of magnetic minerals, their presence in environmental systems, and techniques for their measurement but, more importantly, also showcased the varied ways in which these magnetic techniques could be applied to answer diverse environmental questions. Subsequent updates of this burgeoning field have followed at just under 10-year intervals (Verosub & Roberts 1995; Evans & Heller 2003).

The wide applicability of environmental magnetic techniques stems from the pervasiveness of iron in the environment and the ease with which iron oxides are detectable in soils and sediments, even in small amounts (<1 % or even 0.1 %). As iron archives, soils and sediments record information on the transport and deposition of iron minerals and their transformations via chemical and biological processes. The techniques that are applied to extract this information are rapid and economical and applied to bulk non-oriented samples.

Of particular import for archaeological application is the notion of *Magnetic Enhancement*. Alterations in magnetic mineralogy within upper soil layers result in enhanced susceptibility values in surface as opposed to subsoil horizons. Magnetic enhancement occurs as a result of naturally occurring or human-generated fires or as part of pedogenesis (soil formation), both of which may convert weakly magnetic oxides and hydroxides to more strongly magnetic forms. Pedogenic enhancement occurs through a variety of processes, including low-temperature chemical reactions (i.e., inorganically) as well as organically via magnetotactic bacteria, iron-reducing bacteria, and bacterial-induced chemical reactions. Typically, it is magnetite or maghemite in the superparamagnetic to stable single-domain size range that is produced.

The magnetic enhancement process is environmentally sensitive (Maher 1986) and through pedogenesis linked to the five soil-forming factors (parent material, climate, topography, time, and living organisms) (Mullins 1977). Magnetic enhancement depends on the type of material in which the soils form, the time over which enhancement has been allowed to proceed, climatic variables such as precipitation and temperature, the landform in which the soil develops, and the plant and animal (including human) life on and in the soil. Humans directly influence magnetic enhancement in a number of ways. They alter properties such as soil temperature, soil chemistry, and soil porosity. They add organic matter, expose soils to high temperatures through firing, and incorporate fired or other high-susceptibility materials into the soil matrix. They influence the biomineralization of iron minerals (Bazylinski & Moskowitz 1997), for example, in creating conditions that encourage bacterial production of iron. To some degree, each of these environmental influences may be investigated via soil magnetic studies.

Magnetic enhancement is pervasive, occurring wherever soils develop, and conservative, with the enhanced signature retained unless soils are gleyed or iron minerals otherwise reduced. Enhanced susceptibilities of paleosols provide an avenue for the identification of buried archaeological sites. Vertical patterns in susceptibility provide clues regarding the dynamics of archaeological terrains, tracking natural and anthropogenic processes that redistribute soils and sediments. For example, a ditch or pit excavated into a low-susceptibility subsoil filled with a magnetically enhanced topsoil produces a high-susceptibility feature.

Measurement of magnetic susceptibility is accomplished in either the field or the laboratory using a variety of dual- and single-coil instruments. These instruments allow measurement of various volumes (and depths) in a range of contexts (i.e., surface, including plow-zone surveys; surveys of excavation floors, walls, and other exposures; downhole applications; and measurements of whole- and split-cores and packed samples) (Dalan 2006). Field instruments yield volume susceptibilities while laboratory instruments can be used to normalize susceptibilities by mass and investigate the effects of packing and of water and other inclusions. As many susceptibility instruments investigate volumes similar in size to those analyzed for other physical and chemical properties, susceptibility data is easily integrated into geoarchaeological characterizations of soils and sediments.

Susceptibility measurements are a key component of a basic environmental magnetic reconnaissance. To understand how susceptibility contrasts relate to changes in magnetic concentration, composition, and grain size, however, additional magnetic measurements must be conducted. These expose samples to magnetic fields of varying strengths and directions over different frequencies, temperatures, and times.

They are applied in sequence from least to most (magnetically) destructive. Discussions of techniques and protocol can be found in Banerjee (1981) and Maher (1986), as well as in the overviews of environmental magnetism mentioned above. It is this detailed magnetic characterization that is useful for interpreting past environmental conditions recorded by soil and sediment assemblages.

Applications of magnetic susceptibility and other environmental magnetic techniques are wide ranging. They include studies in fluvial, glacial, eolian, cave, lacustrine, coastal, and marine contexts. They have been used to investigate past climates and other environmental factors, to document land-use histories and landscape dynamics, and as prospection techniques. Unless otherwise noted, examples of these applications can be found in Thompson and Oldfield (1986) and Evans and Heller (2003).

Susceptibility studies have seen extensive use as part of environmental magnetic studies of global, regional, and local climate change. As a paleoclimatic proxy, they have allowed characterization of temperature, precipitation, and humidity variations in loess/paleosol sequences (e.g., in China and the Great Plains of the USA), caves, and marine sediments. Both short- and long-term climatic sequences have been produced, some of archaeological significance.

In addition to climate, other soil-forming factors have been successfully studied using environmental magnetic techniques. For example, susceptibility enhancement has been used as a proxy for the age of soils. Chronological ages have been estimated, and sites and earthen features, such as mounds, relatively dated. Akin to the use of ash layers as marker horizons, magnetic particulates, indicating the onset of industrial coal burning and steel production, have been used as time markers.

In investigations of landscape transformation, iron oxides serve as tracers of soil and sediment transport and deposition. They also provide evidence of landscape stability via magnetic enhancement and thus areas of increased potential for archaeological materials. These iron minerals are useful for studying both the formation of archaeological landscapes, sites, activity areas, and features and post-formation alterations. For example, susceptibility investigations of lake records, in concert with pollen studies, have been used to document archaeologically important events such as deforestation, burning, and the inception of agriculture. Land-based susceptibility studies have been applied to understand hill slope processes such as soil creep and wash. These processes alter topsoil depth and particle size distributions and thus patterns in the depth and character of magnetic enhancement (Dearing et al. 1985, 1986). Susceptibility studies can therefore be used to identify areas of stability, erosion, and deposition related to human activities or the integrity of the archaeological record and even to work backwards to determine the pre-erosion form of archaeological features (Dalan 2006). Anthropogenic earthmoving activities such as borrowing, leveling, and reclamation can also be studied, even sourcing fill materials and providing mixing models (Dalan & Banerjee 1998).

As a prospection technique, magnetic susceptibility surveys depend on the fact that soils from archaeological sites often exhibit enhanced magnetic properties over surrounding "noncultural" or non-site soils (Mullins 1974). Such surveys have been used in defining sites, including buried sites, activity areas, and features (Clark 1996; Dalan 2008). Susceptibility surveys are often combined with other prospection methods such as magnetometry, ground-penetrating radar, resistivity, and electromagnetic conductivity. Types of features most frequently investigated are highly magnetic fired features, filled ditches or pits, and other earthen features comprised of contrastive soils. Susceptibility surveys have also been utilized to identify areas of intense occupation, industrial activity, and agriculturally managed or stockyard soils.

In considering *future directions* for magnetic susceptibility applications in Environmental Archaeology, the importance of anchoring susceptibility within a suite of magnetic measurements cannot be overemphasized. Research questions asked by Environmental Archaeologists are closely related to those asked by Environmental

Magnetists and thus should make use of those techniques. Although the field of Environmental Magnetism has continued its rapid development, archaeological applications over the past decade have tended to focus on field applications of susceptibility. There is thus much potential for expanded use of the entire range of magnetic techniques to answer questions relating to past climates, dating, formation, and postdepositional processes central to understanding the relationship of humans to their environment.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Prospection Methods in Archaeology

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Maisières-Canal: An Open-Air Aurignacian Workshop

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State of Knowledge and Current Debates

Introduction

The Early Upper Paleolithic in Belgium is known primarily from cave sites located in the Meuse Basin, rarely from open-air sites. Until the discovery of the Aurignacian workshop at Maisières-Canal, Aurignacian occupations were known only in caves (Fig. 1), apart from isolated surface finds near Braine-le-Comte (Fourny & van Assche 1992). The situation is similar for the Gravettian, with the addition of two in situ open-air sites (Fig. 1). Most Belgian Paleolithic sites were first excavated in the nineteenth century, and thus lack precise stratigraphic and chronological data, not to mention limitations

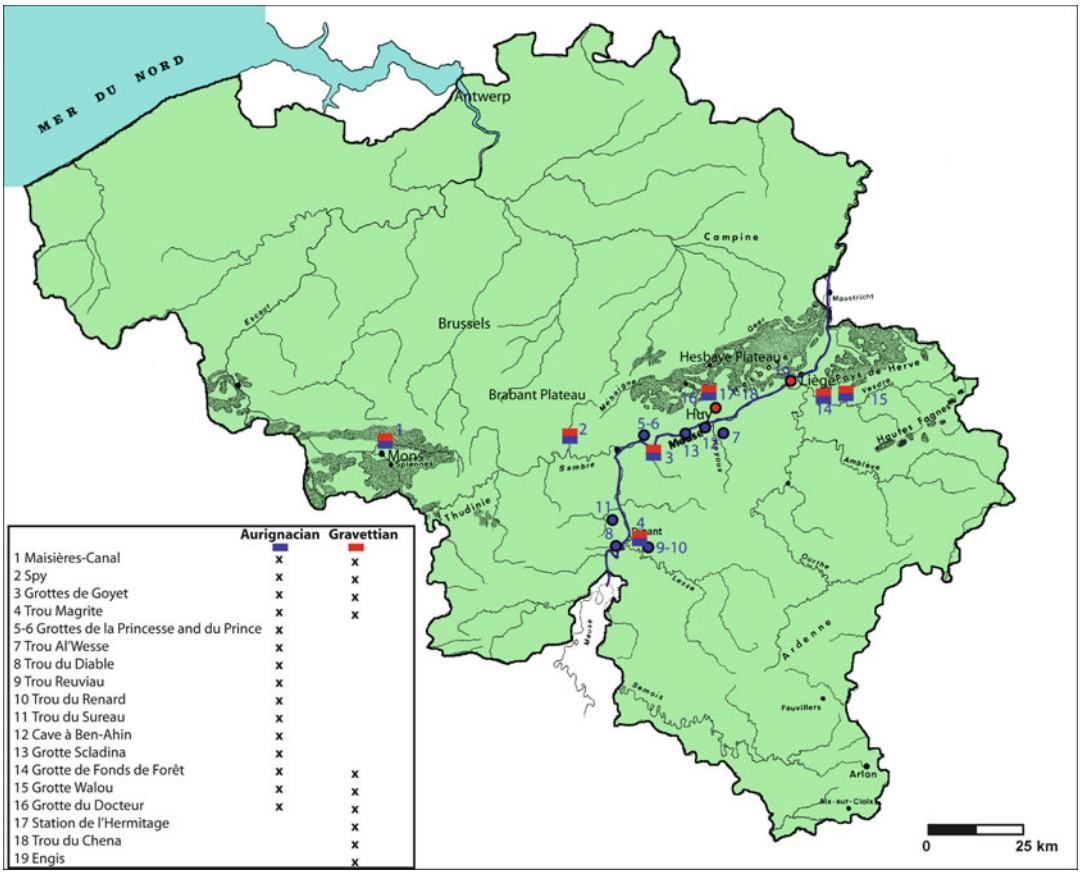

Maisières-Canal: An Open-Air Aurignacian Workshop, Fig. 1 Map showing the principal Aurignacian and Gravettian sites in Belgium

in the lithic and faunal assemblages due to excavation bias.

In the last 25 years, excavations have been undertaken both in new caves (Grotte Walou: Dewez 2008; Pirson et al. 2011; Grotte Scladina: Otte 1992; Otte et al. 1998) and in those previously excavated (Trou Magrite: Otte & Straus 1995; Grottes de Goyet: Toussaint et al. 1999; Grotte du Docteur: Miller et al. 1998; Otte & Miller 2000). Such research yielded new data for the Paleolithic, including Aurignacian and Gravettian occupations, making it possible to establish a regional chronostratigraphic sequence, reconstruct Pleistocene palaeoenvironments, and to address different aspects of prehistoric hominid behavior.

However, such cave sites represent only a part of the range of human activities that took place across the landscape, being occupations of variable duration in the region of Middle Belgium that provided primary access to shelter, water, and fuel, as well as subsistence resources. Open-air sites, which could include short-term camps, hunting stands, kill or butchery sites, and lithic workshops, among others, complement cave sites and represent a broader range of activities. These are rare in Belgium and their discovery has been dependent on public works: Maisières-Canal was discovered in the 1960s as a result of the modernization of the Canal du Centre, the Station de l'Hermitage at Huccorgne in the late nineteenth century when a railroad was cut through the deposits. Huccorgne was also more recently excavated in the 1970s by Destexhe and Haesaerts, and then in the early 1990s by Straus, Otte, and Haesaerts

(Straus et al. 2000). Both sites are Gravettian; the only open-air Aurignacian site, the subject of this entry, was discovered by chance during re-excavation at Maisières-Canal.

Given the rarity of open-air sites in Belgium, new excavations were undertaken at Maisières-Canal in 2000–2002, with the initial aim of expanding the excavation in the "Atelier de Taille de la Berge Nord-Est" zone, which contained a small Gravettian assemblage. While little additional Gravettian material was found, the limits of the occupation were defined and the discovery of an intact Aurignacian level in one of the test trenches reoriented the aims of the project. These focused on the establishment of the chronostratigraphic context, clarification of the technological activities at an Aurignacian flint workshop, its role within the regional lithic economy, and the relationship between open-air and cave sites.

This entry presents a summary of the results obtained through geological and technological analyses, published in greater detail in the recent monograph (Miller et al. 2004).

Location and Description of the Site

The site of Maisières-Canal is located next to the Canal du Centre, near the limits between the villages of Maisières and Obourg in western Belgium (50° 28'55" N, 3° 58'37" E). It includes two zones (Fig. 2a): the *Champ de Fouilles*, covering an area of 95 m^2, excavated in 1966–67 by J. de Heinzelin and P. Haesaerts for the Royal Belgian Institute of Natural Sciences (de Heinzelin 1971, 1973; Haesaerts 1973; Haesaerts & de Heinzelin 1979) and now beneath the canal, and the *Atelier de Taille de la Berge Nord-Est*, a small zone at the time covering 3 m^2 on the Northeast Bank of the canal, around 100 m from the Champ de Fouilles and excavated by P. Haesaerts. Both zones contained Gravettian occupations, the principal occupation in the Champ de Fouilles zone with a rich lithic and faunal assemblage, and a small workshop site in the Atelier de Taille zone. Recent fieldwork yielded the new Aurignacian workshop in the latter zone (Fig. 2b).

Research at Maisières-Canal by the Royal Belgian Institute of Natural Sciences for the first time provided comprehensive information concerning an Upper Paleolithic open-air site in Belgium, integrating data from the archaeology, stratigraphy, vertebrate paleontology, malacology, palynology, and radiometric dates. The Atelier de Taille was considerably altered by modernization of the existing canal. Landscaping on the Northeast Bank truncated the upper part of the Gravettian layer. A 4-m-wide drainage ditch cuts directly through the deposits. Archaeological material was found on both sides; part of the site was thus clearly lost.

Core sampling and test pits around the excavated zone indicate that the deposits are coherent with the stratigraphy of the site. However, the Gravettian occupation is restricted by chalk flow and the geological layer containing the Aurignacian occupation plunges abruptly to the southeast to a depth of 4 m below the surface and is sterile in three test pits.

Both occupations were situated at the top of a small hill overlooking the ancient Haine River. The Haine followed a wide synclinal depression oriented east–west. To the north, the depression is delimited by Cretaceous chalks in contact with the Hainaut Plateau (Haesaerts & de Heinzelin 1979: 9). Obourg flint would have been easily accessible and abundant in the chalks, at a maximum distance of 1 km and likely available in the eroded chalk flows directly at the site. Maisières-Canal was also ideally located for the exploitation of faunal and vegetal resources in the river valley and on the plateau as well as for obtaining good quality flint.

Stratigraphic Context

The 1966–1979 Stratigraphic Sequence

The exceptional character of the sedimentary sequence preserved at Maisières-Canal is linked in large part to the position of the site on the north edge of the alluvial plain of the Haine River, upstream from the Nimy lock and near the mouth of the Wartons stream that drains the northern slope of the valley. In this context, earthworks for the canal enlargement provided access to deposits situated between 36 and 27.50 m ASL over a long distance, on the edge of and below the alluvial plain of the Haine.

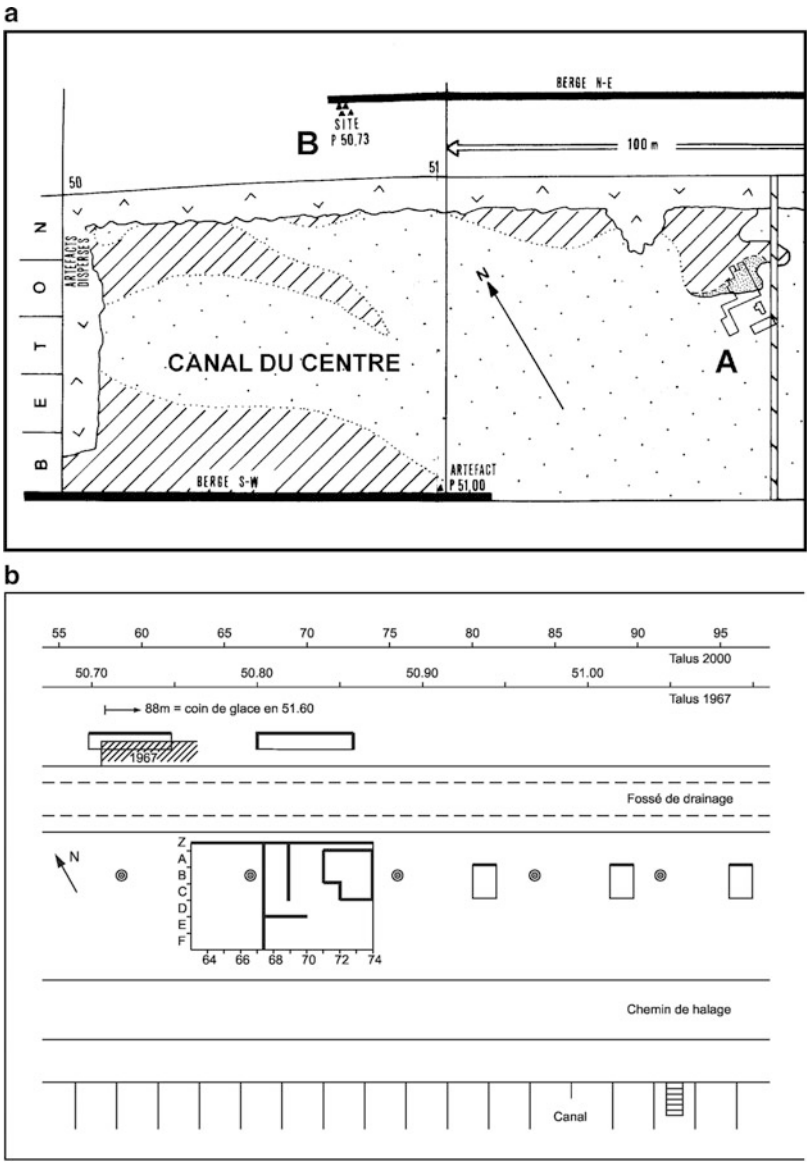

Maisières-Canal: An Open-Air Aurignacian Workshop,
Fig. 2 (**a**) Maisières-Canal site plan showing the Champ de Fouilles and Atelier de Taille de la Berge Nord-Est (IRSNB excavations), (**b**) site plan for the Atelier de Taille (2000–2002 excavations)

The stratigraphy of the site was established on the basis of three groups of profiles located on the southwest bank between 33 and 27.50 m ASL, the Champ de Fouilles at the bottom of the new canal between 29 and 27.50 m ASL, and on the Northeast Bank between 36 and 33 m ASL. The southwest bank, near the center of the valley, exposed the fluviatile deposits of the Haine. These were also visible at the Champ de Fouilles where they came between a double generation of colluvial deposits at the base of the slope. Each colluvial deposit contained a humus-bearing horizon dated by the Groningen laboratory to 27,965 BP and 30,780 BP on sediment samples (Bastin 1971; Gilot 1971; de Heinzelin 1973). The Champ de Fouilles deposits are laterally attached to the lower part of the sequence on the Northeast Bank, overlain by a complex of loess, silty colluvial, and fluviatile deposits from the Wartons stream preserved over a length of several hundred meters between 35.50 and 32 m ASL, and capped by Lateglacial eolian sands.

The Gravettian Occupation

The Gravettian occupation was largely destroyed by canal earthworks, but remained intact at the Champ de Fouilles between 28.50 and 28 m ASL in the lower third of the second humus-bearing horizon (Unite MH). According to de Heinzelin (1973), the area of occupation likely extended the length of a silty promontory joining the valley floor with the northern slope. This appears to be supported by the discovery of the Gravettian workshop in September 1966, at 34 m ASL on the Northeast Bank. This was dated to around 28,000 uncal BP (Haesaerts & de Heinzelin 1979), recently confirmed by new dating of the Gravettian in the Champ de Fouilles zone (Jacobi et al. 2010).

The Middle Weichselian

The Gravettian occupation was situated near the Haine River, at the beginning of a subarctic climatic episode with grass cover dominated by cyperaceaes. Defined as the "Maisières oscillation," this episode is clearly distinct from the lower humus-bearing layer (Unit MD) dated to 30,780 BP, which is attributed to the Denekamp interstadial known from the Netherlands (Vogel & van der Hammen 1967).

The Maisières oscillation was followed by climatic deterioration evidenced at the Champ de Fouilles by periglacial fluviatile deposits (Units MM and MN) incorporating blocks of the underlying humus-bearing layer displaced under the pressure of ice. The ensemble is covered by a clay flow coming from the slope (Unit MO). This climatic deterioration that ends the Middle Pleniglacial is also demonstrated in the Northeast Bank sequence at the top of the silty layer (Unit NDC) containing the Gravettian workshop, where it is marked by tundra gley (Unite NEA) formed under permafrost, here again followed by a thixotropic clay flow (Unit NEB).

The Upper Pleniglacial

At the Champ de Fouilles and the Southeast Bank, a fluviatile aggradation with a strong silt component was deposited after the clay flows and raised the water level of the Haine above 30 m ASL; it is temporarily interrupted in the lower third by the formation of a thin humus-bearing soil (Unit MPD) attributed to the "Wartons oscillation." On the valley slopes, the beginning of the Upper Pleniglacial is also accompanied by the deposition of loessic silts (Unit NEC), followed by a homogeneous loess (Unit BED1). This is overlain by thick bedded loess (Unit NED2) that covers the slope between 35.50 and 32 m ASL and is linked on the southwest bank with a complex of obliquely stratified sands and silty sands associated with a network of braided channels that block the valley to 31 m ASL. After a brief stabilization marked by a cryoturbated peaty horizon, the fluviatile aggradation is followed in the valley above 32.50 m ASL.

At Maisières-Canal, the alluvial plain of the Haine remained stabilized at around 32.50 m ASL during the second half of the Upper Pleniglacial; several generations of channels were incised to 32 m ASL by the Haine and its affluent, the Wartons stream. On the northeast bank, these channels, blocked with sand and bordered by silty alluvium, migrated laterally and were progressively buried by silty-sand colluvia (Units NF to NK). During this period, the climatic context remained relatively cold and clearly humid with several episodes of cryoturbation and probably a temporary renewal of loess deposits in the upper part of Unit NH. Three minor climatic improvements took place, however, during this period, as indicated in the pollen diagrams by the expansion of pine, alder, and hazelnut (Bastin 1971), in Unit NF and at the base of Unit NG (possibly equivalent to Laugeries), then at the top of Unit NK (possibly equivalent to Lascaux).

The Lateglacial and the Holocene

At the end of the Upper Pleniglacial, probably around 16,000 BP, the water level of the Haine descended below 32 m ASL, immediately prior to a significant cold period indicated by a polygonal network of large ice wedges at the base of a double generation of covering sands (Units NUA to NUE), extending across most of the valley slope. These are separated by broken flints that indicate a deflation surface associated locally to a humus-bearing horizon of "Usselo" type,

attributed to the Alleröd. The Maisières-Canal sequence ends with the development of valley peat between 9,000 and 4,700 BP, followed by clayey alluvium deposited after the Neolithic.

The Western Sector of the Northeast Bank (1966–1979)

It was the discovery by J. de Heinzelin in 1966 of the Gravettian workshop on the extension of the promontory connecting the Champ de Fouilles with the Northeast Bank that permitted the link with the loess stratigraphy preserved on the north slope of the valley. The loess was deposited at the top of clay flows mixed with glauconiferous Paleocene sands (Unit NSV). The loess deposits begin with a meter of loessic silt with chalk granules (Unit NBC), overlain by a heterogeneous sandy silt (Unit NCA) incorporating a bioturbated grayish-brown horizon with tiny oxidation stains (Unit NCB) in the upper part. The top is identified by a sine undulating layer of light gray clayey silt. The ensemble was attributed to a hydromorphic soil in relation with the stabilization of the water level of the Haine around 33 m ASL (Haesaerts 1974; Haesaerts & de Heinzelin 1979), during an interstadial episode characterized by a dominance of liguliflorae and a continuous curve for *Betula*, *Alnus*, and *Corylus* in the pollen diagrams.

The units above NCB include two heterogeneous silty-sand deposits (Units NDA and NDC) that evidence a renewal of eolian deposition, largely mixed by runoff, in a cooler and more steppic context marked by an expansion of grasses (Bastin 1971). These deposits are separated by fine lenses of light gray silt (Unit NDB) continuous with the top of NDA; these appear to be the vestiges of a tundra gley formed during a phase of extreme cold, subsequently elongated by solifluction (Haesaerts 1974; Haesaerts & de Heinzelin 1979).

The Gravettian workshop was discovered between squares P50.71 and P50.75 in the lower part of Unit NDC. The lithic artifacts are similar to those found in the Champ de Fouilles occupation and include primarily blades; these are interspersed with bone fragments, many of which are calcined. The area excavated in September 1967 was located at the edge of the workshop; the lithic material was likely displaced by runoff, as indicated by its distribution in elongated lenses following a slight downward slope to the north. The overlying chalk flow (Unit NEB) cuts into the workshop layer west of P50.70 and can be followed to 32 m ASL in P50.60.

Unit NEB extends from a thick deferrified horizon (Unit NEA) that developed at the top of the NDC silts beyond P50.75. This horizon has all the characteristics of a tundra gley with deep ice segregation structures and indicates a period of significant climatic deterioration accompanied by the stabilization of a permafrost landscape (Haesaerts & Van Vliet 1974; Haesaerts & Van Vliet-Lanoë 1981), the NEB chalk flow being likely associated with the phase of permafrost degradation. In the western sector of the Northeast Bank, the loess cover overlying the tundra gley includes three generations of eolian deposits. Sedimentation begins by a loessic silt with chalky granules (Unit NEC) preserved in the lower parts of the landscape, followed by a homogeneous loess (Unit NED1) which goes above 36 m ASL between P50.50 and P50.85, and finally, an obliquely bedded loess of "niveo-eolian" type, deposited on the valley slope after P50.80 where the deposits are cut by the fluviatile channels of Units NF to NK.

The Aurignacian Occupation

The Aurignacian assemblage was found in Unit NBD, which is a homogeneous gray-brown silt 25–30-cm thick, lacking chalk granules, presenting a well-developed porosity, with some small biogalleries. This silt directly underlies the sandy silt of Unit NCA in all three of the trenches excavated. The upper limit of NBD is clear and slightly undulating, while the lower limit is irregular and characterized by a network of small biogalleries penetrating the top of underlying Unit NBC. NBC consists of a loessic silt with chalk granules and overlies the glauconiferous sands of Unit NSV in which the upper part contains a highly bioturbated horizon of browner sand (Unit SVH).

New data obtained for Maisières-Canal confirm the complexity of the Middle Pleniglacial

sequence and permit the insertion of an Aurignacian component which, until now, was lacking in the loess record in Middle Belgium. In particular, recently obtained dates (Jacobi et al. 2010) clearly situated the Maisières oscillation at around 28,000 BP and confirm the validity of the 30,780 BP date obtained for the lower humus-bearing soil at the Champ de Fouilles, which would be younger than layer NBD containing the Aurignacian workshop on the Northeast Bank. In comparison with the new climatic and chronological sequence proposed by T. van der Hammen (1995) for the fluviatile deposits of the Middle Pleniglacial in the eastern part of the Netherlands, the humus-bearing soil MD of the Champ de Fouilles and the bioturbated horizon NCB of the Northeast Bank would be correlated with the Denekamp I interstadial dating between 30,000 and 30,500 BP. The Maisières oscillation, slightly more recent than the Denekamp II interstadial, would be situated between 28,500 and 29,000 BP, to which the humus-bearing silt MD and the sandy silts NDA are attributed. According to this schema, the Aurignacian workshop and Unit NBD would be attributed to the Huneborg II interstadial dating between 32,000 and 33,300 BP in the Netherlands sequence.

The stratigraphic data from the Northeast Bank is also of importance to place the Maisières-Canal sequence in the regional context of the Upper Pleistocene in Middle Belgium, using the Cuesta of Harmignes sequence on the southern slope of the Haine basin (Haesaerts 1974; Haesaerts & Van Vliet 1974). Here again, it is the comparable lithostratigraphic and climatic signatures that serve to make correlations between the two systems; these correlations are centered on the tundra gley NEA associated with climatic deterioration following the Gravettian occupation at Maisières-Canal and which constitutes a stratigraphic marker for the limit between the loess silts of the Middle Pleniglacial and the loess cover of the first half of the Upper Pleniglacial. The conjunction of the record at Maisières-Canal and the Cuesta of Harmignies permits the reconstruction of a pedosedimentological and climatic sequence covering the Upper Pleistocene and can be integrated with the stratigraphies at the sites of the Station de l'Hermitage and Remicourt west of Liège (Haesaerts et al. 1999), which serve as reference sequences for the Hesbaye loess.

In conclusion, the coexistence at Maisières-Canal of both Aurignacian and Gravettian workshops within a complex stratigraphic sequence well-situated chronologically constitutes an exceptional reference element for the loess sequence of northwest Europe where Early Upper Paleolithic open-air sites in stratigraphic context are extremely rare. For comparison, the Gravettian occupation of the Station de l'Hermitage at Huccorgne is more recent than that of Maisières, and is associated with the initial loess deposits of the Upper Pleniglacial, probably around 26,000 BP (Haesaerts 2000). The Aurignacian occupation at Maisières is comparable to Lommersum in the Rhine Valley southwest of Cologne (see Hahn 1977; Terberger & Street 2003).

Site Taphonomy

Taphonomic analysis was done to evaluate the integrity of the context of the Aurignacian assemblage. Six different sources of data were exploited: (1) unit slope, (2, 3) artifact orientation and inclination, (4) lithic raw material, (5, 6) vertical distribution of artifacts and spatial distribution of refits. Results complement stratigraphic analysis and demonstrate that the occupation is in situ, with minor displacement due to post-depositional cryoturbation. The slope of Unit NBD was evaluated on the basis of transversal and longitudinal profiles and the position of artifacts in the lower portion of the unit. The unit slopes slightly downward to the NNE and is nearly horizontal NNW-SSE, indicating that slope processes would have had little role in the movement of artifacts. Artifact orientation was used as a proxy indicator of the direction of possible movement of artifacts. Similarly aligned artifacts would indicate a process of systematic displacement of artifacts, for example, along a streambed or slippage down a hill slope. Orientation was recorded for artifacts that were longer than wide ($n = 283$). Artifacts show a small tendency (39 %) to be oriented NNE, along the slope of the unit, suggesting some lateral

downhill displacement. Artifact inclination (horizontal, oblique, or vertical) along the longitudinal axis was measured for 871 artifacts. The majority are horizontal are slightly oblique (69 %), but 31 % are oblique or vertical, reflecting some displacement due to cryoturbation. Diversity and variability in lithic raw materials in an assemblage can serve as an indicator of possible mixture between strata or the presence of multiple occupations. At Maisières, the Aurignacian level is homogeneous, with a single type of flint represented with a similar patina for all artifacts. The flint is Obourg flint, found next to the site in the Cretaceous chalk formations and easily accessible in the eroding chalk flows. The flint is of good quality, black or brown, and translucent with few inclusions; patina is bluish-white and artifacts often became patinated only after being excavated. Artifacts edges and ridges are fresh, indicating little movement.

Several observations can be made:

1. The vast majority of artifacts are found in a dense circular concentration 5–10-cm thick in the lower part of Unit NBD, centered on squares 68–69 A-B, with a smaller adjacent concentration in squares 67–69 Z-A. The base of the concentration follows the unit slope, and is particularly clear in 68–69 A-B. These concentrations are considered to be in place.
2. A few artifacts are found above the main concentration, at the top of NBD and in the lower part of Unit NCA. No refits were possible between these artifacts and the main concentration; however, they are similar in raw material, morphology, and patination. Oblique or vertical, they appear to have been moved by post-depositional freeze-thaw action.
3. In squares 69 Z-A and occasionally in 67–68 A-B, some artifacts are found below the main concentration in the basal part of Unit NBD corresponding to the small initial horizon of the humus-bearing soil. Others are found 10–15 cm lower in Unit NBC. Refitting shows 13 series joining 43 artifacts from the main concentration and the base of NBD, including seven technological series, two tool modifications, and four breaks. Four tools are also part of the refits. These demonstrate the integrity of the assemblage within Unit NBD. No refits were possible between artifacts found in underlying NBC and the main concentration, although they again are morphologically similar.
4. A slightly different situation is observed in squares 70–73 A-C, which show a dispersed distribution of artifacts within NBD and a relatively high number of artifacts dispersed up to 25 cm lower in NBC. Among the artifacts dispersed upslope from the concentration (squares 69–72 C-D), 28 join with artifacts in the main concentration. It is suggested that the upslope dispersal is due to human activities taking place at the site rather than post-depositional disturbance.

The data demonstrate the integrity of the lithic assemblage of Unit NBD, which would appear to be the product of a single phase of activity. Such activity would have occurred during the initial formation phase of the humus-bearing horizon, in an interstadial episode associated with grass cover on the northern slope of the Haine valley. In this context, the distribution of lithic elements in the upper half of the horizon in squares 68–69 Z-B is likely the result of post-depositional freeze-thaw action, as is also indicated by the sub-vertical or oblique position of many artifacts. However, interpretation of the presence of artifacts in the underlying Unit NBC, some reaching 20 cm below the main concentration, remains problematic and could attest to a preceding activity phase.

Structure of the Aurignacian Lithic Assemblage

Table 1 summarizes the composition of the Aurignacian assemblage.

The Aurignacian assemblage contains 44 formal tools (Table 2) as well as a slightly higher number of artifacts with slight retouch or traces of use (n = 74). Busked and carinated burins are included in the list, but are interpreted as bladelet cores rather than tools; 19 tools were able to be refitted, indicating that they were prepared and abandoned onsite.

Numbering 11, burins are the best represented category (25 % of the toolkit). In addition, two other burins, one busked and one dihedral, are

Maisières-Canal: An Open-Air Aurignacian Workshop, Table 1 Maisières-Canal, Trench 2, Aurignacian. Frequencies of types of reduction products (2000–2002 excavations)

Debitage products		n	%
Unclassified		81	2,82
Flakes < 1 cm	Trimming flakes	1,115	38,82
	Bifacial retouch flakes	3	0,10
	Thinning flakes	46	1,60
Debris	Debris < 1 cm	362	12,60
	Angular debris > 1 cm	15	0,52
	Chunks	3	0,10
Blades		486	16.94
Crested blades		18	0,63
Bladelets		49	1,71
Flakes	Flakes	568	19,78
	Laminar flakes	27	0,94
Tablets	Primary tablets	15	0,52
	Secondary tablets	5	0,17
Flanks		8	0,28
Burin spalls		71	2,47
	Total	**2,872**	**100,00**

Maisières-Canal: An Open-Air Aurignacian Workshop, Table 2 Aurignacian tool kit

Type	Sub-type	n
Burins		**11**
	Busked	5
	Dihedral	3
	Carinated	1
	Simple	1
	On break	1
Retouched artifacts		**8**
Denticulates		**6**
Notchs		**5**
Endscrapers		**4**
Truncations		**3**
Retouched bladelets	Dufour (Roc-de-Combe)	**1**
Composite tools		**6**
	Busked burin -sidescraper-notch	1
	Dihedral burin –notch	1
	Notch-retouched artifact	4
Total		**44**

included in the category of composite tools. For the busked burins (Fig. 3), a notch on the left edge served to terminate transversal removals (Fig. 4: 9–18). The striking platform for these short removals is on the right edge, formed by the removal of a long burin spall parallel to the longitudinal axis of the burin (Fig. 4: 1–3). Busked burins were made on two partially cortical flakes and a partially cortical blade that were produced during the preparation of blade cores; long burin spalls were able to be refitted to each, indicating that they were prepared at the site. Another busked burin was made on a thick blade, onto which a long burin spall and a flake renewing the notch were refitted, suggesting that the artifact had undergone relatively significant reduction. Finally, a distal fragment of a busked burin, broken at the notch, and a proximal fragment of a longitudinal burin spall were refitted. Three dihedral burins are present, one on a blade retouched on both lateral edges, another on a tablet from a blade core, and a dihedral angle burin on an unretouched blade. Refitting of a longitudinal burin spall with transversal negatives to this last indicates that it had previously been a busked or carinated burin. It should be noted that this is the only piece where transversal removals were removed from the left side. A fourth is classified with the composite tools. The distal fragment of a carinated burin with a longitudinal burin spall refitted to the right edge shows the reduction of at least 1.2 cm of the burin by transversal removals. The left edge of the piece is slightly retouched, but lacks a clear notch; it is thus not classified with the busked burins. A simple burin on a blade refits to a burin spall, but was not used to produce short bladelets similar to those produced from the busked burins.

The total number of bladelets refitted to busked burins is 124. This may appear elevated, but certain refits demonstrate that the burins underwent significant reduction in length and would account for the high number of bladelets recovered as well as reflecting the focus on bladelet production at the site.

There is a single retouched bladelet, curved and twisted, asymmetric to the right, with very fine inverse retouch on the mesio-distal portion of

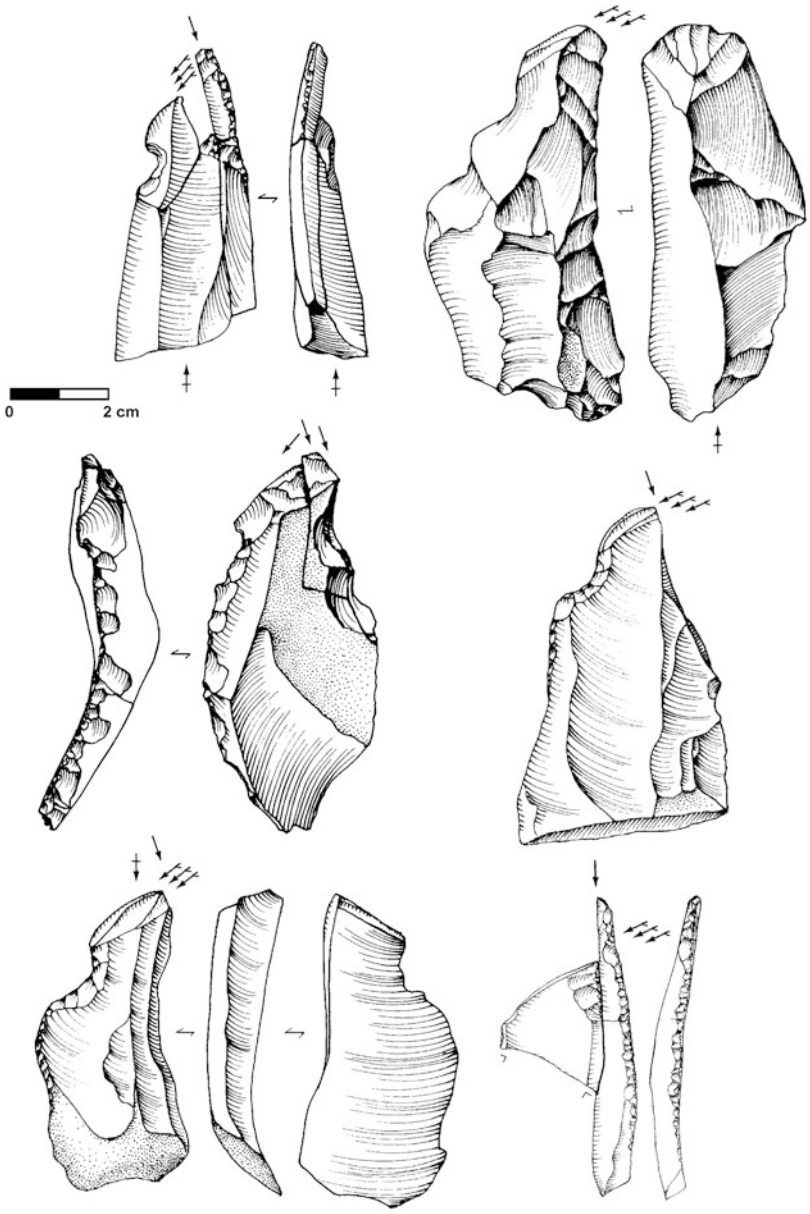

Maisières-Canal: An Open-Air Aurignacian Workshop, Fig. 3 Maisières-Canal, Aurignacian, busked burins

the right edge (Fig. 4: 4). Retouch is limited, but regular and seems to have been intentional. Small chips on the distal end correspond, in contrast, to be accidental retouch resulting from bladelet reduction (Lucas 2000; Bordes & Lenoble 2002: 744; Chiotti 2003; Le Brun-Ricalens & Brou 2003). The piece is similar typologically to Dufour bladelets of Roc-de-Combe type, characterized by its small size (Demars & Laurent 1989: 102) and by its twisted aspect. The morphology and size suggest that it was removed as a "spall" from a carinated piece, such as the busked burins present on the site.

Artifact refitting shows the focus on bladelet production onsite, as well as the preparation of blade cores for export (Fig. 5). Different reduction phases are also demonstrated, including decortication, core preparation, blade/bladelet production, and the removal of crested blades.

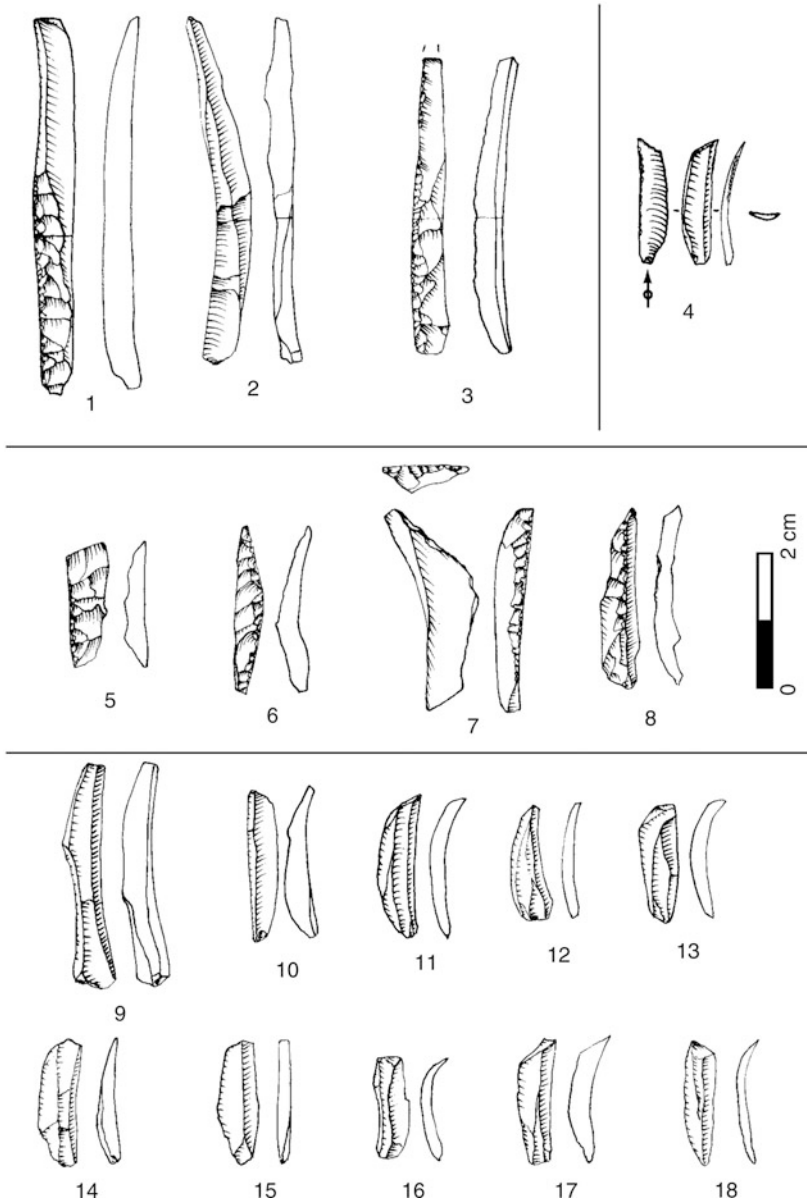

Maisières-Canal: An Open-Air Aurignacian Workshop,
Fig. 4 Maisières-Canal, Aurignacian, burin spalls and bladelets. (**1**–**3**) long burin spalls to prepare striking platform for short bladelets. (**4**) retouched bladelet (Dufour of Roc-de-Combe type). (**5**–**8**) retouched burin spalls. (**9**–**18**) bladelets

Specialized Activity Zones

Two activity zones were identifiable on the basis of the spatial distribution of technological refits and tool modifications (Fig. 6). The main concentration in squares 68–69 A-B is identified by the presence of technological refit series and unrefitted artifacts from all reduction phases: cortex removal, core preparation (series n° 2, 10, 11), preparation of crested blades (series n° 4, 74), removal of tablets during blade production (series n° 6, 8), and blade production (series n° 100). The vast majority of microdebris and small flakes are also found in squares 68A (n = 725) and 69A (n = 407) in comparison with squares 68B (n = 42) and 69B (n = 92); they are rare in the rest of the site. By contrast, bladelet production from burins is shown by refits of bladelets and burins, as well as numerous unrefitted bladelets, found concentrated slightly outside this zone, in squares 68–69 Z-A. All of the busked burins are

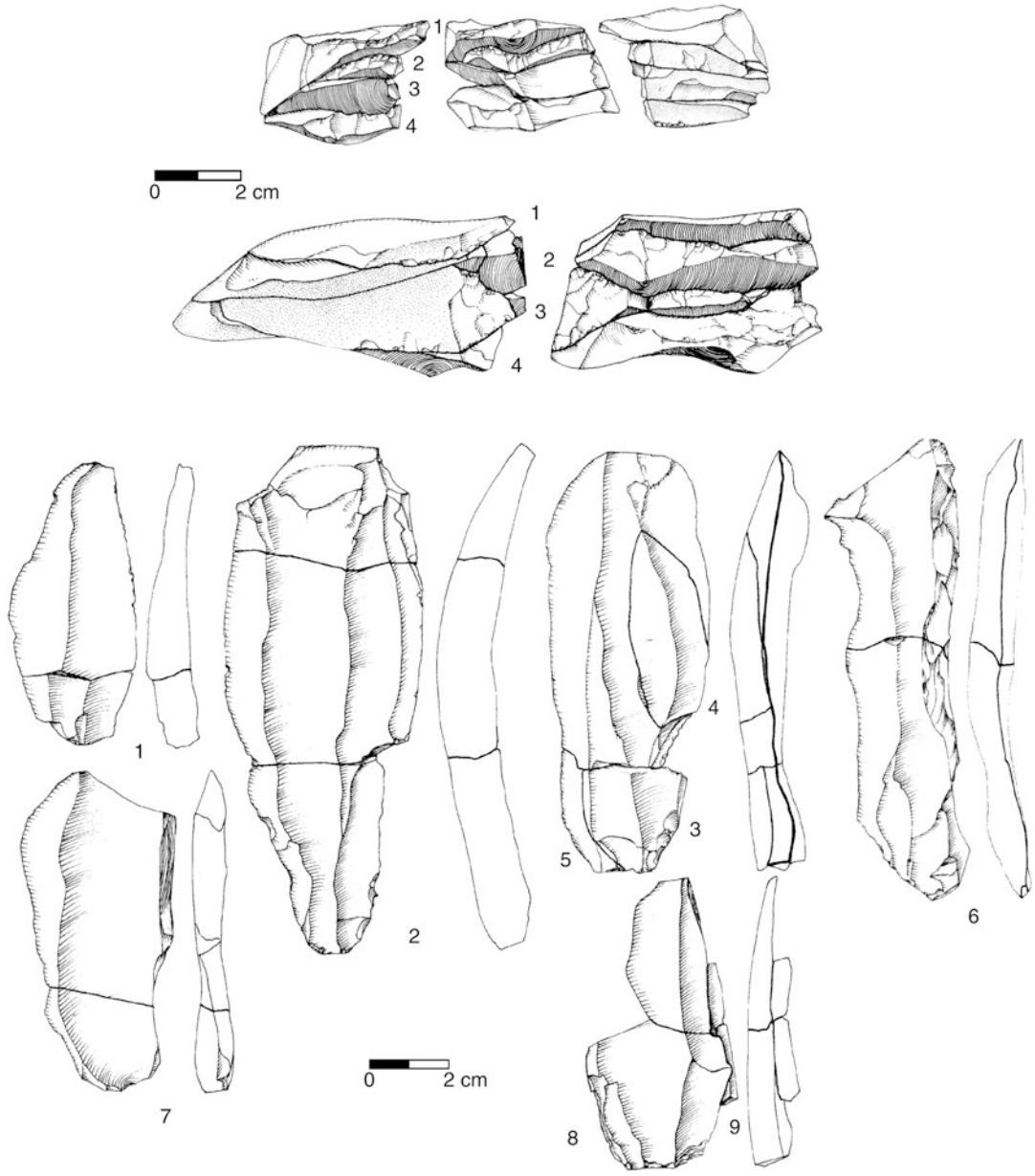

Maisières-Canal: An Open-Air Aurignacian Workshop, Fig. 5 Maisières-Canal, Aurignacian, *top*: two series of refitted core rejuvenation tablets from blade cores; *bottom*: refitted blades

found in squares 67Z, 69Z, and 68A, each refitted to a long burin spall creating the striking platform for bladelet production, while burins on break and dihedral burins are found in 68A-B and 69-70B. Technological activity associated with the busked burins thus took place in a 2 m^2 zone adjacent to the main reduction area. The second zone, then, would appear to have been specialized for bladelet production. Thus, even in a zone fairly restricted in area (around 7 m^2), two specialized activity zones can be distinguished, one focusing on the preparation of flint blade cores and blade production, the other associated with busked burins and bladelet production.

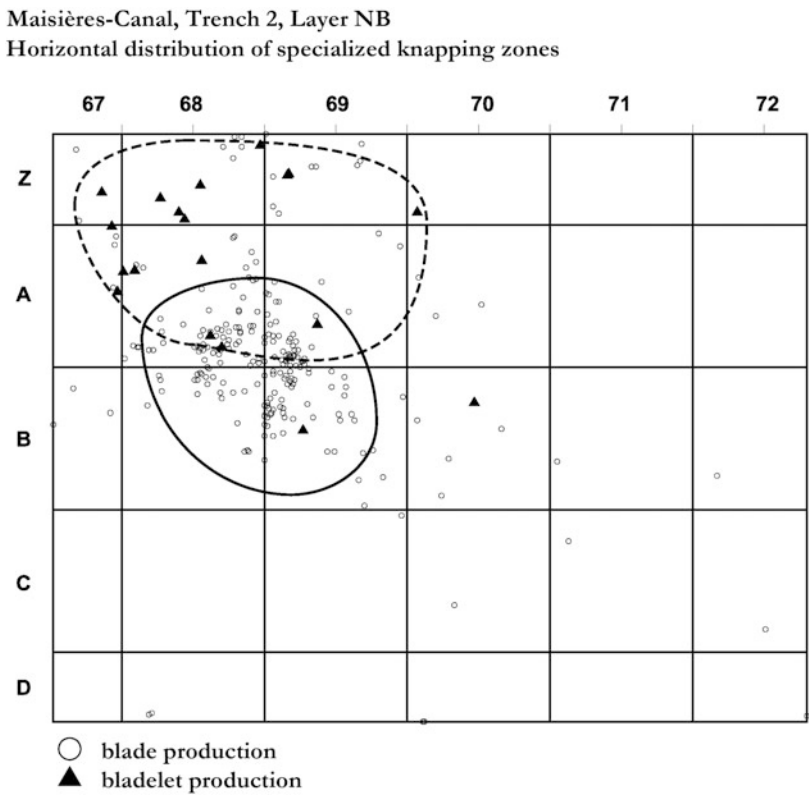

Maisières-Canal: An Open-Air Aurignacian Workshop,
Fig. 6 Maisières-Canal, Aurignacian, specialized knapping zones for blade and bladelet production

Interpretation

The structure of the Aurignacian lithic assemblage and its spatial distribution clearly demonstrate the function of the site as a flint workshop of short duration, for the preparation of blade cores and bladelets for export elsewhere. All of the reduction phases are represented. Tools, while rare and opportunistic, were produced on reduction by-products and not generally on intentional blanks (blades and bladelets). They were likely used for activities during the short-term occupation, reserving any blanks produced for export. The area of the site is small, around 25 m^2 excluding the part of the site destroyed by recent development along the canal.

There is no evidence of hearths or dwelling structures. Apart from the two adjacent knapping zones, there is no evidence for other activities that may have taken place during the occupation. Little fauna is preserved (e.g., a reindeer molar), certainly due to the open-air loess context, but this may also reflect a limited degree of hunting during the occupation.

The Aurignacian workshop thus contrasts in many ways to the Gravettian occupation, which contained hearths, abundant fauna, evidence of butchering activity, the presence of bone tools, and a higher degree of flint reduction activity onsite.

The interpretation of the site is thus that it served as a short-term workshop, perhaps only for a few days, focused on bladelet production and the preparation of blade cores, with few "domestic" activities that would be associated with a longer-term camp. The lithic assemblage appears to have resulted from a single occupation, ultimately with the export of blade cores and blade/bladelet blanks and tools for use at other sites.

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► Europe: Early Upper Paleolithic

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Maize: Origins and Development

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Basic Species Information

Today, maize (*Zea mays* L.), which is also called "corn" or "sweet corn" in English-speaking countries, is one of the most important food crops cultivated globally. From initial, potential domestication in the Balsas River Valley of tropical southwestern Mexico around 9,000–8,600 years ago (Piperno et al. 2009), maize spread across much of Central and South America before 4,000–3,000 years ago (Iriarte 2007), to North America around 2,000 years ago (see Fritz 2007), and has subsequently dispersed across the globe in the last 500 years or so.

Today, maize is grown by subsistence farmers across the globe as a source of starch or carbohydrate. Its widespread geographical adoption is due to its ability to adapt to a variety of climates, soils, and habitats. Although an important food crop, it is also grown for ethanol and corn syrup; the latter is a contributor to a vast array of processed foods.

The multidisciplinary history of maize domestication and dispersal is comparatively well-defined through archaeobotany (macrofossils and microfossils) and genetics (DNA and aDNA). Multidisciplinary research has enabled the processes of human selection and resultant morphogenetic transformation in the generation of maize to be tracked, as well as domestication traits that are not visible in the archaeobotanical record (Jaenicke-Després et al. 2003; Doebley et al. 2006; Zeder et al. 2006).

Major Domestication Traits

Genetic research has shown that maize is descended from a wild grass teosinte (*Zea mays* ssp. *parviglumis* or Balsas teosinte) that is native to the Balsas River Valley in tropical southwestern Mexico (Matsuoka et al. 2002). Domestication resulted in the transformation of multiple traits in teosinte to create maize. These include archetypical traits of the domestication syndrome in grasses, such as size of edible glume (much larger in maize) and nonshattering rachis (in maize), as well as other traits, such as apical dominance (replacement of multiple stalks with single stalk) and kernel case formation (enclosed casing around kernel in teosinte). Genes have been identified that control specific morphological changes, or domestication traits in maize, including *Teosinte branched 1* (*tb1*, apical dominance) and *Teosinte glume architecture 1* (*tga1*, kernel casing), as well as genes that control varietal differentiation based on kernel color, composition, and sweetness (Doebley et al. 2006; Zeder et al. 2006).

In 2001, Piperno and Flannery (2001) reported two archaeological cobs of maize dated to c. 6300–6000 cal BP from Guilà Naquitz Cave in the Oaxaca Valley of Mexico. These cobs exhibited all the major morphological characteristics of domesticated maize (Benz 2001), suggesting that domestication had already taken place. More recent archaeological research at Xihuatoxtla Shelter in the Central Balsas River Valley has identified starch grains and phytoliths of maize on stone artifacts and in associated sediments dating back to c. 9000–8600 cal BP (Piperno et al. 2009; Ranere et al. 2009). These finds indicate that maize was domesticated early

in Mexico, although the exact location and timing may vary with further investigations.

At present, there is a high level of agreement, or consilience, between genetic and archaeobotanical interpretations for the location of maize domestication in the seasonal tropical climates of the Balsas River Valley region of Mexico, rather than the semiarid highlands (see Hastorf 2009 and van Heerwaarden et al. 2011 for discussion and qualification). However, Zeder et al. (2006: 144) caution:

> . . . identifying the Balsas watershed as the place where maize was probably initially domesticated should be tempered with the realization that undiscovered or extinct populations might be yet closer to maize, and species distributions might have changed since the time of the domestication.

The degree of multidisciplinary consilience that exists for understanding maize domestication is unusual and shared by only a few other domesticated plants globally (Smith 2001). There is also relatively good multidisciplinary information for the dispersal of maize in the Americas and the subsequent generation of varieties (Smith 1998: 150-160).

Maize was widely cultivated in diverse climobiological regions across South America by approximately 4,000–3,000 years ago (Perry et al. 2006; reviewed in Iriarte 2007). It was also introduced to the southern United States but remained a relatively minor crop, until c. 1,000 years ago (Fritz 2007). The maize-bean-squash combination was a significant traditional diet in large parts the Americas at the time of European conquest and colonization. This nutritionally balanced diet extended from "Argentina to Ecuador, up through Central America and Mexico, and as far north as southern Ontario" (Smith 1998: 147). Maize was first introduced to Europe in the late fifteenth century, was cultivated for food in Mediterranean regions in the centuries that followed introduction, and has subsequently been dispersed to regions around the globe.

Where maize was the dominant staple in the Americas, it was traditionally processed using alkali (usually lime) – a process referred to as nixtamalization – to remove toxins and increase the availability of nutrients, including niacin (vitamin B3). Without this processing, people reliant on maize diets suffer deficiencies, such as pellagra (niacin deficiency). Pellagra periodically occurred in regions of Europe from the eighteenth century onwards where people were reliant on maize, especially during famines, because nixtamilization was not practiced.

Significantly, at some point during the domestication process, maize lost its ability to reproduce effectively. Without human intervention to remove the corn cob from its protective sheath of leaves, and thereby to remove kernels for storage and planting, unharvested cobs generally rot.

Furthermore, a vast amount of maize seed today, especially within commercial agriculture, is now genetically modified (GM). The narrow genetic diversity of cultivated GM maize has raised fears regarding the susceptibility of the crop to disease, with the potential for economic disruptions to processed food production, as well as the vulnerability of subsistence farmers to famine.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Beans: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
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Malan, Antonia

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Basic Biographical Information

Antonia Malan, Ph.D., was born in Britain in 1948 and initially qualified with a secretarial diploma from the Cambridgeshire College of Arts and Technology. After moving to South Africa, she enrolled for a B.A. degree at the University of Cape Town in 1976, returning to archaeology in 1986 when she graduated with a B.A. honors degree. She earned her Ph.D. under the supervision of Professor Martin Hall at the University of Cape Town (UCT) with a dissertation entitled *Households of the Cape, 1750 to 1850: Inventories and the Archaeological Record* (awarded in 1993). She has been employed in various capacities in archaeology in the Western Cape including contract archaeology, project management, and the occasional lecturing and supervision of students. She has further contributed to the cultural resource management of Cape Town and the Western Cape by serving on the boards and committees of, for example, the Heritage Western Cape appeals committee (the heritage resources agency for the Western Cape Province, South Africa) and various trusts such as the "Cape Town Heritage Trust" and the "Tracing History Trust." In addition, Malan has served as the convenor of the Western Cape accreditation committee of the Association of Professional Heritage Practitioners, an organization which she helped to found (Malan *pers. comm.*).

Major Accomplishments

Malan has made a substantial contribution to the development and growth of historical archaeology in South Africa, particularly in the Western Cape, with her expertise in the study of probate

inventories and the transition from Dutch to British rule at the Cape (Malan 1993). The study of probate inventories has led to further in-depth research on ceramic assemblages (Klose & Malan 1992), architecture (Malan 2005; Malan & Webley 2010), gender (Malan 1993), and slavery (Malan & Worden 2011). She has also written on the politics of heritage management in the Western Cape (Malan 2007). Malan has been involved with the Historical Archaeology Research Group (HARG) in the Archaeology Department at UCT for over 20 years and was active in the Research Unit for the Archaeology of Cape Town's (RESUNACT) excavations in District Six (Malan & Soudien 2002).

Stemming from her probate inventory research, Malan served as project manager of the Transcription of Estate Papers of the Cape of Good Hope (TEPC) project, a joint initiative between the Department of Historical Studies at UCT, the History Department at the University of the Western Cape, and the South African and Dutch archives, which was funded by the Netherlands government. This project saw the transcription of selected papers from the Orphan Chamber (containing inventories of deceased estates between c. 1690 and 1834 and associated auction lists) and from a series of Court of Justice volumes (TEPC n.d.). She is also a founding trustee of the Tracing History Trust, which was established in 2008 in order to continue the work of the TEPC Project (Tracing History Trust n.d.).

Malan is actively involved with the Vernacular Architecture Society of South Africa (VASSA). She has worked as a principal investigator and researcher for various VASSA recording projects in the Cedarberg and Karoo and edits the *VASSA Journal*.

She has done much to further the ideal of interdisciplinarity in the study of South Africa's colonial past, particularly bridging the divide between archaeology, history, and architecture.

Cross-References

► Archival Research and Historical Archaeology
► Colonial Encounters, Archaeology of
► Hall, Martin (Historical Archaeology)
► Modern World: Historical Archaeology

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Malta: Museums

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Introduction

The Museums of Malta attempt to preserve and communicate the historical narrative of this small Mediterranean nation. The history of Malta is complex and intertwined with the history of the region and its subsequent rulers. Heritage Malta is the current supervisory body of the museum sector in Malta. It is part of their mission to communicate this unique historical narrative through its numerous museums.

Definition

Malta's material culture history spans an impressive length of time and encompasses a number of historical narratives: from the ancient temple building culture of approximately 5,000 BCE to the Roman Empire and to the crusader knights and a terrifying World War II story. These historical narratives are all encapsulated in Heritage Malta's museum network. Heritage Malta is also responsible for the interpretation and preservation of the World Heritage Listed sites on the island; these include the City of Valletta, the Hal Saflieni Hypogeum, and the Megalithic Temples.

Key Issues/Current Debates/Future Directions/Examples

Malta's large tourist industry is a large consumer and patron of heritage culture. This leads to concerns regarding the conservation and interpretation of heritage sites. The age and fragility of many of the sites in Malta are impacted due to tourism, for example, the Hal Saflieni Hypogeum. The impact of tourism needs to be strictly controlled in order to maintain the preservation of the Hal Saflieni Hypogeum; this is being achieved by only allowing 15 people per day into the temple complex. Other issues and concerns regarding heritage sites in Malta include graffiti and outdated conservation techniques (Fig. 1).

Listing of Heritage Malta Museums

National Museum of Archaeology, Valletta

The National Museum of Archaeology is housed in the Auberge de Provence, a sixteenth-century Knights of St. John's inn. This museum currently conserves and interprets artifacts from Malta's Neolithic period: the Għar Dalam phase (5,200 BCE) to the Tarxien phase (2,500 BCE). This museum exhibits some of the earliest tools used by the prehistoric inhabitants. It also displays early artistic representations of animal life and human figures. Examples of which include the "Sleeping Lady" from the Hal Saflieni Hypogeum and large altars from the Tarxien Temples.

National Museum of Fine Arts, Valletta

The National Museum of Fine Arts is located in Valletta. The museum narrates and conserves the art of Malta from the late medieval period to the contemporary. Highlights from the collection include numerous paintings, silverware, marble and bronze sculptures, and finely crafted furniture.

Folklore Museum, Citadel Gozo

The museum is located in a late medieval house on the island of Gozo. The museum displays and interprets a wide range of exhibits depicting the domestic, rural, and traditional agrarian economy of the Maltese Islands.

Malta Maritime Museum, Vittoriosa

Located within the Old Naval bakery in Vittoriosa. The Malta Maritime Museum narrates the nation's maritime history within its Mediterranean context. A highlight of the museum's collection is its display of ship anchors that are interpreted in order to illustrate the evolution of seafaring in the region.

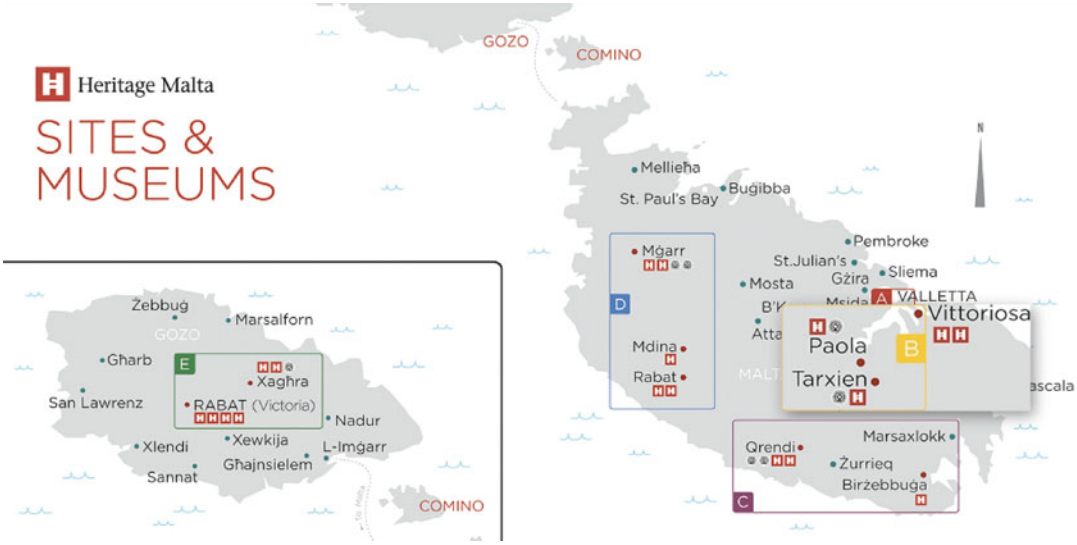

Malta: Museums, Fig. 1 Image from Heritage Malta: Follow link for interactive map http://www.heritagemalta.org/ms_interactive_map.html

Inquisitor's Palace, Vittoriosa

The Inquisitor's Palace is located in Vittoriosa. Msgr Pietro Dusina arrived in Malta in 1574 as the first general inquisitor and apostolic delegate of the Maltese Islands. Despite many renovations, the Palace is a large building that is currently used to interpret the role of the religious inquisitors of the medieval period. Of particular note are the cells and the original graffiti of the prisoners.

National War Museum, Valletta

The National War Museum is located at Fort Saint Elmo, Valletta. The museum's collection is concentrated on the two World Wars (1914–1918 and 1939–1945) and Malta's strategic Mediterranean location and role in these two conflicts. There is an emphasis on the Maltese involvement in World War II and the incredibly difficult siege and massive bombing campaign led by Germany and Italy, which led to the presentation of the George Cross for heroism to the entire population of Malta.

Museum of Natural Science, Gozo

The Museum of Natural Science is located in Citadel of Victoria, Gozo. The museum extends over two floors and interprets collections relating to the island's marine life, geology, minerals, insects, ecosystems, and local habitats.

Palace Armoury, Valletta

The Palace Armoury is a collection of arms from the Knights of St. John who used the island of Malta as their strategic Mediterranean stronghold against the Ottoman Turks. The arms collection includes enough equipment to arm thousands of soldiers during the medieval and renaissance periods. Highlights of the collection include ornate decorated arms from France, Italy, Spain, Germany, and the Ottoman Empire.

Roman Domus, Mdina

The mosaic pavements in the Domus Romana are located in Rabat. They were discovered in 1881 just outside Mdina in the remains of a rich and sumptuously decorated town house of the Roman period.

Cross-References

▶ Heritage Museums and the Public
▶ Museums and Memory Experiences

▶ Museums and the Distortion of Archaeology for Political Purposes
▶ Nationalism and Archaeology

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Manchester, Keith

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Basic Biographical Information

Keith Manchester was born in Leicestershire, England, on the 21 June 1938. Attending King Edward VII Grammar School in Melton Mowbray from 1946 to 1956, he gained his "A" levels which allowed him entry to study medicine at St Bartholomew's Hospital Medical College in London (1956–1962). He was awarded a B.Sc. Honors in Physiology (1959) and an M.B.B.S (Bachelor of Medicine and Surgery) in 1962. In 1963 he started work as a house surgeon in gynecology at St Bartholomew's Hospital and had later house jobs at the Whittington Hospital, London, and St Luke's Hospital in Bradford, West Yorkshire. These posts preceded his establishment as a General Practitioner at Laisterdyke Clinic in 1964, until his retirement in 1998. However, he remains a Locum General Medical Practitioner in Bradford, and has recently "re-joined" the palaeopathology community of Bradford University's Department of Archaeological Sciences.

Manchester had already established his interest in archaeology long ago as a schoolboy in Leicestershire, taking part in excavations with the local archaeological society. Keith married Ann, and they had four children, Sally, Giles, James, and Edward, with subsequent grandchildren. Behind every good man is a hardworking and supporting wife, and Keith Manchester is no exception. Ann has been a stalwart throughout their marriage, supporting his work and many extracurricular activities, including fly fishing and making music (Fig. 1), but also palaeopathology.

Major Accomplishments

Although Keith has many skills and a wide knowledge of many subjects, his focus on palaeopathology has perhaps been the most longstanding, apart from medicine. In 1982 he embarked on a new career in palaeopathology at the University of Bradford, after having done some skeletal reports for West Yorkshire Archaeology Services and also published some papers. The teaching and research he did was as an Honorary Visiting Lecturer and Honorary Research Fellow, alongside continuing to work as a medical practitioner. The advantages of his involvement in teaching were his in-depth knowledge of the impact of disease on the skeleton and what signs and/or symptoms a person could have experienced (Fig. 2). In 1990, following much discussion with the University of Sheffield, the now famous joint Bradford/Sheffield M.Sc. Osteology, Palaeopathology, and Funerary Archaeology course was established and admitted its first students in the UK. This set the precedent for the future training of students in how to analyze and interpret skeletal remains from archaeological sites. This joint course which continued to run until 2000–2001 had many strengths, including for students the advantages of experiencing what two universities could offer, and it attracted more than

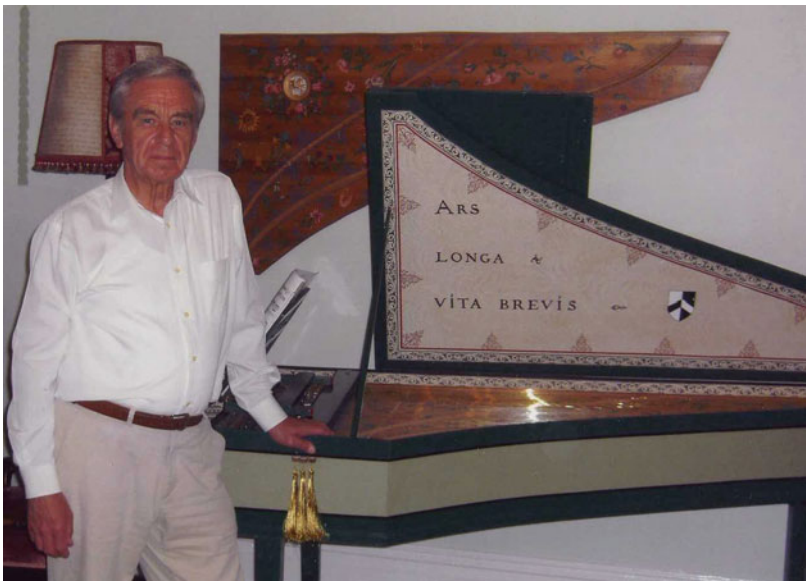

Manchester, Keith, Fig. 1 Keith Manchester showing his passion for music

Manchester, Keith, Fig. 2 Keith Manchester teaching in the 1980s

150 students over the years from North and South America, Greece, France, Spain, Switzerland, Iceland, Germany, Finland, Austria, Jordan, Australia, Japan, Malta and, of course, the UK. The course "produced" many graduates with palaeopathological knowledge and skills who currently work in the field, which is a credit to Keith's initial efforts in establishing the course. His other contribution, through his research collaborations with Don Ortner of the Smithsonian Institution starting in the 1980s, was the setting up of the "Short Courses in Palaeopathology", also at the University of Bradford. He and the author co-organized the

first (of many) course in 1988. Keith's dedication and work effort to enhance the Department of Archaeological Sciences' research and teaching profile was rewarded by the award of a D.Sc. degree by the University in 1991. The Biological Anthropology Research Laboratory was also named the "Keith Manchester Laboratory" when the Biological Anthropology Research Center at Bradford was established. Keith's achievements in palaeopathology were recognized by the Swedish Society of Medical Sciences in 1987. He was elected Fellow of the Society of Antiquaries and the Royal Anthropological Institute (both London). He was one of the first palaeopathologists to be awarded a UK (government funded) research council grant (Science and Engineering Research Council), and one from the Wellcome Trust.

Keith joined the United States-based Paleopathology Association in 1978, and his research in palaeopathology continues to have an impact on the discipline, especially in the field of infectious disease. His first publications were in the 1980s, but one of his main achievements was developing diagnostic criteria for leprosy with the clinical leprologist Johs Andersen, although his base was the work of the Dane Vilhelm Møller-Christensen, another medical doctor with a research interest in palaeopathology (Andersen & Manchester 1986, 1988, 1992; Andersen et al. 1992, 1994). This included a visit to Ethiopia to get first-hand observations of people living with leprosy. In more recent times, he has returned to the diagnostic criteria and is currently working on skeletons at Bradford from the St James and St Mary Magdalene medieval leprosy hospital cemetery from Chichester, Sussex. His work on diagnostic criteria continues to be cited in the bioarchaeological literature. This research has also extended to looking at the reasons behind the fourteenth century CE European decline in leprosy, with a focus on tuberculosis (1984, 1991). The cross-immunity between leprosy and tuberculosis was suggested as the reason for the decline and the rise of tuberculosis, a hypothesis that continues to be an interest for other researchers, both clinically and palaeopathologically. His other major accomplishment was the publication of his *Archaeology of Disease* (1983), which has later appeared in new editions; it is a book that is globally used in teaching and research in palaeopathology.

In more recent years Manchester has returned to the now Division of Archaeological, Geographic, and Environmental Sciences at the University of Bradford where he has been appointed Honorary Visiting Professor of Palaeopathology. Manchester lectures and assists in practical classes for M.Sc. students and is part of a number of projects, including laser scanning photography of leprous bones from the Chichester medieval leprosy hospital skeletal collection. He continues to find leprosy intriguing and says, his "current research interests are in the pathogenesis of leprous bone change, particularly in relation to autonomic neuropathy, and the palaeopathological diagnostic criteria for leprosy, pathognomonic and indicative of the clinical sequelae of *M. leprae* infection in man" (Keith Manchester, *pers. comm.* August 2011).

Acknowledgement This biography is an edited version of a longer version appearing in Buikstra & Roberts (2012).

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- ▶ Angel, John Lawrence
- ▶ Archaeology: Definition
- ▶ Bass III, William M.
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Demographic Transitions
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Ortner, Donald J.
- ▶ Osteology: Definition
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▶ Pathological Conditions and Anomalies in Forensic Contexts
▶ Skeletal Biology: Definition

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Mandui, Herman

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Basic Biographical Information

Mr. Mandui was born in 1969 in Southern Highlands, Papua New Guinea, of Manus (mother) and Sepik (father) heritage. He is a speaker of more than 15 local languages including Melanesian Pidgin and Australian English. He was educated at the University of Papua New Guinea, completing in 1992 a B.A. in Physical Geography, Environmental Sciences, and Archaeology. After graduating, Mr. Mandui was a tutor in Cultural Ecology and Theoretical Archaeology at UPNG before joining the National Museum and Art Gallery of PNG as a Contract Archaeologist working under Dr. Pamela Swadling. Four years later, he was promoted as Principal Archaeologist and in 2008 Chief Government Archaeologist for the Independent State of Papua New Guinea. Mr. Mandui has been at the forefront of managing archaeological research in the independent state of Papua New Guinea. All applications for archaeological research in PNG are processed by the museum which is by law accountable for preserving the heritage of the nation.

Major Accomplishments

Mr. Mandui's major accomplishment is keeping archaeological research continuing in PNG despite

difficult times including at one time the closure of the museum. Mr. Mandui is also an accomplished archaeologist working in many provinces of Papua New Guinea. He has authored a total of 39 publications in reports, journals, and chapters in academic publications to date. More recently he undertook and directed three research projects with Professor Summerhayes. The first focussed on the early colonization of PNG in the Ivane Valley. The second examined the beginnings of Austronesian settlement in the western Pacific by examining Lapita settlements on Emirau Island. The third project examined early settlement along the south Papuan Coast and involved archaeological excavations at the site of Oposisi. Publications from this research are seen below.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Taro: Origins and Development

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Mangi, Joseph Tumbe

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Basic Biographical Information

Joseph (Jo) Mangi (1961–) is from the Middle Wahgi Valley in the highlands of Papua New Guinea. Jo obtained his Bachelor of Arts from the University of Papua New Guinea (UPNG) in 1982. He continued his archaeological studies at the Australian National University for a Bachelor of Literature (B. Litt.) (Mangi 1984) and obtained a Master of Arts from UPNG in 1988.

After returning to Port Moresby, Jo became a temporary research fellow at the National Research Institute (1991) and a lecturer in the Department of Anthropology and Sociology at UPNG (1992–1998). After leaving UPNG, Jo became a consultant for an array of development, poverty alleviation, sustainability, and welfare projects. From the mid-2000s, he has worked extensively in the commercial sector on cultural resource management and social mapping projects across Papua New Guinea. In 2006, he assisted John Muke in undertaking community consultations and drafting of the land-use management plan for the successful nomination of the Kuk Early Agricultural Site to the World Heritage List (inscribed in 2008).

Major Accomplishments

Jo's B. Litt studies involved the analysis of lithic material collected by Ole Christensen during his

excavation of Manim 2 in the Wurup valley, Upper Wahgi Valley, Papua New Guinea (Christensen 1975). Manim 2 was the lowest and oldest (first occupied in the early Holocene) of a series of rockshelters excavated by Christensen along an altitudinal gradient in the Wurup Valley between 1972 and 1974. Unfortunately, Christensen died in an accident before completion of the analysis of the finds from his excavations, which were in part then taken up by Jo. This situation is reflected in the "10 Years BP" thesis subtitle, which is a reference to when the material was collected.

A major contribution of his thesis was the observation that direct comparisons of lithic studies for highland sites had been hindered by the different typologies used in the analysis of assemblages (Mangi 1984: 53-69). Up to that point, researchers had adopted several different classificatory schema: Bulmer's was an intuitive typology based on formal types (Bulmer 1977); White's was a modified version in which some formal types were retained, e.g., axe/adze, waisted blade, and pebble tool, and others were considered according to attribute analysis of altered edges (White 1972: 5-9, largely adopted by Mangi 1984); and Watson and Cole's was an attempt to produce a "scientific," nonintuitive approach (Watson & Cole 1977: 72-3). Jo considered Watson and Cole's classification to be "theoretical window-dressing" given that its "scientific" categories were subsequently articulated in terms of an intuitive typology (Mangi 1984: 68). He surmised that the different presuppositions inherent to each classificatory schema prevented ready cross-correlation and, as a result, only some general points of similarity and difference could be inferred.

In 1986, Jo attended the First World Archaeological Congress at the University of Southampton, England. He subsequently was a British Council-sponsored Visiting Fellow at that university from August to November 1987. This exposure undoubtedly fostered an interest in the political dimensions of archaeology within Papua New Guinea (Mangi 1994), something that underscored many of his subsequent activities.

Jo obtained a Master of Arts at UPNG on traditional Huli trade in the highland interior of Papua New Guinea (Mangi 1988a). He then enrolled for a Ph.D. in archaeology in the Prehistory Department at the Australian National University (discontinued in 1990). As part of his research, Jo surveyed and excavated sites in the Porgera Valley region of the highlands. One site, Purepa rockshelter, dated back to the beginning of the Holocene and was especially noteworthy for containing a waisted blade from a mid-Holocene context and an impressive array of marine shells that had evidently been traded inland, including *Trochus* shell armbands (Mangi 1988b).

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▶ Kuk Swamp: Agriculture and Domestication
▶ Muke, John

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Manioc: Origins and Development

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Basic Species Information

Manioc (*Manihot esculenta* Crantz) is a woody shrub that is cultivated primarily for its tuberous roots that contain large amounts of carbohydrate in the form of starch. The crop originates in South America but is now widely grown throughout the wet tropics and has become the sixth most globally important crop for food (Clement et al. 2010). It is also grown for fodder (e.g., for pigs in the highlands of New Guinea). Cassava is adaptable to marginal environments, has a flexible growth cycle, and has relatively high energy yields per unit area of land (Lebot 2009).

Manioc is ordinarily reproduced vegetatively under cultivation, namely, a stem cutting is planted to generate a new clone of the parent. Even though it is generally regarded as an asexually reproduced plant, it has not lost its ability for sexual reproduction, namely, many vegetatively propagated varieties still produce viable seed (Rival & McKey 2008). Clement et al. (2010: 78) have highlighted the importance of sexual reproduction to the evolution of manioc and the generation of cultivar diversity through a consideration of smallholder behavior today. Many smallholders let "volunteer" plants grow that are generated from seed and incidental incorporation into the seed bank of a plot. They then decide at harvesting if these plants are worth retaining and vegetatively propagating. Clement et al. (2010: 78) conclude: "Genetic analyses confirmed seedling incorporation by detecting high polymorphism in local varieties. . . , and by demonstrating that local varieties are polyclonal, with one predominant clone and a set of morphologically similar plants that are genetically different."

Major Domestication Traits

Cultivated manioc is grouped into "sweet" and "bitter" varieties. The two main groups of cultivars are differentiated based on lower or higher cyanogenic glucoside contents, respectively. Cyanogenic glucoside is hydrolyzed to the poisonous hydrocyanic or prussic acid upon harvesting, making unprocessed "bitter" manioc toxic to people. Consequently, bitter manioc requires leaching, mashing, and heat treatment prior to consumption to remove toxins, whereas sweet manioc only requires standard cooking and some varieties can be eaten raw. The distinction between "sweet" and "bitter" manioc masks continuous variation among cultivated varieties and wild species, suggesting that the two groups of cultivated varieties represent independent and different selective pressures exerted on a common ancestral plant with intermediate cyanogenic potential (Clement et al. 2010: 77).

Following Isendahl (2012), there are three sets of issues associated with the spatiotemporal dimensions of manioc domestication:

(a) The wild progenitor from which domesticated manioc is descended
(b) The locus and biome of domestication
(c) The area of initial cultivation

Various types of multidisciplinary evidence shed light on the history of these domesticatory relationships, including plant biology, phytogeography, plant genetics, plant microfossils (principally starch grain analysis; e.g., Perry 2005), and plant macrofossils (principally charred tuberous remains; e.g., Ugent et al. 1986).

Multiple regions have been proposed as the geographical center of manioc domestication (Vavilov 1951; Sauer 1952; Lathrap 1970; Piperno & Pearsall 1998). The morphology of

manioc, with the binding of water in starch-rich tubers, has suggested adaptation of a perennial plant to periodically dry periods, characteristic of seasonal climates (in Isendahl 2012). Consequently, and drawing on multiple lines of evidence, several commentators have suggested that manioc originates in the transitional zone between savanna and the Amazonian tropical rainforest.

Genetic analyses have enabled the revision of this interpretation by defining the botanical origin more clearly. Previously manioc was thought to be a cultigen, namely, it was thought not to be descended from a wild conspecific ancestral population; it was thought to have originated from the introgression, or interspecific breeding, between different wild *Manihot* species (Clement et al. 2010; Isendahl 2012). Genetic analyses have now confirmed that manioc is descended from *Manihot esculenta* subspecies *flabellifolia* (Olsen & Schaal 2006), although some introgression may have occurred subsequent to initial domestication and contributed to the generation of the range of varieties. Following Isendahl (2012: 458) this genetic interpretation has enabled the locus of domestication to be better determined:

> Having identified a sole progenitor, it is also possible to suggest a probable geographical origin where the progenitor evolved and the agricultural origin of domesticated manioc. The biophysical habitat of wild populations of *Manihot esculenta* subspecies *flabellifolia* is in forest patches in the transition zone between the savanna scrub vegetation of the Brazilian Shield Plateau (i.e., the Cerrado) and the lowland rainforest of the Amazon Basin, where it grows as a clambering under-story shrub or low tree.

Although some authors suggest more restricted geographical regions, these may change in the light of new analyses and greater sampling coverage. On balance, the southwestern edge of the Amazon Basin is the most likely locus of manioc domestication.

The archaeobotanical record of early manioc domestication, which is used as a proxy for early manioc cultivation, has been greatly improved through the application of starch grain analysis (see Ugent et al. 1986; Piperno & Holst 1998; Piperno & Pearsall 1998; Isendahl 2012: Table 1). For example, Perry (2002) has shown that modern starch granules from manioc are larger than archaeological specimens and those derived from its purported wild ancestor. To summarize the diverse archaeobotanical findings, manioc may have been domesticated as early as 10,000–9000 years ago in the South American lowlands, with subsequent widespread dispersal to several areas of cultivation by c. 6,500 years ago, including the Central Andes, Pacific Coast of South America, Central America, and Meso-America (e.g., Piperno & Holst 1998; Piperno & Pearsall 1998). Recent research is also demonstrating the importance of manioc cultivation on Dark Earths in Amazonia (e.g., Fraser & Clement 2008). At present, starch grain analysis is unable to differentiate clearly between "sweet" and "bitter" manioc.

Care needs to be taken in the interpretation of some claims for the importance of manioc in the past. Perry (2005) has demonstrated that the supposed "manioc" graters collected from archaeological contexts in the middle Orinoco valley of Venezuela were used to process a range of starchy and other foods. People evidently engaged in diverse plant food production and exploitation practices in the past, in doing so, they no doubt exploited wild and cultivated forms of manioc.

Ongoing multidisciplinary research on manioc is likely to further refine the phylogenetic relationships between wild *Manihot* species, including *Manihot esculenta* ssp. *flabellifolia*, and cultivated varieties of "sweet" and "bitter" manioc. As genetic interpretations improve, the locus for the origination – effectively the domestication – of manioc will also be refined based upon the present-day distributions of those wild species and cultivated varieties. However, care needs to be taken when using modern plant distributions as a guide to the distant past, given changing climates and biogeographies during the Holocene. At present, the pathways of manioc geodomestication have only been loosely anchored through archaeobotany. Much greater archaeological coverage across the vast lowland rain forests of the Neotropics is required to clarify the distributions of manioc and associated biomes in the past.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General Principles

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Basic Biographical Information

Arif Müfid Mansel was born in Istanbul in 1905. He passed away in 1975. Arif Müfid Mansel graduated from Saint Benoit High School in 1925. After this, he went to Germany to study Classical Archaeology at the University of Berlin. He attended lectures in Ancient History, Ancient Greek, and Latin as well as Archaeology from leading professors of the period such as Ferdinand Noack, Eduard Meyer, and Werner Jaeger. In 1930, after he received his Ph.D., which was based on his dissertation, titled *Stockwerkbau der Römer und der Griechen/ Storied Roman and Greek*, Arif Müfid Mansel returned to Turkey. For 12 years, he worked as the assistant of Aziz Ongan at the Archaeology Museums of İstanbul and as a lecturer in the Ancient History Department of İstanbul University. Arif Müfid Mansel was promoted as Associate Professor in 1936, Professor in 1944, and finally became Professor Emeritus in 1958.

Major Accomplishments

Arif Müfid Mansel founded the Classical Archaeology Department at Istanbul University in 1946 and became the head director of the department.

Until his death, he continued to chair the department and train numerous students and scientists. He mainly focused on ancient architecture especially the sarcophaguses, ancient history studies and museology. In addition, he was interested in bibliographic studies and he produced a major source of reference by compiling a comprehensive book that contains all the publications in Turkey until 1948.

Arif Müfid Mansel conducted excavations in 1933 at Balabanağa Masjid, in 1936–1940 at Thrace Tumuluses, 1938–1941/1948 in the Küçükçekmece region, in 1946–1947/1953–1957 at Perge, and in 1947–1967 at Side. He established the Archaeological Research Station of Antalya Region in 1954 and became the first director of this establishment. This initiated a tradition of an institutional style of research in regional studies and opened up new areas for researchers and students. He was a leader in the Turkish Historical Society; a member of the Supreme Council of Antiquities and Cultural Heritage Property (1954–1956 as head director); primary member of the Committee for the Protection of Ancient Monuments of Istanbul; and a member of the German Archaeological Institute, the Austrian Archaeological Institute, and Sofia Academy of Sciences. He was elected as the Vice President of the International Byzantine Examination Community and moderated the 10th International Congress of Classical Archaeology in 1973.

Cross-References

- ▶ Architecture, Roman
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Classical (Greek) Archaeology
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Tombs, Greek (Iron Age)

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Maps, Cartography, and Worldview in the Roman World

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Introduction

In the grave of a military officer, buried around 239 BCE, seven maps drawn in ink on thin pieces of wood were deposited; they represent a small region at a scale of c. 1:300.000 (Yee 1994: 37). Similarly, the grave of a ruler of 168 BCE preserved a map of a larger region, drawn to a scale of c. 1:180.000 and marking plains, mountains, rivers, roads, and places with standardized symbols and names, and another map with a detail of the same region, at a scale *c*. 1:100.000, marking forts and lines of defense (Bulling 1978; Hsu 1978, 1984). During their lifetimes, the officer and the ruler had both apparently had access to scale maps that were so important to them that they were buried together with their bodies. Literary evidence from the

same period also refers to the use of maps. So a historical work from the second/first century BCE relates that in 227 BCE, the son of a ruler ordered a hit man to kill a neighboring dynast. To get close to the victim, the killer pretended to want to offer the dynast a map sent him as a present by his master – and concealed a dagger in the map roll. The victim survived and founded his own dynasty. When his capital was attacked 20 years later, the soldiers were interested only in the administrative center with its archive and its maps – which ultimately contributed to the formation of a new dynasty that was to last until 9 CE (Watson 1961: 125; Brodersen 2003: 139).

The world to which these artifacts and stories belong is that of ancient China, not of the contemporary Roman World, for which comparable evidence is not transmitted. So what do we know about Roman cartography as a special form of communicating geographic knowledge and worldview?

Definition

Cartography is a modern term created as a combination of Greek *chartês*, "chart," and *graphein*, "write" or "draw," and refers to the study of maps, i.e., two-dimensional representations, often to scale, of portions of the earth's surface.

Historical Background

There is precious little contemporary evidence for Greco-Roman maps. In the modern world, original texts and graphics can be preserved, transmitted, and accessed for extended periods of time. Like other premodern worlds, however, ancient Rome had only a series of copies to work with, made over the centuries, usually on organic and therefore perishable material. While one could produce multiple copies of texts by copyist teams working from dictation, reproducing graphics was difficult and inevitably led to increasing distortion. Copies of copies of copies must generally have been very different from the vanished original, hence the scarcity of scholarly illustrations transmitted from the ancient world (cf. Stueckelberger 1994; for the *Tabula Peutingeriana*, see below). When modern atlases present "reconstructed" ancient maps of, for instance, Hecataeus, Herodotus, Eratosthenes, and Ptolemy, they combine data from ancient texts with modern knowledge about the shape of the earth's landmass (cf., e.g., Smith & Grove 1872; Bunbury 1883; Sieglin 1893; Miller 1898, but also Wittke et al. 2009: 4–5.). Such "reconstructions" introduce a host of modern concepts into the ancient data: north is on top, the shape of coastlines for which no ancient descriptions are available is the familiar modern one (e.g., Italy is presented in the shape of a "boot" – a modern idea unknown in the ancient world; cf. Bertrand 1989), and color coding familiar from modern maps is used to mark the continents and the sea.

Some even go beyond "reconstructions" and invent – that is, falsify – maps from the ancient world. Every decade or so, a new "discovery" of such a map is announced: In 1967, "the earliest Greek map to come down to us in any form and the first physical relief map known" (Johnston 1967) on Ionian coins of the fourth century BCE was published but later shown to be no such geographical representation (Dilke 1988: 92). The plan of the Roman settlement at Aguntum "found" in 1976 during excavations (Alzinger 1977) was soon exposed as a practical joke by the excavator's disgruntled students (Brein 1980). In 1987, "one of the few surviving geographical maps of the pre-Augustan period" (Dilke 1987: 207), a piece of sandstone shaped like Gaul – or rather modern-day France – supposedly found near a fort used by Julius Caesar and immediately published in the monumental *History of Cartography*, was eventually unmasked as a hoax (Brodersen 2003: 134). And "the oldest geographic map ever discovered in Europe" (Gomarasca 2009: 21) on a shard "found" in 2005 and allegedly presenting a "map" of the "heel" of Italy was soon shown to be a hoax intended to embarrass a prominent archaeologist (Yntema 2006). It is probably the desire of modern scholars to find tangible

evidence for the existence of maps in the ancient world that has led to embarrassing credulity vis-à-vis such hoaxes and fakes.

Key Issues

To be sure, some Roman plans of small plots of land, drawn to scale, are preserved. Ancient building plans usually apply a very large scale (if not outright 1:1; cf. Haselberger 1994), and it was of course possible to measure existing structures and represent their topographical relationships on a plan. Several such large-scale plans of tombs along the Via Appia are preserved (Heisel 1993); the most spectacular plan of this kind is the so-called *Forma Urbis Romae* (a modern name), a plan of the center of Rome created around 200 CE, more than a thousand fragments of which survive (cf. the presentation, and bibliography, on http://formaurbis.stanford.edu and Trimble 2007). Apparently, many individual plans were combined to create an impressive display of the topography of the inner city of Rome.

Larger areas could be surveyed in flat territory with few buildings and without high vegetation, where surveyors' instruments allowed for straight lines and right angles to be plotted on the land itself (Campbell 1996, 2000). Where land was, as it were, created afresh by floods (as regularly in the Nile Delta), or acquired through colonization or conquest, it could thus be divided and ownership or taxation recorded. Records of such attributions were usually texts which assigned every plot of land (*centuria*) a unique identifier, by recording its distance from the *decumanus* and the *cardo* lines, which formed a rectangular cross at the center of the territory, but could be visualized – as a small bronze plaque from Lacimurga in Spain shows, published in 1990 (Sáez Fernández 1990: 207) – demonstrating that the concept of scale is irrelevant for this type of record (cf. Cuomo 2007: 109). At Arausio (Orange) in France, the local distribution of *centuriae* was displayed in several large inscriptions, which put the individual plots in their correct topographic position on a plan (not to scale), but also gave their individual locations in the form of texts (*CIL* XII 1244; cf. Piganiol 1962).

Even larger areas, i.e., space that could be traversed on sea or land by soldiers, traders, ambassadors, travelers, or pilgrims, were typically represented by lines following such routes, the *periplous* and the *itinerarium* being the regular method of representing these routes as text. Graphic forms of the *periplous* and the itinerary, on the other hand, are rare. The few extant examples belong to contexts where representation and display were envisaged. A list of stations on the land route from Gades (Cadiz) to Rome adorns four second-century CE silver goblets (*CIL* XI 3281–3284), and soldiers who had served on Hadrian's Wall in Britain presented a list of the names of stations along the wall above a graphic image of a crenellated wall (*AE* 1950, 56 [Amiens], *CIL* VII 1291 = *RIB* II 2, 2415.53 [Rudge], *AE* 2004, 857 [Staffordshire Moorlands]). Some stations along the Black Sea coast are depicted on a unique circular leather object – perhaps a ceremonial shield – dating to the third century CE and found in Dura Europos (*Dura Parchment* 9 = *AE* 1925, 123 = Codex Paris suppl. gr. 1354^2 V, cf. Cumont 1926: I 261; Arnaud 1989). While the authenticity, in whole or part, of the first-century CE "Artemidorus papyrus" (Gallazzi et al. 2008), which combines geographic texts, a diagrammatic and apparently unfinished map (it lacks toponyms), and images of animals and human body parts, is still being discussed (cf., e.g., Brodersen & Elsner 2009), the so-called *Tabula Peutingeriana*, an essentially diagrammatic representation, not to scale, of the topographical relationship of stations along routes in the later Roman Empire, combines a route diagram with toponyms and information on distances, as well as graphic elements. The preserved twelfth-century manuscript has been interpreted as a copy of a Roman map of similar appearance (*pro*: Salway 2005; Talbert 2010; *contra*: Albu 2005).

For the largest areas covered by maps, the continents of the *oikoumenê*, or even the entire globe, descriptive geography is of no immediate use; rather, this is the realm of philosophical speculation and reasoning. A scene in

Aristophanes' *Clouds* (vv. 200 ff., originally produced in Athens in 423 BCE) refers to such a description "of the whole earth" in Socrates' school, and three academic philosophers' generations later (via Plato and Aristotle), Theophrastus' will is said to have referred to "tables on which the *periodoi* of the world are" (Diogenes Laertius 5.51). When the learned orator, politician, and scholar Marcus Tullius Cicero attempted to write his own geographical work, based on such philosophical geography, he exclaimed – "By Hercules, these things are difficult to explain!" (*Letter to Atticus* 2.6.1) – and abandoned the plan.

Current Debates

The current debates focus on the use of maps in the service of the state; newly conquered space was regularly presented in triumphal processions, not by way of maps, but by means of inscriptions listing the conquests or exhibits such as captives, animals, and treasures (Östenberg 2009). We seem to have no clear knowledge of a celebrated artifact often used to demonstrate the "power of images" in the pivotal time of the Roman emperor Augustus: the so-called map of Agrippa. In his influential study of *The Power of Images in the Age of Augustus*, Paul Zanker writes:

> Those with time on their hands could also contemplate the map of the world which was commissioned by Agrippa and later transferred to the Porticus Vipsaniae. It was intended to give the Roman people an idea of "their" empire and heighten their awareness of being *princeps terrarum populus* (Livy, Praef.). We need only think of the impressive marble plan of the Imperium Romanum which Mussolini had placed on the ancient ruins along the Via dell Impero (Zanker 1988: 143).

Agrippa, Augustus' right-hand man, is often credited with a "map of the world" displayed in the center of Rome. Unlike the five maps Mussolini had engraved in 1936 on large marble plates to show the growth of the Roman Empire and the recent Italian conquest of Ethiopia (the latter map has since been removed), nothing remains of Agrippa's "map" (cf. Arnaud 2007/08). There is no evidence for its physical appearance, forcing scholars to speculate about its shape (cf. the survey of conflicting scholarly opinions by Brodersen in Dueck 2012: 108–109); the texts referring to the object do not even contradict the assumption that what Agrippa presented was merely an inscription offering some geographical detail (Brodersen 2003: 273). After all, Augustus' conquest of the Alps was celebrated by a great inscription in modern-day La Turbie (*CIL* V 7817; cf. Pliny, *HN* 3.136), as was the conquest of Lycia in 43 CE – not with a map but with a monumental inscription listing stations in the new province (Sahin & Adak 2007).

Future Directions

The last two decades have seen intensive international research on cartography, mapping, and worldview in the classical Roman period (cf. Talbert 2012). More needs to be done on the changes in the perception and the representation of space which late antiquity witnessed. Do late antique texts that suggest a change in the "worldview" suggest that maps begin to play a more tangible use? When the orator Eumenius, in a panegyric of 297 CE, combines his vision of a reemerging Roman Empire with that of a rebuilt school at Autun which will present a visual presentation of the Roman world (*XII Panegyrici Latini* 9 (4), 20), is this a continuation of previous thought or a new beginning? When Gaius Iulius Solinus, who probably wrote in the same age, adapts Pliny's geographical books for his *Collectanea rerum mirabilium* (collection of miraculous things), does he envisage a readership of his text which can visualize the world in a maplike fashion (Brodersen 2011)? Does a presumed "original" of the *Tabula Peutingeriana* date to Late Antiquity (Rathmann 2012; *contra* Talbert 2010)? And, most importantly, is the late antique reorganization of the Roman Empire the consequence not only of new genres of geographical representation in maps but also a new Roman worldview – or did it generate such changes in perception and representation of space?

Cross-References

- ▶ Architecture, Roman
- ▶ Centuriation and Roman Land Surveying (Republic Through Empire)
- ▶ Epigraphy, Imperial Latin
- ▶ Epigraphy, Latin: Early Through Late Republican
- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Urban Planning, Roman

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Marcos, Jorge G.

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Basic Biographical Information

Jorge G. Marcos was born in Guayaquil, Ecuador, on June 25, 1932, the elder of two children of banker Jorge Marcos Ycaza and Dolores Pino Ycaza. Archaeology had a presence from the very beginning within his family context, as his uncle Antonio Pino inherited a small collection of artifacts from Jorge's maternal grandfather, José Gabriel Pino who accompanied the great German intellectual Otto Von Buchwald while exploring Puná Island off Guayaquil. Doña Dolores, Jorge Marcos' mother, provided an ambiance for reading traditional literature that included themes on legends and indigenous traditions.

In high school, Marcos was a history student of Francisco Huerta Rendón, one of the founding fathers of modern archaeology in Ecuador and one of the initial contributors to the archaeology of Manabí region. Rendón would encourage Jorge by identifying and discussing certain artifacts from his family's antiquities cabinet, such as spindle whorls as well as their cultural affiliations.

During his early years, Marcos took drawing and art classes with German fauvist and impressionist artist Hans Michaelson (1872–1954) in Guayaquil, who had escaped the Nazis and fled to Ecuador. Afterwards, in 1944, Marcos continued polishing his artistic skills in Quito with North American artist Lloyd William Wulff (1913–1965). His art education continued throughout his high school years as he was enrolled in courses at the prestigious Arts Students League in New York, an institution that could boast among its faculty members the likes of Georgia O'Keefe, George Bellows, and Jackson Pollock. These skills, which are notable, came to play a very significant role in Marcos' eventual contribution to his future analyses of the Valdivia ceramics' stylistic sequences, which today stand as a classic to be emulated (Marcos 1986, 1988; Marcos & Michzynski 1996).

Soon after his high school graduation in 1951, Jorge Marcos was sent to a Chauncey Hall school in Boston in order to go through college preparatory courses prior to his admittance to either the Massachusetts Institute of Technology (MIT) or Harvard, both to which he had been accepted. While in Boston, he made contact with an old friend of the family, Federico Stagg Caamaño, then a research fellow and assistant to the then very famous physical anthropologist Dr. Earnest Hooton at the Harvard Peabody Museum. Marcos met Hooton as well as another future luminary of American archaeology, Gordon Willey, both stimulating his longtime interest in archaeology.

Marcos eventually decided on Harvard, but in order to satisfy his family pressures, enrolled in English Literature rather than Anthropology. He did however keep close contact throughout with Hooton and Willey.

In 1955 he received his B.A. degree, returned to Guayaquil, and began working in the offices of "Plantaciones Ecuatorianas," the owner of

several banana plantations in the area of Balao Chico, SE of Guayaquil. Three years later, in 1958, he set up with a partner a company named "Alumar," a Venetian blind window factory. That same year, he married Eulalia Merino Valdivieso.

Marcos spent most of the next 12 years working in the private sector, until 1971, when he decided to go into a professional career in archaeology. He earned his Ph.D. in 1978 under the directorship of Donald W. Lathrap at the University of Illinois and returned to Ecuador to work for a while in the Museum of the Banco Central in Guayaquil. In 1980 he was invited by the chancellor of the Escuela Politécnica del Litoral (ESPOL), the foremost engineering and hard sciences university in Ecuador, to create a research and teaching program in archaeology.

During the next decade, Marcos carried out multiple research projects, while teaching and directing archaeology theses. In 1985 he married Dr. Silvia Alvarez-Litben, a social anthropologist from Mar del Plata, Argentina.

From 2010, Jorge Marcos was wearing two major hats, the first one as the director of the country's largest archaeological research project, the Cerro de Hojas-Jaboncillo Project in Manabí based in Ciudad Alfaro, Montecristi. This is a multidisciplinary investigation of an archaeological area of approximately 35 km^2 of hundreds of terraces, living structures, hydraulic terrain modifications, storage bins, and ceremonial structures on platforms that date to the Manteño period (c. 800–1500 CE) that could be the political and social center to what Marcos has proposed is the Manteño "incipient state." Marcos' second hat was as professor emeritus at ESPOL and director of the M.A. program in ethnoarchaeology and geoarchaeology of the neotropics at the same institution. This is the only program of its kind in the country and the continent.

Jorge Marcos was awarded the Ecuadorian National Order of Merit in 2002, and in 2003, he received the National Prize of Culture Eugenio Espejo for scientific research, the country's highest honor. In 2005 he was inducted into the National Academy of History of Ecuador.

Major Accomplishments

Marcos' first archaeological field trip occurred in June of 1967 when he joined a group of friends who had been students in one of Carlos Zevallos Menendez's courses about archaeology that were then given at the Casa de la Cultura Ecuatoriana in Guayaquil. The plan was to survey the piedmont and lower slopes of the Chanduy Hill as well as different areas of the Chanduy Valley, roughly 90 km west-southwest from Guayaquil on the Ecuadorian coastal plain.

One of the sites discovered was "La Loma de los Cangrejitos" in the Chanduy Valley where they found an early eleventh-century CE Manteño cemetery, as well as what proved to be a sociopolitical center for the same period.

The professional association with archaeologist Carlos Zevallos Menéndez proved to be a very influential one for Marcos, which lasted until Zevallos' death in 1981. In 1969 work began with Zevallos Menéndez at a new archaeological site named "La Loma del Guasango Torcido" finding a Late Guangala cemetery (c. 750 to 800 CE). In 1970 Marcos attended the International Congress of Americanists held in Lima, where he presented the preliminary results of the work at Guasango Torcido. Marcos' participation would prove to be a life-changing experience for him.

The ensuing dialogue and discussions at the Lima Congress which included John V. Murra, Carlos Zevallos, Alberto Rex Gonzalez, and Donald W. Lathrap as well as Jorge Marcos touched on two major topics in Americanist archaeology: the nature of the Ecuadorian Formative and the character of Andean-Mesoamerican correlations. The strategic location of the Ecuadorian coast, from the perspective of these problems, and the provocative ideas brought to the table by the Ecuadorean delegation culminated in another macro-regional meeting in Salinas, Ecuador, in July 1971. It was at Salinas that Carlos Zevallos presented his paper on the origins of maize agriculture in Ecuador, which he suggested took place during the initial Valdivia sequence. It was also at Salinas that Jorge Marcos accepted Donald

Lathrap's invitation to join the Anthropology Department at the University of Illinois to pursue his Ph.D. degree (Marcos 2012: 9).

As was to be expected, at UI, Jorge Marcos came under the direct influence of Donald Lathrap, who was, to many of us, the world's leading authority on the archaeology of the American tropics. Lathrap's insistence on the simultaneous use of ethnohistorical, archaeological, ethnological, and ethnoarchaeological lines of evidence was pervasive in all his courses and was echoed by other true scholars at Illinois at the time such as Gary S. Vescelius, one of the foremost experts on Andean prehistory and mathematical applications to archaeological problems, such as chronology, modeling, typology, and planimetry. This is evident in the later work of Marcos who, besides archaeology, has produced results along all these lines all during his career. An exemplary manifestation of such interdisciplinary and multidisciplinary approach can be seen in his pioneering study of pre-Columbian hydraulic engineering in his *Las Albarradas en la Costa del Ecuador* (2004), in which he directed a complex team of specialists in the investigation of ancient water systems' management and construction. This work raised the level of modern archaeological work not only in Ecuador but in all of the Americas.

Marcos' analyses of the Valdivia sequence, stemming from his doctoral dissertation work at the Real Alto site, as well as from other related sites, clarified the many controversial issues dealing with chronology and stylistics. Marcos' superbly trained eye for design and composition, blended perfectly with Lathrap's inspired approach to ceramic analysis in which the idea was to get to the ceramist's original concepts when constructing the vase, produced the best and currently unsurpassed description of the complete Valdivian sequence.

The work at Real Alto proved to be a forging ground for exemplary archaeological work, as Donald Lathrap encouraged other students to follow Jorge Marcos' (1978) lead and Deborah Pearsall (1979), James Ziedler (1984), and Emily Lundberg (1989), among others, all finished dissertations on Real Alto themes. This made Real Alto one of the best and most systematically studied site in a tropical setting outside of Yucatan and catapulted Ecuadorean coastal Archaeology during the next two decades from being a bibliographic note to being the main table of discussion on critical topics such as the origins of maize cultivation in the tropics, antiquity of ceramics (early Valdivia), and the beginnings of urbanism in the Americas.

In 1978 Marcos returned to Guayaquil and directed the research directorate of the Anthropological Museum of the Banco Central in Guayaquil, where he was instrumental in museum planning and setting up research laboratories. Between 1979 and 1980, he joined forces with longtime friend Presley Norton and obtained a grant from Earthwatch Foundation to work in Isla de la Plata and Salango, two critical sites for the present-day understanding of the Manteño society and their role in long-distance trade between 800 and 1500 CE.

In 1980 Jorge Marcos and Gustavo Galindo, chancellor of ESPOL, created the "Center for Archaeological and Anthropological Studies" (CEEA) attached to the Escuela Superior Politécnica del Litoral (ESPOL) in Guayaquil. With it came the creation of the first Licenciatura degree specifically in archaeology on the continent. The Licenciatura in archaeology (more advanced than the B.A. degree common to Anglo-American universities) produced a generation of class-, field-, and lab-trained archaeologists that took on its shoulders the discipline in Ecuador until 2010, when the first M.A. program in archaeology of the neotropics was established, again at ESPOL, under the directorship of Jorge Marcos.

Marcos entered formally into the field of heritage management with his very significant contribution in the organization of the New World Congress of Rescue Archaeology in 1981 in Quito, with financial backing from the OAS and the Banco Central del Ecuador. The papers in this conference reflected concerns that were being voiced in different circles and in many ways anticipated the critically important WAC 1 (World Archaeology Congress) held in Southampton 5 years later in 1986. By this time, the theme of the social responsibility of

archaeologists was a very heated topic, and this congress provided a forum where the issues of development, heritage, colonialism, social identity, and archaeology were debated.

In 1983 Marcos was appointed deputy regional director for the National Institute of Cultural Heritage and, following an agreement signed with the ESPOL, implemented the management of the Center for Anthropology and Archaeology (at ESPOL) to form new generations of archaeologists and anthropologists.

In 1984 Jorge Marcos and Presley Norton joined Giancarlo Ligabue in organizing the Ecuadorian Archaeology Exhibit entitled "Treasures from the Land of Atahualpa" at the Palazzo Grassi in Venice for which Marcos wrote "A Brief History of Ancient Ecuador" as the exhibit catalogue.

In the spring of 1985, Jorge was an invited professor at the "Max Uhle" Volkswagen Foundation Chair at the University of Bonn. At the time, he also spent two months as guest of the German Archaeological Institute in Bonn, together with Alberto Rex Gonzalez from Argentina and Walter Alva Alava from the Bruning Museum, Chiclayo, Peru, who was then studying (with Michael Tellenbach) the site where the "Lord of Sipan" burial was later found by Alva.

In 1991 Drs. Marcos from ESPOL, Aurelio Álvarez Perez from Universidad Autónoma de Barcelona, and Giorgio Spinolo from the Universita degli studi di Milano were awarded a 3-year European Union Delegation XII Archaeological Research Grant, to study and date Valdivia ceramics from Ecuador. Marcos alternated between the Universidad Autónoma de Barcelona and the Universidad Complutense de Madrid as an invited scholar until 1998.

That same year, he left for Washington to spend a year as a senior fellow at Dumbarton Oaks, Trustees for Harvard University. During that time, Marcos applied and was awarded a 3-year research grant by GEF-World Bank to study the ancient water detention ponds called "albarradas" in Ecuador (2000–2004).

In 2004 Marcos together with Gustavo Politis and Alfonso González Ruibal organized the master's program in ethnoarchaeology and geoarchaeology at ESPOL, which after going through many exhaustive efforts for funding, was successfully launched in July of 2010.

In 2008 he again presided, together with Dr. Silvia Alvarez Litben, the Second New World Conference on Rescue Archaeology in Guayaquil, where an in-depth discussion and analysis of social archaeology produced new contributions to the theoretical framework and its articulation with present-day social concerns in Archaeology in Ecuador. Between 2007 and 2009, he was Undersecretary of Heritage and Culture. In February 2009, he moved to Ciudad Alfaro where he began to organize the archaeological project for Cerros de Hojas-Jaboncillo. In addition, he advised and occupied different positions in the upper levels of the governmental structure and was involved in policy decisions, as well as strategies for research and conservation programs.

In 2009 Marcos was asked to develop a major research project in and around the Picoazá area in Manabí Province in western Ecuador. The idea was to pursue the implications of Marshall Saville's turn of the twentieth-century discoveries in and around Cerro Jaboncillo and Cerro de Hojas, a 35 km^2 massif that has produced over 1,200 pre-Columbian structures pertaining to the Manteño period. It is also the area which has produced the largest amount of U-shaped stone chairs. These artifacts, which are unique in the world, come from a Manteño context and imply a highly important social and political function to the whole region. In a bold, if characteristic, working hypothesis, Marcos proposes that the Jaboncillo-Hojas region is the seat of power for what he aptly calls the Manteño incipient state.

Marcos' contributions range from the methodological and artifactual level, such as the classification and contextualization of early Valdivia ceramics, the mechanics and implications of hydraulic engineering works, to the regional such as the Cangrejitos, Real Alto, and Hojas-Jaboncillo studies about the development of proto-urban regional centers in different time periods, to the macro-regional such as the masterful data gathering and weaving of the ancient spondylus shell trade network covering

most of the Ecuadorean coast and eventually expanding in Mateño times from Acapulco to Cuzco.

Lathrap's lifelong interest in the role of maize in Valdivia economy has been continued by Marcos and, with Deborah Pearsall Marcos, is to be credited with ushering modern paleobotanical studies into Ecuadorean archaeology. His study of clay pastes and mining sources with Aurelio Alvarez opened the door for systematic study about the processes of ceramic manufacture, selection of raw materials, and exchange routes (Marcos et al. 1988). His measured, reflexive style of argumentation has provided a steady platform where thorny points of view and theoretical outlooks can be discussed productively, such as in the decades-old debate between processual and social archaeology. This is one reason why the congresses and meetings under his leadership have always produced constructive syntheses.

But Marcos' greatest contribution, the one that will stand the test of time, will be his unflinching efforts and the victories in his leadership towards the creation of the Licenciatura in archaeology at ESPOL and, most recently, the M.A. program as well. These programs have been the sole lifeline in the country for the creation of native professionals that will continue for years to come. The lines of investigation will continue with, hopefully, the same scientific quality with which they were crafted initially under Donald Lathrap's inspiration and molded under Jorge Marcos' jovial character, surgically precise observations, artistic ability, and holistic approach.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Ceramics: Scientific Analysis
- ▶ Cultural Heritage Management Technology and Training
- ▶ Ethnoarchaeology
- ▶ Field Schools, Archaeological
- ▶ Geoarchaeology
- ▶ González, Alberto Rex
- ▶ Maize: Origins and Development
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Marcus, Joyce

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Basic Biographical Information

Joyce Marcus is a prominent anthropological archaeologist and epigrapher specializing in the archaeology of pre-Columbian Mesoamerican and Andean cultures. Born and raised in California, she enrolled at the University of California at Berkeley, graduating in 1969. At the encouragement of Robert Heizer, Marcus chose Harvard for graduate studies. When she arrived in 1969, Gordon Willey and a roster of notable Maya archaeologists were building up Maya archaeology at the Peabody Museum. Ian Graham asked her to accompany him to the Maya lowlands in 1970, where she aided him in recording hieroglyphic texts. While in northern Guatemala, Marcus excavated at El Mirador and became the first to recover Chicanel and Usulután pottery there, dating key structures to the Preclassic.

On her return to Harvard, she became close friends with Tatiana Proskouriakoff sharing almost nightly dinners. Since Proskouriakoff had achieved success by studying texts at Piedras Negras, she encouraged Marcus to pick one site's texts to examine in detail. Marcus, however, was more interested in examining multiple sites in a search for political hierarchies and inter-site interaction. She received her Ph.D. in 1974 writing on Maya emblem glyphs as a means of inferring the timing of the emergence of the Maya state. She joined the faculty of the University of Michigan in 1985. She is currently Robert L. Carneiro Distinguished University Professor of Social Evolution and Curator of Latin American Archaeology at the Museum of Anthropology of the University of Michigan. In 1997 she was elected as a member of the National Academy of Sciences.

In addition to her Mayan work, Joyce is well known for her work with her husband Kent Flannery at San José Mogote in Oaxaca (Flannery & Marcus 1983; Marcus & Flannery 1996). San José Mogote was the largest and most important settlement in the Valley of Oaxaca. It is considered to have evidence for the oldest permanent agriculture and probably was the first settlement in the area to use pottery. They demonstrated the processes of its growth and decline, from its humble beginnings as a cluster of family dwellings to a complex political center that ruled over a number of subsidiary settlements to becoming a tributary to the Monte Albán.

In the 1980s, Marcus decided to expand her knowledge of ancient states by investigating the Kingdom of Huarco in Peru's Cañete Valley. In collaboration with Peruvian ethnohistorian María Rostworowski, she excavated Cerro Azul, a coastal community whose elite families oversaw hundreds of fishermen. Marcus discovered that a specialized fishing community like Cerro Azul could afford to devote itself to fishing, fish drying, and fish storage because it was supplied with agricultural products from equally specialized inland farming communities. Such exchanges of products were facilitated by the ruler of Huarco until his kingdom was conquered by the Inka in CE 1470 (Marcus 2008).

Major Accomplishments

Joyce Marcus is one of the pioneers in the investigation of ancient regional territorial

organization in Mesoamerica. Beginning in the early 1970s, she applied central place theory to lowland Maya settlement patterns to identify primate centers and hierarchies of secondary and tertiary centers. This led to the first study to integrate archaeological settlement data with results from recent advances in the decipherment of ancient Maya texts, which had identified emblem glyphs that appeared to refer to specific sites in the Maya lowlands.

In her book *Emblem and State in the Classic Maya Lowlands* (1976b), Marcus focused on shifting political and military alliances and the evolution of hierarchies. She isolated three strategies the Maya used to incorporate dependencies: sending royal women from capitals to marry lords at subordinate centers, requiring lords at subordinate centers to attend inaugurations at the capital, and joint military raids in which subordinate lords fought alongside rulers from capitals. These themes, as well as the origins of writing, became the focus of her work in *Mesoamerican Writing Systems* (1992a). She argued that Mesoamerican writing emerged when iconographic symbols proved insufficient for recording proper nouns (names of leaders, captives, and place names), recording the date of an event, and labeling objects to claim ownership.

By integrating the spatial distribution of emblem glyphs with regional settlement patterns, Marcus was able to identify a series of political capitals, each located at the nexus of a hierarchy of subordinate sites. She also pointed out that these hierarchies were maintained by marriage, military, and political alliances. One consequence of this study was her identification of the emblem glyph for the site of Calakmul, which provided the key evidence that led to the realization that Calakmul was the capital of one of the dominant powers of the Maya Classic period.

Working in the Valley of Oaxaca, Marcus identified the glyphs for a series of subordinate centers inscribed at Monte Alban, the capital of the Zapotec state. Marcus (1976a, 1992a) was able to show that Zapotec writing, the earliest in Mexico, arose in the context of endemic chiefly competition; other writing systems like those of the Maya and Mixtec were also used as tools in the competition for dynastic privileges and for political offices. Her work on Zapotec writing was the result of a 1972 visit to the Valley of Oaxaca, where she first examined Zapotec texts. In Oaxaca she went on to collaborate with Kent Flannery, investigating the replacement of egalitarian, politically autonomous village societies by multisite polities with hereditary rank. Their collaboration resulted in *Zapotec Civilization* (1996), which argued that the initial Zapotec state emerged when one chiefdom subjugated and incorporated its rivals.

As a result of both her Oaxaca and Maya lowland research, Marcus proposed that Mesoamerican civilizations were characterized by *political cycling*, recurring periods of consolidation under large expansionist states followed by breakdowns into numerous smaller states. For the Maya, this pattern was reflected in the development of three such cycles of consolidation, in the Late Preclassic, the Late Classic, and the Postclassic, which ended in a final period of fragmentation on the eve of the Spanish Conquest (Marcus 1992b, 1993, 2008).

Marcus proposed a "Dynamic Model" in which expansionist states first incorporated weaker polities, only to have them learn statecraft, secede from their overlords, and form their own expansionist states. In other cases, subordinate polities formed alliances that gave them the power to secede and expand. Marcus (1973, 1976) found that during their apogee, some Maya capitals were surrounded by hexagonal "central place" lattices of secondary centers. Monte Albán in the Zapotec region was surrounded by similar central place lattices at the peak of its power. Such lattices broke down when subordinate centers seceded.

Marcus's work is also notable for including ideology within a systems framework for modeling ancient Zapotec society in the Valley of Oaxaca. By combining archaeological and ethnographic data, both Marcus and Kent Flannery have produced a balanced perspective on the role played by ideology in the development of Zapotec and other Mesoamerican societies. Based on patterns of gender-associated ritual activity detected from the archaeological record,

Marcus (1998, 2001) identified the increasing centralization of power within the Valley of Oaxaca. Initially religious practice was family and community based. At this time women conducted ancestor veneration rituals within their households, while men conducted rituals in separate men's houses. But Marcus found that by c. 700–500 BCE, these earlier religious practices disappeared as ritual activities were taken over by elites. Religion became focused on state-sponsored temples thereafter, initiating a long process of consolidation of elite power by controlling labor, wealth, and ideology that culminated in the development of the state. In many ways, her approach anticipated the current interest in cognitive archaeology.

In an age when increasingly specialized and restricted perspectives have become the norm for scholars, Joyce Marcus has remained dedicated to a broad comparative view of the past. She holds that the best archaeology is informed by ethnography and ethnohistory and requires a search for widespread principles. These principles emerge only when a number of prehistoric cultures are compared and contrasted. Her focus has always been on human decision making, competition, and cooperation, rather than monolithic causes such as droughts and other environmental imperatives. Furthermore, she has widened this cross-cultural comparative perspective by conducting excavations in the Andean area of South America and utilizing case studies from Egypt and other Old World civilizations. As a result, throughout her career, Marcus has enlightened our understanding of pre-Columbian Mesoamerica with landmark publications based on comparative studies of ancient settlement patterns, social systems, trajectories of political development, and the origins and development of writing systems.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Cognitive Archaeology
- ▶ Engendered Archaeologies
- ▶ Flannery, Kent Vaughn
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Willey, Gordon Randolph

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Maritime Archaeological Organizations

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Introduction

There is a broad range of maritime archaeological organizations worldwide whose activities are directed towards recording and preserving underwater cultural heritage (UCH). Membership ranges from professional, to a mixture of professional and nonprofessional, to purely recreational. Depending on their role some organizations restrict their membership to qualified, professional practitioners, while others are inclusive of a range of qualifications and experience.

Definition

Maritime archaeological organizations in this context are distinct from statutory UCH management authorities, government agencies, and UCH consulting firms and can be generally categorized into the following types:

1. Advisory committees and councils set up to establish high-level communication and provide professional underwater archaeological (ethical and technical) advice, with international membership based on recognized qualifications and experience in UCH management. Examples include the International Council on Monuments and Sites (ICOMOS), International Council on Underwater Cultural Heritage (ICUCH), Society for Historical Archaeology (SHA), and Advisory Council on Underwater Archaeology (ACUA).
2. Not for profit professional or paraprofessional "avocational" groups, institutes, and nongovernment organizations (NGOs) made up of diverse community members (e.g., recreational and professional divers, conservators, academics, students, professionals, general public) that conduct activities related to UCH sites. Their activities may include some or all of the following: research, conducting underwater archaeological surveys and excavations, experimental archaeology, conservation, displays and exhibitions, lobbying governments to introduce or amend protective UCH legislation, disseminating information and producing publications, providing training in underwater archaeological techniques, developing community and government networks, running conferences, and promoting the ethical and responsible management of UCH sites. Some examples of such organizations include the Nautical Archaeology Society (NAS), Australasian Institute for Maritime Archaeology (AIMA), Maritime Archaeology Association of New Zealand (MAANZ), Asian Research Institute for Underwater Archaeology (ARIUA), Arqueonáutica (Portugal), Groupe de Recherche en Archéologie Navale (France), Ships of Discovery (USA and Caribbean), Museum of Underwater Archaeology (MUA), and the Underwater Archaeology Society of British Columbia (Canada).
3. A third category is for groups or institutes whose titles may include the descriptors "maritime," "heritage," "archaeological," "historical," or "conservation" but whose activities are not undertaken in accordance with accepted international archaeological or heritage management practices. Their activities may include removing artifacts from UCH sites for personal collection, sale, or trade and may be local or international in scope.

The discipline of underwater/maritime archaeology owes much of its development to volunteer or "avocational" archaeologists – usually divers passionate about documenting and protecting underwater cultural heritage (UCH) sites. Many of the earlier established maritime archaeological organizations were set up in the 1960s–1970s to provide volunteer support for large-scale government-funded shipwreck/UCH excavations. There are numerous such maritime archaeological organizations worldwide, and a comprehensive list is beyond the scope of this entry.

Avocational archaeologists often have professional or technical skills in other areas that contribute enormously to the safe and professional running of underwater archaeological projects. From the Australian perspective, volunteer community participation in underwater archaeological work has long been recognized as essential to encourage public understanding and support for the protection and ethical management of underwater cultural heritage (UCH) sites.

Maritime archaeological organizations such as NAS, ACUA, and AIMA have an international membership and have led much professional and ethical research into underwater archaeological techniques for recording and excavation, the development of ethical codes of conduct to distinguish underwater archaeology from treasure hunting, and the dissemination of information via regular conferences and publications. In some countries such as Japan where there is no official government authority responsible for UCH, organizations such as ARIUA provide advice to local prefecture governments and community museums on issues of UCH management.

The ICOMOS ICUCH was established in 1991 specifically to provide advice on UCH sites to ICOMOS and UNESCO. Its mandate was to develop the UCH management guidelines published as the 1996 ICOMOS Charter, also known as the Sofia Charter. The Charter has in turn became the basis for the Annex to the *2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage*, recognized as world's best practice for the management of UCH sites.

Key Issues/Current Debates/Future Directions/Examples

Paralleling the growth and changes in the discipline of maritime archaeology, avocational groups have changed over time. Some groups were initially divers whose interest in shipwrecks was stimulated by finding and collecting artifacts from shipwrecks, prior to the enactment of protective legislation and modern understanding of the damage caused to sites by such activities. With the increase in knowledge and skills, many organizations matured to become active proponents for the ethical management and protection of sites. The decline in major shipwreck excavations since the 1970s–1980s has meant that some of the established avocational groups have not seen the influx of new members that enthusiasm for such labor-intensive projects generates; however, the skills base in most groups is maintained by experienced individuals.

The popularity for NAS-based training and similar UCH training courses worldwide exhibits the demand for practical training in UCH skills and bodes well for the future of underwater archaeology and community involvement. The continuing development of diving technologies has seen deeper UCH sites being accessed by technical divers, though modern risk-based management usually means government agency and academic divers are not permitted to dive to such depths. This makes collaboration and communication between technical divers and practitioners important in order to document deep UCH sites. Some recently formed avocational groups are focused on documenting UCH sites only accessible with technical diving equipment, for example, Southern Ocean Research (SOR) in Australia.

One significant issue is that many organizations do not publicly subscribe to guidelines or have a Code of Ethics that members are required to adhere to. However, any group involved in UCH activities should explicitly state their stance on treasure hunting and the unethical or illegal salvage of UCH sites in their charter, constitution, or website. Increasingly, ethically minded avocational maritime archaeological organizations are publicly aligning themselves with the *2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage* as the accepted international standard by which to conduct underwater archaeological work.

Cross-References

► Australasian Institute for Maritime Archaeology Inc. (AIMA)

- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Committee on the Underwater Cultural Heritage (ICUCH)
- ▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)

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Maritime Contact Rock Art

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Introduction and Definition

Maritime contact rock art refers to depictions of maritime-related introduced subject matter in rock art most commonly linked to exploration, trade, and exchange during the last 500 years. In most circumstances it relates to the depiction of ships by local populations but also includes depictions of any material culture related to these maritime activities.

Key Issues/Current Debates/Future Directions/Examples

Research

Maritime contact rock art has been documented in many places around the world including, but not limited to, Australia and the Pacific, Southeast Asia, Europe, Africa, and North America. Most studies have highlighted the technical aspects of the vessels and/or attempted to interpret the time period, type, identity, and historic context of the vessel depicted (see, e.g., Pritchard 1987; Mott 1990; Burningham 1994, 2000; Langdon & Van de Moortel 1997; Roberts 2004; O'Connor & Arrow 2008; Wesley et al. 2012) while others have placed their studies in a wider theoretical context such as cross-cultural interaction (e.g., Clarke 1994, 2000a, b; Chaloupka 1996; Clarke & Frederick 2006, 2008; Goldhahn 2012; Taçon et al. 2012). There has been considerable growth in the number of maritime contact rock art studies during the last decade, and this trend is expected to continue as the significance of this art form becomes more widely appreciated.

Case Study

Of all the countries with maritime contact rock art, Australia is thought to have the most examples, and in particular, the north of Australia is home to diverse and innumerable paintings related to this theme. In recent centuries Indigenous Australians came into contact with outsiders from a variety of countries and cultural backgrounds including Macassans, Dutch, English, French, and Spanish traders and explorers. Some of the most common recent rock art in Australia includes paintings and engravings of the watercraft visitors used to

Maritime Contact Rock Art, Fig. 1 Djulirri rock art complex, Wellington Range, Australia

reach these shores. In many cases, this same watercraft quickly became an everyday part of indigenous life. Maritime contact rock art, therefore, provides a means to consider, in localized and national ways, these cross-cultural encounters.

One recently documented site in northern Australia, a site recently added to the Northern Territory Heritage Register and now nominated for National Heritage Listing, is known as Djulirri (Fig. 1). The site complex sits approximately 20 km from the coast in the Wellington Range sandstone massif which is surrounded by coastal plains and a number of small and larger rivers that feed out into the sea. At least 25 introduced types of watercraft (including praus) are painted at Djulirri, and they range in age from the seventeenth century to the 1960s (May et al. 2010; Taçon et al. 2010; Fig. 2). While some of these vessels may have been seen by or visited or worked upon by local aboriginal people, other paintings may be a mixture of features from different ships sometimes with additions being made over time, perhaps by different artists. Some show less familiarity between artist and subject matter. Others still suggest that the artist may have only seen their subject matter in magazines, newspaper, books, or possibly as decoration on tobacco tins in the nineteenth century. One of the remarkable aspects of sites such as Djulirri is that the density and diversity of maritime contact rock art allow us to explore a range of detailed technical and theoretical archaeological questions.

Sites such as Djulirri tell us that watercraft have played a significant role in the lives of aboriginal people since at least the seventeenth century. Artists have depicted this subject matter as part of ongoing artistic systems of representation but in far higher numbers than other contact period art, such as guns, horses, and cattle (May et al. 2010, 2013; Taçon 2012). Maritime contact rock art tells stories of vessels well known across the northern coast of Australia and others that might only have been seen once. As well, they suggest artists were familiar with their subject matter but also not afraid to use "artistic license" and new techniques for painting. They indicate watercraft became part of the aboriginal story-telling traditions, but were not stagnant, instead being updated and renewed with the coming of new watercraft into north Australian waters. While European artists aboard ships travelling the coast of Australia may have believed they were the observers, in fact aboriginal artists were returning the compliment tenfold.

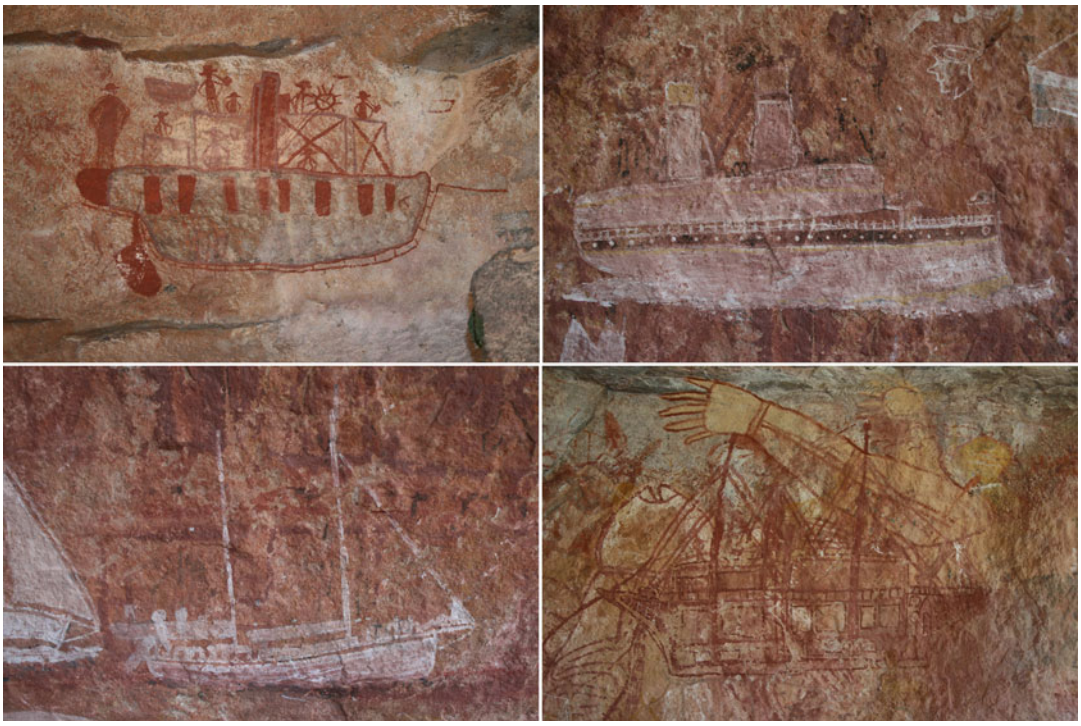

Maritime Contact Rock Art, Fig. 2 Maritime contact rock art from Djulirri, Wellington Range, Australia

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► Australian Paleoart
► Rock Art, Forms of

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Maritime Ephemera

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Introduction

Humans have throughout history found many uses for the coast and intertidal zone and its resources. Most people will think first of formal port structures, but there are many smaller and more unusual features to be found, depending on the local geomorphology and natural resources.

Key Issues/Current Debates/Future Directions/Examples

Core uses of the coast throughout the world include farming, fishing, and trade. Until the industrial revolution, transport by water was vastly cheaper than transport over land, and as much as possible was moved by water. There are places where every farm had its little jetty or quay for transporting people, animals, and other agricultural produce. Similarly most coastal communities had some places where boats could be anchored or beached, for the transport of people and goods. Coastal settlements were generally located where there was a good anchorage or landing-place, preferably sheltered from the prevailing winds.

Subsistence fishing was often done from the shore, with baited lines, or using fish-traps constructed of wood or stone in the intertidal zone, which funneled fish into nets or baskets, usually on a falling tide (Fig. 1). Fishing from small boats needed no built infrastructure. Commercial fishing usually did leave evidence in the form of piers, quays, net-stores, and ice-houses. But even subsistence fishing may leave remains, for example, evidence of areas where nets were spread out to dry. Among the less obvious evidence, cart-ruts across the foreshore have a story to tell, about gathering bait for fishing, or seaweed for manure. Associated with mankind's activities in coastal waters are navigational aids, ranging from simple poles or cairns through classical temples to the large lighthouses of the nineteenth century, capital-intensive structures usually built and maintained by national organizations or governments.

For much of humankind's history, transport of heavy goods overland was expensive, or even impossible, so some coastal areas will yield evidence of extractive industries, such as quarrying for stone, mining for coal, or felling and moving timber. Such products were either transported for sale in their raw form, or used to produce other

Maritime Ephemera, Fig. 1 A large stone fish-trap in Airds Bay, Appin, Argyll, Scotland

Maritime Ephemera, Fig. 2 Remains of limeworking site on the island of Lismore, Argyll. On the right is the quarry face. Moving left, level with its floor are the tops of a pair of kilns. Further left and at a lower level are the manager's office, and stores for the coal used as fuel, and the finished lime. In the left of the picture is the pier to which coal was brought in and from which the finished lime was taken away in "lime smacks", vessels dedicated to this single, dangerous cargo

saleable products. Coastal quarries provided stone for building, but in the case of limestone, to burn to produce lime (Fig. 2). Timber could be used for shipbuilding, or stacked and burned to make charcoal for processing iron ore, and coal, in cool climates, could be used to boil seawater to produce salt (Fig. 3). In warmer climates, salt was produced along suitable coasts by evaporation in shallow tanks, and this too leaves archaeological evidence.

Maritime Ephemera, Fig. 3 Rock-cut basin in which seawater was held as the tide fell while debris settled out. The water was then pumped along the central channel to another holding tank on land from where it was distributed to the nine salt-pans at this late-18th-century salt-production site near St Monans, Fife, Scotland

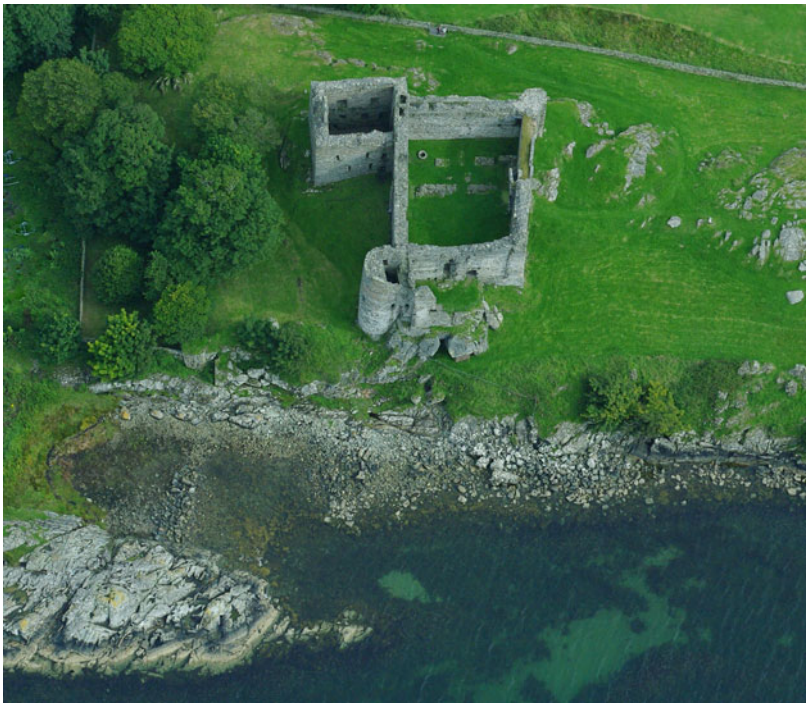

Maritime Ephemera, Fig. 4 Castle Sween, Knapdale, Argyll, one of the oldest stone castles in Scotland. Note its coastal location and shaltered landing-place

At many coastal sites, there will be evidence of the exercise of political, social, or economic control, from prehistoric forts and medieval castles (Fig. 4) to structures built by regional or national authorities, such as customs houses and bonded warehouses. Major ports often had designated quarantine stations nearby, though these may not be easily identifiable archaeologically.

There should also be evidence for the building, maintenance and recycling of boats and ships,

which was done as close to the water as was feasible. Traces may range from scatters of nails to large dry docks. Some boats were protected during their working life, in structures ranging from classical shipsheds through the Iron Age and later boathouses of Scandinavia to the submarine pens of World War Two. The coast itself has in places been altered by humans, with structures designed either to reclaim land or to prevent erosion. It has also been used for recreation, which may leave archaeological evidence such as bathing-houses, or swimming-pools cut from rocks or enclosing areas of the intertidal zone. Wildfowling may also leave evidence in the form of hides.

The coast is often a key area for defense during wartime, and many features survive, from prehistoric forts through medieval and later castles to Martello Towers and the pillboxes, gun emplacements, and other features from twentieth-century wars. Many such features may be clustered in strategically important areas, and there may be multiple reuse of key sites.

Shipwrecks can happen anywhere along coasts, and occasionally there may be evidence of survivors, in the form of temporary camps, where they either waited for rescue or built a smaller boat from the wreckage and set off again. Debris from wrecks can end up on shore, as can objects washed or thrown overboard from vessels at sea. The coast can also be used as somewhere to dispose of unwanted material from the land, from household ash to derelict cars.

There can be few stretches of coast where an experienced archaeologist could not find evidence for man's exploitation of the sea and its resources. And although much of the surviving evidence may be less than 300 years old, many of the uses identified could be expected to have applied in earlier periods, even though no direct evidence survives.

Future Directions

The coastal zone is now being seriously studied. There are Coastal Zone Assessments, consisting of rapid surveys of large stretches of coastline looking for any archaeological remains. Usually conducted by local or national heritage agencies, such projects have demonstrated that a surprising amount of evidence survives even in apparently unlikely areas (for example, Paddenberg & Hession 2008; Scottish reports available via http://www.scapetrust.org/html/czas.html).

There are also recent studies of specific areas, such as Strangford Lough in Northern Ireland (McErlean et al. 2002) where "fieldwalking" techniques were applied to the foreshore, leading to a wide range of discoveries. The investigation of coastal sites is being carried out throughout the world (for example, Ford 2011), and is proving well suited to community involvement in discovery, monitoring, research, survey, and excavation (see, for example, http://www.shorewatch.co.uk; http://www.scapetrust.org/html/scharp.html). It is important to understand the many uses of the coastal zone, to counterbalance our modern bias toward road, rail, and air transport of people and goods, as well as understanding the role of coastal and maritime resources in past economies.

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- ▶ Martin, Colin
- ▶ Post-Medieval Archaeology (Europe)

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Maritime Historic Site Management for the Public

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Introduction

Maritime historic site management generally revolves around issues regarding preservation and protection of resources from looting and commercial salvage, as well as from inadvertent damage by visitors, trawling, dredging, development, and many other potential threats. The purpose of management efforts is to ensure maritime resources, which are a tangible link to the past, survive for present and future generations. Effective strategies for explaining value and instilling appreciation of these sites to the public are key to successful management plans. In many cases, maritime resources technically "belong" to the public because they are located on state, federal, or other public lands. In all cases, cultural resources, maritime and otherwise, are part of the common heritage of our human condition. Archaeologists and cultural resources managers utilize many ways to manage maritime resources for the public benefit and continue to use new technologies and innovative strategies to encourage the public to enjoy, preserve, and learn from maritime historic sites.

Public education and outreach are considered professional obligations for archaeologists, right along with ethical research and reporting of results. If archaeological research does not produce a better understanding of the past, or if the field loses its scientific credibility where the public is concerned, the value of archaeology will decrease in the eyes and minds of the public. Public education is proving to be one of the most powerful tools available to resource managers. The purpose behind management of maritime historic sites for the public, especially through the establishment of underwater archaeological preserves, shipwreck parks, and maritime heritage trails, is to encourage the public to grasp the value of preservation instead of consumption of a nonrenewable resource through exposure to and education about shipwrecks and other maritime cultural resources. A vast majority of interpretive media created about in situ maritime sites are aimed toward this end. Although archaeological sites, including shipwrecks, in many states and countries are protected under federal, state, and local law, this approach does not ensure the protection of shipwrecks (and other maritime cultural sites) from the effects of treasure hunters, souvenir seekers, construction companies, and well-meaning but uninformed divers. Educating the diving public seems to be the only viable alternative to legislation which, although based on good intentions, often proves ineffective and unenforceable.

Definition

Management of maritime historic sites for the public may be defined as methods and strategies used by archaeologists and cultural resource managers to encourage the public to visit, enjoy, value, learn from, and ultimately protect maritime heritage sites. These methods generally involve interpretive strategies to promote educational and recreational visitation. Heritage tourism often is closely tied to public management of maritime cultural sites (as well as other types of cultural sites).

Many interpretive strategies incorporate both terrestrial and submerged maritime historic sites into one attraction that combines elements of several kinds of maritime activity, such as lighthouses, docks and wharves, harbors and ports, coastal fortifications and defenses, and maritime communities. Generally termed a trail and connected through thematic publications or markers, these attractions are ideal for illustrating the maritime cultural landscape of a region or locality. Isolated shipwrecks and groups of shipwrecks usually are interpreted for the diving public as a shipwreck park or underwater archaeological preserve, although trails of submerged attractions also have proven feasible.

Ideal wrecks for this type of promotion are in relatively shallow, clear water and are near the shore. Certainly shipwrecks not in this type of environment are successfully promoted, but the most popular and visited tend to be easy to access and easy to dive. Many also are accessible to snorkelers, which increases the visitor base tremendously. Videos, websites, and glass-bottom boats can enable nondivers to "visit" these sites as well.

Historical Background

Terrestrial archaeological sites have long benefited from management programs targeted to the public, ranging from elaborate reconstruction and living-history interpretations, such as those practiced at Colonial Williamsburg in the US and the Jorvik Viking Centre in the UK, to informal tours and "public days" now incorporated at many archaeological projects. Long-standing volunteer programs encouraging public participation also are mainstays of modern archaeology, providing not only free labor but also a way to educate and engage the public in active research. Only recently, however, have archaeologists and resource managers begun to consider submerged sites appropriate for similar treatment. The growth of sport diving as a popular recreational pursuit increases the potential volunteer base for underwater projects as well as the number of people interested in archaeology underwater and in visiting underwater heritage sites. The proliferation of divers also leads to additional pressure through visitation on already limited and fragile shipwrecks and other submerged sites. Additionally, a pervasive attitude seems to exist among sport divers, fostered by the popular media, that anything underwater can be taken by the person who finds it, regardless of existing laws protecting submerged cultural resources.

While the first "open-air" museum at a historic site was opened in 1891 at the town of Skansen near Stockholm, Sweden (Bennett 1995: 115), public interpretation and access to in situ archaeological resources owe some developmental history to open-air and open-water ecological parks and preserves. These areas protect natural resources, including wildlife, plant life, and geological features, while granting and encouraging public access to the resource in a controlled and sustainable manner. Ecologists recognize that allowing public access to resources encourages visitors to learn about them which, in turn, promotes appreciation and conservation (Andrews 1999: 138). Environmental managers also pioneered directly involving the public, as trustees or stakeholders, in the management and conservation of natural resources (Griffith 2003). The concept of the outdoor historical museum spread to other nations, including the United States (Murtagh 1997: 90), in the 1920s and 1930s, although limited to terrestrial historic sites which were considered appropriate candidates for nontraditional museums. The idea of submerged archaeological sites as underwater museums lagged far behind.

Promoting submerged cultural resources, particularly shipwrecks, as heritage tourism attractions is a relatively new method of maritime historic site management. Although plans for preserving and promoting submerged cultural resources through public education and interpretation were introduced as early as the late 1970s (Council of Europe 1978: 21-5), nearly a decade passed before the establishment of the first underwater archaeological preserves. Programs to provide public access to interpreted shipwrecks and other historic maritime sites began to develop in the mid-1980s and continue to grow today. In recent years, conservation and preservation efforts by archaeologists were aided by developments in business and governmental arenas. Dive training agencies began to promote conservation of shipwrecks just as they promote conservation of natural resources such as manatees and coral reefs; the Professional Association of Diving Instructors' (PADI) Respect Our Wrecks initiative through its Project AWARE is one such program (PADI 2012). Additionally, passage of national legislation formalized preservation initiatives; for example, the US Abandoned Shipwreck Act of 1987 not only gives states title to shipwrecks in their waters but also mandates

management of the shipwrecks for the public benefit, including public access. Internationally, the 2009 ratification of UNESCO's Convention on the Protection of the Underwater Cultural Heritage provides for international protection of maritime historic sites, including in situ preservation and prevention of commercial exploitation. The legally mandated requirement of public access to submerged and other maritime cultural sites is addressed by archaeologists in several ways. One of the most popular ways is through the establishment of shipwreck parks, underwater archaeological preserves, and maritime heritage trails.

Archaeological resources exhibited in situ take advantage of contextual integrity by encouraging visitors to understand relationships between the site and its environment, to feel a direct connection with the content of the "display," and to appreciate the knowledge available from a site preserved in context. Public education and outreach efforts often, and intentionally, lead to the public's desire to visit the resource, resulting in heritage tourism becoming one of the fastest-growing segments of the travel industry (Boniface & Fowler 1993; Jeffries 2001). Education and interpretation strategies often are designed to explain the knowledge value of the resource to the public and to describe the benefits of preservation. While visitation generally is encouraged, managers must strive to ensure zero or low impact to the resource in order to create a sustainable attraction and to preserve the resource for future research and enjoyment. Sustainable use of cultural resources is dependent upon educating the public about the nature of the sites, which often are fragile and susceptible to damage, whether unwitting or intentional. In the case of submerged sites, educational efforts focus on the diving public. Public education efforts generally include printed and electronic media as well as other types of interpretive literature and site markers (Fig. 1a and b). In promoting access to submerged sites, however, managers should be aware of the risks inherent in SCUBA diving and the nature of the environment surrounding their shipwrecks so that visitors are not led into dangerous situations.

Encouraging public access to archaeological sites is described as both incompatible with and contradictory to the goal of preserving a site intact (Hannahs 2003: 6). Certainly the best-case scenario for preservation is for a site never to be discovered, but that is disingenuous and defeats the point of archaeology. Once a shipwreck is discovered, however, it cannot be "undiscovered" and the job of managing the site – taking into account relevant legislation, needs of the public, and needs of science – begins. Educating people who visit the site is the best method to ensure the site is treated with respect and care so it will last into the future. Managers of preserve, park, and trail programs around the world developed a variety of schemes to protect resources while encouraging public access. Interpretive methods include literature (Fig. 2), underwater markers (Fig. 3), signage (Fig. 4), Internet-based media (Fig. 5), and laminated guides for underwater touring (Fig. 6a and b). Archaeologists and resource managers seem to agree that public interpretation of in situ maritime sites is an effective means of protecting sites while educating visitors about the need for preservation of nonrenewable cultural resources, although some issues remain to be solved.

Key Issues/Current Debates

Protecting Sites While Encouraging Public Access

One of the most pressing concerns facing archaeologists and cultural resource managers in the twenty-first century is how to protect cultural resources for meaningful research and future investigation while ensuring access to citizens who, in many cases, own the resource. Unlike natural resources which, given time and protection, can regenerate, cultural resources on land or underwater are nonrenewable; once compromised, whether through controlled scientific excavation or vandalism, the cultural resource is forever affected. In order to preserve known heritage resources and to encourage the protection of newly discovered sites, archaeologists and

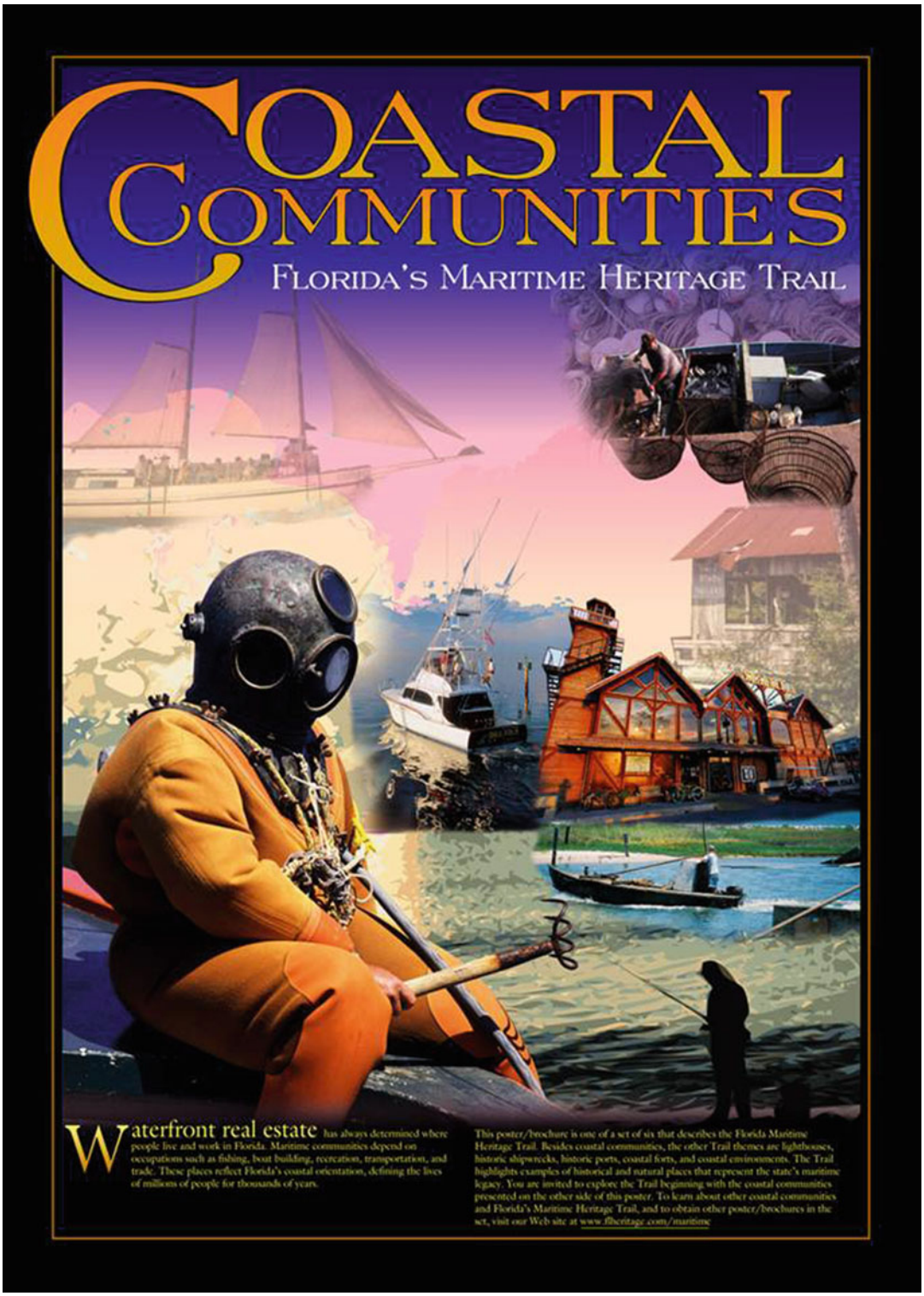

Maritime Historic Site Management for the Public, Fig. 1 (continued)

Maritime Historic Site Management for the Public, Fig. 1 (**1a** and **1b**) The Florida Maritime Heritage Trail poster/brochures are double sided, featuring images on one side and information on the other (Image courtesy of Florida Department of State, Bureau of Archaeological Research)

Maritime Historic Site Management for the Public, Fig. 2 Interpretation for Florida's Underwater Archaeological Preserves includes brochures that present site history, biology, and instructions for safe diving (Image courtesy of Florida Department of State, Bureau of Archaeological Research)

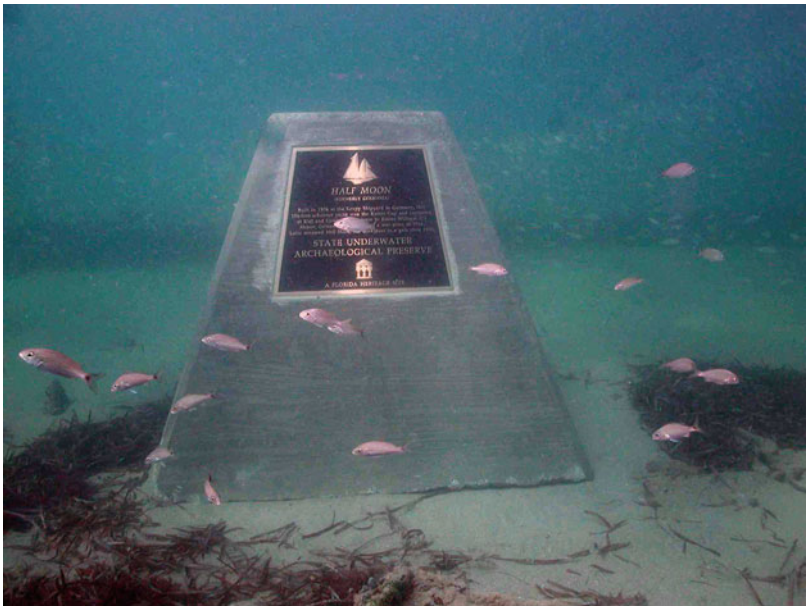

Maritime Historic Site Management for the Public, Fig. 3 Florida's Underwater Archaeological Preserves are marked underwater by bronze plaques set in cement monuments (Image courtesy of Florida Department of State, Bureau of Archaeological Research)

resource managers must find ways of promoting the inherent value of submerged sites. Sport divers often find shipwrecks and, even more frequently, seek out known sites to visit. Unfortunately, many divers still view shipwrecks as repositories of treasure to be mined for personal gain and have a "finders-keepers" mentality for any object found under the water. Generations of television programs, movies, books, magazines, and other media reinforce this image, and the legal salvage of shipwrecks still permitted in some areas adds to the struggle faced by archaeologists. In the face of the failure of legislation alone to protect cultural resources (Prott & O'Keefe 1981: 177; Flatman 2003: 148), public education and outreach programs that encourage learning through responsible visitation appear to be the most effective tools available to managers.

Maritime parks, preserves, and trails all share two basic goals: (1) the in situ preservation of

maritime resources and (2) the interpretation of these resources for public education and enjoyment. The ideal end result is for the public, having experienced the park, preserve, or trail, to gain an understanding of the importance of the resource as an irreplaceable element of our common history and of the need to protect it *and all others* for future generations. Toward this end, archaeologists and resource managers seek to create an experience that not only is exciting enough to capture visitors' time and attention but is meaningful enough to inform the visitor as well.

Maritime Historic Site Management for the Public, Fig. 4 Shore-based signage along Australia's coast marks the location of historic shipwrecks, providing information for divers, fishermen, and beachcombers (Photo by author)

Controlling/Monitoring Visitor Behavior

A visitor to an in situ archaeological site becomes an active participant rather than merely a passive spectator in the management of the site as a museum. Due to the increased level of interaction with the exhibit and, in the case of underwater and remote open-air museums, the lack of on-site professional staff, the visitor is asked to fill the role of interpreter, curator, educator, and trustee and may even become part of the exhibit itself if viewed by others (Hetherington 1996: 173). Visitors to in situ museums often are out of sight of managers and other visitors and simply are trusted to conduct themselves in a manner consistent with the preservation goals of the museum. The continued existence of the in situ museum depends on the visitor taking an active part in its preservation due to their belief,

Maritime Historic Site Management for the Public, Fig. 5 Websites offer virtual tours of underwater sites, providing access to nondivers and encouraging visitation (Image courtesy of Florida Department of State, Bureau of Archaeological Research)

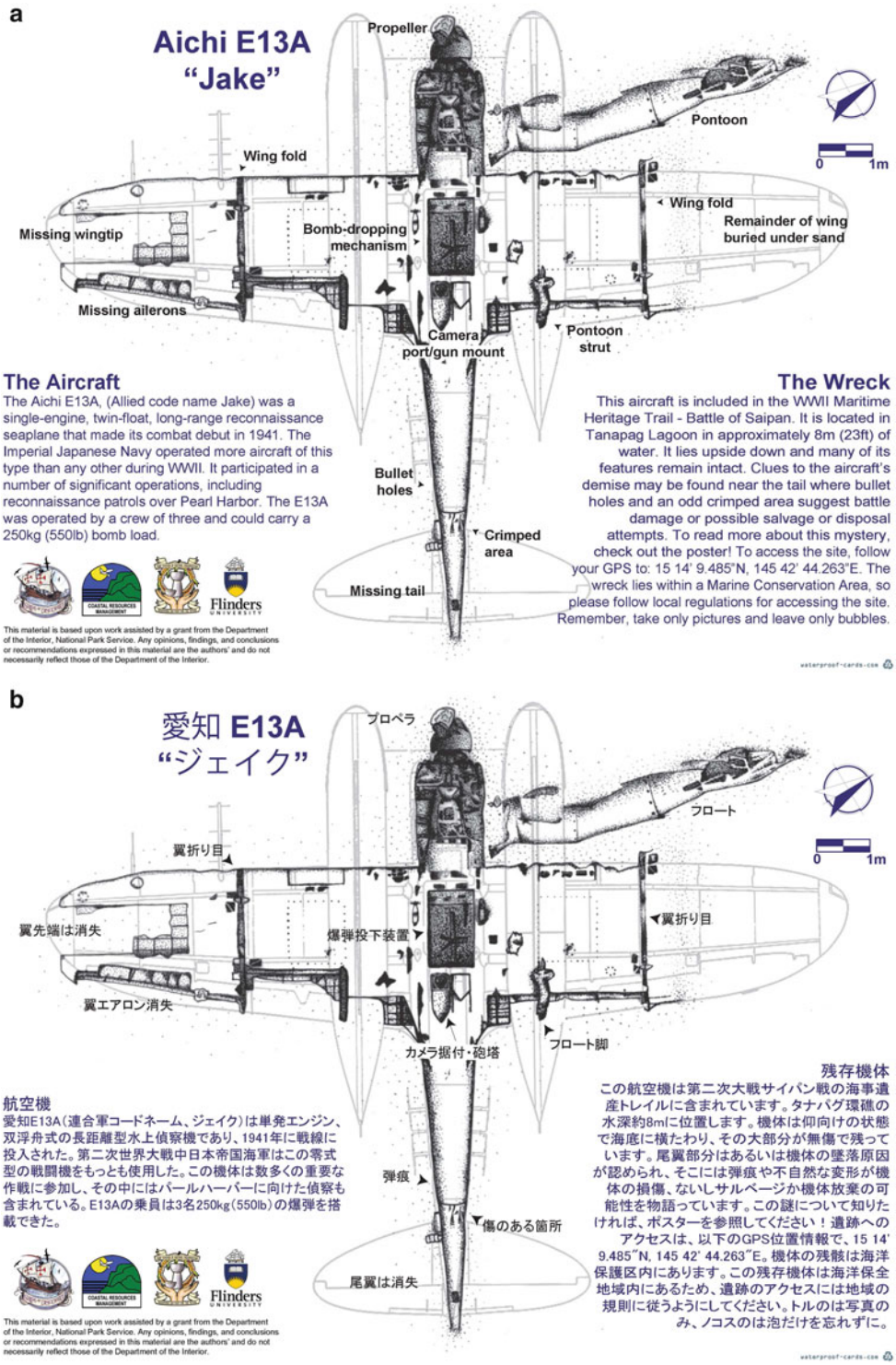

Maritime Historic Site Management for the Public, Fig. 6 (**6a** and **6b**) The Battle of Saipan Maritime Heritage Trail features laminated underwater guides for visitors that are available in several languages (Image courtesy of Ships of Discovery)

fostered by interpretation, that the site is valuable and should be left intact for future visitors.

Tracking visitation numbers and controlling visitor-related damage to sites (intentional and inadvertent) is a primary challenge that has not, to date, been adequately met. Some efforts at controlling visitors, and therefore potential impact, have been developed, with varying success. For example, access to the "*Land Tortoise* – A 1758 Floating Gun Battery" Preserve in Lake George, New York, is strictly controlled. Divers are required to obtain a permit for a specific date and time to visit the shipwreck, and the wreck is encircled by a barrier perimeter to prevent divers getting too close. The barrier, a chain mounted on stanchions is intended to keep visitors from hanging onto and damaging the fragile wooden hull; the chain does not at all hinder viewing the wreck and serves the same purpose as a velvet rope at a historic house museum. Despite this measure, the shipwreck was damaged in 1995 by divers who attempted (unsuccessfully) to remove two cannon port lids; diver-caused damage also was noted to other portions of the wreck.

Similarly, two seventeenth-century shipwrecks in Scotland, designated as important historic wrecks under the Protection of Wrecks Act of 1973, are interpreted for divers through specially administered "visitor schemes." Visiting the shipwrecks, *Swan* and HMS *Dartmouth*, requires licenses from Historic Scotland, an agency of the Scottish parliament. Beginning in 1994, licenses were issued for divers participating in the Nautical Archaeological Society's (NAS) underwater archaeology training course to visit the wreck of *Swan* during field activities of St. Andrews University's Archaeological Diving Unit. In 1995, the license program was broadened to include any sport diver. The popular program was extended in 1997 to include the nearby wreck of *Dartmouth*. The visitor schemes for diving at the wrecks are administered through a local dive center; the former owner of the center is a trained archaeologist and was instrumental in the development of the schemes. Before diving, visitors are briefed about the history of the wrecks, the importance of maintaining proper buoyancy to avoid damaging fragile wooden remains, and the need for preservation. Guidelines and interpretive signs on the shipwrecks allow divers to explore major features; site plans may be taken along as well. Hundreds of divers have visited the shipwrecks with little impact to the wrecks.

Use of the Resource

Because museums without walls do not have the socially constructed boundaries of ownership associated with traditional museums, they often are contested spaces. In the case of shipwreck sites, for example, rights to use the resource are declared by groups as diverse as archaeologists, maritime historians, fishing enthusiasts, sport divers, marine biologists, and survivors and victims' families or their descendants. Often termed "stakeholders," each may have a legitimate claim that must be recognized by the manager of the site. In some cases, stakeholders include those whose intentions are not aligned with archaeological ethics or public benefit. For example, treasure hunters and commercial salvors are concerned with management plans developed for shipwrecks and may go to some length to ensure that their interests are represented. While the removal of archaeological materials from shipwreck sites for commercial sale is unethical archaeologically, in some areas commercial salvage is lawfully permitted and salvage of historic wrecks will continue until the public demands that laws are changed. The ideal management plan is one that balances access and appropriate use with steps to preserve the resource, thereby balancing values of public access and preservation in the present and future.

Promotion of Maritime Historic Sites as Heritage Attractions

Heritage tourism is one of the fastest-growing segments of the tourism industry, ranking alongside other specialty tourist draws such as environmental and educational tourism (which heritage tourism often incorporates as well). In 1999, the World Tourism Organization reported that 37 % of global tourism was cultural/heritage tourism and that this figure was expected to grow (Richards 2000: 1). Visitation to historic

submerged sites also is heritage tourism, bringing benefits of learning, appreciation, and economic incentives for preservation, as well as detriments of use-wear and potential for looting and vandalism.

Contemporary tourism is described as a "quest for the other" (Selwyn 1996; Burns 1999: 21) as tourists seek new sights, locations, and experiences. People interested in heritage tourism must travel to areas featuring attractions of historical interest. Heritage and tourism are collaborative – heritage causes locations to become destinations and the trappings of tourism make the destinations economically feasible. The concept of "heritage" is dependent upon display and interpretation to give a dead site, location, culture, or economy a second life as an exhibit of itself (Kirshenblatt-Gimblett 1998: 7, 151). Methods by which this is accomplished, including interpretational accuracy, entertainment factor, and sustainable management, are the determining factors for successful education, preservation, and visitation. By combining heritage and ecological and educational tourism, shipwreck parks and underwater archaeological preserves fill a tourism niche that no other attraction can match. Shipwrecks are out of the realm of most people's everyday experiences and, consequently, are seen as exotic or romantic or adventurous, thus fulfilling the need for difference and providing the value of difference for visitors. Archaeologists and resource managers can extrapolate from the value of difference to encourage visitors to think about other values of shipwrecks, such as their value to history, heritage, sense of place, local culture and character, social identity, and the economy.

The growth of heritage tourism and its attendant economic benefits encourages ever more communities to promote their pasts to lure tourists. In this climate, sites and exhibits must be authentic and with high quality to attract visitors and to sustain their interest. Credibility can be maintained only if visitors are told explicitly what is real and what is recreated. Archaeology is vital to this effort. Poorly explained sites that do not provide the best possible experience for every visitor ultimately have a negative impact on every other historic site (Slick 2002: 222). Archaeology can provide authenticity to objects and sites, not only by identifying age and cultural context but also in the larger sense of providing a connection to "real things" of the past. This concept is crucial for interpreters who use authenticity to help shape the visitor's encounter (Lipe 2002: 22).

Legal Issues and Liability Concerns

Legal issues and liability concerns are a subject of particular interest to managers of, especially, submerged cultural attractions. Interpreted terrestrial sites likely are subject to the same legal standards in terms of accessibility and liability that apply to other land-based attractions such as wilderness areas or nature trails, although this has not been tested in a court of law. Submerged interpreted sites, however, may pose a higher risk of liability. SCUBA diving carries an inherent risk that cannot be reduced to zero; by promoting shipwrecks as places to visit, managers encourage the public to engage in an inherently risky activity. Archaeologists for the state of Florida asked their legal counsel to consider this fact and to provide an opinion regarding liability if a diver were to be injured while visiting a state underwater archaeological preserve. The state's attorney determined that shipwrecks in Florida waters already are visited by divers and, by interpreting the sites, providing safe diving suggestions, and recommending minimum certification levels, the state's preserve program made visitation safer; therefore, the state did not assume any additional liability by encouraging visitation to the underwater archaeological preserves. The state of Vermont's Attorney General's Office issued a similar opinion. Because the state allowed divers to visit its shipwrecks, it already assumed a degree of liability, and assuming conditions were no more hazardous than what normally is encountered in diving, additional liability was minimal.

Fortunately for submerged maritime historic site attraction programs around the world, no reported incidents of diving accidents are recorded to date, and no legal action has been brought against government-operated programs.

If liability ever is tested in a court case, however, the resulting decision likely will have ramifications for all submerged cultural attractions.

Developing Effective Interpretation Methods

Because submerged maritime historic sites are located in an alien environment, the general public often disconnects their cultural value from the more easily accepted value of cultural sites on land. Shipwrecks are, literally, out of sight and out of mind and out of reach for a large segment of the public. Managers use interpretation strategies to connect the public, both diving and nondiving, to submerged and terrestrial maritime historic sites.

Various methods of interpretation and education are implemented in preserves, parks, and trails around the world. These methods may be divided into two major categories, those targeted to terrestrial audiences and those targeted to submerged audiences, although the two often, and intentionally, overlap. Interpretive materials range from visual attractions on-site to printed media for distribution and often also incorporate mass media such as television, magazine and newspaper articles, and the World Wide Web. The most common interpretive strategy, for both submerged and terrestrial maritime sites, is the production of literature such as brochures and pamphlets describing the site. Some types of interpretive materials are targeted directly at diving and snorkeling visitors who wish to tour the site with information in hand. The form of these materials must be modified in order to make them suitable for use underwater. Signage and markers in various configurations also are applied to maritime sites above and below the water.

From a museological aspect, interpretive methods seek to impart accurate information about the resource in an engaging and easily comprehensible manner that allows intellectual access to the past (Roberts 2004: 217). The most effective interpretation for imparting information does not simply give facts but integrates the resource into the larger historical picture and describes what impact the resource had on local cultural identity and community history. This goal is not easy to meet in a small brochure and many programs employ several forms of interpretive material to provide the whole picture or to enable the visitor to choose the form best suited to their particular desires.

International Perspectives

With the growth of sport diving in popularity and the advancement of technology to allow nondivers to explore underwater sites, more nations around the world are exploring methods for public access and interpretation of underwater archaeological sites. Some are explored below as examples of international perspectives in managing maritime historic sites for the public.

In 1987 the United States' federal Abandoned Shipwreck Act was passed granting title to historic shipwrecks to the states in whose waters they are imbedded. The Act charged states with management responsibility and recommended the creation of underwater parks at shipwreck sites to ensure public access. The first proposal for implementing state management plans based on the Act included suggested criteria for developing parks and preserves. Governmental agencies at the state and federal levels practice cultural resource management as mandated through legislation and often focus on preservation and management of resources specifically for public benefit rather than for strictly scientific research purposes. States, territories, and commonwealths with active programs for management of maritime historic sites for the public include Florida, South Carolina, North Carolina, California, New York, Michigan, Vermont, Maryland, Wisconsin, Puerto Rico, and the Commonwealth of the Northern Marianna Islands. The National Park Service and the National Oceanic and Atmospheric Administration's National Marine Sanctuary Program also host public educational programs including shipwreck trails and maritime heritage attractions.

Australia's network of shipwreck trails is one of the largest efforts in public education and management of submerged cultural resources in the world. A major objective of the country's 1985 Australian Commonwealth Historic

Shipwrecks Program is the identification and implementation of methods for promoting Australia's shipwrecks to the public. The creation of shipwreck trails is in response to the program with efforts sponsored by individual states and administered through either local maritime museums or governmental resource management agencies. To date, however, a concerted effort has not been made to coordinate education and preservation efforts across the states. If such an effort were made, existing trails could be linked resulting in significant stretches of coastline being included in a trail.

Traditionally, public access to archaeological sites located in Canada's submerged environments was through museum displays and exhibits, often the best means of interpretation due to the fragile nature of the remains and to poor diving conditions at the wreck locations. In the early 1980s, the province of Ontario created Fathom Five Provincial Park in Lake Huron to protect historic shipwrecks from looting through a program of resource inventory, documentation, and monitoring. In 1987, Fathom Five Park became Canada's first national marine park. Diving activities are monitored and limited accessibility restrictions are in place, including scheduling visits and requiring divers to register annually. Also in 1987, controlled public access to historic shipwrecks in Louisbourg Harbor, Nova Scotia, was permitted. Parks Canada archaeologists located, identified, and recorded many historic shipwrecks in the harbor; this information was used to develop informational material. Local dive shops permit diving visitors and agree to enforce diving regulations developed by Parks Canada. Additionally, some avocational underwater archaeology groups in Canada, with the support of the government, initiated programs to protect popular historic shipwreck dive sites. These groups, including Save Ontario's Shipwrecks (SOS) and Protect Ontario Wrecks (POW), work with governmental agencies to install mooring buoys, erect interpretive panels, and publish informative pamphlets.

The countries of the United Kingdom are progressing in granting public access to certain historic shipwrecks in UK waters. Shipwrecks designated as historically significant under the Protection of Wrecks Act of 1973 are protected by law and access is restricted to licensed divers. Scotland's visitor schemes and the trails established at some sites in England are creative ways to allow visitors to explore protected sites while ensuring preservation intended by legislation. The Hampshire and Wight Trust for Maritime Archaeology provides training and educational programs for sport divers to engage in recording historic shipwrecks and develops underwater heritage attractions. Dive trails, including those at Alum Bay in the Solent and the wreck site of the warship *Hazardous*, enable divers to explore and understand these maritime historic sites.

The island nations of the Caribbean Sea are among the world's top sport diving destinations, offering clear, warm water and a variety of colorful and interesting natural and cultural marine resources. Recognizing the need for protection of marine resources in order to sustain tourism, several islands enacted laws and regulations for the benefit of protecting natural resources such as fish species and coral reefs. Cultural resources, however, still are relatively unprotected and are rarely promoted, except in their capacity as artificial reefs supporting marine life. A few islands, including Curaçao, the Dominican Republic, and the Cayman Islands, are in the vanguard of submerged cultural resource management including promoting public education and access through heritage trails, shipwreck parks, and museums in the sea.

Finland's first underwater park at a shipwreck site, sponsored by the National Board of Antiquities, opened in 2000 at the wreck of *Kronprins Gustav Adolf* near Helsinki. The park is interpreted on-site with mooring and marker buoys, a map, and a guideline around the wreck with information signs at major features. A webpage provides basic information and rules for visiting the park. Diving the underwater park does not require permission from the National Maritime Museum, as is necessary for diving any other Finnish shipwreck over 100 years old.

Israel developed a guided diver trail at the ancient harbor of Caesarea Maritima. Four dive areas including the harbor entrance, inner harbor, outer harbor walls, and the ancient foundations of the modern breakwater are marked by guidelines and signs numbered to correspond to a waterproof harbor guide. In addition to the interpreted self-guided diving tour, glass-bottom boats provide tours of the harbor to nondiving tourists and schoolchildren. On land, a visitor's center and nearby museum offer displays, artifact exhibits, real-time video, and documentaries.

Future Directions

New ideas for promoting visitation to submerged resources constantly are tested. Glass-bottom boats allow children, the elderly, the physically challenged, and the nondiving public to experience shipwrecks in a way they otherwise could not and have proven popular and lucrative in areas where they are implemented. Moving threatened shipwreck remains to areas with better diving conditions has proven practical in some cases. Underwater museums featuring shipwreck artifacts that are conserved and then returned to the marine environment enable the public to see items that otherwise may not be available for viewing. Some sites are enhanced with replica materials, either discrete artifacts such as cannons or entire replica ships. Tourist submarines, remotely operated cameras, and live "webcams" may be feasible at some locations.

Shipwrecks considered to be especially historically significant traditionally are not promoted for public access. Citing potential problems with looting, vandalism, ignorant souvenir collection, and damage to carefully placed excavation grids, resource managers generally discourage the diving public from visiting shipwrecks in the midst of investigations. The managers of the wreck identified as *Queen Anne's Revenge*, the flagship of the pirate Blackbeard sunk off the coast of North Carolina in 1718, developed an innovative means for allowing the diving public to visit the shipwreck. The North Carolina Underwater Archaeology Branch, in partnership with the North Carolina Maritime Museum, created a program that balances public education and site preservation by allowing divers who complete a shipwreck awareness course to visit the shipwreck under the supervision of a guide who accompanies limited groups as they tour the site (Wilde-Ramsing & Hermley 2007).

Development of new technologies enabling the scientific excavation of shipwrecks in extremely deep water also brings the need for interpreting these sites for a public that likely never will visit them. Traditional presentation methods such as printed articles and books as well as television documentaries are useful and effective, but programs hosted online provide for interactive public participation (Fig. 7). World Wide Web-based pages, blogs, interactive site tours, webcams, and photo galleries enable archaeologists to bring projects to the public in nearly real time. Web 2.0 applications allow the public to engage and interact with archaeologists, ask questions, provide information, and become part of remote research.

Public involvement in stewardship of interpreted sites is becoming more relevant and, in many cases, necessary. With relatively few archaeologists and resource managers available to monitor sites, engaging communities to care for the sites in their areas is a viable solution. Dive clubs can be trained in non-disturbance recording methods and encouraged to "adopt" a shipwreck, checking it routinely for damage, policing fishing debris and accumulated trash, and reporting any changes or disturbance. In this way, the public can engage in the production and preservation of knowledge, rather than just the consumption of knowledge.

The growth and proliferation of preserve, park, and trail programs around the world indicates this strategy of maritime historic site management fulfills requirements for both preservation and public access and encourages the visiting public to value submerged historic resources as tangible elements of the past to be maintained for the present and future. By turning resources into attractions, archaeologists and

Maritime Historic Site Management for the Public, Fig. 7 The deepwater Mardi Gras Shipwreck excavation project utilized web-based interpretation to engage the public (Image courtesy of Florida Public Archaeology Network)

managers can guarantee access and can use the opportunity to educate visitors about the resource. Through intensive education and outreach efforts, visitors are made aware of the value of the resource to local and national heritage and of the need for preserving the resource for future generations to visit and enjoy. By illustrating the value of one shipwreck, managers enable the public to gain an understanding of the value of all.

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- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Charter for the Protection and Management of the Underwater Cultural Heritage (1996)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage and the Public
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- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Outreach
- ▶ Deep-Water Archaeology
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage: Public Perceptions
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Maritime Historic Site Management for the Public

▶ "Public" and Archaeology
▶ Public Education and Archaeology: Disciplining Through Education
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Maritime History

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Introduction

Maritime archaeologists examining a shipwreck can make notable insights to our understanding of the past. The investigators study the vessel's construction techniques, and the artifacts that have survived can offer a picture of the material culture that has been frozen in time. Clearly, much can be learned about that single vessel and its crew using maritime archaeological and historical techniques. Without consideration of the shipwreck's context, however, the archaeologists' insights are limited. What does a single ship say about the society that produced it? How representative was this vessel of the larger fleet of which it was a part? Why was this particular vessel sailing in the waters where it came to grief? Archaeologists must place a site or an object in relation to specific historical contexts (i.e., events/details of construction or use) as well as more general contexts (i.e., processes such as how the historical contexts of settlement/exploration/warfare invariably explain why a ship was going where it was going/wrecked where it did). Careful historical research is essential to establish the shipwreck's significance. Only by situating the wreck in context can maritime archaeology make valuable contributions to knowledge of the past. This is the intersection of maritime archaeology and maritime history in historical archaeology.

Key Issues/Current Debates/Future Directions/Examples

Some of the best works in maritime history incorporate this interdisciplinary approach. Colin Martin and Geoffrey Parker's *The Spanish*

Armada (1988) is a case in point. In the collaboration of a maritime archaeologist and a historian, *The Spanish Armada* incorporates the findings of Martin's excavations of the Armada vessels that wrecked off the Scottish and Irish coasts with Parker's archival research in Spain and England to offer the most accurate interpretation of this famous sea battle. Earlier accounts posited that the Spanish had fired few broadsides in the pivotal action against the English fleet off Gravelines because they had run out of shot. Martin's archaeological evidence clearly demonstrated this was not the case because he found substantial amounts of shot in the wrecks he investigated. Using this evidence with records Parker examined concerning the ordnance carried by the Spanish and English ships, *The Spanish Armada* offers a new and more convincing account for the Armada's defeat. The Spanish fired their guns infrequently because of their outmoded tactics. The English won the battle because of their heavier firepower and better designed gun carriages. The combination of archaeological and historical evidence offers a more informed picture of the past.

This combination of historical and archaeological evidence offers a better depiction of more prosaic maritime activity as well. Archaeologists were familiar with the remains of a nineteenth-century ocean tug lying on the seabed near St. Augustine, Florida. Careful historical research, however, was necessary to identify the vessel. Kimberly Eslinger's investigation of the wreck revealed that the tug possessed an unusual steam engine. In addition, parts of .43-caliber Remington rolling block rifles and cases of rifle cartridges – munitions favored by Cuban revolutionaries – also lay near the wreck. Examination of the engine plans, combined with the date of the wreck and the presence of ordnance, revealed that this was no ordinary tug. Instead, it was the SS *Commodore*, a vessel used to run guns from New York to Cuban revolutionaries in 1897. Moreover, Eslinger's additional historical and literary detective work revealed that noted nineteenth-century American author and newspaper reporter Stephan Crane was a passenger on the *Commodore*. This shipwreck formed the basis for Crane's famous short story "The Open Boat."

Historical records can also be indispensible in determining the causes of a shipwreck. This is certainly true for the wreck of HMS *Santa Monica*, a British Revolutionary War frigate that sank in Hansen Bay off the Danish island of St. John (now the United States Virgin Islands) in April 1782. Kelly A. Gleason's archival research (Gleason 2006) discovered that the Admiralty sent the *Santa Monica* to the Caribbean to protect the British colony of Tortola from the actions of French, Spanish, and American warships and privateers. While sailing in consort with several other Royal Navy vessels, the *Santa Monica*, commanded by Captain John Linzee, struck hard on an unknown submerged rock. The frigate immediately took on water, and Linzee realized that he would have to run his ship aground to save his crew. Linzee skillfully grounded his vessel and saved every man on board. He then supervised salvage operations that recovered the rigging, sails, yards, anchors, guns, and many small stores. Linzee reported all of these events to his commanding officer, Admiral Sir George Rodney, on 29 April 1782. This letter and related documents thus explain why maritime archaeologists found few artifacts when a local diver discovered the wreck in 1970. The extensive records associated with the loss of HMS *Santa Monica* contained in the Admiralty Papers in the National Archives of Great Britain provide the keys to understanding why the frigate sank in the Virgin Islands. Moreover, those historical documents allow maritime archaeologists to understand why this British frigate was sailing off a Danish island in the Caribbean during the American Revolution.

These three examples, which could be multiplied many times over, clearly demonstrate the value of solid historical research for establishing context for maritime archaeology projects. The artifacts on the ocean floor can offer valuable evidence concerning past events that historians miss while reading dusty documents in archives and libraries. On the other hand, those documents are usually indispensible for determining historical context. Clearly, an interdisciplinary

approach that combines maritime archaeology and maritime history in historical archaeology offers the best strategy for understanding the past.

Cross-References

- ▶ Caribbean Historical Archaeology
- ▶ Caribbean Maritime Archaeology
- ▶ Society of the Ship
- ▶ United Kingdom: Cultural Heritage Management Education
- ▶ United States: Cultural Heritage Management

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Maritime Iconography

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Introduction and Definition

Maritime iconography relates to four interconnected fields of study. These include the analysis and interpretation of:

- Maritime images and representations on a wide array of portable and semiportable materials, including the main groupings of stone-carving, graffiti (in stone, wood and plaster), models, manuscript illuminations and drawings, wood carving, tapestries, mosaics, stained and painted glass, coins, seals, tokens, murals, metalwork, paintings, and portable objects (see Farrell 1979) (Figs. 1, 2, 3, and 4).
- Maritime imagery and symbolism that acts as the inspiration for the design and iconography of non-portable materials, everything from individual signs on buildings and sculptures up to entire buildings, and even designed urban environments that use maritime motifs.
- The broader sociocultural uses of the symbolic value of maritime environments or technologies, such as the cultural enjoyment of real maritime environments like beaches and also representations of these environments through art or designed environments like themed bars or restaurants (see Crumlin-Pedersen & Munch Thye 1995).
- Symbolic imagery on or within vessels, e.g., eye motifs painted on the bows of boats, ships' figureheads, or hidden symbolic features such as coins placed in the mast step of vessels. The latter also includes symbolic activities associated to points in the "use life" of vessels (see Kaul 1998).

Maritime iconography has been a nearly constant theme of the majority of societies, even those living significant distances inland, since prehistory. There are virtually no cultures or communities that have not in the past employed some form of maritime iconography, as witnessed by the copious quantities of maritime iconographic materials discovered over the years by historians, ethnographers, and archaeologists. This tendency continues in the modern world, where mass media and consumerism witness the regular use of maritime iconography and symbols in everything from the representation of political events in the media to the marketing of common items such as food, drink, and clothing. The modern world even has entire designed environments that utilize maritime iconography in their design and layout, places such as maritime-themed residential and social waterfront spaces in regenerated (often maritime) urban environments (see Atkinson et al. 2002).

Maritime iconography is the branch of art history and archaeology that studies the

Maritime Iconography, Fig. 1 Cast of the c. 1199 CE seal of Dunwich, Suffolk (Photo by Ian Friel, courtesy and copyright of Ian Friel, 2011)

identification, description, and interpretation of the content of maritime images, be these "direct" maritime images (e.g., of watercraft and associated technologies and locations) or "indirect" maritime images (e.g., the use of common maritime components like rope designs, anchors, or ancillary features commonly associated with the marine zone like tattoos in secondary contexts like architecture and design). Maritime iconography draws widely from across history and art history, archaeology, anthropology, and ethnography in the collection and analysis of data, also in particular from related disciplines like philosophy, the history of science, and geography.

Key Issues/Current Debates/Future Directions/Examples

The formal history of the study of maritime iconography dates back to the nineteenth and early twentieth centuries. It was a key concern of the Society for Nautical Research during the early years of that organization's life from 1911 onwards (see Murphy & Oddy 2011).

Maritime Iconography, Fig. 2 Late fifteenth-/early sixteenth-century CE votive bench-end in the church of St Winnow, Cornwall (Photo by Ian Friel, courtesy and copyright of Ian Friel, 2011)

Maritime Iconography, Fig. 3 Ship graffiti (probably from the sixteenth century CE onwards) on woodwork in the church of St Nicholas, Salthouse, Norfolk (Photo by Ian Friel, courtesy and copyright of Ian Friel, 2011)

Throughout the interwar period, considerable efforts were expended in the collection and cataloging of different examples of maritime iconography as a "source book" for ancient ship

Maritime Iconography, Fig. 4 Ship graffiti on the wall of a medieval chapel at Kilchattan on the island of Luing in the Inner Hebrides (Photo by Colin Martin, courtesy and copyright of Colin Martin, 2011)

technology (see, e.g., Moll 1929). Before the development of maritime archaeology as a formal academic discipline, such studies were often the only significant source for the study of ancient watercraft. After World War II, with the emergence of maritime archaeology and increasing discoveries of the remains of old ships, the importance of maritime iconography as a source declined and so in turn did its study, although it continues on as a niche market to this day and is popular among certain "avocational" groups such as ship modelers, with a particular focus on the arts of the "great age" of sail (e.g., the mid-fifteenth to mid-nineteenth centuries) (see Kemp & Ormond 1992).

For the Middle Ages in particular, maritime iconography remains an important source of analysis and also inspiration, providing details of aspects of medieval vessel technology such as sail types and patterns, hull decoration, and embellishment that archaeology rarely provides as well as providing evidence of ancillary facilities and equipment, also vessel handling techniques and crew behaviors (see Flatman 2009). The rise of post-processual archaeological approaches in the 1980s also witnessed the emergence of new areas of research into maritime iconography. On the one hand, influenced by studies of prehistoric art, especially rock and other forms of "landscape" art in Scandinavia, there was and continues a widespread reassessment of the relationship of the coastline and the marine zone to prehistoric communities, the symbolic place of the sea and ships in such communities (see Crumlin-Pedersen & Munch Thye 1995). There have been similar analyses of other distinctive marine areas, notably the Aegean (see Wedde 2000). On the other hand, influenced by postcolonial theory, there has been the consideration of the symbolic place of both ancient and modern vessels and also maritime archaeology in contemporary society, in particular the use of "ship symbolism" to project a sense of nationalism and "traditional" values (see Cederlund 1994). This was most overtly undertaken by the Conservative administration of the UK in 1982 during the Falklands/Malvinas War, when, with the support of the media, the recovery of the wreck of the Tudor warship *Mary Rose* functioned as a major form of nationalism symbolic ideology to encourage support for the war (see Wright 1991). Post-processual studies of contemporary society and the place of maritime imagery also occurred at this time – see, for example, Shanks and Tilley's (1994) – which considered maritime imagery and social identity on Scandinavian beer-can designs. The ultimate modern example of this phenomenon is the iconography and symbolic profile of the loss of the passenger liner *Titanic* in 1912, which is a near-universally recognized symbol of technological and social hubris, used in all sorts of contexts, including media, advertising, and the arts (see Biel 1997).

In the twenty-first century, the study of maritime iconography has effectively split into two academic groupings that have little cross-fertilization: traditional studies of the iconography of maritime technology allied to historical and art historical studies, and archaeologically led studies concerned with the higher-level symbolism of maritime art and communities. The latter in remain extremely popular, a particular field of study being the symbolic profile of "prehistoric" art, especially rock and other forms of "landscape" art at the coastline. Of late this has expanded to include specialist studies of particular communities, for example, surveys of the maritime elements of coastal Indigenous

Australian rock art. There remains a need for national and international inventories of maritime iconographic materials in this respect, of which ongoing digitization programs of specific media offer considerable potential. Digital access to large quantities of disparate historic data for maritime iconography should allow future scholars to overcome the problems of access to meaningful quantities of source materials that have bedeviled previous scholars in this field.

An instructive example of the pros and cons of the study of maritime iconography comes from medieval-illuminated manuscripts. These are indicative of both the breadth of maritime iconographic themes used in societies and the problems of using much maritime iconography as source materials for ancient societies (see Flatman 2009). Medieval Europe was a society deeply influenced by maritime technology, and tens of thousands of illuminated manuscripts exist containing hundreds of thousands of different depictions of the maritime world, from crude and simple line drawings to detailed, multipage, full-color depictions. Virtually every aspect of the maritime world is depicted in these illuminations, including a startling array of maritime technology – including port and harbor installations, waterfronts, and shipbuilding facilities – coastal defenses, and ships and boats, also specific maritime activities such as sea battles, convoys, and trading activities. These illuminations deploy a complex and extensive symbolic language associated to medieval Christian philosophy, with most illuminations having multiple meanings dependent upon the level of education of the observer, from simple parables up to complex jokes within jokes. These illuminations also share common stylistic or other errors that observers need to be cautious of. Assessments must thus be careful to appreciate the cultural context of illustrations, such as the wider nature of medieval society, its background history, and its theological, intellectual, and artistic traditions, and as such illuminations are rarely reliable (although this does not mean they are not useful). Most aspects of medieval material culture were not considered sufficiently important to be recorded, particularly scenes of everyday life. Thus, when it was felt worth making a record, this was usually for economic reasons, because what was being described was a threat to the established social hierarchy, because those aspects depicted served as a positive or negative role model, or because those aspects depicted were amusing or motivational. Nor was it considered contradictory for the same author to describe a lifestyle as a positive ideal for human existence and simultaneously the negative model, especially in the case of the lives and material culture of the lower classes. Illuminations of ships in particular also tend to be more crowded together in art than in life, and there is also a tendency to exaggerate the height of vessels at the expense of their length. Within this, features that particularly attract the eye also tend to be reproduced on many occasions (e.g., the nails of clinker-built hulls and reef points across the whole of a sail, ratlines – see Villain-Gandossi 1994).

Irrespective of time or place, the majority of global maritime symbolism shares common symbolic themes. The reasons for this commonality and extent of maritime iconography are, as the maritime archaeologist Keith Muckelroy explained, easy to understand: because "in any pre-industrial society, from the upper Palaeolithic to the nineteenth century AD, a boat or (later) a ship was the largest and most complex machine produced" (Muckelroy 1978: 3). With the marine zone and in particular marine technology playing so central a part in the lives of so many people, it is inevitable that maritime iconography develops that reflects this central place of the marine zone in the lives of individuals and communities. Positive symbolic associations in maritime iconography far outweigh the negative ones in most cultures and tend to be of those of characteristics either associated with vessels themselves or gained as a consequence of the use of vessels for trade or war (e.g., power, success, and strength) and extend onto further levels through the conceptualization of strategies or values (i.e., loyalty, competence, and trust). In association – and mutually compatible with – manifestations of power, ships also function as symbols of status and membership, usually of elite groups. Most communities have vocal expressions of ship

symbolism and general importance. Myths, epics, and tales (often expressed further in different media such as songs, images, with other/greater symbolic content) are common and often involve seminal points of cultural life history, such as creation myths. Reflecting this tendency at the small scale, ceremonies also usually exist surrounding vessels at key stages within their "use life," both for their own sake and those of their users. Whether to ensure a successful single event, or more widely for the benefit of society as a whole, such ceremonies can both help and be indicative *of* the physical reality of power and control – economic, political, social, or otherwise – expressed by and through ships. Engenderization of ships – attesting to their familiarity and importance, personalization providing a step onto a different relational level – can be seen alongside this "social inclusion" of ships within society, and the appreciation of this is vital. Establishment of a "soul" both allows and requires such ceremonies at key stages of "life" usage, especially at creation, first use, and final destruction (to be equated with the steps in human existence), and can be taken a stage further by the establishment of personal relationships and/or ties for specific individuals – often in a specific role, like a captain or owner – in which characteristics unique to the specific craft are established (in some cases via unique events such as handling characteristics or bad or good omens at "strategic" use points). These are specific spiritual attributes equated with "its" own "personality," such as perceptions of one ship to be a "good"/"friendly" boat and another a "bad"/"malevolent" boat. Most societies similarly maintain levels of stylistic artwork upon boats. These never function as "art for arts sake": even modern company logos fulfill a purpose of identification and can often be for ephemeral concepts. Three variations exist [a] for the purposes of identification (which can then themselves take on a further symbolic dimension); [b] for the pacification of spiritual forces with impact – beneficial or malevolent – upon waterborne activities (like ensuring a safe voyage or passage); and [c] to project and identify attributes with which a society hopes/wishes to be identified with. Similarly, ships are rarely of purely functional form, with certain design styles or attributes for reasons beyond the rational-functional, often as a result of tradition (itself usually the result of long evolution in the face of the requirements vis-à-vis sea conditions, expected use, tools and building materials to hand, etc.). Such stylistic designs express concepts valid to the society itself and – often in highly altered interpretative frameworks very different to those conceived of by the "home" culture – to others who met through inter-voyage contact.

Cross-References

► Maritime Landscapes

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Maritime Landscapes

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Introduction and Definition

The term *landscape* applied to a maritime world does have a few distinct features which make it different to the application of it in a purely terrestrial context. In reality, of course, there is no clear-cut division between those two, since landscapes are always used and experienced by human beings and they move, albeit not always freely, between the two. Accordingly, in a way one could say that all landscapes are cultural or creations of culture. On the other hand, the natural or physical landscape and its potential resources have had such an overwhelming importance in the establishment of human history that it would be appropriate rather to acknowledge this fact by defining cultural landscape as a *physical landscape + cognitive landscape*. This dualism thus expresses an overall possibilistic strategy.

Key Issues and Current Debates

In the grand narrative history of archaeology, it could safely be argued that only the terrestrial variety of landscape, which largely corresponds to agrarian cultures, has been studied, in fact almost exclusively. It appears rather painful that a qualified reason for this focus seems simply to be that it contains highly visible remains, "pungent" monuments. In asserting the existence of the maritime variety of landscape, therefore, it has been part of a slightly provocative strategy to stress that all relevant remains are not always visible. Furthermore, apart from the comparatively meager remnants of human activity on land along the ancient shores, the landscape extends in a most striking way underwater, even though no such activity necessarily took place there in the past. Here, a far greater place in a study is thus of necessity taken by the immaterial remains, the place names, the landscape in the mind, and the mental landscape, as it is determined by movement on the water and by orientation and navigation on it to be able to reap the resources of it and exploit the network of cultural and social ways on it. Its time span is enormous, but even given the natural/physical changes, the signs of certain aspects of cultural continuity are not only self-evident, they are sometimes astonishing. This landscape has been used by human beings from at least the Mesolithic period onwards in fishing, hunting,

and gathering cultures, and as a tremendous ever-present reserve, it is not only marginal – as is often stated – in agrarian cultures. This does not mean that maritime cultures are integrated; however, they are assumed to lead a separate and parallel existence to the mainstream. It would even be remarkable if terrestrial archaeology would not be influenced by such observations on its own ground.

The *maritime cultural landscape* is the term preferred by many, although not all. It is based on the cultures at the brink of the seas and oceans, its many-sided varieties, and in later times always including some agrarian or other terrestrial pursuits, including hunting inland (see Westerdahl 1992; Jasinski 1994; Parker 1999; Flatman 2003). The other designation, *seascape*, has gained ground during later years (see Cooney 2003). Originally the meaning of seascape is a painting of a ship in a tempest, often rather giving the impression of the helplessness of humans before the forces of nature. The tumultuous sea is often all-encompassing, and no sight of land can always be discerned. This is at its roots much more the physical than the cultural landscape. An instinctive reaction to the concept of the maritime cultural landscape could be to suspect the absence of cultural and social potential. But this term does express efficiently the contrast between the two main perspectives, sea and land, and places them on an equal footing. This could thus be a positive force in a certain stage of argumentation. The question is, however, whether the contrast is that antagonistic, if such a dualism might distort the proportions of qualified distinction. The maritime cultural landscape – i.e., the landscape of maritime culture with connotations as of above – is a painting of land as well as of water. To human beings in a boat, the contours of all kinds of land, islands, skerries, shallows, reefs, promontories, and indented coastlines are as important as the waters proper. Helplessness is here a very relative thing within a social and cultural web. Moreover, whatever you may call them, the aspects, facets, or even elements of any landscape are common to both worlds. The maritime cultural landscape "only" has a character distinctly its own. A few examples have been proposed by the present author: *economic landscapes* (e.g., in the maritime sense fishing, where the underwater shoals are depicted in the mind as well as the topography on land, the hunting of seals, the gathering of eggs and down); *resource landscapes* (for all kinds of wood and other materials, including rock for various kinds of tools, freshwater wells, but also for the neat layout of slipways for boatbuilding); *transport landscapes* (the network of routes and harbors, havens, which are all social constructs as well), with its attendant dramatic scenery of shipwreck, human tragedy, and plunder; *power landscapes* (landscapes of domination, of defense and aggression), but always with an element of *resistance and rebellion* (piracy, illegal trading); a strongly related *social landscape* (organization of land forms, regal rights of land and water); and *cognitive* (place names, mental maps) *and ritual landscapes* (as applied from a boat or at the liminal space of the shores, temples on headlands, fishing chapels, dimensions of taboo, and religious constraints). These elements or aspects are all intertwined, but each could for a temporary purpose of clarity be laid pure. They were certainly seen as clear "taskscapes" by the people of the past. These examples are clearly dangerously diachronic, but only for the purpose of showing continuities of a particular maritime kind. The route to such holistic interpretations of prehistory and early history must clearly go by way of experiences of continuities in the present or near-present. Oral tradition and unusual sources of the *Annales* kind are always important tools.

Scientific terms may not only be English, nor is English the only scientific language possible. Seascape as a term may work in English, since it was more or less created and accepted in that language, but appears rather strange in many other linguistic contexts. On the other hand, landscape is a concept easily translatable. It has its origin in Dutch or Low German where the *schap* or *scap* suffix means skill or ability. As Van de Noort points out (2011: 23) "the original meaning of the word 'landscape´was the perception of the ability to live in, on and off

the land." Such a perception of human use is not difficult to project into the tremendous variety of cultures or languages. Nor need it undermine the analysis of power and the constraints of social forces.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Cognitive Archaeology
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Experimental Maritime Archaeology
- ▶ Landscape Archaeology
- ▶ Submerged Prehistoric Landscapes

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Marketing Heritage

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Introduction

Archaeology is labor intensive and costly, and with the decrease of available financial research resources, archaeologists in the era of neoliberal globalization have recognized tourism as an avenue for generating revenues for excavations and for preservation of sites. Across the globe, archaeology is intertwined with heritage, and heritage tourism has positive potential for archaeological research and presentations, but turning the archaeological record into a commodity has scholarly and social implications. Tourism is a means for large numbers of people to see the results of archaeological research, to experience past landscapes, and to learn about past lifeways. Tourism offers increasing support for sites and a source of funds for continuing excavations and conservation and for the innovative presentation of the past. Because of the attraction, employment and development opportunities can arise with heritage attractions. Yet there are consequences to the visitations by large numbers of people to archaeological sites, otherwise a positive measure of tourist success. Physical harm to archaeological sites as well as popularizing and simplifying the presentations contains ethical concerns for archaeological professionals. With the rapid growth of tourism as a global economic development, the issues involved in marketing heritage have garnered increased concern over authenticity, accuracy, and the consumption of the past.

Heritage can be a powerfully positive empowering focus for communities. The excavations at the African Burial Ground in New York City demonstrated those positive dynamics for archaeologists in the USA. As Cheryl LaRoche and Michael Blakey (1997: 100) note:

> For many African Americans, [archaeology] is a conduit, an avenue leading to spiritual rebirth and renewal of our history. Our history is in the

> bones and in the artifacts excavated from the African Burial Ground. It is tangible, it is real, and it lives through the dead. . ..

The organizing for the preservation of the site enriched the archaeology, its analysis and interpretations, and the commemoration of the burial ground. But heritage's opportunities are also its paradoxes, especially for archaeology.

Archaeology, through excavations, recovers material evidence of the past and becomes a means of producing heritage. Heritage is a broad category that includes personal inheritance, historical identity, and national ideals or generally is defined as the use of the past in the present. David Lowenthal (1998) in *The Heritage Crusade and the Spoils of History* described the global phenomenon of heritage overtaking history and laid out the claims and counterclaims made in the name of heritage. For Lowenthal, history and heritage are quite different: "History explores and explains pasts grown ever more opaque over time; heritage clarifies pasts so as to infuse them with present purposes" (Lowenthal 1998: xi). Barbara Kirshenblatt-Gimblett (1998: 2) in *Destination* Culture asks a critical question for exhibiting heritage: "What does it mean to show?" She also (1998: 15) explains heritage as adding value, producing something new. Archaeologists, across the globe, have experienced and studied this peculiar phenomenon.

Definition

Marketing heritage refers to the paradoxical dynamics of archaeology's intersection with consumerism, particularly through heritage tourism. Uzi Baram and Yorke Rowan (2004: 5) state: "In employing the term "marketing," the active construction of the past toward specific purposes is the goal" of investigating the use of archaeology for tourism and other means of using the past for economic gain. Marketing heritage includes the dynamics of representation, with anthropology offering lessons and insights into the representation of the past for the present. Among the well-known examples of archaeology being presented for consumption are sites such as the Pyramids of Giza, Stonehenge, the Great Wall of China, and Masada and artifacts such as the Parthenon/Elgin Marbles on display at the British Museum. The scholarly critique of marketing heritage illuminates the meanings of objects and places and offers caveats over the trajectory as the past is marketed for consumption.

The implications of marketing heritage became an increasing concern for archaeology during the last quarter of the twentieth century. Visitations to archaeological sites electrify the imagination and encourage study, research, and preservation, but the scale of visits and the transformation of visits into tourism affect the physicality of ancient places and change the meanings and vistas of the past landscape. Brian Fagan (1995) offered a clear example when he contrasted two visits to the Temple of Poseidon at Sounion in 1979 versus 1990. His lament over the loss that comes with a packed parking lot, the cordoning off of the temple, and the crowd of tourists was prophetic: archaeological sites around the world are facing similar concerns over the successful marketing of their significance. Greater access and increasing number of visitors create problems for preservation and change in the feel of a place. The rise of humidity levels inside great monuments, managing crowds, and air pollution from tourist buses have led to restrictions at major heritage sites. The continual growth in tourism to Venice, Italy, has become a well-known example, with tourists themselves being the focus of the tourist gaze (Fig. 1). And the number of visitations is accelerating as tourism continues to grow globally.

Key Issues and Current Debates

Paradoxes and Complexities of Marketing Heritage for Archaeology

Lowenthal (1998) recognized the power of heritage for group identity. Central governments can use places and narratives to impress particular themes onto its subjects, citizens, and visitors. Heritage shapes our present identity and provides

Marketing Heritage, Fig. 1 Tourists in Piazza San Marco, Venice, Italy (Photograph courtesy of the author)

insight for our future. It includes a range of activities such as stewardship, preservation, research, education, and engagement. It can encourage sensitivity to the indigenous natural environment, to the impact of human activity on the natural environment, as well as to differing perspectives regarding objectives, ideas, places, and traditions. Helaine Silverman (2011: 5) points to a shift in the 1990s for the scholarly recognition that heritage is the contested past, a shift that came with an awareness that the past and its representations are political, with social implications. But heritage is not only nationalistic, its value can be essentialist and monocultural but also cosmopolitan; heritage can be accurate in its details or entertaining. These strands and paradoxes constitute the significance of heritage for archaeology.

The representations and presentations for archaeological heritage correlate with globalization, the bundle of processes that include neoliberal economic policies. A useful divide in the goals for marketing heritage is financial capital over social capital. Since social capital can be used for nationalist purposes, the divide is not simple. Social capital's educational focus fits academic archaeology's goals better than the financial possibilities of presenting the past for tourists. The trajectory, under a neoliberal globalization, is "part of a trajectory on which more and more aspects of social life and localized resources become objects for consumption" (Baram & Rowan 2004: 6).

With the increasing monetary interest in heritage, Shashi Misiura (2006) offers a textbook for heritage marketing with chapters that offer insights, case studies, and issues for debate. As John L. Comaroff and Jean Comaroff (2009: 16) notice, an entire industry dedicated to ethnic marketing, which dovetails with heritage marketing, is offering new productive possibilities for identity in a neoliberal, global economy. In conceptualizing heritage as an exploitable resource, the economic goal is to seek the broadest audience for financial gain with niche marketing, "segments that can be targeted effectively" (Misiura 2006: 79). Tourism to Israel illustrates that approach: the website for the Ministry of Tourism in 2005 provided different itinerates one can go on a Christian tour, Jewish tour, Muslim tour, tour the places of ethnic minorities, nature, or other theme, in 2011 that website for North America has three groupings: General Interest, Jewish, and Christian (http://www.goisrael.com/Tourism_Eng). Niche marketing creates different heritagescapes, reinforcing the assumed divides among groups of people. So rather than cosmopolitanism, one sees only what one wishes to see, and routes can come and go based on neoliberal principles. A sterilization of the past, with

nothing out of place, is a concern for the representation of the past where past landscapes are presented for enjoyment not education, using the techniques from Disney theme parks for historic sites. Alan Bryman (2004) coined the term Disneyfication to stress theming, consumption, merchandising, and emotive service, a term used for historic sites as a negative value. Terms such as edutainment, combining education and entertainment, and historicidal indicate a shift from learning and edification to commodification and the loss of history.

The management of cultural resources needs to thread the needle among the competing definitions of the past. Heritage can be the past represented in the present, an inheritance for an individual or a group, an affirmation or collective memory of identity, a commodity and an exploitative resource for tourism, and a means to incorporate a group (Comaroff & Comaroff 2009). The presentation can be informative, allowing visitors to know what to expect at a location but also overpromise what is available at a site. Troy Lovata (2011) offers a perplexing example at the Anasazi Cliff Dwellings of Manitou Springs to open up the intersection of tourism and archaeological sites. The cliff dwellings seem to be Ancestral Pueblo, and are presented as such, except the architectural features were moved to distant location and reconstructed by 1907 in central Colorado as a tourist attraction. They are persistently popular not because of authenticity but since visitors can climb on them, unlike actual ruins. The attraction illustrates how production and interpretation of the past for heritage purposes can give way to consumerism. In Jaffa, Israel, visitors entering the historic sites see a diminutive statue of Napoleon (Fig. 2), whose 1799 invasion devastated the port city, welcoming them. Such whimsy representations suggest how heritage can become tangled in competing histories, real and imagined. For archaeologists and managers of cultural resources being aware of such tourist effects, the ways in which the focus on drawing in tourists to a historic venue, an archaeological site, or a monument influences the presentation and representation of the past, its peoples and legacies, is an important set of insights (Baram 2011). Self-reflection on the source, meaning, and implications of heritage has drawn tremendous attention by scholars over the last decade and is leading to a rapid increase in the number and types of studies.

Marketing Heritage, Fig. 2 Marketing heritage and the ironic images: A statue of Napoleon in Jaffa; in 1799 Napoleon invaded the Ottoman Empire, conquering Jaffa before being defeated at Akko (Photograph courtesy of the author)

To package tours, groupings of sites are organized by maps or trails. Even organizing directions to archaeological sites should raise concerns for cultural resource managers. Signage is not neutral; differential presentation of routes to sites is a tool of national governments to encourage or discourage visits to particular places. The signs pointing to heritage are not only on the side of roads. In Florida, the creation of trails to see specific types of histories (Black, Cuban, Jewish, Native American, women, Spanish Colonial, World War II, with more coming) are published as booklets and are meant to raise awareness of cultural and historical resources (see http://www.flheritage.com/preservation/trails/index.cfm). They also create a series

of monocultural heritage trails across the state. Monocultural heritage targets specific groups either to separate the past into distinct segments or to add to diversity; cultural resource managers need to be aware of the balance. Kelli Ann Costa (2009) offers a reminder of the guides that illuminate such sites and trails, and she explains that often the heritage interpreters are not heard. Whether through people or texts, heritage is the label for recognizing specific aspects of the past are highlighted for the present. An accelerating number of studies employ ethnography to bring out the nuances of presentations at archaeological sites, with its implications for archaeological practice and the use of archaeological places.

Dividing up history into niche markets is only one of the dynamics of concern for heritage marketing. In Tampa, Florida, USA, there is an annual celebration of a pirate. The celebration has two parts in January, first a parade for children and the next week one for adults. The adult version has a pirate invasion of the port city of Tampa, with a pirate parade and street festival. The Gasparilla Pirate Festival is named for José Gaspar, whose legend has him born in the late eighteenth century and dying in 1821, just as Spain submits Florida to the USA. The historical record is clear that Gaspar is an invention, with André-Marcel d'Ans (1980) explaining the myth has two layers: the elitist version using a romantic figure to sweep away the history for the period, one with Cubans and Seminoles, and a popular version providing Tampa with an exciting story with sound and fury for popular enjoyment. The story leads to parades and merriment but not knowledge of what happened in history. Across the west coast of Florida, marketing pirate-themed annual events provide entertainment and objects for purchase.

Souvenirs are an important part of the marketing of heritage, objects that can be purchased and brought home. The interest in seeing the material past can become a passion for antiquities, and the illegal antiquities trade is a major concern across the world but particularly in places where artifacts offer high rewards. The interest in capturing the past is increasing. Objects are made for tourists to purchase in omnipresent gift shops, significant locales for understanding the dynamics of heritage. Souvenirs can range from scholarly books and replicas of artifacts (Fig. 3) to kitsch like shot glasses and refrigerator magnets (Fig. 4). The images on such souvenirs are part of remembrances of archaeological sites.

Marketing Heritage, Fig. 3 Marketing heritage creates commodities: A replica of an ancient Egyptian scarab (Photograph courtesy of the author)

Marketing Heritage, Fig. 4 A remembrance for a visit: refrigerator magnet from Cahokia Mounds State Historic Site, USA (Photograph courtesy of the author)

Marketing heritage raises questions on the uses of the past for the present. In Egypt,

Joseph Hobbs (1989) offers a cautionary tale for the expansion of tourism at historical sites and a focus on the present needs of tourists: Jebel Musa is a special place as Mount Sinai, a holy site for Judaism, Christianity, and Islam. The pilgrimage and religious significance is ancient, and the tourist appeal is increasing. While the local residents would not climb to the top of the mountain, for some tourists access can be an important induction to visit. A development project to increase tourist access included a proposal for a cable car to the top of the mountain. Hobbs explains how the monks of St. Katherine Monastery used international pressure on the Egyptian government, providing an illustration of the interplay of the global and the local for preservation. The dynamics of the local and the global can be seen in the implications of nominating a historic site for the UNESCO World Heritage List. The List, which is growing exponentially, offers a global audience for a place deemed significant by a national government and approved by UNESCO; according to http://whc.unesco.org/en/about/: "World Heritage sites belong to all the peoples of the world, irrespective of the territory on which they are located". Listings offer an ethical challenge: when a place within the sovereign territory of a state, how does it belong to humanity? As the list grows in size, the competition for attention will grow stronger and more interesting. As Daugbjerg and Fibiger (2011: 141) state, building on the critique of heritage by Barbara Kirshenblatt-Gimblett for a collection on global heritage:

> We share such a basic suspicion towards the effect of (world) heritage labeling and. . .set out to scrutinize cases of privileges of access, consumption and inheritance, as well as the appropriation and exploitation of what is understood as or claimed to be global heritage.

Future Directions

These issues and dynamics pose a question: Is archaeology up to explaining the politics of heritage in terms of both its empowering and commodifying processes? Can archaeologists theorize the concerns for heritage tourism and communicate them effectively with heritage managers? The benefits of increasing commodification of the past are clear within a neoliberal economy, but the ethics of stewardship and collaborations with descendant communities are significant as counterweights to the resources generated by archaeology's production of material heritage for consumption. With the accelerating number of tourists seeking heritage sites, with new media possibilities for projecting heritage into new realms for those interested in the past, marketing heritage will continue to be a topic of study and analysis for archaeology around the world.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Heritage: History and Context
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace

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Martin, Colin

Paula Martin
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Basic Biographical Information

Colin Martin's (b. 1939) (Fig. 1) brief early career as a flying instructor was curtailed by an eyesight defect, and he joined the army on a short service commission in 1958. Posted to Cyprus he learned to dive and became fascinated by the many submerged antiquities around its coasts. From 1961 he worked as a freelance writer and photographer based in Scotland, specializing in historical and archaeological topics and diving when he could. During the early 1960s, he participated in David Bellamy's "Operation Kelp" around Britain's coast and later accompanied Bellamy on a botanical expedition to NW Spain.

In 1968 he learned of the late Syd Wignall's planned expedition to SW Ireland to search for the Spanish Armada wreck *Santa María de la Rosa* and wrote asking if he could cover the story for a magazine. His then very amateur knowledge of archaeology, coupled with an ability to dive, was a rare combination in those days, and on his first night with the team in Dingle, he was offered the post of project archaeologist. The wreck was eventually found, and the story of the search and subsequent investigation is recounted in his popular book (Martin 1975).

Major Accomplishments

In those pioneering days it was possible to get into professional maritime archaeology by such unconventional means, though it involved a steep

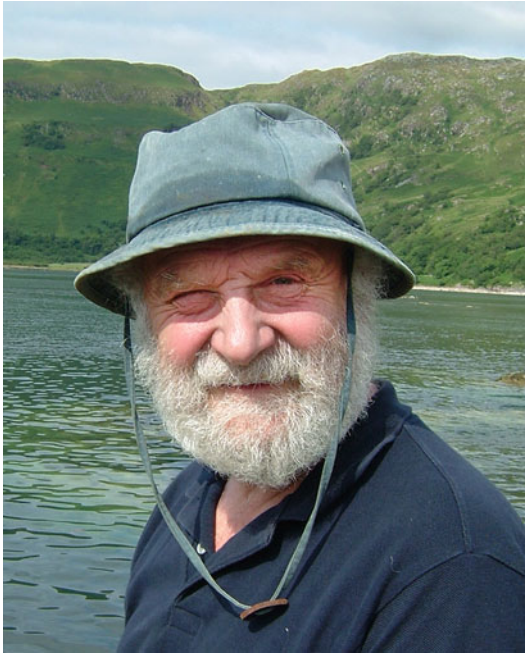

Martin, Colin, Fig. 1 Colin Martin

learning curve. His burgeoning interest next led him in 1970 to Fair Isle, where another Armada ship, *El Gran Grifón*, had been wrecked. Her remains were discovered close inshore on the first day and for the rest of that season, and over a further summer in 1977, the site was extensively excavated, revealing much information about the ship's guns. By now Colin was questioning many historical interpretations concerning the Armada, especially relating to its armament, and was beginning to explore associated documentary sources, finding in the topic a marvelous opportunity to combine historical and archaeological evidence.

In 1971 the Armada wreck *La Trinidad Valencera* was discovered off the Donegal coast by the City of Derry Sub-Aqua Club, and Colin was invited to direct its investigation by the club in association with the BBC and the Ulster Museum. This continued over many seasons until 1985, when the site was finally closed. The recoveries included parts of the Armada's artillery train, including three matching siege cannons blazoned with Philip II's arms (Martin 1988). Great quantities of military equipment, including weaponry and items of clothing, were also found, as well as domestic and personal items belonging to the troops. Studied in conjunction with contemporary documentation in Spain, the finds provided unprecedented opportunities for fresh insights into the Armada, and this led to his Ph.D. thesis, *The Equipment and Fighting Potential of the Spanish Armada* (University of St Andrews 1983). Later, in collaboration with the distinguished historian Professor Geoffrey Parker, Colin wrote a new analytical account of the campaign (Martin & Parker 1988). The recoveries from *La Trinidad Valencera* are now on display in the Tower Museum, Londonderry.

Through the good offices of Joan du Plat Taylor, who exercised a powerful if largely unsung influence on the early development of nautical archaeology in Britain, Colin was invited in 1973 to set up a research institute at St Andrews University, on the east coast of Scotland, with funding from the Leverhulme Trust. From this new base the *Trinidad Valencera* excavation was continued and fresh projects initiated. These included investigations of the wrecks of the Dutch East Indiaman *Adelaar*, lost on Barra in the Outer Hebrides in 1728 (Martin 2005), and the English warship *Dartmouth*, which sank in the Sound of Mull, Scotland, in 1690 (Martin 1978).

The Leverhulme grant included provision for the recruitment of new staff, and Tony Long – a colleague from *Santa María* days – joined as technician. He was followed by Keith Muckelroy and Paula Williams – young archaeology graduates from Cambridge and Bristol, respectively – who were boldly setting out on careers in a field still regarded as not entirely respectable for "proper" academics. Both were divers, and soon the St Andrews quartet was operating as a team each summer on the *Dartmouth*, *Gran Grifón*, and *Trinidad Valencera* projects. The interpersonal chemistry was stimulating, and during post-dive discussions in the pubs of Mull, Shetland, and Donegal, many ideas which have subsequently become enshrined in the discipline were thrashed out, usually amicably.

Keith moved on to research at Cambridge and then to a post at the National Maritime Museum

before his untimely death in 1980. In 1976 Colin married Paula, and in 1985 a new graduate teaching and research program, the Scottish Institute of Maritime Studies, was established at St Andrews. For the next 15 years, it ran a popular diploma course and supervised master's and Ph.D. degrees. Colin retired in 2001 to concentrate on research and writing.

In 1992, seven years after he had ceased active diving with the close of the *Trinidad Valencera* project, Colin was persuaded to retrain for a commercial diving qualification so that he could direct the excavation of a small warship wreck off Duart Castle on Mull, which was threatened by erosion. With funding from Historic Scotland and the Arts and Humanities Research Board, and the support of the National Museums of Scotland, the work was completed in 2003 and is currently close to final publication.

Colin and Paula have remained research partners as well as nuptial ones, and for the past 10 years, they have jointly been engaged in a maritime landscape project among the western coasts and islands of Scotland. This brings together the archaeology of the shipwrecks they have investigated with the area's wider maritime past, conducted through surveys of coastal features such as early harbors and landing places, fish traps, industries, boathouses, recreational facilities, and defense. Some of this involves aerial survey in collaboration with the Royal Commission on the Ancient and Historical Monuments of Scotland, bringing Colin back to his early roots in aviation.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Industrial Archaeology
- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Ship Archaeology
- ▶ Site Formation Processes

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M

Marx, Karl

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Basic Biographical Information

Political radical, journalist, theorist Karl Heinrich Marx has probably been read by more people than any other social critic in the past 160 years, and his work still remains relevant for archaeologists and others today. Born 5 May 1818 in Trier, Westphalia, he died 13 March 1883 in London, England. From his student days at Berlin University in the late 1830 s, Marx honed his understanding of anthropology (Patterson 2003, 2009; Anderson 2010). His appreciation – already apparent in The Ethnological and Philosophical Manuscripts of 1844 or The German Ideology – grew as he continually examined the historical antecedents of Western capitalism as well as the distortion and transformation of

colonial societies on its margins (e.g., Marx 1844/1975, 1857–1858/1973, 1880–1882/1974, 1881/1983; Marx & Engels 1845–1846/1975).

Major Accomplishments

Marx insisted that human beings were simultaneously natural beings interacting with the worlds they inhabited and social individuals enmeshed in historically (developmentally) contingent ensembles of social relations. As natural beings, they distinguished themselves from animals once they began to produce their means of subsistence – a step that involved perceiving and engaging with the world around them, distinguishing themselves from that world through self-objectification (i.e., purposive activity) and action on the world of externalized objects they have created, and transforming their hands, eyes, and other organs into means of production as well as the objects they have forged into extensions of their bodies to mediate, regulate, and control the metabolism between nature and themselves. As social beings, their sociality is actualized in their relations with other individuals through participation in historically specific communities. Their consciousnesses, personalities, ambivalences, identities, and cultures are shaped by the sets of social relations into which they are born, help to actualize, and occasionally even transform during their lives. The two aspects of human beings – the natural and the social – exist in a dialectical relationship with each other and with the worlds they have created. Consequently, Marx's theory of history, contrary to atomistic (Cartesian) reductionism, is built on a notion of totality that includes both natural history and human history. In this view, the totality is a multileveled, historically and developmentally contingent and dialectically structured unity that exists in and through the diverse connections, interpenetrations, and contradictions that shape the interactions of the parts with one another as well as with the totality itself. It is structured by processes and relations that are not always apparent on the surface, the constituent parts are not identical with each other or with their relations to the whole, the parts do not exist prior to the totality but rather acquire their characteristic properties in the interactions that constitute the unity, the totality is in continual flux through the parts and levels may be changing at different rates, the transformations may destroy the conditions that brought the totality into existence, and they may create possibilities for new structures that have not existed previously. For Marx, it was essential to understand the dialectical relation between history and social structure. In his view, the production of goods to satisfy needs and to reproduce life itself and the ensembles of social relations in which this industry occurred were "continually evolving out of the life-processes of definite individuals" living in particular circumstances (Marx & Engels 1845–1846/1976: 35).

It was necessary to grasp both the historical dimension (formation) of the social structure and, at the same time, to understand the structural determinations and contingencies of that historical movement – i.e., the interplay of structure and process, of necessity and accident. This is why he paid so much attention to the social structures of capitalism both in its core areas and beyond and to the underlying historical processes and relations that produced them (e.g., Marx 1863–1867/1977). It is why he recognized subtle variations in the development of capitalism from one country to another, resulting from the singularities of the conditions and relations that existed at particular times and places. Nevertheless, there were limits to this diversity, and the commonalities in ways capitalist societies organized production were manifest in their shared mode of production. Marx (e.g., 1857–1858/1973: 459-514) distinguished capitalist from precapitalist modes of production. Industrial capitalist societies were characterized by commodity production, private ownership of the means of production, a social division of labor between a class whose members owned the means of production and a class of propertyless workers who sold their labor power to produce and reproduce the conditions of their own existence, and the appropriation by the owners of the profit or surplus value created by the direct producers.

In societies manifesting precapitalist modes of production, producers retained control over their means of production and subsistence, even though a portion of it might be siphoned off in the form of tribute, taxes, or rent. He proceeded to distinguish a number of precapitalist modes of production to designate different forms of cooperation and social structure: primitive communal, ancient, Asiatic, Slavonic, and feudal. These do not represent an evolutionary progression ultimately culminating in capitalist but rather different forms of property relations or alternative pathways out of historically specific forms of primitive communal society. Marx was repeatedly struck by the fact that communities manifesting precapitalist modes of production tended to reproduce existing social relations. By this, he did not mean that their cultures remained unchanged or that they were free of tensions, conflicts, or even contradictions. He viewed precapitalist communities as limited, local developments of humanity that possessed "an incomparably greater [natural] vitality than the Semitic, Greek, Roman, and a fortiori modern capitalist societies," and argued that "we should be thoroughly acquainted with all the historical twists and turns" of these formations (Marx 1881/1983: 106-107). He contrasted them with the dynamism of capitalist societies that were driven relentlessly toward universality, that constantly developed their productive forces to create new needs and commodities, that exploited both workers and nature, that destroyed local traditions as they reworked old ways of life, and that provoked opposition and resistance to their expansion.

Cross-References

- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Childe, Vere Gordon (Political and Social Archaeology)
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Social Archaeology

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Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

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Introduction

Marxist archaeological approaches are now considered important in the history of world archaeological thought (Hodder & Hutson 2003; Trigger 2006; Preucel & Meskell 2007). Such approaches have significantly impacted archaeological theories since their early exposition in the twentieth century. Marxist archaeologies have

been employed in many different national contexts in Latin America and have particularly influenced the different levels and structural forms of archaeology in those countries. Additionally, though no less importantly, its practice in the contemporary world is significant, as it proposes an objective knowledge of the past – in the sense that it originated from the study of social materiality – but, at the same time, it differs from other theoretical tendencies by suggesting a critique of this world with the aim of creatively transforming it.

The entire development of Marxist archaeologies cannot be comprehensively covered in an entry of this length, and as such we recommend the following texts to the reader: McGuire (1992, 2008), Vargas and Sanoja (1999), Patterson (2003, 2007), Navarrete (2006), and Trigger (2006). Rather, in this entry, we will focus our attention on a set of Marxist archaeologies from Western Europe and the Americas. In particular, we will assess three traditions from these regions which have resulted from the direct inspiration of the writings of Karl Marx and Frederick Engels: Marxist archaeology in the United States of America, Marxist archaeology in Spain, and Latin American Social Archaeology.

Our aim is to present a succinct but meaningful panorama of the archaeological traditions closest to the classical Marxists and which have had implications for research about the past and for archaeology in theory and practice (also refer to Patterson 2003). Further, we argue that for many of the Marxist archaeologists discussed in this entry, the work of prehistorian Vere Gordon Childe has been of great importance, in particular his publications subsequent to 1936 (Trigger 1984; Politis 1999: 6).

There are also other important Marxist archaeologies, less well known in English and Spanish archaeological literature, such as the Marxist archaeological traditions developed in the USSR and China (Trigger 2006); however, there are problems in accessing such research due to language barriers. Interestingly, both perspectives may be viewed as dogmatic approaches due to the official policies of those countries. As such, even if this research was more accessible, we can assume that these projects would not have had a significant impact in Europe and America (although see the Cuban case in Dacal & Watters 2005). So, even though the labels we use turn out to be reductionist, as they do not encompass the different nuances of the Marxist theoretical position, they do assist us to see the main tendencies present in America and Western Europe, which remained interrelated due to the sharing of texts, ideas, and communal aspirations.

Key Issues/Current Debates

Marxist Archaeology in the United States of America

Archaeology in the USA is located within the anthropological tradition and as such is often located within anthropology departments at educational institutions. It can be argued that the development of Marxist archaeological approaches has been marginalized in the USA, and as a result, their development in the twentieth century was quite late. Indeed, rather than groups or schools of thought, the USA has seen such approaches practiced by isolated individuals (in many cases self-taught). Hakken and Lessinger (1987: 4-5) indicate that the absence of Marxist development in North American anthropology is because "in the United States the interaction between an intolerant liberal politics and a deeply rooted anti- communism in great part prevented this from happening." For Maurice Bloch (1987), the late inclusion of Marxism into North American academic circles can also be explained by the enduring evolutionary thinking of Lewis H. Morgan. Morgan's emphasis on social change as being technologically driven was influential in non-Marxist neo-evolutionary thought in the USA after 1940s, particularly in the work of Leslie White and Julian Steward.

In this way, among the first groups of anthropologists to approach Marxism in the 1940s were members of the so-called Mundial Upheaval Society which included individuals such as Morton Fried, Elman Service, Eric Wolf, Robert Manners, Daniel McCall, Sidney Mintz, Stanley Diamond, Rufus Mathewson, and John V. Murra.

Although many of these practitioners later abandoned Marxist approaches and moved to form part of the emerging New or Processual Archaeology, which from the 1960s would be the most important archaeological theory in the USA. Despite this move away from Marxism, one can still perceive in their writings the influence of Marxist thinking in their research.

Another early Marxist influence in the USA can be observed, for example, in the book *Outlines of Anthropology*, by Melville Jacobs and Bernhard Stern, published in 1947. However, this and other primary attempts to develop a Marxist archaeology in the USA would be radically cut short in 1950 by the commencement of the persecution of party members and communist sympathizers by the Committee of Anti-American Activities led by Senator John McCarthy. This persecution, in which many intellectuals with leftist ideas found themselves involved, forced some teachers to abandon their academic posts (McGuire 1992: 39).

With this intense repression, research and archaeological interpretations that were explicitly Marxist were removed from North American anthropological thought and isolated from the theoretical and methodological developments that were occurring principally in Europe. In this anti-Marxist environment, many archaeologists avoided quoting the writings of Marx or Engels; instead, they referenced the works of Lewis Morgan which, as we know, had already been taken account of by Engels at the time and now were found more acceptable. Interestingly, the 1950s was a decade when neo-evolutionism began to emerge in the hands of researchers like Leslie White and Julian Steward.

Despite this, in the 1960s, with the appearance of many different political movements, especially those critical of the Vietnam War, racism, and the formation of the feminist movement, there was a resurgence of Marxist thought. Anthropology was not far from these movements, and already by 1971, at the meetings of the New York American Anthropological Association, symposia with explicitly Marxist topics began to appear (Lewis 2009: 215). In the same way, in 1972, Dell Hymes published an anthology of texts, *Reinventing Anthropology*, in which many entries shared a critical spirit inspired by Marxism, as was also seen in the founding of the journal *Dialectical Anthropology*.

In this new atmosphere, which was more open and tolerant of Marxist discourse, some archaeologists were able to develop Marxist approaches. In spite of this, it also has to be mentioned that there existed archaeologists who used theories and concepts clearly derived from Marxism but who carried out their research without declaring the original source of their ideas (Spriggs 1984: 7). For example, Matthew Spriggs (1984: 2) discerned up to seven Marxist views of materialism used by some North American archaeologists.

All of the aforementioned history makes it clear that in this political scene, Marxist theoretical positions were undermined by the self-same State and interfered with its sustained development. In truth, what can be noted is that the few archaeologists following Marxist approaches had to do so in a form that was not organic and in many cases autodidactic.

An example could be the case of Thomas Patterson who, while conducting fieldwork in Peru in the beginning of the 1960s, met Peruvian Marxist archaeologists. This contact, together with the understanding of the economic and political Peruvian milieux, and Marxist readings saw him develop a Marxist perspective (McGuire 1992: 74). Patterson is one of the most developed North American archaeologists in the historical materialist perspective as regards important themes in Central Andean archaeology, developing, above all, an explanation based on the dialectic between the social classes originating there. Likewise, in the last few years, he has taken it upon himself to spread the presence of Marxist thinking in global archaeology (Patterson 2003, 2009). One of Patterson's collaborators is Christine Gailey who, in turn, was a student of Stanley Diamond. Based on her research on the Tongan islands of Polynesia (Gailey 1987), she focused her research on the hidden exploitation of men over women and the ways such a "gender hierarchy" was a platform for the formation of the State.

Another researcher to be noted here is Randall McGuire, currently a lecturer at Binghamton University, the State University of New York, who primarily investigates pre-Hispanic societies in the southeast of the United States and Mexico. As a result of his research, McGuire has been exposed to Marxist theoretical developments in Latin America and in the Iberian Peninsula and, in fact, has maintained a dynamic interchange with archaeology research groups such as those of the Universitat Autònoma of Barcelona and students of Latin America. As well as his important synthesis of world Marxist archaeology (McGuire 1992), his 2008 book, *Archaeology as Political Action*, marks a milestone in North American Marxist archaeology, making clear the political commitment that should be involved in its praxis.

For his part, Phillip Kohl carried out archaeological research, especially in Asia, and developed his interpretations from a Marxist perspective (Kohl 1987). Also important are his critique of the "use and abuse" in archaeology of the "theory of the world system" of Immanuel Wallerstein and his critical analysis of the relationship between nationalism and archaeology (Kohl & Fawcett 1995).

Also deserving of mention is Glenn Perusek, who aligned himself with the "materialism of Marx" (Perusek 1994: 193) as a counterpart to the different materialisms existing in our time. Among these materialisms, we find the influential (in North America) structuralist Marxism and the diverse strands of neo-Marxism, which borrow only some Marxist elements. Perusek analyzed the so-called factional competition which has its Marxist correlation in class struggle as the engine of change in societies (for a broader treatment of this question, consult the edited anthology by Brumfiel & Fox [1994]).

As can be seen through these representative cases, Marxist archaeology still prevails in the USA, and the first generations of Marxist archaeologists of the 1960s and 1970s have now been joined by younger researchers who continue to develop and promote this perspective (McGuire 2008: 85), proposing different topics and places to research, always looking to Latin America and, above all, to Europe where Marxism began.

Marxist Archaeology in Spain

From 1960, as occurred in other Western European countries, Spain saw renovation and growth in the discipline of archaeology, although it was not until 1975 that historical materialism would be admitted into academia. This was the case because of Franco's dictatorship (1939–1975) during which time a traditional school of archaeology was maintained and "routine research rather than technological innovation, epistemological analysis and creative methodology" (Vázquez & Risch 1991: 25) was the order of the day.

It is also worth noting that the development of Marxist archaeological approaches in the 1980s was closer in Spain to the discipline of history (and hence archaeology was focused on prehistory) than to the social disciplines such as anthropology, whose frameworks and discussions had less influence on archaeology. On the other hand, Spain's close proximity to France facilitated the introduction of theory and methodology to the country, particularly within Paleolithic archaeology and fine-grained excavation techniques. Likewise, German archaeological research projects in Spain also exerted an influence, principally methodological, on the training of many of its archaeologists; such an influence can be seen in large-scale excavations, the gathering of large collections of archaeological objects, detailed recording of sites and artifacts, the development of typologies, and quantitative analysis.

In this way, it was not until the beginning of the 1980s that new interpretations appeared in Spanish archaeology. These developed as a consequence of the changed political climate, given the left's return to power. Thus, in 1983, Vicente Lull published his doctoral thesis, defended in 1980, about the society of "El Argar" (2250–1500 BCE) in which a materialist historical perspective was used for the first time in an explicit way (Vázquez & Risch 1991: 32). As can be expected, such a publication was not free from the criticisms of the established academics, who were still very conservative.

In the same vein, an important space for the discussion of Marxist perspectives was opened in Barcelona's 1986 Congreso de Arqueología

Teórica (Congress of Theoretical Archaeology) in which the majority of the papers centered on the use of Marxism in archaeology. During those years, the original Barcelona Marxist group was formally constituted, and its appearance in the academic arena at the Coloquio de Arqueología de Soria (1981) (Seminar of Sorian Archaeology) confirmed the materialist historical course that would be followed later. Equally, in the same decade, they carried out the first field investigations that had materialist theoretical frameworks, in which they included colleagues from other nationalities and theoretical positions, who would later take their theoretical substance from Marxism, as in the case of Robert Chapman (2003).

In this way, the Marxist archaeological group of Barcelona is a significant source of theoretical and methodological production for Marxist archaeology, as much in Spain as elsewhere. Its publications included many areas relating to prehistory and have been used as references in different academic spaces. In this sense, Vicente Lull, the lead investigator of this group, acknowledged from the first that dialectic has to exist between theory and material evidence, in this case that of archaeology.

In this way, Lull distanced himself from the many mechanistic Marxist discussions that had gone on previously. During the 1990s, with his team, he developed a series of theories and social explanations from archaeological investigations based on historical materialism. In almost all of these publications, one of the main objectives was to make clear that society comes about through praxis, distancing themselves completely from abstract and normative classifications that had become popular in mechanistic Marxist studies.

Lull and his associates went on to develop quite an active practice, holding conferences in different parts of Spain, Europe, and America as well as bringing to light the synthesis of theories about the origins of the State, written conjointly with Rafael Micó (Lull & Micó 2007) and a long essay by Lull (2007) on his method of viewing archaeological objects from a historical materialist perspective.

It should also be mentioned that at the same Pre-history Department at the Barcelona Universitat Autònoma was another Marxist group led by Jordi Estévez and Asumció Vila. This research group complemented the point of view of the Iberian Peninsula Pre-history Unit with a focus on studying pre-classist societies, specifically from the Paleolithic to ethnographic hunters and gatherers.

Furthermore, this group carried out archaeological investigations in America, particularly in Tierra del Fuego, closely allied with their Argentine colleagues (Estévez & Vila 1999). A similar collaboration with Peruvian colleagues was undertaken by the team led by Pedro Castro-Martínez, which focused their studies on the southern coast of Perú, carrying out various digs there, with results that were beginning to be published in America and Europe.

Finally, we also wish to mention that the Prehistory Department of Barcelona's Universitat Autònoma initiated and promoted a Marxist feminist approach, particularly by María Encarna Sanahuja (who has recently passed away) that has influenced other European and Latin American Marxists as in the case of the Venezuelan Iraida Vargas.

Apart from the Barcelona group, another Marxist group arose in the Humanities Faculty of Jaén University, the principal representatives being Arturo Ruiz and Manuel Molinos. Important studies in this regard include those by Francisco Nocete (1988) about pre-Historic State formation in Guadalquivir and his scathing criticism of the sociopolitical leadership category; also the studies of Oswaldo Arteaga and his Seville team as well as José Ramos and associates in Cádiz deserve a mention here.

As a consequence of the structure of these Marxist archaeological groups in southern Spain, one of the seminal publications, the *Revista Atlántica-Mediterránea de Prehistoria y Arqueología Social* (RAMPAS) (the *Atlantic-Mediterranean Journal of Pre-historic and Social Archaeology*), has echoed their point of view and, of course, has an international following in which Latin American archaeologists have featured, given that the group from southern

Spain has been quite influential theoretically in Latin American Social Archaeology, especially through the work of Luis Felipe Bate who obtained his doctorate from Seville University.

Latin American Social Archaeology (ASL)

After gaining independence at the beginning of the twentieth century, particularly from Spain, the majority of Latin American countries followed socioeconomic and sociopolitical processes which sought to generate identification with their precolonial, or criollo, legacy. Such identities originated in the colonial era and from the higher classes who, once political independence was achieved, eventually lead the new nations and re-created their history.

In this strengthening process, they tried to form national identities by seeking out their ancestors, which later gave rise to the nationalisms that were established through archaeological studies (Kohl & Fawcett 1995). However, scientific archaeology as such did not arise in these countries until the latter decades of the nineteenth century (Politis 1999: 198-199) although, paradoxically, they were initiated by foreign investigators, principally from Western Europe and the United States. With these researchers, cultural evolutionist theory was incorporated into the interpretation of pre-Hispanic societies. In addition, the influence of the USA became more noticeable at the start of the twentieth century, as its political power and economic interests grew.

In the years when diffusionism and cultural historicism were acquiring importance in the USA, countries such as Peru and Mexico were developing a social and political movement called "Indigenismo" (Indigenism) which was particularly influential in the 1920s. Indigenism, which began as a social vindication movement, later transformed into a type of nationalism that sought to strengthen the structure of the State by way of re-creating the pre-Hispanic past (Inca and Aztec, respectively) at the same time with the objective of rejecting colonialism, even though there were different expressions and interests in each country.

During the twentieth century, each Latin American country had a particular political trajectory, including a form that moved from leftist governments to elite US-patronized administrations to rightist military dictatorships.

In this way, owing to political situations in which power was taken by military dictatorships with nationalistic policies (e.g., in Peru at the end of the 1960s), leftist parties (e.g., in Mexico), communist governments, as in Cuba following their 1959 Revolution, or a mix of military dictatorship and left-wing parties (as in Venezuela), a Marxist archaeology was able to establish itself and develop.

In the case of Cuba, after its successful revolution, and with communist policy already installed, it was not long before Marxism was a fundamental part of archaeological interpretation. In this process, Cuban archaeologist Ernesto Tabío published his *Prehistoria de Cuba* (1966) - (*Prehistory of Cuba*), a book through which Cuban archaeology was introduced to the soviet archaeological framework of analysis and through which many Latin American students assimilated this version of historical materialism (Navarrete 2006: 24). It is interesting to note here that before the Cuban Revolution, Ernesto Tabío had carried out important archaeological investigations on the central coast of Peru.

The usual interpretations by archaeologists foreign to Latin American countries (and their local students and followers) were countered later, in 1974, with works such as *Arqueología como Ciencia Social* (*Archaeology as a Social Science*) by the Peruvian archaeologist Luis G. Lumbreras and *Antiguas Formaciones y Modos de Producción Venezolanos* (*Ancient Formations and Venezuelan Methods of Production*) by Mario Sanoja and Iraida Vargas.

As a consequence of these initial proposals, a series of meetings were held which invigorated the development of the so-called Arqueología Social Latinoamericana (Latin American Social Archaeology). The first of these, driven by Lumbreras, occurred at the symposium entitled "Formaciones aborígenes en América" (Aboriginal Formations in America) which was

included in the XXXIX Congreso Internacional de Americanistas (39th International Congress of Americanists) celebrated in Lima in 1970. Later in Mexico, there was the Reunión de Teotihuacán (Meeting of Teotihuacán) in 1975, organized by José Luis Lorenzo. At each of these gatherings, they tried to establish general lines of action according to the perspective of historical materialism, which each of the participants went on to develop in their respective countries. After these early attempts, and dissatisfied with the previous work group, they formed the so-called Grupo de Oaxtepec (Oaxtepec Group) in 1983, among them Luis G. Lumbreras, Manuel Gándara, Mario Sanoja, Marcio Veloz, Iraida Vargas, and Felipe Bate.

For Perú, Luis Guillermo Lumbreras is the principal representative of this school of thought and has left us valuable insights into pre-Hispanic societies, which he endorsed through his empirical research in various zones of the Andes, for example, the Chavín de Huántar site (see the Lumbreras entry in this encyclopedia). Although his works have not been free from criticism, it is undoubtedly his fieldwork, extensive bibliographic production, his panoramic view of social processes, and his political stance that have notably influenced archaeology in Peru and in other parts of the world.

In the 1980s, Lumbreras, together with other researchers, was part of the Instituto Andino de Estudios Arqueológicos (INDEA) (Andean Institute of Archaeological Studies) which provided a space for the practice and reflection of archaeology from the Marxism point of view. For various reasons, a solid group of Marxist archaeologists was never formed, which is made obvious by the few publications in this line. One explanation for this, in part, is that in the 1990s, during the government of Alberto Fujimori, intolerance and persecution of left-wing thought in general made it impossible to explain and practice a Marxist-inspired archaeology.

In the case of Mexico, following the foundations laid by José Luis Lorenzo and other intellectuals who emigrated from Spain due to Franco's dictatorship, the work of Luis Felipe Bate should be noted here. After his exile from Chile, as a consequence of the Pinochet dictatorship, Bate took it upon himself to form a nucleus of Marxist archaeologists with the Escuela Nacional de Antropología e Historia (ENAH) (National School of Anthropology and History) within which Manuel Gándara stands out, generating an important and meaningful production of archaeology which has impacted Latin America and Spain in particular (see Bate 1998). Likewise, thanks to the participation of Luis Felipe Bate and associates in the publication of *Boletín de Antropología Americana* (*Bulletin of American Anthropology*), an academic space was enabled for the diffusion and discussion of themes that were mostly related to Marxism.

In order not to overwhelm the reader with more individual cases, we simply wish to demonstrate that Latin American Social Archaeology still prevails, principally in such countries as Mexico, Venezuela, and Peru, although it has begun to form an autocratic viewpoint relative to its founders, though always keeping the same link between theory and praxis as its founders instituted (see Tantaleán & Aguilar 2012). Likewise, in Chile, there has been a resurgence of this type of archaeology, which had been persecuted and practically disappeared from academic and political circles during the military government of Augusto Pinochet (1973–1990).

After Pinochet's dictatorship, this kind of archaeology began to accept Marxism in both its theoretical and political implications. Studies in this line include those of Patricio Núñez, Mauricio Uribe, Francisco Gallardo, and new generations of young archaeologists such as Benjamín Ballester, Jairo Sepúlveda, Alex San Francisco, and Miguel Fuentes.

This resurgence of Marxist archaeology in Chile makes it clear that Marxism has always had an important political position in this country and that its left-wing intellectuals have been closely linked with the Peruvians, despite attempts to impose nationalisms and the political persecution of the left, particularly in the south.

Future Directions

Final Remarks

As we have been able to briefly outline, Marxist archaeology has had a presence in archaeological thought throughout the twentieth century, with significant influence in the first decade of the twenty-first century. Further, as we have demonstrated, the historical substratum, the academic training, and the academic and political context in which Marxist archaeologists practiced were dominated by other ways of doing archaeology, e.g., historical-cultural and neo-evolutionary approaches.

For this reason, despite taking on much of historical materialism, some Marxist archaeologists unconsciously reproduced assumptions and epistemologies they believed they had overcome. Furthermore, national contexts and, above all, official policies slowed down or halted their natural development. The intricate and diverse political and academic trajectories of the twentieth century can, at least in part, explain the often contradictory history of Marxism in archaeology.

While Marxist archaeological approaches are not dominant, they have influenced the world of archaeological thought. Marxist archaeology has also found ways to generate discussions and contributions which have transcended national borders and maintained a dynamic dialogue between colleagues. Thus, despite the fact that Marxist archaeologies are not always well received by the discipline, they have been well connected with other forms and approaches of practicing archaeology.

As Patterson (2003) would say, many archaeologists have had conversations with the "Ghost" of Marx. Archaeology has, therefore, been enriched by these often unacknowledged and unconscious conversations. We anticipate an ongoing development of Marxist archaeology, based on its fluent dialogues among archaeologists from diverse countries and regions of the world and with non-Marxist archaeologists as well. We also think that Marxist archaeologies need to keep some distance from dogmatisms and rhetorics that often limit their creativity, in order to develop objective and socially meaningful methodologies and historical data.

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- ▶ Childe, Vere Gordon (Political and Social Archaeology)
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Basic Biographical Information

Andrew R. Mason is a Principal and Registered Professional Consulting Archaeologist in Golder Associates' Vancouver, Canada, office. He holds an M.A. from the University of British Columbia.

Major Accomplishments

Mason's research interests include Northwest Coast archaeology, impact mitigation strategies, the role of finance in cultural heritage, and cultural heritage policy. He has over 20 years of experience, undertaking heritage assignments throughout North America, South America, and Asia. In addition to his consulting practice, he is also a Sessional Instructor at the University of British Columbia. He is an ICAHM Expert Member and Vice President for North America in ICAHM. He is also a member of the editorial board of ICAHM's publication series, "Multidisciplinary Perspectives in Archaeological Heritage Management." He was a board member of ICOMOS (Canada) from 2009 to 2012 and is currently Canada's International Voting Member for ICAHM.

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Masson, Vadim M.

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Basic Biographical Information

Vadim Mikhailovich Masson (1929–2010) (Fig. 1) was one of the most prominent archaeologists of Russia, a scientist with an international reputation, a pioneering researcher of ancient cultures of the South of Central Asia, and an important theorist who developed questions around the social and economic organization of proto-state (complex) societies.

Vadim Mikhailovich Masson was born on May 3, 1929, in Uzbekistan. He was the son of academic M.E. Masson. During 1945–1950, he studied in Department of History, Central Asian State University, in Tashkent. In 1959, he defended his Master's dissertation on the subject: *Dakhistan's Ancient Culture*. In 1963, he received a doctoral degree for his thesis *Ancient Past of Central Asia: From Beginning of Agriculture to campaign of Alexander the Great*.

From 1954, he worked in the Leningrad office of the Institute of Archaeology of the Academy of Sciences of the USSR (presently known as the Institute of History of Material Culture at RAS), before becoming the Director in 1982. In 1956, he began to teach in the Department of History of Leningrad State University.

From 1951 until 2002, Masson annually carried out archaeological expeditions in the territory of Turkmenistan on settlements such as Dzheytun, Kara-depe and Altyn-depe, archaic Dakhistan and the Geoksyur oasis.

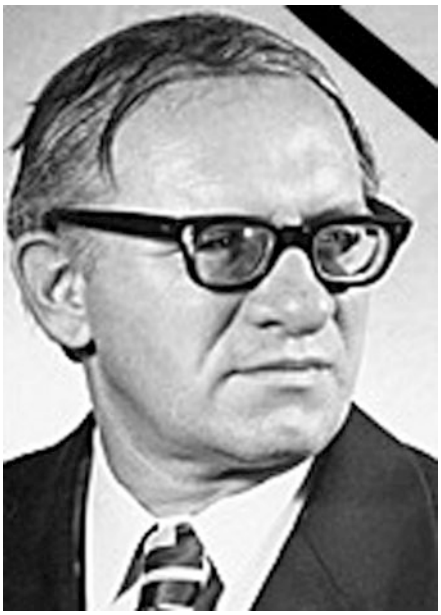

Masson, Vadim M., Fig. 1 Vadim Mikhailovich Masson

Masson died on February 19, 2010, in St. Petersburg.

Major Accomplishments

Vadim Masson made a huge contribution to the discovery and study of the agricultural settlement of the fourth millennium BCE – the well-known Dzheytun. This monument gained worldwide recognition, thanks to its unique artifacts, which brightly narrate the lives of the first farmers and cattle-farmers. V.M. Masson first identified and classified the so-called Dzheytun Culture as an essential phenomenon in the system of agricultural communities of the ancient world. Following V. Gordon Childe, Masson investigated the problem of the "Neolithic Revolution" based on new archaeological materials. He presented his findings in the monograph *Dzheytun's Settlement* (Masson 1971).

Archaeological excavations by V.M. Masson on the settled cultures of the Bronze Age in Central Asia enkindled a great interest in studying the genesis and development of early urban civilizations in this area of the ancient East. As shown in the research of V.M. Masson, in the third to second millenniums BCE between Shumer and India, several large urbanized habitats existed, where ancient civilizations were formed. The first of these was the South Turkmenian urban habitat of ancient-eastern civilization (Altyn-depe, Namazga-depe, Ulug-depe etc.). Early urban centers with monumental architecture were established in this area. The first general works dedicated to studying the pre-urban and early urban cultures near Kopetdag Plane (Namazga, Altyn-depe, Ulug-depe, Yaz-depe), were published in the 1950s and 1960s.

V.M. Masson regarded the South Turkmenian civilization as an early class (complex) society and Altyn-depe as "temple town" and urban center of this region. The detailed analysis of the rich collection of artifacts from this area led V.M. Masson to conclude that the complicated social and economical structure of the Altyn-depe society could also be viewed as a proto-state (complex) community.

V. M. Masson supervised around 50 scholars with scientific degrees for historical sciences. He is the author of more than 500 scientific works, including 32 books, which were published in Germany, Italy, Japan, Russia, Turkmenistan, UK, USA, and other countries.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Modern Material Culture Studies
- ▶ Social Archaeology
- ▶ Urbanism in the Ancient Near East

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Material Culture and Education in Archaeology

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Introduction

In the 1970s, while strongly influenced by a certain interpretation of oriental mysticism, the former Beatle George Harrison released the album Living in the Material World (1973). Imbued with the sounds of sitars, the songs were presented as musical alternatives to the Western

way of life, particularly the US capitalist variety. Barely 10 years later, the theme of the material world returned to the music scene. Madonna's rendition lacked Harrison's orientalism, (2003) declaring more complacently that "you know that we are living in a material world" (1985). To continue with our musical references, Pink Floyd's rock opera invoked a schoolboy choir against "dark sarcasm in the classroom" as, ultimately, they didn't "need no education."

The assertion that we live in a material world is no novelty to either the world of art or academia. Interpretations of the different sets of meanings resulting from these relations, however, are varied and can be construed from different perspectives. Among them we are concerned with how these sets of relations negotiate learning relations and the constitution of social subjects through materiality. The 1970s and 1980s marked a true conceptual turn in both archaeology and education. Our intention is to briefly outline a panorama of such a conceptual turn, as a guide to our present understanding of the partnership between these expressions of human activity.

Material culture is a constant presence in human life. We are born, grow up, and die interacting within diverse constellations of materiality, devised for different purposes: these are the structures, objects, and modifications which make up our leisure, work, and dwelling spaces among other countless possibilities. Material culture, being everything that is made or modified by human beings and that makes up humanity's day-to-day experiences, is therefore independent from time and even space.

One of the roles of this materiality is the transmission of knowledge, whether the result of a learning process – e.g., when making a tool – or by shaping the existing models of education as in the spatial layout of a classroom. We understand education as a learning process, a flux of knowledge in which the elders have a duty to cultivate the immature while guaranteeing their right to "shake up and question everything that is enshrined in the name of what is yet to come" (Brandão 2007).

Historical Background

If we now move away from the world of music and focus on the academic world, an example of a sharp analyst of the multiple meanings of material culture can be found in the British archaeologist Julian Thomas. Thomas proposes an understanding of the changes in the way material culture has been conceived as a key to the changing relations between people and the varied manifestations of materiality. Starting with the ideas of materiality of Aristotle, to medieval scholastics and present-day philosophers, Thomas constructs an overview of the world of ideas and its effects and relationships with the constructions of the material world (Thomas 2004: 202-250).

A second route of enquiry, still within the realm of philosophy but from a perspective which is closer to the history of science, is to reflect on the changing conceptions of material culture within the very field of archaeological science. This choice can be understood based on the authority exerted by archaeological discourses over analyses of material culture throughout the nineteenth and twentieth centuries. As part of a process of constituting and consolidating sciences, history was granted dominion over the analyses of written texts, anthropology dealt preferentially with certain specific cultures, and archaeology remained in charge of ordering, describing, and explaining what we call materiality. Therefore, the underlying question for this second route of enquiry would be how archaeology – perceived as the realm of material culture – understands its own object of study.

It must be highlighted, however, that the very basis of archaeological science allocated the materiality that archaeologists ought to study to past times. Therefore, the science that studied the human past was named archaeology (in Greek, "knowledge of the origins" or "account of things old" (Funari 2003: 10)). Although this definition was outlined throughout the nineteenth century, a significant proportion of scholars define their area as aiming to understand past human times through the analysis of material artifacts.

In a recent edition of the book, *Archaeology: Theories, Methods, and Practice* (2008), British archaeologists Colin Renfrew and Paul Bahn present archaeology as:

> Archaeology is the 'past tense of cultural anthropology'. Whereas cultural anthropologists will often base their conclusions on the experience of actually living within contemporary communities, archaeologists study past humans and societies primarily through their material remains – the buildings, tools, and other artifacts that constitute what is known as the material culture left over from former societies (Renfrew & Bahn 2008: 12).

Archaeology, as presented by Renfrew and Bahn, is constructed from the context of cultural anthropology. With its focus upon the past, the discipline turns material culture into a gateway into human history. Objects are subject to rescue and reconstruction and apt to reveal certain past events or mechanisms of past cultures. This perception of material culture as revealing is only plausible within a certain theoretical discourse about archaeology. Still, as we stated above, it is not the only way to understand materiality or even archaeological science.

Although material culture is enmeshed in human history, it was only in the nineteenth century that it was born as a concept within the studies of prehistory. The French geologist Boucher de Perthes was among the first to use the concept to analyze objects produced by humans during prehistory in his works *Antiquités celtiques et antédiluviennes* (1847) and *De l´homme antédiluvien* (1860). In his analyses, material culture enabled him to make assertions about a human past which had remained unrecorded in writing.

In over 150 years of existence, the term, which has become central to archaeological studies, has been given many different meanings. Archaeological practices of the cultural-historic strand, with their strong nationalist heritage, understood material culture as specific evidence of what humans built and therefore as artifacts. From such vestiges, we can elucidate the way certain cultures work. Culture, in this view, is defined as the sum total of all ideas, activities, and materials that characterize the nature of a certain human group (Jones 1997: 17). It would therefore constitute a social legacy of certain shared traditions, institutions, and ways of life, among other elements (Childe 1974).

Within the cultural-historic theoretical universe, artifacts are configured as cultural indicators. Gordon Childe, the Australian archaeologist who laid the foundations of this theory, asserts that artifacts, through the knowledge they allow, are formative of cultures in an archaeological format. It is through the analysis of archaeological culture that one could understand, for example, how

> (. . .) even in prehistoric times barbarian European societies behaved in a distinctively European way, very vaguely anticipating the contrast which over the past thousand years became flagrant, with African and Asian societies (Childe 1974: 13).

Within an imperialist mind-set and context, Childe puts forth that artifact assemblages would bear the characteristics of the cultures where they are produced. Therefore, even prehistoric Europeans would have been "superior" to the prehistoric men of Africa and Asia, as they were, after all, already European. A direct correspondence is established between a presupposed cultural group and the sets of materiality produced by it.

Whereas the continuators of the cultural-historic traditions perceived archaeological cultures as bearing explicit and therefore incontrovertible truths, Childe warned his readers:

> The reader must understand the hypothetical character of most archaeological conclusions. We can only ask for him to accept the most likely and most generally admitted deductions although these are still only probable. It is to prevent boredom that question marks are omitted, which otherwise might as well accompany most assertions (Childe 1974: 19).

Despite the warnings about the hypothetical character of material culture, artifacts were still understood as objective providers of "correct data" about certain cultures in several theoretical quarters.

Processual archaeology, as inaugurated by the work Method and Theory in American

Archaeology (1958), by the archaeologists Gordon R. Willey and Philip Phillips, questioned the effectiveness of cultural-historic studies and proposed new analyses that would focus on understanding the uses of artifacts by human beings. According to Phillips and Willey, cultural-historic archaeology had delved into the artifact form and the development of grand timelines which afforded little information about the actual cultures which had produced the artifacts under scrutiny.

Influenced by theories of cultural evolution and in an open dialogue with cultural ecology, processual archaeologists opened new lines of enquiry into how certain cultures lived and used their artifacts. In this new view, archaeology became a science without boundaries. According to the French anthropologist and archaeologist André Leroi- Gourhan, material culture and the objectivity which it granted to archaeology allowed the discipline to surpass spatial and chronological boundaries and elaborate syntheses of the general and the particular in reconstructing the objects studied (Leroi-Gourhan 1945: 10).

The access to certain cultures that was enabled by this specific way of recording, as well as its objectivity, began to be challenged, particularly from the 1980s onwards, with the birth of postprocessual archaeology and the strengthening of postmodernist theories.

The humanities in general and archaeology in particular sought to redefine the concept of culture and the objectivity of the researcher. In this new light, the idea of identifying cultures through archaeological artifacts as espoused by both the cultural-historic and the processual trend became a harder equation to solve.

The difficulties met when defining cultural boundaries among human groups would stem from the sheer impossibility of ascribing clear-cut identities to groups or even individual people. In this scope, identity is understood as a series of fluid processes of constructs that answer such questions as "who am I"? or "What groups do I belong to?" Archaeologies linked to postprocessualism answer these questions in multiple ways which vary depending on individual and group engagements in time and space. According to the Jamaican-British researcher Stuart Hall, identity is configured as:

> (. . .) something formed overtime through unconscious processes and not something innate, existing in conscience at the time of birth. There is always something 'imagined' or fantasised about its unity. It is always incomplete, always 'in the process of', always 'in the making' (Hall 2005: 38-39).

The unstability of identities is accompanied by the mutability of the varied images of culture. If within certain theories it would be possible to work with fixed and predetermined cultural categories which condition identities in the postprocessual and postmodern view, "culture" doesn't exist as a solid, homogenous, and single category. On the contrary, it is understood as a fluid process which always varies depending on the interlocutor's view. The latter may or may not share the ethnicities, that is, "practices and cultural visions of a certain community of people which differentiate them from others" (Giddens 2005: 206).

It must be stressed that all the theoretical currents outlined here are subject to many nuances. Even within processualism, there is no consensus about authors' autonomous existence in relation to certain power discourses (Zarankin & Senatore 2002). In this case, material culture can take on different roles in mediating the relationships between discourses or between discourses and subjects (Shanks & Tilley 1982; Hodder 1999). In order to understand the role of material culture within these theoretical stances, one must use the teaching tool of highlighting the different intersection points between them as theoretical lines to form a general framework of the ways in which these theories read the world, in terms of both material and intangible culture. This allows us to use them as tools to think about learning processes. André Leroi-Gourhan, for example, fuses biology, genetics, anatomy, material culture, and social life in a beautiful narrative about the innate and the learned. On aesthetics he says:

> These levels, the physiological, technical, social and figurative will here represent the great clusters into which feelings are ordered. In man, references

> to aesthetic sensibility are rooted in the deepest visceral and muscular sensibility, in dermic sensibility in the senses of smell, taste, hearing and vision; thus, the intellectual image, symbolic reflection of the tissues of sensibility in their entirety (Leroi-Gourhan 1971: 268).

To outline all aspects surrounding gesture in their organic and artificial paths is archaeology's basic proposal. Reflections on day-to-day social life, practices, and ideas cannot lose sight of the ways in which this knowledge is transmitted and how it expresses human relations.

Gordon Childe's Europeanizing identification of material culture seeks to highlight the tangent points between technical know-how, ethnic expression, and the symbolic feedback of social identity. Tracing the evolution line of European civilization also means a search for the didactic path through which symbols are transmitted as well as recognizing their impact on the day-to-day tangible past and present. What processes are involved in the constitution of the European? How can the right steps towards civilization be taught?

Andrés Zarankin elaborates on the central tenet that materiality, a product of human intention, not only responds to but also configures learning mechanisms in Western society (Zarankin 2001). Far from being built randomly, school space operates within a panoptic logic of control and arranging of ideas, repressing subversive qualities and defining misbehavior. Walls erected by the state, behind often templelike facades, domesticate the minds of its pupils into sacred and unquestionable dogmas.

According to Andrea Lisset Pérez (Pérez 2007: 228), education is of paramount importance to understand the socialization processes which reproduce and update different cultural traditions. Although overlooked by anthropology for an important part of its history, the works by Marcel Mauss and Émile Durkheim between the late nineteenth and early twentieth century operated "a fundamental epistemological rupture to understand the educational phenomenon" (Pérez 2007: 228).

In his work *Transmission of Social Cohesion: Tradition, Education* (1969), Marcel Mauss sees education as a traditional obligation to socialize new generations (Pérez 2007). Within this mechanism of transmission of cultural habitus, corporality, sex, age, and social differentiation are combined into discrete learning phases. Still, new generations are not mere imitators of adults. The fact that their spaces are not clearly defined enables them to cross boundaries that adults no longer challenge. New generations observe the interconnections between practices and knowledge and may refuse to hand them down, bringing about a fresh novelty that may reformulate social processes. Their actions – e.g., games – are not mere reproductions, but creative constructions of the social world's meanings.

Key Issues/Current Debates

Material culture, as we have seen so far, has never failed to be a fundamental element in the development of social relations and identities. Its role in the learning processes of social habitus declares the undeniable alliance between education and archaeology. The question is exactly what such an alliance's powers could be. Both elements have been used to demolish human creativity and impose a massified and eliticized proposal for collective behavior. How should we practice archaeology and education to ensure that they are not "just another brick in the wall?"

Future Directions

When addressing material culture, we are dealing with physical, materialized constructions. But that material world is still not detached from the intangible contexts which inform these constructions. These correlations – dynamic, fluid, and extremely delicate – can still be grasped when reflecting on the very concept of culture.

Criticisms of normative identities as put forth by civil movements after 1945 allowed for the elaboration of new theoretical proposals for the concept of culture, expressed both in the

postwar historic-cultural archaeological trend and in the processualist and postprocessualist scopes. As well as the changes in the field of archaeology, multiple perspectives on culture signalled the need to consider the material as a realm worthy of attention from the political sphere.

In this new context, UNESCO's 2003 "Convention for the Safeguard of Intangible Heritage" was formulated with a view to guiding discussion within this new institutional field of research. This recognizes a profound interdependence between intangible cultural heritage and tangible cultural and natural heritage (UNESCO 2003). For UNESCO, dealing with intangible heritage would be an important way of dealing with materiality itself and valuing human diversity (Unesco 2005).

Analyzing perceptions about material culture in archaeology, we find it impossible to define material culture without considering its connections with the intangible world, especially if we lose sight of the political consequences of the theoretical models deployed to study materiality. Archaeology deals with material culture, but the basis of its objects of study, the concept of culture, refers to both the material and the spiritual world, so "there is no opposition between the two that can justify a study of "things" alone (Funari 2003: 10)". Archaeologists' attention must be brought to this correlation between the material and immaterial, and they must also perceive the political consequences of our research. Material culture is an inviting universe for our reflections about archaeology's present and its relations with society.

Among the crisscrossing paths and meanders of new proposals, we believe that the relations between archaeology and education, considering both their material conditions and immaterial impacts, delineate three paths that deserve our attention:

The first of these would be learning relations between professionals and civil society starting from the professionals' point of view. Regarding that relationship, we find that it has been concerns about the preservation of material heritage that have attracted most attention. The effervescence devoted to legal issues and conservationist social engagement are still considered key aims in the eyes of professionals seeking to engage with the lay public.

What we call Public Archaeology today would have emerged from that moment of valuing historic national heritage (Funari & Carvalho 2009). Despite the great value of that struggle and its frequent successes in impeding the excessive penetration of capitalism into places of memory and shared cultural life, we cannot deprive ourselves of a critical awareness of our own interests and practices. Archaeology was, as we have seen, born in the context of both European imperialism and ethnic nationalism; its logic promoted both the ideology of the dominant class and the activities of colonial power (Trigger 1984, Funari & Carvalho 2009).

The varied modes of public coexistence outside archaeology often go beyond our expectations. Over the past 40 years, they have been bravely fighting colonial realities and the normatizations of capitalist society (Funari & Carvalho 2009). Therefore, we can't imagine state-sponsored policies of management of this heritage as representing the social totality (Merriman 2004). As well as this, it is fundamental to reflect on the several ways in which learning occurs within these different groups. In this light, we must stop considering gaps between our way of imagining the past and local ways of doing so as a deficit on their part that we should somehow compensate (Merriman 2004; Gomes 2006; Holtorf 2007). All societies have their own ways of knowledge and educational practices independent of the existence of schools (Pérez 2007), and it is just as important for cultural differences to be taught as it is for conflicts of interest to be negotiated. We therefore don't believe heritage education to be a way of becoming "culturally literate" (Horta et al. 1999; Bastos 2006), as we don't believe in the existence of cultural illiterates but in several cultural literacies.

This brings us to our second learning relationship between professionals and civil society from the standpoint of civil society. It is exactly at the point when we see ourselves as the teaching elders and devote ourselves to cultivating the immature that new paths come to shake off our most set-in beliefs, the time when the educator becomes educated (Freire 1980). The democratic mode of relations – in the words of Cornelius Holtorf and in a line of argument which is not dissimilar to the Brazilian educator Paulo Freire's – advocates that all people hold valuable knowledge: the content of these may vary depending on their personal life histories and experiences but they are all of equal importance.

Whether it be in classrooms, fieldwork, or TV broadcasts, extra-academic media that contribute to circulate our work offer us a point of view that lacks scientific parsimony (Taylor 2007) and which is therefore free of our prejudices and obstinacies. As part of the learning process about society, we must bid farewell to our scientific authority, pry open our Pandora's box (Latour 2000), and place our practice at the center of a discussion with those who are its public, consumers, and appreciators.

From the 1970s, archaeologists influenced by Marxist or postmodernist theories began to question themselves about the social role of archaeology and especially the bases of the relationships between academics, their research, and society as a whole. The work Public Archaeology by US archaeologist Charles Robert McGimsey, professor of anthropology at the University of Louisiana, is considered a landmark on the route to establishing this new field of archaeology (Merriman 2004: 3). What later became known as Public Archaeology is therefore an area of archaeology which focuses on public interest in general and which developed in order to respond to that very need of dealing with dissonances and conflicts of interest (Merriman 2004: 2).

Finally, the third learning relation can be seen internally within the very field of teaching archaeology in higher education. In Brazil, the field's growing social importance can be seen particularly clear when we look at the 11 graduate courses that emerged over the past 10 years. But great powers bring great responsibilities. The expansion of work markets and training in higher education places the difficult task that we have just outlined in the hands of the old guard: to cultivate unripe fruits while allowing oneself to be reformulated by their novelties and to hand down a discipline that will be ethical, socially responsible, self-critical, passionate about its practice, and conscious of its force. This is the only way we can provide a truly liberating education (Freire 1980).

Cross-References

- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Modern Material Culture Studies

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Materiality in Archaeological Theory

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Introduction

Materiality is so enmeshed in our everyday existence that it has a kind of impenetrability. We are in touch with it so intimately that it vanishes. And yet of course it is always very much present. As I write, I sit on a Greek "kafeneio" chair, a simple wooden frame with crisscross rope that leaves its pattern on my legs, at least when I am wearing shorts. The wooden table is simple plywood on dexian. The table, the chair, the wooden floor, the computer, the ceiling fan, the dust, the coffee cups: together they are touched, seen, heard, smelled, and tasted, and somehow despite all these senses at work they go largely unnoticed. Writing brings them momentarily to the fore, though there are other ways too in which they can be made to appear. Many contemporary artists bring the artifacts of the everyday into presence by creating new kinds of encounter with them – from rendering them oversized, as in some of the work of Claes Oldenburg, or at miniature scale as in Slinkachu's almost invisible street scenes, or through redisplay (e.g., Jeff Koons). Sometimes, dramatic events can make the everyday appear to us in a very different light, as, for example, with the house interiors of New Orleans damaged by the floodwaters from Katrina (Wilford 2008). And these two can even come together when contemporary artists redirect their practice in the aftermath of such events, as with the "Floodwall" of Jana Napoli, or the photographic reportage of artist Robert Polidori (Fig. 1). These can help us briefly experience the elusive sense of materiality that is part of our everyday lives.

Arguably, it is the constant exposure to thousands of commodities in the twenty-first century West that forces a kind of drawing back from the

Materiality in Archaeological Theory, Fig. 1 "6539 Canal Street, New Orleans, September, 2005" (© Robert Polidori and courtesy the artist, and Edwynn Houk Gallery, New York)

overwhelming world of materiality. Or perhaps it is the fine-grained engineering of many products that makes our reliance on them so seamless: the thermostats for the silent control of heat in our houses, the ergonomic design of our cars, or the custom orthotics for our feet. But are either of these points valid – is the contemporary world really qualitatively different from the past? In fact, various authors suggest not: that this "condition" is actually part and parcel of being human. We may now sometimes feel choked by materials, but to be human has always been to be material or "artificial" (Taylor 2010). A fascinating set of stories can be traced back through early and later prehistory that document the "gradients" of change in materiality, between, for example, "instruments" and "containers" (Gamble 2007).

Yet despite the integral role of materiality in being and becoming human, the everyday world of stuff is endlessly overlooked both in our everyday lives, and to a surprising degree, perhaps consequently, in our archaeological practice and theory. Although archaeologists necessarily devote much of their attention to things – whether we call them artifacts, material culture, materials, or technologies – definitions of "materiality" have not been forthcoming. While it may seem at one level a term that we might take for granted, a flurry of recent research on materiality shows that it can actually lead in a number of different directions.

Definition

Let us try to think about what defines this phenomenon we call materiality. How is it different from or preferable to some of the other terms mentioned above, such as "artifacts," "materials," or "material culture?" Each of these terms can come across as static and categorical, whereas materiality has the advantage of being more relational. Artifacts imply that only things made by humans are relevant, a shortcoming that materials avoids; the latter could, after all, apply to metal ores, or pebbles on a beach. However, this is perhaps not sufficiently differentiated from the way in which a materials engineer might talk about materials. Material culture more obviously includes the cultural component that concerns the social scientist and humanist, though it does also risk portraying a polarized world of materials on the one hand and culture on the other, with the former acted upon by the latter. Materiality as a term does not make obvious this human

component (sociomateriality could be a solution, but is unwieldy). Yet another term on offer is material world(s); this has the advantage of conveying the plural, ensemble quality of human-thing relations, but again it does not naturally include the human, and like "material culture" it too is static. Thus, none of the terms available quite gives us what we need. Though not perfect, materiality may be the term that gets closest. It does have the distinctive advantage of conveying process, the ongoing dynamic of human-artifactual relations. And it does help to downplay the duality between mind and matter that is really one of the fundamental aims in materiality research (DeMarrais et al. 2004). Though this acts as a useful general guideline, there is an argument for being more specific, which entails considering the multidimensional nature of materiality. In this light, what we need is a concept that can cover four key areas: the dependent (material relations), codependent (social relations), independent (vital), and interdependent (plural) properties of things and objects (Knappett 2012). Admittedly, it is ambitious to try hanging all of these properties on the term "materiality" alone, but this is what it seems to require. One can understand both the reluctance (Miller 2005) and the insistence (Ingold 2007) to define materiality.

Historical Background

It is curious that only relatively recently has the urge to reconnect mind and matter, or the social and the artifactual, been felt. This move notwithstanding material culture is still often described as a reflection or an expression of social organization or cultural ideals. In archaeology, Tim Taylor has attributed this to the deep influence of Gordon Childe (Taylor 2009: 298). Much of the subsequent social archaeology has fallen into a similar Cartesian separation. Indeed, even some of the archaeological literature seemingly aimed at materiality uses terms such as "materialization," which reinforces the idea that something social exists prior to the artifactual, with the former "materialized" in the latter (DeMarrais 2004). Rather than ask here why we see a conjoining of mind and matter reappearing in materiality studies now, albeit unevenly, we should perhaps reflect on what has historically prevented its expression. What is interesting is that, according to Taylor, the sense of an inseparable connection between a community and its artifacts was widely held in the late nineteenth and early twentieth century, with the term "materiality" itself even used by E.B. Tylor as early as 1871 (Taylor 2009: 299). As Taylor also explains, the "sense of the intricate cultural nexus between artifacts and persons" (Taylor 2009: 299) was also tangled up with an essentialism that bound together cultural and racial identity, expressed in the work of Gustaf Kossina, for example, and subsequently subject to political manipulation and abuse in Nazi propaganda. This set of associations evidently led postwar to a disentangling of the cultural nexus to which Taylor refers, with a separation, or even polarization, of the social and the artifactual (actually already expressed in the prewar years by Childe). As an aside, we might note that a similar path was trodden in early twentieth century art history, with Alois Riegl's influential idea of "Kunstwollen" in its formalism promoting the idea of a "cultural nexus," but by the same token also potentially essentializing and hence open to abuse (Elsner 2006). Riegl's ideas generated much debate, with ripostes from Panofsky and Warburg among others (Elsner 2006), and arguably a similar kind of separation of the social and the material as that seen in archaeology.

Despite the postwar backlash against the idea of a tangled cultural nexus binding together a people and their culture, it is not as if the idea ever completely went away. It remained, for example, in the enduring legacy of the Pitt Rivers Museum in Oxford, which has maintained the same organizing principles as originally established when it was founded in 1884, with artifacts arranged according to function rather than geographical origin or period (see Fig. 2). Notable here is that the same E.B. Tylor as mentioned above was keeper of the University

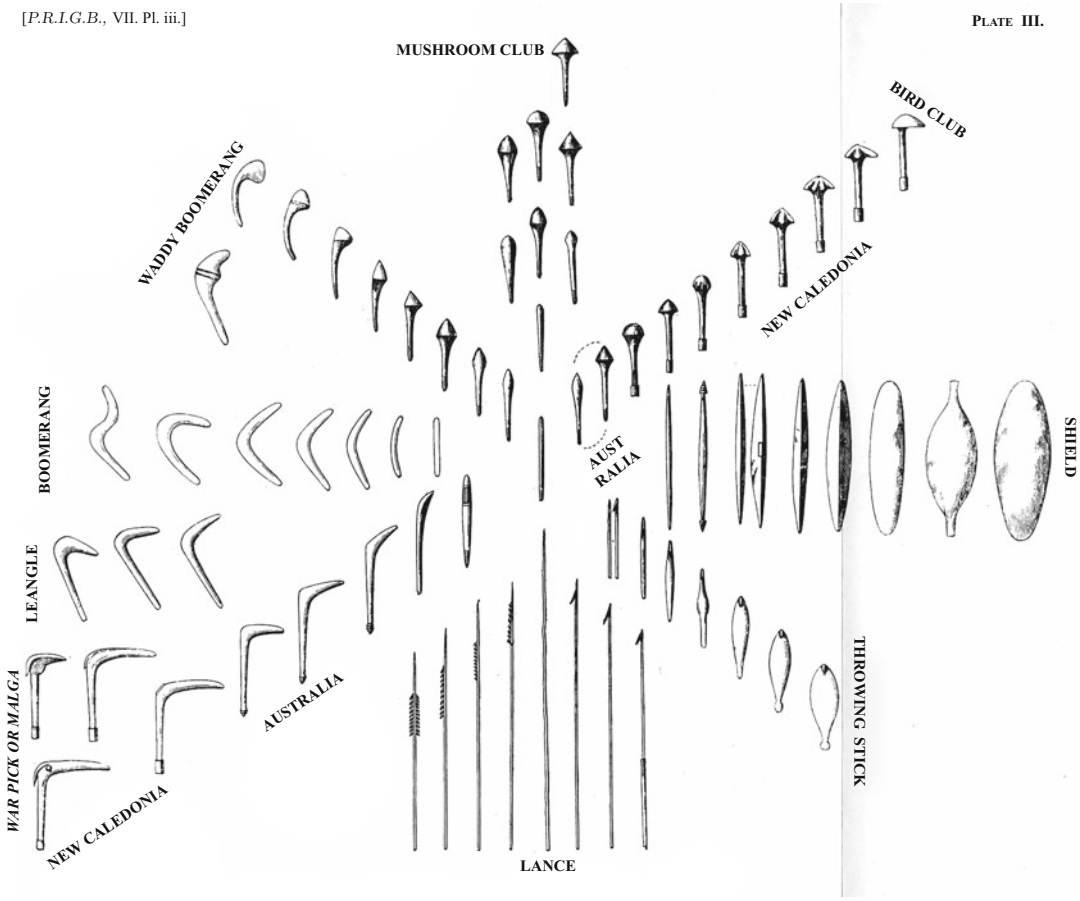

Materiality in Archaeological Theory, Fig. 2 An example of Pitt-Rivers's approach to artifact categorization. (Originally published in 1875; Pitt-Rivers 1906, Plate III.)

Museum of Natural History at Oxford in 1883, adjacent to which the Pitt Rivers was eventually located in 1887, and gave important collections to the Pitt Rivers (Larson et al. 2007). And recently, the Pitt Rivers has been an important stimulus for new work on materiality, not least as the base for Chris Gosden, and more recently for Dan Hicks, both of whom have made important contributions (Gosden 2004, 2005; Gosden et al. 2007; Hicks & Beaudry 2010). And this research base has contributed significantly to the resurgent interest in materiality as a sociomaterial nexus, or what Hodder has recently dubbed the "entanglement" of things with each other and with their human interlocutors (Hodder 2011).

Key Issues/Current Debates

The museum is also a good "laboratory" for thinking about the ontology of artifacts, one of the key issues in materiality studies. If we think about how we engage with materiality in museums, the nature of display is such that we primarily encounter artifacts visually (with some exceptions). This has an objectifying effect whereby we stand back from the artifact as object and consider it consciously (Gosden 2004). This categorical experience of artifact-objects can occur in our daily lives as well, but we are perhaps more accustomed to encounter artifacts in a multisensory way that includes touch, smell, and sound (see opening paragraph). It is this

multimodal experience that immerses us in the material world and makes it appear seamless with ourselves. Gosden (2004) talks about this distinction in terms of "objects," on the one hand, and "things," on the other. This distinction does seem to capture something of the shifting ontological status of materiality. It has not been much used in archaeology (though see Knappett 2010), seeing more currency in literary and cultural studies (e.g., Brown 2003). Indeed, it stems from philosophy and the work of Heidegger, whose object/thing distinction comes along with other distinctions, such as "readiness to hand" and "presence at hand" (Heidegger 1971; Wheeler 2005). When something, such as a hammer, is ready to hand, it recedes from view and is smoothly incorporated into our action repertoires. However, when the hammer breaks, it enters a different mode and becomes present at hand, in which we observe the artifact as object, its categorical properties laid bare as we seek to understand them and return the hammer to use. The interaction between these different modes, if indeed they mark a valid distinction, is little understood and is a key issue for materiality studies.

Another way of viewing what is essentially the same issue is to take a different tack, from a starting point in psychology rather than philosophy. In particular, in the ecological psychology of J.J. Gibson, artifacts are viewed from the perspective of what they can afford an agent (human or indeed any other species) with a particular action repertoire (Gibson 1979). These "affordances" of an artifact are perceived directly by the agent, rather than filtered indirectly through cultural representations. Though a controversial idea in the psychology of perception, it has some common ground with Heidegger's concept of readiness to hand, which implies a kind of direct, seamless perception of an artifact's properties. Archaeologists have made some use of this Gibsonian idea of affordances, but have come up against the problem of how this kind of experience with materiality articulates with a more indirect encounter with the material world, via associations and cultural representations, of the kind envisaged within semiotic approaches to material culture. Again, the issue of the shifting ontologies of materiality arises and how artifacts seem to oscillate between being both objects and things. One solution proposed to the problem is the development of a "situated semiotics," based both on Gibsonian ecological psychology and the semiotics of C.S. Peirce, aimed at addressing both the directness of artifact affordances and the indirectness of artifact associations (Knappett 2005). The groundedness of Peircean semiotics has recently been recognized as an important tool in archaeology for the study of materiality (e.g., Preucel 2006; Crossland 2009) and will surely be an area of lively debate in the years to come.

The issue of the articulation of the direct and the indirect in the ontology of materiality raises another related issue, that of its scale. The notion of affordances is useful for understanding aspects of materiality at an immediate, proximate scale, but through iconic or symbolic associations materiality can occupy scales far beyond the proximate. This has relevance both spatially and temporally. Indeed, the critical role of materiality in allowing early human groups a "release from proximity" has been the focus of important recent work by Clive Gamble, who adopts a long-term perspective stretching from the Paleolithic through to the Early Neolithic (Gamble 2007). Gamble uses a distinction between instruments and containers to chart changing materialities, seeing not so much "revolutions" in material culture, but rather shifting gradients over time in how human groups exploit different material metaphors. The shift toward a more concerted use of containers in the Eurasian early Neolithic, both in the form of houses and ceramic vessels, is thus not seen as a revolution but as a strategic employment of a material metaphor that was already long present, the idea of the body itself as a container. The increasing expression of container metaphors in materials subsequently allowed new expressions of identity to unfold through the Neolithic. One can take this a step further and suggest that a clear idea of the human body as container may not in fact have preexisted the construction of houses and pots as containers, but may only have emerged as an effective bodily metaphor through these materialities

Materiality in Archaeological Theory, Fig. 3 Materiality as assemblage: some of the contents of the Temple Repositories, Knossos. Courtesy of the Ashmolean Museum

(Knappett et al. 2010). If we trace this logic still further forward in time, into later prehistory, we see an explosion of sociomaterial differentiation in the Bronze Age, with an incredible range of artifacts, often operating together in assemblages (Knappett 2009). One of many possible examples is an assemblage from the "Temple Repositories" in the palace of Knossos, deposited c. 1650 BCE (Hatzaki 2009). This includes a wide range of materials – such as sea shells (both original and faience replicas) female figurines (also in faience), a stone cross, faience cups, and storage jars – that were probably part of some cult equipment for use in or close to the palace's central court (see Fig. 3).

This growing differentiation in materialities over the long-term also has a spatial component. The release from proximity not only involves more and more different kinds of artifacts and technologies, but these tend to come from a broader range of more distant places too. If we return to the example of the Temple Repositories, we see faience technology of Egyptian derivation, and imported ceramic vessels from the Cyclades and probably the Dodecanese too. And this is not even an especially "connected" assemblage. Other assemblages we might have chosen from the Late Bronze Age involve more complex networks, particularly if we move further forward in time, to c.1300 BCE, when the complex networks of material circulation are quite astonishing, with "international" trade around the east Mediterranean exemplified in the remarkable cargo of the Ulu Burun shipwreck (Pulak 1998). These networks of materials and materialities can also be seen in the luxury items circulating as part of diplomatic and cultural exchange in the latter part of the Late Bronze Age, c.1400–1200 BCE (Feldman 2006).

Still, these patterns are not often theorized in terms of "materiality." Theoretical debates concerning the temporality and spatiality of materiality have still not been much worked through with detailed archaeological case studies. But a few notable exceptions apart (e.g., Meskell & Joyce 2003; Mills & Walker 2008), much of the

debate remains theoretical at present. We might attribute this to the difficulty of talking about materiality in front of specific objects or assemblages – a point made by Elkins with reference to art history (Elkins 2008). Perhaps the issue, as indeed noted by Elkins, is one of methodology. How to go about studying materiality? Archaeology, however, is not short of methodologies, and there are some distinctive approaches already in existence that could be and indeed are being harnessed for a fuller understanding of materiality. As there are some interesting regional differences, though, in these methods, this we will turn to under the next heading.

International Perspectives

When archaeologists do get beyond theoretical considerations of materiality, the methodologies employed see some interesting variations internationally, principally between North America and Europe. In North America, the "behavioral archaeology" developed by Michael Schiffer and colleagues (e.g., recently, Skibo & Schiffer 2008; Hollenback & Schiffer 2010) has given rise to approaches to ancient materiality that examine people-thing interactions from production all the way through to discard. This has not had a lot of purchase in Europe (including the UK), where the *chaîne opératoire*, much used particularly by French lithic specialists, is more prevalent as a means for understanding production sequences alone (cf. Schlanger 1994; Conneller 2008). Instead, another tradition has picked up the consumption and discard end of artifact life histories, focused around issues of structured deposition and fragmentation (Chapman 2000). To understand processes of deposition in the past archaeologists have turned to the present, studying contemporary processes of abandonment (Gonzales-Ruibal 2008; Olsen 2010). In its experiential outlook this differs from the more rigorous attempts at replication in experimental archaeology's efforts to provide insights into past production choices. While the former may seem more post-processual and the latter processual, we should not make too much of such a distinction. For example, while Rathje's US rubbish project might seem processual in its experimental design, Rathje has recently collaborated with Shanks (Shanks et al. 2004); one might also point out the reference to Schiffer's methods in recent work on materiality by Hodder (Hodder 2011). Thus although there are some important differences in approaches to materiality on either side of the Atlantic, these should not be overstated. We should also note that European perspectives on materiality are not confined to the UK and France, with strands of thought established in Scandinavia (e.g., Olsen 2010, see above; also Fahlander 2008; Normark 2010), and emergent in Germany (e.g., Hahn 2005).

Future Directions

While archaeological approaches to materiality are already interdisciplinary, they could benefit still further from a wider range of dialogue. While archaeologists are aware of contemporary approaches in anthropology, sociology and geography, interesting lines of thought are also emerging in history, art history and other related disciplines. Tapping into approaches from many domains of inquiry is an essential direction for the future of materiality studies, as materiality itself has so many dimensions, with complex relations among materials, and between materials and people, and with properties such as vitality and plurality that are as yet poorly understood. Furthermore, archaeology is well placed, with its distinctive set of methodologies for studying people-thing relations, to contribute to the detailed study of materialities through diverse case studies from many periods and places. However, this methodological move has been slow in coming in materiality studies, perhaps, as Elkins states (see above), because of the difficulty of grasping materiality when faced with specific artifacts. This is arguably one of the most important directions for the future – the development of methodologies for the study of materiality that can match and complement the exciting theoretical moves that are currently underway.

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Matveeva, Galina I.

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Basic Biographical Information

Galina Ivanovna Matveeva (1933–2008) (Fig. 1) was a Professor and Chair of Russian History at the Samara State University, candidate of historical sciences (Scientific degree Ph.D.), founder of archaeological scientific school in Samara State University, President of the Samara Archaeological Society, and the author of more than 120 scientific works and manuals.

Matveeva, Galina I., Fig. 1 Galina Ivanovna Matveeva

Galina Matveeva was born on July 27, 1933, in the city Ashe, Chelyabinsk region, Russia, to the family of a history teacher. From 1951 to 1956, she was a student of the Historical-Philological Faculty of the Perm (Molotov) State University. Her scientific leader at that time was O.N. Bader – a great scientist, talented teacher, and agreeable person. In the university, Galina Matveeva learned the skills of field work and gained fundamental theoretical knowledge of archaeology. The years 1956–1961 were the time of work in Troitsk, the city in Chelyabinsk region, as the director of a regional museum of folklore. During these years, Matveeva carried out extensive archaeological investigations, researching burial mounds, which have been destroyed since through construction, and

deposited the excavated treasures into museum collections. From 1961 up to 1969, she worked in the Bashkir State University. This was a fruitful period for her, during which she determined the main sphere of her intellectual interests–early medieval archaeology (though she was also interested in Neolithic and Bronze epochs). In 1970, she defended her doctoral thesis at the Archaeological Institute of the USSR Academy of Science.

Beginning in 1969, Matveeva's life was closely connected with the Samara (Kuibyshev at that time) State University, where she lectured on archaeology, history of primitive society, and ethnography. The Samara (Kuibyshev) region badly needed research from an archaeological point of view, and Matveeva began her archaeological exploration practically from the scratch. She started the investigation following V.V. Golstein's legacy and founded the Middle-Volga Region Archaeological Expedition in 1970, which still exists, focusing on different places in the region and in the country.

Major Accomplishments

G.I. Matveeva investigated many archaeological relics of the past, including the barrow of the Neolithic epoch near the village Sjeszheye (undertaken in cooperation with I.B. Vasiliev); Bronze period miners and metallurgists' settlement by Mikhailo-Ovsyanka; seventh and eighth ages CE tumuli with iron facings, connected with the early Bulgar tribes coming to Middle Volga from southern areas; Murom settlement – the southern outpost of the Volga Bulgaria of the tenth to thirteenth centuries and the only big town in the Samara region; Suhorechye settling – a handicraft settlement of the Golden Horde. Matveeva's research resulted in the discovery of the "Novinkovskiy" cultural type.

Above all, Matveeva was interested in the medieval times. She constantly carried out research of the Imenkovs' culture and its monuments. She found the origins of these people in the upper Dnieper region, traditional places of settlement of the Slavs and the Balts. She determined their ethnicity as Slavic. In 1982, she investigated Lbische mound and identified the Lbische cultural type, dating third to fourth century CE. She formulated the hypothesis concerning the genetic relationship of the Imenkovs' culture and Slavonic people. This is a leading hypothesis in modern science, which is supported by most researchers who study the Slavonic culture.

G.I. Matveeva's last years were devoted to studying the relations of the Imenkov people with Turkish-speaking Bulgarian tribes and the historical fate of these people.

In Matveeva's scientific work, we clearly see her personality: meticulous, principled, brave, sensitive, intuitive, and knowledgeable. She was a nice teacher and many well-known Samara archaeologists emerged from under her scientific guidance.

Galina Ivanovna published 120 scientific works. In the history of archaeology, she is one of the leading specialists in medieval history of the Volga region.

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Maya Geography and Culture: Ancient and Contemporary

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Introduction

The Maya area is "the broad expanse of territory occupied by the Maya in the centuries before the conquest... defined both by the distribution of ancient ruins of Maya Civilization and by the known distribution of peoples still speaking Mayan languages" (Sharer 1994: 19). Maya geography and culture is thus concerned with both the archaeological past and the ethnographic present. An understanding of the geographic characteristic of this large and diverse territory as well as of the way in which people interacted and continue to interact with their environment is necessary because it informs many archaeological analyses of the ancient Maya.

Definition

Geography plays an important role in cultural production both past and present. The Maya area features great geographical and topographical diversity. Mountain ranges in the northern and southern highlands feature peaks as high as 4,220 m (14,470 ft). The northern, central, and southern lowlands show a range of temperate to tropical climates. The southern lowlands have river basins, while in the northern lowlands water is found in underground streams called cenotes (a Spanish cognate of the Mayan word dzonot). Physical environment is much more than just a "backdrop" against which Maya civilization developed and continues to exist. Geographical concepts such as landscape, space, and place enable archaeologists to analyze the ways in which Maya (both ancient and contemporary) built meaningful relationships with their physical surroundings.

Key Issues/Current Debates/Future Directions/Examples

The Maya area covers about 324,000 km^2 (201,325 m^2), spanning from the lower Lempa River in El Salvador to the Isthmus of Tehuantepec in Mexico, encompassing the Yucatan Peninsula, the southern Mexican states of Chiapas and Tabasco, the countries of Guatemala, Belize, Western Honduras, and El Salvador. Sharer notes that these boundaries are diffuse, stating, "the ancient Maya were very much a part of a larger cultural area that has come to be called Mesoamerica" (1994: 19). This area features a variety of terrains, elevations, and weather patterns.

Archaeologists divide the ancient Maya archaeological geographic region by zones (Fig. 1), broadly categorizing them into the Pacific Coastal Plains (spanning from southern Chiapas, Mexico, Guatemala, to El Salvador); the highlands, those areas between 1,000 and 2,000 m above the sea level (spanning the Mexican states of Chiapas and Oaxaca, as well as Guatemala, Honduras, and northern El Salvador); and the lowlands, those areas between sea level and 1,000 m (spanning the Yucatan Peninsula, the Mexican state of Veracruz, and Belize). These regions are inhabited by the contemporary Maya, whose population (an estimated 7,000,000 who speak approximately 29 Mayan languages) is present in all five countries.

The Pacific Coastal Plain, which stretches from southern Chiapas to El Salvador, is a fertile plain at the foothills of the volcanic

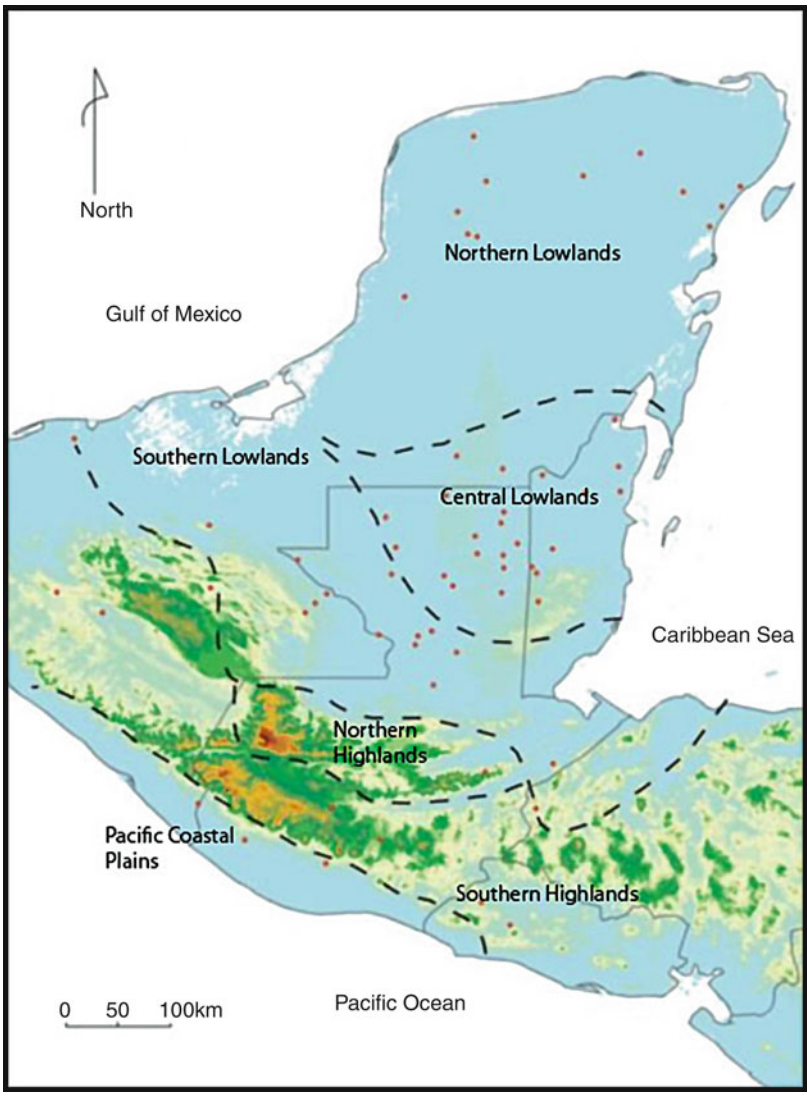

Maya Geography and Culture: Ancient and Contemporary, Fig. 1 Geographical zones of the Maya area

highlands. Its rich volcanic soils are cut by several south trending rivers, the largest of which is El Salvador's Lempa River. The coastal area has a tropical climate, with annual temperatures between 25 °C and 35 °C (77–95 ° F). The coastal plain has been a trading route for longer than any other area in the Maya area, the earliest of which may have been Olmec traders from the Gulf coastal region to the northwest (Sharer & Traxler 2006: 33). Many ancient Maya centers such as El Baúl, Chocola, Takalik Abaj, and Monte Alto are located in the Pacific Coastal Plain (Fig. 2).

Sharer and Traxler (2006) divide the highlands into southern and northern regions. Three continental plates converge in this region, making the southern highlands (located directly to the north of the Pacific Coastal Plain) a very geologically active region. Nevertheless, its rich soils and "springlike" weather continue to make the region attractive for settlement. Today, this area has the largest population density of the Maya area, and the settlements of Kaminaljuyu, El Portón, and Chalchuapa attest to the region's appeal in the past. In contrast, the northern highlands, characterized by Cenozoic limestone

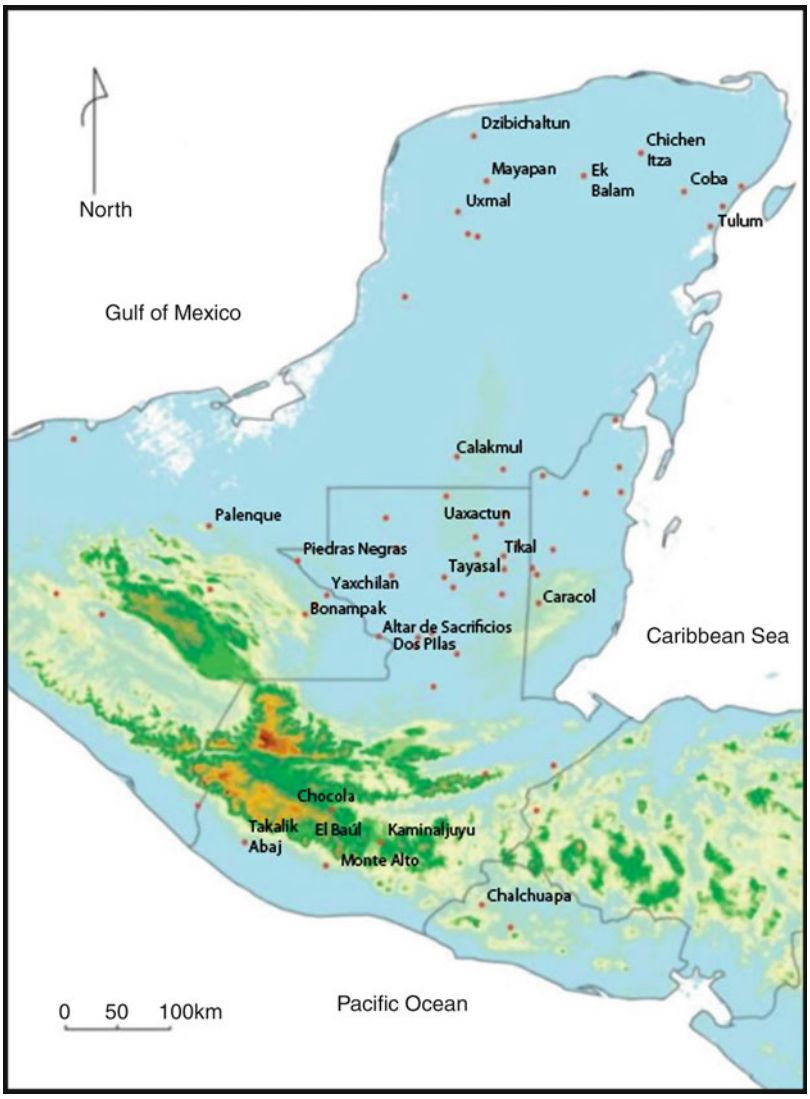

Maya Geography and Culture: Ancient and Contemporary, Fig. 2 Major ancient Maya cities

formations, are largely undisturbed by geological activity. The ancient Maya quarried the region's jadeite and serpentine deposits. Today, the Alta Verapaz preserve is a habitat of the quetzal bird, whose highly valued plumes adorned the headdresses of the ancient Maya ruling elite.

Archaeologists have traditionally divided the lowlands into northern and southern areas. Sharer and Traxler (2006) also define the Peten region as a central area, convincingly arguing that this region represents a gradual transition in climate from south to north. The southern lowlands gradually emerge from the northern highlands, from the Guatemalan departments of Huehuetenango, El Quiché, Alta Verapaz, and Izabal. The region is characterized by heavy rainfall, 2,000–3,000 mm (80–120 in) in a year, and temperatures similar to those of the Pacific Coastal Plain, ranging from 25 to 35 °C (77–95 °F) (Sharer & Traxler 2006: 45). The centers of Dos Pilas, Altar de Sacrificios, Bonampak, and Yaxchilan are located in this region. The central lowlands see diminishing rainfall (about 80 in or 2,000 mm) and lower elevations (about 300 m) than the southern lowlands. The Peten region of Guatemala, where many important ancient Maya cities are located, is

found in the central lowlands. Among the most important sites in this region are Tikal, Calakmul, Palenque, Piedras Negras, Caracol, and Uaxactun. The Maya city of Tayasal (which was not conquered until 1697) is also located in this region at Lake Peten Itza. Finally, the northern lowlands, corresponding to the northern half of the Yucatan Peninsula, is characterized by low bush and scrub forest, the terrain is low and flat, made up of porous limestone. There are no surface streams, but underground rivers and cenotes (sinkholes created when the limestone collapses and exposes the water beneath) make up a subterranean water table. Among the ancient Maya sites found in the Yucatan Peninsula are Uxmal, Chichen Itza, Ek Balam, Coba, Dzibilchaltun, Tulum, and Mayapan.

Knowledge of geography as a science and the concepts it contributes to the archaeology of the ancient Maya is necessary for understanding how archaeologists look at the ways the physical setting of Maya civilization relates to its material culture. Geography is a science concerned with the study of physical terrains and the people who inhabit them. It is characterized by two different approaches to its subject: the first is the positivist approach, which considers the qualitative and quantifiable aspects of physical space and human activity; the second is the humanistic approach, which applies concepts from critical and cultural theory to analyze the actions of human beings and their effects on their surrounding environments. It is from the latter approach to geography that the concepts of landscape, space, and place emerged.

The concepts of landscape, place, and space are particularly useful in analyzing the role that geography plays in the production of culture. Generally, landscape is frequently used in archaeological writing (Anschuetz et al. 2001), and the concept is important in Maya archaeology (Ashmore & Knapp 1999). Rather than seeing geography and geographical features merely as the backdrop against which Maya civilization developed, archaeologists emphasize landscape as "an active and far more complex entity in relation to human lives" (Ashmore & Knapp 1999: 2). In other words, landscape refers to the ways in which human beings build (literally and metaphorically) meaningful relationships with their physical surroundings. As Anschuetz et al. state, "a landscape approach offers strategies and tools that... [construct] the past populated with ideational actors.. rather than 'faceless blobs'... that simply responded to whatever natural environmental vagaries befell them" (162).

Similarly, the concepts of space and place enable anthropologists and archaeologists to think about the social dimensions of location. According to Harry Sanabria (2007), space in this conception "is a construct with spatial (i.e., geographic) coordinates or boundaries with which a landscape is set apart from others based on assumed commonalities or differences" (20). In this sense, the "Maya region," the physical stretch of land encompassing five nations containing the physical remains of ancient Maya civilization, is such a spatial construct. In contrast, the concept of place bundles location, material form, and meaningfulness (Gieryn 2000). Geographically speaking, "place is a particular or lived space" (Agnew 2011: 318). In other words, all places are spaces, but not all spaces are places. The difference between a place and a space is that a place is inhabited and made meaningful by human beings. Within this framework, landscape is the concept used to create an archaeology of place.

These considerations of the role of geography in cultural production are relevant to the study of both ancient and contemporary Mayas. A recent example is the study of ethnoecology in contemporary Yucatan (northern lowlands). The field of ethnoecology considers the ways in which "nature is perceived by humans through a screen of beliefs and knowledge, and how humans, through their symbolic meanings and representations, use and/or manage landscapes and natural resources" (Barrera-Bassols & Toledo 2005: 11). Landscape, then, is constructed through a screen of beliefs and knowledge that informs the way in which Maya people use and manage their natural resources. Archaeologists have used these concepts productively in analyzing how the ancient Maya formed a meaningful relationship with

their environment, transforming the space around them into a meaningful place. Using studies of how contemporary Maya people use, manage, and construct their landscapes, archaeologists have been able to construct models of sacred landscapes that have been useful in predicting the location of archaeological sites and in analyzing archaeological remains (Brady 1997; Ashmore & Knapp 1999; Dunning et al. 1999; Smith 2003; Brown 2004).

Researchers have found that Maya people possess more than a mechanistic understanding of their own landscape but construct their landscape through an elaborate linguistic and ritual system that informs the most important act of landscape-making, agricultural practice. Two studies of landscape among contemporary and ancient Mayas exemplify how these concepts are used in archaeological and anthropological research. The first is a study of contemporary Yucatec Maya ethnoecology by Narciso Barrera-Bassols and Victor Manuel Toledo (2005) that analyzes the "sacred ecology" (Faust 1998) of Yucatec Maya landscape management. The second is an influential study by archaeologist James Brady that used a contemporary model of sacred landscape that placed particular importance on caves to predict a pattern in locating architecture in relation to caves at the Late Classic Maya site of Dos Pilas in the southern lowlands of Guatemala.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Archaeology and Anthropology
- ▶ Cultural Ecology in Archaeology
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Mesoamerica: Strengths and Weaknesses of the Current Classification
- ▶ Mundo Maya
- ▶ Volcanic Activity

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McBryde, Isabel

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Basic Biographical Information

Isabel McBryde is an Australian archaeologist. She was educated at the Presbyterian Lady's College, East Melbourne, and at Melbourne University, graduating with honors in 1957. In 1957, she was awarded a postgraduate scholarship, and in 1958 held a temporary lectureship at the University of New England. In 1959, she won the Jessie Webb Scholarship which enabled her to study at the British School in Athens after gaining a Diploma in Prehistoric Archaeology from Cambridge. In 1960, she graduated with an M.A. Honors (I) in the School of Classical Studies, University of Melbourne.

From 1960 to 1973, Isabel was in turn the first Lecturer, Senior Lecturer, and Associate Professor in Charge of Prehistory, University of New England. She established courses in prehistory at all levels, and initiated and directed a groundbreaking program of regional research in archaeology and ethnohistory in northern New South Wales, with student field training. In 1967, she was awarded a Ph.D. by this University.

From 1974 to 1994, she was in turn Senior Lecturer, Reader, and Professor of Archaeology, at the Department of Archaeology and Anthropology, The Faculties, Australian National University, where she continued her extensive research ,taught and mentored many students, and actively promoted links between Archaeologists and Indigenous people including the entry of Indigenous students into archaeology.

In 1994, Isabel retired from the university with the title of Professor Emerita and is a School Visitor in the History Program in the Research School of Social Sciences and a Visiting Fellow in the School of Archaeology and Anthropology at the Australian National University.

Throughout the course of her busy and fruitful academic career, Isabel has also been very active in a range of national and other seminal committees and boards and in doing so, she played a very significant role in the development of archaeology and cultural heritage management in Australia. Some of her most important roles included being a Member of the Prehistory Advisory Committee, Australian Institute of Aboriginal Studies, from 1964 to 1976, Member and sometimes Chair of Aboriginal Relics Advisory and then of the Interim Aboriginal Sites Advisory Committee (National Parks and Wildlife Service NSW) from 1970 to 1985, and Member, NSW Aboriginal Cultural Heritage Interim Committee (NSW NPWS and NSW State Land Council) 1993–1996 , a member of Council of the Australian Academy of the Humanities from 1981 to 1983, a Commissioner of the Australian Heritage Commission from 1982 to 1988, in turn member of the Consultative Committee on the Plan of Management, of

the Subcommittee on Research and of the Technical and Scientific Advisory Committee – Willandra Lakes Region World Heritage Area between 1984 and 1998, a member of the Advisory Committee to the Aboriginal Liaison Officer and Aboriginal Students Centre and then member, of the Australian National University's Consultative Committee on Aboriginal Education, 1987–1998, and member of the Board of Management of Uluru/Kata Tjuta National Park, 1996–2001.

Major Accomplishments

Isabel McBryde is a founder of the discipline of archaeology in Australia, and a significant proponent and practitioner of archaeology as multifaceted, and multidisciplinary with a contemporary social relevance. She has a deep commitment to the responsibilities which this brings. Her pioneering work has contributed immensely to Australian archaeology as we know it today (Macfarlane et al. 2005).

There was no precedent for her earliest research work in Australia. In contrast to many of her colleagues who limited their research to the excavation of promising sites, Isabel undertook a regional study of northern New South Wales which encompassed all types of site patterns and their distribution , ethnographic work, linguistics, geography, museum studies, and environmental zonation, followed by excavations informed by this detailed regional research. This rich, multifaceted regional work, its involvement of locals, and its fine-grained study of an astonishing range of evidence, all made it a model for Australian archaeological studies and gives us a seldom achieved picture of the Aboriginal presence in and cultural adaptation to the landscapes of northern New South Wales (McBryde 1974, 1978). Other spin-offs from this work include her meticulous and exemplary studies of early photographs of Aboriginal people, of first settler reminiscences, and of Australian Aboriginal ethnographic specimens from across the world located, provenanced, documented, and interpreted by her during her many international study tours (Macfarlane et al. 2005). Her early petrological work with R.A. Binns was also the first of its kind in Australia and a landmark publication (Binns & McBryde 1972). She is a national and international leader in studies of the social meaning and context of artifacts. A multifaceted approach to fieldwork also characterized her work with stone artifacts, quarries, and with trade and exchange networks. In this work, she traced and explained for the first time the dynamics and social determinants of these networks and in doing so gave story and meaning back to the Australian landscape (see, for instance, McBryde 1984, 1997, 2000).

Landscape has been of particular concern for Isabel – especially the landscape of hunter-gatherers which she has actively and influentially promoted nationally and internationally through her writing, her involvement in the cultural landscape of World Heritage Areas, and her guidance in landscape management generally.

Isabel has been an important agent in early work in cultural heritage conservation generally. Historic, natural, and Aboriginal heritage, all received her attention through the wide range of committees and boards where she was an active participant and seminal contributor.

Isabel involved local Aboriginal people in her 1975 excavations at Lake Arumpo, now part of the Willandra Lakes Region World Heritage Area (Macfarlane et al. 2005). This was symptomatic of a key theme of her research and teaching, which emerged early – the rights of Aboriginal people to the custodianship of their heritage, including their right to a decisive voice in archaeological research in Australia (See, for example, McBryde 1985 and 1986). She has written about, lobbied for, and actively promoted this position, sometimes in difficult and contentious circumstances. She has been very influential in the rapprochement and cooperation between Aboriginal people and archaeologists which with some exceptions has come to characterize Australian archaeology. Her leadership at the Australian National University produced outstanding success in training young Aboriginal people as archaeologists (Macfarlane et al. 2005).

Isabel's contribution to archaeology and cultural heritage management has been nationally recognized. In 1990, she became an Officer of the Order of Australia and received a D. Litt. (*hon. causa*) from the University of New England in 1992. In 2003, she received a Centenary medal, and was awarded the Rhys Jones Medal – the Australian Archaeological Association's highest award. She has been awarded Honorary Life Memberships by the Australian Archaeological Association, Australia ICOMOS, and the Canberra Archaeological Society.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage Conservation Training
- ▶ Indigenous Archaeologies
- ▶ Indigenous Peoples, Working with and for
- ▶ Landscape Archaeology

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McCarthy, Frederick D.

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Basic Biographical Information

Fred McCarthy was a pioneering Australian archaeologist/anthropologist throughout the twentieth century. He was born in 1906 in Petersham, Sydney. At the age of fourteen, McCarthy left schooling and took a position as a library clerk at the Australian Museum, Sydney. In 1930 McCarthy was transferred to the Department of Birds and Reptiles where he stayed for 18 months (Kahn 1993). In 1931 he produced his first research paper, "Lake Burrill and How Our Coastal Lakes Were Formed" (McCarthy 1931). In 1932 McCarthy was offered a position as Assistant Curator of Anthropology under W.W. Thorpe (Khan 1993). Thorpe died within months of taking the position and subsequently McCarthy took over curatorship of the entire anthropology collection. In 1933 McCarthy enrolled at Sydney University and undertook a Diploma of Anthropology under Professor A. P. Elkin. His first published excavation was on a rockshelter near Emu Plains in 1934. In 1935 his thesis, *The Material Culture of Eastern Australia. A Study of Factors Entering into Its Composition*, was accepted by Sydney University. Fred McCarthy and his future wife, Elsie Bramell, were the first university-trained anthropologists employed at the Australian Museum to manage the anthropology collections.

Between 1935 and 1936 McCarthy and C.C. Towel undertook excavation at Lapstone Creek in New South Wales. It was the first site in

New South Wales in which culture periods were defined on the basis of stratigraphy (McCarthy 1948; Kahn 1993). Other fieldwork conducted throughout McCarthy's career covered areas such as the New South Wales east coast, western New South Wales, Arnhem Land in Northern Territory, Cape York in Queensland, and northwest Western Australia. Throughout these regions McCarthy undertook excavations, the recording of rock art, and ethnographic studies (Attenbrow 1998).

In 1938 McCarthy attended the Third Congress of Prehistorians of the Far East in Singapore with Norman Tindale and Dermot Casey (McBryde 1998). Here he presented a paper on observed relationships between Australian and Indonesian stone implements (McCarthy 1938a). This trip heralded a new era for McCarthy and on his return he began to press for the drafting of legislation to protect Aboriginal sites in New South Wales (McCarthy 1938b: 120-6). In 1946 McCarthy coauthored one of his best known works, *The Stone Implements of Australia*, with Bramell and Noone. In this volume they attempted the first systematic typological classification of Australian stone tools (McCarthy et al. 1946; Attenbrow 1998).

In 1948 McCarthy joined the Australian-American Scientific Expedition to Arnhem Land under the leadership of C. P. Mountford. Over 9 months McCarthy worked with Frank Setzler and Margaret McArthur conducting excavation and observing many aspects of Aboriginal life (Attenbrow 1998). McCarthy's work on food quest time factors was written with McArthur and remains a classic reference today (McCarthy & McArthur 1960). Throughout 1958 McCarthy studied rock art in north Western Australia and central-west New South Wales. In 1961 he also recorded totemic dances at Aurukun in north Queensland (Khan 1993).

In 1961 experts from many disciplines associated with Australian Aboriginal studies met at a research conference to discuss the founding of an institute for Aboriginal studies (Sheils 1963). McCarthy contributed through his knowledge of archaeology and material culture, and by the end of the meeting, an interim council had been appointed (Sheils 1963: 52–6, 171–94). By 1964 McCarthy was appointed as the Foundation Principal of the Australian Institute of Aboriginal Studies, now known as the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIAS Newsletter 1965: 1). He served as the principal of the institute until his retirement in 1971. McCarthy continued research into Aboriginal studies until his death in 1997.

Major Accomplishments

McCarthy's excavations at Lapstone (1935–1936) and Capertee (1958–1961) produced stratified stone artifact sequences that formed the basis for his famous Eastern Regional Sequence (McCarthy 1948; McCarthy 1964). This sequence consisted of three phases: Eloueran, Bondaian, and Capertian. Although regional variants were later found and Mulvaney promoted two pan-continental phases, McCarthy's tripartite sequence remains relevant today (Attenbrow 1998). In 1946 McCarthy, Bramell, and Noone published *The Stone Implements of Australia*, which was later revised and published as a book in 1976. This groundbreaking work attempted the first continent-wide typological classification of Australian stone artifacts.

McCarthy recorded many styles of rock art throughout Australia. His recordings of the Sydney-Hawkesbury sandstone region remain the only detailed documentation for many sites in this region and an invaluable source of information. Between 1958 and 1979 volumes of *Australian Aboriginal Rock Art* were published by the Australian Museum. It covered regional variants across Australia for engraved and pigmented sites and attempted to find a temporal sequence of styles (Attenbrow 1998). His final work *Artists of the Sandstone* contains ethnohistorical records of Aboriginal life in the Sydney area and is incredible for its wealth of knowledge and consistency.

McCarthy was pivotal in changing the focus of Australian Aboriginal exhibitions at the Australian Museum to encompass social, religious, and economic aspects of culture. He also established and maintained a catalogue of Australia wide sites with the Institute (AIATSIS). As early as

1938 he was drafting proposals to create legislation for protection of Australian Aboriginal sites.

In 1980 the Australian National University granted McCarthy an Honorary Doctorate of Sciences for his vast contribution to anthropological research in Australia. In 1990 he was made a fellow of the Australian Academy of the Humanities and in 1993 the Australian Museum devoted papers by contemporary researchers to commemorate his groundbreaking studies. That same year the Australian Archaeological Association conference in Darwin and its publications were dedicated to Fred McCarthy.

Fred McCarthy published more than 300 papers throughout his life and was pivotal to our contemporary understandings of Aboriginal studies. Over his career he paved the way for more ethical research and helped incorporate Aboriginal people into the decision-making processes around the recording and preserving of their culture.

Cross-References

- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Paleoart
- ▶ Conservation and Management of Archaeological Sites
- ▶ Dampier Archipelago Petroglyphs
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Rock Art, Forms of

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McDonald, Josephine J.

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Basic Biographical Information

Jo McDonald (Fig. 1) was born on the 23 October 1960. She grew up in Cronulla and attended Burraneer Bay Primary School and Woolooware High School with her brother and sister. She undertook her undergraduate training in the

McDonald, Josephine J., Fig. 1 Jo McDonald at UWA event in 2012 (Photo: UWA Press)

Department of Prehistory and Anthropology at the University of Sydney. John Clegg was an early influence, and her honors research investigated whether species differentiation in kangaroo's feet could account for stylistic variability in engraved kangaroo tracks. This study was based at Sturt's Meadows, a semiarid Panaramitee style (Maynard 1979) engraving site in western New South Wales. She graduated with honors in 1982 – and embraced cultural heritage management for the next 5 years – working with many consultants in the Sydney region and forming the company Brayshaw McDonald Pty Ltd, with colleague Helen Brayshaw. She began a regional management study on Sydney Basin rock art for the National Parks and Wildlife Service, which after three years morphed into her Ph.D. research.

Her Ph.D. was completed at the Australian National University, where Andree Rosenfeld was her supervisor. The Sydney region's dual-media rock art (pictographs and petroglyphs) is one of the only in Australia where there are two contemporaneous art systems operating throughout the Holocene. After completing her Ph.D., McDonald continued to work in cultural heritage and for 15 years was the Managing Director of one of Australia's best-practice research-driven cultural heritage management consultancy companies – Jo McDonald Cultural Heritage Management (http://www.jo-mcdonaldchm.com.au/).

She has been involved in the development of the Australian Association of Consulting Archaeologists Inc. (AACAI), holding at various times the position of President, Membership Secretary, Secretary, and NEC member. She was made a Life Member of AACAI in 2010. She was President of the Australian Archaeological Association in 1997–1998.

After moving to Canberra in 2003 with her partner Peter Veth, she continued to manage this company while becoming more research active in rock art. McDonald was Principal Investigator with professors Howard Morphy and Peter Veth on the $1.2mill ARC Linkage Project – Canning Stock Route Project – Rock Art and Jukurrpa. JMcD CHM was an industry partner on this Linkage Project. This project, which grew from Aboriginal community concerns about the burgeoning tourist impacts along this 1,800 km transect through Western Australia's sandy deserts, provided significant research outcomes as well as baseline data for a Plan of Management and a governance structure for the Aboriginal communities located across the arid zone.

In 2011, Jo McDonald commenced an ARC Future Fellowship, with a project studying rock art's role in the settlement and occupation of the arid zone (comparing the Western Desert in Australia with the Great Basin, USA) (Fig. 2). In 2012, she became the inaugural (endowed) Rio Tinto Chair of Rock Art Studies at UWA. She is the Director of the Centre for Rock Art Research + Management (CRARM) at UWA.

She has three children from her marriage to Neil Hanson (Oliver, Jesse, and Zoe). Five of the seven children she and Peter have, have finished school in the last seven years.

Major Accomplishments

Over three decades of practice, Jo McDonald has bridged the gap between academia and public archaeology, as well as working towards

McDonald, Josephine J., Fig. 2 Jo McDonald recording rock art in the Carnarvon Ranges, Western Desert in 2012 (Photo: Stafford Smith)

a mainstreaming of rock art research in archaeological context. Significant contributions to Australian archaeological practice have been through CHM as well as rock art research. Over two decades, McDonald developed conservation and management strategies for the fast-disappearing indigenous cultural heritage resources of Sydney being continually impacted by urban development. She has excavated more than 80 open sites on the Cumberland Plain and rockshelters in the surrounding sandstone country and developed the theoretical and predictive basis for open-site archaeology with a focus on landscape sampling, lithic analysis, and the discovery of sites in an aggrading geomorphic landscape (where the archaeological evidence is invisible/buried in the topsoil). As a result, the industry standard for open-area excavation is now >100 sq. m per site and focussed on cultural landscapes and the retrieval of complete lithic assemblages (JMcD CHM 2005; White & McDonald 2010). Nowhere else in Australia has this extent of open-site archaeology been achieved with obvious research implications for urban/mining contexts around the country.

Major contributions have included:

- The development of appropriate best-practice standards in the sampling, excavation, and analysis of open sites.
- The excavation of the oldest Aboriginal site in the Sydney region – a 30,000-year-old open site in a sand body in Parramatta. More than 500 sq. m of this significant landscape have been salvaged prior to development.
- Working with the police on several forensic excavations (e.g., McDonald 1992). This work (with physical anthropologist, Dr Denise Donlon) resulted in the development of an archaeological unit within the Forensic Diploma which was taught by the NSW Police Department to its Crime Scene officers.
- The discovery, excavation, and collaborative analysis of the first Australian evidence for death by spearing of the *Narrabeen Man* – found beneath a bus shelter during installation of infrastructure (McDonald et al. 2007; JMcD CHM 2008).

Her Ph.D. research on the rock art of Sydney was contextualized by the archaeological excavations undertaken in a number of shelter art sites (McDonald 2008). This work demonstrated the contemporaneity of rock art production with other occupation evidence. Her Ph.D. research achieved some of the first radiocarbon direct dates on pigment rock art anywhere in the world (McDonald et al. 1990).

McDonald's contributions to rock art research have been theoretical and management oriented. Her Ph.D. was the first in the world to undertake a regional analysis of a dual-media rock art province and contextualize this using information exchange theory (Wobst 1977). As well as writing Plans of Management for specific rock art sites and developing a management basis for art sites in the Sydney region, she has pioneered the use of applied rock art research in several successful Native Title claims (De Rose Hill, Martu, and Birriliburu). Following her early dating work in Sydney, she has undertaken

with colleagues an intensive program of pigment dating in the Western Desert, on the Canning Stock Route Project. She has also used rock art research to demonstrate the scientific significance of rock art across the Dampier Archipelago in support of National Heritage listing, achieved in 2007. This work, completed with Peter Veth, has more recently been supplemented by a study of this art province's Outstanding Universal Values for UNESCO World Heritage List nomination. She has also worked with the Department of Indigenous Affairs on developing a Heritage Inventory methodology to progress the documentation of the rock art across this art province (JMcD CHM 2008, 2009b).

She has recently co-edited a new international volume designed as a textbook for rock art scholars (McDonald & Veth 2012; and see McDonald 2013). She is currently working with colleagues to develop digital recording techniques, database development, and GPS-linked techniques to enable rock art research to be managed as digital heritage.

Cross-References

- ▶ Australian Association of Consulting Archaeologists Inc. (AACAI)
- ▶ Clegg, John K.
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Engendered Archaeologies
- ▶ Rosenfeld, Andrée

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McGimsey III, Charles R.

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Basic Biographical Information

Charles R. McGimsey, III (1925), known as Bob to all who know him, is one of the pioneering figures in the development of CRM in the United States. His numerous publications and lectures called attention for the need of archaeologists to engage the public for both financial support and the protection of archaeological resources. He was the driving force in the development and passage of state and national legislation for the management and protection of archaeological resources, including the establishment of the Arkansas Archaeological Survey. He led the effort to professionalize archaeologists in the United States with the creation of the Society of Professional Archaeologists, now the Register of Professional Archaeologists.

His early training in archaeology was interrupted by World War II. He finished his undergraduate degree at the University of New Mexico in 1949 and took his Ph.D. at Harvard University in 1958. His dissertation research focused on the Southwest and he conducted extensive research in Panama during the 1950s and early 1960s. In 1957, he was hired as the assistant curator and assistant professor at the University of Arkansas. He was a founding member of the Arkansas Archaeological Society, a statewide amateur organization established in 1960. From 1960 to 1983, he was Director of the University of Arkansas Museum. He helped create Department of Anthropology in 1969 and was initial chair until 1972. In 1967, he was also named the Director of the Arkansas Archaeological Survey, a position he held until his retirement in 1990.

Major Accomplishments

Bob was responsible for two influential publications during the early development of CRM in the United States. One, *Stewards of the Past* (1970) cowritten with Hester A. Davis and Carl Chapman, grew out of concern for massive site destruction from agricultural practices in the Mississippi River Valley. This small pamphlet was an early manifesto for the preservation of the archaeological record and the engagement of the public. It called on everyone to be a steward of this nonrenewable resource. Thousands of copies were distributed free. In 1972, as an outgrowth of gathering information on state programs, the book Public Archaeology detailed his vision for the engagement of professional archaeologists with the general public. It was an inspiring call for archaeologists to engage the public to develop state laws, to nurture amateur archaeological societies, and to develop public programs.

His legacy in the legal arena began at the state level. In 1959, he drafted and successfully lobbied for legislation establishing a program for archaeological research in Arkansas based in the University Museum. In 1967, working with the Arkansas Archaeological Society, he expanded the 1959 law and created the Arkansas Archaeological Survey. Also in 1967, he was responsible for legislation making it illegal to damage and destroy archaeological sites on public lands in Arkansas and requiring state agencies and municipalities to cooperate with the Arkansas Archaeological Survey. In 1977, he helped draft the legislation establishing Arkansas's state historic preservation office.

At the national level, he is most associated with Public Law 93-291, the Archaeological and Historic Preservation Act of 1974. As President of the Society for American Archaeology, he wrote much of the law and spent endless hours lobbying Congress for its passage. The law is

significant in that it authorizes federal agencies in the United States to spend project funds on site preservation. It complements Section 106 of the 1966 National Historic Preservation Act by requiring data recovery of properties that will be destroyed by federal projects.

In addition to his legislative efforts, while President-elect and President of SAA, Bob traveled extensively giving lectures and participating in meetings and symposia of various national organizations, while arguing the value of public archaeology. Most importantly, he and Hester Davis organized the Airlie House Seminars in 1974 that gathered prominent academic, federal, and state archaeologists and Native Americans to discuss major issues in the developing CRM field. Separate seminars provided recommendations on professional qualifications, report standards, management, communication with the public, laws and regulations, and Native American issues (McGimsey & Davis 1977). The report was quite influential during a critical period of CRM development as it provided guidance to many individuals developing federal and state programs in response to national legislation. As an outgrowth of the Airlie House Seminars, McGimsey argued vehemently for standards to judge the professional capability of archaeologists. He was a founding member and advocate for the Society of Professional Archaeologists, now the Register of Professional Archaeologists, and was its President in 1984. Throughout his career, he wrote and commented extensively on CRM matters (McGimsey 2004).

The Arkansas Archaeological Survey was established by the Arkansas General Assembly in 1967. While McGimsey credits members of the Arkansas Archaeological Society for the legislative clout to affect passage, the design of the Arkansas Archaeological Survey was his alone. The Survey is an independent unit of the University of Arkansas System with 11 research stations associated with state universities and state archaeological parks with a central coordinating office. It follows his vision of public archaeology by working closely with amateurs and the general public in a program of archaeological research, preservation, and education. The Survey and the Society annually sponsor an archaeological training program for amateurs and the general public. The unique organization of the Survey has been a model for other state programs in the United States.

He has received many awards honoring his career. The SAA awarded him the first Distinguished Service Award in 1975 and again in 1995 the Award for Excellence in CRM. In 1989, the Arkansas Archaeological Society named its highest award after him to honor those with distinctive records of archaeological site preservation.

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► Davis, Hester

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Basic Biographical Information

Born in 1928, Seán McGrail is currently Visiting Professor of Maritime Archaeology at the

University of Southampton (1991 onwards). Prior to that time, he held positions at the University of Oxford (1986–1993) and the National Maritime Museum, Greenwich (1976–1986). He is one of the most distinguished British nautical archaeologists, with a long history of research and publication in the field dating back to the mid-1970s. He was instrumental to the development of maritime archaeology as a formal academic discipline, and many of his publications remain the key reference works for the subject. Prior to his career in archaeology, he served in the Royal Navy (1946–1968), including seeing active service during the Korean War, particularly as a pilot in the Navy Fleet Air Arm, before studying archaeology at the Universities of Bristol (1968–1971) and London (1972–1978).

Major Accomplishments

McGrail's major accomplishments focus on two distinct but related concerns: firstly, nautical archaeology, especially studies of ship technology, and secondly, maritime archaeology, especially the development of maritime archaeology as a formal academic discipline and teaching specialism (his 1984 work *Aspects of Maritime Archaeology and Ethnography* being particularly influential in this respect). In both concerns, he has played an active leadership role since the 1970s, including editing many of the key works on both subjects and playing a major role in related organizations, including notably the UK's Advisory Committee on Historic Wreck Sites (1974–1998) and the International Symposia on Boat and Ship Archaeology (ISBSA) that have been held periodically since 1976. McGrail was also central to the establishment of key organizations in maritime archaeology, for example, the Centre for Maritime Archaeology at the University of Southampton, currently the lead academic institution for maritime archaeology in the UK.

McGrail's major publications reflect his focus on nautical archaeology, especially the analysis of ship technology through the rigorous application analytical rules leading to the understanding of shipbuilding traditions. Commencing with his (1978) *Logboats of England and Wales*, he has consistently led this field of study in the UK in particular and more generally internationally, especially in North West Europe. The seminal work in this field remains in McGrail's 1987 (reissued 1998) *Ancient Boats in North West Europe*, a theme that he expanded on in his majestic, encyclopedic (2001) *Boats of the World*. His work has included international fieldwork, in particular in South East Asia (see McGrail et al. 2002), but has primarily been focused on North West Europe, particularly on Romano-Celtic and Medieval vessel technologies, for example, his joint analysis (with Nigel Nayling) in 2004 of the Barland's Farm Romano-Celtic Boat. Other significant vessel assemblages that he has been involved in analyzing include the Late Bronze Age "raft" from Brigg, Lincolnshire; the Viking Age vessel finds from Wood Quay, Dublin; the mid-thirteenth century CE boat from Magor Pill, South Wales; and the mid-fifteenth century CE ship from Newport, South Wales. His work has also included the publication of popular books on this subject, notably his (1981) *The Ship*.

The influence of Seán McGrail can perhaps too easily be underestimated by those from outside the specialized subdiscipline of maritime archaeology. A self-effacing man, he has quietly and unostentatiously taught and mentored generations of maritime archaeologists working around the globe. His emphasis on rigorous analytical inquiry into boat and ship technologies helped make the UK a center of excellence in maritime archaeology in the 1980s when the nation was at risk from being eclipsed in this respect by other nations, including neighbors like Denmark and "distant cousins" like Australia. Internationally, there is a strong case to be made that our global understanding of ancient ship technology would be at least a decade behind the present-day without his contributions (see McGrail 1997 for a summary of his work).

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Crumlin-Pedersen, Ole
- ▶ Experimental Maritime Archaeology
- ▶ Maritime Archaeological Organizations
- ▶ Ship Archaeology

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Meadowcroft: Geography and Culture

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Introduction

Meadowcroft Rockshelter has played a pivotal role in Paleo-Indian studies and assessments of the peopling of the New World since its initial appearance (Adovasio et al. 1975) in the scholarly literature, when the collective understanding of these research themes was very much different from today. At that time, scholars were debating whether the Western Hemisphere's first colonists could have crossed from Beringia to North America any earlier than 15,000 BP, with their entry thereafter essentially being regulated by the retreat of the Wisconsinan ice sheet and the opening of the Ice-Free Corridor. The hemisphere's first cultural manifestation, called Clovis, was thought to have occurred no earlier than 11,500 BP, the age of that entity's earliest recorded component. The Clovis lifeway was then uniformly characterized as rapidly moving hunter-gatherers focused on the hunting of late Pleistocene megafauna. The initial publication of radiocarbon dates from Meadowcroft Rockshelter posed the first widely published, credible challenge to this paradigm, with the release of dates several millennia older than Clovis. Data from this site, along with those from a growing corpus of roughly contemporaneous yet highly diverse archaeological localities, have occasioned a radical reassessment of Paleo-Indian studies and the peopling of the New World.

Definition

Meadowcroft Rockshelter (36WH297) is a deeply stratified south-facing rockshelter

located 47 km (29 mi) southwest of Pittsburgh, Pennsylvania. The site lies within the unglaciated Pittsburgh Low Plateau on the north bank of Cross Creek, a minor west-flowing tributary of the Ohio River. Oriented east-west with a southern exposure, Meadowcroft stands c. 15.1 m (49.5 ft) above Cross Creek with an overhang located some 13 m (42.7 ft) above the ca 65 m^2 (700 ft^2) dry area within the modern dripline. Prehistorically, the protected area was three to four times larger than its present configuration. Meadowcroft and the surrounding Cross Creek drainage have been under intensive multidisciplinary investigation since 1973.

The 11 attritionally and/or colluvially emplaced strata identified at Meadowcroft currently afford the longest aboriginal occupational sequence from eastern North America and one of the longest in the New World. The upper strata of the site (Upper IIa–XI) span the entire Holocene, while the lower culture-bearing strata (Middle and Lower IIa) extend well back into the late Pleistocene. Although the latest aboriginal occupation or use of Meadowcroft is relatively easy to establish – corresponding as it does to just before the Revolutionary War – the dating of primary visits to this site is somewhat more problematic.

The lithic artifact assemblage associated with the site's earliest visitors is assigned to the Miller Complex, the apparent pioneer population in the Upper Ohio Valley. This assemblage has been briefly described and illustrated in previous studies (e.g., Carlisle & Adovasio 1982; Adovasio 1993), and it was intensively examined as part of Boldurian's (1985) dissertation research. The intensive study of these artifacts presents a mixed picture and one somewhat veiled by the small numbers of artifacts (c. 700 specimens), but it is nonetheless possible to characterize the lithic technology of the earliest inhabitants of Meadowcroft Rockshelter and its contemporary sites (e.g., the Krajacic and Mungai sites) in the Cross Creek drainage.

The Meadowcroft lithic debitage sample reflects secondary and tertiary core reduction and biface thinning from late-stage manufacture and the refurbishing of finished implements. The specimens create a clear impression that an essentially curated lithic tool kit was brought to the site by its earliest inhabitants. Interestingly, the initial Meadowcroft populations seem to have exploited (or at least utilized through exchange) raw materials from a fairly far-flung series of quarries. These include Flint Ridge in Ohio, Onondaga chert outcrops in New York, several Kanawha chert sources in West Virginia, the Pennsylvania jasper quarries well to the east of the site, and the local Monongahela chert outcrops in the Cross Creek drainage.

The flaked stone artifact inventory from lower and middle Stratum IIa at Meadowcroft Rockshelter contains small prismatic blades that were detached from small prepared cores. Although complete cores were not recovered at Meadowcroft, the artifact assemblage from the nearby Krajacic site contains a great variety of the distinctive Meadowcroft-style blade implements and small, cylindrical polyhedral cores. These cores were recovered from the Krajacic site after the initial study of the Meadowcroft lithic artifact assemblage had been undertaken in 1975, and they precisely parallel the core reduction strategy posited for the Meadowcroft blades.

In 1976, a small lanceolate biface, subsequently called the Miller Lanceolate projectile point, was found in situ on the uppermost living floor of lower Stratum IIa at Meadowcroft Rockshelter. This floor is dated by bracketing radiocarbon assays above and below it of 11,300 ± 700 BP (cal 13,606–9311 BC [1σ]) and 12,800 ± 870 BP (cal 15,860–11,286 BC [1σ]), respectively. This unfluted biface is the only Miller Lanceolate point thus far recovered from a directly dated stratigraphic context (although others have been recovered elsewhere in the Cross Creek drainage), and particular care must be exercised in formulating even a provisional typological definition.

Bone, wood, and plant fiber artifacts were also recovered from the pre-Clovis levels at

Meadowcroft. These include simple plaited basketry, a bone punch, bone awl fragments, and a bipointed wooden tool, all apparently made and used by generalized foragers who exploited white-tailed deer (*Odocoileus virginianus*) and perhaps much smaller game as well as hickory nuts (*Carya* sp.), walnuts (*Juglans* sp.), and hackberries (*Celtis* sp.) during their predominantly fall visitations.

Key Issues/Current Debates/Future Directions/Examples

Meadowcroft Rockshelter's stratigraphy and chronology, particularly among the site's lower stratigraphic and temporal reaches, has garnered perhaps the most attention among archaeologists. The site has become, unarguably, the most controversial North American locality advanced for early occupation of the New World since Abbott's excavation in the Trenton Gravels (cf. Meltzer 1993: 43–8). Despite the fact that the final report has not yet appeared, Meadowcroft is the most intensively studied, the most extensively documented (Adovasio et al. 1977, 1979-1980a & b, 1984, 1985, 1988, 1990, 1998; Adovasio 1993), and, with its 52 radiocarbon assays, the most thoroughly dated of all the putative pre-Clovis sites in North America.

While none of the dates later than c. 12,000–10,600 BP have been seriously questioned, some have suggested that the earlier dates may be somehow contaminated and anomalously old. However, repeated laboratory examinations by multiple facilities have consistently failed to detect any particulate or non-particulate contaminants. Additionally, micromorphological geoarchaeological studies by Goldberg and Arpin (1999) indicated no postdepositional water percolation into Meadowcroft's sediments and, thus, no potential mechanism for soluble contamination.

Applying the most conservative interpretation of the available chronometric data, we conclude that even if only the youngest date from upper middle Stratum IIa is valid, the minimum age for the presence of human populations in this part of Pennsylvania is in the range of 12,000 BP (cal 12,008–11,807 BC [1σ]) to 10,600 BP (cal 10,682–10,593 BC [1σ]). (All dates are calibrated using OxCal 4.1 [2012], IntCal09 calibration curve.) If the six deepest dates unequivocally associated with cultural material are averaged, a procedure with which we are uncomfortable on statistical terms, then humans were definitely present at the site between 14,555 BP (cal 16,023–15,475 BC [1σ]) and 13,955 BP (cal 15,247–14,862 BC [1σ]). If the younger date in this range is averaged with the younger of the two dates (19,600 ± 2,400 BP [cal 31,329–16,688 BC {1σ}] and 19,100 ± 810 BP [cal 23,119–18,652 BC {1σ}]) from lower Stratum IIa at the site, it is possible that the Meadowcroft's earliest occupation may have occurred around 18,000 BC. It should be noted, however, that the above-cited older dates were both obtained from very small, diluted samples, and both are non-AMS assays with high standard deviations.

In technological terms, many potentially diagnostic features of the pre-Clovis Miller biface are difficult to identify because the type specimen had been resharpened in antiquity. It has therefore undergone a considerable amount of change from its original or prototypic morphology; however, the prototype Miller Lanceolate almost certainly was longer. One fragmentary artifact from the Krajacic site collection conforms exactly in most of its diagnostic characteristics to the posited Miller Lanceolate prototype. Very recently, a complete, unresharpened Miller Lanceolate was recovered from the Mungai Farm in the Upper Cross Creek drainage. Like the fragment from Krajacic, this specimen is a virtual duplicate to the posited prototype. Together with the prismatic blades, the Miller type specimen is of special interest because of its great age and because it reflects its maker's sophisticated knowledge of flaked stone manufacture. Collectively, these data suggest that the first

inhabitants of eastern North America employed a technologically standardized and sophisticated, small polyhedral core- and blade-based industry of decidedly Eurasiatic, Upper Paleolithic aspect.

The environment of Pennsylvania at the time of the initial Miller-complex occupation is not known with any certainty. It appears that a mosaic of different periglacial habitats coexisted in Pennsylvania, with genuine tundra or steppe-tundra conditions generally occurring at the higher elevations and occasionally rather different conditions at other localities, particularly those at lower elevations. These latter settings apparently included both boreal and even limited deciduous floral elements in short-lived combinations that Stephen C. Porter (1988: 19), an authority on North American late Pleistocene climates, has called "ecologically anomalous" by Holocene standards. Indeed, at the time of the first human colonization, Pennsylvania, like other parts of the Northeast, was characterized in some areas by vegetational communities with no modern analogues at all.

Though long without parallel in North America, a number of other sites in North America are now regarded to be at least as old as or even older than Meadowcroft. These minimally include Cactus Hill in Virginia, the Deborah L. Friedkin and Gault localities in Texas, and Paisley Cave in Oregon. Whatever the controversies about its initial occupation, the excavation and documentation protocols employed at Meadowcroft are still widely considered to represent the state of the art, and the site is frequently cited as one of the most carefully excavated locations in all of North America.

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- ▶ Clovis and Folsom, Indigenous Occupation Prior to
- ▶ Monte Verde, Archaeology of
- ▶ Paleoindians
- ▶ Peopling of the Americas

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Media and Archaeology

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Introduction and Definition

Whether an excavation stems from academic research or a legally mandated mitigation effort, the media has an insatiable appetite for archaeology. Indeed, human curiosity will always be piqued by stories about the mysterious past, and therefore archaeological discoveries will always be relevant. The propagation of human stories pieced together from artifacts, ruins/shipwrecks, and human remains lends itself perfectly to a foray of mediums that include printed formats (magazines and newspapers), radio, television (news programs and documentaries), and the Internet.

National and international media are interested in disseminating any archaeological search or discovery that may capture the interest of a larger audience; usually the stories are already familiar tales of the past, or the finds are significant enough to catch the attention of those unfamiliar with the history of the site. Although the topic of "archaeology and the media" can include various forms of electronic and published communication that influences mass audiences on anything related to archaeology, this entry will focus on the formats that archaeologists find most divisive and challenging to negotiate: published news media and television documentaries. While documentaries and local television news programs are made for television, they may be downloaded and viewed on portable electronic devices such as smartphones and laptops. Although daily newspapers and monthly magazines are distributed in print format, this time-sensitive form of media can also be accessed on the Internet where it can be lifted and posted in multiple web sites including listservs and blogs. The various locations and methods of sharing information today underscore the impact the mass media can have on a single archaeology site as well as the discipline in general.

Key Issues/Current Debates

The Debate

The job of documentarian and newspaper editor is to sell stories. Admittedly, humans are attracted to narratives involving a mystery, especially the ones with valuable antiquities and dead bodies. Those who publish archaeology articles and produce scientific documentaries recognize this interest, and naturally their stories include links to sex, drugs, human sacrifice, cannibalism, human remains, gold, taboo behavior, and anything religious. The media also recognize that their public is interested in popular people and events as well as archaeological excavations related to controversial projects and local history. Consequently, most archaeologists have experience sharing information on their work to news reporters. Since the data produced from archaeological excavations results in new information about our past, it is imperative that reporters accurately relay details about these discoveries. Failure to communicate the meaning behind material culture can result in erroneous information about the past that counteracts the archaeologists' efforts to contribute to, contradict, or confirm what was previously known about that particular event, place, and/or person(s). News reporters must become an expert on the subject

they are covering at that moment. Their educational background and previous exposure to archaeology will significantly affect the quality and accuracy of their article. For example, science writers often cover science-based stories and are often successful at comprehending the value and meaning of an archaeological discovery. They possess the ability to extract valuable information from an archaeologist to produce a comprehensive article with few, if any, misrepresentations or errors. Unfortunately, this quality of news coverage on archaeology is the exception rather than the rule.

Many archaeologists have experienced being misquoted and, perhaps worse, the significance of their discoveries overshadowed, often in favor of sensationalism. Although this unintentional or intentional misrepresentation of research can leave a site and the scholar relatively unscathed, occasionally there may be a significant impact to the project. Although many scientists face challenges with the media, Middle Eastern archaeologists are regularly pulled into the spotlight whenever one of their findings could be used to support or emasculate a group's political or religious agenda. An example is the alleged confirmation of Jesus of Nazareth and Mary Magdalene's tomb in Jerusalem by the *Discovery Channel*. After reviewing the evidence, or lack thereof, many of the biblical archaeologists remain skeptical that this ossuary could ever be substantiated as the tomb of Jesus (Gibson 2006: 118; Meyers 2006: 118). Despite the lack of scientific proof, the public is still left holding this mystery in their hands without a decision on the authenticity of the discovery.

As this example demonstrates, protesting the delivery of archaeology on television through avoidance may be futile and perhaps even a disservice to the discipline. Additionally, there are organizations that attempt to legitimize their treasure-seeking agenda by incorporating archaeological methods into their operations. Unfortunately, such organizations tout themselves as "commercial marine archaeologists," thereby creating confusion and reinforcing the erroneous message that archaeologists are treasure hunters in search of gold and objects of monetary value. Considering the impact treasure hunters have on the public may encourage some archaeologists to share their research on documentaries in an attempt to dilute bogus representations of archaeology.

On the other hand, significant repercussions can result from sharing new archaeological findings with the media. An example of an injustice to American archaeology research created by media coverage is the excavation of the Donner Party camp in California. This popular Western tale involved a wagon train becoming stranded in the mountains where some of the emigrants resorted to cannibalism to stay alive. When archaeologists publicly announced they found no human bone at one of the campsites, the news headlines insinuated the project archaeologists proved the Donner Party never cannibalized the dead (Dixon & Schablitsky 2011). In reality, the archaeologists simply did not recover human bone because they did not dig in the location of the bodies or the bone may have decomposed in the acidic soil. In the end, the news media ignored the newly discovered data on daily life in the camp and the reconstruction of a starvation diet in favor of dramatic and inaccurate headlines. This perpetuation of misinformation and insinuation of a "cannibalism debate" took an infamous historical event and created a controversy where there was none. When irresponsible and slapdash reporting on important events can twist and obscure the public's perception of the past, how can we, or should we, trust and share our findings with the media? Is there a reason we should even televise our research when the same network airs programs on treasure hunting our heritage? Herein lays the quandary and the debate.

Published Media

As discussed, sharing archaeological findings can be dangerous since a single interview can create a barrage of problems that did not previously exist. When a site is just discovered and exciting finds have not yet been publicly shared, reporters and even documentary producers can exhibit a voracious appetite for the "new" and "spectacular." Of course, media coverage is not limited to projects that involve significant finds; often stories are published on what the editor believes

their audience will be interested in reading. Local archaeology stories, for example, often include cultural resource management (CRM) archaeology digs that can be attached to controversial construction projects.

Some scholars believe that in order to avoid any misrepresentation of scientific results, the safest response to the media is to simply not engage with them or rely on popular print to reveal one's preliminary findings and interpretations. Many of these scientists clutch tightly to the belief that trusting a non-archaeologist to share their results is not worth the risk of losing control of how their data is delivered to the masses. Unlike 20 years ago, a bad newspaper article does not end up lining a hamster cage. Instead, it lives on indefinitely in an electronic format posted on news sites, blogs, and commentaries. Furthermore, many academic scientists believe that sharing information on their findings within a popular medium prior to appearing in a peer-reviewed publication is popularization and regarded as irresponsible and an unethical delivery of scientific data (Gregory & Miller 1998: 108; Clack & Brittain 2007: 35). Instead, they believe that scholarly results should be restricted to academic publications and proceedings. The downside to this type of exclusivity is that it removes the public's ability to easily access archaeologically produced information about our past. This latter point is extremely important if the archaeological data is gathered with local, state, or federal government funding.

Of course, there are advantages to allowing an archaeological project to be publicly exposed in the mass media. In particular, large and complex archaeological projects take months, if not years to plan. The excavation of shipwrecks, large ruins, and multiyear projects requires a large and regular infusion of funding. Offering a high-profile archaeological site up as a sacrificial lamb to the media gods for the economic good of the project, however, should not be entered into lightly. Once preliminary data surfaces, the principal archaeologists should consider limiting regular and thorough coverage of their work by the media if the finds could be easily misinterpreted or are controversial in nature.

Some would also argue that coordination with the media is a necessary step when federal, state, and local agencies comply with Section 106 of the National Historic Preservation Act (Kuhn 2002: 206). Cultural resource management sections of agencies and private firms often find local news venues that facilitate their compliance with the law by reaching mass audiences, especially those populations who do not have the ability to access electronic information (e.g., email and Internet posts). When an archaeological excavation is finished, many community members may be interested in knowing what was found and learned from the dig. Indeed, a 30-second television announcement or a follow-up article in the newspaper is an efficient, inexpensive, and effective way to communicate what the archaeologists found and how the community's tax money was expended on the project. Recently, the Federal Emergency Management Agency agreed to fund the stabilization of a riverbank in a small town in southern Minnesota. The local news media effectively articulated the process of Section 106 of the National Historic Preservation Act (Lindberg 2011), allowing a 90-year-old citizen to recount that "... the archaeologists will conduct a second phase of work if the first phase results in information about the old ferry landing" (*pers. comm.* Carmel Miller 2011). Indeed, published media is extremely effective at notifying community members from various educational backgrounds and generations about what archaeologists are doing, what they find, and what new information they have learned about a site. The media can be a successful tool to share archaeological findings with those who pay for the science.

The Documentary

The creation of archaeology programs has been a favorite topic of television documentary filmmakers for over 50 years. One of the first televised excavations covered the work of paleoanthropologists Louis and Mary Leakey (*National Geographic*, Dr. Leakey and the Dawn of Man, 1966). Today, television documentaries primarily follow two formulas; however, these formats may overlap one another.

The most common documentary captures a recent discovery, often incorporating the project archaeologists, and if possible, additional data not yet released. Exploring an already discovered shipwreck and new excavations on popular sites also makes popular television documentaries.

Another common format uses a professional host who visits well-known archaeological sites in places such as the Near East, Mexico, and South America. These host-led shows are quite successful and include programs such as "The Naked Archaeologist," "Digging for the Truth," and "Solving History with Olly Steads." As a result of the reality television movement, history-related documentary series are personality driven, and a strong host is crucial for the show's success. An attractive persona, enthusiasm for solving a mystery, and the ability to naturally communicate on camera are what is necessary to lead these types of documentaries and not a degree in archaeology. In other words, the success of the program is dependent on the personality, rather than the subject matter.

In an attempt to emanate scientific credibility and meet funding requirements yet secure high viewer ratings, networks may pair a team of graduate-degreed archaeologists with a professional host. Over 20 years ago, Tim Taylor created a science reality program that allowed the television audience to peer over the shoulders of archaeologists as they recovered Roman pottery sherds and exposed stone walls in neighborhood backyards and local farm fields in the United Kingdom. The program brought three professional archaeologists together but used Tony Robinson, known for his role as Baldrick in the popular BBC television show *Blackadder*, to host the show. Tony is shown becoming extremely animated as he peers into the trenches to find out what the archaeologists have just discovered and then turns to the viewing audience to deliver the news. He is the audiences' interpreter and asks the questions likely on the minds of the audience. The show is energized by his enthusiasm, and a sense of urgency hangs over the team since they only have 3 days to answer their questions. Remote sensing techniques such as ground-penetrating radar and magnetometry, referred to as "geophys," lead the archaeologists to subsurface anomalies that could be buried walls or other culturally created features. Mechanical diggers quickly strip off the modern overburden, creating long trenches that allow the archaeologists to quickly find what they were searching for in that area. The sites are amazing and include Roman ruins, human burials, and even a World War II aircraft. The present and the past converge in the program when food and craft demonstrations are participated in by one of the archaeologists – what does a medieval feast smell and taste like? How do you fight with an ancient weapon? The Time Team format is a unique concept since it uses professional archaeologists who are uncovering their finds as the camera rolls, rather than after the discovery. Indeed, the program's formula can easily be transferred to any place in the world that holds undiscovered secrets and an enthusiastic team of archaeologists.

Fifteen years after Time Team aired in the United Kingdom, PBS determined the American audience was ready for their own science reality television show. Although much less popular than the British version, Time Team America went into production in 2008 and aired five episodes on PBS over a year later. The British Time Team program sent one of their directors to script the show and direct the camera crews on historic and prehistoric archaeology sites across the United States. The show included an amateur host and artist, a team of five professional archaeologists, and a pair of geophysicists. Instead of discovering and digging new archaeology sites like the original Time Team, the filming took place on already known and established excavation sites located on protected lands and managed by public or university archaeologists. Although the sites held mysteries such as the Lost Colony of Roanoke and a hero tale about an enslaved African American establishing a town in the heart of the Midwest, the series did not initially get funded for a second season. PBS did not believe that the discussion on dark soil post molds, finding 150-year-old ceramic sherds, and picking up broken Clovis bifaces were visually exciting enough to keep American audiences' attention. In addition, there seemed to be too

many archaeology personalities on camera. Despite these concerns, PBS found the show format promising and was encouraged by the original British version's success. After a 4-year hiatus, PBS secured a National Science Foundation grant, and Time Team America went into a second season of production in the summer of 2012 with a professional host and a smaller team of scientists.

Pitfalls and Advantages of Archaeology on Television

Although there are many successful documentaries that accurately and effectively communicate scientific discoveries to the public, the dissemination of information to the masses using television still has its critics and for good reasons. All television documentaries are born from a question. Is there evidence of cannibalism at the Donner Party site in California? Was King Tut murdered? Did archaeologists find Jesus' tomb? If the director can attempt to answer such questions by interviewing scientists, examining objects, and in some cases, performing experimentations on camera, then the topic has a potential for a documentary. Before the camera rolls, the vision of the executive director on how to navigate through the story has already failed in the eyes of many archaeologists. Admittedly, the audience will never be provided the credentials of the scientists and/or hosts of the show, the months and years of logistical planning and research will not be addressed, and even the reasons the archaeologists found their discovery significant may be glossed over in favor of a sensationalized aspect of the story. The networks' goal is not to share wonderful archaeology discoveries and teach the masses about the importance of archaeology. Instead, they entered the world of documentary filmmaking to tell a story that explores a mystery that most people will find interesting enough to learn about; archaeology just happens to be one of those topics people find fascinating, along with sharks, the Bible, and military history.

Archaeologists who oppose working with production companies are concerned with blurring the line between the legitimate scientist and the amateur as well as producing an archaeology-themed documentary solely for the sake of entertainment. It is the rare archaeologist who does not take offense at documentaries that focus on "chasing mummies," legitimizing treasure hunting, or producing a program on a controversial subject with little scientific data to support any hypothesis. The big networks, such as *History* and *Discovery*, fail to differentiate between a scientific and financial endeavor – unfortunately, so does the viewing audience. Hollywood reinforces the treasure hunting = archaeology stereotype through movies such as the Indiana Jones series and Tomb Raider – it is a symbiotic relationship. In the end, the discipline's goal to produce solid data about the past by using material culture and patterns is thwarted by the message that archaeologists only care about finding artifacts and, perhaps worse, context is nothing.

Archaeologists who want to create, or agree to participate in, a documentary about their site often do so realizing the benefit in it for them. Setting self-promotion aside, many scientists do see the economic advantage in exposing their site. If asked, networks may be willing to donate several thousand dollars to the project in exchange for permission to produce a documentary on one's research. This influx of funding may allow the principal investigator to complete necessary analyses or to hire a temporary research assistant. In particular, high-profile sites may greatly benefit from an exclusivity contract with the network that allows them to document the site and release information in popular mediums for thousands of dollars. In these longer and more extensive documentary productions, archaeologists benefit from a relationship with the director who is more likely to address the archaeologist's concerns. In still other instances, the high public profile of a site created by mass media coverage can encourage future support in the form of partnerships and additional funding.

Future Directions

Admittedly, media coverage can be detrimental to the field of archaeology as slapdash reporting

confuses details, sensationalizes findings, and legitimizes individuals and groups who financially profit from archaeology. Once the scientific field understands and accepts that the media is not capable of always recognizing the true significance of a discovery, archaeologists may be able to work toward identifying the part of their research that is newsworthy without losing control of the data. It is possible for scholars to use the media to teach the public *who* archaeologists are and *how* they learn about the past using broken things and patterns in the soil. All archaeologists should understand how to negotiate with the media but also simultaneously recognize when the director or reporter could deliver a dramatically construed story rather than a report steeped in scientific realities (Frank 2003: 453; Holtorf 2007: 105). Documentaries want to make their production believable and they try to get there by being as truthful as possible, but the truth is not always captured in documentaries or science reality television (Hampe 2007: 123-5). In fact, as reality television evolves, the public may be increasingly misled and fed misinformation on discoveries for the sake of entertainment. If archaeologists choose to work with the media to deliver a message, they need to exercise caution, anticipate specific questions, and prepare sound bites that the public can digest. Simplifying the message (rather than dumbing it down), although difficult for many, is imperative to reach audiences, as well as reporters, unfamiliar with scientific rigor and theory.

Archaeologists are truth seekers. Their ultimate goal is to literally get to the bottom of a story using all methods and sources available to them. In simple terms, after they gather the data, it is organized, analyzed, interpreted, and compared against other scholar's research. The end result is publication of the interpretations and findings in peer-reviewed publications and/or technical reports. Somewhere in the middle of this scientific process, an opportunity for the media to document and report on the discoveries from a historical site may become available to the archaeologist. A documentary film cannot, and a director would not choose to, capture a comprehensive production that communicates the methods and theories used to reach conclusions about the subject at hand. The mass media is limited and is not the place to launch new data or, in some cases, controversial or sensitive findings without it first appearing in scholarly publications. In the unfortunate event that misrepresentations occur in the media, peers and the public could always be directed to published articles and books for clarification.

In sum, the public's interest in human history will not wane with the passage of time and neither will the media's desire to write about and produce documentaries on archaeology. Perhaps the only thing to change will be the format that archaeological discoveries are disseminated to the masses. It is hoped that archaeologists can appreciate the limitations of the mass media but still find a way to successfully navigate within those boundaries to responsibly share their discoveries with the public.

Cross-References

- ▶ Film, Archaeology in
- ▶ Internet, Archaeology of the
- ▶ Television and Archaeology: Views from the UK and Beyond

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Medieval Archaeology

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Brief Definition of the Topic

Medieval Archaeology is the annual journal of the Society for Medieval Archaeology, first appearing in 1957. It publishes original submissions of international significance, or national significance and of international interest, which further the study of the period from the fifth to the sixteenth century CE. While it maintains a special concern for the medieval archaeology of Britain and Ireland, it also provides a forum for the discussion of important finds and developments within this period from anywhere in the world, serving as a medium for coordinating the work of archaeologists and that of historians and scholars in any other discipline relevant to this field. The Editorial Committee strives to present the highest-quality research, work that not only reflects the breadth of the interdisciplinary period and geographical interests but also inspires and challenges in some way. Its international associate editors form a "virtual board" of advisors whose main function is to support the editor in the delivery of an internationally respected, peer-reviewed journal.

As part of its 50-year celebrations in 2007, the Society made volumes 1–50 available free online (ADS n.d.), while through Ingenta/Maney Publishing volumes 44 onward are available electronically to its individual and institutional subscribers.

The contents (all color since 2011) comprise articles (with translated abstracts since 2007), notes, Medieval Britain and Ireland, and a substantial review section of primarily Europe-focussed books. News now appears in the Society's biannual newsletter. Since 2007, the Society awards the Martyn Jope Award for the best novel interpretation, application of analytical method, or presentation of new findings. The Medieval Britain and Ireland section comprises a report and analysis of new finds from the Portable Antiquities Scheme and a section on highlighted projects or discoveries, accompanied by an index to *all* the medieval fieldwork for the year in question (since 2008 the Archaeology Data Service (ADS n.d.) makes the details of these archaeological projects available online).

Gerrard (2009) and Wilson (2009) discuss the evolving role and significance of the journal in the context of the development of the Society and attitudes toward the study of medieval archaeology. The Society and its journal have been instrumental and highly influential in this respect, the journal acting as the model for later European journals as the subject has expanded and matured. A constant for *Medieval Archaeology* is still the focus on international, multi- and interdisciplinary perspectives, as well as substantive reviews.

To date, the honorary editors have been Donald B. Harden (1957–1973), Richard Gem (1974–1978), D. A. Hinton (1979–1989), H. C. Mytum (1990–1997), John Hines (1998–2006), and Sally M. Foster (2007–2012). There is a separate Review and Medieval Britain and Ireland editor (Neil Christie since 2007). Since 2009, *Medieval Archaeology* also has a deputy editor (Oliver Creighton); at times in the past, there was also an assistant editor.

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► Society for Medieval Archaeology

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Medieval Pottery Research Group (MPRG)

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Basic Information

The MPRG was founded in 1975. At a time when medieval archaeology was still emerging as a credible discipline, it became clear that pottery studies needed consistency of direction and approach. Since then, membership has grown to around 300 and includes people from the USA, Japan, and all over Europe, as well as many institutions. The group is run by a council that includes the president, vice-president, secretary, treasurer, and editors, as well as three overseas representatives.

Major Impact

The purpose of the group remains the communication of knowledge and understanding, the provision of expertise through a network of regional groups, the development of training and educational activities to a variety of audiences, and advocacy of our interests to regional and national bodies.

The first of those aims is achieved through the publication of the annual journal *Medieval Ceramics* which has now reached number 32. A twice-yearly newsletter provides a less formal means of communication, while the occasional paper series includes more subject-specific titles and was launched with the comprehensive *Guide to the Classification of Medieval Ceramic Forms* (1998). The group also holds an annual conference, based each time at a different location, usually within the UK but also including trips to Holland, Germany, and Italy.

The regional group network covers England, Wales, and Scotland. Group meetings are organized at local venues and are usually an opportunity to view newly discovered pottery assemblages and share views and current interpretations. Some groups have also held training events aimed at local amateur societies, and an overall aim is to develop those into a more organized program. Training has also been offered nationally, with funding support from English Heritage, in the form of 2-day workshops in a variety of subjects including characterizing pottery fabrics, European pottery imported into Britain, Staffordshire pottery, and manufacturing techniques.

The MPRG has recently published a *Research Framework for Ceramic Studies in Britain* (Irving 2011), which comprises a survey of current knowledge and the state of the discipline, together with recommendations for the direction of future research. This will also be vital to future advocacy in funding applications and regional and national research programs. One key challenge is to encourage younger researchers to join and participate, as there has been a noticeable decline in the teaching of post-Roman material culture in academic institutions. The John Hurst Travel Fund, set up to honor one of the group's founding fathers, makes a small annual grant available to young researchers needing assistance with travel costs

for studies abroad, and previous recipients have been helped with visits to Jordan and the Faroe Islands.

Information on all this and more can be found on the group's website at http://www.medievalpottery.org.uk/. New members are always welcome.

Cross-References

- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Medieval Archaeology
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Society for Medieval Archaeology

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Medieval Russia (Rus'), Archaeology of

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Introduction

The Slavic colonization of Northwest Russia occurred in two waves coming from the territory of the western Slavs. The first, identified with the tribe known as the Krivichi and distinguished by their use of long barrows, took place in the sixth to seventh centuries. The second wave, identified with the Sloveni and their use of *sopki* (high, conical burial mounds), took place in the eighth to ninth centuries (Yanin 2007: 205).

Medieval Russia from the ninth to twelfth century is often referred to by the term Rus'. The origin of this name, and the populations and lands to which it refers, has been the subject of much debate that has affected both archaeologists and historians over many years. It is usually associated with Scandinavian settlers and tribal leaders, as the early chronicles describe Swedish Vikings coming from the Baltic area to settle and rule over a disparate group of Slavic tribes around the emerging town of Novgorod and its territory, which included the important hill fort known as Ryurik Gorodishche that controlled the waterways on the northern edge of Lake Ilmen. According to one possible theory, the name Rus', like the Finnish name for Sweden (*Ruotsi*), might be derived from an Old Norse term for "the men who row" as rowing was the main method of navigating the rivers of Eastern Europe. The name Rus' would then have the same origin as the Finnish and Estonian names for Sweden, namely, *Ruotsi* and *Rootsi*, respectively.

Scandinavians are sometimes referred to in medieval Russian chronicles as Varangians, another name accepted as meaning Vikings with a Swedish origin. According to the Primary Russian Chronicle compiled in Kiev around

CE 1113, the Rus' had relocated from the Baltic area to northeastern Russia, creating an early polity under the leadership of Ryurik. The descendants of Ryurik were the ruling dynasty of Rus' centered on Novgorod (from 862) and Kiev and the successor principalities of Chernigov, Vladimir-Suzdal, Galicia-Volhynia (after 1199), and eventually Moscow (which did not become a significant urban settlement and power base until the fourteenth century). Their dynasty is referred to as the Riurikid.

Historical Background

Primary Historical Sources

According to the earliest East Slavic record, known as the Primary Russian Chronicle, the Varangians were first expelled, then invited to rule over the feuding Slavic and Finno-Ugric tribes around Novgorod.

The part of the Chronicle that refers to this states that

> "The four tribes who had been forced to pay tribute to the Varangians (the Chuds, Slavs, Merians, and Krivichs) drove the Varangians back beyond the sea, refused to pay them further tribute, and set out to govern themselves. But there was no law amongst them, and tribe rose against tribe. Discord thus ensued among them, and they began to war one with another. They said to themselves, 'Let us seek a prince who may rule over us, and judge us according to custom.' Thus they went overseas to the Varangians, to the Rus'. These particular Varangians were known as Rus', just as some are called Swedes, and others Normans and Angles, and still others Gutes, for they were thus named. The Chuds, the Slavs, the Krivichs and the Veps then said to the Rus', 'Our land is great and rich, but there is no order in it. Come reign as princes, rule over us.' Three brothers, with their kinfolk, were selected. They brought with them all the Rus' and migrated" (the Primary Russian Chronicle entry for either CE 859 or 862 depending on which version of the chronicle is used).

Development of the Subject

In the nineteenth century, the study of Russian medieval archaeology began with a period of antiquarianism, but by the late nineteenth century, the subject had become inextricably linked to nationalistic approaches that were becoming widespread across Europe. After World War I and the Bolshevik Revolution, this approach combined with a growing preoccupation with the ethnic origins of early medieval peoples, their settlements, and burial rites. Examples of this include the early field work at Staraya Ladoga, where investigations, particularly of burial mounds, searched for evidence of Viking incomers to either support accounts from the chronicles or to demonstrate a Slavic national/ethnic tradition (often referred to as "the Normanist controversy") as views polarized about the extent and influence of Scandinavian migrants into Kievan Rus' in the ninth and tenth centuries. Under Stalin, nationalism was also used to legitimize political regimes using ethnogenetic studies.

The domination of ethnic origins and the role of typologies in supporting or countering various arguments about Vikings, Slavs, and indigenous tribes continued throughout much of the twentieth century. During the Soviet postwar period, this approach took on new significance, as it was seen as a relatively safe area of archaeological and historical research, whereas new approaches and the discussion of western ideas could place individuals into a position of conflict with the state with sometimes dire consequences. As recently as the 1980s, leading Soviet archaeologists found themselves in difficulties with the authorities due to their questioning of accepted Soviet interpretations of history. For instance, theoretical archaeologist Leo Klejn faced charges and a prison sentence partly for his questioning of the prevailing view of the Normanist question and for contradicting the orthodox Marxist theory of historical materialism. He was also persecuted for showing interest in Western ideas, such as the New Archaeology, for publishing extensively in Western journals, and for having too many international contacts (Klejn 1991).

In the period of *perestroika* and the post-Soviet era (i.e., after 1991), Russian medieval archaeologists were able to contribute to academic debate within a wider, more open international forum. However, the economic crisis of the mid-1990s brought about its own problems of

diminished resources in university departments and academic institutes, many of which had high numbers of staff but little money with which to pay them (Chernykh 1995).

Throughout all these twentieth-century upheavals, the Soviet, and subsequently the Russian, Academy of Sciences have supported archaeology in general and medieval archaeology in particular through the funding of field work, research staff, and laboratories. The Institute of Archaeology in Moscow and the Institute for the History of Material Culture in St. Petersburg are the two main organizations for field archaeology throughout all of Russia. Both institutes have long pedigrees in high-quality archaeological work (the latter organization being established by Lenin himself). At the present time (2012), both institutes are run by medieval archaeologists (N.A. Makarov in Moscow and E.N. Nosov in St. Petersburg).

University departments also play an important role in both national and regional archaeological research projects. For instance, the long-standing program of systematic excavations in Novgorod has been directed by the Department of Archaeology of Moscow State (Lomonosov) University every year since they were first begun by Professor Artemiy Artsikhovsky in 1932 with the exception of the war years in the 1940s. This connection has continued throughout the postwar and post-Soviet periods, first under the direction of Boris A. Kolchin, followed by Valentin L. Yanin and Alexander S. Khoroshev.

Key Issues/Current Debates

Key Sites

In keeping with the debate about the role and significance of Viking traders and settlers, the site of Staraya Ladoga, investigated since 1972 under the direction of A.N. Kirpichnikov, has been the subject of much interest to scholars of early medieval Europe. It was an important trading center (emporium) of the type well known throughout the Baltic and North Sea at this time, similar to Birka, Hedeby, and Ribe. According to dendrochronological evidence, the settlement of Ladoga emerged no later than CE 753 and quickly became an important trading place on the routes from the Baltic Sea along the River Volkhov, then via the Dnieper or Volga to the south or east. The generally well-preserved remains of timber buildings cover approximately 18 hectares and represent continuous habitation from the mid-eighth century onward. It was a center for craft, administration, trade, and transportation, where Slavic, Finnish, Scandinavian, and other ethnic groups lived and traded. Much of the Arabic silver coinage that reached the shores of the Baltic Sea probably passed through it (Kirpichnikov 2004: 183).

Another site related to the question of Viking penetration into early medieval Russia is Gnezdovo, near Smolensk. This site has also been the subject of extensive investigation, producing a large range of artifacts, mostly from burials, that indicate extensive Viking connections.

An important aspect of medieval archaeology in Russia has been the excavation of urban sites, the primary ones being Novgorod, Pskov, Suzdal, Vladimir, Rostov, and more recently Moscow. These investigations have had a tradition of focusing on the material culture, notably jewelry and other metalwork, and also on technological questions to do with the manufacture of iron and copper alloy objects. Another area of intensive study has been the organic remains of objects of wood and leather, particularly as many of the more extensively occupied towns, such as Novgorod, have very deep anaerobic deposits where artifact preservation is exceptionally good. It was in this context that the first birch-bark documents were discovered at the Nerevsky excavations in Novgorod in 1951. Dating from the eleventh to fifteenth centuries, these documents now number over 1,000 from Novgorod alone, but with further examples found at other towns including Stara Russa, Pskov, Smolensk, Torzhok, Tver, Moscow, and Ryazan in Russia; Zvenigorod in the Ukraine; and Vitebsk and Mstislavl in Belarus. These precious remains of largely domestic, sometimes mercantile, writing have been avidly studied by linguists and historians, as well as archaeologists, the leading experts being the historian V.L Yanin and the linguist A.A. Zalizniak.

Another aspect of medieval urban archaeology that has been much studied is town morphology: notably the layout of streets, properties, and open spaces. A great deal has been made of the so-called Republic of Novgorod dating from the twelfth to the fifteenth century where the *boyars* had a voice to equal, and occasionally veto, that of the Prince. They also elected their own mayor (*posadnik*). As a topographic feature, the outdoor space provided for the town *veche* (a popular assembly similar to the Norse *Thing*) should be recognizable archaeologically, and various ideas about its location have been put forward. In this way, medieval archaeology has been instrumental in the debate about notions of the state and statehood, as well as the organization of "democratic" or "republican" city life.

Recognizing and documenting the evidence for the Mongol invasions of the thirteenth century and their impact on urban places, such as Suzdal and Vladimir, is another recent theme, as is the investigation of the rise of Moscow in the fourteenth and fifteenth centuries. For example, recent work on rescue sites in Moscow, including the town's late medieval mint, has been carried out and recently published by the Institute of Archaeology (Krenke 2009).

It is worth noting that the Soviet era brought in some far-reaching and, for their day, innovative heritage protection laws in the 1960s. The most significant of these for medieval archaeology was "the protection of the cultural layer" first brought into effect in Novgorod and which ensured that archaeological deposits were either protected or excavated by approved archaeologists from the Academy of Sciences. However, changes to heritage protection in recent years have led to a more western approach to rescue archaeology as the involvement of private developers has brought about a more commercial approach to both urban and rural development. This has reduced the amount of research investigation, but has increased the number of smaller investigations and extensive field surveys.

One of the positive outcomes of recent changes has been the emergence of landscape studies looking at rural settlement patterns through time, settlement shift, nucleation, and dispersal. A notable example of this approach has been the work of Nikolai Makarov, whose work in the Byeloozero region has been examining the evidence for the colonization of the northern region of medieval Russia as the principalities of Novgorod and Rostov-Suzdal vied for control of the rich fur-gathering lands that lay between Lake Byeloe and the White Sea. In particular, this survey work has been investigating the formation of a loose but stable settlement pattern in the eleventh to thirteenth centuries, which covered a vast area populated by Finno-Ugric groups who paid tribute in fur and other forest products to the dominant principalities, especially Novgorod. The importance of river systems and portages to the movement of goods and people has been well demonstrated in this research (Makarov 1997). Makarov has built upon these surveys carried out in the 1990s by intensive investigation around Lake Kubenskoye, recently producing three volumes of results that have used a multidisciplinary approach to address wider landscape and ecological themes (Makarov 2007, 2008, 2009).

Turning to ecology, while the study of the animal economy of medieval Russia has lagged behind that in the West, it has had some notable successes in recent years with studies of both domestic and wild species used to understand the role and type of settlements (e.g., settled agricultural communities versus fur-trapping stations). This work has also provided dateable evidence for the decline in the population of certain hunted species such as beaver (Savinetsky & Krylovich 2009). Other zooarchaeological studies have included analyses of the contrast between animal assemblages found at urban and urban-hinterland sites in the Novgorod and Byeloozero regions (Maltby 2012).

The study of the arrival of Christianity in Russia in CE 989 and the impact of the Church on settlement and social stratification has also gone through various phases of development. In Soviet times, these topics were dealt with, as many topics were during this period, from a largely technological point of view. For instance, studies by archaeologist and architectural historian Pavel Rappoport (1913–1988) on

the building of churches within medieval Russia concentrated on the investigation of how people went about constructing them, including topics such as brickmaking, lime firing, roofing, and decoration, as well as how churches were laid out and how much brickwork was required per day (see, e.g., his work on churches in Kievan Russia published in English in 1995) (Rappoport 1995).

More recent studies on the introduction of Christianity into Russia have focused on the material culture of the Church itself in terms of art history and artisan production. The importance of Christianity on settlement and churchyard location is increasingly being recognized as highly significant to settlement patterns of the eleventh to thirteenth centuries, for example, in regional surveys of the Byeloozero region and more recently of Suzdal Opolie (Suzdal Land).

Future Directions

Building upon studies of landscape and settlement patterns, the work program established by the Institute of Archaeology, and supported by the Russian Academy of Sciences, has set the agenda for the foreseeable future for medieval archaeology in Russia. Topics include center/periphery relations, settlement patterns, shifting settlements within a landscape (Brisbane et al. 2012), as well as issues of social stratification and the rise of elites. The last of these raises interesting and much-debated questions of where the elites actually reside – in the town or the country – with some archaeologists now challenging the long-held view that towns such as Novgorod were where the boyars resided and had their power base. Undefended sites around Suzdal are now being mapped and studied with a view to testing this hypothesis.

Another example of one of the institute's long-term projects that will help to bring new ideas forward is the work being undertaken in the region of Kaliningrad, where a German and Russian team of archaeologists have been undertaking joint surveys and excavations in an attempt to locate the Viking settlement of Wiskiauten. In addition, A.N. Khokhlov is leading a team undertaking large, urban excavations within the city of Kaliningrad (formerly Königsberg), some of the first investigations to be carried out in the city since WWII. These projects are part of a wider initiative for a collaborative study of what was formerly East Prussia, supported by Polish, German, and Lithuanian organizations.

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- ▶ Burial Archaeology and the Soviet Era
- ▶ Klejn, Leo
- ▶ Russia: Management of Archaeological Heritage

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Medieval Urbanism

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Introduction

The Middle Ages in Europe was a key period in the continent's urbanization. The proliferation of urban life, especially from 1000 CE to 1300 CE, shaped the European landscape, physically, economically, and demographically, as population levels increased and a growing commercialization affected all aspects of culture and society. The creation of towns occurred simultaneously with the expansion of older-established urban centers to forge a new map of urban Europe by 1300. At the same time, the fortunes of some towns and cities grew, while others waned, and some disappeared altogether or became villages rather than places with urban functions. The explanations given for these changes in urban fortune range from the following: (1) the importance played by long-distance trade, encompassing both maritime networks and land routes; (2) the role played by aristocratic elites through tenancy and dynastic practices, involving both secular and ecclesiastical lords; and (3) the European-wide expansion and colonization of lands through cultivation and settlement, particularly in areas that were previously marginally occupied, such as uplands, woodlands, and marshlands.

Definition

"Medieval urbanism" is usually defined *functionally* based upon the presence of certain urban characteristics, such as settlements having a greater population size and density, a high proportion of economic activities based on consumption and production, and high levels of administrative status and provision. A further definition concerns *urban form*, for urban landscapes are characteristically more nucleated and physically dense than rural settlements, though where the boundary is drawn between "urban" and "rural" settlement hierarchies is largely dependent on locality, on geography, and on temporal context. An urban place in medieval Europe is more likely also to be distinguishable in terms of its *material culture*, in having a greater variety of imported or exotic ceramics and textiles, for example, while higher levels of consumption of towns and cities are evident in the abundant animal and plant remains usually found in medieval urban archaeological contexts.

Key Issues/Current Debates/Future Directions/Examples

Scholars have long studied medieval towns and cities in Europe, particularly in the field of urban and constitutional history, as well as historical and urban geography. The contribution of archaeology to understanding urban life in the Middle Ages began in earnest after the Second World War, particularly through the redevelopment of war-damaged historic cities. As a result of archaeological study, the documentary-based histories of medieval urbanism have been challenged and in some cases rewritten, for what material culture has shown is a much higher degree of urbanization in Europe in the post-Roman period (400–600 CE) than some historians had previously imagined (see Hodges 1982; Verhulst 1999). Rather than urbanism dying out in the "Dark Ages" in northern Europe, evidence for new trading places occupying coastal and riverine locations has shown not only that there were settlements that have characteristics expected of towns but that these places were linked, through long-distance trade, to urban centers in southern Europe, especially around the Mediterranean. By no means were these new places always defended with palisades or walls, though many urban defenses remained in place around the former Roman towns and cities.

After the fall of the Roman Empire, urban life continued in southern Europe, as evidenced by the continuity in urban form and fabric seen in some Italian cities (Ward Perkins 1988). While a break in urban occupation can be detected archaeologically in some former Roman urban centers in northern Europe, in other cases the evidence instead reveals urban development occurring on new sites, sometimes in locations situated close to former Roman cities, as in the case of Hamwic in southern England (Ottaway 1992). Continuity in urban life across Europe after 400 CE was thus differentiated geographically across the continent, but it would be wrong to see northern Europe being "un-urban" at this time, for the period of 400–600 CE was no "Dark Age" as some past historians have suggested, but rather a period of transformation, a shift from one "urban world" to another. Urbanization also continued to occur both in the eastern part of the Empire, in what became the Byzantine Empire centered on Constantinople (present-day Istanbul), and in the former western parts, in sub-Roman Europe in Visigothic Spain and Lombardic Italy, for example.

As well as continuities in urban life in the early Middle Ages, there were of course changes, too, as the map of post-Roman urban Europe reflected shifting geopolitics and economic geographies. By 1000 CE the most important urban centers were invariably those with significant religious and ecclesiastical roles, such as the seats of bishops or archbishops, for example, York (England) and Tours (France), as well as those acting as centers of royal or imperial authority, such as seats of kings and emperors, for example, Prague (Czechia) and Aachen (Germany) (Nicholas 2003). The administrative functions of certain cities thus placed them at the center of networks of power, exercising command over large territories and so further serving the interests of those elites who ruled. It was also in this period of the Middle Ages, particularly from the 1100s onward, that Europe saw the most active phase of urbanization, as many new towns were established by aristocratic elites on their rural estates, and urban authorities sought to extend the built-up areas of already existing towns and cities (Lilley 2002). It was this period, in particular, that created the pattern of medieval towns and cities that survives in Europe today, an inherited urban network of huge cultural significance.

By the time of the Black Death in Europe, 1347–1351, the continent had attained its maximum extent and intensity of medieval urbanization. However, although the plague had a significant demographic impact across the continent – in the countryside as well as in the towns – contrary to popular belief, the plague did not completely kill off many towns, but rather initiated another period of urban transformation (Platt 1996). Indeed, with labor demands in the countryside diminished – especially in arable regions – rural-urban migration increased in the

fourteenth century, and so the population of towns and cities was swelled by new arrivals, economic migrants, sometimes leading to anxiety among established urban elites (Dyer 2002). Urbanism in medieval Europe across 1,500 years is thus characterized by a complex pattern of continuity *and* change, but whether subjected to major political shifts, as with the fall of the Roman Empire, or demographic crises, as with the Black Death, urbanism in Europe was remarkably resilient throughout the Middle Ages (Ottaway 1992).

The general geographical and historical trends in European medieval urbanism have been fairly well established over recent decades, though one issue that continues to see less than adequate treatment is how medieval towns did grow. In part the reason this fundamental question is difficult to answer is because both documentary and archaeological records usually reveal rather little about who was involved in the creation and development of medieval towns and cities. Written sources from the period tend to reflect the roles and interests of social elites, such as bishops and kings, whose charters granting certain urban privileges have survived and are usually regarded by historians as primary evidence for the activities of certain key authorities in creating towns and in fostering urban development. Yet recent research has shown that the granting of a charter to a town often came quite late in its history, for archaeological traces of urban life can be detected long before a particular place became regarded, constitutionally, as a "borough," an enfranchised town.

One way of writing histories and archaeologies of medieval towns and cities is to study their form, their morphology. This involves looking at the characteristics of street layouts and lot patterns, using large-scale modern maps and plans of medieval towns and cities. Although very few medieval maps of towns survive, modern map-making techniques, when combined with archaeological and documentary study, can be used to map out phases of urbanization that had occurred during the Middle Ages. This is because each phase of urban development is identifiable through particular morphological characteristics, each distinctive in its shape and form and made visible by mapping. Such mapping reveals patterns of physical formation, as towns were extended and expanded over the centuries, during the High Middle Ages especially. The variety of these medieval urban forms is immense and is not readily divided into particular morphological groups or categories. Indeed, the morphological evidence does not support at all the idea that there were "planned" towns with "regular" forms and "organic" towns with "irregular" forms. Instead, all medieval towns and cities had "composite forms," made up of distinct areas of streets and lots, so that towns such as Coventry (England) – long considered by some to reflect "organic" growth – can be seen to have plans that reflect phases of "planned development" (Lilley 2002) (Fig. 1).

The subject of medieval town planning has tended to focus on the founding of "new towns" or emphasizes the presence of "regularities" in urban form, such as geometrical patterns in a town's streets and street blocks (Schofield & Vince 2003). Planning, however, took many different forms, and even those examples considered to be "new towns," such as Ludlow (England), were not created in one single "planned" episode but rather were developed over longer time periods, resulting in a "composite plan" (like Coventry) (Lilley 2002) (Fig. 2). The subject of "planning" is critical in understanding how medieval towns grew – for it concerns who did what and how. In fact, there were a number of agents involved in shaping urban landscapes in the Middle Ages, from the landed aristocracies and civic elites on whose lands urban development took place to particular specialized individuals, such as surveyors and administrators, who had the necessary expertise to lay out new streets and lots for townspeople, while of course the occupants of towns and cities themselves also shaped urban landscapes, through the buildings they made and the property transactions they conducted. As a process, then, urbanization demands consideration of the roles played by urban agents and the agency that individuals and groups had in shaping the urban worlds around them.

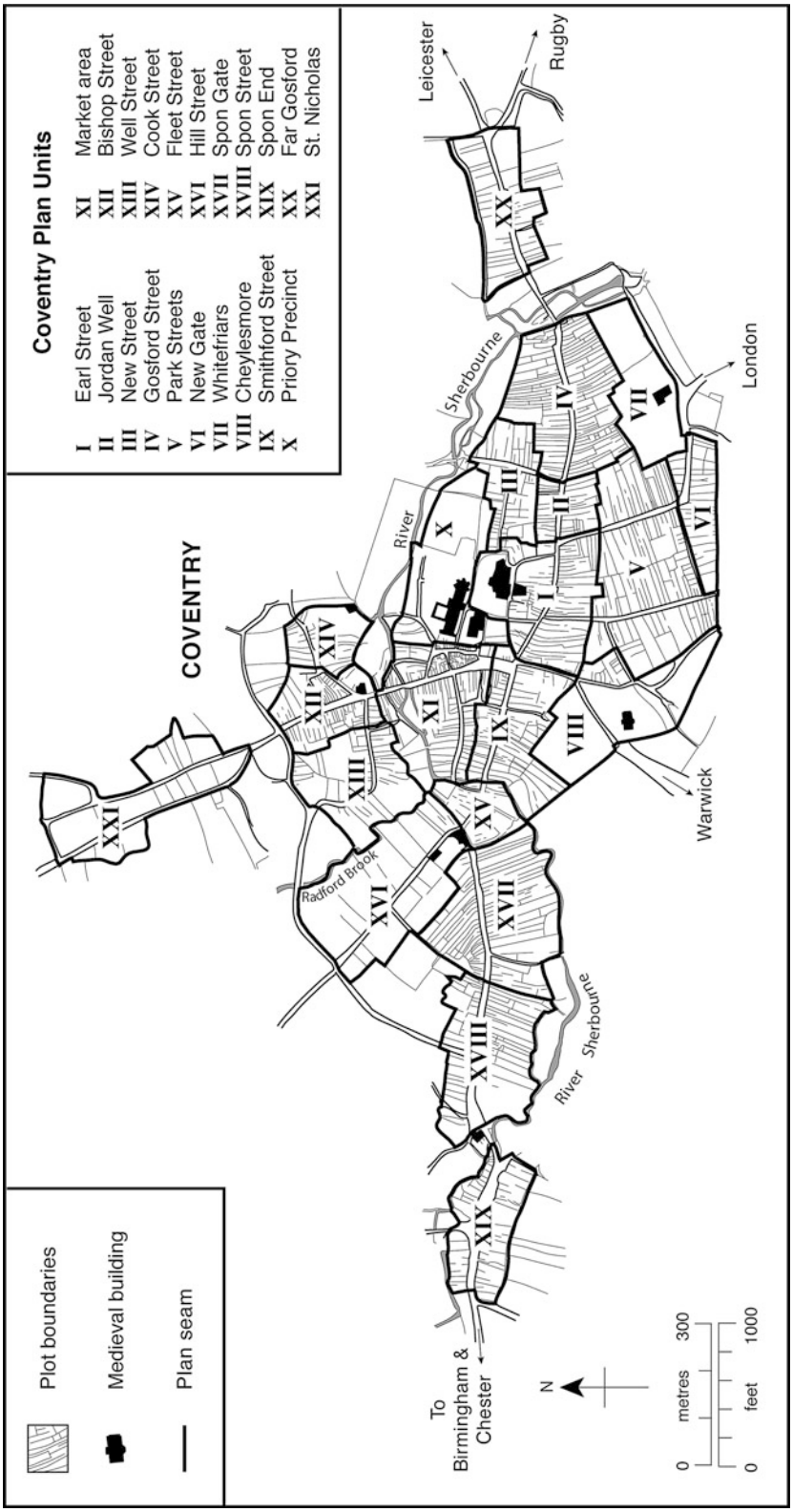

Medieval Urbanism, Fig. 1 The pattern of urban development of medieval Coventry (England) as mapped by Lilley (2002)

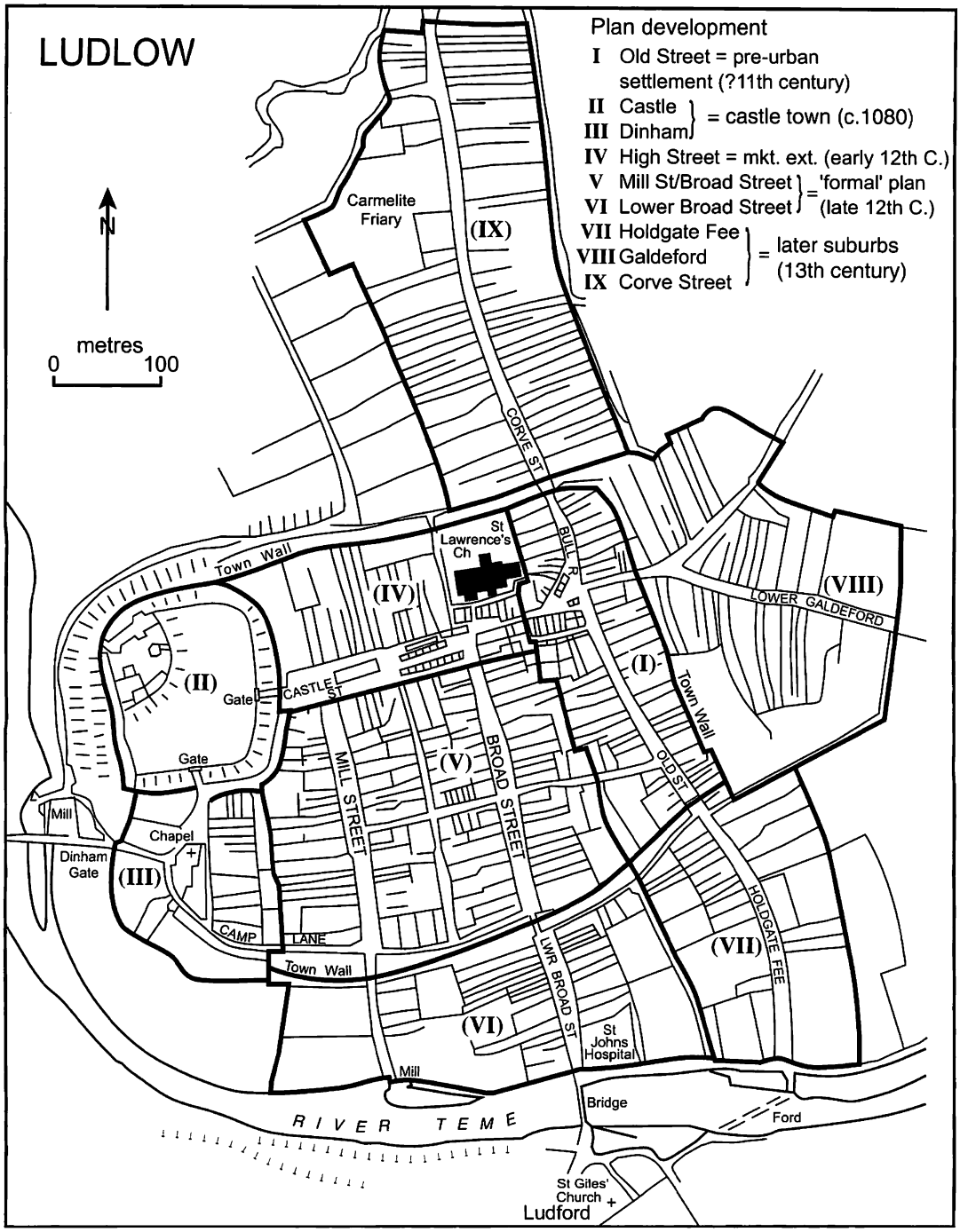

Medieval Urbanism, Fig. 2 The pattern of urban development of medieval Ludlow (England) as mapped by Lilley (2002)

Shaped by a myriad of agents, the resulting urban landscapes were of course ultimately a home to many. How distinguishable one locality in a town or city was compared to another is something that has increasingly interested urban archaeologists and historians, with some describing such differences in terms of the built environment and building types, others focusing more on trades and occupations, or ethnic and cultural identities, as distinguishable traits, while yet others point to different sonic and sensory landscapes. Of course, in the Middle Ages, as now, all of these factors contributed to a *sense of place* in an urban landscape, with some parts of a town seemingly more attractive and appealing to live and work in, while others were deemed more difficult and dangerous (see Goodson et al. 2010). Urban places thus had identities, while the places that townspeople occupied affected how they themselves were seen and perceived by others (Lilley 2002). Particular urban areas acquired reputations from the activities performed in them as well as being reinforced by the social and cultural identities of those who frequented or inhabited them. Areas situated close to trading places, such as quaysides and markets, were often locations where particular "deviant" practices occurred, such as prostitution. Such liminal spaces were places of transitory people – merchants, traders, and sailors – and invariably "edgy." Although attempts were made by urban authorities to expel – or marginalize – such activities, they nevertheless continued.

Cultural identities were thus forged through urban landscapes, of *being* in particular places. For most medieval towns and cities, distinct "neighborhoods" are difficult to define however, either archaeologically or historically. Urban spaces were fluid and the occupants of towns and cities likewise constantly shifting, adding to the *frisson* that characterizes urban life. There were urban communities, of course, fostered through guild associations for crafts or religious institutions, for example, but these were not localized socially except through particular structures such as guildhalls. Nevertheless, certain areas of medieval towns and cities were associated with particular kinds of economic or administrative activity, such as sites of trading, production, or ceremonial practices. Within these areas a multitude of activities would still take place, and housing would be a mixture of dwellings for rich and poor (Beattie et al. 2003). A complex pattern of households existed so even within one individual building different rooms might be lent to journeymen as well as families. The buildings of a medieval "tenement" would generally occupy the street frontage, consisting of workshops and shops at ground level, with rooms for living in both above and behind (Schofield & Vince 2003). To suggest there were rich and poor neighborhoods in medieval towns is therefore an oversimplification. Instead, a sense of locality and community was formed through neighborhood ties and identities defined and mediated through rituals and ceremonies, worship in parish churches serving particular urban areas, for example, and annual activities such as feast days and processions (Hanawalt & Reyerson 1994; Boone & Stable 2000).

Understanding the social and cultural dimensions of medieval urban life, "community," and "neighborhood" relations, for example, has gained much from recent cross-disciplinary studies of medieval towns and cities, combining different approaches. The blurring of boundaries (often drawn by past historians such as Henri Pirenne and Edith Ennen) between medieval urban and rural communities has similarly benefitted from multidisciplinary studies, for it has become clear, increasingly, that town and countryside in the Middle Ages were intimately connected (Giles & Dyer 2005). Indeed, one of the recent trends of exploring medieval urbanism is to think about towns and cities *spatially*, not only in terms of their geographical locations and interconnections through networks but more subtly through the close interrelationships between people and places (Classen 2009). For instance, the places of the urban poor, Jews, and women in medieval towns and cities have all been thoughtfully examined by archaeologists, historians, and geographers through evaluating various kinds of textual, artistic, and material evidence and

revealing the multifaceted and multidimensional qualities of urban life in the Middle Ages (Goodson et al. 2010).

The recent "spatial turn" influencing humanities and social science research and broader intellectual currents such as post-colonialism and gender studies (Wallace 2004) have helped enrich a more empathetic and nuanced appreciation of medieval urbanism. Yet despite the current critical reevaluation of medieval urban life, through adopting new approaches and ideas, the medieval town and city are all too often still considered in isolation. In isolation, that is, from other times and places, in relation to a broader comparative context and a larger history of globalism, of Western, European encounter and expansion. Medieval Europe did not function in a vacuum and neither did its towns and cities (Platt 1979). Instead, its people and its urban centers were part of a wider world of networks and flows, of mobile bodies, ideas, artifacts, commodities, and cultures (see Lev 2002). There exists much scope therefore to look again at the material culture of medieval urbanism, and explore its global as well as local contexts, and establish what this might mean for global histories and archaeologies. The port city of Bristol, for example, in the late fifteenth century, was a key focal point of networks that stretched not only across and around the Mediterranean and Atlantic seaboard of Europe but crossing the Atlantic too, to Iceland and North America (Quinn 1974). Similarly, Portuguese towns and cities of the later Middle Ages functioned as part of an international maritime network that connected Europe with Africa and Asia and potentially even Australasia (Abulafia 2008).

One of the future challenges in the study of medieval urbanism, then, is not only to analyze what was happening within European towns and cities during the Middle Ages but also to look beyond Europe too, to the wider world. In so doing, exploring comparisons and connections between medieval towns and cities at a global scale, there is scope to rethink medieval urbanism and assure its continued place in global archaeology.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ British Isles: Medieval Archaeology
- ▶ Buildings Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Fortifications, Archaeology of
- ▶ France: Medieval Archaeology
- ▶ Global Archaeology
- ▶ Italy: Medieval Archaeology
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- ▶ Medieval Archaeology
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Mediterranean Sea: Maritime Archaeology

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Introduction

The history and development of Maritime Archaeology as a scientific discipline is closely related to the Mediterranean Sea, which has been a witness to some of the oldest civilizations in the world. Along its shores flourishes the Ancient Egyptian, the Phoenician, the Greek, the Roman, the Byzantine, and the Islamic civilizations (Norwich 2007; Scarre & Fagan 2008). Accordingly, throughout the ages, maritime activities played a major role in the rise, development, and decline of such civilizations and societies. On the other hand, their maritime activities have left an array of material cultural evidence, which mainly takes the form of shipwrecks, harbors, and other waterfront installations.

Since the beginning of the twentieth century, the discovery of submerged archaeological sites in the Mediterranean triggered studies in maritime and underwater archaeology in different regions and countries, subsequently, the field of maritime archaeology in the Mediterranean witnessed substantial development on different levels including research, education, preservation, and public presentation.

Definition

It is quite essential, at first, to define Maritime Archaeology, which is the subdiscipline of archaeology concerned with the study of maritime cultural heritage. It mainly includes the study of different types of watercrafts, as well as the study of coastal installations, whether these were found on land or underwater. Maritime Archaeology is not the same as underwater archaeology, which describes the study of the past through any submerged remains (Muckelroy 1978: 3-10). In other words, there are maritime archaeological sites which are not located underwater, such as ship burials, and there are submerged remains which are not of a maritime nature, such as jettisoned cargoes. However, it is evident that shipwrecks are the most common type of maritime archaeological sites; therefore, the development of maritime archaeology in the Mediterranean is often associated with the investigation and study of shipwrecks. On the other hand, maritime archaeology contributed significantly to the development of different studies such as ancient ship construction, ancient seafaring, and harbor archaeology. This entry will be looking at the development of maritime archaeological investigation which has been carried out along the shores and under the waters of the Mediterranean Sea.

Historical Background

Maritime Archaeology in the Mediterranean has gone through different phases of development which started as simple salvage operations and the recovery of submerged objects for their artistic, cultural, or monetary values. Sponge divers,

in particular, have often encountered many ancient shipwrecks, and in most cases mounds of amphora and pieces of wood were of little or no interest to the sponge seekers. However, in 1900, sponge divers discovered near the Greek island of Antikythera the remains of an early first-century BC shipwreck at a depth of 55 m. The ship was carrying bronze and marble works of art, in addition to several pottery and glass items. The discovery of the shipwreck caught the attention of the Greek authorities who decided to salvage the ship's cargo for its artistic and historical value. The project was directed by the Greek antiquities authorities; however, the underwater work was exclusively carried out by helmet sponge divers (Throckmorton 1991: 16-20).

Another significant step in the development of maritime archaeology in the Mediterranean was the excavation of the Lake Nemi vessels in Italy. Since the fifteenth century, there have been several attempts to salvage the two large Early Roman vessels, submerged in Lake Nemi south of Rome. However, between 1928 and 1931, on the orders of the Italian dictator Benito Mussolini, the lake was drained using powerful pumps to expose the two immense and lavishly decorated vessels from the time of the Roman emperor Caligula. Nonetheless, the motive behind the project was political and nationalistic rather than archaeological (Blot 1996: 38-41).

The development of the Self-Contained Underwater Breathing Apparatus (SCUBA) in 1946 by Emile Gagnan and Jacques-Yves Cousteau (Joiner 2001: 1.3 – 1.4) represented a breakthrough in underwater exploration, which was reflected on the development of underwater archaeology. Between 1952 and 1957 Cousteau and his team of divers excavated a Roman shipwreck site at the foot of the rocky island of Grand Congloué, off Marseille. During the project numerous equipment and techniques were experimented and developed for underwater excavation; such techniques are now considered standard in many underwater archaeological projects. However, the Grand Congloué excavation witnessed some serious methodological problems, due to the limited involvement of archaeologists in the project, which resulted, at that time, in the misinterpretation of the site (Sibella 1997: 174-5). Another significant stage in the development of Maritime Archaeology in the Mediterranean was the excavation of the Albenga Roman shipwreck by the Italian archaeologist Nino Lamboglia, between 1961 and 1971. In addition to its archaeological importance as one of the largest Roman shipwrecks found in the Mediterranean, the Albenga shipwreck excavation was directed by an archaeologist, and a number of archaeologists contributed to the study of the excavated material. However, Lamboglia did not think that archaeologists should dive, so none of the archaeologists involved in the project dived on the site. Rather, they remained on surface, managing the excavation remotely and interviewing the divers who collected the artifacts to try to establish their provenance (Carlson 2011: 382).

Perhaps a key turning point in the history of Maritime Archaeology in the Mediterranean took place in the 1960s. It was during that decade that the first scientific underwater excavations took place, and publications about the theory and practice of underwater archaeology started to appear (Dumas 1962; Frost 1963; Taylor 1965; Bass 1966; Throckmorton 1969).

In the 1960s, the excavation of the Late Bronze Age shipwreck off southern Turkey's Cape Gelidonya was the first underwater archaeological project to be carried out according to archaeological scientific standards. The site was originally discovered by Turkish sponge divers. However, it was excavated by a team of sport divers and amateur archaeologists led by the pioneer maritime archaeologist George Bass. The Cape Gelidonya shipwreck was the first one to be excavated entirely underwater and it proved that underwater archaeological sites could be excavated and studied as rigorously as terrestrial sites and according to the same archaeological standards (Bass 2005: 48-55). In the following years, Bass published his first book, which discussed several theoretical, methodological, and practical aspects of conducting archaeological work underwater (Bass 1966). In addition to

the study of ancient shipwrecks, the study of harbors and submerged landscapes also started developing in the 1960s and 1970s (Flemming 1971). The work that Honor Frost did was probably the first in that respect in the Mediterranean. She was a pioneer female underwater archaeologist who had worked with Bass on the Cape Gelidonya shipwreck. She had a special interest in the study of anchors and harbors in the Eastern Mediterranean and had worked extensively in the Levantine coast. Her 1963 book was the first to discuss different aspects of harbor and port archaeology in that region (Frost 1963).

Perhaps, one of the most important publications which represented international recognition for the new field of underwater archaeology was *Underwater Archaeology: A Nascent Discipline* (UNESCO 1972). Not only it contained contributions from a number of archaeologists presenting different maritime and underwater sites, but also it discussed an array of archaeological, methodological, and technical aspects of maritime and underwater archaeology.

The foundation of the Institute of Nautical Archaeology (INA) in 1973 by George Bass and a number of his colleagues was a major step in maritime archaeological research in the Mediterranean. Since then, the INA has carried out numerous surveys and excavations in different Mediterranean countries. It also has contributed to training many archaeologists from those countries in aspects of underwater archaeology. The INA also contributed to the creation of one of the earliest museums of underwater archaeology, the Bodrum Museum of Underwater Archaeology in Turkey.

Few years following the UNESCO 1972 publication, one of the most important volumes on maritime archaeology was published (Muckelroy 1978). In addition to discussing different types of sites and the special qualities of underwater archaeology, the book presented, for the first time, a theoretical framework for the formation of underwater archaeological sites. Muckelroy's contribution has been the basis upon which numerous further studies and discussions were based. His volume is still considered a turning point in the development of maritime archaeology.

Key Issues/Current Debates

For the past 50 years, hundreds of sites were discovered and numerous surveys and excavations were carried out for different types of maritime and underwater archaeology sites all over the Mediterranean (Parker 1992). Accordingly, the field of maritime archaeology witnessed substantial development, particularly from a methodological and technological perspective (Green 2004). Advanced technology used for underwater archaeological investigation, such as underwater acoustics, and underwater imagery techniques became widespread and readily available for researchers and institutions working in underwater archaeology. Moreover, during the past two decades the investigation and study of underwater archaeological sites in deep water using remote sensing techniques became quite common in several northern Mediterranean regions (Ballard et al. 2000; Wachsmann 2011). Despite its high cost, these projects proved the possibility of exploring underwater sites beyond diving limits, using nonintrusive methods, especially since the sites located in deep waters are often in a good preservation condition.

However, the large number of underwater archaeological excavations which took place in the Mediterranean during the past five decades yielded thousands of artifacts of different types, materials, and dates, which required extensive resources for conservation, storage, and display. Therefore, maritime museums and museums for underwater archaeology have been established in a number of Mediterranean countries, mainly to display material culture which has been excavated from underwater. It is worth mentioning, however, that there is a complete absence of maritime museums in most southern and eastern Mediterranean countries, which has negatively affected public awareness of maritime and underwater archaeology in that region.

Despite the existence of specialized conservation facilities and maritime museums in several Mediterranean countries, it became evident that underwater archaeology is significantly costly and time-consuming, not only for the excavation phase but also mainly for the

conservation and management of the excavated material (Robinson 1998: 11).

Shipwreck excavations in the Mediterranean often come across submerged cargoes that include tens, hundreds, hundreds, and sometimes thousands of amphorae. Raising them and hence providing storage often represents a serious challenge for the museums. On the other hand, the conservation of organic material such as ship timbers could take many years to be accomplished, which requires considerable financial and material resources.

Therefore, during the past decade, there has been an evident change of concepts in underwater archaeology, from excavations and retrieving of artifacts to the management and in situ preservation of submerged archaeological sites. It was realized that excavations are not always the best ways for dealing with underwater archaeological sites and that there are other options which are more preferable in many cases. The UNESCO (2001) Convention on the Protection of the Underwater Cultural Heritage asserts that "the in situ preservation of underwater cultural heritage shall be considered as the first option before allowing or engaging in any activities directed at this heritage." Therefore, there has been an international trend towards the preservation of underwater archaeological sites where they are found and more focus in being put on underwater surveys and mapping of sites rather than full excavations. Accordingly, several northern Mediterranean countries are conducting large-scale surveys and mapping projects of their coasts in order to assess their maritime archaeological resources and develop methods for protecting and preserving them. On the other hand, different methods and techniques for the in situ preservation of underwater sites have been developed and tested in Mediterranean countries (Zmaić 2009). However, in situ preservation of underwater archaeological sites raised another issue concerning the presentation of those sites to the public. How can the sites be protected in situ and yet be available for public enjoyment and education? The options were either to bring the visitors physically to underwater sites or to bring these sites virtually to the visitors. The first option is represented by underwater archaeological parks and cultural dive trails which have been developed in some Mediterranean countries such as in Italy, Croatia, Greece, Turkey, and Israel. This mainly targets the diving community which forms the majority of the visiting public to these types of sites. On the other hand, the great development in information technology and digital imaging has enabled transmitting information about the underwater archaeological sites to the wide public through virtual reality images, 3D projections, and holographic displays; all can be utilized in museums to bring the underwater sites to the public (Manders 2008: 35-39).

Another aspect of maritime archaeology which has witnessed a significant development in the past years in Mediterranean countries is education and training. A number of Mediterranean countries have introduced studies in different aspects of maritime and underwater archaeology into their university curricula (UNESCO 2010). Also several countries, such as Turkey, Egypt, Croatia, Malta, and Spain, in collaboration with the UNESCO, have organized workshops and training programs in underwater archaeology and the conservation of underwater finds. This has significantly contributed to building capacity in that field.

Finally, in most Mediterranean countries, there are currently dedicated units within the national archaeology authorities specialized in underwater cultural heritage. Such units are normally responsible not only for conducting underwater archaeological projects within their respective countries, but also for overseeing and organizing work done by other archaeological missions or groups working within the countries' territorial waters.

International Perspectives

The development of maritime and underwater archaeology in Egypt has not differed significantly from other Mediterranean regions (Khalil & Mostafa 2002). However, one of the earlier discoveries in that field took place in the desert rather than underwater. In 1894, at least five boats

from the Middle Egyptian Kingdom were found at Dashur south of Cairo (Haldane 2000: 83-102). The discovery of the Dashur boats could be considered the beginning of maritime archaeology in Egypt. It was followed by the discovery of several other boat and ship burials such as the Old Kingdom royal ships of Khufu in 1954 and the Early Dynastic boats of Abydos in 1991 (Haldane 2000: 39-43, 45-60).

Nevertheless, underwater archaeology in Egypt can be generally divided into two phases. The first phase started at the beginning of the twentieth century with the efforts of sport divers and amateur archaeologists, and it is mainly characterized by accidental discovery of underwater archaeological sites in the Alexandria region and hence the subsequent salvage operations which were carried out at those sites. The most important discoveries of that period were the pre-Hellenistic harbor of Pharos in 1912 and the submerged remains of the ancient lighthouse of Alexandria in the 1960s (Morcos 2000). The second phase of underwater archaeological research in Egypt started in the mid-1990s with two significant projects: the excavation of the submerged remains of the ancient Pharos lighthouse of Alexandria (La Riche 1996) and the excavation of submerged Ptolemaic royal quarters at the Eastern Harbor of Alexandria (Goddio et al. 1998). In addition to the archaeological value and significance of those two projects, they have shed light on the potentials of underwater archaeology in Egypt and opened the door to many projects that took place in the Alexandria region. However, it is worth mentioning that all the underwater archaeological research that took place in Alexandria has been concerned with submerged structures and landscape rather than shipwrecks. Nonetheless, a major drawback in underwater archaeology in the Egyptian Mediterranean waters is that it almost entirely focused on Alexandria, with very limited projects conducted elsewhere. Moreover, the Egyptian contribution to such projects was quite limited as the work was mainly carried out by foreign teams, yet the projects provided a great opportunity for training young Egyptian archaeologists on different aspects of underwater archaeology, which led to the establishment of the Department for Underwater Archaeology (DUA) in 1996 as part of the Egyptian Supreme Council of Antiquities (SCA), the authority responsible for overseeing all archaeological work in Egypt. The establishment of the DUA was a governmental recognition of the significance of underwater archaeological research in Egypt.

In addition to the archaeological projects that took place under Egyptian waters, a number of other important maritime sites were discovered and studied along the shores of Lake Mareotis west of Alexandria. This included some of the most significant lake harbors and lacustrine waterfront structures in the Mediterranean (Blue 2010; Blue & Khalil 2011).

Nonetheless, a major problem in maritime archaeology in Egypt is related to its public presentation and appreciation. Despite its long and significant history, and the number of maritime archaeological sites that have been investigated, Egypt does not have a maritime museum, and the public presentation of maritime and underwater archaeology is insignificant, which has several shortcomings related to public awareness and knowledge of the Egyptian maritime cultural heritage. Nevertheless, Egypt has excelled in specialized education in Maritime Archaeology with the establishment of the Alexandria Centre for Maritime Archaeology and Underwater Cultural Heritage in 2009 as the first academic center in the Southern Mediterranean concerned with providing education and training at different levels in aspects of that field. The center targets students from Egypt, the Mediterranean, and the Arab Region; therefore, the education and training that the center provides would contribute to the development of maritime and underwater archaeology by creating generations of educated and trained maritime archaeologists.

Future Directions

It is evident that maritime and underwater archaeology in the Mediterranean has gone through different stages of conceptual, methodological,

and technical development since the 1960s. Turning away from complete excavations of specific sites to surveying and mapping of large areas have been a distinctive feature of numerous projects that took place during the past decade. However, it is expected that the future will be characterized by multinational projects that are carried out between several countries and which emphasize on specific aspects related to maritime archaeology such as preservation, capacity building, and cultural tourism. Some EU-funded projects, which have already been initiated, were associated with underwater archaeology, such as the Project on Integrated Maritime Policy for the Mediterranean (IMP-MED), which is part of the European Neighbourhood and Partnership Instrument (ENPI), and also the EU (Tempus) Program, which funded the creation of the Alexandria Centre for Maritime Archaeology and Underwater Cultural Heritage in Egypt. On the other hand, the UNESCO secretariat of the Convention on the Protection of Underwater Cultural Heritage has been very active in collaborating with different Mediterranean countries, especially in disseminating the ideas and principles of preservation and public education. During the coming years, the EU will hopefully play an even greater role in funding projects related to site management, education, and training in maritime archaeology in the Mediterranean region. On the other hand, it is expected that more research projects will be carried out in deep and international waters. These are getting more and more accessible with the advances in remote sensing technology, particularly the use of the Autonomous Underwater Vehicles (AUV). Furthermore, in countries where maritime archaeology is still a nascent discipline, such as most Mediterranean Arab Countries, it is anticipated that such countries will put more emphases on the exploration and hence the preservation and public presentation of their cultural heritage. Also regional collaboration in education and training of maritime archaeologists has started and is expected to develop further in the future especially between countries witnessing recent political changes.

Cross-References

- ▶ Experimental Maritime Archaeology
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Port of Alexandria: Underwater Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime
- ▶ Underwater Sites in Archaeological Conservation and Preservation

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Meehan, Betty

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Basic Biographical Information

Betty Francis Meehan was born in Bourke, New South Wales, Australia, in 1933 and grew up there, the elder daughter of Francis Owen and Olive Jane Meehan. After completing high school in Bourke, she trained as a specialist infants teacher at Bathurst Teachers College and later taught in Sydney, Bourke, Darwin, and Canberra. In 1958, she travelled to Arnhem Land in northern Australia, accompanying her first husband, the late Lester Richard Hiatt, on fieldwork for his anthropology Ph.D. There she set up the first school for Aboriginal children at Maningrida. She went on to study at the University of Sydney and gained a Bachelor of Arts (Hons) and Master of Arts (Hons) in anthropology. In 1972, she enrolled in a Ph.D. in the Department of Prehistory and Anthropology at the Australian National University (ANU) in Canberra and returned to Arnhem Land for her fieldwork with her second husband, collaborator, and colleague, the late Rhys Maengwyn Jones. She graduated in 1975 (Fig. 1).

Betty's Ph.D. thesis became the basis for her iconic book *Shell Bed to Shell Midden* (Meehan 1982) for which she became internationally

Meehan, Betty, Fig. 1 Betty Meehan collecting shellfish (*Marcia hiantina*) from shell beds off the beach near the An-barra home base Lalarr Gu-jirrapa where she and her husband Rhys Jones lived for seven months in 1973. Photo taken by Rhys Jones, wet season, early 1973

famous. The book describes the role of shellfish and a year in the life of the An-barra people of the Blyth River and has influenced generations of scholars from ethno-archaeologists to gastronomists. The fieldwork on which this book is based was done with the enthusiastic collaboration of Betty and Rhys' An-barra family – Frank Gurrmanamana and Nancy Bandeiyama (both now deceased) and their extended family.

Betty joined the Department of Prehistory in the Research School of Pacific Studies at the Australian National University as a Research Fellow in 1977. She continued her ethno-archaeological investigations in Arnhem Land and worked as an anthropologist with Athol Chase on the Upper Daly Land Claim in the Northern Territory. In 1985, she joined the Division of Anthropology at the Australian Museum (AM) in Sydney where she carried out research on Aboriginal material culture in northeastern and central Arnhem Land and on the Daly River in the Northern Territory. This research was funded by the Australian Research Council, and detailed reports were lodged with that agency and the AM. From 1990 to 1991, she was Head of the Aboriginal Section in the Collections Management Division, National Museum of Australia in Canberra. In 1991, she joined the Australian Heritage Commission as Director of the Aboriginal and Torres Strait Islander Section where, as part of her responsibilities, she coordinated several National Indigenous Heritage Art Awards. After retirement, Betty has continued to work on her An-barra Archaeological Project in collaboration with Sally Brockwell of the ANU. A major monograph is planned for this research. Betty Ngurrabangurraba, daughter of Frank Gurrmanamana and Nancy Bandeiyama, is collaborating with Betty Meehan and Sally Brockwell in order to complete this work (e.g., Brockwell et al. 2005).

Major Accomplishments

Betty has been an inspirational influence in her dual professions of archaeologist and cultural anthropologist, as researcher, fieldworker, ethnographer, teacher, editor, collector, and curator. Her research has touched on many themes in Indigenous society: the role of women, diet and nutrition, art (including organizing numerous exhibitions), material culture, heritage studies, ecology, demography, and contemporary issues. She has published extensively on her research in Arnhem Land and elsewhere

(e.g., Hiatt 1967–1968; Meehan 1977; Meehan & Jones 1980; Meehan 1991; Hiatt et al. 2002; Meehan & Jones 2005). She is a life member of the Australian Archaeological Association for her outstanding contributions, a Fellow of the Australian Academy of Humanities, and a member of the Australian Institute of Aboriginal and Torres Strait Islander Studies.

Cross-References

► Ethnoarchaeology
► Jones, Rhys Maengwyn

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Megalithic Art: A Visual Repertoire for the Dead

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Introduction

By the mid-fifth millennium BCE, Neolithic communities along the Atlantic Seaboard of Europe began to witness the emergence of a pictographic language based on a common repertoire of abstract and figurative motifs. This distinct art form is arguably an extension of a much wider pan-European schematic art tradition which was mainly confined to communities involved in passage grave construction and use. The megalithic art tradition unified much of the Neolithic world along the coastal regions of the Mediterranean and the Atlantic coastal fringes of Europe, between the Iberian Peninsula and northern Scotland for a period of some 3,000 years. The art itself appears to have acted as a personal signature that was unique to each monument and its builders but drawing on a limited set of symbols that included chevrons, concentric circles, cupules, spirals, and zigzag lines. The majority of this repertoire was engraved, although there is clear evidence that many sites were also painted. Recognized along the Mediterranean and Atlantic coastal fringes are around eight core areas; of these, four are islands. Each area appears to have had its own unique and distinct artistic repertoire.

Definition

It is not entirely clear where and how megalithic art originated, although controversially it appears to form part of a much larger Schematic art tradition, itself having origins in the Late Mesolithic/Early Neolithic of central and western Mediterranean Europe (Fig. 1). Schematic art, forming part of a post-Paleolithic rock art tradition, is the term given to both engraved and

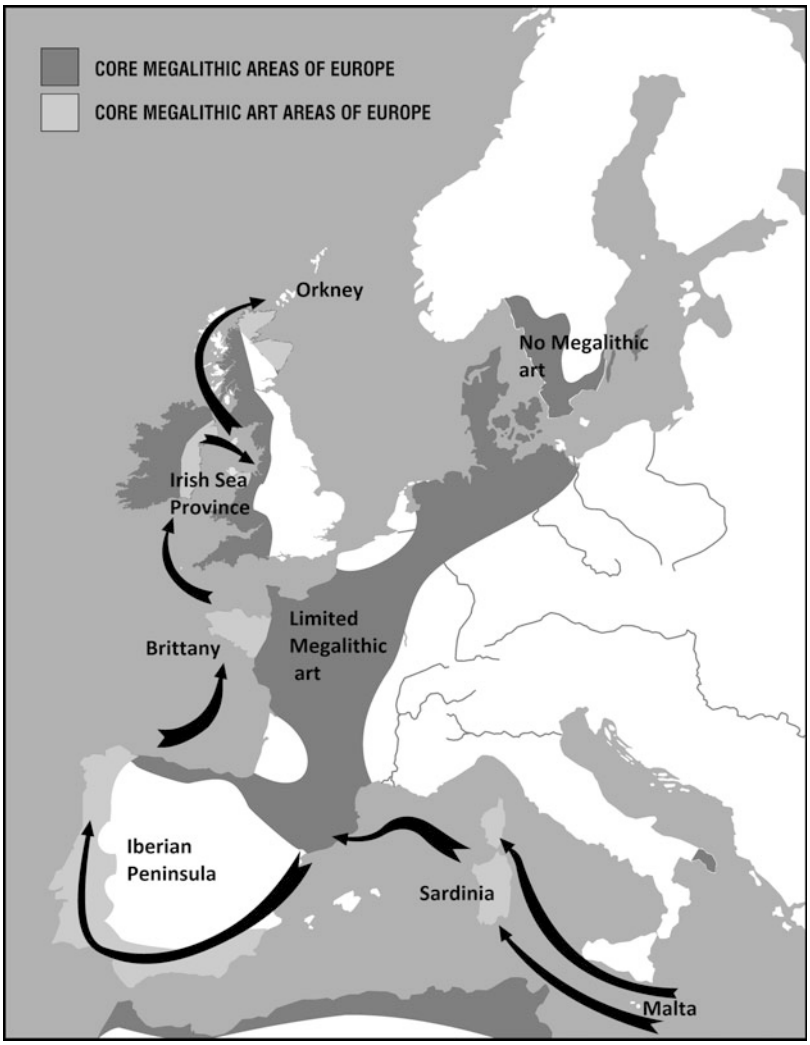

Megalithic Art: A Visual Repertoire for the Dead, Fig. 1 Map of Europe showing the likely chronological spread of megalithic art through the Neolithic world

painted rock art that dates between the fifth and first millennium BCE. Much of what is termed Schematic art is located within southern Europe, in particular, in cave and rockshelter sites of the Iberian Peninsula. Apart from what is present on the walls of rockshelters and caves, this artistic tradition also occurred as a portable assemblage, usually decoration on stone and ceramic items such as pendants and pottery vessels. The height of this significant tradition appears to coincide with Europe's first metallurgists, Copper Age [Chalcolithic] cultures, and extends into the Bronze Age and probably the Early Iron Age as well. Arguably, one of its derivatives is megalithic art which comprises mainly abstract carved and sometimes painted motifs, exclusively associated with Neolithic burial–ritual monuments. It is usually closely associated with the passage grave tradition and decorated pottery (e.g., grooved ware which is common at many sites within Atlantic Europe) which incorporates variations of motifs that are found in megalithic art, such as horizontal bands, chevrons, and lozenges.

In northwestern Europe, this artistic style has been extensively studied by Elizabeth Shee-Twohig (1981), as well as being the subject of a number of regional and individual site

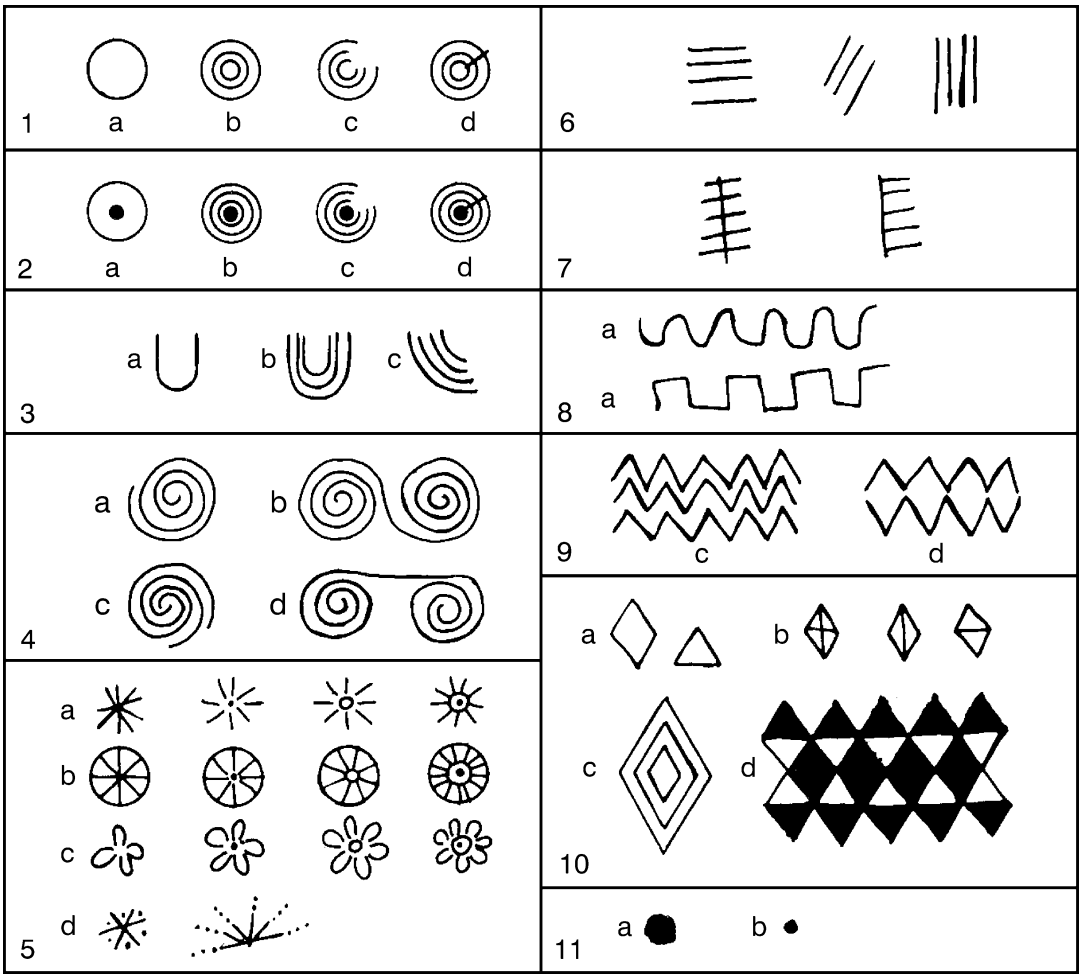

Megalithic Art: A Visual Repertoire for the Dead, Fig. 2 Shee-Twohig's motif classification (1981: 107, Fig. 11)

studies (O'Kelly 1982; Eogan 1986; O'Sullivan 1986; Lynch 1991; Nash et al. 2005; Nash 2010). Elsewhere, megalithic art has been confused with open-air rock art which occurs later in the prehistoric sequence and usually in uplands areas, away from the burial monuments that occupy the coastal fringes of the western Mediterranean and Atlantic Europe (Cunliffe 2001).

Rudimentary studies during the early to mid-twentieth century by the Abbé Henri Breuil and O. G. S. Crawford promoted the idea that the art represented various parts of the human body, in particular the face, which had morphed through time, from Breuil's "stylized mortal" to Crawford's "eye goddess." Not surprisingly, many influences had originated from studies on Upper Paleolithic art by Breuil and German researcher Hugo Obermaier. During this period Breuil considered that there was a direct link between megalithic art within the passage graves and open-air art, engraved onto rock outcropping. However, it is now considered that open-air rock art was being executed between 3000 and 1500 BCE, over a 1,000 years later than the engraving found in passage graves (Bradley et al. 2001: 496).

Elizabeth Shee-Twohig's (1981) seminal work identified a clear repertoire of motifs that include 11 generic forms, ranging from chevrons, lozenges, and cup-and-rings to zigzags and simple cupules (Fig. 2). In addition to this abstract

repertoire and depending on regionality, representative engravings are also present and include footprints, parts of, or complete stylistic anthropomorphic and zoomorphic representations with associated weaponry; however, these motifs may be later additions to an already well-established abstract tradition (Nash 2013). In southern Europe, one can postulate an association between megalithic art and statue stele (menhirs), where stylized anthropomorphic figures are pecked alongside multiple zoomorphic figures and weaponry onto hewn stone and boulders. Here, Bradley (2009: 93) has drawn a clear link between statue stele and burial–ritual monuments, which collectively form a ritualized landscape.

Ritualized landscapes can take many forms; their intensity could have been based on where burial monuments were sited and their relationship with other non-burial structures such standing stone (menhirs) and stone rows. There are a small number of passage graves where megalithic art is carved externally, either onto kerbstones or within the façade, for example, the three Boyne Valley passage grave complexes of Newgrange (Fig. 3), Knowth, and Dowth. Here, the art appears to act as a point of reference between space that is known and the foreboding of the long dark passage and the spaces beyond. These public expressions of ritualized rock art production are, however, few. The carved art is generally strategically placed within the inner passage and chamber areas where visual access would have been restricted to possible elites or religious actors within the community. With some monuments, the art faces into the mound or is carved onto the back wall of the antechamber where its intentional positioning appears to be reserved for the incoming dead and for the ancestors (e.g., the passage graves of D'Er Grah and Gavrinis, Brittany). The carvings within the inner passage and chamber may have represented physical markers whereby the art played a vital role in how the dead changed physically and metaphysically as they moved from one area of the monument to another. The position of such art would have also had an impact on those people allowed to accompany the dead to their resting place.

There are distinct differences in panel distribution, motif style, and association between various core areas; it would appear that certain symbols vary in significance according to where in the Neolithic world they appear, each dominant motif setting a trend. In Ireland, for example, two clear primary stylistic repertoires, including curvilinear and angular forms, are present in different monuments, such as the Late Neolithic Irish passage graves of Fourknocks I, Knowth, and nearby Newgrange, County Meath (O'Kelly 1982; Eogan 1986). Spirals are common in the western Mediterranean, Ireland, and western mainland Britain but less so in Brittany. Similarly, radial motifs frequently occur in Brittany but are somewhat rarer elsewhere in Atlantic Europe. These potent signatures, the majority of which are incorporated into the monument's architecture, probably served as a reminder to both the living and the dead of their ancestral past, thereby enhancing a sense of ancestral belonging, the art being clearly associated with death. It is interesting to note that megalithic art does not occur outside the visual draw of these monuments; the majority of motifs are hidden, usually within the inner passage or the chamber areas of the monument. Megalithic art placed on curbing around the mound structure at Newgrange, Knowth, and Dowth in the Boyne Valley and Loughcrew, County Meath, Ireland, may be interpreted as public symbols (O'Sullivan 1986, 1993). However, all three monuments stand within a defined ritual landscape – on a bow of the River Boyne – and the art could only have been viewed from a point within this ritual area, probably by chosen individuals or an elite. From the south bank of Boyne, onlookers would have seen the monument but not its secret art (Fig. 3).

The Interplay Between Art and Architecture

Certain features of passage grave architecture appear to influence the siting of megalithic art, especially within the internal space of the monument. Rarely are these symbols visible from the entrance or façade; they remain hidden within until access into the monument provides an intimate and discrete viewing. Such *restricted visual access* entails a number of architectural devices

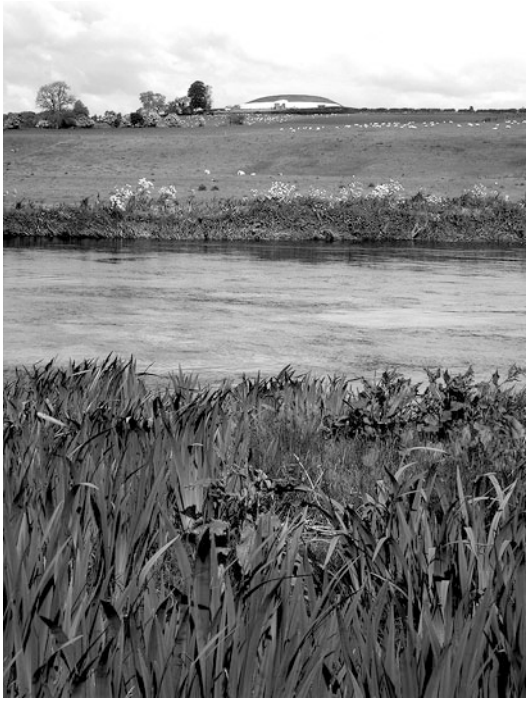

Megalithic Art: A Visual Repertoire for the Dead, Fig. 3 The epitome of being Neolithic – looking at Newgrange from south of the Boyne River

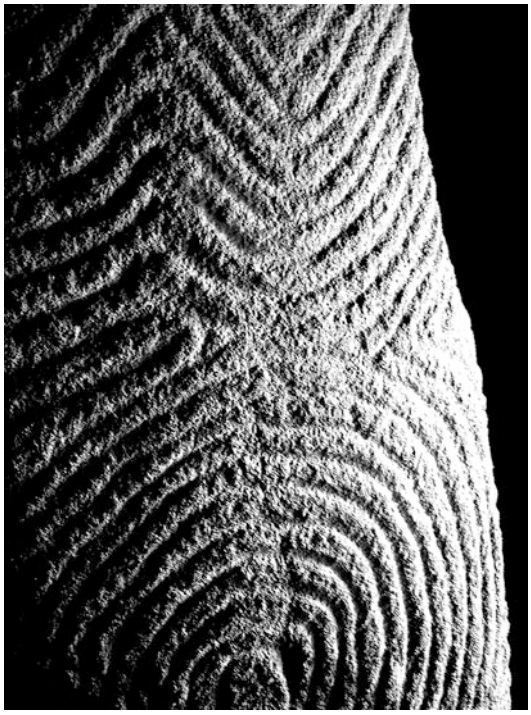

Megalithic Art: A Visual Repertoire for the Dead, Fig. 4 One of the highly decorated uprights within the passage of Gavrinis, Brittany

intended to heighten the secrecy surrounding the production and use of the engraved and painted art. Many passage graves, for example, possess door and sill stones positioned either side of the passage (e.g., Casa del Romeral, Malaga, Spain), and in some cases threshold stones are also used, arguably to define a point of separation between the world of the living and the realm of the dead. Deliberate kinks in the passage also served to restrict visual access and, in some cases, additionally controlled the amount of light penetrating the passage and illuminating the rear wall of the chamber at the summer equinox and winter solstice, undoubtedly significant annual events of immense symbolic importance.

During the early to mid-fourth millennium BCE, carving within burial monuments appears to have been taken up with vigor in Brittany. This tradition flourished for over a 1,000 years. Along with engraving, Neolithic communities appear to have been in creative competition with their neighbors, attested by the construction of large monumental structures that delineate entire landscapes rather than a specific locale. Le Grand Menhir Brisé once standing over 20 m high and weighing an estimated 280 t stood in full view as a focal point for the passage graves of Table des Marchands and D' Er Grah, both of which contain megalithic art. Several kilometers from this complex is the most elaborately decorated of all passage graves, the site of Gavrinis. Dating to c. 3500 BCE and now situated on an island, each of its passage and chamber uprights is carved with elaborate abstract imagery, including representative polished stone-axe depictions, repeated and overlapping concentric circles, and curvilinear motifs (Fig. 4). Although this and other monuments elsewhere adhere to convention in terms of architectural and landscape grammar, the artistic repertoire contains a set of designs and motifs that are regionally unique. These are individually and collectively dispersed around various hidden areas of the monument. Consistent with ideas of ritual concealment and secrecy,

the panels may have been intentionally turned inward, facing the internal space of the monument and are thus only perceptible to the spirits of the dead. Such a practice appears to be an Atlantic coastal tradition with clear in situ in-turned decorated kerbstones at sites such as Newgrange, Knowth, Dowth, and the now destroyed Calderstones monument in northwest England. However, this process appears to have originated around the Gulf of Morbihan at sites that include Gavrinis and nearby D' Er Grah. In the ceilings of both monuments are two broken sections of an enormous 10 m long menhir. Originally this structure would have stood proud within an earlier ritualized landscape. Engraved on one of its surfaces were two goats and a large axe symbol. A section that included the axe symbol was incorporated into the passage grave of Table des Marchands (Le Roux 2006). The destruction of the menhir and its integration within the ceilings of the three passage graves may represent a deliberate act of incorporation, drawing the ritual power of an earlier monument into the body of its successor. Gavrinis and other Breton monuments presumably provided an impetus for the erection of truly monumental structures elsewhere in the Atlantic region of northwestern Europe, as attested by the examples of Newgrange, Knowth, and Dowth in the Boyne Valley, Ireland, Le Déhus and La Gran'mère du Chimquière in Guernsey, and La Hougue Bie in Jersey. However, the number of sites in Ireland and Britain incorporating megalithic art is relatively small and less elaborate in composition.

In most instances the carving on one upright stone rather than another appears to have been a deliberate and intentional act. Based on several well-preserved monuments, megalithic art was only read from the passage or chamber and is thus revelatory in its positioning. At Gavrinis, in the Gulf of Morbihan, 23 of the 29 uprights that construct the chamber and passage are highly decorated, though only some are visible from the entrance looking toward the chamber. However, despite the visibility of those uprights positioned closer to the entrance, the narrative of the other upright panels appears, from this viewpoint, as distorted and virtually impossible to read; the audience is forced to read each stone, probably sequentially (like the chapters in a book). Similarly, visual access is completely restricted at nearby Les Pierres Plates passage grave in Locmariaquer, where 13 decorated uprights occur 5 m beyond the entrance and beyond a kink of some 50° inside the chamber. The hidden art in this monument includes a stylized anthropomorphic "rib-cage" design (Thomas & Tilley 1993). It is argued that this and other abstract forms could not have been viewed by the uninitiated; that is, the majority of the community that would have congregated outside the monument, within the facade area. These people would been excluded from this most secretiveness of the engraved narrative. Instead, the art would have been exclusively read by special individuals who would have had direct contact between the community and the spirits of the dead that would have inhabited the inner recesses of the monument.

The Potency of the Painted Motif

Although megalithic art is usually engraved, there are a number of sites in southern Europe, exhibiting irrefutable evidence of painting, either as a separate entity or as a combination of painting and carving. The first discoveries of painted megalithic art were made in the late nineteenth and early twentieth centuries at Dolmen de Dombate (in Portugal) and Forno dos Mouros (in northwest Spain). At Pedra Cuberta, near La Coruña, the uprights in both the chamber and passage were decorated using black, red, and white pigmentation to create chevrons and multiple zigzags (Rodríguez Casal 1990). More recent fieldwork at the Dolmen de Dombate shows that painted motifs covered most of the internal walls of the monument. It was deduced that both the red and black geometric forms had been painted over a prepared white-painted surface, thus creating a striking yet secretive visual impact upon those few who would have entered this realm of the dead. Red- and black-painted zigzags, at Coto dos Mouros and at Forno dos Mouros, confirm the wide geographic spread of this phenomenon through the northern and western coastal fringes of Portugal and Spain.

Megalithic Art: A Visual Repertoire for the Dead, Fig. 5 The painted spirals at *Tomba Della Scacchiera*, NW Sardinia (Image: Antonello Porcu)

Painted motifs, using the artistic repertoire of the megalithic tradition, appear to be a southern European trait, although this may be taphonomic as evidence from elsewhere may not have survived in the archaeological record. However, painted motifs that can be relatively dated have been found on megalithic tombs in Malta, Sardinia, and the coastal regions of the Iberian Peninsula (Arosio et al. 2011). Charcoal fragments found within stratified deposits abutting the passage wall at Antelas Viseu in Portugal have revealed a radiocarbon determination of 4,655 ± 65 BP (Castro et al. 1957), while a further six megalithic sites have been dated in Galicia, northwestern Spain, using AMS radiocarbon and plasma-oxidation extraction techniques (Freddo 2007). Although painting on these monuments is now extremely faint, a number of characteristic geometric patterns can be recognized.

At the recently excavated rock-cut burial–ritual site of *Tomba Della Scacchiera* in the northwestern highlands of Sardinia, a spectacular array of painted imagery was discovered (Arosio et al. 2011). The *Tomba Della Scacchiera* or *Chequered Tomb*, so named for a unique blue-and-white checker design across the ceiling, comprises a façade and an entrance leading to a rock-cut passage and a massive chamber with three side cells beyond. The walls were painted with characteristic curvilinear and rectilinear motifs, symbols that are usually found carved elsewhere in Neolithic burial–ritual monuments in central and western Mediterranean and northwestern Europe. Additional to the geometric motifs was a series of stylistic bull heads carved along the main wall of the chamber. This recurrent theme appears to have been an important symbol across the western Mediterranean and the Iberian Peninsula at this time. The most striking element of the surviving rock art here is a set of seven interconnecting, large, vibrant, red spirals – very similar in style, size, and composition to carved examples found within burial–ritual monuments in Ireland, Scotland, and Wales (Figs. 5 and 6).

Key Issues and Current Debates

So far, I have briefly identified the geographic distribution of megalithic art, from the Mediterranean to Orkney (see Fig. 1). I now wish to discuss, albeit briefly, past and current ideas on this unique assemblage; clearly these symbols represent some form of visual communication

Megalithic Art: A Visual Repertoire for the Dead, Fig. 6 The recording of the engraved spiral at Llanbedr, North Wales, image taken in 2012

and were associated with ritualized death and burial rites within stone chambered monuments (usually passage graves). During the latter part of the twentieth century, much of the megalithic rock art had been recorded using traditional classifications and methods usually employed with cataloguing portable artifacts, usually by enthusiastic amateurs (Bradley et al. 2001: 494). From these rudimentary studies, researchers began to link together certain core areas of Europe, suggesting geographic associations that were bound by a recognized artistic tradition and monument building (Nash 2012).

With the application of AMS chronometric-dating techniques of minute fragments of organic material, archaeologists can now safely establish a route map through Western Europe for the construction and use of burial monuments. However, the questions arise concerning the relationship between monument and rock art, moreover its meaning. The transmission of ideas through a set of recognized symbols may have occurred during the initial wave of monument construction, suggesting a contemporarity between art and monument. In the case of the reuse of stonework within several of the Brittany passage graves, it appears that the megalithic art tradition was already in place and, therefore, these symbols represented different spatial and temporal zones; a similar hypothesis can be suggested for Bryn Celli Ddu, a passage grave in Anglesey in North Wales. Here, excavation in the early twentieth century revealed a highly decorated stone lying over a central pit that may have once been part of a henge monument (Fig. 7). Later use of the site, at around 3000 BCE, includes the construction of the passage grave which appears to have used the footprint of the former henge. Interestingly, none of the walls inside the passage and chamber areas of this monument are engraved with megalithic art.

The concept of passage grave monuments acquiring megalithic art sometime after construction suggests two or more waves of elaboration to existing monuments. Certain passage graves located within the Gulf of Morbihan and the Bryn Celli Ddu demonstrate that megalithic art (in one form or another) was already in place but engraved on other types of monument. Based partly on the concept of reuse/recycling, one could also suggest that certain stones were picked and engraved prior to construction. Alternatively, established monuments with a long ancestral past could have, as part of their development, been engraved. I say this because in Ireland, of the 225 or so passage graves standing, only around 15 % possess megalithic art (Waddell 2005: 57); similar ratios exist elsewhere in Atlantic Europe. Clearly, Neolithic communities made a choice of whether to incorporate megalithic art or not; could this choice have been merely a trend or a veering away from the old religion to a nonconformist tradition?

Looking Beyond the Motif

Megalithic art became a recognized prehistoric tradition during the early part of the twentieth

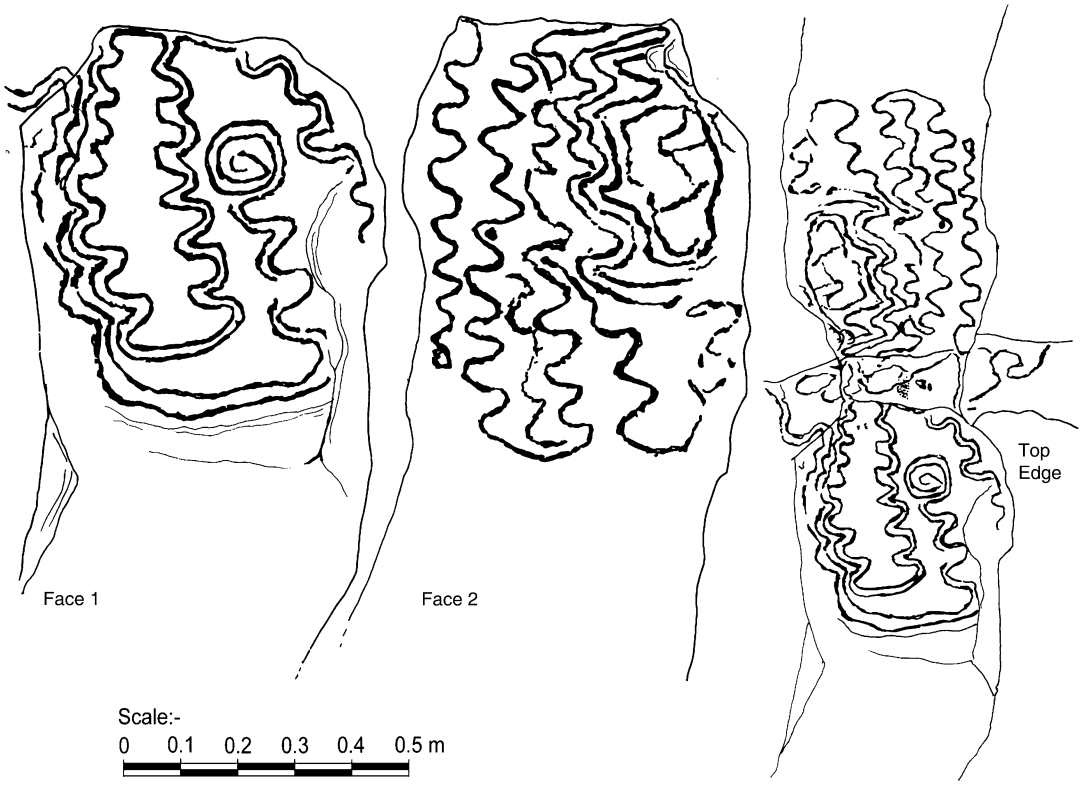

Megalithic Art: A Visual Repertoire for the Dead, Fig. 7 The Pattern Stone recovered from a central pit within a probable henge that stood under Bryn Celli Ddu (After Lynch 1991)

century, and since then a number of dedicated researchers have attempted to provide meaning to this enigmatic set of symbols. The general consensus is that it is a derivative of a much wider Schematic art tradition which may have its origins in the Mesolithic. Elizabeth Shee-Twohig was the first researcher to collate and synthesize most of the then known European Neolithic sites that possessed megalithic art (1981). This monumental piece of work has provided an essential starting point for research in later prehistoric rock art studies. During the next two decades, researchers such as Aubrey Burl, Richard Bradley, and Jeremy Dronfield have gone some way to infuse meaning into what the various symbols might represent; for example Bradley (2009) and Devereux (2009) introduced the reader to sensory components that have not survived the archaeological record. In another groundbreaking piece of research, Dronfield examined the significance of the passage component in Irish passage grave tombs (1996). He established that there was an association between the passage and engraved curvilinear motifs, in particular, concentric circles. He considered the idea that special people, such as shamans would experience a tunnel experience which would be induced via altered states of consciousness as a means of accessing the supernatural world of the inner passage and chamber areas; the devices for this experience were various curvilinear motifs that inhabited the passage area.

In a wider landscape sphere, megalithic motifs have been considered as landscape features (Nash 2012). Using the rock art from the passage grave of Barclodiad y Gawres in North Wales, Nash considered the design sequence on Stone 16, an upright that delineated the space where the inner passage meets the chamber. The panel design contained finely pecked multiple zigzag

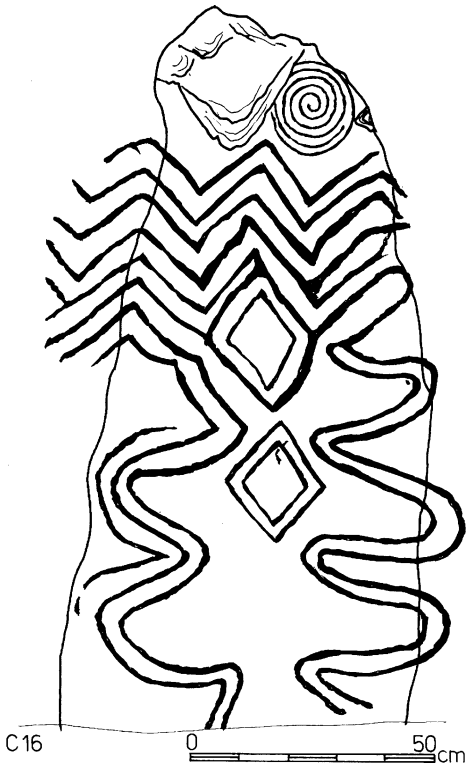

Megalithic Art: A Visual Repertoire for the Dead, Fig. 8 The design sequence on Stone 16 in Barclodiad y Gawres (After Lynch 1991)

lines, wavy lines, and a spiral which he interpreted as mountains, the sea, and a celestial body – probably the sun or moon; the "scene" appeared to replicate the scape to the east of the monument (Snowdonia and the Menai Straits [a stretch of water between the North Wales mainland and the island of Anglesey]) (Fig. 8).

Similarly, Kate Sharpe (2007) promoted the idea of a celestial body (represented by a complex spiral motif) moving across the panel of Copt Howe, Langdale, in northwest England to eventually set behind a series of lines that may represent the summit of a prominent peak within the Cumbria range (Fig. 9a–c).

In both examples the spiral potentially represents a celestial body, but what of the concentric circle? Abreu (2012) has suggested that the concentric circle, one of the most common later prehistoric symbols within the Atlantic coastal fringe, is found exclusively near water on exposed rock outcropping (and occasionally on megalithic monuments) and represents the ripples that are created from dropping a stone into the water. This interesting and conceivable hypothesis is one of a number that require further systematic investigation.

Future Directions

Based on existing chronologies, survey coverage, and geographic scope, there is a probable association between monument, landscape, and megalithic rock art, what I have recently termed as *architecture*, *aspect*, *and art* (Nash 2013). Despite the large number of burial–ritual monuments in Western Europe, only a small number belonging to the passage grave tradition appear to be decorated. While there are differences in association, the evidence suggests that the repertoire of abstract motifs remains constant throughout the Mediterranean and Western European Neolithic core areas with certain motifs establishing distinct trends that create local and regional identity. However, in terms of universality, a recognized repertoire of motifs does extend along some 4,000 km of coastline; therefore, do they maintain the same grammar, meaning, and potency throughout?

It is conceivable that much of the artistic repertoire employed inside burial–ritual monuments during the Neolithic was later replicated on open-air panels, particularly those found in Galicia, northern Britain, and southern Scandinavia. This similar art form, also hidden in the upland landscapes of Western Europe, would have stood close to burial–ritual monuments such as barrows and round cairns that were constructed during the Bronze Age. Not surprisingly, this significant change in the location of (former) megalithic motifs occurs roughly in the same areas where megaliths were once active. However, the same question arises: does open-air rock art possess the same meaning as it did when originally engraved into a passage or chamber of a megalithic monument? If this were the case, the coastal fringes of the Mediterranean and Western Europe could boast a semiotic idiom that was in dynamic circulation for over 3,000 years and may

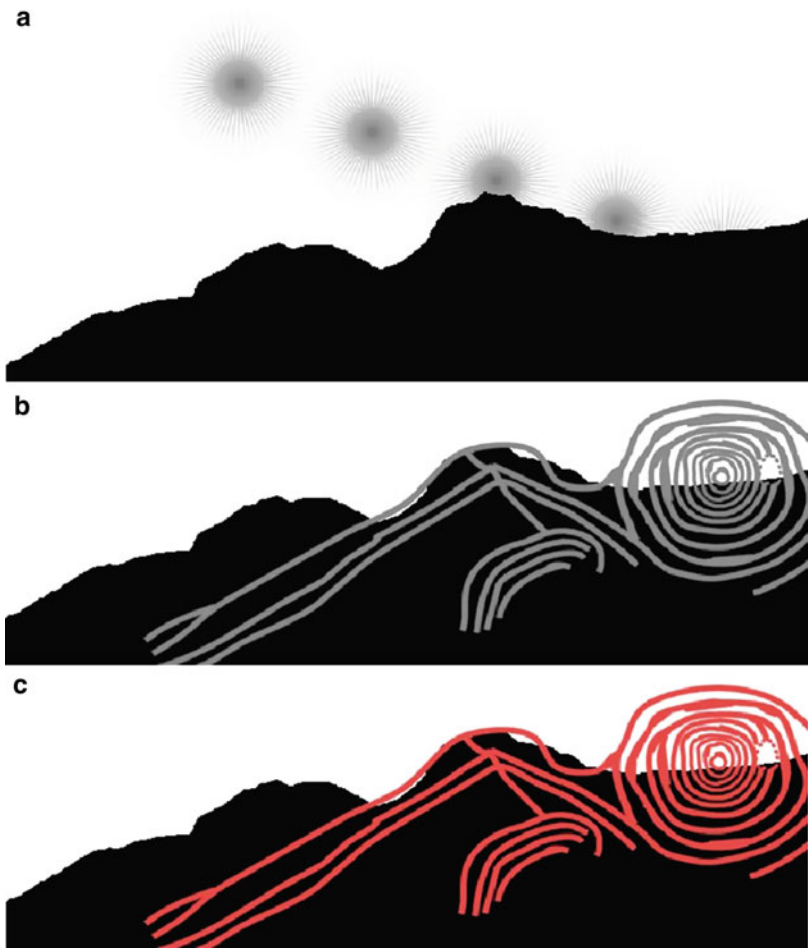

Megalithic Art: A Visual Repertoire for the Dead, Fig. 9 (**a**–**c**). The trajectory of the setting sun (?) and how it was characterized in the rock art from Copt Howe (After Sharp 2007)

have formed the foundations of a pictographic-based language, a visual communication system centered on death, burial, and ritual.

Cross-References

► Palace of the Boyne (Brú na Bóinne)

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Megaw, Vincent

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Basic Biographical Information

John Vincent Stanley Megaw (Fig. 1) was born in Stanmore, Middlesex, in 1934. One of his uncles, A.H.S. (Peter) Megaw, was a distinguished Byzantinist, the last Director of Antiquities of the former British Colony of Cyprus, and a Director of the British School at Athens. Another uncle, Basil, studied archaeology at Cambridge and was Director and Librarian of the Manx Museum on the Isle of Man. In 1940 young Vincent Megaw's archaeological education began after he was evacuated to his grandparents' Belfast home, which was filled with ancient curiosities largely collected by his uncles. This interest led him to join the London Institute of Archaeology as a Member at the cost of five shillings a year at the age of 16 years.

In 1953 Vincent Megaw enrolled in an Honours M.A. in Prehistoric Archaeology at Edinburgh University, with Fine Art as a second subject. It was here that Professor Stuart Piggott suggested that he study early Celtic Art, which was to become a primary focus of Megaw's teaching and research career. In 1958 Thames and Hudson recruited him as an in-house editor, and the young Megaw found himself correcting the English of archaeological luminaries such as Sir Mortimer Wheeler, Max Mallowan, and Grahame Clark.

The year 1961 was a watershed year in Vincent Megaw's life. This was the year that he married Ruth Miller, then a Third Secretary in the UK Foreign Office, who became his close collaborator and coauthor in his various projects. Together, the Megaws have published extensively on European Iron Age art (e.g., Megaw & Megaw 1989, 1996) and soon established an international reputation as experts in this area.

Also in 1961, Vincent Megaw was appointed as Lecturer in European Iron Age Archaeology at

Megaw, Vincent, Fig. 1 Vincent and Ruth Megaw in 2001 at Flinders University on the occasion of the publication of the second edition of their book *Celtic Art from Its Beginnings to the Book of Kells* (Credit: Multimedia Unit, Flinders University)

the University of Sydney, Australia. He enrolled in a part-time external Ph.D. on "The Human Form in La Tene Art" at Edinburgh University that he did not complete. Megaw (2012: 551) recalls that Stuart Piggott commented that this was the first time that one of his postgraduate students had not completed his thesis but published the book instead (Megaw 1970).

In 1972 Vincent Megaw was appointed to the Chair of Archaeology at Leicester University, following in the steps of Charles Thomas. At Leicester University, he established an Honours B.A. in Archaeological Studies, which he complemented with a textbook (Megaw & Simpson 1979). In 1982 Vincent Megaw returned to Australia when he was first appointed to Flinders University in South Australia as a Lecturer in Visual Arts with a remit to introduce courses in prehistoric and ethnographic art. At Flinders University, he devised a new Bachelor of Archaeology degree within a Department of Visual Arts and Archaeology. In 1996 he was appointed to a Personal Chair in Visual Arts and Archaeology.

Professor Megaw's keen interest in music has manifested in various ways during his career. One of his subsidiary interests is music archaeology, and his first publication in *Antiquity* was on bone flutes (Megaw 1961). Also, while at Flinders University, he convened a series of weekly concerts and managed the Flinders University Chamber Ensemble.

Professor Megaw's achievements include an M.A., D.litt. (Edinburgh); Fellow, Australian Academy of the Humanities; Fellow, Society of Antiquaries of London; Honorary Fellow of the Society of Antiquaries of Scotland; Korresp. Mitglied d. Deutschen Archäologischen Instituts; Member, Institute for Archaeologists (UK). In 2004 he became a Member of the Order of Australia for service to archaeology and art history as an educator, researcher and writer, particularly in the areas of European Iron Age art, contemporary Indigenous Australian art and music archaeology.

In 2000 Professor Megaw and Ruth Megaw were appointed as Honorary Research Fellows in the Department of Archaeology at Glasgow University. Vincent Megaw retired and was appointed Emeritus Professor at Flinders University in December 2002. He continues his research and writing.

Major Accomplishments

Vincent Megaw had several successes very early in his career. From 1956 to1963, he joined Charles Thomas' long-running excavations at Gwithian in Cornwall. In 1958, Megaw discovered evidence of

cross-plowing using an ard in the Bronze Age levels of the site. Previously, this feature has been known only from Scandinavia and the Netherlands (Nowakowski et al. 2007).

While at Sydney University during the 1960s, Megaw conducted pioneering fieldwork on the Indigenous archaeology in the Sydney region. Colleagues at this time included Rhys Jones and Betty Meehan, who was one of his students for a time. Megaw's research was undertaken against the opposition of both J.R.B. Stewart, the Foundation Edwin Cuthbert Hall Professor of Near Eastern Archaeology, and his successor as Professor of Archaeology, the Classical archaeologist, Alexander Cambitoglou, who banned university time or money being spent on the archaeology of Australia. Megaw confronted this ban by excavating at weekends and during vacations (Megaw 2012). His work during this period included significant excavations on the shores of Botany Bay near the location of James Cook's landing in 1770 (Megaw 1969).

During the 1970s and 1980s, Vincent Megaw was one of a very few scholars who held that the Indigenous arts of Australia should be understood as art, rather than as ethnographic objects (Megaw 1982). Intrigued by the art of the Western Desert in Central Australia, he collected early acrylic paintings made by these communities in the years before these paintings were accepted as art. On behalf of the Flinders University Art Museum, Megaw established a significant collection of Western Desert paintings. He also acted to promote the artists more widely. Supported by the Australia Council, he initiated a series of short-term residencies for Indigenous artists. Later, he initiated an important travelling exhibition, *The Heritage of Namatjira*, on the work of watercolor artists from Central Australia. This was accompanied by a collection of essays (Hardy et al. 1992) that provided scholarly and cultural insights into this body of work.

The European facets of Megaw's research also flourished and his first-hand experience in Europe continued as it has to the present. Between 1978 and 1981 Vincent returned to Austria and the Dürrnberg bei Hallein (the ancient salt-mining center south of Salzburg) as part of a Leicester rescue project in advance of the construction of an all-weather road from Hallein to Berchtesgaden, renowned as the former location of Hitler's summer villa. Vincent and Ruth Megaw's major survey of early Celtic art (Megaw & Megaw 1989, forthcoming) was followed by a monograph on the Basse-Yutz find, now one of the major treasures of the British Museum (Megaw & Megaw 1990) as well as many later publications including reviews dealing with the ancient Celts – in whom he still believes in spite of much controversy (Megaw 2007, 2010, 2013). Professor Megaw's fine scholarly skills are captured in Rudolf Echt's assessment:

> Megaw... is at his best in tracing formal relationships between individual works, in recognizing formal dependences and influences (Echt 1999: 251, cited in Megaw 2012: 555).

In the early 1990s, Megaw's track record established a basis for several large grants from the Australian Research Council. This funding allowed him and Ruth Megaw to examine various facets of Celtic art in depth (Megaw & Megaw 1996, 1997) and to conduct excavations that shed new light on Dürrnberg's long mining history (Megaw 1990; Megaw et al. 2000).

The scholarly career of Professor John Vincent Megaw has spanned two continents and five decades. During this time he initiated significant academic programs at two universities, established a major collection of Australian Aboriginal art, and conducted internationally leading research. Most particularly, with his wife and colleague, Ruth Megaw, he has revolutionized understandings of Celtic art in Europe and made a major and early contribution to the recognition and scholarly analysis of Indigenous art in Australia. In 2012 he responded to the invitation of Martin Carver, then Editor of *Antiquity*, to write a personal survey of his life. It stands as a characteristically lively self-generated critique of the man and his work – so far. In 2013, Flinders University established the Ruth and Vincent Megaw Annual Lecture, in recognition of a lifetime of joint service to archaeology. Sadly, Ruth Megaw died in July, 2013.

Cross-References

▶ Europe: Paleolithic Art
▶ Jones, Rhys Maengwyn
▶ Meehan, Betty

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Meggers, Betty Jane

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Basic Biographical Information

Betty Jane Meggers (December 5, 1921 – July 2, 2012) was one of the most influential figures in the history of South American archaeology. She conducted research in the Amazon area, with her husband Clifford Evans, for almost half a century, starting as a graduate student in 1948.

Betty Meggers was born in Washington, DC, to Dr. William Frederick Meggers and Edith R. Meggers. Her father was an internationally recognized spectroscopist and an archaeology enthusiast. At the age of 16 Betty Meggers became a volunteer at the Smithsonian Institution and helped to reconstruct pots excavated from Pueblo Bonito, an Anasazi village in New Mexico.

In 1943, Betty Meggers graduated from the University of Pennsylvania with a Bachelor's degree. A year later she was awarded a Master's degree from the University of Michigan. At the University of Michigan, Meggers was introduced to ceramics from the Marajo Island, at the mouth of the Amazon, and published her first scientific article on Marajo pottery in 1945. After obtaining her Master's Degree, she attended Columbia University to finish her Ph.D. At Columbia she was strongly influenced by anthropologist Julian Steward and his new "cultural ecology" approach, but also was enthusiastic about Leslie White's theories of socio-cultural evolution. She also met Clifford Evans at Columbia, a fellow graduate student. They married in 1946, and set off for fieldwork in Marajó about a year later.

During her lifetime Betty Meggers received many awards and honors in recognition of her long and consistent scientific contribution to knowledge of the South American past. She passed away in 2012, at the age of 90, after

serving 68 years as research associate with the Department of Anthropology at the National Museum of Natural History, Smithsonian Institution.

Major Accomplishments

Betty Meggers' accomplishments encompass both research and training. Based at the Smithsonian Institution in Washington, she had an active role in the training of South-American archaeologists as well as the development of long-term archaeological research programs in countries such as Brazil, Guyana, Ecuador, Peru, Venezuela and Chile. Her theories about the origins and development of South American Indigenous cultures have dominated the field of Amazonian archaeology for decades and remain at the center of debates about the socio-cultural history of the region.

In 1948 Betty Meggers wrote one of the few pieces about archaeology published in the *Handbook of South American Indians* edited by Steward (Meggers 1948). Her article on the archaeology of the Amazon basin formed the basis for the theoretical argument developed in her much debated article on the "Environmental Limitation on the Development of Culture" published a few years later (Meggers 1954). Meggers believed that culturally complex societies could not have evolved in the Amazon due to supposed lack of protein and poverty of soils that had prevented intensive agriculture and population growth. Therefore, any sign of social complexity in the Amazon basin, as was implied by the elaborate Marajoara ceramics, had to be interpreted as immigrations of Andean or Caribbean groups, who were fatally doomed to degeneration and decay in a tropical environment. Her theories had a definite impact in characterizing South American tropical lowlands as a marginal area of social development, and reinforced the concept of cultural degeneration within the already biased colonialist Indigenous history of the region. These ideas have been questioned both by subsequent research at the mouth of the Amazon (Roosevelt 1991; Schaan 2012) and the more recent literature on the decolonization of archaeology in Brazil (Noelli & Ferreira 2007).

It is widely recognized that Betty Meggers' focus on cultural ecology and adaptation was highly innovative for her time. Moreover, throughout her career, her research and that of her associates produced enormous amounts of data on different kinds of resource distribution and variability in the Amazon, as well as data on the ecological history of the region, such as climatic changes during the Pleistocene-Holocene transition, the early human occupation of the region, and the evolution of forest environments.

In addition, Meggers is known for her controversial assertion of a trans-Pacific cultural connection between East Asia and South America long ago based on similarities of pottery fragments found in Japan and Ecuador. She contended that Japanese Middle Jomon pottery was similar to ceramics from the Valdivia site in Ecuador — both dating between 2000 and 3000 B.C. To support her argument Meggers stated that plants, pathogens, and parasites of Japanese origin are found among Andean populations.

Betty Meggers also made an important contribution in terms of methodology. In collaboration with Clifford Evans, she developed systematic procedures for both site surveying and ceramic analysis and seriation, the latter building on James A. Ford's typological approach, classifying ceramic complexes into phases, traditions and horizons. These were passed on to a great number of South American scholars through courses, seminars and collaborative research programs. In Brazil, the PRONAPA (Programa Nacional de Pesquisas Arqueológicas, 1964–1970) coordinated by Meggers and Evans, had a profound impact on both the generation of data and the establishment of a chronological framework for the distribution of cultural archaeological traditions, phases and sub-phases, throughout the national territory.

Megger's legacy continues to be imparted through research associates in South America who carried her influence to new generations of archaeologists. Important figures here are Mario Simões, Eurico Miller and Ondemar Dias in

Brazil, Emilio Estrada in Equador, José. M. Cruxent in Venezuela, Mario Sanoja and Iraide Vargas in Colombia.

Betty Meggers wrote nearly two hundred articles, book reviews, translations, and books. She published in many leading scientific journals including *American Anthropologist, American Antiquity, Americas, and National Geographic*. Results from her Ph.D. dissertation appeared in a seminal 1957 publication co-authored by Evans that remains a main reference in the archaeology of the mouth of the Amazon till this day (Meggers & Evans 1957). Her most cited books are *Amazonia: Man and Culture in a Counterfeit Paradise* (Meggers 1971) and *Prehistoric America: An Ecological Perspective* (Meggers 1972).

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Mellaart, James

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Basic Biographical Information

James "Jimmy" Mellaart was born on 14 November 1925 in London to Dutch parents with whom he returned to the Netherlands in 1930. It was in the Netherlands that he first developed a fascination for antiquity in school, particularly while working at the National Museum of Antiquities at Leiden during the Nazi occupation.

In 1947, Mellaart returned to London to study history and Egyptology at University College London. In his formative years around the time of his graduation in 1951, he took part in excavations in different parts of the Near East, including Jericho and Fikirtepe in Turkey, where he met his future wife Arlette. Soon after he graduated, he started working with the British Institute of Archaeology at Ankara (BIAA), where he was appointed as Assistant Director in 1959. Archaeologists at the BIAA, which was founded in 1948, were working in central Anatolia, exploring a part of the Near East that had previously received little archaeological attention. Mellaart took an active part in this pioneering work during numerous surveys on foot and through the excavation of sites he had identified.

He recognized the potential of the Late Chalcolithic/Bronze Age site of Beycesultan, and directed excavations at this site from 1954 to 1959 together with the experienced director of BIAA, Seton Lloyd. Soon, two more large-scale excavations followed at Neolithic/Early Chalcolithic Hacılar in the Lake Region from 1957 to 1960 and at Neolithic Çatalhöyük from 1961 to 1965.

In addition to his fieldwork in Turkey, Mellaart taught archaeology at Ankara and Istanbul. After he had to leave Turkey in 1965

(see below), he was appointed to a newly created lectureship in Anatolian archaeology at University College London where he taught from 1965 until his retirement in 1991.

James Mellaart died on 29 July 2012 in London.

Major Accomplishments

The work of James Mellaart and his colleagues at the BIAA placed Neolithic to Early Bronze Age central Anatolia on the radar of archaeologists. Prior to that, this area of research was somewhat underdeveloped compared to the significant processes and events known from the Levant and Mesopotamia. This view changed dramatically when the remarkable findings of Hacılar and Çatalhöyük became known to the archaeological community and the public (Redman 1972; Mellink 1973). Çatalhöyük was declared a UNESCO World Cultural Heritage in 2012 shortly before Mellaart's death.

Jimmy Mellaart is described by colleagues and student as talented, knowledgeable, spirited, inspiring, charming, and very able to present his data and thoughts in ways that fascinated archaeologists and the public alike. He had an independent mind and the instinct to find sites that would substantially enhance knowledge about Anatolian prehistory.

Mellaart's publications (e.g., 1965, 1967, 1970, 1975) are widely read. Many of his interpretations have been revoked as archaeological knowledge and fashions of thought progressed during the last decades (e.g., Farid 2008; Rosenstock 2010). These new publications not only show how far the knowledge about prehistoric central Anatolia has advanced since the 1960s, however, but also demonstrate once more the importance of Mellaart's pioneering excavations, and of his progressive interpretations that triggered scholarly discussions (e.g., Todd 1979).

During Mellaart's work as an archaeologist, there are mooted instances of imagination and facts becoming confused. Several reviewers of his early work (e.g., Whallon 1968; Redman 1972) criticized this as a general tendency in his excavation publications. A prominent example is the Dorak affair in 1965, during which Mellaart claimed to have inspected a rich collection of Bonze Age artifacts in 1958 at a young woman's house in Izmir, but neither the house, nor the woman, nor the artifacts were ever found. This inconsistent story made Turkish authorities suspect Mellaart of being involved in smuggling antiquities, together with the discovery that artifacts excavated in Hacılar and Çatalhöyük disappeared from depots and made their way to the antiquity market. In 1965, this culminated in Mellaart being banned from Turkey and from ever excavating there again; he was only permitted a very brief visit to the renewed excavations at Çatalhöyük in 2005.

Another controversy developed around accounts of wall paintings supposedly excavated at Çatalhöyük, published by Mellaart in the 1980s. The existence of these paintings was doubted by many since their style, content, and state of preservation were much more spectacular than that of the paintings published in the 1960s, and because no original photos or drawings of the paintings exist (Mellaart 1984, 1985, 1989, and later comments and replies to critics; reviewed among others by Lamberg-Karlovsky 1992; Mallett 1990, 1992).

While such accounts can be disconcerting for most of colleagues, such ambiguities do not diminish the fact that James Mellaart's "contribution to the unfolding of the Anatolian Neolithic and Chalcolithic periods was enormous and fundamental" (Watkins 2012).

Cross-References

- ▶ Çatalhöyük Archaeological Site
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Mesa Verde

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Introduction

Mesa Verde is a National Park located in Montezuma County, southwestern Colorado, United States of America. The park is famous for its numerous well-preserved cliff dwellings, mesa top pit houses, kivas, and multistoried structures. Mesa Verde was designated as a national park in 1906; the park was nominated to the United States National Register of Historic Places 1966 and was named a UNESCO world heritage site in 1978. Mesa Verde was the first park in the United States that was created for the preservation of archaeology sites and has been the focal point of research on the ancient Puebloan peoples. The park contains 4,700 archaeological sites including 600 cliff dwellings. The cliff dwellings vary in size from one-room storage spaces to multifamily dwellings of more than 150 rooms. The area of the park includes 52,000 acres of land with the highest elevations ranging from 6,000 to 8,572 ft (1,000–2,613 m) above sea level (NPS 2012) (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

Region

Mesa Verde which is Spanish for "green table" is located in an area of the United States commonly referred to as the Four Corners where the borders of present day southeast Utah, southwest Colorado, northwest New Mexico, and northeast Arizona meet. The four corners area contains many ancient Puebloan archaeological sites with pit houses, cliff dwellings, kivas, towers, and petroglyphs. Mesa Verde National Park has one impressive petroglyph panel known as "Petroglyph Point" that is accessible by a 2-mile

Mesa Verde, Fig. 1 Mesa Verde cliff dwelling. (Image: P. Steeves, 2012)

trail (BLM 2012). Through the park there are well-marked automobile tour routes, viewing areas, and trails which lead to numerous pit houses, cliff dwellings, and kivas.

Pit Houses

Archaeologists believe that the area of Mesa Verde Park was first settled by ancient Puebloan people around CE 500 (NPF 2012). The mesa tops offered productive agriculture areas where Puebloan people grew corn, squash beans, and other food crops. The earliest structures at Mesa Verde were pit houses which were located on the mesa tops. The pit houses were usually oblong or round and were semi-subterranean with floors dug into the soil a several below surface level. The roof of a pit house consisted of a wood frame covered with brush, grass, thin poles, and capped with mud. The pit house was usually divided into two rooms, the living space which had a fire pit located beneath a center hole in the roof which served as a chimney and an entryway (NPS 2012) and a smaller second room used for storage. Mesa Verde Park has constructed permanent buildings over a few excavated pit houses which protect them from the environment and allow the public to view the interior of the structures (Fig. 2).

Kiva

Archaeologists commonly agree that ancient Puebloan kivas were used for religious purposes as they are today within modern Puebloan communities. Kivas held a prominent place in ancient Puebloan communities and are assumed to have been used mainly for ceremonies; however, they may have held different or diverse functions across time. The majority of kivas were constructed as underground structures, but there are also above ground and tower kivas. The larger cliff dwellings at Mesa Verde have numerous kivas in each dwelling area (Fig. 3).

Cliff Dwellings

The cliff structures of Mesa Verde are believed to have been built and occupied sometime after 1100 CE, a time archaeologists have designated as Pueblo II. There are 600 cliff structures which have been recorded in Mesa Verde Park. Some of the cliff dwellings were large villages of multistoried apartment-like structures, built in a step design with balconies and open areas. These village areas consisted of family dwellings, communal areas, kivas, storage rooms, and towers. Puebloan cliff structures at Mesa Verde were constructed of stone, adobe, mud, and other materials such as wood (Fig. 4).

Mesa Verde, Fig. 2 Pit house reconstruction at Step House. (Image: W. V. Bailey, 2007. This figure is licensed under the Creative Commons Attribution 2.0 Generic license. http://commons.wikimedia.org/wiki/File:Pithouse_at_Step_House_Mesa_Verde_1.jpg)

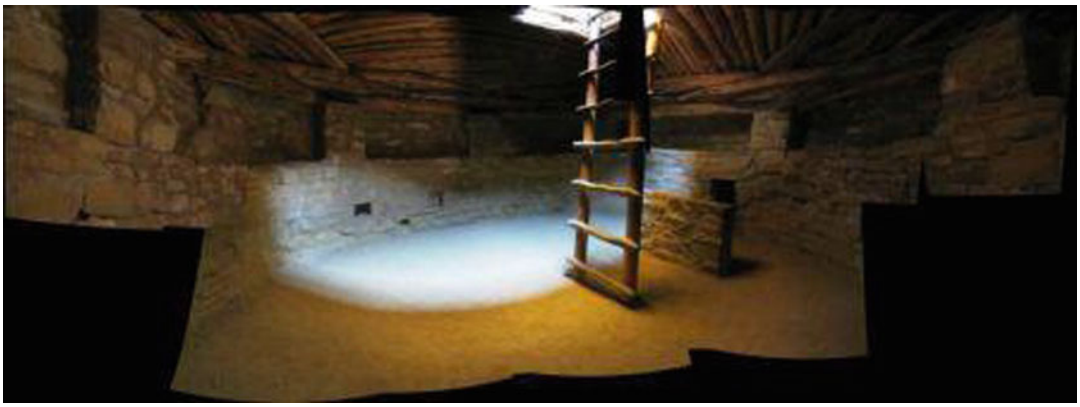

Mesa Verde, Fig. 3 Interior of kiva at Mesa Verde. (Image: Wikimedia Commons 2012. This figure is licensed under the Creative Commons Attribution 2.0 Generic license. http://en.wikipedia.org/wiki/File:Kiva.jpg)

Visitors to the park have the option to walk through some of the cliff dwellings on a park ranger-guided hike. Chapin Mesa has many cultural sites including Balcony House, Sun Temple, Square Tower House, Spruce Tree House which has 130 rooms including eight kivas and is the site of a year round spring, Cedar Tree Tower and Kiva one of several tower sites that are located on the mesa tops, and Triple Village Pueblo sites (Lamb 2001). On Wetherill Mesa there are views of Step House which has one of the largest concentration of petroglyphs found in the park, Mug House which has 94 room clustered around a large kivas, Long House which has 150 rooms and 21 kivas built into three stories, Kodak House, Two Raven House, and the Badger House community area (Lamb 2001). The largest cliff dwelling in Mesa Verde Park is Cliff Palace with 150 rooms, 21 kivas, and 75 open areas (Fig. 5).

Ninety percent of Mesa Verde's cliff dwellings are smaller structures of less than 10 rooms, the larger cliff dwellings Cliff House 150 rooms, Long House 150 rooms, Spruce Tree House 130 rooms, and Balcony House 40 rooms (NPS 2012), and are often discussed by archaeologists as villages.

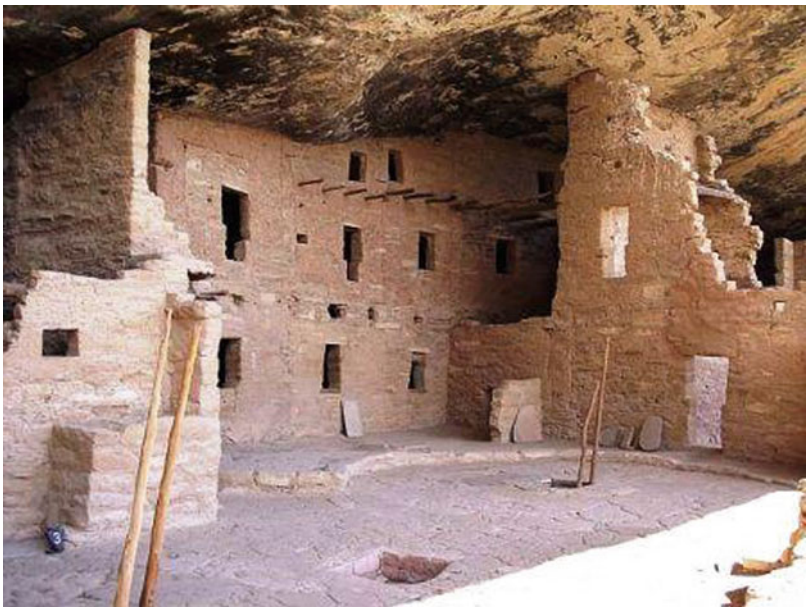

Mesa Verde, Fig. 4 Spruce tree house. (Image: Sascha Bruck, 2006. This figure is licensed under the Creative Commons Attribution 2.0 Generic license. http://commons.wikimedia.org/wiki/File:Spruce_Tree_House_4.jpg)

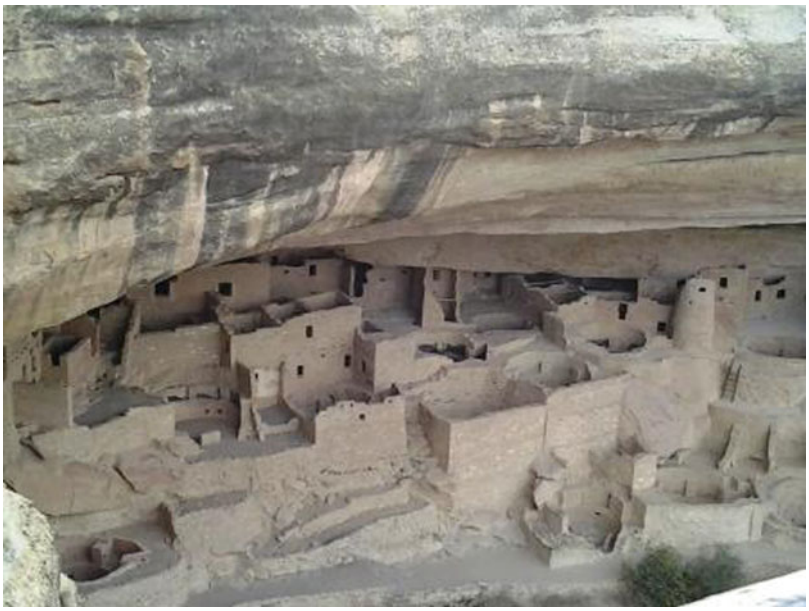

Mesa Verde, Fig. 5 Mesa Verde, Cliff palace. (Image: P. Steeves, 2012)

The ancient Puebloan people were very successful farmers (BLM 2012), and they constructed dams and water systems for agricultural and community use. Archaeologists believe that the Ancestral Puebloan occupation of Mesa Verde ended around CE 1300 possibly due to a severe drought.

Historically early settlers and archaeologists referred to the Puebloan peoples of Mesa Verde as the Anasazi Culture: however, the Anasazi Culture never really existed, and no one group ever called themselves by that name. Anasazi is a Navajo word; in Navajo [Anaasazi "anaa (enemy), sazi (ancestors)"] (Hewit Institute 2012). The identity of the cliff-dwelling people as Anasazi, though formerly established in archaeological terminology and embedded in dominant discourses

on the area, is offensive to modern Pueblo people who consider it an ethnic slur (BLM 2012). The descendants of the ancient Puebloan who lived at Mesa Verde are recognized today as the Hopi, Zuni, Acoma, and Laguna.

Mesa Verde contained millions of artifacts including Puebloan pottery which is very distinctive in style and decoration. Early explorers unfortunately looted the sites and took boxcar loads of pottery and artifacts to museums and private sales in Europe. After the area became a National Park in 1906 the pottery and artifacts that remained were afforded protection under. Mesa Verde Park today houses over three million artifacts including pottery, tools, baskets, and sandals (BLM 2012). The Unites States National Parks Service has an active Archaeological Site Conservation Program (ASCP) at Mesa Verde which included the collection of survey data on all sites in the park, assessment of over 200 of the 600 cliff dwellings, and an active program to stabilize and protect sites from the damaging effects of natural elements such as wind and rain.

Mesa Verde is an expansive archaeological area, the main cliff dwelling and some pit houses can be visited in one day if you drive a car along the loop road tours. The park has a full-service hotel and restaurants, stores, and laundry facilities and a camping area which is located at the entrance to the park.

Cross-References

- ▶ Cultural Heritage Management and Native Americans
- ▶ Pueblo Bonito
- ▶ Rock Art, Forms of
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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Meskell, Lynn

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Basic Biographical Information

Lynn Meskell (Fig. 1) is an Australian-born archaeologist who completed her Ph.D. at Cambridge University in 1997. Currently Professor of Anthropology at Stanford University, she was previously a faculty member at Columbia University (1999–2005) and a Postdoctoral Fellow at Oxford University (1997–1999). Meskell received her B.A. from the University of Sydney in 1994, having also studied Egyptology at Macquarie University. While an undergraduate, she assisted in archaeological fieldwork in New South Wales, Australia, in Micronesia, and in Cyprus and Greece. At Cambridge, Meskell participated in field projects in the Egyptian East Delta and took part in the Cambridge Theban Mission in Luxor. In her doctoral dissertation, Meskell analyzed data from the cemeteries of Deir el-Medina, a New Kingdom worker's village across the Nile from Luxor.

Meskell's postdoctoral field research involved a return to Egypt, where she codirected the South Saqqara Survey Project in 1998 and 1999. With her appointment as Assistant Professor at Columbia University in 1999, she became the field director of the Columbia University

Meskell, Lynn, Fig. 1 Lynn Meskell

Excavations at Amheida, Egypt, in 2000. In 2001, Meskell obtained funding from the National Science Foundation to explore the potential of digital technologies for visualization of heritage sites, initially with her Egyptian project. She continued her work with digital technologies but switched her research site to South Africa in 2003. This marked a turning point that saw her shift her focus from Egyptian antiquity to the contemporary production of "heritage" in post-apartheid South Africa.

Meskell continues participation in field archaeology, as director of the Çatalhöyük Figurines Project. The project aims to overcome a history of representation of figurines from this important early Neolithic site that has focused on a small range of images that support particular interpretations related to fertility and mother goddesses, for example, showing that animal figures are more common than previously understood (Meskell 2008).

On her graduation from the University of Sydney, Lynn Meskell was awarded the University Medal. Her postdoctoral appointment at Oxford was supported by the Harold Salvesen Research Fellowship. She began work in South Africa with funding as a Research Fellow by the South African National Research Foundation in 2002. In 2002, she was also a National Endowment for the Humanities Fellow at the School for American Research (now the School for Advanced Research) in Santa Fe. Meskell received the Andrew W. Mellon Foundation's New Directions Fellowship in 2004, supporting training in ethnography and African studies to prepare her for work in South Africa.

Major Accomplishments

Meskell is recognized for her contributions to feminist archaeology, archaeological ethics, and issues of heritage. In the 1990s, Meskell established herself as a critical voice in the archaeology of women, gender, and the body. Her 1996 article in the *Norwegian Archaeological Review* on what she termed the "somatization" of archaeology was a call to engage with broader social theory. Meskell (1996) wrote that archaeologists' emphasis on power, particularly the work of Michel Foucault, came at the expense of individuality and agency. She advocated viewing "embodied persons" as foci where biology, culture, and experience intersected. Her emphasis on the necessity to consider individuals carried through in later works, such as *Archaeologies of Social Life* (1999), where she used the cemeteries of Deir el-Medina to talk about personhood in

ancient Egypt. The book explored the intersection of multiple dimensions of social difference, including age, sex, and class, in the lives of the buried individuals.

The publication of her edited book, *Archaeology Under Fire*, (Meskell 1998) initiated one of her most enduring emphases: exploration of the social and political contexts within which archaeology is carried out and through which archaeological knowledge circulates. In her contribution for a 2002 conference on ethics in anthropology sponsored by the Wenner-Gren Foundation for Anthropological Research (Meskell & Pels 2005), Meskell drew attention to the way contemporary residents were alienated from locations viewed as sites of heritage by the state and by archaeologists as well.

After the 2001 attacks on the World Trade Center in New York, Meskell (2002) published an influential article proposing a concept of "negative heritage": "a conflictual site that becomes the repository of negative memory in the collective imaginary" (Meskell 2002: 558). Juxtaposing analysis of the World Trade Center site and the Bamiyan Buddhas, destroyed by the Taliban government of Afghanistan, Meskell demonstrated the need for more critical debate that acknowledged the equivocal nature of material marking of pasts. In her most recent book, Meskell (2011) takes the central concept of this earlier article – "past mastering" – as a beginning for understanding post-apartheid heritage development in South Africa. Using ethnographic methods, Meskell traces how archaeology and wildlife intersected in the development of tourism for the new South Africa. She says that the project became "about why natural heritage and conservation has trumped the cultural past, why nature is seen as global and all embracing and non-racial" (Bailey 2011: 11).

Meskell is continuing research on heritage policy in the contemporary world, through an ethnography of UNESCO. She argues that archaeologists, despite working in and around World Heritage Sites, have very little understanding of how UNESCO operates (Bailey 2011: 8-9). By providing an ethnographic account of UNESCO (Meskell 2012), following on her ethnography of heritage in South Africa, Meskell is defining a new field for archaeological ethnography, going beyond the now common approach of conducting ethnography in communities local to archaeological sites and projects.

In a 2011 interview, asked to single out the work for which she would like to be remembered, after mentioning *Archaeology Under Fire*, Meskell noted that she was proudest of her role as a founding editor for the *Journal of Social Archaeology* "because it promotes such good work by people from all over the world" (Bailey 2011: 12). The globalization of archaeology promises to be a lasting contribution of her work as both writer and editor.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Heritage & Society
- ▶ Heritage and Archaeology
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage: Public Perceptions
- ▶ Heritage Theory
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Mesoamerica in the Preclassic Period: Early, Middle, Late Formative

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State of Knowledge and Current Debates

Introduction

Mesoamerica is a term initially introduced by Paul Kirchhoff in 1943, to identify a culture area that, at the start of the Spanish Conquest around 1519, was occupied by numerous indigenous societies who shared a suite of collective cultural and linguistic practices (Kirchoff 1943). The purpose of the term was to provide a conceptual entity that could be used by anthropologists and archaeologists to organize the study of the societies that demonstrated these shared traits and characteristics. The boundaries of the area were originally based on linguistic and ethnographic information. Since then, archaeological data has added substantial new perspectives, and the meaning and use of the term have been altered and modified.

Kirchhoff's (1943) list of shared cultural traits crosscut numerous ethnic and linguistic groups. It represented Mesoamerica as a culture area that was frozen in time at the moment of European intrusion, and represented its maximal spatial boundary (Fig. 1). Today, Mesoamerica is recognized as a more complex cultural concept whose spatial boundaries were altered and shared cultural practices were modified across time and space. At its greatest extent Mesoamerica extended from the north-central latitudes of Mexico southeast through Guatemala and Belize, portions of Honduras, El Salvador, and Nicaragua to the Gulf of Nicoya in Costa Rica.

Mesoamerica is considered to have been an area of cultural unity, a cultural hearth where numerous linguistic and ethnic groups emerged and evolved. These groups shared a common history and displayed a suite of common cultural traits and characteristics. Basic among these characteristics were the use of multiple calendar systems, a ballgame played with a rubber ball, ritual activities that included human sacrifice and self-immolation, ancestor veneration, deity worship, shamanism, and maize agriculture, among others. Not every social group demonstrated all of the 50 or so cultural traits and characteristics originally considered as Mesoamerican, but they did participate to a degree sufficient to be considered part of the culture area.

There is a spatial component to Mesoamerica, but it was dynamic, not constant or fixed. Theorists portray the development of sociopolitical complexity as a mosaic process in which environmental, social, political, economic, ideological, and demographic variables act independently or in combination to bring about change. Indeed, Mesoamerica is best understood as a mosaic of individual pieces that, on the surface, may exhibit differences in adaptation and

Mesoamerica in the Preclassic Period: Early, Middle, Late Formative, Fig. 1 Map of Mesoamerica with regions identified

practice, but are all bonded to the underlying framework by a socially consistent template. The extent of the Mesoamerican culture area is dependent upon the temporal period under consideration. As processes of fission and fusion occurred among and between societies, the boundaries of Mesoamerica expanded and contracted.

Mesoamerica as a cultural continuum began to emerge during the transitional period from the late Archaic (c. 3500 BCE) to the Early Preclassic period (c. 2000 BCE). It was during this time that the move toward sedentary, agriculture-based societies allowed for the initial development of cultural traits and characteristics that would come to distinguish Mesoamerica. By the end of the Preclassic period (c. CE 250), social stratification, subsistence systems, worldviews, and other societal elements would be commonly practiced across portions of an expanding Mesoamerica. This development would continue unevenly throughout the Classic period (c. CE 250–1000) to the Postclassic period (c. CE 1000–1519), when Mesoamerica would reach its maximal area.

Timeline of Mesoamerica

Chronology is crucial in the study of Mesoamerica, and its history has been divided into three primary temporal segments: the Preclassic (c. 2000 BCE to CE 250), Classic (c. CE 250–1000), and Postclassic (c. CE 1000–1519) periods. Unfortunately, these terms are misleading. Early investigations of Mesoamerica were focused on the clearly visible cultural remnants of the Teotihuacán, Zapotec, and Maya cultures. Because of this initial exploratory concentration, broad generalizations about the timing and formational processes of social development were established for all of Mesoamerica.

It was found that these terms were not applicable to most other Mesoamerican cultures that developed along different chronological trajectories.

The initial, simplistic belief was that a "golden age" or Classic period had been preceded by an emergent undeveloped phase, the Preclassic period, and was followed by an age of cultural decline, the Postclassic period. The Classic period was considered the cultural highpoint that included planned cities, architectural complexes, hieroglyphic writing systems, solar and ritual calendars, monumental artistic achievement, a pantheon of deities and ritualized religious practices, long-distance exchange systems, and advanced agricultural techniques. Recent research has demonstrated that all of these presumed "Classic" features actually occurred earlier, in the Preclassic. Therefore, Preclassic, Classic, and Postclassic are now considered only as chronological markers, not as segments in a developmental sequence. Other labels that are considered more descriptively accurate have been proposed but have not been widely adopted by the research community.

Of primary importance here is the Preclassic or Formative period, a chronological designation that spans roughly from 2000 BCE to CE 250. These two terms are often used interchangeably, but it can be noted that the former is essentially used in reference to the Maya, whereas the latter is largely used as a descriptor for non-Maya regions of Mesoamerica. Nevertheless, there is no hard and fast rule on their use. The Preclassic period is further chronologically subdivided in to Early (c. 2000–1000 BCE), Middle (c. 1000–400 BCE), and Late (c. 400 BCE to CE 250) period segments. In turn, these timespans can be further separated into shorter durations, for example, early Middle Preclassic (c. 1000–750 BCE), late Early Preclassic (c. 1250–1000 BCE), or middle Late Preclassic (c. 200 BCE to CE 50). In this essay, the term Preclassic is used to describe the entire period from c. 2000 BCE to CE 250, while Early, Middle, and Late Formative are used to identify the primary chronological subsegments. It should also be noted that the division of these periods is arbitrary, simply chronological markers or guidelines that may vary according to the researcher or region.

Terminology aside, the Preclassic period was one of the most dynamic in Mesoamerican history. It was a transformative era that saw the emergence, establishment, and dissemination of unprecedented social, political, and economic practices along with ideological conventions and materializations that would serve as the framework upon which all subsequent Mesoamerican societies would be based. During the Preclassic period, there were profound transitions that affected every aspect of society. Nomadic, egalitarian band societies that had existed for millennia prior to the Preclassic period rapidly changed to a sedentary lifestyle in socially ranked villages. The focus of subsistence systems changed from seasonal hunting and foraging to full-time agriculture. Populations grew exponentially, and economic specialization and long-distance acquisition of goods and materials ensued. Either as a result of these changes or as a driving factor behind them, the appearance of hereditary inequality and the development of complex societies facilitated the large-scale socioeconomic conversions (see Earle 1991; Clark & Blake 1994; Redmond 1998).

Prelude to the Preclassic Period

The Preclassic period in Mesoamerica was part of a cultural progression. This continuum began long before the Preclassic period, continued through the Classic and Postclassic periods, and endures today in many parts of Mexico and Central America. To better understand the changes that influenced or impacted the social, economic, and political transformations that occurred during the Preclassic, it is necessary to consider what had transpired prior to this time. Although details about the Archaic period (c. 7000–2000 BCE) in the Mesoamerica area remain murky, basic knowledge of ancient social structures and subsistence systems illustrate the contrasts in social organization and the transformation of lifeways that would take place in the Preclassic period (Clark & Cheetham 2002a). During the Archaic to Preclassic period transition, there was a

fundamental change from a seminomadic lifestyle of hunting, fishing, and gathering that was characteristic of the Archaic period to sedentary villages primarily dedicated to full-time agriculture. The clan or band-level social structure associated with the Paleo-Indian period gave way to the tribal structure in the Archaic period. By the Preclassic period, ranked and stratified societies would become the norm.

These changes may, in part, be attributable to the fact that the beginning of the Archaic Period in Mesoamerica (c. 7000 BCE) corresponded with major climatic and ecological deviations including the onset of the Holocene Climate Optimum (HCO), a significant warming period. Concomitant with the HCO was the disappearance of numerous species of large game animals (e.g., mammoth, mastodon, giant bison, ground sloth, camels, and horse) (Prescott et al. 2012). Rapid cultural and material adaptations to these new realities were required for human survival. Subsistence methods turned to the hunting of smaller game and a greater reliance was placed on marine and estuary resources. The collection of specific plant foods increased along with the initial appearance of plant domestication. These alterations meant less travel that allowed more time spent in the most productive areas. The combination of these factors could have facilitated the transition to the fully sedentary lifestyle that became the norm in the Preclassic period.

The Early, Middle, and Late Formative periods each witnessed significant, discrete socioeconomic changes. Recent research suggests that major deviations, such as the move to sedentary village life, the appearance of stratified societies, and hereditary inequality, did not occur universally or simultaneously across Mesoamerica. The origins and expansion of cultural characteristics, technologies, and beliefs were spatially uneven and temporally irregular. This information precludes broad generalizations about pan-Mesoamerican occurrences and indicates that an examination of the Preclassic period is facilitated by observing major changes and events from a synchronic, regionally focused approach.

The Southern Gulf Coast Lowland Olmec

Because of the pervasiveness and conflicting uses of the term "Olmec" in Preclassic Mesoamerican studies, a brief discussion of the term is relevant. The *Nahuatl* word *Olmeca* is an Aztec term used to describe the historic, Postclassic period people living along the southern coast of the Gulf of Mexico in the fifteenth and sixteenth centuries and the late Classic period *Olmeca-Xicalanca* of the central Mexican highlands (c. CE 650–900). The word has also become the label for an archaeological culture that occupied settlements in what is now southern Veracruz and Tabasco, Mexico, between c. 1250 and 400 BCE. The term has likewise been used to describe an art style evident in monumental stone and jade sculptures as well as ceramic figurines and pottery vessel decoration. Olmec has also been used to reflect ethnicity, cultural practices, and politico-religious entities.

The southern Gulf Coast lowland Olmec of the Early and Middle Formative periods are attributed with a number of Mesoamerican "firsts" (e.g., the first established complex society, the first great art style, the first monumental public works programs, the first city, and the first state). Details of these original, unprecedented features have been debated. Whatever the perspective, however, that the ancient Gulf Coast Olmec played a key role in the development of Mesoamerica as a culture area is undeniable (see Pool 2007).

The Gulf Coast Olmec are one of only a handful of "pristine" complex societies or civilizations anywhere in the world that developed without previous archetypes upon which to model their social structure (Diehl 2004: 11-2). The Early Formative period inhabitants of San Lorenzo (c. 1500–900 BCE), on a plateau overlooking the Coatzacoalcos River in Veracruz, was the only one of these antecedent societies to emerge in a forested, tropical, lowland environment. The sui generis development of social complexity among the inhabitants of the southern Gulf lowlands constitutes an example for the study of social theory both as a model and tool for evaluation. The uniqueness of their appearance and environmental circumscription,

plus the legacy of their cultural traits adopted by subsequent Mesoamerican societies, makes investigation of their social maturation critical to theorists.

In this entry, the Olmec are considered the culture group that lived along the southern Gulf Coast lowlands and are identifiable in the archaeological record by a shared array of concepts, values, and practices that established a communal worldview and imparted meaning to the cultural and physical surroundings. It should be noted, however, that the Gulf Coast Olmec were not a homogeneous or uniform entity across space and time. Perceived similarities in style and symbolism led to an early, simplistic view of the Olmec as a static, monolithic entity, whereas recent investigations show that local elite and leaders of sociopolitical centers along the coast selectively employed various traits and characteristics to meet the demands of their constituency (Diehl 2004; Doering 2007; Pool 2007).

The Early Formative Period (c. 2000–1000 BCE)

During the Early Formative period, the characteristic traits that would come to distinguish Mesoamerica as a culture region were first materialized. Patterns of social behavior emerged in small, agriculturally based, autonomous tribal villages that were widely scattered across the landscape: along the Pacific Coast of Chiapas and Guatemala; the southern Gulf Coast lowlands of Veracruz and Tabasco; the central Mexican highlands including the Basin of Mexico, Morelos, and Puebla; the Valley of Oaxaca; and the highlands and coasts of west Mexico. Incipient ceramic technologies (e.g., slips, pastes, forms, and decorations) and interregional long-distance acquisition networks foreshadowed more complex political economies and developing social inequality. Egalitarian societies sporadically gave way to rank societies where the production, distribution, and consumption of goods and materials were controlled, to some extent, by emergent elite rulers.

As population centers emerged and evolved during the Early Formative period, the presence of increasing social complexity was expressed in a variety of ways that included artistic and material articulations of wealth, authority, and ideological beliefs. Nevertheless, for all of the regional diversity of expression, there was uniformity in cultural features and attitudes (e.g., timekeeping and shamanic practices). Societal changes were sporadic, however. The timing and degree of change was largely related to the interaction sphere in which people participated. An example of this irregularity is illustrated through a basic regional comparison. West of the Isthmus of Tehuantepec, small widely dispersed highland villages were primarily dependent upon maize agriculture. Their ceramics and architecture were modest and utilitarian, and social complexity was not readily apparent. To the east of the Isthmus, denser settlement patterns included larger villages with elite residences and ballcourts. Ceramics were exceptionally well made, highly decorated, and varied in form. Besides a utilitarian function, they served as elite vessels for rituals and feasting. The subsistence system included root crop and maize agriculture and a significant use of wild and natural resources. The development of simple chiefdom societies led by shaman-chiefs is suggested by differential access to goods and resources.

The Soconusco Coast

The emergence of chiefdoms as a political entity represented a key shift in the type of sociopolitical organization seen in early Mesoamerica. Social ranking of individuals was determined by their perceived genealogical distance from the chief whether it be consanguinal (blood ties), affinal (marriage relations), or fictive. In this type of social arrangement, the ruler and the community were united within a social network of mutual obligation that was reinforced through economic interdependence and factional commitments.

One of the earliest and best documented appearances of chiefdoms in Mesoamerica took place at the site of Paso de la Amada, in the Mazatán region of Pacific Coastal Chiapas (Clark & Pye 2006). Changes in the regional settlement patterns caused Paso de la Amada to

become the largest in a centralized cluster of villages. The emergence of social and economic disparities is demonstrated by variations in burial practices and the presence of exotic, crafted artifacts. These objects were elite goods that signal the existence of a political economy directed by the chiefly elite, who exerts control over their access, production, and distribution.

The earliest ceramic traditions of the Mazatán region of Pacific Coastal Chiapas, Mexico, were arguably the benchmark of Early Formative period artisanship. The Barra phase (c. 1800–1650 BCE) witnessed the initial settlement across the area and the first regional appearance of pottery. Barra phase ceramic vessels were sophisticated in their production, design, and decoration. Additionally, two architectural features at Paso de la Amada demonstrate its development as an early chiefdom society. The "chief's house," (Mound 6) was a broad platform that supported a residence several times larger than the average in the village. The platform and its superstructure were rebuilt in the exact same location on at least six different occasions over a 200- to 300-year span. Recent interpretations suggest that the structure served both domestic as well as public purposes and was the center of the settlement's ceremonial zone (Blake 2011).

The second major architectural feature was the presence of the earliest known ballcourt in Mesoamerica. The rubber ballgame is a primary element in Mesoamerican tradition, and its role in ancient, historical, and modern times is significant (see Scarborough & Wilcox 1991). The ballcourt, initially constructed and remodeled between 1400 and 1250 BCE, was composed of two parallel mounds bordering a 77-m-long alleyway. The essential characteristics of this design would be adhered to by all later Mesoamerican ballcourt construction, indicating that by the Early Formative period, a fundamental Mesoamerican architectural concept had already been articulated.

The Valley of Oaxaca

Developments that transpired here provide another perspective on sociopolitical events of Early Formative Mesoamerica. Human occupation in the valley can be traced back at the Cueva Blanca rockshelter to least 10,000 BCE, and Guilá Naquitz (c. 8900–6700 BCE) and Gheo-Shih (c. 5000–3000 BCE) may have foreshadowed the early Mesoamerican villages of the Preclassic period and provide evidence of occupational continuity in the region. Unpredictable rainfall in the valley (1,500-m elevation) led to unreliable wild food resources that encouraged highland foragers to adopt a more stable agriculture subsistence system. Domesticated maize, beans, and squash were present by the beginning of the Early Formative period in permanent villages that dotted the landscape. At San José Mogote and Tierras Largas, the presence of pottery from the Esperidión ceramic complex (c. 1900–1400 BCE) is thought to be one of the oldest in Mesoamerica. The vessels were utilitarian in nature; repetitive in design, production, and function; and lacked decoration.

By the Tierras Largas phase (c. 1400–1150 BCE), less than two dozen, small hamlets of several small wattle and daub houses existed. The exception to this pattern was San José Mogote, which was about twice the average size in area and population. During the San José phase (c. 1150–850 BCE), the village was the center of a chiefdom and the ritual and economic hub of the valley with an evolving social and political hierarchy. The elite controlled the procurement, production, and distribution of items crafted from acquired local and distant materials (e.g., iron-ore, marine shell from the Pacific Coast and obsidian from central Mexico and Guatemala).

The presence of the earliest defensive palisade in Mexico, along with other evidence, suggests that the acquisition of power and prestige in the valley required coercion of or conflict with neighboring communities. This situation appears to be anomalous when considering other Early Formative period regions where allusion to warfare is, at best, questionable. Perhaps, due to the limited and restricted resources in the valley, the potential for conflict should not be unexpected, and the use of physical force would become a prominent part of the valley's subsequent history.

West Mexico

The beginning of the Early Formative period in west Mexico is considered a continuation of the preceding Archaic pattern. Hundreds of shell mounds were constructed along the coasts of Sinaloa and Nayarit, and contained stone implements from an Archaic-style toolkit. Some of these mounds were immense, covering areas in excess of 3,000 m^2. Their size, shape, and construction have suggested that they were actually examples of monumental architecture as opposed to simply trash middens.

Many questions about west Mexico as culture region remain, and its perception has been obscured by a dearth of investigation. This situation is rapidly changing and recent research is beginning to fill-in the blanks (see Beekman 2010). The region (i.e., the Mexican states of Nayarit, Jalisco, Colima, Michoacán, and the southern parts of Sinaloa, Zacatecas, Guanajuato, and Querétaro) followed an atypical cultural trajectory compared to other parts of Mesoamerica. Differences in cultural manifestations may be attributable to different linguistic traditions (Otomanguean, Purépecha, and southern Uto-Aztecan) (Beekman 2010). Additionally, variations can be partially ascribed to regional climatic and environmental conditions that required alternative ways of materializing similar Mesoamerican ideological beliefs.

By c. 1300 BCE, shaft tombs at El Opeño, Michoacán, were constructed and were significantly different from burial practices in eastern Mesoamerica. Their creators and their motivations remain obscure as tomb construction coincided with volcanic activity that covered the tomb sites and obscured the associated residential. Recent interpretations, however, have related tomb construction and content to shared pan-Mesoamerican themes related to the underworld and ancestor veneration. Evidence suggestive of auto-sacrifice has been uncovered, as have ceramic figurines of individuals wearing attire used in the rubber ballgame. These are notable indications of a broader Mesoamerican tradition that included west Mexico. Contemporaneous with El Opeño was the Capacha archaeological culture, in the state of Colima. Here, the earliest ceramic horizon for the Jalisco-Colima-Nayarit area were uncovered and included "stirrup-spout" vessels that suggest similarities with items found among the Tlatilco culture of the central Mexican highlands.

There was a comparatively late transition to agriculture, possibly a result of an extended dry phase in west Mexico during the Archaic period. Ceramic traditions also appeared later and have been associated with northwestern South America (e.g., the use of resist and red-on-brown decoration along with exotic bottle forms) (Anawalt 1998). West Mexican ceramic elements were also shared with sites like Tlatilco, in the Basin of Mexico, whose pottery exhibits ties to both the east and west Mesoamerica. West Mexico's participation in long-distance acquisition networks also demonstrates the two-way movement of materials and ideas. Jade from Guatemala's Motagua River Valley, iron pyrite mirrors suggestive of those from Oaxaca, and marine shell from the Atlantic Coast illustrate the scope of these socioeconomic systems. Obsidian exchange indicates the mutual nature of these transactions (e.g., green obsidian from Pachuca in central Mexico is present in west Mexico, and the jet black obsidian from the Ucareo source in Michoacán is found as far east as the Pacific Coast of Chiapas).

The Southern Gulf Coast Lowlands and the San Lorenzo Olmec

At the beginning of the Early Formative period (c. 2000–1800 BCE), the southern Gulf Coast lowlands of Veracruz and Tabasco were subjected to climatic change, natural hazards, and landscape transformation (e.g., hurricanes, El Niños, La Niñas, annual inundations, earthquakes, and volcanic activity). It was also exceedingly fertile and abundant in flora and fauna. Village farming extended northward across the Isthmus of Tehuantepec from the Soconusco Coast of Chiapas and was readily adopted in the Gulf lowlands.

Evidence of sedentary occupation along the lowlands included the presence of a sequence of the earliest regional ceramic horizons. The initial Ojochí phase pottery (c. 1500–1350 BCE) bore

similarities to materials from the Mazatán region. Ojochí, along with Bajío, and Chicharras phase ceramics (c. 1350–1150 BCE) have been uncovered at four sites along the San Juan and the Coatzacoalcos Rivers: El Marquesillo, Cuatotolapan Viejo, Estero Rabón-San Isidro, and San Lorenzo (Coe & Diehl 1980; Doering 2007: 249–252). Although each of these sites would eventually become socioeconomic centers in their own right, it was San Lorenzo that would become the most important Early Formative period site in Mesoamerica.

The southern Gulf Coast lowland Olmec is an archaeological culture that first recognized as such around 1250 BCE, in the swampy lowlands of Veracruz, Mexico, along the northern edge of the Isthmus of Tehuantepec. These Olmec are credited with being the first established complex society in Mesoamerica, and it was at the site of San Lorenzo that they first demonstrated a suite of features and characteristics that would have a profound impact on contemporaneous and subsequent Mesoamerican peoples. The nature and extent of that impact has been an issue of debate (Sharer & Grove 1989; Blomster et al. 2005). Nevertheless, whatever one's position regarding the role of the San Lorenzo Olmec in the social development and ideological trajectory of Mesoamerica, the cultural, artistic, and monumental features demonstrated in the archaeological record there are prodigious when compared to any other Early Formative period settlement.

Prior to around 1400 BCE, San Lorenzo was a 20-ha, egalitarian village located atop a 50-m-high plateau adjacent to the Coatzacoalcos River in the southeastern Veracruz. By 1100 BCE the village had evolved into, arguably, a state-level society and grown to at least 500 ha (1,235 acres) with an estimated population of 10,000 and an additional 20,000–40,000 people living in the contiguous region (Clark 2007). The plateau had become a major urban center of political, economic, and religious power that headed a four-tiered settlement hierarchy. To demonstrate and support their claim to leadership, the elite controlled extensive interregional trade and acquisition networks, corps of highly skilled craftspeople, and a symbolic monumental art form that would become synonymous with their archaeological name. But for all its impressive and significant achievements, by the end of the Early Formative period, San Lorenzo would decline to relative insignificance.

Some 15 km southeast of San Lorenzo lies the sacred site of El Manatí, an anaerobic spring used for the ritual deposition of offerings that included wooden sculptures, rubber balls, jade celts, and other items, including the infant burials. The offerings were deposited in three discrete phases, Manatí A (c. 1700–1500 BCE), Manatí B (c. 1500–1400 BCE), and Manatí A (c. 1400–1200 BCE), and contained information regarding Olmec ritual practices during the Early Formative period (Ortíz & Rodríguez 1993). Several artifact types are of particular note. Nine rubber balls used in the Mesoamerican ball game were recovered from the Manatí A deposit making them the earliest examples known in Mesoamerica (see The Soconusco Coast section above). Numerous celts made of jade from the distant Motagua River Valley of Guatemala were also recovered from this initial deposit. The fact that these celts were exceedingly well made and unusually highly polished suggests that the production and veneration of jade objects is deeply rooted earlier in Mesoamerican history.

The Central Mexico Highlands

In Morelos, sedentary farming villages of 100–200 inhabitants were scattered across the Amatzinac Valley bottomlands during the Amate phase (c. 1500–1100 BCE). During the Barranca phase (c. 1100–700 BCE), Chalcatzingo began to grow and emerge as a civic-ceremonial center that would reach its peak in the ensuing Middle Formative period. The beginnings of landscape modification and architectural constructions at the site were coeval with its participation in what is referred to as the Tlatilco culture that developed between 1250 and 800 BCE. The Tlatilco culture has typically been more closely associated with the Basin of Mexico and the sites of Tlatilco, Tlapacoya, and Coapexco, but recent

research suggest its origins may be in the Morelos region (Grove 2007). Ceramic connections with groups from west Mexico have also been observed (Williams 2004). During the period, stratified social structures corresponded to more elaborate settlement patterns and a substantial escalation in long-distance exchange that may account for a degree of the Olmec art style present within the artifact assemblages.

Maya Lowlands

During the Early Formative period, small, widely dispersed communities of people who participated in a mixed economy of hunting, gathering, and farming and who were perhaps Maya speakers dotted the lowland landscape of southeastern Mesoamerica. In the opening centuries of the Middle Formative period, Maya centers of the northern Petén region of Guatemala would begin to develop the sociopolitical foundations that would support and facilitate the eventual emergence of the Classic Maya.

The Middle Formative Period (c. 1000–400 BCE)

"The Middle Formative period. . .across Mesoamerica was qualitatively different from what preceded it" (Grove 2007: 220). Momentous socioeconomic, political, and ideological transitions occurred during the Early Formative period that laid the foundation upon which Mesoamerica would grow to become a distinct culture area. During the Middle Formative, the transition to settled life and expanding populations occurred throughout Mesoamerica. Although cultural regionalism increased with small villages coalescing into urban areas, an Olmec presence was still widely apparent. Monumental stone carvings, considered to be in the La Venta Olmec style, were erected at important trade centers and along routes. Ceramic industries intensified and new techniques were developed. The neckless jars (*tecomates*), common in the Early Formative Period, were replaced by a more durable pottery decorated with incised lines, frequently referred to as double-line break (see Tolstoy et al. 1977: 98).

Materials and ideas flowed in multiple directions between centers, and fundamental social, political, and economic transformations were accelerating across all of Mesoamerica, changes that would profoundly affect all future Mesoamerican societies. The scope and scale of interaction was amplified as populations increased rapidly and less desirable agricultural regions were settled. Local chiefdoms proliferated along with complex alliances, exchange networks, and increased competition for natural resources and exotic products.

The upsurge was led by a growing elite class who needed to communicate their status and affirm their right to rule. The new elites used their wealth and power to define their social identities through material possessions and public expressions. A rapid expansion in the demand for exotic materials forced changes to the structure and content of newly evolving interregional networks. Correspondences in the material demonstration of public identities suggest these leaders participated, to varying degrees, in an interaction sphere that carried a suite of shared economic, political, symbolic principles and ideological concepts (Joyce and Grove 1999: 12). Results of this participation allowed the expression of status or corporate membership that differentiated individuals or factions from the rest of society while, at the same time, confirming the community's position within a pan-Mesoamerican system that was recognizable to distant peers.

The degree of similarity in the materialization and expression of power, wealth, and authority among emergent elite across Mesoamerica was remarkable, so much so that differences were a matter of scale and extent, not content. Because of this high level of correspondence, the collective manifestation of these expressions by the elite of a community is referred to here as the *Middle Formative Paradigm*. Diagnostic elements of the paradigm included designed, architectural complexes (e.g., pyramids, plazas, special use structures, and ballcourts) and water management systems; iconic ceramic vessels and figurines; high-status burials and ritual deposits; narrative bas-relief stone sculpture; and long-distance acquisition of exotic items, luxury goods, and resources (i.e., obsidian, jade,

greenstone, marine shell, and iron ore). The Gulf Coast Olmec tradition was carried on at La Venta, the Zapotec culture arose at Monte Alban in the Valley of Oaxaca, and multiethnic groups surged at Teotihuacan in the Valley of Mexico. The Maya civilization grew and proliferated across much of Guatemala, Belize, the Yucatán Peninsula, and Honduras. All these societies participated in the Middle Formative Paradigm.

Population growth was a major factor in numerous transformational processes, and expanded agricultural activities played a significant role in their development. Maize has been acknowledged as the primary agricultural product in Mesoamerica (Staller et al. 2009). Although there is evidence for the cultivation of maize as far back as 5000–7000 BCE (e.g., pollen, plant remains, land clearing, and groundstone implements), direct evidence for its consumption as a dietary staple (i.e., stable isotope analysis of bone collagen, bone apatite, and tooth enamel) is not present until around 1000 BCE (van der Warker 2006), precisely the time of the population increase across Mesoamerica. Perhaps an underlying factor that propelled the demographic upsurge was the process of "nixtamalization," a maize preparation practice that has a number of significant benefits, possibly the greatest of which is the substantial increase in nutritional value. Nixtamalized maize was so superior to the unprocessed type that without it some believe Mesoamerican civilization would have not progressed beyond the village level (Coe 1994).

Chiefdoms were the primary forms of social organization in Middle Formative period Mesoamerica; but they were relatively unstable, inclined to cycles of fragmentation, renewal, and expansion. The chiefly or elite ruling class is usually lineage-based, and an individual's role or social status within the chiefdom was generally determined by kinship. Middle Formative period chiefdom societies changed rapidly along with their power and prominence and can be better appreciated through a regional perspective.

The Pacific Coast

The southeastern terminus of Preclassic Mesoamerica was the Ahuachapán region of El Salvador where, during the Early Formative period, settlement consisted of modest farming villages. During the early Middle Formative period (c. 900–650 BCE), Chalchuapa developed into a major trade colony, possibly as a result of La Venta Olmec interest in local materials (e.g., Ixtepeque obsidian and greenstone). At El Trapiche, a northern portion of the settlement, construction of a massive 20-m-high platform took place, and at Las Victorias, the site grew into a leading political and religious center containing a massive boulder carved with multiple Olmec-style figures.

Some 700 km northwest along the coast, at the southern terminus of the Isthmus of Tehuantepec, was the site of Laguna Zope. Between 800 and 400 BCE, Laguna Zope was a major trade center that specialized in the export of locally collected marine shell as well as acting as a redistribution point for materials originating in the Guatemala highlands (e.g., obsidian and jade). An intercoastal waterway and riverine system along the Pacific Coast between El Salvador and Oaxaca provided an almost unbroken stretch of flat water for the transport of goods and materials, a system that was actively maintained up to the beginning of the twentieth century. Adjoining this route were numerous sites that contain carved stone monuments that share common content and artistic canons associated with the major southern Gulf Coast Olmec center of La Venta (Clark & Pye 2000b).

Following the decline of sites in the Mazatán region, La Blanca, Guatemala (c. 900–600 BCE), became one of Mesoamerica's largest Middle Formative period sites and contained one of the earliest examples of the Mesoamerican temple pyramid and, at 25 m, the tallest on the Pacific lowlands. La Blanca also exhibited one of the earliest examples of the quatrefoil shape, an iconographic feature that represented a portal to the underworld. Around 600 BCE, the nearby site of Ujuxte would replace La Blanca as the dominant regional center. Several other sites along the Pacific Coastal plains and adjoining piedmont (e.g., Izapa, Takalik Abaj, and Chocola) were developing population centers that would flourish in the Late Formative period.

Highland Guatemala

Small farming villages occupied many of the highland valleys of Guatemala during the Early Formative period. The appearance of Arevalo phase ceramics (c. 1200–1000 BCE) at the settlement of Kaminaljuyú, located in present-day Guatemala City, was the first evidence of occupation that would last through the Late Classic (c. CE 900). During the Middle Formative period, Kaminaljuyú demonstrated considerable social complexity as it evolved into an administrative center thought to control the vast El Chayal obsidian source and the jade supply along the Motagua River Valley. The La Venta Olmecs were major importers of these commodities, and a trail of these materials follows a key riverine transport system between the Guatemalan highlands and the Gulf Coast that included such sites as La Libertad, Chiapa de Corzo, San Isidro, and others in Chiapas.

During the Las Charcas to Providencia phases at Kaminaljuyú (c. 100–400 BCE), population grew and all the elements of the Middle Formative Paradigm appeared. These factors indicate a centralization of authority by the settlement's elite leaders as they built the highland polity into a dominant socioeconomic capital. Sacrificial victims and captives become apparent on sculptures and burials indicate status differentiation. Similar events took place in the nearby Salama Valley, albeit to a lesser scale, as elites emerged and adhered to the Middle Formative period model.

Guerrero

The mountainous regions of Guerrero have produced evidence (e.g., carved greenstone objects, monumental stone sculpture, and cave paintings) that suggests a significant connection to the southern Gulf Coast Olmec. Teopantecuanitlán, an important regional site that demonstrates this connection, was initially occupied around 1400 BCE and reached its height in population and social complexity around c. 1000–800 BCE (Martínez Donjuán 1996). Various lines of evidence demonstrate that the leaders were adherents to the Middle Formative Paradigm and participants in an interregional exchange network that included the Pacific Coast, the central Mexico highlands, Chalcatzingo in Morelos, the southern Gulf Coast, and potentially the distant Maya lowlands. Acquisition of imported marine shell and obsidian from a variety of distant sources provided materials for the production of luxury goods.

The presence of ceremonial architecture, water management systems, monumental stone sculpture, and Olmec-style ceramic wares demonstrated affinities with the Gulf Coast Olmec. The corbelled arch or vault architectural feature is so closely associated with the Maya that it is called a Mayan arch. Yet, it was at Teopantecuanitlán that this architectural feature was first utilized in Mesoamerica, and raises the question as to how and why this distinctive characteristic may have made its way to the Maya lowlands. Paintings in the Juxtlahuaca Cave and Oxtotitlán rockshelter are two further examples of art and iconography that have been associated with the Olmec art style (Grove 1970). These sites are in remote canyons and not related to any major settlement; yet they are well developed in their execution, suggesting an established tradition. Mural painting is not common in the Middle Formative period; but the theme, content, and chronology have been associated with the southern Gulf Coast and its symbolism and portraiture.

The Valley of Oaxaca

The site of San José Mogote, in the Valley of Oaxaca, was established in the Early Formative period (c. 1400 BCE) and represents one of the region's first permanent agricultural villages and among the first to use pottery (Flannery 1968). The site has been attributed with being the originator of a number of significant sociocultural and political features (e.g., initial appearance of public architectural structures, earliest hieroglyphic writing, and institutionalized lineages). San José Mogote played a major, long-term role in the Valley of Oaxaca's sociopolitical development and was clearly the precursor to the Late Formative period civic-ceremonial center of Monte Albán. Recent analyses have tempered some of the original claims about San José Mogote, however

(Clark 2004; Pool 2007: 198-205; Rosenswig 2010). Near the end of the Middle Formative period, the Zapotec people were implementing artificially terraced hillsides and canal irrigation techniques. Evidence of increasing conflict, captive sacrifice, and defensive fortifications has been attributed to aggressive competition for limited resources of the valley. These factors support the rapid ascension of Monte Albán at the strategic hilltop location at the intersection of the three branches of the valley.

West Mexico

Information regarding west Mexico's socioeconomic and localized centralization of political control during the Middle Formative period is derived primarily from evidence recovered from mortuary features. The shaft tomb tradition of this region that began around 1300 BCE and continued into the Middle Formative period is thought to be lineage-related and contained sumptuous imported objects that demonstrated the status and wealth of the interred families. These practices expanded across the region as wealth and status appears to have been derived by membership in corporate social groups.

Based on the funerary objects, it is clear that west Mexico increased its participation in multiple long-distance interaction spheres. These systems involved not only contact with the most distant parts of Mesoamerica (e.g., jade from the Motagua Valley of Guatemala, Pacific and Atlantic Coast marine shell, Oaxaca iron pyrite mirrors, and central Mexican obsidian) but also interaction with northern Mexico and New Mexico was demonstrated by the presence of turquoise. At the same time, local materials and technologies were being circulated to other regions. Obsidian from Michoacán's Ucareo source is found in the Basin of Mexico, the Oaxaca Valley, and the Gulf Coast. A unique style of circular mounded architecture that originated in west Mexico is seen at distant regions such as Cuicuilco, in the Basin of Mexico, and Capacha and El Opeño ceramic types are found at the contemporaneous site of Tlatilco.

There are two factors that should be noted about west Mexico. First is that evidence of the Olmec art style in the region is visibly absent at this time. Second is that the region continued to display ancient associations with northwestern South America, specifically Ecuador (Townsend 1998; Callaghan 2003). The number and type of associations and the supporting evidence (e.g., archaeological, biological, technical, metallurgical, and ethnohistoric) suggest the possibility of recurrent contact be considered when evaluating the development and trajectory of west Mexican culture.

The Southern Gulf Coast Lowlands and the La Venta Olmec

The final phase of the Olmec phenomenon occurred during the Middle Formative period with La Venta taking up the cultural mantle left by San Lorenzo's relatively rapid and not fully understood decline. The capital of La Venta was located within a dynamic Tonalá riverine system in present-day Tabasco and was the leading example of complex society in Middle Formative period Mesoamerica. The city's elite imported goods and materials from across Mesoamerica and established the benchmarks for the materialization of the Middle Formative Paradigm (e.g., jade and greenstone objects, planned civic-ceremonial architecture and water management system, monumental stone carving, and "massive offerings"). It disseminated ideological and artistic canons directly related to maize and possibly distributing agricultural or technological techniques (Reilly 1995; Taube 2000).

Widely dispersed populations shifted into more nuclear centers across the alluvial lowlands of the southern Gulf Coast, possibly in response to volcanic activity in the Tuxtla Mountains and regional climatic changes. Along the middle San Juan River, continuation of El Marquesillo's occupation was evident in its architectural and ceramic development. El Viejón, on the Gulf Coast, may have operated as a commercial control station for La Venta and was the northernmost site with direct Olmec connections (Wilkerson 1981). Olmec-related jade and portable art items have been uncovered around the El Pital region of north-central Veracruz, and Middle Formative period communities around the Pánuco region expanded the northern boundaries of Mesoamerica

along the Gulf Coast. Smaller, less-concentrated populations may account for the slower development of social complexity in the region. Tres Zapotes, east of the Papaloapan River, produced monumental stone sculpture and demonstrated a chiefdom-level society that would continue into the epi-Olmec period.

The Central Mexico Highlands

During the Barranca phase at Chalcatzingo in Morelos (c. 1100–700 BCE), the modest public architecture of the Early Formative period was replaced by a series of modified terraces that transformed the earlier village and added an elite house compound for the chiefly lineage. A series of bas-relief narratives were carved on stone boulders and outcrops during the Cantera phase (c. 700–500 BCE) and were directionally distributed with ideological representations to the south and depictions of political rulership placed in the elite residential area to the north. Although evidence suggests a small population, the presence of monumental architecture, exotic elite goods, and a large carved stone corpus, the settlement represents a major regional center with substantial connections to the Gulf Coast, Guerrero, and the Pacific Coast (Grove 1987).

In the Basin of Mexico, the development of political and ideological complexity has been seen as trailing behind those of southern Mexico. Settlement along the southern portions of the basin was limited to small villages occupied by members of the Tlatilco culture (e.g., El Arbolillo and Zacatenco) (Sanders et al. 1979). In the site of Tlatilco, evidence of Early Formative Olmec influence underwent a significant change around 1000 BCE. Iconographic and stylistic modifications presented a more local type of expression that may represent modifications in ideological practices, perhaps as a result of the decline of San Lorenzo (Niederberger 2000). By c. 700 BCE, Cuicuilco became a dominant center in the Valley of Mexico, where attributes of the Tlatilco culture were no longer evident. Cuicuilco would prevail as the valley's major civic-ceremonial center, but Cuautlalpan and Chimalhuacan were also large settlements along the southern and eastern shores of Lake Texcoco. These autonomous centers shared the landscape until around 150 BCE, when Teotihuacan would rise to become the largest urban center in Mesoamerica. The development of rank societies would spread sporadically across the valley and into the neighboring areas of Tlaxcala and Puebla.

The Maya Region

Occupied from c. 1400 BCE, the Maya region, including the Yucatán Peninsula, had more or less followed the same socioeconomic and political trajectory as much of the rest of Mesoamerica. Small, dispersed agricultural villages of 100–200 inhabitants dotted the lowland landscape. That scenario began to change when exotic objects and elite luxury items were imported around 900–750 BCE, at sites like Seibal and Altar de Sacrificios (Estrada-Belli 2011). At the site of Nakbe, in the Mirador Basin of the northern Guatemala Petén, construction of monumental architecture began c. 600–350 BCE. Following earlier southern Gulf Coast traditions, standing carved stone monuments (stelae) were placed atop platform structures c. 500–300 BCE. A network of causeways would be built to link emerging settlements within the basin, including El Mirador, El Tintal, and Wakna, that would, during the following Late Formative period, alter the political geography of the southeastern Mesoamerica (Morales Aguilar et al. 2008).

At the site of Cuello, Belize, during the Swasey phase (c. 1200–900 BCE), the establishment of maize agriculture and the introduction of ceramic technology are evident. In the following Bladen phase (c. 900–650 BCE), ceramic associations expanded to the lowlands around the Pasíon River basin, and obsidian and jade were imported from southern Guatemala. Elite wealth and ascribed status were demonstrated in residential contexts and child burials. Mayas from settlements in the southern Petén migrated north along the west coast of the Yucatán Peninsula setting up permanent settlements at Dzibilchaltún, Dzibilnocac, and Komchen. Later incursions by Maya from Belize and the eastern Petén moved northward along the eastern coast of the peninsula (Estrada-Belli 2011).

Southeast Mesoamerica

The eastern boundaries of Mesoamerica during the Preclassic period extended roughly from the Bay of Tela, on the Caribbean Coast of Honduras, south to the Gulf of Fonseca on El Salvador's Pacific Coast. In the Ulua River Valley of Honduras, the settlement at Puerto Escondido contained an exceptionally large mound structure possibly for civic functions (Joyce 2004). At Playa de los Muertos, child burials contained jade and other objects, while an adult burial at the site contained only unadorned skeletal remains, signs that demonstrate ascribed status. At both sites, artifacts included Olmec-related styles and motifs. Further to the south, Los Naranjos and Yarumela each were anchored by large 20-m-high mound structures. Their location along a well-traveled communication route and the presence of marine shell, jade, nonlocal obsidian, exotic ceramics, and other luxury commodities suggest these settlements were trade outposts for the movement of Olmec-related materials.

The Late Formative Period (c. 400 BCE – CE 250)

A number of significant socioeconomic and political episodes occurred across Mesoamerica during the Late Formative period. The cultural vacuum created by the demise of La Venta, and with it the southern Gulf Coast Olmec civilization was filled by a variety of emergent successors. Major cities and states arose in the Valley of Oaxaca, the Mirador Basin, the Guatemala highlands, and at the urban colossus of Teotihuacán in the Valley of Mexico. Regional hegemony and local cultural integration became the new model for sociopolitical structure, and elite rulers put greater social distance between themselves and their constituents, and conflict became commonplace across Mesoamerica.

Generalized traits continued to permeate much of Mesoamerica. Shared characteristics involved similarities in ceramic horizons, the construction of temple-pyramids, and common burial practices. Widespread, intensive agricultural practices (e.g., terracing, irrigation, and raised fields) were developed and implemented to provide the increased subsistence production needed to support rapidly growing populations. The ways in which Middle Formative period elite leaders distinguished themselves from their constituents (e.g., acquisition of exotic and luxury goods, conducting labor intensive public works projects, and commission monumental stone sculpture) were expanded.

Religious and ideological traditions were refined, reinforced, and facilitated through the use of emergent writing systems. Recent research into Mesoamerica epigraphy and iconography demonstrates that the Late Formative period was a pivotal time in the evolution of writing and calendric systems (Justeson & Kaufman 1993; Kaufman & Justeson 2009). Embedded on sculpted monuments were messages that "articulated political ideologies and complex cosmological themes, and formed a shared language of power that was employed by rulers in a Late Preclassic communication sphere" (Guernsey 2006: 1). Early evidence of writing occurred in the Valley of Oaxaca, Chiapas, Guatemala, and Veracruz.

The Pacific Coast

The ethnic affiliations and political relationships along the Pacific Coast during the Late Formative period remain uncertain as numerous, diverse groups occupied the region. A series of sites – Izapa, in the west; El Ujuxte; Takalik Abaj; Chocola; and Kaminaljuyú, in the east – had the unusual distinction of all being major centers, located within a 40- to 60-km distance from one another, that experienced their phases of florescence at the same time. Izapa is a large center near modern-day Tapachula, Chiapas, that contains multiple complexes of earthen mounds and platforms, but its notoriety stems from the large number of carved stone monuments that depict scenes of rulers, deities, and creation myths in an iconic language of power and authority. The Izapan civilization has been heralded as a cultural intermediary between the earlier Olmec and later Maya, and although this hypothesis has some support, it is an oversimplification of the evidence.

The major Middle Formative period capital of La Blanca was replaced by El Ujuxte, a Mixe-Zoquean center with a three-tiered settlement hierarchy that may have withstood the regional Maya expansion (see Love 2007). The site of Takalik Abaj, east of Izapa, on the Pacific Piedmont of Guatemala, contains one of the most eclectic assemblages of monumental stone sculpture in all of Mesoamerica, including examples of regional Pacific Coast and piedmont styles as well as southern Gulf Coast Olmec, Izapan, and early Maya styles. This diversity may be attributed to the settlement's location at the boundaries of multiple linguistic and cultural areas. Sculptural styles identified as Olmec or Olmecoid, Izapan, Pacific Coast, and Maya. Chocola, located just to the east of Takalik Abaj, shares some traits with its neighbor, such as cacao production and water management systems. It cultural affiliations, however, appear more closely tied to the major settlement of Kaminaljuyú, on the western edge of present-day Guatemala City.

The Valley of Oaxaca

The establishment of Monte Albán in a previously uninhabited area at the center of the valley around 500 BCE, represented a monumental transformation in the regional sociopolitical structure and settlement patterning. Populations from various settlements across the valley were shifted to the site, which was defensively positioned on an elevated plateau 400 m above the valley floor. Architectural complexes built on the leveled mountain top appear to have been constructed according to a master plan. They contained a formal ballcourt, plazas, patios, temple-pyramids, and a possible astronomical observatory, and in the Mesoamerican tradition, earlier structures were later built over. Cultural influences from southeastern Mexico were demonstrated in the form of ceramic traditions, and iconographic representations of vanquished captives (*danzantes*) and Zapotec place name glyphs were incorporated into the designs of structures and public areas. Issues of access to water and agricultural lands would have required new, more stringent methods for the control of labor and management of resources.

West Mexico

The Late Formative period in west Mexico is characterized by rapid population growth and attempts made to consolidate political power at regional centers. There was also expansion by farming groups into previously unoccupied areas including the Bajío region, north of the Lerma River Valley. This movement extended the northern boundaries of the Mesoamerican culture area. Associated with this expansion was the Chupícuaro culture, named after the southeastern Guanajuato site where high-quality ceramics were produced between 600 and 100 BCE. Recently, shaft tombs were uncovered at Chupícuaro sites that contained objects similar to those found across the western highlands (e.g., solid and hollow human figurines, shell imported from the Pacific and Gulf Coasts). Although these similarities demonstrate the long-term continuity of this cultural trait across much of west Mexico, differences in the richness of the tombs' contents and their proximity to public architecture imply social inequality (Beekman 2010).

The shaft tomb tradition of west Mexico has its antecedents in the Early Formative period, and it continued to expand throughout the Preclassic period. The rise of the Teuchitlán tradition (c. 200 BCE–CE 200) is considered an extension of the earlier shaft tomb tradition of west Mexico. The rise of the Teuchitlán tradition (c. 200 BCE–CE 200) is considered an extension of the earlier shaft tomb tradition of west Mexico, and is notable for its new architectural style of circular central plazas and conical step pyramids that were regulated by the elite. Larger sites, such as Los Guachimontones, became the model with fortified, defensive sites surrounding the major centers, suggesting political tensions.

The Southern Gulf Coast Lowlands

The Olmec phenomenon had come to an end by the Late Formative period, and significant changes occurred throughout the region. Tres Zapotes, which exhibited some remnants of the ancient Olmec society, underwent substantial transformation, a portion of which has been

linked to the Izapan culture on the Pacific Coast of Chiapas. A primary example of this connection is Stela C, an Izapa-style mask that was carved into one side of the stone monument, while the other side contained one of the earliest Long Count dates of 31 BCE. Such an early date has raised ideas that the Long Count calendric system, which had been considered a Maya innovation, was established in the Late Formative by epi-Olmec peoples outside the Maya region. Elsewhere, there was acceleration in the development of cultural complexity that expanded along the Gulf Coast from the Tuxtla Mountains to the Panuco River area. Cerro de las Mesas was established as a regional center in the Mixtequilla area of the Papaloapan River basin, just to the west of what was the Olmec heartland, beginning around 600 BCE. To the north, the Remojadas culture began its emergence. A major feature in the region was the appearance of an Epi-Olmec or Isthmian hieroglyphic script written in the Zoquean language that is still spoken in the region. The most renowned example is the La Mojarra Stela, a 4-t limestone slab that holds some 535 glyphs. A tentative decipherment of the text suggests an account of warfare, ritual performance, and celestial events that document a ruler's rise to power. This format would become the widely accepted method of propagandizing by rulers throughout Mesoamerica in the following Classic period.

The Central Mexico Highlands

Cuicuilco continued as one of the largest and most important settlements into the Late Formative period. Possibly the earliest stone pyramid on the Mexican plateau was constructed at the site. The circular structure is thought to be dedicated to the famed of Mesoamerican deity *Quetzalcóatl*. The site was abandoned around 300–400 CE, when a lava flow from the nearby Xitle Volcano. The exodus from the site probably led to immigration to Teotihuacán at the north end of the basin.

Midway through the Late Formative period (c. 200 BCE), the site of Teotihuacan was established on a 2,000-m-high plateau in the northeastern part of the Basin of Mexico, and by CE 200, it had become the largest (20 km^2), most populated (80,000–100,000 residents), and most dominant city in Mesoamerica. Within a few centuries, the influence of Teotihuacan would be felt across the majority of Mesoamerica. The early stages of its development are not well understood, but there is little question its leaders were intent on constructing more than a center of commerce. Monumental construction was initiated along a mile-long "Avenue of the Dead," immigration from distant locales ensued, burgeoning agricultural production and intensive utilization of natural resources took place, technological innovations emerged, and new religious institutions and sociopolitical organizations were established. Much of the city's power appears to have been derived from the ideological materialization of inspirational deities and cosmology. The center's supremacy was supported through intensive production and export of goods and materials and a consequent dissemination of its ideology.

Guerrero

Most of the activity in Guerrero during the Late Formative period occurred around the Balsas River drainage. Middle Formative period, Olmec-related sites at Teopantecuanitlán, Oxtotitlán, Amuco, and Juxtlahuaca demonstrated the regions significance to earlier cultural development. During the Late Formative period, the region continued to act as a cultural interface that included the Mezcala and Chumbícuaro cultures, and shaft tombs of the west Mexico tradition were found in Tepalcatepec Valley. Recently, at site of Cuetlajuchitlán (c. 600 BCE–CE 200), a well-developed series of interrelated architectural complexes was uncovered. The urban design included civic-ceremonial structures, water supply systems, and sunken patios. Materials from across Mesoamerica were present at the site demonstrating it served as a major trading center that facilitated the movement of goods to and from the central Mexican highlands to the Pacific Coast.

The Maya Region

Between 600 BCE and CE 100, the Mirador Basin in the northern area of the Guatemalan Petén was the epicenter of the development of Maya social complexity with the concurrent emergence of sites like Nakbe, El Mirador, El Tintal, and Wakna. These sites were of a spatial magnitude that had never been seen previously anywhere in Mesoamerica, and would not be seen again in the Maya region, even during the Maya "Golden Age" of the Classic period. Population in the basin exceeded 100,000, and the Danta Complex at El Mirador was the tallest pre-Columbian structure in the New World. Tikal and Calakmul were contemporaneous centers that would become major rivals after the settlements in the Mirador Basin declined at the end of the Late Formative period.

The widespread use of hieroglyphic writing across the area provided an exceptional dated record of Maya kings and their exploits. Along the Pacific Coast and piedmont (e.g., Chalchuapa, El Baúl, Chocola, and Takalik Abaj), early Maya inscriptions and depictions of rulers are predecessors of the rich burials and records at Kaminaljuyú. El Portón in the Salama Valley is transformed by a series of earthen terraces and platforms related to religious and political activities, and a large stone stela with a partially preserved glyphic text was ancestral to later Classic Maya forms. At these and other sites, evidence for the proliferation of warfare is clear. The expansion of trade connections and the consequent development of Maya sociopolitical complexity to lowland Maya sites are also accompanied by conflict. Adding to the competition is the widespread influence of central Mexico's Teotihuacan, evident at sites like Kaminaljuyú, Tikal, and Copán. In addition to those already mentioned, settlements across the lowlands of the Petén and Yucatán Peninsula (e.g., Cuello, Cerros, and Blackmon Eddy in Belize; Calakmul, Becán, Loltun, San Bartolo, Cival, Uaxactun, Pomona, Komchen, and Dzibilchaltun) provide the foundation for the subsequent flourishing of the Classic period Maya.

Cross-References

- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Flannery, Kent Vaughn
- ▶ Holographic Epistemology: Native Common Sense
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Joyce, Rosemary
- ▶ Maize: Origins and Development
- ▶ Manioc: Origins and Development
- ▶ Marcus, Joyce
- ▶ Mesoamerica: Complex Society Development
- ▶ North American Rock Art
- ▶ Olmec: Geography and Culture
- ▶ Paleoindians
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ Teotihuacan: Geography and Culture
- ▶ Teotihuacan (La Ventilla): Field Method

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Mesoamerica: Complex Society Development

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Introduction

Mesoamerica is primarily a cultural and linguistic concept useful to refer to groups of people who lived within a defined geographic region over a long period of time and who shared certain cultural and linguistic features and cultural practices, the most important of which are (1) a basic structuring economy, (2) beliefs about how the world works (cosmology) and practices related to those beliefs, and (3) material signs of stratification (Joyce 2004). The term refers geographically to the culture area that includes most of Mexico below the northern desert region and northern Central America minus the Caribbean lowlands of Honduras and Nicaragua to the east. Its geographic boundaries encompass the regions in which favorable climate and soils make maize agriculture feasible, and maize was in antiquity (and still is) the basis of the indigenous subsistence economy. Maize and other native cultigens such as squash, beans, and chili peppers were domesticated in Mesoamerica during the Archaic period, beginning about 5000 BCE (Evans 2013).

Definition

"Complex society" is defined here as social formations characterized by hereditary status-ranking differentiating elites and commoners, pervasive social inequality between these two broad social classes, and differential access to wealth and resources (both material and spiritual) (McGuire 1983; Fowler 1991). The phrase "development of complex society" is not necessarily limited to the earliest appearance or "pristine" cases of hereditary inequality, sometimes referred to "transegalitarian" societies because they are transitional from egalitarian to rank societies: political leadership surpasses the boundaries of kinship, acting further afield than the strictly local sphere and extending beyond the lifespan of the individual who exerts it, but neither institutionalized forms of power nor political centralization exists (Hayden 1995). Nevertheless, due to space limitations, this entry will focus on the earliest known archaeological evidence for the appearance of such societies.

Key Issues

By about 2000 BCE, the beginning of the Formative or Preclassic period, Mesoamerica was inhabited by thousands of small, relatively homogeneous, egalitarian communities of full-time

farmers, each consisting of perhaps 10–20 wattle-and-daub houses with thatched roofs and associated activity areas such as kitchens, midden deposits, and storage pits. Age, gender, and personal achievement constituted the dimensions of social differentiation. Agricultural tasks, craft production, and trading were organized at the household level. Some, but not necessarily all, ritual activities and interaction with outside groups may have been organized at the community level, but households and kin groups retained a high degree of autonomy. Leadership was based on achieved status, assumed by individuals with appropriate skills and personal qualities to specific activities and tasks.

Within a few centuries after 2000 BCE, a number of communities of considerable size and complexity – regional centers of economic, political, and religious power – appeared in various regions. At these centers, we see archaeological evidence for the emergence of complex society. These early hot spots of social complexity were considerably larger than most other contemporaneous settlements in their respective regions, and they possessed elite residential architecture ("chiefs' houses"), substantial ritual structures (elevated temple platforms), or both. Some featured public civic-ceremonial spaces such as plazas and ball courts.

The earliest development of political hierarchies in Mesoamerica, reflected in differences in mortuary furnishings, variation in residential form and construction, and tributary economies indicated by differential intrasite distributions of imported, exotic goods such as fine ceramics, mica and iron-ore mirrors, marine shells, obsidian, and greenstone, may be traced to this period. At this level of complexity, the household economy remains central in daily life, but institutional inequality fosters competition between hereditary elites who jockey for position and privilege. These individuals fulfill the roles of community political leaders and ritual specialists who reward cadre with gifts; manage communal labor; sponsor commensal activities; organize and direct interaction with other groups involving trade, tribute, and alliances; and organize and sponsor intergroup competition and violence.

Current Debates

Four decades ago, Kent V. Flannery (1976) influenced a generation of archaeologists to expect that such societal changes would result from gradual evolutionary trends resulting from the long-term effects of sedentary farming that developed in the Late Archaic period (3500–2000 BCE). The idea was that plant selection and improved diet led to population growth, fissioning of social units, and a general settling down in small, egalitarian villages throughout Mesoamerica. Some of these villages, because of differential access to critical resources, eventually became larger and more complex and developed new social institutions. They began to control more trade routes, engaged in increased social and economic exchange, and instituted formal political leadership. While very reasonable and well supported for its time, the gradualist village model of the origins of Mesoamerican social complexity did not anticipate the fact that some precocious centers with ranked society would begin their existence as full-blown, large villages with institutional inequality rather than small, egalitarian villages gradually moving in that direction.

Although many Mesoamerican regions have Initial Formative occupations dating to as early as 2000 BCE, none has the same archaeological evidence for early social complexity as the southeastern region. For more than twenty years, Mesoamericanists have suspected that the earliest development of complex society in the area may have occurred on the southeastern Pacific coastal plain and piedmont stretching from the Soconusco region of the Mexican state of Chiapas and down along the coast of the Central American republics of Guatemala, El Salvador, and Nicaragua (Fowler 1991). At the moment, the best data related to this issue come from the Mazatan zone of Soconusco where a detailed sequence and a number of early centers are known.

Examples

One such precocious center was the polity centered on Paso de la Amada, a large village site in

the Mazatan zone of Soconusco, excavated by Michael Blake (1991) and John Clark (1991, 2004a, b). This ancient village, dating to 1650–1500 BCE (calibrated), appears to have been one of several regional centers of two-tiered settlement systems in the Mazatán zone. The core or ceremonial center of Paso de la Amada covered an area of approximately 40 ha, and the entire site covered 140 ha of dispersed construction (Clark 2004a: 54, 60), more than eight times the size of the next largest known center in the Mazatan zone (Rosenswig 2000: 427). Based on the criteria of size, the site could be considered a small town rather than a small village, but Clark and Blake do not make this claim.

The material culture of the Mazatan Early Formative centers features an array of symbolic goods that indicate social inequality such as ceramic figurines portraying obese males attired in ritual garb, wearing animal masks, and sporting round disks (iron-ore or mica mirrors?) on their chests or attached to a helmet or headdress, interpreted by Clark as depictions of shamanistic chiefs. At the El Vivero site, the osteological remains of a child, 11 years of age at death, were discovered. Grave goods interred with the child included a mirror fashioned of white mica mounted on a round sherd disk buried at the child's forehead region (possibly affixed to a helmet or headdress of perishable materials similar to those depicted in the figurines), clearly indicating ascribed social status. In addition, the child's body had been covered with red pigment, possibly another indication of high status.

Excavations of Mound 6 at Paso de la Amada revealed a sequence of at least nine superimposed platform construction levels of an aristocratic household (Clark 2004a: 56-7; Blake et al. 2006). The remains of these successive elite residences consisted of packed clay floors with postholes, concentrations of sherds and charcoal, bone fragments, trash pits, and occasional subfloor burials. The apsidal-shaped Structure 4 measured 10 by 22 m and was especially elaborate and well-constructed (Lesure & Blake 2002: Figure 2). It is noteworthy that Mound 6 is the only one of several elite house platforms known in this large village that underwent sequential rebuilding; the others were abandoned in time. During the same period, three other elite residences at Paso de la Amada were built on smaller platforms (Mounds 4, 13, and 32), and approximately 40 small, nonelite residential mounds were not built on platforms (Lesure 1997; Rosenswig 2000). These details and associated artifacts and features support the interpretation that Mound 6 was a chiefly residence which increased in relative wealth and status over the course of many generations, as inferred from superimposed building episodes. A symbolic transgenerational link with the past (social memory) is indicated by maintenance of the same shape and orientation of the house through successive rebuilding episodes. The architectural sequence of Mound 6 thus suggests a lineage of petty chiefs successfully consolidating power and passing their leadership to progeny in their household (Hill & Clark 2001: 332).

The rising fortunes of this household may have been connected with sporting and gaming activities. A monumental civic-ceremonial structure, Mound 7, located less than 200 m north of Mound 6 at Paso de la Amada, is regarded as the earliest known ball court and the largest construction known for its time in Mesoamerica (Evans 2013: 114). This is an earthern construction consisting of two parallel mounds with a central playing alley measuring 80 m long and 7 m wide. The flanking mounds are each 80 m long, 30 m wide, and 1.5 m high (Hill & Clark 2001: 333). Stratigraphic cross-dating indicates that construction of the ball court slightly predated the earliest of the sequential modifications of the Mound 6 houses, dated to about 1600 BCE (Blake et al. 1995). Hill and Clark (2001: 331) argue that location of the ball court in close proximity to an elite residence and its early date "constitute strong circumstantial evidence that its construction and/or use was important in and for the development of hereditary inequality and formal ascribed leadership." They highlight the close connection between sporting activity in the forging of community identity and the coalescence of leadership roles around individual

leaders. Drawing on Pierre Bourdieu's theory of practice, they argue that gaming activities and elite sponsorship of ballplaying would have created an avenue for the accumulation of economic and social capital which would have contributed to the heritable power of an emerging chiefly lineage (Hill & Clark 2001: 341).

In their first formulation of a model of transegalitarianism at Paso de la Amada, Clark and Blake (1994) viewed the origins of hereditary village leadership as an accidental consequence of self-aggrandizing individuals pursuing advantage through feasting and competitive acts. They argued that the development of complex society in the Mazatan region was a long-term process involving "special historical and techno-environmental circumstances," the product of "self-interested competition among political actors vying for prestige or social esteem" (Clark & Blake 1994: 17). Hill and Clark (2001: 343) critique the aggrandizer model as overly materialist and political because it downplays the phenomenological component of cultural practices. In contrast, these are foregrounded in the practice-based interpretation of embodiment of ball game habitus related to community leadership based on manipulation and control of material and ideological resources, in turn fostering a sense of community identity (*communitas*), "largely an outgrowth of support for the village team and related activities" that crosscut lineage loyalties. Communitas implicated a titular community head and, combined with chronic disparities in social responsibilities and perquisites, created fertile ground for opportunistic elites to convert achieved leadership roles to heritable rulership.

Clark (2004a, b) argues that the large plazas and monumental buildings at Paso de la Amada were formally planned and laid out according to cosmological principles and using a measurement system of modular units that corresponded to numbers in later Mesoamerican calendar counts. The execution of such an ambitious scale of monumental construction would have required the mobilization of a significant collective labor project. Such a massive communal construction project would also have contributed to communitas through participation in inter-lineage activities, instilling a sense of shared ownership in the results of the project, and especially through a cosmologically charged statement of community identity that conferred founder status on the person or persons who organized and sponsored these activities (Clark 2004a: 61).

The last house of Mound 6 and the ballcourt of Mound 7 at Paso de la Amada fell into disuse at about 1350 BCE (calibrated), and the site itself was abandoned about a century later and never reoccupied (Clark 2004a: 54, 57).

Cross-References

▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative

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Mesoamerica: Strengths and Weaknesses of the Current Classification

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Introduction

Mesoamerica is an analytical term that unifies several cultures of a particular region of the Americas. In this entry, a definition of Mesoamerica as an analytical term is presented in its historical context of development and use. A group of characteristic traits of several cultural traditions has historically been at the root of the term Mesoamerica, but the functionality of the term itself was meant to be as a heuristic device. Here, a commentary on its usefulness highlights both some advantages and disadvantages that resulted from grouping different historical trajectories into a single broad cultural realm. And, finally, while local academic disagreements renew debates on whether the term Mesoamerica has exhausted its value, the strength of this term as a concept emerges best in cross-disciplinary and comparative contexts, providing a means of including Mesoamerican cultures in global discussions of complexity and world archaeology.

Definition

The term Mesoamerica is a concept that comprises the cultural phenomena of the indigenous world of Middle America. It is a framework of reference specifically devised to address cultural characteristics and boundaries, as opposed to geographical and political ones. Therefore, it is the cultural term that refers to a physical setting roughly encompassed between the river valleys of Sonora in northern Mexico and those of Honduras at the southern limits, comprising the modern nations of Mexico, Guatemala, Belize, Honduras, and El Salvador, with some of these

only partially included. For example, the Maya archaeological site of Calakmul in the state of Campeche is politically in the nation of Mexico, geographically within North America, and culturally in Mesoamerica.

While the above example generates little scholarly issue, further north and south, the question of boundaries is at the heart of the sources of disagreement that have been problematic since the initial use of the term. Because the frame of reference is cultural, these boundaries cannot be drawn as hard and fixed lines; these are mobile and unstable cultural frontiers, and they vary with the frame of reference and with the temporal framework. Fluid frontiers represent cultural interaction spheres, so aspects of belonging and exclusion from what were traditionally defined as the "high civilizations" of Mesoamerica in contrast to the "lesser tribes" beyond it (Kirchhoff 1952: 19) have made for scientific, social, and political strife among scholars working in those areas. Most scholars who would refer to themselves as Mesoamericanists tend to work in the core, leaving the issue of boundaries somewhat unresolved.

Temporally, Mesoamerica in its inception referred to the arrangement of indigenous cultures and language groups of this area at the time of contact with Europeans in the sixteenth century. More generally today, the term is used for cultural developments comprising the long swath of time between early human migrations and settlement starting some 10,000 years ago and right up to contemporary embodiments of traditional cultural continuities, be they Postcolonial struggles with identity definition, immigration issues, or indigenous rights movements. As a simplified chronology, Mesoamerica can be divided into an Archaic period, running up to roughly 2000 BCE, a Preclassic period ending about 250 CE, a Classic period up until 900 CE, a Postclassic period ending with the fall of Aztec Tenochtitlan in 1521, and a Colonial and Postcolonial period between 1521 and the varying dates of national independence, with the Mexican Postcolonial period starting in 1821.

Within its physical setting, the concept of Mesoamerica includes several indigenous societies and the worldviews inspired by the relationship between people and their environments. Many diverse ecosystems are part of Mesoamerica's backdrop and can be grouped under three altitude-defined areas: *tierra fría* (high-altitude plateaus with volcanoes), *tierra caliente* (tropical rainforest lowlands), and *tierra templada* (the elevations in-between, with dry forest valleys). The diversity in ecosystems produced materials prized and traded throughout, between highlands and lowlands environments since early on, among which are jade, basalt, obsidian, salt, and perishable prestige items like feathers. Animals, especially those from the lowland tropics like jaguars, deer, monkeys, caimans, and several types of birds, including the turkey, also held symbolic importance in addition to providing sources of food and material for craftwork. Among the food items prevalent throughout Mesoamerica, the triad of early American domesticates – maize, beans, and squash – is a cornerstone of the intersecting cultural identities of Mesoamerican peoples, who might otherwise belong to different ethnicities and language groups. Among all foods, maize represents the most important staple, with consequent symbolic relevance in many cultures, such as the Maize God of the Maya, but cacao also played an important role in long-distance trade out of the lowlands and, in addition to exemplifying a prestige product, may have functioned much like a form of currency.

For Mesoamerican people, environments themselves hold symbolic importance, especially those in connection with water and mountains. In particular, unique environments like the karstic limestone shelf of the Yucatan peninsula, which is studded with sinkholes, caverns, and underground streams, lend a supernatural quality to water scarcity. Caves and points of access to deeply buried water sources symbolize portals to the underworld and access to the realm of gods and godly resources. Caves are symbolically important throughout Mesoamerica and come to embody places of entry into and exit from other worlds – often the place of emergence of mythical human ancestors. Mountains (and volcanoes)

are also locations of emergence: mythical Eden-like places enclosing precious life forces and goods. Ancient pyramid building practices create associations between artificial and natural mountains, constructing the appropriate places for the worship of gods, the burials of the elite, and the caching of offerings and sacrifices to deities.

Symbolism linked to concepts of space and directionality is of particular importance in many Mesoamerican societies and varies with each, but fundamental similarity in world view links spatial patterns from households to entire settlements and from commoner contexts to royal ones, with symbolic associations to an idealized cosmogram. The basic conception of the world is one of space divided into four quarters or directions in the form of a cross, with a center point acting as the most sacred direction, creating a quincunx patterning of space. This quadripartite scheme is reflected also in architectural layouts, as in the plan of radial pyramids, with a staircase on each of the four sides ascending to a central point at the top. Each direction in the cosmogram has cognate symbols, for example associated colors (among the Maya, red for east and the rising sun, white for north, black for west, yellow for south, and green – the color of precious jade – for the center). The directional symbolism of quadripartite structures also links space with time, as it traces the path of the sun from its rise in the east, passage through the zenith, setting in the west, and return through the underworld to its eastern point of emergence. With the cosmos divided into the upper layer of the heavens, the earthly surface, and the underworld below, the path of the sun also provides the mechanism connecting the layers of the cosmos and creates a parallel between quadripartite patterns and the notion of completion of cycles. The passage of time in ancient Mesoamerica was reckoned as cyclical (in particular, a 365-day solar cycle and a 260-day divinatory one), and this conception of time established links between cosmological, astrological, and agricultural cycles.

Despite these general definitions of Mesoamerica as a cultural concept in which shared beliefs between different traditions go back millennia and are evident in daily customs, Mesoamericans are not a single culture and have not traditionally viewed themselves as participating in a common identity. The term Mesoamerica dates to the 1940s and was devised as an analytical term, to allow for the classification of a group of cultures on the basis of shared traits.

Historical Background

Mesoamerica is a widely used term, but as an analytical concept, it is far from representing academic unity in the perception of its validity and continues to be a source of animated debate, especially in Mexico, where it developed and where it has been extensively adopted since its proposal in the 1940s. The classification of several societies straddling North and Central America into the cultural concept of Mesoamerica began with the 27th International Congress of Americanists held in Lima, Peru, in 1939, among members of the Comité Internacional para el Estudio de Distribuciones Culturales en América. It was followed by a formal definition of the term by German social anthropologist Paul Kirchhoff, who was working in Mexico and who published his proposal in Spanish in *Acta Americana* in 1943 and subsequently in an English translation in 1952. The term was initially accepted and adopted without much controversy, mainly by archaeologists, ethnohistorians, and linguists, and less so by physical anthropologists, ethnologists, and sociocultural anthropologists, who to this day and especially in North America tend to make less use of this classification (scholars who call themselves Mesoamericanists tend to be archaeologists, not cultural anthropologists). Debate followed after decades, upon analysis of how the application of the term had morphed over time. Among the chief critical commentaries was that of Kirchhoff himself in the 1975 preface to the third edition of the original publication, in which he expressed disappointment in how his initial call for a productive use of the term had not been heeded with critical evaluation, and the concept was being adopted without serious consideration for its potential.

In the seminal 1943 paper in *Acta Americana*, Kirchhoff created the concept of Mesoamerica by grouping cultures on the basis of a series of shared cultural traits and practices, thereby establishing patterns of belonging and exclusion based on the presence or absence of those traits. The resulting groupings formed Mesoamerica as a cultural area, reflecting the anthropological scholarship of the time in its culture historical and classificatory tendencies, of which Kirchhoff's lifetime work is an evident example. While today the list of traits is the most commonly remembered aspect of Kirchhoff's method for the definition of Mesoamerica, his intentions stemmed from the recognition of a problem in defining the boundaries of culture areas. Kirchhoff objected to a geographic classification of indigenous groups into either North or South American, following biogeographical boundaries, and to the alternative division into Middle America, separating cultures from North and South American ones. He argued that geographical boundaries do not constitute cultural boundaries and that in some cases indigenous cultures of Mexico had less in common with neighboring ones to the north, with which they were grouped into the unit of North America, than they had with ones in South America, from which they were separated geographically and by extension culturally. In creating the term Mesoamerica, Kirchhoff meant it as an analytical term, or a theoretical construct, allowing for distinction from political and geographical boundaries, which remained purely descriptive. In this way, Mesoamerica did not exist as a reality reflected in tangible elements, but as an interpretive and analytical "problem" to address with investigations focused on explaining the presence or absence of elements and their historical trajectory. Despite Kirchhoff's intentions that Mesoamerica be more than just a framework for defining an area of investigation, that nevertheless became its most common usage and led to the development of critical objections to its validity in the first place.

Today, the temporal frame of reference of Mesoamerica is best envisioned in long and flexible spans of time because establishing chronological boundaries is equally as complex as defining cultural ones in geographical terms. In establishing his classification of cultures in the 1940s, Kirchhoff looked to the distribution of language groups "at the time of the conquest" (Kirchhoff 1952: 19), placing his original definition of Mesoamerica into a sixteenth-century context. Subsequently, as the term was adopted more by archaeologists than other anthropologists and historians, it most frequently came to refer to indigenous pre-Hispanic civilizations from much earlier times. Lately, new awareness recognizes that this traditional usage creates "terminological problems" in addressing the "mestizo, European, and even indigenous peoples who had little or nothing to do with the so-called Mesoamerican world but have resided in the region for centuries" (Carmack et al. 2007: 5–6). Contemporary definitions now acknowledge that Mesoamerica includes "not only the rich historical, social, and symbolic traditions of diverse aboriginal cultures (before and after European contact) but also the interweaving of these with European and African traditions from the Spanish conquest to the present" (Carrasco 2001: 212).

In tracing distributions of language groups, Kirchhoff classified Mesoamerican peoples into contact-period linguistic entities that approximated ethnic groups with shared histories and therefore brought out cultural boundaries. He used language and history as forms of identity definition based on community and reinforced by differences with people beyond the group. In Kirchhoff's words, "this all demonstrates the condition of Mesoamerica as a region whose inhabitants, both the very early immigrants and those relatively recent, were bound by a common history that placed them as a group in front of other tribes of the continent, leaving their migratory movements confined, as a general rule, inside its geographical limits once they were within Mesoamerica's influence" (Kirchhoff 1952: 20). Aspects of a common history resulted in elements shared between or lacking from individual societies and allowed Kirchhoff to compile a list of over 40 elements exemplifying "Mesoamericanness." These shared traits can be grouped into

categories that include elements of farming (like corn and cacao), personal adornment and clothing, architectural features (pyramids), writing and computation (such as hieroglyphs and positional numerals), calendar systems (ritual and solar years which combined form a 52-year "century"), components of ritual practices and sacrifice, and military aspects. Many of these categories had direct usefulness for archaeologists, regardless of whether the trait list was an efficient method of analysis. The broader strength of this proposition was the argument for a greater commonality, between cultures previously treated as discrete entities, of lifeways and worldview, of which stepped pyramids and ball courts are material manifestations and therefore subject of study for archaeology.

Among the first scholars who found the term useful and began applying it in their work is the Mexican scholar Pedro Armillas, who adopted aspects of Kirchhoff's Mesoamerica in a discussion of its cultural frontiers along rivers (1951). Armillas had developed a critical attitude toward Mexican archaeology during the early 1940s, targeting the shortcomings of traditional archaeological research design of the time, which focused on studying ceramic sequences in order to establish cultural chronologies. In the United States, Clyde Kluckhohn had published similar critical attacks on Mexican and Central American anthropology (1940), setting the stage for a reorganization of Middle American studies to include more theoretical goals, broader frameworks of analysis, and more generalizing formulations geared toward uncovering cultural universals. These new theoretical influences from Marxist ideologies also imparted tendencies toward cultural evolutionism to the establishment of Kirchhoff's concept of Mesoamerica.

Unfortunately, because Kirchhoff approached anthropology as a historical discipline, the application of Marxist and evolutionist notions of the time also meant that the reorganization of cultures around his trait list resulted in a developmental sequence in which Mesoamerican civilizations emerged as the "super area of higher farmers" (Kirchhoff 1952: 19). This attribution of low-to-high cultural levels to people along evolutionary lines is still one of the enduring weaknesses of the concept of Mesoamerica. Through it, Kirchhoff assigned to many of what he called "tribes" in the northern and southern reaches of Mesoamerica a low level of "culture" and designated the core areas of Mexico as the height of civilization. Further (as discussed below), evolutionary sequences led to the perception of a single developmental sequence, that in turn created the erroneous impression of a single uniform Mesoamerica in which cultures could be seen as derivative of one another – a practice that resulted in a largely diffusionist paradigm of Mesoamerican cultures.

Beyond the 1952 translation of Kirchhoff's definition of Mesoamerica, the term was used interchangeably with Middle America (the term then common among North American archaeologists) in Willey and Phillips's 1958 *Method and Theory in American Archaeology*, from which it became widespread beyond Mexico. The decades that followed saw developments in archaeology that were appropriate for a field of Mesoamerican studies, considerably more multidisciplinary and interregional than any in the preceding half century. Among the archaeological work that rested on the concept of Mesoamerica are regional projects, surveys, and settlement pattern studies; research in cultural ecology and human adaptations to the natural environment; long-distance trade and interaction; and the investigation of social evolution and culture change, urbanism, and the development of civilizations and the state. Starting in the 1940s, systematic research began to expand into regions beyond the traditional focus on the Basin of Mexico, Oaxaca, and the Maya area, and all the way to the frontiers of Mesoamerica. The formulation of a concept for a Mesoamerica distinct from geographical and political classifications also resulted in evaluation of methodological approaches, in several synthetic works on archaeological aspects of the area and in archaeological publications placing culture areas within their larger Mesoamerican context, among which Marquina's (1951) *Arquitectura Prehispánica*, Piña Chan's (1960) *Mesoamérica*, Norguera's (1965) *La Cerámica Arqueológica de Mesoamerica*, Sanders and

Price's (1968) *Mesoamerica: The Evolution of a Civilization*, and Flannery's (1976) *The Early Mesoamerican Village*.

Key Issues and Current Debates

One of the advantages of the term Mesoamerica, as well as what sparks much of the disagreement around the concept, is that it is full of ambiguity, deriving from the nature of the elements considered for its initial definition. Today's anthropological approaches cannot reduce culture to a formula for presence or absence of traits, but the method was typical of the classificatory period of culture history. Ambiguity also stemmed from the fact that the original concept was somewhat devoid of a discussion of its temporal dimensions, and the geographical distribution of the characteristic elements was not homogenous through space within each society. These compounded sources of ambiguity result in a cultural concept for Mesoamerica that identifies different ethnic groups, but the sum of these parts does not equal a single culture. Consequently, the developmental trajectory of Mesoamerica as a cultural tradition has multiple historical strands, at times interwoven in temporally and geographically heterogeneous ways.

Within the classification of New World societies into culture areas, the development of the notion of Mesoamerica is a contribution from Mexico to worldwide archaeology, and therefore, such a fundamental part of the discipline in that nation that for a long time analysis of its strengths and weaknesses has been beyond the realm of questioning. Recently, however, Mexican scholars in archaeology and related disciplines have attempted to systematize and coordinate the various voices of the debate on the continued appropriateness of the concept of Mesoamerica that have periodically questioned its validity since the death of Kirchhoff and even earlier. One such effort resulted in a symposium followed by a special issue edited by Ignacio Rodríguez García (2000) in the journal *Dimensión Antropológica* of the Mexican Instituto Nacional de Antropología e Historia. The aim of the journal is to address issues of national and international relevance to the theoretical and conceptual framework of anthropological research. Because of the deep tradition of Marxist approaches in Latin American anthropology, the issue dedicated to debating the concept of Mesoamerica is also a philosophical debate on the nature of knowledge, determinism, and the lack of theories of change in positivist science. What is clear to scholars in Mexico, more than to others who use the term Mesoamerica, is that it only has the appearance of a descriptive designation defining the extent of an area but that probing its theoretical implications is both an anthropological discussion and a debate on the intentions and legacy of Kirchhoff's contribution to Mexican and global anthropology. As López Aguilar asserts, "Mesoamérica se corrobora e intentifica con la tortilla, las navajas prismáticas, el juego de pelota, Tláloc, las sociedadedes complejas o *clasistas iniciales*, la mexicanidad, el nacionalismo, el México profundo o con cualquiera de los rasgos culturales *ad hoc* que propuso Kirchhoff y que se siguen manejando por los arqueólogos, con una carga teórica que no se ha reconocido hasta ahora" (2000: 107) (Translation by author: "Mesoamerica is corroborated by and identified with the tortilla, prismatic blades, the ballgame, [the rain god] Tláloc, complex societies or pristine states, mexicanism, nationalism, and deep Mexico or whichever of the ad hoc cultural traits proposed by Kirchhoff and that continue to be employed by archaeologists, with a theoretical load that has not been recognized until now."). The critique warns that once accepted as a term reflecting a reality, all research results serve to reaffirm and reify Mesoamerica as a discrete entity: evidence is never used to confront the notion, explain its validity, argue against its usefulness, or question its very existence as a cultural certainty.

In broader terms, the use of the concept of Mesoamerica over nearly 70 years has developed its own historical trajectory in which its meaning has been ascribed changing values by different scholars and at different times. Some aspects of its history constitute weaknesses that are apparent in hindsight. For example, as Kirchhoff's and

colleagues' ideas originated in an environment of Mexican nationalism that reinforced the concept of monumentalism, high culture, and the ideology of the state, the idea of Mesoamerica can be read as a teleological argument for the culmination of certain lifeways into a civilizing process defined by "higher farmers" to distinguish them from lesser farmers and hunter-gatherers. This approach neatly identified the core of Mesoamerica with the core of the Mexican nation, heir to the achievements of the civilizations of the Aztec, Toltec, and Teotihuacanos, and as such appealed to the government and to a state-supported vision of the Mexican past. The Mesoamerica that was intended to bridge fragmented research efforts into a cohesive whole and to represent all its societies as an interwoven cultural unit often resulted in the alienation of many groups whose cultural trajectories did not fall into the grand historical heritage envisioned by a national narrative.

The effects have often been practical, as in the favoring of a few cultural traditions over the whole, which resulted in direct intervention and government support to finance research projects and monumental site restoration for those endeavors that promoted the earliest origins and highest achievements of the grand civilizations of Mesoamerica. The perception of a grand sweep of historical evolution derives from Kirchhoff's original classification, though the effect may not have been in his intentions. One of the weaknesses of a typology of traits is that, once mapped onto a geographical distribution, it leads to a tendency, of which Kirchhoff himself was not free from, to explain the origin and spread of things through diffusion.

One such example is the role of the Olmec in the origins of civilization in Mesoamerica, a debate that has been ongoing since Frans Blom's and Oliver La Farge's 1920s survey of the Gulf Coast but that saw increased intensity after Kirchhoff's proposal of a Mesoamerican cultural unit and became an argument in favor of the Olmec as a "mother culture" with the 1942 Round Table of the newly founded Sociedad Mexicana de Antropología. The concept of Mesoamerica allowed for the impression of a single linear developmental trajectory, engendering a disposition to see one culture as derivative of another and ultimately all Mesoamerican cultures as derivative of a single one. With the dating of Olmec remains showing great antiquity, the Olmec became the case for the original civilization of ancient Mesoamerica, and the *cultura madre* debate continues unresolved today. In generalized terms, among the supporters of an Olmec origin of civilization, Diehl and Coe (1996) place the scholars and national institutes directors of great influence in Mexican archaeology, like Alfonso Caso, Miguel Covarrubias, and Ignacio Bernal, while researchers of other societies, like the Zapotec and the Maya, belong with the proponents of an alternative view in which Mesoamerican civilization is the combined result of many equal donor cultures. The debate is often driven by findings of newer and earlier examples of "traits" that occur first in any one society and therefore remains somewhat local, missing the opportunity for an analysis of the entire paradigm of "mother cultures" and whether this constitutes an appropriate model for the development of complex societies, in Mesoamerica or elsewhere.

Despite the above example of a less than fruitful consequence of the classification of cultural groups into a single Mesoamerica, the concept also has great power as an analytical tool for comparative approaches to Mesoamerican cultures, both within Mesoamerica and beyond it. A demonstrated strength of the concept of Mesoamerica is the example of its use in the analysis of Teotihuacan's interaction sphere, by scholars of Teotihuacan as well as of several other Mesoamerican peoples. In addition to analysis of the legacy inherited by the Aztec and other Postclassic societies, in the study of Teotihuacan's spread of ideas and people into the Maya area in the early Classic period, a common broader view has allowed for very useful integration of separate culture histories into a much more complex pattern of reciprocal influences (see Carrasco et al. 2000; Braswell 2003). Much is still unclear about the nature of the interactions

with the Maya, but a Mesoamerican lens is the appropriate approach to understanding Maya sites with particular traits not common to all sites and to understanding Maya and other ethnic barrios in Teotihuacan's urban core.

Beyond comparative approaches within Mesoamerica, the idea first proposed by Kirchhoff embodies the potential for strong multidisciplinary and cross-cultural discussions in a global context, which despite other weaknesses expressed here, imparts a validity and usefulness to the concept, whose possible theoretical contribution has yet to be fully explored from an international perspective.

International Perspectives and Future Directions

The inherent ambiguity in the concept of Mesoamerica has consequences for the role of the term in a global context. Whether debates center on ontological or theoretical discussions, Mesoamerica remains insufficiently solidly defined to be easily incorporated in worldwide visions. In simplistic terms, among scholars working in Mesoamerica, two camps can be identified: those who use the term widely but do not pose themselves the problem of querying its validity and those who are aware of its history and etymology but squabble over its contemporary limitations. Of the latter, scholars take issue with several of the shortcoming among which those discussed here and argue that its limitations are greater than its advantages, while others who support its validity often do so on the grounds of respect for Kirchhoff's historical contribution. Generally missing is a camp of supporters of the concept of Mesoamerica based on the renewed contemporary advantages it offers in a global context of cross-cultural archaeological inquiry.

While scholars who support the idea of Mesoamerica have seen uniformity, others in the world have sensed the heterogeneity of the concept of a Mesoamerican civilization defined differently for each time and place, making for ad hoc comparisons with the other early civilizations of the world: Egypt, Mesopotamia, the Indus Valley, China, southwestern Nigeria, and Peru. For example, if referring to a "Neolithic Revolution," we should look to the Tehuacan Valley of five millennia ago; if to the origins of complexity, then to the Maya, the Olmec, and the Zapotec of the early mid-first-millennium BCE; if to elaborate writing systems, to the Mixe-Zoque and the Maya before the first millennium CE; and if to urban societies, then to Teotihuacan in the first millennium BCE. However, as the deep history of long-distance trade in obsidian attests, these cultures did not exist over 4,000 years in isolation from each other and instead shared contact and exchanges of goods and information. Nevertheless, the above confusion as to exactly which society we refer to when speaking of a Mesoamerican civilization suggests that the concept of Mesoamerica could use fresh redefinition, perhaps acknowledging its historical roots but specifically formulated to be useful to a worldwide discussion of archaeological civilizations, so that Mesoamerican societies can be considered in a global context. An integrated approach to the study of complex societies that systematically includes Mesoamerican ones would advance a global history of comparable trajectories with the richness of local details.

Another great strength of the original classification lies in the fact that the concept is not defined by a chronological framework. While originally bound by contact period data, the term is inherently temporally flexible and today has come to encompass also Colonial and Postcolonial modern periods. In this realm, scholarship has demonstrated dynamic interaction of ideas between Europe and Mesoamerica that include Spanish, indigenous American, and African traditions (ethnographies and historical records, maps, ideas on religion, humanity, and nature). As Carrasco, who supports the idea of a Mesoamerica not limited to pre-Hispanic times, reminds us, "the encounters and exchanges among various European cultural groups, diverse indigenous cultures, and African

peoples did not represent a termination of indigenous cultural practices, but rather the formation and transculturation of new worlds for Europeans, native peoples, and *mestizos*, mulattos, and *castas*" (Carrasco 2001: 213). Today's scholars recognize that interactions in Mesoamerica in post-contact times have spurred developments in natural history, theology, and philosophy in Europe (during the Enlightenment), which subsequently informed models of biological, social, and political change (now described in such terms as evolution, syncretism, and revolution). These views, rather than treating Mesoamerica as part of a New World in opposition to an "old" one, argue for a New World that is the unprecedented outcome of two old worlds coming together – a perspective that is more consonant with global archaeological inquiry.

Kirchhoff's original proposal assumed that Mesoamerica was an identity concept shared by those people he had grouped under the term, when in reality it is a classificatory notion imposed from a typological perspective. Its value is analytical and cannot be confused with a retrofitted sense of identity for indigenous Mesoamerican groups. But, whether or not we can consider a common identity to be perceived as such, we may be able to observe it empirically in material traces, and such a practice has made the term Mesoamerica useful to archaeologists. Perhaps not in terms of the specific ethnic and linguistic groups, evolutionary stages, or shared traits, nevertheless Mesoamerica exists: as an area of shared cultural characteristics expressed in practices and ideological values resulting from diverse developmental trajectories in a context not devoid of contact and exchange.

Cross-References

- ▶ Global Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Complex Society Development
- ▶ Mexico's Heritage
- ▶ Nationalism and Archaeology
- ▶ Olmec: Geography and Culture
- ▶ Teotihuacan: Geography and Culture

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Mesoamerica: Subsistence Strategies by Region

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Introduction

Establishing subsistence strategies for Mesoamerica appears quite simple; it would suffice to separate periods associated with hunter-gatherers from those in which agrarian societies appear. However, in practice, the situation is more complex. In addition to the fact that domestication represents a long process that cannot easily be considered to be completed, almost all societies at the time of the arrival of the Spanish continued to use hunting, fishing, and gathering as important parts of their obtaining nutrition.

Additionally, periods before the emergence of so-called complex societies have been little studied in comparison with ceramic periods. For this reason, available information regarding earlier subsistence strategies, such as those of the hunters of megafauna, gatherers from the coasts or the interior, and early agriculturalists, is scarce and fragmentary.

Finally, the differentiation carried out in this text regarding subsistence strategies is somewhat idealized in that it distinguishes three large groups: a. hunters of megafauna, b. coastal and broad-spectrum gatherers, and c. agrarian societies. This distinction is made simply to define the essential aspect that dominates each these subsistence strategies, without excluding other, secondary activities in obtaining food.

Definition

Subsistence

Subsistence implies all the strategies and material means that an individual or human group

employs for their survival and reproduction, whether biological or cultural. Thus, it is not synonymous with forms or levels of social integration, such as the terms "band," "tribe," "hierarchical societies," and "archaic state." Nevertheless, each form of social organization can be linked to specific subsistence strategies: For example, societies defined as "bands" (Service 1962) are characterized by a mode of subsistence based on hunting, fishing, and gathering, whereas in hierarchical or state societies, subsistence is generally based on agriculture.

Hunter-Gatherers

Hunter-gatherers are human groups whose subsistence is based on the hunting of wild animals and the collection of wild plants without their domestication and, with the exception of dogs, without domestic animals (Lee & Daly 1999: 3).

Big-Game Hunters

Extinct animals whose weight usually was over a half-ton are considered megafauna, although this term is generally employed to designate megaherbivores, such as the mammoth (*Mammuthus*), mastodon (*Mammut*), or giant sloth (*Megatherium*, *Eremotherium*). Although the Paleo-Indian cultures of the end of the Pleistocene have generally been defined as hunters of megafauna, it is likely that Clovis hunters and other contemporary groups were only occasional hunters of this type.

Broad-Spectrum Foragers (Coastal and Continental)

These groups are oriented toward the collection of plants, mollusks, and smaller fauna and are usually associated with coastal and tropical zones of Mesoamerica, although they are not exclusively from these regions. Even if these groups are identifiable since the end of the Pleistocene, this way of life became widespread in the Mesoamerican zone, beginning with the Holocene.

Cultivation

This is the artificial human propagation of seeds, cuttings or roots, and/or care of plants, whether wild or domesticated.

Agriculture

In this cultural system, subsistence is based on domesticated plants. Agricultural production can be separated into two systems of agriculture: intensive and extensive. Extensive agriculture requires a relatively large area of land and is defined as following the cultivation of a parcel of land by a fallow period (which depends on the characteristics of the soil, but may be of up to seven years), during which the soil is allowed to reconstitute its nutrients.

Sedentarism

This process involves the permanent establishment of human settlement in contrast with nomadism, which involves the constant moving of camps to different territories due to causes such as herding, a reduction of the capacity of the environment, or the need for allochthonous resources. Although in the greater number of archaeological and ethnographic cases, sedentarism tends to be associated with agrarian societies, this association is not universal. In particular, sedentarism is a notably late process in Mesoamerica in comparison with the appearance of the first domesticated plants in this region.

Historical Background

The study of subsistence in Mesoamerica has been linked with the development of archaeology itself in Mexico and Central America. Most likely, the oldest discussions in this regard began with the debate at the end of the nineteenth century between Florentino Ameghino and Aleš Hrdlička. The former argued that modern humans had evolved in South America and subsequently migrated to the rest of the planet; in contrast, Hrdlička denied the idea that humans had originated in the Argentine pampas but also

denied that they could have coexisted with the fauna of the Pleistocene. Later, the findings at Folsom, New Mexico, in 1908, would confirm not only coexistence between humans and Pleistocene fauna but also the possible hunting of such fauna.

During the first half of the twentieth century, many studies of Mesoamerican societies focused on defining cultural sequences and the chronological position of the various regional cultures; therefore, the study of ceramics, sculpture, and architecture was central to defining regional styles. Although complex societies were the principal subject of this research, studies on subsistence systems prior to the development of ceramics were marginal. This condition held true until the discovery of the so-called Tepexpan Man in 1947, when the investigation of preceramic societies began in earnest, particularly in Mexico; various research projects on hunter-gatherer groups were carried out after the creation of the "Department of Prehistory of the INAH [the National Institute of Anthropology and History]." At this time, research also began on coastal gatherers, and research until the mid-twentieth century had a marked focus on cultural history.

In the second half of the twentieth century, ecological perspectives began to dominate archaeological investigations that were centered on defining agricultural systems, their productive potential, and their role in the development of complex societies (Sanders et al. 1979). Additionally, the first long-term studies examining the development of agriculture began, principally in the Tehuacán and Oaxaca valleys (MacNeish 1967; Flannery 1986). The last 3 decades have seen a marked change from research with an ecological and evolutionary focus to studies involving nonlinear dynamic models, as well as models where individuals are considered to be active agents in the models of change. Conversely, the application of new techniques for the recovery of evidence (both direct and indirect) for human subsistence (i.e., phytoliths, starch grains, pollen, chemical analyses, and stable isotopes, among others) has permitted the evaluation of traditional models of the origin of agriculture or the paleodiet and the generation of new research trends.

Key Issues/Current Debates

Early Peopling and Big-Game Hunting

Although it is clear now that the peopling of the American continent took place at the end of the Pleistocene through the Bering Strait, various opinions remain regarding whether this migration took place through the interior of the continent or along the coast, as well as the time at which this process occurred.

One group of researchers argues that this initial peopling must have taken place at the end of the last glaciation (Wisconsin) and suggests that it was not possible until the two large glacial blocs that covered North America (the Laurentide and Cordilleran) had melted between 11,000 and 12,000 BCE. This model (termed *Clovis-first*) suggests that the first settlers were hunters who used fluted points (Clovis) and entered through a hypothetical "ice-free corridor," a thin fringe of exposed land that existed between both glaciers and allowed passage through the area now occupied by Alberta (Fiedel 1996: 72).

The *Clovis-first* model assumes an accelerated "migratory wave" of groups hunting Pleistocene fauna that would go on to carry out a rapid peopling toward the south of the continent and would be responsible for the extinction of the megafauna. Unfortunately, this model presents several problems. Paleoecological studies have shown that this supposed corridor was either impossible or did not exist until very late in the Pleistocene, when the continent was already populated. The model also does not consider the large differences in the gradient of ecosystems located between North and South America, nor does it explain the presence of fully accepted pre-Clovis sites in the New World, such as Monte Verde in Chile.

In Mesoamerica, a large quantity of fluted points have been found, almost all of which are

from the surface, from the Sierra Gorda de Querétaro to Honduras (Acosta 2012). These fluted points, which are found from southern Mexico and Central America, are not "typical" Clovis points but are characterized by reduced dimensions and concave edges such that they are more similar to the points of the late Paleo-Indian period of the USA. These points can be associated with points of the "fishtail" type, as in Chiapas or Belize, although the associated stone tools correspond to those typically associated with Clovis, such as "keeled" scrapers (*limaces*), burins, and scrapers with lateral spurs; these tools indicate a type of subsistence that is highly dependent on hunting and uses specialized artifacts for removing flesh from prey and preparing skins. Only for Los Grifos, Chiapas, has a study reported on the remains of fauna from Clovis settlements, indicating medium-sized prey, such as white-tailed deer (*Odocoileus* sp.), peccary (*Tayassu* sp.), and Pleistocene horse (*Equus* sp.).

Only two Clovis sites in the Mesoamerican area have been dated: Los Grifos in Chiapas, Mexico and Los Tapiales in Guatemala. Unfortunately, the early dates for Los Tapiales (c. 10,500 BCE), Guatemala, do not appear to be clearly associated with the Clovis materials, and the site presents various dates from the early Holocene. The dates for Los Grifos (9,000–8,000 BCE) time the appearance of fluted points in Mesoamerica mainly at the beginning of the Holocene (Acosta 2012).

The association of megafauna with human activity has best been documented at the Valley of Mexico, although many of these sites do not contain diagnostic materials that could associate them with any particular Pleistocene technology. The megafauna (*Mammuthus columbi*) hunting sites associated with projectile points include those for mammoths at Santa Isabel Iztapan and three points associated with them (Lerma, Plainview, and Angostura) in combination with other artifacts linked to the processing of prey. Other sites, such as Atepehuacan, contain mammoth remains that are associated with obsidian flakes. These two sites are dated at the beginning of the Holocene, between 9,500 and 9,000 BCE (Aveleyra 1967).

Despite these datings, sites for megafauna hunting in the Valley of Mexico to date correspond to killing sites; however, base camps have not been located that would allow us to determine whether these great preys were important in the subsistence of these early settlers or these remains only reflect occasional hunting (and most likely scavenging) of the last megamammals that were in the process of extinction at the end of the last ice age.

Coastal Collectors and Broad-Spectrum Hunters

Human groups have exploited coastal resources since the end of the Pleistocene. Indeed, several authors believe that the peopling of the continent must have taken place along the Pacific coastline earlier than the peopling of the continental interior (Dixon 1999). The earliest evidence of coastal collecting groups appears along the entire Pacific coast from the California islands to Chile. These groups show a marked dependence on collecting marine mollusks; however, depending on the region, the hunting of birds, fish, and marine and terrestrial mammals can also be observed.

In the Mesoamerican region, the earliest evidence of coastal occupation comes from submerged caves in the Yucatan Peninsula, where human remains have been recovered that date between 7,000 and 10,000 BCE, although no other cultural materials were present (González et al. 2008). Most of the coastal sites of Mesoamerica correspond to the period known as Archaic (10,000–4,000 BCE) because sea levels stabilized after 7,000 BCE. Although there is a void in the research on the Pacific coast for periods prior to 7,000 BCE, coastal sites have been located (principally "shell middens") along the entire Pacific coast; in Sinaloa (El Calón, 1,800 BCE), Nayarit (Matanchén, 2,500–2,000 BCE), Guerrero (Puerto Marqués, 2,200 BCE), and Chiapas (Chantuto, 5,000–2,500 BCE) (Kenneth 2012).

In the continental interior, groups of broad-spectrum hunter-gatherers based on subsistence linked to the hunting of smaller fauna and the collection of wild plants can be

observed from the Pleistocene-Holocene transition point, approximately 10,000–9,000 BCE. In zones such as the Sierra de Tamaulipas (Ocampo), Puebla (Tehuacán Valley), the Valley of Oaxaca (Guilá Naquitz), the Central Depression of Chiapas (Santa Marta cave), and the Honduras Plateau (El Gigante Cave), these groups show mixed subsistence based on the hunting of deer, rabbits, and peccary, the capture of animals such as turtles, and the collection of freshwater snails (Santa Marta). Collection includes fruits from cacti in arid zones, pine nuts and acorns in forested regions, as well as fruits from tropical trees in more humid zones. One point worth emphasizing is the use of millstones since the Late Pleistocene in sites such as Guilá Naquitz, Oaxaca, and Santa Marta Rockshelter in Chiapas, which indicates a growing increase in the dependence on plants and their processing. Archaeobotanical remains indicate that these broad-spectrum subsistence groups are responsible for some of the earliest domestications in the Mesoamerican zone (Piperno & Smith 2012).

Domestication and Early Agriculture

Recent data indicate that the first domestications took place in groups that maintained a hunter-gatherer pattern of subsistence. It is probable that at least two species (the domestic dog and *Lagenaria* or bottle gourd) entered the continent, having already been domesticated, together with the first settlers at the end of the Pleistocene. The oldest domesticated plant found from the early Archaic Period (c. 10,000–8,000 BCE) is the pumpkin, located at the lower levels of Guilá Náquitz in the Valley of Oaxaca. These first domesticated plants do not appear to be related only to nutritional purposes but also to other aspects of subsistence, such as the transport of water (squash and the bottle gourd) or use as stimulant plants (*Theobroma*) and the production of fermented beverages (*Zea Mays*). In the Balsas river Basin, the region which is considered to have given rise to the ancestor of maize (*Zea parviglumys*), the remains of phytoliths of *Cucurbita argyosperma* (silver-seeded squash) have been located, and grains of corn starch, dated to 6,700 BCE, have been associated with stone mortars (Ranere et al. 2009). The earliest dates carried out directly from the remains of maize come from Guilá Naquitz and are dated to 4,200 BCE.

In the Paleoecological records of the tropical lowlands of Mesoamerica, a sudden increase in the appearance of maize pollen associated with a reduction in the amount of forest and an increase in weeds can be observed between 5,500 and 5,000 BCE. This finding has been interpreted as a change in agricultural techniques from an incipient agriculture or horticulture to a slash-and-burn agriculture, as can be observed in the Balsas river Basin (Ranere et al. 2009), the Pacific Coast (Kennett et al. 2010), and the Olmec zone of the Gulf of Mexico (Pope et al. 2001). In these regions, an accelerated change toward the transformation of tropical forest (including mangrove swamp) into agroecosystems can be observed, including plants originating from South America, such as manioc (*Manihot* sp.), at approximately 4,500 BCE. It is likely that this period corresponds with a true agricultural revolution in Mesoamerica, as demonstrated by the systematic modification of the environment into an agrarian landscape and the establishment of the system of milpa and its implications for the economic and religious structure of the communities. This agricultural revolution, beginning in the tropical lowlands, appears to have been adopted later in other regions, such as the Valley of Mexico and the Mayan Zone, where similar conditions can be observed after 4,000 BCE.

Sedentary Life and Agricultural Societies

The residence pattern of early hunter-gatherers (10,000–8,000 BP), including those of the early Archaic that exhibit evidence of domesticated plants, was one of high mobility and low demographic density. Cristine Niederberger (1979) has suggested two models for the mobility for incipient agricultural societies as follows: a) the "Tehuacán Model," applicable to the semiarid regions of Puebla, Tamaulipas, and Oaxaca, that exhibit a marked period of productivity associated with the rainy season; this model

involved the aggregation of large communities (macrobands) dedicated to the extensive exploitation of cereals and other plants during the season of greatest fertility. In contrast, during the dry season, these groups would disperse into smaller groups (microbands) with the tasks of hunting and collecting in various ecological niches. Although these groups show that certain early agricultural practices had developed by at least the sixth millennium BCE with plants such as maize, chile, avocado, and squash, a sedentary way of life was not observed for these groups until at least three millennia later. b) The model developed for Zohapilco and most likely other regions of higher annual productivity (such as the Pacific coast and other sites from the Mesoamerican lowlands) suggests that the societies of the sixth millennium BCE show territorial and sedentary occupation associated with the lacustrine environment (most likely linked to a period of climatic optimum and associated with a highly productive lake environment, where resources could be obtained during almost the entire year), exhibiting evidence of incipient agricultural experimentation with plants such as *Zea* (tesosinte), *Amaranthus*, and *Physalis* (tomato) for the period between 6,000 and 4,500 BCE. During the Zohapilco phase (3,500–2,200 BCE), however, a notable increase in the appearance of domesticated plants and stone artifacts associated with their processing (metates and manos) can be observed; thus, the model established by Niederberger indicates a marked period of sedentarism within a pre- and protoagricultural context. This model, however, is atypical for the rest of Mesoamerica because a fully established sedentary pattern does not appear to have been established until the period when ceramics appeared between 2,000 and 1,500 BCE.

Between 1,600 and 1,000 BCE throughout practically all of Mesoamerica, permanent communities developed based on extensive seasonal agriculture that was associated with fertile lands in lake zones, such as the Valley of Mexico and the Guatemala Petén, or on river banks in Oaxaca and the coast of the Gulf of México; these communities also developed in coastal zones rich in marine and terrestrial resources, as in Belize and El Soconusco in Mexico. Although continual reference has been made to these early villages as agrarian societies based on maize cultivation, stable isotope studies indicate that at least for El Soconusco, the diet of these first villages was not based on maize but on a mixed diet.

Complex Societies and Agricultural Intensification

Agricultural intensification with the accompanying increase of parcel productivity, whether through increased use of human labor or the introduction of more productive crops, is considered an improvement resulting from the use of applied technology or increased land quality through the incorporation of compost, moisture, or other means that involve increasing the total annual productivity (Scarborough 2012). Although it has generally been thought that demographic pressure was the cause of intensified production, with the data presently available, it is not possible to define whether the intensification observable in the Late Archaic (5,500–3,500 BCE) is the cause or the consequence of the demographic increase. This uncertainty is due to the scant nature of data on domestic contexts for this period. It is certain that one sees the accelerated diffusion of a mode of subsistence based on an extensive slash-and-burn agriculture beginning in 5,500 BCE, beyond simply the small-scale horticulture that is observed during the first half of the Archaic period (8,000–5,500 BCE).

The change from an extensive system of agriculture, such as slash-and-burn, to the various systems of intensive agriculture (including raised fields, drained fields, terraces, *camellones*, *chinampas*, and island beds) appears to be associated with demographic growth during the apogee of Mesoamerican cities and is documented at least since the Late Pre-Classic; however, this change is documented principally during the Classic and the Post-Classic. The implementation of aerial surveying in Mayan lowlands since the end of 1960 has allowed the identification of raised fields and canals on a large

scale in the center of Veracruz, the Candelaria River in Campeche, and the north of Belize (Sluyter 1994). The increase in population of the larger political centers of the Post-Classic, such as those of the Aztec and Tarasco empires, required the systematic implementation of systems of intensification (*chinampas* for the Aztecs and lake-margin fields and extensive terracing for the Tarascan) and greater organization of work and the control of a large body of workers for carrying out hydraulic projects. In the Valley of México *chinampas*, the Aztec state played an important role in developing dikes to separate saltwater from the lake. These hydraulic systems and agricultural techniques, such as the use of chinampa, amazed the Spanish conquistadores when they arrived.

International Perspectives

Although research on cultural ecology and systemic models has dominated studies on subsistence strategies for a long time, particularly with respect to the change from appropriative societies to food-producing societies, there has recently been a return to models based on the study of agency, phenomenology, and Marxist theory as alternatives that allow for recognizing the internal causality of such societies. However, studies remain lacking that would allow broadening the empirical data with which to support the various theoretical proposals.

In the case of hunter-gatherer groups, although theoretical proposals continue to be strongly deterministic in an ecological sense, mainly regarding models of the "optimal foraging" type in which hunters are viewed as inevitably destined to maximize energy resources and minimize risks (Bettinger 1991), there is a growing interest in evaluating the internal causality of these societies by assigning a more active role in historical processes, rather than simply viewing them as having a passive attitude (or, at most, reactive) where "if the medium changes, the society changes."

Regarding early agriculture and the origins of domestication, the demographic and climatic change models used for the Old World do not appear to be applicable to Mesoamerica, but consensus does not appear to exist in this respect. However, two models for the development of agriculture have been developed, with one being associated with lowlands and the other with highlands. To evaluate these models, research has been reinitiated over the last decade, allowing further empirical data to be obtained.

The author of this entry takes a social dialectical position against ecological determinism as a basis for explaining the principal changes in the modes of life of Mesoamerican societies, assuming that the principal force for change is the contradiction engendered within the communities and between the communities and their environment. The various means of resolving these contradictions are provided by specific subsistence strategies and the social and political organization of human groups that inhabited various ecosystems in Mesoamerica.

Future Directions

The study of pre-Hispanic subsistence in Mesoamerica has made great strides, beginning in the second half of the twentieth century, particularly regarding theoretical and methodological developments concerning its study. The clear trend toward the greater specialization of researchers has required collaboration in investigative networks and multidisciplinary projects, which has allowed the integration of various types of data in specialized publications, although a greater dissemination of these results to the non-specialized public remains lacking.

The development of new dating techniques that allow the dating of small samples has allowed us to register botanical materials directly and to obtain greater precision in the chronology of the initial peopling, domestication, and early agriculture. Furthermore, disciplines such as paleoethnobotany and geoarchaeology allow a better understanding of the geological and human processes linked to the creation of archaeological sites and their transformation, and an increasing number of studies use this type of focus.

Recent studies indicate greater antiquity for the processes of plant domestication in Mesoamerica, with certain dates indicating that the first domestications took place at least 10,000 years ago. The development of new techniques that allow the recovery of botanical micro-remains directly from soils, lithic artifacts, and dental calculus has allowed important data on ancient subsistence to be obtained, and new techniques are constantly being developed that permit the recovery of paleoethnobotanical information even in tropical zones in which botanical macro-remains are poorly preserved.

Regarding the first settlers of Mesoamerica, unfortunately, the trend continues to be a focus on the study of typology and the establishment of chronological sequences, which are sometimes unreliable because it remains common to date surface materials based on typology alone. Multidisciplinary studies are required to obtain greater knowledge regarding the subsistence of these first settlers and to obtain a larger number of reliable datings of the contexts.

Finally, the data on subsistence for the later periods of Mesoamerica, beginning from the appearance of the first ceramic villages, contrasts with data available for older periods linked to hunter-gatherers and incipient agriculturalists, which is scant and fragmentary. Thus, a new generation of researchers interested in the preceramic period is needed to increase our knowledge of this early period.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Central America: Historical Archaeology of Early Colonial Urbanism
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Geoarchaeology
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Mesoamerica's Archaic Period
- ▶ Mexico: Historical Archaeology
- ▶ Paleoindians
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Villas and Farms in the Mediterranean World
- ▶ Zooarchaeology

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Mesoamerica's Archaic Period

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State of Knowledge and Current Debates

Introduction

Over 50 years ago, Willey and Phillips (2001 [1958]: 104-7) struggled with a precise, inclusive definition of the New World Archaic period. According to convention (today as when Willey and Phillips were writing), the Mesoamerican Archaic period begins when the Holocene warming reached modern conditions resulting in people exploiting a wider range of resources (~10,000 cal. BP), including plants that caused a wider range of stone tools to be used to process them. This period was then posited to end once sedentary, ceramic-using, agriculturalists are first documented at ~4,000 cal. BP. However, subsistence practices, residential mobility, and container technology are each continuous variables that do not necessarily co-occur, and so, their use to define the Archaic period does not necessarily allow for a clean cleavage from the earlier Paleoindian or subsequent Formative periods.

The Pleistocene-Holocene transition corresponds to the appearance of the earliest domesticated plant in Mesoamerica – the squash (Smith 1997). Therefore, 10,000 cal. BP provides a simple border to define the beginning of the Archaic period and what Smith (2001a: Fig. 7) terms the beginning of "low-level food production with domesticates." This date could be moved earlier as older cultigens are documented, but the beginning of the Holocene provides a convenient epochal transition point. The lifestyle of these early inhabitants of Mesoamerica was, however, little different than their pre-10,000 cal. BP ancestors that were not cultivating squash but subsisting on largely the same hunted and gathered foods.

There is considerably more information for the end of the Archaic period. However, rather than creating a clear division from the following Formative period, the more detailed picture indicates that "nomadic hunting and gathering *slowly gave way* to settled farming through a long Archaic period sequence" (Stark 1981: 354, italics added). Matters are further complicated as researchers have recently begun arguing that there is no clear distinction that occurred with the first sedentary, ceramic-using villagers in terms of either the foods consumed or their food processing tools(e.g., Clark & Gosser 1995; Blake 2006; Rosenswig 2006a, b, 2012a; Clark et al. 2007; Arnold 2009).

Adaptive variability is a significant factor when defining the end of Mesoamerica's Archaic period. The earliest ceramic-using villagers continued to have a nonagricultural adaptation during the fourth millennium BP

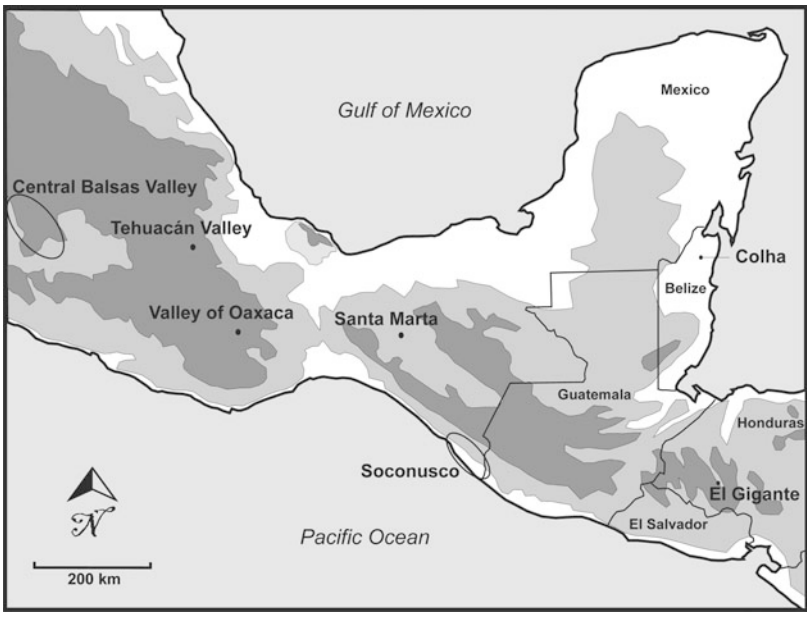

Mesoamerica's Archaic Period, Fig. 1 Map of Mesoamerica with regions and sites mentioned in the text

(i.e., the Early Formative period). There is growing evidence that a significant increase in the reliance on domesticated foods did not occur until 3,000 cal. BP and that prior to this it is more accurate to speak of horticulture (see Rosenswig 2006a: 347-8, following Rindos 1984). Low-level food production (aka horticulture) characterizes the Early Formative period, and so, if we were to use intensive agriculture as the defining characteristic to end the Archaic period, then this change would occur with the Middle Formative period beginning at 3,000 cal. BP. Many of the archaeologists who study Mesoamerica would not be comfortable with this definition. For the purpose of this entry, I end the Archaic period with the first evidence of ceramic use (following Stark 1981 and others). However, ceramic use is first documented in the Maya zone of Mesoamerica only at the beginning of the third millennium BP, almost a 1000 years after they are recovered from most other regions (Clark & Cheetham 2002). This means that the Archaic and Formative "periods" can be said to have coexisted in Mesoamerica during the fourth millennium BP (Rosenswig 2010: 34-8; 2011). The term Archaic is therefore not strictly temporal and the variability during the fourth millennium BP implies a mosaic of adaptations and technologies as one form of adaptation gave way to the other.

In this entry, I focus primarily on evidence of the Archaic period from the Tehuacán Valley, the Valley of Oaxaca, the Soconusco, and northern Belize (Fig. 1). These four regions provide the most completely documented archaeological evidence of Archaic period peoples in Mesoamerica. As the first two regions are in the arid highlands and the latter two in the tropical lowlands, these examples also provide geographical diversity. I end the entry with a brief discussion of the end of the Archaic period and some directions of future research in which to better understand (1) how the so-called "4200 cal. BP Event" of global drying at mid-latitudes impacted Mesoamerica and (2) how a mix of sedentary and mobile subsistence strategies may have created a shifting mosaic of different adaptations during the fourth millennium BP.

Highland Evidence

Tehuacán Valley

Work undertaken by MacNeish and colleagues in the Tehuacán Valley set the agenda for the study of the Archaic period in Mesoamerica (MacNeish 1964; Byers 1967; MacNeish et al. 1967; and see Flannery 2001). The Archaic-era phases defined

in the Tehuacán Valley have been the source of intense scrutiny and controversy over the past decades. Reassessments have been sparked by direct AMS dating of the plant remains that MacNeish used to reconstruct Archaic period subsistence practices. In most cases, AMS dating of domesticated plants indicate that they were more recent than originally claimed. The maize recovered from early levels at San Marcos and Coxcatlán caves was clearly domesticated (Benz & Iltis 1990) and initially dated by stratigraphic association to before 7,000 cal. BP. However, direct AMS dating of six cobs from preceramic levels produced results dating to ~4,700 cal. BP and more recent (Long et al. 1989) – the end of Late Archaic period. Equally importantly, when domesticated beans from Tehuacán were AMS dated, they turn out to be from the beginning of the Late Formative period at 2,300 cal. BP (Kaplan & Lynch 1999; and see Smith 2001b).

Smith (2005) has reassessed the earliest domesticates and stratigraphic integrity of Coxcatlán cave based on 71 dates (both traditional radiocarbon and new, direct AMS dating of botanical remains) and established the extent of stratigraphic mixing. He concludes that postdepositional disturbance was a problem in the west half of the cave (only 6 of 27 dates [22 %] fall in the expected range) but the east half of the cave was more intact (where 30 of 43 dates [70 %] fall in the expected range) (Smith 2005: 9443). Importantly, 25 of the 34 AMS dates (i.e., 74 %) obtained by directly dating domestic plants were from outside their expected range based on published phase association of the deposits from which they were found.

The Tehuacán remains are nevertheless repeatedly employed by those who want to study the origins of crops such as maize. For example, Benz and Long (2000) calculated evolutionary rates of maize based on the morphological characteristics of 26 cobs from San Marcos and Coxcatlán caves (and see Long & Fritz 2001; MacNeish 2001a). The Benz and Long (2000) study dates evolutionary change by stratigraphic association, and so, in his taphonomic assessment of the Coxcatlán cave stratigraphy, Smith (2005: 9443) concludes that such "time-sensitive analysis of rates of evolutionary change is rendered meaningless." One solution to the problem of relying on too little data from too few sites would be to excavate more Archaic period sites so that stratigraphic mixing at a single site does not impact our understanding of this period so severely. Despite all its faults, even 50 years later, the Tehuacán project still provides a significant contribution to the surprisingly limited amount of basic archaeological data on the Archaic period record of Mesoamerica.

Often forgotten from the race to document Mesoamerican's earliest domesticates is the cultural context documented by the archaeological record. In Tehuacán, the most dramatic increase in domesticated plant use and decrease in wild plant remains occurred at 3,000–2,750 cal. BP, the beginning of the Middle Formative period at the end of the Ajalpan phase (MacNeish 1967: Fig. 186 with revised dating from MacNeish 2001b). Due to his reassessment of the Coxcatlán cave stratigraphy and the direct dating of domesticated plants, Smith (2005) documents: "domesticated plants represent ~45 % of the food plants recovered from ceramic contexts and only 2 % of the plant assemblage from preceramic cultural zones." The virtual absence of domesticated plants from Archaic period deposits requires us to accept Farnsworth et al.'s (1985: 114) alternate hypothesis of their carbon and nitrogen isotope analysis: that during the Coxcatlán phase there was an increased consumption of wild grasses and the animals that ate them. Evidence of domestic dogs are absent from Coxcatlán-phase deposits and are first recorded during the Late Archaic Abejas phase (7,825–6,600 BP) and become much more common in the Early and early Middle Formative Ajalpan phase (5,600–4,750 BP). Direct dating consistently pushes the dating of remains from the Tehuacán Valley to more recent times.

MacNeish's (1964) model of dry season microbands and rainy season macrobands painted a picture of progressive increase in sedentism due to reliance on domestic plants so that people spent more time living in larger communities

and less time foraging in small groups for wild resources. While the details and stratigraphic integrity of some of MacNeish's excavations have been questioned (and therefore new dating makes the timing of these changes more recent), his model of the interplay between residential mobility, group size, resource scheduling, and reliance on domesticated plants remains useful for understanding changes occurring in this arid environment during the Archaic period.

Valley of Oaxaca

Equally as important in defining the research agenda for the Mesoamerican Archaic as the Tehuacán project was the research program undertaken by Kent Flannery and his colleagues in the Valley of Oaxaca (Flannery et al. 1981; Flannery 1986; Marcus & Flannery 1996: Chapters 4 and 5). Flannery's (1968, 1973, 1986: 19-28) influential model, based on his work in Oaxaca, posited the Archaic period shift to seasonal scheduling was based on the unreliability of foods that provided the driving force that encouraged food production as a risk buffering strategy.

Early Archaic period populations are estimated at 75–150 people for the entire Valley of Oaxaca and documented only from a few microband sites (Marcus & Flannery 1996: 53). Excavated in 1966, the site of Guilá Naquitz was occupied between 10,000 and 8,500 cal. BP at least six times during the summer and fall months (Flannery 1986). Deer and rabbit were eaten, as were acorns, maguey, cactus leaves, and a variety of fruit. More recent analyses of botanical remains recovered at Guilá Naquitz continue to define how the Archaic period is understood. Unlike the Coxcatlán case, Smith's (1997) direct AMS dating of botanical remains and taphonomic evaluation (Smith 2000: 20-7) document no more stratigraphic mixing of the Guilá Naquitz cave deposits than those originally reported by Flannery (1986: 65-95, 175-6).

Botanical remains from Guilá Naquitz have contributed to understanding Mesoamerican diet during the Archaic period. Piperno and Flannery (2001) present AMS dating of two maize cobs from Guilá Naquitz providing the earliest directly dated macrobotanical examples of this domesticate in Mesoamerica at 6,300 cal. BP. Benz's (2001) description of these early (and tiny by modern standards) ears of corn documents two ranks of cupules with non-disarticulating rachis that still make them dependent on human propagation, as all modern maize is. In addition to the early maize, there is also evidence of teosinte pollen at Guilá Naquitz, Gheo-Shih, and Cueva Blanca (Marcus & Flannery 1996: 67). Using nine AMS assays, Smith (1997) directly dated squash remains from Guilá Naquitz to 10,000–8,000 cal. BP, and morphological analysis documented thicker rinds, larger peduncle diameter, and one with an orange color, which are all characteristics consistent with domestication. Wild bean species were consumed by the inhabitants of Guilá Naquitz, and while there is no evidence that they were domesticated (Kaplan 1986), there is circumstantial evidence to believe that the density of wild beans near the cave increased due to cultivation (Flannery 1986: 15). Along with the redating of beans from Tehuacán (Kaplan & Lynch 1999), it seems that wild beans may have been used to produce a complete protein, but that active control of this plant was not an early piece of the nutritional puzzle during the Archaic period (Smith 2001b). Squash, maize, and beans were each added independently to the Valley of Oaxaca diet and thus must have each been adopted for their own qualities and not as an agricultural package reflecting a new subsistence strategy. Further, together squash, maize, and wild beans never accounted for more than 4 % of the plant remains (let alone the lower proportion of the overall diet once animals are included) deposited at Guilá Naquitz (Flannery 1986: 315).

Gheo-Shih was an open-air site not far from Guilá Naquitz that was occupied in the Middle Archaic period on multiple occasions during the summer months (Marcus & Flannery 2004). The site is best known for two parallel lines of stones 7 m apart that could have functioned as a ballcourt or a road. The inhabitants of Gheo-Shih numbered 15–25 and ate only wild foods (Marcus & Flannery 1996: 59). Variability during

the Early and Middle Archaic periods between the cave site of Guilá Naquitz and the open-air site of Gheo-Shih highlight the fact that during different times of the year and in different locations different foods were being consumed. An important point when interpreting the ephemeral evidence from these three sites is that before intensive agriculture and long-term storage, diet was not constant or stable. People could have seasonally exploited domesticates and still have foraged exclusively for wild resources during significant portions of the year.

Our only glimpse of the Late Archaic occupation in the Valley of Oaxaca comes from Level C at Cueva Blanca. Based on these data, Marcus and Flannery (1996: 61) propose that the inhabitants of the Valley of Oaxaca shifted from a foraging to a collecting strategy (sensu Binford 1980) at the end of the Late Archaic period. Cueva Blanca Level C is proposed to be the remains of an all-male deer hunting party who would have brought their kill back to a base camp on the valley floor.

Recent Evidence from the Chiapas Highlands, Honduras, and the Balsas Region of Guerrero

There are a number of other Archaic-age Mesoamerican sites that warrant mention due to new evidence. The first is Santa Marta Cave in highland Chiapas that was originally tested by MacNeish and Paterson (1962) in his pursuit of dry caves with well-preserved early levels. Recent excavations by Guillermo Acosta (2008) have not produced macrobotanical remains, but microbotanical evidence documents economic species such as maize and cacao back to 8,000 cal. BP.

Recent discoveries in the dry El Gigante rockshelter in southwestern Honduran highlands have wonderful preservation, and Timothy Scheffler (2002, 2008) documented an Archaic period occupation by 7,000 cal. BP that includes storage pits. Excavations in the rockshelter have uncovered aceramic levels with good faunal and botanical preservation. Paleoindian levels from El Gigante document "the exploitation of a wide variety of plants and small animals including waterfowl and aquatic fauna" (Scheffler 2008: 332). This is evidence that the adaptation of the cave's occupants did not necessarily change that drastically with the onset of the Holocene. Squash and maize are documented in the Archaic-age levels. Analysis is ongoing by a team at Penn State, and the well-preserved floral and faunal from this rockshelter will provide the first detailed highland archaeological record outside of Mexico.

Recent evidence also comes from the Xihuatoxtla rockshelter from the Balsas region in Guerrero (Piperno et al. 2009; Ranere et al. 2009). A 1-m deep sequence of occupation was documented with lower levels dated to 8,700 cal. BP. Fauna and macrobotanical remains are not preserved from this site, but ground and chipped stone tools are present, along with starch and phytolith evidence of maize and squash.

Lowland Evidence

Soconusco

The work of Barbra Voorhies (2004) and her colleagues provide the majority of what is known of the Archaic period occupation of the Soconusco region in southern Chiapas. These data are from excavations at six shell mounds that were made of marsh clams and periodically used, based on an absence of house floors or hearths as well as a low diversity of tools and faunal species.

The Archaic period in the Soconusco is defined by the Chantuto A (6,000–5,000 cal. BP) and Chantuto B (5,000–1,900 cal. BP) phases (Blake et al. 1995; Voorhies 2004). Chantuto A is known from the single shell mound site of Cerro de las Conchas which is located in a mangrove-estuary environment and produced a number of C14 dates, but little information pertaining to subsistence activities is currently available. The Chantuto B phase is known from five estuary shell mound sites and the upland site of Vuelta Limon. The estuary sites are interpreted as seasonal resource procurement locales and Vuelta Limon as a base campsite (Voorhies 2004; Kennett et al. 2006).

The site of Tlacuachero is a Chantuto B period shell middens. A large, prepared clay surface was encountered with post holes forming

two oval structures, one measuring 4 x 8 m (Voorhies 1976: 38; Voorhies et al. 1991). This site was seasonally occupied to procure clams, fish, turtles, and other marine resources, and the tools recovered included milling stones and hammer stones. In addition, 57 obsidian flakes were found at the site and trace element analysis indicates that these Archaic period peoples were obtaining obsidian from Highland Guatemala (Nelson & Voorhies 1980).

Two burials have been excavated from the Tlacuachero site, and one of them, an adult male, had extremely worn teeth (Voorhies 1976: 67). Isotopic analysis of these burials indicates a reliance on C4 plants, which includes maize, teosinte, and other grasses (Blake et al. 1992). However, Blake et al. (1995: 167) have suggested that these isotopic results may be due to high levels of consumption of marine resources and one may actually date to the Classic period (Clark et al. 2007: 31).

Phytoliths have been analyzed from the Tlacuachero midden, and a sediment core indicates that a similar mangrove environment prevailed during Chantuto times. Unfortunately, no identifiable pollen was recovered from the site nor was phytolith data pertinent to economic behavior (Micheals & Voorhies 1999: 48). Analysis from Vuelta Limon indicates that forest elements dominated the phytolith assemblage but indicators of disturbance such as grasses are also present, and Voorhies (1996a: 24) states that this phytolith study documents "...evidence of probable cultigens: maize, maize crosses and squash."

Kennett et al. (2010) have recently argued that "pre-pottery slash and burn farmers" were operating on the Pacific coast of Chiapas by almost 8000 years ago. This interpretation is based on pollen, phytoliths, and charcoal from two cores: one collected in the Acapetahua area around the Chantuto mounds and the other 35 km northwest up the coast near the town of Pijijiapan. Core SOCO5-3 in the Acapetahua zone documents pollen evidence of maize and that "Zone 2 (525-475 cmbs [4200-3990 cal. BP]) is marked by a dramatic but temporary increase in red mangrove pollen" (Kennett et al. 2010: 3406). The Pijijiapan core's pollen included no maize from before the Common Era, but the charcoal record shows that "very high fire activity occur [ed] between ~4300 and 4200 cal. BP, 5200 cal. BP, and between 5800 and 5600 cal. BP" (Kennett et al. 2010: 3407). Kennett et al. (2010: 3407) argue that their environmental data is "consistent with burning of agricultural fields." While swidden agriculture is certainly one possible interpretation, another is natural lighting strikes causing forest fires in an increasingly dry environment. A third potential explanation is that foragers set fire to open fields to enrich the soil and/or drive out animals they were hunting (or both). The current paucity of data precludes saying much with certainty, and each of the three hypotheses is worth exploring.

Neff et al. (2006a, 2006b) document similar timing of forest disturbance and a late fifth to early fourth millennium BP drying period based on the six cores from the coast of Guatemala. They interpret this as the "activities of Archaic-period populations practicing shifting horticulture" (Neff et al. 2006a: 288) and further "a pattern of extensive land use by horticultural people who exploited terrestrial fauna and wild plants but also modified the tropical forest ecosystem and incorporated domesticates" (Neff et al. 2006a: 291). Neff et al.'s (2006a) interpretation of horticultural and logistically organized collectors is consistent with how Voorhies and Kennett (Kennett & Voorhies 1996; Voorhies 2004; Kennett et al. 2006) have previously interpreted their archaeological data. That ancestral maize was being used in the Soconusco by 8,000 cal. BP is clear. The possibility that fields were burnt by humans at this time seems a distinct possibility. However, lacking is any evidence to support the interpretation of intensive agriculture (swidden or otherwise) being practiced at this early date.

One striking correspondence is the major disturbance period documented by Kennett et al. (2010) between 4,200 and 3,900 cal. BP with the so-called 4,200 BP Event, a major environmental disturbances around the world (e.g., Thompson et al. 2001; An et al. 2005; Booth et al. 2005) that among other things is used to explain the fall of many Old World civilizations (Weiss et al. 1993;

Cullen et al. 2000; Weiss & Bradley 2001). This 4,200 BP "event" lasted for ~300 years and corresponds precisely to the dramatic disturbance documented in the pollen record of SOC05-3 in the vicinity of the Chantuto sites. Charcoal from increased burning between 4,200 and 3,900 cal. BP is documented by Kennett et al. (2010) along the Chiapas coast and Neff et al. (2006a, 2006b) along the Guatemalan coast. Most telling is that Kennett et al. (2010: 3407) report that burning of grasses (and not trees) is documented in their charcoal record and that these remains are due to burning that occurred upstream on the coastal plain and that the charcoal was washed downstream into the estuary were their cores were located. Dry conditions were likely exacerbated by the activities of local human inhabitants of the Soconusco who burnt newly opening grasslands. Neff et al. (2006a: 288) argue that this "was a punctuated evolutionary event associated with population fragmentation caused by a reduction in available moisture shortly after 2000 cal. BC." I return to the implications of this in the discussion section below.

Northern Belize

Relatively more archaeological work has been undertaken by a greater number of people in Belize than in most other areas in Mesoamerica. However, this work has not produced a clearer or more robust record of the Archaic period. Lohse et al. (2006) provide a recent review of the Paleoindian and Archaic period records from Belize (and see Zeitlin & Zeitlin 2000).

Looking for a lowland location to compare with his Tehuacán work, MacNeish (1981, 1982) began the Belize Archaic Archaeological Reconnaissance project (BAAR) and recorded almost a hundred possible sites in the northern half of the country (Zeitlin 1984; Zeitlin & Zeitlin 2000). The BAAR defined a continuous sequence of Archaic period phases that parallel those defined at Tehuacán; however, subsequent work has shown this sequence to be untenable (Lohse et al. 2006).

The best defined Late Archaic sequence in northern Belize (as well as anywhere in the Maya lowlands) comes from work carried out at the site of Colha and nearby Cobweb swamp (Hester et al. 1980; Hester 1994; Hester et al. 1996; Iceland & Hester 1996). Investigators divide the Late Archaic into an Early Preceramic (4,500–3,900 cal. BP) and a Late Preceramic period (3,500–2,900 cal. BP) based on the available C14 dates (Hester et al. 1996; Iceland 1997). Two formal, superimposed lithic production areas were documented at Colha – a lower surface (Zone C) of Archaic date was found with evidence of constricted uniface production (debris and refits) under another prepared surface (Zone B) with burin spall cores and other diagnostic Middle Formative lithic production debris (Hester 1994: 3; Hester et al. 1996: 47). At Colha, Operation 4046, Zones C and D both contained "... large amounts of patinated lithic material including constricted unifaces, biface and macro-blade fragments, and debitage, but no ceramics..." with associated dates that range between 4,900 and 3,000 cal. BP (Hester et al. 1996: 45).

Colha is located at the north end of an extremely high-quality chert-bearing zone that was extensively utilized from Archaic times up until Spanish contact. Numerous highly patinated flakes, large blades, projectile points, sandstone bowls, and constricted unifaces have been identified in a handful of sites in northern Belize, including Colha. Lowe points have been tentatively dated to 6,500–5,900 BP based on associated radiocarbon dates (Kelly 1993: 215), and this tool type is the primary archaeological characteristic of the Early Preceramic period. Constricted unifaces are associated with the Late Preceramic and have been identified as woodworking adzes (Gibson 1991), but could have also been used as digging tools, as suggested by experimental and microwear studies. Both activities are consistent with a horticultural adaptation.

Mary Pohl and her colleagues undertook a paleoecological program of coring and excavations at a number of swamps in northern Belize and have run over 40 radiocarbon dates (Pohl et al. 1996). They documented maize and manioc at Cob swamp by 5,000 cal. BP. Yet tree pollen indicates that these cultigens were

employed in high tropical forest with minor disturbance (Pohl et al. 1996: 363). However, John Jones' (1994) pollen analysis indicates that after 3,500 cal. BP, forest disturbance was extensive with significant increases in maize and charcoal remains. The lithic assemblage from Pulltrouser Swamp is similar to that at Colha, with the diagnostic complex of unifacially worked macroflake tools (Pohl et al. 1996: 366) and dates that place a constricted uniface found there between 3,300 and 3,000 cal. BP (Bower 1994: 279).

Environmental data and corroborating lithic assemblages from northern Belize suggest that horticultural societies were using a specialized lithic technology to clear and plant crops for over a millennium and a half prior to the first use of ceramics in the region. Forest disturbance is also documented at this time in the Petén Lakes (Vaughan et al. 1985) and the Petexbatun (Johnston et al. 2001: 158-9) regions of lowland Guatemala. Environmental evidence suggests that humans were having an increasing impact on environments in the Maya lowlands by 4,500 cal. BP by cutting down forests. However, there is still little archaeological evidence from this time period pertaining to settlement patterns, social organization, or variation in economic activities.

After inadvertently encountering Archaic period occupation below Postclassic villages in the Freshwater Creek drainage in northern Belize (Rosenswig & Masson 2001), these deposits were tested at Progresso Lagoon. At the site of Caye Coco, approximately 150 m^2 of distinctive orange soils containing patinated, Archaic period lithics were encountered near two pit features and a single posthole (Rosenswig 2004). These are the only Archaic period features documented to date in northern Belize, and we have subsequently dated carbonized wood from these features to the Middle and Late Archaic. In addition to patinated chipped stone tools and flakes, two hammer stones were recovered and evidence of worked oyster shell was also recovered from this area. Excavations were also initiated at the Fred Smith site on the west shore of Progresso Lagoon facing Caye Coco, and many more heavily patinated tools were documented in orange soils, including a variety of bifaces. In the early 1980s, the BAAR had worked approximately 500 m south of the Fred Smith site on the west shore of Progresso Lagoon at the Betz Landing site (Zeitlin 1984). No features are reported from these excavations, but a "reddish-brown soil…" 20–40 cm below the surface produced dates of 1230 +/− 85 BCE and 1275 +/− 85 BCE (Zeitlin 1984: 364). Below this layer, they documented a dark gray, aceramic clayey soil contained lithic, and a date of 1790 +/− 800 BCE was derived from this lower level (Zeitlin 1984: 365). The Archaic period occupation from Progresso Lagoon seems to be extensive and well preserved and thus will soon be the focus of a renewed program of excavation.

Discussion

The spotty nature of fragmentary data on the Archaic-age sites does not provide a representative picture of the range of peoples who lived at this time or the variety of their adaptations. Writing of the Oaxaca and Tehuacán records of food production, Buckler et al. (1998: 161) observe: "While the best-reported and most extensive archaeological sites in Mexico occur in these semiarid regions, the ecological zone was unimportant in the domestication of most Mexican crops." More is known now than 10 or 15 years ago, but the progress has been slow going. This is undoubtedly due in part to the relatively low population density of Archaic period inhabitants of Mesoamerica as there were simply fewer people whose remains are left to encounter compared to their Formative and Classic period descendants. Equally as important though is the surprisingly small number of archaeologists who are searching for and excavating sites from Mesoamerica's Archaic period.

I end this entry with a brief discussion of the end of the Archaic period by focusing on two observations. First, that the end of the global 4,200 cal. BP Event of mid-latitude environmental drying corresponds to the beginning of the end of the Archaic period. Second, that during the course of the fourth millennium cal. BP,

Mesoamerica was occupied by a mosaic of peoples following both "Archaic" and "Formative" adaptations. These are both simple, empirical observations that have significant implications for how the Mesoamerican Archaic period adaptation is modeled as well as how its end is understood.

The 4,200 cal. BP Event and Mesoamerica

Most discussion of drought in Mesoamerica has focused on the Classic period Maya collapse. A synthesis of worldwide collapse published in *Science* by deMenocal (2001) discusses the Akkadian and Maya collapses, one after the other despite their separation by 3000 years. Perhaps more relevant would have been to compare the effects of a single drought period on different parts of the world and to peoples with different adaptations and different forms of sociopolitical organization. The 4,200 BP Event appears to have played a part in the collapse of integrated, hierarchical societies in the Old World that depended on agriculture to sustain the political and administrative organization (Weiss et al. 1993; Weiss & Bradley 2001). But what about the effects of this mid-latitude's drying period on early horticultural peoples such as those in Mesoamerica?

No other Mesoamerican archaeologists I am aware of have discussed the 4,200 BP Event (but see Rosenswig 2006b). However, this was a global, centuries-long environmental disturbance that caused dryer conditions at mid-latitudes and increased precipitation at high latitudes. The resulting drought conditions are clearly documented at eight different sites across the US Midwest using a variety of high-resolution environmental reconstructions (see Booth et al. 2005). For example, between 4,200 and 4,000 cal. BP, the pollen and charcoal analysis of South Rhody peatland in northern Michigan documents an increase in frequency and intensity of wildfires, a disturbance of forest vegetation, and a drop in the water table to its lowest point in the past 5000 years (Booth et al. 2005: 322). An abrupt, centuries-long period of deforestation also began at 4,200 cal. BP in Italy (Drysdale et al. 2006), East Africa (Thompson et al. 2002), and China (An et al. 2005) to name but a few of the rapidly accumulating cases of this global event.

Neff et al. (2006a) argue that a coordinated change in forest disturbance suggests an environmental cause for changes, whereas an uncoordinated series of disturbances is more consistent with human-induced environmental change such as early horticulture. Based solely on the six cores from the Guatemalan coast, their data was inconclusive (Neff et al. 2006a). However, combined with the new cores from the Chiapas coast (Kennett et al. 2010), a clearer picture emerges of an environment with less forest cover and more fires in the grasslands of the Soconusco during precisely the same two to three centuries that the 4,200 cal. BP Event is documented globally.

It is possible to explain the contemporaneous collapse of multiple Old World civilizations as a domino effect and the result of trade and tribute networks falling apart. However, the global nature of the environmental disturbance makes even this interpretation unlikely (Weiss & Bradley 2001). Whereas agriculturally dependent empires in the Eastern Mediterranean and the Middle East could no longer fund their political and military institutions, the end of the two to three century-long 4,200 BP Event corresponds to the first adoption of ceramic containers and increased evidence of sedentary villages in the Soconusco, Oaxaca, and Tehuacán. Why would an increasingly wet environment result in decreased mobility? This is an empirical pattern in need of an explanation. In the Maya area, changes in container technology and residential mobility occurred nearly a millennium later. The reason why the Archaic period in the Maya area lasted so much longer than elsewhere in Mesoamerica, and the shift to a "Formative" adaptation did not follow the 4,200 BP Event, is another pattern that begs for an explanation.

Fourth Millennium BP Adaptive Mosaic

The fourth millennium BP was a fascinating time in Mesoamerica as the Late Archaic transitioned to the Initial Formative period creating an

adaptive mosaic across the region. The first ceramic-using villagers in Mesoamerica are documented at ~4,000 cal. BP once the environment improved after the so-called 4,200 BP Event had ended. The earliest ceramic-using villagers appear to have been isolated local phenomena. The highland Purrón phase in Tehuacán (MacNeish 1964, 2001b) and the Epiridón phase in Oaxaca (Marcus & Flannery 1996) are known from very few sherds at single location spots, and much of the rest of the area was presumably still inhabited by foragers. In the Soconusco, sophisticated Barra phase ceramics (3,900–3,700 cal. BP) are known from a handful of sites on the coastal plain (Lowe 1975; Blake et al. 1995). Then, during the course of the fourth millennium BP, ceramic-using villagers expanded into most regions of Mesoamerica (Clark & Cheetham 2002).

I have proposed that we view the fourth millennium cal. BP as an adaptive mosaic where ceramic-using villagers began as an anomaly whose numbers then progressively increased among the "Archaically adapted" foragers who occupied most of Mesoamerica (Rosenswig 2010: 13-46; 2011). Along with early villagers, less sedentary peoples were probably quite common in Mesoamerica at this time (Kennett et al. 2006: 104-105; Neff et al. 2006a: 308; Rosenswig 2006a, b; Arnold 2009; Blake & Neff 2011). During the course of this millennium, sedentary, food-producing villagers went from being an anomaly to the most pervasive settlement/subsistence strategy across Mesoamerica. The implication of this proposal is that when studying sedentary Mesoamerican peoples, it is worth considering the distinct possibility that other groups coexisted – especially those with greater residential mobility, less ceramic use, and/or subsisting on greater quantities of wild resources. Regional landscapes often form mosaics of adaptive strategies that are dynamically integrated and regulated by fluctuating environmental and social conditions (e.g., Stahl 2004).

The Archaic-Formative transition was not a temporally uniform occurrence in Mesoamerica. One of the better known, non-sedentary, adaptations that persisted throughout the Early Formative period was that of the inhabitants of northern Belize where ceramic use and village life were only adopted ~3,000 cal. BP (e.g., Lohse et al. 2006). One reason why the preceramic peoples in this area are known is that they lived near a source of high-quality chert which they used to make distinctive tools. Other fourth millennium BP non-ceramic-using peoples have likely gone undocumented in much of Mesoamerica – especially those who relied on more perishable forms of material culture. Philip Arnold (2009) also describes the variability of Early Formative adaptation on the Gulf Coast and argues that semisedentary peoples lived at La Joya, which was only a two-day walk from the early Olmec capital of San Lorenzo. The transition was not as simple or as sudden as many Mesoamerican scholars assume.

I have proposed that the inhabitants of the Soconusco, the Gulf Coast, Grijalva Valley, Valley of Oaxaca, and Basin of Mexico and other islands of cultural complexity interacted with each other over long distances (Rosenswig 2010: 34-8, 2011). And further, that together these peoples formed an archipelago of complexity. The cultural islands shared more with each other than with their Archaically adapted neighbors who surrounded them. This interpretation is more consistent with the available evidence than one that posits a continuous distribution of people with a similar adaptive base and employing material culture graded from one set of stylistic standards to the next over vast areas of the early Mesoamerican landscape. Acknowledging the presence of peoples with less sedentary adaptations should impact the ways in which we model both local and interregional interaction in Mesoamerica during the fourth millennium BP. The persistence of non-sedentary peoples further emphasizes how stable and long-lasting Mesoamerica's Archaic period adaptation was.

Conclusion

Mesoamerica's Archaic period – defined by non-ceramic-using peoples following a mobile residence pattern dependent on a mix of wild and domesticated foods – lasted for a longer time than that of all villages, states, empires,

and industrial societies combined. As the inhabitants of Mesoamerica followed a stable Archaic adaptation for 6,000–7,000 years (10,000–3,000/4,000 cal. BP) of the Holocene, what needs to be explained is why change occurred and why change was so slow and patchy. To understand the final millennium (i.e., 4,000–3,000 cal. BP), we need to model mobile foragers living among newly emerging villages and explain why the inhabitants of certain regions – particularly the Maya area – maintained the long-lasting Archaic adaptation so persistently. Future research into the end of the Archaic period will need to address what it was about environmental amelioration at ~4,000 cal. BP (after two or three centuries of drought) that would result in people reducing their level of residential mobility, settling in villages, and adopting ceramic containers.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Agriculture: Definition and Overview
- ▶ Flannery, Kent Vaughn
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Maize: Origins and Development
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica: Subsistence Strategies by Region

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Metal Detecting in Archaeology

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Introduction

The association of metal detecting with relic hunters has almost made the metal detector synonymous with site looting and is perhaps one of the reasons metal detectors have been underutilized by professional archaeologists. Metal detectors are inexpensive and effective remote sensing devices that should become part of the basic tool kit of archaeologists working at sites where metal artifacts are likely to be a part of the site assemblage. The primary difference between relic collecting and site looting and the use of metal detectors as legitimate archaeological tools is simply the manner of application. Metal detectors find metal objects just as a shovel tests or test units might be used to discover a site's

content, depth, or boundary. In archaeological applications the metal detector inventory process, coupled with precise and accurate recording techniques, is a valid and useful field survey technique.

Key Issues/Current Debates/Future Directions/Examples

Today, the use of nondestructive and nonintrusive methods of archaeological investigation is ingrained in the discipline, and archaeologists have turned increasingly to methods of remote sensing for initial site investigation. The metal detector is a remote sensing archaeological tool, a handheld, near surface in-phase conductivity meter. All metal detectors have a similar basic configuration that includes a handle, search coil, cable, and a metal box that houses the battery and electronic circuit board (control housing and memory).

The control housing and metal detectors have four basic technologies in which metal detectors function:

1. *Continuous sine wave*: This is the traditional type of technology as used in most basic detectors. These detectors are commonly known as very-low-frequency (VLF) models. Continuous sine wave detectors create an electromagnetic field which is applied to the ground in a continuous wave.
2. *Broadband spectrum (BBS)*: This method transmits in 17 frequencies simultaneously instead of just one in a square wave form rather than a sine wave as with VLF machines. A further improvement on this technology is full band spectrum (FBS), which transmits in 28 frequencies simultaneously. FBS has the benefit of offering superior ground cancellation and accurate discrimination at depth and over a wide variety of targets. This makes multifrequency detectors the most versatile detectors available today.
3. *V/Flex technology*: This uses state of the art digital and mixed-signal components to enhance standard single-frequency technology. The advantages of V/flex technology gives dependable performance and improved immunity to outside factors. V/Flex technology also allows the detector to operate in different frequencies dependant on the coil being used.
4. *Multi-period sensing (MPS)* or *pulse induction (PI)*: This is the exclusive and patented technology. MPS technology transmits a stream of alternating short and long pulses of magnetic field into the ground, causing objects to produce a changed magnetic field of their own. This means that you can locate metal targets at far greater depth than conventional (VLF) detectors, while small targets can still be found in difficult grounds. MPS technology also aids in the accuracy of ground balance which limits the number of "ghost" or false signals.

The two basic metal detector types routinely used in archaeological metal detecting are VLF (very low frequency) and PI (pulse induction, aka MPS). The *VLF* concept is based on sending an electrical current into the ground to determine if materials that are conductive (also called inductance) or resistive to electrical current are present. VLF technology relies on the principle of phase shift, which is the difference in timing between the transmitter coil's frequency and the frequency of the target object. The difference is a result of its conductivity (inductance) or its resistance to electricity. An object that conducts electricity easily (inductive) is slow to react to changes in the current. An object that does not conduct electricity easily (resistive) is quick to react to changes in the current. Essentially, this means that an object with high inductance is going to have a larger phase shift, because it takes longer to alter its magnetic field. An object with high resistance is going to have a smaller phase shift.

Phase shift provides VLF-based metal detectors with its discrimination capability. Since most metals vary in both inductance and resistance, a VLF metal detector examines the amount of phase shift, using a pair of electronic circuits called phase demodulators, and compares it with the average for a particular type of metal. The detector then provides an audible tone or visual indicator as to what range of metals the object is likely to be.

PI technology sends powerful, short bursts (pulses) of current through a coil of wire. Each pulse generates a brief magnetic field. When the pulse ends, the magnetic field reverses polarity and collapses very suddenly, resulting in a sharp electrical spike. This spike lasts a few microseconds (millionths of a second) and causes another current to run through the coil. This current is called the reflected pulse and is extremely short, lasting only about 30 μs. Another pulse is then sent and the process repeats. A PI-based metal detector sends about 100 pulses per second, ranging from several dozen pulses per second to over a thousand, depending on the model or brand.

A sampling circuit in the metal detector is set to monitor the length of the reflected pulse. By comparing it to the expected length, the circuit can determine if another magnetic field has caused the reflected pulse to take longer to decay. If the decay of the reflected pulse takes more than a few microseconds longer than normal, there is probably a metal object at that location. The sampling circuit sends the tiny, weak signals that it monitors to a device called an integrator. The integrator reads the signals from the sampling circuit, amplifying and converting them to direct current (DC). The direct current's voltage is connected to an audio circuit, where it is changed into a tone that the metal detector uses to indicate that a target object has been found.

PI metal detectors are poor at discrimination because the reflected pulse length of various metals is not easily separated. However, they are useful in many situations in which VLF-based metal detectors would have difficulty, such as in areas that have highly conductive material in the soil or general environment. PI systems detect metal much deeper in the ground than other systems.

The control housing also contains either preset, manual, or automatic ground-balancing functions. Ground balancing reduces or eliminates natural background mineralization in the soil type or types at the work area. This function allows the detector to perform with more predictable results. *Manual ground balance* gives the operator the ability to alter the ground balance to suit the various and changing ground mineralization being detected. *Automatic ground balance* – automatic ground tracking – refers to the ability of the detector to track the changes in ground mineralization and automatically adjust the ground balance to suit. This ensures perfect ground balance and full detection depth and eliminates the need for the operator to stop and manually adjust the detector as the ground conditions change. *Preset ground balance* is preset to suit a particular soil type. This obviously makes the detector limited to where it is able to be used.

The control circuits have built-in operational frequencies established by the individual manufacture. Operational frequency is measured in kilohertz, the frequency is the number of times a signal is transmitted into the ground and received back, per second. The lower the frequency used by the detector, the deeper it can normally penetrate. At low frequencies, however, the sensitivity to small targets is sometimes reduced. The higher the frequency, the higher the sensitivity to small targets, but it may not penetrate as deeply. In general, gold detectors operate at higher frequencies (to find small nuggets), while coin and treasure detectors work at lower frequencies for deeper penetration (the exception to this is MPS-type metal detectors that are sensitive and deep-seeking simultaneously).

A final function of a machine's control circuit is the *discrimination capability*. This function varies by quality of the machine and the manufacture. Discrimination is the ability of the detector to identify the type of metal object found and eliminate the unwanted metal types. There are four basic discrimination types:

Variable discrimination: This is the most basic of discrimination types. It works like a demarcation line in the conductivity level. The level can be set by the operator, and all metals with conductivity lower than where the level is set are eliminated and all metals with a higher conductivity are accepted.

Notch filter discrimination: If all metals were arrayed in order of their conductivity, from least conductive to most conductive, notch filter discrimination segments that array into zones or "notches" and each notch or zone can then be

accepted or deleted. The number and width of the notches offered on the model of detector will determine, to some degree, how selective the detector can be at eliminating unwanted from desired targets (e.g., can tabs from lead bullets or brass items).

Tone identification: Some detectors will indicate the possible ID (identity) of a target, by changing the tone of the target signal. Generally, low conductive metals will give a lower tone, while highly conductive metals will give a higher pitched tone.

Identification meter: Better quality detectors today offer a meter or LCD screen, which will identify the target using as either a graphic display or numeric display specific to the brand or model. Note: The accuracy of discrimination is dependent on the repeatability of an object having the same conductivity as other samples of the same object. Man-made objects will normally be consistent in their conductivity; however, naturally occurring conductive minerals like gold will often have variations in their purity and therefore their conductivity. Soil mineralization will also have an effect on discrimination.

The last major hardware feature is coil or antenna differences. Today, the control circuits are not advancing rapidly even among different manufacturers. The changes in technology to allow greater depth, metal discrimination, and recovery are in the coil technology. There are three aspects to coil differences that are important:

Size: The size of a coil can influence the depth or sensitivity of a detector. The larger the coil, the deeper it tends to detect but less sensitivity it has to tiny targets. The smaller the diameter, the more sensitive it becomes but with less depth. Smaller coils will also be lighter, easier to control, and may be chosen for their ability to negotiate difficult terrain or undergrowth.

Shape: The most common shapes of coil are the conventional solid round or circular coils, elliptical-shaped coils, and open-web coils. The main reason for change to shape is to conform to a physical requirement, i.e., the elliptical coil can be pushed around brush or between rocks easier than round coils. Open-web coils help cut through water when wading or detecting underwater. These coils are also popular for their reduced weight. Conventional round coils are often the more stable and high-performing coil.

Configuration: The three most common types of coil windings are concentric, double D, and mono loop. The difference between these coil types is the pattern the wire is wound within the coil, and configuration is one of the most important elements in coil technology.

Concentric coils have an inner circle and an outer circle wire winding. Its search pattern is cone shaped and can be useful for accurately pinpointing the target. Concentric coils tend to be noisier in highly mineralized ground and require more detector sweep overlap for thorough ground coverage.

Double D wound coils are now the preferred coils for most detecting. They give a blade- or chisel-shaped signal that covers the ground more uniformly, and once an operator becomes accustomed to the signal, pinpointing is no hardship. Double-D coils are also preferred for their superior ground balancing ability.

Mono loop coils are a special style of coil for the MPS technology detectors. These coils have one winding of wire around the circumference of the coil and this winding is used to both transmit and receive. The signal pattern of the mono loop coil is cone shaped, requiring more overlapping, and in extremely heavily mineralized grounds, they can be more difficult to ground balance; however, they tend to provide slightly better depth than the double-D coils.

Metal Detectors in the Field

Operation of a metal detector can generally be learned quickly and easily for most VLF machines. The exceptions are the VLF multifrequency machines and the PI machines which take many hours of experience to use in an effective manner. As with any tool the more experienced and skilled the operator, the more efficient the work and the better the results. Since the skill of the operator is one of the most important variables, many successful projects have relied on experienced volunteer detector operators. The volunteers are frequently

metal-detecting hobbyists who provide their own machines, thus the project benefits from both knowledgeable volunteers and cost savings.

A successful archaeological metal detector project will require careful planning and adaptation of the methods and techniques to the specific site context. When developing a metal detector survey strategy, operator experience, soil conductivity, and the purpose of the work must be considered. One method of survey consists of three sequential operations: metal detecting, artifact recovery, and provenience recording. During metal detecting, metal targets are located and marked. A recovery crew follows and carefully uncovers the objects, leaving them in place. The recording team then plots individual artifact locations, assigns field specimen numbers, and collects the specimens.

Detector operators should walk abreast, following transects across the area to be inspected. Coils should be held as close to and as level with the ground as possible to provide maximum vertical and horizontal coverage. Each operator can normally cover an area of roughly 1.5–2.0 m with each sweep, depending on the individual's height and technique. The transects can also be varied in width to meet the needs of different sampling approaches, ranging from a random sample to a stratified random sampling. The 1.5–2.0 m sweep with a 5.0 m interval between detector operators obtains approximately a 35 % sample of a study area. If necessary, the metal detector operator can cover a site in a series of more closely spaced units in order to cover up to 100 % of the site.

Transect orientation can be based on any reasonable parameter, such as grid orientation or cardinal direction, as long as a systematic approach is maintained to achieve the desired coverage. Parallel transects and radial transects worked from a central point are two other methods that have proven successful and effective in meeting different site sampling needs.

In dense concentrations of metallic debris, it may be necessary to recover the targets located and then re-sweep the area multiple times to recover all the artifacts. The signal from larger metal objects may obscure the signal from other smaller or less dense targets unless the larger targets are removed from the detector field. Metal shafts of surveyor's pinflags can also obscure nearby buried targets so that a dense field of surveyor's pinflags will affect the number of targets found. Pinflags with fiberglass shafts are available and can be used to eliminate the masking problem found with metal shaft surveyor's pinflags.

Conclusion

Metal detectors can aid in the recovery of archaeological information from almost any site containing metal. Without excavation, by simply detecting a site and flagging "targets," the archaeologist can easily examine the distribution and varying density of metal artifacts within a site. This can aid in identifying intra-site spatial patterning and in establishing site boundaries. In shallow, unstratified historic sites, which are common in the western United States, the targets can be excavated and a sample of temporally and functionally diagnostic material quickly and inexpensively obtained. This can also be done within a structure or where structural remains are present; the detector can be used to quickly obtain information on age and function.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

Further Reading

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Metals: Preservation and Conservation

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Introduction

The social significance of metals is reflected in the nomenclature of the *Bronze Age* and the *Iron Age*. The ancient origins of copper and bronze objects appear to lie in the use of rocks containing nonferrous minerals which were reduced to metals in fire hearths. Only the most noble of metals are found in their native or metallic state which is why gold, silver, and copper have been used as items of trade in the fabrication of jewelry and potent symbols of temporal power. Metallurgical analysis of sites in Latin America reveals a level of sophistication in the production of gold and silver alloys that predate European cultural activity. Eurocentric authors have reported that the production of brasses was a nineteenth-century phenomenon which clearly ignores the Chinese and Indian artisans who have been fabricating these alloys for thousands of years. Archaeological excavation of shipwrecks sites in the Philippines has revealed a wealth of 22-carat gold jewelry that was being made and traded with China when Europe was in the Dark Ages. Tylecote's book on the history of metals is still the best reference to this intriguing topic (Tylecote 1976), illustrating the importance of metal objects throughout time and space. As a result, such objects are readily found in certain archaeological contexts and museum collections. Unlike other artifact classes, however, their very composition makes these objects difficult to conserve long term.

Though this entry will touch upon the major issues surrounding metal conservation, a more in-depth analysis can be found in *Iron and Steel in Art, Corrosion, Colorants, Conservation*, by David Scott and Gerhard Eggert; this volume provides the nonexpert with the most up-to-date and integrated analysis of how to understand the nature of the decay of iron objects in their various alloyed formats and thus how to preserve them (Scott & Eggert 2009).

Definition

The vast majority of elements found on the earth are classified as being metallic in their pure elemental state. Metals are characterized by their lustrous surfaces, ductility, malleability, and capacity to conduct electricity without being changed in the process. Ancient and modern metals form an apparently endless variety of alloys which are solid solutions of two or more components. By dissolving less than 10 % copper in silver, the resultant binary alloy has significantly improved mechanical properties that facilitate the production of jewelry. However, every combination of metals has inherent weaknesses associated with the differing chemical reactivity of the component materials. The *oxidation of metals* through corrosion is the reversal of the chemical reactions that converted minerals into metals and alloys. The precise burial microenvironment on land or in the sea will determine which phases of the alloy will be subject to localized or selective corrosion. The layers of degradation on archaeological metals are the *patina of age*, and its preservation is of high importance since its changing composition reveals

underlying differences in the microstructure of the metals without resource to sectioning. Metal coatings, which act as a barrier for the transmission of moist air which is the principal component of aerobic corrosion, can be applied directly to the metal or over the patina.

Key Issues

Conservation of Iron

Since the microstructure of iron and its principal alloys with carbon holds the secret of being able to change properties at will, producing a plethora of corrosion products depending on its interaction with moisture and oxygen, the understanding of how the different phases interact is vital for conservators and for all involved in the management of heritage collections. Impurities such as phosphorus and manganese in an ore body can exert a pronounced effect on the resultant microstructure of the alloy and thus alter the corrosion properties.

Role of Microstructure

The underlying microstructure of metal, influenced by its manufacture and composition, determines the hardness of its surface; its analysis, therefore, enables the conservator to gain an understanding of the relevant technologies and how the mechanical working of the metal results in products of varying degrees of robustness, capacity to function, and avoidance of corrosion. These characteristics have resulted in different terminologies associated with certain metals such as *wrought iron*, *steel*, and *cast iron*. *Wrought iron* refers to the product of decarburized cast iron, which results in a material that is able to be hot worked or forged into shapes that define functional objects. This process reduces the hardness of the cast iron and overcomes the susceptibility to brittle fracture. *Steels* are the product of blast furnace technologies and have similar composition to wrought iron but do not have the slag inclusions that decrease corrosion resistance. Steels have well-defined and uniform mechanical and microstructural properties. *Cast iron* is a high carbon alloy that results from reducing iron ore with charcoal – it is a hard, brittle, but readily cast alloy.

Aerobic Corrosion Products and Decay Mechanisms

Conservators have traditionally been exposed to chloride-induced iron corrosion resulting from marine-buried iron objects and with its characteristic weeping droplets of iron (III) chlorides undergoing hydrolysis to form their red-brown excrescences (Fig. 1). However, all the data on treatment options for marine iron objects is of little worth for objects from a terrestrial or an industrial microenvironment. In these situations, the formation of iron-carbonate complexes in the intermediate phase known as green rust (II), a mixed iron (III)/(II) carbonate, is an essential step in the overall decay mechanisms. The range of relative humidity values in which various hydrates are stable and unreactive with metallic iron provides a useful guide to explaining the mysteries of the range and nature of iron corrosion products containing chloride and sulfate, oxides, and hydroxides.

Anaerobic Corrosion

The role and significance of iron sulfides in the fate of formerly waterlogged wooden vessels such as the *Wasa* (1628) and the *Batavia* (1629) has been the subject of dozens of papers with most of the effort going into the characterization of the minerals. Through a full understanding of the iron sulfide formation mechanisms, the oxidative degradation, which follows successful stabilization of the waterlogged wood, can be effectively managed. Tales of freshly excavated burning cannon balls are explained in terms of the pyrophoric nature of the iron sulfide mackinawite. Since chalcopyrite ($CuFeS_2$) can be formed in different ways, reports of apparent "pseudo-gilding" on objects recovered from archaeological riverine sediments are now doubtful. Storing reactive pyritic minerals specimens at a relative humidity below 40 % gives the best results. For chloride containing iron objects, a local relative humidity of 15 % normally prevents corrosion. The reasons why some iron

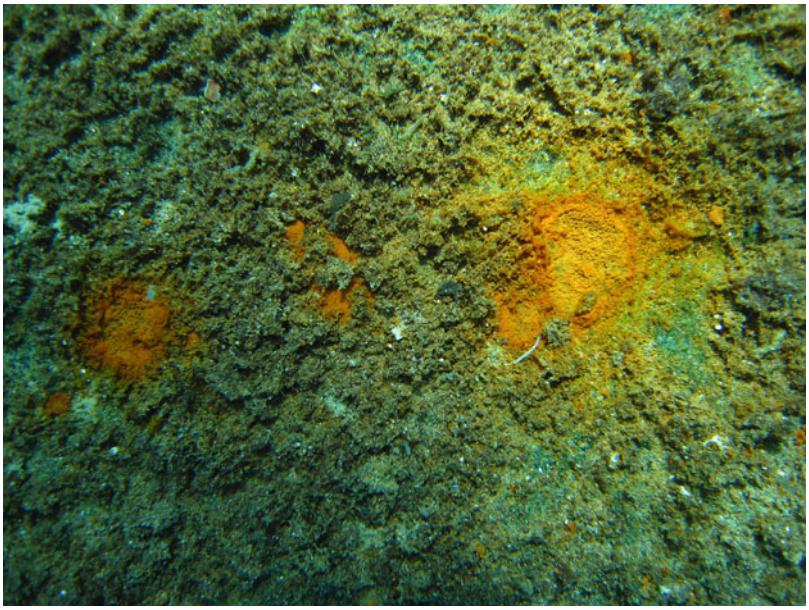

Metals: Preservation and Conservation, Fig. 1 Active iron corrosion on the *Fujikawa Maru* (1944): the result of anchor damage (Photo: Bill Jeffery)

artifacts are recovered with a well-defined "original surface" while others are a mass of twisted pustular outgrowths that fail to make connection with the original form are well discussed by Scott and Eggert (2009).

Treatment Options for Ferrous Artifacts

Further characterization of the nature of the interaction of archaeological iron with the alkaline sulfite method of North and Pearson, which was developed nearly 40 years ago, was recently reported by Rimmer and Watkinson at the Metal 2010 conference. Sulfate residues do not predispose iron to corrosion in high RH, but it is the presence of residual chloride ion that causes posttreatment corrosion problems. Recent work by Eggert and Kuhn (2010) has shown that storage of chloride containing iron objects at −23 °C does not have any lasting benefit; it only prolongs the corrosion induction period. Ultimately the conservator has to intervene to remove the chloride ions (Fig. 2). The stabilization of massive amounts of archaeological iron artifacts can be effected by use of deoxygenated alkaline sulfite treatments (Schmutzler & Eggert 2010).

One of the most important advances in the treatment of archaeological iron has been made by Hunley conservation team at Clemson University with the introduction of subcritical alkaline solutions for the expeditious removal of chloride ions from highly corroded cast and wrought iron matrixes (Mardikian et al. 2010). Relatively dilute solutions of sodium hydroxide (5 g per liter) when heated to 180 °C and at 50 bar are extraordinary in their capacity to extract chlorides from corroded concreted iron. Artifacts in their naturally concreted state were able to be stabilized in less than 10 days, which is a remarkable improvement over traditional methods which take a minimum of 10 months. Surface analysis failed to reveal any signs of chloride ions, and the treated objects are stable in ambient storage conditions for many months. The challenge is now to move to larger reactors and to make this research tool commercially available to maritime conservation laboratories around the world.

Although the wrought iron Delhi pillar has suffered minimal corrosion over 1,600 years, owing to the presence of phosphorus in the corrosion products, some areas are corroding at a faster rate. Singh and colleagues have shown that the impact of cannon balls during civil disturbances in the eighteenth century altered the microstructure. These areas of the pillar are now

Metals: Preservation and Conservation, Fig. 2 Active iron corrosion on a WWII bogey trolley in a marine environment (Photo: Ian MacLeod, WA Museum)

undergoing relatively rapid decay. Cultural sensitivity precludes the use of direct conservation treatments so changing the water profile in and around the monument will lower the corrosion rate.

In situ corrosion and conservation studies conducted on submerged historic shipwrecks have been the subject of archaeological programs in Canada, the United Kingdom, Denmark, the USA, and Australia at sites such as the *USS Monitor* (1862), the *Queen Anne's Revenge* (1718), and the HMS *Sirius* (1790). The work has been extended to reburial projects such as the RAAR program in Marstrand Harbor in Sweden where metal coupons have been left exposed on the seabed, just below the surface, and at 50 cm burial microenvironments (Nystrom-Godfrey et al. 2011). Each provides an excellent case study on dealing with compromised objects and the rapid changes in the nature of wreck sites.

Analysis of sediment cores adjacent to and 20 m away from the First World War submarine AE2 in the Sea of Marmara, Turkey, demonstrated the impact of a large artifact on an archaeological microenvironment. The pH and the redox potential by the submarine were controlled by the electrochemical reduction of dissolved oxygen, while at some distance there was a rapid diffusional gradient for the drop-off of dissolved oxygen. MacLeod demonstrated through corrosion simulation experiments on corroded and concreted iron that the characteristic low pH and high chloride levels can be achieved in a matter of only a year. Thus, in situ studies accurately reflect the long-term corrosion processes. Even after disturbance of the burial environment, it is possible to reestablish the same under carefully controlled conditions (Figs. 3 and 4).

Nonferrous Materials

Not all objects are iron based, and many metallurgical finds are compositions of other materials. Correct identification of all alloys found on shipwreck artifacts from the eighteenth to nineteenth century is vital to avoid the pitfalls of assuming that there is a one-size-fits-all approach which leads to an inappropriate response to the needs of the corroded metals. The metallurgy of the sheathing on the *Snow Squall* (1864) by O'Guinness Carlson and coauthors provides a handy guide to the microstructure of the alloys and the variability in the composition of the parent alloys. Although the alloys were within the formal patent scope of Muntz metal, the way

Metals: Preservation and Conservation, Fig. 3 Measurement of in situ corrosion parameters on the *Gosei Maru* (1944), Chuuk Lagoon, Federated States of Micronesia (Photo: Bill Jeffery)

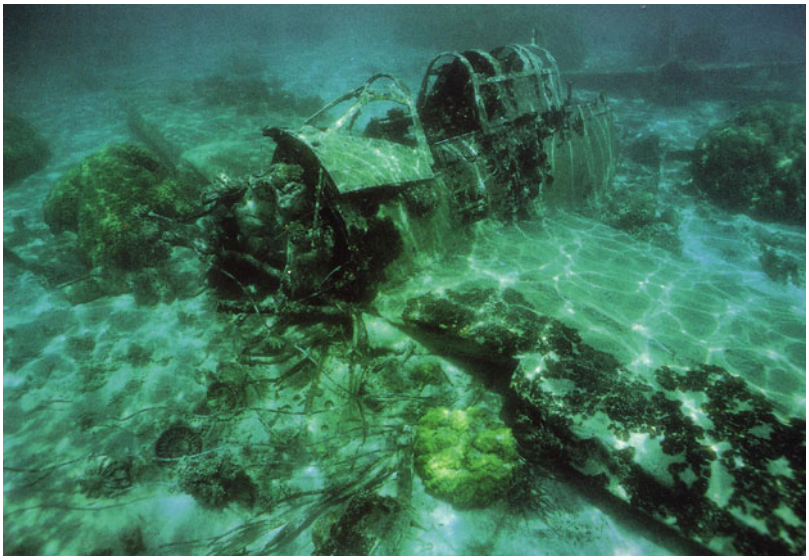

Metals: Preservation and Conservation, Fig. 4 Judy dive bomber, Chuuk Lagoon, Federated States of Micronesia (Photo: Bill Jeffery)

in which selective corrosion of the zinc-rich β-phase took place during the service and depositional life of the alloys removes the conservation dilemma (Fig. 5). The way in which the specific compositions used in letters patent relate to the ability to hot-roll the alloys informs practitioners of the risks of deformation of the metal during restoration work.

Despite the inherently noble nature of silver and its alloys with copper, these materials are very susceptible to decay in the presence of salt and organic acids found in human sweat. Northover reported a very fine study on the interaction of fingerprints on corrosion of fine and sterling silver that involved high-resolution SEM analysis with 3D visualization and analysis by monomer ion time-of-flight mass spectrometry. The conclusion that fingerprints actively promote corrosion of silver and its alloys is not unexpected, but the evidence

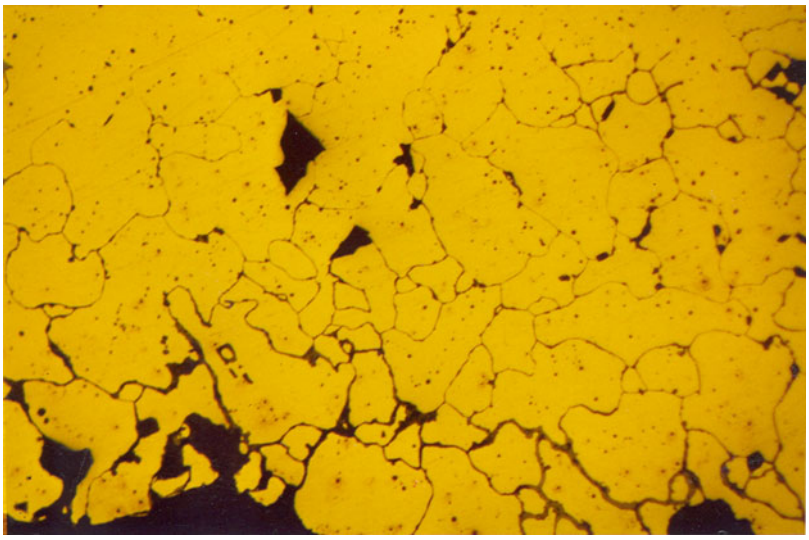

Metals: Preservation and Conservation, Fig. 5 Intergranular corrosion on an American brass nail from the wreck of the Rapid (1811) (Photo: Maria Pitrun, WA Museum)

provides a sophisticated teaching tool that can be used to convey to the public the special handling needs of metals.

Advances in Metal Conservation and Corrosion Inhibition Methodology

Dry-ice blasting methodologies applied to a range of coated metals in their patinated and un-patinated states demonstrated that it is possible to selectively remove organic layers, such as wax coatings, from soft-metal substrates such as aluminum alloys. Results from a number of architectural and sculptural alloys showed that this method provides an alternative to traditional sand blasting or use of walnut shells as the abrasive medium. The work of van der Molen and her coauthors should be consulted for the technical specifications of pressures and angles and methodological details.

The risk of corrosion causing functionality loss in technological metal objects when objects are stored in a static environment is high. A risk matrix assessment of the corrosion during static storage and the erosion from periodic operations (Hedditch et al. 2010) showed that corrosion rates can be lowered by two orders of magnitude by periodical changes in key liquids such as brake fluids combined with dodecanoic acid as an inhibitor in cars.

Since the vast majority of metals in museum collections require some form of coating to provide stability in the absence of specific storage microenvironments, there is a continuing need for assessment of the coating options available to conservators. Importantly, there are key variables which need to be accounted for but are often overlooked by conservators. These parameters relate to surface preparation, application methods, and drying regimes that produce surfaces with very few pinholes and have sufficient dry film thickness to prevent adsorption or penetration of water during both natural and artificial corrosion cycles.

Sodium decanoate owes its protective properties to the formation of iron carboxylates covering the metal surface (Hollner et al. 2010). This type of corrosion inhibition is also applicable to copper and its alloys. Other alternatives have been sought in artificial waxes; Paraloid B-72 is currently being assessed by scholars (Wolfram et al. 2010) with some grades of the Poligen waxes found to be as effective as B-72 and B-44 on ferrous materials, while the traditional Paraloid products and Cosmoloid performed better than Poligen ES 91018 on copper-based objects and coupons. This highlights the need for a proper understanding of the inhibitory mechanism, and the variability of the results is a sign or a symptom of inadequate surface application.

Preventive Conservation

Exhibition Climates for Culturally Sensitive Materials

The practical outcome for conservators from a detailed examination of sections of Lorenzo Ghiberti's famous *Porta del Paradiso* showed that this gilded bronze door could best be exhibited through a controlled relative humidity environment. There was no significant difference between a nitrogen-filled display case and an open display with 20 % RH air flowing over the object.

Analysis of corrosion processes controlling a massive outdoor bronze statue of King Louis XIV at the Palace of Versailles by Chiavari and colleagues has laid the groundwork for the development of better corrosion inhibition through a detailed microstructural analysis of decayed old monuments. Trials with representative quaternary bronze coupons successfully simulated the variable runoff conditions of naturally pooled copper and tin compounds that result in differential corrosion. Under shelter, the patina is a multilayered system with an inner tin-enriched layer covered by copper and lead compounds. In the runoff conditions, a tin-rich patina behaves as a tin porous layer allowing significant dissolution of the other alloying elements of the bronze. A successful coating or inhibitor system must be able to perform in both of these microenvironments (Fig. 6). This is perhaps one of the most significant signposts for future developments in the conservation of outdoor sculptures and monuments.

Metals: Preservation and Conservation, Fig. 6 PVC bubble wrap decay patterns on a restored clock face, The Bell Tower, Perth (Photo: Ian MacLeod, WA Museum)

X-Ray Fluorescence Analysis of Metals

The proliferation of laboratory-based and portable XRF units has produced an avalanche of data pertaining to the composition of surfaces of metal artifacts, but caution has to be exercised in interpreting the results. Testing on the same objects showed up poor reproducibility of the XRF findings (Heginbotham et al. 2010) illustrates the need for appropriate calibration standards and the need to use quantification programs that rely on data from the raw spectra. Further investigations (e.g., the analysis of Panamanian artifacts by Harrison at the Smithsonian Institution) raise the issue of groupings that are best interpreted as being the outcomes of working with naturally occurring impurities of metals from different ore bodies that result in the formation of different alloys, as distinct from planned production of alloys of specific composition and associated properties.

Alloy compositions change as a result of heating regimes associated with either initial fabrication methods or with the pursuit of repairs and corrections to the original castings (van Langh et al. 2010). In order to get reliable data, the choice of spot locations for XRF is best guided by an experienced conservator who has previous knowledge of what effectively constitutes a representative region.

Responses to Traditional and Modern Coating Systems

Complex patinas of metal corrosion products and organic coating systems developed in conjunction with ritual use present special challenges for the conservator who has to balance the stabilization of the metal with the retention of the aesthetic value of the complex layers. These issues were expertly managed on a series of Tibetan gilt objects (Knauer et al. 2010). When coatings have degraded and cease to function, the replacement of the original with a modern but complimentary layer is acceptable practice. This approach is exemplified by Grissom and colleagues from the

Smithsonian in the use of metal powders and pigments to recoat cast zinc monuments from the post-Civil War American era (Grissom et al. 2010). Proper characterization of coatings can present real challenges when the object in question is a massive bronze sculpture tens of meters above the ground atop an historic building. The late Anton Rajer took high-resolution images of the object from hundreds of meters away using a combination of a digital camera attached to a large optical telescope located in nearby high-rise office buildings (Rajer 2010).

Conservation of Large Objects

Conservation of large architectural elements made of cast iron normally does not fall into the purview of museum conservators, but with modern methods of 3D laser scanning, it is possible to accurately map existing structures and "synthesize" missing elements and get 3D prints which then act as molds for replication of missing elements. Similar methods have been used in the restoration of a Rodin bronze, *The Thinker*,which was mutilated with an angle grinder. Laser scanning and metal powder-impregnated resin casting of the mechanically abraded sections resulted in successful in-fills, while the missing leg was cast in the same bronze as the rest of the sculpture (Beentjes et al. 2010). The issues of managing the treatment of the giant Saturn V rocket that took crews to the moon were broken down into a suite of industrial standards of surface preparation and application of a variety of coating systems. Through rigorous process control, the optimum results were achieved. This demonstrates that no job is impossible to a well-trained conservator (Posluszny Bello et al. 2010).

Modeling of Decay and Prevention of Premature Failure

Metals conservation can involve multidisciplinary teams who conduct theoretical analysis of the potential failure mechanisms and present options for the conservator aimed at minimizing the risk of permanent damage to the collection item. This approach has seen the installation of strain gauges on a former firefighting boat in Hong Kong to warn of incipient dangers for this vessel now on exhibition on the hardstand adjacent to the harbor. Finite element analysis demonstrated that the proposed rotation of the partially disassembled *Hunley* Civil War submarine would not cause damage (Blouin 2010). Conservation of the battleship USS *Arizona* (1941) in Pearl Harbor presents many challenges and is being managed through a process of controlled decay. Finite element analysis of a 25-m section of the vessel has enabled prediction of the rate of collapse and of when any oil spills might occur. Knowing the projected life of a shipwreck forms an essential part on the heritage management of submerged archaeological sites which are also war graves (Fig. 7; Foecke et al. 2010).

Metals: Preservation and Conservation, Fig. 7 Inspection of the USS *Monitor* (1862) engine in its caustic treatment tank at The Mariners' Museum (Photo: Ian MacLeod, WA Museum)

Conclusion

Readers of this chapter will have a basic knowledge of the complexity of metals and their

corrosion products and of the need to protect archaeological materials from high relative humidity environments. Application of reversible coating systems can be used to very good effect and can ensure survival of objects in the immediate post-excavation environment. If it is not possible to retain the layers of corrosion products, then samples should be kept for subsequent examination since this depositional matrix records the individual history of the metallic artifacts.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Australia: Maritime Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ In Situ Preservation of Shipwreck Artifacts

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Mexico: Historical Archaeology

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Introduction

Historical archaeology is a relatively new research field in Mexico. In the past, it was overshadowed by the archaeology of pre-Hispanic cultures, which served the State purpose of constructing a unified national identity. Today, the archaeology of the recent past is a well-recognized research strategy and considered necessary for the protection and investigation of the material remains dating to the Colonial and Republican periods. Initially, the archaeology of these periods was related to restoration projects and to rescue archaeology in urban centers. Over the years, however, the number of research projects with scientifically informed questions in both urban and rural areas has expanded, focusing on regional studies, settlement patterns, excavations at religious and secular sites, and the exploration of themes related to colonialism, identity, and consumerism, among others. Even though academic interest in the archaeological study of historical periods has increased over the past decade, there is much to be done as new research questions and topics arise which aim to contribute to a more complete narrative of Mexico's multicultural past and identity (Fig. 1).

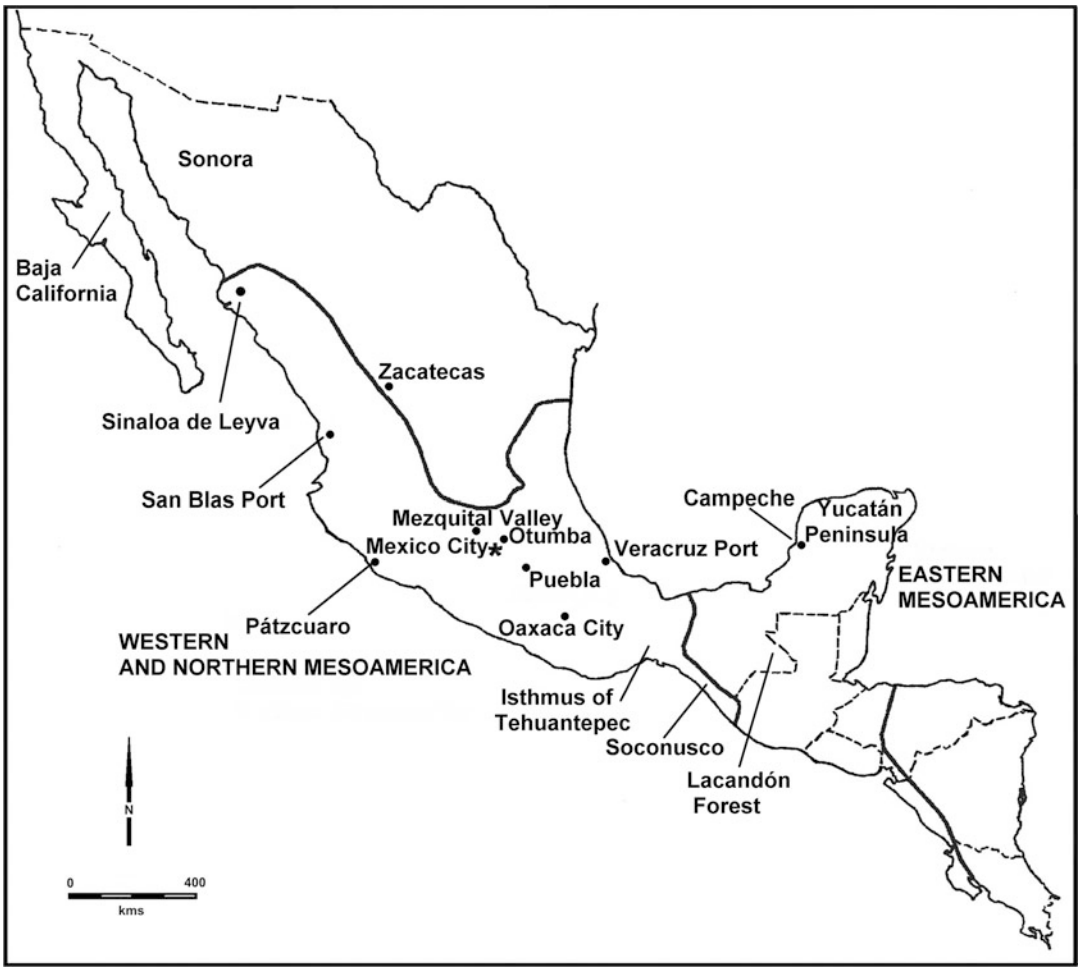

Mexico: Historical Archaeology, Fig. 1 Mexico with areas and important places mentioned in the text

Definition

The term historical archaeology in the New World and specifically in Mexico traditionally refers to the study of the material remains that pertain to the periods that follow the cultural contact between European and Native populations and the impact that the colonization processes had on both groups. The subject matter of historical archaeology in Mexico comprises the archaeological remains and documentary sources of Indigenous and European origin from the Colonial period (c.1519–1521 to 1820) and to the Republican era (1821 to the present) (Charlton & Fournier 2008).

Historical Background

Since its early development, archaeology in Mexico has been linked to the interests of the State. The research agenda and results derived from archaeological research have been used by the State to construct a national ideology through the National Institute of Anthropology and History (INAH) whose mission is to preserve, reproduce, and study this identity. Pre-Hispanic remains pertaining to an indigenous cultural heritage have been used by the State to reaffirm and glorify a native past, and thus, the periods predating the Spanish conquest have been traditionally considered the subject matter of

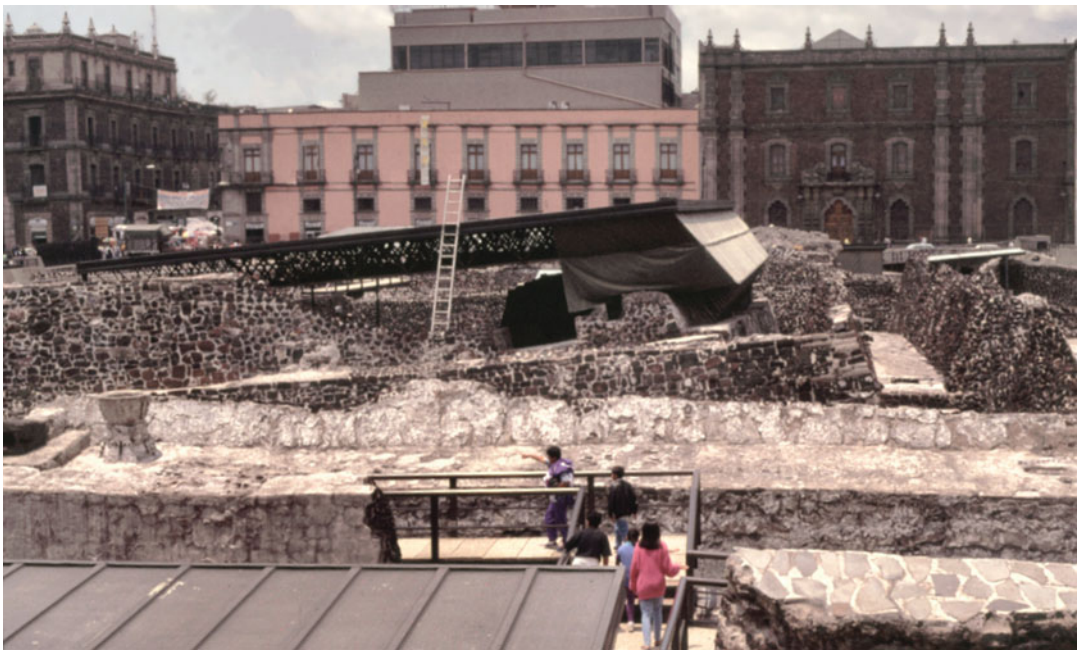

Mexico: Historical Archaeology, Fig. 2 Remnants of the Aztec Main Temple (*Templo Mayor*) in Mexico City

archaeology. As a result, generally the limited funding destined for archaeological research has been granted mostly to projects that focus on pre-Hispanic sites, relegating the study of the postconquest era to local ethnohistorians and historians. This contrasts sharply with projects conducted by American archaeologists who may be funded with larger resources for the study of the remains pertaining to the Mexican Colonial and Republican periods (e.g., Charlton & Fournier 2008; Charlton et al. 2009). However, the situation has been changing in recent times.

Historical archaeology is a relatively new research strategy in Mexico. The first approach to archaeological contexts from the colonial period dates to the 1930s, represented by studies of historic ceramics found in excavations in downtown Mexico City designed to understand technological and stylistic changes of postconquest Aztec ceramics (e.g., Charlton & Fournier 2008). However, it was not until the early 1970s when the archaeology of historic sites acquired relevance in Mexico. This resulted from the discovery of the Aztec main temple (*Templo Mayor*) and from several public works projects in Mexico City, such as the construction of the subway, and from conservation projects in the Metropolitan cathedral and in the National Palace. The excavations in these sites uncovered material culture from historical periods that had been overlooked by archaeologists in previous decades and awoke the interest of some researchers to develop typologies of historic ceramics (e.g., Charlton et al. 2009) (Fig. 2).

Since 1972, Mexican legislation requires that archaeologists protect and conduct research of both pre-Hispanic and historic remains threatened by contemporary public works. This has promoted the interest of Mexican archaeologists to study them under a legal framework and the supervision of a government agency, the Instituto Nacional de Antropología Historia (INAH) (Fournier & Charlton 2012). By the late 1970s, historical archaeology was a consolidated research strategy in Mexico, and trained archaeologists were put in charge of the excavations in buildings dating to the Colonial and Republican periods that were subject to restoration.

Through INAH's Office of Salvage Archaeology, historical archaeology has been linked to

Mexico: Historical Archaeology, Fig. 3 Santa Inés site, Hidalgo. Excavation of early colonial houses and patios

rescue and salvage excavations conducted in religious and secular buildings in Mexico City. An interesting case study is that of the convent of La Encarnación where the skeletal remains of nuns were discovered in graves (e.g., Charlton et al. 2009). Some important projects have been developed in areas outside the capital, for example, at the site of El Olimpo in the main square of Mérida, Yucatán, the city of Campeche, and in the Soconusco region in Chiapas, where a Dominican church was explored archaeologically prior to the construction of a dam (e.g., Charlton et al. 2009; Fournier & Velasquez in press). Also, the rescue excavations at the site of Santa Inés, located in the neighboring area of the Augustinian monastery of Zempoala, Hidalgo, revealed a late postclassic and early colonial indigenous town inhabited by the Otomí. The archaeological materials that were recovered at this site suggest that the life of the native inhabitants of this settlement continued after the conquest without major changes (Fournier & Charlton 2012). Moreover, the INAH Project for urban archaeology has excavated extensively the historic center of Mexico City. Even though the main purpose of this project is to uncover material remains from the Aztec occupation period, research on historic ceramics and zooarchaeological and botanical remains has also been conducted (e.g., Fournier & Velasquez in press) (Fig. 3).

Many historical archaeology projects have also developed from the need to preserve and restore monasteries, convents, hospitals, churches, and palaces in urban centers. These projects adapt the buildings to public or private use such as museums, universities, banks, government offices, or hotels and to promote tourism in Mexico City, Oaxaca, Puebla, and Cuernavaca, in the State of Morelos (e.g., Charlton et al. 2009; Fournier & Charlton 2012). These investigations have integrated archaeological, documentary, and ethnohistorical data in the study of material remains from the sixteenth to the twentieth centuries (Charlton & Fournier 2008). A good example of how archaeological research was conducted parallel to the agenda established by architectural restoration can be observed in the convent of San Jerónimo in Mexico City (e.g., Charlton et al. 2009). Here, the main objective of the project was the restoration of the architectural complex, but also archaeological remains were excavated and ceramics, glass, and human remains analyzed. Another example of how this research strategy was parallel to restoration projects is

Mexico: Historical Archaeology, Fig. 4 Glazed earthenware bathtub excavated at one of the cells of the convent of San Jerónimo, Mexico City

the monastery of Santo Domingo de Guzmán in Oaxaca (Fernández Dávila & Gómez Serafín 1998) (Fig. 4).

Key Issues/Current Debates

Regional Studies

The most relevant regional studies of historical archaeology are those by Thomas H. Charlton in the Otumba area in the Basin of Mexico. They include intensive surface surveys, surface collections, and excavations along with ethnohistorical studies of the region. The project aimed at reconstructing aspects related to the cultural contact between Indigenous and European populations, acculturation processes, demographic collapse, ecological change, and the development of rural settlements (e.g., Charlton et al. 2005). Another important regional study attempted to reconstruct the changes in settlement patterns, ceramic diversity, and consumption from the postconquest period to the twentieth century in the northwest of the States of Puebla and Tlaxcala and in southern Hidalgo (e.g., Fournier & Charlton 2012). Also in the Basin of Mexico in the case of rural Xaltocan, the work by Rodríguez-Alegría (2010) contributed to the understanding of how indigenous groups utilized Hispanic ceramics as symbols of social status. His research has enabled the comprehension of changes in labor patterns and demography by examining the production of obsidian tools during the postconquest period (Rodríguez-Alegría 2008).

In the Mezquital Valley, Hidalgo, research projects with an interdisciplinary approach, addressed the construction of Otomí indigenous identities and the emergence of resistance strategies to the Spanish conquest. These investigations considered the agave exploitation and the consequences of the introduction of ideological and economic systems, marked by Otomí family chapels and rural settlements, as well as the development of privately owned rural residential estates associated with animal husbandry and agricultural activities (*haciendas*) and ranches resulting in landscape transformations and the marginality of the indigenous population in this region (e.g., Mondragón et al. 1997; Fournier & Mondragón 2003) (Fig. 5).

Other examples of regional studies integrating surface surveys, excavations, and documentary evidence were conducted in the Isthmus of Tehuantepec, Oaxaca (Zeitlin 2005), the Soconusco region, Chiapas (Gasco 2005), and the Maya region (Alexander 2012). These investigations examined changes in social inequality, land tenure, landscape, settlement patterns, and ecology to address the transformations that occurred in indigenous communities during the colonial period. In the case of western Mexico, regional projects in the Pátzcuaro Basin, Michoacán, have approached the political, economic, and ecological impact of colonial rule and the conflict between Tarascan indigenous groups and Spanish settlers (Pollard 2005). In the port of San Blas, on the coast of Nayarit,

Mexico: Historical Archaeology, Fig. 5 Ruins of a nineteenth century ranch in the Mezquital Valley, Hidalgo

a major trading post connecting the Pacific Coast of New Spain with the California missions, surface surveys have provided information on the daily lives of the inhabitants of this bay and aspects related to the trans-Pacific trade networks between Mexico and Asia (e.g., Fournier & Charlton 2012).

The study of Jesuit missions, particularly the Jesuit College of San Felipe and Santiago in Sinaloa de Leyva and towns in the neighboring region of El Fuerte, Sinaloa, has contributed significantly to the archaeology of northwestern Mexico (e.g., Fournier & Charlton 2012). These research projects have provided information on the changes from pre-Columbian to historic indigenous and Hispanic ceramic traditions, and on the changes in subsistence strategies and settlement patterns during the colonial and Republican periods (Fig. 6).

Mexico: Historical Archaeology, Fig. 6 Excavations at the Jesuit church of Sinaloa de Leyva

Rural Settlements. Ranches and Haciendas

Studies with a regional scope and that have focused their interest on rural settlements like ranches and *haciendas* are part of a growing field in the archaeology of Mexico. Several projects have been developed in the Mezquital Valley, State of Hidalgo (Fournier & Mondragón 2003); in the *hacienda* of San Miguel Acocotla, Puebla (Newman 2010); and in the *hacienda* de Pánuco, Zacatecas, founded for smelting and refining silver (Fournier & Blackman 2010). The research undertaken in these areas relate to the construction of ethnic identities, the economic activities, and the life of workers, administrators, and owners at the *haciendas* (Fig. 7).

Other projects have concentrated in Yucatán. These investigations aim to understand the social

Mexico: Historical Archaeology, Fig. 7 Ruins of the hacienda de Pánuco, Zacatecas

and economic changes that occurred during the past 500 years related to settlement patterns, towns, and the exploitation of natural resources. The investigations combined documentary sources with settlement patterns and household archaeology. Major contributions to the archaeology of this region addressed the changes in the economic and political landscape during the Caste War (1847–1901) and the correspondence regarding place, identity, agrarian practice, and landscape since the Spanish conquest (Alexander 2012). Furthermore, in Hacienda Tabi, Sweitz (2012) examined the lives of the workers and explored the built environment to address power relations and changes in social status, production, and the organization of labor in the context of capitalism.

Colonialism, Production, and Consumerism

Studies that have dealt with the impact of Spanish colonialism have addressed changes in the production and consumption of material culture, namely, ceramics and other products like salt. These investigations have focused their attention on the changes in indigenous technologies, the introduction of European techniques, and the use given to local and imported ceramics by colonial society.

Artifacts such as Aztec tradition ceramic figurines from the Basin of Mexico have been studied, illustrating changes and continuities in styles and techniques as well as the appearance of European dress and facial features substituting pre-Columbian deities in the case of anthropomorphic figurines (Charlton et al. 2005). Research on the impact of colonialism on indigenous ceramic production and consumption is well exemplified by studies that have considered the red wares from Cuauhtitlán. The results of these studies suggest that ceramic traditions from the late postclassic period suffered only minor changes during Spanish rule and that this ware was popular among members of the Hispanic elite who used it for lavish display (e.g., Charlton & Fournier 2011). Furthermore, the patterns of consumption of this ware have enabled the exploration of the relationship between these ceramic objects and the construction of power, social status, and ethnic identities. The changes that were introduced by the Spanish colonizers to indigenous ceramic technologies, vessel forms, and decorative styles in central Mexico have also been the subject of an extensive study by Hernández (2012). Other examples of this approach include studies of indigenous plain or painted wares from Oaxaca (Zeitlin 2005) and

Mexico: Historical Archaeology, Fig. 8 Early colonial ceramic figurines from Mexico City

Mexico: Historical Archaeology, Fig. 9 Early colonial redware tripod plate depicting an Aztec Warrior, found in excavations in Mexico City

brown wares from northern Mexico (Brown et al. 2004) (Figs. 8 and 9).

The application of archaeometric techniques through neutron activation analysis of glazed wares has provided rich insights into the relationships between production, distribution, consumption, and technological change of Spanish colonial wares. Another important ongoing research deals with the identification of production centers of majolica, its commercialization in the Viceroyalty of New Spain, and aspects related to consumerism and the construction of identities. Potters in New Spain adapted European ceramic technologies to the new environment in order to manufacture objects in a style that emulated Spanish majolica and by the 1600s Chinese porcelain in order to satisfy local consumers (e.g., Fournier et al. 2009). The identification of production centers in Spain and Mexico have enabled the construction of the geographical distribution of majolica and aspects related to commercialization and consumption, indicating that the value attached to majolica by colonial elites as a symbol of social status and identity impacted the production of this ware (Fig. 10).

In addition to these studies, the work by Gasco (1992) explored cultural continuity in Ocelocalco, Chiapas. At this site, indigenous communities were active participants in the colonial economic system through the cacao trade. The control exercised by these groups over cacao production enabled them to consume large quantities of majolica and Chinese porcelain. Gasco's work has contested traditional views that have established a straightforward relationship between ethnic identity and material culture of a Hispanic tradition. Also, within the field of colonialism and consumerism, Palka (2005) examined the responses of Lacandón Maya in Chiapas to colonialism during the nineteenth century that resulted in culture change, transformations in settlement patterns, and consumption of local and imported material culture. Finally, Kepecs (2005) explores aspects related to the commercialization and consumption of salt, for example, and the impact of European incipient capitalism on Maya economy in the Peninsula of Yucatán.

Missions, Presidios, Reales, and Roads

Historical archaeology at missions (European religious foundations in indigenous settlements), *presidios* (forts that housed soldiers who protected the inhabitants from Indigenous assails), *reales* (mining centers), and roads is mainly concentrated in northern Mexico, including Chihuahua, Baja California, Sinaloa, Sonora, and Zacatecas. The research conducted at mission sites offers a valuable opportunity to explore the religious, economic, and social

Mexico: Historical Archaeology, Fig. 10 Seventeenth-century Kraak porcelain dish and Puebla Blue-on-White majolica dish emulating Chinese patterns

transformations in the lives of indigenous populations as a result of the Spanish conquest. Acculturation processes, the degree of interaction between native and Hispanic communities, the transformations in social organization, settlement patterns, subsistence and the introduction of agricultural practices, and the development of ceramic traditions are some of the major research topics conducted at mission sites (e.g., Brown et al. 2004; Fournier & Charlton 2012; Fournier & Velasquez in press).

The missions and the *presidios* were connected with other regions of New Spain and with the *reales* in the north through major roads, like the Royal Road or *Camino Real de Tierra Adentro* and its branches, over which the silver extracted from the mines in the north was transported to Mexico City and the merchandises made in the Viceroyalty or imported from Europe and Asia were distributed, supplying avid consumers all over Mexico. The archaeological research at these sites has contributed significantly to the reconstruction of changes in the production and commercialization of products throughout the colonial period (e.g., Brown et al. 2004; Fournier & Velasquez in press).

The African Diaspora

There are few projects dedicated to the study of the African descendants in Mexico. This is due in part to the difficulty encountered in the identification of the material culture of groups with African ancestry in the archaeological record because of the interracial and cross-cultural processes among African, Indigenous, and Hispanic groups throughout the colonial period. Despite this, Fournier and Charlton (2008) have addressed how slaves and their offspring who served Spanish women, for example, were richly attired for public display and stood as symbols of social status in urban settings. Other investigations have focused on the analysis of the remains of Africans and mulattos contributing to the understanding of their lifestyles (e.g., Gallaga Murrieta 2009).

International Perspectives

Historical archaeology projects in Mexico have been confined largely to the study of sites located within the geographical boundaries of the country, although there have been exceptions to this, where Mexican and American archaeologists have collaborated to expand investigations into the United States. Researchers in Mexico seldom expand their area of interest to regions that were at one time under the political control or responsibility of New Spain, for example, Guatemala and Florida, respectively, and that were part

of a complex network that connected individuals and products. These regions have an enormous potential for exploration of processes like the establishment of religious and secular institutions, commercial relationships, conflict, navigation, regionalism, and the construction of ethnic identities, among others.

Since the 1970s, processualist, materialist, structuralist, and, to a lesser extent, postmodernist frameworks, derived from American, English, and French traditions, have permeated the theoretical development of archaeology in Mexico. However, while these approaches are familiar to most archaeologists in the country, they are seldom applied to specific research questions or to the interpretation of the results. Moreover, as opposed to the United States and Europe where there are important theoretical contributions, in Mexico, there is an urgent need to protect the cultural heritage and to develop more theoretical and methodological schemes. A critical situation that has affected the dissemination of methodological developments and the results derived from research projects conducted by Mexican students and professional archaeologists is that their work is seldom published in languages other than Spanish, or presented at international symposia, and thus their international impact is limited.

Future Directions

In the future, historical archaeology in Mexico should develop investigations with specific research questions with an emphasis on studies with a regional scope in rural areas as most projects have concentrated in urban centers, mostly in Mexico City. The design of projects with specific research questions should provide better results that are often not attainable through salvage and rescue excavations, as the results of these are often limited to the production of descriptive field reports. The archaeological materials recovered at these excavations are processed but seldom subject to further analysis and interpretation. This is a crucial task for the development of the discipline, since it is a fertile setting where contemporary theoretical and methodological approaches can be applied.

INAH's need to protect the cultural heritage and construct a common past, largely based on pre-Hispanic cultures, has relegated the study of the Colonial and Republican periods to historians and ethnohistorians. This constitutes a major hindrance for students and scholars who are interested in conducting archaeological research of the postconquest and modern periods. Therefore, it is necessary to emphasize the potential that this research strategy has for the study of the recent past. This could be attained through the dissemination of the results through a wider variety of local journals and finding new forums in which to present them to the public. While there are some optional modules on historical archaeology offered at the National School of Anthropology and History in Mexico City and at the University of the Americas, in Puebla, it is necessary to create compulsory theoretical and practical modules as part of undergraduate programs to train students in this research area.

Interdisciplinary approaches have been traditionally employed in the historical archaeology of Mexico, by integrating archaeological, ethnohistorical, historical, ethnographic, and zooarchaeological studies. Human osteology and bioarchaeology are usually applied to the analysis of human remains pertaining to historic periods to explore health conditions, life expectancy, nutritional aspects, and the effects of toxic agents on the populations under study (e.g., Fournier & Charlton 2012). However, these studies are usually conducted by physical anthropologists and done independent of archaeological studies and thus their scope is limited to understanding the social context. In recent years, the application of GIS and geophysical techniques have been applied often in rescue and salvage excavations and in the restoration of buildings. However, the main objective has been to recover as much data as possible without further archaeological interpretation of the results, thus limiting the potential that these techniques have. In the future, it will be necessary to apply them to well-defined research questions.

There are few investigations that have been conducted at industrial sites. To date, they include a paper mill in Mexico City, leather tanneries and bottled soda factories in Puebla (e.g., Fournier & Charlton 2012), surveys, excavations, and PIXE analyses of artifacts at the mining district of Real del Monte close to Pachuca, Hidalgo (e.g., Oviedo Gámez et al. 2010). This research has aimed at reconstructing the productive processes and studying in detail the artifacts associated with the end products. However, it is necessary to conduct more studies in this field that focus on aspects related to the life of workers and artisans as these provide insights into an important component of the past of Mexico that is seldom the subject of research projects.

As historical archaeology expands in Mexico and stands as a recognized research strategy, more Mexican students and scholars can become aware of the need to conduct archaeological research on the Colonial and Republican periods and can begin to realize that the study of the recent past is as important as that concerned with pre-Hispanic cultures. If this is acknowledged, then historical archaeology research projects could be incorporated into the institutional agenda. This would enable the reassessment of the national discourse that aims to construct a unified identity, based on the ancient indigenous past, and include a more culturally diverse one. Also a larger collaboration between Mexican scholars and scholars abroad should be aimed at developing projects with a wider regional scope. The potential that historical archaeology has for exploring topics that are relevant to local and international debates such as colonialism, racism, plantation archaeology, identity, gender, and conflict among others is yet to be explored.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Archival Research and Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: The Ibero-American Shipping Container
- ▶ Charlton, Thomas H.
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Fournier, Patricia
- ▶ Goggin, John M.
- ▶ Industrial Archaeology
- ▶ Mission Archaeology in North America
- ▶ Museos de Real de Monte
- ▶ New Spain: Forts and Transport Archaeology
- ▶ Oral Sources and Oral History
- ▶ Plantation Archaeology

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Mexico: Underwater Archaeology

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Introduction

Mexico is a country with a rich cultural past and a vast heritage both on land and underwater. This heritage includes prehistoric, pre-Columbian, colonial, industrial, and modern remains. From the bottom of the sea or the depth of inundated caves that 10,000 years ago were dry to the lagoons in the crater of a volcano at 4,680 m (15,354 ft) over the sea level, Mexico encloses a wide spectrum of possibilities to explore through scientific underwater archaeological projects.

The Instituto Nacional de Antropología e Historia (INAH, National Institute of Anthropology and History), created in 1939, is the official agency in charge of the protection, research, conservation, and dissemination of the national cultural heritage. In 1980, it created an underwater archaeology department.

Submerged cultural heritage site types in Mexico can be divided as follows:

1. Prehistoric sites containing human and animal remains in caves that became flooded over thousands of years due to natural processes of sea level changes in the Yucatán Peninsula.
2. Pre-Columbian human remains and offerings in cenotes (sinkholes) in the Yucatán Peninsula, as well as in springs, lakes, and lagoons in different parts of the country.
3. Sixteenth- to twentieth-century shipwrecks or sites containing isolated elements, mainly from European origin, result of accidents, or deliberate jettison offshore at the Pacific Ocean, the Gulf of Mexico, and the Mexican portion of the Caribbean.
4. Industrial and modern shipwrecks or sites containing isolated elements located in coastal waters, some of them due to deliberate sinking.

Definition

A definition of underwater archaeology is very similar to a definition of land archaeology: "the study of material remains in order to understand past human cultures." The big difference here is the environment in which underwater archaeology takes place. Since the submerged cultural heritage in Mexico is located in marine waters as well as in continental waters, in 1980 when the underwater archaeology area was created within INAH, it was decided to use the term "underwater" instead of maritime or nautical as it was being used in other countries. While the Mexican maritime archaeology focuses mainly in the study of human-sea relationship, archaeology in inland waters – like rivers, springs, lagoons, and cenotes – includes an amazing vision of myths related to the origin of life, to the infra-world, and to deities and mythical creatures that pre-Columbian groups manifested in structures, rituals, and offerings, many of which still remain in these bodies of water.

Historical Background

As in many other countries, submerged cultural heritage in Mexico remained ignored for many years or sometimes even looted and taken out of the country. There were also some cases of accidental and intentional recoveries, both in marine and continental waters. The first and most notorious example took place at the sacred cenote of Chichén Itzá, an offering place for ancient Mayas. Edward H. Thompson, first consul of the United States in Yucatán, bought the hacienda of Chichén Itza, which included an ancient Maya religious center in the northeast part of the Yucatán Peninsula, and dredged the cenote in two occasions – 1904–1909 and 1910–1911 – extracting human bones and thousands of objects of jade and stone figures; gold and copper disks; arrowheads made of flint, calcite, and obsidian; fragments of textiles, etc. (Folan 1968; Bush 1972). Thompson took everything to his country, where some of these pieces are exhibited at the Peabody Museum at Harvard University.

INAH participated for the first time in an excavation at the cenote of Chichén Itzá in 1960 and 1961, together with the National Geographic Society and the Club de Exploraciones y Deportes Acuáticos de México (CEDAM, Exploration and Aquatic Sports Club of Mexico); Norman Scott and his airlift were hired. However, after 4 months, INAH suspended the works because objects were being damaged when passing through the airlift (Luna 1982). In 1967–1968, a second attempt with CEDAM and Scott was made, this time with INAH's archaeologist Roman Piña Chan as the head. Thousands of objects were recovered, among them are the following: vases and cups of different sizes, designs, and periods; textiles; gold artifacts; obsidian knifes; shells; human and animal bones; five stone jaguars; and two serpent-shaped stones. Due to the bones recovered, it was proved that Mayas not only sacrificed young women but also men and children. It was confirmed what Thompson had stated more than 50 years ago that not even 10 % of the objects inside the cenote had been recovered (Piña Chán 1970; Bush 1972). Some of the recovered pieces can be viewed at the National Museum of Anthropology in Mexico City.

After the invention of the Aqua-Lung, treasure hunters and sport divers, national and foreigners, extracted an unknown number of archaeological and historical objects from places such as the Media Luna Spring in San Luis Potosí, Central Mexico; the two lagoons located in the crater of the Nevado de Toluca volcano, in the outskirts of Mexico City; and in the Caribbean and the Gulf of Mexico. This looting increased during the 1950s, 1960s, and the early 1970s. During the 1970s, there were some cases in which fishermen and divers would notify the corresponding authorities about their findings or even deliver to INAH the pieces they had recovered.

In October 1979, INAH received a report from two North American sport divers – Farley Sonnier and Edward Weeks – who had found several archaeological objects in the Cayo Nuevo Reef in the Gulf of Mexico. Among these pieces was a sixteenth-century bronze cannon with several emblems and a date: 1552 [?] (the third digit is not clear). In November 1979, INAH sent a group of archaeologists in search of the cannon. With the support of other INAH's divisions, the Mexican Navy, and the Institute of Nautical Archaeology (INA, Texas A&M University), a first attempt to recover the cannon was made. The cannon was located at a depth of 6 m, but when it was about to be deposited on the Navy's ship, it fell into waters of 40 m depth.

Project Cayo Nuevo Reef, Sound of Campeche, Gulf of Mexico (1980–1983)

In May 1980, 3 months after the underwater archaeology area had been created within INAH, the first underwater archaeology project took place with the participation of other INAH's divisions, the Mexican Navy, the national oil company PEMEX, and the Institute of Nautical Archaeology (INA). The bronze cannon was recovered together with a sixteenth-century iron anchor and a second cannon, this one made of iron. According to a research made in situ, this might be a sixteenth-century shipwreck (Luna Erreguerena 1982). The bronze cannon is exhibited at the San José el Alto Museum in Campeche City, and the anchor is in a public garden facing part of the wall built between the sixteenth and seventeenth centuries to protect Campeche from pirates' attacks. In the 1983 field season, an eighteenth-century shipwreck was located.

From 1980 to 1990, during the so-called first stage of Mexican underwater archaeology, besides the Cayo Nuevo project, other three underwater investigations took place:

- *Land and Underwater Survey at the Media Luna Spring, San Luis Potosí, Central Mexico* (1981–1982) – In spite of being one of the most looted places in Mexico, INAH's archaeologists could locate remains of prehistoric fauna, two infant burials with fragments of textiles, and some ceramic and lithic figures deposited and thrown as offerings to aquatic deities. A study to correlate land sites with underwater ones was fulfilled; 17 sites were recorded near the spring. It was determined that the ceramic belongs to the Post-Classic period (600–900 CE). Some of this material can be seen at the National Museum of Anthropology in Mexico City.

- *Pre-Columbian Navigational Aids along the Eastern Coast of the Yucatán Peninsula* (1984, 1990) – This experimental archaeology project took place between 1984 and 1990 in order to prove Captain Michael Creamer's hypothesis that structures along Quintana Roo eastern coast could have served as navigational aids not only for pre-Hispanic Mayas but also for other indigenous groups that used to visit that area mainly for trade purposes. Through an experiment with two gas lamps installed at the upper part of El Castillo, Tulum's main building, could be proved that when both lights can be seen perfectly aligned from the sea, at El Castillo's upper windows, a boat can enter safely in the cut of the reef, either to disembark on the beach or to navigate inside the reef.
- *Bahía Mujeres, Quintana Roo Project* (1983–1984, 1990) – The last project occurred in 1983–1984 and 1990 in a sixteenth-century site located off Cancun Coast in Quintana Roo, locally believed to be La Nicolasa, one of the ships of the Spanish conqueror Francisco de Montejo. The first part of the investigation took place in 1983–1984 when archaeologists from INAH Mexico and INA Texas A&M traveled to Quintana Roo to interview some of the divers who had participated in the recovery of several cannons, anchors, and artillery pieces at the end of the 1950s and the beginning of the 1960s. In the 1990 field season, archaeologists from INAH and Ships of Discovery (Texas) worked together with biologists from the Universidad Nacional Autónoma de México (UNAM, National Autonomous University of Mexico), who extracted all living corals from the area where diggings were going to happen, replanted them after the archaeological work had finished, and monitored the site during 1 year, until it was completely recovered (Luna Erreguerena 2002: 274). No significant archaeological information could be retrieved from the site. However, based on archival research archaeologists could determine that this shipwreck does not belong to La Nicolasa.

In 1994, INAH organized a master level course together with the Escuela Nacional de Antropología e Historia (ENAH, National School of Anthropology and History) in Mexico City; the practical part took place in the Caribbean. Thirty professors from Mexico, the United States, and Canada participated, and 20 students graduated. In 1995, underwater archaeology in Mexico reached a key point in which the area within INAH was promoted to a Vice Directorate (Subdirección de Arqueología Subacuática, SAS) and the most complex and important investigation undertaken until that moment began.

The 1630–1631 New Spain Fleet Research Project and Inventory and Diagnosis of Submerged Cultural Resources in the Gulf of Mexico (1995 Onwards)

This project focuses in the study and location of *Nuestra Señora del Juncal*, one of the two flagships sunken in October 1631 at the Sound of Campeche in the Gulf of Mexico and a permanent target of treasure hunters. Essentially, this project intents to understand the navigational processes and nautical accidents occurred during the first decades of the seventeenth century in the New Spain. An intense archival consultation began in Mexico, Spain, and Cuba (Trejo Rivera 2003). In 1997, during the first field season, 24 sites with cultural vestiges were located in 16 days. Since none belonged to the New Spain Fleet, a parallel project was created: the Inventory and Diagnosis of Submerged Cultural Resources in the Gulf of Mexico, in which 173 sites from the sixteenth to the twentieth centuries have been recorded up to this day. In May–June 2012, a larger field season took place; hundreds of anomalies detected are being post-processed by specialists in Mexico and the United States.

Underwater Archaeological Atlas to Record, Study, and Preserve Cenotes and Inundated Caves in the Yucatán Peninsula (2000 Onwards)

In 1999, INAH's underwater archaeology area received several reports of archaeological findings made by cave divers in cenotes and inundated caves in the states of Yucatán and Quintana Roo, in the Yucatán Peninsula, in the southeast part of Mexico. A first visit was made

that year in order to confirm these discoveries, and in 2000 this project was created. Among the findings are remains of Pleistocenic fauna (horse, lama-like camelid, gomphothere, and bat), complete human skeletons, and ashes from bonfires, all these dated >10,000 years old. Besides prehistoric discoveries, hundreds of pre-Columbian Maya skulls – some with intentional deformation – have been recorded, together with ceramic and lithic elements. Few colonial artifacts like rifles and a cannon used in the Caste War of Yucatán (1847–1901) were also found in a cenote in the city of Valladolid.

The Manila Galleon in Baja California (2000 Onwards)

This project began in 1999, thanks to the efforts of maritime historian Edward Von der Porten, who was contacted by a group of North American beachcombers who had found sixteenth-century Chinese porcelain fragments in a beach at Ensenada. In 2000, INAH's Vice Directorate of Underwater Archaeology became codirector of this project together with Von der Porten, INAH's Center at Baja California, and the University of Santa Clara in California. Later, archaeologists Eric Ritter and Jack Hunter and scientist Sheldon Brenier joined this investigation. Along several brief field seasons, specialists have collected many pieces believed to be part of the cargo of a Manila galleon that navigated between Manila, Philippines, and the Mexican port of Acapulco in the 1570s. Findings include more that 1,300 porcelain fragments (92 different designs), some stonewares (three different types), a small bronze Foo Dog, wax blocks, a Chinese bronze mirror, a cloisonné plate, and several lead sheets part of the hull of the ship. Due to the fact that archaeological materials from Manila galleons are very rare, this project acquires special importance (Junco 2010a, 2012). A permanent exhibition can be seen at the Museum of the Old Custom building in Ensenada (Fig. 1).

Mexico: Underwater Archaeology, Fig. 1 A bronze figure representing a Chinese Foo Dog, or Buda Dog, found with a metal detector at a beach in Ensenada, Baja California (Photo by Rodrigo del Río, courtesy and copyright of INAH/SAS)

Underwater Archaeological Project at the Volcano Nevado de Toluca

The volcano known as Nevado de Toluca, west of Mexico City, reaches an altitude of 4,680 m (15,354 ft) over the sea level. Its crater and the two lagoons inside have been a site of pilgrimage and offering since the Post-Classic period. In 1962, INAH's archaeologist Otto Schöndube found a pre-Columbian monolith (estela) used for calendar and astronomical purposes. During that same decade, sport divers extracted pre-Hispanic ritual elements from the two lagoons – the Lagoon of the Sun and the Lagoon of the Moon. In May 2007, a field season took place, with the financial support of Richard Siegel and the Goldsbury Foundation through Johan Reinhard, National Geographic explorer. Archaeologists from INAH/SAS worked in both lagoons and recovered ceremonial wood objects in the shape of serpents, sometimes referred to as Tlaloc scepters; cones and spheres made of copal (dated 1280 CE), an ancient incense still used in modern Mexico; fragments of baskets; and leaves and points of maguey (a cactus) used in self penitence rituals; works have continued in 2010 and 2012 (Junco 2009, Junco & Vigliani 2012). In order to establish the relationship between the water bodies and the nearby sites, in all field seasons students from ENAH and the Universidad Autónoma del Estado de México (UAEM, Autonomous University of the State of Mexico) excavated pits on the edge of both lagoons and nearby sites, revealing extraordinary lithic materials such as obsidian small knives and arrowpoints, fragments of

Mexico: Underwater Archaeology, Fig. 2 A cone and an amorphous piece of copal, a pre-Columbian incense, just recovered from the Lagoon of the Moon in 2007 (Photo courtesy and copyright of INAH/SAS)

turquoise – part of a mosaic – beads of jadeite and serpentine, and ceramics (this latter dated to the late Post-Classic). Due to water temperature and acidity, most pieces are very well preserved (Junco 2010b) (Fig. 2).

Underwater Archaeology Project at Hoyo Negro, Tulum, Quintana Roo (2011 Onwards)

Participation of trained – through Nautical Archaeology Society (NAS) courses, lectures, and classes on how to preserve and record a site – and certificated cave divers in this kind of projects is an indispensable support for archaeologists. One of the most important findings took place in 2007, when three cave divers from the Speleological Tulum Project (PET, Proyecto Espeleológico Tulum) discovered several deposits of bones belonging to the Pleistocenic fauna and a human skeleton 1,200 m inside a passage of a cenote known as La Virgen, at a depth between 45 and 60 m inside a hollow which discoverers named Hoyo Negro (black hole). The first field season of this project took place in 2011. Preliminary studies made in Mexico, the United States, and Canada identified the animal remains as belonging to saber-toothed tiger, cougar, black bear, gomphothere, ground sloth, collared peccary, tapir, fruit bat, and catfish. Regarding the human skeleton, in 2011 dental impressions were taken in situ and two molars were extracted for radiometric dating and DNA

Mexico: Underwater Archaeology, Fig. 3 Remains of a feline, most probably a Pleistocenic saber-toothed tiger, found at Hoyo Negro, in Quintana Roo (Photo by Roberto Chávez, courtesy and copyright of INAH/SAS)

analyses (Luna Erreguerena 2012). A preliminary report by Dr. James Chatters, Applied Paleoscience and CSU Fresno, indicates that the human remains are those of a young woman between 16 and 18 years old, most probably a Paleo-American (>9,000 years old), related to the remains of a gomphothere found nearby (Chatters 2011) (Fig. 3).

Key Issues

General Approach

Multi-institutional and multidisciplinary participation, in situ preservation, nonintrusive work, national and international collaboration, and non extracting objects unless conservation can be guaranteed, are some of characteristics present in Mexican projects since 1980, all in accordance with rules established in the UNESCO 2001 Convention on the Protection of Underwater Cultural Heritage.

Training

Constant training is given by national and foreign experts to underwater archaeologists, specialists in other disciplines who collaborate in INAH/SAS underwater archaeology projects, students,

divers, and fishermen. The experience and support of North American underwater archaeologists have been vital in the development of Mexican underwater archaeology. INAH/SAS researchers periodically give classes to archaeology students at the ENAH.

Conservation

Archaeologists work very closely with curators at INAH's center and school of conservation in Mexico City, as well as with the Corrosion Research Center of the State University of Campeche. Since underwater archaeology area was created in Mexico, some curators have shown interest in learning how to treat cultural material recovered from aquatic means.

Dissemination

Over more than 30 years of underwater archaeology in Mexico, dissemination has been constant through publication of books and articles, mass media interviews, papers and lectures in national and international academic and public forums, a Web page, videos and documentaries, itinerant and permanent exhibitions, and recently through illustrated books and comics aimed to children and adolescents.

Community Participation

Close work with cave divers, fishermen, informers, and tourism guides and managers has been very fruitful, especially in the Yucatán Peninsula and in Campeche's coastal waters. Fishermen have been a key element in the underwater archaeological work taking archaeologists to sites with cultural vestiges and, in some cases, act as guardians of the sites.

Management

Underwater cultural heritage management experience in Mexico is limited to two protected areas: a system formed by 23 reefs in Veracruz, Gulf of Mexico, and Chinchorro Bank in the Caribbean. The Comisión Nacional de Áreas Naturales Protegidas (CONANP, National Commission for the Protection of Natural Areas), a division of the Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT, Ministry for the Environment and Natural Resources), with the collaboration of INAH/SAS and the Division for Site Operations, elaborated the management program for the Veracruz National Reef Park, which includes guidelines and concrete actions on any activity related to archaeological heritage, both in the islands and underwater (Noguera & Carrillo 2006). Chinchorro Bank is part of the Mesoamerican Reef System, the second largest in the world, after the one in Australia; it extends near 1,000 km, from the north of the Yucatán Peninsula to the Honduras Bay. In 1996, it was declared a Biosphere Reserve and in 2003 a RAMSAR site for the protection of migratory birds and wetlands; in 2005, it was presented before UNESCO as a mixed (natural and cultural) heritage for its nomination as World Heritage Site. INAH/SAS and CONANP have worked together in order to stop the looting mainly from fishermen; cannons, anchors, and other cultural materials recovered in the past have been located in hotels, diving shops, and private museums in Quintana Roo. Fishermen have received training courses to become tourist guides with the option to visit underwater sites, based on guidelines elaborated by INAH/SAS (Carrillo 2012) (Fig. 4).

Inventories

Three inventory projects are taking place in Mexico: Gulf of Mexico (204 sites recorded), Chinchorro Bank (68), and the Yucatán Peninsula (72). Chronology of these sites ranges from the sixteenth century to the present. Archival consultation on some of these sites has taken place in Mexico, Spain, Guatemala, Cuba, and Colombia (Fig. 5).

Protection of the Underwater Cultural Heritage

Mexico has signed and ratified several international treaties but does not have a specific law regarding its underwater cultural heritage. It has been through the Ley Federal sobre Monumentos y Zonas Arqueológicos, Artísticos e Históricos (Federal Law on Archaeological, Artistic, and Historical Monuments and Zones) (INAH 1972) and its Disposiciones Reglamentarias para la

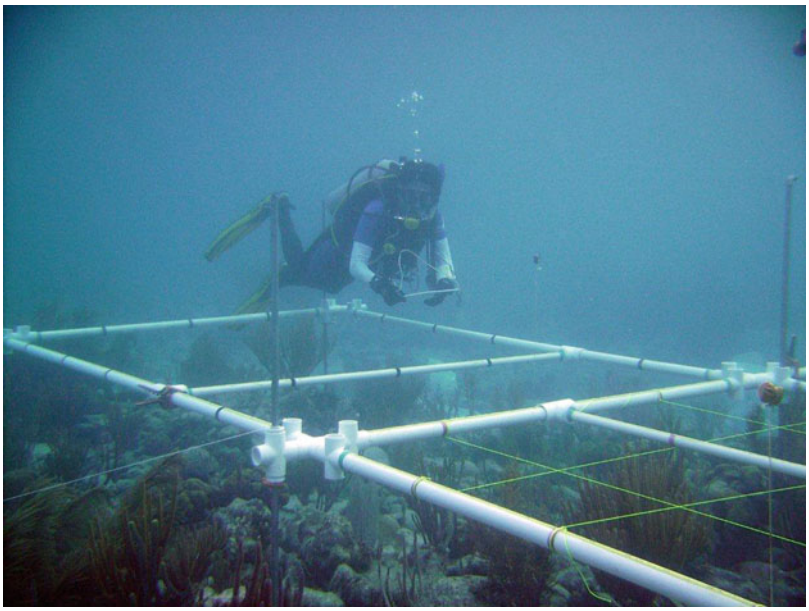

Mexico: Underwater Archaeology, Fig. 4 Recording works at the site "40 Cannons Wreck" in Chinchorro Bank, Quintana Roo (Photo by Leonardo Ortiz, courtesy and copyright of INAH/SAS)

Mexico: Underwater Archaeology, Fig. 5 Archaeologists working in one of the modern shipwrecks recorded in coastal waters of the state of Campeche (Photo courtesy and copyright of INAH/SAS)

Investigación Arqueológica en México (Regulations for Archaeological Research in Mexico) (INAH 1977) that INAH has been able to stop treasure hunters' constant threats. INAH's Council of Archaeology is the national academic body in charge of receiving, evaluating, and approving or rejecting any archaeological project that pretends to be fulfilled in Mexican territory, land, or underwater (Luna 2008). This council works closely with the SAS, and its intervention to stop treasure hunters' pressure has been crucial. Mexico was the 8th country to ratify UNESCO's 2001 Convention on the Protection of Underwater Cultural Heritage and is one of the members of its Scientific and Technical Advisory Body (STAB).

International Perspectives

Mexico's participation since 1982 in international councils devoted to underwater archaeology and the preservation of underwater cultural heritage has been a constant process of learning and preparation to play a supportive role with other Latin American countries in which this discipline is not so developed yet. Mexico's presence in the experts' meetings to elaborate the 2001 Convention on the Protection of the Underwater Cultural Heritage and later in the Convention's Scientific and Technical Advisory Board (STAB) meetings and in the working group to prepare the Operational Guidelines for this Convention has contributed to strengthen Mexico's leader position, shared now with Argentina. In 2010 UNESCO and INAH/SAS organized a master course – Research and Management in Underwater and Maritime Archaeology – in Campeche City; 27 participants from 14 Latin American and the Caribbean countries graduated and created the Organización Latinoamericana de Arqueología Subacuática (OLAS, Underwater Archaeology Latin American Organization). Some of OLAS's achievements are the following: support against treasure hunters in Nicaragua; the first underwater archaeology exhibition in El Salvador; a fight against a proposed law affecting the underwater cultural heritage in Colombia; a comic book on cultural heritage including the underwater cultural heritage in Chile; an underwater archaeology project in Cuba, with the support of National Geographic Society and the Waitt Institute; the opening of a site museum in the Dominican Republic; and the creation of a Web page. Underwater archaeology development and preservation of the underwater cultural heritage in Latin America is a priority now and for the future. International collaboration is also a key point.

Future Directions

Experience gained over more than 30 years in Mexico has shown that the best way to preserve this patrimony is working together with authorities, local communities, and the society itself. New collaboration programs, publications, and videos are being prepared for the general public, including comics aimed not only to children and youth – the future generations who will be responsible of this legacy – but also to adults with just elementary education. The fact that divers and fishermen's interest in underwater sites is growing, management of sites has become a priority.

Results of the analysis of the anomalies detected in the last (2012) field season for the 1630–1631 New Spain Fleet project will open new avenues of investigation in the Gulf of Mexico, while in the southeast, cenotes and inundated caves in the Yucatán Peninsula have a great potential, especially regarding submerged prehistoric remains. Findings and preliminary studies in Hoyo Negro show that this site is so important that it will require a lot of time and work. Other projects may result from findings made by fishermen and divers and reported to INAH/SAS.

Training of new specialists needs to be intensified, especially in marine geophysics applied to underwater archaeology; in the analysis of pre-Historic and pre-Columbian sites and objects; in conservation of materials recovered from aquatic means; and in historical research applied to underwater archaeology investigations, among other fields, in order to continue with the already existing projects and to face the ones to come.

Underwater archaeology in Mexico tends to keep on growing. National specialists committed to underwater cultural heritage preservation, community involvement, support from colleagues from different parts of the world, and participation in international arenas will be key elements for this growth. Sharing results with the general public and exhibition of pieces in museums and public places will keep people aware and interested in the existence and importance of this fragment of Mexico's history that is being recovered from its maritime and continental waters.

Cross-References

- ▶ Caribbean Maritime Archaeology
- ▶ Central America: Historical Archaeology of Early Colonial Urbanism
- ▶ Hispanic South America: Historical Archaeology
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mexico: Historical Archaeology
- ▶ Mexico's Heritage
- ▶ Submerged Prehistoric Landscapes

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Mexico's Heritage

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Introduction

"Did you know? Mexico has more World Heritage sites than any other country in the Americas" is a frequent statement over the Internet, reinstating the commitment of the National Institute of Anthropology and History (Instituto

Nacional de Antropología e Historia [INAH]) to protect cultural resources for future generations. In dreaming a culturally conscious nation, with awaiting resources to be accepted by UNESCO, the quest has had its positive effects, but it too has constrained the meaning of heritage, leaving the remaining of Mexico's patrimony in a defenseless state against the undergoing economic growth, envisioned in the National Development Plans.

Definition

The definition of Mexico's heritage has been bounded inherently for more than a century to economic development, creating everlasting tensions between preserving the past and the indigenous life ways, as emblematic of her identity, and at the same time, incorporating them into a model of modernization. The living conditions of the majority invert prioritizing over archaeological resources, as there is an undeniable need to improve welfare standards through infrastructure growth. Media and information technologies are making those Mexicans that can afford them increasingly aware of what heritage is and, therefore, the consequences of its destruction with this economic expansion. Expressions of public concern against the damage of people's significant spaces, as was the demolition of *El Casino de la Selva* hotel in Cuernavaca to build a COSTCO store, reveal the hidden existence of new forms of valued resources, contradicting the definition of tangible or intangible heritage, designed beyond Mexico's geopolitical borders by world institutions, such as UNESCO, and implemented by archaeologists as part of their academic discourse of national patrimony.

Key Issues/Current Debates/Future Directions/Examples

In finding solutions to reconcile the contradiction, an in-depth discussion of the repercussions of the national heritage model approach followed by Mexican archaeologists to preserve resources can no longer be postponed. Undertaking a profound dialogue has been mostly the initiative of anthropologists (e.g., Lomnitz 2001). Comparatively, archaeologists have rarely expressed awareness surrounding the production of Mexico's history by supporting a national heritage model (see as an exception Fournier & Martínez Herrera 2009). In facing such responsibility, archaeologists have to assume that their discipline praxis is intrinsically political in nature (Meskell 2010), as it has supported the ideals of the federal government and ruling parties for more than a century, but also that their distinguishing the material world of the past in the present ways of life constructs national identity by separating the modern from those holding the traces of the nation's past, and that such research act is of consequence for the welfare of living populations.

Despite that legitimizing collective identities for present peoples by tracing their past through material data has come under scrutiny, given the political and complex route archaeology took during the first half of the twentieth century (Jones 1997), the discussion of this practice is absent in Mexico's archaeological academic setting. First, assigning an indigenous nature to a given population is a fundamental condition for giving the right of access to participate in development policies to alleviate poverty and promote welfare (López Varela 2010). Second, with the exception of those citizens born on Mexican territory and whose parents have foreign origins, the specified traits in the Constitutional Reform of 1992 describe the composition of the entire Mexican population, as we are all, to a lesser or larger extent, ascendants of those past populations occupying the Mexican territory at the time of the Spanish Conquest and still continue to preserve, even partially, their social, economic, cultural, and political institutions.

Thus, the pages that follow critically examine how economic development has historically and politically defined Mexico's concept of heritage. Along with this review, this chapter discusses how economic growth is compelling INAH to change its processes and strategies to regulate and control the use of heritage sites by adopting

a private sector-based model. However, without consideration of people's saying of what is important to preserve for the future, the management of Mexico's heritage is compromised.

Understanding the Concept of Heritage in Mexico

Reversing the landscape of social inequality has been at the center of every government program for the last two centuries. The Mexican Revolution introduced the urgent need to conform a modern nation, requiring the transformation of the miserable living conditions of the *indios*, that after centuries of oppression under the Spanish Crown had left them in a stage of physical, intellectual, moral, and economic underdevelopment (Gamio 1986). Building a modern nation required the search of an identity disassociated from the colonial ruling of the Spanish Crown. As in many other emerging nation states, national identity was defined by the material remains of those that suffered the Conquest and the survivals of their life ways among their ascendants. Few discourses of nationhood have been so contradictory as the forging of the Mexican State, considering the indigenous life ways, their beliefs, and their illiteracy in Spanish as obstructions to the growth of the Mexican nation (Caso 1958: 40), and at the same time, as symbols of her identity. Modernizing the nation has required the cultural homogenization of the country (Díaz-Polanco 1997), a needed strategy to remove their "incapacities" and to have them contribute to the development of the country (Caso 1958: 52). The strategy is a reason behind the extinction of tongues and dialects in Mexico.

Despite the contradiction, Mexico became one of the first countries to consider the protection of its heritage as a fundamental responsibility of the federal government by granting congress the constitutional faculties to legislate over paleontological remains, traditional communities, and monuments of national interest by 1934. To comply with the protection of her heritage, President Lázaro Cárdenas founded and mandated INAH with the responsibility of protecting the nation's patrimony and to help the federal government to promote their economic and social welfare programs by scientifically studying the indigenous populations in 1939.

During his presidential term, Miguel Alemán mandated the creation of the National Indigenous Institute (*Instituto Nacional Indigenista* [INI]) and the National Institute of Beaux Arts and Literature (*Instituto Nacional de Bellas Artes y Literatura* [INBAL]) to promote further assistance in the modernization of the nation and the management of heritage resources. Anthropologists were the qualified professionals to implement acculturating policies without coercion and to spread the use of the Spanish language (Caso 1958: 52). Their knowledge and expertise would evaluate those positive aspects of the indigenous life ways that should be preserved and could sell as crafts. According to Alfonso Caso (1958: 5), the trust that had developed between anthropologists and the indigenous populations could be used as a strategy to disseminate modern ideas and avoid conflicts during the modernization process. Taken to an extreme, the homogenization project designed by José Vasconcelos (1997) idealized the Mexican nation as populated by a "cosmic race," resulting from a mixture of ethnicities, with new customs and knowledge that could be dispersed around the world. The expert knowledge strategy has contributed to the disappearance of traditions and local technologies.

Fundamentally, these federal institutions, based on a legal corpus, establish the areas of research of archaeology and anthropology in Mexico, modeling the ways these will be practiced, learned, and discussed. INAH conducts most archaeological excavations, restoration activities, and salvage work. The Escuela Nacional de Arqueología (ENAH) is mostly responsible for educating students in archaeology, even though the discipline can be studied both at public and private universities. The National Museum of Archaeology displays the past history of the nation and its survivals within living communities.

In this legal setting, the 1972 *Ley Federal sobre Monumentos y Zonas Arqueológicos,*

Artísticos e Históricos defines the concept of heritage by distinguishing three types of national properties, as inalienable and imprescriptible. The definition of heritage resources stresses their monumentality or their relevance in the history of the nation. Archaeological resources, for example, define as the natural and built environment of those present before the arrival of the Spaniards and their created objects, as well as their encountered human remains. The Spanish Conquest is a time marker for the definition of archaeological and historic resources. The production of material culture between the sixteenth and the nineteenth centuries, mostly limited to written documents and a built environment of religious, military, and state architecture, comprehends the nation's historic resources. Beyond the twentieth century, the law protects those artistic resources exhibiting aesthetic values. The preservation clock stops there.

In contrast to many other countries, the law excludes the understanding that tomorrow's archaeological sites are being created today, that history is happening now, and that the material expressions of modern life are the cultural heritage of the nation's future. Excluding modern resources is of great tragedy to the nation, as there will be no material record of her modern history under the national model approach. Attempts have been made to revisit the concept of national patrimony (e.g., Fournier & López Aguilar 2010), mostly embraced within the definition of intangible heritage defined by UNESCO and critiqued by many (e.g., Aikawa-Faure 2009), as it dismisses alternative views of what heritage means to society.

The acceptance of the global values created by UNESCO of what heritage is fulfills the aspirations of the federal government of boosting the identity of a modern and dynamic nation. By promoting culture in UNESCO's terms, INAH contributes to one of the many strategies dictated by institutions such as the World Bank and the International Monetary Fund, to demonstrate Mexico has reached the needed economic indexes to qualify as a developed, democratic, and sustainable economy. The World Heritage List as a policy to promote welfare by establishing a tourist industry might be able to score a few points in its progress against poverty but, at a very high price, that compromises what heritage means to society (Breglia 2009) and is leading to the abandonment of traditions and technologies (López Varela 2010), which are the resources UNESCO is so willing to protect as intangible heritage. Additionally, transnational companies, such as Coca-Cola, are driven forces configuring and marketing the identity of Mexico's national patrimony by supporting INAH's initiative of inscribing sites within UNESCO's World Heritage List.

Transcending into a concept of heritage that stands for the valuable elements of the social and natural landscapes is mainly an insurgent process dictated by the people of Mexico, demanding a football soccer court, a movie theater, a hotel, eating at a restaurant, buying at a shopping mall, or an impacted view of the landscape by a high crystal building, to qualify as dignified resources (Dore & López Varela 2010). While building land-use plans for the State of Morelos (López Varela & Dore 2008), these new resources were brought to the forefront by the average citizen in the community participating in public workshops, and already, they are defending them. Certainly, their views oppose the notion of what heritage is dictated by the national discourse, civil organizations, and world institutions. A perception study at Cuentepec in Morelos, for example, reveals that words such as indigenous or archaeological site are not part of their social and cultural grammar. The inhabitants of Cuentepec are not the only ones far away from embracing the significance of an archaeological site by the academia (see Breglia 2009). "*La casa vieja*," the archaeological site of Cuentepec, is a place linked to the local experiences of the Revolution and still inhabited by magical entities. Their identity is not tied to the material culture lying in this archaeological site or to those that inhabited it before the Conquest. Therefore, they do not consider themselves indigenous, rather Mexicans. It is the academia that continues to believe in the

existence of the indigenous (Robles García 2010) as if they had continued to live in some sort of primal condition (Díaz-Polanco 1987), unaffected by their living of historic events after the Conquest. However, the appropriation of the indigenous identity is slowly permeating in the community through the introduction of development policies. The *Mexicans* recognize that they are indigenous because "they say we are," "we are poor and speak *náhuatl*," or "it is predetermined by the *indigenistas* that we are."

The Heritage Management Process

Heritage resources are the property of the nation in Constitutional terms, having implications for the management of archaeological resources. Private property is not an absolute concept in Mexico. The Constitution confers the ownership of lands and water resources to the nation and everything found in them, such as archaeological sites. The nation has the right to transmit under concession a title of ownership to an individual, constituting private property. The nation keeps the right to expropriate a land for public use against compensation. The legal definition of private property explains the absence of a cultural resources management industry in Mexico. INAH controls the management of heritage resources and absorbs the costs of their preservation through an assigned federal budget. Funding has been a major impediment to protect heritage resources against infrastructure development (Carballal Staedtler & Moguel Cos 2007; García Bárcena 2007) and has stretched the limits of the national model, allowing the participation of the private sector. Before, INAH had signed cooperative agreements with universities to cope with the workload of compliance and research activities.

Given the inalienable nature of heritage resources, their transfer of ownership or trading is prohibited and sanctioned. Historical and artistic resources could remain in private custody, and if needed, the property could be restored with permission of the appropriate institute. However, when the government of Yucatan bought the main core center of Chichen Itza from the *institute* in 2010, in the midst of a heated debate and indifference by UNESCO, the approved transfer of ownership set up a different management system to oversee and control heritage resources in Mexico. In the last few years, INAH has increasingly applied the solution of expanding the differentiation between responsibility and the activities of compliance, leading to more effective ways of protecting heritage resources over the national model approach. Already, private entities demonstrating moral solvency have been permitted by INAH to conduct many of its activities, as demonstrated by the numerous projects funded by Roberto Hernández Ramírez, a well-known banker, serving as international member of the Federal Reserve Bank of New York. The emergent partnership with the private model alleviates the federal government to absorb the full costs of heritage management and will promote a discussion about the applicability of the current values defining archaeology as a discipline dedicated to the study of the past through material remains that are evidence of First Nation peoples.

Assigning the responsibility to protect Mexico's heritage to the private sector requires further analysis to shift the benefits of this emerging model beyond Mexico's wealthiest citizens and transnational companies. Without a clear and open participatory process that regulates the quality of the intervention in the protection of heritage resources, even in the recently approved Law of Private-Public Associations, the creation of a fertile employment field in archaeology that could easily help to achieve a higher GDP (gross domestic product) compromises the working opportunities of an archaeology student and the protection of heritage resources.

A Heritage Model for Success

Any model to better protect and preserve heritage resources must address the fundamental philosophical issues outlined in these pages. The model to successfully achieve a higher level of heritage protection at less cost to the government and the people of Mexico is already under configuration, as INAH delegates the activities of

compliance to the private sector by keeping the responsibility. However, these activities could also be extended to those qualified archaeologists in Mexico who are simply unemployed or employed outside of archaeology. This requires the setting of a model that can ensure that those working in archaeology have the right qualifications in terms of academic degrees, professional registration, and record of practice. Adjustments are needed also in the ways archaeology is learned. Fundamentally, the teaching practice of archaeology should promote its relevance for the future society through its existing applied side that is already contributing to protect heritage resources and employing thousands of archaeologists around the world.

The conditions are given to pay for the work of compliance by private and federal developers, whose projects are destroying heritage resources for their economic benefit. Since the OECD recommended its members to measure the benefits and adversities of a proposed development project on the environment, Mexico has adopted the recommended polluter pays principle (PPP) in which the developer is responsible for allocating the necessary funds to protect natural resources from development policies or actions by a federal institution or a private contractor, but without accommodating heritage in its design. However, two municipalities of the State of Morelos have already considered that sustainable development could be integrated with heritage preservation at the time of land-use plans' creation and adoption. Currently, their land-use plans include decision support systems, use of information technologies for data collection, and consulting, deliberative processes, and predictive modeling in an integrated spatial planning framework (López Varela & Dore 2008).

Lessons of public unrest are leading to the realization that effective governance in building a modern nation requires the promotion of a human-centered approach in all planning activities by considering the sense of place attachment and expressions of people's identities. Using a value-based model, grounded on a random people-focused approach, increases the representation of the diversity of thoughts and says in the decision-making process and is more consultative than relying solely on expert knowledge or the ideals of civil society groups. In listening to these new voices, novel heritage resources emerge that are unappreciative to the global conception of heritage. The people of Mexico must have a saying as to what is important to preserve, and their voices must not be subordinated to international institutions and expert knowledge deciding what their values and traditions must be.

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Cross-References

- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage & Society
- ▶ Heritage and Public Policy
- ▶ Heritage: History and Context
- ▶ Museo Nacional de Antropología, México
- ▶ Nationalism and Archaeology
- ▶ Spatial Analysis in Field Archaeology

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Microcomputerized Tomography (MicroCT) in Archaeology

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Introduction

A growing number of museums and other institutions involved in archaeological and paleontological research are acquiring or developing 3D imaging systems based on X-ray microcomputerized tomography (microCT) (Fig. 1). This X-ray technique evolved from conventional clinical CT scanning, with more than two orders of magnitude increase in space resolution and a great enhancement in image contrast. The past 20 years have witnessed advances in X-ray microCT as a result of advances in X-ray sources (microfocus tubes and synchrotron radiation), 2D detectors (charged-coupled devices, flat-panel detectors, and silicon microstrip sensors), and front-end microelectronics for data acquisition. Advances in computer processing speed and storage memory capacity have also been crucial for the progress of microCT.

MicroCT can reveal, with a resolution down to less than 1 μm, the inner microstructural features of fossil remains and artifacts in archaeological studies. Analyses can be applied to a variety of "hard" materials, such as fossil human teeth and bones; artifacts in metal, glass, ceramics, and stone; and "soft" materials, such as textiles, wood, and paper. Each kind of material requires a different analytical strategy. In particular, effects due to the high dose delivered to some materials of interest, such as the teeth and other precious ancient human remains, should be minimized as they could preclude further analyses. MicroCT scanners are available commercially, but some groups are developing dedicated

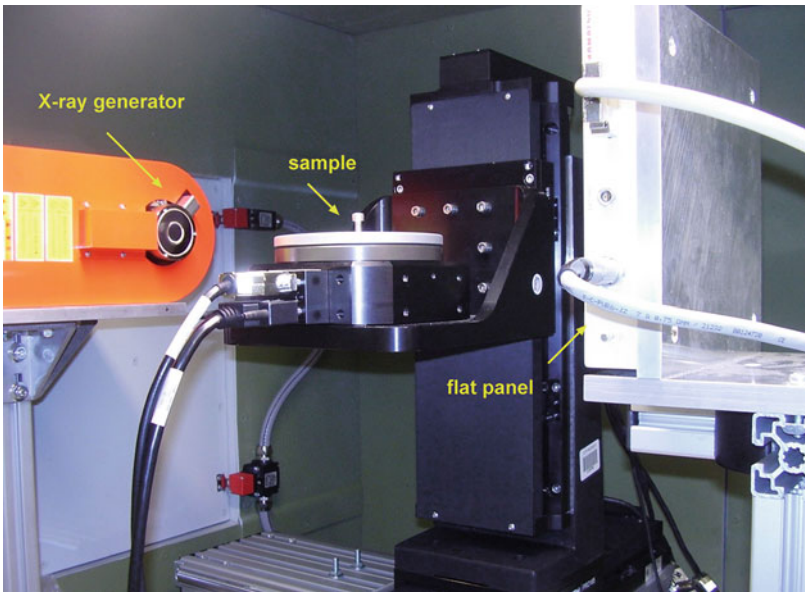

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 1 The microCT dedicated to cultural heritage and paleoanthropology at the "Abdus Salam" International Centre for Theoretical Physics in Trieste, Italy. The system is equipped with a microfocus X-ray tube (*left*) and a flat-panel sensor (*right*). High-precision horizontal and vertical stages allow fine movements and precise alignment of the sample (Tuniz et al. 2013)

systems, specifically designed for applications in archaeology, paleontology, and cultural heritage, with space resolutions from submicron, for small mm-size objects, to tens of microns for 10–20-cm-size objects. Portable systems for very large objects (e.g., archaeological objects that cannot be easily moved from the museum) have been designed or are being planned. Paleoanthropological specimens include human crania, teeth, and postcranial bones, with ages from the Miocene to the Holocene. Other analyses of archaeological interest involve Paleolithic flutes, ancient mommies, stone tools, and wooden statues.

Definition

Computerized Axial Tomography (CAT) was developed in 1972 by Godfrey Hounsfield and Allan Cormack, who received the Nobel Prize in Physiology and Medicine. CAT devices are based on the use of multiple radiographies taken from different angles around a single axis of rotation. In a conventional CAT, the X-ray source is rotated around the part of the body to be imaged, while the X-ray sensor is positioned on the opposite side. Each radiography thus obtained is based on the absorption or scattering of the primary beam by its interactions with the constituents of the object. The transmitted beam intensity follows an exponential law depending on the linear attenuation coefficient (related to the atomic number and density of the sample constituents) and the sample thickness. Hundreds of radiographies are stored in the memory of a computer and 3D images, including slices of internal parts of the body, are then reconstructed using mathematical algorithms. The most common technique is the "filtered back projection", based on mathematical methods developed in 1917 by the mathematician Johann Radon. Medical CAT systems, often using a spiral scan, have typical resolutions of 0.5–0.3 mm, which is insufficient in many applications of interest to archaeology, where structures on the microscale can be of high interest.

MicroCT was developed in the late 1980s (see, e.g., Feldkamp et al. 1989) using microfocus X-ray tubes, image intensifiers, and cone-beam reconstruction. In these systems the X-ray source/detector system is kept fixed while the sample is rotated at various angles. Thousands of digital radiographies are taken using an advanced detector that combines a scintillator and a CCD camera or a flat-panel detector. X-rays penetrate the sample and are detected by a scintillator, which converts them into visible light. Projection images are magnified by microscope optics and

digitized. A 3D image is then reconstructed by back projecting the profiles collected in this way with specific mathematical recipes. As for planar imaging, microCT can be performed either in absorption or phase-sensitive modality (in edge detection or in holography regime), depending on the sample-to-detector distance. Resolutions of a few microns (sometimes down to few tenths of micron) can be achieved with these systems, but there are limitations due to the polychromatic X-ray spectrum.

The use of third-generation synchrotron radiation sources offers particular advantages in microCT imaging. The use of monochromatic beams is important for limiting the "beam hardening" effect, often a serious limitation for conventional polychromatic X-ray sources in the analysis of archaeological samples, particularly fossil bones and teeth. This artifact is produced by the low-energy X-rays of the spectrum, which are more absorbed in the sample than the high-energy ones, producing images with brighter sample borders. This effect is stronger in highly mineralized fossils.

Moreover, the high spatial coherence of the X-rays allows the application of phase-contrast techniques. This method is important for imaging samples with structures made of materials with small differences in their attenuation coefficients, indistinguishable using absorption imaging. Fossilized materials have a very small absorption contrast and benefit from the analysis with phase-contrast techniques.

Three-dimensional imaging of specific elements can be obtained by combining microtomography with X-ray fluorescence induced by a scanning micron-size beam (micro-XRF). The development of these methodologies is based not only on the availability of third-generation X-ray facilities but also on recent advances in computer power, both in terms of calculation speed and memory, considering that images corresponding to many gigabytes of data can be collected in few minutes of irradiation time.

Transportable microCT systems are becoming available thanks to progress in compact X-ray detectors and electronics, allowing in situ nondestructive analysis of archaeological materials. They can be used in museums to study precious and non-movable objects (Morigi et al. 2010). MicroCT systems based on polychromatic microfocus X-ray tubes can be used for phase-contrast imaging (Wilkins et al. 1996).

Key Issues/Current Debates/Future Directions/Examples

MicroCT is opening a new era in paleoanthropology (Fig. 2), where hominid remains can be finally studied "nondestructively" (this point will be further discussed below) (Mazurier et al. 2006; Tafforeau et al. 2006, Macchiarelli et al. 2006). It is now possible to reconstruct virtually the crania, extracting them from the rock matrix and correcting for plastic distortions. The 3D virtual images are the base for modelling ontogenic processes and biomechanical properties. Quantitative studies of specific internal structures are possible with the use of advanced mathematical tools, including Finite Element Analysis. Internal structures of particular interest include the morphology of the maxilla and its pneumatization, the ear labyrinth, the hyoid bone, and the endocranial morphology and the pathology-induced alterations. Information of crucial interest for evolutionary studies includes quantitative analyses of the enamel and dentin. MicroCT has been also used to check collagen preservation in fossil bones, before the use of invasive methods such as those required for radiocarbon dating (Beck et al. 2012).

MicroCT has been proposed as the technique of choice for creating a depository of "virtual" stone tools that could be shared by scientific groups interested to study human behavior. Details of few microns could be easily studied, using advanced imaging software that allow their manipulation as though they were in the hand of the researcher (Abel et al. 2011). Imaging capabilities based on microCT are introducing "virtual anthropology" as part of the general strategies for the preservation, management, and

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 2 Juvenile Neanderthal mandible from Molare, with the *lower-left* second deciduous molar virtually extracted and the tooth tissues of this same element showed by transparency (Tuniz et al. 2012)

promotion of natural history collections. This will also offer novel pedagogical approaches for schools and the public (Balzeau et al. 2010).

Examples of Special Analyses

A cave bear femur with two holes was found in 1995 in the Middle Paleolithic layers of the Cave Divje Babe I in Slovenia. The bone was interpreted as a Neanderthal flute, but some scholars firmly rejected this hypothesis, on the basis of taphonomic observations, suggesting a carnivore origin for the holes. MicroCT analyses (Fig. 3) show that originally there were four holes and that a thin bone layer was removed in correspondence of the holes, suggesting a possible human intervention for facilitating perforation. It was concluded that we couldn't yet rule out a Neanderthal manufacture (Tuniz et al. 2011).

Stone artifacts provide valuable insight into the evolution of human behavior and cognition. The use of CT scans to create 3D models of stone tools opens the broad access to information about lithic technology and typology and allows the critical assessment of the human or natural processes involved. The efficacy of microCT for visualizing flint artifacts was tested using a single flake and a refitting group of flakes with a laboratory microscanner (Abel et al. 2011), showing all the advantages of the technique.

The characterization of prehistoric pottery fragments presents a quite complex task. In provenance studies, petrographic and chemical analyses of the ceramic materials are employed to investigate potential production areas in respect to the geological background. Moreover, also the production technology of the firing process, as well as the forming techniques used by the prehistoric potters, is of great interest. Ceramic fragments from the late Mesolithic to Neolithic site Hamburg-Boberg 15 (northern Germany) were analyzed by X-ray microCT, combining quantification and shape analysis of fabric components by means of computer-aided image processing (Kahl & Ramminger 2012). Furthermore, the microCT method permits the characterization of the connectivity within the porous system, as well as the analysis of the orientation of the pore structures, which are indicative for vessel-forming techniques.

During burial in soil, archaeological glasses develop corrosion phenomena, which might be represented by a thin surface layer in the range of nanometers up to a few millimeters. Degradation may affect the fragment homogeneously, or it may be concentrated to spots and local cracks. Depending on the impact of different environmental situations (soil, humidity, pollutants, microorganisms), the corrosion process leads to significant changes in the chemical composition as well as to a change of the morphology of degraded areas and layers. Due to the high material contrast of phase-contrast X-ray microCT, a number of interesting phenomena have been visualized in the reconstructed tomograms. Defects inside the glass and the corrosion layers, including thin laminated substructures, have been resolved. For the characterization of treated samples after conservation, moreover, the penetration of a coating or a consolidant into the micro-cracks of the corrosion layer needs to be controlled in order to guarantee a suitable

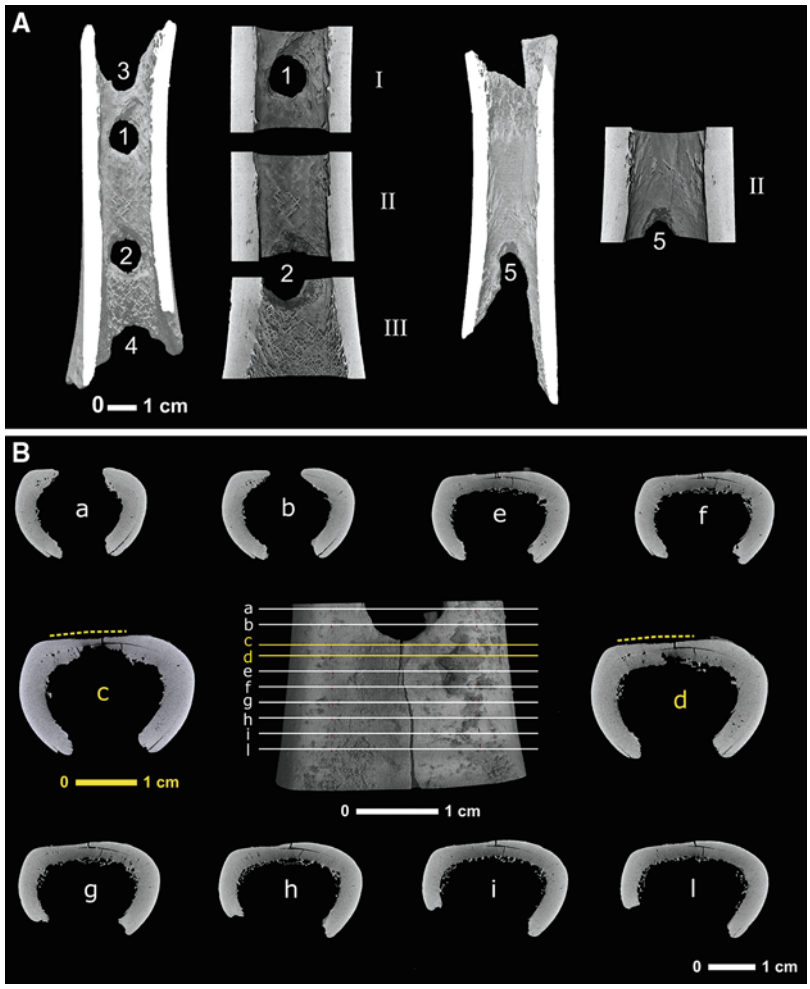

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 3 (**a**) Volume renderings of the "Neanderthal flute" (40-mm voxel size), showing the inner morphology for the holes. (**b**) Ten virtual transverse slices through Part III of the "flute" (Tuniz et al. 2011)

adherence between the polymer and the surface of the glass object. Since conventional microCT is not able to detect a low-absorbing material inside a high-absorbing material such as glass, phase-contrast microCT has been used for this application, and a thick organic polymer coating and a comparatively thin inorganic coating applied on a fairly corroded glass surface could be visualized (Gerlach et al. 2006).

Archaeological wood, and waterlogged archaeological wood in particular, is almost always characterized by a modification in the original properties and structure of the wood. Degradation agents can be of different origins (biological, chemical, physical), and they are able to produce a large variability in the degradation of individual pieces, requiring their characterization for a proper conservation. X-ray microCT is a powerful tool, which provides three-dimensional information on the morphological characteristics of materials.

Furthermore, by means of suitable algorithms, it is possible to reconstruct a volumetric map of X-ray linear attenuation coefficient. X-ray microCT has been applied to the characterization of archaeological wood (Fig. 4) for the investigation of anatomical structure of wood (i.e., determination of wooden specie) and the assessment of wood degradation through the measurement of residual density (Dreossi et al. 2010) (Fig. 3).

MicroCT analysis is defined as a "nondestructive" technique, as X-ray scanning

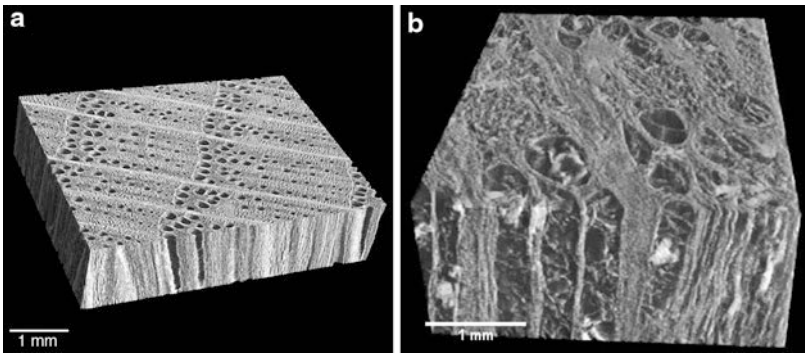

Microcomputerized Tomography (MicroCT) in Archaeology, Fig. 4 A three-dimensional rendering of recent (**a**) and archaeological (**b**) oak (Dreossi et al. 2010)

does not produce visible structural damage to the tissue of the specimen. X-rays interact with the atomic electrons of the material, mainly via photoelectric and Compton scattering, with the release of energy in the tissue (called absorbed dose and measured in gray). These ionization effects become evident in case of submicron imaging of the teeth using powerful SR beams such as those produced by the European Synchrotron Radiation Facility (ESRF) in Grenoble (France), which can cause temporary darkening of the tooth surface. The ESRF scientists suggest to use UV light to restore the original color of the enamel (Tafforeau & Smith 2008). Further studies are in progress to understand the structural damage of the fossil teeth and bones by the ionization effects of X-rays, particularly for synchrotron radiation (Richards et al. 2012). In any case, possible damages, even if only at the microscopic level, are creating anxiety in museum curators. The progress in paleogenetic studies is increasing the value of paleontological collections stored in natural history museums, which should be preserved as much as possible in the original conditions and remain available for future generations of scientists.

A high dose is absorbed in the material during the relatively long scanning time (up to several hours) needed for the analyses, orders of magnitude higher than with medical CT. For example, the microCT analysis of a tooth can correspond to doses of several hundreds' gray that could be of thousands' gray when synchrotron radiation is used. Is this dose producing a fragmentation of the DNA? The Max Planck Institute for Evolutionary Studies tested this effect a few years ago by qPCR of mtDNA of cave bear bones, but no effect was detected (S. Paabo, *pers. comm.*).

No quantifiable increased DNA strand fragmentation has been shown in bird skins preserved in museum, more than 100 years old, after standard CT scanning. The effect of X-ray irradiation could not be separated from the variability of pre-CT DNA fragmentation in different samples, caused by different preservation conditions (Parades et al. 2012).

In crystalline structures, such as apatite in the tooth enamel, X-ray-induced ionization causes electrons in the crystal's atoms to jump to higher energy states, remaining captured in electron "traps." When this effect is strong, as in the case of microCT, it precludes Electron Spin Resonance (ESR) dating, based on the measurement of trapped electrons related to natural radioactivity effects, one of the few dating techniques that can be used to date directly human fossils with ages beyond the radiocarbon limit (Grün et al. 2012). Similar effects should be taken into account for other materials, such as ceramics, that can be dated with thermoluminescence.

Cross-References

▶ Archaeometry: Definition
▶ Dating Techniques in Archaeological Science

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Midden Cultivation

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Introduction

Midden cultivation is an agricultural method which blurs the boundaries between horticulture and agriculture. The concept of midden cultivation was first suggested by Ritchie (1983), Macphail (1990), and Barber (2003), based on findings of flattened middens which (in some instances) overlay prehistoric plow marks. The practice of cultivating middens in situ was identified with greater certainty in the course of a geoarchaeological Ph.D. project (Guttmann 2001) which sought to analyze middens and associated buried land surfaces on multiphase sites in Orkney and Shetland, UK.

Definition

Midden cultivation is the cultivation of a midden or compost heap in situ, as opposed to the more usual practice of taking composted material from a midden and spreading it onto gardens or fields. The practice is identified by the following indicators:

1. Middens (rubbish heaps) which have been flattened and spread out, sometimes over large areas
2. The presence of ard marks (prehistoric plow marks) within or beneath the midden
3. Characteristics that link the soil within the plow marks with the overlying midden, e.g., where both deposits have a similar ash content, soil chemical signature, particle size, or inclusions such as charcoal, charred peat, or unburnt peat
4. The presence of unusually large charred cereal remains, indicating an exceptionally fertile soil

The more indicators are present, the more probable it is that midden cultivation was practiced.

Key Issues/Current Debates/Future Directions/Examples

Discovery

The concept of midden cultivation was formulated following the discovery of extensive areas of flattened midden material on the Neolithic site of Knap of Howar, Papa Westray, Orkney (Ritchie 1983). In the first phase of activity, around 3500 BCE, a midden up to 40 cm thick was deposited. In the second phase, structures were built on top of the midden and a distinct, upper midden deposit associated with the structures was then accumulated. Both the upper and lower midden deposits had level surfaces, and the excavator suggested that they might have been cultivated. The midden material was quite extensive, covering an area of c. 500 m^2 (Ritchie 1983). Links of Noltland, Westray, is another site with an extensive area of possibly cultivated Neolithic midden, measuring at least 210 by 70 m (Clarke et al. 1978). Cultivation of a midden in the Neolithic was also suggested by Macphail (1990) at Hazleton North, Gloucestershire, where small, shifting arable plots were recorded beneath a Neolithic long cairn and one of the plots was placed on top of a midden heap.

Tofts Ness and Old Scatness

Midden cultivation was more firmly identified during the course of a geoarchaeological investigation of two multiphase sites in the Northern Isles of Scotland (Guttmann 2001, 2005; Guttmann et al. 2004). The evidence was derived from two multi-period sites: Tofts Ness, on the Isle of Sanday, Orkney, and Old Scatness, near the southern tip of Mainland, Shetland. The Tofts Ness site dates from the Neolithic to the Early Iron Age (Dockrill et al. 1994), and Old Scatness dates from the Bronze Age to the present, although it was not necessarily occupied continuously (Dockrill 1998). The two sites are in regions which (before stabilization of the dunes)

Midden Cultivation, Fig. 1 Excavating the cultivated midden at Old Scatness, Shetland. Photo by Val Turner

were subject to major episodes of sand blow, and these sand deposits periodically buried and preserved successive agricultural soils together with the associated settlement evidence. At Tofts Ness, radiocarbon-dated Neolithic middens overlay a cultivated Neolithic soil, and at Old Scatness the earliest soil, dating from the Bronze Age to the Iron Age, was buried beneath Iron Age deposits. There were ard marks below both of these early soils (Guttmann et al. 2004).

The two sites were investigated in order to identify changes in agricultural methods over time (Guttmann et al. 2004). A range of geoarchaeological methods were employed in order to identify materials in the soils and middens, with the aim of identifying possible fertilizers used in the fields or accumulated in the middens. The methods included thin section micromorphology, phosphate analysis, soil magnetism (mass susceptibility, frequency-dependent susceptibility, anhysteretic remanent susceptibility, and isothermal remanent susceptibility), loss on ignition, and particle size analysis.

The results of the thin section analysis, phosphate analysis, and particle size distribution demonstrated that the arable soils were composed of exactly the same material as the midden heaps (Figs. 1 and 2). Unlike the soils of later phases, these were not simply soils with added compost but actually represent middens which were cultivated in situ (Guttmann et al. 2004; Guttmann 2005). The material which infilled the ard marks on both sites was clearly the same as that which overlay them, which demonstrates that the ard marks did not predate the layer above but were contemporary with it.

The evidence suggested that the arable plots were placed on top of the midden heaps, that is, the midden heaps were transformed into cultivated plots. The cultivated midden formed a small plot at Tofts Ness; the extent is unknown but the midden soil was not found in surrounding test pits, which suggests that the plot was no more than c. 10 or 20 m^2 (Guttmann et al. 2004). At Old Scatness the midden field may be more extensive; subsequent excavations on the opposite side of the Old Scatness settlement mound have produced more cultivated middens, probably of the same Bronze Age to Early Iron Age date.

Midden Heap Cultivation

Midden cultivation also may have occurred in the Western Isles of Scotland, where large amounts of midden material have been identified interleaved between the machair sands on several sites. Gilbertson et al. (1999) established that Bronze Age and Iron Age buried soils in the machair at Cill Donain, South Uist, contained

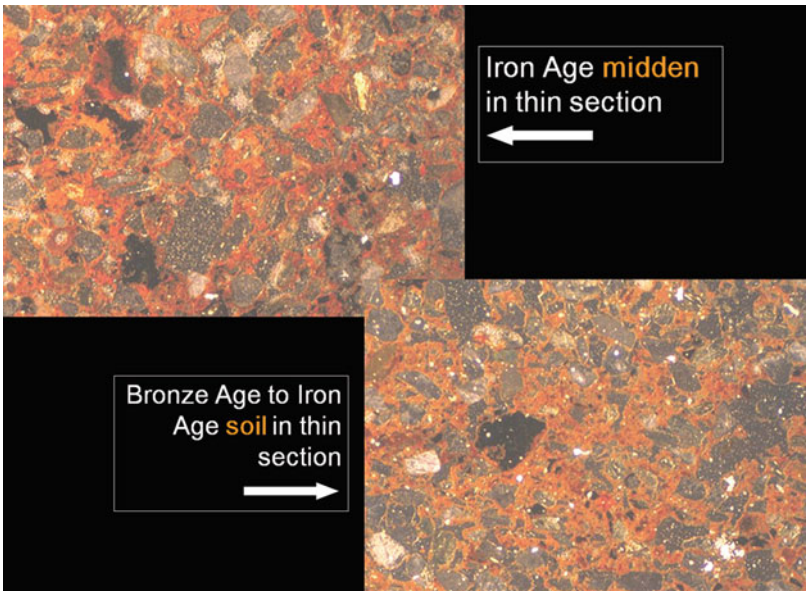

Midden Cultivation, Fig. 2 Iron Age soil and midden in thin section under oblique incident light. Old Scatness, Shetland

large amounts of midden material and represent anthropogenic activity rather than periods of natural dune stabilization. It is possible that some of these deposits were cultivated middens rather than natural soils with added midden material. Midden material was also deposited over large areas on the Bronze Age/Iron Age sites of Baleshare, North Uist, and Hornish Point, South Uist (Barber 2003). Midden material was dumped onto the soil to create arable plots at Baleshare, but at Hornish Point the author suggests that the Iron Age midden deposits were probably cultivated in situ (Barber 2003).

The cultivation of the midden heaps at Tofts Ness and Old Scatness is indicative of a small-scale but intensive land management system. The enriched soils would have been an important resource, which suggests long-term occupation or repeated reoccupation of the sites. The extent of the practice is not yet clear; monumental middens in southern England, such as those found at Runnymede and Potterne, would seem to be potential sites for midden cultivation, but there is no clear evidence for this to date.

Neolithic Cultivation of Mesolithic Middens?

Recent work at Northton, Harris, in the Outer Hebrides, suggests that people in the Neolithic may have cultivated earlier middens as well as those of their own creation. The site at Northton was originally excavated in the 1960s and comprises a series of midden deposits and structures; the pottery indicated a Neolithic to Beaker period chronology. The site was re-excavated in 2000, but despite the recovery of a Neolithic potsherd, a grain of barley and a sheep phalanx (all of which indicate a Neolithic date), hazelnut shells within the midden produced Mesolithic dates (7050–6650 cal BCE and 6450–6200 cal BCE) (Simpson et al. 2006).

A thin section analysis of the deposits at Northton indicated that the midden layers contained large quantities of added anthropogenic materials (Guttmann 2006). The cultural materials (mainly bone fragments and charcoal) occurred throughout the midden deposits, including in the basal layer and the glacial till below. This means that the midden did not seal an undisturbed buried soil, which suggests that the original soil must have either been removed (unlikely) or reworked (very probable). It was evident in thin section that the deposits were intensively reworked by earthworms, but it is also possible that the deposits were cultivated. This would explain why there was no distinct buried soil predating the midden, and it would

explain the absence of soil-forming processes within the midden deposit, and it would also explain the presence of Neolithic material in a Mesolithic midden.

Northton is not the only Mesolithic site where later cultivation may have taken place. A Mesolithic midden located near Prestatyn, on the north coast of Wales, also appears to have been cultivated in the Neolithic (Guttmann 2005; Bell 2007). The midden comprised two layers, the lower dating to c. 4550–4230 cal BCE and the upper to c. 4250–3700 cal BCE. The lower, Mesolithic layer contained dense mussel shell, while the upper had much lower quantities of shell and appeared to have been reworked. Lines of shell extend out from the midden and appear to have been dragged by an implement. These lines are interpreted as possible ard marks.

The recovery of Neolithic material in Mesolithic middens is a common occurrence in Scotland and has previously been interpreted by some as evidence for the continuity of a marine-based economy into the Neolithic period (e.g., Armit & Finlayson 1992). Others argue that there was a radical change in diet in the Neolithic, indicated by a change in the isotopic signature of the human bone (Schulting & Richards 2002).

The evidence from Northton and Prestatyn suggests a possible way of reconciling this apparently conflicting evidence for continuity and change in the Neolithic economy. The attraction of the rich midden deposits may explain why Neolithic people chose to settle on sites that were previously occupied by Mesolithic peoples. If, as is suggested by Schulting and Richards (2002), the Neolithic diet was wholly or almost wholly terrestrial, it begs the question of why terrestrial farmers would reoccupy places which were presumably sited in order to exploit marine resources. If the Neolithic people were not using marine resources, what was the attraction of these sites? The obvious fertility of the middens may have been a key factor. The vegetation growing on the middens would have been distinctively richer than the vegetation produced by the surrounding soils, and this would have been readily apparent to the early farmers.

Midden Cultivation, Fig. 3 Peat ash in thin section under oblique incident light

The extent of midden cultivation outside Scotland is unknown. In Scotland the post-Mesolithic middens are often easy to identify because they tend to contain large quantities of peat ash, which has a distinct yellow or orange color in the field. Under the microscope in thin section samples, the ash constituent is even more obvious, glowing bright orange under oblique incident light (Fig. 3) (Guttmann et al. 2004). In regions where middens are less distinct, it may be more difficult to distinguish cultivated midden from garden soils with large amounts of added fertilizer.

Cross-References

- ► Anthropogenic Sediments and Soils: Geoarchaeology
- ► Europe: Mesolithic-Neolithic Transition
- ► Geoarchaeology
- ► Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches

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Middle East Archaeology: Sites, Texts, Symbols, and Politics

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Introduction

Though the story is most certainly apocryphal, the first recorded incident in which archaeology provided the symbolic ammunition for political ambitions occurred in 550 BCE. The leaders of the legendary warriors of Ancient Sparta sought to expand their tiny kingdom to include richer farmlands elsewhere in their region. The Spartans had long had their eyes on Arcadian Tegea but, after many attempts, had never been able to conquer it. The Oracle at Delphi prophesied that they would not win the lands of Tegea unless they were able to dig up the bones of Orestes. They were told that the bones rested in Tegean soil, and through a chance meeting with a local smith, a Spartan warrior discovered that the skeleton of the ill-fated son of a Homeric hero could be found in a field not far from the city. The Spartans went to the described field, dug up the bones, and won the day (Hall 2007: 333). Texts, sites, and symbols of the past have been in play for the causes of politics ever since.

Definition

Archaeology is seldom considered as a part of military strategy or foreign policy, except to the extent that, in modern war zones, world heritage sites sometimes have greater protections than civilians. The past and representations of the past, however, are clearly part of those elusive elements, which include charismatic leadership, morale building, and the incitement of nationalist, ethnic, or religious fervor, that go into the making of successful wars, insurgencies, and

revolutions both ancient and modern. This is unanticipated by scholars of the past unless they have been directly ordered or inspired to find evidence that will fuel the reigning ideology. It is more often the case that the political value attached to a site or object is a later development. Even in the case of decidedly nationalist archaeological endeavors, the most potent emotional and political connections are usually established long after the projects are finished.

Key Issues

Yigael Yadin's excavations of Masada in Israel or Manolis Andronikos' excavations of Vergina in Northern Greece are examples of this phenomenon. Yadin, of course, knew that Masada, representing the putatively suicidal last stand of Jews against Ancient Romans in 75 CE, was highly significant in Jewish history. He did not necessarily predict that it would become the favored spot for inducting soldiers into the Israeli Defense Forces for many years (Silberman 1994). Similarly, Andronikos may have seen Vergina, with its purported tombs of Philip of Macedon, Alexander the Great's father, as an important Greek heritage site, but he would be surprised to find that the famous symbol he unearthed on a sarcophagus there, the Star of Vergina, became a subject of great contention between the neighboring modern nations of Greece and the Republic of Macedonia (Cowan & Brown 2000).

The recognition that many sites and symbols of the past represent continuing struggles in the present has caused a deepening rift between archaeologists working in areas of enduring ethnic strife and those who work with well-funded governmental and academic institutions on recovering, preserving, and presenting sites in more stable countries. While the former tend to be more concerned with critique, the latter tend to focus on preservation, authenticity, and recognition of living descendant communities. This may be due to the fact that political instability creates uncertainty about the future of the sites and their material culture. The meaning of the past(s) that these scholars would like to relate to modern populations may, thus, be subject to over-politicization in the hands of one group and over-homogenization in the hands of the other.

The convoluted process by which a site or artifact becomes a powerful symbol for a political or social movement involves a number of factors over which archaeologists have little or no control as well as those over which they have great control. Nationalist and imperialist archaeologies may be the impetus for the excavations that produce these symbols – or their significance may simply grow organically as the society itself develops and grows more complex. What is universally true about the relationship between archaeology and politics, however, is that it is both materially and ideologically formed outside of the science of excavating and interpreting sites, particularly in the case of sacred space.

Examples

"A thing belongs to the one who remembers it the most obsessively," as Makiya has said about the Dome of the Rock in Jerusalem (Makiya 2001: 266). Creating obsessive memory is not the province of archaeologists but the close relationship between living traditions and events far in the past in the Middle East means that archaeological endeavors there, particularly with respect to sacred sites, will have an unexpected immediacy and sometimes even notoriety. Jerusalem is the oft-cited example of a city that combines omnipresent antiquity with intense attachments. The deep-rooted feelings that people from so many different backgrounds have about the city are consistently reinforced by its ancient buildings. Jerusalem is also a place where the often carelessly used expression "world heritage" has a highly significant, and unusually divisive, meaning.

The collective memories of Jerusalem's inhabitants remain as contentious as they are cherished by both sides of the continuing struggle taking place there. Embedded in the collective memory of Jews in Israel is the view that Jerusalem represents an incomplete return to Zion – incomplete because the hill upon which one of

Middle East Archaeology: Sites, Texts, Symbols, and Politics, Fig. 1 View of the Old City of Jerusalem with the Dome of the Rock taken from West Jerusalem

Islam's holiest places now sits was the traditional site for the ancient destroyed Jewish Temple (Fig. 1). Embedded in the collective memory of Muslim Palestinians is the belief that Jerusalem establishes a vital connection between them and their co-religionists elsewhere in the Middle East (Scham 2004: 648). Christians from outside of the region find themselves in opposition to each other and sometimes to Christians living within the region, with fundamentalists supporting Jewish claims to Jerusalem while others the claims of Palestinians.

Sites of the past that have religious or nationalist significance for more than one ethnic or confessional group are the foci for hegemonic heritage struggles. These struggles are most often won by those who have control over the site with the memories of other groups effectively blotted out. Hegemonic heritage operates on the principle that if one narrative about the past of a particular place is true, then all others must be false – or worse, dangerous. The fact that permission to use certain sites is furnished to one group but denied to another is not based upon contested histories surrounding the site. More accurately, these sites become battlegrounds because of the necessity for one side to establish its claim and its narrative to the exclusion of all others.

Middle Eastern archaeological sites may also be the scenes of heritage suppression strategies that are designed to tacitly ignore everything that does not benefit the power interests of the present. There are many ways in which such benefits may be defined – but it is generally economic, religious, and political considerations that prevail. In Nasser's Egypt, for example, the country's rich history was denied and ignored because the Pharaonic past was an impediment to establishing a Pan-Arab identity. Building dams without regard to archaeological sites did not endear him as a leader to Western heritage professionals, but it also turned out that Egyptians themselves were more proud of this past than Nasser had estimated (Hassan 1998), and later leaders of Egypt were only too eager to show off the Pharaonic sites to distinguished visitors. Similarly, Saddam Hussein lavished attention and resources on the cities of the Babylonian Empire but those of the Assyrian Empire were largely left to crumble. He, no doubt, felt far less affinity for the Assyrians because their contentious Christian descendants had been a thorn in his side from the beginning of his regime (Abdi 2008). After Hussein was executed, the Assyrian Democratic Movement was one of the first groups to step forward to vie for power in the country.

Heritage repression may be a favored weapon of autocrats, but in recovering war zones, it becomes a means of survival. Beirut is a city where many decisions about archaeological sites

are affected by an implicit agreement that history must be ignored as much as possible. The collective memories of the city's diverse residents have been in conflict for so many years that the best strategy that has been developed is one that involves separating the people from their contentious pasts. The country's multicultural story was laid bare by the destruction of Beirut's downtown during the civil war. Lebanese archaeologists, however, have to continually fight to preserve these remains as the city is being rebuilt as a glittering (and hopefully peaceful) modern example of the "New Middle East" (Lawler 2011).

Current Debates

Sites and symbols are the agents of collective memory, but its structure, at least in the Middle East, is defined by texts. Cuneiform tablets, papyri, scrolls, and inscriptions all have a uniquely privileged status beyond that of mere artifact (Scham 2009: 169). Modern scholars, of course, will not admit to using texts as archaeological source books. They are, nonetheless, an ever-present entity still waiting in the consciousness of many to be put into play in describing finds. This is especially true of the Bible which, despite its dubious historical value, has been used to define the past of Israel, Jordan, and Turkey, and, in part, Egypt and Mesopotamia for generations. Like the *Iliad* and the *Odyssey* in the early years of classical archaeological exploration, the Bible has inspired excavations throughout the region. Unlike the Homeric epics, the biblical text continues to be reinvented for the purposes of explaining the past. Barthes' observation that text is ". . . experienced only in an activity of production. The Text cannot stop. . ." (1977: 157) cogently describes the relationship between archaeology and the Bible.

Ignoring the text in that branch of Middle Eastern archaeology still known as biblical archaeology is not an option, as there are few who will be interested in pursuing an archaeology of the "holy land" denuded of its associations with the Bible. Scholars who have attempted to do this to any extent are dismissed by many of their colleagues as "minimalists." Although the term seems to imply a kind of austerely modern approach, even minimalists cannot eliminate any consideration of the Bible altogether in favor of a sites-and-artifacts-centered view. Minimalists and maximalists alike are both equally defined only by their textual approach, and neither group is willing to consider material culture as anything more than evidence that either confirms or contradicts the text.

Another structural use of text arises as a result of the distinction that those who have had the longest experience in working in very overtly politicized environments, biblical and Near Eastern archaeologists, have drawn between their fields and that of anthropological and social archaeologists. The "labels we choose to stick upon the corpse of history" (Hodder (citing Collingwood) 1993: 269) are not created in these archaeologies by material culture. The concept of "reading" non-textual artifacts as text (Hodder & Hutson 2004) introduced into anthropological archaeology some decades ago is little understood or accepted in biblical and Near Eastern archaeology. The tendency to view text as the primary explicator of archaeological finds is noted by Abu El-Haj (2001) who describes Israeli archaeology as consistently conflating text, dogmatic belief, and practice.

Future Directions

Middle Eastern politics, if not Middle Eastern archaeology, began to veer away from the text, so to speak, in the spring of 2011. As the term text itself became a verb, its full power is being realized in the widespread use of information technology to mount challenges to the ruling powers of Tunisia, Egypt, Libya, Yemen, Bahrain, Syria, Jordan, and Lebanon. That the Arab World has been transformed by young people texting each other has become a modern news cliché. Bible, Q'uran, and historical manifesto notwithstanding, the power of the original is nothing compared to the blogged or tweeted interpretation of it.

What do these social media-stoked revolutions portend for the relationship between Middle East archaeology and politics in the future? It is difficult to assess the uses that new regimes might make of archaeological sites and artifacts. In contrast to the ubiquitous images of Hosni Mubarak as pharoah and Saddam Hussein as Nebuchadnezzar, the images used now are primarily those of Islam and the Islamic Past. This has become the case in Palestinian West Bank as well where a number of biblical sites, once revered by Muslims as well as Christians and Jews, have become symbols of negative heritage to be destroyed and looted as representations of the occupation of the territory by Israel (Yahya 2010).

For every report of site destruction emanating from the Middle East, there is a corresponding report that, even in the midst of armed rebellion, there is also continued veneration of the past. The so-called Treasure of Benghazi disappeared from a bank vault but the rebels who broke into Tripoli's National Museum bent on destruction only wrecked Qaddafi's old cars on display. Looters ran rampant in Egypt but the Supreme Council of Antiquities (SCA) has managed to restore security in most places despite the uncertainty of the country's future. A reported looting epidemic in Tunisia turned out to be an attempt perpetrated by the family and friends of the ousted dictator to make off with valuable artifacts as they left the country (Elkin 2012: 30).

Meanwhile, Israel has hoped to weather the changes being experienced by its neighbors simply by enduring and by continuing its efforts, dating from the end of the Six-Day War, to assert sovereignty over all of Jerusalem. The tremendous post-1967 onslaught of archaeological excavation, attesting to the Israeli government's concern about finding its own truth under the layers of largely Islamic and Ottoman remains in the city, continues in full force. The destruction of the historic Mamilla Cemetery close to the walls of the Old City, with remains of religious Muslims dating back to before the twelfth century AD, is by now almost complete and the construction work on the *Museum to Tolerance* that will take its place has begun.

Cross-References

- ▶ Activism and Archaeology
- ▶ Archaeology and Anthropology
- ▶ Archaeology and Politics
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Military Activity in Islamic Archaeology
- ▶ Nationalism and Archaeology

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Middle East Middle to Upper Paleolithic Transitional Industries

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Introduction

As in Europe, the Middle to Upper Paleolithic transition is an intensely debated topic in Paleolithic archaeology and paleoanthropology of Western Asia. The Middle to Upper Paleolithic transition was an important period of biological and cultural changes in human evolution. The disappearing of Neanderthals and the expansion of anatomically modern humans in Europe and south Western Asia, as well as the emergence of Early Upper Paleolithic technologies, which signals significant changes between 45,000 and 30,000 years ago, are just some of the enigmatic aspects of this transitional period. It is not clear where the process of the changes initiated or whether it has been diffusion from a core area or local adaptation in different regions. Many researchers point to East Africa and Southwest Asia, in particular Levant, the region that the best documented records come from.

Thus, the Middle East is a key area that always has been the center of attention in the quest for the origin of the first wide speared cultural manifestation of anatomically modern humans. The present entry reviews the Middle to Upper Paleolithic transitional lithic industries as an important part of the material culture related to one of the most crucial stages of human evolution in the Middle East. In this entry, the Middle East is defined as a geographical area from Anatolia and southern part of Caucasus in the North, the Levant to the Iranian plateau in the center and the Arabian Peninsula in the South (Fig. 1).

Definition

During Oxygen Isotope Stage 3, several Middle to Upper Paleolithic transitional entities appear across Eurasia dating back to the interval of 50,000–30,000 BP. These variable entities or lithic industries are traditionally attributed to the end of Middle Paleolithic, the Initial and then Early Upper Paleolithic, with different names such as the Emiran, Bohunician, Szeletian and then early Ahmarian or Proto-Aurignacian.

The Initial Upper Paleolithic refers to industries that often encompass a combination of Levallois-Laminar technologies accompanying Upper Paleolithic retouch tools and sometimes Middle Paleolithic types and generally date to between 45,000 and 36,000 years BP. But the earliest appearances of true Upper Paleolithic characteristics manifest in Early Upper Paleolithic industries such as early Ahmarian or Proto-Aurignacian, with production of blade/bladelet from prismatic cores and emphasis on the soft hammer technique. Better-studied European evidence in particular suggests a relatively rapid and growing process of invention in different aspects of hunter-gatherers life during this time span. Apart from blade/bladelet-based technologies, long distance procurement of raw materials, specialized hunting, complex settlement patterns, bone industries, the common use of personal ornaments and ultimately certain types of art are documented in many archaeological sites. It is the beginning of the process through which

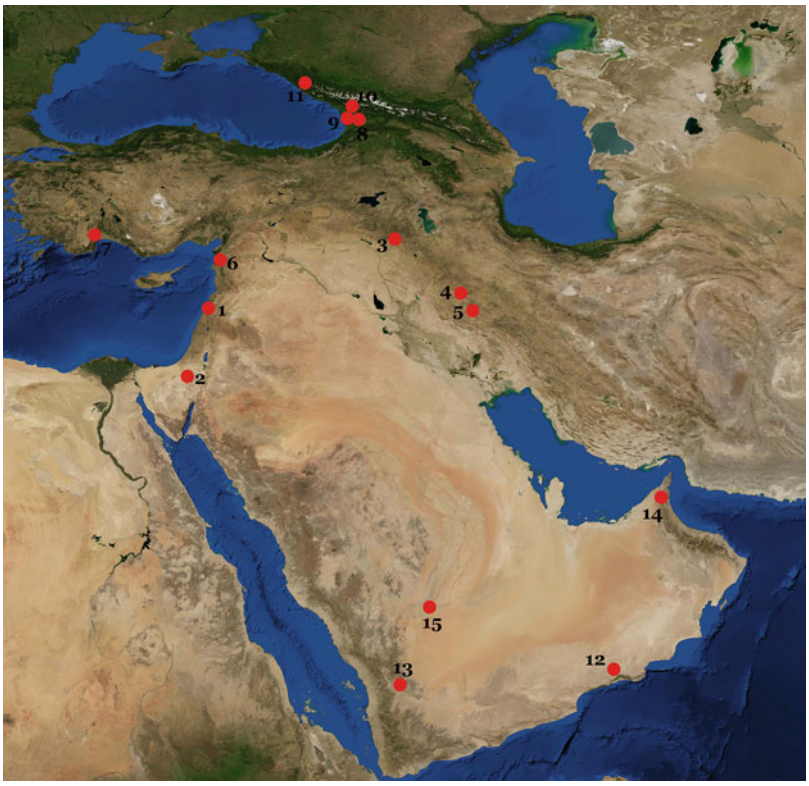

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 1 The locations of key sites mentioned in the text: *1* Ksar Akil, *2* Boker Tachtit, *3* Shanidar, *4* Warwasi, *5* Yafteh, *6* Üçağızlı, *7* Karain B, *8* Dzudzuana, *9* Ortvale Klde, *10* Bondi, *11* Mezmaiskaya, *12* Al-Hatab, *13* Shi'bat Dihya1, *14* Jebel Faya, *15* Faw Well (Basemap courtesy of NASA's Visible Earth http://visibleearth.nasa.gov/)

anatomically modern humans dispersed widely, and is recorded in the variable industries reported from several regions in the Europe and Southwest Asia. Many of these lithic industries traditionally grouped under the title of Aurignacian technocomplexes and were considered as the marker of anatomically modern human migrations. The scarcity of human fossils from Initial or Early Upper Paleolithic contexts compels researchers to rely mainly on cultural remains and particularly lithic technology, which also seems to be a complex and difficult way to discuss the actual changes during the time of "Transition". The transition sometimes refers to the technological continuity between Middle and Upper Paleolithic features, and sometimes indicates a probable mixture of Middle Paleolithic elements with Upper Paleolithic ones in other regions. Traditionally, the typo-technological continuities and discontinuities in lithic entities have been used to support the fundamental hypothesis of local evolution versus acculturation in Paleolithic literature.

Historical Background

The concept of Middle to Upper Paleolithic transition was founded in Europe, particularly Western Europe, the place where the Paleolithic archaeology has its formation roots as early as nineteenth century. In the Middle East, this Euro-centric research historically focused on the Levant and then Iran, in particular Zagros. Pioneering works of R. Neuville and D. A. E. Garrod before the mid twentieth century built a unilinear model for Upper Paleolithic of Levant; in the 1970s, it was replaced by a new hypothesis of parallel entities. In the new parallel Upper Paleolithic entities, the Ahmarian concept defined and added to the previously identified Levantine Aurignacian (Gilead 1981; Marks 1981). In the Zagros, the previous work of Garrod in Levant and Zagros inspired the work of other researchers, which lead to the birth of the Baradostian name for the industry found in Early Upper Paleolithic layers of Shanidar (Solecki 1958). Subsequent research

in the Zagros tended to attribute of most of the discovered Upper Paleolithic industries to Baradostian, and reject the possibility of its evolution from underlying Mousterian. Based on the similarities observed in Warwasi assemblage, Baradostian renamed Zagros Aurignacian and opened for discussion the probability of its local origin in Zagros Mousterian (Olszewski & Dibble 1994). About a decade earlier in Levant, a crucial notion emerged that the evidence in the site of Boker Techtit indicates the development of the local late Mousterian into earliest Upper Paleolithic (Marks 1983). This earliest Upper Paleolithic was in fact Emiran, the first phase of the Upper Paleolithic unilinear model of Garrod and Neuville, which then recalled Initial Upper Paleolithic and was applied by many researchers to the same industry. Technological study of Yafteh cave lithic collections in Zagros revealed the resemblance of Baradostian early and late phases to the two-tradition model of Levant (Bordes & Shidrang, 2009). Ongoing excavations and research also point to some differences between early Ahmarian and early Baradostian that remain to be described in detail (Otte et al. 2011). Apart from these two key regions that historically received more broad attention, quite recently, increasing research in other parts of Middle East, such as Arabian Peninsula, Turkey or Caucasus, is providing us with interesting information. Some of the results of these researches will be briefly reviewed in the following section, in a region by region framework.

Key Issues and Current Debates

Levant

The important geographical location of Levant at the crossroads of Africa and Eurasia has led to centralization of Paleolithic research in this region, and consequently a better understanding of its Paleolithic cultures. This is particularly true for the crucial period of shift between Middle and Upper Paleolithic. As the result of decades of research, a relatively reliable sequence of cultural traditions has presented in Levant, which has become a comparative reference for neighboring areas.

The earliest Upper Paleolithic of Levant represents local modifications of lithic industries from Late Mousterian into the early Upper Paleolithic tradition of Early Ahmarian. Prior to Early Ahmarian, the best known MP-UP Levantine transitional lithic industry is called the Initial Upper Paleolithic, also known as the Emiran (Marks 1990).

The Initial Upper Paleolithic industries of Levant date back roughly to about 45,000–38,000 BP and present two main variants, one with characteristic index fossil of the Emireh point and the other with the chanfrein pieces. The technological characteristics of these industries usually include production of non-Levallois blades and Levallois-like points, hard hammer blade production and Upper Paleolithic retouched tools (Fig. 2). Ksar Akil in northern Levant and Boker Tachtit in southern Levant are the best relevant reference sites showing evidence of continuity for the intermediate phase between Middle and Upper Paleolithic in Levant (Marks 1983; Ohnuma 1988).

The continuity between the Initial Upper Paleolithic and the Early Ahmarian has also been recognized in several sites including those mentioned before (Marks 2003). This continuity is expressed by some similar technological characteristics, exemplified by the continued use of faceting as part of core preparation. The Ahmarian is divided into Early (42,000–30,000 BP) and Late phase (30,000–23,000 BP) and is better known from open-air sites and semi-arid marginal zones. The Early Ahmarian is characterized by the production of blade and bladelet from several types of prismatic cores with the purpose of manufacturing blade/bladelet tools, particularly el-Was points. The other categories of tools, the cortical end scrapers and burins, seem to be also related to the same reduction sequence; their blank produced during the preparations and rejuvenations of blade/let cores (Goring Morris & Davidzon 2006).

The Levantine Aurignacian is another Upper Palaeolithic entity in Levant assigned to about 32,000–30,000 BP (Bar-Yosef & Pilbeam, 2000)

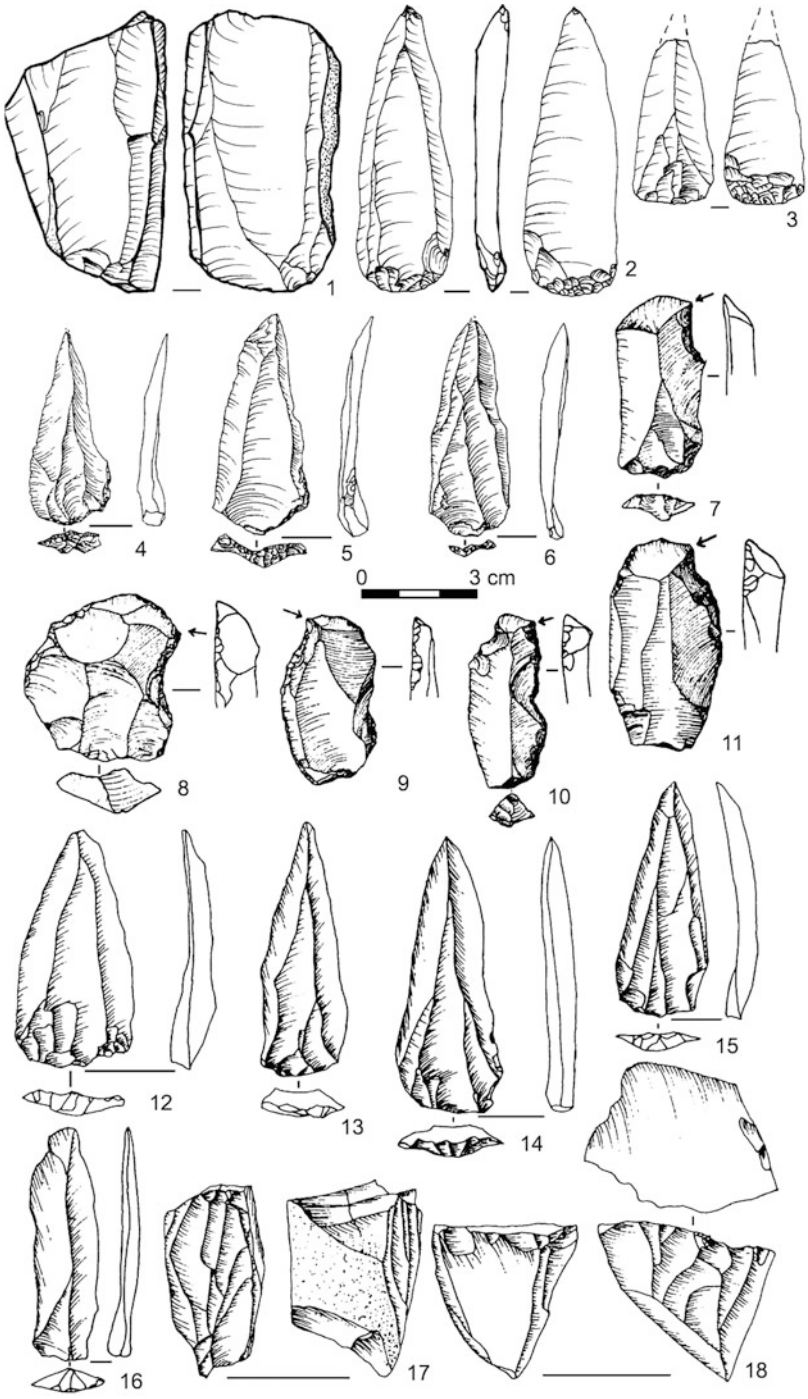

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 2 The characteristic elements of Initial Upper Paleolithic or Intermediate Middle to Upper Paleolithic industries: *1* Nubian Levallois core, *2–3* Emireh points, *4–6*, *12–16* Levallois-type points, *7–11* Chanfreins on faceted blanks, *17–18* Cores (After Belfer-Cohen & Goring-Morris 2007)

and typo-technologically contains classical Aurignacian features. The European Aurignacian seems to present older dates (around 39,000–35,000 BP) and compared to its Levantine counterpart is a longer lived entity. Contrary to Early Ahmarian, which is technologically based on production of straight to curve blade/bladelet, in the Levantine Aurignacian,

blades are the dominant blank for tools and there is a production of small twisted bladelets from carinated pieces, while flakes make up the major part of the debitage (Goring-Morris & Belfer Cohen 2006).

Due to the late, short-lived and geographically limited appearance of the Levantine Aurignacian, it doesn't play an important role in the debate of the Middle to Upper Palaeolithic transition in Levant and is usually considered as a late intrusive culture.

Zagros

The majority of our knowledge for the Iranian Early Upper Paleolithic comes from the Zagros region. Last two decades saw an increasing interest in Upper Paleolithic of the Zagros region, in particular its early phase, which has a potential to answer some of the questions of Middle to Upper Paleolithic transition in Middle East. The resemblance of Baradostian lithic industries of Zagros with Aurignacian technocomplexes in Europe and Levant, and also the hypothesis that it evolved out of underlying Zagros Mousterian, engaged Baradostian as one of the potential candidates for ambiguous origin of Aurignacian. The current information comes from several cave and rockshelter sites, mostly in Iran (except Shanidar cave in Iraq), and more precisely in the intermontane valleys of Kermanshah and Khorramabad in the Western Zagros and a few sites in Fars province in the southern Zagros, which all yielded Baradostian industry. The definition of Baradostian and its affinities to Aurignacian has gradually formed and strengthened since its recognition in 1958 at the Shanidar Cave in the western foothills of the Zagros in Iraq (Solecki 1958). On the basis of similarities observed in Warwasi assemblages and Aurignacian technocomplex, the name "Zagros Aurignacian" suggested for Baradostian and two main chronological phases described for it (Olszewski and Dibble, 1994). The earlier of these has been classified as the Early Zagros Aurignacian, and includes a combination of Upper and Middle Paleolithic tools, such as carinated endscrapers, burins, Font-Yves points, Dufour bladelets, sidescrapers, and truncated-faceted pieces. Most of the tools are on flake blanks and some are on blade and bladelet blanks. The debitage is dominated by flakes, but prismatic blade technology is also present. This assemblage has presented as an example of a transitional industry, which can indicate one sequence of development from a Middle Paleolithic into the Aurignacian. Later phase has classified as the Late Zagros Aurignacian and it is most typical for having the characteristic types of the Aurignacian. There is a considerable number of carinated burins and Dufour bladelets, carinated endscrapers as well as Arjeneh points. Tools are made about equally on blade, bladelet, and flake blanks. Technologically, this assemblage is dominated by bladelet debitage (Fig. 3). The Late Zagros Aurignacian at Warwasi appears to share broad similarity to assemblages of central Europe and the beginning of the Levantine Aurignacian (Olszewski & Dibble 2006). In addition to Warwasi, recent researches of Yafteh Cave, which include restudy of the 1965 collections (Bordes & Shidrang 2009), and new field works (Otte et al. 2007, 2011) yielded a better-defined typo-technological characteristics and more importantly radiocarbon dates for Baradostian (Fig. 4). Based on recent restudies of lithic material from 1965 excavation, the existence of two main typo-technological phases were described for the Yafteh sequence (Bordes & Shidrang 2009). The lower part of the deposit was associated with an assemblage mainly oriented toward the production of Arjeneh points and relatively large, straight or slightly curved Dufour bladelets. The bladelets or blanks of these tools were removed from prismatic cores or sometimes from narrow flake ridges. There are also a number of end-scrapers on blades, which sometimes have Aurignacian retouch on their lateral edges (Fig. 5). In the upper part of the sequence, carinated burins are dominant and small twisted bladelets were removed from them and subsequently transformed by inverse or alternate retouch into Dufour bladelets (Fig. 6). A series of radiocarbon dates which suggests the attribution of the materials to an age between 24,500 and 36,000 14C BP. The more recent results indicate a single chronological signal of approximately 33,500 14 C BP for

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 3 The 1960 excavation at Warwasi rockshelter (Photo courtesy of F. Hole, after Biglari 2012)

the major part of Yafteh sequence. Radiocarbon estimations from main occupation of Yafteh appear to pre-date the chronological range of considerable Levantine Aurignacian sequences and overlap some of the Early Ahmarian ones (Otte et al. 2011).

Anatolia

Despite its important key position, Anatolia is relatively less known in the debate of Middle to Upper Paleolithic transition, compared to Levant and other adjacent regions. The major part of our information for this period comes from two cave sites, Üçağızlı and Karain B located in Mediterranean Zone of modern Turkey. Üçağızlı Cave is located on the Mediterranean coast in the Hatay province of south-central Turkey. Radiocarbon dates indicate that the early Upper Paleolithic sequence of Üçağızlı corresponds to the temporal interval between 41,000 and 29,000 uncalibrated radiocarbon years BP. The earliest dates associated with the Initial Upper Paleolithic (IUP) industry, quite the same transitional industries identified in Levantine sites, correspond to about 35,000 and 41,400 radiocarbon years BP. The earliest true Upper Paleolithic entity, which was found on top of IUP layers, is the early Ahmarian known widely from Levant. The dates for Ahmarian layers at Üçağızlı Cave fall within an interval of 29,000–34,000 radiocarbon years BP (Kuhn et al. 2009). This interval corresponds with the earliest time range of early Ahmarian industries at open-air sites in the Sinai and Negev deserts of the southern Levant (Marks 1983; Bar-Yosef & Pilbeam 2000).

Apparently there is a noticeable degree of typological continuity throughout the Üçağızlı sequence. For instance, the endscrapers are the dominant retouched tool forms in all layers and pointed blades are most common in the upper layers and less abundant in the earlier part of the sequence. The technological attributes of Levallois method and small numbers of chanfreins are common in IUP of Üçağızlı Cave. The Chanfreins are considered one of the types of fossils of the IUP or Transitional assemblages of northern Levant.

The Levallois blanks, particularly blades and elongated points, are common in IUP layers and their frequency decline over time. Changes in platform morphology and preparation indicate an abrupt shift from hard hammer percussion to soft hammer or indirect percussion at the end of IUP layers, which point out to the shift from IUP to Ahmarian (Kuhn et al. 2009).

The Üçağızlı Cave data supports the records from Ksar ‘Akil in showing gradual changes in lithic industries over time. The features that make IUP a transitional industry are the persistence of some Middle Paleolithic characteristics, such as application of Levallois method, hard-hammer technique and platform faceting, while the assemblage is Upper Paleolithic from typological point of view. The attributed Levallois features may imply that the Levantine IUP industries had their origins in the Middle Paleolithic in Levant or Middle Stone Age complexes in nearby regions.

The Üçağızlı sequence provides evidence for the evolution of IUP into the later Upper Paleolithic “early Ahmarian,” but since there is no evidence of Middle Paleolithic underlying

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 4 General view of Yafteh cave (Photo: S. Shidrang)

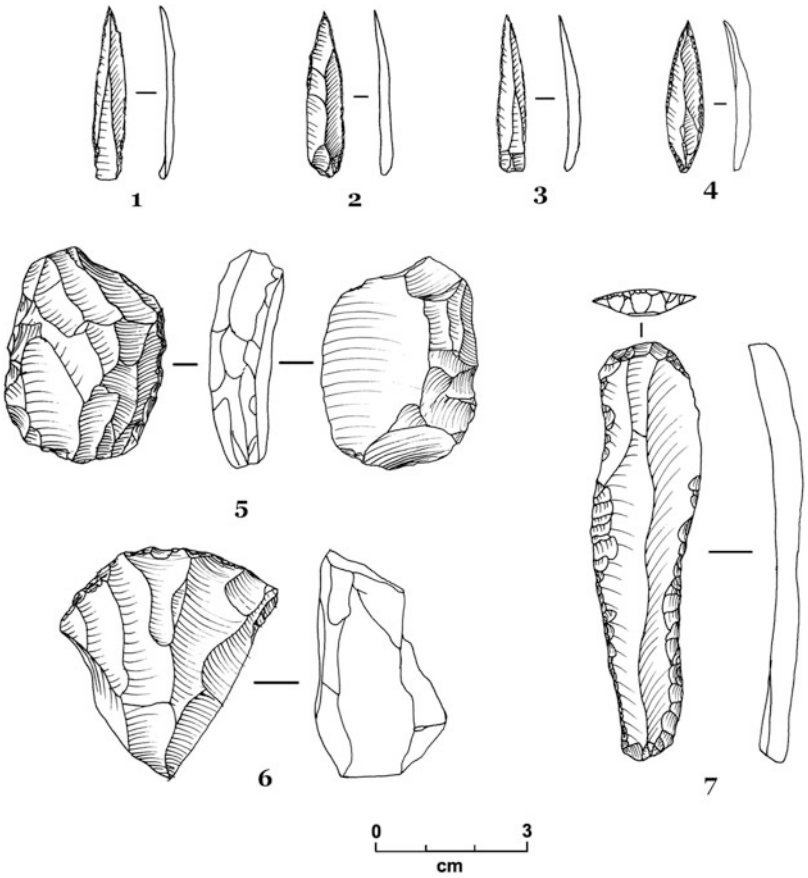

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 5 Some of the Early Baradostian characteristic artifacts from Yafteh Cave: *1–4* Arjeneh points, *5* Bidirectional bladelet core, *6* Prismatic bladelet core, *7* End-scraper on retouched blade (Drawing: S.Shidrang)

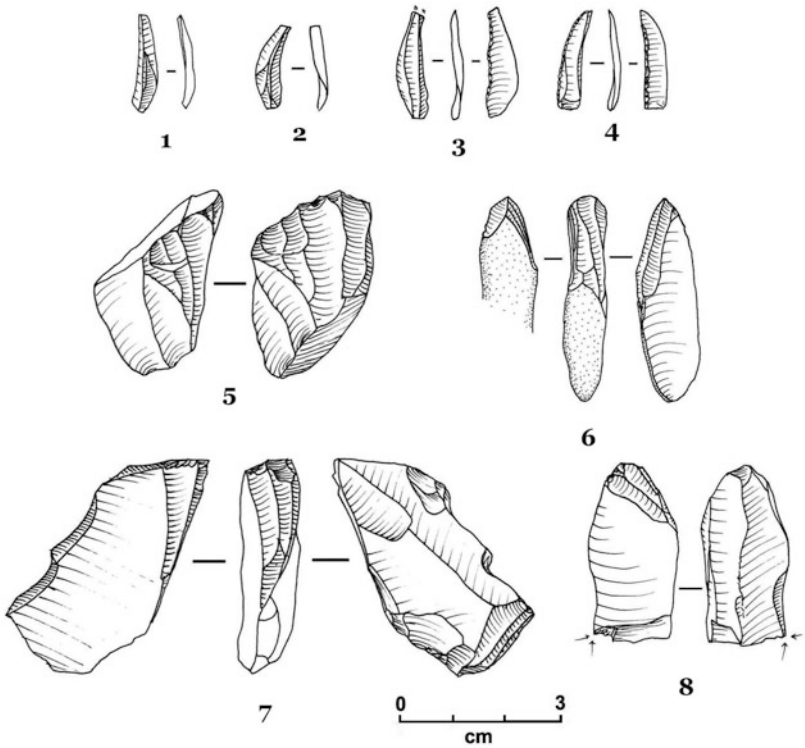

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 6 Some of the Late Baradostian characteristic artifacts from Yafteh Cave: *1–2* small twisted bladelets, *3–4* dufour bladelets (Roc-de- Combe subtype), *5* carinated core, *6–8* Carinated burin (Drawing: S. Shidrang)

the IUP layers of Üçağızlı, it cannot participate in the debate of Initial Upper Paleolithic origins in the region (Kuhn et al. 2009).

Apart from Üçağızlı, another cave called Karain B in Antalya has yielded a sequence encompassing Middle and Upper Paleolithic remains. The Early Upper Paleolithic in Karain B has been described as an Aurignacian-like industry with carinated and nosed end-scrapers associated with Dufour, Krems type retouched bladelets and carinated burins. Beside an irregular flake production, the retouch blades are present in moderate frequency, but a few prismatic bladelet cores were recovered. The available date for this industry is around 28,000 BP, which corresponds with the latest time range of early Ahmarian industry at Üçağızlı cave. The underlying Middle Paleolithic artifacts display the typical characteristics of Mousterian industry, including Mousterian points, side scrapers, notches, etc., quite similar to those found in Zagros (Yalçınkaya & Otte 2000). Despite the proximity of these sites, their sequences are quite different and until the complete and equal publication of their studies, a valid comparison and interpretation would not be possible. Although these sites are described under the title of Anatolia and modern Turkey territory, they are in fact northern Levantine sites in Mediterranean zones. The situation in the mainland of Anatolia itself has remained quite an enigma for the time period of Middle to Upper Paleolithic Transition.

Caucasus

Caucasus (in this entry southern Caucasus) also presents notable insights concerning the expansion of attributed modern human cultures and the disappearance of Neanderthals ones that have useful implications for ongoing debates of Middle to Upper Paleolithic transition in Eurasia. The Middle to Upper Paleolithic pattern of cultural changes in southern Caucasus seems to be relatively abrupt in comparison to Levant. Reassessment of old excavations and new research in several sites in Georgia and Armenia, where the Middle Paleolithic lasted until 35,000 years ago, tend to

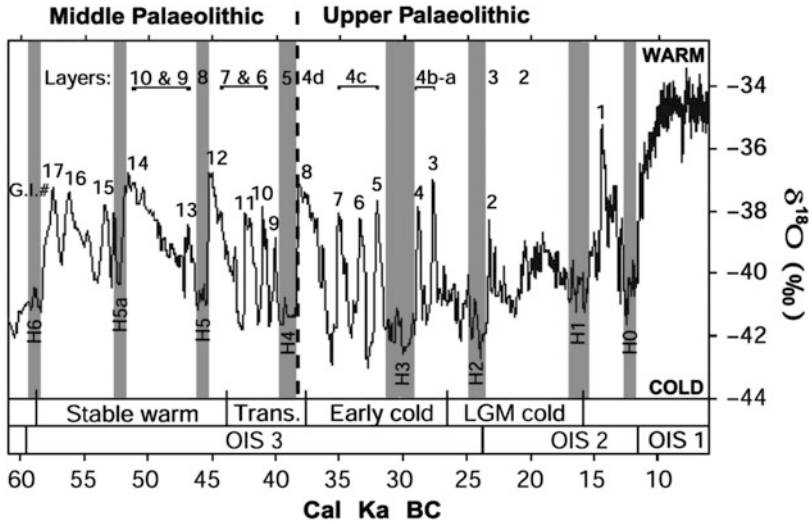

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 7 The Middle and Upper Paleolithic of Ortvale Klde and proposed correlation with Greenland Ice Cores (After Adler et al. 2006)

demonstrate that the genuine Upper Paleolithic is without local precedent and can be intrusive to this region (Bar Yosef et al. 2006). The main evidence for this claim on Caucasian Middle and Upper Paleolithic transitional industries come from two cave and rockshelter sites "Dzudzuana" and "Ortvale Klde" on the southwestern slopes of the Caucasus Mountains. The lithic assemblage from the earliest Upper Paleolithic at Ortvale Klde contains unidirectional blade cores, end scrapers on blades, rounded flake scrapers, burins on truncation, retouched bladelets, and backed bladelets. Beside lithic artifacts, several bone/antler points and decorated objects were discovered in Early Upper Paleolithic layers (Adler et al. 2006). Similar materials were never discovered in the underlying Late Middle Paleolithic layers, which were dominated by Levallois technology and a typical group of Middle Paleolithic scraper types (Adler et al. 2006).

In Dzudzuana Cave, the early Upper Paleolithic industry is characterized by the production of short blades and small bladelets from unidirectional blade/bladelet cores. Microliths are very common and there are typical burins and end scrapers on flakes and blades. The later Upper Paleolithic layer in Dzudzuana contains an industry dominated by the production of small blades and bladelets detached predominantly from carinated cores.

Apparently, there is no clear evidence at either site for interaction between Neanderthals and modern humans attributed cultures. In Ortvale Klde, the Late Middle Paleolithic sequence was overlain by a genuine early Upper Paleolithic occupation (Fig. 7). Interestingly, the lowermost Upper Paleolithic unit in Dzudzuana contains an industry similar to Upper Paleolithic layers of Ortvale Klde. At both sites, the Upper Paleolithic sequence begins at *about* 34–32 Ka BP. Similar industries were also recovered from both the northern and southern slopes of the Caucasus, for instance Mezmaiskaya Cave (Golovanova et al. 1999) dated to 35–34 Ka BP as Ortvale Klde (Adler et al. 2006) or Bondi Cave date to 31–24 ka 14 C BP (Tushabramishvili et al. 2012). To researchers, this homogeneity of Early Upper Paleolithic lithic industries across Caucasus suggests that the modern humans had more success in fast expansion across mountains in compare to Neanderthals, probably due to better communication abilities and improved equipment (Bar Yosef et al. 2006). It is also believed that the Caucasus Mountains may have been a biogeographical and social barrier to the Neanderthals, since the Mousterian industries from the southwestern slopes are similar to the Zagros-Taurus types, while the Mousterian of the northwestern slopes of the Caucasus resembles the Eastern Micoquian.

Arabian Peninsula

The Arabian Peninsula is a geographical bridge between Africa and Eurasia, and its Pleistocene archaeological evidence is of significant interest in tracking the southern route of population expansion from Africa. Compared to Levant and other part of the Middle East, the study of Modern Human origins began relatively late in Arabian Peninsula. Given the scarcity of stratified sites and absolute dating, it is not yet possible to create a comprehensive idea of Middle to Upper Paleolithic Transition in Arabian Peninsula. However, recent research has found some archaeological affinities with North Africa and Southwest Asia, mainly based on Middle Paleolithic discoveries in coastal areas (Marks 2009; Rose et al. 2011; Delagnes et al. 2012). But the Upper Paleolithic of Arabia is less known and the current state of data has documented a long sequence of laminar technologies that date back to around MIS 4 through early MIS 1 (~75–8 ka).

Several sites, like Al-Hatab Rockshelter and Shi'bat Dihya1 inYemen, provide evidence for human occupation in southern Arabia during MIS 4 and MIS 2 (Delagnes et al. 2012). The site of Jebel Faya 1 with remains dated to MIS 5 and MIS 3 (Marks 2009) and Upper Paleolithic sites recorded in the Wadi Hadramaut are examples of Arabian Upper Paleolithic sites that were all found in marginal environments. Jebel Faya rockshelter in Sharjah Emirate is one of the a few stratified excavated Paleolithic sites that have yielded radiometric dates for Arabian Peninsula Paleolithic cultures (Marks 2009). The lithic materials are associated with three distinct archaeological layers of Jebel Faya spanning a major part of the Late Pleistocene. The preliminary results of radiometric dates indicate an age of at least 85 ka for its Middle Paleolithic assemblage (C), while later assemblages (A and B) fall in MIS 3 (Marks 2009). Typo-technologically, the lowest assemblage is characterized by small handaxes, bifacial foliates, hard hammer blades and centripetal cores, and the next upper assemblage (B) is characterized by the production of flakes from 90° cores and flat cores. There are a number of multiple platform cores as well as a few truncated faceted pieces and blade production in addition to some volumetric cores. Tools comprise sidescrapers, endscrapers, denticulates and simple retouched pieces. Later assemblage (A) is characterized by the production of small rectangular flakes from multiple platform cores. The purposeful blade production is very rare, although a few short, wide blades exist. Tools categories include burins, retouched pieces, and small number of endscrapers, sidescrapers and denticulates (Marks 2009). Apparently, the Jebel Faya 1 assemblages A and B show no obvious technological relations to any transitional industry in the Levant or Africa.

Apart from the site Faw Well, which based on its similarities to late Ahmarian of the Levant probably date back to late MIS 3, other contemporaneous sites throughout Arabia show no close affinities to either the Levant or East Africa. The Faw Well, located east of the Asir Mountains in southern Saudi Arabia, seems to be the only convincing evidence for an Levantine Upper Paleolithic presence in Arabia (Marks 2009). The small collections from Faw Well typo-technologically resemble the later Ahmarian of the southern Levant, which date to about c. 24 and 20 ka.

At most of the sites, the blade technology is relatively different from contemporaneous Levantine sites and the absence of el Wad points and finely retouched blades and bladelets, makes it difficult to hypothesis any direct connections. While additional sites and absolute dates are vital to interpret these industries, currently the most accepted view is that they are parts of a long term, local developmental sequence of Arabian lithic industries. However, during early MIS 3, a period of increase in precipitation occurred in Arabia, which increased the possibility of demographic exchanges between Arabia and adjacent regions (Fig. 8). For instance, southern Arabian populations may have spread to the north during this time and disperse a Nubian-derived Levallois technique used in production of elongated points from bidirectional Levallois cores, one of the technological characteristics of the Middle-Upper Palaeolithic transition industries in the Levant (Rose et al. 2011).

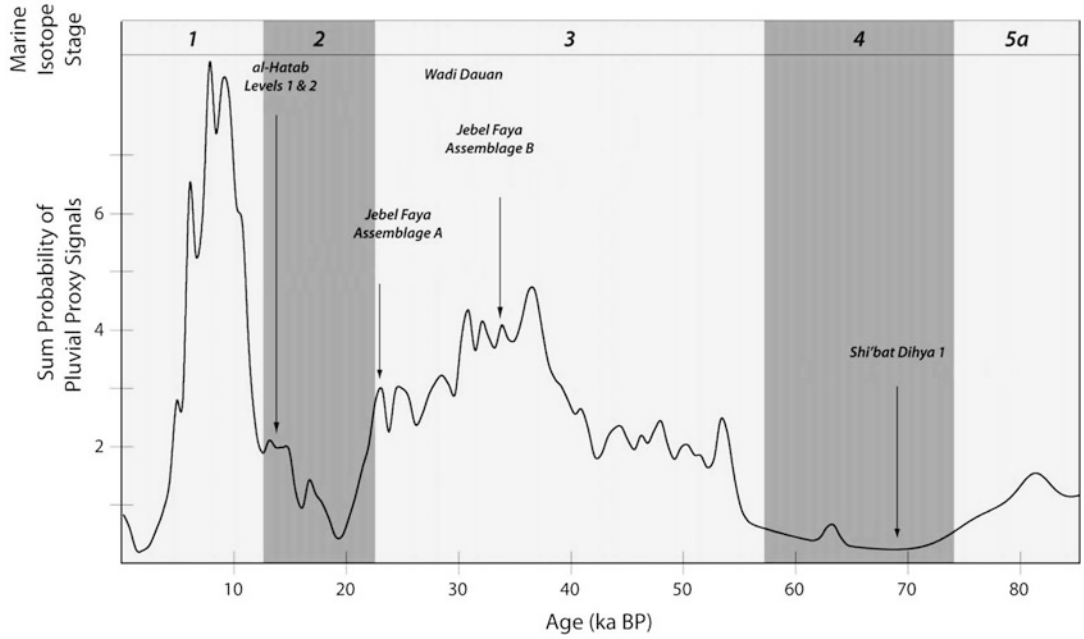

Middle East Middle to Upper Paleolithic Transitional Industries, Fig. 8 Arabian paleoenvironmental curve indicating summed probability curve of pluvial proxy signals from MIS 5a-MIS 1 and some of the dated Upper Pleistocene archaeological sites (After Rose & Usik 2009)

International Perspectives

Middle East and its key location is particularly important in the studies based on the leading model of "out of Africa" or diffusion theory, which discuss the expansion of modern humans and their innovative Upper Paleolithic culture out of Africa into Eurasia, and ultimately replacing the earlier hominids. However, followers of an alternative model believe gradual local evolution from Middle Paleolithic to Upper Paleolithic played a more important role in Middle East and present some archaeological evidence in accordance with their model. But the development of research in the past two decades led to a more complex image, which attempts to adapt both local developments and interactions. The variety of the geographical and cultural contexts in which the different traditions developed, and major and minor movement of hunter gatherer groups within the regions of Middle East and into or from neighboring areas like Europe, were certainly responsible for diversified evidence of MP-UP transition in this region. Unfortunately, the current state of data is not sufficient to reconstruct the processes leading to the appearance and development of the UP in each region of Middle East. This is particularly true for the Arabian Peninsula and the major part of Turkey. But within the Levant, the transition from Middle to Upper Paleolithic defines by the Initial Upper Paleolithic, which dates back to a time range between 49 k cal BP c. and 47.5 k cal BP (Belfer-Cohen & Goring-Morris 2013). The Initial Upper Paleolithic, which seems to have its roots in local Middle Paleolithic, developed into the Ahmarian tradition or the first true Upper Paleolithic tradition of the Levant that is similar to Proto- Aurignacian and partially early Baradostian of Zagros. In the Zagros, Middle Paleolithic typo-technological elements are present in the Early Zagros Aurignacian or early Baradostian of Warwasi, but on the basis of available data, possibility of continuity from Zagros Mousterian to the Zagros Aurignacian cannot be confirmed yet. However, there is no abrupt break between the Mousterian and Zagros Aurignacian of Warwasi rockshelter,

which has kept Zagros as one of the potential candidates for origin of Aurignacian (Olszewski & Dibble 2006). Also based on the Yafteh cave in Zagros, which has yielded solely Baradostian layers, there are certain technological and chronological analogies between the lower Baradostian at Yafteh and the Early Ahmarian, and then the upper Baradostian and the Levantine Aurignacian; the nature of their connections still remains open to discussion (Otte et al. 2011).

Future Directions

As mentioned previously, the degree of our information about Middle to Upper Paleolithic transitional industries or events is not the same in all regions of Middle East. In order to reach a common level of information that enables us to compare and reconstruct a more complete image of human evolution history during this period, the following points are vital to be considered:

- Need for accurate information from well-stratified sites and systematic surveys in all involving regions.
- Generating new data via modern excavation methods and technologies to reach the maximum control over the recovery of materials and accurate documentation of their context as much as possible in all regions.
- Publication of detailed typo-technological characteristics of related industries extracted from in situ materials using efficient approaches, such as reconstruction of chain operation and refitting studies.
- Reliable chronological age determinations for each industry: the systematic dating of transitional sequences in different regions.
- Adopting multidisciplinary research approaches, such as microwear analysis, geoarchaeology, micromorphology and site formation studies, raw material sourcing, additional information from zooarchaeological and palynological analysis, etc., to maximize the extraction of archaeological information and reconstruction of changes in different aspects of hunter gatherers life.
- Refinement of traditional models by establishing new progressive and flexible models to understand the process of changes and developments as they really occurred.

Cross-References

- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Theory and Progress
- ▶ Lithic Technology, Paleolithic
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Out-of-Africa Origins
- ▶ Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea
- ▶ West Asia: Paleolithic

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Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic

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State of Knowledge and Current Debates

Introduction

The Middle East, the Indian Subcontinent, and Central Asia are key regions in human evolution as they are the gateway between our African homeland and the rest of the world. Understanding the early prehistory of these regions is critical to understanding both hominin dispersal patterns and the divergent evolutionary trajectories of hominins in different parts of the Old World. Here, the Middle East is defined as that part of Asia from Anatolia, the Levant, and the Sinai in the west to the Iranian plateau in the east, and from the southern shores of the Black Sea, the Caspian Sea, and the Lesser Caucasus mountains in the north to Yemen in the south. The Indian Subcontinent is defined as stretching from the eastern edge of the Iranian plateau in the west to the Chittagong hills in the east, and from the High Himalayas in the north to Sri Lanka in the south. Central Asia is defined as extending from the Caspian Sea and the Ural River in the west to the Altai, Tien Shan, and

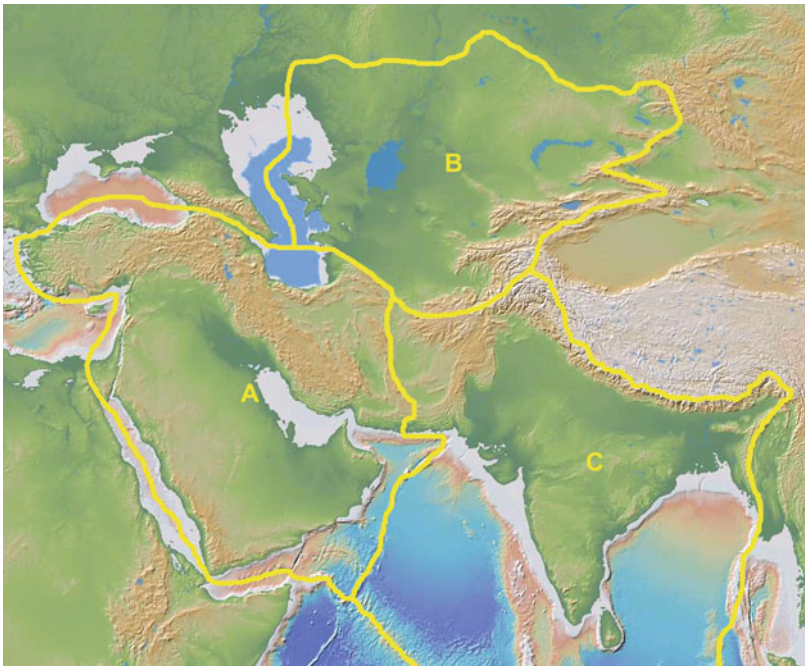

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic,
Fig. 1 Topographic map of the Middle East (**a**), Central Asia (**b**), and the Indian Subcontinent (**c**) (Adapted from GeoMapApp (URL http://www.geomapapp.org))

Pamir Mountains in the east, and from the Kirghiz Steppe in the north to the Iranian Plateau and the Hindu Kush in the south (Fig. 1). This entry is organized chronologically to reflect the fact that this region of intercontinental crossroads cannot be understood in isolation but must be viewed in terms of dispersals out of and into the neighboring regions.

The First Asians: 2–1.6 Million Years Ago

The earliest claim for hominin occupation outside Africa comes from the site of Riwat in the Siwalik Hills of the Pakistani Punjab (Fig. 2). Here, a number of stone flakes and a core were found that were argued to have been produced by human agency by the presence of clear bulbs of percussion and multidirectional negative scar patterns (Dennell et al. 1988). The absence of intermediary forms among the natural stone conglomerate in which they were found further implies the genuine cultural nature of these lithics. Paleomagnetism and fission-track dating indicate that the artifact-bearing horizon is at least 1.9 million years old (Dennell et al. 1988).

To reach the Indian Subcontinent from Africa overland, it is necessary to go through the Middle East (Fig. 2). An early archaeological site in the Jordan Valley, a rockshelter called Erq el-Ahmar, suggests hominins might first have left Africa via a northern route through the Sinai. Here, flaked pebbles were found in deposits preliminarily dated by paleomagnetism and potassium-argon ratios to 1.75–1.95 million years ago (Ron & Levi 2001), but further work is needed to corroborate both the age and authenticity of the artifacts.

The site of Shuwayhitiyah in northern Arabia has also been suggested to be at the vanguard of a northern out-of-Africa dispersal (Whalen et al. 1989). Although no ages have been obtained for this site, typological comparison of the artifacts links it to the developed Oldowan of east Africa, with high proportions of choppers, some polyhedrons and spheroids and some crude bifaces and small tools (Whalen et al. 1989). Similar undated Oldowan-like occurrences in southern Arabia have been used to argue for an early southern dispersal out of Africa across the Bab al Mandab straits (Whalen et al. 1989). Without dating however, these early archaeological sites in Arabia must remain tentative as simple stone tool types recur throughout human history.

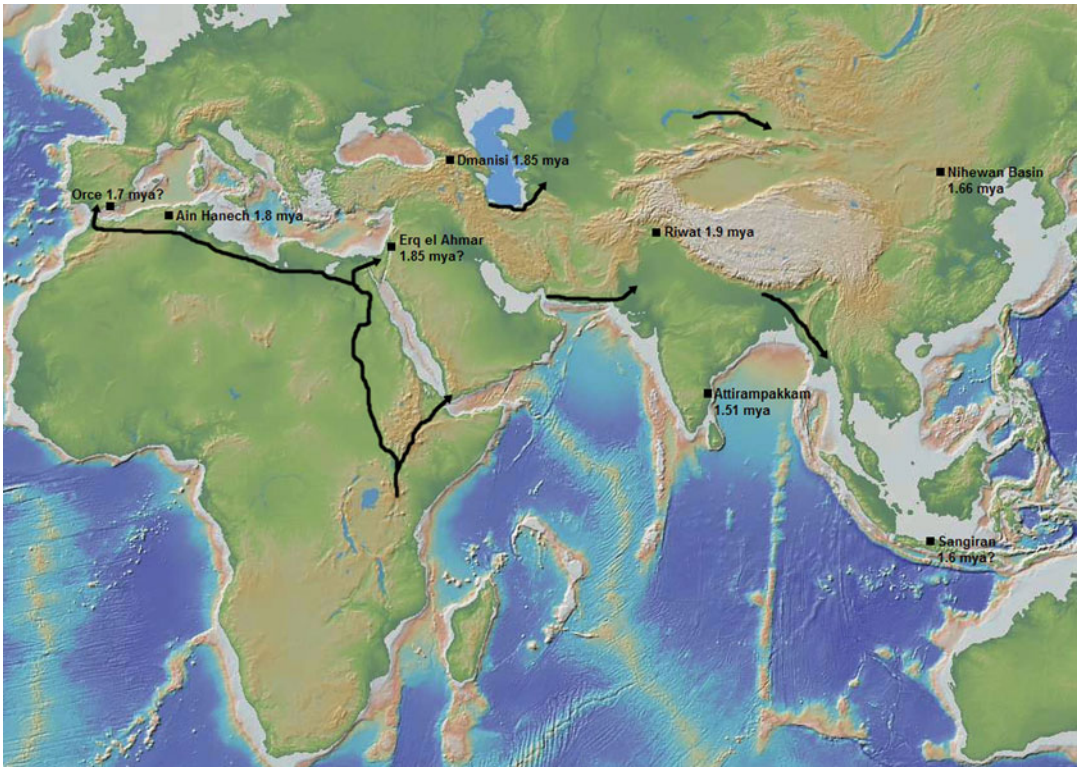

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 2 Hominin occupation sites outside of sub-Saharan Africa older than 1.5 million years and potential hominin dispersal routes

The fossil record for the Middle East, Central Asia, and the Indian Subcontinent is extremely sparse, so determining which species are responsible for manufacturing the various facies of the Lower Paleolithic in these regions is a matter of some conjecture. For this early period, there are however some candidates whose remains were found at the site of Dmanisi on the northern slopes of the Lesser Caucasus (Fig. 2). Here, hominin fossils were recovered from a lakeside setting along with stone artifacts including unifacial, bifacial, multiplatform, and radial cores and small flakes (Mgeladze et al. 2010) (Fig. 3). Fauna at Dmanisi includes deer, giraffes, ostriches, gazelle, and rhinoceros (Gabunia et al. 2000), with cutmarks on a handful of bones indicating hominin butchery using stone tools. Paleomagnetism and argon-argon ratios indicate that the site was repeatedly used by hominins during the period 1.85–1.78 million years ago (Ferring et al. 2011). The earliest hominin remains at the site are of a robust mandible, while overlying this were several crania, gracile mandibles, and teeth. The variation in mandibular robusticity has led to the suggestion that the Dmanisi hominins were either markedly sexually dimorphic or that they represent two different species (Schwartz & Tattersall 2003). Phylogenetically, they appear to be a primitive form of *Homo erectus*, with small brain sizes and several affinities to *Homo habilis* (Rightmire et al. 2006). A subspecies designation of *Homo erectus georgicus* seems the simplest way to taxonomically situate these hominins on current evidence. Interestingly, it has been suggested that the Dmanisi hominins might be ancestral both to classic East Asian *Homo erectus erectus* and to the early African *Homo erectus ergaster* (Rightmire et al. 2006). The hominin finds from the island of Flores in Indonesia are interesting in this regard as they display many primitive features such as the wrist, curved clavicle, flared

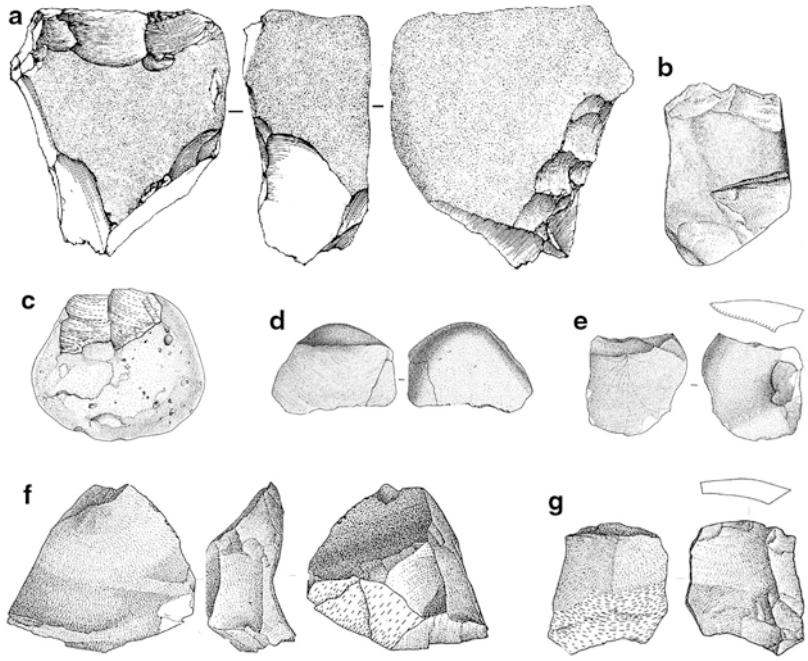

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 3 A selection of Oldowan artifacts from Dmanisi, (**a**) is a multiplatform core, (**b** and **c**) are unifacial cores, (**d**–**g**) are flakes. Drawings are not to scale (After Mgeladze et al. 2010)

iliac blades, and relatively short legs, which indicates they are descended from a species more primitive than *Homo erectus erectus* (Brown 2012). It thus appears that hominins left Africa before the appearance of *Homo erectus* and that this species first arose in Asia and then migrated back into Africa.

The evidence for the earliest human occupation of Asia is sparse and doubtless the story will change with new discoveries in the coming years. At the time of writing, the most likely explanation for the evidence appears to be that an ancestor of *Homo erectus* left Africa just before 2 million years ago and that the exit route was a northern overland route through the Sinai (Fig. 2). Environmental reconstructions suggest that the eastern Sahara would have been savannah grassland and not desert at this time, so it would not have presented a barrier to hominin range expansion (Dennell & Roebrooks 2005). Savannahs would also have extended continuously over much of Eurasia from the Middle East, through Central Asia and the western Indian Subcontinent, to northern China, in an area dubbed Savannahstan (Dennell & Roebroeks 2005). The abundance of medium to large mammals on the savannas would have presented hominins with a niche in which stone cutting tools could be used to butcher the carcasses of these mammals. The savannas may thus have acted as a dispersal corridor for early *Homo* (Dennell 2009). This hypothesis is consistent with the archaeological record for East Asia where the earliest site is a 1.66-million-year-old assemblage of simple stone tools from the Nihewan basin in northern China, an area which would have been savannah in the early Pleistocene (Zhu et al. 2004) (Fig. 2). On present evidence, the Dmanisi specimens are the most primitive forms of *Homo erectus* so it seems that Savannahstan may have been the source region both for East Asian *Homo erectus erectus* and African *Homo erectus ergaster*. The obligate terrestrial adaptations of *Homo erectus* may thus have evolved not on the African savannah but in the Savannahstan belt of Asia.

The Earlier Acheulean: 1.6–1 Million Years Ago

The Acheulean industry originates 1.76 million years ago in east Africa (Lepre et al. 2011) and is distinguished from the preceding Oldowan by the presence of large deliberately shaped bifacial

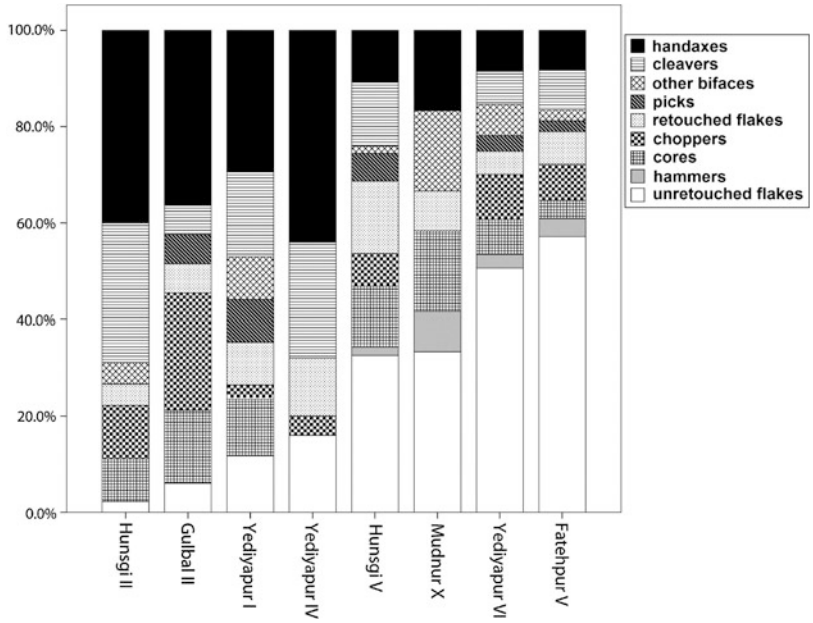

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic,
Fig. 4 Assemblage composition by artifact type in the Hunsgi-Baichbal basin from excavated sites (Yediyapur IV, Hunsgi V, Mudnur X, Yediyapur VI) and surface collections (Hunsgi II, Gulball II, Yediyapur I and Fatehpur V)

cutting tools, often made on large flakes. The earliest Acheulean tools in Asia occur at the site of Attirampakkam in Tamil Nadu in South India (Pappu et al. 2011). The artifacts were buried in clays on the floodplain of the Kortallyar River and were dated by paleomagnetism and cosmogenic dating to 1.51 million years old. The artifacts are made mostly on large quartzite flakes and include the "type-fossil" artifacts of the Acheulean: hand axes (teardrop-shaped bifaces with a long cutting edge) and cleavers (bifaces with a broad unretouched bit as their tip). Attirampakkam also provides evidence for a long stratified Acheulean sequence, with the artifacts in the clay overlain by artifacts in ferruginous gravels, which are in turn overlain by artifacts in clayey silts which are transitional to the Middle Paleolithic (Pappu et al. 2011). This long sequence thus reflects the long term and possibly continuous occupation of India during the Acheulean.

Regional surveys of the Indian Acheulean, such as in the Raisen district in central India, the Kaladgi and Hunsgi-Baichbal basins in south-central India, and the Kortallyar basin in the southeast, have revealed a high density of Acheulean sites. A consistent pattern which emerges from all these surveys, and has also been documented in other parts of the world, is the association between Acheulean localities and freshwater sources. There also seems to have been a preference for semiarid environments (Pappu 1985), with very few sites known from the wetter more heavily forested parts of the country. In the Kaladgi basin, Acheulean sites are concentrated in the lower, dry, eastern parts of the Basin, as opposed to the subhumid upper reaches in the west (Pappu & Deo 1994). The niche of the Acheulean biface makers thus appears to have been tethered to the savannah biome.

A pattern evident at Acheulean sites in the Levant and India as well as elsewhere in the Acheulean world is that away from manufacturing localities, bifaces occur in high proportions and there are far fewer unretouched flakes than would be expected for the number of negative scars on the these bifaces (Goren-Inbar & Sharon 2006; Shipton 2011) (Fig. 4). This typological bias indicates that bifaces were preferentially curated and that hominins would often carry bifaces with them rather than produce and discard tools at the point of need.

Elsewhere in South India, an early Acheulean assemblage has been excavated at the site of Isampur Quarry on the edge of the Deccan

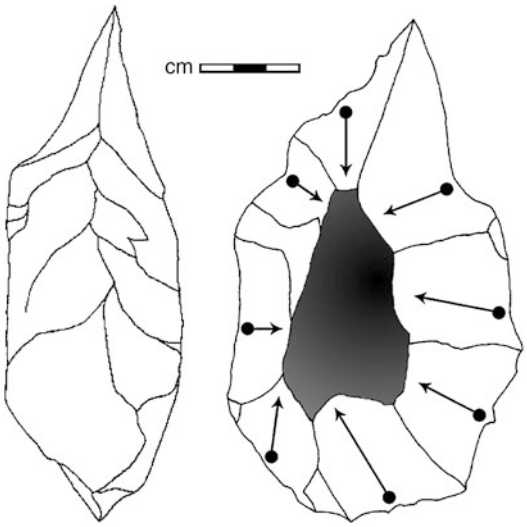

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 5 A hand axe made on a limestone slab from Isampur Quarry. The *shaded area* denotes cortex from the original bedding plane of the slab

Plateau in Karnataka. The Isampur Quarry artifacts are made from limestone slabs, and the site occurs on the edge of small paleochannel, the silts from which buried the artifacts (Petraglia et al. 1999). Electron spin resonance dating on a bovid tooth from this site produced an age of 1.27 million years old, although it could be as young as 730 thousand years (Petraglia 2011). Isampur Quarry is remarkable for a Lower Paleolithic site in two respects: the entire biface manufacturing sequence, from procurement of the raw material to the finished tool, occurs at a single site; and parts of the site are preserved with such spatial integrity that the artifacts are still in the positions that they were left by the ancient knappers (Petraglia et al. 1999). Analysis of the artifacts and experimental reproduction of implements have demonstrated that hominins produced hand axes by reducing slabs of medium thickness to leave the hand axe shape in plan (Fig. 5), while to make cleavers, they struck large flakes from thick slab cores (Shipton 2012). The consistency of this dual strategy for the production of hand axes and cleavers suggests the Acheulean industry was underpinned by robust mechanisms of social transmission, which may account for the unparalleled longevity of the industry. Giant cores weighing up to 65 kg were pried out of the bedrock (when they were even heavier) and propped up to allow for striking large flakes (Shipton 2012). Giant cores are present at numerous Acheulean sites where appropriate large clasts of stone are available (Sharon 2009). The ability to strike large flakes (over 10 cm in maximum dimension) from giant cores is one of the distinguishing features of the Acheulean over the Oldowan. Experimental evidence indicates that manipulating giant cores requires a lot of strength and is most easily achieved with two people working together (Shipton 2012). The appearance of the Acheulean may reflect new levels of individual strength among hominins as it broadly coincides with the emergence of the tall *Homo* body plan. Spatial analysis of Isampur Quarry reveals distinct artifact clusters where different stages of reduction were being carried out (Shipton 2012) (Fig. 6). This suggests that hominins may have been working together with some producing large flake blanks, while others were retouching these into finished cleavers. The emergence of the Acheulean may reflect new levels of cooperation as it is approximately coeval with reduced levels of sexual dimorphism in hominins, indicating reduced male-male competition and long-term pair bonding between males and females (McHenry 1994).

The oldest Acheulean site in the Levant is ‘Ubeidiya in the Jordan Valley. Faunal comparison, radiometric dates, and paleomagnetism put the ‘Ubeidiya formation at around 1.4 million years old (Dennell 2009). Artifacts from ‘Ubeidiya are mostly made on flint cobbles, although limestone and basalt are also used. The artifact types include bifaces, choppers, polyhedrons, and spheroids (Bar-Yosef & Goren-Inbar 1993). Layer K30 has the highest proportion of bifaces and also differs from the other paleoenvironments at the site in occurring in a stream channel context. The most common faunal remains from ‘Ubediya are deer and horse with occasional examples of stone tool cut marks on both of these species (Gaudzinski 2004). Evron Quarry formed as a coastal site in

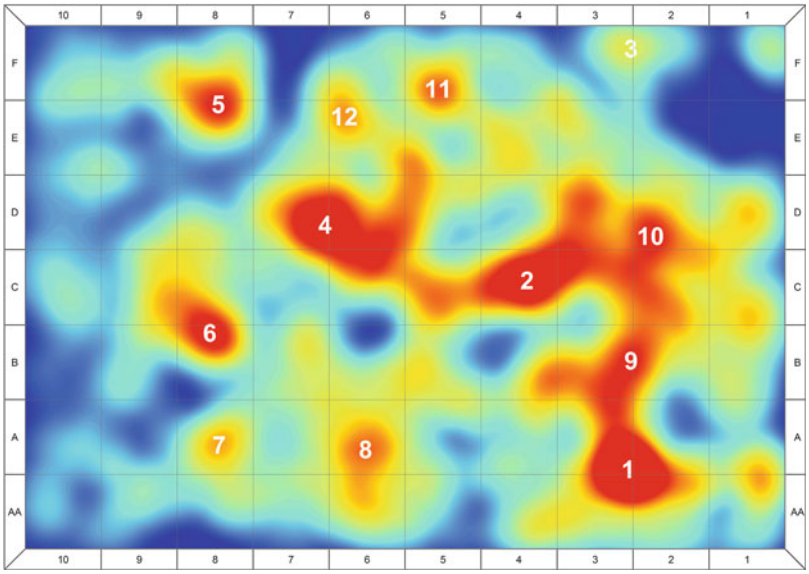

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic,
Fig. 6 Artifact density at Isampur Trench 1. *Red* = high density, *blue* = low density. Maximum number of artifacts = 186 per 1.33 m^2. Units are 1 m^2. Densities are based on artifacts mapped during excavations

the Levant dated by paleomagnetism and faunal correlation to c. 1.1 million years ago (Ron et al. 2003). Here, small artifacts were made on flint cobbles and pebbles from the nearby river.

The early Acheulean occurrences outside of Africa may represent a second dispersal event or the diffusion of an advantageous new technology. The fossils from the Middle East, Central Asia, or the Indian Subcontinent from this time period are too fragmentary to shed light on this question. The OH9 cranium from Olduvai Gorge in East Africa is dated to around 1.25 million years ago and is generally regarded as resembling East Asian *Homo erectus erectus* (Schwartz & Tattersal 2003). This suggests gene flow between Africa and Asia during the early Acheulean, so the distinction between dispersal and diffusion may be blurred during this period.

Homo erectus sensu lato first appears at about the same time as the Acheulean in East Africa, and fragmentary *H. erectus* remains were also found at 'Ubeidiya. This species is the first hominin to have a postcranial skeleton resembling our own with no arboreal adaptations, an elongate body and long legs (Bramble & Lieberman 2004). Several derived features of *Homo erectus*' postcranial morphology suggest adaptations for endurance running, including long legs relative to body length, expanded articular surfaces in lower body joints, and expanded trunk stabilization muscle attachments (Bramble & Lieberman 2004). Endurance running, possibly as a hunting tactic, was thus an important component of the niche of *Homo erectus*. The Acheulean biface may have functioned as part of this niche because its long and durable bifacial edge, and its ergonomic design make it an ideal portable tool (Shipton 2011). This portability explains why at some Acheulean sites, particularly those next to rivers, we see very high proportions of bifaces: these artifacts were preferentially transported to repeatedly used locales where hominins could replace the water lost as sweat while running long distances (Shipton 2011).

The Middle Acheulean 1–0.6 Million Years Ago

The site of Gesher Benot Ya'aqov in the Jordan Valley is one of the most remarkable Paleolithic sites in the world, with its unusual levels of organic preservation yielding evidence for a wide variety of hominin behaviors that are either unknown or poorly documented elsewhere. The Acheulean occupation at the site lies just above the Brunhes-Matuyama boundary of 0.78 million years ago, with faunal comparison, uranium series, and electron spin resonance

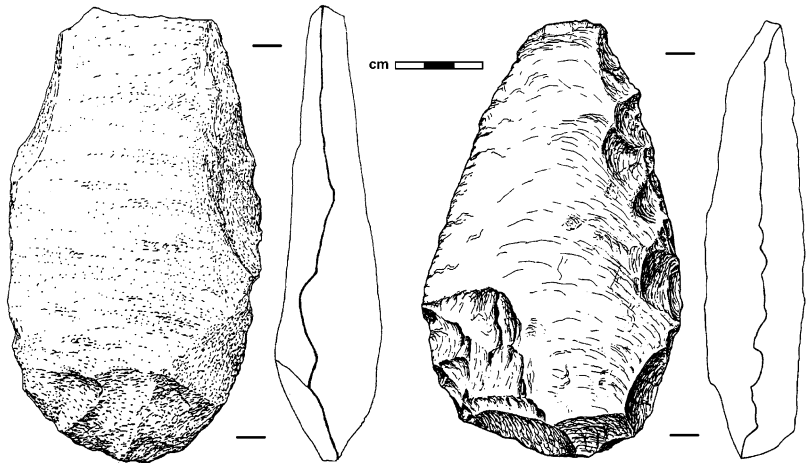

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 7 Ventral surfaces and profiles of two basalt bifaces from Gesher Benot Ya'aqov (After Saragusti & Goren-Inbar 2001)

dating confirming that the site is at least 650 thousand years old (Goren-Inbar et al. 2000; Rink & Schwarz 2005). Gesher Benot Ya'aqov has yielded remains of several edible species of mammals including pig, cattle, deer, horse, gazelle and elephant, as well as plants such as the water chestnut, grapes, the prickly water lily, acorns, pistachios, olives, plums, and jujubes (Goren-Inbar et al. 2000). The site provides some of the earliest robust evidence for the hominin use of fire, with various other activities such as shellfish consumption, nutcracking, and flint knapping structured around hearths (Alperson-Afil et al. 2009). Some of the earliest known wooden artifacts come from Gesher Benot Ya'aqov, including a long branch under an elephant skull that has been interpreted as a lever which was used to turn the skull over and access the brains from the base (Goren-Inbar et al. 1994).

Unlike 'Ubeidiya and Evron Quarry where bifaces were generally made on flint cobbles, at Gesher Benot Ya'aqov, they were mostly made on large flakes of basalt and were then finished with marginal retouch (Saragusti and Goren-Inbar 2001) (Fig. 7). A variety of systematic prepared core techniques were used to produce these large flakes such as the Kombewa method, where large flake blanks were struck from the ventral surfaces of even larger flakes. One hypothesis is that Gesher Benot Ya'aqov is part of a wider large flake facies of the Acheulean, which is represented by pene-contemporaneous sites in Africa, southwestern Europe, the Caucasus, and India with bifaces made by marginally trimming large flakes struck from systematically prepared cores (Sharon 2009). The Gesher Benot Ya'aqov assemblage has been argued to represent a second wave of dispersal of Acheulean hominins from Africa with hippopotamus remains from the site also indicative of an African connection (Saragusti & Goren-Inbar 2001). A cladistic analysis of the shape and flake scars on hand axes from 10 sites suggests there is an out-of-Africa clade that includes sites from the Levant, the Indian Subcontinent, and Europe (Lycett 2009). DNA from Late Pleistocene hominin species shows a coalescence age of 804 thousand years ago between *Homo sapiens* in Africa and Neanderthals and Denisovans in Eurasia, suggesting a dispersal event sometime after this date (Green et al. 2010).

The extent to which prepared large flakes represent a genuine cultural marker versus the extent to which they are dictated by available raw material is unresolved. At Latamne in the Orontes Valley, Syria, elongate bifaces were produced on large cobbles of flint, around 0.8 million years ago based on the microfauna species they are associated with (Mein & Besancon 1993). The site of Bizat Ruhama on the southern Levantine coastal plain is placed by paleomagnetism and thermoluminescence at

780–920 thousand years old. Here, river pebbles of flint were exploited for the manufacture of small tools, though no bifaces were produced at this site, perhaps because the raw material clasts were too small.

Two Acheulean sites from central India with bifaces made on marginally trimmed large flakes have been preliminarily placed in the Early Pleistocene on the basis of paleomagnetism: Chirki and Morgaon (Gaillard et al. 2010). At both these sites, the Kombewa technique is in evidence providing a link to the technology of Gesher Benot Ya'aqov. However at the site of Singi Talav on the edge of the Thar Desert in northwestern India, tentatively dated to the Early Pleistocene, hand axes were made on slabs of schistose quartzite (Gaillard et al. 2010). The predominance of cleavers at Morgaon and their scarcity at Singi Talav perhaps reflects a functional environmental difference. If, as has been suggested, cleavers were wood-working tools (Movius 1944), then they would be more desirable in more forested landscapes. In general, the Indian Acheulean is characterized by higher proportions of cleavers than is the case for regions further west.

Several Acheulean sites have been discovered in Arabia; however, very few have been excavated. The two most notable site complexes are the Wadi Fatimah near the Red Sea coast and Dawadmi in central Arabia. Dating of calcareous nodules at both sites produced dates of 200 thousand years (Whalen et al. 1984, 1988), which must be regarded as minimum ages as the nodules would have formed post-depostionally (Petraglia et al. 2009). The 32 localities identified along the Wadi Fatimah occur close to smaller tributary wadis and outcrops of rocks such as basalt andesite and rhyolite which were used to manufacture the artifacts (Petraglia et al. 2009). The Wadi Fatimah is one of the largest drainages into the Red Sea, and hominins may have used this as a corridor to penetrate into the interior of Arabia. The Dawadami localities occur in the center of the Arabian Peninsula in close proximity to two huge but now extinct wadi systems: the Wadi al Batin and the Wadi as Sahba (Petraglia et al. 2009). Both these wadis flow from western Arabia to the Gulf and would have provided a resource-rich corridor for hominins. The Dawadmi localities occur along an andesite dyke that was exploited for the production of large flake blanks, from which hand axes and cleavers were made. Dawadmi is particularly extraordinary, as Acheulean sites are spread over c. 10 km along the dyke, providing evidence for the intensive and widespread use of the landscape by hominins (Petraglia et al. 2009).

The Lower Paleolithic of Iran and Afghanistan is particularly poorly known, but some potentially Middle Pleistocene choppers, side-scrapers, and denticulates have been found in southwestern Iran (Biglari & Shidrang 2006), while the site of Ganj Par on the south-western shore of the Caspian Sea has yielded Acheulean hand axes and cleavers (Biglari & Shidrang 2006).

The oldest site yet known in Central Asia is Kuldara in Tajikistan, dated on the basis of loess deposition correlations with China, to between 995 and 880 thousand years ago (Ranov & Dodonov 2003). The artifacts at the site are simple cores and flakes without retouch made on various types of pebble. Simple technology at the fringes of the Acheulean occupation world is also seen in Europe and may represent the loss of the more complex Acheulean biface technology in small pioneer groups. The Middle Pleistocene sees Asia become colder and drier, with the Savannahstan belt turning into a marginal environment which has been termed Aridistan (Dennell 2009). The loess and paleosol sequence of the basin between the Pamir range in Tajikistan and the Hindu Kush in Afghanistan provides a clear picture of hominin occupation during the wet interglacials and abandonment during the dry glacials of the Middle Pleistocene (Ranov & Dodonov 2003). Central Asia was thus at the edge of the hominin occupied world during the Middle Pleistocene. The artifacts from this loess-paleosol sequence are all simple core and flake assemblages lacking bifaces. A consistent pattern is emerging in the Lower Paleolithic of central Asia whereby biface traditions are found in the low lying areas and simple core and flake assemblages occur in the more mountainous regions (Vishnyatsky 1999).

The Late Acheulean and Transition to the Middle Paleolithic 0.6–0.13 Million Years Ago

Quantitative comparisons of the Gesher Benot Ya'aqov bifaces with those from the younger Jordan Valley site of Ma'ayan Barukh and the older site of 'Ubeidiya demonstrate chronological trends of increasing symmetry and outline regularity (Saragusti et al. 1998, 2005). In the Hunsgi-Baichbal Valley in India, it has been shown that bifaces from the older sites of Isampur Quarry, Hunsgi V, and Hunsgi VI tend to be relatively thicker and more elongate than bifaces from the younger sites of Teggihalli II and Mudnur X (Shipton 2012). These trends may reflect increasing hominin knapping skill during the Acheulean as producing thin broad tools is the most challenging aspect of bifacial knapping. It is interesting in this regard that one of the limitations of the knappers at Isampur Quarry knappers was the tendency to over hit the bifaces causing end-shock breakages in 23 % of cases. At another workshop site, Ziarat Pir Shaban in Sindh, assigned to the Late Acheulean albeit on typological grounds, this problem appears to have been much less acute with only a single end-shock break reported (Biaggi et al. 1996). In the Hunsgi-Baichbal Valley, bifaces from the younger sites also tend to be smaller with higher flake scar densities and have been transported further from their raw material source (Shipton 2012). Such trends may reflect an increasing use-life length for bifaces during the Acheulean and by inference increasing planning depth on the part of Acheulean hominins.

The Late Acheulean is characterized by an increasing regionalization of artifact styles. This is particularly marked in the Levant, where the terminal Acheulean is known as the Jabrudian industry. The Jabrudian is represented at several cave sites in the Levant including Tabun, Jabrud, Zuttiyeh, Qesem, and Bezez, as well as open-air sites such as El-Khowm. The Jabrudian retains the hand axe element of the Acheulean but also incorporates new tool types such as racloirs, convergent scrapers, backed knives, and edge-nibbled blades (Dennell 2009). Not only are there new distinctive tool types but also the hand axes from the Jabrudian are distinctive, tending to be small, with cortical butts and heavily worked tips (Fig. 8). Regionally distinct industries such as the Jabrudian suggest the emergence of distinct group identities at this transition. At several Jabrudian sites, there are examples of hand axes being used as a Levallois cores with a large preferential scar on one surface struck from a facetted platform on the butt (DeBono & Goren-Inbar 2001). It appears that the transformation of the hand axe in this way is one route by which hominins arrived at Levallois technology. The dating of the Jabrudian is complex and has undergone several re-evaluations, but a reasonable consensus would have the Jabrudian beginning around 350 thousand years ago and ending around 200 thousand years ago (Dennell 2009). Zuttiyeh has produced a partial hominin cranium dated to 300 thousand years which is most likely *Homo heidelbergensis* (Schwartz & Tattersall 2003). This association between *Homo heidelbergensis* and the Late Acheulean is well documented in Europe and Africa. Although there are no dated sites which can be attributed to the Late Acheulean in Arabia, there is nonetheless a consistent pattern of assemblages with small thin hand axes associated with the use of the Levallois technique and the absence of other heavy duty tools such as polyhedrons, picks, and choppers (Petraglia et al. 2009).

In India, the Acheulean to Middle Paleolithic transition is documented at several sites including the 16R Dune in the Thar Desert, Bhimbetka and Patpara in central India, and Lakhmapur in the south. The transition appears to have been a gradual one in India with no apparent population replacement (James & Petraglia 2009). At all of these locations, the transitional assemblages are characterized by small bifaces, greater proportions of small flake tools in comparison to bifaces, and the use of the Levallois technique to produce those small tools (e.g., Haslam et al. 2011). The transitional assemblage from Patpara has been dated by optically stimulated luminescence to 131 thousand years ago (Haslam et al. 2011), while that from the 16R Dune is dated by thermoluminescence and uranium-thorium to

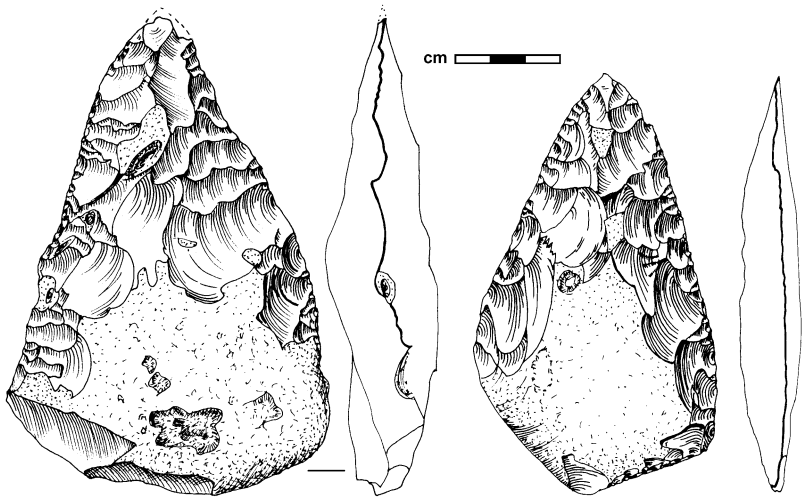

Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic, Fig. 8 Jabrudian hand axe from the Azraq Oasis in Jordan (After Copeland & Hours 1989)

160–130 thousand years ago (Misra 1989). A hominin calvarium from Hathnora in the Narmada valley is dated by electron spin resonance to 165–80 thousand years old (Patnaik et al. 2009). A cladistic analysis of this specimen has assigned to it a sister clade of *H. sapiens* and Neanderthals, descended from *H. heidelbergensis* (Cameron et al. 2004). The exact taxonomic designation for this species is as yet undetermined and will have to await new fossil discoveries for it to be properly situated. Given the temporal and spatial proximity of the Hathnora find to the site of Patpara, it seems the population it represents was responsible for manufacturing the transitional industry there (Haslam et al. 2011).

The abandonment of bifaces and the shift toward small flake tools are commonly thought to be related to the origins of hafting technology. In terms of hominin cognition, the Middle Paleolithic is perhaps the culmination of the trends of increasing knapping skill and planning seen in the Acheulean with generic bifaces abandoned in favor of more task-specific small tools, made using the difficult to master Levallois technique. The transition appears to have had slightly different character in the two regions of western Asia where it is well documented: the Levant and India, and also appears to have occurred slightly later in the latter. We should therefore regard the transitions as being autochthonous processes, but given the similar end points, the possibility of interaction between the regions should not be ruled out. Genetics shows that the west Eurasian Neanderthals and east Eurasian Denisovans have a coalescence age of 640 thousand years ago (Reich et al. 2011), suggesting they had divergent histories from sometime after this date. This may be attributed to the cooler, more arid climate of the Middle Pleistocene which would have made parts of the Middle East and Central Asia uninhabitable during glacial periods, thereby temporarily splitting Eurasian hominin populations.

In Kyrgyzstan, there is an enormous cave site called Sel'ungur where 7-m-deep excavations revealed five archaeological horizons separated by sterile deposits (Islamov 1990). A uranium-thorium date on a travertine capping the uppermost cultural layer produced a date of 126 thousand years (Vishnyatsky 1999). Although the assemblages are described as Acheulean, there are very few bifaces present. Sel'ugnur thus confirms the patterns of the Central Asian Lower Paleolithic that hominin occupation was intermittent and biface technology was scarce in the mountains. Interestingly, the site has also yielded 10 hominin teeth and a fragment of an infant's humerus which are classified as Neanderthal, a hominin ancestral to Neanderthals (Islamov 1990). Central Asia thus has affinities with hominin populations to the west in the

Middle Pleistocene and may have been the route via which the *Homo heidelbergensis* population represented by the Dali cranium in China (Rightmire 2001) reached the Far East.

Acheulean sites of varying ages have been discovered on a river terrace sequence in the Gaziantep region of southern Anatolia (Minzoni-Deroche & Sanlaville 1988). In central Anatolia, surveys have revealed Acheulean sites around the obsidian source of Golludag. Excavations at one such site, Kalatepe Deresi 3, have yielded Acheulean biface technology based on the production of large flakes (Kuhn et al. 2009). The excavators draw comparisons with the Tabelbella-Tachengit method of large flake production known from North Africa. The bedrock at the base of the sequence is no older than 1.3 million years, while an overlying Middle Paleolithic layer has been dated to 160 thousand years ago. In southwestern Anatolia, the cave of Karain E has provided a 12-m Pleistocene sequence going back at least 400 thousand years (Otte et al. 1998). Five phases of Lower Paleolithic occupation have been identified in the lower part of the sequence, each separated by periods of abandonment. The artifacts are dominated by short thick flakes with side scrapers dominating the retouched pieces (Otte et al. 1998). Bifaces are notably absent, a pattern which extends up into southeastern Europe. Western Anatolia may represent another frontier for the Acheulean where Lower Paleolithic occupation is intermittent and small pioneer populations either lost Acheulean technology or chose to abandon it in the mountainous terrain. A similar pattern occurs in the Caucasus Mountains where Acheulean bifaces are relatively abundant in the Lesser Caucasus in the south but become scarce in the Great Caucasus in the north (Lyubin & Belyaeva 2006). A series of caves excavated in the Caucasus, Azych, Kudaro I and II, Cona, and Treugol'naya, show intermittent and ephemeral human occupation at high altitudes with cave bear dominating the fauna (Doronichev & Golovanova 2003). The caves were occupied between 620 and 195 thousand years ago, and hand axes are rare at these sites, except in the case of Cona where nearly half the artifacts are hand axes, but they appear to have been made on nonlocal material and carried some distance to the site.

Conclusion

The Lower Paleolithic is a long and enigmatic period in human history, and we have precious little evidence from these vast regions of western Asia. Nonetheless, several distinct patterns are discernible. The first thing to note is that the most primitive forms of *Homo erectus* are in fact Asian, suggesting that this species with its long legs and obligate terrestrialism may in fact have evolved on the Savannahstan belt of Asia rather than the smaller east African savannah. The niche of *H. erectus* relied heavily on endurance running and technologically assisted butchery, as revealed by cutmarked bone at early *H. erectus* sites like Dmanisi. It is tempting to link these two features and infer *H. erectus* pursued large animals. This niche appears to have culminated in an adaptive package of the long-limbed body of classic *H. erectus* and the long portable cutting edge provided by Acheulean bifaces. Bifaces were clearly highly curated items judging by their overrepresentation at many Acheulean sites, suggesting they may have been carried on the long runs of *H. erectus*. Sites which were repeatedly used during the Acheulean resulting in the accumulation of bifaces are usually found close to sources of freshwater. This may reflect the need of *H. erectus* to replace the water lost through sweating after long runs. Evidence from Gesher Benot Ya'aqov indicates that c. 700 thousand years ago hominins were exploiting a variety of hunted and gathered plant and animal resources and consuming these at a repeatedly used location. Such behaviors may have far greater antiquity, and it is only due to the remarkable preservation conditions at Gesher Benot Ya'aqov that we have good evidence for them at that time.

The question of multiple dispersals within the Acheulean is as yet unresolved and will have to wait for the discovery of more fossil evidence and more cladistic analyses of Acheulean artifacts. There is considerable heterogeneity in the

Lower Paleolithic record of the three regions described here. In the Indian Subcontinent and the Levant, there are numerous sites, and the dates span vast time periods suggesting continuous occupation. These regions were to some extent sheltered from the cooler and drier climate in the Middle Pleistocene which made other parts of western Asia less habitable. The relatively lower density of Acheulean sites in Arabia probably reflects the fact that this region was abandoned by hominins during drier climatic phases. A clear pattern which has emerged is that at the edge of the Acheulean world in the mountainous regions of western Anatolia, the Great Caucasus and eastern Central Asia occupation is intermittent, with probable abandonment during cold periods, and bifaces are either absent or rare. This behavioral pattern may reflect either the loss of complex technology due to the paucity of experts in small pioneer populations or an adaptation to mountainous environments where perhaps bifaces were less useful. The former explanation seems more likely given the presence of Acheulean bifaces in other mountainous regions such as central and eastern Anatolia, the Lesser Caucasus, and Nepal. The absence of Acheulean bifaces in the areas beyond these border regions, Eastern Europe, Siberia, and the Far East, indicates that once this technology was lost, it was not readopted when hominins moved into new low-lying areas. Comparisons of bifaces reveal important chronological trends in the long record of the Asian Acheulean, with bifaces becoming thinner over time, as well as on average smaller and with higher flake scar densities. During the Acheulean period, hominin brain size increases from c. 800 cc in *Homo erectus* to 1300 cc in *Homo heidelbergensis*, while body size remains largely the same. The chronological trends observed in Acheulean bifaces might be attributed to the evolving hominin brain with skill and planning capacity increasing during the Acheulean. The trend of increasing planning resulted in more smaller task-specific tools; these were produced using the multistage and highly skilled Levallois technique and were then often hafted, involving further stages of creating a binding agent and attaching the stone to a wooden shaft. The proliferation of such tools eventually led to the abandonment of Acheulean bifaces and the end of the Lower Paleolithic.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Archaic *Homo sapiens*
- ▶ Dmanisi Hominins and Archaeology
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo heidelbergensis*
- ▶ Lithic Technology, Paleolithic
- ▶ Movius Line
- ▶ Oldowan Industrial Complex
- ▶ Out-of-Africa Origins
- ▶ South Asia: Paleolithic
- ▶ West and Central Asia: Early *Homo* Fossil Records
- ▶ West Asia: Paleolithic

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Middle East: Epipaleolithic

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Introduction

The Epipaleolithic period represents a time when everyone in the world was a hunter-gatherer. But, in the Middle East, these groups were the last of the hunter-gatherers because behavioral choices they made and subsistence strategies they undertook over the course of several millennia led to one of the key economic transitions in prehistory – the origins of agriculture and the domestication of herd animals such as sheep and goats.

Definition

As a term, the Epipaleolithic is used primarily in the Middle East to describe hunter-gatherer groups who lived in the interval from about 25,000 to 11,600 calendar years ago (Fig. 1). This temporal period represents the end of the Pleistocene epoch, which was characterized by a series of global cooling and drying events that resulted in glaciations and glacial retreats in northern latitudes. In the Levant (the region incorporating parts of modern Syria, Lebanon, Jordan, and Israel), behavioral decisions regarding subsistence strategies ultimately led to the origins of food production economies, while in the Zagros

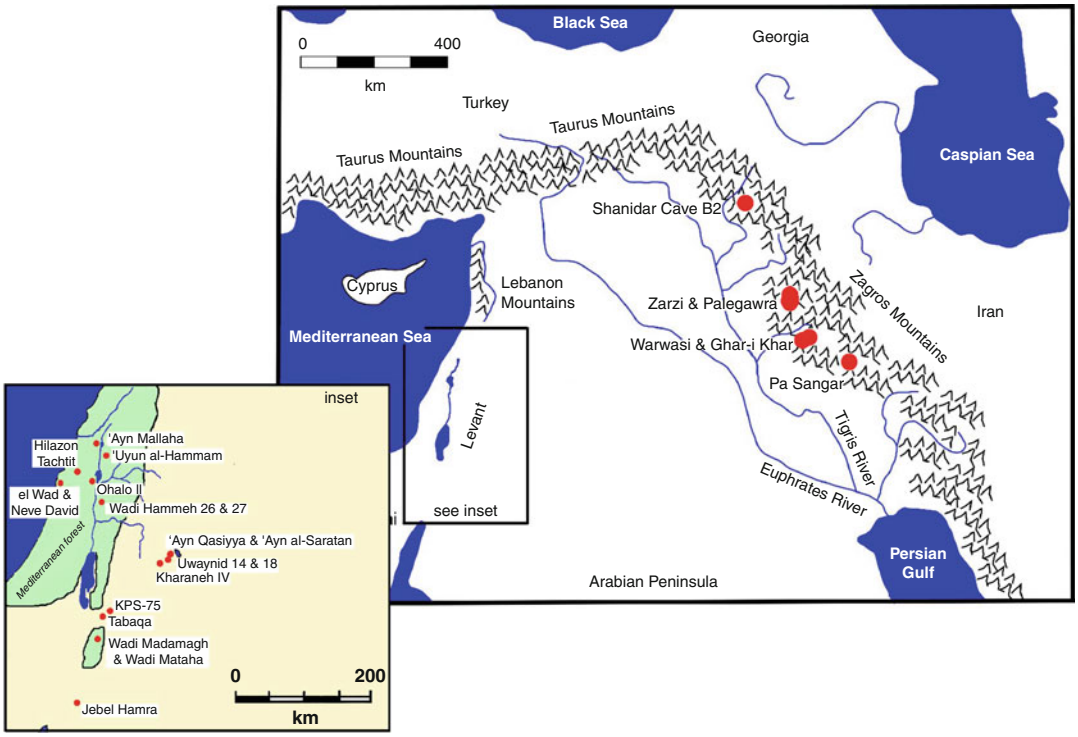

Middle East: Epipaleolithic, Fig. 1 Map showing Middle Eastern areas and Epipaleolithic sites mentioned

(the mountainous region incorporating parts of modern Iraq and Iran), economic strategies of hunter-gatherers may have led to the domestication of goats. The 14,000 year or so duration of the Epipaleolithic in the Middle East is characterized by a variety of named "cultures" (discussed below), some of which were archaeologically contemporary, while others represent changes in material culture and behaviors over time.

One of the hallmark features of the Epipaleolithic is the manufacture and use of very small stone tools called microliths; these usually are less than 3 cm long and 1 cm wide and can be as small as just 2–3 mm (Fig. 2). Epipaleolithic microliths have backing retouch, which usually means small removals along one lateral edge that are steep or abrupt (90° when compared to the exterior and interior sides of the tool). Backing is a method to blunt an edge so that the tool can be inserted into a wooden or bone handle. Backing retouch thus distinguishes Epipaleolithic microliths from those of the early Upper Paleolithic period which have very light (fine) retouch. Microliths are essentially the prehistoric equivalent of interchangeable parts. That is, by creating composite tools which consist of a handle with many microliths inserted, for example, as barbs along an arrow shaft or as elements of a knife blade, damage to any one piece can be easily repaired by removing the broken microlith and inserting a new one, rather than replacing the entire tool. In addition to a variety of other chipped stone tools, Epipaleolithic groups also used ground stone to lesser or greater degrees. These grinding implements may have been for creating pigments in some cases but in others were undoubtedly for processing food resources such as wild cereals.

As hunter-gatherers, the majority of Middle Eastern Epipaleolithic groups were quite mobile, moving frequently from one base camp to another. There are, however, several important exceptions, particularly during the Late Epipaleolithic period (see below), when some parts of the Middle Eastern region were characterized by the development of small settlements

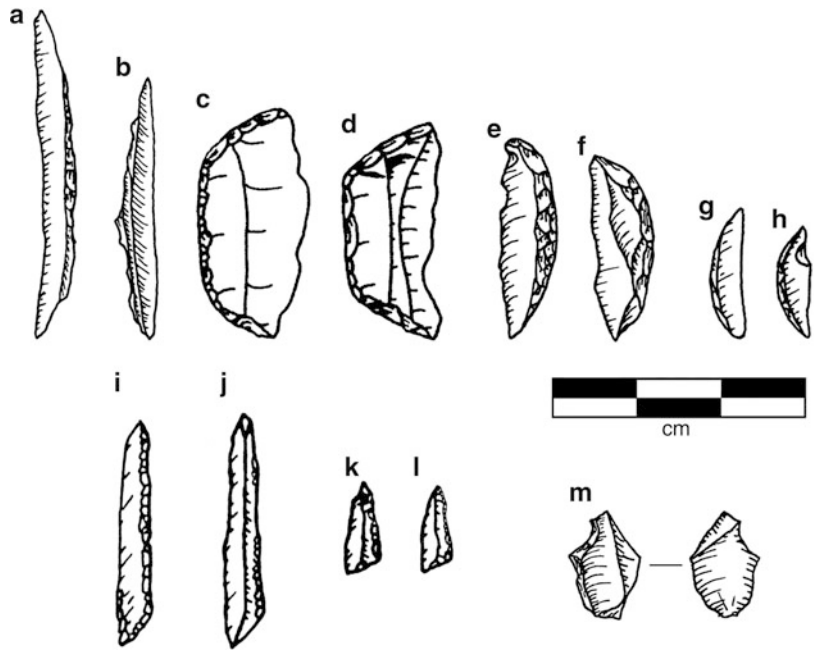

Middle East: Epipaleolithic, Fig. 2 Examples of Epipaleolithic microliths and microburin. (**a**–**b**) Early Epipaleolithic nongeometric microliths; (**c**–**d**) Middle Epipaleolithic geometric microliths; (**e**–**f**) Late Epipaleolithic (Early Natufian) lunate microliths; (**g**–**h**) Late Epipaleolithic (Late/Final Natufian) lunate microliths; (**i**–**j**) Zarzian elongated scalene triangles; (**k**–**l**) Zarzian scalene triangles; m: both sides of a microburin (**a**–**h**, **m**) Drawn by Bradley M. Evans; (**i**–**l**) Drawn by Deborah I. Olszewski)

where hunter-gatherers lived year-round or nearly so. These contexts and the types of cultural materials present in them have long intrigued archaeologists, especially with respect to how or if subsistence strategies undertaken by these Late Epipaleolithic peoples may have contributed to the development of food production economies (the origins of agriculture).

It should be noted that the Epipaleolithic label also is occasionally used in other parts of the Old World, particularly for parts of Western Europe and North Africa. In the case of Western Europe, Epipaleolithic is a marker for hunter-gatherer groups who were immediately after the Upper Paleolithic period as opposed to those of later periods. For example, the Azilian is Epipaleolithic, while later hunter-gatherer groups such as the Sauveterrian and Tardenoisian are called Mesolithic. This distinction is in part a reflection of the large-scale habitat changes that occurred at the end of the Pleistocene "Ice Ages," when open grassland landscapes were gradually reforested as climate became warmer and wetter. Thus, the Western European Epipaleolithic is associated with the very end of the Pleistocene and more open terrain, while Mesolithic groups lived in a heavily forested European landscape. For North Africa, the use of the term Epipaleolithic reflects in part research traditions. Thus, the Iberomaurusian Epipaleolithic groups (found in modern Morocco, Tunisia, and Libya) were named by French researchers who applied terminology familiar to them from European and Middle Eastern contexts. Other researchers prefer to use the term Later Stone Age for the Iberomaurusian and other similar groups, as this terminology, which represents the British research tradition, is used throughout most of the African continent.

The Levantine Middle East

During the late Pleistocene, one of the important ecological distinctions was the primarily Mediterranean forest and open parkland habitats of the western Levant in contrast to the steppe and desert habitats of much of the eastern and southwestern Levant (see Fig. 1). Additionally, the eastern Levant was characterized by a series of Pleistocene lakes and marshes which provided favorable locales in an otherwise relatively cool and dry environment. The late Pleistocene also witnessed the Last Glacial Maximum (c. 22,000–19,000 calendar years ago), a particularly cold and dry period during which Early Epipaleolithic groups

Middle East: Epipaleolithic, Table 1 Middle Eastern Epipaleolithic archaeological cultures

Calendar years BP	Phase	Levant*		Zagros
		Final Natufian	Harifian	
15,000–11,600	Late Epipaleolithic	Late Natufian		Zarzian
		Early Natufian	Late Ramonian	
19,000–15,000			Late Ramonian	
	Middle Epipaleolithic		Mushabian	Zarzian
		Geometric Kebaran	Hamran	
		Nizzanian		
25,000–19,000	Early Epipaleolithic	Kebaran	Qalkhan	Zarzian
		Nebekian		

*Sequential replacement not necessarily implied for columns in the Levant.

are found, followed by warmer and wetter conditions during the Middle Epipaleolithic, which culminated in a climatic optimum during the early part of the Late Epipaleolithic. This was followed by a brief return to much cooler and drier conditions during the Younger Dryas (c. 12,600–11,600 calendar years ago), just prior to the beginning of the Holocene epoch, which is much wetter and warmer and which saw the advent of Neolithic societies.

Early Epipaleolithic: Nebekian and Kebaran

The Early Epipaleolithic occurs between about 25,000 and 19,000 calendar years ago. Two major complexes of hunter-gatherer groups have been identified; these are the Nebekian and the Kebaran (Table 1). For the most part, Kebaran hunter-gatherers were situated in the Mediterranean forest habitat of the western Levant, while Nebekian groups were found in the steppe/desert of the eastern Levant, although there are important exceptions to this pattern, particularly in the Azraq Basin region of Jordan. The stone artifact assemblages of the Nebekian and Kebaran are distinguished primarily on the basis of different forms of microliths and the fact that Nebekian groups use the microburin technique (making a notch in a bladelet [small blade] and snapping it at that place) to break bladelets into segments which can then be selected for backing into microlith tools. Most microliths of the Early Epipaleolithic are very narrow (c. 2–3 mm wide) nongeometric forms (see Fig. 2).

Examples of Kebaran sites include Ohalo II, Wadi Hammeh 26, and Kharaneh IV (Phase B); examples of Nebekian sites are Uwaynid 14 and 18, KPS-75 (Fig. 3), and Wadi Madamagh, while ʻAyn Qasiyya has both Kebaran and Nebekian occupations (Nadel 2004; Olszewski 2008: 56–60; Richter 2011). Most Nebekian and Kebaran sites are small, representing high mobility, but there are exceptions. Of these, Ohalo II, situated on the shore of Lake Galilee, has extraordinary preservation of organic materials (plant remains) because of submersion by lake waters. Hunter-gatherers here constructed brush shelters, ate a wide variety of plant foods (including wild barley, acorns, and wild grass seeds), as well as fish and gazelle, and probably lived at Ohalo II year-round (Nadel 2004). In the Azraq Basin, quite large sites such as Kharaneh IV appear to represent aggregation locales where several hunter-gatherer groups came together at periodic intervals for various social purposes, for example, perhaps to exchange mates or exotic materials such as sea shells from the Mediterranean and Red Seas (Richter et al. 2011).

Middle Epipaleolithic: Geometric Kebaran

In the interval from about 19,000 to 15,000 calendar years ago, Levantine hunter-gatherer groups are classified as Geometric Kebaran (see Table 1). During this period, worldwide climate began to improve, with wetter and warmer conditions compared to the Early Epipaleolithic. Like their predecessors, most Geometric Kebaran groups were highly mobile and continued to make microliths, which included trapezes and triangles; some groups

Middle East: Epipaleolithic, Fig. 3 The Early Epipaleolithic (Nebekian) rockshelter of KPS-75 on the Kerak Plateau, Jordan (Photo by Deborah I. Olszewski)

Middle East: Epipaleolithic, Fig. 4 The Early and Middle Epipaleolithic site of Kharaneh IV (within the fenced area), Azraq Basin, Jordan (Photo by Deborah I. Olszewski)

used microburin technique, while others did not. The microliths of this period are considerably wider, ranging from 5 to 9 mm (see Fig. 2).

Examples of sites include Neve David, Jebel Hamra (Layers A and B), Kharaneh IV (Phase D), ‘Uyun al-Hammam, and Wadi Mataha (Henry 1995: 260–83; Goring-Morris & Belfer-Cohen 1998: 77–9; Olszewski 2008: 56–60; Maher et al. 2011). Sites such as Kharaneh IV (Fig. 4) continue to be aggregation locales, suggesting long-lived traditions of cultural knowledge about place. Several important social behaviors that presage developments in the Late Epipaleolithic are apparent at some sites. ‘Uyun al-Hammam, for example, is the earliest cemetery known in the Middle East and contains eight burials with a total of 11 individuals. A variety of grave goods (such as bone and chipped and ground stone tools) are present, but what is especially interesting is the practice of removal of human skulls (which became very common in the later Neolithic period) and the burial of a red fox skull with one of the humans. This suggests strong ties

between humans and animals and may be a ritual bond that helped lead to the later domestication of several animals such as dogs, sheep, goats, and cattle.

Late Epipaleolithic: Natufian

The Natufian is the widely recognized complex of Levantine hunter-gatherers from about 15,000 to 11,600 calendar years ago. It is divided into several phases – early, late, and final – which represent in part quite different climatic conditions and behavioral adaptations. The late Pleistocene climatic optimum, a period of expansion of the Mediterranean forest ecology, characterizes the Early Natufian, while the Late and Final Natufian witness a return to much colder and drier contexts during the Younger Dryas, during which steppe and desert ecologies expanded at the expense of the Mediterranean forest. Natufians used microburin technique to make microliths, with the most common geometric form being a lunate (half-moon shaped backed piece) (see Fig. 2). Some Natufian groups were highly mobile, while others (especially during the Early Natufian) led a more settled life in small villages.

Among the many Natufian sites are ‘Ayn Mallaha, Wadi Hammeh 27, ‘Ayn al-Saratan, el-Wad, Tabaqa, and Hilazon Tachtit (Edwards 1991; Bar-Yosef 1998; Olszewski 2008: 60–62; Munro & Grosman 2010). The small villages, such as ‘Ayn Mallaha and Wadi Hammeh 27, are mainly located in the Mediterranean forest region and consist of half-a-dozen or so circular stone foundation walls for dwellings. They also contain abundant evidence associated with a more settled lifestyle, such as numerous ground stone tools, art (figurines and engraved bone tools), and dense trash deposits. A number of sites have cemeteries or burials under house floors, including a young canid (possibly a dog) buried with an elderly woman at ‘Ayn Mallaha. Although many Natufian groups became much more mobile during the Late Natufian, there is evidence for elaborate rituals and people with special roles in society. At Hilazon Tachtit, for example, an elderly woman was buried with 50 tortoise shells, a golden eagle’s wing, a gazelle horn, a wild cattle tail, a leopard’s hip, and a human foot (among other things), and there is evidence for feasting rituals, perhaps in association with her burial (Grosman et al. 2008; Munro & Grosman 2010).

The Zagros Middle East

Compared to the Levantine Middle East, the Epipaleolithic of the Zagros region is much less well known, primarily due to historical events that have often constrained archaeological research, although recently Iranian archaeologists have been investigating sites of this period. Hunter-gatherer groups here, like their counterparts in the Levant, experienced the climatic fluctuations of the late Pleistocene, although their behavioral adaptations are less well documented and, consequently, less well understood.

Zarzian Epipaleolithic

The main Epipaleolithic group in the Zagros is the Zarzian, which was first described in the late 1920s. Radiocarbon dates are not available for the majority of the sites, although based on a few dates from two sites, the Zarzian likely predates about 12,000 calendar years ago (Turnbull & Reed 1974: 84). The chipped stone industry shows changes in microliths that over time parallel those of the Levant. That is, the earliest part of the Early Zarzian has many small, inversely retouched bladelets. This is followed by the appearance of scalene triangles and microburin technique and finally by lunates in combination with scalene triangles in the Late Zarzian (see Fig. 2) (Olszewski 1993). Many of the known sites are rockshelters or caves and are small, probably short-term occupations that suggest highly mobile groups of people.

Examples of Zarzian sites include Warwasi, Palegawra, Shanidar Cave (Layer B2), Pa Sangar, Ghar-I Khar, and Zarzi (see Fig. 1). Unfortunately, there have been very few detailed studies of the cultural materials at Zarzian sites. Exceptions include Warwasi and Palegawra. At Warwasi, the sequence of changes in microliths is well documented, but poor preservation of animal bone means that it is possible only to say that hunter-gatherers exploited onager, wild goat/sheep, and wild pig (Olszewski 1993). On the

other hand, at Palegawra, while the chipped stone assemblage has not been studied in detail, the animal bone assemblage was described. It contains at least 27 onagers, 12 red deer, 10 wild sheep, 8 wild goats, 7 Persian gazelle, 3 wild boars, and 2 aurochs (extinct wild cattle) (Turnbull & Reed 1974).

Key Issues/Current Debates/Future Directions/Examples

The Epipaleolithic in the Middle East has long been of interest in the context of factors and decisions leading to the eventual shift to food production economies, including animal domestication. Much of the debate on this has traditionally focused on the Natufian (Late Epipaleolithic), not only because of the temporal proximity of these hunter-gatherers to the period in which agriculture became increasingly important but also because of the unusual archaeological signature of the Early Natufian with its small villages, abundant ground stone tools, numerous burials and associated grave goods, and sporadic plant food remains that included wild cereals (Bar-Yosef 1998; Olszewski 2010). These behaviors, in part, seem to foreshadow those of the later Neolithic. However, recent archaeological research has shown that heavy investment in wild cereals occurred much earlier, at sites such as Ohalo II (Nadel 2004), which themselves appear to be year-round occupations, although with less substantially built dwellings than during the Natufian. Exactly why, after millennia of wild cereal use, people altered their strategies to the extent that cereals became domesticated after the Younger Dryas thus remains an open question that many archaeologists still research.

Similarly, the Early Natufian small villages, and aspects of social life common to them, were long thought to be the earliest such expressions in the Middle East of complex relationships between people (often seen in burial treatment) and between people and animals (Grosman et al. 2008). More recently, however, intriguing evidence for earlier examples of complex social relationships and perhaps ideology, such as the human-fox burial at ‘Uyun al-Hammam, and evidence of long distance exchange networks for sea shells from the Mediterranean and Red Seas document that these behaviors were a part of Epipaleolithic lifeways long before the Natufian complex (Maher et al. 2011; Richter et al. 2011).

Finally, the Middle Eastern Epipaleolithic is characterized by a large number of archaeological cultures, including but not limited to those discussed above (see Table 1). Some of the distinctions between these archaeologically named groups are due to changes over time in hunter-gatherer mobility and behavior and the resulting alterations in cultural materials that form the archaeological signature of each. Others may represent differences between adaptations to differing habitats (e.g., Mediterranean forest versus steppe/desert). Yet other distinctions between cultural assemblages may suggest social boundaries between contemporary, yet geographically separated, hunter-gatherer groups. Continuing research on this fascinating period will undoubtedly yield additional materials allowing much finer nuancing and understanding of the last of the hunter-gatherers in the Middle East.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ West Asia: Paleolithic

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Middle-Range Theory in Archaeology

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Introduction

Middle-range theory is an interpretive methodology influential in New Archaeology. The concept originates in the 1950s in the sociological theory of Robert K. Merton, where it is conceived as a scale of abstraction in the process of linking low-level empirical data to high-order theories about culture (Merton 1968). In archaeology, however, middle-range theory has developed a different, materialist objective, focusing on processes of site formation and the relationship between the material record and the conditions of its production (Raab & Goodyear 1984: 255–8; Tschauner 1996: 4).

By the mid-twentieth century, the traditional culture-historical archaeological approach had successfully developed sequences of artifacts and cultures and placed these within established chronological frameworks (Greene & Moore 2010). In the 1960s, rather than simply continuing to situate archaeological material within space and time, New Archaeology, also known as processual archaeology, sought to examine its *function*, embracing a positivist materialist approach attempting to replace the implied assumptions and interpretive intuition characteristic of traditional approaches with scientifically testable interpretations of the past. Middle-range theory, as developed by Binford in the late 1970s, is the theoretical foundation upon which New Archaeology sought to achieve this scientific epistemology.

Definition

Introduced into archaeology by Lewis Binford in the late 1970s (Binford 1975, 1977, 1978, 1981, 1983; Binford & Sabloff 1982), middle-range theory recognizes the inferential nature of all archaeological interpretation and, by processes of rigorous observation of the relationship between the static archaeological record which exists in the present and the dynamic behavioral and physical conditions of the past which produced that record, attempts to establish generalizing analogies or covering laws by which hypotheses about the past may be independently tested. Middle-range theory seeks to bridge the gap between our interpretation of the past and the past itself, positing that the study of

patterned behavior in the present can be formally linked with defined material signatures. On this basis, the dynamics of human behavior in the past can be reliably inferred from material traces in the archaeological record of the present, which are established as diagnostic.

Central to this approach is an analogy based on ethnoarchaeological observation. Confronted with the problem of understanding prehistoric hunter-gatherers from material traces in the archaeological record of the present, Binford undertook extensive ethnoarchaeological research on the Nunamiut Eskimos of Canada, modern-day hunter-gathers which he believed would exhibit the same adaptive behaviors of groups at similar stages of evolution in the past (Binford 1978). Binford's theory was that objective observation of the relationship between dynamic behaviors and physical conditions on the one hand and the static physical traces they produce in the present on the other could be used to establish universal generalizing analogies with which to test hypotheses about the dynamics of the past as reflected by their physical traces. Binford was seeking a "Rosetta stone" (Binford 1983: 24), a framework of inferences built upon a sound understanding of the dynamic behavioral and natural processes which form the material record and enable archaeologists to establish correlations between the material traces of the past and the behaviors which produced them (Trigger 2006: 33).

Middle-range theory is an actualistic approach based on observation of conditions as they *actually* exist in the present (Fagan & DeCorse 2005: 364). If a correlation can be drawn between aspects of behavior and material culture in the present, then the observation of such material culture in the archaeological record enables archaeologists to infer that the same behaviors were likewise present in the past (Trigger 1995: 2).

Proponents of middle-range theory employ a suite of methodological approaches to identify these causal relationships between the material and the behavioral, all of which are linked by their reliance on processes of analogy, which assumes that if objects share some similarities, they will likely share other attributes as well, allowing archaeologists to take what is known from one context (the present) to explain data from another context (the past) (Johnson 1999: 48; Fagan & DeCorse 2005: 360). Chief among these analogical approaches is ethnoarchaeology, where what is observed of living cultures in the present day is used to infer behaviors in the past. Experimental archaeology is also used to reproduce in the present conditions and processes of the past, such as replicating the manufacture and use wear of ancient stone tools to observe the processes of their production and use (Johnson 1999: 52; Fagan & DeCorse 2005: 373–5). Taphonomy, the study of how natural and cultural behaviors create the archaeological record, encompasses many of the objectives of these approaches (Johnson 1999: 57–8; Trigger 2006: 415).

Key Issues/Current Debates/Future Directions/Examples

Middle-range theory implies a neoevolutionary perspective assuming all societies past and present go through the same fundamental evolutionary stages, such that modern-day hunter-gatherers may be taken as equivalent to similar groups in the past and thus constitute a legitimate source from which to draw analogical inferences (Trigger 1986: 10; Johnson 1999: 52). Critics observe that such assumptions are uniformitarian, not only assuming a high degree of uniformity between societies but also between physical conditions past and present (Johnson 1999: 55; Trigger 2006: 416).

Like Binford, Ian Hodder also conducted ethnoarchaeological research during the 1970s and 1980s. Heavily influenced by structuralism, Hodder championed a hermeneutic contextual approach which has been influential in the development of post-processual archaeology and is often set in opposition to Binford's middle-range theory (Hodder & Hutson 2003). Hodder argues that rather than being purely functional and adaptive, material culture is meaningfully constituted, possessed of culturally specific

symbolic meanings which lie beyond the reach of the kinds of cross-cultural laws advocated in middle-range theory (Hodder & Hutson 2003: 15). Thus, rather than seeking to establish independent universally applicable laws, Hodder emphasizes the internal relations within specific cultural contexts as the proper focus of archaeological interpretations of the past.

Recent reevaluation has found that post-processualist approaches do in fact assume certain generalizing principles and make use of analogy, leading to the conclusion that rather than exemplifying the contrast between processual and post-processual approaches, forms of middle-range theory are in fact common to both (Kosso 1991; Tschauner 1996).

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Behavioral Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Ethnoarchaeology
- ▶ New Archaeology, Development of
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Taphonomy: Definition

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Military Activity in Islamic Archaeology

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Introduction

The archaeology of warfare is construed here in its widest sense. This approach is necessitated in part by the relative paucity of published archaeological work on the actual sites of battles in the Islamic world and palaeopathological studies of those killed in war. It is also very rare for armor, weapons, banners, and other related military equipment to be recovered from excavated contexts, although such items are sometimes encountered in Muslim religious buildings, palaces, and European cathedral treasuries (and many fine examples are today housed in museum collections). As a result the majority of the entry will deal with architecture and civil engineering, dimensions of warfare that might best be described as defensive rather than offensive in character. The archaeological evidence

concentrates upon the regions of the Iberian Peninsula, North and East Africa, the Middle East, and Central Asia.

Definition

Problems are encountered in establishing the extent to which given monuments or artifacts were employed in warfare or other types of armed conflict. For instance, armor, banners, and weapons might perform ceremonial roles as gifts or symbols of official status and never see active use in battle. Shi'a communities commemorating of the martyrdom of Husayn, son of 'Ali ibn Abi Talib (d. 661) and grandson of the Prophet Muhammad (d. 632), at the battle of Karbala' in 681 often make use of steel banners (*'alam*) during parades and armor and weapons in the performance of traditional "passion plays" (*ta'ziya*) (Allan & Gilmour 2000: 125-210, 253-81). Turning to the built environment, it is also difficult to set out hard-and-fast rules for identifying what was constructed solely or principally for military purposes. Castles (Arabic: *hisn* or *qal'a*) obviously have important functions in times of warfare, but they might also be designed with other, less militaristic needs in mind: treasury, storehouse, prison, palace, administrative headquarters, and so on. Forts garrisoned with troops were built along the major routes taken by pilgrims performing the *hajj* to the holy cities of Mecca and Medina (Petersen in Kennedy 2006: 307-17). Other types of building (notably caravanserais) were partially fortified to defend travellers and merchants from brigandage, while elite residences were sometimes given features such as curtain walls, crenellations, and towers for more symbolic or ornamental purposes. Villages and small towns across the Islamic world were also often surrounded by walls for the protection of the inhabitants.

Historical Background

Islamic approaches to warfare and to the construction of military architecture were initially reliant upon the practices of Late Antiquity. The inhabitants of the Arabian Peninsula in the early seventh century would have been familiar with a form of square or rectangular fortified compound with a single entrance and four corner towers – good examples have been excavated at Qaryat al-Faw, Mlayha, and al-Dur – that has its origins in the Roman fort (*castrum* or *quadriburgium*). Adaptations of the Roman *castrum* also appear in eastern Syria and western Iraq in this period; in common with the Umayyad "desert castles" (also *qasr*, pl. *qusur*) of the eighth century, these Late Antique structures were employed principally for residential purposes, and the fortifications were only partially functional (Genequand in Kennedy 2006: 3-25; Milwright 2010: 34-41). Properly defensive architecture was a feature of the Late Antique Middle East and North Africa, however, and it was relatively common in this period for towns and cities to be surrounded by a curtain wall with side and corner towers and strongly constructed gates. In the territories of the Roman-Byzantine Empire, these walls were usually constructed in stone, while mud-brick and rammed earth (*pisé*) are more commonly encountered on Sasanian sites (such as Veh Ardashir, Ctesiphon, and the Erk Kala at Merv). Other types of fortifications existed, for instance, the system of walls and forts (known as "Alexander's Wall") constructed by the Sasanians to defend passes around the Caspian Sea.

During the lifetime of the Prophet Muhammad, the nascent Muslim community fought first against the inhabitants of Mecca who adhered to pagan beliefs and latterly in order to unify the tribes of Arabia under Islam. The scale of early conflicts such as the battle of Badr (624) is difficult to estimate; while they may have been little more than tribal skirmishes when compared to later events, they are important in establishing within Islamic culture the concept of holy war (*jihad*) and the virtuous status of the martyr (*shahid*) killed in warfare. The Prophet attempted to expand his influence north into Syria (culminating in defeat in 629 at the battle of Mu'ta in Jordan), but it was under his successors, the four "rightly guided" (*rashidun*)

caliphs between 632 and 661 and the Umayyad dynasty (661–750), that the greatest territorial expansion was to occur. These extraordinary successes were achieved largely through battles fought successfully against the armies of the empires of Byzantium, Sasanian Iran, and the Tang dynasty of China. Smaller polities such as the Nubian Kingdom and the Visigothic rulers of the Iberian Peninsula were also defeated in this phase (Kennedy 2001: 1-58).

The most obvious physical manifestation of the Arab conquests was the establishment of garrison towns (*misr*, pl. *amsar*) that include Basra (c. 635) and Kufa (638) in Iraq, Ayla (c. 650) in Jordan, Fustat in Egypt (641–42), and Qayrawan (670) in Tunisia. No conclusive physical evidence for the layout and fortifications of these seventh-century settlements has yet come to light; only Ayla preserves its rectangular plan, round corner towers, and defensive gates, these probably dating from the early eighth century (Whitcomb in Kennedy 2006: 61-74; Walmsley 2007: 94-5). The excavated governor's palace (*dar al-imara*) at Kufa may retain some of its seventh-century plan, including substantial walls and rectangular corner towers (replaced by round towers in a later construction phase) (Creswell 1989: 10-15). In the eighth century there is also evidence for the redevelopment of existing hilltop citadels as centers of regional government; those of Samarqand in Uzbekistan and 'Amman in Jordan have both been extensively excavated (Milwright 2010: 79-80). The militaristic aspect of Umayyad public and private art is exemplified by the so-called "standing caliph" coins (in gold, silver, and copper) that on the obverse carry the image of Caliph 'Abd al-Malik (r. 685–705) holding a sword and with a whip attached to his belt. This may be compared with stucco statues of sword-bearing caliphs from the palatial residences of Qasr al-Hayr al-Gharbi (720s) and Khirbat al-Mafjar (740s), both of which draw upon Sasanian royal prototypes (cf. the carved reliefs in the late Sasanian monument of Taq-i Bustan in Iran). Khirbat al-Mafjar, the bathhouse known as Qusayr 'Amra (after 711), and the Abbasid residence at Humayma also preserve diverse painted and sculpted images of soldiers and mounted archers (for illustrations of some examples, see Nicolle 1995-6: II, 24-48).

The Abbasid caliphate (749–1258) brought with it far-reaching changes to all aspects of Islamic culture. The capital of the empire was shifted from Damascus to the new city of Baghdad (constructed between 762 and 766). This circular city was extensively fortified using construction techniques employed in earlier Sasanian and Parthian cities. While nothing of eighth-century Baghdad survives, the probable form of its fortifications can be glimpsed in another Abbasid city, Rafiqa (now part of modern-day Raqqa), in northern Syria, erected between 771 and about 775 (Creswell 1989: 243-8; Daiber & Becker 2004: 3-18). Palaces too could be strongly fortified, as is demonstrated by the late eighth-century complex of Ukhaydir located in the Iraqi desert west of Kufa. This imposing structure is surrounded by a rubble and mortar curtain wall 17 m in height and well equipped with defensive towers and arrow loops (Creswell 1989: 249-58).

During the rule of the early Abbasid caliphs, there was an increasing professionalization of the army, most importantly involving the purchase of Turkish military slaves (referred to as *mamluks*). Highly skilled as mounted archers, these Turkish troops were a potent military force. They were, however, expensive to maintain and apparently often the cause of civil unrest in urban areas. The remarkable city of Samarra (occupied by the caliphs between 836 and 892), located north of Baghdad on the Tigris river, was in part a solution to the latter problem. Stretching 35 km along the east bank of the river, a dominant feature of this urban development are the so-called cantonments, repeated compounds with central courtyards that are arranged in orderly grids within and around the major palaces. Attempts have been made to estimate the changing size of the caliphal army in the Samarran period based on the construction of these cantonments across the city (Kennedy 2001: 205-208; Kennet 2001).

The rigid grid plans of the Samarran cantonments can also be seen in the Syrian city of Rafiqa, itself designed to billet troops from Khurasan. The routes north of Rafiqa led into the contested

border lands (pl. *thughur*) with the Byzantine Empire. Archaeological work in this region has revealed military towns of the eighth and ninth century such as Kharrab Sayyar and Madinat al-Far (Hisn Maslama) in Syria, and early Abbasid fortresses in southern Anatolia, including those of Haruniye and Karafrenk (Edwards 1987: 143-7, 155-6; Kennedy 2001: 190-2; Meyer & Haase in Kennedy 2006: 45-60). To the west of Rafiqa, there is an unfinished site known as Hiraqla that is believed to be a monument to commemorate Caliph Harun al-Rashid's (r. 786–809) conquest of the Byzantine city of Herakleia (Daiber & Becker 2004: 137-42).

This period also saw the emergence of a new architectural form with specifically military overtones, the *ribat*. These compounds were designed to be occupied by *murabitun*, men who for a period of years dedicated their life to the defense of the borders of Muslim polities. Hundreds of *ribat*s were apparently constructed across the Islamic world though only a few survive. Most famous are the ninth-century *ribat*s of Sousse and Monastir in Tunisia constructed by the Aghlabid dynasty (800–909). Both adopt a square plan with corner towers that is rather reminiscent of the Roman *castrum* (Creswell 1989: 286-88; Djelloul 1999: 42-51). Excavations in Spain revealed another *ribat* at Guardamar del Segura south of Alicante composed of three rows of cells surrounded by defensive wall. This evidence may indicate that there never was a standardized plan for this military-religious institution and allows for the possibility that *ribat*s with different architectural plans will be identified archaeologically in other regions of the Islamic world (Harrison 2004: 220-6).

At the end of the ninth century, there was an increasing fragmentation of the Islamic world. The new polities of the period from the ninth to the eleventh century all invested energy in the formation of armies and the construction of defensive architecture. Palatial complexes also adopted strong fortified perimeter walls, and often the elite of the army was located in close proximity to the residence of the ruler. This is seen in the case of Madinat al-Zahra' in southern Spain, constructed during the reign of the Umayyad caliph 'Abd al-Rahman III (r. 912–61). Other partially fortified palaces have been excavated at Lashkari Bazar in Afghanistan and Kilwa in East Africa. Cities too were ringed by defensive walls; the eleventh- to thirteenth-century perimeter wall of Diyarbakr in southern Turkey runs a distance of 5 km and is constructed of ashlar masonry. Equally impressive are the walls of al-Qahira (Cairo). Established by the Fatimid caliphate (909–1171) following their conquest of Egypt in 969, this new city was initially surrounded by mud-brick walls punctuated by gateways, the most important of which were Bab al-Nasr, Bab al-Futuh, and Bab Zuwayla. Between 1087 and 1092 this circuit was replaced by stone walls and imposing fortified entrances. The new Bab al-Nasr is a particularly impressive defensive structure and also important for the carved representations of kite-shaped and round shields on its two flanking towers.

Fortified citadels became a prominent feature of the urban environment of the Middle East and Central Asia from the eleventh century onward. This development can be correlated with the increasing importance of Turkish mounted soldiers in the political life of these regions. Chief among these are the Saljuqs, a group originating in the steppe lands north of the Caspian and Aral seas who migrated south in the tenth century in order to work as mercenaries for dynasties such as the Ghaznavids (r. 977–1186). The Saljuqs ruled a major land empire in the Islamic East between 1040 and 1157 (the period of the "Great Saljuqs") and were vigorous patrons of religious and military architecture. An example of the latter is the citadel known as the Shahryar Ark constructed by Sultan Sanjar (r. 1118–57) in the northeastern part of the walled city of Sultan Kala at Merv. This great city was largely destroyed and abandoned as the result of the Mongol invasions of 1221–2 (a fate which also befell Balkh, Nishapur, and other eastern Islamic walled cities).

Citadels further west in Syria, Anatolia, and Egypt were commonly constructed in masonry and have proved more durable; the Kurdish Ayyubid dynasty (1171–1250 in Egypt and

1260 in Syria) was responsible for major citadels in Cairo and Aleppo and for the renovation of the one in Damascus. A common characteristic of these fortified centers of government is that they constituted an independent urban entity within the city; aside from the space given over to military functions, ministries, and palaces, these citadels contained many of the features – congregational mosque, bathhouses, domestic architecture, and industrial installations – also found in the city itself. Somewhat smaller fortified sites made opportunistic use of existing architecture, such as the citadel at Bosra which is built around a classical theatre.

Another major factor facilitating the evolution of defensive architecture and military technology was the changing balance of power between the Islamic world and Christian Europe, most notably the *Reconquista* in Spain (until 1492) and the establishment of the Frankish states in the Middle East following the First Crusade (1096–99). The castles and other military architecture associated with the periods of conflict have been extensively studied (see below). The shifting of borders between Christian and Muslim polities resulted in complex phases of construction, destruction, and rebuilding. Evolving techniques of siegecraft also affected castle design, with Muslim and Christian designers learning from one another – a good example of this phenomenon is the box machicolation, which occurs at about the same time in Muslim and Frankish castles in the Middle East.

The capture of Acre by the forces of the Mamluk sultanate (1250–1517) in 1291 marked the end of the Crusader presence in the Middle East (though not the end of the Crusading movement). The Mamluks were a military slave elite who had replaced the Ayyubid sultanate. Like their predecessors they invested heavily in military architecture. Many castles were extensively rebuilt in the second half of the thirteenth century including Krak des Chevaliers (Qal‘at al-Husn) in Syria and Karak and Shawbak in Jordan (Faucherre 2004). The Mamluks also recognized the importance of an effective communication infrastructure, and evidence of their postal system (*barid*) remains in the way stations and dovecots constructed along the main routes through the empire. The strongly militaristic aspect of Mamluk society is also evident in their material culture, and the personal emblems (often known as blazons) of Mamluk princes (*amir*s) are a feature of ceramics made in their capital (so-called barracks ware) and of textiles, metalwork, and glass excavated in Cairo and other urban sites of the sultanate. A cache of armor, weapons, and fragments of soldiers' clothing (sometimes with blazons embroidered upon them) from the Mamluk period was found during the archaeological investigation of the citadel in Damascus (Nicolle 2011).

Incendiary technologies such as "Greek fire" (*naft*) had already been employed in earlier centuries, but this aspect of Islamic warfare was transformed by the introduction of gunpowder. In the late fifteenth and early sixteenth centuries, the Mamluk sultanate made considerable, if not always effective, use of primitive handheld firearms (arquebuses) in war. The Ottoman sultanate (late thirteenth century–1924) also embraced cannon and handheld firearms in warfare, as did other so-called Gunpowder empires, the Safavids (1501–1722) of Iran and the Mughals (1526–1828) in India. Not only did these new weapons change the character of military engagements in the field, but they also necessitated adaptations to the design of defensive architecture (see below).

In archaeological terms some of the most interesting evidence from the fifteenth to the nineteenth centuries comes from the military encounters between Islamic and Christian polities. In preparation for the two Ottoman sieges of Constantinople (1396–1402/3 and 1453), the Ottoman sultans Bayezid I (r. 1389–1402) and Mehmed II (r. 1444-6, 1451–81) constructed the fortresses of Anadolu Hisarı and Rumeli Hisarı on the Asian and European sides of the Bosphorous. The Ottomans also extensively renovated existing fortifications as part of their ongoing struggle with the Venetian Republic for control of the Aegean and eastern Mediterranean. Impressive remains of fortresses and city walls may be found in Greek ports such as Nafplio, Nafpaktos (Lepanto), and Pylos. Elsewhere

there is evidence for European military presence in Islamic regions, often involving the construction or extensive renovation of fortresses and walled settlements. Three associated with Portuguese colonial expansion are Qasr al-Saghir in Morocco, Qal'at Bahrain in the Persian Gulf, and Kilwa island off the East African coast (Redman 1986; Milwright 2010: 183-86).

The economic and military superiority of Europe is readily apparent in the history and archaeology of the Islamic world from the late eighteenth century. The Middle East and North Africa were drawn into larger conflicts (such as the Napoleonic War and World War I). Islamic regions also became the subject of the colonial ambitions of European states (most importantly France, Britain, and Russia). Recent archaeological work has recovered traces of some modern military campaigns. Notable examples are the excavation of Napoleonic trenches at 'Akko (Acre) in Israel and the survey conducted of sites in southern Jordan (Ma'an and Wadi Rutm) associated with the period of the Arab Revolt (1916–1918) (Saunders & Faulkner 2010). The latter project is particularly significant for its focus upon the changes to the landscape caused by battles and by the creation of army camps in sparsely occupied regions. Excavation of an Islamic graveyard at the ancient site of Tell Hesi also revealed the presence of trenches dug during the war which led to the creation of Israel in 1948. These trenches were constructed prior to the battles of Hirbet Mahaz in 1948 and continued to be employed until 1959 for training purposes by the Israeli army (Toombs 1985: 6-14).

Key Issues/Current Debates

Much of the recent archaeological work on Islamic warfare has focused upon castles, city walls, and other defensive structures. While castles were obviously designed to withstand attack and could also be employed for billeting troops and as arsenals, they also performed many other nonmilitary functions. Furthermore, the main motivation for the construction of castles was not always the desire to defend borders in times of conflict; Ellenblum has demonstrated that the bulk of the Frankish castles of the Kingdom of Jerusalem was erected in phases of relative peace, and many of these structures were located at a considerable distance from the borders with the neighboring Muslim polities (Ellenblum 2007: 103-86). This leads one to question both the notion that lines of castles constituted a form of border defense and whether one should apply modern conceptions of national boundaries to the porous transitional zones that existed between medieval polities. These considerations are helpful in assessing the roles performed by castles in the Islamic world. It is apparent that fortified structures often functioned as centers of local government and as the principal markets for the surrounding rural communities. For instance, in the Mamluk period the castle and town of Karak was the capital of a district (*mamlaka*) with smaller fortified structures at Hisban, Shawbak, and elsewhere functioning as secondary centers of local government with their own staff of administrators and soldiers (Milwright 2008: 78-93). These networks facilitated the exploitation of resources from the surrounding area, protected the main roads, and provided a point of mediation between nomadic groups and the state. Broadly comparable patterns of castle building can be seen in southern Spain and in other parts of the Islamic world (Zozaya 1996).

During periods of prolonged warfare, areas of land, and the castles contained within them, would often change ownership several times (affecting such things as the size and composition of the administrative and military elite occupying castles). The excavation of important urban citadels such as Damascus and Aleppo has allowed researchers to reconstruct the fluctuations in the material culture of these sites through several dynasties and over periods of centuries (Berthier & Gonnella in Kennedy 2006: 155-75). Particularly important are cases where there are changes in the confessional affiliation of the occupants, such as during the Crusades in the Middle East, the *Reconquista* on the Iberian Peninsula, and the Ottoman conquest of Greece and the Balkans. Following the Portuguese conquest of Qasr al-Saghir, almost every aspect of the Islamic town

was remodelled from the civic buildings to the domestic architecture and shops. Where the Muslim inhabitants had relied upon manufactured goods from the surrounding regions of North Africa and southern Spain, the Portuguese soldiers and merchant families of the fifteenth and early sixteenth centuries imported ceramics and other media from a wider area including northern Europe and China (Redman 1986).

Less pronounced shifts in the material culture were registered in the Islamic and Portuguese occupation levels at Qal'at Bahrain in the Persian Gulf. More significant in this context was the transformation of the fort itself; the final construction phase, dating to the late sixteenth century, has massive walls and substantial galleries designed to accommodate cannon. The adaptation of fortifications to allow for the use of artillery (and to defend against it) has been studied on other sites including the Abdullah Khan Kala in Merv and the forts built by the Ottomans to guard the route of the *hajj* through southern Syria, Jordan, and northern Arabia (Brun 2005: 619-24; Petersen 2001). Similar issues are raised by a consideration of the reflexive relationship between siege technology and military architecture in earlier periods of Islamic history. Recent studies of Frankish and Muslim castles of the Crusader period in the Middle East have revealed the evolution of both outer defenses and inner storage and domestic areas as the result of innovations in siege techniques (Michaudel in Kennedy 2006: 106-21; Ellenblum 2007: 189-286). Sometimes the renovation of damaged sections of a castle allowed for the creation of improved towers or curtain walls. The analysis of numerous construction phases of castles can be challenging, but considerable advances have been made in this field of study using techniques such as rectified digital photography (Tonghini & Montevecchi in Kennedy 2006: 201-24).

The evolution of Islamic weapons prior to the fifteenth century is hampered by the paucity of surviving examples (Nicolle 2011). In part, this must be connected with the Muslim prohibitions upon placing grave goods within burials (this being a significant source of excavated armor and weaponry in many early medieval cultures). Presumably, most military equipment in the Islamic world was recycled when it could no longer be repaired. Our major sources on Islamic weaponry and the techniques involved in making them are textual and visual. Particularly important in this respect is the treatise *On Swords and their Kinds* (*al-suyuf wa ajnasuha*) by the philosopher, al-Kindi (d. 870) (Allan & Gilmour 2000: 56-7). Illustrations of weaponry occur on numerous portable artifacts and manuscript paintings.

Archaeology has contributed to the study of Islamic weapons, however. Two swords were recovered from the excavations in Nishapur, both probably dating to the ninth century. The more complete example has a slightly curved steel single-edged blade (i.e., for slashing rather than stabbing) with bronze fittings and the remains of a decorative wooden scabbard. The closest correlates for the Nishapur sword exist to the north and west in the Altai mountains, the Caucasus, and Russia. During the eighth and ninth centuries, the form of sword encountered in Nishapur spread west into Europe, perhaps as the result of the Avar migrations (Allan 1982: 56-8, 108-109 nos. 208-209). The type of crucible steel employed in the manufacture of the Nishapur sword matches closely the steel ingots found in excavations of a ninth- or tenth-century workshop at Merv, about 250 km to the northeast. Merv had no local deposits of iron ore, and this material was imported. This major industry was probably focused upon the production of weapons and armor for the garrisons of the city (Allan & Gilmour 2000: 50-5). Other fragments of early swords have been excavated at sites such as al-Rabadha, an important town on the road from Medina to Kufa, and the eleventh-century shipwreck at Serçe Limanı on the southwestern coast of Anatolia (Nicolle 1995-96: II, 73-76).

International Perspectives

Warfare is an aspect of human activity that is highly sensitive to technological change, and for this reason the investigation of individual regions, sites, or artifacts always needs to maintain an international perspective. Archaeology

provides a means to study manufacturing practices and the distribution of materials and weapons in different phases of Islamic history. Warfare is often also associated with economic concerns (the defense of trade routes, the opening of new markets, or the desire to obtain raw materials), and this means that the material culture excavated within fortified sites can reveal the changing extent and geographical scope of mercantile activity in different occupation phases. Traders and goods often passed across the borders of warring polities; for instance, excavations in Acre (‘Akko) have revealed the intensity of the trade in Islamic luxury goods to Europe during the thirteenth century (a fact borne out in contemporary written sources). A common concern in the design of fortified sites is the storage of food and water. The provision and storage of water through such features as aqueducts and cisterns has been studied by archaeologists working on sites as diverse as Ismaili castles in Iran, Ottoman towns in Greece, and Muslim fortresses in Spain; this body of evidence invites further comparative study within and beyond the Islamic world (Milwright 2010: 90-4).

Future Directions

With the partial exception of the study of Islamic castles and other aspects of military architecture, the archaeology of Islamic warfare is a relatively undeveloped field of study. The following comments are intended to identify areas of potential study that can build upon existing published scholarship. The rapid expansion of the Islamic state in the seventh and early eighth centuries is one of the most important events in the history of Eurasia, but archaeology has made little impact upon the debate about how and why the Arab armies of conquest were so successful. To what extent was it the weakness of the polities of the early seventh century and what weight should we give to the superiority of Arab military strategy or weaponry? Did the destructive plagues of the sixth and early seventh centuries critically weaken the societies of the Mediterranean and Middle East and thus facilitate the Islamic conquests? Further synthesis of existing archaeological data will refine our picture of the economic and political life of the Middle East and North Africa prior to the Arab conquests, while excavation of battle sites or early *amsar* like Basra or Kufa could help us form a better understanding of the characteristics of the armies of the first Islamic decades. Other periods of rapid territorial expansion such as the establishment of the “Great Seljuq” sultanate, the Mongol conquests of the thirteenth century, and the campaigns of Timur between c. 1370 and 1405 would also benefit from archaeological perspectives.

In general archaeology has provided relatively little information on the human aspects of Islamic warfare, encompassing both the lives of soldiers and of civilians affected by periods of conflict. Battlefield archaeology might well provide insights into this issue. The examination of Crusader-period skeletal remains has provided intriguing data upon weapon injuries (Mitchell et al. 2006). The imposition of large numbers of foreign troops upon a given area must have left an impact upon the environment, as well as affecting the sociocultural and economic lives of the native inhabitants. The *amsar* of the seventh and eighth centuries, the Abbasid cities of Rafiqa and Samarra, and the urban citadels of the eleventh to fifteenth centuries all provide opportunities to explore these issues. The settlement of soldiers and Turkish officials within the countryside of conquered areas has been addressed in survey work in the Pylos region of the Peloponnese (and similar issues have been productively explored in relation to Frankish settlement of the Crusader Kingdom of Jerusalem), but much more work is required (Zarinebaf et al. 2005). This also opens the possibility of comparative analyses with archaeological research in non-Islamic lands, an important recent example being the study of the impact of changes to settlement practices and animal-breeding practices during the Baltic Crusades (Brown & Pluskowski 2011). Lastly, there is an urgent need to improve our understanding of naval warfare during the Islamic period. No major study exists of an Islamic military craft or of a major engagement involving an Islamic navy.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Battlefield Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Islamic and Crusader Archaeologies
- ▶ Islamic and Maritime Archaeologies
- ▶ Medieval Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Sasanian Empire, Archaeology of the
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Swahili Archaeology
- ▶ Underwater Archaeology

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Military Personnel Training in Archaeology

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Introduction and Definition

Devastation in conflict and disaster areas often extends to archaeological sites. For military personnel to respond appropriately in situations where cultural property requires protection, three components are necessary: an educated force; legal requirements for the property to be protected; and accurate maps, documentation, and information. The most comprehensive international legal instrument governing cultural property protection is the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict and its two protocols. Over 100 nations around the world are states parties to this agreement meaning that, in theory, these governments have committed their militaries to the principles and practices of cultural property protection. In addition, many nations have established national register lists and heritage protection laws that offer a beginning point for understanding which properties and collections require rescue or protection. For military personnel to be effective in the protection of archaeological sites, this treaty requires education for them.

Key Issues/Current Debates/Future Directions/Examples

For departments and ministries of defense in the United States, the UK, and some European countries, responsibility for the protection of cultural property including archaeological sites falls under either environmental or civil affairs programs. In the United States and the UK, there are robust domestic stewardship programs that employ hundreds of archaeologists. Each military installation with thousands, and in some cases millions, of acres supports an archaeological survey that inventories archaeological sites and provides compliance archaeology for construction projects and training events that require excavation. In compliance with the US Native American Graves Protection and Repatriation Act, NAGPRA, and a series of Presidential Executive Orders, installation archaeologists in the United States work as advocates for indigenous people whose ancestors lived and were buried on these land holdings. They establish consultation partnerships and diplomatic relationships between leaders of federally recognized tribes and military command groups ensuring access to sacred places and protection of buried remains. In addition to educating military commanders about indigenous people and ancestral sites, installation archaeologists also provide introductions to archaeology found on the training lands for military personnel with a goal of reinforcing appreciation, respect, and site protection rules. In the UK, military archaeologists work closely with English Heritage, caring for scheduled monuments on military land. Salisbury Defense Estate is probably the most archaeologically intact landscape remaining in that country, and their installation archaeologists work daily with the military trainers to ensure that Soldiers are informed and that training events will not adversely affect archaeological features.

During World War II, the United States and the UK assigned military personnel with qualifications as archaeologists, art historians, and landscape architects to serve as monuments officers in their "MFAA," Monuments, Fine Arts and Archives program (Nicholas 1994). However, as recent conflicts have painfully illustrated, the United States and UK engaged in conflicts in Iraq and Afghanistan as well as in recent disaster response operations with a force that lacked the necessary education and planning materials required for accurate identification of and appropriate response to the cultural property they were encountering in these situations. In short, the World War II military cultural property protection capability had been lost.

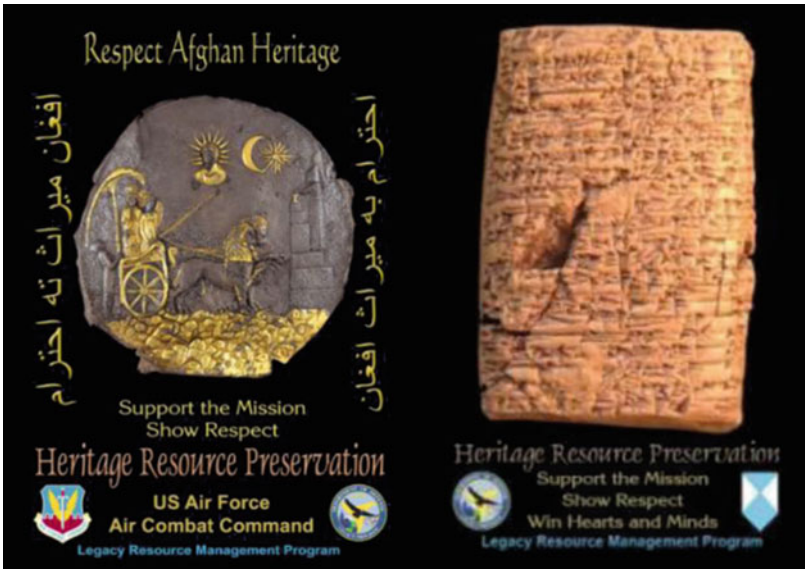

Military Personnel Training in Archaeology, Fig. 1 Card backs for archaeology awareness playing cards developed for US deploying personnel serving in Afghanistan on the left and Iraq on the right. Each card offers a distinct lesson for stewardship

Since 2004 when global media attention focused on damage at Babylon (MSNBC 2004), a core group of archaeologists and heritage professionals from a series of western nations have been working to reestablish cultural property protection as an element of responsible military training and operations. The Archaeological Institute of America was among the first to respond with their Soldier Lecture Program, a volunteer effort where academic archaeologists offered information to Soldiers and Marines on the verge of departing to Iraq or Afghanistan (Rose 2007). This effort is now emerging into a curriculum designed for all Reserve Officer Training Cadets (ROTC) that will introduce the principles of cultural property protection with an emphasis on archaeological sites with a goal of nationwide implementation using academic archaeologists as volunteer instructors. Installation archaeologists in the United States and the UK began to add training for deploying personnel to their domestic archaeological survey, stewardship, and cultural resources management responsibilities. Their accomplishments since 2004 in the United States include development and distribution of over 150,000 decks of archaeological awareness playing cards to deploying personnel (see Fig. 1), establishment of heritage reference websites for Iraq, Afghanistan, and Egypt http://www.cemml.colostate.edu/cultural/cptraining.html, a comprehensive military cultural property protection resource website www.cchag.org, establishment of the Combatant Command Cultural Heritage Action Group, establishment of heritage protection guidelines for Central Command contingency operations in a regulatory format (CENTCOM 200-2, 2008), onsite training at Saqqara Egypt for participants in the Bright Star War Games in 2009, development of cultural property protection scenarios for field training, guidelines for identifying archaeological sites using defense imagery, development and delivery of archaeology and heritage awareness presentations to hundreds of deploying personnel including specialized curriculum for military engineers, and funding of archaeological research related to improved understanding of ancient water systems as found throughout the Middle East, South Asia, and semiarid regions of Africa. US archaeologists in partnership with experienced military personnel are now working on the Field Commander's Guide to Cultural Property Protection for the US Department of Defense.

International accomplishments include international cooperation for identification and implementation of a "no strike" list for archaeological sites

during NATO operations in Libya that resulted in saving a series of archaeological features of world heritage significance (D'Emilio 2011). UK colleagues have developed field-training aides that even include mobile replica museums that can be used for military training in looting scenarios. The Austrian military leads the world in cultural property protection education with a robust Society for the Protection of Cultural Property where cultural property officers can interact directly with military planners and responders in peacekeeping operations. On behalf of UNESCO, the Austrians offer cultural property training courses for defense professionals from all over the world. The Italians also lead the world with a militarized police force whose officers specialize in protection of archaeological sites and objects in addition to other forms of protection for art and cultural material. Called the Carabinieri Tutela Patrimonio Culturale, or the Carabinieri Command for the Protection of Cultural Property, these policemen have established an international database for missing archaeological objects and works of art, investigate and attempt to prevent incidents of looting at archaeological sites, and have recovered thousands of objects and works of art from all over the world amounting to hundreds of millions of euros in value. Carabinieri officers deployed to Iraq in 2003 as peacekeepers where they helped Iraqi heritage professionals capture and prosecute looters of archaeological sites, recovered objects stolen from the National Museum of Iraq, established a database of additional stolen objects, did aerial surveillance of archaeological sites in Nasiriyah and Dhi Qar Provinces, providing Iraqi provincial inspectors with detailed site map coordinates and perimeters, and reopened the provincial museum at Nasiriyah (Carabinieri 2008). Carabinieri have also provided training for site guards, guidelines for effective site protection and even, in cooperation with the University of Torino, a virtual Museum of Iraq http://www.virtualmuseumiraq.cnr.it/prehome.htm.

A series of research programs, dissertations, and books on the subject are emerging including projects at the University of Newcastle, UK (Rush 2010), the University of Amsterdam (Kila 2012), Colorado State University, The University of Kansas in partnership with the US Command and General Staff College, University College Dublin, Indiana University Pennsylvania, and Deakin University, Melbourne, Australia. The right to one's heritage is now emerging as an international human right, so protection of archaeological sites and heritage is now a component of legal discussions, and included in law school programs and courses at Tulane, the University of Sienna, Villanova, and the International Institute of Humanitarian Law in San Remo, Italy. Many of these programs are also making an effort to reach out to military personnel.

One of the most fascinating and exciting recent accomplishments has been the creation of Operation Nightingale in the UK (British Archaeology 2012). This program has achieved outstanding success by using participation in archaeological excavations as therapy for wounded personnel, not only helping them with emotional recovery but also offering them development of marketable skills like surveying and scientific illustration as they prepare to return to the civilian world.

It should be noted that there is a community of archaeologists who have made an ethical choice not to participate in any form of military partnership whatsoever (Hamilakis 2003; Stone 2011). However, for nearly a decade as of 2012, archaeologists have been working productively in a wide range of capacities as teachers and partners with the military with the goal of protecting archaeological sites and collections in any situation where military personnel might possibly be involved.

Cross-References

- ▶ Archaeological Resource Management: The Changing Role of the State
- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)

▶ Cultural Heritage Management and Armed Conflict
▶ Cultural Property, Trade, and Trafficking: Introduction
▶ Ethics in Archaeology
▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
▶ SAFE/Saving Antiquities for Everyone
▶ Stone, Peter G.

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Miller, Margaret C.

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Basic Biographical Information

Margaret C. Miller (Fig. 1) is a prolific classicist and interpreter of the visual/material record of archaic and classical Greece. Her dynamic approach to Greek cultural perspectives on the Achaemenid Persian empire is an especially important feature of her work. Miller was born in Liverpool but soon emigrated to Canada, where she was raised and educated through the B.A. degree (Honours Classics) at the University of British Columbia. Following a second degree at Oxford and a year-long fellowship at the American School of Classical Studies at Athens, she earned her Ph.D. at Harvard University under Emily Vermeule in 1985. She has participated in archaeological projects in Greece (Mytilene and Corinth), Turkey (Sardis), Egypt (Naukratis), and England (Wroxeter). Since 2012, she is codirecting a collaborative field project at Zagora (Andros).

A distinguishing feature of Miller's professional contributions to date lies with her skills as an administrator as well as a scholar and subtle thinker. She taught at the University of Toronto, Department of Fine Arts, from 1989 to 2005, serving as Chair from 1996 to 2000. She has been on the faculty of the University of Sydney, Department of Archaeology, since 2005 as Arthur and Renee George Professor of Classical Archaeology (Head of Department for part of that time). She has consistently participated on many archaeological committees, most recently adding to her dossier of such activities the Headship of the Australian National Committee of the *Corpus Vasorum Antiquorum*

Miller, Margaret C., Fig. 1 Margaret C. Miller

and Membership on the Executive Committee of the Australian Archaeological Institute of Athens.

Major Accomplishments

Miller's first book, *Athens and Persia in the Fifth Century B.C.: A Study in Cultural Receptivity* (1997/2004), established her as a brilliant mind solidly informed by rigorous training in Greek literary and material culture and attunement to issues of intercultural arenas of social contact and exchange between Greece and the Achaemenid Persian empire. Key to the importance of *Athens and Persia* – what has made it a true classic in the field – is the nuanced approach Miller takes to notions of influence as a fluid system rather than a one-way exertion of cultural authority. This book was awarded *Le pris Roman and Tania Ghirshman* from the Académie des Inscriptions et Belles Lettres, Paris, in 2001. Supporting its overarching intellectual mandates are a series of impressive articles on specific topics relating to Greek-Persian cultural entanglements discernible through the visual/material record from pottery and luxury paraphernalia, to costume and sartorial accouterments, to cultural performance (e.g., among others, Miller 1989, 1992, 1993, 2010a, 2011a). Other major articles and chapters pursue a range of topics primarily working across similar platforms of evidence but focusing principally on Greek perspectives (e.g., 1999, 2008, 2010b, 2011b). Another side of Miller's scholarship, particularly in collaboration with Eric Csapo, explores Greek drama and ritual and theories of art- and myth-making as social practice (e.g., 2007).

Professor Miller has won numerous postdoctoral research grants and fellowships: five from the Social Sciences and Humanities Research Council (Canada), two from the National Endowment for the Humanities (USA), one from Harvard's Center for Hellenic Studies (Washington DC), and one from the Australian Research Council. Two book projects forthcoming involve studies of Persians in the Greek imagination and iconographies of orientalization in Greek myth as represented in Attic art.

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Classical (Greek) Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Multicultural Archaeology
- ▶ Semiotics in Archaeological Theory
- ▶ Social Identity in Historical Archaeology
- ▶ Style: Its Role in the Archaeology of Art

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Millets: Origins and Development

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Basic Species Information

Millet is an imprecise English term applied to a large number of smaller-grained, largely tropical cereals that are often distantly related. Millets tend to be small-seeded cereals, i.e., distinct from wheat, barley, oats, rice, and maize. Sorghum is sometimes included with millets (in Indian English it is the "great millet"). Taxonomically speaking "millet-grasses" refers to grasses in the Panicoid subfamily and the Paniceae tribe, but not all traditional millet crops are in this group. Finger millet (*Eleusine coracana*) and tef (*Eragrostis tef*) are in the Chloridoid subfamily. Although a few millet species have been cultivated in Europe, they are generally less important economically and culturally, leading to poor linguistic differentiation in European languages, e.g., French *millet*, German *hirse*, and Spanish *mijo*.

Millets have received far less research than the "big" cereals (rice, wheat, and barley). Indeed statistics on millet production are very poor, as they are grouped as "minor cereals" in most national and FAO statistics. This is, at least in part, the product of a historical European bias against millets, especially among the former colonial powers of Northern and Western Europe, where millet cultivation is negligible. These cereals were undervalued and under-researched in the colonial period which set an unfortunate precedent for modern governmental and nongovernmental agricultural organizations. There are several "lost" or disappearing millets, cultivated in very localized areas or documented archaeologically only. This includes the recently "rediscovered" *Spodiopogon formosanum* of Taiwan (Takei 2008), the now relict browntop millet of South India (*Brachiaria ramosa*) (Fuller 2006), the local domesticate "raishan" (*Digitaria cruciata*) of the Khasi Hills in northeast India (Singh & Arora 1972), the black fonio (*Brachiaria deflexa*) and iburu (*Digitaria iburu*) of West Africa (Harlan 1992), the Sonoran millet of the American Southwest (*Panicum sonorum*), and the no longer cultivated crabgrass millet of Southeastern Europe (*Digitaria sanguinalis*) referred to in historical sources ranging from late Roman times to the nineteenth century (De Wet 2000).

Major Domestication Traits

There are at least 18 domesticated and cultivated species of millet, listed below in Table 1, together with a few other "minor cereals." These have been domesticated on almost every continent that had prehistoric agriculture, with the possible exception of Europe (De Wet 2000; Weber & Fuller 2008). Even in the case of the obvious exception of Australia, several wild millet grasses are reported to have been regularly gathered as a carbohydrate source of some Australian Aborigine groups (Harris 1984). Similarly wild seed gathering in Africa often targets wild millets (Harlan 1992). In many cases, closely related species, in the same genus, have been domesticated independently on different continents, such as *Panicum* domestications in North America, India, and China; *Digitaria* and *Brachiaria* domestications in Africa and South Asia; *Setaria* domestications in China, India, and Mesoamerica; or *Echinochloa* domestications in

Millets: Origins and Development, Table 1 Millets: taxonomy, common names, and regions of origin

Species	Common name	Region of origin and cultivation
Brachiaria ramosa (L.) Stapf. (syn. *Urochloa ramosa* (L.) R. D. Webster)	Browntop millet, pedda-sama	South India
Brachiaria deflexa (Schumach) C. E. Hubbard var. *sativa* Porteres	Guinea millet, animal fonio	Fouta Djallon highlands, Guinea, W. Africa
Bromus mango E. Desv.	Mango	Andes (Peru). Not taxonomically a millet but a now extinct minor cereal cultivar
Digitaria cruciata (Ness) A. Camus var. *esculenta* Bor	Raishan	Khasi Hills, Assam; Hill tribes of Vietnam
Digitaria exilis (Kippist) Stapf.	Fonio, acha, fundi	West Africa
Digitaria iburua Stapf.	Black fonio, iburu, hungry rice	West Africa
Digitaria sanguinalis (L.) Scop.	Harry crabgrass	Eurasian origin; cultivated in Kashmir, formerly in Europe
Echinochloa colona (L.) Link ssp. *frumentacea* (Link) De Wet, Prasada Rao, Mengesha and Brink (= *E. frumentacea* Link).	Sawa millet	Peninsular India(?), also cultivated in the Himalayas
Echinochloa crus-galli (L.) P. Beauv. subsp. *utilis* (Ohwi & Yabuno) T. Koyama (syn. *E. esculenta* (A. Braun) H. Scholz)	Barnyard millet	Japan
Eleusine coracana (L.) Gaertn.	Finger millet, ragi	East African highlands
Eragrostis tef (Zucc.) Trotter	Teff	Ethiopian highlands
Panicum miliaceum L. ssp. *miliaceum*	Proso millet	China and SE Europe(?)/Caucasus; cultivated throughout South Asia
Panicum sonorum Beal (=*P.hirticaule* J. Presl. var. *millaceum* (Vasey) Beetle)	Sauwi millet,Sonoran millet	American Southwest
Panicum sumatrense Roth. ex Roem. & Schult. Subsp. *sumatrense* (syn. *P. miliare* auct. pl.)	Little millet, samai	India, especially peninsula
Paspalum scrobiculatum L.	Kodo millet	India, especially peninsula, and the Himalayas
Pennisetum glaucum (L.) R. Br (= *P. americium* (L) Leeke)	Pearl millet	West African Savannah, cultivated through India
Setaria italica (L.) P. Beauv ssp. *italica*	Foxtail millet	China and SE Europe(?)/Caucasus, cultivated throughout South Asia and in parts of Southeast Asia
Setaria palmifolia (J. Koenig) Stapf	Highland pitpit	Papua New Guinea; cultivated as a green vegetable
Setaria macrostachya Humboldt, Bonpland & Kunth	*Ne-kuuk-suuk* (Mayan)	Mesoamerica, cultivated(?) before rise in importance of maize
Setaria parviflora (Poir.) Kerguélen	Knot-root foxtail	Mesoamerica
Setaria pumila (Poir.) Roem & Schult. (syn. *S. glauca* auct. pl.) (Domesticated population reported)	Yellow foxtail millet, korali	India
Setaria sphacelata (Schumach.) Stapf & C. E. Hubb.	African bristle grass	Sudan: "lost millet" of Nubia
S. verticillata (L.) P. Beauv. (Domesticated populations?)	Bristley foxtail millet	South India
Sorghum bicolor (L.) Moench ssp. *bicolor*	Sorghum, jowar	African Savannahs, cultivated throughout South Asia
Spodiopogon formosanus Rendle	Taiwan hill millet	Cultivated in uplands of Taiwan for Formosan-speaking groups

South Asia and Japan. Thus, millets illustrate the parallel evolution of domesticates and cultivation systems from similar wild materials. Millets contributed to the earliest agriculture in several parts of Eurasia, including northern China, where millet cultivation developed well before rice was introduced (Zhao 2011), Korea, parts of Japan, and various parts of India (Fuller 2006). There may also be an early millet center in Western/Central Asia (the Caspian/Ukraine region) to account for Neolithic *Panicum* dispersal into Europe. In Africa numerous millets were domesticated in various parts of the Savannah zone, in the West African Sahel, and in the Ethiopian highlands.

Millets represent a diverse group of versatile cereals that have long been a part of many agricultural ecologies in Eurasia and Africa, but especially in more arid and tropical regions. Millets are generally well adapted to low-rainfall regimes, short growing seasons, and poor soils (Bhag Mal et al. 2010). They are therefore often the most reliable cereals in many marginal environments. Most millets are reported to be drought tolerant, although a few such as finger millet (*Eleusine coracana*) are usually grown in somewhat wetter conditions and on good soils in order to produce high yields. At the more extreme end of drought tolerance are *Panicum miliaceum* in Eurasia and *Pennisetum glaucum* in the hot and dry parts of Africa and India, both of which may grow with 300 mm of rainfall or less and mature rapidly (within 3 months).

Millets present a challenge archaeobotanically as the grains of several species are somewhat similar and may be especially difficult to differentiate in carbonized material in which the husk is absent. This has led to a discussion of the misidentification problem, with one millet species being reported as another (e.g., Hilu et al. 1979; Fuller 2006). There has also been recent recognition of unfilled (immature) grains that may be common at archaeological sites and may have sometimes been mistakenly grouped with other taxa (Song et al. 2013).

Those millets with better archaeological records are treated in separate entries in this encyclopedia, including browntop millet (*Brachiaria ramosa*), broomcorn millet (*Panicum miliaceum*), finger millet (*Eleusine coracana*), foxtail millet (*Setaria italica*), little millet (*Panicum sumatrense*), kodo millet (*Paspalum scrobiculatum*), pearl millet (*Pennisetum glaucum*), and sorghum (*Sorghum bicolor*).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Brown Top Millet: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Finger Millet: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Mineralization of Macrobotanical Remains

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Introduction

Limited research has been conducted on the factors influencing the process of mineralization of macrobotanical remains on archaeological sites. A few studies have focused on mineralization from archaeological contexts, including the common process of calcium carbonate ($CaCO_3$) replacement in arthropods, such as woodlice, millipedes, and centipedes (Girling 1979: 309; McCobb et al. 2001) and a few studies on seeds (Ciaraldi 2001, 2007; Green 1979; Kenward & Hall 2000; Marshall et al. 2008).

Definition

Mineralization is a naturally occurring complex process in which phosphate and mineral deposits replace minerals from decaying organic matter. Phosphatization, the releasing of phosphate ions, from a variety of sources including faunal remains, food residues, and excrement, is thought to be caused by microbial decay and the movement of the dissolved ions facilitated by fluctuating water levels within the archaeological deposit (McCobb et al. 2001; Marshall et al. 2008: 860; Robinson et al. 2006: 214). Within an archaeological setting, possible sources of phosphate and calcium include human fecal material from specific archaeological deposits such as middens, latrines, and cesspits (a kind of soakaway: liquid material seeped into the ground while solid material remains in the pit (Jansen 2000: 37-9; Jashemski 2002: 27)), mammal bones, fish bones and scales, and plant material (Carruthers 2000 cited in Ciaraldi 2001: 66). Archaeologically, without sewage, the occurrence of mineralization is extremely low.

The process of phosphate mineralization requires a liquid medium to be able to fully engulf an item so that the ions can diffuse and become concentrated and result in the precipitation of calcium phosphate (Marshall et al. 2008: 860). The phosphate ions react with the calcium ions from calcium carbonate, which can come from different sources within the deposit including limestone or mortar fragments, human fecal material, shells of marine molluscs, fish scales and bones, faunal remains, or the leaching of natural substrate in contact with the deposit (Robinson et al. 2006: 214). The result is a cast of the organic material called a pseudomorph, which is reproduced in various degrees of perfection (Green 1979: 282, 284).

Due to their small size, seeds which possess an intact seed coat and fly puparia, with tough larval skin, are particularly well suited to preservation through this process (Robinson et al. 2006: 215). Factors such as the original percentage of calcium minerals in, and thickness of the seed's testa, the presence and amount of cuticles, lignin, and tannins within the cellular structure, and the decomposition of organic material, all impact upon the overall mineralization process (Girling 1979; Miksicek 1987; Carruthers 2000; McCobb et al. 2001; Ciaraldi 2007: 49-50). Seeds which have become mineralized typically

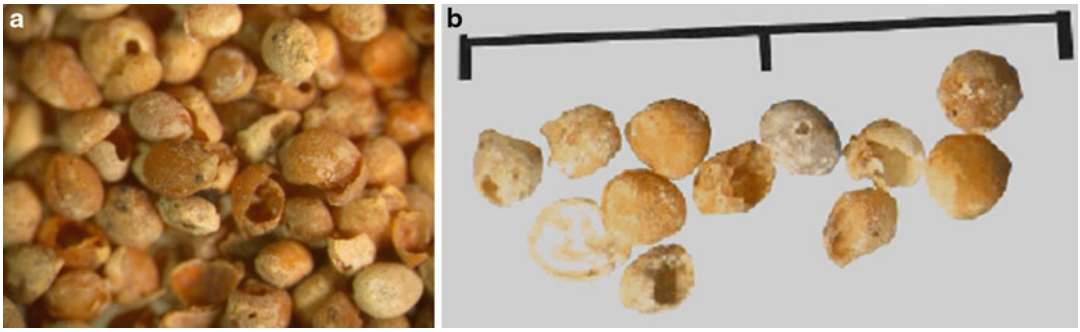

Mineralization of Macrobotanical Remains, Fig. 1 (**a**, **b**) Mineralized Ficus carica (fig) from Insula VI.I (scale in centimeters) (Photo by author) N.B Mineralized fig pips retain their characteristic pyriform shape

consist of light inorganic material with a poorly defined crystalline apatite structure. The main constituent is calcium phosphate, $Ca(PO4)_6(OH)_2$, visible using X-ray diffraction, which is normally light brown, honey-colored to white in color (Green 1979: 279-281). There appears to be a bias toward seeds which are swallowed intact, such as fig achenes, and grape pips (Cool 2006: 119; Robinson et al. 2006: 215). Millets are often recovered in a mineralized state due to the fact that some millets retain their indigestible hull (lemma and palea) even after dehusking. Being quite small, millet grains with their intact pericarp, can pass through the human gastrointestinal tract and facilitate the mineralization process. Hence, seeds with intact thin cell walls such as fig and apple seeds which also pass through the body are much more likely to be preserved through mineralization. As van der Veen et al. (2008: 84) demonstrated in their comprehensive statistical analysis of archaeobotanical remains from Roman Britain, there is a strong correlation between plant type and preservation. A similar pattern is seen in the archaeobotanical assemblages from Insula VI.I, Pompeii, Italy, as carbonized archaeobotanical material is typically composed of olives and fruits and mineralized archaeobotanical material of small fruits seeds such as grape pips and fig achenes (Murphy et al. 2012) (Figs. 1–4).

According to Green (1979: 281), a number of factors influence the process of mineralization including soil type, type of organic refuse present, and sufficient circulation of groundwater. Kenward and Hall (2000: 519, 2008: 586) suggest that urban occupation deposits, with their variation in sedimentology and chemistry on a minute centimeter scale, present a more complex set of problems, with regard to the process of mineralization, than rural sites. Within urban occupation deposits, organic material is often preserved via anoxic water logging. Complete water logging otherwise impedes the process of mineralization. However, it appears that the

Mineralization of Macrobotanical Remains, Fig. 2 SEM of one mineralized Ficus carica (fig) from Insula VI.I (Photo by the author)

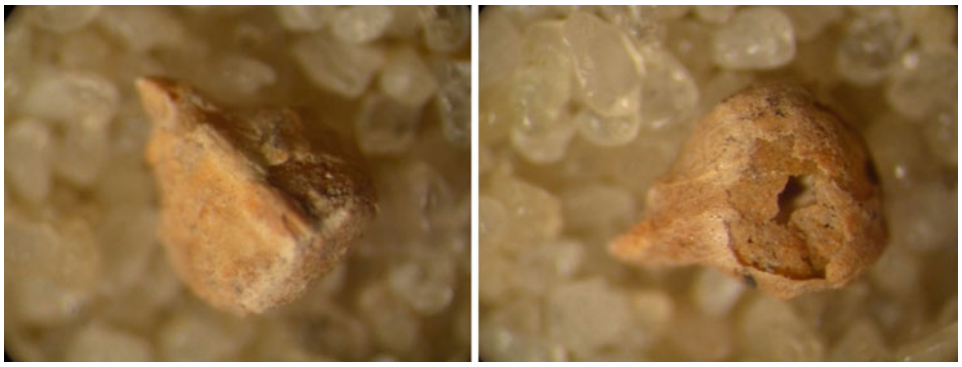

Mineralization of Macrobotanical Remains, Fig. 3 Mineralized Agrostemma githago L. (corn cockle) from Insula VI.I (Photo by the author)

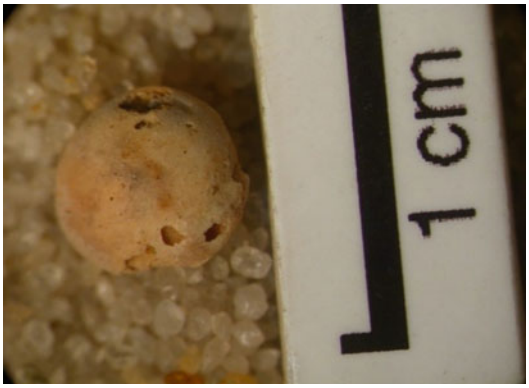

Mineralization of Macrobotanical Remains, Fig. 4 Mineralized lentil recovered from Insula VI.I (Photo by author)

process of mineralization is enhanced by the partial water logging of botanical materials under anaerobic conditions (Briggs & Wilby 1996 cited in Ciaraldi 2007: 49-50); although no firm scientific preservation model for the mineralization of organic deposits has been established to date (Kenward & Hall 2008: 588).

Examples

Case Study

In Pompeii, the mineralization of organic remains happens through the process of phosphatic mineralization. The majority of mineralized remains were composed of fruit, particularly small seeds, which pass through the human digestive system and are preferentially preserved. Ciaraldi's Pompeiian studies (2001: 150-151; 2007: 49-50) found that the unique taphonomy created by the copious ash and lapilli from the numerous volcanic eruptions and the alkaline volcanic soils surrounding Mount Vesuvius resulted in an archaeological matrix rich in calcium phosphate minerals.

Toilets in the kitchen area were a common feature of Pompeian households (Hobson 2009; Jansen 2001: 38). They were strategically placed in or near kitchens allowing for the disposal of burnt kitchen waste. The presence of carbonized material including nuts, weeds, and cereals testifies to this fact. Roman writer Columella mentions the usefulness of ashes as a "disinfectant," "cleaning agent," and "odor suppressant." Deposition of ashes from the cooking area into the latrine may have contributed to the mineralization process as potash, which contains potassium or potassium carbonates in water-soluble form, which along with the high percentage of organic matter in the latrine would have facilitated mineralization (Ciaraldi 2001: 67; Green 1979: 279). This could have contributed to the number of mineralized taxa recovered from this deposit. The mineralized latrine assemblage from the House of the Vestals (VI.I.vii) showed similar characteristics with the mineralized deposits from the House of Hercules' Wedding (VII.IX.x1vii) in which cereals were virtually

absent and fruits and weeds were abundant. This is typical of the preservation found among mineralized contexts (Ciaraldi 2001: 149-152).

Pedological analysis at Pompeii showed that similar soil compositions are present today as in the past: loamy sand to sandy loam, with a high percentage of extractable nutrients and moisture retention capabilities with abundant ash and pumice present (Ciaraldi 2001: 66; Ciaraldi 2007: 49; Foss 1988: 133; Foss et al. 2002: 77-78). Hence, one theory regarding mineralization is that calcium in the subsoil is dissolved into solution by a reaction of percolating ground water on available sources of phosphate (Green 1979: 281). The mineralization process was likely facilitated by a combination of mineral and volcanic ash, as well as partial water logging and leaching of unique contexts of drains and cesspits. Exposure to large quantities of calcium phosphates produces higher quantities of mineralized material. This can be seen in specific deposits from the House of the Vestals (VI.I.vii), as identified and analyzed by Ciaraldi (2001: 162-163), including the drains which span over a century and the toilet feature.

Ciaraldi (2001: 67, 2007: 49-50) argued that some samples from the House of the Vestals (VI.I.vii) underwent water logging during stages of mineralization as a differential density of the mineralized archaeobotanical material was visible through the depth of a deposit. She hypothesized that a liquid medium facilitated this downward movement of heavy preserved botanical material. All seeds were counted, but no mention was made of either the weight or size of the seeds in this analysis. Ciaraldi (2007: 49-50) also observed aggregations of calcium phosphate minerals having vague shapes of seeds within waterlogged samples from the Villa Vesuvio. Again this suggests a possible correlation between mineralization and water logged botanical material. High temperatures are also thought to facilitate the deposition of minerals on organic material, and thus, the high temperatures during the summer months in Campania may have accelerated this process of preservation within the upper soil horizon (Ciaraldi 2001: 67, 2007: 50).

Cross-References

▶ Archaeobotany
▶ Taphonomy: Definition

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Misra, Virendra Nath

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Basic Biographical Information

Virendra Nath Misra (Fig. 1) was born on 17 August 1935 to a farming family in Kandauli village in Farrukhabad district of Uttar Pradesh. In 1951 he became the first student from his village to graduate from high school, which he did at Rastogi School (latter K. R. Rastogi Inter College), Farrukhabad. In 1953 Misra passed his intermediate examination as well as the *Visharad* examination of Hindi Sahitya Sammelan, Allahabad. In 1954 he stood in first position and passed the *Prarthana* certificate examination in Sanskrit from the Government Sanskrit College, Banaras, and won a four-year government scholarship to pursue further studies in Sanskrit. He passed his B.A. entrance examination in 1955 and joined Lucknow University in 1955. He was awarded a two-year bursary scholarship from Lucknow University in recognition of his performance at the B.A entrance examination. He passed his M.A. entrance examination in 1957 and stood first in order of merit in his class. For his performance he won the Pandit Jagpal Krishna Gold Medal. He also passed the *Purva Madhyama* exam in Sanskrit from the Government Sanskrit College, Banaras.

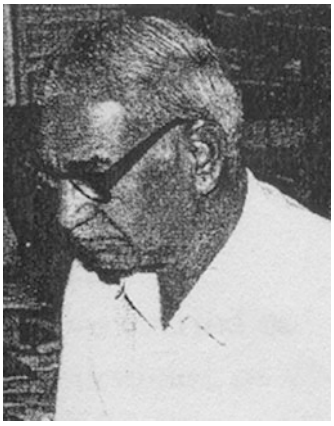

Misra, Virendra Nath, Fig. 1 Photo of Misra

After his M.A., Misra was appointed as a lecturer with the Anthropology Department at Lucknow University, where he taught prehistoric archaeology and social anthropology to B.A. and M.A. students. He got Ph.D. in 1962 from Poona University. On 15 July 1961, he was appointed to an assistant professor's post at Lucknow University and in 1962 he was awarded his Ph.D by Poona University.

From 26 July 1962 to 1981 V.N. Misra was a member staff with the Department of

Archaeology, at Poona University, first as a lecturer (1961–1968) and then as reader and head of department (1968–1981). He later stated that he preferred Pune University to Lucknow University due to better facilities and atmosphere. V.N. Misra also passed certificate courses in French and German from Poona University and Max Mueller Bhavan (Goethe Institute) in 1966 and 1971, respectively, and undertook course in Russian at Poona University. In 1981 he joined Deccan College at Pune as a professor of prehistoric archaeology. Again in 1983 V.N. Misra joined the Department of Anthropology at Lucknow University on September. In 1986 he became Joint Director at Deccan College and Director of the College in 1990. He retired from the latter post on 31 August 2000. He was the editor of *Indian Society for Prehistoric and Quaternary Studies* (ISPQS) in 1989 and also general secretary of the society from 1981 to 2000. Since 2001 he has been the president of the society.

Major Accomplishments

V. N. Misra's career in archaeology has been undertaken during a period of major change in Indian archaeology. During his lifetime many new sites have been discovered and explored. His accomplishments have been achieved local, national and international levels. V.N. Mishra's contributions to archaeology in India started early in his career. During his M.A. he participated in Sankalia's excavation of the Chalcolithic site of Navdatoli in Madhya Pradesh during December 1958. After that, he proceeded to Chittorgarh in Rajasthan in January 1959 and explored Paleolithic sites in the Gambhiri and Berach rivers. From Chittorgarh (Chitorgarh) he went to Pali in western Rajasthan (across the Aravalli Hills) to explore in the Luni River and its tributaries. Through field work in this area and in the valleys of the Banas River and its tributaries in eastern Rajasthan he discovered 14 Lower Paleolithic, 18 Middle Paleolithic, and 4 Mesolithic sites besides a number of Paleolithic and Mesolithic sites which had been discovered by M. N. Deshpande, S. R. Rao, and K. N. Puri of Archaeological Survey of India (ASI) in the valleys of the Chambal rivers and Banas rivers and their tributaries around Chittorgarh. While undertaking his doctoral studies, V.N. Misra wrote a major treatise on the Paleolithic industry of Western Rajputana, which was published in the *Bulletin of the Deccan College* (Misra 1962).

During 1964 and 1965 V.N. Misra analyzed the material from his Rajasthan field work and wrote several articles for different journals and a monograph entitled *Pre- and Protohistory of the Berach Basin*, Southeast Rajasthan, which was published by Deccan College in 1967. He also participated in the prehistoric exploration in the Narmada valley and in the excavations at the Neolithic site of Tekkalakota in Karnataka and the early site of Tripuri in Madhya Pradesh, all under the leadership of H. D. Sankalia. He also explored sites of enigmatic copper hoards as well as Painted Grey Ware and latter cultures in Hardoi, Farrukhabad, Shahjahanpur, and Kanpur districts.

In 1972, V. S. Wakankar (who discovered the site of Bhimbetka in 1957) and V.N. Misra excavated the site in collaboration with the Deccan College.

In 1977, V.N. Misra collaborated with R. P. Dhir, a well-known pedologist of the Central Arid Zone Research Institute (CAZRI), VNM and D. P. Agrawal of Physical Research Laboratory (PRL) to resume a research in Rajasthan to understand the evolution of the environment of the semiarid and arid region, known as Thar Desert, on the western side of the Aravalli. In addition to survey explorations, the team also excavated many sites, namely, Singhvi Talav, Jayal, Chhajoli, Indola-ki-Dhani, Bangar Canal, and in Didwana Lake. V.N. Mishra has played a major role in the development of archaeological research and studies at Deccan College in Pune. In December, 1991 he organized an international workshop at Deccan College on the introduction of African Cultivars into South Asia. The papers were successfully published by the Indian Society for Prehistoric and Quaternary Studies in 2003, Pune, under the tittle Introduction of *African Crops into South Asia*. V.N. Mishra also played a major role in having Deccan College granted the status of Deemed University in 1994.

In 1982, V.N. Misra with the help of V. C. Joshi, the project officer with the Ford Foundation joined the expedition led by the distinguished archaeologist J. D. Clark for search of early humans in Ethiopia. After that V.N. Misra invited Joshi to visit the Deccan College to meet his colleagues and see the research work being undertaken in archaeology. In 1983, Joshi visited and was highly impressed by the research output and potential of the department. This led to the Ford Foundation providing a grant of nearly 300,000 US dollars to the department for argumentation of research facilities. Later, the foundation awarded four more grants and an amount exceeding 800,000 US dollars in total. These grants were used for the acquisition of sophisticated research equipments such as an X-ray diffractometer, atomic absorption spectrophotometer, a number of microscopes, several vehicles for field work, books and journals for the library and for the establishment of a computer center.

In 1972, during V.N. Misra's tenure as Director of Deccan College, the University Grants Commission in India recognized the archaeology department of the Institute for its Special Assistance Programme (SAP). In 1985 the status of the department was upgraded to being a Centre of Advanced Study (CAS). The work of the center was evaluated by expert committees in 1992 and 1998. On the basis of these reports the University Grants Commission sanctioned substantial grants to the department for the acquisition of laboratory equipments, books, journals, vehicles and the hiring of secretarial staffs. V.N. Misra also established a Deccan College emergency relief fund for the peons, watchmen, and other categories of employees whose salaries are low. In addition, he played a major role in the Indian Society for Prehistoric and Quaternary Studies in 1975, which was established to promote research in prehistory, quaternary studies, human evolution and ethnoarchaeology.

The society and its journal *Man and Environment*, which was founded in 1977, have been a misson for V.N. Misra. He was instrumental in establishing the H.D Sankalia Memorial Lecture and the H.D. Sankalia Young Archaeologist Award through the society.

V.N. Misra's distinguished international career has spanned five decades. In 1966 he collaborated with L.S. Leshnik of Heidelberg University, West Germany to carry out extensive explorations in Rajasthan and Gujarat mainly to test Leshnik's hypothesis that early agriculture may have begun in the foothill region of the Aravalli Mountains. They discovered two Mesolithic sites namely Tilwara in Barmer district in western Rajasthan and Bagor in Bhilwara district in eastern Rajasthan. V.N. Misra and his colleagues C.G. Padval and Lakshaman Matal from Pune excavated the sites jointly with the Department of Archaeology and Museums of the Rajasthan Government, Jaipur. The Bagor excavation (1968 to 1970), remains the largest Mesolithic site excavated in India and has provided excellent evidence of the process of acculturation in Indian prehistory. In 1969 V.N. Misra participated in the Second International Conference of Asian Archaeology organized by the Sri Lankan Government's Department of Archaeology at Colombo and presented a paper on his work at Bagor. In 1970 he was awarded a Homi Bhabha fellowship to study European prehistory. He gave lectures on Indian prehistory at several places and participated in Francois Bordes' excavation at Pech de I'aze and in Henry de Lumley's excavation at Grotte de Lazaret in France. On completion of the fellowship V.N. Misra prepared a monograph on *Mesolithic Age in India*, which he submitted to the Homi Bhabha Fellowship Council. In 1969 Jack Golson of the Australian National University, Canberra met V.N. Misra. He invited V.N. Misra to present a paper on Indian Microlithic industries at the eight meeting of the Far Eastern Prehistory Association, held in January, 1971 in Canberra, Australia, under the auspices of the 28th International Congress of Orientalists. In 1979 V.N. Misra went to Greece under the auspices of the Indo-Greek cultural exchange programme. During this time he visited many famous archaeological sites and museums and also gave lectures on Indian Archaeology in the Archaeology Department of the University of Athens. In 1983 he was awarded a senior Fulbright Fellowship, which he held during January-May 1984 at the Department of Anthropology, University of California,

Berkeley. During his 1962 to 1964 explorations in Mewar, he discovered Balathal, one of the nine sites of the Ahar Chalcolithic culture. From the excavation in this site V.N. Misra revealed that the subsistence economy of the Balathal people consisted of cultivation and the domestication of animals and that the technology mainly consisted of copper tools though occasionally stone blades and microliths were also used. V.N. Misra has participated and presented papers in over 50 national and international conferences, seminars, symposia and workshops.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ African Stone Age
- ▶ Bhimbetka Rockshelters
- ▶ Ethnoarchaeology
- ▶ Geoarchaeology
- ▶ Golson, Jack
- ▶ Lithic Technology, Paleolithic
- ▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
- ▶ Oldowan Industrial Complex
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
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Mission Archaeology in North America

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Introduction

Religious missions have played an important role in colonial programs across the globe, and in North America, they were one of the most intense forms of colonialism encountered by indigenous peoples. The archaeological study of missions has followed the same developmental trajectory of historical archaeological research more generally: from particularistic studies focused on restoration of historic sites, to laboratories for building broad cross-cultural generalizations about culture change, to research that furthers our understanding of resistance, cultural hybridity, and human agency.

Mission archaeology includes research on missions founded by various religious orders representing the colonial interests of several European nations. Significant archaeological work, for example, has been conducted on the interactions between Native Americans and Jesuit missionaries operating as part of the French colonial enterprise in North America (Walthall & Emerson 1992), and archaeological studies of mission contexts are growing alongside interest in the archaeology of colonialism more broadly. The Spanish missions established by the Jesuit and Franciscan Orders have attracted the most scholarly attention due to their wide geographic range, long period of operation, and close integration into the broader Spanish colonial enterprise. These missions served as the primary means of bringing diverse groups of indigenous

peoples under colonial control and were a centerpiece of the Spanish colonial strategy in North America.

Definition

Mission archaeology is usually focused on the archaeological study of mission complexes and the activities undertaken therein. Recently, however, this traditional understanding of mission archaeology has been expanded to include a broader concern with the social and cultural implications of missionization, including issues of cultural change and continuity among indigenous groups, as well as the role of missions in colonial economies and indigenous strategies of resistance and perseverance during the colonial period. Accordingly, scholars interested in mission archaeology typically draw on diverse lines of evidence including material culture as well as archival documents and ethnographic data (Graham 1998: 25-6). To best highlight these trends, this entry focuses on the Spanish missions of North America, which date from the 1560s to the 1840s and stretch from the Atlantic coast of Florida and Georgia across the borderlands to Alta and Baja California.

Key Issues

Culture Change and Continuity

Mission archaeology today falls under the broader category of the archaeology of colonialism, and it shares many of the same theoretical concerns. In North America, missions were often the first permanent colonial establishments, and their study can inform our understanding of frontier economies, core-periphery relations, and the intersection of religious and secular interests (Wade 2008; Van Buren 2010). Yet for most contemporary practitioners, the goal of mission archaeology is to examine the complex social relationships and cultural contacts that occurred at missions and related sites. Colonial missions were specifically designed to convert indigenous peoples not just to Christianity but also to Euro-American lifeways, providing archaeologists with datasets uniquely suited to answer broader questions about colonialism and the ways in which native peoples negotiated its constraints.

Mission Architecture

Across North America, many archaeological projects have focused on discovering and delimiting mission architecture. In the Southeast, researchers worked to locate colonial mission complexes, none of which survived intact owing to the vagaries of climate, building materials, and other forces (McEwan 1993; Fig. 1). From central Texas to California, where an arid climate and durable building materials facilitated the preservation of colonial architecture, a great deal of research has been conducted to aid the reconstruction of mission sites and their interpretation for the public (Fig. 2). In addition to providing crucial information about the history of occupation of particular sites, projects concerned with mission architecture also have the potential to illuminate broader issues of colonial and indigenous land use (Allen 2010).

Acculturation

In the second half of the twentieth century, much archaeological research on missions was driven by an interest in acculturation, the cultural modification that occurs as one group adopts the practices and associated material culture of another. As it was employed archaeologically, this framework sought to quantify the amount of culture change that took place among mission neophytes – native converts – by examining ratios of "Indian" to "European" artifacts. Early acculturation studies at Spanish mission sites were undertaken by James Deetz at Mission La Purísima in California and by Charles DiPeso at Mission San Antonio de Padua de Casas Grandes in Chihuahua, Mexico. These studies were problematic inasmuch as artifacts were considered to mark either Spanish or indigenous cultural identity based largely on their material and/or place of manufacture. In his work at Mission Soledad in California, Paul Farnsworth (1992) built upon these models but recognized that the material and origin of a particular artifact says

Mission Archaeology in North America, Fig. 1 Aerial photograph of the two superimposed convento structures at Mission Santa Catalina de Guale in modern-day Georgia, USA. The earlier structure is thought to have been destroyed during the 1597 Guale rebellion (Photo courtesy of David Hurst Thomas)

little about how it was actually used or the symbolic value that may have been attached to it.

Interestingly, the results of several decades of mission archaeology focused on the issues of change and continuity in indigenous societies suggest that Native Americans did not necessarily abandon all of their traditional practices in favor of those of Euro-American colonizers. In Texas, archaeologists found that native peoples living at mission sites continued to employ ceramic and stone tool technologies that were direct extensions of precontact traditions (Hester 1989). Archaeological evidence from California additionally indicates that some native neophytes continued to dwell in traditional structures (Fig. 3) and to engage in some aspects of their hunting and gathering economies as well as other cultural practices such as gambling and contacts with indigenous communities living outside of colonial control (Lightfoot 2005; Panich 2010; Fig. 4).

Resistance and Power

Archaeologists have also sought to understand the issues of power that underpinned the missionary enterprise. One interesting pattern at many Southeastern missions, where shifting political alliances both facilitated and hindered missionization, is that indigenous council houses are often part of the formal mission complex, as at Mission San Luis de Talimali. This architectural layout, unique to La Florida, underscores the political accommodations made by both the Spanish and their would-be converts (Milanich 1999). In the American Southwest, numerous archaeologists have investigated the Pueblo Revolt of 1680 in which Pueblo peoples launched a broad offensive against the Franciscan mission system that involved not just armed resistance but also more subtle reworking of material culture to symbolize social relationships and identities (Preucel 2002). Native resistance to missionization in California has also received significant archaeological attention, with scholars examining the ways that native peoples dealt with missionary policies that included forced relocation, a burdensome labor regimen, and strict social controls (Lightfoot 2005).

The Spanish mission system exacted a very human toll on indigenous peoples throughout North America. Bioarchaeological studies demonstrate how a variety of factors – including relocation to mission sites, increased labor demands, dietary shifts, and introduced diseases – resulted in a general decline in the health of indigenous communities, as well as in broader demographic decline during the colonial period (Larsen 2001). Despite the negative outcomes of missionization, excavations of neophyte cemeteries can also illuminate the nature of religious conversion among mission neophytes. At Mission Santa Catalina de Guale in Georgia, more than 400 native individuals interred in the mission cemetery were laid to rest largely in accordance with Christian practices, although the presence of significant

Mission Archaeology in North America, Fig. 2 Excavators rest near the foundations of Mission Santa Catalina, Baja California, Mexico (Photo by Lee Panich)

Mission Archaeology in North America, Fig. 3 Native American housepit excavated near the site of Mission Santa Clara de Asís in California, USA (Photo by Rebecca Allen)

quantities of grave goods suggests that the Franciscan friars may have deviated slightly from Church doctrine to facilitate the conversion process (Thomas 1988; Fig. 5).

Identity

Research into ethnicity and identity, long a concern for mission archaeologists, is undergoing a fundamental shift. Rather than simply measuring the loss of indigenous cultural practices in mission settings, archaeologists are today considering the various ways that native peoples reinterpreted their identities during the colonial period. In California, studies of archival documents and archaeological artifacts such as mission ceramics demonstrate that native peoples reinterpreted individual and group identity, which often coalesced around a particular

Mission Archaeology in North America, Fig. 4 Obsidian projectile point recovered from Mission Santa Catalina in Baja California, Mexico. The obsidian used to make the object was likely obtained from neighboring unmissionized groups (Photo by Lee Panich)

mission site (Lightfoot 2005). In the Southeast, scholars are also examining the creation of new ethnicities at colonial sites. Christopher Stojanowski, for example, employs skeletal evidence from native communities before and after contact with Europeans to understand the process of demographic change and ethnogenesis in the region (Stojanowski 2010). Throughout North America, missionization often involved changes not just in the practices of everyday life but also in group structure and social organization. To fully understand the implications of such changes, however, we must view them not simply as the result of European domination but also as stemming from the interested actions of indigenous peoples.

In thinking about the dynamic nature of native identities, some archaeologists are considering the implications of missionary colonialism for native peoples today. Kent Lightfoot and others are exploring this issue in California, where many former mission Indians are not recognized by the federal government as legitimate Native American groups due to the often dramatic demographic changes of the colonial period and the assumed success of the missionary program in converting native peoples to European lifeways (Lightfoot 2005). Recent findings suggest that the processes of population aggregation and the creation of novel forms of social organization

Mission Archaeology in North America, Fig. 5 Assorted beads (out of almost 70,000) recovered from the Santa Catalina de Guale cemetery in Georgia, USA. Bead types pictured include Ichetucknee Blue, Seven Oaks Gilded, and several hollow, blown beads (Photo by Bill Ballenberg, courtesy of David Hurst Thomas)

and identity put missionized groups at a political disadvantage compared to other indigenous groups who more closely resembled the ideal anthropological model of California Indians. By exploring the varied ways that the diverse indigenous peoples who were drawn into colonial missions managed to maintain and recreate their identities during the colonial period and its aftermath, archaeologists may find common ground for collaboration with descendant communities.

Future Directions

Across North America, archaeological research at missions and related sites shows that native peoples perpetuated many aspects of their traditional cultural practices at the same time that they

modified them to suit their new colonial situations. Careful archaeological analysis of mission-period materials suggests that native people often maintained settlement patterns, architectural styles, technologies such as ceramics and stone tools, and/or diets that were distinct from those of Euro-American colonists and which underscore significant continuities from late precontact times or represent conscious reconfiguring of traditional practices in opposition to colonization. Yet, in many cases, Native Americans did also adopt certain aspects of Euro-American culture at mission sites, and tragically, the effects of infectious disease, stringent labor demands, and overcrowding at missions combined to significantly change the demographic structure of native polities. The promise and challenge of mission archaeology in the twenty-first century will be to make sense of both the changes and continuities visible in the archaeological and ethnohistorical record of colonial missions throughout North America.

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- ▶ Ethnic Identity and Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
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Missionization and Mission Archaeology in New Zealand and Australia

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Introduction

Recent work in the field of mission archaeology in New Zealand and Australia shows that despite

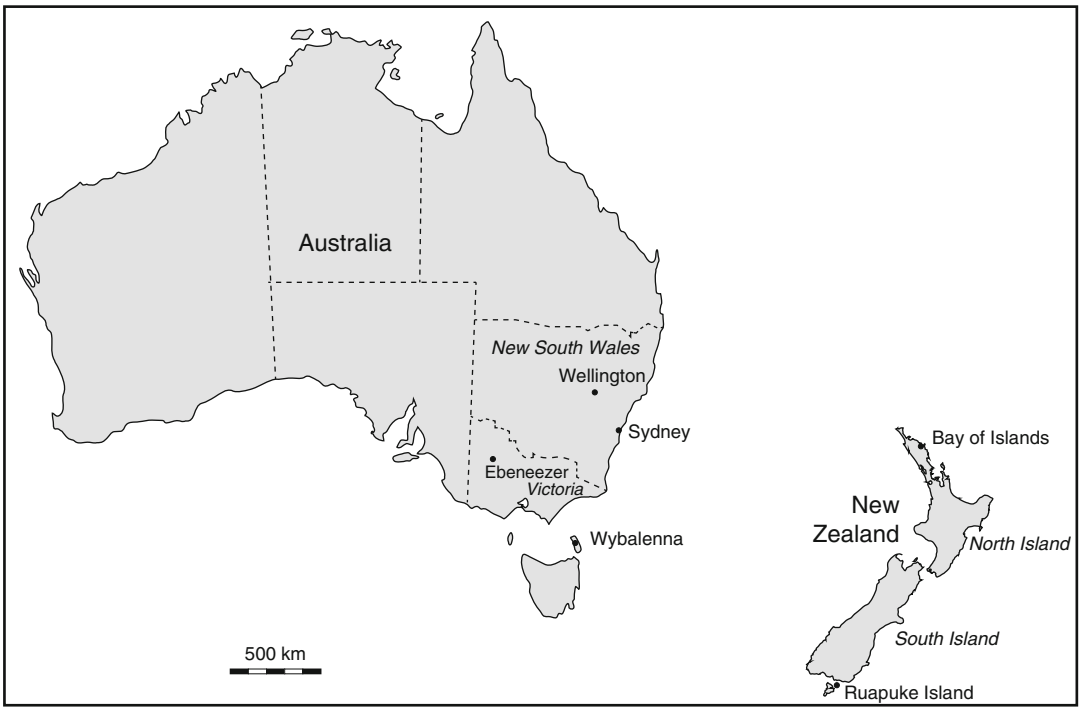

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 1 Map of New Zealand and Australia showing locations of relevant sites

often-assumed historical similarities of these geographically close countries, there were two differing histories of colonial and indigenous encounter, leading to two quite different trajectories of missionization.

Missionization was in the vanguard of colonization in New Zealand, where the first Christian, evangelical mission was founded in 1814, preceding formal British annexation in 1840. In Australia, the situation was reversed. The first British convicts arrived in New South Wales (NSW) in 1788, but, despite earlier efforts, it was not until about 1832 that missions to Aboriginal Australians were properly established (Fig. 1).

Definition

The Oxford dictionary defines a "mission" as a "body sent by religious community to propagate its faith." However, the literature of mission archaeology includes a broad range of different types of organizations and institutions. The Australian archaeological and anthropological literature extends the term to include government organizations and secular successors to missions as well as government reserves, institutions that were not religious or evangelizing in nature (Harris1990: 583).

In New Zealand, where missions were private initiatives of evangelical societies, without any governmental involvement, Snow's (1967, in Middleton 2008: 11) definition is useful:

"A mission is an ecclesiastical unit of area of sufficient size, within which all activities (such as construction, farming, handicrafts, herding, recreation etc.) are administered by a ministry commissioned by, and dependent upon, a larger religious organization for direction or financial support".

"Missionization" is defined as the process of carrying on mission work (http://www.merriam-webster.com/dictionary/), while "mission archaeology" is concerned with the archaeology and material culture of mission stations and

similar sites, a term defined by Graham (1998: 25) in relation to the "Christianization of the Americas."

Key Issues/Current Debates

While Snow's definition applied to New Zealand mission stations, which were primarily the initiative of individuals and Protestant evangelical organizations such as the Church Missionary Society (CMS) and the Wesleyan Missionary Society (WMS), missionization in Australia was quite different (Middleton 2010). However, this definition itself is contested in the literature of Australasian mission archaeology (Middleton 2008: 10; Lydon & Ash 2010: 2). "Missions" in Australia included government institutions, largely "carceral" in which indigenous Aboriginals were confined, a central element in Australian Aboriginal policy (Grimshaw & Nelson 2001; Sutton 2003; Lydon & Ash 2010: 1). This pivotal difference is a factor in the analysis of a two-part typology of mission stations in the New World, the "household" and the "institutional" mission (Middleton 2008: 28-30, 2010, 2012).

Missionization in New Zealand commenced in 1814 with the establishment of the first Church Missionary Society mission at Hohi (also known as Oihi; Bay of Islands, northern New Zealand), also the first permanent European settlement in the country. This was the brainchild of Samuel Marsden, chaplain to the British convict settlement (established 1788) at Port Jackson (Sydney). Protestant missions in New Zealand demonstrate the "household" mission. These were marginal, fragile establishments based on the model of the Christian household, the missionary family living in a small home, initially dependent on Maori benefactors for protection and food. Spatial factors also differentiated these two models. "Household" missions were usually surrounded by fences, built to protect mission families, and prevent unwanted intrusions by Maori (other than the benefactor tribe); the Maori population lived beyond these walls, the missionary often "itinerating" or traveling to nearby villages to catechize, preach, and Christianize. By contrast, the "institutional" mission usually featured fences constructed to incarcerate Aboriginal Australians. Within such institutions, Aboriginal lives were segregated and regimented, and forced child removals began the phenomenon of the "Stolen Generations." Although these were sites of coercion, they also served as "refuges from the effects of invasion" and have become sites "inscribed with new cultures and identities" (Lydon & Ash 2010: 2).

Mission archaeology in Australia began with Birmingham's (1992) seminal work on Wybalenna Station, established on Flinders Island, where some 100 surviving Tasmanian Aboriginals were moved in 1830. Birmingham's original fieldwork was undertaken between 1969 and 1971, the same decade that James Deetz began his work in California. This settlement typifies the Australian situation. Wybalenna was "part of a government segregation initiative to protect white settlers and indigenous Australians from each other during the European occupation of Aboriginal land" (Birmingham & Wilson 2010: 18). Birmingham used documentary records alongside archaeology to reconstruct the 15 or so years of Aboriginal occupation at Wybalenna. Investigations revealed the remains of five brick cottages out of a likely original 20 and the chapel, built in 1837. A range of European items including transfer-printed ceramics, glass, buttons, clay pipes, nails, and other metal along with indigenous artifacts and faunal remains were recovered. Commander George Robinson's journal details daily events and rations and goods supplied such as clothing and building materials. Wybalenna had a structure similar to many mission settlements with obligatory church attendance, work, and education programs; the remnant Aboriginal population was effectively incarcerated on the island (Harris 1990; Birmingham 1992). The settlement closed in 1847 when the last 44 surviving Aboriginals moved to a new location close to Hobart.

Grimshaw and Nelson's (2001) analysis of the "civilizing mission" of evangelicals supports this argument. In Victoria as elsewhere in Australia, the congruence of missionary goals and state

agendas led to a situation where missions appeared to run almost as prisons. "Missionaries and managers appeared not to be their [inmates'] protagonists but their jailers. Religious and secular staff had acquired a capacity for surveillance, coercion and punishment . . . few outside Australia ever realised," where a "travesty of Christian humanitarianism" was demonstrated (Grimshaw & Nelson 2001: 297).

More recent approaches however have reconsidered the view of the Australian mission as a repressive regime. Lydon and Burns (2010: 41) consider this approach marginalizes Aboriginal people, perpetuating a "view of the missions as places of acculturation rather than indigenous transformation and cultural renewal," the ruins of the mission seen to mark the disappearance of Aboriginal identity and the advent of a white future. Mission stations, in this case principally government institutions run by Protestant missionaries working as their agents (Grimshaw & Nelson 2001), are now viewed as "homelands," where kinship ties were formed and indigenous ownership assumed.

Through recent research with indigenous communities working alongside archaeologists, Aboriginal descendants of mission inmates now acknowledge a deep although sometimes ambivalent connection to such places, demonstrated in Lydon and Burns' (2010) examination of the Moravian mission at Ebenezer, in Victoria. As was the case with many missions, Ebenezer was built on traditional country of the Wergaia-language speakers, a refuge from a hostile settler population. Archaeology has become important in recent years in the process of reclaiming such places for the descendent community. While built heritage such as remaining church structures may appeal to the non-Aboriginal community, Aboriginal focus tends to rest on "the more ephemeral traces of Aboriginal-occupied households" and ancestral graves, with a variety of noninvasive archaeological techniques used to identify the location of formerly lost burials (Lydon & Burns 2010: 43).

The Wellington Valley Mission in northern NSW was the first CMS mission in Australia, established in 1832 in the structures of the earlier Wellington Convict Station (Ireland 2010). The "colonial landscape" of the convict and then mission station remains intact and recognizable today. Recent work by Tracy Ireland (2010) has revealed the location of the former government, then mission house, military barracks, and a store, as well as other possible associated sites beyond what is now the Maynggu Ganai Historic Site, after its purchase by the NSW Government for the National Parks and Wildlife Service. The colonial government transferred the convict station to the CMS in 1832 with the expectation that this would facilitate the settler acquisition of land and acculturation of the indigenous Wiradjuri people to work within the pastoralist industry. This was not successful and the mission closed in 1842. Here, as well as in other missions, Aboriginal children were forcibly removed from their families and confined along with young women within the mission compound. As at the Ebenezer mission, the role of missionary wives within the mission house and domestic sphere played a vital role in modeling a "civilized" Christian ideology within a larger "wild" landscape. The landscape of Maynggu Ganai today can be read as a significant place in the "local reconciliation process," where both "black and white people together" can value the landscape for its entangled cultural past and contested histories (Ireland 2010: 152). Ireland endeavored to acknowledge these values, resonating with some of Australia's most important current cultural and political issues, in the conservation plan for the site.

Ireland's examination of Maynggu Ganai Historic Site began with discussion of an 1826 watercolor of the convict station landscape by English artist Augustus Earle, featuring an Australian Aboriginal in the foreground of a colonial landscape. Later that same year, Earle traveled to the Bay of Islands where he executed studies of the Hohi mission (Fig. 3; Middleton 2008: 53, 87; 2010: 172; Smith et al. in press), the Kerikeri mission, the Maori stronghold at Kororareka, and other subjects. The Te Puna mission, also a CMS station, was established in 1832, the same year as the Wellington mission, following the demise of Hohi the same year (Fig. 2).

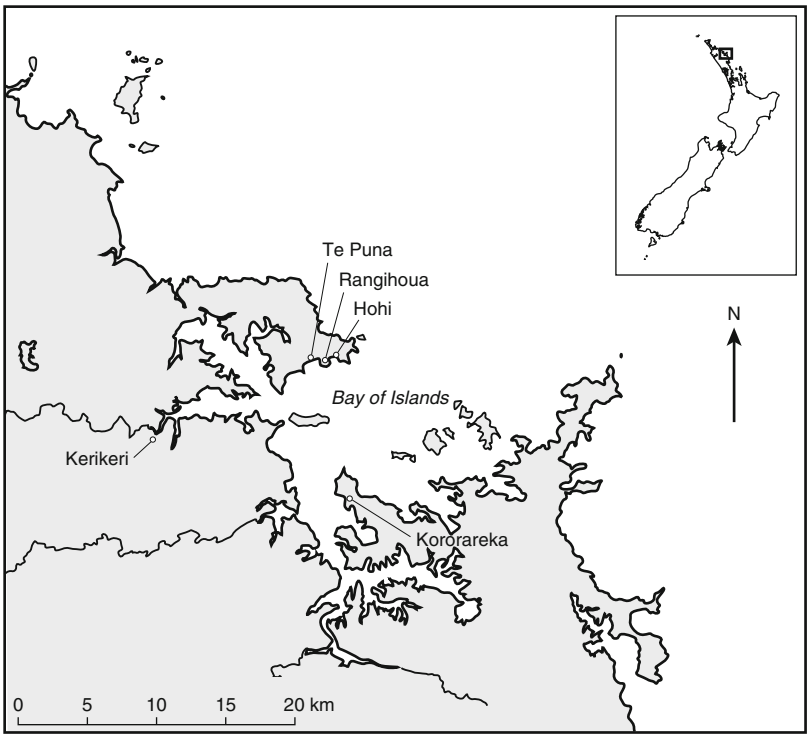

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 2 Map of Bay of Islands, New Zealand, showing relevant sites

Although New Zealand historians have written widely on the history of missionaries and missions, and there have been earlier, partial investigations of mission sites associated with extant mission building restoration and service upgrades, the first research-based investigation took place at Te Puna in 2002 (Middleton 2008). This revealed the remains of the mission house, in particular the cellar, filled with artifacts and building debris (Fig. 4) in which the King family once lived, eking out a subsistence existence from a small piece of land, teaching and attempting to convert Maori, trading goods for food and labor with Maori at nearby Rangihoua Pa, and modeling the appropriate Christian standards of domesticity and gender roles to the Maori population from a marginal site of Christian "civilization."

Between the establishment of Oihi in 1814 and its closure in 1832, four more missions were set up in the Bay of Islands, with others soon following, extending down the length of the North Island and into the South Island, finally to Ruapuke Island in Foveaux Strait (Middleton in press). Surveys of these and later CMS and WMS sites, along with archaeological, visual, and archival sources, demonstrate a similar spatial and social model of the mission station as that found at Te Puna. The typical New Zealand mission station consisted of the missionary husband, wife, and family living in a simple, usually wooden, house, sometimes with a chapel and school associated. One of the principal aims of the mission, alongside conversion to Christianity, was the cultural transformation of Maori society through the model of Christian daily life and domestic practices (Middleton 2007a; 2012). This finding is similar to that of Jane Lydon's (2009) work at the Ebenezer mission. In this focus on domesticity, both the "institutional" and "household" missions shared an ideology (Middleton 2012). Trade and the development of a "global spirit of commerce" (Comaroff & Comaroff 1991: 9) were important factors in New Zealand from 1814; artifacts from the Te Puna archaeological context, analyzed alongside accounts, demonstrate the role of the mission in trading with Maori (Middleton 2007b) and the

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 3 The mission station of Hohi (Oihi) to the right of the valley, with Rangihoua Pa on the hill rising to the left (Augustus Earle, 1827–1828. National Library of Australia PIC T176 NK12/139)

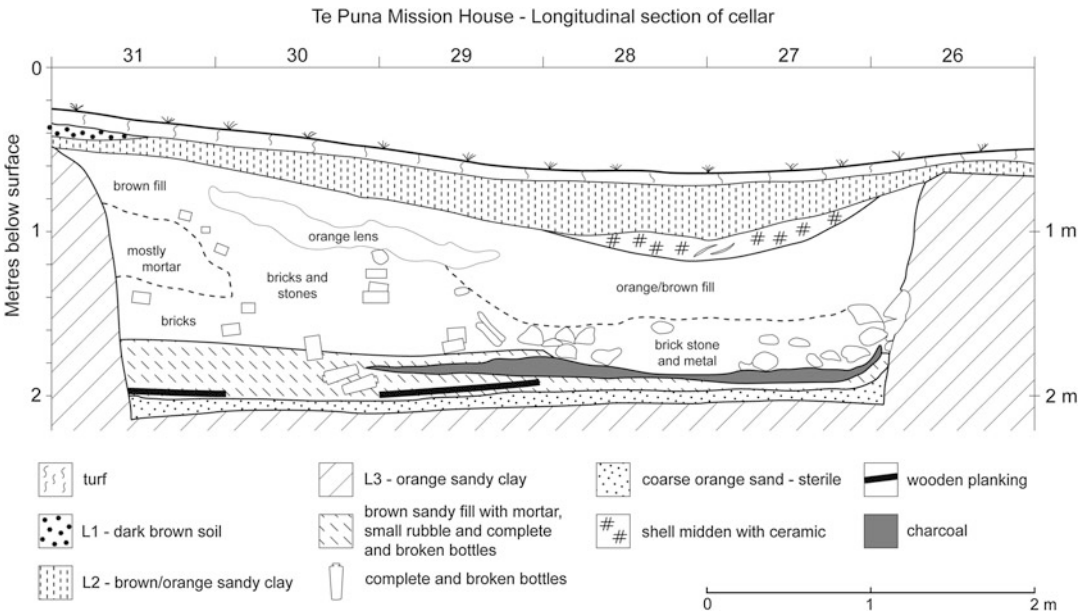

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 4 Profile of the Te Puna cellar excavation, view to the south

advent of capitalism, one of historical archaeology's central themes.

In New Zealand, as elsewhere across the New World, missionaries were deeply implicated in the processes of colonization; CMS leader Henry Williams played a pivotal role in negotiations between Maori and British with his translation (often construed as misleading) of Te Tiriti o Waitangi (the signed version of the Treaty of Waitangi) in 1840. When wars over land and

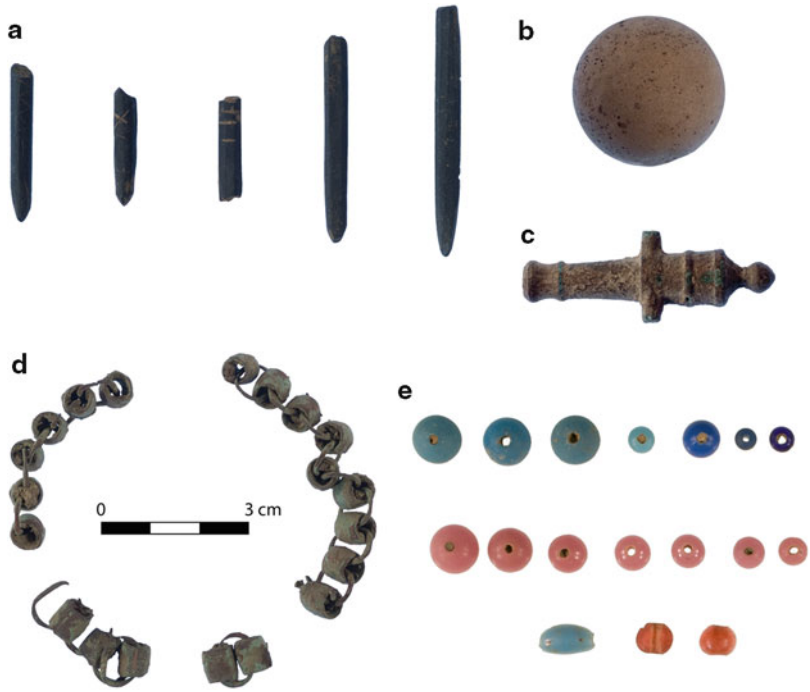

Missionization and Mission Archaeology in New Zealand and Australia, Fig. 5 Artifacts recovered from the Hohi school site

sovereignty broke out, Williams and others trod a tenuous line between government policy and support for Maori, seen as disloyalty to the British. There was also the question of missionary purchases of large tracts of Maori land made prior to 1840.

The approach of the year 2014 brings the bicentenary of the establishment of New Zealand's first mission at Hohi into focus. In another contrast with Australian archaeology, Maori who hold *mana whenua* (traditional authority over land) at Oihi acknowledge that it is the missionary descendants who hold this *mana* over the mission site; Maori authority stands over Rangihoua, the pa alongside. Historically, Maori were not contained within the mission but, from the fortification where they lived, exercised power and control over the mission's inhabitants. One season of fieldwork at Hohi has now been carried out, revealing the remains of New Zealand's first school, completed in 1816 (Fig. 5; Smith et al. in press). Further work is planned for 2013 at this foundation site of nationhood.

Cross-References

- ▶ Australasian Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ Oceania: Historical Archaeology

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Mizoguchi, Koji

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Basic Biographical Information

Koji Mizoguchi was born in 1963 at Kitakyushu City, Fukuoka Prefecture, Japan. He is a Japanese archaeologist who specializes in social archaeology. After being awarded his Ph.D. in archaeology from the University of Cambridge, United Kingdom, in 1995, Professor Mizoguchi became an Associate Professor in archaeology at the Graduate School of Social and Cultural Studies, Kyushu University, Fukuoka, Japan. In 2013, he was promoted to Professor at Kyushu University. From 2000 to 2002, Professor Mizoguchi taught Japanese Archaeology at the Institute of Archaeology, University College London, United Kingdom (Fig. 1).

Major Accomplishments

Professor Mizoguchi has published extensively on Japanese and European archaeology and on archaeological theory. His books *An Archaeological History of Japan: 30.000 BC to AD 700* (2002) and *Archaeology, Society and Identity in Modern Japan* (2006) are considered to be essential reading for anyone studying Japanese archaeology in English. His early work concentrated on the investigation of mortuary practice in the Yayoi period (900–400 BCE to mid-third-century CE) in Japan. He conducted a detailed examination of how mortuary practices informed, and were informed by, the social structure and material culture of Yayoi societies. After that, his research scope gradually extended to explore the application of advanced archaeological theory and methodology. Often, he built on contemporary sociological and anthropological scholarship, by applying this to an understanding of prehistoric societies in Japan, notably those in the Jomon, Yayoi, and Kofun periods, and also in terms of the historical formation of Japanese national identities.

Mizoguchi, Koji, Fig. 1 Koji Mizoguchi

Professor Mizoguchi's English language publications have made a major contribution towards increasing international understandings of Japanese archaeology. His book *An Archaeological History of Japan: 30.000 BC to AD 700* made a groundbreaking contribution to the integration of traditional archaeological investigation and contemporary critical sociological and anthropological theory. Drawing on reflexive postprocessual theory and further extending it, he critically examined the notion widely shared among the Japanese that a unique culture had existed uninterrupted on the Japanese archipelago since the first human settlements more than 30,000 years ago. His critical and reflexive investigation of Japanese archaeology was developed further in his book *Archaeology, Society and Identity in Modern Japan*, which delves into the role of archaeology in the formation of the modern Japanese nation and explores the process by which archaeological practice is shaped by national social and intellectual discourse.

Professor Mizoguchi is recognized for his contributions to the "internationalization" of Japanese archaeology. Often, outsiders view Japanese archaeology as exotic and yet esoteric. This is due to linguistic barriers and a tendency for Japanese archaeologists to focus on detailed history and chronology at national, regional, and local levels, which are, in part, a product of the meticulous and highly organized recording techniques adopted at every stage of archaeological investigations in Japan. In addition to his publications in English, Professor Mizoguchi has encouraged his students to communicate, present, and publish their research in English and to take part in archaeological excavations, workshops, and conferences abroad.

In 2006, Professor Mizoguchi was awarded the Japan Society for the Promotion of Science Prize in recognition of the contribution that his extensive publications, research, and pedagogy have made to situating Japanese archaeology within a broader framework of world archaeology. In January 2013, he was elected as President of the World Archaeological Congress (WAC) during the Seventh World Archaeological Congress, held at the Dead Sea, Jordan.

Cross-References

- ▶ Post-Processual Archaeology
- ▶ Social Archaeology
- ▶ World Archaeological Congress (WAC)

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This encyclopedia includes no entries beginning with Mj–Mn.

Mobiliary Art, Paleolithic

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Introduction

A key question in human evolution is when members of our lineage developed symbolic material culture. An obvious outcome of such an innovation in mobile hunter-gatherer societies is the production of purely symbolic or functional/symbolic portable objects that were designed, carved, or decorated according to the rules dictated by the society's vision of the world. Formally identified for the first time from French Upper Paleolithic sites during the second half of the nineteenth century, such objects have been subsumed under the broad category of mobiliary or portable art in order to distinguish them from painted, sculpted, or engraved representations identified on cave walls (Bahn & Vertut 1997). Since their recognition, instances of mobiliary art have been used to refine the chrono-stratigraphy of the Upper Paleolithic, provide more accurate cultural attributions of cave art, improve our understanding of Paleolithic technology, identify site function, and address issues related to cognition, gender, ethnic affiliation, or social status. Although the recent discovery of symbolic items from sites in Africa and Eurasia that predate the emergence of the European Upper Paleolithic has broadened the potential application of this term to other contexts, most European scholars continue to reserve it for objects found at European sites dated to between 40 and 10 kya.

Definition

The terms "mobiliary art" and "portable art" refer to incised, engraved, perforated, carved, or painted objects found at Paleolithic and Mesolithic sites across the world. Personal ornaments, a variety of tools, and items of hunting equipment have also been included in this category, particularly when decorated with abstract or depictional representations. Mobiliary art includes objects made from a large variety of organic (bone, ivory, antler, teeth, shell, amber, coral, lignite) and inorganic materials (limestone, sandstone, schist, marl, steatite, calcite, clay). The size of these objects varies significantly, ranging from tiny pieces that can hardly be held in one's hand to examples weighting dozens of kilograms that could only have been displaced a few meters at most.

Both depictional and what we perceive as abstract representations are found on Upper Paleolithic mobiliary art items.

Animals largely dominate the depictional representations and their repertoire appears more varied than those present on cave walls. Herbivores prevail. Horse and bison are the more abundant, followed by ibex, the deer-doe combination, reindeer, and ox (Fig. 1, n°1, 2, 5, 6, 7; Fig. 2, n°4–6). Mammoths and carnivores (felines, bear, fox) are also represented along with occasional marine mammals (seals, cetaceans), fish, birds, amphibians, and insects. Human representations are relatively abundant at a number of sites, while rare or absent at others. Representations of women or female body parts occur more frequently than do their male counterparts. A special category of female mobiliary art are the so-called Gravettian "Venuses" (Fig. 2, n°2), the first known tradition of carved human representations spread across a large territory covering more than a million square kilometer.

A similar tradition is embodied in the engraved or occasionally carved schematic female figures from the Magdalenian in which diagnostic female attributes are often omitted and the subject resumed simply by the line of the back and the buttocks (Fig. 2, n°3). Carved or engraved anthropomorphic representations with added animal features, such as the human with a lion head found at Hohlenstein-Stadel (Germany), remain exceptional (Fig. 2, n°1). Plants, possible maps, and landscapes are extremely rare.

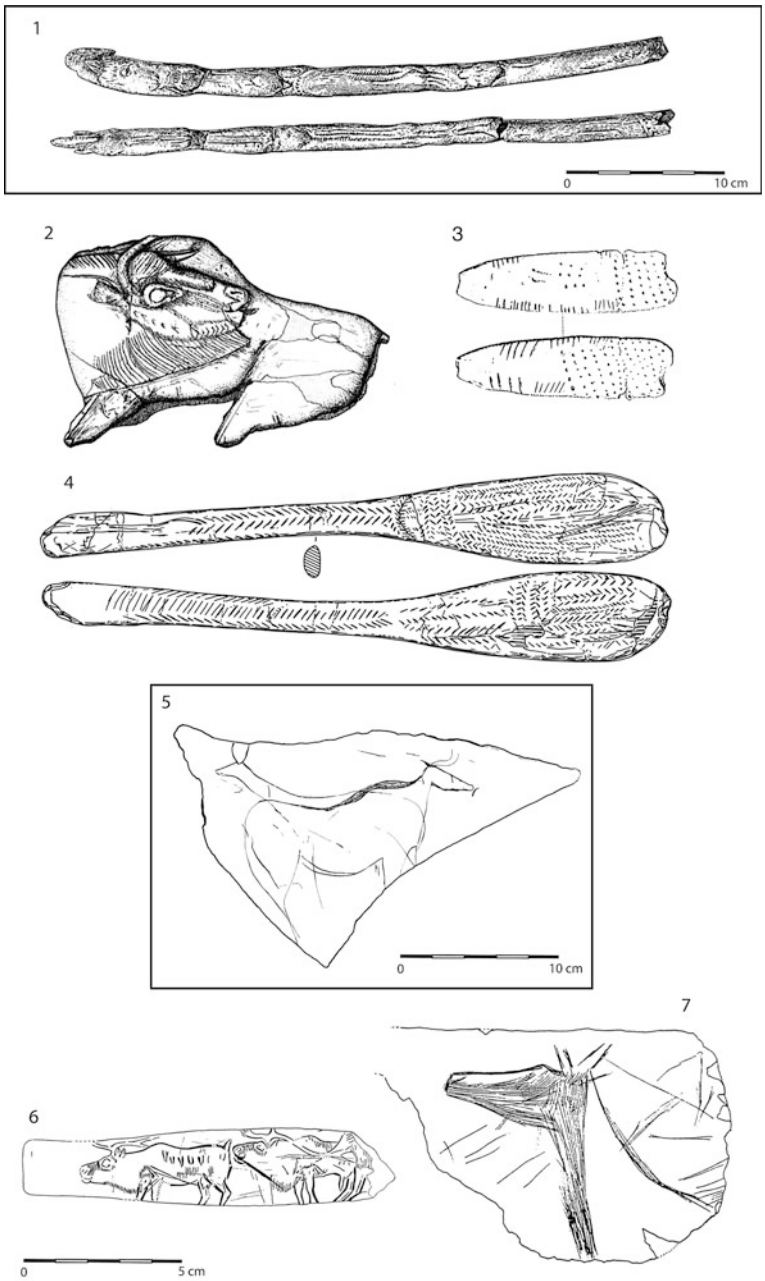

Mobiliary Art, Paleolithic, Fig. 1 The large variety of decorated supports in the European Upper decorated objects: *1* spear thrower carved into a horse head from Bruniquel (After E. Cartailhac); *2* spear thrower carved into a bison licking its flank from La Madeleine (After P. Paillet); *3* smoother with engraved lines and punctures from Gorge d'Enfer (After E. Lartet and L. Christy); *4* smoother with a complex geometric decoration from Dolní-Včstonice (After B. Klima); *5* engraved slab with a doe and an ox from El Parpallo (After V. Villaverde Bonilla); *6* engraved antler with two mating reindeers from La Vache (After A. Roussot); *7* deer scapula with the engraving of a doe from Altamira (After I. Barandiaran)

Although engraved subjects are generally presented in profile, the artist is often able to infuse a realistic illusion by twisting body parts coupled with the use of foreshortening. The morphology of the raw material can also occasion anatomical distortions, focus the artist's attention on particular body parts, or constrain the posture of animals. This latter case is well exemplified by the turned head of the famous bison licking its flank from the site of La Madeleine (Fig. 1, n°2).

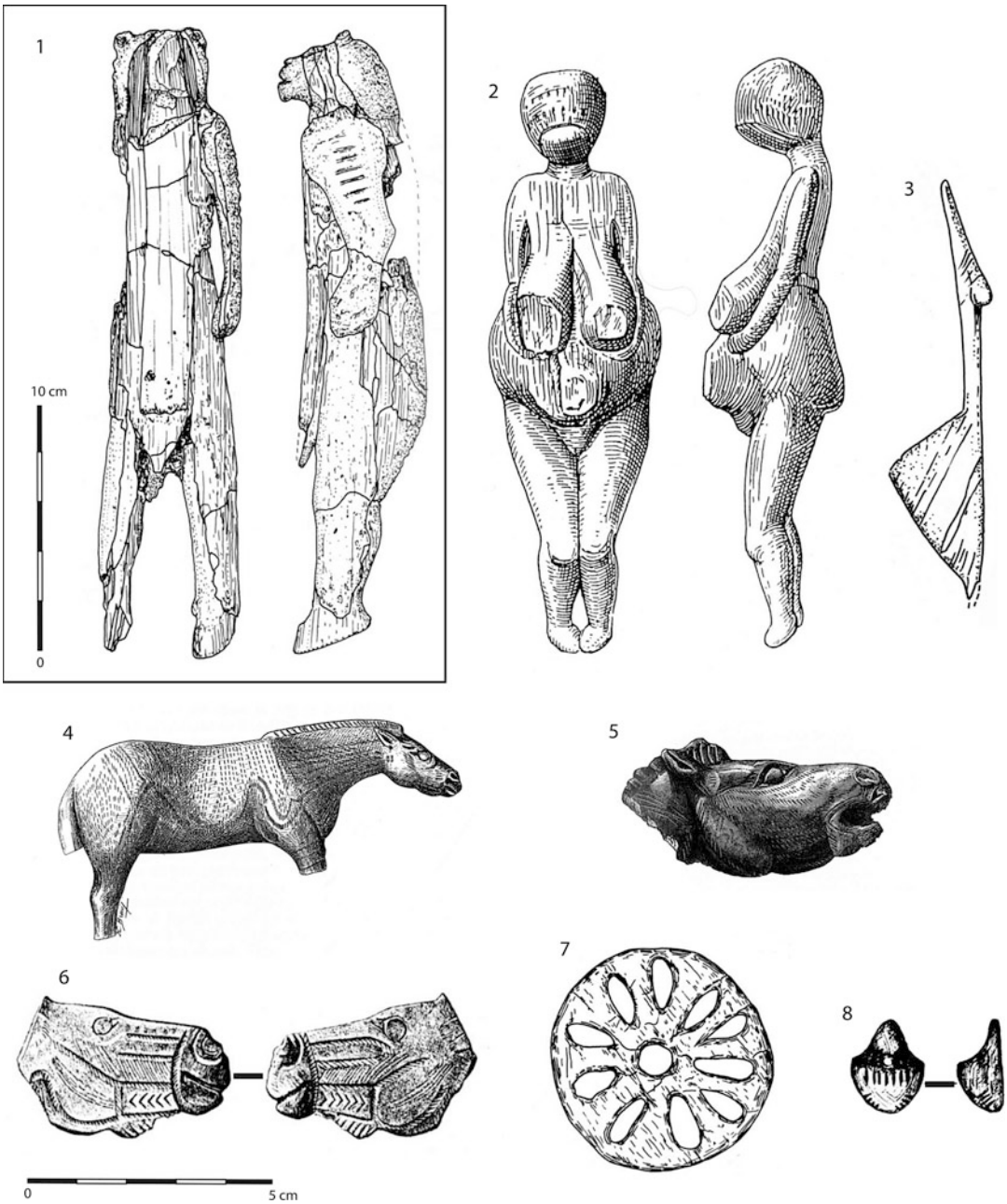

Mobiliary Art, Paleolithic, Fig. 2 Figurines and personal ornaments from the European Upper Paleolithic: *1* Hohlenstein-Stadel hybrid figurine (After J. Hahn); *2* Kostienki 1-I female figurine (After M. Gvozdover); *3* Gönnersdorf female figurine (After G. Bosinski); *4* Lourdes horse figurine (After E. Piette); *5* Mas d'Azil figurine of a whinnying horse (After E. Piette); *6* Mas d'Azil contour découpé (After E. Piette); *7* Sungir perforated disk (After P.I. Boriskovski); *8* Roc-aux-Sorciers 'stomach-bead' (After L. Rousseau)

Significant formal variability is also evident in the animals represented on mobiliary art objects; they may appear realistic, schematic, or sometimes even caricatural. Scenes involving animals, humans, or animals and humans together are rare with the compositions for the most part appearing symbolic rather than narrative.

Geometric signs, including simple lines, dots, circles, triangles, chevrons, and more complex patterns, also occur (Fig. 1, n°3–4; Fig. 2, n°7–8). In a number of cases, these various forms are associated with depictional representations. A variety of different typological classifications have been proposed for organizing these signs (Leroi-Gourhan 1965; Sauvet et al. 1977).

The themes represented and techniques used appear to depend on the type of artifact decorated (Leroi-Gourhan 1965). Among functional objects, items with short use-lives such as projectile points and harpoons usually bear engravings of simple abstract motifs. More technically elaborate, long-lasting objects (spear throwers, *bâtons percé*, half-round rods, spatulas, smoothers) often carry more complex associations combining abstract and figurative themes. Spear throwers and *bâtons percés* are carved into animal or human depictions (Fig. 1, n°1–2). The ends of smoothers are shaped into fish fin or various geometric shapes (triangles, circles, square with excrescences). Engraved decorations can sometimes extend onto the shafts (Fig. 1, n°3–4).

Mobiliary art is particularly abundant at some sites, and is rare or absent at others. From Spain to Russia, some Paleolithic sites stand out for the quality and amount of decorated objects: spectacular bone objects come from Mas-d'Azil, Altamira, El Castillo, El Juyo, Polesini, Paglicci; antler objects from La Vache, La Madeleine, Laugerie-Basse, Isturitz, Gourdan, Plantade, Montastruc, Le Morin, Raymonden, La Viña; ivory objects from Dolni Vestonice, Pavlov, Kostienki, Mezin, Mezerich Hohle Fels, Vogelherd, Geissenklösterle, Brassempouy; stone carvings from Grimaldi, Duruthy; painted and engraved pebbles from Mas d'Azil and Rochedane; slabs from La Marche, Gönnersdorf, El Parpalló, Enlène, La Paloma, Limeuil (Corchón Rodriguez 1986; Sieveking 1987; Leonardi 1988; Villaverde Bonilla 1994; Abramova 1995; Delporte & Clottes 1996; Bosinski et al. 2001; Tosello 2003; Arías Cabal & Ontañon Peredo 2004). Engravings on slabs differ from other mobiliary art categories in that dozens of figurative and abstract depictions as well as randomly oriented lines may be superimposed on the same surface, suggesting repeated use of the support (Fig. 1, n°5–7).

The best known carvings are those representing women; however, animals, including herbivores (Vogelherd, Isturitz, Duruthy), carnivores (Geissenklösterle, Pavlov), and birds (Malta), are also depicted (Fig. 2, n°1–5). Few carvings only portray select body parts (the head, breasts, genitals, trunk, and thigh) and the degree to which they are elaborated varies. In some cases, the artist invested considerable effort to reproduce more intimate details, while in others the carvings appear to have been left deliberately unfinished as can be seen in select examples from Kostienki (Abramova 1995; Dupuy 2007).

Personal ornaments are made of a variety of raw materials (animal and human teeth, marine shells, fossils, bone, antler, ivory, stone, amber, lignite). In most cases, anthropogenic modifications consist only of a perforation or a groove to facilitate suspension. However, fully carved beads and pendants, in some cases decorated with abstract or depictional representations, also exist (Fig. 2, n°7–8). Shaped beads have rounded and elongated morphologies (bowl-shaped beads, tear-shaped beads, basket-shaped beads, rounded beads, perforated disks, etc.). Pendants consisting of small carvings or which employ the natural shape of bones to portray the heads of horse, bison, ibex, or chamois are rarer (Fig. 2, n°6).

Key Issues and Current Debates

The Earliest "Art" Objects

Until recently, the invention of portable symbolic items was considered to be synonymous with the colonization of Europe by anatomically modern populations some 40,000 years ago (ka). Instances of nonutilitarian behaviors older than 40 ka from Neandertal sites in Eurasia and *Homo*

sapiens sites in Africa were considered ambiguous with respect to their significance and anthropogenic nature. New evidence for symbolic behavior from Middle Stone Age sites in Africa and Mousterian sites in Europe and Western Asia challenges this model. However, views diverge concerning the interpretation and significance of individual finds.

Some scholars have claimed that traces of symbolic behavior can be found earlier in Europe at sites associated with early Neandertals and pre-Neandertal hominins. It is difficult to accept the validity of these claims, given that the human manufacture, intentional nature, and symbolic or functional significance of many objects remain to be determined. Symbolic interpretations have been formally rejected for a number of objects following demonstrations that the modifications originally described as anthropogenic and bearing symbolic meaning were in fact natural in origin. Examples include grooved and perforated objects from Lower and Middle Paleolithic sites in Europe and North Africa such as Pech de l'Azé II, Stránska Skála, Kulna, Bois Roche, Cueva Morin, Haua Fteah, Molodova, Divje Babe. Initially interpreted as intentionally engraved items, personal ornaments, or musical instruments, when submitted to a closer scrutiny, these objects instead appear to be bones bearing vascular grooves, damaged by carnivores or simply fakes. This reassessment, however, has not addressed all items reported in the literature as possible early instances of "mobiliary art." On the basis of published photo and descriptions, several stone and bone objects reported from Lower and Middle Paleolithic sites in Europe, the Near East, and Africa (Makapansgat, Bilzingsleben, Tata, Tan Tan, Bacho Kiro, Temnata, Kozarnika, etc.) might well bear deliberate modifications indicative of their use in symbolic activities.

African Middle Stone Age

The archaeological evidence for southern African MSA engravings reveals a complex pattern with several sites yielding isolated pieces and only a few providing consistent evidence. A banded ironstone slab with a few superficial scratches has been recently reported from the Fauresmith levels of Wonderwerk cave (Excavation 6) and dated to at least 187 ka. The random orientation and shallow nature of the lines suggest, however, that they may result from trampling rather than engraving. A piece of ochre from levels at Pinnacle Point Cave dated to 164 ka is argued to have been decorated with a chevron pattern. Pieces with dendritic and convergent line motifs have been recovered from 100 kya contexts at Pinnacle Point in the Western Cape, while parallel linear engravings are reported from an undated MSA context at Bushman Rockshelter in Mpumalanga Province. A cross-hatched pattern engraved on a small ochre slab from Klein Kliphuis in the Western Cape and an engraved stone fragment recovered by Sydow in 1963 at a site containing only MSA lithics near Palmenhorst and Rossing in the Swakop Valley, Namibia also exhibits a cross-hatched pattern. Engraved patterns also appear on an ochre fragment recovered by Malan near the Cape Hangklip Rockshelter in the Western Cape and at Apollo II in southern Namibia. Bone fragments engraved with parallel lines have been documented at Klasies River and Sibudu Cave. The most conspicuous collections of engraved items are the engraved ochre pieces from Blombos Cave (Fig. 3, n°1) and engraved ostrich eggshell fragments from Diepkloof Rockshelter in the Western Cape Province of South Africa. At Blombos Cave, 15 pieces exhibit intentionally engraved abstract patterns from levels ranging from 100 to 75 kya. At Diepkloof, some 270 ostrich eggshell fragments engraved with abstract geometric patterns have been recovered from Howieson's Poort levels dated to 60 ka (Texier et al. 2010).

A recently identified chunk of engraved pigment from the Middle Stone Age levels of Klasies River Cave 1, South Africa, has been dated to between 100 and 85 ka. Microscopic analysis reveals that the surface of the object was ground until smooth before being engraved with a sequence of subparallel lines. X-ray fluorescence and colorimetric analysis of the object and a sample of 12 additional ochre pieces from the same level reveals that the brown color and manganese-rich composition render the engraved

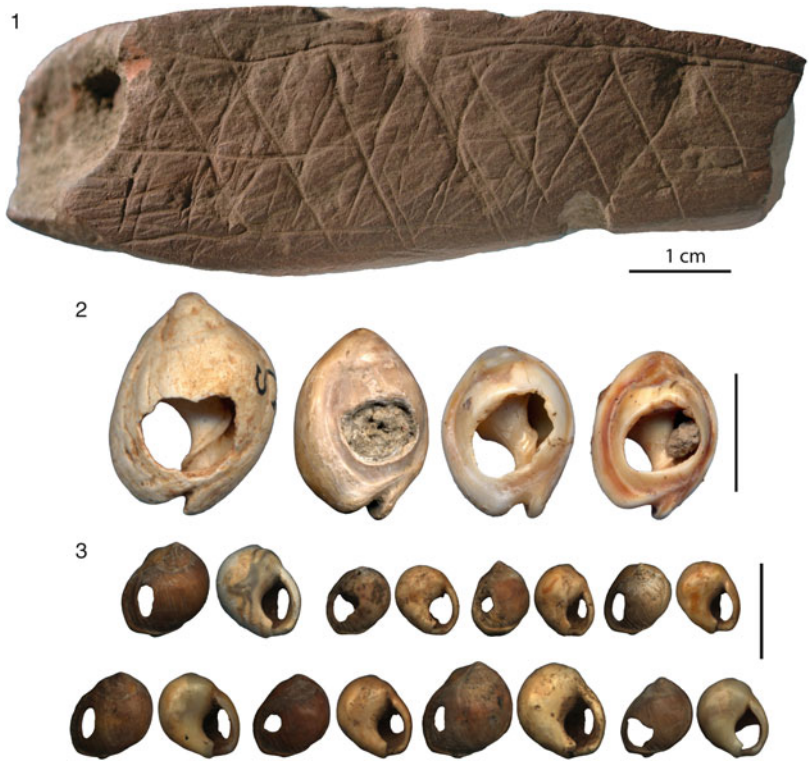

Mobiliary Art, Paleolithic, Fig. 3 Middle Stone Age Mobiliary art: *1* engraved ochre piece from Blombos Cave, South Africa (Photo: F. d'Errico/Ch. Henshilwood); *2 Nassaurius gibbosulus* shell beads from the Grotte des Pigeons, Taforalt, Morocco (Photo: M. Vanhaeren/F. d'Errico); *3 Nassarius kraussianus* shell beads from Blombos Cave (Photo: F. d'Errico/Ch. Henshilwood)

piece unique. This suggests that a particular type of raw material may have been preferentially selected for engravings.

Western Asia

Evidence from the Near East includes the enigmatic Berekhat Ram figurine (Fig. 4), an engraved cortex from Qafzeh, and perforated and ochre-stained marine shells from the same site, all of which were found in deposits associated with burials of AMH. A similar engraved cortex was recovered from the Mousterian open-air site of Quneitra. The 35-mm-long Berekhat Ram figurine is made from a basaltic lapillus tuff incorporating scoria clasts. Given its morphology being vaguely reminiscent of a female figure, the assumption has been that a hominid incised the piece to enhance its natural "female" features in order to produce a figurine. Dated to approximately 233,000 BP, this "figurine" would be the oldest known example of representational art and thus symbolism. A study using both optical and scanning electron microscopy, together with the experimental reproduction of the artifact's grooves and abrasions, demonstrates that this tuff fragment was purposely modified by hominins. Whether this artifact is truly a figurine, however, remains an open question and arguments have been advanced for it possibly serving a nonutilitarian purpose.

Mobiliary Art, Paleolithic, Fig. 4 The Berekhat Ram 'figurine' (Photo: F. d'Errico/A. Nowell)

European Middle Paleolithic

Numerous engravings have been reported from European Acheulean and Mousterian contexts. While a number of objects appear to be engraved, closer analyses are required not only to verify these hypotheses, but also to evaluate the antiquity of the marks and the degree of "deliberateness" underlying them. Lower Paleolithic examples include sequentially notched long bone shaft fragments from the Lower Pleistocene site of Kozarnika in Bulgaria and a mammoth shaft fragment from the German site of Bilzingsleben exhibiting a engraved "fan-like" motif. Noteworthy objects found at Mousterian sites include the Tata nummulite fossil which has a cross formed by a line perpendicularly cut across a natural crack, sequential incisions from Suard, Saint Anne I, Vaufrey, Oldisleben 1, Le Moustier, Lartet, Marillac, Le Petit Puymoyen, La Quina, Cotencher, La Ferrassie, L'Ermitage, Tagliente, Turské Mastale, Temnata, Axlor, and Vergisson IV. The only known Near Eastern examples are represented by a cortex engraved with a set of concentric circles from Quneitra found in a level dated to c. 60 ka, along with a second cortex from Qafzeh Cave engraved with set of parallel incisions, and recovered from the same levels as the human burials.

Personal Ornaments

Personal ornaments have traditionally been considered one of the innovations introduced into Europe by anatomically modern humans approximately 40,000 years ago. We now know that marine shells were used as beads in the Near East, North Africa, and Sub-Saharan Africa at least 35 ky earlier. Ten sites – Qafzeh and Skhul in Israel, Oued Djebbana in Algeria, Taforalt, Rhafas, Ifri n'Ammar, Contrebandiers in Morocco, and Blombos Cave and Sibudu in South Africa – have all yielded evidence of the earlier use of personal ornaments (d'Errico et al. 2009). Perforated shells from Qafzeh consist of *Glycymeris insubrica* bivalves, those from the next six sites consist of *Nassarius gibbosulus*, and those from Blombos are *Nassarius kraussianus* (Fig. 3, n°2). These types of marine gastropods are common on the modern day shores of the Eastern Mediterranean and in South African estuaries respectively. Analyses of these shells demonstrate that they were consistently used as personal ornaments, probably by modern humans, between 100 and 70 ka. Furthermore, the shells used as beads from North African and Near Eastern sites are not the remnants of food left by humans as the animals were dead when collected. Three of the Moroccan sites yielding beads are located 40–60-km inland, while the Algerian site is 190 km from the modern day coastline, suggesting the presence of beads at inland sites to be the probable archaeological signature of well-established exchange networks linking coastal areas and more inland regions. Manufacture traces and use-wear demonstrate that these shells were strung together and the resulting beadwork worn for an extended period of time. The presence of pigment residues on almost all well-preserved shell beads from these sites distinctly links bead and pigment use, further reinforcing the argument for their deliberate symbolic use in Africa and the Near East. This personal ornament tradition seems to disappear at the end of the last interglacial (c. 70 ka), an event attributed to the impact of a 10,000-year-long cold climatic phase (Marine Isotope Stage 4) on demography and population dynamics (d'Errico et al. 2009). Around 45 ka, beads almost simultaneously reappear in the form of ostrich eggshell beads and stone rings. In Europe, the earliest ornaments are associated with both Neanderthals and modern humans and take the form of dozens of discrete and regionally patterned types. The presence of personal ornaments at late Neanderthal sites has been variously interpreted as the consequence of the acculturation of local Neanderthals by incoming Aurignacians, the independent cultural evolution of Neanderthals before the spread of the Aurignacian, or mutual influence of late Neanderthals and Aurignacian moderns.

Earliest Figurative Representations

Painted, engraved, or carved animals and humans are currently only reliably dated to significantly later: ~31 ka in Africa at the Apollo 11

rockshelter, Namibia, and at ~35 ka in Europe, for example, at Fumane and in southern Germany. The oldest known carved musical instruments are bird bone or mammoth ivory flutes decorated with notches from European contexts that also date to ~35 ka.

Meaning and Motivations

Paleolithic mobiliary and cave art has given rise to numerous interpretations, almost all of which have been more or less criticized and questioned: art for art's sake, hunting and fertility magic for animal representations (E. Piette, H. Breuil), myth and fertility rites (H. Bégouën, J.-P. Duhard), systems of information exchange (Mithen), ritual markings (A. Marshack) or representations of femininity (P. Rice, H. Delporte, P.P. Efimenko) for the female figurines; however, these have also been interpreted as priestesses or ancestors (A.P. Okladnikov, E. Saccassyn Della Santa, S.N. Zamiatnine). Structuralist interpretations (A. Leroi-Gourhan, G. Sauvet) have considered abstract and figurative motifs as elements of a symbolic system describing a cosmogonical vision of the world. According to Leroi-Gourhan (1965), such a vision is structured around the male–female opposition. Since the 1980s, researchers have become less interested in unraveling the meaning of these representations, which for many remains an unachievable goal. An increasing number of researchers now consider the technological analysis of these objects as a means to identify their possible function, decipher the motivations of the craftsman, and gain a better understanding of the role artistic activities played in Paleolithic societies.

Paleolithic Notation Systems

The microscopic analysis of Paleolithic objects bearing sequences of notches, incisions, and punctures led A. Marshack (1989), among others, to propose that some could be interpreted as notational systems, counting devices, or lunar calendars (Fig. 1, n°3). This interpretation was based on the number of marks present on the objects and the identification of morphological variations in the marks themselves interpreted as resulting from the use of different tools. The latter is taken as a proof for the various marks being added at different times in order to record items or events. Alternative interpretations have been proposed by F. d'Errico (1994) and others based on experiments which identified criteria for recognizing tool changes and showed that in a number of cases, Marshack's interpretations were either unsupported by the evidence or that while still best interpreted as notations, they differ from the type proposed by Marshack.

Ritualistic Interpretations

Marshack and others have proposed that some Paleolithic art objects were used in rituals. Such an interpretation is based on the presence of figurines that were repeatedly engraved, overlain with signs, erased, bear patinas suggesting long manipulation or were deliberately broken. The discovery of Gravettian figurines in pits located inside or close to habitations was advanced as support for the ritual hypothesis (Kostienki 1-I, Nebra, Avdeevo) (Fig. 2, n°2). The sharpened legs of some Gravettian venuses (Grimaldi, Savignano, Tursac, Malta) have also been taken as proof that they were pitched into the ground for permanent display. However, alternative interpretations have been proposed for the broken objects. A recent technological analysis indicated that breakage on the Kostienki 1-I figurines may in fact represent accidents produced during manufacture (Dupuy 2007). In much the same way, it remains difficult to demonstrate the ritualistic breakage of slabs. However, clear evidence exists at sites such as Gönnersdorf for slabs that were intentionally broken to create and then repair the paving of the habitation area (Fig. 5).

International Perspectives

The European Upper Paleolithic

Mobiliary art develops during the Aurignacian in two major centers of artistic expression. One in south-western Germany characterized by the production of animal (horse, mammoth, felines) and human (Vogelherd, Geissenklösterle, Hohle Fels) figurines in ivory, including the unique discovery at Hohlenstein-Stadel of an anthropomorphic

Mobiliary Art, Paleolithic, Fig. 5 Engraved slab from the Magdalenian site of Gönnersdorf, Germany, with four schematic female figures (Photo: F. d'Errico)

carving of a human with a lion's head (Fig. 2, n°1). The second focal point is in the Périgord region of south-western France, distinguished by the presence of geometric symbols on osseous artifacts composed of notches and cupules (e.g., Lartet, Blanchard) and the frequency of sexual representations (e.g., the sculpted phallus from Blanchard) (Fig. 1, n°3).

With the emergence of the Gravettian comes the first major concentration of mobiliary art in the European Paleolithic. Spread across three principal regions, Moravia has produced the oldest and most significant collection of material followed by south-western France and most recently, the Ukraine. The well-known diamond-shaped female figurines displaying hypertrophic sexual attributes are known over a vast territory between France and Russia (Brassempouy, Lespugue, Grimaldi, Willendorf, Dolni Vestonice, Kostienki) (Fig. 2, n°2). This continent wide distribution portrays a profound ideological unity shared between different cultural groups and poses questions concerning both the origin and diffusion of this symbol (Delporte 1993). In the Pavlovian and Kostienki cultures of Central and Eastern Europe, bodies show more detail (features, hands, personal ornamentation) and coexist with a second, more slender female morphotype. Numerous bas relief sculptures (mammoth, felines, bear, wolf, birds) are also known. A spectacular and significantly geometric mobiliary art (Predmosti, Dolni Vestonice) on osseous materials develops alongside terracotta figures (Dolni Vestonice, Pavlov) which represent a new technical development in the European Upper Paleolithic (Fig. 1, n°4; Fig. 2, n°7). Finally, figurative motifs appear in south-western France (Isturitz, Labattut, Gargas).

Mobiliary art expands considerably during the ensuing Magdalenian period and can be separated into three main facies. The Middle Magdalenian of Western and Central Europe (18,500–16,000 cal. BP) sees an unprecedented diversification of artifacts (spear throwers, *bâtons percés*, half-round rods) including the appearance of engraved slabs at sites of considerable size (Enène, La Marche, La Paloma, Tito Bustillo, Las Caldas) (Fig. 1, n°1–2, 6–7; Fig. 2, n°4–5). Figurative and abstract motifs multiply with the former characterized by its realistic trend of well-proportioned and detailed outlines (Laugerie-Basse, La Madeleine, Mas-d'Azil, Bédeilhac, Altamira). Spear throwers with sculpted horse heads (Fig. 1, n°1), *bâtons percés* carrying horse or bison heads, *contours découpés* (Fig. 2, n°6), and perforated disks are among the most typical objects. Mobiliary art from the Eastern European Middle Magdalenian (Mezin-Meziric culture) contrasts with the earliest Magdalenian given its geometrical trend, especially with specific motifs composed of broken lines or meanders engraved on ivory "bracelets" or painted in red on mammoth bones found within habitations. This trend is also evident in the schematic, shovel-shaped female figurines having a thin waist and wide hips. Across south-western France into Central Europe, the Upper-Final Magdalenian mobiliary art (16,000–14,000 cal. BP) stands out with its schematic trends, less detailed animal representations (Limeuil, La Madeleine, El Valle), and the appearance of new abstract motifs. The spread of a new female morphotype focused on the curved shape of the buttocks (Le Courbet, Lalinde, Andernach, Nebra, Petersfeld, Ölknitz) reveals a second profound ideological current evident in the intense circulation of this imagery (Fig. 2, n°3).

Compared to earlier periods and contemporary Magdalenian trends, Epigavettian mobiliary art is relatively poor (Tagliente, Paglicci, Romanelli) and often abstract in nature

(scalariforms, rectilinear engravings or sinuous lines). Animal representations are composed of simple linear outlines and show hypertrophic trunks and few details.

Mobiliary art becomes rare at the end of the Paleolithic. In the Azilian of France, Spain, and Switzerland, and the late Epigravettian of Italy, it is almost exclusively represented by painted and/or engraved geometric motifs on pebbles, small slabs, and bone (Mas-d'Azil, Murat, Rochedane, Los Azules I) associated to rare schematic renditions of animals (d'Errico 1994).

Future Directions

The richness, beauty, and variety of Paleolithic mobiliary art have not necessarily been instrumental in promoting research strategies able to make these objects speak. In spite of momentous efforts undertaken in the last decades to understand how cultural innovations have emerged in our lineage, the mechanisms that have led human societies to embody symbols in portable objects and the evolutionary advantages that such an innovation may have provided remain largely unknown. This is more so when considering the time and skill required by the manufacture of some of these objects and the long apprenticeship necessary to master their production. Heavy investment in social learning to produce sophisticated art items can appear as a paradox if not conceived in the context of societies governed by equally sophisticated social rules and composed by individuals entertaining complex social interactions. How did we move from the relatively simple manifestations associated to the Middle Stone Age and the Middle Paleolithic to the complex and varied repertoire of art items observed at Upper Paleolithic sites? To what extent an integrated analysis of these objects may allow us to tackle issues such as gender, social status of individuals, cultural geography, exchange networks, and test current hypotheses on the mechanisms determining cultural geography and diversification? Do they inform us on the status of the craftsman within those societies? What are the processes that lead to creation of distinct styles and their eventual diversification or demise? Can we better define what do we mean by style when dealing with Upper Paleolithic representations and transform this ill-defined concept in an operational research tool? What role did each category of art object play in the everyday life of Paleolithic people? Why numerous art objects are found in some regions and not in others in spite of the latter being characterized by comparable environmental settings and availability of similar raw material?

It would be unfair to say that these questions have not been addressed by archaeologists in the past but how many of them have received answers that are widely accepted by the scientific community and integrated in everybody's knowledge about the evolution of mankind? In order to reach consensual inferences in this field, we need to make progresses in different domains. Research questions need to become more explicit and focused. A cultural phenomenon of European and, to some extent, Eurasian dimension, the Upper Paleolithic mobiliary art, is a subject that requires, to be effectively explored, the creation of georeferenced transnational widely accessible databases. Methods must be improved and, more importantly, approaches and analytical techniques that have proved to be effective, but remain anecdotic, should become commonly used paraphernalia of the researchers working on this type of material. Quintessential expression of symbols embodies in material culture, Paleolithic art items represent a too critical topic to be left to archaeologists alone. Their study needs incorporating research strategies developed by other disciplines and the adoption of interdisciplinary approaches.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Art, Paleolithic
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Europe: Paleolithic Art
- ▶ Gönnersdorf (Magdalenian): Geography and Culture

▶ *Homo sapiens*
▶ Leroi-Gourhan, André
▶ Neanderthals and Their Contemporaries
▶ Portable Art Recording Methods
▶ Techniques of Paleolithic Art
▶ Willendorf II: Geography and Culture

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Modern Material Culture Studies

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Introduction

Modern material culture studies have gained significant attention in the field of archaeology throughout the last 40 years. There have been two distinct stages in the development of this area of research. The first stage occurred during the 1970s and 1980s, when archaeologists began to question two core views of archaeology: that archaeological sites and the information gained from them must concern a distant past and that archaeological information should be obtained through excavation (Rathje 1981: 51–2). The confluence of these two lines of thought led to the emergence of modern material culture studies as a subdiscipline within archaeology. As Leone (1981: 7) points out, modern material culture studies developed within two principal lines of inquiry. Firstly, they investigated relationships between modern societies and their material culture to better understand material patterning in past societies. Secondly, they analyzed what modern objects can tell about present-day societies (e.g., Rathje 1974), with the aim of yielding information about an aspect of culture that is not always seen by those creating or using the materials (Leone 1981: 7). In the early 1990s, this area of study received a significant boost with the publication of Tilley's (1990) volume *Reading Material Culture*.

A second stage in the development of modern material culture studies emerged in the 2000s. During this time there grew a greater emphasis on recognition of the active role that material culture plays in the negotiation of social relationships. As Hodder (2012: 33) explains it, "materials and things are seen as actively engaged in the social process" and self and society cannot be "studied independently of materials and the object world." One expression of this trend is a tendency to replace the phrase "modern material culture" with the term "material practices" (e.g., Thrift 2008) or archaeology of the contemporary past (e.g., Graves-Brown et al. 2013). Furthermore, Hudson (1984) iterates that modern material culture "looks at the interaction between material culture and the behavior it reflects" (Hudson 1984: 32). During the 2000s research into modern material practices became increasingly directed into areas such as the analysis of what Meskell (2005) calls the archaeology of materiality, investigating homelessness, conflict and protest, multiculturalism, and social justice, and following the approach of an engaged archaeology (Smith, this volume). An ethnoarchaeological emphasis on material culture analysis to develop theories to understand material patterning in past societies has remained a strong facet of this area of study (e.g., Politis & Alberti 2007). However, the argument that archaeology should be concerned with understanding the distant past has disappeared from view as the proponents of material culture studies worked from the position that archaeology is about material practices, not time, that the past can be anything as small as a nanosecond gone by.

Definition

The term "modern material culture" can be defined as the material artifacts that are produced by contemporary societies. Modern material culture can take many forms; in a contemporary urban setting, it might be the contents of someone's home, their vehicle, and other objects with which they interact. The term does not include ancient objects in a contemporary setting, unless those objects are significantly reworked, as in a contemporary art installation.

Modern material culture studies can be defined as the study of a society through its contemporary material culture. Studying modern material culture reveals much about or own society, as material culture can yield information about subconscious

aspects of society that are not always recognized by those creating or using the materials (Leone in Gould & Schiffer 1981: 7). Hudson (1984: 34) argues that "the sum total of a society's artifacts. . . function as a mirror of its patterned values, beliefs and social structure." From this viewpoint, the analysis of modern material culture can address bias and contribute to a more holistic representation of a society's social, cultural, and cognitive patterns.

Key Issues and Current Debates

One of the key issues surrounding modern material culture studies is the potential for debate around archaeological significance. Projects such as Rathje's (1974) Garbage Project at the University of Arizona, which began archaeologically recording household waste as it was discarded (Shanks et al. 2004: 65), is perhaps one of the most well-known modern material culture studies and one that received considerable criticism. At the time, few archaeologists conceded that the project was archaeology at all, on the grounds that the garbage was not old enough to warrant archaeological analysis (Shanks et al. 2004: 66).

Rathje defines four key ways in which modern material culture studies contribute to archaeology. Firstly, he contends that teaching archaeological principles can be easily achieved through studying modern material culture; as after studying ourselves comparably to the ways we study past societies, students will be more equipped to approach traditional archaeological data (Rathje 1981: 53–4). Secondly, Rathje argues that core archaeological principles, including methods such as ethnoarchaeology and experimental archaeology, can be tested in modern settings (Rathje 1981: 53). Thirdly, he contends that modern material culture studies contribute to the recording of cultural history and to understanding processes and relationships between people and material culture that might otherwise be lost. Lastly, Rathje proposes that modern material culture studies can be used to identify continuing trends between past societies and those of the modern day (Rathje 1981: 55).

Material culture studies are a flourishing and rapidly expanding subfield in archaeology. The present emphases in such studies includes the analysis of modern patterns of consumption, urban heritages, social housing, homelessness, conflict and protest, multiculturalism, and social justice, especially the work of Zimmerman et al. (2010) and Leone (2010) in the USA; Schofield and Kiddey (2011), Harrison and Schofield (2010), and Hicks and Beaudry (2010) in the UK; Meskell (2012) and Shepherd (2003) in South Africa; and Holtorf (2012) in Sweden. For example, Schofield and Kiddey (2011) in their study of the archaeology of homelessness aimed to engage the homeless community of Bristol in the UK in an active heritage project mapping the archaeology of the homeless participants, essentially "constructing an archaeology of themselves" (Kiddey & Schofield 2011: 5), which focused on connections between heritage practice and policy and the benefits of participation by excluded or minority groups. This study actively involved many local homeless people who oriented the archaeologists on the material culture left behind by homeless people, including why it was there and what it meant as some of the material culture, such as drug paraphernalia, was foreign to the archaeologists. This study highlights one important reason for conducting modern material culture studies when information is still available about artifacts by the communities using them, as had the archaeologists not been oriented on some of the material culture that was unfamiliar to them, artifacts could have gone unrecorded, different meanings could have been deduced from the material culture, and an element of the patterns of the society of the homeless population of Bristol could have been lost. Furthermore, studies such as that of Zimmerman et al. (2010) and Pollard (see the entry on ▶ Homelessness, Archaeology of in this encyclopedia) push boundaries of this subfield through a deliberate focus on informing policy. While much of the archaeological literature on

shared space/attachment is concerned with past colonial impact, there is increasing scholarly interest in the immediate past. Important research in this area is being undertaken by scholars such as Byrne (2003; Byrne & Nugent 2004), Harrison (2004, 2011), Murray (2011), Lydon (2009, 2010), Ireland (2010; Lydon & Ireland 2005), and Paterson (2008; Paterson & Wilson 2009).

Increasingly, the study of modern material culture is being used to shed new light on government policies by identifying cultural values that are internalized as part of a person's or community's worldview or by interpreting material patterning in terms of the success or failure of government initiatives (e.g., Zimmerman et al. 2010). Material analyses can provide new information. The presence or absence of particular forms of material culture can be used to identify cultural attitudes to particular routines, processes, and disciplines. The absence of clocks and watches, for instance, might imply an inability to tell the time and/or an absence of time routines and work disciplines, as in Leone's (1999) study of the nineteenth-century Annapolis. Moreover, material culture analyses can identify cultural inhibitors and physical barriers to engaging in activities such as education and employment that can allow people to improve their individual situations. Such research has the potential to provide the basis for the policy recommendations in skills training and cross-cultural communication.

Though the analysis of modern material culture has been a focus of archaeological attention since the 1970s, these studies are undergoing a major rethinking in the early part of the twenty-first century. Over the next few years, we expect to see major breakthroughs in this area of research.

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- ▶ Hodder, Ian (Theory)
- ▶ Homelessness, Archaeology of
- ▶ Material Culture and Education in Archaeology
- ▶ Rathje, William Laurens
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Modern Ruins: Remembrance, Resistance, and Ruin Value

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Introduction and Definition

The word *ruin* is an ambiguous and contested one. In our everyday comprehension, it easily brings to mind ancient and enchanted monumental structures; an archaeological dream world featuring celebrities such as Machu Picchu, Pompeii, and Angkor Wat. For centuries, classical and Gothic ruins inspired poets, artists, and scholars, motivated philosophical mediations and served as instruments of contemplative and aesthetic pleasure. At the same time, the word *ruin* also has a strong negative tone to it. According to the *Concise Oxford Dictionary*, "To ruin is to inflict or bring great and irretrievable disaster upon, to destroy agency, to reduce to a state of poverty, to demoralize completely" (1964: 1095). In this active verb form, it is almost entirely associated with negative and violent processes, with destruction and demolition (Stoler 2008: 194; Japelli 2012).

While the way we think of *ancient* ruins hardly is affected by these dismal and destructive connotations, our attitude toward the ruins of the recent past is indeed very different. Through the rise of capitalist economy in the nineteenth century mass-production, consumerism and cycles of material replacement have accelerated; increasingly larger amounts of things are increasingly rapidly victimized and made redundant. The outcome is a ruin landscape of derelict factories, closed shopping malls, overgrown bunkers, and redundant mining towns: a ghostly world of decaying modern debris normally left out of academic concerns and conventional histories. Lingering on at the outskirts of society, these redundant sites become places of abjection, giving face to a past too recent, too grim, and repulsive to be embraced as heritage (González-Ruibal 2008). Though this attitude is being challenged, as reflected in the growing archaeology of the contemporary past (e.g., Buchli & Lucas 2001; Holtorf & Piccini 2009; Harrison & Schofield 2010) and the broader popular, artistic, and scholarly interest in decay and ruination (Edensor 2005; Romany 2010; Rowsdower 2011), modern ruins still play a very marginal role in the political economy of both the past and the present.

In this entry, we shall first explore some of the causes for this othering and for the ambivalent attitude toward the ruins of the recent past.

Why is it that the ruins of our own time have been considered so devoid of value – historically, aesthetically, culturally, and scientifically – compared to their ancient comrades? And, secondly, why *should* we really care about this rubble; why do these stranded beings deserve our attention? Crucial to this discussion is the materiality of memory and the historical significance of things. Is ruination just a negative process that brings "great and irretrievable disaster upon" its victims? Or can it also be seen as a mode of disclosure that enables the recovery of memories that usually do not find their way to the historical or contemporary narratives: the neglected, unsuccessful, and ineffable? A third and final topic to be explored is how the ruins of modernity *are* and may be integrated in contemporary cultural processes and critique. How their deconstructive agency may contribute to a critical aesthetics and how their ruined physique provides spaces for alternative cultural practices. To sum up, what is the possible capital or affordance of modern ruins?

Key Issues and Current Debates

Untimely Ruins

Given the attention and care that ancient ruins are being subjected to, it is timely to ask, what is wrong with modern ruins? At first, we should note that there is an effective history of norms, values, and distastes involved. Throughout the nineteenth and early part of the twentieth century, architects, artists, and other intellectuals felt a growing concern for the development of what they considered inauthentic architecture: the vulgar iron, concrete, and glass works of contemporary engineers, as expressed, for example, in arcades, exhibition halls, factories, and bridges. One argument used to denounce these constructions was that they lacked "ruin value," they could not produce gentle ruins of the kind left us from classical antiquity (Yablon 2009: 8). The famous English poet, artist and critic, John Ruskin, for example, refused to count iron constructions ("the iron roofs and pillars of our railway stations") as architecture, partly because the constructors did not have true command over iron's "modes of decay" (Ruskin 1849/2001: 68–9). Later and more infamously the notion of ruin value was claimed developed to a "theory" (and even a "law") by Nazi architect Albert Speer. Unable to age and ruin in a graceful way, Speer claimed that modern materials and constructions were unsuited to form the wished for "bridge of tradition" that could inspire future generations. It was "hard to imagine that rusting heaps of rubble could communicate the heroic inspirations which Hitler admired in the monuments of the past" (Speer 1970: 97).

Connoisseurs of ruins have always favored stone, the preferred building material of the archetypical ancient civilizations (Yablon 2009: 8; Cnattingius & Cnattingius 2007: 10). Modern ruins, on the contrary, are made of iron, glass, and concrete, wrong materials that do not know how to age and decay in a proper manner (Fig. 1). Their very fabric and substance prevents them from fulfilling the aesthetical expectations associated with a "proper ruin". As voiced in a recent publication, through their ruination, they will rarely be able to evoke the scenic mood needed for the structure to proceed on to the category of "ruins" (Cnattingius & Cnattingius 2007: 10).

Another serious defect of modern ruins is of course that they are *young*, and their presence thus acts as a temporal disturbance, a noise that challenges our assumptions of time, history, progress, and sustainability. In the dominant conception, ruins are *old*, they have an "age-value" (Riegl 1903/1996) that is imperative to their legal and cultural-historical appreciation as heritage (Cnattingius & Cnattingius 2007: 12). In Norway, for example, unless otherwise specified, the monument, site or object, must not be dated later than CE 1537 in order to be certified. Judged by this criterion, modern ruins become ambiguous, even anachronistic. However, this untimeliness (after Yablon 2009) is not only provoked by being ruins of a wrong time, modern ruins are also untimely due to their wrong pace. Because although age-value, according to Alois Riegl, is at first glance revealed "... in the monuments' outmoded appearance" (1903/1996: 72), value,

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 1 Wrong materials, wrong age. The abandoned herring rendering factory at Eyri, NW Iceland (Photo: Þóra Pétursdóttir)

he argues, does not increase in direct correspondence to age, but with the ruins' slow and uninterrupted "growth into decay" (Riegl 1903/1996: 73). Orderly decay should bear no signs of rupture or destruction, and hence, the signs of "premature aging" in modern structures are mostly seen as anything but an indication of value. The ruin, moreover, should express the kind of peaceful unity and balance with its surroundings, so that ruination may appear as the natural state of structure, and not as an unnatural rupture from its authentic being. Something which modern structures, according to Georg Simmel (1911/1959: 263), are capable of only "as if in afterthought." They pollute and disturb rather than merge with or complete a historical horizon.

Unlike classical ruins presumed to have decayed slowly and gracefully over centuries, modern ruins are often *fast* ruins, sometimes *too* fast. As Alexis de Tocqueville exclaimed after encountering an abandoned settlement in frontier New York in the 1830s: "What! Ruins so soon!" The French political thinker and traveler was struck by the radical contemporaneity of the American ruins, they were, he claimed, "day-old ruins" (Yablon 2009: 10, 20). Today we see even more extreme examples of premature ruins, sometimes preceding their own completion (Fig. 2). While this is of course the sad reality of many war-torn areas the current financial crisis, for example, has made such premature ruins conspicuous in many less anticipated contexts; abandoned construction sites, holiday resorts closed before the first guest arrived, apartment houses and even entire towns that conveniently have skipped the habitation phase and turned themselves into what artist Robert Smithson has called "ruins in reverse," structures that "don't fall into ruin after they are built but rather rise into ruin before they are built" (quoted after Yablon 2009: 12).

Modern ruins, however, are also difficult to cope with for a number of other and perhaps more subtle reasons, and one particular mode of their being may prove to be especially significant. As noted above, the term "ruin" is an ambiguous one which can grasp "...both the claim about the state of a thing and a process affecting it" (Stoler 2008: 195). There is, moreover, a causal tendency to see the noun (ruin) as a frozen form, inert and passive, in contrast to the active and transient verbal form (*to ruin*). Our conception of ancient ruins belongs predominantly within the first mode. The ancient ruin is clean, fossilized, and ready-ruined; it is somehow finished and terminated (see Fig. 5). The ruins of the recent past, on the other hand, have usually not reached this state but are caught up in the ongoing process of ruin*ing* – of "unfinished disposal" (Hetherington 2004).

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 2 Rising into ruin. Unfinished apartment block in the small town of Teriberka, Kola Peninsula, Russia. Started shortly before the fall of the Soviet Union, the construction of this building was brought to an end following the collapse. Instead, it became a valuable brick resource for the local population (Photo: Þóra Pétursdóttir)

And it may well be that it is this state of being in-between, of not belonging, that also makes the ruins of the recent past so disturbing.

A parallel may be made in the context of the human body. This body is attractive, pleasing – or at least tolerable – basically in two states of its being; either as a living, functional body (preferable young, healthy and beautiful) or as de-fleshed osteological remains, as clean bones (the latter moreover subjected to their own peculiar baroque and romantic aesthetics). It is not so attractive during its transformation between these two states, when the human fabric disintegrates and flesh decomposes and rots. Modern ruins are often in this "fluid state of material becoming" (Edensor 2005: 16), they are ruins in the making, and in a number of ways affected by this ambiguity toward the fluid and transformative. Caught up somewhere in between disposal and history, waste and heritage, they are deprived of their former functional or useful value and yet seem unable to take on, or be granted, a cultural significance.

Ruin Memories

This leads us to our second matter of discussion: What is the value of this modern debris? Can we speak of a "ruin value" that is not conditioned by the often dubious effective historical connotations of the term? And why should ruins of our own time be objects of care and concern?

One argument relates to memory and the ruins' potential of challenging dominant perceptions of history and the past. Modernity is often said to be characterized by its detachment from the past. The past, we are told, is over and gone and remains only as a subject of historical inquiry: something to be recalled and reconstructed in our historical narratives. As the narratives proceed, the past is constantly left behind; former periods are replaced by later periods. Things, however, the material residues of all these replacements, object to this pace of history. Although aging and transforming, they stubbornly linger on. Thus, as Walter Benjamin asserted, the past has not budged – it actually piles up in front of our eyes (2003: 392). In different shapes, and in various conditions, it gathers and constantly sediments into potentially new environments of memory (Bergson 2004; Olivier 2011).

Despite the fact that things clearly do age differently and that their expected life lengths also vary greatly, there is a certain egalitarianism associated with their aging. Thus, and given that also persistency can be listed among their qualities, things do not discriminate among themselves in their duration. This means that in addition to those "unbroken" things that facilitate continuous, smooth, and sustainable practices, there is a survival of the outdated and stranded. This is the material past that persists

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 3 Stranded. Redundant Soviet fishing fleet brought to rest in Teriberka, Kola Peninsula, Russia (Photo: Þóra Pétursdóttir)

despite being discarded, ignored, and made superfluous – in short, the surviving material redundancy of the past (Fig. 3). Thus, in the notion of a past that sediments and swells in our midst (after Bergson 2004), there is also and always a component of the neglected, the unwanted (Olsen 2010: 166–7). Importantly, this material gathering of the past is largely not subjected to some suspicious plan or ideological script or censorship. It mostly happens in unpredictable ways and according to material trajectories that are beyond or unrelated to human control and intervention. And which also allows for less edited or censored memories (Olsen 2010, 2012).

Ruined things were once useful, and thus embedded in repetitious practice and infused with lived or habit memory (Bergson 2004). When outmoded and discarded, their lived and habitual significance is lost while their physical presence, albeit ruined, continues. As such, these broken things survive and gather as the material antonyms to the habitually useful, creating a tension-filled constellation that carries the potential of triggering a particular kind of involuntary memory. Reverberating against the taken-for-granted materiality of habit memory, they become potential agents of disruption, triggering the past in a mode that Benjamin called "actualization" (Benjamin 1999: 473-6). The outdated and stranded give face to forgotten or neglected pasts, to the trivial or embarrassing, to the failed or never completed undertakings, the anomalies and the unstable moments. And here lies some of their value or capital: Precisely by being redundant and discarded, these things reveal the gaps and crevices in the construction of history as progress, as a continuous narrative; they bring forth the abject memories that are lost in conventional history.

Just by stubbornly being (t)here, the derelict fur farm, the abandoned boarding school, the disconnected radio beacon, or the abandoned fish processing site openly rebuke the conception of history as sequenced, biographical, and progressive. They of course share this persistency and opposition with their older comrades. However, being *modern* ruins, and thus somehow closer or at least more familiar, and also through their conspicuous transient mode of being, they enact this resistance – and potential – more effectively than ancient ones. In their own and very positivistic manner they show that history is not a projected stream leaving the past behind, but that it bends and twists in a disorderly manner, interrupting the expectations of the

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 4 Inside turned out, privacy revealed. Bunk beds in rooming house for female workers at the herring factory in Eyri, NW Iceland (Photo: Þóra Pétursdóttir)

have been and the *becoming*. Further, by often being negative features within the contemporary geo-political order, the ruins of the modern also hold on and make manifest alternative geographies. They bear witness to other cultural or economic landscapes, to past presences in strange places: a stranded English train engine in an Icelandic fjord, a frozen German weather station in east Greenland, a ruined Soviet missile hangar in Cuba (cf. Jensen & Krause 2011; Burström, Gustafsson & Karlsson 2011).

To speak of ruin memories may of course sound like a conceptual contradiction. Abandonment and ruination is usually understood negatively through the tropes of loss and deprivation. Through decay, withering and corrosion things are degraded and humiliated, while the information, knowledge, and memory embedded in them become lost along the way. However, without at al ignoring its negative aspects, not to mention the immense human traumas inflicted through its sometimes violent and catastrophic causes, ruination can be seen as disclosure – as a mode of unconcealment, and thus a form of recovering memory (DeSilvey 2006). Experiencing an inhabited and well-kept building may not reveal much about the way it actually works, the diversity of materials and technologies that are mobilized to construct and operate it. If not cunningly hidden by design and architectural form, these materials and implements themselves are often absorbed by their tasks, they disappear into usefulness and chains of relations.

Decay, ruination, abandonment, and disposal, however, disturb the routinized and taken-for-granted and produce a defamiliarized landscape (Edensor 2005: 109). Plaster and wallpaper peel off, doors are opened, windows broken, and access provided (Fig. 4). The masked object is unveiled, inside is turned out, privacy revealed. Ruination becomes a kind of slow-motion archaeology, a self-excavation that exposes the formerly hidden and back-staged. In the destruction process, new meanings may be revealed, meanings that may perhaps only be grasped at second hand when no longer immersed in their withdrawn and useful reality. Moreover, by being released from the chains of use, things themselves become more present; they appear to us in ways not seen before. And perhaps it is in this state of abandoned being, "freed from the drudgery of being useful" (Benjamin 2002: 39), that things' ownness and integrity is released and finally enables them to articulate their own source of signification?

Critical Aesthetics and Ruin Values

A final topic to be explored is how the ruins of modernity are and may be integrated in contemporary cultural processes, how they can fuel

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 5 Staged, neat, and picturesque. The ready-ruined Whitby Abbey, Yorkshire, England (Image by Colorbox.com)

discourses of alternative aesthetics and social critique, and at the same time enhance social cohesion by providing physical space for critical, marginal, or alternative cultural practices?

One outcome of the modern attitude toward things and materiality is an oppositional hierarchy between, on the one hand, functional and/or aesthetically pleasing things and, on the other, waste – all rubbish we find disgusting, ugly, polluting, and just want to rid of by increasingly more effective systems of disposal and recycling. In contrast to the attitude characterizing our not so very distant ancestors, the main rule of contemporary public aesthetics is purity and neatness, to "tidy up," to clean and repair, or better replace. Waste, including wrecked cars, abandoned buildings, and rusty oil tanks, constitutes an embarrassment and a problem that should at all costs be kept out-of-sight.

Heritage practices may at first be thought of as mediating this opposition, reflecting a care for and attentiveness to the useless and stranded. After all, it is residues such as these on which archaeologists base their entire knowledge of previous societies. More than anyone, however, archaeologists know that the dialectic between the ruin as rubbish and the ruin as heritage is a fragile one. But while surely not all ruins are as capable of becoming heritage, the case is rather that what is conceived of as proper heritage itself is most strongly affected by this aesthetics. The heritage site, the ancient ruin, is often staged, neat, and picturesque, providing visitors with a disciplined and purified space (Edensor 2005: 22, 95) (Fig. 5). Extraneous materials – plants, fauna, debris, modern materials – all pollutants – are to be expunged and further decay is staved off through restoration and preservation. Arresting decay, preventing death, of course, has always been the imperative of heritage management. And this, moreover, relates to the wider and equally ontologized modern tropes of sustainability, conservation, and the wish for eternal life in general.

Matched against this aesthetics, it is not hard to see why modern ruins fail. They are withering and crumbling: walls and concrete decompose, and nature intrudes, mingles, and reclaims. Gulls, insects, rats, fungus, scrubs, and trees invade and establish their own ruin ecologies. The previously clear distinction between the man-made and the natural surrounding evaporates. Given the imperatives of the current *Zeitgeist*, where all cultures-natures should be neat, healthy, and in balance, where the human body should stay young, fit, and slender, and impairment and death

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 6 Anti-heritage. The abandoned boarding school at Sarnes, northern Norway (Photo: Bjørnar Olsen)

increasingly seems to have become an embarrassment, these ruins make manifest conditions conspicuously at odds with dominant aesthetical, cultural, and political tropes. In their hybrid or uncanny state, they become antonyms of the modern and blur established cultural categories of past and present, purity and dirt, waste and heritage; in short, they become matter out of place – and out of time (Fig. 6).

At the same time, it is precisely this capacity, this rebellious affordance, which provides them with yet another agency and critical potential. Through their difference and disruption, they oppose and rebuke the ideal of seamlessness and tactile sterility, and thereby deride taken-for-granted conventions of purity and dirt. Just think of the contrast their presumed disgraceful alteration and disintegration provides to smooth and increasingly regulated urban spaces and their normalized tactilities of domesticated sounds, smells, and sights (Edensor 2005: 57). In fact, it may be argued that the current urge to clean up and reshape cityscapes to make them efficient, tidy, and green is to deprive the city of its essential, ruin-inclusive affordances. As argued by Shannon Lee Dawdy (2010), ruins, neglected neighborhoods, vacant warehouses, abandoned amusement parks, and squatter camps, although controversial, may be seen as an integrated part of what we think of as the modern city:

> "Looking at the prevailing images of the modern city from the eighteenth to the twentieth century, one would have to conclude that a city would be incomplete and out of balance without ruins and unpoliced zones. These are part of what we desire in a city" (Dawdy 2010: 773).

Also in this sense, ruination may be seen as a kind of return or recovery. However, it is not only a matter of aesthetics or desire, but also of social needs and requirements. While modern ruins may be said to manifest or act out a cultural critique through their uncanny, abject being they are to some extent, yet paradoxically, also significant constituents in the reestablishment and maintenance of social order. To Mary Douglas, dirt resembled social disorder (1966: 2) and it was through its abolition, through purification, that society and social order could be established. However, as everyone knows, housekeeping is mostly about making things disappear from view rather than disappear all together. Things swept away, flushed, or thrown out are thankfully no longer *here*, but they are unfortunately still *there*. As Bruno Latour (2009) has argued, this relentless strife toward a neat order of things has come to the critical point where we cannot rely on an "outside

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 7 Returned to unprescribed activities. Domestic house used as waste disposal for (mainly) king crab claws. Teriberka, Kola Penisula, Russia (Photo: Þóra Pétursdóttir)

environment," or an out-of-sight environment, any more. "There is no reserve outside which the unwanted consequences of our collective actions could be allowed to linger and disappear from view" (Latour 2009: 143). Latour (2009) has even traced the rise of modern environmentalism to this growing problem of "lack of outsides."

While correctly construed, however, the relentless sedimentation of modern ruins can be seen as challenging Latour's claim. Their abject being, even in an urban context: produces "negative features" – localized outsides – that, temporarily at least, will accept the unwanted activities and residues of conventional social practices, and thus keep them out-of-sight. For example, when a modern enterprise abandons a building, it is not simply left behind, becoming something past and *gone*. The building of course lingers on and is in a way "returned" to unprescribed activities and "informal economies" (Dawdy 2010: 776) (Fig. 7). It is turned into a democratic space of common access – a trash dispenser, a canvas for artists, a home for the homeless, a void for the criminal, a center for the marginal – a place, or an "inside," for activities generally preferred out of sight, pressed to the outskirts of the social order, enabling opportunities of alternative modes of life (Edensor 2005; Dawdy 2010: 776). In more quotidian and prosaic contexts the lure of abandoned buildings and derelict structures is probably something most of us have experienced. They provide alternative spaces that support a range of alternative uses: places where windows are for breaking, where common rules do not apply, the places of numerous first time experiences.

This ambiguous lure is probably also part of the reason why we today see a renewed interest in modern ruins, as exemplified by the urban explorer movement, the fast growing number of websites, popular and academic books, and papers devoted to this topic. Tim Edensor has even claimed that there is a "turn to ruins" in the social and human sciences, similar to "the craze for ruins in the Victorian age" (2011: 162). However, as little as there was a craze for ruins in the Victorian age, it was in fact very selective and reserved for the few, the interest in modern ruins is still largely a marginal phenomenon, that has for example hardly affected heritage charters, or concern. And maybe it is this shared marginality that is the very source of this fascination. In other words, the uncanniness which prevents modern ruins from being enrolled in conventional conceptions of aesthetics, history, or heritage is also what is desired among those who are at odds with these values of the establishment. Without this otherness and marginality, modern ruins would be less interesting as a fringe and underground phenomenon

and, more seriously, also lose their greatest tangible assets with respect to infuse a critical discourse on these values.

Edensor is probably right that the new interest in modern ruins is to a considerable extent due to a current social and political unrest and a resistance toward the often naive assumptions of order and progress in modernist projects (Edensor 2011); in other words, a rejection of grand narratives and big abstract plots through the praise of the immediate but largely ignored residual by-products of these projects. Importantly, however, the ruins themselves should not be seen as simple rhetorical tools, symbols, or patent allegories in this discourse but rather as its very source and drive. They are actively part of the discourse through their "affecting presence," in form of *immediacy* and not only of mediation (Armstrong 1971: 26). And of course, if we understand their agenda correctly, it is not one of domestication or normalization, but one of acknowledgement. In fact, subjecting them to sameness would easily bring their own critical voices to silence.

Future Directions

Afterthoughts

The word *ruin* is indeed an ambiguous and contested one. However, at the core of this ambiguity are real and material phenomena that despite being subjected to dominant tropes of cultural ordering also have their own integrity and wealth of affordances, including the capacity to oppose and rebuke these censoring tropes. By their very material presence, modern ruins become untimely reminders of the historical and contingent nature of these tropes, and may also trigger involuntary memories of what is marginalized or left out of conventional historical accounts. As such, their "mission" seems to comply well with an underlying and justifying subtext in most archaeological discourses on the recent and contemporary past. That is, due to their multi-vocal and democratic nature, these abandoned things give voice to marginalized social groups and people; they enable other histories and alternative *human* pasts (e.g., Buchli & Lucas 2001; Olivier 2001; Harrison & Schofield 2010).

While there are a number of good reasons, politically as well as ethically, to sympathize with this emancipating perspective, the fact that it is still conveniently restricted to *our species only* calls for some final reflections. That is, despite the many democratic pleas for the marginal and othered, the things or the ruins themselves are largely regarded as mere means to reach something else and presumably more important: neglected cultures and deprived *human* agents behind these decaying artifacts. The things or ruins themselves are little but things-for-us, reduced to what Heidegger once termed "Bestand," by which their manipulative being as "standing reserves" for us is what largely remains (Heidegger 1993; Introna 2009; cf. Olsen 2010: 82).

A radical implication of the position explored in this entry is that modern ruins are also valuable in and of themselves: as physical entities with a rightful presence in the "order" of urban or rural landscapes. This, importantly, also includes their right not to be meaningful in the dominant interpretative sense where meaning is often conflated with derivative meaning: meaning for and from us. In abandonment and ruination, things are freed from chains of use value, they are allowed to be themselves, and to indulge in their own material trajectories and companionships (Fig. 8). Surely this releasement confronts our customized habit of dealing with things as goods, as tamed domesticated possessions, or as peepholes to a bygone past. Familiar things suddenly appear to us in ways never noticed, become pestering and alien, exposing some of their own unruly thingness. Acknowledging this particular integrity and affordance of modern ruins, by being exposed to their radiation of immediate and anti-intellectual meaning, may also help preparing the ground for another and yet seemingly unlikely possibility: that they themselves are the source of their own signification (cf. Benso 2000: xxvii; Bennett 2010: 108).

Modern Ruins: Remembrance, Resistance, and Ruin Value, Fig. 8 Released from usefulness. Floor assemblage at Sarnes boarding school, northern Norway (Photo: Bjørnar Olsen)

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Homelessness, Archaeology of
- ▶ Modern Material Culture Studies

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Modern Vessel Archaeology (Iron and Steel Wrecks)

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Introduction

That former European colonies were the first nations to develop an interest in the archaeology of modern vessels (iron and steel shipwrecks) was due to their relatively recent settlement by the Europeans – essentially an eighteenth- and nineteenth-century phenomenon. This caused the wrecks of what to most "old world" countries was a far too-recent past to be valued. It was also due in part to a pervading political and academic ignorance of the beauties and complexities of the eons-old indigenous cultures subjugated and to an extent supplanted by the colonists. Another powerful factor was the advent of snorkel and scuba diving. With television also in its relative infancy, a widespread public fascination with the sea, its contents, and all that came from it was the result. Wrecks of all types were a constant interest.

For a mix of these reasons in 1964, the State of Western Australia – which was settled by Europeans in 1829 – elected to protect all pre-1900 shipwrecks in its waters, whether of wood or iron, driven by sail or steam. In 1972 the founder of maritime archaeology – a student of wrecks from the classical era – used the example of two Civil War vessels, one a wooden-hulled "ironclad" USS *Cairo* (1861–1862), to attest to "the value of archaeological research on ships recent enough for photographic records to be available" (Bass 1972: 10). In the following year, another Civil War vessel the iron-hulled USS *Monitor* (1862–1862) was declared the United States' first National Maritime Sanctuary. This was around the time historical, and then, industrial archaeology was becoming accepted as bona fide studies by the mainstream.

Soon after the notion that "modern wrecks" were significant entered a hitherto skeptical European maritime archaeological psyche when the editors of the British-based maritime archaeological journal the *International Journal of Nautical Archaeology* carried news of the USS *Monitor* research (Watts 1975). Now it is a global phenomenon.

Definition

Though "modern" and often very well documented, iron and steel shipwrecks can provide through archaeology information that is not available in the accepted accounts, in archives, or in oral histories. These data can be technical, technological, economic, social, and behavioral. The "modern" wreck can be the catalyst for a wide range of associated historical, economic, and anthropological studies, with its finding and the analysis often providing a raison d'être and focus for those studies.

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 1 The *SubMarine Explorer* wreck at the Pearl Islands in Panama (JP Delgado)

Key Issues/Current Debates/Future Directions/Examples

Iron and steel wrecks form a large percentage of almost every nation's underwater cultural heritage, especially in the former colonies (Figs. 1 and 2). When Australia proclaimed its national shipwreck legislation in 1976, for example, nearly one third of all the wrecks protected around the entire nation were iron-hulled sailing ships and steamers. One of the first wrecks to be included in that register, the Japanese Submarine *IJN I 124*, (1922–1942), was of steel. The parliamentary discussions leading to its inclusion in the first national register of Australian historic wrecks, however, show that it was protected more for social and political considerations than for its archaeological potential. Another very modern example is that of the c. 220-m-long steel freighter *Edmund Fitzgerald* (1958–1975). Declared a maritime archaeological site under the terms of the *Ontario Heritage Act*, with its significance to Great Lakes communities and to the relatives of those lost undoubted, to students of later twentieth-century technology, shipping, and crewing practices, its full archaeological and technological significance will perhaps not be realized for generations to come. Having disappeared with all hands for decades, remaining virtually untouched as a result – escaping the salvors and the ship-breakers who have long since claimed their more accessible counterparts – these two vessels are inexorably becoming the only intact examples of their type. Their worth is escalating as the years passed. Nonetheless, at present, *Edmund Fitzgerald's* indelible place in global maritime folklore is due more to the popularity and persistence of Gordon Lightfoot's haunting dirge than for its increasingly unique status.

Also increasingly significant as time passes are a suite of French and British iron and steel warships and other vessels (barges, freighters, and small troop-carrying boats) sunk by Turkish forces during the Dardanelles campaign in WWI. One of this group, the submarine *AE2* (1913–1915), has become a focus for Turkish interests seeking to raise it in celebration of the successful defense of their homeland. Though lost and its crew imprisoned for the duration, this submarine is also an Australian icon. It is a wreck much valued as one of its most successful warships and a key element in forging the "ANZAC legend" – an overarching

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 2 SS *Colac* an intact iron wreck in the intertidal zone (M. McCarthy)

Australian social theme reflecting the nation's "coming-of-age" on the shores of Gallipoli. It also a prime example of what has been termed "the maritime heritage abroad" (i.e., the shared cultural heritage of often distant and, in this instance, once hostile nations) – a wreck valued and managed by both. There are many similar examples across the globe with Chuuk (Truk Lagoon), a prominent example (Jeffery 2006). Finally, these examples reflect the fact that modern shipwrecks can be extremely large and unlike the majority of their wooden counterparts remain three-dimensional in the water column, requiring isometric or 3D representations to do the site and the vessel justice in reports and interpretive materials.

Modern maritime archaeological powerhouses (with China, India, and Sri Lanka as three prime examples) have all developed robust archaeological programs with modern wrecks also the subject of academic interest. The mid-1990s investigation of a suite of iron- and steel-hulled steamship wrecks in the Lakshadweep Islands in the Arabian Sea off India is an early example of this process (Gaur et al. 1998). They and many of the recent signatories to the UNESCO convention on the Underwater Cultural Heritage which protects all sites a century or more old will inexorably continue this process. Of special regional and national interest will be those iconic iron and steel ships-of-commerce and war that are representative of defining civil wars and modern struggles for political, social, and economic freedom. In China, Sun Yat Sen's SS *Zhongshan Jian* (1910–1938), which was raised with many artifacts in 1997, was eventually excavated to become a centerpiece of its own Museum in Wuhan and is a prime example. In Sri Lanka SS *Conch* (1892–1903), a very early Shell Oil tanker and popular dive site, is another example. Here, as in many other instances across the globe, a modern wreck's value for dive tourism serves to help protect a site of increasing historic and socioeconomic relevance. As one example, this ostensibly mundane tanker is an increasingly rare representative of the early phases of an era subsequent to which many societies have become absolutely dependent on oil (Muthucumerana 2007).

In tracing the antecedents of modern ship archaeology and in highlighting what is now standard practice, two defining modern wreck studies occurred in 1983: one, the corrosion assessment of the massive steel-hulled USS *Arizona* (1915–1941) at Pearl Harbor (Hawaii), now a much-visited international monument, and the other the archaeological-behavioral study at the iron-hulled SS *Xantho* (1848–1872) in Western Australia, a tiny refugee from the scrapheap. Having commenced

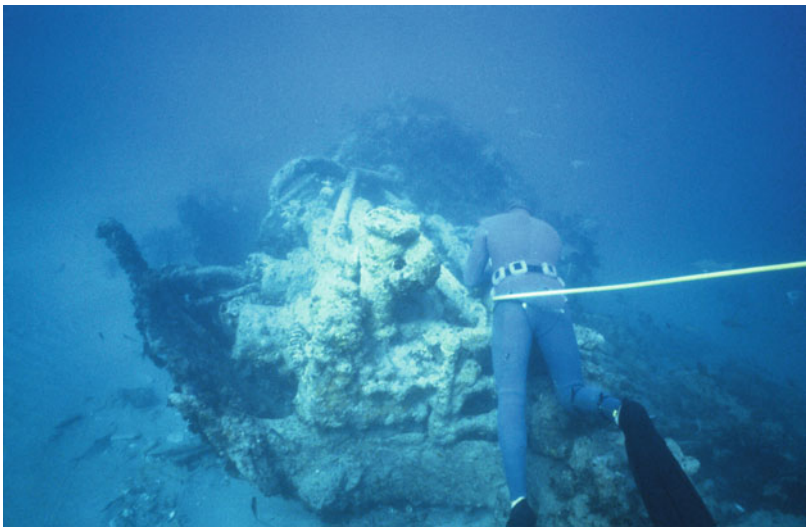

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 3 SS *Xantho* Engine on the seabed (P. Baker)

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 4 SS *Xantho* Engine after deconcretion (J. Carpenter)

with a pre-disturbance biological and electrochemical (corrosion) analysis by diving conservators, followed by the application of anodes to help preserve the hull and its unique ex-Royal Navy gunboat engine, the latter study firmly cemented the place of diving corrosion scientists in iron (and steel) ship studies and in modern ship archaeology. Conversely the de-concretion and disassembly of the *Xantho* engine was treated as an excavation in its own right, performed by the conservators yet supervised by the archaeologist in charge – posing questions, assisting and closely observing throughout, revealing new information about the technology and also behavior of those who owned and operated the vessel (Figs. 3 and 4). Another development was the production of an archaeologically based working model of the engine. Commonplace in the study of the hulls and rigging of wrecks of ancient sailing vessels

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 5 Hunley conservator Paul Mardikian with *H.L Hunley* at the Warren Lasch Conservation Center. Photo Grace Beahm, Post & Courier (with permission)

where plans and descriptions are sparse – or nonexistent (as was the case with the engine from the *Xantho*) – the value of working models based on the archaeological drawings taken from "modern vessels" has been clearly demonstrated (McCarthy 2000).

Another important development was the ongoing "in-laboratory" excavation of the Confederate submarine *H. L. Hunley* (1863–1864) along with the bodies and personal effects of the Civil War dead contained within (Fig. 5). This forensic exercise together with the recording, analysis, and exhibition methods utilized to bring the project to the general public (including working models and computer graphics of the cramped interior) is now the benchmark in "post-raising" archaeology, conservation, and presentation method (Mardikian 2004; Mardikian et al. 2009).

Where excavation is indicated, or can be supported by the required conservation expertise and the long-term commitment of staff and resources, limited excavation is most often the result at modern wrecks. Enclosed compartments help reduce the negative aspects of excavation (e.g., seabed scouring, accelerated degradation) especially where the process can be quarantined to one discrete section of a site, for example, a forecastle to examine crewing practices, a galley to examine life on board, or engine rooms to study, conserve, or even to remove an engine or machine. The fieldwork conducted at the iron-hulled SS *City of Launceston* (1863–1865) is one recent example, involving a full archaeological survey, corrosion and biological studies, and the testing by excavation of one discrete accommodation area, leaving all others untouched (Anderson 2009).

Another overarching theme in modern ship archaeology has been the trend towards thematic studies linking sites of similar type and purpose – for example, the Confederate paddle steamer *Denbigh* (1860–1865) which is one of the better-known representatives of the Civil War blockade-runner type. Another relatively recent trend includes shipwrecks of all types and ages as part of the "cultural landscape" of a place or region. Here a wreck may not be excavated at all but is archaeologically surveyed, assessed, and valued as an integral part of a far wider suite of natural and cultural sites (see Ford 2011).

Notable early examples of modern wreck studies outside former colonies are the French excavation and recoveries at the CSS *Alabama* (1862–1864), a Confederate raider found off Cherbourg in 1984, and in England the raising and exhibition of the early groundbreaking submarine *Holland I* (1901–1913) in 1985 which sank en route to the ship-breakers. Others are the 1985 finding and analysis of the wreck of RMS *Titanic* (1911–1912) and the German battleship *Bismarck* (1939–1941). These two provided a great deal of additional information about how the two ships sank and by the quality of their recording set a benchmark for the now-burgeoning discipline of non-disturbance deep-water shipwreck analysis or archaeological survey by remote sensing. Remote-operated vehicles and manned submersibles, together

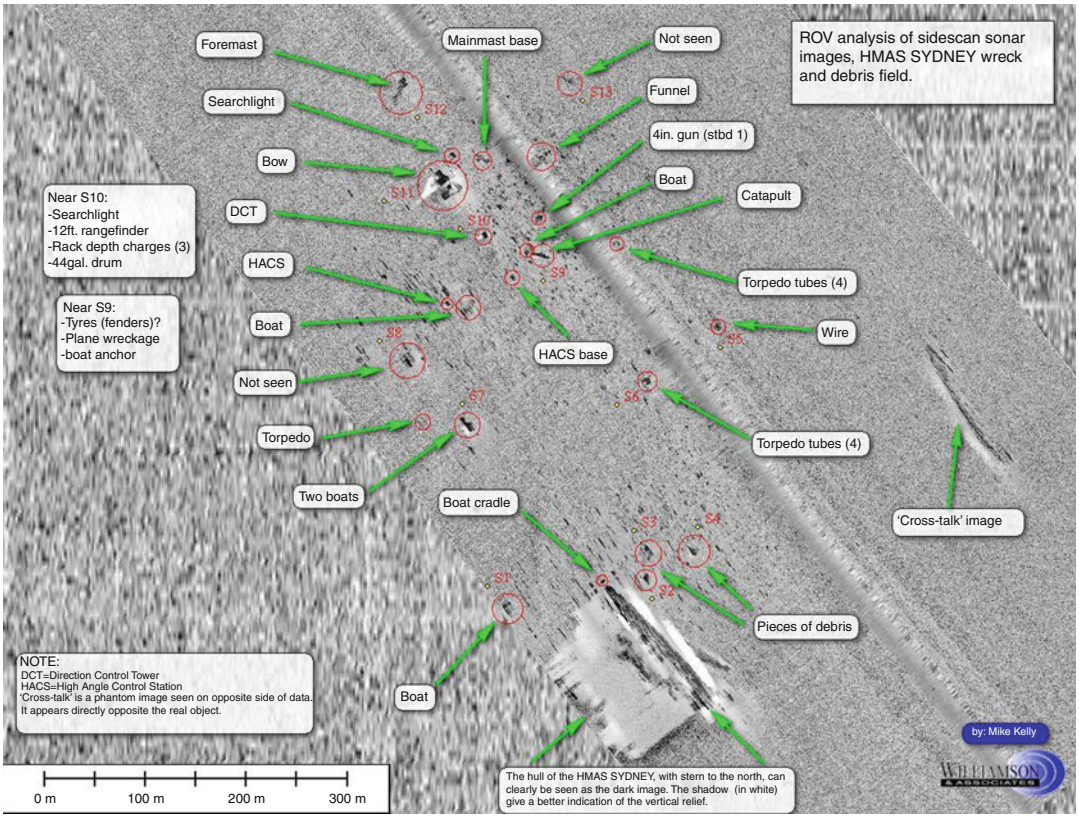

Modern Vessel Archaeology (Iron and Steel Wrecks), Fig. 6 HMAS *Sydney* site plan (M. Kelly, Williamson and Associates)

with remote-sensing equipment such as magnetometers and side-scan sonar, are now commonplace in finding, examining, and analyzing wrecks. Their observations, recording, and analysis are often being performed by what is essentially an expert "remote site analyst" or "archaeological surveyor" directing activities and operating at considerable distance from the wreck.

Another example occurred in March 2008 with the location and analysis of the wartime adversaries the German raider, HSK *Kormoran*, and the light cruiser, HMAS *Sydney*, in over 3,000 m of water off Shark Bay in Western Australia (Fig. 6). The numerous expert technical analyses of the results and a legally constituted national court of inquiry which utilized these data led to a circumstance where the material evidence on the seabed became *the* essential factor leading to a forensically based resolution of the vast majority of the 67-year-old mysteries and controversies surrounding the battle, answering questions about the behavior of those involved, accounting for the loss of the two ships and all 645 of the Australian and British crew of HMAS *Sydney*, and attesting to the veracity of the much-maligned German victor's report of where the battle took place and what occurred after the opening salvo (McCarthy 2011).

Leaving very deep water for the intertidal zone, one very recent example is studies at the wreck of *SubMarine Explorer* (1864–c.1875) (Fig. 1). Intended as the Union reply to CSS *H. L. Hunley*, it was launched too late for the American Civil War and was sent to the Panamanian pearl fishery where after astounding successes, it was abandoned in the Pearl Islands and then lost to living memory. A limited

excavation of the vessel's bilge and the detailed inspection and analysis of its internal configuration, fittings, and fixtures supplemented the relatively sparse detail found in the archives. This research led not only to the study of the development of the vessel and its groundbreaking submarine technology but also to a study of its builder, its people, and to those allied and associated matters that any investigating maritime archaeologist working in the historical and industrial period is invariably drawn subsequent (or prior) to an archaeological survey, site analysis, or excavation. In this instance it was to metallurgy and iron founding: the American Civil War, German immigration into the USA, the ancient Panama pearl fishery, the unrecognized advent of the "bends" or decompression sickness in the underwater environment, and much more (see Delgado 2012). Though much had been written about these various subjects, more had been learnt as a result of the *SubMarine Explorer* study. As was the case with *Xantho*, the anomalous remains on the seabed also led to the investigation of the role of an innovative entrepreneur and to a study of the premature use of technology in industry in a "frontier" setting. Of additional import, by virtue of the policy of social inclusion evident throughout the study, *SubMarine Explorer* proved to be a catalyst for an enhanced Panamanian appreciation of their extensive modern maritime heritage post better-known Spanish-colonial and "pirate" eras. For Panama the importance of the wrecks associated with one of the world's greatest engineering feats; its canal(s) is slowly coming into focus. These wrecks (from many nations) and the *SubMarine Explorer* itself (a boat conceived and built for the Union side in the Civil War, by an innovative German immigrant, taken to Panama and there abandoned in its waters) are other prime examples of the world's shared heritage.

Other important theoretical developments have resulted from the study of modern wrecks. Over a number of decades, a number of commonalities have been observed for iron and steel wrecks coming to rest (a) on a hard bottom, (b) on their side, and (c) on a seabed severely affected by seas and swell, for example. One fundamental principle is what has become known as the "waterline theory of iron ship disintegration" illustrating that an upright iron or steel ship will (all else being equal, e.g., sediment depth and a consistency other than quicksand, very soft mud, or similar) settle on a seabed of soft sediment down to the waterline (Riley 1988). These commonalities, though first recognized at modern wrecks, are now known to apply to wrecks of all types, ancient or modern, wooden, iron, or steel. Because they are not affected by shipworm and because they are relatively recent, modern wrecks often remain highly visible and for that reason have also become a major part of the world's wreck access programs, underwater "wreck trails," or "museum-without-walls" presentations, for example, the wartime wrecks of Coron Bay in the Philippines, Bikini Atoll, Chuuk (Truk Lagoon) in the Pacific, the Dry Tortugas in Florida, Full Fathom Five National Marine Park in Canada, the many NOAA Sanctuaries, world heritage-listed Papahānaumokuākea National Monument, Rottnest Island in Australia, and Scapa Flow in Great Britain, to name a few of the better known. At these facilities the visitor is presented with interpretive (above and underwater) material both on site, on Web sites, and in social media. In many cases the wrecks have become an educational "hook" or catalyst, in effect tools – educational transports – seamlessly leading the viewer into a greater appreciation of the history and events that transpired often into the underlying economics, technology, work practices at sea, entrepreneurial activity, society, and its mores. The last of these are regular features of those anthropologically based studies into wrecks or a suite of wrecks of the modern era popular in some maritime archaeological circles (e.g., Gould 2010).

These are also many examples of extensive site-specific academic analyses of the ubiquitous nineteenth-century sailing barques and ships, with those conducted recently into the

Norwegian bark *Glamis* (1876–1913) in the Grand Cayman Islands, Jamaica (Ho 2004), and the British bark *Sepia* (1864–1898) off Fremantle but two examples. While the former concentrated on the technology, the history, and comparative studies, in the latter case, a limited test excavation designed to examine loading methods, colonial trade, and the survivability of cargo was also conducted (Souter 2009). Further, these and hundreds of other studies show that while submarines tend to be the most intact of all modern wrecks – and are thereby the easiest to raise – followed by steamers and motor ships which are often held together by their engine and boiler rooms, these cavernous sailers often quickly disintegrate leaving only the bow and stern triangles lying proud of the seabed. Other than those caught in the world's "ship traps," there are the iron and steel barges, sailers, steamers, and motor vessels in the deep- and shallow-water "ship graveyards" into which many that escaped wrecking or the ship-breaker were consigned. These appear alongside their wooden counterparts and contemporaries providing an opportunity for a wide range of comparative studies and public interaction (Richards 2008). In the latter context, one interesting collection of around 80 wrecks "The Purton Hulks" lying along the banks of the River Severn, being surrounded by grass, is accessible by scholars and picnicking families, adults, and children alike to become a prime example of the potential educational and recreational value of the modern wreck.

Finally in progressing from the shallows and the shore, another significant development in modern ship archaeology and site analysis has been the increasing depths at which wrecks are being accessed by divers. As an example of this, at the national 1985 practical and theoretical iron and steamship seminar held during the SS *Xantho* excavation, the deepest wreck described was but 30 m. At a follow-up seminar held two decades later, it was in excess of 100 m. This was due to the advent of "technical diving" (open-circuit mixed gas and closed-circuit rebreather) methods in the intervening decades and its becoming commonplace across the globe. To an extent this mirrors the arrival of the scuba tank on the recreational scene 30 years earlier – ushering in a new era in study, analysis, archaeological survey, excavation, conservation, and presentation of modern iron and steel ships.

Cross-References

- ▶ Australia: Maritime Archaeology
- ▶ Canada: Cultural Heritage Management
- ▶ China: Museums
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation in Museums
- ▶ Cultural Heritage and the Public
- ▶ Deep-Water Archaeology
- ▶ Heritage Museums and the Public
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Maritime Landscapes
- ▶ Society of the Ship
- ▶ Site Formation Processes
- ▶ Television and Archaeology: Views from the UK and Beyond
- ▶ US National Park Service and World Heritage
- ▶ Volunteers in Archaeology
- ▶ War at Sea Archaeology

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Modern World: Historical Archaeology

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Introduction

Beginning in the 1990s, a number of historical archaeologists began using the term "the historical archaeology of the modern world" to define their research. Their use of this term was designed to refine the meaning of "historical archaeology" to refer to a specific topic of investigation, the archaeology of post-Columbian history, or sites dating to after about 1500 CE. Since then, the term has been used in at least two ways, as the archaeology of a particular period of history, and as an archaeology specifically designed to constitute a critique of modernity.

Definition

Scholars in diverse fields disagree about the precise meaning of "modernity," but when historical archaeologists write about it they typically mean the post-Columbian, or post-1500 CE world. Many historical archaeologists equate modernity with European expansionism beginning with the Portuguese and Spanish voyages of conquest and terminating at the present. This understanding, however, does not preclude the presence of "multiple modernities," the myriad sociocultural environments that may have had little or nothing to do with European interaction, but which existed in parallel with the European world.

The concept of an archaeology of the modern world developed in the 1970s because of two prominent definitions of historical archaeology. The first, offered by Robert Schuyler (1970: 84), defined "historic sites archaeology" (a specialized term then also used for historical archaeology) as "the material manifestations of

the expansion of European culture into the non-European world starting in the fifteenth century and ending with industrialization or the present depending on local conditions." Shortly thereafter, James Deetz (1997: 5) provided a similar definition of historical archaeology: "the archaeology of the spread of European culture throughout the world since the fifteenth century and its impact on indigenous peoples." Some archaeologists today approach both definitions with caution believing that Schuyler and Deetz put too much emphasis on Europeans. They believe that the argument implicit in these definitions is that indigenous peoples only reacted to European culture, or, to state it differently, that the transference of objects and ideas was only one directional, from Europeans to indigenous peoples. Other archaeologists believe to the contrary that the Schuyler/Deetz definitions highlight an important historical process that has affected the way the world has developed since Europeans began their global efforts to colonize, exploit, and control the non-European world.

The perspective that historical archaeology involves the investigation of the post-Columbian world, however, represents a narrow view of the field. A broader understanding is that historical archaeology includes all research that uses archaeological and historical sources of information in relatively equal proportions. These sources can include ethnographies, personal memories, ancient texts, inscriptions and drawings on walls, photographs, transcriptions of oral testimonies, and just about any other material that can provide information about past lived experience. This broader definition thus encompasses the research of Egyptian, classical, medieval, and other archaeologists who regularly employ non-excavated materials in their research. The broadness of this definition is confusing, however, because all archaeologists – even those studying precontact indigenous cultures – might be considered historical archaeologists because they regularly rely on the written works of other archaeologists, colonial missionaries and explorers, and professional field anthropologists to enrich their understanding of ancient ways of life. As a result, most archaeologists who self-identify as historical archaeologists tend to use the more narrow definition of their field, and concentrate their efforts on post-1500 CE history.

Two variants of the historical archaeology of the modern world developed as archaeologists became increasingly comfortable describing their research in terms of modernity. To avoid confusion, "global historical archaeology" may be used to refer specifically to post-Columbian historical archaeology that usually begins with contact situations that involved indigenous cultures and Europeans (e.g., Hall 2000). This kind of archaeology is most consistent with the Schulyer/Deetz definition. "Modern-world archaeology," on the other hand, is a term used to refer to an archaeological critique of modernity, largely focusing on the material and cultural manifestations of colonialism, capitalism, Eurocentrism, racialization, and other entwined processes that were practiced after about 1500 CE and which continue to affect the world's peoples today (Orser 1996).

A primary research topic of modern-world archaeology is the process of becoming modern, with the four processes noted above being a central focus. These four processes, which were put into operation in the world after 1500 CE – by various cultures and at different times – are tightly interlinked and coterminous. The conjunction of these processes provides both the unique character of the modern era and the rationale for investigating it using the multidisciplinary tools and approaches of historical archaeology.

Key Issues and Future Directions

Archaeologists of the modern world do not believe that historical archaeologists should ignore non-European peoples; such a position runs counter to the theoretical foundations of anthropological archaeology. Labeling the archaeology of the modern world Eurocentric – because of its concern with the power and reach of post-1500 CE European nation-states (including the United States) – is an inaccurate oversimplification.

Both global historical archaeology (defined by era of interest) and modern-world archaeology (defined by era and the critique of modernity) are concerned with the myriad linkages between past and present. An interest in the process of modernity, however framed, makes the archaeology of recent history relevant to scholars concerned with transnational geopolitics, global emancipation, and multicultural understanding.

One great potential of the archaeology of the modern world stems from the archaeologists' ability to conduct multiscalar analysis. Archaeologists can examine lived history at different scales because of the richness and diversity of the extant sources. The inspiration for this line of inquiry stems from the research of French historian Fernand Braudel (1972). Braudel saw history as involving three processes: short-term events (e.g., events, individuals; which he called *evenements*), medium-term structures (e.g., social and economic history, regions, worldviews; *conjonctures*), and long-term structures (e.g., history of civilization, long-term trends; the *longue dureé*). These processes, though they have the appearance of relating only to time, also have significant spatial meaning. The examination of the short term might involve specific individuals and unique events, but these individuals and events had to occur within discrete physical settings. Given this materiality, Braudel's concepts thus have tremendous application to the archaeology of the modern world. The excavation of a house foundation and yard inhabited by a specific person or family might constitute the short term, and the medium term might involve a broader analysis of the neighborhood during the time the family occupied the dwelling. The *longue dureé* might involve an analysis of the entire historical era into which the family – and people like them – operated. To use the enslavement of Africans as an example, the short term could be the excavation of a cabin site on a colonial plantation in Jamaica, the medium term could be the analysis of the slave regime on the island, and the *longue dureé* might involve the entire history of African enslavement in the British Atlantic world.

Globalization is one topic that is especially amenable to analysis as part of the archaeology of the modern world. Globalization is a huge subject with myriad definitions, but one easy way to envision it is as "a state of the world involving networks of interdependence at multicontinental distances. The linkages occur through flows and influences of capital and goods, information and ideas, and people and forces, as well as environmentally and biologically relevant substances (such as acid rain or pathogens)" (Keohane & Nye 2000: 105). This definition stresses two key elements. It promotes the idea of multiscalar analysis because the various linkages have local, regional, and transcontinental expressions. At the same time, the definition does not denigrate the large-scale networks of interaction that existed before 1500 CE, but simply argues that modern-era globalization was enacted on a scale that linked together vastly different peoples across huge distances. These cultures would never have been in contact without globalization. The definition also creates space for the analysis of environmental degradation and biological change in the analysis, topics that have had archaeological significance for years and which continue to have profound importance today. The addition of contagion is especially important for post-Columbian history because it creates space to investigate the transference of disease as a result of cultural contact.

Archaeologists can investigate modern globalization using diverse sources of information. Most pointedly they can employ their special skills in excavation and artifact analysis, modes of investigation not available to scholars in other disciplines. Much archaeological research will undoubtedly concentrate on the local recontextualizations of introduced material objects as part of a process called glocalization.

Glocalization refers to "the interpenetration of the global and the local resulting in unique outcomes in different geographic areas" (Ritzer 2003: 192). Glocalization is a process well studied by cultural anthropologists, and an awareness of the process in archaeology has led to the

writing of "alternate histories" of the modern world, histories that can be used to promote human rights, cultural awareness, and sensitivity to the wishes and worldviews of people throughout the world.

Archaeologists of the modern world are uniquely situated to examine the historical and material roots of globalization and glocalization using their unique sources, including excavated artifacts, information revealed in buried structures, and a diverse range of textual materials. They can chart the initiation, growth, and eventual termination of cultural interactions in the post-1500 CE world using Braudel's ideas about space and time as a starting point. Through this research, archaeologists of the modern world can learn about our own times and gain fuller understandings of their historical and cultural roots.

Cross-References

- ▶ Atlantic World: Historical Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Ceramics: Colonoware
- ▶ Ceramics: European Cream to Whitewares in the USA
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis
- ▶ Ceramics: Stonewares
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Clay Pipes in Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Consumption, Archaeology of
- ▶ Critical Historical Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Labor Archaeology
- ▶ Maritime Historic Site Management for the Public
- ▶ Maritime History
- ▶ Material Culture and Education in Archaeology
- ▶ Mission Archaeology in North America
- ▶ Modern Material Culture Studies
- ▶ Nationalism and Archaeology
- ▶ New Spain: Forts and Transport Archaeology
- ▶ Plantation Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Race in Archaeology
- ▶ Social Memory in Archaeological Theory
- ▶ World-Systems Analysis

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Molluscs (Invertebrates): Analyses in Environmental Archaeology

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Introduction

Due to their variable but generally high inorganic content, shells of the phylum Mollusca constitute

one of the most durable categories of biogenic finds in the global archaeological record. Mollusc shells are omnipresent and often highly visible in the archaeological contexts across the globe, with the rare exception of wet-preserved contents of acidic bog contexts. The nature and quantity of archaeological mollusc shells vary tremendously among sites, chronological periods, and geographic areas, from 125 ka BP sites associated with early modern humans in eastern Africa (Stinger 2000) to elaborate ornaments from Pre-Columbian Colombia (Carvajal-Contreras 2011). Depending on the geographic area and research question, investigations may focus on molluscs of terrestrial, freshwater, or marine origin, and they may focus on molluscs that were exploited as food resource or as raw material in artifact manufacture. Because mollusc shells archive changes in their ambient environment as they grow incrementally (Richardson 2001), archaeological mollusc shells can become subjects of independent or integrated studies of paleoenvironmental conditions.

Definition

The analysis of mollusc remains from archaeological contexts is an integral part of environmental archaeology and zooarchaeology. Both human-modified and naturally occurring mollusc remains can be subject to molluscan analysis in archaeology. The nature of archaeological mollusc evidence can be alternatively classified in terms of different molluscan taxa and habitats. Archaeological molluscs of terrestrial origin consist of gastropods and are colloquially dubbed as land snails. Molluscs originating from marine environments mainly comprise both gastropods (e.g., whelks, topshells, limpets) and bivalves (e.g., clams, oysters), but remains of other classes of marine molluscs such as cephalopods (typically cuttlefish bones) and scaphopods (typically *Dentalium* shells) may also occur commonly in certain contexts (Fig. 1). Artifacts made of molluscs, molluscs that represent food, and naturally occurring molluscs are usually handled separately from each other.

The study of archaeological mollusc shells is increasingly commonly referred to as "archaeomalacology" since the beginning of the twenty-first century (Bar-Yosef Mayer 2005; Çakırlar 2011). The analysis of mollusc shells tackle a seemingly unlimited range of anthropological and paleoenvironmental issues (Claassen 1998). Analytical methods of archaeomalacology include taxonomic identification, sclerochronology (incremental analysis), taphonomy, biometry, quantitative estimations of abundance, ubiquity, dietary contribution, and habitat construction, as well as experimental archaeology of artifact technology and ethnoarchaeology. Common themes in the study of archaeological molluscs include dietary reconstruction, long-distance contact, artifact technology and use, symbolic uses of shells pertaining to belief systems and representation of socioeconomic class and status, industrial activities, seasonality of food acquisition, and human exploitation pressure on marine ecosystems. Theoretical approaches to archaeomalacology have been largely dominated by optimal foraging concepts on the one hand and culture-historical approaches on the other.

Historical Background

The study of archaeological molluscs has developed as a distinct field within environmental archaeology (Brothwell & Higgs 1969) and zooarchaeology (Grigson & Clutton-Brock 1984). J. Evans' work on land snails in the context of British archaeology has played a key role in the recognition of mollusc remains as a source of paleoenvironmental information in the UK (Evans 1972). With the rise of Middle-Range Theory in archaeology and New Archaeology, the field developed rapidly in North America, focusing mostly on developing methods to decipher the meaning of gigantic masses of mollusc remains in coastal shell remains for post-Pleistocene adaptations of hunter-gatherer-fisher groups. The historically important study of Ertebølle culture in prehistoric northwestern Europe has also benefited from these international

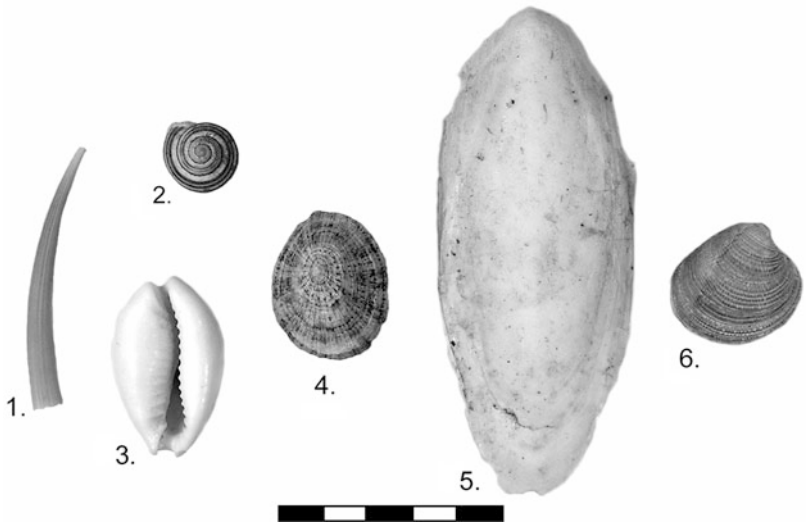

Molluscs (Invertebrates): Analyses in Environmental Archaeology, Fig. 1 Examples of mollusc shells that occur frequently in archaeological contexts (1) Scaphopoda, *Dentalium* shell; (2) Gastropoda, terrestrial (land) snail; (3) Gastropoda, Cypraeidae, "cowrie shell"; (4) Gastropoda, *Patella rustica*; (5) Cephalopoda, *Sepia* sp., "cuttlefish bone"; (6) Bivalvia, *Chamelea gallina*

developments in terms of the methodological aspects pertaining to related molluscan evidence.

One landmark in the history of archaeological mollusc analysis is a pilot study that used the light stable isotopic (carbon and oxygen) compositions of archaeological *Cerastoderma glaucum* (lagoon cockle) incremental biocarbonate in estimating shellfish gathering seasonality (Shackleton 1970). Further methodological advancements in applications of sclerochronology (analysis of ontogenic incremental shell patterning) and shell ecomorphology – relating shell size and shape to molluscan habitats – continue to contribute to the methodological development of the field (Michel et al. 1992).

Key Issues/Current Debates

Studies of archaeological mollusc shells contribute to current debates concerning a number of key issues in archaeology, ranging from the evolution of shared symbolism in recent species of *Homo* (e.g., D'Errico et al. 2005) to the reconstruction of past human impact on marine resources to serve as a baseline for conservation efforts (Marelli & Arnold 2001).

Some of the most tangible lines of archaeological evidence related to the biological and cognitive evolution of recent *Homo* sub/species occur in the form of mollusc shells. Perforated *Nassarius* shells from human encampments dating back to c. 80 thousand years ago constitute some of the earliest ornaments used by humans in Africa (D'Errico et al. 2005). The anthropogenic origin of the perforations was established by experimental work on modern shells. Taphonomic observations using SEM microscopy showed use wear, indicating that perforated objects were strung and probably worn as personal ornaments. Recent well-dated finds indicate that Neanderthals in Europe also manufactured and used perforated and ochre-dyed marine molluscs (Zilhão et al. 2010). The power of such studies in convincing others to see the tangible imprints of hominid symbolism comes from their vigorous use of combined actualistic and stratigraphic research. Experimental work and comparative SEM studies of results have also been of great use in reconstructing the manufacture process and utilization of mollusc shell objects of symbolic value in more recent periods, for example, in aboriginal Australia (Szabó et al. 2007).

Although claims about the significance of the role that marine molluscs played as a food resource during *Homo sapiens*' dispersal out of Africa – together with other marine food resources enabling them to explore coastal routes – have sparked some attention (Stinger

2000), for the time being, evidence for intensive exploitation of molluscs by early modern humans can only be substantiated for the later Palaeolithic phases in Southern Africa (Middle Stone Age, c. 50 ka BP) (Klein et al. 2004). Intensive exploitation of marine molluscs, however, does not become evident until the widespread appearance of shell middens during the Late Pleistocene and Early Holocene on almost all coasts of the world, from Japan to Denmark and Peru (Waselkow 1987). Despite the amplitude and ubiquity of mollusc remains at these and subsequently formed shell middens, whether molluscs constituted, in simplest terms, a dietary staple or supplement for coastal groups who occupied them is still debated (Fa 2008).

The various methods developed to assess the dietary role of molluscs for past human groups, as well as other issues pertaining to shell midden archaeology, such as site duration and seasonality, have also been received with mixed criticism and praise. For example, Claassen (1998: 49) has called for caution toward the common use of decrease in mean shell size as a proxy for declining survivorship in mollusc populations due to human exploitation, arguing that the method dismisses other factors – including pressure from predators other than humans – as potential causes for changes in shell size. Similar debates on methodology have gradually led to the advancement of the analytical procedures used to investigate archaeological molluscs, leading to the more common integration of actualistic research on geographically coherent modern mollusc populations as a means of modeling past human behavior relating to shellfish use.

Other lines of actualistic research, such as ethnographic observations of forager groups, have greatly added to our understanding of the formation of mollusc evidence (Meehan 1982). To these, we can add the contribution of experiments conducted by Ruscillo (2005) that shed light on the formation of the mollusc evidence in detecting origins and scale of a dye industry in the Mediterranean region that used the purple substance secreted by Muricid snails' hypobranchial gland as raw material (Fig. 2). The so-called murex or purple dye industry is mentioned in the Old Testament and by Classical authors. The antiquity and nature of ancient dye manufacture using Muricid snails is a frequently visited issue also in South American archaeology.

Molluscs (Invertebrates): Analyses in Environmental Archaeology, Fig. 2 A sample of crushed *Hexaplex trunculus* (Muricidae) snails from Late Bronze Age Troy. The shells are crushed in the process of dye manufacture

International Perspectives

Current international research on archaeological molluscs can be summarized into three broad categories: scholarship that focuses on archaeological molluscs as artifacts, molluscs as dietary remains, and molluscs as climatic archives. While artifacts made of molluscs tend to receive more scholarly attention in parts of the world where molluscs played a more visible role in the symbolic world of past cultural groups (e.g., Pre-Columbian Meso-America), in other parts of the world where shell middens are abundant (e.g., Denmark, Japan, California), archaeological molluscs are commonly investigated to test hypotheses relating to the adaptations of hunter-forager groups. Studies that consider the role of molluscs as a food resource in past

farmer-herder societies are significantly less common. In studies of post-Neolithic, sedentary societies, mollusc remains (sometimes including fossil molluscs) are commonly used to map long-distance exchange patterns (e.g., Red Sea shells in Bronze Age Mesopotamia), ritual behavior (e.g., mollusc shells adorning the dead), symbolism, and artifact technology. If the variability of the prominence of these two research foci is in part determined by the nature of evidence that varies from one region to the other, it is also in large part dictated by dominant regional academic traditions. Although the exploration of archaeological molluscs, especially land snails, as vessels of past environmental conditions has left a significant impact on the archaeological traditions of some countries like the UK (Evans 1972), this resource has gone almost completely unnoticed in others.

The Archaeomalacology Working Group of the International Council for Archaeozoology (ICAZ) has been fundamentally instrumental in bringing together the multiplicity of international perspectives since its establishment in 2002. Admittedly, proceedings and newsletters of the group (Bar-Yosef Mayer 2005; Çakırlar 2011) testify to its limited success in embracing shell midden and sclerochronological research.

Future Directions

The field of sclerochronology has witnessed a huge leap forward in the recent decade (Schöne & Gillikin 2013), but it unfortunately remains almost entirely unrelated to anthropological (primarily forager behavior) and paleoenvironmental research encapsulated by archaeomalacology. The next decade will hopefully bring along effective communication between archaeomalacology and sclerochronology that will create important opportunities for application in both fields. For the advancement of the analysis of mollusc artifacts, there is ample room toward the under-explored sources of ethnography and use-wear studies. The archaeology of mollusc remains would also benefit from more effective integration with ichthyoarchaeology especially in forming firm baselines for research in conservation biology.

The above-mentioned lines of research, with their differing foci on artifactual mollusc remains, dietary mollusc remains, and mollusc remains as paleoenvironmental proxies, are likely to prevail and progress as largely independent specializations. At the same time, recent studies give clues toward the likelihood that greater shared ground is to be found across the existing "subdisciplines" with interest in archaeological molluscs. This is evident, on the one hand, in the greater emphasis put on the biological and environmental properties of worked and used shells, and in the attention paid to the taphonomy of mollusc remains considered to represent dietary activities on the other, leading to better understandings of, for example, site formation processes. Such developments can only be beneficial for the progress of the field as a whole.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Biometry in Zooarchaeology
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Ethnoarchaeology
- ▶ Experimental Maritime Archaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ International Council for Archaeozoology (ICAZ)
- ▶ Middle-Range Theory in Archaeology
- ▶ Molluscs (Isotopes): Analyses in Environmental Archaeology
- ▶ New Archaeology, Development of
- ▶ Taphonomy: Definition
- ▶ Zooarchaeology

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Molluscs (Isotopes): Analyses in Environmental Archaeology

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Introduction

Mollusc shells are a common component of many archaeological assemblages. Archaeological mollusc shell accumulations are typically the result of food refuse and may be present within a settlement or as a midden nearby. Mollusc-based artifacts such as shell scrapers and shell beads have also been found in sites from Paleolithic to recent times in many geographic areas. However, some terrestrial mollusc shells may be present in archaeological assemblages even though humans did not actively collect them. Studying the chemistry of

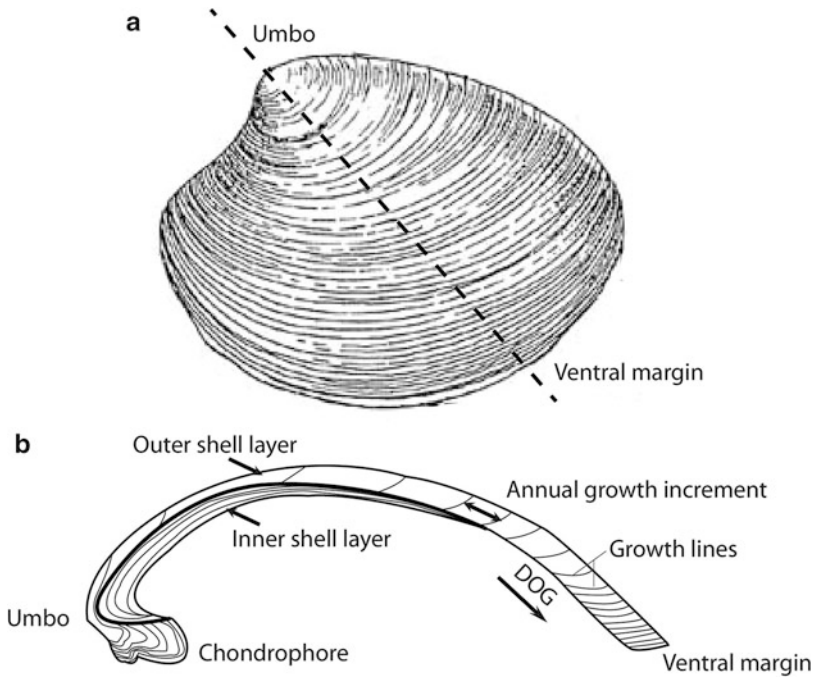

Molluscs (Isotopes): Analyses in Environmental Archaeology, Fig. 1 Idealized morphology of a bivalve shell. The *dashed line* in (**a**) shows the location of the cross section in (**b**). *DOG* direction of growth

shells from archaeological assemblages provides a means to study paleoclimate and paleoenvironmental change that is directly correlated to human activity. Shell chemistry of the final growth increments can also yield information on the seasons in which the shells were harvested. Incorporating climate and seasonality studies within archaeological investigations provides insight on how humans interacted with their environment. Stable oxygen isotope analysis is one of the most common geochemical techniques applied to the analysis of archaeological shells and will be the primary focus of this review.

Definition

The Phylum Mollusca

The Mollusca are a phylum of soft-bodied invertebrates whose bodies are often protected by shells composed of calcium carbonate (either calcite or aragonite). Gastropod and bivalve shells are the most commonly preserved mollusc remains in archaeological sites. Both live in marine, freshwater, and estuarine environments, while gastropods also live in terrestrial environments. The usefulness of mollusc shells as high-resolution environmental archives stems from their shell's incremental growth patterns. Bivalve bodies are encased by a shell consisting of two valves, joined by a hinge. The shells grow by depositing successive increments of calcium carbonate from the umbo to the ventral margin (Fig. 1). Gastropods are encased within a shell, which is often coiled. The shell grows by depositing calcium carbonate growth increments from the apex to the shell lip (Fig. 2).

Molluscs generally precipitate their shells in equilibrium with surrounding ambient environmental conditions. Therefore, the physical and chemical properties of mollusc growth increments record changes in the mollusc's ambient environment during growth. Depending on shell growth rates, high-resolution sampling of these shells can yield environmental information from decadal to subdaily timescales. Short-lived species can record seasonality and weather extremes, and long-lived species can record decadal- to centennial-scale climatic oscillations.

Molluscs are widely distributed in varied environments and are abundant from the tropics to the poles. This offers the potential for

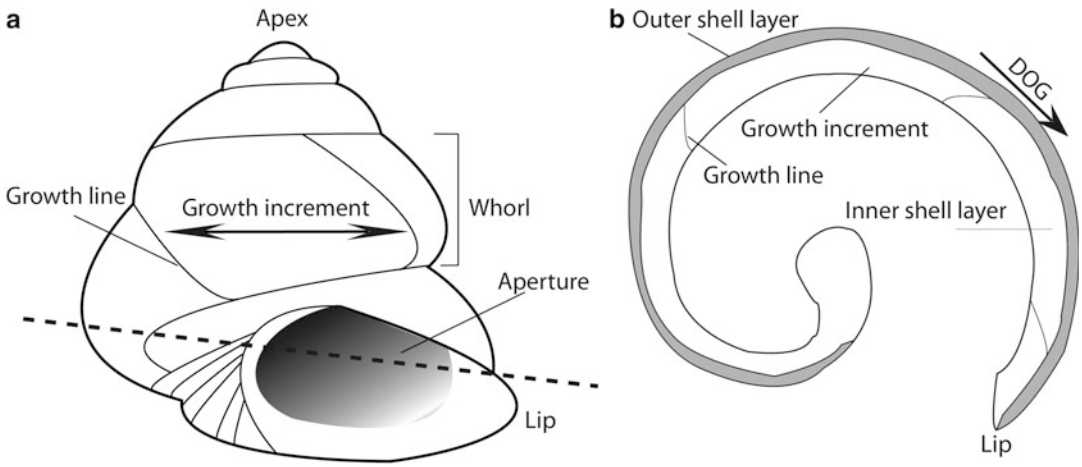

Molluscs (Isotopes): Analyses in Environmental Archaeology, Fig. 2 (**a**): Idealized external morphology of a coiled gastropod shell. The *dashed line* in (**a**) shows the location of the cross section in (**b**). *DOG* direction of growth

high-resolution time series analyses from almost every geographic region. Many other quaternary environmental proxies such as ice cores and marine sediment cores are limited in their geographical extent and temporal resolution.

Stable Isotopes

Isotopes are atoms of the same chemical element that have the same number of protons (thus the same atomic number) but different numbers of neutrons (thus different atomic masses). Stable isotopes have nuclei that do not decay to form other isotopes. Chemically, all isotopes of the same element behave identically. However, due to their differences in atomic weight, the lighter isotopes have different kinetic properties, causing them to respond at different rates during biological and geochemical processes. In "light" stable isotopes with low atomic masses, the differences in weight between the isotopes are large enough for physical, chemical, and biological processes to cause fractionation whereby the ratio of heavy to light isotopes in the system changes. Oxygen is the most routinely studied stable isotope in archaeological mollusc shells. It has three stable isotopes ^{16}O, ^{17}O, and ^{18}O. The application of oxygen isotope analysis to mollusc shells uses the ratio of ^{16}O to ^{18}O. As the differences in natural abundances of stable isotopes are usually very small, the ratio of heavy to light isotopes is measured with reference to the isotope ratio in an international standard in delta (δ) notation:

$$\delta X = R_{sample} - R_{standard}/R_{standard} - 1 \times 1000$$

X = the heavy isotope and R = the ratio of heavy to light isotope. Measurements are expressed in parts per mil (‰).

If δX is more positive, the sample has a higher ratio of heavy to light isotopes than the standard.

Oxygen Isotopes in Marine Shells

The isotopic composition of marine shell is controlled by water temperature and the isotopic composition of seawater (Kennett & Voorhies 1996). In modern marine environments in mid-to high latitudes, the role of evaporation and rainfall on the overall isotopic composition of seawater is negligible, making sea surface temperature (SST) the primary fractionation factor (Fig. 3). Warmer temperatures enrich ^{16}O relative to ^{18}O, to generate isotopically negative signatures, while cooler temperatures produce positive signatures. In these temperature-dominated systems, $\delta^{18}O$ amplitude (the difference between maximum and minimum isotopic values) records the range of seasonal water temperature fluctuations experienced by a mollusc during growth. The relationship between shell

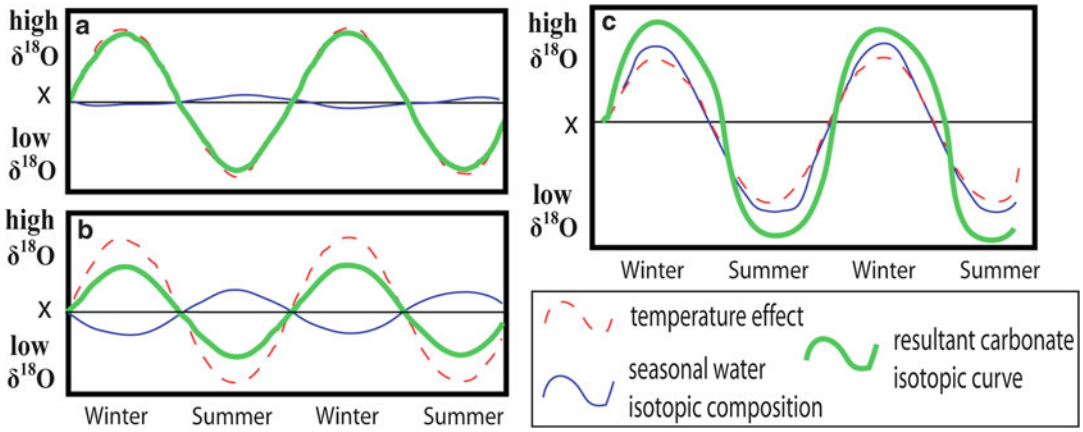

Molluscs (Isotopes): Analyses in Environmental Archaeology, Fig. 3 Simple models of seasonal change in shell $\delta^{18}O$ expressed as a deviation from a mean value (X). Temperature is identical in **a**, **b**, and **c**. (**a**): Change in water composition is negligible and temperature is the principal fractionation factor, so the isotope curve closely follows the temperature effect; (**b**): change in water composition is larger. This could be caused by increased summer evaporation or heavier seasonal precipitation; (**c**): higher amplitudes in negative seasonal precipitation combine with temperature to create larger amplitudes in the resultant carbonate isotopic curve (Modified from Dettman & Lohmann 1993)

$\delta^{18}O$, water $\delta^{18}O$, and sea surface temperature has been expressed in several equations, so $\delta^{18}O$ in shells can be used to quantitatively reconstruct sea surface temperature regimes of the past (e.g., Dettman et al. 1999). In tropical regions, interannual temperature changes are minimal, so $\delta^{18}O$ of mollusc shells can be used to reconstruct paleo-$\delta^{18}O$ of the water, which is mainly controlled by the amount and composition of rainfall. In such regions, $\delta^{18}O$ can be used to reconstruct precipitation and monsoon regimes.

Oxygen-Stable Isotopes in Terrestrial Molluscs

Oxygen isotope ratios of terrestrial mollusc shells provide a record of continental climatic conditions. In terrestrial shells, the water ingested by the snails principally controls $\delta^{18}O$. However, due to the variability in the oxygen isotope composition of the environmental water consumed by the snails, there is no worldwide correlation between snail shell $\delta^{18}O$ and a single environmental variable (see Zanchetta et al. 2005 for a review of recent studies): in humid regions at lower latitudes, meteoric water or precipitation tends to dominate the signal, while at higher latitudes in more temperate climates, temperature and humidity are the primary variables. Isotopic signatures of land snails from archaeological contexts should be validated in relation to a thorough assessment of isotopic data from live-collected snails of the same or similar species from a similar geographic range and within the expected foraging range of the archaeological site or under experimentally controlled conditions, to provide a baseline for the interpretation of the paleoenvironmental and archaeological data.

Oxygen Isotopes in Estuarine Shells

The mixing between marine and freshwater complicates the interpretation of stable isotope ratios in estuarine shells. In estuarine environments, oxygen isotopes and shell growth may be differently affected by factors such as turbidity, temperature, and salinity variations. In tropical regions, where temperature remains more constant throughout the year, oxygen isotopes from estuarine shells can be used to detect salinity changes from freshwater inputs including changes in paleorainfall/paleomonsoon and seasonal variations in runoff (e.g., Kennett & Voorhies 1996). Outside of the tropics the situation is more complicated as both temperature

and salinity variation can differently affect the oxygen isotope record (Fig. 3).

Oxygen Isotopes in Freshwater Shells

Freshwater molluscs present a greater challenge for interpretation than marine molluscs, as the oxygen isotope ratios preserved within shell carbonate preserve evidence of various environmental effects. The $\delta^{18}O$ composition of the ambient freshwater can vary significantly with changes in evaporation and precipitation (e.g., Fritz & Poplawski 1974). In lakes with closed catchments and long water residence time, the local precipitation-evaporation balance is likely to be the controlling parameter on water $\delta^{18}O$ composition. By contrast the controlling parameters in lakes with open catchments and low water residence time are likely to be precipitation $\delta^{18}O$ and/or temperature. In river and lake systems, high evaporation results in more positive $\delta^{18}O$. This has the effect of reducing the seasonal amplitude signal (Fig. 3). River systems may be enriched along their flow paths with isotopically heavy or light rainwater, which will either dampen or heighten the amplitude signatures of the shell (Fig. 3). In order to apply $\delta^{18}O$ analysis for paleoclimatic reconstructions in freshwater systems, a thorough study of modern populations of the proxy species is necessary in order to interpret the paleorecord.

Historical Background

Urey (1947) was the first to reveal that the oxygen isotope composition of biogenic carbonate is temperature dependant, showing that variations in the temperature of the water from which the carbonate was precipitated should lead to predictable variations in the $\delta^{18}O$ ratios of the carbonate. Soon after, Epstein et al. (1951) formulated an empirical paleotemperature equation based on isotopic analyses of molluscs with known growth temperatures.

Season of Collection

The initial focus of stable oxygen isotope analysis on archaeological mollusc shells was on determining the season of shell collection. Shackleton (1973) was the first to recognize that the $\delta^{18}O$ value of the last deposited growth increment reflects the environmental conditions at the time of the animal's death. Season of collection analysis is possible when a primary variable affects the stable isotope composition of the shell. For example, in tropical marine settings, water temperature is fairly constant but $\delta^{18}O$ of the water is affected on a seasonal basis by the $\delta^{18}O$ composition and amount of rainfall. In temperate marine settings, water $\delta^{18}O$ is fairly constant so $\delta^{18}O$ in mollusc shells is primarily influenced by sea surface temperature. Season of collection information is useful for archaeologists because in midden shells, death occurred due to collection by ancient human foragers. Seasonal patterns of shellfish collection bear directly upon interpretations of site use and subsistence behavior, providing important data to aid analyses of foraging practices from the archaeological record. Shellfish season of collection data can be combined with other archaeological data to gain a more complete picture of site use patterns.

These methods have been successfully applied in marine, freshwater, and estuarine environments around the world. In earlier studies, there was debate over the temporal resolution that could be obtained from shell-edge $\delta^{18}O$ values. Killingley (1981) contended that monthly resolution was possible, while Bailey et al. (1983) suggested that only seasonal resolution could be attained. More recently, there has been a growing awareness of the importance of modern validation studies on the proxy species in habitats close to the archaeological study site to understand how factors such as seasonal or ontogenetic variability in growth rates may affect the sample resolution in different environments and latitudes (e.g., Mannino et al. 2003).

The number of samples analyzed in archaeological season of collection studies must balance the need to analyze enough shells per archaeological context to detect meaningful foraging patterns with the need to characterize the pattern of growth to accurately determine season of collection (Mannino et al. 2003). Measuring only the outermost growth increment allows

many shells to be characterized using minimal analyses. This strategy works well to identify seasonal extremes (summer and winter); however, it is more difficult to disentangle signatures from shells collected during transitional conditions (autumn and spring). Sequential analyses covering a year or more of shell growth allow more accurate determination of season of shell collection but require many samples from a single shell, so limit the number of individual shells that can be analyzed. Recent studies have suggested a medium between these two extremes whereby the pattern of stable isotope variation of three or four sequential samples inward from the outermost growing edge can accurately illustrate season of death (Mannino et al. 2003).

Paleoclimate

Mollusc shell chemistry provides an archive of climatic and environmental data. Oxygen isotope records from archaeological mollusc shells allow us to study how humans responded to changing climatic regimes in the past. Emiliani et al. (1964) were the first to apply oxygen isotope analyses to archaeological shells to reconstruct paleoclimate. They studied limpets and top shells from Haua Fteah in Libya and Arene Candide in Italy and identified late Quaternary climatic oscillations that correlated with regional Mediterranean climate records.

Most early applications of stable isotope analysis on mollusc shells focused on grinding up whole shells for bulk analyses to obtain average annual climate records (e.g., Mook 1971). Innovations in mass spectrometry and reductions in analysis costs allowed smaller sample sizes to be analyzed, permitting more routine subsampling of shells to obtain series analyses within a single shell.

Recently, there has been a shift toward combining records of shell growth and geochemistry in order to obtain highly detailed time-resolved records of climate and environment. This research comes under the umbrella of sclerochronology, the study of the physical and chemical variations in the accretionary hard parts of organisms. The time span and resolution that can be obtained for climate records from mollusc shell growth increments depends upon on the sampling method used, the growth rates, and the longevity of the shell. The majority of molluscs exploited by humans have life spans typically less than 10 years. Subsamples from short-lived species produce subseasonally resolved snapshots of the amplitude of the seasonal cycle at the time of shell growth.

In the last decade, highly detailed long-term climate records have been obtained from long-lived bivalve species such as *Arctica islandica* which can live for over 500 years. These slower-growing molluscs can provide annual to decadal records of climate change which may allow identification of climate cycles such as the North Atlantic Oscillation (NAO) as well as long-term climatic oscillations such as Dansgaard/Oeschger cycles throughout the late Pleistocene. Cross-dating techniques, where the individual histories of several shells can be aligned chronologically based on overlaps in their periods of shell growth, allow the reconstruction of longer time series of environmental change. For example, cross-dated archaeological *A. islandica* shells from a Norwegian Stone Age midden have been used to reconstruct a 155-year record of climate related to prehistoric occupations (Helama & Hood 2011).

Shell Sourcing

Another novel application of stable oxygen isotope analyses to archaeological mollusc shells is the use of $\delta^{18}O$ to track foraging ranges. In areas with differential freshwater inputs/salinity regimes but similar temperature ranges, the shape of the seasonal $\delta^{18}O$ curve should be similar, but the absolute values should vary in tandem with salinity (e.g., Andrus & Thompson 2012). Examining the changes in salinity from $\delta^{18}O$ allowed the collection range along the coast to be estimated, allowing more detailed reconstructions of foraging strategies beyond season of collection.

Key Issues/Current Debates

Vital Effects

As with any living creature, molluscan life cycles are complex. An attempt to understand their

growth cycles, physiology, and habitat preferences must be made before their shell morphology and geochemistry can be interpreted with confidence (Schöne 2008).

Shell growth may be modulated by internal rhythms or by environmental factors such as temperature extremes, turbidity, storms, or predation. Under favorable ambient environmental conditions, most molluscs precipitate shell material at regular intervals, termed growth increments. Regular periods of slowdown and cessation of growth result in growth lines that interrupt growth increments with periodicities ranging from subdaily to annual. Shell growth may also cease at irregular timescales as the animal aestivates as a result of ambient environmental conditions that exceed the physiological tolerance of the organism such as increased temperature or salinity. In all cases, there are times when ambient environmental conditions are not recorded in shell growth (Schöne 2008).

Shell growth is generally faster during favorable environmental conditions. Therefore, isotopic records taken at regular intervals across a growth band will be biased toward the animal's physiological optimum. Reproduction may slow growth in some species. Mollusc growth rates also vary throughout their life cycles, tending to decrease as the animals age. Variable growth rates will result in time-averaged values for shell carbonate for the periods of slower shell growth. Research on modern populations has shown that the timing and regularity of growth line and growth increment deposition can vary from species to species and sometimes within a single species across different latitudes and environments. These variations need to be understood in order to apply an appropriate sampling methodology to reliably interpret the isotopic records. When a mollusc's growth rate is understood, the time averaging caused by variable growth rates can be corrected for by mathematically weighting each sample (Schöne 2008).

Understanding the habitat preferences of different mollusc species is also crucial to the interpretation of their isotopic signatures. Different species of molluscs that live contemporaneously within a marine, freshwater, or terrestrial context can have different isotopic composition due to differences in water-isotope composition between different microhabitats. Furthermore, in ancient contexts where chronological resolution is more limited, the range in isotope ratios for each species from a single context can be large. Only by analysis of a significant number of species-specific shells from each sampling interval can a true understanding of environmental change be obtained.

Past Water Composition and the Reconstruction of Sea Surface Temperature

Temperature equations (e.g., Dettman et al. 1999) offer the opportunity to reconstruct sea surface temperature from marine shell $\delta^{18}O$ as long as the $\delta^{18}O$ of the seawater where the shell grew is known or can be estimated. Changes in continental ice volume have caused the oxygen isotope ratios in seawater to vary considerably throughout the Quaternary. Mollusc shell $\delta^{18}O$ is a function of both $\delta^{18}O$ of ambient water and temperature. In order to calculate paleotemperatures from shell $\delta^{18}O$, an estimate of paleo $\delta^{18}O$ of seawater must be used. Paleo-seawater $\delta^{18}O$ is most commonly evaluated indirectly through the analysis of $\delta^{18}O$ in fossil carbonates such as planktonic foraminifera or from analysis of resistant organic compounds (alkenones) preserved in sediment cores. Another method is to directly measure $\delta^{18}O$ from pore water extracted from marine sediment cores. Such studies have shown that the last glacial maximum had the highest $\delta^{18}O$ values in the last glacial cycle corresponding with maximum ice sheet extent. This reflects the $\delta^{18}O$ of past bottom waters which can be extrapolated to surface waters. For a more detailed discussion of seawater $\delta^{18}O$ composition, see Rohling (2007).

These methods of paleo-water $\delta^{18}O$ reconstruction yield average values that cannot account for seasonal fluctuations in water composition or for differences in seawater $\delta^{18}O$ that can occur over small geographic ranges. A change in water $\delta^{18}O$ of just 0.5 ‰ (which is the typical seasonal range for many parts of the

Mediterranean) can lead to a calculated temperature difference of 2 °C. Applying this to the paleorecord where seawater $\delta^{18}O$ is less well constrained could lead to uncertainties of several degrees in temperature reconstructions. These factors must be borne in mind when using mollusc shell stable isotopes for paleothermometry studies.

Diagenesis

In archaeological mollusc shells, recrystallization of the shell carbonate due to diagenesis will alter the isotopic ratios in the shell carbonate. Diagenesis can occur because of cementation (the addition of abiotic carbonate after death) or because of dissolution and re-precipitation of carbonate within the shell after death. If these phases are analyzed, they do not represent the chemistry of shell growth but the chemistry of the water at the time of diagenesis. Therefore, care must be taken to avoid sampling regions of shells that are diagenetically altered. This can be done in a variety of ways. High-resolution microscopy can be used to directly observe diagenetic alteration in polished section. Sampling strategies or sampling "maps" can then be devised in order to avoid the recrystallized part of the shell. X-ray diffraction can be routinely applied to detect recrystallization in shells originally composed of aragonite that may be altered to the more stable carbonate form of calcite.

Future Directions

As this review shows, stable oxygen isotope analyses on archaeological mollusc shells can yield valuable high-resolution, quantitative environmental archives from the time of shell growth as well as provide information on prehistoric human subsistence strategies. Future research is likely to focus on four key issues:

1. *Modern validation studies*: It is becoming increasingly evident that inter- and intraspecies differences in growth rates, physiology, and environmental responses can cause variations in the isotopic profiles of mollusc shells. Therefore, before stable isotope analysis is applied to archaeological shells, it is necessary to examine modern populations of the proxy species to understand how isotopic variation in shell carbonate correlates to local environmental conditions. This allows potential isotopic offsets between the environmental signal and the shell carbonate to be identified and, potentially, allows the generation of a more quantitative record of environmental change.
2. *Integration of sclerochronology and cross-dated chronologies*: The integration of detailed studies of shell growth with geochemical sampling enables the generation of high-resolution time-resolved records of environmental change. Cross-dated chronologies can then be constructed to generate continuous, high-resolution records of climate change from archaeological sites.
3. *Combination of stable isotopes with other proxies*: In some mollusc species, element ratios such as Mg/Ca and Sr/Ca serve as proxies for sea surface temperature that are not influenced by the stable isotope composition of ambient water. The combination of independent methods of temperature reconstruction with stable isotope analysis allows the effects of changing water composition from factors other than temperature (such as rainfall) to be disentangled from the isotope record to provide a more robust proxy of temperature. However, the incorporation of strontium and magnesium into mollusc shell carbonate appears to be more variable between and within species, so more work on modern validation of these trace element proxies is necessary before the potential of these integrated records can be realized (e.g., Surge & Walker 2006).
4. *Clumped isotope geochemistry*: This newly emerging field examines the extent to which isotopes such as ^{13}C and ^{18}O bond with or near each other rather than with the surrounding light isotopes. The proportions of ^{13}C–^{18}O bonds in carbonate minerals are sensitive to their growth temperatures, independent of bulk isotopic composition. Therefore, clumped isotopes in ancient carbonate can be

used as a quantitative paleotemperature proxy that requires no assumptions about the $\delta^{18}O$ of waters from which carbonates grew (Eiler 2007). The application of clumped isotope analysis to marine and freshwater shells is rapidly expanding; however, the infancy of the techniques means extensive modern validation studies are needed. Furthermore, large sample sizes are required, currently hindering the application of this technique to seasonality studies. The only study to date that has investigated clumped isotopes of modern terrestrial shells showed the results were complicated by snail ecophysiological adaptations such as shell color, morphology, and behavior (Zaarur et al. 2011). Thus, further work is required to disentangle their influence before this technique can be applied to archaeological terrestrial shells.

Cross-References

- ▶ Isotope Geochemistry in Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Zooarchaeology

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Molodin, Vyacheslav I.

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Basic Biographical Information

Vyacheslav Ivanovich Molodin (Fig. 1) was born in 1948. He was a Soviet and Russian archaeologist who specialized in archaeology and the prehistory of Siberia. Molodin was born in Orekhovo village of the Brest Region. In 1971, he graduated from the Department of History and Philology at the Novosibirsk State Pedagogical Institute. In 1984, he received his doctorate degree in history.

V.I. Molodin joined the Siberian Branch of the USSR Academy of Sciences in 1971 as postgraduate student of the Institute of History, Philology and Philosophy where he was Head of the Division from 1989 to 1991. In 1992, he became Professor and Deputy Director of the Institute of Archaeology and Ethnography of the Siberian Branch of the Russian Academy of Sciences. He was elected a full member of the Russian Academy of Sciences in 1997. From 1997 to 2001, he was Deputy Chairman of the Siberian Branch of the Russian Academy of Sciences. He was the First Deputy Chairman of the Siberian Branch of the Russian Academy of Science from 2001 to 2007.

Molodin, Vyacheslav I., Fig. 1 Vyacheslav Ivanovich Molodin

V.A. Molodin is a member of the Presidium of the Russian Academy of Sciences, and the Presidium of the Siberian Branch of the Russian Academy of Sciences, as well as the Bureau of the Department of History and Philology of the Russian Academy of Sciences. He is a corresponding member of the German Archaeological Institute.

Major Accomplishments

V.A. Molodin discovered and studied a number of archaeological cultures that existed in

Western Siberia, in particular, the sites of prehistoric art in Altai and Eastern Siberia. He developed an ingenious interpretation of the origin of people who inhabited the southern region of Western Siberia from Upper Paleolithic through to the late Middle Ages. He studied the unique and chronologically diverse burial complex of Sopka 2 in the Baraba forest-steppe, as well as the Russian stockaded towns (Ilim, Kazym). He is a Codirector of the International Program "Pazyryk" and the Russian-German expedition that discovered and studied a unique settlement of Chicha in Baraba, which dated as far back as the 9th-7th century BCE. The multidisciplinary research at these sites that was carried out under his direction and actual participation provided fundamentally new scientific knowledge of this region's occupation.

He took part in foreign archaeological research projects in Mongolia, Cuba, Japan, Canada, and Syria. A number of his works were dedicated to the history of science and science studies, as well as church archaeology. He has been awarded state prizes and decorations from Russia as well as foreign countries.

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► Altai: Paleolithic
► Siberia: Paleolithic

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Mongolia: Archaeological Heritage

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Introduction

In Mongolia, as in many other areas of the world, the science of archaeology has its origin in the activities of private collectors and foreign explorers. One of the first archaeological discoveries of great significance for Mongolian heritage dates to 1889, when the Russian explorer N. M. Yadrintsev (Russian Imperial Geographical Society) identified the ruins located on the bank of the Orkhon River as those of Kharkhorin (Karakorum), the capital of the thirteenth-century Mongolian Empire. In the same region and during the following years, two scientific expeditions, one led by the Finnish scholar A. Heikel and the other by Russian archaeologist and explorer V. V. Radlov, examined the eighth-century Turkic *Khoshoo Tsaidam* stelae which bear inscriptions in both Turkic runes and Chinese script. Their work allowed for the translation of early Turkish writing and the discovery of the history of the first Turks – a heritage now shared by both Turkish people and Mongolians. During his expedition, V. V. Radlov also carefully recorded numerous stone stelae carved with depictions of flying deer and other symbols through a collection of drawings, thus calling attention to these now famous anthropomorphic Late Bronze Age/Early Iron Age (mid-second to mid-first millennium BCE) monuments known as "deer stones." The findings of this expedition were published in the late nineteenth century in a four-volume Atlas of Mongolian antiquities – the first of its kind (Radlov 1892-1899).

Following up on these reports, the Russian archaeologist P. K. Kozlov led an expedition to

Mongolia in the 1920s in order to excavate high-profile archaeological sites that included the Mongolian imperial capital of Karakorum (thirteenth century CE), the early Turk sites in *Khoshoo Tsaidam* (seventh–eighth century CE), and Noyon-Uul, an elite cemetery belonging to the Iron Age and Xiongnu period (2nd BCE–2nd CE), the first state-like polity to develop in Mongolia.

While these early expeditions laid the foundation for the type of archaeological work that even now continues to a certain degree in Mongolia, that is, traveling around and excavating intriguing burials and monuments of many periods, they also put Mongolia on the archaeological map and showed the country's incredibly rich archaeological heritage that today continues to attract numerous archaeologists and tourists from various countries worldwide.

Key Issues/Current Debates/Future Directions/Examples

The History of the Protection of Mongolia's Archaeological Record

Early evidence for the "protection" (or preservation) of archaeological sites and artifacts in and around Mongolia is rare but can perhaps be traced to the efforts of Peter the Great in the eighteenth century. Indeed, it is Peter the Great who was the first to recognize the artistic value of the artifacts of the steppe nomads that were being looted from thousands of burials across the Inner Eurasian steppes, and he ordered that the looted art from these burials be bought up and sent to St. Petersburg. Certainly this did little to discourage looting and arguably only encouraged it. Nevertheless, this loot formed the basis of the great collection of the Hermitage Museum.

In Mongolia proper, there are stories that mention that in the past, people were fined with livestock for looting or damaging ancient burials, but it is not until 1921, after the People's Revolution, that state policy was formulated for the first time for the protection of historical and cultural heritage. This was done under the management of the newly founded Institute of Literature and Script (later to become the Institute of Science and finally the Mongolian Academy of Sciences) which had the mandate to register, document, and protect historical and cultural heritage. Early on and in accordance with the new policy, the Institute organized research projects in the modern provinces of Töv, Arkhangai, Bulgan, and Övörkhangai where they began to register and document known historical places of importance, such as the monasteries of Saridagiin khiid, Baruun khuree, and Erdene Zuu, Mongolia's oldest Buddhist monastery. Starting in 1935, Prefectural Research Centers were established in every province of Mongolia, and their work has led to a vast amount of documented information on historical and cultural heritage sites throughout the country. Paradoxically, archaeological expeditions in Mongolia during these early times were all directed by foreign explorers, and no laws existed to keep the excavated artifacts inside Mongolia.

The following decade was marked by the Second World War, and although Japanese archaeologists continued to work in Imperial Japanese-controlled areas of Inner Mongolia and Manchuria, little archaeological work was carried out in Soviet-controlled "Outer" Mongolia. As a result, much of the work done in this region during this period was synthetic in nature.

By the 1950s, Soviet archaeology had arrived in Mongolia, and after the Second World War, the great majority of archaeological work there was done by Soviet archaeologists, though some of it was also carried out by European and Japanese scholars. Of particular importance during this time were the archaeological expeditions at Karakorum led by Russian scholar S. V. Kiselev. These excavations were the training ground for the first generation of native Mongolian archaeologists lead by Kh. Perlee and Ts. Dorjsuren. Shortly after, both Perlee and Dorjsuren would go on to resume excavations at the Xiongnu period Noyon-Uul cemetery – the first Mongolian-led archaeological expedition.

This period also marked another milestone in cultural heritage legislation. In 1941, the Presidium of the State Baga Khural (State Assembly) adopted new rules for the protection, preservation, and regulation of historical and cultural heritage, the most important one being that henceforth monuments and objects of historical and cultural heritage found on the Mongolian territory were recognized as national property. Despite this, no law was in effect to keep the archaeological materials inside the country. Yet during this time and under the administration of Kh. Perlee (Mongolian Academy of Sciences), a database was developed in order to record the results of archaeological excavations. This first "handwritten" database is kept at the Institute of Archaeology, Mongolian Academy of Sciences. For the next 30 years, no changes were made to the legislation regarding the protection of historical and cultural heritage, although in 1964 Mongolia did sign the international UNESCO Convention for the protection of cultural property in the event of armed conflict that was previously adopted at The Hague (Netherlands) in 1954.

It is not until 1970 that the State Assembly adopted a new law for the protection of cultural properties within the Mongolian People's Republic. Although only in effect in its original form until 1994, this new legislation now comprehensively and systematically included all activities related to research, analysis, conservation, preservation, promotion, and dissemination of historical and cultural heritage within Mongolia. This led to a heightened awareness of national heritage and to a period when the Mongolian government commissioned numerous projects that aimed at discovering, registering, and conserving works of historical and cultural significance. Due to these efforts, especially in regard to the dissemination of the information, the outside world gradually started to get to know about Mongolia's unique cultural heritage.

The 1990s marked a turn not only in the political sphere with the fall of the Soviet Union and Mongolia's transition toward democracy but also in cultural heritage protection. In 1994, the State Assembly adopted a Historical Monuments Act which made the vandalism of sites illegal. Unfortunately, the responsibility of enforcing the law and protecting the monuments was left to local residents alone, and though means to finance this new law were included in the legislation – including investment from the state and income from tourism – no moneys were ever made available. Consequently, the looting and destruction of sites continued. Nonetheless, following the guidelines of this Act, the Ministry of Culture established a Center for Cultural Heritage which instituted a unified cultural heritage registration database in 1996. This registry complies with ICOMOS' principles for the recording of monuments and sites as it was ratified by the 11th ICOMOS General Assembly in 1996.

After several amendments made to the 1994 Historical Monuments Act and under the provisions of the 2001 Law on Protecting Cultural Heritage of Mongolia, hundreds of historical and archaeological sites are now officially under the protection of either the Mongolian state, individual provinces (*aimags*), or rural districts (*sums*). In reality, however, there are little differences between these levels of "protection" beyond prestige. Indeed, the level of recognition depends on the historical or cultural significance of a site or monument. But even the ones on the state list do not receive more protection than the ones on the other lists. It is merely more difficult to get permits to conduct archaeological work at these sites. None receive financial support from the government for their protection or conservation, and protecting these sites consists essentially in protecting the natural aspects around the sites and restricting or banning mining and development in the inscribed areas. Some of the most significant sites on the state list of protected monuments are listed and briefly described in Box 1.

Among the most important sites in terms of Mongolian heritage, however, are those located in the Orkhon Valley in central Mongolia. In 2004, the UNESCO World Heritage Committee inscribed the Orkhon Valley Cultural Landscape on the World Heritage List, one of only two inscribed sites to date in Mongolia.

Box 1 Significant sites inscribed on the state list of protected monuments

Gandantegchinlen Monastery (1840-)
Located northwest of Ulaanbaatar's city center, this monastery is the center of Mongolian Buddhism and houses the Mongolian Buddhist University. It is one of few monasteries that survived the 1930s Stalinist purges when most monasteries were destroyed. It houses a large library of rare books and manuscripts in Mongolian and Tibetan on Buddhist philosophy, astrology, and medicine.

Bogd Khan's Green Palace (or "winter palace")
Located on the south side of Ulaanbaatar, this European-style building was built in 1905 by Tsar Nicholas II of Russia for Öndör Gegeen ("High Lama"), Mongolia's eighth and last religious and political leader. It is now a museum.

Bilge Kagan and Kül Tegin stelae
These are two of the most famous of Mongolia's stone stelae. They are both located near Kharkhorin (Karakorum) City in the Orkhon Valley, date from 732 CE, and bear inscriptions in both Turkic runes and Chinese script. Both are also dedicated to the Turkish Khans who ruled Mongolia between the sixth and eighth centuries. The stelae have been taken under preservation by the Turkish International Cooperation and Development Agency (TIKA) through the construction of a local museum. The National Museum of Mongolia (in Ulaanbaatar) exhibits a copy of the stelae.

Uushgiin Uwur Deer Stone Complex
Located in Khovsgol province, the Uushgiin Uwur Deer Stone Complex includes 18 deer stones. These, as others across western and north-central Mongolia, are associated with sacrificial offerings of horses whose east-facing heads, cervical vertebrae, and hooves are buried in a shallow pit below a small circular mound of stones. Often accompanied by stone burial mounds known as *khirigsuurs*, these monuments together form what increasingly seems to be closely related components of a single Late Bronze Age ceremonial complex. The joint Mongolian-Smithsonian Deer Stone Project has carefully documented the Khovsgol deer stones, which includes for the first time three-dimensional records of individual monuments (Fitzhugh 2005).

Xiongnu Period Sites
All important Xiongnu period sites are on the state list, including the elite cemeteries Tsaram (southern Buryatia), Gol Mod 1 and 2 and Noyon-Uul (north-central Mongolia), Takhiltyn Khotgor (western Mongolia), and Duurlig Nars and Bor Bulag (eastern Mongolia).

The protected region covers an area of about 122 ha and is rich with a diversity of prehistoric and historic sites, including Khar Balgas (the capital of the Uyghur Khanate, which ruled Mongolia from CE 745–854), Karakorum (the great Mongol capital, which was established in 1235 by Chinggis [Genghis] Khan's successor and third son Ögödei Khan), and the sixteenth-century Erdene Zuu monastery (Mongolia's oldest Buddhist monastery, founded in 1586 by Ablai Khan). Interestingly, the colossal grey brick walls that enclose the monastery's compound were constructed using the stones and bricks from the nearby ruined capital of Karakorum City. In collaboration with the Mongolian government, a new museum sponsored by the Japanese government opened its doors in 2010. In addition to exhibiting the findings of various archaeological projects at Karakorum,

including those from the 2000–2004 German-Mongolian excavations, the museum's mission is said to include research as well as the collection and preservation of artifacts.

The only other sites on UNESCO's World Heritage List were just added in 2011 after a sustained effort by renowned art historian Esther Jacobson-Tepfer (University of Oregon) and are subsumed under the Petroglyphic Complexes of the Mongolian Altai. These Complexes consist of three rock art sites which display large concentrations of well-preserved petroglyphs and funerary monuments that range in date from the early-mid-Holocene (c. 11,000–6,000 years BP) to the Turkic period (7th–8th c. CE). The three rock art sites, *Tsagaan Salaa-Baga Oigor* (*Ulaankhus sum*), *Upper Tsagaan Gol* (rock arts of Shiveet Mountain), and *Aral Tolgoi* (*Tsengel sum*, *Bayan-Ulgii*), are also included on the list of historical and cultural properties that are under state protection.

Conclusion: Current Problems and Prospects

Despite the 1994 Historical Monuments Act, there is unfortunately still very little enforcement of the laws nor a structured monitoring system in place to prevent theft or destruction at important heritage sites. A major problem in establishing a national level protection plan stems not only from a lack of coordination at the government level but from the more basic problem of having a territory the size of Mongolia and only some 50 professional archaeologists to manage the vast numbers of antiquities and sites. Accordingly, many historical and cultural sites continue to be destroyed by human activity and natural decay. For example, physical damage to some monuments has recently increased due to certain worshiping practices. This includes the spraying of milk and butter oil on ancient stone stelae and the practice of wrapping the stones with silk scarves (*khadag*) – a practice which traps in moisture and thus accelerates decay.

More significantly, economic changes in Mongolia in the past 20 years have caused more families to fall below the poverty level, and one way some herders have found to supplement their income has been to sell looted antiquities to tourists. Fortunately, there is an increasing awareness of the problems related to the issue of cultural heritage protection in Mongolia, and a number of national and international efforts for protecting, preserving, and even restoring monuments are in progress.

For example, shepherded by the second author, the recently established Mongolian Tangible Heritage Association (NGO) works at protecting the tangible heritage of Mongolia by working to improve legislation linked to cultural heritage, by communicating and cooperating with international organizations that have the same aims, and by implementing concrete comprehensive projects that strive to protect Mongolia's tangible heritage. One such recent project was the restoration of the *Jargalantiin Am* deer stone site in Khanuy Valley, Arkhangai *aimag*, one of Mongolia's most important deer stone sites yet discovered and soon to be included on the provincial (*aimag*) list of protected sites (Turbat et al. 2011).

Detailed inventory work by Esther Jacobson-Tepfer and colleagues in the Altai region of western Mongolia, as well as work by the members of the Smithsonian Institution's Deer Stone Project, has also done much for digitally recording (and thus preserving) important data regarding rock art sites and other archaeological monuments.

In addition, the arrival of large western mining companies in Mongolia has recently spurred the development of a cultural resource management (CRM) arm in the Institute of Archaeology, in the National Museum of Mongolia, at the National University of Mongolia, at the University of Science and Technology, and at the International Institute of Nomadic Culture. This promises systematic, funded fieldwork and published reports on the archaeology from areas threatened by mining.

International collaborative research projects and support from foreign governments are also playing an important role in cultural heritage

preservation. To be sure, to date almost all financial support for Mongolian heritage comes from foreign sources. For example, over the past decade alone, the USA has provided over US $800,000 in nine separate grants under the Ambassador's Fund for Cultural Preservation. As mentioned earlier, the building of museums in the ancient capital city of Karakorum, which house artifacts of national significance, has been sponsored by the Turkish and Japanese governments.

That being said, all these efforts will be for naught without a change in local public attitude toward archaeology and cultural heritage. The National Museum of Mongolia in Ulaanbaatar as well as local provincial museums is playing important roles in this regard by promoting public awareness. However, increasing economic hardship among herders promises to be the biggest challenge to overcome. Clearly, the support of the local population is essential for the protection of cultural heritage, especially given the vastness of the country and the lack of available human and financial resources.

Cross-References

- ▶ Altai: Paleolithic
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Heritage and Archaeology

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Mongolia: Paleolithic

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Introduction

The Paleolithic of Mongolia has been investigated for about a century since the original proposition of a Central Asian origin of humans by H. F. Osborn (e.g., 1927). Between 1920 and 1930, explorer R. C. Andrews conducted surveys in the Gobi and the Gobi-Altai regions but failed to find evidence supporting this hypothesis. The first convincing evidence for Pleistocene human occupation is represented by artifacts collected along the Saikhan and Arts Bogd Uul ranges and nearby Orog Nuur Lake. Archaeologist N. C. Nelson, however, could not find anything comparable to the West European Lower Paleolithic (Fairservis 1993). Between 1927 and 1935, the Chinese-Swedish expedition led by explorer S. A. Hedin investigated Mongolia and Northern China. The team's archaeologist F. Bergmann was not more successful in finding grounds for Osborn's hypothesis. In 1949, during a Soviet-Mongolian scientific expedition, A. P. Okladnikov, assisted by N. Ser-Ojav, discovered the Paleolithic site of Molty-nam along the left bank of the Orkhon River, close by the town of Karkhorin (Okladnikov 1978). Other Paleolithic localities were found in the Tola Valley, in the vicinity of Ulaanbaatar, and nearby Mt. Bogdoul. Upper Paleolithic artifacts were reported near the city of Darkhan and along the Khalkin-Gol

Mongolia: Paleolithic, Fig. 1 Map with the main stratified sites and human remains mentioned in the text (Modified after NASA World Wind)

River. In the 1950s, Ser-Ojav and Mongolian scholars such as H. Perlee and Ts. Dorsjuren surveyed almost the entire Mongolian territory (Gunchinsuren 2009). They reported finds attributed to the Paleolithic period in the Gobi-Altai region. Russian geologists N. Florensov and N. Skvortsov identified flint quarries with Levallois-Mousterian artifacts in the southern and in the southeastern part of Mongolia. During the 1960s, the cooperation between Okladnikov and Mongolian scholars continued, notably with the excavation of the Molty-nam site (Fig. 1).

In 1969–1970, further surveys in eastern Mongolia also led to the description of "pre-Upper Paleolithic" artifacts, such as pebble tools, from the vicinity of the town of Sainshand (Okladnikov 1978). Starting from 1983, a Soviet-Mongolian expedition directed by A. P. Derevianko surveyed the Valley of the great lakes in western Mongolia, the central and eastern Gobi-Altai district, and the southern ranges of the Khangai Mountains (Derevianko et al. 2000b). Excavations at Orkhon-1 and Orkhon-7 sites, Orog Nuur 1 and 2, or Nariyn Gol-1–17 were carried out in the framework of this project. Starting from 1995, J. W. Olsen, A. P. Derevianko, and D. Tseveendorj initiated the Joint Mongolian-Russian-American Archaeological Expeditions (JMRAAE). This program includes excavations of newly discovered sites in Northern Mongolia and in the Central Gobi region, but also intends to generate chronometric data (Gladyshev et al. 2010a). Numerous sites were documented in the Ikh Tulberiin Gol Valley, and excavations were conducted at the Tolbor 4 site, but also at Tolbor 15. In Central Gobi, cave sites such as Tsagaan-Agui and Chikhen-Agui were excavated by an international team (Derevianko et al. 2004). Between 1999 and 2001, the Dörölj 1 site, located along the Eg River, was excavated by a joint Mongolian-French team led by J. Jaubert (Bertran et al. 2003; Jaubert et al. 2004). This project followed a survey of Paleolithic locations in the Hovd province and a geological reassessment of the Molty-nam geological section. A fossil uncovered at Salkhit, northeast Mongolia, was recognized in 2006 as a human skullcap (Coppens et al. 2008). Since 2010, ongoing study has been devoted to both the morphology of the skull and its geological and chronological position. Furthermore, archaeological surveys are being conducted by J. Braga, N. Teyssandier, D. Tseveendorj, and B. Gunchinsuren in the vicinity of the find. In Khentii province, geoarchaeological researches were recently conducted by M. Izuho and B. Tsogtbaatar at the Khanzat-1 locality and by S. Yi at the site of Rashaan Khad. In 2011, an international team started excavations at the newly discovered site of Tolbor 16, in Bulgan province, under the direction

of N. Zwyns, S. Gladyshev, and B. Gunchinsuren. All in all, almost a century of research has brought substantial advances in the understanding of Mongolian Paleolithic, and recent projects have yielded promising results that contribute to these efforts.

Definition

The Paleolithic of Mongolia can be defined based on the Eurasian system of division into three main periods: the Lower, Middle, and Upper Paleolithic. The Lower Paleolithic corresponds to the first human occupation of Mongolia and is not yet dated. The Middle Paleolithic would start at the end of the Middle Pleistocene and last until c. 50 ka. The Upper Paleolithic covers a time range from c. 50 ka to the end of the Pleistocene.

Key Issues/Current Debates

The Lower Paleolithic

Previous researches have underlined the difficulty in attributing archaeological material to this period as it often occurs as surface or redeposited assemblages. The presence of a Lower Paleolithic human occupation is inferred from typo-technological descriptions of lithic assemblages, or on the basis of taphonomic features such as the patina. In southwestern Mongolia, the Kholobolchi assemblage was collected during Andrews's expedition (American Natural History Museum collection). It includes moderately patinated artifacts such as choppers and chopping tools, adzes, and flakes, made of metamorphic rocks (quartzite, basanite). The assemblage of Ulan Nor is said to be more evolved and was produced on red jasper (Fairservis 1993). In Eastern Mongolia, Okladnikov pointed out the archaic typological aspects of surface collections from the Sainshand area (Okladnikov 1978). The described pebble implements are associated with vast basins formerly covered by lakes. Okladnikov considered these artifacts as "very similar to the most ancient pebble implements found in Africa and Western Europe." Chopping tools, blocks with bifacially shaped working edges, are reported and have been referred to as "proto-hand axes" or "biface preforms." The latter type of artifact is reported westward, in south-central Mongolia, nearby the city of Dalanzadgad and on the western edge of the Gobi-Altai area. Split pebbles, choppers, and chopping tools were collected from Bayan-Ölgii, the westernmost province of Mongolia, and their ancient age is inferred from the observed patina. Okladnikov (1978) acknowledged, however, that pebble tools occur in various chronological contexts in Siberia. More recently, researches at Tsagaan-Agui Cave, in the Gobi-Altai province, have yielded assemblages of archaic aspect in the lower part of the sequence (Derevianko et al. 2000a). The tool kit includes biface preforms and "spurs," elements that also occur in the surface collections of the Flint Valley (Derevianko et al. 2002). More surprising are the reported "proto-wedge-shaped cores" with bladelet removals and the flake cores similar to the preferential Levallois method. This material has been compared with other assemblages from Lake Balkhash (eastern Kazakhstan) and interpreted as belonging to "Levallois-Acheulean-like" industries. They are tentatively interpreted as evidence for population movements from west to east. The age of human occupation is inferred from radio-thermo-luminescence (RTL) dates derived from layers 5–12 and ranges between 170 and 650 ka. Although an inversion of polarity was detected in the entrance (layer 11) and first interpreted as the Upper Matuyama chron (Derevianko et al. 2000a), the RTL dates are considered much too old. In fact, they could reflect the high residual signals of unbleached sediment particles (Derevianko et al. 2004).

In sum, the cultural and/or chronological attributions of the so-called Lower Paleolithic assemblages in Mongolia remain unclear due to the current lack of contextual data. Therefore, pending new discoveries, the timing and the nature of the earliest human occupation in this region remain uncertain.

The Middle Paleolithic

The recognition of the Middle Paleolithic occupations of Mongolia is complicated by the lack of

Mongolia: Paleolithic, Fig. 2 View of the Tolbor Valley (Photo credit N. Zwyns)

contextual data available, numerous assemblages being surface collections. In other words, the problems of definition mentioned for earlier periods also apply to the Middle Paleolithic. As is often the case in Asia, archaic technological features are relatively ubiquitous, and a well-pronounced flake technology occurs in assemblages from various periods. In the absence of a chronological framework, the boundary between the Lower and Middle Paleolithic remains unclear. According to some authors, Levallois technology first occurs among the Acheulean-like assemblages that would later develop toward a Mousterian techno-complex (Derevianko et al. 2000a). The earliest evidence of Levallois-like technology has been reported in the lower part of the section at Tsagaan-Agui, but Middle Paleolithic assemblages are better attested in the middle part of the section starting from 90 to 70 ka. Together with Orog Nuur I-II and Argalant I, it corresponds to the Orog Nuur Levallois-Mousterian variant (Derevianko et al. 2004), also known by the surface assemblages from the Valley of Lakes. The latter are not dated and their chronological assignment is based on their degree of weathering, their patina, and their techno-typological features. The undated material from the localities of Hoit Tsenker gol and Tzakhiriin uzuur, in Western Mongolia, may also represent evidence for Levallois technology (Jaubert et al. 1997). In fact, Mousterian as found in Central Asia (e.g., Teshik-Tash) or the Altai "Sibiryachikha" Mousterian is still unknown in Mongolia. Stronger evidence of Levallois-like technology is documented in Northern Mongolia and is associated with the earliest manifestation of blade production. These assemblages illustrate the shift from the Middle to Upper Paleolithic.

The Upper Paleolithic

The beginning of the Upper Paleolithic in Mongolia is characterized by the spread of blade-based lithic assemblages. The earliest examples have been reported from Northern Mongolia. Using material from recent excavations and newly obtained chronometric data, S. Gladyshev and colleagues have proposed a periodization of the Upper Paleolithic into three main stages (Gladyshev et al. 2010a) (Fig. 2).

The oldest occurrence of Upper Paleolithic technology comes from Horizons 5 and 6 at Tolbor 4. The blade-based assemblages are characterized by the production of massive-to-medium blades with parallel ridges and facetted or plane platforms. Lithic reduction is mainly represented by bidirectional cores with two opposed platforms, with alternate use of the broad and narrow faces, or by genuine volumetric cores. Crested blanks are detached to initialize reduction or to reshape the core convexities. These technical blanks, as well as slabs displaying a specific morphology, are transformed into burin cores for the production of small blades and bladelets. Convergent blades with

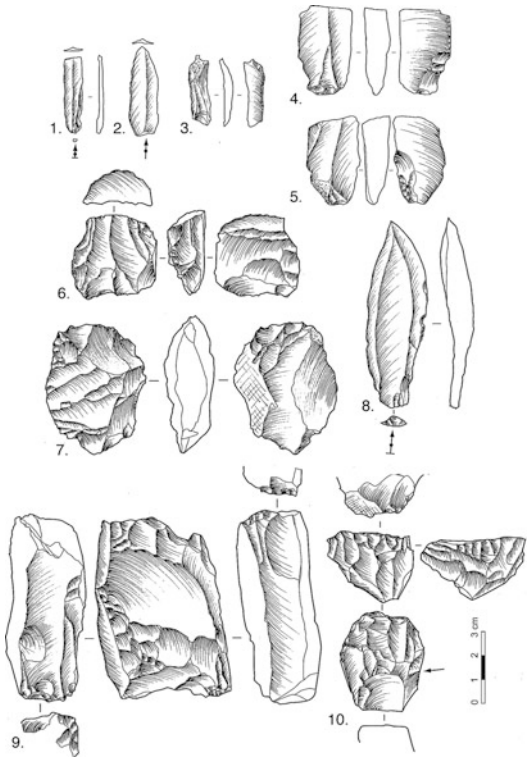

Mongolia: Paleolithic, Fig. 3 Tolbor 15, Early Upper Paleolithic artifacts from Horizons 6 and 7. (*1*, *2*) Small laminar blanks. (*3*–*5*) Retouched laminar blanks. (*6*, *7*, *10*) Bladelet cores. (*8*) Blade blanks. (*9*) Narrow-faced blade core (Drawings by N. Zwyns)

Levallois morphology are produced in the framework of the blade reduction, but smaller size points also occur. The radiocarbon dates available for these two levels seem to indicate an age c. 40–37 kyr uncal. BP (Gladyshev et al. 2010a). These assemblages are chronologically and technologically similar to the Initial Upper Paleolithic as defined in the Siberian Altai (Zwyns 2012) (Fig. 3).

The second chronological stage includes Early Upper Paleolithic assemblages from Tolbor 15, Horizons 5–7, Tolbor 4, Dörölj 1, Chikhen-Agui Rockshelter, and Chikhen 2 (Gladyshev et al. 2012). Reconstructed reduction sequences mainly show production of large-to-medium size blades from unidirectional volumetric blade cores. The blanks show an increase in plain platforms prepared by thin abrasion, likely representing the generalization of soft-hammer use. Burin-core technology is absent; however, a tendency to "microlithization" is expressed by the production of bladelets detached from truncated-facetted or narrow-faced cores. The occasional occurrence of elements such as carinated end scrapers and bladelets with marginal retouch is considered as a typical feature for these assemblages dated between 33 and 26 ka uncal BP. Orkhon-1 (units 1) and Orkhon-7 (unit 1) seem to represent the latest assemblage of this chronological group, dated to between 26 and 23 kyr uncal. BP.

The third chronological group is known only from the middle Selenga Valley with the Horizons 3 and 4 from Tolbor 15 (Gladyshev et al. 2010b). Bladelets are produced by percussion and by pressure flaking from micro-cores of fine-grained raw material. The only date available for this group indicates an age c. 15–14 ka uncal. BP and as such represents the only Paleolithic occupation directly dated post-Late Glacial Maximum (Fig. 4).

Human Fossils

The skullcap from the Salkhit Valley, in northeast Mongolia, is so far the only Pleistocene human fossil found in Mongolia. It consists of a frontal with partial nasals and parietal bones of unclear taxonomic affiliation. Initially referred to as *Mongolanthropus* (Tseveendorj et al. 2006), its relatively robust morphology was also described as a combination of *Homo erectus*, *Homo neanderthalensis*, and Asian archaic *Homo sapiens* features (Coppens et al. 2008). No archaeological material was found associated with the fossil, and although the fauna found in the vicinity would indicate a Pleistocene age, numerous questions remain regarding the context of the find. The reassessment of the geological context, the direct dating, and detailed morphological analysis of the fossil being conducted by J. Braga, D. Tseveendorj, and B. Gunchinsuren are currently ongoing.

Future Directions

Numerous questions remain concerning the timing of the earliest peopling of Mongolia.

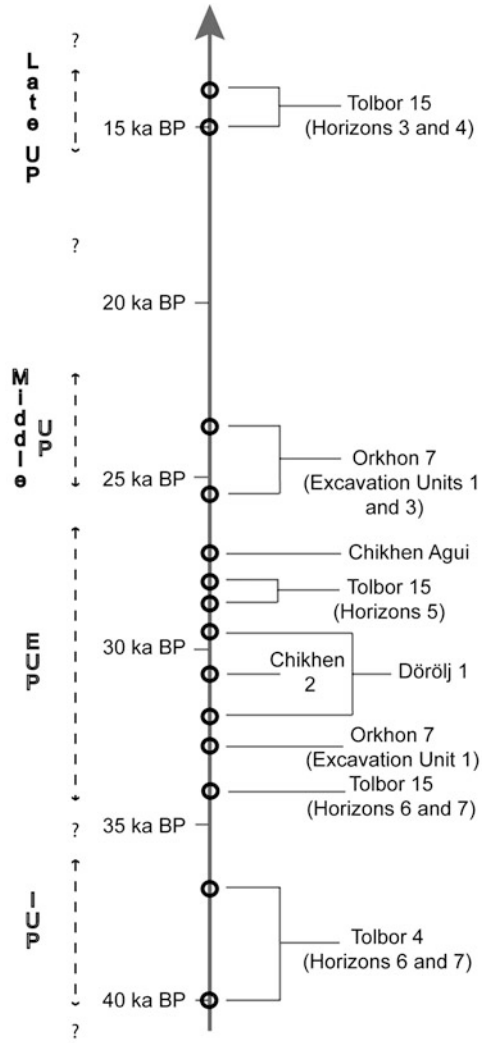

Mongolia: Paleolithic, Fig. 4 Periodization of the Mongolian Upper Paleolithic based on chronometric data (Modified after Gladyshev et al. 2010)

Although the presence of *Homo erectus* in the region is assumed, in situ evidence of Lower Paleolithic occupations is rather elusive, and no systematic production of bifaces of Acheulean type is documented. Current understanding of Middle Paleolithic human occupation of Mongolia reflects similar problems. Levallois technology is clearly documented in surface collections but is far less represented by in situ examples. The origin and the processes of development of this technology are still poorly understood, and the makers of the Middle Paleolithic assemblages are still unknown. In southern Siberia, the recent sequencing of a previously unknown genome seemingly indicates that a population of archaic hominins, known as the Denisovans, occupied a vast territory ranging from the Siberian Altai to Australia until the Late Pleistocene. Mongolia overlaps with the geographical range of the Denisovans and therefore appears to be a key area for our understanding of Northeast Asia. So far, not much is known about the morphology, the timing of emergence, and the material culture of these enigmatic hominins. The earliest appearance of blade assemblages and the subsequent spread of microblade technology could suggest cultural contacts with the Altai and probably with northern China during a period that corresponds to the first appearance of modern humans in Southeast Asia. Furthermore, the appearance and development of microblades produced by pressure flaking also underline the relevance of Mongolia in the debate concerning the peopling of America (Gladyshev et al. 2010b).

Addressing key issues regarding the role played by exogenous cultural influences and environmental factors in the development of the Mongolian Paleolithic requires the acquisition of an extensive data set. Intensive dating programs such as the one provided by the JMRAAE project stand as the first breakthrough in the Paleolithic periodization of Mongolia (Gladyshev et al. 2010a) and are examples of the kind of efforts that will be pursued in forthcoming years. Beyond historico-cultural issues are numerous behavioral, ecological, and environmental questions that the results of ongoing and future field projects will help to address.

Cross-References

- ▶ Altai: Paleolithic
- ▶ Crimean Middle Paleolithic
- ▶ Crimean Upper Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ European Middle Paleolithic: Geography and Culture

▶ *Homo erectus*
▶ *Homo neanderthalensis*
▶ *Homo sapiens*
▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
▶ Mousterian Industry Tradition
▶ Northern and Central Asia: Culture During the Lower Paleolithic Era
▶ Insular Southeast Asia in the Lower Paleolithic

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Monte Albán (Zapotec): Geography and Culture

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Introduction

Monte Albán (500 BCE–CE 700) was the most important regional center of the Oaxacan region and political capital of the Zapotec. Its location on the top of a mountain at 400 m above the level of the Valley of Oaxaca was a defensive but also a valuable ideological aspect for the ruling elite. In 1987 Monte Albán and the city of Oaxaca were declared by UNESCO (United Nations Educational, Scientific and Cultural Organization) as World Cultural Heritage. Today, a great percentage of the central, ceremonial, and administrative structures and plazas has been restored and constitutes a great example of the political and social organization of the Zapotec culture in pre-Hispanic times but also a major touristic attraction.

Definition

Monte Albán was one of the first cities in Ancient Mexico and is today one of the archaeological zones that most impact the visitor by the dimensions of the Grand Plaza surrounded by temples and structures and above all by its location at the top of a mountain at the center of the Valley of Oaxaca. Monte Albán reached at its maximum development a population of 35,000 people;

however, its founding, growth, and splendor as the capital of the Zapotec were the result of a long process of survival and colonization of the first inhabitants of the region and later of organizational strategies of the elites in the three valleys forming the great Valley of Oaxaca.

Key Issues/Current Debates/Future Directions/Examples

The foundation of Monte Albán toward the year 500 BCE. as the Zapotec capital was part of a process of economic and political integration as well as great growth and population concentration, which in turn increased the levels of social inequality in the region. During the previous phases, the dominant center was San José Mogote with other minor settlements around this site; however, between the year 500 and 300 BCE., San José Mogote lost almost its entire population and a new level of hierarchy was created with Monte Albán with over 155 new settlements around the cite (Blanton 1978: 87-91; Flannery & Marcus 1983) (Fig. 1).

The growth of Monte Albán was fast because for the next phase (MA-II, 100 BCE–CE 250), the city reached 4 km^2. With the Grand Plaza as the religious and administrative center of the site, with rectangular shape, oriented north–south is bounded by structures with temples and residences at the top, forming an impressive group. The temples were built with adobe on stone foundation walls; its walls were covered with stucco and painted. Their roofs were flat, supported by wooden posts supporting the walls. Some of the buildings that surround this square show the characteristic Teotihuacan style "*talud* and *tablero*" as decorative architectural elements (Fig. 2). In the northeast corner of the plaza, the ballcourt that had a ritual and religious sense is located with a north–south orientation. Another smaller ballcourt is near to the elite house of Tomb 105, in the northeast portion of the site (Blanton 1978).

Outside the ceremonial center, located at the highest part of the mountain, civil constructions and residential areas were distributed on the slopes, through terraces. Most of the domestic units included also a small orchard, one or several storage pit, and work areas. Although with multiple variants, these units kept a constructive pattern which highlights the presence of a central courtyard, with the rooms around it. Domestic groups lived in these houses for several generations. The size of the house, the central courtyard, and its proximity to the Grand Plaza or to a barrio center have been used as indicators of the socioeconomic status of each family, although there were also differences

Monte Albán (Zapotec): Geography and Culture, Fig. 1 General view of Monte Albán (Photograph taken by the author)

Monte Albán (Zapotec): Geography and Culture, Fig. 2 Building "L" (Photograph taken by the author)

Monte Albán (Zapotec): Geography and Culture, Fig. 3 Reconstructed south wall of Tomb number 105 (Photograph taken by the author)

based on gender, age, and prestige reached within the group (González Licón 2009, 2011).

One particular element of the Zapotec culture is the custom of building tombs to bury their dead. The number, type, and form of these are very broad. They go from simple pits dug under the floor of the rooms without any apparent construction to the elaborate tombs with complex facades, jambs, and lintels with bas-reliefs, and multiple cameras. Some have walls decorated with polychrome murals, with scenes of ceremonial and rituals, such as Tombs number 104 and 105 (Fig. 3).

Others, not as majestic as the previous ones, have marveled at the world for its content, as it was the case of Tomb number 7 (Caso 1969). It is a Zapotec, reused later by Mixtec, elite residence who decides to deposit their ancestors in this sacred place. So they removed part of the ceiling of the tomb, removed the remains that were there, and then put on the floor the skeletons of nine individuals accompanied by a large number of objects finely processed in a variety of materials such as gold, silver, jade, and turquoise among others (González Licón & Márquez 1990) (Fig. 4).

Funerary practices are part of the everyday life of peoples from its most remote past. These arise in accordance with the philosophy of human groups in each particular social context, thus vary in accordance with different cultures, with their social and economic organization, with the degree of technological development, with the ideology, with the complexity of his religious beliefs, and so on. Human being has always expressed a special cult for the afterlife and the boundary between the two, death.

The Zapotec tombs were incorporated in domestic architecture, usually located under the floor of the most important rooms, facing the central courtyard. The tomb was an enclosure

Monte Albán (Zapotec): Geography and Culture, Fig. 4 House of Tomb number 7 (Photograph taken by the author)

that its owner would occupy after his death; among the Zapotec, the tombs are buildings that resemble the structure of the rooms they occupied in life. Example of this is Tomb number 5 of Suchiquiltongo, with the constructive characteristic style of phase IIIb–IV (650–800 CE), building replicas of the fronts of four rooms arranged around a central courtyard (Méndez 1990).

The funerary pattern typical of Monte Alban consisted in the reuse of graves; the most obvious example is found in Tomb number 7, where the richest site offering was located. The interesting thing about this case is that being a Zapotec tomb of phase IIIb, it was reused later in phase V by Mixtec. For this purpose, they took out everything Zapotec and later placed or rather spread across the tomb the remains of nine individuals accompanied by his offering. Not all the tombs were reused, for instance, Tomb number 104 was located with a skeleton in anatomical position, the offerings and the paint intact, although the latter seems to have been finished in a hurry, since "leakages" of painting can be seen in some strokes.

The motives in the murals appear to be symbolic, with complex representations of deities or priests with associated glyphs. The most ancient known, associated to the funerary architecture, mural is Tomb number 72 of Monte Alban, which represents several glyphs in red color. In other examples, processions of men or women singing in any religious ceremony appear. The murals are colorful and predominate the shades of red, white, yellow ochre, green, turquoise, blue, and black. The paintings in the tombs of Monte Albán phase IIIa show some resemblance with the frescoes of Teotihuacan, although in a style clearly Zapotec.

In addition to the murals, many tombs were accompanied by the typical Zapotec funerary urn. Both have been assumed initially as representations of gods, although currently is the notion that some of the murals as well as urns with anthropomorphic representations represent priests and members of the nobility. Many of these figures wear masks that relate to any of the main deities as *Cociyo* "Rain God," *Pitao Cozobi* "Corn God," or some other supernatural force; however, under the mask, the representation is distinctively human. Perhaps they were representations of ancestors, which could serve as intermediaries between them and the gods. The same respect and value that had old age was influenced not only by the accumulation of knowledge and experience that the elderly possessed but also because they were very close to arrive with the gods. Buildings on many of the tombs have offerings and burials associated, which suggest rituals related to the ancestors as members of the domestic group, who will continue many years after his physical burial.

Around the year CE 700, Monte Albán ceased to grow and ceased new constructions and maintenance of large buildings, so it was eclipsing gradually, although this does not mean that it would have been abandoned violently. The latest archaeological excavations on the site indicate that a good number of houses remained inhabited at least until phase V (1300–1521 CE).

The fall of Monte Albán allowed the other cities that already existed strengthen, as well as the emergence of new ones. Cities in these phases IV and V did not maintain total control of the valley. They retained certain autonomy and created alliances through marriage and trade when it was convenient. It was a period of great social and political instability. The most important sites at this stage in the Valley of Oaxaca are Suchiquiltongo, Lambityeco, Mitla, and Zaachila (Blanton & Kowalewski 1981).

In phase V, the militarism in the Valley of Oaxaca expands, in the same way that was happening elsewhere in Mesoamerica. The Mexica arrives to the valley, who established themselves permanently in the area and finally conquered the cities more important as Zaachila, Cuilapan, and Mitla. It was however a temporary domain. Shortly before, they had arrived as groups from the Mixtec, engaging in continuous struggles for the domain of land and control of tribute. The Mixtec managed to dominate at a certain time and created a political center at Cuilapan (Marcus and Flannery 1996).

For this period there was contact with other groups by trade. There was also an intense artistic and technological exchange across styles and forms that are shared with the cultures developed in places away as the Basin of Mexico and in the area of Puebla and the Mixtec region with the Valley of Oaxaca. It is in this stage that Mitla was consolidated as the religious center of the valley. Mitla was one of the most important cities of the Valle de Tlacolula, outstanding among other aspects, by the construction of elite residences decorated with stone mosaics forming designs of great beauty and harmony. It was a dispersed settlement with constructions that took advantage of the small elevations of the land, with low platforms. Predominate within the site domestic complexes type Palace, with large central courtyards, under which tombs with elaborated architecture were constructed (Blanton et al. 1999).

Performing rituals in the region of Oaxaca and particularly in the valley was an important aspect for the maintenance of the ideology and group cohesion. Evidence of ceremonial and rituals have been recorded in all the periods of occupation and in most of the Mesoamerican urban centers. In the particular case of Monte Albán, it is clear that ideological control was important not only for the ruling elite but also for ordinary people who participated in them. The general population was participating in ceremonies and public rituals but also carried out ceremonies to the interior of the domestic group. For the ruling elite, the development of the ideological and symbolic world was a way to increase their power and control over their constituencies. As a corporate society, they focused more on domestic production. The cohesion necessary to achieve this inner wealth was achieved through management of the ideology suitable, materialized in rituals and ceremonies.

Cross-References

- ▶ Buildings, Archaeological Study of
- ▶ Cultural Heritage and the Public
- ▶ Excavation Methods in Archaeology
- ▶ Mesoamerica: Complex Society Development
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Monte Verde, Archaeology of

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Introduction

Monte Verde is located in south-central Chile. The site is an open-air campsite on the banks of a small stream, surrounded by sandy knolls, small bogs, and damp forests that have been there since late Pleistocene times. The bog later developed in the stream basin, covering the abandoned site under a layer of peat. Because the lack of oxygen in the bog inhibited bacterial decay and because the constant saturation prevented drying for thousands of years, all kinds of organic materials that normally disappear from the archaeological sites have been preserved. An interdisciplinary research team of more than 60 scientists has studied the remains excavated from two areas at the site, called Monte Verde I and Monte Verde II.

Key Issues

Monte Verde II exhibits the remains of 10-m-long tent-like structure made of wood and animal hides. The frame was constructed of logs and planks anchored by stakes, and the walls were poles covered with animal hides. Several pieces of cordage and string made of reed wrapped around wooden posts and stakes, recovered among the architectural remains, show that the people planned a lengthy stay. The tent's dirt floor was embedded with hundreds of microscopic flecks of hide tissue, suggesting that it was covered with animal skins. On the floor of the tent were brazier pits lined with clay and surrounded by stone tools and the remains of edible seeds, nuts, and berries. Outside the tent were two large communal hearths, a store of firewood, wooden mortars with their grinding stones, and three human footprints near one of the large hearths. All these remains indicate tasks, primarily food preparation and consumption, tool production and maintenance, and the construction of shelters.

In a second structure, wishbone shaped in ground plan and made of wooden uprights set into a foundation of sand and gravel hardened with animal fat. Parts of gomphotheres and paleo-llama carcasses were butchered, hides were prepared, and tools were manufactured in and around the structure. Eighteen probable medicinal plants were found inside the structure – the same species the Mapuche people, who live in the area today, use to treat various diseases. Although some of these plants grew locally, about half came from coastal environments approximately 70 km to the west, and one was found only in arid regions about 700 km to the north. Since only the medicinal parts of the plants were found in the site, we know they had only one use to the Monte Verdeans.

In addition to medicinal herbs, the remains of a wide variety of edible plants were recovered from the hearths, living floors, and small pits, along with the remains of gomphotheres, paleo-llama, small animals, and freshwater mollusks. Aquatic plants from distant freshwater marshes and lagoons of the flood plain and from brackish marshes of the river delta provided the greatest

variety and, along with meat and wild potatoes, the bulk of the diet. Most of these ecological zones are located far away along the Pacific shoreline or in the Andean mountains. The presence of exotic foods, including seaweed, and other items at the site shows that coastal habitats also provided important resources to the Monte Verde economy.

The wooden artifacts excavated at the site include digging sticks, mortars, fragments of two lances, stakes, and the poles used for building the tent. Bone artifacts consist of a baton for striking flakes off stones, tools made of mastodon tusks, and probable digging and prying tools. Three different stone tool technologies also exist at the site, including bifacial tools, unifacial implements and waste debris, and grinding stones.

The distinct living structures, features, and concentrations of specific materials at the site suggest that occupation was continuous and that portions of the site were used more intensively than others. Different kinds of artifacts give evidence of a wide variety of activities to be done. One living space, for example, contained stone artifacts made of quartz coupled with edible fruits and tubers from plants that grow only in brackish estuaries, suggesting that the occupants may have specialized in collecting resources from the coast. Elsewhere in the living tent, stone scrapers and pieces of animal skin were found in a hide-working zone. The internal division and size of the tent suggests that people had a mixed hunting and gathering economy focused on many different ecological zones. A long sequence of radiocarbon dates on both different materials from the site places the Monte Verde II occupation at about 12,500 B.P.

Buried in a different area of Monte Verde, we found a possible earlier occupation, Monte Verde I, with 26 stone tools and three burned clay features. Radiocarbon dates placed this possible occupation around 33,000 years ago. Although the geology is intact, the radiocarbon dates are valid, and the human artifacts are genuine, the research team is very hesitant to accept this older level without more evidence.

The 12,500 B.P. Monte Verde II component represents a settlement that practiced a generalized economy throughout most of the year. The archaeological evidence suggests that the settlement was formed by a small group of colonizers who lived along the banks of the small stream. Although few contemporary sites have been found in the Americas, it is probable that the people at Monte Verde were part of a low-density population adapted to the cool, temperate forest of south-central Chile after deglaciation.

Cross-References

► Hunter-Gatherer Settlement and Mobility
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Montelius, Oscar

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Basic Biographical Information

Gustav Oscar Montelius (1843–1921), Swedish archaeologist, professor and keeper of National

Montelius, Oscar, Fig. 1 Oscar Montelius (1843–1921)

Antiquities, studied history and Scandinavian languages at the University of Uppsala 1861–1869 (Fig. 1). He was a close friend with Hans Hildebrand (1842–1913), the son of Bror Emil Hildebrand (1806–1884), the Swedish keeper of National Antiquities. The two young students were both influenced by the advances in geology and paleontology in France and by Darwin's *On the Origin of Species* (1859). During his studies, Montelius worked as an assistant at Statens Historiska Museum in Stockholm, where he and H. Hildebrand took part in creating a new, permanent exhibition of archaeological finds that opened in 1866 and was organized according to C. J. Thomsen's Three-Age System. Montelius' doctoral dissertation was about the Iron Age in Sweden (1869). He worked as an antiquary (curator) at the Historical Museum (1868–1907) under the direction of H. Hildebrand, whose successor as keeper of National Antiquities he was 1907–1913. He obtained the title of Professor *h.c.* in 1888, was conferred the title of Dr. *h.c.* in Greifswald 1906, and was offered the position as the director of the Museum für Völkerkunde in Berlin 1907, an offer which he declined. Montelius was the editor of two important periodicals: *Svenska Fornminnesföreningens Tidskrift* (1884–1905) and *Nordisk Tidskrift* (1879–1921).

Major Accomplishments

Montelius' first major work was *Sveriges forntid* (Swedish Prehistory) (1872–1874), the first survey of the culture history of prehistoric Sweden confirming the Three-Age System of C.J. Thomsen. The survey was updated in later editions, and his *Minnen från vor forntid* (1917) has remained a standard catalogue of Swedish Stone and Bronze Age antiquities. In the book *Om tidsbestemning inom bronsåldern* (1885), Montelius divided the Bronze Age in six periods. His chronological scheme is still being used today. He also divided the Stone Age in five and the Iron Age in eight periods.

Montelius was aware that in order to date the Scandinavian prehistoric periods, it was necessary to connect them with historically dated material in the Near East and the Mediterranean. So he became the first Scandinavian archaeologist, who systematically studied prehistory on a continental scale. For 15 years, he spent part of his time on journeys to museums in Europe, especially in Germany, Switzerland, and Italy. The Swiss lake dwellings and grave finds being excavated in Northern Italy provided important new material that allowed comparison of find material north and south of the Alps linking the Scandinavian sequence to the Mediterranean. Montelius worked out chronologies in a series of publications: *Die Bronzezeit im Orient und in Griechenland* (1892), *La Civilisation primitive en Italie* (1895–1910), *Pre-Classical Chronology in Greece and Italy* (1896), *The Tyrrhenians in Greece and Italy* (1896), and *Die vorklassische Chronologie Italiens* (1912). Montelius was convinced that the roots of civilization lay in the Near East, and he saw the spread of civilization as waves of diffusion and migration from the Southeast. The diffusionist view was expressed in *Der Orient und Europa* (1899) and in *Die ältere Kulturperioden im Orient und in Europa* (1903–1923). Montelius constructed a timescale that became widely used and which was not surpassed before later in the twentieth century, when radiocarbon datings opened up for a longer chronology and challenged the diffusionist paradigm (Renfrew 1973: 20-47).

Beside as a diffusionist, posterity has also labeled Montelius a typologist. The ordering of types to form sequences, often from the simple to the more advanced, analogous to biological evolution, was initially used by H. Hildebrand and developed by Montelius, who described the method in the first part of *Die ältere Kulturperioden*. Opposition to the method was expressed *i.a.* by the contemporary Danish archaeologist Sophus Müller. In reality, Montelius did not construct his chronologies using typology alone but based his chronological sequences primarily on find combinations (Gräslund 1987: 70-85). Whether or not typology can be used as an independent method has been a matter of discussion through the twentieth century, especially among Swedish archaeologists (see further readings, Malmer in Åström (ed.) 1995).

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Morgan, Jeff

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Basic Biographical Information

Jeff Morgan is a trained city and regional planner, earning a B.S. from Cornell University. He received an M.S. in Management from Stanford University's Graduate School of Business.

Major Accomplishments

Jeff Morgan is the executive director of the Global Heritage Fund (GHF), a position he has held since founding the organization in 2002. He is a member of the Global Heritage Fund's Senior Advisory Board and the Board of Trustees. In the position of executive director at GHF, he is responsible for global conservation excellence, building a leading international conservancy and

improving the lives in communities where GHF sites are located. He also serves on the Stanford Institute for Economic Policy Research Advisory Board.

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Morwood, Michael

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Basic Biographical Information

Michael (Mike) Morwood (Fig. 1) was awarded his B.A. in Archaeology at Auckland University, New Zealand, in 1973, receiving his Masters in the following year. In 1972 the Auckland University Department of Anthropology awarded Morwood the Anthropology Prize for academic excellence. Morwood commenced further graduate studies in 1976 at the Australian National University. He was awarded his Ph.D. in 1980. His dissertation was titled *Art and Stone: Towards a Prehistory of Central-Western Queensland* (Mike Morwood 2010).

Morwood began his career employed as regional archaeologist by the Queensland State Archaeology Branch of the Department of Aboriginal and Islander Affairs (DAIA) between 1974 and1976. After receiving his doctorate, he returned to the DAIA in Queensland as a field and research archaeologist. In 1981 he began lecturing at the University of New England. As a part of the School of Human Environmental Studies, Morwood lectured in Australian archaeology, Southeast Asian and Pacific archaeology, rock art, archaeological field methods, and archaeological lab methods. It was during this time he discovered *Homo floresiensis*, a hominin species that "...prompted reassessment of fundamental tenets in palaeoanthropology...concerning the peripheral role of Asia in early hominin evolution" (Professor Michael "Mike" Morwood 2011). Morwood moved to Wollongong University in 2007 where he is currently a professor at the School of Earth and Environmental Studies. His research interests include archaeology of Southeast Asia and Australia, early hominin evolution and dispersals, origins of modern humans, rock art, Southeast Asian biogeography, and ethno-archaeology.

Mike Morwood was elected President of the Australian Rock Art Research Association in 1992, a position he held until 2000. In 2003, Morwood was elected a Fellow of the Australian Academy of the Humanities, an organization dedicated to the advancement of knowledge in humanities. Other professional positions he has held include Professorial Fellow Archaeology in the School of Earth and Environmental Studies at the University of Wollongong between 2007 and 2009, Adjunct Professorial Fellow at the University of Western Australia between 2009 and 2010, Adjunct Professorial Fellow at the

Morwood, Michael, Fig. 1 Mike Morwood in the field in Sulawesi, Indonesia

University of New England from 2009, Adjunct Professorial Fellow at Charles Darwin University from 2009, and Adjunct Professorial Fellow at Padjadjaran University, Bandung, from 2010.

Major Accomplishments

Models for the early hominin dispersal out of Africa received considerable attention when the joint Australian-Indonesian research team headed by Professor Morwood discovered *Homo floresiensis* in the Liang Bua cave on the Island of Flores, Indonesia (Morwood & Oosterzee 2007). The finding of *Homo floresiensis*, released on the 28 October 2004, has implications for the dispersal of hominin and human dispersal out of Africa and the colonization of Asia. It has attracted substantial debate from, in part, supporters of the multiregionalist theory of *Homo sapiens* evolution (Morwood). The continued study of *Homo floresiensis* has taken a multidisciplinary approach including paleoanthropological, morphological (see Kaif et al. 2011), and pathological analysis combined with dentition study, ancient DNA extraction, and tomographical techniques. Of additional interest to the find are the lithic tools associated with the discovery of *Homo floresiensis* and the cognitive behaviors connected with their manufacture and use (Brumm et al. 2006). Recent research estimates the faunal sequence and minimum age for hominins on Flores at 1.1million years ago, ensuring the study covers the entire period of hominin habitation in the region. Excavations at Mata Menge, Flores, hope to provide greater evidence on the early hominin colonization of the Indonesian area. The public interest in these hominin finds has sparked numerous documentaries and written works detailing all manner of scientific investigation and discussion on the subject.

More recent multinational research projects have identified the interactions of human activity, the local environment, climates, and island faunas in long-term changes in Indonesia. The implications for island biogeography and

evolution can be seen extending throughout significant periods of time. A collaborative project, with funding from the Australian Research Council, involving Indigenous communities, the University of New England, the Australian National University, the W.A. Department of Environment and Conservation, the Kimberley Foundation, and Heliwork, is looking at the complex cultural sequences resulting from human occupation and the impacts on faunal habitation through investigating the distribution, chronology, and subject matter of cultural heritage sites. The research being conducted in the Kimberly region of Australia may provide evidence of the effect of environmental and cultural alteration as a result of climate change and human habitation in the area (Professor Michael "Mike" Morwood 2011).

Mike Morwood's innovations in on-site field data recovery include the adaptation of shoring techniques found on industrial construction sites that are well suited for deep excavations. In addition, Morwood developed effective wet-sieving techniques that greatly improved finds recovery from excavated material. He is known for his use of an intelligent database design for recording excavated materials and the documentation of site contexts. His experience in directing large-scale projects has ensured the success of collaborative projects between local government agencies, research centers, and interdisciplinary organizations, both in Australia and Indonesia.

As a globally recognized scholar, Mike Morwood is known for his interdisciplinary projects that have embraced various media avenues to promote archaeology to the public. His publications communicate the excitement of archaeological discovery to a wider audience. His scientific research encourages the use of high-profile discoveries to promote archaeology. He is also recognized for his enthusiastic and high-quality training of students and postdoctoral scholars. His former students hold high-level government posts, business and academic positions throughout Australia and in other countries where he has conducted research. Mike Morwood died in July, 2013 in Darwin, Australia.

Cross-References

- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethnoarchaeology
- ▶ Out-of-Africa Origins

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Mosaics: Conservation and Preservation

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Introduction

Conservation is the process of preserving cultural heritage for the benefit of future generations. Mosaics present particular challenges, whether in situ on archaeological sites or within museum collections.

Definition

Mosaics in the Classical tradition consist of a surface of small cut cubes (*tesserae*) of stone, ceramic, or glass (forming the *tessellatum*), often in a decorative configuration. This is the visible part of a composite structure, with a support of multiple levels of lime mortar and a stone rubble base, many times thicker than the *tessellatum* itself. The Latin nomenclature for these different layers is known from the writings of the Roman architect Vitruvius. In Roman architecture, the vast majority of mosaics were floor pavements, but they also embellished walls and vaults as well. In other cultures, different materials may be found. The reference in this entry is to Hellenistic/Roman/Byzantine mosaics.

The origin of Classical mosaics is in the Hellenistic pebble pavements of the eastern Mediterranean. They formed an integral part of much Roman architecture throughout the Empire and endured through the Umayyad and Byzantine periods.

Conservation of mosaics entails numerous activities, such as modification of their environment to mitigate the causes of deterioration or restoration of their structural stability through the addition of new materials.

Key Issues/Current Debates/Future Directions/Examples

Historical Legacy

European interest in Classical antiquity in the Renaissance was invigorated by the discovery of Pompeii and Herculaneum in the mid-eighteenth century.

Early interventions involved the lifting of selective parts of mosaics, usually the highly prized figurative *emblemmata* (central panel), to be displayed in antiquarian collections much as paintings. Presumably, those of lesser interest were abandoned. The detached *tessellatum* was reset onto a new mortar bed of lime mortar or gypsum (or cement mortar from the nineteenth century), fixed to a sturdy support such as wood or stone slate. Restoration of the decorative pattern of the *tessellatum* often utilized loose *tesserae* from the excavation, with a degree of speculation depending on the extent of its preservation. Mortar grouting was then applied into the joints between *tesserae*, followed by mechanical abrasion of the surface to achieve a smooth and polished finish. This effaced differences between the authentic and restored artifact. Wax was often applied to mosaics exposed indoors to enhance color contrast; it darkened over time.

The first tentative attempts at the preservation mosaics in situ occurred from the late eighteenth century. In central Europe, this sometimes entailed the erection of simple vernacular structures over mosaics to protect them from inclement weather and vandalism.

Surviving mosaics, either lifted or conserved in situ, constitute a fraction of those discovered and either willfully destroyed or lost through neglect.

The removal of mosaics to museums was intended as an act of preservation. However, this was by no means guaranteed, and countless lifted mosaics have perished either in site stores or in museums, particularly if they were never reset on a solid new mortar support.

The most unwitting damage sustained by treated mosaics is through the use of artificial

Portland cement mortars, progressively developed over the nineteenth century and employed exclusively in many countries through the twentieth century (see below). This was further exacerbated by the introduction of reinforced iron into new cement mortar supports in the twentieth century.

In the last quarter of the twentieth century, a greater appreciation for the value of mosaics in their authentic architectural context focused energies on their conservation in situ. Throughout Europe, protective cover buildings were erected over many structures containing mosaics. Revival of the use of traditional lime mortars for building conservation was beneficial for mosaics as well, in reaction to the damage inflicted by mortars based on cement.

Better technical interventions such as these have not been sufficient to address the general crisis in the conservation of mosaics on archaeological sites, as a result of poor management. Loss of this heritage is progressive, relentless, and immeasurable.

Deterioration and Damage

Ancient Damage

Any pavement is subject to physical abrasion and impact damage within an occupied building. Indeed, ancient repairs to mosaics are frequently encountered. Disasters such as fire or earthquake were also common. With eventual abandonment, mosaics were buried through a combination of building collapse and site erosion.

Buried Mosaics

In a burial environment, the constituent materials of mosaics (stone, ceramic, and mortar) sustain much slower rates of deterioration than in an exposed one, with large variations in temperature and moisture content. This accounts for the intrinsic survival of so many ancient mosaics. However, some damage may occur from tree roots, burrowing animals, and weak inorganic acids in soil; the latter may leach out calcium carbonate from mortar, resulting in a friable matrix without binding power. In contrast, thin "veils" of calcium often precipitate onto the surfaces of mosaics in burial conditions; these cause no physical harm but do obscure the surface.

Exposed Mosaics In Situ

Upon excavation, all archaeological features undergo a physical "shock" through exposure to a more dynamic ambient environment in which physical and chemical processes interact to degrade materials. The rate of deterioration depends on several factors, intrinsic to the materials of the mosaic, its physical history, and the aggressiveness of its new environment.

Inherent natural faults in its materials, such as *tesserae* of clay-rich sedimentary limestone, may fracture and delaminate in humid conditions. As composite structures, mosaics have multiple planes of weakness, which offer preferential paths for root penetration or detachment of different horizontal layers from differential dimensional change. Ancient mortar, which has degraded in burial conditions (see above), results in a loss of physical integrity of the composite structure, including the large-scale detachment of *tesserae*.

Low forms of plant life (such as moss) lead to the colonization by higher plants, whose root structures can destroy entire pavements. Another potentially aggressive form of environmental degradation is from soluble salts in the soil. Dissolved in groundwater, these migrate into a mosaic structure through capillary forces; in dry ambient conditions, they crystallize and expand within the pore structure of stone, ceramic, or mortar near the surface. Certain compound salts increase many times in volume upon crystallization and eventually destroy such porous materials. A powdery material is the result.

Inappropriate Interventions

The use of cement mortars, and iron-reinforced cement supports, has been the most harmful form of intervention. Cement is an impervious material with high soluble salt content, concentrating moisture movement, and associated decay in the

ancient fabric; furthermore, it is very difficult, if not impossible to completely remove. Where iron reinforcement is present in external or damp internal environments, moisture penetrates through micro-fissures and cracks, causing the corrosion and expansion of the iron and fracturing of the mosaic itself. Gradual loss of alkalinity of the cement also results in iron corrosion.

The process of lifting and relaying of the *tessellatum* on a new mortar support results in a loss of material authenticity and integrity, as the ancient bedding layers which contain much technological information are destroyed; relaying also normally creates an aesthetically bland, flat surface, particularly if cement is used. A common finishing technique was (and still is in some countries) the physical abrasion of the surface of the *tessellatum* to remove any lime concretion and thus enhance the overall design of the mosaic. This further compromises archaeological integrity.

Storage and Presentation Environments

The damage from damp storage environments has been cited above. Storage facilities designed without regard to potential risks can be subject to flooding, fire, or theft. Museum buildings with damp problems can also cause damage to mosaics presented on floors or mounted on walls.

Modern cover buildings erected over mosaics in situ are sometimes designed without an adequate understanding of the condition of sheltered mosaics and the attendant risk environment. This means they either fail to protect from obvious environmental factors (such as site hydrology) or they create an internal environment which accelerates damage from natural processes (as crystallization of soluble salts).

Lack of Maintenance

Poor or nonexistent maintenance is the principal cause of deterioration of mosaics in situ in exposed environments. Poor maintenance is a direct result of incompetent or ineffective management structures and poor training and not necessarily the lack of sufficient financial resources.

Assessment

Any conservation intervention should be preceded by an assessment of a number of factors:

- Significance of the mosaic: cultural importance (in terms of materials, iconography, and craftsmanship) within a specific region
- Condition of the mosaic: current physical state of the materials and structure and the cause(s) and rate of deterioration
- Vulnerability of the mosaic within its risk environment: local environmental risks (e.g., soluble salts, flooding)

The assessment of significance should normally be carried out during a preliminary archaeological inventory (e.g., the creation of an academic *corpus* of ancient mosaics for a given region and country). This, in turn, should contribute to the national Sites and Monuments Record, providing unique numerical identities to each mosaic within a GIS matrix.

There are essentially three levels of mosaic condition survey:

- Preliminary or reconnaissance survey: a relatively rapid initial survey to capture basic data about the condition of a large number of mosaics
- Detailed (or conventional) condition survey: a detailed inspection usually for more significant pavements
- Specialist survey: material analysis or geological prospection undertaken for significant pavements at risk

A condition survey considers and records: the context of the mosaic (the natural environment and building structure within which it is contained), the materials and structure of the mosaic, any repairs or interventions, and, finally, the physical manifestations of deterioration and their likely causes. The survey report should provide recommendations for intervention, and prioritization of treatments, based on diagnosis and prognosis.

Conservation Interventions

Good management of collections of mosaics, either in situ or in museums, requires an

understanding of their significance, condition, and risk, in order to identify the interventions which will guarantee the most beneficial outcome. Only individuals with the appropriate knowledge, experience, and skill to implement them should undertake any interventions in mosaics.

The care of mosaics in situ is particularly challenging, given the aggressive environmental forces to which these are subject. In order to best preserve the mosaic heritage with finite financial resources, a variety of conservation measures usually need to be implemented, following a prioritized program. This should take into account the significance and condition of pavements, ease of access, existing or planned visitor interpretation, and available resources:

- Reburial of mosaics not to be presented in the foreseeable future
- Presentation and interpretation of selective mosaics on a planned visitor circuit (with consolidation, maintenance, and monitoring), possibly under cover buildings

Stabilization of Mosaic Context

Erosion of slopes around exposed mosaics deposits soil which promotes vegetation. Slopes can be stabilized by natural or synthetic netting fabricated for this purpose and the planting of indigenous shrubs.

Where such mosaics are in the path of recurrent rain runoff, land drains can be placed in strategic positions to intercept and evacuate water. Site drainage may also help reduce moisture content within a mosaic and consequently growth of microorganisms on it. Modern synthetic "geodrains" are relatively narrow and thus limit the destruction of archaeological stratigraphy for their installation.

Mosaics in situ within unstable or faulty structures (ancient ones or modern cover buildings, museums, stores) are at risk of damage. Also, exposed mosaics on slopes may be undermined by natural erosion. Masonry repairs need to be undertaken to secure perimeter structures and mosaic foundations, possible with enhanced drainage.

Reburial of Mosaics In Situ

Archaeological mosaics have survived due to a burial environment, and the reinstatement of a burial regime can be a very effective conservation option, if well planned. This may be for short periods (e.g., between excavation seasons), for moderate periods (e.g., during planning for a new cover building), or for the long-term periods (where presentation of the pavement is not currently envisaged). Reburial also prevents deterioration from aggressive soluble salts, where these are present.

Effective protection requires the design of a good burial cover (appropriate materials and stratigraphy), perimeter drainage, and maintenance. Intimate contact between the surface and cover medium (usually soil) is essential. Synthetic separation membranes, such as geotextiles are often incorporated into the reburial stratigraphy, to facilitate re-excavation, or provide chronological "markers" to future archaeologists. These are not strictly necessary in conservation terms; they may inhibit the free movement of water in the reburial regime, which can have detrimental consequences, or promote root growth under the membrane.

Cover Buildings or Shelters

Mosaics exposed to the elements in situ will invariably deteriorate at a faster rate than if protected under cover. To be most effective, cover buildings or shelters need to be designed to a very specific brief, addressing the vulnerability of the mosaic and associated environmental hazards.

Consolidation and Stabilization of Mosaics

The vast majority of remedial repairs to mosaics can be carried out with a palette of lime mortars, based on a binder of lime and an aggregate of sand. Lime is of two varieties, dependant on the mineral properties of the parent stone: non-hydraulic lime, which sets in reaction with carbon dioxide in the air, and natural hydraulic lime, which sets additionally through a chemical reaction with water. The former is appropriate for most surface treatments, while the later is

necessary for surfaces of mosaics which are persistently damp or for the grouting of voids within mosaics where there is less ambient carbon dioxide available.

Technicians undertaking repairs should be adequately trained in the use of lime mortars, which must be properly specified and applied, if they are not to fail. Cement-based mortars are never appropriate nor gypsum in external environments.

Typical mortar treatments consist of:

- Protective borders around the exposed edges of the *tessellatum* to retain *tesserae* in place
- Filling of deep joints between *tesserae* where original mortar is lost
- Filling of losses in the *tessellatum* to prevent water ponding and growth of vegetation
- Readhesion of loose *tesserae*
- Injection grouting of voids in mortar support layers to prevent collapse or detachment

Mosaics to be presented require additional consideration of the appearance of new mortar. Color and texture of mortars used on the surface are provided by careful selection of the mortar aggregate and finishing treatment.

A less frequent treatment is the consolidation of degraded *tesserae*, usually caused by soluble salts. This is a specialist process using chemical consolidants, undertaken by an experienced conservator. There is no perfect chemical consolidant, and efficacy is limited by residual salts and by external exposure.

Cleaning

Periodic cleaning of mosaics is necessary, particularly in external environments to remove micro-organisms or accumulated soil, which encourages plant growth. This is done with clean water and nonionic detergent (which leaves no harmful residual products), applied with soft brushes and sponges. Biocides should be used with caution, as their residual effect is limited and some leave soluble salts in the mosaic as well.

Surface lime concretions should never be removed by aggressive abrasive methods, as this destroys the integrity of the *tessellatum*. Sensitive methods include mechanical removal by scalpel, controlled micro-abrasives, or by chemical means with chelating agents. These are specialist techniques undertaken by or under the close supervision of a qualified conservator.

Surface Coatings

There is often a desire to enhance the design of the *tessellatum* with surface coatings. These all darken with time and attract air-borne particulates and therefore should never be used outdoors. Even if a coating is reversible at the time of application, it may become less so over time, making removal problematic. They are best avoided.

Treatment of Mosaics on Iron-Reinforced Cement

Maintenance Corrosion of iron reinforcement in external environments cannot be prevented, but its rate can be mitigated by systematic maintenance to prevent ingress of liquid water. This means filling all cracks and micro-fissures with suitable mortars.

Storage Detached mosaic panels with iron-reinforced backings should be stored in the driest conditions possible to reduce the rate of corrosion.

Removal of Backing Remedial techniques for the stabilization of reinforced concrete in modern buildings include passivation of iron by means of cathodic protection or sacrificial anode cathodic protection. Unfortunately, this technology is not easily transferable to mosaics on archaeological sites but may be possible inside a museum.

Mosaics in an advanced state of deterioration can only be rescued through the removal of the backing. This is an expensive and laborious exercise, undertaken by conservators with specialist experience, using stone cutting equipment under precision control. The *tessellatum* is secured in advance with multiple layers of natural fabric and reversible adhesive to secure it during this operation.

When most of the cement has been removed, the *tessellatum* is mounted on a new support as described in the section immediately below.

If mosaics in situ contain corroding iron bars near the surface, it may be possible to remove them surgically, after facing the surface with fabric applied with reversible adhesive and filling voids with mortar.

Lifting and Relaying

Current cultural heritage policy endeavors to preserve mosaics in situ, either through reburial or presentation. In some instances, lifting and relaying may be required:

- For very degraded mosaics with large areas of loose *tesserae*
- For mosaics subject to erosion from aggressive soluble salts from the ground
- Where the site is to be destroyed for development

In advance of lifting, the *tessellatum* is rigorously cleaned and stabilized with mortar as necessary. It is then faced with several layers of natural fabric, applied in intimate contact with the surface, with a reversible adhesive. Depending on the size of the pavement and complexity of design of the *tessellatum*, it is either cut into small sections or lifted intact. Metal blades and rammers are used to undercut the mortar support layer, and the each small section of the *tessellatum* is then "sandwiched" and secured between wooden boards for transport away from the site. If the *tessellatum* is to be lifted whole, it is fixed to large wooden drum and rolled as it is undercut; this operation carries greater risk of damage.

Relaying In Situ A mosaic to be reinstated in situ requires a solid new foundation (of hydraulic lime mortar, but cement mortar may be used if not in immediate contact with the *tessellatum*). On sites with high levels of soluble salts and a high water table, a conventional damp-proof course should be inserted into the new mortar foundation. New perimeter drainage should be installed as required.

Degraded bedding mortars are recorded prior to their removal from the back of the *tessellatum*. It is then relayed on the new foundation with lime mortar, the facing is detached and the surface made good with mortar.

Relaying on Panels New solid mounts or supports are required for those mosaics which cannot be returned to their original site. Cement-based materials and iron reinforcement are never appropriate. Instead, best practice utilizes synthetic "honeycomb" boards consisting of an internal matrix of aluminum in honeycomb form, with surfaces of glass fiber in epoxy resin. Being rigid, strong, and lightweight, such panels are ideal supports for detached mosaics. They are fixed to the *tessellatum* with epoxy resin or epoxy foam, with an intermediate "intervention layer" of reversible lime or synthetic mortar.

Such honeycomb panels and epoxies are widely available and affordable in developed countries. Elsewhere, they are expensive and difficult to procure. Research is underway to identify local alternatives.

Maintenance and Monitoring

The preservation of all mosaics, either in situ or in museum collections, requires ongoing care, through maintenance and monitoring of condition. This is the most neglected conservation activity.

Good maintenance requires the creation of maintenance schedules, both for mosaics and their context (site store, museum, or cover building). There are three complementary types of inspection:

- Periodic inspections: on a planned basis at defined intervals
- Occasional inspections: following severe weather or unforeseen events (e.g., floods)
- Cyclical or planned preventive maintenance: at predetermined intervals

Routine tasks consist of vegetation removal (done with care to avoid surface disruption) or treatment with benign herbicides, cleaning of the *tessellatum*, maintenance of protective site barriers, and stabilization of the *tessellatum* with small lime mortar repairs.

Regular monitoring of the condition of mosaics is the responsibility for those who care for them, to ensure that problems are noted as they arise and defects are treated in a timely manner.

Conclusion

The material, aesthetic, and archaeological integrity of most mosaics can be preserved with confidence by the technical means described above. However, this requires both adequate training in their execution, understanding of their vulnerability, and implementation of a robust management context to guarantee their continued survival.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Field Stabilization of Immovable Heritage
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Site Visitation and Interpretation: Management
- ▶ Stone Treatments in Archaeological Conservation and Preservation
- ▶ Stone: Preservation and Conservation

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"Motif" in the Archaeology of Art

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Introduction

The term *motif* is perhaps the most widely used in archaeology art, in both rock art studies and portable art. This is a category of analysis that has dominated the field through all its theoretical and methodological perspectives (Fiore 2009). However, few authors have focused on defining it, often assuming its highly intelligible meaning. Overall, there seems to be an implicit or explicit agreement among specialists that consider the motifs are graphic and conceptual units of visual speech, though many disagree about their formal and semantic definition.

Definition

Motif is an expressive and consistent component of design, characterized by their shape, color, size, position, orientation, texture, etc. (Fiore 2009). Motifs integrate bigger compositions while they articulate spatially and meaningfully with other elements. It is then an expression unit and, as such, expresses a particular view of the world; thus, it is valid to be used as a unit of analysis (Aschero 1988).

According to Gradin (1978), who has been particularly interested in the notion of motif, it is a representation that was made in the same time (execution unit) and with a certain sense (motivational drive unit).

Key Issues and Current Debates

The classification of motifs is another challenge faced in archaeological art studies. Many authors propose a distinction between *simple and complex motifs*. The first are those formed by a single element; all its lines, or its entire surface, are connected into a single entity, displaying a continuous trace which is the result of a unitary creative act. Complex motifs are likely to be constituted by two or more elements that are linked together based on morphological grounds or content (Gradin 1978). This division is based on the number of items that a motif integrates and is common in rock art studies and also in studies of the decoration of artifacts, especially ceramics (Rice 1987).

To some extent, the concept of motif is independent of the technical support and execution, beyond the conditioning that these factors impose. Thus, classification criteria refer primarily to issues of composition, morphology, analogy, and association. In this regard, it is appropriate to consider another parallel way of grouping the motifs – agreed by most researchers – depending on the presence or absence of a recognizable formal correlate with the physical world. The division between figurative and nonfigurative patterns derives from this.

The *figurative motifs* answer to an attempt to apprehend the external forms. In that sense, in this category all the images which allow – partially or totally – to recognize objective world elements of both realistic (recreation or model representation of physical existence) or fantastic (creation or presentation of imaginary figures which combine or reformulate real elements) are included (Gordillo 2009). In contrast, in the *nonfigurative motifs*, no direct empirical analogies are recognized and are presented as linear elements, geometric shapes, irregular shapes, spots, stains, etc.

Indeed, the precise boundaries between figuration and nonfiguration are often arbitrary, and it is difficult to establish whether there is a difference of essence or grade between the two categories – a problem also found with Western art, which is where this classification comes from. It is likely that many nonfigurative motifs have an origin or figurative counterpart; it is

appropriate to consider the *geometric reduction* process, a phenomenon that leads explicit figures of varied figurative levels to the reduction in abstract figures (Leroi-Gourham 1989). Also, in the social context of their production, nonfigurative motifs could represent or be associated with real but unknown referents because of the semantic and temporal distance that separates emic viewers from etic categories (Groupe 1993).

Ethnographic research done by Dolmatoff Reichel (1985) illustrates this point. This study focused on certain geometric or "abstract" motifs which were recurring throughout the material culture of the northwest Amazon Tukano Indians. These motifs, according to the author, are inspired by phosphenic hallucinatory images and also form a coded system where each of those have a fixed ideographic sign value, aspects that are likely to be overlooked by us in the study of past societies.

In short, these observations lead us to a critical problem in the archaeology of art. Motif, as part of a system of symbols, is a reference to something else. And what is communicated by the symbol depends on the viewer's cultural background. If this motif shares the same visual system as the one of the producer, what is expressed on the motif and what is communicated to him can be very similar. For archaeology, where prehistoric art manifestations are studied, this merging is not possible; however, beyond the original semantic and elusive content, shape analysis provides a means to access the way in which the art system operates (Ross et al. 2008).

From the perspective of structural analysis, the proposal is to go beyond the factual or descriptive level and, without the imperative to interpret the allegorical dimensions or the conventional meanings associated originally with each motif, hold the possibility of accessing the unconscious deep and essential meanings immanent to the thought systems of society (see Criado Boado & Penedo 1993). Using a formal analysis of oppositions, the motif of representation that applies to the artist's intention reveals their articulation in the designs and the principles that structure them. In this line of analysis, Kusch (1991) considers that the motif presents "attributes of composition" (view, orientation, attitude, distribution, etc.) pointing to structural and conceptual aspects, where deep meanings live and operate replacing their immediate morphology.

Cross-References

- ▶ Art Studies: Normative Approaches
- ▶ Leroi-Gourhan, André
- ▶ Pigment Analysis in Archaeology
- ▶ Reichel-Dolmatoff, Gerardo
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Rock Art, Forms of
- ▶ Style: Its Role in the Archaeology of Art

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Mousterian Industry Tradition

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Introduction

Everything about the Neanderthals (and the Mousterian industry which, by definition, defines their tools) arouses great interest among our species. In fact, since the 1980s, the matter of the transition between the last Neanderthals and the first modern humans has generated an unprecedented scientometric concentration (research projects, academic meetings, publications, and excavations). All possible approaches (chronological, geoenvironmental, behavioral, socioeconomic, anthropological, etc.) have been pursued to attain a more nuanced and higher-resolution view, resulting in a history without artificial breaks or divisions, as could only be expected from a historical perspective.

The material culture of our genus clearly evolved over the millennia. Studied by lithic typology in the first place, and by analogous methods (typometric, technological, morphotechnical, and traceology) in later years, this approach has incurred in two main defects. First, it has been too schematic, excessively dividing up a conduct (material), in order to attribute a certain chronology to a certain collection. The second defect is that of particularism, by copying a natural geological concept (the fossil guide) and applying it to human-made objects, which are subject to infinite variability and convergence mechanisms that are inexistent in Nature. These are the circumstances surrounding the casuistry to be described.

Definition

The Mousterian culture, in all its variants, was defined in the late nineteenth century (1872), when Gabriel de Mortillet changed the nomenclature based on the presence of certain animal species in the archaeological record (as proposed by Lartet) into the system followed in geological stratigraphy at that time: an eponymous site displaying the main characteristics of the period was chosen and used as its name. Thus, the cave of Le Moustier (Dordogne, France) was selected as the characteristic site of the Mousterian period.

Since François Bordes (Bordes 1953) first defined it systematically, Mousterian lithic industry has been characterized by four main factors. First, it developed a series of techniques, which were little used before, for the centripetal removal of blanks, which gave rise to the Mousterian and Levallois cores. In addition, the format of the blanks was very monotonous: a large part of Mousterian assemblages consists of flakes. The same can be said of the retouched assemblages, as a single type, the side scrapers, comprises over half (occasionally over 80 %) of the tools. Finally, the character of the Mousterian as a "plateau culture" is quite striking. This refers to the fact that the Mousterian soon differentiated itself from the industrial technocomplexes preceding it, but then did not display a clear evolutionary sequence in the period, which lasted for between 100,000 and 220,000 years.

About 42,000 years ago in Europe, technocomplexes that steadily differed from the

Mousterian and which are attributed to our species began to appear. Over much of the continent, under different forms, the Aurignacian represents the first material culture of anatomically modern humans or "Cro-Magnon Man." In certain areas, like northern Italy, the south of France, or northern Iberia, "transition complexes" (Uluzzian, Chatelperronian, Bachokirian, Szeletian, among others) acted as a link between the end of the Middle Paleolithic (and the Neanderthals) and the start of an unquestionable Upper Paleolithic (and the presence of modern humans). We find, for example, a variable proportion of objects exhibiting certain inertia and which have led to the identification of remains of Mousterian tradition in later phases of prehistoric assemblages. Hence, the main issues associated with the presence of Mousterian tradition industries in more recent times can be summarized as follows: what the effect of the human phyletic change in the material remains fossilized in the archaeological record is, and on an even more basic level, what the mechanisms regulating the transmission of knowledge (including technical knowledge) within preliterate societies are.

Historical Background

Paradoxically, as hunter-gatherer societies are essentially nomadic, the description of Paleolithic groups has been over-static. Progress in the description of the Neanderthal bands who were responsible for Mousterian technocomplexes has been made in parallel, yet without many connections, with the characterization of their Cro-Magnon counterparts. For decades, the dominant methodologies used in the study of the lithic technocomplexes of each species were the systems devised by the husband and wife scholars François and Denise Bordes on common foundations, but without foreseeing any connections or mechanisms of conversion. The question of the chronology of the series being studied was previous to the selection of a determinate methodology; in those cases when it was supposed that it was a Lower or Middle Paleolithic series, the type-list proposed by François Bordes was applied, whereas if it was thought that it belonged to a phase of the Upper Paleolithic, it was studied according to the type-list of Denise de Sonneville-Bordes. In this situation, it is difficult to seek the antecedents of the Upper Paleolithic in the late Mousterian, or the inertia of Mousterian industries in the Early Upper Paleolithic. There is, therefore, a serious methodological issue in this debate, as it has proven necessary to develop new classification and analytical systems to be able to trace the transfer of material knowledge between human groups that even belonged to different species.

The four constants in Mousterian lithic assemblages have been cited above (centripetal reduction techniques, flake production, overrepresentation of side scrapers – the implement of reference – and the long-lasting state of a technocomplex in which it is difficult to distinguish a sequence). Each of these has undergone a differential historical development, within a common historiographical framework where the first typological studies pioneered by Bordes and Bourgon (1951) have been refined by the contribution of technologists (like Boëda, Turq, and Bourguignon) and specialists in raw material procurement (like Geneste and Morala, among others). In this way, if the concept of Mousterian industry was originally linked to its typological characterization (the overabundance of side scrapers, which attracted inordinate classificatory interest), it now possesses an eminently technological definition. Indeed, the vitality of technological studies on the Mousterian has encouraged the French "technological school," which seeks to foster this epistemological approach to Paleolithic societies.

Key Issues/Current Debates

Research on Mousterian industry and its durability in later contexts has advanced notably in the last three decades. Without any doubt, this progress is directly related to the impulse in technological studies of Paleolithic technocomplexes in Old World schools of thought. European schools, particularly in France, shifted the focus of their research in the last decades of the twentieth

century, from typological studies and the interpretation of Mousterian industrial variability to the integral description of the lithic exploitation systems that give rise to lithic technocomplexes.

A first approach to Mousterian industry is concerned with the mechanisms of procurement and selection of the lithic raw material to be worked. Although all predator human societies – whatever the human species – are nomadic and highly mobile, their interaction with lithic raw material varies in time, space, and depending on the species involved. Indeed, throughout the Paleolithic, it is easy to identify a changing selection of the most suitable raw materials (usually with a siliceous matrix, such as flint, quartz, or quartzite), even if it meant transporting it from increasingly distant sources. Thus, human types previous to the Neanderthals used the nearest materials to their settlement and sacrificed the technical versatility of the chosen material to this ease of procurement, with the result of making rougher kinds of implements. Our own species, in the opposite extreme, carefully chose the most appropriate materials to make a wide range of stone tools and weapons, in different formats and with careful details. This obviously implies that frequent journeys had to be made to the outcrops of the best raw materials, where even the form of the material (nodules, blocks, slabs, etc.) and its size were selected to obtain the best product for the kind of exploitation to be applied. In the case of the Mousterian, it corresponds to Neanderthal groups, who lie in an intermediate position between these two extremes. Except for particular cases of proximity or distance from the best raw materials, the geographical range of lithic procurement is intermediate, and the use of local raw materials, of poorer quality, to shape large multipurpose tools was often combined with the transport of high-quality materials to make certain implements, such as the Mousterian points. Therefore, it cannot be claimed (as has sometimes been argued) that strategic and selective procurement of raw materials did not exist in the Mousterian. Furthermore, taking into account the above point about camps established near or distant from high-quality raw materials, in this variable, it is possible to identify a certain chronological sequence in the behavior of Neanderthals and even the first groups of modern humans in each regional environment.

From a typometric viewpoint, J. G. D. Clark's classic work (World Prehistory) institutionalized a generic classification of prehistoric hunter-gatherer groups according to the predominant form of their stone tools. Mode 1 groups based their lithic industry on large stones that were barely modified. They were gradually replaced by Mode 2 societies in which the generally large tools were shaped by bifacial knapping techniques. The Neanderthal groups being studied here belong within Mode 3, when the lithic assemblages are based on flake blanks, and these were in turn replaced by Mode 4 groups, when blade formats became predominant. In general terms, these modes are equivalent to the Lower Paleolithic (Modes 1 and 2), Middle Paleolithic (Mode 3), and Upper Paleolithic (Mode 4). In addition to the Eurasian Mousterian, Mode 3 also applies to the technocomplexes of the African Middle Stone Age (MSA), which is similar but was not produced by Neanderthal humans, who did not exist in Africa. This very general classification has acquired a symbolic value which needs qualifying: the flake format appeared together with the first human industries, both as a by-product of knapping larger tools and in the use of the edges produced. Similarly, even when blade production became widespread, flakes remained a significant part of lithic assemblages, although the novelty of blades and bladelets tends to receive more attention. The traditional characterization of the Mousterian as a flake industry is therefore not exclusive to this period, as flakes are found in the assemblages of any period and are sometimes the most abundant format type in collections.

The third of the factors allows a better chronocultural discrimination of Mousterian industries and the degree of permeability towards this technical tradition by other technocomplexes. This is a series of methods of lithic exploitation aimed at the systematic production of flakes, which are linked in a more general way with Mousterian or Mousteroid industries. Thus, in societies with industries attributed to Modes 1 and 2, the

presence of flakes is a by-product of knapping larger tools or of unplanned, even anarchic, exploitations with the object of obtaining cutting edges. The most significant conceptual change represented by Mousterian or Mode 3 industries (including the African MSA) is connected with this preplanned reduction of the nodules of raw material and the consequent systematic exploitation of the cores. As a result, this first standardization in reduction methods was deliberately aimed at producing a large number of blanks (which could be used directly or act as preforms for an increasingly wide range of tools). In addition, it should be noted that very old Mousterian varieties with blade reduction methods have recently been described for the northwest of France.

In general terms, the most usual name given to this first planned method of lithic reduction is centripetal knapping. Essentially, one or two parallel planes are defined to work the core, with a circular or subcircular shape. The raw material is worked by centripetal removals, from the outer edge towards the center of the working surface, alternating the removals from each surface when two parallel sides exist. As the core reduction advances, this procedure produces very characteristic core shapes, called "tortoise shell" pyramidal or bipyramidal forms. This "Mousterian technique" used this way of working in a generic way, and it thus represents a substantial change in comparison with the anarchic exploitation in the Lower Paleolithic. However, since the beginnings of prehistoric research, a very specific centripetal reduction method has been identified as the "Levallois technique." This technique, originally erroneously associated with a culture (Levalloisian), is one of the most sophisticated forms of lithic reduction practiced in Prehistory and is still difficult to replicate in experimental archaeology. It is a particular form of centripetal reduction in which the shape and size of the blanks to be removed are predetermined. After carefully preparing a striking platform at one of the ends of the centripetal extraction plane, two parallel and convergent extractions are removed to determine a central arris that will guide the symmetry of later extractions (flakes, blades, and, above all, Levallois points, which can be used as spear points with hardly any modifications). The characterization of the Levallois technique experienced rapid progress in the 1980 and 1990s, with the research of E. Boëda (1994) especially, later refined by L. Bourguignon (1999), which has succeeded in identifying the great variability within the technique (Erin & Lycett 2012). From the geographical viewpoint, the distribution of this technique is comparable to that of Neanderthal humans and the Mousterian, basically in Eurasia. However, from the chronological point of view, the different varieties of the Levallois technique extend beyond the lower and upper limits of the Mousterian, from about 300,000 years ago to the Gravettian complex. In short, as has occurred with the evolving definition of the Mousterian and other technical traditions linked with it since the nineteenth century, like the Tayacian, increasing knowledge in recent decades has produced a richer and more nuanced understanding, with greater internal variability and flexibility of previous overrigid spatial and temporal frameworks.

Within the characterization of the Mousterian, the typological factor has traditionally been studied most. Unlike the situation in the much shorter Upper Paleolithic, whose typological diversification has allowed internal systematization since the first research in the nineteenth century, the material monotony of the Mousterian has been an obstacle hindering all attempts at organizing the period. A single tool type (side scrapers) always accounts for the majority of the retouched stone tools, sometimes amounting to over 80 % of the total. Other types are found with the side scrapers, like denticulates, simple retouched points, backed knives and objects continuing from earlier periods (trihedrals, bifaces, cleavers, etc.), as well as tools that would become more frequent in later stages (truncated pieces, perforators, end scrapers, and a few burins). Due to the great numerical weight of side scrapers, several attempts have been made at classifying them according to their morphological appearance, as a way to achieve an internal logic to so many

millennia of typological monotony. In the end, proposals attributing a certain chronology to a certain variety of side scraper have been unsuccessful, just as a later attempt to give chronological meaning to the so-called facies ended in failure. Indeed, François Bordes identified several varieties or facies of the Mousterian, depending on the types used, the percentages in which they appeared, or the presence of the Levallois technique: Typical Mousterian, Mousterian of Acheulian tradition (subtypes A and B), Denticulate Mousterian, and Charentian Mousterian (La Quina and Ferrassie varieties), among other proposals that were put forward in the 1960s and 1970s. The failure in the translation of the Mousterian facies, first in chronological terms (Bordes) and then in functional terms (Binford), marked the end of the typological cycle in Mousterian studies, which was definitively replaced by the technological approach. Many of the aspects that had previously been studied through typology, such as Quina side scrapers, Tayac types, and the Levallois concept itself, were now given an exclusively technological consideration.

The above description is an account of Mousterian industrial tradition. Another extrinsic factor is related with the homogeneity exhibited by this tradition for over 200,000 years. Neither the change in perspective involved in replacing typology with technology nor the introduction of absolute dating procedures that cover the chronological range of the Mousterian (unlike radiocarbon dating) has achieved an internal systematization of the Mousterian. Although great progress has been made in understanding the internal diversity of the Mousterian, which now encompasses a much larger chronological range than previously thought, the concept of a "plateau culture" created by the Neanderthals, with hardly any internal evolution and with no temporal sequencing, must be maintained at the present time.

International Perspectives

The geographical distribution of archaeological deposits belonging to the Mousterian culture is concentrated in Europe and central Asia, with a high density of sites in the Near East. The distribution of researchers and research centers is not arbitrary either. Although numerous American researchers have recently started to investigate this period, the main schools of thought publishing about the Mousterian are still in Europe and the Near East. This circumstance has produced certain inertia in the lines of thought going back to the late twentieth century. A frequent approach studied during the last 30 years is concerned with the transition from the Middle to the Upper Paleolithic, the end of the Neanderthals, and the expansion of the Cro-Magnons across the Old World. Since the discovery of a Neanderthal individual in a Chatelperronian level in the cave of Saint-Césaire (Charente, France), the traditional concepts maintained about this phase have been questioned. Each of the changes implicated in this transition (which has come to be known as the Transition, with a capital letter) has been exhaustively reappraised, from the anthropological change to the transformation in symbolic behavior, including the material aspect. The sequence of the variables mentioned above (the raw material used, the increase in the use of blades, changes in technological reduction methods, the introduction of Upper Paleolithic typological elements) and above all the rate and ways in which these changes took place have been the cause of an enriching debate, with countless nuances and references in the literature. The regions where most debate has been generated, as they posses very varied portions of the record, are in the center and east of France, the north of Spain, the Swabia (on the border between Germany and Switzerland), northern Italy, and the Near East.

Future Directions

In the light of this debate on the archaeological understanding of transitions and the creation of a specific commission in the IUPPS about this topic (Camps & Chauhan 2009), in coming

decades, detailed regional knowledge will be attained about the circumstances of the transition in each area. Although Paleolithic human societies were nomadic, they are described in a paradoxically static way, based on the description of a single site or several contemporary deposits, in a single regional environment. The fact that the objective of Prehistory is to obtain an understanding of historical processes from a record with geological resolution does not help in acquiring a precise view of complex underlying cultural phenomena. The material record, due to its archaeological characteristics (it is conserved relatively well and abundant at most sites, its techno-typological evolution is known, and a tested geochronological framework is associated with it), is especially appropriate for a more dynamic reconstruction, in terms of the introduction of innovations and the persistence of industrial traditions in later phases. Future decades will doubtlessly see conflicting information, contradictory with what are regarded as certainties today. However, progress in the knowledge of Prehistory, as in many other scientific disciplines, often comes from situations of crisis, their solution, and the new epistemological and methodological approaches introduced during the whole process.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ African Stone Age
- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Central Asia: Paleolithic
- ▶ Crimean Middle Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ *Homo neanderthalensis*
- ▶ Lithic Technology, Paleolithic
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ Neanderthals and Their Contemporaries

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Movius Line

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Introduction

Nearly 70 years ago, Hallam L. Movius, Jr. (1907–1987), in the first major synthesis of early Paleolithic materials from East and Southeast Asia (Movius 1943, 1944, 1949), observed that the stone implements that were being recovered from Pleistocene deposits from the area were very different from those which had been known from the deposits of similar ages elsewhere in the Old World. The line that marked the boundary of the eastern and western cultural complexes during the early prehistoric times came to be known as the Movius Line, and probable causes for the difference, as well as the existence of the demarcation line itself, have been the topic of debate over the decades, particularly as new discoveries are made, adding complexity to the archaeological map of the region.

Definition

The Movius Line, running across northern India, delineates the area characterized by what Movius called "chopper/chopping-tool culture" from the "hand-axe culture" area to the west (see Fig. 1). On his return from the field research in Burma and Java with the Joint American Southeast Asiatic Expedition for Early Man, 1937–1938, Movius found it necessary to formulate a new typological scheme in order to describe the artifacts of the newly found assemblages. He offered the following terms, emphasizing, as he did on many occasions since, that these categories are based on the form and the technique of manufacture only, without implying the possible function of the implements (Movius 1943: 350-353; see Fig. 2):

(a) Choppers: tools with round, semioval, or almost straight cutting edges which have been formed by the removal of flakes on the upper surface of the implement only in most cases, although some are flaked on the lower surface as well
(b) Chopping tools: bifacial core implements, usually made on pebbles, with sinuous cutting edge produced by alternate flaking
(c) Hand-adzes: unifacial implements of roughly tabular form, with slightly rounded or even a pointed cutting edge, which forms a right angle with the long axis of the implement
(d) Scrapers: smaller version of choppers that are made on cores or flakes

In the more comprehensive syntheses of the early prehistoric assemblages from South and East Asia as a whole, the choppers and the scrapers, which were distinguished by the size difference, were collapsed into one category of choppers and/or scrapers, while a new category of "Proto-hand-axe" was added to accommodate the artifacts recovered from Patjitan in Java (Movius 1944: 91-92, 1949: 350; see Fig. 2: no.4).

(e) Proto-hand-axes: crude and roughly pointed or oval types of hand-adzes of plano-convex section, worked on the upper surface only, leaving large areas of cortex at the butt ends. Typologically transitional between hand-adzes and true hand-axes

As of the late 1940s when the concept was proposed, the components of the chopper/chopping-tool culture (or chopper/chopping-tool complex, as he uses the terms interchangeably even in the same publication, e.g., Movius 1949: 408, 409) were as follows: the Soan (sometimes spelt "Sohan") of the Siwalik Hills region of the Indian

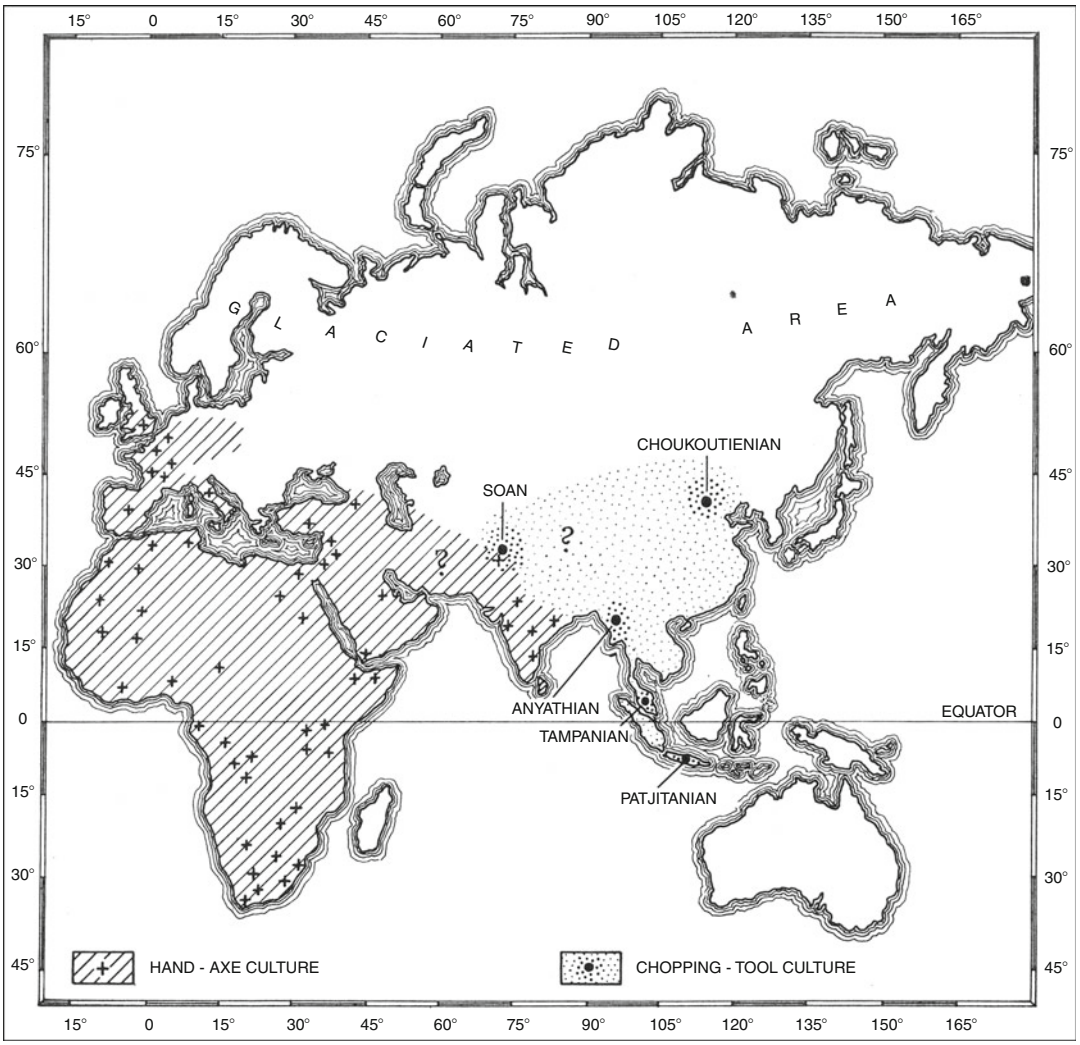

Movius Line, Fig. 1 Distribution of hand-axe culture and chopping-tool culture during the Middle Pleistocene (Presented by Movius (1949: 409), with permission)

subcontinent, the Anyathian of Burma (now Myanmar), Tampanian of the Malay Peninsula, the Patjitanian (now called Pacitan) of Java, and the Choukoutienian (now spelt Zhoukoudian) of North China (see Map on Fig. 1). As Movius frequently emphasized (e.g., 1944: 103, 1949: 408), the area of the chopper/chopping-tool culture is distinguished from the hand-axe culture area of the west, not only by the presence of the categories of stone tools mentioned above but also by the absence of the fully bifacial Acheulean-type hand-axes and the Levallois technique of flake detachment that characterize the Lower and Middle Paleolithic of the other regions of the Old World. The area east of the Movius Line was depicted as being culturally homogeneous, with little change over a long period of time.

It should be noted that while the concept of the "chopper/chopping-tool complex," as well as Movius' definitions of tool types such as the "hand-adze," was being widely accepted through the 1940s and 1950s, it was not until 1965 when the dividing line was given the name. It appears that the name originated with Carleton S. Coon (1904–1981), in his controversial book on race, where he stated: "during the Pleistocene the

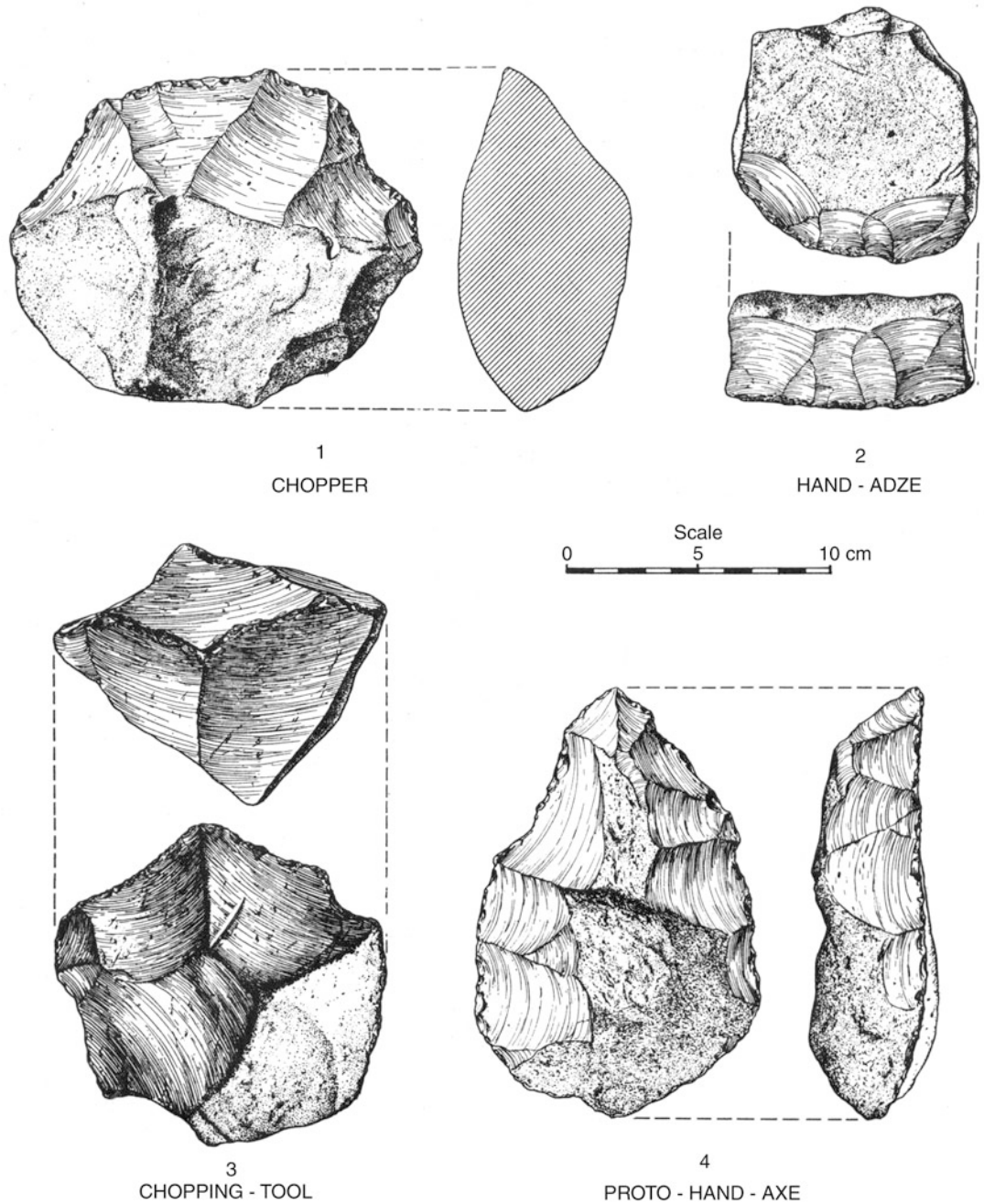

Movius Line, Fig. 2 Major components of the chopper/chopping-tool culture (After Movius (1949: 351), with permission)

inhabited parts of the Old World were divided into two archaeological regions, a western and an eastern one, by a geographic frontier that we shall call Movius's Line, after its discoverer" (Coon 1965: 47-48). In recent years, most authors refer to the line as "Movius Line" (e.g., Schick 1994, Keats 2002; Dennell 2009; Lycett & Bae 2010) without the "apostrophe S."

Key Issues/Current Debates

In his expanded treatise on the Lower Paleolithic of the region, Movius (1949: 410) observed that pebble tools appear to have been present as the "basic cultural substratum" in many parts of the Old World, before the development of the fully bifacial Acheulean hand-axes, but the latter did not appear in the region under consideration. Then, he concluded the monograph with the statement:

> Perhaps the most important single conclusion to be drawn from the implications of the new archaeological material brought to light during the last fifteen years in Southern and Eastern Asia is that this area cannot be considered in any sense 'progressive' from a cultural point of view. . . . In other words, the archaeological, or palaeo-ethnological, material very definitely indicates that as early as Lower Palaeolithic times Southern and Eastern Asia as a whole was a region of cultural retardation. Therefore, it seems very unlikely that this vast area could ever have played a vital and dynamic role in early human evolution, although very primitive forms of Early Man apparently persisted there long after types at a comparable stage of physical evolution had become extinct elsewhere (1949: 411).

Many readers, including the emerging generation of Asian scholars who were now frontline practitioners investigating the archaeological heritage of their own countries, found this characterization of the area objectionable, particularly with the phrase "as early as Lower Paleolithic times," which implied that it is still "culturally retarded." Linking the cultural retardation to the presence of "primitive" forms of humans was taken to indicate racism. A few years later, however, Movius (1953: 189) modified his views by stating that the absence of Acheulean hand-axes from the region is more likely due to the failure of this technique to diffuse into the area rather than due to incapacity of the primitive hominids to understand "the new and improved methods" of tool making developed elsewhere. Although the allusion to cognitive incompetence due to biological limitation was removed, the image of the region as cultural backwaters, isolated from the centers of cultural innovation remained.

1. Bose Basin
2. Chongok-ri
3. Dingcun
4. Gongenyama
5. Imjin/Hantan Basin
6. Iwajuku
7. Lantian
8. Luonan Basin;
9. Mount Do
10. Ogan River
11. Pacitan
12. Sangiran
13. Zoukoudian

Movius Line, Fig. 3 Archaeological sites mentioned in the text

As the pace of archaeological research picked up and flows of information improved in postwar Asia, bifacial tools were reported from several sites, such as Dingcun (formerly spelt "Ting-Ts'un") and Lantian in China, Mount Yarkh in Mongolia, Chongok-ni (also spent as "Chongok-ri" and "Jeon-gok-ri") in Korea, Iwajuku and Gongenyama in Japan, and Mount Do in Vietnam (Fig. 3). These led some authors to recommend that the concept of the Movius Line be abandoned.

Is the Movius Line Still Valid?

Bifacially prepared large cutting tools continue to be reported from various parts of East Asia. Particularly noteworthy is a series of discoveries in recent years of clusters of sites where numerous bifaces were recovered. The clusters are located in the Bose Basin in Southern China, the Luonan Basin in Central China, the Imjin-Hantan River Basin on the Korean Peninsula, and various locations in the island chain of Indonesia, including Sangiran in Java and along the Ogan River in southern Sumatra. The Bose artifacts are described as being "Acheulean-like" (Hou et al. 2000), while the Luonan specimens are reported to fit "comfortably within the Acheulean range of variation" (Petraglia and Shipton 2008: 965), and the bifacial tools from Indonesia are seen as the evidence for "the arrival of typical Acheulean technology" around 0.8 million years ago in Indonesia, where it coexisted, perhaps briefly, with the pebble-tool tradition (Simanjuntak et al. 2010: 421).

The situation is clearly far more complex than what Movius depicted several decades ago. The cultural landscape is certainly not homogenous nor is it monotonously unchanging. Nevertheless, Dennell (2009: 434), among others, finds that "the Movius Line remains a useful way of demarcating the limits of those regions of Asia and Europe where bifaces were commonly used, and those such as Central and East Asia and eastern Europe, where they were rare". Similar views have been presented by Schick (1994), Keats (2002), and Lycett and Bae (2010), because (1) hand-axe sites are rare in Eastern Asia and (2) the percentage of hand-axes in the total artifact assemblage is quite low. Lycett and Bae (2010: 525) note that hand-axes account for less than 5 % of artifacts at Korean sites and less than 7 % in Indonesia. Furthermore, (3) hand-axes in Eastern Asia are morphologically different from those in the west: they are thicker, often with a plano-convex cross section.

Explanations for the Movius Line

If the Movius Line, even in a somewhat modified sense, is still a viable concept, what is/are the reason(s) for its existence? Possible factors considered by various researchers include the following:

1. *The Limitations Placed by the Nature of the Available Lithic Material*

This was one of the factors Movius himself mentioned as a possible reason why the fully bifacial hand-axe and the Levallois technique of flake production were absent from the area, but his position appears to shift over the years (e.g., 1943: 376; 1944: 75-76). In his last statement on the question, he stated that it was not the determining factor because "even in cases where flint was available, the typology of the artifacts inevitably remained within the strictures of the general pebble tool category" (1978: 354). Indeed, Schick (1994: 589) shows a thin, well-prepared hand-axe she manufactured from a piece of tabular limestone, found near the Zhoukoudian site, well known for the choppers, chopping tools, and simple flake tools made of quartz and quartzite.

On the other hand, Leng and Shannon (2000), based on detailed examination of artifacts and replication experiments using the same lithic materials as the archaeological specimens at five Chinese and three Indian sites, state that the raw material can strongly affect the typology of the end product. They note also that producing tools from brittle and junctured quartzite is just as cognitively challenging as producing a symmetrical straight edge out of uniformly structured chert.

2. *Barriers to Migration and Cultural Diffusion*

As noted above, Movius (1953: 189) suggested that the chopper/chopping-tool tradition persisted because of "a failure of more advanced techniques to diffuse into the area" without specifying what may have caused it. Recent reviews (e.g., Dennell 2009; Lycett & Bae 2010) considered the possibility that the Himalayan mountain range, Qinghai-Tibetan Plateau, the major river systems like the Ganges-Brahmaputra, the Irrawaddy and the Mekong, and the tropical rain forests may have acted as barriers for human movement and cultural transmission. Lycett and Bae (2010: 527) conclude, however, that with the exception of the Himalayan and Qinghai-Tibetan Plateau, which

were not penetrated until the latter part of the Late Pleistocene, the geographic and topographic barriers do not appear to provide a full explanation for the Movius Line.

3. *Alternative Non-lithic Raw Material (Bamboo) and Importance of Flakes*

It has been suggested by a number of researchers that the reason why the early inhabitants in the area east of the Movius Line did not expend much time and efforts in manufacturing bifacially prepared tools was the presence of alternative non-lithic raw materials, such as bamboo, which could serve as cutting tools, as well as containers, and has the advantage of being lightweight for carrying during long foraging trips. Pope (1989) has demonstrated the overlap of the distribution of bamboo in Eastern Asia with the Movius' chopper/chopping-tool culture area. Schick (1994: 591) illustrates how a piece of split bamboo can serve as a very effective butchering tool and notes that bamboo can be easily worked with simple stone tools.

In this connection, it should be pointed out that Movius' chopper/chopping-tool complex overemphasizes the core tools, when in fact the toolkit is characterized by the dominance of small flakes. It has been argued that it is the flakes, struck off pebble cores, used as expedient tools to make the real primary tools out of such organic materials as bamboo, that characterized the early Paleolithic assemblages of East and Southeast Asia (Ikawa-Smith 1978).

Unfortunately, the perishable nature of the non-lithic materials precludes the survival of actual evidence. One hopeful indication is the report that a scanning electron microscope examination revealed morphological differences in the cut marks experimentally produced on mammalian bones by bamboo knives from those produced by chert blades (West & Louys 2007). The authors state, however, that marks made by bamboo knives tend to be shallow, thus are likely to fade more easily than those made by stone tools. Nevertheless, it opens a possibility to confirm the "bamboo hypothesis," if and when a zooarchaeological specimen with the characteristic cut marks made by bamboo knives is recovered.

4. *Loss of the Technical Knowledge*

The last possible reason for the Movius Line to be considered here is the difficulty for a group of sparsely distributed mobile hominids to maintain a set of complex technical knowledge such as Acheulean tool-making technology. Schick (1994: 590) notes that as a group of hominids moved into a new area, they may face problems such as locating the lithic materials suitable for biface production, and it may take many years or even a generation before such a material is located. In the meantime, they would have made simpler tools using locally available materials, and the transmission of the technical knowledge would have been interrupted and the technological tradition could eventually be lost.

Lycett and Bae (2010: 531-534), on the other hand, suggest that the thick hand-axes that have been recovered from the East Asian sites are the results of convergence with the Acheulean development elsewhere, not the result of intrusion from the west. Even though hand-axes were manufactured in several places for short periods of time, production did not continue, in their view, because of the demographic conditions: the population density was low, with a small number of skilled practitioners, and the opportunities of sociocultural interaction and transmission of knowledge would have been limited.

Future Directions

After decades of debate and a series of recent discoveries, the Movius Line still serves as an important demarcation line in the Pleistocene world. In one of his last statements on the subject, Movius (1978: 354) stated that "[t]he underlying reasons for this remarkable conservatism still remain unfathomed." Sixteen years later, Schick (1994: 591) echoed the sentiment by subtitling the concluding section of her chapter on the Movius Line as "The Movius Line is still a paradox." The foregoing reviews of possible

reasons for the Line clearly indicated that not much has changed in the ensuing 16 years either.

Efforts will continue to be made to increase quantitative data, comparing morphology of bifaces from both sides of the Movius Line. Efforts will also be directed to obtain more precise dates on relevant assemblages, those consisting "Acheulean-like" bifacial elements as well as those consisting only of pebble tools. Many of the Early Paleolithic artifacts have been collected from the surface and remain undated. Even when chronometric dates are available, there often are questions concerning the relationship of the artifacts to the dated samples. Reliable dates, matched with quantitative data on morphology of the artifacts, will contribute towards gaining a perspective on the patterns of appearance of bifaces in Eastern Asia, in relation to the simpler pebble tools. When compared with the patterns of temporal and spatial distribution and the characteristic shapes of the bifacial artifacts elsewhere, particularly in southwestern Asia and Indian subcontinent, the distribution patterns may clarify one of the outstanding issues: Was the eastern hand-axe indigenous or the result of diffusion from the west? If they are brought in from the west, when did it happen?

Experimental replication of artifacts, cutmark analyses, and paleoenvironmental studies will also be pursued, as will further inquiries into paleodemography. When suitable human fossils are found and DNA could be extracted, we might learn something about the biological affinities of the ancient toolmakers. In short, a well-coordinated multidisciplinary approach would help towards solving the "paradox" of the Movius Line.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ East Asia: Paleolithic
- ▶ Java Man
- ▶ Movius, Jr., Hallam L.
- ▶ Oldowan Industrial Complex
- ▶ West Asia: Paleolithic
- ▶ Zhoukoudian, Archaeology of

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Movius, Jr., Hallam L.

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Basic Biographical Information

Hallam L. Movius, Jr. was born in Newton, Massachusetts, in 1907 and educated at Harvard University. He was appointed as a tenured professor of anthropology at Harvard in 1950 and was also curator of Paleolithic archaeology in the Peabody Museum of Archaeology and Ethnology. He retired from teaching in 1974 and from his curatorship in 1976. He died at home in Holyoke, Massachusetts, on 30 May 1987.

Major Accomplishments

For many years, Movius was considered the dean of Paleolithic studies in the United States. Not the first American to work in the Paleolithic (Homer Kidder, Harper Kelley, and Alonzo Pond preceded him), he was certainly the most influential and productive for several decades from the late 1930s onward. He established it firmly as a discipline in a major university, and he was the dominant figure in undertaking fieldwork, training graduate students, and creating broad regional and interregional syntheses. During those years, he made the Peabody Museum one of the world's focal points for Paleolithic research.

As a young man he seemed destined for a career in finance or business like his father. While an undergraduate at Harvard from 1926 to 1930 he developed a strong interest in archaeology and especially Old World prehistory. His first fieldwork was at the Neolithic site of Homolka in Czechoslovakia in 1930. In 1932, he participated in Dorothy Garrod's investigations at Mugharet es-Skhul in Palestine. From 1932 to 1936, he was in Ireland as a member of a Harvard expedition, excavating a number of Late Mesolithic and Early Neolithic sites around the island. These were the basis for his 1937 doctoral dissertation. In 1937, he briefly abandoned European prehistory to join an international expedition in East Asia. With Helmut de Terra and Pierre Teilhard de Chardin, he spent 4 months in the field in Burma. Following this, he visited Java to inspect Paleolithic sites and artifacts under the guidance of G. H. R. Von Koenigswald. The research produced several monographs on the Early Paleolithic of South and East Asia that were remarkable syntheses of archaeological, geological, and paleontological data extending from India to China and the East Indies, with tentative interregional correlations and interpretations and an innovative lithic terminology defining the great chopper-chopping-tool complex (Movius 1948).

He is probably best remembered today for his work in East Asia, but he chose not to return there after 1938. From 1942 to 1946, he served in the US Army Air Corps as an intelligence officer overseas. After discharge, he resumed his duties at Harvard as a teacher and curator. His research interests now lay in the Upper Paleolithic of Western Europe, particularly France. He excavated the site of La Colombière in eastern France in 1948, where his discovery of an "Upper Perigordian" engraved pebble spurred a lasting interest in Paleolithic art. He was intrigued by the controversy over the so-called Aurignacian-Perigordian dichotomy in southwestern France and decided to evaluate the hypothesis through new fieldwork. From 1958 to 1964, he excavated the deep stratified rockshelter of Abri Pataud in Les Eyzies, Dordogne, and the analysis and publication of the results occupied him for the rest of his active professional life (Movius 1974). He continued to work after suffering a stroke in 1970 but in his last years was virtually incapacitated.

Movius saw as one of his responsibilities making the results of Paleolithic research available to the international scholarly community. He had a large network of correspondents around the world, in Europe, Africa, and Asia who kept him informed of their investigations and sent him their publications. He encouraged

the translation and publication of reports written in Russian, Chinese, and Japanese that were virtually unknown in the West. In 1952, he prepared a far-ranging synthesis of the state of Paleolithic research for an international symposium in New York (Movius 1953). Not the least of the contributions of this article was introducing to English-speaking scholars the recent technological studies and quantitative methods of the young French prehistorian François Bordes.

In the early years of radiocarbon dating, he operated a kind of international clearing house for the new method and undertook to accept Paleolithic charcoal samples from colleagues overseas without access to radiocarbon facilities which were then analyzed in American laboratories.

Movius' research was characterized by meticulous, intensely focussed work. From his days in Ireland, he had strongly emphasized the necessity of interdisciplinary research, studying archaeological remains in their environmental and ecological contexts, and he continued this approach in France. In the 1950s, he was greatly impressed by the work of Grahame Clark and André Leroi-Gourhan in exposing living surfaces and activity areas. He attempted this at Abri Pataud while simultaneously paying careful attention to the complex stratigraphy of the site as he unraveled the relationships between the 14 or so cultural levels from the Early Aurignacian to the Solutrean. His interpretation of the Aurignacian and other hearths illustrates his growing interest in what some call social archaeology (Fig. 1).

It cannot be said that he created a school or even a band of disciples with a specific orientation. One reason may be that he rarely made specific statements about his own methodological and theoretical principles. He usually preferred to leave them implicit in his published work rather than spell them out. Movius did not enjoy professional controversies and disputes. In the face of criticisms, he preferred a dignified silence rather than defense or counterattack. This may account for the absence of direct responses to the charges made by some authors against his interpretation of the apparently long period of lithic artifactual stasis in Asia, east of the "Movius Line." While in 1948, he had used language suggesting the area had been unprogressive and even culturally retarded, in his 1953 paper, he rejected explanations based on biological or cultural inadequacy. Given his deeply conservative temperament and humanistic outlook, his depiction of a long, separate, and relatively unchanging regional lithic tradition may be viewed as consonant with his own innate devotion to stability and continuity.

Movius, Jr., Hallam L., Fig. 1 Photograph of Hallam Movius at Abri Pataud in 1958 with students

Cross-References

► Lithic Technology, Paleolithic
► Movius Line

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Muckelroy, Keith (Extreme Environments)

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Basic Biographical Information

Born: September 6, 1951; Died: September 8, 1980.

Keith Muckelroy earned his undergraduate degree at the University of Cambridge in 1974 under the tutelage of Grahame Clark and David Clarke. While there, he learned to dive with the Cambridge University Underwater Exploration Group (CUUEG) and became involved in the excavation of the seventeenth-century Dutch East Indiaman *Kennemerland*, which had wrecked in the Out Skerries, Shetland, in 1664. Following graduation, he began an assistantship in maritime archaeology under Colin Martin at the newly formed Institute of Maritime Archaeology at the University of St. Andrews, in Scotland. Over the following six years, Muckelroy continued working at the excavation of *Kennemerland* while leading other expeditions in England and Greece and began a new position as the Archaeologist Diver in the National Maritime Museum's Archaeological Research Centre in Greenwich, England. By 1978, he had returned to Cambridge to begin his doctoral research, preliminarily titled "Site Analysis and Maritime Archaeology"; had published additional articles in *The International Journal of Nautical Archaeology*, *World Archaeology*, *Britannia*, and *Progress in Underwater Science*; and finished his first book, *Maritime Archaeology* (Daniel 1980). His final two manuscripts, *Archaeology Under Water* and *Discovering a Historic Wreck*, were published following his death in a diving accident in Loch Tay, Scotland.

Major Accomplishments

Muckelroy's interests stretched beyond maritime archaeology, but they focused primarily in the analytical investigation and interpretation of sites under water. This was the subject of his Ph.D. research and many of his publications. His 1975 article in *The International Journal of Nautical Archaeology* applied matrix analysis and numerical taxonomy to the assemblage of *Kennemerland* to determine how much the various classes of artifacts in the assemblage had been scattered by the wrecking process. A 1976 article in *World Archaeology* attempted to codify and to illustrate the different forces transforming a ship into an archaeological assemblage (Fig. 1), whereas two articles published in 1977 used the Kendall ranking coefficient to reveal the relationship between site cohesion and 11 environmental factors. These studies built the content of the second half of his 1978 book, *Maritime Archaeology*, but they also reveal the influence of Grahame Clark and David Clarke in Muckelroy's thinking. Grahame Clark may have inspired Muckelroy's 1977 articles through a chapter on site preservation in his *Archaeology and Society*. As Clark wrote about different climates, Muckelroy wrote of currents, winds, and waves; as Clark wrote of different soils, Muckelroy wrote of the topography of the seabed and different deposits. Clark's discussion on social behavior on land, then, became salvage operations under water (Clark 1939: 57–85; Muckelroy 1977a: 112–3, 1977b: 51). In contrast, David Clarke's impact may have been more fundamental. Much of Muckelroy's application of statistical analyses adapted ideas in Clarke's *Analytical Archaeology* and, behind that, the influence of Systems Theory and an emphasis on explicit methodologies characterizing New

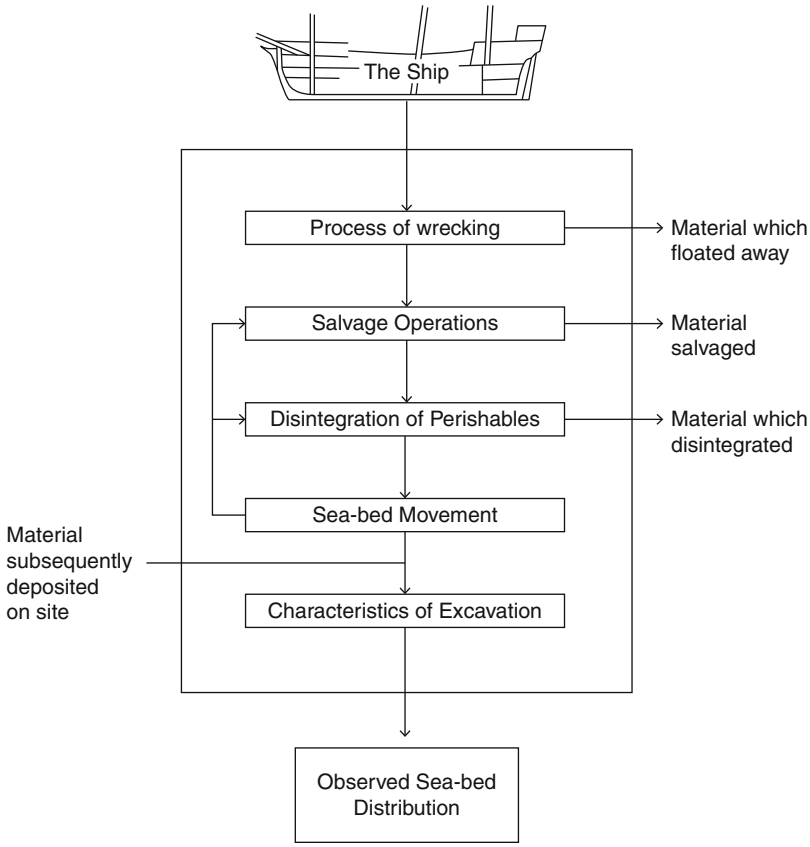

Muckelroy, Keith (Extreme Environments), Fig. 1 In 1976, Muckelroy published a chart depicting the forces that affect a ship as it sinks and becomes an archaeological site on the seafloor

Archaeology. Moreover, Muckelroy's goals may have emulated Clarke's as well.

Clarke's *Analytical Archaeology* promoted matrix analysis as a central, hierarchical paradigm in archaeology and was, effectively, a guide that other archaeologists could follow. The second half of Muckelroy's *Maritime Archaeology*, titled "Towards a theory of maritime archaeology," similarly creates an interpretive framework to guide maritime archaeologists through their investigations of shipwrecks. This framework was based upon the different techniques tested in his articles published in 1975, 1976 and 1977. As a group, they demonstrate different stages in the process of transforming an assemblage into the ship it represents. The 1977 studies quantify how environmental factors may affect the preservation and distribution of an assemblage, his 1976 article demonstrates how to predict differences between the content of the assemblage and the content of the original ship, and the 1975 essay proposes how to determine the functions of objects within the assemblage. In short, these articles and Muckelroy's book contain explicit techniques which, when arrayed together, become the essence of a paradigm needed to recreate a ship from the assemblage left on the seafloor.

Keith Muckelroy wrote his articles and books at a time when maritime archaeology was still young, yet no longer a novelty, and its terrestrial predecessor was assimilating the new philosophical and analytical methodologies that had asserted themselves in the previous decade. As a result, Muckelroy's landscape in the United Kingdom and particularly at Cambridge – what he called a "hothouse of academic archaeology" – was a combination of vibrant individuals redefining archaeology in a variety of ways (Muckelroy 1978: ix). In addition to Grahame Clark and David Clarke, Muckelroy's mentors also included Colin Martin, George Bass,

Nicholas Flemming, Robert Yorke, Joan du Plat Taylor, and A.J. Parker. These were people who were developing new methods of gathering archaeological data from new sources in the sea and testing new perspectives on how best to interpret and understand that information. Much of Muckelroy's work demonstrates his attempts to integrate these influences, but due to his early death they reflect only his first attempts to do so. While he was fundamental in demonstrating the potential of applying statistical analysis to the interpretation of sites under water, he did not have a chance to explore its potential to the fullest. As valuable as it is, then, his corpus represents the beginning of years of scholarship, not the end; his plans and vision, then, may only be extracted from the material in hand while their fulfillment lay with his successors.

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- ▶ Clark, John Grahame Douglas
- ▶ New Archaeology, Development of
- ▶ Underwater Archaeology

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Muckelroy, Keith (Underwater and Maritime Archaeology)

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Basic Biographical Information

Keith Muckelroy (1951–1980) (Fig. 1) studied Archaeology and Anthropology at Jesus College, Cambridge, between 1970 and 1974, achieving a first class degree. He was particularly receptive to the teachings of the prehistorians Grahame Clark and David Clarke and acquired excavation experience on land sites, including Wroxeter. In 1971, he learned to dive with the Cambridge University Underwater Exploration Group. Two years later, as their diving officer, he led an expedition to survey the submerged harbor at Apollonia, Libya. Membership of this group of divers from a range of academic disciplines introduced Keith to similar groups from other universities.

In 1971, divers from Aston University had located the Dutch East Indiaman *Kennemerland*, wrecked in 1664 off Out Skerries, Shetland. Keith joined them in 1973, and this scattered site became the main focus for his study of wreck-formation processes. After graduation, he joined Colin Martin in the recently established Institute of Maritime Archaeology at the University of St Andrews, on the east coast of Scotland, and spent summers working with Colin and the author on the wrecks of the *Dartmouth* in the Sound of Mull, Scotland (1690); *El Gran Grifon* off Fair Isle, Scotland

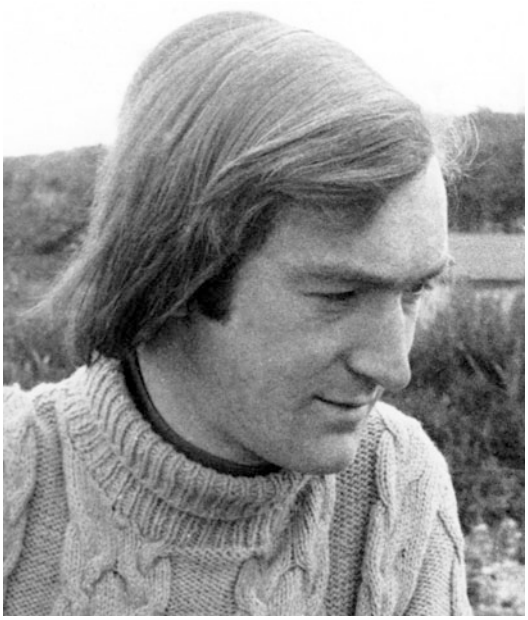

Muckelroy, Keith (Underwater and Maritime Archaeology), Fig. 1 Keith Muckelroy

(1588); and *La Trinidad Valencera* off Donegal in Ireland (1588). In addition to this, he continued his work on the *Kennemerland* and, as part of a large team, on the *Mary Rose* (1545) excavation.

Keith was a hard worker, dedicated to his subject, but easy to work with. He was able to combine the practical side of diving with high-caliber field archaeology and to engage in debate and theorizing. He had very clear views on ethics and deplored the argument – widely advocated in some quarters during the 1970s – that archaeologists could work with treasure hunters. Those of us who knew him and worked with him sometimes teased him for his single-mindedness, but he had a very human side too, and we all miss him and still wonder how his ideas and career might have developed.

Major Accomplishments

"Between his graduation from Cambridge University in 1974 and his death in 1980, Keith Muckelroy's work and ideology were crucial in promoting an alternative research methodology in maritime archaeology" (Harpster 2009: 67). In this early period of the development of maritime archaeology, it was unusual for someone to enter it from a standard archaeological background, rather than from a sense of adventure, a love of diving, or a love of boats.

Between 1975 and 1978, he published seven articles in academic journals. His first book, *Maritime Archaeology*, published in 1978, has since achieved seminal status. He also became involved in work on two underwater finds of Bronze Age material off the south coast of England. So within a few years, he managed to gain experience of quite a number and wide range of sites. In 1977, he left St Andrews and returned to Cambridge to work towards a Ph.D. on "Aspects of Maritime Archaeology, with Special Reference to Cross-Channel Contacts in the Later Bronze Age." In 1980, he joined the Archaeological Research Centre at the National Maritime Museum in Greenwich, but in September 1980, while working on the excavation of a crannog in Loch Tay, Scotland, he was drowned.

Students still discuss Muckelroy's ideas, and some have tried to produce a sequel to his published work or further develop his ideas, but none has yet fully succeeded. Subsequent generations of students in the UK have not yet produced a maritime archaeologist of similar caliber, breadth of interest, and single-minded determination. "In the ten years since he learned to dive as an undergraduate . . . he had achieved more than many achieve in four decades of a working life" (McGrail 1980).

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- ▶ Clark, John Grahame Douglas
- ▶ Martin, Colin
- ▶ Ship Archaeology
- ▶ Wreck Site Formation Processes

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Muke, John

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Basic Biographical Information

John Muke (1960–) is a member of the Tangilka tribe from Tumba in the Middle Wahgi Valley of the highlands of Papua New Guinea. As well as being a prominent archaeologist within Papua New Guinea, John is also required to fulfil the traditional role of a "big man" within his community.

John went from Mount Hagen High School to the University of Papua New Guinea (UPNG), Port Moresby, in 1979. He subsequently obtained his Bachelor of Arts in 1982, specializing in archaeology under the tutelage of Professor Les Groube. He continued his archaeological studies, specializing in research on waisted blades, at the Australian National University for a Bachelor of Literature (B. Litt.) between 1982 and 1985 (Muke 1984).

In 1985, John began his Ph.D. in ethnoarchaeology at Cambridge University under the supervision of Professor Ian Hodder. John's Ph.D. research marked a dramatic departure from his previous, more conventional archaeological studies and drew heavily upon his own experiences of warfare in the Wahgi Valley (Muke 1992). Following completion of his Ph.D., John returned to Papua New Guinea to take up a lecturing position within the Department of Anthropology and Sociology at UPNG.

Between the late 1990s and early 2000s, John transitioned from being an academic archaeologist at UPNG to becoming a consultant in a range of cultural, economic, and social fields. Consultancy projects included water usage/provision and poverty alleviation for squatter settlements in Port Moresby and the prevention of HIV/AIDS in the Wahgi Valley. At the same time, he maintained an active interest in, and was an advocate for, cultural heritage at Kuk and elsewhere in the country (Muke 1998, 2000). From around 2005, John's consultancy – Social Research Institute – has focussed more heavily on cultural resource management projects in the country, most of which are associated with large, resource extraction developments.

Major Accomplishments

John's B.Litt. studies on waisted blades continued research begun with Les Groube on this distinctive type of stone axe-adze found across New Guinea, as well as in Australia and elsewhere. Waisted blades are generally associated with the Pleistocene, although they have also been reported from Holocene contexts on New Guinea (Bulmer 2005). At the time, waisted blades found on the Huon Peninsula marked the (then) earliest evidence for the presence of humans on the island of New Guinea around 40,000 years ago (Groube et al. 1986).

While lecturing at UPNG, John embarked on new archaeological investigations in the highlands, which provided an opportunity to train a new generation of archaeologists. For example, in 1993 and 1994, he directed wetland

archaeological investigations at a newly drained coffee plantation at Kana, Middle Wahgi Valley (Muke & Mandui 2003). Archaeological finds at Kana suggested several episodes of drainage for cultivation extending back to c. 3,000 years ago, including evidence for the cultivation of wax gourd (*Benincasa hispida*) 3,000–2,000 years ago. During this time, John maintained regular contact with the Kawelka at Kuk Swamp in the Upper Wahgi Valley in order to monitor the site following reoccupation by traditional landholders (Muke 1998).

In 2006, John volunteered to codirect (with myself) the completion of the World Heritage nomination for the Kuk Swamp site in the Upper Wahgi Valley. John's role, together with that of his long-term friend and colleague Jo Mangi, was to complete the traditional land-use management plan for the site, which would be a world-first for a World Heritage Site (Muke et al. 2007). John's long association with the Kawelka at Kuk was important to the successful inscription of Kuk in 2008 and ongoing management of the site. Although the management plan for Kuk only exists in draft form, it incorporates traditional community social structures, land-use practices, and values that enable effective management of the site in the often fluid economic, political, and social contexts of the Wahgi Valley today.

A Personal Aside

I first met John in 1987 while an undergraduate in geography at Cambridge University. He was instrumental in my becoming interested in the geography and long-term history of the highland peoples of Papua New Guinea. Since then, he directly facilitated several aspects of my research in the interior of the country, including fieldwork in 1990 for a Master of Science in geography, during which time I stayed with his brother, Sali/Charley Muke, and other family members in the Middle Wahgi and Lower Jimi Valleys.

His continued community engagement with the Kawelka community at Kuk Swamp, as well as with Professor Jack Golson in Canberra, kept the metaphorical "road" open for me to undertake archaeological excavations there in 1998 and 1999 for my Ph.D. More recently, he has facilitated and supported – and we have worked together on – several archaeological research projects and cultural resource management projects in different parts of the interior of Papua New Guinea. The most significant of these is the inscription of the Kuk Early Agricultural Site to the World Heritage List in 2008. As I write this biography in 2012, we are still working together on Kuk and other projects in the country.

My indebtedness to John is clear from the above personal history. However, he has been a mentor to many others within and outside Papua New Guinea. Over the last 20 years, he has worked tirelessly, and often struggled, as an advocate of archaeological and cultural issues within Papua New Guinea. The cultural heritage of Papua New Guinea would be greatly impoverished without his efforts.

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Multicultural Archaeology

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Introduction and Definition

Archaeological discourses related to the creation and functioning of national societies have lost momentum and significance as a result of the emergence of multiculturalism. Multiculturalism has the main tenets of modern societies crumbling, especially the construction of unified collectivities (national societies) in terms of culture, language, and history. In the last two or three decades, multiculturalism has set in motion profound changes, especially regarding the organization of society, which is now premised upon the coexistence of diverse constituencies, conventionally referred to as *cultural diversity*. The modern struggle, often violent, to unify society has been abandoned. Indeed, multiculturalism does not demand "Otherness" (alterity) to be like the self; rather, it encourages Otherness to conserve (or to strengthen or to create) its diversity.

Archaeology has been shaped by this social order and a *multicultural archaeology* has emerged. In order to keep pace with multicultural changes (which archaeology has neither championed nor promoted but which it must accommodate, often unwillingly), profound as they are, four changes have taken place in archaeology: (a) its practice has been opened to local actors; (b) the circulation of discourse has been widened; (c) other historical horizons have been included in interpretations; and, (d) exclusive control of some disputed issues has been given up.

Multiculturalism is not an innocent realignment of society. It has been widely criticized by those who believe that it promotes cultural diversity but ignores the needs and expectations of those who are different. Cultural diversity is channeled to suit multicultural needs, mostly in a political vacuum. The multicultural celebration of diversity, which encourages the proliferation of local and specific identities, effectively weakens more inclusive, binding, and stronger identities. In a world of fragmented identities, no matter how strong they are individually, the system reigns. Multicultural archaeology also falls prey to such critiques. Further, while it tolerates different representations of the past and even the widening of their scenic display, it remains untouched in metaphysical and ontological terms. The masterstroke of archaeology in multicultural times – changing in order to remain the same – mimics what the textualist anthropologists of the 1980s did, about whom Johannes Fabian (1990: 761) wrote, "Should we therefore fear that what looks like a crisis is just a lot of noise made by anthropologists regrouping in their attempts to save their representer's privileges?" Archaeologists, members of a privileged cognitive minority, do not want to lose the privileges granted to them by virtue of their ownership of a manner of representation that, at most, they are willing to share but are unlikely to change. Moreover, the acceptance of archaeology by dissenting agendas – the best known being feminist and indigenous archaeologies – is premised upon the idea that what has been wrong is not the discipline itself but the way it has been used. This has had the effect of strengthening and thus hardening its philosophical fabric. Yet, there are truly

contesting actors that strip archaeology bare, exposing the functioning of the discipline in multicultural times and showing how it contributes to the reproduction of asymmetrical positions with regard to historical representations.

Historical Background

Archaeology related to nation-states through the creation of the national self. Archaeology provided the historical depth and the unified symbolism upon which modern society was formed. It provided the nation with the continuity it needed to not appear as a blatant transgression of what it replaced. The *new* (modernity, the nation-state, the national society) found in the *archaeological* (material-based discourses about antiquities and forebears) a deep density. What does it mean to be national/modern in archaeological terms? It means to update storytelling, to make it transcendent (objective, neutral), to bring a collectivity (national society) and a singularity (the modern individual) to recognize themselves mutually as whole and part, uniting them in a ceremonial, mnemonic space.

Archaeological time performed three functions: it was a measure of progress (society knew where it was, where it was heading, and where it came from); it was a means of control (individuals had to adjust to a temporal behavior that established an origin, a route, and a destiny); and it was the signal of a symbolic exchange (between society and expert knowledge). Archaeology was thus created by modernity to produce a new temporality, suited for the emergence of a national *us* (deep, homogenous, projective, and shared). From such an *us*, as in many other fields of the new nation (e.g., education, health, and law), Otherness was evicted. The archetypical *savage* (the negative counterpoint of the modern *us*) was cast as an outsider of modernity, its dark side, which was to be incorporated or eliminated.

For more than two centuries, archaeology and nationalism grew alongside each other. About two decades ago, the symbolic field of modernity was reorganized, especially with regard to the composition of society; a homogeneous society gave way to a heterogeneous one. As a result of this reorganization, the *savage* was no longer castigated but was elevated to a building block of the new society thus created: diverse, multiple, and plural. Multiculturalism assumed that the savage as *diversity* would abandon its role as a nemesis of modernity only to be tamed and organized. The political eroticism of modernity, whereby Otherness was attracted into the national society, was replaced by the tolerant coexistence of the diverse. The promotion of cultural diversity, unthinkable during modern times, is today a categorical imperative, in the plain Kantian sense, an autonomous and self-sufficient mandate.

The key words linking multicultural reforms are *recognition, autonomy*, and *limits*, especially with respect to ethnic groups. *Recognition* has been heralded, since the early 1980s, as the most important imprint of the new society. Indeed, as Charles Taylor (1994: 38) pointed out, there was a drastic shift from the politics of equal dignity to the politics of recognition:

> With the politics of equal dignity, what is established is meant to be universally the same, an identical basket of rights and immunities; with the politics of difference, what we are asked to recognize is the unique identity of this individual or group, their distinctness from everyone else. The idea is that it is precisely this distinctness that has been ignored, glossed over, assimilated to a dominant or majority identity.

Such recognition was not a mere statement, though, as Taylor continued, "But the further demand we are looking at here is that we all *recognize* the equal value of different cultures; that we not only let them survive, but acknowledge their *worth*" (Taylor 1994: 64; italics in the original). However, what has become clear after almost three decades of multicultural policies world round is that Taylor's caveat was all but ignored. The multicultural conviviality of cultural diversity has not meant the recognition of the worth of the different but merely its existence, which has thus been organized and, to a large extent, isolated.

Varying in intensity and scope, multicultural reforms tended to secure or to consecrate the

territorial, legal, educational, administrative, fiscal, and linguistic *autonomy* of culturally diverse groups. Provided that autonomies of any kind within national borders were always the conundrum of modern political theory, multiculturalism made certain that the autonomy it predicated was not meant to be the demise of the (relatively) cohesive societies that modernity strove so hard to build. As a result, autonomy was consecrated, but within *limits*. Taylor (1994: 62) stated, "liberalism can't and shouldn't claim complete cultural neutrality. Liberalism is also a fighting creed. The hospitable variant I espouse, as well as the most rigid forms, has to draw the line." Legal autonomy, for instance, is granted to minorities with differential conceptions and practices of justice, at times quite apart from modern law; yet, such an autonomy can only be enacted within cultural and territorial limits, that is, it can only apply to certain individuals and in certain places.

Recognition, autonomy, and limits all work together, in a tense yet productive entanglement, to build new post-national societies. However, one prominent symbolic field was apparently spared from multicultural reorganization: history. Multicultural concessions establish a limit set forth by state policies. There are borders that autonomy (ethnic or otherwise) cannot cross: a claim to national autonomy within the nation is one; history is another. History is still an arena – controlled by the state and by academic disciplines – for the deployment of a collective *us*, which becomes an increasingly blurred category in multicultural times. If modern archaeology once had a clear relationship with nationalism, now its home is in utter disarray. If before it administered discourses for dealing with an Other external to modernity, it now ignores what kind of discourses it administers given that such an Other is no longer an exteriority but a constitutive interiority. Is it to keep telling the history of a homogeneous, static, and disciplined *us*, even when constitutive Otherness strives to build itself in difference and disjunction and the cultural diversity multiculturalism widely espouses thrives? Or, rather, is it to write a new (multiple, plural) history in which those Others formerly banished are also represented, those very Others currently struggling to find a place and a time, no matter that they do it by claiming agendas that are utterly anachronistic for the West? In either case, the situation is a complex one for archaeology. If it embraces the former, it would be asserting that multiculturalism may have arrived, but nothing has really changed for the discipline. Yet, that assertion would be backed by the state itself, incoherently exhibiting its modern mnemonic apparatus intact, a strategy that would be utterly anachronistic were it not overtly calculated. (Central museums, for instance, are still national.) The state continues to endow its material referents and build its narratives with a particular yet universalized meaning; it simultaneously creates and condemns an inclusive identity. Legal jurisdictions establish the political legality of the state in the enactment of laws about heritage, which, in the end, regulate the enunciation of historical narratives. The latter endow expert knowledge (such as that of museums and archaeologists) with the right to establish and legitimate the apparatus of censorship that regulates the production and reproduction of historical discourses based on objects.

If archaeology champions the latter, that is, a multiple and plural history, whatever that may be, it would be sailing uncharted waters. That would not be a problem in and of itself if it were not for the unknown and unwanted surprises that may be waiting. For one thing, multiplicity would mean two things: either different histories living side by side – which is a naïve utopia, anyway, given the operation of hegemony – or an umbrella history, somehow modeled in national discourses, under which several particularities would bloom. For the other, a radical Otherness may wish to explode whatever there is left of national histories. In such a case, reconstituting the shattered whole would be a tremendous task and most likely useless.

In archaeology a middle way has been adopted that feels safe and controllable; there is neither the reproduction of a national, unified history nor an unknown (and perhaps impossible) multiple history. The curious approach that has been adopted mixes a bit of old positivism, albeit

nuanced, with another bit of a new constructivism. It is stated that the past is fully knowable through scientific means yet that the past is a historically shaped construction is also accepted. The latter, incidentally, entails the legitimacy of different accounts of the past. In its own way, multicultural archaeology follows a contemporary demand for social justice, which has become a necessity and, additionally, a trope (empty, at that). It engages diversity only marginally, almost unwillingly. Archaeology is not that engaged, after all, at least not in relation to the needs and expectations of nonacademic actors. Multicultural archaeology thus follows the threadbare and orthodox trails of positivism, it disdainfully observes (but selectively uses) the different histories that post-modern capitalism forces it to tolerate, and pleases itself by existing (with the security it obtains from the institutional apparatus) in a world of separate histories, tamed and exploited by the market.

This conundrum – the mix of *positivism* and *constructivism* – is not new. It has occurred in history a number of times. It was perhaps inaugurated by the Marxist insistence on the historical character of the superstructure and, at the same time, on the universality of historical materialism. Critical theory tried to find a way out this *cul-de-sac* by postulating the relativity of superstructural truths, checked by critical reflexivity and by their nesting in political realities. Some archaeologists have tried to bring this home. Moshenska (2009: 47), for example, has stated that "public archaeology in the broadest sense is that part of the discipline concerned with studying and critiquing the processes of production and consumption of archaeological commodities." But for most of archaeology this conundrum is nothing more than an unlikely (but powerful) normal cocktail, which defines the borders of *multicultural archaeology*, a strategy of disciplinary practice that, from afar (not the neutral distance of scientific times but the cynical remoteness of the political correct), contemptuously allows the existence of other historical accounts while it hardens its own operations. Thus, archaeology has accommodated to multicultural mandates by adopting a more democratic, tolerating outlook. In the meantime, other histories (whether based on archaeological narratives or not) strive to find their way. The net result is that historical fragmentation lives alongside a hardened, academic, and state-founded discipline, which by sheer ideology and hegemony still reigns, a pure multicultural product.

The multicultural hardening of archaeology *qua* Western discipline has been enhanced by so-called alternative archaeologies, which challenge the hegemony that have been enjoyed by positivist archaeology for so long a time. Indigenous archaeologies (Watkins 2000; Smith & Wobst 2005), for instance, depart from certain archaeological practices, especially if colonial, and may even position their own agendas, but accept the foundational principles of the discipline. Indigenous peoples even willingly offer to dissolve radical dichotomies: "Indigenous Archaeology is perhaps uniquely positioned to creatively challenge hegemonic categories and dismantle binary frameworks such as 'Indian' and 'archaeologist' " (Colwell-Chanthaphonh et al. 2010: 231). Good intentions notwithstanding, banishing a perhaps important confrontational dichotomy mostly serves to unite and solidify archaeology by making it more democratic. If the dichotomy indigenes-archaeologists was heated and strenuous some while ago, exclusive and irreconcilable, indigenous archaeologies would dissolve it. Theoretical work following Joe Watkins' (2000) book, which "has begun to explicitly frame Indigenous Archaeology as an effort to challenge the discipline's colonialist underpinnings" (Colwell-Chanthaphonh et al. 2010: 228), is based in the implicit that a "decolonized" archaeology can retain the modern core of the discipline. How can alternative archaeologies be defined "as multiple discourses and practices on things from another time" (Hamilakis 2011: 408) if they retain the ontological core of the modern conception of time pasts? Can such "another time" be effectively enacted through/from modern ontology? Hardly so, because one of the main tenets of indigenous archaeologies, as put forward by one of its better-known proponents, states that "While focus and specifics may vary, one common thread among Indigenous archaeologies that I have observed is

an incorporation of, and respect for, the experiences and epistemologies of Indigenous groups globally" (Atalay 2008: 29). For that reason, indigenous archaeologies are at odds to secure being an alternative to something. If *indigenous* is to retain an anti-modern stance (or, at least, a will to be alternative to modernity), where lay most of its political power and utopian promises, it cannot be an adjective to archaeology (a modern discipline practiced by indigenes) but a substantive implying alternative cosmologies in their own. In short, alternative archaeologies that retain the basic tenets of archaeology reassure Western cosmology. Further, alternative archaeologies are the best things that have happened to archaeology since the scientific consensus of the 1960s broke off: the Other is no longer a nemesis but an ally.

This rapid sketch of multicultural archaeology would not be complete without a discussion of the market. Going public, the motto of multicultural archaeology, is tantamount to going into the market while preserving a democratic, open, and tolerant attitude. But it may be the case that the way archaeology has so eagerly embraced the market in the last three decades – in Cultural Resource Management/Cultural Heritage Management (CRM/CHM) operations, museums, the heritage business, and revival parks – is a symptom of its uneasiness. Instead of facing head-on the riddles created by opening up the formerly closed field of historical representation, archaeology goes placidly to the marketplace and delays the confrontation of other realities, hoping that such a deferral will last forever.

Key Issues/Current Debates

The characteristics that define a multicultural archaeology can also help to outline the most pressing issues it now faces. They can be better grasped, however, by first presenting the general critiques raised against multiculturalism itself.

A Critique of Multiculturalism

The coexistence of diverse cultures is a trademark of multiculturalism; yet it is a politics of diversity based on the *recognition* of a stereotypical, virtual, and segregated Other. The "real other" (who responds diversely, not always pacifically, democratically, or humanistically to the pressures of savage capitalism, to the speed of global fluxes, and to postideological violence) must give way, without stridencies, to an "imagined" Otherness (who lives its bucolic and exotic life in a world of tolerance and separation, assiduously visited by the market). As Slavoj Žižek (1998: 157) noted, multicultural tolerance

> excuses the folkloric Other, deprived of its substance (as the multiplicity of 'ethnic foods' in a contemporary megalopolis show) but denounces any "real" Other due to its 'fundamentalism,' given that the core of otherness exists in the regulation of its pleasure: the 'real Other' is, by definition, 'patriarchal,' 'violent,' never the Other of ethereal wit and charming customs. One is here tempted to reactualize the old Marcusean notion of 'repressive tolerance,' considering it now as the tolerance of the Other in its aseptic and benign form, which forbids the dimension of the Real of the pleasure of the Other.

Terrible concepts, indeed: regulation of the pleasure of Otherness; repressive tolerance; stigmatization, and, at the same time, promotion of primordialism. Multiculturalism organizes cultural diversity, nominating and creating it from the state, multilateral agencies, nongovernmental organizations (NGOs), and the academy, while the "real" Otherness is repressed by its virtual reflection. It neutralizes the activism of the different by imposing limits, legal and otherwise, and by delivering it to the market, which treats it just as diversity, controlled and promoted as authentic and pure.

The distance between diversity and difference is thus the main multicultural limitation, both a characteristic and a symptom. In fact, the decades that followed the last world war, but especially the last three decades, have witnessed the general abandonment of pejorative and stigmatizing categories (inferior, primitive, and underdeveloped races) and the enlivening of cultural relativism (diverse cultures) that deactivates wide-base organizations, deracializes racism (but keeps it intact), and reifies/functionalizes differences (as diversity) to downplay inequalities.

As Claudia Briones (2005: 22) pointed out, "Cultural difference emerges as a quasi-ontological property because social relations that recreate processes of alterization are presented and explained unlinked from the organization of capital and from international and national power." The multicultural idea of diversity wants heterogeneity to be understood as "a mosaic of monochrome identities" (Brubaker & Cooper 2000: 33), eliminating historical specificities, processes of alterization, asymmetries, and power relations. Therefore, it is necessary to establish the distance between diversity – that which multiculturalism promotes: quiet, safe, exotic, complacent, organized, and mercantile – and difference – the "constant production and emergence of subjects in the onslaught of their antagonisms and tensions" (Segato 2007: 27-28) – and to understand Otherness in its happening.

As if this were not an almost insurmountable problem, multiculturalism is fraught with constitutive tensions, the most prominent of which are the contradiction between individual and collective rights, and the autonomy accorded to different symbolizations of society and life. Although the latter has been curtailed by the establishment of limits, it nevertheless remains potentially explosive. The "solution" multicultural societies have adopted to solve these problems is deferral and, when circumstances are pressing, casuistry.

A Critique of Multicultural Archaeology

In light of the critique of multiculturalism I have just sketched, I can also posit a critique of multicultural archaeology with regard to its main characteristics: (a) an open practice; (b) a widened circulation of archaeological discourses; (c) an expanded archaeological hermeneutics; and (d) an abandonment of its control over certain issues. Firstly, the *open practice* it champions has only allowed local actors to be members of research teams or, at most, to be trained in the discipline. Such openness has normally been framed under the heading "collaboration," but power relations are rarely at stake. Most archaeologists are content to offer cultural crumbs to communities (a local museum, a video, a booklet) while preserving the control of key issues (research designs, destination of findings, production and dissemination of narratives). Secondly, a *widened circulation of archaeological discourses* – which, along with collaboration form the backbone of so-called *public archaeology*, part and parcel of a more comprehensive entity that I have chosen to call *multicultural archaeology* – has had two results: it reproduces the archaeological canon more widely, and it furthers the reification and objectification of the past, such as in the case of local museums. Thirdly, *an expanded archaeological hermeneutics*, achieved by incorporating non-Western conceptions of the past, has doubtlessly enriched the explanatory potential of the discipline but has not engaged intercultural understandings. Such an interpretative expansion, many times resorting to alien cosmologies that produce curious argumentative hybrids (for instance, live objects, with agency, amidst rigid functional frames), deepens a logocentric arrogance but does not aim to forge nonhierarchical relationships. As a result, historical diversity (that is, differential interpretations of the past, including the conception of what the past is) is a mere instrument for a more vigorous archaeology. And fourthly, *relinquishing control* over certain issues means precisely that: *certain* issues and under *certain* circumstances. This characteristic has been more commonly achieved through the selective repatriation of biological and cultural remains. Although repatriation is an important resource whose potential for social movements cannot be doubted, it is worth asking why it has become so central and visible for archaeology. As if answering such a question, Chris Gosden (2001: 258) noted, "The agency of native peoples in the past in creating colonial forms has a strong echo in the present, where demands for archaeologists to create more locally sensitive views of history are now backed by legislation. This means that present research must be a collaborative project between archaeologists and local people and that this can only come about *once the injustices of the past have been redressed, which will often mean the return of skeletal or cultural material* considered to have been inappropriately obtained, stored, or

displayed" (italics added). Repatriation is a highly debated topic in contemporary archaeology, not so much because giving back sites, things, and remains undermines the fundamentalist view of most archaeologists, but because it has become the ideal place to expiate colonial guilt. Archaeologists are firmly convinced that repatriation will heal *the injustices of the past*. Their sacrifice is rather small: returning (or sharing) a few things while preserving their cognitive privileges, the logocentric gaze, a solid narrative network, and their mnemonic impact.

In short, multicultural archaeology participates in the incoherent multicultural historical discourse, whose *us* has never been so blurred. Besides, it intentionally postpones the solution of the tensions it has contributed to creating, such as the purported autonomy of historical representations. It does so by treating different conceptions of history as a mere isolated diversity – suitable for market exploitation, as in the heritage boom of the last three decades (Martín 2000) – with no consequences whatsoever for society at large.

Future Directions

Current times – postmodern, transmodern, postindustrial – show the new face of bourgeois society, in which identities formerly antagonistic and exclusive now coexist amidst the placid (yet, proven explosive) pacifism of multicultural relaxation. A wide variety of genders and ethnic groups are now a part of the current landscape of the world, whereas before there were only heterosexual and national citizens. Such an unlikely coexistence is the crowning achievement of contemporary capitalism – even more so than replacing commodities by desire in the imagination of people.

Until two decades ago, non-Western histories and their way of relating to materiality and heritage were unknown to the state and to academic disciplines. The symbolic field of history was rather stable and unified around the national self. What has made those histories visible now? Anti-colonialists struggles, of course, but also a more subtle reason: the multicultural search of diversity, the appropriation and neutralization of the different that, in other circumstances, could destabilize the already stabilized by dint of hegemony and hard ideological work. (In this new hegemonic act, fully agreed to by the different, the market thrives.) In this apparently open and horizontal scenario, a "reformed" archaeological establishment is happy to concede to former marginal actors what it cherishes most: epistemic disciplinary coherence. Its gains are numerous. It keeps practicing archaeology as it has been known (it changes nothing of its metaphysical and ontological fabric); it does it publicly (generously); it feels more democratic (by *sharing*); it gets closer to what used to be called *the savage*, appeasing his/her desires and convincing itself that disciplinary nearness translates into spatial, temporal, and cultural coalescence.

But dissonance and confrontation have not ceased to exist; they can be gauged by examining the relationship of archaeology with indigenous peoples, still its most ferocious opponent. To begin with, indigenous peoples and archaeologists think, feel, and expect different things of their mutual concurrence to the discipline. For the archaeologists, the issue is crystal clear: the indigenous acceptance of an open and democratic (multivocal) archaeology is the best hope for their future. Multicultural archaeologists are delighted to share their knowledge with the masses, dressed with ethnic garments. Their enlightened move pleases them because they disguise as altruism and political correctness their unwavering commitment to the Western cosmology. On the other hand, the positioning of indigenous peoples before archaeology is not consensual. Some value archaeological processes and results if they are part of their agendas, considering that material objects and features turned archaeological by academic or community-appropriated discourses can serve to strengthen historical reflection, central in social mobilization and life. Others confront archaeology and reject altogether any possible transaction with it. A perusal of the geographical distribution of those two antithetical positions will show that the former is mostly exercised by native groups

in industrialized democracies while the latter characterizes most indigenous peoples in the old Third World. Such a distribution is not odd; it closely responds to the differential effectiveness of multicultural policies, to how successful they have been in building strong hegemonies, accomplished more completely in those countries where nationalism was more aggressive and triumphant.

Those who confront archaeology and want to know nothing about it raise their voices from a discursive emergence, from a distance, even from an assumed exteriority. They expose and challenge what the West has done and drag its institutions, including academia, into the fight. Confrontation of the West is not new – it is centuries old – but it gained more coherence and strength since the 1950s, starting with the anti-colonial wars in Africa. It has increased its pace and intensity in the multicultural stage, where actors with opposed agendas concur. One of the actors concurring to the historical scene reconfigured by multicultural policies, of which repatriation is one of the most prominent, is archaeology. By its mere concurrence it pretends to forget that something is happening, that some people challenge its work. Archaeologists then sink in utter silence and keep on doing what they have always done, protected by a solid and conservative *esprit de corps* nurtured by esoteric meetings and publications, or they talk the multicultural language. They talk about dialogue and participation. They talk an empty language. But, should archaeologists be surprised that their work is now contested, many times from an aggressive radicalism that they see as unjustified violence against their hygienic operation? The perhaps good intentions of archaeologists, convinced that their sharing of archaeological secrets is the ultimate concession democracy can dispense, bounces back against a solid wall of rejection at the grass-roots level.

Multicultural archaeology opens the world of representation and gives access to other subjects who represent; however, it wants representation to be a mere nonpolitical epiphenomenon of the hierarchical relations it seeks to preserve. The multiple representations of the past that are incidentally released by the autonomy inherent in multicultural reforms (although historical autonomy is conspicuously absent from constitutional and legal mandates) are separated from the world of power. But, what happens if we consider representation as praxis, as suggested by Johannes Fabian (1990)? It would happen that the presence of the Other is felt, lived, and accepted outside of representation as a epiphenomenon – a representation that, at any rate, has been premised upon the absence of the Other. If a plural, horizontal, and open world (historical and otherwise) is to mean something beyond harmless relativistic pluralism, it can be found in the struggle for a radical Otherness. Rita Laura Segato (2007: 18) wrote in this regard,

> The fight of those social movements inspired by the project of a 'politics of identity' will not achieve the radical nature of the pluralism it intends to assert unless insurgent groups depart from a clear conscious of the depth of their "difference," that is, the proposal of an alternative world that guides their insurgency. I hereby understand such a difference not as with regards to substantive contents in terms of supposedly traditional, crystallized, still and impassive 'customs' but as difference on goal and perspective by a community or a people.

The radicalization of Otherness means the liberation of its force, restrained by the nets of cultural diversity. It is to think it as happening (to think relations, becoming, powers), something that can destabilize the stabilized. To destabilize the archaeological canon: that can be the minimal purpose of an emergent tradition that disbelieves, deviates, from multicultural archaeology. As Arturo Escobar (1996: 39) wrote about his book against development "the purpose of the analysis is contributing to liberate the discursive filed so the task of imagining alternatives can begin." Because we dwell in naturalized worlds – created by the cultural, social, political, and economic hegemony of a system, a class, a cosmology – trying to dwell in denaturalized worlds is not easy but surely not impossible. We first have to make them, or to unmake them, liberating the discursive field. That (un)making is a task of happening: something that is, becomes, lives.

Cross-References

- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Nationalism and Archaeology

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Multiple Microfossil Extraction in Environmental Archaeology

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Introduction

Microfossils can be defined as biogenic particles invisible to the naked eye and deposited in any type of soil or sediment context (Coil et al. 2003: 991). These may typically include ancient silica phytoliths, diatoms, faunal spherulites, starch granules, calcium oxalates, cellulose rings, chrysophytes, and micro-charcoal, but any other microscopic particle that is an organism itself or that is part of one may also be included in the definition. This type of research recognizes its origins in phytolith studies (since Pearsall 1978; Piperno 1988, and many others), but it gives other microfossils the same level of importance, partly based upon the development of low-chemical extraction procedures that allow more types be preserved. Laboratory procedures optimized for obtaining as many types of microfossils as possible in a single extraction process have been explored (Coil et al. 2003; Korstanje 2003, 2004), leading to what today may be called "multiple microfossil analysis" (Korstanje 2009). The idea of obtaining multiple microfossil assemblages from the same extraction process has the benefit of allowing a high number of samples to be run without the specific procedures required for each type of microfossil. This approach also circumvents some of the more complex taxonomic analysis and interpretations, which require qualified experts for each of kind of microfossil. However, to answer some research questions, this kind of sophistication is not necessary, and processing for individual types would require many extra working hours using processes already known to be time-consuming.

Conversely, for human perception skills, the possibility of having multiple microfossil types together on the same slide gives the researcher an instant idea about the microfossil assemblages and patterns that might differentiate, for instance, a corral structure from a terrace. Finally, the protocols used for multiple extractions do not always require sophisticated laboratory conditions, and their use has led to interesting results regarding the recovery of microfossil assemblages.

Since this methodology started to be used, many scholars in South America and other parts of the world have been improving it, especially for the study of agricultural soils, cattle management, environmental issues, food production and processing, and artifact use in archaeology.

Definition

Laboratory Procedures

The multiple microfossil extraction procedure consists essentially of a low-chemical protocol, which follows several of the ordinary steps for phytolith extraction, with minor modifications. An added benefit of developing low-chemical and low-tech extraction protocols is the lower hazards and costs associated with such approaches.

Samples are dried in the laboratory oven at low temperatures until weight is stabilized. Equal splits of soil samples are deflocculated by adding sodium hexametaphosphate overnight. Clays are separated and eliminated by gravity using only distilled H_2O in the liquid columns. Decantation times are determined according Stokes' Law, using a centrifuge. Samples are then sieved (50–55 mm mesh) for removal of sand (which is separated, but stored to scan for larger phytolith types), and then silts are separated. Then silts are floated using the centrifuge in a zinc iodide (ZnI_2) heavy liquid solution, prepared at a density of 2.3. There are references in the literature to the use of sodium polytungstate as the heavy liquid for floatation, but this chemical can have unfavorable results in some soil conditions, and since this was the case here, zinc iodide is a recyclable salt that was used instead and found to work well.

After establishing the possibility of using faunal spherulites as evidence for the deposition of camelid dung, experiments were conducted with modern dung samples from the species *Lama pacos* and *Lama glama*, in order to determine the susceptibility of these microfossils to destruction by some common extraction chemicals. To determine whether these procedures were equally valid for most of the microfossils being looked for, tests were run which included different combinations of solution densities, mounting media, time, and temperature conditions for drying (Korstanje 2003, 2004). These experiments clearly showed that when used as the heavy liquid for microfossil extraction, ZnI_2 does not damage or destroy any of the non-silica microfossils, e.g., starch, pollen, or spherulites.

Finally, we tested whether our protocol was adequate for producing visually clear slides for microfossil identification purposes or whether protocols with higher chemical impacts would allow more specimens to be identifiable. Again, projecting the numbers obtained to equivalent density measurements, the comparison shows that the protocol used is appropriate to allow even the most specific types of silica phytolith identification (Korstanje 2009).

Historical Background

Over the last 40 years, phytolith researchers have developed the tools to directly approach landscapes, open-air sites, and artifacts, in contexts where macro-remains are not preserved. In the 1980s, one of the field's principal specialized manuals indicated some of the roles of phytoliths for archaeobotanical studies (Piperno 1988: 168) as:

1. The origins and dispersals of domesticated plants and development of agricultural systems
2. The availability, economic usage, and noneconomic roles of wild plants

3. The nature of environments and environmental modification associated with past human occupation of sites
4. The relationship between technology, economy, and social organization.

Most archaeologists interested in economics and food production were excited enough with these types of possibilities, but there were still more topics which could also be added to the approach from this point of view, such as site formation processes and taphonomy. Following this logic, we started our research on agricultural systems in El Bolsón valley (Catamarca, Argentina), but once we realized the limitations of phytolith analysis for our area, much of the enthusiasm passed away and showed us that we needed extra tools to answer our questions. Since then, we have refocused the research on the possibilities of whole microfossil assemblages as a tool for studying ancient agricultural sites (Korstanje 2009).

The study of Andean pre-Hispanic agricultural technology in the high semiarid valleys of northwestern Argentina has required multiple archaeological dimensions to be integrated into the research:

(a) The range of Andean crop spheres may include both high-altitude taxa (tubers/pseudo-cereals) and middle-altitude taxa (maize, beans, chili pepper, squashes).
(b) The possible occurrence of a relationship between husbandry and agricultural practices (fodder, fertilizers, alternating the use of corrals as agricultural fields).
(c) The coexistence of irrigated and non-irrigated systems.

In northwestern Argentina, phytolith analysis was initially inspired by the low levels of macrobotanical recovery from open-air fields, found at high-altitude, semiarid sites occupied during the early phases of agriculture. Phytoliths were the main target microfossils at first, because they were the most durable type of plant microfossil and there was also an existing tradition in these studies in South America (Zucol et al. 2008). As processing of phytolith reference materials and archaeological sediment samples progressed, the limitations of a phytolith-centered approach became more apparent. For example, few of the indigenous tuber taxa and *cheno-am* taxa potentially cultivated during the early phases of these occupations produce diagnostic or abundant phytoliths. At that point, the only regional crops seemingly amenable to producing phytolith evidence were maize, beans, and cucurbits (Piperno 1988; Korstanje & Babot 2007), certainly important crops, but not sufficient for explaining ancient Andean agriculture.

Apart from the limitations relating to the set of plants growing in the area and the possibilities for their representation through phytolith production, the identification of plant taxa from the fields was crucial for demonstrating what people directly cultivated as opposed to what they consumed or exchanged, since most investigations of agricultural research questions are derived from samples from domestic contexts (Pearsall 1978, 1993; Rosen & Weiner 1994) or from lagoon systems (Kealhofer & Piperno 1994). This difference in the origin of the samples is important, since agricultural sites are open-air sites which do not have the stability of lagoons, as their soils have been plowed and worked at various times. Eventually, extraction and examination of additional microfossil types has not only enhanced the interpretive potential of the phytolith data in this research but has also produced data sets that have been more relevant to the given research questions. For instance, multiple microfossil types support interpretations related to site formation as well as to soil use and function.

To arrive to what today is called multiple analysis methodology, the spirit of earlier phytolith research that considered only two types of microremains together (e.g., Kealhofer & Piperno 1994; Campos et al. 2001) was followed to some extent. In those cases the major advantage was to enhance the potential of one microfossil over the other, for example, using pollen for Asteraceae (difficult to identify from phytoliths) and phytoliths for Poaceae (difficult to identify from pollen) or other possible combinations within siliceous algae and phytoliths. Although they were still the result of different laboratory procedures and research methodologies, studies like these were the first alert that showed that two microfossils

together explained more than one alone while strengthening the individual possibilities.

Good environmental and soil conditions for microfossil preservation encouraged further use of starch grains, within a wide variety of non-silica microfossils. From the first stages of the research, it was readily apparent that sediment samples contained at least some well-preserved starch. Starch granules in these areas have turned to be especially important, due to the variety and importance of tuber crops in the Andes, which have found to produce no clearly identifiable silica phytoliths or to produce none at all. Much effort was therefore put into exploring how different types of multiple microfossil protocols might affect starch recovery and damage (Korstanje 2003), to preserve the ability to make taxonomic identifications and reliable calculations.

After development of this laboratory goal perspective, the next step was to go straight into microfossil research with an extraction protocol and including the analysis of all possible microfossils (faunal, algae, and botanical) and their relationships with the characteristics of the soil matrix. This matrix is the natural and cultural context which can be used to make sense of microfossils. These assemblages explain some of the trends in a site's formation processes and, more importantly, are positive evidence of cultural practices in ancient soil use.

Key Issues

The Potential of the Microfossil Record in Relation to Agriculture and Domestic Activities

From the early years of this research and development of the methodology, it has been suitable to identify early husbandry practices from archaeological open-air fields and rockshelter contexts and to track the chronological and spatial distributions of economic activities for a better understanding of ancient soil use and the archaeological components that survive to the present. However, specifically for agricultural research problems, a methodology considered to be a step further than "multiple microfossil research" is being improved upon by combining and jointly interpreting other soil science information (Korstanje & Cuenya 2008, 2010). The chemical characteristics of a soil under agricultural use covary depending on whether the crop plants contribute or extract various substances or elements. The parameters used to understand each field and soil use condition are principally organic matter and phosphorus, since although there are other chemical elements that can be added or removed during soil use (such as nitrogen, calcium, iron, etc.), it is these two components that are the most stable for studying ancient soils (Porta Casanellas et al. 1994). This is because, even if soils are not closed systems, nor encapsulated and isolated in time, some stable features such as P are preserved in time and become indicators of the prehistoric uses of soils.

Regarding corrals and pens used for domesticated animals, the multiple microfossil approach is important in two ways. At a micro-regional level, distinguishing corrals from agricultural fields can be an important issue, and this is possible if there are some well-preserved paleofeces with which to make a comparison and where phytolith patterns from dung (frequencies and types) should be clearly detectable in some of the soil samples. In such cases, the additional microfossil indicators of spherulites are useful for interpretation of structures as corrals. In another example, microfossil assemblages extracted from a well-preserved camelid dung layer in a rockshelter site have suggested that domesticated camelids may have been fed with some of the same crops that humans consumed, since *Cucurbita* sp. and *Zea mays* phytoliths were found in the preserved dung. As was the case in Brochier et al. (1992), analyzing several types of microfossils together, especially examination of the relationship between phytoliths, diatoms, and faunal spherulites, could also improve interpretation of the depositional origins of these assemblages.

At a larger regional level, the composition of dung may help to understand the routes taken by nomadic pastoralists and caravans, because

there might be more diversity in grasses and therefore in phytolith assemblages from dung (Korstanje 2004).

The methodology has also been suitable for revealing the complex functionality of structures where site uses had previously been assumed from architectural features alone – including residential areas, agricultural fields, corrals, or a combination of these (Korstanje & Cuenya 2008, 2010). To some extent the methodology has also been applied to broader topics, such as understanding artifacts used for food processing and meal preparation (Babot 2009) or evidence for the consumption of hallucinogens in residues from pipes and other artifacts. In these last cases, the laboratory procedures were adapted due to the small amounts of sediment and residues recovered, with almost no laboratory processing necessary in the extraction, and following a similar low-chemical approach as with multiple microfossil extraction.

Microfossil Associations, Physical/Chemical Soil Characteristics, and Human Activities

After realizing the advantages and possibilities of incorporating multiple types of microfossils (Coil et al. 2003), it was necessary to evaluate their potential contributions as data for a specific research problem. Assuming that there would be poor organic preservation in open-air fields and sites, research strategies were designed to include the analysis of microfossil assemblages. In addition to its particular taxonomic identification, the relative frequency of each type of microfossil by locus and structure type is considered relevant for distinguishing practices and activities in agricultural landscapes and sites.

Phytoliths are good indicators for identifying grasses, but for a micro-region such as a valley, there may be not enough variability in grass species to characterize clear patterns. The cultivars recorded in the Andes are not equally as recognizable in the archaeological record. However, among them maize, as a grass in the Poaceae family that is major producer of silica phytoliths in its vegetative as well as reproductive structures, and there can be a high expectation of finding diagnostic maize phytoliths in areas where maize has been cultivated. Alternatively, since potatoes are in the family Solanaceae, which does not produce diagnostic phytoliths, there is no expectation of finding them, but instead is possible to anticipate diagnostic starch granules. In this way, taxonomic determinations are performed using broader microfossil assemblages, using silica phytoliths and starch granules for the determination of Andean crops (Korstanje & Babot 2007). From these examples, scholars interested in using this methodology should review the expectations appropriate for their own study area and plant record.

Calcium oxalate crystals from plants have very restricted diagnostic potential and, since they are quite fragile, are not recoverable in most contexts. However, since these always occur in modern samples of camelid feces, they can be used as supporting evidence for the presence of feces when faunal spherulites are also present. These have recently been shown to be very important working in specific small-scale contexts, such as pipe residues, where a narrow group of hallucinogenic or narcotic plants are expected to be present. Cellulose rings also have very limited diagnostic possibilities but they are very common in fibrous taxa such as plants from the Bromeliaceae family, so these can be recorded as present/absent as possible indicators of plants used for traditional crafts.

In South America, siliceous micro-algae, such as diatoms, are mainly used as an indicator of irrigation, based upon their frequency of appearance. Even though diatoms have taxonomic importance for specialists and may give information about their immediate environment in ancient times, in multiple microfossil analysis they are taken only as an auxiliary evidence for those cases where a genus from a very specific type of environment is present in the samples. This is because at a micro-regional level, diatom assemblages do not necessarily present enough complexity to reflect subtle environmental conditions or changes. Instead, diatoms are more useful for explaining regional diversity in

broad categories (dry/humid, salty/non-salty, marine/continental, etc.).

The Chrysophyceae are lesser-known (golden brown) algae, reported as nitrogen indicators (presence/absence). This level of identification is similar to that usually applied to microscopic charcoal, which can be used to identify the presence of fires, although it is not used for taxonomic identification of the wood's origin.

Finally, since Andean camelidae spherulites can be differentiated from those of European cattle (Canti 1998), but cannot be used to distinguish different camelid species, these are used on a presence/absence basis to indicate dung or to indicate the arrival of European cattle. Nevertheless, spherulites must be taken into account with care. Their presence indicates dung, regardless of the abundance (while not necessary manure), but their absence does not indicate absence of dung, as it has been seen that the same animal in different environmental situations may produce large quantities of spherulites or none at all (Korstanje 2004). We have the additional problem that camelid herds in the past, the same as today, were fed with the remains of harvests, and therefore, their manure may contain the same phytolith assemblages as the agricultural fields. Likewise, during fallow times, the same grasses that camelids graze may easily propagate in the agricultural fields as these seeds can be carried in dung. Consequently, the phytolith assemblages may be similar in both cases. At this point, phytolith assemblages may be useful only in comparing the frequencies of different phytolith types and cross-checking with other independent archaeological evidence, such as architectural features, or other characteristics of the locality if no architecture is present.

Once scholars have researched the regional circumstances, the local characteristics of each microfossil assemblage, and the preservational features based upon soils, sites, and climates, the next step is to put all these data in dialogue with the research questions. For instance: freshwater diatoms in a context with a high-frequency assemblage of middle-altitude crop phytoliths might be considered as an indicator of irrigation; while starch granules from pseudo-cereals and faunal spherulites in an context of low-frequency assemblage of middle-altitude crop phytoliths may indicate fertilization and/or non-irrigated agriculture, among other sets of possibilities.

Based on criteria similar to those described above, it has been possible to find a correspondence within every set of microfossil combinations and soil characteristics, matched with expectations from the perspective of ancient soil use. Some proposals can be presented for the research area in the following synthesized way: if there are α and β in x proportions, we can assume a κ use of land. For example: if we find high values of organic matter (O.M.) and an average abundance of silica phytoliths, we can infer that the soils have not been used for agriculture (Korstanje & Cuenya 2010). It is important to remember that these are comparative, not absolute, values, and so "high" does not mean any particular number but a value that is higher than that of the control sample. This interpretation should also be considered in relation to particular local, contextual, or environmental factors. To follow this reasoning it is important to remember that even if microfossils represent independent evidence in the epistemological sense, they should be explained in relation to contextual data, including archaeological architecture and artifact analysis. We cannot consider them without taking into account the fact that, as with any other archaeological ecofact (e.g., macroscopic plant or faunal remains), similar combinations may lead us to infer different circumstances or activities depending upon the context of recovery.

It is also important to stress that, as this methodology can be used to study other agricultural systems besides those of the Andes, scholars must create their own baselines for research, as some of the initial conditions may be different.

Taphonomy, Regional Aspects, and Limitations of the Methodology

One of their main strengths of phytoliths as a type of archaeological evidence is that, under normal conditions, they are deposited in the soil directly

in situ after the plant decays (Piperno 1988). However, it is important to consider the intromission of phytoliths from the soil fraction transported by wind in arid environments. In fact, this condition is quite important when studying open-air production sites, although is a matter of taphonomy and site formation process that can be evaluated just as in any other archaeological feature and situation. In some cases, for example, there may be an advantage because the sites are located on high mountain slopes, where neither the water nor the wind can carry in sediments from other locations. However, in this case, we have the opposite effect: high levels of aeolian and hydraulic erosion leads to a high loss of the soil's silt fraction. In this sense, it is likely that a high proportion of the original microfossil assemblage has been deposited in the lower areas and lagoons of the valley.

Also, it has been assumed that phytoliths are highly stable in soils and show little mobility, constrained by the same taphonomic processes as any other particle included in the silt fraction. In soil science, it is considered that at a textural level, there is stability of the particles in the silt fraction (Porta Casanellas et al. 1994), but this does not mean that there are no micro-movements of the individual particles. In a soil under agricultural use, periodic plowing incorporates an extra dynamism to soil weathering and leaching. However, this does not create any definitive limit for the study of ancient soils, since this type of bias can be avoided by making comparisons among samples from similar types of environments and soils. In other words, soils from similar environments are easier to compare (e.g., arid to arid), but unless one carries out a comprehensive taphonomic analysis for each situation, comparing soil uses between two very different environments is not recommended (e.g., arid to humid).

Regarding microfossil specimens and classes, taphonomic and site formation factors may also cause differential preservation of siliceous and non-siliceous microfossils. While the first group will prove to be harder and more durable in general, silica phytoliths and diatoms may also be broken by physical action, altered in general shape, or become thinner and more translucent due to chemical processes of the natural silica cycle. Spherulites are very fragile not only to physical conditions but more importantly to chemical conditions. Also, the morphology of many starch granules has been shown to be affected by surrounding conditions. The reasons could be related to either natural site formation or diagenetic processes, but also to processes of cultural manipulation, or to laboratory extraction procedures. Natural and ancient cultural damage is not considered as a problem but as a source of information. These situations only affect the possibility of making a precise diagnosis of origin, but as already noted, although taxonomic recognition may be desirable, it is not a critical issue for this kind of research, as it involves work at the level of microfossil assemblages in order to infer the general environmental or cultural patterns, rather than only to classify the taxonomic origin of individual specimens.

Future Directions

The developing trend towards multiple microfossil extraction and interpretation appears to represent a positive direction. Experiences with microfossil research in archaeology make it difficult to justify any programmatic statements regarding how microfossil research should be done. A better understanding of the nature and taphonomy of microfossils shows that in most cases a single microfossil type would not be sufficient to grasp the dimensions of the entire problem of ancient animal/agriculture relationships. Such a methodology may be perfectly applicable in other environments or parts of the world, but, of course, knowledge of all the factors and particularities related to the soils, plants, and people in these other areas must also be taken into account by the researchers.

A wider range of microfossil types can contribute to archaeological problem solving, and the further development of "reconnaissance" and

low-destruction laboratory protocols are directions that will help microfossil research in archaeology to further advance and also to become more accessible to more archaeologists. Having the ability to view several microfossil types on a single slide aids interpretation of individual microfossil types while opening up new research questions and archaeological contexts.

The results of 20 years of research suggest that a wide range of microfossil assemblages may most effectively address research questions regarding agricultural and production systems. For example, when discussing economic crises in the ancient past, those have involved shortages in staple foods or breakdowns in systems for their production, storage, or preservation (Pilaar Birch & Wallduck 2001). To test this, through collaborations by an interdisciplinary team of geologists, pedologists, palynologists, and archaeologists with various specializations, but particularly on microfossil research, it is possible to observe the existence of micro-changes at the environmental and ndscape level. Also, when these lines of microfossil-based evidence are combined with information from more traditional archaeological avenues such as architectural interpretation of site function, spatial distribution of material evidence for economic activities, and geomorphological signs of field irrigation, the possible interpretive advantages of jointly extracting and interpreting several types of microfossils become apparent. An important point is that these data come from the field record itself rather than from inferences based on macro-remains in residential areas or on ethnographic records and analogies. Therefore, combined studies of soil and microfossil assemblages have demonstrated new possibilities in archaeology for recognizing and explaining activities directly from the sites.

Microfossil research in archaeology continues to develop on a truly international scale and, even when performed following the footprint of each region and its academic traditions, is to some extent open to the exchange of results and ideas. New advances and wisdom can be found well beyond the mainstream of Anglophone literature. Established and emerging research will also expand the range of research questions addressed with microfossils, especially using experimental archaeology to identify patterns of microfossil distribution and to associate these with the activities that produced them.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Alpaca and Llama: Domestication
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Maize: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Potato: Origins and Development

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Multivocality and Archaeology

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Introduction

This entry will attempt to define multivocality and describe how it has been used in archaeology, as well as explore some of the strategic issues and challenges inherent when attempting to enact it in practice. Part of this discussion will situate multivocality alongside other issues which usually accompany it or are sometimes conflated with it, in both theoretical and practice-based (case study) writing.

Definition

A textbook definition of the word is "many voices" – a fairly simple idea which becomes more complex in practice. The idea of "voices" can refer to differences in opinion, ethnicity, class, education, gender, culture, and just about any other form of human identity and variation that exists. In addition, people who claim one voice or another as "dominant" in one particular context can just as easily claim another in a different context – in some situations a person might speak as "a woman," in others as "an archaeologist," in others as "a Native American," in others a "business person,". . .and so on. A key

point, when considering multivocality, is that each person has the potential to speak and identify with many different voices, even if they may choose one over another in any particular political or social situation.

Key Issues/Current Debates

In archaeology the idea of multivocality most often refers to the either the differences between professional archaeologists (so-called experts) and the diverse publics that archaeologists deal with or the differences between the different publics themselves. In addition, it refers to the ways that these different people and groups value, interpret, and find meaning in any given archaeological site, as well as the narratives they create about places and objects. These differences do not necessarily fall into predictable, seemingly simple categories of ethnicity, training, gender, and the like. In addition, although the realities of "standpoint" and individual perspective are critical when considering multivocality, how it plays out in practice varies from situation to situation, project to project, and person to person.

Multivocality is one of several ideas that are central to the practice of postprocessual archaeology, although it has found expression in other forms of social inquiry as well – postprocessual archaeology does not "own" multivocality, even within archaeology, even though much can be found about it in postprocessual writing. Some other postprocessual ideas, which are related to multivocality and often discussed at the same time, include reflexivity, interactivity, relevance, criticality, openness, transparency, and pluralism. In projects which aim for multivocality, both archaeologists and diverse publics (or, to use a currently popular term, stakeholders) attempt to find ways for different points of view about history, meaning, and physical remains to be expressed, *at the same time*. The ideal scenario is that they do this *together*, that power (to "own," control, interpret, assign meaning, etc.) is shared among different stakeholders, and that one group does not have power at the expense of another.

Multivocality can operate, and be analyzed, both locally and globally – although it is important to understand that these arenas constitute and influence each other and the categories "local" and "global" should not be seen as rigid, simple, or non-permeable. For the purposes of this broad discussion, on local levels multivocality can refer to the idea that different (often previously marginalized) groups should have a voice in interpreting archaeological findings or, similarly, that different groups should have a role in studying and publicly interpreting history in ways which may include archaeology but is not limited to it. There are many examples of this across the discipline, in which a variety of people with different skillsets and interests have collaborated in planning museum displays, interpretive centers, web sites, and the like. In many of these examples, different perspectives (about history, about "being," about a site, etc.) are presented alongside each other, with equal standing. In global contexts, multivocality is often seen as a way to democratize archaeology itself and, even more broadly, to have a role in global justice and human rights movements. In these contexts it is seen as one way to dismantle larger forces of colonialism and is often enacted in the work that archaeologists and others do with international organizations such as UNESCO and the World Archaeological Congress. Therefore, there are important differences of scale as different archaeologists engage with the idea of multivocality. Some focus mostly on local practice, and others situate their work in broader arenas, but all modes of practice have important roles in articulating contemporary archaeological discourse about multivocality.

Some important issues and challenges arise at all scales, however. One has to do with past practices and the complicity of archaeology (and, in some contexts, anthropology) in maintaining dominant hegemonies and imperialist power structures. Put simply, those who have been oppressed in the past, or who are still oppressed today, often see archaeology as part

of that oppression and thus suspect. Another has to do with relativism. Is any perspective – any truth, any voice – as legitimate as another? How does any person, or group, evaluate differing truth claims? Most archaeologists are willing to engage respectfully with those whose epistemological and ontological perspectives are widely different from their own, and some archaeological approaches emphasize, more than others, the value of multiple lines of evidence when interpreting material remains. However, few archaeologists are willing to reject empiricism altogether. Despite this, many have found ways to have positive, multivocal, and democratic conversations with those who have different perspectives. Most recently, archaeologists who are, themselves, members of indigenous groups have explored approaches which neither reject nor privilege Western mainstream approaches but instead create new, hybrid approaches which allow for the idea that different "truths" can be equally true, even if they are not commensurable in a scientific sense (Atalay 2008).

In all of these approaches to multivocality, the ideal scenario, as noted above, is usually defined as one where there is *mutual* empowerment between different groups. Obviously this ideal is difficult to achieve. In a global context, multivocality has mostly to do with eliminating the power imbalances caused by centuries of domination by "the West." In commercial archaeology (Cultural Resource Management, known as "CRM") contexts worldwide, power is almost always weighted towards professionals, policy makers, and private property advocates (such as property developers) who are in turn subject to (and supportive of) the power held by politicians. In other contexts, especially over the last couple of decades, some tribal/indigenous groups now have real power with respect to some issues (although it is important to note that some groups do not; see the sections of this volume that deal with indigenous legislation in different contexts). In addition, issues surrounding class, race, and gender, as well the legislative and cultural specifics that emerge from different legal, governmental, and geographical contexts, complicate and influence who has the "real" power in any given situation. Despite these realities, many archaeologists across the globe have attempted to create situations in which multiple voices and narratives can at least be expressed and where there is genuine, reciprocal dialogue between various people and roles. These sorts of projects are sometimes enacted as "collaborations," not as multivocality per se – in practice, the terms and ideas are often conflated.

Examples

Writing about multivocality within archaeology tends to fall into three different and often overlapping areas: theorizing multivocality, operationalizing multivocality, and, more recently, evaluating multivocality. Much of the writing by the various postprocessual archaeologists can be seen as theorizing multivocality (as well as theorizing as the other key ideas in postprocessualism). The literature on this is huge; one example would be Hodder and Hutson (2004) but see "Further Reading" for more. Several of the writers who are interested in theory have also attempted to operationalize multivocality – that is, to apply specific multivocal strategies to specific projects. Two of these would include Hodder (2000) and McDavid (2002).

Other writers have concentrated on operationalizing – that is, on practice. Most public archaeology writing over the past two decades would fall into this category (see "Further Reading"). Although some of the individual contributions to these volumes discuss the author's underlying theoretical assumptions, for the most part these case study volumes focus on practice. Practice-oriented multivocality work would also include that done by countless agency, academic, nonprofit, and museum archaeologists who now routinely acknowledge (and sometimes seek) multiple voices to engage with, even when they do not (or sometimes cannot) write about this aspect of their practice. Some of these operate

in the CRM field, where opening up their practices in an explicit way can be difficult, given the push-pull of client interests and politics. In these cases, multivocality often exists, but in a more hidden way that is seldom written about in public forums (but see (LaRoche 2011) for an important example where it is).

Although the focus in this article is on multivocality, it is important to be aware that many of the ideas mentioned above as, together, informing a postprocessual approach (reflexivity for example), usually occur together. That is, archaeologists who seek multivocal strategies usually hope that their work will be reflexive, open, relevant, collaborative, and so on. A useful idea to take on board, if one is attempting to develop strategies along these lines, is the "collaborative continuum" suggested by Chip Colwell-Chanthaphonh and T. J. Ferguson (Colwell-Chanthaphonh & Ferguson 2008). Here one accepts that even though all projects will fall at one point or another along a continuum of collaboration, multivocality, mutual empowerment, etc., it is still worthwhile to make an effort that works *towards* these things. Therefore, with respect to multivocality, one may find, close to one end of the spectrum, "top-down" outreach efforts aimed mainly at simply sharing archaeological information with different groups. Near the other, one would find projects which are truly multivocal and mutually empowered in all stages of the project – from planning to implementation to interpretation and public interpretation. Stephanie Moser and her colleagues, at the University of Southampton in England, have developed a useful methodological framework for this type of work (Moser et al. 2002). Although it was written specifically for a volume on "community archaeology," it is applicable to a broader discussion of multivocality as well. The introduction to the same volume, and the case studies, is also very useful.

In these sorts of attempts, sharing "real" power is seen as preferable. How this is defined, however, and the degree to which it can be achieved are extremely context-specific. Strategies that are useful for one project may be less or not at all useful for another – there is no one-size-fits-all method for "what works." Even so, it is fair to say that it is now relatively commonplace for archaeologists to make an attempt, at least, to open their work to other voices and perspectives. Again, the idea of a continuum is useful here.

Even when archaeologists attempt to create multivocal projects at the mutually empowered end of the spectrum, the result is not always positive. As noted above, each party has to evaluate the truth claims of other parties and to have a basic acceptance that multiple, even contradictory, truths can exist in any given project or any social or political contexts (even if one does not accept the hybrid approaches noted above). One only has to look at the fraught and bloodstained histories that exist in many parts of the world to know that this is often difficult (Meskell 1998). In order to create successful multivocal projects, archaeologists have experimented with different approaches – philosophical pragmatism (Preucel & Bauer 2001; McDavid 2002; Saitta 2007), participatory action approaches (Pyburn 2009), applied and "activist" anthropology (Shackel & Chambers 2004; Stottman 2010), community archaeology (Marshall 2002), and others. It is not unusual for writers who are allies with respect to the "big" goals of postprocessual practice (to be multivocal, open, reflexive, collaborative, etc.) to have different methodological, philosophical, or theoretical approaches. It is also very common for the same people to contribute to different edited volumes subsumed under different overall approaches.

Future Directions

The most recent writing about multivocality attempts to evaluate it, not to simply describe or celebrate it (both of which are common to much of the earlier writing – critical analysis of multivocality has been rare). Evaluative, critical pieces examine when multivocality works, when

it does not, and why this is the case either way – and avoids the taken for granted that multivocality is always a good thing. One of these new publications, targeted specifically towards the issue of multivocality, is Habu et al. (2008). In this volume various authors (from Europe, North American, Latin America, and Asia) look critically at the roots of multivocality (as noted above, the intellectual traditions of "the West") and question whether it is always useful or even appropriate. As Hodder put it in his contribution to this book:

> …achieving the participation of marginalized groups involves a lot more than providing a stage on which they can speak. It involves changing practices and contexts so that disadvantaged groups have the opportunity to be heard and responded to. It involves trying to move away from the methods and principles that are attuned to the Western voice. It involves ethics and rights (Hodder 2008: 196).

Archaeology as a multivocal exercise is still relatively new. Typically archaeological information has been, and still is, both created and presented in authoritative ways by archaeologists who want to promote archaeological agendas (such as research or stewardship). Therefore, those who attempt to enact multivocal archaeology projects work against a long history of archaeological discourse which has not encouraged debate and critique – much less the mutual sharing of power. Multivocal archaeologies are, therefore, often difficult, and attempts to create them are often unsuccessful.

Even so, as more and more models of this sort exist, it is likely that more and more *will* be seen as successful by both archaeologists and their publics – they will move beyond dialogue (Hodder 2008) to create new and different ways of creating and implementing new archaeological projects, new ways of interpreting archaeological sites, and new ways of expressing "truth." In short, consideration of the issues involved in multivocality, either as a theoretical idea or as a framework for practice, is a necessary part of conducting an ethical archaeology in the twenty-first century.

Cross-References

- ▶ Community Archaeology
- ▶ Heritage and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Post-Processual Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Reflexivity in Archaeology

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Basic Biographical Information

Derek John Mulvaney (Fig. 1) is an Australian archaeologist and is often referred to as the "Father of Australian Archaeology". Mulvaney was born in 1925 in Yarram, Victoria, Australia, and spent most of his youth and teenage years in the regional Victorian towns of Yarram, Albert and Rainbow. He attended the Rainbow Higher Elementary School until he finished the tenth grade, when he moved closer to Melbourne with his family so that he could attend high school in Frankston. Once Mulvaney completed the 11th grade at Frankston High School, he registered as a student-teacher and worked at the Frankston Primary School for a brief period during 1942–1943.

Growing tired of teaching, Mulvaney joined the Air Training Corps in the hope of being a navigator for the Royal Australian Air Force (RAAF). He was enlisted in Somers Initial Training School in 1943, soon after his 18th birthday, where he trained as an aircraftsman second class. During further training in Canada, Mulvaney was promoted to the rank of Pilot Officer of the RAAF and was posted in England for 2 years during the end of the Second World War. Mulvaney was 20 by the time he returned to Australia and he says that the experience was essential to his adulthood as he "departed for Canada as a country lad and returned a serious adult. [His] experience fostered maturity and determination, infused with a romanticism for the past" (2011: 38).

Upon his return from deployment during the Second World War, Mulvaney enrolled in the History department, the University of Melbourne, during 1946–1948. Mulvaney studied British,

Mulvaney, John, Fig. 1 Derek John Mulvaney

Australian, and ancient European history as an undergraduate and undertook a master's degree, for which he received a first, for his study on ancient Britain. It was during his university years and his tenure as a university tutor (1949–1951) that Mulvaney was first introduced to archaeological field work and excavation. After receiving the result of his master's research, he applied for a traveling research scholarship in the Australian National University (ANU), which was only usually awarded to advanced researchers. ANU granted Mulvaney a scholarship on the condition that he enrolled for an undergraduate degree at the university he chooses. The University of Cambridge was the most attractive to Mulvaney because the subjects offered coincided with his interests and the demand for an Australian archaeologist: the Paleolithic. Between 1951 and 1953, Mulvaney studied archaeology at Cambridge and took part in and conducted several excavations. Following his graduation from Cambridge, he was offered a post in Auckland, New Zealand, to set up a university archaeology department; however, he declined as he had already received a position in his old department at the University of Melbourne. Jack Golson, a colleague of Mulvaney, took up the post in Auckland instead.

Mulvaney married Jean Campbell during February 1954 and they were blessed with six children in the following decades. During this decade, Mulvaney continued to support his family by working at the university where he was inspired by the research into ancient Australia by museum curators, Fred McCarthy, Norman Tindale, and Edmund Gill. Mulvaney was determined that Aboriginal occupation of Australia was much older than European Australians believed; however, he had trouble convincing many people. Mulvaney decided that excavation and analysis was the only way to prove the claims of McCarthy, Tindale, and Gill, and he put this into practice at an excavation of Kenniff Cave in Queensland. The radiocarbon dating of charcoal recovered from Kenniff Cave returned dates of 16,000 BP, which Mulvaney claims to be "one of the most stimulating episodes of [his] career" (2011: 113).

Made clear by the persistent thievery and "collecting" that occurred on sites that he excavated, such as Fromm's Landing in South Australia, Mulvaney strongly believed that Australia's heritage legislation needed to be updated and enforced. Mulvaney became an advocate for the legislative protection of Aboriginal cultural heritage throughout his career. After witnessing the destruction of an Aboriginal rock-art site in Tasmania, 1962, Mulvaney successfully campaigned with Rhys Jones for the Tasmanian government to establish heritage legislation, which was put in place in 1975. Departing the University of Melbourne in 1964, Mulvaney took up a new post with the Prehistory department at the ANU and was elected as a council member of the Australian Institute of Aboriginal Studies (AIAS). This new post allowed him to research Australian archaeology without the time and facility restrictions he experienced at the University of Melbourne. Mulvaney became an executive member and chair of the Prehistory Advisory Committee in 1965 and edited a volume in Australian archaeology on behalf of the AIAS in 1968. Mulvaney published his first book on Australian archaeology with Thames and Hudson in 1969, titled *The Prehistory of Australia*, and Penguin Books

published a revised second edition in 1975. This book was the first to focus on Aboriginal history before European settlement. As part of the AIAS council, Mulvaney was involved in the 1975 Australian and New Zealand Association for the Advancement of Science conference in Canberra where the Australian Archaeological Association was formed.

Teaching commitments was part of a multitude of burdens that Mulvaney faced in the late 1970s and early 1980s. His commitments to several councils, such as the Heritage Commission, the Interim Council of the National Museum of Australia, the AIAS, and the Joint Academics Committee on the Protection of Prehistoric Places, left little time for anything else, except for his family, for which he always found the time (Mulvaney 2011: 225). In 1977, Mulvaney was the chief Australian delegate to the UNESCO meeting in Paris, which determined the criteria for World Heritage listing. Mulvaney says that he "believe[s] that the criteria that we drew up... were sound ones, providing equal status for natural and cultural values," however, he has become disillusioned with the current status of World Heritage listing and says that it is "out of hand" (2011: 219-220).

Before his retirement, Mulvaney was inducted as a Companion of the Order of St Michael and St George in 1982. Mulvaney retired from the ANU at the end of 1985, and in the early stages of his retirement, he wrote a book that investigated Aboriginal encounters with non-European people, entitled *Encounters in Place*, which was published in 1989. In 1990, the ANU inaugurated the annual Mulvaney Lecture, which honors Mulvaney's career and contribution to Australian archaeology. Notable events in Mulvaney's retirement include becoming the chair of the new Australian Capital Territory Heritage Commission during 1986–1989, being elected as secretary of the Australian Academy of the Humanities between 1989 and 1996, and being inducted as an Officer of the Order of Australia in 1991. During the late 1990s and throughout the 2000s, Mulvaney continued to write about his career, Australian archaeology and early Australians; the third edition of his book *The Prehistory of Australia* was revised with coauthor Johann Kamminga in 1999 and released as *Prehistory of Australia*. Mulvaney illustrates that his career has contributed to "a story that places Aboriginal societies at both the beginning and centre of Australian history" and that "[his] trowel and [his] pen have contributed to overcoming that silence of ignorance and prejudice" (2011: 332).

Major Accomplishments

The major accomplishments of John Mulvaney include being the first professor of archaeology with direct involvement in Australian prehistory; Establishing Aboriginal occupation of Australia during the Pleistocene; Being a mentor and/or teacher of most prominent Australian archaeologists; Helping secure the Willandra Lakes Region and Kakadu on the World Heritage List; Being a pioneer in engaging with Indigenous Australians about their cultural heritage; Successfully campaigning for the legislative protection of Aboriginal and Australian cultural heritage; Long-term commitment to Australian archaeology by serving on and chairing several of Australia's councils for heritage.

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- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Golson, Jack

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Mundo Maya

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Introduction

Mundo Maya ("Maya World"), formerly referred to as La Ruta Maya ("The Maya Route"), is a joint effort among the Ministries of Tourism from Belize, El Salvador, Guatemala, Honduras, and Mexico to promote tourism throughout southern Mexico and upper Central America. Geographically, the Mundo Maya covers approximately 500,000 km^2, encompassing all of Belize and Guatemala, the western half of El Salvador, northern and western Honduras, and the Mexican states of Chiapas, Tabasco, Campeche, Yucatan, and Quintana Roo.

The program (Organización Mundo Maya) works with UNESCO (United Nations Educational, Scientific, and Cultural Organization) and other agencies to identify a wide range of cultural and natural resources considered appropriate for international tourism in this region, such as Pre-Columbian Maya ruins, Spanish Colonial towns, contemporary Maya villages, beaches, waterfalls, volcanoes, and tropical forests. By coordinating contiguous tourist destinations across national boundaries – all linked directly or indirectly to ancient and modern Maya peoples – the program seeks to facilitate the growth and development of the tourism industry, including ethnic tourism, adventure tourism, ecotourism, luxury tours, language learning, and other touristic experiences. The greater goal of the program is to strengthen local economies, assist in the planning and training of local economic development products and projects, preserve cultural patrimony and ecological resources, and advance the welfare of indigenous Maya communities.

Key Issues/Current Debates/Future Directions/Examples

A "Typical" Tour of the Mundo Maya

A typical trip through the Mundo Maya (e.g., Brosnahan 1991; Knopf Guides 1995) for a foreign tourist might begin in Cancún, Mexico, one of the largest resort areas developed along the Caribbean coast (Fig. 1). From there, one can travel inland to the World Heritage site of Chichén-Itzá and then back to Yucatan's coast to Tulum, touted as one of the most picturesque Maya ruins, set atop a steep cliff overlooking white-sand beaches and turquoise waters. From Tulum, one can head south to Belize, crossing the border at Chetumal and heading on to Orange Walk to visit the Lamanai ruins, accessible only by a jungle river cruise. Heading further south toward Belize City, one can book a tour of Altun Ha, Belize's largest Maya site. A side trip can be taken to visit the beaches of Ambergris Caye and Caye Caulker. From Belize City, one can head west to San Ignacio (a popular respite for tourists and archaeologists alike), to visit the ancient Maya city of Xunantunich and other nearby sites.

A short journey across the Guatemalan border leads to the twin cities of Flores and Santa Elena deep in the Petén jungle, which provide departure points to another large World Heritage site, Tikal. From Tikal, one can head south to Guatemala City to explore the colonial town of Antigua, the Maya markets of Chichicastenango, and the volcano-studded Lake Atitlán, surrounded by contemporary Maya villages. From Guatemala City, one can head east across the border to Honduras to visit a third World Heritage site, the ruins of Copán. Heading north from Copán to Honduras' coast, a ferry shuttles travelers to Roatán Island, which boasts the world's second longest coral reef – a mecca for divers and snorkelers. A short trip by plane or ship from Roatán back to Cancún completes the trip.

A Brief History of la Ruta Maya/el Mundo Maya

The idea of interlinking touristic experiences across the Maya region was originally introduced

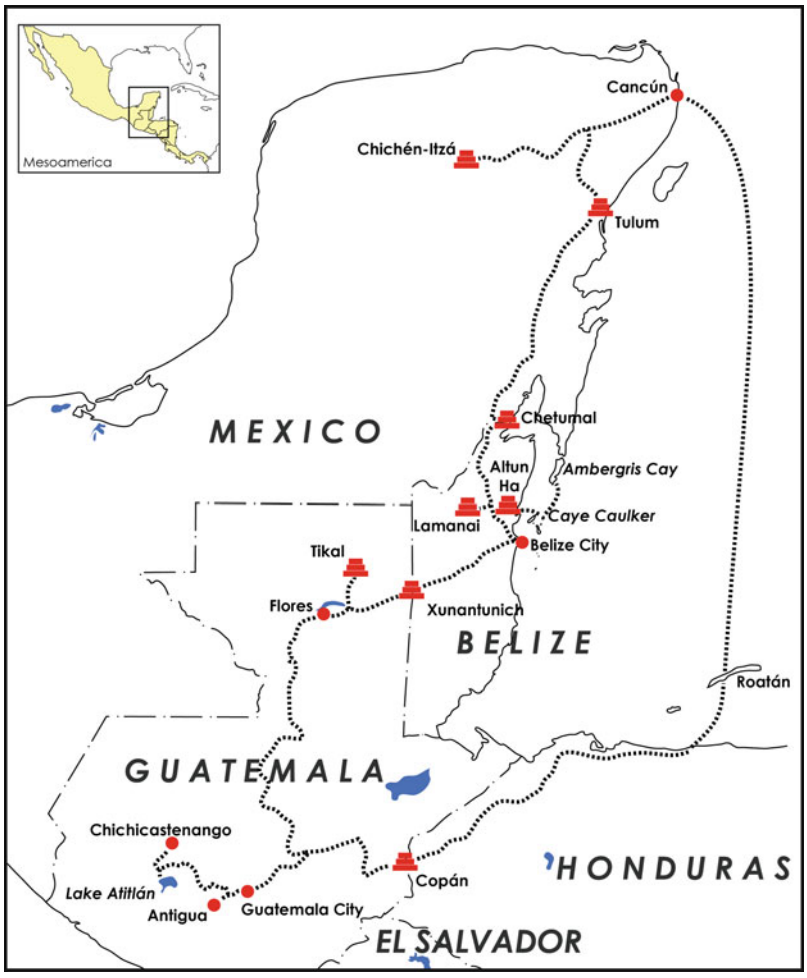

Mundo Maya, Fig. 1 Map of the Mundo Maya, showing a "typical" tourist route

in the 1960s, with both the Organization of American States (OAS) and the Inter-American Development Bank (IDB) expressing interest in its promotion (Burtner 2004). However, the program did not advance until the "return to democracy" in Guatemala, with the inauguration of a civilian president (Vinicio Cerezo) in 1986. After tourism boycotts of the region by solidarity organizations and the international media because of political unrest and humans rights abuses subsided, the tourism circuit was officially launched in 1989 as "La Ruta Maya" by Wilbur Garrett (1989), a former editor of National Geographic magazine who formed La Ruta Maya Conservation Foundation and, together with Partners for Livable Places, presented the proposal to regional governments. Mexican President Carlos Salinas de Gotari convened the first meeting of the organization and, on behalf of the tourism ministry of Mexico, assumed initial leadership of the group. Amid growing economic uncertainty, tourism was viewed as a new strategy for regional economic development that moved away from agricultural exports and allowed areas without viable exports to be exploited.

The Mundo Maya concept, introduced by Guatemalan anthropologist Alberto Rivera, developed separately and with a distinct focus on "alternative" or sustainable tourism and community participation – both lacking within the originally proposed framework of La Ruta Maya.

Driven by the potential for marketing and diversification of the tourism product, La Ruta Maya was transformed into Mundo Maya in 1992 (Organización Mundo Maya (OMM) 1992), with the intention of showcasing the living Maya alongside the archaeological sites of their ancestors. This move was pursued as part of an effort to attract a new type of tourist, coined the "cultural tourist," who tended to stay longer and spend more money than the average beach-going tourist (Machuca 1999). The ecological conservation goals that relied on "low-impact" tourism alternatives remained unchanged. In this plan, the Maya were portrayed as partners. However, the national ecotourism councils established to implement the goals of the program proved to be largely ineffective, encumbered by the inefficiency of government bureaucracies, and the result was an increased role for the private sector.

Between 1999 and 2003, the Mundo Maya Sustainable Development Tourism Program was established with an initial investment of US$150 million from the Inter-American Development Bank (IDB). As part of this initiative, a Technical Secretariat was created to identify priority investments, seek private sector funding for individual projects, and advance consultation and training programs to build capacity in local communities. Although regional and international funding bodies have continuously provided large sums of money through grants and loans, until recently these had been limited mainly to actions such as feasibility studies and broader organizational support. Since 2001, the IDB has been the main financier of the OMM, providing amounts that range from US$70,000 to US$40.8 million for individual projects (Inter-American Development Bank (IDB) 2003).

Long-Term Impacts to Descendant Communities

The success of the Mundo Maya program is unclear. While economic growth, improved infrastructure, and the conservation of cultural and natural resources have all increased dramatically in recent years, two long-term changes to local populations have accompanied these developments. First, in packaging and branding the Mundo Maya for advertising, the incredible cultural and linguistic diversity of indigenous peoples in the region has become homogenized into a single idealized ethnic group, "the Maya" (van den Berghe 1994; Castañeda 1996), with which many local individuals do not identify (Montejo 2002; Magnoni et al. 2007). Moreover, these people are often considered by many to be the direct descendants of the ancient Maya civilization from prehispanic times, an assumption that ignores 1,000 years of conquest, colonialization, and incorporation into emerging nation states (Farriss 1992; Restall 2008). Second, in promoting the Mundo Maya for touristic consumption, descendant communities and cultural heritage have become appropriated and highly commoditized in recent years (Medina 2003; Ardren 2004). The consequences of these ongoing processes can be devastating to local communities that increasingly experience loss of identity and cultural traditions through imposed and invented traditions, loss of participation in determining their future, loss of political and economic independence, and other forms of structural violence (Breglia 2006; Little 2008).

Future Challenges

In the near and longer term, the Mundo Maya initiative will have to face a number of challenges if it is to be sustainable. Economic development has been uneven across the region, with some communities receiving greater emphasis than others (Brown 1999). This legacy has contributed toward the underdevelopment of non-tourist zones and has stimulated short-distance movements of increasingly larger numbers of people (Juárez 2002). In addition, the emphasis on tourism as a primary source of revenue for many communities has increased dependence on external funding agencies and multinational corporations, creating a system that is not resilient to future changes in global markets (Walker 2005). The recent violence in Mexico and the 2009 coup d'état in Honduras, for example, have had massive impacts on the tourism industry in those countries, sometimes compromising economies of entire towns (Euraque 2010).

Perhaps the greatest challenge for the Mundo Maya is developing the capacity to adapt to the consequences of climate change over the next century, which will create social, economic, and political vulnerabilities, especially for growing urban populations. Major infrastructural changes may need to be implemented in coastal regions to counteract the damage caused by greater storm surge due to sea level rise. For inland regions, costs needed to mitigate the adverse impacts of increased storm frequency and intensity may escalate. This kind of long-term planning appears to be a concern for the Mundo Maya. Using the Maya Calendar end date of December 21, 2012 to promote tourism, Mexican President Felipe Calderón has announced the Mundo Maya 2012 campaign, designed to enhance infrastructure for increased tourism in southern Mexico (Secretaria de Turismo México (SECTUR) 2011). Yet, if recent trends are any indication, rising oil prices may continue to slow global tourism to the Mundo Maya, as tourists decide to invest in shorter distance trips or vacation less often—a fate that even the end of the Maya Calendar cannot halt.

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Murray, Tim

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Basic Biographical Information

Tim Murray (Fig. 1) is an archaeologist, professor, and executive Dean based in Melbourne, Australia. His interest in the material culture of the past began as a child collecting stone tools on his family property in rural New South Wales. He was educated in Sydney and embarked on an arts degree at the University of Sydney in the late 1970s, combining philosophy, anthropology, and history. He graduated with a double honors degree in history and anthropology, exploring the life and career of Gordon Childe (anthropology) and nineteenth-century race theory (history). After fellowships in Cambridge and the University of Arizona, he returned to Sydney to complete a doctoral dissertation, entitled *Remembrances of Things Present: Appeals to Authority in the History and Philosophy of Archaeology*.

Tim Murray joined Professor Jim Allen in his newly formed archaeology department at La Trobe University in Melbourne, Victoria, in 1986 and was appointed to the Chair on Allen's retirement in 1995. He became Head of the School of Historical and European Studies in 2001 and Dean of the Humanities and Social Sciences in 2010. At this time he was appointed Charles La Trobe Professor in recognition of his distinguished service to the University in research.

Murray, Tim, Fig. 1 Tim Murray

Throughout his career, Tim Murray has pursued ambitious academic research while managing senior administrative duties. He remained active and engaged in the international research community as a research fellow and has held visiting professorships in France, the United Kingdom, and the People's Republic of China. He was made a Fellow of the Society of Antiquaries of London and Australian Academy of the Humanities in 2003.

Major Accomplishments

Tim Murray is best known as a theoretical archaeologist. In the 1980s and 1990s, he was one of a small group of archaeologists instrumental in focusing on the importance of temporality in the

archaeological record that has come to be known as time perspectivism (Murray 1999a). He has been a vocal critic of theoretical approaches that reduce archaeology to a kind of "palaeo-ethnography" by adopting models from anthropology with little consideration about how to adapt these to make them more appropriate to prehistoric archaeological contexts (Lucas 2007: 156). Throughout his career, these concerns have underpinned a broad engagement with all levels of archaeological enquiry, its history, and politics.

His early research on the prehistory of Australia and the Pacific was in the field of settlement patterns and frontier modelling. He has conducted pioneering research into contact societies and the history of the Van Diemen's Land Company. Following a dispute with traditional owners in Tasmania in the early 1990s, his contentious pursuit of access to archaeological data drew global attention to the negotiation of cultural rights of archaeological recourses. Many years after the resolution of the debate (Lucas 2007: 156), Murray continues to comment on the maturing relationship between archaeologists and traditional owners of Australia's prehistoric archaeological information (Murray 2011).

In recent years Murray's exploration of the archaeology of the modern city has fostered rich, data-driven contributions to the histories of working-class Melbourne and Sydney, which have significant global implications. This work is complemented by Murray's multi-scalar approach to the analysis of the city (known affectionately as the telephone dial, Murray & Mayne 2001: 104), where the dynamic intersection of historical and archaeological records of "vanished communities" and urban landscapes frames has underwritten new histories of the modern city. These research projects into the recent past have also spawned his current interest in transnational archaeologies, which are the subject of the series of Smuts lectures delivered in Cambridge in 2006.

A deep interest for the theoretical development, industry, and social orders of the nineteenth century underlies much of Murray's research into the historiography of the discipline of archaeology. He has edited five volumes of the *Encyclopedia of Archaeology* (Murray 1999b: 2001) and written a single-volume history of archaeology *Milestones in Archaeology* (2007). His research on pioneers in Australian archaeology remains a seminal and much cited work (Murray & White 1981).

Despite his reputation as theoretical archaeologist, throughout his career Murray has committed to a range of initiatives to improve practices in archaeology, heritage, education, and research across the humanities. Handbooks on archaeological practice (Birmingham & Murray 1987), the establishment of the first indigenous training program for heritage managers, and a digital repository for historical archaeological databases in 2011 have supported the integration of archaeological outcomes for public consumption in Australian museums and school curricula.

Tim Murray built the La Trobe Archaeology Program into a global archaeology department and has fostered the research of many students and colleagues. He has successfully engaged in productive collaborations with historians, technical specialists and heritage experts, and archaeologists working in the disciplines many subfields.

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Museo Nacional de Antropología, México

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Brief Definition of the Topic

The Museo Nacional de Antropología (The National Museum of Anthropology), hereafter MNA, is the oldest, largest, and most famous anthropological museum in Latin America. Located in Chapultepec Park in Mexico City, the MNA focuses on displaying the cultural diversity and development of native societies of Mesoamerica through an exhibition that begins by explaining the meaning and practice of Anthropology. It then addresses the origins of the American indigenous peoples (including the theories of Paleo-Indian migration and settlement in the Americas) and goes on to explain in a rather "monographic" fashion, the characteristics and achievements of the principal pre-Columbian ancient civilizations from the pre-Classic, Classic, and post-Classic periods (i.e., Olmec, Teotihuacan, Toltec, Mexica-Aztec, Maya, Mixtec-Zapotec, and Occident and Northern cultures). The exhibition culminates in an ethnographic exhibition on various indigenous communities currently living in Mexico. This perspective, broad in both time and space, represents the core spirit of the Latin American School of Anthropology to study and disseminate American indigenous cultures, which is also articulated in the museological and architectural rationale of the MNA, as well as in its research, dissemination, and educational activities.

History

The genesis of the MNA's archaeological collection can be traced back to the scientific cabinets of collections accumulated in New Spain and, in particular, to the late-eighteenth-century collection preserved at the Real y Pontificia Universidad de México (1551–1865), an early academic and higher-educational institution, where – inspired by a Creole nationalistic ideology – the first Museo Nacional Mexicano (Mexican National Museum, MNM) was officially founded by the government of the newly independent Mexican Republic in 1825 (Morales Moreno 1994: 164, 172). Although Mexican archaeology was a subject of burgeoning interest for both local and foreign scholars during the first half of the nineteenth century, local political instability surely limited the academic and curatorial development of the MNM until 1865, when it was relocated to the former Casa de Moneda, a northern annex of the Palacio Nacional (Solis 2001: 34).

The following three decades saw the consolidation of the MNM with the opening of a series of themed galleries, like the famous Galeria de Monolitos, displaying documents, natural history specimens, antiquities, and historical artifacts; the establishment of a library devoted to both public instruction and scholarly research; the publication of scholarly journals (*Anales del Museo* y *Revista Científica Mexicana)*; and the launching of a series of courses and academic events on national history, archaeology,

ethnology, and indigenous languages that can be considered the disciplinary origins of anthropology in Latin America (Morales-Moreno 1994: 238–304).

With the departure of the natural history collections to the Museo del Chopo in 1906, the MNM reformulated its *reason d'être* according to its newly acquired name: Museo Nacional de Arqueología, Historia y Etnografía (the National Museum of Archaeology, History and Ethnography, hereafter MNAHE), a process that initiated a flourishing era with growing responsibilities. Apart from the accession of a large number of antique sculptures and artifacts from all over the country acquired from private collections and field expeditions organized, authorized, or supported by the museum itself, aid from the federal government enabled the renovation of the exhibition galleries that became not only the depositary of national treasures but also the showcases for the visualization of an imaginary golden pre-Columbian time that provided ideological foundations for the Porfiriato regime from a scholarly perspective (Morales-Moreno 1994: 305–83).

By 1910, the narrative of this political agenda that reconciled patriotic visions of ancient and modern Mexico was articulated by the museum hosting the celebrations of the 100th anniversary of the Independence of Mexico. Then the MNAHE also evolved into a complex multifaceted institution that consisted of departments of archaeology, anthropology, history, ethnography, anthropometry, industrial art, conservation of archaeological and historical monuments, publications, and education. Furthermore, within the framework of the XVI International Congress of Americanists, American Anthropology experienced a key event in its professional evolution with the founding of the International School of Archaeology and Ethnology within the MNAHE, the predecessor of the ENAH-INAH (Rutsch 2007).

Although, the Mexican Revolution brought about the interruption of the museum's activities for period of time, post-revolutionary governments later ensured that the MNAHE maintained its long-standing position as the "national institute *par excellence*, that unlike any other, reflected the very patriotic essence" of Mexico (Castillo Ledón 1924, in Morales Moreno 1994). Further acknowledgment of the museum's educational role was confirmed by its incorporation into the Secretaría de Educación Pública (the Public Education Ministry) in 1921. During the 1930s, ethnographic research by the MNAHE was central to the articulation of an indigenous policy articulated by the regime of President Cardenas as well as to the development of *avant-garde* anthropological studies, congresses, and exhibitions (Solis 2001: 35).

After the establishment of Instituto Nacional de Antropología e Historia (the National Institute of Anthropology and History) in 1939 and the foundation of the Museo Nacional de Historia (the National Museum of History) in 1944, the MNAHE underwent its last organizational transformation becoming the Museo Nacional de Antropología (MNA), a museological, research, and scholarly institution with a solid and growing international reputation.

In 1964, with the full support of President López Mateos, a new building for the MNA was inaugurated at Chapultepec Park. Its architectural design, by Pedro Ramírez Vázquez (2008), represented a revolutionary concept, with a total area of 70,000 m^2 with 30,000 m^2 for galleries and open spaces for exhibition purposes and 15,000 m^2 for collection deposits, curatorial, research, and service sectors.

Today

The MNA, a major touristic and educational landmark in Mexico, is an icon of Mexican museography worldwide. Its galleries are organized around an open central patio, decorated with the famous "parasol" – a monumental roofed pillar with engraved decoration inspired by pre-Colombian figures – and an internal garden water mirror, which provides independent access to exhibitions and thus free visitor movement and permits the integration of the museum with Chapultepec Park. Specifically designed decorative architectural elements and a series of

commissioned works of art by famous modern Mexican artists (Rufino Tamayo, Carlos Mérica, Rina Lazo, Mathias Goeritz) complement the exhibition setting, which includes replicas of pre-Columbian buildings and life-like reconstructions of some aspects of indigenous cultures (Ramírez Vazquez 2008).

The MNA houses the National Anthropological Library, which holds the most important and largest collection of pre-Columbian codices in the world. It additionally, has three large auditoriums for academic events; galleries for temporary exhibitions, recently presenting displays on ancient world civilizations; open spaces, used for academic and more recently political ceremonies; administrative, research, and laboratory areas; offices for educational services and guided tours; parking lots; shops; a restaurant; and a cloakroom.

The order of the archaeological galleries, defined by a cultural-historical theoretical approach, as well as the prominent position of the Aztec culture in the arrangement, has been subject to several critiques, including one by Octavio Paz (1970: 279–81), who exposed the political agenda implicit in the representation of Mesoamerican cultures, stating that the MNA is a architecturally crafted myth that represented the currency of an ideological nationalistic model based on the political domination of the central Mexican political aristocracy and thus questioned the idea that Mexicans are still articulating its patriotic archetype on the basis of admiring pre-Columbian ruins. Further criticism regarding the political bias that uncovers the ethnographic displays has also been addressed (i.e., Carillo Sierra 1994: 48).

Since its inauguration, the MNA has undergone few changes in its original architecture and museography, although from 1998 to 2004, some galleries, including the Temporary Exhibition sector, were renovated as part of a major restructuring plan. This work was concluded before 2005, when the museum celebrated its 80th anniversary (Ramírez Vázquez 2008).

The MNA is one of the national museums under the domain of the INAH.

Cross-References

- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Heritage Museums and the Public
- ▶ Museums and the Distortion of Archaeology for Political Purposes
- ▶ Nationalism and Archaeology
- ▶ North America (USA and Canada): Museums

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Museo Nacional de Arqueología, Antropología e Historia del Perú

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Basic Information

Founded in 1822, the National Museum – as it was formerly known – is Peru's oldest state museum. With more than 23,000 m^2,

30 exhibition galleries, 100 employees, and about 250,000 objects, it is also the largest and most prestigious of the country. Originally created as a History, Archaeology, Ethnology, and Natural History Museum, it was in the first half of the twentieth century that it split into an Archaeology-Anthropological Museum and a History Museum, although sharing a common building since 1924. The Natural History section was also separately refounded in another museum and building. In 1992, the Museum was reunited but keeping the official names while it was divided into National Museum of Archaeology, Anthropology, and History of Peru.

Its importance lies in the vast and diverse holdings, which are more than 250,000 items of invaluable ceramics, textiles, lithic, metals, organic, human and animal remains, Colonial and Republican paintings, and other artwork, dating from the beginning of Andean culture c. 5,000 BCE. to the present. The archaeological collections are world renowned because most of them have archaeological context and are well documented. The museum houses a historical archive as well as a photographic archive and library that are accessible to researchers and students.

Its permanent exhibition halls display its achievements, which is the Peruvian civilization development in a chronological sequence spanning from the first settlers to the Republican period. Signature objects are the Raimondi stela, the largest known Nasca drum (almost 1 m high), and a large-scale model of Machu Picchu with buttons that allows visitors to identify key sectors of the complex.

The building itself is also attractive for its architecture and interior gardens. Built by renowned Portuguese architect Raul Maria Pereira, it was the first design for a museum in Peru. The building was constructed around a Colonial house that dates probably to the seventeenth century. The Spanish Viceroy Jose de la Pezuela bought the house in late eighteenth century as his summer residence. During the Independence, the Libertadores Jose de San Martin and Simon Bolivar lived here. Hence, the house is known today as the Quinta of the Libertadores. It shows the former inhabited spaces of Don Jose de San Martin and Don Simon Bolivar.

The National Museum is located in Pueblo Libre, a district about 3 km from downtown Lima.

Major Impact

The Museum is paramount to the history of Peru. After more than 180 years, the National Museum has played a main role in defining Peruvian history and identity. From its beginning, the directors strived to study and reconstruct the past events of Peruvian history, since nothing beyond the Inca period was known. The museum's first collections gathered in the nineteenth century were lost to Chile during the Pacific War (1879–1884). Besides the Colonial paintings and other historical objects that were timely put in safety hands, the only archaeological item recovered was symbolically the Raimondi stela, which depicts the ancient Andean Wiracocha deity dated c. 1000 BCE. This deity accompanied the cultural development of Peru until the Inca period. It is a famous stone carving of the Chavin culture found by the Italian explorer Antonio Raimondi in 1861. From 1906 onward, the new museum's directors started a series of field researches in Archaeology and Ethnology, collecting material that was the foundation for the reconstruction of Peruvian past as it is known today. Especially the study of the pre-Hispanic History based on extensively archaeological excavations was the main focus of the National Museum. This task is nowadays no more performed, and the museum activities are those dedicated to exhibits, education, and other outreach cultural activities.

The museum's collections are formed not only by whole pieces but also include over 10,000 boxes with archaeological remains product of several excavations campaigns. A research material that is invaluable for

scientific study. Along with the material, the archive holds archaeological field notes, photographs, drawings, and other documentation.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Andes: Prehistoric Period
- ▶ Archaeology and Anthropology
- ▶ Bonavia, Duccio
- ▶ Chronological Systems, Establishment of
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Flannery, Kent Vaughn
- ▶ Hispanic South America: Historical Archaeology
- ▶ Inca State and Empire Formation
- ▶ Lumbreras, Luis Guillermo
- ▶ Marcus, Joyce
- ▶ Vandalism and Looting (Ethics)
- ▶ Uhle, Friedrich Max
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Museo Nacional de los Ferrocarriles Mexicanos

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Basic Information

Founded in conjunction with the reprivatization of the Mexican railway system in 1988, the *Museo Nacional de los Ferrocarriles Mexicanos* (MNFM) is located in two old railway stations: Ferrocarril Mexicano and the Mexicano del Sur in Puebla, Puebla. Public access is through Calle 11 Norte, 1005, Centro Histórico. President Benito Juárez inaugurated the Ferrocarril Mexicano in 1869. The outdoor exhibit covers the grounds and marshaling yards of both stations and is composed of an extensive collection of rolling stock from the late nineteenth to the mid-twentieth century. The collection includes a wide range of engines (locomotives); carriages (coaches); brake vans (cabooses); flat wagons (flatcars), covered goods wagons (boxcars); and dedicated and specialized wagons such as cranes and so forth.

The MNFM includes the *Centro de Documentación e Investigación Ferroviarias* (Cedif) which houses an extensive collection of original documents, plans, and photos as well as a full research library. As of January 2012, the MNFM is open to the public. For further information, consult http://www.museoferrocarriles.org.mx.

Major Impact

The indoor exhibit relies on graphics and railway paraphernalia to portray the economic and political importance of the Mexican railway system. From its humble beginnings in 1837, the railway played a crucial role in the economic

expansion in the nineteenth century that culminated in the Mexican Revolution (1910–1918). During the Mexican Revolution, control of the railway lines had both strategic and tactical implications. After the Mexican Revolution, most of the railway infrastructure was either replaced or updated. It reached its apex in the mid-1940s but the expansion of the national road system and the associated intercity (interurban) bus systems and trucking companies, together with a falling rate of reinvestment, led to stagnation and then decay.

Since 2007, the MNFM has published the journal *Mirada Ferroviaria* three times a year, available online (http://www.museoferrocarriles-mexicanos.mx/boletines.php).

Cross-References

▶ Industrial Archaeology
▶ Mexico: Historical Archaeology

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Museo Tecnológico del Vidrio

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Basic Information

The Museo Tecnológico del Vidrio (Technological Glass Museum) is located in the old La Granja Royal Glass Factory, one of the most significant industrial building of the Enlightened Spain (Fig. 1).

In this sober building, built by order of King Charles III according to the plans of the quantity surveyor Joseph Díaz Gamones, the National Central Glass Foundation was set up in 1982, with the goal of reclaiming the old building, its history, and its most traditional techniques. Its over 25,000 m^2 of area currently houses the Technological Glass Museum, the Library, and the Higher Education Institution of Glass, as well as Furnaces and workshops.

For further information, go to http://www.fcnv.es/.

Major Impact

The visit begins in the Furnaces Hall, an outstanding space with a basilican design, having two great domes made of brick, where the melting furnaces are located. In this singular space, visitors find the Technological Exhibition, where you can learn about different manufacturing processes of glass, from the traditional to the mechanized by means of diverse elements such as furnaces from distinct eras, machines and ancient mills, work tools, molds, and raw materials.

From the firewood patio visitors can access to the glass furnace, where the glassblowers reproduce the ancient pieces of La Granja crystal with

great skill using the traditional glassblowing method with a blowpipe. Undoubtedly, this is the favorite space for our visitors, where the magic of glass is shown in its entire splendor.

Museo Tecnológico del Vidrio, Fig. 1 Part of the building of the Royal Glass Factory of La Granja

Nowadays, Royal Glass Factory production are faithful to its handmade tradition and its superior quality of raw materials (Fig. 2).

On the other side of the Furnace-Hall, you can find the Stainedglass room, with an important collection from the workshops of Maumejean. Towards the end of the nineteenth century and in the first half of the twentieth century, this prestigious workshop, with commercial offices in France and Spain, supplied a great number of religious and civil buildings, and individual homes, in Europe as well as America, Africa, and even Asia. The stainedglass window of Cristo de Martorell, exhibited in the 1925 World Fair of Paris, heads the exhibition from the large Southern window of the second dome.

Crossing the Museum lounge, we come into the Polishing Nave, a wide space of rectangular design, with a narrow corridor in the center, supported by two rows of pillars and lowered arches, all made of granite. In this nave, you can still see the remains of the famous Water Machine, designed by Demetrio Crow, which moved not only the grinding benches, used to polish the glass of mirrors, but also the various mills for grinding raw materials, including several lathes to work the windows of the upper floor. A scale model in the gallery explains the peculiarities of this hydraulic machine.

Museo Tecnológico del Vidrio, Fig. 2 Furnaces-Hall of the technological area of the museum with machinery used in glass production

In this great nave, the visitor can also find the Gallery of Bottles and Containers which gathers in one place the best European collections of bottles, flasks, and containers for pharmaceutical products, as well as for storage of solids and perfume bottles, organized chronologically from the sixteenth to the nineteenth centuries. You can also find how the English wine bottle evolved through the centuries, as well as other peculiarities of this interesting collection.

Through the Polishing Nave, the visitor can access to the historical production of the Royal Glass Factory Gallery, composed of one of the most important collections nowadays, not only for the number and diversity of its pieces but also for their high quality and originality. This collection was formed by pieces from different loans, such as of the National Museum of Decorative Arts of Madrid, Patrimonio Nacional, and the Prado Museum, as well as its own collections, acquired over the years by the National Central Glass Foundation.

Finally, on the upper floor of the same nave, the visitor finds the Gallery of Contemporary Glass Exhibition, which includes the most recents glass trenes of the las few years all over the world. Of note is the collection of sculptures by the Segovian Torres Esteban, as well as collections from Japanese sculptors and from the Czech Republic.

Cross-References

- ▶ Association Internationale pour l'Histoire du Verre (AIHV)
- ▶ Conservation in Museums
- ▶ Corning Museum of Glass
- ▶ Spain: Archaeological Heritage Management

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Museos de Real de Monte

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Basic Information

The Historical Archives and Mining Museum is a Civil Association located in the mining district of Real del Monte and Pachuca, in Central Mexico. It is dedicated to the protection, conservation, and reusing of industrial heritage sites since 1987. It mainly consists of historical archives and several museums.

Major Impact

The Historical Archives of the Compañía Real del Monte y Pachuca (AHMM) houses a collection dating from 1727 to 2002. The AHMM opened in April, 1987, are among the most important of their kind in Mexico. Being one of the few private archives with a general guide to its holdings published, it has acquired the status of a legal entity. Its collection of textual and visual documents has been the cornerstone for the establishment of four museums and is mostly grounded upon a clear feedback system between the archive and the museums (e.g., Oviedo Gámez & Hernández Badillo 2003). Since the opening of these facilities, the demand for service has increased not only the archive but the periodicals and newspaper archive as well as the library. Today, a historical archive with 275 years of information, mostly as the result of the concentration of archives, has been enriched by an image bank of photos, plans, and posters, fully available for scholarly research, to students, and the general public.

Opening in July 1993, the Mining Museum is devoted to the history of geological explorations, exploitation, and mineral processing. It also features social and labor aspects, such as the organization of workers and the efforts on the part of

Museos de Real de Monte, Fig. 1 Acosta Mine Site Museum (Photographed by Marco A. Hernández Badillo)

Mexican, British, and American entrepreneurs and workers to reduce the number of mining accidents. Located in the main patio and gardens is The industrial archaeology space. There one can see not only the heavy machinery employed at that time but an old perforator from the late nineteenth century. Also on display are the Mack vehicles that transported the ore from the processing hacienda of Loreto to the railway station, and an 80-t crane from "The Brown Hoisting Machinery Co." of Cleveland.

The Acosta Mine Site Museum (Fig. 1) opened in July, 2001, and includes the following areas: the superintendent's office and house, a head frame, and the drain gallery used to extract minerals. In addition, two of the major attractions for the visitor are the drain gallery, used to extract minerals, and the entrance tunnel to the depot with a level of 180 in the "Mina Dificultad." In addition, there is The Forge and The Boiler Room, where archaeological excavations exposed the nineteenth century steam boilers' ash pits. Of the former, two of them were restored and one more was consolidated in order for the public to see the condition in which they were. The material collected consisted of iron and ceramic pieces and brick crumbs. Finally, there are two areas specially designed for children in which the first history and visual arts workshops have taken place. These events culminated in the publication of a guide on the Acosta Mine Site Museum illustrated by children.

The "Nicolás Zavala" Cultural Center/ Workers' Medicine Museum opened in October, 2004. The Hospital of the Compañía Real del Monte y Pachuca (CRDMyP) consists of preserved twentieth century buildings, furnishing, surgical and rehabilitation equipment, and x-ray machine and an apothecary that was donated to the AHMM in 1996 by the CRDMyP. When it ceased to function, the following areas and services were present: a reception area, an apothecary, an x-ray room, and a room for hospitalized patients. Besides this, there was a doctor's office, a nurses' station, and recovery, treatment, and rehabilitation rooms. Finally, it included an operating room with its sterilization and equipment area, a bathroom with shower and tub, an area for ironing sheets, and a mortuary chapel. All of these facilities and features as well as a laundry room are housed in the Workers' Medicine Museum (Fig. 2).

The exhibition display design respected this division so that a visit to the museum begins with a stop at the former chapel. There one can see posters printed by the safety department

Museos de Real de Monte, Fig. 2 Workers' Medicine Museum (Photographed by Marco A. Hernández Badillo)

Museos de Real de Monte, Fig. 3 La Dificultad Mine Site Museum (Photographed by Marco A. Hernández Badillo)

describing accidents that occurred in mines. It includes the Archives of the Word.

The Dificultad Mine, Site Museum and Interpretation Center, was opened in May, 2011. The main objective of the museum is to offer to the visitors a comprehensive vision regarding the essential role of "La Dificultad" mine in the history of the mining district and the importance that this place has nowadays as an example of the historical, technological, and cultural heritage. Although these topics are complex, we are trying to explain them in a simple, didactic, and accessible way to all kinds of public through the appropriate resources offered by museography. The use of images, scale reproductions, and interactive examples are designed not only to allow an in-depth appreciation of the subject but its recreation, in such a way that visitors can have access to the necessary information, while at the same time, they can live the experience of touring a real mining site (Fig. 3).

The museum has an important and representative sample of the essential engines to perform mining work. The archaeological materials

consist of an old hoist from the steam era kept in this mine. This represents a rare example in the mining district of an almost intact machine. One of the most important attractions of this exhibition is the steam hoist, adapted to work with electricity so that visitors can see it operating. As a historical complement, illustrations and information cards can be seen and in them the history of hoists, from the ones operated with animal traction to the ones using other forms of power such as steam or electricity, is narrated.

The Andrés Manuel del Río Lithotheque, the drilling cores storage area, houses thousands of core samples boxes and probably, this is the most unusual place of the mine. Visiting it and listening to the explanation of the importance of the geological exploration works can provide an illustrative knowledge of the mineralogical work performed by mining companies. This area has become a mineral sample exhibition room, possibly the first one of its kind in Mexico.

These museums are part of the Silver Route, an important tourist circuit that includes six municipalities in the State of Hidalgo. The scheduled routes take visitors through picturesque mining towns, revealing the richness of the industrial heritage as a learning experience provided by the AHMM (e.g., Oviedo Gámez & Hernández Badillo 2011).

Cross-References

- ► Industrial Archaeology
- ► Industrial Heritage in Archaeology
- ► Litvak King, Jaime
- ► Mexico: Historical Archaeology

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Museum of New Zealand Te Papa Tongarewa

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Basic Information

Located in the capital city of Wellington, Te Papa is New Zealand's national museum and the most visited museum in Australasia. It has been

innovative, successful, and controversial in equal measure since it opened in 1998. Te Papa is the short form of the full name "Museum of New Zealand Te Papa Tongarewa." The Māori name can be translated as a "receptacle of treasured possessions." It alludes to "mother earth" (*Papatūānuku*) in the Māori creation story but can also mean land, foundation, or platform and recalls the traditional *papahou*, or treasure box, containing a rare variety of *pounamu* (greenstone).

The "new" museum was in fact not new at all, but a reinvention of its various predecessors: the Colonial Museum founded in 1865, which became the Dominion Museum in 1907, the National Art Gallery and Dominion Museum in 1936, the National Museum in 1972, and finally in 1992 the Museum of New Zealand Te Papa Tongarewa. By the early 1980s the then National Museum had outgrown its building, and its Māori, Pacific, and history displays were showing signs of being out of step with a changing society (McCarthy 2007). Plans for a new national museum overlapped with, and to some extent grew out of, the groundbreaking *Te Māori* exhibition which toured the USA and New Zealand in 1984–1987. Certainly the museum came under intense pressure for change from Māori leaders in a period of debate about the contemporary relevance of the Treaty of Waitangi, New Zealand's founding document signed in 1840.

The 1985 report *Nga Taonga o te Motu* led on to the establishment of a Project Development Team in 1988 which in turn produced a concept in 1989 recognizing the Treaty and acknowledging the two main cultures of the nation: Māori and Pakeha (European). The new museum was formalized by legislation in 1992 which, controversially for some, integrated the collections of the gallery and museum, leading to criticism that art lovers should be displayed by itself in a more traditional style.

Opened in 1998, Te Papa quickly exceeded its visitor targets and attracted a large and genuinely diverse audience including an unprecedented proportion of Māori visitors. The outstanding features of the new museum which delighted mass audiences and annoyed academic critics – the interactives, the busy "malled" spaces, the celebration of popular culture, and the celebration of NZ identity – signaled a shift away from the old gallery and museum with their somewhat stuffy image and elite audience. Developers sought to reposition Te Papa within the leisure and tourism industry with a strong branding and marketing drive which turned off more conservative visitors. This populist orientation reflected the postmodern tenets of the "new museology," a philosophy which favored the museum as forum rather than temple, and stressed public scholarship and audience-focused exhibitions rather than an inward preoccupation with collections and connoisseurship. These features were seen in other "new" museums in Australia, Canada, and the USA in the 1980s and 1990s, a trend which has generated much debate in the academic literature of museum studies (Message 2006).

Into this heady mix of nation building, project management, and museological experimentation was added the distinctive local ingredient of "biculturalism," the idea of two (bi) cultures in one country based on the Treaty (Message 2006 ; McCarthy 2011). In 2012-3, Te Papa was undergoing change yet again, with a revisioning and restructuring process under a new CEO leading to the return of archaeology as a discipline, formerly marginalized as a framework for managing Māori collections because of its colonial overtones.

Major Impact

Several aspects of Te Papa could be mentioned as creating an impact on museology internationally, not least the visitor experience and playful interpretive approach in multimedia exhibitions, but perhaps the thing the museum has become best known for is biculturalism and the integration of Māori values into museum practice. A raft of policies define biculturalism: *mana taonga* (see below), *mātauranga Māori* (Māori knowledge/world view), and *tikanga taonga* (Māori practices for managing *taonga* or treasures). These policies were operationalized successfully in parts of the institution – notably collection management and exhibition development—while other areas

remained within conventional parameters. Officially Te Papa now saw itself as a *kaitiaki* (guardian, caretaker) rather than an owner of taonga and initiated and maintained a complex and at times difficult process of consultation with major tribes around issues such as handling and display of *taonga*, repatriation, and human remains. The clearest example of biculturalism at work is Te Papa's functioning *marae*, a ceremonial meeting space where visitors are welcomed, run by the *iwi* (tribes) who are "in residence" every two years hosting events and mounting an exhibition.

The central plank of biculturalism is the *mana taonga* policy. *Mana taonga* means literally the power and authority (*mana*) that resides in/derives from cultural treasures (*taonga*). In policy and practice *mana taonga* is a declaration of the Māori control of Māori *taonga*, and consequently a new way of thinking about the relationship of museums and source communities in which anyone who had collections in the museum has the right to participate in their management. The policy had a profound impact on professionals working in the museum project and transformed museological practice in terms of ownership, authority, and identity.

At the level of everyday museum practice, one of the most interesting transformations was the expansion of collection care and management to accommodate the spiritual practices that were necessary for the handling, storage, and conservation of sacred ancestral objects, practices generally (but not always) carried out by Māori people who form the majority of staff working with these collections (McCarthy 2011). It is worth noting that Pacific collections and exhibitions have also been developed in a comparable way, particularly with the contemporary material culture of Pacific Islanders living in New Zealand (Mallon et al. 2012).

Cross-References

► Australia, New Zealand, and Papua New Guinea: Museums
► Indigenous Peoples, Working with and for

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Museum Security Network (MSN)

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Basic Information

The Museum Security Network (MSN) is a Google Group listserv that keeps the public informed about the protection, preservation, and conservation of cultural heritage. The MSN was founded in 1996 by Ton Cremers, who served as head of security at the Rijksmuseum in Amsterdam, the Netherlands, from 1980 to 2003. Since 2003, Cremers has operated a museum security consulting company. In March 2010, Mark Durney, who operates Art Theft Central, a website providing news about and insights into art crime trends, began moderating the listserv. Jonathan Sazonoff has served as a contributing editor since 1997 and helped establish the MSN's multilingual scope.

The MSN's original aim was to serve as a source of information for cultural property protection professionals. Today, the MSN functions as a clearinghouse of information, and on a daily basis, Durney circulates online news articles,

crime alerts, and subscribers' comments from around the world and in a variety of languages including English, French, Spanish, Italian, German, Dutch, and Mandarin via the listserv. Topics covered by its daily digest of information range from art theft to fakes and forgeries, from looted art and antiquities to conservation and restoration, from art vandalism and iconoclasm to restitution, as well as a number of other relevant issues. Its subscriber list has expanded since 1996 and now includes lawyers, security officials, museum professionals, conservators, academics, appraisers, art loss adjustors, insurers, galleries, dealers, auction houses, and private investigators, among its 600 members. The breadth of topics and quality of information disseminated has enabled it to become an invaluable resource to so many people with a vested interest in cultural heritage.

Major Impact

Frequently, the MSN is the first to break news alerts related to stolen or looted cultural property. During Interpol's 6th International Symposium on Works of Art, Antiques, and Cultural Property at Lyon, France, in June 2005, a general secretariat delegate mentioned that he was first notified of a theft by the MSN, not by the member country/countries concerned (Interpol Minutes n.d.). The MSN's alerts have facilitated the recovery of stolen cultural property. In June 2006, 4 headrests and 2 Makonde masks were stolen in a daylight theft from the National Gallery in Harare, Zimbabwe. The director of the National Gallery, Doreen Sibanda, notified the MSN, local authorities, and Interpol in Lyon, France. In November 2006, an American collector of African antiquities contacted the MSN because someone based in Poland had offered him objects that closely resembled those published on the MSN. The seller, who was also discovered to be the thief, was later apprehended.

The MSN was also involved in a landmark First Amendment Internet legal ruling. In 2000, attorney Ellen Batzel sued Ton Cremers and her handyman Bob Smith for defamation after Cremers circulated a message authored by Smith on the listserv that claimed that Batzel was a descendant of a Nazi leader and that she harbored looted art from World War II in her home. Three years later, the Ninth Circuit Court of Appeals found that Cremers, who chose to post Smith's message on the listserv after reading it and making a few edits, was immune from liability under Section 230 of the Communications Decency Act of 1996 (CDA) so long as a reasonable person could conclude that the information provided by Smith was meant for publication on the Internet (Batzel v. Smith, 333 F.3d 1018, 1031 (9th Cir. 2003)).

The MSN is fully independent and refrains from any financial associations with commercial organizations active in the aforementioned fields. It is recognized as a cultural heritage resource by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Criminal Police Organization (Interpol), the Federal Bureau of Investigation (FBI), the Smithsonian, and the Getty, among many other organizations. Over the past decade, the MSN representatives have been invited to meetings and conferences hosted by Interpol, the International Council of Museums (ICOM), UNESCO, and other cultural and educational institutions.

The MSN serves to establish qualitative data that generates awareness related to the realities of art crime. Due to the fact that art crimes are often underreported and misunderstood, the MSN seeks to collect and disseminate information that enables its readers to analyze the current trends and to develop new methods that help better preserve the cultural record.

Cross-References

- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- ▶ UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995)

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Museums and Memory Experiences

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Introduction

The study of "memory" has seen a recent proliferation across a number of disciplines dealing with the past, including archaeology, history, heritage studies, anthropology, and museum studies. Here, it has been stretched beyond a psychological interest in individual cognition to that of public or collective memory, which operates at a broader, communal level. One of the most obvious forums through which this type of remembering is engaged with is that of the museum, a cultural space that is today often referred to as a "site of memory" (Nora 1989) or a "memoryscape." (Edensor 2005). These sit alongside other socially and spatially produced sites of memory, such as memorial sites, war monuments, graffiti sites, plaques, and historic districts, all of which are public places onto which specific narratives about the past – official and otherwise – are etched. Whether literally or metaphorically, these places embody and speak of the past and, in so doing, push forward messages about identity and belonging in the present.

Definition

The idea of "memory" that circulates within the museum setting is a peculiar one. Indeed, it is able to permeate that cultural space despite the absence of both substance, in the sense of a "remembering subject," and physical organ – something that actually operates memory – such as the human brain (Welzer 2010: 5). Rather than thinking in terms of individual memory, the museum context calls for a different sort of conceptualization – one that is cultural and social, existing *between* people and not exclusively *within* them (Welzer 2010: 5). Here, it is comprised of shared meanings, narratives, and images that are compressed together into a useable past which can be "... harnessed for some purpose in the present" (Wertsch 2002: 31). As Jay Winter (2009: 252), a prominent scholar working in the field of remembrance, recently argued, museums can thus be understood as "places where groups of people engage in public activity through which they express "a collective shared knowledge ... of the past, on which a group's sense of unity and individuality is based"" (Winter 2009: 252).

Dealing as they do with collective memories, or that "... what remains of the past in the lived experience of groups" (Cubitt 2007: 10), museums are necessarily imbued with messages and meanings that are social in origin and embedded in a range of cultural and political contexts. The memories they trigger or produce are thus also inflected with, and influenced by, language, rituals, and commemorations and perform in a variety of processes that make past events meaningful in the present. This type of memory is highly contested and draws implicitly upon notions of power; indeed, remembering in a museum setting is always selective and thus yields to particular versions of the past which prioritize certain actors at the expense of others. Of course, not all memory experiences occurring within the museum setting are the same.

Rowe et al. (2002) have identified four key ways in which memory is utilized and/or engaged with in museums, all of which oscillate between "the museum" and "visitor" as producers of those memories. They begin with a memory experience that encourages visitors to tap into larger group narratives and make links with their own life stories; importantly, in these exchanges the larger narratives remain undisrupted, with individual memories simply rolled into them in order to give them meaning (Rowe et al. 2002). Their second form of memory experience likewise envisions an intersection of larger, official memories with personal ones, but here those personal memories are utilized in a bid to expand the relevance of the museum to a wider population. In other words, the personal stories of previously excluded groups are used as an "entry point" or guide for the co-opting of a broader range of participants into authorized narratives (Rowe et al. 2002). The third and fourth modes of memory associated with museums are geared around an assumption of active engagement on the part of museum visitors. In the first of these, museum visitors undertake what Rowe et al. (2002) label "poaching," a process in which the overarching narrative plays second fiddle to the more important personal memories – authorized narratives thus become those from which visitors seek to escape in order to enter a more intimate space of private remembering (Rowe et al. 2002: 106). These performances operate *outside* of the parameters set up by official memories. The final proposed way in which visitors may engage is via memory work that serves to furnish museum narratives with personal accounts that either support or deny their message. Rather than using the museum's cultural spaces to launch into their own memories, visitors draw those memories *into* the public narratives already on display. They become, as Rowe et al. (2002: 108) point out, "authorities in their own right who can testify as to the truth of the museum's representation." This is of course in no way an exhaustive list of the ways visitors experience memories within the museum setting, but it does serve as an indication of the nuanced ways in which such engagements may occur.

Key Issues/Current Debates

Perhaps the most widely cited example illustrating the relationships between museums and memory emerges from attempts to engage with the meaning of Holocaust remembrance. Indeed, the capacity of museums to adequately capture the Holocaust has been a central debate within the field for some time. This is because it stands in as a powerful example of how the past can be remembered differently by different individuals and communities. Levy and Sznaider (2002), for example, provide a thorough analysis of the disparate memory experiences encountered in Israel, Germany, and the USA, noting that the strategies of remembrance drawn upon in each country are inflected by the wants and demands of specific – and disparate – interest groups. For Israel, this has produced an ambivalence oscillating between silenced remembering and sacred remembrance (Levy & Sznaider 2002). In Germany, the immediate silences following the war have today been replaced with a critical and self-reflective narrative espoused in its national museums (Levy & Sznaider 2002), while the USA, by contrast, performs its own unique memorialization, referred to as the "Americanization of the Holocaust," a point evidenced by the sheer number of museums dedicated to its theme (Novick 1999; see also Young 1993). In all three contexts, museums have to flirt with, and respond to, a range of social and political tensions and match these against their own politics of display. As a consequence, the museum one chooses to visit – be it the Holocaust History Museum (Jerusalem), the Jewish Museum (Berlin), or the United States Holocaust Memorial Museum (Washington, DC), for example – mediates almost entirely the memory experiences that history has to offer. The history of enslavement and the trading of African people likewise offer intimations of the different, and often conflicting, ways that collective memories and recollections of the past can be evoked and experienced in the museum setting. In the UK, for example, the history of "abolition" has been retold and remembered in a number of exhibitions, through which

museums have been transformed into either sites of resistance, memorials to suffering, or celebrations of individual heroism (for an expansion of this argument, see contributions in Smith et al. 2011 and their analyses of the bicentenary of the abolition of the transatlantic slave trade). As different interest groups and stakeholders undertake performances of remembering at the various museums dedicated to this theme, they rehearse and make new meanings for themselves in the present, often regarding issues of social justice, emancipation, or "race relations." A third example can be drawn from the "history wars" surrounding the display of the cockpit and nose section of the *Enola Gay* in the proposed exhibition, "The Crossroads: The End of World War II, the Atomic Bomb, and the Origins of the Cold War," at the Smithsonian Air and Space Museum in Washington, DC (Wallace 1996). This is an example of a failed exhibition that has since become synonymous with debate due to the perceived threats it made to American collective memories and sense of "self." In the proposed museum script, a challenging narrative was used to question the dropping of the atomic bomb on Hiroshima, a narrative that was vehemently opposed by a number of stakeholder groups, including US veterans. Embedded within the ensuing debate was a fear that creating such a critical memory space would unsettle broader, national memories of peace and heroism for museum visitors, triggering in their stead a newer memory laced with issues of guilt and culpability. Thus, perhaps more than any other in the field, the example of the failed *Enola Gay* exhibition captures the power of ideological messages implicit within the display of memory.

All three museum experiences outlined briefly above are situated within a social context motivated by examinations of national guilt and apology, in which broader narratives of self and identity were – and continue to be – put at risk. In these scenarios, there has been a tendency to construct and use seemingly consensual narratives as something of a metaphoric screen (see Sturken 1991: 118), behind which lies, in reality, a range of highly emotive and dissonant experiences. Such screen memories are granted the power to master the process of remembering for a whole range of subaltern and alternative groups, thus underscoring the political nature of memory both within museums and more generally. What this tells us is that the notion of memory can never be called upon to simply provide nostalgic and apolitical reflections of the past; rather it is itself a concept shot through with conflict as a range of memories work in tension with each other.

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Museums and the Distortion of Archaeology for Political Purposes

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Introduction

Museum interpretations of archaeological materials not surprisingly often reflect the general worldview of their audiences. Thus, during the late nineteenth and early twentieth centuries, various neophyte American museums developed exhibits that highlighted local prehistoric cultural origin explanations from racist perspectives or from "fantastic archaeology" perspectives. Often, these two approaches were combined, with museums arguing that the indigenous Americanist populations could not possibly have created the local archaeological sites and artifacts, based on perceptions from racial stereotypes. Rather, the curators looked to settings like Atlantis or Mu or to voyagers from Old World civilizations to produce these cultural manifestations, which they believed spread in successive waves via diffusion. These interpretations then served to reinforce local political agendas for paternalism, peonage, and slavery.

By the second half of the twentieth century, due to methodological advances such as radiocarbon assays and trace element analyses, the common political uses of archaeological museum materials had changed.Cultural-historical explanations replaced diffusionism. With the consolidation of U.S. scientific hegemony over countries in Latin America after WW II, there was essentially a type of cultural imperialism in place in interpretations. European philosophical "enlightenment" led exhibit preparators to feel that the use of logical positivism and empiricism, as employed in cultural processual studies, could definitively answer cultural evolutionary questions. There were continuing arguments whether museum curators should employ particularistic approaches; whether they should adhere to description only, just presenting a chronicle without implying causality; or whether they should employ generalizing perspectives, driven by processual or theoretical concepts.

The leading proponents of this processual approach were museum staff trained or influenced by European and U.S. institutions, who sought to create exhibits explaining materials in terms of social institutions. Prehistoric societies' features often were interpreted in terms of market forces, utilizing the parameters which shaped contemporary western economies. This practice developed into culture-ecological and neo-evolutionary models in the 1960s and 1970s, with a further subsequent shift from cultural-historical reconstructions to ecological-systemic approaches. But at the same time some scholars began arguing for a more relativistic, post-processualist viewpoint. This latter framework focused on the historic actor and reminded the viewer that knowledge is socially constituted and additionally that museum agendas are conditioned by nationalistic goals.

Key Issues/Current Debates/Future Directions/Examples

In Latin America particularly, exegesis of regional museum trajectories shows that under the guise of promoting cultural patrimony, institutional displays have been much influenced by imperialism, colonialism, and nationalism. Prehistoric cultural models that national museums have supported have changed with respect to the intended audience. U.S. cultural imperialism, manifested through its museum and research personnel essentially appropriating and manipulating viewpoints relevant to zonal archaeological resources, ignored the native peoples' own traditional perceptions. There is an active dialectical discussion between the non-indigenous primarily Euro-American populations, for whom the indigenous prehistoric patrimony is often mainly academic, and the First Nations groups, for whom museum studies are on one hand a study of their ancestral heritage but on the other hand often a direct challenge to their own cultural narratives.

An excellent example of national governmental involvement in museum archaeology can be seen in Bolivia. A focus on the importance of archaeological Tiwanaku to the national patrimony was emphasized from the beginning of the twentieth century, with the most popular models arguing for its genesis from "lost Atlantis." But by mid-century, the local Aymara people were seen as progenitors, and with the Bolivian MNR revolution of 1952, it was decided to make Tiwanaku a fundamental part of state indigenismo policies. The restoration process and development of a major museum for the site was a political decision, the funding based on restoring the site to its presumed original glory to serve as a "sacred" political ancestral place for the country, the focal point of the national cultural patrimony. Moreover, a concern for the physical preservation of the national cultural heritage from the site was pursued by museum personnel. Foreign researchers had been siphoning off the finest and best of the Bolivian national heritage to European and North American museums. Hence, at the same time that state museum workers were instrumental in creating legislation to glorify Tiwanaku as the origin of high Andean culture, ancestral to the Incas, they simultaneously labored to make it illegal to export any further patrimonial cultural materials.

Museum positions in most of the American republics are still very much an upper-middle class career, and museum staffs are unconsciously (usually but sometimes overtly) influenced by cultural goals of their economic class. And because funding for archaeological cultural studies in several Latin American republics has been primarily controlled by the respective governments, national agencies tended to keep a tight control of dissemination and interpretation of the resulting data and often did not allow the publication or display of dissonant findings that did not support the current regime's agenda. The local archaeological reconstructions often became microcosms of the larger agendas influencing the politics of the world; for example, U.S. trained archaeologists often unconsciously imposed capitalistic models on the evidence, based on their own situations.

The domination of capitalist (and now neoliberal) economic philosophy from the North led various Latin American archaeologists, who often found Marxist perspectives more intellectually congenial, to call for a restructuring of archaeological interpretations in museums. Peruvian personnel initiated a new research agenda, termed "social archaeology," which spread throughout Latin America. For them, society was defined by its productive forms; hence, they argued that museum exhibits should no longer be based upon traditional stylistic or chronological criteria but on productive features.

This agenda led to the founding of the "Latin American Social Archaeology School" at a meeting in Teotihuacan, Mexico, in 1975. Participants explored many of these Marxist interpretations, deciding to develop a political approach for studying Latin American archaeology and for explaining prehistory to museum patrons, based on what they viewed as non-imperialist/non-bourgeoisie procedures. They set out arguments for what portions of the classic Marxist evolutionary model could be imported into Latin American interpretations and which ones were inappropriate, adopting a program which eschewed dogmatic Marxism, strongly rejected French structural Marxism, modified the approach to the study of modes of production through including the influence of culture, and advocated the use of the social practice of museum archaeology as a tool with which to fight for oppressed indigenous peoples' rights.

The "social archaeology" paradigm as well argued that national political agendas always influenced the actual practice of archaeology, and therefore, museum archaeology should explicitly become a part of such political agendas. It also contended that the indigenous peoples had spent millennia in discovering the optimum method of exploitation of the American environment, while the present Euro-American neoliberalism methods were resulting in the destruction of the environment, desertification, and other ecological disasters. Thus, its adherents argued that the indigenous population had been disenfranchised, without its own cultural patrimony intact, and the Eurasian and African

immigrant populations were also being denied access to a native patrimony that they did not know they had, because the previous intellectual perspective was unworkable. Hence, they proposed that museums should employ "social archaeology" practice as one political vehicle by which both the First Nations and the modern nation-states incorporating them might reclaim their appropriate patrimony.

The synopsis of changing viewpoints for interpreting the corpus of archaeological materials included within museum exhibits makes it clear that elucidating the past has been sociologically determined and not determined by dispassionate scientific rationality.

Cross-References

- ▶ Archaeology and Politics
- ▶ Ethics of the Archaeological Record
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Nationalism and Archaeology

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Myanmar (Burma): Archaeological Heritage and Its Management

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Introduction

Myanmar's predominantly Buddhist culture has a substantial archaeological heritage. Religious buildings, some dating back to the first millennium CE, number in the thousands. Many active Buddhist sites are managed by trustees, sometimes with input from government authorities. Gazetted archaeological sites, such as Bagan with its more 3,300 buildings, are managed by the Department of Archaeology, National Museum and Library, which is a division of the Ministry of Culture. The ministry states in part that its mission is "to love and cherish the country and the people by taking pride in our traditions as well as by preserving, exposing and propagating Myanmar cultural heritage . . . to help develop unity, nationalistic spirit and patriotism among the people." The Archaeology Department employs conservators and engineers to maintain and repair buildings and their contents, as well as research officers, who conduct excavations.

Historical Background

Paleolithic to Early Urban

Myanmar (Fig. 1) has had human settlement dating back to between 55,000 and 70,000 years ago, when the dispersal of modern *homo sapiens* out of Africa brought about the occupation of the coast of the Arabian Peninsula, the river valleys of India and Burma, Island Southeast Asia, and

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 1 Myanmar (Burma) and some of its main archaeological and cultural sites

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 2 Bronze pull toy from a Samon Valley grave, probably traded from southern China

Australia. In Myanmar, this population is still visible in Paleolithic tools that have been found across the Ayeyarwady Valley. Occupation of cave sites from around 10,000 years ago has been detected, with the gradual appearance of polished stone tools, incised pictographs, and ochre paintings.

Settlements from the Bronze Age (from around 1500 BCE) and the Iron Age (from 500 BCE) have been located in Upper Burma. By the middle of the first millennium BCE, the arrival of iron technology coincided with an expansion of personal wealth and clear evidence of social differentiation, notably in the Samon Valley and at Halin. Some skeletons from this period are found with armloads of bracelets, their clothing, and persons decorated with hundreds of beads. Burials include bronzes that probably come from southern China (Fig. 2), carnelian beads originally from India but quickly produced locally, and blue-green glass ornaments in styles also found as far away as Cambodia, all suggesting that goods and information travelled long distances over the trade routes of the time.

Migrants from the Samon Valley probably built, from around CE 200, huge walled cities at Pinle and Halin, north of the Samon, and Beikthano and Sriksetra, to the south. Brick construction, Indic deities, and cremation suggest that the indigenous leaders were enthusiastic adaptors of cultural notions from India. Known today as the Pyu (a name given to them by the Chinese), these people developed extensive rice agriculture in and around their cities. Their religion incorporated Buddhism, Hinduism, naga (snake/dragon) worship, and animism. Their settlements feature pots of cremated bones buried in or around brick shrines. The Pyu used coins (Fig. 3) which featured Indian-style symbols but no names or dates. A few words of the Pyu language have been translated from inscriptions, but they left behind few written records.

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 3 Indic symbols and Pyu rising sun design on a coin from Halin

The dominance of the Pyu cities gradually faded away due to a combination of factors including siltation of their agricultural systems, a decline in the authority of the chiefly families and the intrusion, including slave raids, by Nanchao, a Tibeto-Burman-speaking principality in what is now Yunnan. The Pyu lands and cities were slowly incorporated into the Bagan kingdom. Halin had a governor appointed by Bagan in the eleventh century. There are records of princes of Bagan being given Sriksetra to "eat," which meant they were entitled to its revenues. The Shans (or Tai) arrived between the ninth and eleventh centuries and settled in the hills on the Thai-Burma border. The other major group was the Mon, who spoke a language in same family as Khmer and appeared to have migrated into southern Burma from the old Dvaravati kingdom in Thailand.

While the Pyu were active on the central plain, across the Arakan Yoma (mountain range) on the west coast were two contemporary and in many ways similar cities. Dhanyawadi (fourth to sixth centuries CE) and Vesali (fifth to eighth centuries CE) were also large sites enclosed by brick walls. These cities also used coins with Indian symbols. Artworks suggest a mixture of Buddhist and Hindu elements.

Bagan: Eleventh to Fourteenth Century CE

There is a substantial gap between the traditional history and the evidence of archaeology for the first millennium CE in Myanmar. We know from dates on burial urns, for example, that there was a royal dynasty at Sriksetra between CE 688 and 718. These were leaders whose names all ended in "vikrama," a Sanskrit title. Despite the Burmese chronicles' enthusiasm for listing royal dynasties, the "vikramas" are never mentioned. According to the traditional histories, a dynasty of kings ruled at Bagan from the first century CE, but there is little evidence to support this. We know, however, that pottery was being made at Bagan perhaps as early as CE 760. There are also temples, pottery, beads, and Buddhist artworks in the Pyu style at Bagan, suggesting that the site may have been settled during the second half of the first millennium.

Inscriptions at Bagan itself are known so far only from the early twelfth century, although some of these refer to earlier events. Bagan was the site of an artistic and building explosion from the eleventh century (Fig. 4), peaking with the construction of more than 2,500 religious structures in the thirteenth century. Early artisans may have arrived from India, as expanding Hindu and Moslem polities reduced the demand there for Buddhist art and architecture.

After 300 years of military domination and economic expansion, the Bagan kingdom was put under pressure by the Mongols in the late thirteenth century. The commitment of resources to religious buildings also appears to have overstretched the economy. The center of Burman government gradually moved north to the area around Mandalay and remained there for most of the time until colonization. The geopolitical contraction of Bagan was followed by an expansion of Mon polities in the south and the rise of Mrauk-U on the west coast.

Mrauk-U

During the Bagan period, a number of small principalities on the west coast, such as Sambawak, Launggret, and Parein, led fairly autonomous lives, despite occasional attempts by kings of Bagan to carry off the Mahamuni image, which was believed to be a life portrait of the Buddha. In the 1500s, King Min Bin employed Portuguese mercenaries to help fortify his city, train his army, and equip his fleet. Mrauk-U took advantage of Bengal's war with the Mughals to seize East Bengal, which it held as

Myanmar (Burma): Archaeological Heritage and Its Management, Fig. 4 The Shwezigon Pagoda, Bagan

vassal for more than a century. Eventually the Burmese King Bodawpaya (1782–1819) conquered Mrauk-U. After centuries of trying, the Burmese removed the Mahamuni image to Mandalay. At the same time, the Burmese took several Khmer bronze statues, which had passed through several hands before reaching Mrauk-U. They are now in the Mahamuni pagoda compound in Mandalay.

Other Kingdoms

With the decline of Bagan, Central Myanmar split into small kingdoms, Burman, Mon and, Shan, which regularly fought each other. At times, Bagan was a staging post for armies moving north or south, and its vast treasures, buried inside pagodas as Buddhist offerings, were regularly pillaged. In the eighteenth century, the Burmese King Alaungpaya, a dominant military leader, founded the Konbaung Dynasty which ruled Burma from Arakan to Tenasserim. In 1767, Burmese troops besieged Ayutthaya, pillaged the city, and carried off many captives. Ayutthaya never recovered, and the Thais reestablished their capital in what is now Bangkok.

Colonial Period to Independence

Territorial conflicts between the British in India and local Burmese armies led to the first British-Burmese war in 1824. In a process of colonial annexation that took several decades, the British finally took over all of Burma in 1886. The Burmese king and his family were exiled to India, and the last Mughal emperor was exiled to Burma. His grave can be visited in Yangon.

Japanese forces entered Burma in 1941. The British, including many Indian troops and civilians, retreated to India, burning or scuttling the old Irrawaddy Flotilla that had plied the "road to Mandalay" as they left. Some of these vessels have been rehabilitated and are functioning examples of the country's modern technological heritage.

Key Issues and Current Debates

Heritage Sites

Paleolithic implements have been found throughout Myanmar, at sites such as Magwe, Yenanchaung, and Chauk in Central Myanmar and along the river terraces of Ayeyarwaddy near Sale and Bagan-Nyaung U. Stone implements have also come from cave sites such as Pindaya, under what are now Buddhist shrines, and Padah-Lin, which like several other cave sites is protected as much by its remoteness as by official decree. The Archaeology Department maintains a list of sites and their locations, but they are rarely visited except for study purposes.

There are 16 officially gazetted Bronze and Iron Age sites, some of which have been excavated and published by a joint Myanmar-French

team. Details of sites can be found on Archaeology Department websites. Rather than provide a URL that may become outdated, we suggest that interested parties search the internet using keywords such as *Myanmar*, *ministry*, and *culture*.

Seven sites are designated as "Pyu ancient cities." These are Beikthano, Sriksetra, Halin, Kyaikkatha, Wethali (Vesali), Pinle (Maingmaw), and Tagaung. Halin, whose history goes back at least 4,500 years to a Neolithic pottery production site, also has several Neolithic, Bronze, and Iron period excavations conserved under cover as site museums.

Thirty-three areas are named as cultural heritage zones. These are generally sites that feature Buddhist pagodas, monasteries, or major sculptures. They include Bagan, Bago, several pagodas in the Mandalay area, Sagaing (a huge monastic site on the west bank of the Irrawaddy from Mandalay), and cave sites including Kawgun, which contains ancient stone sculptures.

The Archaeology Department has a priority list of over 2,000 buildings with mural paintings, suffering from water leakage, the key factor in deterioration. There are more than 4,000 stone inscriptions, many housed locally in more than 50 storage sheds. Scholars occasionally obtain rubbings from these. The sheds are usually maintained by monasteries, villages, or pagoda committees. Other classes of object that are the focus of conservation are parabaiks (folded paper books), inscribed bronze bells, clay votive tablets, and palm-leaf manuscripts.

In 2011, conservation-repair-reconstruction schemes were active at Sriksetra (Thayekhittaya), Bagan, Halin, Inwa, Bago, Pakhangyi, Tagaung, and Mrauk-U. There was also a focus on the restoration of nineteenth-century wooden monasteries at Mandalay, Sagaing, Inwa, Sale, Salin, Legaing, Pakhangyi, and Pakhannge and repair of the wooden U Bein Bridge at Amarapura.

The Department of Archaeology, National Museum and Library maintain museums at 12 archaeological sites, with important collections at Bagan, Sriksetra (Hmawza), and Mrauk-U, as well as the National Museum in Yangon. There are many small museums in monasteries or local towns, under local control.

The Myanmar government has "spent a large amount of state budget for the national culture preservation" by building replica royal palaces at Bagan, Bago, Shwebo, and Mandalay, as a "symbol of success" and a "way of uplifting . . . the national prestige." In 2012 the nomination process for UNESCO World Heritage status was commenced for the Pyu Ancient Cities, Sriksetra, Beikthano and Halin.

Anthropoid Origins

The study of Myanmar's paleontological record was brought to attention worldwide in 1999 when anthropologist Gustaaf Houtman focused on a search for fossils, including early primates, in a critique of what he called "Myanmafication," an institutionalization of tradition for political purposes. In particular, he pointed to the substantial involvement of the military in the search in the mid-1990s for primate fossils around the Pondaung hills. The paleontological evidence supports the theory that East Asia, including Myanmar, may have been the homeland of the first primates. However, Myanmar scholars have at times taken theory as fact, linking this directly to later human populations, as "proof" that "Myanmar's pre-history dates back 50 million years."

The Mon Paradigm

The first significant leader of the Bagan period is considered to be Anawrahta (r. 1044–1077), although his story is suffused with legend. He is credited with the construction of irrigation works at Kyaukse, after dreaming of three snakes (perhaps representing the major rivers) which he battled. Anawrahta is said to have conquered a Mon-Khmer-speaking kingdom at Thaton, southeast of the modern capital Yangon (Rangoon), taking captives, Buddhist scriptures, and a generally more advanced culture to Bagan. The standard histories of Burma accept the story of the Mon conquest as factual. Professor Michael Aung-Thwin has suggested that the story was made up several centuries after the alleged event and has been wrongly adopted as fact by modern historians. This debate continues at conferences and in print.

The Repair Program

In 1975, a severe earthquake damaged many buildings at Bagan. UNESCO became involved in reconstruction. Since 1994, repairs have largely been funded by donations raised locally – something seen by many as an act that acquires religious merit. International participants in the post-earthquake repairs remain concerned about the direction the donor program has taken and the quality of the work. A cultural heritage conference was told in 2007 that "the utilisation of new materials and the indiscriminate use of concrete have contributed to falsifying to a considerable extent the existing monuments . . . the recommendations of UNESCO for the conservation of the masonry works and the paintings with the drawing up of a master plan went unheeded." In defense of the repair programme, Culture Minister Win Sein had said in 2001 that the objectives had been to satisfy the donors, to retain the original workmanship and design, and to make the buildings last longer. "These are living religious monuments highly venerated and worshipped by Myanmar people" he said, "it is our national duty to preserve, strengthen and restore all the cultural heritage monuments of Bagan to last and exist forever."

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► Cultural Heritage Site Damage Assessment
► Disaster Response Planning: Earthquakes
► Statues and Monumental Art in Archaeology

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Mytum, Harold

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Basic Biographical Information

Harold Mytum, an authority in the archaeology of early Christian Ireland, Iron Age Wales, and

the mortuary monuments of the modern world, was born in 1955. Mytum's B.A. (1977) and M. A. (1981) were from Selwyn College, Cambridge, and his Doctorate (1984) from Keble College, Oxford; his doctoral dissertation topic was *Settlement and Economy in Early Christian Ireland*.

Before even completing his Doctorate, Mytum was appointed James Knott Research Fellow in the Department of Archaeology at the University of Newcastle (1980–1982) and then Lecturer in Archaeology at the University of York (1982). He would remain at York for the next 25 years, serving as Head of Department between 1996 and 2001, and promoted to Reader in Archaeology in 1998; during his time at York, Mytum was instrumental in the growth of historical archaeology (in the American sense of the archaeology of the post-1500 period) within the department. Mytum left York in 2007 to become the Director of the Centre for Manx Studies within the University of Liverpool's School of Archaeology, Classics and Egyptology. He was a Council member of the Society for Medieval Archaeology from 1988 to 1997 and was the Editor of the society's journal *Medieval Archaeology* from 1989 to 1997. Mytum has also been a Committee member of the Society for Church Archaeology (2007–2008) and became a Council member of the Society for Post-Medieval Archaeology in 2011. Mytum was elected a Fellow of the Society of Antiquaries of London in 1987.

Major Accomplishments

Mytum's core research areas are diverse, and while there are arguably links between each of them (religion, particularly Christianity, linking his work in Ireland and postmedieval mortuary monuments; the late Iron Age and immediate post-Roman periods linking some of his work in Ireland, Wales, and the Isle of Man), the totality of his work offers no straightforward overall categorization, except perhaps in his willingness to apply theory-informed analysis to fields where theoretical approaches were previously often lacking and his geographical focus on the area bordering the Irish Sea. Mytum's book *The Origins of Early Christian Ireland* (Mytum 1992) was one of the first attempts to develop a theory-informed approach to the archaeology of early medieval Ireland. Strongly criticized on publication for perceived flaws stemming from its overtly theoretical approach (e.g., Sharpe 1993), the book's subsequent standing has grown as Irish archaeology has itself come to engage more deeply with theory.

In Wales, Mytum was the Director of the long-running Castell Henllys project at the namesake Iron Age and Romano-British hill fort in north Pembrokeshire (between Fishguard and Cardigan). This 20-year project ran from the mid-1980s until the first decade of the twenty-first century. Publication is still forthcoming as of early 2012, though individual papers on the project are in the process of appearing (Mytum & Murphy 2012). During this project's long life, Mytum developed a strong interest in experimental building reconstruction and public interpretation. The long-running training excavations at Castell Henllys, which encompassed Iron Age, Romano-British, and postmedieval sites, included students from United Kingdom, Australia, Europe, and North America. Since becoming Director of the Centre for Manx Studies, Mytum has extended this research to the Isle of Man, so that his focus on the Iron Age and early medieval period now encompasses the entire Irish Sea region.

The last 20 years or so, however, have increasingly seen Mytum turn towards the postmedieval period, with a particular focus on mortuary monuments and gravestones and on the archaeology of internment and prisoner of war camps. Much of the former work has focused specifically on the mortuary monuments of Wales and Ireland (e.g., Mytum 2002), but has also encompassed international comparative studies (Mytum 2006), guides to graveyard recording (Mytum 2000), and overviews of mortuary monuments and burial grounds (e.g., Mytum 2004). While Mytum has

not been the only British archaeologist to study death and commemoration in this period (e.g., Tarlow 1999), he has been at the forefront of a small group seeking to not only make the British archaeology of postmedieval death and commemoration more theory aware but also to make British postmedieval archaeology more generally engaged with theory.

Cross-References

- ▶ British Isles: Medieval Archaeology
- ▶ Churchyard Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Internment and Prisoners of War in Historical Archaeology
- ▶ Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Tarlow, Sarah

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Nabta Playa: Agriculture and Domestication

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Introduction

Nabta Playa is an ancient ephemeral lake and prehistoric archaeological site located in southern Egypt (Wendorf et al. 2001; Fig. 1). Although the modern Nabta region is barren and lacks surface water due to its extremely arid climate, there was enough rainfall during antiquity to support a shallow 1,500 km^2 lake and to sustain a savannah grassland and various human activities. Extensive excavations in the region of Nabta have yielded valuable insights regarding the local Late Stone Age – Neolithic culture – and the climate change that caused desertification in this part of Saharan North Africa during the Late Holocene (e.g., Wendorf & Schild 1980; Wendorf et al. 2001 and references therein).

Key Issues/Current Debates/Future Directions/Examples

The archaeological, paleobotanical, and paleontological records near Nabta enable reconstructions of the critical adaptations and transitions from foraging to food production, domestication, and the practice of animal husbandry (Close 1987). Sites in the area preserve prehistoric dwelling structures, storage pits, wells, and various artifacts preserved in stratified contexts, including characteristic tool assemblages and microliths, decorated pottery and plainware, grinding tablets, and ostrich eggshell beads. More than 100 published radiocarbon dates constrain the occupation during wet phases and the timing of intervening droughts when arid, harsh conditions caused abandonment (Nicoll 2001, 2004; Fig. 2). Interpretation of the material culture suggests that the Neolithic people at Nabta developed more elaborate traditions and practices with increasing social complexity over time (Close 1987; Wendorf & Schild 1998, 2001).

Activities at Nabta commenced around 11,000–9,300 cal BP. The people appear to have herded cattle, but there is intense debate about whether the *Bos* varieties discovered in the excavations were domesticated (Wendorf & Schild 2001). It has been proposed that Nabtans might have regarded their cattle as economic units of social status and prestige, like some modern pastoralists in Africa that herd animals for a regular supply of milk and blood (Close 1987). However, these assertions are speculative, and such ethnographic analogues may not be relevant for reconstructing the Neolithic.

A drought caused the desiccation of Nabta Playa after 9,300 cal BP and forced people to migrate to areas with more water, causing

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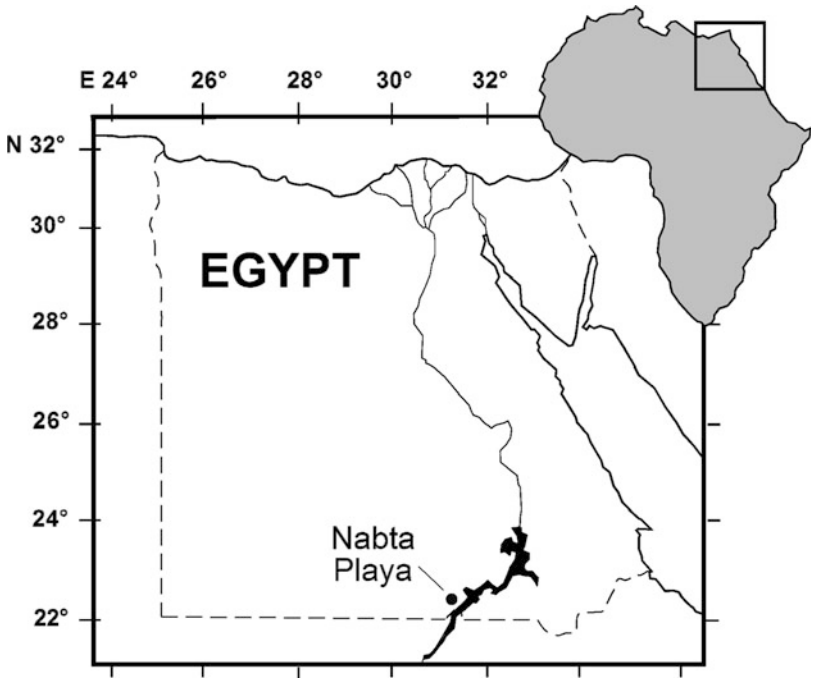

Nabta Playa: Agriculture and Domestication, Fig. 1 Location of Nabta Playa in southern Egypt, approximately ~100 km west of the Nile River Valley and 50 km north of the Sudan border

ka cal BP	ka 14C BP	Geologic Time			Cultural Associations, Variant Typologies, and Notable Events after Nicoll (2001, 2004) and Wendorf et al. (1990, 2001).				Local Enviromental Changes, S. Egypt
0	0	QUATERNARY PERIOD	Late Holocene	Historic	Islamic Period Byzantine Period Graeco-Roman Period Pharaonic Kingdoms				hyperarid pervasive droughts wind deflation
1	1							first camels appear	
2	2								refugia estabilshed arid period; low Nile
3	3							Dynastic apex Old Kingdom collapse	
4	4		Middle Holocene		Predynastic			Nile valley population boom "Exodus" from desert megalithic alignments, stone cirles	
5	5					Late	***Bunat El Ansam*** **"Megalith-Builders"**		less surface water storage and vegetation
6	6						***Ru'at El Baqar*** **"Cattle-Keepers"**	cattle burials nomadic pastoralism	aridification
7	7				Neolithic	Middle	***Ru'at El Ghanam*** **"Sheep-Herders"**	1st villages, ceremonial centres sedentism caprovids	aeolian activity droughts
8	8		Early Holocene	Prehistoric			***El Jerar*** ***El Nabta***		lakes filled; maximal vegetative cover
9	9					Early	***El Ghorab*** ***El Adam***	bladelet technology; microliths	
10	10							ferst cattle & pottery use of wild millet, legumes opportunistic pastoralism	transition to more rainfall & humid conditions
11			Late Pleistocene					flake technology	arid conditions
12	11				Late Palaeolithic-Middle Stone Age				aeolian activity
13									
14									
15									

Nabta Playa: Agriculture and Domestication, Fig. 2 Major variants (italicized) and cultural transitions described at Nabta Playa and the surrounding region, modified after Nicoll (2004, 2012) and references therein

consequent population increases along the Nile River Valley and other areas (Nicoll 2012). The people returning to Nabta after 9,000 years ago established larger settlements in which the huts were arranged in straight lines, and large, walk-in water wells were dug. The numerous grinding stones around Nabta suggest that cereal foods were consumed. More than 20,000 carbonized plant remains from 127 species were recovered from the excavations, including 10 tree and shrub varieties that are common in the Sahel and require 100–200 mm of rainfall per year. Paleobotanical remains included a number of edible plant foods, including variants of wild millets, sorghum, legumes, tubers, and fruits. Preserved bones of small animals (e.g., hares and gazelles) near the dwellings indicate that meat was part of the local sustenance. By ~8,800 cal years ago (~7,800 BP, uncalibrated), pottery was produced locally (Wendorf & Schild 2001, and references therein).

Between 8,000 and 7,000 years ago, Nabta Playa became dry and was abandoned during two major drought periods bracketed by radiocarbon dates. As hyperarid conditions developed, the water table dropped, the savanna grassland diminished, and wind deflation intensified, creating impossible living conditions. The people returning to Nabta after these droughts abated forged a more complex and organized society. The archaeological remains suggest the Nabtans practiced a ritualistic belief system associated with livestock. Excavated items supporting this inference include sacrifices of young cows, and their burial in clay-lined and roofed chambers marked with overlying stone slabs. The inhabitants of Nabta also constructed ~25 complex building structures with surface and subterranean features, including storage pit chambers and a shaped stone that might possibly represent the oldest sculpture in this part of Egypt (Nicoll 2012 and references therein).

Another significant find in the Nabta region is a Late Neolithic cemetery. Excavators discovered more than thirty graves, containing the remains of 69 individuals in all. Some of the graves had multiple and symbolic burials, and there were also two secondary burials, in which the skeleton eye sockets were filled with teeth (Kobusiewicz et al. 2004). A series of furnished graves date to 6,400 and 6,000 uncalibrated radiocarbon years BP. Associated grave goods – including carnelian beads, shell bracelets, polished stones, pottery, ochre, needles, stone tools, and carved figures – demonstrate that the Nabtans had trade connections across the region. The interpretation that these people practiced transhumance is substantiated by the graves containing offerings of disarticulated cattle and caprovid (e.g., goat, sheep) bones. Some evidence dating to ~8,100 years ago suggests the domestication of larger animals, goats, and sheep and development of animal husbandry, but these are controversial interpretations (Wendorf & Schild 2001).

The Nabtans erected monuments and megaliths made of large stone slabs, and these are thought to be among the oldest ceremonial centers and astronomical calendars found in this part of Africa (Wendorf & Schild 2001). Many of these structures involve large worked stones known as stelae or tumuli and are arranged on the landscape as mounded complexes, bedrock carvings located below the ground surface, semicircles, and linear orientations. Within the monuments, butchered cattle, goats, and sheep bones have been found, and these are interpreted as animal offerings. One tumulus site dating 7,400 years ago contained sacrificial remains of a calf buried in an elaborate chamber covered with tree branches (Wendorf & Schild 2001).

As drought conditions worsened around Nabta, water sources dried up, and the grassland disappeared ~6,000 year BP; the area was inhospitable after 5,300 years ago (3,350 BCE). Around 4,780 BP, hyperaridity prevailed, and the Sahara became established. This profound environmental change precipitated migration – an "Exodus event" in which humans left desert locales for more reliable water sources. As the Nabtan and desert peoples relocated, they inevitably contributed their own culture and beliefs to the birth of ancient Egyptian

religion and the Pharaonic civilization, which was organized around irrigation agriculture within the overpopulated Nile River Valley (Nicoll 2004, 2012).

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- ▶ Cattle: Domestication
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age

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Nam, Sylvia

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Basic Biographical Information

Sylvia Nam is a University of California President's Postdoctoral Fellow in the Department of Anthropology at the University of California, Riverside. She received her Ph.D. in City and Regional Planning with a designated emphasis in Global Metropolitan Studies from the University of California, Berkeley. She holds a Bachelor of Arts in Comparative Literature and a Master of City Planning also from the University of California, Berkeley.

Major Accomplishments

Currently, Sylvia is revising her dissertation on the emergence of Phnom Penh as a city of speculation into a book manuscript, while beginning a new line of research on inter-Asian circuits, specifically how visions of the global urbanism move across cities. Her work has been supported by the Fulbright Institute of International Education, the University of California Office of the President, the Center for Southeast Asia Studies at UC Berkeley, and the Center for Khmer Studies.

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Narrative and Storytelling for Archaeological Education

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Introduction

The aphorism "Archaeology is. . . the driest dust that blows" is credited to Mortimer Wheeler, one of the great popularizers of archaeology. Storytelling is one tool to prevent this fate and to make the past accessible to the present. Although it involves creating narratives using archaeological information, storytelling is not merely inventing fanciful stories to rescue children from classroom boredom. As this section is located in the Public Education category of this publication, the reader might assume that storytelling is a one-way process, something professionals (producers) do for the edification of the public (consumers). But this is only part of the story. As something that insiders do for the uninitiated, this is an epistemologically safe approach that draws a hard line between an intellectual pursuit that deals in hard data and the emotional response of encountering the lived experiences of people in the past. To suggest the latter opens archaeologists up to personal vulnerability. If archaeological storytelling were only a pedagogical technique, it would be of little interest to non-teachers. On the contrary, storytelling has both didactic and reflexive benefits. It has value for both its creators and their audience. But what is storytelling? Who is the public and what are they being educated about?

Definition

A story is a piece of prose or poetry that has narrative structure which, according to archaeologist Mark Pluciennik (1999), involves characters, events, and plotlines. For the present purpose, archaeological storytelling means the creation of prose, poetry, performance, song, or other mode by an archaeologist that incorporates archaeological data, has narrative structure, and that transcends standard archaeological presentation. I exclude most mass-market novels from this genre, as they are understood to be inventions regardless of how deeply they may draw from the archaeological record. I distinguish between products created explicitly for public outreach and those created both by and for archaeologists themselves. There is obvious overlap here, but at some point definitions are odious.

Why "storytelling"? I have used the term to de-intellectualize and separate the fledgling practice from the near impenetrable argot of literary theory (Praetzellis 1998). "Telling stories" has an intentional naivety that contrasts with the self-conscious and theoretically loaded "constructing narratives." To some degree and for some practitioners, storytelling is an attempt to regain part of archaeology's lost innocence. It encourages the reader to empathize with the characters, to enter their world and recognize their humanity. Narrative evokes an emotional rather than an intellectual response: coming across the skull of "poor Yorick," Hamlet reflected on mortality, not physiology. "Narrative 'truth'," wrote Bruner, "is judged by its verisimilitude rather than its verifiability" (1991: 13).

Key Issues/Current Debates

The rise of the narrative genre in the fields of history and archaeology is an outgrowth of intellectual movements of the 1960s and 1970s that lead away from the scientific, generalizing explanation of past events and processes to a more descriptive mode (Stone 1979). Hayden White's 1973 essay expressed what many historians had been thinking for years: that primary texts themselves are historical interpretations. At the same time, cultural anthropologist Clifford Geertz claimed that ethnographic descriptions are "not privileged, just particular: another country heard from" (1973: 23). Postmodern skepticism with the metanarratives of the past gave a new respectability to the study of the small scale and local.

While historians delved into micro-history, archaeologists too began to people the anonymous past. The household was well suited to tease out gender relations that were often more visible at this scale of analysis (e.g., Spector 1993). Phenomenology became a useful method at larger scales: Mark Edmonds (1999), for example, reconstructed how ancient peoples may have experienced their cultural landscape. Edmonds' narratives and the work of Chris Tilley (1997) leave one wondering how it is possible to appreciate the functioning of a ritual structure without considering the emotional responses of the people who used it.

One of the outcomes of archaeology's loss of innocence is that each generation must puzzle over how it can remain authoritative while being honest about its epistemology. Narrative and phenomenological approach are subject to frequent critiques from within archaeology. These concern both the intellectual validity of these approaches (e.g., Fleming 2006) and the possibility that archaeology as a field may lose its credibility with the public – and consequently its funding – if practitioners stray from conventional scholarship. Blur the distinction between what we know with some level of certainty and what we merely speculate, and the ice becomes thin indeed (Kristiansen 2011).

While it lived in the rarified atmosphere of the academy, archaeology shared the protected status of many another esoteric specialty. But the rise of legally mandated and public-funded archaeology since the 1980s injected another consideration: the necessity to justify archaeology's cost by an equivalent public benefit. "Telling the stories" of places listed on the USA's National Register of Historic Places involves a range of modes including drama (Thomson & Harper 2000), while fictional accounts based on archaeological and archival sources have been used for decades to present the results of legally mandated archaeology to the general public (e.g., Praetzellis & Praetzellis 1984; Kane & Keaton 1994).

For the practitioner writing about his or her site, storytelling gives the freedom that only comes with an explicitly personalized narrative. The necessity to maintain an objective stance is gone. Invented dialogs invite intellectual thought experiments about potential meanings. Seemingly mundane objects can be explored and recontextualized regardless of their apparent scientific significance. And the standard site report's seamless teleology can be mangled by pursuing one or other of the odd quirks that influenced the investigation. One outcome is esthetic, for the creator derives fulfillment from the creative process by which he or she constructs a reality in which "their" people interact with the objects and documents that have come to be familiar with the investigator. Simultaneously, it is an exercise in reflexivity, a reminder to archaeologists that we ourselves assign meaning and pattern from a range of possibilities.

Examples

Archaeological narrative has several audiences (including the creators themselves) and has many forms. In this section, I present examples of the form organized by structure or mode, since this is how the audience experiences it. The modes are stories, pedagogical dialogs, performances, and novels.

Stories often take the form of archaeologically informed descriptions of mundane events whereby the archaeologist presents site formation processes, for example, the stories that form the introduction to Deetz's 1996 book *In Small Things Forgotten* that include the purchase of some pots that might be later found by an archaeologist. Stories may also attribute theoretically informed motives to the characters as in Spector's wonderfully empathetic *What this Awl Means* (1993). In recent decades, archaeologists have become less timid about straying from the straight road of science and into the potentially treacherous paths of phenomenology. Tilley (1997) is one of the best exponents of an archaeology that inserts emotional response into the understanding of Neolithic landscapes to figure out how people experienced the ritual structures they created. Interpreting publically funded archaeological investigations, the audience for

stories is as wide as can be, including the general public, students, and archaeologists.

Dialogs pit characters' opposing views against each other in more or less realistic conversations often about the nature of archaeological discourse itself. In the premiere example, Flannery's 1982 moral tale *The Golden Marshalltown*, the Old Timer matches wits with an ambitious, amoral upstart over what it means to be a real archaeologist. Dialogs have been a popular pedagogical technique since Socrates, as the writer sets up questions and answers to echo the natural give-and-take of natural argumentation. In Johnson's popular textbook *Archaeological Theory* (2010), the useful but annoying foil Roger Beefy (who loves archaeology but can't see the point of all that theory stuff) interjects many of the empiricist, common sense remarks that are so familiar to undergraduate teachers. My own textbook *Death by Theory* (Praetzellis 2011) attempts something similar in the guise of a cartoon-illustrated murder mystery novel. The audience for dialogs – whose authors intentionally avoid the jargon and convoluted construction that baffles the uninitiated – tends to be university students and professional archaeologists.

Performances and multimedia presentations include pieces created primarily to be experienced in real time by an audience rather than to be read from a book. The emphasis is often on the emotional impact created by theatricality as a reflexive and possibly transformational experience for fellow archaeologists at a professional venue (e.g., Praetzellis & Praetzellis 1998). Bapty's 1990 play "The Agony and the Ecstasy" is an internal dialog about the creation of the past through interpretation through the Inward voice, the Outward voice, and the Past. That the audience is other archaeologists is made clear by the fact that the action takes place at 3:10 p.m. on 19 December 1990 at a particular academic conference: the Theoretical Archaeology Group meeting in Lampeter, Wales. The use of Web-based hypertext documents in archaeology is exemplified by Rosemary Joyce's Sister Stories project that began in 1994 (Lopiparo & Joyce 2003). Seeking an alternative way to interpret archaeological insights, Joyce hyperlinked portions of the sixteenth-century Florentine Codex (a sixteenth-century ethnography of the Nahuatl-speaking people of the Aztec empire) onto a map at locations that would have been familiar to these people. Finally, there are Tringham's movies that reflect, among other things, on archaeologists' complex emotional relationships with their sites. "Back in My Hometown" (Tringham 2010), for example, was created for and aired at the 2010 Society for American Archaeology conference, while the multimedia RAVE (Real Audiences and Virtual Excavations) was Tringham's keynote address at the 2003 Society for California Archaeology conference.

Archaeo-historical novels consist of prose storytelling on a grand scale. While individual stories tend to interpret particular short-lived events, these novels often have complex storylines that extend over long periods. What separates work in this category from conventional historical fiction is their level of documentation – archaeological, documentary, and ethnographic. It is no accident that this mode is often selected by senior archaeologists who use the medium to reflect on archaeological interpretation and their own role in the process. These people have decades of experience to offer and, as recognized scholars, are less susceptible to the kind of criticism for venturing into the narrative mode that might derail a less established career. Layton's novels (1999, 2002) imagine the origins and eventual disposition of the cargo of a vessel that wrecked off the California coast through the eyes of Native Americans, seamen, and the sport divers and archaeologists who eventually brought the collection to light. In contrast to Layton's books, which are extensively footnoted to the archaeological and sources upon which the author relied, are Nelson's mystical novels of Neolithic Korea (1999, 2004). Footnotes would only disturb the flow of these lyrical works through which the author convincingly peoples the ancient past to explore gender, shamanism, and ethnic identity. The audience for archaeo-historical novels ranges from the general public to university students and professional archaeologists.

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Nasca and Pampa Jumana Lines and Geoglyphs

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Introduction

Thousands of giant ground drawings scribed by ancient inhabitants onto the Pampa Jumana of southern Perú in the Río Grande de Nazca ("Nasca" refers to the archaeological culture; "Nazca" refers to geographic locations.) drainage

Nasca and Pampa Jumana Lines and Geoglyphs, Table 1 South Coast of Peru cultural chronology

Formative Period	1800–800 BCE
Early Horizon (Ocucaje)	800–200 BCE
Early Intermediate Period (Nasca)	200 BCE–CE 650 CE
Middle Horizon (Huari influence)	650–1000 CE
Late Intermediate Period (Ica)	1000–1450 CE
Late Horizon (Inca)	1450–1532 CE

are known as the "Nasca geoglyphs" or "Nasca lines." Artifacts associated with the geoglyphs suggest that they were known and used as early as the Early Horizon through Inca domination (Table 1).

Although the region lies on the northern extent of the arid Atacama Desert, adjacent river valleys are generally reliable sources of water and excellent soils for agriculture and habitation. The Pampa Jumana, measuring approximately 3 km × 10 km, contains the densest concentration of geometric and biomorphic figures. Geoglyphs, predominantly geometric, beyond this bounded region are found north in the Palpa Valley and south of Nazca along the foothills of the Andes mountains (MAP). The style and content of many of the geoglyphs echo other forms of artistic expression of pre-Nasca and Nasca cultures, while other geoglyphs appear to lie outside the known artistic corpus.

The geoglyphs were noted in 1926 by the archaeologists Kroeber, Tello, and Mejia while they were undertaking archaeological survey in southern Perú (Mejia 1940). The sixteenth-century Spanish chronicler Pedro Cieza de León may have referred to the geoglyphs in 1553, and in 1586, the provincial magistrate Luis de Monzón referred to "caminos" – roads – in southern Peru that were likely the long linear geoglyphs abundant throughout the region (Clarkson 1985).

Systematic studies of the Nasca geoglyphs began in the 1940s and have expanded to explore their role in the worldview and lifeways of the inhabitants of the region, including astronomy, calendars, religion, and agriculture. Scholarly research in the Nazca region has been broad based, encompassing archaeology, history, ethnography, art history, hydrology, geology, and geography (Kosok 1965; Reiche 1980; Reinhard 1985; Hadingham 1987; Morrison 1987; Aveni 1990; Rickenbach 1999). Additionally, much literature on Nasca geoglyphs falls within the realm of unsystematic research, and Nasca culture and geoglyphs are perhaps better known for popularized fantastic claims that have little or no context within Andean culture history. Such claims deny the ingenuity, creativity, and intelligence of a rich cultural adaptation that thrived for hundreds of years in one of the driest deserts in the world.

Definition

Nasca geoglyphs are intentional human-created renderings of biomorphic, geometric, and abstract forms and are situated on stable surfaces of the desert adjacent to the river valleys of the region. There is evidence of use and reuse of the geoglyphs, beginning with the Early Horizon.

The manufacture of geoglyphs was easily accomplished, requiring neither great strength nor large numbers of people; the execution of the geoglyphs did require forethought, planning, and skill. The desert surface is a natural palette, comprised of light-colored alluvial outwash from the Andean foothills, overlain by stones with dark-colored desert varnish. A "subtractive" geoglyph is made by removing or sweeping aside stones to reveal the lighter-colored substrate in sharp contrast. An "additive" technique provides visual definition to a geoglyph by contrast and shadows cast by low continuous mounds of stones swept aside to outline the desired form. Both manufacturing techniques are stable enough to withstand substantial winds, rain, and earthquakes. The need invoked in the popular literature for aerial viewpoints to see the geoglyphs disregards the parameters of Nasca geoglyphs as nonstatic images and presupposes a Western tradition of viewing "art" on a vertical surface. The linear geoglyphs are easily visible from the ground from a fixed point on the geoglyph. Conversely, the biomorphic figures, measuring up to 125 m, cannot be fully seen from a static location;

there are no natural elevated locations from which the biomorphic figures can be seen, and there is no evidence of constructions. The biomorphic figures were rendered by a single line the width of a walking path that delineates the figure; "seeing" a figure requires experiencing it by walking through the shape.

The motifs of Nasca geoglyphs include naturalistic and abstract (biomorphic) and geometric forms. Flora and fauna associated with motifs on ceramics, textiles, gourds, and other contemporaneous media provide information on naturalistic and abstract imagery. Geometric lines, trapezoids, and spirals are widespread throughout the Nasca region. Straight lines associated with "line centers" emanate from natural projections of the Andean foothills onto the pampas; these lines range up to several kilometers long. The lines extend unerringly straight, regardless of the terrain, suggesting a necessity of form that ignores convenience and suggests ritual walking. The geometric forms are not clearly identifiable in other forms of Nasca material culture, although Andean concepts of radiality associated with kinship, society, numerics, toponomy, and calendrics can be correlated with radiating forms of line centers.

The locations selected to create geoglyphs were deliberately and carefully chosen to avoid areas affected by water. The annual rise in the rivers running through the region, resulting from seasonal precipitation in the Andes, is confined to the rivers, and water flow through the pampa quebradas is minimal and predictable. An exception is found in long straight lines which can run for several kilometers, many of which cross seasonal watercourses. When a line cannot be seen on the opposite side of a watercourse, a cairn is usually present to guide the direction. Geoglyphs are also situated on the flanks of low alluvial hills; the visibility of these figures is assured by their elevation (Clarkson 1985).

Key Issues, Current Debates, and Future Directions

The purposes and ages of the Nasca geoglyphs have remained at the core of investigations, and applications of new hypotheses and technologies continue to spur debate, reexamination, and reconsideration.

Water has been the basis of several studies over the decades. The water table is alternately very deep on the pampa – i.e., inaccessible – and accessible in the river valleys via natural springs and *pukios* (system of wells and subterranean aqueducts). Seasonal rainfall in the Andes results in an increase in water in the pukios and ability to maintain permanent habitation and agriculture (ONERN 1971). The necessity of assuring reliable water generates cultural responses that are elaborated through ethnographic comparisons that are based on documented factors of Andean cultures (Reinhard 1985; Urton 1990). The pukios are an ingenious water control system built where there was accessible water; the ancient builders not only mentally and physically connected springs with a fluctuating water table where it was relatively close to the surface at the valley bottoms, they avoided unnecessary evaporation of precious water.

The twentieth-century rediscovery of the Nasca geoglyphs prompted speculation about their antiquity, particularly because they lack obvious cultural contexts to date them. In spite of controversies about viable dating methods and results (Whitley 2009), independently derived ages (Silverman & Browne 1991; Dorn et al. 2001; Greilich et al. 2004) indicate that the majority of the geoglyphs were made during Nasca culture.

Maximum age estimates can be ascertained by dateable artifacts encountered on geoglyphs. The first systematic age estimates for the geoglyphs of the Pampa Jumana were derived by these means (Hawkins 1974; Clarkson 1990), associating biomorphic geoglyphs within the Nasca culture and geometric geoglyphs with the later Ica culture. The area has been repeatedly traversed since the arrival of Europeans in the sixteenth century, and such age determinations can be confused by more recent visitors redepositing or removing archaeological materials. The time lag between the creation of a geoglyph and deposition of artifacts, either through accident or by design, is indeterminate through this method. Similarly, a ^{14}C age

of 525 ± 80 CE obtained by Strong in 1957 from a wooden post in a geoglyph provides no direct evidence of the association of the wood with the geoglyph.

Intrusive features associated with geoglyphs may provide a relative chronological sequence. Aerial photographs can show overlapping geoglyphs, a distinction that is difficult to observe from the ground; the lapse of time between the geoglyph creations is also indeterminate.

A series of ^{14}C assessments were made on desert varnish on pukios and geoglyphs in the Nazca region in the late twentieth century; the results were and are considered experimental, irrespective of the confirmed fraudulent accusations that the widely tested methodology was rigged (Whitley 2009; Dorn & Krinsely 2011). Oxidizable carbon ratio (OCR) dating provided viable ages for geomorphological features at Nasca, and this dating technique can provide more statistically viable ages for geoglyphs (Dorn 2004: 18).

There is no doubt that the geoglyphs were reused: there is no evidence to indicate that the original purpose for which a geoglyph was made maintained an identical use or meaning for ensuing generations or cultures. Astronomy, ritualized travel, pilgrimage, and metaphorical and allegorical water conduits between the Andes mountains and the river valleys (Reinhard 1985; Aveni 1990; Silverman 1993) are well-substantiated hypotheses. Geoglyphs considered within the context of related symbols on ceramics, textiles, and architecture provide insightful information on the environment, subsistence, and belief systems.

Damage and destruction by humans remain the greatest threat to the Nasca geoglyphs, where even footprints persist for decades. The natural environment has remained stable since before human occupation of the region. Rainfall and inundation on the geoglyphs is virtually nonexistant, and the frequent winds are insufficient to dislodge the stones that comprise the geoglyphs. Conservation and protection of the Pampa Jumana is enshrined by Peruvian law, and Nasca geoglyphs were granted World Heritage status in 1994.

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- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
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Nash, George

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Basic Biographical Information

Dr. George Nash is currently a part-time lecturer and visiting fellow at the Department of Archaeology and Anthropology, University of Bristol, an associate professor, and senior researcher at the Spiru Haret University, Bucharest, Romania, and at the Museum of Prehistoric Art (Quaternary and Prehistory Geosciences Centre, Macao, Portugal). George has been a professional archaeologist for the past 20 years and has undertaken extensive fieldwork on prehistoric rock art and mobility art in Denmark, Indonesia, Malaysia, Norway, Spain, and Sweden (Fig. 1). Between 1994 and 1997 he directed excavations at the La Hougue Bie passage grave on Jersey, one of Europe's largest Neolithic monuments and has directed excavations at Westminster Hall, London.

Nash, George, Fig. 1 Dr. George Nash

Major Accomplishments

George Nash has written and edited many books on prehistoric art and prehistoric monumentality including *Status, Exchange and Mobility: Mesolithic Portable Art of Southern Scandinavia* (1998), *Signifying Place and Space: World Perspectives of Rock-art and Landscape* (2000), *European Landscapes of Rock-art* (2002) (Fig. 2), *The Figured Landscapes of Rock-art: Looking at Pictures and Place*, edited with Christopher Chippindale (2004), *The Architecture of Death* (2006), *Art as Metaphor* edited with Aron Mazel and Clive Waddington (2007) (Fig. 3), and *The Archaeology of People and Territoriality* (2009).

Dr. Nash has authored 120 peer-reviewed papers and has edited, coedited, and written 24 books. George is currently involved in four major rock-art recording and interpretation projects in Penang, northeast Malaysia, and the

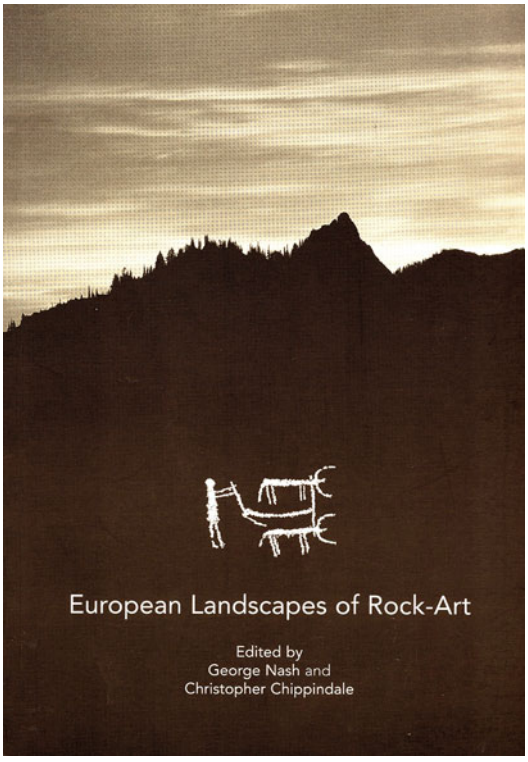

Nash, George, Fig. 2 *European Landscapes of Rock-Art*, edited by George Nash and Christopher Chippindale (Routledge)

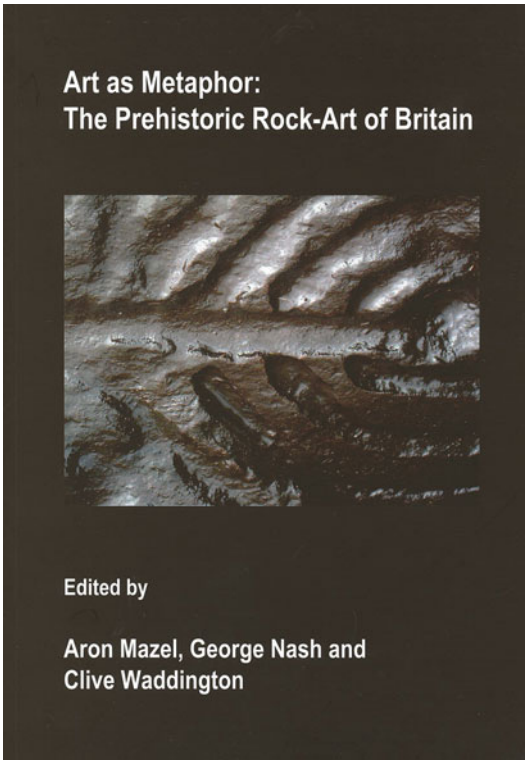

Nash, George, Fig. 3 *Art as Metaphor: The Prehistoric Rock-art of Britain*. Edited by Aron Mazel, George Nash, and Clive Waddington (Archaeopress)

Valcamonica in northern Italy, looking at Iron Age house carvings. In Wales, he is codirector of the Welsh Rock art Organisation (WRAO) and is to coordinate and direct a rock-art landscape project in Staffordshire, Central England. He has also written and presented five programs on European rock art and contemporary graffiti for BBC Radio 4. George is also currently working on two projects: a landscape assessment within the eastern sector of Rhossili Down, South Wales, and representative rock art in the Channel Islands.

Since 2009 George Nash has directed two major field projects: an excavation of a Neolithic gallery grave in Delancey Park, north of St. Peter Port, Guernsey, part of a 3-year project and a Neolithic Portal Dolmen in South West Wales. In 2011 and as part of his ongoing publishing commitments, George has coedited and published *Arkeos* (with Professor Luiz Oosterbeek of Tomar University) and edited *The Levantine Question: The Rock Art of the Spanish Levant* (edited with José Julio García Arranz, Hipólito Collado Giraldo).

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Nationalism and Archaeology

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Introduction

Throughout the last two centuries, nationalism has played an increasingly key role in world politics. Scholarship, however, only awoke to its significance and started analysing it after World War II (Kohn 1946), especially from the late 1960s on (Barnard & Mechner 1965; Deutsch 1966; Kedourie 1966; Smith 1976; Hobsbawm 1990). With the exception of a few comments made by early scholars (Myers 1907: 319; Himmelman 1976: 119–130), it has only been in the last few years that archaeologists have come to realise the importance of discussing the effect that nationalism has had on the discipline and the way in which archaeologists interpret the past. In this, as in many other aspects, archaeologists demonstrate that they are citizens of the world and that the experiences they live through influence their professional practice. This upsurge in interest among archaeologists is related to the rise of nationalist movements throughout the world, due to the end of political regimes in countries such as Spain, Yugoslavia and the USSR, in some cases resulting in conflict and the appearance of new nation-states, political changes that archaeologists have personally experienced. National and ethnic identities are often overlapping phenomena, and recent ethnic conflicts, such as those in Jerusalem and India, have also involved nationalistic uses of archaeological remains that archaeologists have had to deal with. Ethnic conflicts are also behind political claims of indigenous communities throughout the world; these are having a profound effect on the practice of archaeology in an increasing number of countries, leading to a transformation in the definition of archaeology and a change in what it means to be an archaeologist.

Definition

Nationalism is a doctrine that holds that 'humanity is naturally divided into nations, that nations are known by certain characteristics which can be ascertained, and that the only legitimate type of government is national self-government' (Kedourie 1993: 1). For the last two decades, however, many scholars have emphasised the constructivist nature of the nation, arguing that nations do not have an objective existence. Nations are imagined communities (cf. Anderson 1991), whose individuals see themselves as bound together by their culture, history, and common ancestry. Archaeology's potential to provide the nation with information about these ties, especially where history is not able to do this, makes this discipline important in the eyes of the nation.

It is now broadly accepted that archaeology is one of a range of disciplines that feeds national history and national identity. National history needs a past and its drafting usually takes the form, for the earliest periods, of a discrete

number of archaeological cultures that are then identified with a particular ethnic group considered to be the origin of the modern inhabitants of the nation. Territory, politics and ethnicity are thus intertwined. Migration and adaptation are often the mechanisms used to explain changes in material culture over time, together with, in many cases, the arrival in the area of new ethnic groups that are also integrated into the national history in some capacity (either as new members of the nation or as its foes). Therefore, national narratives need archaeology, but they also need other disciplines such as history, philology and anthropology. Depending on the way in which the nation is described, some of these disciplines will have more importance than others. Thus, philology is highly considered and subsidised in countries where the national language is key to national identity. Archaeology has a high status in countries where archaeologists provide a wealth of data to describe a nation's Golden Age; Italy and Mexico with their Roman and Aztec pasts are good examples of this. However, although archaeology may not be able to provide such highly esteemed data to explain national identity in other areas of the world, the information from archaeologists is still useful for writing the nation's history, and this explains the global presence of archaeologists in every country. Their role as data providers for writing the record of the national past is still needed, as national history is not a static narrative, but one that needs to be continuously negotiated and recreated. What it means to be a Canadian or an Australian today is different from what it meant only half a century ago. This explains the continuing importance of archaeology, and how the past of these countries is understood has moved on from the narrative held decades ago. With their practice, archaeologists have been active creators of national identity everywhere in the world, and have also provided the information for others to recreate the national past.

Historical Background

The relationship between nationalism and archaeology started with Modernity, i.e., with the creation of the modern state, although there are precedents in the early modern period and before. The word nation derives from Latin and originally referred to a group of people born in the same territory, either a region or a country. It was used as such in the medieval period and found, for example, in English documents in the formula super omnes nationes. We can find a few examples of the use of the classical past in the medieval period, such as the selection of classical themes to decorate Charlemagne's coffin. However, the main language at the time was that of the Bible. It was during the Renaissance that Europe rediscovered the classical world. The development of urban centres allowed the emergence of a new group in society formed by merchants and traders and a growth in the economic power of the nobility and the monarchy. All these groups needed new forms of political self-definition and new ways of expressing power that would symbolically separate the rulers from the religious medieval discourse, and this was achieved through the language and imagery of Antiquity. Thus, the Roman dictator Cola di Rienzo (c. 1313–1354) legitimised a newly created Roman Republic with the use of the recently discovered fragmentary copy of Vespasian's Lex de Imperio from the first century. This was probably the first time, but by no means the last, that an archaeological object was used to claim political rights in the early modern age.

The concept of the state accepted in Modernity came to be in the early modern era: the use of vernacular languages, the monetisation of the economy, and the decline of the three-order society (peasantry, nobility and clergy). The classical past became one of the main forms of expressing power, and classical antiquities were thus turned into political and social assets. This explains the excavations undertaken from the sixteenth century on in those countries where the Roman Empire had been present, and the collections of antiquities gathered in cabinets of curiosities. It also explains how in the political revolutions of the last third of the eighteenth century, the past appropriated was that of the Classical Civilisations – mainly

Rome, but also Greece and Egypt. The idea of the Classical was associated with all that was right, good and useful, and the newly self-defined nations felt confident in considering themselves the true inheritors of Classical Greece and Rome. In this, as in everything else in these first decades of nationalism, the realities on the ground show that there are no clear-cut features that completely separate the onset of the political use of archaeology from the previous period.

The term 'civic nationalism' (also confusingly known as 'political nationalism') has been used by scholars of nationalism to refer to the earliest type of nationalism, characterised by an understanding of individuals as political beings whose self-fulfilment was linked to citizenship and patriotism. The frequent links between these and the Classical past explains the importance given to antiquities in the first museum opened for the enjoyment and enlightenment of a nation – the Louvre, the transfer of antiquities from Rome to Paris during the Napoleonic occupation of Rome, and the inclusion of an antiquarian on the Commission of Sciences and Arts sent to Egypt to learn about the country. The importance of the past – and in particular, the spectacular monumental remains left behind by ancient civilizations – was also paramount in the earliest nationalist uprisings, when the presence of remains in the territory that were linked to vanished great civilisations was used to justify the national character of the revolutionaries both in Greece and the Spanish Latin American colonies.

However, the character of nationalism changed in the 1840s, and this had a profound effect on the main interests driving the search for antiquities. The task scholars undertook in rationalising cultural and national difference came together with an increasing importance given to language and race in defining the nation. Experts in the study of nationalism have designated this new phenomenon as "mystical" nationalism and, more recently, "cultural" or "ethnic" nationalism. In ethnic or cultural nationalism, nations are defined as units formed by individuals who share a common history and, therefore, form part of the same ethnic group – or, in nineteenth-century parlance, race – speak the same language, and share a distinctive set of customs or culture. A series of new disciplines were professionalised at the time in connection with the new definition of nationalism: first philology and then, in the middle decades of the century, physical anthropology. At the time, the assumption was that the concept of nation was objective and unproblematic, and therefore most believed that there was a direct correspondence between language, race and nation, or, as the latter became increasingly known, culture.

Unsurprisingly, the transformation of the meaning of nation and nationalism from civic to cultural nationalism influenced the study of the archaeological past. The national past became not only that of the Classical civilisations (associated with the ideas of the Good, the Rational and the Truth), but also increasingly that of the groups who had actually lived in the country. In Europe, this led to the social recognition of enquiries about the prehistoric and medieval pasts. For the periods in which no documents existed, the groups inhabiting the national territory were identified by scholars on the basis of the information provided both by the Bible and the Classical sources. It became increasingly clear that the professionalization of the teaching of national prehistoric and medieval archaeology was needed; however, although some posts were created in universities and similar learning bodies, this would mainly have to wait until the twentieth century. In universities and museums, it was more common to find specialists in the archaeology of the ancient Classical civilisations. Beyond Europe racism affected archaeology in two ways. On the one hand, monuments produced by ancient civilisations were considered to have been made by lesser races, and in comparison to the always superior Classical model, they were deemed inferior. On the other hand, where no monuments existed, the indigenous populations living in the area were considered to be a suitable source of information about the prehistoric times. The increasing importance of imperialism as an accurate method of considering a nation's

success only exacerbated these trends. Yet, it was in this period that the first local archaeologists started to work on the archaeology of the colonial and imperial areas with no tradition of Western antiquarianism; countries such as India, Indonesia, Egypt and the Ottoman empire. They had to overcome many difficulties to be accepted as members of the profession and to have their opinions heard, not least because of the obstacles created by their fellow imperial colleagues.

After World War I, nationalism became universally accepted as the proper political method for legitimising the political division of the world into sovereign states. In archaeology, this translated into a definite interest in archaeological cultures and ethnogenesis, the latter being the search for the origin of a single ethnic group that characterised the nation, or that of the mixing of many different ethnic groups (see the concept of mestizaje in much of Latin America). It also translated into further growth in the institutionalisation of archaeology, with the creation of more museums, university chairs in archaeology, in which prehistoric and medieval archaeology had an increasing presence, and a generalisation of heritage offices in a rising number of countries. The instability created by the agreements drafted at the close of World War I, however, led to a crisis in democracy and the emergence of extreme nationalism, especially in Europe. The practice of archaeology reflected this, particularly in countries where the Golden Ages of the nation were able to benefit from archaeologists' work. On the one hand, the number of jobs increased significantly. Examples of this in Europe are an explosion in the number of departments of Prehistory in Germany, and also the increase in funding for Roman archaeology in Italy. On the other hand, this came together with an imbalance in the archaeological periods for which the state was prepared to fund research, resulting in prioritising work on the periods and types of data that justified political narratives. Unfortunately, as happened at excavations such as the Ara Pacis and the Ostia harbour in Italy, the search for immediate results compromised the quality of the work. The political support for racism also led to an increase in archaeology interpreted racially in order to fit contemporary politics. The potentially harmful effects of state funding were a matter of debate in countries such as Britain that were still clutching to democratic regimes, and was reflected, for example, in the conference on 'The Future of Archaeology' held in London in 1943.

The end of World War II soon meant the division of the world into two blocks, in what became known as the Cold War. The state of political affairs affected archaeology in many ways. On the western side of the Iron Curtain, most countries in Europe and America went through a period of apolitisation, partly as a reaction to the previous abuses and to a genuine desire for scientific objectivity. However, in countries such as the US, the McCarthy era had a chilling effect on any political leanings archaeologists may have had. There, rather than being a choice, apolitisation became a self-enforced practice. To the east of the Iron Curtain, archaeology was used under Soviet nationalism to legitimise the political regimes with a generalisation of ethnogenetic studies. In the developing world, the decolonisation of countries, including many in Africa, led to a process of nation-building that had an impact not only on the use of archaeology to create a national past for the new nation, but also on its institutionalisation. A similar process has occurred since the dismembering of the Soviet Union in 1991.

Key Issues and Future Directions

In addition to the nationalisation of the archaeological past going on in the new nation-states, an alternative process has been taking place among indigenous peoples around the globe. To a great degree, this is a movement that can be equated with nationalism. In the United States, the civil rights movement of the mid-1950s raised awareness of the rights Native Americans should have. The American Indian Movement (AIM) was formally founded in 1968

and actions quickly began against archaeologists and physical anthropologists. Their claims were soon heard in other English-speaking areas of the world, and demands to control their past also started in these areas. The demands of indigenous peoples led to legislation such as NAGPRA in the US in 1990 and the Mabo decision of the Australian High Court in 1992, recognising native title to lands in Australia. In addition, there has been a movement for the return of cultural property held in museums to indigenous populations and the repatriation of human remains. The repatriation of antiquities is also being sought by sovereign states on the basis that they were illegally removed from those countries. Examples of this are Greece's request for the return of Elgin Marbles and Guatemala's demand for the Boston Museum of Fine Arts to return the Landon T. Clay collection of Mayan antiquities. The new climate created by these claims and the successes in defying the priority given so far to members of the archaeological profession to rule on everything related to the physical remains of the past has led to new petitions by other communities. These include those from local communities in Europe and elsewhere over the archaeological remains found in their own parish or province, and other faith-based communities such as Hindus, modern re-created beliefs such as Druids, and gender-based movements such as the Mother Goddess movement. The challenges created by all these competing claims to the past are having a profound effect on the makeup of archaeological practice.

Most current debates on the relationship between nationalism and archaeology assess archaeology's potential for nationalist manipulation (Kohl & Fawcett 1995; Atkinson et al. 1996; Díaz-Andreu & Champion 1996; Silberman & Small 1997; Meskell 1998; Díaz-Andreu 2007; Kohl et al. 2007). Most of the studies of nationalism and archaeology of this kind have looked into particular case studies, and there is an increasingly bulky literature on the subject. The challenges facing archaeology today have also led to a flurry of discussion meetings and publications (Gathercole & Lowenthal 1990; Barkan & Bush 2002; Wylie 2005; Brunk & Young 2009). One of the latter trends regarding studies of the relationship between nationalism and archaeology relates to some recent studies that have paid attention to the commodification of the past and the national marketing of heritage (Rowan & Baram 2004; Pomeroy-Kellinger & Scott 2007).

There are several theoretical discussions in which archaeologists looking at the influence of nationalism on their discipline could engage more widely. One of them is the idea of banal nationalism. Billig (1995) analyses how individuals internalise their national identity so that they perceive themselves as members of the nation even if they are not explicitly reminded of it. It is possible to argue that archaeology is potentially a part of the routine of the national forms and symbols that allow the transformation of nationalism into national identity. Archaeological symbols on coins, such as the owl of Athena on Greek one-euro coins or the Pharaoh's bust on Egyptian one-pound coins, help to reproduce the nation. Archaeological practice also has nationhood continually in its background. The productions of the archaeological profession – national conferences, the language used in publications, and the territory covered in journals and books – are daily reminders of national identity.

Cross-References

- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Modern World: Historical Archaeology
- ▶ Supermodernity and Archaeology

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Nationalism and Archaeology: Overview

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State of Knowledge and Current Debates

Introduction

Nationalism is an ideology and social practice which makes the "nation" the major political agent and privileges national interests over all the others. In relation to incorporation rules, scholars distinguish between civic nationalism (inclusive) which embraces all people having citizenship and ethnic nationalism (exclusive) which selects people depending on their origins (on the principle of "blood" which usually emphasizes ethnic origins through paternal or maternal lines or both). With reference to goals, one can distinguish between political, economic, and cultural nationalisms. Nationalism usually (although not always) refers to shared language and culture, their continuity in time, and ethnic roots in a given geographical area. Imagination and emotions play an important role in the development of these ideas. An image of a cohesive and rooted community serves to legitimate a nation's claims for sovereignty within a well-bounded territory. All these images and ideas need to be supported with solid scholarly arguments including references to the traces of the ancestors' activity materialized in historical and archaeological sites and monuments.

It can also be argued that nationalism served to enhance archaeology's professionalization in many areas as well as further its institutionalization. This is because archaeology has been used in numerous instances to claim a nation's long continuity in time through its rich past and ancient roots. For this goal an essentialist approach has often been exploited – one which reifies the nation in order to increase national

Nationalism and Archaeology: Overview, Fig. 1 Neolithic shrine in Malta (author's photo)

consolidation. This approach has obtained a new direction under globalization of which by-products have been localization and a passion for local identities. As a result, the role of "ethnic nationalism" has evolved and become more complex. The struggle for recognition has intensified in many places, and cultural heritage claims have become an important social symbol legitimizing political and cultural assertions for many groups. Some crucial questions arise from these concepts however such as what is included or excluded from a "national heritage"? and whose heritage is it that is being privileged?

Archaeology for Nationalism

Archaeology is valued by those wishing to use it for nationalistic purposes for its ability to provide material evidence of long cultural continuity and to establish links with remote ancestors. Even recent newcomers can be fascinated with their predecessors' achievements in the remote past (e.g., Neolithic shrines are considered national treasury in Malta; see Fig. 1). A presentation of the ancestors' advancements (e.g., various inventions, monument buildings, writing, or a formation of state) including discoveries of new lands plays a great positive role. All of these images may provide psychological comfort and foster self-respect. In addition, the remembrance of glorious ancestors may also be used by people who have experienced historical trauma (e.g., colonial suppression, discrimination, ethnic cleansings, and especially genocide).

Even in cases where ancestors may have suffered defeats, an idea of heroism and sacrifice for the sake of people's freedom may still be valued. Material evidence of such feats (e.g., Masada in Israel – see Fig. 2, Numancia in Spain, and Alésia in France) become national holy places and sites of pilgrimage and respect. All this may assist in the struggle for national independence and sovereignty as well as the building or restoration of a national state. Archaeological findings can also serve as markers of national territory and be used as national symbols (e.g., the state emblem of the Republic of

Nationalism and Archaeology: Overview, Fig. 2 Masada, Israel (author's photo)

Nationalism and Archaeology: Overview, Fig. 3 The state emblem of the Republic of Sakha (author's photo)

Sakha – see Fig. 3). In addition, special museums may be established to respect ancestors and be illuminated by archaeological findings and discoveries (e.g., as in the case of the Museum of the Yayoi culture, Osaka, Japan – see Fig. 4). Monuments of national glory can also be designed using archaeological prototypes (as in the case of Almaty, Kazakhstan – see Fig. 5). Archaeological artifacts too can be represented in national decorations, design elements, and national costume as well as in art, theater, and cinema. Sometimes they are depicted on banknotes and coins, postcards, and stamps and used in advertisements (e.g., Aztec Templo Mayor on Mexican coins; the lur, the sun-wagon, and the "Golden Horns" on Danish coins; a Chalcolithic pot from Vuchedol on the Croatian banknote; the Saka warrior on the Kazakhstan banknote – Fig. 6). Newly established ethnic (pagan) religions (i.e., neo-pagan religions being a segment of the New Age religiosity) encourage worship of grave mounds, dolmens, and ancient stone idols. Some archaeological sites have also become centers of worship and places of pilgrimage (e.g., Stonehenge in England, the Bronze Age site of Arkaim in the Southern Urals – see Fig. 7 – or the medieval town of Bulgar in Tatarstan). All these manifestations and developments are encouraged by a nationalism aspiring to strengthen its positions with references to the remote past.

A view of the past is commonly exploited by the state as the key symbolic resource to claim the given territory and to establish its borders, as well as for territorial expansion, struggle for spheres of interests, legitimation of power in general, and colonial rule in particular. At the same time the colonial and Indigenous peoples refer to the remote past to claim their right for independence (this was characteristic in colonial times – e.g., for the Indian nationalists who glorified the Aryans and for the Black African leaders in South Rhodesia who referred to the Great Zimbabwe – and also in certain federal multicultural states, e.g., in the USSR where the

Nationalism and Archaeology: Overview, Fig. 4 Museum of the Yayoi culture, Osaka, Japan (author's photo)

Nationalism and Archaeology: Overview, Fig. 5 The column in Almaty, Kazakhstan (author's photo)

Nationalism and Archaeology: Overview, Fig. 6 The Saka warrior on the Kazakhstan banknote (author's photo)

Armenians were searching for their ancestors in the state of Urartu). Thus, archaeology is used for ideological struggle and propaganda by various actors in different contexts (Fowler 1987; MacDonald et al. 1995). Nazi Germany provides us with the most evident and tragic case when the nation's claims were approved with reference to the "race" theory including the Nazi interpretation of archaeological data (Härke 2000).

It is not only states that may strive to present a positive view of the past but also societies as well as particular social and cultural groups. Indeed, icons of social memory can serve as a basis for sovereignty and encourage national self-awareness and self-respect.

Social Context of Archaeology, and Nationalism

Thus, archaeology develops and is used in various social and political contexts serving

Nationalism and Archaeology: Overview, Fig. 7 Pilgrims in Arkaim, the Southern Urals, Russia (author's photo)

several functions and with various goals. This is precisely why Bruce Trigger distinguished between nationalist, colonialist, and imperialist (world-oriented) archaeology. Being somewhat arbitrary, the scheme is based on the idea that "archaeology does not function independently of the societies in which it is practiced" (Trigger 1984). Trigger associated the very emergence of prehistoric archaeology in Europe with the interests of the middle class which, on the one hand, were the bearer of the idea of progress yet, on the other, shared ideas of romanticism encouraged by nationalism, especially after the Napoleonic period (Trigger 1989). Thus, nationalism provided archaeology with important social and political functions.

At the same time, archaeology also affected nationalism by focusing on autochthonous origins, long national genealogy, and rigid boundaries of ethnic territories. Nationalism also encourages a view of archaeological culture as a material manifestation of an ethnic group. This assists in the acquiring of remote ancestors and providing the myth of a "golden age" with its desired materiality. Ancient finds that can be associated with the idea of "originality" can play an important role in establishing these views and can also become symbols of national identity. Illustrations of this point include the Celtic cross and Celtic decorations in Ireland; the lur, the sun-wagon, and the "Golden Horns" in Denmark; the "Venetian horse" in Slovenia; and the Persian rhytons in Kazakhstan.

Archaeology is represented in various countries by distinct "national traditions," is structured differently depending on the political agenda, and can play various political roles. Philip Kohl distinguishes between two models which associate nationalism with archaeology in their own ways: (a) in the way nations have been built up by immigrants or shaped by their miscegenation with Indigenous peoples and (b) the way that nations have been shaped after a collapse of colonialism (Kohl 1998: 233). He also notes that even spatially distant Near Eastern archaeology was very important for the national prestige of the world powers.

One can reveal variability in terms of not only space but also time. For example, according to Margarita Diaz-Andreu, the past was used and even viewed quite differently at the time of civic nationalism's domination (1789–1860s) and later on after the emergence of ethnic nationalism. Scholars became aware of the links between archaeology and history only by the very late nineteenth century after the unification

of Italy and Germany (Diaz-Andreu 2007). In addition, at that time archaeology was greatly affected by colonial views and "racial" ideas became popular in that context.

Dominant ideologies play a crucial role in shaping the view of ancestors. Indeed, before the growth of ethnic nationalism, European nationalists neglected an idea of rootedness in the soil and highly valued ancestors that arrived from elsewhere bringing with them products of "civilization." For example, in the nineteenth century, the British preferred intruding Anglo-Saxons and even Phoenicians as ancestors rather than the Indigenous Britons.

In the nineteenth century, European romantic nationalism encouraged archaeology to study the past of the peoples, some of whom made up majorities in the well-established states (e.g., in Denmark) and others who were the minorities who struggled for civil rights and sometimes aspired to have their own state (e.g., Czechs). Dominant majorities and minorities used the same approaches to interpret the remote past yet developed different views of the past to achieve different goals. In particular the culture-historical approach in archaeology was used in this regard. In due course, archaeological cultures began to be viewed as the material remains of ancient ethnic groups. A theoretical foundation for this approach was developed by G. Kossinna who was followed by V. Gordon Childe (Trigger 1989: 161-173). The cultures' dynamics (evolution, territorial expansion, area shrinkage, and disappearance) were uncritically viewed as a real history of distinct ancient ethnic groups. This simplified and one-dimensional approach has been strongly criticized and revised during the last 20–30 years.

Views of the Past, Archaeology, and Nation-Building

In due course, the issue of whose ancestors were represented by particular archaeological cultures became a sensitive topic. The past proved to be a contested field which permanently accompanied a struggle for national self-determination. In this context, archaeology has been extensively utilized by minorities who did not have written traditions. In any event, archaeology has provided arguments for national pride for ancestors who were associated with creativity and outstanding achievements. It also became less necessary to search for European ancestry beyond the borders of Europe. Thus, by the end of the nineteenth century Germans, for example, began to locate ancient "Aryans" in Northern Europe as though they spread out from there throughout the world.

Yet, because of colonial politics, the Near East was still viewed in the nineteenth century as the "cradle of the Western civilization," and this interpretation was supported by Biblical traditions (Silberman 1989). In the eighteenth and nineteenth centuries, British and French colonialism, which was interested in control of the past of subjugated peoples, encouraged a view of civilization movement Ex Oriente Lux. This demand was met by researchers studying Biblical archaeology in their search for material traces of the Biblical record through their attempts to prove the Christian beliefs that underpinned the identities of many Europeans.

While discovering the roots of contemporary peoples, nationalist archaeologists contributed to contemporary nation-building. As already noted, nationalist archaeology reached its climax in Nazi Germany. In the late twentieth century nationalist archaeological approaches suffered a decline in Western and Central Europe but were on the rise in Eastern Europe due to the decline and then the collapse of communism which was finally replaced with nationalism. An emergence of the EU encouraged public interest in the common Celtic substratum which was met in the 1980s and 1990s by a number of exhibitions focused on the Early Iron Age as though it witnessed the initial forms of European unity (e.g., exhibitions such as "Celts – The Roots of Europe" in Venice in 1991 and "Mysteries of the Celts" in Frankfurt-on-Main in 2002).

Whereas some nations developed their views of the glorious past in the course of territorial and political expansion (e.g., Great Britain and France at the epoch of colonial empires), others did so while losing their former territories as their national borders shrank (e.g., Denmark in the

nineteenth century). Some countries (such as Russia-USSR and Yugoslavia) experienced both developments in different periods of their history. These cases demonstrate how the same archaeological data receive different treatment and interpretation depending on the political environment (Shnirelman 2005). Until recently a struggle for "heritage" was aimed at overcoming colonial residues and was perceived as "postcolonial resistance." However, nowadays it is often waged between young nations arising out of colonial pasts or aimed against local minorities. While minorities have in recent times spoken from the margins in many countries, their status has been changing and they may now speak from a more authoritative position in some instances.

According to Trigger, "colonial archaeology" developed in the states built up by "white" immigrants (e.g., USA, Canada, Australia, and New Zealand). The newcomers viewed local people as "primitive" with static cultures, and if their culture was perceived to have changed over time, then this was seen as a result of external influences. This view served to legitimate European rule as a civilizing mission. The historical heritage of Indigenous peoples was also appropriated by the newcomers. Thus, Cecil Rhodes believed that Great Zimbabwe in the former South Rhodesia was originally inhabited by the Phoenicians and "white" Americans ascribed the Ohio mounds to some "superior race" (Silverberg 1968).

The nationalism of younger nations has also drastically affected the strategies and focus of regional archaeologies. Until recently the Paleolithic was the core issue in Sub-Saharan Africa where foreign archaeologists were searching for human ancestors; the Early Iron Age was less known because it had nothing to do with the "white man's past." The Africans' creativity was denied, and "whites" were less interested in their past. The "native" Early Iron Age archaeology began developing only under independence. Likewise, in British India, colonial archaeologists were interested only in the Indo-European antiquities and Harappan civilization, the latter being associated with intruders. A "native" archaeology focused on local cultures developed only in independent India and Pakistan. It is in this way that colonial archaeology turned into a nationalist one. Yet, even before independence, the discoveries of Indian antiquities encouraged a growth of both national self-awareness and local nationalism. Nonetheless, prehistory was still privileged in independent India in contrast to the medieval period dominated by Islam. Nowadays archaeological data are often used by Hindu radicals to prove allegedly autochthonous origins of the Aryans. India serves a case where under radical Hinduism, some archaeologists reject secular nationalism in favor of religious views of the past (Ratnagar 2007).

Sometimes nationalism encourages extreme autochthonism. There are cases where the earliest remains of *Homo* species having been discovered in the territory of a contemporary state has become a point of pride and has been associated with the beginning of continuous human evolution up to the contemporary population. Thus, the *Homo erectus* remains from the Azykh cave in Azerbaijan were advertised as the "first Azerbaijani," the *Homo erectus* find from Dmanisi in Georgia was associated with the "first European," and remains of the early primates in Myanmar were announced as the forefathers of the humanity. In the first case, one deals with national claims for territory (the Azykh cave is situated in the Nagorny Karabakh), in the second case with an aspiration to be included into the EU, and in the third case with the fosterage of patriotism and self-respect in one of the poorest countries in the world.

Indigenous peoples usually appreciate more moderate views of the past presenting the given region as being populated long before colonization – this ensures that they are able to build up their life without intervention from outside as their remote ancestors did (Spriggs 1999: 120). For example, in response to a colonial view introduced by the Chinese and French, which exaggerated the role of the intruders, under independence, Vietnamese archaeologists argued that higher cultures flourished long before the Chinese arrived. This archaeology was a salve for the trauma caused

Nationalism and Archaeology: Overview, Fig. 8 A celebration of the 1100th anniversary of the ancestors' arrival to Hungary (Budapest 1996) (author's photo)

by the long struggle for independence. A restoration of the devastated country demanded for a memory of the local ancient state that developed before Chinese occupation.

Nowadays, many Western archaeologists quite consciously support minority groups while confirming their claims for local natural resources and even political autonomy with a reference to archaeological data and the concept of autochthonism.

Nationalists make a choice between various explanatory models depending on political agendas. The migratory model is popular in case of territorial expansion and an autochthonous one in cases where territorial sovereignty has been gained or where there has been territorial shrinkage. The first model was common for colonial or expansionist powers. Imperialism encouraged migration models which were used to discover the early ancestors' resettlements and their occupation of the vast lands as a civilizing mission of the "white people," "children of the Sun" (G. Elliot-Smith), or "Indo-Germans" (G. Kossinna). Colonial and imperialist archaeology welcomed "racial" ideas which explained sociocultural development with a reference to biology (Trigger 1989: 111-138). For example, a view of the German master race was developed by Kossinna which was appreciated by the Nazis.

The nationalist archaeology in Turkey after 1923 is a clear case of the second model. To legitimate itself, the new state has emphasized an autochthonism in which views of the past incorporated the entire cultural heritage of Asia Minor including the pre-Islamic period. As a result Islamic archaeology is less developed in Turkey even today. Likewise, to legitimate his power in Iran, Reza Pahlavi paid great attention to the glorification of a pre-Islamic past and supported the restoration of early traditions associated with Zoroastrianism.

Sometimes new states appreciate a view of ancestors-invaders who were associated with military glory or a civilizing mission (e.g., the early Magyars in Hungary – Fig. 8, or the Scythians in Ossetia). In addition, during a struggle for independence and/or after victory, nationalists can interpret the same archaeological data in different ways. For example, under British rule, Indian nationalists appreciated the Aryans' arrival from elsewhere, yet after India gained independence, they began to present Northern India as a cradle of the Aryans.

Indeed, the autochthonous model fits nationalist agendas better than migration theories. This is because such models meet the demand for a view of the ancestors' independent development and high cultural achievements in the given territory. In some cases, external influences are entirely denied and suggestions of diffusion or migration are treated as survivals of a colonial mentality. Material evidence of

influences can thus be ignored and hidden from outsiders. For example, about 20 years ago, the Chinese authorities temporarily denied access to foreign archaeologists to the remarkable finds in Xinjiang, where rich graves with Caucasian skeletons were discovered dating to the late second mill. BCE, and Korean scholars and tourists were not allowed access to Northeast China where the early Korean state of Koguryo was situated in the past.

When external impacts are accepted, local archaeologists sometimes make a case for such influences as arriving without the involvement of the neighboring state which practiced colonial rule until recently. For example, for some time, Irish archaeologists viewed the dolmen culture as having arrived from the Mediterranean area (circumventing England) and Korean archaeologists have at times argued that bronze technology arrived from Mesopotamia rather than through China.

Sometimes conflicting interests cause confusion – an idea of "originality" demands for particular ancestors, but political alliances need common ancestors to make allies closer to each other. Political unification encourages a view of common ancestors (as in the reference to the Celtic past in the EU – see above), although particular polities appreciated views of different ancestors in the former time.

Being based on rigid centralization, authoritarian and totalitarian regimes aspire to develop a view of cultural homogeneity in the past (e.g., the Celtic idea in Spain under Franco, the image of the Roman Empire in Italy under Mussolini, and the view of Gauls in France under the Vichy). In contrast, liberal rule, through an emphasis on cultural plurality, encourages a view of the past that privileges cultural heterogeneity. For example, in Great Britain the mixing of different groups and cultures in the past (e.g., Britons, Anglo-Saxons, Romans, and Normans) was seen to have predetermined the viability of the current nation and its ability for colonial expansion.

In the USSR, a view of cultural heterogeneity was accepted only in combination with the ideas of the state-shaping role of ethnic Russians as well as the leading role of titled peoples in the national republics in remote times. State centralization was based on rigid ethnic hierarchy which determined a view of the past. In some cases this model resulted in an appropriation of the minorities' past by dominant majorities (e.g., in China and Japan).

In culturally heterogeneous societies, the dominant majority sometimes uses views of the past for legitimating its domination, whereas minorities may use archaeology for claims relating to equality or political sovereignty. In the first case, majorities may be searching for remote ancestors at the given territory – for example, attempts of certain "whites" to find traces of ancient transatlantic migrations and to ascribe the Native American antiquities to intruders from Europe and North Africa or, at least, from the area of some so-called "higher" civilizations. In some circumstances, fakes have even been employed to achieve these goals. To defend their human rights and to resist discrimination, minorities may use the same resources: either by searching for their autochthonous origins or by attempting to trace their ancestors' migrations to the new territory (e.g., the "Black Celts" in Great Britain or "Ancient Egyptians" in the New World).

It should also be remembered that the interpretation of the past is affected by the investigator's political views. A military victory over the Arabs in 1948 encouraged the Israeli general-archaeologist Yigael Yadin to treat an Israelite resettlement to the Promised Land as a conquest, whereas the Left Zionist Yohanan Aharoni viewed this as a slow peaceful infiltration. It also affected the choices of archaeological sites investigated by the archaeologists. Whereas Yadin focused on excavations of the Canaanite city of Hazor (which was destroyed at the eve of the Early Iron Age), Aharoni searched for the early Israelite settlements in the Galilee hills (Abu el-Haj 2001: 99-116).

Nationalism can even affect field methods. Indeed, some archaeologists, when in search of nationally important material evidence, have destroyed upper layers without employing standard recording techniques or have neglected the small finds that illuminate everyday life in the

past in favor of large monumental constructions of "national significance." Thus, in some cases, nationally "sensitive" findings are privileged at the expense of what "has no importance" (Abu el-Haj 2001: 148-158).

One has also to distinguish between "native archaeology" and "archaeology abroad." The former focuses on the search for one's own ancestors and the restoration of a long genealogy. This type of archaeology is also often more emotional. Such archaeology is based on ethnic nationalism which is characteristic for Eastern and South-Eastern European countries and was encouraged in the former USSR where ethnicity was institutionalized. The latter calls for "objectivity" and scientism and can ignore the emotions of the local inhabitants. It is a stepchild of imperialism, and it is here that evolutionary approaches have been utilized (Trigger 1989). Noteworthy, this approach has been characteristic not only in Western archaeology but also in Soviet archaeology represented in the core – in Moscow and Leningrad (by contrast to archaeology in particular republics).

Certain authors make a distinction between national and nationalist archaeology: the former deals with archaeological investigations within the national state, and the latter is sensitive to political blueprints mobilizing archaeology to take part in nation-building and the shaping of national identity (Kohl 1998: 226 – see also Trigger 1989). At the same time, archaeology played various roles in this process in different countries, and its evaluation is a matter for discussion. Indeed, whereas in some countries national pride focused on Paleolithic archaeology (e.g., in France), in others the archaeology of the Neolithic and Bronze Ages was highlighted (e.g., in Scandinavia). Sometimes the emphasis changed over time as occurred in Germany (e.g., from philhellenism to primordial Germanic tribes). This change reflected the unification of Germany and a growth of German nationalism and chauvinism (Arnold & Hassman 1995; Marchand 1996; Härke 2000).

Archaeology and Politics

The abovementioned case studies serve to illuminate the fact that views about the past are highly dependent on political factors which affect archaeology as well. This means that archaeology can hardly be considered as "value-free research." Archaeologists can be just as affected by social stances as can the amateurs and politicians who may also use views of the past to serve their own causes. In choosing a field or an object of study or by giving names to archaeological cultures, classifying data, restoring genealogies, and establishing borders, archaeology is also an active political agent.

At the same time we should be careful to distinguish that while on the one hand archaeology is a professional activity with its own theory, methodology, and ethical code, on the other its products can be used by amateurs and politicians. One should also distinguish between cases where archaeological knowledge is used for political purposes as opposed to an archaeologists' active participation in national movements.

For example, there were many colonial and military officials who developed "racial" doctrine. And in some new independent states, archaeologists have often shared nationalist ideologies which have affected their professional activities. In Bulgaria, for example, archaeologists, as custodians of the national past, actively participated in politics and occupied important state positions. In Israel well-known politicians and military officers were among the first archaeologists. In Myanmar, members of the military government actively participated in the search for "early humans" in the 1990s.

Sometimes archaeologists may purposely attempt to avoid politics (e.g., in Ireland and Japan), yet their discoveries may still be used to serve political ends. In Southern Rhodesia, archaeology was strictly controlled by colonial officials. At the same time, African revolutionaries used archaeological knowledge to further their own interests. In Iran, Shah Reza Pahlavi and his successor Mohammad Reza Shah paid great attention to history and encouraged archaeological investigations as they found a basis for patriotism in the achievements of ancient Iranian kings. In contemporary India, some archaeologists willingly serve Hindu politics. To put it briefly, in various countries,

professional archaeology has complicated relationships with nationalist movements.

In any case, archaeological results depend not only on scholarly methodology but also on external social factors. Moreover, today a "folk archaeology" may develop in conjunction with professional archaeology and is based on non-scholarly (or pseudo-scholarly) views. This new type of archaeology may offer its own interpretation of well-known archaeological discoveries and/or make forgeries. This type of archaeology develops nationalist, "racial," or religious ideas (New Age style).

Nationalism Against Archaeology

The relationships between nationalism and archaeology are not without problems. There is an ambivalent attitude towards archaeology in the former colonies, and it is often by no means positive. In many Arab countries, it is an "elite knowledge" which is far from ordinary people who share prejudices about the pre-Islamic past. Negative feelings against archaeology in the Arab countries of the Middle East were also provoked by its long association with colonial rule. One can observe the same attitudes among Indigenous Australians.

In Africa, while using contemporary ethnic names in their reconstructions of the regional past, the "white" archaeologists unconsciously provoked ethnic separatism and, thus, undermined the nation-state. As a result, suspicion has ensued. The "white" settlers also were threatened by archaeologists whose presentations of the past inspired "black" movements. On their side, while coming to power, "black" leaders called into question the ability of "whites" to provide objective interpretations about the past.

In some cases, new archaeological studies and interpretations contradict the views of the past developed under a local nationalism and informed by oral traditions. In addition, the meaning of local sites for archaeologists and Indigenous peoples can differ greatly. Indeed, archaeologists may simply view the sites as objects of scholarly interest, whereas local people may respect them as sacred places.

Nationalism can also hinder the archaeological study of some sites and periods. Indeed, ethnic nationalism focuses on the search for its own ancestors; the "others" are either ignored or treated as enemies. In the latter case, their achievements may be downplayed or archaeological studies about such groups may be hindered or even prohibited by the authorities. Examples of such situations include studies of the Golden Horde, Khazar Kaganate, and Scandinavians' (Viking) activity in the early medieval period in the USSR, the Muslim past in Spain and Israel, and Caucasian Bronze Age burials in China. In Egypt, under President Naser, it also became impossible to study the Aramaic ward on Elephantine Island where the Jewish garrison was stationed in the fifth century BCE.

The history of archaeology has witnessed fierce debates on the ethnic attribution of early sites and early ethnic boundaries. Sometimes this has resulted in the destruction of particular sacred sites and attempts to replace them with some others (e.g., the demolition of Babri Masjid in Ayodhya, India, in 1992). Faked "archaeological data" has even been forged in such instances. In other cases, local sacred places may be owned by several different religious communities, and there is the difficult issue regarding which one has to be maintained and restored first (e.g., Judaic, Christian, and Muslim sites in Israel).

Debates about the ethnic past can also become important components of ideological confrontation resulting in bloody wars. In the course of warfare, early sites and monuments have been purposefully destroyed to erase the memory of the enemies from the local past (such as the recent wars in the Balkans, in Abkhazia, in Chechnya). Sometimes a reinterpretation of the past and religious prohibitions result in the destruction of early sites or archaeological data – e.g., the destruction of ancient statues of Buddha in Bamiyan, Afghanistan, in March 2001, under the Taliban rule as well as all of the Buddha images in the National Museum in Kabul; a decline of interest in the pre-Muslim past in Egypt under Naser; the marginalization of archaeology in Iran after the revolution as

"despots' maid"; and the demolition of the mosque in Ayodhya. After 1974 a cleansing of the Greek antiquities took place in the northern (Turkic) part of Cyprus including the looting of archaeological materials, the destruction of medieval churches, and the prohibition of archaeological excavations. Thus, nationalism can both encourage archaeological investigations and result in the destruction of archaeological sites and looting of archaeological treasuries.

Sometimes the dominant religion may demand the "forgetting" of the evidence of other religions (e.g., as in the case of the Russian Empire where archaeologists focused on the Christian sites at the expense of Islam and paganism) – state atheism too has hindered studies of religious aspects of the past (e.g., an ignorance of the Church archaeology in the USSR). Young nations may also occupy themselves with studies of the remote past and ignore the era of recent colonial rule. In the Middle East, local archaeologists have also ignored ruins of the Ottoman period which remind them of the suffering under sultan despotism (Silberman 1989: 231-232). In Ireland, local archaeologists are less interested in studying the period after the Anglo-Norman invasion, whereas in Mexico they focus on the pre-Columbian past at the expense of colonial remains, and in India, local archaeologists ignore medieval sites associated with Muslim rule. All this may reach a climax in "racial" attitudes which are sometimes encouraged and used in a radical nationalism. As a result, some archaeologists have warned us against the usage of archaeological data in contemporary politics (MacDonald et al. 1995).

Archaeology and Ethics

In contemporary archaeological practice, we often attempt to deal with "multiple pasts" – a situation which has raised the issue of the archaeologists' responsibility and role in "shaping identities." This is an especially complex problem in the case of contested territories where neighboring groups struggle for historic heritage and where each side attempts to ascribe local archaeological sites to their own ancestors (Shnirelman 2001, 2006, 2009). While understanding the dangerous nature of such debates, certain scholars discuss the moral responsibilities of archaeologists who, by the results of their studies, support one side and unconsciously or otherwise encourage intergroup conflicts or separatism (Spriggs 1999: 116-118). Such situations may also result in ideological struggles between archaeologists. Yet this is not a solution because nationalists are interested in political benefits rather than plausible scholarly results. Therefore, archaeologists who follow scholarly methodology are unable to provide them with the desired "truth," and nationalists may simply develop their own interpretations of archaeological data.

As a result, archaeologists today can be faced with the problem of choosing whether or not to be loyal to scholarship or to neglect it in favor of local nationalism or minority rights, and where the latter may be the case, which side to take in a multicultural milieu when different ethnic groups are claiming the same historical resources. Such situations raise significant ethical dilemmas for archaeologists.

Over the last 20–30 years, archaeologists have become increasingly aware of these problems which have resulted in provocative and stimulating discussions which will no doubt continue into the future (Trigger 1984, 1989; Silberman 1989; Kohl & Fawcett 1995; Schmidt & Patterson1995; Atkinson et al. 1996; Diaz-Andreu & Champion 1996; Kohl 1998; Meskell 1998; Malone& Kaner 1999; Diaz-Andreu 2001, 2007; Kohl et al. 2007).

Cross-References

- ▶ Archaeology and Politics
- ▶ Bamiyan Buddhas
- ▶ Childe, Vere Gordon (Theory)
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Ethics in Archaeology
- ▶ Ethnic Identity and Archaeology

▶ Race in Archaeology
▶ Trigger, Bruce Graham
▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Native American Graves Protection and Repatriation Act (NAGPRA), USA

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Brief Definition of the Topic

The Native American Graves Protection and Repatriation Act (NAGPRA) (sections 3001 through 3015 of Volume 25 of the United States Code) is a federal law instituted in 1990 to facilitate the return of human remains, funerary objects, sacred objects, and objects of cultural patrimony to lineal descendants, Indian tribes,

and Native Hawaiian organizations. The law provides a process for the return of certain items and ancestral remains held by federal agencies, museums, and educational institutions obtained through archaeological excavations or other collection practices to these groups, which are broadly defined to be Native American. NAGPRA also recognizes the interest of Native American tribes affiliated with burial sites discovered on federal and tribal lands through present-day activities.

Human remains must be clearly identified as "Native American" to be repatriated by a tribe. Funerary objects that fall under NAGPRA fall into two categories: associated funerary objects and unassociated funerary objects. Associated funerary objects are documented to a specific burial site and/or associated with human remains that are in the possession of an agency, museum, or institution. The funerary objects and human remains, however, do not necessarily have to be at the same location, just known to have once been together in their original context. Often funerary objects and human remains were separated once excavated and are today located in separate agencies, museums, or institutions. Unassociated funerary objects are either known or believed to have been from a burial context, but the human remains once associated with them are now not in the possession of a known agency, museum, or institution. This often occurs when human remains become undocumented or lost by institutions that once held them but documentation on the funerary objects is clear.

Sacred items that can be repatriated through NAGPRA include specific ceremonial objects used by Native American religious leaders for religious practices, and that are still needed for present-day practices.

These may include items such as pipes, baskets, clothing, masks, or other religious items used in ceremonial practices. Objects of cultural patrimony are defined as "having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself, rather than property owned by an individual Native American" (National NAGPRA). These objects should never have been separated from the group. The famous wampum belts of the Haudenosaunee (or Iroquois) that represent an important part of tribal history are one example of this type of object.

All federal agencies are required to comply with NAGPRA, as well as any public and private museum, educational or other institution that has received federal funds. The Smithsonian Institution must comply with a separate repatriation law, enacted in 1989, entitled the National Museum of the American Indian Act. Compliance involves providing an inventory of Native American humans remains (whether culturally affiliated or not yet culturally affiliated) and consulting with tribes to determine cultural affiliation, as well as sending summaries of artifact collections with Native American objects to tribes that may have an interest in these collections. Cultural affiliation is defined as "a relationship of shared group identity which can be reasonably traced historically or prehistorically between a present day Indian tribe or Native Hawaiian organization and an identifiable earlier group" (National NAGPRA). In 2010, an amendment to the Act provided a process for the return of human remains and objects that have been defined by institutions and museums as "culturally unidentifiable" or "CUI" (see http://www.gpo.gov/fdsys/pkg/FR-2010-03-15/html/2010-5283.htm for more information).

NAGPRA only applies to tribes as defined by the US federal government, that is, federally acknowledged tribes and Native Hawaiian organizations with a government-to-government relationship with the US government. Non-federally recognized tribes, or lineal descendants from such groups, may not directly make claims through NAGPRA, although they may request repatriations through the National NAGPRA Review Committee, which meets twice per year to hear such requests, disputes between institutions and tribes, and conduct other business related to the law.

Many consider NAGPRA to be a cultural property law, while others consider it more of

a human rights law that was the result of decades of protest and activism by Native American leaders. The several decades leading up to the passing of the Act in 1990, in particular, saw a number of high-profile protests focused on the public display in museums and institutions and continued excavation of Native American burials and objects across the country. While the law has facilitated a large number of repatriations over the past several decades, many thousand human remains and objects still await repatriation and lack of compliance by agencies, museums, and institutions has been an ongoing issue.

Cross-References

- ▶ Activism and Archaeology
- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Human Remains in Museums
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ North America (USA and Canada): Museums
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation Acts: The Politics of Repatriation in North America

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Introduction

Archaeology on the Navajo reservation has been performed by the Navajo Nation itself since the early 1950s. At that time, archaeological surveys were conducted in conjunction with Navajo Land Claims to document pre-1846 Navajo occupation of claimed lands. In the 1970s programs developed to equip the Navajo Nation with cultural resource management services evolved from a single small office to two large departments in four offices with professional staff working throughout the Navajo Nation.

The Navajo Tribal Museum (NTM) was founded in 1961, and its first Director was Martin Link. The NTM's primary focus was collections and exhibits, but in 1972, a research office – the precursor of the Archaeology Department – was established within NTM to conduct small surveys and excavations and was managed by J. Lee Correll. NTM began issuing tribal antiquities permits in 1970, and the Navajo Tribal Antiquities Law was passed by Tribal Council in 1972. Other NTM programs during the 1970s included the zoo and the public library.

In 1977, the Navajo Nation Cultural Resource Management Program (NNCRMP) was established to conduct the archaeological inventory work on the Navajo Indian Irrigation Project (NIIP), a project that would eventually provide agricultural land for the Navajo Agricultural Products Industry.

Richard Goddard was the first Director of NNCRMP, and the program was based in Farmington, New Mexico, to be near the NIIP. This new program was overseen by the NTM. Eventually, over 200,000 acres were surveyed for the NIIP and hundreds of sites excavated. A small "revolving account" was established in 1977 to supplement the tribal and federal funding for NNCRMP and to allow for minor, small-scale efforts occasionally required of NNCRMP by tribal offices. By 1978, the NNCRMP had an office in Window Rock, Arizona and Goddard oversaw the Window Rock office, and Lawrence E. Vogler, M.A., was appointed the Farmington Office Manager and NIIP Project Director. The Farmington office recruited Navajo staff that attained hands-on training under the Comprehensive Employment Training Act (CETA), a federal block grant program administered by the Department of Labor. The Navajo staff gained skills in cultural resource management by learning archaeological inventory field methods, testing and excavation of historic and prehistoric sites, and laboratory techniques with training by the professional archaeologists.

In 1979, David E. Doyel succeeded as the second Director of NNCRMP, and the program became more directly involved in Navajo governmental affairs. Several changes took place. The focus of NNCRMP shifted to historic preservation compliance on behalf of the tribe and issuing permits to meet the requirements of the Archaeological Resources Protection Act (ARPA; passed in 1979), which demanded tribal consent for federal permits on Indian lands. It also became more regularly involved in issues of historic preservation policy.

The NNCRMP also became more involved in projects outside the NIIP, primarily other large-scale excavation projects. A publication series, the *Navajo Nation Papers in Anthropology*, was established, for wider distribution of major works performed by the NNCRMP.

In 1982, Anthony L. Klesert, Ph.D., became the third Director of the NNCRMP and began another process of expansion and redirection. In addition to the large-scale projects, such as road construction, the NNCRMP focused on the myriad of smaller-scale archaeological surveys for private homesites and commercial development on the Navajo Nation, as required of sponsors by the federal and state compliance agencies. Thus, NNCRMP became systematically involved in the hundreds of homesites, power lines, Indian Health Service (IHS) service lines, and other projects that are its staple today. In addition, NNCRMP became increasingly involved in review and compliance activities, representing the tribe's interests to the Bureau of Indian Affairs (BIA) and other agencies on issues like protecting and managing cultural resources and traditional cultural properties important to the Navajo people.

By 1984, NNCRMP had expanded to the point that it could no longer effectively represent the Navajo Nation in the compliance process and also conduct hundreds of needed compliance surveys demanded of it annually. At the same time, the nation decided it could no longer allow the BIA to represent its interests in historic preservation compliance. The nation decided to contract all BIA archaeological and historic preservation functions under P.L. 93-638, the Indian Self-Determination Act. As a result, two distinct departments were established to assume the functions of NNCRMP: the Navajo Nation Archaeology Department (NNAD), whose primary function would be field services; and the Navajo Nation Historic Preservation Department (NNHPD), whose major function was review and compliance. Despite local BIA intransigence, the 638 contract was finally adopted in 1990.

In 1988, the Navajo Nation Council passed the Navajo Nation Cultural Resources Protection Act (CMY-19-88) Title 19, which formalized the process for Navajo review and compliance and which also formally established and recognized the NNAD and NNHPD. Alan S. Downer became the first Director of NNHPD. Klesert was head of NNAD, and Larry Benallie, Jr., M.A., was appointed as NNAD's first Navajo Assistant Director.

It was also in 1988 that NNAD established a third office in Flagstaff, Arizona, with Miranda Warburton, Ph.D., as Office Manager. This office was uniquely designed to train Navajo and Native American college students enrolled in

anthropology at Northern Arizona University (NAU) in addition to its role as an archaeological service provider to the western areas of the Navajo reservation. The goal of the training program was to provide employment as well as relevant hands-on experience in archaeology and anthropology. A memorandum of agreement (MOA) was established between NAU and NNAD, and this document formalized a commitment on the part of both to provide an optimal environment for students to acquire both a formal education as well as the experience in contract archaeology they would need to compete in the job market upon graduation.

In 1991, the Navajo Nation Council provided the needed funding for the NAU Student Training Program, allowing it to expand both its level of support and the range of opportunities available to Navajo and Native American students. In 1993, a second student training program was established at NNAD's Farmington office in cooperation with Fort Lewis College in Durango, Colorado. The FLC-NNAD Student Training Program successfully graduated and hired degreed individuals for full-time positions at the NNAD Farmington office. The FLC-NNAD Student Training Program ended in 2002 due to lack of funding. The NNAD's former branch office located in Farmington, New Mexico, encouraged the NNAD Navajo archaeologists who lacked a formal education to acquire a degree at FLC and also employed FLC students majoring in anthropology and archaeology with on-the-job training experience. In recognition of this work, NNAD was awarded an Honoring Nation Honors in 2000 from Harvard University.

The success of the student training program is evident in the accomplishments of program graduates. For example, in 2002, Davina Two Bears (a former NNAD-NAU Student Training Program student) replaced the program manager at the NNAD Flagstaff office. In 2003, the NNAD-Farmington program manager was replaced by Elaine Cleveland-Mason (a former NNAD-FLC Student Training Program student). In 2004, NNAD's initial goal was fulfilled when a member of the Navajo Tribe, Robert M. Begay (a former NNAD-NAU Student Training Program student) became the fourth Department Manager of NNAD. At that time, the Farmington NNAD office was relocated to Shiprock, New Mexico, presently at Diné College, and a MOA was established to formally provide education and on-the-job training for 2-year students with the intent to advance to a 4-year institution at NAU in archaeology and anthropology. In 2009, Linda Laughing became the delegated Acting Department Manager for the NNAD, and in 2010 to 2012 Neomie Tsosie (a former NNAD-NAU Student Training Program student) was Program Manager of the NNAD Flagstaff office. In total, 63 students have participated in the NNAD Student Training Programs from the following tribes: Apache, Navajo, Hopi, Ho-Chunk, Nez Perce, Lakota, and Gila River Indian Community. Navajo NNAD Student Training Program student archaeologists who pursued degrees (Bachelor's, Master's, and Doctorate) include Richard Begay (M.A., Education, Harvard University), Robert M. Begay (M.A., Anthropology, Northern Arizona University), Patricia Chee (B.A., Anthropology, Northern Arizona University), Elaine Cleveland-Mason (B.A., Anthropology, Fort Lewis College), Vernelda Grant (M.A., Anthropology, Northern Arizona University), Tony Joe (M.A., Anthropology, Northern Arizona University), Jackson Lee, Jr. (B.A., Anthropology, Fort Lewis College), Al Livingston (B.A., Anthropology, Northern University Arizona), Ora Marek-Martinez (M.A., Anthropology, Northern Arizona University, Ph.D., Berkeley University), Aleda Myerson (A.S., Biology and General Science, Diné College), Lanelle Poseyeseva (B.A., Anthropology, Northern Arizona University), Darsita Ryan (M.A., Anthropology, Arizona State University), Harriet Sandoval (B.A., Anthropology, Northern Arizona University), Nathaniel Todea (B.A., Anthropology, Fort Lewis College), Kerry Thompson (M.A., Anthropology, Northern Arizona University, Ph.D., University of Arizona), Lenora Tsosie (B.A., Southwest Studies, Fort Lewis College), Neomie Tsosie (M.A., Anthropology, Northern Arizona University), Davina Two Bears (M.A., Anthropology, Northern Arizona University, Ph.D. in progress at

Indiana University), Shane Wero (B.A., Anthropology, Northern Arizona University), and Timothy Wilcox (M.A./Ph.D., Anthropology, in progress, Stanford University).

Definition

The NNAD is structured to provide cultural resource management services to the Navajo Nation on Navajo Tribal Trust lands and also permitted to conduct CRM projects on State and Bureau of Land Management lands in New Mexico. The NNAD operates three office locations to serve the Eastern, Shiprock, Central, and Western agencies of the Navajo Nation which constitute the largest tribal land base in the United States, encompassing an estimated area of 25,351 square miles.

Established by Navajo Tribal Code in 1977, NNAD provides National Historic Preservation Act (NHPA) Section 106 Compliance and related archaeological services to the Navajo people and for the infrastructure development as the Navajo Nation's first cultural resource management agency. NNAD's mission is to provide cultural resource management services to the Navajo Nation, seeking to enhance and protect the historic and cultural heritage of the Navajo people while assisting the Navajo people and clientele meet Section 106 compliance on tribal and federal lands. The NNAD also assumes the responsibility of educating the Navajo public about the value and importance of preserving cultural resources from negative impacts of development, looting, and vandalism. NNAD also strives to educate the Navajo public about the important role of prehistoric peoples in Navajo cultural identity.

NNAD's Student Training Program functions to provide Navajo and Native American students enrolled in anthropology, archaeology, and applied indigenous studies programs at Northern Arizona University (Flagstaff, Arizona) and Diné College (Shiprock, New Mexico) with on-the-job training in cultural resource management fieldwork, technical report preparation, archaeological lab and curation procedures, and Navajo tribal perspectives on protecting cultural resources. The two training programs are the focus of NNAD's efforts to produce fully qualified Navajo professionals, thereby contributing to greater tribal self-sufficiency. NNAD's ultimate goal is to enhance and protect the cultural heritage of Navajo land in terms meaningful to the Diné (Navajo people), within a workable strategy that also fosters the responsible development of vital services.

Key Issues/Current Debates/Future Directions/Examples

Underrepresentation of Navajo Archaeologists and Navajo Perspectives on Prehistory in American Archaeology: At the present time, New World archaeologists largely consist of academically trained Anglo archaeologists investigating Native American culture and prehistory. Most disconcertingly, this pattern continues even within many tribal cultural resource management and historic preservation offices. The establishment of the NNAD Student Training Program in 1988 at NAU, 1993 at Fort Lewis College at Durango, Colorado (defunct), and 2005 at Diné College was designed to address a nationwide lack of Native American cultural resource management professionals. At that time, the lack of Navajo individuals seeking employment in cultural resource management and degrees in anthropology was apparent to the NNAD management. Despite the success of the training program, there is still an overall lack of Navajo archaeologists who have gone through the training program in American Archaeology. NNAD continues to experience difficulties retaining educated Navajo archaeologists due to decreased program funding from the Navajo Nation. As a result, there is a lack of continuity in skills learned by more experienced NNAD archaeologists who remain with the program, and the incoming student training program participants who are often unable to remain employed with NNAD after completing college due to lack of funding.

The NNAD Student Training Programs offer support to Navajo and Native American students

to complete university degree programs in anthropology while developing practical technical skills that would make them eminently employable upon graduation from Associate's, Bachelor's, and Master's degree programs. The NNAD Student Training Program embodies a training philosophy that follows the traditional Navajo approach to teaching youth. Student archaeologists "learn by doing," with guidance from senior NNAD staff. Through this system of mentorship, students learn archaeological skills at their own pace and are provided the freedom to pursue the areas of specialization of the most interest to them. Through the training of Navajo and Native American archaeologists, NNAD seeks to address ethnic inequities in American and tribal archaeology. Within NNAD, the student training programs were conceived as a mechanism to address the ethnic inequity apparent even within the Navajo tribal agency structure during the 1970s, 1980s, and 1990s. NNAD student archaeologists assist senior NNAD staff to fulfill the NNAD mission of providing needed cultural resource management services to the Navajo people. The student training program has created an environment that encourages the exploration and personal growth of Navajo and Native American students in anthropology and archaeology. Through work-study, NNAD students acquire new skills in a supportive environment, which encourages students to achieve measurable academic progress toward Associate's, Bachelor's, and Master's degrees in anthropology. In 2008, the NNAD Student Training Program celebrated its 20th anniversary providing on-the-job training to Navajo and Native American university students in the field of archaeology through employment with NNAD.

Navajo Cultural Taboo Against Contact with Prehistoric Sites, Cultural Materials, and Human Remains: The traditional Navajo perspective strictly forbids contact with the sites, cultural material, and human remains of prehistoric peoples. This taboo extends to contact with deceased people, and objects belonging to the deceased. Navajo individuals who are interested in exploring archaeology as a career are often confronted with the difficulty of pursuing a career in a profession that necessitates the visitation, handling or close contact with human remains, places where prehistoric people lived, and the material remains of the daily lives of those people. Some Navajo archaeologists do not have the support of family members when making the decision to pursue archaeology as a profession. NNAD Navajo archaeologists who are traditionally sensitive provide a supportive environment and mentorship for beginning Navajo archaeologists who may be experiencing a difficult transition to a professional field that is controversial, and sometimes unacceptable, among Navajo traditionalists.

Lack of Infrastructure: Today, most of those living on Navajo Tribal Trust lands still lack access to basic infrastructure widely available elsewhere. Life on the reservation can include challenges such as living without basic amenities such as electricity, running water, or paved roads. Lack of access to clean running water is a concern for maintaining the health of the very young and elderly. Often, unpaved reservation roads become impassable under heavy rain and snow, preventing travel to and from remote areas of the reservation and making emergency medical treatment and law enforcement difficult or impossible.

Tribal Sovereignty: The training program promotes sovereignty, as it graduates credentialed Navajos, who filled the void of educated Navajo archaeologists on the Navajo reservation. The training program promotes the education of Navajo students, as it provides not only financial support but also crucial "hands-on" real-world archaeological experience, which other students only read about in textbooks. Lastly, the training program ensures the continuance of Navajo culture by protecting Navajo sacred places and sites, while aiding in the development of the Navajo reservation by providing archaeological expertise prior to the installation of buildings, water lines, electrical lines, roads, etc. The NNAD Student Training Programs truly represent a creative approach in support of Navajo education.

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Ndoro, Webber

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Basic Biographical Information

Webber was born in Goromonzi, Zimbabwe, in 1959. He grew up in the Domboshava area just outside of Harare, the capital city of Zimbabwe. He did his Bachelor of Arts degree at the University of Zimbabwe from 1980 to 1982. He obtained an M.Phil. in Archaeology at the University of Cambridge (1987) and M.A. in Architectural Conservation from the University of York (1990) and received his Ph.D. in Archaeology from the University of Uppsala (2000). Webber got into archaeology and heritage management by chance. It was during his undergraduate time that he was introduced to archaeology as part of the history courses. At the time, archaeology was not yet taught as a separate subject at the University of Zimbabwe. It was introduced in 1985. He however started practicing archaeology in 1985 after he moved to join the National Museums and Monuments of Zimbabwe (NMMZ) as a curator. His initial responsibility was to look after archaeological collections in the Museum of Human Sciences in Harare (formerly Queen Victoria Museum) and conducting archaeological field research within NMMZ's northern region. In 1987, he became the resident archaeologist at Great Zimbabwe World Heritage Site after its listing in 1986. In 1991, he was appointed National Monuments Program Coordinator.

Ndoro left NMMZ to join the University of Zimbabwe Archaeology Unit in May 1994. He taught archaeology and cultural heritage

management (CRM) course to both undergraduates and postgraduates. He worked for the university for 12 years during which he had become a senior lecturer in the Department of History. Webber Ndoro joined ICCROM in 2002 as a project manager for AFRICA 2009. Although he had done a few assignments as a consultant and facilitator, this post exposed him to a variety of issues within African heritage management. AFRICA 2009 was a successful Pan-African program geared towards finding lasting solutions to the management and conservation of immovable cultural properties on the continent. Many of these are archaeological in nature. In 2008, Webber Ndoro joined the newly established Africa World Heritage Fund (AWHF) as its inaugural director. This organization coordinates the effective management of World Heritage sites on the continent. It also strives to increase the visibility of African World Heritage places by among other things, helping African countries with the nomination of their places of cultural and natural significance on to the World Heritage list. With AWHF, Webber found an outlet for many of the issues that he had championed over the years.

Major Accomplishments

Webber Ndoro was probably the first trained Zimbabwean heritage manager. Together with a few others, he was also one of the first trained archaeologists in the country. This set him up as a pioneer in many senses. He however surpassed the expectations of a pioneer, and he steered the discipline of archaeology in extraordinary directions especially in the area of archaeological heritage management. He contributed significantly towards a more holistic management of archaeological heritage in Zimbabwe and on the African continent. His pragmatic outlook to archaeological heritage management has resulted in such approaches as the incorporation of local communities, consideration of intangible aspects, and the acceptance of concept of cultural landscapes as compared to cultural sites. All this has seen him become the face of African heritage management today.

Webber has contributed immensely to the training of archaeologists and heritage managers currently practicing in Africa. As they say, charity begins at home. Webber's contribution in germinating heritage management in Zimbabwe can never be overemphasized. At the university, he was instrumental in introducing heritage management courses to the archaeology curricular. In the early 2000s, he also spearheaded the introduction of a Masters in Heritage Management that was to act as a training pool for not only Zimbabwean heritage managers but also managers from southern Africa and beyond. Over the years, he has helped shape a lot of students and professionals in Africa and beyond. He managed to inculcate urgency for heritage management in many of his students. He has become a mentor to professionals too since his approach to heritage management has always emphasized capacity building.

Ndoro has contributed immensely to the development of heritage management in Africa. Webber's major accomplishments are in finding workable solutions to heritage management in Africa. His work at Great Zimbabwe had an immense impact on how archaeological sites and other World Heritage sites are managed. It also led to the proper management of other national monuments in Zimbabwe, especially those of the Zimbabwe culture. On the continental side, his pragmatic approach to heritage management changed the approach from one of just importing ideas from outside the continent to one that looks for ideas that suit the African experience. He has always emphasized result-oriented approaches. He has helped in policy formulation at national and international level. As a member of important organizations such as ICOMOS, ICCROM, and World Heritage committees, he brought African heritage management issues to the attention of the world. His collaborations with organizations such as Getty Conservation Institute, World Bank, and UNESCO have made sure that solutions are found for African heritage management problems. He has reviewed a number of projects on heritage management and provided important guidance.

Ndoro was one of the pioneers of the community participation in heritage management in Africa. This has become one of the best solutions to the challenges of heritage management in Africa. Most of the problems were emanating from disfranchisement of the communities that live with heritage places. This also brought in the viable solution to less expensive management systems, i.e., by employing traditional management systems that communities have always used to look after heritage places. Community participation and the traditional management systems help lessen the burden for formal heritage institutions that cannot afford the financial resources required to look after heritage places in Africa.

One of the greatest legacies that Webber will eventually leave is in his publications. He has written and coauthored several books and papers on archaeology and heritage management in Africa. Any researcher dealing with heritage management in Africa should not overlook Webber's publications. For example, his publications should be the first port of call for any student who is interested in the management of dry stone-walled monuments in southern Africa.

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Neanderthals and Their Contemporaries

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Introduction

The Neanderthals are the longest-recognized nonmodern humans known to science and are usually referred to their own species, *Homo neanderthalensis*. Geographically restricted to Europe and Western to West-Central Asia, fossil data suggest that they are contemporary with early members of our species (*H. sapiens*, or modern humans) as well as with *H. floresiensis* and perhaps late-surviving *H. erectus* as well (the latter two species being limited to Eastern Asia). Genetic data suggest the Neanderthal lineage split from that of modern humans sometime between 800,000 and 300,000 years ago. However, most Neanderthal fossil specimens themselves have been recovered in Late Pleistocene contexts dating from c. 130,000 to 30,000 years ago. Some

scientists argue that the Sima de los Huesos samples from the Atapuerca Hills of northern Spain, which date somewhere between 300,000 and 600,000 years ago, are Neanderthals, but most refer these specimens to the hominin species *Homo heidelbergensis*.

Archaeologically, Neanderthals are most frequently associated with Mousterian tools, a Middle Paleolithic industry found in Europe, Western Asia, and parts of North Africa. However, late (c. 32,000–36,000 years ago in radiocarbon years) Neanderthals in southwestern France (and likely Spain north of the Cantabrian Mountains) are associated with the Châtelperronian industry, which is typologically considered by archaeologists to be either a fully Upper Paleolithic or (more commonly) a transitional Middle-to-Upper Paleolithic industry. Neanderthals have also been thought to have been the makers of similar "transitional" industries in Italy and Greece (the Uluzzian), and the Czech Republic, Slovak Republic, and Hungary (the Bohunician and Szeletian), but this view has recently come into question (see below).

Definition

Homo neanderthalensis is the fossil hominin species most closely related to our own species, *Homo sapiens* (modern humans). Neanderthals are distinguished from modern humans and other hominin species by a long-recognized suite of anatomical (and now genetic) characters, some of which are ancient retentions (*plesiomorphies*) shared with other nonmodern human species and others which are uniquely or shared-derived (evolved) characters (*apomorphies*). Ancient retentions in the Neanderthal skull include especially large shovel-shaped incisors (although in older adults the crowns of these teeth are extensively worn through paramasticatory use), long and low cranial vaults with pronounced browridges, prognathic (forward-projecting) faces that lack canine fossae but which have wide nasal apertures, and mandibles without a forward-projecting chin. Ancient retentions in the skeleton below the skull (i.e., the postcranial skeleton) include wide pelves with elongated public bones, strongly built and more horizontally oriented spinous processes in the cervical vertebrae, and the large, robustly built transverse processes of the lumbar vertebrae. Neanderthal ribs are also large and robust, and there are some data to suggest that the inferior aspect of their rib cage was less constricted (i.e., more open) than those of *Homo sapiens*, perhaps to accommodate the wider pelvis. As was the case with earlier hominins, including members of the genus *Australopithecus*, the Neanderthal elbow joint evinces a relatively short ulnar coronoid process. Neanderthals (including Neanderthal infants) are also like earlier hominins in that they are characterized by limb bones with thickened cortical bone and smaller medullary (marrow) cavities. Neanderthal muscle attachment areas, particularly on the bones of the upper limb, are indicative of a heavily muscled physique; this, too, is a plesiomorphy retained from earlier *Homo*.

There are relatively few derived characters of the postcranial skeleton, the most noteworthy being a depression, or sulcus, running along the axillary (lateral) border of the scapula corresponding to the scapular attachment of theteres minor muscle, one of the muscles of the rotator cuff. This sulcus tends to be found on the ventral, or rib cage, side of the scapula in *Australopithecus afarensis* (A.L. 288-1, or "Lucy"), *Homo erectus*, and *H. sapiens*, but in Neanderthals it is almost exclusively found on the dorsal (back) side of the scapula's axillary border. Derived characters of the skull include size reduction in browridges, chewing musculature and cheekbones relative to Early and Middle Pleistocene *Homo*, larger brains (in absolute terms Neanderthal brains are on average larger than those of *Homo sapiens*: 1350 cc for *H. sapiens*; 1520 cc for *H. neanderthalensis*), occipital buns, and a unique, ovoid depression of dubious function at the rear of the cranium known as the suprainiac fossa. Yet perhaps the most commonly cited distinctive anatomical feature of Neanderthals is their midfacial prognathism, i.e., the anatomical configuration in which the region of the face nearest the body's midline (primarily the nose and anterior dentition) is projecting. Projecting

Neanderthals and Their Contemporaries, Fig.1 Oblique views of the skull of (L to R) La Ferrassie 1 (*Homo neanderthalensis*) and Cro-Magnon 1 (*Homo sapiens*). The canine fossa is the depression visible under the orbits in the cheekbone area of Cro-Magnon 1 (Photo copyright John Reader)

faces are also characteristic of earlier hominins, but Neanderthals differ from the ancestral condition in that the more lateral portions (or sides) of the face (predominately the zygomatics, or cheekbones) are in a more posterior position than would be typical for earlier members of the genus *Homo*. When considered as a whole, the morphological differences between the Neanderthals and our own species are quite marked (Figs. 1 and 2). In fact, multivariate analyses of craniofacial measurements consistently cluster the Neanderthals apart from *Homo sapiens* in multivariate space. In contrast, the differences among recent *H. sapiens* in craniofacial morphology are much smaller – this despite our own species' global distribution. It is of note that these anatomical differences between Neanderthals and modern humans are manifest despite the fact that the Neanderthal genome is over 99 % identical to ours, indicating that perhaps only a few key changes in regulator genes differentiate the two taxa.

Historical Background

The first Neanderthal recognized as such was discovered at the (now obliterated) cave site of Feldhofer, in the Neander Valley (or "Thal" in nineteenth-century German) near Düsseldorf in 1856. Two other Neanderthals had previously been discovered: one at Engis, Belgium, in 1829 or 1830, and a second at Forbes' Quarry in Gibraltar in 1848, but neither of these specimens was recognized as a nonmodern form of human until decades later. Thus, the term "Neanderthal" stuck as both the vernacular and scientific (*Homo neanderthalensis* King, 1864) name for the human species represented by the individuals from Feldhofer and similar specimens from across Europe into Western to West-Central Asia.

Many scientists were at first reluctant to accept the Neanderthals as a prehistoric "race" or species of humans, even when further discoveries were made in Belgium at La Naulette in 1866 and in 1880 in what is now the Czech Republic at the site of Šipka. Among the most vocal critics was Prussian anatomist Rudolf Virchow, known as the "father of pathology," a staunch antievolutionist, who concluded that all of the newly discovered Neanderthal specimens were modern humans evincing various pathological conditions. Virchow's position became untenable after the 1886 discovery of two Neanderthal individuals at the Belgian site of Spy, which were preserved under an undisturbed stalagmitic

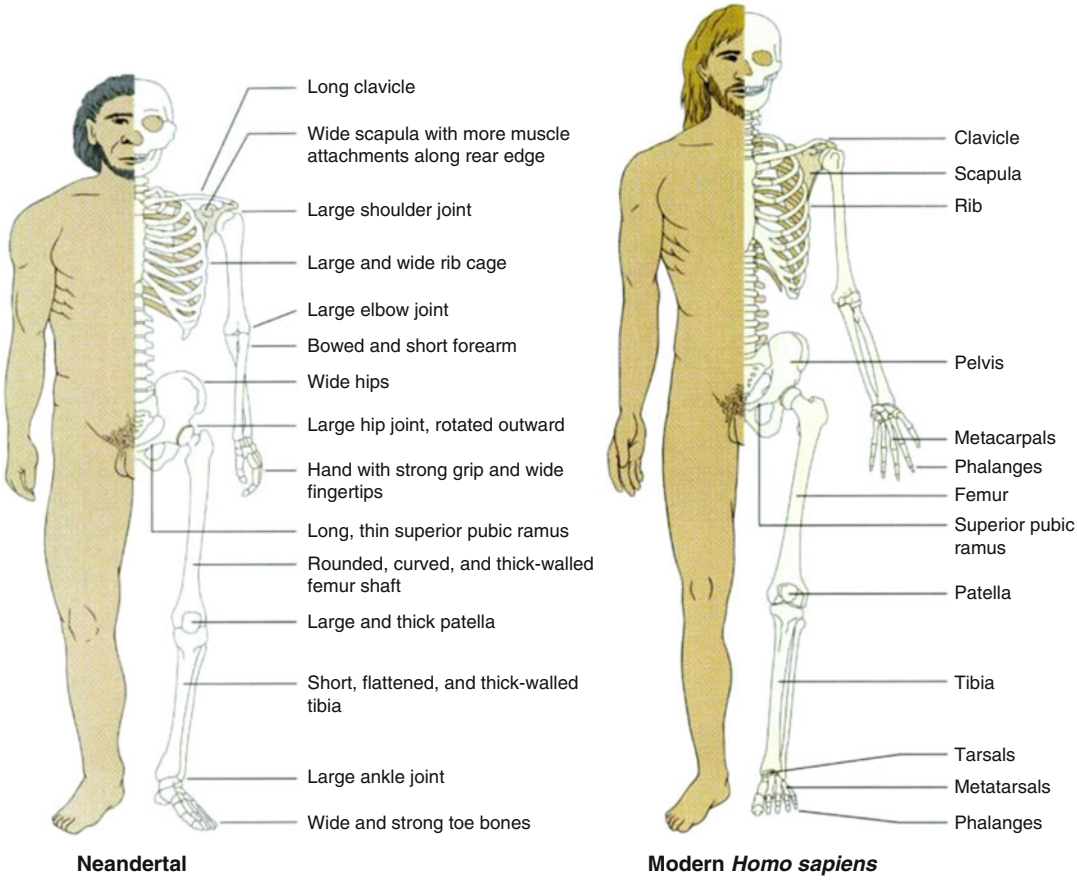

Neanderthals and Their Contemporaries, Fig. 2 Schematic views of a male *Homo neanderthalensis* (*L*) compared with a male *H. sapiens* (*R*) (From Stringer & Gamble (1993: 79))

layer and associated with both extinct mammals and "primitive" (Mousterian) stone tools.

Perhaps the most culturally salient Neanderthal individual was discovered in 1908 at the site of La Chapelle-aux-Saints in Corrèze in southwestern France. The relatively complete and well-preserved skeleton of this adult male individual was given to Prof. Marcellin Boule, who published a series of important articles on it from 1911 to 1913. In these articles, he took great pains to emphasize its "ape-like" nature (Fig. 3). Boule erroneously reconstructed the Chapelle-aux-Saints Neanderthal as having had a stooped posture, due in part to a perceived lack of modern humanlike spinal curvatures. Boule also reconstructed La Chapelle as having walked with a bent-kneed gait. It is to Boule whom we owe the popular conception (which still persists today) of the Neanderthal as primitive brute.

Over the course of the twentieth century and into the twenty-first, many more Neanderthal remains were discovered across Europe, which is widely regarded as the continent on which the Neanderthals evolved. Indeed, a number of Neanderthal features, including their foreshortened distal limb segments and wide bodies with voluminous, barrel-shaped rib cages (and even their large noses), have been argued to be the result of adaptation to the glacial cold of Pleistocene Europe. In Europe clearly diagnosable Neanderthal remains have been recovered in Belgium, Croatia, the Czech Republic, France, Georgia, Germany, Gibraltar, Greece, Hungary, Italy, the Netherlands, Portugal, the Slovak Republic, Russia, Spain, and the Ukraine. The twentieth

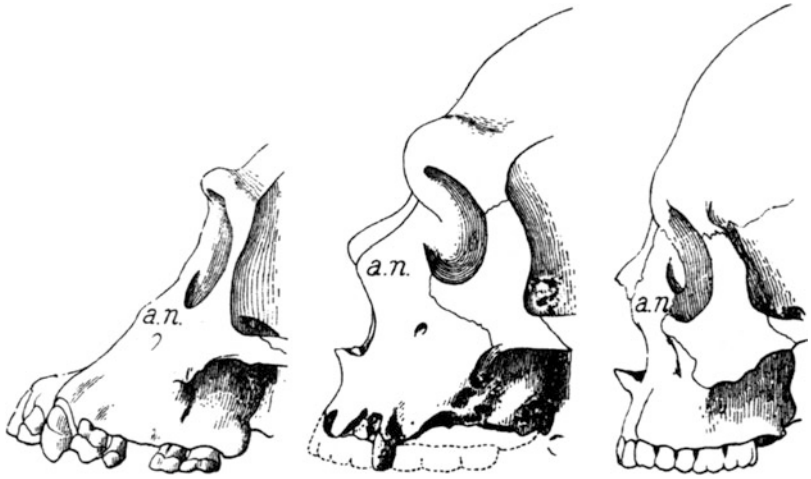

Neanderthals and Their Contemporaries, Fig. 3 Lateral views of crania of (*L* to *R*) a chimpanzee, La Chapelle-aux-Saints Neanderthal, and a modern human from one of Boule's publications. He emphasized the facial prognathism as a primitive feature aligning the chimpanzee with the Neanderthal (From Osborn (1915))

Neanderthals and Their Contemporaries, Fig. 4 Map showing the approximate range of *Homo neanderthalensis*, including the recent discoveries from the Altai Mountains in southern Siberia (From Krause et al. (2007))

century also saw the discovery of multiple diagnosable Neanderthal skeletons in Israel, Iraq, Syria, and Uzbekistan. These European and Western Asian specimens have added greatly to our knowledge of Neanderthal anatomy and our understanding of their temporal and geographic range. Recently, it was revealed that an anatomically nondiagnostic partial juvenile skeleton from Okladnikov Cave in southern Siberia had mitochondrial DNA (mtDNA) sequences indicating it was a Neanderthal – likely extending the species' range to the Altai Mountains of southern Siberia (Krause et al. 2007; Fig. 4, and see below). Thus, Neanderthals ranged from the Iberian Peninsula in

the west across Europe into Western Asia and northwest up into southern Siberia. In contrast, no Neanderthals have been recovered from Africa, where almost all Neanderthal contemporaries, at least based on the fossil record (and not analyses of recent human DNA; see below), appear to be representatives of modern humans (*Homo sapiens*). Likewise, no Neanderthals are yet known from the Indian subcontinent or Eastern Asia. Neanderthal contemporaries in this region are variably referred to *H. erectus*, *H. floresiensis*, or *H. sapiens*, and possibly *H. heidelbergensis* (but see below).

Key Issues/Current Debates

The oldest question in the study of human evolution is that of modern human origins, or the evolutionary emergence of our own species. Since the second half of the nineteenth century, this question has been intimately tied to the "Neanderthal question"; i.e., what role, if any, did the Neanderthals play in our own species' evolution? The last three decades saw the rise of competing models of modern human origins, with the Multiregional Evolution (MRE) and Recent African Origin (RAO) models representing diametrically opposing views. The MRE position, championed by Milford Wolpoff and colleagues, was that in the Middle and Late Pleistocene, genetic exchange between hominins across the Old World kept geographically dispersed populations of the genus *Homo* from differentiating to the point that they became separate species. Therefore, the origins of modern humans are not the origin of a new species, or a speciation event per se, but rather is simply the process of a global fixation of anatomical *characters* that we today recognize as "anatomically modern" – e.g., high, globular, rounded, crania, small browridges, forward-projecting chins, and non-projecting faces tucked beneath the frontal lobes of the brain. The MRE model also held that the Neanderthals made significant genetic contributions to the populations of modern humans who succeeded them in Europe and Western Asia. In contrast, RAO proponents, such as Chris Stringer, argued that the emergence of *Homo sapiens* was a cladogenic (speciation) event, with modern humans evolving first in East Africa c. 200,000 years ago and then expanding to replace their nonmodern cousins in southern and northern Africa, the Levant, Eastern Asia, and ultimately Europe. Some RAO proponents argued that spoken language was unique to the newly evolved species and was ultimately the key to its/our success. However, since we now know Neanderthals had the derived, humanlike version of the *FOXP2* "speech and language" gene, and given that Neanderthal basicranial, mandibular, and hyoid anatomy would not preclude humanlike speech, and considering the large size of the Neanderthal brain, it appears unlikely that among the hominins only *Homo sapiens* could speak.

Many RAO proponents also argued that as separate biological species (following Mayr 2000), there was no successful interbreeding between *Homo sapiens* and *H. neanderthalensis*; rather, the two species were reproductively isolated from each other. In other words, even if members of the two species recognized each other as potential mates, any resulting offspring of such unions were incapable of reproducing themselves, in much the same way as mules, the offspring of a horse mother and a donkey father, are almost always sterile.

Beginning in the 1980s intermediate models staked out the middle ground between the MRE and RAO approaches. In particular, the "Assimilation" Model of Fred Smith and Erik Trinkaus (Smith 1994) and the "Replacement with Hybridization" model of Günther Bräuer (Bräuer 2008) agreed with the RAO position that modern humans evolved first in Africa, but unlike many RAO supporters, these workers saw paleontological evidence for varying amounts of successful interbreeding between *Homo sapiens* and nonmodern species of the genus *Homo*.

While paleontologists heatedly debated the issue of modern human origins for over 150 years, the question was ultimately answered in 2010 when the draft sequence of the Neanderthal genome was published (Green et al. 2010). Green and colleagues found that uniquely Neanderthal genetic sequences survive even today among

non-African people, and they estimate the proportion of Neanderthal ancestry in these non-Africans to be somewhere between 1 % and 4 %. It is notable that this finding is more in line with the predictions drawn from the "Assimilation" or "Replacement with Hybridization" models than with those made by either MRE or RAO. What remains a point of contention, however, is how to interpret this Neanderthal genetic contribution to (at least some) living humans. Does it represent multiple interbreeding events across Europe and Western Asia over the course of many millennia, or is it a remnant of an extremely rare interbreeding that occurred only infrequently, perhaps only a few times in Western Asia? The fact that there is actual genetic evidence of interbreeding at least 30,000 years after it occurred suggests to many that the former is more likely than the latter.

Also related to this question (and still hotly debated) is the question of temporal overlap between Neanderthals and modern humans in Europe. The earliest directly dated, anatomically diagnostic, modern human in Europe is that of Oase, Romania, dated to 35,000 years BP (uncalibrated), and there are also tool industries which to date have only been associated with *H. sapiens* that date back some 40,000 years in Europe. Late Neanderthals are said to date to as recently as 32,000–33,000 BP (radiocarbon years) at the site of Vindija in Croatia, and some Mousterian deposits in southern Iberia are said to postdate 30,000 BP (although both sets of dates are disputed by some workers, some of whom argue that no Neanderthal is securely dated to later than 38,000 BP in radiocarbon years; e.g., Jöris & Street 2008). The late Mousterian dates, if accurate, would seem to indicate a temporal overlap of *Homo sapiens* and *H. neanderthalensis* in Europe of perhaps as much as 12,000 years. However, these dates fall at the very limits of the applicability of radiocarbon dating, and to further complicate matters, there is a radiocarbon plateau at c. 35,000 BP. But perhaps more importantly, given the fluidity of material culture, tools should never be used as genetic markers – and in the archaeological record we do have multiple examples of modern humans making and using Mousterian tools!

Neanderthals and Their Contemporaries, Fig. 5 The skull of the Amud I *Homo neanderthalensis* specimen from northern Israel, dated to c. 50,000 years ago (above), compared with the Skhul V *H. sapiens* specimen from northern Israel, which likely dates between 100,000 and 80,000 years ago (Photo copyright Israel Antiquities Authority (Jerusalem) and Dr. Eric Delson)

An additional potential geographical area of contact between *Homo sapiens* and *H. neanderthalensis* is the Levant, the region along the eastern shore of the Mediterranean. *Homo sapiens* is found in the southern Levant at c. 100,000 BP, while *H. neanderthalensis* remains are found there dating to c. 50,000–60,000 BP (Fig. 5). While some have interpreted these data as indicative of a period of 50,000 years of temporal overlap between the two species in the region, this is unlikely to be the case. Since we now know that Neanderthals and modern humans were interfertile, the notion that they could live side by side in a small area like the southern

Levant for tens of millennia while remaining biologically distinct populations is extremely improbable. What seems much more likely is that the two hominin species were in the region at different times and under different climatic regimes. Specifically, it appears that *Homo sapiens* expanded out of Africa and into the Levant during the relatively warmer climes of the Last Interglacial and later retreated back into Africa as the climate deteriorated with the onset of glacial conditions at c. 75 ka (MIS 4). Likewise, as has been argued for many years by Bernard Vandermeersch (Vandermeersch 1981) and others, the Neanderthals may not have been in the Levant prior to 75 ka and perhaps only expanded into the region from Europe (and/or from the region[s] surrounding the Caucusus Mountains and Caspian Sea) with the onset of deteriorating climatic conditions in the north. Analyses of microfauna by the late Eiton Tchernov support this conclusion, since he found that the small mammal faunal (microfaunal) remains from the Levantine *Homo sapiens* site of Qafzeh have a broad and distinctive Afro-Arabian component, while later microfauna associated with *Homo neanderthalensis* (or at least with cultural remains assumed to be associated with that species) at sites such as Tabun and Hayonim is characterized by many fewer Afro-Arabian elements and a much greater number of Paleoarctic species (Tchernov 1998). Thus, based on zooarchaeological data, contacts between the two species were likely relatively fleeting in the southern Levant.

Another unresolved issue concerning the Neanderthals and their contemporaries is that of the emergence of "modern" behavior and whether the Neanderthals were themselves capable of it. The issue of behavioral modernity has its roots in the archaeological study of the Middle-to-Upper Paleolithic transition in Europe. Viewed through a European lens, the Upper Paleolithic, which begins to appear c. 40,000 years ago in Europe, represents the high-water mark of Paleolithic culture. In the Upper Paleolithic we have, for example, the first-time appearance (in Europe, at least) of large numbers and types of bone and antler tools, particularly those made in such a way as to take advantage of the bone's special properties, such as barbed harpoon points. Complex rock-lined fireplaces complete with ventilation systems replace simple Middle Paleolithic hearths. Vivid and realistic cave paintings, and mobile art in the form of small sculptures, also make their first appearance in the Upper Paleolithic, and there is also a technological shift in the Upper Paleolithic toward stone implements made on long parallel-sided blades. This suite of technological and artistic characters came to be viewed by archaeologists as the "total package" indicative of "modern" human behavior. In contrast, the preceding European Middle Paleolithic industry (the Mousterian) had virtually no evidence of art, with stone tools made on Levallois and other preprepared flakes that were only occasionally blades. Likewise, the Mousterian had very few bone and antler tools. Archaeologists and biological anthropologists alike, then, interpreted the Middle-to-Upper Paleolithic transition as indicative of the work of two different types, or species, of hominin. The Middle Paleolithic (Mousterian) tools were the work of Neanderthals, who lacked the cognitive capacity to make art or complicated tools. The Upper Paleolithic, then, with its art and technological complexity, was exclusively the work of modern humans. This perspective hit a stumbling block when in 1979 a Neanderthal skeleton was unearthed from Châtelperronian levels at the French site of St.-Césaire. Up until that point, archaeologists had considered the Châtelperronian to be (typologically, at least) an Upper Paleolithic industry. Could the Neanderthals be capable of making Upper Paleolithic tools after all? Further analyses revealed that previously nondiagnostic human remains from Châtelperronian levels at the French site of Grotte du Renne at Arcy-sur-Cure were also Neanderthal, and these specimens were also associated with evidence of personal adornment in the form of pierced animal teeth.

Some workers responded to this "problem" by demoting the Châtelperronian (and similar industries such as the Szeletian, Bohunician, and Uluzzian) from truly Upper Paleolithic industries to "transitional" Middle-to-Upper Paleolithic

industries. Many also came to view these "transitional" industries as representative of some kind of Neanderthal response to the superior technology brought into Europe by "invading" modern humans. In other words, the Upper Paleolithic-type tools found in the Châtelperronian were either manufactured in imitation of modern humans' technology or, alternatively, were acquired by Neanderthals via trade with modern humans. Archaeologist Paul Mellars (2005) goes so far as to invoke the timing of the appearance of these transitional industries as evidence that the Neanderthals borrowed these technological innovations from modern humans. He notes that Neanderthals used nothing but Middle Paleolithic tools until the relatively sudden appearance of transitional industries c. 40,000 years ago – a date too coincidentally correlated with the first appearance of anatomically modern humans in Europe not to be causally related to them.

Archaeologist João Zilhão (2006) disagrees, arguing instead that the Châtelperronian and similar industries were autochthonous developments with their technological roots in the preceding local Mousterian. He and his colleagues also argue that given taphonomic processes and the error ranges inherent in radiometric dating, one cannot reject the null hypothesis that the Châtelperronian is older than the Aurignacian (the industry argued by many archaeologists to be the earliest "truly" Upper Paleolithic industry in Europe) at every site that contains both industries. Zilhão also argues that since there is some (albeit relatively rare) evidence for art in Mousterian contexts at multiple European (and therefore presumed Neanderthal) sites, and given the fact that some hunter-gatherers in the ethnographic present manufacture simple lithic technologies and/or make no art on durable materials (i.e., their art would be "archaeologically invisible"), one cannot create a definition of "modern" human behavior that does not either (1) include Neanderthals or (2) exclude some groups of living humans. This debate has also become a bit more complicated when it was revealed that deciduous molars, said to be derived from Uluzzian levels in Italy, cluster in multivariate space with modern human deciduous molars and not those of Neanderthals (Benazzi et al. 2011).

Some researchers criticize the traditional definition of modern human behavior by arguing that the "trait list" approach to defining "modern" behavioral characteristics is Eurocentric and ignores the archaeology of other regions, especially Africa, where arguably many "modern" behavioral characters first appear in Middle Paleolithic (Middle Stone Age, or MSA) contexts (McBrearty & Brooks 2000; Shea 2011). Others posit that the behaviors traditionally viewed as "modern" are most likely outgrowths of shifts in climate, resource intensification, or even population density (Henshilwood & Marean 2003). Recently, one researcher has even called for an end to the use of the "behavioral modernity" concept altogether (Shea 2011), but given the fascination we humans have for what makes us unique, this issue is unlikely to go away anytime soon.

A final notable area of debate surrounding the Neanderthals involves how many species of hominin coexisted with them. Modern (or nearly modern) humans (*H. sapiens*) are found in East Africa (at sites such as Omo Kibish and Herto in Ethiopia) c. 190,000–160,000 years ago and in the southern Levant (at sites such as Qafzeh and Skhul) and southern Africa (at sites such as Klasies River Mouth) c. 120,000–100,000 years ago. Modern or nearly modern humans are also known from North Africa (at sites such as Dar-es-Soltan and Grotte des Contrebandiers) beginning c. 100,000 years ago (and perhaps earlier). All of these dates make early *H. sapiens* contemporary with *H. neanderthalensis*, and interestingly, these modern humans, like most Neanderthals, are associated with Middle Paleolithic (MSA, Mousterian, or Aterian, depending on the region in question) tools.

Yet how many other species of hominin might also be contemporary with the Neanderthals? A high-coverage genome sequence of an unpublished distal fifth manual phalanx recovered from Denisova Cave in the Altai Mountains, in deposits dating to c. 48,000–30,000 BP (and therefore most likely contemporary with late Neanderthals), is argued to be that of a previously unknown species of hominin (or perhaps *Homo erectus*?), but a pedal phalanx from the same site has just recently been

Neanderthals and Their Contemporaries, Fig. 6 Lateral view of casts of (L to R) 1.9 million-year-old KNM-ER 1813 (*Homo habilis*), 1.7 million-year-old Dmanisi 2700 (*H. erectus*), and 18,000 year-old Liang Bua 1 (*H. floresiensis*). Despite the difference in dates, the crania are remarkably similar in size and morphology (Photo credit: Chris Stringer, Natural History Museum, London)

discovered to have the nuclear genome of a Neanderthal (Sawyer et al. 2012). Finally, in terms of "genetic" hominin species, genetic sequences of living Africans reveal introgression from a presumably extinct species of African hominin previously unknown to science, and this species is thought to have been contemporary with Neanderthals (Lachance et al. 2012).

In terms of fossil data for the contemporaneity of other hominin species with Neanderthals, one locale where multiple fossil hominins have been recovered since the end of the nineteenth century is the Indonesian island of Java. While its dating remains problematic, the site of Ngandong in Java has long been thought to be c. 1 million years later than other *Homo erectus* sites on the island, and while the Ngandong crania show larger braincases on average than early Javanese *H. erectus*, paleoanthropologist Susan Antón has shown that in all other aspects of their cranial morphology, the Ngandong crania are quite *Homo erectus*-like. Beginning in the mid-1990s the Ngandong remains were even thought by some to date to the Late Pleistocene, although a Middle Pleistocene age now seems much more likely (Indriati et al. 2011). Such a date could make the Ngandong *H. erectus* specimens contemporary with the earliest Neanderthals (although they likely antedate most Neanderthals).

Also in Indonesia, a find of great importance was the 2004 discovery of diminutive hominin specimens from the site of Liang Bua on the island of Flores, where at least one small-brained individual dating to nearly the end of the Pleistocene (c. 18,000 years ago) evinces cranial morphology similar to both 1.9 million-year-old *H. habilis* from Africa and 1.7 million-year-old *H. erectus* fossils from Dmanisi in Georgia (Fig. 6). While not universally accepted by the scientific community, this specimen and other less complete specimens from Liang Bua have over the last few years become more widely viewed as representative of a late-surviving descendant species of the earliest *Homo* that expanded beyond the African continent: *Homo floresiensis* – a species contemporary with, and one that even postdates, *Homo neanderthalensis*.

In China, Middle Pleistocene specimens from Jinniushan (dating to c. 280,000–250,000 years ago) and Dali (dating to c. 230,000–180,000 years ago) may be contemporary with the earliest Neanderthals, although they are likely older than most (if not all) of them. Neither specimen shows any uniquely derived Neanderthal characters, and some researchers refer the specimens to *Homo erectus* (Dali's cranial capacity [c. 1120 cc] is close to the *Homo erectus* mean). However, both specimens are derived enough that they do not easily fit within the *Homo erectus* hypodigm. Jinniushan's cranial capacity (c. 1,400 cc), for example, is higher than the modern human mean, and while Dali's

face is badly distorted, its neurocranium is decidedly less so, and the shape of its cranial vault is much more derived than what is typically considered *H. erectus*-like. Similarly, the Late Pleistocene (c. 150,000–100,000 years ago) Chinese Maba (Mapa) partial cranium, contemporary with the earliest Neanderthals, is likewise considered by many to be too derived in its morphology to be referred to *Homo erectus*. The question as to which taxon it does belong, however, is much more complicated. The specimen does not preserve any uniquely Neanderthal characters nor does it appear to be derived enough to warrant inclusion in *H. sapiens*. One possible taxonomic assignment for Jinniushan, Dali, and Maba is *Homo heidelbergensis*, but many reserve this name for European and/or African Middle Pleistocene specimens only. Another possibility is "archaic" *Homo sapiens*, but this term is problematic for two reasons. First, as was pointed out by F. Clark Howell, nowhere else in plant or animal taxonomy is a qualifier put before a species name; a specimen or subpopulation either belongs to a species, or it does not. The second problem is that "archaic" *H. sapiens* is somewhat vague in meaning, since this term has been used to describe modern human specimens from Qafzeh and Skhul, and even the Neanderthals themselves! Milford Wolpoff solves these (and similar) dilemmas by sinking all specimens assigned to the genus *Homo* from all continents over the last 2.0 million years into *Homo sapiens*. From the perspective of Ernst Mayr's Biological Species Concept, he is on solid ground in so doing, since most likely all member species of the genus *Homo* would have been interfertile – i.e., capable of producing "hybrid" offspring that could themselves reproduce (Jolly 2001; Holliday 2006). Wolpoff's taxonomic scheme ignores interesting and important biological variation, however, and would make the discussion and teaching of human evolution difficult, at best.

Neanderthals and Their Contemporaries, Fig. 7 Archaeologist excavating in El Sidrón cave in northern Spain. Note the clean-room gear being worn (From Fortea et al. 2008 (*Journal of Human Evolution*))

Future Directions

Discoveries of Neanderthals are still being made at sites across Europe and Western Asia, and one trend that is likely to continue is one begun at the site of El Sidrón in Spain. Here Neanderthal DNA has been recovered, and so archaeologists excavate there in clean-room gear in order to minimize the chances of contaminating fossil DNA with that of recent humans (Fig. 7). In addition to the ongoing international effort to isolate more Neanderthal DNA from existing (and future) fossil finds, genetic researchers such as John Hawks and Laurent Abi-Rached are sorting through the many millions of base pairs of Neanderthal DNA in the draft sequence, searching for evidence of the action of selection on the Neanderthal phenotype, and trying to understand the nature of the Neanderthal genetic contribution to living people. Other scientists, such as Robert Franciscus, are using animal models and 3D morphometrics to better

understand the developmental pathways involved in growing a projecting Neanderthal face vs. a non-projecting modern human one. Scientists like Michael Richards and colleagues are exploring Neanderthal diets by examining stable carbon and nitrogen isotopes isolated from their bone collagen. These data indicate that at least some European Neanderthals ate a primarily meaty diet and that most of their dietary meat came from terrestrial herbivores. More data on Neanderthals from a wider geographic area would be welcome, and future work with oxygen and strontium isotopes isolated from Neanderthal tooth enamel has the potential to tell us if diet changed during growth and development, and even how far individual Neanderthals (or their contemporaries) ranged during their lifetimes. Did Neanderthals, for example, tend to remain in the local area of their birth, or did they frequently venture much farther afield? Finally, researchers like John Shea and Steven Churchill are gathering new experimental data using living human subjects to more fully explore just how Neanderthals used their upper limbs, and armaments, in hunting – is the long-distance throwing of spears, for example, a modern human innovation, one Neanderthals lacked? All of these approaches are likely to prove fruitful over the coming decades as scientists endeavor to learn more about humanity's closest fossil relatives.

Cross-References

- ▶ African Stone Age
- ▶ Altai: Paleolithic
- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Ancestry Assessment
- ▶ Archaic *Homo sapiens*
- ▶ Art, Paleolithic
- ▶ Australopithecines
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone Tools, Paleolithic
- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Crimean Middle Paleolithic
- ▶ Crimean Upper Paleolithic
- ▶ Dali, Archaeology of
- ▶ Dmanisi Hominins and Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ East Asia: Paleolithic
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- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ *Homo erectus*
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- ▶ Human Evolution: Multiregional Origins
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- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age
- ▶ Out-of-Africa Origins
- ▶ Taphonomy in Human Evolution
- ▶ Wolpoff, Milford H.

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Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

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State of Knowledge and Current Debates

Introduction

The Near East is situated at the crossroads between the genus *Homo*'s African evolutionary core and the Eurasian periphery (Fig. 1). The Paleolithic and Neolithic prehistory of the Near East is literally central for understanding the genus *Homo* as a globally distributed lineage, whose single surviving species – *Homo sapiens* – continues to shape and be shaped by the terrestrial, omnivorous, and extractive niche with which it has coevolved. This entry examines the general theoretical issue of biocultural evolution in the context of Near Eastern geography, climate, ecology, and Stone Age prehistory.

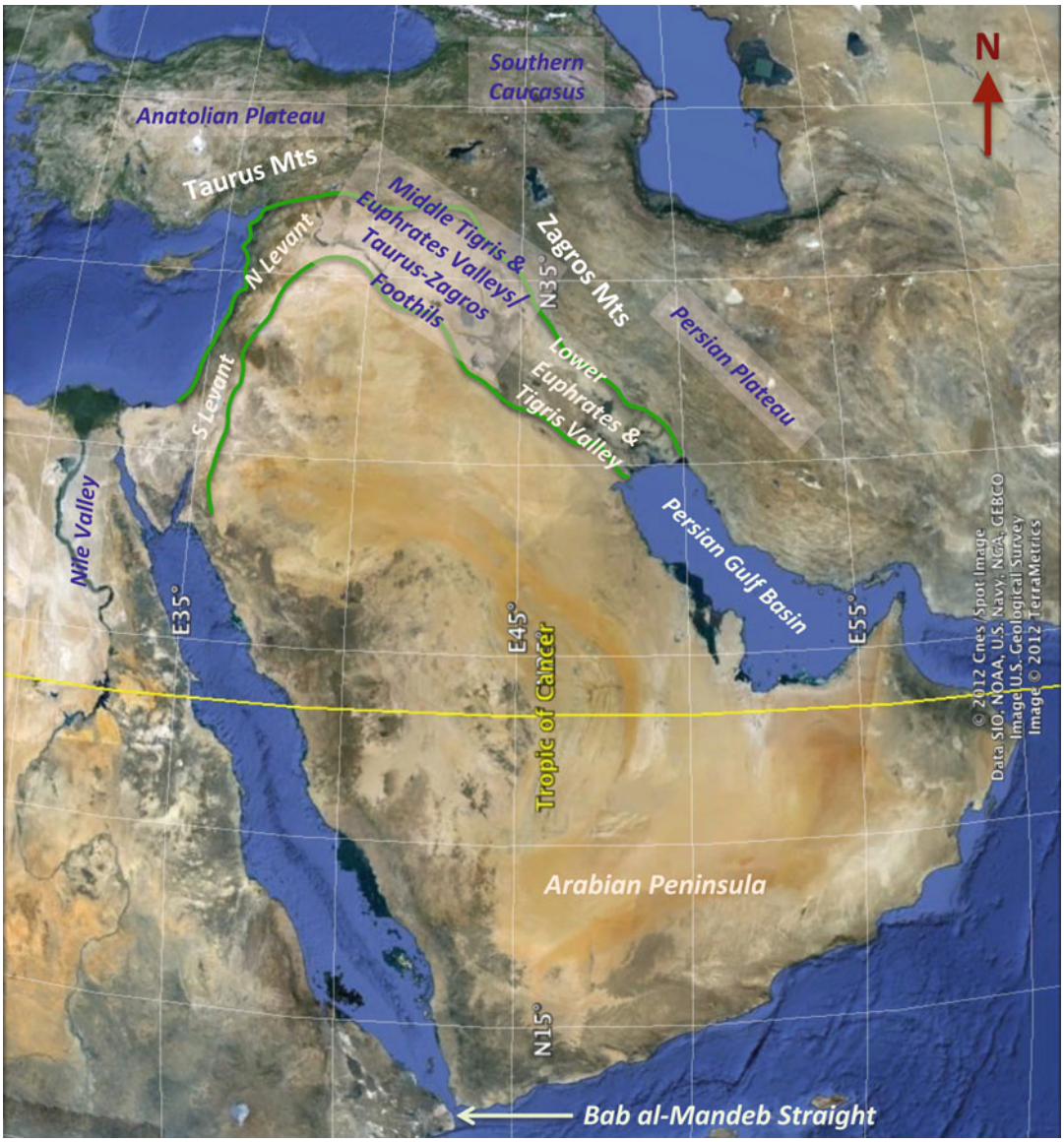

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 1 Regions and locations in the Near East that are key for understanding the geographic structure of human dispersals and population interaction in the Pleistocene and early Holocene (Base-map source: Google Earth)

In doing so, it offers an overview of Paleolithic and Neolithic paleoanthropology and archaeology, with basic introductory information about industries, technocomplexes, fossils, and key sites in chronological context.

The Paleolithic begins with the late Pliocene emergence of Oldowan chipped stone technology (c. 2.6 million years ago [mya]) in Africa. The oldest well-documented Oldowan occurrence outside of Africa comes from Dmanisi (Ferring et al. 2011), on the northern margin of the Near East, but a small Oldowan surface assemblage, likely associated with the Erq al-Ahmar formation in the Jordan Valley, Israel, would be

PREPOTTERY NEOLITHIC 12-8.2 kya	PPNB/C—*Agricultural villages throughout Near East; complex household and communal rituals, especially mortuary ritual*	10.5—8.20 kya
	PPNA—*Early agriculturalist-forager hamlets and villages; monumental communal architecture at Jericho and Gobekli Tepe*	11.7—10.5 kya
EPIPALEOLITHIC 20-12 kya	Late Epipaleolithic—*Natufian archaeological culture in the Levant; sedentary settlements appear throughout the Near East*	15—12 kya
	Middle Epipaleolithic—*Geometric microlith production widely adopted*	17—15 kya
	Early Epipaleolithic—*Microlithic technocomplexes become widespread*	20—17 kya
UPPER PALEOLITHIC c. 50/45 kya—20 kya	Late Upper Paleolithic—*High-mobility hunter-gatherer behaviors and technocomplexes with bladelets and microlithic points*	30—20 kya
	Early Upper Paleolithic—*Blade, point, endscraper, and burin-rich technocomplexes; EUP appears to be associated with anatomically modern human expansion into Eurasia*	50/45—30 kya
MIDDLE PALEOLITHIC c. 250/200 – 50/45 kya	Late Middle Paleolithic—*Levantine Levalloiso-Mousterian; Zagros-Anatolian side-scraper-rich Mousterian; Neandertal burials*	75—50/45 kya
	Mid-Middle Paleolithic—*Levallois flake and blade production extensive; early AMH burials c. 100 kya; possible Neandertal presence*	130—75 kya
	Early Middle Paleolithic—*Levallois and prismatic blade technology; extensive use of campfires at Hayonim Cave*	250/200–130 kya
LOWER PALEOLITHIC 1.8 mya – c. 250/200 kya	Acheulo-Yabrudian—*restricted to central Levant; Qesem Cave evidence of blade production, hunting of prime adult big game.*	400—250 kya
	Acheulean—*biface technology widespread; Kalatepe Deresi evidence of > 1 mya presence in Anatolia; Gesher Benot Ya'akov evidence of campfires and omnivorouscentral-place foraging, c. 800 kya*	1.? – 0.2? mya
	Developed Oldowan—*'Ubeidiya key southern Levantine lake-margin site*	1.5 mya
	Oldowan—*Erq el-Ahmar possible evidence of early Homo*	1.8 mya

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 2 Key evolutionary periods, hallmarks, and archaeological technocomplexes/industries in the Pleistocene and early Holocene prehistory of the Near East

roughly contemporaneous, c. 1.80 mya. The Paleolithic continues until the end of Pleistocene (c. 11.7 thousand years ago [kya]). The Prepottery Neolithic of the Near East then stretches from the Pleistocene-Holocene transition to c. 8.20 kya (Kuijt & Goring-Morris 2002). Figure 2 is a timeline summary of Pleistocene-Holocene prehistory in the region.

Across the vast temporal extent of the Paleolithic, the Near East exhibits a continuous – or nearly continuous – record of human occupation (Bar-Yosef 1980), but paleoanthropological interest in the region emphasizes how it contains migration or dispersal corridors linking East and North Africa to western and southern Eurasia (Lahr 2010). The Paleolithic settlement of the Near East was recurrently shaped by African population expansions into the region, in turn shaping further population waves into the rest of Eurasia. The inference of repeated out-of-Africa (OOA) Pleistocene range expansions is broadly empirically based on human fossil and archaeological evidence, thoroughly backed up by geographic analyses of extant genetic variation (Lahr & Foley 1994; Li et al. 2008). By virtue of the region's supracontinental geographic setting, the human occupation of the Near East must have shaped these OOA range expansions, but very importantly, there is still considerable debate over the environmental context and systemic biological and cultural causes. This debate is vital for ongoing research on three chronologically successive hallmark developments:

- The initial human expansion out of Africa in the Lower Pleistocene (c. 1.8–0.78 mya)
- The initial evolution and spread of modern human anatomy out of Africa, across the

Middle-Late Pleistocene transition (marine isotope stages 5–6, c. 170–80 kya)

- Following a later Middle Paleolithic episode in which European Neanderthal anatomy spread into the Near East (c. 80–50 kya), the decisive expansion of Upper Paleolithic technology – associated with modern human anatomy – in the Late Pleistocene (c. 50–20 kya)

In addition, *the transition from the final Paleolithic – known in the region as the Epipaleolithic – to the Neolithic* (*seen at a long-term scale from c. 20 to 10 kya*) *is often viewed through the lens of the transition to sedentism*, *agriculture*, *and village life*, *which emerged "full-blown" in the Prepottery Neolithic B period of the Near East*. Notably, the Near Eastern case may represent the earliest primary prehistoric transition from a hunting and gathering subsistence mode to a predominantly agricultural one (Bar-Yosef & Meadow 1995; Sherratt 2007).

The theoretical emphasis in this entry is on a complex-systems approach for considering the debates and open questions surrounding the Near East's crossroads setting for recurrent, supracontinental biocultural change during the Stone Age. It is emphasized that new scientific insights, novel questions, and critical humanistic concerns and lessons drawn about Near Eastern prehistory must rely on interdisciplinary integration of evolutionary biology, ecology, environmental science, and diverse social science frameworks, including both quantitative and interpretive cultural approaches.

Near Eastern Geography, Climate, and Ecology in the Pleistocene and Early Holocene

The Near East is generally considered to encompass a large portion of southwestern Asia, including the following key subregions: the eastern Mediterranean Levant, the Arabian Peninsula and adjoining Transjordanian and Syrian plateau semiarid zones, Mesopotamia, the arc of the Taurus-Zagros Mountains, the Taurus-Zagros foothills, and the Anatolian Peninsula (see Fig. 1). The Near East is geographically conspicuous as the link between Africa and the rest of Eurasia, placing it at the center of the largest contiguous landmass that has existed since the Pliocene.

Major Geographic Structure of the Near East

In identifying and understanding the paths that ecologically connect Africa with Eurasia, paleoanthropological research has focused on how overall geographic structure has shaped a persistent climatic and phytogeographic pattern among the major regions that comprise the Near East. In general, the Levant is relatively well watered by a highly seasonal, westerly winter monsoon system. This has yielded a robust Mediterranean environment extending west–east, from the coast to the Transjordanian and western Syrian plateaux. The Anatolian plateau and much of the Taurus-Zagros arc, with their higher elevations, also receive substantial precipitation, but the combination of a more continental Eurasian setting and higher altitudes notably results in colder winter temperatures and, often, snowfall. The Arabian Peninsula is arid, with a band of semiarid steppe extending in an arc from the Transjordanian and Syrian plateaux across Mesopotamia. The Near East is dominated, then, by semiarid or arid habitats. However, the Tigris-Euphrates valley in Mesopotamia has a geomorphological history that can be traced to the late Pliocene (Yacoub 2011), and substantial geological basins in semiarid zones – including el-Kowm in Syria and Azraq in Jordan – have supported strongly flowing springs and widespread wetlands from at least the Middle Pleistocene onward. In these areas that otherwise received very little precipitation, stable hydrological features ensured permanent freshwater corridors and oases. This would have made the entire zone from Arabia to Mesopotamia attractive for mobile hunter-gatherer groups. In fact, as Rose (2010) has recently detailed, the Persian Gulf Basin would have been a wetland for large stretches of the Pleistocene, fed by strong freshwater springs. Even when prevailing climatic conditions were at their driest (occurring during the most extreme hot and cold hemispheric or global episodes), predictable major

wetlands and riverine corridors would have persisted across the Arabian and Mesopotamian zones.

Recently, Lahr (2010) has more broadly emphasized just how important this geographic structure has been for Pleistocene human evolution. Rich alluvial systems or wetland basins situated in extensive semiarid or arid regions characterize not only the Arabia-Mesopotamia-Persian Gulf Basin region but also the entirety of North Africa. The sub-Saharan African geographical core zone of human evolution has been linked to Eurasia via this supracontinental arid/semiarid belt that was conspicuously dissected and dotted by major permanent rivers and oases. When human populations were growing or at prevailing carrying capacity in sub-Saharan Africa, forager groups would have budded off, almost always able to exploit predictably located resource-rich habitats along the Nile drainage, in North African oases, or along Arabian coastal zones accessible via Bab el-Mandeb (see Fig. 1). A high-mobility hunter-gatherer strategy of movement along rivers and coasts and between spring-fed wetland basins would have involved long-distance moves along rich corridors embedded in an otherwise ecologically impoverished desert-steppe belt. Quite simply, the high contrast in ecological productivity between rivers and wetlands, on the one hand, and desert and semiarid steppe, on the other, would have essentially funneled mobile hunter-gatherers from the sub-Saharan African core to the Eurasian periphery in Pleistocene human evolution. It should be noted that occasionally, this very same structure would have supported funneling hunter-gatherer migration from Eurasia into sub-Saharan Africa, but paleoanthropological and genetic evidence overwhelmingly suggests that sub-Saharan Africa was a dominant net population source for migration throughout most of the Pleistocene (Li & Durbin 2011).

The Near East and Climate Change

Human prehistory in the Near East, of course, has not simply been determined by the basic geographic structure of environmental variation. Biocultural evolution in the genus *Homo* has been a complex systemic process, and an important environmental dimension of the complex-systems change has involved major global or Northern Hemisphere Pleistocene and early Holocene climate changes. These climate dynamics have driven fluctuations in boundary locations and in the scale of difference in seasonality and ecological productivity between major habitat zones. Again, these include the Arabian-Mesopotamian arid/semiarid belt, the Levant, the Taurus-Zagros foothills, the Taurus-Zagros Mountain arc, and the Anatolian plateau. The connections and scale of difference between adjacent zones have been complex and dynamic over time.

The Pleistocene and early Holocene periods were marked by recurrent swings in prevailing temperature and rainfall levels, unfolding at scales from centuries to millennia, and this environmental dynamism was only magnified by the Near East's geological and climatic complexity. The region is situated at the confluence of still active tectonic trends, reflecting a relatively ancient collision of the Arabian plate with Eurasia, resulting in closure of the Tethys Sea and formation of the Taurus and Zagros Mountains, the more recent Miocene formation of the Mediterranean Basin, and the Pliocene onset of rifting from East Africa to the Levant. The region's climate is dominated – from south to north – by the Saharo-Arabian desert belt, westerly Mediterranean monsoon systems, and westerly continental systems. Yet, because of the region's tectonic history, we see striking topographic and geological variation in the Levant, the Anatolia, and the Taurus-Zagros Mountains. This has generally meant that within and between the subregions comprising the Near East, gradients between warmer and cooler and wetter and drier climatic patterns could be especially sharp, well within a day's walk. During generally warm and humid hemispheric or global climatic swings, the Near East would have had an especially high proportion of ecotonal habitat, with immediate access to rich forest, gallery forest, wetland, and grassland plant and animal food resources. During cool and dry climatic episodes, well-watered lower elevation

regions – conspicuously including the southern Levant, the narrow northern Levantine and Anatolian coasts, and the Taurus-Zagros foothills – would have been important ecological refugium zones within the larger region. These refugium subregions would have maintained substantial year-round plant and animal resource diversity in a mosaic of forest, grassland, wetland, and littoral habitats. Moreover, the zones adjoining major rivers – notably the lower courses of the Tigris and Euphrates – and wetland basins in semiarid habitats sometimes experienced grassland soil development during moderately cool periods. This is because atmospheric precipitation increased, while riverine and lacustrine evaporation rates fell. Such periods included portions of marine isotope stages 4 and 3 (including the intervals c. 75–50 kya and 40–30 kya) (Bar-Matthews et al. 2003). Paths between year-round refugia – including the southern Levant – and wetland patches nestled in adjacent semiarid subregions would have become more stable and ecologically productive during moderately cool episodes. While it is currently possible to sketch the pattern of ecological connections between subregions under recurrent Pleistocene climatic fluctuations, their complexity and potential for continuous variation make it an outstanding challenge to link climate change clearly to particular developments in human biocultural evolution.

Microenvironmental Variation Within and Between Near Eastern Subregions

Indeed, ongoing research continues to provide striking detail about variation in past Near Eastern environments. In this section, the resulting significant microenvironmental variation – observed at multiple scales between 1 and 1,000 km – is examined more closely. For instance, the west–east geological and topographic structure of Mediterranean Levant is generally similar from south to north – with coastal hills or mountains, interior valleys, a western rift escarpment mountain range, a deep rift valley, and an eastern plateau. Yet, if we compare the southern portion (roughly from the Gaza coast to the Israel-Lebanon border) to the northern portion (roughly from southern Lebanon to the Syria-Turkey border), it may be emphasized that the slightly higher latitude and substantially higher elevation of the Lebanon Mountains increase the role of snowfall and snowmelt on water availability (through spring and lake formation), vegetation patterns, and landscape stability and erosion dynamics, when compared to the southern Levant. Moreover, the higher elevation of the Bekaa portion of the rift valley – when compared to the Jordan Valley-Dead Sea basin to the south – entails substantially colder, often inhospitable, winter conditions. Thus, although the southern Levant also exhibits dramatic microenvironmental variation, often over very short distances, we see relatively warmer winter temperatures from the broader Mediterranean coastal plain, across the lower interior hills and mountains, into the much deeper rift valley (the Jordan and Dead Sea basin), to the Transjordanian plateau. The result is less temperature seasonality and greater overall environmental productivity in the southern than in the northern Levant.

It is instructive to consider how this example of subregional environmental variation would have been significant for hominin foragers over distances of tens to hundreds of kilometers, well within the range of macroband or dialect group territories of ethnographically or ethnohistorically documented hunter-gatherers. Such geographic variation may be most clearly appreciated for Lower and Middle Pleistocene OOA expansion episodes, which – according to all available evidence – predated the adoption of tailored clothing and rigid footwear technology. Modern human thermoregulatory adaptations – in the absence of effective insulating technological solutions – allow us to withstand sustained prevailing temperatures no lower than 0 °C without suffering physiological consequences that have immediate or long-term stress-related fitness effects. Neanderthals and cold-adapted modern humans, with shorter limbs and short but wider torsos, would only have achieved limited adaptive benefits, slightly pushing the low-temperature tolerance level or increasing endurance under conditions of marginal balance between energy intake and heat loss. Of course, clinal selection for thermoregulatory adaptation

across latitudinal gradients – even in the face of extensive gene flow – is well documented for contemporary humans. Still, even cold-adapted human populations – including Neanderthals – would not have been able to sustain extended activity in subfreezing winter daytime conditions without insulating clothing (White 2006). At higher elevations, substantially more habitat in the northern Levant would have had subfreezing winter conditions for much of the Pleistocene. During extreme hemispheric or global cold climatic episodes, the cold-season duration and spatial extent of such habitat would have increased more in the northern than in the southern Levant. Thus, during the warmer spring, summer, and fall seasons, the northern and southern Levant alike would have provided abundant freshwater sources and diverse large animal, small animal, and high-quality plant (fruit, seed, tuber, and nut) resources. Yet, the southern Levant would have encompassed more winter refugium habitat as well as more easily passable long-distance west–east corridors to rich permanent lakes, wetlands, and springs in the semiarid or arid zones that extend from the Arabian Peninsula northward to Mesopotamia (including important permanent oases with deposits stretching back to the Middle Pleistocene, such as the Azraq, Jordan, and Ain Hummal, Syria).

For much of the Pleistocene, then – from the earliest expansion of the genus *Homo* out of Africa to the onset of the Upper Paleolithic – local hominin carrying capacities in the Near East would have been limited not only by average annual environmental productivity and water availability but also by winter temperature and snow cover. More specifically, if winter represented the season during which per capita hominin energy and nutrient balance (calories and vital nutrients in vs. out) reached an annual minimum, then carrying capacity would have been especially strongly limited by seasonality on a subregional scale in the Near East. This would have had a vital implication, in turn, for the hominin behavioral dynamics shaping colonization and range expansions out of Africa and into Eurasia via the Near East. The subregional diversity seen throughout the region – exemplified by the northern versus southern Levant's latitudinal and topographic differences – entails that seasonal winter zones of relatively high temperature and ecological productivity would have been localized zones of higher hominin population density and social interaction intensity. Topographically accessible paths between such winter refugia would also have been particularly important for relieving seasonally concentrated social scalar stress or for maintaining social relationships and sharing information for reducing risk across a wider territory.

Winter refugium subregions – with relatively high moisture and limited winter cold temperatures – would include most of the southern Levant, coastal areas of the northern Levant and Anatolia, and the middle Tigris-Euphrates valleys and lower Taurus foothills. In semiarid or arid areas, more localized winter refugia would have existed at major oases, inland lakes, and wetlands. During Pleistocene periods of lower sea level, the basin that is now the Persian Gulf would have been a much larger marshland or delta landscape, potentially becoming an additional refugium. The lower Tigris-Euphrates valleys would have provided a rich year-round corridor, cutting through a semiarid zone, connecting the lower Mesopotamian/Persian Gulf delta and middle Tigris-Euphrates refugia. Populations in the Mediterranean and Negev-Sinai semiarid zones in the southern Levant would have been connected to much of Arabia and Mesopotamia – via long-distance residential mobility or long-term demographic migration, through a network of seasonally wet wadis, wetlands, and lakes (Groucutt & Petraglia 2012).

Environmental Implications for Human Evolution

This seasonality-based human evolutionary ecology framework sets up a strong expectation that, although the Mediterranean zone and rift basin in the southern Levant would have provided the richest winter refugium zone just outside of Africa, this well-studied subregion's own prehistory cannot be understood without exploring in greater detail how it is interconnected with the rest of the Near East. At the same time, of course,

increasing research interest in the Arabian Peninsula should continue to be contextualized within the broader Near East, too. Recent arguments may be correct that the Bab el-Mandeb-Arabian Coast was a more important long-term physical connector between Africa and Eurasia than was the Nile Valley-Sinai-southern Levant. However, the evolutionary ecology of hunting and gathering in the terrestrial, omnivorous, extractive, and socially intensive human niche carries some necessary implications for understanding human population dynamics. Long-term prehistoric demographic migration streams or expansion waves beginning in Africa and spreading via the Near East into Eurasia would have unfolded over millennial scales, as migration or wave-front advance rates resolved across multiple generations, on centennial scales. In order for any mobile Near Eastern hunter-gatherer population to feed such sustained intergenerational demographic growth, it would have to exhibit ecologically resilient socio-technological adaptations across multiple subregional and regional phytogeographic zones.

It is arguably the case that prehistoric research has focused too much on quibbling over alternative compelling narrative-driven hypotheses – such as Nile Valley-southern Levant versus Bab el-Mandeb-Arabian Coast as main dispersal corridor or fast versus slow OOA expansions. It may be more theoretically appropriate – considering the geographic-environmental structure of the Near East – for researchers to work more explicitly with a regional dynamic complex-systems framework. Smaller-scale shifts in residential mobility strategies, shifts in the geographic distribution and size of social networks, and intergenerational migration-dispersal episodes would have sustained the broader trends of expansion into Eurasia by unfolding at centennial or millennial time frames within the Near East, mainly among:

- *Richer winter refugia* – the southern Levant, the narrower coastal patches of the northern Levant and Anatolia, and the middle Tigris-Euphrates valleys/southern Taurus-Zagros foothills
- *Winter refugium corridors or patches embedded in semiarid and arid zones* – most notably the lower Tigris-Euphrates valleys and Persian Gulf Basin, along with stable or fluctuating wetlands, rivers, and streams across Syria, Jordan, southern Mesopotamia, and the Arabian Peninsula
- *Ecologically rich zones that are inhospitable for at least a month or more in winter* – including and higher-altitude portions of the northern Levant, much of the Anatolian plateau, and the Taurus-Zagros Mountains

This framework is important, in part, because it allows us to model Pleistocene biocultural evolution in the Near East at a finer scale and more accurate level of complexity. While climate change is still considered a critical factor for evolutionary and behavioral change, it is recast from being a primary factor, such as simply forcing the development or disappearance of additional green corridors across the North African-Arabian arid belt. It becomes, instead, an exogenous long-term variable affecting the position of ecological boundaries and the overall ecological differences between adjacent subregions – with the biocultural evolutionary implications varying under prevailing conditions of demography, biological variation, social organization, technology, and socioculturally produced symbolic structures.

Trends in Pleistocene and Early Holocene Biocultural Evolution

The ecological framework outlined in the previous section sets the stage for a fresh look at the well-recognized and long-debated four prehistoric Near Eastern hallmarks noted in the introduction. These are considered here in detail. This section aims to consider thoroughly the interdisciplinary evolutionary issues that may be elucidated by applying the complex-systems ecological perspective to the available paleoanthropological evidence associated with each hallmark.

Earliest Expansion of the Genus *Homo*: Out of Africa, into the Near East

Initial OOA expansion, primarily associated with the Lower Pleistocene – 1.80–0.78 mya – is well documented by in situ and surface Oldowan,

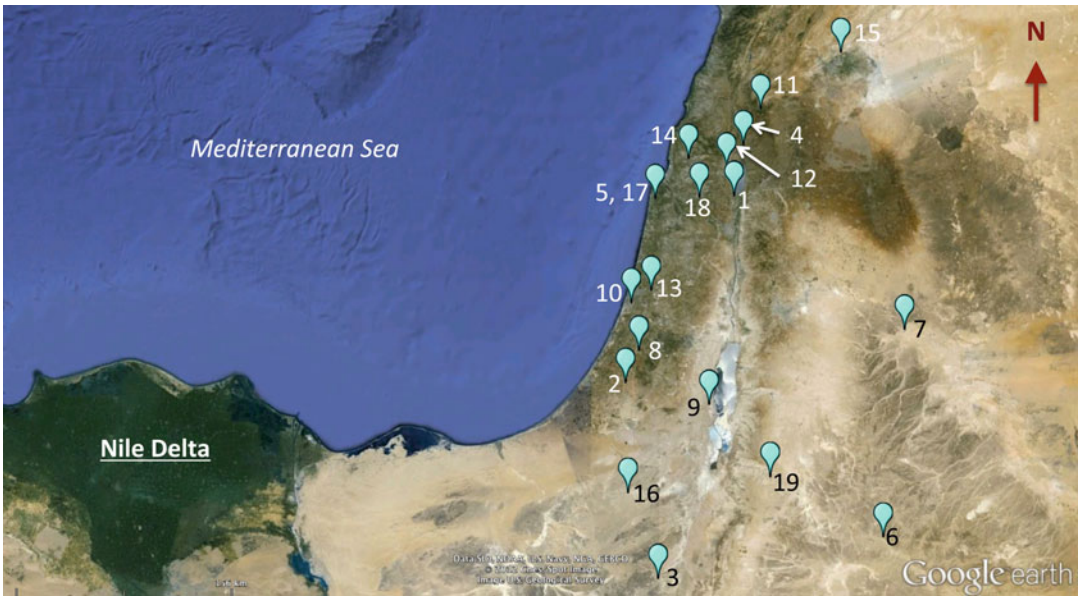

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 3 Selected Lower and early Middle Paleolithic (LP and MP) sites in the southern Levant. Early Pleistocene LP sites: *1*-'Ubeidiya, *2*-Bihar Ruhama, *3*-Zihor lake; sites with Early-Middle Pleistocene sequences, *4*-Gesher Benot Ya'akov (LP); sites with Early, Middle, and Late Pleistocene sequences, *5*-Tabun Cave (LP-MP); Middle Pleistocene sites, *6*-'Ayoun Qedim (LP), *7*-Ain Soda (LP), *8*-Revadim Quarry (LP), *9*-Oumm Qatafa (LP), *10*-Holon (LP), *11*-Berekhat Ram (LP), *12*-Zuttiyeh Cave (LP), *13*-Qesem Cave (LP), *14*-Hayonim Cave (LP-MP), *15*- Yabrud 1 Rockshelter (LP-MP), *16*-Rosh Ein Mor (MP); Upper Pleistocene sites, *17*-Skhul Cave (MP), *18*-Qafzeh Cave (MP-UP), *19*-Ain Difla. See Bar-Yosef (1994, 1998a) and Kuhn (2002) for further information about Lower and early Middle Paleolithic sites in the Near East and Anatolia (Base map source: Google Earth)

Developed Oldowan, and early Acheulean assemblages in the southern Levant (Figs. 3 and 4). Together, these sites fall into the Lower Paleolithic period. The sites are concentrated in the Mediterranean vegetation zone and the well-watered, very warm, and humid Jordan Valley-Dead Sea basin. The best-known early localities are 'Ubeidiya and Gesher Benot Ya'akov (Bar-Yosef 1998a; Goren-Inbar 2011). Long-term research at these sites documents geographic expansion in the genus *Homo*'s terrestrial, omnivorous, technologically dependent extractive niche. Even more than the Lower Pleistocene archaeological record in North Africa, the southern Levantine sites strongly – albeit indirectly – support the inference that early *Homo*, with evolutionary origins in sub-Saharan Africa, exploited Saharan green corridors and oases in the process of population growth and range expansion. Yet, the extreme rarity or absence of Lower Pleistocene archaeological sites in the northern Levant, Arabia, Mesopotamia, Taurus-Zagros arc, and Anatolian plateau suggests that hominin exploitation of patchy wetland corridors/oases or higher-altitude warm-season resources was limited, most likely occurring during relatively (geologically) ephemeral warm and humid climatic periods. Such periodic exploitation has recently been documented at Kaletepe Deresi 3 in central Turkey, dating to c. 1 mya (Slimak et al. 2008). Successful Lower Pleistocene Eurasian range expansion may be clearly interpolated, not only by the rich record from Dmanisi but also by the establishment of substantial Lower Pleistocene hominin populations in eastern Asia and traces of Lower Pleistocene colonization in western Europe. While future research will likely reveal significant traces of Lower Pleistocene human settlement in Near Eastern subregions outside

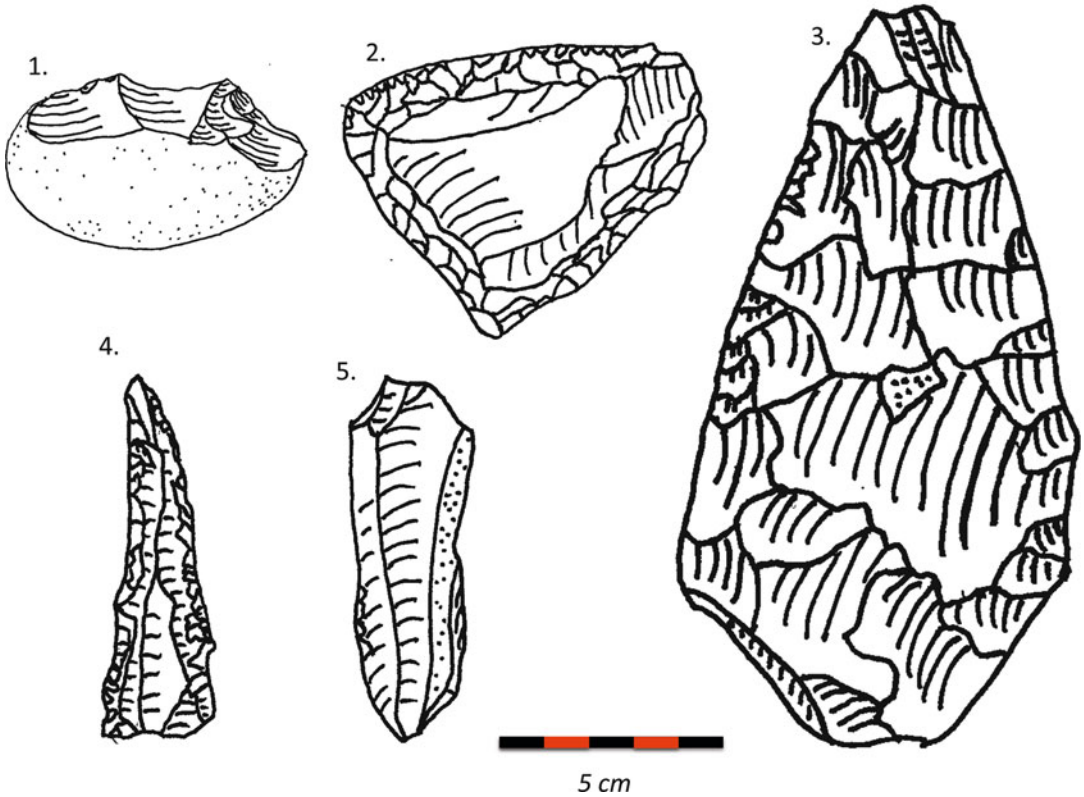

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 4 Examples of chipped stone tool types and technological features in Lower and Early Middle Paleolithic technocomplexes in the Near East: *1*. Oldowan chopper, *2*. Acheulo-Yabrudian scraper, *3*. Acheulean hand ax, *4*. early Middle Paleolithic retouched Levallois blade, and *5*. Amudian facies (Acheulo-Yabrudian) naturally backed blade

the southern Levant, the behavioral ecology of hunting and gathering predicts that population densities would have been very low where aridity or cold winter temperatures limited food or water availability and strongly raised the daily energetic costs of foraging. From a taphonomic perspective, we would expect archaeologically visible early sites to be very rare in the desert-steppe belt or at higher elevations. A further implication for Lower Pleistocene human evolution is that the initial expansion out of Africa may have involved recurrent local extinction and substantial chronological gaps in subregional occupation in much of the Near East.

Ecological Selective Pressures and Adaptive Evolution in the Lower Pleistocene The Lower Pleistocene would have been a (very long) period during which evolutionary selection pressures remained high for embodied socio-cognitive adaptations to reliably exploit diverse, dispersed, and often unpredictable plant and animal food resources. Such emergent adaptative phenotypes would likely have included increasingly complex linguistic information exchange; symbolic construction of self and other; ability to conceptualize narratives that enabled construction of memory, future planning, and decision-making; participation in larger, more stable long-term social networks; and coevolving life-history patterns of extended juvenile dependency periods and more intensive, cooperative parental transfer of resources to offspring. These adaptations in modern humans represent the evolutionary inheritance of long-term Pleistocene changes in brain ontogeny and anatomy, in the neuroendocrine system

overall, and in growth and aging patterns across the life span. They now fit *Homo sapiens* to a globally distributed, ecologically dominant, and increasingly disruptive niche – one that is not only terrestrial, omnivorous, and extractive but also conspicuously socially intensive. Yet, there is very little clear evidence and, as a result, little scientific consensus about how these critical adaptations coevolved with the human niche in the Lower Pleistocene (and through the rest of the Pleistocene, for that matter). What was the tempo and mode of their evolution? More specifically, to what extent was punctuated evolution involved in the spread of adaptive phenotypes, driven by recurrent speciation, range expansion, and competitive exclusion of one *Homo* population by another? To what extent did socio-cognitive and life-history adaptations evolve in a gradual pattern within a framework of multiregional gene flow between sub-Saharan Africa and Eurasia, via the Near East?

The Tempo and Mode of Human Evolution in the Lower and Middle Pleistocene The tempo and mode of hominin macroevolution from the Lower Pleistocene onward define perhaps *the* major unresolved issue in paleoanthropology in general. Still, two important patterns are clear concerning Near Eastern prehistory during the subsequent Middle Pleistocene (c. 0.78–0.13 mya). The first is that sub-Saharan Africa remained a dominant source of population – and thus genetic variation – spreading via green corridors and oases across the Saharo-Arabian desert-steppe belt into Eurasia (Lahr 2010). The second is that, whatever the nature of biological evolution in socio-cognitive and life-history adaptations during the Middle Pleistocene, the archaeological traces of human behavior indicate complex group-based omnivorous foraging – including hunting of prime adults from large ungulate prey species – along with social post-capture mobile-camp processing and consumption activity and complex group-based technological raw material provisioning and production patterns. Recent exciting analyses have provided such evidence dating to the very end of the Lower Pleistocene at Gesher Benot Ya'akov, where researchers report the earliest well-documented instance of controlled use of campfires associated with omnivorous food remains and stone tools (Goren-Inbar 2011). Work at Qesem Cave, dating to the mid-Middle Pleistocene, has yielded further contextual archaeological evidence for large game hunting and food sharing in a mobile-camp setting (Stiner et al. 2009). Perhaps even more importantly, at least some of these social hunter-gatherer behaviors are documented within the arid/semiarid belt and higher elevation zones – for instance, at the later Lower Paleolithic 'Ayoun Qedim site in the Jafr Basin, Jordan (Rech et al. 2007) – where year-round occupation would have been marginally productive compared to the southern Levant or the Taurus-Zagros foothills.

The key sites dating to the Middle Pleistocene (including the later Lower Paleolithic and early Middle Paleolithic) in the Near East are also shown in Fig. 3. Evidence from these sites (see recommendations for further reading below), sharpens the tempo-and-mode debate. Was the more successful socio-technological adaptation to marginal ecological zones in the Near East the result of, for instance, *Homo heidelbergensis* populations spreading out of Africa, carrying adaptive genes for more complex cognitive and social phenotypes initially selected for in sub-Saharan environments? Or was the Near Eastern pattern of Middle Pleistocene behavioral adaptation the interlinked result of immigration and intraregional biocultural feedbacks, involving population growth, stress, selection pressure, and the emergence of interrelated cultural and biological change – and involving intensified hunter-gatherer exploitation of marginal ecological zones entailing higher foraging risk and social communication/residential move costs?

The Initial Spread of Modern Human Anatomy: Out of Africa, into the Near East

The initial OOA spread of modern human anatomy, across the Middle-Upper Pleistocene transition (c. 130 kya, defining the boundary between marine isotope stages 6 and 5, together encompassing the span 170–80 kya), is documented in the Near East most spectacularly

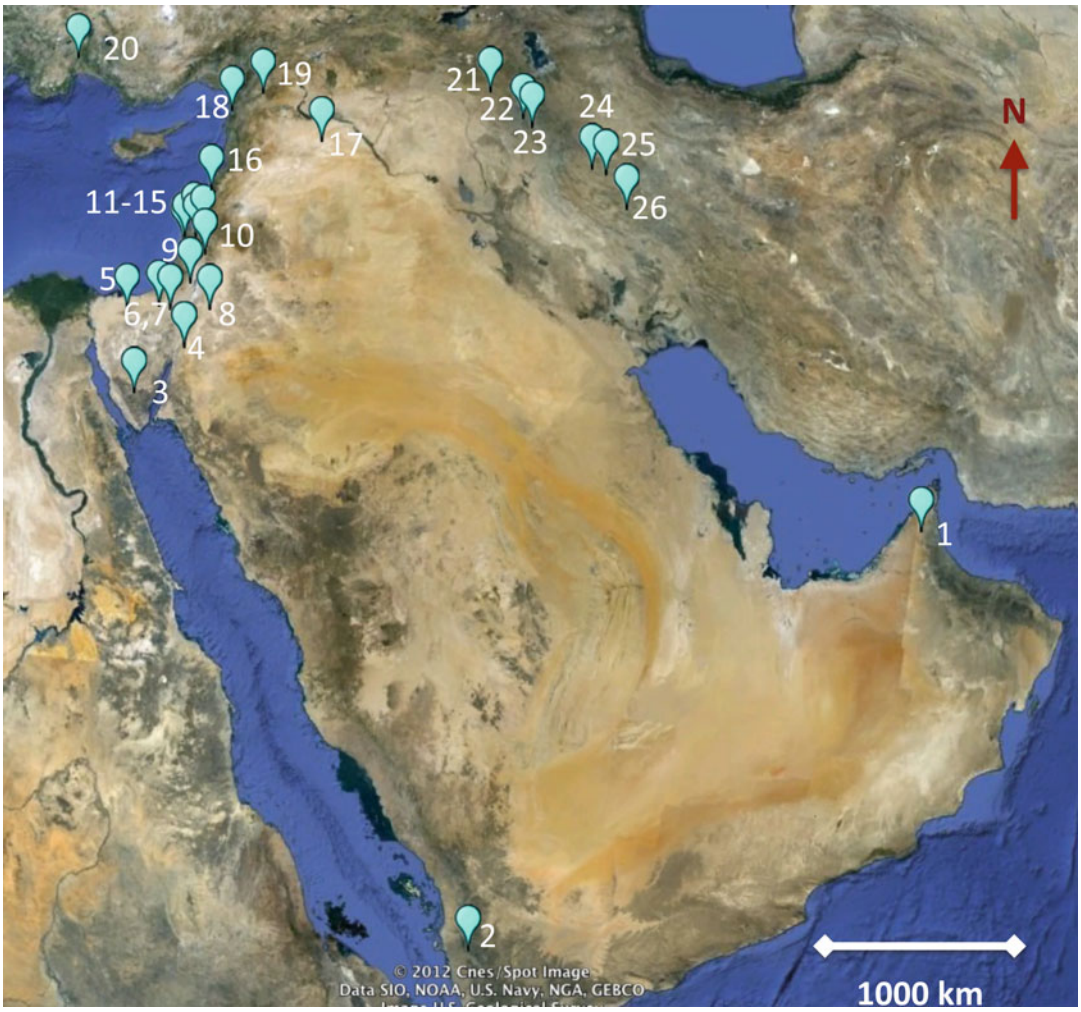

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 5 Selected late Middle (LMP) and early Upper Paleolithic (EUP) sites in the Near East: *1*-Jebel Faya (EUP [with mid-Middle Paleolithic component]), *2*-Shi'bat Dihya 1 (LMP), *3*-Abu Noshra (EUP), *4*-Tor Faraj (LMP), *5*-Lagaman sites (EUP), *6*-Nizzana XIII (EUP), *7*-Boker Tachtit and Boker (EUP), *8*-Tor Sadaf (EUP), *9*-Erq el-Ahmar (LMP-EUP), *10*-Mughr el-Hamamah (EUP), *11*-Kebara Cave (LMP-EUP), *12*-Tabun Cave (LMP) and el-Wad Cave (EUP), *13*-Hayonim Cave (EUP), *14*-Qafzeh Cave (EUP), *15*-Amud Cave (LMP), *16*-Ksar Akil Rockshelter (LMP-EUP), *17*- Umm el-Tlel (LMP-EUP), *18*-Üçağızlı Cave (EUP), *19*-Dederiyeh Cave (LMP), *20*-Karain Cave (LMP), *21*-Shanidar Cave (LMP-EUP), *22*-Zarzi Cave (EUP), *23*-Hazar Merd Cave (LMP), *24*-Warwasi Rockshelter (LMP-EUP), *25*-Bisitun and Kobeh Caves (LMP), *26*-Yafteh Cave (EUP). See Goring-Morris et al. (2009) for more information about LMP, UP, and Epipaleolithic sites in the Near East (Base map source: Google Earth)

by the mobile camp/burial sites of Skhul and Qafzeh Caves, both located in the southern Levantine Mediterranean vegetation zone (Hovers 2009). Key Near Eastern sites that date to the end of the Middle and beginning of the Upper Pleistocene are included in Fig. 3 (the recently reported site of Jebel Faya, with stratified early and mid-Upper Pleistocene archaeological components, is shown in Fig. 5). The OOA expansion of anatomically modern humans is also indicated by recent comparative genetic analyses focusing on extant neutral variation in the Arabian Peninsula, further suggestively supported by archaeological work in

southern Arabia (Groucutt & Petraglia 2012; see Fig. 5). Within sub-Saharan Africa, fossil finds dating roughly to the 200–130 kya interval (the end of the Middle Pleistocene) provide the earliest evidence of modern cranial anatomical patterns (Trinkaus 2005). The presence of multiple primary interment features in two early Upper Pleistocene sites in the southern Levant suggests a cultural tradition of mortuary ritual in mainly anatomically modern mobile hunter-gatherer societies. The social networks, symbolic structures, and associated cosmologies that constituted and were constituted by the ritual practices cannot be reconstructed. However, the symbolically dramatic, ritualized response to the fundamental social crisis of death constitutes a hallmark human group-level behavior, which strongly shapes the surviving group members' comprehensive, shared embodied sense(s) of identity in relation to others, to space, and to time. The repetitive nature of the ritualized interment of the dead at Qafzeh and Skhul Caves points toward long-term cultural reproduction of social networks among mobile – indeed, quite likely very highly mobile – hunter-gatherer populations (Hovers 2009).

As important as this early evidence of mortuary ritual may be, the debate remains the same over how – in terms of macroevolutionary tempo and mode – the underlying socio-cognitive capacity evolved. Do we see again the punctuated spread of anatomically modern human (AMH) populations that evolved in sub-Saharan Africa? Or do we see a more complex, gradual process of biocultural evolution, involving a multilevel social and biological interaction of local Near Eastern groups with expanding African groups; of groups in richer winter refugium habitats with groups in more marginal or patchier zones within the Near East; and of Near Eastern groups with neighboring South Asia, Central Asian, southern Caucasus, and European ones? Of course, the actual answer may be somewhere between the two theoretical extremes of punctuated speciation/replacement and biocultural gradualism.

The evidence for initial Upper Pleistocene Near Eastern AMH populations descending from late Middle Pleistocene African ancestors and constituting hunter-gatherer societies who practiced mortuary rituals may be especially attention grabbing. The Near Eastern data on emerging complexity in Upper Pleistocene human evolution becomes even more striking when one considers that all of the carefully excavated and radiometrically dated burials in the Near East from the subsequent period, c. 80–50 kya, include individuals with predominantly Neanderthal anatomical features (Bar-Yosef 1994). Moreover, radiometric analyses of animal teeth that may be associated with the Neanderthal female adult burial from Tabun Cave suggest that humans with Neanderthal traits may have been in the southern Levant even earlier, contemporaneous with the anatomically modern humans interred at Skhul and Qafzeh (Grün & Stringer 2000).

It is important to remember that Neanderthals were a western Eurasian network of populations that – in a pattern analogous to sub-Saharan African AMH – exhibited a suite of cranio-dental and postcranial anatomical features tending to distinguish them, not only from AMH but also from Asian and possible archaic African populations in the late Middle-Upper Pleistocene time frame from c. 200 kya onward. Neanderthals themselves may be assumed to have descended, for the most part, from western Eurasian populations established during earlier Lower or Middle Pleistocene expansions out of Africa. The AMH anatomical pattern incorporates a relatively high, rounded cranial vault, limited midfacial prognathism, strong basicranial flexion, chin formation, and a relatively narrow torso with non-cold-adapted brachial and crural indices (resulting in a higher encephalization quotient). The Neanderthals, in contrast, tend to display strong midfacial prognathism associated with a straight or receding mandibular symphyseal region, a distinctive occipital morphology involving lambdoidal flattening, posterior "bunning," and a wide suprainiac fossa; and a maximal cranial breadth in the supramastoid region, and small, medially oriented mastoid processes. Neanderthal postcranial anatomy tends to be robust, combining cold-adapted torso shape

and limb proportions with locomotive adaptations for high activity levels. Although Neanderthal brains were as large or larger than those of AMH (fully in the modern human range), their higher body mass indices yield an encephalization level similar to that of Middle Pleistocene archaic *Homo*. At least for males – who are better represented among postcranial remains – the Neanderthal anatomical pattern is suggestive of high caloric intake and high energy flux. As a consequence, reconstructing Neanderthal diet and behavior is vital for modeling possible differences with AMH in activity adaptations and their life-history consequences in terms of growth rates, growth-maturation trade-offs, adult maintenance-fertility trade-offs, and intergenerational resource-transfer effects imposed by variation in adult longevity. The complete anatomical pattern is most often observed on European Neanderthals dating to the Upper Pleistocene, in the period c. 130–45 kya. This pattern is also observed on Neanderthal skeletons from burials in Shanidar Cave, located in the Zagros foothills – set in a key Near Eastern winter refugium zone. The Shanidar burials have been dated by conventional radiocarbon assays on associated charcoal fragments, and although there is substantial uncertainty over such ages, the burials probably date to (very roughly) 50 kya (Solecki 1971).

It is emphasized that the Neanderthal anatomical pattern fully emerges earliest in western Europe, c. 200–120 kya, and consequently, the appearance of Neanderthal features in the Taurus-Zagros foothills, the northern Levant, and the southern Levant between c. 80 and 50 kya (and possibly earlier in marine isotope stage 5, c. 130–80 kya) indicates that a trend of population expansion from Europe to the Near East interrupted the incipient spread of AMH populations out of Africa (Bar-Yosef 1994). Notably, skeletal specimens generally described as Neanderthal from the southern Levant also show some features of the parietal or mastoid regions more commonly retained in AMH (Kramer et al. 2001). Recent comprehensive reconstruction of ancient DNA extracted from European Neanderthal bones indicates that all living non-Africans have inherited roughly 2–4 % of their DNA from Neanderthals – as opposed to early AMH ancestors. The southern Levant – as perhaps the most important Near Eastern winter refugium zone, especially well linked to semiarid zone green corridors and oases – is the most obvious candidate area for Neanderthal-AMH population mixture in the initial portion of the Upper Pleistocene. Yet, this only intensifies the debate over tempo and mode. Are we observing competition between biologically distinct populations, with limited hybridization? Or are we seeing a regional, shifting population balance – perhaps due to climate change or even cultural-technological innovation – in anatomical or life-history features favored by natural selection?

It should not be surprising that the (apparently predominantly anatomically) Neanderthal societies who occupied the Near East in the mid-Upper Pleistocene interval, c. 80–50 kya, appear to have been at least as socially complex and ecologically adaptive as the earlier AMH communities, especially when it came to mobile hunting and gathering in relatively marginal ecological zones, including both semiarid and higher elevation habitats (Henry 2003). Given the behavioral similarities between AMH and Neanderthal hunter-gatherer societies in the earlier Upper Pleistocene of the Near East, it becomes that much more challenging to clarify the systemic causes for the observed, long-term geographic shifts in anatomical variation.

The Middle-Upper Paleolithic Transition, Disappearance of Neanderthals, and Eurasian Spread of Anatomically Modern Humans

The decisive expansion of Upper Paleolithic technology – significantly associated with modern human anatomy – in the later Upper Pleistocene (*c. 50–20 kya*) marks the disappearance of the Neanderthal anatomical pattern in the Near East (and the rest of western Eurasia). In fact, the spread of Upper Paleolithic technology and modern human anatomical features had global biocultural ripple effects. The expansion of early Upper Paleolithic populations across Eurasia strongly contributed to the

predominantly sub-Saharan African pattern of genetic variation seen in all living humans. That is to say, the bulk of extant non-African neutral genetic variation is a subset of variation found in living sub-Saharan African populations (Li et al. 2008). During the Upper Paleolithic, major innovations involving refined fiber working, tailored clothing and rigid footwear, compound tool production (with replaceable flint tool or point inserts), projectile hunting weaponry, and body and clothing decoration become efficiently produced and widely employed for the first time outside of sub-Saharan Africa. While it is likely that Eurasian adoptions were sometimes the result of independent invention, it is at least as likely that the sociodemographic and ecological conditions favoring adoption of these key technological innovations developed later outside of Africa. These innovations facilitated more sustainable or successful long-term hunter-gatherer occupation of highly marginal Eurasian zones, including higher-altitude or higher-latitude areas with very long winters or very little rainfall, including interior Arabia and Mongolia. The development of Upper Paleolithic Eurasian societies – and the longer-range exchange networks that often shaped them – unfolded over a c. 30,000-year period.

Upper Paleolithic emergence, with AMH re-expansion out of Africa, appears to have begun in the Near East before spreading into Eurasia. Key late Middle Paleolithic and early Upper Paleolithic sites in the Near East are shown in Fig. 5. Available radiocarbon dating evidence indicates that the Upper Paleolithic emerged first in the Levant and, quite likely, was localized in the southern Levant, between 50 and 45 kya. Between 45 and 40 kya, aspects of Upper Paleolithic material culture spread or were independently adopted across southeastern, central, and much of western Europe (Bar-Yosef & Belfer-Cohen 2010).

The earliest Levantine Upper Paleolithic is archaeologically recognizable, though, by only quite humble changes in lithic technology. Initial Upper Paleolithic (IUP, also known as "Emiran") chipped stone assemblages (Fig. 6; see also Fig. 2) incorporate "leptolithic" (or blade-focused) core reduction technology, along with relatively thick convergent points, narrow points on blades (el-Wad points), end scrapers, burins (often on truncations), and retouched blades. In contrast, the final Middle Paleolithic assemblages that underlie the IUP at key Levantine sites exhibit few formal tools except for Levallois points, and while some chipped stone assemblages indicate a tendency toward producing narrow elongated blanks, lithic reduction is dominated by the unidirectional convergent Levallois technique for producing broader points and flakes.

The IUP/Emiran lacks a clear material culture antecedent in sub-Saharan Africa, Nile Valley, North Africa, or southern Arabia (representing the eastern continuation of the arid belt, connected to East Africa across from Bab el-Mandeb). The IUP in the northern Levant appears to include regular production of perforated shell beads, a material culture medium virtually absent from Neanderthal-associated late Middle Paleolithic sites (Kuhn et al. 2009). It is unclear, though, how extensive or socially vital shell beads were in IUP societies. Moreover, IUP/Emiran layers lack diagnostic human fossils. It is more broadly unclear, then, what behavioral changes were involved in the transition from the Middle to the Upper Paleolithic in the Levant; why Upper Paleolithic technology was initially adopted after 50 kya, spreading so successfully into Europe and eventually across all of Eurasia; and how interaction between Neanderthals and AMH contributed to Upper Paleolithic emergence, in the Near East and beyond. Thus, research on the MP-UP transition in the Near East remains a highly compelling focus for paleoanthropological fieldwork and analysis. Examples of later Middle and Upper Paleolithic chipped stone technological products are shown in Fig. 6.

The Long-Term Emergence of Domestication and Agriculture in the Near East

The transition from the final Paleolithic to the Neolithic is often viewed through the lens of the transition to sedentism, agriculture, and village life, which emerged "full-blown" in the Prepottery Neolithic B period of the Near East (c. 10.5–8.25 kya). Flannery's (1969) classic

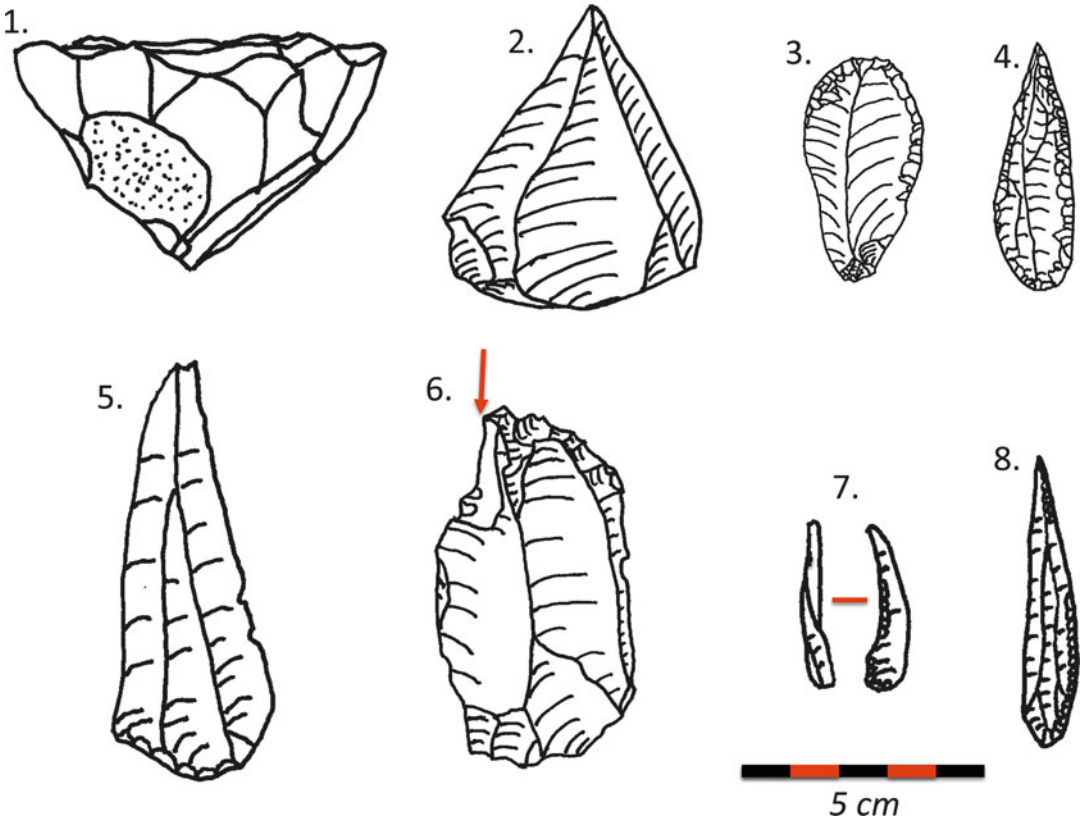

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 6 Examples of chipped stone tool types and technological features from mid-Middle Paleolithic, late Middle Paleolithic, early Upper Paleolithic, and Late Upper Paleolithic technocomplexes in the Near East: *1*. mid-Middle Paleolithic radial Levallois core (lateral view), *2*. late Middle Paleolithic Levallois point, *3*. initial Upper Paleolithic/Emiran end scraper, *4*. initial Upper Paleolithic/Emiran Ksar Akil point, *5*. initial Upper Paleolithic/Emiran Levallois-like blade, and *6*. Levantine Aurignacian burin, Late Ahmarian Dufour bladelet, and Early Ahmarian el-Wad point

archaeologically focused discussion of long-term Near Eastern sociopolitical change – along with the ecological and economic foundations and consequences of that change – included a key suggestion. He argued that plant domestication and agricultural production, which developed in the early Holocene, unfolded at the end of a long-term economic shift from large wild animal resources to more abundant but smaller animal and plant-food packages. Moreover, he pointed to then-preliminary evidence that the trend toward "broad-spectrum foraging" began early in the Upper Paleolithic. Although the systemic causes of the Middle-Upper Paleolithic transition remain poorly understood, more recent research indicates that the Upper-Final Paleolithic shift toward smaller hunted and gathered food packages may have had incipient southern Levantine origins in the (Neanderthal-dominated) late Middle Paleolithic, c. 65–50 kya (Speth & Clark 2006). Put another way, over roughly the last 60,000 years of Near Eastern prehistory, large hunted game became less and less important as a caloric and nutritional resource. At the same time, smaller animal and plant "resource packages" that are resilient to over-harvesting became more central to the human diet. This background to the Near Eastern origins of agriculture is important because it involves what appears to be a continuous long-term trend (Fig. 7).

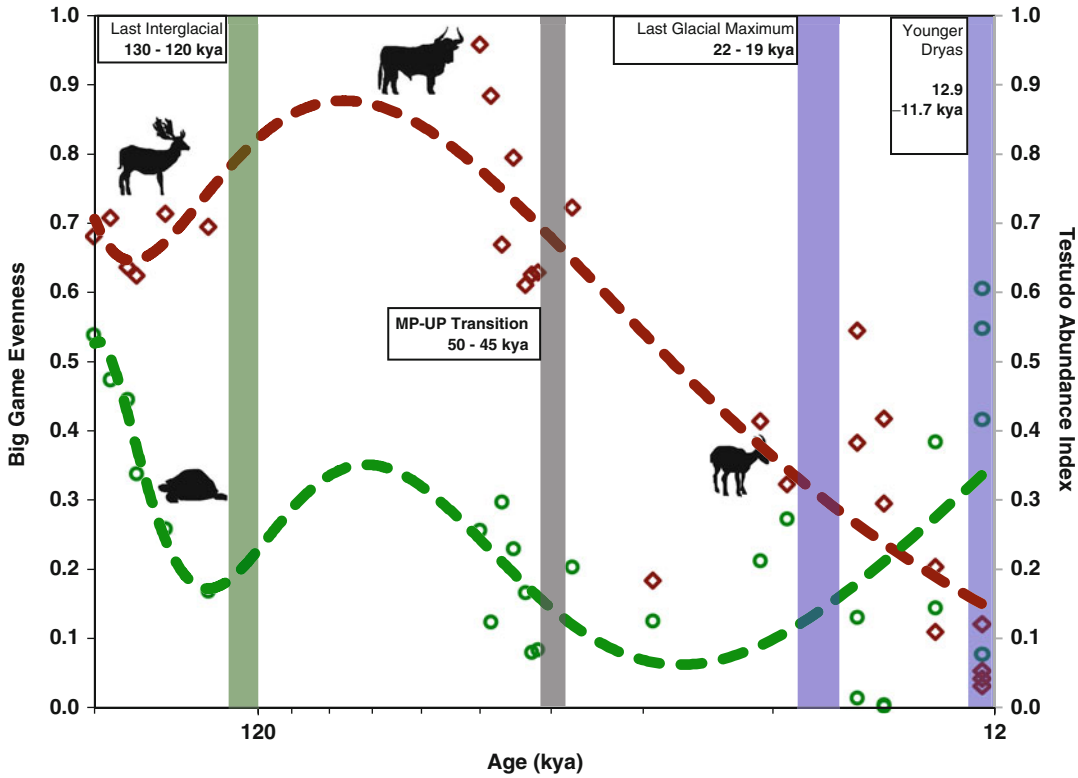

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 7 Long-term dynamics in big game (as represented by aurochs, fallow deer, and mountain gazelle) and small game (as represented by spur-thighed tortoise) in southern Levantine Middle Paleolithic, Upper Paleolithic, and Epipaleolithic archaeofaunal assemblages, from c. 200 to 12 kya. Big game evenness (left vertical axis) measures the dominance – or lack of it – among bones and bone fragments from large (mainly aurochs), medium (mainly fallow deer), and small (mainly gazelle) ungulate species. Because aurochs were relatively less frequently hunted by humans during the Pleistocene, evenness values approaching 1.0 during the late Middle Paleolithic reflect greater focus or success in hunting "the biggest of the big." Evenness values approaching 0.0 during the Early and Late Natufian cultural periods reflect the preponderance of gazelle bones in these late Epipaleolithic assemblages. Testudo abundance index (right vertical axis) refers to the number of identifiable spur-thighed tortoise (*Testudo graeca*) bones and bone fragments relative to the number of big game bones in the same assemblage. Taken together, the two archaeozoological measures suggest that as Middle Paleolithic foragers became more successful at hunting big game – more often taking larger-bodied species – human population grew slightly but significantly, generating predation pressure on smaller, easy-to-capture animal food resources. In the late Middle and Upper Paleolithic, as human population growth and ongoing hunting success depressed big game populations, foragers turned increasingly to a wider diversity of small animal and plant-food resources. In the Early and Late Natufian periods (c. 15–12 kya), the Testudo abundance index rose dramatically, as big game continued to shrink in economic and dietary importance. Big game evenness and Testudo abundance index values calculated from data in Speth (2013), Stiner (2005), and Stutz et al. (2009)

How Did Plant and Animal Resource Consumption Change in the Long-Term Transition to Agriculture? The Upper Paleolithic and early Epipaleolithic use of food resources appears to change subtly and gradually from c. 40 to 15 kya, with fluctuations forced in part by climate change. As for the later Middle Paleolithic, small and medium-sized ungulates – such as fallow deer, gazelle, wild boar, and wild sheep and goat – tend to dominate the big game assemblages from across the Near East. Small game tends to be dominated by easy-to-capture terrestrial animals, especially land tortoises. However, when measured by species

presence alone, small game assemblages are often diverse, including small mammals (often hare), waterfowl and other game birds, and some riverine, lacustrine, and even marine coastal fish and shellfish documented in the archaeozoological record. With the remarkable exception of the Late Upper Paleolithic site Ohalo II, Israel (c. 23–22 kya), charred botanical food remains are poorly preserved or have not been carefully sampled from Near Eastern Upper Paleolithic deposits. Ohalo II provides evidence, however, for a similar broad spectrum of wild fruit, nut, grain, and tuber resources (Kislev et al. 1992). It is worth noting that recent phytolith extraction and identification research on late Middle Paleolithic deposits in the southern Levant also indicates human (likely Neanderthal) exploitation of fruit, nut, and grass (presumably including starchy seed) food resources (Henry 2003). The late Middle Paleolithic phytolith evidence is supported by the rare, exceptionally well-preserved charred botanical sample from the Middle Paleolithic layers of Kebara Cave. These emerging – albeit still limited – results on Upper Pleistocene Near Eastern plant-food exploitation may be combined with archaeozoological research to suggest that the long-term shift toward smaller package-sized food resources initially developed continuously and slowly, probably across the Middle-Upper Paleolithic transition.

The first major, steplike prehistoric change in the scale and organization of Upper Pleistocene Near Eastern food exploitation occurs in the southern Levant, with the emergence of the Epipaleolithic period's Early Natufian archaeological culture (c. 15–13 kya). Early Natufian archaeofaunal samples show a striking drop in the relative proportions of fallow deer bone fragments. Gazelle bones dramatically come to dominate the big game fraction. In other words, considering that adult gazelles have roughly 1/3 to 1/5 the body mass of adult fallow deer, Early Natufian big game food resources include mainly "small big game" (Stutz et al. 2009). In fact, for the first time in the Pleistocene sequence of anthropogenic big game bone assemblages in the Near East, Early Natufian samples incorporate a large fraction of remains from very young, incompletely grown juvenile gazelles (Fig. 8). Moreover, Early Natufian small game assemblages exhibit a sudden shift – when compared to earlier Epipaleolithic or Upper Paleolithic samples – to a dominance of sessile animals, mainly hare and partridge (Stutz et al. 2009).

Paleobotanical remains are generally poorly preserved in Early Natufian sites. It is unclear if there was an equally dramatic shift in the composition of the Early Natufian plant-food spectrum. Preservation of charred botanical remains and plant phytoliths has proven poor at southern Levantine Early Natufian sites. Nutritional and caloric arguments would predict that rich, seasonally available foods that could be mass-collected and stored would be favored. Such resources in the final Pleistocene of the southern Levant would notably include acorns, and wild lentils, wheat, and barley. The focus on fast-reproducing, fast-escaping small game – now very well documented by Stiner and Munro's (2002) pioneering analyses – provides an economic context that would also be congruent with mass collection of ecologically abundant starchy, fatty, or protein-rich plant foods. Both fast-reproducing small game and rich plant foods require high up-front technological investment for humans to harvest, transport, and process them sufficiently effectively. As the work by Stiner and Munro indicates, sessile small game would likely have been captured during Early Natufian times with complicated technological aids. These would include traps (which would not have to be constantly monitored), bow and arrow or harpoon technologies, and tracking or hunting dogs. All of these innovations would have substantially increased post-encounter return rates. If well curated, the initial investment in such technology would have paid off over weeks, months, or years of use. Perhaps most importantly, such small game species would be relatively undisturbed by human presence; their high reproductive rates could offset intensive human predation. Thus, even as Early Natufian hunter-gatherers ate more hare, partridge, waterfowl, fish, and other sessile animals, encounter rates would unlikely have been depressed. It is

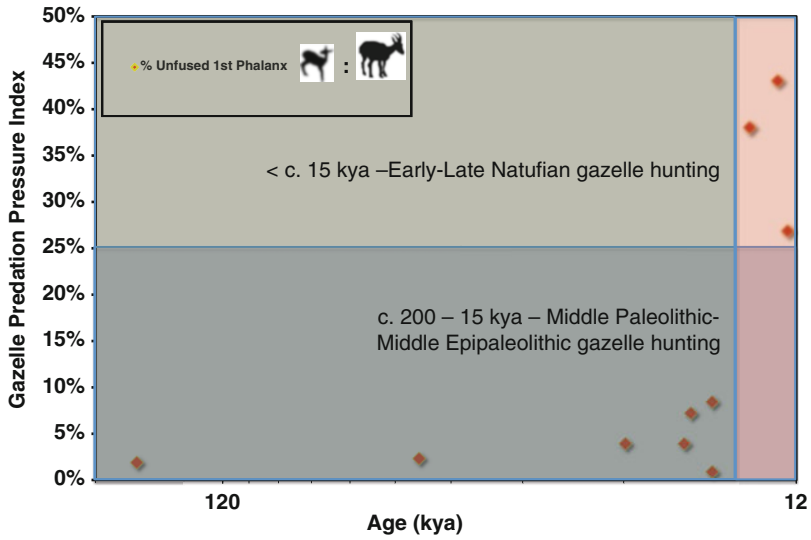

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 8 The gazelle predation pressure index is the proportion of unfused first phalanges among all gazelle phalanges in Middle Paleolithic, Upper Paleolithic, and Epipaleolithic archaeofaunal assemblages in the southern Levant, c. 200–12 kya. The mountain gazelle (*Gazella gazelle*) first phalanx fuses around c. 6 months of age, well before the juvenile has reached adult size. Thus, the substantial jump in juvenile gazelle proportions seen for the Early and Late Natufian periods signals a drop in the caloric and nutritional value of the typical big game catch, while also further contributing to big game population depression. The index is calculated from data in Speth (2013), Stiner (2005), and Stutz et al. (2009)

important to note that the technological investment in sickles, baskets, mortars and pestles, and – possibly – storage pits for high-quality seed, nut, and lentil exploitation involves a conspicuously similar up-front cost and delayed returns, when compared to intensive sessile small game hunting.

Yet, there are two potential differences with seed, lentil, and nut exploitation. First, efficient harvesting and processing may be enhanced, not only by technology but also by social organization. Economies of scale, leadership, and task-specific division of labor can improve harvest rates, plant regeneration rates, and the effectiveness of storage and food processing. Whereas the adoption of small game hunting technology would mainly involve intensification of existing hunter-gatherer social relations, the biological and physical properties of especially rich seed and nut resources can focus common interests and favor cultural transformation toward a larger, more complex scale of work organization. Indeed, an economy of scale supported by more complex organization could enhance plant habitat and dispersal, creating further ecological conditions for increasing caloric and nutritional return rates. Second, the biological and physical properties of starchy or fatty plant foods can – with efficient technology and organization of grinding and cooking – be used to produce relatively energy-rich gruels or porridges that can significantly augment lactation and reduce weaning ages, thereby increasing overall fertility rates in the community. Over a period of generations, systemic change would most likely involve feedbacks among plant resource growth and patch distribution; technology supporting and facilitating harvesting, food processing, and storage; social organization of plant-food exploitation, along with social negotiation over task group mobilization – especially in the face of resource scheduling conflicts and the need to reach consensus about opportunity costs; population fertility, mortality, health, and activity patterns; and migration, social boundary negotiation, and intermarriage practices.

It is not until the succeeding Late Natufian archaeological culture (c. 13–12 kya) that we see evidence for a further, clear increase in the economic importance of rich, starchy plant foods. The site of Tell Abu Hureyra in the northern Levant shows that, for one thing, the Late Natufian archaeological culture – which stratigraphically succeeds the Early Natufian at several sites in the southern Levant – had spread to the Middle Euphrates Valley. Late Natufian sites are also found in the Jordanian Black Desert and are abundant in the Negev and Sinai Deserts. Analysis of the charred macrobotanical remains from Abu Hureyra shows that, at the very beginning of the Late Natufian archaeological culture (Abu Hureyra 1, Phase 1), a year-round base-camp settlement was supported by a starchy plant-food foraging "basket" strongly dominated by wild wheat and rye. The technology and organization of seed resource exploitation practiced by the inhabitants of Abu Hureyra appear to have been resilient to rapid-onset climate change, during the cold and dry Younger Dryas episode (12.9–11.7 kya). Gordon Hillman (reporting in Moore et al. 2000) documents a Younger Dryas-associated shift toward a much broader spectrum of wild seeds, nuts, and fruits, available from a wider diversity of habitat zones, during the Abu Hureyra Phase 2 and 3 occupations. Similar Younger Dryas patterns of broad-spectrum seed and lentil exploitation have been documented at other late Epipaleolithic sites in the northern Levant and eastern Anatolia. These include Mureybet and Hallan Çemi. In the southern Levant, although Late Natufian sites also lack good macrobotanical preservation, evidence for the increasing dietary importance of starchy grains comes from an indirect – but compelling – source. The Early-Late Natufian transition across the Levant, c. 13 kya, is archaeologically marked, in part, by a shift from deep groundstone mortars in the EN to flat, more portable groundstone slabs in the LN phase. Dubreuil's (2004) microwear analysis comparing EN mortars with LN grinding slabs indicates that the former were used to crush and grind multiple food and pigment resources, whereas the latter functioned primarily to process starchy grains. It is notable that small sessile game comprises a smaller proportion of the animal bones from most Late Natufian sites, when compared to the EN pattern of small-sessile-game dominance. At the same time, Late Natufian big game assemblages remain overwhelmingly defined by gazelle remains (i.e., the smallest body-size category of big game available in regional ecosystems), and 35–40 % of those gazelle bones are represented by even smaller, prereproductive subadult animals (Stutz et al. 2009). Gazelle populations under predation by humans appear to have been intensively targeted throughout the Early and Late Natufian cultural phases, but small fast game became less economically important in the Late Natufian. While recovery and analysis of plant-food remains must be an important focus for future Epipaleolithic research in the Near East, there is a strong circumstantial case that starchy seeds – including wild precursors to many domesticated grains and pulses – supplied an increasing proportion of the per capita calories consumed in Late Natufian societies.

The Early and Late Natufian archaeological cultures provide evidence that wild plant resources increased – in successive steps over more than three millennia – in economic, nutritional, and energetic importance for Near Eastern human populations. Experimental harvesting work suggests that the Late Natufian cultural phase likely involved the small-scale horticultural production and experimentation necessary for domestication. The succeeding Prepottery Neolithic A period (c. 12.0–10.5 kya) has yielded indications that – at the very end of the Younger Dryas or the beginning of the Holocene – domesticated grains and lentils began to be planted, harvested, and consumed. However, this early agricultural production was mixed with a broad spectrum of gathered seeds, nuts, fruits, and lentils (Willcox 2007). Wild big and small game continued to be hunted. During the Prepottery Neolithic B period (c. 10.5–8.2 kya), wheat agriculture became the dominant plant-food-producing technology across the Near East, and sheep and goat domestication also spread quickly throughout the entire region. It was during the PPNB period that the "Neolithic Revolution" in

the Near East took hold, sending out population and cultural ripple effects across much of Eurasia and into Africa.

What Changed in Sociocultural Behaviors and Environments in the Long-Term Transition to Agriculture? The previous section presented an overview of how the omnivorous food resource-based changed over a long but critical time frame in Near Eastern prehistory – from the early Upper Paleolithic to the Prepottery Neolithic B period (c. 50–8.2 kya). Sherratt (2007) has directly compared the agricultural technology underlying the shift to a carbohydrate-intensive plant-based diet to modern industrialization's extraction, transportation, and communication technologies – the adoption and development of which drove and were in turn sustained specifically by fossil fuel extraction. The so-called Neolithic Revolution also had a dramatic, extensive impact on the scale and structure of energy flow between human populations and their environments. The early adoption of agriculture substantially raised local ecological carrying capacities while also creating the complex potential for systemic demographic and cultural instability and further change, over time and at multiple geographic scales.

The Near East's later Upper Pleistocene archaeological record traces a very gradual long-term average decline in the nutritional and energetic importance of big game, followed by a series of stepwise increases in the importance of energy-rich plant foods in the Early Natufian, Late Natufian, Prepottery Neolithic A, and Prepottery Neolithic B phases. That same record also provides information about associated behavioral changes, involving raw material provisioning; tool production and use; hunting, gathering, food processing, and consumption; combustion technology for cooking, warmth, and other activities; residential mobility and social organization; and for later time periods, the building, use, maintenance, and abandonment of complicated architectural structures – including monumental features – along with mortuary and other community ritual practices, social identity production, social boundary maintenance, and exchange and long-distance social networks (Kuijt & Goring-Morris 2002).

As described above, the onset of the Upper Paleolithic has been recognized archaeologically by specific changes in lithic technology. Kuhn and Stiner (Kuhn & Stiner 2006) have presented theoretical arguments and preliminary evidence to support a key inference. The elongated blanks, burins, end scrapers, and retouched blades that mark the earliest Upper Paleolithic assemblages in the Near East were part of an otherwise hidden – but profound – shift in social organization. The production of smaller flint tools and projectile points that were likely hafted – and often used for working hide, wood, or bone – likely marks an increased labor investment in technological production to support hunting, gathering, and food processing. Thorough ethnographic comparison of hunter-gatherer social organization indicates that high labor investment in technological production tasks often corresponds to effective division of labor, usually along adult gender lines. Thus, Kuhn and Stiner identify a hallmark biocultural evolutionary development in the early Upper Paleolithic: the establishment of more stable social networks, constituted by more predictable cooperative organization of labor. It is important to note that this development may have occurred substantially earlier in parts of sub-Saharan Africa. In any case, the social practices that shaped and reinforced division of labor would have been set within mobile camps, during moves between campsites, on raw material provisioning trips and on foraging trips. Near Eastern Upper Paleolithic sites – when compared to deposits from earlier periods – appear to vary along a substantially greater spectrum of ephemeral, task-specific camps and larger, repeatedly occupied mobile base camps. Occupation of higher elevation, semiarid, and arid zones gradually became more successful, complex, and resilient. By the onset of the Epipaleolithic (c. 20 kya), a persistent social boundary in lithic style had crystallized between the Mediterranean zone and adjacent semiarid zones in the southern Levant (Stutz & Estabrook 2004). At the same time, the early Epipaleolithic record around

the Azraq Basin, Jordan, indicates that this boundary was actively, dynamically negotiated (Richter et al. 2011). Early, Middle, and Late Epipaleolithic (c. 20–15 kya) base campsites that were repeatedly reoccupied exhibit some durable stone-foundation architectural structures and burials, especially in the southern Levant.

It is with Early Natufian emergence that we observe a departure from the Upper Paleolithic to earlier Epipaleolithic trend of long-term gradual behavioral change. The Early Natufian archaeological culture (c. 15–13 kya) is associated not only with a seemingly quantum shift in food economy; it also involved the settlement of large (c. 1,000–2,000 m^2), likely continuously occupied, sedentary hamlets, with durable subcircular architectural structures and mortuary features located under, inside of, and between structures. The behavioral changes surrounding Early Natufian foraging and food consumption appear to have involved mainly intensification of earlier Epipaleolithic and Upper Paleolithic labor and social relationship patterns. In contrast, the Early Natufian shift in settlement – with greater social and physical investment in spatially dense, long-lasting shelters, food preparation areas, and communal spaces that were often marked by mortuary features – would have integrally involved a reconfiguration of social relationships, cultural mechanisms for resolving conflicts, and cultural ideas and experiences of social time and memory.

Recent research suggests that the adoption of sedentism was – in no small part – a response to long-term predation pressure on big game (Stutz et al. 2009). Larger prey – such as gazelle, wild goat, or fallow deer – appear to have become overhunted, demographically depressed, and more costly to search for. This would have been the result of long-term positive feedback between hunting success and population growth, unfolding at centennial or millennial timescales. Subsequently, the sedentary foraging of smaller, easy-to-find, but costly-to-process plant and small game foods became more economical. The alternative would have involved paying the metabolic, social, and foraging opportunity cost of increasing the length and frequency of moves between mobile camps. The social and cultural implications of sedentary settlement, though, were likely transformative. Early Natufian sedentism may have been sustained by intensive hunting and gathering, but Early Natufian cultural structures for managing social life – within and between families, camps, and perhaps descent groups – may have been integral to negotiating the changing structure of social relationships in the subsequent Late Natufian (c. 13–12 kya) food economy, as starchy seeds, nuts, and lentils took on increasing energetic and nutritional value.

Indeed, the conspicuous increases in the complexity of settlement organization and ritual practice that occurred stepwise, throughout the Near East, from the Late Natufian phase through the Prepottery Neolithic A (c. 11.7–10.5 kya) and B/C (10.5–8.2 kya) periods, may be understood as a complex, recurrent process of social negotiation and reorganization at multiple population scales. With the Prepottery Neolithic A development of monumental architecture – including the tower and wall at Jericho and the extraordinary structures and relief carvings at Göbekli Tepe (Fig. 9; Schmidt 2010) – we see the emergence of a clear early Holocene trend, one that continues through the Prepottery Neolithic B with the construction and settlement of the first large villages. The built environment and community ritual increasingly structured social relationships, mediated by the ideological dimensions of monuments, dwelling, landscape, and the symbolic constitution of culture and nature. The prehistoric biocultural dynamics spanning the Early and Late Natufian phases through the Neolithic revolution involved material manifestations of the social negotiation of worldview and community order.

Discussion and Conclusions: From Intercontinental Connections to Globalization

In this entry, it is suggested that a geographically grounded approach – involving a consideration

Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic, Fig. 9 Enclosures C (foreground), D (rear right), B (rear center), and A (rear left) at the PPNA-PPNB site of Göbekli Tepe in southeastern Anatolia. The round enclosures are associated with Layer III at the site, which is dated to the Prepottery Neolithic A (PPNA) or very onset of the PPNB (c. 11.5–10.5 kya). Further details are given in Schmidt (2010). The stone sculpture and reliefs on the limestone stelae that dominate the Göbekli Tepe enclosures – but that are also found in the nearby PPNA village site of Nevali Çori – are evidence suggesting that the transition to agriculture and village life integrally involved extraordinary social, worldview, and ideological change among early Neolithic communities throughout the Near East (Photo credit: Wikimedia Commons)

of biocultural dynamics at multiple spatial scales – gives a more thorough appreciation of the systemic causes and implications of long-term human population growth, range expansion, and the emergence of sociocultural complexity. This theoretical foundation helps us to clarify why major debates about the Near East's role in human prehistory still deal with classic evolutionary questions of tempo and mode. Have the interactions among genetic variation, ecological setting, demography, and culture emerged gradually throughout the Pleistocene? Alternatively, has it been mainly shaped by punctuated evolution – involving speciation, mainly in sub-Saharan Africa, range expansion, and competitive exclusion within and outside of Africa? Yet, the Near East is all the more important when one further considers the later prehistoric emergence of Upper Paleolithic social networks, Epipaleolithic sedentary settlements, and Neolithic animal and plant domestication and village life. This latter development moves theoretical attention away from macroevolutionary tempo and mode, toward complex biocultural dynamics within anatomically modern *Homo sapiens*.

Indeed, the long-term Upper Paleolithic shift to smaller animal and plant-food-resource "packages" preceded and shaped the so-called Neolithic Revolution in the Near East. This development further contributed to a supracontinental transition. Viewed from a Paleolithic vantage point – which highlights the role of OOA population dynamics – the Neolithic is a turning point in human prehistory. No longer is Africa the geographic driver of major biocultural change on a supracontinental scale. Neolithic and agricultural emergence is mainly an endogenous biocultural development within the Near East. Here, population expansion, sociocultural interaction, and technological diffusion catalyze the spread of agriculture into much of Asia, Europe, and – indeed – Africa. From the ecological complex-systems

perspective emphasized in this entry, four general questions can crystallize ongoing research on the Upper Paleolithic, Epipaleolithic, and Prepottery Neolithic in the Near East:

- What were the systemic interactions among social networks, cultural symbolic structures (including landscape and the anthropogenic built environment), human agency, human demography, and the demography and (perhaps anthropogenically altered) habitat of plant and animal food resources?
- How did behavioral, symbolic, and food-web changes impact human genetic variation – by influencing patterns of random and culturally structured drift, gene flow, and natural selection?
- How did hemispheric or global climate change affect the timing and dynamics of major biocultural trends, such as the initial shift to sedentary settlement or the widespread adoption of grain agriculture?
- How did social interactions, migration, and interbreeding between populations in adjacent phytogeographic zones and subregions within the highly environmentally diverse Near East shape the long-term Late Pleistocene-early Holocene biocultural change – especially as technological developments of textile and basketry production, tailored clothing, durable shelter, trapping and hunting projectiles, dog domestication, food storage, and agriculture dramatically altered food calorie production, energy balance, and stress across the entire region?

Clearly, these critical questions deal with intricate complex-systems dynamics. And so far, research on Near Eastern Neolithic emergence has largely contributed to clarifying the questions themselves. Much inquiry remains to provide satisfying scientific answers.

The Near Eastern transition to agriculture is key for understanding a pivotal biocultural development in the very long-term Upper Pleistocene-early Holocene shift from a core-periphery structure to a truly global Holocene pattern of population distribution. The study of Near Eastern prehistory highlights humanity's shared, predominantly African Late-Middle and Upper Pleistocene ancestry. It also has the potential to elucidate the intricate prehistoric underpinnings of Holocene developments as varied as prehistoric sociopolitical complexity and inequality, recent processes of gene-culture interaction, language and cultural diversification, and the historical development of world-systems political economy. Amplifying a suggestion made by Bar-Yosef (1998b) – concerning how insights from studying the transition to agriculture could illuminate the Middle-Upper Paleolithic transition in the Near East – this entry points toward a similar, but broader, approach. If the systemic and dynamic climatic, ecological, biological, demographic, and socio-symbolic factors involved in the largely endogenous Near Eastern agricultural transition can be clarified, perhaps paleoanthropologists can utilize such insights into biocultural evolution, in order to trace more intricately the human dimensions of earlier, recurrent Pleistocene OAA population expansions into Eurasia – which unfolded via the Near East.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Acheulean Industrial Complex
- ▶ African Stone Age
- ▶ 'Ain Difla Rockshelter
- ▶ Ali Kosh: Agriculture and Domestication
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Barley: Origins and Development
- ▶ Bone Tools, Paleolithic
- ▶ Braidwood, Robert John
- ▶ Çatalhöyük Archaeological Site
- ▶ Çayönü: Agriculture and Domestication
- ▶ Chickpea: Origins and Development
- ▶ Complex Hunter-Gatherers
- ▶ Demographic Transitions
- ▶ Dmanisi Hominins and Archaeology
- ▶ Domestication: Definition and Overview

▶ Europe: Middle to Upper Paleolithic Transition
▶ Flannery, Kent Vaughn
▶ Fossil Records of Early Modern Humans
▶ Goat: Domestication
▶ Göbekli Tepe: Agriculture and Domestication
▶ Handaxes and Biface Technology
▶ *Homo erectus*
▶ *Homo heidelbergensis*
▶ *Homo neanderthalensis*
▶ *Homo sapiens*
▶ Human Evolution: Multiregional Origins
▶ Human Evolution: Theory and Progress
▶ Human Evolution: Use of Fire
▶ Hunter-Gatherer Settlement and Mobility
▶ Hunter-Gatherer Subsistence Variation and Intensification
▶ Lithic Technology, Paleolithic
▶ Mousterian Industry Tradition
▶ Neanderthals and Their Contemporaries
▶ Near East (Including Anatolia): Origins and Development of Agriculture
▶ North and Saharan Africa: Geography and Chronology
▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age
▶ Out-of-Africa Origins
▶ Sheep: Domestication
▶ Sherratt, Andrew
▶ Wheats: Origins and Development

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Near East (Including Anatolia): Origins and Development of Agriculture

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Introduction

It is only during the last 10,000 years that *Homo sapiens* adopted a production economy based on cultivation of a selection of plants. Our species evolved as hunter-gatherers for more than 90 % of its history. In many regions around the world, plants were taken into cultivation during the early Holocene. The cultivation of wild plants created new conditions in which selective pressures led to morphological domestication and production economies. Estimates of the number of regions worldwide where hunter-gatherer societies adopted cultivation have increased as researchers discover more of these. A conservative estimate would be 11, while some scholars would suggest over 20. A production economy permitted higher densities of population. The social consequences of this change in subsistence economy vary widely from region to region. In the Near East, the establishment of mixed farming based on wheat, barley, pulses, and herding of sheep, goat, cattle, and pigs was particularly productive and as a result spread rapidly to Europe and Central Asia. It fueled the civilizations of Mesopotamia, Egypt, Greece, and Rome. European colonialists introduced these species into many parts of the world.

The Near East is characterized by high biodiversity, in particular hundreds of species of wild annual pulses and grasses. Environmental degradation over the last 10,000 years caused by overgrazing, agriculture, and deforestation masks the fact that this area at the end of the Pleistocene and beginning of the Holocene was rich in wild game, fruits, nuts, and seeds.

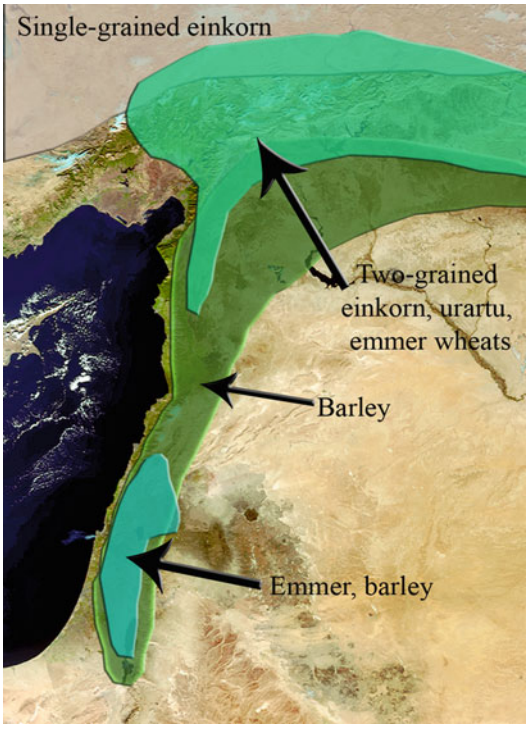

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 1 Present-day natural distributions of wild wheats and barley (einkorn populations in southern Syria are not shown). Past distributions were possibly different, single-grained einkorn has expanded into secondary habitats, and einkorn may have had a more southerly distribution during favorable climatic conditions

The variation in vegetation and climate over short distances, for example, Mediterranean forests with 400 mm of rain give way to open steppe with less than 150 mm in less than 50 km, meant that a wide variety of food resources were available near the sites. This diversity and abundance provided circumstances favorable for the development of agriculture. Figure 1 shows the present-day natural distribution of wild wheats and barley, which grow in an arc that sweeps from the Zagros foothills west to the Taurus and then down a narrow strip parallel with the Levantine coast. This arc, which lies between the arid interior steppe and the more humid (and in the past more wooded) hillsides, is often referred to as the Fertile Crescent.

Definition

Agriculture implies *cultivation*, which may be defined as encouraging plants to propagate. This definition would include practices of hunter-gatherer populations in the recent past which, although having little contact with farmers, encouraged the propagation of wild plants that they gathered in order to avoid overexploitation. This may indeed have been the case for Paleolithic foragers. Cultivation was not invented, but was the result of humans mimicking what they observed in nature. This might explain why agriculture arose independently in different areas of the globe. However, incipient cultivation of this kind has not been identified on archaeological sites. In the Near East the earliest cultivation so far recognized is *pre-domestic cultivation*, defined as the cultivation of morphologically wild plants. This is a prerequisite phase which led to morphological *domestication*, defined by specialists as a genetic change caused by selective pressures brought about by cultivation. In the case of Near East grain crops, most authorities agree that initial domestication involved unconscious or natural selection as opposed to conscious selection. This resulted in populations better adapted to cultivation. Morphological domestication can in some cases be identified from charred remains. *Agriculture* is an established production economy in which farmers depend for their subsistence on cultivation and, in many instances, herding. *Wild progenitors* are the living survivors of species that were taken into cultivation and domesticated.

The terms *PPNA and PPNB* were coined by Kathleen Kenyon for the Pre-Pottery Neolithic levels at Jericho. These terms have remained in use simply as chronological demarcations and are used for the northern and southern Levant.

Historical Background

Interest in the origins of agriculture and domestic plants dates back to the nineteenth century, that of Darwin being a prime example, but in the Near East concrete archaeological data was extremely

limited until the second half of the twentieth century. In the 1950s, three sites produced identifiable charred remains which could be dated by radiocarbon: Jericho located near the Jordan Valley in the West Bank, excavated by Kathleen Kenyon, Beidha in southern Jordan excavated by Diana Kirkbride, and Jarmo located in northern Iraq in the foothills of the Zagros Mountains, excavated by Robert Braidwood. Maria Hopf and Hans Helbaek (Helbaek 1959) were pioneering archaeobotanists at this time. For several decades these sites were key examples of early-agriculture villages. From the 1960s onwards more and more sites were discovered. The year 1969 brought the seminal publication *The Domestication and Exploitation of Plants and Animals* (Ucko & Dimbleby 1969) with ground-breaking papers by David Harris, Daniel Zohary, Kent Flannery, Willem van Zeist, and Jane Renfrew. In the 1970s, Willem van Zeist established sound methods of identification and sampling, while Gordon Hillman developed interpretive tools for the discipline. They worked on charred material from Mureybet and Abu Hureyra, key sites located in northern Syria. Meanwhile, agronomist Jack Harlan and geneticist Daniel Zohary were investigating plant domestication from a biological point of view and examining wild ancestors in their natural habitats. Their research led to a better understanding of the processes involved in domestication and continued for many years (Harlan 1995; Zohary et al. 2012).

Archaeologists have much debated the theoretical explanations for the origins of agriculture. One of the first was Gordon Childe, who in the 1920s, developed the concept of the Neolithic Revolution. Today the consequences of adopting agriculture are seen as revolutionary, rather than the process. Hypotheses abounded in the second half of the twentieth century. In 1953 D. Clarke developed an ecological model, L. Binford's 1969 model was demographic, and K. Flannery in 1969 produced a model based on the broad spectrum revolution. In the 1990s O. Bar-Yosef among others suggested that climate change was a prime factor for the origins of agriculture. These models were based on environmental determinism. Sociocultural models were developed by Jacques Cauvin (Cauvin 2000) who saw religion as a key factor, while for Trevor Watkins, social complexity and the concept of the house as home were contributing factors.

Near East (Including Anatolia): Origins and Development of Agriculture, Table 1 A summary of plant subsistence, cultural periods, and dates. Not all scholars agree on the dates for these periods. Rather than giving a range of dates for the beginning and the end, dates here have been rounded off

Subsistance	Cultural period	Dates BP cal.
Expansion of farming outside of the Near East	Various	8500–8000
Established mixed farmers	Middle PPNB and later	9800–8500
Early stages of domestication	Early PPNB	10500–9800
Cultivator/hunters, pre-domestic cultivation	PPNA and Khiamian	11700–10500
Cereals, small seed gathering, climatic deterioration	Early/Late Natufian	13000–11700
Sedentary villages, cereal gathering	Early Natufian	14500–13000
Cereal and wild grass gathering (broad spectrum)	Kebaran	23000–14500

Between 1995 and 2013 there has been a tremendous increase in the number of sites and the quantity and quality of analyzed plant remains. This has resulted in a body of information which provides a complex chronological and geographical picture and a mosaic of different cultural and environmental zones. Clearly no simple explanation for the adoption of cultivation would be applicable to the whole region.

Late Upper Paleolithic Foragers

Detailed evidence for late Upper Paleolithic subsistence comes from a single site, Ohalo II dated to 23,000 BP (Weiss et al. 2008) (for Cultural Periods, see Table 1). Situated on the shore of the Sea of Galilee in present-day northern Israel, Ohalo II became waterlogged, which provided exceptional conditions of preservation (see Fig. 2 for dates and locations of the sites mentioned). Several brush huts were excavated which

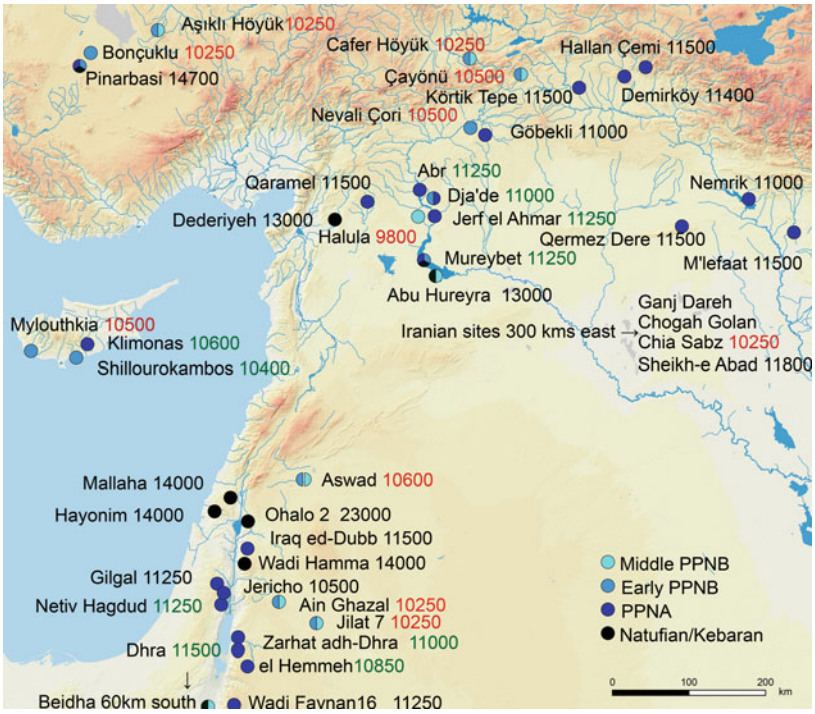

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 2 Map of selected sites. Dates are given as a rounded mean for early levels: *green*, sites with pre-domestic cultivation; *red*, early instances of morphological domestication; however, some need to be verified

contained thousands of seeds including grasses and cereals, notably wild emmer and wild barley. A large quern was found in one hut, associated with charred cereal grains and presumably used for grinding grain. This exceptional site provides evidence that subsistence was based on a broad spectrum of plant and animal species. However, comparisons with other sites are problematic because sites of this period are rare. It is probable that this broad spectrum subsistence, based partly on cereals, was more generalized in the southern Levant than this one surviving site suggests. Ohalo II was inhabited during the Glacial Maximum when climate conditions to the north in Anatolia would have been severe, which explains the lack of contemporary sites in this area.

The Epipaleolithic: Prelude to Cultivation

Sedentary Villages and the Early Natufian Homeland: 14500–13000 BP cal.

The term Natufian comes from Wadi an-Natuf and was coined by Dorothy Garrod, Professor of Archaeology at Cambridge University from 1938 to 1952. This period saw a more favorable climate as ice sheets receded from northern Europe. At this time site density increased dramatically in the southern part of the Fertile Crescent. Most archaeologists agree that some sites represent the earliest known sedentary communities (Bar-Yosef 1998). The most spectacular is the site of Malaha located near Lake Huleh in northern Israel. Here archaeologists unearthed the earliest known houses that represent a sedentary way of life. Excavations revealed a house of more than 7 m in diameter made of large stone blocks. Stone mortars, probably used for processing grain, 40 cm in height and weighing over 20 kg, were found at Malaha. Unfortunately no plant remains were recovered, but at contemporary sites in the region such as Wadi Hammeh and Hayonim, a few charred cereals were recovered, leaving little doubt that plant gathering similar to that of Ohalo II was still in use. The only site in Anatolia for this period is Pinarbashi which is situated in a rockshelter. It is interpreted as being inhabited by highly mobile hunter-gatherers.

Climatic Deterioration: Late and Final Natufian 13000–11700

The late and final Natufian is characterized by a decline in the number of sites in the southern

Levant (Bar-Yosef & Vallat in press). For most scholars, this decline is associated with the deteriorating worldwide climatic conditions known as the Younger Dryas (Bar-Yosef 2011). During the 1990s this deterioration was hypothesized as being a major incentive that led foragers to adopt cultivation (see below).

Plant remains in the southern Levant are rare. However, two late Natufian sites in northern Syria occupied during the Younger Dryas have produced rich plant remains. These are Abu Hureyra, situated in arid steppe on the banks of Euphrates and Dederiyeh situated in the Mediterranean maquis less than 50 km from the coast. These two sites have contrasting plant assemblages which reflect the different species of edible plants available in the Mediterranean zone compared to the steppe. At Dederiyeh grains of wild wheats and other wild progenitors dominate the grain assemblage, whereas at Abu Hureyra small seeds from the valley bottom such as members of the knotweed family and small-seeded grasses are the most frequent (Table 2, Fig. 3). Nuts of terebinth are common at both sites, and at Dederiyeh almonds are also frequent. Cultivation during this period has been suggested by more than one scholar. But the plant assemblages at these sites suggest that local gathering was dominant and solid evidence for cultivation is not forthcoming (Colledge & Conolly 2010). However, small-scale cultivation should not be ruled out, although it would leave little or no recognizable trace in the archaeological record.

Pre-Pottery Neolithic: The Early Farmers

Pre-Domestic Cultivation, Khiamian and PPNA, 11700–10500

Not all scholars agree on the dating of the early Neolithic periods. The year 11700 BP cal. is used here for the end of the Natufian; it corresponds with the Younger Dryas/Holocene boundary and the beginning of the Khiamian period which links the Natufian to the PPNA. It was named after the site of el Khiam, where notched arrowheads, characteristic of this period, were first found. Khiamian sites and plant remains are rare. But layers dated to this period at Mureybet (Ibáñez 2008) and Tell Qaramel, located, respectively, not far from late Natufian Tell Abu Hureyra and Dederiyeh, produced plant assemblages similar to their Natufian counterparts although they existed almost a millennium later. After 11300, PPNA sites are more numerous and many have rich finds of charred plants. Six sites in the southern Levant and five in the northern Levant provide evidence that the subsistence economies were becoming more and more reliant on pre-domestic cultivation (Willcox et al. 2012).

Cereals and pulses, the founder crops, become more common than plants that were not domesticated (Table 1 and Figs. 2, 4, and 5), although this is not the case at Korkik Tepe and Halan Çemi. At Jerf el Ahmar, a gradual reduction in gathered plants from lower to upper levels can be seen. Small-seeded grasses such as *Stipa* and Panicoid types are frequent, as well as other small seeds such as members of the Cyperaceae and knotgrass families (Willcox et al. 2008). The decrease in the gathering of these seeds was compensated for by an increase in the use of founder crops, notably barley, emmer, einkorn, lentil, and pea, which were probably cultivated.

Weeds of cultivation or arable weeds are perhaps the best indicators of pre-domestic cultivation (Colledge 1998). These plants thrive when the soil is disturbed by cultivation and have been evolving since the Neolithic. The number of species increased as agriculture spread into new habitats. Charred weed seeds are common on PPNA sites. The number of arable weed taxa occurring on PPNA sites is equal to or in some cases higher than that found on middle PPNB agriculture sites (Fig. 4).

Grain size increased during the PPNA, particularly in the case of barley, for example, at Jerf el Ahmar and Zahrat adh-Dhra (Fuller 2007). This is often cited as a sign of morphological domestication. However, a phenotypic increase in size resulting from improved growing conditions is an alternative explanation.

Another indication of pre-domestic cultivation is the introduction of crops into areas outside their natural habitats. Thus, rye and two-grained einkorn were the only cereals present at Natufian Abu Hureyra. By the PPN, barley, single-grained

Near East (Including Anatolia): Origins and Development of Agriculture, Table 2 Absolute counts of edible taxa from selected sites in northern Syria and southeast Turkey. All plants are morphologically wild. *Blue highlights* taxa that tend to increase during the sequence, while *green highlights* taxa that decrease and were eventually abandoned. While absolute counts are not reliable when comparing sites, these results have been verified by ubiquities and percentages

		Abu Hureyra 1	Dederiyeh	Qaramel	Hallan Çemi	Tell 'Abr	Mureybet 3	Jerf el Ahmar 1	Jerf el Ahmar 2	Dja'de
	Dates cal. yr BP from	13250	13180	12000	11500	11500	11500	11500	11200	11000
	to	12750	12950	11500	11200	11200	11200	11200	11000	10300
Cereals	Einkorn/Rye grain	888	0	1170	19	2999	2000	1382	1055	1120
	Einkorn spikelet base	0	2	292	0	0	0	0	5	16
	Rye spikelet base	0	0	0	0	0	p	121	22	16
	Wild/domestic barley grain	0	10	217	124	190	164	2353	6474	3763
	Wild barley spikelet base	0	0	0	0	?	6	1546	1746	153
	Single grained einkorn grain	0	173	1108	0	90	1	18	49	302
	Emmer grain	0	0	4	0	0	0	0	0	192
Pulses	Lentil	48	17	1113	11	230	28	452	1147	5850
	Pea/vetch/	48	11	682	748	37	13	146	237	1952
	Chickpea	0	0	0	0	0	0	0	0	3
	Broad bean	0	0	0	0	0	0	0	0	2
	Bitter vetch	3	3	11	29	0	4	10	46	34
Small edible seeds	Feather grass	1573	280	526	76	0	0	2	51	272
	Rush seeds	4776	0	59	4415	0	22	15	14	32
	Panicoid grasses	342	0	1	4415	0	24	19	1	0
	Knot grass family	4848	0	11	3748	0	351	359	126	37
Fruits Nuts	Fig seeds	0	0	4	0	0	3	1	10	42
	Almond	0	1380	2214	179	0	0	760	666	2
	Terebinth	357	9694	1705	120	2	12	1302	1274	911
	Totals of edible plants	12883	11570	9117	13884	3548	2628	8486	12923	14699
	Vol sediment litres	7925	11.5	1772	19393	452	?	6210	5904	6122
	Number of samples	21	?	108	175	30	27	154	81	229
		Late Natufian	Late Natufian	Khiamian	PPNA	PPNA	PPNA	PPNA	PPNA	Early PPNB

einkorn, and emmer had been introduced in that order at Jerf el Ahmar and Dja'de. Then pulses, notably broad bean and chickpea, appear for the first time far from their natural habitats. At Zahrat adh-Dhra in the Jordan Valley, emmer was common, but the site is situated in an area too dry for this crop to grow naturally.

That cereals became increasingly important during the PPNA can be seen not just from the archaeobotany but also from tools such as querns

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 3 Photos of wild progenitors. (**a**) Wild einkorn under experimental cultivation in southern France. Note the detached spikelets. (**b**) Wild emmer. (**c**) Wild einkorn, mountains of eastern Turkey. (**d**) Wild chickpea. These wild progenitors were photographed in their natural habitats in the Karadag Basalt Mountains in eastern Turkey

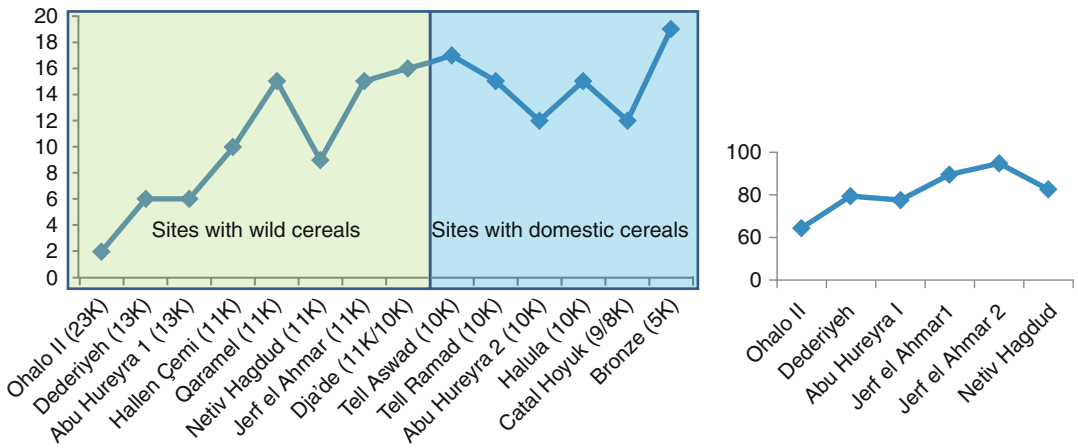

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 4 The graph to the left gives the number of arable weed taxa present on sites which have over 10,000 seed items identified. The number of weed taxa during the PPNA suggests pre-domestic cultivation. Right gives the percentage by volume of cereals compared to small-seeded grasses at selected sites

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 5 Examples of ancient charred remains and their modern equivalents. *Top left*, seeds of centaury (a weed taxon) (Dja'de); *left*, shells of almond (Tell Qaramel). *Second row left*, modern wild rye with einkorn in the *center* and rye spikelet bases to the *right* (Jerf el Ahmar). *Third row left*, single-grained einkorn (Qaramel); *center*, modern equivalent; *right*, modern charred and ancient charred (Jerf el Ahmar), spikelet bases of wild einkorn. *Bottom row left*, modern and ancient fragments of terebinth fruits; *center*, examples of whole fruits; *right*, terminal protuberance of a Stork's-bill single-seeded akene (weed taxa)

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Fig. 6 Examples of large-scale cereal use. *Top left*, burnt daub from a roof structure with cereal chaff impressions; *left*, wall with stones that was covered with a thick render of building earth which contained cereal chaff, examples from Jerf el Ahmar. *Middle left*, latex cast of building earth showing the impressions left by cereal chaff which had decomposed. *Middle right*, one of many buildings which contained several querns. *Bottom left*, two basalt querns from Jerf el Ahmar; *right*, collection of querns left after the excavations at Beidha (early Neolithic site in Jordan), photo 1985

and sickle blades and from storage structures (Willcox & Stordeur 2012). At Jerf el Ahmar large area excavations provided a wealth of information for large-scale cereal exploitation (Fig. 6). Cereals were a major component of the diet; over 15,000 remains of charred wild barley, wild rye, and wild einkorn were identified. This represents more than half of all the seed and fruit remains from the site. But the archaeological evidence for cereal use is equally impressive. Querns used for grinding cereals were found in situ in buildings, frequently occurring three to a room, suggesting that grinding was being practiced in an organized manner, three querns being used simultaneously in a single architectural and social unit. This suggests that cereal processing played an essential role in the everyday economy of the site, and was probably intertwined with the social structure of village life. In addition, chaff, the residue of processing, was used in vast quantities as a tempering medium in the daub constructions. Examination of large quantities of burnt building earth at Jerf el Ahmar, Tell ‘Abr, and Mureybet revealed perfect impressions of chaff, consisting of awns, glumes, lemmas, and spikelet bases. Chaff was systematically added to building earth to reduce shrinkage and increase strength. This technique is still used today in

many parts of the world, including northern Syria. Chaff must have been available in massive quantities, given the size of the buildings at Jerf el Ahmar and the fact that they were regularly maintained, destroyed, and rebuilt. The quantity is surprising if we take into account that the dehusking of hulled cereals, particularly barley, produces a low proportion of chaff to grain.

Large-scale collective storage of grain occurred in communal buildings at Jerf el Ahmar, Tell 'Abr, and Dr'a in the Jordan Valley. Not surprisingly, rodent infestation by the familiar domestic mouse (*Mus musculus domesticus*) occurred. These animals left gnaw marks on objects, charred droppings, and their bones and teeth. Evidence for domestic house mice has been found in the southern Levant at Hyonim B and Netiv Hugdud and at several sites in the north.

Sickle blades used for harvesting show an increase in the intensity of use. This is revealed by the characteristic gloss caused by the buildup of a film of plant silica on the cutting edge of the tool (Ibáñez 2008). At Jerf el Ahmar and contemporary sites on the Euphrates, there is an increase in both size and quantity of these tools compared to earlier sites.

In conclusion, the inhabitants at most but not all of the small PPNA villages were cultivators; however, there is no evidence of herding. These societies hunted big game such as aurochs, equids, gazelles, and small game, including birds. The bones of these animals are very common, suggesting that meat was an important element in the diet. These hunter-cultivators were found across the Levant. In northern Iraq cereals and pulses were also in use, although it is not known whether they were cultivated or not.

Expansion into Cyprus and Central Anatolia: The First Signs of Morphological Cereal Domestication in the Early PPNB 10500–9700

During this period, emmer, einkorn and probably pulses were introduced to Cyprus. Whether or not they were already domesticated is not known. This represents the first sign of cultivators expanding into new territory. The site of Klimonas, dated to the beginning of the early PPNB (or the end of the PPNA) at about 10600, is the earliest site with cereals on the island. The inhabitants hunted local wild boar. Some three or four centuries later at the sites of Shillourokambos and Mylouthia, cattle, sheep, goat, and other animals were introduced. With this agricultural package came the domestic mouse, presumably introduced accidentally with grain supplies. The introduction of mice implies that large quantities of cereals were being regularly imported.

Expansion towards the north appears to have been limited by the Taurus Mountains until the early PPNB. Cafer Hüyük is the earliest site found beyond the Cilician Gate (Gülek Bogazi), where the Euphrates cuts a gorge through the Taurus.

To the west, recent excavations in central Anatolia at Aşıklı Höyük and Bonçuklu, where a phase with sunken oval houses has been unearthed, have demonstrated that cultivation and herding were developed in this area during the early PPNB. These sites are culturally distinct from those to the east suggesting that agriculture developed independently in central Anatolia rather than being introduced from the east.

Cereals and herding have been identified at early PPNB sites farther east in the Zagros foothills such as Ganj Dareh, Chogah Golan, Tepe Abdul Hosein, and Chia Sabz, dated to between 10250 and 10500. This suggests as in the case of central Anatolia that agriculture developed locally, probably derived from PPNA sites in northern Iraq.

Morphological domestication of cereals and the first signs of herding appear during this period. Wheat and barley domestication can be identified by the loss of the dispersal mechanism. This is visible in archaeobotanical specimens when the abscission scar is examined; part of the upper spikelet adheres to the scar, indicating the artificial break of domestic cereals. Possible finds of domestic einkorn have been reported from sites such as Nevalı Çori and Cafer Höyük in the northern Levant. At the time of writing, the dating and the domestic status of these finds need to be reexamined. In the southern Levant at Aswad, the earliest levels, dated to the early PPNB, contain domestic barley and possibly

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 7 The site of Aşıklı Höyük in central Anatolia showing the almost urban nature of this settlement (photo Research Project). Similar settlements in terms of surface area and density of habitats can be found in middle PPNB levels at Halula and Tell Abu Hureyra. These settlements developed as a consequence of a production economy

emmer wheat. Domestication of emmer and barley was also reported at Wadi el-Jilat 7 and Ain Ghazal.

In conclusion, cereal domestication was not fully established because high proportions of wild spikelets were still present. Agriculture was in the process of developing independently in five geographic regions: southern Levant, northern Levant including eastern Anatolia, Cyprus, central Anatolia, and the Zagros foothills of Iran and Iraq.

Fully Established Farming and Later Expansion: 9700, Middle PPNB, and Beyond

Continuity between the early PPNB and the middle PPNB is poorly documented. Whether this is due to a hiatus or to the fortuitous nature of archaeological discoveries is not known. Whatever the case, by around 9700 large settlements developed which included more than ten times the surface area of the early PPNB and PPNA sites (Fig. 7). These settlements were totally dependent on agriculture; gathering and hunting were minor secondary activities. Emmer wheat, hulled barley, lentils, peas, chickpea, and broad bean became the dominant crops across the whole region in the same way that cattle, sheep, goat, and pig became the norm. No doubt other crops that have left no remains were also cultivated. Both crop plants and animals have domestic morphologies but wild specimens persist. Middle PPNB levels at Aşıklı Höyük, in central Anatolia, and at Halula and Abu Hureyra in the northern Levant or late PPNB levels at Ain Jammam, Baster, Ain Ghazal, and as-Sifiya in the southern Levant represent fully established agricultural communities of near-urban dimensions.

Agricultural expansion out of the Near East is poorly understood at the time of writing, with the exception of Cyprus, mentioned above. The dates for early farming settlements elsewhere are controversial and likely to change in the future; those presented here are given as ranges or rounded off. It was not until more than a millennium and half after the establishment of agricultural settlements in the Near East that farming villages appeared in new areas. As we have seen, early Neolithic settlements occurred in Iran; further expansion east is illustrated by two sites dated to between 8400 and 8000 in which emmer, einkorn, barley, sheep, and goat were found: Mehrgarh in southern Pakistan and Jeitun in Central Asia. To the west across the Bosphorus, in Thrace and northern Greece, the earliest farming sites dated to between 8300 and 8000 BP cal. Farther north, the Caucasus sites in Armenia dated to about 8000, while to the south, the earliest farmers in Egypt were cultivating the land about 7500.

Key Issues/Current Debates

The question of whether agriculture in the Near East originated at a single center and subsequently diffused rapidly outwards, or was a protracted process occurring simultaneously across the region, has been much debated. In the 1960s and 1970s, Jericho was considered the key site from which agriculture diffused. By 2000, a small area of southeast Anatolia was seen by agronomists as being the core area; their hypothesis was based on the present-day distribution of wild progenitors and DNA fingerprinting of modern einkorn wheat, rather than archaeology. This hypothesis has been questioned, because in the surrounding regions pre-domestic cultivation predates sites in the so-called core area (Fuller et al. 2011). While some crops may have originated in southeast Anatolia, for example, chickpea, archaeology clearly shows that in adjacent regions (see map), local wild populations were taken into cultivation as early as or earlier than in southeast Anatolia.

Another debate which concerns agronomists and geneticists concerned with biodiversity has been about whether the major crops were taken into cultivation just once or many times. These researchers wanted to know whether today's crops are monophyletic or polyphyletic in origin. The first DNA studies on einkorn in 1997 suggested monophyletic origins. However, subsequent studies are not so clear-cut; other crops such as barley show polyphyletic origins. Studies of modern populations cannot provide the full story because many cultivars have become extinct over the last 10,000 years. For the moment, the debate continues as new information accumulates.

Identifying domestication is an important issue for the origins of agriculture, and not all researchers agreed on the criteria. Van Zeist recognized in 1984 that the earliest domestic populations contained significant proportions of wild specimens. This was later confirmed at several other sites (Tanno & Willcox 2006). This discovery led scholars to question earlier hypotheses proposing that domestication could have occurred rapidly in a few generations. It is now generally accepted that domestication was a slow, protracted, and continual process. PPNA societies took local wild wheats and barleys into cultivation in widely separated regions, and domestication occurred more than once and independently in those different regions.

What were the factors that caused hunter-gatherers to become farmers? This debate has been going on since the 1920s. On the one hand, there are determinists who see natural phenomena as being the catalysts, while on the other, there are those who regard an increase in cultural complexity as the catalyst. But was increased sociocultural complexity the cause or was it the consequence of adopting agriculture? (Watkins 2010). Given the time scale and the geographic and climatic diversity across the vast region inhabited by late Pleistocene/early Holocene societies, factors like climate change, population increase, overexploitation of resources, and societal developments would have played more or less important roles at different times and different places. With regard to climate change, several researchers have suggested that sustainable agriculture would have been difficult during the late Pleistocene but that the more stable conditions of the early Holocene favored agriculture (Fig. 8) (Willcox et al. 2009). The debates continue as new discoveries are made.

Finally, brewing has been mentioned as a possible use for cereals from the Natufian onwards (Haaland 2007). While the idea may seem attractive, the arguments are speculative, and at the time of writing, there is no factual scientific evidence for brewing in the Near East for the Natufian or PPN periods.

International Perspectives

The Near East is just 1 of at least 11 and perhaps over 20 regions where agriculture developed independently around the world. While it is often considered to have been the earliest known center where farming developed, it is possible that cultivation was adopted in tropical regions during the Pleistocene although little evidence has survived. Taphonomic factors have an effect on the international perspective concerning the origins of agriculture. Non-charred plant

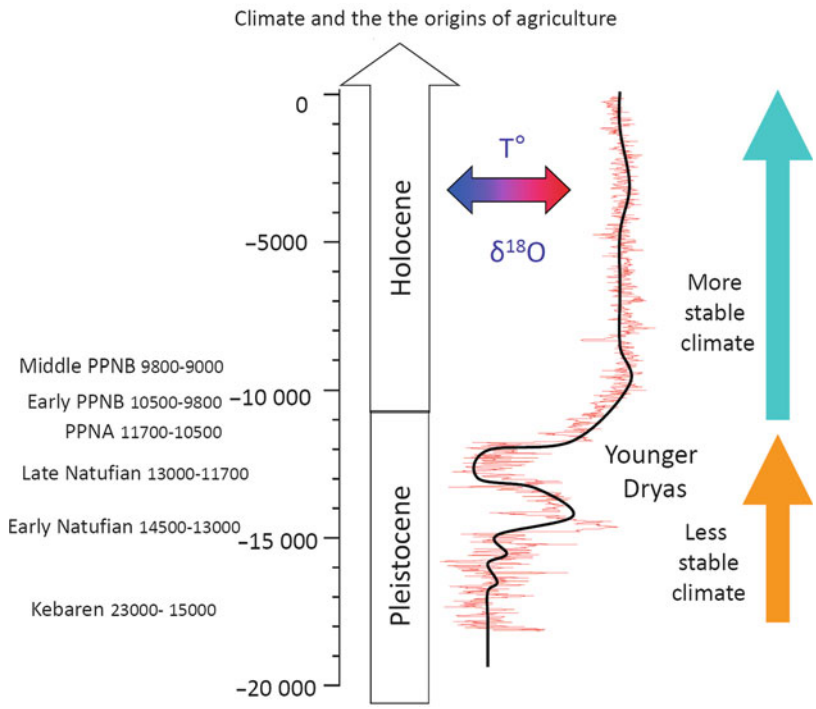

Near East (Including Anatolia): Origins and Development of Agriculture, Fig. 8 The *black curve* gives average worldwide changes in oxygen isotope 18 which reflects global temperatures. Postglacial warming coincides with the increase in density of sites in the southern Levant while the Younger Dryas cooling with decreased density. Holocene warming coincides with the development of PPNA sites and pre-domestic cultivation. The *red curve* gives shorter-term amplitude changes in temperature which are greater during the Pleistocene suggesting unstable climatic conditions. At the start of the Holocene, changes are less severe indicating more stable climate conditions. Several scholars suggest that durable agriculture would be more viable with the stable climatic conditions of the Holocene

materials, including pollen, decompose and oxidize readily in aerobic archaeological sediments, while anaerobic or desiccating conditions are very rare. The semiarid conditions of the Near East favor the preservation of inert charred plant remains because bioturbation and mechanical abrasion are minimal. Thus, the Near East has provided far more information than other regions.

The distribution of archaeological research for the Near East is uneven. Survey coverage of the Near East is irregular; there are vast areas which have not been surveyed. Dam construction on the Euphrates has led archaeologists to carry out numerous rescue excavations in the valley between 1970 and 2000, favoring this area. And of course changing political situations in the lands of the Near East have affected research into the origins of agriculture.

Future Directions

The discovery of new sites in the future will have impact on our view of the origins of agriculture in the Near East, as have the exceptional discoveries of the past few decades. These discoveries are often fortuitous because systematic surveys are lacking in all areas. Detailed systematic survey work in the future will no doubt bring to light new sites, especially in more remote areas. Satellite imagery will no doubt become a useful tool for surveying, but must be backed up by ground surveys.

There is room for improvement in the accurate identification of charred plant remains. Weeds are often only identified to genus and so can only be defined as assemblages. Extinct cereals like the new glume wheat are being recognized, and this aspect will no doubt be developed in the

future. So far ancient DNA has been found to be too degraded in specimens of plant remains from the Near East. New techniques may make breakthroughs possible in the future.

Climate data from locations in the Near East are very limited and often poorly dated. Future studies of natural climatic archives such as lake, marine, and cave sediments will provide more accurate data for paleoclimate research.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agriculture: Definition and Overview
- ▶ Ali Kosh: Agriculture and Domestication
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Çayönü: Agriculture and Domestication
- ▶ Chickpea: Origins and Development
- ▶ Childe, Vere Gordon (Theory)
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Jericho Archaeological Site
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Wheats: Origins and Development

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Nemrud Dağ, Archaeology of

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Introduction

Nemrud Dağ (alternatively spelled as Nemrut Dağ or Nemrud Dağı) is a Taurus mountain with a height of 2,205 m in southeastern Turkey (province of Adıyaman) in the northern part of a small region at the Euphrates that was known as Commagene in antiquity. The burial site of King Antiochos I of Commagene (69–36 BCE) is located at its summit: a temple-tomb (*hierothesion*) designed to be the focal point of a highly original and typical late-Hellenistic project of dynastic self-presentation extending throughout the entire kingdom. The *hierothesion* has never been in use, and its completion was probably hurried along in an improvised manner soon after Antiochos I died; it should be dated, therefore, roughly between 50 and 35/30 BCE. The actual tomb of the king has been searched for intensively, but it has not been found as yet. Nemrud Dağ is remarkable for the fact that it has preserved a highly standardized *Bildprogramm* juxtaposing so-called "Greek" and "Persian" (or "Iranian") elements. The king himself provides a motivation for this through an extensive "foundation text" executed as a monumental inscription at the site itself.

In this entry, Antiochos I characterizes his *hierothesion* as "the throne of the gods," which it is in literal sense (see below). As such, in recent decades, the spectacular site of Nemrud Dağ has been developed into one of Turkey's most important archaeological landmarks, also with the incentive to draw tourists into a relatively poor and underdeveloped area. The issue of stakeholders at this UNESCO World Heritage Site therefore presents a complicated case. Already at the end of the nineteenth century, a German expedition (led by Carl Humann and Otto Puchstein) and an Ottoman expedition (led by Osman Hamdi Bey) competed with each other to claim the site's scientific "discovery" and publication. After WWII, the American archaeologist Theresa Goell worked at Nemrud Dağ while the rest of Commagene, most notably Arsameia ad Nymphaios (see below), was the focus of the work of German epigraphist Friedrich Karl Dörner from Münster, who founded the *Forschungsstelle Asia Minor*. Nevertheless, both scholars collaborated throughout their projects; Münster remains the home of Commagene-studies today. During the past decade, an

international team under the aegis of the University of Amsterdam (the Netherlands) worked on the conservation of the site, soon followed by a Turkish team from the Middle East Technical University with the support of a major EU grant. Unfortunately, these recent efforts have not resulted in a satisfying heritage plan, and the monument is still under threat.

Definition

Nemrud Dağ and Commagene

The site consists of three terraces around a tumulus, which has been transformed into a prominent landmark by means of covering the original mountain peak with a layer of artificial gravel. The tumulus was visible from large distances, and because of this visibility, we may assume that Antiochian kingship made itself felt throughout Commagene (Figs. 1, 2).

This was strengthened by the fact that mountain peaks in the vicinity of important Commagenean settlements had similar dynastic sanctuaries – although generally, these were smaller, less complex, and did not always contain a royal tomb. Nemrud Dağ was therefore part of a kind of "grid" of dynastic self-presentation spanning the whole of Commagene.

Of the three terraces surrounding the tumulus, the East and West terraces are the most prominent; these could be reached from the valleys below via marked processional roads. The so-called North terrace, more like a passageway connecting the East and West "courts", was apparently intended to display a large number of stelae, but only their sockets were put in place, and the project was left unfinished. The East terrace was the most spacious area around the tumulus (around 500 m^2), and its condition has been explored to the full. Rising above the terrace and almost placed against the tumulus, a group of five colossal (originally 8–10 m high) statues were found, flanked at both sides by animal groups consisting of a lion and an eagle (Fig. 3).

The statues are built up by dry-stone masonry consisting of large blocks of yellowish-white limestone in six to eight horizontal layers. Due to earthquakes, the heads of the statues have broken off and fallen down onto the terrace – recently, they have been placed in a row in front of the statues. The monumental inscription, inscribed at the back of the colossi, identifies the figures that are displayed (Fig. 4).

Centrally positioned is Zeus-Oromasdes flanked (at the north side) by Apollo-Mithras-Helios-Hermes and Artagnes-Herakles-Ares and (at the south side) by the goddess Commagene (a personification of the region) and Antiochos I himself. The king thus places himself amid those whom he apparently upholds as the main gods of his pantheon. For a Hellenistic ruler, it was not unusual to claim divinity and to be worshipped as a god. In Egyptian temples, for instance, the Ptolemies received libations and incense as *synnaoi theoi* (temple-sharing deities): the same was intended to occur at Nemrud Dağ. However, the "double identity" of the gods seems remarkable here: they are designated simultaneously as "Greek" (e.g., *Zeus*, the main deity of the Greeks) and "Persian" or "Iranian" (e.g., *Oromasdes*, the main deity of the Persians). The style of the statues seemingly aims for a similar kind of "blending of West and East" and is therefore often defined as "Greco-Persian." This practice seems visible also in the so-called *dexiosis* reliefs, placed before the colossi toward the terrace. On these, the king is portrayed in a very "Eastern" attire (with the Armenian *tiara*, Persian boots, and regalia like a sash) shaking hands with, in one example, a distinctly nude and "Greek" Herakles (Fig. 5).

Originally, the so-called Lion horoscope was also part of this sculptural ensemble: a relief showing a lion with specific stars and planets scattered all over and representing an astronomical constellation. On the East terrace itself, the north and south sides are lined with a "wall" of large reliefs displaying the "ancestors" of the king. Here Antiochos I expresses his wish for double identity through genealogy by claiming that he descends from the Achaemenids (and ultimately the "king of kings" Dareios) from his father's side and, via the Seleucids, from the Macedonian royal house (and ultimately Alexander the Great) from his mother's side. The reliefs

Nemrud Dağ, Archaeology of, Fig. 1 Plan of the site (after the forthcoming book by H.A.G. Brijder, with permission)

show and identify these ancestors (15 "Persian" and 17 "Greek"), who are all portrayed in a very recognizable "Greek" or "Persian" style. All these elements (the colossal statues of the four gods and Antiochos I, the *dexiosis* reliefs, the Lion horoscope, and two rows of ancestor reliefs) are also encountered on the West terrace. There, however, was less space available: the *dexiosis* reliefs were therefore placed next to the statues, and the Seleucid and Macedonian "ancestors" were placed opposite the colossi. The original situation has not been as well-preserved as on the East terrace, as the colossi have entirely collapsed.

The other dynastic sanctuaries throughout Commagene – designated as *hierothesion* when

Nemrud Dağ, Archaeology of, Fig. 2 The tumulus from a distance (Photo: Jurriaan Venneman)

Nemrud Dağ, Archaeology of, Fig. 3 Colossal statues, East terrace (Photo: Jurriaan Venneman)

a royal tomb would be present, otherwise simply called *temenos* – shows (selections of) a similar repertoire of text and material culture. This was standardized to such an extent that when fragments of the monumental inscription (or related texts) are found, they often can immediately be recognized as (part of) paragraph *x* or *y*. This does not mean, of course, that variation was impossible, as is illustrated by archaeological finds from Arsameia ad Nymphaios, a site relatively near Nemrud Dağ that has been explored by a German team in the 1950s, 1960s, and 1970s. Inscriptions from Antiochos I claim that here his father, Mithridates I Kallinikos (c. 100 BCE–70 BCE), was buried and that Antiochos I established a cult for him. At Arsameia ad Nymphaios, there were also colossi and *dexiosis* reliefs and cultic proscriptions like at Nemrud

Nemrud Dağ, Archaeology of, Fig. 4 Part of the *nomos* inscription, East terrace (Photo: Jurriaan Venneman)

Nemrud Dağ, Archaeology of, Fig. 5 Herakles *dexiosis*, West terrace (Photo: Jurriaan Venneman)

Dağ, but the role of Mithras seems to have been more prominent. On the main plateau, banqueting rooms were found corresponding to the Hellenistic Mediterranean style of the period; at Nemrud Dağ, we do not have such buildings. Next to the banqueting rooms, the excavators place the royal temple-tomb for Mithridates I Kallinikos in the dynastic "Greco-Persian" style; the archaeological evidence is scant due to a thorough destruction by later building phases.

Current Debates and Future Directions

There are three key issues for the archaeology of Nemrud Dağ and Commagene.

The first revolves around value judgments and what one could call a "contextual, Hellenistic understanding" of the material. Antiochos' project of dynastic self-presentation is often interpreted negatively, as a failed attempt. This would become clear also from the "hybridity" of the Antiochian style – with the word hybrid intended as a pejorative qualification. Illustrative is the remark by Bert R.R. Smith (Smith 1985: 275) that Antiochos I "suffered probably from both paranoia and megalomania." Through this approach, Nemrud Dağ has been written out of Hellenistic archaeology and history as something marginal and nonrepresentative. Other research, however, stresses the originality and ingenuity of the Antiochian project and sees its eclecticism as typical for the late Hellenistic period. The mausoleum of Augustus, for instance, could be argued to constitute a remarkable parallel to Nemrud Dağ in rather more structural terms. Visibility within the urban landscape was applied as a major instrument for dynastic display by Augustus, who also used a canonical text (the *res gestae*), a colossal statue, and a strong focus on genealogy. This resulted in a monument that was stylistically highly eclectic, as was Nemrud Dağ. Be that as it may, the archaeology of Nemrud Dağ would certainly profit from taking

its object more seriously and trying to understand Commagene as one of the many "centers" of Hellenistic *koine*. Such an approach is strengthened by recent archaeological finds showing that this rich and strategically positioned kingdom at the Euphrates was not at all a cultural backwater but a fully fledged part of the Hellenistic Mediterranean and Near East.

The second key issue revolves around the nature of the sources to our disposal. These are often imagined as "ausnehmend gut" (Schwertheim 2005: 77) because of the availability of texts as well as material culture from a relatively securely dated historical context that, moreover, would add to an interconnected understanding of both. For archaeology, this has resulted in a dominant influence of the texts in historical and archaeological interpretation. However, (almost) all our sources are part of the program of display designed by Antiochos I and are therefore likely to provide us a dynastic image, but not a historical reality. Moreover, there is (almost) no evidence that is *not* part of this Antiochian program. In other words, we cannot check or contextualize his "propaganda." It could be argued, therefore, that our sources are in fact not good at all as they are extremely one-sided and (potentially) misleading. The gravity of this matter becomes clear from the excavations at Arsameia ad Nymphaios. In the texts from this site, Antiochos I boasts to have substantially enlarged and enriched an older Commagenean settlement (mentioning new royal palaces, a water supply, a military base, etc.), but more than two decades of investigations led by Friedrich Karl Dörner (from 1953 to 1976) failed to find any of these nor does there seem to have been a pre-Antiochian phase. The archaeology of Commagene, therefore, has an unstable foundation seeing that it has so far focused solely on the dynastic monuments. No first century BCE Commagenean village or city has been excavated; its capital Samosata (Samsat) has only been provisionally explored and published and is now beneath the waters of a large reservoir; there is (almost) no epigraphical record outside the Antiochian texts; no intensive field survey has been undertaken. In other words, we do not really know what the relation was between the thoroughly Hellenistic project of dynastic display and the social context in which it was supposed to function, as that context is simply not available. This is one of the reasons why the recent work by Engelbert Winter (Münster) and his team in Doliche is so important: here we have an Antiochian *temenos* that stood in relation to an older cultic context.

The third and final key issue for the archaeology of Nemrud Dağ and Commagene is how to understand this "coming together of East and West at the Euphrates" theoretically. Most scholars argue, often implicitly, that we would deal here with acculturation processes like Hellenization and Persianization. The topographical position of Commagene is thus considered to be the key to the understanding of its material culture: "East" and "West" literally seem to meet here. For instance, Bruno Jacobs (Jacobs 2003), the author of a series of important interpretative articles on the archaeology of Nemrud Dağ and Commagene, assumes the existence of Greek and Persian elites in society. Antiochos I would have tried to reach and integrate these groups by means of his double-styled language of images. Such a hypothesis, although well imaginable, is difficult to prove seeing that we know so little about late Hellenistic Commagenean society (see key issue 2). Moreover, if we take Nemrud Dağ seriously as Hellenistic *koine* (see key issue 1), other strands of interpretations emerge. Referring to things "Greek" and "Persian" seems in the first place to have to do with cultural memory and invention of tradition, as in the first century BCE, neither Greeks nor Persians were a real (political) factor anymore whatsoever. However, as cultural concepts, "Greek" and "Persian" styles and elements played an important role within the Hellenistic world and its *koine*. It is perhaps more likely, therefore, that we should try and interpret the "Greek" element not in terms of Hellenization but in terms of *Hellenism* and the "Persian" element not in terms of Persianization but in terms of *Persianism*. Taking up these kinds of elements because of the meanings and associations they had acquired over time and putting them together in innovative combinations are

typical for the culture of late Hellenistic *bricolage*. From this perspective, Nemrud Dağ could be argued to be a most significant case study for the archaeology of the (late) Hellenistic world, as it attests to the first century BCE eclecticism that Augustus would use to create the canon that we call Roman. It is Wolfram Hoepfner (Hoepfner 2000) who first seems to have realized this perspective to a full extent. In general terms, the Hellenism and Persianism of Antiochos I can be explained as follows. "Doing Greek" was the way for a local dynast to show that he was significant (or wanted to play a role) on the Hellenistic stage, as Hellenism simply was the language of culture and modernity. "Doing Persian" was the way to claim dynastic legitimacy in a region where the Achaemenids were the last uncontested rulers of a true world-empire. There is certainly a lot more to explore from this perspective, an important point of discussion being the fact that the dynastic program of Antiochos I seems to have been targeted more toward his rival Hellenistic kings than toward the population of his small kingdom. But we can only do so when Nemrud Dağ is given a more central place in the archaeology of the Hellenistic and Roman Near East. Given the large array of important discussions to which Nemrud Dağ seems able to contribute (to name but a few: the functioning of Hellenistic *koine*, Hellenism and Persianism in antiquity, dynastic propaganda and the language of images, the divinity of Hellenistic rulers, Romanization in the East, the contextualizing of the Augustan cultural revolution), it certainly deserves that place.

The work by Theresa Goell from the 1950s, finally published by Donald H. Sanders in 1996, remains the most important point of departure for the archaeology of Nemrud Dağ itself (Sanders 1996). It is best consulted together with the review by Bruno Jacobs (Jacobs 1998). For recent work by the international team, see the articles by Eric M. Moormann and Miguel John Versluys (the final report edited by Herman A.G. Brijder is forthcoming); for the most recent Turkish project on the site, see contributions to Winter (2011). The best general introduction to the archaeology of Nemrud Dağ and Commagene is Wagner (2000). All historical information on Commagene, Antiochos I, and his dynasty has been assembled in Facella (2006). Margherita Facella, Bruno Jacobs, and Jörg Wagner have published important interpretative essays on Antiochos I and his dynastic program. The best introduction to the epigraphic source material is now Crowther & Facella (2003) (with full bibliography). Arsameia ad Nymphaeum has been published in two volumes: Dörner & Goell (1963) and Hoepfner (1983). Ongoing work in Doliche is published in the *Istanbuler Mitteilungen*, so far in volumes 55 (2005: 191–214) and 56 (2006: 185–205); see most recently several articles in Winter (2011). Michael Blömer and Engelbert Winter have now published (Blömer & Winter 2011) an up-to-date archaeological guide of Commagene with all basic information and full bibliography. Several volumes of the series *Asia Minor Studien* deal with Commagenean archaeology specifically, most recently Winter (2008) and Winter (2011). Merz & Tieleman (2012) contains several articles dealing with the question of commagenean identities in the first century BCE and the first century CE. I have tried to describe Nemrud Dağ from a wider Hellenistic perspective in terms of *bricolage* using Hellenism and Persianism (Versluys 2013, forthcoming).

Cross-References

- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Interculturality and Archaeology

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Netherlands: Cultural Heritage Management

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Introduction

In the Netherlands, the professional archaeology had its start in 1818 with the appointment by the national government of Caspar Jacob Christiaan Reuvens as archaeology professor at the University of Leiden and as the director of a national museum for antiquities that he had to develop. Reuvens (1793–1835) was actually the first university professor of prehistoric archaeology in the world (Brongers 1973). It was however already long before this that a concern for the preservation of archaeological phenomena had emerged. That happened in the 1730s, when the best-known Dutch monuments, the *hunebedden* (megalithic burial chambers of c. 3400 BCE–2850 BCE), became endangered due to a massive attack of shipworms (*Teredo navalis*) on the Dutch coastal defenses. As these "termites of the sea" were eating the piles in the dikes, loads of heavy stone material was needed to restrengthen the dikes. Poor inhabitants of the province of Drenthe saw in this an opportunity to earn some money by collecting and selling the

free stone material that was abundant in the boulder clay soil in the North. But the *hunebedden* also provided a rich source for heavy stone material and were dismantled rapidly. When the provincial government of Drenthe realized what was at stake, they announced on 21 July 1734 a resolution to protect the tombs against stone digging (Brongers 1976). Even a pecuniary punishment of 110 gold guilders could be imposed. With this, the first monuments legislation was a fact and it can be considered the start of cultural heritage management in the Netherlands. Since then the approach has obviously been altered drastically. Especially in the last two decades, when market-driven development-led archaeology was introduced, a complete transformation of Dutch heritage management has been witnessed.

Key Issues/Current Debates/Future Directions/Examples

The first legal provisions to preserve the archaeological heritage did not have much effect. The destruction of the *hunebedden* continued, because the risk of being caught was low and very few people were fined. Even governments seemed to have used stone material from the megalithic structures, for instance, to improve roads. When in 1818 a first formal inventory of the burials was made, it was clear that additional protective measurements were needed. These were effectuated as of 1846 when the provincial and national government started to purchase the sites. By 1872, a total of 45, nearly all that remained, was owned by the authorities. These, and eight others that were added afterward, have all been preserved till the present day (Rijksdienst voor het Cultureel Erfgoed 2009).

Although in a way effective, this type of protection was clearly not systematic and structural. The state's and professional archaeology's main interest concerned scientific research, to learn about the material culture through excavations and collecting finds. Reuvens, for instance, initiated a national documentation of archaeological sites (Willems 1997), but his focus and that of succeeding archaeologists like Jan Hendrik Holwerda (1873–1951) and Albert Egges van Giffen (1884–1973) was on developing excavation methods. For instance, as curator of the Drenths Museum in Assen, Van Giffen was assigned in 1919 by the minister of Education, Art and Science to make an inventory of the condition of the remaining megalithic tombs and to do some restoration works, but these preservation activities were restricted to these most prominent archaeological phenomena and had an incidental character (Fig. 1).

Growing Awareness

A first step toward a more systematic focus on preserving the archaeological heritage was the initiation, on 24 May 24 1940, of a national advisory committee (Rijkscommissie voor het Oudheidkundig Bodemonderzoek) and an office for the archaeological heritage (Rijksbureau voor het Oudheidkundig Bodemonderzoek, RBOB). Besides documenting finds, one of the first tasks of the office was to list the artificial dwelling mounds (*terpen*) in need of protection. At that time, it had just become clear that these artificial dwelling mounds, which were constructed in the north of the Netherlands from c. 500 BCE to protect people and cattle against the sea, were even more threatened than the *hunebedden*. They consisted of very fertile soil, which was harvested intensively to fertilize the poor sandy soils in other parts of the country (Fig. 2). This exploitation had started slowly in the 1850s, became very popular as of the 1870s, and had its peak in the 1920s (Rijksdienst voor het Oudheidkundig Bodemonderzoek 2002: 17). So, when in 1943 the exploitation of the *terpen* was finally legally restricted and the RBOB made its inventory, it turned out that, for instance, the province of Friesland had already lost more than 75 % of its original 910 dwelling mounds (Halbertsma 1963). Thanks to this protection policy, approximately 350 dwelling mounds are preserved. In fact, dwelling mounds are one of the best represented categories on the list of nearly 1,800 national monuments (Rijksdienst voor het Cultureel Erfgoed 2009: 31).

Netherlands: Cultural Heritage Management, Fig. 1 One of the 53 remaining *Hunebedden*. Their rapid destruction in the eighteenth century raised awareness that the archaeological remains needed protection of the authorities (Photo: M.H. van den Dries)

Netherlands: Cultural Heritage Management, Fig. 2 The exploitation of the *terp* of Hogebeintum, 1896. (Source: H.M. van den Berg, 1981, *Noordelijk Oostergo. Ferwerderadeel*. Den Haag: Staatsuitgeverij)

The need for a more systematic care for monuments became even more apparent after the Second World War, when war-damaged historical buildings and the archaeological remains in the subsoil had to be protected against massive reconstruction activities. So, in 1947, two new state agencies were founded for this purpose, one for historic buildings (Rijksdienst voor de Monumentenzorg, RDMZ), and one for archaeological research (Rijksdienst voor het Oudheidkundig Bodemonderzoek, ROB) (Willems 1997). Van Giffen became the director (1947–1949) of the latter. Although he kept his

chair at Groningen University and became primarily famous for developing excavation techniques, Van Giffen also had genuine preservation motives. For instance, his selection of sites for excavation was often directed by considerations of threat. After his retirement, he even became the first and only State Inspector for the protection and maintenance of *hunebedden* and restored archaeological monuments.

Shared Responsibility

The ROB's main task was to make an inventory of all archaeological monuments in the Netherlands, and to subsequently take care of their protection and preservation. In practice, this meant that almost all capacity was directed toward rescue excavations. Due to the large scale of post-war reconstruction works, land reclamation projects in the new polders, and the re-allotments policy, the ROB was preoccupied with excavating the remains that these activities exposed (Willems 1997). Large numbers of volunteers were hired to assist, but also additional specialist capacity was needed. Thus, in 1954, a nautical archaeological department was established to take care of the shipwrecks that were uncovered in the polders.

Additional digging capacity was also gained from the university departments in Leiden, Amsterdam, and Groningen, and as of 1960, individual municipalities started to establish their own archaeological service (Sarfatij 1990). The first was Rotterdam, that suffered from the most extensive war destruction, but others followed soon. Currently, over 40 municipalities and around 20 regions have an archaeological service (www.gemeente-archeologen.nl). Between the late 1960s and early 1970s, a network of 12 provincial archaeologists was subsequently developed that covered the entire country. This in particular introduced a more continuous and systematic care for endangered archaeological sites.

Successive Monument Acts

A first effective attempt to prevent the rapid destruction of both historic buildings and archaeological sites and to start protecting them was made with the introduction of the Monuments Act in 1961. It defined a monument as immovable property created by man which is more than 50 years old and of general interest on account of its beauty or scientific or cultural value. It required each municipality to draw up a list of historic buildings and it subsequently banned any alterations to, or demolition of, these listed buildings without the Minister's consent. For the archaeology, the law introduced the obligation to report chance finds and a prohibition on digging without an excavation license.

As it also paved the way for the protection of valuable historical entities such as townscapes, the Monument Act has been rather effective for the protection of historic monuments. In 1970, the monument lists were completed for all municipalities, and in 1980, 42,000 monuments were protected, including over 1,400 archaeological sites. Its success however also resulted in a lack of finances for the maintenance and restoration of all these monuments and very time-consuming administrative procedures (Van Haaff 2006). It led to appeals against listings by private owners of monumental buildings and a stagnation in new listings. The need for a new way of handling monuments grew, along with a desire to protect other cultural elements as well, like younger buildings and underwater cultural heritage. Thus, a revision of the act was initiated, though it only entered into force in 1988.

The most important change for historic monuments was the principle of decentralization, by which municipalities gained much more authority. Proposals for listings no longer came from the central Monuments Council but from municipalities themselves. For archaeology, the revision meant that sites could be protected better. First, finds were now legally owned by the State (or a municipality with a license and a repository), and sites outside the territory of a municipality, like maritime sites, could be designated as a monument too. Moreover, excavation permits were no longer given to individuals or provinces but to the national service, universities, and municipalities only. In order to gain more control over the archaeological record, such bodies were also obliged to give notice of all excavations and to report the results to the State Service.

International Influence

Although it was clear that the rescue archaeology practice was disastrous for the preservation of the archaeological record, it continued during the 1980s and early 1990s. As the Netherlands were involved in the revision of the Council of Europe's European Convention on the Protection of the Archaeological Heritage of 1969, an attempt was made to integrate the care for the archaeological heritage in the national planning process, but the national law in force, the revised Monument Act of 1988, provided no legal means. This practice only changed after the Malta Convention was signed, in 1992 in Valletta, and authorities started to adapt their policy regarding the archaeological heritage.

As of the 1990s, other international agreements on cultural heritage gained influence on Dutch policies and approaches as well. Until then, only the first protocol of the UNESCO Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague 1954) had been signed (in 1958), but after the Malta Convention, the country soon signed the UNESCO World Heritage Convention (1972). This led to the listing in 1995 of the first and so far only archaeological site, Schokland (www.schokland.nl), on the World Heritage list. Subsequently, the Council of Europe's Treaty of Granada (1994) was ratified in 1994, followed by the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970) in 2009.

Implementing the Valletta Principles

The implementation of the Malta convention has had a major impact on the management of the archaeological heritage in the Netherlands. The centralized and state-dominated archaeological system was replaced by a decentralized and liberalized system with a commercial archaeological sector and archaeological research was integrated in all planning, building, and land development processes. It was implemented in national legislation in September 2007 by means of the *Wet op de Archeologische Monumentenzorg*, WAMZ, which was an amending law that simultaneously adapted all related laws, like the Monuments Act and the Housing Act (http://wetten.overheid.nl/).

Already from 1998 onward, however, when the Dutch Parliament ratified the Malta Convention, the principles of the Malta Convention were systematically applied in case of soil disturbances by the national, regional, or local governments. This rapidly generated a lot of mitigation projects. As the small group of 30 organizations holding an excavation permit could not conduct all the extra work, the State Secretary for Culture, economist Rick van der Ploeg, decided to allow a free market system with a commercial sector for archaeological work (Willems 2005: 50–4). While awaiting this to be implemented in the legislation, an interim policy allowed companies from 2001 onward to "borrow" the excavation license of the State Service.

The ministry acknowledged that instruments for quality management would be needed as well. It was considered a risk that commercial and financial considerations of the archaeological contractors and building companies would prevail over those of the (scientific) quality of the work. Adding rules and regulations was politically only feasible, however, if the archaeological community would take care of some parts of the quality management too (so-called self-regulation). Thus, a mixture of both publicly and privately organized instruments was designed. As the commitment of the archaeological community was needed for the successful development and implementation of most of these instruments, they were developed in concert by a large number of archaeologists (Van den Dries & Willems 2007).

On the public side, an excavation permit and an inspectorate (www.erfgoedinspectie.nl) complemented the Monument Act. On the private side, a quality standard (www.sikb.nl), a professional register, and a research agenda (www.noaa.nl) were initiated. The quality standard describes how the archaeological processes and procedures should be carried out and by whom (Willems & Brandt 2004). The professional register lists the individual archaeologists who, after a peer review, are allowed to take care of these activities. The research agenda sets prevailing scientific research questions.

These instruments are closely linked. An excavation permit, which is provided by the National Agency for Cultural Heritage (www.cultureelerfgoed.nl), the former ROB, is, for instance, only granted if a contractor can demonstrate compliance with the Quality Standard and employs qualified senior archaeologists. The Inspectorate subsequently monitors whether in practice people comply with the legislation and the self-imposed quality measurements. The system gradually has become operational as of 2001, and all elements except the register are functioning. Although many archaeologists are members of the Dutch professional association (www.nvva.info), so far attempts to establish a peer-reviewed register have not been successful. Thus, the national agency decides on the qualifications of individual archaeologist when they assess the applications for excavation licenses.

Malta in Practice

Due to the revision of the law, care for the archaeological record is now integrated in planning processes and local authorities have to take known and unknown archaeological remains into account when they define a new or revise an existing development plan. In this development plan, the authorities indicate the valuable archaeological areas in which private developers and property owners are required to conduct (and pay for) validations and impact assessments when they apply for a building permit. In 2009, an inventory showed that 32 % of the municipalities had indeed included provisions to protect the archaeological heritage in all their development plans, and another 57 % in some of their development plans (Erfgoedinspectie 2010: 102).

The local authorities have various moments and instruments to administer the heritage management process. First the competent authority points out its research demands in a project outline (which in practice is often written by an archaeological consultant). This project outline serves as a basis for the subsequent tendering process, by which the developer selects an archaeological constructor to do the research. The archaeological contractor is obliged to follow the demands of the project outline and the municipality has the authority to verify whether the demands of the project outline are being followed. Next, the authority takes the assessment results into account when they decide on the building permit and whether a mitigation process must be carried out or whether the terrain will be protected. In case of further archaeological research, the municipality authorizes the site report which contractors are obliged to produce within two years after the fieldwork has finished. At the end of the process, the reports and results are published by the State agency. The finds, soil samples and documents are kept by the provincial authority.

Some Facts and Figures

The implementation of the Malta principles has had a serious impact. For 2007/2008, it was estimated that 90 % of the work is developer-funded (Waugh 2008). In particular, the number of inventories and field evaluations has increased tremendously since 2000 (Fig. 3). The number of excavations remained relatively small, till 2008 just under an annual number of 200 (Van den Dries et al. 2010). It is not known to what extent this reflects "preservation in situ." An inventory by one of the companies shows that nearly forty percent of the sites they discovered may have been preserved in situ (Schutte et al. 2011). The heightened attention on the archaeological heritage has however not led to a substantial growth of legally protected archaeological monuments; in 2002, nearly 1,700 were listed, in 2007, 1,770 (Rijksdienst voor het Cultureel Erfgoed 2009: 29).

Most of field work is carried out by the commercial sector (Fig. 4). At the start of 2011, 19 companies had a license to excavate. Municipalities can still obtain a license too. At the start of 2011, 23 municipal archaeological services had one (http://www.cultureelerfgoed.nl/node/815/), but they increasingly focus on developing and applying heritage policies and on public outreach activities rather than on field work. In addition, an increasing number of municipalities work together to create a regional archaeological service. It implies that at least seventy of all 318 municipalities (22 %) have archaeological knowledge at their disposal. Both municipal and

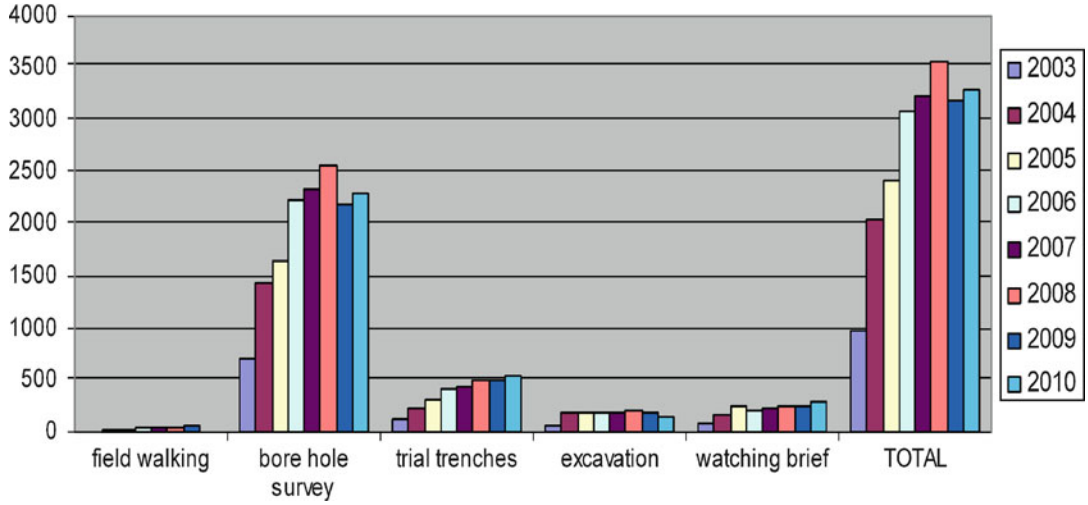

Netherlands: Cultural Heritage Management, Fig. 3 The annual number of field work projects as of 2003 (Source: archaeological information system ARCHIS, 2011)

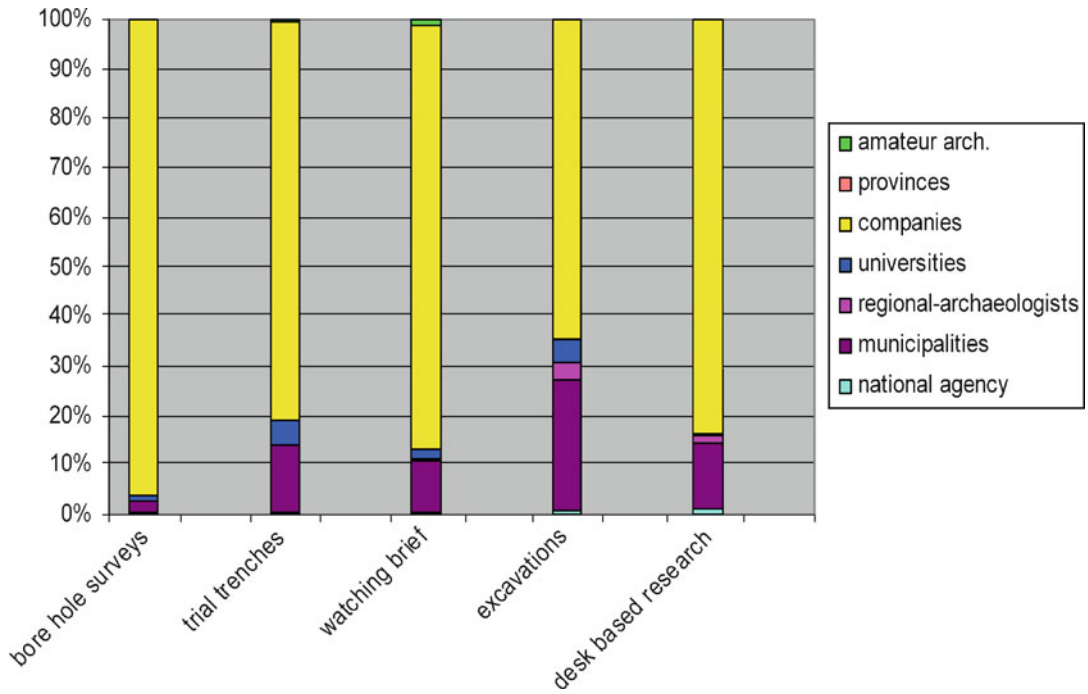

Netherlands: Cultural Heritage Management, Fig. 4 Most archaeological (field) work is nowadays carried out by commercial companies (Source: archaeological information system ARCHIS, 2011)

regional services participate in a network, called CGA (www.gemeente-archeologen.nl).

Apart from the companies with a license, at least another hundred private companies are active on the archaeological market. Most of them are doing various kinds of activities for which no license is needed, like surveys, consultancy, specialist services, presentations, etc. Most

of the companies are joint in one of the two branch organizations, VOIA (www.voia.nl) and NVAO (www.opgravingsbedrijven.nl).

As a result of the emerging commercial sector, employment in archaeological heritage hugely increased from an estimated number of around 800 in 2000 to over 1100 in 2011. It implied that prior to the global economic crisis of 2008/2009, there was almost full employment of the Netherlands' archaeologists. This also attracted large numbers of students for all five universities (Leiden, Groningen, two in Amsterdam, and Nijmegen) where archaeology is being taught. On a yearly basis, around 150 students start an archaeological training at one of the universities (www.vsnu.nl).

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Neustupný, Evžen

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Basic Biographical Information

Evžen Neustupný was born in Prague, Czech Republic (formerly Czechoslovakia), in 1933. He studied prehistory and Egyptology at the Charles University in Prague and received his Ph.D. in prehistoric archaeology in 1957. Until 1966, he worked with rescue excavations of endangered sites at the Most branch of the Institute of Archaeology of the Czechoslovak Academy. He returned to Prague in 1966, and until 1998, he worked in the Institute mainly on archaeological theory and served from 1990 to 1993 as its director. At the same time, Neustupný was a member of the presidium of the Czechoslovak Academy of Sciences. In 1998, he was the founding director and full professor of the Department of Archaeology at the University of West Bohemia in Pilsen. His specialization is archaeological theory and method, and the prehistory and protohistory of Central Europe ranging from the Neolithic to the Medieval periods.

Neustupný has published five monographs, three edited books, and more than 190 articles. Though his main publications focus on method and theory in archaeology – culminating in his renowned book, *Archaeological Method* (1993) and recently complemented by *Method of Archaeology* (2007) and *Theory of Archaeology* (2010), both not yet translated into English – his broad research interests and output range from studies on relative chronology to radiocarbon dating, from taphonomy to paleodemography, and nutrition through Central European pre- and protohistory. He has been both an active and accomplished field archaeologist – especially during his years at Most, when he spent most of the year in the field and created an effective documentation system for archaeological data from the excavation to laboratory analysis and recording to storage including a pioneering georeferencing of sites in coordinates – and acclaimed connoisseur of material culture, especially that of the Eneolithic period of Central Europe.

Neustupný's archaeological work and research has to be seen in light of the rise and fall of communism in Central and Eastern Europe. His deep conviction and refusal to be manipulated or silenced by its academic leadership is applaudable. On a side note, in the Czech language, *neustupný* means intransigent, unyielding, or pertinacious (Kuna 2012: 3), which quite adequately describes both his personal character and professional work ethic. As a student inspired by Marx, Saussure, and Hegel, he scrutinized the widespread (in continental Europe) culture-historical approach, using similar approaches as the early New Archaeologists/Processualists, such as deductive cognitive models and multivariate methods in mathematical analysis. It is especially interesting that Neustupný – completely isolated from Western archaeological communities – wrote an article on the preservation of bones at

prehistoric settlements in the same year (1981) as Binford's famous "Bones" book.

Major Accomplishments

Evžen Neustupný's major accomplishments are in archaeological research and method and theory. He succinctly incorporates these in this writings ranging from *Czechoslovakia before the Slavs* (1961), an internationally acclaimed but in Czechoslovakia heavily criticized outline of the prehistory of this country, which he cowrote with his father, the well-known Czech archaeologist Jiří Neustupný (1905–1981), to his Marxist-inspired book *The beginnings of patriarchy in Central Europe* about the Eneolithic period (1967) and his more recent work on the "*Origin of Megalithic Architecture in Bohemia and Moravia*" (2001). He is also known for his witty, award winning *Antiquity* essay, "Whither Archaeology?" (1971), and his eloquent characterization of paradigm shifts in archaeology. More recently, he has disassociated himself from the processualism which 40 years ago he regarded as the driving force of integration of theory and practice in archaeology (Kuna 2012: 16).

His long-lasting influence on and intellectual struggle with European archaeology is a significant contribution. In particular, his early interest and rigorous support for radiocarbon dating (Bucha & Neustupný 1967) and eventually its calibration not only gained him an invitation to the prestigious Nobel symposium held in Uppsala, Sweden, in 1969 (Neustupný 1970) but also changed our understanding of European prehistory forever. He also coined enduring concepts and theories, such *social landscape* (1998) and lately *artifact archaeology* (2007, 2010), which are widely used both in Continental European and Anglo-American archaeology. His criticism that postmodern/postprocessual archaeologists were so far unable to provide an adequate approach to study the role of the individual as well as events in the past is the basis of a new theory he is currently developing to better understand culture change and culture transfer by rapid transformation of symbolic cultural systems rather than by vast migration (Kuna 2012: 21–22). In his impressive body of work, Evžen Neustupný has shown that the minority status of Czech archaeology in his division of archaeological communities into mainstreams and minorities might have to be reconsidered.

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Neutron Activation Analysis (NAA): Applications in Archaeology

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Introduction

The chemical composition of archaeological materials has long been recognized as occupying an important role to archaeometric studies of technology, provenance, dating, authentication, conservation, preservation, and restoration (Pollard et al. 2007). Archaeologists make use of chemical data on man-made artifacts to investigate the impact of social and economic developments on changes in ancient technology. Compositional analyses of artifacts make it possible for archaeologists to conduct provenance and dating studies and to use the information to develop models of prehistoric migration and exchange (Glascock & Neff 2003). Knowledge of artifact compositions can assist museum curators in determining the authenticity of artifacts and in the development of methods for preserving and protecting valuable and unique cultural objects (Lister & Renshaw 2004).

One of the important instrumental analytical techniques used to perform chemical analysis of archaeological materials is neutron activation analysis (NAA). The technique was employed to a study of artifacts for the first time during the mid-1950s (see review by Speakman & Glascock 2007). NAA continues, today, to occupy an important role as one of the key analytical methods used to chemically characterize a broad range of artifact types. This entry will explain how the NAA technique works.

Key Issues

Theory Behind Neutron Activation Analysis

NAA is a sensitive multi-element analytical technique used to perform both qualitative and quantitative analysis of major, minor, and trace elements in almost any type of sample (i.e., solid, liquid, or gas). The basis for NAA is that by exposing a sample to neutrons, nuclear reactions are induced with the nuclei of atoms present in the sample. The induced nuclear reactions are followed by the emission of gamma rays that can be detected and their characteristic energies measured to identify the specific nuclear reaction(s) taking place and, hence, identify the elements present in the sample. By measuring the number of emitted gamma rays, the amounts of different elements in the sample can be determined with a high degree of accuracy and precision. For many elements, the sensitivities possible with NAA are at levels ranging into the parts per million, parts per billion, and below. Because it is possible to determine a large number of elements in a wide range of sample types, NAA methods can be used to establish compositional profiles or "chemical fingerprints" of samples to support research in a variety of disciplines ranging from archaeology to zoology (Alfassi 1990).

Readers wanting more information about the theory and practice of NAA and related methods of activation analysis should consult the following references: De Soete et al. (1972), Ehmann and Vance (1991), Glascock (1998), and Neff (2000).

Nuclear Reactions

Nuclear reactions occupy a central role for all methods of activation analysis. In a nuclear

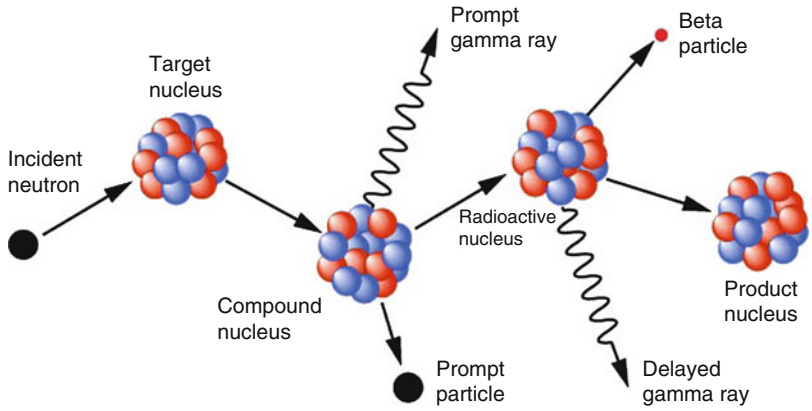

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 1 Sketch showing a nuclear reaction between an incident neutron and a target nucleus. The prompt and delayed emissions that follow from the reaction are also shown. In NAA, the energy and intensity of the delayed gamma signal is measured to determine quantitative composition of the sample

reaction, the incident particle interacts with the target nucleus either by scattering or by absorption. The interaction causes the nucleons (i.e., protons and neutrons) present in the nucleus to become excited. The process frequently results in creation of a different product nucleus and the emission of one or more particles and/or photons. The diagram shown in Fig. 1 illustrates a typical nuclear reaction involving interaction of an incident neutron with a target nucleus followed by the emission of both prompt particles and prompt gamma rays and resulting in a new product nucleus. In this example, the latter nucleus happens to be radioactive. Whether or not this new nucleus happens to be radioactive will depend on the nuclear properties of the new nuclide. If a radioactive nucleus is produced, the emission of additional decay particles or decay gamma rays will follow through one or more decays until a stable product nucleus is created.

A typical nuclear reaction can be described by the general expression

$$a + A \rightarrow [X] \rightarrow b + B + Q \qquad (1)$$

or in shorthand notation as $A(a,b)B$. In the expression shown here, a indicates the incident particle or radiation, A is the target nucleus, $[X]$ is the compound nucleus in a state of excitation, B is the product nucleus, b is the exiting particle or radiation, and Q accounts for the total amount of energy released or absorbed during the reaction. When Q is positive, the reaction is exoergic. When Q is negative, the reaction is endoergic.

Some of the incident neutron energy is used to conserve momentum for the particle-nucleus system. Therefore, the incident neutron must have a kinetic energy in excess of the Q value. The minimum amount of kinetic energy required for a particular nuclear reaction to take place is known as the minimum threshold energy or E_T.

Most of the reactions used for NAA are exoergic such that the reaction can take place when the incident neutron has a kinetic energy of nearly zero. This is the situation for reactions involving the absorption of thermal or epithermal neutrons. These reactions are also referred to as neutron capture or (n,γ) reactions. At higher neutron energies and when the threshold energy is exceeded, particle-emission reactions such as (n,p), (n,α), (n,n′), and (n,2n) are more common. The diagram shown in Fig. 2 illustrates a portion of the Chart of the Nuclides and shows the positions of product nuclides for selected nuclear reactions relative to the target nucleus.

Most NAA applications rely on measurement of the prompt gamma rays emitted from the compound nucleus $[X]$ or delayed gamma rays emitted from the product radionuclide B.

The measurement of delayed gamma rays is usually preferred over measurement of prompt gamma rays because the sensitivities are much higher. The main exceptions are those elements that do not produce a convenient radionuclide (e.g., B, Li, P, Y, Bi, and Pb) for one reason or another. For these elements, it is sometimes necessary to measure the prompt gamma rays or consider use of a completely different analytical method.

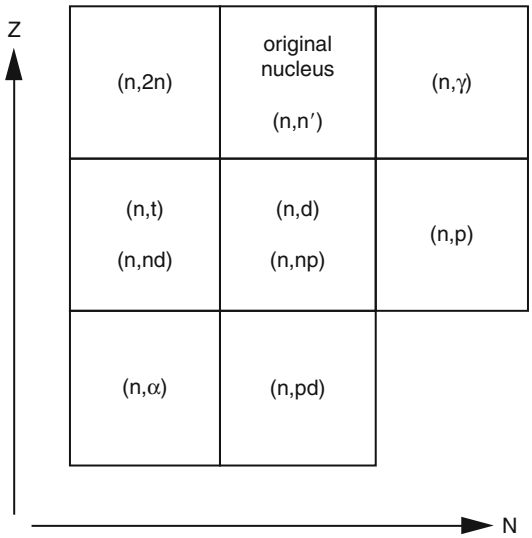

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 2 Relative locations of the products from various neutron-induced processes on the Chart of the Nuclides. Z is the number of protons and N is the number of neutrons in the nucleus

Reactor Neutron Spectrum and Reaction Cross Sections

Nuclear reactors based on the fission of uranium offer the most intense neutron sources available for NAA. The neutron spectrum in a reactor consists of three regimes as illustrated in Fig. 3. In the high-energy region, fission-produced neutrons still have most of their original energy (i.e., approximately 2–6 MeV) and are frequently called primary fission or "fast" neutrons. Fast neutrons lose their energy rapidly through elastic scattering with moderating materials in the reactor, such as water and graphite. Neutrons in the energy range from 0.5 eV to 1 MeV are commonly referred to as epithermal neutrons and have been partially slowed down. At energies below 0.5 eV, the neutrons are usually referred to as thermal neutrons, and they have slowed to where they have a velocity distribution similar to that of the molecules and atoms in their surroundings. In a typical light-water-moderated reactor, the fluxes of epithermal and fast neutrons are on the order of 2–3 % and 6–8 %, respectively, of the thermal neutron flux.

The interaction rate for a given nuclear reaction depends on the number of incident neutrons, the number of target nuclei of a particular type present in the target sample, and the

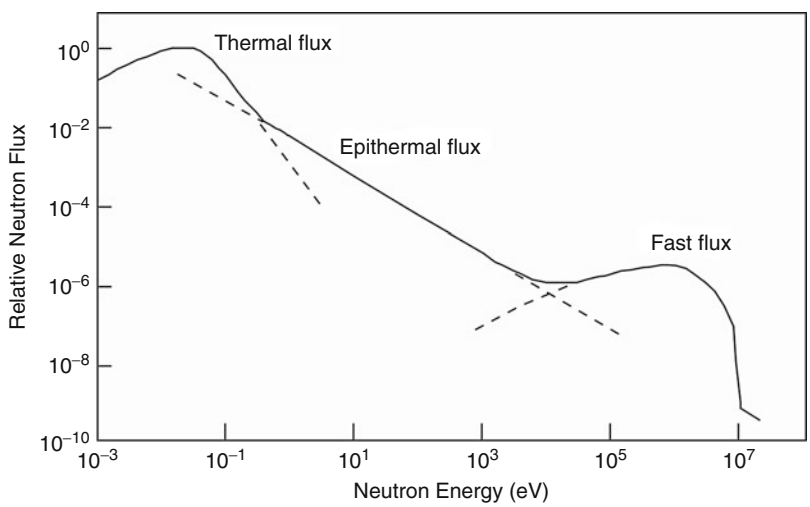

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 3 A typical neutron spectrum from a nuclear fission reactor

probability that the particular nuclear reaction will occur. To a first approximation, the reaction probability, σ, for a single incident neutron is similar in magnitude to the cross-sectional area of the target nucleus, which for most nuclei is on the order of 10^{-24} cm^2. For the sake of convenience, reaction cross sections are usually expressed in units of barns (b), where 1 b = 10^{-24} cm^2. Actual reaction cross sections will vary widely according to the energy and the type of incident particle, the identity of the target nuclide, and the specific type of reaction. In general, neutron capture (n,γ) reactions with low-energy neutrons have the highest cross sections and account for a majority of the radioactivity produced by NAA.

Epithermal neutrons also contribute to the total amount of radioactivity produced by (n,γ) reactions. However, since the number of epithermal neutrons is much smaller, their contribution is usually much less. Due to resonances in the cross-section curve above 0.5 eV, the (n,γ) cross section varies widely. To facilitate the calculation of radioactivity induced by epithermal neutrons, an epithermal cross section (also called the effective resonance integral) is defined by the expression

$$I = \int_{0.5eV}^{\infty} \frac{\sigma(E)}{E} dE \tag{2}$$

Because both thermal and epithermal neutrons can induce (n,γ) reactions, a non-rigorous but commonly used expression to describe the total reaction rate for a particular nuclide in a uniform flux of incident neutrons is given by

$$R = n[\varphi_{th}\sigma_{th} + \varphi_{epi}I] \tag{3}$$

where n represents the number of target atoms belonging to the nuclide of interest in the sample, φ_{th} and φ_{epi} are the respective thermal and epithermal neutron fluxes (cm^{-2} s^{-1}), and σ_{th} and I are the respective thermal and effective resonance integral cross sections (b).

Although reactions involving low-energy neutrons tend to have the highest cross sections, the magnitudes of the cross sections are quite variable and depend greatly upon the target nucleus. At higher neutron energies, the cross sections for (n,γ) reactions are very small. Instead, reactions that result in the ejection from the nucleus of one or more particles – (n,p), (n,α), (n,n′), and (n,2n) – are dominant. As mentioned earlier, these reactions are only possible if the neutron energy is above the minimum threshold energy. Because the energy distribution is complex at high neutron energies, an average cross section for fast neutrons is defined by the expression

$$\overline{\sigma_f} = \frac{\int_{E_T}^{\infty} \sigma(E)\varphi(E)dE}{\int_{E_T}^{\infty} \varphi(E)dE} \tag{4}$$

Using this average cross section, the total reaction rate for a particular fast neutron reaction is given by the equation

$$R = n\varphi_f\overline{\sigma}_f \tag{5}$$

where φ_f is defined as the average fast neutron flux. There are only a few instances in which fast neutrons are important to NAA. Among these are the measurement of nickel using the ^{58}Ni(n,p)^{58}Co reaction and corrections to the (n,γ) reactions for several light-mass elements (e.g., Na, Mg, Al) due to interference from fast neutron reactions. In general, fast neutron reactions range in magnitude from about 0.5 to 10^{-12} b.

For nuclear reactions involving neutrons, the attenuation of neutrons by the sample is usually not a problem because neutrons have no charge and they pass through most samples being analyzed by NAA with very little attenuation. However, the presence of certain high cross-section elements (e.g., boron, cadmium, gadolinium, gold) in a sample can have a significant absorption effect on neutrons causing variations in the neutron flux. This effect is commonly referred to as sample self-shielding. Charged particle beams and photon beams are affected differently from neutrons, such that absorption effects must be considered on the basis of both particle energy and atomic number of the target matrix.

Radioactive Decay

Radioactive decay involves the spontaneous transformation of atoms by emission of particles

or gamma rays from the nucleus or by the emission of X-rays after capture of shell electrons by the nucleus. When performing activation analysis, one must recognize the radioactive species, the amount of radioactivity present, and the length of time that the radioactivity will be present. Radioactive decay is a statistical process. For a sample that has been made radioactive, there is no way to predict which atom will be the next to decay, but it is possible to describe the decay characteristics of the entire sample. The number of atoms of a particular radionuclide that decay per unit of time is defined as the activity, **A**, and this rate of decay is known as the fundamental law of radioactivity:

$$A = -\frac{dN}{dt} = \lambda N \tag{6}$$

where N is the number of radioactive atoms and λ is defined as the decay constant. The value of λ is different for each species of radionuclide. The solution to Eq. 6 gives an equation describing the time dependence of the number of atoms of a particular radionuclide present as

$$N(t) = N_0 e^{-\lambda t} \tag{7}$$

where N_0 is the number of radioactive atoms at time $t = 0$. Therefore, radioactive decay follows the exponential law, and the activity of the radionuclide is controlled by a characteristic property known as the half-life (i.e., the period of time during which half of the original atoms of that nuclide disintegrate). Since the activity is proportional to the number of radioactive atoms, it also decreases exponentially according to the expression:

$$A(t) = A_0 e^{-\lambda t} \tag{8}$$

The exponential behavior of radioactivity, as defined by Eqs. 5 and 6, is due to the fact that all radioactive transmutations are essentially random. Deviations from this behavior are increasingly smaller as larger numbers of radioactive atoms are monitored.

The half-life is related to the decay constant according to

$$t_{\frac{1}{2}} = \frac{\ln 2}{\lambda} = \frac{0.693}{\lambda} \tag{9}$$

The half-lives of various radionuclides range from milliseconds to several times the age of the universe.

Radionuclide Production

For most NAA measurements, the numbers of nuclei decaying are measured during a postirradiation time period. The number of decaying nuclei for a particular species depends on the total number of radioactive nuclei produced during the irradiation less the number of nuclei that decayed during the irradiation period and the number that decay during the interval between the end of irradiation and the beginning of measurement. Thus, the rate of production, half-life, length of irradiation (T_i), length of decay (T_d), and length of measurement (T_c) must be considered.

Mathematically, the rate of change in the number of radioactive nuclei during irradiation is given by the difference between rate of production and rate of decay. If one assumes that the sample was irradiated by a uniform flux, an equation to describe the rate of change is

$$\frac{dN^*}{dt} = R - \lambda N^* \tag{10}$$

where R is the reaction rate and N^* is the number of atoms of the radionuclide present. If the Eq. 10 is integrated using the initial condition that $N^*(t = 0)$, then the total number of radioactive nuclei present at the end of irradiation is

$$N_0^* = \frac{R}{\lambda}\left(1 - e^{-\lambda T_i}\right). \tag{11}$$

In general, measurement of radiation emitted from activated samples does not begin immediately after irradiation, but after some period of decay. Under normal conditions, short decay times are used for radionuclides with short half-lives

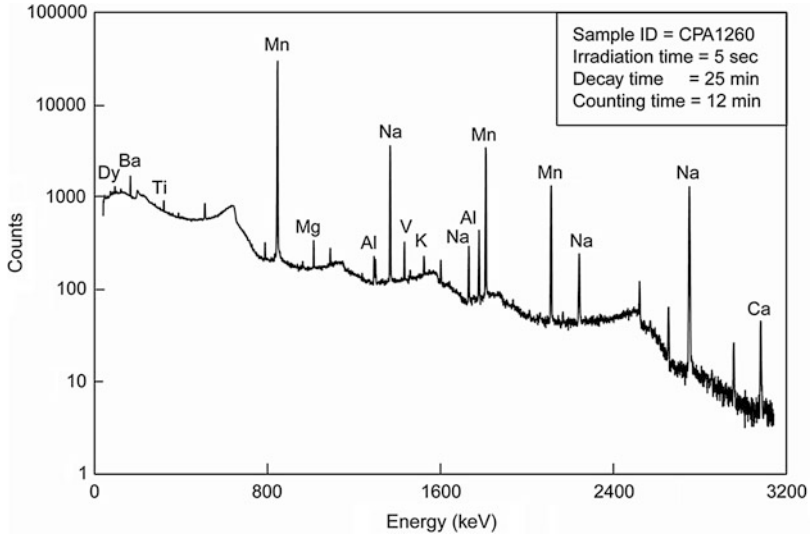

Neutron Activation Analysis (NAA): Applications in Archaeology, Fig. 4 Gamma-ray spectrum from a sample made radioactive by neutron activation

and long decay times are used when the half-life of the radioisotope of interest is long. The long decay time allows possible short-lived nuclides with initially high activities to become insignificant. Therefore, an equation describing the number of radioactive atoms that decay between the start and end of a measuring period is

$$\Delta N = \frac{R}{\lambda}\left(1 - e^{-\lambda T_i}\right)e^{-\lambda T_d}\left(1 - e^{-\lambda T_c}\right) \qquad (12)$$

Special Conditions for NAA

When the sample matrix contains high concentrations of Na, Al, K, Sc, Cr, Mn, Fe, or certain other elements with high thermal neutron cross sections, it can be difficult to measure low-concentration elements due to the masking of activities by the major elements. A possible solution for this problem exists for elements that have high ratios of I/σ_{th}. The sensitivities for elements such as Ag, As, Au, Gd, In, Mo, Pd, Pt, Ta, Th, U, and W can be improved by using neutron filters made of B or Cd which themselves have high thermal neutron cross sections to shield samples from thermal neutrons. The technique is known as epithermal neutron activation analysis (ENAA), and by suppressing those elements most sensitive to thermal neutrons, the relative sensitivities for elements with high I/σ_{th} ratios are enhanced. In this same way, the shielded irradiations are also useful for fast neutron activation analysis (FNAA) when the (n,p), (n,α), (n,n'), and (n,2n) reactions are being used to correct for possible interferences with (n,γ) reactions.

Calculating Concentrations

In NAA, the radioactive nuclei produced usually undergo decay to daughter nuclei by emitting beta particles. The daughter nuclei created are often in excited states and undergo emission of one or more gamma rays before arriving at a ground state. In conjunction with the irradiation and decay parameters, measurement of these gamma rays yields the information necessary to determine the abundances of elements in the irradiated sample.

Gamma rays interact with matter in several ways, one of which is an absorption process by which the energy of the gamma ray is transferred to photoelectrons inside a semiconductor detector. The photoelectrons are converted into electrical pulses which can be measured to determine the energy of the incoming gamma ray. A typical spectrum of gamma rays collected in a high-purity germanium (HPGe) detector used to measure a sample of obsidian after irradiation is shown in Fig. 4.

The photopeaks shown in Fig. 4 are the main gamma rays detected from different radioactive

isotopes present in the sample. The actual number of gamma rays collected by the HPGe detector is smaller than the total number of decays due to several factors:

1. The intensities (gamma-ray branching ratios) of emitted gamma rays are in many cases less than 100 %. This means that a gamma ray of a particular energy may not be released with every decay event.
2. Some of the emitted gamma rays do not reach the detector. Due to the isotropic nature of gamma-ray emission, only those headed in the direction of the detector can be measured. In addition, absorbing materials between the sample and the detector will reduce the number arriving at the detector.
3. A portion of the gamma rays will pass through the detector without interacting, especially the high-energy gamma rays. In other cases, some gamma rays lose part of their energy through Compton scattering and pair production effects, thus contributing to the gamma continuum beneath the photopeaks of interest.

Peak identification can be accomplished by consulting a number of compilations of decay schemes and related tables listing the associated gamma-ray energies and branching ratios (Erdtmann & Soyka 1979; Firestone et al. 1996). For most peaks, the peak area can be determined by summing the total number of counts under the peak and subtracting an estimated or fitted background. The count rate for a particular gamma ray is then calculated by dividing the peak area by the counting time.

In order to convert the measured count rates into concentrations, one can use an absolute method based on the knowledge of all nuclear and experimental parameters. For NAA measurements using thermal and epithermal neutrons, an equation to express the activity present at any time is

$$A = \left(\frac{m}{M} N_A \theta\right)(\varphi_{th}\sigma_{th} + \varphi_{epi} I) P_\gamma \varepsilon SDC \qquad (13)$$

where m = mass of sample (g), M = atomic weight (g mol^{-1}), N_A = Avogadro's number (6.02×10^{23} molecules mol^{-1}), θ = isotopic abundance, $P\gamma$ = intensity of the measured gamma ray, ε = efficiency of the detector at the energy of the measured gamma ray, S = irradiation factor ($1 - e^{-\lambda Ti}$), D = decay factor ($e^{-\lambda Td}$), and C = count factor ($1 - e^{-\lambda Tc}$).

The absolute activation analysis procedure using Eq. 13 is rarely used in NAA because much easier comparator methods are normally preferred. The equation used to calculate the mass of an element present in an unknown sample relative to a standard with known concentration is

$$\frac{A_{\text{sam}}}{A_{\text{std}}} = \frac{m_{\text{sam}}\left(e^{-\lambda T_d}\right)_{\text{sam}}}{m_{\text{std}}\left(e^{-\lambda T_d}\right)_{\text{std}}} \qquad (14)$$

where A = the activity or count rate for the sample (sam) and standard (std), m = mass of the element, and T_d = the decay time. When performing short irradiations, the irradiation, decay, and counting times are usually identical for all samples and standards (i.e., the steps are performed on individual samples and standards sequentially, and all counting uses the same geometry) such that all time-dependent and geometric factors will cancel. Thus, the previous equation simplifies to

$$c_{\text{sam}} = c_{\text{std}} \frac{W_{\text{std}}}{W_{\text{sam}}} \frac{A_{\text{sam}}}{A_{std}} \qquad (15)$$

where c = concentrations of the element of interest in the sample and standard, respectively, and W = the weights of the sample and standard.

Standard Reference Materials and Quality Control Monitors

A majority of today's NAA laboratories utilize one or more multi-element calibration standards when performing an analysis. The basic procedure is to collect gamma-ray spectra for both unknowns and standards under conditions that are as similar as possible, then to use one of the equations above to calculate concentrations for the elements whose peaks appear in the gamma spectra of both the standards and the unknowns. Quality control and check standards are usually included with each batch irradiation in order to provide an independent check on the quality of

the data and to identify mistakes, such as weighing errors, before the data are interpreted by archaeologists. Certified reference standards for analysis of archaeological and geological materials can be purchased from the National Institute of Standards and Technology (NIST). Other well-known sources of standard reference materials are the United States Geological Survey and the Geological Survey of Japan.

Advantages and Disadvantages of NAA

Neutron activation analysis has a number of important advantages for analysis of many types of archaeological specimens. One of the most important is the transparency of artifact matrices containing high amounts of elements such as C, N, O, and Si. These elements make up the abundance of the sample matrix for a large fraction of archaeological and geological materials; however, by NAA, these elements will hardly form any radioactive isotopes. This makes NAA a more sensitive technique for measuring the trace and minor elements present in solid sample matrices without the need for sample dissolution. Thus, for most types of archaeological samples, it is rarely necessary to perform any sample preparation other than size reduction to obtain an appropriate amount of sample material (usually 100–200 mg is sufficient, but sometimes as little as 5 mg can be used). This limited requirement for sample preparation reduces the likelihood of contamination caused by sample preparation.

Most sources of systematic or random error such as interfering nuclear reactions, overlapping spectral lines, and dead-time losses are readily identifiable, since the theory of NAA is well understood. Nearly all of the interferences that occur can be corrected by adjusting the decay time before measurement or by measuring the same sample twice using different irradiation conditions to correct for fast neutron interferences. Due to its outstanding precision and accuracy, NAA is usually considered the referring technique for samples that yield differing results when analyzed by other analytical techniques.

Neutron activation analysis has some limitations also. Extremely large samples cannot be analyzed in a reactor without making the entire sample radioactive. Therefore, for large artifacts or museum objects, analytical samples must be obtained by removing a piece of the object (e.g., drilling from an obscure location is often recommended). Because NAA usually requires the sample material to be irradiated and measured following a period of decay, the results are not available immediately. And, in recent years, the number of research reactors has declined such that NAA is gradually becoming less available and the remaining capability is more expensive.

Conclusions

This brief resume has concentrated on describing the basic theory and application of NAA. The method is very sensitive and has a broad range of applications. It is important that users of any analytical methodology understand and recognize the capabilities and limitations of the methods being employed so that accurate and reproducible measurements of major, minor, and trace elements can be performed.

Acknowledgments This work was supported in part by a grant from the US National Science Foundation (BCS-0802757).

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► Ceramics: Scientific Analysis
► Provenance Studies in Archaeology

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Nevada Test Site

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Introduction

The Nevada Test Site, now named the Nevada National Security Site due to a change of mission, is located 105 km northwest of Las Vegas and is operated by the US Department of Energy's Nevada Site Office. This test site was the United States continental nuclear testing ground during the Cold War. Between January 20, 1951, and September 23, 1992, the United States conducted 928 nuclear tests there, 100 atmospheric and 828 underground tests (US Department of Energy 2000: xxviii). Other nuclear-related projects also were carried out within the site boundaries, an area of 3,520 km^2.

Key Issues/Current Debates/Future Directions/Examples

For many years, archaeological research focused solely on prehistoric and historic cultural resources, ignoring nuclear testing remains. In 1991, Colleen M. Beck presented a proposal to the Nevada Site Office that outlined the historic importance of the built environment associated with nuclear testing and the need to document these locations. On September 26, 1991, the first nuclear testing-related structure, an underground parking garage designed as a fallout shelter, was studied by an archaeologist and an architect. This research was immediately followed by documentation of the 1,527 ft tall Bare Reactor Experiment Nevada tower, a tower that housed a nuclear reactor used in experiments to accurately estimate the radiation doses received by selected survivors of the atomic bombings of Nagasaki and Hiroshima.

From 1991 forward, the archaeological study of nuclear testing sites has been an integral component of the cultural resources program for the site (Beck 2002). The concept of doing archaeology of Cold War buildings and structures, much less nuclear testing-related locations, was slow to acceptance in the archaeological community. A 1995 article on nuclear testing studies in Archaeology Magazine (Johnson & Beck 1995) generated discussion as to whether or not this work qualified as archaeology and also served as an impetus and example for Cold War archaeological studies related to military installations, government facilities, civilian structures, and at other nuclear facilities within the Department of Energy complex (Schofield et al. 2006; Nickens et al. 2001; Harvey 2001; McGehee 2001;).

Between 1991 and the end of 2011, the nuclear archaeology program at the site has documented more than 650 nuclear testing-associated buildings, structures, and objects, as well as artifacts related to the construction and use of testing locations. In the Frenchman Flat historic district (Johnson et al. 2000) and the Apple-2 historic district (Johnson & Edwards 2000), archaeologists recorded the actual structures and

Nevada Test Site, Fig. 1 Nuclear testing remains in Frenchman Flat

Nevada Test Site, Fig. 2 Apple-2 two-story house with blast damage

features that survived nuclear tests. The Frenchman Flat inventory is noteworthy because no one knew how many nor the types of structures and features left. The archaeological study identified a surprising 157 structures (Fig. 1) and features from 14 atmospheric tests. At the Apple-2 test, one of the wood two-story houses (Fig. 2) still remains, a building type best known from the iconic film footage of the destruction of a similar building by the nuclear blast. One atmospheric test, named Grable, was the only time a nuclear device was shot from a cannon as a nuclear projectile. Although the coordinates of the explosion were documented, the location where the cannon had been placed had been lost through time. An archaeological survey found this place over 10 km south of the detonation. It was identified based on the presence of a trench with substantial tie-downs, communication cables, and other assorted artifacts.

In the early 1960s, there were tests associated with the Plowshare Program, a series of projects to evaluate the feasibility of using nuclear detonations for peaceful purposes, such as

Nevada Test Site, Fig. 3 Sedan Crater

construction of canals and harbors and to increase oil and gas production. One of these locations, the Sedan Crater (Fig. 3) on the Nevada Test Site is listed on the United States National Register of Historic Places. Archaeologists further identified and documented a number of Plowshare locations in the western United States outside the Nevada Test Site. This research studied locations that had fallen from common knowledge within the Department of Energy after the program ended and this work is the only compilation of information on this aspect of the Plowshare Program (Beck et al. 2011).

After 1963, testing was conducted underground in tunnels and vertical shafts. Although craters from nuclear tests in vertical shafts are common, there has been little research conducted at these locations. In recent years, there has been a long-term project to document the historic landscapes of nuclear testing tunnels (Fig. 4) for horizontal underground tests (Drollinger et al. 2011; Jones et al. 2013). Associated landscape features number as many as 200 with a single tunnel. A recent study of structural response program structures, built to study the effect of underground detonations in tunnels and vertical shafts on buildings, provided information about 14 structures that have become enigmas on the landscape.

The sets of benches where dignitaries and others watched the atmospheric tests are a favorite of visitors because everyone tries to imagine what it was like to view a nuclear detonation. Archaeological studies have been completed on News Nob, the best known of the viewing locations and on five other sets at other locations. Three of these sets were first documented through archaeological research.

Archaeological research also has been conducted at other locations related to nuclear research, such as Camp Desert Rock, military trenches, an experimental farm, and the Nuclear Rocket Development Station. At the south end of the test site is Camp Desert Rock, the place where military personnel were stationed during their participation in maneuvers for atmospheric tests. Although all standing structures have been removed, the remains produced a remarkably well-preserved vision of the camp organization. Even trenches near testing locations used by the

Nevada Test Site, Fig. 4 Nuclear testing tunnel entrance

troops still exist. At the north end was the Environmental Protection Agency experimental farm. Besides a crop field, this farm included a laboratory and dairy facilities for the 100-head herd that was used to determine if radioactive materials in the environment were being transported to humans through the soil-forage-cow-milk food chain. In another area, four facilities at the Nuclear Rocket Development Station present a complex picture of the research and development activities for a nuclear reactor-powered rocket for long trips in space (Drollinger et al. 2000; Beck et al. 2001). A smaller, yet similar facility for the development of nuclear reactor-powered ramjet engines for cruise missiles has also been studied by archaeologists. Rail lines were used to transport the reactors and engines for testing purposes. For years, many of the railroad vehicles, modified for this specialty research, could not be located nor could information about their disposition. Then, it was discovered that most had been stored in an open-air facility that is now a documented archaeological site.

Future directions in research will develop a methodology to study vertical underground nuclear tests, identify the changes in the cultural landscape based on what is known about the appearance of a test location when it was ready for the detonation, and how the test location looks today. Efforts will continue to document and analyze the nuclear landscape.

Near the test site, archaeologists have been conducting research at a peace camp. This study tells the other side of the nuclear story. Two archaeologists who worked on the Nevada Test Site, Colleen M. Beck and Harold Drollinger, with John Schofield, who had been involved in a peace camp project at Greenham Common in England, began surveying the camp in 2002. Based on a preliminary visit, these archaeologists estimated 50 or so features in the area. Much to their surprise, in addition to camping and cooking areas, a Western Shoshone ceremonial space, and some easily seen rock features and geoglyphs, the peace activists expressed their views through a rich artistic tradition that has been left on the landscape. There are geoglyphs of peace signs (Fig. 5), rock circles, sculptures, and drainage tunnels with antinuclear and peace-related paintings and personal expressions. Even the top of a nearby hill is covered with items, such as large rock cairns (Fig. 6), offerings, a stone compass, and a red clay sculpture of a pregnant woman. The discovery of the extensive use of the landscape was not anticipated nor were the more than 800 features that have been recorded there (Schofield et al. 2006; Beck et al. 2007, 2009).

Nevada Test Site, Fig. 5 Peace Camp symbol

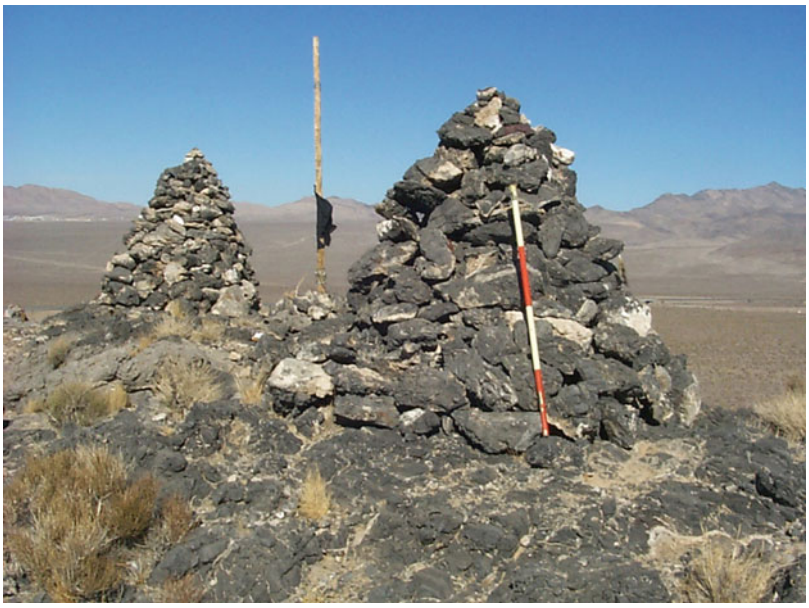

Nevada Test Site, Fig. 6 Rock cairns on hill

More than 200 antinuclear and peace groups used this area. The largest demonstration was the American Peace Test in 1988 with more than 8,000 participants (Butigan 2003). The Peace Camp continues in use today with dozens instead of thousands of people gathering together. The challenge of working at this location has been the changing landscape due to reuse of the area during the research and subsequently, an uncommon aspect to most archaeology that will lead to future recording of new features and alterations to existing features.

Cross-References

- ▶ Archaeology and Politics
- ▶ Buildings, Archaeological Study of
- ▶ Cold War
- ▶ Modern Material Culture Studies

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Neves, Eduardo Góes

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Basic Biographical Information

Eduardo Góes Neves (Fig. 1) was born on March 24, 1966, in São Paulo, Brazil. He has a B.A. in History from the University of São Paulo and a Ph.D. in Archaeology from Indiana University, in the United States. He is the Director of the Laboratory of Tropical Archaeology (ARQUETROP) at the Museum of Archaeology of the University of São Paulo. From 2009 to 2011, he was the President of the Brazilian Archaeological Society. He is a member of numerous international boards in archaeology and anthropology, including the board of the Wenner-Gren Foundation.

Neves, Eduardo Góes, Fig. 1 Eduardo Neves in the field at Hatahara site, Central Amazon, 2006 (Photo Val Moraes, Central Amazon Project)

Major Accomplishments

Eduardo Neves is part of a group of archaeologists that in the 1990s and 2000s started a movement that revolutionized understandings of the ancient occupation of the Amazon prior to onset of European colonization in the sixteenth century CE (MacEwan et al. 2001). Those archaeologists, including Michael Heckenberger, Stéphen Rostain, Edithe Pereira, Heiko Prümmers, Denise Schaan, Vera Guapindaia, Cristiana Barreto, and Denise Gomes, have produced evidence for dense, sedentary, and long-term occupation in different parts of the Amazon. This evidence challenged the then accepted view that the ancient people of the Amazon had mobile lifestyles in small, unstable, and short-lived settlements. Neves' work seeks to move away from environmental determinism and social evolutionary typologies to develop new theoretical frameworks to understand the long history of intertwinement between native populations and nature in the wet tropics.

Among Neves' major contributions to archaeology is the systematic study of the nutrient-rich and highly productive *terra preta* soils of the Amazon. *Terras pretas* have been known to naturalists since the late nineteenth century, but it was only 100 years later that geochemical and archaeological research demonstrated that they were created by human management in the past. This recognition brought further data to show that ancient Amazonian have modified their natural settings, presenting a direct challenge to the theory of environmental determinism that dominated Amazonian archaeology through much of the second half of the twentieth century. Neves also did work with Indigenous people of the Amazon such as the *Tukanoan* and *Palikur* Indians (Green et al. 2003), in an attempt to match oral traditions and archaeological data. The results point to a remarkable fit between these different sources of data and show that these Indigenous people have occupied their current areas continuously for many centuries.

In 1995 Eduardo Neves, together with Michael Heckenberger and James Petersen, started the Central Amazon Project (CAP), which Neves led until 2010. Petersen's untimely and unfortunate death in 2005, when he was shot in a robbery at a roadside restaurant during fieldwork, was a major blow to everyone involved in that long-term research effort. Indeed, Petersen's loss was felt not only by those with whom he worked in the Amazon but also among his colleagues and students from the Caribbean and New England, in the United States.

The Central Amazon Project is the longest-running project held in Amazonian archaeology. It has included the careful and intense mapping of dozens of the large archaeological sites located around the area of confluence of the Amazon and Negro rivers in Brazil, the establishment of a regional chronology and interdisciplinary research. However, its major contribution probably comes from the fact that it provided a venue for younger archaeologists, Brazilian and foreign, to obtain their graduate and undergraduate training in Amazonian archaeology. This was done through field schools held annually and also through the graduate program in archaeology at the University of São Paulo, in collaboration with other institutions such as Cambridge University, the University of California at Berkeley, Kansas University, the French National Museum of Natural History, and the Brazilian National Museum.

Neves has also made a major contribution to the development of robust theory in South American archaeology through his work, together with Pedro Funari, in the conception and inception of the "South American Theoretical Archaeological Meetings" (TAAS), which they initiated at the city of Vitória, Brazil, in 1998. Since that time, TAAS meetings have been held regularly, on average every 3 years, in different South American countries such as Argentina, Colombia, and Venezuela. Over the years TAAS meetings, which are self-regulatory and unattached to any archaeological association, have provided an opportunity for South American archaeologists to meet and discuss topics related to the history and political dimension of the practice of archaeology in the continent.

Aside from research and teaching, Eduardo Neves has played a major part in the development of a framework for the practice of professional archaeology in Brazil. He has trained and supervised a host of young archaeologists which are active in Amazonian research and currently work and teach at different local universities and research institutions. He has designed and helped to create the undergraduate program in archaeology at the State University of Amazonas and is continuously engaged into widening the possibilities for the socially conscious practice of archaeology in the Amazon.

Cross-References

► Amazonian Dark Earths: Geoarchaeology
► Archaeological Theory: Paradigm Shift

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"New 7 Wonders of the World" Campaign

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Brief Definition of the Topic

The "Seven Wonders of the Ancient World" are well known to anyone who has had a Western-style high school education. They were located around the Mediterranean and Fertile Crescent.

The list of these monuments was the result of peripatetic Hellenic colonization and early tourism. The best known of the Greek lists was made in the first half of the second century BCE by Antipater of Sidon. The most commonly cited ancient seven wonders were: Pyramids of Giza, Hanging Gardens of Babylon, Temple of Artemis at Ephesus, statue of Zeus at Olympia, Mausoleum of Halicarnassus, Colossus of Rhodes, and Lighthouse of Alexandria.

Two thousand years later, in 2001, Canadian-Swiss Bernard Weber created the "New Seven Wonders of the World Foundation" (N7WF) and launched a worldwide competition to create a new list. Countries were invited to nominate their sites and to encourage their citizens to vote for the "wonders." The winners were announced on 7 July 2007 in Lisbon. The N7WF claimed that some one hundred million votes had been cast. The winners were Chichen Itza, Colosseum of Rome, Machu Picchu, Great Wall of China, Petra, Taj Mahal, and the non-ancient Christ Redeemer Statue overlooking Río de Janeiro. The reason for including this campaign in the *Encyclopedia of Global Archaeology* is because of the challenge the N7WF presented to UNESCO's own World Heritage List and because the campaign itself showed the tight relationship between national archaeological patrimonies, coveted international prestige, and the global tourism industry.

UNESCO stated on 20 June 2007 (before the results of the contest were known): "There is no comparison between Mr. Weber's mediatised campaign and the scientific and educational work resulting from the inscription of sites on UNESCO's World Heritage List. The list of the '7 New Wonders of the World' will be the result of a private undertaking, reflecting only the opinions of those with access to the Internet and not the entire world. This initiative cannot, in any significant and sustainable manner, contribute to the preservation of sites elected by this public" (UNESCO 2007).

UNESCO's attitude is hypocritical, given the severe criticism that has been directed at its World Heritage Committee in recent years over its politicization and the lack of transparency of its decision-making and because the driving force behind countries' nominations is rarely site preservation but rather national pride, international recognition, and potential marketing of a new tourist attraction. UNESCO provides little money for site preservation and, as its own List quickly approaches one thousand inscriptions, one must consider that the N7W popular poll has selected six (not the Christ the Redeemer Statue) truly spectacular and significant sites that do meet the UNESCO criteria for "outstanding universal value" (see http://www.culture.gov.uk/images/consultations/UNESCO10_criteria.pdf).

In contrast to UNESCO's monopolization of cultural heritage authority, the United Nations praised the N7W campaign as part of its "Millennium Development Goals." On 8 July 2007, the United Nations Office of Partnerships lauded the campaign, noting its "aim to contribute to the process of uplifting the well being and mutual respect of citizens around the world, through encouraging interaction, expression of opinion and direct participation by voting and polling on popular themes and global issues which are understandable to everyone" (United Nations 2007).

Cross-References

- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

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New Archaeology, Development of

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State of Knowledge and Current Debates

Introduction

"When he goes out in the open, he not only keenly observes the activities of people and their consequences in the material world but also seeks to recognize patterns in both and link these together." This is a comment about recently deceased Lewis Binford, the principal proponent of New Archaeology, which the author heard during his tenure as a Fulbright Senior Research Fellow at the University of New Mexico, Albuquerque, in 1987 from one of the doctoral students there. It captures equally well the whole message of New Archaeology. The defining features of New Archaeology are as follows:

1. Emphasis on the recognition of interrelationships among various units of the archaeological record
2. Adoption of scientific reasoning for isolating causative factors that enable us to infer human behavior from these linkages
3. Imparting an overall anthropological dimension to the discipline by way of making the explanation of cultural similarities and differences across time and space as its primary goal

These are now firmly entrenched in the fabric of contemporary archaeology.

This entry investigates the following major aspects of New Archaeology: (a) the overall academic ferment that prevailed in social sciences in the mid-twentieth century; (b) how it facilitated or even anticipated the growth of a nonconformist movement in archaeology; (c) reconceptualization of theoretical and methodological domains of the whole discipline; (d) growth of sub-schools within New Archaeology; (e) some examples of field research from both New and Old Worlds involving the application of New Archaeology's formulations in theory and method; and (f) the place of New Archaeology in the context of later developments in the discipline.

Background

Far from constituting an aberration, the rise of New Archaeology fits in very well with our knowledge of the history of major developments in both the natural and social sciences, each one continuously striving to achieve a more systematic and comprehensive understanding of the whats, wheres, whens, hows, and whys of a specific portion of the empirical world forming its subject matter. One general feature that strikes us is that all these disciplines were initially preoccupied with singular-atomistic studies, which were subsequently replaced by perspectives treating phenomena as *Ganzheiten* or interconnected wholes.

Secondly, in their formative stages, these sciences primarily concerned themselves with the identification of broad, long-term trends about their respective domains of the empirical world. Soon a need was felt to put these sweeping ideas on a sounder basis by taking up systematic studies of spatially and temporally limited portions of reality. In the physical sciences, experimental method played an important part in these fresh studies from the beginning of the eighteenth century. Commenting on its role, Heisenberg (1952: 79) wrote: "This method could be applied to individual problems posed by nature and hence it was no longer a question of understanding a single interconnected whole but of a detailed analysis of many small specific connections." Highlighting a similar situation that prevailed in the social sciences, the nineteenth-century French sociologist-philosopher Tarde averred: "...a new science begins by assuming the existence of large-scale "apparent" regularities, but can genuinely advance only with the discovery of the real, small-scale repetitions" (as quoted by Martindale 1961: 446).

It was against this wider background that many of the social sciences took new incarnations towards the end of the nineteenth century and in the first half of the next century. New Geography,

New History, New Sociology, New Anthropology, New Political Science, etc. appeared on the academic horizon.

In its antiquarian stages, archaeology too was concerned with particular sites and monuments and then started recognizing broad, long-term trends in the preliterate past of humankind. C.J. Thomsen's Three-Age system – Stone, Bronze, and Iron Ages – was the first step in this direction (Thomsen 1848). These ages were much elaborated and improved upon in the second half of the nineteenth century by John Lubbock and many other workers in Europe. Benefiting from the recognition of these stages and also from the archaeological discoveries made in the first half of the twentieth century, several evolutionary or developmental models of the preliterate stage were put forward. Publications such as Gordon Childe's *Man Makes Himself* (1936) and *What Happened in History* (1942) and Leslie White's *The Evolution of Culture: The Development of Civilization to the Fall of Rome* (1959) not only strengthened the discipline's academic identity and brought the story of humankind to the threshold of the educated layperson but also gave a fillip to regional archaeological investigations in both Old and New Worlds. Thus, culture history, involving the preparation of regional timetables of culture, emerged as a dominant trend by the mid-twentieth century.

Cultures were defined as recurrent series of similar-looking artifactual assemblages having spatiotemporal boundaries. The introduction of various scientific techniques and methods after World War II added an extra dimension to the study of the archaeological record (Brothwell & Higgs 1963). Wherever large-scale excavations were undertaken, it was even possible to say something about the past lifeways. In short, lots of queries about the whats, whens, and wheres of the archaeological record were raised and successfully answered. Soon some books devoted to theory and method also appeared, e.g., Grahame Clark's *Archaeology and Society* (1939), Gordon Childe's *Piecing Together the Past* (1956), Willey and Phillips's *Method and Theory in American Archaeology* (1958), and Stuart Piggott's *Approach to Archaeology* (1959).

These positive developments, while they constituted what David Clarke (1973) called the stage of self-consciousness, were not without their skeptics. Clarke (1968: xiii) himself called the whole endeavor "an undisciplined empirical discipline." The issue for the discipline was epistemological in nature and necessitated a reexamination of its foundations and a logical analysis of its concepts. In other words, questions were raised about the quality of knowledge itself about the past. Could one elevate this knowledge from the level of data-packed, inductive generalizations or assortments of facts to that of seeking interconnections among these facts? Observations like the one made by the French filmmaker Louis Renoir that "I care not for things themselves but their interconnections" began to find an echo in archaeological circles too. Gordon Childe (1935) and John Bennett (1943) called attention to reading the meanings of the archaeological record in functional terms. In his Rickett Memorial Lecture of 1953, Grahame Clark diagrammatically represented human culture as made up of various structural components, all linked one with another and with the environment (Clark 1960: 175). Walter Taylor's (1948) book *A Study of Archaeology* not only advocated contextual and functional approaches to the analysis of archaeological data but in fact anticipated the more recent interpretive trends by locating the source of behavior in human minds and the various feelings and sentiments generated there. Julian Steward's (1955) cultural ecology stressed the need for monitoring interconnections between cultural and environmental components, while Willey and Phillips (1958) called for an anthropological orientation to the whole discipline.

But all these views and ideas were in the form of isolated pleas for improvement and therefore failed to make any significant impact on the archaeological community. It was left to the proponents of New Archaeology to coalesce these "germs of thought" and add to these the hardware as formed by statistical techniques for pattern recognition and the software as provided by principles of the scientific method. Once this fusion took place, a virtual manifesto was born, as

contained in the initial writings of Lewis Binford (1962, 1964, 1965, 1968a) and David Clarke (1968, 1973). One is reminded here of the analogy provided by the famous pamphlet of 1929 issued by the Vienna Circle, which wanted to free empirical sciences from the "metaphysical and theological debris of millennia" and inject into these a scientific world conception (wissenschaftliche Auffassung) (Hahn et al. 1929). Archaeology simply represents the latest example among empirical sciences which experienced this shift from a mere concern with bundles of facts to the construction of positivist and verifiable knowledge about the real world. It is unimaginable that without the background provided by this fundamental change, the ideational trends that later arrived in archaeology would have found a rationale for their genesis.

Birth of New Archaeology

The actual genesis of New Archaeology took place in the 1960s. Not many feathers will be ruffled when it is said that the *dramatis personae* comprise just two figures – David Clarke from England and Lewis Binford from the USA. Let us first consider the views of Clarke. He introduced statistical methods to understand variability in the archaeological record, be they simple artifacts or megalithic tombs. By means of matrix analysis, Clarke recognized two main geographical or functional series within the British Beaker pottery dated to the third millennium B.C. (Clarke 1962). In 1968 he published his book *Analytical Archaeology*, which sought to revamp the whole conceptual framework of the discipline. Of particular importance is his conception of cultures as systems consisting of components interacting among themselves and with the environmental subsystems. His paper "Archaeology: The Loss of Innocence" was a terse (hence termed gobbledygook by readers in Britain) but welcome exposition of the major tenets of the new stream of thought (Clarke 1973). He identified four stages in the development of archaeology, viz., stages of consciousness, self-consciousness, critical self-consciousness, and self-critical self-consciousness. He also advocated the study and interpretation of the archaeological record with reference to four paradigms (geographical, anthropological, morphological, and ecological). Clarke visualized that the application of these four paradigms would lead to improvements in theory formation at four levels: concepts, information, reasoning, and general theory. These views surely reflect Clarke's larger conception of the archaeological record in cultural and anthropological terms. Finally, he defined New Archaeology as "an interpenetrating set of new methods, new observations, new paradigms, new philosophies and new ideologies within a new environment" (Clarke 1973: 12). His death in 1976 at the young age of 38 robbed archaeology of one of its most fertile minds.

Binford's contribution to the emergence of New Archaeology was as much an expression of mind inspired by ideas about the relevance of scientific reasoning and statistical techniques for pattern recognition as it was the product of clashes of ideas with senior colleagues like James Griffin and Robert Braidwood at the universities of Michigan and Chicago about the nature of the archaeological record and its potentialities to inform us about the past. The introductory portions of the three volumes containing his collected essays (Binford 1972a, 1983a, 1989) and also the inside view provided by one of his group members (Flannery 2006) provide many gripping details of the birth pangs as well as of later developments concerning New Archaeology's efforts to direct attention to the larger anthropological goals of the discipline (Willey & Sabloff 1980: 181–210; O'Brien et al. 2005: 36–66). Binford (1972: 1–14) told us how his stint of military service in East Asia created in him an interest in observing simple societies, this in turn motivating him to enroll for a graduate program in anthropology, and how he developed "archaeology commitment" in order to provide a temporal perspective for explaining diversity in human societies across the globe. He also told us about the clashes he had with senior archaeologists about the very definition of concepts like culture, the whys and hows of the emergence of food-producing way of life, and explanation of variability in

archaeological record. So it fell upon Binford to play the role of a Darwin as well as that of a Huxley.

The Structure of New Archaeology

With this background we shall now identify the main propositions of New Archaeology. It should be noted at this stage that the phrase New Archaeology was a pejorative expression used by critics for lumping together unconventional papers that were being presented by Binford and his group at meetings of the Society for American Archaeology in the early 1960s. Binford himself was content with characterizing the views of his group as "New Perspectives" that call for "some fundamental changes in the way archaeologists viewed the archaeological record and particularly in the conventions then current for assigning meaning to archaeological facts" (Binford 1986: 459). But the label got entrenched in the literature.

Conceptual Changes

New Archaeology argued for a basic epistemological change. In traditional archaeology, facts per se – be these about dates, sizes of sites, or the actual finds – constituted knowledge and were regarded as self-explanatory. These were only required to be organized into assortments or groups. Generalizations in the form of summaries of facts constituted knowledge about the past, e.g., culture X has red and grey ceramic fabrics in equal proportions, represented by 13 and 16 vessel shapes, respectively. New Archaeology raised doubts about the limitations of this form of knowledge in promoting the cause of anthropological orientation to archaeological record. As Bertrand Russell would have argued, can we meaningfully understand the world around us by merely enumerating its "furniture?" The anthropological dimension, involving the study of development of human cultural forms along space and time trajectories, required the archaeologists to thread their facts together. Adopting the age-old saying "Divided we fall, united we stand," the new epistemological turn laid emphasis on linkages among facts.

This epistemological reorientation entailed two drastic changes in the culture concept. First, in the place of the earlier "shreds and patches" and trait list versions, cultures now began to be treated as totalities or systems comprising not merely component elements but their interrelationships as well. Secondly, the normative definition of culture as a repository of ideas and norms held in the minds of people was now substituted by a functional definition treating it as an extrasomatic means of adaptation. Butzer (1982) independently discussed at length the operational strategies required for putting the concept of adaptation to use. This redefinition of culture highlighted the study of culture process, which has become synonymous with New Archaeology.

In order to emphasize the importance of anthropological orientation to the discipline advocated by him, in the initial stages, Binford did talk of archaeology's contribution to the understanding of diachronic or long-term trends in the evolution of culture and even referred to tracking down "laws of cultural dynamics." But it was soon realized that this task must be preceded by a more fundamental task, i.e., holistic understanding of spatially and temporally limited segments of the archaeological record. This required a shift of emphasis from the study of culture of humankind to the investigation of cultures of peoples. It is the study of this synchronic aspect of culture which constitutes culture process; it finds expression at numerous places in the writings of both Clarke and Binford. Their views were influenced by systems framework and the ecosystem approach which had just emerged as prominent analytical tools in the empirical sciences.

A few additional remarks are warranted on this specific issue. David Clarke (1968: Chaps. 2 and 3) viewed archaeological cultures as vast information systems, made up of several interlinked subsystems. He viewed the aim of archaeology as the identification of patterns or regularities in the functioning of cultural systems, which in turn would lead to a higher body of knowledge in the form of models and hypotheses. Binford espoused the culture process concept in more elaborate terms.

Writing in 1968, Binford stated: "Process, as I understand it, refers to the dynamic

relationships (causes and effects) operative among the components of a system or between systemic components and the environment" (Binford 1972a: 117). Some years later, he warned that "A cultural system is not a summation of all the events, behaviours or other transactional phenomena going on at a given time, but rather the conditioning organizational framework within which all these events transpire" (Binford 1981a: 201). Later, Binford underlined the priority of the study of process at a synchronic level in these words: "...before archaeologists could cite formal variability in the archaeological record as indicative of large-scale process, evolution, system changes, ethnicity, or even such historical events as migrations, we had to be able to recognize the archaeological record at differing organizational scales" (Binford 1989: 18).

Thus, in their advocacy of the cause of culture process, neither Clarke nor Binford showed any interest in producing yet another grand model of cultural evolution. Rather their interest was in "freezing" cultural systems in space and time in order to understand their functioning. This synchronic process orientation of New Archaeology was influenced by the prevailing functionalist trends in anthropology via the writings of Leslie White and others. As stated earlier, it constitutes a major instance of the operation of two important trends noticed in the history of factual sciences. These are as follows: (a) a coming into vogue of theories treating phenomena as *Ganzheiten* in replacement of singular-atomistic studies and (b) a shift of emphasis from the formulation of linear or long-term trends to the detection of constant, short-term relationships, and uniformities. It is worth noting here that processual orientation to the study of social phenomena was already a prominent feature of the American social sciences like sociology, political science, and economics in the early part of the twentieth century (Kress 1970).

Methodological Innovations

To give effect to these radical conceptual changes, New Archaeology proposed innovations in the methodological approaches or strategies to be adopted for studying the archaeological record at various levels. Realizing that cultural systems of whatever age always operate at a regional level but never exclusively at the level of individual sites – however big these might be, a Cahokia or a Troy or Harappa – Binford called for the employment of a regional research strategy in field investigations. In his own words, he said: "It is argued that the methodology most appropriate to the study of culture process is a regional approach in which we attempt to gain reliable and representative information covering the internal structure and ecological systems" (Binford 1964: 160). The archaeological record was now visualized as consisting of populations of cultural items, cultural features, sites, and ecofacts or non-artifactual data of cultural significance. Since it is not always possible to exhaustively study all portions or aspects of regional or site data, New Archaeology for the first time introduced probability sampling methods and multistage fieldwork into the discipline for identifying and studying representative units of data universe.

As a complement to these innovations in field strategies, New Archaeology also called for a more rigorous analysis of the archaeological record itself. Reference has already been made to Clarke's use of matrix analysis for restudying British Beaker pottery. Under Albert Spaulding's tutelage, Binford acquired familiarity with multivariate statistical techniques which proved to be extremely helpful to him in identifying patterns in the archaeological record and also in inferring similarities and differences among cultural systems.

These innovations in field methodology and data analysis were pooled together by Binford to develop a research paradigm called the settlement system approach (Binford & Binford 1969). While settlement pattern studies stop at the level of descriptive accounts of distribution of sites on a given patch of landscape (Willey 1953; Chang 1968), the settlement system approach is explanatory in nature and seeks to lay bare the linkages between site contexts, resource use schedules, demographic arrangement, and ecological setting. While neighboring human groups

may share similar genetic, linguistic, and historical traditions, they nevertheless tend to develop their own settlement systems due to differences in both natural and social environments. Initially, the settlement system approach was developed by Binford to explain variability in the French Mousterian assemblages. This work and his prolonged ethnoarchaeological study of the Nunamiut Eskimos of Alaska enabled him to formulate the forager versus collector model of hunter-gatherer settlement systems (Binford 1980). His more recent book *Constructing Frames of References: An Analytical Method for Archaeological Theory Building* (2001) extended this model to cover all major hunter-gatherer societies spread across the world. With some additions and variations, it is also applicable to the study of food-producing and other developed cultural systems.

The Role of Scientific Reasoning

There are two important and overarching aspects of New Archaeology – both falling within the domain of scientific reasoning (Paddayya 1983, 1990: 8–19). One of these concerns the nature and role of laws or generalizations in archaeological research. This topic generated much debate in the discipline and to some extent even scandalized New Archaeology by caricaturing its proponents as "a law and order group." During his visit to one of the universities in Midwest America in 1999, the author noticed on the doorway of a senior faculty member this short inscription: "All generalizations are false." This hostile attitude to the topic was occasioned by certain misconceptions: (a) traditional archaeology's relativistic and trait list conceptions of human cultures, providing no scope for generalizations; (b) the supposedly inviolable nature of lawlike propositions in the natural sciences; and (c) the unwarranted view that laws in archaeology must refer to long-term trends in human culture.

Such misconceptions are totally uncalled for on various counts. First, laws do not exist in nature but are conventions made by us to designate recurring patterns or associations (causal and otherwise) among phenomena. Secondly, there is no finality attached to them, since the empirical world is infinite and new data could necessitate revision or even discard of existing generalizations. So the inscription on the doorway of the American professor should more appropriately read: "All generalizations are false and are liable to be replaced by newer ones." Thirdly, generalizations are not ends in themselves but form "an indispensable instrument of historical research" (Hempel 1965: 231). Mandelbaum (1977) aptly called them the "mortar" of historical accounts. Fourthly, the oft-repeated dichotomy that sociocultural sciences are idiographic (seekers of individual facts) and that natural sciences are nomothetic or lawmaking is totally false. The fact is that research in all empirical sciences presupposes an unending cycle between acquisition of facts and threading them together with the help of generalizations. Hence, both groups of sciences are idiographic as well as nomothetic. There is absolutely no way that archaeology can be excluded from this matrix and accorded a special status.

As pointed out by Hempel (1965: 242–243), past-related sciences like history and archaeology do make use of prescientific generalizations of everyday experience as well as generalizations adopted from both social and natural sciences. Archaeology has made its own generalizations, e.g., Three-Age system, law of evolutionary potential, and law of cultural dominance (Stickel & Chartkoff 1973).

Middle Range Theory, as developed by Lewis Binford, seeks to identify more of such general propositions (Arnold III 2003). It rises above the earlier arbitrary ways of giving meanings to the archaeological record and aims to develop a fresh cognitive frame of reference. This cognitive framework consists of ideas and concepts in terms of which one could diagnose the archaeological record in order to identify the processes that led to its formation (Binford 1977, 1981a). Binford visualized that Middle Range Theory (encompassing ethnoarchaeological research, use-wear analyses, and bone taphonomy) could produce patterns at three levels: (a) first-order field or laboratory observations about various segments of the archaeological record, (b) second-order observations recognizing patterns

between two or more variables, and (c) pattern recognition leading to theory formation which establishes causal links in cultural systems and explains their functioning. Middle Range Theory paves the way for General Theory which has the task of "understanding the processes responsible for change and diversification in the organizational properties of living systems" (Binford 1977: 7).

Binford's book *Constructing Frames of Reference: An Analytical Method for Archaeological Theory Building* (2001) contains a large number of lower-, middle-, and higher-order generalizations arrived at after a comparative study of 340 hunter-gatherer societies of the world. Referring to their possible use to archaeologists, Binford (2001: 3) writes: ". . .From the equations developed in the book an archaeologist can anticipate many of the properties of hunter-gatherer groups that might be expected to occur at a given location, at an archaeological site or at a series of sites. . .the explanatory theory is available for archaeologists to use deductively by reasoning to or simulating changing conditions and thereby providing patterns of change that can be expected to occur in the archaeological record at specific locations. . .."

Another major contribution made by New Archaeology to the discipline relates to the introduction of the method of hypothesis testing. Traditional archaeology was mainly based on the use of intuitive and ex cathedra statements. Attention was now focused on the need to test the reliability of archaeological reconstructions. For this purpose the method of the hypothesis-forming part of the philosophy of science was adopted. In Binford's own words, "The accuracy of our knowledge of the past can be measured; it is this assertion which most sharply differentiates the new perspectives from more traditional approaches. The yardstick of measurement is the degree to which propositions about the past can be confirmed or refuted through hypothesis-testing" (Binford 1972a: 90). Although one could locate some instances of hypothesis formulation in traditional archaeology, e.g., Thomsen calling his Three-Age system a conjecture to be confirmed or rejected in the light of future work and the Iraq Jarmo project of Robert Braidwood (1974) for ascertaining Neolithic origins, New Archaeology's culture process goals called for a formal introduction of the hypothetico-deductive method in order to deal with the problems of the whys and hows of culture process. It involves putting forward a hypothetical answer to a problematic situation concerning the archaeological record and deducing from it consequences which could be tested with reference to the empirical world. In the natural sciences, the application of this method led to far-reaching qualitative changes in knowledge formation.

As with the topic of laws, the method of hypothesis too invited much doubt and disbelief in archaeology in the initial stages. The reason was that traditional archaeology had by and large been content with answering questions of what, when, and where by making inductive statements taking the form of summaries of facts. The scope for raising why and how queries was limited. Moreover, it was mistakenly believed that hypotheses should always involve "if, then" causal links. The truth is that research in empirical sciences has much scope for and needs non-causal hypotheses too. The Greek philosopher Novalis put this issue very well: "Hypotheses are like nets; only he who casts, will catch" (Popper 1980: 11). In our own times, the French scientist Poincare tendered this useful advice: "Instead of summary condemnation we should examine with the utmost care the role of hypothesis; we shall then recognize not only that it is necessary, but that in most cases it is legitimate. We shall also see that there are several kinds of hypotheses; that some are verifiable, and when once confirmed by experiment become truths of great fertility; that others may be useful to us in fixing our ideas, and finally, that others are hypotheses only in appearance, and reduce to definitions or to conventions in disguise" (as quoted in Copi & Gould 1972: 284).

Aftermath

Estimates of the place of New Archaeology vary. James Griffin (1985) observed total silence about it while reviewing his career achievements in archaeology. Walter Taylor (1972) called these

ideas "old wine in new skins." In contrast to this opinion, another senior archaeologist Paul Martin (1972) called it a revolution. But this has been denied by Meltzer (1979); he believes that it represents a continuum with traditional perspectives.

Revolution or not, New Archaeology represents a set of eclectic conceptual and methodological tenets aimed at a reorientation of our basic perceptions of the archaeological record. The following are the principal new perceptions:

(a) Systemic conception of cultures in the place of the traditional type-fossil and trait list views
(b) Emphasis on knowing how cultures function with reference to their own components as well as surrounding environmental and social milieu
(c) Adoption of a regional perspective in field studies
(d) Use of various pattern recognition techniques
(e) Emphasis on the use of generalizations secured via Middle Range Theory
(f) Application of the method of hypothesis

All these were geared to raise knowledge of the past from the level of accumulation of individual facts to the status of science that seeks to identify their interconnections and explain their whys and hows (Wylie 1981; Watson 1991; Gamble 1999; Meltzer 2011). New Archaeology thus achieved the effect of the "lowering of foundations" of the discipline and brought in a new paradigm in the sense of "a universally recognized scientific achievement that for a time provides model problems and solutions to a community of practitioners" (Kuhn 1962: x).

New Archaeology failed to remain a unified stream of thought. Influenced or inspired by it in one way or another, several "newer" archaeologies appeared on the American scene from the 1970s onwards. These include an "explicitly scientific" archaeology (Watson et al. 1971), the behavioral archaeology of Michael Schiffer, cultural materialism (Segraves 1974), Marxist archaeologies (Spriggs 1984), critical archaeology (Leone et al. 1987), Annales perspectives (Knapp 1992), cognitive processual archaeology (Renfrew 1994), and evolutionary archaeologies (Maschner 1996; O'Brien & Lyman 2000). While no doubt conceding the importance of processual orientation provided to the discipline by New Archaeology and also its efforts to strengthen the discipline's conceptual foundations, these perspectives seek to attend to some of the gaps left untouched by the main program.

Among these behavioral archaeology, as developed by Michael Schiffer, is a more prominent and enduring one. Schiffer successfully argued that inferring human behavior from the archaeological record entails us to first recognize the processes involved in the transformation of objects from one state to another within the original systemic or living context and then their transfer to the archaeological context (Schiffer 1976). He also pointed out that archaeologists paid no attention to the possible cultural as well as natural processes that acted upon the archaeological record since its disconnection with its creators. Thus, Schiffer highlighted for the first time the need to understand the processes that create as well as transform the archaeological record before we use it for reconstructing past human behavior (Schiffer 1995). It is not surprising therefore that the topic of formation processes (*c*-transforms and *n*-transforms) has become an integral component of contemporary archaeology's suite of research strategies (Schiffer 1987).

Impact

Let us briefly consider the impact made by New Archaeology on the discipline. Its theoretical and methodological propositions made sense particularly to those who were actively involved in the study of the archaeological record in the field or laboratory and who desired to pull out interconnections of various kinds from the "teeth of stubborn and irresistible" facts. Citation of a few studies carried out at site or regional levels will serve the purpose of this encyclopedic entry. Let us start with the two architects themselves.

Two of David Clarke's reinterpretations of the European archaeological record are fascinating examples of model building. First, we will consider his restudy of the archaeological record of the British Iron Age site of Glastonbury

excavated three quarters of a century ago. His efforts to infer "mutual relationships and the strengths and covariation of those relationships in a variety of alternative classificatory dimensions" led him to slot this small Iron Age site at a lower level of the four-tier settlement (and impliedly social) hierarchy that existed in the marshlands of Somerset (Clarke 1972). The second study concerns the nature of economic organization of the North European Mesolithic phase. Clarke carefully examined the functional aspect of microlithic assemblages and implications of the spurt in vegetative growth consequent upon the retreat of ice sheets from North European plains. This led him to doubt the traditional emphasis on hunting. Instead he proposed the view that the Mesolithic subsistence economy "may have approached limited, fire-controlled asexual horticulture and arboriculture, based on vegetatively reproducing *root* staples, forest *perennials*, controlled nut and fruit trees, backed up by shell-fish, dog and pig husbandry…" (Clarke 1978: 36).

Binford's first major use of the new armature for approaching the archaeological record concerned the four or five variants that had been recognized by Francois Bordes within the French Mousterian. Raising serious objections to Bordes' interpretations equating the variants with different ethnic groups, he and his wife Sally Binford put forward the famous functional argument which sought to trace assemblage variability to functional variability, which in turn is governed by seasonal variability in the availability of resources (Binford & Binford 1966). This argument was extended to account for variability in the Late Acheulian assemblages from Olorgesailie, Kalambo Falls, and other sites in Africa (Binford 1972b). Later Binford used this strategy and reexamined the faunal collections obtained much earlier from Olduvai Gorge localities in East Africa from the point of view of bone taphonomy and arrived at the startling conclusion that the early hominins, far from being great hunters, were only scavengers of the leftovers of meat from carnivore kill sites (Binford 1981b; 1983b). Likewise the mighty "elephant hunters" of Torralba were reduced to the status of mere expedient exploiters of animal food resources naturally available in the ecosystem (Binford 1987). These studies provided much stimulus to contemporary research on bone taphonomy and hominin dietary patterns.

Likewise, in his paper "Post-Pleistocene Adaptations," Binford (1968b) reviewed evidence pertaining to origins of food-producing ways of life. Going beyond "nuclear zone" and "culture was ripe" theories, he put forward the view that in the Near East evidence of plant and animal domestication at the primary level would be found not in the areas occupied by sedentary forager-fisher groups but in the adjacent zones. He further pointed out that evidence for independent experiments in food production could be expected from various areas in both New and Old Worlds – a proposition upheld by a series of field projects undertaken subsequently.

The Mousterian debate with Bordes made Binford realize the need to supplement archaeological data with analogies arising from the study of the actual functioning of living hunter-gatherer societies. His 4-year-long (1969–1973) field studies among the Nunamiut Eskimos of Alaska and the resulting publication set a model for later work in hunter-gatherer ethnoarchaeology (Binford 1978). It has already been mentioned that the settlement system approach to the archaeological record developed by him is a lasting contribution to the discipline and, with suitable modifications and additions, is helpful for studying the structure and functioning of even agropastoral and other later cultures.

We will now examine the use of new ideas by other archaeologists. The volume *New Perspectives in Archaeology*, edited by Sally and Lewis Binford (1968), contains a set of ten papers presented at a symposium organized in Denver in 1965 as part of the annual conference of the American Anthropological Association. These papers represent the first-generation applications of New Archaeology in the Americas. Irven DeVore, one of the seven leading non-archaeological anthropologists of the time who had been invited to comment on these papers, summed up the overall positive response in these words: "…I warmly applaud the shift in

emphasis in archaeological thinking in recent years as evidenced, for example, by the papers in this symposium. In the past we were presented with lithic industries which, to judge by their descriptions, were copulating, hybridizing, evolving, adapting, and producing offspring. . ." (DeVore 1968: 346).

The papers by James Deetz, William Longacre, James Hill, and Robert Whallon used ceramic data from individual American archaeological sites to make inferences about social organization (demographic aspects and residence and descent rules). The papers by Howard Winters, Kent Flannery and Michael Coe, and Stuart Struever, also dealing with North American sites, were broader in scope and region oriented. More importantly, these papers adopted ecosystem and functionalist orientations for studying the archaeological record of the Formative and Classic stages. This volume also included three papers which took the new ideas to the Old World – Sally Binford's paper on variability in the Near Eastern Mousterian, James Sackett's paper on the French Upper Paleolithic, and Frank Hole's study of the early food-producing culture of Iran.

Coincidentally, in 1968 another set of eight interesting essays appeared as part of an edited volume entitled *Anthropological Archaeology in the Americas* (Meggers 1968). These essays, arising from lectures delivered during the two previous years under the auspices of the Anthropological Society of Washington, were very much in alignment with the new ideas that were already in the air; in fact three of the writers also published papers in *New Perspectives* as mentioned above. These contributions once again laid emphasis on systemic and superorganic conceptions of culture and the role of the natural environment. Stuart Struever argued for a methodological reorientation in American archaeology in order to come to grips with the new goals. James Deetz's essay dealt with issues relating to the contact period. The remaining six papers (by J. Campbell, E. Wilmsen, J. Schoenwetter and A. Dithert Jr., K.V. Flannery, W. Sanders, and D. Thompson) reflected the use of new ideas and methods in the investigation of American archaeological sites belonging to paleo-Indian and later cultural stages.

Subsequently some of the above-mentioned authors elaborated on these beginnings and completed major research projects, e.g., Flannery's (1976, 1986) work on the early food-producing cultures of the southern highlands of Mexico and Winters' (1969) work on the Riverton culture of Wabash valley in Illinois. Other major projects, which also fall within the framework of New Archaeology, include the work of MacNeish and others on the emergence of food-producing way of life in the Tehuacan valley (MacNeish et al. 1972) and Adams' work in Mesopotamia (1965, 1966; Adams & Nissen 1972).

The volume *Processual Archaeology*, edited by Johnson (2004), contains a set of another ten essays representing third-generation studies employing the approaches recommended by New Archaeology. These concern site or regional-level studies of sites belonging to hunter-gatherer and later stages and clearly show that the themes broached by New Archaeology are still vibrant in contemporary archaeology both in America and the Old World. Surely, between 1968 and the volume edited by Johnson, there have been a good number of field studies of hunter-gatherer, food-producing, and state-level societies in different parts of the world which benefited from New Archaeology's propositions (O'Brien et al. 2005: Chaps. 3 and 4). But it may as well be the case that just as one does not always notice Darwin's name in the discussions concerning the theory of evolution, the inspiration provided by New Archaeology does not always find explicit mention.

India is one of the few regions outside the Anglo-American world which began to favorably respond to the call of New Archaeology from an early stage. Thanks to the initiative taken by Sankalia (1977) and the inspiration provided by Binford's month-long personal visit to Deccan College in Pune in 1986 to give a series of lectures on the basic premises and applications of New Archaeology, Indian archaeology began to experience the influence of New Archaeology from an early stage. The settlement system

perspective has been adopted for studying Paleolithic and Mesolithic sites which were for a long time dubbed as producing only "stones" and "more stones" (e.g., Murty 1981; Paddayya 1982; Raju 1988; Mohanty 1990; Cooper 1997; Selvakumar 1997). Settlement system studies have also been undertaken with reference to the early food-producing communities of the Deccan (Dhavalikar 1988) and the Indus civilization (Possehl 2002a, b). New Archaeology's regional approach to the archaeological record was employed with excellent results for studying the medieval capital of Vijayanagara in South India. The 700 localities found in an area of 250 km^2 around this city facilitated a much better understanding of the dynamic relationships between the city and its hinterland (Sinopoli 2007). Also, the topic of formation processes has taken firm root in Indian archaeology (Paddayya 2007). It is a stunning fact that in 1963, Raymond Allchin published a comprehensive study of the Neolithic ashmounds of the Deccan, which involved not only sound traditional archaeology but also the employment of strategies like hypothesis testing, the regional approach, and the interpretation of the archaeological record in terms of human motives that later became major tenets of New Archaeology and post-processual archaeology (Allchin 1963).

Conclusion

Scientific research is dynamic and builds upon existing blocks of knowledge. Thus, it was not surprising when in 1982 Ian Hodder put forward the view that material culture items, their functional roles apart, are symbols in action and shape human minds (Hodder 1982). This was the beginning of post-processual archaeology, which emphasizes that archaeology cannot stop at the level of reconstructing past human behavior but must trace it back to human feelings, sentiments, and emotions (Flinders Petrie actually put forward this idea a hundred years ago (Petrie 1972)). Interpretation replaced explanation as the discipline's goal. As in the case of New Archaeology, this trend also soon experienced a stream of subtrends – semiotic archaeology, archaeological poetics, hermeneutical archaeology, structuralist archaeology, phenomenological archaeology, agency theory, etc., which are fit topics for separate encyclopedic entries. Attention was also drawn to the sociological dimensions of the study of the past – gender archaeology, public archaeology, archaeology as sociopolitical action in the present, etc.

New Archaeology's propositions were for some time questioned and even derided by these more recent trends. But soon the falsity of a mind-body dichotomy, which had plagued European philosophy for centuries, began to dawn upon us, and it was then easy to appreciate that the interpretation of human cultures as ideational systems has to rest upon their study as functioning systems in the material world. The great German *litterateur*, Bertolt Brecht, expressed this notion in a few beautiful words: "Erst kommt dass Fressen und dann die Moral." It is good to note that Hodder himself has recently called for an integrated approach for decoding what he calls "human-thing entanglement" in the past (Hodder 2011).

Seen in a wider context, the traditional culture history approach, New Archaeology, and ideational perspectives, far from being mutually exclusive, are actually complementary to one another. If one may slightly rephrase Thomas Kuhn (1977), academic tensions are not only essential but beneficial. Depending upon the nature and extent of the previous work on the archaeological record, their application will vary from area to area and from problem to problem. Much wisdom lies in the message which Buddha gave to the perplexed village folk of North India 2500 years ago: "Listen to all kinds of teachings but adopt what suits you, employing your own powers of observation and reasoning!"

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Archaeological Record
- ▶ Archaeology and Anthropology
- ▶ Behavioral Archaeology
- ▶ Hypothesis Testing in Archaeological Theory

▶ Post-Processual Archaeology
▶ Post-Processualism, Development of
▶ Processualism in Archaeological Theory

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New Spain: Forts and Transport Archaeology

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Introduction

Although the Spanish conquest of Central Mexico and the Aztec capital of Tenochtitlan took a little over two years, the conquest of northern New Spain took 400 years to complete, using the same strategies as the original conquerors, explorers, and adventurers radiated from Mexico City in search of fame and fortune. In that search, they furthered the principal goals of the Spanish colonial enterprise: profit, evangelization, and cultural expansion, co-opting indigenous social and economic systems where possible and creating new-life ways and urban centers where convenient and viable.

Historical Background

Opening bridle paths and wagon roads was part and parcel of the expanding colonial enterprise.

New Spain: Forts and Transport Archaeology, Fig. 1 Road network in New Spain in the early 1800s (Map created by P. Fournier)

Many were built on preexisting trails that integrated the ebb and flow of ideas, knowledge, and commerce that was Mesoamerica. These trails were quickly converted from trails of integration to trails of destruction and subjugation. They radiated from the metropolitan capital to the newly created provincial capitals and principal ports and sustained the authority and power of the Spanish crown. Initially less than a meter wide and defined by the continual passage of *tamemes* (porters), human beasts of burden capable of carrying 35 kg on their backs, these trails had to be adapted to the needs of horses, mules, and wagons that carried far greater loads and to the needs of their drivers. They were widened, graded, and given firmer substrates. Permanent sources of drinking water and areas of forage were found. Way stations were built (Rees 1975; Lira López 2009). Initially, the old and the new modes of transportation coexisted and adapted together, but as time went by and the volume of freight increased, *arrieros* (teamsters) replaced *tamemes*.

The colonization and pacification of northern New Spain was built on the establishment of missions, mines, and market towns that formed a series of networks, or heartlands, integrated by a principal artery – *el Camino Real de Tierra Adentro* (the Royal Inland Road) – that began in Mexico City. By the late sixteenth century, that artery reached its maximum extension in northern New Mexico. Branches to the east and west covered immense areas. Toward the end of the seventeenth century, the western branch extended all the way to San Francisco, California, while the eastern branch tentatively reached the border between Texas and Louisiana (Fig. 1).

As the frontier moved further north, the distances between settlements grew, the population density shrank, and the need for protection increased as travelers were continually subject to surprise attacks and ambush by nomadic people intent on dislodging the invaders and purloining the exotic goods they carried.

While the Spanish terms *fuerte* and *presidio* can be translated into the single English word "fort," in New Spain, they were distinct classificatory terms. Forts, such as the Fuerte de San Juan Ulúa (Veracruz) or the Fuerte de San Diego (Acapulco), were major military defensive installations designed to defend sea ports from foreign invaders. As such, they tended

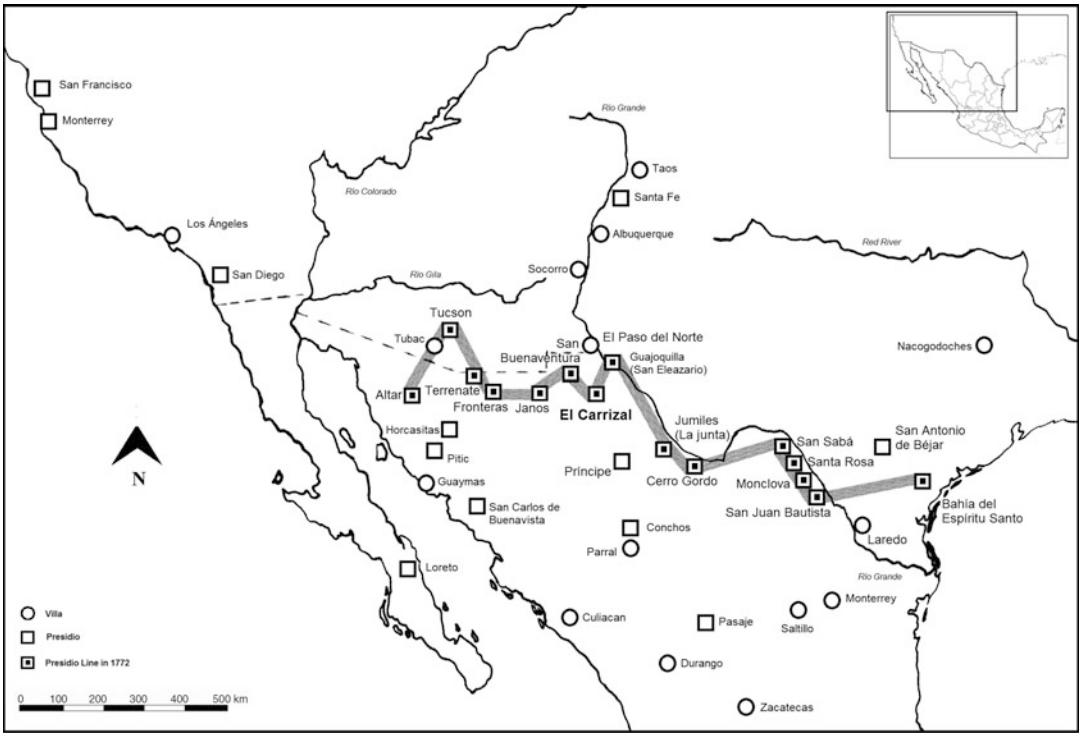

New Spain: Forts and Transport Archaeology, Fig. 2 The *presidio* line of northern New Spain in 1772 (Map created by P. Fournier and A. Avila)

to be strategically located and heavily armed. They were generally built and rebuilt by military engineers.

Presidios, derived from the Latin *præsidium* meaning frontier defensive outpost, were generally landlocked, considerably smaller, and less robust than forts. When initially built in New Spain, they were expected to protect and defend the civilian settlements on the northern frontier of New Spain and the commerce that flowed along the *Camino de la Plata* (Silver Road), precursor to the *Camino Real de Tierra Adentro*. At that time, they may have been manned by no more than a dozen soldiers and officers garrisoned in a small blockhouse. By the beginning of the eighteenth century, the nature of the threat had changed, and the presidios had evolved into much larger rhomboid or quadrilateral structures that included one or more towers, which when fully complimented may have housed as many as a hundred soldiers and officers (Fig. 2).

The new garrisons formed a defensive line from California to Texas designed to keep out native populations to the north and those to south of the Spanish controlled areas. In the case of *presidios* located in the arid lands of northern New Spain, the soldiers and their families lived in and nearby the architectural complex and often engaged in small-scale agriculture and cattle raising outside it to complement their official rations. The troops were of mixed ancestry, the product of several generations of Spanish, indigenous, and African liaisons; some *presidio* soldiers had relations with and sometimes married native women.

Key Issues

Forts

Forts were massive defensive structures designed within the parameters of European siege warfare to defend crucial trade nodes in New Spain such

as the ports of Veracruz, the principal point of access linking the colony to the Iberian Peninsula, and Campeche in the southern fringes of the Viceroyalty, a major source of tropical woods and dye stuffs. The structures visible today were built in the late eighteenth century to replace earlier earthworks that had failed to deter attacks by pirates, buccaneers, and corsairs.

The lack of concerted archaeological research is evident. Excavations have been either subsidiary to the installation of modern infrastructure or auxiliary to the conservation, restoration, and reconstruction of public places or specific buildings.

In New Spain, the wealthiest people lived in urban centers located in the highlands, far from unhealthy port towns. In the case of the port of Veracruz and the San Juan de Ulúa fort, the archaeological record indicates that the construction of inns (*ventas*) on the mainland in front of the fort preceded the construction of the earliest massive defenses. The material evidence also shows that the nascent Veracruz was little more than a shanty town until the middle of the eighteenth century (Hernández Aranda 2006). However, after the harbor and the town were devastated by fires and hurricanes several times, in 1737, orders were issued to construct walls surrounding the settlement and to replace the all-pervasive wooden huts with masonary buildings. The residents of Veracruz did not live in opulence. They were middle- to low-class merchants from Spain and New Spain; store and inn owners; sailors, porters, and soldiers stationed at the fort; and servants, African slaves, and free mulattos. Excavations at residences, inns, a shipyard site, and in the San Juan de Ulúa complex have uncovered architectural fills, leaving activity areas ill defined. The associated ceramics found were largely tablewares: 70 % plates and 15–12 % cups and mugs, but unlike assemblages recovered from mixed deposits in urban centers (Hernández Aranda 2004) such as Mexico City, there were no clear indications of class distinctions.

Although not strictly a fort but a walled city supported by bulwarks and redoubts, Campeche, a town built on an existing pre-Hispanic settlement, has provided a wide range of ceramics including sixteenth century majolica from Spain, seventeenth and eighteenth century majolica from Puebla, and the ever-present glazed or unglazed coarse earthenwares and olive jars. Nineteenth century artifacts underline the role of international trade in Campeches' growth and development (e.g., Ojeda Mas 1998).

Presidios

In the case of *presidios*, their setting and construction ranged from simple adobe houses to walled quadrangles protected by one or more towers and housing barracks, a chapel, officers´ quarters, a smithy, and a gunpowder house. There would have been only one entrance. Often, there was a corral against one of the external walls. Many of the buildings may have been incorporated into, or abutted, the enclosing wall. The exterior walls were almost 2 m high and may have included firing slits and some form of interior bench or walkway that would have given the defenders a height advantage over any potential attacker whether mounted or on foot. They were not provided with canons and generally lacked an interior water source that would have succored them in times of a siege. Luckily, they rarely had to face such an eventuality. Their marauding challengers never, or rarely, saw the need to attack these static bulwarks. They found it easier to avoid them and go after their weak spot: the horse pasture. Due to the arid nature of the local environment and the limited ability to grow fodder on whatever bottom lands that might have been available, the presidios' horses all too often had to be grazed away from the presidio itself where they were exposed to ambush and stampede. It was also easier and more profitable to attack the pasture, leaving the presidial cavalry on foot and at a significant disadvantage until the horses could be replaced (Fig. 3).

Rex Gerald's (1968) seminal study examined and summarized what was known about the architecture and artifacts of the line of *presidios* that extended from California to Chihuahua. Williams (1991), Costello and Walker (1987), and Voss (2008) have studied and summarized

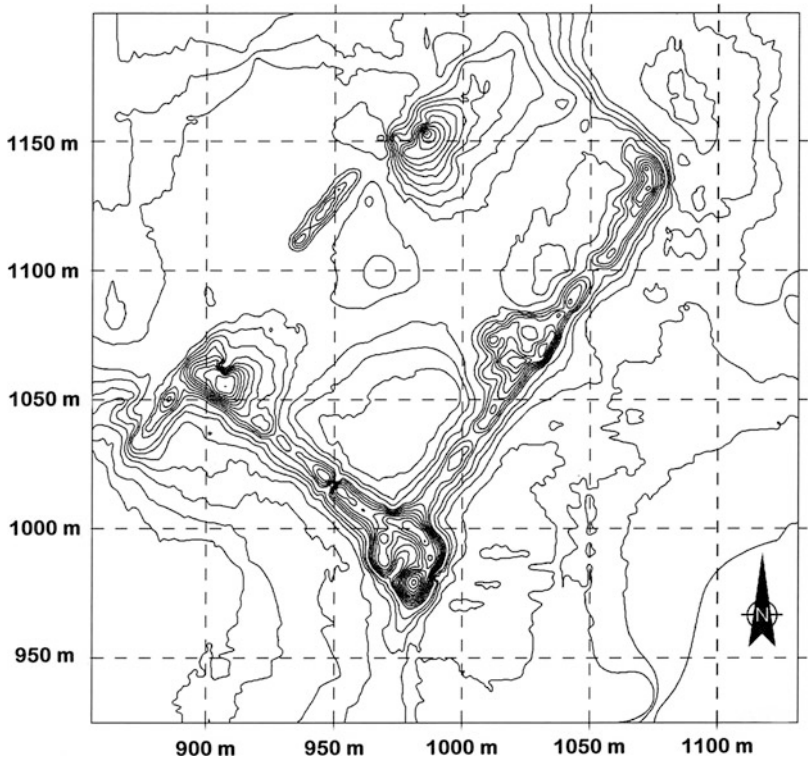

New Spain: Forts and Transport Archaeology, Fig. 3 Topographic map of Presidio El Carrizal, Chihuahua (Brown et al. 2004: 278)

different aspects of the history, architecture, and associated features of military settlements in Sonora, Arizona, and California. Subsequent research has focused on a number of *presidios* across the Spanish Borderlands (e.g., Bense 2004) such as El Carrizal, Chihuahua (Brown et al. 2004), and Aguaverde, Coahuila (Turpin & Eling 2004). Nonintrusive research techniques have included subsurface interface radar, proton magnetometry, and EDM topographic surveys (e.g., Brown et al. 2004). Stratigraphic excavations of architectural features have recorded both construction techniques and materials and helped to identify and interpret activity areas (e.g., Bense 2004; Brown et al. 2004). In a few instances, human burials have been recovered and subject to relevant osteological studies including osteometric analyses of morphological features of crania and teeth (Costello & Walker 1987). Zooarchaeological and macro-botanical remains have also been studied to better understand living conditions and foodways (e.g., Pavao-Zuckerman & LaMotta 2007).

Handwrought and cast-iron items, various metal utensils, glass containers, lead musket balls, gunflints, clothing and personal items, and other material remains have been analyzed (e.g., DiPaolo Loren 2001; Fox et al. 2009). Indigenous, Hispanic, Chinese, and European ceramic wares have been used as chronological markers and have helped to identify the extent and nature of regional exchange systems. Neutron activation analyses were applied to understand the colonial economic adaptation of plain ceramics, lead-glazed wares, and majolica from the Presidio San Francisco district. The results illustrate the development of local pottery production of plain and glazed wares, exchanges between mission sites, and the relevance of imports from Mexico in the daily lives of people of European descent in the fringes of New Spain (Skowronek et al. 2009).

The most common wares were regionally made brown wares produced by both *mestizo* (people of indigenous and European descent) and indigenous groups (e.g., Brown et al. 2004).

While some results suggest there were few social markers in the archaeological record, others suggest that colonists sought to differentiate themselves from the indigenous population through their material possessions (e.g., Brown et al. 2004; Voss 2008). In this case, ethnogenesis provides a theoretical framework to help understand the creation and continual evolution of cultural identities, with special reference to gender and sexuality (Voss 2008).

While the specific ceramic assemblage from each site is distinct, the ceramic assemblage from El Carrizal, Chihuahua would seem to be fairly representative. This consisted of 1,509 sherds of which 80.78 % were regionally produced brown wares, plain (95.32 %), decorated red-on-brown (4.35 %), and burnished tradewares (0.33 %). The plainware vessel forms included jars, bowls, platters, basins, *comales* (corn tortilla griddles), and discs made from recycled sherds. The bichrome wares included jugs, basins, bowls, and jars (Brown et al. 2004). The remaining 19.22 % of the ceramic materials was composed of majolica tradewares from Puebla, Guanajuato, and probably Aguascalientes (8.48 %); lead-glazed ceramics from western and central Mexico (4.31 %) or from northern New Spain (Presidios Green, 4.17 %); British creamware (0.13 %); British and Dutch white wares (0.99 %); Mexican white wares (0.07 %); Chinese porcelain pertaining to the Qing dynasty (0.33 %); olive jars (0.20 %); Tonalá burnished ceramics (0.20 %), from western Mexico; coarse earthenwares (0.13 %); and industrial porcelain (0.20 %) (Fig. 4).

These data indicate that Spanish-tradition ceramics used to display status in urban colonial culture were scarce because of distance, cost, and difficulties in transport. Ceramic forms, dominated by native brown wares, were employed for a variety of culinary, storage, table-service, lighting, and amusement purposes, evidencing the distinct residential character of the military settlement.

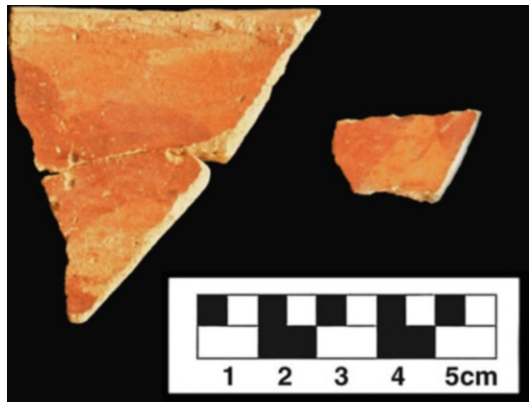

New Spain: Forts and Transport Archaeology, Fig. 4 Indigenous *red-on-brown bowl* fragments from *presidio* El Carrizal

Transport and Way Stations (*Parajes*)

Two groups of sites, the first in the Valle de Maltrata, Veracruz, and the second at Paraje de San Diego, in southern New Mexico, can be used to demonstrate the changes from foot path to bridle path to roadway and on to the introduction of the railroads and expressways.

Valle de Maltrata, Veracruz

The Valle de Maltrata is a narrow crucial pass from the coastal plain of Veracruz to the Mexican Highlands and as such has seen innumerable travelers over the last 5,000 years or more. First, in pre-Columbian Mesoamerica, *tamemes* carried on their backs trade goods and tribute through the mountains. During the colonial period, the introduction of horses, mules, and wagons saw an increase in the commercial traffic and the introduction of cobblestone avenues. Then, in the late 1800s, the railroad replaced the avenue, and in time, the expressway replaced the railroad.

As a result of archaeological surveys, stone-paved sections of several roads in the Valle de Maltrata have been registered. Although details are not provided (Lira López 2009: 140), their width and the use of switchbacks and massive, arched, stone bridges indicate that wagon and mule trains crossed the mountain passes easily. Surface collections recovered in and around the zone where causeways are located date from the early colonial to the modern period. The Early Colonial and Later Colonial period are defined by distinctive majolica types, while the

Modern period is defined by a dramatic increase in metallic artifacts and nineteenth century majolica types (Lira López 2009).

Paraje de San Diego, New Mexico

The Paraje de San Diego is a well-known cluster of sites that includes a camp ground or way station that was used by Juan de Oñate, conqueror of New Mexico, in 1598. Depending on the direction of travel, it provides water before or after crossing the Jornada del Muerto, a 90-km stretch of the Camino Real de Tierra Adentro that lacks adequate water. The ceramic and artifact assemblages (e.g., majolica, lead-glazed pottery, olive jars, Chinese porcelains, indigenous ceramics, glass, and metal) indicate that the site was commonly used from the early eighteenth to the mid-twentieth century; moreover, low percentages of pre-Columbian pottery were found (e.g., Fournier 1999). The research began with a metal detector survey to determine site boundaries which was followed by an intensive surface collection that provided material that also could be conveniently divided into three periods. The subsequent excavation provided a ceramic assemblage of 668 sherds of which the majority of pieces are limited to the period, c. 1650–1680. Forms concomitant with the preparation and serving of food are the most common: soup plates (30 %), bowls (12 %), cups (20 %), and jugs or pitchers *(jarros)* (3 %). Cooking vessels include jars (*ollas*) (24 %) and basins (*cazuelas)* (1 %); water jars are limited to 5 % (Staski 1998; Fournier 1999). The limited morpho-functional variability is a result of the nature of activities carried out at the site, used as a camp for repeated short-term occupation, where food was cooked and served and water was gathered (Staski 1998) by travelers and merchants who transported goods along the Camino Real.

Ongoing investigations include studies of *haciendas* and mining towns along the Camino Real (e.g., Fournier & Blackman 2010) as well as an interdisciplinary and inter-institutional research project – "Cultural Heritage and Identity," codirected by J. Pacheco, P. Fournier, and M.A. Morales – extending from central Mexico to Durango (http://promep.sep.gob.mx/ResultadosConvocatoriasPTC/2012/Redes.htm).

Future Directions

As they develop, the material correlates of the archaeology of forts and transportation in New Spain will provide a better understanding of the daily lives of those that rarely make it into the history books such as the soldiers, stevedores and teamsters, and their families. Each *presidio* was built in the colonial period and reflects both specific local needs and the overarching goals of the viceregal authorities. They share a common cultural sequence defined by the ebb and flow of the viceregal policies and modified by regional political, socioeconomic, and military considerations. However, only a limited number of *presidios* have been partially excavated, and as a result, a concerted effort is warranted to expand the study of forts and transportation before the relevant sites are destroyed by neglect, vandalism, and rural and urban development (Figs. 5 and 6).

Steps have already been taken to address this. In 1994, a cultural, academic, and technical cooperation agreement was signed by the National Institute of Anthropology and History (INAH), the University of New Mexico, and the Office of Cultural Affairs of New Mexico to develop projects related to the research and conservation of the natural, cultural, archaeological, historical, and paleontological heritage of the Camino Real de Tierra Adentro (http://www.oas.org/udse/cic/ingles/web_cic/programamexicoheritage.htm). However, while the idea was to promote Royal Road research, tourism, and dissemination, the impact and results have been limited (e.g., Pacheco & Sánchez 2000).

The Camino Real traverses ten states in Mexico, without counting its eastern and western branches. Most scholars often carry out their work in isolation from their colleagues and seldom join efforts to integrate research results for the understanding of the social, economic, and political past processes associated with this road. In Mexico, archaeological research is governed by federal laws and INAH's guidelines, always privileging the pre-Columbian heritage. Scarce funding is a major problem for the development of interdisciplinary projects with a historical archaeology component that investigate,

New Spain: Forts and Transport Archaeology, Fig. 5 A poorly preserved segment of the Royal Road in Zacatecas. Note the completely vandalized historical marker in front of the electric post

New Spain: Forts and Transport Archaeology, Fig. 6 Ruins of a colonial bridge on the Camino Real, destroyed by a rural road in Zacatecas

document, protect, and promote public understanding and appreciation of the Camino Real.

In anticipation of the designation in 2000 of El Camino Real de Tierra Adentro National Historic Trail in Texas and New Mexico spanning more than 650 km of the Royal Road, a number of archaeological studies – both surveys and excavations – were undertaken. Many of the results have been published in the Bureau of Land Management Cultural Resources Series (e.g., Palmer 1993; Palmer & Fosberg 1999). Since 2003, El Camino Real de Tierra Adentro Trail Association (CARTA), in collaboration with the National Parks Service, the Bureau of Land Management, the New Mexico Department of Cultural Affairs, and various Mexican organizations such as INAH, state cultural institutes, and local universities, has striven to highlight

the importance of the Camino Real de Tierra Adentro and to promote its protection and study, as well as to facilitate the participation, involvement, and understanding of the communities along the trail as they celebrate the many facets of their multicultural and multiethnic history, the traditions of a living trail (http://www.caminorealcarta.org/aboutCARTA.htm).

Most recently, in 2010, 60 historic sites along the Mexican section of the Camino Real de Tierra Adentro were added to UNESCO's World Heritage List. However, most of them have not experienced an increase in tourism or substantial economic development. As mentioned, many historical landmarks continue to be subject to neglect and vandalism. In a country where the tourism industry is a major economic force, initiatives for engaging government institutions in the protection and in-depth study of the sites along centuries-old trajectory of the road, and public involvement through educational and outreach programs to promote the cultural importance to the communities that it served are pending tasks.

Cross-References

- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Fortifications, Archaeology of
- ▶ Fournier, Patricia
- ▶ Heritage Tourism and the Marketplace
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Mexico: Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Zooarchaeology

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Niah Cave (The West Mouth)

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Introduction

Niah Cave is one of a large system of caverns situated at the base of a large limestone massif in the lowland rainforests of Sarawak, Malaysia, and is one of the largest Palaeolithic sites in Southeast Asia. The main archaeological site is the West Mouth, an enormous cavern that links via internal passages to several smaller cave mouths, one of which, Lobang Hangus, also contains Palaeolithic deposits. The West Mouth contains evidence of human activity dating from at least 50,000 years ago until the historic era. The site also contains a long history of human burial dating from 12,000 BCE until 200 BCE that encompasses a rich tradition of depositional practices including flexed burial, secondary jar burial, cremations, and supine coffin burials (Lloyd-Smith 2009).

Niah Cave (The West Mouth), Fig. 1 View looking east into the main E-Series trench excavation areas in the West Mouth. Tom Harrisson and others pictured working on a north-facing section (Image courtesy of Dr. Ipoi Data, Sarawak Museum Image Archive)

The site was first excavated by a team led by the curator of the Sarawak Museum, Tom Harrisson and his wife Barbara from 1954 to 1967 (Fig. 1), by Zuraina Majid in 1977 (Zuraina Majid 1982), and most recently by Professor Graeme Barker, who directed the Niah Cave Project from 2000 to 2003. The aim of the original excavation was the discovery of early human remains following the remarkable discoveries of *Homo erectus* (*Pithecanthropus erectus*) by Eugene Dubois at Trinil, Java, Indonesia, in 1891. The site and Tom Harrisson became world famous with the discovery of anatomically

modern human remains, a skull and tibia, in 1958, that were radiocarbon dated to c. 40,000 years BP (Harrisson 1959). While the original excavation team left extensive records of their work with the Sarawak Museum, a final report on the site was never published.

Key Issues/Current Debates/Future Directions/Examples

Harrisson was innovative at the time for the extensive use of the new radiocarbon dating technique and use of other specialists such as the geologist, Dr Schroder, from the Brunei Shell Petroleum Company, to recover pollen from the cave sediments to understand the Pleistocene environment, and Lord Medway, now Earl of Cranbrook, to analyze and interpret the cave fauna. His wife Barbara, while not a trained archaeologist, ran the excavation during Tom's absences, was present during the initial discovery of the Deep Skull, and professionally directed the recovery of human remains from the extensive and complex late Holocene cemetery also discovered in the West Mouth. A final report on the cemetery excavations was published by Barbara Harrisson in the Sarawak Museum Journal in 1967 (Harrisson 1967).

A major flaw of Tom Harrisson's site interpretation was that he believed sediments had accumulated gradually at a relatively fixed rate of 1 in. (2.5 cm) every 521 years (Harrisson 1958). Harrisson directed excavators to remove sediment in arbitrary horizontal spits, unwittingly cutting through a complex and often, convoluted set of sedimentary sequences. As a result there remained serious doubts among the archaeological community about the veracity of Harrisson's chronological and typological interpretations, leaving Niah sidelined from major archaeological debates in the region (Spriggs 1989; Bellwood 1997).

The Niah Caves Project

The Niah Caves Project (NCP), 2000–2003, was instigated to resolve several unanswered questions about the precise chronology of the site, the age of the Deep Skull, and details of the stratigraphic and cultural sequences (Barker et al. 2000; 2001; 2002a, b; 2003; 2007; 2011). The project was multidisciplinary involving experts in a wide range of fields to address the complex formation history of the site and draw as much information about occupation history from the remaining sediments, while minimizing further physical impact to the site. The NCP investigations recovered a remarkable record of organic remains from the Pleistocene layers of this site, including animal bone, fish bone, mollusks, macroplant remains, starch granules, and organic tools including attached bindings. From these investigations excavators have been able to reconstruct details of diet and hunting technology.

Reanalysis of the Deep Skull determined its age to range between 42,000 and 39,000 years old, based on ABOX radiocarbon dates of nearby charcoal and uranium-series dating of bone fragments from the cranium (Barker et al. 2007). The skull and tibia fragments remain the oldest modern human remains in Southeast Asia. Further radiocarbon dating of charcoal associated with stone tools, burnt bone, and hearths indicates human occupation at Niah from at least 50,000 years ago (Barker et al. 2007; Higham et al. 2008). The recovery of flaked stone below these radiocarbon dates suggests possible earlier occupation, but attempts to date these and lower layers using optically stimulated luminescence were unsuccessful (Stephens 2004).

Organic remains from the site provide a rare insight into the technical capabilities and knowledge of these late Pleistocene foragers. Faunal remains include large numbers of bearded pig, *Sus barbatus*, Malay tapir, *Tapirus indicus*, bovids and sambar deer, *Cervus unicolor*, as well as a range of reptiles, fish, and bats. They harvested freshwater snails such as the gastropod *Paludomus everetti* and the mussel *Ctenodesma borneensis*. Plant foods represented include a wide range of fruits, nuts, and tubers, and these indicated that people were able to detoxify poisonous plants from the Late Pleistocene. After the Last Glacial Maximum, there is evidence that

people may have engaged in burning forest edges to enhance plant and animal productivity (Hunt & Rushworth 2005).

Charred nut fragments included fragments of the toxic plant, *Pangium edule*, recovered in deposits dating from at least 40,000 years ago (Barton & Paz 2007). This plant is deadly to humans if not properly processed; even so fermented nuts remain a popular food today in some parts of Malaysia. From deposits dating to around 20,000 years ago, macro-remains of several yams and tuberous plants were recovered, including the toxic yam, *Dioscorea hispida*, and the aroid known as taro, cf. *Colocasia* elim. *esculenta*, as well as other unidentified tuberous remains (Barton & Paz 2007). Recovery of starch granules from the cave sediments revealed further use of yams including cf. *Dioscorea* sp., as well as the forest aroid *Alocasia longiloba* (Barton 2005). The latter plant is avoided as a food today, as it is considered too itchy, but produces large rhizomes, which could have been eaten in the past. Starch granules of the sago palm *Eugeissona utilis* were also recovered from deposits dating to 40,000 years ago, indicating the use of this palm as a food source at this early time (Barton 2005). These findings show that early foragers had knowledge of useful sources of starchy foods such as yams, rhizomes, and starch storing palms, and they also knew how to detoxify some very poisonous plants.

Bone points were recovered from early Pleistocene contexts, but none have been securely dated. The earliest bone point comes from Trench HR/1 at 120–123 in. (300–307.5 cm) (corresponding to c. 40,000 years ago). Analysis of wear patterns on this point and eight others suggests their use as multifunctional tools, including for crafts like basketry (Rabett et al. 2006). A total of fourteen bone points from Lobang Hangus (a cave entrance on the opposite side of the limestone massif to the West Mouth), dated from 14,000 years ago, were identified as projectile armatures, probably part of a bow and arrow technology (Piper & Rabett 2009: 562). From the West Mouth, bone bipoints, including examples made from the spines of freshwater stingrays, were dated to 12,000 years ago (Barton et al. 2009). Several of these retained traces of hafting resins and fiber bindings. It is thought that these were part of a composite spear technology, such as a multipronged fishing leister.

The lithic technology is relatively informal throughout, consisting primarily of unretouched quartzite flakes struck from river pebbles and cobbles with some use of quartz, chert, shale, and limestone. Organic residue analysis of the lithic technology revealed use of silica-rich plants like bamboo, rattans, and palms from the earliest levels. Several tools from layers dating to around 40,000 years ago had been used to work plant resins, suggesting use as mastics and composite organic tools might date from the earliest periods of human occupation at this site. There is a relatively sudden addition of ground stone, cobble mortars after 17,000 BP associated with an increase in woody ash deposits that might suggest a change in site use intensity at this time. Later Holocene layers contain polished pebble axes and a variety of adzes, but there are no secure dates for the establishment of these traditions in the West Mouth.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Rice: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Vegeculture: General Principles
- ▶ Yams: Origins and Development

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Niah Caves: Role in Human Evolution

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Introduction

The Niah Caves of coastal Sarawak in northern Borneo (N 3° 48′ 54.6, E 113° 46′ 52.3″) have been a subject of archaeological interest ever since the mid-nineteenth century, when the naturalist Alfred Russel Wallace visited Sarawak

Niah Caves: Role in Human Evolution, Fig. 1 The West Mouth of the Great Cave; the archaeological reserve is on the far *right*, immediately in front of the tourist boardwalk visible on the skyline (Photograph: Graeme Barker)

in 1855 to collect biological specimens and, though he was unable to visit the caves, reported their likely significance for anthropological research to Charles Darwin and Thomas Huxley (Sherratt 2002). The 1950s and 1960s excavations of Tom and Barbara Harrisson brought the caves to international attention, especially those in the West Mouth of the Great Cave (Fig. 1), in particular their discovery of an anatomically modern skull that they dated to c. 40,000 BP, the so-called Deep Skull (Fig. 2). Renewed investigations since 2000 have confirmed the central importance of the site for human evolution studies in Southeast Asia (Barker et al. 2007, 2013; Barker 2013).

Definition

The Niah Caves lies within the Gunong Subis, a steep-sided limestone massif close to the northern shoreline of Sarawak. In the 1950s and 1960s, Tom and Barbara Harrisson conducted excavations in many of the cave entrances, but the largest, and most important for early prehistory, were those in the West Mouth of the Great Cave. In February 1958, a team led by Barbara Harrisson discovered in the deepest part of their excavation near the front of the West Mouth (the "Hell Trench") the skull and other bones of an anatomically modern human (Brothwell 1960), its antiquity indicated by charcoal found the previous year near the skull findspot which was dated by the then revolutionary method of ^{14}C dating to 39,820 ± 1012 BP (GrN-1339C; calibrated, the date would be 42,391–45,629 BP) (Harrisson 1958). Other finds indicated that the West Mouth was used for human occupation and burial from the time of the "Deep Skull" more or less to the present day, and their excavations in the other entrances of the Great Cave and other caves elsewhere in the Gunong Subis yielded further evidence for human settlement and/or burial at different periods of the past. The work gave the caves iconic status in the archaeology of Island Southeast Asia as having the longest sequence of human occupation known in the region (though older fossils have since been found elsewhere in the region, e.g., Mijares et al. 2010; Demeter et al. 2012).

For a number of reasons, the Harrissons were never able to publish their excavations in final form, and despite the many interim papers they published, some of their discoveries, stratigraphic findings, and interpretations were controversial. One of the criticisms raised by scholars subsequently was that, given the fact that caves frequently have complex dipping deposits, the excavation method of horizontal spits used by the Harrissons (Fig. 3) was likely to have mixed together material of different ages. Also, a key component of their dating was

Niah Caves: Role in Human Evolution, Fig. 2 (*top*) The discovery of the "Deep Skull." The label to the *left* of the partially excavated skull refers to the location of the charcoal found the previous year and dated to c. 40,000 BP; (*bottom*) the Deep Skull after restoration (*top*) and a modern human skull (*bottom*) (Photographs reproduced with permission of Sarawak Museum)

extrapolation by depth, Tom Harrisson arguing that the most common deposit in the West Mouth, what he called the "pink and white layer," accumulated as a drizzle of sediment from the cave roof at a steady and constant rate, but a simple depth-age relationship in cave sediments ran counter to the experience of most cave excavators. The major question was whether the Deep Skull was really as old as Tom Harrisson claimed. The Malaysian archaeologist Zuraina Majid conducted further smaller-scale excavations in the West Mouth that made a notable contribution to understanding the Niah sequence (Zuraina Majid 1982), but significant uncertainties remained. This was the context for a further program of fieldwork and related laboratory, artifactual, and archival studies (the Niah Caves Project, hereafter the NCP) that began in 2000, coordinated by Graeme Barker (University of Cambridge). The main fieldwork took place between 2000 and 2004, and analytical work has continued ever since, focussed both on materials from the new fieldwork and the rich assemblage of archaeological finds – which include animal bones, human bones, shells, stone tools, bone tools, pottery, textiles, and beads – from the previous excavations.

Key Issues/Current Debates/Future Directions/Examples

The NCP investigations in the West Mouth have defined a series of major geomorphic and palynological phases bracketed by new ^{14}C dates (Gilbertson et al. 2005; Higham et al. 2008; Fig. 4). In the period >50,000–37,000 BP, colluvium (defined as Lithofacies 2C) slid down from the cave lip into a natural basin on its interior side, where it interbedded with silts and clays formed by episodes of streamflow from the cave interior (Lithofacies 2). The climate alternated between warmer and wetter, and cooler and drier, conditions, with corresponding landscape changes between lowland forest, mangroves, and coastal swamps (in the former) and dry montane and lowland forest (in the latter). It became progressively drier and cooler after c. 45.000 BP, though there were still episodes of hot wet climate when lowland rainforest and mangroves developed in the vicinity of the caves. Around c. 35,000 BP, possibly triggered by a major roof fall, earthquake, or very wet episode, there was a major collapse of wet guano (Lithofacies 3) in the West Mouth interior that caused a mudflow

Niah Caves: Role in Human Evolution, Fig. 3 Tom Harrisson excavating in 1958 in the West Mouth of Niah Great Cave (Photograph reproduced with permission of Sarawak Museum)

that filled the West Mouth basin, deforming and covering the existing sediments. Thick sequences of archaeology-rich brown silts (Lithofacies 4) then built up across the front of the West Mouth, forming from soon after the mudflow to the Early Holocene c. 8500 BP. Most of the latter sediments were removed by the earlier excavators but enough remain to indicate that human activities in the Terminal Pleistocene and Early Holocene included the digging of pits and their filling with food refuse. The windblown component in Lithofacies 4 and the associated palynological record suggest an overall trend towards a drier and more open landscape in this part of northern Borneo c. 20,000–10,000 BP, before the hot and wet climate of coastal Sarawak today, and dense rainforest, developed with the onset of the Holocene.

Fragments of the Deep Skull (which belongs to a teenage girl) have been dated using the uranium-series method to about 37,000 years ago (Barker et al. 2007). The NCP has established its likely stratigraphic position within the Lithofacies 2 sediments but has obtained ^{14}C dates on charcoal from *higher up* the profile of c. 40,000 BP. Furthermore, the sediments cemented within the skull are very different from those of Lithofacies 2 in terms of their bulk characteristics, geochemistry, and palynology, and most strikingly include large granite crystals, the nearest sources of which are a considerable distance away in the Rajang Valley and on Mount Kinabalu. The discrepancies in the dating, sedimentology, geochemistry, and palynology are consistent with the skull and its associated long bones (a left femur and right proximal tibia: Krigbaum & Datan 2005) having been in a pit dug down from the Lithofacies 4 sediments into the Lithofacies 2 sediments, i.e., that they are the result of deliberate burial rather than, say, parts of a body dumped on the cave lip that slipped down naturally into the natural basin

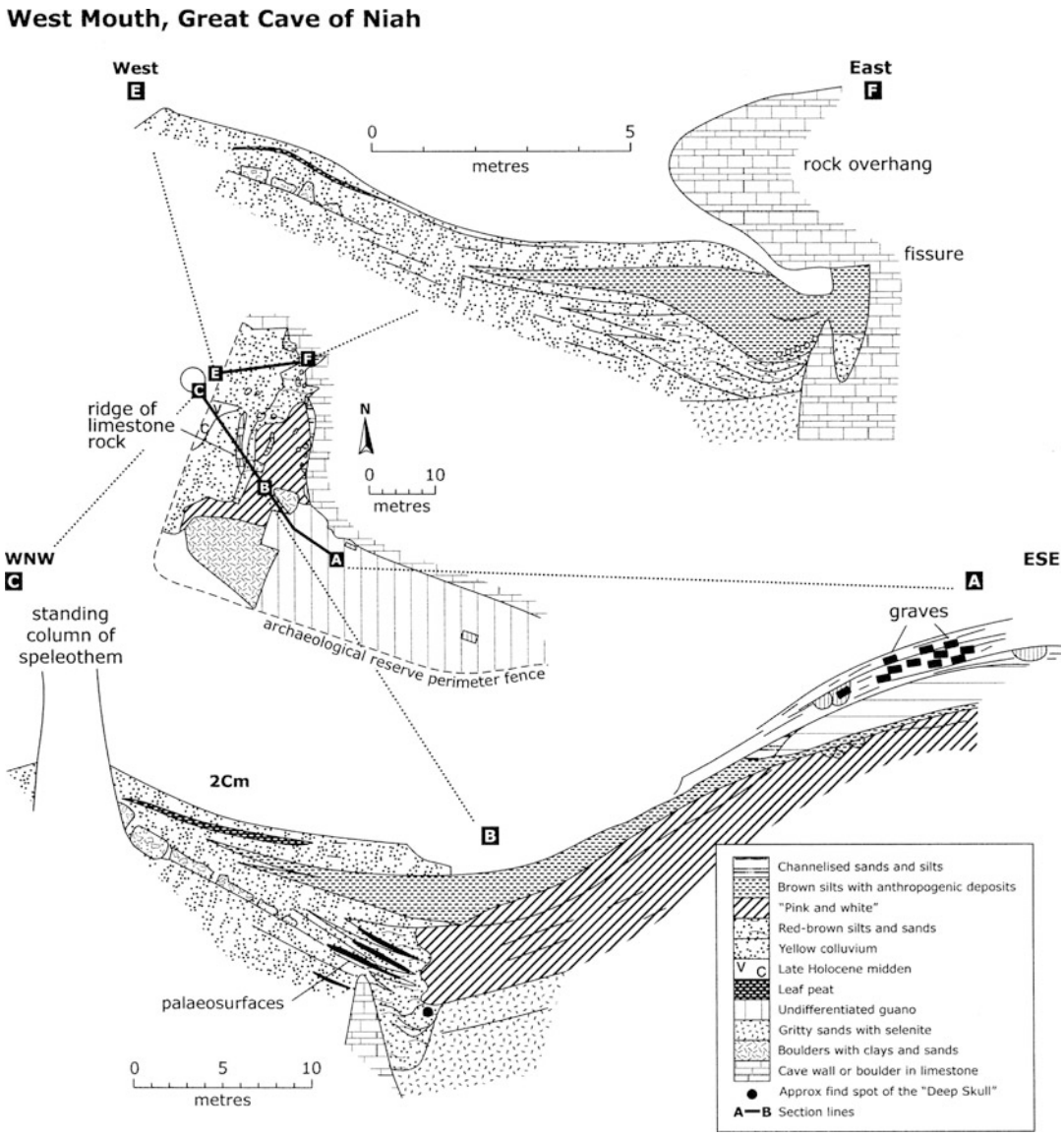

Niah Caves: Role in Human Evolution, Fig. 4 Schematic representation of the Late Quaternary lithostratigraphy of the northern part of the West Mouth of the Great Cave (Revised from Gilbertson et al. 2005). The present surface of the surficial deposits is the result of earlier excavations. Heights are given with reference to the site datum (~50 m above sea level) (Illustrations: Tim Absalom)

behind it and was incorporated in the Lithofacies 2 stream sediments there (Hunt & Barker 2013). An intriguing further hint at ritual activity associated with the heads of the dead is traces of a red wash, probably from a tree resin (Pyatt et al. 2010), on the interior surface of human skull fragments that have been found among the vertebrate fauna from the Harrisson excavations, from the same depths as the Deep Skull.

Evidence for hominin presence in the West Mouth goes back to c. 50,000 BP. Dates of this antiquity on charcoal have been obtained from excavating one of the surviving Harrisson balks (HP/6) in the Hell Trench (Fig. 5), from a series of

Niah Caves: Role in Human Evolution, Fig. 5 Excavating the Harrisson balk HP/6 in the Hell Trench (looking south). The excavator is trowelling one of the ash- and organic-rich layers dated to c. 45,000 BP that form part of the overall body of colluvial sediments (Lithofacies 2C) that dip east into the cave from the entrance lip. A similar organic-rich layer is visible as the white smears in the balk behind him (Photograph: Graeme Barker)

organic-rich "palaeosurfaces" full of charcoal and ash, with occasional humanly struck stone flakes and numerous fragments of butchered animal bone. These palaeosurfaces, formed of organic debris slipping down from the cave lip into the basin within the Lithofacies 2C colluvium, appear to equate to the rich "bone-under-ash layer" that the Harrissons discovered in their basal spits; charcoal samples from the latter, curated in Sarawak Museum, have yielded dates of comparable antiquity to those from the excavated balk. Hominins were regularly visiting the West Mouth from c. 50,000 BP to the period when the Deep Skull was deposited, their visits resulting in the accumulation of lenses of ash, charcoal, and other cultural refuse along the front of the West Mouth entrance. There is no human skeletal material to demonstrate conclusively that these remains were deposited by groups of *Homo sapiens*, as opposed to other forms of hominin present in Island Southeast Asia at this time, notably *Homo floresiensis*, but the identical nature of the depositional activities and material culture in the earliest layers compared with those associated with the Deep Skull makes a very strong case that they were. A 1.5-m deep sounding excavated after the removal of the HP/6 balk, below where it stood, found fragments of butchered bone and a humanly struck jasper flake in the basal context reached, indicating some kind of definite hominin presence before 50,000 BP. This is beyond the range of radiocarbon, and unfortunately, the West Mouth sediments lacked the quartz grains essential for OSL dating, but the finds clearly imply that 50,000 BP can be treated as a *terminus ante quem* date for hominins, almost certainly *Homo sapiens*, in the Niah Caves.

The palynology of the cave sediments, the vertebrate fauna and molluscs from the Harrisson and NCP excavations, and macroscopic plant remains – phytoliths and starch grains – indicate that these hominins foraged around the Niah Caves in a mosaic landscape that included montane forest (on the Gunong Subis massif), open woodland, scrub, lowland dipterocarp rainforest, riparian swamp forest, and mangrove swamp, interspersed with lakes or large rivers, smaller fast-flowing streams, and stagnant ponds (Barker et al. 2007). They especially hunted the bearded pig along with a wide variety of other prey including arboreal species such as orang-utan. There are hints in the age composition of the fauna that trapping or snaring may have been employed as well as spearing. They collected a wide range of molluscs from rivers, streams, ponds, and swamps, and fished these same localities. Some of the most remarkable evidence for the foraging systems of the Niah modern humans is a suite of macroscopic and microscopic botanical remains recovered from the new excavations: nuts, fruits, tissues (parenchyma) of tuberous plants such as yam and swamp taro, and starch grains of sago

palm – plants that needed time and effort in the case of sago (to extract the pith) and in many cases careful processing to remove toxins. Peaks in *Justicia* pollen suggest that people were also burning forest edges to improve the productivity of forest clearings for plants such as tubers (Hunt et al. 2007), a strategy that would have improved their own plant food supply and also attracted animals such as pigs to these locations. Biomass burning of this kind is also known from New Guinea at this time (Summerhayes et al. 2010).

The Niah Caves may not tell us when anatomically modern humans first reached Sundaland, but they provide rich evidence for the latter's presence here from c. 50,000 BP, how they managed their subsistence activities, the climatic and environmental conditions in which they lived, and hints at their ritual lives. To collect the range of fauna and flora represented in the archaeological record of the West Mouth in this period required ingenuity, a considerable degree of targeting, and forward planning. Niah is currently the only site in Southeast Asia and Australia in the 50,000–35,000 BP time bracket with a well-dated human fossil associated with detailed evidence for the behavior of that hominin, and in this case, they are both strikingly "modern."

Cross-References

- ▶ First Australians: Origins
- ▶ Fossil Records of Early Modern Humans
- ▶ *Homo sapiens*
- ▶ Radiocarbon Dating in Archaeology

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Nicholas, George P.

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Basic Biographical Information

George P. Nicholas (b. 1953) knew he wanted to become an archaeologist by the age of eight. His first archaeological fieldwork was during summers as a high school student enrolled in the Franklin Pierce College (New Hampshire) archaeological field school, directed by Howard Sargent. Nicholas received his B.A. in Anthropology from Franklin Pierce in 1975 and his M. A. from the University of Missouri–Columbia in 1978, supervised by William Marquardt and W. Raymond Wood. In 1976–1977, he was the archaeologist for the New Hampshire Water Commission, followed by a short stint as a Research Associate at Phillips Exeter Academy in New Hampshire. In 1978–1980, he did postgraduate research at the University of Maine's Institute for Quaternary Research. From 1983 to 1990, he pursued his doctorate at University of Massachusetts–Amherst under the supervision of Dena Dincauze and was a Research Associate with the American Indian Archaeological Institute, working with Russell Handsman. His Ph.D. was awarded in 1990 for a dissertation on early postglacial land-use patterns and wetland ecology at Robbins Swamp (CT). In 1990, Nicholas with his wife, Catherine Carlson (also an archaeologist), and their two sons moved to British Columbia. Beginning in 1991, Nicholas developed and directed a university-based program in Indigenous Archaeology for Simon Fraser University (SFU) and the Secwepemc Cultural Education Program located on the Kamloops Indian Reserve (Fig. 1). At the time, this was the only postsecondary archaeology program for Aboriginal students in Canada. From 1991 to 2004, Nicholas directed 12 archaeology field schools and numerous research and cultural resource management projects, providing training to several hundred Aboriginal students in a setting where students were always considered part of the research team. Many of his students now work for various First Nations governments or have found full- or part-time employment in cultural resource management, criminal forensic investigations, museums, and other archaeology-related fields. During this time, he was also Project Archaeologist for a 6-year study of Secwepemc People and Plants (directed by Nancy Turner) and a collaborator on the Project for the Protection and Repatriation of First Nation Cultural Heritage (directed by Catherine Bell and Robert Paterson). In 2006, upon becoming a full professor, Nicholas moved to the main SFU campus in Burnaby, BC, where he teaches, among other things, archaeological theory, Australian archaeology and ethnography, and lithic technology (Fig. 2).

Nicholas served as editor in chief of the *Canadian Journal of Archaeology* from 2001 to 2007 and currently is coeditor (with Julie Hollowell) of the World Archaeological Congress *Research Handbooks in Archaeology* series, published by Left Coast Press. He is an adjunct faculty member in archaeology at UMass–Amherst and at Flinders University in Adelaide, South Australia.

Major Accomplishments

Over his career, Nicholas has directed numerous fieldwork and research projects in western Canada and the northeastern United States from academic-based research to community-oriented archaeology training and cultural resource management projects. In the 1970s and 1980s, his primary research interests encompassed

Nicholas, George P., Fig. 1 1991 Secwepemc/Simon Fraser University Indigenous Archaeology Field School, Kamloops, British Columbia: (*left* to *right*) Mel Seymour, Steve Lawhead, Petrina Schooner, George Nicholas, Diane Biin, Dean Billy, Gladys Baptiste, Debbie Jules, Laurie Kennedy, John Jules, Percy Casper, and Donna Dillman (Photo courtesy of George Nicholas)

environmental archaeology and human influences on landscape in the Northeast, with a focus on the role of wetlands on landscapes occupied by hunter-gatherers. His article in *Current Anthropology* (1998) examined this topic from a global perspective, noting how widespread and long-lived the association between humans and wetlands has been and documenting how attention to wetlands reveals significant and often unexpected evidence of distinctive human activities, not found elsewhere. Nicholas also edited *Holocene Human Ecology in Northeastern North America* (Plenum, 1998), which challenged conventional thinking about the way humans influenced and were influenced by their environments.

After moving to British Columbia, Nicholas' interests turned to Indigenous peoples and their involvement with the practice and process of archaeology. In 1997, the edited volume *At a Crossroads: Archaeology and First Peoples in Canada* (coedited by Nicholas and Thomas Andrews) assessed the state of Indigenous-oriented archaeology in Canada in the late 1990s and offered examples of innovative and successful strategies for creating more equitable archaeological practice. This volume was followed by numerous book chapters and conference presentations on Indigenous archaeology (Nicholas 2008), collaborative practice, and decolonizing approaches, as well as an edited volume, *Being and Becoming Indigenous Archaeologists* (Left Coast Press, 2010) with chapters contributed by 37 Indigenous archaeologists around the world, sharing stories of their career paths.

In recent years, a major focus of Nicholas' work has been on intellectual property issues related to archaeology and cultural heritage. His 2004 article "Copyrighting the Past," written with Kelly Bannister, represents the first direct examination of issues concerning

Nicholas, George P., Fig. 2 George Nicholas in Kamloops, BC 1995 (Photo by Shauna Huculak)

intellectual property within the realm of archaeology. In 2007, Nicholas was awarded a prestigious Major Collaborative Research Initiative grant from Canada's Social Science and Humanities Research Council for an international and interdisciplinary research initiative titled "Intellectual Property Issues in Cultural Heritage: Theory, Practice, Policy, Ethics." This 7-year project supports community-based research on a range of emerging heritage issues with the goal of informing practice and policy (see www.sfu.ca/ipinch). Although serving as project director of this major initiative occupies much of his time these days, Nicholas manages to keep up with all of his other interests. While remaining fully rooted in and devoted to the discipline, he has always pushed archaeology slightly beyond its comfort zone to places that foster critical reflection, creativity, and groundbreaking scholarship.

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- ▶ Hunter-Gatherers, Archaeology of
- ▶ Indigenous Archaeologies
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project

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Niemeyer, Hans

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Basic Biographical Information

Hans Niemeyer (1921–2005) was one of the founders of contemporary archaeology in Chile

and was renowned for his contributions to the field of scientific methodology, geography, and the prehistory of the arid desserts and northern semiarid deserts of the country. However, among his many achievements, he is also considered to be the father of the study of rock art. Niemeyer showed interest in these visual artifacts from the beginnings of his passion for the discipline, in an era where the function of rock art was limited to decorating the covers of conference proceedings and other archaeological publications (Niemeyer 1955). He was a hydraulics engineer by profession, a job which led him to travel to the most significant river basins in the country, from the extreme north to Chilean Patagonia. His vocation as an explorer also allowed him to record numerous rock sites and provide the first Chilean rock art panorama at an international level, despite his colleagues' failure to understand the archaeological value of such kind of evidence.

Major Accomplishments

Niemeyer discovered and recorded important rock art sites in the eastern valleys, in Tarapacá, the Atacama Desert, the semiarid north, the central zone, and the Aysén region in the extreme south of Chile. His contributions were not limited to recording as his work also served to establish analytical descriptions, taxonomies, quantitative methods, and the referential styles and interpretation of these visual forms. After 25 years of arduous work in the field, he formulated the first styles by which he organized the enormous range of rock art varieties known for that era.

Although his styles appear governed by monothetic rules, he included other motifs in accordance with the rule of association, a task which allowed him to offer intuitive polythetic classifications. Among these styles several stand out, including the style of *Sierra de Arica* (extreme north of Chile), with its paintings of schematic hunters and naturalistic llamas; the *style of Guaiquivilo*, the fitomorphic engravings, animal and human footprints, and symmetrical figures and curved outlines of which extend widely through the Andean foothills of central Chile (Niemeyer & Weissner 1971; Niemeyer 1972); the *Aconcagua style* with its stylized human figures and subcircular outlines referred to as "signo escudo" (shield sign) (Niemeyer 1964); and his contributions to the Patagonian style characteristic of the South American cone (Niemeyer 1976). The most traditional were the definitions of the *Limarí style* of faces or masks recorded in the semiarid north of Chile (Niemeyer 1979) or the *El Médano style* (coast of Antofagasta), where we observe extraordinary scenes of trawling whales and other marine mammals (Niemeyer 2010).

Niemeyer worked on rock art right up until a few days before his death. Completely blind, and suffering from a lung condition, he worked on his final and most precious work, the rock paintings of the marine hunter-gatherers of Taltal, of the coastal mountain range of Antofagasta (Niemeyer 2010). He passed away before seeing his book of the "El Médano" paintings published, but he completed the task he considered his primary responsibility: to suitably pass on the fruits of his labor.

Cross-References

► Andes: Prehistoric Art
► Rock Art, Forms of
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Nkang: Early Evidence for Banana Cultivation on the African Continent

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Introduction

The site of Nkang (11°19'E; 4°16'N) is located about 10 km east of Monatele, in the Lekie division, and 70 km to the northwest of Yaoundé, Cameroon. It is one of the most northern sites belonging to a group of large Stone to Metal period large settlements recorded in the Yaoundé area.

Excavations at Nkang exposed 11 pits as big as 3–15 m^3 volume. They were clustered and spaced some meters intervals and apparently were not linked to any other archaeological features. These pits were originally dug as wells, which were then filled in with refuse following abandonment. The pits contain admixed soils with broken ceramics, stone tools, iron slags, charcoal, seeds, and faunal remains.

The chronology of Nkang is based on eight radiocarbon dates on charcoal samples recovered from six pits. Three samples recovered from pit F9 were radiocarbon dated between 2850 and 2300 cal BP (800–350 cal BCE with a 95 % level of confidence).

Definition

After a comparative study of the volcaniform phytoliths from modern reference samples of *Musa* species and the two endemic African *Ensete* species (*E. ventricosum* and *E. Giletti*), archaeological volcaniform phytoliths recovered from two pits (F9 and F7NF) at Nkang have been positively identified as deriving from *Musa* (Mbida et al. 2001, 2006). Based on the modern-day distribution of bananas on the African continent (De Langhe et al. 1996), they are assigned to plantain. These volcaniforms were recovered from soil sediments (F9 and F7NF) and in a carbonized organic crust adhering to a potsherd (F9).

Two Musa species, *Musa acuminata* and *M. balbisiana*, played a key role in a complex domestication process that involved intra- and interspecies hybridization and plant translocation and ended in polyploidization, seed sterility, and parthenocarpy. Given that the wild ancestors of the African bananas are not native to the continent, any archaeobotanical find of *Musa* means some form of (proto)agricultural or agricultural practice. Based on modern-day distribution of bananas (De Langhe et al. 1996), any archaeobotanical evidence for Musa sp. in the West African context indicates the cultivation of AAB plantains.

The evidence for plant food production during the 3rd millennium BP is in agreement with the recovering of bones of domesticated sheep and goat from other pits features (Mbida et al. 2000) assigned to the same occupation period as the banana phytoliths.

The archaeo-environmental reconstruction for the site is a mixed of primary, pioneer, and old secondary forests and Savannah settings. This is consistent with climatic phase Kibangian B that started around 3000 years ago and would have caused a retraction and fragmentation of the forested habitats and a possible lengthening of the dry season (Mbida et al. 2006).

Plantains are edaphically much more demanding than other banana cultivars and require easy access to nutrients. The older deposits within the pits at Nkang are enriched in organic matter,

carbonate, and phosphate. Usually, such refuse dumps are located in the backyards of houses and close to settlements. Thus, the archaeological contexts of the phytoliths along with the edaphic and likely paleoenvironmental conditions are all highly suggestive of plantain cultivation in backyards close to settlements, rather than in forest clearings (Mbida et al. 2006).

The findings at Nkang pertain to four major questions in African prehistory (Neumann & Hildebrandt 2009):

- Early contacts between Africa and Asia
- The contacts and exchanges between coastal African and the central part of the continent
- The antiquity of exotic crops in Africa
- The role of banana cultivation in the spread of Bantu-speaking farmers

Key Issues/Current Debates/Future Directions/Examples

Recently, the original morphological criteria used to distinguish *Musa* and *Ensete* volcaniforms have been revised and confirmed (Perrier et al. 2011). These criteria enable the chronological framework for the domestication, evolution, and diffusion of banana cultivars to be anchored, namely, between 6950 and 6400 cal BP at Kuk, Papua New Guinea (Denham et al. 2003), and 2750–2300 cal BP at Nkang, Cameroon (Mbida et al. 2001, 2006).

So far, the Nkang findings have not been replicated at other sites in Africa. Claims for *Musa* phytoliths at Munsa (Uganda), putatively dated to c. 5000 years ago (Leju et al. 2005, 2006), are inconclusive due to problems of chronostratigraphic integrity and phytolith identification. More recent archaeological investigations in southern Cameroon for slightly more recent periods (c. 2400–2200 years ago) substantiate a food production system based on Savannah cereal crops (*Pennisetum glaucum*) in combination with the exploitation of plant resources from primary forests (Neumann et al. 2012). The Savannah cereal component was only possible in southern Cameroon during a drier paleoclimatic event starting around 2500 years ago, likely postdating the bananas at Nkang, that resulted in forest fragmentation and a more marked seasonality. To date, the Nkang findings have not been corroborated by archaeobotanical evidence from other sites in the region.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Bananas: Origins and Development

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Noël Hume, Ivor

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Basic Biographical Information

A prolific writer and one of the founders of historical archaeology in North America, Ivor Noël Hume was born in London on November 4, 1927, studied at Framlingham College and St. Lawrence College in England, spent a brief period in the British Army, and was an assistant stage manager at a London theater. In 1949, he began his archaeological career, joining the staff of London's Guildhall Museum and studying under Adrian Oswald, a pioneer in clay tobacco pipe studies. In 1957, Noël Hume was hired as the first full-time trained archaeologist at Colonial Williamsburg, Virginia, and later became chief archaeologist and director of the expanded archaeology program at Colonial Williamsburg, Virginia, and subsequently the director of the Department of Archaeological Research where he remained until his retirement in 1988. He separated archaeological excavation and laboratory analyses from the Office of Architecture and instituted open-area stratigraphic excavation with grid squares and balks replacing narrow trenching and test pitting done by his predecessors. In addition, he introduced meticulous excavation with trowels and other hand tools (rather than using shovels) and the systematic retrieval and documentation of features and artifacts. This allowed researchers to understand the relationships of buildings to one another and reconstruct Williamsburg's cultural and social history. Hence, the archaeology practiced at Williamsburg is essentially the model for historical archaeology and interpretation practiced today.

Major Accomplishments

His publications, academic and public lectures, and television appearances popularized archaeology and wedded colonial history, archival research, archaeological excavation, and material culture studies into the discipline of historical archaeology. He is a fellow of the Society of Antiquaries of London and served as vice president of the British Society of Post-Medieval Archaeology. The author of 34 major books, monographs, and excavation reports, Noël Hume's achievements include discovering the first traces of England's failed Roanoke Island Colony, excavations at the

seventeenth-century site of Wolstenholme Towne, one of the earliest Virginia settlements after Jamestown, and at Martin's Hundred, where its inhabitants were massacred. In Colonial Williamsburg, he conducted major excavations at the original site of Eastern State Mental Hospital, the James Geddy House and Shop, and rigorously documented site evolution at Weatherburn's Tavern. Three Colonial Williamsburg Foundation reports in 1969 focused on glass, pottery, and porcelain; others included the Weatherburn Tavern, English Delftware (1977), and an array of artifacts (1996, 2005), as well as the excavations at Carter's Grove (1974) and Martin's Hundred (1983). A majority of his fieldwork and artifact studies were undertaken with his first wife, Audrey (1927–1993), his wife of 43 years; in 1994, he married a close friend and colleague, Carol Grazier. In 1993, Queen Elizabeth II of Great Britain recognized his achievements, and he was made an Officer of the Order of the British Empire (OBE) for service to the British cultural interests in Virginia. Noël Hume continues to write and publish on archaeological topics and contributes to the annual *Ceramics in America*. His autobiography *A Passion for the Past: The Odyssey of a Transatlantic Archaeologist* (2010) and the interview with Miller (2011) are significant, enlightening resources.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: Conservation and Preservation
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Corning Museum of Glass
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- ▶ Histories of the Archaeological Discipline: Issues to Consider
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Nondestructive Subsurface Mapping in Field Archaeology

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Introduction

Archaeological *excavation* provides unparalleled detail of past lives, but it is a costly process and destructive to the site under investigation. Cost and respect for the resource means that excavation can only be applied over limited areas. By contrast, subsurface mapping methods can cover wide areas while leaving the site intact (Scollar et al. 1990). These methods, once regarded only as a means of finding sites (prospection), represent now a complementary tool kit for detailed archaeological investigation of a site and its surrounding landscape. The methods provide overviews of human activity and buried structures of archaeological and historical interest in increasing detail over considerable areas. Subsurface mapping also permits the selection of high-potential areas for targeted scientific excavations and provides a broader settlement context for sites already excavated. Recent developments based on high-resolution multichannel near-surface geophysical technology and advances in state-of-the-art remote sensing now permit the cost- and time-efficient spatiotemporal archaeological investigation and documentation of buried features across entire landscapes. This has applications in both research and rescue projects.

Key Issues

The most commonly used ground-based archaeological subsurface survey methods are magnetic, electromagnetic and geoelectric (Gaffney & Gater 2003). Less frequently employed are geochemical methods, the best known being phosphate mapping. Traditionally *surveys* are conducted manually in rectilinear grids using tape measures and survey lines placed on the ground for orientation and facilitating exact sample positioning and spacing. The advent of automated positioning systems in form of *Global Positioning Systems* (GPS) or *total station survey instruments* (TST) permits the rapid high-precision location of *anomalies* (high and low readings) recorded by geophysical instruments. The output of these surveys is essentially a map of these subsurface anomalies in two dimensions, although georadar adds the third dimension by presenting the anomalies in "depth slices" (see below).

Magnetic Methods

Magnetic archaeological survey, also known as magnetometry, is based on the passive measurement of the earth's magnetic field using highly sensitive magnetometer instruments (Aspinall et al. 2008; Becker 2009; Fig. 1). Magnetic archaeological prospection can be used for the detection of ferromagnetic objects, such as iron objects or slag from metal production sites, causing a relatively strong localized disturbance in the earth magnetic field, as well as for the detection of thermoremanently magnetized,

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 1 Motorized magnetometer prospection at the Iron Age site of Uppåkra in southern Sweden using a multichannel Foerster gradiometer array mounted on a nonmagnetic cart (Image courtesy of Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology)

burned archaeological structures, as, for example, hearths, kilns, bricks, or ceramics. The topsoil displays in general a substantially increased magnetization compared to deeper soil horizons and the underlying geological layers, a fact known as the *Le Borgne effect*, which is thought to be based on natural (e.g., forest fires, lightning strikes, oxidation of magnetite to maghemite) and anthropogenic influences (use of fire in prehistoric times). Hence, under favorable geological conditions, it can be possible to successfully locate and map archaeological trenches, pits, and postholes containing prehistoric topsoil in a matrix of relatively lower magnetization (Fig. 2). In order to be able to detect the small magnetic field variations caused by archaeological structures in the presence of a strong earth magnetic field, two magnetometer sensors are placed vertically above each other, resulting in an instrument known as a gradiometer: both sensors measure the effect of the earth's magnetic field as well as any of its temporal variations, which can be caused, for example, by solar activity, while the sensor that is closer to the ground measures the stronger effect of any structures buried within the shallow subsurface. State-of-the-art archaeological magnetic survey is conducted using one or more magnetometers (*fluxgate/Foerster* type, *Overhauser*, or *optically pumped cesium magnetometers*) along measurement transects with no more than 50-cm parallel spacing and 10-cm inline sample spacing. In general, no definite information about the depth of structures causing variations in the magnetic data can be derived from magnetic prospection.

Geoelectric Methods

Geoelectric survey, also termed resistivity or earth resistance survey, is based on the measurement of the resistance of artificially injected electrical currents into the subsurface (Hesse et al. 1986). The electrical soil resistance (or its reciprocal value, the electrical conductivity) is strongly dependent on the presence and amount of soil humidity, pore space, and salt and ion content in the shallow subsurface, as well as archaeological features present, which can cause measureable electrical effects at the surface. Positive features, such as stone walls, contrast with negative features, where the soil filling usually retains a greater amount of moisture. In suitable ground and weather conditions, resistance measurements can be used to locate stone structures, walls, and cavities due to their relatively increased electrical resistance, while filled ditches and pits can show by virtue of their relatively increased electrical conductivity. Geoelectric measurements are generally conducted by injecting an alternating electrical current into the soil using two electrodes. The electrical potential associated with the injected current is affected by an electrically heterogeneous subsurface, which can cause a measureable variation of the electrical potential at the ground surface. Therefore, two additional

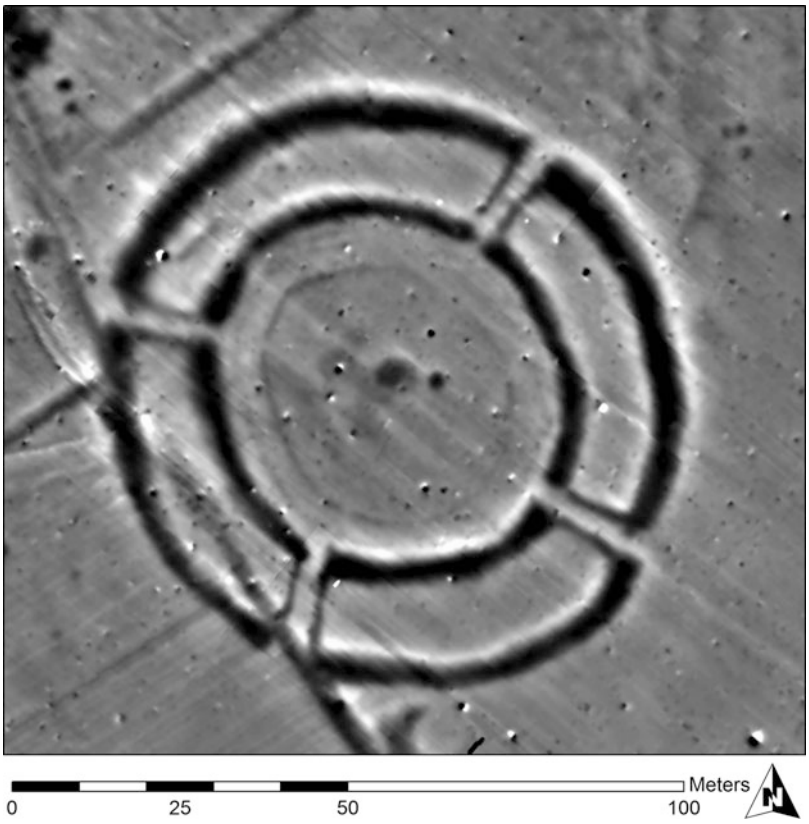

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 2 Magnetic prospection result showing the Neolithic ring ditch of Steinabrunn in Austria measured with a multichannel cesium magnetometer system. The amplitude range of the *gray* scale image is −8/+12 nT (*white*/*black*) (Image courtesy of Wolfgang Neubauer)

electrodes are employed in commonly used four-electrode arrays in order to measure the electrical potential over a fixed distance. At the surface, soil resistivity represents an average of the values along the flow path of the electrical current and is hence called *apparent resistivity*. The depth of investigation is a function of the distance between the current electrodes. By varying this distance it is possible to investigate the change of apparent soil resistivity with depth. Using a linear multielectrode array, it is possible to record the soil resistance with increasing electrode spacing at different depth levels, resulting in a so-called *pseudosection*. Most geoelectric archaeological prospection surveys are conducted manually using a fixed electrode frame or fixed multielectrode arrays with 0.5- or 1.0-m probe spacing, resulting in relatively limited spatial measurement progress. In the UK and in France, experiments have been conducted employing towed carts equipped with spiked electrode wheels. In recent years motorized geoelectric cart systems have been developed in France, permitting considerable spatial coverage rates with three simultaneously measured depths of investigation (Fig. 3).

Electromagnetic (EM) Methods

Electromagnetic (EM) archaeological survey methods comprise magnetic susceptibility, the Slingram method, induction methods, and metal-detecting and ground-penetrating radar (GPR), also known as soil radar or georadar.

Magnetic susceptibility is a dimensionless measure indicating a material's degree of magnetization in response to an applied magnetic field (*magnetizability*). On the earth all materials are naturally exposed to the earth's magnetic field. Using dedicated instruments, sometimes called *Kappameter*, the magnetic susceptibility of soil layers, stones, and objects of archaeological interest can be determined in the field, or soil samples can be taken into the laboratory for measurement. An increased magnetic susceptibility

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 3 Automatic Resistivity Profiling with two ARP(c) systems. The electrodes are the toothed wheels (Image courtesy of Geocarta, Paris)

of soil samples can indicate cultural layers due to thermoremanently increased magnetization. Spatial measurements of the distribution of the soil magnetic susceptibility can thus reveal areas of archaeological activity.

The *Slingram* method utilizes a transmitter and a receiver coil with constant spacing between them. A primary low-frequency EM field generated by the transmitter coil is projected into the ground where it induces eddy currents in electrically conducting objects and materials. These induced currents give rise to a secondary EM field that can be detected by the receiver coil, simultaneously measuring the apparent resistivity and magnetic susceptibility of the ground. The method is used widely for the characterization of soils (*pedology*) and in precision farming. Other EM *induction meters* can be used to locate and map changes in clay content and soil humidity, filled-in trenches, walls, as well as areas of increased magnetic susceptibility, indicating cultural layers, fire places. A typical EM induction meter consists of a rod with transmitting and receiver coils mounted at its opposite ends. The system is carried or towed on a sledge horizontally over the ground along measurement transects. Measurements are usually recorded with an inline spacing of several decimeters, while transect spacing in case of instruments with 1-m coil separation should be around 50 cm. The depth of investigation corresponds to approximately half the transmitter-receiver spacing. Data positioning can be implemented using a global positioning system antenna or reflectors and a robotic TST. State-of-the-art EM induction meters using several receiver coils permit the simultaneous recording of electrical conductivity and magnetic susceptibility of the soil at four depth levels. Using motorized vehicles these systems can cover several hectares per day with 80-cm transect spacing (Fig. 4). A great advantage of the EM method over geoelectric survey (or georadar) is the fact that it does not require a contact to the ground and that it can be used efficiently in environments with high soil conductivity (e.g., wet soils, clay, saltwater beaches, arid regions with high electrical topsoil conductivity).

Metal detectors are manually operated EM induction devices designed for the detection of metal objects in the topsoil and shallow subsurface. In the case of the popular very-low-frequency (VLF) or induction balance detectors, the effect of the oscillating primary EM field generated by the transmitter coil onto the receiver coil is electrically balanced in the absence of

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 4 The DUALEM-21S sensor for simultaneous measurement of apparent resistivity and magnetic susceptibility mounted in a sled, pulled by an all terrain vehicle with DGPS and Lightbar Guidance System (Image courtesy of Wim De Clercq, Gent University)

a nearby metal object. In the presence of a metal object, this balance is disturbed and the machine emits a visual and audio signal. Modern computerized metal detectors permit the discrimination of metals and the cancelation of effects caused by soil mineralization. The depth of investigation of a metal detector for metal objects the size of a coin corresponds approximately to the diameter of the search coil used. In many countries the use of metal detectors is regulated by law.

Ground-penetrating radar is an active survey method based on the reflection of a short electromagnetic impulse off subsurface layer interfaces and structures with differing dielectric properties, such as buried foundations, cavities, and stones in the shallow subsurface (Conyers 2004). A short electromagnetic impulse with a frequency band between 100 megahertz (MHz) and 1 GHz is emitted into the ground from a transmitter antenna located on the ground surface, and the reflected radar signal is recorded by a receiver antenna as function of the time that has passed since pulse emission. Transmitter and receiver antennae are placed next to each other in commonly used soil radar systems. Depending on the pulse frequency, the power of the antenna output and the electrical conductivity of the soil, signal penetration depths between 0.5 and 5 m depth can be achieved. Georadar measurements are conducted along straight transects and measurements are made with close inline spacing of, for example, 2 or 5 cm. State-of-the-art in professional archaeological survey is a transect spacing of not more than 25 cm when measuring with a 500-MHz GPR antenna. Exact data positioning is achieved with help of a distance wheel mounted on the GPR cart or sledge and guidance lines placed on the ground with constant intervals, or through the use of a differential GPS with centimeter accuracy. Modern multichannel georadar array systems (Fig. 5) offer dense high-resolution measurements with as little as 8-cm transect spacing (Fig. 6). Densely measured 2D georadar sections, which can be thought as vertical scans through the subsurface, can be merged into virtual 3D data volumes. Subsequently these data volumes can be cut into horizontal slices, showing structures at approximately the same depth (*GPR depth slices*). Archaeological structures contained in georadar data are often more recognizable when presented in plan view as horizontal depth-slice images. Of all archaeological subsurface methods,

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 5 Motorized GPR survey with the 16-channel MALÅ Imaging Radar Array at the UNESCO World Cultural Heritage site Birka-Hovgården. Data positioning is conducted with the GPS antenna mounted on top of the GPR system (Image courtesy of Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology)

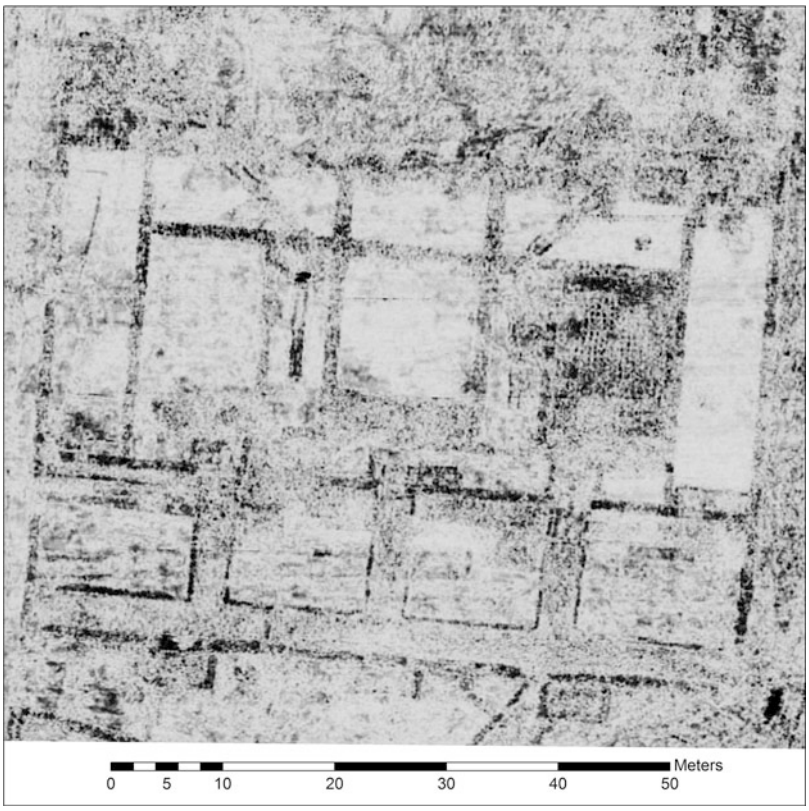

Nondestructive Subsurface Mapping in Field Archaeology, Fig. 6 Georadar depth slice measured with the 16-channel 400-MHz MALÅ Imaging Radar Array (MIRA) with 8-cm transect spacing showing the southern part of the main building at the Forum of the Roman town of Carnuntum. In the high-definition data for the first time the individual brick columns of the hypocaust system under the floor of the easternmost room became visible (Image courtesy of Archeo Prospections®)

GPR generates the largest amount of data and offers highest spatial measurement resolution, horizontally and vertically, and the best chance of assessing the depth of features.

Seismic Methods

Geophysical seismic reflection and refraction methods are only rarely used for archaeological onshore prospection due to the rather time-

consuming data acquisition and data processing involved, as well as due to the relatively low imaging resolution. Special application cases are, for instance, the seismic investigation of the depth to bedrock at an archaeological site, or the nondestructive testing (NDT) of architecture using ultrasound. In marine and underwater archaeology seismic geophysical prospection methods, such as *sonar* (e.g., chirp sonar, side-scan sonar), boomer, pinger, sparker, and *sub-bottom profiler*, are successfully used for the detection and mapping of archaeological and historical structures (e.g., wrecks, harbor constructions) on and below the seafloor.

Geochemical Methods

Geochemical archaeological survey methods are based on the mapping of distribution and amount of specific chemical elements and compounds within the soil for localization and delimitation of archaeological sites, as well as for a more detailed analysis of known sites and the function of subareas (Oonk et al. 2009). Compared to the number of geophysical surveys, the number of reported geochemical surveys is small, due to the relatively slow data acquisition involved. Most commonly employed have been soil phosphate measurements using sample intervals between 1 and 50 m with the goal of locating and delimiting prehistoric settlement sites. Increased phosphate values can indicate the presence of cultural layers of archaeological interest due to the release of phosphate ions during the decay of deposited organic material (occupational waste and manure) and their subsequent binding to soil particles. Other geochemical prospection methods involve the analysis of heavy metals in archaeological soils to identify metalworking sites. Aside from increased phosphate, archaeological soils commonly show anomalous levels of calcium, copper, magnesium, potassium, sodium, and zinc. One concern regarding geochemical mapping for archaeological prospection is the comparability of data values obtained from different soil phases. Geochemical methods are also erosive since samples have to be taken.

Future Directions

Archaeological subsurface surveys all map variations in the physical or chemical properties of the topsoil and the near subsurface. Digital systems generate the maps as gray scale (Figs. 2 and 6) or color-coded raster images located on the local or national grid. The use of Geographical Information Systems (GIS) aids interpretation by presenting these geophysical maps within the context of previous discoveries or modern land use (Neubauer 2004). Improved digital imaging is an important part of current R&D.

The most important parameters affecting the efficiency of subsurface archaeological prospection methods are sensitivity, speed, and sample spacing (Becker 2009). Considerable advances have been made using motorized multichannel systems with GPS positioning and navigation. Understanding of the nature of structures observed in geophysical data is being improved empirically by comparison with the results of subsequent excavations. Research into the visibility of buried archaeological structures using different survey methods continues. Of particular interest in this regard are "ghost" structures visible in the geophysical record that fail to show during subsequent excavation.

Cross-References

► Ireland: Investigations in Advance of Motorway Construction

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Non-Places in Archaeology

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Introduction

The question of "non-places" in archaeological research is likely to evoke strange reactions from archaeologists and non-archaeologists alike. In both a practical and discursive sense, archaeology is in the very business of *making places* as it substantively engages in processes of materializing and articulating the absent, the forgotten, the concealed, or even the excessive (Buchli et al. 2001: 171). Namely, archaeology articulates these undisclosed figures and processes as distinctive places, what we have come to understand as archaeological sites and "the past."

How, then, are we to understand the archaeology of non-places? The term "non-place" used by archaeologists comes from the French anthropologist, Marc Augé, who views non-places (*non-lieux*) as an opposite polarity to "anthropological places," which are generally regarded as localized, organic, familiar, known, occupied, and meaningful to both occupants and observers (Merriman 2004). Places come into being through the ongoing negotiation of social relations, shared histories, and identities (Augé 1995). While non-places take part in this negotiation, they represent the negative polarities of such processes. Moreover, for Augé, non-places and their proliferation are a distinctive characteristic of supermodernity and include spaces of transit or faceless transaction that tend to evoke feelings of isolation, detachment, and suspension. In short, non-places appear to lack a sociality characterized by a sense of rootedness, attachment, and belonging.

Evocative of transience, suspension, and unrootedness, non-places orient the archaeological gaze towards the abject, the subaltern, and the marginalized. These subjects are often viewed as the embarrassing underside of history and society, as they remind us of humanity's failings, malice, and brutality; they also evoke feelings of alienation, isolation, and willful forgetting. Histories of the abject and dispossessed often dissolve into non-places – the scars or ruins of modernity (or history) – because they inspire little if any personal or collective investment in them (Moran 2004). But the material record does maintain traces of such histories and archaeology stands to offer a unique perspective into those histories of human society and culture largely neglected by or inaccessible to discursive productions of scholarly analysis.

The archaeology of non-place, then, marks a critical turn to actively incorporate histories of the subaltern and dispossessed into the field of archaeological knowledge. While the concept of "non-place" has particular resonance with those who study the archaeology of the contemporary past or present (Gonzalez-Ruibal 2008; Harrison & Schofield 2010; Harrison 2011), its application need not be limited to examinations of the twentieth and twenty-first centuries. Processes of exclusion and marginalization as well as experiences of alienation and isolation are not restricted to the (post/super) modern experience. They are a part of almost every "complex" society. We might therefore refigure the concept of non-place in terms of the more general idea of an archaeology of alienation articulated through material, social, spatial, and temporal vectors. This specific attention to subaltern histories provides a fuller archaeological accounts of the past and gives the discipline some political teeth in its accounts of the historical past and the present.

Key Issues/Current Debates

Augé's Non-lieu

We should begin by revisiting Augé's specific idea of non-place and why it has gained some traction in archaeological circles. While the term "non-place" has appeared in many, it is a concept that has received much critical attention and has received much criticism, much of which is valid and some of which likely derives from miscues from the peculiar style of this particular ethnographic project. Merriman notes that *Non-Lieux, Introduction à une anthropologie de la surmodernité* (1992) should be taken as a form of self-analysis through a fictional style of ethnological writing (2004: 149). With this project, Augé does not seek to present multitude of potential experiences. With reductive simplicity, Augé states: "If a place can be defined as relational, historical and concerned with identity, a space which cannot be defined as relational, or historical, or concerned with identity will be a non-place" (Augé 1995: 78). His analysis focuses on spaces of transit – airport lounges, motorways, theme parks, supermarkets, and motels – that he sees as coming into experience and memory only partially formed. These are non-places, material, physical, and inherently transitional.

Contrary to Augé's Pierre Dupont in fluid movement, there are many who would not experience these spaces as non-relational, nonhistorical, or sites of non-identity. There are also places where people get stuck, sometimes to the extent that they become suspended in (and in some ways defined by) their denied access to history, social relations, and identity. Augé's style of semi-fictional, ethnological self-analysis asserts one perspective over numerous other possibilities, including those that would foster a more habitual, long-standing engagement with these spaces. Given this limited vision, Augé's conceptualization of the non-place has been criticized as being conceptually blunt and lacking the nuance necessary to address the heterogeneous complexity of sociomaterial forms, relations, and networks (see Merriman 2004: 147-52, Latour 1993: 100-1). Despite this limitation, Augé, in the end, does retreat from a blunt opposition between place and non-place. Rather, he underscores the co-constitutive play that defines the relationship between the two: "[non-place] never exists in its pure form; places reconstitute themselves in it; relations are restored and resumed in it . . . Place and non-place are rather like opposed polarities: the first is never completely erased, the second is never totally completed; they are like palimsests on which the scrambled game of identity and relations is ceaselessly rewritten" (Augé 1995: 78-9).

The often quoted definition of non-places as "non-relational, non-historical and not about identity" is therefore misleading. Non-places are not relationally and socially bereft; rather, they provoke and enable modes and socialities of dwelling-in-movement or dwelling-in-betweenness as a counterpoint to dwelling-in-place (see also Sekedat & Aldred 2011). As Augé states, "a person entering a space of non-place is relieved of his usual determinants. He becomes no more than what he does or experiences in the role of traveller, customer or driver" (1995: 103). But this description of non-place assumes that the "social game" is always being played elsewhere, namely, in a place (Augé 1995: 111). However, the "gentle form of possession" one might experience in non-places – what Augé describes as identity-loss – is not always temporary or gentle. Those non-places that delineate the margins rather than the articulating nodes of society – slums, refugee camps, tent towns, clandestine detention centers – can suspend their dwellers in a long-term or even semipermanent state of transience and negation. For pavement dwellers, slum residents, refugees, and numerous others, dispossession becomes a significant part of their identity and relations.

In a sense, non-places produce non-persons – those stripped of the basic social "determinants" that allow their full recognition by the state and other members of society. In some cases this stripped state is not merely temporary. Abject non-places differ from locations such as airports, transit systems, and shopping malls in the sense that their "visitors" do not engage in contractual relations with such spaces or the powers that

govern them (see Augé 1995: 101). There is no checkout counter, toll booth, or passport control from which one can "retrieve" and assert his or her identity, reclaiming the rights and recognition it entails. The camp, slum, or detention center is often marked by the lack of contractual relations. Here, the contract is null and void. Transience, suspension, and nonrecognition become a way of dwelling (in relation to the governing powers and normative practices), and the non-place takes on place-like qualities, where "travelers" are forced to grow roots, as it were. Non-places at the social, economic, and political margins critically demonstrate how the interplay of place and non-place articulate complex, heterogeneous, and dynamic constitutions of social spaces and agents.

Examples

Contemporary spaces of the abject and the dispossessed perhaps have most captivated the archaeological gaze focused on the present day. Not trivially, it is in the examination and constitution of material traces of the abject, alienated, and subaltern that marks a critical archaeological contribution to contemporary culture studies (Buchli et al. 2001; Buchli 2007; Harrison & Schofield 2010). Archaeological expertise is not just about locating and illuminating a distant and remote past. Rather, on a more general level, it is about uncovering that which has remained unspoken, hidden, or overlooked. Unlike other disciplinary forays into contemporary material culture studies that tend to aim at discursive forms, archaeology, by necessity, has become adept at negotiating the non-discursive, quotidian traces human activity. This focus is critical: through the archaeological attention to non-discursive, taken-for-granted activities, "the archaeological act comes directly into contact with the subaltern, the dispossessed and the abject" (Buchli et al. 2001: 14). Buchli and Lucas critically remind us that the realm of discourse (and the realm of most scholarly work) is the realm of the enfranchised, whereas the non-discursive realm of the quotidian and taken-for-granted often leaves the only traces of subaltern activities and experiences (Buchli et al. 2001: 14). In the study of the contemporary past, archaeology can uniquely examine and help constitute the histories of those people whom society pushes to the margins. Indeed, many scholars argue that given this distinctive position, archaeology has a particular obligation to bring to light those obscured and often painful pasts that haunt contemporary life, and a responsibility to the individuals, communities and institutions implicated by archaeological work to help them come to terms with their recent hidden histories and ongoing circumstances (Buchli 2007; Harrison & Schofield 2010: 9, Zimmerman et al. 2010).

An emergent archaeological subfield now focuses on spaces of the abject or the "scars" of modernity (Gonzalez-Ruibal 2008), such as mass graves and genocide (Crossland 2000, 2002; Funari & Zarankin 2006, Ferrandiz 2006; Gonzalez-Ruibal 2008); landscapes of war and conflict (Schofield 2005, 2009; Saunders 2007); concentration camps (Kola 2001, Myers 2010, Myers & Moshenska 2011); the homeless (Zimmerman & Welch 2006), the welfare state (Harrison 2009), abandoned buildings, parks, and towns (Edensor 2005; Pringle 2009; Andreassen et al. 2010), and places devastated by disasters (Gould 2007). These are non-places of the recent past and present, but both have a distinct orientation towards articulating a particular history of the modern condition. Many of these engage with and extend studies of the "contemporary past" (Rathje 1979; Gould & Schiffer 1981; Buchli 1999; Graves-Brown 2000; Buchli et al. 2001; Rathje & Murphy 2001) and combine conventional archaeological methods and analyses with those from ethnography and textual, material, and visual culture studies. Oftentimes, there are explicit political projects underwriting the study of modernity's detritus and failures, whether it is putting archaeology to work as bearing witness to an abject, forgotten past, or as a kind of therapeutic project in reconciliation and retribution or as a political commentary on the conditions and issues of the present (Harrison & Schofield 2010: 149). In this arena, archaeology gains political teeth and social

relevance and, in many instances, aligns itself with social justice and heritage ethics.

The challenge of non-places also brings attention to the noninvasive methodologies of archaeological analysis and how they can be uniquely employed in the study of the present. Archaeological non-places are not just abandoned ruins and uninhabited sites hiding in plain sight (Harrison & Schofield 2010). They are, of course, also inhabited. Indeed some archaeological methods combined with new technologies can be used to examine physically inaccessible sites. Adrian Myers has used Google Earth to track the growth of Camp Delta at Guantanamo Bay, demonstrating how traditional archaeological analyses combined with satellite imagery can quantify the material manifestations of secretive government policies (2010). When applied towards challenging official governments statements, the use of such viewing technology can serve to democratize the "panoptic gaze" traditionally reserved for the powerful (Bernbeck 2008); importantly however, Myers reminds us that it also produces an essentially distancing and potentially dehumanizing perspective and thus should be used ethnically, ideally in concert with other more intimate, on-the-ground archaeological techniques (Bernbeck 2008). On the flip side, archaeologists are also employing standard archaeological methods such as survey, mapping, photography, and artifact collection to study transiently inhabited sites such as Black Rock City at Burning Man (Carolyn L. White) and the sites and material culture of undocumented migrants crossing the southwest American border (Jason P. de Leon).

Future Directions

From Augé to the archaeologists that have mobilized his concept, the non-place appears as a distinctly modern or contemporary feature of society. However, I would argue that a theory and politics of non-place could have a much broader application in archaeology. What is common in all accounts and applications of the non-place are notions of alienation and suspended recognition that take on spatial and material entailments. Non-places, past and present, direct our attention to those histories that often lie outside the lines of traditional archaeological inquiry – the more visible hegemonic and normative practices and structures. And yet, as Victor Buchli, Gavin Lucas, and others have persuasively argued, archaeology is uniquely equipped to deal with the unarticulated histories of the dispossessed and subaltern. Furthermore, such histories provide important and evocative counterpoints to dominant historical modes and narratives we have so far produced and stand to provide a richer and more balanced picture of the human condition in various times at various places.

Archaeology has made some notable strides in this general direction. For decades, many researchers have increasingly pursued archaeologies "from below." Many projects now form research questions around and implement methodologies to analyze quotidian activities and practices, and there is an expanded focus on "non-elite" and non-monumental structures and sites. But these projects still maintain a distinct focus on normative, dominant structures rather than on the subaltern and alienated. The question then is how might one locate a non-place (which may or may not have been materially enduring) in the archaeological record, especially in the absence of written records and archives that may have marked its existence? If we are speaking of locating sites such as ancient detention areas, or refugee camps, then it is often a matter of luck (for example, the fortuitous finding at Vindolanda during the 2011 excavations). But merely locating such "non-places" is not tantamount to an archaeology of non-place. Rather, it is a particular kind of (postcolonial) attention to the analysis of human activity that constitutes such a project.

Attending to the pasts and histories of those at the social margins, embraces a certain kind of postcolonial logic and also stands to provide a more resonant and fuller account of the past. While articulating the histories of the subaltern and abject in ancient times may lack the political urgency of similar projects focused on the present (there is no chance of generating strategies for political change), these histories nonetheless may testify to the lives and conditions of persons from diverse sectors of society but also

complicate and challenge our current understandings of ancient hegemonic forms. Just as detention centers, homeless camps and abandoned theme parks reveal the abuses, inequalities, and failures of modern societies and thus contribute to a more balanced view of modernity; the study of past non-places may similarly provide more nuanced accounts of ancient life and societies.

An archaeology of non-place thus requires a shift in perspective and mode of intellectual inquiry. Following Ian Lilley, subaltern and marginal histories should not only be articulated and investigated; rather, it is also a matter of "moving the interests of the periphery to the center" (2011: 142). This shift should not only apply to contexts of the recent or contemporary past. Rather it should inform the archaeological project more broadly. The greater value of doing an archaeology of non-place lies in the way it stands to fill in some discursive "blind spots" of traditional archaeological knowledge. What interpretive possibilities emerge when we focus our analytical gaze first on the place of transit, the slum, the ludic object, or daily practices of the dispossessed? Situating the spatio-material entailments of alienation at the center of archaeological inquiry does the double work of compelling researchers to ask why certain places, objects, and narratives have been written out of history while at the same time asserting their right to be "recorded" in the archaeological record.

Within archaeology, Augé's concept of non-lieu connects sites of transition, movement, and in-betweenness to states of alienation, abjection, and dispossession. Given the unique expertise of archaeology in dealing with non-discursive material traces and remains, the discipline has a certain obligation to further pursue and develop its interpretive sensibilities to include those pasts and histories which have been historically excluded.

Cross-References

- ▶ Archaeology and Politics
- ▶ Internment and Prisoners of War in Historical Archaeology
- ▶ Postcolonial Archaeologies
- ▶ Supermodernity and Archaeology

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Nonstructural Sites: Monitoring

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Introduction

After the initial inventory of an archaeological site, periodic visits may be required to determine that the site conditions have not been altered by either naturally occurring events or by human intervention. Although the methodology of inventory is often outlined in considerable detail, the techniques of monitoring sites are much less rigorously defined.

Definition

Nonstructural archaeological sites include a vast array of cultural remains which are not buildings or structures. Rock art sites, battlefields, mounds, flint quarries, and painted caves are common examples of nonstructural archaeological resources. Many of these sites are located below the ground surface, and their significance is unknown until appropriate analysis can be conducted.

Key Issues/Current Debates/Future Directions/Examples

The laws, policies, and regulations that are the basis of historic preservation are usually outlined in considerable detail by the national, state, or tribal entities which manage them. A considerable body of information, guidelines, and procedures is available in the professional literature (National Park Service 1983; Hardesty & Little 2000; King 2000). The legal frameworks that constitute tribal, state, and national preservation programs clearly specify requirements for the identification of sites for eligibility to various lists. Inclusion on these lists elevate the sites to national or international status for the recognition of outstanding cultural value to society. Two examples of such programs are the National Register of Historic Places in the United States (NRHP) (National Park Service 2002) and the World Heritage list maintained by the United Nations Educational, Scientific and Cultural Organization (UNESCO World Heritage List n.d.).

Because of the wide variety of nonstructural sites, environmental conditions, and possible impacts, a single set of monitoring criteria is not feasible. Those who seek guidance in formulating monitoring practices will find considerable information on the inventory techniques but little information on monitoring. In many cases, monitoring is perceived as a one-time effort in conjunction with construction or earth moving to identify cultural resources. Literally thousands of nonstructural sites have been identified in preparation for highway construction, damming of waterways, encroachment of suburbs, etc., but the results have been primarily "salvage archaeology" and not monitoring in the strict sense. Land modification by grading and earth movement is particularly damaging to small surface sites. Many members of the public may not be aware of the historic preservation laws and not fully understand the damages their own actions may do.

In other cases, monitoring consists of posing security personnel at the sites, primarily to curtail looting and vandalism (UNESCO Cultural Landscape and Archaeological Remains of the Bamiyan Valley n.d.).

The reason for this is that a far greater number of sites are seriously damaged or destroyed by human actions than by natural processes (Wood & Johnson 1978; Wildesen 1982).

The need for systematic monitoring is frequently mentioned in requirements to protect historic/archaeological properties, but is not discussed in detail. Given limited funding, many programs focus their monitoring efforts on a very narrow range of highly sensitive and/or highly visible sites, such as rockshelters, rock art, mounds, cemeteries, and battlefields that are primarily threatened by looting and vandalism. Such efforts may (depending on field protocols and data management) be adequate for those sites, but such highly selective monitoring is not really sufficient for compliance with the intent of relevant historic preservation law. Extended site monitoring is thus often seen as an activity that is important but less critical than site discovery and evaluation.

One innovative monitoring program in the western United States seems to be working well. This program, called SITEWATCH, is currently being used by several US government entities including the National Park Service, the US Forest Service, and the Bureau of Land Management (New Mexico Historic Division 2007). Sitewatch recruits and trains volunteers from the public sector who then are assigned particular sites to monitor. Participants provide their own transportation, cameras, and other equipment and try to visit the site on a regular basis. After each visit, a short form and relevant photography are submitted to the managing agency. This program shifts some of the financial and labor costs from the managing agency to the volunteers.

The US military manages thousands of hectares of land containing cultural resources. The US Corps of Engineers has developed criteria and protocols which address how to best monitor archaeological resources (Department of the Army US Army Corps of Engineers 2009). The focus of their guidelines is to detect changes and mitigate damage. Also addressed is perhaps

the most difficult part of monitoring which is data management. The rapid technological changes in global positioning units, digital cameras, high-resolution photography, and custom software can make compatibility across time and computer platforms difficult.

A particularly sensitive environment is that of caves in which drawing or paintings are located. One cave in particular which has received considerable recent attention is that of Lascaux in France. Discovered in 1940, it was opened to the public in 1948 and up to 100,000 visitors per year entered the cave to view the magnificent paleolithic paintings. Over the years, several species of fungi, algae, and mold have been transferred from visitors or equipment to the atmosphere of the cave and consequently to the cave walls and paintings. In addition, lint and other organic materials are shed by visitors as they move through the cave environment. Lint, dead skin cells, and other organic materials act as a food source for microorganisms (Jablonsky et al. 1993).

By 1963 changes of airflow, relative humidity, and aggressive growth of microorganisms ultimately lead to the closure of the cave to general visitation, and a replica of a portion of the cave was created nearby. The lessons learned from this have lead to the closure of a number of painted caves to the general public. Some cave environments are so delicate that general visitation by the public will never be feasible without significant detriment to the resource (Bradshaw Foundation n.d.). Conversely, caves such as the World Heritage Site of Sterkfontein which are devoid of significant rock art are routinely visited without damage to the resources which, in this case, are remains of ancient hominids (UNESCO Cradle of Humanity n.d.).

A successful monitoring program requires a significant commitment of both time and money. Many monitoring programs are managed by tribal, state, or national entities where personnel and budget constraints may curtail or even eliminate a monitoring program. A successful monitoring program will identify goals, possible impacts, and treatments, develop appropriate forms for recording conditions, and identify standard operating procedures. Baseline and routine monitoring procedures will be established and documented. There must be written protocols for the use of electronic equipment (digital cameras and global positioning units) to assure the uniform and consistent acquisition and management of data.

The proliferation of devices such as smartphones and electronic tablets makes monitoring information easier to acquire, and these data can often be imported directly into existing programs and files. Regardless of how the data are acquired, they should be backed up on a routine basis and a copy of all data should be stored off-site. One new feature of the Internet is the concept of the "cloud" which allows data to be stored on an external server on the Internet. Authorized personnel can then retrieve and edit these data. Since the software used to manage data will probably be revised and updated over time, the data must also be kept up-to-date. Standard off-the-shelf software programs should be used to insure a smooth transition in the event key personnel are moved or new computer systems are acquired.

Cross-References

- ▶ Atlantic Ocean: Maritime Archaeology
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Norms of Quito (1967)

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Introduction

The document known as Norms of Quito is the outcome of an experts meeting convened by the Organization of American States (OAS) between 29 November and 2 December 1967, held in the capital city of Ecuador, to discuss on the preservation and utilization of monuments and sites of artistic and historic values of the Americas, especially those located in Latin America. Since the document can be considered a milestone in the evolution of the theory and practice of heritage conservation, the central purpose of these notes is to highlight the main aspects introduced and developed in the Norms of Quito. In order to better understand its significance, it is necessary to shortly explain the context in which it was conceived, both in terms of the situation in the Americas and in the field of monument conservation and restoration.

Definition and Key Issues

The Organization of American States was created in 1948; among other purposes, it seeks to promote social and economic development, fostering dialogue and strong relationship among the countries of the Americas. In 1961 the USA launched the program Alliance for Progress with the aim of canalizing the economic and social assistance of the country to Latin America. One of the main meetings promoted by OAS over that period was held in Punta del Este, Uruguay, in April 1967. The final document stresses the compromise of reinforcing the objectives of the Alliance for Progress and, among other issues, the economic integration and industrial development of Latin America, the multinational action for infrastructure projects and educational,

scientific, and technological development. Among the aims of education, it is explicitly cited to create or reinforce the services of conservation of the cultural heritage. In this framework, it is possible to state that the Norms of Quito are a typical product of the period; the idea of economic and social development was crucial at that time; the document places cultural heritage as a resource to reach that goal.

Up to the 1960s, just a few international meetings on conservation of monuments and sites had been held. The first international document on heritage conservation is the Athens Charter of 1931; in 1964, a second International Congress of Architects and Technicians of Historic Monuments was held in Venice. The outcome of that meeting is the international charter for the conservation and restoration of monuments and sites, known as the Venice Charter, which sets out doctrinaire and theoretical principles that guided technical interventions over the last 50 years. Another result of the Venice meeting was the foundation, 1 year later, of the International Council on Monuments and Sites (ICOMOS), the main worldwide nongovernmental organization which deals with heritage protection and conservation.

The Venice Charter, one of the milestones in the evolution of the theory of conservation and restoration, is a short text elaborated by experts and addressed especially to experts. The document of Quito completes the ethical contents of the Venice Charter with operational principles oriented to the utilization and enhancement of monuments and sites of historic, archaeological, and artistic values. Maybe the most important conceptual idea is that monuments and sites constitute economic resources in the same sense as the natural wealth of the country, and they can become therefore instruments for development and progress. The document introduces a series of concepts that anticipate the idea of "integrated conservation" that would appear in the 1970s: not only technical aspects are considered but also economic, social, juridical, and administrative. The necessity of integrating conservation of monuments and sites in the framework of national territorial planning and the active participation of communities are stressed. In this sense, it is a document addressed to a wider audience than the Venice Charter and, especially, to decision makers related to public policies, planning, and economic development.

The idea of utilization of monuments and sites had been cited in the Venice Charter when setting out that "*the conservation of monuments is always facilitated by making use of them for some socially useful purpose*." The Norms of Quito further explores this aspect and makes usability of cultural heritage one of the main topics of reflection. Monuments and sites must fulfill a social function. The idea of "enhancing" is introduced in the sense of making maximum use of existing resources; the proposal is incorporating economic potential, "*making an exploited resource productive*" by a process that enhances its historic or artistic significance and "*raises it from exclusive domain of erudite minorities to the awareness and enjoyment of the masses*."

One of the main sections of the document is dedicated to monuments and sites as tourist attractions. Even if there were some previous documents that dealt with the relationship between cultural heritage and tourism, the Norms of Quito anticipate one of the main issues that arouse in the field of heritage conservation and management over the end of the twentieth and the beginning of the twenty-first centuries, when tourism appears as an extraordinary economical force that has both positive and negative impacts on cultural assets. The document of Quito establishes that tourism can contribute to raise awareness on the importance and national significance of monuments; together with adequate restoration and maintenance, infrastructure works are also required to complete the travel plant of a region.

Current Debates

Forty-five years after the meeting of Quito, the situation of the countries of the Americas, the evolution of theory and practice of heritage

conservation and management, and the very concept of cultural heritage have considerably changed. It does not mean, nevertheless, that the Norms of Quito should be considered only a historic document, a step in the evolution. Some of the issues introduced in 1967 are still a matter of reflection and debate; some of the situations regarding the lack of adequate protection or management of cultural heritage can still be observed, not only in Latin America but also in other regions of the world. The relationship between cultural heritage and sustainable development is at the center of the current debate and was proposed by UNESCO for the commemoration of the 40th anniversary of the World Heritage Convention in 2012. When reading the Norms of Quito today, it becomes evident that, although the document was conceived taking into account especially the situation of the Latin American countries, the approach and principles can be applied to different geo-cultural contexts and most of them are still valid. It is a document that can be revisited because it is still a source of inspiration for reflection on how to adequately manage cultural heritage.

Cross-References

- ▶ Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO

Further Reading

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North Africa, Roman

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Introduction

North Africa was a remarkably prosperous territory throughout its ancient history and under Roman rule achieved a level of affluence to which the physical remains attest. It was the birthplace of the Severan dynasty (late second to third centuries CE) and the home of such literati as Terence, Apuleius, Tertullian, and St. Augustine. It made significant contributions to the agricultural wealth of the Roman Empire and had thriving ceramic and mosaic industries. By the second century CE, the region counted over 600 cities, many of which contained striking examples of monumental architecture.

The French were the first to excavate the region following their invasion of Morocco, Algeria, and Tunisia in the nineteenth century; they dominated all fields of North African study well into the twentieth century. The Italians have imparted a similar colonial legacy in Libya, where they continue to be the primary excavators. Only after the Second World War did other international groups become involved, in particular the British, Canadians, Americans, and, since the 1970s, Maghrebian scholars.

There were two broad ethnic groups by the time of Roman occupation: those whom the Greek sources called Libyans (and whose descendants modern historians call Berbers) and the Carthaginians, or western Phoenicians, whom the Romans called *Poenici*. The Libyans were the earlier inhabitants: though their precise origin is uncertain, it seems that they migrated westward from the Egyptian Sahara and occupied much of the region by at least the second millennium BCE. Centuries later, the Libyans were widely dispersed and had developed into a number of different peoples with their own regional traditions and dialects. Chief among them were

North Africa, Roman, Fig. 1 Distribution map of peoples in North Africa (Law 1978a: 142, Fig. 22) (Copyright of Cambridge University Press 1978. Reprinted with the permission of Cambridge University Press)

the *Mauri* of Morocco and western Algeria, the *Numidae* of the Tell in northwestern Tunisia and northeastern Algeria, the *Gaetuli* of the coastal hinterland between the Atlantic coast and the Gulf of Syrtes, and the *Garamantes* of the Libyan pre-desert. Ancient sources made reference to a number of other tribes and subtribes based on geographical, ethnic, cultural, political, and linguistic grounds, but these are often vague and conflicting. Nonetheless, it seems that the *Mauri*, *Numidae*, *Gaetuli*, and *Garamantes* were confederations at the top of the tribal hierarchy, made up of conglomerates of various tribes and subtribes (Fig. 1).

Definition

Roman North Africa refers to the northwestern region of the continent that was ruled by the Romans as a series of provinces for over 500 years. Roman occupation began after the destruction of Carthage in 146 BCE and the subsequent annexation of its territory as the province of *Africa Vetus*, in modern Tunisia. At its greatest extent, in the third century CE, it occupied the littoral plain north of the Sahara, between the Atlas Mountains in the west and the Altars of Philainos on the Gulf of Syrtis in the east.

Historical Background

Sometime in the first half of the first millennium BCE, the Phoenicians founded a series of trading colonies along the coast of North Africa, the most important of which was Carthage. Their primary interest in the area, at least initially, was directed toward western Mediterranean trade, rather than the establishment of settlement colonies and the development of African hinterland. The Phoenicians established a number of other trading posts throughout the western Mediterranean, namely, Spain, Sardinia, Sicily, and Malta, to achieve these same ends. It was not until the fifth century BCE, after defeat by the Greeks in Sicily and victory over the Libyans in northeastern Tunisia, that Carthage turned its attention inland, in particular, toward the fertile Cape Bon peninsula. Here, Carthage developed a number of large estates that produced a variety of cash crops; this area increasingly became the chief focus of

economic and political interest in the third century BCE as Carthage lost control of the western Mediterranean in the Punic Wars (264–146 BCE) with Rome.

The First Punic War (264–241 BCE) was the first of three wars that witnessed the increasing involvement of Rome in the political, economic, and social affairs of North Africa, which the Roman historians Polybius, Livy, and Diodorus Siculus describe. Interactions between Rome and Carthage during the fifth and fourth centuries BCE were generally limited to a series of treaties detailing trading rights in the western Mediterranean and, in the third century BCE, an alliance to oust King Pyrrhus of Epirus from Sicily. By this time, Rome had consolidated her power over southern Italy and was increasingly concerned over Carthaginian involvement in Sicily. War broke out between them over control of the island, at the end of which the Romans had succeeded in driving out the Carthaginians, while forcing them to pay heavy indemnities.

The loss of Sicily, and subsequently Sardinia, compelled Carthage to seek new sources of capital in Spain. This proved to be a successful strategy, and Carthage, under the leadership of the Barcids, gained considerable wealth and manpower from this new territory. This was a source of alarm for Rome, who established a treaty with Carthage in 220 BCE limiting Carthaginian expansion to the river Ebro in Spain. Rome, moreover, had formed an alliance with a town south of the Ebro, Saguntum, which lay within Carthaginian limits. When Hannibal besieged the town in 218 BCE, the result was a renewed conflict between Rome and Carthage, the Second Punic War (218–201 BCE). Despite a series of early victories, the Carthaginians were defeated by a Roman invasion of North Africa. Carthage had now lost Spain and a number of African territories, was forbidden to wage war without the permission of Rome, compelled to assist with Roman wars, and forced to pay an annual indemnity.

The terms of peace between Rome and Carthage also granted to Masinissa (c. 240 or 238 to c. 148 BCE), king of the *Massylii* and Roman ally, the restoration of all lands ever belonging to him or his ancestors. Whether these lands comprised the territory surrounding Carthage or not, Masinissa nonetheless began a gradual encroachment of Carthaginian territory. Carthage was not permitted to declare war according to the terms of the treaty, and Rome elected not to intervene. The subsequent outbreak of war between Carthage and Masinissa in 150 BCE constituted a breach of the treaty, and the following year, Rome declared war on Carthage. This engagement was the Third Punic War (149–146 BCE), which resulted in the destruction of Carthage and the annexation of its territory as the Roman province of Africa.

The nature of Roman involvement in the area for the next two centuries was sporadic and military. In 111 BCE, Rome declared war on Jugurtha, a descendant of Masinissa, when a struggle for the Numidian throne led him to kill a number of Italian settlers. Following his defeat, Rome established a series of client kings, who were variously involved in the civil wars between Marius and Sulla and subsequently Caesar and Pompey. Caesar's victory in 46 BCE brought an end to the civil war and much of the Numidian kingdom. The territory of North Africa at this time was reorganized: the original African province was now called *Africa Vetus* and the new annexation, *Africa Nova*. To the west, Octavian annexed Mauretania in 33 BCE and subsequently reestablished it as a client kingdom; in 29 BCE, he sent a *deductio* of colonists to Carthage and by 27 BCE had united *Africa Vetus* and *Africa Nova* as *Africa Proconsularis*. The late first century BCE to early first century CE witnessed a number of revolts in the pre-desert areas that resulted in the permanent installation of the Third Augustan Legion in southern Numidia and a second annexation of Mauretania in 40 CE.

At this point, North Africa was fully absorbed into the Roman Empire, and its administration changed accordingly. A *proconsul* governed *Africa Proconsularis*, the most important, wealthy, and urbanized province of the region, as a senatorial province. Its territory included much of Tunisia, eastern Algeria, and the littoral of western Libya (later known as Tripolitania). A legate appointed by the emperor, however,

controlled the legion stationed in the Algerian portion of the province nearly independently. *Mauretania* was administered by equestrian *procuratores* as two separate provinces, *Mauretania Caesariensis* in the east and *Mauretania Tingitana* in the west.

There was relatively little military presence in the provinces during the first two centuries CE. The Third Augustan legion, which consisted of approximately 5,000 legionaries and 15,000–20,000 auxiliaries, occupied all 110,000 square miles of the region. Half of these were stationed in *Mauretania Tingitana*, conversely one of the most heavily militarized provinces. The other half were stationed in southern Numidia, along the *limes* (frontier) of *Mauretania Caesariensis* and Tripolitania, first in Ammaedara, then Theveste, and, by the beginning of the second century, Lambaesis. These areas were also the location of a number of veteran colonies, particularly in southeastern Numidia, whose inhabitants remained culturally distinct from the majority of the indigenous population.

Apart from a few cities founded by Romans, the majority were of Punic and Libyan origin. The lowest ranking were the peregrine *civitates*, noncitizen communities that were recognized by Rome as self-governing and thus retained their pre-Roman magistrates, *sufetes*. Leading inhabitants often petitioned for these communities to become *municipia*, which adopted Roman constitutions and whose senior magistrates were granted Roman citizenship. The highest-ranking settlements were the *coloniae*, all of whose freeborn residents obtained Roman citizenship, whether or not any Roman colonists had ever settled there.

Administration of these settlements was typically undertaken by local city magistrates, and in communities that adopted Roman styles of government, the *decuriones* were chiefly responsible. They were involved in the collection of taxes, the handling of local law courts, and the construction and maintenance of public buildings; they also comprised the local city council (*ordo*) in each community. It was under their direction that North African cities developed a characteristically Roman appearance: *fora*, theaters, circuses, baths, temples, and amphitheaters were erected in most cities from the late first to early third centuries CE. The decurial office became increasingly prestigious and lucrative, since it offered lower ranking magistrates and wealthy North Africans the opportunity to achieve the authority, distinction, and recognition with which they were able to rise in the imperial administration.

For Rome, the chief objective of these magistrates and their cities was contribution to the *annona* in the form of taxes paid in-kind. These primarily consisted of agricultural foodstuffs: grain, which by the mid-first century furnished two-thirds of Rome's yearly grain supply, and olive oil, initially from Tripolitania, and in the late-second-century Tunisia as well. To achieve these ends, land was farmed intensively and the pre-desert areas heavily irrigated. Much of this land consisted of imperial estates leased out to private individuals, typically senators, under long-term leases. Free peasants farmed the land as sharecroppers on behalf of their landlords, and in the second century CE, the imperial government offered incentives that promoted not only increased production but also stability in tenure.

North Africa continued to prosper under these conditions well into the early third century CE. Cities grew in size and number: by this time there were 500–600 cities, 200 of which were located in the fertile areas of northern Tunisia. Agricultural production of grain and olive oil spread into the pre-desert areas to satisfy demand; on a smaller scale, the ceramic, textile, and quarrying industries increased. A number of the local elite, strengthened by their newfound wealth, had entered into the imperial administration. Many became senators and acted as patrons of their native cities, petitioning to raise the status from *municipium* to *colonia*. These kinds of developments accelerated during the reign of Lucius Septimius Severus (193–211 CE), the founder of the Severan dynasty of Roman emperors and a native of Lepcis Magna. Under his rule many North African communities were given municipal rights; to his hometown he granted the highest

possible status for a provincial city, that of *ius Italicum*, which exempted it from certain forms of taxation. The province of *Numidia* was created from the southeastern region of Algeria and populated by the legion and veteran colonies.

A rebellion in 235 CE brought this prosperity to an end. The legions stationed in Pannonia had murdered the last of the Severans and proclaimed their commander, Maximinus Thrax, emperor. As a reward for their loyalty, Maximinus doubled the soldiers' pay and raised taxes in order to cover the costs. These exactions were particularly heavy in *Africa Proconsularis*, and in 238 CE, a group of landowners there murdered the *procurator* and proclaimed their *proconsul* Gordian emperor in revolt. The Numidian-based legion remained loyal to Maximinus, however, and ensuing conflict between the two groups resulted in the death of Gordian, his son, many of their supporters, and a number of the landowning elite. The next 50 years were marked by a succession of soldier emperors whose rule weakened North Africa, particularly at its borders. The dissolution of the Third Augustan Legion in 238 CE left the provinces largely defenseless to a series of attacks by Libyan tribes, which, despite the legion's restitution in 253 CE, resulted in the abandonment of *Mauretania Tingitana* by the end of the century. There is little evidence of public building at this time, and what did occur appears to have been the initiative of emperors or imperial governors, not private individuals. The ceramic industry was likewise in a state of flux: production of Tunisian fineware, once common throughout Italy, ceased, but other centers of production arose.

The rule of Diocletian (284–305 CE) resolved North Africa's third-century crisis and revised the organization and administration of the provinces. The region was first contracted: following the outbreak of warfare in southern *Mauretania Tingitana*, the province was largely abandoned and what remained was left to Spain. The remaining provinces were subdivided: *Mauretania Caesariensis* became *Mauretania Sitifensis* and *Mauretania Caesariensis*; *Numidia* was divided between *Numidia Cirtensis* in the north and *Militiana* in the south, only to be reunited in 314 CE; *Africa Proconsularis* became *Zeugitana* in the north, *Byzacena* in the south, and *Tripolitania* in western Libya. The provinces were then brought together under imperial control and formed the *dioecesis Africae*. Governors of senatorial rank continued to supervise the proconsular provinces, which initially included *Zeugitana* only but later the reunited *Numidia* (c. 320 CE) and *Byzacena* (c. 340 CE). The other provinces were governed by a *vicarius*, an official of equestrian rank with a general supervisory role, who was answerable to the emperor.

The reforms of Diocletian initially left the armies of North Africa under the control of *praesides*, provincial governors of equestrian rank, who were in turn supervised by the *vicarius*. By the mid-fourth century CE, however, the civil and military functions of these governors were increasingly separated, and control of the armed forces became the responsibility of military specialists, *duces* and *comites* (dukes and counts), who were often of equestrian rank. The *praesides* remained the civilian governors of the provinces without proconsular rank.

The increasing centralization of power that occurred in the fourth and early fifth centuries CE brought with it the growth of an imperial bureaucracy that in many ways supplanted the judicial, financial, and administrative duties of local city magistrates. In particular, imperial officials were now responsible for the assessment and collection of taxes, a lucrative job that allowed its officers to finance public building projects. There were approximately 20,000 open positions in the imperial administration, many of which were short-term and granted senatorial rank to its officers; as a result of which, participation in the imperial bureaucracy was not only desired but required for the ambitious local elite. Nevertheless, the cities of North Africa continued to prosper, since many of these new senators retained close ties with their home communities. Under their jurisdiction many civic buildings were renovated, including *fora*, amphitheaters, bathhouses, and theaters. Moreover, since these new senators were no longer required to own land in Italy, many began inhabiting their landed estates; a large number of villas with elaborate

decoration dominate the coast and country of North Africa during this period. Only the far western and eastern portions of North Africa seem to have suffered at this time: Volubilis in *Mauretania Tingitana* was no longer part of the empire, and Lepcis Magna was subject to a number of attacks by Libyan tribes from which it never recovered.

The Christian community of North Africa grew significantly over the course of the second and third centuries CE but emerged in the early fourth as a substantial and divided one. The Great Persecution of 303 CE, issued by Diocletian, led a number of clergy members to hand over church scriptures to their city officials. These men became known as *traditores* and were required to undergo penance and a second baptism before readmission into the church. Moreover, their previous sacraments were rendered invalid. Thus, when, in 311 CE, a new bishop of Carthage, Caecilianus, was ordained without the consultation of the Numidian bishops, the latter claimed that Caecilianus was ordained by a *traditor* and his appointment invalid. The Numidian bishops, moreover, elected their own bishop of Carthage, first Maiorinus, then Donatus, who gave his name to the rival sect.

There now existed two opposing churches in Africa, the Catholics and the so-called Donatists, which created a schism that lasted until the early fifth century CE. During this time both churches maintained a separate administration, ordained a separate bishop, and upheld different policies, including those on the redemption of the *traditores*. Although church councils, official investigations, and the imperial government supported the Catholics, the Donatists continued to expand, particularly in the inland regions of *Africa*, *Byzacena*, and *Numidia*. Persecutions of the Donatists were sporadic and did nothing to quell the movement; the exile of Donatus in 355 CE only temporarily slowed Donatist growth, and by the late fourth century, the church had more than 300 bishops, support of most rural populations, and fidelity of many in the towns. By 420 CE, however, the Donatist church was more or less defeated when the Catholic church successfully implicated the Donatists in a series of military revolts and the imperial government declared Donatism heresy (405 CE), even illegal (in 411 CE). Both churches were to be united, Donatist clergy exiled, Donatists fined, and their property confiscated.

The Vandal invasion of 429 CE, however, brought an end to this religious conflict as well as Roman rule in North Africa. Over the course of the next 10 years, the Vandals took control of *Proconsularis*, *Byzacena*, and eastern *Numidia*; Carthage fell in 439 CE. Western *Numidia*, *Tripolitania*, and the *Mauretania* were occupied by 455 CE. The Vandals confiscated properties throughout *Proconsularis*, exiled or enslaved their landowners (of whom a large number were senators and other imperial officials), and distributed the land to Vandal followers. In the remaining provinces, landowners could retain their estates so long as they paid taxes. By the end of the fifth century CE, the Vandal kings, in an attempt to make Arian Christianity the official religion, exiled Catholic and Donatist bishops.

Despite changes in government, the African provinces prospered under Vandal rule. The region was now governed by a king to whom *comites* (companions), royal notaries, and Arian bishops were answerable, but civilian and municipal administration functioned without substantial change. The end of the *annona* to Italy and a flourishing in the Tunisian fineware industry brought a significant amount of wealth to the region. Exports of North African amphorae increased throughout the Mediterranean. Baths and churches continued to be constructed and maintained; a wide array of literary works were being produced.

Economic and political activity at this time was concentrated in towns and other rural settlements, a pattern mirrored in the increasing ruralization of urban centers. There is no visible decrease in the population of towns and rural settlements, but a number of cities appear to have suffered significant contraction and, in the case of Lepcis Magna, abandonment. In the cities, *fora*, temples, and theaters were no longer used for their original purposes; some *fora* even became areas for pressing olives.

The Roman administration gradually became decentralized and was eventually superseded by the authority of the tribes. Indeed, the most prosperous regions were those that depended less on interactions with the Mediterranean world and more on those with Romano-Libyan tribes. These Romano-Libyans, who came to control much of southern *Numidia* and both *Mauretania* by the early sixth century, were contributors to a new regional trade based on the intensive agricultural cultivation of their territory.

The Byzantine invasion of 533 CE removed Vandal kings from the seat of authority in North Africa, replacing them with the Byzantine emperor. A brief period of prosperity followed, during which time the emperor founded two new cities and began building campaigns in existing ones. Catholic bishops recovered their positions and privileges, churches were reconstructed and refurbished, and certain estates were returned to their Roman landowners.

The situation reversed in the mid-sixth century CE, due to a succession of natural, political, and religious crises. An outbreak of plague in 542 CE was followed shortly thereafter by an agricultural disaster; two years later, a Libyan revolt spread throughout *Tripolitania*, *Byzacena*, and southern *Numidia*; and, in the same year, a new schism divided the churches of Africa, Constantinople, and Rome. Similar disruptions are visible in the economy and archaeology of the region. The production of fineware decreased substantially and, in Tunisia and eastern Algeria, at least, was discontinued. Exports from North Africa became rare, and what little trade remained was directed eastward. Settlement patterns changed significantly: in the cities, amphitheaters and circuses were no longer used, luxury villas were transformed into farms, and cemeteries replaced urban centers. Forts and Christian basilicas were the only new constructions but were more Byzantine in style. By the end of the sixth century, however, a series of attacks led by the Arabs effectively brought an end to whatever traces of *Romanitas* and Christianity remained and introduced Islam to the area.

Key Issues/Current Debates

The mechanisms of imperialism and approaches to identity are at the center of current scholarly debates, concerning what it meant to be Roman in North Africa. Cultural exchange is no longer viewed as the active enforcement of the dominant power and passive acceptance (or aggressive resistance) of the subject; rather, it is generally accepted as the reciprocal transfer of culture and ideas, which varies according to region. The number of Roman public buildings and inscriptions throughout urban and rural settlements in North Africa attests to enthusiastic support of Roman culture, but the contemporaneous presence of Neo-Punic inscriptions and private monuments in indigenous styles points to the survival of local traditions (Mattingly 1995, 2004; Fentress 2006).

This then poses the questions of who engaged in these activities, what they stood to gain, and why? It is generally agreed that, at least in other provinces of the empire, the greatest level of compliance and adoption took place among the highest levels of society, that is, the ruling elite. The local, provincial elites were active agents in the adoption of Roman culture, while the lower classes became involved through emulation of their superiors. The subject remains understudied in North Africa, however (Mattingly 2011). Some studies accept the outright Romanization of the area (Picard 1990), while others see the provincial elite as recipients (Thébert 1978) or resistors (Bénabou 1976). The extent to which the lower classes participated, particularly in rural areas, is also uncertain. Whatever the case, it is important to allow for significant variability within and between different groups and in different regions (Mattingly 2011).

The study of economic history occupies a central position in current scholarship, questioning the extent to which Roman North Africa contributed to the economy of the empire (Wilson 2002; Dossey 2010). It also asks how the economy operated on local, provincial, and empire-wide levels, what were the primary industries, and who were the proponents of this activity. The Roman North African economy

seems to have been largely agricultural: Rome, in the early empire, formulated an economic policy in order to exploit the resources of the provinces for the long-term needs of the empire. In *Africa Proconsularis*, the imperial administration promoted intensive agricultural cultivation by leasing out imperial land to small-scale farmers, offering incentives for them to farm as intensively as possible, and overseeing their management through a group of middlemen (Kehoe 1988). More recently, scholars have examined the contributions of economies beyond agriculture, including ceramic (Hayes 1972; Carandini 1983; Peña 1998), olive oil (Mattingly 1985), and textile industries (Wilson 2001). While the presence of African Red Slip ware and amphorae throughout the Mediterranean, in addition to the number of olive presses throughout the African hinterland, suggests a highly diversified and vibrant local and empire-wide economy, it remains uncertain to what degree this matched the importance of agriculture.

The diversity of funerary architecture and its occupation of the Roman North African landscape have long attracted the attention of scholars. A number of tomb types have been identified and classified throughout Africa's long history, including *haouanet* (rock-cut tombs), *cupulae* (barrel-vaulted monoliths), and tower mausolea. Recently, however, scholars have focused on how these tombs and their associated rituals were connected to particular landscapes (Stone & Stirling 2007). It examines how individuals incorporated both local environment and funerary monument to communicate ideas of property rights, identity, and ritual behavior. What is more, the study of funerary rituals and monuments offers one of the best means through which to study displays of cultural identity, particularly in a region such as North Africa, which witnessed successive changes in dominant powers.

International Perspectives

The majority of research undertaken on the Roman history and archaeology of North Africa has been from a distinctly colonialist perspective (Mattingly 2011). From the French and Italian excavations of the nineteenth century to the more recent work of American and British scholars, outsiders have historically determined the region's Roman past. This is due in large part to the French and Italian appropriation of Roman history as their own; they believed themselves successors to this portion of the Roman Empire and even imitated imperial accomplishments. To that end, indigenous culture was discredited and viewed as a passive, if not rebellious, recipient of superior, foreign regimes (Gsell 1933; Munzi 2001). When Maghrebian scholars entered the discussion in the 1970s, they highlighted indigenous cultural (as opposed to military) resistance to Roman influence (Benabou 1976; Leveau 1978). While neither extreme is currently propounded, North African history continues to be approached primarily as a history of other peoples in the region (Punic, Roman, Vandal, Byzantine, Arab, and so on). Only very recently have scholars focused on the activities of the indigenous and nonelite peoples, which have revealed them as innovators of agricultural technology, agents in the economy, assimilators of Roman culture, and members of highly stratified social networks in their own right. While this research has made significant contributions to understanding North Africa's Roman history, it is necessary to pursue aspects of the Romano-African culture, in particular, and reintegrate them into the cultural heritage of Morocco, Tunisia, Algeria, and Libya (Mattingly 2011).

Future Directions

Of particular significance in future studies of Roman North Africa is the analysis of Roman imperialism and its effect on local, indigenous societies (Mattingly 2011). Rather than understand the empire simply from the "ruler and subject" point of view, this approach explores the various effects and experiences encountered at all levels of society. It questions the extent to which the imperial center is the agent of this change; likewise, it asks how subordinate

populations experienced empire and how this was manifest in their behavior and material culture. Cultural change, then, is viewed as the coexistence and exchange of values between indigenous cultures and prevailing power. It does not ignore the voices of the elite presented in contemporary literary sources, but supplements them, primarily through material culture, with the remaining subject population.

Postcolonial approaches to the study of Roman imperialism may have the most far-reaching impact in this field (Mattingly 2011). Postcolonialism, which concerns the effects of colonialism and colonization, has gained ground in historical research on empire from different periods and regions; it emphasizes the new identities created and negotiated both at the limits and in the center of empire. Given the abundance of archaeological evidence attesting to the activities of the elite (senatorial, provincial, and local), military communities, and subject peoples, Roman North Africa seems well suited to this approach. Likewise, the presence of contemporary Roman, Punic, and Libyan ethnicities (and combinations thereof) contributes to what must have been a fairly heterogeneous part of the empire.

Roman Africa is relevant to the field of economic studies, which is important for understanding the urbanization and functioning of the empire, in particular the study of commodities and their contribution to the imperial economy. Studies in the production and distribution of commodities, such as pottery, amphorae, olive oil, marble, mosaics, and textiles, have gone some way in illustrating the diversity of the Roman economy (though primarily agricultural) and the relationships between local, regional, and long-distance trade systems. Patterns of consumption are necessary, however, in order to better understand what proportion of the population benefitted from this economic production. In particular, analysis of patterns of consumption in rural and urban settings permits the identification of different settlement types; this, in turn, allows for diachronic comparison of settlements on a regional and empire-wide basis.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Economy, Roman
- ▶ Numismatics, Roman Imperial
- ▶ Urban Planning, Roman
- ▶ Western Roman Provinces, Archaeology of the

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North Africa: Historical Archaeology

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Introduction

The archaeological investigation of North Africa emerges in the late nineteenth and early twentieth centuries in coordination with European colonial projects across the region as part of the expansion of classical and Orientalist scholarship into the study of sites along the southern Mediterranean coast. French, German, and to some extent British and American expeditions dominated the countries of Morocco, Algeria, and Tunisia well into the postcolonial period, while Italian-led excavations proliferated in Libya. It has only been since the latter part of the twentieth century that the archaeological services of the various independent states have asserted local control over the archaeological record within their borders. The case of Libya is somewhat exceptional in the wake of decades-long sanctions that led to the near cessation of foreign missions to its many sites. Similarly political unrest in Algeria at times has drastically reduced the contributions of international teams. It is still too early to predict how the landscape for a renewed archaeological involvement in several of these countries will change following the protest movements which took place in various North African states in 2011–2012, some resulting in the ousting of long-held dictatorial regimes.

During the first century of scientific excavations, most work was concentrated on the classical period cities of the North African littoral. This is hardly unsurprising given the scholarly agenda of most Euro-American scholars for whom North Africa's importance in world history only begins largely as a result of the Phoenician and later Roman colonization which established an impressive network of roads and cities all along the southern rim of the Mediterranean. This process of urbanization, the establishment of far-flung trade networks, and later the workings of Roman imperialism often served as ideological support for the new European colonizers who sought to establish what they saw as a similar *mission civilatrice* in the various regions of North Africa. That sentiment is neatly captured in an address to French army officers in Morocco in 1925 where one official advised them to let the indigenes know "that we Roman were here before the Arabs" (cited in MacKendric 1980: 319). Unsurprisingly under these ideological circumstances, archaeological work has concentrated most heavily on the great classical period cities such as Carthage, Leptis Magna, Timgad, and Volubilis as a demonstration of the grandeur and accomplishments of a colonial settler society that had turned the region into an agriculturally productive, imperial engine. More recently archaeological work of the classical period has begun to examine the relationship of these

colonial centers to a largely indigenous rural hinterland in an effort to understand the impact of Carthage, Rome, and Byzantium on the substrate "tribal" societies.

Despite the early emphasis placed on the classical period during European colonialism of North Africa, the early twentieth century saw some limited efforts to conduct archaeological research on the postclassical era particularly for the region's seventh-century transition from a Byzantine domain to one under Arabo-Islamic control. As with the work of classical period scholars, questions regarding the processes of urbanization and imperial settlement and control continued to dominate research programs. French archaeologists in particular were occupied with developing an ideal typical notion of the "Islamic city." Indeed, the cities of North Africa, both living and ruined, became the prototypes both for an essentialized Islamic period urbanism and notions of space as fixed by Islamic principles.

Definition

The geographical limits of North Africa defy precise demarcation but have largely been agreed upon to include the region stretching from the Atlantic coast of Morocco to the western desert of Egypt. It extends from the southern Mediterranean into the largely uninhabited zones of the Sahara desert. Demographically the vast majority of the peoples of this region were to be found either along the coast, where seasonal rains allow for reasonably predictable agricultural production, or in various mountain ranges that offer both protection and possibilities for animal husbandry, control of trade routes, and other economic opportunities related to natural resources. Additionally, small population pockets are to be found in a handful of oasis settlements. Traditionally, Egypt has not been included in the historical or archaeological study of North Africa, with early European scholars referring to the region as Barbary of Africa minor. It is somewhat complicated to justify this exclusion particularly given that various imperial polities that ruled the Nile valley also exerted control over parts of Cyrenaica, the modern-day eastern Libyan coast. Similarly, an oasis settlement such as Siwa in the Egyptian western desert, both historically and to the present day, has a much stronger cultural affinity toward the ethnic Berber groups of North Africa than they do with the peoples of the Nile. Early Islamic geographers themselves were in disagreement about the exclusion of Egypt and the nature of the region's eastern border, and even one scholar of the tenth century CE, al-Muqaddasi, proposed the inclusion of Sicily and Spain into what was termed in Arabic as *al-Maghrib* (lit. the west or where the sun sets).

North Africa is dominated by a climate marked by hot dry summers with wetter cooler conditions in the winter months. The fringes of the Sahara are significantly more arid, while areas such as the Atlas Mountains tend to be more temperate than on the coast. These weather patterns have allowed the region to sustain cereal cultivation since the Neolithic, though annual rainfall variations can often lead to disastrous results. The economy has witnessed diversification through a long tradition of sheep and goat pastoralism, while both herder and agricultural livelihoods have together lead to destruction to woodlands that were once part of the landscape. In many ways this region is not at all dissimilar to other parts of the Mediterranean, one reason why it may have been attractive to colonists from the Levant, Greece, Italy, and elsewhere.

Key Issues

Phoenician and Roman Eras

Archaeological evidence for major settlements is lacking prior to the founding of the many colonial emporia which were initiated with the establishment of Carthage by the Phoenicians early in the first millennium BCE. Historical evidence for the indigenous populations is limited to references in ancient sources to groups lumped together with the ethic term Libyes, although the nomenclature for the territorial locations of a handful of tribal confederations survives. The contemporary term "Berber," which is used to refer to North Africans

who do not associate themselves as Arabs, is itself a corruption of the Greek epithet *barbaroi*, meaning non-Greek speakers. It is important to note that the archaeological study of these indigenous groups, whether nomads or settled farmers, has been secondary in most cases to the study of those outsiders who would transform the region through urbanization and imperial politics. An important exception is the Garamantes, first mentioned in Book IV of Herodotus' *History* and whose society and its archaeological signatures have become of focus of much research in recent decades.

Cities dominate the focus of most archaeological research projects in North Africa, none more so than the seminal site of Carthage, which has been excavated since the nineteenth century and with major projects undertaken as part of a campaign to save the site in the 1970s and 1980s under the auspices of UNESCO. Such concerted attention to this principal seat of Punic control, which ruled over much of North Africa for more than half a millennium prior to its final conquest by Rome in 146 BCE, has allowed archaeologists to reveal most of the city's main features. The ruins of ancient Carthage which span from its Phoenician inception through to the end of Byzantine control in the late seventh century CE are located in what are today the suburbs of Tunis, the modern capital of Tunisia. Excavations have revealed much of the town's citadel, known as the Byrsa, though its earliest occupation levels have been largely truncated by the transformation of the area by Roman period engineers. Other areas of major study have focused on the port of Carthage, the key to the city's role as a major Mediterranean trading hub that vied with Rome for control of that sea. The city was served by two harbors, one that was devoted to the military and the other to commercial operations, demonstrating the dual nature of the social context in which its inhabitants lived. Of its major urban institutions perhaps the most intriguing is that of the tophet, or precinct of Tanit, a religious sanctuary in which the citizens were known to practice various forms of ritual human infant and animal sacrifice. This open-air enclosure delimited by a temenos wall was filled with centuries of cremated urn burials which were surmounted by variously decorated stone markers. Similar sanctuaries of the Punic culture have been excavated at various other North African sites and were in use even into the Christian era.

While Carthage was certainly the most famous of the Phoenician settlements, it was by no means the only one; rather it was the center of a far-flung network of ports all along the North African coast and beyond. Of these Kerkouane is perhaps the most well preserved and archaeologically best documented with two main periods of occupation that were interrupted by an invasion from Sicily and with the town abandoned at the start of the Punic Wars with Rome. This was a walled town with a system of wide streets laid out orthogonally. Near the center of the urban landscape was a large courtyard structure with stone benches that may have served as a temple for an unknown cult. The archaeological record also indicates that this was a center for the production of the much famed purple dye of the Phoenicians, owing to the large quantities of Murex shells recovered from an area of the site that appears to have been an industrial zone of kilns and workshops. Further east lay the province of Tripolitania which was colonized in the seventh century BCE, taking its name from the region's three main urban foundations: Labdah/Leptis Magna, Sabratha, and Trablus/Oea. The region west of Carthage as far as Tangiers and even beyond exhibits numerous Phoenician coastal settlements that appear at roughly equal intervals. Archaeologists, taking note of this apparent uniform spacing, have suggested that this was designed to provide ports at a distance of about one day's sail (c. 30–40 km). While suggestive of the possibility that first millennium BCE traders operated a system similar to that of *cabotage* (short coastal sailing and trading known through documentary evidence from the early modern period), the chronology of many sites suggests they were somewhat later than the height of Phoenician power in the region.

The Roman conquest of Carthage, resulting in the city's brutal destruction, would nevertheless maintain and indeed expand this urban network

begun by the Phoenician colonists. The transition to Roman rule and the status of various parts of North Africa as either directly controlled provinces or client kingdoms have left substantial traces in the archaeological record. The degree to which the southern Mediterranean underwent a process of Romanization, an analytical term deeply contested among classical archaeologists for its ability to capture the nature of the cultural, political, and economic interactions that developed with the construction of the vast Roman Empire, remains at the center of much research for this period. The archaeological record of life in Roman North Africa provides us with a large volume of data regarding the transformation of the region into a granary of the empire, for the new municipal intuitions and urban amenities, as well as the system of defenses that sought to ensure the productivity of its land and the safety of its cities. A major force in these changes was the Roman army which was responsible for extensive public works. Across the region the archaeological record is still replete with evidence of the roads, aqueducts, fortresses, and walls which imperial forces put in place. Urban landscapes became filled with theaters, baths, temples, nymphaea, and with the coming of Christianity as a state sanctioned religion all manner of ecclesiastical structures. The security situation, which was largely designed to make nomads sedentary and thus lessen their threat to urban centers, was so successful at times as to allow some towns, such as Cuicul and Teuchira in Cyrenaica to do without defensive walls.

The city, however, was not the only beneficiary of Roman rule. Imperial estates abounded as well as the privately owned *latifundia* for which Roman Africa had become famous. Archaeological surveys have shown that large swaths of previously unproductive land came under cultivation in many areas due to extensive walled terracing which would fall into disrepair and neglect after Rome withdrew and the Vandals moved in. To a certain degree, this would be resuscitated as the region was reorganized as a province of Byzantium. This productive land was the basis for an economy that supported large numbers of wealthy landowners and entrepreneurs who had the wealth to build large private residences throughout the region. These manors and estates have received much attention by archaeologists and art historians alike for their numerous fine floor mosaics depicting many aspects of Roman life in the province. This visual culture has suggested not only the prosperity which many segments of the society enjoyed but also their close ties to Roman cultural practices, even when inscriptional evidence suggests that the patron was of Punic origin.

The Coming of Islam

North Africa's emergence in the late seventh century as part of *Dar al-Islam* (lit. the house of Islam) following the conquests of the Arab-Muslim armies was to signal a profound change in course for this region. Of the most important transformations that this area entertained were the migration of large number of Arabs and other Easterners and the establishment of Islam and the Arabic language as major cultural forces. These long-term processes that do not really begin until well into the tenth century and later have largely been ignored by archaeological research and left to scholars of the textual record. What can be stated is that for the indigenous Berber populations, their incorporation within the expanding Muslim world would have a far more profound effect on their politics and culture than what was experienced during previous imperial interactions with either Rome or Carthage. The archaeological record of both cities and other sites has demonstrated major shifts in the kinds of material culture, economic lifeways, as well as social relations within communities. More specifically archaeological work has demonstrated that new trade networks developed that linked North Africa with the wider Near East, West Africa, and beyond. This region became the conduit for the major supply of commodities such as gold, ivory, and labor that came from other parts of the African continent. The manufacturing centers in Egypt and Iraq would in turn supply the growing city states and minor principalities across the *Maghrib* with luxury goods ranging from ceramics to new plant species originating from the Indian subcontinent. A good example of

these interconnections and their material culture correlates can be found in the archaeology of the Moroccan site of Sijilmasa, a major caravan station for the gold trade.

The Orientalist notion of the quintessential "Islamic city" has been widely influential for much of the early archaeological work that analyzed the record of the Islamic periods in North Africa. In many ways this is a continuation of classical archaeology's fascination with urban landscapes and an effort to articulate an abrupt rupture between the periods of late antiquity and Islam. This project has become increasingly more nuanced in recent decades with work at a multitude of sites, including costal redoubts (*rabitat*, s. *ribat* in Arabic) such as Monastir and Sousse demonstrating elements of both continuity with the existing built environment and aspects of adaptation to changed political and cultural climates.

Questions of empire and imperial control continue to play a role in archaeological investigations as North Africa enters into the early modern period. Excavations at the site of Qsar es-Seghir in northern Morocco are an early example of global historical archaeology particularly as it relates to the development of the European colonial enterprise. In this case excavators revealed the impact of Portuguese colonial expansion beginning with Henry the Navigator in the fifteenth century. The project also initiated a regional archaeological survey that tackled questions of smaller scale urban settlement patterns that demonstrated the role of larger political forces and imperial integrations in shaping the organization of settlement hierarchies.

Future Directions

As the archaeology of North Africa enters the twenty-first century, it faces a number of uncertainties and challenges as well as opportunities. While much of the future of archaeology in this region will be shaped by the rapidly changing political climate and the amount of resources that governments and other funders are willing to expend on the rich heritage of their territories, there continues to be a strong local interest in studying the various pasts which the archaeological record can reveal. Despite this desire to sponsor archaeological work, many sites are threatened by rapid urban expansion, the consequences of political turmoil, worsening environmental conditions, and the general perception that the field of archaeology is less prestigious or lucrative than other professions and thus unattractive as a career option. Regardless, partnerships between local and foreign scholars continue to build on the work of previous generations often despite of a legacy of colonial and Orientalist attitudes that have guided much of that previous scholarship and practice in the field.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ North Africa, Roman
- ▶ West and Central Africa: Historical Archaeology

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North America (USA and Canada): Museums

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North America (USA and Canada): Museums, Fig. 1 Museums can play a profound role in educating the public about both the past and its study, largely by allowing the public to engage with authentic objects and better understand their importance in archaeological inference (Milwaukee Public Museum; Photo Alex W. Barker)

Introduction

Museums of archaeology in North America include at least three distinct kinds of entities: (1) museums in the strict sense, combining maintenance and care for permanent archaeological collections with their public interpretation; (2) science or interpretive centers, which interpret archaeological knowledge and material evidence of the past but do not hold or curate permanent collections; and (3) repositories, which care for collections but do not embrace a public education or interpretive role.

Taken as a whole, museums play a crucial role both in preserving material evidence of humankind for the benefit of future generations and in interpreting that past for broad public audiences. Their potential to increase knowledge regarding the past is considerable – a survey in 2000 found that 88 % of American adults had visited museums interpreting archaeological materials (Fig. 1). It is less clear that this potential has been fully realized; that same survey found that less than 10 % reported learning about archaeology from those visits (Ramos & Duganne 2000).

Today there are some 20,000 museums in the USA and Canada, but the precise number holding archaeological collections, and the scale of those collections, is not known. By any measure, however, the scale is immense. In fiscal year 2002, the US Department of the Interior placed the number of archaeological objects in its own museum property programs at nearly 65 million, not including associated documentation and records (or the collections of the Smithsonian Institution itself). Harvard's Peabody Museum of Archaeology and Ethnography holds more than 1.2 million catalogued objects and more than half a million photographic images, while the Canadian Museum of Civilization holds some three million objects.

North America (USA and Canada): Museums, Fig. 2 Yukon Beringia Interpretive Centre, a non-collecting institution, interprets the archaeology and paleoecology of the "land bridge" once connecting the Old and New worlds (Photo by Hans-Jürgen Hübner, http://en.wikipedia.org/wiki/File:Whitehorse_entrance_Yukon_ Beringia.JPG GNU Free Documentation License)

This entry deals primarily with North American museums as archaeological institutions. For entries regarding museum representation and critical approaches to museum interpretation, see the entries on ▶ Museums and the Distortion of Archaeology for Political Purposes, and ▶ Museums and Memory Experiences in this encyclopedia.

Definition

Within the United States, museums are defined by statute as a public or private nonprofit agency or institution organized on a permanent basis for essentially educational or aesthetic purposes which, utilizing a professional staff, owns or utilizes tangible objects, cares for them, and exhibits them to the public on a regular basis. In Canada, museums are similarly defined as permanent, not-for-profit institutions that acquire, preserve, research, interpret, and exhibit the tangible and intangible evidence of society and nature, whose exhibits are regularly open to the general public. Both the American Alliance of Museums (AAM, until 2012 the American Association of Museums) and the Canadian Museums Association (CMA) broaden these definitions somewhat to include entities that do not manage collections (science centers), and within the USA in particular, there are a range of repositories which manage collections with limited or no public exhibition or interpretation.

Relatively few museums in the USA and Canada are dedicated exclusively to archaeology (Fig. 2). Some include ethnology and anthropology more broadly (e.g., the US National Museum of the American Indian, the Peabody Museum of Archaeology and Ethnology, the Arizona State Museum or the Canadian Museum of Civilization), while others include archaeology within a broader set of disciplines within natural history (e.g., the American Museum of Natural History, the Smithsonian's National Museum of Natural History, the Field Museum of Natural History, the Denver Museum of Nature and Science, the Royal Alberta Museum, or the Natural History Museum of Los Angeles County) or general museums (e.g., the Glenbow Museum, the Royal Ontario Museum, or the Milwaukee Public Museum). More recently museums created and managed by Native communities have been developed (e.g., Alutiiq Museum and Heritage Center, Mashantucket Pequot Museum and Research Center, 'Ksan Historical Village and

Museum, Aanischaaukamikw Cree Cultural Institute, Huhugam Heritage Center) interpreting the past from the standpoint of indigenous communities.

Other museums (e.g., the Metropolitan Museum of Art, the Cleveland Museum of Art, or the Getty Museum and Villa) hold archaeological objects but manage and interpret them exclusively as works of art. Museum ethical standards, particularly within the USA, reflect a tension between these two approaches, with museums managing objects as works of art often arguing for less rigorous requirements regarding provenance and legal export.

Historical Background

In the nineteenth and early twentieth centuries, museums were the primary institutional settings for North American archaeology. Most of the great North American archaeological museums were founded during this period, and many amassed the bulk of both their collections and their stature prior to World War I. In the middle decades of the twentieth century, the primary context for Americanist archaeology shifted to universities, with the unintended effect of separating the creation and interpretation of archaeological collections from their curation and care. But while the intellectual focus shifted away from museums, this was also a period in which massive archaeological collections were generated through federally funded projects, creating and sometimes filling both freestanding and university-based museums. In some cases collections remained under the control of academic departments without explicit arrangements for longer-term care, creating legacy collections whose status and care remains a challenge. In the closing decades of the twentieth century and opening decades of the twenty-first century, those roles have further fragmented, with the majority of archaeological materials now being generated by cultural resource management (CRM) and contract-based archaeological projects (in Ontario, e.g., it is estimated that 80–90 % of all archaeological fieldwork is contract-based CRM work). This fragmentation has led to a separation between the archaeologists conducting the bulk of fieldwork and the resultant collections (archaeologists in CRM), the substantive scholarly and grant-funded research based on fieldwork and collections (archaeologists in higher education), and the management, care, and stewardship of those collections (archaeologists in museums). Lack of coordination between the three sectors has resulted in rapidly growing collections whose research value is largely unknown, and may result in additional fieldwork on questions which could be effectively addressed by extant data already in repositories and museums.

By the late 1970s, a "curation crisis" had been recognized, with museums lacking the space, funding, and staff to adequately deal with burgeoning collections resulting from CRM compliance. Museums and repositories were to have been integral parts of heritage management from its inception; the 1906 US Antiquities Code required that objects collected be placed in public museums and permits were to designate a publicly accessible repository. In more recent years, CRM projects have included curation fees for the management and care of collections resulting from compliance activities, but for the most part, these have been simple fee-for-service arrangements not based on the research value of the collections themselves.

Several important trends emerged in the late 1980s and early 1990s. Thoughtful approaches to the ethics of collecting the cultural property of indigenous communities (e.g., Messenger 1989), critical studies of museums as institutions and their representation of the other (e.g., Karp & Lavine 1991), and increased attention to the impact of museum acquisitions on antiquities trafficking and site looting (e.g., Tubb 1995) all changed and enriched discourse in museum archaeology.

At the same time, Native concerns over both the way their cultures were represented in and cultural property and human remains appropriated by museums came to the fore. In the USA, these concerns led to the Native American Graves

Protection and Repatriation Act (NAGPRA) and the National Museum of the American Indian Act. These laws allowed Native communities to reclaim human remains and four categories of objects from museums based on cultural affiliation: (1) funerary objects associated with human remains in a museum's collection; (2) funerary objects not associated with human remains in a museum's collection; (3) objects of cultural patrimony; and (4) sacred objects. In Canada, the Task Force on Museums and First Peoples was created to address concerns raised by a Glenbow Museum exhibition organized to coincide with 1988 Calgary Olympic Games. Native communities found the original title, layout content, and sponsorship inappropriate, and these concerns led to the Task Force's recommendations which have permanently altered the relationship between First Peoples and Canadian museums.

Key Issues/Current Debates

Curation Crisis

No resolution to the ongoing "curation crisis" has yet been offered (Bawaya 2007). New or expanded federal repositories in the USA and Canada address some shorter-term aspects of the curation crisis, but do not address the needs of nonfederal museums, repositories, tribal museums, or university museums. The rate of compliance activities and the resulting growth of collections continue apace (Fig. 3), without equivalent increases in government or private support for curatorial activities. While the rate of compliance-related collections growth at the Canadian Museum of Civilization has slowed, it has increased correspondingly at provincial and territorial museums. Government support for museums continues to decrease both as appropriations for governmental museums and repositories and as grants for nongovernmental entities. The US National Science Foundation no longer supports curatorial activities or collections improvement grants, and both restructuring of Canadian museums and reduced support for both Canadian museums and agencies that support museums place further stresses on overstretched staff. And while many aspects of legal or ethical mandates for repatriation and consultation are valuable and long overdue, they further overextend museums which had already been recognized as understaffed, underfunded, and overcrowded prior to these mandates. This is essentially a funding issue and is unlikely to be resolved in the near term.

North America (USA and Canada): Museums, Fig. 3 Archaeological collections from compliance activities continue to grow at a faster rate than funding for their curation (University of Missouri Museum Support Center; Photo Alex W. Barker)

NAGPRA and Repatriation

NAGPRA has had significant effects on American museums, most positive. Canadian repatriation protocols based on recommendations of the Task Force on Museums and First Peoples lack the force of law, but are accepted by all major Canadian museums. Consultation with Native communities has increased, summaries and inventories have improved intellectual control over many categories of archaeological materials and remains, and a range of collaborative research and interpretive projects have been developed. An increasing number of curators in anthropology and archaeology museums have built successful academic careers by working with Native communities and making those relationships the basis and subject of their scholarly study. While the costs of NAGPRA compliance were a considerable concern in the years following passage of the Act, most museums have now adjusted their staffing levels and expectations to accommodate compliance activities. Most current concerns regarding NAGPRA involve the disposition of human remains whose cultural affiliation cannot be determined. Recent regulatory changes (codified under US federal regulations as 43CFR10.11) mandate the disposition of human remains to claimant groups even if there is no evidence that they are culturally affiliated to the remains themselves; museum and scientific organizations have expressed concern that this provision conflicts with the Act's original intent.

While both NAGPRA and the recommendations of the Task Force on Museums and First Peoples have had generally positive impacts on the relations between museums and the communities they study, they privilege certain kinds of research at the expense of others. Legal and voluntary restrictions on the analysis of human remains have had a clear and continuing effect on scientific studies of the human past; since North American museums hold human remains from other areas of the world as well, one outcome has been that archaeologists and physical anthropologists are able to better address questions regarding the human career in some geographical areas but in others must leave them unaddressed.

Conservation

Scientific advances in conservation have greatly improved our knowledge of how to preserve and protect cultural collections. In part this has resulted in better understanding of environmental factors and preventative care, and in part in improved interventions for conserving and stabilizing individual objects. Along with these advances has come an increased appreciation of the effects of older chemical treatments, particularly the use of arsenical and mercuric compounds, on modern collections (Charola & Koestler 2010). The contaminants limit the utility and accessibility of some older organic collections. Repatriation of contaminated objects is a significant and well-documented problem, particularly for objects being repatriated because they are required for continuing religious purposes. A growing body of literature deals with both the identification and amelioration of contaminants, and helping claimant communities manage risks associated with these objects.

As museums have become more sensitive to the concerns of Native communities (Clavir 2002), conservation approaches have changed to accommodate respectful treatment including the inclusion of sacred plants, orientation of objects, organization of collections, and the performance of necessary ceremonies. In some cases these protocols contradict conservation guidelines based exclusively on preservation and reflect a more inclusive approach to stewardship (Ogden 2004).

Museums and Unprovenanced Collections

In April 1970 the University of Pennsylvania Museum of Archaeology and Anthropology issued the Pennsylvania Declaration, which affirmed that the Museum would purchase no antiquities for its collections unless accompanied by a provenance "pedigree" – the first major market country museum to take such a position. Shortly thereafter the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership

of Cultural Property was signed. The 1970 date for the UNESCO Convention has become an ethical touchstone for many US museums (Canadian law prohibits the importation of cultural objects unless legally exported from their country of origin). The Association of Art Museum Directors (a US-based organization limited to the directors of the 200 largest art museums) had previously established guidelines allowing the purchase of antiquities by museums if it could be shown that objects had left their country of origin at least 10 years before. Numerous archaeological organizations (including the Society for American Archaeology, the Archaeological Institute of America, the American Anthropological Association, and the Council for Museum Anthropology) raised strong concerns that these guidelines served less to prevent site looting than to regularize it. In 2008 both AAMD and AAM released revised standards for the acquisition of antiquities. Both organizations required museums to obtain documentation that objects had either left their source countries before the date of the UNESCO Convention or that they had been legally imported; AAM guidelines went considerably further by requiring that objects also have been legally exported from their country of origin, a much more stringent standard.

Deaccessioning

In addition to the restrictions on the acquisition of archaeological material previously noted, once antiquities enter the US or Canadian museum collections, they are subject to additional restrictions on any future use. Federally associated collections or collections in federal repositories cannot be deaccessioned (removed from permanent collections) under current US regulations, creating a problematic situation where collections may be culled or limited as part of the research design or field component of research, but once they are transferred to a museum or repository, no deaccession or management by culling is allowed. Currently there are initiatives to allow deaccessioning under specific conditions similar to those used by nonfederal museums. Normally these reasons include lack of relevance to the institution's scope, limited or negligible value for study, duplication (both of the foregoing usually applying to works of art rather than research collections), poor condition or deterioration beyond the point at which conservation is feasible, determination that the object is a fake or forgery, determination that the museum does not and cannot hold good title, or a valid repatriation claim. In addition to any ethical restrictions on sale of antiquities, museum ethics restrict the use of any proceeds from the sale of deaccessioned objects of any kind to the acquisition of more representative or useful objects, preferably in the same collections area. AAM guidelines also allow funds to be used for the specific conservation of objects within the collection, narrowly defined. Under no circumstances may the proceeds be used for general operations. Several university-based museums have violated these guidelines in recent years, including Brandeis University, which sought to deaccession and sell its collections to make up for market losses to its university endowments, and Fisk University, which agreed to sell collections objects for operating funds in violation of both applicable ethics codes and restrictions of the original donor.

Virtual Data and Physical Objects

While broad metadata standards for archaeological data exist (the Dublin Core and its various extensions including the Darwin Core for biological materials, CIDOC, and the associated ISO 21127 standard), they are neither fully embraced nor systematically applied. The conceptual complexity of some of these data models adds to the challenge of systematic implementation; CIDOC 5.0.1, for example, includes 86 classes and 137 properties (and their inverses) as part of its schema. In 2011 the US National Science Foundation solicited white papers identifying "big questions" or pressing needs in the social and behavioral sciences – issues that could allow major advances in research with the infusion of significant funding. One of the needs identified (and endorsed by the American Anthropological Association) was a systematic survey and inventory of all of the cultural holdings already housed in American museums, repositories, and institutions of higher education. Artefacts Canada, an

initiative of the Canadian Heritage Information Network (CHIN), already allows the public limited search access to some four million selected objects in Canadian museums.

The expansion of Canadian and US Museum Studies programs in the late twentieth century – and of online version of these programs in the twenty-first century, making them more accessible to smaller museums, tribal museums, and affordable to nontraditional scholars – has increased the professionalism and working knowledge of many entry-level museum staff, as well as honing and updating the skills of more senior staff. Much of this training focuses on interpretation and the stewardship of physical things, including both paper records and collections objects. The emerging demands of electronic resources and collections are quite different, and museum organizations (CMA, AAM, CHIN) and funders like the US Institute for Museum and Library Services and National Endowment for the Humanities have increasingly focused on training new museum professionals to meet the changing demands of digital collections (CHIPs Workshop Report 2008).

Institutional efforts to capture and maintain digital archaeological archives are already underway. In Canada, the Sustainable Archaeology program at Western and McMaster universities serves as a cooperative for the archiving of both physical and digital archaeological data on a fee-for-service basis. First Nations communities are active partners in developing management and access standards. In the USA, the Digital Archaeological Record (tDAR) serves as an international archive for digital data relating to archaeological investigations and scholarship, focusing primarily on sustainable archiving and the specific requirements of digital curation. The Alexandria Archive Institute, another US-based entity, focuses on open access scholarly communication and data sharing through digital access.

Scholarly Status of Curatorial Activities

With the shift from the museum to the academy as the primary venue for substantive archaeological research in North America came changes in the ways in which scholarly productivity was measured. In recent years museum anthropologists in the USA and Canada have worked to have curatorial activities unique to the museum field – organization of exhibitions, consultation with descendant communities, work as experts on cultural property issues, and other endeavors which may not lead to journal-based publication – recognized in promotion and tenure decisions. Efforts in this area were led by the Council for Museum Anthropology, a professional society within the American Anthropological Association. In 2012 AAA issued promotion guidelines for practicing professional anthropologists and archaeologists and also established expert review panels of practicing professionals to assist academic units in both promotion decisions and departmental program reviews (American Anthropological Association 2011).

Accreditation and Standards

Museum accreditation within the USA has been performed by the AAM through a separately established Accreditation Commission since the early 1970s and involves a combination of institutional self-study, review by Accreditation Commission staff, peer evaluation by a visiting committee of accreditation reviewers, and a final decision by the Commission. Accreditation has generally been for 10 years or less, although this was recently increased to 15 years as part of reorganization and streamlining of the accreditation process. About 750 US-based museums have been accredited as of 2012.

Within Canada, the Canadian Association of Professional Conservators (CAPC) has had an active accreditation program in place since the early 1970s. Accreditation is based on a formal application with supporting credentials and documentation, followed by a peer evaluation conducted by a four-person Board of Examiners. The evaluation includes both general conservation knowledge and techniques/knowledge specific to the applicant's area of specialization. Within the USA the American Institute for the Conservation of Historic and Artistic Works (AIC) proposed an examination-based certification program, but the initiative was defeated in 2009 by a vote of the membership.

No accreditation or licensing mechanisms for other archaeological museum professionals are currently in place in either the USA or Canada.

International Perspectives

Archaeology as Anthropology

Unlike other continents, archaeology in North America has been traditionally viewed as a subdiscipline of anthropology with closer intellectual ties to ethnography than to either history or geology. Developing from museum contexts in which the material culture of communities both extant and extinct was being systematically organized, during periods in which there were few chronological controls, North American archaeology was heavily influenced by the direct historical approach (itself born in museum contexts) which constructed cultural chronologies by working backward from living communities into the prehistoric past. Organizational schema such as the Midwestern Taxonomic System – initially developed at the Milwaukee Public Museum in the 1930s – used material culture trait lists to organize archaeological assemblages relative to one another and to those of historic groups. While in many respects this anthropological approach has benefited North American archaeology, it also reflects a racial disconnect in which archaeology as anthropology divorces Native histories from broader national histories privileging European colonization at the expense of aboriginal occupations (Ames 1992).

Composition of the Archaeological Archive

Archaeological collections in North American museums and repositories generally include both physical objects from excavations as well as all associated records and documentation, in distinction from some other countries (e.g., Scotland and Wales, where objects are held by regional museums and records by their respective Royal Commissions for Ancient and Historic Monuments). Management of this larger archaeological archive is understood to begin with the research design stage, long before the initiation of fieldwork (e.g., Sullivan & Childs 2003).

International Treaties and Trafficking

While Canada and the USA are both source and market countries in the global antiquities trade, for the most part both are viewed as markets, legally allowing the commercial movement of objects illegally removed from their country of origin; in recent years applicable Canadian laws have reduced the import of unprovenanced or illegally exported cultural objects.

Museums in the USA and Canada are subject to several international treaties affecting their ability to acquire and accession objects. Both Canada and the USA are signatories to the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, although the USA accepted only articles 7b and 9 and Canada's implementation focuses primarily on article 3. Implementation within the USA depends on negotiated memoranda of understanding between the USA and other signatories to the Convention; since ratification only 14 such memoranda have been completed. In Canada both exports of cultural materials from Canada and imports of cultural property from source nations are controlled, but foreign governments seeking return of objects must compensate individuals or institutions who acquire objects without knowledge that they were acquired in violation of applicable law. Both the USA and Canada are also signatories to the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict; the USA formally ratified the Convention in 2008, more than 15 years after its promulgation. Neither the USA nor Canada is a signatory to the UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects.

Ownership and Title

Property laws in Canada and the USA do not vest ownership of antiquities in the federal government unless the material originates from public lands. Similarly, and in contrast to some other parts of the world, Canada and the USA never established a national museum system with a centralized administrative center supervising smaller regional museums. Different museums developed independently following quite distinct

developmental trajectories, informed by a range of interests and concerns, and including museums organized as public charities or nonprofit corporations, arms of government (local, state/provincial, national, or tribal), or units within institutions of higher education, among others. Title and control over collections vary considerably across this range of institutional forms. Changing forms of governance has also complicated issues of title. Privatization of some previously city- or county-run institutions has led to different models for collections ownership. In some cases the nonprofit organization operating the museum assumes ownership for objects acquired after privatization; in other instances, it does not.

Canadian museums generally receive a larger proportion of overall funding from government than do American museums. Nongovernmental museums in the USA reported in a 2008 survey that less than 24 % of funding derived from government support at any level and most of that funding was targeted at science museums and science centers.

Within the USA one of the major changes affecting museum title in the latter part of the twentieth century was the development of the McClain doctrine, a set of legal principles holding that if a foreign nation state has well-defined and enforced laws vesting ownership of archaeological materials in the state, then that nation state has standing to bring legal action in US courts against looters and traffickers under the US National Stolen Property Act. While convictions under the doctrine have been few, and one recent case (between the St Louis Art Museum and the Egyptian government over a cartonnage funerary mask of Ka-Nefer-Nefer) has called into question how broadly the doctrine can be applied, McClain problematizes title for objects without clear provenance, making museums more sensitive to the need for adequate documentation prior to acquisition.

Future Directions

Achieving Balance Between Museum Functions

Early twentieth century North American museum theorists like John Cotton Dana emphasized the public education rather than research role of museums. In a landmark 1992 report, *Excellence and Equity*, the American Association of Museums called on all museums to place education at the center of their public service role and make education part of all museum activities. North American museums continually rebalance and reexamine the resources allocated within museums for primary research and for public education; in more recent decades research allocations have also had to compete against the desire to attract more visitors to museums in order to increase earned revenues and leisure market share in an increasingly competitive environment (Fig. 4). Similarly, the rise of repositories holding collections on a fee-for-service basis has increased concerns that strategic growth of museum holdings based on long-term value may be compromised by short-term efforts to raise revenue through curation fees on the one hand or increased gate and visitor traffic on the other. Some curators find research becoming a residual activity – something they can do when or if the more pressing demands of public engagement, education, fundraising, and management allow. And while the curatorial function is central to the idea and character of the museum, it is not generally a revenue-generating position and is hence subject to close scrutiny during cycles of budget reductions.

Audience

In recent decades North American museums in general have increasingly focused on the needs of visitors. While generally positive, these efforts have led to increased demands on curators to engage in social media, fundraising, and public relations events which are aimed less at education in the formal sense than public engagement more broadly, which may erode the core curatorial functions. Partially countering this trend, archaeology museums have increasingly focused on the viewpoints and values of source communities, in part to undo stereotypes reified and perpetuated by previous generations of museum exhibitions. This can create tensions between common models for museum interpretation which allow considerable latitude to the visitor

North America (USA and Canada): Museums, Fig. 4 Over the course of the twentieth century, the primary emphasis of North American museums shifted from behind-the-scenes research and curation to public interpretation and engagement (Canadian Museum of Civilization, Hull, Quebec, Canada. Photo by Taxiarchios228, http://commons.wikimedia.org/wiki/File:Gatineau_-_QC_-_Canadian_Museum_of_Civilization5.jpg, GNU Free Documentation License)

in meaning-making and concerns of Native communities who wish to more clearly define how they are perceived and portrayed.

While many North American museums recognize the need to better serve and engage minority populations, few have successfully done so on a sustained and continuing basis. Minority populations constitute 34 % of the US population, for example, but minority individuals represent only 9 % of museum visitors. Demographic trends suggest that by sometime in the middle of the twenty-first century, minority groups will actually form the aggregate majority of the US population. While museums – and particularly anthropology and archaeology museums – have become increasingly sensitive to the interests of Native or source communities regarding core issues including rights, repatriation, and representation, they have generally been less responsive to the demands of other minority populations they serve as visitors, whose needs may be different from or in competition with the interests of Native communities.

At the same time, one of the fastest-growing areas within the broader museum community is "tribal" museums, created and managed by tribes, First Nations, or descendant Native communities (Fig. 5). Coupled with the expansion of tribal historic preservation programs and increasing number of Native peoples pursuing careers in anthropology and archaeology, this trend may profoundly change both the ways in which museums are perceived by descendant communities and the representational tropes by which Native peoples are depicted in museums generally. In a 2003 survey of 74 tribal museums, conducted by the American Association for State and Local History, "cultural preservation" and "role as a repository" were identified as a tribal museum's most important functions. The same survey indicated that the primary audience for most tribal museums was other tribal members (Abrams 2003).

Title

Accessioning reflects an assertion of title to collections, but several trends in cultural property law and ethics call into question aspects of the goodness of title many museums assume they enjoy. NAGPRA avoided constitutional challenge as a taking by asserting that museums never held good title to certain cultural collections in the first place. The McClain doctrine similarly questioned the clarity of title to certain kinds of cultural materials if good provenance was not proven. And although the

North America (USA and Canada): Museums, Fig. 5 An important trend in the later twentieth and twenty-first century has been the rise of Native museums interpreting indigenous histories and identity through Native voices (Photo by Elliot Schwartz for Studio EIS, http://en.wikipedia.org/wiki/File:StudioEIS_Mashantucket_Pequot_Museum.jpg GNU Free Documentation License)

recommendations of the Task Force on Museums and First Peoples do not impact issues of legal title, they do problematize the ethics of asserting title to certain categories of material. Broader issues of image rights and intangible property are likely to become more sharply defined in coming decades, undermining nineteenth century Lockean constructions of museum collections as private property. A gradual shift is thus likely from management of collections based primarily on legal title or ownership of objects to management based on defined rights and agreements, with title being recognized as problematic in many cases and separated from the custody and use of collections by museums. Numerous examples are already in place where museums manage and interpret collections by agreement with source countries or descendant communities rather than asserting title.

New Museum Formats

In an age of increasingly immersive and experiential entertainment, more didactic and static museums struggle to engage and retain visitors. Traditional forms of display tend to privilege authentic objects but struggle to place them into meaningful living contexts that excite the imagination of visitors. More interactive formats are better at creating a sense of wonder, but often do so at the expense of the real objects. The rise of virtual or online museums offers tantalizing promise for the provocative and multivocal interpretation of archaeological collections, yet it also poses significant pitfalls. Technical challenges are being addressed through innovative partnerships and increasing technological sophistication of museum staff, but some museum professionals see a risk of further undercutting support for archaeological collections by separating their public interpretation (which can be mounted without the infrastructural demands of brick-and mortar-museums) from their care and curation, which ultimately depend on physical space and staff.

Cross-References

- ▶ China: Museums
- ▶ Conservation in Museums
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ East Africa: Museums
- ▶ Encyclopedic Museum
- ▶ Heritage Museums and the Public

▶ Human Remains in Museums
▶ Ireland: Archaeological Museums
▶ Israel: Museums
▶ Japanese Archaeological Museums
▶ Museums and Memory Experiences
▶ Museums and the Distortion of Archaeology for Political Purposes
▶ Pakistan: Archaeological Museums
▶ Regional/Site Museums
▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
▶ Southeast Europe: Archaeological Museums
▶ Taiwan: Archaeological Museums
▶ Turkey: Archaeological Museums
▶ United Kingdom: Archaeological Museums
▶ Vandalism and Looting (Ethics)
▶ West Africa: Museums

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North America (USA): Historical Archaeology

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Introduction

In the USA, historical archaeology involves cultural resource management, heritage studies, public archaeology, and academic training and research. The National Archaeology Program comprises legislation, policies, education, funding, and land, site, and collections ownership and management in the public trust. A national register of historic landmarks and places and a system of national parks and monuments preserve an increasingly broad cross section of the nation's material legacy. These programs, along with an array of state, local, and private enterprises, enable people to confront authentic material pasts. While archaeology remains implicated in the reproduction of mythic national histories in the USA, significant efforts to interrogate and challenge these histories strive to engender empathy and understanding of past struggles and experiences.

Multiscalar, multivocal approaches are most widely advocated, through which researchers consider individual objects or object constellations in local, regional, national, and global settings of production, exchange, consumption, use, and disposal. To understand the networks, webs, and entanglements in which people and objects are embedded, analyses are conducted from the perspectives of individuals and groups in diverse structural positions in society. Ultimately, contemporary historical archaeology in the USA is exploring how forces of colonialism, capitalism, nation-state formation, industrialization, mass population movements, racism, gender hierarchy, and cultural exchanges shaped the post-Columbian world (e.g., Paynter 2000). This essay is structured around four issues that dominate our discourses and practices: the relationships of structure and agency and of archaeologists and publics; the materiality of social and cultural processes and practices; and the global phenomena of colonialism, capitalism, and industrialization.

Definition

The definition or boundaries of historical archaeology have been contested from the beginning. Today, US historical archaeologists define the field as historical anthropological or anthropological historical approaches to study of (a) European colonial conquest and the encounters of peoples, environments, and objects that ensued; (b) capitalism and the modern world; and (c) the past, using all available lines of evidence, including material culture (i.e., environment, landscape, architecture, objects, texts, images), living people, and memory.

Historical Background

The origins of the contemporary practice of US historical archaeology lie in the (1) nineteenth-century anthropological archaeological studies of American Indian cultures, (2) Colonial Revival-inspired historic sites movement, and (3) Great

Depression public works projects in the 1930s and 1940s. The nation's first heritage preservation legislation, the Antiquities Act, dating to 1906, established the federal government's responsibility to recognize and protect prehistoric and historic sites on land it owns or controls. Historic sites like Virginia's colonial capital, Williamsburg, became the focus of private preservation and interpretation projects in the 1920s and 1930s. Depression-era public works projects fostered the expansion in scope and scale of public archaeology across the USA and the development of salvage archaeology. Heritage and environmental movements in the 1960s led to legislation establishing the National Register of Historic Places, mandating national cultural resource inventories and sponsoring surveys in advance of federal construction. These laws fueled the development of the cultural resource management industry in the 1970s.

Intellectually, historical archaeology has a dual, historically dichotomous, identity as science and/or humanity. This binary has opposed anthropological etic versus emic perspectives and foci on populations in environmental-cultural systems versus histories of peoples and their systems of meaning. Stanley South modeled the scientism of processual, New Archaeology for historical archaeology in his 1977 work, *Method and Theory in Historical Archaeology*. Processual archaeology challenged traditional "handmaiden to history" archaeology, seeking to reveal the material culture patterns defining site types and cultural affiliation, which in turn would elucidate processes of cultural variation and change. Studies of enculturation and adaptation in colonial settings ensued. James Deetz's *In Small Things Forgotten* also appeared in 1977, introducing a mentalist, structuralist approach to studying early American life. Deetz argued that the Enlightenment (Georgian) world view precipitated the greatest cultural transformation in European-America. This had implications for all material culture as people reordered their world in concert with their new understandings.

A related debate centered on sources of evidence, especially the place of documentary analysis in historical archaeology. Contextual, interpretive historical ethnographies of people and place, and critical perspectives on the legacies of capitalism, racism, and nationalism began to appear in the mid-1980s. Their authors imagined the relationship of text, site, and object differently, but they shared a goal of critically querying and analyzing texts as well as traditional archaeological evidence.

Key Issues/Current Debates

Social theory, and especially debates over the relationship of structure (e.g., the state) and the nature, extent, and circumstances of individual agency, dominates the intellectual discourse in American historical archaeology today. Various theoretical perspectives orient research on social and cultural processes and identity along with global phenomena like colonialism, capitalism and modernity, industrialization and consumerism, and the institutionalization of American life.

Structure and Agency

Marxists rejected the social unity and ahistoricism of the concept of *world view* espoused by structuralists James Deetz and Henry Glassie. They take a dialectic view of the dynamic web of internal relations constituting society, giving special attention to the inherent contradictions of capitalism and the *ideologies* that reproduce it (McGuire 2006: 125-7, in Hicks & Beaudry 2006). In this view, ideology defines the self-other relationships that structure people's understanding of the world (Burke 2006: 137, 139 in Hall & Silliman 2006). For epistemological Marxists, ideology is true and false consciousness; the individual itself is an ideological construct of capitalism, as is the concept of agency itself in historical archaeology (Matthews 2010: 2). Others hold a more sociological view, focusing on the function of ideology. They have adopted, and challenged, a variety of social theorists' conceptions, including Gramsci's hegemony, Althusser on ideology as material practice, Bourdieu's *habitus*, and Giddens' "lived experience" (Burke 2006: 129-30, 133 in Hall & Silliman 2006).

Contextual, interpretive approaches seek to decenter master narratives and understand the multiplicities and ambiguities of past experiences. Attending to multilocality and multivocality, and reflecting on the relationships among archaeologists and their sources, these archaeologists produce alternative histories in the traditions of historical ethnography, Clifford Geertzian "thick description," and narrative. They give voice to individuals and to everyday artifacts in innovative and provocative forms including artifactual storytelling and archaeological biography (Beaudry & Symonds 2010: xii-xx).

Feminist scholars argue for the centrality of gender in human history and have explored the construction and dismantling of gender hierarchies. They have replaced the either-or structuralist, androcentric perspectives inherent in previous archaeological research with inclusive both-and approaches in their studies of minorities as well as women (Spencer-Wood 2011, in Spencer-Wood & Matthews 2011).

Historical ecological and *evolutionary* archaeologists are challenging another fundamental dualism: nature-culture. Work in the American West has conceptualized the environment as a networked ecological theater experiencing cycles of boom and bust prompted by global technological and economic change. Human action comprises strategic responses to this economy-environment in order to maximize profit opportunistically and resiliently, with the fittest surviving (Hardesty 2010). Insight into the intersections among contemporary environment-economy-public health problems drives much work in this tradition, including contemporary garbology studies (Shackel 2009: 3).

Social and Cultural Processes

Archaeologists continue to struggle with defining and operationalizing appropriate social analytical units for the study of self-fashioning and "othering." Identity is multiscalar, fluid, and internally contradictory, and any categorization imposes limits (White 2009: 4). Scholars now challenge the family-household as the basic social unit of analysis, charging that the choice represents an uncritical transferral of normative middle-class, European-American domestic practices and ideals into archaeologists' methodological structures. Multiscalar identity demands multiscalar levels of analysis: individual personhood; meaningful, organizing social groupings; and geographic proximity locally, regionally, nationally, and globally. Archaeological approaches to individual materiality seek to interrogate social identity and cultural diversity holistically through studies of embodiment, life-course analysis, and networking. The aim is to reintegrate the individual and understand the interpenetrations of gender, race, sexuality, class, age, ethnicity, and other vectors of identity (White 2009).

Gender: Current debates surround the biological sex-cultural gender model versus performance theory, which challenges the validity of the nature-culture duality (Voss 2006: 107-8 in Hall & Silliman 2006). A second theme, gender and power, highlights heterarchy and the diverse forms of power, with special emphasis on cooperative power.

Race: Racialization assigns people to essentialist groups based on physical appearance allowing them to be perceived as biologically inferior and socially unequal (Orser 2007: 9). Paul Mullins (2008) and others strive to demonstrate that racialization is at the heart of American social life. Diasporas, the traumatic global movement of peoples involving famine, war, enslavement, ethnic cleansing, and conquest, create prime circumstances for racialization. African diaspora archaeologists in the USA, for example, are working to develop an alternative account that challenges racist histories and assumptions about the culture of African peoples (Matthews 2010: 178).

Sexuality: American historical archaeologists are latecomers to the study of sexuality. Prostitution, birth control, reform institutions, and interracial unions in colonial settings have received most attention. Same-sex relations, sexual violence, and concubinage are more recent topics (Voss 2008).

Labor: Work involves material and social practices, not just technology, production,

waste, and products (Silliman 2006: 149 in Hall & Silliman 2006). The administration, management, supervision, and imposition of labor, as well as laborers' accommodations, resistance, and daily living, form growing foci of study.

Class: Although a considerable historical archaeological literature on class exists in the USA, the fundamental definition of class as a thing or a relation remains contested. In thing studies, class is imagined as a hierarchical ordering like a ladder. Marxian scholars see class as a dialectical relation comprising the whole of lived experience. They deconstruct experience to examine each part's fits and functions within the social totality (Wurst 2006: 191, 195 in Hall & Silliman 2006).

National: Nationalist studies emerged in the context of American exceptionalism and explore the processes of becoming American, including the transformation from immigrant to hyphenated American and, finally, incorporation into American society (Brighton 2009: 116).

Ethnicity: US immigrant history has generated great interest not only in nationalism but also in the processes and purposes of ethnic stereotyping and boundary maintenance responses that challenge social marginalization. Current approaches focus on hybridity and the ways people imbue material culture with meanings that reference common identities. Heritage formation among ethnic groups is investigated as a process of constant reevaluating of these meanings based on new group experiences (Brighton 2009: 145-6).

Age: Age and life-course studies in US historical archaeology are few. These are beginning to challenge essentialist perspectives on childhood and research children "becoming" and "being."

Religion: Processual scientism and Marxism in American historical archaeology have disparaged the importance of religion to past peoples and limited archaeological investigations of "mainstream" religion (Veit et al. 2009). Studies of Spanish missions and dissenting religious societies like the Shakers and Mormons, as well as gravestones and cemetery landscapes across the country, are countering this position.

Global Phenomena

Colonialism

From the Atlantic World to the Pacific Rim, US historical archaeologists are probing how colonialism worked as a contentious yet "shared project" occurring simultaneously in homelands and in colonies. Constituted in material, social, and cultural inclusion and exclusion, colonialism generated diverse asymmetries of race, gender, status, and personal experience (Loren & Beaudry 2006: 256 in Hall & Silliman 2006). Long conceptualized as a neutral set of "contacts" among natives and newcomers, the shift to "colonialism" acknowledges the concerted effort of settler populations to dominate indigenous peoples based on ideologies of inherent inequality and racism, acts of labor control, dispossession, and economic marginalization (Silliman 2005: 59-66). A "cottage industry of resistance studies in archaeology" has resulted; their challenge is to determine what constituted and meant resistance to whom (Liebmann & Murphy 2011: 9).

Others counter that it is Eurocentric to cast all native actions in colonial settings as mitigating oppression. Doing so risks romanticization, homogenization, and a denial of agency. These archaeologists decenter resistance to examine other motivations and intentions (Liebmann 2011: 200 in Liebmann & Murphy 2011). Some have turned to micronarratives to nuance and explain the generic macronarrative of the Columbian conquest (Liebmann & Murphy 2011: 9-10). Rejecting essentialist notions of native material culture, they focus on processes of ethnogenesis, creolization, hybridity, syncretism, and bricolage without necessarily assuming any group's cultural superiority (Kelly & Hardy 2011: 181; Silliman 2005: 68).

On the Pacific Rim, archaeologists have identified different trajectories of change in native populations and cultures as they negotiated Spanish missionary and Russian mercantile colonial structures. Despite the differences, native peoples' maintenance of Indian identity for decades is remarkable (Lightfoot 2005).

French colonialism in the USA has not yet received the archaeological attention given to

English and Spanish efforts, limiting opportunities for comparative colonialism. Work to redress the inequity centers on whether, how, and to what extent French, African, and Native American peoples created their own versions of social order through their unique encounters of people, objects, and places (Kelly & Hardy 2011).

Environmental archaeologists are analyzing the interactions among native, settler, and environment that transformed precolonial landscapes. They are exploring the ways European livestock and crops impacted the environment as well as how colonists learned about the new environment, adjusted their practices and thinking, and ultimately relinquished their expectations from home as they sought to reproduce a familiar diet (Mrozowski 2006).

Informed by and challenging the Deetzian tradition, archaeologists continue to examine the implications of the Enlightenment in the eighteenth century. The nature-culture divide, order and chaos, reason and science, and the beginnings of individualism and consumerism represent central topics of concern (Matthews 2010: 58-61). The culture of gentility that emerged within Atlantic World cosmopolitanism prompted growing consumerism in early eighteenth-century urban America from St. Augustine through Charleston, South Carolina, to New York, Boston, and Portsmouth. The commonality and variability among individual choices in personal hygiene, dress and adornment, and home furnishing and the elaboration of foodways have received special attention.

The archaeology of conflict has a long history in US historical archaeology. Excavations at colonial forts and battlefields have enabled study of ordinary soldiers and officers across time and space, the complexities of provisioning and transporting armies, the cultural landscapes of encampments, and the course of battles using multiple lines of evidence. Comparative analyses of early forts are revealing differences in colonial nations' goals and approaches to dealing with the frontier, native populations and each other, as well as differences between expected and actual behavior.

Capitalism and Modernity

Capitalism is the central phenomenon of study for archaeologists who identify the USA as a nation-state founded on a culture of capitalism. The definition of capitalism and relevant research foci remain contested. Some define capitalism as an economic system and social order for the creation of private profit. In capitalism, an ideology legitimizing consumer greed and accumulation enables the commodification of everything (Mrozowski 2006: 11). For others, capitalism wrought a fundamental change in relations between workers and owners so that the former sell their labor to the latter. The key elements of US capitalism they examine include the factory system, time and body discipline, the corporation as a vehicle for capital investment, and the deskilling of labor (Shackel 2009: 21-2). All share a critical interest in the construction of the individual in the commodity market, the sources of means to distinguish the self as an authentic individual. Objects are not produced to meet demand, but rather to create desire for images of the self associated with the object (Matthews 2010).

Obstacles to archaeologists' ability to understand the material and discursive legacy of capitalism include inadequate conceptions of meanings of privilege, poverty, and wealth (Matthews 2010: 44). Further study of state formation processes and ideologies, resistance, and revolution are also needed (Paynter 2000: 171).

Industrialization Historical archaeologists of nineteenth- and twentieth-century industrialization in the USA examine the technologies, costs and benefits, environmental impact, and laboring lifeworlds associated with industrial processes of centralizing, mechanizing, and standardizing production. Technological studies address the machines, equipment, buildings, and landscapes that industrial labor created and altered and the raw materials and transformative processes that created consumer goods, tools, equipment, and transportation systems. Other projects are investigating the relationships, institutions, and practices that controlled workers' lives (Gadsby 2011: 12 in Spencer-Wood & Matthews 2011).

In New England, corporate paternalism created cities like Lowell, Massachusetts, using space instrumentally to create places embodying control and hierarchy and efficiency. Archaeologists have documented the material growth, maturity, and evolution of industrial processes and the industrial city. Increasing privatization of workers, the growing importance of immigrant labor, and the erosion and ultimate abandonment of corporate paternalist responsibility for worker welfare took material form in an increasing divergence in the living conditions and domestic environments of labor and management (Mrozowski 2006). Other projects are also revealing the impact of changing technology on workers and families. Resistance to labor practices and working conditions in the forms of arson and sabotage and increasing numbers of broken, unusable parts discarded during production have been documented archaeologically (Shackel 2009: 3, 56, 61).

The industrialization of rural America through the development of scientific, mechanized agriculture forms another research focus. Archaeologists are probing the complex, uneven efforts to standardize and homogenize agricultural production in the search for efficiency and maximum profit. In the twentieth century, the project of modernizing agricultural processes and farm life introduced rural electrification and new technologies and crop regimes and transformed class and gender roles and structures. Archaeological examinations of the material culture of domestic and farm life are revealing how people countered the pressure to homogenize locally, regionally, and socially (Groover 2008).

In the nineteenth and early twentieth centuries, scholars have argued that the American West was an "underdeveloped periphery of the northeastern, industrial, capitalist core" (Matthews 2010: 132). Valued for its sites of resources extraction and low labor value, the West was dominated by corporate, regional hierarchies of resource extraction, milling, redistribution, and transportation. Workers in the West were predominantly unskilled, sharing similar experiences of transience and intense alienation (Matthews 2010: 132-5). Archaeological work has centered on mining, the railroad, ethnic group experiences, and the urbanization of the West Coast.

The USA has a tradition of idealistic social reform dating back to its colonial origins (Van Bueren & Tarlow 2006). By the nineteenth century, many utopian or "intentional" communities had formed to reject or resist features of industrial capitalism and patriarchy. These communities, the Shakers among the most well-known, used material culture explicitly to promote an alternative social order and relations. Recent research has emphasized the place of liminality and communitas in these projects and charted community responses to internal and external pressures over time (Van Wormer 2006, in Van Bueren & Tarlow 2006). Feminist scholars seek to illuminate the interplay of ideology and practice in the construction of gendered hierarchies or equalities in these communities. They propose the greatest challenge is to make utopian communities' struggles real, and human, without becoming apologists or judges (Spencer-Wood 2006: 3, in Van Bueren & Tarlow 2006). All stress the importance of utopian imaginations today in creating a future not based on war, terrorism, and inequality (Van Bueren & Tarlow 2006: 5).

Nature and Culture Marxian-inspired historical archaeologists have debated whether nature is social reality or discursive construct. Under capitalism, abstract processes of commodification transformed nature into spatially and statistically differentiated units of exchange (e.g., land, animals, plants, water) (Matthews 2010; Mrozowski 2006). Studies have revealed the social and functional specialization and segregation that distinguish capitalist cities. Deteriorating environmental conditions in mill and worker domestic yards produced poor sanitation, contaminated water, and high disease loads that city governments were slow to address (Matthews 2010: 119-31; Shackel 2009: 28-38). Later-nineteenth-and early-twentieth-century domestic reform movements also transformed urban landscapes, blurring the public-private ideological distinction through

creation of corporate housekeeping places and other alternative domestic forms.

Social Relations and Identity *Racism*: Archaeological studies in the USA are contributing to understandings of the origins and processes of racialization (Paynter 2000: 83). For decades, archaeologists working at Southern plantations have investigated enslaved living conditions, foodways, belief systems, power relations, informal economies, and Africanisms and composed detailed portraits of slave life (Groover 2008). Black feminist scholarship is illuminating special exploitations associated with sexuality and enslaved women, the gendered legacy of "soul food," and the gendering of spirituality and African diaspora cosmology (Voss 2008: 115).

More recently, concepts of diaspora and racialization have been extended to explain the experience of other groups in the USA, especially the Irish and Chinese. One study of the Irish diaspora after the 1840s potato famine examined how Irish immigrants strategically used the symbols of their racialized identity to contest and disrupt the dominant discourse of exclusion. Ultimately, they came to accept the ideology of mainstream American consumerism as representations of citizenship and respectability and thus achieved a level of incorporation into American society (Brighton 2009). Studies of the Chinese focus on their experience in the Western US, examining the grounding of Chinese racialization in American isolationist anti-immigration policies and ideologies. Recent scholarship argues that rather than seeking to describe Chinese culture or identity, usually informed by acculturation models and an orientalist exoticism mind-set, archaeologists should focus on the processes and practices of creating, maintaining, and changing identities in the context of changing circumstances (Orser 2007: 125-78; Voss & Allen 2008: 5).

Class: The making of the middle class in nineteenth-century America, the segregation of work and home, shifting gender roles, domesticity and changes in household organization, and other entanglements have been explored in cities, towns, and farming communities from New York to California. The relationships between middle and working class cultures, in particular the model of emulation, with its implications that the working class lacked cultural autonomy, form another interpretive focus (Mrozowski 2006: 152). The recent economic downturn has revived interest in the culture of poverty and its critique. Contemporary models of poverty as a form of internal colonialism that extends beyond the merely economic inform this scholarship. The capitalist ideology of individual responsibility for success and failure has effectively criminalized poverty (Spencer-Wood & Matthews 2011: 1-2).

Consumerism and Domesticity Authenticity and competency in interpretive symbolic expressions became important in the ideologically individualistic society enabled by eighteenth-century mercantilism (Matthews 2010: 3). Considerable research has examined the impact of mass production on individual expression and the behavioral disciplines of the new commodities (Mrozowski 2006: 115; Mullins 2011). Studies of nineteenth-century mass consumerism evidence technological advancement in foods, dining, hygiene, and health care reinforced by middle-class Protestant religious ideology dictating that goods translated into social position and morality (Brighton 2009: 123). In the industrializing West, large-scale producers and locals used consumption to adjust to transformations engendered by economies of scale, in the process creating new ways of life within capitalism (Matthews 2010: 141-7). In the twentieth century, transportation and communication technologies spread goods and ideals into rural America, creating a national consumer culture (Paynter 2000: 176).

Shopping studies have illuminated the active role of material culture at the moment of consumption, when value and meaning are assigned in these economic, social, and political acts of cultural recreation. At home, these new goods negotiated the oppositions of family and society, work and home, private and public, male and female, and women's moral authority and

responsibility. In this way, mass production collapsed distinctions between the market and domestic sites like the dining table, at which individualism and discipline were highly ritualized. But did hierarchies of dining wares, forms, styles, and functions sacralize capitalist social relations or the moral authority of women? Did lower middle-class, immigrant women in cities like New York, for example, use expensive teawares to create community, reject their isolation, express their ethnicity, signal their acceptance of capitalist ideologies, and/or assert their domestic power (Brighton 2009: 7; Matthews 2010: 94-9,158-9; Mullins 2011: 178)?

Others argue that most archaeologists have yet to imagine approaches to consumerism that challenge the simple presumption that past people were economically rational consumers who merely projected uncomplicated, bounded identities onto static material things (Mullins 2011: 2-3). They do not ask why people *wanted* consumer goods rather than reiterating the factors enabling access such as availability, wage labor increases, social mobility, advertising, or simplistic explanations of emulation (Mullins 2011: 2-3, 42-3).

Institutionalization of American Life

Archaeological studies of almshouses, schools, reformatories, hospitals, prisons, and asylums abound. The most provocative work asserts that America is a carceral society in which institutional confinement functions as a specific mode of population management. Asking "why incarcerate?" archaeologists probe the relation of the individual and the state, and the ways that the state uses institutional incarceration to reconstruct the citizen-self and purge society of the uncivil and unproductive. They examine the profoundly material, embodied experiences of confinement constituted in architecture, landscape, furnishings, tools and materials of labor, food, clothing and bodily care objects, and illicit objects. Study of these body-space-object relations reveals the dynamics of punishment, reform, and deterrence, domination and resistance, respite and ritual, survival and exchange in circumstances that deprive individuals of their basic security, material possessions, social life, individual freedom, and personal expression (Casella 2007).

Archaeology and Publics: Community, Shared Authority

Archaeology is an act of commemoration, and archaeologists today are rethinking what, why, how, and for whom they are remembering. Fundamentally, recasting the relationships among archaeologists and publics has revolved around the ethical question of who owns the past, literally and figuratively. The issue of who makes decisions about preservation, access, commodity and intellectual ownership, possession, disposition, funding, and interpretation of archaeological sites, collections, and human remains in the USA is highly contested. Justifications for historical archaeology include learning, sharing, entertaining, provoking, empowering, promoting community and economic development, and undoing historical injustices. Critical Marxists strive to gain knowledge of, critique, and transform the world (McGuire 2006: 124, in Hicks & Beaudry 2006), in particular working to illuminate and intervene in power structures and institutionalized ideologies and struggles. For example, historical archaeologies of urban gentrification and the active material erasure of the poor from the American landscape and economy reveal and challenge the process today (Gadsby 2011: 22, in Spencer-Wood & Matthews 2011).

Critical scholarship also challenges the professional authority structures of bureaucratic archaeology in favor of local definitions of the value of the past and local archaeological action (Palus et al. 2006: 84-100 in Hall & Silliman 2006). Community-centered projects are challenging post-civil rights movement emphasis on positive change to reveal the constancy of racial inequality in the USA today (Matthews 2010: 42-3). Others target labor struggles. Archaeological collaborations investigating the Colorado Coal Field War of 1914, in which the National Guard killed strikers and family members at a tent colony, have galvanized unionized workers in the region today. For them, the

massacre provides a powerful symbol of their struggle (McGuire 2006: 137, 141, in Hicks & Beaudry 2006).

Another impetus to reassess public archaeology in the cultural resource management sector is the current pro-development, antiregulatory political climate in the USA. Efforts involve justifying how and why federal funds are spent, increasing program efficiency and knowledge of the past as well as public engagement, participation, and ownership (Sebastian & Lipe 2009).

Most Americans encounter archaeology as heritage tourists at museums and historic sites. These are key venues at which archaeologists help both to critique the white, elitist, progressive, and nationalist ideologies that have driven historic preservation and interpretation and to introduce more inclusive histories. Alternative, revisionist memories of negative heritage in the USA, for example, are being made at sites of military forts and battlefields, burial grounds, and institutions (Shackel 2009: 95-103).

International Perspectives

In 1997, the Society for Historical Archaeology and Society for Post-Medieval Archaeology held a joint meeting in England, to promote critical comparisons between American and British scholarship. Global historical archaeology is still a work in progress, engaging American archaeologists with alternative intellectual traditions, cultural processes, and phenomena, particularly in the Atlantic, Pacific, and Anglophone worlds. Reconsideration of issues of scale has fostered explorations of the webs of interconnections that have defined the modernizing world. A new holism is emerging, rooted in rejection of singular metanarratives and embracing of comparative perspectives. Archaeologists are probing and parsing local–global entanglements in diverse historical, geographical, social, and cultural contexts.

Many of these entanglements have colonial origins. American archaeologists are collaborating in new ways with indigenous peoples, archaeologists, and publics in imperial homelands and other former New World, European, African, and Pacific colonies. Plant, animal, food system, pathogen, and manufacturing studies are deepening understandings of the biological and environmental exchanges and consequences of colonialism. Archaeologists are reconceptualizing indigeneity in association with new models of hybridity, appropriation, resistance, adaptation, and identity and conducting in-depth, diachronic studies of variation and diversity in European and local cultures, geographies, and sociopolitical organizations (Liebmann & Murphy 2011; Kelly & Hardy 2011). Increased attention to the colonial transformation of Europe since the fifteenth century is further complicating and challenging colonial metanarratives. So too is the explicitly global scope of diasporic orientations and the attention directed at the materiality of pre-diasporic experiences and structures and the forces leading to diaspora. These archaeologists are interrogating the materiality of alienation, accommodation, appropriation, acceptance, and other transformative processes experienced by diaspora subjects.

Understandings of globalized industrial production, the distribution and localization of consumer commodities, and the associated transformations of capital are also deepening and broadening through comparative work. These perspectives challenge simple models that hold the global distribution of industrial commodities responsible for threatening cultural diversity while revealing the many ways that a globalizing economy has bred environmental and social injustice. The scale and ubiquity of industrial facilities rendered obsolete by rapidly changing technologies and corporate quests for cheaper labor has produced an increasingly global trail of communities coming to terms with industrial legacies and identities. Similarly, the escalating destructive power of war technologies has scarred ever-larger areas of the global landscape, defying the imaginaries of victory and heroism that have inspired traditional memory-making and marking.

Finally, American historical archaeologists share with international colleagues the current preoccupation with identity and identity-making processes and forces that characterizes the postmodern condition (Johnson 2010).

Future Directions

Pragmatic, economic, technological, legal, social, political, theoretical, cultural, and philosophical forces and events will inform the future of American historical archaeology, as they have the past. Economic recession and raging ideological stalemates over America's capitalist-socialist future have shunted public attention away from archaeology. This has produced urgency in archaeology to confront the issues surrounding rights and privileges, public values, cultural memory, and shared authority. The outcome will have a profound impact on the future of the field. The relevance of historical material evidence to contemporary concerns will continue to justify future endeavors. Archaeologies of gender, sexuality, and individuality and consumerism will persist, with growing significance given to authenticity, advertising, and branding. With the aging of the post-World War II baby boomer generation, the latter end of the life course promises to join childhood studies as a focus of interest. Archaeologists already study the recent past and the present, although not yet with full comprehension of how the lack of temporal distance is implicated in our preservation and interpretation decision-making.

American historical archaeologists must expand their budding multiscalar, comparative approaches informed by Atlantic World, Pacific Rim, and global studies. More studies of human-land-object forms of association, occupation, and ownership will illuminate alternative ways of valuing past material remains and guide decision-making for the future. They will also broaden and deepen the scientific knowledge, and humanist empathy archaeologists need to make choices regarding study of human remains, genetics, and bio-cultures. Contemporary health, environmental, climatic, and social problems are transnational, and so must be archaeologists' contributions to their comprehension and solution.

Cross-References

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- ▶ Annapolis: Historical Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Battlefield Archaeology
- ▶ Beaudry, Mary C.
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Consumption, Archaeology of
- ▶ Critical Historical Archaeology
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- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Deetz, James (Theory)
- ▶ Engendering Historical Archaeology
- ▶ Glassie III, Henry H.
- ▶ Heritage and Archaeology
- ▶ Historic Jamestowne
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- ▶ Mission Archaeology in North America
- ▶ North America During the European Contact Period
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North America During the European Contact Period

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State of Knowledge and Current Debates

Introduction

Beginning in the age of discovery and exploration, European powers made contact with Native peoples in North America and subsequently colonized the continent. The cultural encounters that took place in North America during the European contact period have had a profound influence on world history with a lasting material legacy. In conjunction with ethnologists, historians, and demographers, archaeologists have employed documentary sources, ethnographic materials, oral accounts, and pictorial images to decipher the archaeological traces of contact to understand the interactions between Natives and newcomers (e.g., Galloway 1991; Nassaney & Johnson 2000a; Paterson 2011: 133-196). Many of the central questions pertaining to the

contact period revolve around the ways in which Indigenous peoples, Europeans, and Africans influenced each other and how they impacted the environment in the process of cultural interaction and colonial engagement. While earlier scholarship emphasized the dominating role of Europeans, more recent work examines the agency of colonial actors of various identities, their creative responses to a rapidly changing social and political landscape, and the benefits of such a shift in perspective.

This entry discusses the significance of the North American contact period within the context of a broader global historical archaeology. It begins by examining the spatial, temporal, and practical dimensions of the European contact period. A brief overview of Native North America at contact is presented, followed by a history of early exploration and colonial encounters. A discussion of archaeological investigations into the contact period and some of the interpretive frameworks that have been used provide the context for the framing questions and enduring themes that have guided and emerged from archaeological research. Some of the salient research results pertaining to the materiality of contact are presented along with current debates that will propel future work in fruitful directions as the field becomes increasingly inclusive and attentive to a multiplicity of voices that reflect various stakeholders with an interest in the outcome of archaeological studies.

The Spatial and Temporal Scope of the North American Contact Period

For the purposes of this entry, North America is defined in ethnological terms to include the continental area north of Mexico City. Early anthropologists differentiated the cultural and political attributes of the occupants of this large landmass from those of Mesoamerica – particularly the state-level societies of the Valley of Mexico, the Yucatan, and areas further south – and organized groups into culture areas based on cultural and material similarities and differences (Fig. 1). They recognized that Native North America was by no means uniform, since it was marked by considerable phenotypic variation representing more than 500 ethnic groups speaking nearly 300 languages organized into some 60 discrete linguistic families. Europeans lacked the conceptual framework to account for these populations when they first encountered them in the sixteenth century, leading to a range of divergent ideas about their history and origins. Archaeologists have since demonstrated that North America has been occupied for over 10,000 years, while many Native groups claim ancestry on this continent since time immemorial.

A few archaeologists have proposed trans-Atlantic contacts in pre-Columbian times, some even dating back to the Upper Paleolithic. However, with the exception of limited Norse settlement in the north Atlantic, no contacts prior to CE 1492 have been substantiated archaeologically. Thus, the contact period in North America began in the late fifteenth century and "by convention... commonly refers to the temporal range in which European colonists and Native peoples established social relations" (Wilcox 2009: 27). Of course, Indigenous communities interacted with culturally diverse peoples prior to the arrival of Europeans. Moreover, because contact can take many forms, it is incumbent upon scholars to define what they mean precisely by "contact" and to justify its analytical utility.

Bradley (2012) has suggested four phases or stages in the contact experience. The first phase is a rumor or report of an unusual occurrence. The second phase is marked by physical evidence such as a piece of imported brass or a glass bead. In the next phase, initial face-to-face contact occurs, and this becomes sustained interaction in the fourth phase. These phases may occur very rapidly or over a period of decades in some regions.

The first two phases have been referred to as "protohistory" to describe the indirect impact of Europeans (Paterson 2011: 167). This connotes derisively that Natives lived "before history" until Europeans arrived, a distinction reified by the term "prehistory." While the terms prehistory and protohistory are fading from use in many scholarly circles due to their pejorative

North America During the European Contact Period, Fig. 1 Culture areas of Native North America and the locations of select ethnic groups when first documented in written records. Map drawn by Jason Glatz

connotations, documentary sources undeniably were created and are available for study in some cultural contexts (when literate people were present) and not in others. Rather than seeing documents as creating a gulf between periods, they can be viewed more profitably as another line of evidence for historical reconstruction. Of course, written documents are no panacea for historical archaeologists and must be used critically just as should all sources since they harbor biases and limitations (see Galloway 1991).

Some archaeologists have critiqued the contact period terminology and the conceptual baggage associated with it (Silliman 2005), preferring the term "colonialism" because contact implies a benign relationship of relatively short duration. On the other hand, colonies as an extension of empire did not exist for much of North America until the last half of the seventeenth century when both the French and the English became real imperial powers. Before that, most of the European settlements in eastern North America were commercially based enterprises or religious refuges. The advent of colonialism involved "the projects and practices of control marshaled in interactions between societies linked in asymmetrical relations of power, and the processes of social and cultural transformation resulting from those practices" (Dietler 2005: 54). Contact in North America consistently carries colonialist connotations.

Colonies, by their very nature, are associated with states and empires during periods of expansion (Rogers 2005: 353). Colonial ventures provide opportunities for trade, information exchange, technological transfer, and ethnogenesis – the creation of new ethnic groups and forms of cultural practice. From an archaeological perspective, colonialist relations often involved goods that were produced, exchanged, and employed to further the colonial enterprise or resist its imposition, along with the ideological

changes and continuities that accompanied it. Given its focus on the long-term and the material conditions of social life, archaeology is well poised to contribute to our understanding of cultural contact and entanglement. By examining the expansion of the capitalist world system – which was responsible for the most extensive implementation of colonialism (and contact) in world history – archaeology can expose evidence that is complementary and sometimes contradictory to written documents (Nassaney & Johnson 2000b; Dietler 2005: 50). The archaeology of contact is firmly grounded in the field of historical archaeology, which emerged in North America in the 1960s as the study of the expansion and impact of European culture. While material culture in all its forms is central to the field, historical archaeologists typically employ multiple lines of evidence produced in different contexts to interrogate and interpret how artifacts and the built environment were implicated in the interactions engendered by contact in North America.

Native North Americans on the Eve of European Contact

Prior to European explorations, mobile hunter-gatherers, semisedentary horticultural societies, and more centralized agricultural groups occupied most of North America north of the Rio Grande. Farmers dependent upon maize, beans, and squash were concentrated in the Eastern Woodlands and in arable areas of the Southwest (Fig. 1), whereas others could rely on the natural bounty of the environment that yielded plentiful plant and animal food resources that varied by season and locale. Some groups modified the landscape to increase resource productivity through the construction of raised fields, irrigation ditches, fish weirs, and wing traps to capture animals. Many also managed resources through controlled burning that encouraged edge areas and promoted other ecological benefits. Native peoples everywhere scheduled their activities and movements in accordance with the spatial and temporal distribution of resources and devised social networks to buffer against resource fluctuations. Reciprocity was widely practiced as the means by which goods were distributed and consumed.

Kinship was the dominant metaphor in Native societies and created a sense of belonging by virtue of the roles that were assigned to individuals according to age, gender, and skill. Women were generally seen as life givers and in charge of reproduction, plant gathering, cultivation, and child rearing. Men, in contrast, played a more public role spending much of their "time away from their villages and families, hunting, trapping, fighting, and conducting diplomacy" (Kicza & Horn 2013: 22).

Political positions ranged from achieved to hereditary in different ethnic groups. Power was seldom monopolized as leaders were expected to lead through example and consensus was usually sought. While men held many of the political offices in Native societies, women were not excluded. They could also exert influence both directly through the leaders they selected for office and indirectly through gossip and other informal means. In general, male and female roles were seen as complementary in Native societies without one having dominion over the other (cf. European patriarchy).

Native cosmology recognized various animated forces at work in the universe, both in this world and in the upper and underworlds. Phenomena and objects as diverse as trees, the wind, illness, stone tools, animals, and celestial bodies were seen to have inherent qualities that were to be respected as part of an interdependent web of connections that were important to sustaining human life. Ritual acts were often oriented toward maintaining those interconnections so as to achieve and renew the physical, social, and ideological well-being of individuals but more importantly, the community. This is the worldview that guided many Native peoples as they tried to rationalize and accommodate the European invasion.

Early European Explorations and Encounters in North America

Europe was marked by an expanding mercantile economy in the fifteenth century with the capital and infrastructure to seek out raw

materials and luxury goods in distant lands. Early encounters with Native peoples were initially unintentional and incidental; Native groups were not initially part of Europeans' imperial designs, though they were subject to immediate manipulation to ensure a competitive advantage in territorial expansion. While the history of encounters and appropriation varies in its details, what followed for several centuries throughout North America are a recurrent series of social, political, economic, and ideological contests that pitted Native against newcomer in a struggle for power and hegemony. Abductions, disease, warfare, exchange, intermarriage, migration, conversion, overexploitation, accommodation, and rebellion occurred repeatedly on a pan-continental scale as a result of cultural interactions involving misunderstanding, fear, greed, and power.

In the early years of contact, European settlement was often tentative and ephemeral. Natives usually outnumbered Europeans who depended upon their hosts for subsistence, marriage partners, appropriate technologies, and information needed for survival. To court their favor, Europeans often presented Natives with gifts such as cloth, glass beads, brass bells, copper kettles, iron hatchets, knives, axes and other metal implements, which they employed in familiar and innovative ways (Loren 2008). Failure to live up to Native protocols in exchange and other interactions was often disastrous, leading to conflict and ruin (Mallios 2006). Eventually, European disease, warfare, and subversive political tactics weakened Native groups allowing Europeans to gain a foothold. But not before Native groups made concerted, collective efforts to repel Europeans and restore former cultural practices. Rebellions and revitalization movements, such as King Philip's War (1675-6), the Pueblo Revolt (1680), the Natchez Uprising (1729), and Pontiac's Rebellion (1763), were common events throughout the history of contact. European imperial desires could be thwarted by Native actions indicating that outcomes of contact were always contentious, often negotiable, sometimes amicable, and never inevitable. This is easily forgotten when the history is told from the perspective of the dominant culture that assumed Native disappearance, marginalization, or absorption instead of continuity, persistence, and survivance. This divergence of perspective fuels the politicization of the contact period and leads to significant disagreements over reconstructions of the past. The causes and effects of European and Native actions are of central importance to our understanding of the contact period and are constantly being reinterpreted in light of new theoretical frameworks that illuminate data from varying angles, a recurrent theme of this essay.

In the sixteenth and seventeenth centuries, the Spanish, French, Dutch, and English vied openly against each other in North America (Fig. 2). Expansion was driven by efforts to discover a westward passage, find new tribes to convert, search for resources, and stake territorial claims. Explorations across the north Atlantic were undertaken to exploit rich sources of codfish or seek a more direct route to the Far East, which gradually led to increasing geographic knowledge of the North American landmass. Capitalizing on developments in seafaring technologies, England, France, and Spain became the dominant colonial powers as they claimed territory and established permanent settlements in North America. The shifting political geography of North America reflects the ebb and flow in the fortunes of various empires as they attempted to control land and exploit profitable commodities to bolster national pride and fill royal coffers.

By the middle of the eighteenth century, England had permanent settlements along the Eastern Seaboard from the Gulf of Maine to the South Atlantic Slope with a combined population in excess of one million colonists (Fig. 2). English posts also ringed Hudson's Bay to take advantage of prime northern fur-bearing animals. France had entered the interior of the continent through the St. Lawrence River valley and expanded west into the Great Lakes region, nearly to the Rocky Mountains, and down the Mississippi River Valley to the Gulf of Mexico. Spain had settled the southern reaches of the continent, following on the early explorations of de Soto in the Southeast (1539) and Coronado in the Southwest (1540). They eventually blended

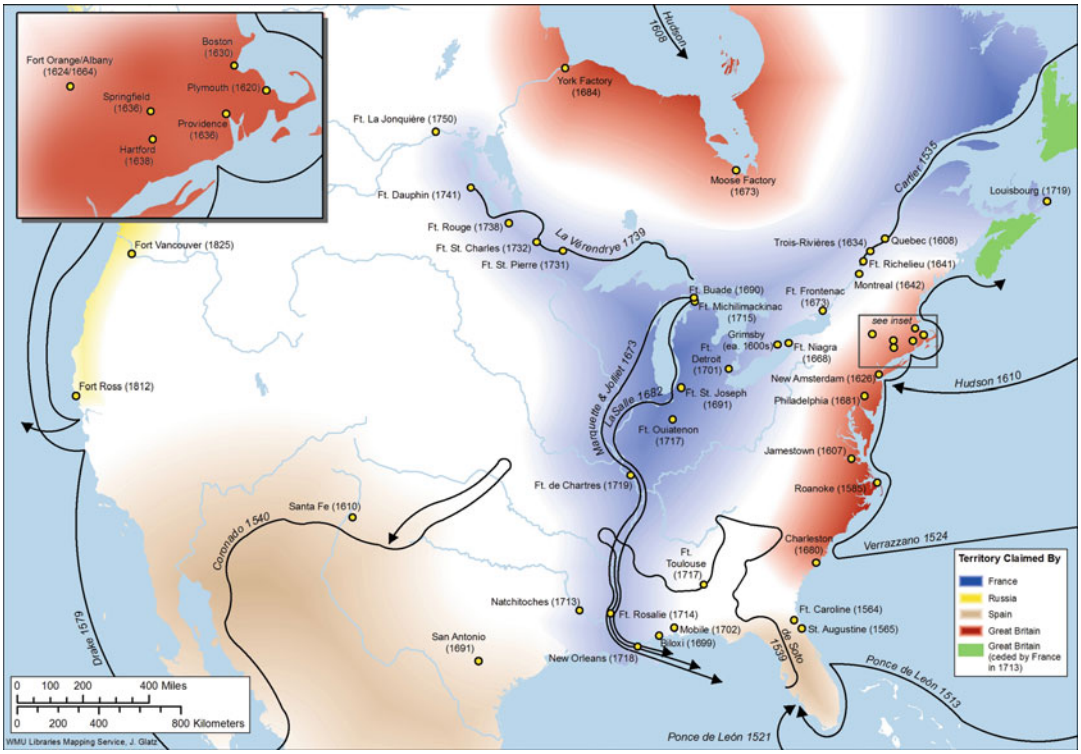

North America During the European Contact Period, Fig. 2 Routes of European explorers, territorial claims of European powers, and locations of early colonial settlements and archaeological sites. Map drawn by Jason Glatz

missionary and agricultural activities to harvest souls and cash crops through the use of Native labor.

The Spanish first landed in Florida in 1513, though their efforts to colonize the Southeast were largely unsuccessful. The de Soto *Entrada* (1539–1543) traveled hundreds of miles through the region and eventually crossed the Mississippi River. Its chroniclers have left us tantalizing glimpses into chiefly societies before their dissolution. Apart from the presence of a limited number of Spanish goods in Native sites, the most lasting effects of the *Entrada* were the trail of destruction left in its wake and the deleterious effect that disease may have had among the population. Spanish settlement, beginning with the establishment of St. Augustine (1565), was confined to Florida. Towns, fortifications, and missions soon dotted the landscape until the late eighteenth century when Spain ceded Florida to the English.

Spanish settlement of the American Southwest followed from the successful conquest of the Aztecs further south in the sixteenth century. Northern Mexico contained some of the richest silver deposits in the region, prompting the Spanish to found mining towns and establish farms and ranches to feed these communities (Kicza & Horn 2013: 121). The Spanish also established missions on the frontiers of their empire in Texas, Arizona, and eventually Alta California (1769) as they had in La Florida. Efforts to expand north were in response to Russian exploitation along the Pacific Coast and England's territorial acquisitions after the Treaty of Paris (1763), which posed threats to the security of Spanish colonies. The Franciscans attracted Natives to their missions and attempted to convert them to agriculturalists and Christianity. The surplus produced in the missions supplied the nearby *presidios* (military bases) where soldiers were stationed for protection and to help

capture runaways, demonstrate Spain's claim to California, and block Russian expansion to the south.

In the course of exploring and colonizing the continent in their search for precious metals, spices, and a route to the Far East, Europeans often settled for less lucrative resources like fish, timber, and furs, particularly in more northerly regions. Native peoples were usually recruited to harvest the raw materials, which were acquired through trade for manufactured goods. Exchange was one of the most significant mechanisms of interaction during the contact period, serving social, political, as well as economic functions. The depletion of furs in Europe enticed Basque and French fishermen to exchange iron and brass trifles for furs in Newfoundland perhaps as early as the fifteenth century. The demand for furs and hides fueled the trade, which became pervasive throughout North America and persisted for nearly four centuries. The fur trade illustrates the types of relationships that developed between Natives and Europeans and their social, economic, political, and environmental effects.

The French were especially active in the fur trade beginning in 1534 when Jacques Cartier encountered Micmac Indians near the mouth of the St. Lawrence River willing to trade furs for European goods. The English and Dutch soon entered the fray, exploring and subsequently establishing settlements along Hudson's Bay (1608) and the Hudson River (1614), respectively – bodies of water that provided access to the resources of the continent's interior. The English, Dutch, and French soon realized that furs were plentiful and potentially profitable. Competition to obtain the furs from Native producers in North America drove political and economic relations well into the nineteenth century.

Beaver was the preferred fur-bearing animal in much of North America, predominantly for its short undercoat fur that could be processed into felt for hats that marked social status in Western Europe and in the colonies. But other animals were also deemed desirable for various purposes leading to trades in buffalo, sea otter, and deer. Furs were implicated throughout North America during the contact period. Whatever the specific resource, European traders generally relied on Native peoples to capture and process the furs, for which they obtained manufactured, imported goods that served to cement the relationships that were more than merely economic in nature.

While the fur trade illustrates the close entanglements between Europeans and Natives, it also drove exploration as beaver were overexploited and sources of furs began to decrease along the Eastern Seaboard. After 1700, Native peoples in the northern fur trade no longer brought their furs to large trade fairs in Montreal; the French began expanding west and establishing trading posts in closer proximity to their Native allies. French exploration and expansion of the trade was made possible by support from the Crown, knowledge of the interior gained from the Natives, and a desire to claim new lands in advance of other Europeans.

For the French, who were never able to attract as large of a settler population as the English or Spanish, Native relations in the fur trade were essential for their survival in the New World. The fur trade was the glue that bound the interests of the French and their Native allies against their enemies – the English and the Five Nations Iroquois. It also demonstrates that alliances were not always built along cultural lines. In an effort to secure the interior, establish Native alliances, and thwart British and Iroquois efforts to expand westward from the Atlantic Coast, the French established a string of posts in the western Great Lakes region beginning in the late seventeenth century (Fig. 2). Among them was Fort St. Joseph, an important frontier outpost in the North American interior (Nassaney et al. 2003). Initially established in the 1680s as a mission on the St. Joseph River near a strategic portage that linked the river and the Great Lakes basin to the Mississippi drainage, the fort became the keystone of French control of the southern Lake Michigan region. For nearly a century, this post served as a hub of commercial, military, and religious activity for local Native American populations and European colonial powers. It afforded a vital

link in the colony's communications network and played a major role in the exchange of manufactured commodities for furs obtained by the Natives.

While the French controlled much of the trade in the St. Lawrence-Great Lakes riverine system, the English had established settlements in Massachusetts and Virginia. From Jamestown (1607), they hoped to raid Spanish vessels returning to Europe laden with precious metals. The region soon supported a considerable population that profited from tobacco production. The Pilgrim settlement at Plymouth (1620) was founded for religious freedom in an area that had been decimated by disease. The remnant peoples there welcomed the English as potential political and military allies against the Narragansetts who had been less affected by the epidemics (Kicza & Horn 2013: 153-154). The English population, which grew rapidly with settlements at Boston (1630), Springfield (1636), Providence (1636), and Hartford (1638), soon placed pressure on Native lands in the region. An early effort to confine Native groups to small tracks of land occurred in eastern Massachusetts beginning in the 1650s where John Eliot established a series of "praying towns" that were ostensibly designed to convert Native peoples to Christianity and assimilate them to English society, albeit with marginal success.

The Narragansetts and neighboring coastal groups in southern New England played important roles in colonial politics throughout the seventeenth century. These people participated in the fur trade by producing wampum – beads from marine shell – that were exchanged to the colonists for manufactured goods (Bradley 2011) (Fig. 3). The wampum was in turn moved into the interior where it was accepted in trade for furs. Through networks like this, European goods reached Native hands long before Indigenous peoples saw the traders themselves.

The English also sought to access furs from the interior through a more northerly route; hence, they chartered the Hudson's Bay Company (HBC) in 1670 and established several posts along the shore of the bay to keep down costs (Klimko 2004: 160-161). As with the

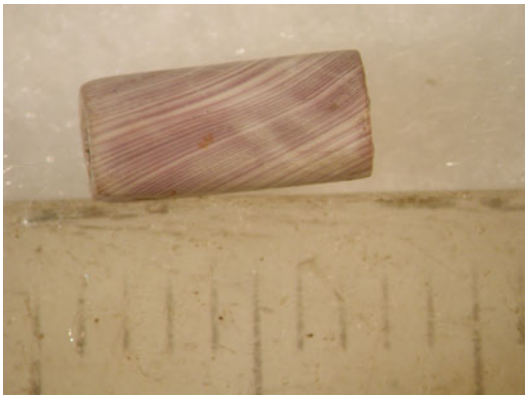

North America During the European Contact Period, Fig. 3 Wampum has been referred to as the magnet that drew the beaver out of the interior forests. Made of marine shell from coastal New England and New York, these small, cylindrical beads served political, social, and economic functions throughout the colonial period in much of the Eastern Woodlands. Length: 70 mm. Photo by Lisa Marie Malischke

Montreal trade fairs, aboriginal groups were drawn to the HBC posts to trade. Also similar to the French situation, the presence of independent traders who traveled into the interior eventually forced the HBC to construct inland posts, prompting western expansion (Klimko 2004: 161) stretching all the way to what would become British Columbia and US Pacific Northwest.

In an effort to anchor Britain's claims to the Oregon Country, the HBC established the headquarters of its Columbia Department at Fort Vancouver in 1825 (Wilson 2011: 7). Over the next two decades, the fort became the fur trade capital of the Pacific Northwest with warehouses, locally produced goods, and agricultural surpluses to supply fur brigades, Indians, settlers, and up to two dozen other company posts in the department "from Russian Alaska to Mexican California and from the Rocky Mountains to the Pacific Ocean, a territory of approximately 700,000 square miles" (Wilson 2011: 7). Peoples of diverse backgrounds inhabited Fort Vancouver including English, Scots, French-Canadian, Hawaiian, Portuguese, *métis*, or from one of more than 30 Native American groups including Cree, Delaware, Haida, and Iroquois. The offspring of European

fur traders and Native women led to the creation of a distinctive *métis* identity (Wilson 2011: 10). Some colonial powers such as Spain, Russia, and France encouraged interethnic unions as a strategy to populate distant frontiers (Lightfoot 2005: 216). While Britain did not, it was often difficult to regulate practices at places distant from the metropolis.

A rigid social hierarchy marked colonial life throughout much of North America. Moreover, this hierarchy was expressed through distinctive consumption patterns associated with food remains, ceramics, architecture, and a host of other prosaic objects used and discarded in daily practice. In the Columbia District of the Northwest, clerks and officers occupied buildings within Fort Vancouver's palisade, whereas *engagés* (company employees) lived in a multiethnic village of over 600 people. The higher ranks were generally English, Scottish, or French-Canadian, whereas the hired hands were French-Canadian, American Indian, Hawaiian, or *métis*. Cultural background dictated to a large degree one's occupation and prospects for economic mobility (Langford 2011: 30). In addition to processing furs, activities included logging, ship building, farming, and various crafts to support and diversify the economic pursuits of the company (Wilson 2011: 8–10). The artifacts recovered from the site testify to this social variation as well as the cultural changes that were taking place in house construction, subsistence, and dining practices and the accommodations the villagers made to intense cultural interactions.

Europeans made contact with coastal peoples of the Pacific Northwest well before the HBC. Sir Francis Drake had visited the region in the sixteenth century, but the English did not establish any permanent settlements there. However, after the Russians began to acquire and market pelts to the Chinese in the seventeenth century, they soon crossed the Bering Strait (1742) and settled in Alaska to exploit sea mammals for their furs (Lightfoot 2005). From 1743 to 1800, Russian fur traders obtained more than eight million rubles worth of skins (Gibson 1988: 376). In 1799, Tsar Paul granted the Russian-American Company a charter giving it a monopoly over all Russian economic activities in North America. Employing Hawaiians, Aleuts, Native Californians, and Creoles (offspring of Russian and Native unions), the Russians instituted a system of forced labor to acquire furs from Alaskan waters and as far south as northern California that could be sold at a considerable profit to Chinese merchants. Russian exploration along the California coast led to the establishment in 1812 of Colony Ross at the mouth of the Russian River just north of San Francisco Bay. The purpose of the settlement was to grow wheat and other crops to sustain Russian traders in Alaska, hunt marine mammals, and trade with Spanish California (Lightfoot 2005). The site was a successfully functioning multicultural settlement for nearly 30 years when the Russian-American company decided to abandon the colony due in part to the depletion of the California sea otter population. Mexican and American settlers also posed a challenge to Russian claims in the region, demonstrating that sovereignty in North America rested on the ability to seize, occupy, and hold territory – usually by force.

This brief overview suggests that there was significant temporal, spatial, and cultural variation in the activities associated with Native and European interactions in the contact period of North America. Yet similarities abound as all areas experienced trade, information exchange, technological innovation, and the creation of new forms of cultural practice (Rogers 2005: 352-3). Archaeology can provide the data to examine how these large-scale processes were experienced at the local level since archaeological materials derive from daily activities. Approaches to the archaeological record of contact have changed over the past century in accordance with intellectual shifts both internal and external to the discipline and form the basis for the following discussion.

History of Archaeological Investigations into the Contact Period

Anthropologists showed little interest in the contact period and its consequences in the early

twentieth century. Driven by the salvage ethnography that aimed to capture traditional Native culture prior to contact, ethnographers such as Franz Boas, Alfred Kroeber, Robert Lowie, and Julian Steward aimed to reconstruct Native societies unspoiled by European influence (Ramenofsky 1991). The prevailing ideology of the dominant society posited the vanishing Indian; assimilation was seen as the means for Native survival, as promulgated in government policies such as the Dawes Act of 1887, which sought to complete the process of dispossessing Natives from their land. With the advent of acculturation studies in the 1930s and the work of the Indian Lands Claim Commission (1940s), archaeologists began to examine the impact of European culture on Native societies. They aimed to demonstrate the ways in which Native societies had become more like European ones, perhaps most readily apparent by the imported goods that they had adopted. The advent of processual archaeology in the 1960s, which sought generalized and dehistoricized explanations for human behavior, did little to promote contact period studies (Wilcox 2009: 46-48), nor did the rise of historical archaeology that focused on European sites of national significance like Williamsburg, Mount Vernon, and Monticello, though trading posts were also of interest (e.g., Fort Michilimackinac). Most of the posts were examined for purposes of reconstruction with the aim of interpreting their role in manifest destiny and in support of other national myths (see Klimko 2004).

The Native American Reorganization Act of 1934, Native activism such as the formation of the American Indian Movement in the 1960s, increasing numbers and vocalization of federally recognized groups, and the debates that led to the Native American Graves Protection and Repatriation Act (1990) laid the groundwork for the conceptual spaces needed to discuss Native history, the contact period, and colonialism in fundamentally different ways by the late twentieth century. Despite claims to the contrary, Native living descendants had not vanished. Many were hidden in plain sight, and their cultural persistence, as expressed in practices and beliefs that set Indigenous peoples apart from the dominant society, contradicted the dominant narrative and the biological imaginings that justified dispossession. Under the banner of post-processual archaeology, interpretations shifted toward an interest in meaning, an insider's perspective, and multivocality. While it is difficult to tease out the influence of Native voices from the contributions of other disenfranchised groups (e.g., people of color, other minorities, and women) to this movement, what is clear is that political action effected this change (Nassaney 2012). As a result, Indigenous peoples and other stakeholders throughout the United States and in many other parts of the world are now seen to have a legitimate interest in the past and, by extension, a concern for archaeology. More specifically, the interpretations given to the events of the contact period have practical implications. Furthermore, Native experiences in the contact period were different from those of the colonizers. This realization underscores the idea that archaeological interpretations can serve, reinforce, or challenge dominant *and* subordinate ideologies. These pragmatic concerns over power inform the interpretive frameworks that have been used to examine the contact period, a summary of which follows.

Interpretive Frameworks

Whatever happened in the European contact period remains unchanged; however, our perceptions of it are constantly in flux due to shifts in the way we see the world based on our theoretical framework, social identity, and a host of other factors (Nassaney 2012). A number of interpretive frameworks have been employed to examine the contact period. They are presented in roughly chronological order, but they should not be seen as paradigmatic replacements. Some approaches are complimentary, while others are clearly contradictory and developed in response to shortcomings of previous perspectives.

Acculturation was the dominant interpretive framework for understanding the contact period for most of the twentieth century. Acculturation often carried the embedded assumption that European culture was destined to replace

Native cultures due to racial and technological superiority. This explained the drastic and continued decrease in Native population and the proclivity of the survivors to adopt European goods. Researchers employed this relatively straightforward – though in hindsight theoretically unsophisticated – research methodology by comparing quantities of traditional and imported objects to assess the extent to which Indians had become civilized. The increase in Western goods over time was interpreted as evidence for the inevitable process of cultural decay.

The rediscovery of Marxian approaches in anthropology in the work of Eric Wolf and others in the 1950s paved the way for a concern with political economy and the ways in which labor is organized and surplus is mobilized on a global scale. World-system theory sought to explain the factors that led to global inequities and identified core areas of resource accumulation and peripheral areas of resource extraction. Gold and silver mines in Spanish possessions, English plantations run by African slave labor, the French fur trade, and other New World practices were the means by which Europe underdeveloped and economically marginalized their colonial subjects. While world systems explained the growth of mercantile capitalism, it failed to account for the diversity of responses at the periphery and denied the disenfranchised proletariat the exercise of agency in their actions and avenues for self-expression, accommodation, and resistance.

Critical theory is another organizing framework that owes its genesis to Marx and his predecessors and has played a role in contact studies (Nassaney 1989, 2012). Critical theorists posit that contemporary social and political conditions influence interpretations of the archaeological record that, while created in the past, only exists in the present. Thus, material remains are subject to varying interpretations according to the personal and political predilections of the interpreter. Critical theory calls us to recognize that the archaeological record is underdetermined with ample room for ideological bias to creep in.

It follows that seemingly disempowered stakeholders in excluded positions can use archaeology to challenge the status quo and subvert a dominant ideology. In the post-NAGPRA world, an Indigenous archaeology has emerged that aims to reintegrate "Indigenous materials, remains, history, and research with contemporary Indigenous peoples" and their concerns (Wilcox 2009: xii). By creating conceptual space for Indigenous matters, the narratives that posit the disappearance and alienation of Native peoples from their pasts can be reversed, and attention can be focused on explaining the rather remarkable existence of Native peoples in contemporary society 500 years after Columbus (Wilcox 2009). The archaeologies that result from such practice and our understandings of the contact period will be fundamentally transformed.

While yet to be fully realized, some archaeologists are attempting a comparative study of colonialism through which the experiences of all people within the contact period in North America and beyond can be juxtaposed to gain an understanding of "glocalization" – the intersection between the global processes that accompanied contact everywhere and the local responses of colonial subjects (both colonized and colonizers). Moreover, the genres have become blurred, to paraphrase Clifford Geertz, in a process of hybridization that challenges us to avoid essentialized categories like dominant/subordinate, colonized/colonizer, and continuity/change. These identities are increasingly seen as fluid and situational and can be no more fixed in matters of policy than in material practices. The archaeology of the contact period, with its theoretical ebbs and flows, gives us an opportunity to create a new world in the twenty-first century as we simultaneously rewrite the past by interpreting material remains in ways that accord with a larger chorus of voices that strives for justice and equity. Ultimately, the archaeological study of the contact period can shed light on cultural continuities and discontinuities as two sides of the same coin and its significance for understanding ourselves in the present.

Framing Questions and Enduring Themes in the Archaeology of European Contact

Just as our understanding of the contact period is in flux, so too are the framing questions that we

pose about the past. Yet in an effort to situate knowledge claims, culture contact archaeologists want to know what we know about past culture contact and how we know it. They aim to determine the types of encounters that occurred and their outcomes. Moreover, they are particularly interested in the material manifestations of the human responses to culture contact.

Murray (2004) has identified five variables of interest in the archaeological study of contact in settler societies, which were developed to examine contact in a comparative framework. These include (1) chronology of colonization, (2) types of societies encountered, (3) intentions of the colonizers and responses of the colonized, (4) demographics of colonization, and (5) duration of colonization (see also Lightfoot (2005) and Rogers (2005) for complementary organizing frameworks). Although these categories are by no means mutually exclusive, they can serve to focus the study of the archaeological evidence in the contact period in select areas of North America in an effort to highlight enduring themes.

Basic archaeological matters of space, time, and form interest archaeologists who study culture contact, even though they have access to documentary sources. Researchers continuously work to establish a chronological framework for contact by creating artifact typologies that are temporally sensitive (e.g., Quimby 1966). In the Southeast, archaeologists have tried to identify and locate objects associated with de Soto in order to trace his travels through the region. More importantly, such objects can increase temporal precision of sites in order to examine their distribution over time to evaluate models that posit shifting political and population dynamics prior to European contact. Chronology is an important variable because the changing political and demographic conditions of both Indigenous societies and colonizing powers influenced the type and intensity of impact. For example, the strategy and tactics that Native peoples used to counter English colonialism in southeastern New England changed considerably after their experiences in the Pequot (1637) and King Philip's (1675) wars; thereafter, they employed new strategies of accommodation to ensure biological survival that influenced settlement-subsistence strategies and land use practices.

The nature of social formations had a significant impact on the activities and outcomes of colonial interactions. Groups ranged along a spectrum from relatively egalitarian, hunter-gatherers to more centralized, ranked societies. These organizational forms often correlated with population size and surplus mobilization. As European populations increased, Native mobility was compromised making it difficult to maintain traditional subsistence practices. The result was often a decrease in mobility, more intensive land use practices, or wage labor that required new seasonal movements.

The effect of contact on Native peoples has been a central issue in the study of culture contact. Research shows that there was considerable variation in the "degree to which colonial agents actually dominated native peoples and exerted power in the exploitation of resources, goods, and labor" (Lightfoot 2005: 210). In order to assess this process in qualitative and quantitative ways, archaeologists often sought to establish an ethnographic baseline. Thus, considerable efforts have been expended on identifying the precontact predecessors of historically documented ethnic groups often using the direct historical approach. Archaeologists have also challenged the reliability of the ethnographic record, arguing that groups were compromised by disease and population loss and consequently were fundamentally transformed by the time their lifeways were documented (Ramenofsky 1987). While most archaeologists agree that Native societies had no immunity to Old World diseases before contact, there is little consensus on the severity of population loss. Precontact population estimates range from 1 to 18 million (see Ramenofsky 1987: 6-21). While a reliable estimate likely falls somewhere in between, it seems equally likely that catastrophic disease often led to population decline well in advance of permanent European settlement in some parts of North America such as the Lower Mississippi Valley. Those groups that were located farther

inland, those that were mobile, or those that were necessary for European survival were likely to have had different post-contact experiences (Ramenofsky 1987: 175).

Permanent European settlements along the Eastern Seaboard in the seventeenth and eighteenth centuries led to large-scale population shifts from east to west over much of the Eastern Woodlands. Such movements in turn pressured adjacent groups in a domino effect that had significant consequences for group size and ethnic identity. For example, the Five Nations Iroquois experienced population decline in the early seventeenth century perhaps brought about by European disease. They used guns acquired from the Dutch to exert military pressure on neighboring tribes to obtain war captives that could be adopted as fictive kin. This aggression triggered a series of population movements that led to demographic shifts felt onto the Plains. Southwest Michigan was abandoned, and the Potawatomis migrated to the western shore of Lake Michigan where they coalesced with unrelated groups. Amalgamation was partly a result of demographic imbalances brought about by disease and warfare, factors that were critical in the changing social landscape of Native North America after contact.

In southwest Michigan, archaeologists are examining the distribution of settlements immediately before, during, and after the French and English occupancy of Fort St. Joseph. Pre-contact settlements seem to lack imported manufactured goods, which typically were available well in advance of permanent European settlement (cf. Ehrhardt 2005). The absence of sites that reflect the "protohistoric period" suggests that the region may have been abandoned in the mid-seventeenth century due to Iroquoian threats; reoccupation followed after the French pacified the area in the late seventeenth century. Suffice it to say that population movements were extremely dynamic during the contact period reflecting new economic practices, political strategies, and military tactics.

The timing of contact and the composition of the social groups involved were related to the intentions of the colonizers and responses of the colonized. When sixteenth- and seventeenth-century French explorers were seeking a westward passage, they solicited information from Natives as to the existence of interior water routes that led to an inland sea. In the course of their initial chance encounters with Native peoples, they often exchanged goods of little economic importance to ensure safer passage and reliable information. When it became apparent that the existence of any such route lay far to the west, relations became less casual and more formal as each group saw the other as a potential ally in the larger political machinations that mark human groups everywhere.

As pointed out by Marcel Mauss nearly a century ago, economic exchanges in the form of gifts serve to solidify social relations, and European contact in North America was no exception. Inspired by the acculturation paradigm, archaeologists have used material remains acquired as gifts and in exchange to monitor various aspects of the contact experience. Europeans acquired a host of New World products and adopted associated practices; most of these have been examined as part of a larger Columbian exchange that focused on the transfer of pathogens and domesticates for tobacco and maize. Considerably, more attention has been paid to the imported, European-manufactured goods that appear in trade lists and inventories of archaeological materials from post-contact Native sites throughout the continent (Fig. 4).

Despite earlier facile interpretations, archaeological studies have repeatedly shown that Native peoples were discriminating consumers who selected objects that were consistent with their belief systems. For example, at the Grimsby site, an early-seventeenth-century Native cemetery in southern Ontario, "the Neutral were in possession of a large amount of trade goods, but this material... had almost no impact upon the pattern of values and attitudes which we know as Neutral culture. The people were guided by their own way of doing things, by their own cultural configuration" (Kenyon 1982: 226). Similarly, none of the trade goods that were adopted by late-eighteenth- and

North America During the European Contact Period, Fig. 4 Modern recreations of common eighteenth-century trade goods including kettles, firearms, axes, cloth and clothing, beads, and silver ornaments. Photo by Barbara Cook

early-nineteenth-century Indians along the Saskatchewan River and elsewhere in the West "were necessities for daily life. Indians [acquired goods that enhanced]... their repertoire of artifacts without eliminating their own manufactures" (Kehoe 2000: 181). Their basic way of life was not altered until after the devastating epidemics of the nineteenth century. As for new adoptions in clothing, Native women's readiness to adopt new styles was a pragmatic choice that reflected comfort, cheapness, and "appropriation of generally desired innovations" (Kehoe 2000: 183).

The presence of imported goods in Native sites often testifies to ways in which objects were adopted, transformed, and reinterpreted within a Native worldview. Yet, these seemingly practical choices also had unintended consequences. For example, copper-base kettles were commonly acquired by Natives after contact and were frequently buried with their owners or users at the time of death (Fig. 5). Kettles were subject to wear rendering them in need of repair until the end of their use life when they were frequently cut into ornamental shapes in the form of tinkling cones, hair pipes, or beads (Fig. 6). Such goods were exchanged over long distances and were often acquired by Native peoples well before they encountered Europeans themselves (Ehrhardt 2005). Kettles

North America During the European Contact Period, Fig. 5 Brass kettles, like this eighteenth-century specimen from the vicinity of Fort St. Joseph, were often acquired by Native peoples and used in ways that were both intended and unintended by their European makers. Photo by Roger L. Rosentreter. Courtesy of the Fort St. Joseph Museum Collection

also afforded some people greater mobility. For example, when the Micmacs received copper kettles in exchange for furs, they were no longer tethered to large wooden caldrons for food processing and hence ranged further afield in search of furs thereby expanding their hunting territory (Martin 1975).

This and numerous other examples demonstrate how Indigenous peoples adopted European

North America During the European Contact Period, Fig. 6 Tinkling cones adorned both Native and European garments, bags, and moccasins in fur trade society in the western Great Lakes region. Photo by Brock Giordano. Courtesy of the Fort St. Joseph Museum Collection

technology and used it in new ways that led to cultural changes. Archaeologists may be hard-pressed to distinguish between processes of change and continuity as both are simultaneously at play. The adoption of alien goods challenges archaeologists to reconceptualize objects as having essential characteristics indicative of Native or European culture. Furthermore, some objects like tinkling cones and wampum had their genesis in the process of cultural exchange and are clearly products of cross-cultural interaction.

In late-seventeenth- to mid-nineteenth-century plantation contexts from the Chesapeake south to the Carolinas, archaeologists have recovered a distinctive ceramic type referred to as colonoware – a low-fired, often locally produced, hand-built earthenware (Singleton & Bograd 2000). Interestingly, it exhibits traits of both Indigenous and African ceramic traditions, often rendered into forms that appealed to British colonial tastes (Fig. 7). While archaeologists initially thought Indians made it, a growing consensus suggests that colonoware is a product of interaction constructed by both African and Native Americans. It exhibits certain preferable qualities that had practical advantages over iron pots and other kinds of cookware. Moreover, they were found "in the kitchens of planter families as well as in the cabins of slaves" (Singleton & Bograd 2000: 15). This example emphasizes the meaning of an artifact to the people who used it over who made it. It also points to the syncretism and cultural borrowing that characterized the contact period for several centuries.

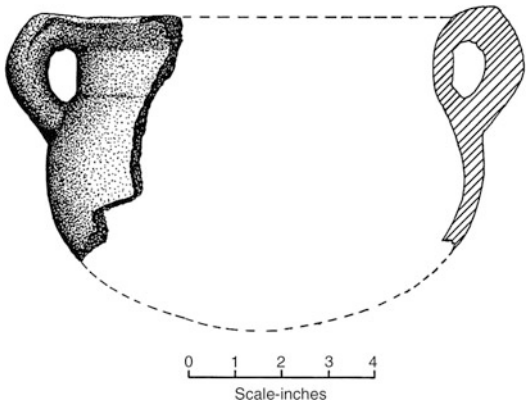

North America During the European Contact Period, Fig. 7 This colonoware vessel from Fort Moultrie in South Carolina imitates the form of a legless iron pot, complete with round, loop handles. Courtesy of the University of South Carolina Institute of Archaeology and Anthropology

While domestic settings often reflect the role of artifacts in daily use, mortuary remains represent a context in which Native peoples negotiated new social relations and manipulated material culture to express old and new beliefs in an effort to counter colonialism. Recent archaeological studies have shown that ritual acts and associated objects were significant elements in Native responses to the changing social and political conditions brought about by European interactions (see Nassaney 1989, 2004).

In southeastern New England and elsewhere in North America, Native religious practitioners employed tobacco in sacred rituals to ensure spiritual and physical well-being. Social disruptions brought about by disease and warfare challenged Indigenous beliefs leading some segments of society to search for new ways to secure their own earthly or heavenly salvation. Archaeological and ethnohistorical evidence suggests that smoking became more widespread in Native society by the mid-seventeenth century as men, women, and children adopted it. While the expansion of the practice was facilitated by the introduction of widely available European-manufactured white clay pipes (Fig. 8), the reasons for the expansion of the practice were more complex than mere emulation of European recreational usage. Instead, there was an attempt to expand and redefine aspects of Native ritual activity to rectify a declining social and spiritual order (Nassaney 2004: 135). Women were active agents who sought to appropriate tobacco to rationalize the demographic, social, and political upheavals that Native communities experienced. Their efforts are visible in new artifact forms and changing mortuary patterns that signal an attempt to ameliorate the imbalances that Europeans caused.

North America During the European Contact Period, Fig. 8 White clay pipes were mass produced initially in England and Holland and traded extensively throughout North America in the seventeenth and eighteenth centuries. Photo by Tori Hawley. Courtesy of the Fort St. Joseph Archaeological Project

Female use of tobacco in Native society was an attempt to connect with the cosmological forces that could help restore balance in an increasingly unintelligible world of death, animosity, and conflict. As tobacco use expanded in society, ritual became less institutional and more personal as the efficacy of religious specialists was called into question. The practice became popular among those who circumvented the hegemony of traditional healers and sought their own direct communication with spirit beings.

Pipes are not the only artifacts that had ideological significance for Native peoples under colonialism. Effigy pestles, which are long cylindrical stones with a sculptured representation at one end (Fig. 9), were made and used during the contact period in the greater Northeast (Nassaney & Volmar 2003). The recurrent association of these artifacts with women in death and in folk tales and the animals they depict suggests that these artifacts are symbols of female power that were first crafted in the seventeenth century. Furthermore, the creatures they depict evoke mythological symbols of supernatural beings that signal women's social position in

North America During the European Contact Period, Fig. 9 Effigy pestles recovered from archaeological sites in southern New England seldom exhibit utilitarian wear suggesting they served a different function. This bear effigy was recovered from the Burr's Hill site, an eighteenth-century Wampanoag cemetery in Warren, RI, along the eastern shore of Narragansett Bay. Drawing by Pamela Rups

Algonquian society. In the onslaught of a crumbling social order that challenged the predictability of roles and relations, it appears that individuals developed new ways to make contact with other worldly forces and beings as a way to rectify an unstable situation represented through mortuary ritual and effigy pestles.

Native peoples exhibited cultural flexibility and resilience by incorporating many Western forms of material culture into their way of life (e.g., white clay pipes). Yet many core features of Native culture persisted. Despite a decrease in their numbers and land base and the encroachment of colonists, they retained and reshaped their ethnic identities as they sought to remain autonomous communities (Kicza & Horn 2013: 184).

One means of ensuring cultural and biological survival in the contact period was the interethnic unions formed between individuals – the most intimate of interactions. Mixed-race groups emerged in the form of Spanish *mestizos*, French *métis*, and Russian Creoles. Most often, they were the offspring of Native women and European men. Loren (2010) has examined how this new identity was expressed archaeologically through the medium of clothing and adornment. She finds archaeological, historical, and ethnographic examples of attire that reveal a pattern of varied small finds such as shell ear pins, tinkling cones, and brass buttons worn by people who exhibited mixed fashions (Loren 2010: Figure 2.6); this intimates that disparate clothing styles were the norm for some segments of society despite sumptuary laws that prohibited them. She posits that this sartorial stance "allowed individuals to move through complex and socially restrictive colonial landscapes to create new identities" (Loren & Beaudry 2006: 266). The consumption of goods played a central role in identity formation in culturally mixed settings; objects enabled "people to locate others within social fields through the perception of embodied tastes and various indexical forms of symbolic capital" (Dietler 2005: 64).

The material manifestations of colonial entanglements are clearly revealed in the archaeological record, particularly in the objects of daily life that were used and discarded; these materials are indicative of other cultural changes that permitted both Natives and newcomers to persist. For example, cloth was among the most frequently traded commodities by value and volume, despite the abundance of less perishable iron, brass, and glass artifacts in the archaeological record. The acquisition of cloth contributed to a decline in the production of leather and hide clothing, which were labor-intensive tasks that were predominantly women's work (Anderson 1994). Thus, women could reallocate their labor to other activities, perhaps associated with processing furs for the burgeoning European market or embroidering beads onto garments using distinctive Native motifs. Thus, Indigenous labor often focused on a more limited range of activities, sometimes driven by European demands. Rogers (1993) documented a major decline in Arikara artifact categories linked to several activity sets such as scraping, pounding, knapping, and chopping among others and an increase in many of the Euro-American activity sets on the Northern Plains in the first third of the nineteenth century. This pattern suggests discontinuities in activities as a consequence of social disruptions caused by contact.

Some European goods acquired in exchange for furs were substitutes for Native counterparts, but many were used in distinctively Native ways. Some objects (e.g., military attire) served as markers of newly emergent political statuses, which increased social inequalities, whereas other commodities (e.g., iron drills, files) facilitated the intensification of wampum production and a lapidary industry used to create elaborate forms of smoking pipes (Fig. 10). Commodity exchange affected Native groups in two other related ways. First, imported goods often replaced Native goods freeing up time for Native producers to reallocate their labor, as in the case of the adoption of European cloth. Second, Native peoples channeled their labor to produce goods that Europeans wanted to acquire. For instance, the English were eager to obtain maize from Native trading partners in the early stages of their interactions in southeastern New England. Later on, they demanded increasing quantities of

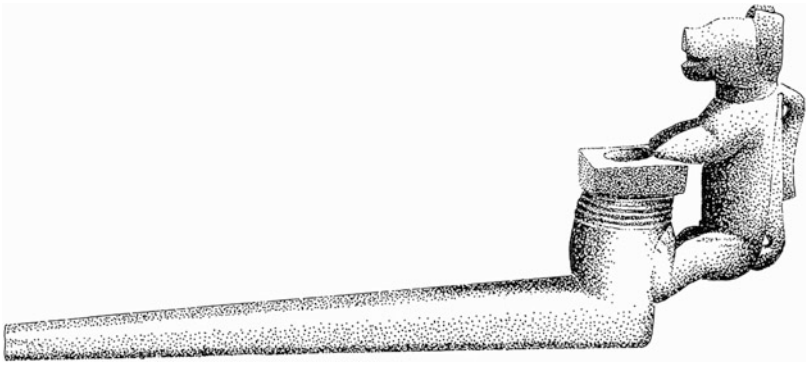

North America During the European Contact Period, Fig. 10 An elaborate lapidary industry developed in New England after contact once Natives gained access to metal files. Stone pipes were among the objects produced, including this specimen from the Burr's Hill site, in Warren, RI. Drawing by Pamela Rups

wampum to secure economic stability and increase political influence in the region. Thus, Native participation in the fur trade had a significant influence on the ways in which labor was allocated and organized. By the end of the seventeenth century, the events of the colonial encounter that left many people landless made it impossible for them to maintain an economy that reflected an earlier (i.e., precontact) division of labor and enticed them into becoming wage laborers. But Native peoples were responding to these new conditions even before they became dispossessed.

Native efforts to meet European demands for deer hides in the Southeast are reflected in butchering patterns observed on deer carcasses during the seventeenth century in the Ridge and Valley province of the Appalachian Highlands. Some sites "show a greater reliance on white-tailed deer and a decline in the diversity of non-fur-bearing animals" as a result of participation in the deerskin trade (Lapham 2005: 22). Native hunters developed a selective predation strategy intended to procure deerskins specifically for commercial trade (Lapham 2004: 189). Evidence of intensified processing activities throughout the region is also reflected in the increased production and use of beamers – bone tools "used to scrape hair and fatty debris from deerskins during the initial processing stage" (Lapham 2005: 23). Finally, deer bones exhibit cut marks consistent with skinning to maximize the size of the hide that was removed intact.

In sum, new production activities that developed to fulfill European desires led to the acquisition of manufactured goods that effectively replaced their Native counterparts soon after contact. Metal knives, axes, and drills quickly replaced many types of stone tools (Nassaney & Volmar 2003). Metal hoes also became common, although some elderly women resisted their adoption and sought to retain their shell equivalents in seventeenth-century New England. The broad range of European cloth types at a Narragansett Indian cemetery may be taken to indicate that cloth became widely available after 1650. Brass kettles and imported ceramic containers made Native ceramic technology nearly obsolete by the end of the seventeenth century in the Northeast and the Midwest, though it apparently persisted in areas of the Southeast well into the nineteenth century. Caddoan ceramics in east Texas were produced until 1805 and were common on Spanish mission sites, suggesting the incorporation of Native elements into the mission system (Perttula 1993: 104). While generalizations can be offered for the observed patterns, it remains necessary to examine localized contexts to illuminate why some practices and goods were absorbed into the everyday lives of people, while others were ignored, rejected, or contested (Dietler 2005: 62).

European contact also had profound ecological consequences that are reflected archaeologically. Cronon (1983) examined the impact of the introduction of new species on Native societies. While some groups were reluctant to adopt Old World domesticates, remains of cow, sheep, swine, chicken, and various imported plant foods like peaches and watermelons have been

recovered from Native sites throughout North America. Furthermore, the behaviors of large ungulates like horse, pigs, and cattle threatened the habitats of animals that Native peoples depended upon with deleterious effects on Native subsistence strategies.

The demands brought about by the commercial harvesting and processing of animal resources, especially as related to the fur and deerskin trades, often led to overexploitation. Native peoples responded by relying on alternate species, moving their settlements, or engaging in wage labor. The Dutch arrived in New Netherlands in 1624, and trading posts were soon established on the Connecticut and Delaware rivers. Yet the decimating effects of the early fur trade forced the Dutch to move their posts upriver when coastal beaver populations were overhunted (Brasser 1978: 82). The outcomes of overexploitation drove fur traders and Native hunters further inland and upriver throughout the seventeenth and eighteenth centuries. Commercial hide exploitation redirected exchange networks, altered political alliances, created political factions, reshaped gender relations, and transformed belief systems (Lapham 2004: 191). The forces set into motion during the contact period had enduring effects.

Future Directions

North America during the European contact period has been well documented through the writings of explorers, settlers, soldiers, and missionaries. However, this record reflects the perceptions of a small, literate segment of the population. Natives passed down their experiences after contact through oral traditions, though these are often inaccessible to researchers who have either neglected to consult them or have been unable to decode them for historical and anthropological information. While both documentary sources and oral accounts have great potential to inform on the North American contact period, both Natives and newcomers left an equally important body of data that can be exhumed and interpreted to examine what happened in the past and who was involved. While archaeology is fragmentary by its very nature and subject to its own set of biases, it "offers a continually evolving database that can serve as a crosscheck against insights gained through other approaches" (Nassaney & Johnson 2000b: 5). Artifacts are also multidimensional symbols, insofar as they express technological, social, and ideological aspects of culture simultaneously. It is their multivalency that makes them such powerful interpretive tools.

Thus, archaeology can furnish evidence about the contact period that is different from and independent of the colonial texts of historians (Dietler 2005: 50). It can reveal the subaltern histories that were created alongside the dominant narratives and in so doing, contribute to the historical experiences of marginalized groups. This has long been a hallmark of historical archaeology. Recent archaeologies of colonialism have continued to examine the "conditions surrounding Indigenous peoples' engagement with Europeans and the impacts of those entanglements on material and social identities" (Nassaney 2012: 6). Some have concluded that the collaborative study of colonial contexts can work to decolonize archaeological practice by promoting a redistribution of power and authority through the creative flow of knowledge among different partnering groups (Atalay 2006; Nassaney 2012).

Should archaeology continue to follow this direction, it will become increasingly emancipatory by providing a conceptualization of the contact period that aims to "pay homage to hybridity, emphasize cultural fluidity, acknowledge human agency, and empower contemporary cultural groups who have a stake in the history of... the colonial enterprise" (Nassaney 2012: 17). Archaeologists of this ilk will become receptive to the concerns of stakeholders who have a vested interest in the analysis of the contact period impelling efforts to be more inclusive in practice. Even in the absence of direct collaboration "non-Indigenous archaeologists need to help each other develop the capacity to witness how we reproduce a colonialist discourse" as they "examine and rectify their own colonial practices and work toward a broader reconciliation between their practice and the stakeholders with whom we share an interest" (Nassaney 2012: 18).

Archaeology of the North American contact period is still in its infancy, but it will come of age by embracing right relations. This will require practitioners to face up to the colonialist legacy so that we can all recover from it, engage in the process of healing, and make ourselves whole. There is a profoundly spiritual dimension to the work of interpreting the North American contact period. Archaeologists hold the tools to amend past wrongdoings and create greater equity in a way that restores dignity to all the historical agents who became entangled in contact, whether of their own doing or not.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Indigenous Archaeologies
- ▶ Mission Archaeology in North America
- ▶ North America (USA): Historical Archaeology

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North American Classification Schemes: Overview

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Introduction and Definition

North American archaeology can be defined as the study of the material remains of past North American peoples and restricted to areas north of central Mexico, mostly in the United States and Canada. Although this field did not develop in complete isolation from European archaeology or from research on the civilizations of Mexico and other parts of Central and South America, it has several distinctive and interrelated features (Willey & Sabloff 1993).

First, from its beginnings in the antiquarianism of the eighteenth and nineteenth centuries, North American archaeology has focused on scientific questions such as those related to artifact typology, geography, and stratigraphy rather than on art, iconography, and other more humanistic topics. These emphases can be attributed to the levels of human sociocultural organization observed among North American Indians at European contact and evidenced in the material remains of North America. When compared to peoples in Central and South America, North Americans have been perceived as relatively less complex socioculturally, and their study has fallen largely within the tradition of natural history. This orientation continues to this day despite growing recognition of the limitations of evolutionary typologies and contemporary interest in iconography and religion.

Second, until the latter third of the twentieth century, North American archaeologists primarily focused on the prehistoric past rather than on the historical developments following the arrival of Europeans in North America. Despite

the tremendous potential for investigation of historical topics, most North American archaeologists have studied prehistory, all the while seeing North American prehistory as largely cutoff from history and understanding the cultures of contemporary Native American descendants as too modified to provide many significant insights into the past. Coincident with the development of a robust historical archaeology of North America over the last few decades, the indigenous people of this continent have increasingly asserted their interest in and relevance to the archaeology of their ancestors. Both these developments have had major effects on theory and practice and made it clear that the traditional classificatory schemes employed by North American archaeologists and discussed in this entry may not be heuristically sufficient.

Finally, in North America, archaeology is understood as one of the four fields of anthropology. The commitment to a four-field anthropological approach developed by the Boasian school of anthropology in the early twentieth century has defined how archaeology has developed in North America. In this school of thought, culture was understood as divisible into distinct units or cultures with unique characteristics and histories and bound together by norms of behavior. In turn, North American archaeology can be understood as an investigation of the past cultures of the Native Americans being studied by ethnographers. In fact, in the early twentieth century, anthropologists studying Indians often did both ethnographic and archaeological research. At this time, documenting customs, language, biology, and material culture, before what was thought to be the inevitable further loss of culture, were all seen as essential pursuits for the anthropologist, and archaeology was part of this process. North American archaeologists are still trained in anthropological holism and view themselves as contributing to the field of anthropology. Today, even though the unit concept of culture has been questioned, most contemporary North American archaeologists still understand archaeological evidence as reflecting culture and focus their research on investigations of material culture as a means of understanding the cultures of the past.

Given these perspectives, a central problem has been how to organize the North American archaeological record into meaningful cultural units for productive investigation and scholarly communication. Such cultural units have been perceived as more or less mirroring cohesive subdivisions of the past cultural world. Their grouping into classificatory schemes at various temporal and spatial scales also has been considered a legitimate means of summarizing as well as understanding the past. Methodology for creating classification schemes developed within the normative, ahistorical approach to culture that dominated anthropological theory in the early twentieth century. Anthropological and archaeological theory has moved beyond this approach, but North American archaeology continues to use basic classificatory schemes relying on the dimensions of space, form, and time recognized by the culture historians of the first half of the twentieth century. Although often questioned and nearly universally considered limited in their accuracy in representing the past, these classificatory devices remain in use for want of superior methods. Familiarity with these schemes is central to understanding the field of North American archaeology.

Historical Background

Space and the Development of the Culture Area Concept

Although nineteenth-century scholars understood that there had been geographically circumscribed cultural expressions within North America such as Hopewell or Fort Ancient in Ohio (Trigger 2006: 279-280), inclusive geographic means of understanding North American Indian cultures first developed around the turn of the twentieth century when the concept of culture areas was developed (Holmes 1914; Wissler 1926). These formulations had the practical advantage of providing a way of organizing ethnographic and archaeological collections for museum display and study that was not dependent on the unilineal evolutionary typologies that were then falling out

of favor among anthropologists. The translation of these culture area schemes from ethnographic regions to the prehistoric past was seamless because at this time, North American scholars did not believe there was any great time depth to the Indian past. These formulations gave more importance to natural or environmental features than to historical or evolutionary trajectories, but in order to avoid falling into a simple geographical or environmental determinism, they relied on diffusion from cultural centers to explain the distribution of cultural traits.

Perhaps the most important work on the concept of North American culture areas was Kroeber's *Cultural and Natural Areas of Native North America* originally published in 1939, but republished several times because of its seminal significance (Kroeber 1963). Kroeber defined the culture areas of North America in terms of meticulously enumerated cultural traits, an approach that lent itself to subsequent statistical analyses (e.g., Driver & Massey 1957). He took pains, however, to point out that his focus was on whole cultures rather than traits per se. Kroeber also was not an environmental determinist, and he wrote before the development of theory in cultural ecology (Steward 1955) that would greatly impact North American archaeology. He notes that although cultures cannot be completely understood without reference to their natural context, "the immediate causes of cultural phenomena are other cultural phenomena" (Kroeber 1963: 1). His focus was on the delineation of cultural climaxes within the commonly recognized North American culture areas; these were examples of what he called cultural intensity or points "from which the greatest radiation of culture material has taken place in the area" (Kroeber 1963: 223).

By the mid-twentieth century, it was clear that culture areas could not necessarily be defined by the distribution of archaeological traits. However, the practice of using natural areas as a means of bounding archaeological regions or, as suggested by Rouse, of identifying one's data with the cultural center it most closely resembled continued among archaeologists (Webster 2008: 17).

Over time thinking about Native Americans in terms of culture areas has become convention within both North American archaeology and ethnology. No matter that the theoretical basis of this approach in environmental possibilism and diffusionism has long been repudiated by North American archaeologists. North American archaeologists recognize that cultural centers and boundaries cannot really be projected backward in time over many millennia. They also recognize that within culture areas at any given point in time, actual cultural diversity was greater than these formulations imply, and particular cultural groups may not fit the generalities for a given area. Today, as the normative idea of culture has been challenged, and many contemporary archaeologists focus on variability rather than classification, the limitations of the concept of culture area are clear. Nonetheless, North American archaeologists continue to find culture area designations useful in organizing their data. Scholars define their regional specialties in terms of these areas, and they are used in introductory textbooks on North American archaeology.

North American archaeologists commonly recognize ten pre-Columbian culture areas with the boundaries defined more or less as shown in Fig. 1. These areas are the Arctic, Subarctic, Northwest Coast, Plateau, California, Great Basin, Southwest, Plains, Southeast, and Northeast culture areas. Commonly accepted generalizations about the cultures of these areas are also summarized in Table 1 although cultural variation actually was greater than this table implies.

Formal Variation and Temporal Change

Early twentieth-century American archaeologists focused on formal variation as they tried to make sense of the increasing array of materials from archaeological survey and excavation. While archaeologists in the Southwestern United States took one direction focusing on stratigraphy and chronology, other North American archaeologists were focusing on formal variation alone to create taxonomies.

In the Southwest, Kidder (1924) and others were creating ceramic types based on attributes

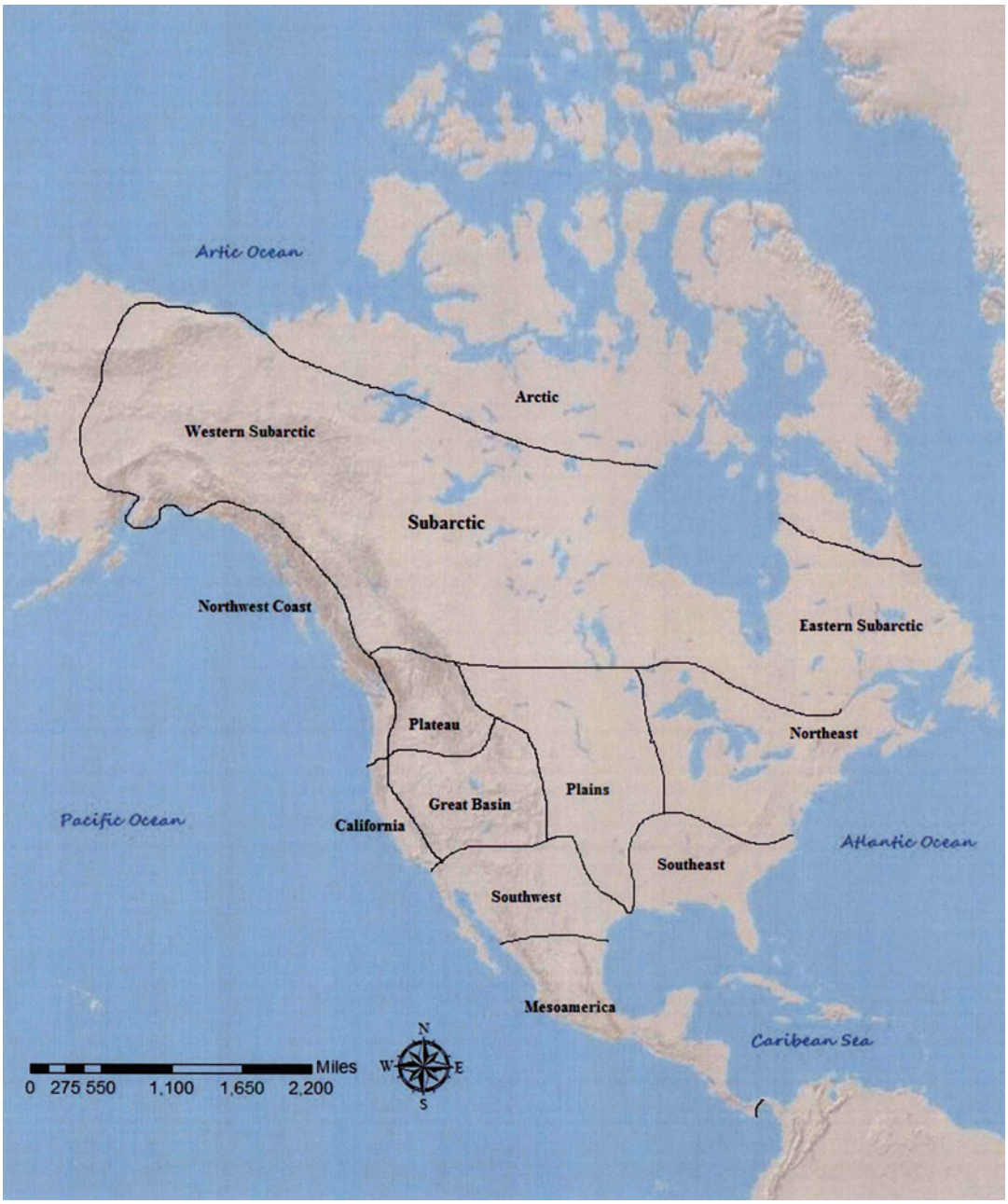

North American Classification Schemes: Overview, Fig. 1 Native American culture areas

with temporal variation through the use of stratigraphic control and seriation. The growing use of the stratigraphic method led to the increased use of metrical rather than natural stratigraphic controls during excavation. There was considerable debate over the reliability of relying on arbitrary excavation levels. These methods led Kidder to start developing a broad cultural chronology which culminated in the Pecos Conference in 1927, a meeting of the leading archaeologists working in the Southwest to create a chronological classification

North American Classification Schemes: Overview, Table 1 Characteristics of the North American culture areas

Culture area	Generalizations related to economy and material culture	Generalizations related to sociopolitical organization and religion
Arctic	Exploitation of sea mammals, caribou, and fish; tailored clothing, elaborate harpoons, umiaks, kayaks, and dogsleds; wood, stone, sod, and snowhouses	Organization into bands; bilateral descent; shamans
Subarctic	Exploitation of caribou, moose, and fish; semi-tailored clothing and snowshoes, toboggans, bark canoes, basketry; lean-tos and rectangular log-frame houses, conical tents	Organization into bands; bilateral, matrilineal and patrilineal descent; shamans, shaking tent divination
Northwest Coast	Exploitation of salmon and sea and land mammals; elaborate woodworking, dugout canoes; rectangular, plank, multifamily houses; elaborate masks	Villages, social classes, slaves; matrilineal and patrilineal descent; potlatches, elaborate ceremonies
Plateau	Exploitation of salmon, game, and roots; basketry, bark fiber clothing; semisubterranean winter pit houses and reed or mat-covered summer houses	Villages; bilateral descent; shamans, diverse spirits
California	Exploitation of acorns, mesquite beans, game, and marine resources; basketry, seed-grinding stones, sinew-backed bows; brush, bark, and grass shelters	Bands and tribes, ranked societies along southern coast; bilateral descent; shamans, elaborate female puberty ceremonies
Great Basin	Exploitation of pine nuts, rabbits, and antelope; basketry, seed-grinding stones, sinew-backed bows, nets for land mammals; brush, bark, and grass shelters	Bands; bilateral descent; shamans, elaborate female puberty ceremonies
Southwest	Cultivation of maize, beans, and squash as well as exploitation of game and domesticated turkeys; irrigation; pottery and basketry, cotton garments; multiroom pueblos	Villages; matrilineal and bilateral descent; elaborate ceremonial round, kivas, masked dancers
Plains	Cultivation of maize and beans as well as exploitation of bison; bone and skin working, dog-drawn travois, game surrounds, hide shields; skin tipis	Bands; bilateral, patrilineal and matrilineal descent; vision quests and guardian spirits
Northeast	Cultivation of maize, beans, and squash as well as exploitation of game and fish; hide clothing, bark canoes; wigwams and multifamily longhouses, palisades	Tribes and confederacies; matrilineal and patrilineal descent; secret societies, seasonal ceremonial round, dogs eaten ceremonially
Southeast	Exploitation of maize, beans, and squash and exploitation of game and fish; clothes made of feathers over netting, storage facilities, rectangular multifamily structures, fortifications	Tribes, confederacies, chiefdoms; matrilineal descent; complex ceremonies, sun worship, priests

(After Oswalt 2009: Table 1.1)

system that could be used throughout the Southwest. The result was the Basketmaker I–III/Pueblo I–V sequence still used in modified form in the northern Southwest. As shown in Table 2, this nomenclature was based on a taxonomic classification of architecture, community patterns, pottery styles, and other artifacts. In noting that the "'Pecos Classification" was more a pattern of cultural change than a chronological scheme, Winifred and Harold S. Gladwin criticized the system for its lack of applicability to areas outside of the northern "Pueblo" area such as the Hohokam and Mogollon regions. Gladwin proposed a classification based upon a tree analogy with three major roots (Anasazi, Hohokam, and Mogollon), leading to a variety of stems, branches, and phases (Gladwin & Gladwin 1934). While this

North American Classification Schemes: Overview, Table 2 Pecos classification as originally defined

Original period	Traits
Pueblo V (historic)	CE 1600 to present
Pueblo IV (protohistoric)	Widespread abandonment, decline in artistic elaboration, plain pottery wares
Pueblo III (Great Pueblo)	Very large communities, artistic elaboration, and craft specialization
Pueblo II	Small villages, pottery corrugated over entire surface
Pueblo I (proto-Pueblo)	Aboveground structures of contiguous, rectangular rooms, pottery with unobliterated coils or bands at neck, cranial deformation
Basketmaker III (post-Basketmaker)	Pit houses or slab houses, plain pottery, no cranial deformation
Basketmaker II (Basketmaker)	No pottery, but agriculture and atlatl present
Basketmaker I (early Basketmaker)	Pre-agriculture, no longer in use and considered the Archaic

taxonomy was based primarily on "cultures" grouped together because of similar traits, it also relied upon geography in its formulation. The chronology was assumed in the nature of the tree analogy with roots preceding stems and so forth.

At the same time, other North American archaeologists also were struggling with creating taxonomies that would help them to sort the increasing amount of data being generated by archaeologists. The most influential of these efforts was the Midwestern Taxonomic System, sometimes referred to as the McKern Classification (McKern 1939). Although linked to McKern, this taxonomic system was the result of a decade of debate among Midwestern archaeologists about the need for a common classification system to aid in comparative studies. One unique aspect of this classification as opposed to the Pecos Classification was its specific exclusion of time and space as defining attributes. Instead, this system was designed to rely on "determinants," diagnostic traits that could be used to distinguish "manifestations" of culture. This grouping of determinants could then be used to create a classification to distinguish cultures. This resulted in the levels of classification noted in Fig. 2.

Although the Midwestern system initially ignored time and space, an important implicit assumption was that this strict taxonomy would eventually relate to time and space. In this context, an archaeological culture was based upon shared physical characteristics. The goal was to distinguish these cultures which would then occupy distinct times and places.

These initial classifications based upon the variability in formal attributes all had a similar concern in terms of trying to distinguish archaeological cultures and establish a sequence of culture change. This initial concern was linked to the lack of data early North American archaeologists had about the sequence of events or about different groups of people. However, by the mid-twentieth century, archaeologists were starting to focus on what these "typologies" represented in terms of function and cultural context. Julian Steward and Frank Setzler (1938) in their article titled "Function and Configuration" were among the first to note a lack of focus by archaeologists on understanding or describing cultures. They criticized archaeologists for focusing too much on building artifact chronologies without considering the culture that produced the artifacts.

Archaeologists also were debating what the formal typologies they created actually represented. Some, including Ford (1954), suggested that typologies were simply useful tools abstracted by the archaeologist to answer their specific research questions. Spaulding (1953) and others argued that archaeologists could derive types that had demonstrable meaning for the people of the past. Rouse (1960) suggested ways in which types could be either abstracted by the researcher or discovered as part of a past culture. Rouse proposed these as two different ways to classify artifacts. Analytic classification could be used to discover the modes of a culture. Taxonomic classification involves using different modes (attributes) to create types meaningful to the archaeologist's research

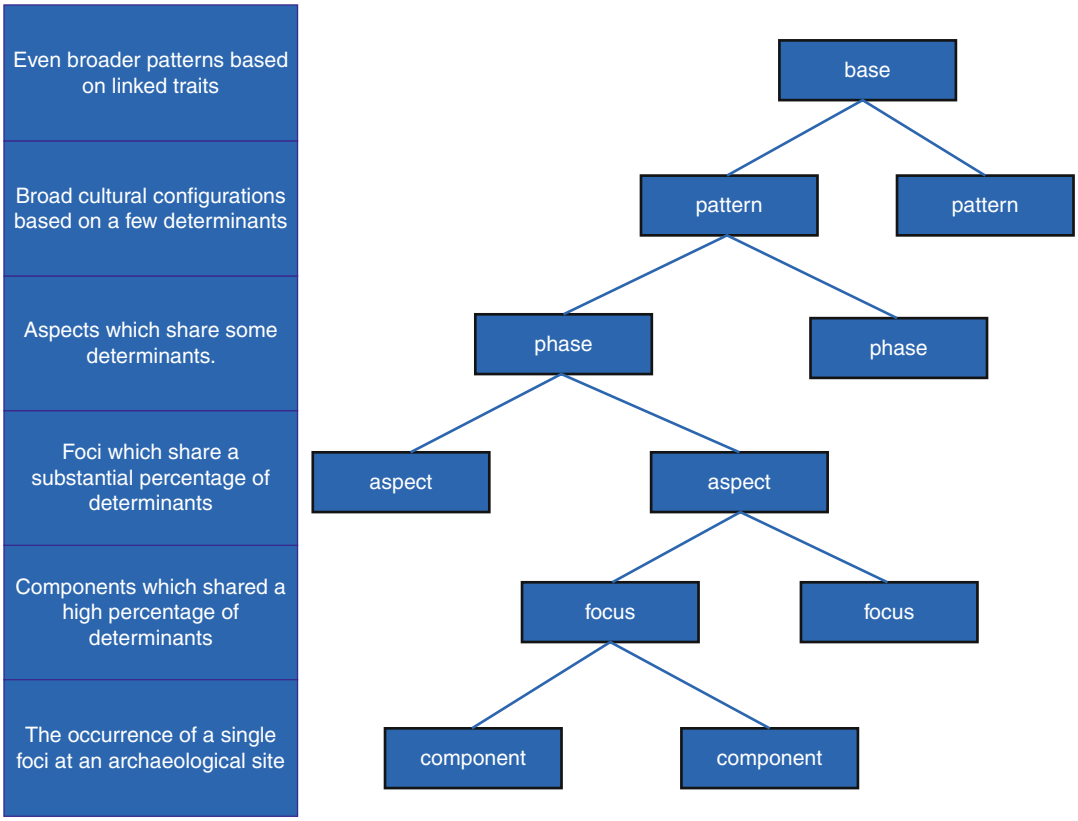

North American Classification Schemes: Overview, Fig. 2 Units of the Midwestern classification

question. For example, if you are creating temporal types, you only use those modes that reflect variation in time and space, such as the shape of a projectile point. But if you are interested in reconstructing lifeways, you might use another mode such as raw material type for these projectile points.

Until 1928, North American archaeologists generally thought that humans had a relatively brief presence of only a few millennia in North America. Then, a fluted spearpoint was discovered embedded in the rib cage of an extinct bison skeleton being excavated at Folsom, New Mexico. This find established an Ice Age presence for humans in the Americas and made the question of temporal variation much more significant.

Nevertheless, through most of the first half of the twentieth century, American archaeologists had to deal with temporal variation by relying on relative dating techniques such as stratigraphy, seriation, and typology. With the development of absolute dating techniques by the 1950s, such as tree-ring dating in the Southwest and radiocarbon dating for the rest of North America, archaeologists not only had a key to building chronological sequence, but they could measure the time depth of human occupation in the New World inferred from the Folsom find.

About this same time, Willey and Phillips (1958) attempted to bring the diversity of perspectives on American archaeological method and theory together into a more coherent classification. The focus in American archaeology had been on culture history, attempting to order the archaeological record into a sequence over time and space. Willey and Phillips proposed what they called an "Operational Basis for Culture-Historical Integration" as an attempt to define the way archaeologists actually use the

North American Classification Schemes: Overview, Table 3 North American stages as defined by Willey and Phillips

Willey and Phillips stages	Characteristics defined by Willey and Phillips	North American expressions
Post-Classic	Breakdown of classic styles and culture, continued urbanization but militarism, secularism, and warfare, interregional transference of styles but aesthetic decline	None
Classic	Beginnings of urbanism, florescence of material culture, climax in architecture and sophisticated art	None
Formative	Development of agricultural lifeways especially maize agriculture, sedentary village life, minimal social complexity	Hohokam, Anasazi, and Mogollon in the Southwest; Woodland mound-building cultures of the Northeast and Southeast, primarily Middle Woodland, Mississippian developments; possibly Plains village cultures
Archaic	Migratory hunting and gathering cultures in increasing modern environments, addition of groundstone as well as bone technology, small but sometimes longer-term settlements, diversification of subsistence pursuits	Eastern Archaic, Plains Archaic, Southwestern Archaic, Desert Archaic, and probably maritime cultures of the California and Northwest Coast
Lithic	Initial adaptation to New World environments, reliance on rough and chipped stone tool technology, small scale, mobile societies, emphasis on hunting	Paleo-Indian

dimensions of time, space, and form. In this volume, they defined only two basic archaeological units for classification, the component and the phase. These were common terms used in archaeology, but Willey and Phillips tried to more precisely define their use in archaeology as the elements of formal variation in archaeology. The component is the single manifestation of a culture at an archaeological site. They define the phase as "an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time" (Willey & Phillips 1958: 22).

Willey and Phillips also operationalized terms for space (site, locality, and region) and time (local sequence and regional sequence). These provide the context for the basic archaeological units of phase and component. Beyond these basic units, they provide what are called integrative units of horizon and tradition. The horizon marks traits and assemblages whose distribution in space suggests a rapid spread over a broad area. The tradition is a temporal continuity represented by persistence in technologies or related forms.

Taken together these concepts were meant to help archaeologists construct local and regional culture histories. But in this volume, the authors took it a step further in response to the neoevolutionary approaches becoming popular at mid-century. They propose the use of a "Historical-Developmental Approach." It is here that they propose a series of developmental stages distinct from periods. While the term period refers specifically to chronology, the stage can be defined by content regardless of time. These developmental stages are defined as descriptive although "founded on common participation in important historically derived traditions" (Willey & Phillips: 64). They were intentionally trying to avoid the common criticism of being unilineal evolutionists. The five stages of development they proposed for American archaeology are Lithic, Archaic, Formative, Classic, and Post-Classic (Table 3). Willey and Phillips saw this descriptive process of defining formal variation, plotting it in time and space, and identifying their functions and relationships as "archaeology's primary task" (Willey & Phillips 1958: 61). Although they

recognized the need for explanation in archaeology, they do not propose any archaeological methods for achieving this.

Key Issues/Current Debates

In a general sense, these concepts defined by Willey and Phillips are still being used by North American archaeologists today. Archaeologists are still defining components and phases or horizons and traditions. However, in many regions, the way in which these terms and especially the stage concept are operationalized has been modified. For example, the lithic stage is usually referred to as the Paleo-Indian period, and while the Archaic is referenced by most archaeologists, it is as likely to be called a period as a stage. North American archaeologists generally do not use the concept of a Formative stage, although they do recognize the development of agricultural societies in the Southwest, the Plains, the Northeast, and the Southeast. In the Southwest culture area, horticulture was important in the various regional traditions (e.g., Ancestral Pueblo and Hohokam) that developed after approximately CE 200. In the Plains, the Northeast, and the Southeast, Woodland cultures after approximately 1000 BCE can be considered to parallel the Formative. In all these regions, experimentation with plant cultivation and domestication began in the Archaic, but the cultural characteristics associated with the Formative by Willey and Phillips are more fully evident after the Archaic. In the Western parts of the United States, there is little evidence of a Formative. However, settled life and the development of social hierarchies did develop in some areas. Along the Pacific Coast, complex hunter-gatherers, who developed social ranking, had hereditary chiefs, and lived in large, settled communities, are found in the later pre-Columbian times. Neither the Classic nor the Post-Classic was recognized as occurring in North America by Willey and Phillips, and North American archaeologists do not use these concepts at all. Nevertheless, Willey and Phillips' "primary task" of formulating archaeological units that are assumed to represent cultural units has not been abandoned.

Continuing Methodological and Theoretical Developments

The advent of the "new archaeology" in the 1960s altered perceptions of Willey and Phillips' approach. Since most North American archaeologists remain basically processualist theoretically, this critique of culture history is entrenched in the thinking of North American archaeologists even today. The essence of the processualist critique of attempts at classification involved defining earlier archaeologists as culture historians who saw the ordering of cultures in time and space as the primary goal of archaeology. Processualists did not so much reject the classification methods of culture historians as make an argument that this was not the only contribution of archaeology to the understanding of past cultures. Classification of assemblages into components and phases and their grouping into larger units such as traditions and stages was understood to be a descriptive step that preceded the reconstruction of past lifeways and ultimately the exploration of questions of culture process. As anthropologists, processualist archaeologists were more interested in how culture functioned and how it changed than in the ordering of components and phases. Nevertheless, it was believed necessary to build on culture history to accomplish these loftier ends. As a result, the classificatory schemes, including local phases and regional traditions and the stages proposed by Willey and Phillips, have continued to be utilized in North American archaeology. Perhaps because of processualism's disdain for culture-historical analyses of chronology and time-space systematics, many of the specific archaeological units North American archaeologists still employ have not been critically evaluated.

A systemic, adaptive approach led processualists to view archaeological phases as rough equivalents of cultures. In this view, the archaeological record provides evidence of cultural systems which in turn can be characterized by particular adaptive strategies. Culture change results from factors such as environmental change or human population growth which upset the systemic equilibrium. Influenced by neoevolutionary thought as well as the variability evident in a growing body of data, some

archaeologists rejected Willey and Phillips' stage concepts. These North American archaeologists have argued that North American archaeological data should be grouped into periods of time rather than stages of cultural development. In practice, however, periods often have been treated as being characterized by cultures having the attributes of Willey and Phillips' stages, and evolutionary assumptions have been implicit. For example, the Archaic period peoples of North America have been characterized rather universally as small bands of seasonally mobile hunter-gatherers even though the growing body of data on the Archaic indicates considerable diversity in economic, sociopolitical, and ideological traits (Emerson & McElrath 2009).

Thus, although the "new archaeology" of the late twentieth century criticized the approach of earlier culture historians, processualists used many of these concepts as a starting point for their attempts at explanations of culture process. More recently, in the twenty-first century, archaeologists from a variety of theoretical perspectives are rejecting these basic unit concepts outright, noting their asynchronic and nomothetic nature. The new evolutionary archaeology proposed by Dunnell (1978) and others rejects the notion of starting with cultural units in favor of defining specific traits and tracking the adaptedness of traits rather than cultural units. On the other side of the theoretical spectrum, these culture unit concepts are also rejected by postprocessualists because of the lack of concern for the individual and the role of agency in a dynamic cultural system. There is also the criticism that working from a culture unit concept constrains a variety of explanatory frameworks such as ideology, art, religion, or even gender.

Future Directions

Given recent assaults on the theoretical assumption that unit cultures as discrete, stable entities in the past and present exist, it might be expected that traditional classificatory schemes, resting on this very assumption, would be abandoned. However, there are aspects of the practice of North American archaeology in the twenty-first century that foster the continued use of these classificatory schemes. First, processualism, albeit a modified processualism that has been influenced by the post-processualist critique, remains the basis for the majority of North American archaeology (Hegmon 2003). Given the view that establishing the regional culture history is a basic step that precedes more sophisticated analyses, North American archaeologists still utilize these classificatory units.

Second, and perhaps most importantly, the development of cultural resource management (CRM) has encouraged the continued use of recognized units of culture history such as phases and traditions. Since the 1960s, a series of laws in both the United States and Canada have explicitly defined archaeological sites as well as historical structures as cultural resources that must be managed for the benefit of society at large. Today, the vast majority of archaeology done in North America is done to define which resources are important enough to be protected from the processes of development. Alternatively, the effects of development must be mitigated through thorough excavation or recordation of these sites and structures (King 2008). Traditional academic archaeology done for research sake certainly persists in universities and museums, but most archaeologists work for government agencies, engineering, or archaeological firms in the growing industry generated by CRM laws. One result of this trend has been the frequent disengagement of many practicing archaeologists from the metadebates about archaeological theory and method going on in scholarly circles. Thus, the critique of the unit culture assumption has not been thoroughly examined by those doing the majority of the archaeology taking place in North America.

Moreover, the requirements of CRM archaeology, which include efficiently assessing the significance of sites and their assemblages in a timely manner, lend themselves to fairly simplistic adoption of the classificatory schemes developed by culture historians. It is easy to conceptualize the task of the CRM archaeologists as filling in missing gaps in our knowledge of past cultural entities through archaeology. This is, of course, not an entirely atheoretical undertaking, but theory may

seem to have a less obvious place in this kind of work especially to harried practitioners working for clients with deadlines. These circumstances encourage the writing of reports that rely on boilerplate descriptions of cultural phases and regional traditions defined in state preservation plans. Such reports may fit the results of survey and excavation into existing classificatory schemes uncritically. There may also be a tendency to define the job of the CRM archaeologists as generating data, which can be utilized by others in synthetic and regional evaluations that are outside the CRM practitioner's purview. Whether or not such synthetic work ever actually happens seems less important than completing reports and moving on to the next project.

Third, a reengagement with culture-historical classification stems from the increasing interest of Native Americans in archaeology. The need to correlate material culture and its distribution with specific historical ethnicities has increased rather than decreased in the age of NAGPRA. At the same time, the ethical awareness of North American archaeologists that consultation and collaboration with descendant populations is desirable has grown. This has reinforced the importance of the systematics of culture history (Webster 2008). Some of the same archaeologists, who critique the normative culture unit assumptions employed in traditional classification and seek multivocal interpretations of the past, recognize the need to identify ethnicity in the archaeological record. As imperfect as culture history classifications are, they remain the starting point for much of this discussion. Fortunately, in pursuit of ethnicity, archaeologists are much more likely to critically evaluate regional schemes of culture history.

For these reasons, the traditional North American classificatory schemes are likely to remain important in the actual practice of North American archaeology despite calls for focusing less on culture as a normative whole. Thus, it remains important for archaeologists studying prehistoric North America to understand the nature and formulation of these units.

North American archaeology's traditional classification schemes were developed in the first half of the twentieth century around concepts of space, form, and time. Culture areas within which cultures tended to be similar were recognized first, and they continue to be referenced today despite general understanding that they do not begin to capture the true variability and nuance of past cultures. The concept of unit cultures recognizable in the distribution over time and space of material culture traits was developed by the middle of the twentieth century. These formulations recognized components and phases that can be grouped into regional traditions and horizons. Ultimately, these classificatory units have been thought to relate to stages of development or to prehistoric periods. Despite recognition that these units mask variability and debate about the underlying concept of unit cultures, these units are still employed by North American archaeologists.

While the continued sway of processualism among North American archaeologists as well as the growth of CRM archaeology may encourage less than critical use of regional schemes for phases and traditions, the sociopolitics of contemporary North American archaeology also encourage a renewed interest in the recognition of ethnicity in the archaeological record. These research interests, which often lead to a critique of the concept of unit cultures altogether, are more likely to generate critical reevaluation of the culture-historical classifications used by North American archaeologists.

Cross-References

- ► Cultural Ecology in Archaeology
- ► Histories of the Archaeological Discipline: Issues to Consider
- ► Post-Processual Archaeology
- ► Processualism in Archaeological Theory

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North American Megafauna Extinction: Climate or Overhunting?

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Introduction

In North America, nearly three dozen genera of large terrestrial mammals (known as megafauna, the animals whose adult body mass was >44 kg) went extinct just before, at, or soon after the end of the Pleistocene epoch, 10,000 radiocarbon years BP (before present) (about 11,350 calibrated or calendar years before present, written as cal BP) (Table 1). The extinctions removed almost 70 % of the terrestrial mammalian taxa known from Late Glacial North America, although six of the genera are still found on other continents (marked in Table 1). The dying out of some of the extinct mammalian genera may have predated the end of the Pleistocene, co-occurring with various climatic oscillations. Not all the genera are well dated, and last appearances are not confidently known for many. Some extinctions may have postdated the Pleistocene. *Mammuthus primigenius* (woolly mammoth) survived to the mid-Holocene on the Pribilof Islands in the Bering Sea west of mainland Alaska, where bones of the taxon have been directly dated to 5,700 radiocarbon years BP (Crossen 2005). But at least 16 genera became extinct in the lower 48 United States in what may have been a geologically synchronous event 12,000–10,000 radiocarbon years BP (13,000–11,350 cal BP) (Faith & Surovell 2009).

The apparently abrupt wave of extinctions was selective for large body size and cannot be termed a "mass extinction" because of the clear size selectivity and the wide range of other animals that did not suffer such a degree of die-outs, particularly reptiles and fish. A number of avian

North American Megafauna Extinction: Climate or Overhunting?, Table 1 Extinct megafaunal taxa and the most reliable radiometric dates of their last appearances (references can be found in Faith & Surovell 2009). An *asterisk* indicates the genus survived outside North America

Family	Genus	Last appearance date (radiocarbon years before present)
Pampatheriidae	*Pampatherium*	
	Holmesina	21,150 ± 400
Glyptodontidae	*Glyptotherium*	23,230 ± 490
Megalonychidae	*Megalonyx*	11,450 ± 90
Megatheriidae	*Eremotherium*	38,860 ± 1,300
	Nothrotheriops	10,400 ± 275
Mylodontidae	*Paramylodon*	20,450 ± 460
Mustelidae	*Brachyprotoma*	13,740 ± 145
Canidae	*Cuon**	(Not available)
Ursidae	*Tremarctos**	23,230 ± 490
	Arctodus	10,870 ± 75
Felidae	*Smilodon*	11,130 ± 275
	Homotherium	13,970 ± 310
	Miracinonyx	14,935 ± 610
Castoridae	*Castoroides*	10,850 ± 60
Hydrochoeridae	*Hydrochoerus**	12,000 ± 300
	Neochoerus	(Not available)
Leporidae	*Aztlanolagus*	>31,150
Equidae	*Equus**	10,370 ± 350
Tapiridae	*Tapirus**	10,940 ± 100
Tayassuidae	*Mylohyus*	11,860 ± 40
	Platygonus	11,060 ± 60
Camelidae	*Camelops*	10,370 ± 350
	Hemiauchenia	12,210 ± 430
	Paleolama	10,890 ± 130
Cervidae	*Navahoceros*	12,860 ± 400
	Cervalces	11,405 ± 50
Antilocapridae	*Capromeryx*	12,200 + 200
	Tetrameryx	23,230 ± 490
	Stockoceros	12,520 ± 200
Bovidae	*Saiga**	(Not available)
	Euceratherium	11,630 ± 150
	Bootherium	10,980 ± 80
Mammutidae	*Mammut*	10,630 + 80
Elephantidae	*Mammuthus*	10,710 ± 130

genera disappeared around the same time, but most were scavenging or commensal types that probably could not survive the loss of so much terrestrial carrion.

Climatic oscillations in North America between about 18,000 and 10,000 radiocarbon years BP (21,450–11,350 cal BP) (Table 2), following the Last Glacial Maximum, must have seriously stressed megafaunal populations. This time range is doubly significant because it is also when the most credible or promising evidence of the earliest human presence has been proposed for the continent. Therefore, it is not clear if the ultimate cause of the extinctions was climate change or human activities such as hunting, or perhaps some other factor(s).

If the late Pleistocene climate changes were more severe than the numerous earlier climatic reversals which had been survived by many megafaunal taxa, the main cause of the extinctions can reasonably be considered climate change. On the other hand, if the terminal Pleistocene climate changes were no more severe and no less survivable than the earlier oscillations in climate, the addition of hunting by humans was the most decisive factor behind the extinctions.

Preserved mitochondrial DNA in extinct megafaunal bones of known ages has been analyzed to identify time periods when genetic diversity in the taxa was lost, presumably a precursor or suggestion of impending extinction as a result of population fragmentation. In one study centered on Eurasian taxa (Lorenzen et al. 2011), a model of species distribution based on the mtDNA data was evaluated against paleoclimates, habitat changes, and human presence, to conclude that some species disappeared due to climate change alone, but others (e.g., steppe *Bison* and *Equus*) most likely died out due to a combination of climatic and anthropogenic effects, while *Mammuthus primigenius* (woolly mammoth) extinction is still unexplained.

Historical Background

Climate change is a popular theory often advanced to account for the extinctions. However, a competing theory that hunting by humans caused the extinctions was initially suggested in the nineteenth century, when archaeological hints were first found of human

North American Megafauna Extinction: Climate or Overhunting?, Table 2 Climatic intervals in the northern hemisphere during the last ten millennia of the Pleistocene (Adapted from Haynes 2002)

Climatic interval	Approx. midpoint radiocarbon age (approx. midpoint calibrated age)	General characteristics
Onset of full glacial/last glacial maximum	18,000 (21,450)	Cold, dry
End of last glacial maximum	16,000 (19,150)	Warming
Bølling	12,500 (15,085)	Relatively warm, moister
Older Dryas	12,000 (14,065)	Cool
Allerød	11,500 (13,350)	Warmer, moister
Younger Dryas begins abruptly	11,000 (13,000)	Cold

contemporaneity with the extinct taxa (Grayson 1984). In the late 1960s and later, paleoecologist P. S. Martin (e.g., 1984) vigorously supported the theory and emphasized that many genera of the extinct megafauna such as *Equus* and *Mammuthus* had already survived numerous major climatic reversals over the past million years or more in North America without dying out, long before the first appearance of human foragers, thus making climate change an insufficient explanation.

Key Issues

Human Activities as a Cause of the Extinctions

Human influence on the extinctions may have been on multiple levels. Habitat alterations such as deliberate burning by dispersing human foragers could have had adverse impacts on megafaunal species. Killing by humans also may have been a significantly destructive factor. Partial support for the overkill theory can be found in the fossil record; for example, the geographical distribution of *Mammuthus* in the climatically ameliorating interval of the Late Glacial (15,000–10,000 radiocarbon years BP) was more extensive than during the earlier severe conditions of the Last Glacial Maximum, suggesting population recovery for this genus just before its extinction but around the time of the most widespread appearance of early human cultures. The extinctions did not preferentially affect only the taxa with reduced geographic ranges. The dispersal of *Homo sapiens* throughout the world correlates positively with megafaunal extinctions in different continents and islands but does not correlate clearly with climate changes.

In P.S. Martin's favored variant of the overkill theory, nicknamed "blitzkrieg," the rapidly dispersing population of new human arrivals in the New World encountered many species of large mammals that were naively ineffective at escaping from such an unfamiliar new predator, and human hunting as it spread over the continent steadily decimated the animal populations in a short time. Martin's critics pressed him to explain the almost absolute lack of kill sites of most of the extinct megafaunal genera in North America, but Martin had reasoned that kills made so quickly would not be expectably preserved in open-air sites, other than from animals with bones as massive as those of mammoths and mastodons, except in unusual circumstances. This possibility is not an empirically testable hypothesis, but it is a generalization in agreement with observations from long-term neotaphonomic fieldwork that has documented the rarity of animal skeletons in unsettled parts of the world as bones are consumed by scavengers, scattered to become undiscoverable over time, or weather away (Haynes 1980).

Although very few North American archaeological sites contain evidence for the killing and butchering of most of the extinct megafaunal taxa (Table 3), a dozen or more virtually contemporaneous sites in North America are generally

North American Megafauna Extinction: Climate or Overhunting?, Table 3 North American archaeological sites having cultural evidence associated with bones of extinct megafauna (see Haynes 2002; Surovell & Waguespack 2009; Redmond et al. 2012 for more information and references). All are in the USA, unless noted as "Mexico." "Clovis" lithics refers to typologically distinct stone artifacts of the Clovis era; the main sites of which have been dated 11,050–10,800 radiocarbon years BP (roughly 13,100–12,650 cal BP) (Waters & Stafford 2007). Other sites may belong on this list.

Site	Taxon of likeliest human prey present (MNI refers to minimum number of individuals of the taxon)	Cultural association and radiocarbon age (BP)
Blackwater Draw, NM	*Mammuthus columbi*, MNI = 6; *Bison antiquus*, MNI = 1	Clovis lithics, butcher-marked bones; 11,040–11,630
Boaz, WI	*Mammuthus columbi*, MNI = 1	Possibly associated Clovis projectile point
Burning Tree, OH	*Mammut americanum*, MNI = 1	No lithics; possibly butcher-marked bones; 11,660; 11,450 (gut contents?)
Coats-Hines, TN	*Mammut americanum*, MNI = 1	Untyped lithics (flakes, scrapers, biface, gravers); disturbed sediments, wide date range (27,050–6,530)
Colby, WY	*Mammuthus columbi*, MNI = 7; *Camelops hesternus*, MNI = 1; *Equus* sp., MNI = 1	Clovis lithics; 11,220; 10,864
Dent, CO	*Mammuthus columbi*, MNI = 13	Clovis lithics, butcher-marked bones; 11,200; 10,980–10,670
Domebo, OK	*Mammuthus columbi*, MNI = 1	Clovis lithics; ~11,000
Duewall-Newberry, TX	*Mammuthus columbi*, MNI = 1	No typed lithics, possibly butcher-broken and marked bones; estimated 12,000–10,000
Dutton, CO	*Mammuthus columbi*, MNI = 1; *Equus* sp., MNI = 1	Clovis lithics; <11,710
Escapule, AZ	*Mammuthus columbi*, MNI = 1	Clovis lithics; no date
Hebior, WI	*Mammuthus* sp., MNI = 1	Untyped lithics; possibly butcher-marked bones; 12,480–12,590
Heisler, MI	*Mammut americanum*, MNI = 1	No lithics, possibly butcher-marked bones; 11,770
Hiscock, NY	*Mammut americanum*, MNI = 6	Clovis points; 9,150–11,390
Huntington Canyon, UT	*Mammuthus columbi*, MNI = 1; *Arctodus simus*, MNI = 1	Non-Clovis projectile point possibly from same stratum as mammoth; 11,220
Kimmswick, MO	*Mammut americanum*, MNI = 2	Clovis lithics; no date
Lange-Ferguson, ND	*Mammuthus columbi*, MNI = 2	Clovis lithics; no direct date
Lehner, AZ	*Mammuthus columbi*, MNI = 13	Clovis lithics; 10,900
Leikum, AZ	*Mammuthus columbi*, MNI = 2	Clovis lithics; no date
Lubbock Lake, TX	*Mammuthus columbi*, MNI = 2(?)	Clovis lithics; 11,100
Manis, WA	*Mammut americanum*	Possible bone projectile point embedded in a rib; 11,800
Miami, TX	*Mammuthus columbi*, MNI = 5	Clovis lithics; no date
McLean, TX	*Mammuthus columbi*, MNI = 1	
Murray Springs, AZ	*Mammuthus columbi*, MNI = 2; *Bison antiquus*, MNI = 13	Clovis lithics; 10,900
Naco, AZ	*Mammuthus columbi*, MNI = 1	Clovis lithics; no date
Navarette, AZ	*Mammuthus columbi*, MNI = 1	Two Clovis points; no date
Norwich Township, OH ("Firelands Ground Sloth")	*Megalonyx jeffersonii*, MNI = 1	No lithics, possible toolmarks from meat-stripping; 11,740 ± 35
Pleasant Lake, MI	*Mammut americanum*, MNI = 1	No lithics, possibly butcher-marked bones; >10,395
Rawlins, WY ("U.P. mammoth")	*Mammuthus columbi*, MNI = 1	Untyped lithics; 11,280

(*continued*)

North American Megafauna Extinction: Climate or Overhunting?, Table 3 (continued)

Site	Taxon of likeliest human prey present (MNI refers to minimum number of individuals of the taxon)	Cultural association and radiocarbon age (BP)
Santa Isabel Iztapan, Mexico	*Mammuthus columbi*, MNI = 1	Lithics, possibly associated non-Clovis projectile point; no date
Schaefer, WI	*Mammuthus* sp., MNI-1	Untyped lithics, possibly butcher-marked bones; 12,390-12,310
Sloth Hole, Aucilla River, FL	*Mammut americanum*, MNI = 1+	Fluted point variants, lithics, bone tools, 33 ivory points; no direct dates
Wally's Beach, Alberta	*Camelops hesternus*, MNI = 1; *Equus sp.*, MNI = 7	Possibly butcher-marked bones, untyped lithics; 11,070; Possible blood residue, possibly butcher-marked bone

accepted as human-made kills of mammoths or mastodons, some with multiple animals. Saunders (1980) proposed that some multiple-animal mammoth sites such as Blackwater Draw, NM, and Dent, CO, were the remains of herds killed together by human hunters, but Hoppe (2004) analyzed isotopes in mammoth tooth enamel from these and other sites and concluded that the assemblages were time-averaged accumulations of unrelated animals. It is possible that the multiple mammoth sites with associated stone tools were simply scavenged by humans after the animals were found dead, but cutmarks on meat-bearing bone surfaces from sites such as Blackwater Draw, Dent, and Duewall-Newberry, TX (Krasinski 2010), and the presence of killing implements (stone spear points) in most sites support the interpretation that many of the animals were actively killed. The pursuit, killing, and processing of prey as huge as mammoths may have been costly for economizing foragers, but Surovell and Waguespack (2009) concluded humans did preferentially select the largest megafaunal taxa, mammoths and mastodons, deliberately choosing to bypass the smaller species at certain times and places. Perhaps foragers sought not only food but also the added prestige of killing such imposing animals.

Climate Change as a Cause of the Extinctions

Climate change is commonly an alternate default explanation for the cluster of selective extinctions, especially among scientists who do not think spear-wielding pedestrian human foragers could have eradicated megafaunal populations. The numbers and densities of megafaunal taxa in the Late Glacial are unknown, although their geographical distributions seem to be very broad (FAUNMAP Working Group 1994). Table 2 shows that climates shifted dramatically during the last millennia of the Pleistocene, and these shifts must have greatly affected megafaunal ranges when preferred forage plants were locally extirpated or redistributed in the continent. Megafauna in Late Glacial metapopulations may have been depleted to relatively low numbers due to the disruption and displacement of vegetational communities in response to the climatic oscillations.

Several researchers have suggested steps in the possible ecological processes through which megafaunal taxa were driven to extinction during this difficult interval of ever-shifting climatic conditions. For example, Guthrie (1984) proposed that the trend toward zonal vegetation replacing highly diverse mosaic plant communities at the end of the Pleistocene reduced nutrient balance and plant diversity, forcing megafauna to feed more heavily on limited types of plants whose antiherbivory chemical compounds were harmful in higher doses, eventually leading to extinctions of large-bodied animals with specialized diets. Guthrie (2003) also showed that the body size of one extinct genus, Alaskan *Equus*, declined in the last millennia of the Pleistocene, construed as indirect evidence of climate-caused ecological stress in response to depressed forage productivity.

The evidence is not clear whether environmental conditions during the last glacial-to-interglacial

transition were more severe than during the earlier transitions which the megafauna had survived. Prescott et al. (2012) analyzed climatic trends and the timing of extinctions for the last 700,000 years of earth history and suggested that rapid cooling, high temperature variance, and low mean temperatures in the last 100,000-year period were conducive to more extinctions than in previous periods and the addition of modern humans in previously unsettled landmasses such as North America also raised the probability of more extinctions. However, while some general trends in vegetation and climatic conditions at the end of the Pleistocene would have affected all parts of North America, there still would have been significant differences between regions.

No unidirectional set of paleoenvironmental changes affected all of North America at the end of the Pleistocene. For example, the Great Basin's huge pluvial lake systems started disappearing as the region dried and warmed at the end of the Pleistocene and the beginning of the Holocene, making the landscapes perhaps less productive and uninviting to megafaunal taxa. At the same time, as atmospheric circulation patterns repositioned due to the shrinking of the continental glaciers, moisture regimes north of the Great Basin probably increased, improving conditions for browsing megafaunal taxa. Thus, in some parts of the continent open habitats expanded at the expense of woody habitats, while in other parts woodlands and forests began replacing the more open environments of the Pleistocene. Thus, diverse megafaunal foraging opportunities did not vanish for the entire continent, although the megafauna did vanish everywhere. Isotope studies (e.g., Feranec 2004) show geographic variability in megafaunal diets, and some taxa were capable of switching diets to take advantage of changed local vegetational communities. The complete disappearance of so many grazers, browsers, and mixed feeders during a period of variably responding plant resources is not easily explained.

Other Proposed Causes

Several alternative theories are based on the reasoning that if climate change and hunting by humans cannot be conclusively proven as the main factors in the extinctions, another agency must be sought. One example is a theory advanced by MacPhee and Marx (1997), who proposed that a disease capable of jumping species was brought into the New World by dispersing humans, perhaps via their dogs, and subsequently spread throughout the different taxa that became extinct. Although not impossible, as can be seen in modern times with different strains of influenza that cross species lines or with mange in African game reserves that has spread from canids to African lions with serious effect, no evidence has been found of a widespread North American disease organism in sediments of terminal Pleistocene age nor have there been discoveries of disease antibodies in fossil animal bones.

Another alternative theory is that a meteoritic impact or huge airburst event from a meteor or comet(s) occurred over the eastern Canadian ice sheets about 12,900 cal BP (Firestone et al. 2007), creating a meltwater surge into the Atlantic Ocean that shifted north Atlantic climate back to a much colder and drier pattern that lasted almost 1,000 years. The powerful explosion of the extraterrestrial object(s) and the aftermath created conditions similar to nuclear winter, wiping out many species of large animals and severely challenging human survival, although these postulated effects are not detectable everywhere in the continent. Stratigraphic markers of a possible explosive event and resulting human population decline have been identified by some researchers (e.g., Anderson et al. 2008; Kennett et al. 2009) but refuted by other researchers (e.g., Buchanan et al. 2008; Paquay et al. 2009) in a fast-growing body of literature. Further weakening the theory is the fact that some large mammalian genera in North America such as brown and black bear (*Ursus* spp.), whitetail and mule deer (*Odocoileus* spp.), and moose (*Alces alces*) did not become extinct.

Future Directions

Lately, the trend in interpretations has been toward a dual-causality model for extinctions on several continents and landmasses, in which range restrictions and limited genetic connectivity among

metapopulations – the results of oscillations in climate and vegetation – were exacerbated by the addition of hunting by modern *Homo sapiens*, and the two factors together led to the disappearance of the large mammals. This dual-causality concept has gained traction among scientists who realize that theories of single causes, such as climate change or hunting by humans, are by themselves unprovable and imperfect. Any synergistic interplay of climate stresses and human impacts will have to be painstakingly worked out separately for each extinct taxon.

Cross-References

- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ Haynes, Jr., C. Vance
- ▶ *Homo sapiens*
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North American Mound Builders: Hopewell, Natchez, Cahokia

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Introduction

In the minds of most Americans of the nineteenth century, the native inhabitants encountered in the eastern United States were not the builders of the earthen monuments scattered across the landscape. Native Americans found living among them north of the Ohio River professed no knowledge of their builders. The mounds must have been constructed in the distant past because centuries-old trees were found growing on them. The two findings coalesced into the belief that the mounds were remains of a lost race that derived from Mexico where mound building had a long-recognized history. It was not until archaeological investigation had conclusively determined that Native Americans were indeed descendants of the Mound Builders that the invention of a lost race was disposed of. These same investigations demonstrated an antiquity that rivals that of their presumed source south of the United States. Mound building can be traced to back to 4000 BCE (Milner 2004). As a consequence, the central reason for seeking external influence ceased to be relevant. But other considerations remain. Beliefs and practices known ethnohistorically as well as archaeological evidences are reminders that Mesoamerican culture is not entirely divorced from the history of the mound builders. The question remains – were Mesoamerican innovations so important that they were responsible for creating structural changes in the long-term history of the mound builders? Or did they only color that history? A tension between these positions poses an appeal to exogenous forces on the one hand as against a history that is essentially self-contained. The final assessment is likely to be a more measured perspective as new research sheds light on old assumptions. The quest for answers continues to stoke many debates including the role of Mesoamerica.

Definition

Presently, the ethnic connections between the precontact builders of mounds and the post-contact Native Americans are firmly established. Notwithstanding this connection, no other overall designation has arisen to replace the term, mound builders, despite its origin in a racial mythology about the precontact inhabitants of the eastern

United States. It does have usefulness as applying to a major historical chapter in the history of Native Americans. In the first place no single group of people is descended from these ancient peoples. Diverse language groups appear to have participated in major mound-building programs. The major language groups are the Caddoan, Iroquoian, Muskogean, and Siouan. However, it is probably no accident that their descendants and cultural representatives happen to have been singled out by congress in the nineteenth century as deserving a distinct citizenry status as the Five Civilized Tribes (Fogelson 2004; Townsend & Sharp 2004). Although these tribes dominate the list of descendants, many smaller tribes that had historical connections to the Mound Builders lost their separate identity by incorporation into larger tribes, such as the Creeks. Among them are the Natchez of the state of Mississippi, who were a notable example of a once famous mound-building tribe that joined the Creek Confederacy out of necessity.

In many respects, our perspective to the precontact history of the East has been framed by a natural historical approach to the past. Tracking the historical ecology through time has been enormously successful in explaining economic and social developments (Smith 1993, 1995). Improvement in the productivity of natural environments following the Ice Age has been an important factor in increasing the resource base for humans and extending the duration of sedentary settlement. Against the background of this process, plants became domesticated from local species, although the fact that some of these species were the same or potentially the same as plants in Mesoamerica has led to a reawakening of old debates (Smith 1995). A critical area of debate has been over the role maize cultivation had in supporting cultural complexity and major monument construction. That debate has been settled by placing monuments well before the introduction of maize around 1 CE. Even in the centuries that immediately followed its introduction, archaeological discovery has shown that maize was a minor dietary item until about 1000 BE and did not dominate foodways until 1200 BE. As important as the development of maize consumption was in fueling Mississippian Period societies, it cannot be cited as a factor earlier in time.

The place of domesticated plants in mound builder history continues to be a critical issue, although the debate over the source of the principle starch grain (*Zea mays*) has been settled by establishing the Southwest as the immediate source, not directly with Mesoamerica (Smith 1993, 1995). However, the possibility exists that various varieties of this and other domesticates were introduced more directly.

The importance of a maize-based diet is that it is associated with the period of greatest expansion of the widespread distribution of mound building (Smith 1993, 1995; Milner 2004). But as agriculturally beneficial environments shrank in extent and became increasingly unstable around 1400 CE, the distribution of mound use diminished and the frequency of mound renewal declined. The final blow was struck during the seventeenth century by the persistent slave-raiding expeditions that took place from the Atlantic Coast. These raids undermined the sacred authority of chiefs and the priests that were in charge of political activities associated with mounds before European contact. Dislocations of populations that ensued from climate change led to the abandonment of territories in the Ohio Valley and Great Lakes that centuries before European contact had been the home of a long tradition of mound building. Replacement peoples from the north and east knew little of the mound-building practices.

Key Issues

Issues of Scale and Organization

Behind every major earthwork lies the question of how self-sufficient collectors or farmers managed to recruit and direct the necessary labor force behind monument building. It is commonly thought that the more the effort toward constructing a monument, the more the enterprise is likely to be embedded in a complex political organization. However intuitively satisfying this relationship might be, it is reliable only in very broad terms. It cannot be measured off on an

interval scale. The social processes inherent in increasing social complexity create structural discontinuities in the capacity to amass labor and other resources. For instance, if large monument construction were calculated by its labor value, then logically these constructions would appear to be out of range for small-scale economies. Concluding from labor value alone, one might rate the society in question much more complex than other more reliable material indicators would indicate (e.g., subsistence organization, local population sizes). In the case of monuments constructed by mound builders, earthwork mass, to take one term of an equation, has to be scaled in terms of overall labor input and duration of the enterprise. When the three measures are balanced in particular cases, then the short time that field investigation shows it took to erect exceptionally massive mounds, such as Mound A at Poverty Point and Monks Mound at Cahokia, reveals the capacity in those cases to marshal extraordinarily large labor pools (Kidder 2012). However these pools of labor might have been marshaled, the aggregate size is the critical factor. Bear in mind that any enterprise of the magnitude we are speaking of simply cannot afford to interrupt the processes of acquisition and preparation of food. This realization is all the more stark when due consideration is taken of the food resource base of Poverty Point, which is fishing and plant collecting albeit in a highly productive base of aquatic and wetland resources (Gibson 2000). In the case of Cahokia, maize and other cultivated plants yielded comparable productivity to the same kind of wetland/aquatic resource base many miles to the north (Milner 2006).

Centralization of Authority

The matter of adequate-sized labor pool connects with another debate. We have already shown that in two large construction projects, the size of the labor pool available for short periods had to have been drawn from a much wider catchment than usually projected from local support alone. In the case of the large geometric Hopewell earthworks the labor pool likewise does not appear to match the population size that can be mustered from the scattered settlements of rather small size. The ensuing debate revolves around the distribution of population that supported the monumental earthworks of Ohio Hopewell. Since substantial villages have not been found, was the dispersal of population sufficient to provide the construction and support for these mound centers (Byers & Wymer 2010)? The answer has an impact on whether or not pilgrims are dependent upon for labor or whether the local population was sufficient. The relationship between the major multi-mound geometric earthworks and the support population also raises the issue of settlement permanence during the Middle Woodland Period.

This issue touches on the kind of leadership required since planning of the enterprise and coordinating the execution entails uncommon experience and or knowledge (Gibson & Carr 2004). These considerations play heavily into the debate over the matter of social complexity throughout mound builder history (Byers & Wymer 2010). Whereas some scholars have made Poverty Point out to be an expression of chiefly power (Gibson 2000), others have preferred an egalitarian organization because of the fisher-collector economy. Cahokia (IL) has even been placed in its own social category of civilization by calling into question the entire evolutionary scale (Pauketat 2007). One conclusion that can be drawn from these debates is that social evolutionary schemes abstracted from sources outside the subcontinent poorly fit its observed social history. Some have called into question those scales.

Sacred Authority

Other issues come into play. If specialized expertise for mound building is involved how are leaders to acquire it? Does this expertise enter in a significant way into the attainment of political leadership? If they go to far distant places to gain this expertise, do those trips leave traces with hard evidence?

Archaeological investigations have shown that mound building on a small scale can be traced to back to 4000 BCE when more plentifully available food resources made frequent movement of settlements less attractive (Smith 1993). These life-sustaining resources then led, where it was possible, to the entrenchment of claims of ownership

and to the planting of burials nearby as a form of certification. These early expressions were usually small and basically made up of mounded cemeteries. Mounds in many cases thereby became the by-product of the continuity of cemetery usage of particularly important place on the landscape, defined either economically or spiritually. Although the cemetery function of mounds was probably the most widespread usage in time and place, the most conspicuous uses have other functions as well. These are the geometric earthworks of the Hopewell period and the platform mounds of the Mississippian period. From such usages an association of mound burial with spiritual connections developed.

Two of these connections stand out for comment. The first and probably the earliest of these are constructions guided by, if not dedicated to, the observance of celestial risings and settings. The sun is particularly important after 1200 CE, whereas the moon is previously important (Byers & Wymer 2010). The second spiritual connection is as a repository for the remains of the celebrated ancestors (Smith & Miller 2009). The remains of members of the founding lineage were housed in shrines or temples dedicated to their veneration and from whom sacred powers flow to the chief, his living relatives, and his priesthood. The two functions were often combined.

Shrine-based authority for central leadership is largely guided by our text-based understanding of Natchez cultural practices, which have a strong connection with Natchez hierarchical social and political organization. The Natchez case has provided the principle model for chiefdom level of organization in the East. They were organized around matrilineal groups that traced their descent from a tribal semi-deified culture hero. Genealogical seniority was translated into rank with rich clans composing a social tier of nobles. The chief, called the Sun, controlled the tribal ancestor shrine that housed the stone image of that hero as well as the remains of the chief's immediate family and ancestors.

Exotic Material Objects

The subject of spiritual authority leads to a question about it social impact, particularly when such authority derives from features of a sacred place on the landscape. One model is to have people flock in pilgrimages to spiritual places on a regular basis in Hopewell and early Mississippian times (Beck 2003; Byers & Wymer 2010). The attractiveness of this model puts the hosts at spiritual places in the advantageous position of directing visitors in making large monumental projects. The sacred contexts of these projects would be one that would appeal to the circumstances of attraction in the first place. One advantage of this pilgrimage model is that it explains the appearance of large numbers of people that appear to have been enlisted in the colossal mound-building projects. Only the large quantity of food remains need to be documented for brief periods during warm weather.

During the Hopewell Period, quantities of objects and raw materials moved over long distances, coming from peninsular Florida, Ontario, and Yellowstone Park. Some of the largest aggregations of obsidian bifaces and marine shell containers and ornaments ended up in south-central Ohio during the Hopewell Period. A parallel situation at Cahokia exists before 1200 CE in the quantity of marine shell from Florida waters that ended up there (Milner 2006). The question remains was this due to traders departing from the northern centers to acquire valuable raw materials or were visitors from the south journeying north with goods. What part did either of these economic movements take and with regard to the potential role that down-the-line trade played? A finding in favor of journeys to the spiritual places supplies a much needed explanation for the strong presence of exotic goods and the intense periods of mound building that created some of the more spectacular examples of monumental construction in the past.

Impact of Warfare

The impact of deadly conflict until relatively recently was measured by the presence and frequency of fortified settlements. Only with detailed examination of human remains did the record of pervasive violence begin to emerge. That record reveals that the kinds and intensity of violence through time and place were indicative of

patterned responses to social, political, and environmental stresses (Chacon & Mendoza 2007). While episodic flare-ups of deadly violence were present from at least 4000 BCE, continent-wide patterns appeared in the centuries during which local population crowding can be documented. Preceding and during the adoption of maize agriculture is one such period and another is during periods when well-organized polities of aggregated settlers fueled by maize agriculture expand at the expense of less organized groups.

Examples

Relatively early in this history, a large set of earthworks was constructed near the confluence of the Red River with the Mississippi. The Poverty Point is a complex of earthworks spread over 900 acres that was established around 1650 BCE. The central mound of Poverty Point, Mound A, faced a fanlike configuration of six concentric ridges that resembled half of an octagon. Five paths ran through the juncture of the sides from a point radiating from the riverbank. Mound A is aligned with the centerline of this fan. The complicated geometry that underlies this configuration demonstrates the presence of a command of large-scale planning and constructional execution associated with some kind of leadership. Mound A is the second largest mound in the United States by bulk. Archaeological investigation revealed that construction took only 3 months starting between 1450 and 1250 BCE. The planning and execution that went into this monumental achievement is all the more remarkable considering that the supporting economy was based on fish and other wetland resources.

The Hopewell period is the next notable time of extensive mound construction. At this time, mound building was accompanied by an exuberant art style that endured from about 100 to 400 CE with distinct phases therein. The cultural markers of this period are discontinuously present from Florida to the Great Lakes and from the Appalachian mountains to the area of Kansas City. They testify to a new cultural unity among local self-sufficient small-scale gardeners. Major mound groups not attached to local communities were situated in two kinds of locations, either on boundaries between major watersheds or at places uniquely positioned to observe celestial events, in other words places that accessed major sources of spiritual power located in the heavens. Largely small-scale self-sufficient settlements distributed over much of the Midwest and Mid-south were tied by the movement of finished goods and selected raw materials.

The third Mississippian period saw the creation of major earthworks from roughly 1050 to 1200 CE that appeared to continue the well-established attraction of spiritual centers. The difference was in the population sustaining power of maize agriculture that led to much larger and more permanent settlements. Cahokia was one of the largest such aggregation consisting of 150 ha of occupation and at least 102 mounds of which the central monument, Monks Mound, stands 30 m high with a footprint of 7 ha. This nascent city was in the neighborhood of other large settlements on the floodplain of the Mississippi River, altogether making a large population presence along the Mississippi River. Monks Mound stood in the center of a cruciform of four monumental plazas. Around 1200 CE, social changes took place that greatly increased the number and distribution of townsites through the Midwest and Southeast where maize cultivation was possible in the vicinity of wetland environments. By this time the relationship of population and these resources created the notable distribution of earthworks that provided an identifier for the period. But those earthworks became less important as warfare intensified and Europeans embarked on projects of large-scale trade and colonization.

Cross-References

► Cahokia
► Poverty Point, Archaeology of

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North American Plains: Geography and Culture

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State of Knowledge and Current Debates

Introduction

This entry spans the entire North American Great Plains and more than 12,000 years. The goal is to present important issues, debates, and data organized in a chronological, geographical, and topical format. Citations were limited as to number, and so review essays are emphasized, especially those covering the broadest range of topics. Sometimes more recent citations were eliminated in favor of earlier, broader ones. Readers wanting details can check references in these essays and do electronic searches on keywords. All radiocarbon dates are uncalibrated.

Initial Occupation of the Americas

The earliest occupants of the Americas were once thought to arrive through a corridor between the Laurentide and Cordilleran glaciers (Fig. 1). The corridor becomes available around 13,000 years ago (BP, or before present). Clovis complex sites represent these first peoples. With general acceptance of the 15,000 BP occupation at Monte Verde, Chile, interest in pre-Clovis sites increased.

A Pacific coast route is now favored. The interglacier route provides a second route into the Americas (Meltzer 2009: 5). A third route across extreme northern Alaska and Canada and then down the Atlantic coast is possible as well (O'Rourke & Raff 2010: Fig. 1). The lack of ancient DNA (aDNA) analyses prevents assessment of whether a particular cultural complex on the Plains is a descendant of people who followed any of these routes. A proposal that Solutreans from southern France first colonize the Americas receives no support from DNA studies (Meltzer 2009: 185-8). In spite of suggestions for Solutrean input, the donor population is Asian. Eastern Siberia is most likely (Meltzer 2009: 191).

Timing of the earliest occupation is a matter of debate. Several archaeological sites in the Americas have radiocarbon dates earlier than 12,000 BP, but there is often debate about their validity. Because DNA cannot be dated directly, a number of debatable assumptions are made about the rate of genetic change in order to estimate dates for occupation (O'Rourke & Raff 2010: R203-R204). Regardless of how dates are obtained, they range widely from 35,000 to 13,000 BP. A date between 25,000 and 20,000 BP is most likely.

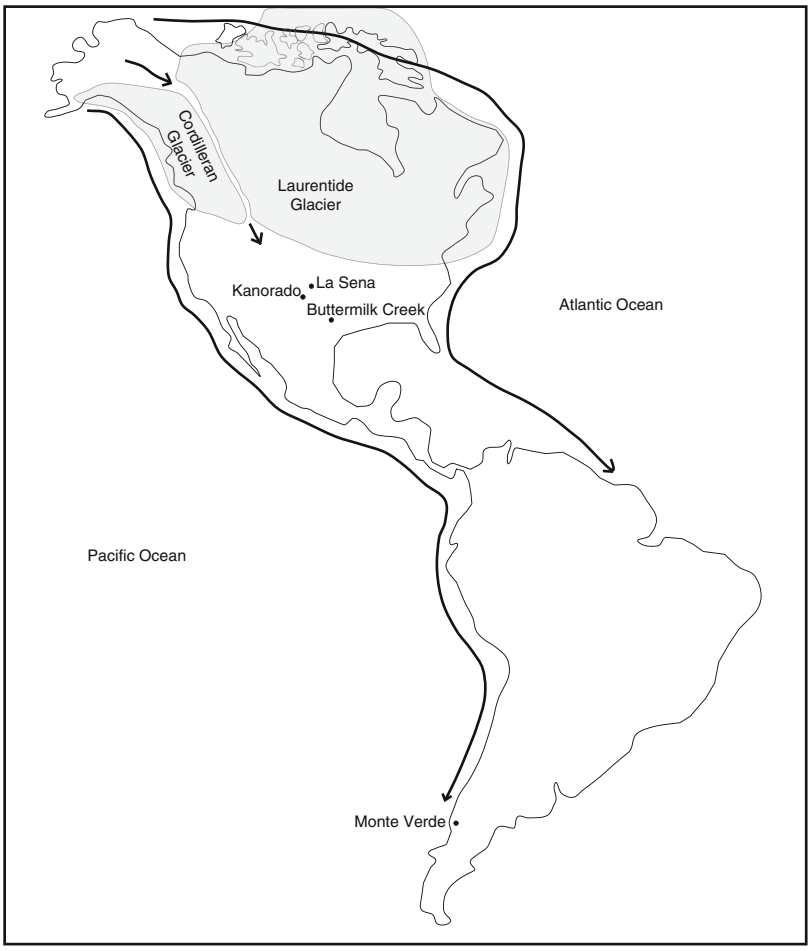

North American Plains: Geography and Culture, Fig. 1 North American glaciers and possible routes for occupying the Americas

Occupation of the Americas from Asia did not take place just once followed by isolation. Several separate movements into the Americas are proposed based on linguistics and skeletal morphology. Geneticists favor a single movement with continuous gene flow (O'Rourke & Raff 2010: R205).

Pre-Clovis

Clovis complex is unlikely to represent the earliest occupation. For the Plains, two sites possibly represent occupations earlier than 15,000 years ago, La Sena in Nebraska and Kanorado in Kansas. These sites are controversial because stone tools are not present (Kornfeld et al. 2010: 71-3). The Buttermilk Creek complex in central Texas dates between 13,000 and15,500 BP. This complex includes lithic technology attributes that could be precursors to Clovis (Waters et al. 2011). We know little of their lifestyle.

Clovis Complex

Clovis represents the earliest Plains occupation about which there is no disagreement. The hallmark is a large, basally to weakly fluted projectile point. The flute generally covers only a small part of the point's surface. These points were part of a spear, lance, and/or atlatl (spear thrower) system. Clovis has a variety of other tools as well (Meltzer 2009: 242-6). Potentially Clovis develops from people already resident in North America. However, it may represent instead a migration through the interglacial corridor (Meltzer 2009: 183-202). Sites are common on the Plains and across North America.

Clovis dates from 11,500 or perhaps even 11,000–10,800 BP. This short amount of time implies rapid radiation of either the point style or people across the landscape. Nonetheless, regional variations develop. The complex overlaps the early part of the Younger Dryas climatic event and a change to a colder, wetter climate (Meltzer 2009: 50-60, 254-5).

Lifestyles of Clovis people remain a matter for debate. They often are portrayed as moving over great distances. Widespread distribution of high-quality stone tool material types supposedly reflects this mobility. However, other factors, such as trade and politics, could be responsible. Now-extinct mammoths are seemingly common game. Nonetheless, other large animals plus a wide range of smaller animals are clearly used (Meltzer 2009: 273-9). We know essentially nothing about plant use (Adair 2003: 277).

It is possible, but unclear, that people with other projectile point styles are present contemporaneously with Clovis. However, resolving the dates for these complexes is difficult.

Pleistocene Extinctions/Overkill

Toward the end of the Pleistocene epoch and continuing on into the early Holocene, many animal species become extinct or change morphologies, especially size. The question is whether climate change (Younger Dryas) or human hunting pressure is responsible (Meltzer 2009: 255-68). The debate remains unresolved, and occasionally new culprits such as comet impacts, disease, and interspecies competition are introduced. Likely both climate change and humans are involved, along with other factors, but to different degrees for each species (Meltzer 2009: 267).

Post-Clovis to 8,000 BP

The largest and most numerous game after 10,000 BP is the bison. Although different bison species are recognized based on morphology, ancient and modern mtDNA studies indicate only one species (O'Shea 2012).

Folsom Complex

Folsom follows Clovis. The hallmark is a projectile point with basal fluting that covers most of both faces. Reason(s) for fluting is unclear. Another important diagnostic tool is ultrathin bifaces used for skinning bison (Meltzer 2009: 295-7, 303). Folsom complex dates between 10,900 and 10,200 years ago. The Younger Dryas (11,000–10,000 BP) is contemporary with Folsom (Meltzer 2009: 284-5).

Folsom potentially derives from Clovis. Earliest dates suggest a northwestern Plains origin (Fig. 2). Folsom replaces Clovis there either through cultural diffusion or actual population movement. On the southern Plains, population replacement is more likely (Collard et al. 2010). Folsom is basically a Plains complex with other complexes appearing elsewhere in North America.

Bison are the primary game. Nonetheless, smaller game is more important than traditionally recognized (Hill 2008; Meltzer 2009: 301-2). Although Folsom no doubt exploits wild plant resources, there is almost no evidence (Adair 2003: 277-8).

Folsom points are often of high-quality lithic material moved over long distances. Consequently, Folsom is portrayed as moving significant distances in pursuit of bison (Meltzer 2009: 286). However, exotic materials are restricted principally to projectile points, and these could just as easily be moved through social interaction with other groups.

Folsom people build a variety of structures. Some are mud-walled, while others are temporary, more akin to tipis. None are year-round permanent residences but are used seasonally, perhaps repeatedly (Meltzer 2009: 299, 301). If occupations are repeated, then Folsom movement is scheduled and not a free-ranging following of bison.

Late Paleo-Indian

Many different cultural complexes follow Folsom indicating significant cultural diversification. Most are not well dated. They are considered together here. Climatically a trend begins to a warmer and dryer climate. Most complexes hunt bison, but smaller fauna is far more important than previously thought (Hill 2008).

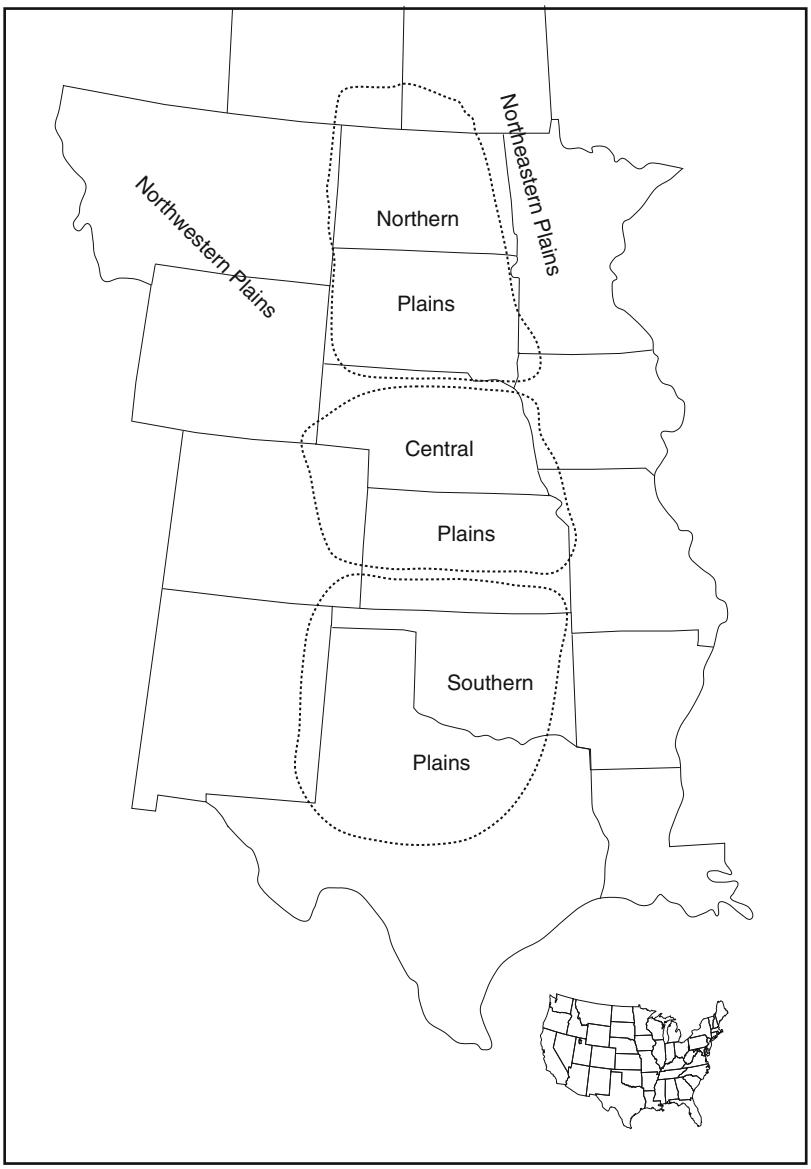

North American Plains: Geography and Culture, Fig. 2 Plains subareas

Lanceolate-shaped projectile point types lacking fluting are diagnostic (Hofman & Graham 1998: 109-13). Late Paleo-Indian complexes generally date between 10,200 and 8,000 years ago (Hofman & Graham 1998: 103). Beginning around 8,000 BP, climatic drying and warming intensifies, bison begin to undergo a decrease in size, and projectile point styles change to stemmed and notched forms. Late Paleo-Indian origins are unclear and subject to debate but to some degree likely lie in Folsom. Continuities are seen among earlier and later complexes within Late Paleo-Indian as well (Kornfeld et al. 2010: 85-6, 89).

Use of exotic lithics continues, but locally available stone materials increase in use. Diversification in projectile point styles and increasing use of local lithics suggest an increasing population and movement over smaller areas. Evidence for structures includes temporary shelters such as tipis, whose presence is marked by stone rings, to more permanent constructions having stone-lined

walls (Hofman & Graham 1998: 112, 121-2; Kornfeld et al. 2010: 401). The latter may indicate repeatedly utilized base camps. Bison kill rituals have resemblances to those of historic tribes (Kornfeld et al. 2010: 232-3).

Bison remain the primary game, but the importance of small animals is likely underestimated. Reliance on quick reproducing but harder to catch small prey potentially reflects resource depression in some locations by latest Paleo-Indian times (Hill 2008: 46-7). Little is known about Late Paleo-Indian plant use (Adair 2003: Table 7.2).

There are no aDNA analyses for human skeletal remains for the period 15,500–8,000 BP. Human skeletal remains are rare. Paleo-Indian and later Archaic populations are relatively homogeneous craniometrically. Homogeneity potentially results from widespread mating networks associated with low population densities (Key 1983: 66).

Plains Archaic Period

Holocene Climatic Optimum (HCO)

Plains climate between roughly 9,000 and 4,500 BP is marked by episodes of pronounced aridity and high temperatures (Grimm et al. 2011). Bison size declines rapidly between 8,000 and 6,500 BP and continues to around 2,000 BP when bison become smaller than modern individuals, especially on the southern Plains (Hill et al. 2008: 1759-60). Bison possibly shift their ranges east, west, and perhaps north. Herds are potentially more localized (Widga et al. 2010).

Early Plains Archaic Period

The Early Plains Archaic coincides with HCO. The hallmark is large, stemmed, and notched projectile points of various styles used as part of an atlatl complex. Ground stone implements, such as manos and metates, used primarily to process plant materials increase. A variety of cultural complexes are recognized (Kay 1998: 174-93, Fig. 6.1). Subsequent discussion generalizes across these.

The Early Plains Archaic generally runs from around 8,000 BP to around 6,000 BP. However, there is much variation in dates depending on whether changing projectile point styles or changing subsistence strategies are considered important.

Origins are in earlier Paleo-Indian populations as Late Paleo-Indian projectile point styles and characteristics, along with other artifact types, continue into the Early Archaic, overlapping with new styles and objects (Dyck & Morlan 2001: 115; Vehik 2001: 148; Collins 2004: 118). What little human skeletal material there is supports continuity as well (Key 1983: 66; Gill 2010: 533-4).

Because of HCO, it was once thought humans left the Plains, either moving west into the Rockies or east into better-watered locations. However, we now know wholesale abandonment does not occur. Nonetheless, some Plains peoples may move away, but others living outside the Plains may expand into the region (Kay 1998: 173, 185, 188-9; Vehik 2001: 148-9). Human population possibly declines.

People live in the best-watered places. Diversification in projectile point and other artifact types along with increased use of local stone suggests people move over smaller areas. Structures likely to be houses are more frequent. These represent repeatedly used base camps. Temporary structures, such as tipis, continue in use (Vehik 2001: 148; Kornfeld et al. 2010: 392, 395-8, 401).

Bison are not common and herds possibly are localized. Resource use expands to include not only medium-size animals such as deer and small animals such as rabbit, mussels, and fish but also baking of bulbs in earth ovens and burned rock features and seed processing with ground stone implements such as manos and metates (Adair 2003: Table 7.3; Collins 2004: 119-20; Johnson & Holliday 2004: 290; Kornfeld et al. 2010: 249-54, 395-8; Widga et al. 2010).

We know little about social and political organization. Small family units and networks of those units (bands) are probably characteristic. Where gathering contributes substantially to food supplies, the role of women may be greater (Vehik 2001: 149). The presence of nonlocal materials likely reflects trade rather than the size of space over which people move (Vehik & Baugh 1994: 251).

More speculatively, late in this period movement of people from the intermountain northwest onto the northwestern Plains may reflect an expansion of proto-Algonquian speakers. Mitochondrial DNA analyses indicate Algonquian speakers spread from west to east over the last 3,000–4,000 years (Malhi et al. 2001: 38-41). Glottochronology suggests a date of about 5,000 years ago for the origin of Plains Algonquian with eastern Algonquian languages developing later (Holman et al. 2011: Table 6). Historical linguistics analyses indicate a west to east expansion (Campbell 1997: 152-4). Perhaps proto-Algonquian expansion across the northern Plains is why northwestern Plains craniometrics indicate similarity through time to a sample of modern Algonquians (Gill 2010: 543). An east–west trade across the northern Plains is supportive of this idea (Vehik & Baugh 1994: 251).

Middle Plains Archaic Period

Large projectile points are the primary diagnostic artifact. Most have a large, broad blade, but there is a diversity of hafting styles. Some use corner, basal, or side notches, while others are simply stemmed. There are many other regionally diagnostic artifacts. Ground stone, primarily used to process wild plants, increases. Burned rock features are common over much of the Plains.

The period begins around 6,000 BP and ends around 4,000 BP. Where beginnings and ends are set depends upon what individual researchers consider important for defining the period. Increasingly, the end is set at a change to a wetter and cooler climate around 4,400 BP.

Similarities between Plains Middle Archaic projectile point styles and styles outside the Plains are sometimes taken to reflect movements of people. Diffusion of point styles rather than movement of people is seldom considered. It is likely most Plains peoples stay in place adjusting to changing climate and resource conditions, albeit continued population decline is quite possible (Vehik 2001: 149-150; Gill 2010: 534).

People remain hunters and gatherers. Although small herds of bison are present, dental abnormalities among southern high Plains samples suggest bison are under stress, probably from poor range conditions (Johnson & Holliday 2004: 290). Bison size decreases. Most sites with bison are on the high Plains, but bison are occasionally found eastward. Large-scale bison hunting is rarely indicated. Most faunal inventories contain deer and small animals.

Plant resources mostly are wild, although some late sites in the high Plains and Rocky Mountain foothills have maize. Perhaps more important is widespread use of a variety of wild oily and starchy seeds, such as goosefoot, knotweed, smartweed, marsh elder, and sunflower. Some of these will ultimately be domesticated albeit not necessarily on the Plains. *Prunus* begins to appear quite often in botanical assemblages (Adair 2003: 279-86). This genus is consistently used through time and, along with grape, other berries, fruits, and nuts, may be an "encouraged" or "managed" wild plant.

Burned rock middens and earth ovens are used to bake bulbs, roots, shellfish, insects, and meat. Surface water is limited to the point that wells are excavated in several locations on the southern high Plains. Favorable settings with strong springs, streams, or lakes are repeatedly occupied. Houses are uncommon, but pit houses and tipi rings are present on the northwestern Plains. Mobility is likely high and population densities low. However, occasional construction of burial mounds and cemeteries may mark use rights to resources. These may also tie dispersed peoples together through ceremonies and feasting. There is not a lot of information on health status, but high dental wear likely reflects use of stone grinding to process food. There are also examples of frequent disruption in bone growth, possibly from food stress. There is little to suggest much difference in sociopolitical organization compared to the Early Archaic (Myster & O'Connell 1997: 151; Kay 1998: 179; Collins 2004: 120-1; Johnson & Holliday 2004: 290-1; Perttula 2004: 375; Kornfeld et al. 2010: 254-5, 392, 401).

In southeast Oklahoma, a series of sites show continuity in artifact styles from the Middle Archaic through later periods when people speaking Caddoan languages occupy the area. People speaking Northern Caddoan languages ultimately come to occupy the Plains from Oklahoma to

North Dakota. It may be from southeast Oklahoma that ancestral Northern Caddoans begin their movement out on to the Plains.

Late Plains Archaic Period

Broad-bladed, corner- or side-notched dart points are the principal diagnostic items. Contracting stem points that may also be knives are present as well. Later, the bow and arrow, marked by much smaller projectile points, may start to appear, especially on the northern Plains. Occasionally pottery occurs late in the period as well.

The beginning date is increasingly set at around 4,000 BP in reference to the end of HCO. The ending date is extremely variable. For some parts of the Plains ceramics, smaller projectile points and/or domesticated plants may mark the end date. These appear around 2,000 BP. In other locations, they appear later or not at all, especially domesticated plants. In those cases, the Archaic can extend until after European contact. The terminal date is here set at 2,000 BP.

Changes in projectile point styles often are used to suggest population movements. Mogollon people from the Southwest and Numic peoples (ancestral Shoshone) from the northern Great Basin may expand onto the southwestern and northwestern Plains, respectively. Movements of peoples already on the Plains are also possible. That these new point styles may simply diffuse across the Plains is seldom addressed. Most origins are seen in earlier Plains complexes (Kay 1998: 189; Dyck & Morlan 2001: 123; Vehik 2001: 150). Craniometrics suggest both population continuity and an influx of genes not only from the Great Basin but also from areas east of the Plains (Key 1983: 63-6; Myster & O'Connell 1997: 214-5; Gill 2010: 543, 552).

A marked increase in the number of sites is taken to reflect a population increase. However, decreased erosion and deposition also may increase site visibility compared to earlier (Perttula 2004: 375-6; Kornfeld et al. 2010: 122).

In response to increasing population, mobility declines requiring more use of local resources and a greater variety of food sources, perhaps especially seeds. An emphasis on use of local lithic resources is in agreement. A diversity of animal resources is utilized. Bison are important game in most areas (Dyck & Morlan 2001: 121-5; Vehik 2001: 150-1; Johnson & Holliday 2004: 292; Kornfeld et al. 2010: 124-5, 255-60).

Wild plant inventories emphasize nuts and the seeds of goosefoot, pigweed, knotweed, marsh elder, and sunflower. *Prunus* and grape are also present. Cultivated or domesticated plants include squash on the eastern edge of the Plains and maize on the western edge. Most ethnobotanical samples yield wild plants exclusively (Adair 2003: Table 7.3).

Use of burned rock facilities and earth ovens continues (Vehik 2001: 150; Collins 2004: 121; Perttula 2004: 376). Houses include brush structures as well as more substantial constructions such as pit houses. However, tipi rings are frequent, especially on the northern Plains (Kornfeld et al. 2010: 392, 401).

Ossuary and mound burial are documented on the northeast Plains' margin, but organized burial programs are uncommon. Health quality varies. In some locations, diet quality may be problematic. Infections and other health-related problems represented by bone growth arrest lines appear occasionally. More common is severe tooth wear. Cavity rates are highly variable but generally are low with some exceptions. The low caries rate may reflect higher meat intake. Conversely, a higher plant, especially seed, intake may be responsible for the few instances of high cavity rates. It seems health status is mostly good. Evidence for conflict is rare (Myster & O'Connell 1997: 152-3; Vehik 2001: 150; Owsley & Bruwelheide 1996: 190; Gill 2010: 539).

Sociopolitical organization likely remains based on families and networks among families (bands). Where bison are a significant resource, the basic residence group may be larger than elsewhere as bison are a clumped rather than dispersed resource. Increasing population and residence group size are associated with increasing political complexity, perhaps involving something similar to tribal systems of political organization. Where gathering provides most

food, the status of women is likely higher than where animal hunting is most important.

Trade increases (Vehik & Baugh 1994: 253). With increasing population and smaller resource areas, interaction networks potentially intensify if not expand in size. However, trade also is a mechanism for status enhancement within the context of increasing political complexity.

With a change to a more mesic climate, people bearing an adaptive strategy focused on forested environments and speaking Caddoan languages may expand westward following stream valleys out onto the southern Plains. Glottochronology indicates ancestral Northern or Plains Caddoan diverged from ancestral Caddoan languages during this period (Holman et al. 2011: Table 6). Speakers of proto-Kiowa and/or Tanoan languages are possibly represented in southwestern Plains Jornado Mogollon assemblages and/or in assemblages from southeast Colorado with basketmaker affiliations. Craniometric studies indicate continuity with Paleo-Indians – at least on the central and northern Plains (Key 1983: 63-6). On the extreme speculative end, perhaps the latter are associated with ancestral Missouri River and/or Mandan Siouan languages and cultures.

Plains Woodland Period

At the beginning of the period (2,000 BP), the climate is relatively cool and moist. Episodes of drought increase toward the end of the period at around 1,000 BP. (Schmeider et al. 2011: 1808). Sedentism, ritual architecture, ceramics, arrow points, and domesticated plants increase in importance. The number of archaeological complexes increases. However, ceramic rather than lithic remains define these. Because pottery is a plastic medium, it conveys more cultural information than do reductive mediums like stone.

Early Plains Woodland Period

If not for ceramics, there is little to differentiate this period from the Late Archaic. On the eastern edge of the Plains, earliest ceramics date to a little before 2,000 BP. Ceramics resemble types in the Illinois area. However, for much of the Plains, the Woodland period is defined by the slightly later appearance of ceramics resembling Illinois Hopewell. In southeast Oklahoma and eastern Texas, ceramic connections are to the lower Mississippi valley, especially Tchefuncte complex. On the southwestern edge of the Plains, ceramics have connections to Jornada Mogollon. Increasing use of ceramics reflects reliance on simmering and boiling to process the small seeds that are becoming important food resources (Johnson 2001: 159; Boyd 2004: 317; Perttula 2004: 376; Kornfeld et al. 2010: 62).

Although large dart points similar to the Late Plains Archaic continue, smaller points representing the bow and arrow increase. Not all researchers agree for recognizing bow and arrow technology when only the stone point remains (Dyck & Morlan 2001: 122-3; Boyd 2004: 314, 328-9; Johnson & Holliday 2004: 292).

Domesticated plants increase. Nowhere on the Plains do domesticates provide a majority of the food supply though.

Few sites on the Plains show connections to Early Woodland period ceramics of the eastern United States. Thus, this study defines the Early Plains Woodland period as dating between 2,000 and 1,500 BP (CE 0–500).

Strong similarity of most Early Plains Woodland material culture to that of the Late Archaic indicates most people remain where their ancestors lived (Johnson & Holliday 2004: 292; Logan 2006: 76-84). There are some exceptions. Most notable is Kansas City Hopewell centered on the juncture of the Kansas and Missouri rivers. It is still unclear whether this complex reflects a movement of people from Illinois or contact with people in Illinois or a complex mix of both (Logan 2006: 76). Craniometric analyses indicate Kansas City Hopewell is quite distinct from other Plains Woodland populations (Key 1983: 69, 71, 93, 105) suggesting an intrusive population.

On the southwestern Plains, Jornada Mogollon affiliated groups are also possibly intrusive (Boyd 2004: 296). Biological and archaeological evidence for population change exists in the northwestern Plains' Besant complex as well. But biological change is not consistently evident in all members of the complex (Key 1983: 71). Appearance of new projectile point styles is often

taken to represent new peoples or movement of peoples, but diffusion of point styles across people is seldom considered. Sometime after 1,700 BP, Plains elements appear in northern Fremont complex of the Great Basin, possibly introduced by ancestors of southern Athapaskans (Apache and Navaho) (Dyck & Morlan 2001: 125-7). Mitochondrial DNA studies suggest Fremont in the Great Salt Lake area is related to Puebloan (Anasazi) people of the Southwest and not Athapaskans, however (Kaestle & Smith 2001: 4).

Most plant resources are wild. Emphasis is on seed-producing plants, although nuts, bulbs, and roots remain in use. Berries and fruits increase. Maize is in some high Plains and northern Plains sites. Domesticated sunflowers, squash, tobacco, and marsh elder occur occasionally (Adair 2003: Table 7.5-7.10). Chipped stone double-bitted axes increase (Perttula 2004: 376). Possibly these reflect clearance for crop planting. However, more consideration needs to be given to woodland thinning for management of wild resources such as nut trees, fruit trees, and berry vines.

Bison kills take place just east of the southern high Plains but are increasingly uncommon farther eastward (Boyd 2004: 318, 328; Johnson & Holliday 2004: 292-3). Bison are more frequent northward (Dyck & Morlan 2001: 124-5; Johnson 2001: 162-5).

Based on increased site numbers, population continues to grow. Population on the northwestern Plains reaches its height by 1,500 BP (Kornfeld et al. 2010: 130).

Burial mounds exist the length of the Plains, especially in eastern areas. Their inspiration is traced to the Mississippi River Valley, especially Illinois Hopewell and Marksville complexes (Johnson 2001: 161-2; Perttula 2004: 377, 388; Gill 2010: 534-5). These mounds involve obvious alterations of the landscape and likely mark use rights to certain areas. That one's ancestors are buried there reinforces that idea.

Structures considered to be houses increase. These are circular to oval in shape. Stone foundations mark some central high Plains houses. Increased house construction suggests declining mobility or repeated returns to certain locations. Stone tipi rings are common on the northern Plains (Boyd 2004: 328; Perttula 2004: 377; Kornfeld et al. 2010: 392, 398, 401).

Bison pound or corral construction increases on the northwestern Plains. Some are used and repaired repeatedly. Shaman huts are nearby (Kornfeld et al. 2010: 260-8).

Cooking by roasting pit and hot rocks declines. Wylie pits in North Central Texas are roasting ovens for processing abundant, but seasonally limited, root and nut resources. Feasting and mortuary events also take place here (Vehik 2001: 153). Feasting is a potential response to declining mobility as it facilitates interaction with others. Feasting is also a mechanism by which political leaders increase power. Ceramic vessels used to boil and simmer increasingly replace hot rock cooking, however.

Information on health and diet is not specific to the Early Plains Woodland period. Tooth wear rates tend to be high and caries rates low. High wear reflects use of resources, probably seeds, processed through stone grinding. Caries rates suggest higher meat consumption. Episodic stress rates can be comparatively high. Malnourishment is occasionally indicated. Decline in life expectancy starts to take place on the northwestern Plains. On the southern Plains, however, health appears good (Owsley & Bruwelheide 1996: 190, 193, 196-7; Myster & O'Connell 1997: 159-60, 222; Perttula 2004: 377). Conflict seems to increase. Evidence is broadly spread across the Plains (Myster & O'Connell 1997: 159, 222; Boyd 2004: 309-11, 330). Potentially an increasing population is responsible for at least some of these trends.

Trade increases and can serve to tie less mobile populations together, thereby reducing risk from famine and conflict. Trade also provides a mechanism by which political leaders can increase power. Interaction of some Plains groups with Hopewell and Marksville is indicated, but nothing suggests Plains groups consistently provide commodities to the Hopewell trade network (Vehik & Baugh 1994: 254-5).

People depending on bison hunting likely have larger social groups. Males have greater

status and authority in such societies. Increasing population size and dependence on smaller areas for resources can facilitate increasing political complexity. Nonetheless, most political systems were probably similar to band and tribal organizations.

More speculatively, Northern Caddoan languages must be expanding northward during this time. Although this expansion is assumed to involve population replacement, craniometric analyses place Keith variant of the central Plains (an often postulated Northern Caddoan group) closer to northern Plains complexes that are likely ancestral to Missouri Valley or Mandan Siouan people (Key 1983: Figs. 15, 18). Possibly, the expansion of Northern Caddoan languages is accomplished through intermarriage and cultural assimilation as much as by actual population movement.

Algonquian peoples continue to live on the northern Plains. However, there is little agreement on which complexes represent them.

Tanoans, possibly including the Kiowa, may be represented in Jornada Mogollon-related complexes of Southwest and West Texas. There also may be Tanoan speakers in southeast Colorado since some complexes there have Southwest connections. Kiowa origins perhaps are better sought in southeast Colorado among groups with Southwest cultural affiliations and high Plains adaptations.

Late Plains Woodland Period

Small projectile points become common after 1,500 BP, especially corner-notched forms often called Scallorn. Ceramics increase, although some western complexes show little to no use of them (Johnson 2001: 166-71; Vehik 2001: 153-4; Boyd 2004: 314; Collins 2004: 122-3).

The beginning date is commonly set at 1,500 BP (CE 500). This coincides with an episode of drought. The end date is set at 1,100–1,000 BP (900–1,000 CE) when a number of cultural and climatic changes take place. In the extreme southern and northwestern Plains, 1,500 BP marks the start of the Late Prehistoric period.

Continuity in culture and population is likely. In some cases, Early Plains Woodland complexes continue on into this period. There are a few exceptions to continuity nonetheless. The spread of small arrow point styles and ceramic attributes is often taken to indicate actual movements of people. Thus, expansion of Southwest, Athapaskan, Numic, and Algonquian peoples is proposed, even though some may actually already be resident on the Plains from earlier. Diffusion of point and ceramic styles across populations is only occasionally addressed (Key 1983: Fig. 15; Dyck & Morlan 2001: 125-7; Johnson 2001: 166-70; Boyd 2004: 296-329; Perttula 2004: 376-7; Logan 2006: 84-5; Kornfeld et al. 2010: 131).

Site numbers increase and more cultural complexes are recognized. Together they suggest an increasing population (Logan 2006: 88).

Bison decline east of the central and southern high Plains. This is possibly in response to drought. The northern Plains seem unaffected. In response, central and southern Plains peoples rely more on seeds and nuts along with a diversity of smaller game animals. Most plant foods are wild. Bulbs and roots seem less common except perhaps on the high Plains. Domesticates involve mostly maize, sunflower, squash, and marsh elder (Johnson 2001: 166-70; Vehik 2001: 155; Adair 2003: Tables 7.5–7.9; Boyd 2004: 307, 318-21; Kornfeld et al. 2010: 398).

Greater investment in facilities construction suggests repeated or long-term use of a location. Houses are found in almost all parts of the Plains. Predominant house outline is oval to circular. Framework is lightly built. In the high Plains of Colorado and New Mexico, use of dry laid masonry perhaps reflects some connection with the Southwest. Tipi rings are frequent on the northern and northwestern Plains. Residences generally are loosely distributed across the landscape either singly or in small groups (Johnson 2001: 166-8; Boyd 2004: 304-7, 328; Perttula 2004: 377; Logan 2006: 84-6; Kornfeld et al. 2010: 398).

Storage pits are present in more sedentary settings (Johnson 2001: 165-8; Boyd 2004: 304-7, 317). Most are used to store food. People store food where resource productivity is highly seasonal and/or insufficient to supply

people with food year-round. Storage increases as population grows.

Mound, ossuary, and cemetery burial are all practiced (Vehik 2001: 154; Johnson 2001: 166-70; Perttula 2004: 377-8). The use of planned, spatially restricted burial programs marks use rights to resources and provides opportunities for social interaction.

Burned rock middens and roasting/baking pits still occur. However, ceramics and boiling/simmering of food increase (Boyd 2004: 305-6; Perttula 2004: 377; Kornfeld et al. 2010: 398).

Bison corrals continue on the northwestern Plains. However, bison jumps are increasingly frequent. While corrals permit taking only a few animals and require fewer humans, jumps can kill large numbers of bison but require more humans (Kornfeld et al. 2010: 269, 272-3). Bison jumps are a possible focus of intergroup gatherings.

There is not a lot of data on health. The information noted for Early Plains Woodland likely is relevant to this period as well.

Skeletal evidence suggests conflict is more frequent on the western edges of the Plains (Boyd 2004: 325-7; Collins 2004: 122-3; Gill 2010: 536). But otherwise, conflict seems infrequent.

Trade is less prominent. Perhaps this is because social groups are more localized and independent (Vehik & Baugh 1994: 255-6). Low conflict rates are supportive of that idea. But, declining mobility, increasing storage, and spatial concentration of burials suggest external connections should be important. Potentially, short-distance trade used to build risk-minimization networks is more important than long-distance trade to fund status and power acquisition by political leaders. Short-distance trade can be more difficult to recognize archaeologically. Risk-minimization networks and short-distance trade can produce the regionally similar material cultures seen among Late Woodland complexes.

Dispersal of houses and settlements suggests sociopolitical organization emphasizes families and networks among families. Communal burial programs and bison jumps are episodic events networking dispersed families and groups together. Consequently, political power is potentially weak and dispersed during Late Woodland times.

The expansion of Northern or Plains Caddoans northward likely continues. Problems noted for Early Plains Woodland in tracing this movement remain.

Origins of the Middle Missouri tradition, ancestors of the Mandan, Hidatsa, and Crow (Missouri Valley Siouans), are traced to the Late Woodland of Iowa and Minnesota (Wood 2001: 186, 190). Yet, at the same time, many other Late Woodland complexes on the northeastern edge of the Plains share ceramic similarities both with earlier Woodland and later Middle Missouri tradition complexes (Johnson 2001: 166). Craniometrics emphasize these local connections as well (Key 1983: Fig. 15). Although an expansion of Middle Missouri tradition peoples may take place, perhaps local northern Plains people more often adopt the material cultures and languages of Middle Missouri tradition.

Late Prehistoric Period

The end of Late Woodland and the start of the Late Prehistoric period overlap the Medieval Warm Period (MWP) or Medieval Climatic Anomaly (MCA). The MCA is variably dated. Often it begins at 1,150 BP (CE 850) and ends at 750 BP (CE 1,250). The main characteristic is periods of prolonged drought extending for decades with the first major episode appearing around 1,000 BP (Herweijer et al. 2007: 1354-7).

Projectile points are small triangular forms. These potentially mark use of the compound, reflex bow. Ceramics increase greatly. Ceramics are frequently decorated with designs that vary both within and between sites. These designs presumably communicate information about group memberships, associations, and beliefs as well as reflect temporal changes in those behaviors. Signaling group memberships or identity may increase in importance with greater competition for resources within and between social groups.

Domesticated plant use increases significantly and possibly rapidly. Bison increase their numbers and range as well. The strategies used

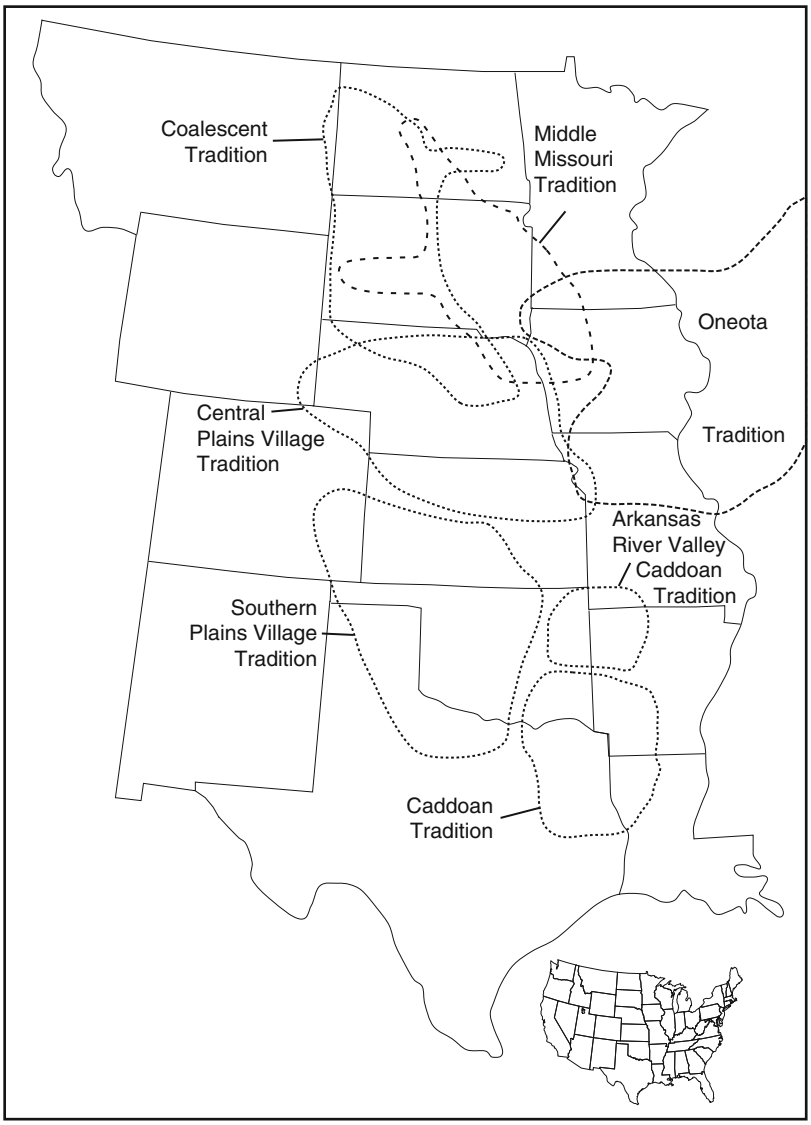

North American Plains: Geography and Culture, Fig. 3 Late Prehistoric period cultural traditions

to integrate these resources into human life help define the period.

Several cultural traditions mark the Late Prehistoric (Fig. 3). Traditions consist of many smaller groups or complexes having similar material cultures through time. Plains Village, Middle Missouri, Coalescent, Oneota, and Caddoan traditions are most significant.

In this study, the Late Prehistoric period is divided into three parts, Late Prehistoric I, II, and III. Although this subdivision is not common practice, the divisions reflect substantial changes in lifeways.

Late Prehistoric I

Domesticated crops, especially corn, increase. There is overlap between small corner-notched (Scallorn) points and small, triangular points with side notches. Numerous cultural complexes are defined based primarily on differences in ceramic decoration.

Date is1,000–750 BP (CE 1000–1,250). The period co-occurs with MCA.

Origins of most Late Prehistoric I complexes lie in the preceding local Late Woodland (Drass 1998: 423, 429-30, 440; Gunnerson 2001: 234; Henning 2001: 222, 225; Johnson 2001: 172;

Wood 2001: 190). Population movements do occur, however. The Middle Missouri tradition expands westward into the Dakotas following the Missouri River Valley. At the same time, resident populations are incorporated into the tradition (Key 1983: Fig. 17; Wood 2001: 190).

Oneota tradition begins westward expansion from Wisconsin. Oneota represents people speaking Chiwere-Winnebago and Dhegiha Sioux languages, although perhaps more the former than the latter. Both population replacement and incorporation of local residents occur (Henning 2001: 229-33). An example of Oneota incorporation of local populations can be seen in ancient mtDNA studies of western Illinois Oneota where haplotype distribution is very similar to that for modern Algonquians instead of Siouans (Eshleman et al. 2003: 10).

People from Cahokia, at the junction of the Missouri and Mississippi rivers, are sometimes proposed to move west to the junction of the Kansas and Missouri rivers where they establish a bison procurement operation. Material culture from the proposed colony, Steed-Kisker complex, is mostly of types common to the Plains Village tradition, however. Steed-Kisker craniometric similarities are strongest with Plains Village tradition as well (Key 1983: 89, Fig. 21; Steinacher & Carlson 1998: 254-5). Steed-Kisker is not a Cahokia colony.

The Plains Village tradition represents people who likely speak Northern or Plains Caddoan languages. Central Plains Village tradition complexes mostly are ancestral to various groups of Pawnee, while southern Plains Village tradition complexes are primarily ancestral to various groups of Wichita. Some members of the Plains Village tradition may expand westward on to the high Plains where they depend more upon hunting than farming. However, other possibilities include seasonal-only (summer/fall) use of the region or local hunter/gatherer adoption of Plains Village material culture (Gunnerson 2001: 234).

Late in the period, central Plains Village tradition people may move northward abandoning, at least partially, more western locations. Central Plains Village tradition craniometrics indicate people in more northern locations are distinct from those in southern locations, though (Key 1983: 79-83, Fig. 18). Thus, it seems possible to reiterate that movement of Northern Caddoan languages northward is as much about incorporation of local residents as it is their replacement.

Population increase is often invoked in explanations for the spread of Plains Village, Middle Missouri, and Oneota traditions. The number of sites certainly increases, and so population may grow. However, on the northwestern Plains, population declines (Drass 1998: 428; Wood 2001: 190; Kornfeld et al. 2010: 130).

Subsistence varies. Wild plants are sometimes still the only resources utilized, especially in western areas. Domesticated plant use increases eastward. Bison increase on the western edge of the Plains. On the northwestern Plains, corrals, jumps, and arroyo traps show repeated use.Eastward deer are more often used (Drass 1998: 424, 429, 433; Steinacher & Carlson 1998: 246, 250, 253-4; Dyck & Morlan 2001: 128; Henning 2001: 227; Adair 2003: Tables 7.11, 7.13, 7.16; Kornfeld et al. 2010: 268-76).

Houses are more substantially built, especially among farming peoples. Plains Village, Coalescent, and Middle Missouri tradition complexes construct square or rectangular houses. Houses on the southwestern Plains sometimes have stone foundations and can be built contiguously reflecting possible influences from Pueblo architecture. Stone circles reflect use of tipis. In the southern and central Plains, houses tend to be sparsely distributed along drainages, either singly or in small groups. Larger groupings occur in the Caddoan tradition and in the northern and northeastern Plains. Fortified villages occur in Middle Missouri tradition (Drass 1998: 423, 428-9, 432-3, 439; Johnson 1998: 313, Fig. 10.4a–b; Steinacher & Carlson 1998: 241, 245, 248-9, 252-3, 256; Wood 2001: 192; Perttula 2004: 379-85; Kornfeld et al. 2010: 398-9, 401).

Storage pits are important among sedentary farmers but do not occur in large numbers except perhaps on the northern Plains. Predominantly they are either bell-shaped or cylindrical in profile (Drass 1998: 429, 433, 439; Steinacher & Carlson 1998: 241; Henning 2001: 224-6;

Wood 2001: 188). Analyses of storage pit size and density could provide information on the extent to which various groups of people rely on stored resources and likely farming.

Mound construction in the Caddoan tradition is used both for elite burial and elevation of elite residences. Mound and ossuary burial continue in some parts of the central and northern Plains. However, in general, mound and ossuary burial seem in decline, except on the northeastern Plains. Cemeteries increase and some may serve multiple villages or hamlets. On the northwestern Plains, burials are placed in crevices or exposed (Steinacher & Carlson 1998: 242, 246, 250, 254, 257; Dyck & Morlan 2001: 128; Henning 2001: 224-6; Perttula 2004: 379-84; Gill 2010: 536, 540).

With increasing use of maize and consumption of carbohydrates, caries increase. Tooth wear declines in a few places suggesting a less abrasive diet and perhaps a different way of processing grains other than by stone grinding. Incidences of episodic biological stress lessen, possibly because the food supply is more stable and sufficient. Stress does not disappear completely however. On the northwestern Plains, people are perhaps not doing well since the average age at death declines. Increased competition for food under a high population density may be responsible. The caries rate in this area declines reflecting an increase in the consumption of bison meat compared to plant foods (Owsley & Bruwelheide 1996: 190, 193-7; Myster & O'Connell 1997: 164-71, 228; Gill 2010: 539, 546). The MCA does not seem to have a strong negative effect on human health.

Conflict increases. Both hunter/gatherers and farmers are involved. Evidence includes damage to human skeletons, aggregation of people in larger settlements, location of settlements in defensible positions, and area-wide abandonment of settlements. Some farming villages as well as mobile bison hunter camps are fortified. The exact cause of conflict is unknown. Athapaskans moving south and Puebloan peoples moving east may be responsible on the west-central and southern Plains (Drass 1998: 423; Steinacher & Carlson 1998: 254; Wood 2001: 190-2; Collins 2004: 122-3; Gill 2010: 536, 546-8). Competition over access to bison may be important as well.

Trade increases. Trade occurs both among Plains groups and with people living outside the Plains. Stones and ceramics are most easily identified, but, no doubt, other, more perishable, resources such as bison products are also traded. On the southeastern edge of the Plains, the formation of complex political systems among Caddoan tradition complexes is associated with acquisition of many Plains resources. Trade increasingly is for political purposes rather than for food or technology resources (Vehik & Baugh 1994: 257-9; Vehik 2002: 44-51).

Given dispersal of houses and settlements, political systems emphasizing networks among families are likely. Many complexes grade into one another rather than having sharp boundaries, which suggests politics involves local, fluid networks of relations, probably much like tribal organizations. Nonetheless, planned, visible, and spatially restricted mortuary practices indicate rights to resources remain important. In some places, the construction of special ritual structures, concentration of nonlocal materials at one or a few sites, and multicommunity mortuary facilities suggest access to political power and resources has some inequalities. This is most pronounced among Caddoan tradition societies.

Expansion of the Plains Village, Middle Missouri, and Oneota traditions possibly is a result of farming with the greater food supply fueling population growth and expansion but also causing land exhaustion. Yet, climate conditions do not seem that favorable to farming, and craniometric data suggests less actual movement than commonly assumed. Instead, perhaps because of long periods of drought, farming (and increased storage) is added to diversify subsistence. Plains Village tradition expansion is possibly most successful precisely because it maintains a more diversified subsistence.

Late Prehistoric Period II

The predominant point style is small, triangular, and side notched. Bison procurement and processing tools are common. Use of ceramics increases. Farming tools such as grinding stones, hoes, and digging stick tips are frequent.

While some climatic researchers suggest a cooler and wetter climate starting around 800 BP (CE 1,200), others continue MCA through this period. The MCA may end abruptly around 600 BP (CE 1,400) (Herweijer et al. 2007: 1354). Some sites from Late Prehistoric I are covered by wind-blown dust as are some sites from this period (Johnson 1998: 328). Climatic conditions are likely comparatively dry.

This period extends from 750 to 600/550 BP (CE 1,250–1,400/1,450). The end is marked by major environmental and cultural changes.

Many complexes descend from those of Late Prehistoric I or are continuances of those complexes, but there are exceptions (Drass 1998: 421-2, 430, 433, 439; Johnson 1998: 313, 327-8; Steinacher & Carlson 1998: 244, 248, 255-6; Gunnerson 2001: 234; Wood 2001: 192-3). The problem of material culture similarities not agreeing with craniometric analyses continues. Some complexes on the southwestern Plains have a southern Plains Village tradition material culture, but craniometrics indicate a lack of similarity to other Plains Village tradition cultures. Neither do these groups resemble earlier populations (Brooks 2004: 335). Other southern Plains groups adopt a southern Plains Village tradition bison hunting material culture as bison populations increase and expand (Vehik 2001: 155-6; Collins 2004: 122-3, 125).

The Missouri River Valley in the northern Plains is a favorable location for farming. Not only are members of the Middle Missouri tradition resident along the Missouri River but other related groups may move into the valley from elsewhere (Wood 2001: 193). Craniometrics supports the idea of diverse origins for people of the Middle Missouri tradition as noted earlier (Key 1983: Figs. 17, 19).

Several complexes in eastern North Dakota, western and northern Minnesota, and southern Manitoba and Saskatchewan potentially represent Siouan and Algonquian peoples. These complexes appear to move northward and westward (Dyck & Morlan 2001: 128-9; Henning 2001: 230). Perhaps they do so in pursuit of bison.

A new tradition, the Coalescent, has origins in central Plains Village tradition (Northern Caddoans) – at least to some extent (Johnson 1998: 327-8). Expansion of Coalescent tradition north along the Missouri River pushes Middle Missouri tradition people northward.

Population may increase, but toward the end of the period, significant rearrangements of people begin. There is population movement and amalgamation, but there also may be population loss (Drass 1998: 422, 431-2).

Many Plains peoples intensify farming, but some remain hunter/gatherers. Bison increase in numbers and distribution. They are the primary game for most Plains peoples (Drass 1998: 421, 431, 433; Steinacher & Carlson 1998: 255; Gunnerson 2001: 235-6; Henning 2001: 229; Vehik 2001: 155-6; Wood 2001: 188; Adair 2003: Tables 7.12, 7.13, 7.14, 7.16; Collins 2004: 122-3; Perttula 2004: 383).

While farmers are associated with relatively permanent houses, some bison hunters have seasonal village residency in similar houses. Houses are mostly square or rectangular in shape. Structures with circular floor plans occur on some Plains Village and Coalescent tradition sites but are most common on Caddoan tradition sites in east Texas. Houses with stone foundations are constructed in the southwestern Plains. Some are built contiguous to one other, similar to a pueblo. Although some houses continue to occur singly or in small groups scattered along stream drainages, larger clusters exist in almost every complex. It is not clear what prompts formation of larger aggregations. Conflict is likely involved to some degree, as may be social and economic opportunities some communities might offer over others (Drass 1998: 419, 425-6, 430-2, 440; Johnson 1998: 313; Steinacher & Carlson 1998: 255; Wood 2001: 193; Perttula 2004: 379, 382).

Storage pits are extremely common, especially among farmers (Drass 1998: 419, 425, 430, 433, 440; Henning 2001: 229; Wood 2001: 188; Perttula 2004: 379). Along the southeastern edge of the Plains, aboveground storage facilities are also indicated (Perttula 2004: 379, 382-3). With increasing reliance on seasonal food production through farming, along perhaps with periodic drought episodes, the need to store food increases.

Among Caddoan tradition societies on the southeastern edge of the Plains, burials are placed in mounds and cemeteries. These reflect complex sociopolitical systems and differential access to wealth, power, and authority. Mound building and ossuary construction decline elsewhere. Cemetery burial increases. The presence of a few large cemeteries in association with some villages suggests multicommunity mortuary practices. These perhaps maintain the communal aspects of mound and ossuary mortuary rituals while introducing new, more hierarchical features. Some Plains Village tradition complexes may also have charnel or other specialized mortuary houses. In some cases, there is no evidence regarding how deceased society members were treated. Scaffolding or other forms of exposing the dead may be indicated (Drass 1998: 419, 423-6, 430, 439; Johnson 1998: 313-6; Perttula 2004: 379-86). Important shifts in mortuary ideology are suggested, but their nature is unclear.

Residence in villages and reliance on high carbohydrate diets impact health. Southern Plains Village tradition people have high preadult mortality, but older adults live longer compared to those living farther north and later in time. Caries and alveolar bone pathology rates for the southern Plains are high. This suggests a high carbohydrate intake. Earliest Coalescent tradition skeletal material indicates a rate of episodic biological stress, higher than in southern Plains Village tradition groups. The rate is also higher than in later Coalescent groups (Owsley & Bruwelheide 1996: 162-3,190, 193-4, 196, Table 70). Much more research is necessary to substantiate and reconcile these features and define their causes.

Violence is common. Depending on location, settlements emphasize high locations such as mesas, peninsula settings having commanding valley views, large village size, closely spaced settlements, abandonment of areas once occupied, and fortification. Skeletal trauma is widespread. The best testament is the Coalescent tradition Crow Creek village where over 500 people were massacred. Caddoan tradition iconography emphasizes violence, albeit that violence is not very visible in archaeological remains (Drass 1998: 422-3; Johnson 1998: 313, 316; Gunnerson 2001: 236-7). It is not clear who is fighting whom or what the reasons for conflict are. Access to bison, interethnic relations, competition for farmland, status acquisition, and retaliation for grievances may all be involved. Although not recognizable in material culture assemblages, Athapaskan ancestors of the Apache and Navaho must be moving south.

Some earlier trade relations cease, but trade between Plains groups intensifies as does trade with groups in surrounding regions (Vehik & Baugh 1994: 259-61). What is archaeologically visible today are nonlocal shells, stones, and ceramics with some of the latter often being local copies of what must be more prestigious wares. Trade in bison hides, skulls, meat, and tool bones is of equal if not greater importance. Explanations for how and why trade intensifies are many. Most emphasize mechanisms for obtaining food. However, political intensification potentially results in greater emphasis on nonlocal materials as markers of inequalities (Vehik 2002).

Sociopolitical organization increases in complexity among many. For Caddoan tradition complexes, this is the time of maximum political complexity similar to chiefdoms. Many Plains Village tradition sites have structures whose large size, form, placement, and/or content indicate specialized ritual or political activities. Some Middle Missouri tradition villages also are organized around central plazas (Brooks 1987: 142, 151; Brown 1996: 183-91; Gunnerson 2001: 236; Wood 2001: 193; Perttula 2004: 380, 382-6). Given specialized ritual and political structures, patterned village layouts, and labor organization necessary to design and construct increasingly sophisticated fortifications, it is likely most Late Prehistoric II societies are more complexly organized than earlier.

Late Prehistoric Period III

Significant cultural changes start taking place with the end of Late Prehistoric II. The changes are poorly understood but involve pronounced social change and population movement.

Changes coincide with the Little Ice Age (LIA). When LIA begins and ends is not agreed upon, but usually the starting date is around 600 BP (CE 1,400). The climatic transition is abrupt. For the Plains, temperatures are colder and precipitation increases. Changes on the northern Plains may be greatest. Although favorable for farming, studies suggest dry growing seasons – at least in some places. Droughts occur but are not as severe as during MCA (Herweijer et al. 2007: 1354). Bison numbers and distribution expand greatly. LIA conditions continue through Late Prehistoric III.

The primary projectile point style remains the small triangular form, but unnotched forms predominate. Tools associated with bison processing increase. Ceramics increase in frequency, especially among farmers. Among horticulturists, crop production and processing tools are numerous.

Late Prehistoric III starts between 600 and 550 BP (CE 1,400–1,450). Setting a termination date is somewhat arbitrary. Sometimes a terminal date is determined by the appearance of Europeans. That varies, however, as Europeans visit the southern Plains in CE 1,541, while on the northern Plains, it may be more than two centuries later. The termination date is set here at 350 BP (CE 1,650). There is little evidence for Europeans having much influence or presence on the Plains prior to that date.

The Arkansas River Valley member of the Caddoan tradition begins the period with exhumation of the dead and their reinterment in a massive mound construction event. Although perhaps reflecting the maximum political complexity achieved in this area, there is soon a decline. Sometime in the late seventeenth century CE, the Arkansas River Valley Caddo abandon a place lived in for several thousand years, move south, and become the Northern Caddoan-speaking Kichai. Caddoan tradition people living in east Texas and adjacent areas show less abrupt change. They are ancestors of various Caddoan groups such as the Hasinai and Kadohadacho (Brown 1996: 187, 191-200; Perttula 2004: 393-407).

Southern Plains Village tradition people abandon some places lived in for 400+ years. It is unclear why. Climate changes unfavorable to farming are perhaps responsible. However, potentially bison hunting becomes more productive than farming, instigating abandonment of farming. Increasing conflict may encourage people to move. Changes begin early in the fifteenth century CE. Farmers from different southern Plains locations coalesce along the eastern Plains margin, while bison hunters dominate western areas. Coalescing farmers and some of the mobile bison hunters are ancestors of the Northern or Plains Caddoan-speaking Wichita. Athapaskan bison hunters are intrusive from farther north (Drass 1998: 422, 424-5, 431-4, 441-4; Gunnerson 2001: 239; Vehik 2001: 156-7; Johnson & Holliday 2004: 293).

Central Plains Village tradition peoples reside in central and northern Nebraska. They farm and hunt bison. They are ancestors of the Northern Caddoan Pawnee and perhaps of some Arikara. It is difficult to trace precise relationships through material culture or craniometrics (Key 1983: Fig. 21; Steinacher & Carlson 1998: 258-9).

The Coalescent tradition includes ancestors of the Arikara and possibly part of the Pawnee. This issue is complex, both biologically and culturally, and is not well understood. Coalescent tradition expands northward. They farm and hunt bison (Key 1983: Fig. 21; Johnson 1998: 309, 327-31; Steinacher & Carlson 1998: 258-9).

Members of Oneota tradition maintain a strong presence on the eastern edge of the central Plains. They farm and hunt bison farther out onto the Plains. Connections with Historic Plains groups are complex and difficult to trace (Key 1983: 86, 96; Henning 2001: 229-30, 232-3).

Middle Missouri tradition people move northward along the Missouri River, pushed by Coalescent tradition. If the Crow do not split from the Hidatsa earlier, they do so now. Other complexes with strong similarities to Middle Missouri tradition live to the north of the Missouri River, but their relationships are unclear. They farm to varying degrees and hunt bison (Johnson 1998: 329; Dyck & Morlan 2001: 129-30; Wood 2001: 194).

Athapaskan ancestors of the Apache and Navaho meanwhile are moving south on the western Plains. Two associated complexes are Dismal River in southwest Nebraska and northwest Kansas and Tierra Blanca in the Texas panhandle (Vehik 2001: 156). They are strongly associated with bison hunting.

Several other ethnic groups are likely on the Plains at this time. They include ancestors of the Kiowa, Arapahoe, Gros Ventre, Dakota, Assiniboine, Blackfoot, Plains Cree, and others. However, making connections to specific archaeological complexes is difficult, and there is much disagreement (Hanson 1998; Dyck & Morlan 2001).

Depopulation may begin early in this period – at least in some places. The idea of depopulation may be a result of the abandonment of many areas. Likewise, proposals for population increase may come from coalescence of people in a few locations. European epidemic diseases do not seem a problem for the Plains until after 1,650 and so is an unlikely cause of depopulation (Vehik 1994: Table 11.5; Perttula 2004: 398, 403, 406). Warfare is common and a potential cause of depopulation (Steinacher & Carlson 1998: 259).

Subsistence is more specialized, emphasizing farming or bison hunting – not to say that doing one totally precludes the other. Farmers occupy the eastern Plains and bison hunters the western Plains. Domesticates are corn, beans, squash, and sunflower. A variety of wild fruits, nuts, and seeds are collected, and their growth likely encouraged. A marked increase in bison jumping after CE 1,500 in the northwestern Plains no doubt reflects larger bison populations (Drass 1998: 443-4; Dyck & Morlan 2001: 129; Gunnerson 2001: 240; Vehik 2001: 156-7; Wood 2001: 188; Adair 2003: Table 7.12–7.14, 7.16; Perttula 2004: 394, 405; Kornfeld et al. 2010: 131).

Sedentary farmers construct substantial houses. Circular floor plans increasingly replace rectangular or square designs. Some full-time bison hunters maintain villages where they are seasonally sedentary. Stone rings mark the use of tipi-like structures. Particularly among farming groups, structures are much less often strung out across the landscape. In some cases, houses occur in small clusters near one another, but not uncommonly villages are quite large (Drass 1998: 440, 443; Johnson 1998: 318; Gunnerson 2001: 240; Vehik 2001: 156-7; Wood 2001: 194; Perttula 2004: 393, 395, 399; Kornfeld et al. 2010: 401).

Farmers have many storage pits. They are larger and more numerous than earlier. This reflects increased dependence on maize farming – both for subsistence and trade. Storage facilities are smaller and fewer among bison hunting and foraging peoples (Drass 1998: 440, 443; Gunnerson 2001: 240; Henning 2001: 229; Vehik 2001: 156; Wood 2001: 188; Perttula 2004: 395, 398).

Mound construction to elevate temples and elite residences as well as for burial of elites declines in the Caddoan tradition. Mound construction is rare elsewhere on the Plains. It is unclear how Plains Village, Coalescent, Oneota, and Middle Missouri tradition farmers dispose of their dead. Complexes associated with forager and bison hunter adaptations also yield no evidence of a planned burial program. The lack of burials suggests the use of exposure (Johnson 1998: 319; Henning 2001: 230; Wood 2001: 188; Perttula 2004: 393-6, 400-4). Changes in Plains mortuary practices from interment in earth to exposure above ground culminate in this period. The ideological changes behind this are not understood.

The lack of burials results in much less information on health. Caddoan tradition health conditions overall are good. The northwestern Plains' caries rate is low and probably a result of increased meat eating. Northwestern Plains' skeletal evidence indicates increasing violence against women as bison hunting increases. The logic is that hunting is primarily a male activity. The more it contributes to the economy, the less the value of female labor. The less women are valued, the greater the incidence of violence against them (Johnson 1998: 329; Perttula 2004: 393-4, 405; Gill 2010: 546-9).

Evidence for conflict is extensive. Fortifications exist on both the southern and northern Plains, but not all sites are fortified. Abandonment of some locations and coalescence in others very likely are defensive (Johnson 1998: 318;

Vehik 2001: 156-7; Wood 2001: 188). Causes include those mentioned for Late Prehistoric II. Warfare is potentially so intense that people of some cultural complexes may make no genetic contribution to later groups (Steinacher & Carlson 1998: 259).

Trade increases (Vehik & Baugh 1994: 261-4). Possibly this is to temper warfare. Other possibilities include intensifying relationships in order to mitigate risks of food insufficiency, creating mutualistic partnerships for the exchange of bison and corn, forming a world system centered on the Southwest, and intensifying political complexity (Vehik 2002; Perttula 2004: 406).

Coalescence of once independent social groups, intensifying conflict, and increasing subsistence specialization favor increasing sociopolitical complexity among some, but certainly not all, Plains populations. Some Plains Village tradition settings have specialized structures for ritual and political activities. In other Plains Village, Coalescent, and Middle Missouri tradition complexes, larger lodges in central locations provide similar services. Patterned village layouts and sophisticated fortifications imply some degree of sociopolitical complexity. Among Arkansas River Valley members of the Caddoan tradition, political complexity declines (Johnson 1998: 318; Vehik 2002; Wood 2001: 194; Perttula 2004: 401, 406).

Conclusions

The prehistory of Plains peoples is complex. It involves actual movements of people but perhaps more important may be culture-switching within the context of a variety of transformative situations. The ethnic groups recognized in the nineteenth century must be understood as a product of long-term development with especially pronounced changes still ongoing at the time of the European intrusion.

Cross-References

- ▶ Agricultural Practice: Transformation through Time
- ▶ Agriculture: Definition and Overview
- ▶ Animal Paleopathology
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Cahokia
- ▶ Chronological Systems, Establishment of
- ▶ Clovis and Folsom, Indigenous Occupation Prior to
- ▶ Culture in Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Domestication: Definition and Overview
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
- ▶ Fortifications, Archaeology of
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Maize: Origins and Development
- ▶ Monte Verde, Archaeology of
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
- ▶ North American Terminal Pleistocene Extinctions: Current Views
- ▶ Paleoindians
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Peopling of the Americas
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ Squash: Origins and Development
- ▶ Woodland and Mississippian Cultures of the North American Heartland
- ▶ World-Systems Analysis

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North American Rock Art

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Introduction and Definition

Rock art is a landscape art: images created on natural rock surfaces, such as cave walls and ceilings, cliff and boulder faces, and the natural ground surface. North America, especially western North America, has a very rich record of rock art. This includes rock paintings and drawings (pictographs; Fig. 1); peckings, incisings, and scratchings (engravings or petroglyphs; Fig. 2); and intaglios and rock alignments (earth figures or geoglyphs; Fig. 3). Although contemporary and historical Euro-Americans have sometimes created graffiti of various kinds on the landscape, rock art in this discussion is limited to imagery created by Native Americans.

Description

The earliest North America immigrants are assumed to have brought rock art production with them from Siberia. Though the age of this initial colonization is still uncertain, it is thought to have occurred c. 15,000 Years Before Present (YBP) or earlier, with the ultimate antiquity of North American art as yet unknown. Despite this difficulty, growing evidence suggests that rock art was not simply present prior to 10,000 YBP, during the Paleo-Indian period, but that regional traditions had already been established by that time. In the Great Basin and the greater Southwest, a Great Basin Petroglyph Tradition was established by at least 12,000 YBP (Whitley & Dorn 2012; Fig. 4). This is characterized by a wide variety of geometric motifs and figurative images of simple stick-figure humans and bighorn sheep (*Ovis canadensis*). In the northern Plains, Early Hunting Tradition petroglyphs have similar antiquity. They include quadrupeds of various kinds, typically with exaggerated "ball feet," simple humans, nets, and *atlatls*

North American Rock Art, Fig. 1 Pictographs or rock paintings are common in many regions in North America. Although *red*, made from ocher, is the most common color employed, this is an example of a *black* and *white* bichrome painting from the southern Sierra Nevada, California

(spear-throwers; Tratebas 2012). On the southern Plains, the Old Incised Tradition consists of fine-lined incised geometric designs (Loendorf 2012). Created as both rock and mobile art, this also may be 12,000 or more years in age. It is likely that other early regional traditions existed but have not yet been identified, including early painted art (as has been found in South America).

Subsequent rock art illustrates two widespread (but not universal) temporal trends: increasing regionalization and/or greater artistic elaboration and augmentation over time. By roughly 7,000 YBP (the Middle Archaic), regional patterns that existed during the historical period began to develop. These approximately follow ethnographic "culture areas" (Fig. 5), as described by anthropologists, signaling the fact that the historical cultural distributions themselves have relatively great time depth.

The Great Basin Petroglyph Tradition, widespread across the west during the early Holocene, retracted over time, ultimately being primarily restricted in a core area consisting of the Great Basin physiographic region. Although the tradition thus has great time depth, change is visible in increasing artistic elaboration (e.g., complex "patterned body" anthropomorphs in addition to stick figures) over time, as well as by the development of localized variants with their

North American Rock Art, Fig. 2 Petroglyphs or rock engravings are found throughout North America but are especially common in the desert regions where dark rock varnish coatings provide a distinct contrast with the lighter, underlying heart rock. These examples are from the Coso Range, California

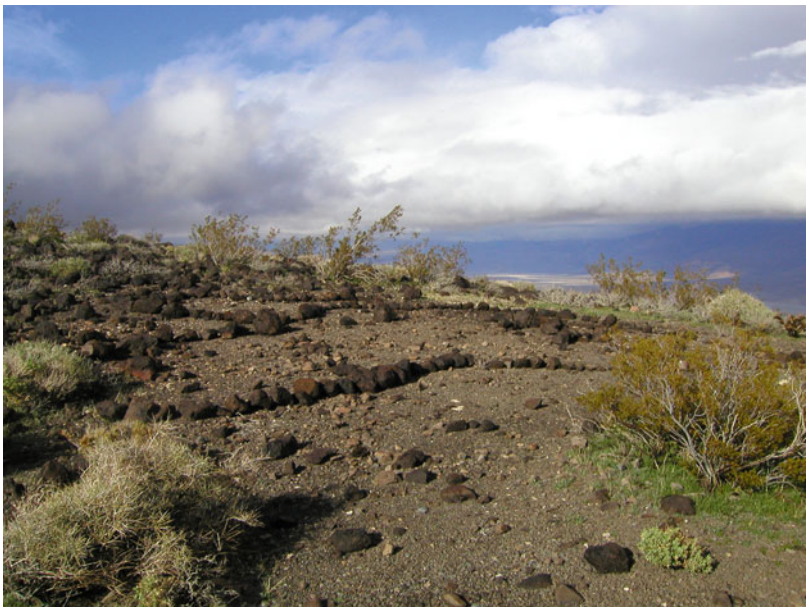

North American Rock Art, Fig. 3 Geoglyphs or earth figures include rock alignments and intaglios (which are scraped into a desert pavement). This example of an alignment is from the Slate Range in eastern California

North American Rock Art, Fig. 4 Bighorn sheep petroglyphs from the Coso Range, California, have been chronometrically dated to as early as 11,200 YBP. These early motifs are heavily revarnished, as shown by these examples from an early Coso site

own specific stylistic and motif emphases (Whitley et al. 1999). An increase in rock art production also appears to have occurred during the last few thousand years, with the tradition continuing into the historical period.

A distinct California Tradition developed in southwestern California by or shortly after the Middle to Late Archaic (by 3,000–4,000 YBP) and continued into the historical period (post-230 YBP; Whitley 2000). This primarily consists of pictographs, the majority of which are simple monochrome geometrics and stick-figure humans, lizards, snakes, and other animals. In certain regions, particularly in the Chumash area around Santa Barbara and in the southern Sierra Nevada, bichrome and

North American Rock Art, Fig. 5 North American rock art is best discussed in terms of nine ethnographic culture areas, as shown here

polychrome paintings were created. Some of this art is quite elaborate if not psychedelic in appearance.

The Northwest Coast Petroglyph Tradition, like the renowned wood carvings and sculptures from this region, is highly conventionalized with a strong iconographic coherence (Keyser & Poetschat 2012). Sites are commonly located on boulders on the coast, at or near the tide line, in proximity to villages at the mouths of salmon-spawning streams. Motifs emphasize schematized human faces/masks, along with a variety of geometric forms and zoomorphs, such as bears, birds, fish, and sea mammals. The earliest of these sites appear to date to approximately 4,000–2,000 YBP, with the motifs becoming increasingly conventionalized after that date. The tradition continued into the historical period.

Arctic rock art is rare, consisting of sporadic pictograph and petroglyph sites (Stevens 1974). Motifs are similar to those found in the Northwest Coast Petroglyph Tradition, but lack the conventionalization typical of that adjoining region, and cannot be said to constitute either a recognizable style or tradition. The petroglyphs are believed to date from roughly 1,200 YBP but may be earlier.

The Columbia Plateau Tradition includes pictographs and petroglyphs sharing widespread thematic consistency, despite a series of regional stylistic variants (Keyser 1992). The tradition is predominated by simple stick-figure humans, block-bodied animals, rayed arcs, tally marks, "sun" symbols, and other geometric motifs, but the hallmark consists of one or (often) two stick-figure humans standing under rayed arcs. The discovery of both pictograph and petroglyphs panels buried by datable volcanic ash indicates that Plateau rock art began before 7,000 YBP, possibly much earlier. More elaborate stylistic variants of the tradition developed regionally after about 1,500 YBP, and Plateau rock art continued to be created in contemporary times.

Whereas the rock art traditions described above were created by hunter-gatherers or hunter-gatherer-fishers, the rock art of the Southwest was partly produced by settled farmers, following the development of agriculture approximately 2,000 years ago (Schaafsma 1980; Bostwick 2002). One result is a complicated rock art record, reflecting the large series of cultures in this large area. At least five regional styles were present in the Southwest by the Early to Middle Archaic (if not earlier), including a southeastward extension of the Great Basin Tradition, discussed previously. This Archaic/hunter-gatherer substrate includes both pictograph and petroglyphs. Although not universally present, one characteristic of these early traditions is large anthropomorphs (Fig. 6), many of which are elaborately and/or flamboyantly rendered.

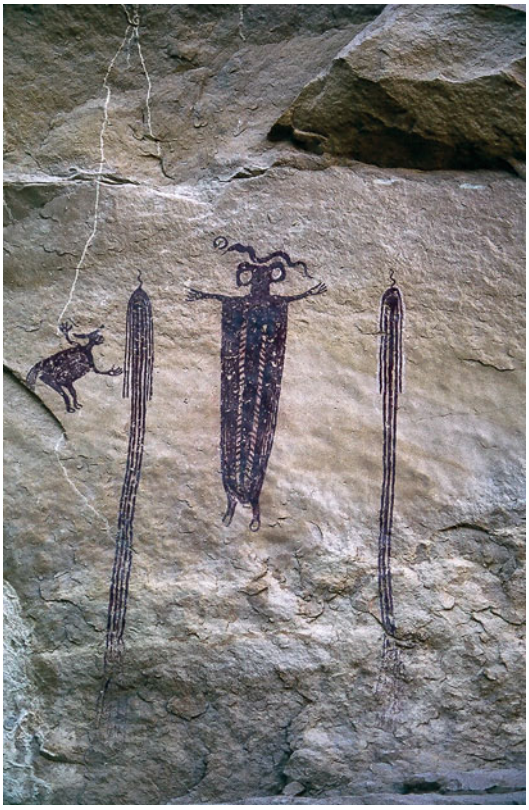

North American Rock Art, Fig. 6 The Archaic hunter-gatherer substrate of the American Southwest is notable for large anthropomorphic pictographs found in Utah. This example is from the Head of Sinbad site

A great proliferation of Southwestern styles occurred after about 2,000 YBP, during the Puebloan and Hohokam period, with the development of local farming cultures and

North American Rock Art, Fig. 7 The Puebloan farmers of the American Southwest created rock art in a number of contexts, including a ritual salt pilgrimage, where they engraved their clan symbols at the sacred site of Willow Springs. Shown here are bear clan symbols

probably reflecting the appearance of priestly religions and cults (Fig. 7). Pictographs and petroglyphs are again present, with the motifs typically (though not invariably) consisting of relatively simple and regionally conventionalized images. Certain of these styles retracted geographically or disappeared c. 700 YBP, following the Puebloan collapse. The incursion of hunter-gatherers and pastoralists after that event added another layer of complexity to Southwestern rock art, with the appearance of a series of new tribal styles, sometimes with wide geographical extent.

Great Plains rock art, like that of the Southwest, is complex and diverse, again reflecting a changing mix of hunter-gatherers, farmers, and, historically, pastoralists – the famous Plains "horse cultures" that developed following the Spanish reintroduction of the equine into the Americas (Keyser & Klassen 2001; Loendorf 2008). Petroglyphs tend to be most common overall, though pictographs predominate in the northwestern Plains, with designs ranging from simple, crudely pecked geometrics to finely rendered polychrome figurative images. Motifs include geometrics, supernatural beings, war exploits, and a wide range of animals, including especially horse, deer, and elk (wapiti).

The Early Hunting Tradition, on the northern Plains, and Old Incised Tradition, in the south, demonstrate that Great Plains rock art was created as early as 12,000 YBP. The Early Hunting Tradition continued until approximately 2,500 YBP, after which a series of more localized styles developed on the northern Plains. The Old Incised Tradition, in contrast, was replaced by the South Plains Archaic Tradition at c. 7,000 YBP. The apparently "pan-tribal" Ceremonial Style developed as an overlay across much of the Plains after about 2,000 YBP. The Biographic Style appeared c. 400 YBP and continued into the historic period. Like the ceremonial art, it was pan-tribal in distribution and is linked to the historical horse cultures. Much of its art is related to raiding and war (Fig. 8), which were endemic in the region during this period.

Petroglyphs are more common than pictographs in the Eastern Woodlands Tradition which, in addition to these two common kinds of rock art, also includes "mud glyphs" (Diaz-Granados & Duncan 2004). These are images that were scraped into the soft-sided walls of dark-zone caves. Birds are the predominant motifs at Eastern Woodlands sites, with the thunderbird serving as the hallmark of the region. This was a large, supernatural being whose flapping wings caused wind and thunder. Other common motifs include anthropomorphs of various types, including faces, geometrics,

North American Rock Art, Fig. 8 Commemorative rock art, made to memorialize war honors and events, is common in the Great Plains. This example is from La Barge Bluffs, Wyoming

animal tracks, various other animals, other supernatural beings, and weaponry. Although some images include significant detail, overall the art is relatively simple and only minimally elaborated. The currently earliest dated Eastern Woodlands art was created about 7,000 YBP, but the tradition is likely more ancient in origin. Most of the art appears to date to the last 2,000 years however, with much of it reflecting the iconography and beliefs of the widespread Southeastern Ceremonial Complex associated with the Mississippian culture.

The Northern Woodlands (or Canadian Shield) Tradition primarily consists of monochrome pictographs, though with a concentration of petroglyphs towards its southeastern extreme. Common motifs include a variety of simple humans, often with upraised arms and with variable body shapes; birds; tracks; snakes, lizards, turtles, and various quadrupeds; "mythological beings"; drums and canoes; and geometrics (Rajnovich 1995). The painted sites are commonly located on vertical or near vertical cliff faces that front lakes or rivers, whereas the incised (and occasional pecked) petroglyphs occur on flat horizontal outcrops. The Northern Woodlands Tradition dates as early as 2,000 years ago, with the tradition continuing into historical times.

Historical Background

Euro-American intellectual interest in North American rock art began with the writings of the Puritan Cotton Mather, at the beginning of the seventeenth century (Whitley 2001). This sets the tone for the first two-and-a-half centuries of occasional rock art study, which was philologically oriented, emphasizing the putative significance of the art in terms of the origins of writing. An ethnographic approach was introduced in the mid-nineteenth century by Henry T. Schoolcraft who, though still interested in philology, recognized the religious origin of much of the art. Garrick Mallery, at the end of that century, provided the first continental synthesis. Like Schoolcraft, Mallery cited then-available ethnographic data and also acknowledged the art's religious significance.

The combination of the early philological interests and the later ethnographic approaches had an important implication for the history of North American rock art research. The study of much of global rock art can be understood historically as an outgrowth of the discovery and acceptance of the antiquity of western European Upper Paleolithic art. One result was the strong influence that European interpretations had on

rock art studies in other regions, particularly hunting magic. North American rock art, in contrast, had its own research tradition prior to the systematic study of the European art. Ironically, the influence of the European hunting magic interpretation on North American rock art interpretation only developed as this explanation was losing favor in that region.

The first "modern" regional synthesis, in the sense of including a systematic data analysis, was provided in 1929 by Julian Steward, an anthropologist who subsequently gained renown for his theory of multilinear evolution and contributions to cultural ecology. Perhaps surprisingly, given his anthropological background, Steward effectively denied any connection between historical tribes and rock art – or maybe this is not surprising in light of his insistence (despite his own evidence) that hunter-gatherer cultures were principally "gastric" in nature. Steward's attitude was perpetuated by many subsequent archaeologists, who accepted on faith the contention that most regional rock art traditions were necessarily prehistoric, not also potentially historical/ethnographic, in age. Perhaps the most influential of these archaeologists were Robert Heizer and Martin Baumhoff (1962) who published a widely read monograph on Great Basin rock art. Among other matters, this introduced hunting magic as the preferred interpretation of hunter-gatherer rock art, at the same time that European Upper Paleolithic archaeologists were rejecting that theory.

Heizer and Baumhoff were, however, traditional cultural-historical archaeologists, and their interest in rock art was not on the agenda of then-developing processual archaeology. A professional rock art research lacuna resulted, with subsequent North American rock art studies, with only occasional exception, the product of amateurs. The most prominent of these was Walt Disney cartoonist Campbell Grant, who championed hunting magic in a prolific, and again influential, series of popular books and articles.

The common processual archaeological dismissal of rock art was ostensibly based on the fact that, at that time, it could not be dated, but the deeper issue was that symbolism and cognition were considered epiphenomenal and, therefore, of little importance in the cultural ecological and materialist paradigm of that period. Significant professional archaeological interest in rock art, accordingly, did not reappear until the late 1970s, promoted by a series of factors. One was then-widespread cultural interests in shamanism and archaeoastronomy and their apparent connections to some hunter-gatherer rock art. Another was renewed attention to ethnographic research, especially in the far west, and the "discovery" of rock art ethnography. Initial attempts at chronometric dating also started at this time. But perhaps the most important variable, in the long-term reemergence of North American rock art research, was the development of heritage management as the primary emphasis of archaeological work. This required the consideration of all aspects of the archaeological record, not just those pertaining to individual research designs, and it involved the consideration of a wide range of heritage values, including specifically art, aesthetics, and, ultimately, Native American religious concerns and issues.

North American rock art research, accordingly, has flourished in the last three decades as the archaeological profession has increasingly reoriented itself towards heritage management. Direct chronometric dating techniques, though sometimes still experimental, have dispelled the contention that the art is entirely undatable. Post-processual archaeology, with its interest in symbolism and interpretation, has provided a theoretical justification for rock art studies. Perhaps most importantly, however, legally mandated Native American involvement with heritage management has pushed sacred sites, including rock art, to the forefront of concern.

Key Issues/Current Debates

As with many global regions, North American archaeology originated when colonialist attitudes about indigenous peoples were prevalent. North American rock art research is no different and, while many archaeologists have moved beyond

the primitivist biases that colonialism engendered, colonialist thought remains the subtext of the most significant current debate in North American rock art research (Whitley & Whitley 2012). This concerns ethnography: whether there is directly relevant rock art ethnography in certain regions; what this ethnography implies about origins, functions, and meanings of the art; and the potential relevance of ethnographic accounts to truly prehistoric rock art corpora. Although seemingly an empirical controversy, the debate is founded on underlying and opposing philosophical positions, with largely unrecognized but significant social implications.

Although commitments on both sides of this debate vary from extreme to moderate, the colonialist position can be generally characterized as denying or downplaying any putative ethnographic data in favor of interpretations based on contemporary western archaeological models and contexts. This partly reflects the belief that a complete or near-complete cultural disjunction exists between the pre- and post-European contact periods. Where ethnographic information is admitted to exist, the statements are considered to be literal and factual comments that can be fully understood in contemporary and rationalist Euro-American intellectual terms. Where such statements make no obvious rationalist sense, in western scientific terms, they are dismissed as evidence of rock art ignorance by indigenous informants, thereby supporting the entirely prehistoric-age interpretation of the art.

The postcolonialist attitude, in contrast, starts with the premise that rock art ethnography may exist in many regions. If found to be present and despite the fact that substantial disruption occurred to indigenous cultures with European contact, specific aspects of these cultures, such as religious beliefs and practices, may not have been entirely destroyed, and precontact indigenous knowledge may have been preserved. Statements of religious belief, from this position, are recognized as inherently counterfactual in nature, with ethnographic data thereby frequently requiring symbolic-metaphoric interpretations, which must be contextualized in terms of relevant indigenous thought systems. Continuity between the ethnographic/historical and more truly prehistoric periods, if any, must be empirically demonstrated on a case-by-case basis, but the passage of time alone is not considered an adequate justification for denying this possibility. (Change occurs over time, but time does not cause change to occur.) Over a century of continuity in ethnographic comments about rock art, in a series of North American regions, has been cited in support of this position and contrasted with the fact that prevailing and opposing, more "purely archaeological" interpretations have consistently changed, on average, every decade.

These two philosophical and methodological positions underpin the current, most visible aspect of North American debate, which concerns the shamanistic interpretation of certain corpora of this art. Some (but not all) North American hunter-gatherer rock art has been interpreted as shamanistic, based on ethnographic and other lines of evidence (including, using independent data and a separate approach to analysis, the neuropsychological model for the forms of the mental imagery of trance; see Lewis-Williams & Dowson 1988). These interpretations have been contested, in some cases vigorously, primarily by simply denying the relevance of the ethnographic data. Alternative explanations have only occasionally been offered in the shamanistic critiques. These commonly emphasize hunting magic. Although there is ethnographic evidence for shamanistic hunting magic rock art in some but not most regions (Keyser & Whitley 2006), the critiques instead follow the colonialist archaeological assumption that dietary concerns were the primary basis for non-Western ritual and belief and that western intellectual models best explain all types of human behavior.

The social implications of these contrasting positions are only occasionally recognized. The colonialist stance reiterates the view that Native Americans do not, and historically did not, have any knowledge of rock art and that the art is therefore necessarily prehistoric, not potentially ethnographic/historical, in age. This effectively separates Native Americans from any direct connection with the archaeological record and serves to strip them of their patrimony. This last fact has particularly important consequences now

that Native American tribes have been awarded legal rights to aspects of the archaeological record and are actively attempting to reestablish their claim to their patrimony and heritage. The postcolonialist opinion holds that there is a direct link between contemporary Native Americans and at least the recent prehistoric past. Based on widespread ethnographic evidence, it emphasizes the sacred nature of rock art sites and acknowledges their importance in terms of social memory, education, and self-identity for tribal peoples. Postcolonial rock art research has served as an effective bridge between archaeologists and Native Americans, whereas the colonialist agenda perpetuates the divide and antagonism that has traditionally existed in North America between the two parties.

Other key current research topics include the gender implications of rock art; the widespread, unusual acoustical properties of many rock art sites; the relationship of rock art sites to the landscape, in both symbolic and adaptive terms; chronometric dating, including the dating of the earliest art; and site management and conservation techniques and approaches. Because of Native American's increasing participation in heritage management, including the prioritization of their heritage values during the planning for site management, research on management and conservation techniques is likely to increase in the future.

International Perspectives

The divergent history of North American rock art research, relative to the remainder of the western (and especially Anglophone) world, initially sets it apart from global research trends. This isolation has continued, to a certain degree, with international practices and interests having only limited impact, although there are two important exceptions to this generalization. The first concerns shamanistic interpretations of hunter-gatherer rock art. Despite debate, ethnographically based shamanistic interpretations of North American rock art had been suggested at least since Mallery in the nineteenth century, and they are currently advocated for specific American regions and corpora by a number of archaeologists. David Lewis-Williams' (e.g., 2012) shamanistic research on South African San (Bushman) rock art has, accordingly, resonated with North American researchers, with a significant methodological and philosophical impact on them, especially concerning the use of ethnographic data. His parallel development of the neuropsychological model for the mental imagery of trance has likewise been influential analytically, though in fact it was inspired by slightly earlier work on Chumash rock art in southern California by Thomas Blackburn. Similarities in the kinds of ethnographic and prehistoric cultures present, and the types of data available for analysis, helped create a natural research bridge between these two geographically distant regions. Furthermore, the emphasis on the origin and meaning of rock art in both of these regions sets them slightly apart from hunter-gatherer rock art research in some other parts of the world, notably Australia, where the primary concern typically is the implications of the art for social processes rather than its symbolism and religious significance.

The second area of research in which North Americanists have heavily participated is rock art chronometrics. In this case, the specialized kinds of expertise and equipment needed to conduct these studies necessarily require international collaboration, with Americanists participating fully in this regard. Although much remains to be done, the first steps towards a chronometric understanding of worldwide rock art have occurred, and North American researchers have played a key role in this regard, both in terms of establishing regional North American chronologies and in the development of the techniques to date rock art globally.

More than research history serves to separate North American rock art studies from international ones, however, specifically with reference to one of the most widely studied problems in archaeology. This is the initial appearance of art and its implications for the beginnings of behavioral-cognitive modernity. There is a consensus that art and modernity developed long before the Americas were colonized, despite

the fact that we are still not certain when that event occurred. Regardless of specific date, it seems unlikely that North American research can directly contribute to this central archaeological issue.

Future Directions

North American rock art, despite substantial research and management advances in the last few decades, confronts a series of daunting challenges. The amount of rock art, especially in the west, is quite high: over 1,500 sites are known in California alone, for example, with similar numbers in surrounding states. But very few sites have been fully documented or carefully researched, let alone published. At the most basic level, there is still a substantial amount of foundational work that must be completed before the full range and variability of the continental record is known and before regional rock art chronologies are adequately understood. Fewer still of these sites have been subjected to proper condition assessments; hence, the relative preservational status of North American rock art, including the potential for its long-term sustainability, is all but unknown in any general sense. These circumstances suggest an agenda for future North American rock art research and management. This would include, first, a substantial program of systematic data collection. The recent proliferation of digital recording equipment and techniques, which have increased the accuracy of documentation, facilitated data storage and manipulation, and dramatically improved fieldwork efficiency, enhances but does not guarantee the possibility of achieving this goal.

Continued chronometric research is also seriously needed, second, both in terms of technique development and improvement, and empirical applications. Although some locales have at least preliminary chronometric sequences, such as the Great Basin, Lower Pecos, and northern Plains, almost no chronometric dating has occurred in others (e.g., the Columbia Plateau). Yet this kind of information is crucial not simply to understand the art but also to better integrate it into regional cultural-historical sequences.

Professional site management (including conservation) approaches and applications need to be applied, third, not simply on an ad hoc site-by-site basis, as has occurred to this point, but regionally and collectively. These include professional site documentation, condition assessments, and management plans. Absent these kinds of programs and information, applied on a regional scale, site management will consist of little more than putting out forest fires, thereby remaining cost ineffective and, potentially, futile in terms of the larger resource base. Like the other items on this list, this is a massive and difficult goal to achieve. But the recent development of rapid, quantitative approaches to site condition assessment (Dorn et al. 2008) makes this at least possible, though, again, far from guaranteeing completion.

The future of North American rock art, from this perspective, can be seen optimistically. We now have the tools and abilities to obtain a better understanding of this art and ensure its long-term preservation. But it will be up to this and future generations of the archaeological community to see that the appropriate steps are implemented to fulfill this agenda.

Cross-References

- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lewis-Williams, James David
- ▶ Rock Art, Forms of
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

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North American Terminal Pleistocene Extinctions: Current Views

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Introduction

The end of the Pleistocene in North America witnessed the extinction of a remarkable array of large mammals, encompassing at least 32 genera of megafauna (animals > 44 kg) and another 4 genera of smaller mammals (Table 1). The majority of extinct genera ($n = 30$), including mammoths and mastodons, saber-toothed cats, and giant ground sloths, became globally extinct at this time, whereas a handful ($n = 6$) disappeared from North America while continuing to survive elsewhere. Altogether, more than 70 % of North America's megafaunal genera disappeared (Barnosky et al. 2004). In addition to extinctions at the generic level, several megafaunal species with surviving North American congeners also disappeared near the end of the Pleistocene, including the dire wolf (*Canis dirus*), the American lion (*Panthera atrox*), Harrington's mountain goat (*Oreamnos harringtoni*), and the beautiful armadillo (*Dasypus bellus*).

North American Terminal Pleistocene Extinctions: Current Views, Table 1 Extinct late Pleistocene mammals of North America

Order	Family	Genus	Common name
Cingulata	Pampatheriidae	*Pampatherium*	Southern pampathere
		Holmesina	Northern pampathere
	Glyptodontidae	*Glyptotherium*	Simpson's glyptodont
Pilosa	Megalonychidae	*Megalonyx*	Jefferson's ground sloth
	Megatheriidae	*Eremotherium*	Rusconi's ground sloth
		Nothrotheriops	Shasta ground sloth
	Mylodontidae	*Paramylodon*	Harlan's ground sloth
Carnivore	Mustelidae	*Brachyprotoma*	Short-faced skunk
	Canidae	*Cuon*[a]	Dhole
	Ursidae	*Tremarctos*[a]	Florida cave bear
		Arctodus	Giant short-faced bear
	Felidae	*Smilodon*	Sabertooth
		Homotherium	Scimitar cat
		Miracinonyx	American cheetah
Rodentia	Castoridae	*Castoroides*	Giant beaver
	Caviidae	*Hydrochoerus*[a]	Holmes' capybara
		Neochoerus	Pinckney's capybara
Lagomorpha	Leporidae	*Aztlanolagus*	Aztlan rabbit
Perissodactyla	Equidae	*Equus*[a]	Horses
	Tapiridae	*Tapirus*[a]	Tapirs
Artiodactyla	Tayassuidae	*Mylohyus*	Long-nosed peccary
		Platygonus	Flat-headed peccary
	Camelidae	*Camelops*	Yesterday's camel
		Hemiauchenia	Large-headed llama
		Palaeolama	Stout-legged llama
	Cervidae	*Navahoceros*	Mountain deer
		Cervalces	Elk-moose
	Antilocapridae	*Capromeryx*	Diminutive pronghorn
		Tetrameryx	Shuler's pronghorn
		Stockoceros	Pronghorns
	Bovidae	*Saiga*[a]	Saiga
		Euceratherium	Shrub ox
		Bootherium	Harlan's muskox
Proboscidea	Gomphotheriidae	*Cuvieronius*	Cuvier's gomphothere
	Mammutidae	*Mammut*	American mastodon
	Elephantidae	*Mammuthus*	Mammoths

[a]Genus survives outside North America

North America's late Pleistocene extinctions are not only remarkable in terms of the diversity of animals to disappear but they are also noteworthy in that the extinctions primarily affected the larger species (Koch & Barnosky 2006). While it is true that some of the extinct mammals were small in size, such as the Aztlan rabbit (*Aztlanolagus agilis*, ~2 kg) and the diminutive pronghorn *Capromeryx minor* (~10 kg), the majority ranged in size from large to massive. For example, the giant beaver *Castoroides ohioensis* weighed up to 100 kg (compared to ~20 kg in its living relatives) and the giant ground sloth *Eremotherium*, weighing in at ~3,500 kg, was

comparable in mass to an African elephant (*Loxodonta africana*). All North American mammal species larger than 1,000 kg disappeared, as did more than half of those between 32 and 1,000 kg (Koch & Barnosky 2006).

Of the 36 genera to disappear during the late Pleistocene, the last appearances of 16 are securely dated to between 12,000 and 10,000 radiocarbon years ago (all dates discussed here are in radiocarbon years) (Grayson 2007; Faith & Surovell 2009), a time period referred to here as the terminal Pleistocene. The remaining taxa are quite rare in the fossil record, and most lack reliable last appearance dates altogether, hindering the establishment of a comprehensive extinction chronology. However, statistical analyses of the chronology suggest that all genera may have disappeared during the terminal Pleistocene (Faith & Surovell 2009). The clustering of extinctions at this time coincides with a period of dramatic climate change, which caused massive shifts in the composition and distribution of plant and animal communities, and with the arrival of Clovis hunter-gatherers in North America, which until recently has been considered the earliest secure evidence of people on the continent. These temporal associations play an important role in attempts to explain the extinctions.

Definition

Why did North America's Pleistocene megafauna disappear? For decades archaeologists, paleontologists, and a range of Quaternary scientists have tried to account for the extinctions. Stemming from their chronological correlations with the extinctions, there are two dominant explanations for the losses: climate change and human predation. Understanding their role in the extinctions has been the subject of intense debate that continues today.

Historical Background

Nineteenth-Century Explanations

The historic roots of scientific enquiry into the problem of North America's late Pleistocene extinctions have been traced in great detail by Grayson (1984). The following discussion draws heavily from his work.

Although it is now accepted as fact that extinctions occurred in the past as they do today, the recognition that species could become extinct emerged only during the late eighteenth century. Prior to then, naturalists studying the history of life found the possibility of extinction both unlikely and a direct challenge to the presumed divinity of creation. However, at the very end of the 1700s, owing largely to the work of French naturalist Georges Cuvier, a growing body of fossil evidence demonstrated without question that extinct animals lacking living representatives once inhabited the earth.

With the reality of extinction clearly demonstrated, it did not take long for naturalists to become aware of the magnitude of extinctions in North America. By 1825, ten extinct North American mammals were recognized, including two species of giant ground sloth (*Megalonyx* and *Eremotherium*), two proboscideans (*Mammuthus* and *Mammut*), and several artiodactyls (e.g., *Bootherium* and *Cervalces*), among others. Many naturalists working on the topic, including Charles Darwin, reacted to the growing awareness of the magnitude of North America's extinctions with utter astonishment.

The mounting evidence for massive extinctions in North America and elsewhere posed a scientific problem that demanded explanation. Stemming from the presumption that the extinction of Pleistocene mammals occurred suddenly, extinction scenarios forwarded in the early 1800s included rapid and catastrophic geological change of a sort never before observed in modern times (e.g., global glaciation, flooding on a biblical scale). These catastrophist explanations were rejected by uniformitarians, most notably British geologist Charles Lyell, who, believing the extinctions to have occurred over an extended period of time, argued that slow, natural changes across the surface of the earth were to blame. Although the precise nature of such changes was rarely made explicit, possible mechanisms include gradual changes in the physical environment, such as climate, seasonality, or habitat structure.

Arguments that humans played a role in prehistoric extinctions were initially formulated in the late eighteenth century and became increasingly popular through the 1800s. Prior to the 1850s, however, a crucial stumbling block was that evidence for the contemporaneity of people with extinct megafauna was lacking. At the time, the antiquity of humanity had yet to be established, and most naturalists, including Cuvier and Lyell, believed that the emergence of people postdated the extinct Pleistocene mammals. This perspective changed during the 1850s, when archaeological research in France and England provided unequivocal stratigraphic evidence that people and extinct Pleistocene megafauna coexisted. For Lyell, who had long recognized the potential impact of humans on modern plant and animal communities, an anthropogenic role in the extinctions seemed the most powerful explanation. Many of his contemporary naturalists soon followed suit, suggesting that humans were solely, or at least partially, responsible for past extinctions on a global scale.

Emergence of the Contemporary Debate

Although the scientific context within which the debate takes place has changed significantly, many contemporary explanations for the extinctions are rooted in those that emerged in the nineteenth century, focusing primarily on the extent to which people or external physical change (e.g., climate change) contributed to the extinctions.

One of the more important factors in the emergence of the modern extinctions debate was the advent of radiocarbon dating. Before then, those interested in the matter could only speculate as to when the extinctions took place, posing obvious challenges when attempting to relate the losses to causal mechanisms. Even with the availability of radiocarbon dating, however, establishing a reliable chronology proved challenging in the past and continues to do so in the present. For example, early attempts (1957–1960) to establish an extinction chronology for North America's megafauna led to the conclusion that the extinctions were Holocene in age, with many species disappearing around 8,000 years ago, but some surviving until as recently as 2,000 years ago. Such a chronology would be rejected out of hand today.

Making use of the growing list of radiocarbon dates for extinct megafauna, in 1967, Paul Martin published one of the most influential analyses of the extinctions (Martin 1967). Noting that carefully excavated and well-dated Holocene archaeological sites consistently lacked remains of extinct megafauna, Martin truncated the extinction chronology and suggested that the main wave of extinctions occurred around 11,000 years ago. This corresponded precisely with emerging dates for Clovis archaeological sites, which at the time represented the earliest evidence for the peopling of the Americas. As discussed below, Martin believed that this temporal correlation was not coincidental.

Martin (1967) was impressed by the fact that most of the animals lost in North America were large herbivores or the carnivores and scavengers that were ecologically dependent on those herbivores. Large herbivores were potentially attractive prey to Clovis hunters, a premise supported at the time by archaeological associations between Clovis points and mammoth remains. Martin was also struck by the fact that the late Pleistocene extinctions differed from those documented earlier in the Cenozoic in that (1) the ecological niches of extinct forms were not replaced by new or closely related species and (2) there was no appreciable extinctions in the small mammals, reptiles, amphibians, or plants. These factors set the late Pleistocene extinctions apart from presumably climatically driven losses earlier in time. Perhaps most intriguing, not only did human colonization correspond with extinction of the megafauna in North America but a parallel correlation between human colonization and the loss of megafauna also seemed apparent elsewhere (e.g., Australia, New Zealand, and South America). To Martin, the only mechanism capable of accounting for this was human predation. Today, this argument is widely known as the "overkill hypothesis."

Over the years, Martin (1984) refined the details of Pleistocene overkill in North America. He hypothesized that around 11,500 years ago, Clovis hunters entered the continent through an ice-free corridor east of the Canadian Rockies and encountered an abundance of large prey that

were naïve to human predators (i.e., lacking adequate defense behaviors). With such an abundant supply of easily captured prey, Clovis hunters rapidly multiplied and spread across the continent. In doing so, they devastated North America's large mammal community and brought about the extinction of the megafauna in a geological instant. This rapid extinction is referred to as the "blitzkrieg" model. To support the plausibility of blitzkrieg, Martin cites evidence for the ecological devastation and extinctions wrought by humans following the colonization of islands and extrapolates these data to the continental scale.

Although the inferred 11,000 BP extinction wave overlaps with the appearance of Clovis in North America, the end of the Pleistocene is also characterized by dramatic environmental change. Many Quaternary scientists attempted to incorporate such change into explanations for the extinctions. Stemming from observations made in the 1960s that late Pleistocene biotic communities often contained a mixture of northern and southern species – referred to as disharmonious or non-analog associations – it was suggested that late Pleistocene climates were more equable than those of the Holocene (i.e., less extreme seasonal fluctuations). In short, warmer winters allowed southern forms to expand north and cooler summers allowed northern forms to expand south. In the same year that Martin formulated the overkill hypothesis, Axelrod and Slaughter independently applied this concept to the problem of the extinctions, arguing that increased seasonality at the onset of the Holocene was to blame for the losses.

Since then, numerous additional climatic explanations have been developed to account for the loss of North America's megafauna. Among the more widely cited explanations are those of Graham and Lundelius (1984) and Guthrie (1984). Graham and Lundelius' (1984) coevolutionary disequilibrium hypothesis argues that as climates became less equable at the onset of the Holocene, changes in vegetation structure caused coevolved mammal communities to disassemble, disrupting ecological relationships between plants and animals. For large herbivores, the outcome was reduced niche differentiation and heightened competition for forage, ultimately leading to the extinction of species less adapted to the novel plant communities. Guthrie (1984) proposes that a long and varied growing season during the Pleistocene promoted a diverse, spatially complex vegetation mosaic capable of supporting a wide range of large herbivores. A possible transition to shorter and less varied growing seasons at the onset of the Holocene increased zonation in the plant communities and decreased the quantity and quality of forage available to large herbivores, with extinction following. A more recent, but related, hypothesis argues that rising atmospheric CO_2 concentrations near the end of the Pleistocene lowered plant nutrient content, initiating a series of feedback mechanisms that caused megafaunal populations to crash (Faith 2011).

Key Issues and Current Debates

The debate over the cause of North America's megafaunal extinctions is far from resolved today. Although each scenario advanced to explain the losses has its strengths, one does not have to look far to find weaknesses. Some of the major issues that routinely emerge in the debate are highlighted below.

Pleistocene Overkill

Archaeological Evidence

The fiercest criticism of overkill comes from archaeologists who see little empirical evidence for it. The overkill hypothesis proposes that Clovis people hunted massive quantities of now-extinct megafauna on a continental scale. However, among the 36 genera of large mammals to disappear near the end of the Pleistocene, kill sites have been confidently documented only for mammoth, mastodon, and camel. For the remaining genera of extinct mammals, there is no evidence of human predation whatsoever, causing many to doubt the fundamental premise of overkill.

Martin (1984) responded to this argument by suggesting that the North American extinctions occurred so rapidly in geological time that archaeological evidence of overkill should be

very difficult to come by. At the same time, however, proponents of the overkill hypothesis, including Martin, cite the abundance of kill sites for moas in New Zealand as evidence that human predation drove the extinction of these large flightless birds. This contradiction that overkill can lead either to an abundance or scarcity of evidence poses a serious logical challenge to the hypothesis. This challenge appears to have been met in an upcoming paper by Surovell and Grund (2012), who argue that the archaeological signature of overkill can be very different (i.e., many or few kill sites) depending on the temporal depth of the extinctions, human demographics, and taphonomic bias. For now, only time will tell whether the absence of evidence for hunting of extinct North American megafauna is truly evidence of its absence.

Island Extinctions

Is it possible that small populations of hunters armed with Stone Age technology could cause massive extinctions on a continental scale? Among supporters of the overkill hypothesis, the answer is unquestionably yes. To establish that catastrophic anthropogenic extinctions are not only feasible but have happened numerous times in human prehistory, Martin draws upon evidence from island settings. Across the islands of the world, there is unquestionable evidence that extinctions rapidly followed in the footsteps of human colonists. The apparent synchrony between island colonization and extinctions, together with colonization of the Americas and extinctions, contributes to an appealing, albeit disheartening, argument – wherever people went in prehistory, extinctions followed.

The logic behind connecting what happened on islands to what happened on continents has been challenged repeatedly in the literature (e.g., Grayson 2011). Namely, it is well established that island populations are vulnerable to extinction because of their small population size, clearly delineated and often small habitable landmass, and lack of source populations from elsewhere. These factors are not in play at the continental scale. In addition, extinctions on islands are often the result of a combination of factors, including human predation, introduction of alien species (e.g., dogs, pigs, rats), and vegetation change. In no case is it clear that hunting alone drove island extinctions, as required by overkill. In short, the fact that people contributed to island extinctions is largely irrelevant to what happened in North America.

Colonization of the Americas

At the time of the formulation of the overkill hypothesis, Clovis archaeological sites, typically dated to between 11,570 and 10,900 radiocarbon years ago (Meltzer 2004), represented the earliest evidence of people in the Americas. The apparent synchrony between colonization and extinctions supported the rationale behind overkill, especially considering the parallel – although debatable – correlation between island colonization and extinctions. However, there is now compelling evidence that the Americas were colonized well before Clovis. At Monte Verde in southern Chile, some 16,000 km south of the Bering land bridge connecting Asia to North America, there is spectacularly preserved evidence for a pre-Clovis presence in the Americas dating to 12,500 radiocarbon years ago (Dillehay 1997). Moving further north, the Paisley Caves in Oregon provide the oldest evidence for humans in North America, based on human coprolites dated to between 12,260 and 12,400 years ago (Gilbert et al. 2008). There is even evidence that people hunted mastodon prior to Clovis, as indicated by the Manis mastodon from Washington, which dates to 11,960 radiocarbon years ago and was found to have a bone projectile point embedded in its rib (Waters et al. 2011).

It is now clear that people were present in the Americas well before Clovis and that they overlapped with and hunted some of the megafauna for upwards of 2,000 years. Given the difficulties in detecting the earliest people or the latest megafauna in North America, this temporal overlap is likely to increase with future field work. This protracted overlap falsifies the strict blitzkrieg model of the extinctions and raises questions concerning the supposed rapidity with which humans are said to have exterminated the megafauna. However, it is impossible to say how

much overlap is "too much" to accommodate within an overkill scenario, and there is little reason why humans could not have contributed to the extinctions over extended periods of time.

Extinction Chronology

In order for humans to have hunted North America's Pleistocene megafauna to extinction, those megafauna had to have been present when humans arrived. Of the 36 mammal genera involved, however, only 16 can be shown to have survived to the time of human arrival on the continent (Grayson 2007; Faith & Surovell 2009). Thus, the reason archaeologists have failed to provide substantial evidence for human predation on extinct megafauna could be because the potential prey became extinct long before humans arrived on the scene. For example, there is no evidence that *Aztlanolagus* or *Eremotherium* survived the Last Glacial Maximum.

The possibility of extinctions prior to the terminal Pleistocene poses an obvious problem for the overkill hypothesis. However, those taxa missing from the terminal Pleistocene tend to be poorly represented in the fossil record. This raises the possibility that insufficient sampling is responsible for their absence from the terminal Pleistocene, in which case overkill remains viable. A statistical examination of the radiocarbon chronology of extinctions suggests that this is likely the case (Faith & Surovell 2009). Nevertheless, overkill critics argue that even if this is true, it remains possible that the megafauna had begun to decline long before then (Grayson 2011). For example, experts in the paleobiology of the giant ground sloth *Eremotherium* believe that plummeting winter temperatures at the onset of the Last Glacial Maximum caused its range to contract southward to the point where it was extirpated from North America (McDonald & Lundelius 2009). This is consistent with its fossil history and implies that *Eremotherium* was absent from North America long before it was colonized (the latest *Eremotherium* survived in South America).

The Broader Picture

Although the extinction of the megafauna at the end of the Pleistocene is astounding in its scope, the story does not end there. At the same time that extinctions were taking place, both small mammals and plants were undergoing substantial range shifts. Even a species of spruce tree (*Picea critchfieldii*), which was abundant and widespread in the Lower Mississippi Valley during the Last Glacial Maximum, did not survive the end of the Pleistocene. These changes cannot be explained by human activities but are attributed without issue to climate change. In addition, at least 19 genera of birds disappeared during the late Pleistocene. Some of these, including the massive *Teratornis*, were scavengers whose extinctions were likely tied to the loss of the megafauna. However, others include flamingoes, shelducks, and jays. Their disappearance at the end of the Pleistocene is more difficult to attribute, directly or indirectly, to human predators.

Multiple lines of evidence indicate that the end of the Pleistocene was a tumultuous time for North America's plant and animal communities. At least some of these changes, but perhaps all, cannot be accounted for by people. This simplicity appeals to critics of overkill, since only climate change is capable of explaining the entire suite of biotic changes observed at the end of the Pleistocene. As discussed below, however, climatic arguments are not without their own set of problems.

Climate Change

Although there is good reason to doubt that people played a role in the extinctions, even outspoken critics of the overkill hypothesis readily admit that compelling climatic explanations are lacking (e.g., Grayson 2011). There are many reasons for this, although the simplest is that none have explicitly linked climatic variables to the paleoecology of extinct species, such as dietary habits, habitat preferences, and geographic range, in any persuasive manner. There are several other problems that plague attempts to explain the extinctions by climatic mechanisms, briefly discussed below.

Previous Climate Change

There is no question that the end of the Pleistocene was a time of dramatic climate change on a global scale, with profound impacts on the plant and

animal communities of North America. However, dramatic climate changes occurred repeatedly during glacial/interglacial cycles throughout the Quaternary. Yet in North America, massive extinctions are observed only at the end of the Pleistocene. There is no evidence that the magnitude or rapidity of change at this time was any more extreme than during earlier glacial/interglacial cycles, causing many to doubt that climate change adequately explains the extinctions (Barnosky et al. 2004; Koch & Barnosky 2006). For climate change to remain a viable explanation, it must be demonstrated that climate change at the end of the Pleistocene was somehow unique.

Supporters of climatic explanations note that our understanding of the magnitude and rapidity of climate changes during previous glacial/interglacial cycles is based primarily on isotopic evidence from deep sea or ice cores. Although these data provide insight into global temperatures and continental ice volumes, they provide no insight into variables that may be relevant to the extinctions, including vegetational complexity, seasonality, or duration of the growing season. Of equal importance, global climate records are not a substitute for empirical paleontological and paleobotanical data documenting the response of biotic communities to climate change. In short, scientists do not yet know whether climate change at the end of the Pleistocene was unique or not.

Selectivity of the Extinctions

Compared to earlier episodes of mammal extinctions in North America, the late Pleistocene extinctions are unusual in that the losses disproportionately affected large mammal species. Smaller mammals, which were commonly the victims of climate-driven extinctions earlier in time, fared quite well at the end of the Pleistocene. This pattern lends some support to the argument that people, rather than climate, drove the extinctions, since larger species are presumably preferred prey. Body size alone, however, does not explain the entire situation. Johnson (2002) showed that extinction risk was highest among species with low reproductive rates regardless of body size. Among those species with low reproductive rates that survived, many are arboreal, nocturnal, or prefer to live in densely vegetated habitats. These are precisely the sort of traits that would reduce their possible interaction with human foragers, suggesting that humans did indeed play a role in the extinctions. If climate change alone were to blame for the extinctions, it is very difficult to imagine why it would spare arboreal or nocturnal animals. The selectivity of extinctions has yet to be adequately explained by extinction scenarios relying on climate change.

Empirical Problems

In addition to the issues raised above, some of the more noteworthy attempts to explain the extinctions in terms of climate change (Graham & Lundelius 1984; Guthrie 1984) also suffer from a lack of empirical support. For example, paleobotanical evidence provides no evidence for changes in vegetation complexity of the sort proposed by Guthrie (1984). Likewise, several lines of evidence suggest that late Pleistocene climates were characterized by higher seasonality in both temperature and solar insolation compared to today, in contrast to the predictions of the coevolutionary disequilibrium hypothesis (Graham & Lundelius 1984). While intriguing, these climate hypotheses are not convincing.

International Perspectives

North America was not the only continent to suffer major megafaunal extinctions near the end of the Pleistocene. Across the continents, more than 90 genera of megafauna disappeared within the last 100,000 years or so (Barnosky et al. 2004; Koch & Barnosky 2006). The international perspective on North America's losses is largely colored by debates over the cause of extinctions elsewhere. The case of Australia, which in many ways parallels the North American debate, provides an excellent example.

Many of the empirical challenges that hinder resolution of the debate in North America are also evident in the Australian record. Of ~68 extinct Pleistocene species, there are 25 known to have survived to the late Pleistocene (beginning at 130,000 years ago), of which only 15 are known

to overlap with human colonization of the continent ~45,000 years ago. It is unclear whether those species missing from the time of human arrival reflect extinction earlier in time, as argued by advocates of climatic explanations, or instead insufficient sampling of the fossil record, as argued by supporters of anthropogenic extinction scenarios. The empirical evidence for human involvement in the extinctions is particularly weak. Whereas North America has confirmed kill sites for three genera of megafauna, Australia has none. This is interpreted by some as evidence that people had little to do with the losses, whereas others argue that such evidence is neither expected nor necessary. Sweeping climatic explanations have been proposed, although, as is the case for North America, none are particularly compelling as they do not explicitly link climatic variables to the individual species.

Considering the parallel structure of the debate, the Australian perspective on what happened in North America largely depends on one's viewpoint on the Australian losses. Those favoring anthropogenic extinctions in Australia see the losses in North America as part of a global pattern of colonization followed by massive extinctions (Brook et al. 2007). On the other hand, there are many Quaternary scientists who see very little evidence of this in Australia or in North America (Wroe et al. 2006).

Future Directions

Speculation and debate over the cause of North America's megafaunal extinctions has persisted since the problem was recognized in the nineteenth century. Although continued fieldwork and technological advances have improved the quantity and quality of data available since then, the debate is far from resolved today. There is reason to believe that this is largely due to the manner in which hypotheses are framed (Grayson 2007).

Most attempts to explain the loss of North America's Pleistocene megafauna, whether in terms of human activities or climate change, share the following similarities: they try to account for (1) the loss of all species (2) at the same time (3) by the same mechanism. Such blanket explanations ignore the fact that extinction is an evolutionary process that must be understood at the level of individual species and in terms of their ecology, demography, and biogeographic histories. For example, by proposing that human predation or climate change between 12,000 and 10,000 years ago caused all extinctions, one overlooks the fact that the ground sloth *Eremotherium laurillardi*, which seems to have preferred subtropical to tropical climates, likely retreated into South America long before then (McDonald & Lundelius 2009). This clearly illustrates why it is important to examine the history of individual species when trying to understand what happened to them. An end of the extinctions debate will require future scientists to examine the biogeographic histories of individual species in relation to paleoclimatic, paleoecological, and archaeological data.

Cross-References

► Peopling of the Americas

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North and Saharan Africa: Geography and Chronology

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State of Knowledge and Current Debates

Introduction

Northern Africa is the northernmost region of the African continent, linked by the Sahara to sub-Saharan Africa and by Egypt to the Sinai

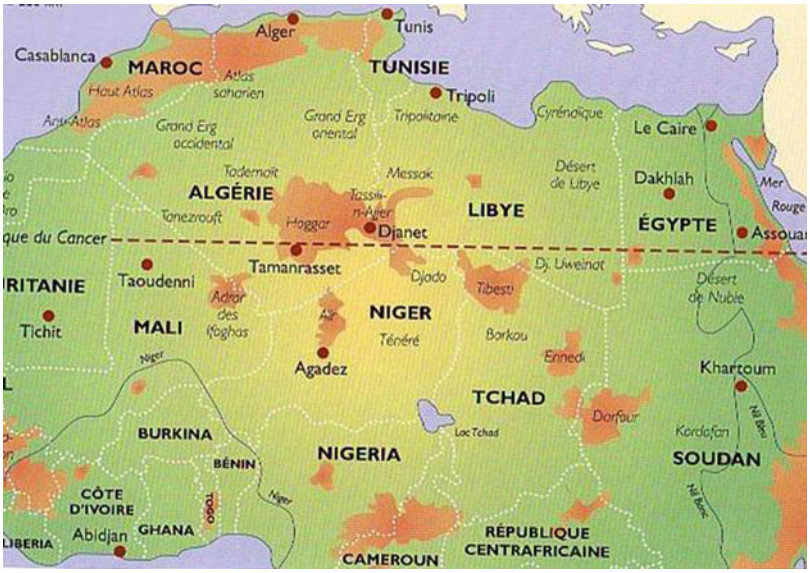

North and Saharan Africa: Geography and Chronology, Fig. 1 Map of North Africa

Peninsula, which is in Asia. Northern Africa can be divided into four big natural zones: the first is Maghreb that stretches from Tunisia to Morocco along the Mediterranean coast and is predominantly mountainous (Fig. 1). The second is the Sahara region, covered by the desert that goes from the Atlantic to the Red Sea, and the third is Sahel, a belt of grasslands and savannas south of the desert. Finally there is the Nile Valley that borders the Sahara desert to the east.

Northern Africa is underlain by folded sedimentary rock and is, geologically, more closely related to Europe than to the rest of the continent of Africa. The Atlas Mountains, which occupy most of the region, are a part of the Alpine mountain system of southern Europe.

The North Africa plateau is formed mostly by a tableland of very ancient rocks, today occupied by the Sahara desert. The internal area of the tableland is broken by some isolated mountain massifs: Ahaggar, Tibesti, where the highest peak in the mountains is Emi Koussi, 3,415 m high, and Darfur, where the highest point is mount Marra, (3,088 m). This vast region is skirted to the west by a plane that stretches around the estuary of the river Senegal, to the north by Libyan and Tunisian planes, and to the northwest by the Atlas Mountains where the highest peaks are the High Atlas and Toubkal Mount (4,167 m). Several big rivers flow at the edge of the Sahara, they have a tropical regime with a single high water season in correspondence to the rain season. The Nile, the longest river in the world and in Africa (6,671 km), after having crossed Sudan where the waters of the Blue Nile and of the Atbara river flow into it, enters Egyptian territory through a narrow valley and then flows through a vast plane to the delta that empties into the Mediterranean. Mali and Niger are crossed by the river Niger, while the southwest border of Mauritania is crossed by the Senegal River. The Lake Chad is located in the Sahara desert; its size varies because of evaporation and irregular rainfall (Longman 1974).

Historical Background

Research in North Africa started in the colonial period and has since then been characterized by a multidisciplinary approach.

Geographical explorations, aimed at better understanding the geography and the geology of the desert areas, were carried out together with ethnographic studies that brought into light the variety of the Berber and Bedouin cultures, their economic systems, the relations between the groups, and the subordination to the dominant Arab culture and to the concept of centralized state.

Archaeological research was also the result of such strong interest in the region.

North and Saharan Africa: Geography and Chronology, Fig. 2 Rock art from Tassili

In Tripolitania and Cyrenaica, the British with McBurney and the Italians with Petrocchi are the protagonists of the discovery and excavation of archaeological sites of great importance (Petrocchi 1940; McBurney 1967).

But the Sahara in particular came to be at the center of the attention of the pioneers of research.

The archaeological exploration of the African continent has developed in parallel with the colonial period.

In the first half of the twentieth century also intensified the archaeological exploration of the Sahara, especially by French and Italian archaeologists. The discovery of rich rock art (dating from the late Paleolithic to modern times) and Paleolithic and Neolithic sites allowed the reconstruction of the population of the region from the early Paleolithic periods to the present (Fig. 2) (Le Quelleq 2008).

Several authors have highlighted the importance of the multidisciplinary studies on North Africa and on the Sahara that have contributed to the understanding of climate change and man's adaptation to it.

Key Issues

Paleoclimate

The study of the climate history registered in the lake sediments in various zones of the Sahara has allowed reconstructing the various climatic phases of the Quaternary period. The sediments of the Lake Megafezzan and of the Tunisian chotts clearly indicate the presence of 17 glacial cycles, interrupted by short humid periods and by interglacial periods. About 10,000, at the time of the Holocene Climate Optimum, the Sahara was covered by a savanna and was rich of vegetation. During this phase the African Monsoon moved north where a series of wetlands consequently formed, making it also possible for men to inhabit the area again (Sue & Neelin 2005). The actual hyperarid climate of the Sahara stabilized around 4,000 B.P., following a steady process of desiccation that started around 6,000 B.P. Around 5,000 B.P., the African monsoon gradually moved south, and this led to the definitive drying up of the area.

From 150,000 to 130,000, Africa experienced colder and more arid than present conditions. About 130,000, a warm phase moister than the present began, and this lasted until about 115,000, with greater rainforest extent and the deserts almost completely covered with vegetation. Subsequent cooling and drying of the climate led to a cold, arid maximum about 70,000, followed by a slight moderation of climate and then a second aridity maximum around 22,000–13,000 14C. Conditions then quickly became warmer and moister, though with an interruption by aridity around 11,000 14C.

A resumption of warm, moist conditions led up to the Holocene "optimum" of greater rainforest extent and vegetation covering the Sahara. Conditions then became somewhat more arid and similar to the present. Relatively brief arid phases (e.g., 8,200 14C years ago.) appear to punctuate the generally moister early and Mid-Holocene conditions.

Around 150,000 years ago, there was maximum penultimate glaciation (oxygen isotope stage 6) with generally drier conditions than present and extended desert in North Africa (Van Andel & Tzedakis 1996).

Between 125,000 and 120,000 years ago, there was the moistest phase of the Eemian interglacial (isotope stage 5e). Rainforest occupied a far greater area than at present, and rainfall was generally higher over North Africa.

During the period between about 110,000 and 11,000 14C years ago, there was a great deal of variability in climate across the North African region, though conditions were generally drier and cooler than at present.

The most intensely dry and cool phases across Northern Africa and Arabia are thought to correspond to cold, ice-rafting phases in the North Atlantic.

The period between 90,000 and 110,000 years ago represents the arid phase following the end of the Eemian interglacial. There are indications from the record of desert-dune formation across southwestern Africa that at least part of this phase was extremely arid (Stokes et al. 1997). Desert conditions seem to have existed over a large area west of about 25 deg.E, and south of about 18 deg.S.

An intense cold stage occurred between 75,000 and 58,000 (oxygen isotope stage 4). Sea level was about 75 m below present level, and vegetation conditions seem to have been much as they were at the Last Glacial Maximum (see below), with greater-than-present desert extent in North Africa (Van Andel & Tzedakis 1996).

The oxygen isotope stage 3 period, between 57,000 and 24,000, was characterized by an unstable climate that fluctuated on time spans of a few thousand years (Van Andel & Tzedakis 1996).

Shortly before the Last Glacial Maximum, 28–22,000 ^{14}C years ago in north Africa/the Levant, conditions around 28,000–25,000 ^{14}C years ago seem to have been significantly moister than at present, with soils being formed (Goodfriend & Margaritz 1988). This may reflect conditions moister than present across North Africa in general.

The Last Glacial Maximum aridity goes from 22 until 13,000 ^{14}C years ago and may have been a slightly moister phase (though still very arid) separating two extremely arid phases. Aridity and to a lesser extent cooling are the major features of Africa during the full glacial period. Ancient sand dune distributions suggest that the Sahara desert zone extended hundreds of kilometers further south than at present, compressing the other vegetation and climate zones equatorwards. However, in a restricted area of the northwest Sahara, greater winter rainfall seems to given moister conditions, with a belt of semidesert appearing to the south of the present-day desert margin (Hooghiemstra et al. 1992).

Around 12,500 ^{14}C years ago, there appears to have been a rapid further increase in temperature and in moisture availability throughout most of Africa.

During the Younger Dryas, approximately 10,800–10,200 ^{14}C years ago, a cold, dry period affected Europe and at the same time Africa also seems to have experienced a relatively arid phase. In North Africa, for example, the water levels of Lake Chad fell, although Thomas and Thorp (1993) suggest that the climate may not have been much drier than at present. The levels of East African lakes fell during the Younger Dryas (apparently gradually over several hundred years), and there was a reduction in forest pollen in the mountains.

After the Younger Dryas, conditions became moister. The vegetation zones of the Sahara seem to have lain in similar positions to those of the present day (Lezine 1989), although Thomas and Thorp suggest from the level of Lake Chad that conditions were moister than present at around 10,000 ^{14}C years ago.

After 9,000 ^{14}C years ago, conditions in North and Central Africa had become much moister

than at present. The Sahara desert had virtually disappeared under a mixture of semiarid and -seasonal vegetation types (Lezine 1989; Ritchie 1994). Organic-rich mud layers in the eastern Mediterranean suggest maximum precipitation and freshwater discharge by the Nile between 9,000 and 8,000 ^{14}C years ago.

Between 8,000 and 7,000 ^{14}C years ago due to the much greater rainfall, Lake Chad (in the southern Sahara) was greatly expanded in area during all or most of this phase and surrounded by extensive inter-dune wetlands.

The generally northward movement of monsoon rains into the Sahara region can be expected to have resulted in a northward expansion of rainforest as well, and this does appear to be the case from the pollen record (Brooks et al. 2005). A conjectural boundary for the rainforest zone is drawn here.

A severe arid phase (correlated in many places around the world) seems to have affected North Africa around 7,500 14C years ago (Alley et al. 1997), perhaps lasting for a century or two. There was a reduction in Nile flooding, in NW Sudan lake levels, and at sites in the Western Sahara, the Sahel and sub-equatorial Africa.

Between 6,500 and 5,000 ^{14}C years ago, conditions across northern, central, and east Africa became somewhat drier than before, but were still moister than today. For example, on the basis of pollen and charcoal, Neumann et al. (1995) suggest a mixture of semidesert and denser scrub and grassland for the Western Sahara, in areas that are now extremely arid. A similar picture is obtained by Ritchie (1994) on the basis of pollen evidence and by Lario et al. (1997) for the Blue Nile on the basis of sedimentological and zoological indicators.

After about 5,000 14C years ago., lake levels suggest that aridity in north Africa became more severe, culminating in an arid phase about 3,800 14C years ago., a partway return to moist conditions 4,000–3,000 14C years ago., and a decline to aridity thereafter (Petit-Maire & Gua 1997).

Hominization

The first hominid remains found in North Africa is the *Australopithecus bahrelghazali*, found in Chad. The remain is a fragment of jaw found in the valley of Bahr el Ghazal near Koro Toro. This species is dated to between 3.5 and 3.0 million and is therefore contemporary *Australopithecus afarensis* (Brunet 1995).

The first evidence of human occupation of North Africa is in the form of the comparatively rare occurrence of very early stone tools. The majority of these Oldowan sites are undated, but the 1.8-million-year date proposed for the site of Aïn Hanech in Algeria (Sahnouni et al. 2002) suggests that hominins colonized North Africa at the same time that the first dispersals into Eurasia were taking place. Oldowan sites in the Sahara are extremely rare. Although Oldowan artifacts have been found at several localities, these are rarely in either stratigraphic position or as part of unmixed deflated archaeological assemblages. Four areas appear to have clear evidence for an Oldowan occupation – the Saoura Valley in Algeria, around the Richât Massif in Mauritania, Enneri in Chad, and Fezzan in Libya. Interestingly, there are no well-documented Oldowan sites in Egypt and Nubia (Veermersch 2001), suggesting that the Nile was not a main route of hominin dispersal in the Lower Pleistocene (Mirazon Lahr 2010).

Around the same period, Acheulean complexes started to appear also in Mediterranean Africa, in Aïn Hanech in Algeria or in the Thomas Quarries 1, and in Casablanca in Morocco; on the other hand, sites in Western Africa seem to be rare.

In the Western Egyptian desert, the Acheulean findings have been studied since the first decades of the past century following the research carried out by G. Caton-Thompson and E.W. Gardner in the oasis of Kharga and Dakhla. Other sites have been located in more recent years such as the sites 8,715 in Umm Shagir, Arkin 8 in Nubia, the site 8817 in the Dungul oasis, and BS14 in the Bir Sahara depression. The Acheulean sites along the Atbara in Sudan seem to be more recent, while the excavations made in 1949 in Abu Anga near Khartoum by A.J. Arkell allowed to unearth manufacts that were identified as Acheulean *lato sensu* by F. Wendorf.

North Africa and the Sahara have a rich record of Acheulean sites, a small number of which are

dated. The nature of the artifacts and the distribution of the few dates that exist suggest that early Acheulean occupation in the Lower Pleistocene was also very ephemeral – the key locality being the complex of sites at Casablanca, Morocco, where the oldest archaeological industry is an early Acheulean assemblage dated to approximately one million. The Late and Middle Pleistocene Mode 2 localities are much more frequent and probably indicate a change in either biogeographic patterns (perhaps associated with the establishment of glacial cyclicity and recurrent wet episodes) or the adaptive scope of hominin groups.

Middle Stone Age and Anatomically Modern Human

The record of the Middle Stone Age/Middle Paleolithic in North Africa and the Sahara is extremely rich, although the almost complete absence of dated sites makes its interpretation difficult. In sub-Saharan Africa, the MSA first appears between ~350,000 and 300,000, disappearing in the last 50,000 years. This 300,000-year period encompasses major climatic shifts that would have made the Central Sahara at certain times uninhabitable and at other parts of a rich ecosystem interconnected by rivers and lakes, deeply affecting the biogeographic distribution of hominin populations. The period also encompasses major evolutionary events, in particular the first evidence of modern humans in East Africa around 200,000, as well as of their first dispersal out of Africa in the subsequent wet interglacial phase 130,000–100,000. The beginning of this dispersal is archaeologically difficult to identify, as the stone tools manufactured by early humans did not differ substantially from those produced by other hominins since ~ 300,000 (including the Neanderthals). However, once established in North Africa, these early humans developed a new cultural identity, the Aterian, which contains distinctive stone tools. The Aterian has been dated in Morocco from 110,000 to at least 80,000 (Barton 2009) (Fig. 3). However, the extremely arid conditions that prevailed in the Central Sahara between 70,000 and 14,000 probably restricted the temporal extent of the Aterian occupation in the region.

A series of fossils seems to confirm the African origin of the anatomical modern human *Homo sapiens*, the most famous being the Jebel Irhoud fossil, related to an MSA technology as Mousterian and/or Aterian. Some of the more ancient fossils are related to Acheulean technocomplexes.

The most important element that indicated an early development of a modern behavior as regards the production and spreading of iconic symbols can be found in the Blombos Cave in the South African Republic. Two small ochre fragments flattened by scraping and then engraved were found in the Middle Stone Age levels and were dated to over 75,000 B.P. with the thermoluminescence method.

Late Stone Age and Out of Africa

Late Stone Age defines the technological complexes and cultures that developed in Africa in the last phases of the Pleistocene that clearly presents innovative features compared to the previous phases. In this period in the whole African continent, blade industries are developed by *Homo sapiens*, and microlithic characteristics also become more marked. This phenomenon took place at different times in the different regions, and this underlines the role played by the environment in the decision-making process of the groups of humans.

Before hominins could disperse out of Africa, they needed to disperse out of their likely area of endemism in sub-Saharan Africa to North Africa, the most likely departure point for Eurasia. Prior to the Middle Pleistocene, successful long-term colonizations of North Africa by hominins were very rare and apparently less successful than their colonizations of Eurasia. The Early Pleistocene hominin dispersal into Eurasia was most probably along the western coast of the Red Sea. The ability of hominins to successfully disperse into Eurasia and successfully colonize northern continents was made possible by the ecological and climatic diversity within Africa (Lahar 2010) (Figs. 4 and 5).

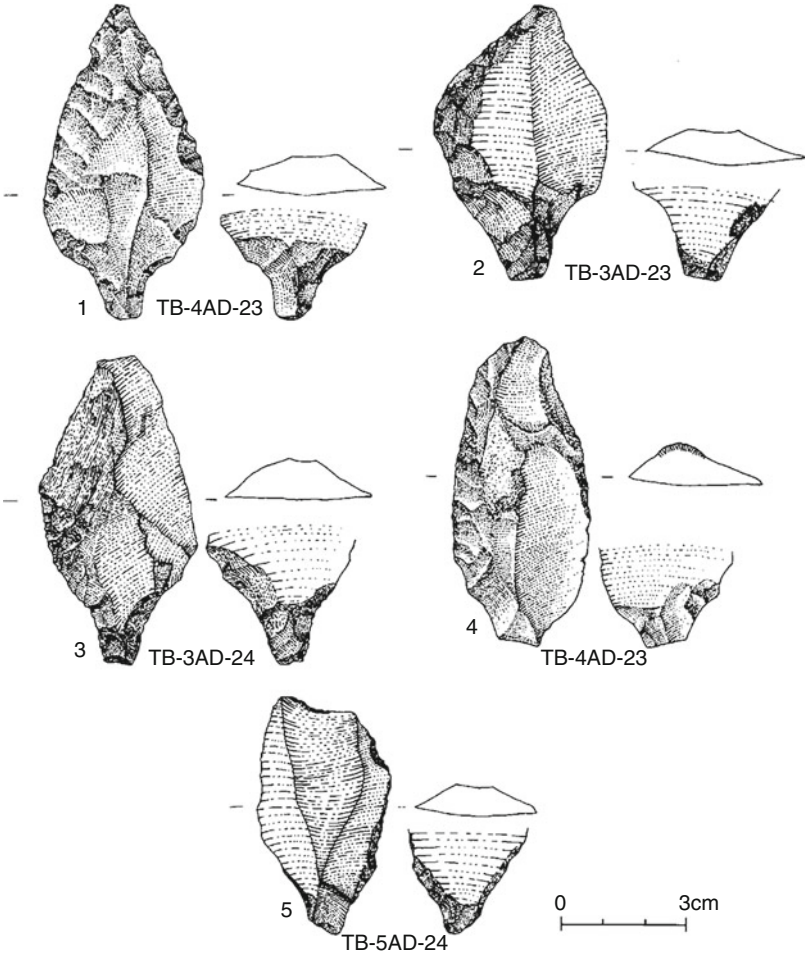

North and Saharan Africa: Geography and Chronology, Fig. 3 Aterian pedunculate. After Garcea & Tabu 2001

International Perspective

The migration of Homo sapiens out of the African continent is currently one of the most debated topics in the scientific debate. Many scholars support the *Out of Africa* model rather than the other ones (replacements, assimilations, multiregional models (Aiello, 1993)). Probably the ways that modern humans have been used to leave Africa were more than one, and a multiple-dispersal event is, according to many scholars, the most probable explanation to the exit of modern humans from Africa (Gunz et al. 2009; Garcea 2010), even if the Levant corridor may be still considered as a main route of human dispersal during the MIS 5e – 125–120 ka BP (Smith 2010).

Shea (2003) recognized two main episodes in the Out of Africa 2 model, the first one from 130 and 80 ka BP and the other one after 50 ka BP. If the makers of Aterian and Taramsa lithic complexes were the protagonists of the first episode (Garcea 2010), after 50 ka BP, Homo sapiens from the African Mediterranean coasts have definitely replaced Neanderthals in the Levant.

During the Pleistocene, the occupation of the Sahara, an area far from the Mediterranean coast and from the Nile Valley, was determined by the availability of water. The most critical period is the Late Pleistocene that corresponds to the Late Stone Age phase. The present state of research seems in fact to indicate an interval between the last Aterian traces that date to 60 ka and the scarce LSA occupations (30,000). The areas near the coastline present a different situation:

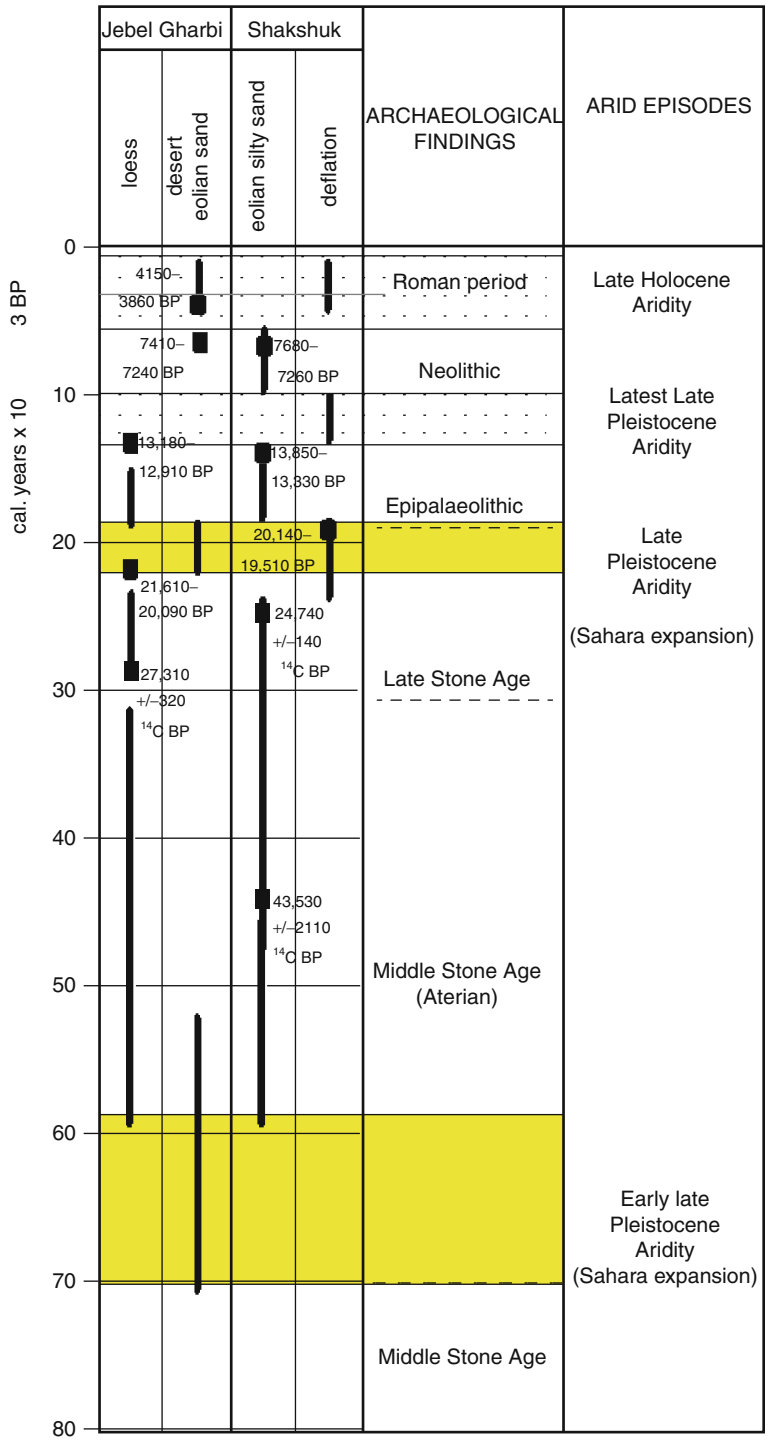

North and Saharan Africa: Geography and Chronology, Fig. 4 LSA. Chronology and paleoclimatology of Jebel Gharbi

North and Saharan Africa: Geography and Chronology, Fig. 5 Hafted geometric tool

despite a time interval between the emergence of the two cultures, these cover a shorter time span that goes from 40,000 to 24,000.

The last phases of the occupation of the Sahara can be referred to the Holocene, after 10,000 B.P., when the arid and hyperarid areas were again covered by vegetation and inhabited by animal species. There is evidence that in the same period, domestic livestock appeared in eastern Sahara and then probably spread west around 7,000 BP.

The spreading of the microlithic industries in the Sahara zone and more in general in North Africa took place over a long period of time. The phenomena of the reduction of tools and the backing of the edges take place for the first time with the Iberomaurusian culture (>20.000 B.P.) and are well documented by the important sequences in the sites of Tamar Hat, Taforalt, and Haua Fteah. Examples of what has been called the "programmatic use of the environment" have been traced working on some famous sites in the Nile Valley, such as Wadi Kubbaniya and Shabona. A. Testart has emphasized the different adaptation patterns followed by the hunter-gatherer cultures and the coexistence of sedentary and mobile groups with a variety of intermediate patterns, a variety of techno-economic specializations, storing methods, and social organizations (Testart 1982).

Around 12,000–10,000 BP, there was a peak in humidity, precipitations exceeded evaporation, and the rainfalls probably occurred at regular intervals (Vernet 1995). From then, adaptation in the Sahara regions took place in more diverse and complex ways, indicating a higher degree of interaction between man and the surrounding environment. In the western desert of Egypt, the sequences of the sites of Nabta and Bir Kiseiba indicate that occupation here started at the end of the arid phase. Bir Kiseiba was inhabited again for the first time in the period called el-Adam that goes from 10,000 to 8,200 BP. The site is important because here remains of oxen were found (that date to 10,220 to 9,460 B.P.) and considered domestic by A. Gautier (1984). Although this hypothesis was opposed for some time, it was however very important in reframing the problems related to the Neolithic production in the Sahara. The oasis of Selima, Siwa, Farafra, Dakhla, and Kharga provides more evidence of humid conditions in the early antico Holocene.

The most ancient traces of human presence in the southern area of the Nile Valley are to be found in the remains of industries of the Lower Paleolithic (pre-Chellean, Chellean, Acheulean, Micoquian) and Middle Paleolithic (Mousterian), unearthed in fluvial terraces that date to the Middle and Late Pleistocene (600,000–90,000 BCE).

Lithic industries became stylistically very diverse in the Lower Pleistocene (20,000–8,000 BCE); traces of both macrolithic and microlithic industries have been found in the valley, defined as Epi-Levalloisian because of the Levallois stone knapping\flaking technique typical of the Middle Paleolithic, and microlithic blade industries, often characterized by an intensive use of scrapers. Both these industries seem to be of Nilotic origin and would thus indicate the

presence of indigenous populations with different cultural traditions in the same area. They could represent a Paleo-African tradition typical of northeast Africa. The Epi-Levalloisian industries include the Halfan (about 18,000–15,000 BCE) between the second cataract and Kom Ombo, the Edfuan (about 15,800–15,000 BCE) in the region of Esna, the Sebilian (about 13,000–9,000 BCE) between the second cataract and Qena, and the Afian (about 12,000 BCE) in the region of Kom Ombo. The blade industries include the Fakhurian (about 16,000–15,600 BCE) in the region of Esna, the Menchian (about 13,000–9,000 BCE) in the area of Kom Ombo, the Isnian (about 11,000–10,500 BCE) in Esna (Esna), the Sebekian (about 14,000–11,600 BCE), and the Silsilian (about 13,000 BCE) in Kom Ombo. The remains of fauna associated to these industries clearly indicate the exploitation of the river resources with activities such as fishing, hippopotamus hunting and gathering of freshwater mollusks, and\or hunting of wild livestock in the nearby savannas. The sites are generally small in dimension and seem to suggest camps that were used seasonally by groups of 5–40 individuals. However, the presence of millstones and grinders in the Menchian and Isnian sites suggests that these groups also gathered wild grasses and consequently that they were preadapted to the preparation of food.

There is no certain evidence that blade industries derived directly from the Middle Stone Age industries in Northern Africa. The Dabban, present in Libya between 40,000 and 20,000 B.P. seems to be the result of a local development in Cyrenaica. Until the end of the Middle Stone Age, changes occurred at a slow pace. The Dabban also asserted itself as a lasting and stable tradition, and only after 18,000 B.P. did a series of changes take place more rapidly and in shorter time, both in the Nile Valley and in the Maghreb territories.

An increased regional diversification, which characterizes the late Pleistocene, could be the consequence of a higher population density and the symptom of specific forms of a more differentiated adaptation. Moreover, the technological specialization of the period indicates a more efficient exploitation of resources. The indirect percussion with punch technique in fact allowed to manufacture more efficient tools.

The Iberomaurusian and the Caspian are the two main cultures of the North African Late Stone Age. The first spread along the coast and inland towards the wet area of Tell from Eastern Morocco to the Gulf of Tunis, between 20,000 and 10,000 B.P. Iberomaurusian was first classified by J. Roche (1963); later J. Tixier (1963) designed a system that was adopted as typological model for all the North African Late Stone Age\Epipaleolithic industries, devised by analyzing the various deposits in the Maghreb region. It is known that this definition was given at the beginning of the last century in a context in which North African studies tended to view the archaeological and industrial aspects in relation to a specific historic-geographic dimension. Today, the tendency is to have a general view of the Late Pleistocene technology in all of Northern Africa (including the Nile Valley) that represents the preliminary step to food production.

The Mechta-el-Arbi human type (or Mechta-Afalou) is considered the prototype of the anatomically modern North African man. Remains were found in the numerous Iberomaurusian necropolises. A similar type, called Mechtoid, was found in cemeteries that are present in fewer number than the necropolis (Gebel Sahaba and Tushka are the better known) in the Nile Valley (Wendorf et al. 1989). The Capsian physical type tends to be more fragile than the Mechta-el-Arbi; it has a long and slim face and small mandibles. The Capsian were called proto-Mediterranean by G. Camps, thus implying a connection with the actual Berbers (Camps 1982). The Capsian culture attracted the attention of researchers for a long time. Today less importance is given to this culture that in fact lasted for less time than what was believed and occupied a smaller portion of territory. It is considered to have developed between the Pleistocene and the Holocene, prevalently during this last phase. Geographically its expansion was limited to Tunisia and to the North province of Algeria. It lasted approximately from 11,000 to 8,000 B.P. To a certain degree, the Capsian industry can be considered a transitional industry

that flourished at the end of the Iberomaurusian. It is a Pleistocene industry characterized by an advanced degree of technological ability, ceramics, and food production (Lubell & Sheppard 1997; Barich & Conati Barbaro 2003). Probably some Capsian groups, which were already sedentary and had developed intensive gathering strategies, helped in the diffusion of new techniques for resource exploitation that had originated outside Maghreb and that spread in the VIII and VII millennium B.P. It can be said that this Late Stone Age/Epipaleolithic complex brought on the progressive shift to the pastoral economy in Maghreb, the so-called Neolithic of Capsian tradition.

The classification of the Late Stone Age microlithic industries in the Nile Valley is complex, in particular with regard to the industries that flourished between 19,000 and 10,000 B.P.

The most ancient industries that can be defined as late Paleolithic are in the area of Wadi Halfa. While the Khormusian is still part of the Levallois tradition, the Halfan in Lower Nubia and the Kubbaniyan in Upper Egypt between 19,000 and 17,000 B.P. are characterized by important microlithic features such as microblades and microflakes and by a recurrent Ouchtata presence in the Kubbaniyan. Both cultures practiced hunting in the savanna, game and large size animal hunting, but also fishing in the river Nile. The high number of grindstones found in the various complexes suggests also that they were gatherers of tubers and wild grasses. The use of the tuber and of a very common plant in the habitat of the Nile (*Cyperus rotundus*) is well documented in the Wadi Kubbaniya site, where many examples of a complex use of the environment in ancient periods can be found. The exploitation of big quantities of fish and wild plants indicates treatment and storage systems that allowed to keep resources and consume them at a later time. This is a strongly innovative aspect that indicates a major change that occurred in the habits that had been of immediate consumption in the case of simple gatherers.

The Late Stone Age Nilotic industries reveal elaborations and complex processes of differentiation that occurred from 16,000 B.P. especially in Upper Egypt. The main industries can be dated to the Lower Paleolithic alluvial phase in which the size of the river Nile grew smaller because of a reduced flow of water from the springs. This however did not affect human occupation that is on the contrary attested to be consistent by several large sites and by the contemporary development of differentiated economic activities. Around 12,000 B.P, a crisis caused by the onset of an arid period determined the spread of intensive gathering in order to integrate the protein diet, though there is no evidence of stable settlements at the time. On the contrary, the crisis determined an increase in fishing activities that lasted for a long period. The el-Kab site in Upper Egypt that dates to around 8,000 B.P. is emblematic: here a settlement of hunters and fishermen was occupied for a brief period by humans that developed a highly microlithic industry, where the main components are backed bladelets. Despite the lack of evidence of food production, it is reasonable to believe that the Nilotic groups in the final phases of the Pleistocene were preadapted to animal breeding and controlled wild herd animals like cattle and gazelles. Here however animal breeding, mainly of sheep and goats from the Near East, started around 6,500 B.P. (5,000 cal. BCE) together with the cultivation of barley and wheat, also from the Near East.

Food Production

The most ancient agricultural society known to us in the Nile Valley (and in all of North Africa) is located in the Fayyum depression, in Lower Egypt. Between 8,000 and 7,000 B.P., this area was inhabited by sedentary hunters and fishermen (Fayyum B/Qarunian) that made use of microlithic tools and bone harpoons in a context in which the traditional Epipaleolithic economy was still dominant (Figs. 6 and 7). Around 6,800 B.P. the first food-producing groups settled in the Fayyum area (Fayyum A/Fayyumian). The characteristics of this culture, i.e., the establishment of sedentary settlements, cereal preservation systems, and fully domesticated resources to dispose of, make it as the real precursor of the settlements of the later Predynastic period.

Northeast Africa offers a series of essential data for the study of the origin of the first types of herding systems, from the beginning of the Holocene in the western Egyptian desert, where domestication first started and then spread to the rest of the African territories, to the west, towards central Sahara, and to the east in the Nile Valley. With concern to this aspect, and also with regard to incipient cultivation practices, recent studies have sufficiently brought to light the important role this territory and the other Egyptian oasis played (Farafra, Dakhla, and Kharga, especially) as autonomous areas for important proto-Neolithic developments and as areas of innovation that connected the Sahara to the Nile Valley (Barich 2002) (Fig. 8).

The Neolithic El-Nabta type (between 8,100 and 7,900 B.P.) saw the recolonization of the Nabta-Kiseika region at the end of a period of extreme aridity followed by a new humid phase. In this period regular rainfalls provided the conditions for a more stable settlement and for the emergence of a permanent village, the Nabta E-75-6, that is similar to Ti-n-Torha East in Tadrart Acacus, Libya. Wild cereals (sorghum and millet) have been found in recent excavations.

North and Saharan Africa: Geography and Chronology, Fig. 6 Neolithic pottery

F. Wendorf e R. Schild in Lower Nubia and in the Upper Nile. This research has allowed to identify two main phases of the alluvial deposit during the late Pleistocene. In Wadi Kubbaniya, sediments of the late Paleolithic deposit have been identified at around 12 m above the actual level of the *wadi* bed and date between 20,000 and 12,400 B.P. In this period the river was less active because of the arid climate, vegetation grew scarce at the source of the river, and the consequent colluviation in the banks and the great mass of detritus being transported determined a rapid growth of the alluvial plane of the Nile (Wendorf et al. 1989).

The issue concerning the local domestication of cattle that started with the first wild Bos primigenius type has been long debated in African studies. In the area of Bir Kiseiba, more than 10,000 faunal remains, mostly species that were adapted to arid climate (hares and gazelles), were found. Some remains of oxen, in an extremely fragmented state, were classified, with a high degree of uncertainty, as domestic remains, or in an incipient state of domestication (Gautier 1984). It was observed that wild examples of Bovidae (oxen or buffalo) could in no way have survived in a climate with such a low

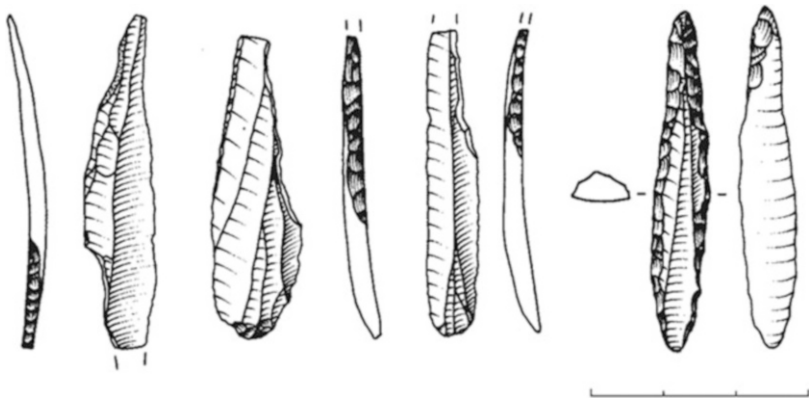

North and Saharan Africa: Geography and Chronology, Fig. 7 Cran-bladelet from Early Holocene site, Hidden Valley Plateau, Farafra oasis

North and Saharan Africa: Geography and Chronology, Fig. 8
After McDonald et al. 2006

Approximate Age Years B.P.	Cultural Stratigraphic Units: Dakhleh Oasis	Cultural Stratigraphic Units: Kharga Oasis	Developmental Stages
4000 6000	Sheikh Muftah Unit	Yebsa Unit	Neolithic
	Bashendi Unit	Baris Unit	
8000 10,000	Masara Unit	Midauwara Unit	Epipalaeolithic
15,000	?	New "2008" unit [undefined]	cf. Later Stone Age (LSA)
40,000	Sheikh Mabruk Unit	Khargan Unit(s)	(Terminal, TMSA)
50,000	"318" unit		
100,000	Dakhleh unit	Kharga Aterian Unit	Middle Stone Age
140,000	[undefined units]	Matana Unit	(Younger, YMSA)
200,000	Teneida Unit Gifata Unit	Refuf Unit	(Older, OMSA)
300,000 400,000	Balat Unit	Dharb el-Gaga Unit KO10 unit	(Terminal. TESA)
	[undefined Uits: Upper and Lower African Acheulian *sensu stricto*]		Earlier Stone Age (ESA)
1,500,000 2,500,000		?? cf. Oldowan Complex	(Developmental, DESA)

humidity level. Presently the new study of the microcondial DNA of the *Bos* type has revealed an ancient separation (that occurred about 25,000) between the African heads and the Eurasian and Indian ones, thus confirming the hypothesis that the African bovine domestication process occurred independently (Holl 1998). This process seems to have taken place in the first phase of the Holocene, at a time in which the monsoon cycle stabilized and summer rainfalls appeared again. Groups that came from the Nile Valley (probably belonging to the

Qadian culture) reoccupied the territory that had previously been hyperarid for thousands of years. The possession of small domestic herds made the occupation of desert lands easier, providing an important source of protein during the recurring climate crisis. This hypothesis also explains the rapid spread of livestock in the Central Sahara communities. The arid interval observed in the Sahara sequences between 7,900 and 7,700 B.P. must be considered in relation to the coeval increase of the first experiments in livestock herding carried out by the groups that inhabited the Central and Western Sahara territories (Barich 2002).

Data about the Holocenic communities in Central Sahara has been classified into two categories. The most impressive collection documents the cave art repertoire, carved or painted on the walls of rockshelters in Tassili n'Ajjer, in Tadrart Acacus, in Messak, in Ahaggar (Sansoni 1994; Muzzolini 1995; Mori 1998). This region played a key role in the transfer of domestic livestock from Eastern Sahara towards the regions in the south and west. More precise indications about the later phase of the development of Saharan pastoralism have emerged thanks to research carried out in Acacus (Cremaschi & Di Lernia 1998) that shows a diffusion of sites from Erg Uan Kasa to Tanezzuft, between 5,000 and 4,000 B.P.

In Niger the first evidence of a pastoral economy dates to the middle of the VII millennium B.P. and is to be found in the sites of Dogomboulo and Rocher Toubeau and especially in the sites of Adrar Bous. The Tenerian is the pastoral culture par excellence; this culture reached its peak around 5,000 B.P. and was particularly widespread along the eastern edges of the Air, between the Adrar Bous and Areschima (Roset 1987). The economy of this pastoral group was based on herding, hunting, and extensive wild grain gathering. The studies by F. Paris on Neolithic and post-Neolithic burials in the region of Adrar Bous provide original data regarding the composition of the expansion of settlements during the Late Holocene (Paris 1996, 1997). During the period that goes from the middle of the V millennium to the middle of the IV millennium B.P., a number of groups immigrated to this region; these groups had a structured social organization that might also have included *élites* that built burial monuments and were different from the local group types from a paleoanthropological point of view. Paris asks where these new populations came from. Because the burial monuments were mostly for men, he suggests that they were intended for prominent people such as the heads of the group and that the organization was of an aristocratic type similar to a chiefdom. The Tenerian culture ended around 3,800 B.P., when the climate conditions worsened.

In the coast regions west of North Africa, the traits of the material culture that are commonly called Neolithic (ceramics, polished stone tools, arrow heads worked on both sides) are to be found only in a very restricted area opposite Gibraltar in northern Morocco (in the territories of el-Khril near Tangier). As regards the bovine and caprovine remains associated in these sites to the Cardial style pottery, Camps (1982) noted that "It would seem that in this area the introduction of domesticated animals coincided with the beginning of the pottery production."

In Haua Fteah, the phase F, documented by the levels VIII–VII (from 6,800 to 4,800 B.P.–5,000 to 2,700 BCE), was attributed by C.B.M. McBurney (1967), the first archaeologist to work on the site, to the sphere of the Neolithic of Libyco-Capsian tradition. Mostly caprovine remains were found in Haua Fteah (the presence of bovines is not certain). The caprovines are small in size, especially if compared to the Libyco-Capsian type (levels X–IX). This change seems to have occurred suddenly and non-gradually: E.S. Higgs (author of the zooarchaeological study) concluded that goats had been imported at a more advanced stage of domestication.

More important information regarding the pastoral organization in these Northern regions comes from the Capéletti cave (Khanguet Si Mohammed Tahar) in the Aures Mountains of eastern Algeria (Roubet 1979). The cave is at about 1,500 m above the sea level and shows a uninterrupted stratigraphic sequence caused by

a very slow sedimentation process that took place over a period of about 2000 years in the Mid-Holocene (from 6,530 to 4,300 B.P.). The most ancient phase of occupation (from 6,530 to 5,900 B.P.) shows no presence of domestic livestock. Later (in the second period) the cave was inhabited by shepherds that made use of Capsian type tools, also tools that consisted in a ceramic piece with a cone shape bottom were found, sometimes decorated and carved, and manufacts in polished stone. Because of the similarities with the Capsian, the culture was called Neolithic of Capsian tradition. The groups of humans exploited a wide range of resources, though this did not include small size livestock: land and freshwater mollusks and great quantities of various wild plants. The men were mammal hunters, especially antelopes and gazelles, and of avifauna. The available data seem to indicate a system of transhumance between the plane, occupied in winter, and the plateau, occupied during the summer (Holl 1998). The dimensions of the Capélletti cave suggest that it was inhabited by specialized groups (task groups) of young men that lead the livestock to pasture.

There is a clear chronological *décalage* in the distribution of the pasture lands outside the areas described up to now, both in the Saharan territories and in sub-Saharan Africa. It is known that the presence of the tsetse fly that infested the southern regions was an impediment (though also cultural factors may have played an important role). The data available does not provide any evidence of domestic livestock on the northwest borders of the Sahara, in the area situated in the Algerian and Moroccan regions of Atlas and Aures, to the North, and in Tanezrouft in the south, along the border between Mali and Algeria. This area seems to have been inhabited by mobile groups of hunter-gatherers (culture of Hassi el-Abiod, culture of Kobadi). Considering this evidence, it is correct to say that the northwest portion of the Sahara did not function as a corridor for the passage of domestic livestock from north (Aures) to west Africa. On the contrary, the first pasture sites that date to 6,000–5,000 B.P. (like the famous Adrar Bous in Niger) are located along the western edges of the Ténéré from where probably they spread south and southwest, towards the Atlantic coast of western Sahara in Tintan and Chami, the Taoudeni basin at Erg-in Sakane in the Adrar des Ifoghas, the Tilemsi Valley in Mali, Dhar Tichitt in Mauritania, Azawagh Valley in Niger, and reaching Kintampo and Ntereso in Ghana.

From the "nucleus" in Eastern Sahara, the pastoral communities rapidly migrated towards Central Sahara, to then return towards the Nile, Sudan, and from here continue towards southern regions. The migration paths are marked by typical settlements, hearths, megalithic burial structures, vast pottery deposits, and burial and ceremonial monuments. In Eastern Sahara, the routes intersected in the area between the Egyptian oasis and the Nile. Together with the core farming activity, agricultural activities, involving imported plant species, were also important in the Nile Valley.

The occupation of the region reached a peak in the Holocene period. The expression *Saharan Neolithic* (also identified as *Sharo-Sudanese Neolithic* by G. Camps) refers to a spectrum of cultural traits that emerged between 10,000 and 5,000 in the central area of the Sahara, between 15' and 25' N. lat. Among the innovative aspects that characterize these cultures (that include a series of technological traits, artistic aspects, and settlement patterns), the production of pottery and food preparation, in the context of a pastoral economy, are no doubt the most important elements.

With regard to cultivation processes, the only available evidence indicates the use of species of the millet and sorghum group.

The beginning of the transformation in living habits in the Sahara region coincided with the onset of rainfalls and with the consequent reoccupation of the territories that had been practically abandoned during the arid phase that reached its peak around 20,000. In the transition phase between the Pleistocene and the Holocene, the types of culture that developed were based on the exploitation of water resources that determined a lifestyle that the archaeologist J.E.G. Sutton defined as "water culture." At first, this definition was criticized by many; today it is considered appropriate.

The most reliable sequences in Egypt, Libya, and Niger date the first occupations of the Sahara to the period in which the monsoon cycle stabilized again in the earliest phase of the Holocene. The Nabta and Bir Kiseiba sequences, in Egypt's western desert, begin at the end of the long arid period that followed the Aterian humid period.

The first occupation at Bir Kiseiba (called el-Adam phase, between 10,000 and 8,200 B.P.) is important because here remains of oxen were found (dated between 10,220 and 9,460 B.P.) in the E-79-8 site. The el-Nabta Neolithic type (between 8,100 and 7,900 B.P.) is characterized by the recolonization of the region at the end of a phase of extreme aridity that was followed by the onset of a new humid phase.

During this period, more regular rainfalls allowed more stable settlements and the establishment of a permanent village, Nabta E-75-6, that is similar to Ti-n-Torha east in the Acacus area, Libya. Many comparisons have been made between the lithic industry found in the E-75-6 site and the industries of other sites in the western part of the desert, like Wadi Bakht in Gilf el-Kebir, Abu Ballas and Lobo opposite the Great Sand Sea, the Masara B horizon from Dakhla, and the Early Holocene horizon in Farafra.

In Libya, the sequence of the main occupation has been identified in the Tadrart Acacus mountains that, together with the Algerian massif Tassili n'Ajjer, constitutes the most important cave art complex in the Sahara. In the Wadi Ti-n-Torha (Barich 1987), Ti-n-Torha East appears to be a real proto-village with a series of hut bases close to the rocky sides of the *wādī*. The types of fauna indicate an economy based on hunting, fishing, and gathering. Some very baldy preserved remains of a large-sized bovine (that date to between 8,500 and 8,000 B.P.) is worth mentioning. Gautier suggested the remains were of a domestic ox, a hypothesis that was not confirmed by the research carried out later. The stratigraphic series that are visible in the three Wadi Ti-n-Torha sites (East Shelter, the Two Caves site, and the North Shelter) cover the whole period of the Early Holocene.

The sequence at Niger also displays a series of stratigraphic and chronological similarities with the situation in Libya. The research carried out by J. Desmond Clark in Wadi Greboun and in Adrar Bous identified an Epipaleolithic culture (Kiffian) in the eighties; more research by J.P. Roset brought into light sights that date to around the same period which are Temet 1 (between 9,650 and 9,450 B.P.), Ti-n-Ouaffadene (9,360–9,080 B.P.), and Adrar Bous 10 (9,220–8,840 B.P.). The lithic complexes are of an Epipaleolithic type, though they also display a rich pottery tradition. On the whole it has been observed that there is a large chronological gap between the first remains of what is believed to be domestic oxen in the western desert and the remains found in other regions, Sahara and North Africa. In Niger the sites of Dogomboulo (between 7,100 and 6,600) and Rocher Toubeau (5,650–5,500 B.P.) are the first examples of an occupation that dates to the Mid-Holocene based primarily on farming. The lithic complex of this horizon (Tenerian) is characterized by large bifacial tools such as gouges, disks, arrow heads, and polished axes. An almost complete skeleton of a domestic ox (*Bos taurus*) found at Agorass n'Tast was dated to between 6,250 and 5,250 B.P.

In the area of Uan Muhuggiag, the presence of domestic oxen from the VIII millennium B.P. is certain, although the fauna of the region included also many wild species. In the period between 6,000 and 5,000 B.P., the pastoral culture spread to the entire Central Sahara region.

The description of the Neolithic *of* Sudanese tradition given by A.J. Arkell was based on the similarities between decorative motifs, the wavy line motif, and the dotted wavy line motif that can be found both in the Sahara and in Sudan. Arkell dated the Khartoum Mesolithic, the most ancient, to around 8,000 B.P. Today it is believed that the economic transition in Sudan should be considered in connection to the arrival of groups from other regions that brought with them domestic species. The region of Nabta Playa, in the north, has been indicated as one of the places from where these domestic species arrived after having crossed the Nile Valley.

At the beginning of the Holocene (around 8,000–5,000 BCE), Upper Egypt was occupied

by populations with lithic industries of local Late Pleistocene tradition. They are the Tarifian (about 8,000–6,000 BCE) in Thebes, Elkabian (about 6,500–5,000 BCE) in the region of el-Kab, and Qarunian, initially defined Fayyum B (about 6,100–5,200 BCE), in the Fayyum depression. The Elkabian and the Qarunian are associated with a number of remains of fish that confirm an intensive exploitation of water resources.

The so-called Early Khartoum Mesolithi culture, originally thought to have been confined to the areas surrounding the Nile, seems to have spread widely in semidesert areas. There were therefore two residential zones, between the Nile and the mountains: the area by the river, inhabited during the arid season, between October and June, and the area inland, inhabited during the rainy seasons, in summer. The two areas were equipped with sites for functional and seasonal specialization and hunting stations installed on the peaks of the many *gebels*, within an 8 km radius around the inhabited sites. These have been identified as living quarters because of the deposits found in very thick stratifications. The presence of many burial sites is an indication of the custom of burying the dead inside the village, by the entrance of the huts.

The sites of this early phase are dated in Central Sudan to between 8,000 and 6,500 B.P. (Caneva 1983; Caneva et al. 1993). They are all characterized by the presence of the earliest type of Sudanese ceramics, pottery items of various sizes, generally large, globular shaped and made with a fine and well-baked clay, with a lithic filler and a surface decorated by impression or engraving. The most significant ornamental motif that is present on more than 20 % of the items is the wavy line combed motif that gives the name to this culture and constitutes the distinctive trait of the Sudanese culture if compared to the coeval Saharan.

The horizon that followed, the Late Mesolithic dotted wavy line pottery, is defined by the sudden appearance of a more uniform pottery production, characterized by a more fragile consistence, by a less sophisticated baking process, and by decorations obtained solely by impression with combs that create a wolf-tooth motif, often a dotted wavy lines. The appearance of this type of pottery dates to 6,100 B.P. like the other type and has the same stratigraphic position as the wavy line pottery, in all the sites where it has been observed, like Shaqadud (Marks & Mohammed-Ali 1991) and Kabbashi (Caneva et al. 1993). The groups that produced it, hunters, as in the first culture, occupy the same area by the river and the same inland territories, though in a less intense and articulated way and for a shorter period of time. The simultaneous appearance of a uniform pottery, identical to the one of Central Sahara and of the regions confining with Chad, suggests that the groups of hunters that gradually migrated towards the Nile Valley came from these regions.

C14 dating, all around 6,100 B.P., indicates that this development took place in a very short time. The pastoral groups, dated to between 5,800 and 5,500 B.P. that came from the same Saharan regions, only arrived in the Nile Valley 200 years later. Domestic animals were certainly imported into Sudan from northwest African regions. The characteristics of the first cultures with an economy based on production in Sudan are the same as the Saharan ones, though they seem to have undergone an *itinerant* process, in the course of a slower migration process, that was probably more divided and fragmented compared to the first culture, having been carried out by several groups at different times. From this moment, a continuous development towards nomadic pastoralism can be traced in Sudan.

Researches in the western desert carried out in the last twenty years by R. Kuper (1993) have shown that the desert was crossed more than inhabited and that the majority of sites identified dates to later periods, post-Neolithic, in particular to the type called Halbmond Leiterband because of its characteristic pottery decorations (4000 B.P.).

Cross-References

- ▶ African Stone Age
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaic *Homo sapiens*
- ▶ Fossil Records of Early African *Homo*

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North and Saharan Africa: Geography and Culture During the Lower Stone Age

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State of Knowledge and Current Debates

North and Saharan Africa: Geomorphology and Climatic History

North and Saharan Africa constitute a vast geographical region delineated by the Mediterranean Sea to the north, the Red Sea to the east, and the Atlantic Ocean to the west. The Sahara desert sands are bordered to the south by the *Sahel* savannah grasslands, a shifting transitional ecoregion in perpetual expansion and contraction under the impulse of cyclical climate change. Presently, North Africa partly or wholly embraces Morocco, Algeria, Tunisia, Libya, and Egypt, while Saharan Africa includes the northerly sectors of Mauritania, Mali, Niger, Chad, and Sudan. The most striking geomorphological feature of this region is, of course, the Sahara desert, a vast platform punctuated by high plateaus and mountain ranges whose foundations are composed of Precambrian era rocks. This ancient platform was warped up, denuded, and eroded over time into swells and basins. Sandstone and limestone deposits were accumulated after global warming during the Cretacious Period that caused huge areas of the Sahara to be submerged. Organic oceanic sediments amassed during this period were transformed into the petroleum and natural gas deposits that are currently exploited by countries like Libya, Algeria, and Nigeria. Over the following millennia, extensive and recurring erosion stripped sediments of the organic nutrients needed for agriculture but maintained their component mineral deposits (bauxite, salt, manganese, iron, gold, copper, uranium). This wealth of natural resources spurred the development of geological research and surveying in the Sahara desert. Explorations for natural resources have indirectly contributed to the growing awareness of this region's prehistory by tracing its geological and geomorphological past and by providing a framework for the understanding of the appearance and evolution of human life in this expansive territory (Fig. 1).

Today, the Sahara represents a variety of landscapes bordered by coastal areas comprising the majority of the population. Inland, the topography is relatively monotonous, punctuated by sandy deserts, ridges and basins, and mountains and valleys. The land ascends gradually from the western Atlantic shoreline to form vast plains, and the northerly Atlas Mountain range culminates at Mount Toubkal at an altitude exceeding 4,000 m. Long, profound valleys cut into the plains that extend southwards from the Atlas Mountains, reaching into the Algerian Desert regions. Southern Algeria's Hoggar Mountains (3,000 m) and the Emi Koussi volcano (3,500 m) in northern Chad's Tibesti massif are among the most important elevations of today's Sahara. Occasionally, oases with their associated vegetation break with the general aridity of the desert. The mythical great Nile River marks the overall landscape as it flows northwards out of Ethiopia, through Sudan and into Egypt, where its huge delta spews fresh water into the Mediterranean Sea. Remarkable expanses of desert surround this vital water source. Other, massive expanses of sand deserts are those of Algeria's Great Erg and Libya's Fezzan basin. The central regions of the Sahara, from southern Algeria to western Sudan, are characterized by barren plateaus and hills with a mean altitude of 180–365 m (Fig. 2).

Throughout the Quaternary Period (c. 2.5 Mya), the Sahara offered diverse climatic scenarios that culminated in a variety of landscapes, including tropical and savannah-like environments well suited to a broad spectra of large and small mammals, including hominins. At the onset of the Quaternary, intense rainfall severely eroded the highlands, redepositing masses of sediment and developing important water systems

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 1 Satellite image showing the countries presently included in North and Saharan Africa

and alluvial terraces. These waterways constitute the single most important element permitting early humans to occupy and settle the northerly sectors of the African continent. Lakeside regions developed providing ideal settings for human life, and river valleys constituted passageways permitting populations to disperse into new territories. Looking at the Sahara desert today – one of the most inhospitable places on earth – it is difficult to imagine that it once provided a flourishing environment favorable to human life. In fact, desertification of the region began only some 4–5 Kya, when shifts in the earth's axis caused temperatures to increase and precipitation to decrease. From that time, the area suffered the transformation of its tropical plant life into savannah grasslands that finally culminated in the installation of desert conditions.

Much of North African Quaternary climatic history has been interpreted by comparing its geomorphological and stratigraphical associations with evidence from the European Mediterranean coastal areas, notably some well-dated sequences from Italy, France, and Spain. A well-established sequence of fossil shorelines has been proposed especially for the Atlantic facade of Casablanca, as well as in other regions of Morocco and Algeria. Correlations have also been established using paleoclimatic data obtained from deep-sea cores or pollen and vegetation sequences. In North and Saharan Africa, as elsewhere, cyclical climatic change characterizes the Quaternary Period, and its glacial/interglacial dynamics caused variations in pluviosity, marine transgressions, and regressions, as well as in isostatic phenomenon. The most significant effect of climate change

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 2 Present-day desert landscapes from western Morocco – near the junction between Morocco, Algeria, and Mauritania. Sparsely wooded, savannah-like landscape (*above*). Denuded and eroded primary rock surface (*below*) (Photos Jordi Mestre, IPHES, Spain)

influencing the spread of early humans into this zone was certainly the periodic extension of the Sahara desert (Arouaghe 2006). Landscape settings shifted throughout the Pleistocene from dryer, desert conditions to tropical savanna with sparse forest containing Mediterranean essences. These settings provided the ecological conditions necessary to harbor a wide variety of large mammals, many of which were of Afro-tropical origin. Although the likelihood that hominins formed a part of migratory waves of animals moving out from similar landscapes to the south and to the east at specific times throughout the Quaternary, there is a paucity of evidence of human activity in this area during the Lower Stone Age (LSA = European Lower Paleolithic).

Many of the large mammals sustained in the region from the Late Pliocene into the Upper Pleistocene underwent slight or no anatomical change and therefore present little biochronological significance. The earliest Pleistocene, characterized by a general lowering in temperatures and increased aridity, is distinguished by open landscapes populated with large, grazing herbivores. Temperatures and pluviosity augmented from around 1.2 Mya, favoring the establishment of extensive water systems and their corresponding forest environments. From

around 0.9 Mya, temperatures decreased, degrading landscapes and provoking important changes in corresponding faunal associations. The beginning of the Middle Pleistocene, from 0.78 Mya, is marked by the return of higher temperatures, while the Upper Pleistocene, from around 0.12 Mya, was considerably colder and dryer (Agustí et al. 2009).

Except for intense research in the Atlantic coastal region of Morocco (the Casablanca cave sequence) and in Algeria (Ternifine, Ain Hanech, Ain Boucherit), North and Saharan Africa have been neglected in terms of Early Paleolithic research, especially when compared to East and South Africa. But recent findings have highlighted their importance as a source of knowledge about our shared, distant past. The once widely accepted hypothesis postulating a unique emergence for humanity – east of the great African Rift Valley (*East Side Story*, Kortlandt 1972; Coppens 1994) – has been under question since 1993, when fossil hominins dating to 3.6 Mya were discovered nearly 2,500 km west of the Rift Valley, near Koro Toro in Chad (Brunet et al. 1995). The finds were attributed to a new species of australopithecine named *Australopithecus bahrelghazali*, commonly referred to as "Abel." Just a few years later, in 2001, new fossils were brought to light in the Chadian, Djurab Desert belonging to a bipedal hominin nearly 7 Myrs old. These hominin remains, denominated *Sahelanthropus tchadensis* or "Toumaï," were also recognized as belonging to a new species and are thought to represent one of the earliest human ancestors, perhaps the closest yet to the chimpanzee-*Homo* divergence. These important discoveries have established Saharan Africa as a key zone for the emergence, evolution, and diffusion of ancient hominins.

Europe and Africa have been separated by the Mediterranean Sea ever since the Atlantic Ocean breached the landmass joining these two continents over 5 Mya. This natural barrier favored evolutionary divergence of humans and other species on either side of the divide, but it did not entirely impede their passage from one to the other throughout the different phases of the Quaternary Period. Although relatively little is known of the timing and mechanisms through which such migrations occurred, growing evidence of a hominin presence in Eurasia from the Early Pleistocene underlines the key role played by the northerly regions of Africa. This region constitutes an obvious geographical crossroads, a sort of greenhouse where favorable conditions encouraged the growth of human culture and socialization that would eventually enable them to establish the demographic success necessary for their spread into Eurasia (discussed below).

Pioneering archaeological and geological research began in North Africa during the late nineteenth century, notably along the northern Atlantic coastline near Casablanca, revealing evidence of a long succession of human cultures in the area. Except for some precise dating carried out on the Casablanca sequences (OSL, U/Th, ESR, Raynal et al. 2010), the specific geomorphological history of the region has not proven particularly favorable for radiometric dating techniques. Overall, difficulties in obtaining reliable radiometrical dates for artifact-yielding sediments of North African sites have impeded establishing a chronostratigraphical framework within which to place the archaeological finds. Unlike in the East African Rift Valley, North Africa has undergone modest volcanic activity during the Quaternary – its sedimentological record does not offer the same context of successive layers of datable tufa and/or volcanic ash separating neatly stratified deposits. Nor has the region known comparable tectonic activity that, in the East African Rift Valley, exposed the huge stratified sequences that provide a virtually uninterrupted record of fossil-bearing sedimentary sequences for the entire Plio-Pleistocene. Well-preserved fossils and artifacts within datable, sequential volcanic deposits have made East Africa an ideal ground for spectacular discoveries in a well-calibrated chronological framework. Extensively documented research carried out in the Rift Valley since the 1970s, for example, in the Hadar region, Omo Valley, Koobi Fora, and Olduvai Gorge (Ethiopia, Kenya, Tanzania), provides a foundation with which to compare North African faunal, hominin, and lithic discoveries, helping to establish their own chrono-cultural

evolutionary trajectory. The difficulties in elaborating this framework have steered systematic archaeological research away from the earliest phases of the Paleolithic in the Sahara and Maghreb regions and towards the more recent periods such as the Neolithic and the Bronze Age.

Lower Pleistocene (Gelasian Stage, 2.588–1.806 Mya)

Pre-Acheulian/Oldowan/Mode 1

The earliest cultural manifestations of the Lower Stone Age (LSA) are referred to as *Pre-Acheulian*, *Oldowan*, or *Mode 1*. These denominations, corresponding to the *variability* phase of human cultural evolution (Carbonell et al. 2009), are poorly represented throughout North and Saharan Africa. In contrast, elsewhere on the continent, notably along the East African Rift Valley, discoveries are multiplying, and the age of the earliest stone tool assemblages has recently been pushed back to 2.6 Mya (Semaw et al. 1997). So far, the oldest stone assemblages are known only from this part of the globe and are characterized by worked pebbles and nonmodified flakes. In Africa, the period covered by the cultural umbrella most often referred to as the "Oldowan" is situated between c. 2.5 and 1.7 Mya. From around 2 Mya, stone industries tend to increase in technological variability, and some assemblages include polyhedrons and/or spheroids.

Following discoveries in East Africa, *Homo habilis* was commonly accepted to be the author of the first stone tool industries. But other hominins, such as robust and gracile australopithecines, are also present at some sites during the same time frame. These hominins have been found in possible or probable association with cut-marked bones and/or knapped stone industries (Leakey 1971; Howell et al. 1987; Sussman 1991; Kimbel et al. 1997; de Heinzelin et al. 1999; Kunman & Clark 2000; McPherron et al. 2010). While the evidence for australopithecines and early *Homo* and their stone industries dating to this time frame is comparatively abundant in South and East Africa, not a single hominin fossil attributed to this period has yet been discovered in North or Saharan Africa. In the future, exploring the earliest phases of hominin expansion into this region will be essential to understanding how they survived and proliferated in the face of the changing paleoenvironmental conditions of the Quaternary Period. North and Saharan Africa certainly holds unexploited information fundamental to understanding the key phases of early human morphological evolution and how stone technologies allowed them to develop culturally and socially, eventually favoring their demographic spread into other regions of the globe.

Migrations of other species from South and East Africa into North and Saharan Africa are documented at the paleontological site of Ahl al Oughlam, a quarry located at Casablanca (Morocco) and dated to 2.5 Mya (Raynal et al. 1990; Geraads 2006). This site has yielded a rich collection of large fossil vertebrates, including tropical species such as elephants, giraffes, rhinoceros, horses, Hippotraginae, and Tragelaphinae, as well as numerous amphibians, reptiles, and birds. In spite of the wide variety of large and small vertebrates found there (over 60), no evidence of a human presence has yet been identified.

The warmer and wetter climatic conditions from around 1.8 Mya witnessed the development of important river systems that crisscrossed the region, depositing thick alluvial deposits. Resulting lakes and marshes provided favorable conditions for a lush, forested environment rich in biological diversity. To date, Algeria boasts the only two excavated sites so far attributed to this period: Aïn Hanech and El Kherba (Sahnouni & de Heinzelin 1998, 2005, 2006; Sahnouni et al. 2002, 2010). These two open-air sites are located in floodplain deposits at the edge of the eastern sector of the Algerian high plateau (Sétif Province). They have yielded a rich faunal assemblage in association with stone tools, knapped from local limestone and flint. The assemblages include cores, sub-spheroids, spheroids, flakes, and retouched pieces. Because of their low degree of formal standardization, their lack of hand-axes or cleavers, and the presence of spheroids and orthogonal flaking, these industries are attributed to the Oldowan techno-complex. The age of the sites has been evaluated using paleomagnetic and biochronological criteria to between 1.95 and

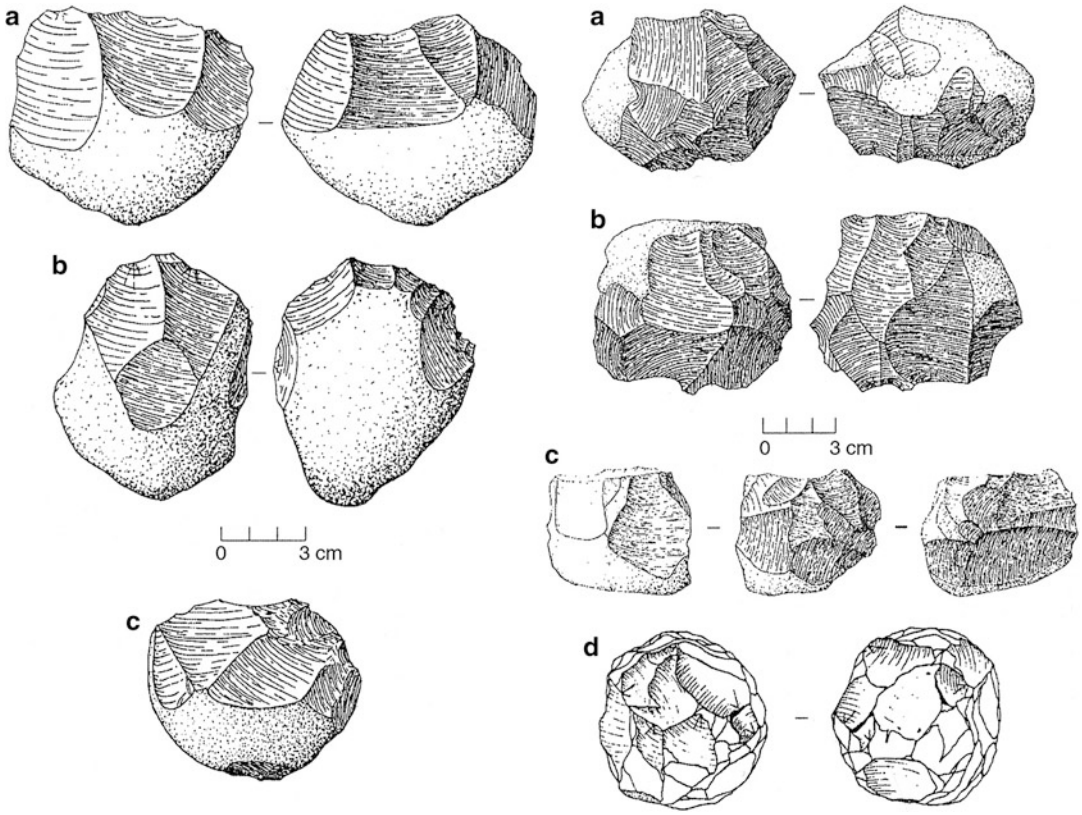

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 3 Typical Oldowan tools from El Kherba and Ain Hanech in Algeria, 1.8 Mya. *Left*: (**a**) and (**b**) are from El Kherba (Redrawn by de Heinzelin); (**c**) is from Aïn Hanech (Drawn by de Heinzelin). *Right*: (**a**), (**b**), and (**c**) are from Aïn Hanech (Redrawn by de Heinzelin); (**d**) is from Aïn Hanech (Drawn by Wilkerson) (Sahnouni & de Heinzelin 1998)

1.77 Mya (Sahnouni et al. 2002). Paleoenvironmental conditions assessed for this time frame from faunal remains and radio carbon isotopes confirm the dominance of an open, grassy landscape with sparse woodlands and indicate a progressive increase in aridity over time (Sahnouni et al. 2010). Species of biochronological interest include *Kolpochoeros heseloni*, *Dicerorhinus africanus*, and *Anancus* (Sahnouni & van der Made 2009) (Fig. 3).

Elsewhere in Algeria few other Oldowan occurrences are well documented. The El Mansourah open-air site, for example, has yielded Oldowan industries analogous to those from Aïn Hanech, without hand-axes and cleavers. The faunal assemblage shows similarities to Aïn Hanech, but some species may indicate that the site is slightly older (Chaid-Saoudi et al. 2006). However, further research is required in order to establish the relationship between the stone industries and the faunal remains. The faunal list includes *Kolpochoeros*, a suid indicative of the Lower Pleistocene. The bovid *Tragelaphus* cf. *gaudryi* predates the *Tragelaphus algericus* from the Early to Middle Pleistocene site of Ternifine. The presence of *Hippopotamus* and *Reduncini* indicates a nearby water source.

Throughout the rest of North and Saharan Africa, additional evidence for the presence of human populations producing Oldowan-type industries is sparse and, as we have noted, systematic research for the earliest phases of hominin evolution has yet to be developed. In Libya, for example, there have been spot finds of Oldowan tools (worked pebbles) and Acheulian tools (hand-axes, cleavers), but they lack

precise chronostratigraphical information. The same is true of Egypt, where only isolated finds have been cited (Vermeersch et al. 1990). The situation is similar for the more southerly regions of Saharan Africa, in Mauritania, Mali, Niger, Chad, and Sudan, where there is a paucity of excavated sites and/or spot finds attesting to the presence of early hominins. While to date there have been no finds of hominin remains dating to the Oldowan time frame, sparse discoveries of their tools attest nonetheless to their presence in North and Saharan Africa, establishing the region as a foothold for understanding the subsequent emergence of ever more numerous prehistoric civilizations, both inside and outside of Africa.

Early–Middle Pleistocene (Calabrian Stage, 1.806–0.781 Mys, to Ionian Stage, 0.126–0.781 Mys)

Acheulian/Mode 2

During the *Acheulian* or *Mode 2*, the evidence for stone industries belonging to the *diversity* and *multiplicity* phases of human cultural evolution (Carbonell et al. 2009) becomes relatively more abundant throughout North and Saharan Africa. Cutting tools such as hand-axes and cleavers shaped on large flakes (LCT's: L > 10 cm, Sharon 2009) and references therein are emblematic of this new phase of human technological know-how. Throughout the Acheulian, stone knapping was often performed using bifacial technology to extract flakes from disc-shaped cores. Small retouched toolkits appear and develop extensively to include several varieties of converging scrapers (pointed tools). In Africa, the emergence of Acheulian technology is generally believed to coincide with the appearance of *Homo erectus*. Behavioral changes accompanying the acquisition of new and advanced technological skills are perceivable in the archaeological record. Among the latter, higher group mobility, increased social complexity, and improved hunting capacities are important acquisitions.

To date, the oldest known Acheulian industries have been discovered in Kenya, at Kokiselei 4, and in Ethiopia, at Konso-Gardula, dating, to around 1,75 Mya (Lepre et al. 2011; Beyene et al. 2013). By around 1.5 Mya, sites with Acheulian industries became increasingly numerous in South and East Africa (Leakey 1971; Piperno & Bulgarelli-Piperno 1974; Isaac & Harris 1978; Texier 1995; de la Torre 2011). The increase in the number of sites as well as in individual site densities probably indicates the adaptive success linked with newly acquired technological skills. Sites with continuous stratigraphical sequences covering this time range, such as Olduvai Gorge or Melka Kunturé, bear witness to the generalization of this transition. Acheulian industries are present on the continent up to around 0.3 Mya when they are progressively supplanted by the Middle Stone Age (MSA) industrial complex.

Nascent Acheulian culture (*diversity* phase, Carbonell et al. 2009) in Africa thus coincides with the installation of the more humid climatic conditions characterizing the beginning of the Calabrian or the earliest Lower Pleistocene (c. 1.7 Mya). Human expansions outside of Africa apparently coinciding with this new cultural phenomenon took place within the context of the more arid conditions of the second half of the Early Pleistocene (c. 1.4 Mya, Ubeidiya, Israel, Bar-Yosef & Goren-Inbar 1993; Agustí et al. 2009). This second phase is marked by human demographic growth and the progress and complexification of Acheulian-producing populations inside and outside of Africa. The shift in climatic conditions also spurred a new wave of faunal migrations, with the arrival in North Africa of new species of east African origin, such as *Connochaetes*, *Theropithecus*, and *Elephas atlanticus* (Arouaghe 2006).

Just prior to the onset of the Middle Pleistocene, at least 1 Mya in North and Saharan Africa, Acheulian industries and/or *Homo erectus* fossils are relatively well documented. Nevertheless, the paucity of organized research programs in the region explains why much of the material has been recovered only from isolated finds without chronostratigraphical context. Distinctive features of early Acheulian industries in North and Saharan Africa include the mastery of large flake production from giant cores using technologies

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 4 Accumulation of Acheulian tools in place at Yeslem II (*left*). Large-sized cleaver from Yeslem II (*right*) (Adrar Region, Mauritania, Lumley et al. 2006)

specifically developed for the production of supports for large cutting tools (such as bifacial, sliced slab, Kombewa, Victoria West, cobble opening flake or *éclat entame*, Tabelbala-Tachenghit, or Levallois, Tixier 1956; Biberson 1961; Balout et al. 1967; Alimen 1978; Sharon 2009), an impressive array of retouched tools and the widespread use of discoidal knapping technology for flake production. On a wider scale, analogous characteristics exemplify not only the African Acheulian but also some other assemblages from the Iberian Peninsula, India, and the Levant (Santonja & Villa 2006; Goren-Inbar et al. 2000; Pappu et al. 2011).

Apart from the very large size of some of the stone implements, another distinctive – and intriguing – feature of the North and Saharan African Acheulian is the sheer density of LCTs present in some areas. The existence of huge surfaces literally "paved" with hand-axes and cleavers poses important problems of interpretation of these occurrences. It seems plausible that vast areas of North and Saharan Africa where such accumulations have been cited constitute zones of frequentation by hominin groups over thousands of years, probably connected with waterways. The combination of high occupation frequency and very slow sedimentation could help to explain the abundance of stone tools found in some cases (Fig. 4).

Given problems related to obtaining precise chronological information for many of the finds, attempts were made early on to create a chronological framework based on the overall morphology of LCTs, particularly hand-axes and cleavers (Tixier 1956; Biberson 1961, 1967). In general, the more thoroughly knapped and symmetrical pieces were thought to be more recent than more partially or less "finely" worked pieces. However, research has since revealed that the concept of a progressive morphological symmetry observable over time is not a valid chrono-cultural notion. On the contrary, some Acheulian sites with long stratigraphical sequences demonstrate that hand-axe morphology sometimes shows an inverse tendency, with the more elaborate tools representative of the older levels and the more partially manufactured pieces exhumed from the more recent levels (in Syria, e.g., at Nadaouiyeh I, Le Tensorer et al. 1993, or in France, at the Caune de l'Arago, Barsky & de Lumley 2010). Today, other factors are known to influence the overall morphology of stone tool industries, such as raw material

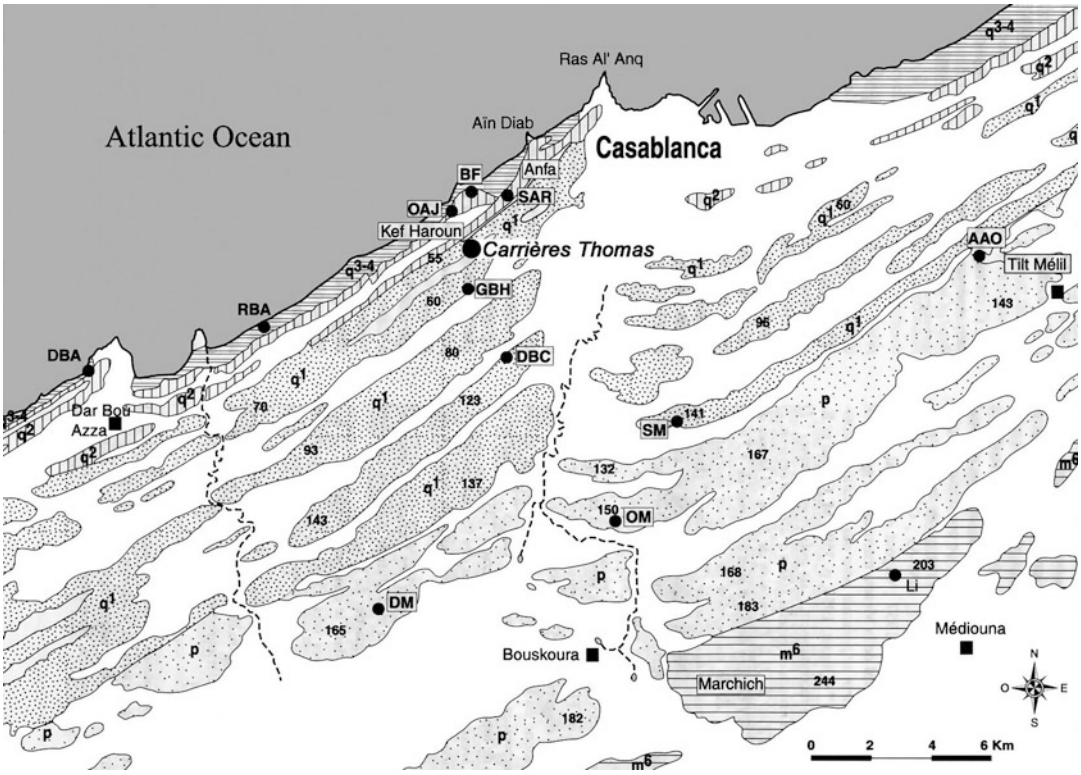

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 5 View of the Miocene, Pliocene, and Pleistocene sedimentary sequence in the region of Casablanca in Atlantic, Morocco. The sections exposed by quarrying provide an exceptional sedimentary record covering nearly 6 Myrs. A number of archaeological cave and open-air sites dating to the Early and Middle Pleistocene were discovered and excavated here since the early nineteenth century. These sites constitute the best known reference for the appearance of *Homo erectus* in North Africa and the development of Acheulian culture (After Raynal et al. 2010). q^{3-4} – Upper Pleistocene and Holocene, q^2 – Middle Pleistocene, q^1 – Lower Pleistocene, p – Pliocene, m^6 – Miocene (Messinian). Sites illustrated: Thomas Quarry (Thomas I, III, Oulad Hamida 1); AAO, Ahl Al Oughlam; BF, Bir Feghloul; DBA, Bar Bou Azza; DBC, Dar Bouchaïb Oulad Caïla; DM, Douar Mouhak; GBH, Ghandour Ben Habib; Li, Lissasfa; OQJ, Oulad Aj J'mel; OH, Oulad Hamida; OM, Oulad Malik; RBA, Reddad Ben Ali; SAR, Sidi Abderrahmane Quarries; SM, Sidi Messaoud (Raynal et al. 2010)

quality and availability as well as differences in site function (as in the Acheulian sequences of Atapuerca's Gran Dolina and Galería, Ollé et al. 2011).

Major Acheulian Occurrences in Chronostratigraphical Context

The earliest and best documented evidence of Acheulian culture in North and Saharan Africa is from the Casablanca sequence in Atlantic Morocco. Situated on a plateau (or meseta) of northwestern Morocco, between the Atlantic coastline and the Middle Atlas Mountain range, Casablanca is well known for its exceptional stratigraphical sequences covering nearly 6 Myrs of geological and archaeological history. The huge sections composing these formations were fortuitously exposed after extensive quarrying was carried out to accommodate Casablanca's expanding urban context. The thick deposits are characterized by a series of barrier beaches of marine and eolian origin, disposed parallel to the present-day shoreline (Fig. 5). Formed by the gradual uplifting of the Moroccan coastline, the age of each of the stepped, dune-covered beaches increases progressively as one moves inland. The successive phases of marine and continental deposition

exposed by quarrying in the sections exposed near Casablanca provide a unique opportunity to observe the paleo-littoral context of the region and its evolution over time. They continue to provide a solid foundation for the establishment of the chronostratigraphical framework, for the Maghreb, and beyond.

Since explorations and research were initiated in the first quarter of the last century, the Casablanca depositional sequence has been the object of intense research aiming to understand the mechanics of its formation and to establish a chronostratigraphical framework within which to place its important archaeological occurrences (Neuville & Ruhlmann 1941; Lecointre 1952; Dresch et al. 1952; Biberson 1961; Lefèvre & Raynal 2002 and references therein). Early excavations carried out at Sidi Abderrahmane (Schneider Quarry) revealed for the first time the great antiquity of the human presence on the Moroccan coastline (Neuville & Ruhlmann 1941), attracting early on the attention of eminent prehistorians like Abbé H. Breuil (Institut de Paléontologie Humaine, Paris). Progressively, exploitation of the quarry was to disclose the existence of other cavities containing archaeological material (*Rhinocéros, grotte de l'Éléphant, grotte de la Gazelle, grotte du Cheval, Cap Chatelier*). Even though the area was classed as a cultural heritage site in 1951, it has been poorly protected, and the degradation of the relationships between quarry workers and archaeologists eventually led to the partial destruction of the sites and unfortunate losses of many of the artifacts.

Biberson exhumed the first remains of *Homo erectus* in 1955 from the *Grotte des Littorines*, including a fragmentary mandible, in association with Acheulian tools and abundant Upper–Middle Pleistocene faunal remains. The human bones were promptly attributed to a new species: *Atlanthropus mauritanicus*. Following a period of neglect lasting nearly 20 years, new excavations were finally undertaken in 1978 thanks to the initiative of the *Service de l'Archéologie du Ministère des Affaires Culturelles du Royaume du Maroc* and then under the direction of the *Institut National des Sciences de l'Archéologie et du Patrimoine* in collaboration with French researchers. The excavations undertaken in the 1950's by Biberson gave rise to the first typological lexicon defining primitive stone industries. This work provided one of the first foundations for a synthetic chrono-cultural framework alongside the widespread lexicon defined by Mary Leakey, based on her monumental work on the lithics from Olduvai Gorge (1971).

Today, multidisciplinary research continues to work towards the realization of a coherent correlative synthesis between regional stratigraphy and global glacio-eustatic events in order to precisely evaluate the age of the artifact-yielding deposits of the Casablanca sequence (Texier et al. 1994, 2002; Lefèvre & Raynal 2002). A joint project between France and Morocco has undertaken systematic explorations of the region since 1988 (Raynal & Texier 1989). Different methods have been applied in attempts to establish a reliable chronology (U/Th radiometrical dating, parallelisms with the well-calibrated northern Mediterranean littoral formations and glacial deposits, biochronological criteria such as the succession of foraminifera fauna documented in deep-sea cores). Some of the correlations are based on research carried out in central Italy (Ambrosetti et al. 1972) where a chronological framework has been elaborated according to parallelisms prepared between alternating periods of sedimentation and erosion and marine glacial oscillations by the intermediary of faunal and floral evolution (Fig. 5).

The earliest evidence for hominin activity from the Casablanca sequence comes from the Thomas-Oulad Hamida Quarries complex Unit L and Hominid Cave at Thomas Quarry 1, dating to the end of the Early Pleistocene. Other key archaeological sites identified around the Sidi Abderrahmane locality belong mostly to the Upper–Middle Pleistocene and are representative of the final phases of the Acheulian or the beginning of the MSA (Upper Pleistocene): Bears Cave, Cap Chatelier, Rhino Cave at Oulad Hamida Quarry 1, Sidi Abderrahmane Extension, and Sidi Al Khadir open-air sites.

The age of the hominin bearing archaeological Level L at Thomas Quarry 1 is evaluated to around 1 Mya (Raynal & Texier 1989; Raynal et al. 2002, 2009), making it the oldest archaeological site with hominin remains in all of North and Saharan Africa. Following systematic investigations at this site, carried out by P. Biberson (1961), a hemimandible of a robust hominin was unearthed in 1969 by P. Beriro and attributed in the same year to *Atlanthropus mauritanicus*. This attribution was based on finds discovered at Ternifine (Algeria) by C. Arambourg in the 1950s (Arambourg 1957; Ennouchi 1969). More recently, these fossils were denominated *Homo rhodesiensis* (Hublin 2001). The early hominins present at Casablanca are generally recognized to be within the variability of robust *Homo erectus* such as those from the Chinese site of Zhoukoudian or from Java, in Indonesia. Between 1994 and 2009, more human remains were exhumed from Thomas Quarry Hominid Cave, including a child's hemimandible, vertebra in anatomical connection, and isolated teeth, found in association with Acheulian tools and faunal remains (Raynal et al. 2010).

The rich faunal assemblage from Thomas Quarry 1 includes *Hippopotamus amphibius* s.1, *Eqqus mauritanicus*, *Ceratotherium simum*, elephants, *Gazella atlantica*, *Connochaetes taurinus*, *Ursus* sp., *Crocuta crocuta*, and *Theropithecus* cf. *atlanticus* translating an open, savannah grassland environment with sparse wooded areas (Geraads 1980, 2002; Geraads et al. 1980). Unfortunately, most of the species provide little biochronological information, and they persist in (North) Africa up to the end of the Middle Pleistocene. However, the presence of a third molar from the suid *Kolpochoeros* and the characteristics of the micromammalian assemblage both confirm an Early Pleistocene age for this site (Geraads et al. 1986).

The stone industries (Raynal & Texier 1989; Raynal et al. 2010), ascribed the *Early Acheulian*, were knapped from quartzite pebbles and blocks and flint nodules collected nearby. They include some hand-axes, cleavers, and pics on large flakes or pebbles, as well as worked pebbles and cores. Knapping technology was unifacial-unidirectional or discoidal. Some flakes were produced from polyhedrons. There are also some retouched tools.

Rhinoceros Cave, situated in the Oulad Hamida 1 Quarry, yielded Acheulian stone tools and numerous large vertebrate fossils, among which the white rhinoceros is particularly well represented. The faunal assemblage seems to indicate an open, relatively arid environment. The age of the accumulation is evaluated to around 0.4 Mya (by ESR on tooth enamel).

As a whole, the Casablanca complex provides essential information concerning the appearance of *Homo erectus* in the North African regional context and their evolution towards *Homo sapiens* in an area of the globe where no intermediary fossils (*Homo neandertalensis*, *Homo heidelbergensis*) have yet been brought to light. Furthermore, the Casablanca sequence, covering around 800 Kyrs of early human cultural evolution, offers a precious database for understanding the variability of Acheulian culture over time. The data so exceptionally preserved and brought to light at this locality is essential for understanding the scenario of early human migrations into Eurasia throughout the different periods of the Early and Middle Pleistocene (Fig. 6).

Fragmented skull parts found in 1933 near Rabat and the Salé cranium (0.4 Mya) found in 1971 show features reminiscent of *Homo erectus* but also display some more advanced characteristics evoking a local evolution to *Homo sapiens*.

In sum, evidence from the Atlantic coast of Morocco indicates the presence of Acheulian-producing populations from around OIS 17 to 5, thanks to a few key, hominin-yielding sites (Sidi Abderrahmane, Thomas Quarry, Oulad Hamida, Rabat, Salé), allowing to postulate that the transition from *Homo erectus* to *Homo sapiens* occurred in this region between around 0.4 and 0.2 Mya (Arouaghe 2006). This hypothesis is mainly based on the observation of changes in stone tool technology and human anatomical characteristics over time.

Another site in Morocco that yielded remains of *Homo mauritanicus* with Acheulian tools is Aïn Maârouf, an inland locality discovered in the 1950's (Choubert & Sittler 1957) near El

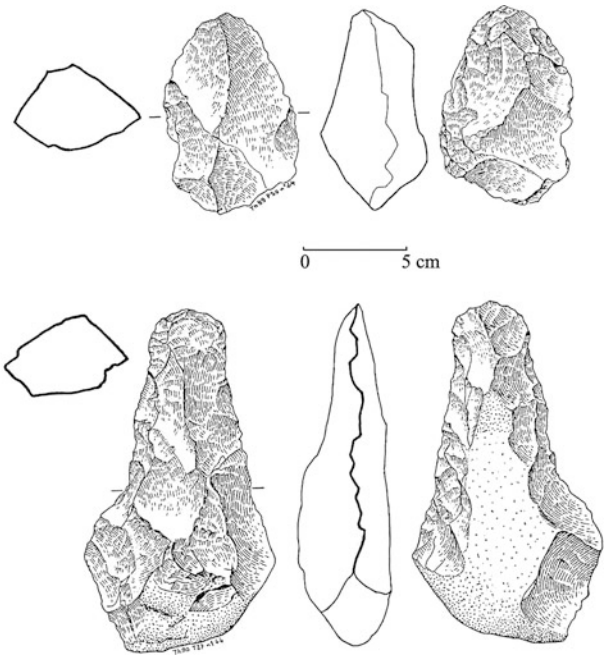

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 6 *Left*: *Homo mauritanicus* mandible from Thomas Quarry 1, Casablanca (Morocco). *Right*: Retouched tool and hand-axe emblematic of Acheulian culture – both from Thomas Quarry 1 (Raynal et al. 2010)

Hajeb, in an open-air context (Hublin 1992). This occurrence has also revealed fossils of large mammals such as elephants and hippos. The presence of *Antelope Parmularius ambiguus*, a species known elsewhere in North Africa only from Ternifine, suggests a chronological affinity between these two sites (Geraads & Amani 1997).

Elsewhere in North Africa, one of the most important Acheulian occurrences in a precise stratigraphical context is the Middle Pleistocene site of Ternifine (Tighenif; Palikao), located in Algeria, near the city of Mascara (Arambourg 1955; Arambourg & Hoffstetter 1963; Balout et al. 1967; Geraads et al. 1986). At this open-air site, large vertebrate fossils (elephant, rhino, hippo) were first unearthed from a dune embankment in the last quarter of the nineteenth century after quarrying was carried out for construction purposes (Pomel 1878, 1893–1897). Following initial excavations, the prehistoric stone industries found there were described by Tommasini (1886). The archaeological site, surmounted by a Muslim cemetery, was to be systematically exploited some years later when Arambourg recognized its archaeological potential after exploring the area in 1931. Arambourg undertook excavations in the water-logged basal sector of the mound and exhumed hominin remains (a parietal, three mandibles, and isolated teeth, Hublin 1985) that were attributed to *Atlanthropus mauritanicus* (within the range of Asian *Homo erectus*). These remains were found in association with stone tools ascribed to an *Early Acheulian* morpho-complex, as well as large vertebrate fossils (Arambourg 1955). The site was further excavated from 1981 to 1983 (Geraads et al. 1986).

The Ternifine site deposits are nearly 7 m thick and are composed of alternating layers of clays and sands accumulated from a nearby paleo-lake and the artesian springs that fed into it. Analysis of the surface of sand grains composing much of the infill revealed their eolian transport. The age of the archaeological levels has been assessed mainly from biochronological

criteria and paleomagnetic evaluations to c. 0.7 Mya (Geraads et al. 1986; Raynal et al. 2001). The kinds of animals collected from the different archaeological levels suggest an open, savannah-like environment surrounding the site. Taxonomically, Ternifine differs significantly from the older sites of Aïn Hanech or Aïn Boucherit, resembling more closely Thomas Quarry 1 at Casablanca (Geraads et al. 1986).

The stone industry includes pebble tools as well as a number of characteristic, large flakes shaped into hand-axes, trihedrals, and cleavers (Balout et al. 1967; Sharon 2011). These "heavy duty" tools were made from cobbles or slabs of sandstone, quartzite, and some limestone. In addition, there are some small flint flakes (Balout et al. 1967; Geraads et al. 1986). The "cobble opening flake method" (*éclat entame*) was used by hominins to obtain large flakes that needed only modest transformation to be shaped into hand-axes and cleavers (*LCT's*, Sharon 2009, 2011). Flat pebbles were used to extract *entame* and Kombewa flakes, a distinctive feature of the Ternifine industry that is observed at some sites in the Iberian Peninsula (Sharon 2011). This particular, shared technological know-how could have been transmitted via the Straits of Gibraltar some time after its development (Sharon 2011).

In Tunisia, the only excavated Acheulian site is Sidi Zin (El Kef, Belhouchet 2001), a locality discovered during geological research around Fef (Dumon 1942). Excavations revealed three distinct archaeological levels containing stone tool assemblages with limestone hand-axes and cleavers attributed to the Final Acheulian. Relatively numerous shaped tools (LCTs) are found with some worked pebbles and small cores and flakes knapped from local flint. The stratigraphical sequence is surmounted by a layer of tufa containing a "Mousterian" industry knapped in flint.

LSA Occurrences Lacking Precise Chronology

In Morocco, a number of open-air stations were once reported to contain scatters of Oldowan-type industries: Tardighet-er-Rahla, Douar Doum (Rabat), and Salé plateau (Biberson et al. 1958–1959; Biberson 1961), but these were later discounted because of their uncertain stratigraphical position and/or doubts concerning their anthropic origin (Debénath 2000). In northeastern Morocco, abundant and remarkably rich prehistoric sites that may be attributed to all periods of human cultural evolution, from the Oldowan through to the Holocene, attest to the continuous occupation of the area. But systematic research still needs to be developed to properly document the archaeological treasures of this region. The oldest occurrences are found in deeply eroded, staged alluvial terraces and conglomerates. Acheulian industries are sometimes found in scatters over surfaces thousands of square meters in diameter, but most occurrences are devoid of faunal remains, and the dating of the sandy, artifact-rich sediment continues to be particularly troublesome. Some of the sites contain lithics with rolled surfaces attesting to their transport after the erosion and dismantling of their original alluvial context.

In Algeria, there are numerous Acheulian findings in many regions, including the top of the sequence of Ain Hanech site. In the Algerian Sahara, the site of Erg Tihodaine (Djanet, Tamanrasset) has also been reported to present a good collection of Acheulian implements. In N'Gaous (N'Gaous, Batna) a travertine sequence contains different stratified Acheulian levels in open-air conditions (Sahed 2011). Other sites (Tabelbala-Tachenghit, Djebel Meksem, Tessala, Aoulef, Reggan, Saoura, Bordj Tan Kena) are attributed to the Early Pleistocene on the basis of the composition and general morphology of the stone industries they contain. Unfortunately, most are non-stratified scatters of industries, and they are generally lacking in associated fauna (Champault 1951; Balout 1955; Hugot 1955; Laplace-Jauretche 1956; Alimen & Chevaillon 1960; Ramendo 1963; Roubet 1967; Thomas 1973; Alimen 1978; Heddouche 1980).

One of the more interesting open-air sites is Errayah, situated in northwestern Algeria (Sidi Ali, Mostaganem). This site has provided a stratigraphical sequence containing two distinct archaeological levels with industries (flakes, retouched tools, worked pebbles, hand-axes, cleavers) believed to represent a sequence of

successive cultural phases from Early to Final Acheulian. Raw materials are from local sources and include sandstone, quartzite, and flint. This site is one of many discovered in 1996 during surveying near the coastline at Mostaganem (Derradji 2006). Excavated since 2001, the site's deposits are mostly sands, accumulated in a fluvial or lakeside environment upon a marly Pliocene substrate (Derradji 2006). Unfortunately, there is no fauna at Errayah, and no dates have yet been made available for this site.

A very rich Acheulian industry is described from another Algerian open-air site – El Mansourah (Constantine) – discovered in 1953. The assemblage is composed of some quartzite hand-axes and cleavers, worked pebbles, spheroids, cores, and flakes. Initially, the presence of trihedral forms alongside polyhedrons was interpreted to represent some kind of "intermediate" cultural manifestation between the spheroid-rich industries of Aïn Hanech and the more developed bifacial industries with which they continue to coexist (such as those from Ternifine (Laplace-Jauretche 1956)).

In Tunisia, Oldowan industries have yet to be documented in a precise stratigraphic situation. However, a few Acheulian localities have been mentioned after explorations that took place in the early nineteenth century. (E. Gobert). Still, the LSA is very poorly documented throughout the country: a few localities are known from Quaternary alluvials in the southwestern Tunisian high plateaus. Flakes, pebble tools, and hand-axes were found at two stations near Gafsa, El Mekta, and Redeyef. The latter has yielded some facetted polyhedrons in flint (Gobert 1910). Some bifacial choppers have also been reported from the northeastern coast of Tunisia (Gragueb & Oueslati 1990).

Studies of Pleistocene archaeology documenting the presence of Acheulian peoples in southern Egypt were methodically undertaken in the 1930's at Kharga Oasis (Caton-Thompson 1932) and also at Gilf Kebir (Bagnold et al. 1939). Acheulian industries are known from various localities to the south, essentially near the Sudanese border at Bir Tarfawi–Bir Sahara (Schilde & Wendorf 1975, 1981; Wendorf et al. 1976; Hill 2001). The Bir Tarfawi–Bir Sahara region is localized in the Darb el Arba'in Desert (Haynes et al. 1997; Hill 2001), one of the most arid regions of the world today whose history is marked by dramatic climatic change. During the wetter, pluvial periods of the Middle Pleistocene, the region was home to a wide variety of mammals, including hominins, living in a lush, forested environment. A few, isolated discoveries of Acheulian industries have been reported from the Saharan portions of Sudan, Chad, and Libya (Hill 2001). The presence of fossil springs at these localities underlines the need for a source of fresh water for the survival of early humans (Figs. 7 and 8).

In the westerly sectors of Saharan Africa, in Mauritania, pre-Acheulian and Acheulian industries were recognized as early as the 1930's, for example, in the outer ring of the Guelb er Richat structure, also known as the "eye of the Sahara" (Adrar region). The unique elliptical structure of the Guelb results from the differential erosion of rocks composing the dome. After explorations in the region, Théodore Monod discovered and described Early Paleolithic industries from El Beyyed, Oued Akerdeil, Tazazmout, and Aderg (Monod 1975). These finds were to spur further research in the surrounding Quaternary sedimentary sequence by a French–Mauritanian team (Giresse et al. 2012).

Surveying in the Oued Akerdeil from 1998 led to the discovery of more LSA sites at El Beyyed, notably Yeslem I, II, and III (Lumley et al. 2006), that have yielded hand-axes and cleavers of extraordinarily large dimensions. These artifacts form a part of a larger assemblage that includes chopping tools, cores (mainly discoidal), and flakes, knapped mainly from locally available quartzitic sandstone. Some faunal remains were recovered from Yeslem III, and the presence of hippopotamus and crocodile remains indicates a watery environment. Overall, the faunal list portrays a savannah landscape with some canopy forest in proximity to water sources, suggesting perhaps a lake-edge environment. This paleoecological assessment is buttressed by data obtained from the sedimentological analysis suggesting a fluvial origin for the deposits. It has not been possible to evaluate the age of the sites using biochronological criteria since the species represented survive in the region up to the end of the Pleistocene.

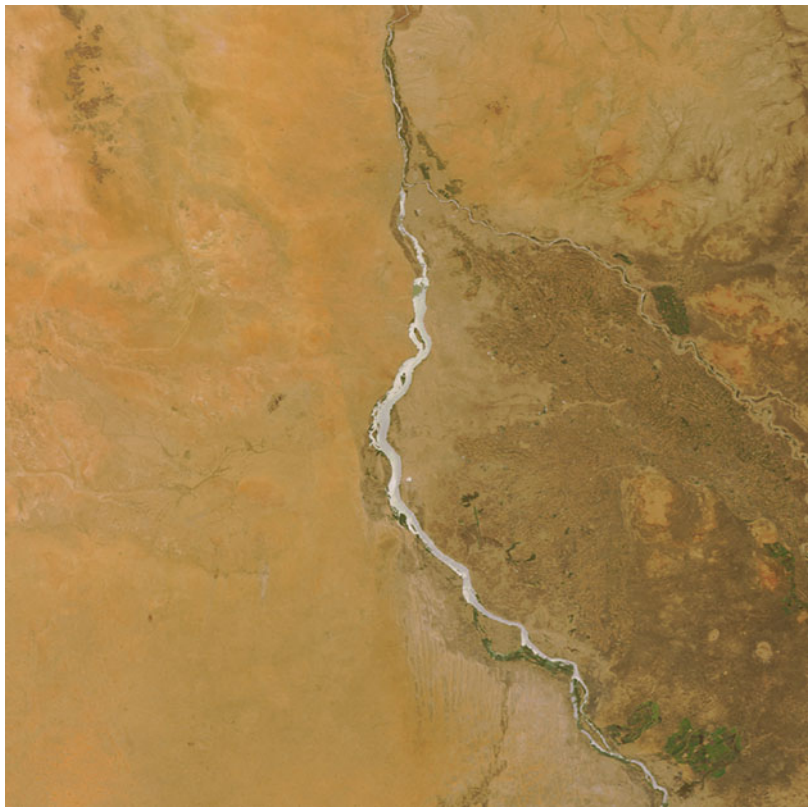

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 7 Arial view of the present-day Nile River showing irrigated farmland surrounded by vast expanses of the Sudanese desert

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 8 Natural underground water source surging out of a barren desert landscape in Western Sahara (Photo Jordi Mestre, IPHES)

Waterways, Water Systems, and Hominin Dispersions out of Africa

Close examination of trends in environmental conditions in which LSA Pleistocene hominin sites occur in North and Saharan Africa (and elsewhere) evidences the key role played by waterways and water systems for human survival and diffusion. The extension and layout

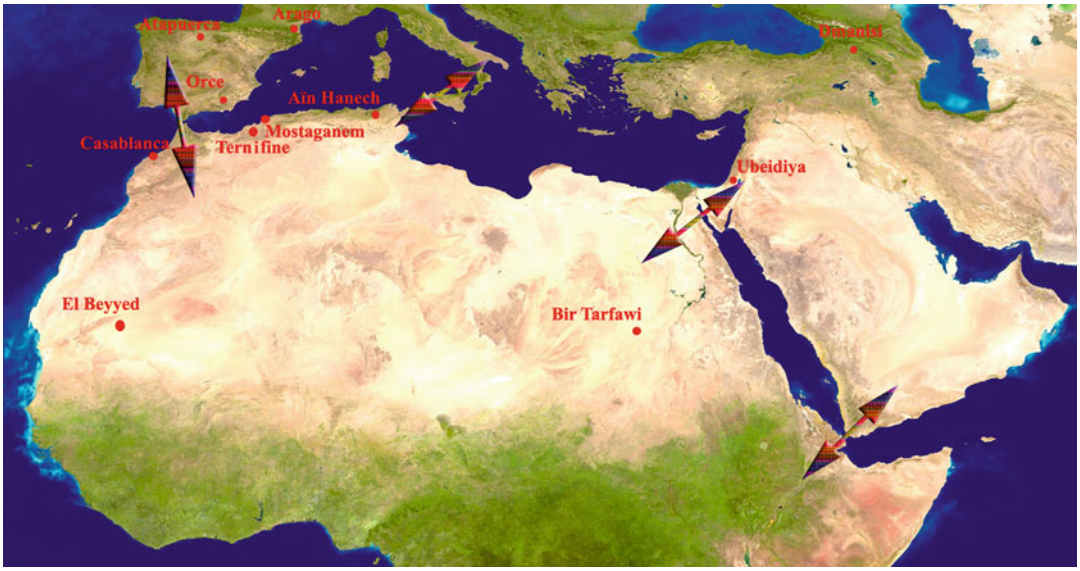

North and Saharan Africa: Geography and Culture During the Lower Stone Age, Fig. 9 Map showing some Oldowan and Acheulian sites in North and Saharan Africa and in Mediterranean Europe, as well as possible migration routes (*from left to right*: Morocco–Spain via Gibraltar Straits, Tunisia–Sicily route, Levant passageway, Djibouti–Yemen via the Bab-el-Mandeb Straits). Oldowan sites: (Spain) Atapuerca (Sima del Elefante, Gran Dolina levels TD4, 5, 6) and Orce (Barranco León and Fuente Nueva 3), (Georgia) Dmanisi; (Algeria) AÏn Hanech. Acheulian sites: (Spain) Atapuerca (Galería, Gran Dolina); (France) Caune de l'Arago; (Levant) Ubeidiya; (Morocco) Casablanca sequence; (Algeria) Ternifine, Mostaganem; (Mauritania) El Beyyed; (Egypt) Bir Tarfawi

of these waterways dictated emplacements of early human settlements and migration routes.

Observation of the archaeological record from Eurasia during the Early and Middle Pleistocene is essential to understanding why, how, and when hominins from North and Saharan Africa dispersed northwards across the Mediterranean seaway. Of paramount importance to this understanding is the Dmanisi site, situated in the piedmont of Georgia's Caucasus Mountain range, since it has provided the earliest evidence of a hominin presence outside of Africa. Juxtaposing Central Asia, Eastern Europe, and the Near East, Dmanisi has yielded Oldowan industries with faunal and hominin remains attributed to *Homogeorgicus* and dated to 1.8 Mya (Gabunia et al. 2002). According to current data, the first peopling of Eurasia likely took place when hominins moved out of their African homeland via one or more of four potential passageways: the Gibraltar Straits, the Tunisia–Sicily route, across the Sinai Peninsula, or the Bab-el-Mendab Straits (Fig. 9).

Geographically, migrations across the Straits of Gibraltar into the Iberian Peninsula appear as an obvious route out of the Maghreb – but there are numerous difficulties in providing evidence that early humans were in fact capable of effectuating such a voyage (swimming, navigation). Nevertheless, cultural similarities in lithic assemblages between these two regions have often been noted for the Lower Paleolithic (Sharon 2011) and also for the Middle and Upper Paleolithic (Otte 2007). Today this corridor is only 15 km wide, and this distance may have been shortened when water levels lowered during glacial events. The highlands present on either side of the straits are clearly visible in fine weather conditions and must have been a lure for human populations of time. Although the depth of the ocean at this particular point has always been too great to allow for the formation of a land bridge, emerged

island-hopping remains within the range of possibilities for humans to have crossed over from Africa into Europe (and vice versa).

The Iberian Acheulian differs from that of the rest of Europe with the tool kits showing more morpho-technological affinities to the African industries. It is notably characterized by large flakes transformed into hand-axes and – especially – cleavers. The relative abundance of cleavers in Spanish assemblages constitutes a particularity suggesting African heritage with possible migrations via Gibraltar. In fact, the frequency of these tools diminishes progressively as one moves eastwards and northwards out of the Iberian Peninsula. In addition, the appearance of the first Acheulian industries in Europe largely postdates that of North Africa (in Europe, for example at the Caune de l'Arago c. 0.6 Mya, Barsky & Lumley 2010 vs. at least 1 Mya at Thomas Quarry, Raynal et al. 2002, 2009). In Europe, Acheulian tool kits seem to appear abruptly, and there is no evidence for progressive, regional emergence. The age of the oldest archaeological evidence for the Acheulian in Spain is around 0.5 Mya, for example, at Atapuerca (Burgos, Rodríguez et al. 2011). Acheulian industries are frequently found in the alluvial terraces of the Iberian Peninsula, in particular around the Meseta. Similar morphotypes have been collected from alluvials accumulated by other important waterways such as the Duero, the Tage, the Guadiana, and the Guadalquivir.

Among the excavated sites, Pinedo (Toledo), situated in river deposits of the middle terrace of the Tage, has yielded pebble tools and trihedrals, as well as hand-axes with a low level of symmetry. The assemblage has been described as belonging to an early phase of the Acheulian. Similar industries have been found on the middle terraces of the Tormes, in the northern part of the sub-Meseta (levels III and II, La Maya). The open-air, elephant kill sites of Torralba and Ambrona (Central Meseta), systematically excavated over large surface areas, are attributed to OIS 12 although precise dates are not available. The assemblages have been attributed to either the *Lower Middle Acheulian* (Howell and Freeman) or to an *Evolved Middle Acheulian* (Bordes and Santonja). Just 18 km southeast of Madrid, on a flood plain of the Jarama riverbed, Aridos I and II are also open-air, elephant kill sites that have also yielded similar Acheulian tools.

The longest and most complete archeostratigraphical record on the Iberian Peninsula is from the Atapuerca sequence (Rodríguez et al. 2011). The karstic system exposed long stratigraphical sections after a trench was dug out for the passage of a cargo train (*Trinchera del Ferrocarril*). Atapuerca's Elefante, Galeria, and Dolina sites have yielded stone industries, fauna, and hominin remains providing an almost complete record of human occupation of Europe during the Pleistocene (c. 1.2–0.25 Kya). At the Elefante site, level TE9 has recently revealed stone tools and hominin remains dated to 1.2 Mya. The unique hand-axe from the Sima de los Huesos, found in association with numerous *Homo heidelbergensis* skeletal remains (28 almost complete individuals), is dated to 0.53 Mya. This tool currently represents the oldest evidence for Acheulian culture in Spain in a well-stratified and precisely dated context.

Some authors postulate the Levantine corridor as the most probable route taken by hominins out of Africa and into Eurasia at the beginning of the Early Pleistocene (Agustí & Lordkipanidze 2010), and it is probable that pioneering hominin groups originated from the lands now occupied by the Sahara desert. Human groups producing Oldowan-type industries could have spread throughout North Africa and then into the Western Mediterranean basin, frequenting deltaic and other water-rich environments in search of prey. Coastal routes would have provided resource-rich environments attracting plentiful animals and encouraging hominin settlement. Some well-known archaeological occurrences in Spain bear witness to this early occupation of Europe, at least as early as 1.4–1.2 Mya, at Barranco León and Fuente Nueva 3 (Orce, Andalusia, Toro-Moyano et al. 2010b), Sierra de Atapuerca's Sima del Elefante level TE9 (Burgos, Carbonell et al. 2008), and also Gran Dolina TD4, 5, 6 (0.8 Mya, Carbonell et al. 1995). Following the transition to the Acheulian and the appearance of *Homo erectus/Homo ergaster*, new waves of migration

back and forth from Africa into Eurasia took place from around 1.5 Mya (Ubeidiya & Attirampakkam; Bar-Yosef & Goren-Inbar 1993; Pappu et al. 2011) and especially after around 0.9–0.8 Mya (GBY, Yunxian; Goren-Inbar et al. 2000; Sharon 2011) (Fig. 9).

Concluding Remarks

The Aïn Hanech and El Kherba sites (1.8 Mya, Algeria, Sahnouni 2006; Sahnouni et al. 2010) prove that North Africa was inhabited by hominins producing Oldowan industries during the Early Pleistocene, although the paucity of sites in the Maghreb region has lead some authors to point out the possible incidental nature of this occupation. Presently, it appears clear that North and Saharan Africa harbor some of the richest Acheulian sites in the world attesting to the occupation of this zone throughout the Middle Pleistocene. Towards the end of the Upper Pleistocene, from around 0.3 to 0.2 Mya, within the context of a continuing climatic trend towards increased aridity, Acheulian industries were replaced by the more complex Middle Stone Age (MSA) lithic assemblages with their profusion of divers, small retouched tools. In the context of the gradual replacement of *Homo erectus* by *Homo sapiens*, knapping technology continued to complexify, orienting production towards highly standardized flakes.

Continued surveying, cartography, and systematic research will surely reveal more evidence for the earliest occupation of this vast and little known area of our African homeland. In the future, improved and modernized technology will contribute to the discovery of new LSA sites in the more remote and inhospitable areas of the Sahara desert. We may look forward to the establishment of collaborative programs combining the infrastructure and funding necessary to effectively excavate these sites and to adequately curate the artifacts found there.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Handaxes and Biface Technology
- ▶ Hominids, Earliest African
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ Oldowan Industrial Complex
- ▶ Stone Tool Usewear and Residue Analysis

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Northern and Central Asia: Culture During the Lower Paleolithic Era

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State of Knowledge and Current Debates

Recent discoveries of archaeologists, anthropologists, geneticists, and other scientists have finally determined Africa to be the ancestral home of humans. The most ancient human sites of *Homo habilis* with stone tools of the Oldowan type dating from 2.4 to 2.6 Ma BP are located mostly in Eastern Africa in the area of the East African Rift. Around 2 Ma BP, *Homo erectus* expanded beyond Africa and began dispersing over Eurasia. Available scientific data suggest that the first global wave of early human migration moved in two main directions. One direction was connected with the dispersion of ancient hominids across the Near East and Iran to the southern regions of Europe: the Caucasus and Mediterranean. Another wave moved through western regions of Asia eastwards. It is hypothesized that most ancient populations moved in two eastward directions. One migration wave passed through the south of the Himalayas and Tibet through Hindustan into East and Southeast Asia, while the other migration wave passed through the Middle East Asian highlands to the areas of Central Asia, Siberia, and Far East.

North Asia

The Karama Lower Paleolithic site has provided the earliest evidence on the human habitation of the southern regions of Siberia. The Karama is located in the upper reaches of the Anui River in the northwestern Altai (Derevianko & Shunkov 2005). Four culture-bearing layers have been established in the proluvial-alluvial deposits on

the gentle slope elevated to 50–60 m above the river level. The two upper layers have been established within the middle portion of the profile of boulders filled with reddish-brown loam and sand containing a considerable amount of gravel and gruss. The red-colored deposits were accumulated in the upper levels of the Anui valley during the early Middle Paleolithic according to the data of paleontological analyses (Derevianko et al. 1992a) and RTL-dating (Derevianko et al. 1992b). Dense grey sandy loam with a minor admixture of coarse-grained gravel and weathered rock fragments underlies the red layer. The lower portion of the profile contains two horizons bearing Lower Paleolithic artifacts. This portion represents an intercalation sandy loam and clayey laminations underlain by two layers of the slitozem soil (Derevianko et al. 2005). Compact buried soils are not typical for the Middle and Upper Pleistocene of North Asia. Thus, the occurrence of compact soil serves as indirect support for the early age of this pedocomplex.

The pollen analysis of the samples from the middle and lower portions of the Karama profile suggests the presence of many exotic and warmth-loving species typical for Europe and Far East in the floral associations (Bolikhovskaya & Shunkov 2005). The taxonomic composition of the group of exotic species together with the diversity of the ecological features allows us to estimate an early Middle Pleistocene age for this floral association. Available data of the paleobotanic studies suggest that the early peopling of the Altai took place under the favorable climatic conditions. The region was vegetated by birch and pine forests with an admixture of dark coniferous trees and broadleaf taxa, like elm, hornbeam, lime tree, oak, Manchurian nut tree, hazel, and mulberry tree.

The Karama archaeological materials include pebble tools made on large fragments of the local volcanic rocks, mostly effusive spherulite. The industry is characterized by the irregular and parallel flaking. The primary reduction products include core-like pebbles with plain and roughly prepared striking platforms, and spalls with prepared platforms and subparallel flaking patterns of the dorsal surfaces. Sidescrapers of the longitudinal, diagonal, and transversal varieties, most of which bear natural or trimmed backs, constitute the largest tool category. Another large category includes choppers with the straight, convex, and concave working edge. The tool kit also includes denticulate notched and beak-shaped tools. Also such tools as large pebble tools with a nose-like protrusion, thick points with a wide-angle working element, knives fashioned on citron flakes with an edged back, and carinated pebble tools, which morphology is close to that of the core-like scrapers. In general, the industry can be identified as the pebble tool industry. However, the tools from the upper horizons are more progressive. The tool kit of the two upper horizons comprises cores bearing negative scars of parallel flaking, truncated spalls, trihedral point with thin thrusting tip, and carinated end-scraper fashioned through micro-laminar flaking.

Geochronology of the Karama culture-bearing horizons is based on climato-stratigraphic characteristics of the lower and middle portions of the Karama sediments, which characteristics suggest formation of these sediments during the early Middle Pleistocene four stages of various climatic conditions corresponding to two interglacial and two glacial periods (Bolikhovskaya et al. 2006). Correlations of the paleogeographical data with the data of geomorphology and lithologo-stratigraphy make it possible to infer that the sediments containing the two lower culture-bearing horizons were accumulated during a warm period most likely corresponding to the oxygen isotope stage 19 (790–760 ka). The overlying stratum of grey loam was formed during a cool period correlated to the oxygen isotope stage 18 (760–715 ka). The major part of the red-colored sediments with the two upper culture-bearing horizons was accumulated during the warm period corresponding to the oxygen isotope stage 17 (715–660 ka), while the uppermost part of it was formed during the relatively cold period corresponding to OIS stage 16 (660–620 ka).

Archaic pebble tools from Ulalinka, the site located in the lower Katun River basin in the southeastern suburb of Gorno-Altaisk (Okladnikov 1964a) attest to Lower Paleolithic human occupation of the Altai. The excavation trench established at the edge of the terrace 15 m

high revealed three sediment packs of varying features separated by long sedimentation hiatuses (Tseitlin 1979). The lower portion of the profile contained clayey dark-yellow sediments intermixed with boulders, gravel, and gruss. Multicolored clay layer is overlain by the stratum of gavel and loam (pebble and boulder – in other description) containing artifacts made on fragmented quartzite pebbles. This stratum is covered by a layer of grey and brown loam; loess-like loam represents the surface layer.

Upper Paleolithic tools have been recovered from the bottom part of the loess-like loam stratum suggesting the Upper Pleistocene age of the sediments. Paleomagnetic analyses have shown the normal polarity of the upper and middle portions of the profile corresponding to the Brunhes period. The lower portion has revealed the reverse polarity that can be correlated to the Matyama paleomagnetic episode (Pospelova et al. 1980). The TL-date of 1.5 Ma BP has been generated for the dark-yellow sediments within the lower portion of the profile (Ragozin & Shliukov 1984). The loam sediments underlain by the horizon bearing Paleolithic artifacts have been correlated to the Krasnodubovsky suite of the upper Ob basin that corresponds to the early Middle Pleistocene. The dark-yellow clay deposits containing the culture-bearing horizon were correlated to the regional Kochkovsky suite and dated to the Lower Pleistocene (Okladnikov et al. 1985). However, according to the primary sources, samples for paleomagnetic analyses have not been collected from the culture-bearing horizon (Pospelova et al. 1980: 10), while the TL-date was obtained from the dark-yellow clay overlain by the boulder and pebble stratum (Ragozin & Shliukov 1984: 9). That means that the Matyama zone of reverse polarity (older than 0.7 Ma) and the TL-date of 1.5 Ma corresponding to the Lower Pleistocene do not represent the age of the culture-bearing horizon. The loam and debris horizon with artifacts that was located at the contact zone between the lower and middle portions of the profile can be correlated with the Krasnodubovski suite by the noted lithological and stratigraphic features. This attests to the early Middle Pleistocene age of this stratum (Adamenko 1970; Tseitlin 1984).

Abundant assemblage of quartzite items from the loam-debris horizon contains such doubtless artifacts as core-like pebbles with negative scars of irregular and amorphous flakes, thick pebbles trimmed along the narrow side to form choppers and chopping tools, scraper-like tools with natural backs and cutting edges prepared with the stepped trimming on flattened pebbles and pebble tools with ovoid spur-like protrusion (Okladnikov 1972; Abramova 1986).

The archaic look of the Ulalinka pebble industry and the assessed age of the country sediments as the early Middle Pleistocene are generally well correlated with the available paleomagnetic analytical data. The sedimentation hiatus between the lower and middle profile portions has been determined through analysis of the fine structure of the geomagnetic field in the chronological interval of 300–700 ka (Pospelova et al. 1980). The age of the culture-bearing horizon can be determined within the interval of 400–600 ka.

The Lower Paleolithic site of MK 1 is located in the Kuznetsk Depression in South Siberia. It is the nearest site to the Altai. A few lithic implements have been assembled in the course of profile wall cleaning in the Mokhovo coal quarry (Derevianko et al. 1992c). Flaked stones were located on the weathering crust of the Perm sandstone deposit among clusters of siliceous quartz sandstone and gravelite rocks. The Perm sandstone layer is overlain by thick deposits of subaquatic loam of the Kedrovski suite corresponding to the second half of the Middle Pleistocene (M–R) within the regional stratigraphic scale.

The age of the Mokhovo lithic tools has been estimated on the basis of accompanying Pleistocene faunal remains and the data of the carpological analysis of the overlying sediments. The collection of heavily mineralized animal fossils contains metapodia, rid and molar fragments of a large primordial bison, and tubular bone fragments bearing blow marks and some part of the molar plate of an early mammoth form. It is most likely that these are the remains of the Mammuthus trogontherii, a typical taxon of the Viliuy faunal complex of the early Middle Pleistocene. Also, non-definable tubular bone fragments bearing signs of artificial

fragmenting have been discovered (Foronova 1998). The established composition of seeds and fruit from the lower portion of the Kedrovski suite suggests coexistence of warmth-loving and arctic plants under the cooler and more humid climatic conditions than they are nowadays. This is characteristic of OIS stage 9. On the other hand, remains of certain spore-bearing plants – indicators of the "Siberian" Mindel–Riss – have not been noted in this floral complex, which fact suggest the age of not older than the terminal stage of that period (Nikolaev & Ponomareva 1998). On the basis of available biostratigraphic data, the minimal age of this site has been established as the upper boundary of OIS stage 9 with open lower chronological boundary (Derevianko & Markin 2007).

The MK 1 Quarry has yielded mostly siliceous quartz sandstone fragments, ovoid or rectangular in shape, bearing scars of parallel, uni- and bidirectional flaking of uncertain origin. However, four pieces show signs of premeditated flaking. These are a flat single-platform core with the prepared striking platform and negative scars of parallel elongated removals on the flaking surface, a massive asymmetrical spall, one of the thick-end-bearing pebble cortex that can served as a back and the opposing end served as a cutting edge prepared with scalar, two-step retouch, and two triangular spalls with convex dihedral striking platforms and negative scars of longitudinal and transverse removals. The artifacts bear weathering signs suggesting a long-term exposition that is well correlated with the stratigraphic position of these artifacts under the condition of the long hiatus in sedimentation.

The site of Torgalyk A is located in South Tuva in Uvs Nuur Lake basin, northernmost lake in the Mongolian Grand Lakes Depression. Archaeological materials were exposed on top of a 20 m high alluvial terrace on the bank of the Torgalyk River. The surface artifact collection includes lithic tools of varying degree of surface weathering: from the slightly weathered surface to heavy corrosion cortex. Some artifacts demonstrating the heaviest degree of surface weathering have been classified as the pre-Mousterian and oldest tool category (Astakhov 1998, 2008). According to researchers (Astakhov & Yamskikh 1995), the geomorphological layer bearing the artifacts was formed during the second half of the Middle Pleistocene and weathering cortex on the artifact surfaces was likely formed during the same period (climate cooling R_1 or R_2). In this case, geological aspects so not provide any grounds for the artifact age estimation. However, determination of the oldest artifacts with heavily abraded surfaces not typical for the Tuva Middle Paleolithic complexes seems well-grounded. It can be assumed that the artifact surfaces were heavily abraded during the Middle Pleistocene.

Lithic tools made of the local alluvial pebbles, mostly hornfels on aleurolite and fine-grained sandstone, were equally dispersed over the area of about 30,000 m^2. The collection of heavily abraded artifacts comprises more than 400 specimens including core-like pieces, thick spalls, and archaic tools.

Primary reduction is mostly illustrated by complete and fragmented pebbles bearing signs of core preparation. The subcategory of morphologically clear artifacts is dominated by the flat, mostly elongated, single and double platform cores; the shortened varieties are few. There are also cores bearing signs of the Levallois flaking, bifacially worked cores, and global-shaped varieties with multiple striking platforms. Flaking was executed from the plain striking platforms at the blunt angle. The spalls are large, elongated with heavy percussion bulbs. There are no small spalls wasted in the course of core formation and tool manufacturing in the collection.

Tools were mostly manufactured through hewing and large-faceted retouching. Few artifacts show traces of medium-sized, alternative retouch. Flat hewing, mostly on both faces is a specific technique of fashioning bifacial tools. Many tools show various notches formed through Clactonian encoches or large-faceted retouch.

The tool kit includes amorphous sidescrapers with the convex and straight uneven cutting edges, massive spur-like points with the triangular cross section, end scrapers on elongated flakes, backed knives fashioned through abrupt retouch as well as notched, denticulate, and beak-shaped tools. The industry includes such specific tools as primitive limands and proto-limands and

almond-shaped and ovoid bifaces. The bifacial tools are fashioned on large and thick spalls and elongated, flat, fractured pebbles. One of the surfaces is usually hewed more heavily with the help of large and flat removals; the other surface is flattened through broad and shallow flaking. Uneven edges on some artifacts were smoothed out through large-faceted retouch. The bases are mostly sharpened, straight, and beveled. The industry belongs to the Early Paleolithic pebble tradition based on certain elements of the Levallois flaking and the primitive technique of bifacial hewing.

A few artifacts of similar typology and degree of surface abrasion have been recorded from the two other sites at the Torgalyk, namely, at Torgalyk B and Torgalyk 1 that was defined as a "workshop on the river bank" (Derevianko et al. 1999).

In the southern part of Middle Siberia, Upper Paleolithic artifacts have been recorded within the surface-collected tools from the Kurtak archaeological area in the north of the Minusa Depression. Clusters of archaic implements bearing aeolian abrasion signs have been collected from the beach of the Krasnoyarsk Dam in the areas where the Pleistocene deposits were washed out. These Pleistocene deposits have been located in the stratigraphic context between the buried soil of the OIS substage 5e and the bed of the Pliocene terrace of the Yenisei (Drozdov et al. 2000). The animal fossils associated with the same stratigraphic unit contain bones of the Khazar mammoth, large caballoid horse of the Khazar type belonging to the Early Mammoth complex (*Khronostratigraphia*... 1990). All these animal types represent typical representatives of the animal community of the second half of the Middle Pleistocene.

Basing on the technical–morphological features, researchers regard the archaeological materials from the site of Razlog 2 as the oldest artifacts in the Middle Siberia (Drozdov et al. 2001). A small collection of artifacts (about 60 specimens) was assembled from the Yenisei bank. The industry belongs to the pebble type based on radial and subparallel reduction strategies. Disc-shaped and subrectangular cores, chopper-like tools with the transverse edge bearing signs of hewing and tools with nose-shaped protruding parts are made of thick quartzite pebbles from the river alluvium. The Razliv site has yielded a mostly similar collection of archaic pebble implements. In addition to the abovementioned tool types, the Razliv tool kit includes few radial cores with two flaking surfaces, orthogonal cube-shaped cores, bifacially worked chopping-like tools, and backed scraper-like tools fashioned on citron flakes. Two loci have been established in Berezhekovo. The site has yielded pebbles with signs of hewing and retouched spalls that were recovered in association with the motley debris sediments of the second half of the Middle Pleistocene and attributed likely to the industry type described above.

The Kamenny Log site has produced the lithic artifacts with the heavily abraded surfaces that look like more developed Early Paleolithic industries. The artifact collection includes cores bearing traces of the Levallois and proto-prismatic reduction, triangular spalls with the prepared striking platform with the convex center in addition to the large pebble tools and backed citrons. The excavation area revealed a radial core and few spalls that were detached from this core and illustrated the core utilization process. This finding provides the evidence that the archaeological materials were not heavily washed out.

Abundant and interesting Lower Paleolithic materials have been reported from the south Angara basin (Medvedev 1975). Dozens of archaic quartzite implements bearing heavily weathered surfaces have been collected from surface clusters and individually along the right-side (eastern) sloppy bank of the Angara. The artifacts were mostly discovered on high hills like Mts. Olonskaya, Balushkina, Ponomarevskaya, Igetei, Tarakhai, and others. The hills represent the remnants of the ancient denudation surface elevated to the level of the watershed plateau. The artifacts were exposed on tops of the hills among the outcrops of the Jura cobbles and pebbles or else were shifted down by the erosion processes over the southern and western hill slopes at the height of 80–150 m above the valley bottom. Artifacts of the similar type and degree of surface abrasion

were also discovered at the lowermost part of the sand and debris layers that were formed during the OIS 4 at the level of medial Angara terraces and shifted down on the contemporary banks of the Bratsk water reservoir.

Judging by the geomorphological position of surface exposing and conditions of relative stratification of the artifacts with abraded surfaces, the artifacts can be attributed to the period not younger than the first glacial period of the Upper Pleistocene (Tseitlin 1975). However, redeposition of the heavily abraded artifacts as well as the absence of any biostratigraphic and geochronological data do not make it possible to estimate the age of these findings more precisely. In this situation, the noted degree of weathering of the worked surfaces can be regarded as an important age indicator. The established techniques of age estimation make it possible to regard the artifacts with the heaviest degree of surface weathering as the oldest archaeological materials in the region and assess their age as not younger than the second half of the Middle Pleistocene (Medvedev 2001).

The total collection of the heavily weathered artifacts comprises about 1,000 fractured quartzite items including numerous cores, pebble spalls, and comparatively few typologically distinct tools. Various forms of cores demonstrate various reduction strategies simple flaking of quartzite pebbles without special preparation of the striking platform and flaking surface and specialized technique of fashioning pyramidal, convex flaking surfaces with the aid of continuous, radial hewing of both faces. The typical varieties of cores are the single-platform triangular cores with one flaking surface bearing sign of convergent flaking and flat rectangular cores with parallel flaking scars over one or two prepared striking platforms. Elongated laminar spalls including those with the parallel flaking pattern on the dorsal face, straight or curved symmetrical profile and striking platform with large facets represent the developed reduction technique.

The tool kit is dominated by the longitudinal, transverse, and combined varieties with uneven cutting edge manufactures mostly with the large retouch facets. Few pointed tools on thick convergent spalls represent likely dejete sidescrapers. Choppers with the straight, convex, and triangular edge have been fashioned on quartzite pebbles. There is a specific tool representing a pointed cleaver on an elongated, large, and flat spall with the transverse cutting edge and hewing signs on one surface of the lateral sides.

The artifacts collections from the Angara basin can be classified into the Tarakhai and Olon trends (Medvedev 1983). The industries of the Tarakhai trend represent pebble traditions. The technique of citron flaking was often used; various choppers represent the most typical implement in the tool kit. The Olon trend is closer to Acheulian tradition. Ovoid core-like implements bearing signs of bifacial, radial working are most typical, while the proportion of pebble tools is comparatively small.

Quartzite implements close to the tool described above in the shape and weathering signs have been recorded in the northern part of the Bratsk dam (Volokitin 1992). In the Angara–Okinsky basin in the erosion area of contemporary river banks that are situated at the elevation of 70–80 m above the original river level (the sites of Monastyrskaya Gora, Mys Dunaisky, Zharik), about 200 artifacts with heavily weathered surfaces were collected. Within the collection of the most archaic quartzite artifacts, ovoid cores with radial flaking patterns on the flaking surfaces, rectangular single-platform cores of the parallel reduction, longitudinal, transverse, and dejete sidescrapers with natural backs made on thick cortex spalls or on knapped pebbles, pebble choppers with convex abrupt edges and large flakes bearing discontinuous retouch traces have been noted.

The Balyshevo site located in the eastern outskirts of the Angara–Lena watershed plateau has produced interesting data relevant to the assessment of the geological age of the archaic and weathered technocomplexes from the southern parts of Middle Siberia (Zadonin 1992). The first heavily weathered quartzite artifacts were assembled from the tilled left-side slope of the Lena elevated to about 40 m above the water level. The test excavations at one of the area of

the artifacts scattering yielded heavily weathered artifacts from the depth of 0.4 m in association with the weathered pebble and gravel layer on the top of the solifluction deposits aging from OIS stage 4. The complete petrographic identity of the pebble context and the associated archaic Paleolithic artifacts as well as a convergent sidescraper and a flake detached from this implement discovered in the excavation area attest to the fact that the artifacts were accumulated in association with the quartzite outcrops rather than were slid down the slope of redeposited in any other way. The predominance of primary reduction products in the collection of artifacts provides an indirect support to this inference.

In total, 130 quartzite implements have been collected from the surface and within the excavation area. The manufacturing features and the degree of worked surface weathering make it possible to establish a single technocomplex. The collection includes ovoid cores of radial pattern of flaking from one pyramidal-shaped or two convex surfaces and the cores with the convergent flaking pattern. Also, choppers on thick pebbles and sidescrapers on large cortex and semi-cortex spalls with convex, stepped edge, laminar spalls bearing marginal retouch and shortened flakes including those detached from the prepared striking platforms.

The Balyshevo industry is likely one of the youngest lithic industry among the oldest Paleolithic materials in Middle Siberia. However, heavily weathered surface that was formed under the glacial conditions during the Upper Pleistocene (OIS stage 4) did not support the hypothesis of the Middle Pleistocene age of these heavily weathered artifacts that was proposed by G.I. Medvedev (2001).

The data on the Early Paleolithic from the eastern shore of Lake Baikal (Trans-Baikal) are contradictory. Zasukhino probably represents the earliest archaeological site in Trans-Baikal. Zasukhino was established within the biostratigraphic profile in the quaternary deposits of western Trans-Baikal. According to the published data (*Prirodnaia sreda*... 2003; Lbova 2005), knapped rocks were noted in four loci within this biostratigraphic profile. The artifacts were noted in association with the laminations of buried soil within the Middle Pleistocene deposits containing faunal remains of the Viatka theriocomplex. The artifacts were recovered from the contact zones of four lithological units. The lowermost unit has shown the reverse polarity and attributed to Matyama episode. The overlying sediments were formed under the normal polarity of the Earth's magnetic field. The RTL data suggest the chronological interval of 190–900 ka. Despite certain discrepancies in the straigraphic location of lithic artifacts in diagrams and descriptions, the geological age is not younger than the Middle Pleistocene.

A cluster of large pebbles noted in one of the lowermost layers containing cultural remains is noteworthy. Lenses of charcoal and fragmented burnt bones make it possible to interpret the pebble cluster as a hearth pavement. If it is really an intended artificial construction, the hearth is the oldest evidence of premeditated usage of fire in Northern Asia. However, available publications do not provide comprehensive information concerning the features of the construction, its planigraphic context, sediment microstratigraphy, and others.

The petrographic composition of the knapped pebbles includes quartzite, vein quartz, granite–gneiss, and granite. These rocks, with the exclusion of granite, are characterized by the poor isotropic features and are not good for knapping, which features of the used raw materials make cultural attribution of the artifacts difficult. Within the rock pieces, knapped pebbles and fragments with pebble cortex. Some pieces resemble sidescrapers and choppers. Some pebble might serve as hammerstones and anvils. However, the published drawings and photos of these pieces (*Prirodnaya sreda*.. 2003) arouse doubts in the artificial origin. Such controversy in the attribution of rock pieces to artifacts requires group decisions. If the Zasukhino findings are defined as artifacts, it will give researchers the grounds to speak about human habitation of Trans-Baikal prior to the Upper Pleistocene. Presently, this possibility is only an assumption that was made by A.P. Okladnikov more than half a century ago (Okladnikov 1959).

Diring Yuriakh is the earliest Paleolithic site in Yakutia. The site is located in the middle Lena basin to the north from latitude 60. According to the recently published data (Mochanov & Fedoseeva 2002), the excavation area at Diring Yuriakh exceeds 36,000 m^2 and yields 51 clusters of cultural remains totaling to 5,000 items.

Artifacts were recovered from the sediment of the 105–120 to 125–135 m high terraces overlying the common basis of the Cambrian sandstone located at the relative height of 105 m. According to Y.A. Mochanov, the culture-bearing horizon represents a thin (3–5 cm) layer of weathered pebbles and gravel. It overlies the red Pliocene sand deposits with frost clefts. Above it, there is a layer of grey loam of the horizontal laminar structure. Mochanov argues that the sediments underneath the culture-bearing horizon belong to the riverbed fascia, while those above it belong to the floodplain and old bed fascias of the alluvium of the Tabaga accumulative cycle of the Lena basin. The age of that cycle has been estimated within the range of 3.2–1.8 Ma (Mochanov 1988a). Along with the geological assessment of the age, other scientific studies have been carried out at the site. However, the results of these studies in the interpretation of the main researcher (Mochanov 1992) and the scientist who made the analyses (Penkov 1992) are ambiguous and allow for various age estimations.

With regard to the geological age of the containing sediments, Y.A. Mochanov considers the Diring Yuriakh materials as belonging to the earliest stages of the Paleolithic and believes that the only reasonable way is to compare them exclusively with the Oldowan culture in Africa (Mochanov 1988b). The Diring Yuriakh lithic industry is really archaic. The industry is characterized by irregularly split quartzite pebbles and cobles that were fashioned into various choppers, sidescraper-like implements and nosed tools as well as amorphous pebble spalls with unclear signs of premeditated knapping, anvils, and hammerstones. All the quartzite pieces show heavily weathered surfaces.

The geological and archaeological old age of Diring Yuriakh that is not usual for high latitudes makes Y.A. Mochanov revive the idea of nontropical origins of humans (Mochanov 1992). Not going into details of this issue (Ranov 2005), it is necessary to stress the key point in the Diring Yuriakh Paleolithic is the geological estimation of the age of the culture-bearing horizon being the main point of controversy between Y.A. Mochanov and his numerous opponents. V.A. Ranov and S.M. Tseitlin (1991) visited the site, studied the lithological and stratigraphic situation, and proposed a well-grounded critical assessment of the sediment origins and its relative age. According to the observations of these competent experts, the culture-bearing horizon is associated with the lower portion of the grey sediments at 5–25 cm above the top of the red Pliocene sand layer in the profiles of the 125–135 m high terrace. Thus, the culture-bearing horizon does not directly contact the Pliocene deposits as in Mochanov's interpretation. Hence, on top of the 105–120 m high terrace, the pebble and gravel sediments containing cultural remains occurred on the layer of red pebbles because of the denudation processes. Ranov and Tseitlin argued that the Diring Yuriakh terrace was formed in two stages separated by a long hiatus. Deposition of the red, riverbed pebble and sand took place during the Pliocene, while the subaquatic grey sand and sandy loam containing cultural remains were deposited during the Pleistocene. The grey sediments were likely accumulated under the conditions of slow flowing water from a pond dammed by melting ice, most likely during the OIS stage 8. The hypothesis on the formation of the grey deposits during the Pleistocene is shared by other researchers (Alekseev et al. 1990; Waters, Forman & Pierson 1999). The American researchers based their inferences on their TL dates of 267 ± 24 ka BP for the sand deposits overlying the culture-bearing horizon and 366 ± 32 ka BP for the underlying frost vein (Waters et al. 1997). Despite certain criticism of the reliability of these TRL-dates (Huntley & Richards 1997), they are well correlated to the main point of Mochanov's opponents on the Middle Pleistocene age of the sediments containing cultural remains.

The idea to assess the Diring Yuriakh age on the basis of comparisons of the technical–typological features with the earliest African complexes (Mochanov 1992) does not seem well-grounded either. Given the general similarity within a single stage of phased development, the more precise technical–typological comparisons show mostly different rather than similar features. For instance, the Diring Yuriakh collection does not include any cores, polyhedrons, disc-shaped cores, and small flake tools typical for the Oldowan (Leakey 1971). These distinctions point out the formality of comparisons of the industries from such distant regions as the northeastern part of Africa and the northeastern part of Asia. Thus, neither primitive knapping techniques nor archaic look of the pebble implements does not provide any reasonable grounds to regard the age of the Early Paleolithic site of Diring Yuriakh as older than the second half of the Middle Pleistocene.

Two other loci where archaic quartzite implements were found have been recorded in the middle reaches of the Lena (Alekseev & Cherosov 1992). Artifacts have been recovered from the layer of weathered pebble and gravel underlying the layer of modern soil on top of a 125–130 m high terrace-like surface in the Olekma River mouth. The Yunkiur site located in the vicinity to the city of Olekminsk, weather artifacts have been discovered among the layer of ventifacts that was exposed in the wind-blown sediments at the depth of 9 m from the surface of the 35–40 m high Lena terrace during the quarry works. Judging by the published drawn images and the morphological descriptions of the findings (Alekseev & Cherosov 1992: 137, 139, 141, 142), attribution of the Yunkiur items as artifacts arouses considerable doubt. In contrast, the Ust-Olekma collection includes distinct choppers with well-prepared edges, polyhedrons–spheroids, trihedral chopping tools and flakes, hammerstones, and anvil. The minimal geological age of the weathered pebble layer that was redeposited in subaerial, slope sediments in the upper portions of terraces most likely corresponds to the Upper Pleistocene, yet its initial geochronological position is not clear.

The sites with coarsely flaked pebbles that were discovered in the Amur River basin in the 1960s are noteworthy, especially from the historiographic point of view. This discovery aroused discussion about the possible peopling of North Asia in the Early Paleolithic (Okladnikov 1964b). Initially, such fractured pebbles have been discovered at Filimoshki in the upper reaches of the Zeya. The artifacts were uncovered from the upper portion of the riverbed alluvial fascia on the 10–12 m high left-bank terrace. The alluvial fascia overlies the bed of sandstone intercalated by laminations of carbonaceous shale. The culture-bearing horizon was overlain by laminations of sand and sandy loam. The layer of riverbed pebbles contains fractured pebbles of fine-grained quartzite. The variety of artifacts includes amorphous cores without prepared striking platforms, primitive sidescrapers and choppers with minor preparation of the edges, and specific tools with nose-shaped protrusions. Similar fractured pebbles have been discovered in analogous context in several other loci at the mouth of the Ust-Tu spring at the right-side bank of the Zeya and in the vicinity to the village of Kumary in the upper Amur (Derevianko 1983).

In general, the considerably archaic look of the flaked pebbles and their relative stratigraphic position under the condition of possible repeated redeposition attest only to the minimal age of the findings in the range of the geological period when the containing sediments were formed. Initially, it was presumed that fractured pebbles were redeposited in the upper portion of the riverbed pebbles of the so-called Belogorski suite during the second half of the Middle Pleistocene (Ibid., p. 49). However, additional studies of the lithological structure of the 10–12 m high terrace 2 of the Zeya along with the data of the pollen analysis and mechanical composition of the sandy fill of the pebble layer make it possible to estimate the geological age of this layer as not earlier than the second half of the Upper Pleistocene (Tseitlin 1979). Thus, the presumed old age of these findings have not been supported by geological data, and the artifacts can be regarded only in the general context of the earliest archaeological sites in North Asia.

The similar inferences concern another unusual Paleolithic finding from the village of Bogorodskoe in the lower Amur basin (Okladnikov 1979). On the tow path on the Amur right-side bank at the foot of 20 m high terrace, a bifacially worked cordiform tool with the symmetrically convex cross section made of a dark volcanic rock was discovered. On the basis of the noted shape and the technique of working, A.P. Okladnikov interpreted this tool as an Acheulian hand axe. He argued that this hand axe fell down from the Middle Pleistocene deposits of the high floodplain terrace of the Amur and attributed it to the earliest Paleolithic stage. In fact, this tool represents a thick pebble tool with the natural back and shows bifacial working through removing short and broad spalls. The stratigraphic position of this tool is unclear; hence, its age has not been defined.

Fractured pebbles from the Sennaya-1 site are regarded as the evidence of the initial human occupation of Sakhalin. The site is located on the southeastern coast of the island (Vasilevsky 2008). The excavation trench at the gently sloping coast revealed the proluvial–alluvial deposits containing fractured pebbles. This layer has been established overlying the bed of the Middle Pleistocene sea terrace elevated to about 50 m above the sea level. The lowermost portion of the profile reveals clay and sand of subaquatic origin. Above it, a layer of dense loam intercalated with lenses of sand and sandstone pebbles and cobbles. The loam layer is overlain by a layer of light-yellow sandy loam with the humus horizon of soil on top.

The OSL dating of the middle portion of the profile suggests the age of this deposit in the range of 154–197 ka. The data of spore-pollen analyses of the lower and medial part of the loam horizon suggest that accumulation of this layer took place under the relatively warm climatic conditions favoring vegetation of dark-coniferous forests with admixture of broadleaf species. On the basis of these data, the following sedimentation sequence has been proposed. The clay and sand deposits represent the sediments of marine lagoon; the layer of loam with sand admixture was accumulated initially as the floodplain fascia during one of the warm periods of the Middle Pleistocene and as the terrace-forming sediments during the subsequent cold stage of the Middle Pleistocene. The layer of yellow sandy loam was formed during the late Upper Pleistocene, while the humus-containing horizon appeared during the Holocene.

However, the proposed geochronological scenario is poorly correlated with the lithological features of the sedimentation sequence. According to the established stratigraphic column and the lithological features (Vasilevsky 2008: 74, 75, 292), the layers attributed by A.A. Vasilevsky to distinct geological periods and paleogeographic stages are intermixed at some portions, and the continuous sequence of sediments does not show any traces of sedimentation hiatuses. The light-yellow sandy loam overlies the dense loam without any traces of long hiatus, while according to the proposed interpretation, these two layers are separated by the hiatus lasting not less than 100,000 years. The biostratigraphic interpretation of the sediments also seems doubtful. It is based on fragmentary data from two pollen samples containing few pollen seeds, while the palynological conclusion has been made on solitary pollen seeds of oak and elm noted in the samples (Vasilevsky 2008: 250, 251). The noted stratigraphic discontinuity and the lack of reliable paleontological data make the OSL-dates debatable and require better support of the Middle Paleolithic age for the sediments containing cultural remains.

The relative age of the sites can be established on the basis of the stratigraphic position of pebble implements. Fractured pebbles were noted throughout all the lithological layers within the profile. However, about one-half of all the fractured pebbles have been recovered in association with the sediments of the terminal stage of the Upper Pleistocene and Holocene (Vasilevsky 2008: 83). Artifacts from the underlying layers demonstrate the same features as the pebbled from the upper portions of the profile do. It makes it possible to regard the whole collection as a single technocomplex with the geological age close to the Pleistocene–Holocene threshold.

The artifact collection mostly includes indistinct fractured quartzite, flint, argillite, and other

pebbles. A.A. Vasilevsky has defined core-like pebbles, thick flakes, cortical spalls, typologically indistinct sidescrapers, implements with spur-like protrusions, and knives fashioned on cortical segments. A.A. Vasilevsky argued that the tools were fashioned through mostly longitudinal and diagonal knapping with the aid of hard hammer or through a blow against the anvil. Other techniques include detaching narrow diagonal spalls and percussion technique. A.A. Vasilevsky defined these implements as remains of the Lower Paleolithic pebble industry on the basis of the noted simple knapping and secondary working techniques. It seems that the indistinct typological features of this industry can be explained by the fact that the majority of the artifacts represent defected or broken implements that are not suitable for further usage. The artifacts seem to represent raw material testing at the workshop that was destructed by slope processes judging by the deposition features.

Central Asia

According to the latest data based on the oldest Paleolithic finds from the loess–soil deposits of Tadzhikistan (Kuldara, Khonako II, Obi-Mazar-6), the appearance of*Homo erectus* in Central Asia refers to the period between 600 and 900 ka (Ranov & Schaefer 2000; Ranov 2001).

In Acheulian, technocomplexes with bifaces have been discovered in the Mugodjari Mountains in the northwestern part of Kazakhstan and represent the most interesting Early Paleolithic assemblages (Derevianko et al. 2001). The Acheulian sites of Mugodjari 3–6 represent clusters of heavily and moderately weathered artifacts on the surface of deluvial shelves and on hilltops at the outcrops of sandstone that was the main raw material for tool production. Among the collected artifacts, the sets of Acheulian foliate, ovoid, and cordiform bifaces are most noteworthy. Also cores bearing signs of the Levallois flaking, various types of sidescrapers, and notch-denticulate tools have been identified.

Other well-defined Acheulian bifaces have been recorded in the Mangyshlak Peninsula (Medoyev 1982), in Bale Hills, Semizbugu, locus 2 in the northern portions of Balkhash region (Medoyev 1970; Derevianko et al. 1993), in the southwestern and northeastern parts of the Kazakh hill country (the sites of Zhaman-Aibat 4 and Vishnevka 3) (Klapchuk 1976; Voloshin 1988), and in the left-side bank of the Irtysh in the Pavlodar region (Kudaikol) (Medoyev 1968). The lithic collections from these sites include bifacially worked tools of various types as well as products of the Levallois reduction, various sidescrapers, and notch-denticulate tools.

Archaeological materials from Koshkurgan 1 located in the southwestern part of the Karatau mountain range represent a special type of the Early Paleolithic industry (Derevianko et al. 2000b). Lithic artifacts have been recovered from the stratified context in association with animal remains of the Koshkurgan (Tiraspol) faunal complex dating from the second half of the Middle Pleistocene. Cultural remains have been recovered from the subaquatic sediments of the ascending spring within the gryphon travertine formations. The age of the fossils has been estimated through the ESR analysis in the range of 400–500 ka. Archaeological materials have been defined as the pebble industry of the microlithic type. Tools were made of small pebbles of various rocks. The size of the artifacts does not exceed 4–5 cm. The Levallois and single-platform cores, shortened non-faceted spalls, simple longitudinal and double sidescrapers, and notch-denticulate tools represent the most typical artifact types.

The site of Shoktas 1 was established in the travertine sediments of the gryphon in the vicinity to Koshkurgan (Derevianko et al. 2000b). The Shoktas artifacts demonstrate technical–typological features similar to those from Koshkurgan and have been defined as the Early Paleolithic industry of small tools.

The sites of Borykazgan, Tanirkazgan, Akkol, and others (Alpysbayev 1979) from the northeastern piedmonts of the Karatau represent another type of the earliest lithic industries in Kazakhstan. These lithic industries are characterized by the pebble nonstandard cores, large chopper and chopping tools, and few flake tools. Some researchers point to the minor "proto-Levallois features" (Liubin 1970) and some clearly Levallois technological features (Medoyev 1982).

The majority of the Early Paleolithic collections in Mongolia belong to the pebble industry type. The most archaic artifacts have been reported from several loci of Nariin Gol 17 in the northern part of the Lake Valley (*Kamenny vek*... 2000e). The heavy to moderate degree of artifact surface aeolian abrasion and the position of the artifacts at the foothills and on the slopes of a high Pliocene terrace suggest the Lower Pleistocene age to this site, which is the earliest in the Mongolian Paleolithic. The Nariin Gol lithic collection includes such noteworthy items as large multi-platform orthogonal cores, cores with one flaking surface bearing the parallel reduction pattern, segments, and specific scraper-like tools.

The lithic collections from the so-called Mankhan cluster of sites in the Mongolian Altai represent the next stage of the Early Paleolithic and belong to the Middle Pleistocene according to the arguments of the researchers (*Kamenny vek*... 1990). The assemblages from these sites comprise comparatively few weathered artifacts including pebble cores bearing irregular flaking patterns, Levallois and parallel reduction cores, choppers, and notch-denticulate tools.

A.P. Okladnikov (1983) was the first to identify bifaces of the Acheulian type within the Paleolithic assemblages from the sites of Dno Gobi (Bottom of Gobi) and at Mt. Yarkh. Almond-shaped, ovoid, and subtriangular bifacial tools along with the disc-shaped, proto-Levallois, and Levallois cores represent the most archaic part of the chronologically heterogeneous assemblage of the surface-collected artifacts (Okladnikov 1986).

Archaeological studies in the southern regions of the Gobi Altai provide researchers with the new data supporting the conception of dispersal of the Acheulian features in the Mongolian Paleolithic industries. The bifacially worked tools associated with the Levallois reduction products have been recorded within the collections of the heavily abraded artifacts collected from the sites in the Flint Valley (Derevianko et al. 1996), Trans-Altai Gobi (Derevianko et al. 2000c), lower stratigraphic layers in the Tsagan-Agui cave site (Derevianko et al. 2000b), and the Tsagan-Agui workshop site located at the cave (Derevianko et al. 2000d). Available data of the physical analyses of the age of the Tsagan-Agui sediments suggest that the Levallois–Acheulian traditions emerged in this region as early as in the Middle Pleistocene.

Archaeological materials from Uench-1 illustrate development of the Early Paleolithic traditions during the terminal stage of the Acheulian period (Derevianko & Petrin 1992) or else during the initial Mousterian period (Okladnikov & Abramova 1994). The Uench lithic industry is distinct among other technocomplexes in the used raw materials and smaller lithic implements including the Levallois items, various sidescrapers, and backed and notch-denticulate tools. It should be noted that the Levallois technique of stone working is the major characteristic feature of practically all the early lithic industries in Mongolia.

Cross-References

- ► Bone Tools, Paleolithic
- ► Lithic Technology, Paleolithic
- ► Mongolia: Paleolithic

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Northern Asia: Origins and Development of Agriculture

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Introduction

The origin and development of agriculture is one of the most important processes in human history, as it has fundamentally and irreversibly changed not only the subsistence strategies but also the whole trajectory of cultural development of human beings. Agriculture has led to the occurrence of labor division, professionalization, social inequality, and civilizations and has produced long-lasting impact on the physical evolution of human beings, the environment, and natural resources, including the soil, climate, landscape, and many flora and fauna species in the earth.

Because of these significances, the study of the origin of agriculture has been one of the most important topics in the field of archaeology, anthropology, genetics, history, historic ecology, linguistics, paleozoology, paleobotany, as well as other related disciplines of sciences and social sciences. Based on studies of these disciplines since the 1910s, it is quite clear now that Northern Asia, which includes eastern Russia, China, Mongolia, Japan, and Korea, and stretches between latitudes approximately 72° and 19°N, and longitudes between approximately 70° and 145°E, has witnessed an independent origin and development of agriculture, with its temperate eco-zone located between latitudes approximately 43° and 25°N being the core area.

Definition

There are various definitions of "agriculture." In this entry, "agriculture" is defined as a subsistence strategy of systematic and continuous cultivation of plants and husbandry of animals, which facilitates the domestication and continuous evolution of certain plants and animals, and the development of human beings and their cultures. "Domestication" is the dynamic process of human manipulation and the genetic and physical evolution of plants and animals, which creates new species that have to rely upon human beings for their survival, and vise versa (Lu 1999, 2006). "Culture" is the integrated and dynamic system of technology, social structure, symbols, beliefs, behavior patterns, and other cognitive aspects learnt and transmitted between members of a given human society in a given period of time (Kottak 2002).

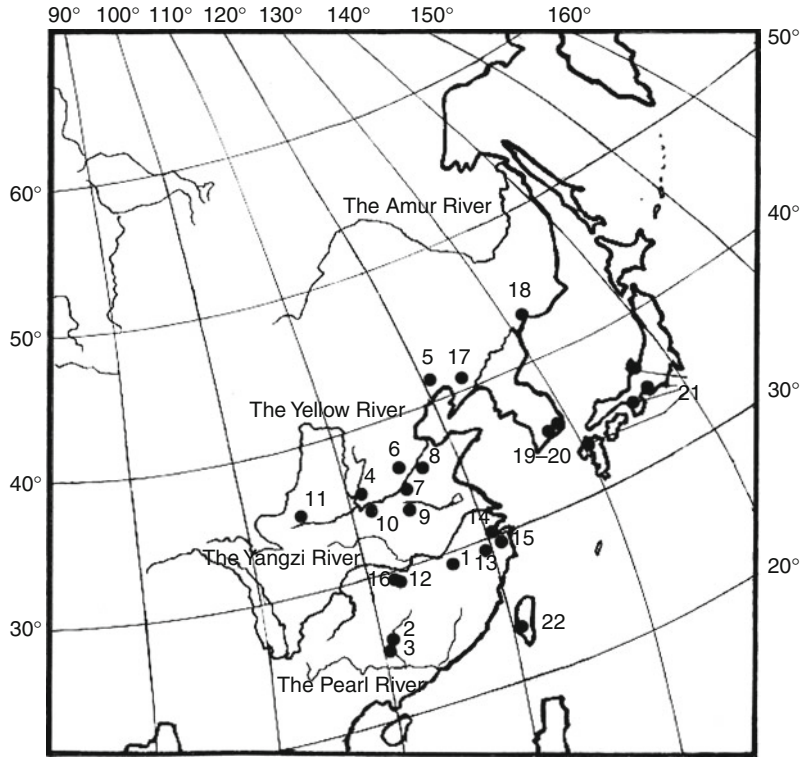

Northern Asia: Origins and Development of Agriculture,
Fig. 1 Archaeological sites mentioned in the text: *1* Xianrendong/Diaotonghuan; *2* Yuchanyan; *3* Zengpiyan; *4* Xiachuan; *5* Xinglonggou; *6* Cishan; *7* Peiligang; *8* Yuezhuang; *9* Jiahu; *10* Yangshao; *11* Dadiwan; *12* Pengtoushan/Bashidang; *13* Shangshan; *14* Kuahuqiao; *15* Hemudu; *16* Chengtoushan; *17* Xinle; *18* Krounovka 1; *19–20* Pyeonggeodong and Tongsamdong; *21* Archaeological sites of the Yayoi culture; *22* Nan-kuan-li

Historical Background

Studying the origin and development of agriculture in Northern Asia is primarily a result of the occurrence of modern archaeology in this area. In 1927, Swedish geologist and archaeologist Johan G. Andersson discovered rice husks on pottery dated to approximately 7,000 years ago in Yangshao, Henan Province, China (Andersson 1934). Rice remains have been found in archaeological sites of the Yayoi culture dated to between approximately 2,800 and 2,400 years ago in Japan from the 1930s onward (Misaka & Wakabayashi 2011). In the decades that followed, particularly after the 1970s, hundreds of archaeological sites dated from approximately 15,000 years to 4,000 years ago have been excavated in Siberia, Mongolian area, the Yellow and the Yangzi River Valleys, South China, Japanese archipelago, and Korean Peninsula; research methods from botany, zoology, soil analysis, isotopic analysis, genetics, chemistry, and starch analysis have been applied to archaeological studies, and enormous amount of plant and animal remains have been found and analyzed. The result provides substantial information for the understanding of the origin and development of agriculture in Northern Asia, although there are remaining questions.

Based on these studies, it seems that there are probably two centers of the origin of agriculture, with cultural contacts, in Northern Asia (Lu 2006). The first center expands from the southern edge of the Inner Mongolia to the middle to lower Yellow River reaches, where the cultivation and domestication of foxtail and broomcorn millet (*Setaria sativa* L. and *Panicum miliaceum* L., respectively) occurred at around 8,100–8,000 years ago; the second center locates mainly in the middle to lower Yangzi River valley and the adjacent Huai River, where the cultivation and domestication of one subspecies of rice (*Oryza sativa japonica*) originated at approximately 9,000–8,500 years ago (Lu 1999; Zhao 2011) (Fig. 1). So, what are the causal factors of nature and culture for the origin of agriculture in this area?

Climate and Environment

Northern Asia is a landmass of great ecological and cultural diversity. Geographical, pollen, phytolith, and soil analyses have been used to investigate the climate, natural resources, and the landscape changes in this area. Geographically, the northern part of Northern Asia is dominated by mountains, including the Altai, Tian shan, Kunlun shan, the Khreber, the Stanovoy, and the Da Hinggan Ling Mountains; between the mountains there are the Siberia, Mongolian, Qinghai-Tibet, and the Yungui Plateaus, and many rivers with the Yellow and the Yangzi River being the longest.

The climate in the continent of Northern Asia is controlled by the northward summer monsoon from the Pacific Sea and the southward winter monsoon from Siberia, while the climate of the Japanese Archipelagos and the Korean Peninsula is also affected by sea currents. Generally speaking, the Last Glacial Maximum had significant impact on this landmass, particularly on areas north of latitudes 22°N, as the climate became much colder and drier during that period (Lutaenko et al. 2007; Lim & Fujiki 2011). The rising and falling of sea levels and geological movements also play important roles in the local climatic changes from the Last Glacial Maximum between approximately 22,000 and 15,000 years ago, to the gradual warming up period between 15,000 and 12,000 years ago, and the warmer and wet Holocene Optimum between about 7,000 and 4,000 years ago (Lutaenko et al. 2007; Lim & Fujiki 2011). The period from 12,000 to 7,000 years ago saw the origin and development of prehistoric agriculture in this region.

Foragers Prior to the Occurrence of Agriculture

Between approximately 15,000 and 10,000 years ago, pottery, composite tools made by microblades and organic materials, and grinding stones independently occurred in Siberia, Japan, the middle Yellow River Valley, and South China, as new implements used by human beings to exploit different resources and develop broader spectrum subsistence strategies in various environments, including the collection of grass seeds, tubers, nuts, shells, and fishing and hunting (Lu 1999, 2006, 2008; Liu et al. 2010; Crawford 2011). The earliest rice phytolith dated between approximately 15,000 and 12,000 years ago are found in the Xianrendong and Diaotonghuan site in the middle Yangzi Valley, the Yuchanyan site at the northern border of South China, and the Zengpiyan cave in South China (Lu 2006, in press; Zhao 2011). Rice husks and phytolith of leaves have been found at Shangshan, the lower Yangzi Valley and are dated to between 10,000 and 7,500 years ago (Zhao 2011). However, it is not clear whether rice phytolith or remains found in the aforementioned sites are wild or domesticated species, nor is it certain that rice was cultivated or just collected for food and/or fuel, or for other purposes (Fig. 1) (Lu 2008; Zhao 2011). Nonetheless, these discoveries illustrate that rice was exploited by human beings in the temperate zone in Northern Asia by 12,000 years ago.

The early exploitation of millets, on the other hand, is unclear. Use-wear analysis on stone flakes found in Xiachuan (Fig. 1), Shanxi Province, China, indicates that cutting grasses was practiced at around 12,000 years ago in the middle Yellow River Valley (Lu 1999), but as millets cannot produce identifiable phytolith (Zhao 2011), and flotation has not been carried out in late Paleolithic sites in this region, the exploitation of wild millets remains to be investigated.

The Early Farmers

When the climate gradually warmed up after approximately 9,000 years ago, some societies living in the southern edge of the Inner Mongolia, the middle and lower reaches of the Yellow and the Yangzi River valley began to cultivate millets and/or rice, respectively. Grains of broomcorn and foxtail millets have been found in the Xinglonggou site in Inner Mongolia, the Cishan and Peiligang sites in the middle Yellow River Valley, the Yuezhuang site in the lower Yellow Valley, and the Dadiwan site in the upper Yellow River Valley, all dated to between 9,000 and 7,500 years ago (Fig. 1). It has been argued that the millets are domesticated except the grains found in Yuezhuang, which cannot be confidently identified (Lu 1999; Crawford 2011; Zhao 2011).

Rice grains have been found in the Jiahu site in the Huai River Valley dated to between 9,000 and 7,800 years ago, in the Pengtoushan and Bashidang in the middle Yangzi Valley dated to about 9,000–7,500 years ago, and in the Shangshan site in the lower Yangzi Valley dated between 10,000 and 7,500 years ago (Fig. 1). According to Zhao (2011), the rice grains found in Jiahu are likely to be domesticated, but the species of the Shangshan rice is unclear. Rice grains found in Bashidang are probably in between wild and domesticated and are identified as a transitional species (Zhang 1998).

Although living in different environments and cultivating different cereals, the cultivators of millets and rice shared some cultural similarities. First of all, they are all sedentary, as remains of houses have been found in all the aforementioned sites. Experiments of millet and rice cultivation indicate that sedentism is a crucial condition for cereal farming (Lu 2006), and the construction of houses results from sedentism. However, houses not only are shelter for human beings, but also provide space and facility for the formation of small social units (family?) and the storage and accumulation of private or family-owned properties, which eventually leads to private properties and social inequality, although archaeological data of the early farmers do not illustrate significant gap between households at this stage (Lu in press). Second, hunting and gathering (including fishing) remained as important subsistence strategies of the early farmers, illustrating that the origin and development of agriculture is a graduate process in Northern Asia, and that foraging did not immediately diminish after the occurrence of farming (Lu 2006). In fact, it is the development of agriculture, sedentism, increased population and much greater demand for wild plant and animal resources that eventually led to the depletion of wild flora and fauna, thus forced farmers to reduce foraging and rely more on agriculture (Lu in press). Thirdly, based on pottery and stone tool analysis, labor division and craftsmanship are at a very early stage in the early farming society (Lu in press). Finally, burials have been found in all the aforementioned sites except Shangshan, and items such as tortoise shells have been found in Jiahu, manifesting the existence of cognitive sense of social unit and the possible practice of rituals (Lu in press).

Did the early farmers keep livestock? Genetic studies suggest that dog might have been domesticated in East Asia, and the earliest one might have been found in northern China dated to about 10,000–9,000 years ago, but there is no evidence that the dog keepers were farmers. The dog found with millet cultivators in the Dadiwan culture is dated to between 8,000 and 7,400 years ago (Flad et al. 2009). The earliest domesticated pig was kept by the Jiahu rice farmers dated to approximately 8,500–7,800 years ago, and at around 8,100–7,400 years ago pig might have been husbanded by farmers at Xinglongwa in Inner Mongolia, Dadiwan in the upper Yellow River Valley, Cishan in northern China, and Kuahuqiao in the lower Yangzi River Valley (Flad et al. 2009) (Fig. 1). Sheep and goat are not locally domesticated, and might have been introduced into China by about 5,600–5,000 years ago; so would be the case for cattle, although the domestication of cattle in East Asia cannot be ruled out, as wild cattle exist in this region (Flad et al. 2009).

The Development of Agriculture

The Holocene climatic optimum between approximately 7,000 and 4,500 years ago witnessed the development of agriculture in Northern Asia, characterized by the occurrence of paddy rice field and plowing in the Yangzi River Valley, and sophisticated craftsmanship in both the millet and rice farming societies. Socially, this is an era of more stable sedentism, larger settlements, branched social units within the village, different economic and social status among members of the society, and gender differentiation (Lu 1999, in press).

This period also saw the expansion of agriculture possibly associated with human diaspora. Rice farming dispersed northward to the Yellow River Valley at about 7,000 years ago, and southward to South China by 6,500 years ago; and millet farming expanded to Xinle, Northeast China at around 6,100 years ago (Lu 2005) (Fig. 1). The number of archaeological sites

with remains of millets and/or rice increased substantially, the size of many sites became bigger, and the impact of agriculture upon local environment and natural resources was also visible in this era. For example, in the Hemudu site (Fig. 1), Zhejiang Province, China, where substantial amount of rice remains were found in the 1970s, pollen profiles indicate that the quantity and variety of hardwood was very rich at around 7,000 years ago when the rice farmers arrived; however, both the quantity and variety of hardwood reduced significantly at around 6,000 years ago, after the site being occupied by farmers for about 1,000 years, clearly showing the impact of farming activities upon local vegetation (Lu in press). Vegetation changes will have impact on local fauna. The quantity and variety of animal bones found in many archaeological sites occupied by millet and/or rice farmers between approximately 7,000 and 4,500 years ago also show the trend of declining (Lu 2006, in press).

After 7,000 years ago, rice and millet farming further expanded to Russia, Taiwan, the Japanese Archipelagos, the Korean Peninsula, Southeast Asia, and the Pacific. Within Northern Asia, seeds of broomcorn millet and beefsteak plant have been found in the Krounovka 1 site dated to between 4,670 and 4,640 years ago in Primorye, Russia; wheat, barley, pea, soybean, and buckwheat have been found in various archaeological sites dated after about 5,000 years ago, and hoed agriculture occurred at around 4,500 years ago in this region (Kuzmin & Rakov 2011) (Fig. 1). Dog was the earliest domesticated animal in Russia Far East dated from about 6,800 years ago, and animal husbandry began at around 3,000 years ago, with domesticated pig, horse, and cattle (Kuzmin & Rakov 2011).

In the Korean Peninsula, no archaeological data on prehistoric agriculture is available in North Korea (Lee 2011). The earliest remains of foxtail and broomcorn millet and legumes in South Korea are found in Tongsamdong and Pyeonggeodong (Fig. 1), dated to about 5,500 and 5,000 years ago; rice remains are dated to between approximately 4,000 and 3,000 years ago, and domesticated dog occurred at about 5,500–4,000 years ago, while remains of domesticated horse and cattle are dated to about 2,300 years ago (Lee 2011). Foxtail millet and rice farming reached Nan-kuan-li, western Taiwan by 4,500 years ago (Tsang 2005). Wet-rice farming expanded to the Japanese Archipelagos in the Yayoi period at around 2,800 years ago, and became a major subsistence strategy afterward (Misaka & Wakabayashi 2011) (Fig. 1).

Domesticated species from far afield also entered Northern Asia after approximately 5,000 years ago, most noticeably wheat and barley, which are originally domesticated in West Asia at around 10,000 years ago (Bellwood 2005) and expanded to Russia Far East (Kuzmin & Rakov 2011), the Yellow River Valley and adjacent areas by about 4,300–4,000 years ago (Zhao 2011). In other words, by 2,800 years ago, the cultivation of local species of rice and millets was practiced in continental and island Northern Asia, and "exotic" species like wheat and barley had also cultivated in the cold and temperate ecozones.

Agriculture of Other Plants

The aforementioned archaeobotanic data are primarily retrieved by flotation and phytolith analysis, which have been applied quite extensively in archaeological works conducted in Northern Asia after the 1980s. However, not all plant remains can be identified by the two methods, particularly tuber plants, which produce no phytolith, and cannot be identified to genus or species based on their charcoal remains found in archaeological deposits. Thus in recent years starch residue analysis has also been used in archaeological works in Northern Asia. In 2003, starch residues of taro were found on tools in the Zengpiyan cave site in Guangxi, South China, but starch cannot reveal whether it is a wild or domesticated species (Lu 2008) (Fig. 1). This study shows the exploitation of taro in South China before the expansion of rice farming from the Yangzi River Valley, but it is unclear whether South China is another independent center for the origin and development of taro farming (Lu 2008).

In addition to cereals and tubers, many other plants have been exploited and possibly

cultivated in Northern Asia. The Jomon people lived in Japan between 12,000 and 3,000 years ago collected and utilized many plants, including chenopods, dock, knotweeds, elderberry, grape, lacquer tree, goosefoot, walnut, beans, bottle gourd, hemp, and barnyard grass *Echinochloa crus-galli*, the latter might have been cultivated afterward (Crawford 2011). Based on genetic studies and archaeological data, it is also hypothesized that azuki and soybean might have been domesticated in Japan by the Jomon people, as well as by the Chulmun people in South Korea at around 5,300–5,000 years ago (Crawford 2011; Lee 2011), but more data are required to address these hypotheses.

Key Issues and Current Debates

Though many works have been done in the last decades, there are still issues under debate. These issues can be classified into two categories: the first one on the identification and classification of raw data, and the second one on the theoretical discourse of agriculture, such as the impetus, process and consequence of agriculture, and whether agriculture is an "advanced" development.

The Identification and Classification of Raw Data

Within this category there are debates on the progenitors of broomcorn millet and domesticated rice, as botanists and genetics still do not know much on the former, and disagree on the latter. Some scholars argue that the perennial wild rice (*Oryza rufipogon* Griff.) should be the progenitor, but others think that it should be the annual wild species (*O. nivara* Sharman and Shatry). While one subspecies of domesticated rice (*Oryza sativa japonica*) seems to have been domesticated in the Yangzi River Valley, it remains unclear where, when and by whom the other subspecies *O. sativa indica* and *O. sativa javanica* were domesticated. It is also unclear whether soybean was domesticated in Northeast China once, or was also domesticated in Korea and Japan (Crawford 2011; Lee 2011).

The question of when and how domesticated wheat, barley, and sorghum were introduced from Western Asia into Northern Asia also requires further studies (Zhao 2011). In addition, very little is known about the cultivation and domestication of many other plants, such as the Chinese tea tree, jujube, peach, lotus, water chestnuts, Chinese cabbage, and other species of vegetables, fruits, and nuts in Northern Asia (Lu 1999, in press; Crawford 2011; Kuzmin & Rakov 2011; Lee 2011).

In terms of identifying archaeobotanic findings, scholars also disagree on whether the morphological differences and measurements of rice grains and spikelet bases, as well as the phytolith morphology of the husks and leaves of rice, can be used to distinguish wild and domesticated rice (Lu 2006, in press). As domestication is a process, there should be species in-between (Zhang 1998). Based on comparative measurements of the perennial wild rice (*O. rufipogon* Griff) and domesticated rice (*O. sativa japonica*), it is argued that a more holistic approach is required, as the size and structure of the stem and spikelet of the two species also differ and should be taken into consideration (Lu in press). Further, how to be certain that plants and animals found in archaeological sites were locally cultivated/husbanded, instead of being brought to the site as a result of cultural exchange and trading, is an important issue too (Lu 2008, in press; Crawford 2011).

There are more remaining questions on the husbandry of animals in Northern Asia. As mentioned above, the domestication of cattle, chicken, water buffalo, silkworm, and fish remains unclear to date, as scholars are debating on the identification of wild and domesticated species of cattle, chicken, and water buffalo (Flad et al. 2009; Kuzmin & Rakov 2011), and very little attention has been paid to the cultivation of silkworm and fish in Northern Asia.

Theoretical Issues

To date, the majority of scholars working on agricultural in Northern Asia agree that the origin and development of agriculture is a process, but there are different opinions on defining

"agriculture," on the causal factors of the transition from foraging to farming, on the impact of cultural contact between the Yellow and the Yangzi River Valley related to the origin of agriculture, as well as the consequence of agriculture (Lu 1999, 2006; Crawford 2011; Kuzmin & Rakov 2011). Data of archaeology and other disciplines are far from sufficient to solve these debates at the present, but the consequence of agriculture seems to be very significant.

Based on archaeological, archaeobotanic, and zooarchaeological data found in Northern Asia to date, plus data from collecting, cultivation, and harvesting experiments, it is argued that when cereal cultivation began in the Yellow and the Yangzi River Valley, the productivity must be very low, particularly for rice, as the progenitor of domesticated rice is a perennial plant and produces very small amount of shattered seeds; thus, harvesting wild rice as food is highly inefficient comparing to collecting tuber plants, shells, and fishing (Lu 1999, 2006). Given the extremely low or even negative return of cultivating wild cereals at the initial stage of farming, agriculture must have been a small proportion of prehistoric economy, and it is possible that the main driving force for continuous cereal cultivation might not have been for food, although whether religious or other cognitive activities playing any role in this process requires further studies (Lu 2006, 2008, in press).

However, once occurred, cereal cultivation has significant impacts on people's way of life. First of all, it requires sedentism in order to look after and harvest the plants. Second, it requires close access to substantial amount of water and flat land. These requirements must have forced the initial cultivators to give up caves in hilly areas and move to plains and river terraces. Consequently, they had to learn to build dwellings, which was the beginning of architecture and settlement planning of human beings. Archaeological data have illustrated this change of settlement patterns in the Yangzi and Yellow River Valleys, as the prehistoric farmers are often located in the latter geographic settings (Lu 1999, in press).

Dwellings are not just for the physical protection and comfort of people. Based on ethnographic and archaeological data, it is argued that when a group of mobile people staying in caves, members of the group had to share *one* public and unstable space; there was no permanent and private space for them to keep and accumulate private properties. However, sedentism and the construction of dwellings provide stable and private spaces for people to store and accumulate their private properties, thus facilitate the occurrence and development of private (as individual or small social unit) ownership and inheritance of properties, which could be tangible items like tools, pottery, food (including the storable cereal grains), etc., or intangible items like craftsmanship and knowledge. All these have paved the way for social inequality (Lu in press). Studies on the dynamic between agriculture, changed space structures and social changes in prehistoric Northern Asia are quite limited at the moment, and much more research is required.

As agricultural techniques developed, particularly with the construction of paddy field for rice farming as a powerful medium of human interference by around 7,000 years ago, wild cereals were gradually domesticated, farming productivity might have increased, and more mouths could be fed. On the other hand, ethnographic and historic data demonstrate that traditional agriculture (without machines) is very labor intensive, thus more hands would be required. These factors, plus sedentism, must have led to population increase, as illustrated by the significantly enlarged settlements, increased houses within each settlement, and more densely located settlements in the Yellow and Yangzi River valley, as well as in adjacent areas (Lu 1999, 2006, in press). However, much more research is required on the impact of technological changes upon demographic, economic, and social change, as it is another important theoretical issue in prehistoric Northern Asia.

With all the aforementioned material culture, economic and social changes, labor division, professionalization and standardization of craft production, increase economic, social, and political inequality gradually occurred after 7,000 years ago. As increased populations had to compete

for limited land and water resources, group conflicts occurred or increased, and walled villages, and later, towns, were constructed. The earliest protective ditches surrounding a farming village have been founded in Bashidang, the middle Yangzi River Valley, dated to about 8,500–7,800 years ago (Fig. 1); and the earliest walled town has also been found at Chengtoushan in the same region dated to approximate 6,500–6,300 years ago, with rice paddy field being enclosed by the wall (Lu in press) (Fig. 1). This phenomenon clearly demonstrated that, first of all, rice field was a valuable property of the farming society at that time. Although it is not clear whether the field was publicly or privately owned, the protected rice paddy field illustrates the occurrence of immovable properties (farming land) and territory ownership in prehistoric Northern Asia. Second, the construction of these protective mechanisms indicates that there might have been group conflicts related to crops and lands. Further, these protective mechanisms are material evidence of the existence of some kind of cognitive boundary between social groups, even collective identities (Lu in press). The occurrence of individual and collective identity is a topic of cognitive archaeology and anthropology, and more attentions are deserved on this topic in Northern Asia.

More walled towns occurred in both the Yellow and the Yangzi River valleys after 6,000 years ago, particularly at around 4,800–4,000 years ago. At that time, farming techniques had developed further, rice paddy fields with irrigation system were constructed, plough was used in the Yangzi River Valley, and hoe was widely used in the continent of Northern Asia. The period between approximately 5,000–4,000 years ago saw further increased productivities and populations, accumulated tangible and intangible properties, more specified labor division and professionalization not only within the same group but between regions, and mass production of certain crafts, like pottery items, in the Yangzi River Valley. There were small and big houses within farming societies, and the quantities and qualities of burials in cemeteries varied significantly. Labor-intensive items for the social elite like jade and ivory items appeared in some of the big tombs located at human-made mounds in the lower Yangzi River Valley, possibly used for rituals and other special functions. All these illustrate the occurrence of complex society, with substantially differentiated social segments. It is based on this kind of society that ancient civilization in the Yellow River Valley occurred after 4,000 years ago (Lu in press). The formation process from complex societies to early states in Korea and Japan, on the other hand, is not very clear yet (Stark 2006).

Based on available data to date, the development of agriculture was associated with the decline of both the quantity and variety of wild plants and animals found in many archaeological sites in both the Yellow and the Yangzi River Valley after approximately 6,000 years ago, particularly after 4,500 years ago (Lu in press). As the climate between 7,000 and 4,000 years was generally warm and moist, it is more likely that this decline was the result of human activities and increased consumption of human populations in the two river valleys, which had been intensively farmed since some 9,000–8,500 years ago. Eventually, it became more difficult for members of the farming societies to hunt and collect, and they had to rely more on a few species of cultivated cereals and livestock (Lu in press). Foraging became less important and agriculture was more dominating in the economy. The diminishment of a broader spectrum subsistence strategy not only means that human beings have been irreversibly "domesticated," that their way of obtaining food becomes more vulnerable when attacked by natural and human-made disasters, but also means that it is more difficult for the poor members of the society to obtain free food from nature (Lu in press). The lack of variety of food ingredients, particularly the insufficient meat intake, might have caused malnutrition of the lower social class, although much more physical anthropological studies of human bones are required to tackle this issue. However, historic documents show that the upper class in Bronze Age Yellow River Valley was called "meat eaters" as opposite to the grass-root people (Lu in press). Thus, the

development of agriculture, and consequently the depletion of natural resources, has widened the gap between different social segments in terms of not only economic, social, and political status, but also physical well-being.

On the other hand, archaeological data and isotopic analysis seem to indicate that fishing, shell collecting, and foraging still played important roles even after the occurrence of farming in coastal and inland societies from approximately 5,500–3,000 years ago in South Korea, where intensive agriculture occurred by 3,400 years ago, possibly associated with migrating farmers from the Northern Asia continent (Lee 2011). Whether the less intensified agriculture in South Korea produced less impact on the environment and depletion of wild fauna and flora, requires further studies.

In summary, the origin and development of agriculture in Northern Asia some 9,000–8,000 years ago (Two articles published in PNAS and PLoS by Lu et al. (2009) argue that foxtail millet was domesticated in the Yellow River Valley by 10,000 years ago. However, the majority of scholars, working on prehistoric agriculture, including the author of this entry, do not agree, because the site was not re-excavated, and the archaeological context is not clear. For details please see Zhao (2011) in the reference list of this article.) have caused fundamental changes in terms of human beings' mobility, subsistence strategies, social (including kinship) and political structures, as well as their physical beings and mindsets, including the senses of property and territory ownership, and group boundary. It is primarily based on agriculture of millets, rice, wheat, and barley that ancient civilizations occurred in the Yellow River Valley by about 4,000 years ago and in the Japanese Archipelagos and the Korean Peninsula after 2,000 years ago (Lu 1999, 2006; Crawford 2011; Lee 2011; Zhao 2011). Agriculture was the choice made by some groups in Northern Asia at the beginning of the Holocene, and it has sent human beings onto a completely new trajectory with no return.

As agriculture sets the foundation of civilization, archaeologists in mainland China tend to think agriculture is an "advance," and blame environmental changes for the decline of some farming societies in the Yangzi River Valley, while scholars outside mainland China have different opinions (i.e., Lu 2006, 2008; Crawford 2011; Lee 2011). It has been argued that the current definition of "agriculture" is a Eurocentric concept (Crawford 2011), but the concept of "agriculture" in China also has a long history in the academic discourse in the Central Plain of the middle Yellow River Valley, which has been the "core area" of Chinese civilizations (Lu 1999, in press), so it really is a "Central-plain centrism" concept versus the foraging groups living in the so-called peripheral areas in China, the latter have been often described as "barbarians" and/or "backward" in China's historic documents and even the current archaeological discourse. Thus, the debate of whether agriculture is an "advance" or is the biggest mistake made by human beings is about whether cultural changes are unilinear or multilinear, about cultural relativism *versus* cultural "evolution," about Sinocentrism and/or "Central-plain centrism" *versus* cultural diversity in areas other than the so-called core areas of the origin of agriculture, and about using the past to construct and enhance nationalism and patriotism of different polities in Northern Asia today.

International Perspectives

There are the so-called core and secondary regions in terms of the origin and development of agriculture in Northern Asia, each showing various trajectories of cultural changes from approximately 15,000 to 3,000 years ago. A comparative discussion within Northern Asia can trigger questions on the diversity of human beings and environments, as well as their unique cultures (Crawford 2011). Further, the analytic outcome from Northern Asia can also be compared with those in Southeast Asia, where rice farming occurred at approximately 4,700–4,000 years ago (Bellwood 2005). The origin and development of agriculture might have resulted in human diaspora within Asia and from Asia to the Pacific, particularly the expansion of the Austronesians and Austroasiatics, which has

contributed to the current distribution of human beings in the world (Bellwood 2005).

Data found in Northern Asia to date do illustrate similarities and differences in terms of the transition from foraging to farming comparing to the origin and development of agriculture in Western Asia, which is the earliest core area of the origin and development of agriculture. With insufficient data dated to about 12,000–10,000 years ago in the Yellow and the Yangzi River Valley, it may be premature to launch a comprehensive comparison on the two "primary centers" of agriculture; but this comparison certainly will provide fundamental insights for understanding the dynamics between peoples and different natures, the unilinear or multilinear development of human cultures and societies, the inter- and intragroup interactions as one of the crucial mechanisms of cultural changes, and the creativeness of human beings as "agents" (Lu 2006, in press). Finally, the study of the origin and development of agriculture also provides lessons from the past for the present and future of humans' destinations.

Future Directions

As mentioned above, there are still many questions remaining on the origin and development of agriculture in Northern Asia. To tackle the issues, it is important to:

1. Adopt integrated multidisciplinary studies to retrieve as much information as possible at field work, such as the integration of isotopic, residue, phytolith, pollen, and use-wear analysis of archaeological findings.
2. Integrate archaeological experiments with archaeological data and information from other disciplines to understand the evolution process from wild to domesticated species and its impacts on human/cultures.
3. Apply theories of anthropology, critical geography, and sociology to study the dynamic and consequence between material culture, social, and politic institutions and cognitive changes, for example, the function and meaning of spaces in prehistoric societies or the occurrence of individual and collective identities.
4. Conduct research with scholars from different countries within and outside Northern Asia to facilitate comparative studies. In fact, this is already happening now, but it will benefit the whole field of prehistoric agriculture if this international and multidisciplinary approach becomes more common in Northern Asia.
5. Increase academic exchanges by timely publications in various languages, and by more academic meetings, site visiting, and workshops.
6. Train the younger generation with broader knowledge. Students major in archaeology should also receive introductory training on genetics, phytolith, pollen, archaeozoology, and theories of anthropology. A more in-depth and holistic study on the origin and development of agriculture in Northern Asia can only be carried forward by scholars with broaden academic horizon.

In summary, works carried out by archaeologists, archaeobotanists, historians, zoologists, and scholars of many other disciplines in the last decades have set a solid foundation for understanding the origin and development of agriculture in Northern Asia. It is believed that with new technologies, new methods, and new mindsets, much more data will be revealed, and the whole process from foraging to farming, as well as the consequence of this transition in Northern Asia, will be much better understood, and provide food for thoughts for humans at the present and in the future on the relation between human and nature and between human cultures, as well as on the direction of human societies as a whole.

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► Agriculture: Definition and Overview

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Northern Europe: Middle to Upper Paleolithic Transition

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State of Knowledge and Current Debates

Introduction

Seen from Europe, it has been often claimed that the beginning of the "Upper Paleolithic," around 40,000 BP, corresponds to a dual phenomenon: the development of innovative behaviors and a biological change (the disappearance of the last Neanderthals and the arrival of *Homo sapiens sapiens*). These different behaviors seen as particular features of the Upper Paleolithic (see, among others, Mellars 1989) include, for example, lithic tools based mostly on blade production, a greater variety and increased standardization of tools, bone tool production, ornaments, figurative art, greater regional variety in lithic industries, and more rapid evolution through time, the existence of systematic and specialized hunting (as opposed to scavenging and opportunistic hunting that was previously more common), demographic increase, increase in the size of occupation areas, and development of dwelling structures. Other criteria have also been sometimes proposed as

markers of the Upper Paleolithic, such as bladelet production (Bar-Yosef & Kuhn 1999).

Trying to escape from a definition of the Upper Paleolithic based on European data and given the numerous evidence of so-called "Upper Paleolithic" behaviors during the African Middle Stone Age, the "behavioral modernity" concept has been increasingly employed, being now as important as the concept of "Upper Paleolithic" itself. However, this concept remains fuzzy; material traces of such "behavioral modernity" are not so easy to identify in the archaeological record and often correspond to the same list of behaviors (bladelet production, ornament, bone tools, etc.). But other phenomena have also been claimed to correspond to this "behavioral modernity," among others: funerary practices, sailing (involved in the peopling of Australia), rocks or bones with organized incisions, musical instruments, projectiles and other composite tools, use of pigments, planning depth in the management of raw material procurement, and the existence of exchange networks (see, e.g., McBrearty & Brooks 2000).

Whether using the concept of "Upper Paleolithic" or of "behavioral modernity," scholars often propose to attribute these different innovative behaviors to a cognitive evolution unique to anatomically modern humans (different from the other hominins, whether Neanderthals, Denisovans, or *Homo erectus*) (e.g., Mithen 1994; Gargett 1999). This model linking biological evolution and cultural changes has two variants: some scholars propose the existence of rapid and recent cognitive change (after 50,000 BP; e.g., Klein 2000), and others propose slower and gradual evolution, more ancient (transition between Acheulean and *Middle Stone Age*, between 300 and 200,000 BP) unique to Africa where such "behavioral modernity" would develop in parallel with the modern anatomy of *Homo sapiens* (McBrearty & Brooks 2000). In both cases, it is then proposed that the development of the Upper Paleolithic in the different regions of the world can be explained by the dispersal of anatomically modern humans from Africa and the Near East (in agreement with most of the paleoanthropological and palaeogenetic hypotheses). Thus, the beginning of the Upper Paleolithic in Europe and Asia would be strictly related to the spread of *Homo sapiens sapiens* replacing other hominins (McBrearty & Brooks 2000; Mellars 2006; Bar-Yosef 2007) even if a certain amount of admixture has now been established between different hominin populations in Eurasia based on genetic data (Green et al. 2010).

Another general model proposes, on the contrary, that Upper Paleolithic development is not related to the replacement of archaic populations by a "modern" one and that the Middle to Upper Paleolithic transition does not correspond to a particularly deep behavioral shift (Straus 1995; Clark 1999). This transition is considered as a step during a longer and gradual evolutionary process, where selection and adaptation (notably due to environmental changes) are the driving forces of the progressive transformation of cultural and behavioral choices. Regarding biological evolution, this "continuity" model is related to work by paleontologists defending the idea of a multiregional origin of modern *Homo sapiens* rather than dispersal and replacement from a unique African source (e.g., Wolpoff et al. 2001).

However, these two conceptions of the development of the Upper Paleolithic, one in which it is seen as a "package" of behaviors unique to anatomically modern humans who spread across the globe with the dispersal of this new population, and the other in which the shift from Middle to Upper Paleolithic is just a step among others during universal and progressive evolution, both show weaknesses that should lead to the development of more complex approaches of these issues.

Indeed, numerous discoveries and recent research show that at least some of the behaviors said to be "modern" were already present before the Upper Paleolithic and even outside the African Middle Stone Age and *Homo sapiens sapiens* populations. Cynegetic capacities (e.g., Rendu et al. 2012), hafted tools, and projectile points (Rots 2013; notably involving synthetic resins: Grünberg 2002); planning depth in the management of the lithic resources

(Roebroeks et al. 1988); spatial organization of the living areas (e.g., Speth 2006); funerary practices (d'Errico et al. 2003); use of pigments; and presence of rocks and bones with organized incisions (Soressi & d'Errico 2007) are all attested during the Middle Paleolithic of Eurasia, notably among Neanderthals.

Moreover, the artificial nature of the package of new behaviors, said to be unique to the Upper Paleolithic or to "behavioral modernity," is also visible because it groups phenomena that developed independently at different times and in different regions. Ornaments, figurative art, or bone tools did not appear at the same time in the same regions with the presence of anatomically modern humans. The idea that it is possible to follow a dispersal of anatomically modern humans across the globe that would correspond to the development of the Upper Paleolithic is not supported by the archaeological record. Asia is in particular interesting from this point of view. Anatomically modern humans spread trough Asia to arrive between 70 and 40,000 BP in Australia, but the archaeological record does not really yield evidence of sudden behavioral change in these regions, especially if we consider Southeast Asia (Moore & Brumm 2007) and even Australia (Habgood & Franklin 2008).

Behind the so-called Middle to Upper Paleolithic transition are thus hidden a large variety of different phenomena, and it is better to tackle them separately to be able to draw more precisely the history of the human societies during this particular period.

Related to this strongly debated issue, the European Aurignacian and "transitional industries" draw much attention to technological, behavioral, and chronological aspects. However, some regions, like Northwestern Europe, and various technocomplexes, are still poorly known and often neglected when broadscale views of this period are proposed. Concerning the Northwestern Europe "transitional industry," called the Lincombian-Ranisian-Jerzmanowician (LRJ), it is nonetheless possible to integrate this region into discussions of the transitional period, concerning both cultural change and the question of the anatomy of the hominins involved, the last Neanderthals, or first European *Homo sapiens sapiens*.

The Issue of the Lincombian-Ranisian-Jerzmanowician Definition: A Short History

Leaf-points made on blade blanks by partially bifacial retouch, now for the most part called "Jerzmanowice points," were discovered at several sites during pioneering nineteenth century excavations in Great Britain, Belgium, Germany, and Poland. At that time, they were compared to the Solutrean and Protosolutrean industries. Henri Breuil (1912) described these artifacts as "Protosolutrean features," and this attribution persisted until the second half of the twentieth century (e.g., Garrod 1926). Later, some researchers (Sonnevilles-Bordes 1961) suggested an earlier age for these artifacts, and this was confirmed by the first radiocarbon dating of Nietoperzowa Cave, layer 6 (Poland) that led Waldemar Chmielewski (1961) to define the "Jerzmanowician," based mainly on the three layers (6 to 4) yielding blade leaf-points that he recognized during his excavations in this cave.

The Protosolutrean nature of the Jerzmanowice points from Great Britain and Belgium was later questioned, notably after the publication of Ranis Cave (Thuringia, Germany; Hülle 1977) where a layer yielding similar artifacts was found between Middle Paleolithic and Aurignacian layers, confirming the early age of this assemblage with Jerzmanowice points. In Great Britain, works by Roger Jacobi (1980) and John Campbell (1980) led to the definition of the "Lincombian," also marked by the presence of Jerzmanowice points. Finally, given the strong similarities of the leaf-points from these adjacent regions (Otte 1981), these different geographically limited names were combined into the "Lincombian-Ranisian-Jerzmanowician complex" (Desbrosse & Kozłowski 1988; here shortened to LRJ).

The definition of this new technocomplex has nonetheless often been rejected. The relevant assemblages being rare and poor, the characteristic artifacts having been often found mixed with

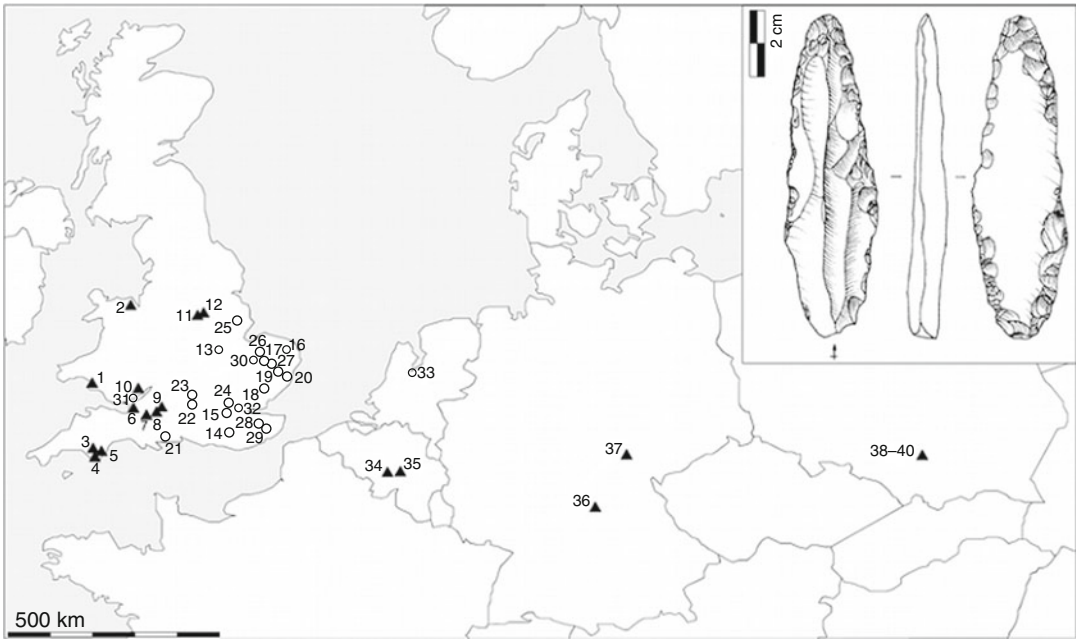

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 1 LRJ sites (*circle*: open-air site; *triangle*: cave site; illustration: Jerzmanowice point from Spy Cave; redrawn after Otte 1979). *1*: Paviland; *2*: Ffynnon Beuno Cave; *3*: Bench Tunnel Cavern; *4*: Windmill Hill Cave; *5*: Kent's Cavern; *6*: Uphill Quarry Cave 8; *7*: Soldier's Hole; *8*: Hyeana Den; *9*: Badger Hole; *10*: King Arthur's Cave; *11*: Pin Hole; *12*: Robin Hood Cave; *13*: Glaston Grange Farm; *14*: Beedings; *15*: Earl of Dysart's Pit; *16*: Drayton; *17*: Warren Hill; *18*: White Colne Pit I; *19*: Eastall's Pit; *20*: Bramford Road Pit; *21*: Moordown; *22*: Sutton Courtenay; *23*: Osney Lock; *24*: Creffield Road; *25*: Wallow Camp; *26*: Brandon; *27*: Town Pit; *28*: Bapchild; *29*: Conningbrook Manor Pit; *30*: Hainey Hill; *31*: Goldcliff; *32*: Temple Mills; *33*: Aardjesberg; *34*: Spy; *35*: Goyet; *36*: Zwergloch; *37*: Ranis 2; *38*: Grotte Nietoperzowa; *39*: Grotte Koziarnia; *40*: Grotte Puchacza Skała

other industries during imprecise excavations, it seemed more relevant to some researchers to not isolate these small assemblages within a separate technocomplex, but rather to consider these artifacts as part of already defined complexes. The Jerzmanowice points have thus been sometimes associated with the Aurignacian, in Great Britain and Belgium, and to the Szeletian in Central Europe (e.g., Allsworth-Jones 1986), or even to the Bohunician (Svoboda 2004: 43), as a hunting camp facies or as an economic facies (related to the availability of lithic raw material) of these complexes.

The Lincombian-Ranisian-Jerzmanowician

Geography and Chronology

Excluding dubious assemblages (lacking diagnostic artifacts), the LRJ complex has been identified at 40 sites (including isolated artifacts, sometimes from surface collections; Flas 2008). Most of them (32) are found in Great Britain (Jacobi 2007), assemblages from continental Europe (Belgium, Netherlands, Northern Germany, and Cracovian Jura) being clearly less numerous (Fig. 1). Even if the Jerzmanowice points from Czech sites are added, for which chronocultural attributions are debated (Nad Kačákem and Pekárna Caves, surface collections from Dubicko, Ondratice, and the Brno region; Flas 2008), the difference between Great Britain and the continent is still significant and cannot be explained as a mere consequence of the history of Paleolithic research in these different regions.

All of the stratified LRJ assemblages (32) come from Interpleniglacial (Isotopic Stage 3) deposits. For a more precise view of the chronological situation of the LRJ, the available

data are, however, rare. At Ranis, the LRJ assemblage (Ranis 2) was found in a layer between an underlying late Middle Paleolithic (*Blattspitzengruppe*, Ranis 1) and an overlying Aurignacian level (Ranis 3; Hülle 1977). This position between the Middle Paleolithic and the Early Upper Paleolithic is also indicated by the LRJ assemblages that have been mixed with both Mousterian and Aurignacian (and/or Gravettian) artifacts during ancient excavations (e.g., Paviland, Hyena Den, Kent's Cavern, Pin Hole, Spy, Goyet; Flas 2008).

Since the development of radiocarbon techniques, many results have been used to date assemblages with Jerzmanowice points. However, after a critical review, very few of these dates can be considered as relatively reliable. Indeed, imprecision during ancient excavations, as well as reworked and obviously mixed assemblages, makes associations between the dated samples (most of the time bones without anthropic traces) and the LRJ artifacts from the same deposits (Flas 2008) quite dubious.

It is, at any rate, possible to use the few dates that give the most reliable indications. Layer 6 from Nietoperzowa Cave yielded two ^{14}C dates around 38,000 BP (uncalibrated), consistent with the site stratigraphy.

Recently, at Glaston (England), six ^{14}C dates using ultrafiltration, made on bones directly associated with a recently excavated open-air LRJ occupation, have confirmed an age around 38,000 BP (Cooper et al. 2012). These are at present the most reliable results available for the LRJ complex.

Some other British sites have yielded similar results, between 38,000 and 36,000 BP. Nonetheless, these dates should be considered with caution, given the quality of early excavations and the nature of the deposits yielding the Jerzmanowice points and the dated bones found near them (Jacobi 2007).

While the development of the LRJ around 38,000 BP (or c. 43,000 BP calibrated) is thus likely, the chronology of the end of this complex is more difficult to determine. Beedings, an important LRJ open-air site of South East England, yielded a later TL date, but with a large sigma, and is considered a minimum age for the occupation (Jacobi 2007). There is only one date indicating a possible extension of the LRJ, around 30,000 BP, but it was obtained on a bone (not humanly modified) of imprecise provenience (layer 5 or 4?) from Nietoperzowa Cave. Thus, given the available chronological data, the LRJ does not seem to have existed later than 35,000 uncalibrated BP (Flas 2008).

Main Features of the LRJ Lithic Industry

Jerzmanowice points being the *fossile directeur* (and thus the most easily identifiable LRJ artifacts in mixed assemblages and in collections lacking stratigraphic context), and perhaps also due to the cynegetic function of most of the known LRJ occupations, they are the most commonly found type of tool (Figs. 1 and 2). On average, they have a length around 9–10 cm, width of 3 cm, and thickness of 1 cm. However, these points show some diversity, particularly variability in size and in the extension of retouch, but such sub-typological variety cannot be correlated with geography nor can it be explained by development from sturdier to lighter (gracile) points as proposed by Waldemar Chmielewski (1961). The variability of the Jerzmanowice points seems more likely related to properties of the blades that were used (dimensions, presence of cortex, more or less straight morphology) and, in rare cases (notably for the LRJ assemblage from Spy Cave), to the reduction process of such pieces (Flas 2008).

No use-wear study has ever been made on Jerzmanowice points. Nonetheless, these pieces being pointed and symmetric, and likely axially hafted as suggested by the importance of proximal shaping (by inverse flat retouch and sometimes dorsal longitudinal thinning; Fig. 2, no. 2) as well as likely impact fractures (burin-like removals, "spin-off" removals, strongly marked bending fractures) seen on some of them (notably in the Beedings assemblage; Jacobi 2007; Fig. 2, no. 1), support the hypothesis of use as projectile points.

In addition to Jerzmanowice points, LRJ assemblages may also contain bifacial

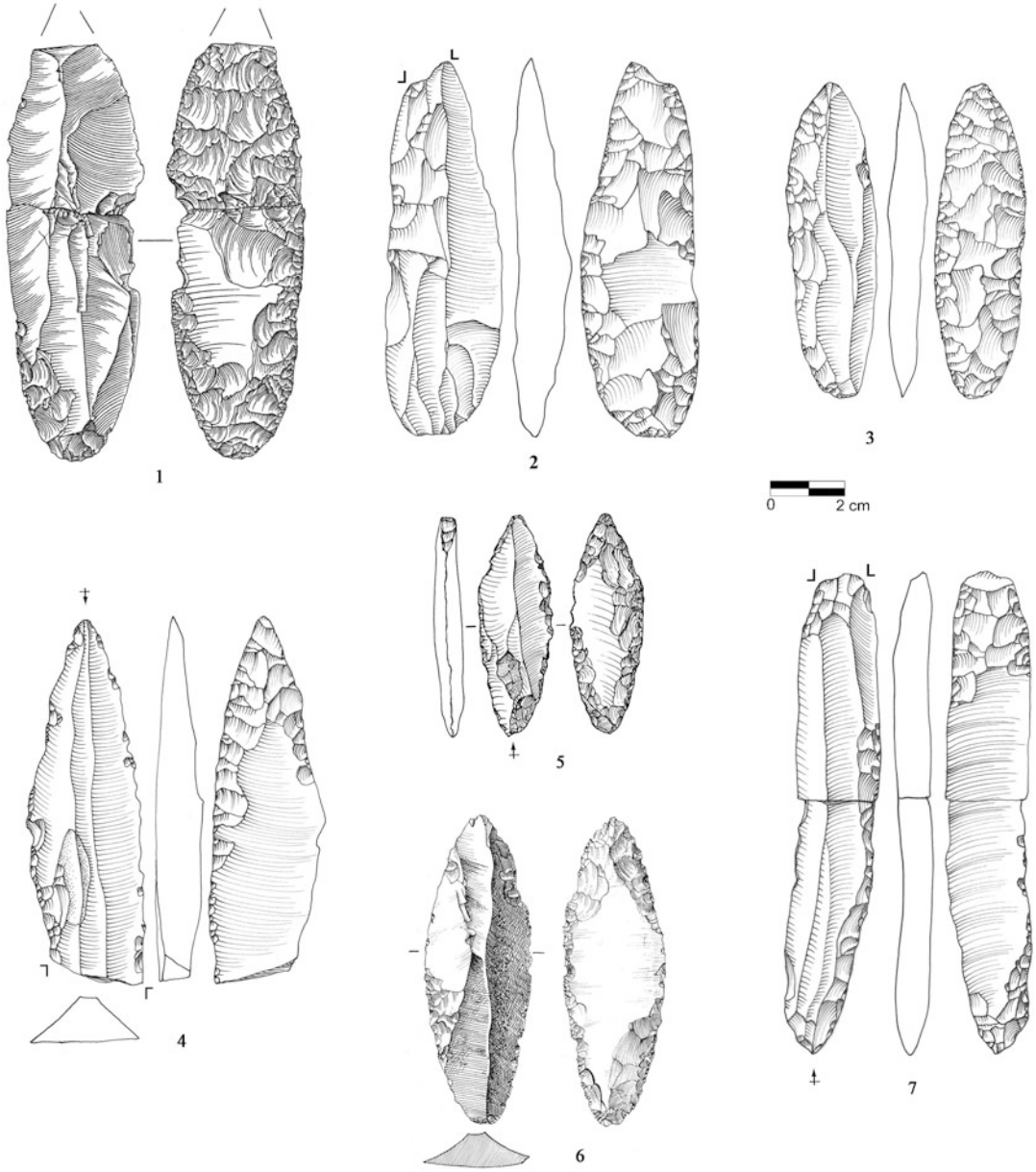

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 2 Jerzmanowice points. *1*: Beedings (After Jacobi 2007); *2*: Kent's Cavern; *3*: Robin Hood Cave; *4–5*: Spy Cave (6 after Flas 2008); *6*: Ranis 2 (After Hülle 1977); *7*: Nietoperzowa Cave

leaf-points, made on blocks or large flakes (Fig. 3). They are far less numerous than the former, except in the Ranis 2 assemblage (Hülle 1977) and are only found in a few sites (Paviland Cave, Kent's Cavern, Soldier's Hole, Robin Hood Cave, Bramford Road, Nietoperzowa Cave).

Other tool types are much less common (Flas 2008; Fig. 4). However, pointed blades, retouched blades, end scrapers (often made on the proximal end of blades; Fig. 4, nos. 1–3), and burins (dihedral, on truncation or on break), sometimes made on former Jerzmanowice

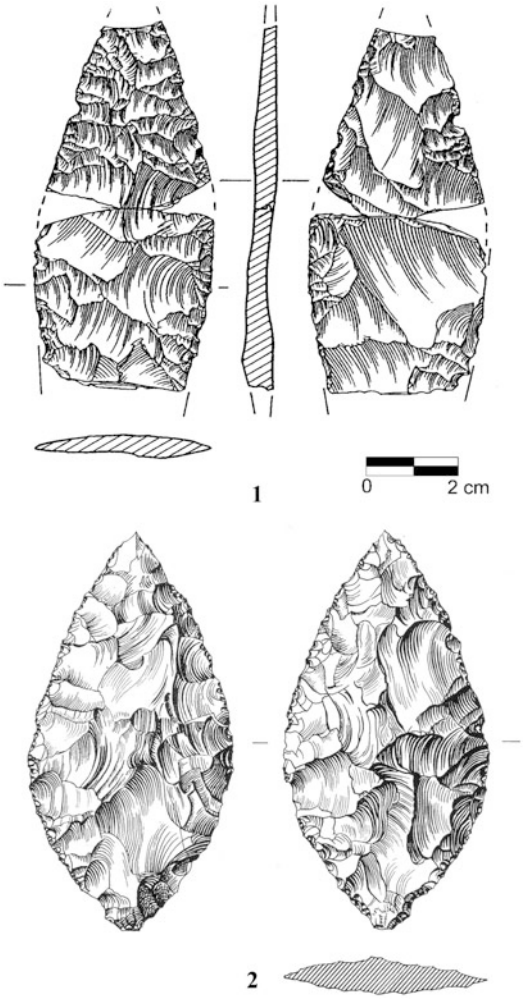

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 3 Bifacial leaf-points. *1*: Robin Hood Cave (After Jacobi 2007); *2*: Ranis 2 (After Hülle 1977)

points, are present. Few truncations, perçoirs, and splintered pieces have been identified in LRJ assemblages. Beedings (Jacobi 2007) also yielded several "Kostenki knives" (Fig. 5, no. 3), but their function as a tool is not certain as it is also possible that they were bladelet cores. "Archaic" tool types (sidescrapers, denticulates, notches) are sometimes present but rare, being clearly less common than typologically "Upper Paleolithic" tools.

Concerning blade production technology, some homogeneity is observed between the LRJ assemblages (Jacobi 2007; Flas 2008). The most common knapping method corresponds to blade production using cores with two opposed platforms (bidirectional) (Fig. 5, no. 1; examples of blades from bidirectional debitage: Fig. 2, nos. 1–3, 5, 7; Fig. 5, no. 2), although unidirectional blade production is sometimes also documented. Blade knapping is most of the time done with an organic soft hammer, based on the relative thinness of blade platforms (less than 5 mm, with an average around 3 mm) and the frequent presence of a lip. Blade production is volumetric, involving preparation of the cores by different crests (central crest to initiate blade production and lateral crest to shape the back of the cores and enabling management of the transverse curvature of the knapping surface during the reduction process). The knapping surface is relatively broad with alternating use of the two opposed striking platforms, yielding mostly straight and relatively sturdy blades (around 10 cm and more in length, c. 3 cm in width, and 1 cm in thickness), sometimes pointed (Fig. 5, no. 2). These blade blanks are perfectly suitable to be transformed into Jerzmanowice points.

Bladelet production is likely if we consider some of the cores from Beedings (Jacobi 2007). Indeed, the assemblage includes small bidirectional cores that yielded bladelet-size blanks in the final production stage (Fig. 5, no. 4). There are also "core-burin" and "Kostenki knives" showing bladelet removals (Fig. 5, no. 3). However, because of imprecision during excavation at this site, no complete description of this potential bladelet production can be drawn.

On the other hand, no flake production method has been recognized in the LRJ. The few flakes found in some of the assemblages may simply correspond to by-products of blade production or to flakes knapped from exhausted blade cores.

Bone Artifacts and Pendant?

Only two artifacts may possibly indicate the presence of bone tools and ornaments in the LRJ. These are a bone point (or awl) and a perforated ivory disc fragment, both from Ranis 2 (Hülle 1977). Unfortunately these two pieces are lost: the perforated disc being only known from

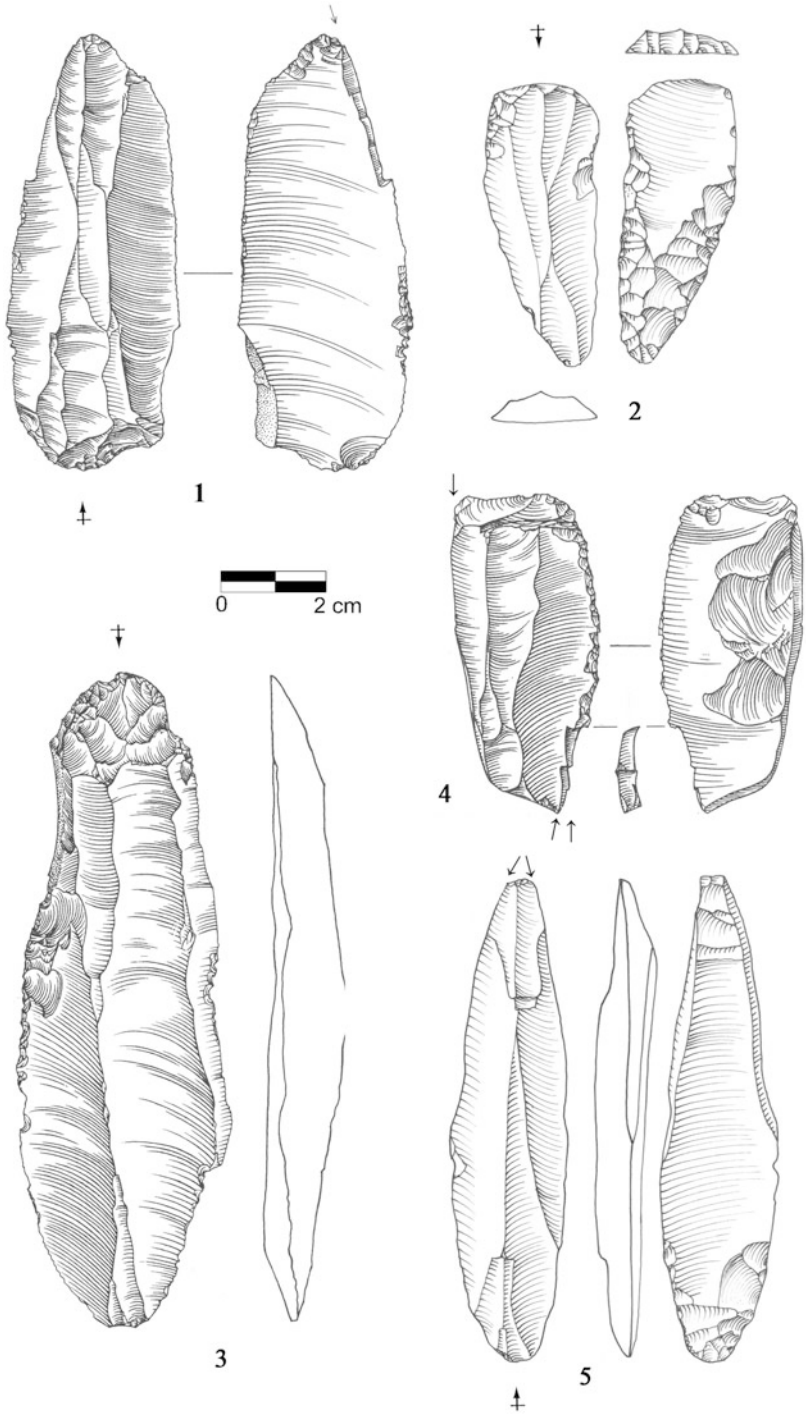

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 4 LRJ. *1*: burin on truncation/end scraper, Beedings; *2* : end scraper, Goyet; *3*: end scraper, Beedings; *4*: double burin (on truncation/dihedral on angle), Beedings; *5*: double burin on truncation, Robin Hood Cave. *1*, *3*, and *4* (After Jacobi 2007)

a sketch in a field notebook, as its fragility did not permit it to be removed from the sediment. Given the excavation imprecision at Ranis, one should be particularly cautious about the attribution of these two pieces to the LRJ as no other LRJ assemblage has yielded similar artifacts. Indeed, the bone points described at Nietoperzowa Cave (Allsworth-Jones 1986: 136–137) and

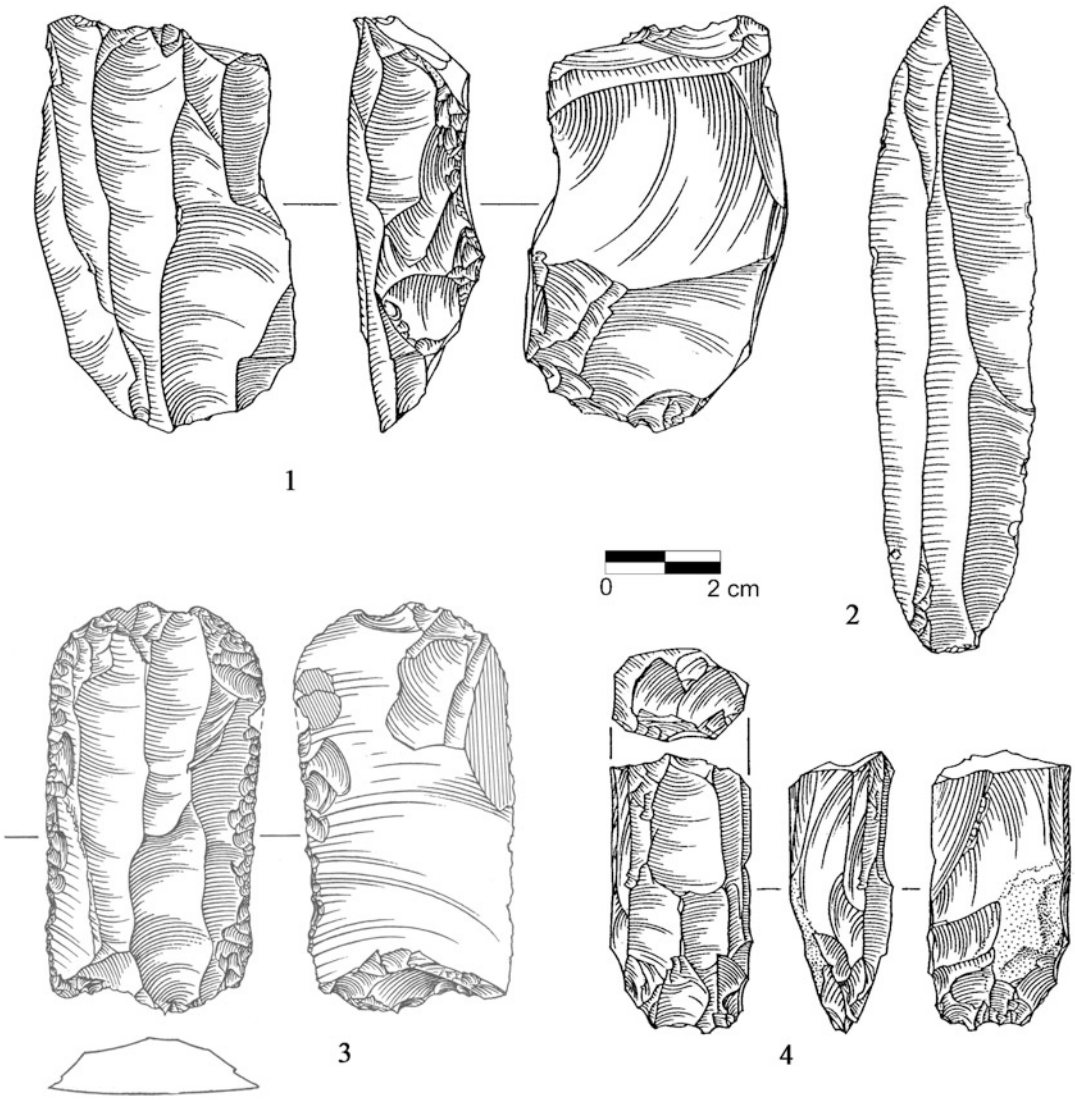

Northern Europe: Middle to Upper Paleolithic Transition, Fig. 5 LRJ, Beedings (After Jacobi 2007). *1*: Blade core with two opposed platforms; *2*: blade; *3*: "Kostenki knife"; *4*: Bladelet core with two opposed platforms

Soldier's Hole cannot be accepted, their anthropic nature not demonstrated, and their stratigraphic origin uncertain.

The LRJ: An Independent Technocomplex

LRJ vs. Aurignacian

Some researchers have proposed that some LRJ assemblages can be considered as part of the Northern Europe Aurignacian. Yet several arguments converge to confirm that the two complexes are unrelated (Flas 2008).

The stratigraphic associations between diagnostic Aurignacian artifacts and Jerzmanowice points are rare (seven sites). Moreover, they all correspond to unreliable contexts where different industries were mixed because of geological (colluvium) and taphonomic (notably bioturbation) processes and the imprecision of ancient excavations (the seven sites being excavated before 1930). Among recently excavated sites, only Trou Magritte stratum 3 would have yielded an Aurignacian assemblage including a bifacial

foliate. However, a preliminary reappraisal of the lithic collection shows that neither the Aurignacian features nor the presence of a bifacial leaf-point can be substantiated and that this assemblage corresponds more likely to a Mousterian industry (Flas 2008: 76).

The current chronological data show that Aurignacian is not found in these Northern European regions before 35,000 BP (uncalibrated; Flas 2008). This implies a hiatus of several millennia with the LRJ assemblages dated around 38,000 BP. The difference between the two complexes is also geographic: contrary to the LRJ, Aurignacian is commonly found in northern continental Europe (Meuse river basin, Middle Rhine basin, southern Poland), but is very rare in Great Britain where it has been found only in a few sites in western England and Wales (Flas 2008; Dinnis 2012).

Moreover, essential differences are obvious in blade production technologies of the two complexes. Indeed, in Aurignacian, blades are produced almost exclusively from unidirectional cores, yielding blanks that are more curved and for the most part lighter (particularly for width and thickness) than in the LRJ (Flas 2008). Blade production technology observed for the Northern Europe Aurignacian is identical to that described for other Aurignacian assemblages in Europe (e.g., Teyssandier 2008).

Central Europe: Jerzmanowician, Szeletian, and Bohunician

LRJ assemblages from Poland have been sometimes seen as a mere facies of the Szeletian or the Bohunician (Allsworth-Jones 1986; Svoboda 2004: 43); however, the separation of these complexes is still the most likely hypothesis.

Jerzmanowice points are actually very rare in assemblages hypothetically attributed to the Szeletian (one in the assemblage from Mamutowa Cave, Poland) or to the Bohunician (two in the "Bohunician" assemblage from Dzierżysław I lower layer, Poland). Other stratified Szeletian and Bohunician sites did not yield any artifacts similar to Jerzmanowice points. The distinction between the LRJ and the Szeletian is thus not based on the simple proportion of tool types that could be related to the nature of occupations (large settlements with varied activities vs. hunting camps), but has a more profound typological and technological difference (Flas 2008).

Blade production is actually not so well developed in Szeletian assemblages, and blades appear to be mostly knapped from unidirectional cores using hard stone-hammer percussion (Neruda & Nerudová 2005; Flas 2008: 103). This strong difference with LRJ blank production, seen in several sites in different geographic contexts, cannot simply be related to the influence of available lithic raw material. "Krumlovský Les chert," the main raw material of the Moravian Szeletian, does not prevent blade production as it can be seen in the Vedrovice Ia Aurignacian assemblage (Neruda & Nerudová 2005). Moreover, Szeletian assemblages from southern Poland (Flas 2008), using similar raw material to the LRJ, do not develop a technology similar to the former.

Similarly, the few artifacts described as "Jerzmanowice points" from stratified Bohunician assemblages do not correspond typologically to the LRJ artifacts. Moreover, Bohunician blank production is very specific (Škrdla 2003), producing elongated Levallois-like points, that cannot be mistaken for the blade production seen in the LRJ.

These strong differences between the LRJ, Szeletian, and Bohunician are actually confirmed by their geographic ranges: LRJ assemblages are mainly found in regions (Great Britain, Belgium, Northern Germany) where there are no Szeletian or Bohunician sites.

Discussion. LRJ: An Acculturation Phenomenon of the Last Northern Europe Neanderthals?

There is a consensus among researchers regarding the origins of the LRJ. All agree on the similarities observed between some of the late Middle Paleolithic industries from Northern and Central Europe (particularly the German *Blattspitzengruppe* or "Altmühlian," or the Belgian "*Evolved Mousterian*" and the LRJ) (e.g., Chmielewski 1961; Allsworth-Jones 1986; Kozłowski 1990; Otte 1990; Bar-Yosef 2007).

Continuity between these industries and the LRJ is at present perhaps not as obvious than it may seem because of the lack of reliable chronological data and the problems inherent in old collections (Flas 2008); it is nonetheless clear that some technical behaviors seen in the LRJ already existed in industries from the first half of the Interpleniglacial in Northern Europe: the presence of bifacial leaf-points and blade production, especially from bidirectional cores (Piekary IIa and Ksiecia Jozefa sites; Sitlivy et al. 2007).

The LRJ thus developed around 38,000 BP uncal. (or c. 43,000 BP calibrated) and shows an "Upper Paleolithic" technology and typology, as well as similarities with late Middle Paleolithic industries of these regions. Then, two questions arise: who are the makers of the LRJ industry (Neanderthals or *Homo sapiens* sapiens)? If they are Neanderthal populations, can the development of an Upper Paleolithic-like industry be explained as the result of an acculturation process stemming from the contact between the anatomically modern humans spreading in Europe around that time?

No human remains are as yet directly associated with the LRJ; hunters responsible for this industry have thus been sometimes considered as Neanderthals by some scholars and as anatomically modern humans by others. For example, Stephanie Swainston (1999: 41) proposed that the LRJ corresponds to *the earliest intrusive modern human industry* in Great Britain. It is likely the "evolved" nature of the LRJ blade production and tool types that led it to be so attributed to anatomically modern humans. However, most of the scholars propose that they were Neanderthals because of the technical continuity detected between the LRJ and some of the late Middle Paleolithic industries (e.g., Otte 1990; Bar-Yosef 2007).

Although no human remains are directly found in association with an LRJ assemblage, it is still possible to consider the available data to evaluate which hypothesis is more likely. Two sites have yielded remains "close" to the LRJ: a maxilla fragment from Kent's Cavern and the three Neanderthal individuals from Spy Cave.

The human remains found in the *Vestibule* of Kent's Cavern raise several issues (Jacobi 2007; Flas 2008; White & Pettitt 2012). Recent studies suggest that previous dating of this bone (around 30,900 BP uncal.) is a minimum age due to contamination. Faunas found during the same excavations have been now dated using ultrafiltration and suggest an earlier age for the maxilla (before 37,000 BP radiocarbon, Higham et al. 2011). However, these human remains come from an unreliable sedimentary context excavated with very unprecise method (Jacobi 2007: 307; White & Pettitt 2012) preventing us from using dates from fauna as indications of its age, and it is only "associated" with nondiagnostic artifacts (blade fragments). Moreover, refitting of these blade fragments indicates an important disturbing of the deposits (White & Pettitt 2012). It is thus clearly impossible to use this human remain to relate the LRJ assemblage from this site to an anatomical type nor to suppose an early presence of anatomically modern humans in Great Britain.

More interesting are the Neanderthal remains from Spy Cave that have been generally related to the Middle Paleolithic assemblage from the upper part of the lower (third) layer, a Mousterian of "Charentian type." However, it should first be emphasized that according to the excavation report, human remains were found directly below the red deposits corresponding to the second layer, this latter layer including Mousterian, but also LRJ and Aurignacian assemblages. It is thus not impossible, if the bodies were buried, that graves were dug into the lower layer and that these individuals are actually related to occupations in the second layer, thus corresponding to particularly recent Neanderthals.

This late age has been recently confirmed by ^{14}C dates on several bones and teeth belonging to these Neanderthal individuals (Semal et al. 2009). Reliable results for the adult individuals are around 36,000 BP uncalibrated. These dates fit more with the chronology of the LRJ (beginning, as we have seen, around 38,000 BP uncalibrated) than with the final Mousterian chronology that is not found so late in Northern Europe (Pirson et al. 2012). Thus, even if no direct archaeological

association between the Spy Cave Neanderthal remains and the LRJ assemblage from that site can be established, these Neanderthals are chronologically more likely related to the LRJ than to the Mousterian.

Despite the lack of direct association of human remains and LRJ, the Neanderthal hypothesis is thus much more likely than the anatomically modern human hypothesis for several reasons. First, the late Middle Paleolithic in Northern Europe, from which the LRJ complex seems to have developed, is made exclusively by Neanderthals as is shown by the human remains from Trou de l'Abîme at Couvin (layer dated around 45,000 BP uncal.; Toussaint et al. 2010), Trou Walou layer CI-8 (around 40–38,000 uncal. BP; Pirson et al. 2012), and Neanderthal (around 40–39,000 BP uncal.; Schmitz et al. 2002). Second, the dates of the Spy Cave Neanderthals seem too recent to be associated with the Mousterian and fall within the LRJ chronology. They are similar to the dates from the Neanderthal remains from Saint-Césaire (France) that are attributed to the Châtelperronian (Hublin et al. 2012). Moreover, the oldest European anatomically modern humans (Pestera cu Oase: Rougier et al. 2007) are more recent and geographically distant of the LRJ complex.

Explaining why and how important technical and behavioral transformations appeared among Paleolithic societies is a challenging task given the fragmentary and coarse resolution of the available data. In this framework, the acculturation theory, proposing that the European transitional industries (as the LRJ) are the result of acculturation of Neanderthal populations trying to imitate new technical behaviors brought to Europe as the Aurignacian complex made by anatomically modern humans (e.g., Mellars 1989; Bar-Yosef 2007), has the advantage of simplicity. However, several elements suggest that, at least in the case of the LRJ, this hypothesis is rather unlikely. First for chronological reasons, at least 4,000 radiocarbon years separate the oldest dated LRJ assemblage (around 38,000 BP) from the oldest Aurignacian assemblages in the same regions (around 34,000 BP). While Protoaurignacian assemblages older than 37,000 BP could exist in Europe, as at Kozarnika layer VII (Bulgaria, Tsanova 2008) or the lower layers of Isturitz (Southwest France, Szmidt et al. 2010), they remain rare (most Protoaurignacian and Early Aurignacian assemblages post-date 37–36,000 BP). Given the resolution of ^{14}C dates, we do not know if these assemblages are older or younger than, or contemporary with, the LRJ. Certainly these assemblages are distant from the regions where the LRJ developed, and the process by which the presence of blade and bladelet knappers in Bulgaria or the Pyrenees around 38,000 uncal. BP could be the stimulus, across Interpleniglacial Europe, of the development of a blade technology in Northern England, is difficult to imagine. Moreover, as has been previously shown, LRJ blade production strongly differs from the Aurignacian, and it is thus difficult to see how the latter could have participated in the development of LRJ technology, all the more since blade technology is already recognized during the late Middle Paleolithic of Northern Europe (Sitlivy et al. 2007).

Recently, maybe because an acculturation process related to the Aurignacian complex has been challenged on the basis of chronological and stratigraphic data (e.g., d'Errico et al. 1998; Bordes 2003), other industries have been proposed as proxies for the spread of anatomically modern humans and as acculturators driving the last Neanderthals to develop the "transitional industries" (e.g., Bar-Yosef 2007). In Central Europe, the Bohunician has been seen as a complex related to the spread of anatomically modern humans from the Near East (e.g., Bar-Yosef & Svoboda 2003). Indeed, it shows similarities with the Boker Tachtit layers 1–2 assemblages (Skrdla 2003), and Tostevin (2007) has set out in a detailed way how the Szeletian assemblage from Vedrovice V may be seen as the result of acculturation of the local Middle Paleolithic (*Keilmessergruppe* from Kulna Cave) by the Bohunician complex. However, the extension of this model to include a scenario whereby LRJ Neanderthals are acculturated by Bohunician anatomically modern humans

finds little support in evidence and is thus a weak hypothesis. There are no human remains, either in the Near East or in Central Europe, showing that this "Emireo-Bohunician" complex is made by anatomically modern humans, and it could alternatively correspond to the diffusion of technical ideas rather than to a population dispersal. Moreover, the relationship between Boker Tachtit (in the Negev) and the Bohunician (in Moravia) is based on technological similarities, but intermediary assemblages between these two distant regions are rare (Bar-Yosef & Svoboda 2003) and sometimes show variability (Temnata and Bacho Kiro: Tsanova 2008; Teyssandier 2008). It would be also necessary to assess other European late Middle Paleolithic industries that could potentially play a role in the emergence of the Bohunician, such as the Polish sites of Piekary IIa and Ksiecia Jozefa (Sitlivy et al. 2007), as well as Korolevo I/IIb (Ukrainia; Monigal et al. 2006) and the Bulgarian Moustero-Levalloisian with leaf-points of Samuilitsa and Muselievo (Tsanova 2008). Even if the hypothesis that Bohunician corresponds to an anatomically modern humans dispersal from the Near East is accepted, the LRJ shows different objectives and reduction strategies from the Bohunician. More generally, it is difficult to see which lithic innovations are found in Bacho Kirian or Bohunician industries that could be the stimulus for a long-distance acculturation.

Conclusion

The presence of the LRJ in Northwestern Europe confirms the proliferation of technocomplexes during the Middle to Upper Paleolithic transition. In this respect, grouping together different industries under too large and poorly defined labels (such as "Szeletian") masks an essential part of these phenomena.

From an unknown origin, most likely in the context of the *Blattspitzengruppe*, the LRJ complex spreads in different milieus at the end of the Middle Paleolithic, between Poland and Wales, regions where bifacial pieces and blade production have been found variably but regularly and which are thus a favorable substrate for the adoption of LRJ technology, a new mixture of already existing behaviors. Once the shift to Jerzmanowice points was established, perhaps related to a change of cynegetic behaviors, and thus the correlative production of suitable laminar blanks, "Mousterian" industries began to change to an "Upper Paleolithic" technology.

Given the available paleoanthropological and chronological data, the LRJ was much more likely made by Neanderthals, whereas the anatomically modern human expansion in Europe seems to be concomitant with the appearance of the Aurignacian complex. At any rate, the development of the LRJ complex cannot be explained by acculturation from the Aurignacian, this complex being much later in Northern Europe and contributing nothing, at least for blade production, to the technology used by the last Neanderthals.

This shift from Mousterian technology to the LRJ is a further example of the absence of a link between an "Upper Paleolithic" lithic industry and the dispersal of anatomically modern humans, giving credence to the idea of a separation between the cultural and the biological issues involved in the "Middle to Upper Paleolithic transition" (e.g., Hovers 2006). Moreover, it confirms the existence of processes of change within the Interpleniglacial technocomplexes prior to the (Proto)Aurignacian, as has been described in other European regions (e.g., Monigal et al. 2006; Teyssandier 2008).

Cross-References

- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian

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Numismatics, Ancient Greek

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Introduction

Ancient Greek numismatics is the study of the coinage produced by the Greek cities, by their colonies in the East and the West – from India to the western Mediterranean – and by many kings, during the Archaic, Classical, and Hellenistic periods. The coinage is described as "Greek" because of the Greek legends on the coins giving a variety of information (e.g., the name of the issuing authority, a die engraver, or a mint official). Ancient Greek and Hellenistic coinage is dated roughly from the end of the sixth century BCE – from the issuing of the very first coins – down to the year 31 BCE, the date of the conquest of Egypt by Octavian. From the year 30 BCE onwards, the Roman period begins.

Definition

The coinage produced by the Greek cities and kings is a material evidence in the service of history. Coins differ from other artifacts in that state authorities issued them; they therefore constitute official documents that were used either by the city or the king who issued them to finance specific needs and to diffuse the messages depicted on their limited surface. The designs and the inscriptions played a monetary as well as a political role (the latter is especially true for the Hellenistic period) and provide precious information about many aspects of Greek civilization. In contrast with modern numismatics, where the metric system is clear and the coins indicate their numerical value, we do not possess a metrological manual for ancient Greek coinage. The numismatist has to find the answers to questions relating to attribution, dating, denomination, value, volume of issue, metal composition, and circulation – amongst others – for each coinage that was produced and survived to the present day. For these purposes, the numismatist must combine the evidence of the coins themselves with other available sources such as ancient texts, inscriptions, and archaeological finds. He will then have to consider the iconography represented on the surface of each coin, the coin legends, the symbols, any monograms, countermarks, or overstrikes – which would indicate the reuse, the "second life" of a specific coin – and employ statistical, metrological, and metallurgical analysis to carry out his research.

The Making of an Ancient Greek Coin

Coin manufacture in ancient times differed completely from modern, automated processes. All ancient coins were produced by hand in the mints of the various cities, which explains their imperfections in terms of shape. In all cases, the procedure was the same (Fig. 1): the first task was to create the blanks or flans of metal of the correct weight (according to the denomination that the mint wanted to issue). Then, the flans had to receive the impression of the obverse and the reverse types, which were engraved in negative (*in intaglio*) on the bronze or iron dies.

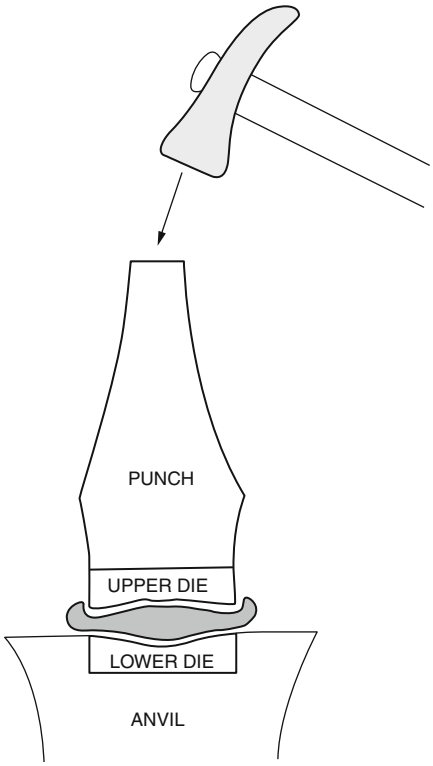

Numismatics, Ancient Greek, Fig. 1 The method of coining in ancient Greece (From Rutter 1983: 14, Fig. 2, with permission)

Numismatics, Ancient Greek, Fig. 2 Aegina, silver *didrachm* (ca 510 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford (From Howgego 1997: Fig. 16, with permission)

Numismatics, Ancient Greek, Fig. 3 Persia, gold *daric* (ca 400–330 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford (From Howgego 1997: Fig. 30, with permission)

The obverse die was fixed in an anvil, while the reverse die was fixed on a punch that was handheld. The weighed flan was placed on the anvil, and the punch was hit with a hammer, resulting in the impression of both dies on the flan. The result of this process was the transformation of a flan into a coin, a piece of weighed metal bearing the marks of the issuing authority that attested both its validity and its value.

The Earliest Coins and the Diffusion of the Coinage

Coinage was first issued probably in Lydia, from where it spread rapidly in the sixth century BCE to mainland Greece (Athens, Aegina (Fig. 2), Corinth), Italy and Sicily, and to specific areas under Persian control during the Archaic and Classical periods (western Asia Minor, Cyprus, Cyrene).

Phoenicians adopted coinage in the middle of the fifth century, and the Carthaginians and the Etruscans later followed suit. The spread of coinage is associated with the development of the city-state (*polis*), but not all cities issued coins. Although electrum (a natural alloy of gold and silver) was used for the earliest coins, the kings of Lydia or the kings of Persia started issuing coins in pure silver and pure gold (bimetallism) around the middle of the sixth century BCE. The Persians continued to produce gold (*darics*) and silver (*sigloi*) coins (Fig. 3) until the time of Alexander III (Alexander the Great), while the majority of the Greek cities issued coins almost exclusively in silver.

Until gold coinage was issued in large quantities by Philip II of Macedonia, by Lampsacus and Cyzicus, by Pixodarus of Karia, and by some kings of Cyprus, the Greek cities mainly issued gold coins in times of crisis. A good example is the coinage minted by the city of Athens at the

end of the Peloponnesian War (431–404 BCE) when the Spartans took control of Dekeleia and prevented Athenian access to the mines of Laurion, their principal source for silver (406 BCE). In order to continue financing the war, as Pericles suggested (Thucydides, II, 13.4-5), the Athenians melted down the gold plates of seven statues of Victory and produced a gold coinage composed of various denominations (from *staters* down to *hemiobols*) that survive in a few examples today. In parallel, the Athenians issued a series of silver-plated coins (silver on the exterior and bronze in the interior), mentioned as "πονηρά χαλκία" in Aristophanes (Frogs, 717-733). Each of these coinages represents a solution of making payments and facing financial difficulties during a period of crisis.

From the middle of the fifth century BCE, some Greek cities also minted coins in bronze, a coinage of a small value that was designed to cover mostly everyday needs, which explains its local diffusion. Hoard evidence, as well as other finds, proves that fractional coinage was issued in important quantities during the Classical period by many cities.

The rise of the kingdom of Macedonia, with Philip II (360–336 BCE), who exploited the gold mines in the territory of Krenides to pay for mercenaries, then with Alexander III (336–323 BCE) and his campaign that led to the fall of the Persian Empire and the conquest of the East, changed the political scene of the Greek world and inaugurated a royal coinage of a broader scope (Fig. 4).

Alexander III gained control of the Persian treasury c. 333–330 BCE and accessed a massive amount of silver (both coined and in other forms); this booty, calculated at 180,000 *talents* of silver (a Greek *talent* is roughly equivalent to 26 kg), financed his campaign. With Alexander's conquests, coinage in gold, silver, and bronze was issued in the east, at Babylon, at Susa, and at Ecbatana, the former principal cities of Persia, while around 200 BCE, Greek coinage was produced in western India. It was even adopted by the Parthians and the Sassanians. In the north, the coinage of Phillip II and Alexander III was imitated by the Celts, the cities in the Danubian region, and later on in Gaul and Britain.

Numismatics, Ancient Greek, Fig. 4 Macedonia, Alexander III, silver *tetradrachm* (ca 336 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford (From Howgego 1997: Fig. 42, with permission)

Numismatics, Ancient Greek, Fig. 5 Antiochus I, Mint of Seleuceia on the Tigris, silver *tetradrachm* (ca 274–270 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford (From Howgego 1997: Fig. 70, with permission)

After the death of Alexander III, his empire was divided amongst his Generals. Although coinage in the name and with the types of Alexander continued to be issued after his death by these successors (the Diadochoi) for reasons of legitimization of the dynasties, soon after the adoption of the title of *βασιλεύς* – king – in 306, they started issuing coinage with their own types and legends. In the Seleucid dynasty, it is Antiochus I (281–201 BCE) who first placed his own portrait on the coins (Fig. 5), but the *Alexanders* were a dominant currency in the Seleucid Empire that retained the Achaemenid system of the division of the satrapies but – contrary to the Persian policy – did not normally allow the satraps to mint their own coins.

In the Ptolemaic kingdom, the royal Ptolemaic coinage was imposed around 290 BCE, and there

is evidence for the exclusive use of the Ptolemaic currency in the kingdom which also applied in the areas of Ptolemaic control such as Cyprus, Phoenicia, and Palestine. The Ptolemaic "closed currency system" created revenue, because foreign coins that were heavier in weight were exchanged for local coins that were lighter in weight and were legal tender in Egypt and in the areas of Ptolemaic control (at the beginning of the third century BCE, the Athenian tetradrachm weighed 17.2 g while the Ptolemaic one weighted 14.3 g). This type of exchange also helped to retain silver in Egypt, which did not possess any natural sources of that metal.

The Attalid dynasty at Pergamum, founded by Philetaerus, became a major force in Asia Minor in the third and second centuries BCE. The coinage produced adopted Alexander types in the name of Alexander, then of Seleucus, then the portrait of Seleucus with the name of Philetaerus, and his successors adopted the head of Philetaerus on their coinage.

At the beginning of the second century BCE, the introduction of the cistophoric coinage reflects a major change. The name of this coinage derives from the representation of a sacred chest (*cista*) on the coins, and in contrast to other royal coinages, it does not bear a portrait and is signed by the cities that produced it. The cistophoric coinage was issued by a number of cities and was used exclusively in the Attalid territory; it was lighter than the Attic weight by approximately 25 %. Although this practice brings to mind the Ptolemaic system, the Attalid one is more complicated since the Attic weight standard was still used for export.

In the Hellenistic period, the royal coinages circulated together with the coinages of the Leagues – that is, the confederations of cities such as the Arcadian and the Boeotian – as well as those of specific cities with a status a part, such as Rhodes and Carthage.

Weight Standards

The coin, νόμισμα, is a piece of metal whose official stamp guarantees its weight and value. Each weight belongs to a specific weight standard that was adopted by the different cities (Table 1). Studies carried out in the nineteenth century have identified the main weight standards (Attic, Aeginetan, Thraco-Macedonian, Persian, as well as various local standards) that were adopted by many peripheral cities. It is still very difficult to completely understand these standards and fully trace the fractions – subdivisions of the main unit – their theoretical weight, or their exchange ratio to other coinages and/or other metals.

The best-known example is that of Athens, where the *drachm* is the basic unit: 100 *drachms* made up one *mina* and 6.000 *drachms* – that is, 60 *minae* – made up one *talent*. The *mina* and the *talent* of course describe the weight or the value of silver and do not refer to coins. The standard coin on the Attic weight standard was the *drachm* (ca 4.36 g), and there were multiples (in Athens the *decadrachm* is the highest denomination) and fractions down to 1/48 of a *drachm*, whose names appear in the texts, and are based on the equivalence of 1 Attic *drachm* to 6 *oboloi* of ca 0.72 g.

In many cases, die studies of individual coinages and thorough metrological analysis have permitted an approach to the assessment of the theoretic weight of specific weight standards.

Coin Circulation

The combined evidence of isolated coin finds and of coin hoards of different types (whether emergency or by accumulation) that were never recovered by their owners for various reasons is very important for the dating of the coins included in the hoard and for understanding the area in which specific coin types and denominations circulated. The *Inventory of Greek Coin Hoards* (IGCH) is the first publication that combined the known hoards up to 1973, and since then, nine volumes of *Coin Hoards* (CH), supplementing the initial catalogue, have been published (Thompson et al. 1973).

Metal Composition

The evolution of research during the twentieth century has permitted nondestructive analysis to be carried out on coins, in the search for metallic composition. Today, there are various methods that study only the surface (X-ray fluorescence (XRF

Numismatics, Ancient Greek, Table 1 Some weight standards of the ancient world

Weight standards of the Greek World					
Attic			Aeginetan	Corinthian	Samian
Denomination	Number of Drachms	Grams	Grams	Grams	Grams
1 Decadrachm	10 drachms	43.66			
1 Tetradrachm	4 drachms	17.44			17.40 (stater)
1 Didrachm	2 drachms	8.72	12.6 (stater or didrachm)	8.6 (stater)	8.70 (1/2 stater)
1 Drachm	**drachm**	**4.36**	**6.3**		
Pentobolon	5/6	3.63			
Tetrobolon	2/3	2.90			2.90 (1/6 stater)
Triobolon	½	2.18	3.15		
Diobolon	1/3	1.45			1.45 (1/12 stater)
Trihemiobolion	¼	1.09			
Obol	**1/6**	**0.72**	**1.05**		**0.73 (1/24 stater)**
Tritartemorion	1/8	0.54			
Hemiobolion	1/12	0.36			
Triemitetartemorion	1/16	0.27			
Tetartemorion	1/24	0.18			
Hemitetartemorion	1/48	0.09			

and EDXRF)), a small ablated portion of the coin in the nanogram range (LA-ICP-MS), or a more important area of the object (nuclear techniques using cyclotrons such as neutron activation analysis (12 or 14 MeV)). In-depth techniques look for trace elements that could indicate the provenance of the metal and maybe that of the mint, together with the major elements such as gold, silver, and bronze. The purity – or not – of the metal can help the researcher to detect any intentional manipulations of the coinage's alloy by the issuing authorities that could help them economize in precious metal and help their cities in times of crisis.

Coin Types

Greece was not a unified state; the traditions, customs and origins of individual cities were reflected in the great variety of surviving iconographical types and coin legends.

The coins of the Archaic period mostly bear images of animals and plants, often because they are related to the products of the city or to its name. At Ephesus, the bee represented on the coins is related to the cult of Artemis, whose priests were known as "bees"; on coins of the island of Melos, the apple (μήλο in Greek) is represented, while at Selinous in Sicily, the leaf of a wild celery (σέλινον in Greek) refers both to the local products of the area and to the city's name (a "canting" or "punning" type).

Some cities represent images associated with local myths and traditions on their coins. In Athens (Fig. 6), from the end of the sixth century BCE, the type of Athena, the patron deity of the city, on the obverse and her sacred bird, the owl, on the reverse, with the coin legend AΘH became the characteristic types of Athenian coinage for five centuries.

During the second century BCE, the *stephanephoroi* coinage, known as "new style coinage," is named from the wreath within which the reverse design appears. Likewise, the coins of Corinth and those of Corinth's colonies represent in the fifth century BCE Athena on the reverse and on the

Numismatics, Ancient Greek, Fig. 6 Athens, silver *tetradrachm* (ca 450 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford (From Howgego 1997: Fig. 21, with permission)

Numismatics, Ancient Greek, Fig. 7 Bactria, Demetrius I, silver *tetradrachm* (ca 200–190 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford (From Howgego 1997: Fig. 75, with permission)

obverse the mythical winged horse Pegasus who was tamed by the Corinthian hero Bellerophon, images that are both linked to the local myth. A sandal on a coin of Larissa alludes to a local myth about Jason, while the shield on the Boeotian coinage can be linked to the various labors of Heracles, represented on the obverse of those coins.

On rare occasions, the coin types bear a clear political symbolism, such as the control of one city by another. This is the case of the coins with Samian types issued by the Samians who occupied Zancle in Sicily in the years 493–488 BCE. Similarly when Theron, the tyrant of Acragas, conquered Himera in Sicily around 483 BCE, he altered the weight standard and depicted a crab, the characteristic type of his coins, on the reverses of the coins of the occupied city.

The earliest coins to feature portraits of living rulers first appeared in the fifth and fourth century coinages of Persian satraps of Asia Minor, such as Pharnabazos on the issues of Kyzikos, Perikles on the *tetradrachms* of Lycia, and Tissaphernes on the *tetradrachms* of Lydia. Individualized and lifelike portraits on coins (Fig. 7) became a characteristic feature of the Hellenistic period: the portrait was the main type on the obverse of the coinages of the Hellenistic rulers and was linked to the legitimization of the monarchies and the divinization of the rulers through their representation with divine attributes.

Coin Legends

Archaic, Classical, and Hellenistic coinages bear a great number of inscriptions in various local

Numismatics, Ancient Greek, Fig. 8 Corinth, silver *tridrachm* (ca 345 BCE), The Ashmolean Museum, Heberden Coin Room Collection, Oxford (From Howgego 1997: Fig. 18, with permission)

scripts. The most common inscription of the early coinages is that of the name of the city and more specifically that of the citizens. It is either represented in full (on the coins of Syracuse ΣΥΡΑΚΟΣΙΩΝ –of the Syracusans–) or in abbreviated form (as in the case of the Athenian coinage where the reverse legend AΘH abbreviates the word AΘHNAIΩN –of the Athenians–) or even as a single letter (the Archaic Greek letter *koppa* is the initial of the Corinthians on the coinage of that city) (Fig. 8).

The colonies of Corinth, although they bear the same iconography as their metropolis, differentiate their issues through the initials of their cities, Greek letters that appear below the winged horse on the reverse: for example, the letter *Λ* on the coins of Leucas and the letter *E* on those of Epidamnos. In areas such as Cyprus, Phoenicia, or Lycia, other local scripts were used on the coinages, indicating the issuing authority. Alexander III placed his name and royal title on

his coins, and rulers in the Hellenistic period used the Greek alphabet to indicate the name of Alexander, the name of the founder of the dynasty or their own name, followed by the title *ΒΑΣΙΛΕΩΣ* (of the king).

In addition to the coin legends, punch marks, regal dates, monograms, and magistrates' names offer additional information on the coinage of the cities and kings during the Archaic, Classical, and Hellenistic periods.

Historical Background

The collecting of Greek and Roman coins goes back to ancient and medieval times, but the study of these coinages dates from the Renaissance period in Italy, where collections were formed in the aristocratic houses (Médici, Gonzaga, Este). The work of Andrea Fulvio, *Illustrium Imagines*, dates from the sixteenth century (1517), while the very first numismatic book, *De asse et partibus ejus*, was published around that same period by Guillaume Budé (1514). In the next centuries, studies accumulated, and the eighteenth century is marked by the synthetic works of J.C. Rasche, *Lexicon universae rei numariae* (Leipzig, 1785–1805), and J.H. Eckhel, *Doctrina numorum veterum* (Vienna, 1792–1798). The establishment of the chronological perspective of Greco-Roman art, the archaeological discoveries of the nineteenth century, and the use of photography made a more substantial volume of numismatic material available for study. From the nineteenth century also begins the publication of the major coin collections in Paris (*Traité des monnaies grecques et romaines*) and in London (the *Greek Coins in the British Museum*, abbreviated as BMC). In the twentieth century, many studies of individual mints were carried out, reconstructing not only the numismatic production according to the various periods but also the analysis of the monetary politics of the issuing authority. This type of numismatic research is in our era enhanced by coin die studies, metallurgical analyses of the coins, and the application of statistical methods in numismatics that help calculate the volume of the coinages produced in a specific period.

Key Issues/Current Debates

The questions of why coinage was invented and what it's original purpose was, still have no precise answer. The issuing of the very first coins still gives rise too many discussions concerning the issuing authority that first came up with the idea of coinage – was it produced by a state or by individuals and what was the function of these coins? Although it was believed that the earliest coins were first struck in the kingdom of Lydia, evidence deriving from ancient written sources (Xenophanes and Pollux 9.83), from coins found in an archaeological context and from the existence of natural sources of electrum in the area (Herod. 1.93; 5.101), permits to argue otherwise.

Likewise, the chronology of the spread of the coinage to the Greek world is also highly uncertain and under discussion because the only datable archaeological context for the sixth century coinage is the Apadana foundation deposit in Persepolis, whose dating is placed at some point in the last quarter of the sixth century. For the fifth century, the coins found in archaeological contexts multiply, and hoard evidence offers a more concrete basis for the dating and the attribution of specific issues.

The complete understanding of the various local or "international" weight standards and especially the denominational value relation to silver, gold, and bronze issues of the various authorities is still in progress. Discussions concern the theoretical weight of denominations and their exchange ratio as well as the attribution and dating of bronze coinages to the issuing authorities. As C. Kraay stated in 1966, "The attainment of [an] accurate chronological classification is the primary task of Greek numismatics today" (Kraay & Hirmer 1966: 20). In order to provide full and reliable information today, almost 50 years later, that task is still necessary.

International Perspectives

Research in ancient Greek numismatics has much developed in the past years, with the help of international collaborations, research projects, and online databases that make the numismatic

material accessible to a much broader audience of numismatists, archaeologists, historians, and other interested members of the public.

The biggest collaborative publication effort of the past decades has been the *Sylloge Nummorum Graecorum* (SNG) project, the publication of illustrated catalogues of Greek coins in public and private collections in the British Isles, Denmark, France, Germany, Greece, Israel, Sweden, Switzerland, Italy, and the United States. The SNG collection is coordinated by the International Numismatic Commission (http://www.muenzgeschichte.ch/inc/index.html), and today it exceeds 120 publications and is accessible online (British Academy research project: http://www.sylloge-nummorum-graecorum.org/). The project *Achémenet* (http://www.achemenet.com/) collects and diffuses various sources related to the Achaemenid Empire, from publications to detailed descriptions of objects and coins. At the same time, the project *Lexicon Iconographicum Numismaticae* (LIN) from the collaboration of the Universities of Messina, Bologna, and Milan aims to put together a method for the iconographical analysis of coin types.

Future Directions

The general bibliographies in numismatics are today a valuable tool to enable the researcher to discover the latest publications. The most important general bibliography of numismatic publications (Clain-Stefanelli 1985) is currently supplemented on a biannual, annual, or even five yearly basis. These numismatic bibliographies can be found in Numismatic Literature (published twice a year by the American Numismatic Society), the "Numismatic" section of *L'Année Philologique* (Paris, Belles Lettres), the "Numismatik" section of the *Archäologische Bibliographie* (published annually with the *Jahrbuch des Deutschen Archäologischen Instituts*), and finally the *Survey of Numismatic Research*, the collection with a brief commentary of the numismatic publications that appear in the 5-year interval between each *International Numismatic Congress* (the most recent one is covering the years 2002–2007, containing over 12,000 publications from ca 4,000 authors, and it was published on the occasion of the XIV International Numismatic Congress in Glasgow that took place in 2008).

The Internet today offers a broader accessibility of coin information. Museums have started to publish their numismatic collections' databases online (The Fitzwilliam Museum in Cambridge: http://www.fitzmuseum.cam.ac.uk/opac/search/searchcm.html / The British Museum in London: http://www.britishmuseum.org/collection / The American Numismatic Society in New York: http://numismatics.org/search/ / The Cabinet des Médailles de la Bibliothèque Nationale de France in Paris). At the same time, coin auction archives (http://www.coinarchives.com/) today offer high-quality digital images and important information on coins that were sold in coin auctions and now reside in either private or public collections.

Cross-References

- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican
- ▶ Trade and Transport in the Ancient Mediterranean

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Numismatics, Roman Imperial

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Introduction

Roman imperial numismatics is the study of coins and medallions of the Roman Empire from the commencement of the reign of Augustus in 27 BCE to the reign of Anastasius (CE 491–518), whose coinage is arbitrarily chosen as the beginning of the Byzantine series on account of his bronze coinage reform. Ancient coins have survived to the modern era either because they were hoarded or randomly lost ages ago.

Definition

Roman imperial numismatics may be viewed as a subfield of ancient history or archaeology or as a specialized discipline in its own right. The educational background of a numismatist largely colors his or her approach to the subject and the sorts of questions that a numismatist will pose. For instance, historians tend to appreciate coins as a source material for economic or narrative history in concert with textual evidence. Archaeologists have been more interested in coins as chronological indicators for their sites, although coins in context also say much about the movement of populations, localized economic conditions, and coin circulation. Art historians attend to the iconography of Roman coins, consider the semantic meaning of designs, and compare coin

	Aureus (gold)	Denarius (silver)	Sestertius (brass)	Dupondius (brass)	As (copper)	Semis (copper)	Quadrans (copper)
Aureus	1						
Denarius	25	1					
Sestertius	100	4	1				
Dupondius	200	8	2	1			
As	400	16	4	2	1		
Semis	800	32	8	4	2	1	
Quadrans	1600	64	16	8	4	2	1

Numismatics, Roman Imperial, Fig. 1 Roman imperial coin denominations and their relative value

Numismatics, Roman Imperial, Fig. 2 Silver Denarius of Augustus. Yale University Art Gallery, 2001.87.5292

designs with artworks or iconographic themes in other media. Traditionally, those who identify themselves as numismatists, and who concentrate on the medium of coinage alone, grapple with the field's specialized methods, such as die studies, hoard analysis, metrology, and so on, all of which reflect more upon production context rather than the context of use or deposition that are of greater concern to archaeologists, art historians, and historians. But today, greater care is taken to apply interdisciplinary methods in the field of numismatics.

For approximately 250 years, Roman imperial coin denominations followed the structure inherited from the Republic that was based on the silver *denarius* (Fig. 1; an Augustan *denarius* is illustrated in Fig. 2). The gold *aureus* was the largest denomination worth 25 *denarii*. The regular production of a subsidiary bronze coinage was an imperial innovation. The largest bronze denomination, the *sestertius*, was introduced by Augustus in 23 BCE. It and the *dupondius* were made of a copper-zinc alloy known as *orichalcum* (brass) that gave the coins a bright, golden appearance. This original color is not apparent after centuries of patination. However, *sestertii* and *dupondii* from the anaerobic layers at the Vindolanda excavations in northern England maintain their original appearance on account of the lack of oxygen. Smaller denominations, the *asses* and the irregularly produced *semisses* and *quadrantes*, were struck in copper which gave

Numismatics, Roman Imperial, Fig. 3 Orichalcum Dupondius of Nero. Yale University Art Gallery, Ruth Elizabeth White Fund with the assistance of Ben Lee Damsky, 2007.183.6

Numismatics, Roman Imperial, Fig. 4 Silver Antoninianus of Caracalla. Yale University Art Gallery, Promised Gift of Ben Lee Damsky, TR2007.13938.716

them a reddish color. Even in antiquity as base metal coins circulated through the years, they darkened and oxidized. This often caused confusion between the *dupondius* and the *as*; although the *dupondius* was heavier, it was approximately the same diameter as an *as*. In Nero's principate (54–68 CE), the bust of the emperor on the obverse of the *dupondius* began to be depicted with a radiate crown (Fig. 3) in order to distinguish it from the *as*, upon which the emperor typically wore a laurel crown.

Nero decreased the weight of precious metal coins and the silver coinage was gradually debased through the reign of Septimius Severus in the third century CE. Caracalla (211–217 CE) introduced a new silver denomination, the *antoninianus*, which featured the emperor's portrait with a radiate crown (Fig. 4) to differentiate it from the *denarius*. The *antoninianus* was meant to circulate as a double *denarius* in spite of the fact that it contained only one and half times the amount of silver than the *denarius*. Elagabalus discontinued production of *antoniniani*, but they were reintroduced by Balbinus and Pupienus and soon became the silver standard for the rest of the third century. By the reign of Gallienus, the silver content of the *antoninianus* had become superficial (Fig. 5 shows an *antoninianus* with a green patination, the result of high copper content). *Sestertii*, *dupondii*, and *asses* were no longer produced as the *antoniniani* had essentially become a bronze coinage.

It is important to note that the Roman imperial coinage is distinct from the Roman provincial coinage, minted by cities for local use. A local coinage was struck by some cities in the Roman West until the principates of Tiberius (14–37 CE) and Caligula (37–41 CE) when the western provincial coinage died out. In the eastern Roman Empire, provincial coinage survived until the later third century. Roman imperial coinage was the official currency of the Roman Empire, produced at the mints of Rome and Lugdunum (Lyon, France) until Vespasian's reign when the imperial coinage became the prerogative of Rome. Nevertheless, military mints or branches of the imperial mint were in operation at various

Numismatics, Roman Imperial, Fig. 5 Debased Antoninianus of Gallienus. Yale University Art Gallery, 2001.87.15728

times in Rome's history and are typically included under the definition of "imperial coinage." As political power shifted away from Rome during the political, military, and economic turmoil of the third century, branch mints became the norm. In fact, the mass production of highly debased *antoniniani* by imperial mints operating in the eastern provinces was probably the reason that local mints closed in the late third century as the debased imperial currency negated the need for a locally produced bronze coinage (Burnett 1987: 63-5).

Under Diocletian and Constantine, a series of imperial mints stretching from London to Alexandria were established. Diocletian also attempted to reform the coinage with a genuine silver coin. There were also numerous attempts in the fourth century to standardize and stabilize the coinage (for a summary of third century and fourth century monetary history and changes in the organization of mints, see Burnett 1987: 63-5, 122-5; Howgego 1995: 136-40; and relevant contributions in Metcalf 2012). Although there were some purer silver coins, billon and copper coins dominated the fourth and fifth centuries CE; in the fifth century, copper *nummi* traded at 7,200 coins to the *solidus*, the standard gold denomination in the fourth and fifth centuries. Fourth and fifth century billon and copper coins were mass-produced and are, therefore, among the most common finds from excavations at Roman imperial sites.

Roman imperial gold and silver coins circulated across the Empire's wide expanse, and even beyond it. Roman gold *aurei* are commonly found in India and testify to the extent of Rome's trade. Roman imperial bronze coins were less mobile. *Sestertii*, *dupondii*, and *asses* are found more commonly in the western Roman Empire where the provincial mints had ceased to operate by the second quarter of the first century; eastern cities relied more on their local coinage. But even imperial bronze coins tended to circulate locally once they had been introduced into a region (on coin mobility and circulation, see, e.g., Duncan-Jones 1989, 1999). The absence of an adequate supply of bronze coins in the Roman West is apparent in various periods and in certain regions. In Germania, for example, local imitations of the imperial coins of Claudius were commonplace as the official coinage was in short supply (compare Figs. 6 and 7). After the establishment of imperial mints across the Empire under Diocletian and Constantine and the implementation of a uniform coinage from Britain to Egypt, imperial bronze coinage was used everywhere but site finds as a rule tend to be comprised of coins from the most proximate imperial mint. The irregularly produced *semisses* and *quadrantes* of the first and second centuries appear to have been struck for special purposes in Rome and Italy and are more common there than in the provinces. Their occasional presence in frontier regions on the Rhine

Numismatics, Roman Imperial, Fig. 6 Orichalcum Sestertius of Claudius, Yale University Art Gallery, 2001.87.5471

Numismatics, Roman Imperial, Fig. 7 Imitation of a Sestertius of Claudius. Yale University Art Gallery, Gift of James H. Schwartz, 2005.6.78

may be connected with the movement of soldiers or the imperial court (e.g., Kemmers 2003; Kemmers 2006: 218-9).

Historical Background

Modern study of Roman imperial coinage began in the Renaissance (consult generally Clain-Stefanelli 1965; Giard 1981). Coins are among the most common material objects to have survived the ages; their small size and portability made them desirable collectibles for aristocrats and antiquarians who developed a taste for ancient art. Early students of numismatics published aristocratic collections, some of which became the basis of the collections in today's encyclopedic museums. These early numismatic books often failed to present the material in a systematic fashion and were rife with speculation, fantasies, and forgeries. Inspired by the detailed representations on Roman coinage, Renaissance artisans achieved an aesthetic quality in medallic art that had not been witnessed since Roman antiquity. At the same time, the demand for Roman coins led to the production of forgeries and fantasy pieces, a problem that continues to plague numismatics even to this day.

Serious study of numismatics began with Joseph Eckhel whose work was the first attempt to organize the vast corpus of coins in a systematic way and to sort out all the fantasies and forgeries (Eckhel 1792-1798). Antiquarian study of coins provided scholars with a detailed knowledge of coin production, mints, and chronologies, but the intense focus on the object itself limited and isolated the field. The great Roman historian Theodor Mommsen demonstrated the greater role that numismatics could play in the historical sciences with the publication of his seminal numismatic monograph in which he brought numismatics together with the critical application of epigraphic and textual evidence (Mommsen 1860); he was also one of the first scholars to make extensive use of hoard evidence.

Key Issues/Current Debates

The bronze coinage of Augustus regularly bore the reverse legend S(*enatus*) C(*onsulto*), meaning "by decree of the Senate." *S C* remained on the regular imperial bronze coinage until its disappearance in the third century. The abbreviation only rarely appeared on precious metal coins of the Roman Empire, and usually as *EX S C* when it did, in order to call attention to an act of the Senate. Mommsen (1860: 739-50) argued that *S C* indicated that the base metal coinage was the responsibility of the Senate while the lack of it on the gold and silver coinage proved they were the prerogative of the *princeps*. This rigid diarchal interpretation dominated numismatic thought for much of the twentieth century; some scholars even assumed that Rome was home to two mints, one for precious metal ("the imperial mint") and one for bronze ("the senatorial mint"). Now the majority of scholars postulate that *S C* on the bronze signified only the Senate's nominal role as the visible authorizer for the withdrawal of bronze coinage from the treasury, even though the *princeps* had come to hold that power in actuality (e.g., *RIC*^{2} I: 24, 32). No longer does the presence of *S C* on the bronze coinage affect the interpretation of designs on Roman imperial coins since, in essence, visual messages would have originated from the imperial court, not the Senate.

Hoard analysis remains an important tool available to numismatists. Hoards are dated by the latest coin in the group to provide a *terminus ante quem*. Hoards can also be compared with one another to establish chronologies for the coins themselves. The Reka-Devnia hoard is the largest and most famous hoard of Roman imperial silver coins (Mouchmov 1934; Depeyrot 2004). It was so large that it was a primary source for the writing of *Roman Imperial Coinage* (*RIC*), the standard imperial type catalogs, the earliest volumes of which were published in the early twentieth century. Recently, there has been a growing interest in quantifying the reverse types represented in coins hoards in order to examine the evidence that this might yield regarding the semantic value of numismatic images in the Roman world (e.g., Noreña 2001; Depeyrot 2004). Individual coin finds are useful for archaeologists as they can date archaeological strata and features. They can provide additional information on coin circulation and can also indicate pathways and other highly trafficked areas at a site.

Unfortunately, hoards and individual finds are most often unrecorded as coins are one of the most sought-after and collected forms of antiquities. Presently, most of the numismatic material that enters the trade is looted from Eastern European and Middle Eastern countries. Often there are highly organized criminal networks that pay gangs of metal detectorists to find coins, which are then smuggled and sold to European and American dealers. The situation in Bulgaria is particularly grim (e.g., Dietrich 2002; Petkova 2004). Dietrich (2002) records an instance in which a Bulgarian supplier to American dealers spirited a metric ton of ancient coins to the United States in 1999.

International Perspectives

In recent decades, national projects have begun to inventory coin finds within their own political

boundaries. The best inventories come from the area of the former northwestern provinces of the Roman Empire, and especially the area of modern Germany. At the time of writing, 41 volumes of *Die Fundmünzen der römischen Zeit in Deutschland* (*FMRD*) have been printed, cataloging a combined total of approximately 300,000 to 350,000 coins. The first volume of *FMRD* was published in 1960, but since then, numerous other countries and regions have initiated similar series: *Die Fundmünzen der römischen Zeit in Österreich (FMRÖ), Die Fundmünzen der römischen Zeit im Größherzogtum Luxemburg (FMRL)*, *Die Fundmünzen der römischen Zeit in Slowenien* (*FMRSl*), *Die Fundmünzen der römischen Zeit in den Niederlanden* (*FMRN*), *Die Fundmünzen der römischen Zeit in Kroatien* (*FMRHr*), *Die Fundmünzen der römischen Zeit in Ungarn (FMRU)*, *Die Fundmünzen der römischen Zeit in Polen* (*FMRP*), *Inventar der Fundmünzen der Schweiz* (*IFS*), and *Ritrovamenti monetali di età romana nel Veneto* (*RMRVe*). Some of the above projects have recently begun placing material online as well. Other regions such as England and Wales have online finds databases, including the Portable Antiquities Scheme (http://finds.org.uk/) which currently has recorded approximately 400,000 finds reported by metal detectorists. A large group of c. 70,000 coin finds from Rome is being prepared for comprehensive publication, but already the custodians of that data have frequently made the unpublished information available to scholars for study. Finds inventories such as these provide the groundwork for contextual numismatic research and questions that can be asked from across a number of historical disciplines (e.g., see entries in von Kaenel & Kemmers 2009).

Future Directions

Today, Roman imperial numismatics lays at the intersection of economic, historical, art historical, and archaeological research. Nonetheless, many scholars fail to consider numismatics, do not deploy its full potential, or use coins recklessly in their research. The fear of numismatics is perhaps due in part to the fact that numismatic methodology can be highly specialized and that a very narrow object-based avenue of inquiry continues to exist (discussion in von Kaenel 1994). While studies based on the objects or production contexts alone unquestionably have their applications and merits, they can be irrelevant or even unintelligible to historians outside of the small circle of numismatic specialists. Numismatists have had some difficulty making their work accessible and relevant to those who write history. It is a worthwhile challenge then for a scholar to have a command of the historical sources and material or visual culture and also to develop a deep and thorough knowledge of numismatic resources and methods. Interdisciplinary approaches are a necessity for numismatists working in the twenty-first century.

The Roman imperial coinage has been thoroughly cataloged and published, and thus there is ample room for the methodical application of numismatic evidence, especially in visual and archaeological studies. Excavated coin finds have always been of importance to archaeology for their potential to provide essential chronologies for sites and their accompanying strata (Casey & Reece 1988 is a commonly cited introduction). Over the past few decades, critical methods to deal with coin finds have been greatly advanced, particularly by the Frankfurt School (see, for example, methodological discussions in R.-Alföldi 1979; von Kaenel & Kemmers 2009). But in addition to their utility as chronological indicators, attention to archaeologically recovered finds can provide information on economic conditions, coin supply and circulation, military activity, and beyond. Coin finds can give insight into ritual practices and other forms of human behavior, as at Avenches where excavations determined that the living preferred to deposit imperial coins with specific reverse types such as Pax, Salus, Felicitas, and Roma with the deceased (Koenig 1999).

Since the 1980s, it had been understood that the Roman state intermittently supplied the

western provinces with bronze coinage. Recent research has additionally suggested that the Roman state chose to supply different populations with bronze coins laden with appropriate reverse iconography in order to communicate ideas to those populations. This phenomenon is best illustrated at Nijmegen where the Flavian bronze coin finds from the legionary fortress show a much stronger proportion of martially themed reverse types than the finds from neighboring civilian settlements or from Rome (Kemmers 2006: 189-244). This discovery ought to set an agenda for scholars asking questions about the communicative value of Roman imperial coins (Elkins 2009).

Cross-References

- ▶ Economy, Roman
- ▶ Iconography in the Roman World
- ▶ Numismatics, Ancient Greek
- ▶ Numismatics, Roman Republican

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Numismatics, Roman Republican

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Introduction and Definition

The study of the coinage of the Roman Republic covers the period from the introduction of coinage in Rome in about 300 BCE to the end of the Roman Republic. In numismatics, the latter is conventionally dated to 31 BCE, the date of the battle of Actium and the establishment of the new political order, the Roman Empire. Traditionally, the discipline only encompasses coins issued under the direct authority of Rome and excludes related contemporary coinage issued in Italy and the Mediterranean region.

Historical Background

The Development of Roman Coinage

Before the rise of the Roman Republic, some areas of Italy had developed a tradition of coinage on the Greek model from the sixth century BCE. This was however not adopted in the area of Rome, where the earliest money appears to have been in the form of bullion and currency bars.

Around the fourth century BCE (the date is not certain), cast bronze currency bars appeared, based on the weight standard of the Roman pound (about 324 g). From about 300 BCE, this was joined by the production of struck bronze and silver coins. By the early to mid third century BCE, there were three separate monetary systems operating in Rome:

1. Cast rectangular bronze currency bars, sometimes referred to as "*aes signatum*."
2. Cast circular bronze coinage, otherwise known as "*aes grave*."
3. Struck coinage (silver and bronze) based on the Greek model but for the first time inscribed in the name of the Roman people. The silver and bronze coinage was derived from the coinage of southern Italy and appears to have had a more southerly geographical distribution than the cast coinage.

The currency bars appear to have been a fairly short-lived phase and went out of use in the middle of the third century. Around this time, the other elements were combined and operated as a single monetary system of gold and silver coins and cast bronze. A standardized design was adopted for this coinage, with a janiform head on the obverse of the silver "*quadrigati*" (so-called by numismatists for their reverse design featuring a *quadriga*, or four-horse chariot) and the cast bronze coins.

The denominations of the bronze coinage were based on divisions of the *as* (originally one Roman pound (the libral weight standard) but gradually devalued so that this became a token coinage). One *as* was divided into 12 *unciae*; the number of these represented by each coin was shown in the denominational markings on bronze coins, as in Table 1 below. These denominations remained throughout the Roman Republican period, although the weight standard of the bronze coinage suffered successive reductions over time and there were periods when bronze coinage was not issued.

Reforms of the Second Punic War

The function of coinage in the third century BCE seems to have been primarily as a tool for the state to make some payments for military and civic purposes. The very difficult military period of the second Punic War (218–201 BCE) saw successive reforms of the coinage in the form of devaluations and weight reductions (from libral, to semilibral, and post-semilibral bronze coinages) and a short-lived series of high value gold denominations. This probably reflects the unprecedented demands made on the Roman treasury at that time.

This turbulent period in Rome's monetary history ended around 211 BCE with the introduction of a completely new currency system based on the *denarius* (ten asses). This denomination persisted into the third century CE. The denarius was a silver coin of standardized design, initially depicting the head of Roma on the obverse and

Numismatics, Roman Republican, Table 1 Denominations of the *denarius* system

Denomination	Date in use	Mark	Metal	Multiple of an as
Aureus	Intermittent		Gold	400 (25 *denarii*)
Denarius	c. 211 BCE	X	Silver	10
Denarius (revalued)	from 141 BCE	XVI, X crossed or X	Silver	16
Quinarius	Intermittent	V	Silver	5
Sestertius	Intermittent	IIS	Silver	2 1/2
"Victoriatus"	up to c. 170 BCE		Silver (base)	
As	c. 215 BCE to 80 BCE	I	Copper alloy	1
Semis	c. 215 BCE to 80 BCE	S	Copper alloy	1/2
Triens	c. 215 BCE to 80 BCE	••••	Copper alloy	1/3
Quadrans	c. 215 BCE to 80 BCE	•••	Copper alloy	1/4
Sextans	c. 215 BCE to 80 BCE	••	Copper alloy	1/6
Uncia	c. 215 BCE to 80 BCE	•	Copper alloy	1/12
Semuncia	c. 215 BCE to 80 BCE	Σ	Copper alloy	1/24

the Dioscuri on the reverse. Additional silver denominations of the *quinarius* (5 asses) and the *sestertius* (2.5 asses) were also introduced. The cast bronze coinage went out of use and the struck bronze followed new designs featuring heads of deities on the obverse and a prow on the reverse. Gold coins of the denomination known as the *aureus* (25 *denarii*) were only intermittently issued and their appearance can be connected with times of crisis. They appear during the civil wars of the 80s and 40s BCE, becoming more common in the final years of the Republic.

Moneyers

Initially the coinage was produced anonymously in the name of the Roman Republic. The appearance of living individuals on Roman coins was apparently taboo, being too resonant of kingship and the Greek model of coinage, and this initial reluctance to name individuals on coins was probably a reflection of these Republican ideals. Early Roman Republican coin designs featured deities and mythological figures, particularly those related to Rome and its foundation myths (Roma, the Dioscuri and Romulus and Remus). In the period 211 BCE–170 BCE, coins are inscribed ROMA and the *denarii* carry the head of the goddess Roma.

The individuals who issued the coins, referred to as the moneyers, were junior magistrates. They held the responsibility for minting coinage from reserves held in the Treasury at Rome. They held the office of triumvir and formed a board of three men, the *triumviri auro argento aere flando feriundo* ("three men responsible for casting and striking gold, silver, and bronze") although sometimes coins were issued by other magistrates or on the authority of the senate (marked "*EX S C*"). Their number was increased to four for a short time under Caesar. From the late second century, the moneyers had an increasing influence in the selection of designs for the coinage and their identities were more clearly marked on the coins.

The earliest issuer's marks on coins are in the form of letters, monograms, and symbols. Although the names of the individual(s) issuing the coins are usually not known in this period, they are thought to be indicated by the symbols used, sometimes in the form of visual puns. For example, the symbols of birds on coins of the moneyers Turdus (RRC 193) and Gragulus (RRC 238) (*turdus* is Latin for thrush and *graculus* for jackdaw). It was not until the mid second century BCE that more complete names appeared on the coins and the identities of the moneyers can begin to be suggested.

It is clear that over time (and particularly from the late second century), moneyers found their role in the production of coinage to be an ideal platform for political advancement and it became

more acceptable to allude to familial identity and achievements. Ancestors were named or referred to by the choice of design used on the obverse and/or reverse. For example, the ancestral achievements of the Manlii Torquati are commemorated on coins of L. Manlius Torquatus (RRC 295/1) which feature a Gaulish torc. This is a reference to the heroic deeds of T. Manlius Torquatus in Gaul in the fourth century BCE. He is said to have slain a fierce Gaulish warrior and worn his torc, gaining the cognomen "*torquatus*" (torc) (Livy 7.10).

In time it became acceptable to honor the living as well as more distant ancestors, and finally to allude to one's own achievements. M. Caecilius Metellus placed a Macedonian shield on his coins in 127 BCE (RRC 263/1) in reference to more recent victories of his father, Q. Caecilius Metellus Macedonicus. In 128 BCE, the aedile Cn. Domitius referred to games and corn dole potentially promised during his own office by adding a corn-ear to the obverse of his *denarius* and a small figure of a man fighting a wild beast on the reverse (RRC 261/1). These changes were accompanied by a gradual move from stylized to more individualistic portraiture, with recognizable individuals depicted.

In the late Republic, this tradition was overturned by Julius Caesar, who was the first living Roman to issue coins decorated with his own portrait. While this has been seen as an illustration of his hubris, the practice was widely adopted by others in the years leading up to the end of the Republic. During this turbulent period, coins were issued by or on behalf of the various competing political factions rather than in an official capacity for the state. Perhaps the most iconic coins from this period are the *aurei* and *denarii* issued by M. Junius Brutus celebrating the assassination of Caesar on the Ides of March 44 BCE. They show the cap of Liberty flanked by two daggers and the date "*EID MAR*."

The coinage of Octavian (later Augustus) draws on his descent from the deified Caesar, setting the iconographic tone for what became the first Imperial dynasty.

Production

Coins were for the most part made in the mint at Rome, which is known to have been near the Temple of Juno Moneta on the Capitoline Hill; later the goddess Moneta appears on coins as the personification of the mint. The designs on the coins were struck onto the blank flans using engraved obverse and reverse dies. The number of dies used varied according to the scale and length of production. It is clear that the supply of coinage fluctuated over time, according to demands on the state (such as the payment of soldiers and public works).

The mint was able to monitor the production of successive issues of the same design by means of a system of control marks found on *denarii* from the second to early first century BCE. These took the form of sequences of letters, numerals, and symbols (sometimes paired in relation to each other, for example, a symbol of a hare on the obverse paired with that of a hound on the reverse of a *denarius* of L. Papius).

Measures were put in place to combat forgery but this still occurred. Coins are found with a copper alloy or iron core covered in silver plating. The distinctive crimped edge of a coin known as the *denarius serratus* issued for a period from the late second century BCE may have been intended to reveal the core of a solid silver coin but plated forgeries of these still occur.

The high silver content of Roman Republican *denarii* meant that they were in circulation for a long time. They are found in British hoards of the first century CE and the "legionary series" of *denarii* of Mark Antony (RRC 544), which had a slightly lower silver content, circulated into the second century CE. It is thought that Roman *denarii* were a source of silver for the production of the British Iron Age silver coinage.

Bronze coinage was not issued throughout the Republican period, but after the late second century, it may have circulated for many years after issue (coins found are often very worn). Although the *denarius* became the standard silver coin of Spain in the first century, it appears that local issues were widely used for small change in the Roman world and imitations of Roman bronze coins could also have filled this gap in other areas.

In the eastern Mediterranean, bronze coinage continued to be issued by cities now under Roman rule. These are often termed "Greek Imperial" or "Roman Provincial" coinage by numismatists (listed comprehensively in Burnett et al. 1992).

Key Issues/Current Debates

As Roman Republican coins do not bear dates, early work focused on determining the chronological sequence of types and the identities of the issuers. This dating has been influenced by the presence or absence of types in dated hoards from Italy and the Mediterranean. Sydenham published a systematic typology of the series in 1952 (Sydenham 1952). This was followed by a comprehensive study of the coinage published by Michael Crawford in his 1974 work *Roman Republican Coinage* (Crawford 1974) that set out the standard typology by which the coins are now commonly described (RRC types). The types are listed in chronological order by issue, with subtypes given to different denominations and to design variations within these.

More recent work has focused on refining this chronology. New discoveries of hoards have had a significant impact on the dating of the series (notably the large Mesagne hoard (Hersh & Walker 1984) which led to revision of the dating of the issues of the mid first century BCE (see also Mattingly 2004)). Detailed studies of certain parts of the series have appeared that draw on both archaeological and historical evidence (for example, Woytek's 2003 work on the coins of the 40s BCE). Revised dating has also had an impact on the identification of the moneyers who issued particular types; in many instances, their identity is inferred from the trajectory of their political career.

Another key strand of recent research has been the estimation of volumes of production. Die studies have provided estimates of the numbers of dies in use for particular series. The extent to which this can be related to output has been fiercely debated (see, for example, Buttrey & Buttrey 1997); the number of coins produced from each die is not known. The arguments also depend on the extent to which the production of coinage was a response to contemporary military commitments.

International Perspectives

Paris has the largest collection of Roman Republican coins (at the Cabinet des Médailles in the Bibliothèque Nationale) at over 20,000 items, including the important d'Ailly collection. Important collections of Roman Republican coins are also held in London (the British Museum), Vienna (Kunsthistorisches Museum), Hannover (August Kestner Museum), Rome (Vatican, Museo Nazionale and Capitoline Museum), Turin (Museo Civico), Madrid (Museo Arqueólogico Nacional), Naples (Museo Nazionale), Berlin (Bode-Museum), Copenhagen (National Museum), and New York (American Numismatic Society). In recent years, there has been a move toward greater accessibility of museum collections, with online databases and catalogs appearing (for example, see Ghey et al. 2010).

The study of Roman Republican coinage is not limited to the academic sphere, and many leading experts are collectors or coin dealers. The illegal trade in antiquities is an important issue for this area of numismatics (and others). It is illegal to remove archaeological material from the ground without permission in many European countries. The export of coins from many countries is restricted; recent changes in legislation also ban import of early Roman Republican coins from Italy into the USA. These measures are in place to protect the archaeological context of artifacts. This context is crucial for understanding subtleties of use and dating of archaeological material. For example, estimates of numbers of coins in circulation or the contents of hoards can be difficult to make when the scale of loss through illicit activity is not known.

In England and Wales, where metal-detecting is legal (but there is a legal obligation to report finds of coin hoards under the Treasure Act), the Portable Antiquities scheme (PAS) has had much

success in encouraging finders of ancient coins and artifacts to record their objects on an online database. The large volumes of material now recorded are a significant resource for those wishing to study geographical and chronological trends in the distribution of material over a wide area.

The International Numismatic Commission holds a major conference, the International Numismatic Congress, about every 6 years. For each conference, it publishes a Survey of Numismatic Research that gives a general overview of the subject. (For the most recent report on the Roman Republican period, see Woytek 2009).

Future Directions

New discoveries continue to allow refinement of chronology, and there is still scope for traditional numismatic studies focusing on chronology, typology, weight standards, and iconography. Increased understanding of these basic numismatic principles will facilitate discussion of the financial and monetary history of the Roman Republican period. Progress in these areas requires collaboration with ancient historians, archaeologists, and classicists. Scientific input is also critical for our understanding of metal sources and production techniques.

A continuation of the current focus on the distribution and chronology of hoards and site finds is likely. The past few decades have been marked by the collection and storage of such data, made possible by improved information technology. Increasingly, numismatists have been working alongside archaeologists to produce contextual studies of coinage from particular sites and regions. Such applied numismatic studies at, for example, Pompeii, have given us a more complete picture of the way in which the coinage fitted into the wider monetary systems of the Roman world (for example, demonstrating the extent of use of local bronze coinage alongside Roman silver).

There are many questions to be answered about interaction between the Roman and non-Roman worlds (for example, the imitation and use of Republican coin types outside the area of Roman authority).

Cross-References

- ▶ Economy, Roman
- ▶ Iconography in the Roman World
- ▶ Numismatics, Roman Imperial
- ▶ Trade and Transport in the Ancient Mediterranean

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Núñez, Lautaro

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Basic Biographical Information

Lautaro Núñez Atencio was born on January 24, 1938, in Iquique (Fig. 1). He came from a family of Spanish origin that had settled in the oasis of Pica, Tarapacá, in the seventeenth century and from a local mestizo line dating back to the nineteenth century. Although he lived in Iquique, he spent long summers with his family in Pica, where as a young boy he experienced the caravans that came to Tambo del Resbaladero run by his aunt, Luisa Núñez. The caravans that he witnessed not only brought charqui, ropes, woven items, quinoa, potatoes, and liquor, among many other goods; they also were accompanied by children, who spent several years in Pica before returning to their homes.

In Iquique he lived in El Morro, a neighborhood populated by local fishermen. With Juan Varela, who would later become a geologist and close collaborator in Lautaro's Paleo-Indian investigations and other friends, he founded the Huracán Explorers Club. This group of 12–17-year-old adolescents went on several excursions to climb the peaks of the Coastal Range, Pica and Tarapacá, camping near shell middens and cemeteries, relying on freshwater springs and coastal resources, forging a close link with the natural world. Academically, Lautaro was deeply influenced by the engineer Bertie Humberstone, the son of James "Santiago" Thomas Humberstone, founder of northern Chile's modern saltpeter industry. Bertie was a kind of philanthropist who invited children from the local school to his house in the afternoons, where they had access to his extensive library. It was on these visits that Lautaro first encountered the scholarly world of archaeology.

It is difficult to tell exactly how these early influences – his exposure to the ethnic world, the nature and its resources, and the study sessions at Bertie Humberstone's home – marked the young Lautaro, but with no doubt contributed in his decision to travel to Santiago to study history and geography at the Universidad de Chile (as at the time no archaeology programs existed in our country). In 1960 he became a research assistant at the Universidad de Chile's Center for Anthropological Studies and in 1962 was appointed director of the Museum of Calama and established the Program in Archeology and Museums at the Universidad de Chile, Zona Norte. His interest in early sites, chronology, and stratigraphy led him to the Univerzita Karlova in Prague between 1968 and 1969, where he worked on large Paleolithic sites and also married Drahomíra Srytrova, an academic with a Masters in History.

In April 1974, in the midst of intense social unrest in Chile, Lautaro was dismissed from his post for political reasons and the Archeology and Museums Program was suspended meanwhile the campuses of the Universidad de Chile Zona Norte were shut down. In January 1975 he joined the Universidad Católica del Norte and in 1984 he co-founded the Institute of Archeological Research and Museum (*Instituto de Investigaciones Arqueológicas y Museo*, IIAM), serving as its director for two terms. Today, he works as a researcher at IIAM and is a professor in the Masters' and Doctoral Program offered jointly by the Universidad Católica del Norte and the Universidad de Tarapacá.

Major Accomplishments

His first excavations were in northern Chile, in the Tarapacá ravine, and were carried out with D.

Núñez, Lautaro, Fig. 1 Lautaro Núñez at his laboartory in San Pedro de Atacama

True as part of an agreement between the Universidad de Chile and the University of California. These were Lautaro's first approaches to formative societies, and it quickly triggered his interest in the history of the processes that had led to their increasing complexity.

Upon his arrival in San Pedro de Atacama, he began a research program through the Archeological Museum. The work was financed by the Paleo-Indian Program of the Smithsonian Institution with the support of Betty Meggers and Clifford Evans and sponsored by R. P. Gustavo Le Paige, Director of the Archeological Museum, with whom Lautaro formed an abiding friendship. His study of the Paleo-Indian sites of Tagua Tagua and Quereo marked the beginning of his multidisciplinary approach, which would lead to collaborations with professionals in many fields, including his childhood friend, Juan Varela, who as a geologist accompanied Lautaro on several excavations along with specialists in paleontology and bioanthropology, among other disciplines.

At the same time, he explored other areas of interest such as caravan traffic and the relations between routes and geoglyphs. As an outcome of a conversation held with Tom Dillehay during the VII National Congress of Chilean Archeology, which was held in Alto de Vilches in 1977, the book *Movilidad Giratoria, armonía social y desarrollo en los Andes Meridionales: Patrones de tráfico e interacción económica* was conceived (Núñez & Dillehay 1979). Convinced that caravan traffic was crucial to an understanding of Andean prehistory, Lautaro pursued a Doctorate in this subject from the University of Tokyo, completing his thesis *Tráfico de complementariedad de recursos entre las tierras altas y el Pacífico en el área Centro Sur Andina*.

As a consequence of the connection he established with Dr. Martin Grosjean of the University of Bern, Switzerland, his investigations took on a new dimension: the environment. The reconstruction of the environment had always been an important element of Lautaro's work, especially in relation to early settlements, but through his research at Puripica, he sought to analyze specifically the relationship of human groups to their environment. This was the starting point for the understanding of the paleoclimatic history of the study area; it would be followed by several interdisciplinary projects that significantly expanded the existing knowledge of human occupations in the desert environments of the western slope of the Atacama Puna region. By means of a large occupational sequence that began c. 12,000 BP, it was possible to model the relationship between human occupations and

paleoenvironments. This work demonstrated the need to understand those extreme environments, where the scale and the effects of environmental variations may cause different impacts, even on microenvironments within the same region (ecorefuges) and therefore on the human groups residing there.

Lautaro Núñez always defended the autochthonous thesis, which holds that the trajectory of a society can be understood as the result of local processes deeply rooted in the archaic period. He obtained convincing support for his ideas as a result from his work at Quebrada Tulán from the late 1970s onwards, from the discovery of a large ceremonial center (Tulán-54) comparable to the earliest ones of the Circumpuna Andes and from his understanding of animal domestication centers beyond the Central Andes, among others. He believed that the particularity of formative societies could only be understood by acknowledging the early importance of exchange and interaction networks and the combined social, ritual, productive, and environmental factors that existed in each region.

The versatility of Lautaro Núñez's work makes it difficult to synthesize his many areas of interest and contributions to the field of archaeology. But these interests and contributions do share some common elements, including a strong emphasis on temporal dimension, the interdiscipline, and the need for an analytical framework firmly grounded in anthropological and ethnographic knowledge of the Andean world.

Professional Awards and Honors

During 2002 the government of Chile awarded Lautaro Núñez the National History Prize in recognition of his lifetime achievement. In 2012, in recognizance of his academic and investigative work, the Universidad Católica del Norte granted him the honorary degree of doctor honoris causa and published a book in his honor, entitled *Temporalidad, interacción y dinamismo cultural* (2011).

Lautaro Núñez's interest in our heritage – not only the archaeological but the anthropological and historical as well – led him to write several books for a wide audience. These include the popular religious practices of Tarapacá (*La Tirana del Tamarugal: del misterio al sacramento*, 1989) and on Tarapacá's society (*The evolution of a valley population and resources of Tarapacá over a Milennium*, 1986). Others focused on the impact of the Spanish conquest on the Americas (*Fiesta en la Antípoda: Reflexiones sobre el ocultamiento de América*, 1993) and also one that invited children to learn about the archaeologist's work (*Aprendamos arqueología en nuestra tierra*, 2001). This body of work not only earned Lautaro the recognition and respect of his academic colleagues but also led to him being declared an illustrious son of the city of Iquique (2003) and of Pica (2003), his places of origin.

Lautaro's work enjoys widespread international recognition, demonstrating the heights that can be attained by archaeology in the Southern Cone of America. Lautaro Núñez was a pioneer in that field and has encouraged its expansion through his interactions with colleagues in Argentina, Peru, and Bolivia.

Cross-References

- ► Andes: Prehistoric Period
- ► Environmental Reconstruction in Archaeological Science
- ► Hunter-Gatherers, Archaeology of
- ► Paleoindians
- ► Peopling of the Americas

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Nuragic Culture and Architecture (Bronze Age to Iron Age)

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Introduction

The term "Nuragic" refers to an extensive, shared material culture that developed on the island of Sardinia beginning in the Early or Middle Bronze Age and continued at least through the Early Iron Age. Most visibly, the societies of the Nuragic culture shared a distinctive type of architectural construction: megalithic stone towers called *nuraghi* (sg. nuraghe). Archaeologists estimate that over ten thousand nuraghi once existed throughout Sardinia, although now only a few thousand are extant. In addition to the nuraghi, Nuragic societies shared other types of material culture. Similarities in the construction of tombs and cult places as well as in ceramic styles, agricultural and food processing equipment, and household objects all indicate a high degree of interaction among Nuragic societies. Although the nature of this interaction is not fully understood, it probably included trade, intermarriage, and shared rituals and may also have involved intergroup raiding and conflict.

Although the Nuragic culture developed autochthonously from earlier Neolithic and Eneolithic cultures and is unique to the island of Sardinia, similarly megalithic Bronze Age cultures developed simultaneously on Pantelleria, Corsica, the Balearic Islands, and the Iberian mainland, suggesting that the development of the Nuragic culture was part of broad changes affecting much of the West Mediterranean (cf. Blake 2001). The Nuragic culture had important connections with the East Mediterranean as well, and a variety of East Mediterranean imports have been found in excavations of Nuragic contexts.

Definition

The Nuragic culture is named after its characteristic form of architecture, the nuraghe. Nuraghi are monumental, dry masonry structures that use multistory towers in the shape of truncated cones as the basic unit of building. The first appearance of the term *nuraghe* in writing is an inscription on the lintel of Nuraghe Aidu Entos in Bortigali. The inscription is dated to the first century CE on epigraphic grounds, but the word itself does not have Indo-European roots. It is thought to be the original Bronze Age word for the towers (Lilliu 1959: 32), and some scholars use the word as a name for the Nuragic people themselves, calling them the Nur (Webster 1996: 22). Although this can be a useful shorthand, it should be remembered that "Nur" is a modern coinage that may suggest more ethnic unity than the Nuragic culture actually had.

Key Issues

Architectural Overview

The earliest Nuragic structures are the corridor nuraghi, sometimes called proto-nuraghi or pseudo-nuraghi. These are monumental dry masonry platforms, each with one or more

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 1 Front (*left*) and side (*right*) views of Sa Dom' e S'Orcu (Siddi), a giants' tomb in the later, coursed-stone construction style (Photos E. Holt)

narrow corridors running through them. They often have small, roughly circular or elliptical rooms branching off of the corridors (see Lilliu 1982: 13–29). Housing structures were built on top of these platforms, and food or livestock were probably kept in the corridors and small rooms below. Few radiocarbon dates exist for corridor nuraghi, and those that do exist have error ranges so broad as to be unhelpful in dating their period of construction. Corridor nuraghi are generally dated on the basis of pottery to the Early (c. 2000–1700 BCE) or Middle Bronze Age (c. 1700–1365 BCE).

The funerary architecture that accompanies the corridor nuraghi elaborated on the earlier traditions of the Eneolithic: cist graves, dolmens, and especially passage graves. The early Nuragic people added a curved forecourt to the plan of the passage grave to create a new kind of funerary architecture traditionally called giants' tombs (*tombe di giganti*) (Fig. 1). The forecourts of the giants' tombs were originally constructed of stele, and the central stela was often carved with a door motif and contained an opening through which offerings could be made to the dead. Forecourts were the locus for feasting rituals. Many early Nuragic giants' tombs were constructed *ex novo*, but in several instances, earlier passage graves were elaborated into giants' tombs, including the sites of Su Cuaddu de Nixìas (Lunamatrona), Li Lolghi (Arzachena), and Coddu Vecchiu or Capichera (Arzachena). Examples of cist graves and dolmens that were transformed into giants' tombs are rarer but do exist.

Nuragic construction techniques improved during the Middle Bronze Age with the discovery of how to build false tholos and true tholos chambers, beehive-shaped false domes constructed by stacking successively smaller rings of stone blocks (see discussion in Lilliu 1982: 30–61). Many corridor nuraghi were then elaborated and expanded into more complex structures that included false tholos and tholos nuraghi; this continuity of occupation can be seen at numerous sites in Sardinia such as Sa Fogaia (Siddi), Su Mulinu (Villanovafranca), and Santa Vittoria (Serri). Thousands of new Nuragic sites were also constructed at this time. Many of the sites were single towers, often called simple nuraghi. Others were multi-tower or complex nuraghi: two or more attached towers which frequently included an attached, walled courtyard (Fig. 2). Some sites that were founded at the end of the Middle Bronze Age developed into nuragic complexes, with multi-tower nuraghi at their centers surrounded by circumference walls, additional towers, and villages. Nuraghe Su Nuraxi (Barumini) and Nuraghe Arrubiu (Orroli) are two of the best known (Fig. 3).

The construction of giants' tombs also changed during the Middle Bronze Age, drawing on the improved architectural techniques of the tholos nuraghi. The orthostatic stele construction was replaced by courses of stones inclining toward an arched ceiling, and the central stela

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 2 Nuraghe Santu Antine (Torralba), a multi-tower nuraghe with a central tower, courtyard, and three surrounding towers (Photo E. Holt)

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 3 The Nuragic village surrounding Nuraghe Su Nuraxi (Barumini) (Photo E. Holt)

with door motif was replaced by a simple opening with a stone architrave between the two wings of the forecourt (see Castaldi 1969; Blake 2001).

During the Late (c. 1365–1175 BCE) and Final Bronze Age (c. 1175–1020 BCE), successful sites such as Nuraghe Su Nuraxi and Nuraghe Arrubiu were elaborated into important centers with the addition of new walls and towers; however, the basic Nuragic construction techniques remained the same. Architectural innovation during this period came in the form of cult architecture, and the well temple or sacred spring (*pozzo sacro*) was established. These well temples utilized the tholos construction technique of the nuraghi to create underground, vaulted chambers over naturally occurring springs. Well

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 4 The entrance (*left*) and staircase (*right*) of the well temple of Santa Cristina (Paulilatino) (Photos E. Holt)

temples include some of the finest architecture built during the Nuragic period, and the well temple of Santa Cristina (Paulilatino) is a particularly impressive example (Fig. 4). Well temples were the sites of important Nuragic ritual and remained in use for centuries, continuing to receive votive offerings well after the end of the Nuragic culture.

During the Final Bronze Age and Early Iron Age (c. 1020–900 BCE), an important change occurred in the construction and use of Nuragic architecture. No new nuraghi were constructed after the Final Bronze Age, and the existing nuraghi were allowed to collapse. Many fell out of use, and those that remained in use were treated as ritual spaces, taking on a ceremonial function they had not previously had. Villages were built around some nuraghi that had not previously had villages, sometimes utilizing stones from the collapsed nuraghe itself. Even the floor plans of the Early Iron Age houses were different from those of the Bronze Age. Bronze Age houses tended to be circular in plan, but the houses of the Early Iron Age were composed of many subcircular and subrectangular rooms around an open courtyard. Evidence excavated from the Early Iron Age village of Genna Maria (Villanovaforru) indicates that these rooms had distinct functions, unlike the undifferentiated space in Bronze Age houses. The new Iron Age villages also differed from their Bronze Age predecessors by being open-air villages lacking fortifications and circumference walls. Funerary architecture also changed in the Iron Age. Communal burial in giants' tombs began to give way to individual burial, such as the famous burials at Monti Prama (Cabras).

Socioeconomic Overview

The complex architectural history of the Nuragic culture with its development, elaboration, and periodic innovation indicates complex and changing socioeconomic structures. However, scholars disagree about the amount of social hierarchy present in Nuragic society when the first corridor nuraghi, giants' tombs, and tholos nuraghi were built. Some see the corridor nuraghi and single-tower nuraghi (Fig. 5) as evidence of an egalitarian society with a family-level organization (Webster 1996: 71, 96) and interpret the giants' tombs as having the same community burial function that passage tombs appear to have had in the Eneolithic. Other scholars interpret corridor nuraghi as early signs of developing hierarchy and question whether burial in the restricted space of the giants' tombs was, in fact, open to all members of society (Bernardini 2010).

Nuragic Culture and Architecture (Bronze Age to Iron Age), Fig. 5 A single-tower nuraghe at Santa Cristina (Paulilatino) (Photo E. Holt)

In spite of the disagreements about the beginnings of Nuragic society, scholars tend to agree that by the Late and Final Bronze Age, Nuragic society had a stratified organization with privileged leaders controlling production. Many scholars see the Early Iron Age cultural transition indicated by the abandonment of the nuraghi; the construction of large, open villages; and the move away from giants' tombs toward individual burials as evidence of a codified social hierarchy (Van Dommelen 1998: 79, 105; Perra 2009). An alternative hypothesis suggests that, toward the end of the Nuragic culture, power fell out of the hands of the ruling aristocracy and into the hands of religious leaders (Campus et al. 2010: 62–8).

Carved reliefs from Medinet Habu, the mortuary temple of Rameses III in Luxor, Egypt, may show Nuragic warriors as part of an influx of Sea Peoples that was successfully repulsed c. 1200 BCE. The identification of these warriors as Nuragic is based on stylistic similarities between the helmets they are shown wearing and the helmets worn by warriors in bronze figurines produced by the Nuragic culture in the Final Bronze and Early Iron Age. This evidence may indicate that Nuragic people took part in the widespread, armed migrations that occurred at the end of the Mediterranean Bronze Age.

In general, the subsistence economy of the Nuragic people seems to have been similar to that of other Bronze Age Mediterranean cultures. The Nuragic people grew wheat and barley; raised sheep, goats, and pigs; used cattle for traction and periodically meat; and hunted, fished, and gathered according to the locally available resources (cf. Perra 2010). However, we know next to nothing about the specifics of farming and herding strategies, systems of land tenure, or the social aspects of production and storage. One important difference from other Mediterranean Bronze Age economies is that there is currently no evidence for the presence of the horse in Bronze Age Sardinia. This absence, if real, will have limited travel times, communication, and certain kinds of elite competition.

Craft production in Nuragic society is difficult to reconstruct. As often happens, we are left with abundant evidence of the most durable products and know little about the rest. Spindle whorls are frequent finds on Nuragic sites, indicating textile production, and impressions left on some types of Nuragic pottery attest to the weaving of mats and baskets. Ceramic production came in a variety of shapes for serving, cooking, and storage and became more refined as the Nuragic period progressed. Slag, stone molds, and copper ingots

of different shapes attest to a developed bronze working industry at an early stage of the Nuragic culture (see Lo Schiavo et. al. 2005), though deposition of bronze artifacts does not occur in any great quantity until the Final Bronze Age and Early Iron Age. Numerous figurines of humans and animals, known as *bronzetti*, have been recovered from later Nuragic sites, though very few have any contextual information attached. Other common Nuragic artifacts are bone awls and pins, river pebbles used to burnish pottery, and fine sedimentary stones for sharpening metal tools. Obsidian, which is available on the island, remained an important resource for toolmaking, as it was in the Sardinian Neolithic.

The people of the Nuragic culture also participated in extensive extra-insular trade networks. Trade during the Middle, Late, and Final Bronze Age tended to be with the East Mediterranean. Numerous finds of Mycenaean and Cypriot artifacts in Sardinia include a Late Helladic IIIA2 alabastron from Nuraghe Arrubiu (Orroli), Mycenaean ceramics from Nuraghe Antigori (Sarroch), a carved hippopotamus ivory figurine from the Nuragic village Mitza Purdia (Decimoputzu), and fragments of oxhide ingots from numerous sites throughout the island (Giardino 1992). Recent work in ceramic petrography and composition studies has expanded our knowledge of Nuragic trade, identifying imports from a greater number of locations than was previously recognized as well as Nuragic ceramics that were exported to the East Mediterranean (Karageorghis 2011; Lo Schiavo 2012).

At the end of the Final Bronze Age and the beginning of the Early Iron Age, people on Sardinia seem to have traded less with the East Mediterranean and focused more on the West Mediterranean and mainland Italy. The Nuragic people exchanged ceramics, weapons, and *bronzetti* with the societies of Etruria and the Iberian Peninsula.

Current Debates and Future Directions

Numerous important issues are currently being debated in the study of the Nuragic culture, the most fundamental of which is probably that of chronology. At present, the number of radiocarbon and dendrochronological dates for the Nuragic culture is small compared to the number of excavated sites, and much of the dating of settlement types, ceramic styles, and architectural changes is conventional. Two different perspectives on Sardinian chronology have therefore developed (see Van Dommelen 1998: 55). The first perspective, associated with historical and classical archaeology on Sardinia, relies primarily on textual and epigraphic evidence and on art historical comparison between Sardinian artifacts imported from the Aegean and Near East and similar artifacts found in datable contexts in the East Mediterranean. The second perspective, associated with prehistoric archaeology on Sardinia, bases its chronology on dendrochronology and radiocarbon dating (cf. Tykot 1994; Manning 1998).

A second fundamental discussion in Nuragic archaeology addresses what was the purpose of the nuraghi, a discussion that is fundamentally tied to understanding the structure and interactions of the numerous societies that made up the Nuragic culture. That the nuraghi had a primarily domestic function is no longer in doubt (cf. Blake 2001: 146), but whether the nuraghi also served a defensive function is debated. The massive walls of the nuraghi and their enclosed courtyards suggest a protective function, as does the placement of many Middle Bronze Age nuraghi in high, defensible locations with good views of the surrounding territory. The existence of circumference walls around many Nuragic villages may also indicate that defense was a concern.

However, the overbuilt, megalithic nuraghi may have served as displays of power and authority rather than as actual defensive structures. Many scholars point out that the usual archaeological indications of conflict, such as human skeletons showing violent trauma and evidence of the periodic destruction of settlements, are missing from Nuragic society (Campus et al. 2010: 67).

Archaeologists' ability to settle this debate is currently hampered by a lack of information about Nuragic settlement systems. Although the

spatial relationships among visible monuments have often been studied (Trump 1990; Blake 2001; Cossu & Perra 2008), few excavations and field surveys have explored these relationships in depth. In addition, useful information about Nuragic populations is difficult to obtain because most giants' tombs were looted or reused in antiquity, destroying their contents. Without a more detailed understanding of the relationships among complex nuraghi, simple nuraghi, villages, and tombs, it will remain difficult to understand all the functions the nuraghi may have had.

Finally, there is an important debate that centers around what happened to the Nuragic culture. Some scholars see the events of the Final Bronze Age and Early Iron Age as indicating reorganization and change, resulting in a different Sardinian culture during much of the Iron Age (see Van Dommelen 1998: 76–9, 101–3). Other scholars see evidence for cultural continuity well beyond the Early Iron Age, continuing to use the word "Nuragic" to describe Sardinian society as late as the Punic (Lilliu 1982), Roman (Webster 1996), and even Medieval periods (Dyson & Rowland 2007).

Although much important work has been done on the archaeology of the Nuragic culture, the current state of the field invites substantial future research. New excavations and surveys, particularly projects investigating a wider range of settlement types and projects focusing on the early development of the Nuragic culture, will help resolve many of our unanswered questions about the structures and interactions of Nuragic society. The collection of new radiocarbon dates will continue to refine our knowledge of Nuragic chronology. Some projects have already begun the process of reconstructing the Nuragic environment (Ruiz-Gálvez 2005), but the need to contextualize the Nuragic economy within its resource base and natural surroundings warrants considerable further study. Finally, archaeometric techniques such as ceramic petrography are opening up exciting new avenues of research. As a field of inquiry, Nuragic archaeology has great potential for growth and development.

Cross-References

- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Cyprus, Archaeology of
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Material Culture and Education in Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ Style: Its Role in the Archaeology of Art
- ▶ Tombs, Etruscan
- ▶ Trade and Transport in the Ancient Mediterranean

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Nzewunwa, Nwanna

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Basic Biographical Information

Information on this yet-to-be-celebrated archaeologist is surprisingly quite few. From the few articles about him gleaned for this work, it was observed that he was a field archaeologist. Nzewunwa believed, and rightly, that excavation and field surveys are the principal tools of archaeology (Nzewunwa 1983). Dr. Nzewunwa obtained a B.Sc. in African Archaeology and History from the University of Nigeria, Nsukka, in 1973 and went on to the University of Cambridge, England, for a Ph.D. He earned this Ph.D. in 1979; his thesis is titled "*Aspects of Economy and Culture in the Prehistory of the Niger Delta*."

Major Accomplishments

Nzewunwa was an accomplished field archaeologist. Beginning from the early 1970s, he successfully organized, both single-handed and jointly, archaeological excavations in Nigeria particularly in the Middle Niger Valley and in the Niger Delta areas (Nzewunwa 1980, 1983). He also participated in field research works in Britain, Denmark, France, and Germany. In 1981 he was appointed Chairman of a three-man task force committee by the Archaeological Association of Nigeria (AAN) to produce a brochure on tourism in Nigeria. It was while serving in this committee that he got the inspiration to produce an enduring material to serve as a guide to available archaeological sites at that time. In 1983, he published the book titled *A Sourcebook for Nigerian Archaeology*; this book is still unparalleled in Nigeria today.

After obtaining his Ph.D. degree, Dr. Nzewunwa served as a Junior Fellow at the University of Nigeria, Nsukka, and later became a lecturer at the University of Jos (Nzewunwa 1983). Perhaps on the invitation of one of Nigeria's legendary historian – Prof. E.J. Alagoa – he finally moved to the University of Port Harcourt as a Senior Lecturer. While in Port Harcourt, he had several joint projects with Profs. E.J. Alagoa, F.N Anozie (of blessed memory), and Mr. (now Prof.) Abi Derefaka. A major product of such collaboration is the 1987 book: *The Early History of the Niger Delta* jointly edited by E.J. Alagoa, F.N. Anozie, and N. Nzewunwa. He had in 1980 published the book *The Niger Delta: Its Prehistoric Economy and Culture*.

Dr. Nwanna Nzewunwa had about ten publications in journals, books, and chapters in books until his unfortunate and untimely death. His demise, which occurred at the prime of his career, was a rude shock to the AAN and NCMM. Although the exact date of his death could not be ascertained, the event would have occurred shortly after his last major publication in 1983.

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- ▶ Anozie, Fred
- ▶ West Africa: Museums
- ▶ West and Central Africa: Historical Archaeology

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O'Connor, Susan

Sally Brockwell
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Basic Biographical Information

Professor Susan Lillian O'Connor (Fig. 1) gained her B.A. (Hons, 1st class) in archaeology from the University of New England in 1980 and her Ph.D. from the University of Western Australia (UWA) in 1991. She worked as a lecturer and researcher at UWA until 1994 and joined the Australian National University (ANU) in the same year as a Research Fellow in the Department of Prehistory, Research School of Pacific and Asian Studies, now the Department of Archaeology and Natural History. She was Head of Department between 2005 and 2012 and was promoted to Professor in 2008 and in 2012 was made an Australian Research Council (ARC) Laureate Fellow.

Major Accomplishments

Sue's wide research interests include the archaeology of Australia and Southeast Asia, coastal and island archaeology, maritime colonizations of Island Southeast Asia and Australia and the links between these regions, interactions between humans and their environment, Southeast Asian rock art and rock art dating, the Neolithic transition in Southeast Asia, and technological change, innovation, and transmission theory. Sue is a dedicated fieldworker often working in remote locations under difficult conditions, e.g., in Arnhem Land, the Kimberley, Indonesia, Papua New Guinea, and East Timor. She has a special interest in the archaeology of the Kimberley region that spans over 20 years from her Ph.D. research and has continued to pursue active research in that region. Her thesis was entitled *A Prehistory of the Islands of the Buccaneer Archipelago and Adjacent Mainland West Kimberley, Western Australia* and concerns the nature of Pleistocene colonization and changes in occupation from the late Pleistocene through to the late Holocene (O'Connor 1999). In 1993 she was awarded an ARC grant to investigate the antiquity of occupation and cultural transformations in hunter-gatherer societies in the Oscar Napier Ranges. This project provided the first evidence of indigenous occupation of the Kimberley region dating back over 40,000 years as well as the earliest evidence for rock art production in Australia (O'Connor 1995; O'Connor & Fankhauser 2001). Sue has always worked closely with indigenous communities and has recently undertaken an Australian Institute of Aboriginal and Torres Strait Islander Studies funded joint initiative with the Worrorra community to record rock art and assess the impact of cultural tourism on sites in their country in the

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O'Connor, Susan, Fig. 1 Prof. Susan Lillian O'Connor

coastal west Kimberley (O'Connor et al. 2008). Overseas, Sue has worked on research projects in Indonesia, Papua New Guinea (PNG), and East Timor and was one of the first archaeologists to work in East Timor after independence. She has discovered and excavated high-profile Pleistocene sites, including Jerimalai in East Timor, at 42,000 years, the earliest site occupied by modern humans in Island Southeast Asia and oldest evidence for pelagic fishing in the world (O'Connor 2007; O'Connor et al. 2011). Her reassessment of the Neolithic transition holds major implications for our understanding of cultural/technological transmission between PNG/Island Melanesia and Island Southeast Asia in the early mid-Holocene (O'Connor 2006).

Sue has always been open to collaboration with colleagues from a diverse range of disciplines leading to innovative research, reflected by her successful research grants and publications. She recently completed two ARC projects in Southeast Asia on indigenous fortifications and climate change in East Timor with Andrew McWilliam (ANU) (O'Connor et al. 2012) and rethinking the interaction between culture and nature in the management of cultural heritage with Denis Byrne (Office of Environment and Heritage, New South Wales Government) (Brockwell et al. in press). She is currently undertaking research on four more ARC projects: in Western Australia on the effect of catastrophic marine inundation events on the archaeological record of the Pilbara and Kimberley coastline with Anthony Barham (ANU) and Stewart Fallon (ANU) (Barham and O'Connor 2007); on the lifeways of the first colonists to the Kimberley region with Jane Balme (University of Western Australia) and Moya Smith (Museum of Western Australia) (Balme and O'Connor in press); in the Northern Territory on contact period sites in Arnhem Land with Daryl Wesley (ANU); and in Sulawesi investigating modern human colonization across our region with Ben Marwick (University of Washington). In 2012 she won the ARC's most distinguished award, a Laureate Fellowship, to research modern human dispersal and behavioral complexity from a Wallacean and Australian perspective.

As well as Sue's outstanding research and publication record, she has made numerous other contributions to archaeology, as a teacher, editor, reviewer, examiner, consultant, and committee member, and she has promoted Australian archaeology both here and internationally through conference organization, numerous presentations, and media interviews. She has an excellent record of graduate completions, and her past students include a principal heritage advisor to Rio Tinto, a CEO with the Department of Foreign Affairs and Trade, an advisor to the National Directorate of Culture in Timor Leste, and several students who hold current academic university positions at ANU and the Universities of Queensland, Cambridge, Washington, and Wisconsin. Her outstanding contributions to the discipline were recognized in 2007 when she was elected Fellow of the Australian Academy of the Humanities (FAHA) and the Society of Antiquaries of London (FSA), and in 2011 she received the Rhys Jones Medal, the highest honor awarded by the Australian Archaeological Association. In 2009 her efforts were rewarded by the ANU when she she was awarded two Vice-Chancellor's awards for staff excellence and excellence in supervision and in 2012 when she was promoted to the highest level of professorship.

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▶ Balme, Jane

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Oceania: Historical Archaeology

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Introduction

Oceania is a vast region containing many thousands of islands that entered the modern world along a diverse range of trajectories over a period of about four centuries. Only a small proportion of these islands have seen archaeological investigations focused on this period. Where it has occurred, this research has generally concentrated on either the recent past of indigenous oceanic societies or on those of new settler communities, with a small number of studies exploring the middle ground of new social and community identities forged through the engagement of these two worlds.

Definition

Oceania is centered on the tropical and subtropical islands of the Pacific Ocean. Precise definitions of its boundaries vary, but the term is used here to encompass the islands of Melanesia, Micronesia, and Polynesia (Fig. 1). Prehistoric human settlement had begun by c. 40 kya in the west but did not reach the southern margins of Polynesia until the thirteenth century CE. European encounters with Oceania began in 1521 with the Spanish in Guam and 4 years later the Portuguese in Yap. Following the establishment of a Spanish colony in the Philippines to the west of Oceania in 1565, regular passage of Manila galleons between there and Mexico led to sporadic encounters throughout northern parts of

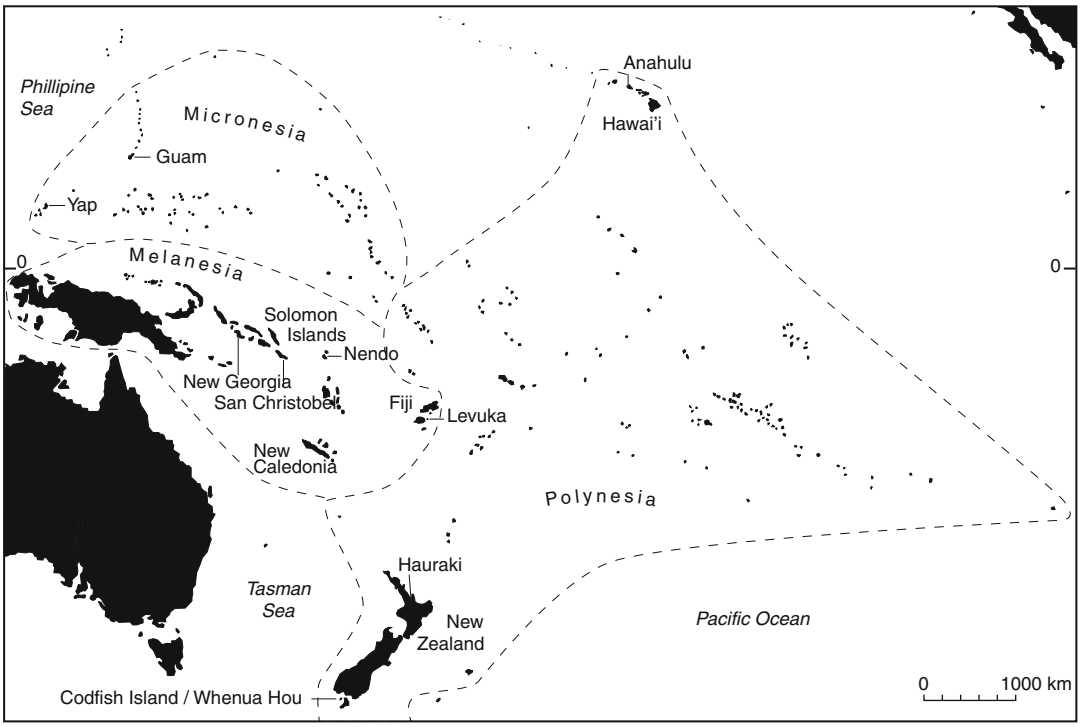

Oceania: Historical Archaeology, Fig. 1 Oceania, showing places mentioned in text

Oceania, which were extended southward by Spanish and Dutch explorers during the seventeenth century. However, the vast majority of oceanic islands were first encountered between the mid-eighteenth and late nineteenth centuries by ships from Britain, along with smaller numbers from America, France, and Russia. Most initial encounters arose through exploratory voyages, and seldom involved sustained contact. With only a few exceptions, more lasting engagements arose only after whalers, traders, missionaries, and purposeful colonists began to frequent the Pacific beginning in the last two decades of the eighteenth century; prior to this, there were only six attempts to establish European settlement, and all but one of these failed rapidly. The timing and nature of encounters between the Oceanian and Western worlds varied significantly between islands, providing immense potential for archaeological study.

The practice of historical archaeology is very unevenly distributed throughout Oceania. It is most strongly developed in New Zealand where it began in the 1920s and flourished after the 1960s (Smith 1991), although in recent decades it has been dominated by development-driven consultancy archaeology with its attendant lack of full publication (Smith 2004). In Hawaii, historical archaeology also emerged in the 1960s (Kirch 1985: 303–18) but, with some notable exceptions, has seldom been reported in published sources. Elsewhere activity has been sporadic with clusters of published work from the Solomon Islands, New Caledonia, and Fiji and more limited examples from ten further islands or island groups.

Examples

Archaeologies of Colonial Settlement

In 1595 four Spanish ships set out from Peru with the intention of establishing a colony in the Solomon Islands, discovered in 1568 by their leader Alvaro de Mendana y Neyra. Three of these ships made landfall at Graciosa Bay on

Oceania: Historical Archaeology, Fig. 2 Ceramic sherds from Pamua and Graciosa, Solomon Islands (From Gibbs 2011, published with permission of Society for Historical Archaeology)

Nendo Island, in the Santa Cruz group, establishing a settlement that lasted for less than two months before internal tensions, disease, and conflict with locals led to its abandonment. Archaeological investigations in 1970 (Allen 1976) located the settlement which disclosed a defensive ditch, a house floor, and small quantities of Spanish colonial pottery, probably from South or Central America (Gibbs 2011). Near-identical pottery was recovered from two sites at Pamua on San Cristobal Island (Fig. 2) which have been convincingly linked to an historically unrecorded settlement by people from the fourth ship in Mendana's expedition. The quantity and diversity of pottery at these sites suggest that their occupation was of slightly longer duration than on Nendo, but they too were soon abandoned. In this case at least, the impact of colonial settlement on the indigenous people and their environment was minimal.

The only permanent colonial settlement established before the late eighteenth century was founded at Agaña on the island of Guam in 1668. It incorporated both a Jesuit mission and a military presence, and provided a reprovisioning base for Manila-bound galleons on their outward journey from Mexico. Archaeological investigations of the colonial period have been limited, the most significant being excavations on the site of the Spanish Governor's palace (1744–1898) which was subsequently the seat of American colonial rule then Japanese military government before destruction by bombing in 1944 (Scheutz 2007). This disclosed a ceramic assemblage dominated by oriental, particularly Chinese, wares, with only a handful of sherds attributable to New Spain and none to the Spanish homeland, demonstrating that pottery was not a significant component of the cargoes on the outward journeys of the Manila galleon trade. It also reflects the vibrant East Asian trading network centered on the Philippines since long before Spanish arrival, which was one of the main stimuli for establishment of their colonial presence (Skowronek 2009).

More typical of colonial settlement histories throughout Oceania is Fiji, where European settlement did not begin until the early nineteenth century. Burley's (2003) preliminary analysis of the archaeological record in the town of Levuka charts its emergence as a settlement of European and American beachcombers and their Fijian

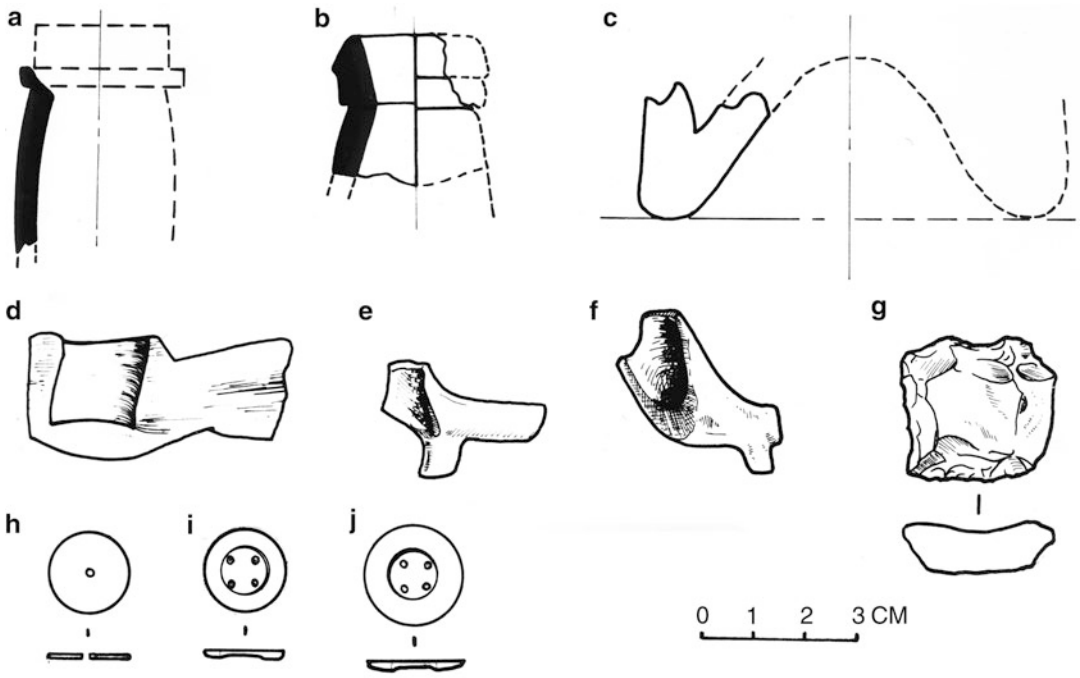

Oceania: Historical Archaeology, Fig. 3 Selected artifacts from occupation by sealers in the Southport caves, Fiordland, New Zealand: *a–c* – glass bottle fragments; *d–f* – pipe fragments of wood (*d*) and clay (*e*, *f*); *g* – gun flint; *h–j* – bone buttons

wives in the 1820s and 1830s, transforming into the major commercial port of call in the island group during the 1860s and its colonial capital in the 1870s, before slowly waning after the 1880s. He highlights the role of imported material goods in maintaining a sense of Europeaness within the settler community but also signifying increasing social differentiation within it.

The most substantial archaeological record of colonial settlement derives from New Zealand, where it has been integrated with the well-established prehistoric record into a long-term culture historic sequence (Smith 2008). The Maori period, covering 500 years of indigenous occupation, is followed by the Pakeha period (1792–1860) during which European immigrants were outnumbered by Maori and constrained in their geographic distribution and the Kiwi period (1860–present) when the immigrant population had numerical, military, political, and economic ascendency. First European contacts took place toward the end of the Maori period, beginning with Dutch exploration in 1642 and resuming again with British and French presence in the two decades from 1769. This was exclusively coastal exploration that left minimal trace in the archaeological record, confined largely to incorporation of the narrow range of metal and glass items initially adopted by indigenous Maori.

The Pakeha period commenced in 1792 with the onset of European settlement. For the first two decades, immigrants were sojourners who spent short periods in residence on New Zealand shores before departing again. The most important group of sojourners was sealers, mostly operating out of Australia, harvesting fur seal skins for Chinese and British markets. Archaeological sites associated with this industry include caves and hut sites that have yielded sparse artifact assemblages (Fig. 3) along with faunal remains dominated by indigenous species, making it difficult to distinguish the archaeological signature of European sojourners from that of contemporary Maori. Permanent European settlement began with the establishment of the first mission station in 1814, followed by another four

Oceania: Historical Archaeology, Fig. 4 House from Te Hoe whaling station, Mahia Peninsula, New Zealand. The shape and dimensions of the house, its shallow porch, and scoop hearths are typically of pre-European Maori dwellings, while the vertical wooden slab construction and stone chimney are features common in houses of European whalers

missions before the end of the 1820s. Archaeological investigation of these earliest permanent settlements has been limited to date, but thorough investigation of a slightly later mission has shown that they operated as small family farming enterprises. European presence was initially confined to the northern and southern ends of New Zealand but expanded geographically in the 1830s with development of the shore-whaling industry. A key feature of the archaeological record of this industry is its diversity, with housing, artifacts, and fauna at some sites almost exclusively European in character while other exhibit distinctive Maori features (Fig. 4). Formal towns were first established in 1840, coincident with the beginnings of British colonial governance of New Zealand, a burgeoning immigrant population and a shift in economic focus from maritime extractive industries toward pastoral farming.

The archaeological record of the first four decades of the Kiwi period is characterized by the emergence of new economic pursuits, evidence of military conflict, and the growth of urbanized settlements. The discovery of gold in 1861 sparked a series of rushes that heightened the pace of immigration and transformed the mid-nineteenth-century economy. This industry was the largest single contributor to the making of New Zealand's archaeological landscape in terms of the acreage of land covered by sites.

It brought settlement to parts of the interior that had previously seen only transient Maori occupation, and left an archaeological record of both fleeting camps and permanent towns. Among the new migrants were Chinese miners whose ceramics, food containers, opium-smoking paraphernalia, and food preparation methods have all left a distinctive trace in the archaeological record.

Rising immigrant demands for land and heightening Maori resistance to its loss gave rise to a series of wars between various *iwi* (tribes) and changing combinations of British, colonial, and Maori forces. This stimulated two decades of fort building throughout central regions of the North Island and led to massive alienation of land that displaced many Maori communities and disrupted their economic activities. Archaeological investigations have demonstrated innovations in both the technology and strategy of warfare by both colonial and indigenous forces. The urban settlements that developed in the latter half of the nineteenth century have been the main focus of recent archaeological investigations of colonial settlement in New Zealand, but as yet are poorly published.

Archaeologies of Indigenous Cultural Transformation

While many earlier archaeological studies of prehistoric societies in Oceania ended at the point of European arrival, it has become increasingly common for them to explore the ways in which these societies encountered the modern world. These disclose considerable diversity in trajectories of change while at the same time highlighting indigenous agency in these processes. On New Georgia, Solomon Islands, Roviana head-hunting chiefdoms had little direct contact with the outside world until the mid-nineteenth century when trade with Europeans was commenced on terms strongly controlled by Rovianans. Archaeologically, there is little evidence of externally influenced cultural change beyond the appearance of a select range of European-manufactured items on ancestor shrines (Fig. 5), but even these were incorporated into indigenous constructions of personhood (Walter et al. 2004).

While some earlier studies of culture contact in New Zealand posited rapid, widespread, and cataclysmic changes in Maori culture consequent upon European arrival, recent investigations have identified regional variations in the timing and nature of cultural borrowings and demonstrated the persistence of traditional cultural forms. Unsurprisingly the earliest adoptions are at the northern and southern ends of the country, which saw initial sustained European contact, while it was almost a century before European artifacts were common in Maori archaeological contexts from more remote localities (Coutts 1969; Phillips 2000). Irrespective of timing, there is clear evidence of selectivity in Maori adoptions of imported artifacts, plants, and animals.

Phillips' (2000) detailed study covering four centuries of pre- and post-contact Maori settlement in the Hauraki region shows that there were significant changes in settlement pattern, economy, and technology during the first four decades of the nineteenth century but that these were driven almost entirely by intertribal warfare. Although European muskets were utilized, this was essentially traditional warfare conducted for traditional reasons and similar to events that had taken place in earlier times. She characterizes this period as "a dynamic one in which Maori responses were principally to other Maori. European goods were used to Maori ends" (Phillips 2000: 168). In the 1840s–1850s, Hauraki Maori encouraged European trade in order to increase their access to imported goods which, along with the influence of missionaries, brought greater changes. However, depopulation through epidemic diseases and, later, alienation of land were equally important factors in transformation of the indigenous world.

In Hawaii, Kirch and Sahlin's (1992) study of the Anahulu Valley on O'ahu provides perhaps the most comprehensive archaeological and ethnohistorical analysis of change within an oceanic community as it emerged into the modern world. The initial drivers of changes in settlement pattern, economy, and political organization were indigenous. Following conquest of O'ahu in 1804 during unification of the

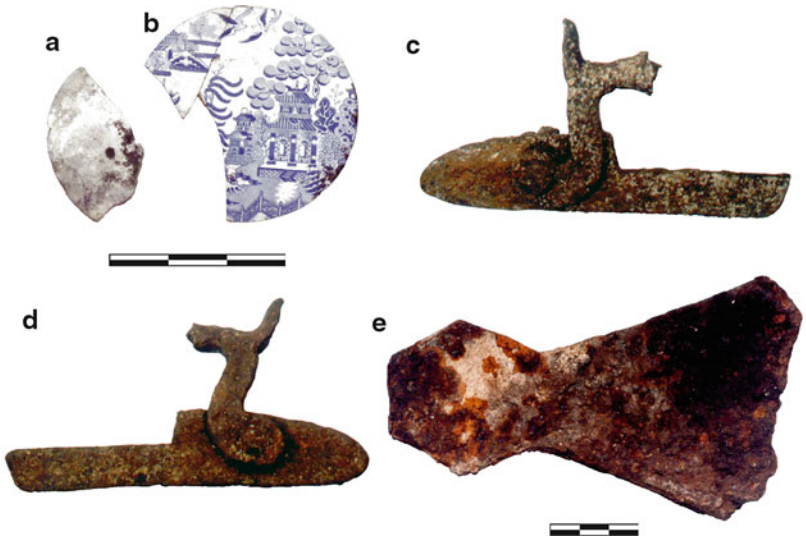

Oceania: Historical Archaeology, Fig. 5 Historic period artifacts from ancestor shrine platforms, Nusa Roviana, Solomon Islands: *a* –fragment of Tridacna shell back plate for *kapkap* forehead ornament. A circular lattice of tortoise shell would sit over this in a complete specimen; *b* – transfer printed plate ground and drilled for back plate of *kapkap* ornament; *c*, *d* – hammer mechanisms from double barrel percussion cap shotgun; *e* – iron axe head, used as tomahawk (Courtesy of Tim Thomas, University of Otago)

Hawaiian islands by Kamehameha I, the Anahulu valley, previously only sparsely used, became a well-populated center of agricultural intensification directed toward supplying tribute to the chiefs. At the same time, Hawaii was visited regularly by fur traders, and merchants focused on acquiring sandalwood. Interactions with these visitors were largely controlled by the chiefly class, limiting their impact on the wider community. The archaeological record from Anahulu shows that household clusters established during the first three decades of the nineteenth century conformed to the traditional pattern of a series of functionally specialized structures; with only a limited range and quantity of imported material items, many reworked for traditional purposes.

After 1830 the burgeoning Pacific whaling fleet began to frequent Hawaii, missionary activity expanded, and sugar cane plantations and cattle and sheep ranches were established, expanding connections with the wider world and increasing the pace of indigenous cultural change. Several studies have noted that while some cultural items, such as clothing, changed rapidly, others such as stone adzes remained in use for about a century after contact, indicating complexity in the processes of change (Bayman 2009).

Archaeologies of the Middle Ground

Several recent studies have examined the emergence of communities or social identities that are neither purely indigenous nor nonindigenous. For example, the Sealers Bay community (1825–1850) on Codfish Island/Whenua Hou, New Zealand, was made up of Maori women, their partners from a diverse range of nations, and their offspring. These hybrid origins are reflected today in its legally sanctioned dual nomenclature, and apparent also in the archaeological record which shows traditional Maori earth ovens alongside European-style housing, and a material culture inventory (Fig. 6) drawn from New Zealand, Australia, and elsewhere in the Western world (Smith 2008).

Bayman (2010) has examined two individuals who played important roles in early cultural

Oceania: Historical Archaeology, Fig. 6 Selected artifacts from early-nineteenth-century settlement at Sealers Bay, Codfish Island/Whenua Hou, New Zealand.: *a* – bone fishhook point; *b* – obsidian flake; *c* – chalcedony flake; *d* – fragment from argillite adze; *e–g* – bone buttons; *h* – brass watch hand; *i* – rim sherd of coarse earthenware; *j* – rim sherds of shell-edged whiteware; *k* – clay pipe manufactured by William White Glasgow; *l* – clay pipe manufactured by Joseph Elliot, Sydney

exchanges in Hawaii: John Young, a British-born sailor left behind by his ship in 1790 who lived there till his death in 1835, and Kauikeaouli who ruled as King Kamehameha III from 1824 to 1854. Young became an advisor to Kamehameha I during his unification of the kingdom, served from 1802 to 1812 as his governor of the island of Hawaii, and twice married indigenous women. Archaeological investigation of his residence disclosed a combination of Western-style and traditional Hawaiian structures and a similar combination of artifacts. Kauikeaouli also combined Hawaiian and non-Hawaiian elements in his residences, and the artifact assemblage from one of these included numerous British, Chinese, and Japanese ceramics which, in contrast to those in sites of commoners, had not been reworked for traditional purposes. Bayman uses these two figures to emphasize the importance of exchange in the construction of the hybrid social identities during early contact in oceanic societies.

In New Caledonia, where the beginnings of historical archaeology are coinciding with the transition to independence after more than a century and a half of French colonial rule, archaeology is informing and enhancing Kanak (indigenous), Caldoche (locally born immigrant), and emerging collective identities. Excavations at penal colony sites have revealed Kanak presence in the convict administration and

emphasized convict influence in Kanak clans. Kanak, Caldoche, Asian, and Polynesian school children participating in an ongoing program of excavations perceive the diverse remains they encounter as "just 'one'; the story of their nation under construction" (Sand et al. 2006: 158).

Future Directions

The vast majority of islands in Oceania are completely unexplored by historical archaeologists. Where work has been undertaken, it has disclosed both significant differences and shared themes in trajectories of change as Oceania engaged with the modern world and has highlighted the importance of this "sea of islands" as a laboratory for comparative studies of cultural change. New investigations commencing on missionization in Vanuatu will provide the first evidence of the impact of this process beyond New Zealand and Hawaii. Among other avenues ripe for exploration are comparative studies of the nineteenth-century beachcomber settlements that emerged in many of the ports frequented by trading and whaling ships, and the cultural influences of the numerous groups of indentured laborers who were transported within and into Oceania.

Cross-References

- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Colonial Encounters, Archaeology of
- ▶ Missionization and Mission Archaeology in New Zealand and Australia
- ▶ Pacific Ocean: Maritime Archaeology

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Ogundiran, Akinwumi

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Basic Biographical Information

Akinwumi Ogundiran is a renowned Nigerian-born archaeologist who at the time of writing this entry is based in the Department of Africana Studies, University of North Carolina at Charlotte. He is the chair of the Department. He had his first degree, a Bachelor of Arts in archaeology, from the Obafemi-Awolowo University, Ile-Ife in 1988, graduating with a first class honors, a feat which earned him the chief Ajayi Fabunmi prize for the best graduating student in archaeology of that year in OAU.

Ogundiran had his masters at the Department of Archaeology and Anthropology, University of Ibadan, and completed his doctoral thesis in the year 2000 at Boston University.

Early in his career, Professor Akin Ogundiran briefly worked as a Graduate Assistant in Edo State University, and as an Assistant Lecturer at Delta State University and later University of Benin.

From the fall of 2001 to the summer of 2006, Ogundiran was an assistant professor, Department of History, Florida International University. He became an associate professor in that institution in 2006; in the same year, he was made the Director, Africa-New World Programme.

Major Accomplishments

The scholar has contributed immensely to the discipline through his extensive research on the archaeology of Yorubaland, 1200–1900, and the archaeology of Atlantic Africa and the African Diaspora. For example, the article titled "Material Life and Domestic Economy in a Frontier of the Oyo Empire during the Mid-Atlantic Age" published in the International Journal of Historical Studies in 2009 (Ogundiran 2009) addresses how the domestic economy of a hinterland Atlantic African community responded to the commercial revolutions in the Atlantic world. Ogundiran's research interests also include cultural history, material culture, imperialism: the landscape and cultural history of sacred groves and African modernity.

Between 1997 and 2000, he directed the Eka Osun Project which focused on historical landscape, social memory, and regional interactions in Ilare District, Nigeria (1200–1900 CE) The result is a series of journal articles and a monograph titled *Archaeology and History in Ilare District (Central Yorubaland, Nigeria), 1200-1900* (Ogundiran 2002).

From 2003 till date, Professor Ogundiran has been leading the Upper Osun Archaeological and Historical Project in Nigeria, an investigation that focuses on (a) the political economy and cultural process in Oyo Empire, (b) the landscape and cultural history of Osun Osogbo Sacred Grove, and (c) the cultural history of the Atlantic experience in Yoruba hinterlands.

Ogundiran has created novel ways for interpreting and conceptualizing material culture in the cultural history and archaeology of West Africa. He has also developed a ceramic typological scheme that is amenable to studying issues of regional interactions, trade, sociopolitical development, and foodways in Yorubaland.

Ogundiran is editor of *Precolonial Nigeria* (Ogundiran 2005), and coeditor (with Toyin Falola) of *Archaeology of Atlantic Africa and the African Diaspora* (Ogundiran & Falola 2007), and (with Cameron Monroe) *Power and Landscape in Atlantic West Africa* (Monroe & Ogundiran 2012). Ogundiran is a member of several editorial boards of journals around the world particularly those with special interest on African archaeology. Among these are the *African Archaeological Review*, *Archaeology and Heritage*, and *Ofo: Journal of Trans-Atlantic Studies*.

In the same vein, Akin Ogundiran's research has enjoyed funding from different organizations including the Wenner Gren Foundation for Anthropological Research, National Endowment for the Humanities, and Dumbarton Oaks, and Boston University Humanities Foundation,

among others. His writings have appeared in *Azania: Journal of Archaeological Research; Journal of World Prehistory; International Journal of African Historical Studies; Journal of Field Archaeology*; *African Archaeological Review; History in Africa; Historical Archaeology;* and *Current Anthropology*, among others.

For his many contributions to archaeological research, Akinwumi Ogundiran has received many awards such as the University of Texas at Austin's Africanist Award for Research Excellence and the UNC Charlotte Center for Academic Excellence Teaching Award in 2011. In 2007, the United States House of Representatives gave him a special recognition certificate for excellence in community service.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ African Diaspora Archaeology Network (ADAN)
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Historical Archaeology (SHA) (Cultural Heritage Management)

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Okladnikov, Alexey P.

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Basic Biographical Information

Alexey Pavlovich Okladnikov (1908–1981) was a Soviet archaeologist and historian who specialized in human prehistory, archaeology, and ethnography of Siberia, the Russian Far East, and Northern, Central, and Eastern Asia. He was born in Konstantinovshchina village of the Irkutsk Governorate in Siberia and was educated at the Irkutsk Pedagogical College before going to the Irkutsk State Pedagogical Institute to become one of the prominent Soviet historians who founded the Siberian school of archaeology.

In 1927 he joined the Irkutsk Museum as Head of Division, remaining there until 1934, when he left to study in the State Academy of the History of Material Culture in Leningrad as a postgraduate student. He continued to work there as a senior researcher until 1949. In 1947 he received his doctorate degree. In 1949–1950 he was the deputy director and head of the Leningrad Division of the Institute of the History of Material Culture. In 1951–1961 he was the head of the Department of Paleolithic in the Leningrad Division of the Institute of Archaeology. He joined the Siberian Branch of the USSR Academy of Sciences in 1961, working as head of the division of Human Research and Deputy Director of the Economics Institute

until 1966. In 1962 he became professor and head of the Department of History at the Novosibirsk State University.

In 1964 he became a corresponding member of the USSR Academy of Sciences. In 1965–1981, A. P. Okladnikov was a member of the Presidium of the Siberian Branch of the USSR Academy of Sciences. He was a founder and director of the Institute of History, Philology and Philosophy of the Siberian Branch of the USSR Academy of Sciences (1966–1981). From 1968 he was the executive editor of the journal *Izvestiya SO AN SSSR. Seriya obshchestvennykh nauk* (*Proceedings of Siberian Branch of the USSR Academy of Sciences. Series of Social Sciences)*. He was elected as a full member of the USSR Academy of Sciences (1968), a Corresponding Fellow of British Academy (1973), a foreign member of Mongolian Academy of Sciences (1974), a foreign member of Hungarian Academy of Sciences (1976), and an honorable doctor of sciences in the University of Poznań, Poland (1978). He was also a co-chairperson of the Soviet-Hungarian Committee of Historians.

A. P. Okladnikov was awarded with state prizes and the highest decorations of the USSR and foreign countries as well. His memory is perpetuated with a memorial plaque mounted on the building of the Institute of Archaeology and Ethnography SB RAS in Novosibirsk, and one of the caves in the Altai Mountains and an auditorium at the Novosibirsk State University were named after him. The Okladnikov prize was introduced for young scientists, and the scholarship in his name was established for students of the Novosibirsk State University.

Major Accomplishments

A. P. Okladnikov substantially contributed to the interpretation of human origins, as well as the early peopling of Northern Asia and America. He was the first to discover numerous sites dating back to the Paleolithic, Neolithic, and Bronze Ages in Siberia and the Russian Far East, including the first Neanderthal remains ever found in the territory of the USSR (1938, Teshik-Tash Cave in Uzbekistan). He discovered and explored the main areas of petroglyphs found to vary in styles and ages, dating from the Paleolithic to the medieval times. He was recognized as the leading authority on the prehistoric rock art. He directed the Soviet-Mongolian archaeological expedition (1960) and the Soviet-American Siberian Expedition in Alaska (1975). *The History of Siberia* was the first summary edition on the history of the eastern regions of Russia, published in five volumes under his editorial guidance.

Cross-References

- ▶ Northern and Central Asia: Culture During the Lower Paleolithic Era
- ▶ Siberia: Paleolithic

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Oldowan Industrial Complex

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Introduction

The earliest traces of hominid cultural behavior begin with sites at Gona, Ethiopia, dated to 2.6 Ma. The knowledge of how to select

appropriate raw materials and how to flake effectively is well evident in a number of assemblages from Gona in primary context, dated at 2.6 and 2.5 Ma (Semaw 2000; Semaw et al. 2009). Hence archaeologists believe that early human culture must have preceded 2.6 Ma, and some are actively investigating older deposits between 2.9 and 2.6 Ma in East Africa. Here they hope to find evidence of stones used for breaking and pounding activities, especially for cracking open nuts and processing other foods to make them more edible. Researchers believe that this must be the way in which early hominids realized that stone could be flaked to produce sharp cutting tools, and it is these sharp-edged flakes and the cores from which they were struck that preserved as the earliest form of material culture. We expect that prior to 2.6 Ma, tools in perishable materials were certainly used and modified by pre-Oldowan hominids, because there are many such examples used by the modern great apes. For example, chimpanzees use a variety of items as tools: leaves as sponges for water extraction and for hygiene, twigs and stems to extract termites from their mounds, hammers and anvils in both stone and wood to break open nuts, sticks to extract honey from beehives, and most dramatically, sticks sharpened with the teeth to kill bushbabies in their sleeping holes in trees. There are also recorded examples of proper toolkits that involve sticks of different thickness and strength taken to a site for extracting food, such as termites. Chimps are also observed to deepen the hole in the crown of oil-palm trees and use a frond as a pestle to pound and mash up the apical bud of the tree for food. Orangutans have also been observed using sticks to extract fruit from its casing, and gorillas have been seen to use a stick to probe the depth of water (For a review, see Haslam et al. (2009) in Further Reading.)

Although we know enough today about Oldowan sites and their technologies to engage in substantive debates about flaking skills, there are still less than 20 localities where Oldowan sites are well documented in Africa (Plummer 2004). The overwhelming majority is found in East Africa where many assemblages, large and small, are known (in Ethiopia, Kenya, and Tanzania). Only four Oldowan sites are known in South Africa, with numbers of artifacts ranging from one or two at Kromdraai B, to 30 at Wonderwerk (Chazan et al. 2008), to 3500 at Sterkfontein Member 5 East (Kuman and Field 2009), to thousands also at Swartkrans Member 1, Lower Bank (Sutton 2012). Two Oldowan sites are also known in Algeria, where 3876 have been published from three strata at Ain Hanech and from El-Kherba (Sahnouni et al. 2002). In the central African DRC, one assemblage in disturbed context is reported. Despite the limited occurrence of sites outside of East Africa, the distribution of Oldowan assemblages shows that this earliest technology was a widespread African phenomenon.

Definition

The Oldowan is the simplest and earliest stone tool technology known, consisting mainly of flaked cobbles (called cores) and the flakes struck from these cores, which were used in various cutting tasks suitable to their sharp edges. Glynn Isaac, a leading East African archaeologist, accurately assessed Oldowan technology as a "least effort solution" to the subsistence needs of early hominids.

Most archaeologists believe that Oldowan flakes were used initially to cut meat, probably from carcasses scavenged or wrested from carnivore kills on the landscape, but soon their use was extended to other subsistence activities. This cultural tradition first appeared in Africa at 2.6 Ma and persisted until 1.7 Ma as a variable but simple set of regional industries within the Oldowan Industrial Complex. Just over 1.7 Ma, these basic core and flake tool kits were supplemented by the first purposefully shaped heavy-duty tools in the form of handaxes and cleavers, ushering in the Early Acheulean complex. As a simple core and flake technology, the Oldowan is also referred to as a Mode I industry. The earliest dated occurrences of such simple tools beyond Africa are at 1.8 Ma at Dmanisi, Georgia, and at Niehewan, northern China, by

1.66 Ma. A small number of tools are found in Pakistan at 2 Ma, and possibly at 1.7 Ma at Yuanmou in China where some artifacts have been found out of context but near to some early hominid teeth and dated deposits. Beyond Africa, however, the industries are referred to as Mode I, to distinguish them from the Oldowan of Africa.

The Oldowan tradition is most often described and its assemblages compared by its core types, which Leakey (1971) described as heavy-duty tool types in her seminal work on the subject. Leakey terms these heavy-duty types as follows: choppers, cobbles flaked along the side or an extended edge, either unifacially or bifacially; discoids, cobbles flaked in a radial direction, usually on both faces; polyhedrons, cobbles flaked in random directions, obtaining a multifaceted shape; heavy-duty scrapers or core scrapers, cobbles flaked downward from a flat surface; and spheroids and sub-spheroids, polyhedrally flaked cobbles that have been battered down through use to a more spheroidal shape. Leakey considered the sharp edges where flaking platforms met to be the functional parts of the tool. Leakey also categorized light-duty tools, consisting mainly of modified flakes, scaled pieces (outils écaillés), and occasional awls and burins. The latter two types are, however, debated. Many archaeologists continue to use a modified version of Leakey's classification because it has good descriptive value, but most would also recognize that her heavy-duty types are mainly cores. Many thus prefer to use the terms of chopper cores, discoidal cores, polyhedral cores, and single platform cores (as opposed to core scrapers, unless some use-wear justifies calling the piece a scraper). While any core type can also be used as a tool, it is important to have some evidence of use-wear on the functioning edge of the piece to call it a core tool. Spheroids have been variously discussed as tools used to pound and process food or as cobbles and cores used persistently as hammerstones, which eventually produces a more spheroidal shape.

Freehand, hard-hammer percussion is the most common method used in the Oldowan (Figs. 1–2), but bipolar flaking is also well known in some assemblages, particularly those with quartz. In this technique, the pebble or cobble to be flaked is rested on a stone anvil and struck from above with a hammerstone. The throwing of cobbles to initiate fracture is another technique sometimes discussed, but its characteristics can be difficult to recognize as they vary with the shape and properties of the rock.

Oldowan Industrial Complex, Fig. 1 Quartzite cores from the Oldowan at Sterkfontein

Oldowan Industrial Complex, Fig. 2 Quartz cores from the Oldowan at Sterkfontein

Historical Background

The term "Oldowan" derives from Oldoway, an early name for Olduvai Gorge in Tanzania, where Louis Leakey found such tools and compared them with other occurrences in East Africa. M. D. Leakey (1971) provided the first

well-defined and fully illustrated description of the industry in her monograph on the early archaeology of Olduvai Gorge, where the relevant deposits date from 1.9 to 1.8 Ma. It was common in her day to consider that the movements of different hominid groups or hominid species were responsible for sudden changes in industrial traditions, such as the first appearance of the Early Acheulean at 1.6–1.4 Ma in the Olduvai sequence. Such changes in the archaeological record may appear to be sudden for geologic reasons, as no early sequence is continuous, or they may indeed be sudden. Evolutionary changes in anatomy or behavior can be punctuated in nature, particularly if adaptations or innovations arise in small, localized populations that may not preserve in the fossil or archaeological records. At Gona, Ethiopia, Semaw et al. (2009) document what does in fact appear to be the sudden appearance of Early Acheulean, which they also note for other sites in East Africa. However, working in the 1970s, M. D. Leakey took a combined approach that argued for both the sudden appearance of the Early Acheulean and continuity of the Oldowan tradition. She described this continuity by grouping the Olduvai sites in a series of stages: Oldowan, followed by Developed Oldowan A at 1.7–1.6 Ma, Developed Oldowan B ca 1.5–1.4 Ma, and Developed Oldowan C persisting through much younger beds in the Olduvai sequence. Handaxes (or bifaces) were said to appear in Developed Oldowan B, but they were usually smaller than Early Acheulean examples, and as a type, they comprised less than 40 % of the "core tool types" as defined by Leakey. Subsequently, some archaeologists continued to use the Developed Oldowan as an industry which contrasts with the Early Acheulean, but the A-B-C designations were avoided. Today, few researchers use the term, as the distinctions have been ascribed to differences in raw materials and in intensity of re-sharpening of the bifaces (see Semaw et al. (2009) for a comprehensive review and assessment). The result is that the Oldowan tradition is widely viewed as a distinct industry that arose by 2.6 Ma and persisted until 1.7 Ma. Semaw et al. (2009) would place the Developed Oldowan A with the Oldowan complex, and the B and C variants with the Acheulean, which is also the majority opinion of other researchers.

The work of Toth (1985) was influential in shifting the historic focus on Oldowan typology and cores as tools to a more dynamic understanding of the relationship between artifacts and the raw materials on which they were made. In an experimental approach, he demonstrated how the shapes and sizes of the cobbles that were flaked heavily influenced the resulting core types. He thus turned the focus from core tools to cores, arguing that the central goal of Oldowan flaking was to obtain sharp-edged flakes for multiple tasks, but initially for the cutting of meat from animal carcasses.

Another important methodology for study of Plio-Pleistocene lithic assemblages was developed by Schick (1987). Both Schick and Toth worked with Glynn Isaac, whose many students were encouraged to develop projects (particularly at Koobi Fora, Kenya) that would tease out the behavioral information from the natural geologic and biological modifications to sites and their lithic and faunal assemblages. Schick's work focused on the formation and transformation of archaeological sites by natural forces, particularly in shallow water contexts affected by flooding, as most East African sites were associated with low-energy riverine deposits and lakeshore sedimentation processes. She concluded that sites exist in a continuum of contexts, from the primary or pristine, largely undisturbed sites, to secondary, disturbed contexts, as well as a range of contexts intermediate between these two extremes. The movement of water across a site has the power to winnow out the smaller material, and at higher velocities, it also will orientate the larger pieces in specific directions that respond to current direction and velocity. Working with experimentally created assemblages, Schick also demonstrated that an undisturbed assemblage flaked on-site should consist of 60–85 % of small flaking debris (pieces under 20 mm in length). Some experimental assemblages, such as those made in brittle materials like quartz, even show much

Oldowan Industrial Complex, Fig. 3 Experimental flaking of vein quartz, showing the large majority of small flaking debris in an undisturbed, complete assemblage

higher percentages of small flaking debris (Kuman & Field 2009; see Fig. 3).

In these earlier years, Isaac and a number of his other students also explored the behavioral implications of sites with large numbers of bones and stones, which in the 1970s had been considered a form of home base to which hominids repeatedly returned. Over the next couple of decades, various explanations for these large sites took shape, aiming to test this "modern human" interpretation of early hominid behavior (see Plummer (2005) for a review). The formation of large sites was modeled and debated by various researchers as follows: central place foraging sites; sites that were repeatedly reoccupied by routed foraging of fixed resources; caches of lithic material actively moved to strategic locations, or alternatively, more passively accumulated lithic and bone debris forming over time at favored locations; activity locations such as kill sites; and venues where hominids gathered for safety against carnivores or took refuge to consume game that was scavenged from carnivore kills. The study of bone fracture patterns, along with cut marks indicative of scavenged or butchered game and percussion marks from the breaking open of bones for marrow, has become a highly developed method of analysis in interpreting these models and early hominid behavior in general.

Key Issues/Current Debates

The Timing of Access to Animal Carcasses

The behavioral models discussed above were hotly debated in earlier years, and many faunal analysts today continue to explore questions raised by these models – e.g., were hominids limited to scavenging scraps of animal protein from carnivore kills (i.e., late access), or did they have early access to these carcasses, obtaining the meatier portions. Researchers thus still debate the exact nature of the interaction hominids had with the associated faunas, but this is largely a research focus for the East African sites. In South Africa, only one hominid site with Plio-Pleistocene tools bears significant numbers of cut and percussion marks, left by the processing of carcasses by hominids, and in this case interpreted as early access (Pickering & Brain 2010). The modes of accumulation for South African faunal assemblages instead are dominated by natural and biological agents, such as carnivores, natural deathtraps, and slope wash or collapse around cave entrances. Being in secondary contexts, the lithic assemblages from these hominid sites require thorough investigation of the site formation processes affecting their accumulation before behavior (other than technological) can be interpreted. At Sterkfontein, the fauna associated with

Oldowan artifacts is largely a deathtrap accumulation, with some contribution from slope wash.

Tethering to Raw Material Sources

One of the traits commonly discussed for the Oldowan is the tethering of these sites to raw material sources. While there are some exceptions, there is indeed a fairly strong pattern of Oldowan sites being more "tethered" to raw materials than are Acheulean sites. However, Oldowan-bearing deposits are limited in number, and perhaps "tethering" is not the best term. It might be more accurate to say that stone tools are more "archaeologically visible" close to significant sources of raw material. Hominids undoubtedly transported stones and tools across the landscape to food resources, but it was primarily close to gravels and rock outcrops that hominid activities preserved best as archaeological sites. Nowhere is this clearer than in South Africa's Cradle of Humankind in Gauteng Province. This world heritage region preserves at least 14 Plio-Pleistocene sites with fauna and many with hominids, but only the sites close to the major gravels of the Blaaubank River have substantial numbers of stone tools. At Sterkfontein and Swartkrans, both sites that are close to gravels, the artifacts number in the thousands, from Oldowan to Acheulean and Middle Stone Age. Coopers and Goldsmith's sites are also relatively close to the Blaaubank gravels, but at these sites, Early Pleistocene artifacts are found in smaller numbers, perhaps because they were not so geographically favored as activity sites. In contrast, sites at considerable distance from this raw material source, namely, Gladysvale and Drimolen, have yielded only a handful of artifacts between them, while others have none at all.

Our interpretation of hominid behavior from lithic assemblages in the Oldowan is undoubtedly influenced by the methods of analysis we use. Braun and Harris (2003) have suggested a means of analyzing whole flakes in early assemblages that goes beyond simple linear measurements, which are the focus of most studies. They apply a "flake utility" index calculated from the length of a flake edge (or perimeter) in relation to the mass (or overall volume) of the piece. In particular, they compare Koobi Fora, Kenya, assemblages from the KBS/Oldowan industry (1.89–1.65 Ma) with Developed Oldowan assemblages from the Okote Member (1.65–1.30 Ma), also at Koobi Fora. Their goal is to use assemblages with good palaeoenvironmental and geomorphological data to address early hominid behavior in ecological terms, which they argue is a necessary prerequisite before considering hominid abilities and change through time. They conclude that the Oldowan hominids at Koobi Fora contrasted with later hominids, who knapped in a way that maximized a flake's cutting edge in relation to a given volume of raw material. By their calculations, the Developed Oldowan hominids produced at least double the number of flakes per volume of core as did the KBS hominids, which would have conserved stone and allowed them to range further from raw material sources. The method is promising, but due to the small database that exists for Oldowan sites with good environmental reconstructions, it is not so straightforward to interpret exactly how these observations may relate to ecological and geographic factors v. change through time.

Landscape Archaeology

At some East African site complexes, numbers of Oldowan sites occur over distances of one or more kilometers (e.g., Olduvai and Peninj in Tanzania and Koobi Fora in Kenya). Volcanic deposits provide the means of dating and correlating such deposits in both space and time, making study of hominid behavior across a portion of the landscape possible. At Olduvai, artifacts excavated from dated sites can sometimes be traced to specific raw material outcrops, which allows us to reconstruct the larger movements of hominids on the landscape. The South African early archaeological record is preserved in very different contexts. The three sites in Gauteng's Cradle of Humankind which have deposits with Oldowan-aged tools are Sterkfontein, Swartkrans, and Kromdraai B. All are underground caverns in dolomitic limestone, where material has been redeposited from occupations

on the surface. Faunal dating provides relative ages, and thus far the most successful absolute dating methods have been uranium-lead dating of karst cave flowstones and cosmogenic nuclide burial dating of quartz sediments or quartz/quartzite manuports. Electron spin resonance dating has also been attempted, but the geologic contexts of these sites make it a more problematic and controversial method. Even the dating of deposits with uranium-lead must be done with great care, as many flowstones are postdepositional in time, filling in voids created by subsidence of hardened breccias, or capping old deposits hundreds of thousands of years after their deposition. For the cosmogenic burial method, accuracy depends on the absence of reworking of sediments or rock samples within a cave system. The recent report of Oldowan period tools at Wonderwerk Cave in the Northern Cape is in a different context (Chazan et al. 2008). This cave records a long sequence of occupations from the Earlier to the Later Stone Age. The lowest unit is ca 2 Ma and contains two cores and 28 small flakes. This is the only Oldowan assemblage in Africa yet found in a habitable cave context. However, the assemblage is small, which differs with later caves occupations that begin only in the mid-Pleistocene, and if it did not arrive in the cave through natural processes, Wonderwerk may not have been an Oldowan occupation so much as a comfortable place to shelter from the elements.

Knapping Abilities

In recent years, the Lokalalei 2C site in Kenya (western Lake Turkana) has become almost as iconic as the important sites of Olduvai. At 2.34 Ma, this open-air site has such a well-preserved assemblage that Delagnes and Roche (2005) have been able to refit many sets of artifacts and reconstruct the selection of cobbles, along with the flaking patterns and decisions made by the hominids. Describing the "chaine operatoire" (or operational chain of actions), the authors conclude that these hominids had a good mastery of flaking skills, even planning some more complex technical actions when flaking the best shaped cobbles. They first selected angular cobbles and fragments with good edge angles for flaking, and then they exploited a large flat face as the best flaking surface. Refits showed that an average of 18 flakes were struck per core; however, in one instance, a minimum of 51 flakes were knapped, and in another, more than 73 flakes were obtained from a cobble that yielded several large fragments cycled into cores. Hammerstone impact marks show a skillful level of control. While such intelligent flaking was applied to better raw materials, poorer-quality rocks were flaked in a simpler manner. At the same time, however, the Lokalalei 2C hominids did not attempt to work rocks with less amenable shapes, which later hominids were able to master by creating the correct angles, and when the good flaking angles were lost on a core, they did not attempt to adjust them. The authors conclude that the Lokalalei 2C hominids were thus limited in their mastery of flaking, but they also state that the raw material source was less than 50 m from the site. This abundance of raw material complicates behavioral interpretation, as the hominids did not need to conserve their raw materials by correcting problems on the cores. Many more Oldowan sites and assemblages are undoubtedly needed to address such debates as skill v. economical needs or even variability due to simple motivational differences in hominids. All of these factors influence the archaeological residues of early cultural behavior.

At a somewhat older site at Hadar, Ethiopia, Hovers (2009) has argued that hominids in fact did have some ability to correct knapping mistakes. As cores were worked to the point that flaking angles became problematic, flakes could be detached that did not end in a fine feathered termination, but instead broke off with a stepped or hinged distal end. This left the core with a compromised surface for further flaking. Correction occurred when such cores were often rotated, so that a large flake could be struck to remove the problem area.

Even at the oldest sites at Gona, 2.6 Ma, assemblages show a clear understanding of fracture mechanics and a developed ability to make stone tools (Semaw et al. 2009). There are no signs of "incipient" abilities that improve with

time, either at Gona or in the Oldowan in general, which is sometimes suggested for earlier assemblages that have more unifacial flaking. Although unifacial flaking of cobbles is prominent at some of the Gona sites, other methods are used, and cores with complex, multi-facial flaking are of equal antiquity. Unifacial flaking seems rather to be influenced by raw material forms and the degree of intensity of flaking. Cores were also transported to sites for further flaking at the Gona sites, and also at Sterkfontein, where quartzite flakes were brought into the site. Such patterns are not uncommon in the Oldowan.

Raw Material Selectivity

The most commonly reported feature for Oldowan assemblages is the hominids' ability to determine not just the appropriate shapes of cobbles to be flaked but especially the quality of rocks and their flaking properties. Semaw et al. (2009) discuss this selectivity for the 2.6 Ma artifacts from the Gona sites. Here the raw materials consist of a number of igneous rock types. Surveys of available raw materials show that hominids selected rocks that were fine grained and of better flaking quality, because such rocks produced tools that were sharper and more durable. The same applies to many other East African sites.

The Oldowan industry from Sterkfontein, South Africa, also exemplifies the selection of rock types for specific flaking properties ca 2 Ma (Kuman & Field 2009). Although quartzite is the most common rock type in gravels close to the site and chert is also common, the assemblage is dominated by vein quartz, which is less common. This assemblage is dominated by small flakes and flaking debris, and the focus for tools was on sharp edges for light-duty cutting tasks. Vein quartz is extremely easy to flake (even in cobble shapes that are not ideal) because it is brittle, and as flaking of cobbles progresses, chunks are produced that can be further cycled into cores. The best rock for flaking at Sterkfontein was carried into the site from the river terrace a few hundred meters away. Preliminary work on a similarly aged Oldowan assemblage at Swartkrans (Member 1, Lower Bank) suggests that tool production at this site, only 1.5 km from Sterkfontein, was somewhat more opportunistic (Sutton 2012). Swartkrans lies on the other side of the Blaaubank River to Sterkfontein, and the site seems to have been a little closer to the raw material source. Such differences demonstrate the importance of sampling in Oldowan archaeology. Only more assemblages in differing geographic and environmental contexts can reveal the extent of the variability and potential explanations for such differences.

Was the Oldowan Unchanging?

An important debate for some years has been the nature of the Oldowan as an evolutionary stage in cultural behavior. Semaw et al. (2009) and Stout et al. (2010) have argued that Oldowan technology persisted with little or no change for almost a million years, until the Early Acheulean appeared just over 1.7 Ma. They argue that this is evident in the skill manifested from the beginning of the Oldowan, until the Developed Oldowan/Early Acheulean. This is indicative of a stable, successful adaptation. At 1.7 Ma, environmental reconstruction points to a shift to drier climates, and this change coincides with the end of the period of Oldowan stasis. In contrast, others have argued that there is change exhibited during the Oldowan, with differences between the earliest assemblages from 2.6 to 2.0 Ma and the classic Oldowan so well known from Olduvai Gorge, 1.9 to 1.7 Ma (Kibunjia 1994; Delagnes & Roche 2005). Originally some researchers argued for a pre-Oldowan phase from 2.6 to 2.0 Ma, but now the tendency is rather to call such assemblages "Early Oldowan," in contrast with the "Classic Oldowan" of Olduvai Gorge. The Lokalalei 2C site was pivotal in this debate as an example of the more skilled side of technological variability, suggestive of population-based differences that drove cultural (and probably also hominid) evolution. In particular, this site is contrasted with Lokalalei 1, where hinged and step-terminated scars on the cores indicate problems with the detachment of good flakes. However, critics argue that this site has problematic raw material, and it is a fact also that

Lokalalei 2C shows evidence of both simple and more sophisticated flaking strategies, undoubtedly practiced by the same population. Thus, the notion of a pre-Oldowan phase has not gained wide acceptance, and those researchers who decide to make a similar distinction instead use the terms of Early v. Classic Oldowan.

In the end, it seems amply clear that our database of Oldowan assemblages is too small to argue convincingly for patterns of behavioral evolution between 2.6 and 1.7 Ma, particularly when other plausible explanations for the variability have been proposed – e.g., abundance of (v. distance from) raw material sources, ecological differences across Oldowan landscapes, raw material properties, and random walk variability in our limited sampling of the Oldowan. It is true that Lokalalei 2C has more retouched pieces than other Early Oldowan sites possess, compared with the Classic Oldowan, but this is an unusually well-preserved site. It is also true that some of the Olduvai sites are long-term accumulations, which are more likely to preserve a greater variety of modified tool types, including retouched pieces. Additionally, some researchers have questioned the identification of retouched pieces at some Olduvai sites, which puts the argument even deeper into the realm of debate (de la Torre & Mora 2005).

Who Made the Oldowan?

There is a number of hominid species present on the African landscape during Oldowan times, 2.6 to 1.7 Ma. In East Africa, these include *Paranthropus aethiopicus* and *Paranthropus boisei*, the early *Homo* species of *H. habilis* and *H. ergaster*, and the *Australopithecus* species of *A. garhi* and certain specimens designated as late-occurring examples of the *Australopithecus* (see the entry on *Homo habilis* in this encyclopedia as well as Clarke 2012 on *H. habilis*). In South Africa, there are also multiple species existing between 2.6 and 1.7 Ma: *A. africanus*, *A. prometheus*, and *A. sediba Paranthropus robustus; Homo habilis* (in the form of SK 27 at Swartkrans); and *Homo ergaster* (see the entries on ▶ *Australopithecines*, ▶ *Homo ergaster*, ▶ *Homo habilis* and ▶ *Paranthropus* in this encyclopedia). Among these South African fossils, only *P. robustus* and *H. habilis* are found in association with Oldowan assemblages.

There are many researchers who firmly believe that all hominids were intelligent enough to have made Oldowan tools of one variety or another. While it is impossible to prove that some *Paranthropus* and *Australopithecus* individuals never used any stone in their subsistence behavior, the Oldowan does show a certain developed level of intellectual and manual skill and selectivity of raw materials, which suggests that early *Homo* was the main and more probably the only species able to master this level of tool manufacture. *Paranthropus* was a species highly adapted to certain fallback foods for its survival. It became extinct ca 1 Ma, which suggests it did not possess the kind of flexible, adaptive behavior we see recorded in the Oldowan. The fate of the various species of *Australopithecus* is a much debated issue as well, with some arguing that one of these species may have been ancestral to *Homo*, and others certain that they all became extinct, suggesting that *Homo* has a more deeply rooted ancestry in the family tree that is not yet clear. At Sterkfontein Member 4, there are hundreds of specimens of *Australopithecus* preserved, but not a single associated stone tool in context in this 2–2.4 Ma time zone, which further supports the view that this genus did not make stone tools or father the *Homo* lineage. These lines of reasoning thus implicate early *Homo* or its direct ancestor as the most probable maker of the Oldowan industries present in Africa.

Future Directions

Debates regarding Oldowan cognitive abilities and subsistence behavior are alive and well, although they will require many more excavated sites in datable contexts, with good palaeoenvironmental reconstructions, along with in-depth analyses of the lithic assemblages, to reach better consensus. Despite the limited number of sites, there is much we now know about the widespread distribution of the Oldowan tradition in Africa,

from North to South, and this situation will only improve with further research.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Australopithecines
- ▶ Dmanisi Hominins and Archaeology
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
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Olduvai Gorge Archaeological Site

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Introduction

Olduvai Gorge is an exceptionally rich archaeological site, preserving one of the best records of human history spanning nearly 2 Ma. The site has yielded abundant human and animal fossils and stone artifacts preserved in well-dated stratigraphic sequence. The quantity, quality, and geological context of paleontological and archaeological data provide a yardstick for rates of evolutionary changes in human form and stone tool technology. Over four hominin species, including the holotypes for *Paranthropus "Australopithecus" boisei (Zinjanthropus)* and *Homo habilis*, as well as remains of *Homo erectus* and prehistoric *Homo sapiens* have been discovered at the site (Leakey 1971). The hominin record is consistent with the evolution of stone tool technology from the Oldowan to Acheulean, Middle Stone Age, and Later Stone Age industries. The Oldowan industry (characterized by simple core-and-flake stone technology) is the earliest known human technology and was first discovered at Olduvai Gorge. More than 200 vertebrate taxa, including approximately 25 holotype species, have been documented at the site. Fossil and associated paleoenvironmental data establish the composition of the Plio-Pleistocene vertebrate communities in East Africa.

Definition

Olduvai Gorge (approximately 25 km in length and up to 100 m deep deposits) is located in the Ngorongoro Conservation Area, northern Tanzania, which is inscribed by UNESCO's World Heritage Committee as a "Mixed Property" (http://whc.unesco.org/en/list/39) (Fig. 1). The Olduvai sequence, which dates from 2.03 Ma to c. 62,000–17,000 years old, is divided into seven stratigraphic units defined from the oldest to youngest as Beds I–IV, Masek, Ndutu, and Naisiusiu (Fig. 2). Bed I and basal Bed II deposits are the best studied part of the sequence, due to the abundance of Oldowan tools and Plio-Pleistocene faunal remains found there. These older deposits have yielded fossil remains of *Paranthropus "A" boisei, Australopithecus cf. africanus*, and *Homo habilis* (Leakey 1959; Leakey et al. 1964; Clarke 2012), suggesting that three distinct forms of human ancestors lived contemporaneously during the Oldowan time, when the central portion of the Olduvai basin was occupied by a fluctuating saline-alkaline lake (Hay 1976).

Key Issues/Current Debates/Future Directions/Examples

Olduvai provides a rich record for investigating some of the fundamental questions in human evolutionary studies. These include the evolution of early behaviors of Oldowan hominins, the timing and nature of the technological shift from the Oldowan to the Acheulean, and the transition from late *H. erectus* to early *H. sapiens* (Leakey 1971; Rightmire 1983). However, this entry focuses on the origins of hominin foraging and land use behavior with evidence from the Olduvai paleo-basin.

The origins of complex social behaviors and the ecological contexts in which early human behavior evolved is one of the major problems in paleoanthropological research. Scientists depend on a variety of evidence from the archaeological record, which preserves traces of

Olduvai Gorge Archaeological Site, Fig. 1 A view of Olduvai Gorge as seen today

hominin behavior, such as stone artifacts or fossilized bones of wild animals bearing stone tool cut marks or hammerstone percussion marks. Carnivore bite marks are also important, and if detected in the fossil record may indicate the degree of predator or scavenger activity on ancient landscapes. These feeding traces are important in understanding past ecological processes, such as competition, carcass persistence, and survivorship of skeletal material, and are significant in understanding the scale of hominin-carnivore interactions and the role of predation in human evolution.

Since their initial discovery, the dense concentration of crude stone artifacts in association with fossilized bones of large and small vertebrates preserved in thin layers of sediments at Olduvai were speculated to represent "occupational sites" or "living" sites, where early hominins manufactured and/or discarded tools, processed carcasses, and consumed meat on a scale unknown among modern nonhuman primates (Leakey 1959, 1971). Living sites were viewed as favorable points on a landscape or "home bases" at which breeding groups of hominins conducted social and maintenance activities such as hunting, food sharing, and division of labor (Isaac 1978).

This generalized idea, adopted from 1960s ethnographic observations of hunter-gatherers and championed by Glynn Isaac in the 1970s, conceptualizes the evolution of early hominins as a complex interaction of social and biological adaptations. The premise of this hypothesis is that tool making, tool use, and meat eating played major roles in promoting brain development and increased social complexity. Therefore, hominin carnivory behavior, increasing dependence on stone tools, and cooperation between and within the sexes led to the advent of organized hunting, the family unit, and the division of labor, with all social and subsistence activities being centered spatially around a home base (Isaac 1978). The occurrences at Olduvai of stone tools together with broken-up animal bones, some bearing butchery marks, therefore, suggested that complex social behaviors had already evolved in Africa by 2 Ma ago (Leakey 1959; Isaac 1978).

Numerous archaeological sites recovered from Beds I and II by the Leakeys were widely accepted as home bases. These include DK

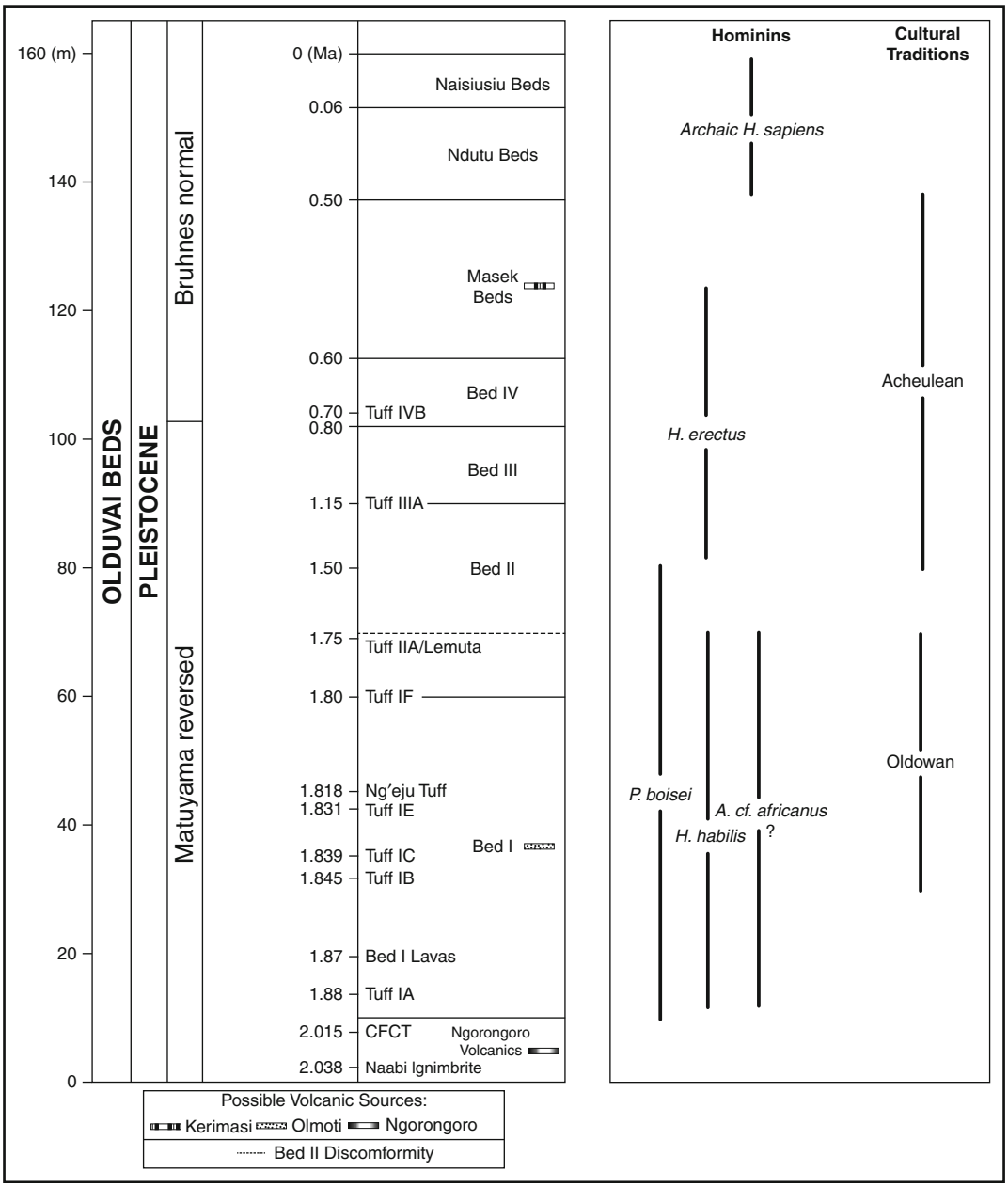

Olduvai Gorge Archaeological Site, Fig. 2 The Olduvai stratigraphy (Modified from Hay 1976)

(levels 1–3), FLK NN (level 3), FLK (*Zinjanthropus* level or level 22), FLK N (levels 1–2), HWK E (levels 1–2), BK, and MNK. Since the early 1980s, archaeologists focused on the analysis of lithics and fossil bones of these assemblages, but FLK *Zinjanthropus* has received more attention than any other Oldowan assemblage because it is the largest and best preserved tool-marked bone sample.

The early view that these sites represented home bases of hominin occupation was challenged by Binford (1981), who argued that

the stone artifacts and bone concentrations at sites such as FLK *Zinjanthropus* are palimpsests of both hominin and predator activities. He contended that the site was marginally attended by hominins, whose activities were limited to scavenging carcass parts from carnivores. Binford's alternative idea was supported by evidence of large mammalian carnivore feeding traces at the sites, including gross gnawing of bones (Bunn 1981; Potts & Shipman 1981; Potts 1988).

Nonetheless, Binford's criticisms kicked off a flurry of controversy about mode of carcass acquisition by Oldowan hominins. Whether hominins actively hunted large animals or scavenged the leftovers of predator kills is still a hotly debated issue, as are the specific activities that resulted in the creation of the archaeological sites (Binford 1981; Bunn 1981; Potts & Shipman 1981; Blumenschine 1986).

Since the publication of Charles Darwin's "The Descent of Man" in the nineteenth century, the theory of "Man the Hunter" has pervaded popular and scientific literature. Hunting seems nobler than scavenging and, at first glance, more bountiful, predictable, and safe. Scavenging is perceived to be marginal, opportunistic, and dangerous. What better way to reaffirm our evolutionary success than to portray our early ancestors as mighty hunters?

Binford's proposed hominin scavenger idea led to various alternative hypotheses about the evolution of Oldowan hominin foraging behaviors and functions of the purported living sites. Bone surface modifications became central in this debate because they are the most definitive traces for determining whether carnivores or hominins had primary access to carcasses at these archaeological sites (Binford 1981; Bunn 1981; Potts & Shipman 1981; Blumenschine & Selvaggio 1988). Subsequent studies in the 1990s and 2000s have recognized tooth marks of animals other than large mammalian carnivores such as crocodile, chimpanzee, and human. Despite cautionary notes about possible superficial mimicry of stone tool cut marks and percussion marks by other agents of bone modification (Njau 2012), identification of marks on bone surfaces continues to play a critical role in the interpretation of hominin carnivory behavior in the archaeological record.

Among the proposed interpretations of Olduvai sites includes the "stone cache" hypothesis by Potts (1988). According to Potts, the Olduvai sites were simply places on the landscapes with pre-positioned concentrations of stones where hominins brought carcass parts for quick processing. Other alternative interpretations offered include routed foraging (Binford 1981), central-place foraging (Isaac 1978), dry season-riparian woodland scavenging (Blumenschine 1986), and carcass processing locus (Njau & Blumenschine 2012).

These competing explanations of site function and associated hominin behaviors, however, are still debated. This is because the spatial resolution of the landscape contexts of occurrences was too coarse to understand the ecological settings of hominin activities and activity traces. One problem was that researchers focused analysis on single sites (e.g., isolated dense clusters of stones and bones). As such the ecological contexts of hominin activities and land use behavior were not evaluated on a broad landscape scale (or beyond excavated sites).

Geological, paleontological, and taphonomical studies place the FLK *Zinjanthropus* site in a lakeshore context that has been variously interpreted as grassland, woodland, spring, and marshland (Hay 1976; Ashley et al. 2010). Despite much attention to this topic, many paleoanthropological studies were unable to provide specific ecological contexts of hominin activities. Reconstruction of specific habitats is critical for understanding patterning of hominin land use across paleolandscapes because, theoretically, the distribution of positive resources (e.g., potable water, animal and plant food, refuge trees) and negative resources (e.g., predation hazards, volcanic ash, disease) defined land use. These ecological factors can potentially predict patterns of hominin activities on the landscape as well as the traces of their activities.

The recent basin-wide analyses of Olduvai paleolandscapes (e.g., Lower Bed I, Middle

Bed I, Upper Bed I, Lowermost Bed II, and levels immediately above basal Bed II) suggest that dense clusters of animal bones and stone tools at sites such as FLK *Zinjanthropus* do not represent isolated living sites but rather are part of a broad prehistoric land surface utilized extensively by Oldowan hominins (Blumenschine et al. 2012). For example, the intensive stratigraphic, sedimentological, and paleoenvironmental work on Middle Bed I in the eastern portion of the paleolake margin have identified three landscape facets (a river channel, peninsula, and wetland settings) at the FLK area (Blumenschine et al. 2012; Stanistreet 2012). These lakeshore landscape facets are distinctive geomorphologically and ecologically, and they probably afforded hominins different and predictable types of resources (e.g., animal and plant food, climbable trees, shade trees, hazards). This study shows that hominin activities in the FLK area were focused on the "peninsula" and on the "edges of the wetlands" in general, and not at the FLK *Zinjanthropus* site in particular (Blumenschine et al. 2012).

The peninsula setting provided multiple places, which served as temporary loci where hominins frequently but hurriedly processed carcass parts abandoned there by large predators or foraged from the margins of the wetlands. Probably, hominins accessed the peninsula through the riparian corridor on the FLK Fault footwall (Blumenschine et al. 2012). The treed peninsula afforded shade and refuge from terrestrial predators. Therefore, the accumulations at the FLK *Zinjanthropus* site represent hominin activity traces at one of these relatively safe loci. Nevertheless, the peninsula and wetland edges would have also attracted ungulate prey and their concomitant predators, thus exposing hominins to high predation risk. It is, therefore, implausible that early hominins would have centered daily foraging and social activities of breeding groups at these localities (Njau & Blumenschine 2006).

Indeed, evidence of carnivore damage on hominin bones (White 1988; Njau & Blumenschine 2012) and non-hominin bones (Potts 1988) is well documented at FLK *Zinjanthropus* and other Oldowan hominin sites. It is argued that biologically active settings such as peninsula and wetland edges were also characterized by high predation risks. Therefore, just like other animals, early hominins were preyed upon or scavenged by predators (Njau & Blumenschine 2012). For example, all hominin individuals including specimens of the famous *A. boisei* skull (OH 5) found from FLK *Zinjanthropus* site bore carnivore damage. With the exception of a tooth (OH 44), other hominin materials bearing carnivore tooth damage are the cranial bones (OH 6) and leg bones (OH 35) of *H. habilis* (White 1988; Njau & Blumenschine 2012), suggesting the vulnerability of hominins to predation.

In sum, increasingly new geomorphological, paleobotanical, and paleontological data obtained from Olduvai suggests that the lake margin environments during the Plio-Pleistocene times did not provide safer place for hominins to conduct the full range of maintenance and social activities such as a typical hunter-gatherer home base (Stanistreet 2012; Blumenschine et al. 2012). Although this view is still debated, other studies contend that the clusters of bones and tools represent only irregular, brief feeding activities by possibly small subgroups of nonbreeding individuals who obtained and processed food for consumption there or transport elsewhere (Njau & Blumenschine 2012).

Although various studies confirmed that hominins made stone tools and butchered animals at the FLK *Zinjanthropus* site (Bunn 1981; Potts & Shipman 1981), the evidence is not conclusive as to what extent early hominins engaged in complex social activities such as sharing of food transported to a home base inhabited by a social group throughout successive days and nights. This landscape ecological approach for interpretation of the archaeological record suggests that if hominin home bases existed during the Oldowan times, they were located at safer sites not discovered yet in the greater Olduvai paleo-basin.

Cross-References

- ▶ Australopithecines
- ▶ Fossil Records of Early African *Homo*
- ▶ *Homo erectus*
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Oldowan Industrial Complex
- ▶ *Paranthropus*

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Olives: Origins and Development

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Basic Species Information

The olive (*Olea europea* L.) tree is a subtropical evergreen plant that was indigenous to the Mediterranean Basin, confined by its intolerance of frost. It has adapted to long summer droughts and a semiarid temperate climate, well-drained soils, moderate-to-low pH (below 8.5), and mild soil salinity (Terral et al. 2004: 64; Doveri & Baldoni 2007: 254-5). The genus *Olea*, belonging to the family Oleaceae, currently consists of more than 20 species found in tropical and subtropical areas over five continents. Recent revisions of the taxonomy surrounding *O. europea* suggest that this species should be divided into six subspecies based on morphology and geographical distribution including: (1) subsp. *europea* with two botanical varieties *europea* (cultivated olive) and *sylvestris* (wild olive), which is widely distributed throughout the Mediterranean Basin; (2) subsp. *cuspidate* distributed from SE Asia to SW China as well as the Arabian peninsula through East and South Africa; (3) subsp. *laperrinei* is restricted to the Sahara region; (4) subsp *maroccana*, which is restricted to Morocco; (5) subsp *cerasiformis* restricted to the island of Madeira; and, (6) subsp *guanchica* which is restricted to the Canary Islands.

The olive tree is a prickly, long-living evergreen, reaching heights of 15 m and a branch spread of up to 9 m. The olive tree's dense foliage is composed of elliptical-shaped leaves that are gray-green in color. Olive trees can have life spans of more than 500 years, with a few reaching 2,000 years (Doveri & Baldoni 2007: 254). In advanced age, the olive tree trunk becomes hollow, acquiring its characteristic pattern of pronounced twists and protuberances on its bark and continues to add girth to its circumference.

The hermaphroditic olive flowers are wind pollinated. Most trees are self-incompatible but a few are self-compatible (Doveri & Baldoni 2007: 254). *Olea europea* L. is the only species that produces edible fruit (Manousis & Moore 1988: 7). The olive is an oleaginous, one-seeded drupe with the fruit yielding up to 50 % of its weight in valuable edible oil. Technically, the olive stone (endocarp) "is a fusiform, uni-integumented and sclerified endocarp, composed of two asymmetric valves [separated by a longitudinal suture line] protecting one seed" (Terral et al. 2004: 64), with the surface covered in longitudinally aligned furrows.

The olive tree does not bear fruit for the first 10 or 12 years (Finley 1973: 31). The olive fruit takes 6–7 months to develop fully. The fruit grows slowly over the spring and summer months. A faster increase in size takes place in the autumn due to the water content. Restriction of fruit development can occur if exposed to prolonged droughts. The weight of an individual olive can vary between 1 and 15 g. Oil deposition within the fruit starts at the beginning of the month of August, increases throughout the autumn, and then reaches its peak during November-January when the fruit turns completely black. Harvesting takes place in the autumn after the dramatic increase in size has occurred and the fruit starts to change color. For oil-producing olives, harvesting takes place when the olives are completely ripe, during the months of December or January, to permit the olives to obtain their maximum size and oil content. The commonest method of extraction of the oil from the pulp involves putting the fruit through mills of the edgerunner type (Manousis & Moore 1988). Modern and traditional methods of olive oil production crush the entire olive fruit including the stone to increase oil production as the broken edges of the pit continue to grind the olive fruit, releasing more oil and facilitating the flow of the oil (Tyree & Stefanoudaki 1996: 175).

Subjected to intense climatic and anthropogenic manipulation, the olive tree is considered one of the most versatile and essential crops of the Mediterranean (Terral 2000: 127-8; Costantini & Giorgi 2001: 246; Jashemski et al. 2002; Warnock 2007: 1). Olives were the primary source of edible fat in the Mediterranean used in cooking, soap manufacturing, ointment, perfume, fuel for illumination, and medicine (Finley 1973: 31; Meyer 1980: 405; Costantini & Giorgi 2001: 246). During Roman times, there were about 20 different kinds of olive being cultivated in Italy, Spain, and North Africa; these differed in the shape; size; color of the olive fruits, from nearly white to green, violet, and deep purple; and, in the shape and size of the leaves, from small linear-laceolate to large ovate. Recent studies have shown olives contain antioxidants in abundance, represented by acteosides, hydroxytyrosol, tyrosol, and phenylpropionic acids (Doveri & Baldoni 2007: 255)

Major Domestication Traits

It is believed that oleaster (*Olea europaea* Linn. var. *sativa* DC) represents the progenitor stock from which the cultivated plant derives, which was endemic across the Mediterranean region and the Middle East (Doveri & Baldoni 2007: 253). The domestication of olives has led to the selection of olive trees with larger fruit size and higher oil content under vegetative propagation from either cuttings or grafting to indigenous oleasters (Doveri & Baldoni 2007: 253). The earliest signs for the domestication of olives are generally attributed to the areas bordering the east coast of the Mediterranean Sea during the Chalcolithic period from the fourth millennium BCE in Palestine (Zohary & Hopf 1993: 141 in Zohary 1994: 62-63; Terral et al. 2004: 64). Olive domestication in the Near East is thought to have occurred in early Bronze Age, second half of the fifth millennium BCE, based upon the discovery of olive oil presses and the presence of pollen grains, olive stones, and wood remains (Doveri & Baldoni 2007: 253). Olives have been discovered from the third millennium BC sites in Palestine and Syria and Bronze Age (3rd–2nd millennium BCE) sites in Cyprus, Greece, and northern Italy (Renfrew 1973). By the middle and late Bronze Age, olive cultivation and olive oil production seems to have been well established throughout the countries bordering the east shore of the Mediterranean

Sea including Palestine and Syria to Greece (Zohary & Spiegel-Roy 1975: 187). Recent molecular analysis based upon nuclear and cytoplasmic markers from both eastern and western Mediterranean populations found that these two populations are strongly differentiated from one another (Doveri & Baldoni 2007: 255). There are now over 80 different kinds of olive trees grown in the Mediterranean Basin (Newberry 1937).

It is not possible based upon palynological data to distinguish between wild and domesticated olives (Galili et al. 1997: 1141; Ciaraldi 2001: 172). Olives possess a high degree of variability in the size of the olive stone (endocarp) and it impossible to distinguish between the wild forms and those of cultivated varieties (Liphschitz et al. 1991: 441; Kislev 1996; Zohary & Hopf 1988 cited in Galili et al. 1997: 1141). Recent genetic work has created genetic markers of *O. europaea* which would potentially allow for the germplasm identification of olives, even with the use of poorly preserved material from herbarium specimens or archaeobotanical material (Besnard et al. 2003). Due to their preferential preservation, olive stones (endocarps) are fairly ubiquitous and usually recovered from most Mediterranean archaeological sites (Finley 1973: 31; Terral et al. 2004: 63-64).

Timing and Tracking Domestication

Domesticated olives were brought to the New World in the fifteenth century by Europeans. This was the first time that the olive tree was cultivated outside the Mediterranean Basin. Today, the olive is grown commercially in Australia, South America (Argentina and Chile), and South Africa (Doveri & Baldoni 2007: 253). Cultivated olives possess high variability. There are at least 1,275 known cultivars. Many local varieties and ecotypes have contributed to the richness of olive germplasm. Few cultivars are dispersed over widespread areas. The majority of olive cultivars are highly localized (Doveri & Baldoni 2007: 254). Cultivars are mostly diploids with a few tetraploid plants reported (Doveri & Baldoni 2007: 255). Some olive varieties are used for oil and some varieties for food as preserved olives (Feliks & Gilboa 2007: 406). In processed olive fruits, sugar content varied among olive cultivars according to processing conditions (Marsilio et al. 2001: 485) (Fig. 1).

Olives: Origins and Development, Fig. 1 Whole carbonized *Olea europea* (olive) endocarp recovered from Insula VI.I, Pompeii, Italy (scale in centimeters) (Photo taken by author)

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Date Palm: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Figs: Origins and Development
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Grapes: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Olmec: Geography and Culture

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Introduction

The Olmecs emerged about 1200 BCE along the rivers of Veracruz and Tabasco. The ethnicity of these people now dubbed the spoken Mixe-Zoquean or Mayan language due to lack of archaeological data, but there is no information as far as what the Olmec called themselves. There is a good reliable register about their cities they founded and a list of gods worshipped. One of these gods is represented with incised flamed eyebrows found within an extensive region; for about 1,000 years, these symbols and gods were used as a way of communication across a large region. Individuality self-confidence as exact observers of nature and self-empowerment for manipulation rose among the population as shamans and priests, for some theorist's population was divided into at least two main social classes to include commoners. Shamans

developed a systematic cosmology to explain creation, origins of humankind, and used the human body and nature to explain it. Olmecs occupied a vast tropical rain forest where felines, eagles, caimans, and snakes complemented practices and rituals. They observed a parallelism of humans with consumers of flesh, that also became elements for sacrifice, bloodletting, pilgrimages, cave ritual, offerings of caches, quadripartite vision of the world, and fascination with mirrors (Miller & Taube 1993: 15).

The subject Olmec has to be divided into two parts: (1) the Olmec art style and (2) the Olmec area surrounding the Tuxtla Mountains. The art style has been reported as far away as Peru. The main Mesoamerican sites where Olmec art has been found outside the Olmec heartland are Chalcatzingo and Oxtotitlan.

The most important Olmec sites are La Laguna de los Cerros, Tres Zapotes, San Lorenzo, and La Venta. Most of the literature up until the 1960s is covered in Ignacio Bernal's *El Mundo Olmeca*. Much of the later material on the Olmec sites can be found in the supplements to the *Handbook of Middle American Indians*. San Lorenzo rose probably around 1200 BCE but gets destroyed around c. 900 BCE, about the time La Venta began to flourish (800–300 BCE). The three-site settlement pattern is laid out based on bilateral symmetry, just as their art, symbolism images and representations are along a central axis.

There is still a general consensus that the Olmec was the fount of all later Mesoamerican civilizations. However, William Sanders in his *Mesoamerica* (with Barbara Price) insists that formative developments in the valley of Mexico were far more sophisticated than the Olmec materials. This goes along with his notion (and the ideas of many others) that central Mexico dominated all of Mesoamerica throughout history (Edward Kurjack, pers comm).

Definition

The name Olmec is a modern corruption of Olmecatl (Nahuatl "rubber people" or "people of the rubber country"), by which the Aztecs referred to the inhabitants of the region during the Late Postclassic period. Authors like G. Lowe note five main phases of development, but that is in the Formative and Middle Formative periods starting in 1500 BCE, when it starts taking off, and by 1200 BCE coincides with San Lorenzo's growth and development. Its emergence as an important cultural power in southern Mesoamerica and its ultimate decline at the beginning of the first millennium BCE La Venta replaced San Lorenzo during the Intermediate Olmec phase (900–600 BCE) and climaxed in subsequent Terminal Olmec times. Tres Zapotes and other sites located northwest of the Tuxtla Mountains came into power in Epi-Olmec (300 BCE–1 CE) times while under the strong stylistic influence of societies on the Pacific coastal region of Chiapas and Guatemala.

La Venta contains the first radial pyramid ever built within Mesoamerican architecture, which has been interpreted as a volcano effigy. In this site, Olmecs buried pavements and caches in this radial patter, while in San Lorenzo, basalt sculpture were buried along the edges of a large ceremonial platform. Olmecs built thrones or shrines and colossal heads from which lords talked to shamans. Olmec art has not found a parallel prototype in the world, as a unique and complex art of early civilization.

The Olmecs extended from Central America to western Mexico, particularly in search of scarce highlands resources like jade. According to John Pohl, there are four main Olmec sites along a line of 100 miles from the Atlantic coast of the Gulf of Mexico; La Laguna de los Cerros y Tres Zapotes are found in the high elevated lands surrounding the mountains of Tuxtla, while San Lorenzo y La Venta are found between the alluvial plain of the rivers that drains into the ocean. Each site monopolized salt, clay, limestone, and hematite as they were exchanged with squash, beans, and corn, which allowed San Lorenzo development, and La Venta to become a ceremonial center by 800 BCE.

Magnificently carved stone sculptures are the hallmark of Olmec culture. Stones quarried in the Tuxtla Mountains, some weighing many tons, were transported over distances of more than

150 km by water and land. The corpus of sculptures includes colossal human heads that may be portraits of rulers, huge flat-topped "altars," or thrones; realistically depicted life-size human figures; and a bewildering assortment of human, animal, and intermediate forms that combine traits of both. Scores of monuments must have been displayed simultaneously at every large Olmec center, but since few if any have been found in their original placement, it is impossible to know how they were arranged.

A unique Olmec style is evident in both the monumental sculptures and the smaller portable objects of jadeite, serpentine, clay, and other materials. According to Coe (1965), "the Olmec style is strongly contrasted with all other Middle American styles" not only in its iconographic content of baby-faced, snarling were-jaguars and cleft heads but in its formal qualities of shape, line, and space. Their style was so distinctive as its components and pieces display that it can be readily attributed to Olmec artisans regardless of where the object was discovered in modern times.

Olmec commoners lived in small villages indistinguishable from those of earlier times, but the newly emergent elites along with their dependents and retainers occupied larger settlements that we can justifiably call towns. These communities became the foci of economic power, political influence, and religious leadership. Many such towns probably existed, but only San Lorenzo, La Venta, Laguna de los Cerros, and Tres Zapotes have been studied by archaeologists. Not only were these towns larger than the subordinate villages surrounding them, they also contained stone sculptures; temples and elite houses placed on the summits of earth mounds; and buried caches and offerings containing discarded monuments, greenstone celts, and figurines as well as other rare and highly prized objects.

Key Issues/Current Debates/Future Directions/Examples

The heart of the Olmec style has been debated vigorously for decades. Most authorities believe that it grew out of an earlier artistic complex indigenous to the Olmec heartland but executed in wood, cloth, and other objects that have failed to survive the ravages of time. Not everyone agrees, however, and some scholars still seek its antecedents in Guerrero, Oaxaca, Chiapas, or other regions of southern Mesoamerica. For example, if look as at the Göbekli Tepe site and the shrines of the Stone Age, in High Mesopotamia, there is evidence of a "hunter and gatherer" civilization, who built amazing fine stone large slabs with art work sculpted in it. This evidence is forcing theories of early civilizations that do not necessarily explain the evolution of art and religion as being part of a complex society, in the whole sense of the word, but to explain more simple societies – where art gave shape to religious temples – before the conformation of complex societies.

Striking evidence of early civilizations such as the Olmec has taken specialists like Matthew Stirling (1939) to uncover the most early dates written in the calendar called the Long Count prevalent among the Maya; nonetheless, Tres Zapotes and its Stela C lacked this type of calendrical note; Stirling correlated the date to 32 BCE, similar in time to other reading of Long Count found at Chiapa de Corzo in Tuxtla Gutierrez and La Mojarra Stela 1, depicting a standing lord wearing the principal deity headdress and regalia as those of the Maya kings. This evidence has resulted in the beginning of a formal tradition in Mesoamerican art, representing the dynastic generations of rulers, registration of time with the use of calendars, and phonetic writing.

Author Richard Diehl (2004a, b) expresses that these civilizations are special kinds of human societies that have appeared only infrequently in the human past. They are more complex than the smaller-scale, simpler societies that preceded them. Their defining characteristics include complex social hierarchies, economic structures, and political systems; clearly defined territories or spheres of influence; "capitals" that were larger than the satellite communities subordinate to them and that, in some cases, true cities or urban centers; with high attainments in

the arts. Architecture, calendrics, religion, ritual, written and oral literature, and other branches of esoteric knowledge that according to him reflect the presence of an upper class or elite, perhaps the trait that most distinguishes civilizations from their less complex and organized predecessors.

This take to consider findings like well-preserved wooden sculptures and objects of rubber and other perishable materials immersed in a permanently wet spring over 40 wooden busts carved out of soft wood and feature faces stylistically identical to Olmec carvings in stone, wooden scepters shaped like serpents, rubber balls, and over 100 greenstone celts, that such early symbols marked the rest of ideology and Mesoamerican symbology of royal power like that shark's tooth mounted on the wooden serpent mouth scepters. An objects deliberate placement in the bottom of the spring, perhaps as offerings to a water deity at sometime after 1000 BCE might make theorists formulate comparisons with distant areas, like those large heads carved at Eastern island, and the Classic Maya site of Ek Balam, this time exposing a behavior of deliberate hiding of an 8 m sculptured decorated exterior facade of a temple that showed some of the finest stuccoed art work ever to be found within the region.

Theories hold that Olmec society contained at least two social strata: a small ruling elite and a much larger group of commoners who form large work parties; perhaps numbering in the thousands, the commoners constructed earthen mounds, transported basalt from quarries in the Tuxtlas, and carried out other projects requiring the efforts of entire communities. Monuments depict rulers wearing sumptuous capes, headdresses, jewelry, and other articles of clothing symbolic of their high status. Rulers controlled long-distance trade and exchange systems that supplied them and their supporters with obsidian, serpentine, jadeite, pottery, feathers, iron ore ornaments, and other raw materials and luxury goods that enhanced their prestige. Goods and materials that came from central Mexico, Morelos, Guerrero, Oaxaca, coastal Chiapas, and Guatemala were probably paid with cacao, jaguar pelts, crocodilian skins, stingray spines, and an array of finished products in the Olmec style.

Key issues are that most scholars agree that the Olmecs "influenced" their neighbors and later Mesoamerican civilizations but the nature and extent of their impact is the subject of spirited debate (cf. essays in Sharer & Grove 1989). Some maintain that the Olmecs were Mesoamerica's mother culture, the precocious base civilization that set the example for its less highly developed neighbors. Others maintain that Olmec societies were no more complex than their contemporaries elsewhere in Mesoamerica and that the widespread occurrence of Olmec motifs and stylistic conventions result from ideas and practices in many areas, rather than diffusion from a single Olmec source. Similarly, some authorities stress the continuities, especially in art, ideology, and religion, between Olmec culture and later civilizations, while others emphasize the differences that appeared during the later evolution of urban life.

For example, by 900 BCE, Copan down in the Maya raising civilization made imitations of Olmec ceramics and jade, while in western Mexico, Olmecs encountered with the Xochipala culture where naturalistic human figures had been made after 1500 BCE. Olmec-style petroglyphs also mark the cliffs of highland Guatemala and Chiapas, established a center at Teopantecuanitlan, Guerrero, and Olmecs performed rituals in caves at Cacahuazqui, Juxtlahuaca, and Oxtotitlan as well in Guerrero.

Some of the Oxtotitlan paintings, dating late Middle Preclassic period c. 800–500 BCE, were investigated by Dr. David Grove in 1968 and 1969. The paintings appeared in detail in several publications in Spanish and English. Scenes depicting simple geometric designs, large polychrome murals were executed on the cliff face. One painting depicts a personage wearing a bird mask and bird-feather cape. The bird mask has traits suggesting that it represents a horned owl. The personage is seated atop alarge supernatural serpent face. The size of this painting is 3.8 m by 2.5 m. The graffiti and damage caused by past visitors has been

eliminated, and many of the paintings have been carefully cleaned and preserved. In addition, the villagers of Acatlan have assumed the important role of caretakers and guardians of the cave and its paintings. The cave is open to public, but it is now protected by a large fence with locked gates, and people wishing to visit the cave must first register at Acatlan's municipal palace in order to gain access.

David C. Grove declares that because of its elaborate and precocious bas-relief rock art dating to c. 700–500 BCE, Chalcatzingo, Morelos, has long been recognized as one of Mexico's most important Formative period archaeological sites. For decades, scholars noted the close similarities between Chalcatzingo's rock carvings and the monumental art at distant Olmec centers on Mexico's southern Gulf Coast. However, the nature of Chalcatzingo and the "Olmec presence" there remained unclear. Had it been an Olmec colony? A trade control center? In the 1970s, the Chalcatzingo Archaeological Project, codirected by Jorge Angulo, Raul Arana, and David Grove, sought to gather data on the Formative period village – its dwellings, public architecture, and material culture – in order to better understand the site's evolution and also its relationship with the Gulf Coast Olmecs.

Chalcatzingo possesses monumental architecture, consisting of earthen platform mounds sometimes faced with stone, and began appearing in Mesoamerica around 1300 BCE during the Early Formative period (1500–900 BCE). The site is located 120 km southeast of México City in the state of Morelos, at the base of two large hills on the only good expanse of agricultural land for many miles. Chalcatzingo provides a unique opportunity to investigate the form and function of monumental architecture since it is the only known central Mexican site with evidence of monumentality in the Early Formative period.

Investigations on Chalcatzingo's settlement pattern, environment, agricultural practices, trading patterns, and social organization led to questions like, do the platform mounds serve as substructures for chiefly residences or public buildings? What are the types of activities associated with these platform mounds? How did these platform mounds change over time? The data yielded by the excavation of the platform mound was also used to examine theories of the rise of sociopolitical complexity at Chalcatzingo.

Results lead to believe that platform mounds served as substructures for the erection of important structures that functioned as a public building or multiple-purpose facilities which served as both temples and chiefly residences. Above all, monumental architecture is significant for the understanding of sociopolitical development as indicators of an inegalitarian social organization which marked its status and power through monumental constructions during the Early Formative of Mesoamerica.

Monument 32 similar to Monument 21 depicts a woman wearing elaborate clothing, holding her hands in a similar pose, and standing in front of a column. The two monuments appear to be mirror images of one another, perhaps representing a male and female who were related in some way. Cyphers (1984) has indicated the portrayal of a woman on Monument 21 commemorates a marriage alliance between the elite of Chalcatzingo and a nearby area and has identified this site as Teopantecuanitlán, Guerrero. The male personage on Monument 32 may be her marriage partner and may also come from this locale.

Long sequence of occupation of this site preceded and postdated the platform mound. Whether it was built through voluntary communal effort or under the direction of a particular individual, the platform mound indicates the existence of a centralized authority.

Analysis of the ceramics, figurines, and other artifacts associated with the platform demonstrates a similarity with materials from other sites in the Valley of México during the same period of time which indicated independent development of sociopolitical complexity at Chalcatzingo. This contradicts previous theories which postulated that cultural development at this site was the result of contact with the Olmec culture of the Gulf Coast (Piña Chan 1955; Coe 1965; Bernal 1969).

Domestic architecture, subsistence practices, food-preparation techniques, refuse disposal patterns, level of technology, economic practices, craft production, and other aspects of daily life have not been under study and form part for future studies. Only a handful of Early Formative houses from Central México have been excavated.

Cross-References

- ▶ Cueva de las Manos, Río Pinturas Cave Art
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Kondoa Rock Paintings: Traditional Use
- ▶ Megalithic Art: A Visual Repertoire for the Dead
- ▶ Mesoamerica in the Preclassic Period: Early, Middle, Late Formative
- ▶ Mesoamerica: Complex Society Development
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Mesoamerica's Archaic Period
- ▶ Urban Archaeology

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Oral Sources and Oral History

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Introduction

The archaeological use of oral sources has gained rapid popularity in recent years as archaeologists around the world have recognized the value and need of connecting their research with topics

relevant to public interest and to local community concerns. Implicit in much of this orally informed research is the use of archaeology as a means of addressing issues of social justice by empowering marginalized groups "without history" (Wolf 1982) both to create a heritage narrative by and for the people and to insert these multiple narratives into mainstream national origin stories and provide them with a role in these. Scholarly citations in the Web of Knowledge with oral history or oral traditions as keywords greatly increase in the years after 1996 and are few and far between prior to 1994. Historical analysis of the literature indicates that oral sources were being used in some areas at the beginning of organized archaeological research in those regions, Africa (Posnansky 1966; Pender-Cudlip 1972; Schmidt 1978; Scully 1979) and North America (Cushing 1886; Kroeber 1916) being clear examples. This historical precedence needs to be acknowledged while also recognizing the emergence of distinctively new approaches.

One new trend worthy of attention is in the use of oral sources in the historical archaeology of the twentieth century. A 2009 study of World War II aerial bombardment seeks to link personal experience to collective memory as focused on buildings and physical sites in Germany (Moshenska 2009). A 2003 study uses oral sources in conjunction with ethnobotany, forestry, and archaeology to document recent rainforest regeneration after logging in the Solomon Islands (Bayliss-Smith et al. 2003). Another study integrates spatial data with oral histories pertaining to infant burials in unconsecrated ground (Murphy 2011). These studies indicate that at least some archaeologists are exploring innovative connections between the material and expressive realms in framing a more human-centric perspective to the scientific practice of archaeology.

The increasing visibility of oral sources in archaeology also serves as a call to revisit fundamental practices and tenets of oral techniques, as archaeologists did not invent this mode of investigation. It is useful to distinguish two kinds of oral sources. This is important because the two kinds employ slightly different methods, theories, and applications. Still, the two are often conflated by both researcher and reader and even by the informant or narrator. The first kind is oral history, which is a record of an individual's personal experience with a past place, way of life, or event. This can be a person's life story as it intersects with the subject of archaeological interest such as at a historic place, in an archaeological site that needs to be evaluated as part of regulatory compliance, in artifacts or objects being evaluated for conservation and preservation and their value in public interpretation, or on landscapes on which now-vanished ways of life once played out. The unit of analysis in oral history is the individual, often referred to as the "informant" or narrator. The informant is one member of a group of "locals" each of whom functions as an individual source of information. The oral history technique is widely used in anthropology (Angrosino 2008), history (Vansina 1965), folklore (e.g., the many volumes of the *Foxfire* series, published by Anchor Press), sociology (Portelli 1991), and journalism (Terkel 1986). Archaeologists typically construct oral history interviews to collect information on the appearance and life history of buildings, how artifacts and the tools of technology once functioned, the demographics and social composition of user groups, social relations and ideology, and social meanings attributed to the use of space (Barber 1994: 27-8). To do oral history effectively, archaeologists benefit greatly from basic training in ethnographic methods. They would also do well to remember that the interview is a relationship between two people and can create ambiguity as well as certainty. The usual format is the audio or visually recorded interview or written notes, which can then be transcribed for study and analysis. In this form other researchers can access the narratives and essentially use them as historical documents. In the USA, for example, the federally supported Works Progress Administration (WPA) collected many volumes of oral histories during the Depression-era 1930s, most of which are readily accessible today in print and online formats.

The second kind of oral source is the oral tradition. Oral traditions are cultural narratives such as origin stories, myths, and legends that are passed down from generation to generation

orally as cultural knowledge. Typically, until the intervention of an outside researcher, oral traditions do not exist in written form. Oral traditions comprise a corpus of explanations, values, and historical facts that become the touchstones of cultural identity. Oral traditions can exist in story and song and are sometimes in whole or in part given artistic expression as glyphs on rock faces, as decorative pottery styles, basically on any surface suitable for bearing an inscription made by the human hand. Oral traditions can be elicited by interviewing an informant, but the events and beings, human and otherwise, typically belong to a time before the informant's direct life experience. Oral traditions thus are a type of culture history and function socially as a binding historical narrative. Further, to the extent that these narratives also provide explanatory knowledge of natural history, cosmology, and physics, they also define an indigenous science. Therefore, the archaeological goals of analyzing the structure and content of oral traditions differ in some respects from the goals of oral history analysis. Unlike oral histories, oral traditions tend to be recounted as received scripts and although personally variable and potentially idiosyncratic, cannot be further explicated by the informant beyond the initial telling. From the teller's point of view, they are whole and complete in and of themselves. Claude Levi-Strauss is well known, rightly so, for his ability to identify and break down the coded components of traditional narratives into patterned sets of opposing elements (Levi-Strauss 1966), and his structural approach has influenced the archaeological use of oral tradition, particularly in Africa (Schmidt 1978). Levi-Strauss and most structuralists, including his archaeological disciples, agree that the oppositions that form this deep history are beyond (or beneath) the conscious intellectual repertoire of the human bearers of tradition and cannot be directly elicited through questioning.

Historical Background

The first generation of archaeologists to systematically incorporate oral sources as valid lines of evidence acknowledges the work of Jan Vansina (1965) as their primary source of inspiration (Schmidt 1983). It is not coincidence that Vansina's work and the research of these archaeologists was situated in Africa, which turned out to be a particularly rich location for developing and expanding the use of oral sources in archaeology (Shaw 1977; Scully 1979; Maggs 1980; McIntosh & McIntosh 1980). Vansina, although not an archaeologist, argued that oral sources are expressive cultural messages and can be systematically analyzed to yield insights into cultural and historical process, in essence placing oral traditions within the same analytical frameworks that archaeologists use to understand the relationship between artifacts and the contexts of knowledge in which they were created. Archaeologists responded well to Vansina's comparative and integrated approach that emphasized the evidentiary potential of oral sources when carefully applied to archaeological problems.

Some archaeologists were openly dismissive of the contributions of oral sources to an explicitly scientific archaeology (Smith 1984), but others by the mid-1980s increasingly viewed archaeology as being incomplete and even unethical in not including oral sources provided by living peoples whose ancestors created the archaeological record under investigation. In the USA, much of this rethinking initially focused on the relationship between archaeologists and American Indians (Trigger 1980), which has by now resulted in an abundantly rich literature (Swidler et al. 1997; Echo-Hawk 2000; Whiteley 2002; Mason 2006). The formal relations between federally recognized Indian Nations and archaeologists were given structure and legitimacy through federal laws and policies regarding Indian sovereign rights to the objects and places comprising their cultural heritage. Archaeologists employed in federal projects and Indian representatives of nations whose heritage might be impacted or threatened by federal action (dam building, navigational improvements, and highway construction as typical examples) together learned how to engage in the mandated consultation process, one goal of which is to elicit native testimony as to the

significance of sites, landscape features, or other elements of material culture that might be incompletely understood or appreciated using standard archaeological and historical techniques alone. By law, oral histories and oral traditions are given equal status with conventional archaeological and historical evidence in determining Indian claims in both the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 and the Traditional Cultural Property process associated with the legal evaluation of significance (King 2003, 2007). These key pieces of federal law and federally mandated regulatory process have fostered a greater acceptance of oral sources by the archaeological mainstream, despite some initial reluctance to yield authority over knowledge of the past. In the USA as the cultural resource management (CRM) industry has matured in response to broader, more inclusive federal historic preservation goals, the use of oral sources has increasingly found its way, almost routinely, into a wide range of efforts aimed at promoting cultural diversity by directing archaeological attention to remains associated with minority, marginalized, or victimized populations. These projects run the gamut of current research themes or problem orientations in historical archaeology and include World War II Japanese-American internment camps and German POW camps in the USA and Canada, coal mining communities (Metheny 2007), pioneer and homestead settlements (Lewis 1997; Futch 2011), urban African-American enclaves (Weisman 2011), and immigrant populations facing the challenges of relocation (Hornung 2002).

Key Issues/Current Debates

The use of oral sources is not unique or original to archaeology. Other social sciences and humanities disciplines have developed a body of method and theory, to guide us, of what for them is one of the major sources of data for their scholarly inquiries. The challenge for archaeologists is to use oral sources to both critique and expand conventional archaeological research designs in an integrative approach that demonstrates the inextricable connection between material culture and expressive culture. Clearly what is found in the ground and what comes from an informant's mouth are cultural products and reflect the interaction between individual agency and social constraint. Archaeologists through middle-range theory and increasingly sophisticated understanding of post-depositional effects on the archaeological record have taken an appropriately critical view of direct or simplistic behavioral interpretations. Likewise, they also need to develop a critical approach to the use of oral sources. As a source of data, oral histories in particular need to be problematized and subjected to analytical rigor. As Vansina cautions, oral history is the product of human memory (1965: 147), and it can be created in numerous ways to serve the subject's interests. The invention of a personal history that coincides with or articulates with larger historical events is a well-known human penchant. Further, eyewitness accounts can be clouded by smoke or dust or fear. Being in the middle of an action as it is unfolding is no guarantee of veracity and rarely affords a panoramic, distanced perspective. Personal narratives can intentionally or unintentionally fail to disclose crucial circumstances or can absorb and then repeat collective narratives in the guise of individual experience. Clearly there is skill involved in reconstructing personal and cultural realities from such narratives. Careful attention must be paid to the rigor and intellectual discipline in order to establish credibility and defensibility. Investigators must also be aware of their own biases and internalized ethnocentrisms that might privilege etic data or physical evidence over emic or internal expressions (Schuyler 1978). Archaeologists face a further challenge in giving equal footing to oral sources and the archaeological record in developing their interpretations. Some archaeologists envision a conversation between the two data sources in which contradictions or discrepancies generate new questions and enrich the potential for truly original research design (Beck & Somerville 2005).

This approach, valuable in refreshing the perennial but occasionally lapsing concern with method and theory, essentially repeats the process engaged in years ago by historical archaeologists as they struggled to reconcile history's written record with what was found in the ground. As such, archaeologists should now recognize fully that oral history is a form of history, perhaps even history with a capital H, and can be subjected to textual analysis. This critical approach is of ever increasing importance to counter any tendencies to romanticize oral sources or elevate their importance over other forms of evidence, especially if one of the goals of modern archaeology is to build synthetic, systemic, and integrated models of the human past.

New opportunities for the innovative use of oral sources will emerge as archaeologists endeavor to theorize the concept of memory as it can be investigated materially. The study of memory is gaining ascendancy in the humanities and social sciences research, meaning memory as something culturally constituted and possessed collectively or, alternatively, memory as the historical reality experienced and defined individually. This is an area that lends itself to true interdisciplinary research and to which archaeologists can uniquely contribute. Archaeologists can link both places and things to ideas about places and things carried around in people's heads and by so doing can add insights to the broader understanding of how people create the realities of their own existence through both conceptual mental frameworks and the physical structuring of space. Using places generatively to confront or prompt memories essentially as a locus of oral history production is one step toward an "archaeology of emotion" (Murphy 2011) and attempt to fundamentally reposition oral history with archaeology.

International Perspectives

The use of oral sources in archaeology is most widely advanced in areas of the world where archaeologists have explicitly attempted to bridge and reconcile the historical and cultural erasures of colonialism through increased access to the archaeological record by indigenous peoples. Archaeologists working in these regions and sympathetic to the goal of connecting indigenous people to a past severed by colonial practices tend to view access to history as a human rights issue and the use of an indigenous-centered archaeology as one means of redressing human rights abuses. The USA (Swidler et al. 1997; Echo-Hawk 2000), Canada (Clark & Clark 1974; Stewart et al. 2000), Africa (Raharijoana 1994; Schmidt 2006), and Australia (David et al. 2004) have particularly well-developed literatures in which oral sources are seen as inseparable and foundational in the development of truly indigenous archaeologies which are both empowering for the native peoples and supported by national legislation. In considering the junction of oral history and archaeology as one source of a multiple historical approach to studying Mayan populations in Guatemala, Metcalfe (2005) brings to our attention the ethical considerations in deliberately eliciting information from indigenous groups that is then restructured into Western definitions of archaeological space and content. Indeed, this can be seen as the modern version of cultural appropriation simply dressed up in the latest jargon. Metcalfe also cautions that the process of converting oral histories into scholarly research and publication brings with it, unavoidably, a shift in context that might transform or recast their original meanings and purposes. In South America, archaeologists from the US National Museum of the American Indian are using oral traditions and archaeology to develop community-level heritage projects focused on the historical and cultural significance of the Inka Road. More synthetic approaches in the historical archaeology of South America use North American methods and theory as a model and suggest that oral sources present a largely untapped potential (Funari 1997).

Europe and the UK have an emerging literature focusing on public traumas and civil strife of the recent past. Archaeologists working in Jordan

have used Bedouin oral histories to address deficiencies in nomad archaeology (Simms & Russell 1997) while Caribbean archaeologists have attempted to engage modern African-descended populations with the places of their colonial past (Scudder-Temple 2009).

Many archaeologists around the world have seen the need to connect and communicate with indigenous peoples as increasingly evident and are seeking to equalize the relationship between authority derived from academy and science-based expertise and the traditional knowledge possessed by people typically cast in the "subject" role. Most of these archaeologists seek risk in foregoing the benefits and value of science and seek to balance the contributions from oral sources with those gained from traditional archaeology. Debates will continue as to how and if this balance can be achieved.

Future Directions

One of the main goals of using oral sources in archaeology is to construct a locally contextualized model of past reality that is relevant to participants, engages contemporary communities, and verifiably contributes to broad knowledge of the human experience. Truly integrating oral sources into an archaeological research design with the level of theoretical and methodological sophistication present in other disciplines will require new approaches in training future archaeological professionals. The credibility of the oral source as a line of archaeological evidence and its ultimate acceptance as a core archaeological practice requires rigorous application by trained professionals. The question then is the following: how to train students to be both theoretically and methodologically adept at applying an integrated ethnographic and archaeological skill set in the areas of basic research, cultural resource management, and heritage stewardship? This cross-training is not easily accomplished in the traditional academic silos in which most of the future professionals continue to be educated. Many academic archaeologists already face the reality of having to submit an application for oral history research to their Institutional Review Board (IRB) or, as often referred to in European institutions, "Ethics Committee," because oral history is categorically defined as social-behavioral research and informants considered subjects. In most cases, such research is regarded by the IRB as posing minimal risk and therefore qualifies for expedited review; nonetheless, the IRB experience should not be the first and only exposure to the ethics of ethnographic research.

At present there is no unified theory shared by all archaeologists who use oral sources in their work. Some archaeologists continue to use oral sources for the conventional purpose of improving the discovery and interpretation of archaeological sites and features (David et al. 2004), while others seek to use oral sources creatively to bring new perspectives and new research questions to the archaeological record (Bernardini 2005). Some relegate oral sources to a minor supporting role in confirming alleged archaeological facts, some place the two in conflict with each other hoping that the contradictions will yield new insights, and some strive to put archaeology and oral sources side by side as parallel streams of knowledge flowing toward a larger cultural synthesis. There remain two camps of archaeologists: those who respect oral sources and bring them actively into their research and those who are deeply skeptical of any claimed continuity between present and past as expressed through oral sources. These two strains run deep in the history of archaeology and have ebbed and flowed through time. While it seems likely that there are more archaeologists working today than ever before and that the global opportunities for archaeological research are at an all-time high, it also appears that the archaeological use of oral sources is enjoying a rise in popularity and in new, innovative forms. Undoubtedly not all of these attempts will stand the test of time, but the challenges they present will stimulate greater future awareness of the role of oral sources in archaeology.

Cross-References

- ▶ Historical Archaeology: Indigenous Perspectives and Approaches
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Lightfoot, Kent G.
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Oral Tradition: Ancient Greece

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Introduction and Definition

Oral tradition refers to cultural material transmitted orally from one generation to another without the aid of writing. It may take many forms: jokes, sayings, narrative poetry, songs, folktales, genealogies, and praise poetry. In this way, laws, prescriptions, and even historical elements are transmitted. But principally *oral tradition* refers to poetic composition and, as such, is called "oral theory" or "oral-formulaic theory." Oral tradition is distinct from the study of orality, which has to do with the nature of thought and expression in illiterate societies.

Historical Background

The study of oral traditions began in the nineteenth century with the Serbian scholar Vuk Stefanović Karadžić (1787–1864), of peasant origins. Vuk Karadžić was a linguist and reformer of the Serbian written language, especially its orthography, bringing it closer to common speech and away from Serbian Church Slavonic. He is called the father of Serbian folklore because of his famous collections of folk songs, fairy tales, riddles, and proverbs. His studies were characterized by the same national interests as those of his contemporaries Jacob and Wilhelm Grimm, who knew Karadzic; in the culture of the folk was thought to lie the true soul of the people.

Vasily Radloff (1837–1918), a German-born Russian and the founder of the scientific study of Turkic peoples, followed up Karadzic's work with studies of the songs of the Turkic Kara-Kirghiz in central Asia. Radlov was a founder of the museum of ethnography in St. Petersburg. The work of Karadzic and Radlov provided

models for the work of Milman Parry (1902–1935), creator of the oral-formulaic theory.

Milman Parry was born in Oakland, California, and studied classics at the nearby University of California in Berkeley, where he earned a BA and MA. Even as an undergraduate, Parry became interested in the Homeric Question, that is, where did the Homeric poems come from, the earliest poems in the Western tradition? These are the *Iliad* and the *Odyssey* from probably the eighth century BCE, always ascribed to a man named Homer about whom nothing is known. How did they come into being? Parry's discoveries were to revolutionize not only Homeric studies but also the study of many other literatures. While influenced by Vuk Stefanović and Vasily Radlov, his work made direct use of the insights of Marcel Jousse at the Sorbonne (1886–1961), who studied the anthropology of gesture; Matija Murko (1861–1952), a Slovene scholar who worked on south Slavic epics and whose publications in French Parry studied in Paris; and Arnold van Gennep (1873–1957), the founder of folklore studies in France, famous for his work on rites of passage. But Parry's discoveries were to go far beyond the work of any of these men.

When Parry began his work, the prevailing view of Homer was that the poems were the result of a long period of accretion and editorial redaction. The poems had been "stitched together" (an inaccurate understanding of the word "rhapsode" as "stitcher") from many shorter poems by unknown hands, perhaps in the sixth century BCE in Athens during the reign of the Peisistratids. This position was called Analysis, as opposed to the minority Unitarian view, which held that the poems were the creation of a single intelligence at a single time. Whereas the Analysts made use of narrative and logical inconsistencies, of which there are a good number, to establish the lines of demarcation between allegedly originally separate poems, the Unitarian position looked past such flaws in a theory of unitary composition.

After receiving his M.A. at Berkeley, Parry traveled to Paris in 1924 and enrolled at the Sorbonne, where he studied under the great linguist Antoine Meillet (1866–1936). In 1923 Meillet had written the following (quoted in Parry's first French thesis 1925):

Homeric epic is entirely composed of formulas handed down from poet to poet. An examination of any passage will quickly reveal that it is made up of lines and fragments of lines which are reproduced word for word in one or several other passages. Even those lines of which the parts happen not to recur in any other passage have the same formulaic character, and it is doubtless pure chance that they are not attested elsewhere.

Meillet thought that this feature might be distinctive of orally transmitted epic (such as the *Iliad*) and suggested to Parry that he observe a living oral tradition to find out if his suggestion was accurate. He introduced Parry to Murko, who had made phonograph recordings of Serbo-Croatian heroic epic and written extensively about them. Murko sat in on Parry's Ph.D. defense and recommended that he travel to then Yugoslavia. Parry did just that in 1933–1935, with his assistant Albert B. Lord (1912–1991), and assembled the largest collection of field recordings ever made–12,500 dictated texts and sound recordings on more than 3,500 aluminum discs. Today the collection, of which only a portion is published, is housed in the Widener Library at Harvard University.

Up to the fieldwork of Parry and Lord, the theory of the oral origins of the Homeric texts had depended on a rigorous analysis of the text, but the theory was justified by Parry and Lord's unprecedented experiment in the real world. Parry argued that Homer, like the Serbo-Croatian poets, composed orally by means of "formulas" instead of our "words." He defined a formula as "a group of words which is regularly employed under the same metrical conditions to express a given essential idea" (Parry 1971). For example, such phrases as "rosy-fingered dawn" (*eos rhododaktylos*) or "wine-dark sea" (*oinops pontos*) or "much-suffering divine Odysseus" (*polutlas dios Odysseus*) or "gray-eyed Athena" (*glaukôpis Athena*) or "swift-footed Achilles" (*podas ôkus Achilleus*), or "glancing-helmed Hektor" (*koruthaiolos Hektor*) occupy a certain portion in the metrical line and

enable the singer (Greek *aoidos*) to compose rapidly. Such formulas are characterized by "thrift," that is, there is only one such formula with a certain metrical pattern occupying a certain place in the line. Such a system could not be the creation of one man, but must depend on a tradition to which the singer had access. The formulas did allow internal substitutions and adaptations in response to narrative and grammatical needs, a flexible pattern that fit varying situations, and eventually Parry formulated the notion of a "formulaic system" that contained both a constant and a variable element.

The purpose of such a system of ready-made diction was to enable composition in performance, so that traditional features of Homer's language became proof for its oral origins. The thesis seemed to explain the highly unusual *Kunstsprache*, the "artificial language" or curious so-called epic dialect that incorporated features (especially Aeolic) alien to Homer's otherwise Ionic dialect. No one ever spoke this dialect, but it must have emerged over a long period of time through exposure to various dialectal forms that proved useful to the construction of the poetic line. Such features are unknown to such demonstrably written texts as Apollonius' *Argonautica* or Vergil's *Aeneid* and could only have come into being through the generations as a collective inheritance of many singers, Parry thought.

Parry died before he could compare systematically the technique of South Slavic poetry with Homer's, and his work attracted little attention until the publication in 1960 of *The Singer of Tales* by his assistant Albert B. Lord, perhaps the most influential work of literary criticism of the twentieth century. Parry's work was gathered together and published by his son Adam Parry in 1971 as *The Making of Homeric Verse*. In the *Singer of Tales*, Lord widened the comparative investigation to include medieval English, medieval French, and Byzantine Greek literature. Together with examples of formulaic language in South Slavic epic, he described such other features of oral traditional style as the *type scene*, or "theme," and the story patterns that governed whole epics. Lord also wrote about the singer's apprenticeship, describing his study under a master as a young boy to the time of his mastery of the craft.

Parry and Lord worked with an assistant named Nikola Vujnovic, himself a singer, and conversations between him and other singers shed considerable light on the process of oral composition. We think of poems as being made up of words, but linguists cannot define a "word" except as something found in dictionaries. The concept "word" is a product of literacy. When asked "what is a word" (*retch* in Serbo-Croatian), one singer replied as follows (Foley 1995):

> *Nikola*: Let's consider this: "*Vino pije licki Mustajbeze*" ("Mustajbeg of the Lika was drinking wine"). Is this a single *retch*?
> *Mujo*: Yes.
> *Nikola*: But how? It can't be *one*: "*Vino-pije-licki-Mustajbeze*."
> *Mujo*: In writing it can't be one.
> *Nikola*: There are four *retchi* here.
> *Mujo*: It can't be one in writing. But here, let's say we're at my house and I pick up the *gusle* (the one-stringed instrument that accompanies heroic song) – "*Pije vino licki Mustajbeze*" – that's a single *retch* on the *gusle* for me.
> *Nikola*: And the second *retch*?
> *Mujo*: And the second *retch* – "*Na Ribniku u pjanoj mehani*" ("At Ribnik in a drinking tavern") – there.

In short, for the illiterate singer, a "word" is a unit of meaning, not a typographical convention that depends on the technology of writing. Further questioning revealed that by *retch*, the singer could mean several lines, a scene, or even a whole poem.

Parry's noun-epithet formulas, such as "much-suffering divine Odysseus" (*polutlas dios Odysseus*), function in much the same way as units of composition that combine with other phrases to constitute a hexameter line. The noun-epithet formula is metrically suitable for combination with various phrases containing a verb. Together they make up a whole line. Such is true of hundreds of noun-epithet "words" for people and gods in the *Iliad* and *Odyssey*.

On a broader level, poets working in the tradition use type scenes, or "themes," to build the overall poem. We might say that the "words" are whole type scenes, standardized in outline but flexible enough to fit the immediate context. For example, in the *Odyssey*, when somebody arrives

for a feast, there is always a seating of the guest, a servant brings water for washing, a table is placed before the guest, a servant provides bread and other foods, and a carver hands around meat and gold cups. Then:

> They put their hands to the good things that lay prepared before them,
> but when they had put aside their desire for food and drink . . .

Though these details are common to all scenes of feasting, a very different use is made of them in the feast of the suitors, of Odysseus on Circe's island, and of Telemachus at the house of Menelaos in Sparta, a reflection of the flexibility of the Homeric traditional style.

Typical type scenes in Homer include Battle, Travel, Speeches, Messenger Speeches, Dreams, Divine Visitation, Conference, Assembly, Supplication, Dressing, and Seduction. All such scenes can be fleshed out or compressed in accordance with the dramatic requirements of the narrative. Such type scenes are common in the south Slavic epic that Parry studied, as well as the general theme of return, also attested in the traditions of medieval England, nineteenth-century Russia, Albania, Bulgaria, Turkey, and central Asia.

Key Issues/Current Debates

The theory of oral composition was used to explain the various narrative inconsistencies of which Analysts had made so much, for the dictating poet has no way to go back and correct "errors" nor any interest in doing so. It also explained the use of such unsuitable epithets as "blameless Aegisthus" to describe the murderer of Agamemnon, or "swift-footed Achilles," while he sits calmly in his chair. It also could explain the inordinate length of the Homeric poems, because when an oral poet dictates his text, freed of the exigencies of a live performance, free to elaborate his tale at will, the songs can become very long. The *Iliad* and the *Odyssey* are far longer than any ordinary oral poem.

Lord devoted a good deal of effort to the work of a Bosnian singer from Montenegro named Avdo Međedović (1875–1973), who did dictate a poem about the same length as the *Odyssey*, called *The Wedding of Smailagic Meho* (which Lord translated,1974: see http://www.youtube.com/watch?v=8buaCDlYU2U). Not only was the poem about the same length as the *Odyssey*, but the story is similar. A young man comes of age, he is called to marriage, there is a great battle, and in the end there is wedding. The poem far outstrips typical performances by Avdo's peers in both length and artistry. The example proved that the *Odyssey* could have come into being in just this way, as a dictated text. Such has become orthodoxy in a modern understating of the genesis of Homer's poems.

Oral Theory was initially criticized because it appeared to make the *fons et origo* of Western literature a slave to a mechanical system. Where was room for poetic invention and genius if the lines are made up of preset expressions? The contribution of individual creativity appeared to be submerged in a collective poetic tradition. However, the units of expression that Parry and Lord identified in oral verse are no more restrictive on expression than the large but finite store of words (in a conventional sense) in literate traditions. The oral-formulaic language is just that: a language, subject to the morphological and grammatical restrictions of any language.

Another criticism of the Parry-Lord oral-formulaic theory questioned the validity of the analogy between Serbo-Croatian epic and Homer, pointing to the greater "metrical strictness" of Homeric poetry and its higher quality in general. But differences in quality, whether or not they are real, depend on the skill of the composer and not on the technology he is using.

International Perspectives

The work of Parry and Lord has been applied to many other literatures, both living and in textual form, including Medieval English, Medieval French, African, Native American, and Chinese. Already in 1953, Francis P. Magoun (1895–1979), Albert B. Lord's dissertation

adviser at Harvard, published a famous essay on Beowulf, "The Oral-Formulaic Character of Anglo-Saxon Narrative Poetry." In it Magoun argued that Anglo-Saxon poetry was a transcription of traditional oral performance, heavily imbued with pre-Christian values. In a related development, the Canadian media theorist Marshall McLuhan (1911–1980) began to concentrate on how communicative media shape the content of the message.

McLuhan was advisor to the Jesuit Walter Ong (1912–2003), whose interests in cultural history resulted in *Orality and Literacy* (1980), which has had considerable influence. Ong drew heavily on the work of the Anglo/American Eric A. Havelock (1903–1988), who had suggested a shift in the form of thought coinciding with the transition from "orality" to "literacy" in Ancient Greece. Writing is a technology like other technologies (e.g., fire, the iron plow, the internal combustion engine). Ong considered that when introduced to what he called a "primary oral culture" (which has no writing), writing (he means alphabetic writing) produces wide-ranging effects on economics, politics, art, and other cultural forms. Ong thought Literacy changes people's mentality, causing "interiorization" and "individuation." Without writing, people must depend on proverbs and other forms of condensed wisdom in order to make legal and moral decisions. Epic poetry provided stylized culture heroes, for example, the wise old Nestor, the clever Odysseus, or the brave Achilles. Writing allows far more individualized models for behavior.

Ong distinguished between "primary oral cultures" (which have never known writing), "craft literacy" (where scribes hold the power), and cultures with a full literacy (such as our own), in which however there may still exist a "residual orality." In primary oral cultures, thought is cyclical whereas in literate culture it is linear, historical, or evolutionary. In the modern electronic age, Ong distinguished a "secondary orality" that lives alongside writing in which a new orality is sustained by telephone, radio, television, and other electronic devices that depend for their existence on writing. Ong's works widened what we understand as oral tradition by accounting not only for the creation of literary artifacts (the preoccupation of Parry and Lord), but for their reception.

Another scholar important to the study of oral tradition was John Miles Foley (1947–2012), founder of the journal *Oral Tradition* (http://journal.oraltradition.org/) and the Center for Studies in Oral Tradition (1986) at the University of Missouri. Foley consolidated oral tradition as an academic field that brought together scholars working in disparate academic fields (but primarily ancient Greek, Anglo-Saxon, and Serbo-Croatian). Foley introduced the concept of "traditional referentiality" by which he explained the meaning of such epithets as "swift-footed Achilles" as summing up, through reference to the tradition, the whole character of Achilles. Therefore, "swift-footed Achilles" did not mean just "Achilles," as Parry thought, but embodied the whole essence of his personality.

As the study of oral tradition progressed, a great difficulty was faced in scholars' inability to define clearly what was meant by a "formula." Noun-epithet formulas were easy to find, but other formulaic expressions slipped away as one tried to pin them down. The term "formulaic system" was suggested, which contains "substitution slots" for syntactic, morphological, and narrative needs, but in fact research into the formula proved a dead end. Such could only have been the case, just as the attempt to define a conventional "word" has proved impossible. Language is a flexible medium depending on invisible templates that generate the form on the surface. For this reason, the many attempts to define the "formula" proved ineffective, because language is not mechanical, but a human faculty whose origins and functioning are poorly understood.

Future Directions

A persistent problem with those dealing with the oral-formulaic theory and the dichotomy orality/literacy is the failure to understand that "literacy" is not a single thing. By "literacy" commentators always meant "alphabetic literacy," not understanding that there are many other kinds of

literacy, for example, that prevalent in ancient Egypt or in China today (Eric Havelock did have an inkling of this). Barry B. Powell has argued that the invention of the Greek alphabet made possible a very special kind of literacy, and that it was inspired by the desire to record the *ipsissima verba* of Homer himself (Powell 1991, 2003). The strongest evidence for this thesis comes from several factors: (1) the correspondence of the apparent dates of Homer, probably the eighth century BCE, and the invention of the Greek alphabet around 800 BCE; (2) early inscriptions, which are preponderantly hexametrical; (3) the absence of references to writing in Homer (except once, where he does not understand it); and (4) the history of writing. The Greek alphabet was the first writing that could actually be pronounced, even by a non-native speaker. All other forms of writing provide only hints of the actual sound of the language represented and, in the case of Chinese, scarcely even that. The Greek alphabet was the first system of writing capable of preserving Homer, and it is odd that it actually did this if that was not the purpose of its design.

Therefore, in thinking about literacy's effect on human mentality, on its promotion of linear over cyclical thinking, for example, or on its encouragement of philosophical thought, one must remember that alphabetic literacy is a very special form of literacy invented with the express purpose of recording oral poetry. Conclusions based on it cannot be extrapolated easily to the literacy of ancient Mesopotamia, where in fact there was no philosophy. Powell argues furthermore that "orality" is nothing as such, with special qualities, and that "literacy," being very different in different cultures, has different effects, always elusive and hard to define.

The study of oral tradition has in any event been widened since the work of Parry and Lord to include philosophy, cognitive science, linguistics, communication theory, semiotics, biblical studies, communication theory, popular culture, film study, and many other fields. The recognition of oral tradition as the source and basis of the alphabetic literate tradition has profoundly altered our understanding of the past.

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Epigraphy, Greek
- ▶ Oral Sources and Oral History
- ▶ Panhellenism
- ▶ Papyrology in the Greco-Roman World
- ▶ Preserving Heritage: The Role of the Media
- ▶ Symposion

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Orce: Early Pleistocene Archaeological Sites

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Introduction

Orce is the name of a town in SE Spain (province of Granada) rich in early Pleistocene archaeological sites. Venta Micena (VM), Barranco León-5 (BL-5), and Fuente Nueva-3 (FN-3) are the localities of special interest because the archaeological and biological evidence shows human occupation between 1.3 and 1.2 Ma. BL-5 and FN-3 have supplied a large collection of Oldowan tools associated to vertebrate fauna (Fig. 1). In addition, a half human molar was recovered from BL-5 (Fig. 2). Venta Micena does not show lithic tools, but anthropic action on bones has been described associated to three fragmentary human remains and fauna (Gibert et al. 2006).

Definition

Barranco León (BL-5)

The deposit of Barranco León-5 is located in a fine sand bed varying in thickness between 10 cm and 25 cm that belongs to the distal part of a small alluvial system. BL-5 is a classical paleontological site, above layers BL-1 to BL-4 but is the only one that has supplied lithic tools to date (Gibert et al. 1992a; 1998a). The first excavation in 1995 revealed a lower mandible of hippopotamus surrounded by more than hundred lithic artifacts associated with the following fauna: *Castillomys* cf. *crusafonti, Mimomys sp., Allophaiomys pliocaenicus, Equus granatensis, and Hippopotamus amphibius antiquus*.

Barranco León produced in 1995 114 lithic artifacts, 112 of flint, 1 of quartzite and 1 of Jurassic dolostone, and 20 manuports also from dolostone. The flint from BL-5 is of good quality and is mostly gray in color although a yellow-brown variety is also present. The flint cores and flakes are small within a range of 20 mm–61 mm with a mean of 40.7 mm. The butts have a very variable morphology, and the flakes are not usually cortical. Chopper cores of flint and dolostone are also present in BL-5.

The source of the flint and dolostone from Barranco León is the Jurassic Sierra de la Umbria and Periate where locally the chert replaces the Jurassic marine limestones. Blocks of quality flint (up to 10 cm) are concentrated in alluvial fan deposits down on the valley, only 2 km SW the site, behind the town of Orce.

Fuente Nueva-3

FN-3 site is also located in a marginal zone of the basin between Sierra de la Umbria to the south and Cerro de la Venta to the NE. Lithic artifacts were initially identified during a survey by Dr. J. Gibert and J. Serrallonga in 1990, and later in 1992 more artifacts appeared when the electrical company was carrying out work nearby (Gibert et al. 1992a). The first extensive excavations were developed during summer of 1995 and then numerous lithic artifacts associated with *Mimomys sp., Allophaiomys pliocaenicus, Equus granatensis, Hippopotamus amphibius antiquus, Mammuthus meridionalis, and Bovini indet*. The majority of the lithic artifacts were closely associated with remains of large mammals in three distinct archaeological levels. Those levels are affected by soft sediment deformation probably induced by earthquakes.

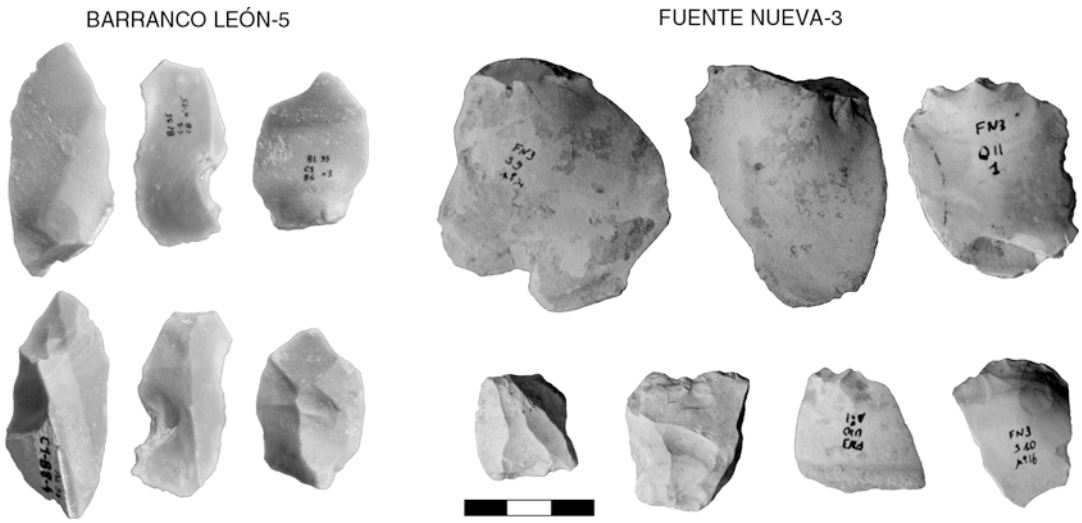

Orce: Early Pleistocene Archaeological Sites, Fig. 1 Tools from BL and from FN-3. View of Oldowan tools (unretouched flakes) from Barranco León and Fuente Nueva-3. Those tools were unburied during field season of 1995; all them are made from local flint although from different sources

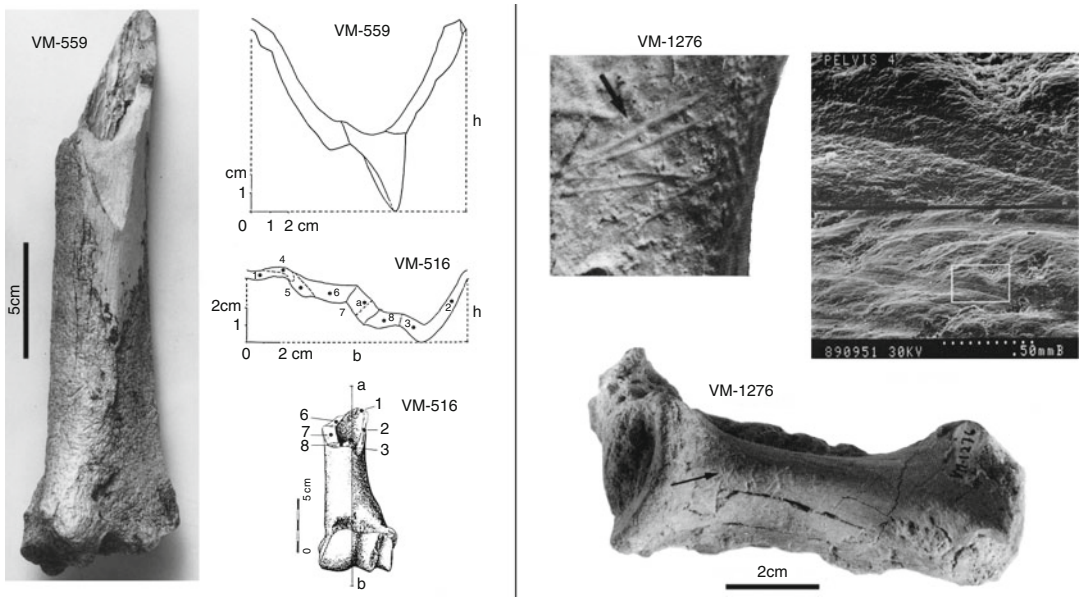

Orce: Early Pleistocene Archaeological Sites, Fig. 2 Cut marks and broken bones from *VM*. This figure shows an example of a bone broke by percussion from Venta Micena; those fractures show a very different pattern than bones broken by carnivores (Gibert et al. 1992b). The same figure shows *subparallel cut marks* from a pelvis from Venta Micena; the view under SEM shows a typical microstriation usually associated to cut marks and indicates that erosion is affecting equally the surface of the bone and the surface of the cut marks indicating and old origin (Jiménez & Gibert 1992)

More than a hundred lithic artifacts were discovered during this initial excavation, mainly from level FN3a. Greater than 90 % of these artifacts are made with local flint although some tools of quartzite and dolostone were also identified. In addition, 20 dolomite manuports were uncovered.

In Fuente Nueva-3, the flint is of uniform white color and of good quality, with some pieces having secondary iron oxide staining. Identified cores have centripetal flaking, their mean length is 65 mm, while the flakes range from 21 to 64 mm with a mean of 59 mm. Flakes have plain striking platforms and some show probable use traces (Gibert et al. 1998a). A chopper core of quartzite was probably used as a hammer stone, to judge by abrasion on the cortical face.

Fuente Nueva-3 flint has a different source than BL-5, which is still unclear; the closest source for quartzite from BL-5 and FN3 are the late Miocene fluvial deposits outcropping 6 km NE from FN-3 and that should be exposed during the early Pleistocene.

The BL-5 and FN-3a lithic assemblages show no important differences. They represent a lithic technology with a very simple *chaîne opératoire*, lacking any sign of bifacial flaking technique, and accordingly both can be compared to the Oldowan and even classified as such, being the first well-defined examples of Oldowan in Europe (Gibert et al. 1998a).

Venta Micena

Venta Micena contains a rich fossil-bearing layer 80 cm thick that extends in horizontal lacustrine deposits for at least 1 km^2. Venta Micena is the richest site in fauna, more than 11,000 bones have been unearthed representing 32 species of mammals. The following fauna association has been reported from this site: *Homo sp., Desmana sp., Allophaiomys pliocaenicus, Apodemus aff. mystacinus, Castillomys crusafonti ssp., Eliomys intermedius, Hystrix major, Prolagus calpensis, Oryctolagus* cf. *lacosti, Ursus etruscus, Canis etruscus, C. falconeri, Vulpes praeglacialis, Homotherium latidens, Megantherеon sp., Lynx sp., Pachycrocuta brevirostris, Meles sp., Mammuthus meridionalis, Equus granatensis, Dicerorhinus etruscus brachycephalus, Hippopotamus amphibius antiquus, Praemegaceros sp., Cervidae indet., Bubalus sp., Soergelia minor, Hemitragus alba, Testudo sp., Lacerta sp., Rana sp., and Charadriiformes indet*. No lithic tools have been identified to date although pieces of Jurassic dolostone were recovered in the fine grained deposits of VM (Gibert et al. 1992a); those rocks were interpreted as transported to the site by early humans. In contrast Venta Micena shows three potentially human remains: VM-0, a parietal-occipital fragment; VM-1960, a juvenile human diaphysis; and VM-3961, the mid-shaft of an adult humerus. As is usual in paleoanthropology, these remains generate considerable debate (Gibert et al. 1998b). In addition, evidences of human activity such as bones broken by rock percussion and cut marks have also been described at Venta Micena associated to evidence of scavengers activity showing an interesting competence between early humans and hyenas (Figs. 3, 4) (Gibert et al. 1992b, Jimenez & Gibert 1992).

Key Issues/Current Debates/Future Directions/Examples

Implications

The exceptional sedimentary record in Orce is dated between 2 Ma at the bottom of the Salar and Vélez canyons and 1 Ma to the top (Scott et al. 2007). This section can be completed to the west at Cúllar and Huéscar where middle Pleistocene deposits have been preserved from erosion. Those sections contain the archaeological site of Cullar-1 dated at 0.75 Ma and the Paleontological site of Huescar-1 and Puerto Lobo with ages of 0.9 Ma (Gibert et al. 2007). To the south the site of Solana del Zamborino exposes a nice collection of acheulian tools with evidences of fire that have been dated at 0.75 Ma (Scott & Gibert 2009). In summary, we can say that the Orce region has a long record of human occupation between 1.3 Ma and 0.75 Ma. The presence in SE Iberia of the oldest Oldowan

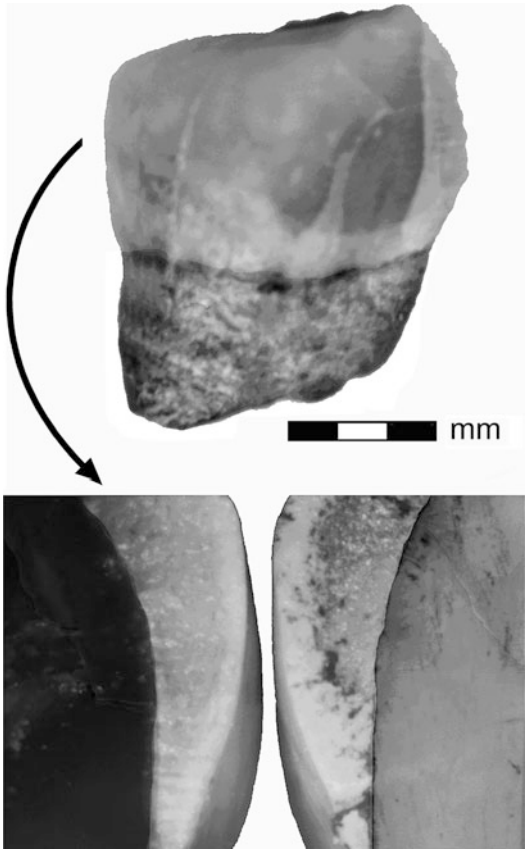

Orce: Early Pleistocene Archaeological Sites, Fig. 3 Human molar fragment from Barranco León. This molar shows characteristic human enamel features (Gibert et al. 1999). Here it is shown compared with a half modern human molar (*below right*) showing identical enamel distribution

tools and later the oldest evidences of Acheulian tools in Western Europe suggests that the Strait of Gibraltar was a permeable barrier for humans during the early Pleistocene. This hypothesis challenges classical model of human dispersal from Africa to Europe around the Mediterranean during the early Pleistocene. Archaeological finds in Soa Basin (Flores island) indicate that early humans were able to cross marine barriers (Brumm et al. 2010), and the presence of African primates (*Theropithecus oswaldi*) at the early Pleistocene site of Cueva Victoria supports a dispersal of fauna through the Gibraltar Strait, probably in a moment when the sea level was low and the distance between continents was reduced substantially (Fig. 5).

The Geology

Orce is located in the NE marginal sector of the Baza basin, which has a lacustrine record since late Tortonian (7.8 Ma) and until the middle Pleistocene (~0.5 Ma). The Baza basin was occupied by a large lacustrine system with a central saline lake surrounded by a fringe of marginal ephemeral ponds where all finds occur. In Orce, the most relevant archaeological sites are found in the upper 20 m of the stratigraphy, where a 25 m thick lacustrine unit outcrops (Scott et al. 2007). This unit corresponds to shallow lakes that accumulate thick deposits of calcium carbonate that preserved the finds until erosion uncover those layers.

The Chronology

Since its early discovery, the fauna assemblage of Venta Micena was dated as early Pleistocene (Biharian biozone), but a numerical age was missing. The lack of volcanic material in the basin makes paleomagnetism as the best technique to solve the age of the archaeological sites. A preliminary magnetostratigraphic study claims for the identification of the Olduvai subchron in the upper 10 m of the Barranco de Orce section (Agustí et al. 1997), located only 300 m west from Barranco León. The lower boundary of Olduvai was placed at the same stratigraphic level than the BL-5 site, suggesting an age of 1.95 Ma for BL finds (Gibert et al. 1998a). Later, a review of the paleomagnetic data at Barranco de Orce proved that the rocks were remagnetized in the present field direction invalidating these old chronologies (Gibert et al. 2006). In 2000 a study of the upper part of the Barranco León and Fuente Nueva-3 sections showed only reverse polarity placing the sites in the early Pleistocene but without a given concrete age (Oms et al. 2000). It was in 2007 when a magnetostratigraphy for the complete section outcropping in Orce was published (Scott et al. 2007); this study showed a polarity sequence of three magnetozones with a sequence of reverse–normal–reverse. Different field tests were done to

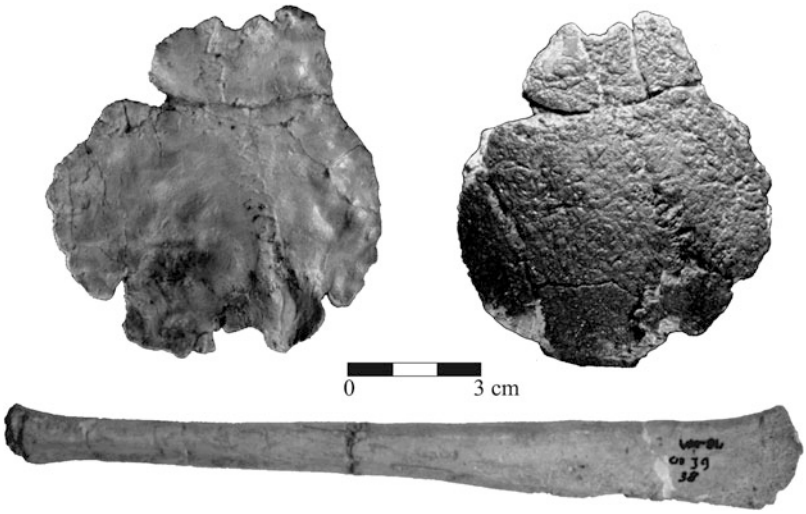

Orce: Early Pleistocene Archaeological Sites, Fig. 4 Internal and external view of an infant skull fragment (VM-0) and a infant humeral shaft (VM-1960) recovered from Venta Micena site. Both fossils where located only a few meters apart (Gibert et al. 2006)

guarantee that this normal zone was not remagnetized. The paleontological information permitted to correlate the normal zone with Olduvai subchron (1.98–1.75 Ma) and to date with accuracy the lower part of the section at 2 Ma and produce minimum ages for the archaeological sites of 1.3 Ma for Venta Micena, 1.25 Ma for Barranco León, and 1.2 Ma for Fuente Nueva-3 (Scott et al. 2007).

In an attempt to refine the age of Orce sites, two additional techniques were used:

Amino acid racemization analysis on remains from gastropods from Venta Micena produced an average age of 983 + −58 Ky for the site. This age was validated assuming a correct age for the site of Cúllar Baza-1 of 441 + − 27 Ky obtained using the same technique (Torres et al. 1997). In 2007 a paleomagnetic study placed Cúllar Baza-1 at the Brunhes–Matuyama boundary 0.78 Ma (Gibert et al. 2007) showing a much larger error in this technique.

In recent times new attempts using combined U-series/electron spin resonance (ESR) dating method has been applied without success. In Venta Micena, 5 mammal teeth were sampled. The results gave disperse ages between 1.79 + 0.30/ –0.23 Ma and 0.57 + 0.08/ –0.09 Ma (Duval et al. 2011). In Barranco León and Fuente Nueva-3, nine teeth samples were analyzed. Seven samples could not be dated, and the remaining two give again nonconsistent ages of 1.19 ± 0.21 Ma and 0.52 + 0.09/ −0.08 Ma for FN-3 (Duval et al. 2012).

The History of the Investigations

The site of Venta Micena was discovered in 1976 during a survey led by Dr. Josep Gibert; a second survey in 1979 identified additional fossiliferous strata in the Orce section like Barranco León and Barranco de Orce. In 1982 the first extensive excavations were developed, and after the identification of a human skull at Venta Micena, more work was done between 1984 and 1986. A controversy on the Orce skull halted the excavations at Venta Micena. Between 1986 and 1994, new sites were discovered, and some worked pieces of flint and quartzite where found in situ at some of the beds in Barranco León and Fuente Nueva-3. In summer of 1995, the first extensive excavation at the sites of Barranco León-5 and Fuente Nueva-3 was organized by Dr. Gibert producing a large collection of tools. The finds were presented at the International Conference on Human Paleontology held at Orce in September of 1995. During this conference, the participants had the opportunity to examine the sites and the finds with and agreed that sites yielded very old evidences of human presence (Zihlman & Lowenstein 1996) closing the debate about the

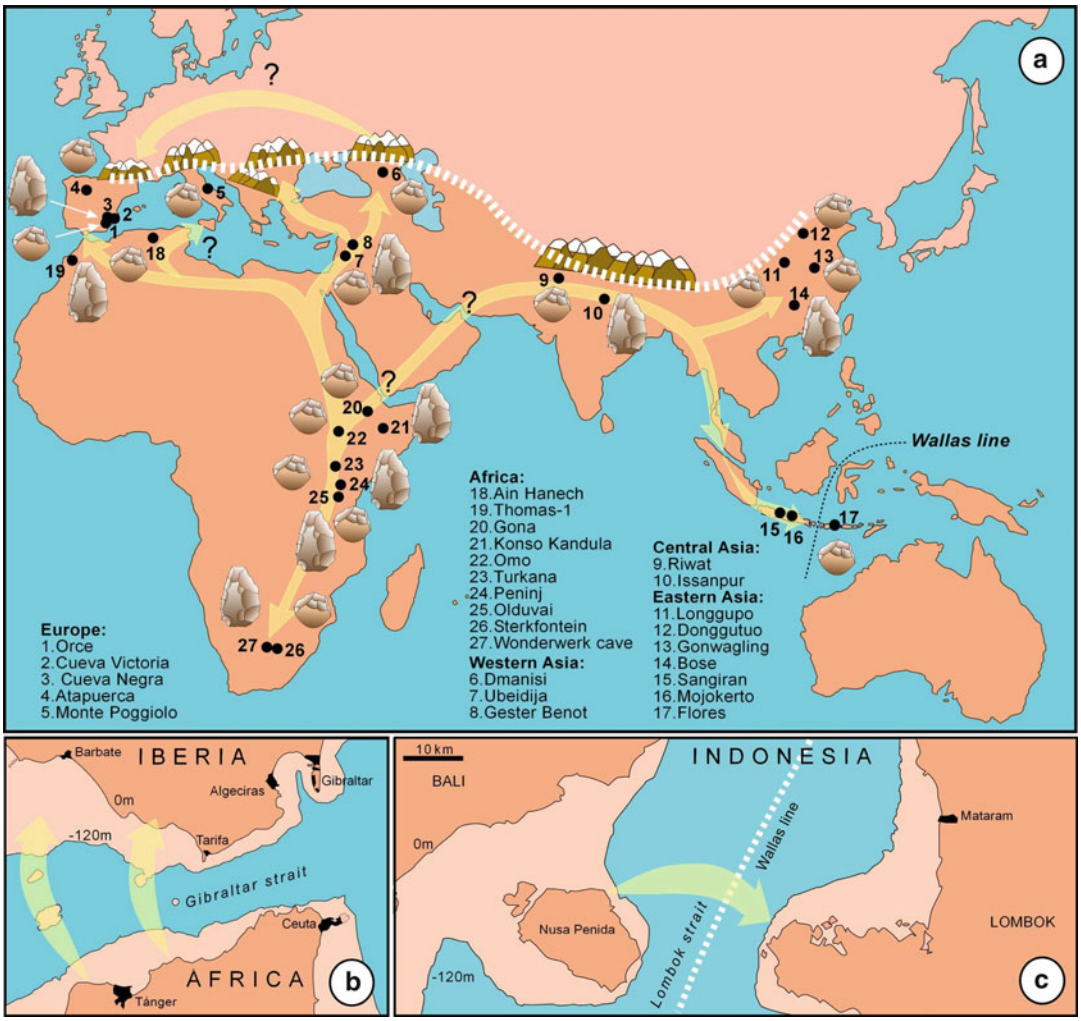

Orce: Early Pleistocene Archaeological Sites, Fig. 5 (a) Model of dispersal. Map showing the distribution of the oldest Oldowan and acheulian tools during the early Pleistocene. In Europe, the presence of the oldest evidences of the African Oldowan technology and later the oldest evidences of the African Acheulian technology challenges classical view of human dispersal from Africa to Europe around the Mediterranean and suggests that the Strait of Gibraltar was a permeable barrier for humans during the early Pleistocene. The map shows a *dotted line* indicating the limit of Early Pleistocene human dispersions; there is no evidence of human presence north of this line before 0.8 Ma. (b) The paleogeography of the Strait of Gibraltar during a sea level fall of 120 m under this situation the distance between continents was reduced by 50 % and some islands appeared. (c) The paleogreography of the Lombok strait (SE Asia) during a sea level fall of -120 m. This strait is wider than Gibraltar and was crossed by early humans to reach the Flores island before 1 Ma (Brumm et al. 2010). In Africa the oldest Oldowan is at Gona (Ethiopia, 2.6 Ma), in North Africa is at the site of Ain Hanech (Argelia, 1.5–1.6 Ma), in Asia at Dmanisi (Georgia, 1.7 Ma) or Riwat (Pakistan, 1.9 Ma), and in Europe at Orce at 1.25 Ma. The oldest Acheulian occurs at Konso-Gardula (Ethiopia, 1.4 Ma) or Peninj (Tanzania, 1.5 Ma.), in North Africa at Thomas Quarry (Morocco at 1 Ma), in Asia at Bose (China , 0.8 Ma), and in Europe at Cueva Negra (0.9 Ma) and Solana del Zamborino (0.75 Ma), both sites being in SE Iberia

early human presence in Orce. After this conference, the "Orce man" controversy was reopened in Spain (Gibert et al. 1998b), and the excavations were stopped until 1998, when a new team took the sites of Barranco Leon and Fuente Nueva-3. Although Dr. Gibert applied for administrative permits until his premature death in 2007, no new extensive excavations have been permitted at Venta Micena to date.

The Controversy on Orce Skull

In 1982 a skull fragment with human affinities was recovered; the fossil with number VM-0 was published and named by the news media as "Orce man." It consists in two parietals and the occipital, and its external view shows typical human anatomy. Based on its exocranial morphology, curvature, low thickness, and the *impressiones digitatae* on its endocranial face, it was concluded that VM-0 belonged to an infant around five years old (Fig. 1) (Gibert et al. 1983; Campillo & Barceló 1989).

After the endocranial was completely cleaned, a small internal sagittal crest was identified. This atypical anatomical feature in humans was used by some to suggest that the fossil was an equine. This rumor arrived to the press in 1984 starting a debate in the Spanish news media between supporters and rivals of the human affinity. The equine hypothesis was published finally in 1987 by two of the colleagues of Gibert who participated in the discovery (Agustí & Moyà 1987). The new classification of VM-0 was based on the presence of this atypical internal crest and a supposed suture coronalis in VM-0 situated at 40 mm of lambda point. This would imply that VM-0 belonged to a "being" with a small brain like a horse. A detailed X-ray study proved no presence of a coronalis suture in VM-0 and demonstrated that all interpretations based on the presence of coronalis suture are incorrect (Campillo et al. 2003).

The same study shows a character which proves the human affinity of VM-0: presence of a wide sulcus sagittalis (9 mm), the print of the superior sinus sagittalis where drained venous blood of a big brain, like the human, but not possible in a colt whose brain size is similar to that of sheep and the sulcus sagittalis is much narrow (Campillo et al. 2006).

Dr. Gibert and Dr. Campillo studied a collection composed of 311 X-rays (61 infants, 73 juveniles, 177 adults) and a further 735 human crania (Campillo 1989) and 72 horse crania (two, aged 0–2 months; six, aged 3–4 months; 15, aged 7–9 months; 49 adults) (Gibert et al. 1998b) and never were able to identify an equid which permits an anatomical comparison with VM-0. In contrast, similar sagittal crest in humans were indentified (Campillo 1989). In 2006, the endocranial morphology of a skull from an infant from a Roman necropolis shows an identical internal occipital crests to that of the VM-0 fragment, confirming that such crests occur in human crania disproving all previous arguments made against the human hypothesis (Campillo et al. 2006).

In an unprecedented effort to solve the "Orce man" controversy, two different laboratories carried out independent immunological test on residual proteins extracted from these disputed fossils. Dr. Concepcion Borja and Dr. Enrique Garcia-Olivares (Univ. Granada) detected human albumin and human immunoglobulin in all three. Dr. Jerold Lowenstein (University of California, San Francisco) also detected human albumin as well as human transferring and collagen in the cranial piece (VM-0) and human albumin in VM-1960. As a further check, both teams found equine albumin in specimens identified morphologically as equids, and Dr. Lowenstein identified bovine albumin in two bovine fossils (Zihlman & Lowenstein 1996; Borja et al. 1997).

"The role of immunology is critical here, where the morphology is incomplete," observed Prof. Phillip Tobias (Univ. Witwatersrand); after close examination of the fragments, Prof. Tobias concluded that "nothing in the remaining morphology would exclude their being hominid" (Zihlman & Lowenstein 1996). At Orce in September 1995, Tobias stated that he was more impressed by the evidence of the fossil proteins of the three bone specimens, as were determined by the studies of two different groups, using two different technical approaches. [. . .] The convergence of the two laboratories, working independently of one another, by two different methods,

provides very strong evidence in support of the conclusion that all three of the bones from Venta Micena are of hominid origin (Tobias 1998).

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Age Estimation
- ▶ Biomolecular Archaeology: Definition
- ▶ Dating Techniques in Archaeological Science
- ▶ Europe: Early *Homo* Fossil Records
- ▶ Europe: Paleolithic Art
- ▶ Geoarchaeology
- ▶ Handaxes and Biface Technology
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Tobias, Phillip V.
- ▶ Vertebrate Taphonomy in Archaeological Research

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Organic Residue Analysis in Archaeology

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Introduction

Organic residues of substances that were used in the past can survive as visible amorphous residues or trapped in the porous of archaeological materials, such as ceramic matrix or plasters. The study of these residues has relied on the possibility of identifying markers or indicators of the different substances (biomarkers) that survive through time and different postdepositional environments (Evershed 1993, 2008a).

The study of these residues that can be performed with a number of analyses, instruments, and extraction methods has provided archaeologists with interesting data on different aspects of the ancient way of life.

Historical Background

As Evershed has recently shown, a major influence in the development of the field was the emergence of a new generation of analytical chemical methodologies in the middle of the twentieth century that enabled complex environmental materials to be studied in increasingly fine detail (Evershed 2008a). Nevertheless, it was the emergence of chromatographic methods able to achieve molecular-level resolution and recognition during the 1950s and 1960s, and in particular the development of gas chromatography (GC) coupled to mass spectrometry (MS), that allowed the real development of this field of research.

The first studies were conducted in the 1970s, being the Condamin and Formenti contribution fundamental for the development of the

organic residue analysis of archaeological ceramics (Condamin et al. 1976).

After overcoming the incredulity that organic residues can survive in archaeological materials, this field of research experienced a rapid development.

It is mainly thankful to the tireless work of Richard Evershed and his group that nowadays we can really consider organic residue analysis a major field in archaeological sciences. More and more laboratories exist in Europe and in the rest of the world that perform these analyses, but none have as many publications and have faced such a wide range of themes as Bristol laboratory.

While the first analyses were mostly aimed at understanding the commodities transported in amphorae, the focus of the analyses later moved to the study of the content of cooking pots and a variety of other themes, such as linings, glues, and tars. The possibilities offered by specific techniques have provided information on the species of animals, dairy and marine products cooked in the vessels, and the origin of resins and tars. In general, during the last years the characterization of more and more numerous substances, allowed recovering information on different aspects of ancient ways of life.

In particular this was due to the use of suitable extraction and analysis methods on one side, and of the application of experimental archaeology and ethnoarchaeology to the study of chemical residues.

Key Issues

Organic residues are a complex mixture of compounds absorbed within a porous substrate that is usually not visible at naked eye. These components are too small for bacteria to penetrate and undergo weak physicochemical interactions with the ceramic matrix of the pottery vessel (Reber & Evershed 2004).

These processes protect a proportion of the absorbed residues from decay and microbial attack, preserving many of the compounds in the absorbed residue from decomposition over time (Evershed 1993). Depending on the environment in which the archaeological material was preserved, residues undergo a different degradation.

Absorbed organic residue analysis has concentrated mainly on the analysis of ceramic materials and has contributed to the identification of the ancient content of pottery and therefore its use and function.

In general, these studies have been applied in the investigation of ancient food practices, some of them being related with the early diffusion of specific foodstuff such as dairy products, maize, as well as fermented beverages, such as wine, beer, and chocolate. The data obtained have sometimes been related to major transformations in human societies, such as breeding and domestication of animals, domestication and cultivation of plants, sedentarization, and landscape use (i.e., Barnard & Eerkens 2007; Brown & Brown 2011; Regert 2011).

The study of the residues preserved in ceramics regarded more generally the alimentary practices in certain periods and the food prepared and consumed at the different sites, sometimes as part of integrated studies. Also ritual practices associated with burials have been treated (i.e., McGovern et al. 1999; Guasch-Jané et al. 2006).

More specific themes are related with the aim of establishing the use and/or function of specific archaeological materials, such as cooking pots with specific forms, *mortaria*, or *amphorae*. In particular, the study of amphorae content, which corresponded to the early stage of chemical analyses of archaeological materials (Condamin et al. 1976; Heron & Pollard 1988), has recently re-entered the landscape of the organic residue analysis demonstrating that the association between amphorae typologies and content is more complex than expected and must be treated with caution, in particular if regarded as a source for the study of ancient Mediterranean economy (Garnier 2007; Pecci et al. 2010). Also the analyses of other ceramic vessels have provided interesting data, sometimes showing that the archaeological hypothesis on the use of ceramic vessels was not correct. The analysis of different

parts of the vessels has provided information on the way of cooking in the different commodities (Evershed 2008a).

Among the compounds that more commonly are identified with the analyses of the organic residues absorbed in archaeological materials are lipids (Evershed 1993, 2008a; Regert 2011); nevertheless, also many others can be studied (Brown & Brown 2011; Barnard & Eerkens 2007; Garnier 2007; Guasch-Jané et al. 2006; Colombini & Modugno 2009).

The identification of animal origin products has been a major issue in residue analysis, being possible in establishing the species of animals that were consumed, distinguishing between adipose fat and dairy products, and identifying marine origin fats (Regert 2011); this has also allowed the discussion on animal domestication. Also vegetal fats are identified, being vegetal oils being important substances in the past. Residue analysis has confirmed that also oils different from olive oil were produced, used, and traded in ancient times (Garnier et al. 2009; Pecci et al. 2010). Other vegetables such as *Brassicaceae* and *Allium porrum* have also been identified, although with some reserve (Evershed 2008a).

Another important aspect of organic residue analysis is the characterization of amorphous materials that are found either as contents, linings, and glues of ceramic or other artifacts (stone, bone, and wood) or as bulk materials. The analysis of these materials that are usually beeswax, resins, incenses, tars, bitumen, and gums is aimed at characterizing them and identifying their source (i.e., Regert et al. 2008; Stern et al. 2008). Their analysis also sheds light on the methods of preparation of these substances and on their geographical origin, as they could also be subject to trade. These same substances can be identified and preserved in the pores of ceramic matrices. Visible residues can also be adhered to lithic tools, such as blood residues.

Residue analysis can be performed also on porous materials different from ceramics, such as the plasters of the archaeological floors of households or temples, and can be useful to identify activity areas, as the liquid or semiliquid substances produced by human activities are absorbed by the porous surfaces on which the activities are performed (Barba 2007 and his entry on ▶ Floors and Occupation Surface Analysis in Archaeology in this encyclopedia). Nevertheless, also the plastered coatings of basins that are found in production installations can be studied to establish if they were used to produce wine, oil, or other substances (Pecci et al. 2013).

Since the beginning of chemical prospection in the 1920s, it was recognized that soils preserve the chemical signature of human activities. The analysis of samples of soil from the surface of an archaeological site can be used to suggest hypothesis on the distribution of activities at the site (Barba's entry on ▶ Floors and Occupation Surface Analysis in Archaeology in this encyclopedia), while the study of discarded loci can be useful to get information on the way of life of the inhabitants (Bull et al. 2003). Also changes in vegetation through time can be investigated through the analysis of organic matter in soil (van Bergen et al. 1997), and the cultivation of specific crops has been proposed (Webb et al. 2004).

Finally, the study of organic residues is also related with the conservation of materials (i.e. Mills & White 1987). It is in fact important to know their origin and degradation problems before preserving and restoring them. This area of research sometimes presents conflicts between the preservation of intact materials and their study and between their preservation for further studies and the use of modern organic polymers to consolidate and preserve the shape of the piece of art.

Analyses and Sampling

For the study of organic residues, several techniques have been applied. The choice depends on the characteristics of the materials and on the facilities available at the different laboratories. Until now, gas chromatography, (GC), gas chromatography coupled with mass spectrometry (GC-MS), isotopic analyses (GC-C-IRMS), and pyrolysis (Py-GC-MS); high-pressure liquid chromatography (HPLC); and Fourier transformation infrared spectroscopy (FT-IR) have been the most popular, although nowadays some more

have been implemented. Application of ESI and APCI has given good results, and NMR has been tested. For a first screening of the samples, also solid-phase microextraction (SPME) and other quicker methods can be used (Barnard & Eerkens 2007; Brown & Brown 2011; Colombini & Modugno 2009). Moreover, spot tests can be used both for the analysis of archaeological floors (Barba 2007) and as a first approach to the analysis of ceramic vessels. These tests do not allow identification of the specific substances that were contained in the vessels but make it possible to suggest some hypothesis on their use and discard some contents. Moreover, they could be combined with other techniques to obtain better results for the analysis of different archaeological materials (Middleton et al. 2010).

Different extraction methods have been proposed depending on the substances that are investigated and the techniques used; the total lipid extraction being the most common. Recently, several articles have been published on the possibilities of identifying wine residues in archaeological materials (Pecci et al. 2013).

As for the sampling, there is a trade-off between the quantity of sample to be analyzed and the information that can be recovered that depends on the characteristics of the samples and the techniques that can be applied (destructive versus nondestructive or micro-destructive analyses). Most of the time, especially when the residues are trapped in the matrix of ceramics and plasters, destructive analyses are carried out. An amount of sample (ranging from fractions of a gram to several grams) is crushed in order to be sure to recover information on the substances adsorbed in these matrices. Nevertheless, in specific cases, nondestructive analyses are carried out either performing the extraction without crushing the sample (i.e., with solvents directly inside an archaeological vessel) or performing microanalyses (i.e., FT-IR-LA). This is especially the case for museum objects.

As for the problem of contamination, if the materials are carefully treated after recovery, this is not common. Nevertheless, to keep a control on this phenomenon, it is important to sample the earth of the stratigraphic unit in which the ceramics or amorphous materials were found or to evaluate the differential presence of residues in several parts of the vessels.

Current Debates and Future Directions

Although organic residue analysis has been performed for several decades, there is still a lot to do, and different lines of research will have to be implemented in the future.

While radiocarbon dating is now common in archaeological projects and other archaeometrical techniques such as inorganic analysis of ceramic vessels and isotopic analyses of bones are everyday more common, the organic residue analysis of pottery is still quite rare.

Among the recent approaches to organic residue studies that deserve a special attention, the radiocarbon dating on the organic residues preserved in archaeological ceramics is particularly interesting (Berstan et al. 2008). This application will provide dates for the use of the vessels and therefore for the archaeological contexts where they come from.

Experimental DNA analyses have been applied on ceramic sherds and revealed the original contents of amphorae which had no visible physical remains (Hansson & Foley 2008). Although still in preliminary stages, the development of this kind of analyses will open a new field of molecular archaeology analyses and provide a powerful tool for obtaining information about the agricultural production, contact networks, and economies of past civilizations. The development of DNA analyses will probably change the way of performing residue analyses.

The data obtained on proteinaceous materials are also promising for the future of this kind of study, as it will provide data that can complement those obtained with lipid analyses.

As for the techniques of analysis that are already applied systematically, further investigations are needed in the identification of the animal species with GC-C-IRMS, mainly for what concerns the data coming from regions different from Europe, with difference in C_3 and C_4 plant

diffusion that can affect the results of the analyses, as well as for marine and dairy products (Regert 2011).

The recent developments suggest that new techniques each time more precise, and less destructive, will probably be available in future years.

As for the "traditional" residue analysis, until now the high costs of these time-consuming analyses and the fact that they require expensive instruments have had the consequence that they are not performed in a systematic way in archaeological projects. Nevertheless, to find a possible answer to most of the archaeological questions related to food practices and ceramic use, it will be fundamental to increase the number of samples coming from different sites and regions in the world. For instance, in order to clarify the use of specific archaeological materials such as amphorae, it will be necessary to carry out an important number of analyses and projects that involve different countries. On the other side, a diachronic study of materials coming from the same region should be performed to evaluate if important sociopolitical changes (i.e., the fall of the Roman Empire and the formation of different states in the Mediterranean area or the arrival of the Spaniards in Mesoamerica and South America) can be reflected in the food practices of the inhabitants of the region. Moreover, to use the residue analysis of pottery as markers of social relations, it will be important to look for differences among sites of the same periods and inside the same sites among different areas that can be related to different social groups. Also the analysis of materials coming from different regions in the world will be necessary to investigate ancient ways of life.

Regarding some of the issues stated above, a great limit of this kind of analyses is the difficulty in perceiving differences in the food prepared in the vessels belonging to different household, sites, or periods. Most of the time, animal and vegetal fats can be identified in the vessels analyzed, with no possibilities of pointing out major differences in the food prepared, apart from the species of animals cooked, and eventually the presence of dairy products. This fact has two implications: on one side, the right questions must be asked, taking into account all the data coming from the archaeological context; on the other side, the characterization of a bigger number of substances should be carried out. In particular, as for the question on the alimentary practices, more experiments are needed. As it has been done for oils, beeswax, wine, beer, chocolate, and a number of other substances (i.e., Evershed 2008b), foodstuffs that were typical of specific cultures should be characterized. These will be useful to recognize the changes in the alimentary practices in time and space and the influence of a culture on another one. As each cultural region has its own feeding resources, the characterization of different substances has to be done in every region.

The implementation of databases of the analyses of modern and ancient materials should be performed in order to provide a greater diffusion of the possibility of analysis and interpretation of the data and therefore increase the number of samples analyzed. Furthermore, more crossing of data among laboratories should be carried out, with the aim of the standardization of the techniques and extraction methods that can lead to the comparison among the analyses performed by different laboratories. Also the understanding of residue degradation will have to be continued, as it will allow interpreting the data of the analyses.

The study of ethnoarchaeological ceramic materials has also to be implemented for the understanding of ceramic use and residue degradation (i.e., Evershed 2008b); as ethnoarchaeological works have been carried out for the identification of activity areas in archaeological sites (Barba's entry on ▶ Floors and Occupation Surface Analysis in Archaeology in this encyclopedia; Wells & Moreno Cortés 2010).

In general, it must be remembered that organic residue analysis is only one aspect of the global archaeological investigation that should take into account also archaeozoological, archaeobotanical studies, residues in floors, anthropological analyses, and isotopic analyses on human and animal bones, together with written sources, when they exist. The number of integrated studies should therefore be increased to get inside such a complex world as ancient ways of life. To approach this kind of

investigations, research that takes into account experiments, ethnoarchaeology, and archaeology are also to be applied.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Ceramics: Scientific Analysis
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Consumption, Archaeology of
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Trade and Transport in the Ancient Mediterranean

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Organization of World Heritage Cities (OWHC)

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Introduction

The Organization of World Heritage Cities (OWHC) is an international non-profit, non-governmental organization which brings together the cities from around the globe that have within their territory a site that has been inscribed on the UNESCO World Heritage List.

The OWHC was created to assist member cities to adapt and improve their conservation and management methods. In the activities of the OWHC, these cities are represented by their Mayors with the participation of their heritage management experts and technicians. Cities that are not listed as well as individuals may join the OWHC as observer members.

The OWHC has five official languages, French, English, Spanish, Arabic and Portuguese, while French, English and Spanish are the OWHC working languages.

The Mayors of the OWHC member cities form the General Assembly, the paramount authority of the Organization. At its meeting every two years, in the course of the World Congress, the Assembly elects eight Mayors to serve on the Board of Directors that meets at least once a year.

The headquarters of the OWHC are located in Quebec City, Canada. The General Secretariat is directed by the Secretary General, appointed by the General Assembly, who oversees the execution of mandates adopted by the governing bodies, the day-to-day administration of the Organization and personnel management. Seven Regional Secretariats support the work of the General Secretariat.

Historical Background

Following the inscription of the Historic District of Old Quebec (Canada) on the UNESCO World Heritage List in 1985, the city's Mayor, Jean Pelletier, voiced the need for World Heritage Cities to join together to face the challenges and obligations of their World Heritage status.

It was left to Mr. Pelletier's successor, Mr. Jean-Paul L'Allier, also a man of vision, to organize a meeting in Quebec City in July 1991, of 41 Mayors of listed cities to take part in the First International Symposium of World Heritage Cities. The Symposium was held under the auspices of UNESCO with the cooperation

of the Government of Canada and the authorities of the Province of Quebec.

At the end of that first symposium, the elected representatives who had attended signed the Quebec City Declaration to establish a network of World Heritage Cities. Two years later at Fez (Morocco), on 8 September 1993 the Charter of the Organization of World Heritage Cities (OWHC) was adopted by the Founding General Assembly and the decision taken that the headquarters of the Organization would be established in Quebec City, Canada.

It is remarkable that the first gathering held in Quebec City led to the establishment of an international network that includes over 230 World Heritage Cities with a combined population of over 130 million people.

Key Issues

Mission

The primary objectives of the Organization are to:

- Favor the implementation of the UNESCO World Heritage Convention
- Encourage, on both regional and international levels, co-operation and the exchange of information and expertise among historic cities on matters of conservation and management in close collaboration with other organizations pursuing similar goals
- Promote public awareness to heritage values and their protection
- Foster a sense of solidarity among its member cities

To this end, the OWHC organizes World Congresses, regional conferences, seminars and workshops dealing with the challenges to be faced in the realm of management as well as strategies pertaining to the preservation and development of historic cities.

To better articulate its goals, the OWHC has followed the example of the UNESCO World Heritage Committee which outlined its Strategic Objectives, the originally four and now five Cs (Credibility, Conservation, Capacity building, Communication and Communities), in its Budapest Declaration (2002). The OWHC has set itself five strategic directions, its own five Cs, to pursue its mission:

- Collecting experiences
- Capitalizing on know-how
- Consolidating heritage enhancement
- Constructing intercity partnerships
- Contributing to the international debate

Support

The initial grant given by the Government of Canada as well as the continued support of the Province and City of Quebec in providing grants as well as staff and premises for the General Secretariat have been crucial to the continued activities of the OWHC.

In addition to the membership fees from the cities, the Organization also benefits from the wealth of human resources that exists in its member cities. The generosity that these cities have shown in putting professional staff at the disposal of the OWHC has been a tremendous asset throughout its existence. This generosity was crucial to the creation of the seven OWHC Regional Secretariats throughout the world.

The establishment of the Regional Secretariats has been very important in the development of the OWHC, playing a significant role in achieving cohesion and unity among its member cities. The Secretariats have provided a vital link between the cities of each region and the General Secretariat in Quebec City. They facilitate the implementation of programs and projects of the OWHC, adjusting them to the cultural requirements of each region. Equally important are the activities initiated by the regions themselves, especially the Regional Conferences held every two years between World Congresses, which can better relate to the needs of those cities that share cultural, linguistic or geographic affinities.

The seven Regional Secretariats serve the areas of Northwestern Europe, Central and Eastern Europe, Southern Europe and the Mediterranean, Latin America, Africa and the Middle East, Euro-Asia and Asia-Pacific.

The World Congress

The OWHC has long promoted the cooperation of the various actors involved in cultural heritage

conservation and management. It has been said that the OWHC is the only international platform where mayors, decision-makers and experts meet together to discuss issues of mutual concern for World Heritage Cities. This synergy of authority and expertise has yielded many positive and significant results.

As envisaged from the outset, a World Congress is held every two years, which the OWHC considers to be its most important event. The host city of each World Congress, elected by the members of the OWHC at the previous Congress, has the responsibility of proposing a theme and making provisions for its development and presentation in the scientific sessions.

These assemblies provide a unique forum, giving decision-makers and professionals the opportunity to share their experiences and to learn about new developments and strategies for meeting the critical challenges associated with the conservation and management of World Heritage Cities.

Mayors' Workshop

The job of a Mayor of a World Heritage City is not easy. Most Mayors are not heritage experts but the responsibility of preserving or managing historic sites becomes theirs once they are elected. Having conserved their rich heritage over time, World Heritage Cities hold the keys to understanding long-term evolution of a place from the past and on to the future. City governments are at the heart of the action. As guardians of the world's heritage, World Heritage Cities face an additional challenge – any action taken at these iconic places can attract considerable attention and influence the adoption of good management practices elsewhere.

To assist the local authorities in their difficult task, from 2005, the OWHC has introduced at its World Congresses a Mayors' Workshop as a conference session, focusing on the experiences of the host city with the inclusion of site visits. These workshops, organized in collaboration with the Getty Conservation Institute, aim to raise the awareness and to enhance the sensitivity of Mayors regarding heritage issues as well as to give greater insight into the methodology of protecting and managing historic resources in their cities.

The Jean-Paul L'Allier Heritage Prize

The Jean-Paul L'Allier Heritage Prize is awarded by the OWHC, at the end of a competition and selection process, to one of its member cities that has distinguished itself by its achievements in the conservation, enhancement or management of property inscribed on the World Heritage List and located within its territory. The Prize is awarded every second year at the World Congress.

Projects and Programs

Compilation of Case Studies

The OWHC project, "Compilation of Case Studies," under the leadership of our member city, Lyon, France, and in cooperation with UNESCO, the Council of Europe, the France UNESCO Convention, the Netherlands Funds in Trust, the Getty Conservation Institute and ICOMOS, aims to take advantage of the experiences of its members and prepare a lasting contribution on two major questions that managers of historic cities face:

- How to manage an urban, inhabited and living heritage site?
- How to respect the values of heritage while allowing the city to grow and develop?

The case studies submitted from the member cities have identified and presented exemplary achievements in one of the fields of heritage management and urban development such as traffic, lodging, public space, commercial or tourism functions and architectural creations. The studies will be posted on the OWHC website, www.ovpm.org and ultimately will be published, with the addition of other studies, in the form of a "how to" guide.

Youth Programs

The OWHC public awareness program places emphasis on youth as an investment in the future. Through the years the Organization has introduced projects and programs such as international drawing contests, youth forums, the twinning between schools in World Heritage Cities and

an international video production competition. All of the youth activities aim to promote an understanding of the importance of one's cultural heritage and the need to preserve it.

City2City
The longstanding City2City program facilitates the sharing of information and expertise as well as joint initiatives between member cities.

Partners

The OWHC has had the benefit of the continuous support of its partners in its activities.

From its founding, the OWHC has enjoyed a close cooperation with UNESCO and especially the World Heritage Centre, which was instrumental in its creation. This relationship was formalized with UNESCO by the signing of a Memorandum of Understanding in February 2002. The OWHC takes part in many UNESCO initiatives, including those concerning Historic Urban Landscapes. Conversely, UNESCO supports and participates in several OWHC projects.

In addition to its collaboration in the Mayors' Workshop, the Getty Conservation Institute, chose to assist three World Congress host cities in the selection and development of their themes as well as in the selection of speakers and the format of the scientific sessions. Through the years, the OWHC has also been supported in its activities by its other partners, the Council of Europe, the Getty Foundation, ICOMOS, ICCROM and the World Monuments Fund.

Future Directions

Throughout its existence, the OWHC has been a part of the crusade for the better preservation and management of World Heritage Cities, recognizing that their inevitable evolution and growth are posing ever-greater challenges to the achievement of these goals. The OWHC through its programs and in collaboration with its partners, seeks to respond to these and other issues, to achieve a balance and make a relevant, constructive and prospective contribution for the holistic, sustainable development of its member cities.

Cross-References

- ▶ Council of Europe Framework Convention on the Value of Cultural Heritage for Society (2005)
- ▶ Getty Foundation
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Monuments Fund (WMF)

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Orientalism: Islamic Archaeology and Its Colonial Context

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Introduction

For most of the history of Islamic archaeology, it has been conducted overwhelmingly by

non-Muslims, often from nations with a political, and sometimes an openly colonial, interest in the regions which contained the archaeological subject matter of their choice. These parties have predominantly, especially until World War II, been from France, the USA, Germany, and Britain, with significant contributions also from Belgium, Italy, Spain, and Russia. The broader political agenda of each of these nations had an undeniable impact on the way in which survey and excavation work was carried out, and indeed the conclusions which this work produced. The advent of post-processual theory in the 1980s brought critiques of the conduct of archaeologists, pointing out that archaeology has since its origin as a serious academic pursuit been to some extent a "vehicle of validation for social groups engaged (and enmeshed) in industrial growth, capital accumulation, and colonial expansion" (Hinsley 1989: 79-80). However, it is arguable that Islamic archaeology has been *particularly* susceptible to the influence of colonial thought and practice, with Islam and its influence regarded as an exotic "other," separate and distinct from the majority of those investigating it, and depicted in opposition to an apparently superior "West."

The term "colonial" can be defined in a number of ways. Trigger (1984) attempted to make a distinction between imperial and colonial archaeology, but for much of the nineteenth and earlier twentieth centuries, the relations between western nations and the Middle East, for example, fluctuated between the two. The definition used here is a broader one, that it is "the archaeology of countries where European powers have subjected native populations to various forms of institutionalised domination" (Jones 1997: 9).

Exploitative contact by western nations over large areas of North Africa, Western Asia (often described as the Middle East), and Central Asia took a variety of forms. Such contact has included direct military invasion and political control (as in French control over Algeria and the Russian invasion of Turkestan in the nineteenth century), sustained attempts at political control and some military intervention (as in the British and French presence in Egypt in the nineteenth and earlier twentieth centuries), the interwar "Mandate" period (where Britain and France divided much of the Middle East between themselves in the form of "protectorates" during the 1920s and 1930s), and more complex forms of intellectual representation (as in the Americans in various parts of the Middle East and Germany in the Ottoman Empire from the very end of the nineteenth century and up to World War I). These kinds of early political and military contact had a profound impact on the ways in which archaeological thought developed, an impact which has only begun to evolve away from such a colonial outlook since the 1990s, but which in some ways continues.

Historical Background

Islamic archaeology came relatively late to the attentions of European and American archaeologists. Although a rise in Orientalist literature and study had begun during the early eighteenth century, it was not until the 1880s that significant research avenues and funding structures for Islamic art, architecture, and archaeology developed (Vernoit 1997: 1-2). Islamic art had been regarded by scholars for much of the nineteenth century as unaccomplished and inferior to either Classical or Christian traditions. In 1855, James Fergusson could describe Islamic architecture in such simple and dismissive terms as "a pointed arch style, without pillars or entablatures, and with a system of ornamentation peculiar to itself" (Fergusson 1847, cited in Vernoit 1997: 1). Indeed as late as the first decade of the twentieth century, H.C. Butler, in his otherwise pioneering publication of a survey of the Limestone Massif and Hauran regions of Syria, fails to hide his disappointment that Islamic-period settlement had changed and obscured the finer, more "civilized" Roman and Byzantine architecture. He comments of the village of Harran, for example, that "unfortunately it was chosen as a place for settlement by the early Moslems and was almost completely rebuilt by them" (1907: 423).

Islamic levels were often hastily excavated with the "real" business of Classical, Iron Age and earlier remains the intended goal. This attitude continued in some areas well after World War II. In the new state of Israel, for example, occupation levels of the Islamic period were regarded as unimportant and routinely discarded long after a serious interest in such deposits had developed in neighboring Lebanon and Syria (Silberman 1989: 232, 234).

Key Issues

The maturing of Islamic archaeology as a subject of serious academic interest during the late nineteenth century came at a significant moment in relations between the changing political entities of North Africa, the Middle East and Central Asia, and the powerful nation states of Europe, and the United States.

The effects of this changing relationship can be seen in a number of ways, but it is important to be clear that Islamic archaeology did not simply occur *within* this political context. After all, archaeological thought and practice "must be understood as *constituted*, not just shaped or influenced or interfered with, by its social, political context" (Wylie 1989: 94). This means that not only can we recognize the presence of forms of *bias* imposed by archaeology's colonial context but it is also important to understand that Islamic archaeology was profoundly interlinked with the colonial agenda in ways which had a significant effect for the operation of *both* archaeological enquiry *and* the process of acquiring and holding colonies in predominantly Islamic lands.

The nature of that interlinkage can be defined as threefold: logistical (military and diplomatic), institutional, and intellectual. Describing and understanding the colonial context of Islamic archaeology is important not merely as an academic exercise but as a method of decoding and interpreting the significant body of work produced. However, as a counterbalance, it should be stated that to deconstruct the colonial context of Islamic archaeology is not necessarily to destroy or entirely dismiss the data and publications it produced. Substantial bodies of work have been carried out which may still be useful for scholars today, but that work may become *more useful* to us if we can understand the political context within which it was produced.

Diplomatic Context

The establishment of a permanent administrative presence created both the thirst for and the possibility of explorative missions to collect information on behalf of western governments, and archaeology was an important and attractive target for such journeys. These journeys were described as *Reisen* by German teams, *voyages* or *missions* by the French, and *expeditions* by the British and later the Americans. Travellers such as Joseph Rousseau in Syria and Iraq in 1807, Pascal Coste in Egypt and Iran in the 1820s, Charles Texier in Asia Minor and Iran during the 1830s, de Vogüé in Syria during the 1860s, and Alois Musil in Transjordan during the 1890s combined observation of physical archaeological remains with ethnography, philology, and a broader religious and political assessment of the populations encountered.

As archaeological observation and intervention became more specialist in the later nineteenth and early twentieth centuries, the links between such practitioners and the colonial administrations for whom they worked did not diminish. For example, Austen Henry Layard served as ambassador in Istanbul during the 1880s, Gertrude Bell was influential in informing the British response to the Arab Revolt and served in the British High Commission in Iraq, and J.W. Crowfoot was a member of the Egyptian civil service. A notable consequence of the presence of European administrators in the Middle East was their ability to influence antiquities legislation and infrastructure to their advantage, such as the introduction in Egypt of an antiquities policy by Auguste Mariette in 1858, the creation in the Ottoman Empire of a General Directorate for Imperial Museums in 1889, or the creation in

1920 of a Department of Antiquities in Palestine during the British Mandate.

Military Context

Military conquest was often followed closely by archaeological examination. Russian military advances in Central Asia during the late 1860s, for example, led to a number of scientific expeditions. Following the defeat of Abdul Malik Tura, the Russians established Samarkand as the capital of the newly formed "Russian Turkestan," and the Trans-Caspian railway reached the city in 1888. Already by 1885, one of the first large-scale excavations of an Islamic city had begun there (Rogers 1974: 50-55). Archaeology can be seen as a primary tool in this context in the interpretation and "knowing" of newly acquired territories, particularly where significant differences were perceived as existing between the conquerors and the conquered.

Furthermore, the invasion and holding of ground by military means required a detailed understanding of the topography and distribution of populations through the creation of detailed mapping. Such mapping relied initially on the sketches and descriptions made by travellers and archaeologists, and as it became more sophisticated such as those records made by the Bureau Topographique du Levant during the French Mandate over Syria in the 1920s, it in turn enabled archaeologists to discover and understand archaeological sites in more detail. The aerial photography carried out in the Middle East and North Africa by British, French, and German crews during World War I also contributed a great many new sites, with the French Jesuit Priest Antoine Poidebard a particularly notable practitioner.

Institutional Context

From the 1880s, such diplomatic and military engagement in North Africa, the Middle East, and Central Asia by France, Britain, the USA, and Russia led to the establishment of more formal institutional underpinnings and the creation of the earliest true "discipline" of Islamic archaeology. This new discipline was helped substantially by the creation of a number of foreign schools and institutes throughout the Middle East, such as the British School of Archaeology in Egypt and the Institut Français de Damas. But the early formation of research agendas using such schools as their bases was (and to some extent remains today) an almost entirely foreign phenomenon, with the conception of subjects and methods of research rarely involving any meaningful input from local archaeologists (Hull 2007: 100).

The interests of the emerging discipline of Islamic archaeology were heavily influenced by art-historical interest, rather than socioeconomic analysis. As the mass surveys of the first half of the twentieth century gave way to more intensive, single-site studies, the lens, and to some extent technique, through which such studies were focused was an aesthetic one. Just as colonial ambitions were driven in part by the potential for the exploitation of natural resources and trade routes, Islamic antiquities emerged in the years prior to World War I as a desirable and marketable resource. A significant market in Islamic-period objects opened up from sites such as Fustat, Rayy, and Raqqa, leading to significant amounts of looting (Vernoit 1997: 5). Such an exploitative and aesthetically driven attitude towards Islamic archaeology was not confined to the black market, with western museums also developing a great appetite for high-status Islamic artifacts and funding research projects to gather examples into their collections (see Patterson 1986: 8 for a description of the appetite of American institutions during the nineteenth and early twentieth centuries).

Similarly, Oleg Grabar's two-volume study of Qasr al-Hayr al-Sharqi described the architectural elements of the high-status structures in some detail, but failed satisfactorily to explain the site's wider function and socioeconomic context, not least due to an unwillingness to examine seriously the lower-status settlement to the east of the *qasr*. Divorced of this more nuanced and informed archaeological evidence, the standing structures seem isolated and unexplained. A more

recent study has begun to analyze more convincingly the chronology and function of the site (Genequand 2005).

Intellectual Effects

The most influential and debilitating aspect of these earlier attempts at archaeological study of the Islamic period was not logistical or institutional but intellectual. Islamic archaeology was, until the 1990s at the earliest, still a disconnected, specialist discipline, kept at arms' length from other periods and regions. The "Orient," and in many ways Islam specifically, was viewed as something separate and distinctly different from those western archaeologists and institutions which were carrying out the bulk of the work.

This is in large part because archaeological study of "Eastern" subject matter has tended to be regarded as "special," unique to the "East." We may reflect, for example, on Butler's description of the surface remains of the Hauran that "it represents a distinct racial, if not national life, and which is Oriental in sentiment and in expression" (Butler 1907: vi). Opinions such as this produced a lasting attitude that such remains required a special outlook in order to deal with them. The study of Islamic archaeology, architecture, and the decorative arts tended to be associated with "academic pigeonholing with…'exotic' archaeological studies placed away from the received mainstream and thus made to appear remote, inaccessible and different" (Insoll 1999: 3). This is reflected in the fact that studies of Islamic archaeological material often derived from university departments whose primary emphasis was on the "Orient" as a region. Admittedly, this has led to a rich cross-fertilization of ideas from different disciplines, such as anthropology, linguistics, literature, and history. However, it may also be argued that this method of study has isolated many of the narratives drawn from Islamic material from broader, interregional intellectual processes pursued in mainstream archaeology departments whose emphasis is subject, rather than area, related. For Islamic archaeology, this situation has had the consequence of limiting the application of theoretical frameworks and field methodologies developed within archaeological practices elsewhere.

Edward Said and Orientalism

This intellectual context did not form on its own – it was directly influenced, if not largely created, by the political context within which it was first formed during the early years of substantive contact between "East" and "West" in the eighteenth and nineteenth centuries. Indeed this context can be described as evolving into what Edward Said has termed "Orientalism," whereby representations of an "East" are juxtaposed as separate from a "West" and where "the Orient came to be seen as stagnant and despotic in order to define the democratic dynamism of Europe" (Hodder 1998: 125; Said 1978). Said asserted that the motivations behind this study, the methods through which it has been conducted, and the ways and the location in which it has been presented are "a way of coming to terms with the Orient that is based on the Orient's special place in European Western experience" (Said 1978: 1). The product of this process has been, for its creators, not only an Orient which is "a place of romance, exotic beings, haunting memories and landscapes, remarkable experiences" but also "the source of its civilizations and languages, its cultural contestant…its contrasting image, idea, personality, experience" (1978: 1-2). In short, Said argued that an Orient had been created which was an exotic "other," set in opposition to a more dynamic, functionally superior Occident.

The studies which have resulted from this polarized approach are, according to Said, "shot through with doctrines of European superiority, various kinds of racism, imperialism, and the like" (1978: 8). But crucially, scholarly enquiry and the cultural media which derived from such work were, consciously or otherwise, products of a colonial process and were bound up within its machinery. Archaeological surveys of the kind that created the works of de Vogüé, Butler, Creswell, Sauvaget, Bell, and others were not simply *products* of the domination of certain western nations over the "East" – they were actively involved in the business of domination.

Indeed, archaeology played a role in the depiction of a hauntingly beautiful yet despotic "East" by eighteenth- and nineteenth-century Europeans, with the historic environment forming an important backdrop in such illustrations as Delacroix's *Algerian Women in their Apartments* and Léon Benett's exotic illustrations of locations such as Samarqand for the Jules Verne novels. These depictions had a strong influence over European and American imaginings of North Africa, the Middle East, and Central Asia. Furthermore, as is described above, the exploratory work of archaeologists on the ground also played an active role in carrying out colonial policy.

Edward Said's notion of Orientalism is not without its critics, and academics from various disciplines have expressed difficulty in accepting his view (Halliday 1993; Irwin 2007). Criticisms have been expressed that Said tended to overstate his case and that his views derived from some kind of personal grudge against western academia. He has been accused of perpetrating the very juxtaposition of representation of which he himself complained. Said did not engage directly with archaeology in his writings. Nevertheless, the theoretical framework which he provided is regarded widely within disciplines such as anthropology as useful in accounting for the nature of Orientalist studies in the past, and also in striking a cautionary note in any cultural representations, particularly when the culture is not that of those doing the representing.

One of the consequences of Orientalism is that Islam has been depicted too strongly as a divisive influence in the course of history. The influential work of the Belgian historian Henri Pirenne, often called the "Pirenne thesis," was particularly significant in this regard (Pirenne 1937). For Pirenne, the Roman Empire continued largely unchanged in the eastern Mediterranean, and so the unity of the Mediterranean Sea in cultural and economic terms remained largely intact: it was Islam that broke the economic ties which bound the Mediterranean region together, and so the social and political processes of early medieval Europe began. Just as Said has described, Pirenne was in essence using Islam to define Europe.

For the scholars who inherited this tradition of thought, Islam was also portrayed as a divisive, cultural shock. For Georges Tchalenko (1953), who spent much of the 1930s and 1940s mapping and interpreting the olive oil-driven "dead cities" of the Limestone Massif in northwest Syria, Islam swept through the lower plains, isolating these upland communities and destroying the trade routes which had enabled olive oil to flow into Mediterranean markets. According to Tchalenko, this process impoverished the 700 or so villages of the Limestone Massif and began a process of decline and abandonment. This view can be seen as the continuation of a much older intellectual framework. In fact, the arrival of Islamic thought and the spread of Arab culture have since been shown to have occurred more gradually and in subtle and different ways throughout the Middle East and the Mediterranean (for the Limestone Massif, see Sodini et al. 1980; for more general comments on the spread of Islam, see Walmsley 2007: 45-7, 111-12).

Another consequence of the Orientalist intellectual context is what might be termed "essentialism," where Islamic culture came to be thought of as consisting repeatedly of the same elements and its material culture assumed to indicate a predictable "pattern" which could be read in a relatively simple manner wherever it is encountered. Muslim society has been assumed by some to be distinct, self-contained, and unchanging. One example of this is the nature of commentary for much of the twentieth century on the Islamic city. Some have concluded that a set number of fixed elements make up a geographical "kit" unfolded by Islamic conquerors in the seventh century and which remained in place thereafter: the high-status citadel (*qasr*), a congregational mosque, *suq*s with quarters for separate trades, communal baths, closed neighborhoods for each extended family group consisting of courtyard houses, and a caravanserai outside the city walls are some of the elements typically described (e.g., Carver 1996; von Grunebaum 1961). A difficulty in such an outlook is that these elements of a "typical" Islamic city are assumed – in

a fashion typical of the romantic outlook of the Orientalist – to be somehow unchanging, without the dynamism and complexity assumed of western societies.

The apparently clear, but ultimately flawed, historical and intellectual framework which Orientalist thinking established also led to the mis-categorization of sites. A stark example is provided by Fergusson's misunderstanding of the Dome of the Rock as the Church of the Holy Sepulchre later taken over by Muslims. The significant technological achievement of the Harbaqah dam in Syria was assumed to be Roman, without any strong dating evidence to justify such a claim, simply on the grounds of its solidity and sophistication (Schlumberger 1986). This site has since been more convincingly identified as Umayyad in date, feeding as it does a sophisticated mill and irrigation system at Qasr al-Hayr al-Gharbi some 17 km away (Genequand 2006: 64).

This under-recognition of early Islamic achievement created a divisive rush to identify a clear difference and to assign this difference (even if unspeakingly) as ethnically or racially derived. Such a division seemed somehow to "fit" and to make sense to those seeking to explain the complex social and political changes of the fourth to ninth centuries. Hugh Kennedy wrote an influential piece in 1985 which sought to capture the essence of changes from Byzantine to early Islamic society in the Middle East. In "From Polis to Medina," he concludes that the wide, ordered streets of the Classical eastern Mediterranean became in the early Islamic period cluttered, winding alleyways focused wholly on commerce at the expense of a calm and ordered urban landscape. There is almost an inference here of helpless, chaotic collapse, as "broad, colonnaded streets were invaded and divided up by intrusive structures, both houses and shops, and became more like narrow winding lanes than the majestic thoroughfares of classical antiquity; and the extensive, open agora, scene for markets and meetings, was gone" (Kennedy 1985: 4-5). Such changes also coincided with a switch away from carts towards pack animals, again Pirenne's theme of a turning inwards towards the Great Syrian Desert and away from the Mediterranean markets of the Roman period.

Kennedy is careful to note that some of these changes occurred earlier than the arrival of Islam and he warns us against issuing value judgements. However, at the same time, there is a continuity of thought in Kennedy's conclusions which extends half a century back to some of Jean Sauvaget's analysis of Islamic cities in the 1920s. It was always difficult with such works to avoid the implication that the arrival of dark and winding streets somehow derived from the encroachment of a winding, deviant Oriental mind. This may not explicitly have been the intention of authors in all cases, but the insinuation was certainly present. More recently, the conduct of more sophisticated urban archaeological projects with greatly improved chronologies have led many to react against the model of Classical streets becoming clogged and neglected by Islamic *suqs*. Cities like Jarash, for example, have been shown to be far from the "putrid urban skeleton left behind after the decay of a once respectable 'Roman' metropolis" in the early Islamic period, with the maintenance, enhancement, and adaptation of the municipal infrastructure of the city an ongoing priority well into the seventh and eighth centuries (Walmsley 2007: 84).

Future Directions

It has taken some time for this context of thought to change. The period following World War II was one of significant self-definition for newly formed nation states in the Middle East, many of which established new national museums and antiquities services and developed a keen appetite for Islamic-period remains to inform an emerging national identity. Such processes have been more recent in North Africa, and more recent still in Central Asia, but it remains a fact that in all of these regions, Islamic archaeology is

still predominantly (though no longer exclusively) practiced by scholars from elsewhere (there are exceptions, such as Hawker et al. 2005). Until the 1990s, the research agenda employed for Islamic archaeology remained those defined prior to World War II: essentially art-historical, set by western Orientalists, and continuing to define Islam as a decisive break with the past and a divisive influence on the Mediterranean and wider region. Theoretically, practitioners of Islamic archaeology took little notice of the changes and self-reflexive thinking brought about in other archaeological disciplines from the late 1960s. Methodologically too, excavation of Islamic sites has continued to suffer from the widespread exploitation of large, cheap, local labor forces, with projects sometimes poorly supervised and with little meaningful knowledge exchange between local archaeologists and their European and American "partners."

Over the last 30 years, there has been a gradual evolution in the relationship between Islamic archaeology and the European and American writers who are still, largely, its creators. A significant reappraisal of the impact of Islam has occurred, particularly regarding its role during Late Antiquity, with an emphasis now on more subtle and nuanced changes occurring in different ways in different areas. Walmsley has concluded that "while there were significant changes, overall urban life continued strongly in early Islamic Syria-Palestine" and that social changes probably did not occur to any great degree until somewhat later in the ninth century (2007: 112). The macro-social model of a widespread and sudden impact from the 630 s, conceived in the later nineteenth century and continued by influential scholars like Pirenne, has been contradicted by the collection of data of a higher quality deriving from research agendas conceived within more reflexive intellectual frameworks.

Islamic material culture is now more frequently treated as the archaeological record of a faith and its sociopolitical context, rather than a historical "moment" exclusive to the Middle East (Insoll 1999 is an important text in this regard). Thus, there has been a diversification of interest to Indonesia, sub-Saharan Africa, India, and indeed Western Europe.

But it is clear that the relationship between western academia and Islamic archaeology has far from completed its evolution. We must continue to be wary of the academic exclusion of the Muslim voice; secondly, there continues to be a complex and largely unequal political relationship between those regions of the world where Islam predominates and the "West." This inequality arguably continues to lead those who play a role in representing Islam – whether scholars, journalists, or others – to continue the long tradition of overemphasizing the difference and the disconnection between Islam and others and thus failing to see some of the complex comparisons and inter-relationships which certainly exist today and which archaeology can elucidate for us in the past.

Cross-References

- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Capitalism in Archaeological Theory
- ▶ Capitalism: Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic and Crusader Archaeologies
- ▶ Islamic and Maritime Archaeologies
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Military Activity in Islamic Archaeology
- ▶ Nationalism and Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Pakistan: Archaeological Museums
- ▶ Postcolonial Archaeologies
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Spain and North Africa: Islamic Archaeology
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Orientalizing Phenomenon: Greek Archaeology Perspective

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Introduction and Definition

The Orientalizing in Greek Archaeology is something that, at first sight, looks straightforward but on closer examination becomes anything but. Traditionally, the term Orientalizing refers to a phase in Greek history when Greeks adopted a number of ideas, motifs, and technologies from the Near East and Egypt. It also corresponds to an archaeological phase

within the Early Iron Age (c. 1,100–700 BCE) or Archaic (c. 700–480 BCE), usually dated to the seventh century BCE (c. 700–600). It has also come to mean a style, particularly a style of painted pottery that employs a large number of motifs or images that conspicuously display their Near Eastern or Egyptian origin. The palmette, the "tree of life," the lion, and the griffin all count as "Orientalizing" motifs. They can all be traced back to prototypes (usually to be found in metalwork) in art from the Levant (modern Syria, Palestine, Lebanon) or Egypt.

An example of this style of painted pottery is the Orientalizing of Knossos in Crete, dating to the seventh century BCE (Brock 1957; Moignard 1996, 1998). This polychrome pithos (no. 993, from tomb II in the Fortetsa cemetery near Knossos; Brock 1957: 92) illustrates many of these features traditionally taken to be "Oriental." On its central band, it has a guilloche, a cable motif which must derive from some metal prototype; on its lower belly, it has a lotus chain, again a motif common in the art of both Egypt and the Levant. The debt to Eastern prototypes is clear.

That the Orientalizing was both a style and a phase, and was confined to the seventh century, used to be one of the fixed points in the main evolutionary sequence of Greek Archaeology. Over the past three decades, however, this picture has been shattered. First, Walter Burkert redefined the Orientalizing, not as a style or a phase, but as a revolution that affected all aspects of Greek culture, both literary and material (Burkert 1992; cf. West 1997). The adoption of Oriental motifs on painted pottery was, therefore, linked to the borrowing of ideas and stories from the Levant and their incorporation into the corpus of Greek storytelling. Then Martin Bernal mounted his critique of what he saw as the "Aryan" tendencies within traditional classical scholarship (Bernal 1991). In insisting on the uniqueness of the Greek achievement, traditional scholarship necessarily downplayed Greece's debt to the Near East and Egypt (or so he argued). Sarah Morris (1992) took this argument further. For her, there was never really an Orientalizing phase. Greece was always in the process of "Orientalizing," from the Bronze Age down to the conquest of the Achaemenid (Persian) empire by Alexander the Great. Contact with, and borrowing from, the Near East was the norm rather than the exception.

The Orientalizing then can be defined in a number of ways: first, as a *phase*, confined to the seventh century, and then as a *style*, one that adopted motifs to be found on Oriental metalwork and applied them to the surface of painted pots. Neither of these definitions is very satisfactory if we want to consider the full range of the cultural encounters between the Near East and the Orient. It is perhaps best to consider the Orientalizing as a *process* whereby the Greeks adopted what they found good or useful from their Near Eastern neighbors. Or rather, it was an aspect of a wider process by which the Mediterranean world (the Greeks, the "Orientals," and various Italian peoples) became highly interconnected, especially but not exclusively during the eighth and seventh centuries BCE (Horden & Purcell 2000). There is as yet no widely accepted term for this process. However we define it, the Orientalizing remains an encounter between "the Greeks" and "the Orient." Do these categories withstand any external scrutiny?

Key Issues

Greeks and the Orient

Bernal was right about one thing: we owe to Classical scholars our commonsense notions not only of what Greek but also Oriental culture was. Greek culture is the community of Greek speakers, whose collective identity (or national consciousness) is expressed equally in its literature, philosophy, art, and material culture. But this picture does not in fact withstand any close scholarly scrutiny. It is, for example, extremely unlikely that there was anything like a Greek national consciousness, or sense of collective identity, before the sixth century BCE (i.e., after the "Orientalizing" period; see Hall 2002). Material culture groups (archaeological cultures) do not correspond to our commonsense

notions of what is Greek and what is Oriental (Gunter 2009: 50–123). Ethnic, linguistic, and material culture groups are not tightly defined cultural blocks, but overlapping, polythetic sets, with porous boundaries (see Clarke 1978: 263–6 and 311–408; cf. Whitley 2001: 231–3). Take Cyprus, an island with a mixed population of Greek speakers, Phoenicians (West Semitic speakers), and "Eteocypriots" (a supposed remnant of an aboriginal population, whose linguistic affinities are unclear). During the Iron Age in Cyprus, a Late Bronze Age style of pottery gradually and seamlessly yields to something labelled "Cypro-Geometric" which in turn yields to "Cypro-Archaic." There is no Orientalizing phase as such, because (in a sense) Cyprus is a part of the Levant and shared many cultural traits with much of Northern Syria throughout this period. Nor are the distinct groups of Greek, Phoenician, and "Eteocypriot" speakers distinguished by any particular material culture traits – the chief "Phoenician" city Kition (despite its reputation as a "Phoenician colony") looks much like any other Cypriot city in the Iron Age and Archaic periods (see Iacovou 2008).

But if "Greek" and "Oriental" are not clearly defined entities or categories, where does that leave the Orientalizing? Well, it is at least clear that the inhabitants of the Aegean did gradually transform their Geometric pottery styles into something markedly more figurative and colorful and that this process involved making creative use of metalwork that came from the Near East. It is less clear, however, that this transformation was effected entirely within the seventh century BCE. Indeed, different regions of Greece had different kinds of Orientalizing phases, which do not all fall within the seventh century. In Crete, for example, contact with points further East was never really lost. The inhabitants of Knossos continued to make use of Cypriot-inspired tripods and Egyptian-style lotus-handled jugs throughout a long period from c. 1,000–600 BCE (see Brock 1957). In the ninth century BCE, large quantities of Oriental-inspired metalwork is deposited in Knossian graves, leading some scholars (notably Boardman 1967) to argue that this period saw a guild of North Syrian metalworkers set up shop in late ninth-century Knossos. Certainly, motifs derived from Levantine metalwork form part of the inspiration for the curious "Protogeometric B" style of pottery, which some have seen as Greece's first "Orientalizing" style.

Regional Variations: Athens (Attica) and Corinth

But the same is not true of other parts of Greece in this period. In Athens, Oriental objects (a North Syrian bronze bowl) and Oriental technologies (techniques of granulation and filigree in goldwork) make their appearance in rich ninth-century graves. But there is no discernible effect on the decoration of the locally produced painted ceramic finewares (Whitley 1991: 116–37). These remain strictly Geometric in their exterior decoration. In the succeeding eighth century, there are some signs that knowledge of both the iconography and techniques of Levantine metalwork are having an effect on local craftsmen. Gold bands, decorated with embossed quadrupeds, appear in some numbers, and such animals then appear in friezes on some notable pieces of Late Geometric pottery. The famous Dipylon vase, Athens NM 804, datable to around 750 BCE, almost certainly used as a grave marker for an important female aristocrat, is decorated mainly with strictly Geometric ornament. Such animal friezes as such vessels possess remain subsidiary to the overall Geometric design (Whitley 1991: 137–80). It is only in the middle of the seventh century that Athenian (or conceivably, Aeginetan) potters and painters adopt most of the techniques of a truly polychrome, Orientalizing style (called Middle Protoattic, or the "Black and White style"). On the Polyphemos amphora from Eleusis (see Morris 1984, Fig. 6), the cables between the panels clearly derive from metalwork, and the gorgons have heads in the shape of bronze cauldrons decorated with animal protomes (the most characteristic form of Orientalizing metalwork).

Compared to its neighbor Corinth, the Athenian Orientalizing style appears half-hearted. The full-blown Corinthian Orientalizing style is called Protocorinthian and is confined to the

seventh century. But it is much more deeply engaged with Near Eastern metalwork than its contemporary Athenian style or Knossian Orientalizing styles. These styles borrowed polychromy and a range of motifs (guilloche, cable, lotus). Protocorinthian – or at least Middle Protocorinthian – borrows a metalworker's technique, engraving, and applies it to painted pottery. Engraving was used to define the features, the detail of painted figures, to remarkable effect. Take the Macmillan aryballos, a highly decorated flask used for holding perfumed oil, now to be found in the British Museum. Like the Polyphemos amphora and the pithos from Knossos, this vase shows a distinctive motif derived from Oriental metalwork; on the shoulder, there is an elaborate lotus chain (or scroll). But the vase goes further, and its debt to Oriental metalwork goes deeper. Its spout/mouth is in the form of a lion's head, and the figures and the shields of the duelling hoplites are outlined with engraving. And unlike the vases from Knossos and Eleusis, whose function (or final use) was funerary and whose decoration is correspondingly large and splashy, all the figures in the Macmillan aryballos are in miniature. The vase itself is only 7 cm tall; to see the figures in the museum, you have to look through a magnifying glass.

What is most remarkable about this most creative of the Orientalizing pottery styles of Greece is that it seems to come out of nowhere. Whereas both in Knossos and in Athens there is evidence that Oriental techniques and artifacts had been known from at least the ninth century BCE, there is little evidence for Oriental stimulus in the Corinthia before c. 700 BCE. The Late Geometric Corinthian style, while distinctive, owes nothing to the Orient, and the finds of Oriental objects (some bronze bowls called phialai) that appear to have arrived in any major Corinthian sanctuary (Perachora or Isthmia) are few. One could argue that the very unfamiliarity of Oriental material culture provided a greater stimulus and thus invited a more sophisticated response. And Protocorinthian probably remains the most influential of all the Greek Orientalizing styles of the seventh century. First perfume flasks, then pouring vessels (such as the Chigi vase, an *olpe*), and finally the whole range of shapes that came later to be associated with the Greek symposium (in particular the krater) start to turn up in various sites in Italy and not only sites of Greek colonization, but Etruscan and Latin sites as well. Orientalization is thus linked to Hellenization and to that complex of mutual borrowings and interactions characteristic of the period c. 800–600 BCE ("Mediterraneanization," Morris 2003).

The Mediterranean Perspective

It is the scale, range, and profound consequences of this process of Mediterranean transformation that might make a narrow focus on styles of Greek painted pottery appear myopic in the extreme. Certainly, there was a lot more going on than some creative borrowing of craft techniques. Oriental models affected other media, sometimes in a more or less direct copying of Levantine prototypes. So the so-called Astarte (nude female) figurines that appear all over the Aegean, but especially in Crete, in the seventh and sixth centuries BCE differ only slightly from similar examples in the Levant or the Phoenician settlements in the Western Mediterranean. And much of the best evidence for the impact of Oriental material culture comes not from graves in Greece or Italy but from major sanctuary sites. Olympia, later the greatest of Panhellenic sanctuaries, became the recipient of a number of Near Eastern engraved bowls (Markoe 1985), and, in the seventh century, Olympia becomes the home of a number of tripod cauldrons dedicated with griffin protomes, following closely on models produced in Urartu and Assyria (which in turn provided the model for the gorgon heads on the Polyphemos amphora). Sanctuaries indeed seem to fill up with various Near Eastern "entangled objects" (sensu Thomas 1991) in the seventh and sixth centuries BCE. Oriental ivories from Nimrud and the Phoenician coast are deposited in the Idaean cave along with the "Orientalizing" bronze tympana produced by Cretan craftsmen as offerings to Cretan Zeus in the eighth and seventh centuries BCE. But the most spectacular example of this tendency

to deposit Oriental antiques with extended biographies is the find Aramaean horse frontlet, securely dated by its Aramaic inscription to the ninth century BCE, in a sixth-century stratum in the sanctuary of Hera on Samos (the Samian Heraion; see Kyrieleis & Röllig 1988; discussion in Gunter 2009: 124–6).

This object then illustrates one side of the multiple and multiplying entanglements that "the Orientalizing" was connected to. Some scholars have seen more in this; engagement with Oriental (and ostentatiously Orientalizing) material culture was part of a social strategy through which elites defined themselves, in Athens and elsewhere (Whitley 1994; Morris 1999: 155–91); Orientalizing imagery on Protocorinthian perfume flasks has been considered as being intimately related to the definition of Greek masculinity (Shanks 1999). But the most long-lasting of these material entanglements does not lie with biographical objects, imagery, or art. It is the adoption of the shapes and (to a lesser extent) the phonetic values of the Phoenician script (whether or not we call it a consonantal syllabary or alphabet) and its adaptation better to suit the phonetic requirements of Greek (with the addition of signs for vowels) that marks the most creative and the most long-lasting of Greek encounters with the Levant. The adoption of the alphabet (Jeffery 1990: 1–42; Whitley 2001: 128–33) sometime in the early eighth century BCE was not merely the "recovery of literacy," as if literacy is something that can be simply discarded and then found again. It was a completely different kind of literacy and produced a completely different set of material entanglements, whose effects we can feel even today. But that is another story, one that goes beyond any consideration of the "Orientalizing" in ancient Greece.

Cross-References

- ▶ Classical (Greek) Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Panhellenism

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Basic Biographical Information

Charles E. Orser Jr., one of the leading North American proponents of a globally aware historical archaeology of the modern world, was born in Wyandotte, Michigan, in 1950. Orser initially studied history (with minors in geology and English literature) at university, graduating from Eastern Michigan University with a B.S. in 1972. He then studied for an M.A. in anthropology at Wayne State University, graduating in 1975. His doctorate in anthropology was awarded by Southern Illinois University at Carbondale in 1980; his dissertation was titled *An Archaeological and Historical Socioeconomic Analysis of Arikara Mortuary Practice*.

Orser's academic and professional career was initially focused on the upper Midwest and northern Plains of the United States. From 1979 to 1980, he was Assistant State Archaeologist in the Michigan History Division, Michigan Department of State. His first academic post was as Visiting Assistant Professor, Department of Sociology and Anthropology, Loyola University of Chicago (1980–1982); he then moved to the University of South Dakota, where he was Visiting Assistant Professor in the Anthropology Program (1982–1983). From 1983 to 1989, he was Assistant Professor of Anthropology, Department of Geography and Anthropology, Louisiana State University; he was granted tenure in 1988. During this time, Orser was also briefly adjunct faculty in the Division of Continuing Education of the University of St. Francis (Joliet, Illinois) in 1985. In 1989, he moved to Illinois State University, where he became Director of the Midwestern Archaeological Research Center. When Orser left Illinois State at the end of 2007, he had achieved the rank of Distinguished Professor of Anthropology in the Department of Sociology and Anthropology. Since early 2008, he has been the Curator of Historical Archaeology at the New York State Museum and University of the State of New York; he is also currently a Distinguished Professor Emeritus of Illinois State University and an Adjunct Professor of the Department of Archaeology, National University of Ireland, Galway (a position he also previously held from 1994 to 2004). Orser has also held a large number of visiting positions. These include Visiting Professor, Department of Anthropology, University of Tennessee (1988); Visiting Professor, Department of Archaeology and the Culture and Colonialism Program, National University of Ireland (1995); Visiting Professor, Department of Archaeology, University of Lund, Sweden (1996); Research Associate, Department of Anthropology, The Field Museum, Chicago (1993–2003); Visiting Professor, Department of Archaeology, University College Dublin, Ireland (2007–present); and Visiting Professor, Department of Anthropology and Archaeology, University of Otago, New Zealand (2011). He was also a member of the Board of Directors of the Society for Historical Archaeology between 1996 and 1998.

Major Accomplishments

Though Orser's graduate research might have suggested a future career on the archaeology of

Native Americans, his involvement in historical archaeology began before he completed his doctorate. His early publications in the field were initially focused on the upper Midwest (e.g., Orser 1981). Over the course of the 1980s and early 1990s, however, Orser's research turned to the historical archaeology of plantations, with a particular focus on South Carolina and Georgia. This work, which culminated in the publication of *The Material Basis of the Postbellum Tenant Plantation: Historical Archaeology in the South Carolina Piedmont* (Orser 1988), served to develop many of Orser's ongoing research foci, particularly as regards race, class, status, and power, and the role of material culture in the analysis of these themes. It also showed a willingness to challenge historical archaeology orthodoxies of the time, such as the use of pattern analysis in material culture interpretation (Orser 1989).

While his work continued to focus on many of the same themes, from the early to mid-1990s, Orser's attention increasingly turned to global perspectives in historical archaeology, with a particular focus on Brazil and Ireland. In his influential 1996 book *A Historical Archaeology of the Modern World*, one of the first historical archaeology volumes to argue for a coherent overtly international archaeological approach to the global nature of the modern world, Orser identified four "haunts" of historical archaeology: colonialism, Eurocentrism, capitalism, and modernity (Orser 1996: 57-8). The intersection of these themes in the fifteenth century defined both the modern world and the archaeology thereof (Orser 1996: 86). While outlining how these themes were relevant at both the local and the international comparative level, Orser coined what is probably his most famous maxim: "Think globally, dig locally" (Orser 1996: 183). While international comparative and globally aware approaches are now much more common in historical archaeology across a range of topics, in the early to mid-1990s, a comparative study of sites in Palmares, Brazil, and Gorttoose, Ireland, from an explicitly globalizing perspective was groundbreaking. Orser's commitment to international issues in historical archaeology can also be seen in his founding the *International Journal of Historical Archaeology* in 1997 (of which he remains the editor) and the Springer book series "Contributions to Global Historical Archaeology."

While Orser continues to maintain strong research and publication links with South America, particularly Brazil, often in close collaboration with Pedro Funari (e.g., Funari et al. 2005), the bulk of his research since the mid-1990s has focused on Ireland, where he has directed historical archaeology fieldwork in counties Roscommon, Sligo, and Donegal (e.g., Orser 2006). Much of this work has focused on Orser's familiar themes of class, status, and power (e.g., Orser 2005), usually encompassing (whether implicitly or explicitly) the globally aware approach that has characterized most of his work since the mid-1990s. He also continues to take a strong interest in general theoretical and educational approaches to historical archaeology. His *Historical Archaeology*, currently on its second edition (Orser 2004), is one of the most widely used introductory textbooks to the subject.

Cross-References

- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
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Basic Biographical Information

Donald J. Ortner (1938–2012) (Fig. 1) was born on August 23, 1938, in Stoneham, Massachusetts, the son of a conservative Christian minister, A. W. Ortner, and his wife, Marie Schweizer Ortner. Drawn to science (particularly biology) in high school, he was introduced to anthropology through the works of Margaret Mead and Ruth Benedict. His M.A. thesis at Syracuse University in 1960 was a comparative sociocultural study, but he was impressed by the courses in physical anthropology taught by Gordon Bowles. After moving to Washington, DC, with his wife Joyce Elaine Walker Ortner, a registered nurse, Ortner took a job at the National Museum of Natural History (NMNH), Smithsonian Institution, as laboratory assistant to J. Lawrence Angel. Bowles and Angel were both successful products of E. A. Hooton's program in physical anthropology at Harvard, and Ortner became

Ortner, Donald J., Fig. 1 Donald J. Ortner (2010)

intrigued by Angel's insights into the dynamic interactions between human biology and culture.

Encouraged by his colleagues at NMNH, Ortner entered the Ph.D. program in anthropology at the University of Kansas to study with the skeletal biologists Ellis Kerley, Thomas McKern, and William Bass. During his year of coursework at Kansas, Ortner was awarded (co-jointly with Angel) a 5-year research grant from NIH to explore the microscopic and biochemical effect of aging on human compact bone. Ortner's dissertation, *The Effects of Aging and Disease on the Micromorphology of Human Compact Bone*, deepened his understanding of the essential biological interactions between soft tissue and bone and strengthened his conviction that a solid grounding in general human anatomy and physiology is essential for anyone seeking to conduct successful research in skeletal biology.

After his return to NMNH, Ortner was appointed assistant curator in the Department of Anthropology. At this time, Angel and two other physical anthropologists at NMNH, T. Dale Stewart and Lucille St. Hoyme, were broadening the theoretical foundations of the relatively new discipline of paleopathology (the study of health and disease in antiquity), bringing a truly anthropological perspective to this mainly descriptive field. After reading Adolph Schultz' studies of skeletal pathology in wild-shot primates, Ortner was influenced by the theoretical implications of Schultz' argument that adaptation to illness (including infectious diseases, parasites, and traumatic injuries) was a very powerful force in prehuman and human evolution. To further his education in anatomy, physiology, and the mechanisms of disease processes, Ortner enrolled in a rigorous course in orthopedic pathology taught by Lent Johnson, chief of orthopedic pathology at the Armed Forces Institute of Pathology. This course marked a turning point in Ortner's career toward understanding the complexity of various disease processes and the web of biological and cultural factors which affected their development.

After his decision to concentrate on human skeletal remains from archaeological sites (rather on living subjects), Ortner began gaining archaeological field experience by working with colleagues at burial sites in the Washington, DC, area. He quickly acquired a broad knowledge of archaeological methods and became convinced of the importance of conducting in situ examinations of skeletal remains as well as conducting sophisticated laboratory analyses. In 1976, Ortner was promoted to curator of physical anthropology in the Department of Anthropology at NMNH (the position he held until his death in 2012), and in the following year, he joined a research project sponsored by the Smithsonian Institution (1977–1981) at the Early Bronze Age I site of Bab edh-Dhrâ, Jordan, to direct excavations of the cemeteries.

Major Accomplishments

In his long and active career, Donald J. Ortner's significant contributions to biocultural anthropology and paleopathology fall into three categories.

Teaching

Ortner organized a series of special courses on human skeletal paleopathology (1971–1974, 1985) which combined lectures on orthopedic

pathology and osteology with laboratory sessions devoted to studying pathological cases from the human skeletal collections at NMNH. His stated objectives were to improve the professional competence of anthropologists in paleopathology; to foster dialogues among anthropologists, physicians with specialties in skeletal radiology and orthopedic pathology, and museum staff who curate human skeletal and mummified remains; and to develop a teaching file of photographs and x-ray films of modern, documented pathological samples and an international registry of paleopathological specimens.

Beginning in 1988, Ortner offered a similar series of short courses in paleopathology (now widely emulated at European universities and research centers) at the University of Bradford, England. From 1989 to 2010, Ortner taught a series of half-day workshops in skeletal pathology at the annual North American meetings of the Paleopathology Association. In addition, Ortner mentored numerous pre- and postdoctoral students of skeletal biology and paleopathology as well as visiting professionals from many different countries who came to Washington, DC, to study the human skeletal collections under his curation at NMNH. Through these efforts, he provided invaluable training for several generations of paleopathologists, both students and professionals.

Research in Biocultural Anthropology and Paleopathology

Ortner published 4 books and more than 100 scientific articles on various topics in skeletal biology, biocultural anthropology, and paleopathology. His most influential work in the latter field is *Identification of Pathological Conditions in Human Skeletal Remains* (Ortner & Putschar 1981; Ortner 2003). Initially coauthored with the eminent pathologist Walter G. J. Putschar, this volume presents basic concepts in human skeletal biology relevant to orthopedic pathology as well as detailed descriptions, diagnoses, and interpretations of hundreds of documented pathological examples from European museums and hospital collections. His second book, *How Humans Adapt, A Biocultural Odyssey* (Ortner 1983), presents the proceedings of an international symposium sponsored by the Smithsonian Institutions. In Ortner's contributed chapter, "Biocultural Interaction in Human Adaptation," he discusses genetic adaptations (e.g., post-childhood lactose tolerance) that have appeared in human populations in response to changing cultural contexts and other important culturally mediated dimensions of human health, such as changes in exposure to zoonoses and environmental pathogens and circumstances for the transmission of human-to-human infectious diseases.

In 1988, Ortner and his longtime colleague and friend, pathologist Arthur C. Aufderheide, organized a symposium on human paleopathology at the 12th International Congress of Anthropological and Ethnological Sciences in Zagreb, Republic of Croatia. The edited volume of proceedings from this symposium (Ortner & Aufderheide 1991), *Human Paleopathology: Current Syntheses and Future Options*, includes brief overviews of theoretical foundations, methodologies, and cutting-edge interpretations by eminent paleopathologists on six continents. Ortner's most recent book, *The Early Bronze Age I Tombs and Burials of Bâb edh-Dhrâ, Jordan* (Ortner & Frohlich 2008), presents an exemplary biocultural analysis of the mortuary features at a major archaeological site. The detailed descriptions of the archaeological contexts of the burials are matched by rigorous analysis of the human skeletons; together, they illustrate Ortner's firm commitment to the *biocultural* perspective, in which each category of material remains yields data pertinent to their mutual interpretation. Ortner's lifelong dictum is masterfully illustrated here: that skeletal biologists should seek as much information as possible about the multiple synergistic factors (both biological and cultural) affecting human growth, development, and health in order that they may interpret accurately the specific skeletal lesions that they observe and, beyond that, the biocultural significance of disease prevalence.

Service to the Discipline of Biocultural Anthropology

In addition to his educational and research responsibilities at NMNH and his publications on biocultural anthropology, Ortner made significant contributions over the past four decades to the professional development of the Paleopathology Association (PPA), a scholarly society of physicians, pathologists, anthropologists, medical historians, and others interested in ancient health and disease. He served from 1982 to 2009 as an associate editor of the PPA's quarterly, *Paleopathology Newsletter*, and has been a member of the scientific committees for the PPA Biennial European Meetings since 1986. In 1999, Ortner was chosen to serve a 2-year term as PPA's first elected president; during his tenure, he led PPA to incorporation as a "scientific/educational" federal tax-exempt organization. In 2005, in recognition of his many years of service to PPA in diverse capacities, Ortner became the first recipient of the Eve Cockburn Service Award (named for the "founding mother" of the organization).

Note. Space does not permit the inclusion of Ortner's complete list of publications nor of his impressive roster of service activities and awards from numerous international institutions. This information appears in his curriculum vitae, available from the Department of Anthropology, NMNH, Smithsonian Institution.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone, Trauma in
- ▶ Demographic Transitions
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

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Osteology Reference Collections

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Introduction

The fields of bioarchaeology and human skeletal biology rely extensively on human skeletal reference collections. Although clinical studies lead to some routinely employed methodology, most techniques are based upon research conducted on reference collections curated throughout the world.

Definition

Research Collections

Collections of human remains vary considerably in their composition and documentation. Ideal

reference collections are large and well preserved with accurate information about the individuals represented. Most techniques of analysis are based upon collections of known individuals with documented age at death, sex, stature, ancestry, disease history, and related life information. Many collections derived from archaeological excavations lack the type of documentation listed above but are accompanied by details of site location, culture, approximate date, and related mortuary data. All collections are of great value for research, but the type of study conducted depends highly on the representation of the individuals and the nature of the associated documentation.

Knowledge of the documentation of a collection utilized in research is critical for proper interpretation and methodology development. For example, since limb proportions vary considerably among world populations, a method to estimate living stature from long bones based on a sample of individuals from one area within the United States would be limited in its application outside of the United States. Similarly, research leading to a method of estimating adult age at death should be based on collections that have individuals with documented ages in all of the appropriate age categories. Awareness of population variation in all methodology depends upon access to collections reflecting that variability. Fortunately, well-documented collections of human remains exist globally and new assemblages continue to be formed. Corsini et al. (2005), El-Najjar (1977), Quigley (2001), and Usher (2002) provide discussions of available collections and issues relating to their documentation and representation. Collection composition can be affected by repatriation issues and other factors. The following represents a partial global listing of key reference collections of human skeletal remains.

Examples

Brest Bone Collection: Brest, France

Skeletal and dental samples in this collection were all collected at autopsy in Brest, France, between 1996 and 1997. The collection consists of approximately 450 individuals and is located at the University Hospital (Centre Hospitalier Universitaire) in Montpellier, France (Baccino et al. 1999).

British Museum of Natural History Collections: London, England

This museum holds a large number of human remains (around 20,000), but few of these are documented. The Spitalfields Coffin Plate Collection, comprising the majority of the identified individuals at the museum, represents over 900 deceased, 387 of whose identity is known from legible coffin plates. They were buried in the crypt at Christ Church Spitalfields between 1729 and 1859 and excavated in the 1980s. Name, age, and date of death are all available from the coffin plates, and additional information drawn from the historical record includes place and date of birth, nationality, place of residence, and occupation (Cox 1989). In addition to the Spitalfields collection, approximately 106 mostly Asian crania from the nineteenth century are similarly documented. Parts of the approximately 20,000 human remains originated from different institutions and collections prior to coming to the Natural History Museum (Margaret Clegg 2011 *pers. comm*).

Cape Town Documented Skeletal Collection: Cape Town, South Africa

This collection is derived from cadavers dissected in the Department of Anatomy at the University of Cape Town between 1980 and 1996. Known data include age, sex, and ancestry based on common classifications of the time (Ginter 2005). Most of the 200 individuals in the collection are over the age of 50 (Robinson & Bidmos 2009).

Chiang Mai University Skeletal Collection: Chiang Mai, Thailand

This modern Thai skeletal collection is composed of the willed remains of 104 individuals (70 males, 34 females) who were collected at the Faculty of Medicine at Chiang Mai University between 1993 and 1996 (King et al. 1998; Schmitt 2004). Documented information on this

collection includes age, sex, residency, occupation, and socioeconomic range (King et al. 1998).

Coimbra Identified Skeletal Collection: Coimbra, Portugal

Excavated from the largest cemetery in Coimbra (Cemiterio da Conchada), this collection is housed at the University of Coimbra in their Museum of Anthropology. The collection includes 505 individuals, mainly of Portuguese descent, with ages from 7 to 96 years and dates of birth and death from 1826–1922 to 1904–1938, respectively (Coqueugniot & Weaver 2007). Cemetery records are available with name, sex, age, place of birth and death, date and cause of death, occupation, marital status, and parents' names (Santos & Roberts 2001; Coqueugniot & Weaver 2007).

Coimbra International Exchange Skull Collection: Coimbra, Portugal

Excavated from, and curated in, the same locations as the Coimbra Identified Skeletal Collection above, this osteological collection consists of 1,075 crania (Wasterlain et al. 2011). Both sexes are represented evenly in the collection, and the individuals are mainly Portuguese (Wasterlain & Dias 2009). All are identified from the cemetery record book with information such as age, sex, place of birth and death, year and cause of death, and occupation (Wasterlain & Dias 2009; Wasterlain et al. 2011).

Coimbra Medical School Skull Collection (*Escolas Médicas I*): Coimbra, Portugal

This collection was the first of the Coimbra identified osteological collections (above) to be assembled at the Museum of Anthropology at Coimbra University. The skulls were collected from medical schools in Lisbon, Coimbra, and Oporto between 1895 and 1903. There are 585 complete crania (366 male, 219 female) belonging to individuals born in Portugal or the Madeira archipelago. Birth year and death year (between 1802–1890 and 1895–1903, respectively) are documented as well as sex, age, and place of birth. The collection is mainly adult; only 2.9 % (17) individuals were under 20 years old at death (Cunha & Wasterlain 2007).

Francis J. Ranier Collection: Bucharest, Romania

First established by anatomist Francis J. Ranier in the early 1900s, the Ranier collection was separated from the Anatomy Department of the University of Bucharest in 1938, to be housed in the newly established Anthropology Institute of the Romanian Academy. Composed of crania and some postcranial elements, the collection was expanded through the 1950s, with the majority of individuals collected in the 1930s and 1940s. Remains were predominantly unclaimed individuals of low socioeconomic status recovered from nearby hospitals and morgues. Sex, age, ancestry, pathology, cause of death, and profession are available for most crania; 93 % of the collection is classified as of Romanian ethnicity, with the remainder composed of various ethnic minorities. Known age at death is primarily in the 18–60-year range, with 2,123 inventoried adult males, 1,194 adult females, and 214 children. The total count of remains is 6,800 (Ion 2011).

George Huntington Collection: Washington, DC

The Huntington Collection is composed of over 3,600 documented human skeletons housed at the National Museum of Natural History of the Smithsonian Institution. George S. Huntington of the College of Physicians and Surgeons in New York City amassed these skeletons from immigrants and US citizens who died in New York City between 1893 and 1921. The collection is very well preserved, has a high level of documentation (most individuals are of known age, sex, nationality, cause of death, and in some cases occupation), broad ethnic representation, and many examples of trauma, pathology, and occupational stress (Hunt & Spatola 2008).

Grant Collection: Toronto, Ontario

This collection was received by the Anatomy Department at the University of Toronto in the early half of the twentieth century and is now part of the Anthropology Department's research collection. Local hospitals and welfare institutions provided the majority of the 202 human skeletal remains that make up the collection, of which age

at death, cause of death, sex, and name are known. Most of the individuals (175) are male and a large number of those (147) are over 40 years old (Bedford et al. 1993).

Hamann-Todd Osteological Collection: Cleveland, Ohio

This extensive collection is housed at the Cleveland Museum of Natural History and consists of 3,300 unclaimed individuals collected by Dr. T.W. Todd at the beginning of the twentieth century (Cobb 1959). Each skeleton is associated with a file outlining basic information determined by soft tissue analysis and/or hospital and autopsy records. Data include, but are not limited to, age, sex, name, cause of death, nationality, and occupation (Andersen 1986).

Institute of Normal Human Anatomy Collection: Siena, Italy

This craniological collection at the University of Siena is composed of several hundred skulls amassed between approximately 1881 and 1932. Consisting of the inhabitants of Siena and its outskirts, the majority of the skulls are of known age, sex, and state of health (Guidotti et al. 1986; Brasili-Gualandi & Gualdi-Russo 1989).

Jikei Collection: Tokyo, Japan

The skeletal remains of nearly one hundred adult individuals are housed at the Jikei University School of Medicine's Department of Anatomy. The deceased lived the majority of their lives in the first half of the twentieth century (İşcan et al. 1994; Tanaka et al. 2000) and cadaver records give biographical data such as sex, date of birth and death, birthplace, and cause of death (Tanaka et al. 2000).

Johns Hopkins Fetal Collection: Cleveland, Ohio

The Johns Hopkins Fetal Collection was assembled by A.H. Schultz in the 1920s from stillbirths in the Baltimore area while he was at Johns Hopkins University. The collection is comprised of 112 fetal and infant human skulls of known age and sex; it was moved to the Cleveland Museum of Natural History in 1973 (Erikson 1981; Ridley 2002).

Luís Lopes Collection: Lisbon, Portugal

Begun by Luís Lopes in the 1980s to replace the collection of Ferraz de Macedo that was mostly destroyed by a fire, this collection (also known as the Lisbon Collection) is located at the National Museum of Natural History in Portugal. The collection, curated by Hugo Cardoso, currently has around 1,800 mostly complete identified individuals, many of which came from Lisbon cemeteries and were of Portuguese nationality. Data on these individuals were drawn from cemetery records or civil registration and include age, name, sex, birthplace, occupation, address, and cause of death (Cardoso 2006; Matos & Santos 2006).

Maxwell Museum's Documented Skeletal Collection: Albuquerque, NM

This collection is located at the Maxwell Museum of Anthropology, part of the University of New Mexico. It consists of 257 (as of 2008) mostly documented (207) individuals donated from several sources including self donations, next-of-kin, the University of New Mexico's Anatomy Department, and the Office of the Medical Investigator. Documentation on the 207 positively identified individuals varies depending on the source of donation but generally includes population affinity, age, sex, cause of death, and donation year (Komar & Grivas 2008). Most individuals died within the last 40 years and were New Mexico residents (Yoder et al. 2001).

Modern Collection of Santiago (*Colección Subactual de Santiago*): Santiago, Chile

Housed at the University of Chile in the Department of Anthropology of the Faculty of Social Sciences, this collection contains around 2,000 human skeletal remains and was granted to the University from the General Cemetery (*Cementerio General*) in Santiago during the 1970s (Rodrigo Retamal Yermani 2011 *pers. comm.*). It consists of individuals who died between 1950 and 1970 whose name, age, sex, cause of death, and occasionally date of birth and death are documented (Urzúa et al. 2008).

Modern Japanese Osteological Collection: Tokyo, Japan

This modern Japanese sample is part of an anatomical collection housed at the University Museum of the University of Tokyo. It consists of well-preserved skeletons of known age and sex from individuals who died in the late nineteenth and early twentieth centuries (Case & Heilman 2005).

Museo Nazionale di Antropologia ed Etnologia di Firenze Skull Collection: Florence, Italy

Approximately 200 individuals are represented in this documented cranial sample. The deceased are from three Italian cities (Siracusa, Catania and Firenze) and all died at the end of the nineteenth and beginning of the twentieth centuries. Hospital dissections and local cemeteries are the sources for the skeletal material, and age at death is known from the registry office (Frederic et al. 2006; Rinaldi et al. 2006).

National Museum of Health and Medicine Skeletal Collections: Washington, DC

The skeletal collections within the Anatomical Collections at this museum are numerous. Almost 5,000 specimens are included in 13 collections, 12 of which are human and 6 of which are relatively well documented including the Civil War Skeletal Collection (Sledzik & Moore-Jansen 1991; Barbian et al. 2000), Indian Wars Collection (Sledzik & Moore-Jansen 1991), Forensic Anthropology Collection, and others. These collections are all curated by the National Museum of Health and Medicine, which separated from the Armed Forces Institute of Pathology (AFIP) in 2010 and is now part of the U.S. Army Medical Research and Materiel Command (National Museum of Health and Medicine, Skeletal Collections n.d.).

Oloriz Collection: Madrid, Spain

This collection was assembled from cadavers in the latter half of the nineteenth century (1884–1898) (Oloriz 1899; Ubelaker et al. 2009) by Federico Oloriz Aguilera and is now located in the Faculty of Medicine in the Complutense Universitaria in Madrid. The collection consists of nearly 2,000 crania of known sex, age at death, and regional origin (Ubelaker et al. 2009).

Pretoria Bone Collection: Pretoria, South Africa

This collection was created in 1942–1943 and is currently held in the Department of Anatomy at the University of Pretoria (L'Abbé et al. 2005; Robinson & Bidmos 2009). Individuals in this collection are known and are either unclaimed or donated. Age, sex, and ancestry are documented on a majority of the 704 crania, 290 full and 541 postcranial skeletons in the collection (L'Abbé et al. 2005).

The Raymond Dart Collection: Johannesburg, South Africa

Initiated in the 1920s, this collection has grown to be one of the most extensive documented collections derived from cadavers in the world. The Dart Collection includes 2,605 individuals with known population affinities, age, and sex. The collection is located in the University of Witwatersrand in its School of Anatomical Sciences (Dayal et al. 2009).

Robert J. Terry Anatomical Skeletal Collection: Washington, DC

The Smithsonian's National Museum of Natural History houses the 1,728 individuals which compose the Terry Collection, collected first by Robert J. Terry from 1898 to 1941, then by Mildred Trotter until 1967. All individuals in the collection died in the St. Louis, MO area, and have a morgue record with age, sex, ancestry, date of death, as well as some additional information (Boldsen et al. 2002). Most have additional forms covering dental and bone inventory, measurements, and other records (Hunt & Albanese 2005).

San Nicolas Tolentino Collection: Mexico City, Mexico

In the year 2000, the Department of Physical Anthropology of the Escuela Nacional de Antropología e Historia in Mexico City began exhumation at three local cemeteries to compile a contemporary skeletal reference collection. The San Nicolas Tolentino Cemetery and the 20 de

Noviembre Cemetery yielded individuals buried 7–10 years prior to exhumation, whose family members were unable to pay cemetery dues. Death certificates and other records were obtained from the Civil Registry for each of the exhumed, providing date of death, cause of death, sex, age, and occupation, as well as information related to income, quality of life, and health. Individuals exhumed from the Dolores Cemetery date to the nineteenth and early twentieth centuries with little documentation, but serve as a sample to test methods verified on the San Nicolas Tolentino and 20 de Noviembre collections. The three combined burial populations totaled 102 individuals in the year 2006, with the goal to reach a total of 2,000 male and female individuals spanning each year of life (González et al. 2006).

Sassari Collection: Sardinia, Italy

The Sassari collection, part of the Frassetto collections of the Museum of Anthropology at the University of Bologna, Italy, is made up of 606 individuals exhumed from municipal cemeteries whose deaths date to the first half of the twentieth century. The skeletons are well preserved and have associated information on sex, age, date of death, and, in many cases, date of birth and occupation (Belcastro et al. 2008; Hens et al. 2008).

Scheuer Collection: Dundee, Scotland

The Scheuer Collection is located at the Centre for Anatomy and Human Identification at the University of Dundee. The collection has approximately 150 juvenile skeletons from predominately archaeological and anatomical contexts. Some of the individuals have documented age and sex (Rissech & Black 2007; Rissech et al. 2008). The University's website provides the most current information on the collection (Center for Anatomy and Human Identification, Anatomical Collections n.d.).

Spitalfriedhof St. Johann Known Age Collection: Basel, Switzerland

The Spitalfriedhof St. Johann collection consists of 220 skeletons of known age and sex identified through hospital and cemetery records. The Spitalfriedhof St. Johann cemetery was associated with the Bürgerspital Hospital of Basel and in use from 1845 to 1865. Over two thirds of the patients who died in the hospital were buried in the cemetery, making the collection fairly representative of the hospital mortality patterns of the time. The collection is located in the Natural History Museum in Basel (Griffin et al. 2009).

St. Bride's Church: London, England

This documented skeletal collection is housed at St. Bride's Church on Fleet Street (Black & Scheuer 1996). The 244 individuals originate from the eighteenth and nineteenth century and coffin plates document their age and sex (Gapert et al. 2009).

St. Thomas Anglican Church: Belleville, Ontario

In 1989, a portion of the 1,564 deceased interred in St. Thomas' nineteenth century cemetery were excavated. Of the 576 disinterred individuals, 80 were personally identified by coffin plates that were still in place (Saunders et al. 1997). The names from the coffin plates correspond with the church's burial records providing data such as age, date of death, burial date and, at times, cause of death and family relationships (Saunders et al. 1993).

Universidad de Complutense Collection: Madrid, Spain

One hundred and thirty-three Spanish adults comprise this collection, 116 of whose name, birth date (range from 1880 to 1945), death date, and cause of death are known (José Antonio Sánchez Sánchez 2011 *pers. comm.*). These data were gathered from the records of the South Cemetery of Madrid, from which these individuals were exhumed in 1991 (Trancho et al. 1997). A more recent exhumation from the same cemetery has provided 86 additional individuals, 84 of which have known identity, were between 20 and 55 years of age at death, and were born between 1941 and 1976 (José Antonio Sánchez Sánchez 2011 *pers. comm.*).

Universidad Nacional Autónoma de México Collection: Mexico City, Mexico

Initiated in 1994, this collection is part of the Faculty of Medicine in the Physical Anthropology

Laboratory at the National Autonomous University of Mexico (Molgado et al. 2007). Sex is known for all of the 172 individuals that comprise the collection and cause of death is known for some (Socorro Báez Molgado 2011 *pers. comm.*).

Universitat Autònoma de Barcelona (UAB) Collection of Identified Human Skeletons: Barcelona, Spain

The UAB Collection is a well-documented, well-preserved selection of 35 Catalan adults from the twentieth century. Each individual was a Spanish national interred at the Granollers cemetery in Catalonia. The cemetery register, corresponding to each grave and gravestone, contains information such as name, age, birth and death place, cause of death, parents' names, and place of residence. This information leads to the Civil Register and birth certificates, which provide a considerable amount of additional data about each of the deceased (Rissech & Steadman 2011).

University of Athens Human Skeletal Reference Collection (The Athens Collection): Athens, Greece

This modern collection was assembled between the years of 1996 and 2003 and belongs to the Department of Animal and Human Physiology at the University of Athens. Of its 225 individuals, 214 have documented occupation, age, sex, birth place, and cause of death based on available death certificates (Eliopoulos et al. 2007).

University of Szeged Collection: Szeged, Hungary

Located in the Department of Forensic Medicine in the Faculty of Medicine, this fetal collection contains remains from individuals with known age and sex. The age range for the collection is 4–10 lunar months (Castellana & Kósa 2001).

W. Montague Cobb Human Skeletal Collection: Washington, DC

W. Montague Cobb, anatomist and physical anthropologist at Howard University, collected and prepared the collection between 1932 and 1969 from cadavers from the anatomy dissecting room. The collection includes 700 preserved skeletons with detailed anatomical, demographic, and medical records, and is located in the College of Arts and Sciences at Howard University. The Cobb collection is representative of the eastern urban population of the USA during that time (Rankin-Hill & Blakey 1994).

William F. McCormick Clavicle Collection: Knoxville, TN

The McCormick Collection, housed in the Anthropology Department at the University of Tennessee, is a documented autopsy collection of approximately 2,000 clavicle pairs collected from autopsies in East Tennessee between 1986 and 1998 (Langley-Shirley & Jantz 2010).

William M. Bass Donated Skeletal Collection: Knoxville, TN

The University of Tennessee is home to the Bass Collection, which contains a large number of modern human skeletons: 917 as of mid-August, 2011 and growing steadily. All skeletons are donated by family, self, or medical examiner and therefore, identity, age, sex, ethnicity, and stature are mostly known. Age ranges from infant to adult are represented by this collection (Shirley et al. 2011).

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition

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Osteology: Definition

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Brief Definition of the Topic

Osteology, from the Greek *osteon*, meaning bone, and *logos*, meaning science, is the study of the structure and function of bones.

Cross-References

▶ Bone: Histological Analysis
▶ Forensic Anthropology: Definition
▶ Skeletal Biology: Definition

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Österreichische Gesellschaft für Mittelalterarchäologie

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Basic Information

The Austrian Society for Medieval Archaeology was founded in 1985. As in other countries, the importance of the archaeology of recent historical periods grew immensely during the mid-twentieth century and a framework for scientific exchange was therefore needed. In line with this, the Society has the dual objectives of promoting research on the archaeology of the Medieval and Post-Medieval periods in Austria and opening these fields up to interested laymen and women. Archaeological sources and their interpretation in a historical context provide the main focus for the work of the Society. Also, interdisciplinary approaches are strongly encouraged together with collaboration with neighboring humanities and the natural sciences.

For many years, Prof. Dr. Fritz Felgenhauer and Prof. Dr. Sabine Felgenhauer-Schmiedt chaired the society, and in this role, they have significantly influenced the direction of medieval archaeology in Austria and have helped place it in a wider European context. Currently,

Prof. Dr. Claudia Theune, University of Vienna, is chairwoman of the Society, the Vice Chairman is Dr. Thomas Kühtreiber, Institute of Material Culture of the Austrian Academy of Sciences, and the Society's secretaries are Dr. Gabriele Scharrer-Liska, University of Vienna, and Elfriede Huber, Vienna. Additional information is provided on the Society's Web site: www.univie.ac.at/oegm.

Major Impact

To achieve its goals, the Society organizes biennial international conferences at different locations in Austria. The primary regional focus of these is on the medieval and post-medieval archaeology of the entire Danube region, although studies on other European areas are also considered so as to provide a comparative perspective. Papers presented at these biennial meetings are regularly published in the journal *Beiträge zur Mittelalterarchäologie in Österreich*. The Society's other publications provide an overview of current research in Austria, and these include both edited volumes and monographs. Details of these can be found on the Society's website.

In addition to conferences, the Society organizes lectures and excursions to medieval monuments in Austria, and visits and guided tours in museums aimed at providing members opportunities to study and learn about the archaeology of the medieval period in Austria. The Society also hosts an archive on Medieval Archaeology, which houses documents (including both plans and descriptions) on medieval fortifications and deserted villages in Austria, and examples of a range of typical medieval ceramics.

Cross-References

- ▶ Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)
- ▶ Historische Archäologie
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology

Ottoman Archaeology: Localizing the Imperial

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Introduction

Ottoman archaeology is the youngest area of specialization within Islamic archaeology. Tied most closely to textual history and owing its nascence, in part, to historians' investigations of Ottoman-era archival sources, the study of this ideologically charged era has been slow to capture the attention of archaeologists for a variety of reasons. Chronologically framed by the cultural-historical "golden ages" of Late Antiquity and the great empires of the Middle Ages, on the one hand, and the modern era, on the other, strata dating to the Ottoman period were once casually removed, either excavated without the same concern for detail as earlier strata or, in the worst case, bulldozed to reach levels of greater interest below. While these practices fortunately represent a bygone era of disciplinary history, underlying the general lack of scholarly interest in Ottoman archaeology before the 1990s are negative images of the era held by scholars for many years – the Ottoman era as the "Dark Ages," a period of decline and decay, centuries of devastation of landscapes, and abandonment of village life – and a general "aversion to the modern."

Ambiguities about the legal status of Ottoman-era sites have been a further deterrent to archaeological inquiry. Local departments of antiquities have traditionally relegated study of their Ottoman heritage to the realm of ethnography and legally defined the material culture of the era as "antiques" rather than "antiquities," with the preservation of period monuments falling under the jurisdiction of Ministries of Tourism. According to Jordan's 2005 Law of Urban and Architectural Heritage, for example, no structure postdating 1750 can be considered an antiquity,

and the 1988 Antiquities Law No. 21 pertains only to moveable and immoveable objects made or modified before that date. Similarly, Israeli antiquities law, which also covers the West Bank, does not consider post-seventeenth-century sites and artifacts to be "archaeological."

The comparative youth of the Ottoman period (the Empire officially ending only in 1923) presents an array of challenges to practicing Ottoman archaeology that go beyond the legal. Stratigraphically, the most recent of Ottoman layers are located on the surface or in very shallow deposits below it. The tendency for Late Ottoman sites to be occupied to modern times mitigates against their excavation; modern development erases the trace of others. Furthermore, it is not uncommon for buildings constructed during the Ottoman period – sixteenth-century steam baths in Budapest and nineteenth-century farmhouses in Jordan, for example – to continue to be used or occupied. For these reasons, among others, there have been few systematic excavations of Ottoman-era sites, urban or rural. Archaeological surveys are challenged by the nature of Ottoman-era artifact assemblages, namely, the inability to identify and date the coarse wares that dominate surface collection. The nature of Ottoman-era surface finds, outside of pottery, present special problems: some of the most reliable and readily identifiable chronological markers of the period – coins and tobacco pipes (namely, *chibouk* bowls) – are picked off the ground through illicit collection and rarely make their appearance in archaeologists' survey reports. Dating rural sites is further complicated by the general paucity of coins and dated inscriptions outside urban centers.

These characteristics of Ottoman-era artifacts and sites aside the nature of the Ottoman Empire make archaeological investigations of it extremely difficult. Two centuries of extensive conquest, institutionalization of the millet system that lent autonomy to minority communities, and a move towards decentralization of the administration in the seventeenth century created a cultural, religious, ethnic, and geographical mosaic that extended across the Mediterranean. This rich diversity resulted in distinctive regionalisms expressed most strikingly in the material record and physical landscape: common wares, architectural styles, village structure, and land use differed markedly from one region to another, complicating interregional comparisons of the archaeological record. Moreover, the physical scale of the Empire means that scholars must either specialize in one small region or learn a variety of languages in order to work in different countries and access the local archives (a necessity of Ottoman archaeology today). The Ottoman Empire was as long-lived – spanning over six centuries – as it was physically vast. Over the course of this period different regions of Europe, the Mediterranean, and the Middle East came alternatively under or freed themselves from Ottoman control, their material culture changed through adoption and adaptation in the process.

The textual resources of the period, on the other hand, present vast opportunities for socio-economic analysis of the archaeological record that is simply not available for the study of earlier Islamic societies. The Ottoman state was a bureaucratic behemoth: state ministries maintained detailed documentation on everything from taxation to garrison payrolls, creating multiple copies of the same for distribution throughout the Empire. The sheer quantity of these documents, their wide distribution, and the continued use of some of the most recent into modern times (such as registration of right to title to land) has guaranteed their preservation for contemporary study. The kinds of contemporary texts available include tax registers (*tapu defter*s), endowment documents (*vekfiye*s), fixed-price registers (*narh defter*s), Ottoman yearbooks (*salnameh*s), chronicles, garrison rolls, diplomatic documents and records of European consulates, monastic and church records and correspondence, travelers' accounts, Venetian cadastral maps, Late Ottoman-era land registers (post-Tanzimat), and memoirs. Such a vast and varied corpus of documents not only presents great potential for an enriched archaeological analysis but also requires from archaeologists responsible incorporation of textual analysis into their own research.

Definition

In the same sense that "Islamic archaeology" is not limited to the study of Muslim societies, the term Ottoman archaeology refers not to the study of a political entity but to the societies that once formed part of it. The fact that the borders of the Ottoman Empire were in constant flux for the six centuries of its existence means that what is chronologically "Ottoman" differs from one region to another. The Ottoman era for Bilād al-Shām, for example, lasted four centuries (1516–1918), whereas in Hungary, it survived a mere 150 years (1541–1699); Turkey's Ottoman heritage harkens back to the turn of the fourteenth century. Not all provinces, moreover, were equally incorporated into the Empire – many regions of Hungary and Greece, for example, remained outside Ottoman control. In spite of calls for an "archaeology of empire" (Baram & Carroll 2000: 12–13), "Ottoman archaeology" today generally denotes the study of a particular region, during the period that it was under Ottoman control.

The use of other terms to denote this chronological period reflects uniquely local perspectives on the period and regional developments in the discipline of archaeology as a whole. For example, chronologically the "postmedieval" period in European scholarship is roughly the archaeological equivalent of the historian's "Early Modern" era; the former, however, emphasizes the cultural break with the Middle Ages and general cultural and artistic decline. The Greek "post-Byzantine" era serves a similar purpose: it is a convenient term to denote the vast, anomalous period between the Golden Age of Byzantine hegemony and the birth of the Greek national state. A greater chronological precision is to be found with the "Ottoman-Turkish" era (*hódoltság kori régészet*) of Hungarian archaeologists, which is limited to the period of Ottoman occupation, and to only those regions directly controlled by the Ottoman state. An alternative to these is the "Late Islamic" nomenclature of archaeologists working in southern Bilād al-Shām. Recognizing that cultures do not routinely change with political transitions, this term roughly coincides with the European Early Modern era and includes the latter years of Mamluk and the duration of Ottoman control of the region.

Approaches to Ottoman Field Archaeology

Landscape Archaeology

The majority of large-scale, Ottoman projects adopt some kind of landscape approach. The discipline naturally lends itself to the study of the rural landscape, as continuity of settlement to modern times renders excavation difficult, and provincial textual sources of the period deal largely with land and the rural economy. There is an undeniable local focus to these projects; localized traditions in architecture, handicrafts, and land use and tenure loom large in the survey reports. Landscape approaches are also necessarily multidisciplinary and rely heavily on textual analysis (namely, of tax registers and travelers' accounts), oral history, and geographical methods. Archaeological surveys in the Troodos Mountains of central Cyprus have adopted a landscape approach, combined with relevant textual analysis, identifying a range of different rural sites and human activities within the landscape in the process (Given et al. 2003). Likewise, in consultation with Venetian and Ottoman archives, intensive surface survey in the Pylos region of southwestern Greece has produced a social-economic map of the region for the late seventeenth and early eighteenth centuries (Zarinebaf et al. 2005; Davis & Davies 2007).

Landscape projects such as these rely heavily on Ottoman tax registers (*tapu defterleri*), which describe a fiscal landscape, however idealized, for the region. In combination with archaeological survey, the registers can be guides to reconstructing a peopled landscape of the period, with its great variety of settlement and land use types. The *defter*s, for example, account for settlements of different scale and function, as well as "non-settlements," such as the *mazra'ah*s (cultivated lands with no associated settlement, or seasonal settlements) and sites referred to as *khali* ("empty," or abandoned, villages) in southern Syria. The specialized terminology used in these and other Ottoman records suggests

a refined understanding of the rural landscape and rural society by officialdom; archaeologists, however, have yet to fully tap these sources in interpreting the physical and functional variety of the landscapes they survey. Locating and investigating abandoned villages and tracing the movements of migrant minority groups, which are growing concerns of Ottoman landscape projects, are two areas of inquiry that have benefited from reference to such archival sources (Grivaud 1998; Sutton 2000; Davis & Davies 2007).

Increasingly such landscape projects have been turning to environmental history as a mode of inquiry about agricultural history, climate change, and landscape transformation. In an effort to better understand the pressures on villages that create the settlement cycles suggested by the archaeological record, environmental-oriented projects include extensive textual research and geomorphological and paleobotanical analyses as core components of their research structure. The Troodos Archaeological and Environmental Survey Project, to cite one example, makes use of archaeological survey data on landscape and textual data on landholding to investigate the development of social organization in the Cypriot countryside during the centuries of Ottoman hegemony there (Given & Hadjianastasis 2010). The commercialization of agriculture in Cyprus in the eighteenth and nineteenth centuries created new landed elites, spatially impacted village structure, changed consumption patterns, and transformed land use in ways that have correlates in the archaeological record. What constitutes a rural "community" in this period is expressed in surprising variety across the Cypriot landscape.

Questions about settlement cycles and landscape transformation inform environmental projects in Jordan as well. The Northern Jordan Project is a case in point. Launched in 2003 originally to investigate the phenomenon of settlement decline in the Late Islamic period in a regionally comparative fashion, the project has aggressively mined archival sources and broadened its base of environmental analysis to explore the dialectical relationships among settlement, land use, and environmental change (Walker et al. 2007). Ottoman-era archaeological research throughout Jordan, Israel, and the West Bank continues to focus on the ways the Ottoman state transformed the rural landscape and agricultural and pastoral communities of the region.

Historical Archaeology

Because of the wealth and diversity of documentary sources of the period, Ottoman archaeology is progressively becoming a text-based discipline. Increasingly more regional projects, in particular, have included on-staff professional historians with the language skills and expertise to penetrate the textual sources housed in the Ottoman archives. Ottoman archival sources most relevant to archaeologists relate to land use and agricultural and pastoral productivity (in tax and Tanzimat-era property registers), settlement longevity and population migration (in tax registers and censuses), and the function of castles (in military rolls and ration records). Among the themes explored in hybrid textual-archaeological research are the emergence of new landed elites and the spatial world they create (Given & Hadjianastasis 2010); the physical transformation of the rural landscape by imperial policies (Davis & Davies 2007; Walker et al. 2007); the daily lives of Janissaries (Gerelyes & Kovács 2003; Hinds & Sakkout 1986; Hinds & Ménage 1991; Yenişehirlioğlu 2005: 260–261); local histories of settlement, land use, and toponymy (Zarinebaf et al. 2005); demography, migration, and the spatial variation in settlement by minorities (Davis & Davies 2007: 5); and disappearing villages and "fluid landscapes" (Grivaud 1998; Sutton 2000).

Imperial Archaeology

Given the distinctive regionalisms in culture, governance, and land use throughout the Ottoman territories, it is natural that the discipline of Ottoman archaeology has tended towards provincial specializations. In an effort to rise above the conceptual and operational divides separating specialists of the Balkans, Anatolia, and the Arab world, an imperial approach has

developed, linking "local and imperial histories in dynamic relationships" (Baram & Carroll 2000: 12). The Ottoman Empire was one of the world's great empires and, as such, readily participated in global trade and markets, was impacted by such international phenomena as epidemics and disease control, and was transformed by large-scale migration and the new modes of transportation that facilitated it. The imperial approach is phenomenological and process oriented and encourages a multidisciplinary, cross-cultural perspective. Related to this approach are frontier studies that, by incorporating historical and anthropological methods, examine the dialectical and ever-changing relationships between local society and the state; consumption studies describing the material cultures and practices associated with newly introduced commodities, such as tobacco, coffee, tea, and fruit drinks (Baram & Carroll 2000; Gabrieli 2004; François 2008); interregional and comparative ceramic analyses documenting the distribution of export wares and local production and exchange of common wares (Walker 2009); and studies of the political economies and food systems of local societies transformed through incorporation into the Empire (Baram & Carroll 2000; Gabrieli 2004).

Historical Background

European Mainland

Hungary

Located in the heart of Europe, large parts of today's Hungary came under Ottoman control with the fall of Buda in 1541, the Ottomans ceding this territory a century and a half later with the signing of the Treaty of Karlowitz in 1699. Hungary provides a special perspective on the Ottoman era, as it formed at this time the Ottomans' western frontier – the border constantly in flux – and the state alternatively exercising authority in some regions of Hungary through garrisons of Janissaries or granting autonomy to others. The material culture of "Ottoman-Turkish" sites in the country reflects this diversity. The demographic landscape was, moreover, markedly transformed, with the emptying out of the plains (the *puszta*) and creation of "mega villages" (*mezővárosok*), as peasants fled Ottoman forces and clustered on larger, self-defending settlements; the imposition of the *devşirme* to recruit Janissaries from local villages; and the migrations of entire ethnic groups in and out of the region, the direct and indirect results of Ottoman settlement and military policies.

Hungarian archaeology has the longest history of excavations of Ottoman sites, and the country has some of the best and most diverse collections of Ottoman artifacts of the former Empire. It also has some of the best preservation of architectural remains outside Anatolia, the result of government policies to preserve and restore these monuments. The study of Ottoman archaeology in Hungary has its roots in written descriptions and drawings of Ottoman architecture in the seventeenth century, immediately following the withdrawal of Ottoman forces. In the late nineteenth and early twentieth centuries, attempts to preserve monuments in Pécs and Buda led to salvage projects yielding important material evidence and chronological data. It was not until the interwar era, however, that a scholarly discipline emerged, under the influence of local ethnography and a growing interest in the applied arts. Fieldwork at Gazikasim Paşa Cami in Pécs was among the earliest of the systematic excavations; the excavation of rural, Ottoman-era settlements was driven by the search for the historical roots of traditional peasant houses and reflected the populist leanings of many scholars, writers, and artists of the 1920s and 1930s. The preoccupation with monument preservation that characterizes Ottoman archaeology through eastern-central Europe and the Balkans continued unabated through the 1970s: by 1975, 710 Ottoman structures had been recorded and registered, and these in a wide variety of forms: mosques, madrasas, schools, caravanserais, steam and thermal baths (Fig. 1), gunpowder magazines, forts, cemeteries, and tekkes (Gerelyes & Kovács 2003: 8). Such inventories preserved information about many structures that had since been demolished.

Ottoman Archaeology: Localizing the Imperial, Fig. 1 Király fürdő (Ottoman *hammam*) in Budapest, Hungary, sixteenth century

The questions asked of the archaeological record by Hungarian Ottoman specialists since the 1970s are largely informed by nationalist concerns. The phenomena of "disappearing villages" and internal migration have become research objectives in themselves, with research projects designed to identify ethnic groups in the archaeological record; distinguish "traditional" Hungarian material culture; and locate the settlements "lost" during the Ottoman wars and determine when they were abandoned, with recourse to the Ottoman *defter*s. Among the most notable in these regards are the excavations of the "lost" villages of Szentkirály in the southern Great Plain and market towns (*oppidum*s) Ete and Babócsa (with its cemetery) in southern Transdanubia, study of the Vlach coarse wares from the Békató graves, and analysis of the seventeenth-century Battonya jewelry hoard. In an effort to better understand the ways the Ottomans came to physically dominate the land, excavations have also focused on the castles of Szigetvár, Esztergom, and Visegrád, as well as the numerous palisades and their barracks (studied in conjunction with the military pay rolls preserved in Ottoman archives), through which the hinterland was subdued.

Greece

Much of Greece came under Ottoman rule in the mid-fifteenth century and, with the exception of a brief period of Venetian control of southern Greece during the 1680s and 1690s, remained an Ottoman province until the 1821 War of Independence. Changes in land use and tenure and population migrations left traces on the Greek landscape; these "footprints" of Ottoman policy have become a focus of many regional archaeological projects in the country since the 1990s. Such projects have stood out for their systematic incorporation of archival studies into their larger research plans. The pioneering project in this regard was Cambridge's Boeotia Project, launched in the late 1970s, which has established high standards for studying settlement history in conjunction with documentary sources. The Ottoman tax registers and cadastral surveys have been invaluable in this regard for many subsequent projects in documenting settlement trends and describing the agricultural economy on a regional scale (Zarinebaf et al. 2005; Davis & Davies 2007: 5). The Ottoman *defter*s have provided a chronological anchor for the changes in settlement and land use suggested by archaeological surveys, and they have been an

Ottoman Archaeology: Localizing the Imperial, Fig. 2 Paphos fort, Cyprus, Byzantine structure refortified by the Ottomans (Courtesy of Ruth Smadar Gabrieli)

invaluable resource for the landscape and historical-based approaches described earlier in this entry.

Eastern Mediterranean

Cyprus

Cyprus passed from Venetian to Ottoman control in 1517 and remained under Ottoman suzerainty until 1878, when the island was "rented" to Britain under the terms of the Treaty of Berlin (Fig. 2). The seventeenth and eighteenth centuries witnessed important changes in local land use and demographics, with the establishment of *çiftlik*s, through land reclamation and requisitioning of land from indebted farmers; numerous tax rebellions; and a demonstrable drop in population. A century later, the large landed estates in Cyprus were producing wheat for export to Europe and Turkey, creating scarcities of the same commodity at home.

Interest in the physical correlates of these trends has guided the development of Ottoman archaeology in Cyprus. Regional surveys since the 1990s have been concerned with identifying the ways in which the Cypriot landscape was transformed by three centuries of Ottoman rule and to distinguish medieval from postmedieval occupation, an objective hindered by the nature of postmedieval coarse wares. The first of these, the Sydney Cyprus Survey Project, which was in the field from 1992 to 1997, was designed to document landscape development in the northern Troodos from the medieval through modern periods. Its research design was a sophisticated one and set high standards for future surveys, combining traditional archaeological techniques with soil science, archival research, geobotanical and archaeometallurgical analyses, architectural surveys, and ethnography into a common GIS-based database (Given et al. 2003). Following its lead, the Troodos Archaeological and Environmental Survey Project investigated settlement, land use, and resource exploitation in the Ottoman era in the northern Troodos foothills from 2000 to 2004 (Fig. 3). This project has been most effective at identifying a wide range of rural sites and human activities in the Cypriot countryside as well as documenting the seasonal and long-term movements of peoples in that landscape (Given & Hadjianastasis 2010). More recently, the French project "La constitution des paysages dans l'Orient médiévales" has applied a multidisciplinary survey and excavation design to a single site and its

Ottoman Archaeology: Localizing the Imperial, Fig. 3 Athassi, Cyprus, small estate in the Lagoudhera valley, Cyprus that appears in sixteenth-century village lists. Threshing floor behind the village (Courtesy of Michael Given, Troodos Archaeological and Environmental Survey Project)

hinterland – Potamia-Agios Sozomenos – documenting changes in settlement and land use at this former manor house from the medieval to Ottoman transition. It is one of the few projects in Cyprus to incorporate textual analysis with excavation of a site of the later historical periods (Lécuyer et al. 2003).

Turkey

Anatolia was the homeland of the Ottoman sultans, Osman I having established there a state in 1299 that would survive for over six centuries. As Ottoman history in Anatolia differs from the other regions of the Empire, the development of Ottoman archaeology here has also followed a different trajectory, guided by the challenges of early excavations of urban sites (Athenian Agora, Corinth, Byzantine Great Palace in Istanbul, Sardis, and Ephesus), a focus on ceramic analysis, and a ready appreciation for and application of "defterology" (the study of the Ottoman tax registers, largely located in Turkish archives). In Turkey today, the emphasis of Ottoman archaeology remains the excavation of urban and industrial sites, in an effort to better date and understand the distribution of locally produced pottery.

Interest in Ottoman sites in Turkey has remained rather limited and has been focused largely on ceramic chronology. The generally poor stratigraphy of urban sites, such as Saraçhane in Istanbul, and paucity of coins made reliance on the dating capacity of Ottoman fine wares that much more important (Hayes 1992). The Ottoman-era sites that have been excavated since the 1980s have been largely salvage projects (Saraçhane) or targeted explorations of industrial sites (the Iznik, Eyüp, and Takfur palace kilns; Demirköy foundry). Excavations at Karacahisar fortress and of the town of Bilecik are among the few systematic and long-term investigations of nonurban, nonindustrial sites (Yeneşehirlioğlu 2005: 254–260).

The Arab World

The Mamluk Empire, which encompassed much of the Eastern Mediterranean and Red Sea coast since the mid-thirteenth century, fell to Ottoman forces during campaigns in Syria in 1516 and Egypt in 1517. For the next 500 years, these Arab lands comprised the eastern frontier of the Ottoman Empire. In the sixteenth century, the state built fortresses along the *hajj* route from Damascus to Mecca, manned these forts with standing garrisons, and instituted a taxation system, in Bilād al-Shām largely based on Mamluk precedents, which systematized the incorporation of towns, villages, and Bedouin

tribes into the state structure. Ottoman rule in its Arab lands, however, was inconsistent, and the strategic role of the eastern frontier quickly faded by the seventeenth century, when its forces were needed on other fronts. Much administration fell to local dignitaries and tax farmers, many of the garrison forces were removed, and the state was unable to (or uninterested in) collecting taxes from large parts of southern Bilād al-Shām until the Tanzimat reforms of the late nineteenth century. The region of Transjordan, for example, maintained its autonomy, free from the presence of tax collectors or governmental officials of any form, for a good two centuries.

The kinds of Ottoman archaeology that have emerged in the modern countries carved out of this territory reflect these inconsistencies of Ottoman rule. In today's Syria, systematic archaeological exploration of the country's Ottoman heritage is best illustrated by the excavations of the two important symbols of Ottoman rule: the Damascus and Aleppo citadels. While the Damascus excavations have revealed a continuous stratigraphic record, allowing for construction of a ceramic chronological sequence spanning the medieval through Ottoman periods (François 2008), those in Aleppo have focused on the remains of house foundations dating to the seventeenth century, a period for which domestic architecture in the Levant is poorly known (Yenişehirlioğlu 2005: 263).

Interest in the highly politicized Ottoman period in Israel and the West Bank has evolved from salvage excavations, in the first case, and cultural heritage management, in the latter. The result has been a growing appreciation for the "local" in material culture and daily life as reflected in the archaeological record of this period. Excavations at Tell el-Hesi in the 1970s and 1980s marked a turning point in the archaeology of the region; the publications of this work have become a model for the excavation and publication of late historical burials and have generated interest in traditional burial practices (Eakins 1993). The increasing number of, largely salvage, excavations of rural sites by the Israel Antiquities Authority has expanded our knowledge about village society. Palestinian excavations at Ti'innik, Zir'in, and Tell Birzeit, largely in publication stage, have been informative about settlement history and the material culture of traditional Palestinian society during the transition to Ottoman rule.

Ottoman archaeology in Jordan is the most developed of all the former Arab territories. The overwhelming rural character of the country, its autonomy from the Ottoman state for much of this period, and a proven commitment to historic preservation among government authorities and domestic and foreign archaeologists are converging factors in the ways archaeological research on Ottoman Jordan has developed. Scholarly investigations of Ottoman Jordan have followed four different trajectories since the 1980s: studies of vernacular architecture, combining architectural, archaeological, and ethnographic approaches; investigations on traditional village structure and foodways; excavations of Ottoman garrisons and *hajj* forts; and multidisciplinary regional projects documenting long-term cycles in settlement expansion and abatement and corresponding changes in agriculture. Long-term excavations at Khirbet Faris, Tall Hisban, and Umm al-Jimal have focused on the Ottoman period at different points in their project history; the Northern Jordan Project, described above, was designed from the start to study village life during the late medieval and Ottoman periods on a regional level (Fig. 4).

Archaeological efforts in Egypt have been strikingly different. Outside of urban revitalization projects in the traditional neighborhood known as "Islamic Cairo," with its concentration of Ottoman-era grandee houses, mosques, madrasas, and fountains, and, of course, Muhammad Ali's constructions in the Cairo Citadel, specifically "Ottoman" projects in Egypt, are rare. The most important excavation of an Ottoman site in the country is that of Qasr Ibrim, the Nile garrison south of Aswan that served the Ottoman state from 1560 to 1812. This has been a very important project, as it was the first detailed study of a Janissary garrison (here

Ottoman Archaeology: Localizing the Imperial, Fig. 4 Historic village of Saham, Jordan with turn-of-the-twentieth-century farmhouses and caves used for occupation in the Late Ottoman period, Northern Jordan Project

Ottoman Archaeology: Localizing the Imperial, Fig. 5 HMGP juglet from excavations at Tall Hisban, Jordan, Field M, sixteenth-century domestic context

housing Bosnian troops) and systematically incorporated local documentary analysis. Unlike archaeological projects in other countries that have made use of the archives of Istanbul and Ankara, this one has relied on its well-preserved collection of Turkish and Arabic texts, retrieved on site from the excavations, that describe in detail daily life in the garrison (Hinds & Sakkout 1986; Hinds & Ménage 1991).

Key Issues/Current Debates

The identification and chronology of local wares remain the greatest challenge to Ottoman archaeology. The study of Ottoman fine wares has been pivotal in dating local pottery in associated strata. Long-term American excavations in Greece – namely, that of the Athenian Agora during the 1930s and of Corinth during the 1960s – were seminal in raising an awareness of Ottoman export wares (Frantz 1942; MacKay 1967). More recent excavations in the Anatolian heartland have refined the chronology of the most widely distributed of them (Hayes 1992). Local coarse wares, which are the most common physical remnants of the period, have only recently become a focus of study on their own, and with the restricted production and distribution of glazed wares in many parts of the Ottoman Empire, the coarse wares are frequently the only evidence of settlement in the countryside. The result has been that in many regions of the former Empire, archaeological surveys have underestimated the extent of settlement of the period and exaggerated the degree of settlement decline, as Ottoman-era sites have been misidentified as medieval. The red-bodied coarse wares of Cyprus and the so-called Handmade Geometrically Painted Ware (HMGP) of southern Bilād al-Shām are the most problematic in this regard, as their production extends well into the twentieth century (Fig. 5; Gabrieli 2004; Walker 2009).

International Perspectives

Ever mindful of the legacy of the Ottoman Empire in living societies, the practice of Ottoman archaeology in the United States today tends towards a practical application of scholarship to local development and sustainability. This has led to such initiatives as Project Rainkeep (http://www.rainkeep.org/) and community-oriented efforts such as the Hisban Cultural Association (an NGO) and the Dhiban Excavation and Development and Umm al-Jimal Projects in Jordan; the shared heritage project at Akko in Israel; and the Islamic Cairo Historical Development Project in Egypt (associated with the American Research Center in Egypt). Multidisciplinary projects such as these are applauded locally for their commitment to community engagement and concern for economic and agricultural development.

Future Directions

For the archaeology of the Ottoman era to progress, more systematic excavations are needed. The refining of local ceramic typologies will be impossible without their retrieval from well-stratified, and datable, deposits. The ongoing commitment to regional, landscape projects is commendable and should continue, working the occasional excavation into what are essentially survey designs. The archaeologically informed textual analysis that has emerged in recent years is one of the most promising trends in fieldwork and should become a regular component of every archaeological project concerned with the later historical periods. A rigorous investigation of written sources does not mean the return to a disciplinary past, when texts determined archaeological strategies and scope. It offers, instead, new ways to understand patterns read in the archaeological record and opens new venues of inquiry in such poorly understood aspects of premodern Islamic society as pastoralism, technology, ecology, identity, and migration.

Cross-References

- ▶ Ottoman Empire: Historical Archaeology
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Archaeology: The World at 1800–1850
- ▶ Archival Research and Historical Archaeology
- ▶ Buildings, Archaeological Study of
- ▶ Buildings Archaeology
- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Clay Pipes in Historical Archaeology
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Historical Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic and Maritime Archaeologies
- ▶ Islamic Archaeology
- ▶ Military Activity in Islamic Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Orientalism: Islamic Archaeology and Its Colonial Context
- ▶ Phytoliths in Islamic Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology

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Ottoman Empire: Historical Archaeology

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Introduction

The geographical scope and chronological span of the Ottoman Empire was huge (Fig. 1), making any assessment of its archaeology extremely challenging both because of its empirical complexity and because of the enduring political significance of its legacy. Throughout large parts of the Middle East, the Balkans and North Africa governments are still dealing with territorial, cultural, and legal issues dating back to the rule of the Ottoman sultans. In some cases such as the Israel/Palestine conflict, disputes arising out of the dissolution of the empire continue to have a worldwide impact.

Before discussing the historiography, current scope and future developments of Ottoman archaeology, it is worth briefly reviewing the accepted chronology and dimensions of the empire. The origins of the Ottoman dynasty date back to the thirteenth-century Anatolia, and Osman (?- c. 1324), its founding leader, is first mentioned in written sources from the year 1301. The fledgling Ottoman state was one of a number of small Turkic states which had established themselves between the Byzantine Empire in Western Anatolia and the Mongol Ilkhanids in the east. During the 1300s the descendants of Osman began to build a state in the vicinity of Iznik in northwestern Anatolia, and the first archaeological evidence of this is a coin minted in the name of Osman's son Orhan (c. 1324–1362) and dated to 1326/7 (Finkel 2005: 7). Three important features of the Ottoman state can be detected even at this early stage: one is their relationship with the Byzantines, the second is their Turkic identity, and the third is their Muslim faith. During the 1300s and

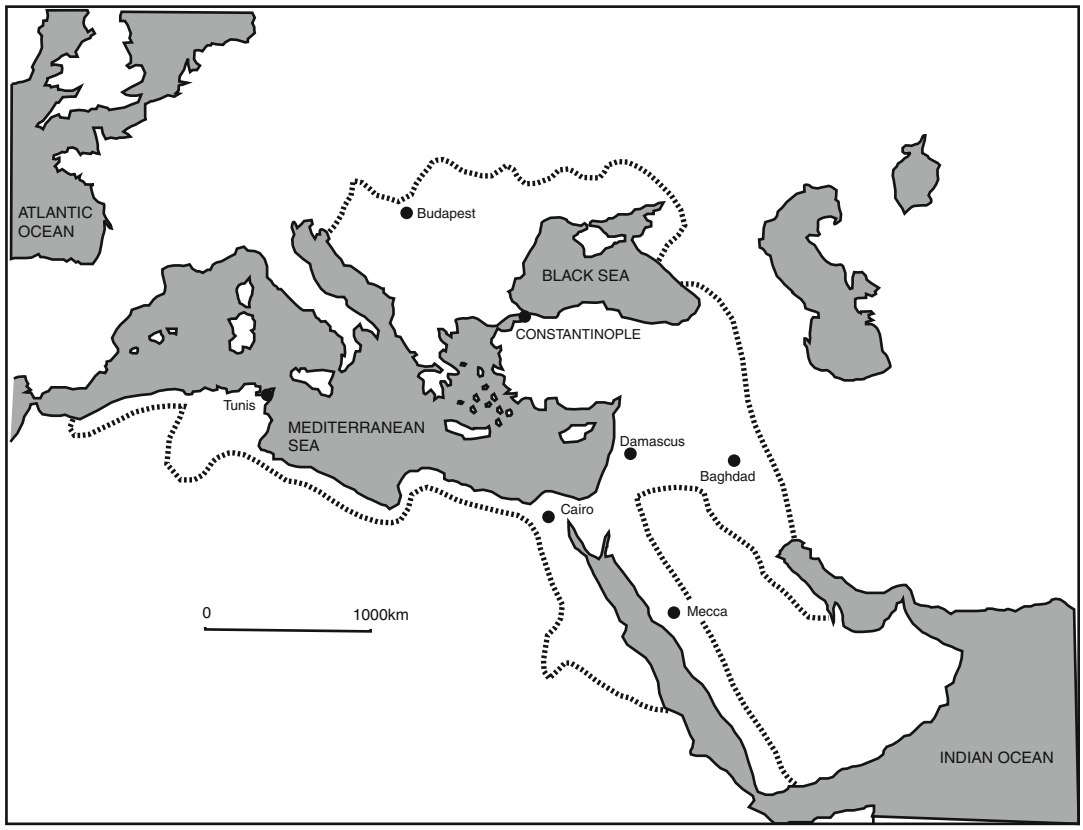

Ottoman Empire: Historical Archaeology, Fig. 1 Map showing geographical extent of the Ottoman Empire during the sixteenth and seventeenth centuries (A. Petersen)

early 1400s, the Ottomans gradually increased their territory which extended on to both the Anatolian and Balkan sides of present day Turkey thereby encircling the Byzantine capital of Constantinople. In 1453 the Ottomans finally captured Constantinople, effectively ending its role for more than 1,000 years as capital of the Eastern Roman Empire. In the following 500 years, Turkish rule was extended over much of the area of the former Byzantine Empire, and it is probable that the Ottoman rulers were conscious of this as they developed their own imperial vision. At its greatest extent in the sixteenth and seventeenth centuries, the Ottoman Empire extended over most of North Africa (with the exception of Morocco), the Balkans, most of the Black Sea littoral, Anatolia, Greater Syria (Bilad al-Sham), Mesopotamia, Arabia, and parts of Western Iran.

The other key component of Ottoman identity was their Turkic identity. Like the Seljuks the Ottomans traced their roots back to Turkish tribes in Central Asia, and this remained a consistent feature of their culture expressed through Turkish language and customs. Although this provided the Ottomans with a secure identity, it meant that in many of their territories and particularly in the Arab provinces they were often regarded as foreigners.

The third consistent feature of Ottoman rule was the adherence to Sunni Islam as seen in the fact that Osman had a Muslim name. Although Ottoman Islam was suffused with Sufism and ancient Turkic customs which some found distasteful, it was nevertheless Sunni and enabled the sultans to pose as leaders of the Islamic world. This role as paramount Muslim rulers was expressed both when the empire was at its most

powerful when Sultan Selim I (r.1512–1520) assumed the title of caliph and in the nineteenth century when Sultan ‘Abd al-Hamid II (1876–1909) sought to revive his fortunes by styling himself as a leader of Pan-Islamism against the dominant imperial powers of Western Europe.

While the beginnings of the Ottoman Empire are shrouded in mystery, the date of the end of the empire is also unclear with a variety of dates suggested including 1922, the abolition of the Sultanate; 1923, the declaration of the Turkish Republic; 1924, the abolition of the caliphate; or 1927, the year Ataturk made his great speech defining the foundations of the modern Turkish state.

Definition

Based on this rough historical outline, it is clear that the archaeology of the Ottoman Empire lies at the intersection of several branches of mainstream archaeology which include historical archaeology, Islamic archaeology, and conflict archaeology, as well as archaeology of particular regions and countries.

The archaeology of Ottoman remains is often subsumed within Islamic archaeology which in recent decades has expanded to become a significant field within the discipline. As a field of enquiry, Islamic archaeology certainly encompasses much of the material considered by archaeologists of the Ottoman Empire – this is particularly the case for sites in the Middle East where there is a strong Muslim presence and continuity from earlier periods. However, there are some parts of Ottoman territory such as the Balkans where the Muslims were in a minority and the Islamic perspective may be less helpful. A more significant objection is that the phrase “Islamic archaeology” has several theoretical problems concerning the use of the term Islamic which in recent years has become more contentious (e.g., Is Islamic archaeology an Islamic view of the past? Can a non-Muslim study Islamic archaeology? Can non-Muslims be included within the study of Islamic archaeology?). While the term Islamic archaeology continues to grow and retains a certain currency, because of the large numbers of non-Muslims within the Ottoman Empire and because the empire operated on a worldwide scale Ottoman archaeology perhaps fits better within the remit of historical archaeology.

With its emphasis on the postmedieval world and global interactions, historical archaeology is perhaps the most suitable perspective for viewing the material remains from the Ottoman lands. In particular historical archaeology emphasizes how the Ottoman world was transformed by exchanges with the New World (e.g., tobacco and coffee, see below). Also implicit in the term historical archaeology is that it deals with societies for which there is written evidence and the Ottoman territories were extensively documented even though the full potential of that documentation is only gradually being realized by archaeologists (for a recent example of the integration of texts and archaeology, see Zarinbaf et al. 2005). Ottoman written sources include imperial and local tax registers, imperial directives, local *waqf* (charitable trusts), and court records. In addition there are a wealth of narrative accounts both Ottoman and from European travelers to the region. At this point it is worth mentioning Evliya Çelebi who traveled throughout the Ottoman Empire and wrote detailed descriptions of thousands of places. His work is indispensable to many archaeologists and is frequently used as a starting point for investigations even though on occasions he is prone to exaggeration. Another figure of major importance is the Ottoman cartographer and navigator Piri Reis (1470–1513) who mapped the Ottoman world and possibly the Americas and hence provides an insight to the Ottoman conception of the world. Historical archaeology also places an emphasis on imperialism and the application of ideologies over large areas. However, there are some limitations to this perspective, the most obvious of which is that the early years of the Ottoman Empire, certainly up to the fall of Constantinople in 1453, are more relevant to the concerns of medieval archaeology with the focus on the decline of the Byzantine Empire

and the emergence of medieval principalities. Also on a practical level the archaeology of Ottoman levels at a particular site is often carried out by archaeologists interested in medieval and earlier periods with an emphasis on continuity of community. Within this context Ottoman archaeology can be considered as part of local, national, or regional archaeology. One particularly apt regional classification is Mediterranean archaeology which emphasizes the continuity with the ancient world and the interconnections between various peoples both within and outside the territory of the Ottoman Empire.

Although there are a large number of archaeological projects which in some way include Ottoman material remains as well as a large body of articles discussing archaeological material from the Ottoman period, there are few books which focus exclusively on Ottoman Archaeology. The first attempt at an overview of the subject was Uzi Baram and Lynda Caroll's recent book with the citation (Baram & Caroll 2000). This comprises a series of articles by different authors dealing with sites and monuments ranging from Anatolia to the Red Sea. In addition, the book includes an introduction and conclusion which together make a case for an "Ottoman archaeology." The other major contribution to Ottoman archaeology is the publication of a British Academy Symposium on Ottoman frontiers edited by Andrew Peacock (2009). Although not specifically devoted to archaeology, the majority of chapters are based on archaeological fieldwork and research. Together these two books provide an excellent introduction to the scope and interest of Ottoman archaeology though a theoretically informed overview is still awaited. For the present, a number of themes or potential directions of research are suggested followed by an introduction to the regional concerns of Ottoman archaeology.

Key Issues/Current Debates

Obviously the archaeology of the vast area that comprised the Ottoman Empire is likely to encompass many diverse areas of interest. In particular the position of the Ottoman Empire between Europe, Africa, and Asia demonstrates the immense complexity and potential for the exchange of people, ideas, and cultures all of which can be investigated through archaeology. Out of this, three research themes have been selected partly because they represent areas of research already underway and partly because they indicate ways in which the Ottoman Empire has influenced the present.

Coffee and Tobacco

The consumption of coffee and tobacco are one of the defining features of the modern world, and both are intimately connected with the economic and social life of the Ottoman Empire. The origins of coffee within the Ottoman Empire (i.e., highlands of southwest Arabia and the Horn of Africa) mark it as a global commodity first exploited within the Islamic world and later introduced as a crop to a variety of locations including the Americas, Africa, and Southeast Asia. Tobacco on the other hand originated in the New World and was first imported and later cultivated as a crop in the Middle East. The history of both commodities illustrates the extent to which the Ottoman Empire was an integral part of world systems. In archaeological terms both commodities can be identified from excavations and surveys in the form of ceramic coffee cups and clay tobacco pipes and are often used as a defining feature of Ottoman period assemblages. Beyond their immediate economic significance (pilgrims traveling to Mecca could pay for their travels and make a profit by buying coffee in Mecca and selling it on their return home), both coffee and tobacco had immense social implications such as stimulating political debate and promoting more relaxed ideas about hedonism and pleasure (Grehan 2006: 1353).

Architecture

Architecture is one of defining features of the Ottoman Empire; from mosques, fortresses, and caravanserais, the stamp of the Ottoman regime is unmistakable. For example, one of the most recognizable features of an Ottoman city is the presence of a domed mosque with pencillike

slender minarets. A number of important studies of Middle Eastern cities testify the extent to which the Ottomans used architecture to imprint their vision of the world throughout the empire (e.g., Weber 2009). In art historical terms Ottoman architecture is one of the few non-western traditions to be fully incorporated into the study of historical architecture (Goodwin 1978). Much of the focus in Ottoman architecture has been on Sinan who designed many of the buildings for Sultan Süleyman the Magnificent and his successors in the sixteenth century. While Sinan's genius is well recognized, the work of later architects is now also beginning to be appreciated. As well as the famous Ottoman monuments, humbler buildings such as those lining the Hajj (pilgrimage) routes to Mecca were also of a surprisingly high standard both in terms of construction and design (e.g., Petersen 2012). In contrast to the Ottoman government structures, local buildings were generally built in the local tradition though there could be some influence from the imperial architecture. One of the challenges of Ottoman archaeology is to identify the interplay of local traditions and identity against the background of the Empire (e.g., Carlton & Rushworth 2009).

Landscapes

Because the Ottoman period is relatively recent, there has often been an assumption that the landscape and environment were much the same as today. However, increasingly archaeological projects have begun to look at the evolution of landscapes during the period (e.g., Given 2000). In Palestine, for example, it is clear that the Ottomans actively promoted settlement in the countryside (Fig. 2), both to increase their revenue base and also to secure the region against nomadic incursions and agricultural degradation. In Greece the Ottomans created agricultural estates (*çiftliks*) sometimes protected by walls and armed troops to provide a secure food source for the rulers (Zarinbaf et al. 2005). In addition to the newly introduced crops such as tobacco, cotton, and maize, the Ottoman period saw the introduction of the prickly pear cactus (*opuntia*) which was used both as a defensive barrier as well as a means of producing cochineal used as a red dye for clothing. Other characteristic plants of the Ottoman period include tulips and cypress trees, both of which had considerable social and economic significance. For example, the cultivation and sale of tulips was of such importance in the early eighteenth century that the era was known as the Tulip Period (*Lale Devri*), while cypress trees were regarded as symbols of life and were often planted in cemeteries.

International Perspectives

Although there are certain issues and areas of interest to archaeologists which can be traced throughout the empire and over different time periods, there are some distinctively regional patterns and historical perspectives which can be discussed as discrete units. For ease of discussion, the empire can be divided into four large regions which are the (1) Balkans, (2) Anatolia and the Black Sea littoral, (3) the Arab Middle East, and finally (4) Egypt, Cyprus, and North Africa.

In addition to the regions within the empire, it is perhaps worth considering the possibility of investigating Ottoman archaeology beyond the borders. Examples might include the activities of slave traders in Africa (e.g., Lane & Johnson 2009), the presence of the Ottoman navy based in Toulon in France in the sixteenth century, or the Ottoman influence on fortifications and warfare in Southeast Asia.

The Balkans

The Balkan Peninsula is an extremely mountainous area of southeastern Europe which is bounded to the west by the Adriatic Sea to the south by the Ionian and Aegean Seas and to the east by the Black Sea. The northern boundary of the peninsula is marked by the Danube as well as the Sava and Kupa rivers. Linguistically, the area is highly heterogeneous with a number of diverse language types spoken including Slavic, Romance, Hellenic, Albanian, and Turkic. Historically, the Balkans are one of the oldest parts of the Ottoman Empire with Thrace conquered in the mid-fourteenth century. By the

Ottoman Empire: Historical Archaeology, Fig. 2 Eighteenth century Ottoman merchant's house at Ramla in Palestine/Israel (Photo: Author)

end of the same century, both Serbia and Bulgaria were also under Ottoman domination. In 1463, Bosnia and Herzegovina were annexed, and during the 1500s Hungary and Romania were added to the Ottoman possessions. An indication of the strength of Ottoman control in the region can be seen from the fact that they were able to besiege Vienna as early as 1529. The antiquity of the Turkish presence in the region is reflected in the use of a Turkish name for the peninsula (Turkish *Balkan* = forested mountain chain).

The archaeology of the Ottoman Balkans (e.g., Figs. 3, 4) is politically one of the most contentious areas of enquiry with territorial, religious, and ethnic divisions continuing to influence how archaeology is practiced and publicized (e.g., Meskell 1998). Within each of the modern states of the Balkans, there is a different attitude to the Ottoman past and of course its archaeology. This has meant that archaeological projects and publications focusing on the Ottoman era are more common in some of the countries of the region. For example, Hungary which was occupied by the Ottomans for a relatively short period (1541–1699) has a thriving tradition of Ottoman archaeology (e.g., Gerelyes & Kovács 2003). The extent to which the Ottoman past is incorporated into the national heritage can be seen by the Gül Baba monument in Budapest. Gül Baba was a companion of Süleyman the Magnificent who died during the Ottoman siege of Budapest in 1541. The tomb, which was built between 1543 and 1548, remained a prominent landmark after the Hapsburg reconquest of the city in 1686. In the nineteenth century, the shrine was restored by the Ottoman government, and the site is now registered as a Hungarian National Monument. The site which is now owned and maintained by the Turkish government is often referred to as the most northern Muslim pilgrimage site.

Other Balkan nations have been less eager to investigate and incorporate their Ottoman past into their national heritage. For a long time, the archaeology of the Ottoman period in Greece was regarded with suspicion (e.g., Bintliff 2007: 221). This was not necessarily a reflection of the country's attitude to its Ottoman past but rather an expression of difficult relations with the Turkish Republic. However, recently this approach has begun to change spurred on partly by the work of foreign archaeologists in Greece and partly by generally improving relations with the Turkish Republic. Important studies include the interdisciplinary Boeotia project which combines archival source material with field survey to define a pattern of settlement during the period of Ottoman rule (Kiel 1997). There have also been recent studies of

Ottoman Empire: Historical Archaeology, Fig. 3 Sixteenth century Ottoman bridge in Mostar, Bosnia-Herzegovina. Destroyed 1993 rebuilt 2004 (Photo: Anthony Grey 22.9.11)

Ottoman Empire: Historical Archaeology, Fig. 4 Palace of Ahmed Kuri Pasha (late eighteenth century), Ottoman governor of Berat, Albania (Photo: Anthony Grey 31.5.12)

Ottoman architecture in Greece, most significantly the volume produced by the Greek Ministry of Culture (Brouskari et al. 2009). In Bulgaria there has also been limited interest in the archaeology of the Ottoman period although there have been extensive historical publications dealing with this period. Guinova's 2005 publication provides a useful synthesis of recent work on Ottoman archaeology in the country.

Anatolia and the Black Sea

The modern Turkish state is more or less identical with the geographical region of Anatolia (sometimes also referred to as Asia Minor) and represents the heartland of the Ottoman state. Anatolia is bounded to the south by the Mediterranean, to the west by the Aegean, and to the north by the Black Sea. The Ottoman capital of Constantinople stands at the northwest corner of

Anatolia straddling the narrow opening connecting the Black Sea to the Mediterranean. Historically, the Black Sea region was a border zone between the expanding Russian and Ottoman Empires and for convenience can be placed in the same region as Anatolia.

Despite the fact that the Turkish Republic is the direct successor of the Ottoman Empire, the attitude of modern Turkey to its Ottoman past has been ambiguous. Kemal Attaturk, the founder of the modern state, rejected the Ottoman past as "stale and unprofitable" (Finkel 2005: 1). The break with the past was symbolized by the change from the old imperial capital of Constantinople to Ankara located on the central Anatolian plateau. The emphasis within history and archaeology was on Anatolian civilizations and the Central Asian roots of the Turkish people (Özdoğan 1998). Although some Ottoman architecture was praised, the whole period was characterized as one of decline and of little relevance to the modern state. Until recently the majority of excavations and surveys in Turkey have focused on the prehistoric and pre-Islamic periods, and where the Islamic sites were investigated, the emphasis was on the medieval Seljuk remains rather than on the later Ottoman remains. Indeed, one commentator writing at the end of the 1990s wrote "with justification we can claim that during the last decades more Ottoman archaeology has been destroyed than any of the earlier periods since public opinion still posits that Byzantine and Greco Roman remains are antique whilst Ottoman ones are not" (Özdoğan 1998). However, since the late 1990s, there has been an increasing interest in Ottoman archaeology in Turkey partially reflecting a worldwide tendency of interest in the more recent past and also reflecting political changes in Turkey which have begun to see the Ottoman Empire in a more favorable light.

Apart from the coasts of Anatolia and Bulgaria, the Ottoman area of control on the Black Sea falls mostly within the Republic of the Ukraine. The region was first incorporated into the Ottoman realm in 1538 during the reign of Süleyman the Magnificent (r. 1520–1566) though the control of anything beyond the shores of the Black Sea was largely a matter of alliances rather than direct control. The Ottoman presence in these areas was mostly in the form of fortresses which remained in Ottoman control until the early nineteenth century. For examples of Ottoman archaeology in the Black Sea region, see Kellner-Heinkele et al. (2008). A summary of archaeological work on Ottoman monuments in Ukraine can be found in Bilyayeva and Ersoy (2008).

The Arab Middle East

The Arab Middle East is a term of convenience used to describe the Arab provinces incorporated into the Ottoman Empire during the early sixteenth centuries. This area comprises the modern states of Syria, Iraq, Lebanon, Jordan, Palestine/Israel, and parts of Saudi Arabia and Yemen. This area remained part of the Ottoman Empire for nearly 400 years and had a special distinction in that it contained both the spiritual home of Islam as well as the capital cities of Damascus and Baghdad. Ottoman rule in this region was described in negative terms by European nineteenth-century travelers in the Middle East, and these accounts have informed many Western perceptions of a declining Ottoman Empire. This view was reinforced during the early twentieth century when the Ottomans supported the Germans in the First World War while the British supported an Arab revolt against Turkish rule. Set against this background, it is surprising that in this area the successor states have a more positive view of the Ottoman period, and it is in this area that Ottoman archaeology is most developed. Studies of Ottoman monuments began as early as the 1930s when Jean Sauvaget (1937) published his survey of Ottoman caravanserais in Syria. In general, however, studies of the Ottoman period only became common from the 1980s as techniques improved and recent centuries were considered legitimate subjects of archaeological investigation. A summary of historical and archaeological work in the area can be found in McQuitty (2001). The archaeology of the Ottoman period in Iraq has been less studied

partly because the Ottoman presence in the area was more disrupted (this formed a border zone between the Saffavid and Ottoman Empires) and partly because of disruptions due to almost continuous warfare since the 1980s. However, Simpson's (2011) article based on fieldwork in the North Jazira provides an interesting summary of Ottoman archaeology in northern Iraq.

Within the Arabian Peninsula, Yemen and Saudi Arabia contain significant numbers of Ottoman sites and monuments, yet in both cases, for different reasons, there has been little investigation of the archaeology of the Ottoman period. In Yemen, civil war and social unrest have meant that investigations of the Ottoman period have been limited, whereas in Saudi Arabia there has been an ideological reluctance to recognize the Ottoman presence, as indicated by the destruction of Ottoman monuments in Mecca and Medina.

Yemen was incorporated into the Ottoman Empire in the sixteenth century though by the 1630s Yemeni forces succeeded in ousting the Turks. The Ottomans returned in 1872 and retained control of the Yemeni highlands until they were expelled in 1914. There have been few specific studies of Ottoman period archaeology though Ottoman period sites are mentioned in a large number of archaeological surveys. Ottoman architecture in Yemen has also been investigated as part of its wider historic heritage as well as a distinct architectural period (Farah 2011).

Two areas within Saudi Arabia were incorporated into the Ottoman regime, the Al-Hasa Oasis on the eastern coast and the Hijaz on the Red Sea coast. In addition to Ottoman buildings in Mecca and Medina, the Hijaz contains Ottoman forts along the Hajj routes (Fig. 5) as well as nineteenth-century forts associated with the Ottoman reconquest. The Al-Hasa area contains a number of Ottoman buildings including the mosque of Ibrahim.

Egypt, Cyprus, and North Africa

Egypt was incorporated into the Ottoman Empire in 1517 following the defeat of the former Mamluk rulers. In terms of population Egypt was the largest Arab province within the Ottoman Empire and as such had certain degree of autonomy which increased in the 1800s to virtual independence. In terms of archaeological research, there has been an emphasis on the pre-Ottoman medieval periods both because they are more distant in time and because they are considered to be more "Egyptian" (i.e., not under foreign domination). Ottoman architecture, on the other hand, has received considerable academic attention particularly in Cairo where new architectural forms were introduced. Outside Cairo there have been a few archaeological projects which have focused on Ottoman period remains: examples include the Japanese project at Al-Tur in the Sinai (Kawatoko 1995), the excavation of Ottoman Quseir (LeQuesne 2007), and the excavation of Qasr Ibrim.

Further south in the territory of modern Sudan, the Ottomans established a presence along the Nile valley as early as the sixteenth century though the whole country was only incorporated into the Egyptian Ottoman Empire in the nineteenth century (a useful summary of Ottoman archaeology in Sudan can be found in El-Zein 2009).

The Ottoman presence in North Africa to the west of Egypt has a different character to the Balkans, Anatolia, and the Arab Middle East, though there may be some similarities to the north coast of the Black Sea. The Ottoman presence was generally limited to the coastal cities with very little influence on the interior. In many ways North Africa served as a series of naval bases which served both official Ottoman naval operations as well as local corsairs who raided throughout the Mediterranean and beyond. Little research has been carried out into the Ottoman archaeology of this area (cf. Heywood 2009), although a few studies show the potential for further work.

In regional terms it is difficult to position Cyprus within the Ottoman Empire. It has strong links to the Balkans through the Greek-speaking population and links to Anatolia and Syria

Ottoman Empire: Historical Archaeology, Fig. 5 Ottoman Hajj fort at Mudawwara on the border of Jordan and Saudi Arabia (Photo: Author)

through proximity and trade but are included in this section as representative of the Ottoman presence in the Mediterranean. The continuing cultural complexities of Greek and Turkish Cyprus have had obvious implications for the investigation of the Ottoman archaeology of the island; however, there have been some interesting studies which reflect this complexity (e.g., Given 2000).

Future Directions

It can be seen that archaeology of the Ottoman period already encompasses a vast area and many different forms of human settlement and interaction. Much remains to be done in integrating textual research with archaeology and also with environmental studies. Several areas with potential for further exploration include the archaeology of slavery within the Ottoman Empire (e.g., Lane & Johnson 2009); the visibility and interactions between various ethnic, religious, and social groups; long distance trade in particular connections with the Indian Ocean and the Atlantic; and the role of archaeology in developing an international heritage.

Cross-References

- ▶ Clay Pipes in Historical Archaeology
- ▶ Cyprus, Archaeology of
- ▶ Fortifications, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Turkey: Archaeological Museums

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Ounjougou Site Complex, Archaeology of the

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Introduction

The Malian site complex of Ounjougou is located in the Boucle du Niger (or Niger Bend) in the Dogon Country, more precisely on the Bandiagara Plateau about 15 km east of the town of the same name (Fig. 1). It includes more than a hundred archaeological sites in a valley around the confluence of four rivers, of which the main one, the Yamé, joins the Niger 30 km north of the town of Mopti. Topographically, this zone presents as a series of gullies cut through a

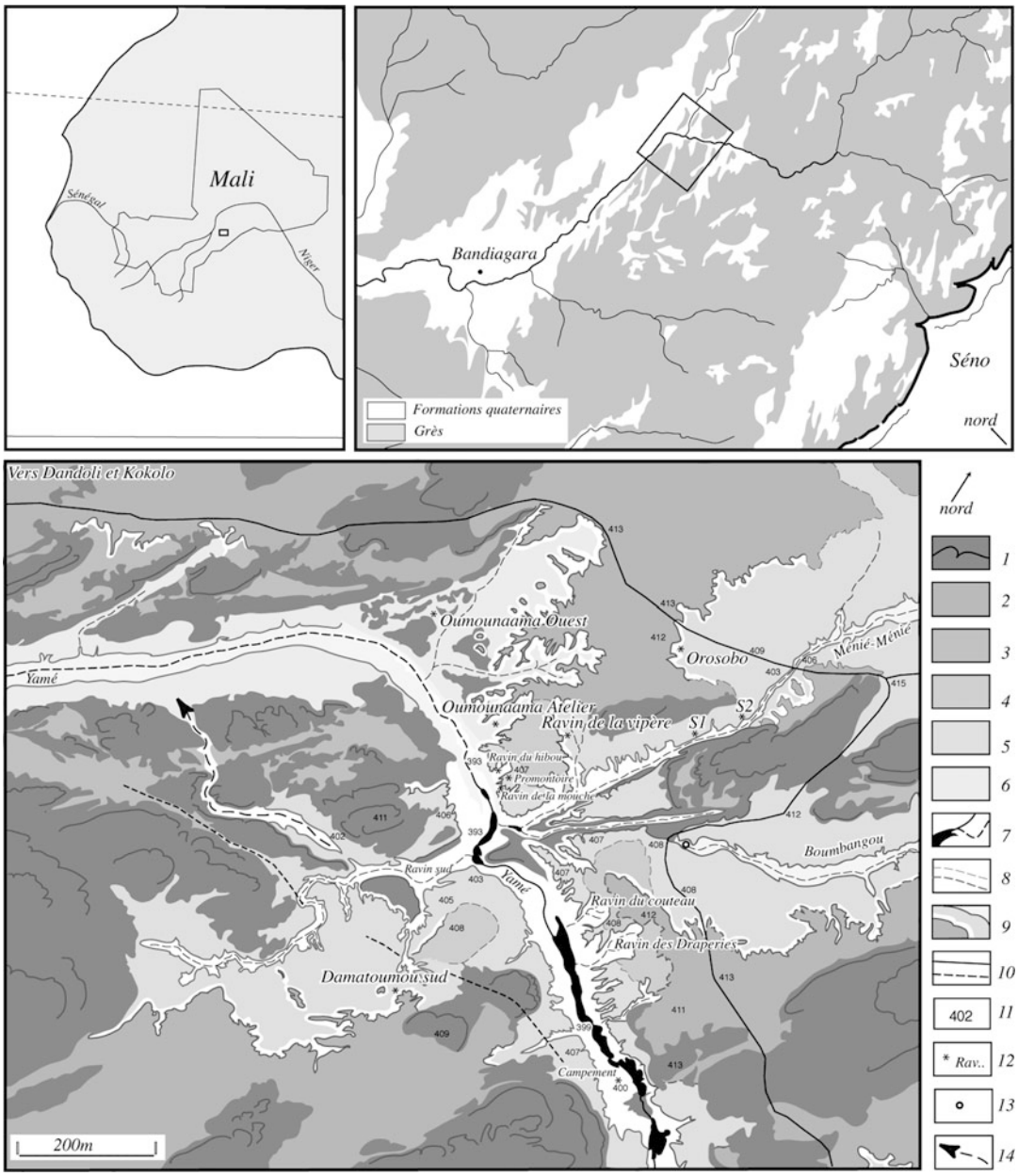

Ounjougou Site Complex, Archaeology of the, Fig. 1 Location and geomorphological presentation of the site of Ounjougou. *1*: Sandstones and scarps in sandstones; *2*: Main terrace-glacis; *3*: Eroded sectors of main glacis; *4*: Holocene terrace (8th millennium BCE); *5*: Secondary terrace-glacis; *6*: Sands and silts of alluvial accumulation; *7*: Hydrographic network and permanent lakes; *8*: Stratigraphic limits; *9*: Terraces and glacis edges; *10*: Track and relics of the colonial track; *11*: Height (meters); *12*: Archaeological sites; *13:* Infiltration of Boumbangou through sandstones; *14*: Paleoriver of Yamé (Mapping: M. Rasse)

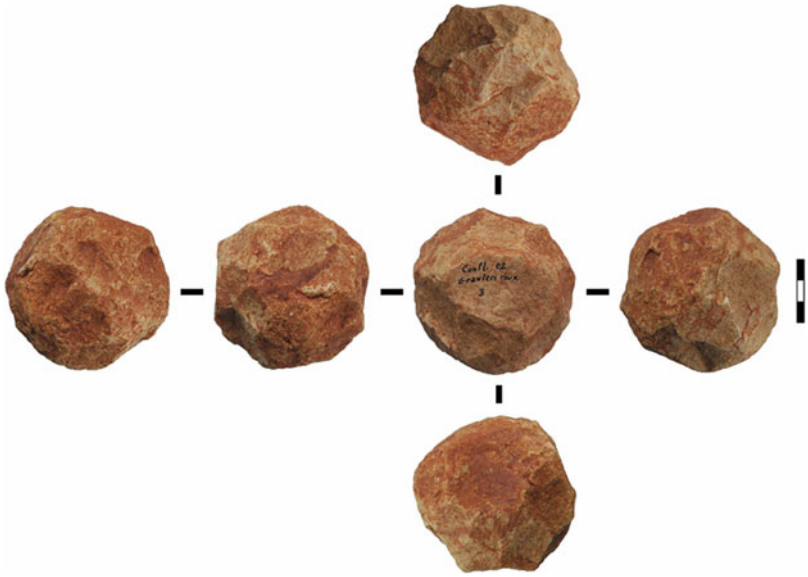

Ounjougou Site Complex, Archaeology of the, Fig. 2 Polyhedron extracted from the deepest sedimentary formations of Ounjougou

complex succession of Quaternary eolian, alluvial, and colluvial formations (Lespez et al. 2011). The stratigraphic sequence, which can in places be 16.50 m thick, has yielded archaeological material from the Lower Paleolithic to the present. The deposits also contain abundant vegetal remains (pollen, leaves, charcoal, wood, seeds, etc.) of excellent preservation. As a result, the site complex offers the possibility to place human occupations in relation to climatic and environmental changes over a long chronological sequence.

After the discovery in 1994, 13 field seasons were undertaken between 1997 and 2009 in the framework of an international and interdisciplinary research program entitled *Human settlement and paleoenvironment in West Africa*, with 12 research institutes involved from Mali, France, Germany, and Switzerland and coordinated by the Swiss Archaeological and Ethnoarchaeological Mission in West Africa (MAESAO), now the *Laboratoire Archéologie et Peuplement de l'Afrique* at the University of Geneva (Huysecom 2002). Research carried out in this program has contributed many elements that have significantly changed our understanding of the prehistory and history of the Dogon Country, and more broadly of West Africa. In addition, while remaining attentive to the causes that lead to migration or technological innovation, they have confirmed that climatic variations that affected the modern Sahel region throughout the Pleistocene and Holocene had a decisive effect on human groups and their adaptive responses, whether by controlling the environment by systematic burning or by developing ceramics, herding, and agriculture.

Key Issues/Current Debates/Future Directions/Examples

Paleolithic Occupations

The earliest evidence of human occupation is seen at several sites in the complex where the lithic industry contains polyhedrons and sub-spheroids in quartzitic sandstone associated with worked cobbles (Soriano et al. 2010) (Fig. 2). These artifacts, which reflect an early phase of the Paleolithic by their typological and technological traits, were observed in stratigraphic context, sealed in plates of coarse sands adhering to bedrock. An OSL date for the Final Middle Pleistocene was obtained for the deposits overlying these formations, providing a terminus ante quem of 180 ka for this lithic industry. The degree of arenization (surface weathering) of the

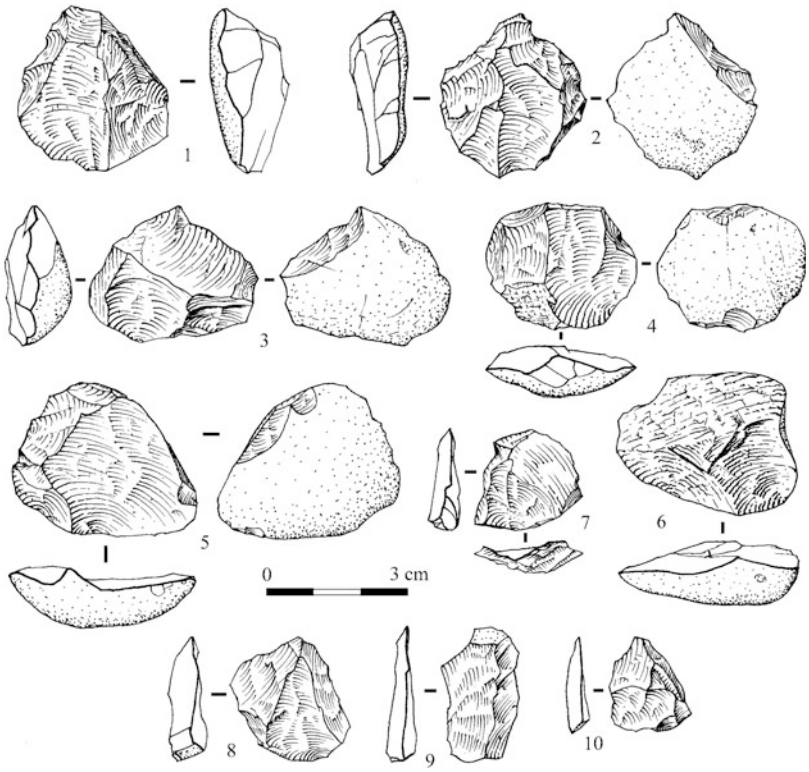

Ounjougou Site Complex, Archaeology of the, Fig. 3 The Levallois industry of the site of Ounjougou – *Orosobo 2*, dated to 35–30 ky*:* Lithic industry on quartz. 1–6, Levallois cores; 7–10, Levallois flakes

plated layers in which this industry was discovered, suggests that these deposits underwent long periods of leaching under damp warm conditions, and on typo-technological comparisons with Paleolithic material from the Maghreb, an age between 1 and 500 ky can be considered for this polyhedral industry at Ounjougou (Soriano et al. 2010).

Although having a broad archaeological visibility, the Acheulean is still absent across the entire Ounjougou zone, the Bandiagara Plateau, and the Seno Plain. This may indicate the existence in West Africa of regions not frequented by Acheulean populations, although they are well represented in neighboring regions.

A Levallois core with preferential removals, found isolated in stratigraphic context, marks the first evidence for the Middle Paleolithic at Ounjougou (Fig. 3). An OSL date places this core around 150 ky, in the Late Middle Pleistocene. Middle Paleolithic occupations in the Ounjougou site complex, all open air, become more common during the Upper Pleistocene: 25 typo-technologically distinct assemblages were identified between 100 and 22 ky, with a particular concentration during oxygen isotope stage 3 between 50 and 30 ky (Rasse et al. 2004; Soriano et al. 2010). All of the known occupations are open-air sites, and the lithic material for most of them is preserved in primary position or very slightly reworked in colluvial silts. Most of the reduction techniques typically recognized are represented at Ounjougou: Levallois, discoidal, unidirectional, blade, and facies with leaf-shaped bifacial pieces. The lack of technological recurrence in the chronological succession of lithic industries at Ounjougou raises questions, particularly given their diversity. We nearly never find two successive occupations with the same lithic industry. The diversity of lithic industries found in stratigraphic context at Ounjougou and their sequence without obvious logic further raises questions about population dynamics in Sahelian West Africa during the Upper Pleistocene. Even more than the observed diversity is the rate of change, which is very high since the most of the

Ounjougou Site Complex, Archaeology of the, Fig. 4 Ceramic sherds from stratigraphic unit HA1 of Ounjougou – *Ravin de la Mouche*, older than 9,400 cal BCE, including a bowl fragment (**A**) and a decorated sherd (**B**)

known occupations are situated during OIS 3 over a period of 30 ky years. The succession seen at Ounjougou enables us to reject the hypothesis of gradual local evolution in technological traditions for this period. It suggests rather that human groups with different technological traditions regularly succeeded one another in the region (Soriano et al. 2010).

During OIS 2, after 22 ky, the Ounjougou region underwent extremely arid conditions and appears to have been deserted by humans until the climate improved at the onset of the Holocene (Rasse et al. 2004).

Holocene Occupations

The discovery of ceramic sherds associated with grinding tools and small bifacial armatures in Holocene layers dated to the beginning of the 10th millennium cal BCE and to the 8th mill. cal BCE has significantly altered the state of archaeological knowledge (Huysecom et al. 2004, 2009; Soriano & Huysecom 2012) (Fig. 4). Indeed, these are the oldest ceramic known today in sub-Saharan Africa. The solid stratigraphic and chronological context of the site of *Ravin de la Mouche* at Ounjougou (Rasse et al. 2006; Lespez et al. 2008; Neumann et al. 2009; Ozainne et al. 2009) indicates that knowledge of ceramic production appeared in sub-Saharan West Africa at least as early as in the Nile Valley, prior to 9400 cal BCE. This innovation, as well as very specific bifacial armatures, is probably linked to the reoccupation of the open tropical savannas that regenerated in the Dogon Country at the start of the Early Holocene. This new typo-technological complex would have spread rapidly to the north, particularly toward the central Sahara, at the same time as the movement of the front of intertropical convergence, when the Saharan zone became increasingly green, developing surfaces of edible grasses and major changes in the composition of wild fauna hunted.

During the Middle and Late Holocene, around the 5th and the mid-3rd mill. cal BCE, we observe two phases of human reoccupation, at the sites of *Promontoire Néolithique* and *Ravin du Hibou*, showing affinities in their material culture with some Neolithic complexes in the central Sahara (Huysecom et al. 2004; Kouti & Huysecom 2007). A millennium later, during the seventeenth and sixteenth centuries cal BC, cultural complexes of the Final Neolithic that developed in the Ounjougou region present unique traits, with the appearance of pottery decorated by different kinds of roulettes with highly characteristic motifs (Ozainne in press). The existence of stone dwellings along the river, with grinding materials and abundant calcined grass stalks, is established, while the practice of millet (*Pennisetum glaucum*) agricultures is confirmed by the discovery of burned seeds dated by AMS. The Neolithic occupations were abandoned near the middle of the 1st mill. cal BCE (Ozainne et al. 2009; Ozainne in press).

Protohistory

Protohistoric occupations over the last two millennia are less well represented at the site complex, maybe following a dry episode during

Ounjougou Site Complex, Archaeology of the, Fig. 5 Pottery from the ritual rockshelter of Dangandouloun, dated between the seventh and the twelfth century CE, notably including numerous tripod cups

the first centuries BCE/CE (Mayor et al. 2005). Excavations at *Promontoire protohistorique*, with a sequence of colluvial layers, document the domestic pottery used between the seventh and thirteenth centuries CE by populations who settled in the region prior to the arrival of the Dogons. The excavation of a rockshelter with ritual function, *Dangandouloun*, yielded abundant ceramic material of excellent quality, including jars, bowls, and many tripod cups, as well as iron weapons and ornaments (Fig. 5). A series of thermoluminescence dates places this set of objects between the seventh and twelfth century CE. Stylistic and technical analyses of the ceramics have demonstrated the primarily local production of pottery by a group of the Gur linguistic family, shaped by pulling out of a lump of clay, the use of recipients produced by Mandé groups from the Inland Niger Delta and rare importing of recipients produced on the Seno Plain or further east, shaped by pounding in a concave form above a straight mat. This indicates that the Bandiagara Plateau was located at the crossroads of at least three large cultural spheres from the second half of the 1st mill. CE (Mayor 2011).

In addition, the study of modern and past ceramic traditions, through the excavation of historical sites and collection at abandoned villages known by oral tradition, has enabled us to follow changes in styles through time and to formulate hypotheses concerning the settlement of the plateau. Finally, the reconstruction of very complex Dogon migration routes on the plateau over the last three to four centuries, understanding of the relationships that were established between the different clans, and the delimitation of ancient territories, at the heart of current land ownership disputes, were made possible through oral tradition survey (Mayor et al. 2005).

Ethnoarchaeological research has moreover been extensively undertaken for the modern ceramic traditions of the region and has enabled identification of a peasant tradition (tradition A) in the center of the Dogon Country and a series of traditions made by the wives of smiths (traditions B, C, and D). The latter are either of local origin or from societies on the periphery of this region. The map of these traditions is extremely useful to interpret archaeological remains, particularly those from the Ounjougou site complex (Mayor 2011). Finally, archaeological and ethnohistorical studies have been carried out with the smith clans and traditional iron production on the Dogon Plateau during the period between the last precolonial empires (mid-2nd millennium CE) and the arrival of French colonization (late nineteenth to early twentieth century). They have made it possible to develop an overall scenario for the history of settlement

of smiths in the region and their production and to situate them within the dynamics of the central Nigerian plateau (Robion-Brunner 2010).

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Landscape Domestication and Archaeology
- ▶ West and Central Africa: Historical Archaeology
- ▶ West and Central African Neolithic: Geography and Overview

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Out-of-Africa Origins

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Introduction

Around 100,000 years, the world was inhabited by a heterogeneous group of hominins: the Neanderthals in Europe and Western Asia, Denisovans and possibly other primitive hominins in East Asia, and more modern-looking humans in Africa and the Middle East. By around 30,000 years ago, most of this diversity had disappeared and modern humans occupied much of the Eurasian continent. How did this transition occur?

Definition

The Out-of-Africa Origins model (also Recent African Origins) was developed by several workers during the 1980s and was discussed in some detail by Chris Stringer and Peter Andrews (Stringer & Andrews 1988). The hypothesis is that the modern form of *Homo sapiens*, or anatomically modern humans (and probably also fundamental aspects of modern human behavior), had evolved in Africa by at least 150,000 years ago. Around 60,000 years ago, modern humans left Africa, replacing archaic hominins outside of the continent with restricted amounts of interbreeding.

Key Issues/Current Debates/Future Directions/Examples

The origins and spread of modern humans have been hotly debated throughout the history of paleoanthropology. There are several hypotheses that explain modern human origins. The first is the Out-of-Africa or Recent African Origins hypothesis (Fig. 1). This hypothesis states that modern humans and modern human behavior evolved in Africa and then spread from Africa around 60,000 years ago, replacing archaic hominins with restricted amounts of inbreeding (Fig. 1). The second hypothesis is the regional continuity or multiregional model and proposes that modern humans evolved in parallel across the globe from the hominins that lived there at the time, with gene flow between the different lineages. A third hypothesis is the assimilation model. This model proposes a middle ground and states that modern humans evolved in Africa but they merged with the local hominins, resulting in hybrid populations. With advances in scientific methods and additions to the fossil record, these hypotheses are ever changing, but their essence remains the same.

Below are the arguments supporting the Recent African Origins model. Evidence from the fossil record indicates that the African continent gave rise to modern humans. Both morphological and behavioral modernity evolved in Africa between 200,000 and 100,000 years ago. These people would then have spread throughout Africa and across the rest of the world, replacing the other hominins with little gene flow between them. Genetic evidence from mitochondrial and Y-chromosome DNA supports this hypothesis, while nuclear DNA is more ambivalent.

Fossil Evidence

The oldest modern human fossils come from East Africa and date to about 160–195,000 years. Fossils from Omo and Herto show some primitive features but, at the same time, some derived *Homo sapiens* characteristics such as a rounded skull with high forehead, a chin, and a short face that is tucked under the large brain case. There is fossil evidence from other parts of Africa that modern humans also lived there at least 100,000 years ago. At Klasies River Mouth in South Africa, for example, the remains of several individuals have been found that suggest some

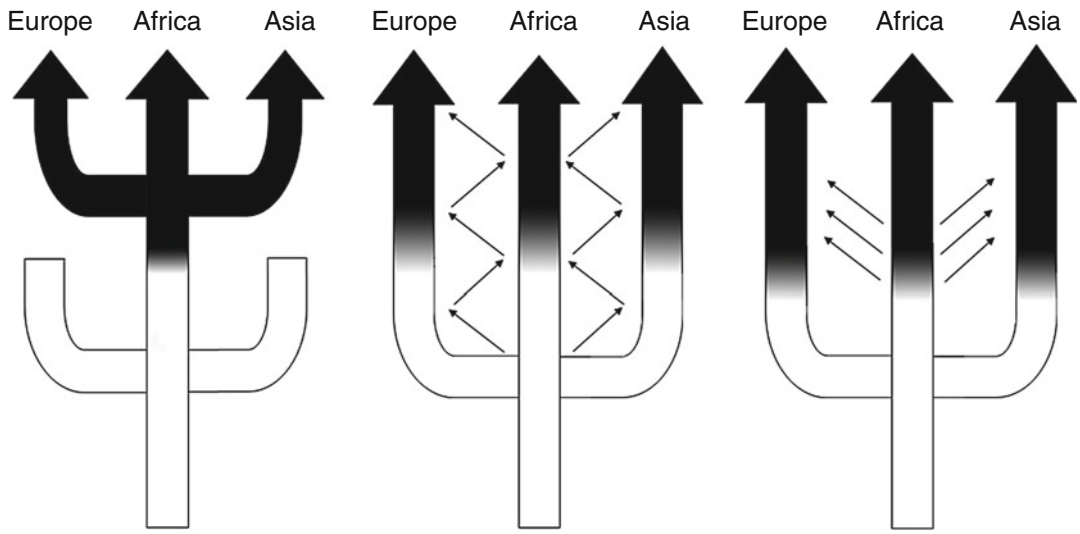

Out-of-Africa Origins, Fig. 1 Three models of modern human origins. *Left*, Out-of-Africa model; *middle*, multiregional model; *right*, assimilation model

modern affinity. Although the fossils are fragmentary, archaeological evidence from the same site has been described as presenting aspects of behavioral modernity. More complete modern human fossils from Qafzeh and Skhul Caves in Israel are dated to around 110,000 years. Environmental evidence has shown that modern humans were present in this region during a warm and wet period, possibly between phases of Neanderthals occupation. Other Afro-Arabian mammal species are also present in the archaeological deposits from that time and suggest that this was a small-scale migration into the Levant due to favorable climatic conditions that suited the African fauna.

The earliest fossil evidence for morphologically modern humans outside of Africa comes from sites such as Lake Mungo in Australia (~42,000 BP), Niah Cave in Sarawak (~40,000 BP), Tianyuan Cave in China (~40,000 BP), and European sites such as Cavallo Cave and Kents Cavern (42–45,000 BP (Benazzi et al. 2011; Higham et al. 2011). Accompanying some of these fossils is evidence of modern human tools and artifacts. The exodus out of Africa is believed to have been firstly via a coastal route into eastern Asia and down into Australasia. Australia appears to have been a stepping stone for the peopling of the Pacific Islands by 5,000 years ago. Northeast Asia served as the gateway to North and South America by 20,000–15,000 years ago. To date, no morphologically modern humans have been well dated outside of Africa to more than 45,000 years ago, apart from those at Skhul and Qafzeh in the Near East.

Genetic Evidence

Until recently, it was impossible to extract intrinsic DNA from fossils. Therefore, until the end of the twentieth century, genetic research in the field of paleoanthropology was limited to the study of modern human and living primate DNA. Modern human diversity in different types of DNA (mitochondrial, Y-chromosome, and nuclear [autosomal] DNA) enables us to look at the demography of humans' ancient ancestors, the size of the ancestral population, and the number of humans that may have left Africa to populate the rest of the world. DNA can also be used to estimate dates for some key events.

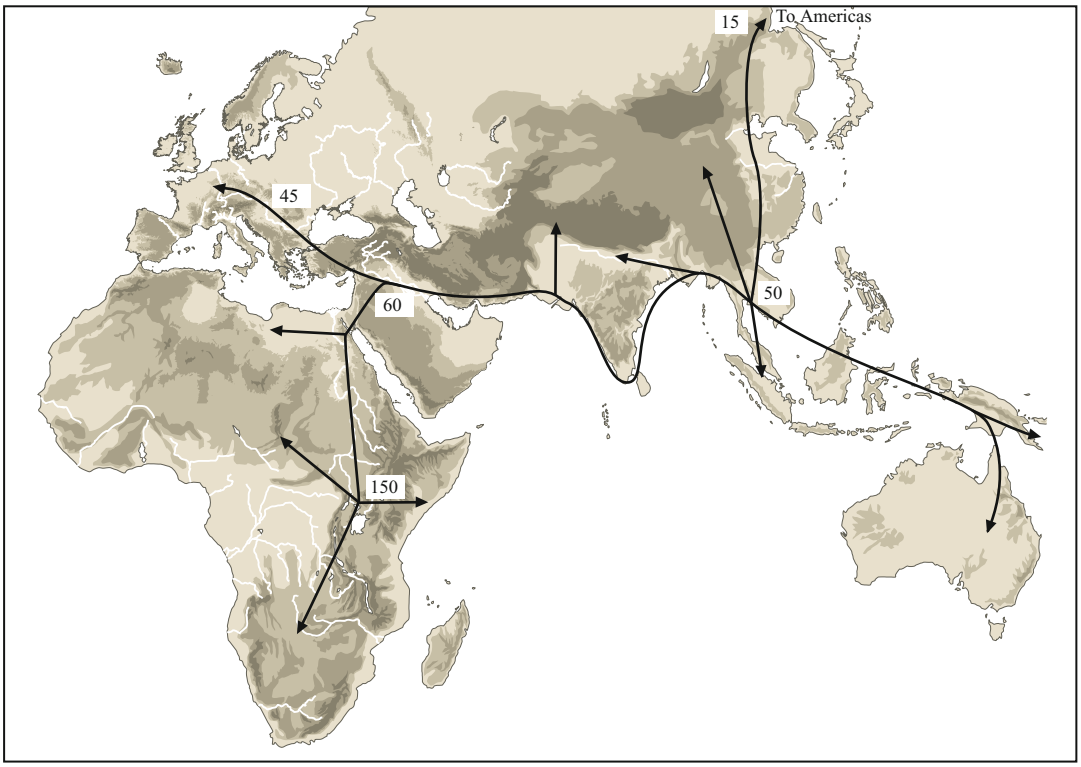

Out-of-Africa Origins, Fig. 2 Map showing the spread of model human groups as traced using mitochondrial DNA (numbers refer to 1,000 years ago) Routes shown are notional, not precise (From Lone Survivors etc. Credit: Silvia Bello)

Mitochondrial DNA (mtDNA) is found in the mitochondria, which are small organelles that are involved in energy processing inside the cell. mtDNA is inherited by both males and females from their mother's ovum. Mitochondrial DNA does not undergo recombination but can carry a novel mutation in the child. Many of these mutational changes are introduced at a slow, but steady rate. Despite its clear signal of ancestry and descent, mtDNA studies have received criticism because they cover a limited amount of genomic coding compared to the whole DNA sequence. At the same time, the small size of the genome and its limited coding means that it is easier to sample and sequence, and mutations can be easily tracked. Results of mtDNA analysis show that the African lineages contain the greatest diversity, indicating that they had the longest time to diverge and are therefore the oldest lineages. This is consistent with Africa being the place of origins of all modern humans. Because the amount of mutation is proportional to time passed, mtDNA can be used to estimate the date when the "mother of all living mtDNA" or "mitochondrial Eve" lived (Fig. 2) and how large the pool of ancestral females was. Although mtDNA mutation rates are not perfectly understood, and therefore dating is still approximate, results from mtDNA studies show that the ancestral population of humans must have been in Africa and perhaps consisted of around 10,000 individuals, with the latest estimate for the mitochondrial origin dating to around 150,000 years (Endicott et al. 2010).

Y-chromosomal DNA is inherited by males from their fathers and carries very few genes. It can only be used to infer the evolutionary history of males. It has received less attention than mtDNA, but in recent years, the Y-chromosomal DNA for a large worldwide sample has been fully sequenced and has yielded some important data on human history. The theoretical "Adam" had been estimated to have lived approximately 70,000 years ago, though recent research has doubled that age estimate, and the deepest branches again appear in Africa, supporting an African origin for all modern humans.

The study of autosomal or nuclear DNA has also been used to reconstruct human population history, and analyses of different sequences have largely supported the results from mitochondrial and Y-chromosomal DNA in confirming the same pattern: the greatest amount of variation is present in Africa and DNA diversity steadily declines with overland distances from Africa. This decline in diversity is also picked up in the morphometry of skulls in populations from different parts of the world.

In 1997 the first ancient mtDNA was extracted from Neanderthal bone. Since then, some 30 Neanderthal fossils (Green et al. 2008) have been sequenced, showing that mtDNA diversity in Neanderthals was much lower than that of modern humans. In addition, the results strongly indicate that Neanderthals made no lasting contribution to the human mtDNA gene pool. This does not mean, however, they did not contribute to the nuclear DNA of humans.

In 2010, a nearly complete Neanderthal nuclear genome was published for the first time (Green et al. 2010). That same year, the nuclear DNA of the Denisovans, a previously unknown population that has distinct DNA from modern humans and Neanderthals, was published. This population is known only from a phalanx and two teeth, but DNA analysis has indicated that this population may have been relatively widespread in Southeast Asia before modern humans migrated into the area, somewhat like Neanderthals were widespread throughout Europe and Western Asia when modern humans arrived there (Reich et al. 2010).

Contrary to the results of the mtDNA, nuclear genome analysis indicates that humans interbred with both Neanderthals and Denisovans. Between about 1 % and 2 % of Neanderthal DNA is still present in non-African DNA today, and Denisovan DNA is additionally present in the genome of modern-day Australasians at a rate of around 4 %. These levels of interbreeding are low, but significant and ongoing analysis is focused on the ways in which these genetic differences between Neanderthals, Denisovans, and modern humans would have manifested phenotypically and how some similarities might have been advantageous to modern humans (e.g., protection from endemic diseases).

The genomic evidence confirms that humans have a predominantly recent African Origin. Yet, at the same time, it is evident that considered globally, *Homo sapiens* is not entirely Out-of-Africa and that a limited amount of interbreeding with populations outside of Africa had occurred.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ Europe: Early *Homo* Fossil Records
- ▶ Fossil Records of Early African *Homo*
- ▶ Fossil Records of Early Modern Humans
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ Human Evolution: Molecular Timescale
- ▶ Human Evolution: Theory and Progress
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- ▶ West and Central Asia: Early *Homo* Fossil Records

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Overseas Chinese Archaeology

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Introduction

Since its beginnings in the Western USA in the late 1960s, Overseas Chinese archaeology (or archaeology of the Chinese diaspora) has developed from an uncoordinated collection of primarily descriptive site reports to a rapidly unifying, interdisciplinary, and international field employing sophisticated theoretical approaches in an increasingly contextual and comparative manner. Its significance lies in its potential for addressing themes related to migration, race and ethnicity, cultural persistence and change, and other topics of wider archaeological relevance.

Definition

Overseas Chinese archaeology focuses on material remains associated with individuals and communities of Chinese descent living abroad, typically in the context of nineteenth and early twentieth century global population movements. It includes both first generation Chinese immigrants and their naturalized descendants. Studies have been undertaken from a range of theoretical perspectives, and there are currently no dominant research paradigms. To date, research is largely restricted to the USA, Canada, Australia, and New Zealand but could include any country to which Chinese migrated over the past several hundred years or more. Generally excluded are sites not occupied by ethnic Chinese (broadly conceived) but where

Overseas Chinese Archaeology, Fig. 1 Reconstructed Chinese laundry, Barkerville, British Columbia

Chinese-manufactured objects, including coins and export porcelain, have been found. However, the field may encompass the influence of Chinese migrants and material culture on their non-Chinese neighbors and others with whom they interacted.

Field projects have explored a range of urban and rural contexts, site types, and features. They include industries such as logging, mining, dam and road construction, charcoal burning, fish canning, shrimp and abalone harvesting and processing, and market gardening, as well as stores, restaurants, laundries, boarding houses, gambling halls, temples, cemeteries, and cooking features, among others (Fig. 1). Sites are typically identified through historical records or the presence of one or more classes of imported Chinese consumer goods, including ceramic table and storage wares, opium paraphernalia, glass pharmaceutical and beverage bottles, coins, and gaming artifacts. Chinese merchants developed large-scale distribution networks for imported foods and other goods that reached even the most remote labor camps (Fig. 2). Consequently, Chinese sites have been comparatively easy to identify archaeologically, although direct equation of objects with ethnicity remains interpretively problematic and risks overlooking Chinese-occupied sites that lack imported artifacts.

While many studies have been explicitly archaeological, others have drawn together a range of archival and archaeological data to develop historical syntheses of individual regions or local communities. Detailed artifact studies have been conducted on Chinese ceramics, opium paraphernalia, coins, and faunal remains, and important work has also been done on standing architecture and in situ collections of objects recovered from such structures.

Historical Background

Overseas Chinese archaeology emerged in the USA in the context of heightened interest in civil rights, social history, multiculturalism, and ethnicity in the 1960s, along with the advent of legally mandated resource management archaeology. Early studies were conducted in the late 1960s and 1970s in the Western USA, including pioneering work on Chinatowns in California, Nevada, Arizona, and Idaho. Other projects were completed on railroad construction

Overseas Chinese Archaeology, Fig. 2 Cabinets of imported merchandise in a reconstructed Chinese store, Burnaby Village Museum, British Columbia

camps in California and Texas, a rural Chinese store and an industrial borax works in California, and a salmon cannery in Oregon. Most work was done in a resource management context, in which Chinese sites were not a self-conscious research objective.

In the 1980s and 1990s, Overseas Chinese archaeology developed into a distinct field of study in the Western USA marked by an increase in the volume and diversity of research, including sophisticated resource management studies and an increasing number of graduate theses (Voss & Williams 2008). Onset of this coalescence is marked by the founding of the Asian American Comparative Collection (AACC) at the University of Idaho in 1982 and publication of two comparative studies of ethnicity incorporating research from Chinese sites (McGuire 1982; Schuyler 1980). The first was an edited volume combining chapters on African and Asian American archaeology, while the second used archaeological data to develop a model of ethnic group formation and change rooted in boundary maintenance. The AACC is a research resource for archaeologists housing an extensive comparative collection of Asian artifacts commonly found on overseas sites plus a sizeable reference library (Fig. 3). It is overseen by volunteer curator Priscilla Wegars, who also edits the AACC's quarterly newsletter.

Throughout this period, most projects continued to be driven by resource management imperatives that included large-scale urban redevelopment projects, although some academic institutions like the Universities of Idaho and Nevada undertook research-oriented excavations. Most studies also focused on descriptive summaries of archaeological findings, including functional artifact typologies. Major resource management projects were undertaken on historic Chinatowns in California, including San Francisco, Sacramento, Oakland, Los Angeles, Riverside, and San Jose, along with Chinatowns in several other states. Work was also done on a range of rural labor camps and related industrial sites across the West but typically on a much smaller scale. Since the 1990s, resource management and academic studies have grown exponentially in quantity and quality, including an expanding volume of published works and a large number of recent graduate theses. These recent developments will be discussed further below.

In Canada, archaeological research on the Chinese diaspora remains limited compared to the USA and is largely restricted to British

Overseas Chinese Archaeology, Fig. 3 Chinese artifacts in the Asian American Comparative Collection, University of Idaho

Overseas Chinese Archaeology, Fig. 4 Chee Kung Tong benevolent society hall, Barkerville, British Columbia

Columbia and dominated by graduate student research. The most substantial work includes excavations at a Chinese store and society hostel in the gold mining town of Barkerville and an associated regional settlement survey of Chinese mining sites in the broader North Cariboo District (Fig. 4). Another major research project is a comparative study of Chinese and Japanese salmon cannery workers along the lower Fraser River. Substantial studies have also been done at a Chinese mining community and associated cemetery at Wild Horse Creek Provincial Historic Site, twentieth century urban cemeteries in Vancouver and Victoria, and the D'Arcy Island Leper Colony in the Gulf Islands. There have also been

small-scale urban excavations in Vancouver, Victoria, and Nanaimo (Ross in press).

Research results are largely contained in unpublished reports and theses, although the 1980s and 1990s saw publication of major monographs on Chinatowns in Los Angeles, Riverside and Woodland, California (Felton et al. 1984; Great Basin Foundation 1987; Greenwood 1996), along with an edited volume on Overseas Chinese archaeology (Wegars 1993). Wegars' volume addresses rural and urban contexts, work and leisure, analytical techniques, and comparative and theoretical studies. It ranges from local case studies focusing on archival records, rural dwellings and terraced gardens, ethnic boundary maintenance, and the presence of Chinese women, to comparative analyses of faunal assemblages and pioneering studies of opium paraphernalia and Asian porcelains. It concludes with a survey and critique of the field by Greenwood. These volumes synthesize large quantities of historical and archaeological data, including numerous individual studies of Chinese traditions and material culture. However, chapters are often compartmentalized rather than building toward an integrated picture of Chinese immigrant life.

Although addressing a range of interpretive themes, much early literature adopted an acculturation paradigm and subscribed to linear, mechanical models of cultural persistence and change that assumed a direct correlation between artifacts and culture. Based on the frequency of imported Chinese artifacts, many studies concluded that Chinese maintained their traditional culture, resisted acculturation, and insulated themselves in ethnic enclaves. Such resistance was interpreted as agency and ethnic boundary maintenance on the part of Chinese immigrants. This approach has been subject to internal critiques beginning in the 1980s (Praetzellis et al. 1987; Voss 2005; Wegars 1993). These critiques have also challenged views of Chinese immigrants as internally homogeneous, when they varied widely in terms of language, class, economic status, and cultural traditions. Subsequently, there has been a gradual interpretive shift toward cultural exchange, fluid and dynamic identities, and strategic adaptation and selective accommodation to local Euro-American culture in particular local contexts.

Mary and Adrian Praetzellis were among the first to argue in favor of a contextual approach (Praetzellis et al. 1987). Their innovative resource management studies of Chinese merchants in Sacramento highlight the active role of material culture in immigrant social strategies. They show how merchants adopted Euro-American material culture while also maintaining homeland practices and manipulated both in their relations with non-Chinese business associates and Chinese laborers. A key observation was that retention of Chinese consumer goods and adoption of Euro-American ones can reflect a variety of factors besides acculturation, including differential access and power relations. One of their main contributions was to demonstrate that, rather than simply reflecting a static ethnicity, material goods could be actively used to create and transform identities in particular contexts and to serve particular agendas.

Key Issues and Current Debates

Studies of the Chinese diaspora bear on numerous core themes in historical archaeology and represent a valuable counterpoint to more established scholarship on the African and European diasporas (Voss & Williams 2008). Such themes include migration, racialization, identity, cultural persistence and change, capitalist economics and labor relations, gender and sexuality, urbanization, and material consumption, among others. For most of its history, however, Overseas Chinese archaeology has had little impact on the broader discipline, largely because much of the literature is confined to unpublished reports and theses and remains underrepresented in peer-reviewed journals. This situation is changing and scholars have begun incorporating it into disciplinary syntheses and critical overviews of topics like racialization (Orser 2007) and material consumption (Mullins 2011). Asian American archaeology was also spotlighted in a 2004 thematic issue of the *SAA Archaeological Record* focused on ethnicity.

A 2008 thematic volume of *Historical Archaeology* offers a sampling of the research being done on Chinese sites in the USA, along with an updated bibliography of Overseas Chinese archaeology, a list of international organizations, and an introduction to the AACC (Voss & Williams 2008). The paper by Voss and Allen provides an overview of Overseas Chinese history, historiography, and archaeology and offers critiques of the field and prospects for the future. The volume concludes with critical reflections on the field by Mullins and Yu from an archaeologist's and a historian's perspective. Other papers address immigrant responses to anti-Chinese movements; scales of analysis in Overseas Chinese communities; the lives of a solitary Chinese seaweed gatherer, California farm workers, and Chinatown residents in San Bernardino, California and Deadwood, South Dakota; an urban Chinese American cemetery in Portland, Oregon; and a plantation cemetery in Hawaii. A particularly groundbreaking paper is Williams' gendered approach to interpreting material culture used by the predominantly male overseas Chinese population rooted in multiple, competing discourses of masculinity. His work points to the need for a more explicitly gendered approach to the lives of Chinese migrants.

In his contribution, Mullins cautions that ghosts of linear and universal models of acculturation still haunt the literature, along with a somewhat static and bounded (essentialist) view of Chinese culture, despite increasing recognition of ethnic identities as fluid and context dependent. He notes that the popular "accommodation" model of culture change differs markedly from the one adopted by archaeologists of African America, rooted in issues of power and inequalities across the color line. He argues that greater attention to the role of racism and race-based exclusion and inequality is needed in archaeological interpretations of overseas Chinese. Furthermore, the overwhelming focus on migrants' agency and resistance to dominant ideology risks ignoring structural conditions constraining individual choice. Finally, Mullins cautions against overemphasizing the "strange and unusual" aspects of Chinese culture, including opium pipes, Asian ceramics, and gaming pieces, in ways that reify ethnic distinctions and stereotypes (Fig. 5).

Overseas Chinese Archaeology, Fig. 5 Chinese gaming pieces recovered from a salmon cannery near Vancouver, British Columbia

In the same volume, Voss and Allen note that most archaeologists studying Overseas Chinese sites have little or no Chinese language training, and few take advantage of the full range of Chinese documents locally or in the homeland. Furthermore, comparative archaeological studies of nineteenth and twentieth century sites in China are rare or nonexistent. They advocate for an overall approach that counters the lingering tendency to perceive Chinese communities as bounded and insular. Such an approach should focus on the interplay within and between ethnic and racialized populations and explore the role of cultural practices in the ongoing negotiation of fluid communities and identities in particular historical contexts, in the way that Praetzellis et al.'s (1987) and Lydon's (1999) pioneering research does.

Studies increasingly demonstrate that, although they often lived in segregated communities and maintained aspects of homeland culture, Chinese migrants also combined inherited and adopted objects and practices and developed relationships with their non-Chinese neighbors, while maintaining distinct ethnic identities. Adopted elements include drinking and dining habits, medicinal remedies, smoking,

Overseas Chinese Archaeology, Fig. 6 Chinese and non-Chinese kitchen wares in a reconstructed Chinese home, Barkerville, British Columbia

gaming, and clothing (Fig. 6). Sometimes this involved significant changes to traditional cultural practices but also reuse and recontextualization of non-Chinese objects and behaviors in unique ways. In fact, evidence of non-Chinese artifacts and behaviors has been documented archaeologically from the beginning. However, under the acculturation paradigm, it was largely ignored or rationalized as a product of mixed assemblages or as limited adaptation born of necessity (Voss 2005).

An important recent development, inspired by Asian American studies, is the emergence of comparative studies within a transnational and diasporic paradigm. This approach recognizes the significance of multiple simultaneous physical and psychological connections and identities migrants maintain between home and host countries and with Overseas Chinese communities elsewhere. In Voss and Williams (2008) and in her dissertation, Kraus-Friedberg adopts a transnational approach to interpreting Chinese, Japanese, and Filipino plantation cemeteries in Hawaii. She argues Chinese migrants constructed unique local identities rooted in both home and host countries by adopting and modifying native Hawaiian burial practices. Likewise, Ross' (in press) comparative study of Chinese and Japanese salmon cannery workers in British Columbia develops an explicitly diasporic and transnational interpretive approach and demonstrates that migrant identities and consumer habits were influenced by a range of factors at the local, regional, and international levels.

Increasing attention has also been directed to Overseas Chinese cemeteries and funerary rituals, including cultural persistence and transformation, regional origins of particular rituals, the importance of feng shui, the practice of exhuming and returning remains to the homeland, and bioanthropological studies of human remains (Fig. 7). Work has involved excavation, along with analysis of spatial organization and grave markers, emphasizing the retention of Chinese death rituals and the timing and manner with which they were combined with local Euro-American practices (Chung & Wegars 2005).

A major priority of several recent Chinatown projects has been community involvement and collaboration between disciplines and institutions, including universities, museums, cultural organizations, government agencies, and resource management firms. One of the best examples is the Market Street Chinatown Archaeological Project, directed by Barb Voss at Stanford University, focused on analyzing and publishing a collection of artifacts from San Jose's Chinatown originally excavated in a resource management context in the 1980s. Another increasingly important component of Overseas Chinese archaeology is self-reflexive studies that critically examine the nature of the field in terms of its objectives, standpoints, and agendas, along with biases, power relationships, and the kinds of research questions scholars are asking (or not asking) (e.g., Wegars 1993; Voss 2005). For example, Fong (2007) explores the role of historic stereotypes of Chinese Americans in the development and current practice of Overseas Chinese archaeology. Similar disciplinary critiques have been offered in Australasia.

A survey of graduate theses over the past decade indicates a range of current research foci, including acculturation and adaptation, intercultural encounters, material culture preferences, social landscapes and relations, skeletal biology, individual and community identity, globalization, technological change,

Overseas Chinese Archaeology, Fig. 7 Chinese cemetery in Hilo, Hawaii

racialization and discrimination, transnationalism and diaspora, material consumption, and the role of voluntary organizations.

International Perspectives

Outside North America, substantial research has been done in Australia and New Zealand. Much pioneering research in Australasia focused on goldfields in heritage management contexts and was more a product of an interest in mining sites and landscapes than an explicit interest in Chinese heritage (Lawrence & Davies 2011). The earliest Overseas Chinese archaeology was conducted by Ritchie (1986) at a series of Chinese mining-related sites on New Zealand's Otago goldfields from the late 1970s to mid-1980s in conjunction with hydroelectric development. His dissertation and publications contain a wealth of valuable data on Chinese sites and material culture. Likewise, early work in Australia focused on a Chinese market garden on the Palmer River goldfield in northern Queensland. Since Ritchie's studies, only limited archaeological research has been done on Chinese sites in New Zealand, including a series of regional surveys and large-scale excavations at Lawrence Chinese Camp in the Otago region. Mining has remained a prominent focus in Australia, comprising regional surveys and excavation since the 1980s, including Smith's (2006) work on Chinese regional settlement systems in New South Wales.

However, increasing urban archaeology in the 1990s uncovered sites associated with Chinese immigrants in neighborhoods of Sydney and Melbourne (Lawrence & Davies 2011). Since then, Overseas Chinese archaeology in Australia has become increasingly research oriented and diverse both thematically and in terms of site types investigated, ranging from market gardens to fish-curing sites. Studies have addressed issues of social and economic organization, hierarchical settlement patterns, trade networks, consumption patterns, comparisons between urban and rural life, relations with non-Chinese, and religious beliefs and rituals. Particular classes of Chinese sites and features have been the focus of considerable attention as central places in Chinese physical, social, and ritual landscapes, including temples, cemeteries, and stone ovens used to prepare communal meals. Themes include the role of feng shui in the location and orientation of sites and structures, architectural and stylistic analysis of temples, types and uses of ovens, and the role of all of these features in settlement networks.

As in North America, most early work was done in conjunction with resource management and emphasized descriptive and typological studies of Chinese sites and material culture.

Most studies also adopted theoretical frameworks emphasizing acculturation and situational adaptation, largely arguing in favor of cultural persistence. However, there has been increasing realization that objects like Chinese and European ceramics were embedded in complex trade networks, social strategies, and relations of power within and beyond the Chinese community. A number of studies have shown how Chinese combined traditional dining and drinking habits with those of the host society, demonstrating a complex combination of continuity and change. For example, like the Praetzellises in Sacramento, Muir (2008) argues that Chinese in Melbourne used English ceramics consciously as a means of gaining access to opportunities in a white-dominated society, and use of Chinese ceramics had as much to do with obligation and reciprocity as a desire to maintain traditional diet.

A landmark work in the region was Lydon's (1999) study of Chinese in the Rocks neighborhood of Sydney, replacing acculturation with a model of cultural entanglement and exchange, and of bounded and static ethnicity with multiple fluid and competing identities. Lydon explored the role of material objects in colonial encounters between Chinese immigrants and those of European descent. In her examination of cultural exchanges between these groups, objects and material behaviors comprise a form of communication that draw on elements of both cultures, which she refers to as "pidgin English." The fluidity of identity means that inherited and adopted objects and practices can be complementary and immigrants can hold multiple simultaneous identities as both Chinese and Australian. As part of her study, she also offered a detailed overview and critique of the field in North America and Australasia.

Since the 1990s, scholars and heritage organizations in Australia have developed a series of studies of Overseas Chinese heritage resources. These include a thematic survey of Chinese sites in the country that comprised a historical overview, an annotated bibliography and a state-by-state analysis of recorded sites and investigations, plus a national database of sites and a guide for finding and assessing Chinese heritage places (Casey & Ritchie 2003). Unlike the USA, Overseas Chinese archaeology in Australasia has had a significant influence on the larger discipline with respect to themes like race and ethnicity and is discussed in depth in Lawrence and Davies' (2011) recent overview of historical archaeology in Australia. Likewise, there has long been a close relationship between archaeologists, historians, museum personnel, and community members, including joint conferences and publications. One such conference resulted in a thematic volume of *Australasian Historical Archaeology* on Overseas Chinese archaeology in Australia and New Zealand (Casey & Ritchie 2003). Besides an overview of the field, it includes papers on identifying Chinese alluvial mining and other sites, along with studies of Chinese ceramics, temples, cemeteries, and a summary of Chinese archaeological sites, artifact repositories, and archives in North America and Australasia.

Future Directions

To date, most research on Overseas Chinese sites remains centered on the Western USA and Canada, and similar regionalism exists in Australasia. There is considerable need for expansion into other regions and countries in the Americas, Asia, Europe, and Africa where Chinese migrants settled. There is also need for comparative studies of Chinese communities in a range of contexts and with other Asian and non-Asian diasporas and ethnic groups. Detailed comparisons between North America and Australasia would aid in understanding the relationship between local circumstances and broader international patterns of diasporanization. The field would also benefit by including research on the Asian diaspora more broadly, including migrants from Japan, Korea, the Philippines, and elsewhere.

Material culture studies have focused primarily on descriptive typologies, and much less attention has been granted to the cultural origins, shifting meanings, and social and

Overseas Chinese Archaeology, Fig. 8 Chinese medicine bottles recovered from a salmon cannery near Vancouver, British Columbia

economic contexts in which these objects were produced, marketed, and used. More work is also needed on materials analysis like elemental characterization to refine our understanding of the regional origins, manufacturing technologies, dating, and distribution networks of ceramics, bottles, and other artifacts commonly found archaeologically (Fig. 8).

As the field matures, it is necessary to continue pursuing collaborative studies with local communities, organizations, and institutions, and with scholars in related disciplines, as active participants in research design, methods, interpretation, and dissemination of results. Research must also integrate oral history, archival research using Asian language sources, and recent developments in Asian diaspora studies with the results of archaeological analysis. For the field to maintain contemporary relevance, archaeologists must be increasingly self-reflexive about the assumptions and agendas underlying their research, along with the interests it serves and its implications for living communities. Of particular value would be development of relationships with scholars in China to pursue archaeological and ethnohistorical research on everyday life in the nineteenth and early twentieth centuries. Such data would provide a more nuanced context for interpreting overseas sites similar to ongoing work in Africa and Ireland, not only as a model of life prior to emigration but to understand changes influencing transnational migrants maintaining ongoing relationships with the homeland.

In the 2008 thematic volume of *Historical Archaeology*, Voss and Allen argue that Overseas Chinese archaeology is still an emerging field and faces three major challenges to its further development. They include a continued need to (1) shift from descriptive reporting to problem-oriented research that addresses pluralistic, multiethnic sites and issues of power and race, (2) move away from acculturation and develop alternative models of intercultural contact that account for complex relationships between immigrants and the host society, and (3) overcome the Orientalist tendency to draw fundamental, stereotypical distinctions between Eastern and Western culture that homogenize variability. To meet these objectives, the authors call for research that is multistranded, multisited, multilingual, multi-scalar, and multidisciplinary. These five "m's" encapsulate the future of the field, which is poised to make a major impact in historical archaeology and the broader discipline as a whole.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Australasian Historical Archaeology
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Community Archaeology
- ▶ Contemporary Past, Archaeology of the
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Global Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ Multicultural Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Oceania: Historical Archaeology
- ▶ Post-Processual Archaeology
- ▶ Race in Archaeology
- ▶ Reflexivity in Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Urban Archaeology

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Özbaşaran, Mihriban

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Basic Biographical Information

Mihriban Özbaşaran was born in Turhal, located in Tokat City, Turkey. She graduated from Kadıköy Anatolian High School in 1975 and started her studies at Istanbul University's Classical Archaeology Department in 1975. She graduated with an undergraduate thesis titled "House Types of Continental Greece: Neolithic, Early Hellas, Middle Hellas Ages," supervised by Prof. Dr. Aşkıdil Akarca, while taking the subsidiary certificate programs including prehistory, Greek language, and literature. Özbaşaran finished her M.A. dissertation titled *Structural Characteristics of the Early Chalcolithic Architecture of Tülintepe* in 1984. She was assigned as an assistant in 1985 in the Prehistory Department of Istanbul University. Her Ph.D. studies, which she started in the same year, were finished in 1994 with a dissertation entitled *Place of Tülintepe Architecture in Chalcolithic East and Southeast Anatolia*. Özbaşaran was promoted as Assistant Professor in 2000 and Professor in 2008.

Major Accomplishments

During Özbaşaran's undergraduate studies, she participated in excavations such as those at Perge, led by Prof. Dr. JaleİNan, in 1977, followed by Aizonai, under the direction of Prof. Dr. R. Naumann from 1978 to1979. Özbaşaran began as a student at Domuztepe, supervised by Prof. Dr. Halet Çambel, and continued her work as an M.A. scholar and then as a Ph.D. scholar.

Özbaşaran served as the field director at the Yarımburgaz excavations led jointly by Prof. Dr. Trust, from the University of California, and Prof. Arsebük. She also participated in the Aşıklı Höyük excavations led by Prof. Dr. Ufuk Esin. Özbaşaran worked as a team member on numerous studies such as the Gournia/Girit Survey Research Project conducted by Prof. Dr. L.V. Watrous from Buffalo University.

Özbaşaran directed excavations in Neolithic Musular in Aksaray, Cappadocia from 1996 to 2004 and Neolithic Akarçay Tepe in Birecik, Urfa, leading international teams consisting of specialists and archaeologists. She also conducted the Istanbul area excavation at Çatalhöyük, under the direction of Ian Hodder from Stanford University, from 2005 to 2008.

Özbaşaran is the leader of the Aşıklı Hoyuk (Aksaray, Central Anatolia) Excavation, Research, Conservation and Exhibition Project, which began in 2006. Her key lecture subjects are the history of archaeology and scientific approaches; theoretical archaeology; experimental archaeology; cultural evolution in prehistory; complex societies; and key concepts of prehistory and prehistoric cultures of Cyprus. Her area of expertise is mostly focused on the neolithization process of central, east, and southeast Anatolia between the ninth and seventh millennia. She continues to study neolithization models, developmental differences, and similarities between the two regions in question.

In recent years, Özbaşaran has been leading the project of Aşıklı Höyük in ethnoarchaeology, experimental archaeology, and cultural heritage management content.

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Practice Theory in Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Social Archaeology

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Özdoğan, Mehmet

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Basic Biographical Information

Mehmet Özdoğan was born in Istanbul, Turkey, in 1943. He graduated from İstanbul University's Faculty of Literature Prehistory Department in 1969. He was awarded his M.A. on the basis of his dissertation, titled *Dating and Evaluation of Pottery and Small Finds of Kumtepe from 1934 Season*, in 1970 and began to serve as an unsalaried assistant with the Department of Prehistory, Istanbul University, until 1975. He became Dr. Assistant in 1979 on the basis of his Ph.D. dissertation titled *Evaluation and Dating Problematic of the Fikirtepe Small Finds from the Years Between 1952 and 1954*. He was promoted to the post of Assistant Professor in 1985 and Professor in 1994. Professor Özdoğan spent many years as Head of the Archaeology Department at İstanbul University. He is a member of numerous scientific institutes and groups and was elected as a foreign member of the American National Academy of Sciences in 2005.

Major Accomplishments

From the beginning of his undergraduate years, Mehmet Özdoğan participated in numerous archaeological excavations and projects, including the Çayönü excavations undertaken by İstanbul and Chicago Universities. In these excavations he worked primarily as field director and later as project director. As well as being the general director of Archaeological Survey Research of Lower Euphrates Project organizing by Middle East Technical University (ODTÜ), Mehmet Özdoğan was the field director of excavations at Keban, Tepecik, Tülintepe, and Degirmentepe.

Mehmet Özdoğan's major fields of study are the origin and diffusion of village, life based on

food production in Neolithic period, cultural relations between Southeast Europe, Aegean and Anatolia, geoarchaeology, politics and history of archaeology, and cultural heritage management. His contributions to Turkish archaeology include the development of a new model for archaeological survey research and research investigations into diffusion of the first food-producing groups from Anatolia to Southeast Europe.

Mehmet Özdoğan also made a major contribution to archaeology in Turkey through developing the concept of a cultural sector and by developing cultural inventories for the Turkish Academy of Sciences (TÜBA). In 2001, he directed a pilot project on cultural inventories in the region of Birecik-Suruç, Şanlıurfa, as a part of the TÜBA-TÜKSEK (Turkey's Cultural Sector) Developing with Culture project.

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Özgüç, Nimet

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Istanbul, Turkey

Basic Biographical Information

Nimet Özgüç was born in Adapazari in 1916. After graduating from Ankara Girls' High School, she was among the first students of the newly established Faculty of Languages, History, and Geography of Ankara University, along with her future husband, Tahsin Özgüç. She studied from 1936 to 1940 and, after completing her education, was assigned to the Archaeology Department as an assistant. After receiving her Ph.D. dissertation titled *Anatolian Stamp Seals* in 1943, she was promoted to assistant professor in 1949 and then professor in the Protohistory and Near Eastern Archaeology Department of Ankara University in 1958.

Major Accomplishments

Nimet Özgüç participated in the excavations of Ankara Roman Bath, Çankırıkapı, and Temple of Augustus carried out by Prof. Dr. H.H. von der Osten and Prof. R.O. Arık. She was a member of the team which carried out the Dündartepe, Kavak, Kaledoruğu, and Tekeköy excavations in 1941, and the Elbistan Karahöyük excavations and survey studies in Elbistan plain together with Tahsin Özgüç. Her work on the separation and development of Assyrian trade colonies' seals

and seal impression styles helped to clarify the development of the art style of Anatolian history of the period, the Mesopotamian Old Assyrian periods, and Old Babylonian period.

Nimet Özgüç also participated in the excavations of Kayseri Frakdin in 1954 and Erzincan Altıntepe in 1959. She led the Acemhöyük excavations which she started in 1962 and continued until 1989. During the Acemhöyük excavations, two of the best-preserved monumental palace buildings in Anatolia were revealed, and it emerged that the settlement was the center of a local kingdom in the Assyrian trade colonies period.

Nimet Özgüç investigated the period from the Byzantine to Iron Age within the excavations in Niğde Tepebağları that she led. From 1978 to 1989, as a part of the Middle East Technical University's Lower Euphrates Project, she conducted the Adıyaman-Samsat-Huyuk excavations which were going to be inundated by the Atatürk Dam reservoir. In Samsat, which is one of the largest and highest mounds of Anatolia, she found evidence of a time period ranging from the Chalcolithic to Seljuk. She published papers concerning the Sumeysat of Seljuk period; Hellenistic and Roman periods; Samosata, the capital city of Commagene Kingdom; and Kummaha and Hahhum of the Iron and Bronze Ages.

Nimet Özgüç served as a member of the Ministry of Culture High Council of Real Estate Antiquities and Heritage in 1984. Following her retirement the same year, she continued to work in excavations that she conducted and resumed her scientific activities by publishing books and articles.

Özgüç received awards including the G. Bude Medal of College de France (1980) and the "Woman of the Year" award of the Turkish Women's Union on Science field. She conducted courses and seminars as a guest lecturer at Munich, London, Saarbrücken, Marburg, Princeton, Columbia, Yale Universities, and Bryn Mawr College. In addition, she served as an ordinary member of the German Archaeological Institute (1979), honorary foreign member of the Archaeological Institute of America (1994), honorary member of Turkish Historical Society (1995), and honorary member of Ancient Historical Sciences Istanbul (1995).

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Özgüç, Tahsin

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Basic Biographical Information

Tahsin Özgüç was born in Kýrcaali, Bulgaria, in 1916. He was one of the first students of the newly established Faculty of Languages, History and Geography at Ankara University in Turkey. He studied archaeology, history, dead languages, and their cultures under some of the esteemed scientists of the period such as Şevket Aziz Kansu, Şemsettin Günaltay, Hans Henning von der Osten, Hans Güstav Güterbock, Benno Landsberger, and Georg Rohde. He was awarded a Ph.D. in archaeology in 1942 based on his thesis, which was titled *Anatolian Idols in Prehistory*. He was appointed as an Assistant Professor at Ankara University in 1946 and became a Professor in 1954.

Major Accomplishments

In 1940, Tahsin Özgüç began to carry out excavations which were going to last over 2 years in the Samsun region (Dündartepe, Tekeköyve, Kaledoruðu). This work was conducted with his colleagues Kýlýç Kökten and Nimet Özgüç. In 1945 Özgüç undertook excavations of two tumuli together with Mahmut Akok. These tumuli were in the construction area of the Mausoleum of Mustafa Kemal Atatürk in Anýtkabir. Özgüç was appointed as an Assistant Professor at Ankara University after completing his habilitation thesis titled *Burial Customs of Anatolia in Prehistory* in 1946. In that same year he carried out the excavations of Sivas Maltepe and Sivas Tower.

In 1947 Tahsin Özgüç was elected as a member of the Turkish Historical Society, along with two other important scientists, Aydýn Sayýlý and Halil Ýnalcýk. Dr. Özgüç conducted excavations at Fraktin (Develi, Kayseri) and Karahöyük (Elbistan-Maraş) in the same year. In 1948 he began excavations at Kanis-Nesa (Kayseri). These excavations were to continue over for his lifetime, for 58 years.

After he became a Professor in 1954, Tahsin Özgüç's responsibilities grew. In that year he undertook the Kültepe excavations himself while simultaneously directing other excavations in different settlements. In subsequent years, he examined the different periods of Anatolian cultures and published his evidences in a systematic manner. He undertook excavations at an Early Bronze Age settlement area and cemetery in Horoztepe (Erbaa, Tokat) in 1956; at Altýntepe (Erzincan), which had remarkable architecture and small finds, in 1959–1966; at Kululu (Kayseri), which was the center of one of the Late Hittite kingdoms Tabal with particular sculptures and hieroglyphic-inscribed lead plates, in 1967; at Maºat Höyük (Zile, Tokat), one of the few cities located outside of the center Boðazköy that had Hittite archives, from 1973 to 1983; and at Kazankaya (Çekerek, Yozgat), at a cemetery of the old Hittite which highlighted the different periods of Anatolia, in 1976.

Tahsin Özgüç was an internationally recognized scholar. He lectured in the Institute for Advance Study, Princeton University, in 1962–1963; Universität des Saarlandes in 1964; and at Universität München in 1975–1976, 1978–1979 and 1980–1981. Dr Özgüç conducted seminars and conferences in various universities throughout Europe and the USA. He was awarded the Order of Merit by the Federal Republic of Germany, the Order of the Rising Sun of Japan, the National Order of the Crown of Belgium, and the Collége de France Medal.

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Pacific Islands: Finding the Earliest Sites

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Introduction

The character and date of the earliest settlement of the remote Pacific Islands remains an important research objective. Tracing human origins in "Remote Oceania" reveals a series of west-to-east migrations, ultimately from southern coastal China before 6,000 years BP (Bellwood et al. 2011). In the far west of Micronesia, the Mariana Islands have become known as the home of the oldest archaeological sites of Remote Oceania, dated 3,500–3,300 years BP (Fig. 1).

We are only now achieving some clarity on where to find sites, in a manner that conforms to CRM constraints. The local governments consider excavations to be destructive to cultural heritage resources and harmful to the natural environment. Archaeological excavations are therefore undertaken only in strict compliance with government regulations, which are not always conducive to archaeological visibility. The normal procedures use *shovel tests*, holes 10–20 m apart dug the size of a shovel blade and sieved through a 6 mm mesh, to find sites, and *test pits*, 1 × 1 m in plan taken down by trowel, to investigate them. Monitoring of a machine-dug trench has become standard procedure for archaeological resource management in beach settings.

Key Issues/Current Debates/Future Directions/Examples

Survey

Nearly all sites in the Marianas are found through *surface reconnaissance*, walking at close intervals (usually 5 m) through the dense jungle, sometimes augmented by transects of *shovel testing* where the ground visibility is particularly difficult. This approach works well in areas with little or no soil development, where site remnants are easily accessible. In fact, most island terrain fits into this category, bearing perhaps 20–30 cm of rocky silt or clay directly over solid bedrock. Using little or no excavation, this strategy has been successful for mapping and recording sites of the more recent time period, roughly within the last 1,000 years. Megalithic house pillars and capitals (locally called *latte*) mark most residential sites. Broken pottery is littered almost everywhere, along with lesser amounts of stone and shell adzes and other such durable tools.

For the most ancient sites, dating to 3,500–3,300 years BP, the best chance of finding a preserved archaeological deposit is to search in

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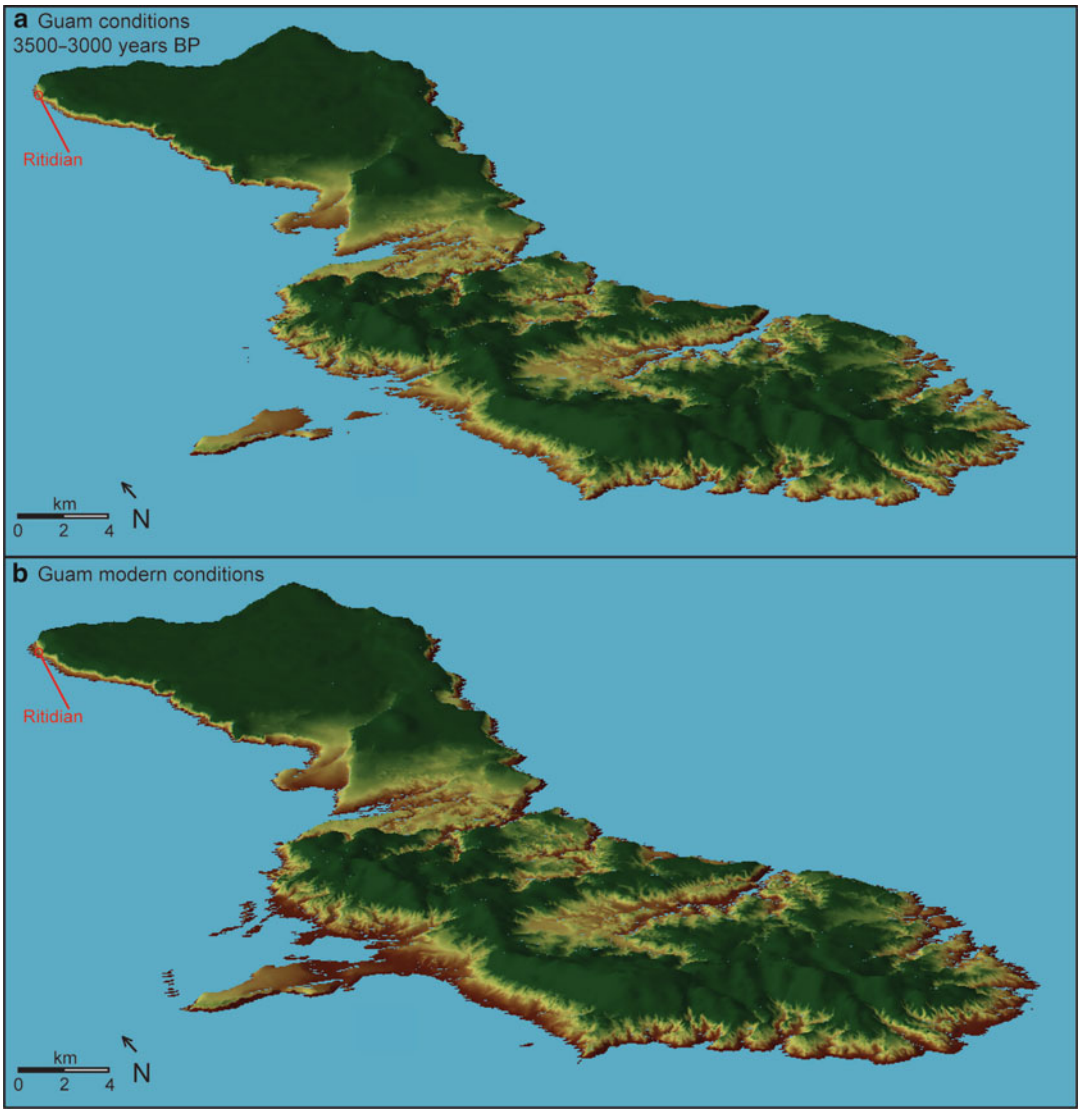

Pacific Islands: Finding the Earliest Sites, Fig. 1 Island-wide terrain model of Guam showing (**a**) conditions 3,500–3,000 years BP and (**b**) modern conditions (Modified from Carson (2011))

the beach sand. These locations fortuitously match expectations of where the earliest islanders lived, near productive crop-growing soils and bountiful coral reef ecosystems. The beaches as seen today, however, are recent geological formations. The ancient sea level stood 1.8 m higher than today, plus the earliest sites are at least 1–2 m beneath today's sandy beaches and 100 m or farther inland from modern shorelines. These circumstances teach us two things. First, the coastal terrain has been transformed substantially since the time since the sites were first inhabited. Second, exploratory survey for the most ancient sites cannot rely on surface finds, and researchers must dig deeply in locations that may not appear immediately obvious.

Taking into account these formation processes, a paleo-*terrain model* can be used to depict the approximate coastal topography at the time when the oldest sites were inhabited (Carson 2011). The model has been continually

Pacific Islands: Finding the Earliest Sites, Fig. 2 Setting of 3,500–3,300 years BP beach site at Ritidian, Guam, now more than 100 m from modern shoreline and 2.5 m beneath the surface

Pacific Islands: Finding the Earliest Sites, Fig. 3 Arrangement of post-moulds, hearths, and other features in ancient living floor 3,500–3,400 years BP, 100 m landward from House of Taga, south coast of Tinian

refined by *test pits* and trenches that give precise locations, depths, and dates of ancient sedimentary layers, whether or not they contain archaeological materials. The most thorough work has been in Guam, the largest and southernmost of the Mariana Islands.

Excavation

At Ritidian on Guam, dozens of small test pits, each 1 m by 1 m, were dug at 10-m intervals throughout an area targeted by the paleo-terrain model. The most ancient deposit was found only in one of these test pits, meaning that the original site covered a rather small area less than 20 m by 20 m in total. The deepest cultural layer was buried more than 2.5 m deep and more than 100 m from the present shoreline. The ancient shoreline context was dated 3,500–3,300 years BP by radiocarbon. Exceptionally thin (1–2 mm) red-slipped pottery fragments were refitted, representing 10–20 % of two different small bowls or jars, plus more than 55 % of another shallow open bowl. The oldest site layer at Ritidian was sealed beneath a zone of 1 m of hardened beach sand (calcrete) that solidified after the site had been buried, creating a barrier that few archaeologists would attempt to breach. The excavation required chiselling of large solid

blocks of calcrete, later dissolved in mild (5 %) acid and sieved through half-mm wire mesh for full recovery of the constituent artifacts and midden. Beneath the calcrete, the loose beach sand was removed by trowel and sieved through half-mm mesh for consistent recovery (Fig. 2).

The most thoroughly studied early period Marianas site has been on the southern coast of Tinian, 100 m inland from the famous megalithic *latte* ruins of the House of Taga. An excavation slightly larger than 16 sq m here proceeded by hand troweling of *stratified layers*, each internally divided into *arbitrary levels* 10 cm thick. This strategy uncovered an arrangement of post-moulds, hearths, and other features of an ancient living floor dated about 3,500–3,400 years BP (Fig. 3). Among 30,000+ earthenware pottery fragments, more than 150 exhibited finely impressed, stamped, and incised decorations on a red-slipped surface. Chert adzes and flaked tools, shell beads and pendants, fishing hooks, shellfish remains, and bones of fish, turtle, and birds completed the assemblage.

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Geoarchaeology
- ▶ Landscape Archaeology

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Pacific Islands: World Heritage

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Introduction

Pacific cultural heritage research has taken an active role in reshaping notions of cultural significance that has been recognized by UNESCO. Acknowledging the importance of associative cultural landscapes, first applied to the Tongariro National Park, New Zealand, in 1993 and Ulu*r*u-Kata Tju*t*a, Australia, in 1994, culminated in the 2008 inscription of the "*Chief Roi Mata's Domain*," Vanuatu, into the World Heritage List (UNESCO 2010).

These advances in Pacific cultural heritage research do not hide the fact that Independent Pacific Island Nations (referred to here as IPIN) are underrepresented on the World Heritage List. The uneven distribution of World Heritage sites globally is exemplified by the presence of only 13 sites in the wider Pacific area and only five sites nominated by IPIN. Below is a list of World Heritage properties located on Pacific Islands (standing 2011).

Key Issues

The strong underrepresentation of cultural sites has been a matter of discussion since the mid-1990s (UNESCO 1994) and resulted in the "Filling the Gaps" – World Heritage Action Plan (ICOMOS 2005) and the World Heritage – Pacific 2009 Programme for capacity building in the region (UNESCO 2004). The plans represent a partial success in that since its launch in 2002, nine of 14 IPIN (including New Zealand and Papua New Guinea) have submitted properties to the World Heritage Commission and in

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total 39 properties have been registered on the Tentative List. Consequently, there has been an increase in properties inscribed on the World Heritage List; six sites have been inscribed since 2003, although these include the property "*Lagoons of New Caledonia: Reef Diversity and Associated Ecosystem*" in a French overseas territory and the "*Papahānaumokuākea*" property in the US state of Hawaii.

Looking at the representation of cultural sites on the World Heritage List, it is apparent that the usual four-to-one ratio of cultural to natural sites internationally (currently 725 cultural, 183 natural, and 28 mixed properties) is significantly different in the Pacific, where the cultural–natural site ratio is one to four. This ratio might relate to the status of several islands, such as being a territory of one of the Western developed countries USA, UK, or France (Table 1) or being of interest to international nongovernmental organization such as the World Wildlife Fund for Nature and Conservation International, emphasizing on environmental preservation rather than indigenous cultural heritage protection (e.g., "*East Rennell*," Solomon Islands). It has also been argued that the lack of monumental architecture present in the archaeological record of past societies in the Pacific is a factor in the underrepresentation of Pacific cultural heritage on the World Heritage List. Non-monumental cultural heritage is dominant in the Pacific in comparison to the number of built structures in, for example, Europe; however, there are several prehistoric and historic sites with monumental architecture present in the Pacific Islands, such as "*The Ancient Capitals of the Kingdom of Tonga*" in Tonga, "*Nan Madol*" on Pohnpei, the "*Pulemelei Mount and associated stone villages*" in Samoa or the earthwork terraces ("*Ouballang ra Ngebedech*") in Palau, none of which is currently inscribed into the World Heritage List.

The move by UNESCO to include cultural landscapes into the Outstanding Universal Value (OUV) criteria acknowledges the long-term dominance of monumental sites and the underrepresentation of cultures whose heritage is associated with non-monumental sites on the World Heritage List (Fowler 2003, 2004). This is particularly important for IPIN where a large number of properties (26 out of 52 sites on the WH and Tentative Lists) have a significant cultural landscape component, for example, "*Sigatoka Sand Dunes*" in Fiji, "*Rock Islands – Southern Lagoon Management Area*" in Palau, or "*Manono, Apolima, and Nuulopa Cultural Landscape*" in Samoa. Smith and Jones (2007) and Lilley (2010) recently defined key themes for 13 organically evolved relict and associative cultural landscapes on Pacific Islands in two ICOMOS thematic studies. Early maritime colonization and settlement patterns, social

Pacific Islands: World Heritage, Table 1 World Heritage properties located on Pacific Islands (until 2011)

Nominating country	Property name[a]	Inscription date
Australia	Lord Howe Island (N)	1982
	Australian Convict Sites (KAVHA, Norfolk Island) (C)	2008
Chile	Rapa Nui National Park (C)	1995
France	Lagoons of New Caledonia: Reef Diversity and Associated Ecosystems (N)	2008
Kiribati	***Phoenix Islands Protected Area (N)***	***2010***
Marshall Islands	***Bikini Atoll Nuclear Test Site (C)***	***2010***
New Zealand	Tongariro National Park (M)	1993
	Te Wahipounamu – South West New Zealand (N)	1990
	New Zealand Subantarctic Islands (N)	1998
Papua New Guinea	***Kuk Early Agricultural Site (C)***	***2008***
Solomon Islands	***East Rennell (N)***	***1998***
United Kingdom	Henderson Islands (N)	1988
United States of America	Hawaii Volcanoes National Park (N)	1987
	Papahānaumokuākea (M)	2010
Vanuatu	***Chief Roi Mata's Domain (C)***	***2008***

[a]*C* cultural site, *N* natural site, *M* mixed site. ***Italic***: properties nominated by Independent Pacific Island Nations (IPIN)

organization of traditional land uses in marginal environments, and seascapes are important research objectives in Pacific archaeology that also have significant cultural heritage values that are frequently "non-monumental."

The two thematic studies also identified a series of properties, including one transboundary (*"Yapese Disk Money Regional Sites*," Federal States of Micronesia/Palau) and one serial site ("*Lapita Pottery Archaeological Sites*"), with OUV in the Pacific. Nonetheless, only three of the properties mentioned in these studies ("*Bikini Atoll Nuclear Test Site*," "*Kuk Early Agricultural Site*," and "*Chief Roi Mata's Domain"*) have been inscribed into the World Heritage List, with multi-jurisdictional difficulties hindering progress in the nomination of transboundary/serial sites.

Current Debates

Seven decades of intensive archaeological research in the Pacific have identified a reasonable number of prehistoric sites with OUV, so why are IPIN underrepresented on the World Heritage List? One major factor in the lack of progress in gaining international recognition for Pacific cultural heritage sites, and consequently their protection, is the limited human resources available in most IPIN for the lengthy and increasingly complicated task of coordinating a successful nomination file for assessment through ICOMOS, IUCN, and UNESCO. It appears that efforts to address the underrepresentation of IPIN sites on the WH List are tempered by a real concern that many IPIN do not have the resources to effectively manage and protect significant heritage sites. As a result, nomination files submitted by IPIN are likely to be cautiously scrutinized to determine whether the resources and expertise for cultural site management exist. This is appropriate, but an obvious danger is that the desire to reduce imbalance in the WH List by encouraging IPIN to nominate sites is not matched by practical support to increase the heritage expertise of IPIN to a necessary level. Rejection of IPIN WH site nominations due to a perceived absence of heritage capacity would likely result in the skewing of WH site representation in a different direction: a higher representation of sites on the WH List from Pacific Islands which have significant relations with developed nations from their current or former status as an overseas territory/collectivity (France, UK, Australia, Chile), state (US), protectorate (Germany) or free association compact (US, New Zealand). Such a trend is already apparent in the 13 World Heritage properties on Pacific Islands with 62 % submitted by developed colonial nations.

In addition to a lack of human resources, many IPIN are still developing their heritage capacity with limited legal protection of heritage sites at the local and national level and incomplete cultural site registers. This is particularly important for the nomination of cultural landscapes which generally cover a large area and include numerous archaeological features many of which have not been surveyed/tested by local and international heritage specialists. This has implications for developing a comprehensive conservation management plan, which is now a standard requirement for the successful nominations of heritage properties.

A way forward for IPIN is to assemble networks of local communities, external and local archaeologists, anthropologists, and other heritage experts. This is likely to be a key strategy for IPIN wishing to produce World Heritage cultural site nominations as shown in the recent successful nominations of three cultural properties from IPIN (Wilson et al. 2009). One positive outcome of such an approach is that it allows knowledge about the *World Heritage Convention* (1972) and WH nomination process to circulate through IPIN government and community organizations and it involves close partnership between the local community and archaeologists/heritage experts.

Participation of local communities and traditional landowners in the nomination process, particularly the provision of traditional knowledge and the management of sites, is actively encouraged by the World Heritage Convention (UNESCO 1972: §14) and by UNESCO (Asia)

in the Hoi An Protocols (UNESCO (Asia) 2009). The recognition that many heritage sites in the Pacific are embedded in the cultural traditions of local communities and the relationship between a site and the local community requiring specific consideration in the management plan is an important advance in cultural heritage practice.

UNESCO is by definition an international body of independent nation states, and only federal organizations (State Parties) are able to submit nomination files for inscription. The process of submitting nomination files has significant implications for IPIN where access rights to heritage sites are largely determined through traditional structures. Uncertainty about the impact of World Heritage nomination to access and stewardship of heritage sites occasionally culminates in legal procedures, where traditional owners seek clarification about the ownership of sites. In these cases, external experts can have an important role in mediating conflicting interests for the benefit of conserving heritage sites for future generations. To avoid legal conflict about sites and resources, it is necessary to properly inform local stakeholders about the purpose and effects of property inscription on cultural practices and economic development during the early planning stages of World Heritage nomination. An additional means of informing stakeholder could be the inclusion of local leaders of World Heritage properties as national representatives to annual ICOMOS/IUCN or UNESCO meetings.

Future Directions

World Heritage practice in Pacific Islands is only at its beginning. In the last decade, the exposure of local communities to international cultural heritage concepts and conservation practices has led to the desire to have their cultural heritage recognized at the international level, which in turn increases the necessity of protecting IPIN heritage sites. This grass roots approach to cultural heritage management deserves to be supported by the international community.

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- ▶ Community Engagement in Archaeology
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
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Pacific Ocean: Maritime Archaeology

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Introduction

The Pacific Ocean is the largest in the world. Within its vast expanse are thousands of islands which have a rich history of human interaction that stretches back for millennia. Though the distance and the time required for successful crossings created difficulties for seafarers, an understanding of the winds and currents allowed it to be used as a highway (Van Tilburg 2011: 588). Indigenous peoples have inhabited even the most remote parts of the Pacific for centuries; they constructed villages, navigated and traded between islands, and harvested the marine resources they needed for survival. Europeans and Western cultures used the Pacific Ocean for activities such as exploration, colonization, resource extraction, and trade, each of which has left an indelible mark on the cultures and environment of the region. For many years maritime archaeological projects have been conducted around the Pacific Ocean, and their results have provided unique insights into the human interaction with and within the ocean.

Definition

The area encompassed by the Pacific Ocean is so expansive that geographers use the divisions of South, Central, and North Pacific when discussing the different regions. The greatest density of the islands exists in its central and southern parts, and cultural groups have inhabited these areas for thousands of years. For the purpose of this entry, the area that will be discussed is Oceania. Oceania can be defined as the islands of the southern, western, and central Pacific and includes Melanesia, Micronesia, and Polynesia.

Historical Background

Archaeologists and linguists generally agree that the colonization of the Pacific was a two-pronged movement that began approximately 3,500 years ago (Bellwood 1979: 282; Russell 2009: 63). The first phase involved the settlement of the western Micronesian island groups of Palau, the Marianas, and possibly Yap, and the second involved an easterly movement through Melanesia to western Polynesia, eastern Micronesia, and later the Hawaiian Islands and New Zealand (Russell 2009: 63). Once established on the various islands, complex and distinct cultures developed which were manifested socially, linguistically, and technologically. The connection to the sea was tantamount to these societies, and assemblages of material culture associated with this relationship have been archaeologically documented.

The final phase of Pacific colonization was signaled by the appearance of Europeans within the last 500 years (Lilley 2006: 5). Beginning with the Spanish explorers of the sixteenth century, European contact and colonization had drastic effects on the cultures and islands of

Oceania. Spain's success in establishing a trade route across the region led other European countries to explore more regions in the hope of finding new lands and expanding their presence. During the seventeenth and eighteenth centuries, Dutch, French, and British expeditions sailed throughout the region and made significant geographic and scientific discoveries.

Although the Spanish were successful in developing trade routes across the ocean, it was not until the late eighteenth century that extensive trade was established by other nations. At that time the British were focusing their efforts on the colonization of Australia, while American trading vessels from New England were crossing the Pacific and establishing links with China. These voyages allowed traders and colonial powers alike to compile information about available resources of potential commercial interest, and soon stories of sandalwood and significant numbers of seals and whales reached the United States (US) and Britain. This news produced an explosion in the numbers of ships roving the waters of Oceania by the early nineteenth century. The need for freshwater, food, and firewood during these journeys ultimately led to contact with nearly every archipelago, and these interactions had a profound effect on local cultural groups.

From the mid-nineteenth to early twentieth centuries, American and European powers developed their colonial holdings in many areas of Oceania. Initially, they served as supply and transshipment outposts for passing vessels, but soon they realized that the climate and environment of the Pacific islands also allowed for the harvest of guano for use in fertilizers and cocoanuts for copra. The development of large-scale agricultural production of crops like sugarcane resulted in the construction of colonial government towns and significant maritime infrastructure to assist in navigation and shipping.

The Pacific Ocean was relatively quiet during the First World War; Japan and the US quickly took control of all German colonies there. At the end of the war, Japanese occupation of nearly all former German territories in the Pacific was formally recognized through the Treaty of Versailles. Japan quickly established administrative centers in many parts of Oceania and increased maritime infrastructure development through the construction of lighthouses and channel markers, as well as port-related facilities. By the 1930s Japanese military infrastructure construction was also increased in preparation for war.

The December 7, 1941 attack by Japan on the US Naval Base at Pearl Harbor in Hawaii had profound effects on Oceania. Many of its island archipelagos became the scene of the Second World War's Pacific Theater. Prewar occupation of these islands allowed the Japanese military to heavily fortify their installations and establish extensive air bases. Such was the strength of these fortifications that some of the most intense and bloodiest battles of the war were fought on the islands of the Pacific and in the sea and air surrounding them. The results of these battles were devastating and left a permanent mark on the islands.

Archaeology in the Pacific is dominated by two main foci: prehistoric colonization of the islands and the activities of the post-1500 historic period. Due to the number of maritime archaeology projects that have been undertaken in the region and the variety of topics covered, a thematic approach to this discussion is appropriate. The context for each theme, which includes colonization, exploration, European trade, resource extraction, conflict, and warfare, is provided, and examples of archaeological investigations pertaining to each are discussed below.

Colonization

Debates about the post-Pleistocene colonization of the islands and the origin of the first voyagers are ongoing, as research provides new information. According to Ian Lilley (2006: 5), approximately 3,500 years ago seafaring, pottery-making farmers in the Bismark Archipelago established the "Lapita phenomenon" and were the first people to occupy remote Oceania. The Lapita debate is a major focus for archaeological investigations of coastal sites through Oceania and has taken a central theme in literature relating to Pacific

prehistoric archaeology over the past decades. Though these studies attempt to determine the earliest occupation of Oceania through the association of pottery types and other aspects of cultures, no definite remains of the watercraft used by the voyagers to make the long trips between the islands have been identified. The reason for this can be explained by considering the organic nature of such craft and the tropical marine environment of the region. Rough sea conditions quickly break up abandoned or wrecked wooden vessels, and the remaining structure is quickly consumed by tropical wood-boring organisms. As watercraft would have been constructed almost entirely of wood and plant products, this would leave very little evidence aside from stone anchors and any stone implements that were onboard.

Submerged archaeological sites relating to prehistoric occupation include evidence of early seafaring and marine resource extraction. Sites containing stone anchors and fishing implements have been recorded in several areas of Oceania since the 1960s. Examples of archaeological investigations of such sites include those conducted in Hawaii, French Polynesia, and the Federated States of Micronesia (FSM).

Shell fishhooks and scattered basalt artifacts such as stone fishing weights and anchors are abundant in some sites around the island of Oahu in Hawaii. In 1996 archaeologists and students from the University of Hawaii conducted investigations of a scattered collection of lithic artifacts, fish trap weights, and octopus lures directly off of Waikiki (Van Tilburg 2002: 251). The study resulted in the hypothesis that the high-density fishing-related artifacts are found on nearshore-raised reefs due to a greater density of marine life concentrated in the area (Pfeffer 1995; Van Tilburg 2002: 251).

Another significant prehistoric maritime archaeological site is located in Mo'orea, French Polynesia, near Tupaparau Pass in the Afareaitu lagoon. Numerous hewn and worked stone objects have been recorded there; objects identified include stone anchors, fishing weights, finished basalt tools (adzes), and a small number of domestic objects. Although the function of the site is still unknown, it is significant due to the fact that hundreds of objects are located in one area (L'Hour 2010: 47).

Archaeological evidence of marine resource extraction is common in Oceania. One type of site associated with marine subsistence strategies are fish traps. Such sites are especially abundant in the FSM state of Yap, where local people see their use as a sustainable fishing practice. A comprehensive archaeological survey of fish weirs (locally know as *aech*) was conducted to assist in prioritizing restoration work and to encourage the revitalization of their use. Conducted in association with the *aech* owners, village chiefs, and the Yap Historic Preservation Office (HPO) staff, the survey resulted in the location of hundreds of *aech* and the archaeological recording of a large number of them (Jeffrey 2011).

European Exploration

Early sixteenth-century Spanish explorers seeking a trade route between Acapulco (Mexico) and Manila (Philippines) were the first known Europeans to enter the Pacific. Once a course was established for what would become known as the Manila Galleon trade, the Spanish established a provisioning entrepôt for their ships at Guam and soon claimed islands in the Carolines, Solomons, and Marquesas. Dutch traders, already long established in Southeast Asia, are also known to have explored parts of the South Pacific in the seventeenth and eighteenth centuries. However, it was not until the eighteenth and nineteenth centuries that French and English expeditions made significant geographic discoveries in the region. By the nineteenth century other nations also explored the Pacific while making circumnavigations of the globe in the name of science.

Several vessels associated with the various expeditions are historically known to have come to grief on the treacherous reefs and in the extreme depths of the Pacific Ocean. An example of a maritime archaeological investigation of lost ships of exploration is that of the French vessels *Astrolabe* and *Boussole* in the Solomon Islands. Explorer Jean-François de Galaup, Comte

de Lapérouse was engaged in a scientific and exploratory expedition in the region when the two vessels were lost off the island of Vanikoro in the Santa Cruz group in 1788. Though the sites were first discovered by French explorers in the early nineteenth century, they were not archaeologically investigated until 1986. A multinational research team recorded the wreck sites and also located the remains of associated survivors' camps (Stanbury & Green 2004).

Shipwrecks are not the only archaeological remains of European exploration that have been identified. In many cases ships narrowly escaped wrecking but were forced to sever anchor cables in the process. Thanks to excellent record keeping by expedition leaders and their crews, the approximate locations of many lost anchors from such ships are known and, in some cases, have been archaeologically documented. Examples of this are anchors identified in Tahiti from the late eighteenth-century expeditions of both Captain James Cook of England and Louis Antoine de Bougainville of France (L'Hour 2010: 47-48).

European Trade

While archaeological evidence sheds light on the extensive prehistoric trade networks that existed between the islands, European trade also left identifiable physical impacts. Colonial ports were built throughout Oceania to assist with shipping cargos. Maritime archaeological sites associated with trade include shipwrecked trading vessels and maritime infrastructure sites have been investigated in nearly every island group.

Of the sites associated with the post-1500 European period are those related to the Manila Galleon trade. Many vessels are known to have been lost over the trade's four-century history, and shipwreck sites could provide a great deal of information about the vessels involved, the cargos that they carried, and the conditions that existed onboard. And while the remains of several Manila Galleons have been located, so far all of them have been claimed and impacted by treasure-hunting companies looking to profit from them. Spanish shipwreck sites located near the main provisioning points of Guam, Rota, and Saipan have been salvaged by treasure hunters, and as a result valuable archaeological data is lost forever.

Wrecks of merchant vessels propelled by sail, steam, and petroleum have been investigated in waters surrounding nearly every archipelago in Oceania. One example of a wreck associated with the copra trade is that of the hulk *Elsanore* located at the port of Levuka on the island of Ovalau, Fiji. *Elsanore* was loaded with a cargo of 500 t of copra when it was destroyed by fire in 1895. The wreck site was investigated by archaeologists from the Australian National Maritime Museum in 1998 (Hosty & Hundley 1998).

One unique example of a wrecked trading vessel is that of *Lenora*, a brig that belonged to the famous Pacific pirate Bully Hayes. Hayes' story was sensationalized by the popular media of the time which portrayed him to be a shrewd swindler, trader, blackbirder, and bigamist (Russell 1982: 4). Hayes used *Lenora* to engage in the illicit trade known as blackbirding, or kidnapping of islanders and using them as forced labor. In 1981 archaeologists with the US National Park Service (NPS), the Kosrae Historic Preservation Office, and the (then) Office of Historic Preservation, Trust Territory of the Pacific Islands investigated the remains of the wooden brig *Lenora* in Utwe Harbor, Kosrae (Carrell 1991).

Resource Extraction

The marine environment and close proximity to deep water of the islands of Oceania has allowed for the exploitation of both pelagic and shallow water species since initial colonization. And over the past 200 years, European and American interests developed industries related to resource extraction in the region. Such industrial activities include fishing, sealing, whaling, pearling, bêche de mer collecting, and guano mining. Archaeological investigations of the remains of the various methods associated with these industries have been carried out in several areas. Of these projects, perhaps the most comprehensive research has been conducted on the archaeology of whaling.

By the late eighteenth century, British and American whaleships rounded Cape Horn and entered the Pacific. There, they found rich, new hunting grounds which soon led increasing numbers of whalers who explored the region in search of their prey. In the nineteenth century, vessels equipped for voyages of several years in length roamed throughout Oceania until they filled their holds with valuable oil. Due to the harsh environmental conditions encountered, many vessels were lost on remote and uncharted reefs. Sites of wrecked whaling vessels have been identified in the waters surrounding the FSM states of Pohnpei and Kosrae, as well as Hawaii. Of the known sites of wrecked whaleships that have been investigated archaeologically, those located in Papahānaumokuākea Marine National Monument (in the northwestern Hawaiian Islands) present a unique opportunity to study contemporary vessels from competing nations and the technological changes that occurred over the industry's peak period. Of the ten British and American whaling vessels are known to have wrecked within the boundaries of Papahānaumokuākea over the first half of the nineteenth century, five have been archaeologically recorded and are the subject of ongoing research (Raupp & Gleason 2010).

Conflict and Warfare

No other post-1500 European activity has added more to the archaeological record of Oceania than warfare. Activities such as prewar military infrastructure development, commerce raiding, weapons testing, and battles on land, in the air and underwater, have all greatly affected the Pacific region. The physical remains of these activities on land include fortified structures, command posts, gun emplacements, storage structures, and airstrips. In the waters surrounding the various island chains exist the remains of wrecked ships, landing craft, assault vehicles, and aircraft deposited either as a result of conflict or in its aftermath. Archaeological sites associated with the US Civil War, World War I, World War II, and post-WWII nuclear weapons testing have all been investigated in Oceania.

Of the warfare-related sites in Oceania, none are more prevalent than those associated with WWII. Clandestine prewar Japanese military buildup began in the 1930s in Oceania, and by the end of the decade extensive, extremely well-fortified bases and ports were complete. Japanese assaults in the region set the scene for some of the most intense combat of the war and left battlefields littered with detritus. While in some places lost or abandoned Allied and Axis military craft were often left to deteriorate in situ, in others they were relocated to dumping areas as part of cleanup efforts and the necessary clearance of obstructions to navigation. As a result of such activities, a large number of unique archaeological sites exist in both shallow and deepwater environments.

For many years when such sites were identified, they often only preliminarily surveyed as a result of proposed harbor developments or management planning activities. However, over the past few decades, the significance of these sites and their connection to a shared, global heritage has resulted in an increasing interest among both cultural heritage managers and academic researchers. In that time, archaeological investigations of WWII sites have been undertaken in most of the archipelagos of Oceania, as well as in deepwater locations throughout the Pacific. Beginning with inventories of known sites and surveys at battle locations, research has since flourished, and many innovative projects have been undertaken to better understand the physical and cultural processes that affect sites and in turn how their presence has affected the cultures and environments that surround them. Notable projects include the extensive documentation and interpretation of American vessels sunk during the Japanese attack on Pearl Harbor by the US National Park Service (Lenihan 1990); collaborative efforts by the University of Hawaii, NOAA, and NPS to investigate and develop a long-term management strategy for the remains of a Japanese midget submarine sunk in deep water off of Hawaii (Van Tilburg 2006);

the use of anthropological approaches to understanding the range of values, meanings, and relevance that archaeological sites in Chuuk Lagoon have for different cultural groups and how this knowledge can assist in site management (Jeffrey 2007); and the development of an underwater heritage trail aimed at highlighting the many wrecks associated with the 1944 Battle of Saipan and encouraging site protection and preservation through sustainable, heritage tourism (McKinnon 2011).

Key Issues/Current Debates

Many of the key issues faced by maritime archaeological sites in the Pacific are the same as those in other parts of the world. However, issues related to site protection, permitting and access, preservation, and conservation are all compounded by the enormous area in which they exist. The vast distances that must be traversed to access sites make archaeological research and management in many parts of Oceania difficult. The costs associated with accessing these sites are a major limiting factor in the amount of time that can be spent surveying, recording, and/or monitoring them. As such it is possible for unscrupulous visitors and salvage operations to impact the archaeological context of sites without being detected. And as with archaeological sites in other parts of the world, perhaps the most important method for providing protection to archaeological sites in Oceania is through education.

Efforts to increase awareness of the fragile and irreplaceable nature of maritime archaeological sites in Oceania are underway and appear to be achieving success in many areas. An example of such can be seen in attitudes towards WWII shipwreck sites in Micronesia. For decades many of these sites were explored and negatively impacted for subsistence, commercial, and recreational purposes. A common practice the world over, local fishers take advantage of the unique artificial reef habitats created by submerged wrecks; however, the methods used for catching fish can be devastating to both archaeological sites and to the fishers themselves. These same wrecks have long been popular with diving tourists as well, and early diving activities often had detrimental effects on heritage sites through looting of artifacts and structural stress caused by improper anchoring practices. However, for the past 20 years, government agencies throughout the region have increasingly implemented fishing and diving regulations and educated operators about the need to preserve and protect the integrity of sites. Over time these efforts have succeeded in transforming them into sustainable, heritage tourism ventures.

Future Directions

The large number of sites that exist in the coastal zones and waters of Oceania and the range of time represented by them provide seemingly endless options for maritime archaeology. Research into the many different phases of human interaction with the Pacific Ocean has long been established, and significant advances in knowledge are consistently being made into Indigenous cultural and environmental adaptation, as well as the activities of historic periods.

Future maritime archaeological research and management strategies in the region should employ cost-effective methods to achieve goals that are both culturally and environmentally sensitive. In order to do this, collaboration is the most important key. In times past, inclusion of the various cultural groups of many island communities has often been neglected by researchers, which has resulted in negative impacts upon them and often one-sided interpretations of results. However, recent approaches to archaeological research in the region have focused on inclusive practices and community consultation to ensure that all groups have a voice, and local wisdom is respected. In terms of physical characteristics, the environments in which sites exist offer opportunities for collaboration with members of the community that use the sites and scientists from many different disciplines. Such collaboration will lead

to a more holistic understanding of how sites have affected the environments in which they were deposited, and in turn, the effects of their presence on those same environments.

Though the vast distances separating Pacific archipelagos have been seen as a major limitation for researchers operating on often unreliable sources of funding, they can also be seen as invisible barriers that provide increased levels of protection to sites. While it is true that for many years sites have been visited, and often negatively impacted, by resourceful divers and relic hunters, the high costs of reaching many areas of Oceania have likely been deterrents to other more destructive commercial ventures like scrap metal operations and large-scale land and port development. As a result, many maritime archaeological sites in Oceania are well preserved and hold great potential to provide insight into human interaction with the world's largest ocean.

Cross-References

- ▶ Atlantic Ocean: Maritime Archaeology
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Oceania: Historical Archaeology
- ▶ Pacific Islands: Finding the Earliest Sites
- ▶ Ship Archaeology
- ▶ War at Sea Archaeology

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Paddayya, Katragadda

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Basic Biographical Information

Katragadda Paddayya received his Ph.D. from Poona University (now University of Pune) in 1968, where he studied under Dr. H. D. Sankalia. Sankalia founded the Department of Archaeology at Deccan College Post-Graduate and Research Institute in Pune, India. Paddayya has held a series of positions at Deccan College including Lecturer in European Prehistory, Reader in Field Archaeology, Professor of Geoarchaeology, and Director of the institution. He is currently Professor Emeritus at Deccan College and is on the editorial advisory boards of the *Indian Historical Review* and the *Journal of Social Archaeology*. He is an honorary fellow of the Society of Antiquaries of London, and most recently, in 2012, he was awarded the Padma Shri by the Government of India (a national civilian award granted for exceptional and distinguished service).

Major Accomplishments

Paddayya's fieldwork has been underpinned and shaped by an exploration of archaeological epistemology, including significant engagement with processual archaeology (1990); as significant as his fieldwork have been his explicit discussions of the nature and development of archaeological theory in India (1995). His field research has focused on the archaeology of the Shorapur Doab in northern Karnataka, India, especially the Paleolithic and Neolithic landscapes of the region. His work, spanning more than 30 years, has made this previously little-known region into one of the best documented through extensive systematic surveys and detailed excavations (Paddayya 1982, 2007a; Paddayya et al. 2000). This research, beginning with his dissertation fieldwork on the Neolithic and subsequent projects on the Paleolithic sites of the Hunsgi and Baichbal basins in the same region, has emphasized contextualizing sites within environmental and cultural landscapes (Paddayya 1982) and the role of formation processes in the creation of the archaeological record (Paddayya 2007b).

Paddayya has consistently argued that questions of chronology and the reconstruction of the paleoenvironment and past lifeways could be better understood through intensive regional surveys and with a landscape and settlement system perspective, marking a significant departure from the way of prehistoric research was being done in India. This shift in research orientation led to the discovery of many Acheulian sites in varied topographic and sedimentary contexts and allowed for a reconstruction of the Paleolithic cultural landscape. Such an approach has helped identify sites like Isampur, an Acheulian quarry site with evidence for various stages of manufacture. At this site he and his colleagues have delineated toolmaking processes and behaviors (Paddayya et al. 2000) and have explored the possibility of understanding hominid cognition (Shipton et al. 2009). He has similarly contextualized the Neolithic ashmounds of the region, arguing that the ashmounds had to be understood as a part of the physical and cultural landscape and in relation to the various contemporaneous settlements that surrounded them (Paddayya 2002).

Paddayya has sought to engage with global archaeological theory and explore its relevance to the Indian context. While acknowledging that archaeology was introduced to India by Europeans, he emphasizes the fact that Indian archaeologists need to grapple with its theoretical apparatus to make it truly productive in India. The uncritical acceptance of archaeological theory would be as problematic as the uncritical rejection of it – rather, there is a space for the development of an Indian archaeological epistemology.

For example, in "Theoretical Perspectives in Indian Archaeology" (1995), Paddayya lays out what he calls "indigenous" traditions for studying and understanding the past, such as Hindu and Buddhist historical traditions, and argues that post-processual approaches to the Indian past are possible by being cognizant of the Indian epistemological and philosophical contexts. This engagement with the local context is also seen in his attempts to bring archaeology to the public, either through writing popular articles in English and other Indian languages or the establishment of a museum in the village of Hunsgi and encouraging local schools to visit his archaeological excavations.

Cross-References

- ▶ Indigenous Archaeologies
- ▶ Lithic Technology, Paleolithic
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Site Formation Processes
- ▶ South Asia: Paleolithic

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Paddy Soils: Environmental Analyses

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Introduction

Rice is a major staple crop in the world today. The rice growing countries are most of Asian countries, parts of Africa, Europe, and America under tropical, subtropical, and temperate climates. Such significance has drawn enormous attention to the agricultural history of rice from an agronomic perspective. Its historical development has been suggested by excavation of ancient

paddy fields and ethnoarchaeobotanical research on rice remains, and ancient literature studies. However, paddy soil, a type of modified soil by wet rice farming, has been rarely researched regarding its paleo-environmental conditions and cultivation modes. A limited number of prehistoric and historical paddy fields have been investigated: China, Japan, Korea, and Sri Lanka. Here, some general soil pedogenic processes in paddy soil associated with agricultural regimes and research topics on ancient paddy soils are briefly introduced.

Definition

A paddy field is an artificially submerged habitat of the rice plant created by either using naturally flooded low-lying land or by constructing a bounded field system to keep water with additional irrigation facilities. Human controlled irrigation schemes were initially determined by local climates, landforms, and advanced by technical development in water management over time. Geomorphological settings of paddy fields are generally classified into five types. They include flood-prone, rain-fed lowland, irrigated, rain-fed lowland and upland. At the micro-topographic level, ground and surface water regimes in wetland paddy cultivation based on longevity of saturation encompass stagnant water, stagnogley, and pseudogley, which significantly affect soil physical alteration as well as cultivation modes. The most general types are irrigated stagnogley and pseudogley type paddy soil resulting from submergence and drainage, and their common characteristics observed from buried paddy fields are dark colored soil with high organic content and precipitated nodules or stains of iron and manganese due to repeated oxidation and reduction processes (Moormann & Van Breemen 1978; Greenland 1997).

Key Issues

Compared to macroremains of rice, recognition of cultivar, and cultivation contexts, employing genetic markers and morphological variations is relatively standardized for cross-regional comparison; ancient agricultural soils went through more complicated post-depositional processes and tend to be affected by sedimentation after abandonment of the field. Moreover, locally inherited soil properties such as parent material, acidity, and soil texture are highly varied and their physical and chemical responses to cultivation activities are dynamic. Hence, manifestation of agricultural effects on soil physiochemical alternation is irregular and choosing parameters to determine land use dynamics of paddy rice farming is problematic. However, despite the roles played by local properties in pedogenesis as well as effects by cultivation, there are a few common features of paddy soils to note.

Changes to the physical properties of soils by cultivation are induced by puddling (wet tillage) and plowing while preparing land turns and mixes, through breaking up of soil aggregates and re-structuration. Consequently, it causes a plow pan formation by downward movement of clay, creating impermeable zones and constraining plowing effects within the A horizon. On a microscopic scale, concentration of fine particles such as clay and silt, and formation of anomalous clay pedofeatures has been observed (Miura et al. 1992; He et al. 2008; Lee 2011). Concurrently, there are some changes in soil micro-structure and pore space, depending on local soil composition by wetting/drying processes and puddling (Eickhorst & Tippköter 2009).

A peculiarity of rice paddy cultivation is considered to be its in-field irrigation regime, which is comprised of artificial waterlogging and intermittent drainage (De Datta 1981). Frequent submergence and desaturation of the land geared at providing air to rice plant roots, as well as weeding, usually triggered complex redoximorphic features of iron and manganese (including precipitated nodules and formation of iron pan) as well as gleying of soil (which is caused by iron movement in waterlogged soil). As a result of the accumulation of organic matter and repressed anaerobic decomposition processes caused by waterlogging, paddy soil usually

exhibits high organic components in various forms including fresh organic residue, DOM (dissolved organic matter), and macro- and micro-charcoals. DOM in paddy field is a major contributor of emitted atmospheric methane, which can be stored in ancient paddy soil (Pfeffer 1995; Kögel-Knabner et al. 2010). On the other hand, burning the field after harvest, as well as applications of fertilizers (such as fermented animal manure, crop residue, and/or modern chemical fertilizers), would result in changes to some soil components such as P and Si. In the case of paddy soil, however, use of conventional techniques to study archaeological cultivated soils, such as measurements of phosphate concentrations and magnetic susceptibility enhancement (the latter employed to detect burning), is problematic due to gleying, leaching, and the fact that relatively high values of phosphate and nitrogen can be attributed to fertilizer usage (Kögel-Knabner et al. 2010).

More intensive paddy rice cultivation is reported to trigger hydromorphic degradation by leaching of iron as well as clay domain alignment changes and chemical components of Si, Al from clay minerals, and various soluble elements, resulting in the formation of an E horizon under the paddy soil (Brinkman 1970; Kyuma 2004). Furthermore, redox processes in wetland likely cause precipitation of minerals such as pyrite and siderite. In arid climatic zone, salinization due to excessive water evaporation by high temperature on irrigated paddy soils generally occurs as a form of land deterioration.

Although a line of conventional agronomic research on physiochemical composition of paddy soil is informative, its resolution is not high enough to reflect such diversified cultivation mode changes in archaeological paddy soils. In addition to inherited environmental conditions, the main variables to determine the productivity of rice yields and reflection of past cultivation techniques are soil fertility, cultivar variety, planting density, weeding, irrigation regimes, and scheduling corresponding to growth of plant. Issues can be extended to recognizing duration of past agricultural land including discontinuance of land use often resulting in preservation of paddy field by abandonment and minor local environmental fluctuations in ancient times through soil analyses. Other associated topics such as indigenous or lost methods to replenish soil fertility (Barnes 1990), assessing natural soil fertility by parent material and addition of nutrients by regular flooding, crop-rotation patterns, multiple croppings per year, and long-term interplay with local environmental changes such as groundwater level fluctuations and sea level changes (Zong et al. 2007) are rarely studied and expected to be addressed in further ancient paddy soil research.

The recent geochemical and soil micromorphological investigations on ancient paddy soils appear to be able to provide detailed information regarding ancient wet-rice farming schemes. They include detecting the difference between rain-fed and artificial irrigation regimes from prehistoric (*c*. 1000 BCE) and early historical paddy soils (400–1000 CE) at the Gulhwa and Pyunggeo sites, South Korea, by silty clay concentration pedofeatures exhibiting hydrological alteration and degradation due to irrigation scheme changes (Lee 2011), and a series of cultivation activities and their associated pedofeatures such as trace of harvest by uprooting, presumed application of manuring, burning in field, and development of irrigation toward more human water controlling regimes during Liangzhu period (*c*. 7,000–4,000 BP) at the Maoshan site near the lower Yangtze region (Zhuang et al. forthcoming). In geochemistry, increase of soil organic matter, movement of iron and manganese, and removal of calcium carbonate in calcareous soil affected by long-term cultivation are noted through examination of a paddy soil chronosequence spanning 1,000 years (Chen et al. 2011). Some view the emergence of paddy rice cultivation as a more active form of rice plant use by inferring infield burning through increased micro-charcoal contents coupled with micro-fossil evidence at the Kuahuqiao site between 7,700 and

7,550 cal. year BP and at the Tianluoshan site during 5000–2500 BCE, south east China (Zheng et al. 2006; Zong et al. 2007). But soil alteration caused by construction, practice, and management of paddy field and precision of certain soil analysis techniques should be examined in further detail due to the complex nature of paddy soil chemistry. Multiple qualitative analytical techniques can be expected to yield more solid results.

Although detecting the evolution of paddy rice farming and its locally diversified trajectories can only be achieved through multidisciplinary research, including here archaeoethnobotanical research and archaeological excavation of buried ancient field systems and irrigation facilities, there are a number of independent research topics that necessarily demand a geoarchaeological approach. First, building up a dataset of chemical and physical soil alterations associated with agricultural practices based on samples from multiple ancient buried paddy soils. This would serve as a crucial tool to assess early paddy soils in which clear field system features are not usually preserved well to understand paleo-environmental conditions and cultivation modes. Further research is also needed to identify possible signatures of different paddy cultivation regimes and to shed light on degradation due to excessive land use. Another challenge is to detect the start of dry rice farming (upland rice) and to recognize paleosols under the influence of dry rice farming.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Rice: Origins and Development

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Pakistan: Archaeological Museums

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Introduction

A museum is a nonprofitable institution that caters for conservation and exhibition of artifacts of significant value and educates the society about the human past and her environment through material evidence. The objects in a museum relating to ancient cultures and civilizations are organized in such a manner that spectators can conceive the exact picture of the past. The archaeological investigations in Pakistan reveal the earliest human occupation of Soan Valley near Rawalpindi and Sanghao Cave in Mardan since times prehistoric. The prehistoric caves, rockshelters, workshops, and quarries reported in the tribal belt, Mohmand and Bajaur agencies, Rohri Hills, and the Thar Desert further testify the existence of prehistoric occupations in Pakistan. The evidence of the Neolithic Culture Phase dating from the 9th to the 4th millennium BCE comes from the sites of Mehrgarh, Gumla, Jhandi Babar-I, and Sheri Khan Tarakai. The excavations at Kot Diji and Rehman Dheri provide substantial proof of this period in Sindh and Khyber Pakhtunkhwa, respectively, followed by an urbanized and developed Indus Valley or Harappan Civilization, which was almost contemporary to the Egyptian and Mesopotamian Civilizations, followed by the Gandhara grave culture or protohistoric cemetery sites dating to the 2nd millennium BCE were discovered in Swat, Dir, Malakand, Bajaur-Mohmand, Chitral, Peshawar, and Taxila regions. The Gandhara Civilization existed in this region from sixth century BCE to fifth century CE. The White Huns, Hindu Shahis, Ghaznavids, Mughals, Durranis, Sikhs, and British ruled and left their footprints in this part of the world from sixth to twentieth century CE. Most of the major museums of the world have relics of the Indus Valley and Gandhara Civilizations exhibited therein. The concept of this entry is to highlight the history of archaeological museums in Pakistan from the 1850s to 2012. This report will serve as a documentary proof of the latest development of museums in Pakistan and will make the world aware of the scope of materials available and exhibited in the Pakistani museums.

Key Issues

The development of museums over the land where today Pakistan exists started soon after the establishment of the British Government. The first museum was established in Karachi in 1851, followed by one each in Lahore in 1864, Quetta in 1900, and Peshawar in 1907. All of these were public museums and represented mostly ethnological collections. Besides, a few museums were also constructed in some institutions of Lyallpur (present Faisalabad) in 1909 and Lahore in 1910 (Natural History Museum in Government College) and zoological museums, one each at Islamia College, Peshawar, and Rawalpindi both in 1934 for education and research purposes. As a result of large-scale explorations and excavations, a number of site museums were established at Taxila in 1918, Mohenjo-daro in 1925, and Harappa in 1926. In 1937, a private museum was established at Lahore with the title of "Faqir Khana" (Dar 1981: 13). The Swat Museum in 1959 was founded by the Wali of Swat and Dir Museum in 1969 by the then Governor of the province. A noticeable development in the establishment of museums was observed; six archaeological museums were added to the list in Pakistan during 2002–2006 by the Provincial Directorate of Archaeology and Museums, Government of Khyber Pakhtunkhwa, under the directorship of Prof. Ihsan Ali. Later on, three

more museums, two by Hazara University, Mansehra, in 2007–2008 and one by Abdul Wali Khan University, Mardan, in 2012, were established by Prof. Ihsan Ali during his tenures as Vice Chancellor. These museums are located in Gor Khuttree, Peshawar; Pushkalavati Charsadda; Mardan district; Hund, Swabi; Chitral district; Bannu district; Abbottabad district; Hazara University, Mansehra; and Abdul Wali Khan University Mardan. All these museums are functional and represent archaeological and cultural profile of the respective regions of the country.

The Victoria Museum, Karachi

This Victoria Museum (see Fig. 1) was established by Sir Bartle Frere in 1851 in Karachi (Morley 1981: 10). Originally the museum housed objects of both archaeological and ethnological nature and was representing the artistry, archaeology, and natural history of the country. The museum building was later used by the Karachi Municipal Corporation Department in 1870. Likewise in 1908, various alterations and constructions within and the surroundings of Burns Gardens completely lost the originality of this museum in terms of its architecture and use. So due to lack of interest and awareness about the role of museums in societies, this museum remained abandoned since 1870, and the fate of the materials is not known as there is no such record of it.

The Lahore Museum, Lahore

The Lahore Museum (see Fig. 2) previously known as Jubilee Museum, Central Museum, and Punjab Museum was established by the British Government in 1849. This museum was first opened in Wazir Khan Baradari and represented both archaeological and ethnological cultures of the region. Their antiquities immensely suffered in 1947, when major pieces were shifted to India under an agreement of devolution of cultural properties. Later on the museum building was occupied by the Punjab Public Library. The present Lahore Museum is located near old Food Street in Lahore district, housing rich collection of Buddhist and Islamic art pieces. The fasting Buddha is one among its unique collections. The contributions in the form of explorations, excavations, surveys, and documentations of the Archaeology Department and NCA Department of Punjab University produced valuable antiquities,

Pakistan: Archaeological Museums, Fig. 1 The Victoria Museum, Karachi

Pakistan: Archaeological Museums, Fig. 2 The Lahore Museum, Lahore

which are displayed in the museum representing a complete profile of the regions.

The McMahon Museum, Quetta

The developmental process of this museum was started in 1900 and the museum was formally opened to the public in 1906. Originally the museum housed antiquities of natural history, arts, crafts, and archaeological interest that represented the culture, ethnicity, lifestyle, and traditions of Baluchistan, Afghanistan, Persia, and Arabia. These antiquities were jointly collected by Mr. Hughes Butter and Sir Aurel Stein. In 1935, as a result of a devastating earthquake, most the museum building was damaged. Since then, the museum was shut down and the antiquities were dumped in municipal warehouses. Today, nobody knows anything about the precious antiquities that the museum displayed.

The Taxila Museum

Sir Alexander Cunningham first started archaeological investigations in Taxila during the period 1913–1934 and produced rich material of sculptures, jewelry, and household utensils. Initially these materials were displayed in a temporary hall which was then shifted to the museum. In 1918, the foundation stone of a new building was laid by the then Viceroy of India Lord Chelmsford and it was formally inaugurated as a museum in 1928 (Ashraf & Lone 2005: 41). Currently the museum is located at about 5 km off the main Peshawar-Islamabad G. T. Road, at a distance of 35 km from Islamabad, with a rich collection of Gandharan art, principally coming from the sites of Bhir Mound, Sirkap, Sirsukh, and the Buddhist monasteries and stupas of Dharmarajika, Julian, and Mohra Muradu (see Fig. 3).

The Peshawar Museum, Peshawar

The Peshawar Museum (see Fig. 4) was built in 1906 in the memory of Queen Victoria and formally opened in November 1907. In its early days the Peshawar Municipality ran the Peshawar Museum. In 1917 the building and museum was transferred to Local Government supervision. The superintendent of the Archaeological Survey of India, Frontier Circle, acted as curator of the museum. In 1927, the Frontier Circle Office was shifted to Lahore. A full-time curator was

Pakistan: Archaeological Museums, Fig. 3 The Taxila Museum

Pakistan: Archaeological Museums, Fig. 4 The Peshawar Museum, Peshawar

appointed for the Peshawar Museum, and the building along with antiquities was transferred to the Provincial Government.

Often the main hall of the Peshawar museum building was used for investitures, balls, departmental examinations, tea parties, and sessions of the Legislative Council. The museum collections were displayed in the vestibule, side galleries, and upper galleries of the building. The exhibition area covered 4,850 sq ft. The first session of the Legislative Assembly of Khyber Pakhtunkhwa, the then North-West Frontier Province, was first time held here on April 19, 1932, inaugurated by the Viceroy of India, Lord Willington (Khan 1972: 3). The Provincial Government fully realized the difficulty and inconvenience caused to visitors to the museum and disallowed the use of the hall for political purposes. After independence, the museum remained under the direct control of the Director of Public Instructions, Government of Khyber Pakhtunkhwa, the then NWFP. In 1971, an autonomous body, under a Board of Governors, headed by the Chief Secretary, was instituted to run the affairs of the museum. In 1992, the Government of Khyber Pakhtunkhwa, the then NWFP, established a Directorate of Archaeology and Museums to ensure better protection, preservation, promotion, and safeguarding of the archaeological and cultural heritage of the province; thus the Peshawar Museum became part of the Provincial Directorate.

The original two-story building, an amalgamation of British and Mughal style architecture, consisted of a main hall and two side aisles on the ground and first floor, surmounted by four elegant cupolas and small pinnacles on all corners. In 1969–1970 on the eastern and western sides of the building, two halls were added in a similar fashion. In 1974–1975, a second story was added to these two side halls. A new block under a project "Extension of Peshawar Museum" was approved in the year 2002 under the supervision of the principal author of this chapter at a cost of Rs. 33.11 million. The project had two components: first, an extension of the museum to construct an Islamic Block with two galleries, a conservation laboratory, two halls for the reserve collection, offices of the Provincial Directorate, and a cafeteria. The second component was a complete remodeling of the existing building including replacement of showcases, lighting, labeling, and display works in all galleries of the existing main building along with refurbishing the floor, ceiling, and structures. When the project was completed, the antiquities were displayed according to international standards.

The museum since its early days housed a rich collection of the Gandhara art pieces, excavated and recovered from the major Gandharan sites like Shah-Ji-Ki-Dheri in Peshawar district; Sahri Bahlol, Jamal Garhi, Shahbaz Garhi, and Takht-i-Bahi in Mardan district; and Aziz Dehri in Swabi and from other Gandharan sites excavated by both British and Pakistani scholars. The main collection includes Gandharan sculptures, coins, manuscripts, and copies of the Holy Qurans, inscriptions, weapons, dresses, jewelry, Kalash effigies, Mughals and later-period paintings, household objects, and local and Persian handicrafts. Today the Peshawar Museum is best known for its collection and is ranked as the largest museum in the world in terms of Buddhist art collections.

The Dir Museum, Chakdara

Dir district in terms of historical and cultural values is one of the most important regions among the districts of Khyber Pakhtunkhwa. Its territories stretched out between 34° 22′ and 35° 50′ north and 71° 02′ and 72° 30′ east and mainly comprised of the terrain drained by the Panjkora River and its tributaries. Dir takes its name from the name of a village, Dir, which served as a capital of the state during the Nawab regimes. It is surrounded by Swat district on the east, Bajaur on the west, Chitral on the north, and Malakand Agency on the south (see map). The archaeological expeditions in Dir district were started by the Department of Archaeology, University of Peshawar, during 1966–1969 and excavated sites like Andan Dheri, Chat Pat, Amluk Darra, Damkot, Balambat, Timargarha, Shah Dheri, Gumbatuna, and Shalkandi. To house the collection from these sites, the State Government of Dir constructed a museum in Chakdara. Capt. Rahatullah Khan Jaral, the then Political Agent of Dir Agency, proposed the Dir Museum and allocated a sum of Rs. 2,50,000 for its construction. The Provincial Government afterward allocated an additional fund of Rs. 4,90,000 for the construction of residential quarters, boundary wall, guest house, storage, and other facilities.

The museum building was designed by Mr. Saidal Khan, Consultant Architect of the Public Works Department (PWD) of Khyber Pakhtunkhwa, the then NWFP. The architect adopted the local style of architecture and constructed the museum with bare stone, called as Malakandi stone. The museum has a fort-like appearance, with a grand facade, consisting of an arched entrance, two square-corner picket towers, and battlements on the parapet (see Fig. 5).

The museum remained as a state museum until 1969, and when the state was merged into the province, the museum was handed over to the Provincial Government. The Provincial Government constituted a Board of Governors under the Provincial Educational and Training Ordinance 1970 to run the affairs of the museum and was formally inaugurated on May 30, 1979, by Lt. General (Rtd.) Fazl-e-Haq, the then Governor of the province (Dar 1981: 17). However, the museum was properly organized in 1979. The purpose of the museum is to exhibit the extensive

Pakistan: Archaeological Museums, Fig. 5 The Dir Museum, Chakdara

archaeological, Islamic, and ethnological materials of the area. The materials include Gandharan sculptures, coins, jewelry, and weapons.

Today the museum has a total collection of 2,161 objects, mainly Gandharan sculptures, coins, and ethnological materials. The display of the Gandharan objects, more than 1,444 in number, revolves around the themes of Buddha's pre-birth and life stories, miracles, worship of symbols, relic caskets, and individual standing Buddha sculptures. The most represented of the pre-birth stories or Jatakas are Dipankara, Maitryakanyaka, Amara, Syama, and Vessantara Jatakas. The most represented scenes from the Buddha's life story include Queen Maya's dream, interpretation of the dream, birth of Siddhartha, bath scene, seven steps, going to school, writing lessons, wrestling matches, palace life, marriage scene, renunciation, great departure, ascetic life, first meditation, demon attacks, attaining enlightenment, first sermon at Sarnath, conversion of Ksyapa, monks, death scene, cremation of Buddha, distribution and guarding of relics, and the construction of stupas on the relics. The miracle of Sravasti and taming of a wild elephant are the two commonly represented miracles, along with different types of the relic caskets and stupa models, along with life-size Buddha statues. Other Gandharan representation comprises of boddhisattvas, atlantes, ichthyo-centaurs, cupids, garland bearers, Corinthian, Persipoliton, Indo-Persipoliton pilasters, and decorative architectural fragments. Most of the Gandhara art pieces come from the sites of Andan Dheri, Chat Pat, Baghrajai, Bumbolai, Jabagai, Shalizar, Ramora, Tri Banda, Macho, Amluk Darra, Nasafa, Damkot, Bajaur and Talash, Dir, Malakand, Balambat, Timargarha, Shamlai Graves, Inayat Qila, Shah Dheri Damkot, Gumbatuna, Jandol, Matkani, and Shalkandi.

The Ethnological Gallery of the museum was established in 1977, reflecting on the cultural heritage of the area and presenting a general picture of the life of the people to the visitors. The ethnological material, 498 pieces in all, includes manuscripts, weapons, jewelry, dresses, ceramics, musical instruments, household objects, furniture, and wooden architectural elements.

The City Museum, Gor Khuttree, Peshawar

The City Museum (see Fig. 6) is located in the Gor Khuttree Complex and can be approached either through Chowk Yadgar from the west or Lahori Gate from northeast of the walled city of Peshawar. The complex occupies the highest

Pakistan: Archaeological Museums, Fig. 6 The City Museum, Gor Khuttree, Peshawar

point center of the city. This site has been identified with the place of Buddhist embellishment relating to "the tower of Buddha's bowl" and with Kanishka Vihara (Dani 1995). Mughal kings like Babur (Beveridge 1975), Akbar, and Jahangir talked about this site in their diaries and referred this site to the settlement and religious place of Hindu Jogis (a place where Hindu funeral sacrifices and Sardha ceremonies were held) (Roverty 1852: 22-3; Jaffer 1945: 203-4). It was Jahanara Begum, the daughter of Mughal King Shah Jahan (1050 HA or 1540 CE), who converted this site into a caravanserai and named it as Sara-e-Jehanabad and built a Jamia Masjid (a place where Friday prayers are held) and a Hamam (Jaffer 103-6). Upon the recommendation of Nur Jahan Begum, wife of another Mughal king Jahangir, a network of cells on four sides with lofty turrets at each corner, two high archway gates on the eastern and western sides, and two wells were constructed which covered a total of 700 sq ft area and completed the shape of a caravanserai (Ali et al. 2005: 228). Later on from 1838, the Italian General Paolo de Avitabile as Governor/Representative of the Sikh Government made major alterations in the complex. He converted the Jamia Masjid into Gorakhnath Temple and used the cells for official purposes (Jaffer 1945: 103; Durrani et al. 1997: 189). The addition of second storey structure upon the western gate was the alteration he made for public petition and official use (Jaffer 1945: 103). This site remained the focal point of the British Government as well. The 1912 fire brigade building and barracks on the eastern and southeastern corners, respectively, are the alternations they made. Currently, the site is under direct supervision of the Directorate of Archaeology and Museums and Crises Management Unit, Government of Khyber Pakhtunkhwa.

The City Museum was inaugurated on Pakistan Day on March 23, 2006, by the former Chief Minister Mr. Akram Khan Durrani under the leadership of the principal author of this chapter. The archaeological gallery of this museum represents a continuous profile of the Peshawar Valley in the form of excavation material recovered from the site of Gor Khuttree. This excavation was started by Prof. Dr. Ihsan Ali, the then Director of the Directorate of Archaeology and Museums, in 2002 and today the excavation area with a 49-m-deep trench claims the honor of the deepest excavation in the world, testified through the journal *Current World Archaeology* (Selkrik 2006: 20). The second gallery is of ethological culture of Peshawar, where household objects, traditional dresses, armaments, ornaments, musical instruments, arts, and

Pakistan: Archaeological Museums, Fig. 7 The Pushkalavati Museum, Charsadda

craft objects are displayed. It is worth mentioning that the structural integrity of surviving monuments, museum antiquities, and excavation area within Gor Khuttree Complex produced M. Phil. and Ph. D. scholars at both national and international levels. Dr. Jennifer Campbell from Toronto University, Canada, and Dr. Shah Nazar and Mr. Fazal Sher from Peshawar University are a few scholars whose research was directly based upon the site.

The Pushkalavati Museum, Charsadda

The establishment of this museum (see Fig. 7) is closely linked with the historical background of the region. Pushkalavati, the modern Charsadda district being the first capital of Gandhara, is situated about 30 km to the northeast of Peshawar. The term Pushkalavati is a combination of two Prakrit words *Pushkara/Pushkala* and *wati/vati*, which, respectively, mean "lotus" and "city." The area is very fertile and has ponds full of lotus flowers. The lotus flower, which also symbolized Buddha in archaic sect, is still grown in Charsadda. The legendary Hariti Devi and Panchika were born here and converted to Buddhism by Lord Buddha. The Siyama Jataka also took place here (Sehrai 1982; Ali 2003). This region is also known as "Hashtnagar" which is a Persian word meaning "eight villages." According to Prof. Dani, this name is the corrupt form of "Astes Nagar," (city or village of Astes) after its ruler Astes who ruled over Gandhara before the onslaught of Alexander the Great (Dani 1966).

Here the remains of the two cities have been exposed at Bala Hisar and Shaikhan Dheri, opposite to each other. The second one is situated on the bank of river Jinde, a stream with its source in Malakand Agency flowing through Charsadda and joining the river Swat. The site of Bala Hisar yielded the material dated to the time of the Achaemenian, Greeks, Scytho-Parthians, and Kushans (Wheeler 1962). Prof. Ihsan Ali's survey conducted in 1993 discovered 144 sites of different types (Ali 1994). The report brought to light a good number of Buddhist stupas and monasteries in this region.

Keeping in view the historical wealth of the region, Prof. Ihsan Ali, former Director of the Directorate of Archaeology and Museum, initiated a project for the establishment of a museum on the site of Ghani Dheri, aiming to house both archaeological and ethnological material of the area and educate the people about their rich cultural properties. The museum building was completed, but due to departmental issues, this museum is yet to be opened for public.

The Mardan Museum, Mardan

The Mardan Museum (see Fig. 8) was proposed by Sahibzada Riaz Noor, the then Commissioner of Mardan, on December 29, 1990. He constituted a Board of Governors in January 1991 to help the establishment of the museum in Mardan district. The museum started functioning in March 1991, and the display work in the solitary hall, measuring 50 × 22 ft, was completed in April 1991. The Peshawar Museum donated 22 showcases for the display, while the Department of Archaeology, University of Peshawar, rendered technical support. In 1992, with the establishment of the Directorate of Archaeology and Museums, Government of Khyber Pakhtunkhwa, then NWFP, the Mardan Museum came under its administration. The Peshawar Museum provided 137 confiscated antiquities to start display work. Initially the old building of the Mardan Museum had a total collection of 419 artifacts, including 258 Gandharan sculptures; 127 coins of Kushan, later Kushan, Kushano-Sasanian, and Hindu Shahi dynasties; 6 terracotta animal figurines; 5 mercury containers; 10 household objects; and 13 agricultural tools. The subject matter of the Gandharan sculptures in the Mardan Museum of schist stone are Queen Maya's dream; birth of Siddhartha; bathing scene; the great departure; the first sermon at Sarnath; the conversion of Kśyapa; offerings to Buddha; distribution of the relics; worship of the wheel of law; stupa and alm bowl; Buddha with worshippers and monks; Buddha seated in reassurance pose (Abhaya Mudra); garland bearers; Buddha seated under arches in meditation pose (Dhayana Mudra); Corinthian, Persepolitan, and Aśokan capital; broken architectural elements of pillars, pilasters, harmika, dome, yashthi, chitras or umbrellas, spacers, and floral and geometrical decorative elements from votive and large stupas; broken pedestals with Buddha and Bodhisattva feet; broken hands in different postures; figures of sheep, lion, horse, peacock, and ichthyo-centaurs; and a seated figure of Ardoksho. The stucco sculptures include a seated Buddha in meditation pose (Dhyana Mudra), heads of Buddha, Bodhisattva, and common folk.

Though the initial collection of the Mardan Museum is based on the confiscated materials, later the excavated antiquities from Safiabad, Mardan, and Hund, Swabi, were also displayed in the museum. Confiscated antiquities from Katlang, Rustam, and Baja police stations along with the donated objects were also displayed in the old building of the museum. From 2002 onward, under the leadership of Prof. Ihsan Ali,

Pakistan: Archaeological Museums, Fig. 8 The Mardan Museum, Mardan

the then Director initiated a project for the establishment of a big museum because the old building's capacity was not enough to house the objects systematically. So the current Mardan Museum, which is located on Mardan-Charsadda road, was inaugurated by the Chief Minister Amir Haider Khan Hoti in 2008. The material displayed in the old building have been shifted here and displayed along with borrowed antiquities from the Peshawar Museum. Today this museum mainly represents the Buddhist art and architectural elements and educates the nation about the past glory of the region.

The Hund Museum, Swabi

The Hund Museum (see Fig. 9) was established upon the landscape which has been mentioned hundreds of years ago by various scholars, the earliest account of which came from Sarada inscription found at Hund which describes this region as Udabhandapura, meaning "the upper town" or high-altitude landscape (Rahman 1979a). Xuanzang, the Chinese pilgrim, who is also known as Hiuen Tsang in historical accounts, mentioned this site in his autobiography of 644 CE as Wa-to-kia-han-cha. Waihand and Ohanad are also the names used for the present site of Hund (Shakur 1946; Rahman 1979b; Ali 1999; Ali et al. 2005). Keeping in view the historical value of the site, the Directorate of Archaeology and Museums under the leadership of Prof. Dr. Ihsan Ali initiated a project based on various activities. In its first phase, the building for the museum, rest house, cafeteria, and a monumental

Pakistan: Archaeological Museums, Fig. 9 The Hund Museum, Swabi

Pakistan: Archaeological Museums, Fig. 10 The Bannu Museum, Bannu

Corinthian pillar in the memories of Alexander the Great has been completed, while in the second phase systematic excavations, aiming to determine the complete cultural profile of the region, and construction of a bypass road are yet to be completed. The current museum was inaugurated in 2009 by Mr. Sayed Aqil Shah, Sport, Youth Affairs, Tourism, Archaeology and Museum and represents both archaeological and ethnological wealth of the region.

The Bannu Museum, Bannu

Bannu basin is connected to the Gomal Valley and is surrounded by hills and mountains. It is very strategically located between the Balochistan plateau, Central Asia, and the plains of the greater Indus Valley. The area was inhabited in prehistoric times and it is no wonder that a few Neolithic settlements and prehistoric sites were recorded here. The sites of Sheri Khan Tarakai (Khan et al. 1986), Lewan, and Akra were excavated jointly by the University of Peshawar and the Bannu Archaeological Mission including the British Museum, the University of Cambridge, the University College London, and Bryn Mawr College from 1984 to 2001. Bannu, having rich cultural history in the form of material evidence, the Directorate of Archaeology and Museums has established a Museum of Archaeology and Ethnology near Allah Chowk, next to the Agriculture Office at Bannu, inaugurated by Mr. Sayed Aqil Shah, Minister for Sports, Tourism, Archaeology, and Youth Affairs, in 2011 (see Fig. 10).

The Chitral Museum, Chitral

Chitral district is one of the famous regions among the regions of Khyber Pakhtunkhwa and best known for its indigenous culture and quaint beauty. The district lies in the northwestern part of the province, between 71° 12′ and 73° 53′ longitude and between 35° 13′ and 36° 55′ latitude, bounded on the west by the Badakhshan Province of Afghanistan, on the east by the Northern Areas of Pakistan, on the north by the Wakhan Province of Afghanistan, and on the south by Dir and Swat districts (Ali et al. 2002). The altitude of the district from sea level is about 1,129 m at Arandu to 3,658 m at Baroghil (Raza 1994). The landscape is rugged and mountainous, while the valleys developed in deep narrow and tortuous areas. Natural streams and channels of river Chitral run through all valleys (Dichter 1967). The archaeological expedition to Chitral conducted by Peshawar University; Bradford and Leicester Universities, UK; and the Directorate of Archaeology and Museums, Pakistan, unearthed a number of Gandhara grave culture or protohistoric cemetery sites in the district. The historic-period sites of this

Pakistan: Archaeological Museums, Fig. 11 The Chitral Museum, Chitral

district have also contributed to the establishment of cultural profile of the district. Chitral, with its multifaceted culture, history, and archaeology, led the Directorate of Archaeology and Museums under the leadership of Prof. Dr. Ihsan Ali to establish a museum there. This museum was inaugurated by the late Saleh Mohammad, former Director, in 2008. The displayed material include dresses, armaments, ornaments, wooden effigies, household objects, and Gandhara grave culture materials (see Fig. 11).

The Abbott Museum, Abbottabad

Prof. Dr. Ihsan Ali as a Vice Chancellor of Hazara University, Mansehra, completed the establishment of this museum which was formally inaugurated by Mr. Nisar Muhammad Khan, the then Federal Minister, on February 22, 2008. The museum represents archaeological profile of the province in general and Abbottabad and Haripur districts in particular. In 2006–2007 the staff of the said museum under the leadership of Prof. Dr. Ihsan Ali initiated archaeological investigations in Hazara division. The surface collection of the survey conducted at Abbottabad and Haripur districts in the form of potsherds, bones, iron and metal objects, and photographs embellished the archaeological gallery of this museum. The material recovered from the pre-Buddhist grave site at Gankorineotek in Chitral district, excavated in 2008 through INSPIRE project, which was jointly run by Hazara University, Mansehra; Abdul Wali Khan University Mardan; British Council, Islamabad; and Leicester University, UK, are displayed in the main hall of this museum which educate the spectator about past glories (Ali et al. 2010). Household objects, armaments, ornaments, wooden furniture, and dresses are the main objects representing the culture and tradition of the area. The representation of Buddha's life story in watercolor painting and images of those political personalities who contributed directly or indirectly into the establishment of Abbottabad town in Burning Artwork in the said museum is the unique idea of Prof. Dr. Ihsan Ali to promote modernized arts and to pave a new way for students of other academia to contribute to archaeology. A beautiful cultural diorama adorned with traditional furniture, household utensils, and colorful arched facade is an eye-catching element of this museum (see Fig. 12).

Hazara University Museum, Mansehra

The establishment of the Hazara University Museum (see Fig. 13) is another achievement of Prof. Dr. Ihsan Ali as a Vice Chancellor. This museum was formally inaugurated by the then Honorable Governor of Khyber Pakhtunkhwa Mr. Owais Ahmad Ghani on February 13, 2008. It houses a diverse collection of archaeological

Pakistan: Archaeological Museums, Fig. 12 The Abbott Museum, Abbottabad

Pakistan: Archaeological Museums, Fig. 13 The Hazara University Museum, Mansehra

and ethnological materials representing different occupational and cultural background of the region. The materials are either obtained through explorations and excavations or purchase and donation. The excavations at Gandhara grave culture sites in Chitral district (Ibid) and Bedadi site in Shinkiari, Mansehra, revealed a fairly large number of antiquities which are displayed in the museum and give an authentic dataset for educational and research purposes. The material came from the archaeological survey of Mansehra district, conducted by the staff and students of the Archaeology Department under the leadership of Prof. Dr. Ihsan Ali in the form of potsherds, wooden objects, grave headstones, urn burials, and Gandharan stone panels that

Pakistan: Archaeological Museums, Fig. 14 A 3D view of the proposed Museum of Archaeology and Ethnology at Abdul Wali Khan University Mardan

make up the collection of this museum. The museum also received a lavish donation of 114 relics and 72 coins from the Governor House. Household objects, ornaments, armaments, and Buddha birth scene in watercolor painting and different poses of Buddha in mirror work are of great interest for the spectators.

Museum of Archaeology and Ethnology, Abdul Wali Khan University Mardan

The Museum of Archaeology and Ethnology, Abdul Wali Khan University Mardan (see Fig. 14), is located at the main campus of the university, situated to the north of the Kabul River between 34° 05′ and 34° 32′ north and 71° 49′ and 72° 24′ east in the heart of ancient Gandhara about 64 km from Peshawar. The excavations at Sanghao Cave in Mardan district by Dr. A. H. Dani in 1963 pushed the history of this region back to 40,000 years (Dani 1999). King Asoka (third century BCE) inscribed the creed of Buddhism on the rocks at Shahbaz Garhi in Mardan and popularized the religion of peace and tranquility. During the time of Scytho-Parthians (first century BCE) and Kushanas (first century CE), the real expansion of Buddhism took place and a new era was ushered in. Hundreds of stupas and monasteries were erected for the propagation of the law of Dhamma. Chinese and Korean travelers and pilgrims, who came here, recorded the existence of these sites.

The site of Jamal Garhi, Sahri Bahlol and Shahbaz Garhi including Takht-i-Bahi which is on UNESCO's World Heritage List is located in this district that yielded a great volume of the Gandharan art pieces that are currently on display at Peshawar, Mardan, Lahore, and Karachi museums. Keeping in view the historical and cultural wealth of the area, Prof. Dr. Ihsan Ali, as a Vice Chancellor of the Abdul Wali Khan University Mardan, laid the foundation stone of the University Museum of Archaeology and Ethnology on July 20, 2011, and formally inaugurated the museum through Sayed Aqil Shah, Minister for Sports, Tourism, Archaeology, and Museums and Youth Affairs on December 22, 2012. This museum has been established with the main objective to educate and engage staff and students in extramural activities of the university. The students are given an opportunity to improve and demonstrate their knowledge and communication, leadership, and management skills by designating them tasks related to different activities of the museum. This will enable them to improve their level of understanding

about past and present glories. Moreover, it will not only change their environment but they can express their aptitude which will certainly help them choose a profession of their interest in the future. The museum is equipped with ethnological materials which are systematically displayed in eight galleries. The first two galleries represent household objects, ornaments, armaments, coins of different periods, and straw-made items mostly purchased and a few donated. The third gallery is a Swat cultural, where a diorama of Swat valley has been established, embellished with wooden art pieces like engraved pillars, doors, and furnitures. The fourth gallery represents Kalash culture, where the Gandhara grave culture objects, traditional Kalash household utensils, dresses, ornaments, and armaments have been displayed. The fifth gallery represents contemporary art gallery, where pieces of wooden, marble, and straw artwork present the artistry of the region. The sixth gallery presents the color of the province in the form of photographic representation, capturing the culture, traditional games, cuisines, built heritage, and beauty of the province. The seventh gallery represents the vision of Islamic art. Calligraphic Qurans, books, objects of wooden block printings, tile work, and decorative household objects are displayed here. The eighth gallery represents traditional dresses and jewelry. The last two galleries are kept vacant for the archaeological material, and it is hoped that archaeological material will soon be arranged via departmental loan act or donation or through excavations. The digitization of the museum artifacts has also been started, and each object is recorded on a database after its physical verification. The detailed description of selected objects like jewelry, Islamic calligraphy, wood art, marble art, and henna art, from barter system to coinage and manual plow displayed in various galleries made this museum one of the best in Pakistan in terms of evolutionary descriptions. The distribution of antiquities, systematic display, lighting, and detailed authentic descriptions of objects today educate the students and allow researchers to look at the past through material evidence and evaluate the difference (Tables 1 and 2).

Pakistan: Archaeological Museums, Table 1 List of other museums in Pakistan

S_no	Name of museum	City	Province
1.	Sir Sahibzada Abdul Qayum (SSAQ) Museum	University of Peshawar	Khyber Pakhtunkhwa
2.	Swat Museum	Saidu Sharif	Khyber Pakhtunkhwa
3.	Bamburet Museum	Kalash, Chitral	Khyber Pakhtunkhwa
4.	Quaid-e-Azam University Museum	Islamabad	Federal Capital
5.	Lok Virsa Museum	Islamabad	Federal Capital
6.	Islamabad Museum	Islamabad	Federal Capital
7.	Army Museum	Rawalpindi	Punjab
8.	Bahawalpur Museum	Bahawalpur	Punjab
9.	Harappa Museum	Sahiwal	Punjab
10.	Mughal and Sikh galleries	Lahore fort	Punjab
11.	Banbore Museum	Thatta	Sindh
12.	Umarkot Museum	Thar	Sindh
13.	Hyderabad Museum	Hyderabad	Sindh
14.	National Museum	Karachi	Sindh
15.	Shah Abdul Latif University Museum	Khairpur	Sindh
16.	Mohenjo-daro Museum	Larkana	Sindh

Pakistan: Archaeological Museums, Table 2 List of proposed museums

1.	Site Museum at Takht-i-Bahi, UNESCO World Heritage Site	Takht-i-Bahi	Khyber Pakhtunkhwa
2.	Tribal Museum	Khyber Agency	FATA
3.	Museum in each district of the country		

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Regional/Site Museums
- ▶ Universal Museums

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Palace of the Boyne (Brú na Bóinne)

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Introduction

Large and imposing prehistoric stone monuments never appear to stand in isolation nor are they constructed as a single event. Since the advent of chronometric dating techniques and good systematic fieldwork, archaeologists are beginning to understand the chronology and complex

development of burial-ritual monuments and the landscapes they inhabit (e.g., Edmonds 1999; Thomas 1999).

Irish passage tombs (or graves), in use between the fourth and third millennium BCE, form part of a much wider Atlantic sequence that probably has its origins in the Iberian Peninsula (Shee-Twohig 1981; Grogan 1991; Nash 2012). They are arguably the most noticeable Irish monument group and number around 220, although only 50 contain passage grave art (Waddell 2005: 74). They are usually clustered in groups forming cemeteries and are distributed in a distinctive northeast/southwest band across central and Northern Ireland.

Along with the Boyne Valley complex, the two passage tomb clusters at Loughcrew and an array of Neolithic monumentality including the Mound of the Hostages occupy the Hill of Tara (Co. Meath) and make for a busy ritual presence within this part of Ireland (Stout 2003; O'Sullivan 2005). This distinct architectural form usually comprises a circular (sometimes subcircular) mound which is delineated by a stone kerb. Mounds vary in size, between 10 and 85 m in diameter, and usually cover an east–west oriented passage (ranging between 1 and 40 m in length) that leads from a facade/entrance to a chamber, deep within the heart of the mound. It is on components such as the kerbing, passage, and chamber where a unique prehistoric rock art tradition is engraved, sometimes referred to as *passage grave art* or *megalithic art* (Shee-Twohig 1981; Eogan 1986). This sometimes hidden signature is a nonrepresentational repertoire and comprises geometric and curvilinear motifs such as chevrons, concentric circles, spirals, and zigzags; no two panels across the entire assemblage are the same, each stone reflecting a unique narrative (Lynch 1973; Shee-Twohig 1981; Eogan 1986; O'Sullivan 1986, 1993; Cochrane 2006; Nash 2006). Many motifs present within the larger monuments are distinctively regionalized such as the double and triple spiral and the radial variants found in at Newgrange or the crescents and serpentiniforms from Knowth. Analysis has identified certain areas of the monument that contain either curvilinear or rectilinear motifs (see in particular by Elizabeth Shee-Twohig 1981; George Eogan 1986 and Muiris O'Sullivan 1986, 1993). Closely associated with rock art and the architecture is the way that the dead are brought to the monument and where they are deposited, along with the grave goods that accompany them. Throughout the passage grave tradition where preservation allows, burial rites and symbolic behavior as shown through the artifact assemblages appear to be identical, passage tombs acting as repositories for successive generations of people, each mound representing a periodic corporate act of internment.

Key Issues/Current Debates/Future Directions/Examples

Signaturing Landscape

The 35 Neolithic monuments, standing within a postmedieval agricultural landscape, occupy the northern river terrace gravels (regarded as highpoints within the valley landscape) and ridges of a bend within the Boyne Valley, County Meath, central-eastern Ireland. The bend in the River Boyne, designated a World Heritage Site in 1993 (Referred by UNESCO to as an *Archaeological Ensemble of the Bend of the Boyne*), appears to enclose this landscape of over 785 ha. Here, the course of Boyne appears to physically separate ritual space immediately north of its banks from secular space to the south during a time when the passage tombs are the focus of extraordinary community activity. However, secular monuments in the form of circular stock enclosures and evidence of settlement, located among the ritual monuments, probably represent earlier and later utilization of the landscape before and after passage tombs are in use (Eogan 1991).

The monument group, comprising mainly passage tombs of varying size and clustered into four distinct groups, is one of Western Europe's most concentrated and has as its foci three massive circular or ovoid stone chambered Neolithic passage tombs – Dowth in the east, Knowth in the west, and Newgrange in the central part of

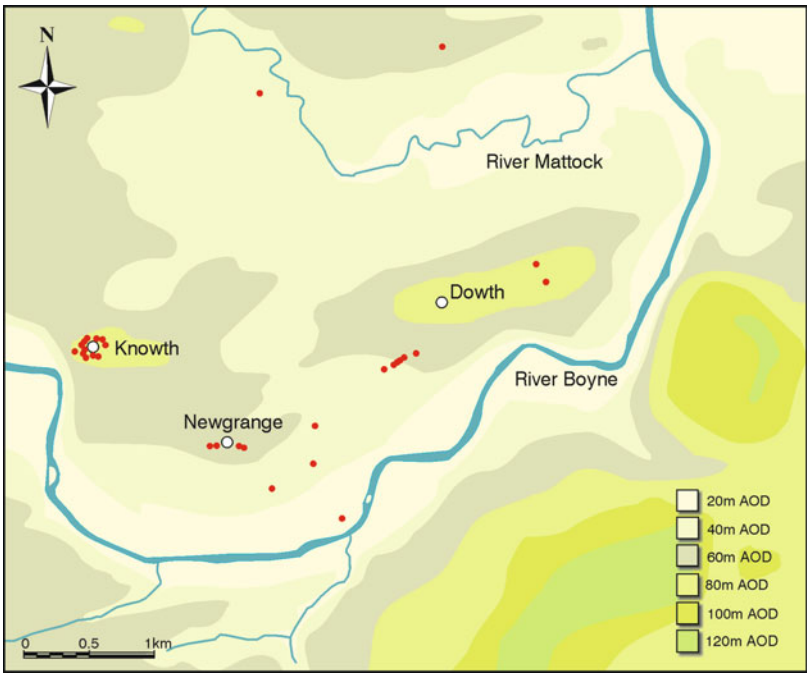

Palace of the Boyne (Brú na Bóinne), Fig. 1 The distribution of the Boyne Valley group of monuments including the passage graves of Newgrange, Knowth and Dowth

the bend (Fig. 1) (O'Kelly 1982a, b; Eogan 1986). Apart from these monuments, this ritual complex is also home to an array of smaller [satellite] passage tombs, monoliths (standing stones), later post-passage grave henges and earthen enclosures (Stout 1991), and evidence of pre- and post-passage grave settlement. Early pre-cairn Neolithic settlement is witnessed with the excavation of longhouses located within the northern part of the Knowth site, dated to around 3900 BCE. Prior to the construction, between 3300 and 2900 BCE, later settlement then shifts to the western part of the site with the construction of further longhouses (Eogan & Roche 1997; Cooney 2000). Concerning the Late Neolithic post-cairn ritual landscape, enclosures and henges would have indelibly stamped their presence on the Late Neolithic landscape.

Establishing Monumentality

The monuments that occupy the northern terracing of the Bend of the Boyne are arranged into four clusters; three of these center around the three large passage tombs, while a fourth linear cluster stands between Dowth and Newgrange.

The largest and arguably the most impressive of the three passage tombs is Newgrange (Gaelic: *Sí an Bhrú*). This circular stone, earth- and turf-constructed monument was built between 3,295 and 2,925 cal BCE, at a time when there were a large number of passage grave monuments being erected around the Neolithic core areas of Atlantic Europe (Grogan 1991: 126). Its dominance, standing on a small ridge along with a series of enclosures, standing stones, and tumuli within the Boyne landscape, would have probably provided the pilgrim with an obvious visual and ritual focus (Fig. 2) (O'Kelly 1982a, b).

The slightly oval mound measures 85.3 m in diameter and stands 12 m, covering a total area of around 0.45 ha. The central section of the cruciform chamber has a corbelled vaulted roof that extends some 3.5 m into the core of the mound, while the roofs of the side chambers have flat slabs. The long passage is constructed of 43 upright stones (21 on along the eastern side and 22 along the western wall); some of these are decorated with carved abstract images. Outside, the mound is delineated by 97 kerb stones made of local grit (graywacke) or slate and each decorated on both the external and internal

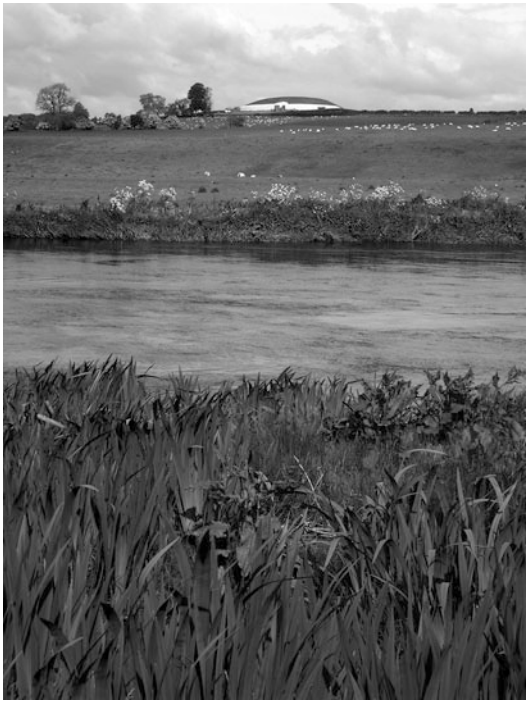

Palace of the Boyne (Brú na Bóinne), Fig. 2 Newgrange from the Boyne (Image: G.H. Nash)

surfaces with carved rock art. Based on the seminal work of Shee-Twohig (1981), Newgrange has up to ten types of motif that include curvilinear (arcs, circles, cupmarks, cup-and-rings, serpentiniforms, and spirals) and rectilinear forms (chevrons, lozenges, radials, parallel lines, and offsets); Knowth is similarly embellished.

Over its long history, Newgrange underwent a number of phases of use and abandonment. Similar to other passage tombs elsewhere, Newgrange is constructed using a tried and tested blueprint that includes four major architectural elements: circular mound, entrance/facade, passage, and chamber. These primary architectural elements are arranged in such a way to make the architecture of Newgrange unique (Nash 2006). According to Michael O'Kelly, the archaeologist responsible for excavating Newgrange, some of this architecture is aligned to ritually acknowledge a number of celestial and cosmological events such as the winter solstice. An extensive archaeological excavation of Newgrange revealed a number of unique traits including a roof-box above the main entrance, abstract passage grave rock art both inside and outside the monument, and a 19-m-long east–west passage that was deliberately constructed in such a way to restrict the visual access between the entrance/facade and the cruciform chamber, a trait repeated in passage grave monuments throughout the Neolithic. The roof-box, unique to the European passage grave tradition, was possibly constructed in order to allow a beam of light to penetrate the back of the chamber during the midwinter solstice (Lynch 1973: 152).

One of the earliest detailed archaeological plans of the three passage tombs was made by Welsh antiquarian Edward Lhwyd in 1699. Lhwyd was alerted when farm laborers discovered the entrance at Newgrange when digging the mound for stone, and as a result, he made a detailed plan of the internal arrangement of the passage and chamber areas. Following in the footsteps of Lhwyd were a number of antiquarians who undertook various pieces of work both inside and outside the monument, some suggesting that the monument was constructed during the early medieval period by marauding Vikings; others considered the ancient Egyptians as the builders. Between the time of Lhwyd and until it was taken under the control of the state (then, the United Kingdom of Great Britain and Ireland) in 1882, the monument and the surrounding landscape had been under great threat, mainly the result of vandalism and farming practices. Following statutory protection, Newgrange underwent a significant conservation program in 1890 under the directorship of Thomas Newenham Deane. During the early to mid-twentieth century, Newgrange was investigated a number of times in order to establish its construction methodology and date. It was still considered at this time as a Bronze Age monument rather than Neolithic. Throughout this period and in addition to the intense archaeological activity, the site had become a focus for tourism (e.g., Macalister 1939), and as a result, electric lighting was installed in the passage area during the 1950s. The site also became a local

Palace of the Boyne (Brú na Bóinne), Fig. 3 Photograph taken by 19th century photographer R. J. Welch of the entrance and the decorative sill stone

tourist attraction with numerous visitors leaving their mark, usually in the form of graffiti. To some, the entrance became an evocative statement of a bygone megalithic age (Fig. 3). The largest and most comprehensive investigation of the site was undertaken by Michael O'Kelly between 1962 and 1975 where a sporadic sequence of prehistoric activity, from the Late Mesolithic (Residual (disturbed) Late Mesolithic flint tools have been recovered from Bronze Age Beaker context from Newgrange (Cooney 2000: 30).) to the Iron Age and beyond, was unearthed.

Following O'Kelly's exhaustive excavation program, the site was controversially restored. During excavation, white quartzite was found in high concentrations around the base of monument, in front of the kerbing, either side of the façade. O'Kelly considered the white quartzite stones to have originally been fixed to the near-vertical mound walls, and as a result of this, the restoration program fixed a wall of white quartzite stones and river cobbles to a steel-reinforced concrete retaining wall that surrounds the eastern section of the mound, including the area around the façade. This extremely obvious display of this section of the mound arguably contradicts the concept of restricting the visual access of the monument (Nash 2006). Moreover, a similar deposit was found around one of the entrances to Knowth. Eogan, the archaeologist responsible for excavating Knowth, considered the quartzite deposit to be a ritualized pavement (Eogan 1986: 47).

At the extreme east of the bend and standing on a short oval ridge, around 250 m east of the Boyne, is Knowth (Gaelic: *Cnobha*). The ovate-shaped mound measures 81 m by 95 m and is delineated by 127 decorated kerbstones. Unusually for the European passage grave tradition, there are two passages leading to two chambers (entered from the east and west), both discovered through excavation in 1967 and 1968 by George Eogan's team who originally started investigating the site in 1962 (The site was briefly investigated by R.A.S. Macalister in 1941). Surrounding the monument are at least 18 smaller satellite

Palace of the Boyne (Brú na Bóinne), Fig. 4 Mid-19th century engraving of Dowth prior to excavation in 1847 by W.F. Wakeman and published in his *Hand-book of Irish Antiquities* (1848)

passage tombs of varying shape and size (Eogan 1986). According to a useful synthesis by Cooney (2000: 83-5) based on investigations by Eogan and Roche (1997), the satellite monuments developed soon after the construction of Knowth, probably around 3,000 BCE.

The slightly ovate mound supports two diametrically opposed chamber and passage arrangements, one entering from the eastern side of the mound and the other from the west; both aligned on the March and September equinoxes (Eogan 1986: 178). The eastern chamber is cruciform in plan and is connected by a 35-m-long passage while the undifferentiated western chamber has a 32-m-long passage. Carved on much of the stone, including those surfaces that face inwards towards the mound, is an array of passage grave art. Archaeologists have also uncovered a white quartzite pavement around the eastern façade area as well as granodiorite, a phaneritic igneous rock found in other parts of the monument. The visual display of the rock art, the color symbolism of the quartz pavement, and other elements would have carried religious meaning.

Dowth (Gaelic: *Dudhadh*), the least-investigated of the three passage tombs, was probably constructed around 2,500 BCE (Fig. 4). The mound, measuring 85 m in diameter and standing over 15 m in height, sits on one of the highest points within the Bend of Boyne's landscape. From the top of the mound, there is clear intervisibility with Knowth and Newgrange. Similar to the other two passage tombs, the mound at Knowth is delineated by a series of kerbstones, some of which are engraved with passage tomb art. Within the vicinity of the entrance and façade is evidence of a white quartzite pavement. The mound was unceremoniously excavated in 1847 under the direction of county surveyor R.H. Frith (on behalf of the Royal Irish Academy), the result being much of the western section of the mound being completely removed, and no official records of the excavation were made. Before work commenced, a curious building known as the *gala music room* was demolished. This building had stood on the summit of Dowth since before 1775 (Harbison 2007) (present on Gabriel Beranger's copy of an engraving of 1775).

Constructing the Boyne Landscape

We are somewhat fortunate that two of the three giant passage tombs within the Bend of the Boyne have been excavated in recent times, both applying modern archaeological excavation techniques. Furthermore, and as a result of these recent excavations, there has been a number of useful discussions concerning their origin, use, demise, and the landscape in which they sit (Cooney 2000). There is a clear chronological development of the secular and ritual landscapes that commence from the Late Mesolithic/Early Neolithic through to the demise of the passage grave tradition during the Late Neolithic. This heavily ritualized landscape is later replaced by a subtle, less commanding landscape of the henge and enclosure. The use of the natural topography along with the physicality of the River Boyne clearly shows an intentionality to enclose a ritual landscape, possibly separating ritual from secular activity.

The monuments themselves appear to act as a catalyst for ritual and symbolic behavior, the landscape being the backdrop. Both the dead and the living would have each participated in the ritual in and around each monument, the dead as passive participants embarking on a journey to another world. While in the monument, probably the dead would have understood the rock art narrative on each of the kerbstones that faced inwards towards the mound, their realm, their art (Nash 2006). The audience located outside the monument, within the facade area, would have caught their last glimpse of the body as it entered the realm of the dead. The passages at Newgrange and Knowth slightly constrict in size in order to restrict the visual access to the ritual activity that would have occurred within the inner passage area, where much of the rock art is engraved, and also to the chamber. Limited archaeological evidence indicates that as the body passed through the passage to its temporary resting place – the chamber – the rock art would have played an integral role in legitimizing the activity within this part of the tomb. Accompanying the body would have been an array of engendered grave goods, some of them prestige items such as mace-heads and axes. These items, along with daily perishable commodities such as food, would have assisted in the successful transition between the liminal world where body has a name and face to a world where only the metaphysical remains can gain access. The ongoing use of each monument over time created an ancestral cult and embodied the legitimacy of each monument and the landscape in which they stand.

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► Europe: Paleolithic Art

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Paleoanthropology Society

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Basic Information and Major Impact

The Paleoanthropology Society was founded in 1991 and held its first annual meeting the following year.

It has twin goals: the first, to foster research which furthers understanding of human evolution and the second, to build an international community of researchers and interested individuals who enjoy collaboration and participation in the creation and advancement of such knowledge.

The society is built on the understanding that multiple factors – biological, behavioral, and environmental – must be taken into account to gain insight into how the human species evolved and that research best proceeds through the interaction of researchers in many disciplines. Biological anthropologists, archaeologists, geologists, paleontologists, and cognitive scientists, as well as other specialists have participated in and contributed to annual meetings which include both posters and oral presentations in nonconcurrent sessions. Abstracts for presentation are evaluated through peer review and submission instructions are included on the Society's open access web site, www.Paleoanthro.org.

The Society publishes an online electronic-only journal, *PaleoAnthro*, which is accessible free of charge through the Society's web site. The society meets annually, normally in alternate years, with the Society for American Archaeology and the American Association of Physical Anthropologists. Membership is open to all interested individuals, the majority of whom consist of graduate students and Ph.D. researchers both within and outside the United States. Annual dues and meeting registration fees are purposely kept low and income above expenses is used to subsidize participant meeting attendance. The Society is incorporated in Washington DC and is recognized under US law as a tax-exempt scientific organization.

Cross-References

► American Association of Physical Anthropologists (AAPA)
► Society for American Archaeology (SAA)

Further Reading

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Paleoart Studies: Scientific Methods

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Introduction

Most of the world's surviving paleoart (art-like productions of preliterate societies) occurs in the

form of rock art, which is found in nearly all countries of the world. Its study by scientific methods is a historically recent development, especially of the last three decades. In this short time the scientific methodology applied to rock art has evolved with the help of several disciplines. Foremost among these are nuclear physics, forensic science, geochemistry, geomorphology, conservation science, ethnography, and semiotics, but many others have also contributed. As a result a number of specific approaches have been developed. This emerging methodology is briefly defined here.

Because of the perceived need to integrate rock art in archaeological constructs or narratives, it has long been a high priority to ascertain its age. The archaeologically favored method, excavation, and age estimation of sediments concealing rock art have several limitations. Over the past 120 years, archaeological excavation has succeeded in only 21 instances in providing credible minimum antiquities by this method. The age of a sediment deposited after the creation of rock art can at best offer minimum ages, and these may be very conservative. Moreover, these determinations depend upon a chain of unfalsifiable deductive propositions: that the sediment has not been subjected to disturbance or redeposition, that the dating criterion actually relates to the event of deposition (e.g., charcoal may have been dislocated through turbation, quartz grains may have been displaced without exposure to light occurring), and that the dating method has yielded valid results (Bednarik 2001).

One of the rationales of the scientific approach in rock art research is to supplement this indirect dating method with direct methods, which are defined by direct physical relationships of art and dating criterion and the formulation of falsifiable propositions concerning this relationship.

Definition

The epistemology of rock art science requires that all propositions be rendered testable and that interpretations not be dependent upon etic assumptions in the absence of emic evidence. This narrows the range of admissible practices and methods, of which those listed below have so far been pursued. Ultimately, most are in some fashion reminiscent of the techniques of forensic science (Montelle 2009) (Fig. 1). This definition excludes, for instance, reliance on interpretations

Paleoart Studies: Scientific Methods, Fig. 1 Example of forensic work: determining the tools used in the creation of deep cupules in a cave (Ngrang Cave, Victoria, Australia; photo by Yann-Pierre Montelle)

of rock art (on what it supposedly depicts) and on etic taxonomies of it, such as those based on perceived styles or on the statistical treatment of nonrepresentative samples. Therefore, one of the pivotal principles in a scientific paradigm is to treat all rock art as taphonomic residue, whose quantitative properties are determined by taphonomic logic (Bednarik 1994a) rather than by the characteristics inherent in a living tradition.

Key Issues/Current Debates

The demand in direct dating of rock art for secure physical relationship between the rock art and the dating criterion is illustrated by the following example. The bulk radiocarbon content of rock paint residues is in most cases not an acceptable criterion, because all rock surfaces and surface deposits contain organic matter, as do all mineral accretions over or under petroglyphs. Such dates are only viable if they derive from materials sealed in by impervious deposits (silica or oxalate) or if the analyzed matter is identified at the object or molecular level. The latter condition has only been met once so far (Ponti & Sinibaldi 2005). The most reliable carbon dates are those from beeswax figures, followed by charcoal pictograms. Radiocarbon dates from paint residues dominated by mineral pigment are not credible, because the dating criterion's (carbon age of unknown matter, in this case) relationship to the age of the paint cannot be demonstrated.

The nano-stratigraphy of paint residues or mineral accretions is determined by microscopic excavation of very thin layers (Fig. 2), either for chemical analysis of strata or their radiometric dating (Bednarik 1979; Watchman 1992). It has been applied to ferromanganese accretions, carbonates, silicas, and oxalates, providing testable data for age estimation and other scientific information about rock art. Similarly, the analysis of the composition of, and inclusions in, paint residues (such as brush fibers and pollen; Cole & Watchman 1992) can provide a wide range of empirical information about rock paintings and of the circumstances of their production.

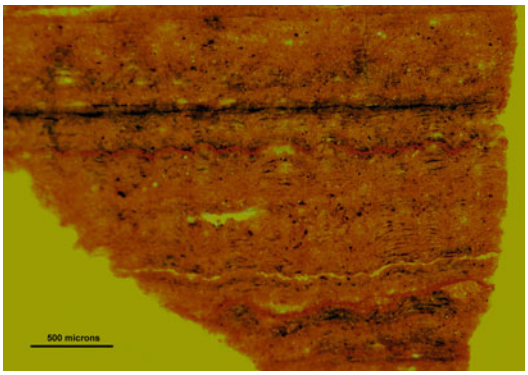

Paleoart Studies: Scientific Methods, Fig. 2 Nanostratigraphic section of mineral accretions of 2.11 mm thickness, containing several paint layers and spanning 26,000 radiocarbon years as determined by ten AMS dates from the section (Walkunder Arch Cave, Queensland, Australia; photo by Alan Watchman)

The most promising methods of determining the age of petroglyphs utilize variables of geomorphology providing sequential contexts. Each rock panel features numerous forensic traces of events and processes, some of which may be datable, and each rock art motif is situated within a chronological framework they provide. Exfoliation or spalling scars, macro-wanes, fissures, patination, weathering rinds, glacial striae, fluvial or marine wear, and fire or lightning damage are among these traces and need to be recorded, locating the rock art within their relative sequence. Some of these processes, such as rock surface retreat and microerosion, are amenable to quantification. The latter involves microscopic erosion criteria (Fig. 3), including the micro-wanes gradually forming on fracture edges of mineral crystals (Bednarik 1992) or the relative retreat of a more soluble rock constituent (such as the cement of sandstone). Both this dating method and the estimation of fluvial degree of erasure of low-grade metamorphics by suspended load in rivers (Bednarik 2009a) have been calibrated against sidereal time, providing sound approximations of petroglyph ages.

Another promising method is colorimetry of ferromanganese accretions on petroglyphs (Fig. 4). The gradual colonization of rock

Paleoart Studies: Scientific Methods, Fig. 3 Microerosion analysis at Penascosa, Côa valley, Portugal (photo by author)

Paleoart Studies: Scientific Methods, Fig. 4 Calibrated colorimetric study of differences in petroglyph patination indicating differences in age (Najd Sahī, Jabal al-Kaubab East, Saudi Arabia; photo by author)

surfaces by patina-forming matter appears to be a relatively constant and regular process as a function of time (Bednarik 2009b). The detection of splattered paint in sediment below rock painting panels or of mineral dust and fractured grains deriving from the production of petroglyphs seem comparatively less promising.

The technology of rock art – how it was made – is an important aspect of rock art science (Bednarik 1998). It proceeds primarily by forensic methods in tandem with replication studies and gestural research (biokinetics). Especially the intensive study of impact or abrasion marks in petroglyphs can lead to propositions about

Paleoart Studies: Scientific Methods, Fig. 5 Pothole surrounded by cupules and other petroglyphs (Bola Chanka, Santivanez petroglyph complex, Bolivia; photo by author)

technology that can then be subjected to testing by replicating the traces under controlled conditions. This can yield information about the tools used, the direction and energy of impact or abrasive action, and, in combination with spatial aspects and accessibility of rock panels, about the circumstances of production. Similar considerations apply to rock paintings, drawings, and stencils, albeit to a lesser degree. Replicative studies of considerable variety have been attempted, and they form one of the principal approaches of scientific rock art research.

The discrimination of anthropic from natural rock markings has engendered much confusion in the past. Particularly the separation of petroglyphs from numerous types of natural and even other humanly made rock markings resembling them requires specialist attention, notably when relatively simple markings are involved (Bednarik 1994b). Potholes, sandstone erosion pits, and solution scallops in caves have been mistaken for cupules (Fig. 5); animal scratches and other limestone cave features have been interpreted as cave petroglyphs; anthropic marks such as bulldozer scrapes, steel cable grooves and core drill circles were described as open-air petroglyphs; and natural coloration of rock surfaces as rock paintings; the latter was even radiocarbon dated in one case. This frequent confusion of natural rock markings with rock art is of concern because there is no value in treating such phenomena as rock art and then invent meanings for them.

Only a small proportion of surviving paleoart consists of portable material. Some of the methods specifically developed for this corpus, especially traceology (the microscopic study of abraded or incised marks), have been successfully adopted by rock art science; other technological analyses are specific to mobiliary paleoart. Traceology derives from "internal analysis" as developed by Marshack (1972) to examine suspected notations and other incised markings on Paleolithic portable objects. Besides its application to engraved plaques, microscopy also provides the most important analytical tool in the scientific study of beads, pendants, and figurines, and is crucial in the detection of fakes and misidentifications. This can include the identification of a wide variety of taphonomic markings, such as those acquired by transport or caused by plant rootlets. In the scientific analysis of portable paleoart, replication is again of particular importance (Bednarik 2001).

Future Directions

The recording of rock art has come a long way since the iconographic, interpretation-driven endeavors of the past. It now involves a rapidly evolving and complex methodology based on state-of-the-art technology (e.g., Plets et al. 2012). To be comprehensive and scientifically relevant it needs to provide not only the most accurate record of the rock art, but also of all other traces preserved on the rock panel (Soleilhavoup 1985). Such detail is required not only for realistic evaluation and empirically based interpretation but also for the purposes of conservation and preservation science. This field has since the 1980s advanced from a commonsense approach to a scientifically based discipline with its own extensive methodology (Rosenfeld 1985). It is also developing rapidly and is becoming increasingly important in view of the ongoing degradation of all of the world's rock art. Different conservation methodologies are being designed for open-air sites and deep cave sites, because the environmental constraints differ inherently between these two site types.

The scientific study of rock art draws heavily on many of the hard sciences, but it is a relatively new approach and remains in a comparatively embryonic state. Nevertheless, it has emerged as a discipline in its own right and is likely to develop in unexpected directions. Most of the work so far is much in need of refinement and standardization, and a sound epistemology is not sufficient to have a significant practical impact. It needs to be translated into new methods and approaches. Some of the most exciting recent developments are the endeavors to introduce scientific fields such as the cognitive and neurosciences. This approach is likely to center on the role of exograms, the memory traces stored outside the human brain. From a scientific perspective the most important aspect of paleoart is that it represents the only comprehensive and dependable source of information about the cognitive evolution of hominins. That potential has so far remained almost unexplored. This is one development suggesting that, rather than serving as a source of etic archaeological narrative, rock art and other paleoart need to serve a variety of other disciplines if their full research potential is to be realized.

Cross-References

- ▶ Age Estimation
- ▶ Australian Paleoart
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science
- ▶ Geoarchaeology
- ▶ Rock Art Sites: Management and Conservation

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Paleoentomology: Insects and Other Arthropods in Environmental Archaeology

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Introduction

Insects are the most diverse group of animals on the planet and as such are present in a wider variety of habitats than most other organism groups. This diversity, in addition to a long evolutionary history (Grimaldi & Engel 2005) and together with a propensity to be preserved in both desiccating and anaerobic environments, has provided an excellent tool for the reconstruction of both Quaternary and more immediate archaeological environments. Insect remains often provide proxy environmental information on the immediate context from which the fossils are derived and as such may either be complementary to the more regional picture provided by palynology or indicate site conditions, such as levels of hygiene and evidence of trading connections, which are rarely available from any other palaeoecological source. They therefore provide information on a broad range of habitats and conditions, on- and off-site, and, in addition, in appropriate contexts, also climate. Processing of samples is essentially simple, requiring readily available materials, yet is time-consuming, and identification of the usually disarticulated fragments (sclerites) requires diligence and patience and access to well-curated reference collections. Fortunately, abundant literature, computer software, and database tools now exist to aid in their interpretation.

Definition

Paleoentomology is the study of (sub)fossil insect remains, generally with an aim towards understanding environmental, climatic, and/or cultural conditions in the past, from both archaeological and off-site contexts. Just over half of the sites which have been investigated to this date (Fig. 1), which tally to over 1,000, are archaeological contexts. The remainder are Quaternary geological contexts or off-site stratigraphic sequences (Buckland & Buckland 2006; Elias 2010b). The application of paleoentomology to archaeology is sometimes referred to as archeoentomology. The method relies on the concept of species constancy, both in terms of detailed morphology and of habitat. Recent work has shown that for some species, at least the morphology holds at least as far back as the Miocene. For habitats, the assemblages associated with the oldest Paleolithic material in the British Isles that form sites along the Norfolk coast (Parfitt et al. 2010) are concordant with those from a modern boreal forest. By identifying the taxa present in a sediment sample, a picture can be built up of the environment represented in the sediment catchment. Archaeological contexts, however, may be

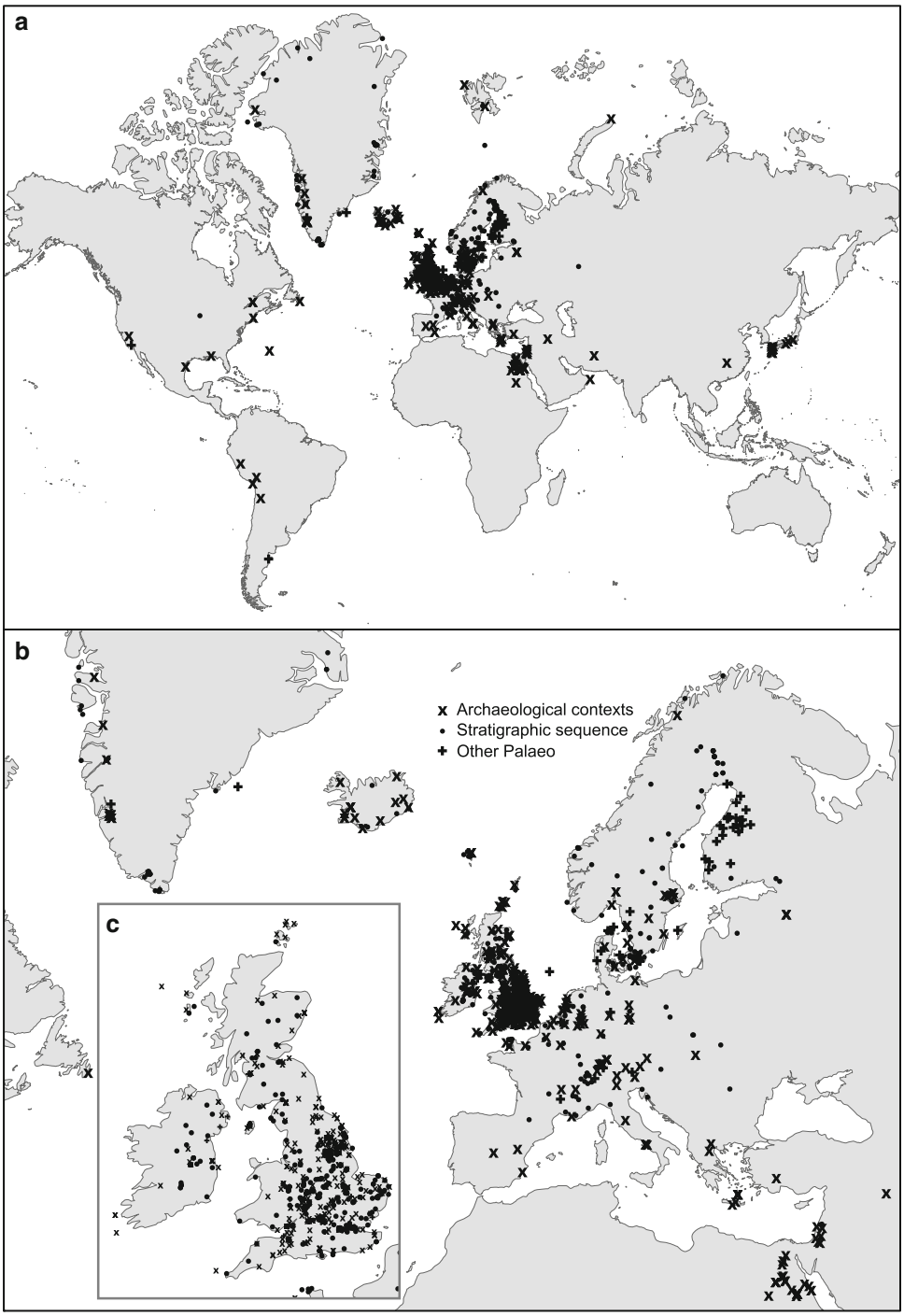

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 1 Map of the >1,000 paleoentomological investigations currently stored in the BugsCEP database (Buckland & Buckland 2006) (A) globally (B) around Europe and (C) Britain and Ireland. Symbols represent the primary research context of the investigation, although some sites have multiple profiles. Note that a number of extra-European (mainly North American, Russian, and Australasian) investigations are not currently stored in the BugsCEP database and so not shown on this map (see Elias 2010a for details)

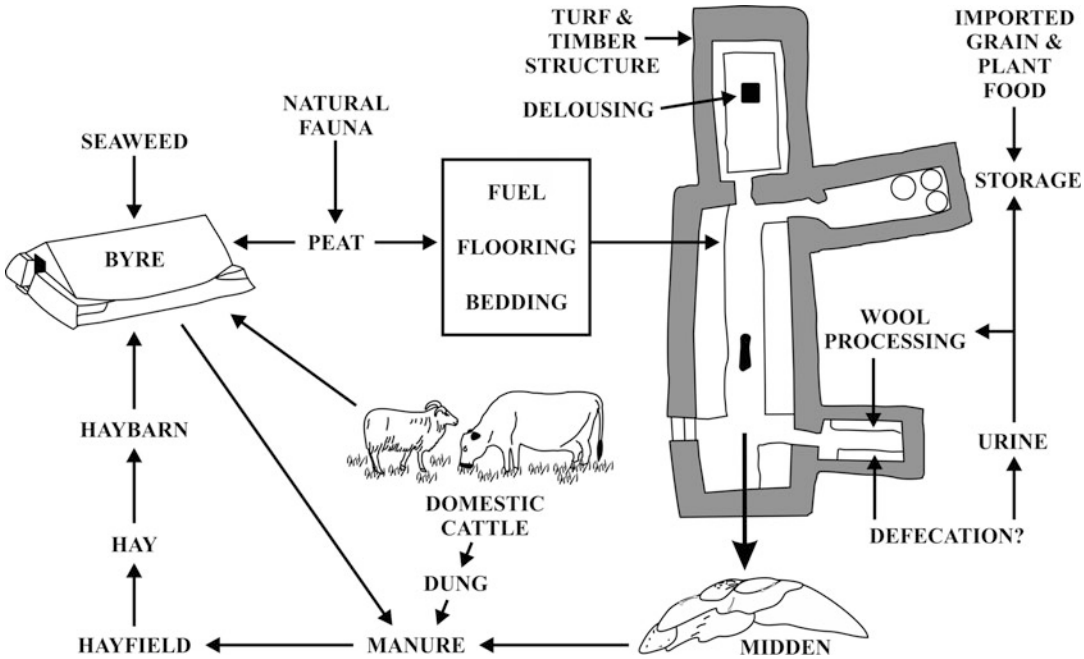

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 2 Insect evidence in a Norse Farm site. Arrows indicate potential movement of deposits containing insects or insect remains (Modified from Buckland et al. (2004))

dominated by insects accidentally incorporated from imported materials rather than those forming the autochthonous assemblage. Sample size varies depending on the faunal group and context being studied. A single cubic centimeter of lake sediment will often provide an interpretable chironomid (nonbiting midge) assemblage (e.g., Brooks et al. 2012), while Quaternary and archaeological sediments for a more diverse range of insets usually rely upon a 5 l sample, although this may be far too large for contexts particularly rich in insect remains, such as wells and cesspits (e.g., Kenward et al. 1986). Floor layers may be particularly difficult to interpret, and close integration with the other lines of evidence, particularly field archaeology, is essential. It may be assumed that the insects represent the results of activities in the room. Large numbers of ectoparasites, for example, may reflect both the traditional primate activity of delousing or, if of sheep, they might point to wool processing. In house floor faunas, the buildup of twigs, hay, and other materials used to make a habitable surface may introduce large number of fly puparia (with several species of beetle) that are able to exploit the artificially warmed environments created by humans and their domestic stock beyond their natural range. Such faunas die out rapidly when a site is abandoned (Panagiotakopulu et al. 2007). To a lesser extent, casual introductions into a room, for instance, species brought in as a result of human activities (e.g., in floor material, including fossil material in peat, in fodder, feces, and foodstuffs), may form the more interesting elements in site interpretation, and room and area use may be evident in the distribution of faunas across floors. The interpretation of such layers is far from simple, and a perfect picture of room use should never be expected from the complex web of faunal movements (Fig. 2). Taphonomic processes, such as bioturbation, decay, mixing, and redeposition, can complicate the picture further, and it is essential to use multiple lines of proxy evidence, particularly plant macrofossil,

sedimentological, and other geoarchaeological analyses. While the same samples can be utilized to provide material for most of these, it is useful to have multiple samples both to examine within context variation and to scan for additional identifiable fragments of rarer insect taxa; surplus material can always be disposed of at the end of a project, while resampling may be impossible.

Historical Background

The development of both Quaternary entomology and archeoentomology owes much to techniques developed by the late Russell Coope and Peter Osborne at the University of Birmingham, UK, where in the late 1950s, examination of samples from two Late Pleistocene sites in the English Midlands, Upton Warren, and Chelford indicated the potential of insect remains for reconstructing past climates and environments (Elias 2010b). This work built upon that of the Dane Kai Henriksen and the Swedish entomologist Carl Lindroth, although identification of insects from archaeological contexts had occasionally taken place over the previous century. The technique of water sieving over 300 μm, followed by paraffin (kerosene) flotation and sorting under a low power microscope, was summarized by Coope and Osborne (1968) in a paper on a Roman well, and this established the basic sample processing technique which has essentially remained unchanged to this day. The need for access to full reference collections – the UK beetle fauna alone has some 4,000 species including incidentals – somewhat restricts the wider application of archaeoentomology, and there are currently only some 30 active Quaternary entomologists globally, the majority of them based in Europe, although working internationally.

Since the earlier work on samples from archaeological contexts, particularly by Osborne and later Girling, Kenward, and Robinson, perhaps the most significant advancements in archaeoentomology have been related to closer integration with modern entomological studies, partly stemming from a *caveat* issued by Kenward (1975) concerning the interpretation of urban assemblages. This relates largely to the different questions asked of natural and more strictly anthropogenic assemblages, where in the latter case, the field archaeologist may want to know what has taken place on a particular spatio-temporal level rather than the slightly more regional picture on a broader time plane which a sample from an adjacent peatbog might provide. Attempts at habitat quantification, quantitative climate reconstruction (e.g., MCR – Atkinson et al. 1986), and taphonomic comparisons with modern pitfall and other assemblages (e.g., Smith 1999) have recently been integrated into database software (Buckland & Buckland 2006). The advent of readily accessible computing power, cheap and user-friendly statistics software, and database management systems has provided the basis for a more complex and detailed handling of the large amounts of numerical data which can be obtained from fossil and modern insect assemblages.

Key Issues/Current Debates

Methodology

Sampling in the field is, as always, best undertaken by individuals trained either in environmental archaeology or Quaternary studies. The ability to identify, describe, and sample closed contexts is imperative if a reliable interpretation of a site is to be obtained, and while this might seem less of a problem with the more mechanical process of coring lakes and peatbogs, effective logging of stratigraphy in the field often preludes later problems of interpretation. This applies as much to natural contexts as archaeological ones, particularly where the pace of environmental or climate change is singularly rapid, as for example, during the Late Glacial to Holocene transition, where transition from high-arctic to warm-temperate conditions takes place in less than a few decades and often defies the sampling interval. The ability of insect assemblages to describe phases of environmental change relies on samples representing as coherent a picture as possible, and large samples covering periods of rapid environmental change will inevitably

produce diffuse and less than illustrative results. On archaeological sites, where possible, excavation by single context provides the greatest utility for taking samples and providing the entomological results which are most useful during interpretation.

Fig. 3 shows how insect sample processing fits into the battery of biological proxy analysis methods typically used in archaeological investigations. After disaggregation in running water, followed by drainage of surplus water, liquid paraffin (called kerosene in North America and lysfotogen in Scandinavia) is added to the sample retained on the sieve and the material floated with water. This floatation technique has been shown to preferentially concentrate insect remains over the plant and mineral matrix of a washed sample. A standard sieve size of 300 μm is used, although 250 μm may be required where the retrieval of particularly small sclerites, such as those of chironomid larval head capsules, which have a size range of <0.3 mm, is required; normally, however, these would be recovered from separate subsamples of a few cc. The float is washed in a mild detergent to remove the paraffin and then transferred to a beaker of either distilled water or 70 % alcohol (Fig. 4). The latter has the advantages of increasing preservation times and a reduced surface tension when sorting, but disadvantages in terms of smell and evaporating more quickly. It should also be pointed out that paraffin floatation and alcohol storage should not be used if anything in the sample is to be used for radiocarbon dating. Insect sclerites are extracted into a tube of alcohol or water using forceps under a low power binocular microscope. Seeds, macroscopic charcoal, and other material which may aid in interpretation are routinely extracted by most practitioners at this stage, although it should be noted that some seeds, such as those of *Juncus*, will pass through a 300 μm mesh, and the abundance of plant remains may necessitate subsampling.

Techniques using water and kerosene are not appropriate to the recovery of insect remains from desiccated sediments, where wetting is likely to destroy the remains and gentle sieving with hand picking out of larger debris may precede sorting under a binocular microscope. Put simply, dry material has to be kept dry, while wet can be wetted, but any change between states is likely to be deleterious. This leads to a number of long-term preservation problems. Dry material can be stored in closed glass or plastic tubes, but even modern material kept in alcohol tends to bleach and decay over about a decade, and earlier work on fossils relied upon card mounting with gum tragacanth or similar adhesive. This often resulted in the distortion of the more fragile material, such as the elytra of aphodiine dung beetles, but the main problem was that as the amount of material being studied increased, it became impossible to mount everything. It seems probable that storage in slightly acidified distilled water may be the better way to preserve material, but the problems of longer-term preservation and deposition of fossil material have yet to be addressed.

Identification is undertaken by comparing the fossil parts (Fig. 5) with modern reference material (Fig. 6), illustrations, photographs, and through the use of identification keys. It is often advantageous to group fossils by shape on a piece of filter paper, which should be kept damp at all times to prevent sclerites drying up and fracturing. The currently available identification keys are almost entirely based on characters rarely recovered in a fossil context, such as antennal segment lengths, tarsal structure, or genital armatures. The latter have major significance in some genera and have occurred in Quaternary sediments sufficiently frequently to form the basis of major biogeographic and taxonomic studies. Published keys are often more useful for confirming characteristics after identification than the actual process, although Lindroth, because of his interest in the Quaternary fossil record, included comments on elytral microsculpture in his carabid keys. Due to the vast diversity of insects, it is not uncommon for specialists in several groups to cooperate or send specimens to acknowledged experts in particular taxonomic groups.

The stages described above are undoubtedly the most time-consuming part of insect analyses; 5 l of poorly humified peat may take over a week

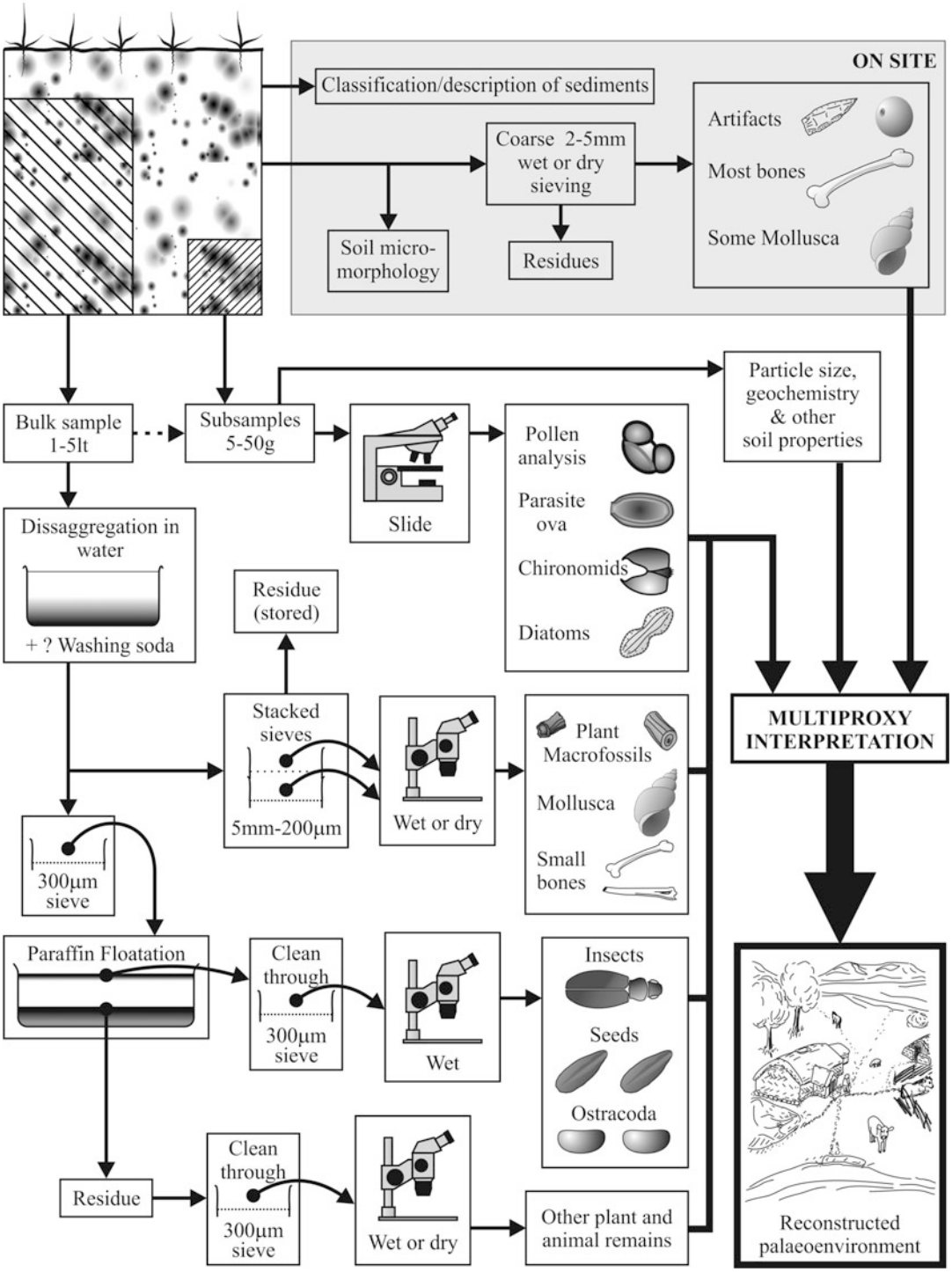

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 3 Paleoentomology is one of many biological proxy methods which can be used to investigate archaeological sites. Standard insect floatation method is illustrated, but variations may be applied to cater for particular sediments or other requirements (Modified from Buckland et al. (2004))

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 4 Fossil insect material as part of a float. A binocular microscope and forceps are used to extract the identifiable insect remains from the matrix of amorphous plant material

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 5 Fossil beetle parts (sclerites), primarily carabids (ground beetles), extracted and ready for identification. The sample is from a well excavated in Mårtensby, Vanda, Finland, and dendrochronologically dated to 1776/1777

to process, and samples from either remote islands or past and present arctic landscapes may be low in both diversity and numbers of individuals but nevertheless meriting detailed study. Taxonomic lists, correctly ordered against the relevant checklist, usually utilize the minimum number of individuals (MNI). Larvae of caddis flies, blackflies, chironomids, and other taxa where species may have several instars, each with recognizable fragments, are less clearly counted as individuals and are usually listed as numbers. Interpretation of the resulting species lists relies on a detailed knowledge of general ecology and biology as well as the specifics of individual insect species ecology. Naturally, for archaeological contexts, it also requires an understanding of cultural activities relevant to the investigation, knowledge of the excavation in question, and also any particular questions that the excavator thinks might be answered by study of the insect remains. Here again it needs to be stressed that the best results are obtained by on-site collaboration between field archaeologist and all the relevant paleoecological specialists, something which is as yet unfortunately rarely achieved.

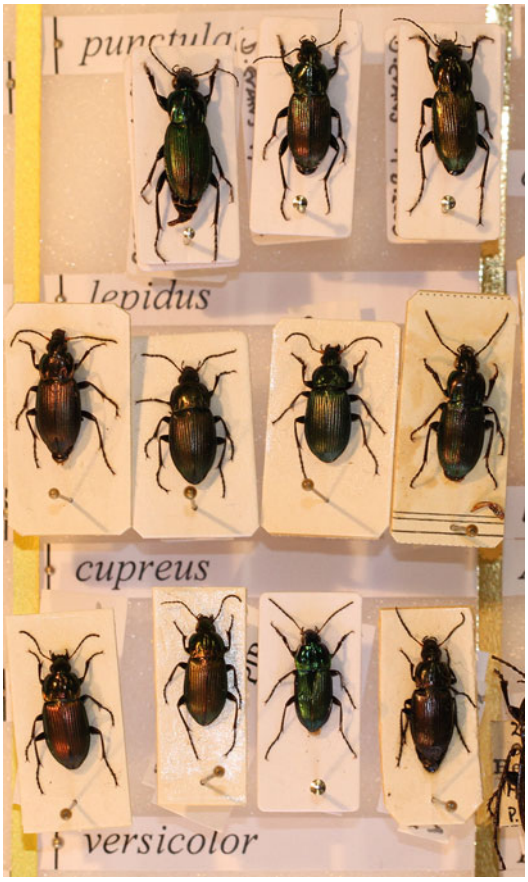

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 6 Reference collections consist of thousands of identified card or pin-mounted specimens. These collections take decades to establish and require curation and periodic treatment for pest infestations. Ironically enough, the pest species are common finds in archeoentomology

Insects in Archaeology

Although there were earlier studies, the first paper which effectively pointed out the potential of insects in archaeology was that of Peter Osborne in 1971. Here, in a study of a refuse pit in the small town of Alcester in the English Midlands, he showed that not only the baggage of Roman occupation included an extended fauna of pests of stored products, grain weevils, and the saw-toothed grain beetle but also a longhorn beetle, *Trichoferus fasciculatus*, whose modern distribution suggests that it had arrived in an imported piece of woodwork, presumably furniture from the Mediterranean. Since Osborne's pioneer study, much work has gone into tracking the origins and movement of stored product pests and has included research ranging from the Neolithic and Bronze Age eastern Mediterranean to post-Medieval Québec (Bain et al. 2009). The results extend beyond archaeology. Until Coope and Osborne's find of the saw-toothed grain beetle, *Oryzaephilus surinamensis*, in the Romano-British Barnsley Park well, most entomologists would have regarded the species as a recent introduction from the New World, as the name given by Linnaeus would suggest. Other biogeographic conundra have also been elucidated from the archaeological fossil record. Fleas are not infrequent finds in archaeological contexts, and the origin of the so-called human flea, *Pulex irritans*, as an ectoparasite of a New World rodent, the Guinea pig, has been considered. This work has more recently been followed up with DNA studies of fleas from South American mummies. Mummies have also frequently yielded head and body lice, and crab lice, *Pthirus pubis*, also reached the northern frontier of Rome, although its pre-Columbian occurrence in South America suggests that, like the other human lice, it was an early uninvited guest.

In an early taphonomic study, Osborne showed that the pests of stored products passed virtually unaltered through the human digestive system when accidentally consumed as the nutty bits in bread made from whole-wheat flour or in porridge. This, as well as Kenward's point that this equally applies to other omnivores and herbivores, has led to some reinterpretation of some deposits, like the Roman sewer in York, where proximity of granaries is replaced by the more prosaic presence of feces. Other species in the sewer, however, cannot have been consumed and the abundant small, stinging ant, *Hypoponera punctatissima*, therein again suggests an accidental import from warmer climes much further south, perhaps the Mediterranean; it has recently been found in a Late Medieval deposit in Coventry, Central England. Like the rice weevils from similarly dated deposits in Southampton, the insects indicate trading connections which might otherwise be unnoticed.

Moving away from the directly human, domestic animals may also be indicated by their ectoparasites. Dog, cat, and rat fleas are recorded from a number of sites; the more interesting of the last, *Xenopsylla cheopis*, the vector in bubonic plague, has yet to be found, although there has been interesting speculation on both its and the epidemic's origins (Panagiotakopulu 2004). The ked, a wingless parasitic fly which lives on sheep, and the fleece louse are not infrequent finds, although their presence is more likely to indicate wool processing than the animal itself. Its close relative, the deer ked, appears incidentally in the equipment of the Late Neolithic "man in the ice" from the Italian Tirol. There are a few records of goat and cattle lice, and it is worth noting that on sites with acidic sediments, such evidence from insect faunas may survive where animal bone does not. Buildings used to stall and stable animals may preserve other evidence than the rather infrequent ectoparasite in that fodder, litter, and manure have characteristic insect faunas. Stalling of cattle was deduced from the fly puparia associated with Neolithic structures in the Swiss Alps, and there is similar evidence from southern Sweden at Alvastra. The characteristic assemblage of species associated with hay stored as fodder was exported with Norse settlers across the North Atlantic, although interpretation is complicated by the use of peat and turf both as animal litter and for sod walls, which introduce elements from the natural fauna (Fig. 2). The origins of this essentially anthropogenic assemblage have been considered by Kenward and Allison. It extends into urban centers from the countryside, and much of the fauna was a feature of towns, before the demise of the horse as the main means of transport, the disappearance of the backyard pig, and the eclipse of meat supply on the hoof. A similar pattern of species emerges from sites as far apart as Novgorod, Oslo, York, and Dublin. Away from the cleaner areas of the fortress, Roman York looks little different from Anglo-Scandinavian York. In regions where urban origins go back much further, around the Mediterranean littoral or in the Near and Middle East, there is currently little evidence, and wells which would have acted as pitfalls for the local insect fauna would repay detailed study. The faunas from New Kingdom Amarna in Egypt, preserved by desiccation, hint at similar if much warmer conditions, with a mix of pests of stored products, probably derived from animal dung, ectoparasites, including bed bugs, flies, and fodder feeders.

While the immediate environment, reconstructed from insect remains, is perhaps of most significance to the field archaeologist, the regional picture which the insect evidence presents provides detail which is largely unavailable from other sources. Pollen may be interpreted in terms of forest composition in the broadest sense, although the extent of clearings, both natural and anthropogenic, in the woodland is often difficult to see. The insect fossil record for the early to mid-Holocene shows that after initial rapid warming to conditions slightly warmer, or at least more continental than present day, the development of closed forest was fairly rapid, if initially out of step with amelioration – it took time for the trees to catch up and beetles associated with decaying wood and its fungi appear long before their more usual hosts, a feature of the fact that it is the situation and state of decay which is more important to the insect than the tree species. A similar pattern is evident in the herbivore dung faunas, where situation is more important than species of origin. There are, however, among the deadwood fauna elements, such as many scolytids, bark beetles, which are more host specific and could have profound impact upon forest composition in both the Old and New Worlds. More has perhaps been written on *Scolytus scolytus*, the elm bark beetle, than any other insect in archaeology, and its occurrence has been lined with the widespread decline in elm which heralds the Neolithic. Whether human impact is needed is debatable, although increased stress on the forest as a result of domestic grazing pressure at a time of climate stress might be relevant. It is worth noting, however, that a catastrophic mid-Holocene decline in hemlock in North America has been similarly linked to an insect-borne pathogen. Whatever the cause, from the elm decline onwards, forest faunas come under increasing pressure as human impact

increases. Of the regional extirpations of species, most easily seen in the offshore island of Britain, roughly 80 % of the losses relate directly to the forest, and much of the remainder has some association with woodland. As woodland faunas decline, dung faunas increase, and species which are rare in the mid-Holocene become increasingly common; others are fresh introductions, some not seen since the more open landscape of the previous, slightly warmer interglacial, which with elephants, rhinoceros, and hippopotami was curiously lacking in humans in northern Europe. The extinction of the larger herbivores had a significant impact on the natural dung fauna, just as the disappearance of mammoth and wooly rhinoceros had on the colder fauna. While the frequent dung beetle in the middle of the last glaciation, *Aphodius holdereri*, found a refuge in yak dung on the high Tibetan Plateau, the one certain extinction from the Palearctic insect fauna is a botfly, *Coboldia rusanovae*, which was parasitic on mammoths.

BugsCEP Database and Software

The Bugs Coleopteran Ecology Package (BugsCEP; http://www.bugscep.com; Buckland & Buckland 2006) is currently the only freely available database for fossil and modern insect data.

It stores published raw data on the occurrence and abundance of individual taxa, as well as accompanying dating evidence, bibliographic and site metadata. The system also provides an extensive habitat database for most taxa, along with software tools for analysis, aiding interpretation and the identification of similar sites. Table 1 summarizes the contents of the database at the time of writing.

In addition to data browsers and retrieval tools, BugsCEP provides a number of software tools, as outlined in Table 2. These are designed to help in the interpretation of archaeological and natural environments and reduce the time and expertise required for a number of common data-intensive exercises, such as compiling list of habitats descriptions and references associated with the species found at a site.

Quantitative Habitat Reconstruction

Paleoentomology, as archaeobotany, has traditionally relied on qualitative or semiquantitative analysis of taxa. Indicator species and the subjective assessment of the relative ecological implications of taxa have led interpretation based on extensive knowledge of the relevant entomological sources. This is most likely a result of several factors, including a past lack of easily accessible computing power, an absence of relevant databases, the prevalence of small numbers of fossils in samples, and certain skepticism over the application of techniques from ecology to the inevitably more fragmentary fossil record. The subject has therefore lagged behind palynology in this respect, which has an active quantification community for many years, even if a considerable body of practitioners prefers to use simple and often misleading, percentage-based analyses.

A fossil insect assemblage retrieved from a sediment sample is in itself a sample of the population of the environment at the time of deposition. By the time a species list has been obtained, however, the sample has been subjected to a number of taphonomic processes which will have reduced its ability to fully represent that population. The representivity of the sample, and the resulting interpretation, depends on a number of factors, which collectively come under the banner of taphonomy. A number of studies have investigated sample representivity at both the individual species and assemblage/community level, and Kenward et al. in particular have looked at the concept of a "death assemblage" in comparison with living populations in environments useful to archaeology.

Modern Ecology Calibration Data

As insects are present in every terrestrial and freshwater environment, and many species are highly specialized in their ecological preferences, knowledge of arthropod ecology is essential when reconstructing past environments, climates, and human activities. Disturbances as a result of human activity can be reflected in the degree of openness and structure of woodlands and in turn may reflect the impact of grazing and land

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Table 1 Enumeration of the BugsCEP database (as of 27 May 2012), illustrating the nature and extent of the Quaternary fossil insect record. The database is being continually updated, and these figures are thus out of date. Refer to the current version of the database or its website for current information

Species related	
10,480	Taxa with 6,395 synonyms
777	Species association records (e.g., predator on and predated by)
1,747	UK Red Data Book rarity records (RDB)
9,057	Size attributes (minimum and maximum sizes)
400	Identification keys to families, genera, and species largely by Peter Skidmore, with some translations into English of French and German sources
Fossil record	
1,051	Sites
1,119	Abundance datasets, of which 552 are archaeological and 482 stratigraphic sequences
143,650	Fossil or modern record entries (finds of a particular taxa at a particular site)
1,228	Calendar-based dates – specific years or ranges of calendar years
	Ranging from CE 1995 to dendrochronological dates >5,000 BCE
5,824	Period date records – encompassing period types from archaeological to vegetation and geological, ranging from Pleistocene to Modern, and used where no more specific data are available
999	Radiometric dates – mainly radiocarbon but also uranium series, OSL, etc. Ranging from 370 to 167 500 BP
Bibliography	
4,781	References, of which 1,582 are the source of, or refer to, the abundance datasets
Ecology and climate reference data	
436	MCR species thermal envelopes (see Climate Change Studies below)
29,692	Habitat and ecology text abstracts
	Text concerning the habitat and ecology of a species as described by the cited author
30,263	Distribution text abstracts
	Distribution notes for a species from a cited author
8,565	Bugs ecology code assignments – classification of species according to a limited set of general habitats and used for rapid environmental reconstruction (see Quantitative Habitat Reconstruction below)
13,836	Koch ecology code assignments – classification of species according to an extensive set of habitat and ecology descriptions, based on Koch (1989–1992) with translation and additions (see Quantitative Habitat Reconstruction below)
9,865	UK adult activity month records

management practices, as well as more immediate on-site impacts. Work on modern analogues aims towards understanding how well insect assemblages characterize the surrounding environment, and work has focused on studying how well insects reflect forest structure and landscape openness. Beetles and true bugs (Coleoptera and Hemiptera) assemblages have been studied from a wide range of modern deposits with varying spatial relationships with respect to woodland and trees. Results indicate that a significant proportion of tree-associated beetles and bugs are to be expected within a woodland area and that the abundance of tree-associated species will indeed reduce with distance from woodland (Kenward 2006). Similar results are shown in studies in Finland on ground beetles (Carabidae) from pitfall traps along transects running from within a forested area to within open farmland. These concluded that forest ground beetles were abundant within the forest and right up to the forest edge, whereas the number of open-habitat species decreased drastically 5–10 m towards the forest edge. Buckland (2007) compared the Finish results using the environmental reconstruction facilities of the BugsCEP software (see above), demonstrating that the latter could be used as a tool for studying modern insect assemblages

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Table 2 The main tools provided by the BugsCEP software interface deliver the results of complex queries at the click of a mouse, reducing the need for complex query construction in database management software

Tool	Form, purpose, and results
Climate reconstruction	The BugsMCR module uses the MCR dataset (see Climate Change Studies below) to calculate the most probable thermal regimes represented by the species found in each sample at a site. Jackknifing may be applied to give an indication of the reliability of reconstructions, which generally are related to the number of species in the sample. The system can also be used to predict which other species could survive in the temperature range tolerated by any single species
Environmental reconstruction and statistics	The BugStats module uses the bugs ecology code system to quantitatively summarize the habitats represented by each sample at a site. The results can be expressed as bar charts (Fig. 7) or a text report, and a variety of pretreatment and standardizations can be applied to improve inter-sample comparability and aid interpretation. Correlation matrices may also be produced comparing the similarity of the assemblage of each sample with every other sample at a site
Search by habitat, distribution, and rarity	The database can be queried for a list of species preferring any single or combination of coded habitats or where any specified word is included in their habitat or distribution data. The UK RDB data (see Table 1) may also be queried in the same session, and logical operators are catered for. Results may be output as species lists or a list of sites containing the species retrieved

and environments in order to validate paleoentomological studies and Quaternary environmental reconstructions. When using arthropods to reconstruct the local environment, or the on-site conditions, it is important to understand the spatial representivity of the samples. This is especially important when sampling in natural contexts, or wells/refuse pits which act as pitfall traps, where the taxa found are often of natural (non-synanthropic) origin. Smith et al. (2010) examined the degree to which tree-associated beetles and pollen could be used to predict openness in woodland. They suggest that it is possible to use tree-associated beetles to assess the degree of local vegetation openness and the relative intensity of land use by grazing animals within a limited area, roughly within 100–200 m radius of the sampling site.

Climate Change Studies

Fossil beetles were among the first proxies used to identify the rapid nature of global warming at the end of the last Ice Age, later confirmed by ice core data. The most established method for climate reconstruction from fossil beetles is the mutual climatic range method (MCR) (cf. Atkinson et al. 1986), available with slight modification in the BugsCEP software (Buckland 2007). MCR is a mathematically simple modern analogue method, whereby the climate in which the majority of the species in a sample live today is considered the most probable climate represented by the fossils found together in a sample (see Elias 2010a for methodology). Unlike assemblage-based methods, MCR does not assume species communities and independently evaluates each species. It therefore avoids issues of non-analogue communities when reconstructing the climates of periods where community structures may have been different from any of those observable today, such as the mammoth steppe which is considered to have covered much of what are now northern temperate regions during the last glaciation.

The MCR calibration dataset includes the temperature requirements of 436 beetle species known fossil from northern Europe, based on several thousand point source and area distribution maps. There is therefore considerable room for expansion, especially taxa from more continental climates and Mediterranean regions. Beetle MCR results have been shown to slightly

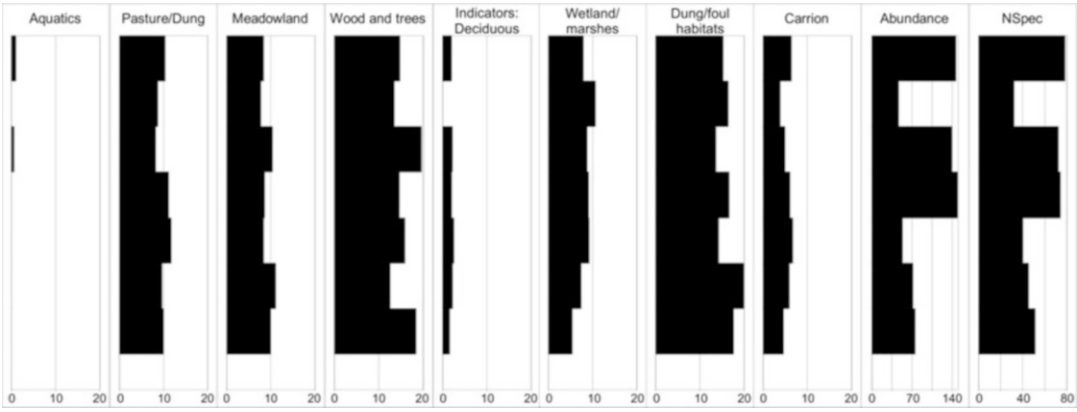

Paleoentomology: Insects and Other Arthropods in Environmental Archaeology, Fig. 7 Habitat diagram created by the BugStats module in the BugsCEP software, showing a sequence of samples taken from an eleventh-century ditch on the border of a deer park at Conisbrough, UK. Species richness data, standardized by sum of habitat indications (see Buckland 2007 details), illustrate the relative changes in surrounding environment represented by the fauna of each sample. Most of the 22 habitats have been omitted for clarity. The last two columns (SumRep, Abundance, and NSpec) show the total numbers of environmental indications, individuals and taxa in each samples, a factor which is negated through standardization, but useful information for evaluating the results. Note that the number of individuals is generally proportional to number of species in fossil assemblages just as it is for modern ones

underestimate extreme climates, and this may be a reflection of the limits of the calibration data.

There are a number of other insect-orientated climate reconstruction methods in use, and chironomid-based reconstructions have been used extensively (e.g., Brooks et al. 2012). A number of alternatives to MCR for beetles have also been investigated, and the reader is directed towards Elias (2010a) for an overview.

Future Directions

Paleoentomology can provide an enormous amount of detailed information from on and around archaeological sites, and it is hoped that its use will only increase in the future as more archaeologists realize this fact. User-friendly database software, online portals, and GIS technology will enable the volume and scope of the all-important reference data to be expanded, also increasing the relevance and applicability of insect data. Habitat summary data, modern environment calibration data, and MCR climate reference data are areas which could be expanded upon relatively easily, although the gathering of species collection data would be time-consuming. The paleoentomological community is, however, small and therefore of limited productivity even if the individuals themselves are not. Increased student recruitment is therefore essential, especially at the postgraduate level, if the community is to grow, and it is hoped that the integration and community-based growth of digital tools will help towards encouraging more students to continue to higher levels.

DNA-based studies, while no replacement for morphology-based identifications (e.g., Will & Rubinoff 2004), when used in combination with the methods described above, are likely to play an important role in studying long-term changes in biogeography. In particular, issues of faunal origins and the movement of pest species are likely to benefit from the molecular approach, especially with its ability to identify genetically similar populations. Parasitic insects may also prove useful as information stores for the DNA of parasites and thus advance the understanding of the spread of insect-borne diseases and past epidemics.

Although all proxy data sources can provide useful information, it has been suggested that the limits of single-proxy reconstructions are being

reached and that we gain less and less from each new investigation. If this is true, then multi-proxy integration is the way forward. With the databases now available for several proxies, and an increasing number of multi-proxy databases under construction, there is much scope for integrated environmental and climate reconstructions where the limits of one proxy may be strengthened by the advantages of another. A logical continuation of this would be the integration with an increasingly accessible range of external data sources for ecology, biodiversity, and perhaps soon ethnography and cultural history. Such inter-archive linking could greatly improve the speed with which basic quantifications and interpretations could be processed and thus leave more time for the more detailed qualitative interpretation of results and their implications.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)

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Paleoethnobotany

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Introduction and Definition

Paleoethnobotany is the study of behavioral and ecological interactions between past peoples and plants, documented through the analysis of pollen grains, charred seeds and wood, phytoliths, and residues (Ford 1979; Hastorf & Popper 1988; Warnock 1998; Pearsall 2000). It uses an ecological approach to elucidate the nature of human–plant interaction, seeking to understand not only which plants were used in construction and manufacturing, as food or fuel, in religious observation, or as medicines, but also how they were used and why some plants had such uses while others did not. It seeks to explore how the range of taxa present in an area and their season of availability structured settlement patterns and subsistence practices. It documents the effects that past human populations, cultures, or groups may have had on the distribution of particular plant taxa and their impacts on plant communities and the environment in general. Paleoethnobotany is not about simply cataloging which plants past peoples consumed but rather attempts to better understand the nature of plant–human interdependency.

Historical Background

Paleoethnobotany has its origins in ethnobotany, which, in general, refers to the scientific study and recording of the interrelationships between plants and people in both the present and the past (Cotton 1996). As such, the roots of ethnobotany can be traced back through time in the writings of the Ancient Greeks, the Chinese, the Egyptians, and all the way to Sumer and the origins of writing itself, where records of grain yields and lists of cultivated plants were inscribed in cuneiform. Stephen Powers, however, can be seen as the father of the modern discipline, publishing, in 1875, an article entitled *Aboriginal Botany*, which he defined as "all the forms of the vegetable world which the aborigines use for medicine, food, textile fabrics, ornaments, etc." (Powers 1875: 373). The term ethnobotany itself appears to have first been used by John Harshberger in a lecture he delivered in Pennsylvania in 1895, where he defined it to mean the study of plants used by aboriginal peoples. His subsequent 1896 publication, *The Purposes of Ethnobotany*, is generally accepted as heralding in the field of study (Harshberger 1896).

The term paleoethnobotany was introduced in 1959 by Danish botanist Hans Helbaek and defined as how ancient cultures used plants. He wrote that paleoethnobotany resulted from the joining of botany and archaeology, stating "it is

clear that any domesticated plant is an artifact, a product of human manipulation" (Helbaek 1959: 365). Helbaek's positions were reinforced by Jane Renfrew (1973: 1), who defined the discipline "…as the study of the remains of plants cultivated or utilized by man in ancient times, which have survived in archaeological contexts." Richard Ford (1979: 286) subsequently defined paleoethnobotany as "the analysis and interpretation of the *direct* interrelationships between humans and plants for whatever purpose as manifested in the archaeological record" (emphasis in original). Within the same article, he broadened the potential area of investigation by defining archaeobotany as "the study of plant remains derived from archaeological contexts" (Ford 1979: 299), breaking the previous bond between plants and human activity and allowing the incorporation of more ecologically oriented investigation. In the decades since, paleoethnobotany has moved toward a heuristic approach in which behavior and ecology have become intertwined, while the focus of research has moved away from the exploration of plant utility toward a more complete understanding of the reciprocal relationships between plants, people, and the socio-natural environments within which both are nested.

Perhaps the first paleoethnobotanical research occurred in Egypt with Giuseppe (Joseph) Passalacqua, who lead an excavation of ancient tombs at Deir el-Bahri on the west bank of the Nile, opposite Thebes (Luxor). Among the artifacts, he found dried plant remains, which he turned over to botanist C. Kunth, who reported the results of his analysis in Passalacqua's 1826 report (Passalacqua 1826). Paleoethnobotanical research subsequently spread beyond the arid lands of Egypt and into Europe – for example, botanist O. Heer analyzed plant remains from sites in Switzerland (Keller 1866) – and the Near East; in the latter area, a special emphasis was placed on studying the origins of agriculture, an emphasis that has continued through the years (Warnock 1998). Hans Helbaek, the originator of the term paleoethnobotany, was one of the leaders of this research, working both in the Near East and Europe (see especially Helbaek 1960). In addition to examining seeds and other plant fragments, he was one of the first to recognize the potential of phytolith research.

Research – and the number of researchers – in the New World trailed that of the Near East and Europe. Prior to the 1890s, the few paleoethnobotanical studies that were conducted were written mainly by botanists, whose interests lay in natural rather than cultural history. With the rise of anthropology and the training of ethnologists in the 1900s, research perspectives began to change. Botanists, aside from natural history, were primarily interested in determining how aboriginal knowledge of plant use could have utility in the modern world. The focus of anthropologists and ethnologists, on the other hand, was on the Native American perspective and how these plants were integrated into their world. David P. Barrows' (1900) dissertation exemplified this approach, stressing the social and religious importance of plants among the Coahuila of California.

But as with the Old World, there was considerable interest in the origins and spread of New World agriculture. Though much of the effort went toward discovering the origins and spread of the Mesoamerican derived crops of beans, squash, and especially corn (e.g., Mangelsdorf 1974), paleoethnobotanists were also interested in identifying and documenting the use of less well-known domesticates. Such research resulted in discovery of a range of such domesticates, including ragweed, pigweed, sunflower, and may grass in the eastern United States (e.g., Gilmore 1931), as well as agave, little barley, Mexican crucillo, and amaranth in the Southwest (e.g., Bohrer 1991).

Early attention to the relationships between New World plants and people also lead to the discovery that it was not just agricultural peoples who modified their environments. In his study of the plant use among Plains Indians, Gilmore (1919), for example, determined that groups often introduced plants from one region into another and set fires to eliminate native plants considered to be weeds, thus increasing the amounts of certain types of plants, particularly those with edible seeds or tubers. Gilmore subsequently went on to become the first head of the

University of Michigan's ethnobotanical laboratory established as part of the Museum of Anthropology. In this capacity, he solicited plant remains from archaeological sites across North America, thereby expanding both the scope and availability of paleoethnobotanical analysis in the New World.

The pace of paleoethnobotanical research quickened significantly in the 1960s. Texas A&M University paleoethnobotanist Vaughn Bryant, for example, has calculated that between 1876 and 1965, there were about 375 substantive works published on plant remains from New World archaeological sites; today, such works number in the thousands. Partially, this is a result of the development of New Archaeology and the concomitant increase in attention paid to ecological approaches to analysis and from the growth in archaeological research resulting from legal requirements and the rise of cultural resource management studies. But this increase is also partially technological. Faced with a pit filled with extremely ashy fill, archaeologist Stuart Struever followed the suggestion of botanist Hugh Cutler, and the technique now known as flotation was born. Flotation refers to the gentle agitation of a sediment sample in a water bath so that charcoal and other plant materials float to the surface, where they can be collected. Whether done with a bucket and screen or a stand-alone high-efficiency closed-system machine, flotation is seen as the single most important technological development in paleoethnobotany (Pearsall 2000) as it greatly enhances both the concentration and collection of botanical remains over the previous norm of the serendipitous discovery of a charred seed.

Key Issues

Plant remains collected from archaeological sites, whether during the course of excavation or through flotation, constitute what are referred to as macrobotanical remains. Though such remains have traditionally formed the bulk of paleoethnobotanical analysis, modern paleoethnobotany also incorporates microbotanical remains – chiefly pollen and phytoliths – as well as the chemical remnants of plants adhering to artifacts. All can provide data in regard to past human behavior, and several provide data on paleoenvironmental conditions as well.

As most uncharred seeds decay within a century or so, uncharred seeds are likely to be of recent origin. Consequently, unless dealing with recent sites, arid climates (such as in the Near East) or other situations in which plant remains are likely to be well preserved (e.g., submerged sites or caves), paleoethnobotanical research emphasizes analysis of charred materials. In the Near East, research has emphasized analysis of seeds and related plant parts as these are more germane to the historical interest in agricultural origins; analysis of (charred) wood has been rather more limited. In the New World, analysis of charcoal (charred wood) and seeds (which include nuts and similar plant parts) has been more equal. Analysis of macrobotanical remains routinely provides information in regard to plants cultivated, collected, and consumed as well as those used as fuel, in the construction of shelters, for making various types of tools and other artifacts and for medicinal purposes. Depending on context, such remains may also provide information in regard to religious observations. Further, their analysis can provide insight into plants that were growing in the area, as well as those derived through trade.

Palynology (the study of pollen grains) has a long history of use in paleoenvironmental reconstruction but also has considerable utility for paleoethnobotanical analyses. There are several characteristics of pollen grains that make them suitable for paleoethnobotanical (and paleoenvironmental) analysis. First, the amounts observed vary with the number and proximity of the source plants. Second, they are abundant, though the amount of pollen produced varies substantially from species to species – especially if comparing zoophilous (animal, chiefly insect, pollinated) to anemophilous (wind-pollinated) taxa – as well as from plant to plant. Third, pollen grains are durable; and fourth, they are morphologically distinctive. Finally, and of crucial

importance for paleoethnobotanical studies, their amounts are affected by human activity. Thus, in addition to its use in reconstructing past vegetation patterns and inferring past environmental conditions, pollen analysis, like macrobotanical analysis, is well suited to documenting plants cultivated, collected, consumed, or used in rituals. Further, palynology can provide data on plant use not available from the macrobotanical record.

In the American Southwest, for example, cholla cacti were a very important part of the prehistoric data but are seldom seen in the macrobotanical record as the desired product – flower buds – is unlikely to be preserved in that record. Instead, unusual frequencies of cholla pollen are required to document cholla use, as harvesting and processing of cholla flower buds often introduces relatively large numbers of cholla pollen into cultural settings. Systemic patterns in regard to the distribution and abundance of cholla pollen, and their deviance from those expected as a consequence of natural patterns of pollen production and dispersal, are used to identify unnatural occurrences of such pollen and evidence of resource use. As the quantity and quality of resource-use patterns accumulates, the ability to distinguish between those patterns associated with cultivation and those derived from collection may also become more apparent.

An important counterpart to pollen analysis is phytolith analysis. Phytoliths are microscopic silica bodies that form in many living plants, and these forms are often morphologically distinctive. Furthermore, different phytolith forms may occur in different parts of the plant. Phytoliths that form in the roots of corn plants, for example, are morphologically different from those that form elsewhere in these plants; this fact has proven helpful in identifying the location of prehistoric agricultural fields, particularly when such phytoliths are found in conjunction with anomalous amounts of corn pollen (e.g., Stuart 2008).

In contrast to pollen, phytoliths are not part of the plants' reproductive process and therefore are not dispersed into the environment in the same way as pollen. Instead, phytoliths enter an archaeological context through decay or burning of the source plant, or through a plants consumption and subsequent release (i.e., in coprolites or in soil from the abdominal area of a burial). Once deposited, phytoliths usually remain close to the point of deposition, though soil movement and formation processes may have an effect on final placement. As they are inorganic, phytoliths tend to be resistant to decay and therefore may be preserved in circumstances detrimental to organic preservation. Consequently, their study can be quite complementary to pollen analysis.

Organic residues include a broad range of materials, and though organic residue analysis is a relatively new technique to archaeology, the archaeological application of residue studies is growing rapidly (Barnard & Eerkens 2007). Organic residue analysis can also be seen as a component of paleoethnobotanical research as plant residues such as starch grains and proteins can be obtained from a wide range of artifacts. Starch grains are tiny granules that are the main energy source for plants. Some starch grains, called storage starch, are quite durable and continue to exist long after the plant itself has died and rotted away. In this regard, then, they are quite comparable to phytoliths. Starches may be recovered from soil samples or collected off of artifacts; the latter makes them particularly appropriate for assessing artifact use. As with starch grains, the use of an artifact to process some plant (or animal) resource will result in the transfer of protein from that resource onto the artifact, and some of that protein may remain preserved on the artifact. Even minute quantities of such protein can be identified, providing important insight into artifact use. Given the rapid advancement in the archaeological applications of organic residue studies, it seems likely that DNA analysis of plant residues will also soon be part of the paleoethnobotanists analytical repertoire.

Paleoethnobotany is well positioned to address a broad range of questions in regard to settlement and subsistence variability and human–environment interaction and impacts. Through paleoethnobotanical analysis, one can

address strategies for environment utilization, resource procurement and processing, and cultural–environmental relationships, impacts, and manipulations. A paleoethnobotanical assemblage dominated by cultivars and domesticates, for example, suggests a high degree of residential permanence, especially if combined with substantial aboveground and pit structures, storage facilities, and a site location with preference to arable land. By contrast, a paleoethnobotanical assemblage dominated by wild species, especially if accompanied by ephemeral structures and limited activity areas, suggests settlement mobility. Further, specialized activity areas such as prehistoric agricultural fields, with or without accompanying rock features, can be recognized by a combination of unusually high frequencies of pollen and phytoliths of weedy taxa with high incidences of pollen and phytoliths of cultivated plants.

Quantitative analyses of paleoethnobotanical remains can be expected to identify patterns of utilization and help determine relative emphasis on different subsistence strategies. The relative proportion of remains of domesticates and cultivated plants versus wild and collected plants allows the paleoethnobotanist to assess the relative importance of cultivated versus collected foods at any given site and how these reliances differ spatially and temporally. The relative abundance of such plant remains can also inform on occupational intensity. Further, differential distribution of floral (and faunal) remains within a site may reveal specialized activity loci, functional variability, sample bias, social hierarchy, or other variables. Additionally, identification of relationships between artifact types (e.g., spindle whorls) and plant resources (e.g., cotton or agave fibers) can be used to infer local production. And correlation of distribution patterns of botanical remains with those of faunal remains, stone tools, and vessel forms can be used to establish site/feature function.

Similarly, quantitative analysis of paleobotanical remains (i.e., plant remains from non-site or off-site contexts believed less intensively affected by human activity) allows documentation of diachronic and synchronic environmental variability and how such variability may have affected past subsistence and settlement systems. Such data also provides a baseline (or control) from which to identify behaviorally induced botanical patterns.

Chronology is often of archaeological concern. Paleoethnobotanical research can be instrumental in not only identifying those contexts most suitable for chronometric analysis but will also provide the most appropriate samples. Rather than use of wood for radiometric dating, with its well-documented limitations, the routine separation, identification, and tabulation of charred annuals – which forms the basis of flotation analysis – provides the ideal specimens for radiocarbon assays. Furthermore, pollen can and has been radiometrically dated (e.g., Stuart 2003), and pollen analysis would identify those samples most appropriate for dating.

Future Directions

While the incorporation of new techniques into the suite of available analyses is a welcome component of future paleoethnobotanical research, some modification of traditional approaches to paleoethnobotanical analysis would also be welcome. It is unfortunate that sampling procedures and quantification methods often vary from site to site and researcher to researcher, making direct comparison of results often difficult; a more unified approach to these topics would greatly enhance comparability of these results. Though these problems have long been known, a definitive means by which to address them has not been forthcoming and remains an important issue for future research.

At least as pressing a problem as sampling and quantification is the role of the paleoethnobotanist. Or more particularly, at what stage in a research project a paleoethnobotanist is included. Often, and especially with cultural resource management projects, samples are shipped off to paleoethnobotanists without their having been part of the original planning or excavation; indeed, often they are sent without

information in regard to the research questions and research design being included. Ideally, analysts (and not just paleoethnobotanists) should be involved in all aspects of the project, from formulation, planning, and identifying research questions through excavation, sampling, and sample selection. When involved in a project from the beginning and with greater knowledge of the goals of the project, the better can paleoethnobotanical data be integrated into the project and used to more clearly address questions posed in the research design. Indeed, if integrated into the project from the beginning, the paleoethnobotanist can help formulate and refine the research design and therefore contribute more directly to and facilitate achieving of the projects research goals.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Phytolith Studies in Archaeology

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Paleoindians

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Introduction

Paleoindian (also spelled Paleo-Indian, Palaeo-Indian), or literally "Old" or "Ancient" Indian, is a term widely employed to refer to the

archaeological record of the Americas dating to the Late Pleistocene to Early Holocene from as early as perhaps 11,500 ^{14}C years BP to as late as 8,000 years BP in some areas (13,500–8,800 calibrated years BP). The term is often used to distinguish this segment of the archaeological record from that of potentially earlier dating, "Pre-Clovis" peoples, and later-dating, Post-Paleoindian "Archaic" and other peoples. A basic distinction has often been made, particularly in North America, between "Early" Paleoindians (prior to c. 10,400–10,100 BP), who produced distinctive, flaked, lanceolate, stone point tips with grooved or fluted bases (see Fig. 1), and "Late" Paleoindians (after c.10,400–10,100 BP) who made unfluted lanceolate and stemmed points. Many different and finer Paleoindian regional/temporal subdivisions, variously referred to as cultures, complexes, industries, or phases, also have been suggested of which the earliest well-established and most widespread subdivision is Clovis, dated c. 11,000 ^{14}C years BP. Such distinctions have been made primarily on the basis of differences in the stone point assemblages although other, usually more subtle, differences in stone tool kits and production technology are present. For example, only Clovis Paleoindians seem to have employed a true blade technology.

Definition

The term Paleoindian was first used by Frank H. H. Roberts Jr. in the title of a 1940 paper. He did not define the term and only used it once in the text in the last line of that paper. Yet, it was clear that he was using the term in a general sense to refer to any archaeological evidence that existed at that time that seemed to be of considerable antiquity and thus had a bearing on when the Americas were first peopled. This evidence included the famous discoveries of the previous 13 years at sites like Folsom and Clovis, New Mexico, and Dent and Lindenmeier, Colorado (for a summary, see Wormington 1957), where the distinctive point tips and other exquisitely made stone artifacts had been found in Late Pleistocene contexts, often in kill sites in association with extinct megafauna such as mammoths and large bison species. However, Roberts (1940) also discussed sites that were apparently of some antiquity but yielded less well-made lithic assemblages that often included smaller, non-lanceolate point forms, cruder choppers and scrapers, and even, on occasion, grinding and milling stones.

Only rarely do current researchers use the term in Roberts' (1940) general sense. In most quarters the term has come to be used in more limited and specialized ways. In the 1950s there was an increasing tendency to restrict the usage of the term Paleoindian to assemblages that not only were of some antiquity but also could be separated out from later or even potentially earlier ones in terms of certain characteristics. Particularly stressed were characteristics of the archaeological record itself, such as the kinds of artifacts produced and distinctive aspects of the sites, or in terms of ideas about the lifeways (e.g., subsistence and economic practices) and other aspects of the cultural systems of these groups.

In terms of the artifact record, today's scholars stress the presence of the stone lanceolate or lance-shaped point tips and, particularly in some slightly later-dating assemblages in areas such as the Plains, Great Basin, and South America, stemmed forms – points with side or corner notches for hafting to the weapon shaft are absent; a stone tool kit dominated by more formalized, extensively retouched/resharpened tools such as bifaces, side scrapers, and hafted end scrapers; overall excellence in flint-knapping skill; the selection of only the highest grades of flakeable stone materials ("cryptocrystallines"); a tendency to transport toolstones over long distances; the use of standardized core reduction techniques including true blade industries in the earliest well-established Paleoindian development (e.g., "Clovis") as well as more generally the use of large biface cores; an absence of ground and polished stone tools; and, at least to some (e.g., Krieger 1964), an absence of food-grinding implements used in plant processing. To this list I would add the regular use of thick edges produced by the purposeful snapping or radial

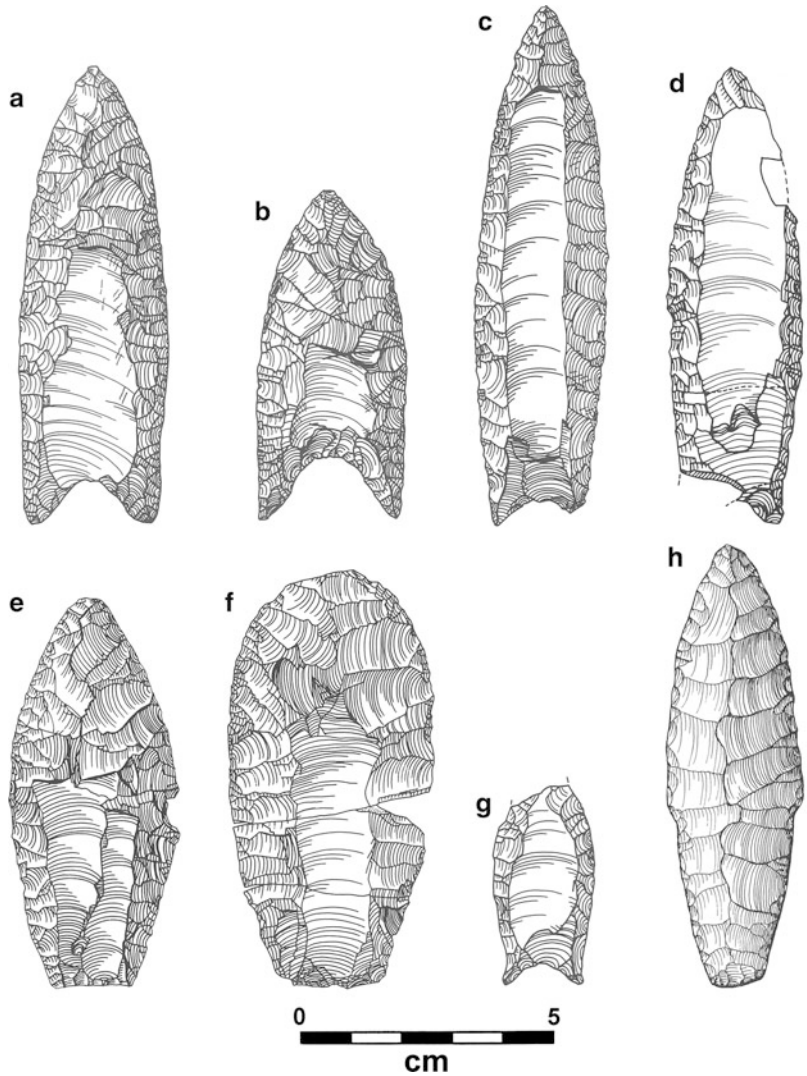

Paleoindians, Fig. 1 Paleoindian stone points and preforms from various sites in Northeastern North America. (**a**–**g**) Early Paleoindian fluted bifaces; (**h**) Late Paleoindian contracting stem biface (Drawings by Janie Ravenhurst and Ian T. Kenyon)

breakage of bifaces and flakes, the consistent presence of certain kinds of other distinctive artifacts such as large side scrapers and well-made needlelike micro-piercers and borers ("gravers") (Fig. 2) and, for some reason, a real absence or rarity of fire-cracked/broken rocks used in heating and cooking. The last named is a major contrast with subsequent Archaic and other sites.

Paleoindian sites themselves are seen to contrast with those of their later descendants in that they are rare and ephemeral with little evidence for substantial structures or other features. However, utilitarian, as well as apparently sacred, caches of stone artifacts are proving to be especially common (e.g., Deller et al. 2009). The sacred caches or offerings can be purposefully broken either by heating or by deliberate smashing (e.g., Fig. 3) and some are accompanied by red ochre. Where preservation is suitable, a very few of the sacred caches are accompanying burials but in other cases they are not. Using minimally the presence of the distinctive, well-made stone points as a defining characteristic, Paleoindian sites can be found throughout all of unglaciated North America of the time, both south of the ice sheets and in Alaska, all of

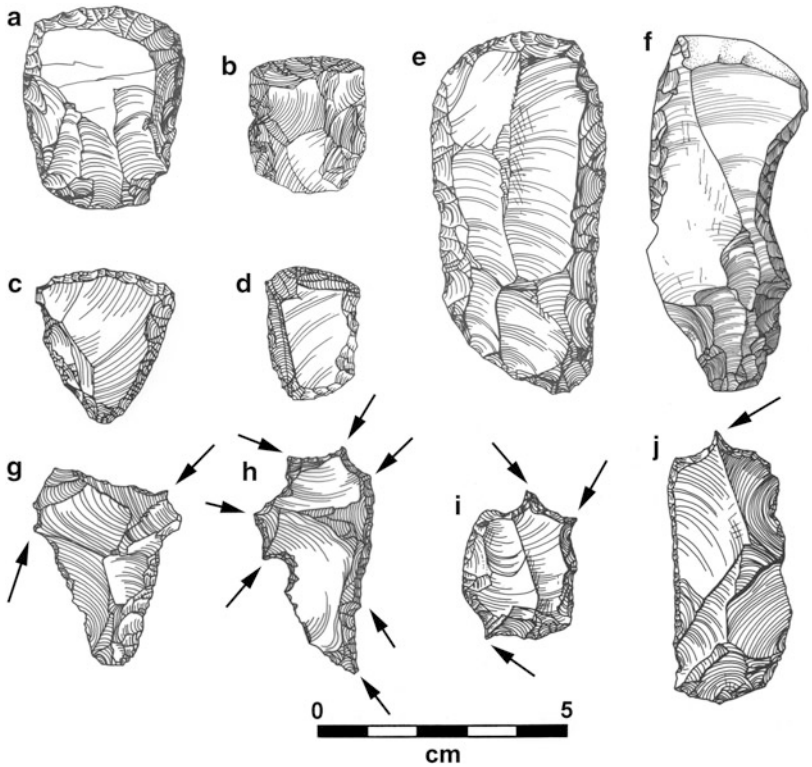

Paleoindians, Fig. 2 Paleoindian unifacial stone tools from various sites in the Province of Ontario and New York State. (**a**–**d**) Trianguloid end scrapers; (**e**) Large end and side scraper; (**f**) Double concave-convex side scraper; (**g**–**j**) Micro-piercers or gravers (*arrows* show spur locations) (Drawings by Janie Ravenhurst)

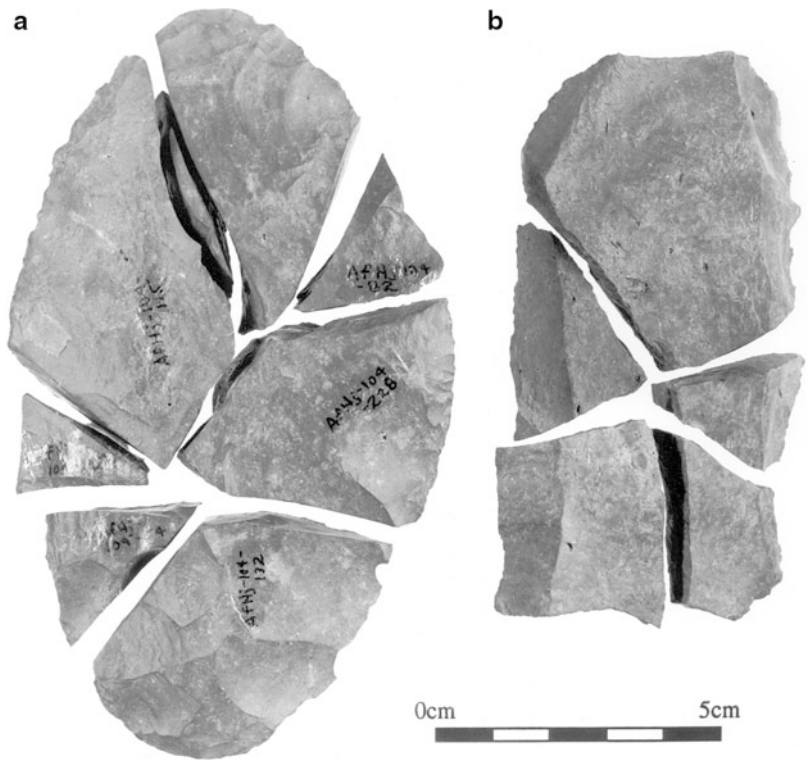

Paleoindians, Fig. 3 Biface (**a**) and large uniface (**b**) purposefully broken by radial breaks from Caradoc Site, Ontario, Canada

Central America, and, more spottily, in areas of South America such as the southern cone and northwest parts of that continent.

The small size and ephemeral nature of most sites, the use of exotic toolstones from distant sources, the employment of standardized core reduction techniques that some have interpreted as resulting in a more efficiently produced and portable tool kit, etc. have often led to the inference that Paleoindians lived in small groups and practiced a highly, mobile lifestyle, moving their camps frequently and over a large area annually. Such characteristics are frequently related to the arguments that Paleoindians were the first major occupants of the area, were involved in colonizing new regions, and lived at low population densities. Also, as the first reported sites in the Western USA were almost all kill sites of large game, along with an absence of food-grinding implements, it was often inferred that these peoples relied much more on hunting than did later groups such as those of the Archaic (e.g., Mason 1962; Krieger 1964). Some even went so far as to suggest or use alternative terms for Paleoindian such as "Early Hunter" or "Early American Hunters" to reflect this inferred lifestyle.

These definitions based on inferred cultural characteristics such as mobility and subsistence practices, while popular, have been and continue to be problematic, especially when applied at continental scales. For instance, many later Plains Paleoindian groups do not seem to have relied much on exotic stones nor on standardized, purportedly more portable, core forms like bifaces, suggesting they had a less mobile lifestyle (e.g., Bamforth 2002). Also, many have questioned the idea that Paleoindians were primarily big-game hunters, notably in areas such as the American Southeast, the Great Basin, or much of South America. In these cases, there often have been calls to abandon the use of the term Paleoindian to refer to these early peoples. In the Great Basin, for example, while some lithic assemblages seem technologically Paleoindian, settlement pattern data, paleoenvironmental data, and faunal recoveries suggest a broader resource focus leading to investigators calling certain assemblages "Paleoarchaic" (for discussion, see Madsen 2007). In South America, a lack of substantial evidence for a big-game hunting focus in many areas has led some to conclude that Paleoindian is a term that cannot be easily applied there and terms such as "proto-Archaic" have been suggested as alternatives (e.g., Dillehay 2000: 7-8). However, it is worth stressing that there is evidence that does suggest some of these early groups, such as Clovis in the Southwest USA, seem to have relied relatively heavily on larger game such as mammoths (Waguespack & Surovell 2003). Apparently the Paleoindian flaked stone technology was a very flexible one, capable of use in a wide range of subsistence and economic contexts.

Key Issues/Current Debates/Future Directions/Examples

Beyond the long-standing problems of the exact nature of their lifestyle/economic organization and of providing a rigorous, consistent definition, the use of the term "Paleoindian" itself also has become contentious. Some have suggested that these early peoples may have originated in areas such as western Europe rather than as, in the traditional view, east Asia/Siberia (see below). In addition, there have been studies of the limited early skeletal material that suggest the earliest peoples were morphologically different from more recent "Indian" populations. Hence, several recent scholars prefer the term "Paleoamerican" (Meltzer (2009: 175-6, 205) reviews these issues and in agreement with him, I am not impressed with their rationale). Also, the indigenous scholar Eldon Yellowhorn (2003: 62) has argued that the use of the term Paleoindian should be replaced with the term "Paleolithic" to achieve "the objective of placing Aboriginal peoples on an equal basis with other early peoples elsewhere in the World."

Perhaps the most contentious issue in Paleoindian studies concerns the origins of these peoples. The traditional view has been that Clovis Paleoindian peoples were the first inhabitants and this viewpoint is consistent with the widespread

distribution of the distinctive Clovis technology over a very large area. Moreover, in the traditional view, Clovis technology is very much like that of the Asian (and European) Upper Paleolithic, notably in the inclusion of a true blade industry, the inclusion of burins (albeit very rarely such that some dispute that the reported Clovis examples are actually purposeful burins), and of similarities in organic technologies including the production of shaft wrenches and cylindrical points having on one basal side a beveled surface incised with cross-hatched lines. The genetic and physical evidence could be and was used to argue specifically for an ultimate origin in the East Asian/Siberian Upper Paleolithic. However, some have argued that more unique aspects of the Clovis archaeological record, such as the production of large bifaces that are thinned by repetitive, stylized use of "overshot" flaking (e.g., large flake removals that are deliberately carried across the whole biface surface and actually detach a small area of the biface edge opposite the striking platform edge) or the caching of large bifaces, have closer analogs in the Upper Paleolithic of Europe, specifically in the Solutrean of Spain and France. This evidence leads them to argue for a European origin and that people crossed the north Atlantic Ocean along the edge of the ice sheets at the time to reach the Americas (Bradley & Stanford 2004). Needless to say, several scholars have objected to this idea, pointing out, among other things, that Solutrean material dates thousands of years earlier than Clovis and that all known Clovis biface caches are actually in western North America rather than in the presumed point of entry in the east (see Meltzer 2009: 185-8).

There have also long been claims of archaeological finds predating Clovis Paleoindian ones, finds that would undermine the "Clovis first" idea. Many of the earliest claimed sites were characterized by very simple flaked stone technologies that lacked stone projectile points and hence were often referred to a "Pre-Projectile Point" era (see Krieger 1964). However, the vast majority of those sites have been discredited or their status remains unclear. Yet, since the 1970s there have been increasing reports, albeit not undisputed, of Pre-Clovis assemblages dating c. 16,000–11,500 ^{14}C years BP window that do include points including lanceolate as well as smaller triangular forms and some sites are said to also include evidence of blade industries (for a recent summary, see Pitblado 2011) and even, in one case from Texas, the production of radial break and snapped edge tools (Waters et al. 2011). If so, then they might be plausible Clovis and other Paleoindian ancestors – the presence of these points and standardized core working would suggest they can be viewed favorably as Paleoindian per se rather than as simply "Pre-Clovis."

At a theoretical level, there has been a real tendency to explain the Paleoindian archaeological record in more materialist terms. For example, as hinted above there has been a preponderance of arguments that attempt to explain aspects of that record, such as technological characteristics, in terms of simply what Paleoindians were eating and/or how far and how often they moved across the landscape. However, as also indicated above, that viewpoint has become increasingly problematic or at the very least seems oversimplified – Paleoindian groups using similar technologies apparently had a diversity of subsistence and mobility practices. As such, and in line with more general theoretical trends within the discipline as a whole, there have been increasing calls for more people-centered approaches to interpretation that foreground more explicitly these peoples' beliefs, the construction of social identities, and more broadly their histories in order to understand why their archaeological record differs from that of other peoples (e.g., Ellis 2009).

Cross-References

- ▶ Clovis and Folsom, Indigenous Occupation Prior to
- ▶ North American Plains: Geography and Culture
- ▶ North American Terminal Pleistocene Extinctions: Current Views

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Paleolithic Archaeology of Wales: Overview

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Introduction

There are many caves in the Carboniferous Limestone bands that stretch across South Wales from Gower to Pembrokeshire and in Northeast Wales. Many of these caves have been used for human occupation in the past, and many of them have been investigated, either formally or informally, over the years. The results of this work enable a picture to be drawn together of a human presence in Wales dating back some 225,000 years.

Definition

The Paleolithic occupation of what is now Wales can be seen to span a time period from evolutionary early Neanderthals at Pontnewydd Cave, through evidence for a true Neanderthal presence at sites that include Coygan Cave to the arrival of evolutionary modern humans at Paviland Cave, Cathole Cave, and Ffynnon Beuno before the last Glacial maximum. Humans withdrew from Wales during the coldest time of the last Glacial to reappear when vegetation and a food source

had once again reestablished themselves during the post-Glacial period, around 12,600 BP. Their presence is not thought to have been continuous, there being a short gap in the sequence of evidence during the late Glacial Younger Dryas stadial event, with humans reappearing after a gap of around 1,000 years, never again to leave Wales.

Key Issues

Pontnewydd Cave, Denbighshire, defines the starting point for a human presence in Wales at around 225,000 BP (see Walker's EGA entry Pontnewydd Cave). Excavations at Pontnewydd Cave have recovered the remains of 16 hominin teeth and one tooth fragment. These represent a minimum of five evolutionary early Neanderthal individuals aged from 8½ years to mature adult. These hominins left behind over 1,284 stone tools, among which is a Levallois technology accompanying Acheulian bifaces and an associated faunal assemblage. The activity at the cave suggests the main hominin activity took place just outside the cave and that the people were expediently making use of local raw materials for their toolkits. There is no in situ evidence for these early Neanderthals' presence at the cave. The deposits have all been washed into the cave during a series of debris flow events that took place sometime just before the development of the stalagmite floor. It is this stalagmite and thermoluminescence from burnt flints that date the hominin occupation at Pontnewydd Cave at 225,000 BP (Fig. 1; Green 1984; Aldhouse-Green et al. 2012).

A number of single chance finds, some of uncertain or dubious provenance, make up much of the rest of the evidence for a lower Paleolithic presence in Wales. Among these are single bifaces from reliable provenances from Afon Marlais, Narberth, Pembrokeshire (Green & Walker 1991: 30-1), and Rhossili, Gower, Swansea (Fig. 2; Green 1981). The number of such finds is, however, small, and sites tend to be single spots where chance losses have been made. These do not provide reliable evidence

Paleolithic Archaeology of Wales: Overview, Fig. 1 The exterior of Pontnewydd Cave, Denbighshire. © National Museum of Wales

Paleolithic Archaeology of Wales: Overview, Fig. 2 Biface from Rhossili, Gower, Swansea. © National Museum of Wales

Paleolithic Archaeology of Wales: Overview, Fig. 3 The bifaces found at Coygan Cave, Laugharne, Carmarthenshire. © National Museum of Wales

for their dating but hint at what must have been a more extensive hominin presence in Wales than the single, well-excavated site of Pontnewydd Cave might suggest.

A true Neanderthal presence in Wales is indicated by finds made in excavations at just a small number of sites. The oldest of these is Coygan Cave, a site excavated at various times in the nineteenth and twentieth centuries. The site mainly contained a hyena den assemblage with a middle last Glacial fauna among which are the heavily gnawed remains of *Mammuthus primigenius, Coelodonta antiquitatis, Rangifer tarandus, Bison priscus*, and *Ursus arctos* (Aldhouse-Green et al. 1995). As well as hyena occupants, a human use of the cave is hinted at through the discovery of three *bout coupé* bifaces and three worked flakes. Two of these bifaces were seemingly cached, having been carefully left together beside the cave wall (Fig. 3). Perhaps it was the Neanderthal's intention to return to the cave to make future use of the tools (White & Jacobi 2002). The dating of the Neanderthal presence at Coygan is currently thought to lie between 66,000 and 38,000 BP, based on redating of associated faunal material by the late Roger Jacobi (*pers. comm.*).

Levallois flakes were discovered during the excavations ahead of the construction of the Second Severn Crossing at Sudbrook, Monmouthshire (Green 1989: 194-6). These also imply a Neanderthal presence in Wales; unfortunately, dating the Sudbrook assemblage is not possible due to the lack of a stratigraphic context for the finds.

Further hints at a Neanderthal presence can be seen in the presence of leaf points at two Welsh cave sites: Ffynnon Beuno, Tremeirchion, Denbighshire, and Paviland Cave, Gower, Swansea; there is also a chance find made away from the caves at Goldcliff, Monmouthshire (Jacobi & Higham 2010a: 186).

The arrival of evolutionary modern humans in Wales appears to have taken place sometime around 36,000 years ago based on dated parallels from elsewhere in the UK (Jacobi & Higham 2010a: 188). There are currently just two sites known from Wales where there is an Aurignacian presence. Paviland Cave, Gower, Swansea, contained the largest assemblage (see Walker's EGA entry Paviland Cave). Here, stone tools of diagnostic Aurignacian forms were found. The second site is Hoyle's Mouth Cave, Tenby, Pembrokeshire, from where a single Aurignacian burin busqué is recorded (Green & Walker 1990: 58).

An early Gravettian presence is demonstrated in Wales by the rich burial of a skeleton within Paviland Cave, Gower, Swansea (also known as Goat's Hole; Fig. 4). The burial has been redated to around 29,000 radiocarbon years BP by Jacobi and Higham (2008). The skeleton, known as the

Paleolithic Archaeology of Wales: Overview, Fig. 4 The exterior of Paviland Cave, Gower, Swansea. © National Museum of Wales

Paleolithic Archaeology of Wales: Overview, Fig. 5 A Cheddar point from Nanna's Cave, Caldey Island, Pembrokeshire. © National Museum of Wales

"Red Lady" of Paviland Cave, is that of a young adult male who was buried carefully in a grave with perforated shells, ivory rods, and bracelets. Red ocher was present in the burial (Aldhouse-Green 2000).

A later Gravettian activity is seen by the presence of tanged blades (or font Robert points), the dating of which may be around 28,000 radiocarbon years BP, based on parallels from the site of Maisières-Canal, Belgium (Jacobi & Higham 2010a: 210). These have been found in the assemblage from Paviland Cave and also Cathole Cave, Gower, Swansea, where the context is also not recorded (Garrod 1926: 66-7).

As would be expected, there is no clear evidence for a human presence in Wales during the height of the last Glacial and evidence provided by the recent work of Jacobi and Higham (2010a) has pushed the departure of humans from Wales further back than dating evidence from Paviland Cave had previously indicated (Aldhouse-Green 2000). That there was a hiatus in human presence in the country is to be expected, given the proximity of the ice that covered the majority of the country, just stopping short of covering the entirety of Wales.

New dating of bones from Sun Hole, Cheddar, Somerset, suggests that humans had returned to southern Britain by 12,600 BP and reached Wales soon afterward (Jacobi & Higham 2010b). The colonization of Britain at this period is thought to be at a time when wild horses were a key part of the fauna and which were very soon joined by red deer and wild cattle. The diversity of a large game fauna may have been the factor that enabled the Wales to be resettled at this time (Jacobi & Higham 2010b: 243). Lithic artifacts from Welsh caves that indicate a human presence are Cheddar points, end scrapers, burins, piercers, and retouched truncations (Fig. 5). The *en éperon*

Paleolithic Archaeology of Wales: Overview, Fig. 6 Penknife points from Priory Farm Cave, Pembroke, Pembrokeshire. © National Museum of Wales

butt preparation technique is also a distinctive indicator for tools of such age (Jacobi & Higham 2010b). In Wales, evidence for people of this date can be found at Paviland Cave, Gower, Swansea; Worm's Head Cave, Gower, Swansea; Hoyle's Mouth Cave, Tenby, Pembrokeshire; Nanna's Cave, Caldey Island, Pembrokeshire; Cathole Cave, Gower, Swansea; and Kendrick's Cave, Llandudno, Conwy. Few of these caves have been subject to full study and dating; most of the evidence available comes from the stone tools found during excavations at the sites.

Final Paleolithic sites are characterized by a technology dominated by the presence of penknife points, a tool not seen among the assemblage at Gough's Cave. The dating of sites with penknife points can now be attributed to a time between 11,800 and 10,800 BP (R.M. Jacobi *pers. comm.* 2005). Caves, including Priory Farm Cave, Pembroke, Pembrokeshire (Fig. 6), and Nanna's Cave and Potters Cave, Caldey Island, Pembrokeshire, all have these distinctive tools among their assemblages.

In Wales, the coldest part of the Younger Dryas started around 11,600 BP and lasted until c. 10,200 or 10,000 BP based on evidence for bare, stony ground from pollen cores taken at Llyn Gwernan, Ceredigion (J.J. Lowe & S. Lowe 2001: 147-8). During this period, the winter sea-ice margin lays just south of Strumble Head, Pembrokeshire. While much of the precipitation fell as snow, there would not have been a good snow cover on the ground because of the effect of very strong winds and the sparseness of the vegetation which prevented such cover developing (Isarin et al. 1998: 451). A consequence of this cold stadial was that people left Wales, only returning once the climate improved sufficiently to sustain life once again.

Cross-References

- ▶ Paleolithic Archaeology of Wales: Paviland Cave
- ▶ Paleolithic Archaeology of Wales: Pontnewydd Cave

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Paleolithic Archaeology of Wales: Paviland Cave

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Introduction

Paviland Cave (also known as Goat's Hole), Gower, Swansea, Wales, is a cave site with a long history of occupation both before the last Glacial maximum and again after it. The cave is famous for the excavation by William Buckland in 1823 of the skeleton of a young adult male with associated grave goods.

Definition

Paviland Cave lies on the southern coast of Gower in South Wales. The cave has been extensively excavated many times since the first discovery of finds within it in 1822. The most recent excavations took place there in 1996. The cave has become well known for the discovery of the skeleton known as the "Red Lady" of Paviland Cave which has been the focus of interest in the site since its discovery over 200 years ago. Now dated to c. 29,000 BP, the "Red Lady" can claim to be one of the oldest burials of an evolutionary modern human anywhere to have been associated with manufactured grave goods.

Key Issues

Excavations first took place in Paviland Cave in 1822 when two Roman coins and what were recorded as elephant bones were discovered in the cave (Fig. 1). Early in January 1823, Professor William Buckland visited the cave in the company of Miss Talbot and John Traherne. They undertook a day digging in the cave and the following day were joined by Lewis Weston Dillwyn of Swansea, during which time they recovered the remains of a partial skeleton which they initially took to be a customs man, thought to have been overcome by smugglers on the Gower coast. On February 15, 1823, Buckland announced the findings in a public lecture given in the Ashmolean Museum, Oxford. Later the same day Buckland wrote to Lady Mary Cole, the landowner, "the man whom we voted an exciseman, turns out to be a woman, whose history would afford ample matter for a Romance to be entitled the Red Woman or the Witch of Paviland – for some such personage she must have been" (letter from William Buckland to

Paleolithic Archaeology of Wales: Paviland Cave, Fig. 1 Paviland Cave, Gower, Swansea, Wales. © National Museum of Wales

Lady Mary Cole dated 15th February 1823 in the collection of the Department of Geology, National Museum of Wales NMW 84.20G. D167; North 1942: 108). The interpretation offered by Buckland was that this was the burial of a woman who had lived in the cave during Roman times and was associated with the camp on the hill above the cave (now known to be an Iron Age promontory fort). The grave goods included ivory bracelets, ivory rods, and perforated shells. The skeleton was also stained red with ocher, all of which led Buckland to infer that the skeleton was that of a female, a woman of loose morals. Buckland illustrated his description of his discoveries in the cave with a reconstruction of what the site might have been like before digging commenced within it (Fig. 2; Buckland 1823).

Since the discovery, the skeleton, now preserved in the collections of the Oxford University Museum of Natural History, has been subject to regular scrutiny and study, including direct dating on four occasions. The first date obtained by Kenneth Oakley in 1968 was of 18,460 ± 340 BP (BM-374; Powell 2000: 272) and caused some consternation, as it falls during the period when the ice would have been at its maximum during the last Glacial. Further dating was undertaken in 1989 on powder remaining from Oakley's date. This resulted in the more believable date of 26,350 ± 550 BP (OxA-1815; Powell 2000: 272). More recently, dates have been obtained on a rib fragment of 28,870 ± 180 BP and 28,400 ± 320 BP (OxA-412; OxA-16502) and on a scapula fragment 29,490 ± 210 BP and 28,820 ± 340 BP (OxA-16413; OxA-16503) (Jacobi & Higham 2008: 904, Table 8). This new dating places the skeleton in the early Gravettian at a time that correlates with a period of interstadial warmth, and as a burial, it is currently the oldest to be associated with manufactured grave goods (Jacobi & Higham 2010: 206).

Study of the skeleton by Trinkaus and Holliday (2000) concluded that the remains are that of a young adult male, aged in his mid-twenties at death. He was average in body size and generally relatively gracile for an early upper Paleolithic human (Fig. 3). The skeletal evidence shows no evidence for the cause of his death and his bones were generally very healthy. Stable isotope analysis of the "Red Lady" indicates a diet that had some marine content of around 10 %. The suggestion is that the individual was highly mobile and that marine foods were exploited opportunistically during his annual movement around the landscape, as opposed to indicating seasonal mobility between inland and coastal zones (Richards 2000).

The grave goods found and associated with the "Red Lady" burial include perforated shell beads of flat winkle, *Littorina littoralis*, of which Buckland recorded finding about "two handfuls" close to the part of the thigh bone where the pocket is usually worn. These may have been worn as beads or sewn onto clothing. The shells would have been available along the

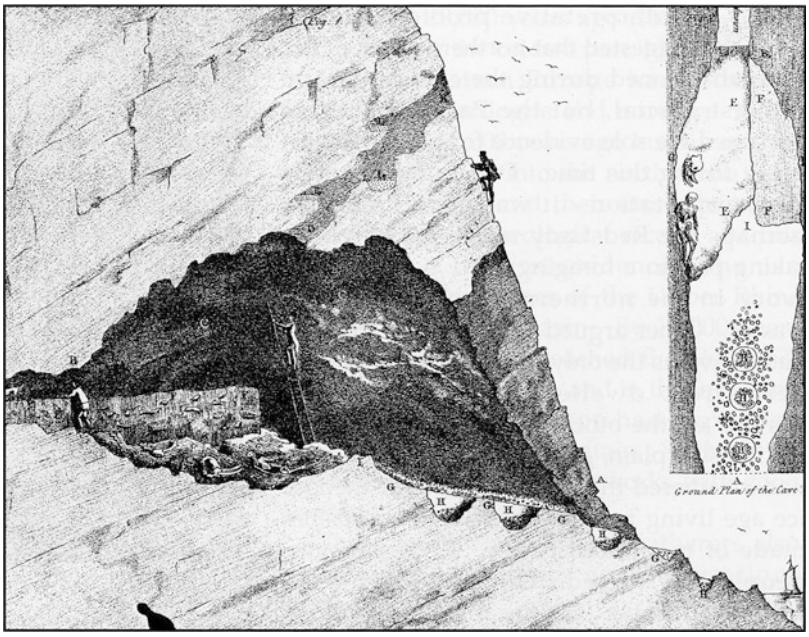

Paleolithic Archaeology of Wales: Paviland Cave, Fig. 2 William Buckland's 1823 reconstruction of the excavation of the "Red Lady." © National Museum of Wales

contemporary coastline (Aldhouse-Green 2000: 115). Ivory rods and bracelets were also found in the burial. Whether the rods were unused blanks for beads or, as Aldhouse-Green favors, as fragments of magical wands remains unclear. The bracelets are small in size and have been reinterpreted as possible talismans that were hung from clothing rather than for wearing on the wrist (Jacobi & Higham 2010: 204). The red staining of the bones, which has given the "Red Lady" his sobriquet, has been demonstrated to come from ocher, originating from locally obtained hematite that was deliberately emplaced within the grave. How the ocher came to be present remains unclear. The more probable of the theories include the possibilities that it was associated with preservation treatment of clothing or that it was sprinkled over the body in the grave. Parallels for the use of ocher in rich Gravettian burials can be found elsewhere in Europe and so this is not uncommon (Aldhouse-Green 2000: 239).

Paviland Cave, while often best known for the remains of the "Red Lady," also contained archaeological evidence of other occupations both within the pre- and post-last Glacial periods. Evidence for this comes mainly from the lithic artifacts, which have been subject to study by a number of researchers in recent years. The lithic finds were mainly recovered from excavations which took place in the cave in 1912 by Professor William Sollas. His excavations recovered over 4,000 lithic artifacts which today are split between the collections of the National Museum of Wales and the Ashmolean Museum, Oxford (Swainston & Brookes 2000: 31). Analysis of these collections has resulted in various interpretations. The most recent interpretation by Jacobi and Higham (2010: 215-16) suggests that there was a possible very late Neanderthal presence at the site evidenced by nine leaf points in the assemblage (Swainston 2000: 100). Dating at Paviland is hampered by the palimpsest nature of the assemblage, so dating of specific events is dependent on parallels drawn from other UK sites. For blade leaf points, Jacobi and Higham have drawn on the date from Badger Hole, Wookey Hole, Somerset, where a fragment of horse dentary bone, associated with a leaf point, provides a date of 36,000 ± 450 BP (OxA-11963; Jacobi & Higham 2010: 188). Other dates from hyena dentary fragments from Bench Quarry Tunnel, Brixham, Devon, and from Pin Hole, Creswell Crags, Derbyshire, are slightly older. An evolved Aurignacian presence is indicated by a number of key tool forms in the assemblage

Paleolithic Archaeology of Wales: Paviland Cave, Fig. 3 A cast of the "Red Lady" skeleton displayed in the National Museum Cardiff. © National Museum of Wales

including burin busqués and what is being termed the "Paviland burin" (Dinnis 2009). Dating of the Aurignacian occupation event is by association with dating for worked antler/bone points from Uphill Quarry, North Somerset; hyena den, Wookey Hole, Somerset; and Pin Hole, Creswell Crags, Derbyshire, all of which fall around 32,000 radiocarbon years BP (Jacobi & Higham 2010: 195). The burial of the "Red Lady" at around 29,000 radiocarbon years BP is a single event that took place in the very early Gravettian period. This was followed by a slightly later use demonstrated by the presence of tanged blades the dating of which may be around 28,000 radiocarbon years BP, based on parallels from the well-dated site of Maisières-Canal, Belgium (Swainston 2000: 108; Jacobi & Higham 2010: 210). A post-last Glacial lithic assemblage includes diagnostic tool forms such as backed blades, Cheddar points, a Creswell point, and a penknife point (Swainston 2000: 108-9). These might suggest a use of the site between around 12,600 BP and 11,600 BP.

As well as the lithic artifacts, many large mammal bones were recovered during the excavations at the cave. These are also difficult to date with any certainty other than by direct dating through AMS radiocarbon techniques. The Aldhouse-Green report resulted in some 46 dates being generated on species including *Cervus elaphus, Ursus arctos, Crocuta crocuta, Rangifer tarandus, Mammuthus primigenius, Canis lupus, Equus ferus, Coelodonta antiquitatis, Bison priscus*, and *Megaloceros giganteus* (Pettitt 2000: 64). Several of these dates have now been questioned, following the introduction of ultrafiltration for dating samples, so while it is possible to say with certainty that bones of these species have been found within the deposits of Paviland Cave, their dating is considered to be less accurate than was the case at the time of their publication in 2000 (Jacobi & Higham 2010: 172).

Paviland Cave is therefore demonstrated to be one of the most significant sites of Paleolithic age in Wales. It has the longest recorded sequence of events, which can be elucidated from the lithic and dating records. The discovery of what remains the only formal burial of Gravettian age from the UK also adds to the importance of the discoveries made at this site.

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Paleolithic Archaeology of Wales: Pontnewydd Cave

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Introduction

Pontnewydd Cave, Denbighshire, Wales, contains a unique early Neanderthal site on the northwesternmost edge of the known Paleolithic world. This cave site is unusual having survived in an area that has experienced a series of glaciations since early hominins made use of the cave 225,000 years ago. As such it makes a significant addition to the limited number of fossil hominin remains so far discovered in the United Kingdom.

Definition

Evolutionary early Neanderthal fossils, associated stone tools, and a contemporary faunal assemblage have all been excavated from deposits within Pontnewydd Cave. Dating back to around 225,000 BP during marine isotope stage 7 (MIS 7), the deposits are not in situ but washed into the cave during debris or mudflows.

Key Issues

Pontnewydd Cave in the Elwy Valley in Denbighshire, northeast Wales, provides evidence for the earliest hominin occupation of Wales. The cave was first mentioned by Reverend Edward Stanley in 1832 who described visiting it when the road was being constructed that today runs downhill from Cefn Meiriadog to Bont Newydd in the valley bottom (Stanley 1832: 42). Stanley described the cave as having great potential, as it was entirely blocked up with soil which might contain important new organic remains. William Boyd Dawkins, Mrs. Williams Wynn, and the Reverend D. R. Thomas, Vicar of Cefn, are the first people recorded to have investigated Pontnewydd Cave at a date sometime prior to 1874. The exact dates and the extent of their excavations are not recorded, but it seems these were extensive as Thomas McKenny Hughes and the Reverend Thomas, who published their own investigations of the cave in 1874, noted that the deposits had already been removed from the first 25 yards into the cave from the entrance (Hughes & Thomas 1874: 388). McKenny Hughes' work revealed a series of crude stone and flint tools, a faunal assemblage which he recorded as including *Hyaena spelaea,*

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 1 Pontnewydd Cave, Denbighshire, Wales (© National Museum of Wales)

Ursus spelaeus, Ursus ferox, Equus caballus, Rhinoceros hemitoechus, Cervus elaphus, Capreolus capreolus, Canis lupus, Canis vulpes, Meles taxus, and *Homo sapiens*. The human tooth was sent to George Busk for identification, and it was he who recognized it as being larger than any human tooth he had previously seen (ibid: 390). Today, this tooth is currently unlocated, although the stone tools survive in the collection of the Sedgwick Museum of Geology in Cambridge, UK.

The cave was largely left untouched until 1940 when it was requisitioned for wartime use as a store for land mines and depth charges, during which time the floor was leveled and covered with gravel over which duckboards were placed. Spoil from this work was placed outside the cave entrance, and the entrance was faced with limestone blocks to camouflage it against possible enemy attack (Fig. 1; Green 1984: 19).

In 1978, Stephen Aldhouse-Green, then working for the National Museum of Wales, commenced a research project at Pontnewydd Cave that was to last until 1995 involving some fourteen seasons of excavation. An interim report was published in 1984 (Green 1984), and a final monograph will be published during 2012 (Aldhouse-Green et al. 2012). This work has led to the discovery of some significant new observations at this cave.

The stratigraphic sequence within the cave comprises a lower sands and gravel deposit derived from glacial sediments and brought into the cave in debris flow events. This is overlain by an upper sands and gravel deposit of the same origin. An intermediate complex suggests a temperate stage when soils provided organic matter and stalagmite growth could take place. These sediments contain limestone debris as well as animal bones, some hominin fossils, and stone tools. The overlying lower breccia was formed by a major debris flow event entering the cave which caused disruption to underlying deposits and contained a higher limestone component from the vicinity of the cave. Overlying this was a stalagmite floor with water-lain silt beds formed by water pooling within the cave. A further debris flow event emplaced the upper breccia during MIS 3. This event channeled the lower breccia and intervening deposits reworking them into this deposit. A red cave earth and upper clays and sands overlie the upper breccia, neither containing any archaeological material (Fig. 2). In 1987, a second entrance was uncovered on the hillside outside the cave. This was excavated in order to record the stratigraphic sequence and was found to be approximately 5 m deep. The sequence of deposits has been correlated with those excavated from within the cave and the lower contexts also generated a similar suite of stone tools, animal bones, and one hominin tooth.

One of the first discoveries to be made during recent excavations at the cave in 1980 was a hominin tooth, PN1, a left upper second molar which displays characteristic features of taurodontism (an enlarged pulp cavity and coalesced roots) (Fig. 3). Study of this tooth led to the assertion that Pontnewydd Cave had been used by early Neanderthals (Green 1981). Further hominin finds discovered at the cave have resulted in a total of 16 teeth and 1 tooth fragment confirmed as early Neanderthal in origin (a further metapodial PN14, vertebra PN3, mandible PN2, and a lower right second molar PN8 are now believed to be of Holocene date, due to direct dating, or originating from disturbed contexts

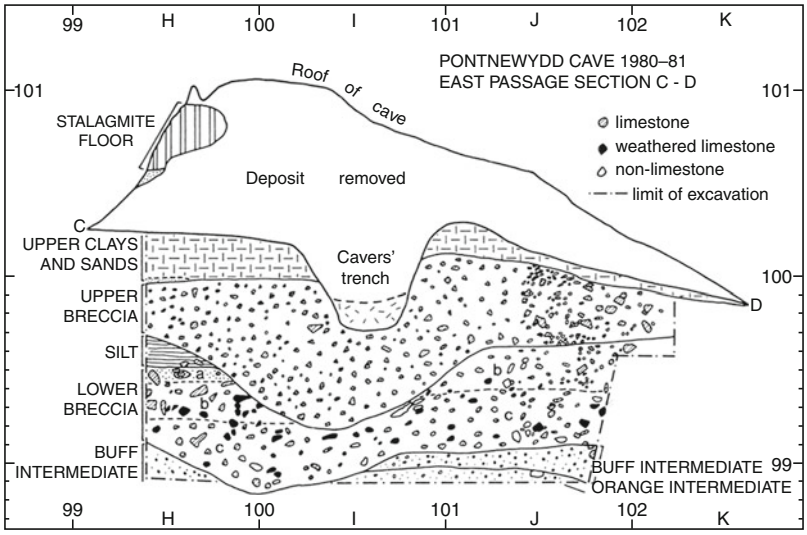

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 2 The main section through the cave deposits at Pontnewydd Cave (© National Museum of Wales)

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 3 Molar PN1 displaying features of taurodontism (© National Museum of Wales)

(Aldhouse-Green et al. 1996)). Recent study of the Neanderthal fossil hominins suggests that they represent a minimum of five individuals comprising an 8.5-year-old male, a 9-year-old female, an 11–11.5-year-old male, a young adult male (14–16 years), and a mature adult male. The maximum possible number of individuals represented is 16: 9 juveniles/adolescents and 7 adults. The teeth are predominantly single teeth and mostly have crowns; although a few teeth have roots, many do not. Two teeth are still in position in a right maxillary fragment. These are the remains of the 9-year-old female. What is particularly interesting about this individual is that the maxilla contains a heavily worn upper fourth deciduous premolar and a lightly worn upper first molar (Fig. 4). Comparisons have been made with other well-excavated and well-studied early Neanderthal populations from elsewhere in Europe. The sites of Krapina, Croatia, and the Sima de los Huesos (SH) site at Atapuerca, Spain, have some of the closest parallels to the Pontnewydd Cave teeth. Detailed study has been undertaken of the many different dental traits and their comparisons across these and other assemblages of similar and different ages in work done by Compton and Stringer (2012).

As well as hominin fossils, the excavations at Pontnewydd Cave generated a substantial stone tool assemblage. Some 1,284 stone tools were recovered and study of the character and taphonomy of the artifact assemblage suggests that the main hominin occupation took place just outside the modern cave system. The raw materials used

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 4 PN4, the maxilla fragment of a child aged approximately 9 years old. The worn deciduous premolar sits alongside a permanent first molar (© National Museum of Wales)

Paleolithic Archaeology of Wales: Pontnewydd Cave, Fig. 5 Stone tools discovered during excavations at Pontnewydd Cave (© National Museum of Wales)

to make the tools are predominantly hard volcanic rocks with just a small number of flint. The dominant raw materials are ignimbrite and rhyolite as well as a variety of volcanic tuffs. The resulting stone tools are consequently very crude in appearance, the nonconchoidal fracturing of such rocks resulting in laminar fractures and irregular forms. The majority of the raw materials used were available locally and need not have been transported far. Many different debris flow movements have moved artifacts from their original sites of deposition. The assemblage is technologically very consistent and may represent a single extended phase of occupation, or possibly a palimpsest of short occupations. Tool forms include Acheulian bifaces as well as a Levallois technology of prepared cores, flakes, and blades. Retouched tools include scrapers, knives, and denticulates (Fig. 5). There is no human occupation associated with the MIS 3 fauna in the upper breccia debris flow event.

The faunal assemblage from Pontnewydd Cave has been studied by Andrew Currant of the Natural History Museum, London. The species list for the MIS 7 contexts comprises *Canis lupus, Ursus* sp., *Panthera pardus, Panthera leo, Equus* sp., *Stephanorhinus kirchbergensis, Stephanorhinus hemitoechus, Cervus elaphus, Castor fiber, Arvicola cantiana, Arvicola* sp., *Microtus gregalis*, and birds. The MIS 3 context species list comprises: *Canis lupus, Vulpes vulpes, Ursus arctos, Equus ferus, Rangifer tarandus, Ovibos moschatus, Dicrostonyx torquatus*, and *Lepus timidus*. The assemblage from the intermediate complex and the lower breccia are deemed to be of MIS 7 age with a later MIS 3 faunal accumulation from the upper breccia.

The final report, published in 2012, draws together the information gleaned by these studies and puts them into full context.

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Paleonutrition and Bioarchaeology: Ethical Perspectives

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Introduction

The development of bioarchaeology through the study of ancient populations at large and their contextual data in particular has contributed to the emergence of many subdisciplines, for example, paleonutrition, paleopathology, paleoparasitology, paleoepidemiology, and palaeogenetics. However, key issues have often emerged from paleonutrition, as this area covers both nutrition (nutrients provided by food) and diet (food consumed by humans). These two themes are essential for bioarchaeologists who explore the evolution of human societies. When we ask about what people ate in the past, it is a way of approaching the notion of identity of a population and its adaptation to an environment through the adoption of an economic strategy. Eating behaviors (food consumption and cooking practices) are cultural characteristics that may reflect a biological identity; however, this is not always so, because culture is not simply equal to biology. Thus, paleonutritional reconstructions contribute indirectly to stimulate current ethical debates in bioarchaeology, especially when analyzing human remains that are ancestors to descendant communities today.

Definition

As a participant to a holistic and scientific approach based on the study of sites, bioarchaeology integrates various cultural (history, archaeology) and biological data (demography, health, diet, origins). Two notions are central to this approach which originates from the New Archaeology and Anthropology: that of "population" in evolutionary terms but also that of "society." The goal is thus to attempt to reproduce both biological but also social history (way of life in the past) for a past group and to explore their relationship with their environment (Larsen 1999). The subdiscipline of paleonutrition, although focusing on past eating behaviors and their evolution through time, concerns many other aspects, including the study of ancient diseases and mortality issues (Steckel & Rose 2002). Indeed, the specific sanitary and epidemiological conditions of a group can be explained by many factors (genetic and environment) and, moreover, are not necessarily directly linked to the diet consumed. After the development of archaeological sciences and of paleoenvironmental studies, bioarchaeology and consequently paleonutrition now rely on a wide range of data, from soil to ecofacts, artifacts, and bones.

Key Issues

Firstly, major advances in paleonutrional studies are largely dependent on the type of data analyzed. Previously, these studies were mainly based on the analysis of artifacts, fauna, and plants, in order to explore diet and nutrition. Currently, all of the results already obtained have been clarified, thanks to the analysis of stable isotopes (on elements such as carbon and nitrogen) (Katzenberg 2008). Chemical analyses performed on plant and animal remains provide us with direct information on the type of food consumed during life. However, there are well-known

biases in relation to various factors: climate, diagenesis, variable remodeling of the bone, and the influence of food on the marine carbon isotopic signatures. Although this approach cannot reveal the nature and quantity of nutritional intake as precisely as studies on living populations, it may suggest the main food groups consumed in the past and their position in the food chain. The analysis of stable isotopes of carbon and, in particular, the different photosynthetic modes (C_4 et C_3) observed in wild and domesticated plants allows us to identify the emergence of agriculture and imported foods in different regions of the world (corn in the Americas, millet in Europe, and sorghum in Africa). The nitrogen isotopes were also very useful to distinguish between marine and terrestrial resources in food intake. Thus, they have helped to develop interpretations of differential access to protein-rich resources and the socio-economic stratification within a society.

Consequently, paleonutritional studies that use isotopic signatures help us to better understand the concept of identity or cultural affiliation and its evolution through time. They differ from forensic anthropology, which emphasizes the biological identity of an individual. Their approach is closely related to social archaeology, where the social dimension (position of the individual within society) is predominant. Within the goal to better understand the notion of past identity, recent research tends to combine even more methods and various data (historical records, archaeology, funerary archaeology, diet, mobility). Certain regions in the world, such as South Africa, whose peoples are differentiated by a long, diverse, and complex history, are a source of inspiration for bioarchaeological research (Cox et al. 2001; Ribot et al. 2010). With the development of agriculture, newcomers settled in areas and displaced others who were already there or they came into conflict with them. All this led to cultural and biological changes, such phenomena having occurred not necessarily in a continuous fashion in time and space. To understand these events, food reconstructions combined with other data (material culture, morphology, ancient DNA) can help us identify these past populations "in transition," exposed to various gene flows. In the case of communities of the Iron Age (AF) in KwaZulu-Natal (RAS), data on diet and morphology showed no significant change over time (Ribot et al. 2010). Thus, the hypothesis has been proposed, of a gradual assimilation of hunter-gatherers ancestral to the Khoesan, by Bantu farmers. However, elsewhere, on more recent sites associated to the period of slavery (Americas, the Caribbean, Africa), the question of identity in the broadest sense becomes a more complex concept difficult to define. Indeed, various groups of people, individuals from forced diasporas, or slaves were moved from various regions and then intermixed with local groups, sharing with them cultural and/or biological aspects (traditions, culinary practices, languages, genes) (Larsen 1999; Cox et al. 2001).

In exploring the history of past populations as well as their identity, does paleonutrition contribute to the promotion of descendant communities as well as a recognition of their identity? The answer is positive, as a cultural affiliation can be suggested from what people eat, and thus contributes finer detail to other sources of data based on biological affiliation criteria (ancient DNA, morphology). Museums all around the world have accumulated thousands of ancestral skulls from diverse descendant communities (Native Americans, Australian Aborigines, Khoesan South Africans), often without any ethical concern. These collections were often acquired before the period of independence, while the European colonial powers dominated the world. The thinking at that time focused on the classification and definition of race. Following these events, current communities required spiritual repair and appropriate reburial of their ancestors. In the USA, the NAGPRA ("Native American Graves Protection and Repatriation Act") was established in 1990, in order to return human remains to descendant communities (Larsen 1999). Following this, a systematic process of recognition of cultural and biological identity of human remains of Native Americans has been set up and is ongoing even now in the USA, its impact even being carried out in Canada. As a result of NAGPRA

legislation, bioarchaeological studies including paleonutritional analyses have multiplied exponentially, even though the scientific value of the collections are still debated and threatened by reburial (Williamson & Pfeiffer 2003). Questions of this type are also raised in South Africa in this post-apartheid era. Ethical guidelines for the management of human remains are not yet totally in place, and access to osteological collections, ancestral to current descendant communities, is more restricted than ever before (Sealy 2003).

The historic graves of slaves are sites which have recently raised a number of ethical questions, given that the descendants are often present in contemporary societies. This is, for example, the case in Cape Town, where the awareness of the collective heritage is in a process of transformation (Shepherd 2007). Debates have emerged around the complex identity of these ancient slave populations, which became more and more mixed over time. The study by Cox et al. (2001) on the skeletons found at Cobern Street, in particular, was able to reveal aspects of the life trajectory of each individual, because it combines isotopic analysis with diverse data (general history, archaeology funeral, dental changes). The level of carbon and nitrogen obtained from bones and teeth has enabled the identification of diverse groups within the cemetery, such as foreigners (consumption of C_4 plants during childhood) and natives (plants C_3). These ideas and approaches used by Cox et al. (2001) have provided a model for many other isotopic studies on slave cemeteries (Schroeder et al. 2009).

Future Directions

Recent paleonutritional studies involving food reconstructions, combined with several other approaches and advances in the area of isotopic studies, are very useful tools for researching the identity of a group. By analyzing the diet, diverse knowledge can be acquired, notably on the environment (plants, wildlife) and the period under study (economics, resource use, cultural practices). It thus brings us in a more subtle and critical way toward a better understanding of the human identity of the past and, in particular, for the groups which have been neglected throughout the past and poorly documented in historical archives. However, when human remains are discovered, the major difficulty is around ethical questions (not only in relation to reburial), which are discussed between scientists and indigenous communities. Indeed, these two groups often have in mind very different interests and priorities concerning human remains. The scientists focus on scientific merit. By contrast, some indigenous groups today lean more on the spiritual value and the memory of their ancestors or some are even very concerned about the profanation of the remains of their ancestors. These questions are essential for our postcolonial, post-apartheid societies, and they have lead to a renaissance in the identity of indigenous populations. This process began in South Africa after 1994 (Shepherd 2007) and can be considered as a model for other countries, in particular North America, as it forces us to rethink the concepts and methods used in our very own different disciplines! For the future, it nevertheless remains to develop the inclusion of indigenous people in bioarchaeological projects, so that the acquisition of scientific knowledge can benefit these communities directly.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethnic Identity and Archaeology

▶ Foraging to Farming Transition: Global Health Impacts, Trends, and Variation
▶ Heritage Museums and the Public
▶ Human Migration: Bioarchaeological Approaches
▶ Human Remains in Museums
▶ Human Skeletal Remains: Identification of Individuals
▶ Isotope Geochemistry in Archaeology
▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
▶ South Africa: Heritage Management

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Palmer, Marilyn

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Basic Biographical Information

Marilyn Palmer is a British industrial archaeologist and educator and a fellow of the Society of Antiquaries of London. She received her undergraduate degree in modern history from St. Anne's College Oxford in 1965 and a postgraduate certificate of education from Leicester University in 1966. She was awarded an Oxford master of arts degree in 1969. Professor Palmer began her professional career as a history teacher at Loughborough High School and then began lecturing in history at the Loughborough College of Education. Building upon her amateur interest in industrial archaeology, she enrolled in a 4-year part-time certificate in British archaeology program at Leicester University, which she completed in 1973. Between 1977 and 1988, Marilyn Palmer was employed in the History Department of Loughborough University, rising through ranks from lecturer to senior lecturer to head of department. In 1988, she took up a post as senior lecturer at Leicester University, dividing her time equally between the History and Archaeology departments. In 1998, she moved fully into the School of Archaeological Studies, and in 2000 she was promoted to professor of industrial archaeology. From 2000 to 2006, she served as head of the School of Archaeology and Ancient History at the University of Leicester. In 2005, she received an Award of Merit from the Society for Historical Archaeology, in recognition of her many contributions to the advancement of industrial archaeology. She retired in 2008 but remains very research active.

Major Accomplishments

Marilyn Palmer's most significant achievement has been in leading the transformation of

industrial archaeology from an amateur pursuit to a professional and academic discipline. She has spearheaded the integration of industrial archaeology into the broader discipline of historical archaeology, as exemplified by her founding role in the establishment of the Centre for Historical Archaeology at the University of Leicester in 2009. Her joint publications with the late Peter Neaverson (Palmer & Neaverson 1992, 1995, 1998, 2005) provided a needed methodological and theoretical dimension to the practice of industrial archaeology. Professor Palmer's research has long stressed the importance of examining the social dimensions of industrial workplaces. To that end, she has produced landmark studies examining the experiences of textile workers in South West England (e.g., Palmer & Neaverson 2005). While strongly advocating industrial archaeology as an academic pursuit, Professor Palmer has always stressed the importance of the contributions made by amateur enthusiasts in both researching and conserving industrial heritage.

Marilyn Palmer has been active in the Association for Industrial Archaeology (AIA) since its establishment in 1973, serving the organization twice as its chairperson, as joint editor for its journal *Industrial Archaeology Review*, and as honorary president. Through her AIA activities in particular, she brought together a diverse group of interested amateurs and scholars from a range of disciplines including history, archaeology, and engineering. She has also worked in an advisory capacity with the National Trust, English Heritage, and the Council for British Archaeology. She currently chairs the Buildings Archaeology Group for the Institute for Archaeologists, serves as a member of the National Trust Archaeology Panel, is vice-president and trustee for the Council for British Archaeology, and is on the English Heritage Industrial Archaeology Advisory Committee.

Marilyn Palmer's publications include both academic contributions and publications designed for the general reader. She has published on a range of industries, from lime production to iron manufacturing to lead and tin mining to the textile and hosiery industries. She has also been active in producing strategy documents as well as basic guides for interested readers. Her most influential work is *Industrial Archaeology*: *Principles and Practices* (1998), coauthored with Peter Neaverson. With David Gwyn, she coedited *Understanding the Workplace*: *A Research Framework for Industrial Archaeology in Britain* (Palmer and Gwyn 2006), a special issue of the Industrial Archaeology Review which strongly advocated taking a social approach in industrial archaeology. In so doing, it opened up new fields of enquiry and encouraged considerable discussion within and beyond the field of industrial archaeology (see Palmer 2008).

Since retiring from the University of Leicester in 2008, she has been researching the range of technological innovations adopted by country house owners from the eighteenth to early twentieth centuries. Her project, the Country House Technology Project (http://www2.le.ac.uk/departments/archaeology/research/centre-for-historical-archaeology/research-1/country-house-technology), is funded by the Leverhulme Trust.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Avocational Archaeology
- ▶ Buildings Archaeology
- ▶ Council for British Archaeology (CBA)
- ▶ Industrial Archaeology
- ▶ Industrial Heritage in Archaeology

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Palmyra, Archaeology of

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Introduction and Definition

In the first three centuries CE, Palmyra could be compared with the largest and most influential cities in the eastern part of the Roman Empire. It was a prosperous caravan city on the route between the Indian Ocean and the Mediterranean Sea. At the end of the third century, the legendary queen Zenobia controlled larger parts of the eastern empire, but after her fall the city was transformed to a military stronghold within a smaller area and surrounded by a new defensive wall (Fig. 1).

From 1920 to about the 1970s, the main effort of the archaeological investigations was concentrated on the Roman period up to the end of the third century within the walls of the late Roman city. The eastern part of the great colonnaded street, the tetrapylon, the temples of Bel and Baal-Shamin, the theater, and the agora with annex were cleared down to the level of the Roman period without any documentation of the later periods, and thereafter partly restored, together with the Diocletian's camp and the temple of Allath in the western part of the city (Schmidt-Colinet 1995; Delplace & Feydy 2005).

Key Issues/Current Debates/Future Research

Center of Palmyra

Since then there has been a growing awareness that the city of Palmyra covered a much larger area and that other periods need more attention. Recent investigations south of the later Roman city have revealed a large quarter with houses, an official building, and broad streets leading toward the temple of Bel (al-As'ad & Schmidt-Colinet 2006-2007) (Fig. 2). The earliest layers can be dated to the Hellenistic period, and the area was abandoned at the end of the third century CE, when the settlement was confined within the new defensive walls to the north. In the northeastern part of the city, a market has been excavated (Delplace 2006-2007), and an amphitheatre has been identified from old aerial photographs, probably from the late Roman period (Hammad 2006-2007). Excavations west and northwest of the tetrapylon have brought to light remains of several public and private buildings from the first century CE to the early Islamic period (Gawlikowski 2007) (Fig. 3). Some of the buildings were destroyed in the middle of the second century CE when the great colonnaded street was constructed, which changed the city plan of central Palmyra. Other large houses, originally for the well-to-do, were constructed in the second century CE, but in the sixth and seventh century, they were modified into several dwellings of more rural character as centers of production, probably reflecting changes in the position of Palmyra in the Byzantine era and forth (Gawlikowski 2007).

In the fifth and sixth century, three Christian churches were built north of the colonnaded street (Gawlikowski 2003; Majcherek 2009). Two of them, one with a baptistery, were still in use in the Umayyad period, but converted into

Palmyra, Archaeology of, Fig. 1 Aerial view of Palmyra from the NW (Photo J.C. Meyer)

habitation or a craft center in the ninth and tenth century, during the Abbasids. Another Christian basilica (Gawlikowski 1998) was probably constructed as late as the Umayyad period, and they all testify to the existence of two parallel Christian and Islamic communities in the early Islamic period. During the Umayyads the great colonnaded street was also transformed into a large market street consisting of a suq with small shops in the street between the columns (al-Asʿad & Stępniowski 1989), and a small mosque was constructed within earlier Roman buildings (Genequand 2008) (Fig. 4). The city area was finally abandoned in the ninth century, when the population of Palmyra was confined to the precinct of the temple of Bel.

The new investigations have emphasized that Palmyra had a long and very complex history. It stayed an important center also after the end of the third century, even if the habitation was confined to a smaller area within new defensive walls. It became a main garrison city of the eastern border, and later a bishopric. In the Umayyad period, when large "desert castles" or palaces were constructed in the region (Qasr al-Heir al-Sharqi and Qasr al-Heir al-Ghabi), it was still a thriving regional center with both a Christian and Islamic population (Genequand 2008). However, the finds from the pre-Roman period are still scanty. The Hellenistic finds are few, and virtually nothing is known about the oasis in the prehistoric periods and the Iron Age. Palmyra (Tadmor) is mentioned briefly in Bronze Ages sources, but the oasis does not contain any large tell which can be compared with Ebla, Mari, or Qatna. The location of Bronze Age Palmyra is supposed to be beneath the temple of Bel. Excavations here, however, have only revealed a few shards. New stratigraphical excavations are needed in the oasis, also to clarify the extension and character of the habitation in the Roman period before the end of the third century CE. How much of the city area, which covered an area of twenty square kilometers within the farthest walls, was occupied by gardens, open spaces, and buildings? This is of great importance for any attempt to estimate the population of the city, which has ranged from 30,000 to 200,000.

The Hinterland of Palmyra

Whereas the prehistoric finds from Palmyra itself are insignificant, the finds from the hinterland north and southeast of Palmyra testify to an intensive exploitation during the PPN (Pre-Pottery Neolithic: c. 9.500–5.500 BCE), when the climate was moister and the fauna and vegetation was different (Anfinset & Meyer 2010; Morandi

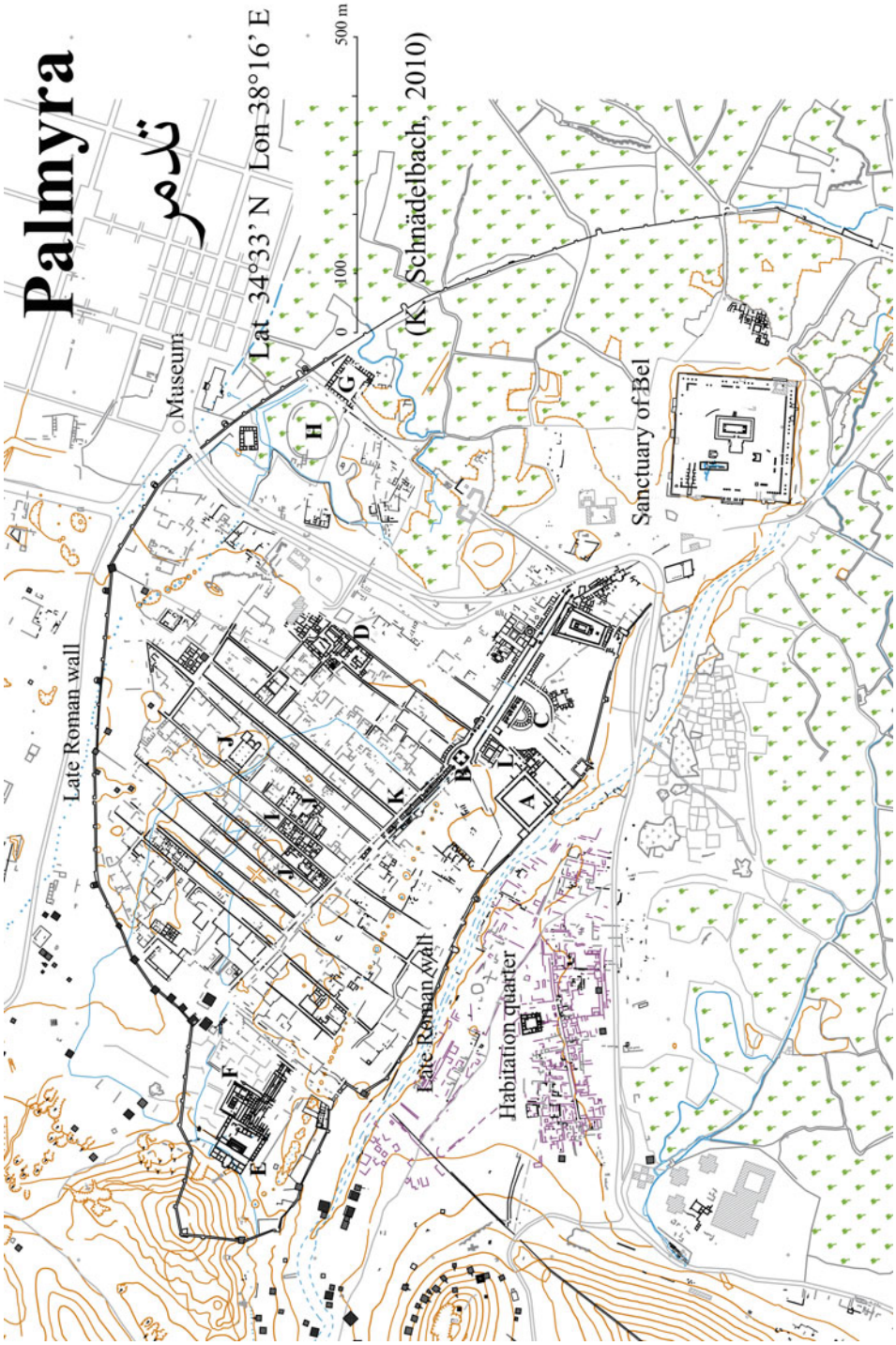

Palmyra, Archaeology of, Fig. 2 Map of the central part of Palmyra. *A*: Agora. *B*: Tetrapylon. *C*: The theater. *D*: Baal-Shamin. *E*: Diocletian's camp. *F*: Temple of Allath. *G*: Market. *H*: Amphitheatre. *I*: Habitation quarter. *J*: Christian basilicas. *K*: Umayyad suq. *L*: Mosque

Palmyra, Archaeology of, Fig. 3 Habitation quarter NW of tetrapylon (Photo Jørgen Christian Meyer)

Palmyra, Archaeology of, Fig 4 Umayyad suq inside the great colonnaded street (Photo Jørgen Christian Meyer)

Bonacossi et al. 2012). The sites are located close to former fresh water lakes and wadi outlets, and they seem to be related to seasonal hunting. In addition several kites, or large hunting traps, are a common phenomenon. Unfortunately their dating is still controversial, and some of them probably belong to much later periods. The relation to the oasis of Palmyra is not clear, and it is possible that the sites are more related to the early farming communities to the north and the east. They may also be related to the early domestication of animals and the development of early pastoralism.

From the end of the Pre-Pottery Neolithic until the beginning of the early Bronze Age not much is known about the use of the steppe. In the early Bronze Age (c. 2500) at the latest, when the climate became drier, several hundred cairns were erected in the landscape (Anfinset & Meyer 2010; Morandi Bonacossi et al. 2012). Generally they are located along major tracks

and mountain ridges, visible at long distances, marking the territory and the main communication lines, which is common also in other Bronze Age societies in Jordan and the Arabian Peninsula. As there are no major Bronze Age sites within the area, they probably belonged to a pastoral nomadic population, which lived in symbiosis with the agricultural societies and early cities in other parts of Syria. The exact dating of the cairns (C14 and OSL dating is awaited) and the relation to the oasis of Palmyra still need to be clarified.

In the historical period, the oasis of Palmyra with its springs could not have supported a large city with foodstuff. Palmyra needed more stable sources of nutrition within its own territory. Daniel Schlumberger was the first scholar to carry out more detailed investigations of the hinterland from 1933 to 1935. In the mountains north of Palmyra, he documented several smaller forts and 15 settlements in the tableland of Jebel Chaar, which he dated to the three first centuries CE. Most scholars have classified the settlements as pastoral holdings, as centers of stock raising, camel herding, or horse breeding.

Recent surface surveys north of Palmyra have given a much better understanding of the potential of the hinterland for production of foodstuff (Meyer 2012) (Fig. 5). Normally the area is called a desert, but it rains every year (average annual precipitation 125 mm), and it is more correct to classify it as a dry steppe. Traditional agriculture with barley is a very risky business, but by employing different kinds of water management, the fertility of the soil can be exploited. Small dams, cross-wadi walls, and cisterns with elaborate catch arm systems led the surplus water to the fields as a supplement to the annual rain. Agriculture and horticulture in semidesert areas, based on proper water management, are much more resistant to drought and minor fluctuations in the climate than their counterparts in regions with higher precipitation, and it is also known in The Negev desert, Jordan, and North Africa. The new surveys have also increased the number of known settlements dramatically in the mountain areas, which were covered by trees until recently, and have demonstrated a very dense settlement pattern, which makes more sense in connection with agriculture and horticulture, not pastoralism alone. The chronology of the sites must also be revised. Nothing can be dated to the Iron Age or the Hellenistic period, but late Roman, Byzantine, and Umayyad pottery are found in large numbers at almost all sites. This conclusion fits well with the recent excavations in Palmyra itself. The history of Palmyra did not stop after Palmyra lost its position as a major caravan city at the end of the third century. However, the chronological distribution of the surface finds cannot reveal fluctuations in the intensity of human activities at the sites. This issue can only be resolved by excavating sites with deep cultural layers. Schlumberger also investigated one of the largest dams in antiquity about 100 km southeast of Palmyra, the Harbaqa Dam near Qasr al-Heir al-Gharbi. Until recently the project has been dated to the early Roman period, later improved by the Umayyads, but some scholars now date the construction to the Umayyad period (Genequand 2006). The site needs to be reinvestigated.

The greatest challenge for further research, apart from establishing a more precise chronology for the sites, is to correlate the settlements with the different phases in Palmyra itself and put Palmyra into a larger interregional context. We are dealing with a very long time span, covering over 800 years. Was the relationship between city and hinterland the same throughout the period and how do the later Umayyad castles fit into the picture? It has been suggested that the both the rise and fall of Palmyra and the extensive exploitation of the hinterland coincided with major climatic changes, but nothing seems to indicate that the climate of the dry steppe was markedly different from the Ottoman period or that the pre-Roman period was drier. Rather the intensive exploitation of the dry steppe seems to depend on a heavy investment in water-management systems and a high degree of political and military control. The Romans and the Umayyads were willing and able to guarantee that. Hereafter a Bedouin strategy of survival, with low degree of central control and low population density slowly took over, and Palmyra was reduced to a small oasis village in the shadow of its former greatness (Fig. 5).

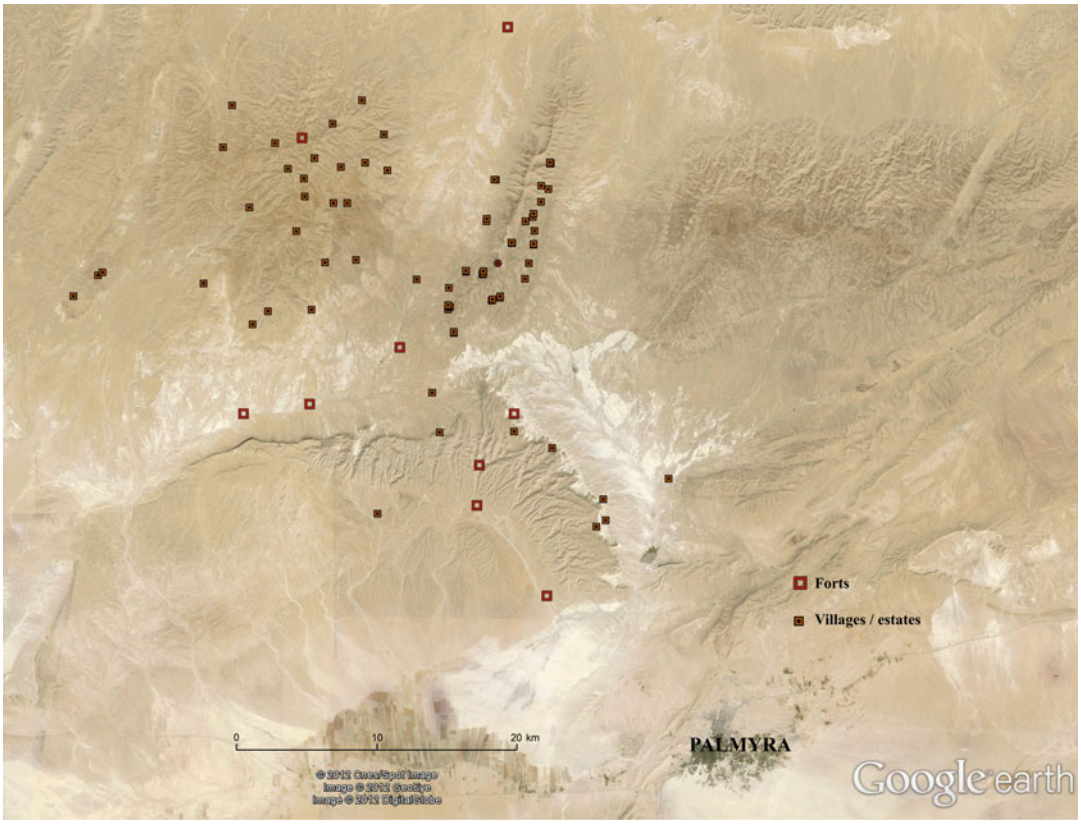

Palmyra, Archaeology of, Fig 5 Villages/estates and forts north of Palmyra

Cross-References

- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Islamic Archaeology
- ▶ Landscape Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Surface Survey: Method and Strategies

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Panamá Viejo (Old Panama) Archaeological Site

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Brief Definition of the Topic

Panama City was founded by Pedrarias Dávila in 1519, a few years after the arrival of Vasco Núñez

Panamá Viejo (Old Panama) Archaeological Site, Fig. 1 Panamá Viejo (Old Panama) archaeological site

de Balboa in Mar Del Sur and about a quarter of a century into the Spanish conquest of the American continent. From 1534, it acquired an important role in the world economic system with the consolidation of Spanish power in Peru, as it then became the link between Andean mineral deposits and the Mother Country. In 1671 the city was destroyed by the buccaneers of Henry Morgan and was subsequently transferred to the place now known as Casco Antiguo (the Old Quarter).

This site, known as Panamá Viejo (Old Panama) (Fig. 1), is today administered by the Patronato Panamá Viejo (Old Panama Trust), a not-for-profit organization with a mixed management derived from private and state institutions. In July 2003, Panamá Viejo was included in the UNESCO World Heritage List, conjointly with the Historic District of Panama (that denominated Casco Antiguo). The institution carries out an extensive program that, among other things, includes intervention plans for the site and its surrounds and archaeology projects and plans for the conservation of personal belongings and the preservation of historic ruins, promotion, and tourism (Arango 2006).

While it is true that Old Panama has been heritage-listed due to its Hispanic legacy, archaeological research has expanded this considerably, highlighting the importance of its original occupancy. The chronology for the pre-Hispanic component is concentrated between 859 and 1250 CE and ranges from 500 to 1400 CE.

As regards the colonial component, research in progress has revealed hitherto unknown aspects of the daily life of the colony, deriving from documentation of a rich collection of pottery. Studies have been carried out of the geographic distribution, composition, and style of the so-called Panamanian Majolica (e.g., Rovira et al. 2006). An exhaustive revision of diverse historical sources (including the painting and literature of the Spanish Golden Age) allowed scholars to relate the Roja Fina (Fine Red) pottery collected from many Spanish colonial sites in the Americas as well as that reported in European texts of the seventeenth century (in Spain, Portugal, and Holland), with indigenous fragrant vessels or "búcaros" (Rovira & Gaitán 2010).

Work carried out since structuring of the Old Panama Trust has made a significant contribution to the history of architecture and town planning, incorporating systematic field research (e.g., Campos & Durán 2006). Recovery of the urban fabric has been a priority, given the necessity to facilitate its reading as a colonial city. Interpretation of the built spaces subject to intervention required an interdisciplinary approach guided by internationally adopted principles (Arroyo 2010). The Old Panama Trust develops information programs directed at diverse audiences, among

others, an on-site museum, schools of archaeology, and specialized publications. In this way, it contributes to the influence of the site in the spheres of education, academia, and tourism.

Cross-References

- ▶ Central America: Historical Archaeology of Early Colonial Urbanism
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis
- ▶ Historic Building Conservation: Current Approaches
- ▶ Portuguese Redwares and Coarse Wares in Historical Archaeology
- ▶ World Heritage Objectives and Outcomes

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Panhellenism

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Introduction

The *Oxford English Dictionary* defines panhellenism as patriotism based on the concept of Greece as a whole. This broad understanding of the term has been much in vogue since its invocation in the nineteenth century by early historians of Greece, like G. Grote and John Fiske, who sought to emphasize the reality of an ancient, panhellenic, "united" Greece in response to current political events, particularly the struggle for Greek independence and a "return" to a united, panhellenic, Greece (cf. Mitchell 2007: xv-xxii).

Matching the modern term panhellenism (let alone its meaning) to the ancient Greek world has, however, proved more difficult: there is no example of the use of *panhellenismos* or other term specifically for the phenomena of panhellenism in the ancient sources. Scholarship has concentrated instead on finding references to terms that allude to such a concept.

The most obvious is in the Roman world, with the advent of Hadrian's *Panhellenion* (Hadrian's union of Greek poleis within the Roman province of Achaia) in the second century CE. The *Panhellenion* sought to place emphasis on kinship and cultural Greek ties and sparked a wider use of the term, for example, the panhellenic games in Athens. Yet even this *Panhellenion* was not panhellenic in the sense that it included all parts of a united Greek world but was rather focused on the metropoleis of old Greece and their overseas colonies (cf. Spawforth & Walker 1985: 81-2).

In the archaic and classical Greek world, scholars have pointed to the (rare) use of "panhellenes" and to calls for (different kinds of) Greek unity in different ancient authors (discussed below). Scholars have also occasionally used the concept of panhellenism to argue for the wider existence of particular genres of artistic creation, such as tragedy (e.g., Taplin 1999), and

the similarity of "Greek" material culture across its different poleis, thus by extension minimalizing the "uniqueness" of Athenian art (e.g., Morris 1998). The most important application of panhellenic to archaeological material and sites, however, has been as a description for a group of important Greek sanctuaries: Olympia, Delphi, Isthmia, and Nemea (those which hosted the "crown games" and were part of the "periodos" circuit). As a result of this label, it has often been assumed that the function and effect of these sanctuaries was to host and foster "panhellenic unity" through the different activities on offer at each site.

Recent scholarship, however, has continued to re-investigate the appropriateness of the term panhellenism and its meaning as "a union of all Greeks" to the ancient reality (and even ideal) in both literature and material culture. As a result, its current definition in the *Oxford Classical Dictionary* evokes a subtle move away from the earlier blanket concept of unity towards a comparative idea focused around similarity and difference. Panhellenism is "the idea that what the Greeks have in common as Greeks, and what distinguishes them from barbarians, is more important than what divides them" (Hornblower & Spawforth 2003: 1106).

Definition

Use of the ancient Greek term "panhellenes" is rare before the Roman period. Early examples are Hom *Il*. 2.530; Ar. *Peace* 292, 302; Pind. *Isthm*. 2.38, 4.29; and *Pae*. 6.60 (fr.52f = D6Ruth). Nor do all these examples necessarily mean "all the Greeks." Hall in fact argues that the term "hellenes" actually began as "panhellenes" (cf. *Iliad* 2.530), meaning not "all of the Greeks," but the "the most Greek of the Greeks" (Hall 2007: 272-4). Much more frequent, of course, are what have been termed "appeals" to concepts of panhellenism, all with reference to different types of community. The most famous is that of Herodotus (8.144.2), in which Greek kinship is based on common language, blood, sanctuaries, sacrifices, and common ways of life; but other such definitions of community can be found in, for example, Hdt. 7.132; 8.121; 9.81 and in inscriptions like Meiggs and Lewis 1988 no. 24 (line 4). Scholarship has occasionally emphasized the very explicit political opportunism of such appeals, particularly by Athens (e.g., Perlman 1976). Yet as a result of widening the net for panhellenism, many scholars have felt the necessity to add descriptive adjectives to narrow down the vagueness of panhellenism, such as "functional" and "true" panhellenism (Neer 2007: 226) and "strong" and "weak" panhellenism (Mitchell 2007: xviii). Such a widening net has also meant increasing overlap with scholarship on differing concepts of "hellenism," to the extent that the necessity and value of the term panhellenism as distinct from hellenism have been questioned ('what is so "pan" about "panhellenism"?).

In its application to sanctuaries, and particularly Olympia, Delphi, Isthmia, and Nemea, there has also been increasing scholarly uncertainty. This has focused firstly around the date at which each of these sanctuaries can be said to have acted as "panhellenic" entities. Snodgrass, for example, claimed that Delphi was acting out a panhellenic role from the eighth century BCE (Snodgrass 1986), yet Morgan has argued that no such role can be envisaged before the seventh century BCE (Morgan 1993). Scott has continued that line of enquiry, by questioning the role of Olympia and Delphi as always places for all Greeks into the classical period (Scott 2010). Secondly, scholars have criticized the distinction of these four sanctuaries as panhellenic and thus different from others: they were not, as has been claimed, in receipt of unique services, the only sanctuaries that attracted large panhellenic crowds, nor the only ones which were open to all Greeks (cf. Scott 2010: 257). Thirdly, scholars have noted a wide range of differences in activities, ownership, and audience between the four panhellenic sanctuaries themselves (cf. Neer 2007: 226). Equally, other scholars have rejected the usefulness of the term panhellenic as a group description at all, with more recent surveys of these sanctuaries speaking of them as "interurban" rather than panhellenic.

Key Issues/Current Debates/Future Directions/Examples

While the use of panhellenism as a blanket term meaning "the unity of all the Greeks" to describe the reality of ancient Greece has faded, as well as its use as a distinguishing term for a collective grouping of particular sanctuaries, the scholars have rightly continued to consider moments, genres, places, and ways in which notions of (different kinds and levels of) Greek unity may have had value in the ancient world as ideal and/or reality. In terms of chronology, most scholars agree that the acme for sentiments of panhellenism during the archaic and classical periods was in the aftermath of the Persian wars (Mitchell 2007: xvi). These events also gave a particular flavor to the concept of Greek unity as something conceived in opposition to what it was not: Persian/barbarian (see the *OCD* definition above). This was reinforced in the late classical period, when several ancient authors refer to the post-Persian wars (and the anti-barbarian Greek unity that came with it) as a "golden era," which their worlds should seek to emulate (e.g., Gorgias, Isocrates, Demosthenes, cf. Low 2007), and when Philip based his Hellenic league loosely around the same aim (attacking Persia). In terms of place, though the description of the periodos sanctuaries as panhellenic has been deservedly recognized as problematic, no one denies that there were panhellenic (as well as equally un-panhellenic) aspects to their activities, audience, and reputation, both of which often existed simultaneously and which were constantly changing over time. This increasing recognition of the dynamic and multiplicitous perception and experience of sanctuaries continues to provoke new insights into the complex and crucial place of sacred spaces in ancient society and their frequently oscillating importance within the wider landscape (such as the recent examinations of the early panhellenic outlook of the sanctuary of Kalapodi as on par with that of Olympia and Delphi: Felsch 2007: 227). As such, concepts of panhellenism continue to find their place within the wider spectrum of hellenism, not as a static construct of unity but as an evolving part of the polyvalent discourse of Greek identity.

Cross-References

- ▶ Classical (Greek) Archaeology
- ▶ Polis
- ▶ Religion, Greek, Archaeology of

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Paper: Preservation and Conservation

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Introduction

Paper is one of the oldest man-made materials which origin is conventionally dated to 105 CE when paper was described for the first time by a Chinese script (Hunter 1978). From its invention, paper has been used for many applications, mainly as a material on which art was created and documents written. The container and packaging industry relies on paper. Clothing, umbrellas, and a variety of daily accessories made of paper point to a multitude of paper uses. Each application requires different optical, physical, and chemical properties to meet the users' expectations. Properties of paper, longevity and response to adverse conditions, rely on properties of fibers that compose paper, process which fibers undergo, and characteristics of additives. Understanding the materials and basic principles of paper manufacturing serves as basis for designing a long-term preservation and conservation strategies.

Although its use is ubiquitous, paper is prone to warping, tearing, and staining as a result of mishandling, exposure to light, or changes in temperature and humidity in the environment. Although not all these processes governing chemical and physical changes in paper are fully understood, recognizing that there is a relationship between the environment and paper alteration guides principles of preventive conservation. Conservators are capable to reverse only some of the deterioration processes aiming to stabilize paper and regain aesthetic enjoyment of art and artifacts made on paper.

Definition

Paper is a web of fibers, sizing, and fillers assembled with a great degree of heterogeneity in distribution, shape, and chemical composition. Paper is a three-dimensional structure of fibers and voids between them (Bristow 1986). Surface of paper has different properties than bulk. Smoothness or roughness of the paper surface is imparted by application of sizing (or its absence) and different methods of flattening, while paper pliability, rigidity, density, or weight are engineered during paper processing. Fiber composition, additives, and manufacture of paper have impact on longevity of artifacts made of paper (Szczepanowska & Cavaliere 2012; Szczepanowska et al. 2012).

Preservation and conservation are activities ensuring that cultural, artistic, and historic material is passed on to future generations serving as a testimony of previous generations' ways of living. Preservation and conservation activities cannot be properly implemented without understanding the physical and chemical makeup of artifacts.

Key Issues

Paper components and manufacture, an overview:

Paper can be described based on:

- Fiber composition, as rag or wood-base paper
- Manufacture, as machine or hand-made paper
- Western or Oriental, based on the geographical location of paper manufacturing and type of raw material used as paper fiber
- Sizing, based on the presence or absence of sizing as sized or unsized paper

Paper Fibers

Fibers used in papermaking are of plant origin. Commercial papers use primarily wood-origin fibers and dominate today's market, while artists'

papers are made from cotton and linen (flex) fibers derived from rag; such paper is often referred to as "rag paper." The main difference is their chemical content; wood fibers contain more lignin and hemicelluloses, while cotton papers consist of nearly pure cellulose and no hemicelluloses (Rance 1980). All plants that contain lignin also contain hemicelluloses, whereas cotton and other lignin-free fibers lack hemicelluloses. Rag fibers contain the highest percentage of cellulose; thus, papers they produce are more durable and of higher quality. Because of their higher lignin content, wood-pulp papers are of lesser quality and more easily deteriorate.

Rags and later wood pulp were the main raw materials in Western papermaking. Paper made in the Far East, known as Oriental paper, utilizes mitsumata or mulberry paper (common name: kozo) fibers, harvested from the inner bark of shrubs. Paper therefore can be described as Western or Oriental, depending on the geographical location and associated type of the raw material used in its manufacture.

Cotton used for papermaking is derived from new textile cuttings, old rags, and linters. Linters are the shortest fibers in the cotton-harvested lot, varied in a range of 12–64 mm in length long and 20 μm in width. Cotton is almost pure cellulose with a small percentage of protein, pectic substances (congealed gum-like carbohydrates) ash, and wax. Characteristic twist of flattened fiber is a diagnostic morphological feature of cotton fibers.

Flax fibers are used in textile and in fine papers (rag papers). The fibers are formed in the stem of the flax plant (*Linum usitatissimum*). Chemically, flax is the same as the cotton polymer in that they are both cellulose polymers. Physically, the flax polymer differs from the cotton polymer in the degree of polymerization. Morphologically, characteristic nodules on the flax fibers serve as diagnostic feature in a microscopic examination of paper content.

Oriental Paper Fibers

Fibers of mulberry paper (common name: kozo) and mitsumata are bast fibers, and similarly to flax derive from the inner part, under the bark of plants or shrubs. These fibers are used in the Oriental handmade papers producing strong and permanent papers. Besides showing thick walls, the fibers do not have very distinctive morphological features therefore are not easily identified microscopically. Paper mulberry may show a transparent membrane in some places along the fiber wall while Mitsumata shows broader portion in the central part of the fibers (Ilvessalo-Pfaffli, 1995).

Paper Manufacture

The *paper-making processes* serve as one of the broad criteria in describing paper as hand- or machine- made and laid or wove paper. The processing of paper has a direct impact on paper's longevity and susceptibility to deterioration. The principles of papermaking are essentially the same in all regions. Fibers are macerated, suspended in water, and retrieved by sieve-like mould to form a sheet. The changes in the manufacturing processes followed modernization and technical inventions in other fields. The growing needs for variations in paper's properties lead to broadening the array of additives and finishing processes.

Formation of Paper Sheets

Macerated fibers (or pulp) are suspended in water slurry. A mould is dipped into the vat of macerated pulp, and a layer of the wet, fibrous material is brought to the surface. When the paper sheet is formed on the mould made of bamboo or grass, horse hair or metal, sieve-like lattice, less fibers are gathered in areas where vertical and horizontal strains of the lattice are intersecting, thus forming so-called chain and laid lines and refer to laid paper. Wove paper is usually produced in a machine-made process and does not have chain and laid lines, but a uniform, cloth-like appearance.

Hand and machine processes produce different papers, the quality of which is determined by retention of the original features of the fibers. Long fibers are undamaged in hand processing; short fibers indicate machine production. The quality of the fibers has a direct impact on paper longevity; longer fibers, less damaged during

processing, are less susceptible to mechanical breaking and chemical and microbiological attack. The strongest and best quality papers are made by hand; the poorest are machine produced. A great variety of papers fall between these two extremes. The manual process ensures even dispersion of fibers in slurry (fibers suspension in water) and retains fibers' length, strength, and luster. Fiber flocks are almost completely avoided in a sheet (flocculation is a process in which particles aggregate into small lumps).

Paper Sizing

The purpose of adding sizing to paper is to modify its resistance to water; it is necessary for the ink to remain on the surface. Gelatin and starch were historically used as paper sizing. Gelatin is made of animal skin shavings, bone or tendon therefore is of protenacious base. Starch is a polysaccharide derived from plants. It is estimated that on a commercial level, starch sizing was abandoned ca fourteenth century in favor of gelatin (Clapp cited in James 1978). However, both are being used in individual, small production paper mills until today. For example, watercolor papers are traditionally sized, meaning additives are applied to reduce the paper sheet absorbency and making it hydrophobic (i.e., repelling water). Filter paper, such as Whatman papers, are unsized, because their purpose is to let the water freely flow during filtration processes.

Internal sizing is added to the paper pulp before it is cast in the paper mould; external sizing is applied to the paper surface after the paper has dried. Other traditional sizing included gum Arabic or rosin (Hunter 1978; Emeryton 1980). These substances bond with cellulose via hydrogen bonding and have film-forming propensity on the surface of fibers, thus modifying the paper surface.

Rosin-Alum Sizing

Alum rosin has been known and used since the nineteenth century. Rosin is a resin extracted from the pine tree, composed of several resinous acids. Alum is a salt, aluminum sulfate. A combination of rosin and alum results in production of sulfuric acid; pH drops to 4.5–5. The invention of rosin-alum sizing aimed to act as retardant of microbial and fungal growth in wet paper pulp. However, high acidity of the sizing resulted in rapid discoloration of paper and disintegration of fibers.

Causes of Paper Deterioration Paper is a stable material when properly cared for, as exemplified by archival collections of manuscript and art on paper dating several hundred years back and found in different parts of the world (James et al. 1997). However, paper can deteriorate easily when proper conditions are not met.

The causes of paper deterioration fall into three categories:

1. Inherent, contained in paper: fiber content (cellulose or lignin), introduced during manufacture, such as rosin-alum sizing or applied as acidic inks and paint, such as iron gall ink and verdigris (copper green paint).
2. Environmental, induced by exposure to environmental factors (light, humidity, temperature), contact with acidic material on exhibit or in storage enclosures, or effects of natural or man-made disasters such as floods and hurricanes, fires recovery or war conflicts. Microbiological deterioration falls into this broad category.
3. Negligence of handlers, resulting in damage, such as breakage, tearing or staining, and poor housekeeping, such as unattended pests and insects in collections.

Paper-based museum collections include not only flat sheets of paper, such as documents and art, but also bound books or pamphlets, three-dimensional objects, such as globes or paper-mâche sculptures, hats, kites, advertising balloons, and unusual objects such as large balloons carrying incendiary booms during the World War II. Those artifacts contain other materials such as wood, metal, printing inks, artistic media applied on the surface, adhesives, or other additives. Each additional material or alteration of paper dictates a different set of handling and care procedures.

Based on the paper objects' structure and nature of deterioration, two main types of deterioration can be discussed:

Paper: Preservation and Conservation, Fig. 1 Early, twentieth century photograph portrait mounted onto acidic wood-pulp board. Oval, size: 19 ¾″ × 13 ½″. (**a**) Mechanical type of deterioration manifested itself as breakage of the board and tearing of the photograph. Highly acidic and poor quality board lost its strength to support the photograph. (**b**) After conservation. The photograph was separated from the source causing deterioration, an acidic backing board. Torn fragments were assembled, aligned, and mended on reverse with Japanese tissue, as seen on Fig. 2

1. Mechanical
2. Chemical

So-called "mechanical deterioration" usually refers to physical alterations of an artifact, such as deformations (creases, folds, undulations), structural separations (tears, losses), punctures, skinning of surface, or abrasions. Mechanical type of deterioration often results from breakdown of paper on molecular level (Fig. 1).

"Chemical deterioration" indicates alterations of paper on molecular level. These changes may be induced by light (photochemical damage, as seen on Fig. 3) (Feller 1975; Feller & Johnston-Feller 1978; Feller 1994, Whitmore 2002) acidity (Figs. 4, 5) or chemical interaction of applied additives, for example, sticky pressure tape. Biodeterioration caused by fungi alters chemical makeup of papers that contain fillers, causes staining of paper and in conditions favorable to fungal development leads to structural disintegration of paper (Fig. 6) (Szczepanowska & Lovett 1992; Szczepanowska & Cavaliere 2000; Szczepanowska & Moomaw 1994).

Acidity is particularly detrimental to longevity of papers because even the most chemically resilient cotton fibers are weakened and destroyed by

Paper: Preservation and Conservation, Fig. 2 Reverse of the photograph seen on Fig. 1 illustrating one of the methods used by conservators in assembling and aligning paper fragments. Once aligned, the paper fragments are mended with Japanese mulberry paper using as adhesive archival quality paste

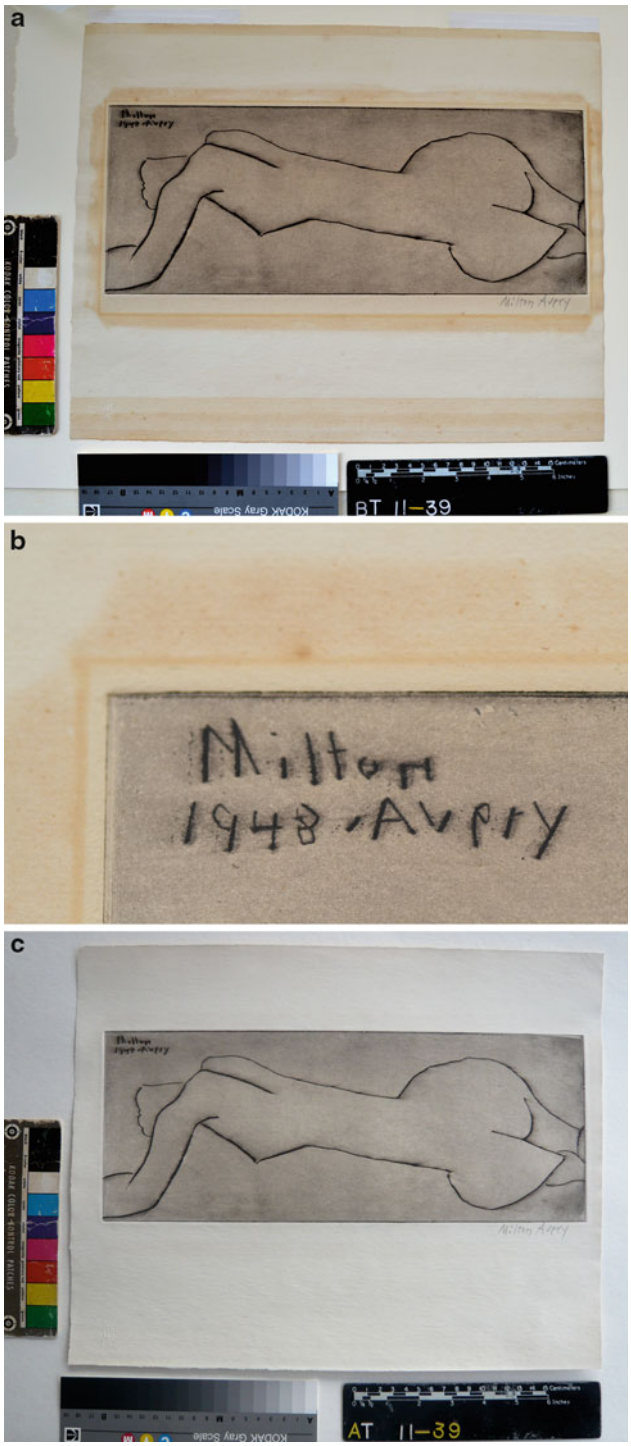

Paper: Preservation and Conservation, Fig. 3 A 1948 etching on paper; artist: Milton Avery; title: "Nude with Long Torso"; size: 13″ × 16 ¼″. (**a**) Discoloration of the edges and perimeter of the image indicated, based on their pattern, contact with acidic material used by a framer. Discoloration is one of the indicators that paper became acidic. (**b**) Detail of the etching, showing impression of folds imprinted on paper. It is a typical example of acid migration by contact with inferior material. (**c**) After conservation work. Discoloration caused by migration of acids from framing material was removed in a series of treatment processes, with organic solvents, washing and chemical local reduction of stains

Paper: Preservation and Conservation, Fig. 4 A 1842 watercolor by D. Burgdorfer; size: 17 7/8″ × 14″. (**a**) The overall discoloration of this watercolor was caused by synergy of light effect on paper and acid migration from the backing board. The details and colors of the image were obscured by this severe discoloration. (**b**) After conservation treatment. The watercolor was separated from the board, which was one of the sources of deterioration and washed with water and organic solvents

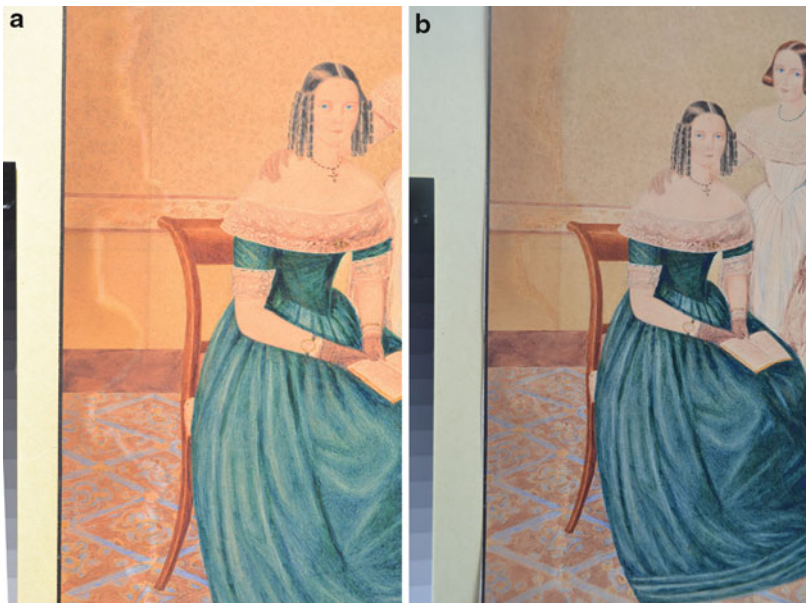

Paper: Preservation and Conservation, Fig. 5 A detail of the watercolor shown on Fig. 4, (**a**) before and (**b**) after conservation. Through the conservation process, the original colors and details were regained

acids. Sources of acidity in paper-based museum objects can be identified as inherent, resulting from chemical alterations of paper or caused by off-gassing emitted by the most immediate environment such as enclosures (on exhibit, storage, framing) or polluted environment. The source of paper acidity may be internal, such as the high lignin content in wood-pulp papers. Lignin, an intercellular tissue of the wood, is primarily responsible for rapid degradation of papers made of wood pulp. Another source of paper acidity could be the presence of alum-rosin sizing or acidic paint. One of the visible signs of acidic deterioration of paper is yellowing and brittleness.

Preservation Principles

Preservation guidelines for paper-based artifacts in archives and museum setting are based on the understanding of the physicochemical makeup of paper, structure of artifacts made of paper, and factors which may cause deterioration of paper. The purpose for which the artifacts were

Paper: Preservation and Conservation, Fig. 6 A black and white print of Degas, Nude, exemplifying severe biodeterioration. Pigmented fungal deposits stained the paper, and in other areas, fungi digested paper resulting in losses. Paper lost its structural integrity

collected and are used influences the preservation guidelines. Flat documents will require different handling and supports than three-dimensional globes or hats. The latter, in particular, will need supports to maintain their three-dimensional form. Preservation may be discussed in two categories as *preventive preservation* (before any deterioration occurs) and *active preservation*, such as conservation (when damage has occurred and intervention is needed).

Preventive preservation focuses on:

1. Providing proper environment for collections on exhibit and in storage. That means stable temperature (T), relative humidity (RH), and light (L) from which UV portion is filtered out. Although the values of recommended range of RH are shifting when more research reveals an intricate relationship between materials and environment, generally, according to the Smithsonian Institution, the acceptable range is from 37 % to 53 % (Mecklenburg et al. 2004). The most important is to avoid fluctuations of the environmental parameters (RH and T) over longer periods of time.
2. Good housekeeping, meaning ensuring insect and rodent-free environment.
3. Using acid-free materials in the construction of storage enclosures and exhibit supports. Close proximity of artifacts with these materials needs to ensure that no acidity is transferred to the original objects.
4. Handling policies, loan, transport, packing guidelines, handling and training workshops are the backbone of preventive, long-term collections care.

Conservation can be considered an active form of preservation. It requires an interaction with the objects' fabric; therefore, each step has to be carefully reviewed and planned. Any interaction with the original material leaves an irreversible mark on the original fabric; therefore, conservation should be undertaken only by trained conservators.

Knowing that acidity is detrimental to longevity of millions of archival collections, paper engineers and chemists along with archives' custodians have been engaged for years in finding solutions to prevent and retard that irreversible acidification of paper. The process of neutralizing acidity in paper is called deacidification. *Deacidification* involves introducing to paper alkaline material such as calcium or magnesium carbonates or calcium hydroxide through aqueous methods (water is the carrier) of nonaqueous (organic solvents are the carrier). Deacidification with aqueous and non-aqueous solutions has been experimented with on large quantities of books. However, there are other composite materials in books, such as bindings, adhesives, and printing media which often reacted with chemicals used in the deacidification processes; therefore, that method not always could be applied to rare and valuable collections.

Definition of conservation, according to the American Institute of Conservation reads: [*Conservation*] "The profession devoted to the preservation of cultural property for the future. Conservation activities include examination, documentation, treatment, and preventive care, supported by research and education" (AIC Directory 2012). Conservation of paper-based artifacts may involve structural repairs, minor stabilization, such as tear mending (Fig. 2) or flattening of folds, and aesthetic treatment aiming to regain visual and artistic integrity of an artifact or artwork. Decisions leading to undertaking

conservation often involve input from collections custodians/owners and curators. Conservation of spiritual collections, that is, objects that are believed to have spiritual significance or power follows rules specific to the culture that produced those artworks, objects, or documents.

Cross-References

- ▶ Archaeological Archives
- ▶ Archaeological Record
- ▶ Canada: Cultural Heritage Management
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Management: Project Management
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Experiencing Cultural Heritage
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Conservation and Preservation)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Material Culture and Education in Archaeology
- ▶ Recording in Archaeology
- ▶ SAFE/Saving Antiquities for Everyone

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Papyrology in the Greco-Roman World

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Introduction

Papyrology, the study of day-to-day documents from the ancient world, provides a rather direct and sometimes intimate look into everyday life in the Greek and Roman Mediterranean. By studying and analyzing the documents actual people left behind, if possible in tandem with the archaeological remains, scholars can arrive at a much more detailed analysis than looking at literary texts or archaeological remains alone.

Definition

Papyrology is the field of scholarship that deals with texts written on papyrus and other perishable writing materials from the ancient world (potsherds, wood, wax tablets, linen). Papyrus was used as a writing surface from the middle of the third millennium BCE until the introduction of paper at the end of the first millennium CE

The writing material papyrus was made from the papyrus sedge (*Cyperus papyrus*) that grew abundantly along the banks of the river Nile. The person making papyrus would take the stem of the papyrus and peel it. He would then cut strips along the length of the stem and place one layer of these strips closely together horizontally and another vertically on top. Pounding the strips resulted in bringing out the juices that would ensure the strips stayed together to form a sheet. Twenty of such sheets would be joined to form a roll. The inside of the roll would be the side where the fibers ran horizontally, the outside, vertically, allowing for easy rolling of the papyrus, without breaking it.

The writing materials that form the object of papyrological scholarship were used all over the

Mediterranean world. Their organic nature, however, has caused them to survive, with few exceptions, only in the dry sands of Egypt. Among the more notable exceptions are the carbonized papyri from Herculaneum (Italy) and Petra (Jordan), the wooden tablets from Hadrian's Wall, and a number of caches of documents found in caves in Israel (including the Dead Sea Scrolls). Potsherds with writing (*ostraca*, singular *ostracon*) have survived in bigger quantities as is witnessed by their presence on the Greek mainland and islands (Crete and Rhodes), North Africa, and elsewhere (Bagnall 2011).

Within Egypt, papyrus and other writing materials survive largely from arid, upland portions of the country. There are, for example, only a handful texts that survive from Alexandria, Egypt's capital in the Greek and Roman periods, because of the location of this city in the Nile Delta – and these only survive because they were removed from the city. Within sites at higher elevations, texts are found as part of the archaeological record in inhabited spaces and in refuse collections (Cuvigny 2009). However, texts that were found in one particular location in Egypt may derive from another location, within Egypt itself, or even in the Mediterranean world at large. Thus, there are several letters written outside of Egypt to addressees living in Egypt, often by soldiers serving in the Roman army. P.Mich. 8.490–491, for example, were written by a recruit who had just arrived in Rome, and P.Mich. 3.203 (114–116 CE) was written by a Roman soldier stationed in Pselkis in Nubia. Both men sent letters home to their family in Karanis, Egypt, where the letters from Rome were actually found during the University of Michigan excavations (the letter from Nubia was purchased on the antiquities market).

Historical Background

Papyri and other writing materials from Egypt have been the object of archaeological investigation since the early 1880s (Cuvigny 2009). Initially, papyri were the prime objective of these activities, searching for the remains of classical and early Christian texts. In the course of the twentieth century, the focus changed to papyri as part of the archaeological record in an attempt to analyze the lives of the people of Greek and Roman Egypt. In addition to this organized archaeological activity, papyri have also been discovered during clandestine excavations. These made it to the antiquities market and were purchased by the major collections in the Western world. Precise archaeological proveniences for these papyri are often unknown. Such trade has been illegal since the 1972 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property came into force.

The writing materials from Egypt preserve all languages that were in use during Egypt's history. There are documents in the various Egyptian scripts (Hieroglyphs, Hieratic, Demotic), Aramaic, Greek, Latin, Coptic, Arabic, and smaller samples of other language communities that were present in Egypt at one time or another. Historically, the scholarly world has divided the various languages between different fields with Egyptian texts falling under Egyptology and Greek and Latin under Classical studies, often with such division that bilingual texts on the same piece of papyrus were published in separate installments. More recently, the growing interest of historical studies in the papyri from Egypt has given rise to more encompassing studies of Greek and Roman Egypt using both textual documents (whatever the language) and archaeological data (e.g., Wendrich et al. 2003).

Key Issues/Current Debates

The contents of papyrological texts are diverse and varied (Bagnall 2009). They include everything from works of literature to small receipts for the payment of taxes. The works of literature include both those that are known from the medieval manuscript tradition as well as those that were lost during that process. Among the known works, Homer is the most popular author in terms of surviving fragments, partly because of the importance of this author in education (Cribiore 2001).

Among the authors whose work can now be glimpsed from papyri is Menander, as well as several poets from the archaic period like Simonides, Sappho, and Alcaeus. Literary papyri are very important in understanding and analyzing literary culture, especially during the Roman Empire (Johnson 2010).

A large portion of the surviving texts from Egypt illustrates the activities of the state, both when Egypt was an independent kingdom under the Ptolemies and later when part of the Roman, then Byzantine Empire. There are several directives from the reigning monarchs, both decrees of the Ptolemaic kings (Lenger 1980) and edicts of the Roman emperors (Oliver 1989). More numerous are texts from the lower ranges of the bureaucracy to various higher state agencies. These include census declarations, various reports about the use of land and livestock, and so on. Taken together, papyri allow for a vivid picture of Egyptian state government at work in various historical periods. The surviving documents from Greek and Roman Egypt also include many financial documents, allowing for detailed debates about the workings of the ancient economy (Manning 2007; Rathbone 2007). There are numerous documents of sale, loan, and lease, as well as numerous accounts that allow for the reconstruction of the workings of, for example, large estates in Roman Egypt (Rathbone 1991; Hickey forthcoming).

Although found in Egypt, papyri often illustrate matters concerning the ancient Mediterranean world at large. One text from the Michigan collection, for example, provides a list of boats that arrived at the Alexandrian harbor. The text, P.Bingen 77 (=P. Mich.inv. 5760), dates to the second century C.E. and gives a list of the boats with their tonnage, their names, the harbor from which they sailed, and their cargo (largely wine). This text gives a firsthand account of what trade in the Roman Empire was all about.

Future Directions

One of the more intriguing historical questions in dealing with Egypt's relatively rich textual sources is whether or not the arising picture is representative for other parts of the Mediterranean world. In this respect, there are two interesting tendencies in modern scholarship. The first is, for the Hellenistic period, a drive towards seeing Ptolemaic Egypt principally as a representative of Egyptian, not Hellenistic history (Manning 2010), though the everyday writing culture in Egypt may be representative for large parts of the Hellenistic world (Bagnall 2011).The second tendency is the growing awareness among historians of the Roman world that Egypt is in many (but certainly not all) respects a typical province of the empire (Lewis 1984).

Cross-References

► Hellenistic and Roman Egypt, Archaeology of

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Paranthropus

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Introduction and Definition

This genus name was created by R. Broom in 1938 for a partial cranium, right mandibular corpus, and isolated teeth from Kromdraai near Sterkfontein, South Africa. The fossil had been found by a schoolboy, Gert Terblanche. Broom noted that it not only had large molars and premolars but that if a ruler was placed across the cheekbones, the nasal region was behind the ruler. It was clear that it possessed a naturally dished face, unlike those of Taung and Sterkfontein. Thus, Broom considered it a new genus of ape-man, parallel to man (*Paranthropus*), with robust jaws and teeth. He therefore gave it the species name *Paranthropus robustus*.

Key Issues/Current Debates/Future Directions/Examples

In 1948, Broom and his assistant, John Robinson, found similar fossils at Swartkrans Cave also near Sterkfontein, and named a second species *Paranthropus crassidens*. Swartkrans proved to be a prolific source of *Paranthropus* fossils including crania (Fig. 1, right), mandibles (Fig. 2), two proximal femora, a partial pelvis, and isolated teeth. They ranged from infants to elderly and provided much information on *Paranthropus* morphology (Broom & Robinson 1952). The dished face resulted from the cheek bones having moved forward to make space behind them for the massive temporal muscles that, in males, were anchored to a sagittal crest. Such muscles were necessary to operate the heavily built mandibles that contained huge molars and premolars with low bulbous cusps that wore down to a flat surface in older individuals. By contrast, the canines and incisors were small and cramped into a small space. This emphasis on heavy grinding dentition led Robinson to advance a dietary hypothesis suggesting that *Paranthropus* was a specialized vegetarian.

Another locality rich in *Paranthropus* fossils, including a complete female skull, was discovered by André Keyser (2000) at Drimolen Cave some distance from, but in the same general area as Swartkrans. All of these fossils, together with a few from Cooper's Cave, Sterkfontein Caves, and Gondolin, date to under 2 million years ago and are associated with fauna of a more open grassland environment than that of *Australopithecus africanus*. It is now generally accepted that only one species, *Paranthropus robustus*, is represented.

On the 17 July 1959, Mary Leakey discovered, eroding out of Bed I deposits at Olduvai Gorge, Tanzania, a cranium with colossal cheek teeth, small cramped incisors and canines, a sagittal crest, dished face, and gutter running from the maxillary clivus into the floor of the nose (Fig. 1, left). Louis Leakey named it *Zinjanthropus boisei*, but it is clearly a massive East African form of *Paranthropus*. Phillip Tobias who

***Paranthropus*, Fig. 1** *Paranthropus robustus* cranium SK 48 from Swartkrans (*right*), and *Paranthropus boisei* cranium OH 5 from Olduvai (*left*), with reconstructed mandible

***Paranthropus*, Fig. 2** *Paranthropus* mandibles from Swartkrans

published a monograph on this cranium (Tobias 1967) did not recognize the generic distinction of *Paranthropus* and so classified the Olduvai fossil as *Australopithecus boisei*. Others before him had also considered that *Paranthropus* should be classed as *Australopithecus*. John Robinson, however, who knew the fossils intimately, argued from his experience as both zoologist and paleontologist that because *Paranthropus* could be distinguished clearly from *Australopithecus* on almost any parts of the skeleton, it deserved generic recognition. He was supported in this view by Clarke (1996) and now, with the very large inventory of fossils of several species of *Australopithecus* and three species of *Paranthropus*, many more researchers have accepted the generic distinction.

In 1964, Kimoya Kimeu on an expedition to West Lake Natron, Tanzania, run by Richard Leakey and Glynn Isaac, spotted a mandible high up in an exposure of sediments at Peninj. When he retrieved the fossil, it proved to be a *Paranthropus* in excellent condition with all teeth preserved. Particularly noticeable were the small size of the canines and incisors crowded in front of the huge premolars. Although similar to mandibles from Swartkrans, the Peninj jaw had teeth even bigger, of the size that would fit the Olduvai *Zinjanthropus* cranium. This mandible is classified also as *Paranthropus boisei*.

The Olduvai cranium was dated by potassium argon dating of the layer in which it occurred to 1.75 million years and in subsequent years, some more fragmentary fossils, including isolated teeth of *Paranthropus boisei*, were found at Olduvai.

Many more fossils of this species were later recovered from similar aged sediments on the east side of Lake Turkana (Formerly Lake

Rudolf), Kenya. These included some mandibles even more massive than that of Peninj as well as crania. One magnificent cranium, KNM ER 406, was lying in a dry river bed and spotted by Richard Leakey as he was riding a camel. Although the teeth had been weathered away, the cranial architecture exhibited classic *Paranthropus* morphology of a dished face, extreme postorbital constriction leaving ribs of bone above the orbits, a sagittal crest, and widely flaring zygomatic arches leaving a large space for the temporal muscles. The discovery of a smaller, less muscular cranium, KNM ER 732, showed typical *Paranthropus* morphology and this represented a female contrasting greatly with the males KNM ER 406 and *Zinjanthropus* (OH 5).

A partial cranium containing some well-preserved teeth including a tiny canine was found under a thorn tree at Chesowanja, near Lake Baringo, Kenya, in 1970 (Carney et al. 1971).

Beginning in 1967, several *Paranthropus* mandibular fossils and numerous isolated teeth were recovered in the Omo region of Southern Ethiopia by a joint French and American expedition directed by C. Arambourg, F. C. Howell, and Y. Coppens. One very massive mandible (L7-A-125) dates between 2.15 and 2.25 million years. It is thus much older than the *Zinjanthropus* cranium or the other *Paranthropus boisei* fossils from East Lake Turkana. However, it has been generally assumed to belong to *Paranthropus boisei* (Howell 1978).

Another Omo mandible without teeth was derived from an even older horizon dating to about 2.6 million years. This mandible (Omo 18-1967-18) was made the type specimen of a new genus and species *Paraustralopithecus aethiopicus* (Arambourg & Coppens 1968). It is now, however, classified as *Paranthropus aethiopicus*. Creation of a new species on the basis of this poorly preserved mandible was debatable, but a subsequent discovery of a cranium from West Lake Turkana provided support. The cranium KNM WT 17000 was found in 1985 at Lomekwi and dated to 2.5 million years ago. Because of its color, it was known as the "Black Skull" and its significant differences from *Paranthropus boisei*, coupled with its early date, prompted Alan Walker and Richard Leakey to suggest that it might represent *Australopithecus aethiopicus* (i.e., *Paranthropus aethiopicus*).

Although the Black Skull has cranial architecture typical of *Paranthropus*, i.e., a broad, dished face, extreme postorbital constriction, widely flaring zygomatics, nasal gutter, inflated mastoids, wide supramastoid shelf, prominent sagittal crest, and bases of massive cheek teeth, it has some differences from *Paranthropus boisei* and *Paranthropus robustus*. The anterior dentition occupied a wide space and the endocranial capacity was only 410 cc compared to the 530 cc of *Zinjanthropus*. The facial profile exhibits a pronounced anterior slope, contrasting with the typically much more vertical profile of *Paranthropus boisei* and *Paranthropus robustus*.

The first known cranium with associated mandible (KGA 10-525) of *Paranthropus boisei* was found in 1993 at Konso, Ethiopia (Suwa et al. 1997). The skull and eight other *Paranthropus* fossils were recovered from deposits well dated between 1.4 and 1.5 million years. They are associated with dry grassland fauna.

A very weathered maxillary fragment with damaged first and second molars (RC 911) was found in 1996 in the Chiwondo Beds of Malema in Malawi. The fossil was provisionally dated at 2.4 million years and assigned to *Paranthropus boisei* by Schrenk et al. (1997).

Paranthropus was a widespread African genus of massive-jawed ape-man extending from South Africa to Ethiopia and covering a period of one and a half million years. It is not known outside of Africa. John Robinson had considered that the heavily built mandible of *Meganthropus* from Java was a *Paranthropus* but the teeth are morphologically distinct from that genus and it seems probable that it is an Asian representative of *Homo habilis*, as observed by Phillip Tobias and Ralph von Koenigswald.

Although *Paranthropus* has often been found in areas where there are Oldowan and Early Acheulean stone tools, it is not generally thought

that *Paranthropus* was responsible for making them. *Homo habilis* and *Homo ergaster* also occur in the same areas, and it is believed that *Homo* with its much larger brain was the toolmaker while smaller brained *Paranthropus* relied on its specialized dentition for processing plant foods. The cheek teeth of *Paranthropus* are large and wear to a flattened surface with side to side scratches and pitting, indicating that its molars were natural grindstones.

Because of the massive teeth and jaws with associated strong musculature, *Paranthropus* is often referred to as a "robust australopithecine." This term can however be misleading because some of the so-called gracile australopithecines, i.e., members of the genus *Australopithecus*, often have large teeth and robust jaws that can exceed those of many *Paranthropus* individuals. *Australopithecus prometheus* and *Australopithecus garhi* in particular exhibit large "robust" cheek teeth.

Cross-References

- ▶ Australopithecines
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Olduvai Gorge Archaeological Site
- ▶ Tobias, Phillip V.

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Parchment: Preservation and Conservation

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Introduction

It is believed that processed animal hides were first used as writing materials in Egypt, in the Fourth Dynasty – 2700–2500 BCE (Ryder 1964). The processed hide-parchment-grew in popularity because of the high cost and growing

scarcity of papyrus. Its use spread across the empires of the Babylonians and Assyrians (2300 BCE) and is reported in inscriptions on stone tablets found from the Seleucid era (311 BCE–600 CE); KUSH-SAR appears, meaning "skin writer," and this is contrasted with DUB-SAR meaning "tablet writer."

Parchment was in many respects an ideal writing material because of the practicality of transporting parchment documents, the superior handling qualities, and its durability. It was most commonly used for sacred documents which were likely to endure much use and consultation. Although papyrus was undoubtedly the most common writing medium in the Egyptian empire, by the first century CE parchment had surpassed papyrus in popularity. Parchment sheets were often stitched together to form parchment notebooks which were used for accounts, drafts, and letters. Evidence for this use is provided by the poet Martial, who refers to the availability of parchment codices for use by travelers (Epigrams 1.2 and XIV.184-92) (Reed 1972).

Parchment documents reporting our history are culturally important; they describe – in part – the development of civilization and our progress over time. Using historical documents, we have been able to investigate the important aspects of our ancestors and the origin and attributions of divinity to humans in the ancient world. Some of the most important parchment documents ever discovered, namely, the Dead Sea Scrolls, have contributed significantly to the divine ideology.

Parchment can also provide information about how the methods of producing documents and processing animal hides have developed over the centuries. Furthermore, provenance of parchments provides information about the growth of cities, trade routes, and its economic and social importance in relation to local communities. Preserving such documents is therefore an important undertaking if we are to keep our cultural heritage intact, and parchment research is vital if we are to improve our knowledge of preservation treatments and store these precious documents for future generations.

Definition

The processing of hides into parchment involves treatments to remove a majority of the non-collagenous components such as hair and fat. The most common hides used to make parchment are those from cattle, calves, sheep, and goats. The practice of processing animal hides for the use of written documents has evolved over the last 4000 years; the main points of the manufacturing processes are well known. There are various forms of parchment, and they depend upon the manner in which the animals were killed. Most hides come from animals slaughtered in abattoirs, whereby the animal is thoroughly bled. The draining of blood allows the fine dermal blood vessels to become colorless, making them difficult to visualize in the flayed skin. If the skin is not drained of blood, the iron compounds present in the heme group react with the liming solutions and can form dark stains which are difficult to remove. If the animal has not been slaughtered in an abattoir and killed by a hunter or died of natural causes, blood often remains in the blood vessels and the parchment appears "veined," although this may not be desirable for documents, it is often used to produce decorative book bindings. Most parchments are manufactured from young animals, between 8 and 12 months old; however, occasionally much older animals may be used. The type of parchment from older animals is instantly recognizable, in that it is thick in substance.

The most revered parchments are those manufactured from kidskin and calfskin, which are made from very young animals; these are some of the finest parchments available. The skins are superior in strength and have very smooth grains. The hair follicle markings are exceptionally weak because the blood vessels have not fully developed, and their appearance is fine and hardly visible with the naked eye (Reed 1975).

The strength and durability of parchment is attributed to its main structural component collagen. Collagen is a protein made from polypeptide chains, which are linear polymeric sequences of amino acids. Collagen has a specific rigid

configuration of local ordering (and in some cases long range ordering) of polypeptides chains. Collagen polypeptide chains have an obligate sequence based upon the multiple repetitive amino acid tri sequence Glycine-X-Y, where X and Y are frequently proline and hydroxyproline (imino acids). The small glycine amino acid affords the tight turn of the helical structure and its intimate relationship with two neighboring polypeptide chain sequences to form a triple helix. This metastable entity is well recognized in many tissues of the extracellular matrix. It can be described as a structural motif that polypeptide chain sequences rich in glycine and amino acids can lock into. Furthermore, the strong ropelike structure has to be perturbed significantly in order to push the local conformational stability toward a more global entropically stable state – gelatine. More detailed descriptions of collagen structures at a variety of architectural levels have been documented by Wess in (Fratzl 2008).

In skin (hide) and subsequently parchment, the fibril-forming type I and type III collagens are present. The structure of the collagen hierarchy for fibril-forming collagen types from the triple helix to the fibril and thence fiber has been widely investigated and its mechanical properties reported. Collagen polypeptide chains wind into a triple helix to form a collagen molecule, collagen molecules are then consecutively arranged to form a fibril, fibrils are arranged into bundles to form fibers, and fibers are arranged to form a collagen tissue.

The collagen triple helix is "locked" into its rope like structure. The stability of the triple helix and the collagen tissue is the result of extensive intramolecular and intermolecular bonds. The triple helical collagen molecule is stabilized by intramolecular bonding between the amide group of the glycine residues and the carboxyl group of the proline residue and water mediated hydrogen bonds. Additional stability of the collagen hierarchical assembly and aggregation of the collagen fibril is conferred to further intermolecular bonding such as cross-linking at the terminal ends of collagen molecules. There are several factors that also contribute to triple helix stability and these are well documented.

The loss of structural integrity and subsequent fragmentation of parchment are attributed to the loss of the structural order of the parchment's collagen component. When collagen molecules lose their characteristic triple helix motif, they tend to adopt a random geometry, producing a disordered structure – gelatine.

The denaturation and unfolding of the collagen triple helix post mortem requires two components: firstly, an agent to break molecular bonding and perturb the structure and secondly, water to cause osmotic swelling and force the polypeptide chains apart from one another. The agents that can cause molecular bond disruption are numerous. They include high and low pH, UV irradiation, and heat. In parchment, the measurement of degradation has been widely investigated (Gonzalez & Wess 2008).

The absence of the hierarchical structural organization and random chain conformation in gelatine means that the mechanical properties of gelatine are different to the parent collagen. The change in the mechanical properties is brought about because the random chain conformation exposes more sites for ionic and covalent molecular bonding to occur. When dry, gelatine is more resistant to deformation than the parent collagen tissue, and when wet, it has the potential to hold more water than the parent collagen tissue (Yakimets et al. 2007). This means that parchments can hold different amounts of water at the same relative humidity, depending upon their relative proportions of collagen and gelatine.

Key Issues and Future Directions

Preserving Parchment Artifacts

Archives and institutions that house parchments manage their collections to make the parchments available for use. Parchments are incredibly stable materials and when well preserved can survive for thousands of years. However, the continual problem archives face is that parchments change over time; they can, for example, discolor, fragment, tear, curl, and become brittle. The change of parchment artifacts can occur very slowly, and this can be – in part – controlled by

the environment that the parchment is housed in; for example, storage rooms can have their temperature, relative humidity, and amount of light controlled. Further preservation can be enhanced by conservation treatments and the way the documents are handled (Larsen 2007). The care taken when handling documents is focused upon preventing damage as the objects are moved and read. For example, books should never be pulled from the shelf by their spine using fingernails as this could cause scratches to the covering material. It is also recommended that a hand be placed over the cover of the book and to gently slide the book forward until it can be grasped securely to remove it.

Managing the "change" of parchment collections is a difficult task because it requires a balance between making parchments available to users and protecting the integrity of the object. The array of factors that cause degradation has subsequently led to a growing need to understand how to prevent deterioration and how to store documents more effectively. The macroscopic properties of parchment have been used extensively as a qualitative means of identifying degradation of parchment. Parchment research over the last two decades has developed significantly by providing quantitative evidence of degradation within parchment; this has been through spectroscopic, thermal, and structural analysis, which has in turn informed management of collections and the effectiveness of conservation treatments (Larsen 2002). The next section provides a brief overview of how these different parchment research areas and how they have contributed to our current knowledge of parchment and the best methods for preservation.

What Do We Need to Understand to Provide the Best Preservation and Conservation for Parchments?

In the last 20–30 years, the availability of scientific techniques to the field of conservation has meant that new understandings of the parchment material and how it behaves have led to more evidence-based decisions. In this time it has been possible to work toward defining the chemical and structural changes within parchment that contribute toward the overall change of a parchment manuscript. To aid in the preservation and conservation of parchment, the following (among many) research questions can be addressed:

What Is the Structural Composition of Parchment?

Parchment as a form of treated dried skin can be analyzed using techniques that have evidenced the molecular hierarchical organization of many biological tissues. Here, the production process and subsequent storage or treatment can cause alteration in the molecular structure of the material as well as influence the differential hierarchical and stratigraphic nature of parchment. Microscopic evaluations of parchment tend to mostly be qualitative and examine textural differences within specific sites of parchment samples; electron microscopy by transmission or scanning modes also tends to have a more qualitative view of the hierarchical organization and nanostructure of fibrils being evidence or otherwise (Kautek et al. 2000). X-ray diffraction has provided a more robust way of furnishing structural information about parchment since the diffraction signal for collagen is relatively well characterized and very strong in terms of biomaterials. The intensity of the diffraction pattern and the changes that occur due to increased disorder in the sample and the presence of the lipid and mineral can all be captured in the same diffraction images (Kennedy et al. 2002). The potential to evidence the presence of gelatine in the parchment is more challenging due to the ill-defined structural basis by which gelatine is characterized as opposed to collagen. However, the ability for X-ray diffraction to collect the contribution made from several billion molecules simultaneously can provide a statistically useful qualitative analysis of the structural composition. This can be further aided by an analysis of the structural heterogeneity within the parchment from the flesh to grain side by the use of Microfocus X-ray diffraction. Typically, X-ray beams used are of the order 100–200 μm in diameter; taking thin sections of parchment samples, an X-ray beam can be used to selectively scan the parchment thin

section from the flesh to grain side; this can reveal the stratigraphy of the parchment and allows the possible effects of ink penetration to be evaluated. Spectroscopy can also be used as an efficient way of examining molecular change within parchment and is especially useful where the penetration of the probing radiation such as infrared can be limited to the first few microns on the surface of an object.

How Does Parchment React with Relative Humidity?

Having defined parchment as a composite hierarchical material with a stratigraphic variation in composition and organization from flesh to grain size, it is likely that such material has a complex relationship with thermal changes and relative humidity. Although it may be attractive to imagine that parchment may behave differentially in thermal and humid settings, the quantitative evidence of this has been challenging. Thermal studies of parchment are often used to monitor the melting of collagen fibers to detect the susceptibility of parchment to be compromised by any storage or treatment strategy. Quantitative studies have been used to detect the fire damage that a parchment may have been exposed to (Fessas et al. 2000). Systematic studies where changes in relative humidity have been used to see if a lasting imprint is made on parchment have been more challenging. Few studies have been conducted in this area, and the results are difficult to interpret in terms of providing evidence regarding the best possible storage conditions for parchment documents (Hansen et al. 1992; Dernovskova et al. 1995).

What Are the Degradation Processes Within Parchment and How Can We Measure Them?

The main considerations of change in parchment are those that affect the functionality of a document, that is, the contrast with which it can be read and the ability for it to be handled. The change from collagen to its entropically stable partner end state of gelatine leads to fragility; however, the relationship between macroscopic behavior such as cocking and tearing has been difficult to correlate causally with molecular change. Discoloration of parchment as a significant factor of change needs to be considered; although this has for some time been believed to be related to the presence of gelatine, this has more recently been shown to not be correlated to other physical changes, and the mechanism of discoloration possibly resided in more complex chemistries involving lipid and sugar residues (Gonzalez et al. 2012).

How Do Conservation Treatments Affect Parchment?

The development of intervention strategies for conservation of materials has to be approached with caution. There are several causes where strategies for conservation have caused more damage than good. Strategies for deacidification (especially in papers) and lamination of both paper and parchment have both produced unintended and damaging consequences. The potential for new developments in conservation treatment and the efficacy of established treatments can be assessed in the light of analysis of the integrity of the parchment in terms of surface and substructure. A good example is the use of X-ray diffraction to examine the potential damage through laser cleaning of parchment objects (Kennedy et al. 2004). Results showed that the collagen within parchment remained intact after laser cleaning, but parchment collagen could be damaged by exposure of laser cleaning using dwell times for cleaning longer than those advised or used routinely.

Can We Advise on a Strategy for Storage?

The scientific evidence described above can be used to inform strategies for conservation and storage. More work will have to be done in terms of longitudinal studies that will monitor and provide numerical analyses of the effects of different parchment storage environments. In terms of work conducted so far, it must once again be stressed that parchment is a stratigraphic material and that the structurally most vulnerable part of the parchment is the gelatine component and the collagen component that is predisposed to denaturation. Techniques therefore need to identify the most vulnerable

parchments in collections and also be useful in identifying the region of the parchment most at risk. For example, a future phased conservation strategy may use our scientific knowledge to prioritize the parchments that have the highest gelatine content for storage under more stringent conditions and for the parchments with the highest collagen contents to be exposed to a more relaxed and cost-efficient variable RH and temperature regime.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology

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Parker, Arthur Caswell

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Basic Biographical Information

Arthur Caswell Parker (1881–1955) was the first Native American to become a professional archaeologist. He led an often contentious but ultimately successful career as an archaeologist and museologist in New York for more than five decades.

Born on the Cattaraugus Reservation in western New York, Parker firmly considered himself to be a Seneca Indian of the Iroquois (Haudenosaunee) nations. However, Parker's mother, Geneva Hortense Griswold, was originally from Connecticut and of English and

Scottish ancestry. In 1879, Geneva married Arthur's father, Frederick Ely Parker, who was descended from a line of prominent Senecas, though his own mother was also Anglo. As a result, Parker's identity was ambiguous because the Seneca trace descent matrilineally while the US government traces descent patrilineally, although Parker was formally adopted into a clan and given the name Gawasowaneh in 1903.

Parker lived on the Cattaraugus Reservation until 1892, when his family moved to White Plains, a suburb of New York City. Eventually, Parker found his way to the American Museum of Natural History, where he befriended Frederic W. Putnam, then one of the luminaries of American anthropology. Parker became one of the "Putnam Boys" – which also included M. Raymond Harrington, Alanson B. Skinner, and John W. Fenton – a handpicked group of promising young students. In 1899, Parker was hired on an occasional basis at the American Museum as an "archaeological assistant." In 1903, Putnam invited him and Harrington to lead an archaeological expedition under the auspices of the Peabody Museum at Harvard University. As codirectors, Parker and Harrington productively excavated the Silverheels Site on the Cattaraugus Reservation. This experience led Parker to quit college at Dickson Seminary, to pursue a career in archaeology.

After several difficult years of temporary jobs, Parker became the first New York State archaeologist in 1906. In this role, he published widely on Iroquois ethnography (e.g., Parker 1910, 1923) but also conducted original archaeological research, focusing principally on developing a culture history of New York. Parker greatly expanded the collections of the New York State Museum and produced one of the first major scientific compendiums of the state's ancient past (Parker 1922). Parker was also involved during this period in political advocacy, campaigning for a pan-Indian nationalism, through the Society of the American Indian (Berg 2000). In 1924, Parker resigned from his state position and became the director of the Rochester City Museum. He thrived in this position, remaking the institution into the Rochester Museum of Arts and Sciences, although his administrative duties required that he reduce fieldwork and archaeological research. Parker retired in 1945, but continued writing and publishing (e.g., Parker 1952). He died in 1955, suddenly, from a heart attack.

Major Accomplishments

Although Parker did make noteworthy contributions to the archaeology of New York (Sullivan 1992), he is principally known today for his accomplishments as a museum archaeologist, a passionate advocate for scientific archaeology, and a promoter for the protection of archaeological resources. His early diorama exhibits were long considered as setting the standard for the industry, and he is credited with coining the term "museology." Parker often directly involved the public in research activities, shared the results of archaeology with the public, and published for myriad public audiences, including children (e.g., Parker 1928). Parker was also intensely involved in protecting archaeological sites, particularly from looters and casual avocational excavators (e.g., Parker 1938).

Parker's other major accomplishment was his novel ability, as a self-identified Native American, to have a fruitful career in archaeology during a period in which few ethnic minorities could participate in the sciences. Despite the bias and bigotry he faced, Parker reached some of the highest offices in the field: Parker served as vice president of the American Association of Museums (1927) and president of the New York State Archaeological Association (1932), Society for American Archaeology (1935), and New York State Historical Association (1945). He became a fellow of the Royal Society of Arts and also the American Association for the Advancement of Science and received numerous awards and honorary degrees. Parker's successes

as a professional archaeologist demonstrated more than a century ago that Native Americans could contribute, significantly, to the field.

Cross-References

- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Indigenous Archaeologies
- ▶ Heritage Museums and the Public
- ▶ North America (USA and Canada): Museums
- ▶ Society for American Archaeology (SAA)

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Parks Canada: Historical Archaeology

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Basic Information

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http://www.pc.gc.ca/eng/progs/arch/index.aspx

Major Impact

Parks Canada is the primary institution conducting historical and underwater archaeology in Canada. It has been honored by the Society for Historical Archaeology for single-handedly establishing the discipline of historical archaeology for an entire nation. Parks Canada is the federal government agency responsible for national parks, national historic sites (NHS), and national marine conservation areas throughout Canada. Historical archaeology research, on land and underwater, supports cultural resource management (CRM) at historic sites within the national parks and at operating NHS and supports the Historic Sites and Monuments Board of Canada, the federal advisory board responsible for identifying places, persons, and events of national historic significance. Since the formation of regional offices in 1963, specialist archaeological, curatorial, and conservation staff have been stationed in Ottawa, in four regional service centers and at the Fortress of Louisbourg NHS. In 2012, however, Parks Canada began a significant reorganization that will centralize a reduced cultural service function in Ottawa.

Historical archaeology at Parks Canada began in 1961, when archaeologists were needed for the applied research behind an ambitious program of

Parks Canada: Historical Archaeology,
Fig. 1 Video 3D laser survey of Fort Conger NHS, showing the remains of the 1881 station built by Greely to house the Lady Franklin Bay Expedition on Ellesmere Island, Quttinirpaaq National Park (Courtesy of Margaret Bertulli (Parks Canada), Peter Dawson and Richard Levy (University of Calgary), and Chris Tucker (Point Geomatics Ltd.). For more information about the NHS, please see http://www.pc.gc.ca/eng/pn-np/nu/quttinirpaaq/natcul/natcul6.aspx)

restoration and interpretive projects in an expanding park system. A separate Fortress of Louisbourg restoration section was also created to support a monumental reconstruction of the eighteenth century fortified townsite. The archaeologists rapidly developed research skills and material culture expertise that were not found elsewhere in the country.

Canada's centennial in 1967 was a time of optimism and growing public interest in heritage conservation. The restoration projects of the 1960s and 1970s were at NHS chosen to reinforce national identity, create employment in the regions, and support a historical narrative of social and economic progress. For example, Castle Hill, the Halifax Citadel, Fort Beausejour, and Fort Lennox spoke to the battles of the colonial period. Les Forges du Saint-Maurice spoke to early industrial history and Fort Wellington to the War of 1812. Lower Fort Garry, Rocky Mountain House, and Fort Langley spoke to the expansion of the fur trade into Western Canada. The Nuu-chah-nulth village of Yuquot on Vancouver Island spoke to the first contacts between a thriving First Nation and European explorers in the late 1700s.

Since then, NHS commemoration has changed in emphasis from reconstructing buildings as the centerpiece of a relict landscape, frozen at one point in historic time, to valuing structures and artifacts for their witness to the evolution of a cultural landscape over time. In the national parks, archaeology is integrated with an array of resource management interests, seeing human presence as part of an ongoing ecological relationship, with historic sites as only the most recent layer. Parks Canada also has a strong national presence in precontact period archaeology, and often the line between historical and precontact archaeology is blurred. This is particularly true in the large western and northern parks established under modern aboriginal treaty provisions, where traditional land use continues, and CRM is a joint responsibility with First Nations.

Recent historical archaeology projects emphasize visitor experience and public education, as well as research. An excavation at the early seventeenth century Saint-Louis Forts and Châteaux was visited by thousands during Québec City's 400th anniversary celebrations. A 3D laser survey of Fort Conger NHS, at the northern tip of Ellesmere Island, provided a detailed virtual rendering, so the public can experience an otherwise inaccessible site (Fig. 1). Public archaeology projects run at the

Acadian farmsteads of Beaubassin and the Bar U Ranch. Increasingly, work at historic sites is salvage in nature, responding to threats of erosion from changes in sea level on subsiding coastlines (e.g., at the Fortress of Louisbourg) or from melting permafrost and riverbank erosion (York Factory and Fort Prince of Wales in the Arctic).

Parks Canada has an internationally renowned underwater archaeology unit. Since 1965, archaeologists have undertaken a wide range of inventory, CRM, and research projects. The most extensive have been an investigation of nine different vessels at the sixteenth century Basque whaling settlement at Red Bay, Labrador, and recent searches in Arctic waters for the *Erebus* and *Terror*, the lost ships of the Franklin expedition, and McClure's *Investigator*, abandoned in 1853 during the search for Franklin.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: Cultural Heritage Management
- ▶ Canada: World Heritage

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Parthenon (Elgin) Marbles: Case Study

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Introduction

The Parthenon (Elgin) Marbles are a group of marble sculptures from the Athenian Acropolis owned since 1816 by the British Museum. They have gained twofold significance, as pieces that encompass the glory of classical Greece and as perhaps the most famous case related to the issue of repatriation of material culture up to now. For more than 200 years, they have been appropriated as signifiers of identity by Britain and Greece and have been one of the most pervasive national claims by the Greek governments.

Definition

The "Elgin Marbles," as the British Museum is obliged by statute to refer to this group of artifacts since their acquisition in 1816 (Hitchens et al. 1997: viii, 17, 43), or the "Parthenon Marbles," as the Greek official national rhetoric addresses them (Yalouri 2001: 97-8), are a group of marble sculptures, statues, inscriptions, and architectural members that, between 1801 and 1802, were removed from the Athenian Acropolis, at the time under Ottoman occupation, by the Seventh

Earl of Elgin, Thomas Bruce (Greenfield 1996: 330, Hitchens et al. 1997; Hamilakis 2007).

The most renowned group of these artifacts is the ensemble of the marble sculptures which belonged to the fifth-century BCE Parthenon Temple that depict mostly scenes from the Greek mythology. Almost half of its sculptures are currently displayed in the British Museum and the other half in New Acropolis Museum of Athens. In addition, fragments from the Parthenon sculptures can be found also in other museums, in France, Denmark, Germany, Austria, France, and Italy (Greenfield 1996). The monument's fragmentation has been the issue of intense ongoing debates, and the Parthenon (Elgin) Marbles are firmly entangled with the demand of the repatriation of cultural heritage.

Key Issues/Current Debates/Future Directions/Examples

Repatriation of cultural heritage is not an easy to tackle issue, as it is connected to the question "who owns cultural heritage?" Is it the nation and its subjects? Is it individual collectors? Is it local communities? Museums? Or humanity at large? The answer is rather complicated, especially because in the case of the Parthenon (Elgin) Marbles, the international conventions for the protection of cultural heritage (the Hague Convention of 1954, the UNESCO Convention of 1970, and the UNIDROIT Convention of 1995) do not apply, as the Parthenon (Elgin) Marbles were acquired before the conventions' inception. Therefore, it is necessary to look into the historical dimensions of the debate, especially the context of the Marbles' removal from the Athenian Parthenon in the era of British colonialism, and reflect on the history of collecting which formed the modus operandi of many contemporary world museums (Curtis 2006: 118).

Classical art offered to the British Empire a sense of rebranding through culture (Greenland in press: 3), because the aesthetic values through which it was viewed were thought to signify harmony, morality, and excellence, virtues that perfectly suited upper-class Britain. Thomas Bruce, as the British Ambassador to the Ottoman Empire (1799–1803), benefitted from the auspicious British-Ottoman political relationships that were developed during the French-Turkish war, when Britain became an ally of the Ottoman Empire rivalling France on a political, military, and cultural level (Greenfield 1996: 335). The acquisition of the Elgin marbles, with a controversial permit obtained from the Ottoman administration, was for the British a matter of power and authority vested with cultural connotations. British imperialism was thus ascertained through the projection of Britain as the successor of classical Athens that managed to rescue the classical material culture from destruction (Greenfield 1996: 337).

The fact that a foreign culture was being appropriated by the British imperialist narrative did not seem to be at odds with the national and supranational sentiments at the time (Greenland in press: 6). That is exactly because the Parthenon (Elgin) Marbles were deemed as pre-national, having been created prior to nation-states by a culture with a sociopolitical formation different to that of the Nation (Greenland in press). Hence, the Parthenon (Elgin) Marbles were considered cultural products of a long lost civilization, the remnants of which were only ruins found in the then Ottoman-occupied Athens. This ambiguous state of being enabled them to acquire a dual subsistence by belonging to no one in particular and simultaneously to everyone.

This universalist approach is in absolute synch with the concept of the universal museum, that is, the encyclopedic museum, which presents itself as a representative of the whole humanity (Cuno 2006; 2011). Encyclopedic museums, the British Museum among them, are thought to promote diversity of world cultures and the "spectacular" art that is mankind's common heritage. As stated in the website of the British museum, "the Museum is a unique resource for the world: the breadth and depth of its collection allows a world-wide public to re-examine cultural identities and explore the complex network of interconnected human cultures. The Parthenon Sculptures are a vital element in this interconnected world collection. They are a part

of the world's shared heritage and transcend political boundaries" (the British Museum n.d.).

Supranational narratives are the core of the encyclopedic museums, which are rendered world museums. Regarding the Parthenon (Elgin) Marbles, the British Museum shapes its argument by drawing on the fact that their fragments exist divided in museums of eight countries in total (Hitchens et al. 1997: 109-115; Hamilakis 2007; Greenland in press), which supposedly enables different stories to be told. This argument reproduces the nineteenth-century British narrative and colonial ideas about the universalism of culture, while it adeptly overcomes the issue of the monument's fragmentation. Nonetheless, the Marbles also elevate the position of the British Museum as a world museum, where high art can be admired by visitors from all over the world, art with no nationality but with supranational world significance.

That is precisely the argument employed against claims for the repatriation of the Parthenon (Elgin) Marbles, as the term "world heritage" overrules other claims of ownership (national claims, as far as the Marbles are concerned) and repatriation, validating their retention in the British Museum (Simpson 2005: 253-4).

Yet, Greek demands for the repatriation of the Parthenon (Elgin) Marbles began right after the formation of the independent Greek nation-state, in 1830, striving to confirm homogeneity and continuity between ancient and modern Greece. In this process, classical antiquities acquired nationality and were the driving force towards the construction of a coherent national identity. The assertion of direct lineage with classical Greece allowed Greek governments to demand the exclusive ownership of antiquities, the materiality of which provided the newly founded nation-state with strong visual images, recognizable among the European elites.

Eventually, the Acropolis was inscribed on the World Heritage list in 1987, described as "Illustrating the civilizations, myths and religions that flourished in Greece over a period of more than 1,000 years, the Acropolis, the site of four of the greatest masterpieces of classical Greek art – the Parthenon, the Propylaea, the Erechtheum and the Temple of Athena Nike – can be seen as symbolizing the idea of world heritage" (UNESCO 1988).

Over the years, there have been many occasions which signified the resurgence of the demand for the Marbles' repatriation, starting with the speech of the then Minister of Culture Mrs. Melina Mercouri at the World Conference on Cultural Policies (Mexico City, 29 July 1982) organized by UNESCO, reaching their peak in 2004 when Greece hosted the 2004 Olympic Games, as well as in 2009 when the New Acropolis Museum was inaugurated, and in 2012 when the Ministry of Culture and Tourism established an Advisory Committee in order to proceed with a planning strategy towards the return of the Parthenon Marbles and the fulfillment of this national goal (Greek Ministry of Culture, 19/09/2012).

Apart from the claims of ownership, another powerful argument is the unification of the monument itself, the cultural biography of which continues being fragmented. The fact that the Parthenon (Elgin) Marbles, once returned to Greece, will be put on display in the New Acropolis Museum and not on the Parthenon itself does not weaken the sense of the monument's reunification, as the visual contact and close proximity of the sculptures to the monument would create a materially contingent ensemble.

The desire for reunification is clearly expressed within the New Acropolis Museum, where the demand for the repatriation of the Parthenon (Elgin) Marbles is transformed into a physical experience, as the visitor is called to engage with the notion of void and absence. Empty spaces are left to indicate the missing pieces, most of which are displayed in the Duveen Gallery of the British Museum. While this is not the space to discuss the museological parameters of the Marbles' display in the British Museum or the symbolic use of space behind the architectural construction of the New Acropolis Museum, it is noteworthy that the New Acropolis Museum achieved to display a collection which it does not possess (Lending 2009: 572).

Absence is not just spatially denoted but also discursively constructed through the prevailing

narrative in the Greek press, around the time of the New Acropolis Museum's inauguration, which ascribes human qualities to the Parthenon sculptures on display. The sculptures appear to talk, to cry out, to yearn, to hurt, to call their abducted siblings in London, in an obvious attempt to "speak the same language" as the visitors. The personification of antiquities and the attribution of human characteristics and emotions to the museum exhibits facilitate the process of familiarizing subjects (visitors) and objects (sculptures), process which consolidates their meanings to the point of idealization. Unification demands are further reinforced through the sense of victimization and trauma, since the sculptures are presented in the Greek press with attributes of wounded humans. Words such as fragmented, dismembered, and wounds, and references to destruction, looting, and rape, emotionally charge the communication between the public and the past emphasizing on the unfulfilled claim for the Parthenon (Elgin) Marbles' repatriation (Stefanou in press).

There is a number of national and international committees for the reunification of the Parthenon sculptures (International Association for the Reunification of the Parthenon Sculptures n.d.), from the British Committee for the Restitution of the Parthenon Marbles to the most recent one founded in Greece in September 2012 by the Ministry of Culture, which was established to persistently pursue the return of Parthenon Marbles. Movements in favor of the Marbles' repatriation do not only stem from official agents, as various protests are held from time to time outside the British Museum, with the last one held on 20 October 2012 by the Cypriot Students' Union and the "I AM GREEK AND I WANT TO GO HOME" Independent Voluntary Movement for the Repatriation of Looted Greek Antiquities.

The main issue at stake now is whether the Parthenon (Elgin) Marbles should continue being on display in the universal British Museum, treated as aestheticized masterpieces of world art, or whether they should be recontextualized by returning to Athens in order to be displayed in the New Acropolis Museum.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology
- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Elgin, Lord Thomas Bruce
- ▶ Greece: Cultural Heritage Management
- ▶ Heritage & Society
- ▶ Heritage and Archaeology
- ▶ Heritage and the Need for Theory
- ▶ Heritage Museums and the Public
- ▶ Heritage: History and Context
- ▶ Religion, Greek, Archaeology of

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Pathological Conditions and Anomalies in Archaeological Investigations

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Introduction and Definition

The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." This definition has not been amended since 1948 (http://www.who.int/suggestions/faq/en/, accessed October 2011).

Pathological Conditions and Anomalies in Archaeological Investigations, Fig. 1 Sculpture showing possible tumor on left eye

This of course is a definition that relates to living populations but could be equally applied to the past. Being unhealthy today compromises normal life and the very function of society; this would have been true for our ancestors all over the world.

How can we study our ancestors' health? It is possible to access information pertinent to health and disease in the past by studying historical documents describing disease, and viewing artistic representations of disease in particular periods in time (e.g., Fig. 1). In prehistoric times, these types of evidence are relatively nonexistent and they are more useful for more recent periods, for example, the medieval period in Europe. Our primary form of evidence for disease and injury in the past comes from human remains excavated from cemeteries and other funerary contexts dating from when the earliest humans appeared on the planet (Fig. 2). This study is named "palaeopathology" and is defined as the study of disease in the remains of both human and nonhuman remains, as first defined by Marc

Pathological Conditions and Anomalies in Archaeological Investigations, Fig. 2 Medieval cemetery excavation

Armand Ruffer in 1910 (Aufderheide & Rodríguez Martín 1998). It is a subdiscipline of "physical or biological anthropology" which, in turn, is a part of the discipline of "Anthropology" (Roberts & Manchester 2010; Buikstra & Roberts 2012). The Paleopathology Association provides the infrastructure for people working in this field, an Association based in the United States that has its origins in 1973 (http://www.paleopathology.org/

While most work in the early history of palaeopathological study was on animal remains, now there is much more work focused on humans rather than other animals. Much of the early (human) work concentrated on evidence of disease in individual skeletons ("case studies"), but over the last 50 or so years there has been much more of a trend toward looking at "population" health and the consideration of larger groups of skeletons from specific funerary contexts (e.g., see deWitte & Bekvalac 2010). However, "Case studies" can provide invaluable information about the presence of a disease in a particular geographic context and time period, but the data cannot be applied to understand general population health in that place and/or time (e.g., see LeFort & Bennike 2007). In more recent times there has also been a focus on bringing together large amounts of data to study the history of specific diseases, and the application of newly developed methods to diagnosing disease in human remains (see below). Most human remains that palaeopathologists study consist of skeletons, and therefore any disease that only affects the soft tissues of the body will not be seen, unless more advanced analytical techniques are used, for example, ancient pathogen DNA analysis. Not only are historical documents and artistic representations in this instance invaluable to access information about diseases that do not affect the skeleton, pathogen DNA analysis is starting to detect those soft tissue diseases.

A key factor to remember in utilizing the evidence of disease in human remains to reconstruct the origin, evolution, and history of disease is to place the data in archaeological context, termed the bioarchaeological approach (Buikstra & Beck 2006). For example, if there is evidence on ribs of a high rate of respiratory infection in a population then it is essential to explore what type of living conditions the population had, how many people lived in the community and its density, and whether the housing conditions would have predisposed to transmission of the infection. By using archaeological evidence of settlements and housing, it is possible to assess how living conditions prevented or put at risk the community's inhabitants. Using a bioarchaeological approach is the key to understanding why and when

diseases appeared in populations at specific times. It also enables a "themed" approach to be taken, by concentrating on using the pathological evidence to discuss particular "themes" such as diet and economy, work, indoor, and outdoor living environment, access to health care, and the impact of age, sex, gender, ethnicity, social status, migration, and climate on health within those broad themes (Roberts 2009: Chap. 6).

Palaeopathology is a thriving discipline. It contributes the time depth to studying disease that medical doctors today cannot hope to achieve when diagnosing and treating patients with disease over relatively short time periods. It also provides data on how bones and teeth are affected in disease, and sometimes the pathological changes recognized in skeletal remains are invisible to doctors today because the changes are too subtle to even detect with radiographic techniques (e.g., Lambert 2002).

Pathological Conditions and Anomalies in Archaeological Investigations, Fig. 3 Dental caries in a molar tooth (Courtesy of Anwen Caffell)

Pathological Conditions and Anomalies in Archaeological Investigations, Fig. 4 Woven bone formation on calcaneum, or heel bone

Pathological Conditions and Anomalies in Archaeological Investigations, Fig. 5 Lamellar bone formation on long bone

Key Issues

How Are Pathological Conditions Studied in the Archaeological Record?

The focus now is on skeletal remains. Disease is recognized in the skeleton by bone formation and bone destruction, or a mixture of the two. Teeth may also be destroyed, for example, in dental caries (Fig. 3), and dental disease can be accompanied by bone formation and destruction in the jaw bones. Bone formed may be classified as "woven" or lamellar" (Figs. 4, 5). In the former, the bone is immature, porous, and disorganized, indicating the disease process was active at the time of death of the person; the latter is smoother and more organized and indicates the person survived for some time with a disease such that the initial woven bone was transformed into healed lamellar bone. Lamellar bone indicates evidence for chronic disease. These changes are recorded for each skeleton and then their distribution pattern considered, bearing in mind that not all skeletons are completely preserved. It is known in the clinical record that diseases affect the skeleton differently. For example, the autoimmune disease rheumatoid arthritis affects the synovial

joints of the neck vertebrae, and of the hands, feet, shoulders, elbows, wrists, and knees, symmetrically (Resnick 1995), and in the bacterial infection tuberculosis, destructive lesions of the lower spine, hip, and knee joints are most commonly seen. Differential diagnosis for lesions detected in each skeleton must be discussed because the skeleton can only be affected by disease in a limited number of ways (bone destruction or formation); so several diseases may be possible diagnoses for the bone lesions seen, especially if the skeleton is fragmentary. However, while there are clinical data that provide these characteristic bone changes and distributions for each bone disease, it has to be assumed that the changes and their skeletal distribution have not changed throughout time. Standards for palaeopathological data collection have been developed so that data are collected in the same way by all palaeopathologists; this means that valid comparisons of data can be done (Buikstra & Ubelaker 1994; Brickley & McKinley 2004). Other methods of diagnosing disease in skeletal remains are also used, including histological, radiographic, and biomolecular analyses, and it is the data derived using these methods that are developing more nuanced diagnoses and interpretations that are having an impact on our further understanding of the history of disease.

Following collection of the data, disease frequency rates are produced and, by linking these rates to contextual data from each site, this will show how common or how rare certain diseases were for that population compared to others, perhaps of the same time period and geographic region, but also for different time periods and regions. For example, studies of fractures to bones of people who lived in Medieval British urban contexts varied from 0.3 % to 6.1 % of the total bones examined for each of six sites, with the highest rate being seen in London and the lowest at a site in Scotland. Thus, it can be seen that, even in the same context, injury rates can vary and this will be related to similar and different risk factors specific to particular sites and regions. Along with using archaeological data, to interpret the disease patterns seen, contemporary medical historical information may be available. Palaeopathologists are also increasingly using medical anthropological research to inform their findings, medical anthropology being the study of health and disease often in traditional living communities and usually in developing countries. They are also beginning to work alongside scholars from evolutionary medicine (e.g., Trevathan et al. 2008), a discipline that will benefit more and more from the deep time approach of palaeopathology.

What Are the Limitations to Palaeopathology?

Wood and colleagues' "Osteological Paradox" paper (1992) provided an opportunity for palaeopathologists to reflect on their discipline, a paper that is as relevant today as it was then. They highlighted a number of problems with inferring health from the skeleton: the impact of the state of preservation of the skeleton on what can be recorded, the fact that soft tissue diseases cannot be detected, that people may have died before bone changes could occur, that often small samples of skeletons were being studied and their representation of the living population was questionable, and that there was a focus on individual skeletons rather than larger skeletal samples. They also emphasized that those with evidence of disease were the "healthy" people, i.e., those who had survived the acute stages of a disease and lived long enough for bone changes to occur and become "healed" mature bone. They furthermore pointed out that it was not possible to detect individual variation in risk of disease and death using skeletal samples, and that the sample studied had undergone selective mortality, i.e., they were the dead part of the original living population – so how representative of the living were they? Other factors to be considered was the nonstationary nature of populations (in- and out-migration), the lack of nonadults in most samples (thus negating much inference about the health of that portion of society), the subjective nature of ageing adults and the problem of estimating sex

of nonadults, the lack of information about cause of death (it is only possible to suggest what people suffered during life), that pathological bones are fragile and may deteriorate in the ground and not be excavated or analyzed, and that it was important to be able to detect postmortem changes versus pathological ones, and also skeletal characteristics that represent normal variation. This long list perhaps suggests that there is not much point in spending too much time on palaeopathology but, while Wood et al. (1992) is still very current and is required reading for all palaeopathologists, there have been developments that have addressed some of their concerns.

Those developments include emphasizing the importance of providing true prevalence rates for disease, i.e., how many bones or teeth observed have changes attributable to specific disease processes, which can account for poor preservation of skeletal remains (see Roberts & Manchester 2010: 9-10). Bayesian analyses are also helping to more accurately reflect the ages of adults. The increase in ancient pathogen DNA analysis to detect and diagnose disease in skeletal remains means that soft tissue diseases can potentially be identified. DNA analysis in the living can also provide an indicator of genetic risk of disease; it is anticipated that this is an area that could see development in bioarchaeology. DNA analysis can also be used to estimate the sex of nonadult remains. Larger sample sizes are also now studied which means that the data on disease are, in theory, more representative of the disease experience of the general population. Furthermore, stable isotope analysis to explore mobility in bioarchaeology will increasingly provide information on how mobile people were in the past and whether that mobility could have potentially affected the demographic and morbidity profiles of a dead population being analyzed. Additionally, there has in recent years been more of a focus on the juvenile part of the archaeological past which has led to the seeking out of cemetery samples that represent that section of society. Better training of bioarchaeologists has also led to the more reliable differentiation of antemortem, perimortem, and postmortem skeletal changes, although poor preservation of pathological bones remains a challenge.

Past and Current Work, Including Debates

Initially, most work in palaeopathology consisted of "case studies," as discussed above, which is still the case, although population based work is much more common. Some parts of the world have contributed exponentially more information about palaeopathology than others, for example the United States and United Kingdom. "Case" and "Population" studies both have their part to play in palaeopathology, but it is the latter that provides a broader view of past health at the population level. In addition to studies of individual and population health from around the world, there have been some studies of health through time in particular countries or continents. In many of these broader studies there appears to have been a decline in health through time as societies became more complex. Palaeopathological studies now frequently aim to answer specific questions or test hypotheses about health, based on what is known about the prehistory or history of a specific population or place; this might be to consider the effect of a transition such as from hunting and gathering to agriculture or from rural to urban living. Scholars have also focused on specific diseases to explore their origins and histories, often using a range of disciplines to come to conclusions.

Finally, and increasingly, palaeopathologists are using a suite of analytical methods to generate data on health that was simply not possible before these methods were used. For example, as discussed above, ancient pathogen DNA analysis since 1994 has allowed scholars to diagnose soft tissue diseases, diagnose disease when the person died before bone changes could occur, and even more recently explore the origin and evolution of the organism that caused the bone changes. Stable isotope analyses for diet and mobility are also making it possible to link disease with diet and mobility to assess their impacts on whether

a person or population contracted disease. Advances in imaging and histological techniques are adding to the methods used for disease diagnosis and, furthermore, palaeopathology utilizes archaeological and historical contextual data to interpret biological data for disease much more than in its early years. There remain debates about the validity and ethics of doing destructive analyses of precious skeletal remains, whether data emanating from aDNA analyses are verifiable, and about the origin of diseases (e.g., venereal syphilis).

Future Directions

As destructive analyses increase in bioarchaeology while scholars strive to discover more about their ancestors' health, there is increasing repatriation and reburial of skeletal remains around the world (Roberts 2009: Chap. 2). However, it is without doubt that these destructive techniques will continue to be used, and for ancient pathogen DNA analysis there are now studies focusing on the evolution of organisms. However, basic macroscopic data collection will remain the mainstay of palaeopathology because, without it, there is no possibility of interpreting the data derived from those destructive analyses. Furthermore, more advanced analytical techniques are expensive and most scholars do not have access to either the facilities or the money to do them. With increased repatriation and reburial, it is imperative that skeletal collections are used more widely than is currently the case and databases of curated collections should become established (see Roberts & Mays 2011). It is also without doubt that the trend is to look at the big picture of past health whereby very large datasets are being collected which provide a much more nuanced view of health over long periods of time and large areas of the world, as seen in the Global History of Health Project (http://global.sbs.ohio-state.edu/). Palaeopathology has provided a wealth of information about the health of our ancestors through their remains but there is much more to come in the future.

Cross-References

- ▶ Bioarchaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Dental Anthropology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

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Pathological Conditions and Anomalies in Forensic Contexts

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Introduction

Bone pathology is a basic tool for understanding the epidemiology of archaeological populations and the natural history of different diseases. Osteopathological analysis may also be helpful in forensic cases where identification is an issue. Bone pathology may be of use in the positive identification of individuals because pathology, in general, constitutes crucial individual characteristics (Maples 1984; Rodríguez-Martín et al. 2005). In exceptional cases, some pathological conditions can be the only guide to identification (Rogers 1987).

Stewart (1958) was one of the first to introduce the forensic implications of skeletal pathology (degenerative disease) to diagnose age and Reichs (1986a, b) to diagnose sex and ancestry. Other studies have contributed to expand the field: some diseases cause alterations in the personal appearance that can help in identifying a person (Pickering & Bachman 1997). Comparison between lesions observed in the osseous tissue and antemortem radiographs or medical records may also be extremely useful (Krogman & Iscan 1986). When examining and interpreting bony changes, it is important to consider differential diagnoses: similar bony changes can be produced by different agents. Alternatively, similar events may produce different conditions in different persons or at different time of their lives (Ubelaker 1989; Burns 1999).

While bone pathology is widely studied, it is important to note that the majority of diseases do not affect the skeleton: most diseases need a long time to develop (chronicity), and very few are a direct cause of death. The study of skeletal lesions is widely based on macroscopic analysis,

but certain cases need other diagnostic methods (radiography, computed tomography, microscopy, chemical analysis, or DNA).

Examples

Metabolic Disturbances

Scurvy (Deficiency of Vitamin C or Ascorbic Acid)

Ascorbic acid is required for collagen synthesis. Therefore, a deficit may lead to subperiosteal hemorrhage (the most important sign) causing hematoma that is calcified, separation of the epiphyses, osteoporosis, and joint disturbances by hemorrhage. Scurvy is typically classified in two types: infantile, showing most of the skeletal changes, and adult showing mostly osteopenia (lower bone mineral density).

Rickets and Osteomalacia (Deficiency of Vitamin D)

A deficit of vitamin D can be produced by a failure of its intake or a renal failure leading to mineralization alterations. If this occurs in subadults, it is called rickets and in adults osteomalacia.

The condition of rickets shows widespread skeletal deformities: cranial thinning and softening with bulging fontanels; rachitic rosary; enlargement of wrists, knees, and ankles, by widening of the epiphyses; marked curvature of the long bones; and spinal kyphosis, scoliosis, and increased lumbar lordosis which contribute to decreased stature.

Osteomalacia can be the consequence of rickets perpetuated into adulthood, but it is mostly acquired (Aufderheide & Rodríguez-Martín 1998). Most individuals do not show skeletal deformities, only osteopenia.

Osteoporosis

Osteoporosis is said to be present when there is loss of 30 % or more of bone mass. There are different types of osteoporosis: infantile–juvenile, traumatic, post-pregnancy, and aging-related (postmenopausal (55 years, rapid, 6 times more frequent in females) and senile (>70 years, slow, females twice affected)). The typical changes in osteoporosis are thinning of cortical bone, generalized rarefaction of the skeleton, and compression (codfish vertebra) and pathological fractures.

Joint Diseases

Degenerative Joint Disease (DJD) (Osteoarthritis)

DJD involves diarthrodial joints. When spinal bodies (not diarthrodial joints) are affected, the condition is known as spondylosis. DJD may be acquired (e.g., through trauma or strong physical activity) and age-related (usually generalized). The most prominent features are osteophyte formation at the joint margins, increased porosity and formation of subchondral cysts on the joint surface, and later eburnation and deformity of the whole joint. Spondylosis also shows vertical disk hernia (Schmorl's nodes).

Rheumatoid Arthritis (RA)

RA is a chronic, inflammatory, systemic, and nonsuppurative disease of the synovial joints and connective tissue that causes the ultimate destruction of the joint. A probable autoimmune nature is suspected. Females are two to three times more affected than males, and its onset typically commences between the fourth and sixth decades. Hands and feet are commonly involved. The changes are polyarticular, bilateral, and symmetrical involvement of the joints; *pannus* (inflamed synovium) formation producing marginal erosions and destruction of the joints; and little, if any, reparative activity. No osteosclerosis is detected in the radiographs. The consequences are subluxation and dislocation of the joints.

Ankylosing Spondylitis (Bechterew or Marie-Strümpell Disease)

Ankylosing spondylitis is a chronic, inflammatory, progressive, and systemic disease linked to the antigen HLA-B-27. Males (whites and adolescent–young adults) are more affected than females. Its clinical picture consists mainly in spinal changes and disk disease, fusion of the sacroiliac joints (first sign), ossification of the anterior and posterior ligaments of the spine, and increased kyphosis and decreased lordosis (an inward curvature of a portion of the lumbar and cervical vertebral column). Peripheral joint

involvement (hips, knees) is almost identical to RA (see above).

Diffuse Idiopathic Skeletal Hyperostosis (DISH) (Forestier-Rotés Querol Disease)

DISH consists of ankylosing hyperostosis of the spine due to ossification of the anterior longitudinal ligaments without inflammatory changes. The disk is not involved. Older males are predominantly affected.

Gout

This disease is an inflammatory arthritis, usually monoarticular, by chalky deposits (urate) due to primary or secondary (most common) hyperuricemia. Gout typically presents in the periphery of the joint causing erosions that create a punched out appearance. Reactive sclerosis is observed and osteoporosis is not present. It is more common in adult males.

Hematological Disorders

Iron Deficiency Anemia

This condition can be produced by one of the following causes: decreased intake, blood loss, or bad absorption of iron. Women are more affected.

Sickle Cell Anemia

Alterations in the B-hemoglobin chains produce deformed red cells that lead to increased hemolysis with ultimate bone marrow hyperplasia. The typical changes are osteopenia (by increased bone marrow) and then osteoporosis responsible for vertebral collapse and kyphoscoliosis, bone infarction (femoral head and spine) (Steinbock, 1976), and possible osteomyelitis (mostly by salmonella).

Thalassemia

Thalassemia is produced by alterations in hemoglobin chains. It may be *major* (homozygous) and *minor* (heterozygous, with lesser bone alterations). Thalassemia is most prevalent in individuals from the Mediterranean. There is great and severe anemia with big marrow hyperplasia causing severe osteoporosis in the skull ("hair-on-end"), appendicular skeleton ("honey comb"), and axial skeleton (kyphoscoliosis).

Porotic Hyperostosis and Cribra Orbitalia

Most types of anemia show skeletal changes in subadults, especially on the cranial vault (porotic hyperostosis) or orbits (*cribra orbitalia*). Porotic hyperostosis is characterized by lytic lesions, symmetrically distributed, in the parietals and frontal bones and in lesser degree in the occipital, showing thickening with porosity of the overlying outer table that exposes the diploe. *Cribra orbitalia* shows a similar pattern.

Multiple Myeloma (Kahler's Disease)

This is an aggressive plasma cell dyscrasia affecting persons >50 years of age. The disease is usually located in the spine and associated with possible pathological fractures; the skull and pelvis may show round lytic defects without sclerotic reaction, and more rarely osteopenia.

Infections: Nonspecific Bacterial Infections

The skeletal changes produced by nonspecific bacteria are indistinguishable.

Osteomyelitis (OM)

OM is an inflammation of bone and marrow. It is important to note that 30 % of acute OM (hematogenous or by direct infection) become chronic.

Hematogenous OM

Hematogenous OM predominantly affects children (>3 years old). It is uncommon at other ages but can affect adults with chronic diseases, debilitated elders, or drug addicts. *S. aureus* is the usual germen responsible. Defects are usually located in the distal femur, proximal tibia, proximal femur, or distal radius.

Direct Infection

Puncture wounds, accidents, and iatrogenic infection are the most common causes of direct infection. It is usually polybacterial and typically involves the tibia and femur. The infection produces a defective blood supply leading to bone necrosis (*sequestrum*) that is surrounded by a shell of new bone (*involucrum*). Cloacae are also present to drain pus and detritus.

Infections: Specific Bacterial Infections

The changes produced by every bacterium are specific.

Tuberculosis

Mycobacterium tuberculosis (Koch bacillus) is the responsible bacteria. Approximately 1 % of cases of tuberculosis observed in developing countries show skeletal changes. Tuberculosis affects persons of <25 years of age. The skeletal changes are produced by metastatic spread or continuity and affect the spine (vertebral collapse causes severe kyphosis or Pott's disease) and knee in children, and knee and hip in adults. Other changes include osteoporosis; marginal erosions; destruction of subchondral bone, with little bone reaction; and bony ankylosis of the sacroiliac joint (Ortner & Putschar 1985).

Leprosy

Leprosy is caused by *Mycobacterium leprae* (Hansen bacillus). It may be tuberculoid (TT), showing more skeletal changes, and lepromatous (LL). While there is evidence of leprosy in antiquity worldwide, today it predominantly occurs in tropical areas. Skeletal changes are due to direct extension more than hematogenous spread. Skeletal alterations include rhinomaxillary syndrome (*Facies leprosa*) showing erosion of the nasal margins with destruction of the maxillary area and the nasal spine along with nummular palatal perforation and loss of the upper central incisors; periostitis of the long bones; and changes due to peripheral neuropathy and anesthesia (trauma creates an infection – OM and septic arthritis – with bone destruction and marked periostitis) (Charcot's joint).

Treponematosis

It is very difficult to perform a diagnosis of each of the treponematosis without knowing the origin of the sample.

Yaws or Frambesia

Yaws or frambesia is a nonvenereal disease caused by *Treponema pertenue*. Geographically, the disease has been observed in Africa, Latin America, Southeastern Asia, and Southern Pacific. Only 1–2 % of the cases show skeletal changes: dactylitis of the hands, saber shin tibia or boomerang leg, gummatous OM of long bones without prominent periostitis, gangosa (extensive destruction of the nasal area), Goundou or "big nose" in children, and uncommon joint involvement. Spontaneous healing is usual.

Bejel, Nonvenereal Syphilis, or Endemic Syphilis

Nonvenereal and caused by *Treponema pallidum endemicum*, it is an acute children's disease of the Eastern Mediterranean and Southwestern Asia. 1–5 % show skeletal changes: saber shin tibia, gummatous destruction, and nasal–palatal destruction similar to gangosa. Spontaneous healing is usual.

Venereal Syphilis

Venereal syphilis is caused by *Treponema pallidum* pallidum and may be acute, subacute, and chronic. It predominantly affects young people and occurs worldwide. The skeletal lesions include gummatous lesions that appear in advanced stages involving skull (parietal, frontal, and nasal–palatal involvement) and tibia showing the pattern of the skull (thickened cortex and rough surface). Although less frequently, other bones are also involved. Gummatous arthritis is rare.

Nongummatous lesions show periostitis, especially at the metaphysis, leading to cortical thickening and deformation causing narrowing of the medullary cavity and saber shin tibia.

Neurosyphilis: Charcot's joint in large joints.

Congenital Syphilis

Congenital syphilis is caused by *Treponema pallidum pallidum*. There are two types: early or infantile showing osteochondritis at the epiphysis and metaphysis plus diaphyseal osteitis and periostitis, and late with gummatous and nongummatous OM or periostitis with diffuse hyperostosis, dactylitis, and Clutton's joints (more in knee and bilateral) and teeth anomalies (Hutchinson's teeth and Moon's molars).

Congenital Malformations: Cranial Malformations

Craniosynostosis

Craniosynostoses are the most common form of cranial malformations and are the result of the earlier closure of a cranial suture. The most clinically significant are scaphocephaly (sagittal suture closure causing hyperdolicocephaly), plagiocephaly (asymmetrical suture closure), turricephaly (coronal suture producing a tower-shaped skull), trigonocephaly (metopic suture giving a triangle-shaped skull), and triphyllocephaly (multiple closure resulting in a trilobular skull).

Congenital Malformations: Spinal Malformations

Atlas Assimilation

Atlas assimilation refers to the partial or total fusion between the atlas and the skull base. One percent of the population is affected, and around 50 % show C2–C3 fusion.

Spina Bifida

Spina bifida is the most common of all spinal malformations, consisting of incomplete bony closure of the neural arches, especially at the sacrum. It may be aperta (very severe condition in which meninges are not protected by skin, muscle, or bone) or occulta (the most common form).

Transitional Vertebrae at the Lumbosacral Level

There are two types: sacralization of L5 (the sacrum appears with six segments) and lumbarization of S1 (the sacrum shows four segments only). Both can be complete or partial.

Vertebral Block

Vertebral block refers to the fusion of two, three, or more vertebrae in a block that may involve spinous and transverse processes.

Spondylolysis and Spondylolisthesis

This is a failure of ossification in the pars interauricularis producing separation of the vertebra in two parts, one anterior and other posterior, that can be displaced (spondylolisthesis). Minor trauma plays an important role in its origin.

Thoracic Malformations

Cervical Ribs

It is an elongation of the transverse process of C7 becoming a rib with head, neck, and body but very rarely reaches the sternum.

Pelvic Malformations

Congenital Dislocation of the Hip

This condition is based on the loss of the normal relationship between the femoral head and the acetabulum. If not treated, the result is a dysplastic acetabulum, deformed and flattened head, and formation of a false acetabulum (neoacetabulum). It seems to be hereditary, and there are examples of familial cases. In general, there is a considerable population variation. Frequency: 1 to 15–20 per 1,000 of live births worldwide (Aufderheide & Rodríguez Martín 1998). 25–50 % of the cases are bilateral, being the left side more affected in the rest. Females are more affected than males (5–8: 1).

Limb Malformations

Upper Limb Anomalies

Madelung's deformity Seventy percent of the cases show bilateral involvement with shortening and bowing of the distal radial third that due to the difference in length with the ulna leads to congenital subluxation of the wrist.

Carpal Blocks This is a relatively uncommon diseases characterized by fusion of two or more carpal bones.

Lower Limb Anomalies

Developmental Coxa Vara Both sexes are equally affected. The changes are short femoral neck and an angle of less than 120°, osteoporotic head and elevated greater trochanter producing short limb (>5 cm), and degenerative joint disease in adulthood.

Tarsal Blocks The most common are talocalcaneal, calcaneonavicular, and talonavicular coalition.

Skeletal Deformities

Scoliosis

This anomaly is based in the lateral curvature of the spine with rotation of the vertebrae and spinous processes toward the concavity where the ribs are approximated among them, being pedicles and laminae thinner and shorter than normal. There is a cuneiform aspect of the vertebra. Several types are observed: the idiopathic type is the most common (80 %) appearing at 10–12 years and being inherited and familial (30 % of the cases), followed by the paralytic type that is commonly located at the thoracic–lumbar level. The less frequent type is the secondary to localized spinal malformations.

Bone Tumors

A tumor is a cellular proliferation without the control of normal growth-regulating mechanism. Benign tumors show limited growth potential, meanwhile malignant neoplasms manifest much greater growth autonomy and this leads to invasion of other organs.

Benign Bone Tumors

Osseous Origin Button osteomata are solitary, slow-growing tumors of compact bone, usually involving the cranial vault but may involve sinuses and orbit. Adult males are more affected.

Ossifying fibroma typically affects adolescents and young adults. Jaws and, uncommonly, diaphyses and metaphyses of long bones (tibia, showing anterior bowing) are the most involved bones (the epiphyses are spared). Osteolysis and cortical thinning and expansion are the typical features (Aufderheide & Rodríguez-Martín 1998).

Osteoid osteomata affect children and adolescents and are relatively common. Males are twice as likely to be affected. Osteoid osteomata tend to be small and have solitary foci involving the end of diaphyses of the bones of the lower limb, within the cortex, showing peripheral sclerosis.

Vascular Origin Hemangiomas are tumors that affect middle-aged individuals and involve the vertebrae and the skull. The lesions are cystic cavities showing thickened vertical trabeculae.

Fibrous Origin Nonossifying fibroma (fibrous cortical defect) affects children. The skeletal changes include a solitary, eccentric, and well-demarcated lesion at the metaphysis of the femur and tibia which produce cortical erosion with sclerotic margins. Pathological fractures can occur.

Cartilage Origin Osteochondroma (exostosis). This lesion accounts for almost half of all benign bone tumors, affecting individual under 30 years. It is usually located on metaphyses of the lower femur and upper tibia, as a projection of the bone surface with a core of trabecular bone continues with that of the metaphysis and covered by normal cortex. The size varies and the shape may be sessile or pedunculated.

Enchondromas are common tumors involving short bones as an intramedullary lytic lesion. Although the cortex is usually spared, pathological fractures can occur.

Miscellaneous Tumors

Giant cell tumor appears in the third to fourth decades like a locally aggressive lesion (lytic and eccentric, without sclerosis), located at the epiphyseal end and at the metaphyses of long bones.

Primary Malignant Tumors

Osseous Origin Osteosarcomas (osteogenic sarcomas) are the most common primary neoplasm of bone (20 % of all bone tumors) and affect children, adolescents, and young adults (mostly males). 50 % are osteoblastic, being central or parosteal (periosteal and intracortical are very rare), and the metaphyses are usually affected. The common pathological findings are

"sunburst" pattern, Codman's triangle, and certain degree of sclerosis.

Cartilage Origin Chondrosarcomas are the second most common malignant primary tumor of bone and involve the medullary cavity of the femur and tibia at the metaphysis showing defects with scalloped and poorly defined inner cortex. Adults are most commonly affected.

Metastatic Tumors

Most malignant skeletal lesions are metastases, appearing in individuals over 40–50 years. The most metastasizing are prostatic carcinoma and breast carcinoma, and the most involved bones are vertebrae, pelvis, ribs, major limb bones, sternum, and skull. The lesions are usually osteolytic, while most prostatic metastases are osteoblastic.

Circulatory Disturbances of Bone

Osteochondritis Dissecans (König Disease)

This condition affects males more than females, at 10–25 years. Its etiology is not completely known (idiopathic, vascular factor, trauma). It is a benign, noninflammatory condition of the diarthrodial joints (especially femoral condyle, talus, and elbow), showing foci of skeletal necrosis being the cartilage spared. The typical feature is a craterlike lesion which may range from several millimeters to centimeters in size. The lesions are most commonly unilateral and sporadic although familial cases have been observed (probably CE).

Osteochondrosis

Osteochondrosis affects individuals of less than 10 years, mainly males. The etiology is varied (trauma, steroid therapy, idiopathic). It is a benign and noninflammatory condition of the apophysis and epiphysis. Multiple involvements may occur. The typical lesion shows increased bone density at the beginning and then subchondral radiolucency leading to the collapse of the articular surface and joint fragmentation producing joint deformity.

Cross-References

- ▶ Bone, Trauma in
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Skeletal Remains: Identification of Individuals
- ▶ Imaging Techniques in Bone Analysis
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

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Basic Biographical Information

Anthropologist, social theorist, and activist-critic, Thomas Carl Patterson was born on November 5, 1937, in Rutland, Vermont. He received his B.A. in Anthropology from the University of California, Riverside (1960), and his Ph.D. in Anthropology from the University of California, Berkeley (1964). He held teaching positions at Berkeley, briefly, and then at Harvard, Yale, and Temple Universities before joining the faculty at the University of California, Riverside, in 2000. During field research in Peru in the 1960s, civil unrest paralleling events at home in the United States led him to question mainstream approaches to understanding social order and change. Reading Marx opened what Patterson found more effective lines of thinking, and since then, his writings and activism have reflected his commitment to social justice, informed by a profoundly Marxist perspective. A critical autobiographical statement (Patterson 2003:vii-xvi) gives a fuller account, complemented by a thoughtful perspective from Latin America (Tantaleán 2011).

Major Accomplishments

Patterson's initial research addressed socioeconomic, demographic, and environmental topics in ancient South America, drawing on settlement patterns, pottery, and stone tools as primary evidence (1971). In the first decade of his career, publications ranged widely in context, from earliest human occupation through Inca times, and across Andean South America's coast and highlands. His analytic and reporting skills emerged in his earliest publications, including his dissertation on the Miramar and Lima pottery styles of Peru's central coast (1966); analyses reported therein are fundamental reference points today. His research is so solid that, in 1971, for the South America volume of a landmark synthesis of American archaeology, Gordon R. Willey cited Patterson's unpublished, preoral reviews of South American research as key sources.

Patterson's methods and interpretations fit comfortably in archaeological frames of the time, showing little yet of the theoretical and political transformations he was experiencing. Through the late 1970s, Patterson worked out his new ways of thinking largely in teaching, not publications (personal communication). Classroom settings have often inspired his subsequent writing, in textbooks and other venues (1983a, 1997a). His attentive mentoring has boosted countless students and colleagues, including the 30-plus whose dissertations he has supervised through 2010.

By the early 1980s, transformations in his thinking were rendered firmly in print. He openly challenged positivist, ahistorical approaches to past societies, arguing that historical materialism yielded deeper, more compelling insights about people's lives. This standpoint was first explicit in writings on class and state formation in Peru (1983b), interpretations that coalesced in his book on *The Inca Empire* (1991), and a cross-cultural, edited volume of concepts, processes, and case studies (Patterson & Gailey 1987). He has since pursued such analysis in other settings as well (1997b).

Also in the 1980s, Patterson embarked on critical social histories of theory and practices in archaeology and anthropology, especially in the USA and Latin America (1989). His work in this domain accelerated in subsequent decades (1994, 2001), especially as he wrote more about social inequalities of race, class, gender, and other forms of social diversity (Patterson & Spencer 1994; Patterson 1995, 1997a; Susser & Patterson 2001). He remains deeply concerned with the intersection of such unequal positions and the politics in which they are embedded, including challenges to free speech and academic freedom,

and the politics of knowledge production. He has been active in civil rights and antiwar demonstrations at home, solidarity with oppressed peoples abroad, and labor unions, supporting strikes and rights to organize. Patterson participated as well in actions giving rise in 1986 to a newly independent World Archaeological Congress (WAC), the aftermath of conflicts over including South African scholars and protesting apartheid. Theory and praxis are inseparable for him.

Patterson has continued critical consideration of theoretical trends in archaeology, placing in historical contexts the provisions of and tensions among such perspectives as processualism, post-processualism, and postcolonialism (2008a). He frequently critiques archaeologists' failure to recognize the widespread political and economic change wrought by capitalism and their use of interpretive models based in capitalist experience to interpret pre- or noncapitalist situations (2008b). In counterpoint, he applauds the union of theory and praxis in Latin American social archaeology (1994; Tantaleán 2011) and other expressions of social engagement, including Indigenous, feminist, and Marxist archaeologies.

As a social theorist, Patterson seeks to articulate archaeology more firmly with history, economics, and other social scientific and humanistic disciplines, beyond its home in the USA within anthropology (2008b). He also believes firmly in an integrated anthropology, of which archaeology is only one part. At the same time, he advocates and embodies moving beyond one's country, culture, and language of origin, connecting with diverse scholars and intellectual traditions. Increasingly his attention overtly encompasses explanations for social order and change today, expanding on early concerns for historical inclusiveness; *Change and Development in the Twentieth Century* (1999), for example, evaluates perspectives on this very recent period based in works of Weber, Durkheim, and Marx.

Combining social theory, archaeology, and his historical sensibilities, Patterson has turned to examining intellectual biographies of scholars he views as fundamental contributors. He began with Marx, with whose ghost whom Patterson (2003) contended archaeologists hold continuing conversations. In 2004, Patterson and Charles Orser reproduced select writings of V. Gordon Childe, who, as a scholar-activist, intellectual, and Marxist, became "one of the most eminent archaeologists in the twentieth century" (p1).

Fittingly, Patterson (2009) returned to Karl Marx, assessing what the latter thought about nascent anthropological ideas and findings and what his legacies to today's discipline are. Archaeology takes backstage in this book, but from the preface on, it reveals much about Patterson and the integration of his archaeological and anthropological thinking.

In research, teaching, and publication, Patterson keeps expanding themes established at varied points in his career. He works on projects as varied as race and the history of anthropology, class conflict and state formation in archaeology contexts, and from the deep past to the present, changing political economy in southern California's Inland Empire. He continues confronting inequities, through practices in archaeology, anthropology, and daily life. His is truly a life unified in theory and praxis.

Cross-References

- ▶ Activism and Archaeology
- ▶ Critical Theory in Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Inca State and Empire Formation
- ▶ Labor Archaeology
- ▶ Latin American Social Archaeology
- ▶ Marx, Karl
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
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- ▶ Social Archaeology

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Peabody Museum of Archaeology and Ethnology (Harvard University)

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Introduction

The Peabody Museum of Archaeology and Ethnology is one of the oldest anthropology museums in the world and the oldest anthropology museum in the United States. It is located in Boston, Massachusetts, and was founded on October 6, 1866, after philanthropist George Peabody gave a modest gift of $150,000 to Harvard University in support of a museum and a professorship of American archaeology and ethnology (Putnam 1898). Peabody was inspired to do this after his nephew, soon to be Yale Professor of Paleontology O. C. Marsh, approached him in 1865 about his avocational interests in the nascent field of American archaeology (Putnam 1898).

The museum holds around 10 million items. About 2.5 million items, roughly one quarter of the museum's collection, are from North America (Peabody Museum of Archaeology and Ethnology 2013). Perhaps one of the most celebrated parts of the North American materials is the largest surviving collection of objects from the Lewis and Clark

expedition. The museum's Central American collections include an impressive array of Mayan and Aztec artifacts and monument casts. The South American collection contains items from the Amazon basin, Bolivia, and Peru, including an impressive array of Peruvian textiles and quipus. (Peabody Museum of Archaeology and Ethnology 2013). This collection also includes materials from Asia, Africa, Oceania, and Europe. The museum's archives are also rich and include 500,000 historical photographs, hundreds of paintings and drawings, and numerous research records. Today, much of the Peabody Museum's collection can be accessed and viewed online.

Key Issues

The museum's first curator was Dr. Jeffries Wyman, who graduated from Harvard College in 1833 and Harvard Medical School in 1837, and was appointed as curator in 1866. Wyman, who had also served as the Hersey Professor of Anatomy at Harvard College since 1847, held both positions until his death in 1874. As the first curator, Wyman worked diligently to grow the museum's collections, which had grown to some 8,000 items by the time of his death (Browman 2002). He accepted donations from scholars and colleagues, including Harvard University's Louis Agassiz, Alexander Agassiz, and Henry David Thoreau. Wyman also purchased thousands of artifacts from Europe and led several expeditions throughout Maine, Massachusetts, and Florida to collect his own specimens as well (Browman 2002). These first collections were initially assembled in Wyman's laboratory in Harvard's Boylston Hall and then in the Anatomical Museum, until construction of the Peabody Museum was completed in 1878.

Frederic Ward Putnam, a former student of Wyman's and Agassiz's, was appointed the second curator shortly after Wyman's death and a brief interim curatorship by Asa Gray. Putnam held this position from 1874 until 1909. Called the father of American archaeology by his contemporaries, Putnam worked to establish the Peabody Museum as more broadly focused on archaeology, physical anthropology, and ethnology (Browman 2002). Under Putnam's guidance, Ohio's Serpent Mound was purchased and Serpent Mound Park was established (Putnam 1898). It was not until 1886 that the professorship was actually established, which was filled initially by Putnam (Putnam 1898). Less than a decade later, Putnam helped create a series of exhibits for the 1893 World's Colombian Exposition in Chicago, where Franz Boas served as one of his assistants. Under Putnam's guidance, the artifact collections and library holdings expanded at such a fast rate that by 1889 an addition was built that more than doubled the museum's square footage. Immediately prior to the close of the century in 1897, the Peabody Museum officially merged with Harvard University.

Frederic Putnam facilitated the establishment of the Peabody Museum Press in 1888, which continues to publish monographs, reports, and other papers (Peabody Museum of Archaeology and Ethnology 2013). These include the *Papers of the Peabody Museum of Archaeology and Ethnology*, which has highlighted many of the 800 expeditions that the museum has supported across the globe (Spencer 1997). Through the Peabody Museum and their Central American Expedition Fund, some of the earliest research was conducted on sites such as Copan (1891–1900), Seibal (1895), and Chichén Itzá (1904–1910). Gordon Willey, who joined the Peabody Museum in 1950, continued to explore some of these earlier sites in the Yucatan.

The museum's first ethnological expedition took place in Peru and Bolivia between 1906 and 1909, led by William Curtis Farabee. Decades later the museum supported John Marshall's ethnographic research in the Kalahari Desert from 1950 to 1961 (Peabody Museum of Archaeology and Ethnology 2013). This research inspired John Marshall and Robert Gardner to found the Harvard Film Studies Center through the Peabody Museum in 1957. Some of the earliest ethnographic films produced here include classics like John Marshall's *The Hunters* (1957) and Robert Gardner's *Dead Birds* (1963).

Current Debates

After the 1990 passage of the Native American Graves Protection and Repatriation Act (NAGPRA), the Peabody Museum founded a repatriation office that has been working to repatriate human remains, funerary objects, sacred objects, and objects of cultural patrimony. This has been an ongoing task, considering that the museum's collection included roughly 22,000 sets of human remains (Bethell et al. 2004). Not all remains fall under the jurisdiction of NAGPRA, as the Peabody Museum's osteological collection originates from more than eighty countries and six continents (Peabody Museum of Archaeology and Ethnography 2013).

The Peabody Museum currently supports three research labs: the Gordon R. Willey Laboratory for Mesoamerican Studies, the Paleoanthropology Lab, and the Zooarchaeology Lab (Peabody Museum of Archaeology and Ethnology 2013). Current projects include a 3D scanning project on Mayan monuments (started in 2007), the Corpus of Maya Hieroglyphic Inscriptions Program (started in 1968), the Harvard Yard Archaeology Project (started in 2005), and excavations at Magdalena de Cao Viejo (started in 2004) (Peabody Museum of Archaeology and Ethnology 2013). In 2012, the Peabody Museum became part of the Harvard Museums of Science and Culture consortium, which includes six other Harvard University museums.

Cross-References

- ▶ Heritage Museums and the Public
- ▶ Human Remains in Museums
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ North America (USA and Canada): Museums

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Peach: Origins and Development

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Basic Species Information

Peaches (including nectarines), *Prunus persica* (L.) Batsch. syn (*Amygdalus persica* L.), are the edible fruit of a deciduous tree belonging to the subfamily Prunoideae (family Rosaceae), which also includes apricots, cherries, plums, and almonds. Some taxonomists maintain peaches and almonds are very closely related within the genus *Amygdalus*. The name peach derives from the Greek *Persikon malon* for "Persian apple" into Latin *malum Persicum*, which became *pêche* in French and peach in Middle English. Although first cultivated in China, the name *persica* stems from the pre-nineteenth-century European belief that this tree originated in Persia (Bassi & Monet 2008). Nectarines are smooth-skinned hairless varieties of peach (*Prunus persica* (L.) Batsch var. *nucipersica* (Suckow) C. K. Schneid.), and they might have originated more than once as a mutant within peach groves. Nectarine stones are indistinguishable from other peaches, meaning that archaeobotanically their origins cannot be traced, but some early written sources have been interpreted as indicating the presence of nectarines as early as 2,000 years ago in the Mediterranean.

Major Domestication Traits

Wild forms of peach grow in central and eastern Asia and these are interfertile with cultivars (Zohary et al. 2012). Self-compatibility seems associated with cultivation. All related species are self-incompatible (Ladizinsky 1998), while under cultivation selfing assures higher fruit production rates. It is likely that the peach arrived in the Mediterranean, represented in Greek texts from Persia before 300 BCE (Zohary et al. 2012), having spread from Central Asia and northwest India earlier still. Peaches were then spread more widely in Europe by the Roman army.

The earliest diploid *Prunus* probably arose in Central Asia splitting into the ancestral species of *P. persica*, which then evolved in north and northwest China (Bassi & Monet 2008). True wild peaches are generally regarded as native to northern China (Lu & Bartholomew 2003), but the progenitor populations of cultivars may be extinct given the massive anthropogenic transformation of the Chinese landscape. Some authorities point to *Prunus davidiana* (Carr.) as the closest wild relative (e.g., Scorza & Okie 1990), and this species is prominent in breeding research to improve peaches. *P. davidiana* occurs in middle elevation thickets throughout the hills of northern, western, and southwestern China (Lu & Bartholomew 2003). Wild peaches *P. persica* are also reported as "escapees" from cultivation especially in northwest China.

There is vast diversity within the modern cultivars (Bassi & Monet 2008). Most peach subspecies have a chilling requirement of between 600 and 1,000 h and require heat to mature the crop so their range is limited to warm temperate, continental regions, or high altitudes. They are found just above 3,000 m in parts of the Himalayas. The trees can tolerate low temperatures (to −30 °C) but the buds and flowers are susceptible to frost.

The fruit is a drupe with a soft mesocarp and pubescent, velvety (peach), or smooth (nectarine) exocarp. The endocarp is lignified and corrugated with deep furrows and pits on the outer surface (Fig. 1). The patterning on this, including deep double groves near the suture of the endocarp's two halves, allows relatively small fragments to be identified. There is a pronounced ridge along the ventral suture and sometimes a very acute tip at the apex. Inside this hard shell is the starchy kernel. The seed can contain high levels of hydrogen cyanide. Nevertheless, with detoxification it is likely that these kernels were food resources in parts of Neolithic China (Hosoya et al. 2010).

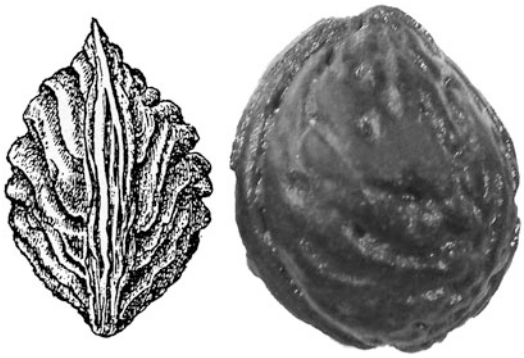

Peach: Origins and Development, Fig. 1 At the *left* is a drawing of a peach endocarp, showing the distinctive longitudinal furrows (After Darwin 1868), at the *right* is a photograph of a Neolithic waterlogged peach stone (*P. persica*/*davidiana* type from Tianluoshan, Zhejiang (6500–7000 BP)) (Photo by DQ Fuller)

Timing and Tracking Domestication

While there has been documentary evidence for peach cultivation in China for over 3,000 years (Bassi & Monet 2008), archaeological evidence is even earlier. Determining, however, when wild gathering turned to propagation remains a challenge. Sites in the middle and lower Yangtze regions (extending back to 7000–8000 BP) have peach stone finds (of either *P. persica* or *P. davidiana*), such as Bashidang, Hunan (7000–6000 BP); Chengtoushan, Hunan (4500–4000 BCE); Kuahuqiao, Zhejiang (6000–5400 BCE); and Hemudu and Tianluoshan, Zhejiang (4900–4600 BCE) (Table 1 Hosoya et al. 2010). Peaches also occur in central China, along the Yellow River region from the Yangshao period onwards

(about 6000 BP), but with more frequency from c. 5000 BP. It may be that systematic cultivation only began at this time. However, reports of peach from a Jomon site in Japan (Kiriki, Nagasaki) dating to 5500–6000 BP (D'Andrea 2007) could point to an earlier period of propagation and translocation.

There can be no doubt that by 4000 BP peaches were cultivated, as it is around this time that they are first introduced to northwest India. Here, they are reported from late Neolithic Kashmir and together with apricots can be attributed to a "Chinese horizon" of crops introduced via Central Asia at this period (Boivin et al. 2012).

The introduction further west into Persia remains to be better documented, but classic written sources from the fourth century imply that it was already well established there. In the Mediterranean the earliest finds are from the seventh-century BCE Heraion, Samos (Zohary et al. 2012). By the first century BCE, Romans were cultivating peaches in southern Europe, Israel, and Egypt. During the Roman period Pliny (CE 79) describes how the peach had recently been imported into Europe from Persia and Egypt from Rhodes (Bassi & Monet 2008). Peach is recorded at 32 Roman period sites in Europe, most in the south. The northern sites are military settlements so it is likely any peaches were imports (Bakkels & Jacomet 2003). A second route to Europe could have been via the Black Sea and Danube. By the Middle Ages France had become a major producer and the peach reached the Americas by the first half of the sixteenth century (Bassi & Monet 2008). The earliest mention of nectarine varieties is in the fourteenth century CE.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Apricot: Origins and Development
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Pedra Furada, Archaeology of

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Introduction

The peopling of America is still one of the most controversial issues of world prehistory,

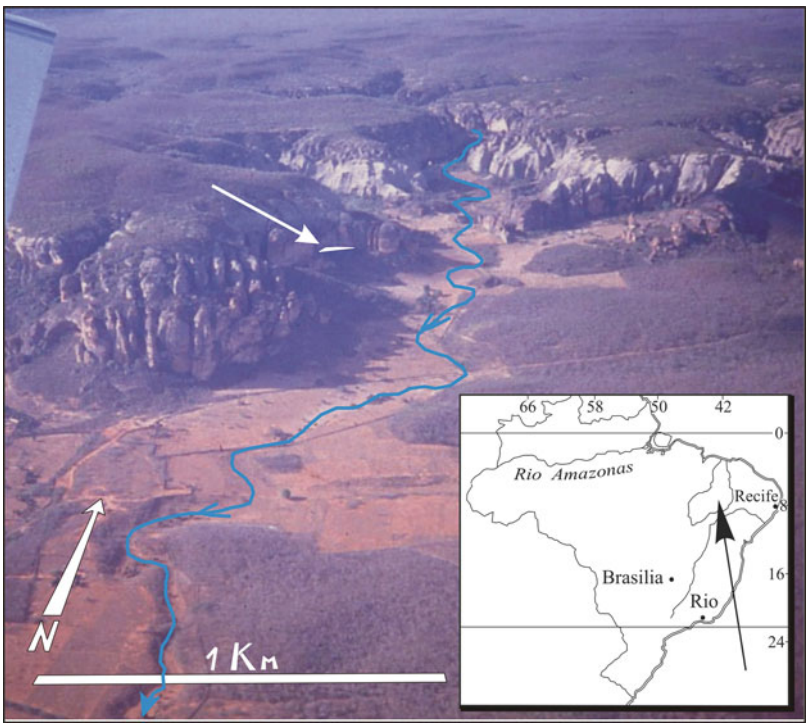

Pedra Furada, Archaeology of, Fig. 1 Aerial view of *Baixão* da Pedra Furada, looking North. The canyon is entailed in the Devonian *Serra Grande* formation. *White arrow* pointing to shelter. The total height of *cuesta* is about 150 m. Modified from Parenti (2001).

regarding its chronology, number and routes of population waves, and palaeoanthropology. As well as some other case studies, the "question" is the result of (seldom undeclared) contentions in different domains, such as methodological perspectives, intrinsic data limitations and – finally – academic traditions and relationships. From 1927 onward, when the discovery at Folsom (New Mexico, USA) of a lithic spearpoint plunged into the ribs of an extinct bison symbolically launched the acceptance of Paleo-Indian peopling of North America, many sites have been proposed as much older than the limit between Pleistocene and Holocene, conventionally fixed at 12 ky BP. Few of them, nevertheless, have survived careful revision and screening of their evidence, for chronological, taphonomic or strictly archaeological reasons (Dillehay & Meltzer 1991; Dillehay 2010).

Definition

Pedra Furada (the abbreviation of Toca do Boqueirão da Pedra Furada) is a sandstone rockshelter in the southeastern portion of Piaui state, North-Eastern Brazil (8°50' 09" South, 42°33'20 West), 30 km northeast of the town of São Raimundo Nonato (Fig. 1). The relevance of the site is due to its very old dates, spanning from 5 to at least 60 ky BP for a sequence of occupation layers and stone tools, and to the consequent debate issued about the chronology of first peopling of the Americas. The site is very well dated by a coherent radiocarbon sequence, but it did not provide human fossil remains, so the burden of proof of the consistence of the human presence leans entirely on the cultural origin of archaeological structures, hearths and lithic industries, just the matter of contention. The site has been excavated first by Niéde Guidon between 1978 and 1987, and then by Fabio Parenti from 1987 to 1988 (ongoing report in Guidon & Delibrias 1986; Delibrias et al. 1988; Parenti et al. 1990; Bahn 1993), and entirely published by the latter (Parenti 2001); new researches are still (2012) underway by a French–Brazilian team led by Eric Boeda.

Historical Background

Pedra Furada, as well as many important sites in South-Eastern Piaui, was discovered in the seventies by a French–Brazilian team led by Niéde Guidon, a former student of André Leroi-Gourhan, sponsor of the *Serra da Capivara* National Park (http://www.brasil.gov.br/localizacao/parques-nacionais-e-reservas-ambientais/parque-nacional-serra-da-capivara-pi%20) and responsible from 1987 onward for the *Fundação Museu do Homem Americano*, an important international research center in São Raimundo Nonato (www.fumdham.org). The team was, at that time, surveying the area of the Siluro-Devonian sandstone *cuesta* of southern Piaui, where many painted shelters had been signaled by local authorities. Some of them were tested, in search for a firm chronology of figurative and geometric prehistoric paintings and engravings, so richly diffused in brazilian *Planalto*, Amazon and *Nordeste* regions. Pedra Furada itself was first tested in 1978 and 1980, obtaining surprisingly old (final Pleistocene) radiocarbon dates from charcoal and *cuvette* fireplaces. Regular excavations took place in 1982, 1984, 1985, and 1987 in the western portion of the shelter (grossly 30 % of the whole filling), under the direction of Niéde Guidon, and from 1987 to 1988, Fabio Parenti led excavations on the remaining 60 % of the eastern side.

During the 10 years of excavation process at Pedra Furada, some important changes took place, both in American prehistory itself, such as the research in Monte Verde (Chile) (Meltzer et al. 1997) and the contention on some "robust" Pre-Clovis sites as Meadowcroft (USA), and in methodological and technical terms: a more generalized adoption of middle-range strategy in South American archaeology and the diffusion of thermoluminescence (TL) and accelerator-mass-spectrometry (AMS) dating. For almost 10 years, Pedra Furada has been the spear point of the oldest South American sites challenging the Clovis-first model for the peopling of Americas, but today its informative potential is largely underestimated, both because of its uniqueness in South American archaeological context, but also because of the intrinsic nature of the debate on antiquity of peopling, with an exhausting succession of announcements and dismissals, and the lack of fully Pleistocenic human remains in Americas.

Key Issues/Current Debates

The sheltered area (around 700 m^2) is located at bottom of a sandstone overhang, 70 m high, composed by cross-stratified estuarine sandstone of *Serra Grande* Formation of the Piaui-Maranhão basin. The site, facing South, is quite open to sunshine during November and December, but gently shadowed in the rest of the year, providing a remarkable standpoint at the entrance of one of main canyons of the region (*Boqueirões*), as proven by number of archaeological sites upstream (Fig. 1). The shelter is surrounded, East and West, by two waterfalls, still active today, eroding the uppermost conglomerate of the cliff (Fig. 2). The eastern waterfall, the highest, at the bottom of which there is a talus of quartz cobbles, is the main source of raw material (and geofacts) both in Pleistocene and lower Holocene times, and this is what led to the dismissal of the oldest archaeological units by many authors. The features of gravitative fracture occasionally observed on some pebbles and cobbles have been measured both on western and eastern waterfalls on a sample of 2,000 stones >32 mm, and applied to the selection of purported lithic industries (details in Parenti 2001: 135–150). It resulted that the waterfalls produced no cobbles with more than three clear flake-scars >10 mm, no bifacial trimmed pieces, nor uncortical butts on pseudo-flakes.

The filling of the shelter, as is usual in the evolution of sandstone walls in tropical climate, has been allowed by repeated block collapses barring and protecting endogenous and anthropic sediment from erosion. The first are composed by disaggregating sand and sandstone slabs from the roof and by quartz cobbles from uppermost conglomerate layers; the last, anthropic component is made from cobbles and pebbles for stoneworking and boarding of fireplaces, selected

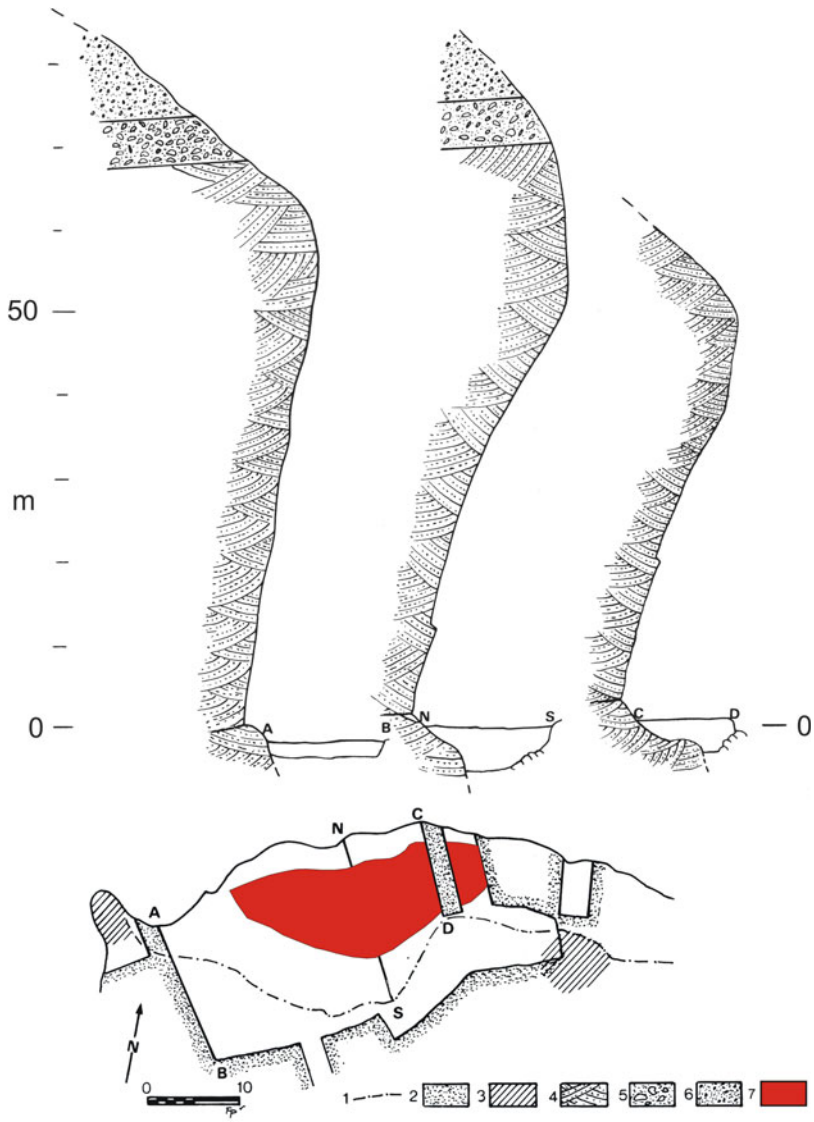

Pedra Furada, Archaeology of, Fig. 2 Wall sections and position of waterfalls: (*1*) dripline; (*2*) unexcavated deposit (1988); (*3*) top surface interested by waterfalls; (*4*) Devonian cross-stratified sandstone of *Serra Grande* formation; (*5*) conglomerate with quartz cobbles; (*6*) conglomerate with quartz pebbles; (*7*) maximum occupied surface in *Pedra Furada* phase (Pleistocene), as defined by structures and hearths. Modified from Parenti (2001).

on the talus or transported from outside, and the mineral fraction of past organic components such as plant or animal remains. Because the very acid siliceous sediment did not allowed conservation of bone remains older than 6–8 ky BP, we do know anything about Pleistocene fauna in this site, which makes correlation with opposite, fossiliferous, limestone caves (1.5 km) essential.

The whole archaeological sequence is contained in the 5 m of sediment fill, with an average East to West dip of 10° and a slight concavity in the middle (Fig. 3). The sandy and gravelous sedimentary matrix contains several charcoal lenses derived from the gentle slopewash of fireplaces, the stony boarders of which have sometimes been partially removed but mainly preserved in the uppermost eastern side.

Excavation technique from 1982 onward has been by "natural layers", i.e., simply paying careful attention to sedimentary structures and strata formation, at that time quite an innovative strategy in the context of Brazilian archaeology. A total of 2,050 m^3 of sandy and gravelous sediments were removed, leaving a bulk for future research and specific analysis that was

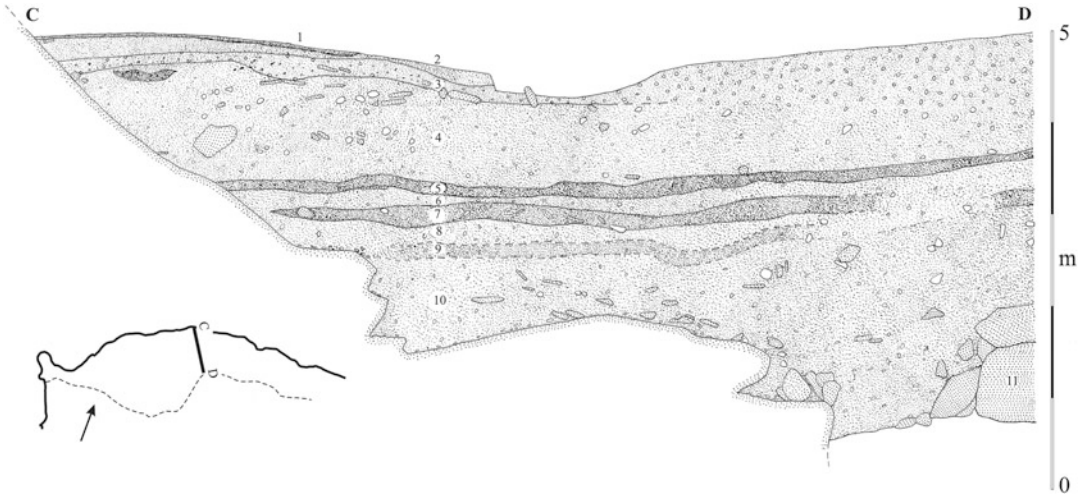

Pedra Furada, Archaeology of, Fig. 3 Western face of preserved block: (*1*) fine sand with ashes, charcoal and botanical macroremains (historical period); (*2*) fine sand, incised on the southern side by a channel dug in 1982; (*3*) medium sand with ashes and charcoal, with termite galleries; (*4*) medium sand with gravels; (*5*) charcoal lens in fine and medium sandy matrix; (*6*) medium sand with gravel; (*7*) charcoal lens in fine and medium sandy matrix, Southern limit is blurred; (*8*) medium sand with gravel; (*9*) sandy lens with charcoal, less than upper units, with blurred limits; (*10*) medium sand with some quartz pebbles in southern part, sandstones slabs; (*11*) bottom sandstone block collapse. *Vertical scale* refers to the whole height of the deposit. Modified from Parenti (2001).

partly excavated by Boeda's team in 2010 but is still unpublished. Sediment inside the drip-line was dry-sieved (1 mm mesh) and every macroscopic remain was collected, mainly for the recovery of the overabundant charcoal fragments, both for dating and anthracological purposes. Basic sedimentological analysis was performed by Joel Pellerin (Centre National de la Recherche Scientifique, Caen, France) on the main section, and a detailed study of the remaining eastern block was conducted in 1996 by Evelyne Débard (Centre National de la Recherche Scientifique, Lyon, France), but it is still unpublished.

The chronology of the site was established on the basis of 55 (14 Holocene, 41 Pleistocene) coherent radiocarbon dates by five different laboratories with standard 14C, AMS with acid-base-acid (ABA) and acid-base-wet (ABOX) pre-treatments for samples older than 35 ky (Santos et al. 2003). The whole sequence is presented in Fig. 4. Moreover, 39 dates have been performed on heated quartz pebbles of the lowermost units of the eastern sector, yielding ages comprised between 35 and 150 ky BP (Valladas et al. 2003). The units dated both by radiocarbon and TL show an acceptable concordance, but the lowermost TL dated samples, reaching 160 ky, have been skeptically considered by the authors themselves because of possible reworking of the lower deposit or natural origin of fires. In sum, the Pedra Furada sequence is fully upper-Pleistocene and chronology is not a matter of contention per se, but the cultural content of it has been regarded as a fanciful conjecture by some colleagues (Meltzer et al. 1994), and, despite detailed reply (Parenti et al. 1996), the site is still waiting for full acceptance by archaeological literature.

Adopting the minimum duration for the total sequence (55 ky), we can roughly evaluate an average sedimentation rate of about 1 mm per 10 years, a serious challenge for any reasonable attempt of reconstructing "past behaviors" or similar paleoethnological mirages in this kind of deposit, which is, at least in the Pleistocene, a cumulative palimpsest (*sensu* Bailey) of probably occasional, episodic, visits for raw material procurement, or a temporary camp for other (archaeozoologically) unknown purposes; in the

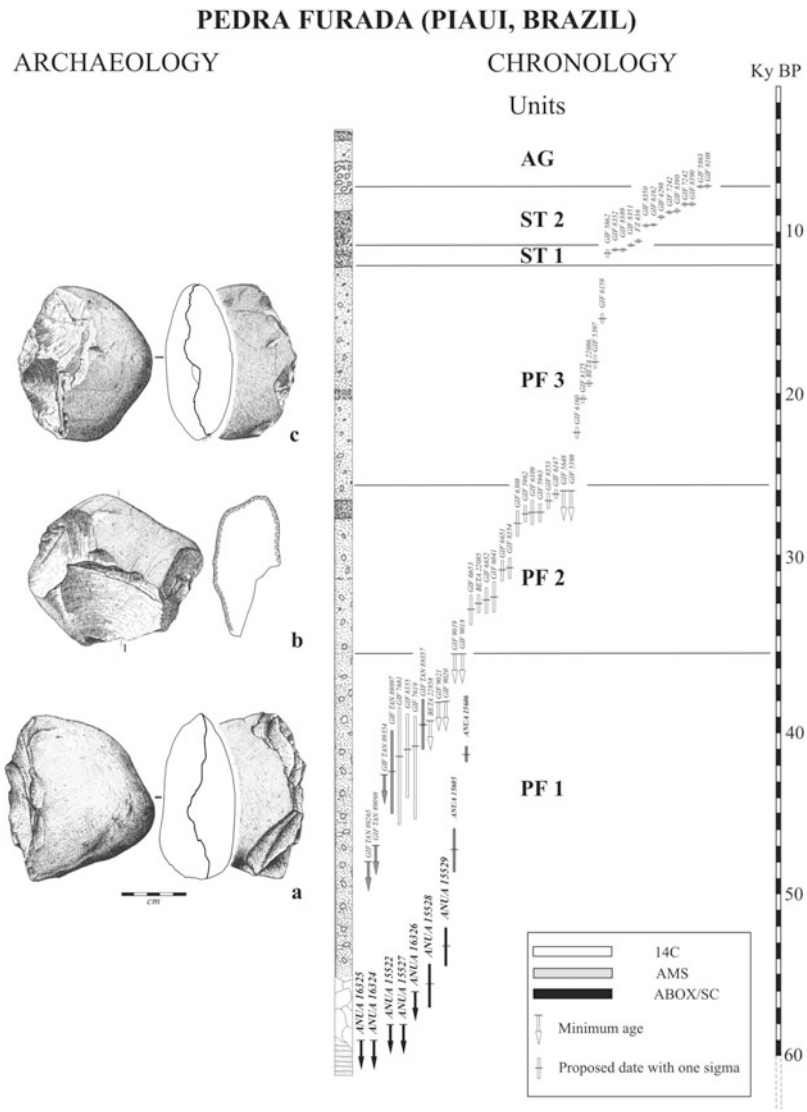

Pedra Furada, Archaeology of, Fig. 4 Uncalibrated radiocarbon chronology, cultural phases and sedimentary column. Note main hiatuses: 10.4–14.3 ky BP, 22–25 ky BP. Sedimentological symbols refer to main, central, and section. Artifacts are described in detail in Parenti 2001: Plates 54, 83, 94. (**a**) 18637: bifacial trimmed pebble, quartzite; (**b**) 17090: centripetal core, quartzite; (**c**) 15778: bifacial trimmed pebble, quartzite. Reprinted from Santos et. al. 2003, with permission from Elsevier.

Holocene, the site became a more substantial "central place" in the context of ecotone landscape of sandstone *cuesta*, as strongly indicated by structured stratified hearths, lithic complex reduction sequences and art depiction.

On the basis of radiocarbon chronology, the position and correlation of sedimentary bodies, the sequence was subdivided in six units (Fig. 4), three for the upper Pleistocene, named *Pedra Furada* (PF) 1–3 layers, two for the lower *Serra Talhada* (ST) 1–2 and one for middle Holocene *Agreste* (AG). For the Pleistocenic phase (PF), this is partly an arbitrary subdivision, because the main sedimentological and cultural traits do not show relevant changes, either in lithic tradition or regarding the general pattern of site exploitation (Fig. 5).

Archaeological features have been described and interpreted on the basis of a morphological and technical analysis of their conservation and construction. In fact, the main goal at the time of the excavation was twofold: firstly, the distinction between anthropic and natural (sedimentary) origin in the disposition of structures (i.e., arrangement of cobbles, pebbles and sandstone slabs); secondly, the identification of the agents

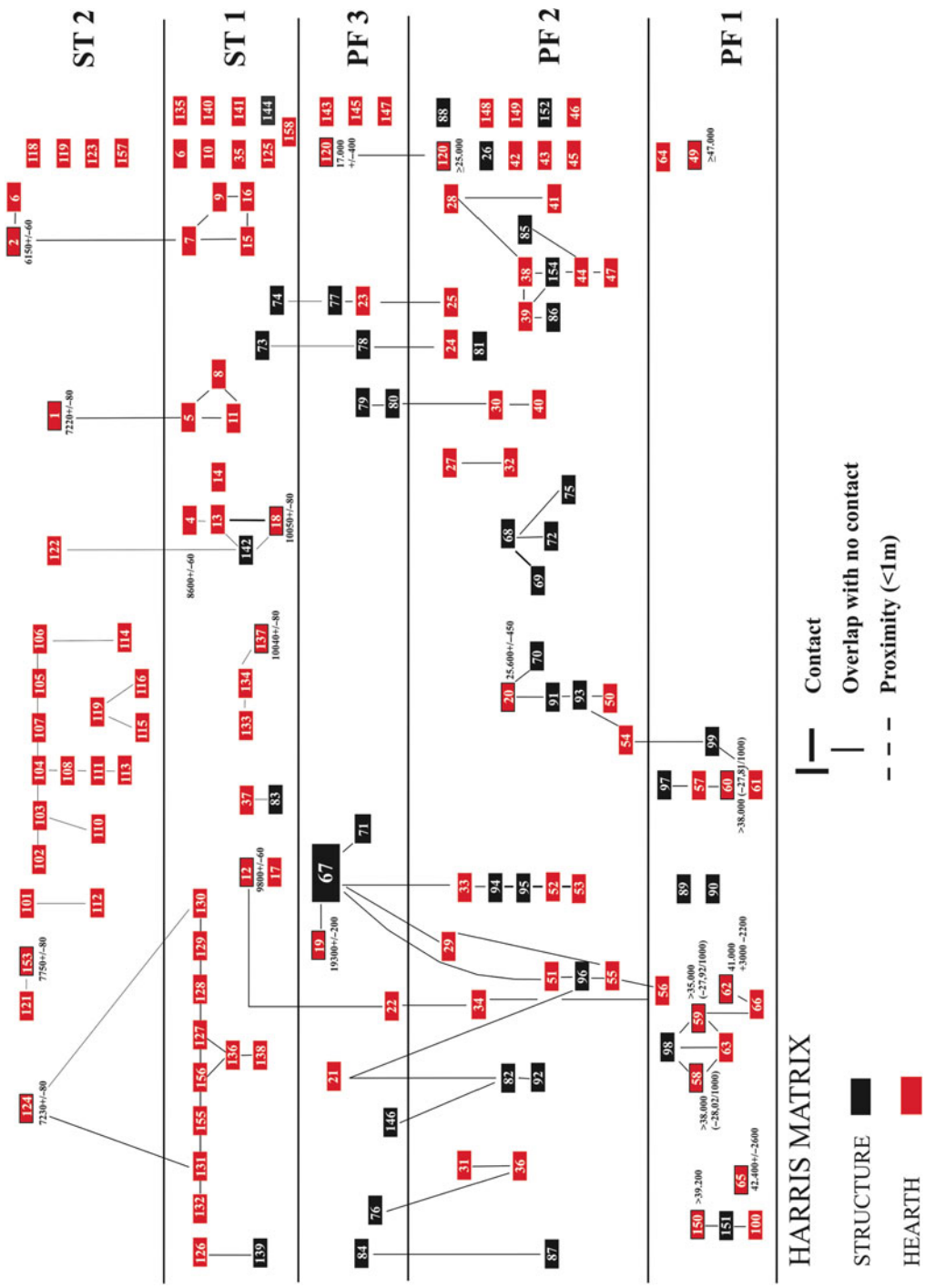

Pedra Furada, Archaeology of, Fig. 5 Simplified matrix of relative chronology and position of structures and hearths. Modified from Parenti (2001).

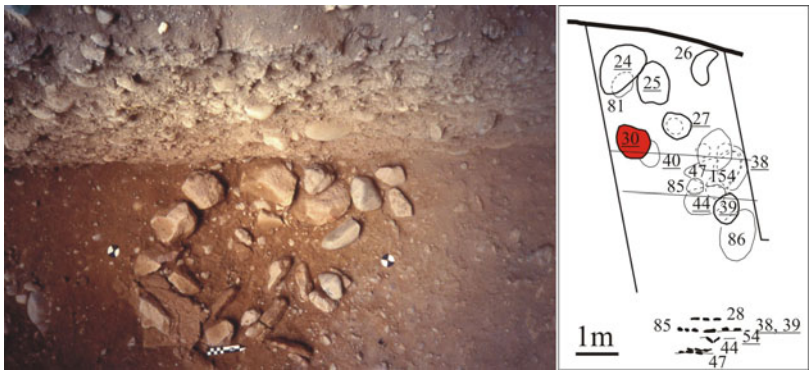

Pedra Furada, Archaeology of, Fig. 6 *Left*: hearth N 30, boarded by sandstone fragments and quartz cobbles, Trench 6; note the fine gravelly matrix of the sediment. *Top right*: position of structures in Trench 6, phase PF 2, between 25 and 33 ky BP. Hearth N 30 in *red*. *Bottom right*: vertical situation along the 1 m band. Modified from Parenti (2001).

responsible for combustion. Bush fires in tropical landscape, both semi-arid as today, or wetter as in final Pleistocene, are trivial and we cannot exclude them at all; but they usually leave homogeneous combustion traces on the uppermost soil, at fairly low temperature. Moreover, the average 10° dip of the eastern talus of Pedra Furada caused episodic scour of smaller or lighter sedimentary particles, such as charcoal. In fact, the highest density of charcoal remains was recovered in the middle, lowest, portion of the site and so the observed, apparently "unheated", upstream structures could have perfectly pertained to fireplaces. Because of these taphonomic problems, we paid special attention to the position of heated stones all over the excavations; this led to the publication of an ongoing report (Parenti et al. 1990) in which, thanks to the contribution of TL techniques, we were able to demonstrate the non-chaotic position of heated elements of some of the oldest hearths of Pedra Furada 1 layer, i.e., their anthropic origin. On this basis, the following study (Parenti 2001: 109–132) of the whole body of identified structures (156, 86 of which were in *Pedra Furada* phase) was classified mainly on physical (presence of heated elements or clearly associated charcoal or both) and morphological (form, depth, number and contiguity of elements) criteria.

For many stone features, TL samples showing no clear macroscopic evidence of fire (reddish cobbles or concentrated charcoal) were not available, so they can be arranged both in the fireplaces or simple, apparently unheated, structures categories. However, in some cases, well-defined stone circles have also been observed in *Pedra Furada* layers, such as the astonishing stone ellipse in Fig. 6, well far away from the talus slope and just close to the most protected area of the site, excluding fancy interpretation about its "natural" origins. This structure has not been directly dated because of the absence of charcoal inside, but it pertains to the PF2 layer, with an approximated age of 30 ky BP.

The spatial distribution of structures, both heated and not, shows a clear concentration in the easternmost sector, just below the best preserved painted panels of *Nordeste* (lower Holocenic) figurative "tradition". Because the resolution potential of the site is very weak (a feature of 10 cm height could have taken an average thousand years to be covered and sealed!), it is impossible to determine the duration or the contemporaneity of the elements of some heaps of structures as, for example, that of Fig. 6. Density of structures at Pedra Furada is measured as total surface/time and changes along time, not only for obvious taphonomic causes (the younger the layer the richest the content of preserved structures), but also for (unknown) cultural and ecological reasons. In the PF phase, all over the second half of upper Pleistocene, density

is higher in the PF2 layer, and not at the beginning (PF1) nor at the Pleistocene-Holocene transition (PF3), when the site seems almost abandoned or very rarely frequented (cumulative distribution of PF phase in Fig. 2: 7). The same is true for Holocene layers (*Serra Talhada* and *Agreste* phases), when the shelter, undoubtedly, had a more permanent and, maybe, ritual function in the context of a dense settlement system of the whole *Nordeste:* in the lower Holocene (*Serra Talhada*), density is higher than in middle Holocene (*Agreste*) when a critical decrease both in demographic and cultural terms seems to have affected the whole central Brazil, as already pointed out by Araujo et al. (2005).

Stone tools at Pedra Furada in Pleistocenic layers are the core of contention. After having been identified as such on the basis of a detailed study of natural forces acting on the talus cobbles from waterfalls, 595 stone artifacts from quartz and quartzite cobbles and pebbles have been described in *Pedra Furada* phase, subdivided as follows: 196 in PF1, 273 in PF2 and 126 in PF3. Among them, some are undoubtedly trimmed with unifacial or bifacial technique (Figs. 4, 7, 8), but many others – possibly geofacts – exibit at least clear relevant macrowears (Parenti 2001: Plates 74, 75, 92, 93, 97).

Quartzitic cobbles have been flaked, mainly in order to obtain expedient cutting edges or cores, but intensity of raw material exploitation changes throughout both the *Pedra Furada*, *Serra Talhada* and *Agreste* phases, as shown by the ratio of the number of flake scars >10 mm to weight (kg), which is as follows: PF1: 7.5; PF2: 6; PF3: 5.8; ST1: 10; ST2: 15: AG: 8. These data point to a lesser exploitation of local low material in both of the last layers of each phase: PF3 and AG. The ratio of bifacial to unifacial core tools obtained from local raw material decreased constantly from Pleistocene to Holocene (Table 1), with a slight increase in the ST2 layer, when the shelter probably gained its maximum population density.

In spite of the ambiguous nature of some naturally trimmed (but probably used) flakes or fragments, the only retained by some hasty critics, many artifacts from Pleistocenic layers show clear evidence of technically coherent trimming sequences, such as the examples exposed in Figs. 7 and 8. Many others are exposed in detail in Parenti (2001, plates 53-55, 57, 60, 62, 65, 67, 71, 73, 81, 83, 87). For the whole *Pedra Furada* phase, from a strictly typological point of view – perhaps scarcely useful in the case of informal tools – the toolkit is composed by choppers and chopping-tools, cores, simple scrapers and trimmed flakes, with some notched pieces and denticulates.

Pedra Furada, Archaeology of, Table1 Ratio of bifacial to unifacial trimmed pebbles on local raw material along time.

	UNIF.	BIF.	TOT. CORE TOOLS	BIF./UNI.	% BIF.
AG	6	1	7	0.17	14
ST 2	33	10	43	0.30	23
ST 1	35	7	42	0.20	17
PF 3	15	5	20	0.33	25
PF 2	30	17	47	0.57	36
PF 1	26	21	47	0.81	45

Unif.: unifacial; Fof: bifacial; tot. core tools: total core tools; Bif./Uni: Bifacial to unifacial; % Bif.: percentage of bifacial.

After a chronostratigraphic or archaeological gap between 14.3 and 10.4 uncal. ky BP in the first half of Holocene (i.e., Paleoindian and Archaic period in cursory subdivision of Brazilian prehistory), the groups of *Serra Talhada* and *Agreste* phases, although maintaining the exploitation of local cobbles for the obtention of cores and heavy-duty tools, shifted to a more complex lithic technology, integrating different raw materials with more intense core reduction sequences; this led to a true *débitage*, especially on exogenous brown chert, for the obtention of a typical unifacial toolkit: scrapers, *limaces*, and end-scrapers, some of which have been thermally treated (Parenti 2001, Pl. 100). The persistence of a cruder tool manufacture with local raw material has been often observed in brazilian prehistory until very recent times, and is documented also in the nearby shelter of Sitio do Meio (Parenti et al. in print).

Some 950 red and white figures are painted on Pedra Furada sandstone wall, apparently spatially

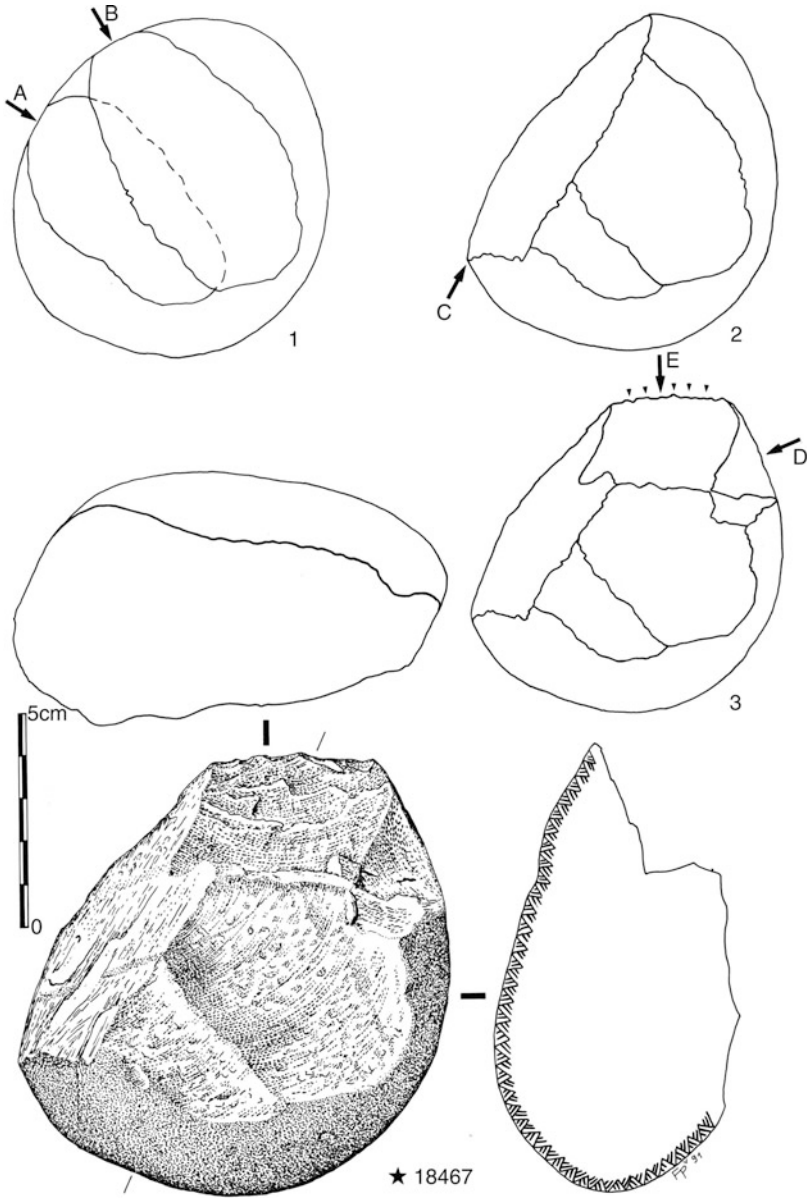

Pedra Furada, Archaeology of, Fig. 7 PF1 multi-purpose artifact, 18467: unifacially trimmed quartzite pebble, with flaking sequence: (*1*) two parallel flake-scars A and B; (*2*) longitudinal splitting C, because of its use as hammer; (*3*) centripetal flake-scars *D* and retouch macrowears on distal cutting edge *E*. Modified from Parenti (2001).

uncorrelated with the archaeological features below. In other sites of the area, figures of the same "style" or "tradition" have been dated, for the most, at the first half of Holocene, a very rich period for central and Northeastern Brazil from a demographic and cultural point of view, just before the so called "archaic gap" of Brazilian prehistory (Araujo et al. 2005).

Organic remains have been recovered only in Holocenic deposits, because of the acidic (Ph4) siliceous sediment. In *Agreste* e *Serra Talhada* phases, scanty bone fragments of medium to small extant *taxa* are documented, but a rich coprolite assemblage (both animal and human) has been recovered, providing precious insights about lower Holocenic vegetation, archaeobotanic practices (Chaves & Renault-Miskowsky 1996; Chaves 2000) and palaeoparasitology (Araujo et al. 2008). This last, particularly, has (indirectly) proved the existence of at least two maritime

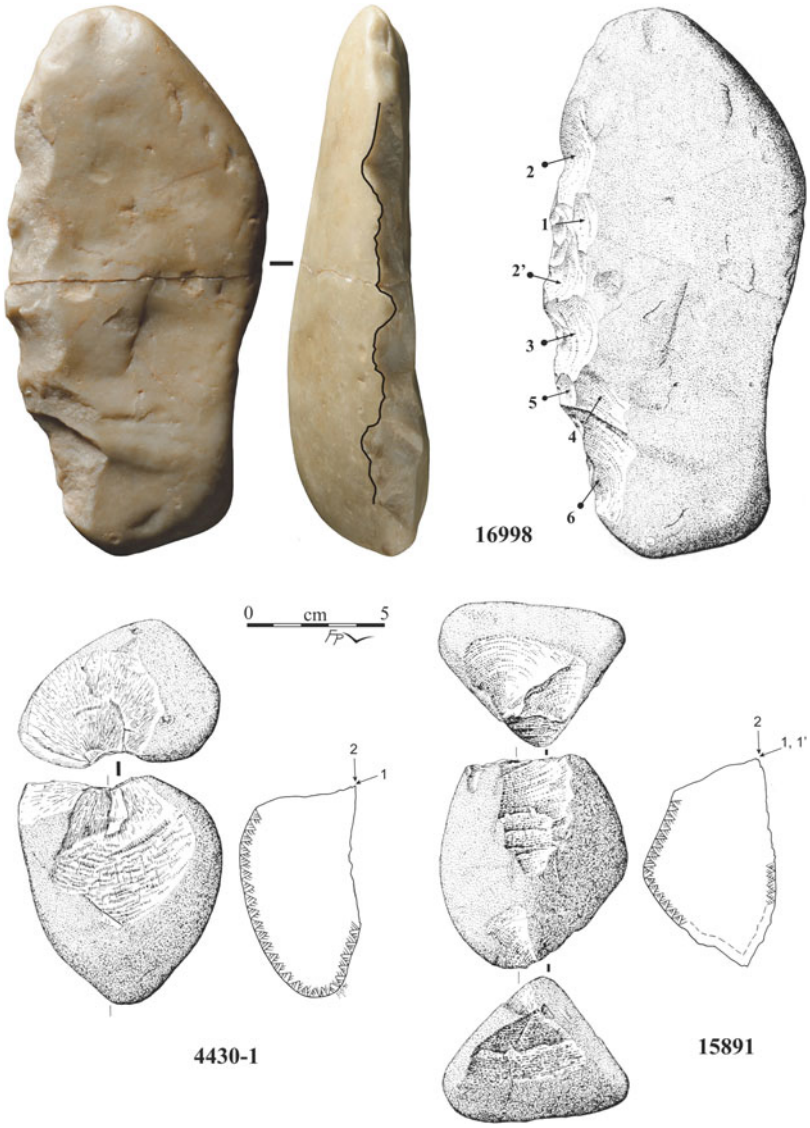

Pedra Furada, Archaeology of, Fig. 8 *Top*: PF2, 16998: unifacially trimmed quartzite pebble, probably a core. Average flaking angle of 70°; cortical portion preserved in the middle; the flaking sequence has been established on the basis of the disposition both of flake-scars and visible *lancettes* inside them; bottom: two PF2 cores; both have been obtained by the same trimming sequence. 4430–1: orthogonal core on quartz cobble. 15891: orthogonal core obtained on quartzite cobble; lower view: double, synchronous, split fracture, due to percussion. Modified from Parenti (2001).

migration waves to Americas in the early lower Holocene, because Helminths eggs recovered in human coprolites from ST2 layer cannot have been survive in cold Beringian climate (Montenegro et al. 2006). Charcoal remains from fireplaces, or purported natural fires or both, have been entirely collected from top to bottom of *Pedra Furada* layers and their anthracological study (under the responsibility of Rita Scheel, *Museu Nacional*, Rio de Janeiro) will provide one of the most long lasting palaeobotanical sequences in the Neotropic.

In the context of Brazilian archaeology, Pedra Furada evidence has been received with skepticism by many scholars, for pure academic reasons, but also because the majority of them lack familiarity with the Northeastern landscape and geoarchaeology. In any case, between the end of excavations (1988) and the final report (2001), Pedra Furada gained useful complementary information from some other important sites in the region, especially from close limestone caves and fossil-bearing deposits, such as Toca da Barra do Antonião, Serrote do Artur,

Serrote do Sansão, Garrincho (Guérin & Faure 2008). In this last site, some 20 km SW from Pedra Furada, human fossilized remains (one parietal fragment, one lower incisive and a fragment of jawbone with an upper molar) were recovered below a calcitic duricrust dated at 10,020 ± 290 uncal. years BP (GIF 9335), along with a rich Pleistocene megafauna directly dated at 12,170 ± 40 uncal. years BP (BETA 136204) (Guidon et al. 2000). They pertain to *Homo sapiens*, but their "archaic"–quite robust traits – according to the authors, point to a local development of prior populations derived from the ancestral stock that firstly peopled the region.

International Perspectives

Today (2012), the whole issue of the Pleistocene peopling of the America is quite "frozen" in mainstream literature, and this is not, in my opinion, an unfavorable situation for the progress of a "normal" science in Kuhn's terminology. In South America and Brazil, particularly, prehistoric research with a more prominent palaeoenvironmental and geoarchaeological tone is finally on the way, which is of crucial relevance because of the overabundant attention paid to more visible phenomena (such as rock art or formal lithic typology) in the past decades. Peda Furada has been of great importance for the debate of the antiquity and modalities of peopling of South America, and still holds consistent potential as a reference site for eastern Brazilian lowlands. With its continuous paleobotanic and well dated record, the shelter can fill the geographic gap in paleoclimatic sequence of tropical South America, between the better studied areas of the Amazon basin and Southern Brazil. From a strictly anthropic point of view, Pedra Furada – besides being a reference at regional scale – can be integrated in a true global debate about (dis)continuity and gaps in the archaeological record of many area of the world, such as South Africa, central Asia, northern Europe and many others.

Future Directions

Pedra Furada has not yet definitely and fully been accepted in archaeological literature, and it will probably remain in this limbo situation until the discovery of robust and dated palaeoanthropological evidence in the region. Nevertheless, it is worth noting that the site has produced some true testable hypotheses about palaeoenvironments and regional settlement systems, as follows: (1) a clear cultural discontinuity between upper Pleistocene and lower Holocene, as suggested by lithic traditions; (2) the existence of a humid phase between 10 and 9 uncal. Ky BP, as suggested by gravel lens of unit 3 (Fig. 3) and by the erosion and falling rock at nearby shelters of Perna, Sitio do Meio and Antoniao; (3) weak interaction between man and megafauna, the former being in no way responsible for the (mostly Holocenic) disappearance of the latter; (4) Pleistocenic groups had, on the whole, a weak territoriality, probably correlated with the very low demographic density, indicated by the scanty site occupation in this period, the absence of an intra-site web system, and the weak transport of lithic products outside the shelter; (5) the (rare) Pleistocene sites of the region could have a lesser proportion of core-tools, because these latter are overabundant at Pedra Furada, given the proximity of *cuesta* cliff; (6) the absence of chert and calcedony in the PF phase is due to its non visibility for pedogenetic reasons or for cultural causes (see point 4) or both; (7) the bimodal distribution of structure dimension in Pleistocene layers is due to functional reasons: the smaller could have been combustion structures, while the larger probably served as contention, space arrangement or pavement structures; (8) at the very beginning of Holocene a true regional integrated system is in place, in which some sites have specialized functions as quarry or ritual place; (9) in lower Holocene, local quartzite has been heath-treated for the making of some formal tools; and (10) rock art of *Nordeste* tradition (lower Holocene) is not specially bound to a specific site function.

New research based on the relevant Pedra Furada archaeological sequence will be useful and fully acknowledged only if it is truly interrelated with palaeoenvironmental studies in a continental perspective.

Cross-References

- ▶ Archaeobotany
- ▶ Bones: Preservation and Conservation
- ▶ Charcoal: Preservation and Conservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dating Techniques in Archaeological Science
- ▶ First Australians: Origins
- ▶ Haynes, Jr., C. Vance
- ▶ Hrdlička, Aleš
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Meadowcroft: Geography and Culture
- ▶ Monte Verde, Archaeology of
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ Serra Da Capivara National Park
- ▶ South America: Lithic Industries
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Peiligang: Agriculture and Domestication

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Basic Site Overview

Peiligang (2 ha) is an early Neolithic site, located near the Peiligang village in Xinzheng county, Henan Province. It was first discovered in the 1960s, and subsequently excavated in four seasons during the 1970s. Its cultural deposits measured 1–2 m in depth, and within the excavated area of 2,615 m^2, archaeologists found 22 ash pits, one kiln, and 114 burials. The site dates to c. 6200–5600 BCE (Kaifeng 1978; Institute of Archaeology 1984, 2010: 126-141).

After these excavations, more sites sharing similar material assemblages with Peiligang were discovered in central Henan, and collectively named the Peiligang culture. To date more than 100 Peiligang culture sites have been identified, distributed over a large area of the middle Yellow River valley, including mainly the Huanghuai Plain in central Henan and the Yiluo basin in western Henan.

Peiligang sites can be classified into two types in terms of their environmental settings: those on the alluvial plains and those on hilly areas. Sites of the former type (lowland) tend to be larger in size, with thicker deposits and more elaborate material assemblages, such as Jiahu (5 ha) in Wuyang county and Tanghu (30 ha) in Xinzhengcounty. On the other hand, sites of the latter type (upland) appear to be smaller in size, with thinner deposits, less variety among artifacts, and pottery vessels of simpler form, made more crudely. These contrasting traits may reflect different subsistence-residential strategies and various levels of social complexity. The sites on alluvial plains may have had higher levels of sedentism and more complex social organization, while some of those in hilly areas are likely to have been seasonal camp sites or small villages (Liu & Chen 2012: 141-150).

Peiligang culture sites are further divided into two regional variants based on their geographical distribution and material remains; these are the Peiligang type in the north and the Jiahu type in the south. Some 40 radiocarbon dates from ten sites show that most Peiligang sites date to c. 6200–5500 BCE, although the earliest phase at the Jiahu site dates to as early as 7000 BCE (Institute of Archaeology 2010: 126-141).

Pottery of the Peiligang culture is characterized by various functional types, distinguishable as cooking, serving, and storage vessels, many of

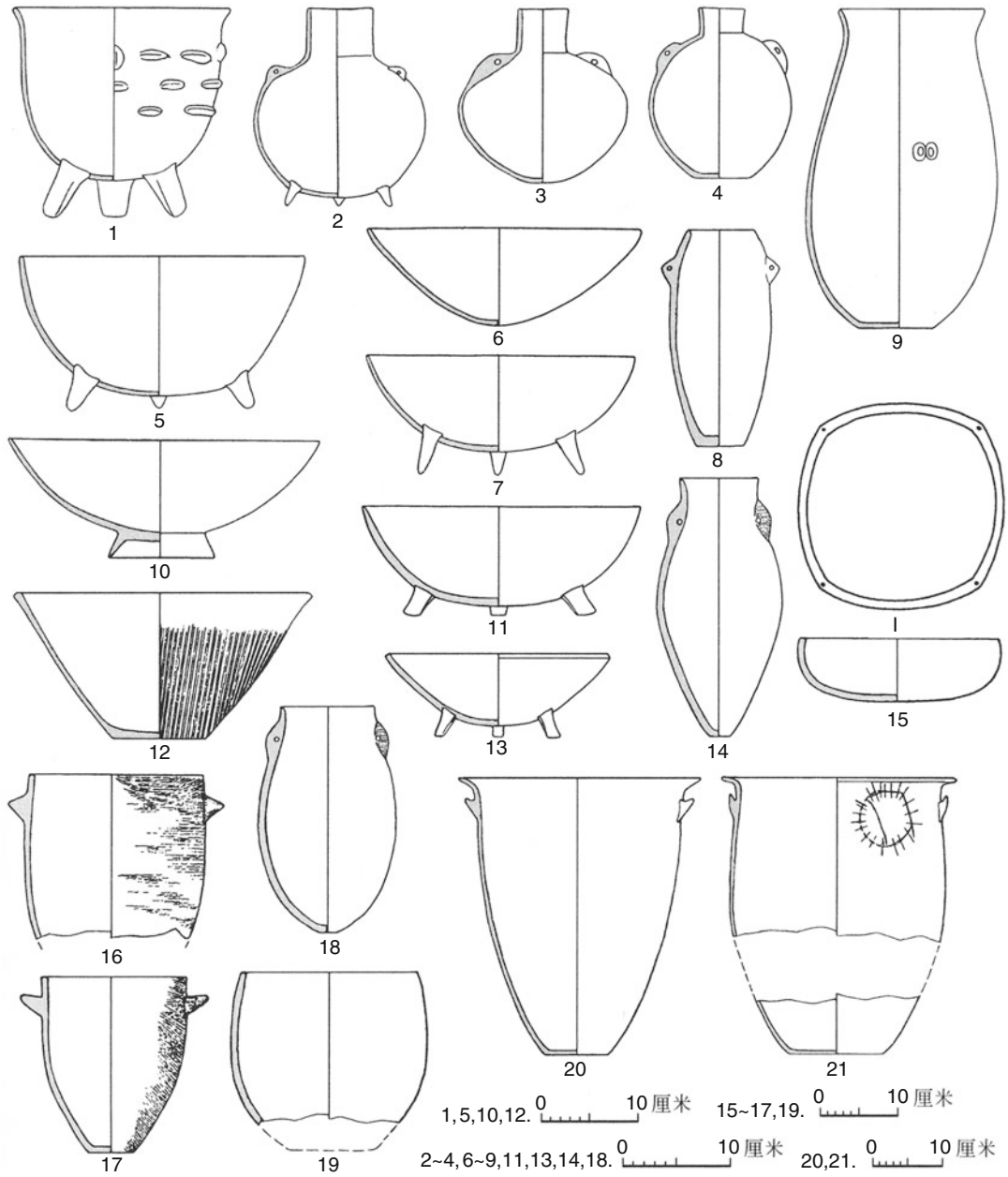

Peiligang: Agriculture and Domestication, Fig. 1 Peiligang culture pottery (After Institute of Archaeology 2010: Fig. 3–10)

which are customarily referred to as tripods, due to their three-legged design (Fig. 1). Lithic implements include both chipped and ground tools, and the latter are morphologically classified to axes, adzes, chisels, spades, sickles, and knives. Microliths have also been found. Grinding stones made of sandstone, including slabs and elongate handstones, have often been uncovered from burials (Fig. 2).

Most dwellings were small semi-subterraneous houses, normally less than 10 m^2 in size. They were round, oval, square, or irregular in shape. Deceased were often buried in cemeteries, separated from

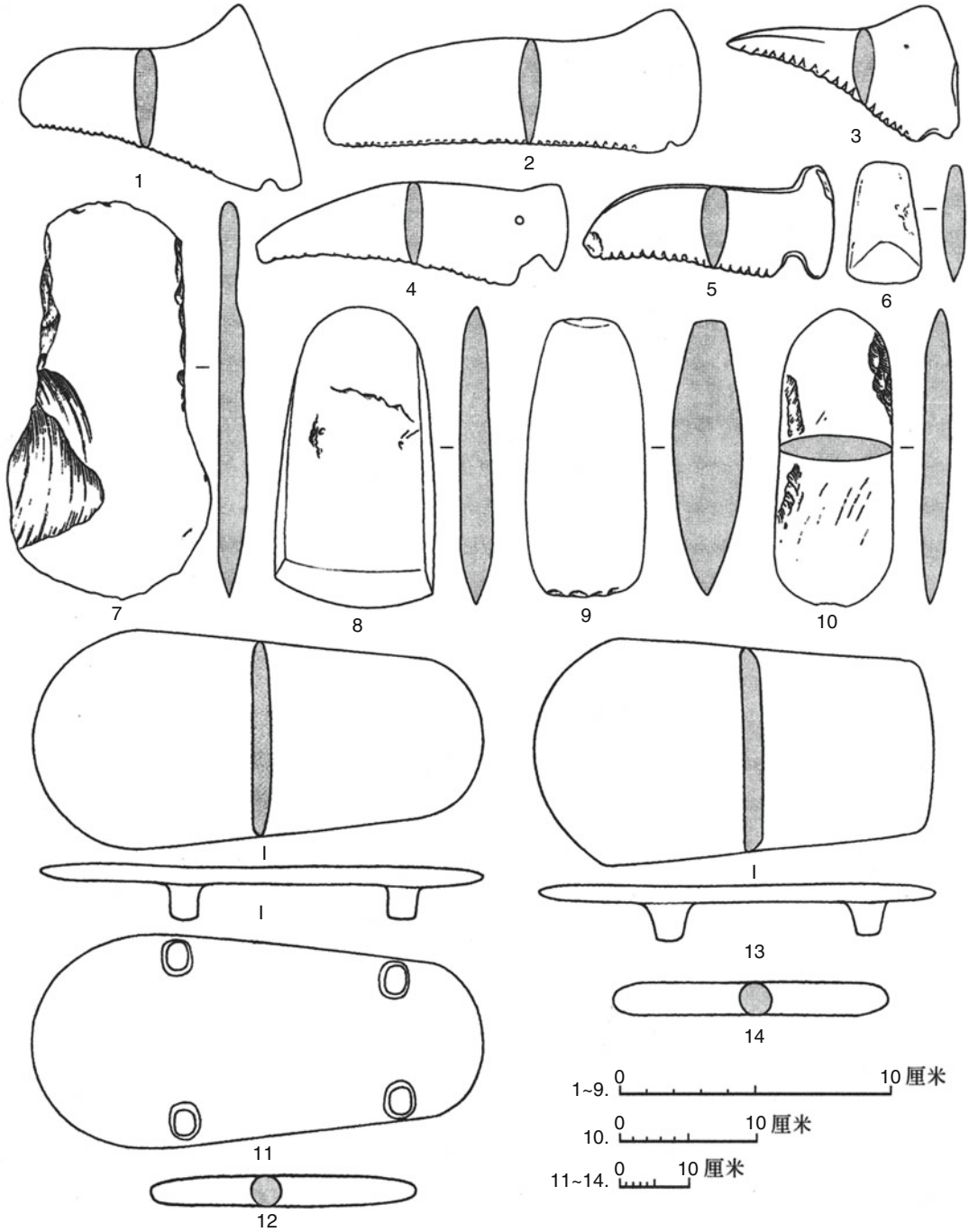

Peiligang: Agriculture and Domestication, Fig. 2 Peiligang culture stone tools (After Institute of Archaeology 2010: Fig. 3–11)

residential areas. Tombs were rectangular shafts with single interment, but some secondary burials with multiple interments have also been found. A majority of tombs was associated with grave goods, including pottery vessels and stone tools, which seem utilitarian in nature. The quantities of grave goods vary among tombs, ranging between one and a dozen in most cases. At Jiahu, however, some tombs were furnished with ritual objects, such as bone flutes and turtle shell implements, a phenomenon rarely seen in other sites.

Evidence of Early Agriculture

Several Peiligang culture sites have revealed millet remains (*Setaria italica*), and Jiahu has revealed rice remains (*Oryza* sp.). These are among the earliest domesticated cereals in North China. Floral remains recovered from Peiligang sites, however, are more heavily weighted toward wild plants (e.g., soybean, acorns, walnuts, hazelnuts, jujube, plums, and water caltrops) than toward cultigens (rice and millet) (Table 1). The importance of wild plants in the Peiligang subsistence is supported by functional study of grinding stones, which occupy substantially high proportions of the Peiligang culture toolkits. Starch and usewear analyses of grinding stones from Egou and Shigu indicate that they were used for processing acorns, beans, tubers and millet (Liu et al. 2010).

Peiligang: Agriculture and Domestication, Table 1 Plant remains from major Peiligang culture sites (Liu & Chen 2012)

Site	Cultigen	Wild plants
Jiahu	Rice	Wild rice, acorn (*Quercus* sp.), water caltrop, tubers, lotus root, walnut, wild grape, soybean
Peiligang	Possible foxtail millet	Walnut, Plum, jujube
Shawoli	Possible millet	Walnut, jujube
Egou		Acorn (*Q. acutissima*), walnut, jujube
Shigu		Hazelnut, walnut, jujube, elm fruit
Shuiquan		Acorn (cf. *Q. variabilis*), walnut (*Juglansmandshurica*), jujube (*Zizyphus jujube*)
Tieshenggou		Fruits and nuts
Wuluo Xipo	Foxtail millet	Nuts, foxtail grass, Panic, mannagrass
Fudian	Foxtail millet	

Dog and pig were domesticated, while a wide range of wild animal species was hunted, such as deer, wild boar, raccoon dog, and rabbit. Fishing was also a part of subsistence economy (Henan 1999).

Peiligang culture has long been regarded as having achieved a substantial level of agriculture, but the archaeological record shows that the people actually practiced broad-spectrum subsistence strategies, in which food production was only a minor component of the economic system.

Cross-References

► Chinese Field Methods
► Jiahu: Agriculture and Domestication

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Peking Man

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Introduction

Peking Man (*Homo erectus pekinensis*) is an example of *Homo erectus*. The first evidence for Peking Man was discovered in 1921 by Austrian paleontologist Otto Zdansky who found a single hominin molar within a deposit at a quarry near the Chinese town of Zhoukoudian (then Chou K'ou Tien) approximately 30 miles (around 48 km) from Beijing (formerly Peking) (Reader 1988: 94). Further evidence of Peking Man came in 1927 when a third tooth (Zdansky had found another while sorting the excavated material (Reader 1988: 99)) was discovered by Swedish researcher Dr. Birger Böhlin. This tooth was turned over to Canadian anatomist Davidson Black for study (Conroy 1997: 303). Black considered the tooth to belong to a previously unknown species of hominin, the oldest discovered on the Asian mainland, which he named *Sinanthropus pekinensis* (Black 1927). The first Peking Man skull was discovered by Chinese paleontologist, archaeologist, and anthropologist Whenzong Pei on the 2nd of December 1929. This skull revealed that, despite slightly different dentition, Peking Man was not in fact a member of a new genus but rather an example of *Homo erectus* and very similar to Java Man (formerly *Pithecanthropus erectus* now *Homo erectus erectus*) (Reader 1988: 106). By 1937 fourteen skulls, eleven mandibles (lower jaws), and 147 teeth, along with seven femurs (upper leg bones), two humeri (upper arm bones), a possible clavicle (collarbone), and a single carpal (wrist) bone belonging to *Homo erectus pekinensis*, had been discovered at Zhoukoudian (Reader 1988: 107). Excavation was halted by the outbreak of the Second Sino-Japanese War and the subsequent Japanese invasion in 1937; however, the Peking Man fossils remained safely stored in Zhoukoudian at the Cenozoic Research Laboratory until 1941 when, due to growing American-Japanese tensions during World War Two, the bones were packed for shipment to America. Sometime in late 1941 all the Peking Man fossils, except for the few teeth discovered by Zdansky, vanished and have not been seen since (Conroy 1997: 304). A number of drawings, photographs, and a full set of casts did make it to America, however, in the hands of the head of the Cenozoic Research Laboratory, Franz Weidenrich (Reader 1988: 108). Excavation at Zhoukoudian resumed in 1949 and has continued periodically since, uncovering a number of cranial and postcranial bones (Reader 1988: 109). The most recent excavations at Zhoukoudian, beginning in 2009, have revised previous dating of the site and of Peking Man (Shen et al. 2009).

Definition

Peking Man is the common name of a collection of fossilized specimens first discovered in Zhoukoudian, China, in 1921 and known scientifically as *Homo erectus pekinensis* (Reader 1988; Conroy 1997). In the 1970s Peking Man was dated to around 230–500 kyr (1,000 years) based on fission-track dating of Locality 1, layer 10 (the lowest level to contain hominin fossils) and ^{230}Th/^{234}Ur (thorium/uranium) dating of layers 1–3. These dates were supported by later electron spin resonance and ^{231}Pa/^{235}Ur (protactinium/uranium) and have been generally accepted as correct (Shen et al. 2009: 198). However, more recent work conducted at Zhoukoudian has offered an older date range of around 680–780 kyr based on ^{26}Al/^{10}Be (aluminum/beryllium) dating methods (Shen et al. 2009).

Key Issues/Current Debates/Future Directions/Examples

The Use of Fire

A number of thick ash layers have been identified at Zhoukoudian, some being up to 6 m in depth (Conroy 1997: 316), which indicate extended

periods of burning. This has commonly led to the conclusion that Peking Man had the ability to create and manage fire even from its earliest occupation and continued this practice for long stretches of time. While Peking Man's use of fire is generally accepted within the scientific community, some have argued against this view. In 1985 Lewis Binford and Chuan Kun Ho argued that while there was certainly evidence of burning at Zhoukoudian, the ash layers were most likely not hearths as they were far too thick and spread out. Instead, Binford and Ho argued that the "ash" layers were probably the result of burning guano deposits (most likely owl droppings) which either spontaneously combusted or were ignited by an outside source (Binford & Ho 1985: 429), as evidenced by the large number of rodent bones and comparative lack of hominin remains associated with the deposit. While this theory has its supporters, many continue to believe in Peking Man's use of fire at Zhoukoudian.

The Use of Stone Tools

Many thousands of individual stone artifacts made of sandstone, flint, and quartz (Conroy 1997: 310) have been discovered at Zhoukoudian, some in direct association with hominin remains, many not (Binford & Ho 1985: 429). Nevertheless, artifacts discovered as deep as layers 8–11 (Locality 1) indicate that Peking Man was utilizing stone tools from as early as 460–420 kyr (Conroy 1997: 313). Tool types discovered at Zhoukoudian include points, burins (chisel-like artifacts), scrapers, and choppers, many of which display evidence of retouching (Conroy 1997: 313) and at least three different techniques (anvil percussion, direct percussion, and bipolar percussion) for making the tools seem to have been employed. Over time Peking Man's toolkit appears to have improved and evolved; tools recovered from the earliest occupation layers are generally larger and are made using all three techniques, while those from higher levels (dated to around 300–230 kyr) are smaller and more refined, and the bipolar percussion method is most common (Wu & Lin 1983). In general the stone artifacts discovered at Zhoukoudian provide greater evidence for evolution adaptation and change in Peking Man over time than the fossilized hominin remains.

Peking Man's Diet

While few of the stone tools found in association with Peking Man could be directly considered as weapons, there is a general assumption that *Homo erectus pekinensis* was both a hunter and a gatherer. Indeed the large amount of faunal remains – including wild pig, mouse, rat, frog, bat, hare, hedgehog, bear, horse, a huge amount of deer, and a number of other animals (Chia 1975: 42) – seem to suggest that some sort of predator was utilizing the caves at Zhoukoudian; whether this predator was human, however, is often debated. A large number of hyena bones have also been found at Zhoukoudian, and the guano deposits indicate that owls also made a home in the caves. Binford and Ho (1985: 425) have suggested that the composition of the faunal remains, including the parts and types of animals heavily represented (most notably the deer), and their location in dark parts of the caves, suggests that their accumulation at Zhoukoudian is more likely due to hyena activity than it is an indication of hominin hunting. However, some burned remains and some hominin modified antlers (Chia 1975: 31) discovered in the deposit do suggest that Peking Man was utilizing the local fauna, though whether this was through hunting or simply scavenging is unclear. Floral remains at Zhoukoudian are far less common. A number of hackberry seeds have been discovered at the site, but it is hard to determine if they are an indication of Peking Man's diet or if they simply fell, through sinkholes, into the caves.

Cannibalism

There has been some suggestion, since the discovery of Peking Man, that cannibalism may have occurred at Zhoukoudian. This conclusion of cannibalism is based mainly on the longitudinal splitting of a few postcranial bones, the burning of a very small amount of hominin remains, the breakage pattern displayed in the mandibles (lower jaws), the lack of facial regions among the skulls, and some fractures, groves, and abrasions

on a number of the skulls (Binford & Ho 1985: 414). While the theory of cannibalism continues in some texts and the popular media, it has generally been discounted among the scientific community as the damage to the bones can be explained by either common taphonomic processes or the actions of other, nonhominin, predators.

Evolution of People in Asia?

From discovery to the present day, a number of the debates regarding Peking Man have linked to the evolution and dispersal of humans throughout the world. While the majority of the international scientific community supports what is popularly known as the "out of Africa" hypothesis – the idea that modern humans (*Homo sapiens*) evolved from a small population in East Africa and only began to move throughout the world within the last 100,000 years, replacing previous populations of *Homo erectus* and other hominin genera as they spread – the official view in China is for a rather different method of human evolution. Chinese scientists generally advance a more "sinocentric" (Sautman 2001: 99) view on evolution, suggesting that the earliest hominids evolved within modern Chinese borders and that modern humans developed independently in Asia several hundred thousand years before they did elsewhere. This belief in multiregional evolution posits that modern humans evolved from various pre-*Homo sapiens* populations around the world (Howells 1983: 298), the Chinese from Peking Man, Australian aboriginals from Java Man, and Europeans from Neanderthals (Sautman 2001: 100) due to unique morphological features which persist throughout certain region's populations. Some Chinese scholars still support the idea posited by Franz Weidenrich in the 1930s that Peking Man was a direct ancestor to modern Chinese people and that *Homo erectus pekinensis* proves that Chinese people have existed since the very earliest stages of humanity (Sautman 2001: 97). At present fossil, genetic and linguistic evidence supports the "out of Africa" hypothesis much more firmly than the "sinocentric" viewpoints (Sautman 2001: 98).

Cross-References

- ▶ Black, Davidson
- ▶ *Homo erectus*
- ▶ Java Man
- ▶ Weidenreich, Franz
- ▶ Zhoukoudian, Archaeology of

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Basic Biographical Information

André Penin Santos de Lima (1976–2012) (Figs. 1 and 2) was a Brazilian archaeologist,

Penin, André, Fig. 1 André Penin at Santa Catarina, Santa Marta's sambaquis, 2008

Penin, André, Fig. 2 André Penin, in his office at the University of Rondonia, 2009

born in São Paulo in 1976. He graduated from law school at the Pontifical Catholic University of São Paulo in 1998, but it was at the University of São Paulo that he pursued his career in archaeology. He graduated in history (2000) before achieving a Master's degree (2005) and Ph.D. (2010) in archaeology at the Museum of Archaeology and Ethnology.

In 2009 André Penin became a professor of archaeology with the Archaeology Department at the Federal University of Rondônia, near the Brazilian frontier with Bolivia. He was also affiliated as a professor at the State University of Amazonas and a member of the editorial board of the *Veredas Amazônicas* Journal.

Professor Penin's main areas of interest were heritage, archaeology, and cultural resources management. He was an active and engaged member of the forums regarding those subjects, as well as on the national meetings of the archaeological community, where he was always posing questions and presenting works regarding the political background of the Brazilian archaeological scenario. He was engaged in the three domains in which archaeology takes place in Brazil: the academy, cultural resources management and "the other side of the desk" – as he used to say – as he spent time as a technician at the Institute for National Artistic and Historical Heritage (IPHAN), in the states of the São Paulo and Santa Catarina.

André Penin died tragically at the beginning of 2012.

Major Accomplishments

At the beginning of his career as an archaeologist, Penin focused on the lithic industry and shell

mounds of the southern and southeastern Brazilian coast. It was these subjects that he pursued his thesis, titled *Analysis of the Formative Processes of Capelinha Archaeological Site – Setting up a Microregional Context*.

In 2005, André Penin started to work at IPHAN, first at São Paulo and later at Santa Catarina. It was within this scenario that he was able to draw on his background as a lawyer and engage in the politics of Brazilian archaeology. This experience was later translated into his dissertation in 2010, *Academic, Contract and Heritage. Different Views of the Same Discipline: Archaeology* (Penin 2010), in which he analyzed the practical consequences that the law has on archaeological practice in addition to conducting a legal analysis of the legislation concerning archaeology.

In 2009 he finally became a professor fulfilling his desire to teach – an activity that he carried out with the same commitment and engagement that he displayed in the other domains of Brazilian archaeological practice. His early and tragic death greatly affected the archaeological community in Brazil. Though he was young, he left a legacy in terms of his professional conduct and commitment to ethics in Brazilian archaeology and through his passion for teaching and research, which has inspired others to follow in his footsteps.

Cross-References

- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Ethics of Commercial Archaeology: Brazil
- ▶ South America: Lithic Industries

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People as Agents of Environmental Change

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Introduction

When archaeologists consider people as agents of environmental change, they open a group of related discussions, some of which have been going on as long as archaeology has been recognized as a discipline. These same issues are becoming more important to wider audiences, and archaeologists now have opportunities to contribute to conversations in other disciplines, as well as to decisions made in the public sphere. As archaeologists study relationships between people and the environment in their efforts to study the past, categories such as "nature" and "culture" can be seen as terms used to achieve political and economic goals. Those who have a stake in whether and how people change the environment will always be interested in the answers to these questions.

Historical Background

People value environmental knowledge because they construct their economic lives out of it. Before considering whether people changed the environment, it seems clear that people can change themselves, into a spectacular variety of different ways of interacting with the environment, at every scale. Fishers, farmers, nomads, urbanites, traders, and crafters are a few of the distinctive ways to make a living from the

environment. This diversity of human activity is impossible to separate from its corresponding range of relationships that people have with the environment.

Study of the environment in archaeology is integral to the discipline. Archaeology was born in the realization that geological strata were correlated with different categories of artifacts. The three-age classification (Stone, Bronze and Iron Ages) was closely related to the development of stratigraphy as a tool in geology. Archaeologists and paleoecologists used pollen to reconstruct past vegetation, analyzed glaciers to understand the geological past, and then used those reconstructed environments as context for the evidence of prehistoric life. Reconstruction of the environment has always been a part of archaeology. In broad strokes, this historical context is an ecology or an interaction between three distinct kinds of ideas. These three categories make a tidy set, but just as with any classification, the phenomena in question (the practices of different researchers) in fact combine features of all three.

The first is the founding ideas of the biological and historical sciences, dating to the nineteenth century. After Darwin and Wallace put forward the idea of natural selection, nature was thought of as a variable, rather than a constant. Without this insight, archaeology (and coincidentally, anthropology) would not be recognizable. Because people were seen as part of the universe described by natural selection, the question of how human societies came to be was reopened. This question would be answered against the backdrop of environmental processes that had operated throughout the history of the earth, and even the solar system. In this view of environment, and its relationship with humans, the tools of biological science, chemistry, physics, and geology are used to better understand the current environment and its history through the operation of these universal processes. This powerful mode of thought lies behind the development of all the historical sciences, and accounts for much of the relevant research today.

Individuals are hard to distinguish in the archaeological record, and archaeologists interested in environment generally focus on communities or societies. Ideas about the most useful way of thinking about communities of people vary widely. American archaeology (via its disciplinary roots in anthropology) often views groups of people as having culture, a set of ideas that has influences or perhaps determines how they interact with the environment. Archaeology in Europe (and the UK) is perhaps more oriented toward the idea of society; it is less concerned with ideas that people might share, and more with how groups of people are organized and how they function.

The second idea that contributes to archaeological understanding of the environment dates to roughly the middle of the twentieth century, in conjunction with many significant advances in biology, cybernetics, and ecology. Translated into anthropology (or at least American anthropology), this resulted in a surge of interest in cultural evolution, ecology, and human ecology. The environment is conceived as constantly changing, but perhaps predictable as it follows feedback loops to maintain key variables (population, for example) within sustainable bounds. For example, populations of deer and wolves might vary, but because they are mutually dependent, they oscillate around a stable mean value. This idea is perhaps equally influential as the first, and certainly has resulted in useful research on how human communities relate to the environment in complex ways, whether through rituals associated with sweet potato gardening and raising pigs, or relationships between population and resource among nomadic peoples, or intensive farmers. Ecological points of view often emphasize balance between people and the environment, but people often fail to maintain such relationships.

The third type of idea acknowledges that nature is changing, but because of the efforts of field ecologists (Botkin 1990), it seems that self-regulating, equilibrium relationships do not often manifest themselves outside the laboratory. Instead, ecologists and interested social scientists have converged on a combination of ecology with history, often termed historical ecology. Ecological relationships are still central, as the inputs and outputs of any part of a system impact all the

other parts, but the historical contingency of these relationships becomes the center of attention (Crumley 1994). In this point of view, nature or environment is seen in intimate connection with people, but large patterns are difficult to discern. The way to build such understandings is taken from history, and archaeologists and biologists alike study the local contexts and interactions between people and the environment to build larger theories.

The interplay between these three categories leads to the examination of issues of agency and scale. The idea of agency raises the question of whether intentionality is important to anthropogenic environmental change. For these purposes, anthropogenic change need not be intentional in order to qualify as environmental change. Agency refers to how humans cause change, whether or not they know what they are doing. For example, examining changes in soils over time through the addition of organic inputs like charcoal, it may not be clear whether the changes were intentional or not. Intentionality can also be difficult to define in the archaeological record, when juxtaposed with the different groups of people that might be associated with aspects of the archaeological record. Archaeologists are often more comfortable with what happened in the past than with what people in the past thought was happening.

The question of scale is crucial to describing change and its significance. Archaeologists are concerned with longer periods of time, so that often a change that takes less than a generation is instantaneous. On the other hand, archaeological evidence can establish the presence and importance of long-term trends, over generations, centuries, and millennia. One key question that runs through the history of archaeology, historical sciences, and history is how different scales relate to one another, especially whether causes can be found more at one scale than at the others.

Key Issues

We can define environment as the geological, climatological, biological setting within which people act. The question could then be whether people are capable of moving the scenery around on the stage on which they find themselves. Making this strong distinction between people and the environment as actors and scenery allows an argument to go forward, but the dichotomy itself is part of the theoretical discussion. Different people think of the relationship between people and the environment in very different ways. Because archaeologists and other scholars are also people, they are trapped within this frame of reference. Anthropologists have described many individuals and groups of people who do not draw the line between people and animals in the same place as many westerners. Case studies of how people have changed the environment have made it clear that the distinction between nature and culture is not easy to maintain. What follows is a set of examples in rough chronological order, from human ancestors to the archaeology of the current global political economy.

People use fire to clear grasslands, cook food, warm houses, and hunt animals. Thought of as a technology, the control of fire changes human ecologies tremendously in and of itself, and also as the prerequisite for other technologies: pottery and metallurgy, for example. Although the earliest use of fire has been a controversial topic, recent research suggests that the use of fire predates the human species, as usually defined. If fire was in use by human ancestors and then humans for one million years or more (or perhaps 40,000 generations), then the environment and human communities have been in complex relationships for long enough time to affect both human and landscape evolution. Acting directly on plants and animals, fire is used to favor savanna and fire-tolerant or dependent plants over other forests, to hunt animals on a larger scale, and to open up new sources of food through cooking (Fig. 1; Pyne 2001). Indirectly, the use of fire for other purposes, from cooking to making pots to keeping warm, results in demands for fuel that have further effects, and create processes that generate their own momentum (Bateson 1972). No other process or tool is easier to use and still produces such a dramatic range of profound changes in the environment.

People as Agents of Environmental Change, Fig. 1 Large pre-Columbian raised fields near Santa Ana del Yacuma in the Bolivian Amazon. The differences in color are caused by the effects of burning the savanna. Individual fields average about 20 m by 200 m

A broad category of interactions includes those by which humans domesticate plants, animals, and landscapes. Domestication is a process that changes both humans and other species biologically, geographically, socially, and culturally. Over the course of several thousand years, corn (*Zea mays*) went from an unassuming tropical grass to a hybridized monster that cannot survive outside a complex, industrialized agriculture integrating genetic engineering, chemical fertilizers, herbicides, world markets, and land-grant universities (Piperno & Pearsall 1998). The changes in the human consumers of corn are equally startling. Among animals, the changes in domesticated animals can be seen through faunal analysis, as these species are also integrated into specialized ecologies. But even among animals that are not changed genetically by farmers, the movements and migrations of species that are hunted by humans, used as pets, or who follow human settlement have tremendous effects around the world. This effect is particularly visible on islands, but was by no means limited to them (Kirch & Hunt 1997). Humans also move earth and manipulate fire and water to favor some ecological communities over others. Realizing that fish are trapped in an oxbow lake, or that animals are limited to high ground during a flood season, allows people to predict and take advantage of regularities in the environment, without expending the effort to domesticate plants and animals at the genetic level.

In many cases, these manipulations of the environment, at many different levels, led groups of people to create and maintain ecologies that are usefully thought of as common pool resources (Ostrom 1990). Forests, often greatly modified and managed by people, are the result of practices like pollarding, coppicing, selecting for particular trees, harvesting firewood, fruits, and managing populations of animals. Some landscapes have documented histories of hundreds or even thousands of years (Rackham 1989). The scale of this management, especially in the tropics, is potentially very large (Balée 1998). Another group of managed resources are fisheries, both fresh and salt water. One of the first topics of research for the anthropologists, historians, and social scientists who study the management of common pool resources: Fisheries are amenable to archaeological research through the analysis of paleodiet combined with settlement archaeology to study changes in population over time.

The often-arid landscapes of the Near East have been the stage for human history for many tens of thousands, and perhaps hundreds of thousands of years (Wilkinson 2003). The Near East is a palimpsest of landscape features that were built and used over thousands of years. Irrigation channels, threshing floors, roads, caves, tells,

trails, and paths, all "written" on top of each other and then rewritten. Many of these landscape features also contain historical and cultural significance for their creators and descendants. These links and these relationships are very important today, and presumably also in the past. If a group of people can change the landscape by piling rocks into a monument, that act can have consequences over the long term that are belied by the simplicity of its immediate consequences. Again, the link between what people think about the environment, and how they relate to one another within the environment, is of first importance. Historical examples like irrigation systems in eastern Spain provide evidence about how human institutions and landscapes are related, over many generations. Archaeologists have uncovered widespread evidence of how pre-Columbian peoples built terraces, raised fields or chinampas, causeways, canals, geoglyphs, zoomorphic figures, mounds, paths, roads, dams, artificial channels, a huge range of direct modifications of the landscape that in turn shape the flows of fire, water, plants and animals, and permanently change the geography of the places where people live (Doolittle 2000; Lentz 2000; Denevan 2001; Whitmore & Turner 2001; Balée & Erickson 2006). The terraced landscapes of Southeast Asia and South America demonstrate how people invested their labor over centuries to make the landscape more productive, and increase the return on their time. Archaeologists have the resources and expertise to determine, not if a resource or a way of life is sustainable, but whether it was in fact sustained.

Many archaeologists have studied the interactions between people and the environment, not as examples of how people have built complex landscapes, or domesticated huge catalogs of plants and animals, but as explanations for drastic changes that are seen in the archaeological record (Redman 1999). The decisions that humans made about the environment, whether the consequences were foreseen or not, have been used to explain changes, usually in complex societies or "civilizations" around the earth. The collapse of the Maya, or the Tiwanaku, or Indus Valley civilization, to take three examples, is taken to be the result of overpopulation, overexploitation of resources, or of limited flexibility in the face of environmental changes such as drought. Many technological processes require large inputs of resources. Using wood and charcoal for fuel may have led to the local extinction of algarrobo trees on the Peruvian coast. Using wood or charcoal to fire adobe into bricks may have been an important limitation on the construction of Harappan cities in the Indus Valley. And the use of resources on Easter Island is an important issue in debates between Diamond and his critics regarding the fate of the people who lived there before the arrival of Europeans. Examining these ideas brings together natural and social scientists in productive ways, because although geologists or climate scientists might have insight into long-term changes in precipitation, archaeologists or historians might have insight into how societies interact with seasonal and long-term changes.

Are the fates of human societies governed by unchangeable environmental (geographic, biological, climatological) parameters, or is it possible for humans to change the environment, or change the rules? It is possible for humans to farm even on another planet, if they invested enough resources in the effort. Likewise, a swampy environment could be unlivable to one group of people, while at the same time being an ideal place for another group. Such differences might be in part preferences, as when someone would rather have warm weather year-round than cope with ice and snow, but such choices are also always interwoven with economic and political choices. James Scott argues that some societies "took to the hills" and moved to remote mountain environments to avoid the predation of lowland kingdoms (Scott 2011). These cultural ideas are as important as environmental limitations.

A very powerful way of thinking about the creation of systems within groups of people that relate to the environment is the idea of "second nature" (Cronon 1991). When ideas about nature acquire importance and value separate from the aspects of the nonhuman world, they purport to describe or organize, a second nature is established. When corn, timber, or cotton becomes

a commodity instead of a crop, the difference between the plants grown by two different farmers in two different places is flattened out. Trade and interaction between people over grain futures becomes more important than interaction between people over grain, or even between people and plants themselves. Farmers make decisions not based on any local factors that concern plants, animals, labor, or inputs, but based on a market in corn futures that they might never see, but whose effects they feel through subsidies or fluctuating prices. Cronon's insight raises the question of whether there might be other kinds of "second nature" that are not tied to the historical and geographic context of nineteenth century Chicago. Such disconnections between decision makers and the environment certainly occurred elsewhere. In addition to looking for the evidence of environmental change in lake cores or glacier cores, archaeologists might also look ideas about how "natural" things are brought into more and more abstract contexts.

The long-term history of commodities and political economy brings archaeology into contact with history, economics, and sociology, among other fields (Hornborg & Crumley 2007). Historical archaeology, which some have defined as the archaeology of the world through the development of industrial capitalism, has a great deal to offer to the study of environmental change. Industrial processes can be studied using historical documents, but archaeological evidence multiplies the value of historical sources. In the Amazon, for example, a historical archaeology of the many efforts to colonize, develop, and modernize the Amazon would include the story of Jesuit missions, connected to a global effort to establish an explicitly Christian utopia, the story of rubber exploitation, with a network of ports and company establishments, ranging from the empires of rubber barons in Peru and Bolivia, to Fordlandia, the company town established to oversee industrial cultivation of latex, and the construction of the Madeira-Mamoré railroad, intended to circumvent the non-navigable rapids and bring Bolivian rubber to the international market. Archaeology of the past 500 years around the world will be indispensable to understanding how industrialization changed the environment, both in the industrializing core, and the distant peripheries of the world economic system. Finally, the intentionality of pre-Columbian peoples is directly tied to one of many ideas that have been projected from the western imagination onto indigenous peoples. That Native Americans should be Noble Savages, counterexamples to the squalor and desperate violence of the fifteenth and sixteenth centuries in Europe, was perhaps an inevitable story. That the idea of native Americans as counterexample to the environmental destruction of multinational corporations and modern nation states is a new variation on an old idea. This idea allows intentionality to modern people, but denies it to pre-Columbian (and contemporary) indigenous communities. It also can be used against indigenous groups when they fail to live up to an imagined standard of behavior, instead choosing to follow their own self-interest.

International Perspectives

Archaeologists of South America, from around the world, and from South America itself, have a unique take on people and the environment. This stems from the unique relationships that pre-Columbian South Americans had with the environment, and with a recent history of interaction between ideas from different schools of thought from a variety of traditions. South American archaeologists have long been interested in the connections between pre-Columbian people and their shaping of the landscape from the terraces that gave the Andes Mountains their name, to raised fields that seem to correlate with widespread intensive agriculture across the continent, to concepts about nature and the place of people in it, deriving from the increasingly detailed ethnographic literature.

Environment is a habitat where people interact with other nonhuman factors and create a wide spectrum of adaptations to those factors. This is a line of thinking that is as old as South American archaeology, and the application of a host of new techniques is making it more and more

productive. For example, the application of faunal, botanical, and environmental analyses of early sites has shown that before 12,000 years ago, and perhaps much earlier, groups of people in South America were pursuing a wide variety of ways of life. This has upended previous interpretations of the importance of Clovis peoples in the peopling of the New World, not only through the earlier dates, but more importantly through the documentation of ways of life that are manifestly unrelated to Clovis big-game hunters. The refinement of techniques to better recover and analyze faunal and botanical remains has made these developments possible. Advances of equal importance are being made across the continent, showing that the deep histories of the areas outside the focal Andean region are equal partners in any account of continental archaeology.

Many archaeologists are also aware of the debates in cultural anthropology about the relationships between indigenous South Americans (especially Amazonians) and the natural world. Many of these relationships may have parallels in other parts of the world, and they certainly have profound consequences for how archaeologists interpret their evidence to stand for pre-Columbian ways of life. For the Huaorani in eastern Ecuador, trees are at the same time ancestors, links to historical knowledge, and part of the living environment where people spend their lives (Rival 2002). If individual trees, kinds of trees, and groves of trees can all have these meanings for Huaorani, then archaeologists have to consider that botanical remains of trees represent more than resources that people consumed. Cormier shows how people and monkeys are categories that blend together, as women nurse baby monkeys, and monkeys are accorded many of the statuses of humans (Cormier 2003). This is a pattern of interaction with animals that holds for many other species, although the social relationships differ. A strong thread in Amazonian cultural anthropology leads through the ideas that relationships between humans and the nonhuman world are social relations, rather than inert instrumental relations. In short, indigenous South Americans draw the line between humans and nonhumans in a different place, if indeed they draw that line at all.

And finally, archaeologists are reckoning with the understanding that the earth itself is a living thing. This is true at the level of soil science, where recent studies have focused on the question of how Amazonians manipulated soil properties to create new kinds of soil that have long-lasting properties, thereby changing the plant and animal communities based on those soils (Glaser & Woods 2004). These studies go to the heart of the question of agency – whether pre-Columbian communities created ADE soils intentionally or as the by-product of occupation. Such soils, known since the nineteenth century, are now being studied as a possible development alternative, and as a key to the puzzle of pre-Columbian economies, both along the main rivers, and in areas far removed from them. The agency attributed to South American mountains and constructed mounds is a remarkable example of complex relations between humans and the environment (Dillehay 2007). Social relationships between people and mountains, or between people and constructed monuments (which are also archaeological sites), are key to living in the right way.

South American archaeologists and anthropologist come to the idea of people as agents of environmental change by choice, but also by necessity. From what we now know of the long-term history of people on the South American continent, it would be difficult to understand from any one theoretical perspective, much less one which does not account for the social relationships between people and trees, animals, and the earth. There is little agreement on a larger framework for fitting these ideas of the environment into a larger story about the South American past, but the analysis of people as agents of environmental change is now well established in the field.

Future Directions

Changes in the technology of archaeological research are a trend that will influence future

studies. Archaeologists work hard for their data in the field, and while this will always be true, new techniques in remote sensing, recovery techniques, and management of data will plunge archaeologists into increasingly deep seas of data. Although shovels remain the same, archaeologists in 2012 derive chronological information from a wide range of recovered materials: scrape botanical information from artifact surfaces, and model hydrological or ecological processes in great detail over very large areas.

At the same time, the integration of local stakeholders in archaeological decision making will certainly have an equal impact. For many, the distinction between archaeology and ecology might not be all that important, as long as they bring in tourists or scientific and development grants. For others, archaeology has the potential to focus international attention (and funding) on issues of cultural identity that have always been important, but now are positioned to gain influence.

Finally, the environmental change that is underway in the twenty-first century will certainly influence the practice and interpretation of research. For example, some cultural resources will be destroyed by sea levels, but perhaps others will become available as different parts of the globe become more accessible. Some assumptions about the inevitable course of environmental change (such as deforestation) require greater scrutiny (Fairhead & Leach 1996). More significantly, the course of environmental change in the twenty-first century will likely influence strongly the goals and prejudices of archaeologists and stakeholders. Research may come to focus on case studies of environmental disaster in the past, and on examples of sustained societies as well. Although this trajectory cannot be separated from the arena of conflicting ideas in the present, the study of changing societies and environments in deep history is a question that combines archaeology, ecology, environmental reconstruction, history, geology, botany, geography, and other fields to inform decision makers at all scales, from descendant communities to state bureaucracies, to multinational companies.

Today, many are convinced that people change the environment, from a local to a global scale. However, environmental change in the twenty-first century is a divisive political and economic issue. Establishing connections between how people relate to the environment today, and how they did so in the past, can be a powerful rhetorical strategy. To see societies in the past as examples of sustainable ways of life, or as cautionary tales of mismanagement and ignorance, is a powerful argument when buttressed by archaeological data. Likewise the past 100 years have been described as "Something new under the sun," another strong position in current debates over environmental issues (McNeill 2001). Archaeology is more than political rhetoric, however, and research and analysis suggest that in fact, people have been agents of environmental change for many millennia, over most of the surface of the earth, and into oceans, rivers, and the atmosphere.

If people were agents of environmental change for centuries or millennia, this adds a crucial dimension to our understanding of societies in the past. Arguments over how and why civilizations "rose" and "fell" are often made using reconstructions of past environments, and the further study of these relationships is critical. But it also puts today's debates about environment and society into an important perspective. The world today, whether thought of as social, natural, or something else, is affected by processes that have operated for many generations. The accumulated changes of generations of artificial selection have changed corn from a tropical grass to a commodity. In a similar way, the accumulated labor of generations of farmers has produced irrigation ditches, terraces, raised fields, and other agricultural infrastructure, which is crucial to modern agricultural successes. The study of people as agents of environmental change must change several fields, by demonstrating that ancient environments, ancient societies, and the relationship between society and the environment today are all conditioned by these important historical contexts, whether or not the analysis of these case studies yields any kind of universal history or model.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agriculture: Definition and Overview
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Landscape Archaeology
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- ▶ Maize: Origins and Development

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Peopling of the Americas

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Introduction

Examination of the timing, methods of movement, routes, and origins of human migration into the hitherto unpopulated western hemisphere has engaged archaeological inquiry for over 150 years. The last of the Pleistocene migrations by fully modern humans, and arguably the last of the great earthbound human migrations, this journey covered thousands of kilometers over the course of several 1,000 years, well after the movement of modern humans out of Africa (c. 50,000 BP) and Central and Eastern Asia (c. 45,000–40,000 BP). Upon their arrival, these first migrants then appear to have quickly spread throughout the entire (and then completely unknown) hemisphere within a matter of just a few 1,000 years, adapting to a complex and variable array of local climates, landscapes, and biota while also exhibiting concomitantly diverse technologies and lifeways on the landscape in very widely distributed locations.

Scholarly answers to the questions surrounding this migration have achieved varying levels of resolution and consensus, but some aspects – most notably the timing of the event(s) – have admittedly remained intractable and unresolved. It is generally agreed, for example, that the earliest inhabitants of the Americas were at first Siberians. Resolution and consensus begin to break down, however, once one starts speaking about the timing (pre- vs. post-Last Glacial Maximum [LGM]) and routes of the migration (coastal versus interior, or both?). Moreover, considerable lacunae continue to exist in our understanding of late Pleistocene lifeways in the Americas, hinging as it does on quite variable data from far-flung sites that are often relatively small, poorly preserved, and ephemeral occupations compared to later (and sometimes overlapping) cultural manifestations. This entry is not offered with the presumption of resolving these and attendant issues but, rather, summarizes the history of scholarship concerning the peopling of the Americas and our current knowledge of this watershed event in human history.

Historical Background

The confirmation of a deep human antiquity in Europe by a delegation of British geologists and antiquarians visiting the excavations of Jacques Boucher de Crèvecœur de Perthes on the Somme in northern France in 1859 soon filtered across the Atlantic. This, in turn, stimulated American academicians to naively seek phenomena of comparable antiquity in the Americas. The ensuing "American Paleolithic" debate would foreshadow later and still ongoing disputes about the timing of the arrival of the hemisphere's first colonists. The question of an American Paleolithic would temporarily be resolved by the turn of the twentieth century, when – thanks largely to the insistence on rigorous standards of evidence by Aleš Hrdlička, William Henry Holmes, and others – all claims for an Ice Age human presence in the Americas had been dashed. Prior to the 1920s, the received wisdom was that no humans had entered this hemisphere before the final retreat of the glacial ice and the subsequent inundation of the Bering Platform.

This almost universally accepted position would ultimately be dismantled by another delegation of experts which, in 1927, confirmed Jesse Dade Figgins' claimed association of an extinct species of bison (*Bison antiquus*) with artifacts of indisputable human manufacture in an unambiguous stratified context. The artifact suite notably included delicately made projectile points with bilateral channel flakes or flutes, which were named Folsom after the locus of the discovery. This seminal research not only established that humans were in the Americas sometime before

the end of the last Ice Age but also that they were living among and preying upon extinct Pleistocene fauna.

Four years later, two other discoveries, one near Dent, Colorado, and the other at Blackwater Draw, south of Clovis, New Mexico, revealed more evidence of the apparent hunting of extinct Pleistocene megafauna, in these cases, mammoth (*Mammuthus columbi*). Associated with these remains was a robust form of bi-channel flaked point which subsequent excavations demonstrated was stratigraphically deeper and thus older than the bison-associated Folsom point. Named Clovis after the nearby New Mexico community, these points were subsequently reported from much of unglaciated North America as well as portions of Central and South America. Within a few decades, these points and a suite of loosely associated artifacts came to be regarded as the signature artifacts of the hemisphere's initial colonists and considered emblematic of a highly specialized, big-game-focused lifeway pursued by rapidly moving spear-wielding hunters.

With the advent and application of radiocarbon dating in the late 1940s and early 1950s, the Clovis "horizon" was initially fixed at c. 13,500–13,000 years ago. By the late 1960s, a peopling scenario that held Clovis as the hemisphere's initial colonizing pulse was widely accepted by a great majority of North American scholars and the lay public. Called "Clovis First" in more recent times, its proponents believed that sometime shortly before 13,500 years ago, a small group of Paleo-Indians crossed the Bering Platform dry-shod, passed through the unglaciated Bering Refugium, and then rapidly moved south through the narrow corridor between the waxing and waning Cordilleran and Laurentide ice sheets. Following their transit through the ice-free corridor, these putative first inhabitants of the Americas were then presumed to have spread throughout the entire hemisphere in the span of only about 500 years. Either shortly before or perhaps during this dispersal, they were also presumed to have invented the fluting of projectile points and used these allegedly lethal weapons to more or less synchronously dispatch some 35 species of late Pleistocene fauna. This "blitzkrieg" dispersal, as it came to be known, was championed by late Paul Martin (1967). An important additional corollary to this scenario was the explicit stipulation that Clovis technology was ancestral to all other tool kits in the entire hemisphere. Although not without its critics, the Clovis First model became further entrenched by the repeated failure to identify bona fide sites predating Clovis and the apparent support provided by the limited physical anthropological and linguistic data available at that time.

Despite its inherent weaknesses, especially the existence of roughly contemporaneous lithic industries that are clearly distinct from Clovis, the Clovis First paradigm did not begin to unravel until the early 1970s with the discovery of several sites that seriously challenged the Clovis First model. The most frequently cited localities that have precipitated a general acceptance of the existence of pre-Clovis populations in the Americas are Monte Verde in Chile (Dillehay 1989, 1997) and Meadowcroft Rockshelter in southwestern Pennsylvania (Adovasio et al. 1977, 1985, 1990). These two localities yielded durable and perishable artifacts of indisputable anthropogenic origin in well-defined stratigraphic contexts that were tightly bracketed by multiple internally consistent radiocarbon determinations. Despite continued criticism from some scholars, these two sites nonetheless definitively established a human presence in the Americas at least 1,000–2,500 radiocarbon years before the Clovis First model's presumed crossing of the Bering Strait.

Although Meadowcroft was discovered and initially published upon before Monte Verde, this latter site is widely considered to be the first site to have seriously challenged the Clovis First peopling scenario. Located on a tributary stream c. 15 km northeast of the Gulf of Ancud on the west coast of Chile, Monte Verde is the southernmost pre-Clovis site in the hemisphere. Though two cultural components have been identified at Monte Verde, MV-I, the earlier of the two, is presently known only from a very limited deep excavation. The MV-I component essentially consists of three possible cultural features with a small number ($n = 26$) of apparently associated

lithic artifacts and two radiocarbon determinations of 33,370 ± 530 BP (cal. 37,462–34,761 BCE [1σ]) and >33,020 (older than cal. 36,494–35,123 BCE). (All dates are calibrated using OxCal 4.1 [2012], IntCal09 calibration curve). If these assays are accurate, they represent the earliest directly dated human manifestation in the hemisphere. Despite the potentially profound significance of MV-I, which may be penecontemporaneous with the earliest generally accepted penetration of humans into upper Siberia, the excavators prefer to withhold assessment on this component (Dillehay 1997: 774–5). As a result, far more attention has focused on the much more extensively and intensively investigated MV-II component.

Monte Verde's later occupation (Dillehay 1997: 49) is securely dated by over a dozen conventional and AMS assays on various substrates to between c. 12,300 BP (cal 12,874–12,063 BCE [1σ]) and 12,800 BP (cal 13,630–13,005 BCE [1σ]). Significantly, it appears to reflect a semisedentary, broad-spectrum adaptation that is fundamentally different in all respects from that modeled for later Clovis populations. The MV-II component is a streamside residential site that is sealed beneath a post-occupational peat mantle. The principal habitation area lies north of the stream and is composed of the structural remains of 12 rectangular, hut-like dwellings made of wood elements and covered with plant material and/or the skins or hides of animals like paleo-llama (*Llama glama glama*). Associated with these structures were four workshop areas, a midden concentration, and a variety of hearths and pits. Excavations in the residential area yielded lithic, bone, wood, and fiber artifacts as well as the remains of more than 70 taxa of plants, including local as well as exotic edible and medicinal varieties. Remarkably, actual specimens of animal tissue and hide were recovered in addition to abundant faunal remains notably including fragmented, burned, and unburned mastodon (*Cuvieronius* sp.) bone and ivory. Directly to the west of the hut complex was another structure with a wishbone-shaped foundation and extensive associated refuse.

Collectively, the archaeological and ecofactual inventory from Monte Verde indicates a semisedentary subsistence regime that included the exploitation of small game, paleo-llama, and larger animals like mastodon as well as a wide diversity of local and nonlocal plant foodstuffs. The tool kit is dominated by perishable artifacts with a lithic industry that is remarkable only for its expedient character and general lack of temporal diagnostics. Indeed, with the exception of three projectile point fragments with apparent affinities to the Paleo-Indian El Jobo type, the majority of the durable tool kit can only be called depauperate, with few curated tools and a virtual absence of formalization. Most of the igneous raw materials employed in the production of the MV-II stone tool kit are derived from locally abundant glaciofluvial gravels with fewer than 15 % coming from nonlocal sources. In sum, the evidence from Monte Verde indicates an adaptation completely inconsistent with the Clovis First paradigm in chronological, technological, and behavioral terms. Though still subject to some criticism, the majority of the North American scholarly community accepts the antiquity of the MV-II occupation at Monte Verde.

More than 9,000 km north of Monte Verde is Meadowcroft Rockshelter, a deeply stratified south-facing rockshelter located on a minor tributary of the Ohio River in southwestern Pennsylvania. The 11 strata at this site have yielded the longest occupational sequence from eastern North America and one of the longest in the Americas. The site's upper strata (Upper IIa–XI), whose temporal provenance has never been seriously disputed, span the entire Holocene with a terminus ad quem dating to just before the American Revolutionary War (CE 1775–1783). The lower culture bearing strata (Middle and Lower IIa) and their attendant radiocarbon dates, however, have been the subject of four decades of vigorous debate and controversy. Continued criticism has pivoted around alleged contamination of only the 11 oldest radiometric determinations from the site, along with the absence of a final report.

No evidence of any form of contamination has ever been demonstrated despite extensive

publication on stratigraphy and the dating issue, however, and there appears to be an emerging consensus on the antiquity of the site's deepest levels. Applying the most conservative interpretation of the available chronometric data, the latest age for the presence of human populations in this portion of the Ohio River basin is in the range of 12,000 BP (cal 12,008–11,807 BCE [1σ]) to 10,600 BP (cal 10,682–10,593 BCE [1σ]). If the six deepest dates unequivocally associated with cultural material are averaged, then humans were definitely present at the site between 14,555 BP (cal 16,023–15,475 BCE [1σ]) and 13,955 BP (cal 15,247–14,862 BCE [1σ]).

The lithic artifact assemblage associated with the earliest Meadowcroft populations is relatively small (approximately 700 specimens) but sufficient to characterize the industry. The Meadowcroft lithic debitage sample reflects secondary and tertiary core reduction and biface thinning from late-stage manufacture as well as the refurbishing of finished implements. The essentially curated tool kit notably includes an unfluted lanceolate bifacial point (the Miller point) and small prismatic to triangular (in cross section) blades struck from small prepared cores. Additionally, bone, wood, and plant fiber artifacts were also recovered from the site's pre-Clovis levels. These include plaited basketry, a bone punch, bone awl fragments, and a bipointed wooden tool, all apparently made by generalized foragers who exploited white-tailed deer (*Odocoileus* sp.) and smaller game along with hickory nuts (*Carya* sp.), walnuts (*Juglans* sp.), and hackberries (*Celtis* sp.), during the predominately short-term fall visits.

Key Issues/Current Debates

The publication of the initial series of radiocarbon dates from Meadowcroft in the mid- to late 1970s, arguably when the Clovis First paradigm was at its zenith, constituted the first serious challenge the Clovis First paradigm and was immediately met with skepticism and withering criticism. The intervening years, however, have witnessed the gradual unraveling of Clovis First in the face of mounting evidence to the contrary, both in the form of newly discovered Clovis contemporaries and/or pre-Clovis sites (which as of this writing number at least 30), and more subtle strains of evidence marshaled through advances in analytical techniques, multidisciplinary research initiatives, and innovative approaches. Molecular genetics, bioanthropological research, and historical linguistics, for example, have been enlisted in the search for the points of departure for the early colonizers of the Americas. Moreover, continued archaeological research and refinements in historical geology, historical glaciology, and geomorphology have permitted a better understanding of prior population movements through the Russian Arctic and Siberia and an exploration of their implications for human subsistence and adaptability as well as the timing and route(s) of entry. Freedom from the strictures of received wisdom has also permitted the consideration of factors and approaches which might have previously been ruled out, such as the consideration of coastal (or even maritime) routes of entry to the Americas.

Pre-Clovis Sites

Perhaps the most important development has been the archaeological discovery of new challengers to the Clovis First paradigm in far-flung localities in North and South America. These include sites which are clearly older than the Clovis horizon and/or penecontemporaneous and, hence, unrelated in any descendent way. Among the older sites is Cactus Hill in Virginia, a stratified, multicomponent, open site situated in an approximately 1.8-m-thick aeolian dune deposit adjacent to the Nottaway River on the interior coastal plain of Virginia. The site was investigated by two independent groups, one directed by J. McAvoy (McAvoy et al. 2000) and the other M. Johnson.

The occupational sequence at Cactus Hill is roughly confined to the upper 1 m of the dune deposit but, like Meadowcroft, extends from before Clovis times to the historic period. In several sections of the site, a Clovis occupation has been identified beneath which lies a thinly but clearly

separated pre-Clovis component. The Clovis occupation is dated to c. 10,920 ± 250 BP (cal 11,395–10,269 BCE [1σ]) on the basis of firepit-derived charcoal. The pre-Clovis component has a series of radiocarbon and complementary OSL determinations. Notable are dates of 15,070 ± 70 BP (16,620–16,077 BCE [1σ]) from a probable hearth and 16,670 ± 730 BP (19,926–16,636 BCE [1σ]) from a charcoal concentration beneath a lithic tool cluster. A second date of 16,940 ± 50 BP (18,401–17,925 BCE [1σ]) appears to confirm the other dates as do the OSL assays. Collectively, the data suggests one or more earlier than Clovis occupations dating 17,000–15,000 BP (cal 18,426–16,066 BCE [1σ]).

Lithic analysis of the approximately 70 flaked stone tools from the pre-Clovis component(s) reflects a core and blade technology with two different kinds of small cores (conical platform cores with and without faceting and thick, chopper-like cores). The locally obtained quartzite cores were flaked with soft stone hammers or hardwood billets thought to have been prepared elsewhere then brought to the site for blade or blade-flake production. Also represented are at least two thin subtriangular to lanceolate unfluted bifaces. The excavators suggest that the blade and biface technology was employed by generalized foragers, not specialized big-game hunters. Additionally, the resemblance of the early Cactus Hill tool kit to its counterpart at Meadowcroft is readily apparent in all but raw material choices.

Although a uniform consensus exists for none of them, several other sites in North America are often cited as older than Clovis: the Paisley Five Mile Point Caves in Oregon, Page-Ladson in Florida, the Schaefer and Hebior sites in Wisconsin, and the Deborah L. Friedkin and nearby Gault localities in central Texas.

The Paisley Five Mile Point Caves, which were initially investigated in the late 1930s, are a complex of eight closed loci in south central Oregon that were carved by wave action from basalts, volcanic tuffs, and breccias. Much more recent research in Paisley Five Mile Point Cave 5 (Jenkins 2007) has yielded durable and perishable artifacts, cultural features, late Pleistocene faunal remains, and putative human coprolites in apparent association within deeply buried stratigraphic contexts. Seven of the coprolites have been directly dated by radiocarbon assay, yielding ages ranging from 12,400 ± 60 BP (cal 13,011–12,150 BCE [1σ]) to 10,670 ± 60 BP (cal 10,744–10,488 BCE [1σ]). Five of the dated coprolites have yielded human DNA and human protein residue and are often cited as among the oldest directly assayed evidences of a human presence in North America. Despite fanciful efforts to challenge the anthropogenic origin of the coprolites, many accept these materials as demonstrating a pre-Clovis presence in the Pacific Northwest.

Page-Ladson is a sinkhole in the submerged bed of the Aucilla River in the Big Bend area of Florida (Dunbar 2006). Excavations in the deepest levels at this locus have produced lithic debitage, at least one unequivocal uniface, and apparent anthropogenically modified bones and ivory in apparent association with late Pleistocene megafauna including mammoth (*Mammuthus primigenius*), mastodon (*Mammut americanum*), horse (*Equus* sp.), ground sloth (*Megalonyx* sp.), and paleo-llama (*Llama glama glama*). A series of radiocarbon dates from these levels range from 13,130 ± 220 BP (cal 14,783–13,172 BCE [1σ]) to 11,770 ± 90 BP (cal 11,867–11,457 BCE [1σ]).

More or less contemporaneous are sites of the Chesrow Complex, defined on the basis of 35 localities on the west side of Lake Michigan in southeastern Wisconsin (Overstreet 2005). The Chesrow Complex includes both habitation and mammal kill/processing localities. Two of the sites, Schaefer and Hebior, are reported to contain cultural materials associated with late Pleistocene megafauna in well-dated contexts. The Chesrow artifact suite as derived from numerous sites includes unfluted lanceolate to basally thinned concave base points, other weakly stemmed points, bifaces, cores, utilized flakes, and hammer stones made largely from locally available quartzite cobbles. Two of the kill/processing sites have produced radiocarbon determinations from alleged associations with

artifacts and extinct fauna. Schaefer yielded eight dates ranging from 12,610 ± 80 BP (cal 13,258–12,289 BCE [1σ]) to 10,960 ± 100 BP (cal 11,143–10,695 BCE [1σ]) with seven of the eight in the thirteenth millennium BP. Hebior yielded three dates ranging from 12,590 ± 50 BP (cal 13,240–12,309 BCE [1σ]) to 12,480 ± 60 BP (cal 13,095–12,229 BCE [1σ]). At both sites the principal associated fauna is mammoth (*Mammuthus primigenius*). Two additional Chesrow Complex sites, Mud Lake and Penske, have also yielded apparently butchered mammoths but without artifact associations. Mud Lake yielded two dates of 13,530 ± 50 BP (cal 14,950–14,497 BCE [1σ]) and 13,440 ± 60 BP (cal 14,933–14,229 BCE [1σ]); Penske produced two dates of 13,510 ± 50 BP (cal 14,941–14,471 BCE [1σ]) and 13,470 ± 50 BP (cal 14,932–14,403 BCE [1σ]). Notably, the excavators of the dated Chesrow sites see technological resemblances between the Chesrow lanceolate bifaces and those recovered from Cactus Hill and Meadowcroft.

Debra L. Friedkin and Gault are deeply stratified open sites in central Texas on the alluvial flood plain of Buttermilk Creek, a tributary stream in the Lower Brazos–Little Brazos watershed (Waters et al. 2011). Separated by less than 250 m, it is probable that both sites are part of the same very extensive series of seasonal residential occupations. Deep excavations at these localities have yielded long occupational sequences which include Late Prehistoric; Late, Middle, and Early Archaic manifestations; and the entire Paleo-Indian sequence, notably including well-defined (and in the case of Gault, very large) Clovis components. Beneath the Clovis layers at both sites is an extensive manifestation that is older than Clovis. At Friedkin, more than 15,000 artifacts have been recovered from the pre-Clovis levels, a total which includes 12 bifaces, 23 utilized flakes, 19 whole or fragmentary blade or blade flakes, gravers, at least 1 core, and 1 piece of polished hematite. The bifaces include unfluted lanceolate forms and exhibit varying thicknesses. A generally similar assemblage was recovered from Gault, specifically including fragments of 2 very small, expanding stem unfluted projectile points and at least 1 unfluted lanceolate biface. Gault also yielded a pre-Clovis stone pavement which may be part of an anthropogenically created house or structure floor.

Optically stimulated luminescence dates suggest that the pre-Clovis occupation at Debra L. Friedkin ranges from 14,350 to 16,170 years BP, with a similar estimate for Gault. It should be stressed that the Clovis occupation at Gault is far and away the most extensive ever recorded in North America. Stretching over a minimum of 12 ha, the Clovis component at Gault has produced more than 600,000 Clovis-age lithic artifacts from excavations covering less than 3 % of the site's total surface area. Virtually all of the lithic artifacts recovered from both sites derive from extensive local outcrops of Edwards Plateau chert, which appears to have been a major attraction to populations visiting both sites throughout their occupational trajectories. Interestingly, the pre-Clovis technology at both sites shares certain attributes not only with later Clovis-age materials but also with the pre-Clovis technology exhibited at such far-flung localities as the Chesrow Complex sites, Meadowcroft Rockshelter, and Cactus Hill. It is also significant that the excavators believe that the Clovis occupations at Gault and Debra L. Friedkin are probably both longer term and suggest a more broadly based subsistence lifestyle than that posited for this time period by the Clovis First paradigm.

Clovis Contemporaries: Diversity and Dissimilarity from Clovis

As damaging as the evidence from the pre-Clovis sites summarized above is to the integrity of the Clovis First model, data from penecontemporaneous sites and/or complexes to which Clovis cannot possibly be ancestral is equally compelling. As with pre-Clovis manifestations, a significant number of sites, site complexes, and tool industries that have been identified across the length and breadth of the Americas have yielded bona fide artifacts and tool kits reflecting lifestyles that are sharply at variance with the putatively typical Clovis patterns. In far western

North America, such phenomena notably include the Western Stemmed Tradition (WST) sites in the Great Basin and immediately contiguous areas (Beck & Jones 2010). Noteworthy among the WST sites are Smith Creek Cave in Nevada (with its Mt. Moriah points, gravers, and unifaces), Danger Cave in Utah, Connley Cave #5 in Oregon, Cooper's Ferry on the lower Salmon River in Idaho, Clarks Flat on the western flank of the Sierra Nevada Mountains in California, and Dietz in Oregon. While the deepest and oldest dates at several of these localities have been challenged and claims have been made that Clovis predates the WST, it is generally accorded that in technological and behavioral terms, these sites significantly differ from and are fundamentally unrelated to Clovis.

Far to the north at the eastern end of the Bering Platform are the central Alaskan sites of the Nenana Complex: Dry Creek, Walker Road, Mock Creek, and Panguingue Creek in the Nenana Valley; Owl Ridge in the neighboring Teklanika Valley; and penecontemporaneous localities like Broken Mammoth, Swan Point, and Mead in the Tanana Valley. Excavations at all of these open sites have produced generally similar lithic assemblages that include Chindadn points (an unfluted lanceolate to subtriangular to teardrop form) and high frequencies of end and side unifaces (i.e., end and side scrapers), other unifacial and bifacial forms, a few true burins, and extensive debitage. Also present at most sites are small- to medium-sized blades, blade cores, and tools made on blades (Powers & Hoffecker 1989). Once thought to date to c. 11,800 BP (cal 11,827–11,529 BCE [1σ]) and, therefore, a potential ancestor to Clovis, Nenana is now viewed as a c. 11,300 BP (cal 11,332–11,166 BCE [1σ]) Clovis contemporary. Though sharing some broadly similar technological attributes with Clovis, Nenana is clearly not a descendant complex.

Farthest afield and not surprisingly evidencing the least technological or behavioral resemblance to Clovis are a growing number of South American sites whose ages are, again, either clearly earlier or broadly contemporary with Clovis. These include Lapa do Boquete, Lapa dos Bichos, and Grande Abrigo de Santana do Riacho in Brazil; Fell's Cave, Tagua-Tagua, Quebrada Santa Julia, and Quebrada Jaguay in Chile; Tibitó in Columbia; Cerro Tres Tetas, Cueva Casa del Minero, and Piedra Museo in Argentina; and Taima-Taima in Venezuela. Most of these sites have yielded undiagnostic flake tools as well as a minority of bifacial elements. A few, like Fell's Cave and Piedra Museo, have produced distinctive fishtail points once thought to be Clovis derivatives. Though many of these sites are only partially reported and few have multiple, internally consistent chronometric ages, the inescapable fact remains that their lithic industries are quite different from Clovis (or, indeed, any other North American industries) and are clearly not descended from them. Though this elemental lack of technical relationships has long been cited by South American archaeologists, it has been casually dismissed or ignored by proponents of Clovis First.

Discussion

Just as the Clovis First model appeared to be consistent with and thereby supported by the extant linguistic and biological data of the 1950s–1970s, so also now does the pre-Clovis paradigm appear to be corroborated, however imperfectly, by more modern data from these disciplines. Although space precludes in-depth discussion of recent genetic, bioanthropological, and linguistic scholarly efforts to address or establish the timing of the arrival(s) of the first humans into the Americas, suffice to note that virtually all of the available genetic, morphological, dental, and linguistic data continue to consistently and overwhelmingly point to an East Asian origin for Native Americans. Despite this fundamental consensus, however, some scholars suggest that at least one of the colonizing lineages (i.e., the X haplogroup) may derive from Iberia, not Siberia (see below), while others advance the possibility of a sub-Saharan African homeland for some native South Americans.

Any consensus on the number and/or timing of population pulses into the Americas based on

non-archaeological evidence is far more tenuous. Some geneticists and linguists favor a single movement; others advocate two, three, or more population spreads. Some suggest an entry before the Last Glacial Maximum (LGM) now fixed between c. 20,000–19,000 BP and 16,500 BP, others maintain a post-LGM entry, and others still postulate multiple movements before and after the LGM, occasionally with the possibility of failed migrations. Likewise, various models have been offered to simulate rapid population expansion, slower spreading rates, and even very slow movements north to south. None of these models has achieved general or even limited acceptance, and the present state of knowledge unfortunately does not appear to permit the definitive establishment of a chronology for either the first or subsequent entradas. Indeed, Meltzer (2009: 133) may well be correct that the ephemeral signature of the very first colonists on the American landscape will never be found.

If there is considerable disagreement over the timing and/or number of separate entradas into the Americas based on genetic or linguistic data, there is perhaps even greater dispute over the route or routes of entry. Some authorities, mostly proponents of Clovis First, still support the traditionally recognized entry route through the unglaciated interior of Beringia into the unglaciated Bering Refugium and thence down the ice-free corridor; others have resurrected coastal entry hypothesis of Fladmark et al. (1988), which holds that populations migrated along the southern margins of the Bering Platform then down the Pacific Coast by a combination of pedestrian and boat travel. A variation of this scenario has coastal migrants moving into the interior at various favorable spots along the way. Still another variant of the coastal hypothesis has populations moving down the coast into Central America then traveling across the Isthmus of Panama and moving north and east around the North American continental margins, without any early penetration of the interior. This view is obviously modeled after the initial coastal peopling of Australia which has gained currency in recent years.

Perhaps the most controversial colonization scenario yet offered is the trans-Atlantic hypothesis championed by Stanford and Bradley (2012), which posits that maritime-adapted Solutreans emanating out of the Atlantic coast of southern Europe and traversing the North Atlantic in umiak-style watercraft. Upon arriving in the Americas, they are speculated to have introduced elements of Solutrean technology which ultimately gave rise to Clovis in the American southeast. Stanford and Bradley cite the occurrence of the X haplogroup in Western Europe as well as a claimed series of congruencies between Solutrean and later Clovis technology, which they believe cannot be coincidental or reflect convergent evolution. They also cite very recent excavations on the mid-Atlantic coast as well as a series of offshore and terrestrial artifact recoveries of putative Solutrean implements to buttress their claims. Furthermore, to fill the chronological hiatus between Solutrean and Clovis as currently dated, Stanford and Bradley pose Meadowcroft and Cactus Hill as transitional industries. No consensus has been achieved for this scenario to date, and initial scholarly reaction has ranged the gamut from scornful rejection to enthusiastic acceptance.

Whatever the plausibility of the trans-Atlantic theory, Stanford and Bradley have correctly stressed the fact, as did Dixon (1999), that scholars have collectively ignored the role of boats, water transport, and maritime adaptations in virtually all North American peopling scenarios. Likewise, until recently, the inundated continental shelf on both the east and west coasts has never been systematically mapped or studied for the presence of early now inundated sites. This lacuna is now being addressed in the Gulf of Mexico, along various points of the Atlantic seaboard, in the Gulf of California, and along the Pacific coast.

Despite a sometimes profound lack of resolution to the various issue surrounding the peopling of the Americas, however, several aspects of the debate that were once rejected out of hand by the scholars of the 1960s and 1970s have achieved widespread acceptance by the

scholarly community. Based on Monte Verde *alone*, it is clear that humans entered the Americas well before the appearance and proliferation of Clovis technology. Furthermore, when other early sites and site complexes – such as Meadowcroft, Cactus Hill, the Buttermilk Creek Complex, the Chesrow Complex, the Paisley Five Mile Point Caves, and Page-Ladson – are considered along with penecontemporaneous sites/complexes like Nenana, the WST, and the flake-oriented industries of South America, the case for an earlier-than-Clovis presence is overwhelming. The diversity of the tool kits and attendant lifestyles at many of these sites points toward multiple movements by different groups at different times via different routes from East Asia.

Cross-References

- ▶ Clovis and Folsom, Indigenous Occupation Prior to
- ▶ Meadowcroft: Geography and Culture
- ▶ Monte Verde, Archaeology of
- ▶ North American Terminal Pleistocene Extinctions: Current Views

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Pereira, Edithe

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Basic Biographical Information

Edithe Pereira is a Brazilian researcher and archaeologist at the Emilio Goeldi Museum. She was born in the city of Belém, in the state of Pará, which is located in the Amazon region. She graduated from the Federal University of Pará in 1982 with a degree in History, and began her career in archaeology in 1983, as a trainee at the Goeldi Museum under the supervision of Dr. Mário Simões. In 1988, Edithe Pereira joined the research framework of this institution, and in the same year, she started a master course in History at the Federal University of Pernambuco, intending to study Amazon ceramics. Instead, she was drawn to the research being done in Piauí by Dr. Niéde Guidon and her team, on what was what to become her greatest interest: Rock Art. Under the guidance of Dr. Anne Marie Pessis, she wrote *As Gravuras e Pinturas Rupestres no Pará*, *Maranhão e Tocantins*: *Estado atual do Conhecimento e Perspectivas*, obtaining a master's degree in 1990. She then earned her Ph.D. at the University of Valencia, Spain, in 1996, with a thesis entitled *Las Pinturas y los Grabados Rupestres del Noroeste de Pará - Amazônia – Brasil*, directed by Prof. Dr. Valentín Villaverde Bonilla. As a dedicated researcher, Edithe Pereira has made Rock Art in the Amazon a lifelong project, and has coordinated projects that include: Survey of Sites in the Lower Amazon Rupestres Records (1990–1993), Rock Art and Archaeological Context in the Lower Region/Middle Araguaia (1999–2000), Arraias Stone to the Cadena Lajedo – the Characterization of Rock Carvings in Southern Pará (2000–2006), Rock Art of Monte Alegre – Dissemination and Memory of Archaeological Heritage (2012–2014), Rock Art and Archaeological Context in the Caves of Rurópolis (2012–2014) and The Pre-Colonial Occupation of Monte Alegre (2012–2014). She has also coordinated projects pertaining to Contract Archaeology, including the Preventive Archaeology Program in the area of Serra do Sossego (2001–2006) and the Archaeological Survey in the area of the Belo Monte hydroelectric (1999–2000). Recently, Edithe Pereira began acting in the area of Archaeological Tourism, in partnership with the Instituto do Patrimônio Histórico e Artistico Nacional (IPHAN), on a pioneering project that aimed for the musealization of archaeological sites in the Amazon. She has organized Archaeological Tourism events; among these are the first and second Debate Forum in Archaeology and Tourism in the Amazon in 2005 and 2008, respectively, as well as the Symposium on Tourism, Archaeology of Research and Planning Methodologies (2008), and the International Tourism Workshop on Archaeological and Heritage Management (2009). The result of her involvement with this issue culminated in the book, "Turismo e Gestão do Patrimônio Arqueológico" edited together with Silvio Figueiredo and Marcia Bezerra, and released in 2012.

Major Accomplishments

Edithe Pereira has contributed decisively to Amazonian Archaeology, particularly in relation to her dedicated research on Rock Art. In the late 1980s when her history as an eminent researcher began, the landscape of rock art studies on Amazon was negligible compared to ceramic studies. All reconstructions of prehistoric occupation of the Amazon, hitherto considered the occupation of the potter to be primary. To cope with this approach, Pereira's research associates a detailed survey of source tales, spatial distribution, visual documentation and systematic analysis of rock motifs. From the results of this competent and meticulous work emerged the strong potential that studies of rock art in the Amazon have as another important area of knowledge in the reconstruction of the

prehistoric Amazon. The bibliographic record on the subject deserve highlights: (1) the article Testimony in Stone: Rock Art in the Amazon (2001), which provides a summary of research conducted on the Amazon so far; (2) the book *Arte Rupestre na Amazônia—Pará* (2003), which finds, describes, and classifies information about each site, and addresses issues such as diversity of Amazon rock art, the problems of dating and archaeological context. It also sounds an alert on the issue of preservation of these sites, and the Academy of History Paulistana gave this book the CLIO award of History (2005); (3) the book *Petróglifos Sul-Americanos* of Koch-Grünberg (2010), whose translation into Portuguese was organized by Edithe Pereira; and (4) the articles "Historia de la investigación sobre el arte rupestre en la Amazonía brasileña, (2006) and Histoire, territorialité diversité et dans l'art de l'rock Amazonie brésilienne" (2011).

In 2008, Pereira Edithe coordinated the First International Meeting of Archaeology Amazon, based in Belém do Pará in an embodiment of the Goeldi Museum, in partnership with the IPHAN and the State Secretary of Culture for the State of Pará. This event fostered discussion on archaeological research conducted in the Amazon over the past 20 years, discussing topics related to the ancient settlement of this region, coastal occupations, domestication of plants, climate change, expanding linguistic, social complexity in ancient Amazonia, historical archaeology, transformations in the landscape, paleogenetic paleodemography, art and archaeology in the Amazon pre-colonial, and heritage education.

The book *Arqueologia Amazônica* (2010), co-edited by Edithe Pereira & Vera Guapindaia, presents the outcome of this meeting in two volumes that demonstrate the undeniable growth of different theoretical and methodological approaches in the study of prehistory Amazon (Whitehead 2011). Edithe Pereira continues to undertake her career as a researcher, producing knowledge that resulted in the recent book publication of *A Arte Rupestre de Monte Alegre* (2012). As the fruit of her research in Monte Alegre and aiming at the formation of new generations, she has published a children's book titled *Itaí – A carinha pintada* (2012), authored by Juraci Siqueira and illustrated by Mario Baratta, and has produced a documentary about the rock art of Monte Alegre (2012). Edithe Pereira is also a talented photographer taking most of the photos contained in her books, and having published a book of photographs titled *Poemas deMiriti*, with Luiz Carlos França's poetry.

Cross-References

► Heritage Tourism and the Marketplace
► Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

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Pérez Gollán, José Antonio

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Basic Biographical Information

Jose Antonio Pérez Gollán, born in 1937, is a prominent Argentinean archaeologist who has made a main contribution to the archaeology of the southern Andes. Born in the city of Córdoba, Pérez Gollán was educated in history at the National University of Córdoba, earning a B.A. in History in 1965 with a thesis on *Peopling Patterns of Northwestern Argentina*. That same year he became a fellow of the newly created National Council of Scientific and Technical

Research (CONICET), and two years later he became a teaching assistant in anthropology at the National University of La Plata. In 1969 he became a researcher at CONICET and in 1971 he was appointed professor at the National University of Córdoba.

In 1977 Pérez Gollán obtained a doctoral degree from the National University of Cordoba with a thesis entitled *Analysis of Archaeological Ceramics at the Site of Ciénaga Grande (Tumbaya Department, Jujuy Province)*. Immediately after this, he went into exile in Mexico because of the dangerous situation generated by the military dictatorship installed in Argentina in March 1976. In 1979 Perez Gollán was appointed professor and chair of Andean Ethnohistory at the National School of Anthropology and History and researcher of the National Institute of Anthropology and History, Mexico. Once constitutional order in Argentina was restored in 1983, he returned home to Argentina in 1987 and was reinstated and promoted at CONICET. In the same year he became director of the Ethnographic Museum of the University of Buenos Aires. In 2005 he left that position to assume the direction of the National Historical Museum, where he served until 2013.

Perez Gollán has received throughout his career many honors, such as the First Prize (in collaboration) to the Regional Scientific Production (Central Zone), 1966–1967 of the Secretary of Culture of the Nation (Argentina); the Prize for Scientific and Technological Research of the Secretary of Science and Technology of the University of Buenos Aires (three times, in 1992, 1993, and 1994); the Critics Award 2004 of the Argentina Association of Art Critics; the Marta Wegier Prize in 2005; the Konex Award 2006; and the Merit Diploma and Gratia Artis Award 2012 of the National Academy of Arts (Argentina).

Major Accomplishments

Pérez Gollán undertook his first archaeological experiences as a student at sites in the province of Córdoba, Argentina. From excavations in Los Molinos, he obtained the first radiocarbon dating of the province. Later he devoted his efforts to study of the formative period in the Humahuaca Valley, in northwestern Argentina, developing a chronology of "La Isla" pottery, through cross-referencing information from sites in Jujuy with evidence from mortuary contexts of San Pedro de Atacama in northern Chile.

Between the late 1960s and early 1970s, Pérez Gollán published in collaboration with Alberto Rex González (Fig. 1) several works of synthesis on ceramic times in northwestern Argentina. One of them, *Indigenous Argentina. Eve of the Conquest* (González & Pérez 1972), remains to date the most widespread book on Argentine pre-Hispanic past, widely trespassing the boundaries of academia.

In the early 1970s, Pérez Gollán opened up new areas of research in partnership with his colleague and friend Osvaldo Heredia, another of González's disciples from the University of Córdoba. Together, these two investigated the little known area of Cafayate, in Salta, and then Ambato Valley, in the province of Catamarca. In the latter area they made a transcendent discovery in the history of archaeological research in Argentina: the site of La Rinconada, also known as "Iglesia de los Indios," is the first known ceremonial center of the La Aguada culture (see Pérez Gollán et al. 1997). This archaeological culture had been defined by González a decade before, extending the proposals of Max Uhle, but until then had not been specifically recognized as an indigenous settlement. La Rinconada, subsequently investigated by González and then by Gordillo (see González 1998 for synthesis), provided extensive information on the middle period and on the social organization of sedentary populations in the northwest of Argentina.

In 1975 Pérez Gollán attended the famous meeting "Reunión de Teotihuacan," in which a group of Latin American archaeologists drafted the key document of the Marxist-inspired Latin American Social Archeology trend. During that trip, Pérez Gollán made contacts that would allow him to settle in Mexico two years later, in order to be safe from political persecution in Argentina by the military government. During his exile he

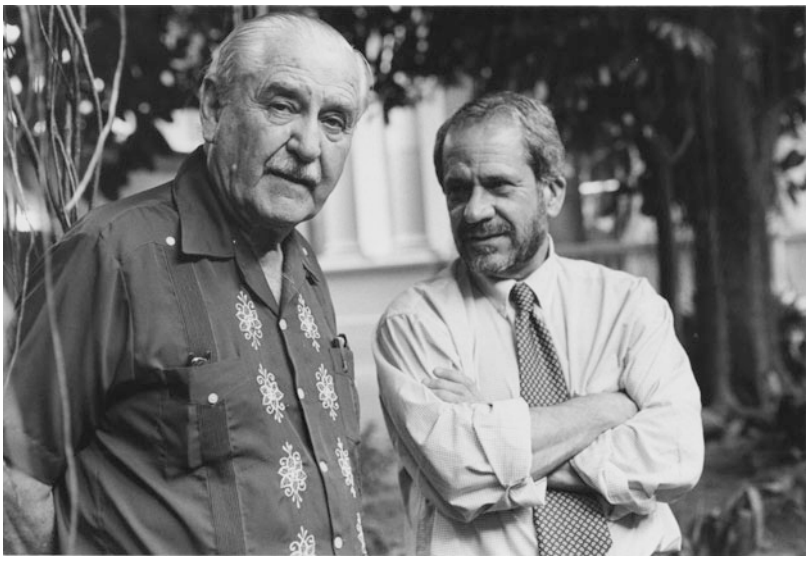

Pérez Gollán, José Antonio, Fig. 1 José Pérez Gollán (at the right) with his master Alberto Rex González at the Ethnographic Museum of Buenos Aires in 1999 (Courtesy of Pérez Gollán)

conducted several field projects and also began to investigate the history of archaeology, around the figure of Vere Gordon Childe. Pérez Gollán's (1981) book about Childe was the clearest demonstration of a theoretical commitment to leftist thinking by an Argentine archaeologist until that time. However, by then Pérez Gollán had begun to distance himself from the more orthodox and reductionist positions that flourished in the context of Latin American Social Archeology. His teaching work in Mexico put him in contact with Andean chronicles, in which he learned to investigate the symbolic interpretation of pre-Columbian iconography. His interpretations of the iconography of Lafone Quevedo Disk (corresponding to the Aguada culture) is a milestone in terms of the development of an original form of hermeneutical studies of Andean aboriginal material culture (Pérez Gollán 1986). On a similar vein he produced a new interpretation of the artifacts known as "pleadings" (*suplicantes*), small stone sculptures of high artistic value, corresponding to the formative period of the Argentine Northwest (Pérez Gollán 2000) (Fig. 2).

During the 1990s Pérez Gollán resumed fieldwork in Ambato, Argentina, with colleagues from the National University of Córdoba, revealing ceremonial and habitation sites of the Aguada culture.

Pérez Gollán, José Antonio, Fig. 2 Bronze plaque known as "Lafone Quevedo Disk," whose iconography was studied in detail by Pérez Gollán (Taken from González 2007)

Pérez Gollán, José Antonio, Fig. 3 Facade of the Ethnographic Museum of the University of Buenos Aires (Photo by Javier Nastri)

He conducted then a "rethinking" of that culture, proposing to redefine the middle period as the "Regional Integration Period." Questions like this gave a strong impetus to research on the topic, which crystallized even in specific conferences on the issue. In recent years, Pérez Gollán's research has focused on the study of the late period at Ambato Valley, about which very little is known until now. In addition to his archaeological fieldwork, Pérez Gollán is widely recognized for his work as a director of major museums. He introduced modern standards of preservation and exhibition of collections, refurbishment of infrastructure, repatriation of remains, and publishing catalogues during his periods as director at both the Ethnographic Museum of the University of Buenos Aires (Fig. 3) and at the National History Museum of Argentina.

Cross-References

► Andes: Prehistoric Art
► Andes: Prehistoric Period
► Childe, Vere Gordon (Political and Social Archaeology)
► Childe, Vere Gordon (Theory)

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Periodization in Japanese Prehistoric Archaeology

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Introduction

It is possible to apply European periodization to Japanese history: prehistory, protohistory,

Ancient, Medieval, Early Modern, and Modern. In this entry, I suggest that Ancient period is from 593 to 1192, Medieval from 1192 to 1573, Early Modern from 1573 to 1868, and Modern from 1868 onwards. The prehistoric period consists of the Paleolithic, *Jomon*, and *Yayoi* periods, and protohistory is virtually equal to the *Kofun* period. The Ancient period is composed of the *Asuka*, *Nara*, and *Heian* periods, and the Medieval period is composed of the *Kamakura* and *Muromachi* periods. The Early Modern period consists of the *Azuchi-Momoyama* and *Edo* periods. The name of a period from Ancient to Early Modern signifies the location of either the capital or the governmental office at that time.

The European periodization based upon the 3-age system is not suitable to the case of Japan. While the Paleolithic period in Japan had stone axes with ground edges, and the Stone Age is followed by the Iron Age, the Bronze Age is absent. Instead, pottery/ceramics can be used for marking boundaries in time scales, though certain changes in ceramics in the historical period do not necessarily correspond with an epoch-making event of history in cultural, political, or economical terms, other than in a few exceptional cases, such as the start of production of porcelain which occurred immediately after the dawn of *Edo* period. Especially after the introduction of kiln firing, in the middle of the *Kofun* period, the sequence of diagnostic pottery types can be a chronological measure that can mark off every one-fourth or one-fifth century. Even before kiln firing, in spite of its long duration over 14,000 years, pottery is effective in providing precise relative dating. This is because of the huge number of prehistoric sites excavated so far to produce the archaeological data, including pottery that is regarded as time sensitive. The period before the invention of pottery manufacturing is called the "Paleolithic," though it is sometimes alternatively called the "preceramic" period. In terms of periodization in archaeology, the following paragraphs focus on pre- and protohistory – the Paleolithic, *Jomon*, *Yayoi*, and *Kofun* periods.

Key Issues and Current Debates

Most archaeologists now assume that the first occupation in the Japanese archipelago can be traced back to around 30,000 BP, though they once accepted that this phenomenon could have happened even much earlier. Artifacts dated to about 30,000 BP are often called Middle Paleolithic, though they are not necessarily similar in form to artifacts from the European or Continental Middle Paleolithic.

The first discovery of Paleolithic stone tool, in 1949, was long after pottery in Jomon period was recognized as the oldest ceramics in Japan. The most common kinds of stone are obsidian, sanukite, and flintlike silica shale, all of the three also common in Jomon and Yayoi periods. After two decades, the quantity of preceramic artifacts became sufficient to consider a sequence for the Japanese Paleolithic. During the 1970s, before the famous fabrication by Mr. Fujimura (SICPEMP 2003), Professor Sosuke Sugihara, who was one of the two leading scholars in Paleolithic studies, first proposed the subdivision of the Paleolithic into four stages: (1) axe tool, (2) blade tool, (3) point tool, and (4) microlithic. Professor Chosuke Serizawa, the other leading Paleolithic scholar, had pursued studies of the old Paleolithic, which would be comparable to the Early or Middle Paleolithic in the continent, for the latter half of his lifetime. He tried, on the one hand, to distinguish stone tools from eoliths by microscopic use-wear analysis that he introduced to Japanese archaeology and on the other, to pay attention to the different kinds of stone, particularly of chert.

The Paleolithic period is the age of the forager. There are dozens of examples of house structures from this period. However, they are considered to have been a beehive and to have functioned as temporary accommodation. The Paleolithic period ends with the appearance of pottery, and the Jomon period starts. However, the invention of pottery is now recognized to have happened within the last glacial period, rather than being the result of adaption to a post-Pleistocene environment. When Paleolithic stone tools

are found with pottery, they are regarded as belonging to the Jomon period. This is one of the reasons why some archaeologists still use the term "preceramic."

The Jomon period is the time of fisher-hunter-gatherers with pottery, ranging from 15,000 to about 2,500 BP. During the 1930s, the Jomon period was divided into five main stages according to the relative balance in numbers of pottery types in each stage: initial, early, middle, late, and final. By the 1960s, the incipient stage was added to the division as the first stage. Dr. Sugao Yamanouchi proposed the basic framework for this chronological division of the sequence of Jomon pottery. In some areas where the archaeological materials are rich, there are more than 60 subdivided periods of time, indicated by differences in pottery types. Jomon is originally the consolidated term, *Jo-mon*, for describing a decoration made by a cord-mark; *Jo* means a cord or a string, and *mon* means a figure or a pattern.

Between the final Paleolithic and the incipient Jomon, stone industries are not distinguished in practice by archaeologists; bifacial points or microblades are associated with potsherds in some cases, and not in other. However, at around 10,000 BP at the latest, a sedentary lifestyle was set up, indicated by pit-dwelling house structures and the appearance of the concept of a burial area, as well as by a broad spectrum of subsistence strategies suggested by storage pits, shell middens, saddle querns, and so forth. Such Jomon collectors often occupied a large area for their settlement, which would lead to a circular village. They produced a large number of objects and features, such as clay figurines, phallic stones, pottery embedment into the earth's surface, and stone circles, all of which show their religious customs and beliefs, though the meaning of this is too difficult for us to access.

The Jomon period ended with the establishment of the systematic cultivation of rice, and the Yayoi period began. Until the 1920s, rice cultivation was believed to have been introduced with metal use into Japan. However, domestication in itself now can be recognized in the Jomon period. In terms of animals, dogs must have been domesticated much earlier, based on the evidence of their burials. In terms of plants, various types of millet are thought to have been introduced by the late Jomon. As Dr. Yamanouchi's pioneer study (1925) pointed out, rice is also likely to have existed in the final Jomon period at the latest, as evidenced by rice impressions in the textile of, and on the surface of, pottery.

Yayoi is named after the type-site in Tokyo where the first Yayoi pottery was found in 1884. This pottery was recognized as different from Jomon pottery in textile and color. Until the 1930s, differences between the Jomon and Yayoi pottery were generally considered, by almost all leading scholars including Ryuzo Torii and Kosaku Hamada, to have been due to the differences in the people who produced the respective pottery. By the 1940s, Dr. Yukio Kobayashi (1943) completed the framework of the relative dating by pottery in Japan. The Yayoi period, from the middle of the first millennium BCE to the early third century CE, is classified by the design of pottery into three main stages: early, middle, and late. Pottery of the beginning of the early Yayoi period can be distinguished from that of the Jomon period in many areas not only by the materials used but also by production technique.

The Yayoi period is also marked by the introduction of metal use. Although bronze did not replace stone as the main sharp-edged tool, it served as a ritual good from the early Yayoi period. Stone as a sharp-edged tool was almost fully replaced by iron by the late Yayoi period. Such metallurgy was diffused from the continent through the Korean peninsula, as was the new technology for manufacturing pottery.

Yayoi farmers conducted mixed farming with pigs and rice and often built a settlement enclosed by a causeway in which towers, storage buildings, and a shrine were accompanied by normal pit-dwelling houses. These settlements formed a large and complex network of information and exchange not only within the Japanese archipelago but also stretching to the Korean peninsula as indicated by the similarities in pottery, polished stone swords, house plans, and so forth.

Moreover, the network was connected with the Chinese continent, as evidenced by imported prestige materials such as bronze mirrors.

Yayoi farmers were usually buried in a cemetery, and some of them were deliberately interred in a specific individual grave, within coffins made of wood or cist stone along with other grave goods such as beads, bracelets, swords, and imported mirror. These individual burials were sometimes surrounded by ditches of square shape in the early Yayoi and of circular shape in the late Yayoi. They strongly suggest the appearance of chiefdoms. By the end of the late Yayoi period, some of these delimited graves increased the volume of burial mounds into barrows, in several parts of Japanese main islands. This phenomenon might well point to the appearance of elites and the affiliation of them as well. When the area for mortuary ceremony attached to a barrow within the inside of the ditch, the barrow in turn became a Kofun tumulus.

The Kofun period, from the middle third century to the early seventh century, is characterized by the overwhelming vogue to construct tumuli and is divided into three stages: early, middle, and late. The difference between a Yayoi barrow and a Kofun tumulus is subtle. As for the barrow of elites, the mortuary ceremony area was enlarged, and the barrow took a keyhole shape. However, the normal individual burial did not change virtually. However, pottery at the beginning of the Kofun period, called "Furu" type, is easy to distinguish from Yayoi pottery because it has a distinctive feature in the profile of its rim. It also has a wider distribution in many areas. Thus, although there are a number of archaeological sites of this period without a tumulus, such as settlements and ritual sites, they can be dated by the Furu-type pottery. The early Kofun period is also defined as the advent of Haniwa, which was a large ceramic object of various shapes which was placed in line(s) on the surface of tumulus for external decoration. Some of the largest tumuli in the early Kofun period are located in the Kinki region. This fact may support the argument for Yamatai-koku, which was recorded as one of the supreme chiefdoms dominated by the queen named *Himiko* within the Japanese archipelago in the imperial chronicle of the *Wei* dynasty in ancient China and which is deeply rooted in the identity of modern-day Japanese people.

The middle Kofun period is identified by the introduction of *Sue* pottery, which was the first pottery to be fired in kilns in the history of ceramics in Japan. As for tumuli, the middle Kofun period is also distinguished by the introduction of specific grave goods, other than Sue pottery – a set of harness. This means that the horse was introduced at around this time. These innovations were due to the influence of an immigrant population from Korean peninsula.

The distinction between the middle Kofun period and the late Kofun is rather arbitrary, based on a gradual change in form of the various objects in material culture as well as in both the scale and shape of tumuli. The most important characteristic of the late Kofun period is the introduction of Buddhism, dated to 552 or 538. Buddhism became popular with elites, who replaced the Kofun tumulus with a Buddhist temple, which was a different form of monument to their power. By the end of the sixth century, the emperor established his/her power at the pinnacle of hierarchical society in the main lands of Japan and constructed the capital in Asuka area, resulting in the birth of the state of Japan. In terms of archaeological objects, the latter half of the late Kofun period, or Asuka period, is characterized by the appearance of roof tiles engendered by the adoption of Buddhism, though roof tiles were only used in Buddhist temples and in the capital at this time.

The age from the late Yayoi period to the end of the Kofun period is so called the time of the "state formation process." This process has been well studied by many scholars including historians, along with the everlasting controversy in the identification of the location of Yamatai-koku (Saeki 2006, as an example). In terms of archaeological contributions to the study, barrows and tumuli have long been intensively researched by many archaeologists, for example, Professor Yoshiro Kondo (1983, as an example) and Professor Hiroshi Tsude (2005, as an example), while the long history of thorough investigation of not only other features and monuments, including causewayed settlements, shrines, and

temples, but also artifacts such as bronze mirrors, iron tools, and *Sue* pottery should not be underestimated.

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- ▶ Torii, Ryūzō
- ▶ Tsude, Hiroshi
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Permafrost Digging

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Brief Definition of the Topic

Permafrost is defined as ground that remains below 0 °C for at least two years. As a natural conservation agent, it provides an archive of environmental proxy records including biological materials of vegetable, animal and human origin, and artifacts, particularly those made of organic materials such as wood, bone (antler, ivory), or fibers deriving from plants or animals. Permafrost may contain up to 60 % of ice or virtually none at all. Atmospheric heat and water alter deposits quickly, and dramatically

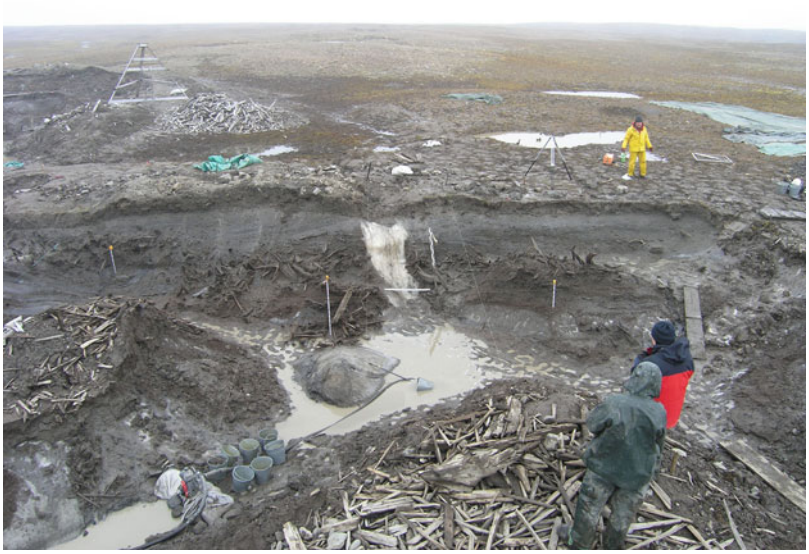

Permafrost Digging, Fig. 1 Excavations of the Zhokhov site, 2004, by V. V. Pitulko (8,000 BP, New Siberian Islands, Russian Arctic)

affect the preservation of archaeological sites. Finding sites in this terrain still depends on artifacts or cultural layers exposed by chance. Test pits, aerial and geophysical methods have not been successful except for the most recent sites of approximately past 2,000 years or so. Early Holocene and Pleistocene sites, particularly in Siberia, still remain fully frozen. Not many of them are known up to now, but in all cases, they are encased in ice-rich deposits. Experience of excavating such sites is so far limited to three cases – Zhokhov, Yana RHS, and Berelekh (Pitulko 2008). Excavation strategies are determined mostly by the depth of the site and the degree of icing. Where cover is thin, *area excavation* can be applied, but under a thick cover of frozen ground, it is necessary to approach from the side *in profile*. Examples of both these strategies are given here.

On shallow sites, after the frozen deposit is exposed in area, there are three steps in the investigation: (1) thawing, (2) drying (by evaporation and drainage), and (3) regular excavation of the now relatively dry cultural deposits. Steps (1) and (2) require permanent control. Fast thawing creates too much water and saturates the sediment. Forced thawing can be done if the host sediment is not deep frozen and has a low ice content. The best system is to rely on natural melting and evaporation under a summer breeze. Ideally, the area is large enough to be divided into three: one third thawing, another drying, and the last being excavated. Depending on weather conditions, this allows the excavation of strata 5–10-cm thick each day. This method was successfully used at Zhokhov (Fig. 1), and resulted in the excavation of cultural deposits extending over about 500 m^2, to a depth of 3 m (Pitulko 2008). A sump is required to pump out the meltwater. Screening is achieved using water with a low pressure pump. In other respects, routine archaeological procedures are followed.

Deep sites, with a thick cover of overlain deposits, can only be accessed from a lateral exposure, for example, in a river bank as at Yana RHS (Pitulko 2008; Pitulko & Pavlova 2010). Here the overburden was 7–8-m thick, with an ice content of 40–50 %, and included a polygonal grid of syngenetic ice wedges. It is always possible to clean up and record cultural

Permafrost Digging, Fig. 2 Excavations on the river bank at Yana RHS, Northern Area, 2011 (28,000 BP, low Yana River, north of Yana-Indighirka Lowland: excavations by V. V. Pitulko)

layers seen in the profile, and even to record some finds in situ. However, real excavations are possible only if the ice wedges are first extracted from the archaeological deposit. This can be achieved by thawing if they are well exposed to the air and the bottom of the wedge is below the cultural layer.

As soon as the top of the wedge becomes thawed, it is shoveled out and the adjacent deposit can be excavated in a strip 1–2-m wide. Then the operation is repeated, gradually reducing the deposit in series of steps (Fig. 2). This prevents the remaining thawed deposits from collapse. Material that has been shoveled out is removed by pumping water through the natural erosional channels created by the ice wedges. This kind of excavation requires a large investment of labor. More than 2,000 m^2 has now been excavated at Yana RHS.

The radiocarbon dating of frozen sites in permafrost areas is tricky. Wood, particularly in small pieces, is a floatable material and can be easily transported from elsewhere or deliberately recycled. Although the date of bone will relate directly to the death of the animal, some bone (e.g., mammoth) may be curated over long periods. Sediments themselves may transported through ice action. Dating of the host sediment may give dates approximately 2,000 radiocarbon years older than the date of plant remains they contain (Pitulko & Pavlova 2010). Errors can be avoided by taking many samples from above and below the cultural layers, as well as within them.

Cross-References

- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Polar Exploration Archaeology (North)

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Peru: Cultural Heritage Management and Education

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Introduction

The Peruvian Cultural Heritage

Peru's cultural heritage includes the legacy, tangible and non-tangible, of its pre-Hispanic cultures, those belonging to Colonial and Republican periods, present-day cultural manifestations, either urban or rural, the culture of native communities in the tropical forest and the highlands, besides the Africans, Asians and Europeans who also brought distinctive cultural customs either in colonial times or later. In fact, all of them have created what Peru is today, and as in the past, we are part of a multicultural country. However, there have been diverse opinions about what cultural heritage is, and on occasions, it has been controlled by the interests of particular dominant groups or social classes that have the political and economic power in Peru.

During the Colonial period, such designation for the Spaniards was related to the idea of valuable antiquities, relics, and monuments. For example, H. Cortés said, "I came looking for treasures, not to cultivate the land as a peasant" (Ravines 1986: 147). Even at that time, governments attempted to protect antiquities of new world conquered nations, as testified by Leyes de Indias y la Política Indiana (Indian laws and Indian Politics) published by Solorzano and Pereyra (Ravines 1986: 148).

Additionally, the division into the "Republic of Spaniards" and the "Republic of Indians" during the Colonial period, in which the former was related to a civilized way of life and the latter to a primitive one, helped to develop an incorrect idea about the past based on values such as grandeur and appearance that encouraged the prejudices of people with different cultural patterns. Even though such division disappeared after the Peruvian independence, social exclusion continued, and the dominant social class that inherited the ideology of the first group built its own parameters about the past based on the criteria of monumentality and aesthetics.

Such discourse admired past and present cultural manifestations as isolated events not necessarily associated with the history and the creativity of people from whom Peruvians descend. Therefore, very little effort was devoted to learning and valuing past and present cultural manifestations.

Definition

Types of Peruvian Cultural Heritage

The Peruvian cultural heritage has been divided based on physical features (monumentality of buildings), fragility (documentary data, pieces of textiles, and organic materials), and time period (pre-Hispanic, Colonial, and Republican epochs); on the other hand, according to its bylaw of Organization and Functions (Supreme Decree 001-2011-MC, May 13, 2011), the Ministry of Culture (Law 29565, 1910) not only recognizes present-day Peruvian cultural diversity but also has also created several departments in order to manage culture. Heritage is divided into Archaeological Heritage, Contemporaneous Nonmaterial Heritage, Colonial and Republican Historic Heritage, and Cultural Landscape. Therefore, the Peruvian cultural heritage includes the following:

Monumental

This may be defined based on size and aesthetic features and includes monuments of pre-Hispanic times (a domestic settlement or the city of Chan Chan), apart from Colonial and Republican buildings (the Church of San Francisco and the Oquendo or the Osambela Residence). According to Article 21 of Peru's Political Constitution enacted in 1993, in order to become a cultural heritage, it must be declared as such through a Ministerial Resolution.

Documentary Data

This is an endangered type of heritage given its fragility and includes all kinds of texts and documents written in Panama even before the Tawantinsuyu Empire was conquered in 1532 (Varon 1986). Among other texts is one which describes how much gold and silver Inca Atahualpa gave for his freedom and how gold and silver were distributed among the conquerors. Means of conservation for this documentary evidence are mainly devoted to preserving only those documents considered as valuable; however, due to lack of funds and other factors, case preservation within Peru is very difficult. For example, the Independence Act of 1821 was sent to the Vaticano archive for treatment.

Arts and Crafts: Folklore

This cultural expression persists within the context of the modernity and globalization. A large portion of this heritage originates from craftsmanship composed of objects made out of clay, wood, metal, timber, textiles, etc., and vernacular music. According to Oliva (1986), this cultural expression was influenced by the indigenous movement that began in the 1920s, and its demand by tourists and Lima's middle class in the 1960s and 1970s increased its production. As a result, quality of handmade crafts was poor, and in several cases, the tendency was to impose other nontraditional decorative motifs. Craftsmen's reaction was to return to their home to produce with freedom and complete autonomy.

Oral Tradition

According to Millones (1986), it includes life stories, ritualism, songs, legends, and fairy tales and is extremely relevant for Peruvians since the written words did not exist before the Spanish conquest. This heritage is transmitted orally, from generation to generation; makes part of the collective memory of the community; and represents belief systems, values, and the spirituality of a nation; therefore, oral communication is more important than written communication.

Key Issues/Current Debates/Future Directions/Examples

The Role of Education in Peru: Points of View and Controversy

Peruvian educational goals have been a topic of debate since the nineteenth century. Such debate focused on how education should help to integrate and develop the country, and while a group supported its elite character, another group proposed that education should attempt to liberate and redeem the natives. This latter group declared that education had to do with the "Indian Problem," which became a part of a larger dilemma since it would have first been necessary to change the political and economic structure of Peru in order to improve the education (Ames 2005: 358).

At present, studies about the role of education in Peru show that it is just one way of improving social position, obtaining social mobility, and improving living conditions. In other words, education seems to be within a developmental project designed to promote change and modernity. This assumption is supported by data collected by E. Vasquez in the 1950s at Vicos, a community in the northern highlands. Similar results from communities of Lampián, Huayopampa, and Pacaraos, in the Peruvian central coast Chancay River Valley, were recovered by F. Fuenzalida and Carlos Iván Degregori in the 1960s and 1970s (Ames 2005: 360-2).

However, there are different perspectives on this issue. Montoya states that education contributes to losing "cultural identity" because its goal is progress. Formal education does not consider native values and emphasizes western society models. For example, Montoya (2011) remarked that the Summer Institute of Linguistics in the jungle of Peru provided topics with religious orientation. Therefore, Montoya names it "education's contemporaneous myth" (Ames 2005: 365). From the native's point of view, education scares native children since attending class means ending the relationship between man and nature. According to Ames, Peruvian modern education "leads to the ignoring or destroying of

peasant culture and to the acceptance of the dominant ideology" (Ames 2005: 362).

Peruvian cultural diversity has been seen as a disadvantage when it came to the purposes of educational projects, since traditional communities of the highlands and tropical forest seem to be conservative when faced with new cultural patterns. With regard to whether we only need to study cultural diversity or if it is also necessary to apply educational and developmental programs, many questions arise. How should this situation be approached? What is best for these communities? Who decides what is best for everybody?

As previously indicated, scholars differ on these topics. Heise et al. (1994: 14) say, "We disagree with the position of intellectuals who approach the study of traditional cultures with the interest that they remain static, and impose the conservation of their traditions and past…" Therefore, the issue of cultural heritage implies a theoretical elaboration, especially if an educational program has to be developed.

Assuming that cultural heritage expresses specific features of a shared social custom of a human group that coexists with other cultural customs, it is necessary to identify and treat all of them equally, since together, they represent the identity of a given society. In other words, the cultural diversity of a country should not be arranged into rating scales because each specific cultural manifestation has its own material representation and way of thinking.

Why shall we consider such a premise? Simply because culture is social, and when an individual permanently socializes, he engages in several interactions, including educational ones. Also, a dialogue involving distinct social actors is opened, and with this interacting process, it is possible to understand the other social actors and to discover that common interests do exist.

Given the fact that in Peru several cultural expressions exist, an intercultural process has been proposed (Zúñiga & Ansión 1997). What is this intercultural process? Scholars concur that it is where populations practicing distinctive cultural patterns share and make their lives. For example, the recent Peruvian and US Treaty for Free Commerce has propitiated intense relationships between particular cultural patterns that influence one another mutually, no matter if one of them plays a dominant role in the relationship. What is important to note here is that both of them have their own cultural patterns and traditions.

However, although interculturality exists in Peru, it requires long-term state support and community participation. In fact, Montoya (2011: 420) believes that its application is still a dream because "cultural conflict" persists, and it is far from being solved since natives are excluded from development and social programs.

Additionally, it has been observed that intercultural processes are sometimes so complex and profound that they are difficult to identify. For example, to what extent did native Mesoamerican and Andean food staples influence North America? Mexican chili, corn, and the Peruvian tomato are just a few. Also, we may ask what highland influences are observed among modern creole populations in the Peruvian coast; for example, the "causa" dish (potato and chili) is well known in Lima, but we do not know when and how it was introduced into the main menu of coastal cities.

Legal System and Education of Cultural Heritage

The political constitution of 1993 not only establishes respect for people's identity but also proposes bilingual and intercultural education based on regional characteristics in order to preserve Peruvian cultural manifestations and meet cultural integration. However, archaeological heritage, Historic period relics and monuments, and archive documents receive a somewhat distinctive treatment since it is first necessary to nominate them as cultural heritage before they are registered in the Peruvian cultural heritage records (Article 21; Article 58, items i, m, r of bylaw of Organization and Functions of the Ministry of Culture).

The General Law of Peruvian Education states that education should be formulated based on Peruvian diversity, taking into account interculturality and respecting the environment (Articles 7, 8). Consequently, education must

affirm national identity without neglecting Peru's cultural, ethnic, and linguistic diversity (Article 9). In order to achieve this commitment, education in native communities should apply special curricula (Article 19), although a common curriculum should be implemented for the entire country (Article 13, item b). Clearly, with this plan, education must be offered in Spanish and in other native languages spoken in the highlands (Quechua, Aymara) or in the Amazon basin.

Actually, intercultural processes need to be implemented in Peru in consideration with its cultural diversity. By 1999, 45 native languages existed in Peru, apart from Quechua and Aymara groups; there were 42 communities and 16 linguistic families in the jungle, 18 of which may soon disappear. Although the 1993 Census registered 3,177,938 Quechua-speaking people, research by anthropologists indicates that 4,500,000 people spoke Quechua by 1999. With the addition of Quechua speakers in the Amazon, the total is 5,700,000 individuals (Montoya 2011: 423, 424, 515).

According to the spirit of both the Political Constitution and the General Law of Education, the Ministry of Culture has approved several guidelines through its bylaw of Organization and Functions. This document recognizes cultural diversity and proposes to support cultural development through intercultural projects. In fact, the goal behind this plan is to affirm Peruvian national identity, sustain its social inclusion, and shape an intercultural citizenship (Sections 3.3.2.1, 3.3.2.2, items f, Article 12, item b).

The bylaw encourages training in the area of cultural management and implementing a network of research and data collecting of present-day cultural manifestations, including traditional native knowledge (Article 12, item h; Article 64, item j; Article 71, item n). With regard to archaeological remains, the office of the Director of Archaeology will propitiate the creation of site museums and centers of interpretation at archaeological settlements so that the visitors understand the significance of past remains (Article 54, item f). Additionally, the office of the Director of Museums will coordinate with university research and data collecting about current cultural manifestations (Article 56, item d).

As stated previously, the Ministry of Culture is supposed to manage all past and present cultural manifestations, besides ethnic and cultural pluralism of Peru, since the state is responsible for policies regarding cultural issues. The Political Constitution of Peru indicates that education should emphasize the progress and development of the country; this goal should be pursued with an open spirit in its citizens which will enable them to participate in this process (Art. 3, Section 3.2, items h, j, also Section 3.3.1, item e).

In addition, recommendations about formation on cultural topics as part of the national educational system will be formulated (Art. 3.3.1, item g), apart from implementing cultural programs through mass-media systems (Art. 3.3.1, item m). In fact, there are already several TV programs portraying different cultural expressions. However, even though it is still early for an appraisal of how educational plans on cultural heritage will be eventually implemented, it appears that the law emphasizes its economic benefits. The expression "cultural industries" (see, e.g., Section 3.2, item h, Section 3.3.1, item f) seems to point towards improving infrastructure (roads, hotels, flying routes, etc.). Interestingly, this law seems to prefer homogeneity rather than diversity, as may be interpreted from its plan of "integrating all the Peruvians" (Section 3.3.1, item m).

On the other hand, promotion of tourism only considers the Ministry of Foreign Commerce and Tourism's participation, but not that of the universities (Section 3.3.1, item p). Why should universities be consultants? The answer is simple; several universities, public and private, have schools of Archaeology, Anthropology, and Tourism. In addition, pre-Hispanic cultural heritage is at least 12,000 years old, in comparison to the Colonial and Republic periods which together are only 519 years old, if we consider the discovery of America as a chronological reference. Needless to say, tourists visit Peru because of its long history and its biodiversity.

Concluding Remarks

The education of Peruvian cultural heritage is the responsibility of both the state and the community. The participation of all social actors may prevent inappropriate decisions that may not be part of long-term cultural plans, such as those archaeological discoveries governments took for granted right after the media pointed out their importance to the country. For example, the royal tombs of Sipan in the mid-1980s, the mummy Juanita found on the Ampato snow-covered peak in the 1990s, and the attention paid to the Amazon native communities at the beginning of this century. However, the positive reactions of people are spontaneous and temporary; they disappear when the political agenda changes.

Establishing educational programs about cultural heritage in Peru implies the consideration of regional particularities since each region contains customs, monuments, and relics that have become icons. Therefore, an intercultural approach is recommended. For example, while the people of Ica, located in the southern coast of Peru, have a historical link with the Nasca culture, the people of the Callejon de Huaylas have a connection with the Recuay culture and the nearby snow-covered mountains of Huascaran and Huandoy. In both of these cases, the creation of specific symbolic meanings refers to concrete relationships established through myths, natural components, buildings, and objects. Peruvian culture, past and present, is the coalescence of those manifestations, and education programs should not neglect them. In other words, the Amazon basin and Machu Picchu form part of this old natural and cultural legacy of the Andean universe.

It is recommended that a bilingual intercultural approach be taken with regard to present-day native communities for educational purposes in order to avoid cultural shock between traditional values and occidental external components which usually represent the dominant culture. By this process, natives increase their knowledge about the exterior world which is unavoidably present in the everyday life of the population. To pretend that people ignore such external knowledge is to deny them their cultural rights to survive and face the world. In other words, people should learn how to live with other cultural components without denying their own cultural patterns.

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Petra National Trust and the Challenge of Site Management at Petra

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Introduction

The site of Petra is one of the most spectacular sites in the Near East, Petra has long attracted travelers and explorers, and archaeological investigations have been conducted in the area since the 1930s. Late in 1985, UNESCO inscribed Petra on the UNESCO World Heritage List on the basis of its "Outstanding Universal Values." On four occasions thereafter, Petra was placed on the "World Monuments Fund's 100 Most Endangered Sites". On July 7, 2007, Petra was selected as one of the "New 7 Wonders of the World".

Petra is located halfway between the Red Sea and the Dead Sea in Jordan (Fig. 1) and has been inhabited for more than 200,000 years. Traditionally the tribes were shepherds and farmers.

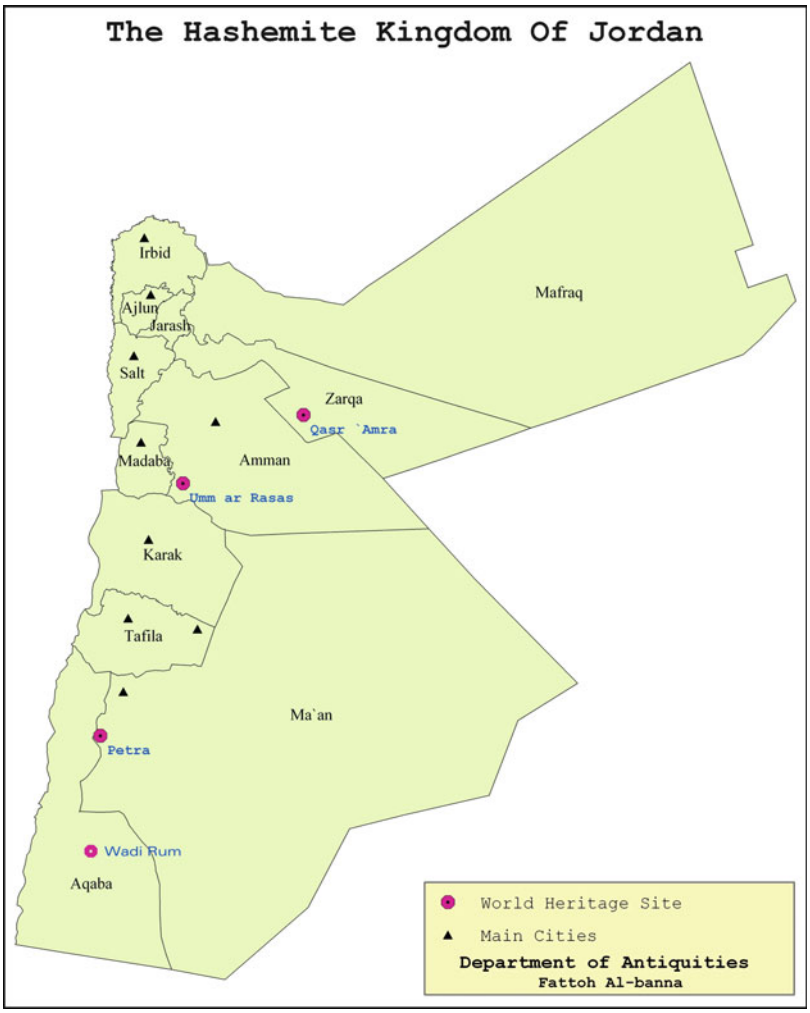

Petra National Trust and the Challenge of Site Management at Petra, Fig. 1 Map of Jordan

Today people in the area live in modern hillside towns and villages and Bedouin encampments. The park is surrounded by six main towns, and they are, from north to south, Beidha, Um Seyhun, Wadi Musa, Taybeh, Rajef, and Dlagha (Fig. 2). In recent years, with the arrival of tourists, the inhabitants have moved closer to the archaeological site and earn a living by working on excavations and guiding tourists.

Definition

Petra National Trust (PNT) is a Jordanian nongovernmental organization (NGO) dedicated to the preservation and protection of the World Heritage Site of Petra. Since its inception in 1989, PNT has worked to bring together people in Jordan and abroad who are committed to that same goal. The Trust is the pioneer NGO in the field of archaeological, natural, and cultural heritage preservation in Jordan. PNT does not set policy but works with the policy makers in the government of Jordan and with other NGOs to achieve its objectives. HRH Prince Raad bin Zeid, as president of the Board of Trustees, oversees the Trust's activities and guides PNT in the implementation of its mission and the fulfillment of its vision.

PNT implements its mission through conducting preservation projects and by raising awareness. PNT was instrumental in 1993 in the

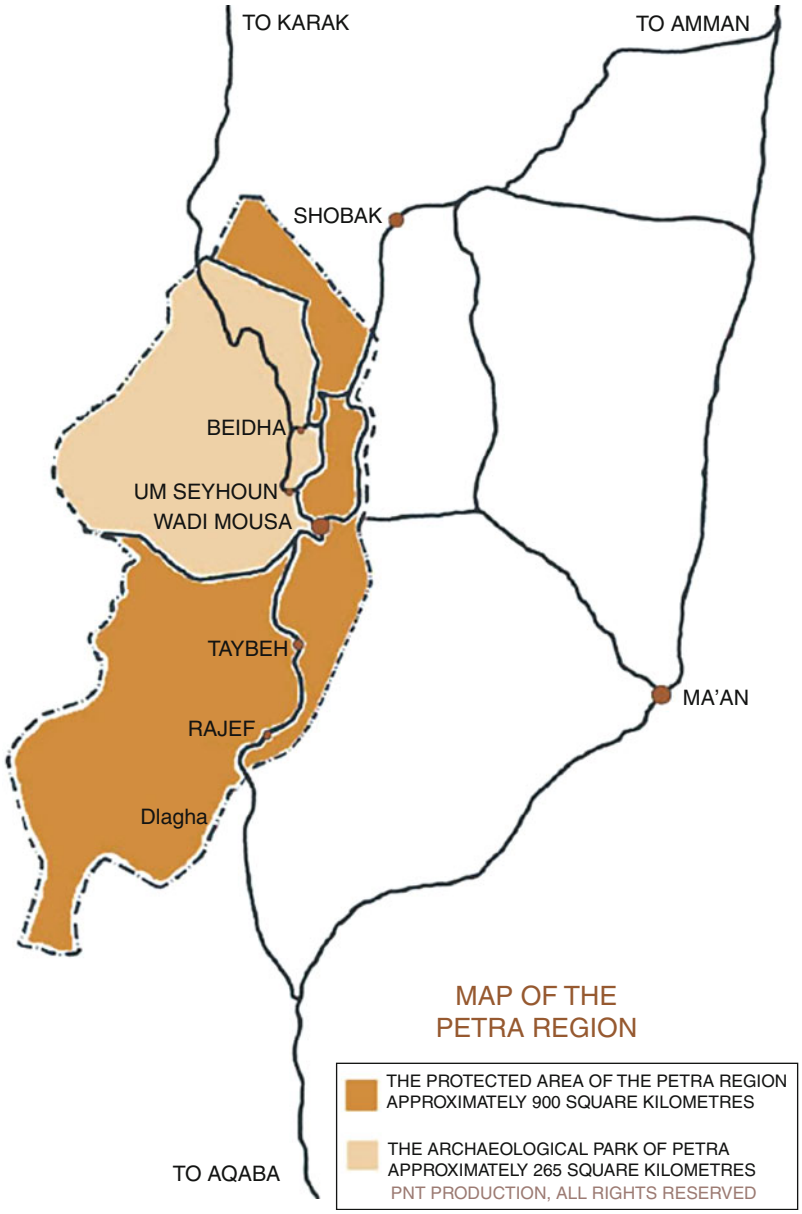

Petra National Trust and the Challenge of Site Management at Petra, Fig. 2 Map of the PAP, showing the main towns surrounding the PAP

creation of the Petra Archeological Park (PAP), a protected area covering 264 m^2. With the aim of decentralizing the management of Petra, in 1995, PNT played a pivotal role in the establishment of a single body, the Petra Regional Planning Council (PRPC), to govern the Petra Region that later came to be known as the Petra Regional Authority (PRA). This authority evolved into the Petra Development Tourism Regional Authority (PDTRA). The role of all these bodies, present and past, is to coordinate the efforts of the many Jordanian governmental departments and other institutions involved within the Petra region to maintain a balance between heritage preservation and tourism development and to promote responsible tourism.

In all its activities, PNT cooperates closely with the Ministry of Tourism & Antiquities (MoTA), the Department of Antiquities (DoA), the PAP, and the PDTRA. PNT is a member of

the Advisory Committee of the PDTRA that oversees the management and developments within the PAP and its buffer areas. In its role as an advocate for the preservation of the park, PNT addresses the threats, partly natural and partly human, and alerts the governmental bodies responsible for the management of the site, UNESCO, and other international heritage organizations.

In addition to its advocacy role, and with the support of private Jordanian and international corporations, government institutes, international diplomatic missions, and private donations, PNT has to date raised funds and implemented 22 projects in the areas of preservation, biodiversity, site management, community and awareness, and tourism.

Key Issues/Current Debates/Future Directions/Examples

Jordan has undertaken a number of measures to resolve the confusion in responsibilities and chain of command of the management of Petra, and in 2009 established PDTRA. PDTRA manages the entire Petra Region of 755 km^2 including the PAP which covers a protected area of 264 km^2. Historically, the PAP was managed by DoA, a subordinate department of MoTA. However, the management of the park now falls under the responsibility of the PAP management body, a subordinate organization that reports to PDTRA. PDTRA reports directly to the Prime Minister and is headed by a Chief Commissioner who is assisted by four deputy Commissioners. The deputy commissioners make up a council called "Commissioners Council" that manage the authority and oversee its affairs.

PDTRA's role is the development of the Petra Region economically, capitalizing on its potentials in tourism. It also plays a role in local community development, infrastructure development, heritage management, and the environment. Jurisdiction over archaeological research, conservation, restoration, and preservation, however, lies with DoA.

Challenges and the Impact of Growth

Site management has been a concern in Petra for at least the last four decades. In the beginning, tourism was minimal and, in general, limited to the most adventurous souls. The inscription of Petra on the UNESCO World Heritage List, however, rendered it incumbent on Jordan to protect and preserve it for the enjoyment, scholarship, and pride of future generations. Yet this sparked the surge in the number of visitors; from 93,000 visitors in 1985, it increased to almost a million in 2010. The sudden increase in numbers of visitors, spurred by the peace agreement with Israel in 1994, abruptly brought to the surface the issue of site management. This situation was compounded by the declaration of Petra as one of the "New 7 Wonders of the World" in 2007. DoA, whose primary concern had been archaeological research, found itself unprepared to effectively manage Petra.

In recognition of the need to protect and preserve this outstanding example of national heritage, as well as the importance of the site for economic advancement, both the government and donor agencies invited international organizations to prepare management plans on five occasions. The first of these plans was prepared as early as 1968 and the latest in 2011. The plans assessed the state of conservation of the park and provided guidelines for the use, development, interpretation, presentation, zoning, protection, and general administration the park.

There is a basic consensus among the plans on the type of management structures and interventions needed for Petra. The approach toward the implementation of the recommendations proposed, however, has been fragmented over the years. Instead of adopting a holistic approach to the recommendations delineated in the plan in their entirety, subprojects were selected for implementation, leading to the imbalance witnessed today. This is due to a number of reasons, which include inadequate participation by related organizations and stakeholders in the planning process resulting in a lack of commitment and follow-up, an insufficient understanding and appreciation of the site values and their potential that leads to an unbalanced approach to

development, inexperience in the management of cultural heritage sites, and frequent changes in government management.

The Role of NGOs in Site Management

NGOs have been in existence in Jordan since 1966. The focus then was on natural heritage, and the first NGO established for this purpose was the Royal Society of Conservation (RSCN). It, in contrast to all other NGOs, owns and manages six natural parks successfully. Twenty-three years later, in 1989, the first national NGO, whose focal point was archaeological heritage preservation, was established as PNT. The Friends of Archaeology & Heritage (FOAH) was established in 1990 in Amman, and it focused on awareness and introducing Jordanian and non Jordanians to the archaeological heritage of the country. It, however, did not work in Petra Archaeological Park, PAP. The NGO "Bait al-Anbat" based in the Liwa of Petra was established in 1997, and its focus is "the development of cultural life in Jordan, to raise awareness of cultural heritage and to develop improved dialogue among civilizations." There are numerous other NGOs working in the field of socioeconomic development, education, special education, handicrafts, and others in Petra. With the exception of PNT, most of these NGOs work independently of the PDTRA and the PAP.

Whereas, there is some recognition by the government for the need to explore innovative approaches to site management and to allow NGOs to participate; it has in effect been inconsistent in its approach. This, to a great extent, is due to the traditional centralized modus operandi of the government bureaucracy coupled with a lack of understanding of the role of NGOs in heritage management. The advocacy role of NGOs is perceived as threatening which exacerbates the situation further. A better understanding of the roles of each of these two stakeholders with the aim of achieving a more complementary partnership in the field of site management is the most effective way forward. NGOs, unlike the government, are in the unique position of being nonprofit and, therefore, not motivated by economic gain; at the same time, they are not overburdened by bureaucracy, which gives them the ability to operate effectively.

Conclusion and the Way Forward

For Petra to be preserved, it must be understood in its totality. A clear-cut strategy for the conservation and management of the site must be developed. The impacts of management decisions on the site's values must be clearly identified and appreciated by the decision makers and stakeholders working together as one team. Only in this way will viable site management plans that are relevant to local conditions be adhered to and implemented with success. Petra is a result of many layers of accumulated historical heritage that needs to be managed and presented in a manner that does not encourage further deterioration. Consolidation of the studies and their recommendations with emphasis on the values that set Petra apart from any other heritage site, using an integrated approach with the participation of those having a stake in Petra, is the shortest and most effective way to achieve this objective.

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Petra, Archaeology of

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Introduction

The ancient city of Petra, in southwest Jordan, is among the most widely recognizable archaeological sites in the world. The city was inscribed as a UNESCO World Heritage Site in 1985 and has more recently been popularly elected to a list of the "New Seven Wonders of the World". Originally constructed by the Nabataeans in the late first millennium BCE and later annexed by the Roman Empire, this ancient trading hub features stunning monumental architecture, much of which is carved directly into the red sandstone cliffs for which the site is widely known. The architecture of Petra features a combination of local and classical forms (McKenzie 1990), many of the latter manifested as elaborately carved facades for cave structures in the cliffs that enclose the city. Such is the case for the numerous tombs found within the boundaries of the city, including the widely recognizable "Treasury" (Al Khazneh), which has been featured in several films including *Indiana Jones and the Last Crusade* (1989). The city center also exhibits large freestanding structures, including a colonnaded street, temples, civic administration buildings, and a varied range of domestic structures. The rich religious life of Petra's inhabitants is evident throughout the site. Numerous rock-cut shrines and thousands of relief steles (*betyls*), cultic niches, altars, and inscriptions can be seen carved in the cliff faces in the maze of mountains and valleys surrounding Petra (Wenning 2001, 2010). Petra is also known for an elaborate water management system that once sustained an estimated urban population of 20,000 or more. This system included numerous channels, dams, pipes, cisterns, and storage tanks, as well as pools and gardens (Bedal 2003; Ortloff 2005). Water management features such as dams and cisterns can be found not only within the city but throughout its hinterland as well.

Petra may now be entered by two primary approaches. The *Siq* entrance to the east is taken by most visitors to the site and is by far the more dramatic of the two approaches. This passage through a long, narrow gorge (1.2 km in length and as narrow as 3 m in some areas) through the surrounding sandstone cliffs ends at the iconic Al Khazneh tomb (the "Treasury") which boasts what is arguably the city's most spectacular and well-preserved facade (Fig. 1). A less spectacular northern approach is today used primarily as a utility road. Historically the city was approached by a number of routes from the north and west, as well as from the south, via a main route that passed Jabal Haroun (Aaron's Mountain).

In addition to its Nabataean and Roman history (on which most historical and archaeological attention has been focused), the site also saw prehistoric and Iron Age occupations and boasts later activity by Christian and Muslim populations alike. The Byzantine period is well represented today by three churches in the city center and a monastery complex on Jabal Haroun (Fiema & Frösen 2008). These include the cathedral of the Petraean see, the bishop of which participated in a number of history's important doctrinal councils (Fiema et al. 2001). Still later periods of occupation and use of the site are represented by two crusader castles, a Mamluk period *weli*(shrine) to the Prophet Aaron on Jabal Haroun, a late medieval/early modern Islamic village at Bayda, and traces of Ottoman period habitation in the ancient tomb complexes. The areas surrounding Petra also boast a much broader history with evidence of activity from three hominid species extending as far back as the Paleolithic, as well as Neolithic and Bronze Age settlements

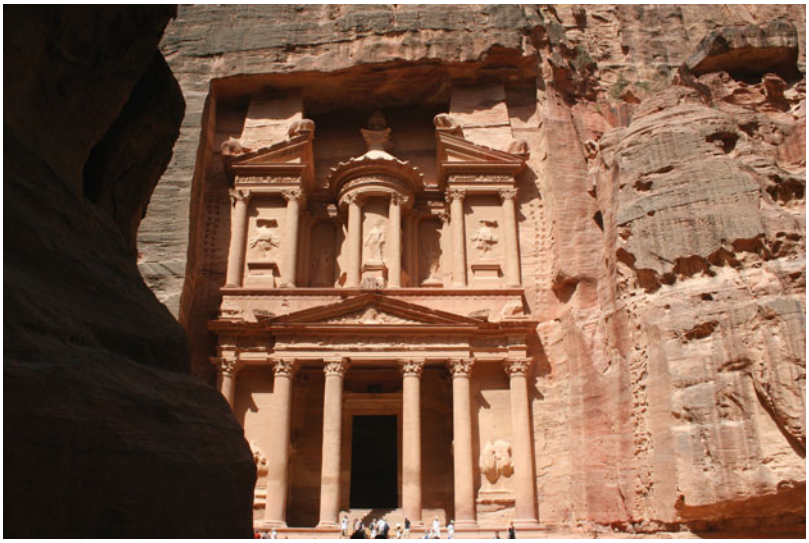

Petra, Archaeology of, Fig. 1 At the end of the *Siq* visitors are greeted with a stunning view of the "treasury" (Al Khazneh)

(Kirkbride 1968; Byrd & Field 1989; Lindner & Genz 2000; Lindner et al. 2001; Jansson 2002; Vella et al. 2012).

Definition

Petra refers to an archaeological site in southwest Jordan that consists of an ancient city and its hinterland. The Nabataean people utilized the Petra valley from at least the mid-first millennium BCE prior to the full sedentarization of their culture. The earliest constructions in what would become the city of Petra likely began in the mid- to late third century BCE as the Nabataeans gained increasing control of the overland trade routes between the Arabian peninsula and the Mediterranean Sea. Petra became an important hub for ancient trade under the Nabataeans and continued in this role after the Roman annexation in CE 106. With the eventual collapse of the ancient trade networks that once sustained Petra's prosperity, the city became less prominent, and its character altered. Occupation at Petra continued following the Nabataean and Roman periods, including activity in the Byzantine and Islamic periods as well as a later Bedouin presence which lasted until quite recently. Archaeological evidence also suggests that prior to the monumentalization of Petra proper, human activity in the area extended well into prehistory.

Key Issues/Current Debates/Future Directions/Examples

Current Research and Future Directions

Since its reidentification by Swiss explorer Johann Ludwig Burckhardt in 1812, Petra has been the subject of many archaeological investigations. Excavations began at the site in 1930 and continue today, but the types of archaeological research have become much more diverse, expanding to include landscape surveys, geophysical investigations, GIS mapping, laser and photogrammetric documentation methods, and the development of conservation and preservation intervention strategies to help protect this fragile site and its environment. Following are examples of some of the major academic research projects active at the site today.

A number of interesting and important projects are affiliated with the Association for the Understanding of Ancient Cultures (AUAC), a nonprofit organization based in Basel, Switzerland. The International Umm al-Biyara Project, directed by Stephan G. Schmid (Humboldt University, Berlin) and Piotr Bienkowski (Manchester, U.K.), is a multidisciplinary exploration of the Nabataean monumental architectural remains on the summit of the flat-topped Umm al-Biyara mountain, which has sometimes been described as the "acropolis" of Petra.

Several seasons of mapping and test excavations have demonstrated that these are possibly the remains of a royal or other elite complex situated to overlook the Petra city center. The International Aslah Project (IAP), directed by Robert Wenning (University of Münster) and Laurent Gorgerat (Antikenmuseum Basel und Sammlung Ludwig), is investigating one of the most important rock-cut cultic areas in Petra. The research area is focused around the monument known as the Aslah Triclinium, which contains what may be the oldest, dated Nabataean inscription known at present. Employing both survey and excavation methods, the project has yielded one of the best data sets yet available to help understand the role and functions of the many shrine installations found around the ancient city. The North-Eastern Petra Project (NEPP), directed by Stephan G. Schmid, Zbigniew T. Fiema, and Bernhard Kolb, is a landscape and architectural survey that began recently of an important but largely unexplored sector of the city center near the monument known as the "Palace Tomb." This project is undertaking a detailed mapping of the free-standing architectural remains in the area, employs some geophysical investigations, and hopes to eventually excavate some of the features.

Several projects are currently working to expand our understanding of the funerary landscape of Petra which, although seemingly apparent due to the prevalence of the tomb façades, actually remains quite obscure. Two projects directed by Lucy Wadeson (Oxford University) and affiliated with the AUAC, the International Khubtha Tombs Project (IKTP) and the Funerary Topography of Petra Project (FTPP), both seek to elucidate aspects of the funereal practices in the city. The IKTP is scientifically excavating the areas inside and outside selected tombs and the FTPP is investigating the possible functional relationships between these spaces. Another set of tomb excavations directed by Isabelle Sachet and Natalie Delhopital, in association with the mission archéologique français de Pétra (MAFP) of the Centre national de la recherche scientifique (CNRS), have yielded additional information about funerary spaces and, most importantly, uncovered some of the first stratified burial deposits to augment the limited data from previous excavations in disturbed tombs (Bikai & Perry 2001).

The Petra Garden and Pool Complex (PGPC), directed by Leigh-Ann Bedal (Pennsylvania State University – The Behrend College, Erie, PA), has been investigating a unique set of water installations and gardens that are situated in the heart of the city center (Bedal 2003; Bedal et al. 2007). The results from this project have contributed to a better understanding of the central urban fabric of the city and raised intriguing questions about the possible symbolic roles played by the control and display of water in this arid landscape.

Brown University in Providence, RI (USA), has sponsored two major field projects. The first is directed by Martha Sharp Joukowsky at the "Great Temple" complex in the city center (Joukowsky 1998, 2007). The second, the Brown University Petra Archaeological Project, directed by Susan E. Alcock and Christopher A. Tuttle, is aimed at gaining a diachronic understanding of the relationship of the city to its hinterland. This project is composed of several different components, including limited excavation and geophysical prospection in the city center itself. The bulk of this project's activity, however, has focused on the site's hinterland to the north, through a combination of highly intensive pedestrian survey, architectural recording and mapping, geophysics, and strategic excavation probes, as well as more extensive excavation at the Islamic village at Bayda. Results point to an enormously rich artifactual landscape and one much modified, over the millennia by human activity (Alcock & Knodell 2012).

The major long-term project of the MAFP, directed by Christian Augé (CNRS), is the investigation of the "Qasr al-Bint," a Nabataean temple in the city center, which is the only free-standing building to survive largely intact to the present day. This French project has produced the definitive architectural study of this important building and, through excavations in its precinct, has elucidated different aspects about the uses of civic cultic space in the city throughout different historical periods.

The search for "Early Petra" is a major research initiative involving a number of different projects. These efforts are seeking evidence of the earliest Nabataean-constructed environment in the Petra valley, hints of which were first revealed by excavations in the 1950s (Parr 1957, 1960). The Hellenistic Petra Project, directed by David Graf (Miami University) and Stephan G. Schmid (Humboldt University, Berlin) has conducted several seasons of excavation in areas adjacent to Parr's original trenches in order to verify and elucidate the original published data (Graf et al. 2005, 2007). Additional work on "Early Petra" has been undertaken as part of the MAFP, also in the vicinity of the Qasr al-Bint (Mouton et al. 2008). These projects have collectively now proven that there was a constructed environment in the mid- to late Hellenistic period in the Petra city center, although a complete understanding of the full nature and extent of these constructions still awaits additional research.

Despite the nearly 200 years of documentation now completed in Petra, potential for future research in the archaeological park remains enormous. Technology has offered exciting ways to investigate Petra and further our understanding of this important site. The trend in archaeology toward nondestructive investigations has taken hold in the ancient city. For example, the use of geophysical and remote sensing techniques has already started to tell us more of what lies beneath the accumulations of time (Conyers et al. 2002; Urban et al. 2012). We can anticipate that through the judicious employment of both new and old methods, the wonders of Petra will continue to astound for many generations to come.

Threats

As with many World Heritage Sites, Petra's popularity has been a mixed blessing, with tourists making substantial contributions to the host economy but also posing a serious threat to the preservation of the site (see Comer 2012). The sprawling site is difficult to police, and visitors routinely climb and walk on architectural features and remove artifacts as souvenirs. The Bdoul Bedouin tribe that once resided inside Petra and many of its monuments was ejected in the 1980s as part of the process for establishing the World Heritage Site and associated park. Many were displaced to the nearby village of Umm Seyhoun. Many Bedouin now earn a living providing guide services and running small tourist shops in the city center. Others have found work with archaeological teams providing field assistance and logistical support to research at Petra. There also seems to be a general problem with looting, with artifacts spanning the full occupational history of the region readily available for sale to tourists at the shops. While necessary for sustaining the economic survival of the local Bedouin, these different types of engagements with the archaeological park also create threats to the site as the result of inadequate management and mitigation strategies. Efforts are presently underway to develop appropriate and sustainable strategies that will hopefully ameliorate some of these potential threats.

In addition to human pressures, Petra also faces much natural erosion due to the action of wind and water. Recently, for example, a Byzantine church in Petra's city center has sustained water damage to its floor mosaic (Fig. 2). Some of the most significant threats faced by Petra are those related to conserving and preserving the monuments carved and constructed from the fragile sandstone. All of the monuments are endangered through human and animal interactions, water, wind, solar radiation, and salt efflorescence from the building materials themselves. Neither a coherent conservation management plan nor a trained team of conservation technicians exist in the park to undertake sustainable preservation interventions. Despite these limitations, substantial progress in improving the situation has been made in the past several years.

The UNESCO office in Amman, Jordan, in partnership with the Petra Development and Tourism Regional Authority (PDTRA) has recently completed the definitive GIS mapping of the Petra Archaeological Park boundaries, which encompass some 264 km^2. This effort has

Petra, Archaeology of, Fig. 2 The Byzantine Church in Petra's city center exhibits spectacular floor mosaics which are presently threatened by water damage

also produced a proposal for the creation of the associated buffer zone that is required for a World Heritage Site. The UNESCO team also pioneered a new methodology for risk mapping and categorizing, assessing, and prioritizing the various threats to the site.

Several current projects are aimed at addressing the need for developing sustainable conservation capacity and practices. The Petra Archaeological Park is presently designing a conservation management plan that will define priorities and lay the foundation for establishing a set of policy and procedural standards. The Petra National Trust is undertaking the Wadi al-Jarra Dam Restoration Project that is working to rehabilitate ancient Nabataean water management installations to help control flood waters near the Al Khazneh monument. The American Center of Oriental Research (ACOR) is executing two major preservation projects, the Petra Church Maintenance and Restoration Project and the Temple of the Winged Lions Cultural Resource Management Initiative. Both of these projects are designed to implement urgent interventions to preserve the respective monuments but also involve technical capacity building in the local communities as a means of creating a trained workforce to facilitate making future conservation initiatives sustainable.

Cross-References

- ▶ Joukowsky, Martha Sharp
- ▶ Petra National Trust and the Challenge of Site Management at Petra

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Petrie, William Matthew Flinders

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Basic Biographical Information

William Matthew Flinders Petrie was born on 3 June 1853 in Kent, England. The only child of a middle-class Victorian family, his father was an inventor and surveyor, while his mother was the daughter of famed explorer and navigator, Matthew Flinders. After a severe childhood illness almost claimed his life, Petrie's parents were advised to restrict his contact with other children to avoid any further risks to his health. As a result, Petrie never attended a formal school (Drower 1985: 15). Instead, his parents took him on many family holidays to measure and survey ancient British monuments. This provided Petrie with a solid foundation in surveying and recording techniques. At the age of 24, Petrie undertook his only formal education with a university extension course in algebra and trigonometry (Drower 1985: 18). In 1880, he began his survey of the pyramids at Giza in Egypt. For the next 44 years, Petrie continued his work in Egypt, accompanied by his wife Hilda, whom he had married in 1896. In 1923, Petrie was honored with a knighthood for his services to the field of archaeology. In 1927, he moved his excavation efforts across the Egyptian border into Palestine. He continued this work for a further 11 years. Flinders Petrie died in British Mandate of Palestine on 28 July 1942, at the age of 89.

Major Accomplishments

Flinders Petrie pioneered many revolutionary techniques in the field. He is often referred to as the "Father of British Egyptology" (Persson 2012: 9). Petrie's exposure to rigorous surveying methods as a child is evident in his later career as an archaeologist. His first expedition to Egypt (1880) was to begin his detailed measurement and survey of the pyramids at Giza. At Tanis (1884), Petrie implemented his new, systematic approach to excavation. He instructed his team to excavate the site in a systematic fashion, focusing on the various layers within the site and their relationship to each other (Encyclopedia of World Biography 2004). This was an approach that was not utilized by other archaeologists at the time. Rather, Petrie's contemporaries would extract the interesting or unique pieces that they found with no reference to the chronology of the site or the context of the find.

Throughout his extensive career, Petrie discovered some extraordinary Egyptian artifacts, such as a collection of jewelry dating to the twelfth dynasty. However, Petrie also insisted on recording and excavating more mundane objects, particularly sherds of undecorated pottery, that were previously ignored in the search for rare and exotic artifacts. This practice allowed Petrie to develop the concept of "sequence dating," a method also known as "seriation." He further extended this by developing a "cross-dating" technique that facilitated the use of Egyptian artifacts to date strata at other sites outside of Egypt (The Columbia Encyclopedia 2012).

Petrie's greatest contributions to the discipline of archaeology were made in the field. As well as systematic excavation techniques and seriation, Petrie was known for his obsessive recording of detail, a practice that stemmed from his adherence to the concept of scientific observation. While his field methods were heralded as revolutionary for his time, Petrie's theoretical interpretations of the results he obtained were (and in some cases, still are) considered to be highly controversial. His theories on the origins and development of the alphabet were strongly opposed by his contemporaries, while his connection to noted eugenicist Francis Galton has drawn criticism from subsequent generations of archaeologists (Encyclopedia of World Biography 2004; Sheppard 2010). In contrast to his expertise in excavation and classification, his survey techniques were considered by his peers to be rudimentary (Gardiner 1942: 204).

Despite having had very little formal education, Petrie's academic career was outstanding. In 1892, he was made the first Edwards Professor of Egyptology at University College

London (UCL). He retained this position until 1933, and the Egyptian Archaeology Museum at UCL is named in his honor. Additionally, his career in the field was extensive. Beginning in 1875 in Britain, he began his work in Egypt in 1880. He continued there until 1924, and in 1927 he moved his excavations across the border in to Palestine. His work in Palestine continued until 1938, and he remained in the country until his death 4 years later. Obituaries and postmortem accounts of his life highlight a pioneer of modern, scientific archaeological methods (Gardiner 1942: 204; Wheeler 1953).

Cross-References

- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ Stratigraphy in Archaeology: A Brief History

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Phenomenology in Archaeology

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Introduction

Phenomenology in archaeology refers to an interpretive method and associated theoretical stance developed by British post-processualists. Most phenomenological research focuses on investigations of past landscapes. Phenomenological archaeology draws its theoretical position and its inspiration from the existential philosophy of Edmund Husserl and Martin Heidegger. It is based on the assumption that there are universal similarities in human spatial perception. Because all human bodies share the same configuration, we can assume that all humans have generally similar spatial perceptions of such body-relevant experiences as directionality and scale. The human body organizes spatial experiences into up and down, front and back, and left and right. And, like us, past subjects constructed their spaces to create and reflect aspects of their habitus. If we accept these premises, then a phenomenological approach can give us insights into the ways in which prehistoric peoples experienced, perceived, and represented the spatial world. Phenomenological archaeologists work from the starting point of contemporary bodies in the same spaces, moving through ancient landscapes and architecture as prehistoric peoples did. Proponents assert that the judicious employment of phenomenological methods aids archaeological investigations of past meanings, worldviews, and emotions. Phenomenology helps humanize the past and has inspired new research into the senses and the body. Critics focus on empirical as well as epistemological

issues, contending that phenomenological approaches do nothing to advance archaeological knowledge. The debate is itself a healthy development for the discipline.

Historical Background

Phenomenology in archaeology derives from phenomenology in existential philosophy. Gosden (1994), Casey (1996), and Thomas (1996) all provide good reviews of this intellectual history. Existential philosophy addresses the realism v. idealism conundrum that Western philosophers have pondered since Plato. Paradoxically, we know the world by separating ourselves from it, but at the same time, we can only understand ourselves in relation to the world. So, to what extent is the world "real," and to what extent is it a construct of our consciousness? Rene Descartes' (1641) solution was "I think, therefore I am." Immanuel Kant (1781) distinguished between the "phenomenal" world, or the world as our consciousness apprehends it through the filters of our senses, and the "noumenal" world, or an objective reality that remains beyond the grasp of our imperfect bodies and minds. Following these thinkers and the work of the nineteenth-century philosophers Søren Kierkegaard and Friedrich Nietzsche, existentialism posits that we bridge the distance between objective reality and our subjective consciousness through existence or daily experiences and participation in the world. Phenomenology – one branch of existentialism – emerged in the twentieth century through the works of Edmund Husserl (1931), Martin Heidegger (1927), and Maurice Merleau-Ponty (1962).

Husserl argues that we know the world not through pondering it (à la Descartes) but rather through daily life, experience, and perception. Conscious, intentional, bodily engagement with the physical world is the starting point for all knowledge. Husserl is an idealist – for him, understanding the world hinges around these shared, conscious *perceptions* of experience. Heidegger, a student of Husserl, moved the conversation away from epistemology (the study of how we know what we know) towards ontology (the study of being or existence). Like Husserl, Heidegger sees the human body as the point of dialectical mediation between consciousness and the physical world, subject and object. However, for Heidegger, bodily experience takes precedence over ideals and intentions, because experience creates the context in which all else takes place. Existence involves a mesh of contingent relationships with other beings and objects in both a spatial and temporal dimension. Place has a critical part to play for Heidegger – all bodily experiences are spatially situated. This is explored in Heidegger's concept of *Dasein*, translated as being-in-the-world or dwelling (see Thomas 1996 for a good discussion). Maurice Merleau-Ponty (1962) further elaborated upon these ideas, focusing on the intersections between the body, perception, consciousness, and place.

Phenomenology resonates well with practice theory, as both are concerned with breaking down a subject/object or actor/structure dichotomy, refocusing attention on the ways in which understandings, meanings, and actions are mutually constitutive. Bourdieu's concept of habitus has synergy with Heidegger's *Dasein*, as meanings arise through lived, daily, bodily experiences. The hermeneutic or dialectical aspects of these approaches have common Marxian roots (see Gosden 1994: 113-122). Both phenomenology and practice theory contributed to the development of humanistic geography, with its focus on place and landscape (see Tuan 1974, 1977; Cosgrove 1984; Jackson 1984; Lefebvre 1991; Casey 1996, 1997, 2001; Soja 1996).

Archaeological Cases

Given this history, it should come as no surprise that existential philosophy, practice theory, and humanistic geography have contributed to the emergence of a landscape archaeology that sees place as a mutually constitutive part of the social and spiritual world rather than as a set of resources to be objectively exploited (see, e.g., Bender 1993; Bradley 1998; Ashmore & Knapp 1999). However, not all landscape archaeology is phenomenological nor is all phenomenological archaeology focused on landscape.

All phenomenological archaeologists share the view that we make sense of the world by experiencing it. Some go further to contend that their own bodily perceptions can provide a means for learning about the past. By the early 1990s, British archaeologists began to explicitly explore the relevance of Heidegger's phenomenology for archaeology (Ingold 1993; Gosden 1994; Tilley 1994; Thomas 1996).

Tim Ingold (1993) starts from Heideggerian *dwelling-in-the-world* to build his concept of *taskscape*, which adds temporality and practice to the spatial study of landscape. Ingold points out that people are never disembodied, but move seamlessly through the world and through time. Meaning is created and sustained through cross-cutting fields of relationships among people, objects, and places that gradually unfold. *Tasks* – the practical activities carried out by people on a daily basis – are the constitutive acts of dwelling. The *taskscape*, then, is an inherently social array of spatially and temporally related activities.

Thomas (1996) employs Heidegger in a sophisticated critique of archaeological practices that are, he contends, mired in Descartian dichotomies. Archaeologists tend to objectify the material record as a target of study, or we try to read it as a text, but neither really works. We need to break down the false separation between human existence and the material. *Dasein*, or being-in-the-world, encourages us to think of objects, meanings, places, and people as continually, mutually constitutive, flowing into one another across time. Thomas illustrates the differences between phenomenological and objectifying approaches using three British Neolithic case studies, each at different scales. For example, objectifying approaches interpret a chambered tomb in Wales as a transcendental expression of structural meaning. From a dwelling perspective, by contrast, the chambered tomb is one in a chain of performative events linked with recent and older ideas and practices.

In *A Phenomenology of Landscape*, Christopher Tilley (1994) set forth a program for phenomenological landscape archaeology that has inspired a host of emulators and has sparked energetic critique. Archaeologists, Tilley argued, generally objectify landscapes, viewing places as empty, abstract containers for resources and actions. Tilley contrasted this "space as container" perspective with the human, bodily experience of places as meaningful, spiritual, temporal, and corporeal. He grounded his theoretical position in Heidegger's concept of dwelling and then tied phenomenology into concurrent, overlapping development in practice theory, humanistic geography, and Native American cultural landscapes (see, e.g., Basso 1996; Cosgrove 1984). Following Merleau-Ponty and de Certeau, Tilley is interested in how people construct and experience places by moving through them; he defined landscape as relational places linked by paths. Tilley believes that archaeologists' own bodily experiences as they walk through landscapes can be a source of information about the past. He expanded phenomenology from a philosophical framework for interpretation to a methodological approach.

Tilley carried forward his ideas through a series of case studies. The second half of his 1994 book featured narratives about Tilley's phenomenological perambulations through the British prehistoric countryside, conveyed through thick description and photographs. He focused on the viewsheds of high places and monuments and on the order in which places are experienced as a walker moves among them. He is also interested in the ways built places can evoke natural features and the ways in which topographies affect bodily experience (such as difficulties in climbing steep hills). Tilley followed *A Phenomenology of Landscape* with additional volumes (Tilley 2004, 2008, 2009) in which he further developed his philosophical position and presented additional case studies. In these works, Tilley moved beyond the British Isles to investigate Breton menhirs, Maltese temples, and Scandinavian rock art. He expanded his solitary musings to incorporate the observations of earlier researchers, and he argued for synesthesia, or the involvement of all the senses in bodily experiences. For example, on Malta, Tilley (2004) suggested particular limestones were associated with honey and the sweet smell

of death, while other limestones were associated with ochre and the living. Tilley's work has inspired a small but enthusiastic cadre of phenomenological practitioners in archaeology.

Among the best known of these is the work of Vicky Cummings and colleagues on the megalithic landscapes of Neolithic Wales (Cummings et al. 2002; Cummings & Whittle 2004). Like Tilley, Cummings et al. adopted an explicitly phenomenological framework and focus on the role of vision in the perception of place. Cummings et al. conveyed the bodily, experiential qualities of Neolithic tombs and monuments using thick descriptions of the features in their topographic settings, supplemented by photographs. The authors wanted their observations to be replicable, and so they made considerable effort to systematically record their visual observations, drawing and photographing 360° panoramas around each monument, and employing GIS to explore viewsheds. Cummings et al. argued that Neolithic monuments in Wales both concealed and emphasized particular vistas and topographic features. Chamber tombs, for example, are situated at places where viewsheds change. Ultimately, the authors used their phenomenological observations to bolster structuralist interpretations. For example, they argued that chamber tombs spatially evoked a transition from symmetry to asymmetry and back to symmetry, mimicking three stages of a human body as a living entity, a decomposing corpse, and a set of skeletal remains.

Similarly, Van Dyke (2007, 2011) conducted a phenomenological analysis of the monumental landscape of Chaco Canyon in the Southwest United States. Focusing on viewsheds and visibility, Van Dyke walked ancient routes into Chaco Canyon, using a video recorder, still photographs, and thick description to convey her bodily experiences. Van Dyke found a series of nested dualisms or oppositions illustrated by monumental architecture and by the placement of these buildings in dramatic topographic settings. She argued that Chacoan builders intentionally designed a spatial experience to legitimate their power for pilgrims to this "center place." Van Dyke supported her essentially structuralist interpretations with indigenous Pueblo ethnography and ethnohistory.

Hamilton and Whitehouse (2006) were among the first to move phenomenological work beyond visual perception and monumental architecture. They investigated Neolithic sites identifiable as artifact scatters in plowed fields in northeast Italy. Hamilton and Whitehouse incorporated sound, smell, and gendered bodily differences into their research. They worked to develop explicit, replicable phenomenological methods. Like Cummings and her colleagues, they drew 360° panoramas from the center of each site, recording near and distant landmarks and horizons. Hamilton, Whitehouse, and their team systematically walked out and back from sites over set periods of time, periodically recording observations. They conducted experiments to identify distances for different kinds of intervisible interactions (e.g., signaling v. presence of a human form) and vocal interactions (normal speech v. shouting). Hamilton and Whitehouse noted gendered differences along all of these dimensions. Their work is a significant contribution towards a phenomenological methodology.

Current Debates

Human beings do not experience spaces as abstract, empty containers. Phenomenology in archaeology arose as one way to transcend the sterile, objectifying, treatment of landscapes in more traditional methods such as settlement pattern analysis or catchment analysis. Advocates contend that phenomenological approaches help archaeologists to think about past peoples' meaningful, memory-laden, emotional, sensory, and metaphorical connections with their surroundings. For archaeologists using practice theory, in which people and their worlds are mutually, continually engaged, phenomenology provides a method for investigating those reflexive constructions.

Nonetheless, the critics of phenomenology in archaeology are many and vocal. Major appraisals to date include Joanna Brück's (2005)

measured assessment, Andrew Fleming's (1999, 2005, 2006) scathing dismissals, and John Barrett and Ihlong Ko's (2009) philosophical analysis. Criticisms may be roughly grouped into two categories – those that focus on faulty or incomplete methods and analyses and those that revolve around larger questions of ontology and epistemology. In the first set of criticisms, scholars have argued that phenomenological archaeology lacks replicability and methodological rigor, fails to contend with past/present environmental differences, ascribes a monolithic universality to bodily experience, fails to acknowledge that experience is culturally constructed, privileges the visual, and emphasizes description at the expense of power relations. In the second group of criticisms, scholars have pointed out that phenomenological archaeology has a tendency to devolve into structuralism, represents a misuse of Heidegger (who was, furthermore, a Nazi sympathizer), conflates association and causation, and lacks epistemological legitimacy. Many of these critical points – particularly those in the first batch – have merit and should lead phenomenological archaeologists towards stronger interpretations. Other criticisms – particularly those in the second group – are grounded in fundamental epistemological differences among researchers and, thus, are unlikely to be resolved.

Faulty or Incomplete Methods and Analyses

Phenomenological interpretations originate with the subjective experience of the researcher. The researcher's bodily experience is meant to provide her with insight into the intentions of past builders. But in order for a credible body of knowledge to be constructed, the subjective researcher's bodily experience should be replicable by others. Fleming revisited some of Cummings and Whittle's megalithic sites and did not see what they saw, leading him to conclude that phenomenology does not constitute a legitimate epistemological method. Rather, Fleming argues that phenomenologists produce nothing more than the researchers' own contemporary, romantic perceptions of contemporary landscapes. Hamilton and Whitehouse concurred with Fleming that phenomenology needs replicability and methodological rigor. They developed a set of standardized forms for researchers to use in recording phenomenological observations, and they carried out work in teams rather than as solitary walkers.

Clearly, the archaeological landscapes of today are not identical to the cultural landscapes of the past, even when there is relatively good architectural preservation. Phenomenologists should take into account changes in vegetation, weather, seasons, and architecture. Nonetheless, past landscapes no longer exist – contemporary landscapes can only provide researchers with partial, distorted experiences. Just as the landscape is not constant, neither is the human body. Phenomenology proceeds from the assumption that bodily experiences of landscape are to some extent universal, but bodily experiences surely would have been dissimilar for individuals of different ages, genders, and social standings. Hamilton and Whitehouse engaged with this point through their work on Neolithic ditched enclosures in Italy. Rather than assuming a universal (and by default, male) human body, they explicitly incorporated and recorded gendered differences in bodily movement and perception.

But even if bodies, topographies, and features could be held constant, spatial experiences are – as Bourdieu has taught us – culturally constructed. Although human bodily configurations are to some extent always shared, past sensual perceptions were culturally situated and might be quite different from our own. For example, phenomenological accounts are often written from the perspective of the solitary walker encountering the past for the first time – but past meanings were created and negotiated by people as participants in social worlds engaged in repeated, multiple encounters with places.

Although phenomenologists claim to engage with bodily experience, in practice their work has focused almost exclusively on the sense of vision, revolving around intervisibilities among monuments, or shifting visual perceptions along routes

of movement. This is shifting somewhat – Tilley's more recent work incorporates smell and touch. Hamilton and Whitehouse carried out a series of acoustic experiments using different sounds and less systematically noted the presence of various smells. New work in sensory archaeology (e.g., Hamilakis et al. 2002; Day 2013) moves well beyond the visual, monumental landscapes favored in early case studies.

Phenomenological explanations essentialize description to the detriment of explanation, privileging the sensory over the political (Smith 2003: 67-68). Phenomenologists often argue that buildings or landscape elements represent certain ideas, for example, but fail to give their attention to the social and political processes through which these symbols were negotiated. Although power may be an underdeveloped dimension of some phenomenological studies, researchers are well aware that spaces are political (e.g., Tilley 1994: 20-21). Van Dyke, for example, explicitly argued that spatial experiences on the Chacoan landscape were meant to legitimate the power of ritual elites.

Finally, critics contend that phenomenologists lack the means to distinguish between association and causation. Phenomenologists may observe sensory regularities (such as intervisibility with a particular mountain peak), and those observations may be replicable, but this association does not demonstrate that the regularities were meaningful to ancient people. Mountain peaks are tall and are visible from many places. This methodological problem is closely tied with a larger, epistemological issue.

Ontological and Epistemological Objections

The descriptive cast of many phenomenological interpretations emerges from a latent structuralism common to most analyses, including those of Tilley, Cummings, and Van Dyke. Fleming considers that the ancient dualisms identified by phenomenologists are created by the scholars' own modernist worldviews. But even if past peoples did situate architecture to embody structural dualisms, to what extent were these meaningful? Were they intentional? Is a transcendental, abstract, structuralist perspective at odds with a philosophy that posits meaning as created through immediate, participatory, bodily experiences? At the crux of this group of criticisms are fundamental anthropological and philosophical questions about the nature of social meaning and the construction of knowledge. One question has to do with Heidegger's politics.

Heidegger was a member of the Nazi party from 1933 to 1945. For many scholars, this does not detract from the power of his ideas, whereas for others, it is a damning indictment that renders his work ethically unpalatable. Some archaeologists contend that because a scholar's ideology is not separable from his/her thoughts and writings, Heidegger's work is not separable from the fascist ideals he believed in. However, the phenomenological issues Heidegger investigated are part of a philosophical tradition that transcends Nazism. Husserl – his mentor and a major phenomenological philosopher – was, in fact, a Jew by birth, who lost his academic position under the Nazi regime.

Barrett and Ko's (2009) address another problem with archaeologists using Heidegger. Barrett and Ko contend that phenomenological archaeologists have misread the philosopher and would do better to ground their work in Husserl. Their argument may be summarized as follows. For Heidegger, human understanding of the world arises through subjective, experiential encounters, or *zuhanden*. Humans can also construct knowledge through *vorhanden*, or intentional, objectifying inspection, but *zuhanden* creates the context of knowledge and thus must come first. Husserl, by contrast, contends that humans must detach from the world in order to learn about it. Husserlian phenomenology emphasizes conscious and intentional experience. Barrett and Ko (2009) point out that British phenomenologists assume an ahistorical, transcendental vantage point. They treat the knowing subject as conscious and objectifying, thereby privileging *vorhanden* rather than *zuhanden*. Thus, phenomenology as practiced by such scholars as Tilley,

Cummings, and Whittle is really Husserlian rather than Heideggerian.

Barrett and Ko argue that Tilley, Cummings, and Whittle's works contain unstated, problematic premises about ancient builders' intentions. Phenomenological archaeologists have assumed that human action is goal oriented and that monument builders sought to ensure certain visual consequences. Thus, the archaeologists believe the monuments allow them to access the builders' motivations. However, for Heidegger, landscapes and monuments do not inscribe a cultural order – rather, dwelling is an act of engagement with the world, and order is emergent. Top-down structural analyses would appear to be at odds with *Dasein*.

So, are contemporary archaeologists' experiences a legitimate source for interpretations about the past? Barrett and Ko argue that they cannot be, unless we invoke the transcendental universals that are anathema to a Heideggerian phenomenology. Barrett and Ko are correct that analyses that offer nothing more than structuralist descriptions are incomplete and more Husserlian than Heideggerian. But this does not negate the value of phenomenological studies for identifying sensory patterns in the material world. This criticism is really a restatement of a fundamental anthropological question about the relationship of agency and structure.

Barrett and Ko conflate the identification of transcendental patterns with the investigation of a deeper question – to what extent are these patterns intentionally constructed, agenda-driven order, and to what extent are they emergent, nondiscursive properties? The relationship between agency and structure is important for understanding ancient political and social order. But before archaeologists can interpret past social worlds, they must first identify patterns that allow them to build interpretations. Phenomenological archaeology provides one means for identifying sensory patterns that may be both discursive and nondiscursive in origin.

Those researchers who do not consider interpretive approaches as valid pathways to archaeological knowledge see phenomenology as at best naïve, at worst a threat to archaeological authority. For archaeologists such as Tilley who consider the past to be constructed within a political present, this is less of an issue. All we have, ultimately, is our own culturally situated understandings of the past – we cannot "access" the "true" past. However, this position threatens the authority of archaeologists as singular arbiters of knowledge about the past, leading some to consider phenomenology as quite dangerous (witness the vitriol in Fleming's attacks). The crux of the dispute is epistemological – what are the acceptable avenues by which we can construct knowledge? Philosophers have been struggling with this question from Plato and Aristotle onwards, so it is unlikely that archaeologists will resolve it any time soon.

Future Directions

The full potential of phenomenology in archaeology has yet to be realized. The introduction of explicitly phenomenological approaches in archaeology is giving rise to several positive developments. In general, there is more of a concern with visual perception and meaning than there has been in the past. Archaeologists are likely to think about lines of visibility from shrines on high places to dramatic, distant peaks, and they are likely to ask questions about whether these connections could have been meaningful in the past (e.g., Boivin 2004). Following Hamilton and Whitehouse, archaeologists are more aware of gendered and other bodily differences in spatial experience, and they are likely to think about how bodies experience movement across different kinds of topographies (e.g., Scarre 2002). They are conducting systematic experiments to assess differences in movement, sound, or sight across landscape. Increased methodological rigor should help to bolster the perceived legitimacy of phenomenological approaches in the eyes of some critics. These explorations are connected to a burgeoning interest in sensory and haptic

archaeologies concerned not just with the visual but also with sound, touch, taste, and smell (see, e.g., Gosden 2001; Watson & Keating 1999; Hamilakis et al. 2002; Day 2013). Finally, a great value of phenomenological archaeology is that it challenges scholars of all theoretical persuasions to engage with deeper ontological and epistemological questions.

Cross-References

- ▶ Landscape Archaeology
- ▶ Post-Processual Archaeology
- ▶ Practice Theory in Archaeology

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Phillips Spring: Agriculture and Domestication

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Basic Site Overview

The Phillips Spring site (23HI216), discovered in 1973, is within the Pomme de Terre River valley in northern Hickory County, Missouri. The drainage is part of the larger middle Osage River basin that empties into the Missouri River. The Pomme de Terre is familiar to Quaternary specialists as the location of Albert C. Koch's 1840 excavation of the American mastodon and its claimed association with artifacts. More recent investigations, beginning in the mid-1960s, have reevaluated Koch's find as well as examined deeply buried, multilayered sites, among them Rodgers Shelter and Phillips Spring. Systematic excavations of Phillips Spring, an active artesian spring, began in 1974 and continued in the years 1976–1978. The initial investigation was an attempt to locate another late Pleistocene (c. 40,000–10,000 years BP) or Holocene (since c. 8050 BCE or 10,000 BP) palynological record that might coincide with the prehistoric habitations in the valley and to provide direct evidence of middle Holocene environmental and climatic conditions in the western Ozark Highland. Ultimately, these goals were largely satisfied. Along the way, even more impressive discoveries were made, including that of potential ancient cultigens (*Cucurbita pepo* [pepo "squash"] and *Lagenaria siceraria* [bottle gourd]). The unimpeachable, deeply stratified contexts of these discoveries at Phillips Spring extended the record of plant husbandry for the Archaic of the Eastern Woodlands of North America to a date earlier than 2250 BCE (4200 years BP). One pepo seed fragment came from alluvium dating about 7,000 radiocarbon years ago (5050 BCE); however, the earliest pepo and bottle gourd seed and rind concentration is younger and dates in radiocarbon years from 3050 BCE to 2250 BCE (5000–4200 BP). These discoveries were a catalyst in reformulations of the Archaic as a period of dynamic adaptation and experimentation with both exotic and local plant resources.

Phillips Spring is a deep, finely stratified archaeological site with exceptional preservation of normally perishable, uncarbonized plant remains. Under these sediments is an equally important, older alluvial record for the late Pleistocene and early Holocene that contains scattered pollen layers. Its remarkable organic preservation stems from the anaerobic environment created by the spring itself. The site contains the best-defined, radiocarbon dated sequence of Holocene alluvial cut and fills in the valley. Just above bedrock is a Late Wisconsin Boreal Forest assemblage dominated by jack pine that dates to c. 25,350 BP (23,400 BCE). Unlike other artesian

springs in the valley, Phillips does not contain a Pleistocene bone bed.

Evidence of Early Agriculture

The archaeology of Phillips Spring is dominated by Late Archaic Sedalia phase (c. 2550–650 BCE, or 4500–2600 years BP) encampments that probably represent base camps. Subterranean food-storage facilities were dug, and large oval basins were used as steaming pits for communal cooking. The most common food species represented are pepo and the exotic tropical cultigen, bottle gourd, plus native plants among which walnut, hickory, and oak acorns figure prominently. Most of these species would have been grown, collected, and stored during the summer and into the fall. Seed and rind morphology of pepo and bottle gourd suggests their growing may have been for their seeds, for containers, or both. Storage pit construction and use was mainly a summer-fall operation, which could well have continued into the winter or early spring. Adzes dominate the tool assemblage, but simple ground-stone tools and a variety of hafted chipped-stone points are present, too. The adzes have been referred to as "Sedalia diggers," but they are clearly heavy duty woodworking tools. At least one broken Nebo Hill lanceolate of seemingly nonlocal material (presumably from the Nebo Hill region around Kansas City, Missouri) was found along with an occasional wooden tool. Subsequent habitations include Middle and Late Woodland encampments that generally have larger-sized storage pits containing the same suite of plant foods as for the Sedalia phase; one well-defined oval house and a distinctively local, hematite-tempered ceramic are present.

The Phillips Spring site is now beneath the waters of Harry S. Truman Lake, a federal impoundment.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agriculture: Definition and Overview
- ▶ Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Geoarchaeology
- ▶ Squash: Origins and Development

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Basic Biographical Information

Kaseka Phon graduated from the Faculty of Archaeology, Royal University of Fine Arts in Phnom Penh, Cambodia, in 2000. He is currently Director of the Archaeology Department at the Royal Academy of Cambodia, as well as a Ph.D. candidate at the same institution.

Major Accomplishments

He has extensive archaeological research experience across Cambodia. His research on the Cheung Ek archaeological site began in 2002. In 2002 he worked on "The East Cambodia Archaeological Survey" organized by the NAGA Research Group. In 2003–2004, he worked at the site of Phnom Borei, Takeo province, exploring its relationship with the nearby site of Angkor Borei. In 2004–2005, he began site survey and mapping at Cheung Ek with support from the NAGA Research Group. In 2005–2006, he worked on a site-mapping project in Ang Snoul district. Fieldwork at Cheung Ek continued in 2007 with a project of archaeological investigation and CRM supported financially by the US Embassy. In 2007, he conducted survey and mapping in Baray district, Kampong Thom province, as well as directing the Sre Ampil Archaeological and Conservation Project supported by the Center for Khmer Studies (CKS). In 2008, this project was expanded into a theoretical and practical training workshop in order to develop a coherent research and teaching program in the field of archaeology at the site of Sre Ampil. The CKS Junior Faculty Training Program (JFTP) as well as the Scaler Foundation and the Rockefeller Foundation jointly funded the project. In 2009, he trained site guardians at Prasat Banteay Chmar in a project funded by the Friends of Khmer Culture. That same year, he participated in the Industries of Angkor Project (INDAP), directed by Dr. Mitch Hendrickson at Preah Khan of Kompong Svay, Preah Vihear province. In 2011 and 2012, Kaseka Phon directed two projects supported by the Royal Academy of Cambodia. The first involved site survey and mapping in Trapeang Prasat district, Udor Mean Chey province. The second project involved survey and mapping of Buddhist Vihara Mounds at Udong and Lovek Cities. Most recently, he has returned to do fieldwork at the site of Cheung Ek, examining ceramics kilns and temple foundations in this area, as well as creating a ceramic typology. To date (August 2012), 61 pottery kilns and 11 temple foundations have been recorded. The survey and upcoming excavation is supported by the Friends of Khmer Culture. He also has been involved in many translation projects including *Early Cultures of Mainland Southeast Asia* by Dr. Charles Higham (funded by the Luce Foundation), a guidebook entitled *Guidelines for Stone Conservation and Preservation in Angkor* (funded by German Apsara Conservation Project) and *Archaeometallurgy* (funded by the Center for Khmer Studies).

Cross-References

▶ Cambodia: Cultural Heritage Management
▶ Post-Khmer Rouge Cambodia, Archaeology in

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Phytolith Studies in Archaeology

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Introduction

Phytolith analysis is a micro-botanical technique used in archaeology to study ancient plant remains. Phytoliths are opaline silica bodies formed during the lifetime of a wide variety of plant taxa within and between certain cells. These micro-remains can provide insight into ancient diet, the non-food uses of plants (such as for fuel or weaving), spatial arrangements of plant use and discard across settlements, agricultural practices, and seasonality of pre-agrarian site occupations. The durability of these micro-remains makes them particularly valuable at archaeological sites where preservation conditions are not suited to the survival of charred, desiccated, or waterlogged macro-remains. Phytoliths provide both complementary and unique information about plant use at sites where charred macrobotanical remains (cereals, seeds) are present since these datasets preserve information about different suites of plant parts and enter the archaeological record through different taphonomic routes. Outside the field of archaeology, phytoliths from soils and sediments are frequently used to reconstruct vegetation and climate histories.

Definition

The term phytolith derives from the Greek for plant "phyton" and stone "lithos." The term phytolith is most commonly used to discuss silica particles within plants, especially within archaeological studies, but does also refer to other types of mineral deposits. Only silica particles are discussed here. Phytoliths are formed when monosilicic acid (H_4SiO_4), present within groundwater, is taken up by various plant families and deposited as opaline silica within or between certain plant cells. Phytoliths are generally silt sized and have a refractive index of 1.41–1.47 and a specific gravity between 1.5 and 2.3. These microfossils are formed in different plant parts, depending on the taxa and most commonly within epidermal cells of aerial structures (such as leaves, stems, seed bracts, and fruit rinds) but also sometimes within wood, mesophyll, and roots. Silica deposition can be both actively controlled by plants through physiological and genetic mechanisms and in relation to specific cells, and passive potentially leading to silicification of a more variable range of cells and areas of plant tissue. For example, the production of grass "short cells" (rondels, saddles, bilobes, and crosses) is considered to be genetically controlled (Fig. 1), but levels of phytolith production and the range of silicified cells can be enhanced by environmental conditions that influence water uptake and soluble silica levels in groundwater (Mithen et al. 2008; Madella et al. 2009). Areas of epidermal tissue can become silicified, and these conjoined phytoliths are commonly referred to as silica skeletons (Fig. 1) (Rosen 1992). Sometimes, silica skeletons can be macroscopically visible; at Çatalhöyük, evidence for basketry and brick temper survives as whitish traces of whole plant parts (Ryan 2011).

Historical Background

Phytolith research emerged in the early nineteenth century, and there are several distinct periods of phytolith research (Piperno 2006). In the 1830s, Christian Gottfried Ehrenberg coined the term "phytolitharia" and famously recognized these fossilized plant cells in dust samples collected by Darwin on the HMS Beagle voyage. From the end of the nineteenth century through to the mid-1930s, a phase of botanical studies was centered around Germany, and also during this time frame, cereal phytoliths were first recognized at archaeological sites. A broader range of botanical and ecological studies, including paleobotanical research, began from the 1950s, and in 1971, Irwin Rovner published a key article about

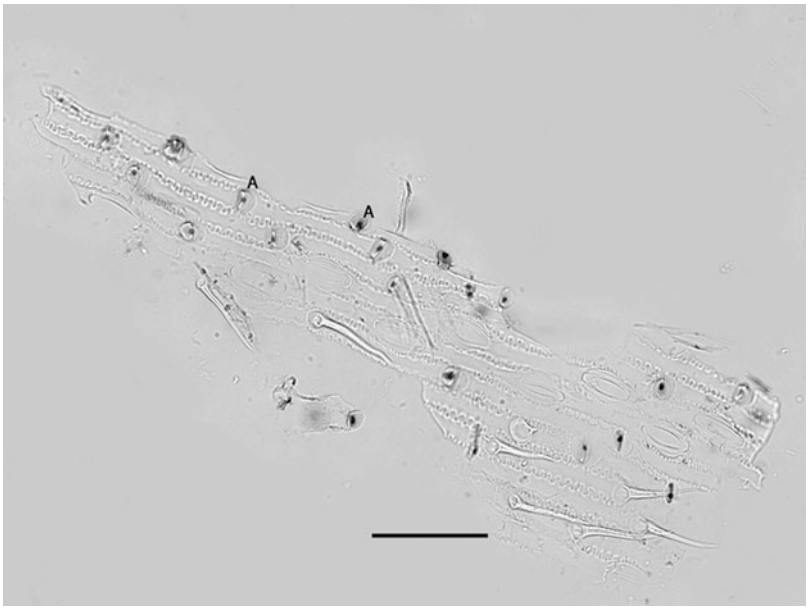

Phytolith Studies in Archaeology, Fig. 1 Silica skeleton from *Triticum dicoccoides* leaf (wild emmer wheat), including rondel phytoliths (*A*); scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

the use of phytoliths in paleobotanical studies (Rovner 1971). From the end of the 1970s, large-scale research projects began to investigate vegetation histories and prehistoric plant use in the New World lowland tropical forest, as well as elsewhere in the Americas (Piperno 2009). Dolores Piperno (1988) published the first major book dedicated to phytolith research. Numbers of phytoliths studies increased substantially during the 1990s and dramatically from 2000 onwards.

Key Issues/Current Debates

Research questions addressed with phytolith analysis include the study of ancient diet, plant domestication, crop processing, non-dietary uses such as for fuel, spatial arrangements of plant use at archaeological sites, and the identification of ancient field systems. There are interpretative considerations specific to different geographic regions, for instance, concerning the degree of taxonomic information that relevant taxa can provide. Different site types, such as caves, shell middens, and urban settlements, also necessitate particular approaches. Ongoing investigation to establish phytolith identification criteria and to understand taphonomic factors remain important fields of research for phytolith studies both within and outside of archaeology.

Taphonomic Considerations

There are many factors to be considered when interpreting the phytolith record, including phytolith formation within plants, the cultural pathways of plants into the archaeological record, and postdepositional factors. A recent review of pre- and postdepositional processes can be found in Madella and Lancelotti (2012). Phytoliths are released into soils when plants decay or are burnt, and for the most part, those in archaeological sediments will act as good indicators of on-site plant use (Piperno 2006: 105). In general, phytoliths are not transported over long distances with some exceptions, such as dust or sandstorms. The potential impact of factors such as soil formation and bioturbation may vary by region and site type. Although very robust, phytoliths can be destroyed in very alkaline soils (above pH 9). The shape and chemical properties of individual phytoliths can variably impact rates of dissolution (Piperno 2006: 108, 123). Phytoliths can also be mechanically damaged, for instance, through trampling or sweeping

in antiquity. Different laboratory processing methods will also affect numbers of conjoined cells in silica skeletons (Jenkins 2009).

Sampling and Archaeological Questions

Sampling strategies will vary depending upon site type, for instance, between tell sites, shell middens, or caves. Samples should be taken, when possible, from tightly defined features likely to contain concentrated plant remains, such as storage areas, hearths, and ash lenses, as phytolith data may then reveal information about the specialized functions of certain areas (Piperno 2006: 83). In sites (or areas of sites) where no clear features are apparent, samples can be taken at regular intervals across surfaces or vertically between site levels. Control samples from sterile layers or off-site sediments are also important. Most samples are taken in the field, but samples of micro-lenses can also be taken from micromorphological blocks in the laboratory (Madella & Lancelotti 2012).

Sediment samples taken for phytolith analysis can be taken at two scales of analysis: at the scale of the excavation unit defined by site excavators and from smaller "spot" samples within these units. These "small-scale contexts" can be used to examine microdistribution patterns (Rovner 2001). Spot samples can be taken across horizontal surfaces, for example, across floors within buildings. Spot samples can also be taken vertically from micro-lenses within sections, for instance, through floors or rubbish deposits to investigate specific depositional events. Alternatively, for contexts such as rubbish deposits, subsamples from bulk sediments (at the scale of the excavation unit) may be useful for analyzing temporal and spatial trends by enabling a greater number of archaeological contexts to be studied. Such bulk samples are also directly comparable with macrobotanical or faunal datasets in terms of scale. If macroscopically visible silica skeletons are present, these are best sampled with a scalpel and placed in a small glass vial, as the individual signature of the plant will be lost if the silica skeleton disintegrates into surrounding sediments (Ryan 2011). Phytolith samples can also be taken from objects such as grinding stones (Radomski & Neumann 2011) or dental calculus (Henry & Piperno 2008).

Processing and Analysis

Phytoliths are typically extracted from sediments and soils through a series of laboratory steps. Usually around 0.5–2 g of sediment is processed, depending upon phytolith densities within sediments. Processing methods vary between researchers (Albert & Weiner 2001; Rosen 2005; Piperno 2006: 90-92), for instance, organics can be removed through chemical digestion or through ashing in a muffle furnace at 500 °C. Other processing steps include carbonate removal using a 10 % solution of hydrochloric acid, clay removal through a settling process and the use of a 5 % solution of sodium hexametaphosphate (Calgon) as a clay deflocculant, and a flotation stage using a heavy-density liquid such as sodium polytungstate made to a specific gravity of around 2.35 g/cm^3. Phytoliths can be mounted onto slides using a suitable permanent fixative such as Entallin. Alternatively a liquid mounting medium like immersion oil is useful for studying the three dimensionalities of phytolith forms. Slides are scanned and counted using a light-transmitting microscope at around × 400 magnification. The amount of forms counted by researchers varies but commonly falls within 200–400 phytoliths and partly depends upon the frequency of rare types. Absolute counts (which are a measure of phytolith density) can be calculated per gram of sediment or (depending on processing methods) to the sediment's acid-insoluble fraction (AIF) (Albert & Weiner 2001; Rosen 2005). Relative abundances (percentages) among phytolith categories can also be calculated. There are advantages and biases inherent in using both absolute counts and relative abundances. Relative abundances (%) are useful for comparing phytolith assemblages from varying context categories with different types of sediments but can be problematic when a plant produces extremely large quantities of phytoliths as the variability among other lower phytolith-producing taxa among samples may be obscured. Phytolith images can be taken using a camera attached to a light-transmitting microscope,

a scanning electron microscope (SEM) to examine three-dimensional form, or a variable pressure scanning electron microscope (VP-SEM) which enables imaging of cell wall patterning and phytoliths in their anatomical location (Ryan et al. 2012).

Several classification schemes exist for phytolith description. The International Code for Phytolith Nomenclature 1.0 (Madella et al. 2005) aims to create an internationally accepted protocol to describe and name individual phytoliths. Silica skeletons can consist of many types of plant cells arranged in their original anatomical location, and studies by grass systemists such as Metcalfe (1960) can aid identifications.

Key Phytolith Types

Phytoliths provide varying levels of taxonomic information. Some morphologies can be identified to family, subfamily, genus, and more occasionally to species. The greatest quantities and categories of taxonomically identifiable phytoliths are produced by monocotyledonous plants, especially grasses (Poaceae), and also by palms (Arecaceae), sedges (Cyperaceae), and the banana family (Musaceae). Phytoliths are also formed within many dicotyledonous woody tree and shrub plant families. Piperno (2006) provides an extensive review of phytoliths produced by different plant groups.

Grasses produce multiple phytolith forms providing varying levels of taxonomic information. Several important cereals (discussed below) and wild grasses produce diagnostic morphologies identifiable to genus level and more occasionally species. These diagnostic forms are most frequently from grass husks (seed bracts), but sometimes phytoliths from other plant parts are identifiable to genus level, for instance, *Phragmites* sp. (common reed) has recognizable leaf and stem multicell phytoliths (Fig. 2). With notable exceptions, less diagnostic cell types include various types of long cells, hairs, stomata, and bulliforms. Some phytoliths provide anatomical information, for instance, most commonly bulliform cells are associated with leaves and dendritic long cells with husks.

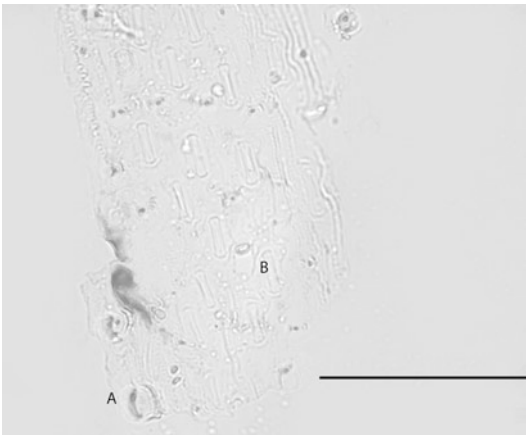

Phytolith Studies in Archaeology, Fig. 2 Multicell phytolith from *Phragmites australis* (common reed) leaf, showing saddle (*A*) and stomata (*B*) phytoliths; scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

Grass "short cells" can broadly distinguish among several major grass subfamilies (Twiss 1992). The basic groupings are rondel forms (most common in the Pooideae, which includes wheat and barley), bilobe and cross forms (most common in the Panicoideae), and saddle-shaped forms (mostly found within the Chloridoideae subfamily). Pooid grasses have C3 photosynthetic pathways and are common in temperate climates and high altitudes, chloridoid grasses and most panicoid grasses usually have C4 photosynthetic pathways and are common in hotter environments, while chloridoid grasses are usually associated with aridity. There are exceptions; for instance, the saddle-producing chloridoid grass *Aeluropus* spp. grows in wetland habitats spanning arid to temperate climates. Also, some short cell types are present within more than one subfamily, for instance, in the Arundinoideae subfamily rondels and "saddle-topped short trapezoids," are found within *Phragmites australis* (common reed) (Fig. 2) (Ollendorf et al. 1988).

Phytoliths are also abundantly produced by sedges (wetland plants that superficially resemble grasses: family Cyperaceae). The most distinctive "cones" often derive from achenes and achene bracts, while less potentially

distinguishing cone forms are also produced in leaf/stem areas (particularly leaves), as well as sometimes other cells types including stomata, hairs, bulliforms, and various types of long cells (Figs. 3 and 4). Phytoliths are also abundant in palms. Genus-level identification is problematic but depends on the range of regional palm genera. In the Near East, "spherical echinate" forms from date palms (*Phoenix dactylifera*) (Fig. 5) can be potentially distinguished from doum palm (*Hyphaene thebaica*) phytoliths that are generally larger and fall into two size groups (Rosen 1992).

"Polyhedral," "jigsaw," and hair phytoliths (Fig. 6) are formed in certain dicotyledonous tree or shrub leaves (Bozarth 1992). Phytoliths can also be present within wood and bark, although up to 20 times lower than grasses and absent in some taxa (Albert & Weiner 2001). Silica deposits can be present in parenchyma, axial parenchyma cells, in fibers, and in vessels (Metcalfe & Chalk 1983: 93). Phytoliths in bark may be secondarily deposited (for instance, from leaves). Phytoliths from woody plants are generally of irregular morphology (Albert & Weiner 2001). Phytolith forms can also derive from outer layers of certain dicotyledonous seeds and nuts, including *Celtis* sp. (hackberry).

Phytolith Studies in Archaeology, Fig. 3 Multicell phytolith from *Carex divisa* inflorescence bracts (sedge); scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

Selected Phytolith Studies by Region and Crop Type

Many cereals and other crops have taxonomically diagnostic phytoliths that can be used to investigate plant diet and agriculture. Crop taxa have often been most intensively studied in regions where they were originally domesticated and where preservation of plant macro-remains has been poor – for instance, in lowland tropical areas or at pre-agrarian Epipalaeolithic sites in the Levant.

Phytoliths have been used to study wheat (*Triticum* spp.) and barley (*Hordeum* spp.) agriculture particularly in the Near East, where they were domesticated, and now increasingly in other areas including parts of Europe, Central Asia, and North Africa. The analysis of silica skeletons from Near Eastern cereal crops was pioneered by Arlene Rosen (1992), who outlined several criteria for identifying husks from wheat (Fig. 7), barley, and three wild grasses from the

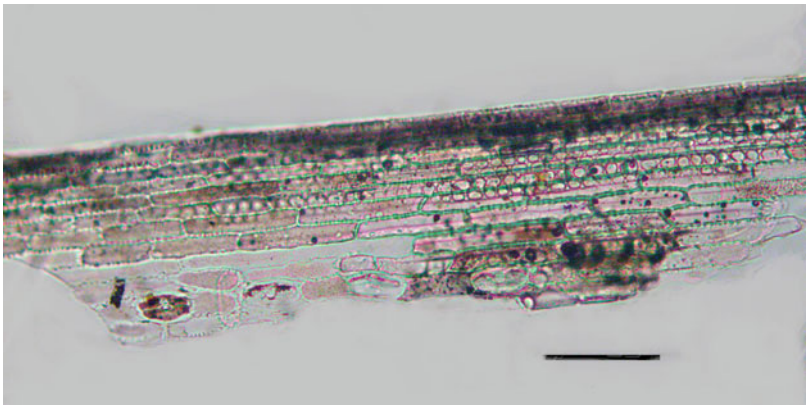

Phytolith Studies in Archaeology, Fig. 4 Multicell phytolith from *Cyperus* sp. leaf (sedge); scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

Phytolith Studies in Archaeology, Fig. 5 Globular echinate phytoliths from *Phoenix dactylifera* leaf (date palm); scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

Phytolith Studies in Archaeology, Fig. 6 Multicell dicot phytolith including hair from *Buglossoides tenuiflora* leaf (gromwell); scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

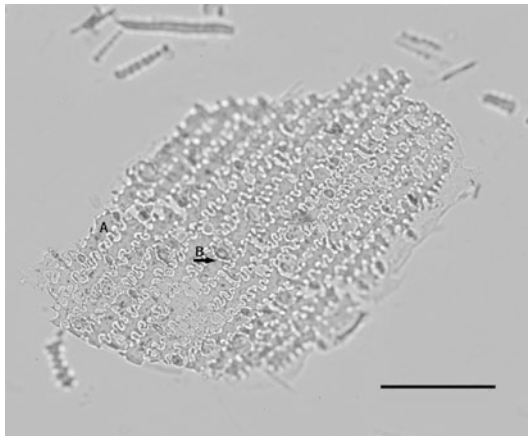

Phytolith Studies in Archaeology, Fig. 7 Silica skeleton from *Triticum durum* husk (durum wheat), including dendritic (*A*) and papillae (*B*) phytoliths; scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

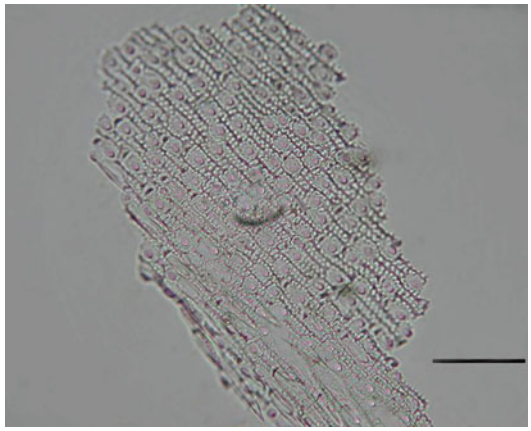

Phytolith Studies in Archaeology, Fig. 8 Silica skeleton from *Bromus* sp. husk (bromegrass); scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

Pooideae subfamily; oat grass (*Avena* spp.), rye grass (*Lolium* spp.), and goat grass (*Aegilops* spp.). Identification criteria are yet to be defined for husk silica skeletons from many Pooideae grasses, but can sometimes still be identified as 'wild grass husk' (Fig. 8). Key identifying features include the undulating wave patterning created particularly by the dendritic cell walls and the shape and ornamentation of papillae cells (Fig. 7). Individual papillae cells can differentiate between wheat and barley at genus level as well as among certain species (Tubb et al. 1993). Ball et al. (1999) used computer-based scanning software to study the morphometrics of individual husk cells from several wheat and barley species and, from this, developed a classification key as well as discriminant function tests that were able to distinguish among these taxa (confidently to genera and often to species depending on the method). Morphometric analysis of single cells can be applied to sample contexts where

phytolith assemblages are likely to contain husks from cereals rather than a wide range of grasses, as other Pooideae grasses may have overlapping cell measurements (Ball et al. 1999).

Archaeological applications of phytoliths in the Near East have been increasingly applied across a wide range of periods and settlement types. For instance, phytoliths have been used to study pre-agrarian shifts towards wild grass exploitation at late Natufian Levantine settlements (Rosen 2010), early agriculture and plant use at Neolithic sites such as Çatalhöyük (Rosen 2005; Ryan in press), and urban centers such as Bronze Age Tel Dor (Albert et al. 2008). Studies from cave sites including from Middle Paleolithic through to Natufian levels have revealed information about plants used for fuel (Albert & Weiner 2001) as well as about possible Neanderthal wild grass husk exploitation (Madella et al. 2002). Other studies have investigated wheat and barley phytoliths as indicators of crop-growing conditions. A pioneering study by Rosen and Weiner (1994) showed numbers of conjoined cells in cereal husk silica skeletons increased with irrigation. Madella et al. (2009) have shown the ratio of short cells and long cells from leaves, and stems can act as an indicator of water availability, while Jenkins et al. (2011) have outlined a further method using the ratio of short cells to dendritic long cells from cereal husks.

New World crop phytoliths, especially maize (*Zea mays*), have a long history of research. Large-scale modern reference studies led by Dolores Piperno and Deborah Pearsall since the late 1970s and centered around the lowland Neotropics have enabled size and morphological criteria to be developed to identify particular cross-shaped phytoliths from maize leaves and to distinguish these from wild grass populations (see references in Piperno 2009). Studies from the subtropical panicoid grasslands of southern South America have shown the criteria hold elsewhere (Iriarte 2003). Distinctive phytoliths within maize cobs were recognized from the mid-1980s in studies by Susan Mulholland and Steven Bozarth in North America (for references see Piperno (2009)). Large-scale reference studies of cob and fruit-case phytoliths have been carried out; maize and its wild ancestor Balsas teosinte (*Zea parviglumis*) can be distinguished, with wavy top rondels diagnostic of maize cobs and ruffle top rondels identifiable at the *Zea* genus level (Pearsall et al. 2003; Piperno 2009). Other well-studied New World crop phytoliths include distinctive scalloped phytoliths from the fruit rind of the *Cucurbita* genus, first recognized by Steven Bozarth in the 1980s, which have been used to study the history of domestic squashes and gourds and sometimes to distinguish between wild and domesticated species (Piperno 2009). Archaeological applications have included investigations of sediments from prehistoric settlement sites and agricultural terraces, as well as of residues from grinding stones and other food-related artifacts including pottery (Piperno 2006, 2009).

The potential of rice phytoliths to investigate the origins of Asian rice agriculture is also well established. Large reference studies of rice and related wild grasses from southern China have been undertaken and phytolith identification criteria established (Pearsall et al. 1995; Zhao et al. 1998). The *Oryza* genera can be identified from double-peaked hair cells (from husks), and further characteristics have been suggested to differ between wild and domestic species, although these remain controversial (Fuller et al. 2010). Other cell types identifiable to the rice genus are keystone bulliforms with flared edges. These show differences between *indica* and *japonica* subspecies of rice, although this variation is also found in wild populations, making application of this useful in regions like Japan without wild rice (Zheng et al. 2003).

Millet phytoliths have seen comparatively less focus. Foxtail and common millet were staple foods across the Far East and also important across Eurasia. Modern phytolith reference studies have defined identification criteria for common millet (*Panicum miliaceum*) and foxtail millet (*Setaria italica*) based on several characteristics of husk silica skeletons including the undulated patterns of epidermal long cells (Lu et al. 2009). Similar criteria have also been developed to distinguish foxtail millet, the predominant Neolithic crop in northern China, from its wild ancestor green foxtail (*Setaria viridis*)

(Zhang et al. 2011). The potential of phytoliths for identifying several other millet species is demonstrated by Madella et al. (2013). Harvey and Fuller (2005) investigated how crop-processing models can inform analysis of millet and rice phytoliths and applied their model to a Neolithic site in India.

There have been comparatively few phytolith studies of African crops and archaeological settlements. A recent study has examined inflorescence phytoliths from wild and domesticated West African grasses and applied this to the analysis of phytoliths from archaeological grinding stones in the Eastern Sahara and Western Sahel savannah (Radomski & Neumann 2011). Findings included that certain cross and bilobe phytoliths could be used to group some grasses within the Paniceae tribe, that *Digitaria* (which includes the crop fonio) was distinguishable due to papillae density, while sorghum husks had distinctive bilobes and dendritic long cells. Many Panicoideae grass genera are known, such as *Panicum* and *Sorghum*, to potentially produce husk silica skeletons (Fig. 9), and further identifications of African millet grasses may be possible with multicell identification methods analogous to those applied to common and foxtail millet (above). However, the applicability of this method will depend on the presence of silica skeletons in archaeological samples as opposed to predominantly single cells, which may vary in likelihood among genera and be influenced by plant-growing conditions such as water availability in very dry environments (as well as post-taphonomic factors). Madella et al. (2013) show the potential of husk long cell phytoliths (in single and multicell form) for identifying millet species, including *Sorghum bicolor* and *Pennisetum glaucum* (pearl millet). Phytoliths of bananas (*Musa* sp.) have been shown to differ from those of indigenous African *Ensete* (Vrydaghs et al. 2003). Archaeological applications of phytolith analysis in Africa span vastly contrasting landscapes, time frames, and settlement types, including early modern human plant exploitation from cave sites (Albert & Marean 2012), equatorial forest sites during the Late Stone Age (Mercader et al. 2000) to Late Holocene settlements such as a Numidian site in Tunisia (Portillo & Albert 2011), and the New Kingdom colonial town of Amara West in northern Sudan (Ryan et al. 2012).

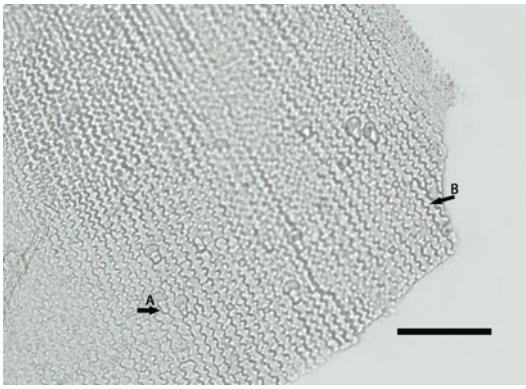

Phytolith Studies in Archaeology, Fig. 9 Silica skeleton from *Sorghum bicolor* husk (sorghum), including sorghum-type bilobe (*A*) and dendritic-type phytoliths (*B*); scale bar, 100 μm (Image: PL Ryan; copyright Trustees of the British Museum)

For studies from other areas of the world, including Australia, New Zealand, and Central Asia, see references in the further reading section (below).

Patterns of Plant Use, Processing, and Disposal at Archaeological Sites

Phytolith categories found on archaeological sites can provide important information about agricultural practices, habitats exploited, wild plant foods, and non-dietary plant uses. Phytoliths from woody species, palms, grasses, and sedges may provide important information about plants burnt for fuel, while the presence of sedges and reed phytoliths provides information about wetland exploitation. Phytoliths can potentially be used to study spatial arrangements of plant use and discard across archaeological settlements. Locations of plant use may be suggested through quantified "peaks" of certain phytoliths across surfaces or features studied. It is often possible to identify phytoliths from different plant parts, enabling investigation of crop-processing practices (Harvey and Fuller 2005), as well as the use of leaves and stems in basketry, building materials, and fuel. Distributions of cereal husk or straw phytoliths can be studied

to investigate spatial arrangements of cereal storage, processing (such as dehusking), crop by-product disposal, as well as the secondary use of crop-processing by-products.

Different input sources can be explored by investigating a wide range of archaeological contexts and materials. Analysis of varied sample categories at Neolithic Çatalhöyük in Central Anatolia (including storage bins, ovens, fire spots, floors, mudbricks, basketry, and dung pellets) enabled detection of spatial patterns of plant use, processing, and disposal (Rosen 2005, Ryan in press). Large quantities of plant materials were incorporated into raw materials such as mudbricks, including cereal chaff and wetland plants (Ryan 2011). Samples from storage bins provided information about storage, and locations of cereal dehusking were identified within buildings. Phytoliths from bulk sample analyses (from middens) spanning over 1,000 years of site occupation enabled detection of long-term changes in plants present (Ryan in press), while phytolith samples from micro-lenses from particular midden sequences provided perspectives on discrete episodes of plant deposition (Shillito 2011; Ryan in press). Animal dung can be an important route for phytoliths into archaeological contexts, for instance, through stabling or the use of dung as fuel, and analysis of calcareous spherulites can be analyzed as a proxy for herbivore dung (Portillo & Albert 2011). At sites where dung pellets are present, phytoliths can be extracted from dissected pellets and may provide perspectives on foddering or grazing practices.

Regionally relevant ethnographic and ethnobotanical studies can provide useful analogies about certain plant uses, such as for food or fuel, and about their processing and disposal. Harvey and Fuller (2005) showed how crop-processing models (derived from ethnographic studies of traditional farming) could be applied to the analysis of millet and rice phytoliths, in terms of interpreting which phytoliths derive from by-products produced by specific processing stages, and this approach is also applicable to other cereals. Prior to storage, crop-processing stages include threshing, winnowing, and sieving. Some cereals, such as glume wheat, require an extra processing stage (potentially post storage) to remove husks. Different by-products created during each stage may potentially be collected for use as fuel or fodder or may become incorporated into other materials such as temper in dung cakes or in building materials. There have been a small number of ethnoarchaeological phytolith studies, such as Tsartsidou et al. (2008), which involve taking samples from present-day or recently abandoned settlements to investigate phytolith signatures from different types of site area or deposits.

Integrating Botanical Datasets

Charred macro-remains and phytoliths can provide unique and complementary data through offering information about different plant parts and by surviving through different taphonomic processes (Harvey & Fuller 2005, Ryan et al. 2012). Charred macro-remains can identify a wider range of taxa than phytoliths; however, phytoliths will provide information about plant parts that do not frequently survive charring, such as leaves and stems, and about plants present in ashy contexts where charred macros are entirely destroyed by high temperatures. Phytoliths may also provide separate categories of information about plant use in non-burnt site areas or materials. Studies have also combined starch and phytolith results, especially in the case of samples taken from artifacts or dental calculus and also particularly in studies from the Americas (Henry & Piperno 2008; Piperno 2009). Starch will provide information about non-phytolith-producing plant parts, including cereal grains and tubers.

International Perspectives

Phytolith research is a worldwide discipline,with two major international conferences. The International Meeting on Phytolith Research (IMPR) is convened by the Society for Phytolith Research. The South American Meeting on Phytolith Research (Encuentros de Investigaciones Fitolíticas (EIF)) is convened by the Grupo de Estudios Fitolíticos Aplicados del Cono Sur GEFACS.

Research trajectories can often be regional, especially when investigating early agriculture. However, many crops have wide geographic distributions in later time periods and are increasingly studied across different continents within phytolith research. Many non-dietary phytolith-producing plants also have wide geographic distributions (such as reeds) and thus relevance to researchers, especially when considering identifications at genus or plant family level. Discussions of approaches to studying phytoliths from certain types of archaeological sites can also have cross-regional relevance, while other research questions pertain to regionally specific cultural or environmental settings.

Future Directions

Certain regions and time periods are less well studied than others, with areas of major crop domestications having the most extensive history of research. There are a number of phytolith-producing crops that have so far seen little/emerging research, such as African cucurbits and various African, southern Indian, and south-east Asian millet grasses (Piperno 2006: 79). Ethnoarchaeological phytolith research projects in contemporary or abandoned settlements offer another new area of emerging research as so far there have only been a handful of research projects using this approach. Future directions could also include further integration between phytolith, charred seed, and charcoal datasets at archaeological sites to provide complimentary datasets from both the same sediment samples as well as comparing overall results. Comparing starch and phytolith results, especially from artifact residues, is a well-established technique in some regions such as the Neotropics (Piperno 2009) and less frequently applied in other areas such as the Near East.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Maize: Origins and Development
- ▶ Millets: Origins and Development
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Paleoethnobotany
- ▶ Phytoliths in Islamic Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Rice: Origins and Development

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Phytoliths in Islamic Archaeology

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Introduction

The study of Islamic rural history and archaeology is a fast-growing focus for archaeological science. Despite efforts by many researchers to

incorporate environmental studies, such as archaeobotanical analysis, into their methodological framework, these studies are limited and non-systematic. Information regarding local economic decisions, independent from state control, which represent the local resilience of medieval subsistence farmers, is missing. It is therefore important to develop a better understanding of shifts in agricultural investment and intensification of production, and the life of subsistence farmers in relation to environmental, political, and economic change during the early, middle, and late Islamic periods.

Definition

Sediment analysis for phytolith extraction can be used to inform the issue of agricultural systems during the Islamic periods and to reveal risk-minimization strategies adopted by medieval peasants as mitigating factors against political and environmental turmoil. The adaptive decisions of peasants can be investigated using micro-botanical data deriving from different environmental regions and multi-temporal Islamic archaeological sites. It is important that data for the purposes of this analysis be derived from different environmental zones. Without downplaying the political economic forces that shaped the social and ecological history of the Islamic periods, the role of regional agricultural and pastoral production for state profit and for local subsistence can be assessed with the use of phytolith data. Such research considers regional agricultural practices adopted during and after the agricultural revolution of the early Islamic period (Watson 1983) and aims to investigate what happened in the periods following these important changes to the Islamic agrosystem.

Key Issues

Phytoliths are particles of amorphous silica that are formed with the absorption of ground water by the plants when living. Silica (opal) is deposited in the cells of plant epidermal tissue, and the shapes of these cells define the phytoliths' morphology. For the purposes of archaeological analysis and interpretation, the recovery and identification of two major types of phytoliths is necessary: single-cell and multi-cell phytoliths. Single-cells are individual cells formed within the plant, and multi-cell phytoliths are conjoined single-cells that form silica skeletons of adjacent cells of the epidermal tissue of grasses (Rosen & Weiner 1994). In order to assess the issue of agricultural production during the Islamic period, the identification of particular phytolith morphotypes is used for interpretation. First, plant families and subfamilies are identified using single- and multi-cells, with the identification down to genus of major economic plants using multi-cell phytoliths. Second, the identification of different plant parts is used in order to identify by-products associated with different crop-processing stages following the conclusions of ethnographic work conducted by Hillman on macro-botanical remains (Hillman 1984) and the study of Harvey and Fuller (2005) on the identification of crop-processing stages through macro- and micro-botanical remains. Phytoliths can in this way offer information on agricultural activities and processing by-products and allow the exploration of agricultural and pastoral pursuits.

Phytoliths' direct deposition in sediments makes them excellent proxy data for archaeobotanical analysis. As inorganic matter, their persistence against destruction in different environments such as temperate, cool climates, and arid and semiarid conditions increases the possibility of their preservation when other archaeobotanical and paleoecological evidence may decay unless charred (Rosen 1999; Piperno 2006). However, not all plants produce diagnostic phytoliths. Many families and species share morphological characteristics making their identification through the phytolith record difficult or impossible. For the purposes of archaeological analysis and interpretation, emphasis has been given to the study of the identification of major economic plants and crops such as maize (Piperno & Flannery 2001) and

others useful for the purposes of the study of the Islamic periods: Poaceae family cereals, some wild cereals and dates (Rosen 1992, 1999; Rosen & Weiner 1994), rice (Pearsall et al. 1995; Harvey & Fuller 2005), millets (Harvey & Fuller 2005), Cucurbitaceae family plants (Piperno et al. 2000), and a number of Cyperaceae family plants (Ollendorf 1992). Dicotyledonous plants (woody trees and shrubs) offer limited identification potential (Bozaarth 1992), while phytoliths in fruits and pulses likewise present limited possibilities for identification.

Current Debates

Phytolith data from selected Islamic archaeological sites can produce a better understanding of the historical ecology and agricultural practices adopted during the Islamic periods. More specifically, micro-botanical analysis can assess the intensity in habitation and land use through identification of agricultural and pastoral pursuits or intensification of agriculture through irrigation signals and diversification (Rosen & Weiner 1994). Experimental work done on phytoliths of Emmer wheat has explored the possibility of using phytoliths as evidence of past irrigation systems. Counts of more than 10 and 100 conjoined single-cells were formed in irrigated planted cereals (Rosen & Weiner 1994). Since then, further work has been done to explore further planting and growing conditions of cereals and the effect of irrigation and rain water on the formation of phytoliths (Mithen et al. 2008). Experimental studies supported the results of Rosen and Weiner, but yet posed questions of how soil chemistry, evapotranspiration rates, and sub-, optimal, and over-optimal irrigation affect phytolith formation in wheat and barley species and in different parts of the plant. Phytolith data can provide information for local practices, subsistence, identification of activity areas such as for crop processing, animal husbandry practices, and other cultural activities and aspects of the medieval economy (Rosen 1999; Piperno 2006). Once more data are produced from medieval Islamic sites in different regions, phytoliths may shed light on similarities and/or differences in subsistence, economy, settlement cycles, and microenvironments of sites from different geographic regions and environmental zones.

Phytolith data that derive from medieval Islamic centers and villages seek to test two hypotheses. First is to trace the continuity of the early Islamic agricultural revolution, or "Green Revolution," as defined by Watson (1983) regarding agricultural intensification through the production of major cash crops and other crops during the periods of study. This can be done through the identification of phases of agricultural intensification of production. Do we see the peak and decline of agricultural intensification after the period of the Green revolution? The idea of an Islamic agricultural revolution that happened with the beginning of the Islamic era was proposed by Watson. Watson claimed that the early Islamic world contributed to the global history of agriculture (700–1,100 CE). He suggested that the Middle East, North Africa, and Spain underwent an agricultural revolution. This period brought two major changes in agricultural and landscape history. One was the intensification of production through the spread and cultivation of new major cash and staple crops. Most of these crops came from East or South Asia, and they were not known in the Middle East and/or the Mediterranean. The example of sugarcane is crucial and has been central to historic and archaeological studies trying to trace its diffusion, production, and state or domestic use (Watson 1983). Like sugarcane, rice diffusion and intensive cultivation during the Islamic period is of great interest.

Intensification of production did not come only from intensified agriculture of cash crops, such as sugar, cotton, and rice, but also with the rise in varieties of crops and diversification of production. Watson (1983) lists 18 crops, which he claims were incorporated into the economy and diet of the Middle East and the Mediterranean due to Islam, although most of the crops existed before the period of the Green Revolution. The new crops were diffused from tropical

climates of the East and incorporated into the production economy of the Middle East. A second change resulting from the Islamic agricultural revolution was the shift to double cropping and the introduction of highly irrigated summer crops. Of course, the increased need for water by these new crops led to extensive investment and reuse of existing irrigation systems. Watson claimed that crops were diffused from India and Southeast Asia, through a huge connection network relating to maritime trade, along with the "manuals" and knowledge for their cultivation. In addition, emphasis was given to the expansion of free-threshing durum wheat and drought-resistant sorghum that changed the production and diet of the medieval period. However, Watson based his thesis on textual evidence and theories of diffusion, and although his conclusions are impressive and rational, his thesis should be supported through archaeobotanical evidence along with the study of medieval texts and has thus been reevaluated (Butzer 1985).

Secondly, phytolith data can be used to suggest the resilience of subsistence farming by local people during the Islamic periods, during and after the period of the Islamic agricultural revolution using samples from different sites in different geographical regions. This method offers the opportunity to compare pastoral and peasant land use and subsistence among the areas under study. Thus, phytolith data can offer a different insight into adaptations to different environmental zones during periods of climatic and political turmoil during the Islamic periods and a new insight into the resilience strategies of medieval farmers in different regions of Jordan at that time. Identification of single-cell phytoliths that represent subfamilies of the Poaceae family, Pooideae, Chloridoideae, and Panicoideae (Twiss 1992) and plants of the Cyperaceae family, can be used for the description of sites' microenvironments and to show whether local environmental conditions favored crop production. In general, C3 plants are indicative of more moderate climatic conditions and produce rondel-shaped short cells. Panicoid grasses generally grow in warm and humid environments and produce bilobes and cross-shaped phytoliths. Chloridoideae, which indicate dry land grasses and warm and dry habitats, create saddle-shaped short cells (Twiss 1992; Piperno 2006). Looking at phytolith densities of C3 versus C4 grasses present on sites during the Islamic periods could shed light on this direction of research.

Also, phytolith data from Islamic sites aim to identify two major economic plants, wheat and barley, given that identification is possible using specific morphological criteria of multi-cell phytoliths (Rosen 1992). As they are main staples, and in the case of wheat, cash crops of the period of study, their identification is crucial for describing the continuity of agricultural production. They can be identified securely as they have been well studied by phytolith scientists (see Rosen 1992) and can contribute to the identification of these major economic plants of the medieval period and trace irrigation signals. Husk and stem phytoliths can be counted and used as indicators of the by-products of crop-processing stages in order to explore whether the sites under study produced their own crops or imported grains or other crops (Hillman 1984; Harvey & Fuller 2005).

In addition, phytolith and macro-botanical data acquired from multi-temporal medieval sites of different environmental zones, from a variety of contexts with an expected high yield of phytoliths (Rosen 1999), can shed light on the subsistence economy characterizing different regions. Information about the main agricultural crops produced in the sites under study in different regions during the Islamic periods can be provided, in addition to whether crop selection changed through time.

The Social Significance of Phytoliths for Islamic Archaeology and the Importance of an Interdisciplinary Approach to Rural Islamic History and Archaeology

The state-controlled agricultural economy and the subsistence economy of a site can be reflected in the phytolith record based on the sampling strategy adopted. Samples may derive from both state-controlled buildings and subsistence farmers' buildings. Thus, phytolith data can be

used as indicators for state-controlled access to irrigated crops, as well as for a more opportunistic agriculture adopted by subsistence farmers. An example of such a site is Tell Hisban, Jordan, where the villagers' farmhouses and animal pen, as well as the fourteenth-century governor's storeroom and sixteenth-century governor's house courtyard, were sampled for phytoliths. At Tell Hisban, both domestic and administrative-related buildings have been excavated and sampled for phytolith analysis, shedding light on the political ecology of the period of study, but such contexts are not always available. Thus information from medieval texts becomes invaluable.

Walker (2011) investigates and explains parameters of medieval society in Jordan that emphasize the regionally distinct character of its districts and the selective investment and decisions of the Mamluk state. She suggests that local histories should be reconstructed in order to understand the forces that shaped the socioeconomic transformation that took place between the fourteenth and sixteenth centuries. First, she addresses the issue of Jordanian tribes as a political force. The Mamluk state aimed for strong ties with and allies within the local tribes, and this was ensured with sultanic visits and assimilation, tactics that were not always successful in controlling local rebellions and complaints especially during periods of environmental and economic stress. Local tribal history constitutes one aspect of regional histories affecting the relationship of the state with its provinces and by extension Mamluk investment in the peripheral state of Jordan. The different political, cultural, and environmental regions of Jordan, where the Jordanian people/tribes resided, are described according to their urban character through information from Mamluk *waqfiyyat*, court documents (*shari'ah*), and sixteenth-century tax registers along with their agricultural and pastoral potential and production. The rural character of the country is dominant in the description of these texts, and the concept of a city is absent for Mamluk and Ottoman South Syria, apart from the castle-towns. However, Walker presents archaeological work and the results of surveys that have been employed in order to understand the nature and extent of the "villages" of Mamluk and Ottoman Jordan mentioned in *waqfiyyat*. Most importantly, the archaeological work she supports will help to reconstruct the everyday life of commoners, in addition to information from medieval court documents, something that is missing from the contemporary administrative, economic, and legal sources. The focus of political economic history is now shifting towards the investigation of local environmental parameters, such as the quality of agricultural land, soil properties, local rainfall variations, and local land-use changes as found in the archaeological record. Syrian chronicles and Ottoman registers are also used in order to reconstruct peasants' lives, agricultural history, and how the rural history of the middle and late Islamic periods in Jordan can shed light on the issue of demographic decline by the end of the Mamluk Era. Walker's work takes an interdisciplinary approach to this phenomenon of "decline" that emphasizes the regional character of Jordanian society as shaped by its political, ecological, and economic environment. The analysis of phytolith data is another strand that can and should be added to this multidisciplinary research.

Future Directions

It is necessary to incorporate the study of phytoliths into research that uses archaeobotanical analysis for identifying the everyday life practices of peasants. Walker (2011) offers an interesting approach, which combines archaeological work conducted on the major cities and villages accounted in registers and waqfiyyat of the Mamluk period, as well as in Ottoman tax registers of the early sixteenth century, in order to investigate the regional implications of administrative control over local production.

In sum, phytoliths can provide an innovative contribution to the study of Islamic rural history and archaeology. Future research will shed light on the investigation of local agricultural regimes

as key factors transforming regional social, demographic, and ecological history with the use of multiple lines of evidence alongside phytolith analysis and interpretation, such as archaeological, environmental proxy data, as well as documentary data such studies are under way (Cordova 2005; Lucke 2012). A systemic analysis of all these sources can inform land-use change and environmental and climatic histories of the medieval Islamic periods.

Cross-References

► Paleoethnobotany
► Plant Processing Technologies in Archaeology

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Basic Biographical Information

Barbara Pickersgill is a British horticultural botanist and geneticist. She was born (13 May 1940) and raised in Yorkshire, England, and obtained her B.Sc. degree in Horticultural Botany from the

University of Reading in 1962. Immediately thereafter she pursued her Ph.D. in Botany at Indiana University, Bloomington, under the supervision of Charles B. Heiser, Jr., with a thesis entitled *The Variability and Relationships of Capsicum chinense* Jacq. that she defended in 1966. Upon her return to England, she was appointed Lecturer in the Department of Agricultural Botany at the University of Reading, UK. She retired in 2005.

Barbara Pickersgill's work with *Capsicum chinense* stimulated a lifelong interest in determining the origins and dispersals of Neotropical crops, later expanded to the rest of the world with her numerous students. Her interests in the use and conservation of crop genetic resources also involved her with the International Board for Plant Genetic Resources, now Bioversity International. She participated in expert consultations, funded by the Board, to plan and execute *Capsicum* collection, characterization, evaluation, and use strategies for collections held at both the Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba, Costa Rica, and the Centro Nacional de Recursos Genéticos, Brasília, Brazil.

Soon after returning to Reading, she was invited to act as botanist for the Ayacucho Archaeological-Botanical Project, Peru (1969–1971), and later for the Cuello Early Maya Archaeological Project, Orange Walk Town, Belize (1979). These activities introduced her to many of the Neotropical archaeologists working with crop origins and dispersals and involved her in numerous symposia over the next decades.

While based at the University of Reading, Barbara Pickersgill was appointed by the Royal Society to be a Visiting Professor at the Departments of Agriculture and Biology of the University of Papua New Guinea, Port Moresby, in 1978. She was also invited to offer undergraduate or postgraduate courses in Italy, Spain, the Netherlands, and Cuba. She also acted as external examiner for Ph.D. theses at 8 British and one Irish universities.

In 1993, Barbara Pickersgill was awarded the Linnean Gold Medal for Botany, became a Fellow of the Linnean Society of London, and was elected a Fellow of the Institute of Biology. She was later elected President of the Society for Economic Botany (2000–2001).

Major Accomplishments

Barbara Pickersgill's early work with the cytogenetic and morphological variation in *Capsicum* complemented work by Charles B. Heiser, Jr., her doctoral supervisor, and W. Hardy Eshbaugh, another Heiser student, and was instrumental in delimiting species and species complexes within the genus, as cytogenetics is a much more precise technique for species analysis than is morphology, especially in such morphologically variable domesticates as *C. annuum* and *C. chinense*. Heiser and his group confirmed that Native Americans domesticated five *Capsicum* species and distributed three of them widely. The three widely distributed species, *Capsicum annuum*, *C. chinense*, and *C. frutescens*, form a complex, because their probable wild ancestor is also widely distributed. The group confirmed that *C. annuum* originated in Mexico and was distributed southwards, while *C. chinense* originated in Amazonia and was distributed northwards; *C. frutescens* is less well understood, although its distribution is nearly as wide. *Capsicum baccatum* originated in the low-level Andes of Bolivia and Peru and was distributed only as far as Colombia, while *C. pubescens* originated in the higher Andes. These studies were immediately relevant to archaeologists, since they may allow species-level identification by the combination of seed, fruit, and fruitstalk morphology and known distributions and provide criteria for distinguishing domesticated from wild peppers (Pickersgill 1969a & b).

During the 1960s and 1970s, the taxonomy of cultivated plants was often confused, because taxonomy was based primarily on morphology. With the inclusion of cytogenetics, the taxonomy of crops could be clarified (Pickersgill 1977), allowing curators of collections of genetic resources and archaeologists to work with better information. Since then, molecular genetic

techniques have become powerful tools in taxonomy and domestication studies (Pickersgill 2007).

With her students, Barbara Pickersgill has delved into the origin and dispersal of the common bean (Chacón et al. 2005, 2007), peanut, and the domestication process in Mexican cacti (Casas et al. 1997), as well as into Paleotropical crops, such as winged bean and bananas. This wide range of studies has given her a privileged view of crop domestication, which has resulted in recent reviews of Neotropical crops (Pickersgill 2007) and of the domestication process itself (Pickersgill 2009). During her career, she published more than 60 papers and book chapters, many of which are widely cited by archaeologists, as well as plant breeders and curators of crop genetic resources.

Cross-References

► Andes: Origins and Development of Agriculture
► Capsicums/Chiles: Origins and Development

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Pig: Domestication

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Basic Species Information

Pigs belong to the genus *Sus*, the family Suidae, and the order Artiodactyla, which are even-toed ungulates (hoofed mammals). Unlike other domestic ungulates such as sheep, goats, cattle, and llamas, pigs are opportunistic omnivores that feed primarily by rooting and scavenging. Wild pigs easily adapt to new environments and inhabit a wide variety of habitats and ecosystems (Groves & Grubb 1993).

Other common names for pig include *swine* and *hog*:
Boar: male pig
Sow: female pig
Piglet: baby pigs

The common domestic pig is a domesticated form of the Eurasian wild boar (*Sus scrofa* sp. Linnaeus, 1758). *Sus scrofa* sp. is divided into four distinct groups (the Western, Indian, Eastern, and Indonesian/Sundaic races) and consists of up to 17 subspecies (Groves & Grubb 1993). *S. scrofa* is one of the most widespread and numerous mammals in Eurasia, and its natural geographic range covers most of the Eurasian continent stretching from West and Central Europe (including Scandinavia and the UK, where it has been reintroduced after extinction) and North Africa in the West to Eastern Siberia, Malaysia, and the Indonesian Islands in the East (Fig. 1) (Groves & Grubb 1993).

Feral or wild pigs are often found outside the native range of *S. scrofa* as a consequence of

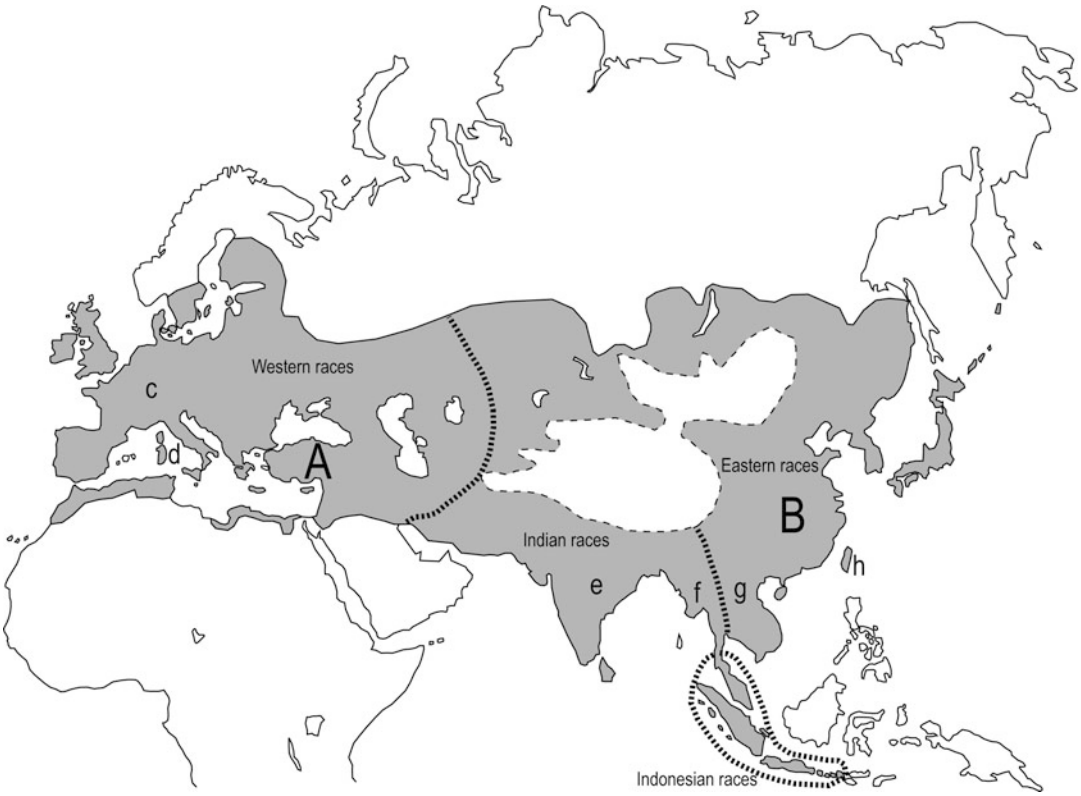

Pig: Domestication, Fig. 1 A simplified depiction of the native distribution of *S. scrofa* (*light gray*) across Eurasia (Redrawn from Groves & Grubb (1993) and Larson et al. (2011)). Uppercase letters depict the two major centers of independent pig domestication in Eastern Anatolia and East Asia (**A** and **B**, respectively). Lowercase letters (**c**–**h**) indicate putative domestication centers where it remains unclear to which degree domestication was independent (**c**: Europe, **d**: Italy, **e**: South Asia, **f**: Peninsular Southeast Asia, **g**: Southern Yunnan Province, Northern Vietnam, Northern Laos, **h**: Lanyu off the coast of Taiwan). Thick dashed lines highlight the four major groups of *S. scrofa* subspecies and their approximate geographic distribution. Thin dashed lines across Central Asia depict an area where *S. scrofa* is rare or absent

human agency (translocations of wild or domestic pigs). Large feral pig populations are particularly common in South and North America (where it is known as the *razorback*), Papua New Guinea, New Zealand, Australia, Sardinia, and Corsica (Albarella et al. 2009).

Domestic pigs display a large variety of morphological and behavioral traits compared to their wild predecessor. The most prominent characteristics include changes in the reproductive cycle, reduced brain size, floppy ears, shortening of the snout and tooth-row, general reduction in size (although both giant and dwarf variants occur), a large variety of coat colors, wavy and curly hair (see the curly coated pig breed Mangalitsa), and rolled or curly tails (Groves 1999; Albarella et al. 2009).

Morphological changes in teeth and long bones are good markers for identifying domestication in archaeozoological materials. Measurements of the M2 and M3 are particularly useful for telling apart wild and domestic pigs (Albarella et al. 2009).

The relationship between humans and pigs extends back more than 10,000 years (Larson et al. 2011). Many pig populations and especially prehistoric ones are difficult to define as either fully domesticated or completely wild. This is due to the fact that humans have managed and controlled morphologically and

behaviorally wild populations and kept domestic pigs under varying degrees of control since at least the Early Holocene (Albarella et al. 2009; Larson et al. 2011). Modern anthropological data from Papua New Guinea reveal that humans both manage and control both wild and domestic populations simultaneously. The morphological and biometric differences between these populations have been substantially reduced because people often breed their domestic pigs with wild boar (Redding & Rosenberg 1998).

Despite methodological difficulties, archaeological and genetic data clearly demonstrate that pig domestication occurred independently in at least two major geographic regions: West Eurasia and East Asia (Fig. 1) (Larson et al. 2005), though pigs may have been domesticated up to nine times across Eurasia during the Holocene (Fig. 1) (Larson et al. 2011). The extent to which these domestication processes were truly independent, and to which extent they represent wild-domestic hybridization, remains uncertain (Larson et al. 2011).

Pig domestication was integral to the Neolithic revolution. The earliest archaeozoological evidence of pig domestication in West Eurasia comes from several archaeological sites in the Near East and dates to approximately 10,000 BP (Fig. 1) (Larson et al. 2007). Archaeozoological and genetic data show that domestic pigs possessing genetic signatures previously endemic to the Near East were introduced to Europe at least 7,500 BP. Once introduced to Europe, local domestication or extensive introgression gradually replaced the genetic signature from the Near East with those of the local European wild boar. The introgression appears to have been widespread as domestic pigs possessing haplotypes endemic to Italy and the northern Adriatic coast appear in the archaeological record subsequent to the earliest introduction from the Near East (Larson et al. 2005; Larson et al. 2007).

In East Asia, archaeozoological and genetic data reveal complex patterns of local domestication. The earliest evidence of pig domestication comes from archaeological sites along the Yellow River (and to some extent the Yangtze River) in Central China dated to approximately 10,000–9,000 BP. Unlike the patterns of genetic turnover in Europe and the Near East, ancient and modern genetic data suggests long-term genetic continuity between early and modern domestic pigs (Larson et al. 2010; Larson et al. 2011).

The remaining putative domestication centers (Fig. 1) have been identified primarily through modern genetics (but also through the combination of geometric morphometrics and genetics). In many cases, modern genetic data reveal unique genetic signatures possessed by both local domestic pigs and local wild boar (Larson et al. 2010). These include several locations in Europe (see above), Peninsular Southeast Asia, and surrounding areas in southern China, Northern Vietnam and Northern Laos, South Asia (Indian subcontinent), and the Lanyu islet off the coast of Taiwan. Until ancient DNA becomes readily available from these locations, the demographic history of these populations remains hypothetical (Larson et al. 2011).

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- ▶ Darwin, Charles R.
- ▶ Genetics of Animal Domestication: Recent Advances

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Pigeon Pea: Origins and Development

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Basic Species Information

Pigeon pea (*Cajanus cajan* L. Millsp.), also known as *toor*, red gram, Congo pea, no-eye pea, *kadios*, and tropical green pea, is a legume grown in tropical and semitropical regions across the Old and New Worlds. While New World cultivation is relatively recent, pigeon pea is a traditional crop of South Asia and western and central Africa and an African diaspora in the Caribbean. It is grown as a food and/or fodder crop and has additional use as a green manure crop.

Pigeon pea can grow up to around 4 m in height. It is a drought-tolerant crop and can grow with less than 300 mm annual rainfall due to its long tap roots, although it prefers

600–1,000 mm. The ideal temperature range for pigeon pea is 18–30 °C; however it can resist temperatures over 35 °C. It is therefore a crop particularly suited to the drier tropics. It can be grown at altitudes of up to approximately 2,000 m, as long as the temperature is not too low. The plant takes between 6 and 11 months to reach maturity usually, but some newer varieties take only 3–4 months. Pigeon pea is rarely grown as a primary crop and is often cultivated alongside grain crops such as millet, sorghum, or rice (Kachroo & Arif 1970).

The crop can be harvested as either green pods, which can be used as fresh vegetables, or dry, just before the mature pods shatter. Rather than being fully non-dehiscent, domesticated forms have delayed dehiscence. Harvesting dry pods tends to be done with a sickle in large areas of both Asia and Africa. The plant is then left to dry further in the sun before threshing is carried out. It is then winnowed and the clean peas are collected (Fuller & Harvey 2006). This simple process means that the peas are less likely to appear in the archaeological record than crops which require extended processing sequences. Splitting the peas, however, may increase their chances of preservation as waste from milling (including fractured peas) may be burnt. Split pigeon peas are a popular pulse in India, used to make *toor dal*. Aside from its use as a food crop, the plant can be used as a host for lac-producing scale insects (Krishna 2010). Lac, a red resinous substance which can be used as a dye or as a varnish, is predominantly produced in South and South-east Asia.

Major Domestication Traits

Identification of pigeon pea seeds can be quite straightforward. The split peas often show a distinctive apostrophe-shaped shoot bud within the embryo (Fig. 1). Whole peas range in shape, from more rounded to fairly square, but all tend to be flat on the hilum end. The distinction between wild and domesticated peas is difficult. However, wild peas tend to be slightly smaller and flatter than the domestic species. In addition, wild species have a greatly increased appearance of a raised ring around the hilum (Fuller & Harvey 2006).

Timing and Tracking Domestication

Pigeon pea was domesticated from *C. cajanifolia*, populations of which occur across eastern

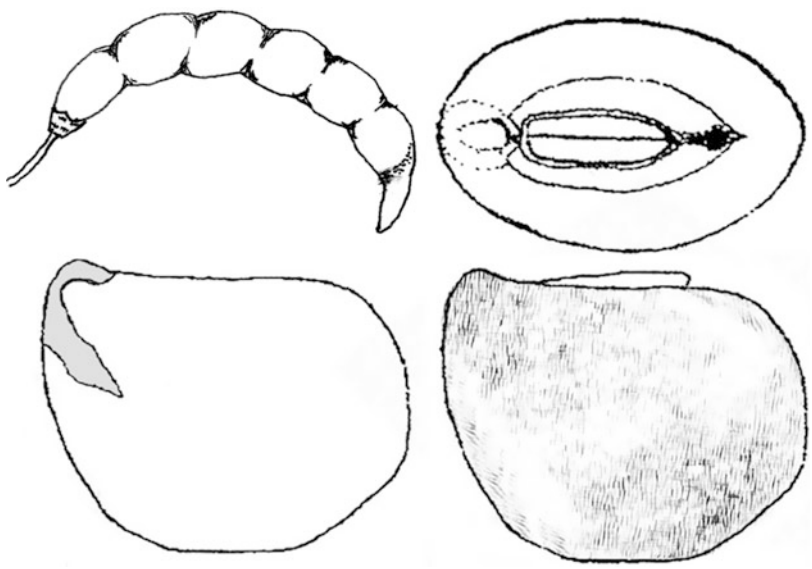

Pigeon Pea: Origins and Development, Fig. 1 *Line drawings* of pigeon pea pod and seed, clockwise from *top left*: pod; basal view showing hilum, including internal anatomy such as distinctive plumule; lateral view with protruding strophiole of hilum visible above; and cross section showing embryo plumule shaded

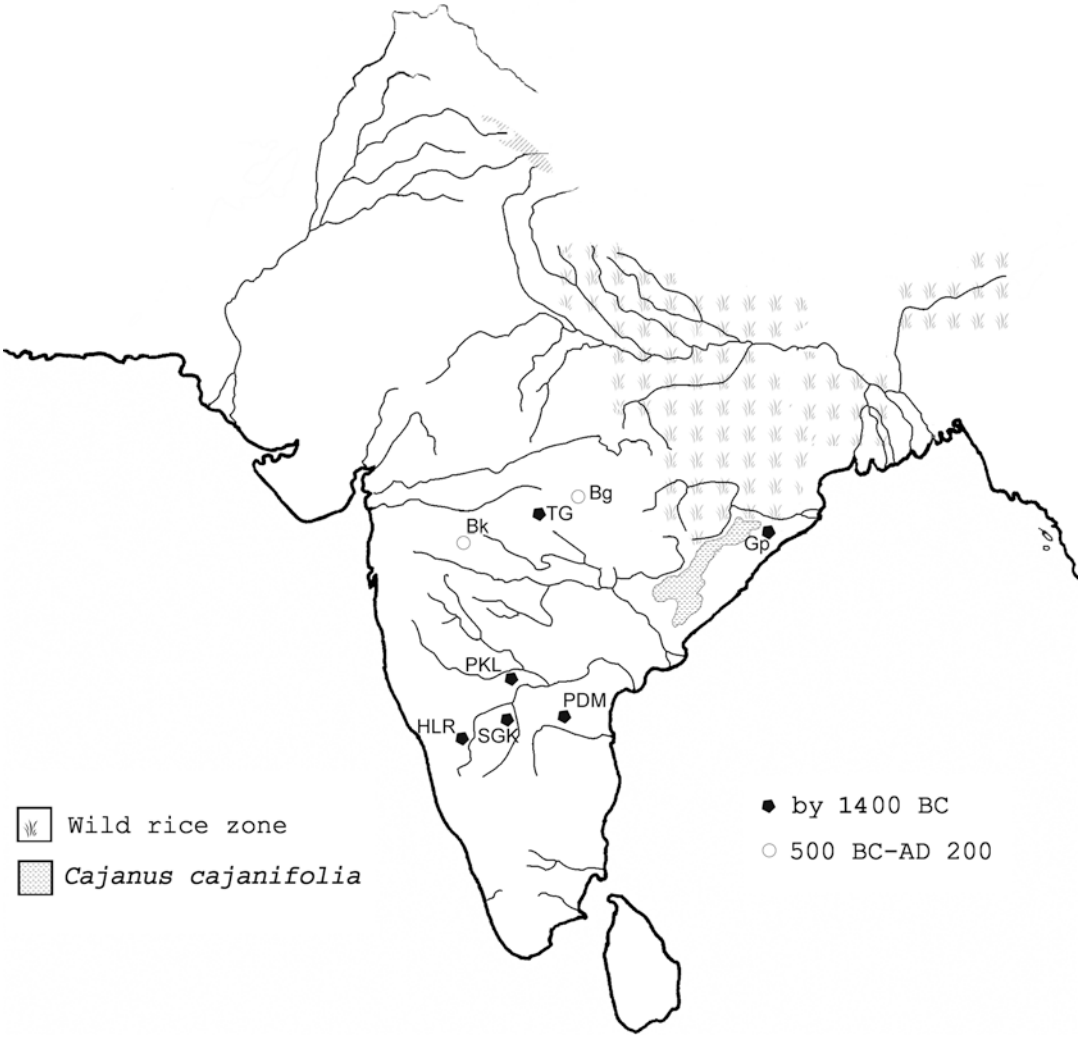

Pigeon Pea: Origins and Development, Fig. 2 Distribution map of wild *Cajanus cajnifolia* together with archaeobotanical finds of pigeon pea in India. The location of wild pigeon pea at the southern margins of the wild rice zone are indicated, as this may suggest domestication by early rice cultivators in eastern India. Site names abbreviated: *Bk* Bhokardan (Early Historic, 300 BCE–CE 300), *Bg* Bhagimohari (Iron Age, 1000–300 BCE), *Gp* Gopalpur (Late Neolithic, 1500–1200 BCE), *HLR* Hallur (Late Neolithic, 1500–1200 BCE), *PKL* Piklihal (Late Neolithic, 1500–1200 BCE), *PDM* Peddamudiyam (Late Neolithic, 1500–1200 BCE), *SGK* Sanganakallu (Late Neolithic, 1500–1200 BCE), *Tg* Tuljapur Garhi (Chalcolithic, 1500–1200 BCE)

Peninsular India (Fig. 2; see discussion in Fuller & Harvey 2006; Kassa et al. 2012). While reported finds of pigeon pea are few and far between in India, "*Cajanus* sp." peas have been identified at Tuljapur Garhi and Sanganakallu in the Deccan Plateau and date to 1500–1000 BCE (Fuller et al. 2004). These sites are situated in an area with no wild populations of *Cajanus*, suggesting that these finds derive from domesticated crop plants. Direct dates for *Cajanus* peas come from Gopalpur and Golbai Sasan, Orissa; the dates of 1400–1300 BCE are the earliest for pigeon pea and come from sedentary settlement sites with established agriculture (Harvey et al. 2006). The natural distribution of the wild progenitor of pigeon pea includes Orissa,

suggesting that the pea may have been domesticated there. Pigeon pea appears to be a relatively late domesticate in terms of global agricultural history, at around 1500 BCE. Recent archaeobotanical research in southern Thailand (see Castillo & Fuller 2010) indicates that like other pulses of Indian origin, this species arrived in mainland Southeast Asia, perhaps by sea trade links, before 2,000 years ago (C. Castillo, unpublished data).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Pigeons: Domestication

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Basic Species Information

Domesticated from the rock pigeon (*Columba livia*), the domestic pigeon is an Old World pigeon that, along with over 300 other pigeon and dove species, comprises the family Columbidae, in the order Columbiformes. Although fossil evidence suggests that rock pigeons evolved in Southern Asia, today the natural habitats of the wild rock pigeon are open and semi-open environments across Europe, North Africa, and Western Asia, with a preference for cliffs and rock ledges for breeding. Domestic pigeons, however, and their feral descendants have spread across all permanently inhabited regions of the world.

Pigeons exhibit variations in more traits than any other bird species (Price 2002). Although first domesticated as a source of food, the later spread of the chicken diminished their importance and thus most domestication traits present in modern birds were explicitly selected for exhibition, or to improve racing speed and homing ability. As a result, the different breeds show dramatic variations in craniofacial structures, color and pattern of plumage pigmentation, feather placement and structure, number and size of axial and appendicular skeletal elements, vocalizations, and flight behaviors (Figs. 1 and 2). This variation is so great that Charles Darwin, the father of modern evolutionary thought, noted that based on morphology alone, a taxonomist might be tempted to classify different breeds as completely

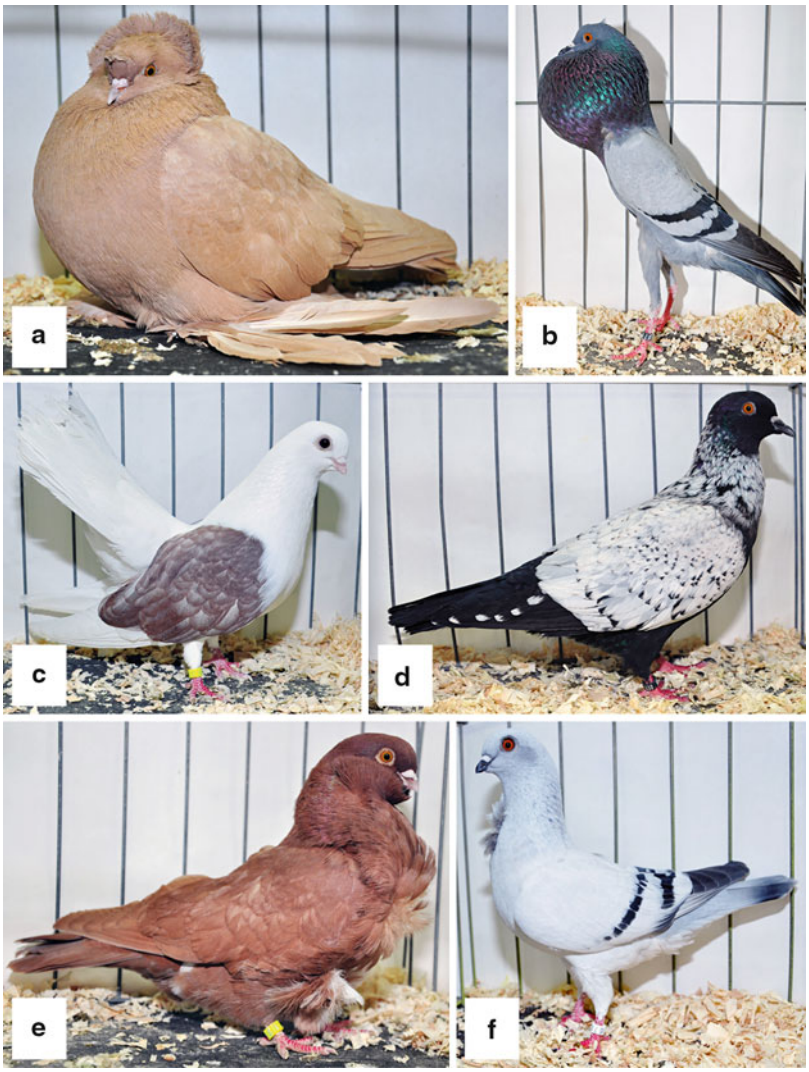

Pigeons: Domestication, Fig. 1 Variations in body shape, posture, and plumage color among domestic pigeon breeds. (**a**) English trumpeter. (**b**) Brunner pouter. (**c**) Taganrog tumbler. (**d**) Starling. (**e**) Chinese owl. (**f**) Italian Owl. (Also see Fig. 2c. Photo credit: M.D. Shapiro)

different genera (Darwin 1868). Despite their remarkable divergence, pigeon breeds are so obviously unified in their descent from a single ancestral species, that Darwin used them as a key example to illustrate his ground-breaking ideas about natural selection. In particular, he saw pigeons as a striking exemplar of how continual selection can lead to significant, and rapid, morphological and behavioral variations from a single ancestral type (Darwin 1859).

Although pigeons are among the earliest domestic birds and one of the earliest domestic animals (Hansell 1998), relatively little is known about their initial domestication. The rock pigeon today consists of many subspecies spread across Eurasia and North Africa, but exactly which subspecies was the ancestor of domestics, when, where, and how many times domestication occurred, and how domestics spread over the majority of their history are largely unknown. Most of the available information comes from written accounts rather than archaeological remains, probably due to both the problem of morphologically discriminating between wild rock pigeons and the earliest ferals and domestic strains, and their relatively fragile bones, which could bias against long-term survival in the archaeological record.

Pigeons: Domestication, Fig. 2 Variations in other traits among domestic pigeon breeds. (**a**, **b**) Extreme beak differences between the Scandaroon (**a**) and Old German owl (**b**) breeds. The Old German owl also has a crest of reversed feathers on the back of its head, a trait present in many domestic breeds but not in the ancestral rock pigeon. (**c**) Fantail breed with supernumerary and elevated tail feathers. (**d**) Cropper breed with a greatly enlarged and inflated crop, an outpocketing of the esophagus. (**e**, **f**) Variation in epidermal structures on the lower hind limb of domestic pigeon breeds. Feathers grow from the skin of the tarsus and foot of some breeds (**e**), while most breeds retain the ancestral trait of scales on the lower limb. (Photo credits: M.D. Shapiro (**a** and **c**-**f**) and S.A. Stringham (**b**))

Pigeons are first mentioned in Mesopotamian records over 5,000 years ago, and are documented in most subsequent developed cultures of the region (Johnson & Janiga 1995). The pigeon played a range of important roles in ancient cultures, including messenger, food, pet, religious icon, medicine, and navigation aid. We also know that, in some cultures, the scale of their domestication was immense – ancient Egyptians retained massive populations (as they did with other

domesticates such as cats and dogs), sacrificing as many as tens of thousands in single ceremonies. More recently, Akbar of India regularly traveled with a menagerie of thousands of pigeons. As with other domesticated animals (e.g., dogs and cats), interest in fancy breeds increased in the eighteenth century and continues today.

In contrast to the paucity of information about the earliest phase of their domestication, their relatively recent interest to breeders and hobbyists provides historical accounts that help trace the origins of modern breeds. Nevertheless, the diversification of domestic pigeons has received surprisingly little attention from a genetics perspective although recently Stringham et al. (2012) analyzed microsatellites from a broad sample of domestic breeds and found that while it was not possible to recover a well-resolved phylogeny describing the relationships among breeds, pigeons can be loosely subdivided into two ancestral clusters. Furthermore, while pigeons exhibit substantial genetic differentiation at the breed level, a phylogeny was difficult to resolve probably due to the reticular history of many breeds. As with other domesticates such as dogs and chickens, pigeon breeds were (and are) continually hybridized throughout their history in order to modify or add traits. Each of the two ancestral clusters encompasses remarkably different morphologies, with the first principally containing the pouters and croppers, fantails, and mane pigeons, and the second consisting predominantly of the tumblers (the most breed rich group) as well as the owl, wattle, and homing breeds (the latter containing the modern racing homer pigeon, which itself is a hybrid of several ancient breeds).

No discussion of domestic pigeons is complete without mentioning their feral descendants – feral pigeon populations are found in almost all human inhabited locations and, in terms of numbers, represent one of the world's most successful feral animals. In North Africa and Western Asia, feral populations are probably as old as domesticates themselves. The natural homing response of pigeons would have enabled domestics to be released to fly free during the day before returning to man-made lofts, thus providing plenty of opportunity for birds to go feral. The extent of this feralization has been so great, and the opportunities for hybridization between domestic and free-living populations so numerous, that truly wild rock pigeons might be on the verge of genotypic extinction. The chronic genetic contamination of wild populations greatly complicates attempts at resolving exactly when, and where, the original domestication processes occurred. In other regions, the feralization is likely contemporaneous with the introduction of the domestic breeds. For example, pigeons were introduced ~400 years ago in North America by European colonizers. In contrast to the tremendous morphological variations observed among pigeon breeds, the morphology of feral pigeons is remarkably homogenous, with close similarities to racing breeds. Genetic analyses of some feral populations support this association, with feral and racing pigeons being only minimally genetically differentiated (Stringham et al. 2012). This is not surprising given the widespread global interest in racing pigeons, often over long distances and with release from locations unfamiliar to the birds. Racing birds sometimes do not successfully return to their home lofts, and those that survive likely add to the feral pigeon population and gene pool.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Pigment Analysis in Archaeology

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Introduction

Pigments are a common decorative component found in many archaeological and cultural contexts from around the world. The term "pigment" can be applied to materials that are used to color. Pigment analysis provides data that are valuable in interpreting cultural heritage.

Definition

Pigment analysis has been applied to a variety of materials, including pigments, paints, dyes, and inks. The color properties can arise from either inorganic (mineral pigments) or organic (dyes) materials or, in some cases, a combination of both. Depending on the chemical composition of the pigment and its binder, a variety of destructive and nondestructive techniques can be used to analyze the pigment.

Key Issues/Current Debates/Future Directions/Examples

The analysis of pigment materials has provided an important venue for understanding the cultural heritage as well as the technical qualities of the material itself. Pigments are found in rock art, frescoes, fabric, ceramic slips, manuscripts, body decoration, and virtually the majority of cultural heritage material categories.

Pigment analysis allows insights into the material composition of pigments, which facilitates a more comprehensive understanding of pigment technologies and application processes. In addition, chemical analysis provides insights into the origins of the original source materials. The statistical analysis of samples from sources and objects can provide information on the cultural exchange of pigment materials. In both cases, the appropriate analytical method must be chosen in terms of both the limitations of the technology as well as the potentially destructive effects to the cultural material. For example, a mass spectrometry study of organic components would not be appropriate to analyze the inorganic compounds in pigments. In addition, the resulting data must be interpreted carefully for both cultural context and scientific value. This entry covers some methods most commonly encountered in the literature; however, there are many more analytical techniques utilized for pigment analysis and many authors apply a combination of techniques toward understanding specific cases.

In the most ancient contexts, pigments refer to inorganic minerals that are easy to mine and prepare artwork and cultural application. An example of this from the earliest human societies is ochre (Fe-oxide-based minerals) for rock art pictographs (Henshilwood et al. 2001). As a whole, ochre is used nearly universally by early cultures in a variety of applications from burial contexts to paintings. This continues into the present. Other ancient pigments included the uses of charcoal or soot for contrast in artwork using black lines and designs. Later Mediterranean and European cultures added to mineral palettes with the addition of pigments such as cinnabar (HgS) and white lead [$(PbCO_3)_2 \cdot Pb(OH)_2$].

During the Renaissance, pigments such as Naples yellow [$Pb(SbO_3)_2/Pb_3(Sb_3O_4)_2$] and ultramarine ($Na_{8\text{-}10}Al_6Si_6O_{24}S_{2\text{-}4}$) were introduced. In the Americas, Maya Blue (a mixture of indigo and palygorskite clay) was used extensively since about 800 CE. until the sixteenth century. With various technological advances since the early nineteenth century, new pigments based on cobalt and chromium were developed (such as cobalt blue [$CoAl_2O_4$] and chrome yellow [$PbCrO_4$]). Other organic-based pigments were also derived in the twentieth century, although these and other modern pigments since the nineteenth century are of interest to archaeology and conservation more so for detecting forgeries or for conservation of archaeological examples.

One of the historic challenges of pigment analysis is the destructive nature of sampling, whether it is physical or chemical. In many cases, the need for further data and information necessitates the destruction of a small amount of pigment sampled by a skilled conservator, and the data obtained outweighs the insignificant damage to the object. In other cases, sampling is not possible for a variety of reasons, and analysis is limited only to nondestructive techniques. In the majority of cases, if nondestructive techniques are available and provide the same quality or quantity of data, these methods are preferred, but they are not always applicable due to the complexity of the object. For techniques such as neutron activation analysis (NAA), or various forms of mass spectrometry (MS), a small sample in the order of milligrams is required. Other techniques such as Raman spectroscopy can be considered non-destructive provided the entire sample can fit into the instrumentation (for instance a microscope stage) and additional sampling is not necessary. Recent technology in spectroscopic techniques such as Raman and IR spectroscopy has allowed portable instrumentation with fiber-optic probes that can provide data on pigment composition without contact with the object. Many museums and archaeological expeditions also have been using handheld portable X-ray (PXRF) instrumentation that provides qualitative information on elemental composition of the pigments and substrate, depending on the thickness and composition of the pigment (Frahm & Doonan forthcoming). Quantitative analysis of pigments by portable instrumentation is often hindered by surface effects and nonuniform coverage of pigments, as well as the shape of the original object. Under controlled conditions, these effects can be minimized for quantitative analyses.

Raman spectroscopy has found significant advantages in pigment identification due to its nondestructive qualities, while also providing reproducible data with high sensitivity. Given the appropriate equipment, the analyses can also be performed in situ, which is a significant advantage in the museum or archaeological site context. L. Burgio and R.J.H. Clark have published significantly in this area, primarily on European works, but also on objects from stuccos, papyri pigments, and Asian manuscripts. The authors have also compiled a comprehensive database of spectra of FT-Raman spectra of interest to cultural heritage (Burgio & Clark 2001). Edwards and Jaan (2009) recently published on the applications of Raman spectroscopy to archaeological contexts, including several chapters that were concerned with pigment applications.

XRF (X-ray fluorescence spectroscopy) instrumentation has been used increasingly worldwide for the elemental identification of pigments. The majority of applications are of PXRF (portable X-ray fluorescence spectroscopy) through the use of a handheld instrument. Bonizzoni et al. (2008) recently completed a study to evaluate the advantages and limitations of investigating pigment layering using PXRF and UV-visible spectroscopy. This study determined that a combination of methods was effective for the identification of two layers, but in examples with more than one layer, qualitative data could be used on elemental identification. Another recent study investigated Hellenistic plasters by PXRF, among other methods (Aquilia et al. 2012).

While the majority of studies on pigments have investigated composition, some recent works have also studied pigments as indicators of cultural exchange in a similar manner to materials such as obsidian and ceramics. These studies

are based around the framework that trace compositions of the materials are indicators of the origins of the pigment materials. Duwe and Neff (2007) use laser ablation inductively coupled mass spectrometry (LA-ICP-MS) to investigate the recipes and exchange of paints on Pueblo ceramics from Arizona. This concept has also been applied to the provenance of ochre pigments in North America and Australia (Eiselt et al. 2011; Popelka-Filcoff et al. 2012).

In addition to the identification of pigment components, the identification of the pigment binder has also proven useful in archaeological studies. Binders often contain additional information on the pigment application technique as well as information on cultural trends. Separation techniques for the identification of binders include varying forms of gas chromatography as the most common technique (Casoli et al. 1996; Bocchini & Traldi 1998). As with other analytical studies, methodologies from other fields have been adapted for cultural heritage use as in the use of immune-detection of proteins in binders (Cartechini et al. 2010).

While the identification of pigments often reveals information on the pigment composition, other techniques can provide data on the age of the pigments. In the case of prehistoric pigments made of soot (carbon based), in some cases, the carbon in the pigment can be dated. Originally developed at Texas A&M University, this technique uses sub-milligram quantities of carbon to date rock art, for example (Armitage et al. 2001).

In addition to these relatively well-established methods, new methodologies from analytical chemistry are finding applications in pigment analysis. A recent example of methodologies adapted from nanotechnology is SERS (surface-enhanced Raman spectroscopy), where the technique realizes enhanced Raman signal through the application of molecules on the pigment surface. The application of SERS to organic dyes has several cultural applications (Casadio et al. 2011). Varying types of mass spectrometry have demonstrated use in pigment analysis: for example, the use of DART (Direct Analysis in Real Time) mass spectrometry for organic dye compounds (Selvius DeRoo & Armitage 2011).

Pigment analysis by a variety of methods provides data and cultural interpretations of materials from the inorganic, organic, and binder components of pigments from a variety of cultures and applications. While new technologies offer innovative ways to investigate pigments, care must be taken in the application of these methods and in the subsequent interpretation of data and cultural analysis in order to produce a meaningful archaeological science study.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry: Definition
- ▶ Dating Techniques in Archaeological Science
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Pikirayi, Innocent (Historical Archaeology)

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Basic Biographical Information

Professor Innocent Pikirayi was born in 1963 in Masvingo, Zimbabwe. He obtained a B.A. (honors) degree in history (1985) and an M.A. in African history (1987) from the University of Zimbabwe, where he was taught by archaeologists such as Peter Garlake and Robert Soper. He combined his interests in history and archaeology in further studies, receiving his Ph.D. in historical archaeology from the University of Uppsala where his dissertation was entitled *The Archaeological Identity of the Mutapa State: Towards an Historical Archaeology of Northern Zimbabwe* (Pikirayi 1994). Pikirayi began his teaching career in archaeology at the University of Zimbabwe in 1988, attaining the rank of senior lecturer in Archaeology in 2001. In 2004 he joined the staff of Midlands State University (Zimbabwe) as senior lecturer in archaeology and executive dean of the Faculty of Arts. In 2005 he relocated to South Africa to work at the University of Pretoria where, in May 2010, he became a full professor of archaeology and head of department of the Anthropology and Archaeology Department (Pikirayi *pers. comm.*).

Major Accomplishments

Pikirayi has made a substantive contribution to the archaeology of the southern African later Iron Age, especially to the archaeology of the Great Zimbabwe period (c. 1290–1450) and the post-Great Zimbabwe or Khami-era (c. 1450–1835). Theoretically, his interest has been in furthering understanding of how sociopolitical complexity originated, developed, and eventually declined at the site of Great Zimbabwe and its surrounds. Pikirayi has published

extensively on this both singly (Pikirayi 2001) and in tandem with other Zimbabwean scholars, including a prizewinning *Antiquity* article in 2008 (Chirikure & Pikirayi 2008). More recently, he has turned his attention to the Mapungubwe State and the factors that may have led to its demise. The regional and spatial contexts of both the Great Zimbabwe and Mapungubwe States are being studied as part of his participation in the larger "Urban Mind" project, led by scholars based at the University of Uppsala (Pikirayi *pers. comm.*).

Pikirayi has long been interested in exploring different aspects of public archaeology (Pikirayi 2006) and the relevance of archaeology and heritage in postcolonial Africa. His participation in the University of Pretoria Mapungubwe Committee, tasked with the repatriation and restitution of cultural and skeletal remains from the site of Mapungubwe, led him to further consider the role of public archaeology and the relevance of archaeological practice to descendant communities in South Africa and to publish his book *Tradition, Archaeological Heritage Protection and Communities in the Limpopo Province of South Africa* in 2011.

He has advanced the field of historical archaeology in the southern African subcontinent in his historical archaeological investigation of the Mutapa State (1450–1900). This work was important not only for yielding valuable data about the post-Great Zimababwe period but also for increasing academic understanding of African-European interactions, colonialism, and conflict. In particular, he used archaeological data to contest written Portuguese accounts of the political status quo in the Mutapa State (Pikirayi 2009).

Pikirayi is a specialist in the analysis of archaeological ceramics and has conducted ethno-archaeological research on pottery production, distribution, and use in Swaziland and eastern and northern South Africa and has written on the relationships between group identity and ceramics (Pikirayi 1999, 2007).

He has played an important role in furthering cultural heritage management in Zimbabwe serving as vice-president of the International Council on Monuments and Sites (ICOMOS), Zimbabwe, from 1997 to 2003 and as president from 2003 to 2004. During that time he headed up the ICOMOS-Zimbabwe evaluation mission for the nomination of the Matobo Hills to the World Heritage List (Pikirayi *pers. comm.*).

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- ▶ Colonial Encounters, Archaeology of
- ▶ Modern World: Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Southern Africa: Historical Archaeology
- ▶ Zimbabwe: Cultural Heritage Management

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Pikirayi, Innocent (Indigenous Archaeology)

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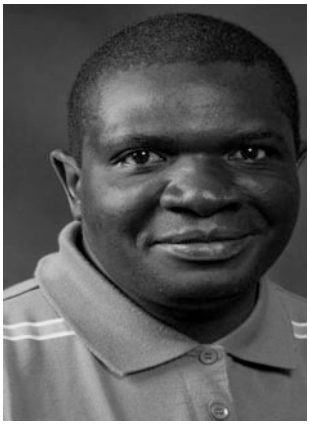

Pikirayi, Innocent (Indigenous Archaeology), Fig. 1 Innocent Pikirayi

Basic Biographical Information

Born in 1963, Innocent Pikirayi grew up in Zimuto, a district in Masvingo (formerly Victoria) Province of Zimbabwe (Fig. 1). His father was a carpenter in the Public Works Department in the then Rhodesia from which he resigned following the intensification of the liberation war in the late 1970s. His mother was a stay-at-home mum who engaged in subsistence farming and largely saw the children through to school. A practicing Catholic, Innocent Pikirayi is married to Susan Philistus Muzivi, and they have 2 daughters and a son. The fifth born in a family of seven, he attended local schools run by missionaries and later a multiracial school in the same province before heading for the University of Zimbabwe (UZ) for his undergraduate studies where he developed an interest in archaeology.

Innocent entered university in 1983, just after Zimbabwe's independence. Many archaeologists who had worked in Zimbabwe had left after the fall of a Rhodesian government that had declared unilateral independence from the United Kingdom in 1965. There was therefore an urgent need to train indigenous archaeologists who would "correct" the biased archaeology that had developed under a nationalist settler government. He is therefore one of the first indigenous Zimbabweans to receive training in Archaeology.

His encounter with archaeology was at 2nd year level at university (1984), where he had already enrolled as an honors student in history. Two people influenced his decision to take up archaeology: Professor Vella, a classicist from Malta, and Dr. Peter Garlake, whose presence at UZ in 1983 and 1984 is instrumental in his decision to take up archaeology as a career. The subsequent arrival of Robert Soper and Gilbert Pwiti at UZ, the introduction of archaeology as a degree, and the SIDA-SAREC-funded research project *Urban Origins in Eastern and Southern Africa* (coordinated by Uppsala University and the Swedish National Board of Antiquities) saw Innocent Pikirayi embarking on Ph.D. studies in 1988. His doctoral thesis was shaped by this project and resulted in a monograph on the historical archaeology Mutapa State (CE 1450–1900) in northern Zimbabwe. Paul Sinclair from Uppsala University was Innocent's supervisor and mentor for his Ph.D., which was completed in 1992. Since then, he has embarked on a program of research and publication, focusing on the origins, development and decline of state societies on the Zimbabwe plateau, the development of African ceramic traditions during the last 2000 years, as well as archaeology in contemporary politics and society.

Currently, Innocent Pikirayi holds the position of Chair in the Department of Anthropology and Professor in Archaeology at the University of

Pretoria, South Africa. In 2009, he was appointed Docent in Archaeology by the Department of Archaeology and Ancient History at Uppsala University. Previously he has worked as a Dean and Senior Lecturer in Archaeology in the Faculty of Arts at Midlands State University in Zimbabwe. He has also worked as Lecturer and Senior Lecturer at the University of Zimbabwe. In 2000 he was a Visiting Commonwealth Fellow and Scholar at the Pitt Rivers Museum, Oxford University.

He has mentored many of the second-generation indigenous archaeologists who have worked and continue to work for the National Museums and Monuments of Zimbabwe (NMMZ) and the two universities teaching archaeology in Zimbabwe, viz, the University of Zimbabwe and Midlands State University. He has worked closely with NMMZ in the development of management plans for Zimbabwe's World Heritage Sites and played a huge role in the organization of the ICOMOS 14th General Assembly and Scientific Symposium which was held in Victoria Falls in 2003. A jovial character who is always happy to assist peers and students, Professor Pikirayi is highly respected in archaeology circles in his native Zimbabwe, Africa, and the world.

Major Accomplishments

Professor Pikirayi's research interests are in the late farming communities of southern Africa. He has published widely and consistently on the Zimbabwe culture as well as on ceramic traditions of southern Africa for the past 25 years. Professor Pikirayi has written and edited books and articles on the rise, development, and decline of the Zimbabwe culture. His major scientific contribution however has been in ceramic studies, and his in that area has illuminated the prehistory of Zimbabwe and southern Africa. Currently, Professor Pikirayi is researching on archaeological and ethnographic ceramics in southern Africa, examining issues in the production, distribution, use, and relationships between ceramic remains and group identity. He has also developed an interest in public archaeology especially in understanding how indigenous communities can participate and engage with Archaeology as well as conservation of archaeological sites.

Innocent Pikirayi has contributed tremendously to the understanding of the second millennium in Zimbabwe and adjacent regions. His book, *The Zimbabwe Culture* (Pikirayi 2001) has become one of the most important texts for students studying later farming communities and complex societies of southern Africa. This book combined oral traditions, archaeology, and archival documents to produce a synthesis of the history of Zimbabwe and adjacent areas in the second millennium. The book analyzed new evidence on the origin, development, and decline of an extraordinary culture, the Zimbabwe culture (1050–1850). It also discusses the early Zimbabwe phase of Mapungubwe and shows how it contributed to the development the Great Zimbabwe and Khami phases. *The Zimbabwe Culture* discusses the later periods in which the latter states had contacts with the Portuguese as well as the colonial interface with the British and other European countries. One of his recent articles (in collaboration with one of his former student, Shadreck Chirikure) on the use of space at Great Zimbabwe was published by Antiquity in 2009 and was judged the best article for the year by the same journal (Chirikure & Pikirayi 2008). Professor Pikirayi has served as a reviewer and advisor for the National Research Foundation, South Africa, and is also an editorial board member for *Azania:* the *Journal of African Archaeological Research* and the *African Archaeological Review*. He was also editorial advisor for the *Encyclopedia of Precolonial Africa: Archaeology, History, Language, Cultures, and Environments* published by Altamira Press in 1997 and reviewer of the UNESCO General History of Africa volumes which were published in 2010.

Cross-References

▶ Pikirayi, Innocent (Historical Archaeology)
▶ Zimbabwe: Cultural Heritage Management
▶ Zimbabwe's World Heritage Sites

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Pinnacle Point: Excavation and Survey Methods

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Introduction

The transdisciplinary project centered on Pinnacle Point (the South African Coast Paleoclimate, Paleoenvironment, Paleoecology, and Paleoanthropology Project-SACP4) has as its primary goal to develop an integrated paleoclimate, paleoenvironmental, and paleoanthropological record for the south coast of South Africa spanning 400 to 30 ka, a time that spans the origins of modern humans. The African Middle Stone Age (MSA), a Middle and Late Pleistocene stone tool phase, dominates the majority of this time span. The MSA in South Africa has gained increasing attention in debates about the antiquity of modern human behavior; some researchers arguing that the South African evidence suggests an early origin of modern behavior, while others suggesting a late origin. Resolution of these debates relies on two advances: improvements in our theoretical approach and an improvement of the empirical record in Africa. Fieldwork was initiated at Pinnacle Point (Mossel Bay, South Africa) to improve the empirical record (Marean et al. 2004).

Key Issues/Current Debates/Future Directions/Examples

Strategy

The field strategy uses state-of-the-art excavation and survey methods and techniques to obtain precise and accurate data, relying as much as possible on digital data acquisition integrated into 3D models of the "paleoscape." The paleoscape is a seamless model of land and sea that projects hunter-gatherer food resources at different climate states. We model that paleoscape with integrations of sea level and coastline change joined to species distribution modeling. A specific part of the transdisciplinary strategy is to use speleothem records to generate long, continuous, and tightly dated paleoclimatic and paleoenvironmental sequences for the MSA combined with other techniques (e.g., faunal change, phytoliths, magnetics) that enrich the environmental reconstructions.

Survey Method and Program

Pedestrian and mountain-climbing reconnaissance techniques revealed sites along the cliffs at Pinnacle Point. Today, wooden staircases and walkways provide access to most of the sites (Fig. 1). We use total stations to map all sites

Pinnacle Point: Excavation and Survey Methods, Fig. 1 Pinnacle Point landscape. The wooden walkway leads to the entrance of cave PP13B

and landscape features, coding all visible features directly to handheld computers using drop-down menus programmed into survey software. Using both RTK GPS and direct total station measurements, all coordinates are translated directly into the South African National Coordinate (SANC) reference system (Marean et al. 2004, 2010). The data is integrated into a GIS using ArcGIS, and a 3D paleoscape model is created.

Excavation Methods and Program

Our excavation recording system is designed so that every measurement made on-site of artifacts, features, sections, surfaces, and everything else is recorded by total station directly to handheld computer (Fig. 2). Total stations give all finds a 3D provenience, and finds are given a unique barcode number and assigned to a square, quadrant, and stratigraphic unit. Bar code scanners are connected to handheld computers through USB cables, requiring little to no typing of specimen numbers or other observations. This significantly reduces the transcription errors that plague field recording (Dibble et al. 2007). We record both ends of elongated artifacts by total station to calculate orientation and slope of artifacts within stratigraphic aggregates. We use artifact orientation to gain knowledge about site taphonomy (Bernatchez 2010). All non-plotted materials are gently wet sieved with fresh water through a nested 10-3-1.0 mm sieve (Marean et al. 2010).

We excavate within 50 cm quadrants within squares, naming them by their bearing: NE, NW, SE, and SW. Excavations within these quadrants are conducted following natural stratigraphic units (StratUnits: layers, features, etc.). These StratUnits are grouped into larger stratigraphic aggregates (layers) in the field and then checked with 3D GIS analysis. All excavator accounts of StratUnits are recorded to forms (supplemented by notebooks) and then typed into a form-based database system. Sediment volume is measured during excavation and sediment samples are taken from every StratUnit. Subsamples of the sediment samples are used to measure magnetic susceptibility (MS) used to identifying evidence for human occupation, mainly due to the use of fire at archaeological sites (Herries & Fisher 2010).

Section drawings are created by combining regular graph paper drawing with dense measurements of all stratigraphy and features using a total station directly to handheld computer, which links the section drawing to true grid space. We then digitally rectify all our section drawing and photographs (Bernachez & Marean 2011) to true

Pinnacle Point: Excavation and Survey Methods, Fig. 2 Excavation in progress at cave PP13B (Photographs courtesy of SACP4)

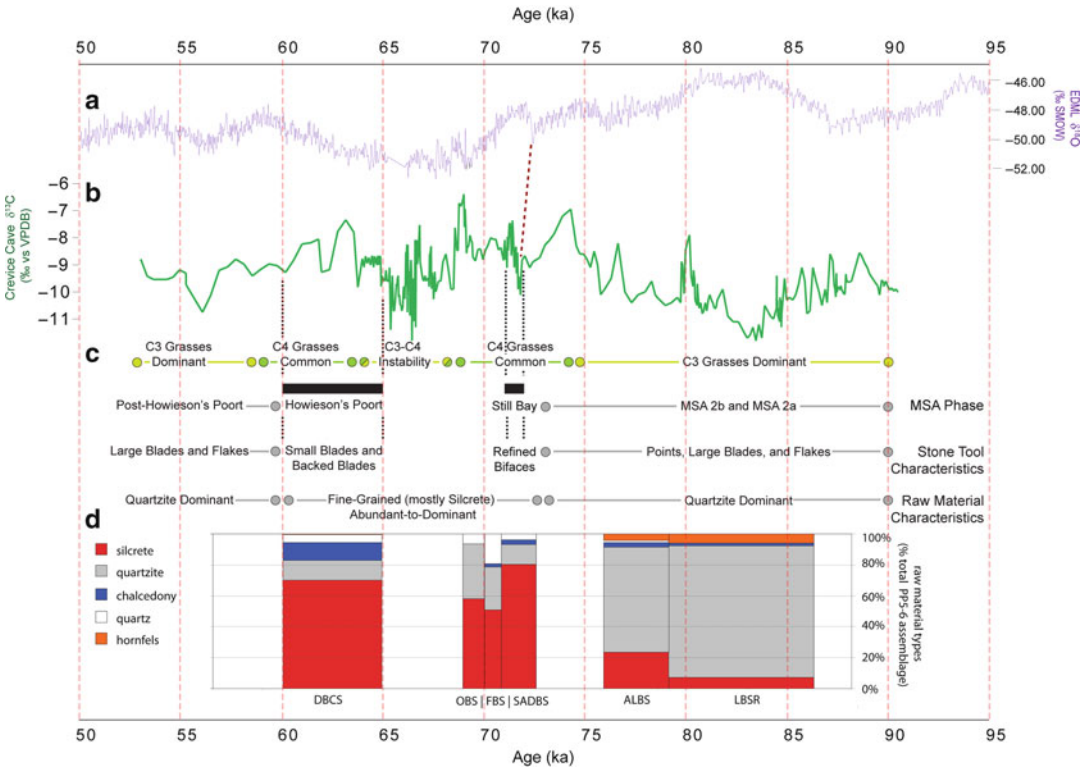

Pinnacle Point: Excavation and Survey Methods, Fig. 3 The inferred vegetation sequence from the Crevice Cave speleothem relative to southern hemisphere temperature change and major phases in the production of stone tools and use of raw materials in the southern Cape of South Africa. (**a**) The EPICA EDML d18O record (EPICA Community Members, 2006), (**b**) the Crevice Cave (Pinnacle Point) d13C (*green*) records with inferred grass regimes, (**c**) the major changes in stone tool phase, stone tool type, and raw material abundance in the southern Cape, and (**d**) the raw material abundances at archaeological site PP5-6 (Bar-Matthews et al. 2010: Fig. 11)

grid space, which allows us to plot on those photographs all artifacts, dating samples, stratigraphic boundaries, and anything else removed from site (Marean et al. 2010). On-site checking of field-acquired data eliminates most potential errors.

Analysis

Optically stimulated luminescence dating (OSL), TT-OSL, and U-Th dating (also known as uranium series, U-series, 230Th/U) are used to maintain chronological control (Bar-Matthews et al. 2010; Jacobs 2010; Marean et al. 2010). Most OSL ages come from locations where we also conduct micromorphology. Micromorphology significantly enhances our ability to understand sedimentary processes that are potentially problematic for OSL. Pinnacle Point research employs micromorphology regularly, as a foundation to stratigraphic analysis in complex depositional contexts (Marean et al. 2010; Karkanas & Goldberg 2010). We rely heavily on 3D GIS integration of all data and using ages, micromorphology, and stratigraphy to develop "life histories" of the caves (Fig. 3).

Assessment of Success

Fieldwork at Pinnacle Point has yielded the earliest evidence for human exploitation of marine resources, earliest securely dated use and modification of pigment, early use of bladelet stone tool technology at PP13B by ~164 ka, and early evidence for heat treatment of lithics at sites PP13B and PP5–6 (Marean et al. 2007; Brown et al. 2009; Thompson et al. 2010; Watts 2010). We have published, to date, the highest resolution speleothem record for Africa for the MSA for the time span 90–53 ka, which provides us with an unprecedented understanding of changes in rainfall and vegetation (Bar-Matthews et al. 2010). In addition, our tightly collaborative research has allowed us to detect correlations between the coastline distances, strontium isotope ratios in the speleothems, and the abundance of shellfish in coastal sites (Fisher et al. 2010; Jerardino & Marean 2010). We attribute a portion of our success to the reliance on digital acquisition of data, which allows fast- and high-quality analysis of field data, and the synergy created by our transdisciplinary approach, which allows quick insights that cross the traditional boundaries of science.

Cross-References

- ▶ African Stone Age
- ▶ Dating Techniques in Archaeological Science
- ▶ Field Method in Archaeology: Overview
- ▶ Human Evolution: Theory and Progress
- ▶ Human Evolution: Use of Fire
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunting and Hunting Landscapes
- ▶ Out-of-Africa Origins
- ▶ Lithic Technology, Paleolithic
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ Stratigraphy in Archaeology: A Brief History

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Piotrovsky, Boris B.

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Basic Biographical Information

Boris Borisovich Piotrovsky (1908–1990) was a famous Soviet Russian academic, historian, orientalist, and archaeologist who studied the ancient civilizations of Urartu, Nubia, and Scythia. He is well known as a key investigator in the study of the Urartian civilization of the southern Caucasus. Boris B. Piotrovsky's main works are devoted to the history, culture, and art of the Caucasus and the Ancient East, in particular the states of Urartu, and to questions of the origin and development of the ancient history of Armenian people. For most of his life, Boris Piotrovsky had connections with the State Hermitage Museum in Saint Petersburg. From 1964 until his death, he was director of this museum.

Piotrovsky was born in Petersburg in 1908. In 1929, being the student of a last year of historical and linguistic faculty of the Leningrad State University, B. B. Piotrovsky went to work in academy of history of material culture (Institute of Archaeology of the Academy of Sciences), in the sector of language, which academic N.Ya. Marr directed at that time. In 1930, B. B. Piotrovsky graduated from the university, and a year later he began to work in the hermitage as a scientific fellow.

Piotrovskyspecialized in the history and archaeology of the Caucasus region, and in the beginning of the 1930s, he began to acquaint himself with Urartian civilization. Thanks to the long-term (from 1939 to 1971) joint excavations of the Academy of Sciences Armenian Soviet Socialist Republic and State Hermitage under the supervisor of B. B. Piotrovsky, the ancient city of Teyshebaini was studied. This

site is one of the most interesting and most comprehensively studied monuments of Urartian civilization.

From 1953 to 1964 B. B. Piotrovsky was the leader of the Leningrad Department of the Institute of Archeology of Academy of Sciences of the USSR, and in 1964 he became the director of the State Hermitage. He remained in this position for 26 years until his death. Boris Piotrovsky combined scientific activity and administrative work with pedagogical and public work. From 1966 until his death, he was head of the Department of the Ancient East at Faculty of Eastern Studies in Leningrad State University.

Major Accomplishments

Since his student years, B.B. Piotrovsky took part in various archaeological expeditions in the North Caucasus. Archaeological study of the complex analysis and historical reconstruction of Urartu's monuments for many years becomes the main direction of his scientific activity.

The sphere of scientific interests of B. Piotrovsky was extraordinarily wide and various: archaeology and the Ancient East, questions of social and cultural history, the history and collections of the Hermitage, and the people who have made a significant contribution to creation of the museum.

Piotrovsky was director of the 1939 excavations that uncovered the Urartian fortress of Teishebaini in Armenia. The antiquity was hidden for many centuries under "a red hill" and now is one of the most interesting and most comprehensively studied monuments of Urartian civilization. Karmir Blur means "red hill" or "red fortress" (Armenian: Կարմիր բերդ meaning "red fortress"). It is a fortified Urartian settlement, which was destroyed in the beginning of sixth century BCE. Evidence found there has been a key to understanding the Urartian civilization. His well-known excavation of a fortress on a hill Karmir Blur about Yerevan opened to the world the new ancient state of Urartu and was a great discovery.

The results of expeditions were described in detail by B. B. Piotrovsky in his scientific works – archaeological reports on Karmir Blur's excavation (1950, 1952, 1955) and monographs: *History and Culture of Urartu* (1944), *Karmir Blur* (1950–1955), and *Art of Urartu by the Eighth–Sixth Centuries BC* (1962).

Since the beginning of the Great Patriotic War in 1941–1942, B. B. Piotrovsky wrote in Leningrad the book *History and Culture of Urartu*, which was published in 1944. For this work he was awarded the scientific degree of the doctor of historical sciences (1944) and the State Prize of the USSR (1946).

After the Great Patriotic War, Piotrovsky continued research in Karmir Blur, and in 1956 he had an opportunity to visit Egypt. Later, in 1961–1963, he headed the work of the International Archaeological Expedition to Nubia, in the territory flooded by waters of the Aswan Dam under construction.

The name of B. B. Piotrovsky has entered into the Soviet and world historical science about the ancient world. Boris B. Piotrovsky possesses numerous works on ancient history, archaeology, art of Transcaucasia, the North Caucasus, Central Asia, and also on history and culture of ancient Egypt, finding the deserved recognition as in Russia and abroad. Experience and knowledge allowed B. B. Piotrovsky to carry out more than 50 scientific archaeological expeditions fruitfully. The scientific results of excavations at Urartian fortress on a hill Karmir Blur in Armenia, near Yerevan, which passed from 1939 to 1941, were especially significant.

These were not Piotrovsky's sole contributions to the field of archaeology, however. Piotrovsky worked elsewhere in the Caucasus, especially on the Scythian culture. In 1961, he became the head of an expedition of the USSR Academy of Sciences to study Nubian monuments in Egypt.

B.B. Piotrovsky was elected as a full member of Academy of Sciences of the USSR on Department of History (History of Culture) in 1970, was a full member of Academy of Sciences Armenian Soviet Socialist Republic in 1968, and a member correspondent of the Bavarian Academy of Sciences, the British Academy of Sciences, Royal Academy of Morocco, and an honorary member

of fifteen other foreign academies and scientific societies.

In his lifetime, B.B. Piotrovsky published more than 200 works in the fields of archaeology, history, and art.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Museums and Memory Experiences
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Russia: Management of Archaeological Heritage
- ▶ Urartu, Archaeology of

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Plain of Jars Archaeological Landscape

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Introduction

The remote plateau of Xieng Khouang in Laos is home to one of the most enigmatic and fascinating archaeological landscapes in Southeast Asia. Clusters of megalithic jars, ranging in size from 1 to 3 m in height and diameter, dot the lower foot slopes and surround the central plain. The limited archaeological research carried out to date indicates that the stone jars were part of Iron Age burial practices which occurred and evolved at the crossroads of the two major eco-cultural systems of Iron Age Southeast Asia: the Mun-Mekong System and the Red River/Golf of Tonkin System.

The strategic importance of the Plain of Jars in the region was highlighted during the Siamese-Dai Viet conflicts of the late eighteenth to late nineteenth century and again during the Indochina Wars. It was during the Second Indochina War that the United States carpet bombed Xieng Khouang and left a deadly legacy of unexploded ordnance (UXO). UXO has been the main cause of poverty in the province as it severely hampers economic development; it has also resulted in limited archaeological research.

A UNESCO-Lao government initiative called *Safeguarding the Plain of Jars Project*, which commenced in 1998, has compiled a Geographical Information System database of 89 sites within Xieng Khouang province (www.unescobkk.org/culture/pdj/). The database provides information on location, form, material, and conservation status for each individual jar, as well as overall site descriptions and information on 7 or 8 locations regarded as jar quarry and manufacturing sites. The identification of multiple sites allowed researchers to develop a better understanding of the locations chosen and the

technical know-how behind jar production (Baldock & Van Den Bergh 2009). The project was set up as a comprehensive effort to rehabilitate the Plain of Jars, and initially, with the financial assistance of the New Zealand government (NZAID), seven jar sites were cleared of UXO and prepared for community-led heritage management and tourism development.

Definition

Plain of Jars is an organically evolved archaeological landscape in the central east of Lao PDR. The landscape consists of clusters of megalithic jars and associated features which are thought to reflect ancient beliefs in birth, life, death, and rebirth. The typical attributes of a jar site comprise stone jars, stone disc-shaped grave markers, stone lids, and secondary burials with pottery, stone, bronze, or iron grave goods. The latter components, together with the site locations, decorative expressions, and limestone cave at site 1 and quarries, form the Plain of Jars Archaeological Landscape.

Although the jars are largely undecorated, the range of jar forms and modifications in manufacturing process may indicate either individualistic expressions of the carvers or simply changing needs, that is, a transition from ritual excarnation to cremation. Among the few decorations adorning jars and stone discs are human and animal *bas-relief* figures, including monkeys, tigers, and possibly frogs.

The secondary burials surrounding the stone jars are typically simple with plain urns, some stone tools, stone beads, plain or incised pottery, and a few metal artefacts such as bronze bells, bronze or iron wire bracelets, and iron knives.

Historical Background

Investigation History

The first systematic archaeological investigations at the Plain of Jars were conducted in 1931–1933 by Madeleine Colani under the auspices of the Ecole Française d'Extrême Orient in Hanoi. She recorded around 20 sites, excavated a number of them, and published two volumes with her findings a few years later (Colani 1935).

No further academic research was conducted until November 1994 when Professor Eiji Nitta of the Kagoshima University in collaboration with Lao Archaeologist Thongsa Sayavongkhamdy excavated, surveyed, and mapped the main site at Ban Ang (Nitta 1996). Mr. Sayavongkhamdy then continued to excavate several trenches at sites 1–3 in 1996 (Sayavongkhamdy & Bellwood 2001).

Limited archaeological investigation led by Ms. Van Den Bergh and Mr. Samlane Luangaphay took place as part of the unexploded bomb clearance of the seven jar sites in 2004–2005 and 2007. During such work, a methodology for archaeological data retrieval during UXO clearance was developed in collaboration with UK-based charity Mines Advisory Group. The methodology allows for safe information gathering during excavation for unexploded bombs (Rogers & Van Den Bergh 2008).

Excavation results since the 1930s have contributed only modestly to the further interpretation of Plain of Jars as a collection of Iron Age burial sites. Recent archaeological work has confirmed the presence of secondary burials surrounding the jars and also proved that the stone jars are contemporary with the burials. The dating of the Plain of Jars remains in question as the few AMS and C14 dates so far obtained fall outside of the accepted Southeast Asian Iron Age range (Sayavongkhamdy & Bellwood 2001: 108; Van Den Bergh 2007: 5), while the net-patterned pottery and human decorative *bas-relief* motifs are similar to fifth-century BCE to third-century CE examples from southern China. Although an Iron Age date for the Plain of Jars is generally accepted, Nitta suggested the resin covered urns should be dated to the end of the first millennium CE (Nitta 1996: 17).

A working hypothesis put forward by Dr. Pamela Rogers and Dr. Richard Engelhardt (2003) proposed that the stone jars functioned as

"distilling" vessels for human corpses. The ritual decomposition was then followed by secondary burial. Traditional Southeast Asian royal mortuary practices provide modern parallels that symbolize the transition of the deceased into the spiritual world. The hypothesis is supported by the secondary burials found around the base of stone jars and scant evidence of human bone and teeth inside the jars recorded by Colani.

Legislative Framework and Protection Mechanisms

The Plain of Jars was put forward by the Lao Government in 1992 as a tentative UNESCO World Heritage Site. The government recognized the site as a national heritage in 1993 after its registration by the Provincial Department of Information and Culture, and its protection status was thus defined and subsequently enshrined in the Heritage Law of 2005.

Key Issues/Current Debates

The key issue for the Plain of Jars is to put in place mechanisms to ensure the protection of this vast, complex, but little understood landscape in the context of a poor, predominantly rural, developing country (Van Den Bergh 2011). Currently the 3 main sites are managed by local provincial and district governments, and these are the only jar sites that generate limited income from tourist entrance fees. The one euro entrance fee covers the services of a ticket seller and basic maintenance of the site(s) by the community. The central or provincial governments lack sufficient funds to provide dedicated protection for the numerous sites.

A further constraint is the obvious imbalance between the Lao PDR's small number of national archaeologists, and the human resources actually needed to deal with the complex, widespread, and often remote Plain of Jars sites. Community-based heritage management is a significant step forward in front line protection, but the training of competent personnel at provincial and district level is crucial if sustainable management and periodic monitoring of sites are to be ensured.

The Plain of Jars Archaeological Landscape has a high level of integrity with the sites having suffered mainly from benign neglect – the obvious exception being the carpet bombing of the province during the Second Indochina War. The end of the first decade of the twenty-first century has, however, been marked in Xieng Khouang province by the accelerated development of agriculture, road networks, and mining exploration. Development without thought for the preservation of the entire archaeological landscape may save the most famous and accessible sites at the cost of losing the very essence of the Plain of Jars: an archaeological landscape reflecting the extensive and elaborate mortuary practices of a long-disappeared civilization with strong cultural exchanges evidenced in the form and location of jar sites across its entire extent.

International Perspectives and Future Directions

Megalithic jars are not unique to Laos and the Plain of Jars. In 1929 Mils and Hutton (as cited in Colani 1935: 223-236) recorded four stone jar sites in the Cachar Hills of Northeast India, and "stone vats" have been recorded in the valleys of Bada and Besoa, Central Sulawesi, and Bima, Sumbawa Island in Indonesia. Nevertheless, when considered collectively, the well-understood strategic importance of the plateau, the integrity, authenticity of the landscape, and the resulting high research values make the Plain of Jars Archaeological Landscape a good candidate for UNESCO World Heritage Listing.

In addition to contributing to our understanding of Southeast Asian prehistory, the sites have great potential for education and the development of community-led heritage tourism, which was recognized by UNESCO, the Lao government, and NZAID in Phase IV of Safeguarding the Plain of Jars Project 2006–2010.

The UXO problem, however, must be acknowledged, and bomb removal efforts should continue to focus on sustainable heritage development.

Cross-References

- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Poverty
- ▶ Laos: Cultural Heritage Management
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ UNESCO's World Heritage List Process
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Plant Domestication and Cultivation in Archaeology

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Introduction

Plant domestication and cultivation are key concepts for archaeologists who study food-producing societies. Food production takes many forms, ranging from behaviors such as controlled burning that increase harvest yields to highly integrated agricultural systems supporting large populations. Dependence on food production has implications that ramify throughout sociocultural systems and played a key role in the development of corporate land tenure, social mechanisms for control of food surplus, and social hierarchies worldwide. In addition to its cultural significance, plant domestication is the ultimate basis for many of the human behaviors that have modified ecosystems on a global scale.

Definition

Most broadly, plant domestication can be defined as evolution under human management. By definition, then, domestication involves some change in gene frequencies within the population

in question. Gene frequencies change because the phenotypic traits they express – such as unusually large seeds – are favored by selection in the modified habitats created by human activity. Domestication is sometimes perceived as purposive, but in fact it can be initiated as a result of human modification of the environment without any conscious planning. Phenotypic change within domesticated populations may be visible in the archaeological record, depending on the plant tissues affected and their likelihood of preservation. The study of ancient DNA has made it possible to pinpoint significant mutations and track their history in some taxa.

Domestication represents a continuum, and scholars have acknowledged this fact by using such terms as "semidomesticated," "fully domesticated," and "initial stages of domestication." Morphological departures from the state characteristic of natural populations provide one set of indicators that domestication was underway. However, human management does not always leave such clear morphological signals.

Whereas domestication is a particular type of evolution in which selection under human influence plays a major role, cultivation encompasses a suite of behaviors involved in managing plant resources, including but not limited to clearing, burning, plowing, selective breeding, planting, and harvesting. Domestication is an evolutionary process or relationship, whereas cultivation is a type of human activity. The two are closely related and often co-occur, but they are clearly different types of phenomena. There is more ambiguity regarding the difference between the two when "domesticated" and "cultivated" are used as modifiers, as in "domesticated plant." Archaeobotanists usually distinguish between cultivated plants, which are tended by humans but may or may not have undergone selection as a result, and domesticated ones, which must meet the additional criterion of having been morphologically and genetically altered from the wild state.

Domestication is seldom viewed today as an intentional, goal-directed form of technology in which humans impose their will on plants and animals to create new, culturally modified forms. Instead, domesticated species are recognized to be active participants in a mutualistic relationship that has evolutionary consequences for both partners. Highlighting and reinforcing this view is the recognition that humans are not the only organisms that domesticate, as research on social insects has revealed (Rindos 1984). The nature of the domesticatory relationship in terms of human control, degree of phenotypic modification of the domesticate, and the significance of evolutionary and environmental constraints upon the coevolutionary process vary considerably depending upon the species involved.

Historical Background

Historical Geography and Evolution of Domesticates: The Nineteenth Century

The first in-depth scientific studies of plant and animal domestication were undertaken in the nineteenth century. Most famously, Charles Darwin used the development of distinct varieties of domesticates as an analogy for natural selection (Darwin 1859). He skillfully took the reader through the argument, which provided familiar points of reference from animal breeding – the breeder's decisions to enhance some traits and suppress others, the principle of inheritance (by which like produces like), and the appearance of "sports" (unusual phenotypes). By the time he deftly replaced the pigeon fancier with Nature as the selecting agent, the basic elements of the principle of natural selection had been presented, accompanied by a body of supporting evidence. Darwin subsequently published a two-volume treatise in which he explored the causes of phenotypic variation in domesticated animals and plants (Darwin 1868).

Darwin relied for much of his data on the work of Alphonse de Candolle, who aimed to identify the geographical origins of crop plants based on their then-current geographical distributions, historical information, languages, and archaeology. First published in 1855, his major work predated the publication of Darwin's *Origin* by several years. However, even the later (substantially revised) 1888 edition (De Candolle 1886) has

little to say about the evolutionary processes by which plants become domesticated. De Candolle did, however, have a keen interest in the archaeological record as a source of evidence for ancient crops and their history. He knew of the excavations of Oswald Heer at the Swiss lake dwellings and was acquainted with the desiccated seeds and other plant parts that had been discovered in Egyptian tombs (De Candolle 1886: 11). Archaeobotany was still a young discipline, but in the years to come archaeologists would begin to appreciate its potential for documenting domestication.

Archaeology and Plant Domestication: The Early Twentieth Century

One of the first archaeologists to take an explicit interest in plant domestication and agricultural origins was Rafael Pumpelly, whose excavations at Anau in Turkey investigated climate change in relation to early food production (Zeder et al. 2006a). Archaeological research in the Near East has been, and continues to be, a major source of paleoenvironmental and archaeobotanical data on plant domestication.

With the realization that even minute plant parts such as seeds could be recovered from archaeological soils, archaeobotanists began looking more closely at the distinctive morphological traits that differentiated domesticated plants from their wild relatives. The University of Michigan Museum of Anthropology's Ethnobotany Laboratory made major contributions to the metric study of the seeds and fruits of native eastern North American domesticates, such as the sunflower (*Helianthus annuus* L.) and marshelder (*Iva annua* L.). This work, begun by Melvin Gilmore and his student Volney Jones, was carried on by subsequent generations of ethnobotanists. This Michigan school of paleoethnobotany was influenced by the work of botanist Edgar Anderson, whose 1952 book *Plants, Man, and Life* presented what came to be known as the "dump-heap theory" of plant domestication (Smith 1992). Anderson recognized that human activity enriched soils and disturbed vegetation in ways that encouraged the colonization of campsites by weeds, many of which were cultivated as food sources. Many later archaeologists and archaeobotanists were to find this model useful in explaining how and why domestication began. Anderson's vision of domestication as a purely incidental consequence of unplanned environmental modification by humans was to become an appealing alternative to the idea that domestication was a calculated innovation.

In plant science, the work of Nikolai Vavilov (1992) in the early part of the twentieth century was an important foundation for later studies of the geographical origins and dispersal of cultivated plants. Vavilov proposed that geographical origins of crop species could be pinpointed by looking for high levels of diversity in inherited traits. Although the center of diversity/point of origin correlation has not held up well over subsequent years, Vavilov's work continues to be a point of comparison for geneticists and archaeologists currently examining crop origins.

Ecological Approaches: The 1960s and 1970s

Human ecology and systems theory were attractive paradigms for archaeologists working on the origins of agriculture. These approaches informed the work of North American archaeologists such as Kent Flannery, who initiated multidisciplinary projects that laid the groundwork for the scientific study of plant domestication in both Mexico and the Near East. Across the Atlantic, the economic prehistory school was flourishing, producing data-rich and theoretically informed studies of ancient plant domestication. Flotation recovery of archaeological plant remains using fine screens was yielding assemblages of unprecedented size and quality, stimulating archaeobotanists to investigate the morphological correlates of domestication by measuring seeds and fruits. In eastern North America, this work led to widespread recognition that the domestication of native plants had preceded by at least two millennia the introduction of maize from Mexico (Smith 1992, 2006; Zeder et al. 2006a).

In agricultural sciences, Jack Harlan revived Vavilov's centers of domestication, modifying the original model to acknowledge the true complexity of crop origins and dispersals by

recognizing primary and secondary centers of domestication as well as noncenters (Harris 2007). Harlan along with colleagues in botany and crop sciences began to define the effects of cultivation on natural selection in plant populations. A rigorous model of the "adaptive syndrome" of domestication in seed crops was beginning to crystallize (Harlan et al. 1973).

Domestication as Coevolution: The Late Twentieth Century

By the 1980s, archaeologists and archaeobotanists had embraced an explicitly evolutionary understanding of domestication. Multidisciplinary approaches to domestication origins and processes were widespread and gaining momentum. Researchers interested in the question of morphological change under domestication turned increasingly to metric analysis of seeds and fruits, an effort fueled by the accelerated recovery of plant remains by flotation. In eastern North America, Bruce Smith demonstrated that goosefoot (*Chenopodium berlandieri* L.) was a domesticate by applying the evolutionary understanding of selection under domestication previously developed by Harlan et al. (1973). His work exemplifies the synthesis of new methods (such as scanning electron microscopy and direct accelerator dating of plant material) with evolutionary and ecological theory (specifically, the adaptive syndrome of domestication and Anderson's dump-heap model). Smith applied his understanding of plant domestication as coevolution to explain archaeological patterns in eastern North American riverine environments of the Middle Holocene (Smith 1992). Coevolution became an influential concept in many regions as archaeologists grappled with the problem of how and why plant domestication emerged from straightforward predation. The continuum of human-plant interaction envisioned by David Harris and revised over several decades continues to influence theories of plant domestication (Fig. 1). In light of this ethnographically informed view of the broad spectrum of human behaviors affecting plant populations, the dichotomy separating domesticated from wild was increasingly untenable.

The theory of plant domestication as coevolution was systematically set out in a monograph by David Rindos, an American scholar with a diverse background including a Ph.D. in Anthropology and Evolutionary Biology and an M.S. in Botany, both from Cornell. Rindos' 1984 book (Rindos 1984) was read with great interest by many archaeologists and ethnobotanists. Its influence was not universal, in part due to his insistence that human intention was not a proper ingredient in an evolutionary theory of domestication. He emphasized instead the mutualism that develops when animals become dispersal agents for plants. His model of agricultural expansion was largely ignored. However, Rindos forced researchers to question many of their assumptions about domestication, including its definition in terms of morphological and genetic markers. He did this by stretching the definition of domestication to its breaking point, including every instance of animal/plant mutualism, including ant "agriculture." Rindos' view of the continuum from generalized to specialized to agricultural domestication was not widely adopted in its original form. However, his contention that initial domestication did not require explanation because it was a natural outgrowth of evolved dispersal relationships seems to have struck a chord with many researchers.

Domestication in Twenty-First-Century Archaeology: A Prologue

A number of trends and issues can be identified in the contemporary study of plant domestication and cultivation in archaeology. Morphology is losing its status as the sine qua non of plant domestication; researchers realize that the diverse trajectories of domestication demand flexible criteria that may include landscape modification and dispersal of domesticates into new habitats and regions. Genetic studies have become key tools for tracing crop origins and dispersals. Starch grains and phytoliths offer new opportunities for documenting ancient domesticates. Current debates over explanation pit agency against blind evolutionary forces and behavioral ecology against niche construction as theoretical frameworks.

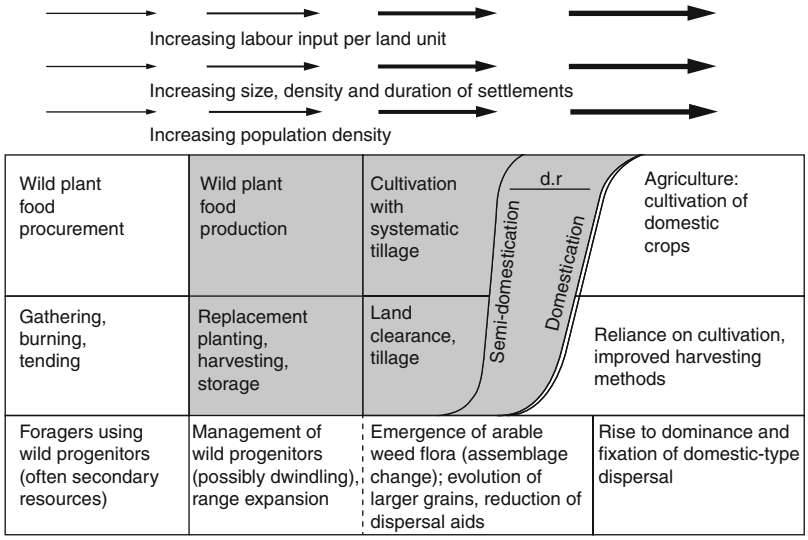

Plant Domestication and Cultivation in Archaeology, Fig. 1 A model of the foraging-to-agriculture continuum developed by David Harris and modified by Dorian Fuller (2007). *Shaded areas* represent stages of pre-domestication cultivation. The *bottom row* indicates archaeobotanical signatures associated with each stage (Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/2.5/))

Key Issues/Current Debates

Documentation of Domestication in the Archaeological Record

For annual seed crops, the adaptive syndrome of domestication has stood the test of time. Morphological criteria that can be securely linked with selection under domestication continue to have great value, particularly when macrobotanical remains are the target of study. For example, an increase in seed and fruit size has long been known as a response to intentional selection of seed stock but can also occur by way of seedling competition in modified soils (Table 1). Size can easily be assessed with simple measurements of length, width, and thickness. Indicators of the loss of germination dormancy may be more difficult to observe. In *Chenopodium*, thick seed coats that inhibit germination tend to be reduced or lost under domestication. Measurements of seed coat thickness must be done using high-resolution, high-magnification microscopy. The trait of shattering to disperse seeds is qualitative rather than quantitative. For example, in cereals the abscission layer that permits the ripe seed cluster (spikelet) to fall from the parent plant is lost. The resulting pattern of breakage – across the rachis, the stalk that anchors the grass seed cluster to the parent plant – is archaeologically distinctive (Pickersgill 2007; Fuller et al. 2012).

Comparisons designed to differentiate domesticated from non-domesticated populations (or semidomesticated ones) should be made between populations or samples, since variants exhibiting domesticated-type morphology may be present at low frequencies even in wild stands. Simultaneous ripening, for example, might be assessed by measuring variability in seed size within a single context or on a bundle of infructescences (fruit clusters) harvested together and preserved in a cave or rockshelter.

For plants that are cultivated for their underground storage organs (USOs), documentation of domestication can be difficult. These plants are propagated clonally, with some sexual reproduction to maintain variation. The parts consumed are nonreproductive tissue consisting mainly of starch. Fortunately, the size and morphology of starch grains and phytoliths have the potential to reflect selection under domestication, although it is not always clear that these phenotypic changes have a genetic basis (Smith 2006).

Recently, morphology has been joined by genetic analysis as a method of documenting the appearance of domesticate phenotypes. This exciting development involves the study of quantitative trait loci (QTLs) that code for specific phenotypic traits. In maize, for example, domestication-related genes for plant architecture, storage protein synthesis, and starch production have

Plant Domestication and Cultivation in Archaeology, Table 1 Selection pressures under a regime of harvesting and replanting of stored seed (the adaptive syndrome of domestication)

Specific behaviors	Selective pressure	Trait associated with domestication	Archaeobotanical signature
Habitat disturbance, tilling	Intensified seedling competition favoring rapid germination	Loss or reduction of germination inhibitors	Seed coat thin or lacking
	Intensified seedling competition favoring vigorous seedlings	Increase in food reserves for seedling growth	Larger seeds
Whole-plant harvesting	Competitive advantage of non-shattering type	Loss/reduction of dispersal mechanisms	Non-shattering spikelet morphology
Seed-beater harvesting	Competitive advantage of shattering trait	Dispersal mechanisms retained	Shattering spikelet morphology (abscission layer intact)
	Selection favoring seeds that are mature when harvested	Synchronous maturation of seeds	Low variance in seed size/few immature seeds

Sources: Harlan et al. (1973), Smith (1992), Pickersgill (2007)

been identified and their distribution studied using ancient DNA (aDNA) (Jones & Brown 2007). The locus controlling for starch quality was found to be different in aDNA from 4000-year-old cobs from the Ocampo caves in Mexico (a soft type preferred for making tortillas) as compared to 1,000–2,000-year-old maize from Tularosa Cave in New Mexico (a hard-kernelled form) (Zeder et al. 2006b).

With this kind of data, both morphological and genetic, accumulating from many world regions, it has become necessary to reassess the validity of phenotypic markers as the sole or primary criterion for plant domestication. Morphological change is not necessarily the "leading edge" of domestication, but in some cases represents a much later outgrowth of pre-domestication cultivation (Zeder et al. 2006a; Harris 2007; Jones & Brown 2007). Domestication might also precede cultivation in the strict sense, due to unconscious forms of selection (Rindos 1984).

In light of the great variability of ecological situations that give rise to human-plant coevolution, researchers have called for a richer and more nuanced treatment of domestication. This newer view acknowledges that phenotypic and genotypic changes do not universally characterize the mutualisms between human and plant populations (Zeder et al. 2006b). To understand how these mutualisms develop, it is necessary to look beyond seed measurements and view plant management in its cultural context. Landscape management and archaeological occurrence of a plant outside of its known wild range are other non-morphological indicators of domestication in this broad sense (Zeder et al. 2006a). Plant domestication may be seen as one aspect of niche construction, by which organisms modify their environments in ways that affect the reproductive success of their offspring (Smith 2007).

Rates of Domestication

In the view of nineteenth-century social evolutionists, agriculture was a precondition for civilization, and domestication of animals and plants was the brainchild of human ingenuity. Today, scholars recognize the importance of unconscious selection as well as selective breeding, and therefore that rapid transitions should not be expected. The domesticated vs. wild dichotomy has been largely replaced by a continuum in which coevolutionary relationships are fluctuating and sensitive to environmental and cultural influences rather than heading inevitably toward agriculture. However, questions still remain about the rate of domestication and how that rate varies between species. Are single mutations responsible for most domesticated phenotypes, or are they often influenced by multiple loci? What is the role of genes of large effect, such as

regulatory genes that control growth and development? Do some harvesting methods accelerate domestication?

For a brief period, rapid rates had considerable support from harvest experiments that suggested that domestication of wild wheat and barley could have been accomplished in a matter of decades (Allaby et al. 2008). Also contributing to the rapid transition model for the Near East was the apparently sudden appearance of intensively harvested wild cereals in the Early Holocene. However, accumulating archaeobotanical data indicate a much longer period of domestication, beginning with intensive seed harvesting some 20,000 years ago and continuing with pre-domestication cultivation by 13,000–12,500 BP, with the fixation of the domestication syndrome perhaps taking several thousand more years (Allaby et al. 2008). Possible reasons for the length of this process include relatively weak selection and ongoing gene flow from wild populations. The latter barrier could sometimes be removed only by removing the plant from its original range. The full spectrum of domestication syndrome traits for a species does not necessarily form a "package"; instead, changing harvesting practices or economic strategies shift selection so that different traits emerge at different times (Allaby 2010). In rice and other cereals, for example, changes in grain size and shape preceded the loss of the shattering trait; in legumes, cultivation was practiced for thousands of years before larger seeds developed (Fuller 2007). Another variable that may speed the rate of domestication is developmental plasticity, which allows for phenotypic variation without corresponding changes in the genome. In a stable environment, over time, such traits may become less responsive to environment and become genetically fixed or "assimilated" (Gremillion & Piperno 2009).

Single Vs. Multiple Origins of Crop Plants

Since Vavilov's centers of domestication, new evidence has revealed a much more complex picture of crop origins. Modern cultivars frequently show the influence of multiple lineages from different geographical areas. Single origins for important crops have been proposed based on phylogenies that are monophyletic (possessing a single lineage). However, the interpretation of monophyly as indicating a single origin rests on the assumption of a rapid process of domestication. Allaby et al.'s (2008) simulation of evolution under domestication, however, indicated that sample size and the number of generations over which evolution occurred had strong effects on phylogenetic outcomes. Thus, monophyly is a poor indicator of single origins. The histories of many crop plants remain to be worked out, but close collaboration between archaeologists, archaeobotanists, geneticists, and other specialists has produced impressive results so far and promises to continue to do so in the future.

Agency and the Role of Evolutionary Theory

Collaborative research and the great variability in pathways to domestication have stirred up theoretical debates as well. Some researchers are uncomfortable with evolutionary approaches to understanding the human side of the domestication equation and champion agency as a force for change. Agency alone seems to have little explanatory value without a theory of decision-making to accompany it. Both conscious and unconscious selection shape plant domestication, and understanding how agency is mobilized in certain directions and not others deserves serious attention. Evolutionary thinking remains influential in explaining the activities of human actors in the domestication process, but there is a tension between behavioral ecology (which predicts likely behaviors based on correlates of fitness such as risk reduction and efficiency) and niche construction, which also emphasizes adaptation but without using simple models or a simplified "currency." Niche construction theory is attractive because of its strong emphasis on ecological details and explicit inclusion on the feedback between human alteration of the environment and natural selection (Smith 2007).

There is also a tension between comparative and contextual approaches to domestication and

agricultural origins. The comparative perspective seeks common processes and causes and attempts to generalize across diverse cultural and environmental contexts. In contrast, the contextual approach recognizes the diffuse and mosaic character of domestication and the importance of understanding its sociocultural context. It advocates strong attention to historical details, the actions of self-aware agents, and local environments as a bridge to broader forms of explanation (Vrydaghs & Denham 2007).

International Perspectives

Historical differences in the development of archaeology in North America and the UK influence approaches to domestication. North American archaeology has been closely associated with cultural anthropology and human evolutionary studies. In the UK, prehistoric archaeology was more closely affiliated with geology and paleontology. Today, collaboration has erased or blurred these distinctions and opened up new opportunities for multidisciplinary research that takes advantage of many lines of evidence. An example of this trend is the integration of molecular approaches into the study of domesticate history.

Until recently, archaeological research on plant domestication has been dominated by relatively few regions, among them temperate North America, Western Europe, the Near East, and those parts of Mesoamerica and South America that gave rise to urbanism. Efforts are now underway to include the domestication histories of regions formerly marginalized, such as the humid tropics of Africa and the Americas, Southeast Asia, and the Pacific Islands. Integration of this new information highlights the global variability of human-plant interactions, leading to calls for each region to be understood on its "own terms" (Vrydaghs & Denham 2007: 11). Former colonies of Western nations are producing archaeologists whose worldviews are strongly influenced by awareness of indigenous perspectives on the plant world.

Future Directions

The past two decades have yielded a multitude of innovative techniques and approaches to plant domestication and cultivation in prehistory. The next two decades promise to be similarly productive, quite possibly in unanticipated ways. Based on current trends and gaps in knowledge, the following developments seem likely:

1. *Increased attention to the cognitive basis of decision-making and proximal mechanisms involved in plant use and management.* Archaeology has access to the material residues that document such decisions, but lacks direct empirical evidence of the thought processes that motivated prehistoric people. However, cognitive science continues to yield insight into how the human mind works, in some cases documenting species-wide strategies such as rapid, intuitive decision-making and persistent biases. There is also much to be learned from studies of contemporary peoples who manage plants on a daily basis using traditional systems of knowledge. Their decisions are based both on socially learned information (culture) and their own experiences.
2. *Further exploration of biomolecules, especially aDNA, to document the history and spread of domesticated plants.* This research effort continues to expand to encompass more species and has moved beyond analysis of selectively neutral loci to the identification of loci known to regulate the phenotypic traits associated with domestication. Much continues to be learned from modern plant populations about their ancient predecessors, but aDNA will yield more opportunities for pinpointing key events in crop history. Judging by progress over the last decades, methods for analyzing aDNA will continue to be refined and improved in the years to come.
3. *More frequent application of models, particularly simulation models, to important questions about the process of domestication.* Modeling is a crucial analytic tool for understanding evolution in the case of prehistoric

populations, which are imperfectly documented in the material record. Models permit the manipulation of numerous variables, such as population size, mutation rates, and rates of cultural transmission, under conditions that cannot be replicated in the real world. Their results enhance understanding of how variables are interrelated and provide a framework for interpretation of archaeological evidence (Allaby et al. 2008).

4. *Investigation of the domestication of nonfood plants*. Food plants, especially cereals, have been the focus of much domestication research because of their impact on human population growth, social organization, mobility, and other sociocultural phenomena of interest to prehistorians. Fiber plants and fruit trees have received some attention, as have some psychoactive plants. Studies of major crops will continue, but innovations in residue analysis (for identification of lipids, alkaloids, and other biomolecules), fiber identification, and perhaps high-power microscopy of plant tissues will continue.
5. *Eventually evolutionary theory will be fully integrated with the study of plant domestication in prehistory*. The evolution of plants under domestication is becoming reasonably well understood, but human populations are often ignored as the other partner in the coevolutionary relationship. Many archaeologists are reluctant to engage with evolutionary theory as applied to humans. Often they are concerned that evolutionary thinking will necessarily lead to reductionistic explanation and a neglect of human agency. However, models that thoughtfully incorporate specifically cultural processes as well as biological inheritance will probably play an increasingly important role in the years to come.

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Plant Processing Technologies in Archaeology

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Introduction

Agriculturally produced plant seeds, tubers, and stems form the core of food systems for the vast majority of the world's population. Today, as in the past, effective use and consumption of these foods relies on processing technologies. Ever improving archaeological science techniques and improved collection strategies from archaeological sites are greatly increasing the temporal and geographical range of material evidence for past plant processing technologies. A wider frame of ethnographic and experimental reference is also improving the ability of researchers to interpret those traces. The key role of processing technologies in the long-term development of agricultural systems and in the domestication process itself is now well established, and higher-quality evidence from Paleolithic sites is now demonstrating the preagricultural presence of plant food processing

in several regions over at least the last 30,000–50,000 years. Evidence now suggests that while processing is important for the evolution and adoption of domesticates, specific technological advances in processing were not the key triggers of domestication itself.

Definition

Plant food processing refers to a wide range of activities that ultimately have one aim: to extract edible foodstuffs from the inedible. Most plant tissues, with the exception of some soft fruits, are not edible or provide at best meager food value to human digestive systems without some form of processing. This includes a large number of foods that are routinely eaten today and are the focus of agricultural production systems around the world, including the edible grains, legumes, and many tubers. Without processing grains pass through the digestive system largely undigested; while without cooking, grinding, or leeching, many forms of legumes (e.g., grass pea (*Lathyrus sativus*) and chickpea (*Cicer arietinum*)) and some tubers (e.g., bitter cassava (*Manihot esculenta*)) are lethal. Inedibility results from a number of protective features of plant physiology and chemistry, in part prompted by evolutionary pressures from potential predators, including humans (Stahl 1984; Jones 2009). Most directly, plants may encase edible parts, such as seeds, in some form of protective coating, such as nutshells or grass-seed husks (chaff), which deter predation. In other cases the deterrent may be chemical compounds, ranging from relatively benign chemicals that reduce digestibility or cause a bitter taste to life-threatening compounds such as the arsenic-containing amygdalins of wild almonds, which poison the consumer (Martinoli & Jacomet 2004). Also of relevance are fibrous structures in plant leaves and stems which may hinder the mastication and digestion of otherwise nutritious plant foods.

While plants are relatively easy to locate and harvest compared to hunted animals, these protective features provide a series of challenges which must be overcome if plants are to make a contribution to the human diet. The solutions require the investment of significant time, energy, and equipment in a wide range of technological responses to the challenges of plant inedibility; they include a range of implements and techniques in many cases forming elements of quite complex multiple-step processing sequences (Hillman 1981; Jones 2009). Harvesting may include simple collection of plant resources from the ground, or more involved use of harvesting devices, such as sickles and digging sticks. Releasing the edible foodstuffs from nutshells, seed coats, husks, or fibers may involve pounding, cutting, or grinding combined with winnowing, sieving, and soaking. Detoxifying foods of chemical compounds may include pounding, leeching toxins with water, grinding, and heating, which may also be employed to break up larger plant structures – such as grass seeds – into smaller more digestible particles, such as grits and flour. Perhaps the best-studied multiple-step processing sequence is that of the Old World cereal crops, which in ancient glume wheat species (e.g., einkorn (*Triticum monococcum*) and emmer (*Triticum dicoccum*)) includes harvesting, threshing to separate the cereal spikelets from the straw, winnowing to remove the chaff, pounding to release the grains from the chaff, and various stages of sieving and hand sorting to remove the weed seeds, straw nodes, and remaining chaff before the grain is milled and eaten. This process can be undertaken using a range of tools and spaces and results in the production of a range of products and by-products which may be identified in archaeobotanical assemblages.

These processing techniques are found in many plant procurement systems, whether using wild resources or domesticates. They leave a range of potential archaeological traces, including the tools used to process the plants, such as grinders, pounders and blades, processing installations and even the residues of the processed plants themselves. The scale and organization of plant processing varies in different societies, depending on their economic emphasis and structure, as reflected in the number, size, and

organization of processing facilities. Settlement remains from small-scale societies commonly preserve the remains of grinding stones distributed through dwellings or in communal areas, such as threshing floors, while urban societies may see the development of specialist processing facilities for production of food (e.g., centralized bakeries as seen in Classical cities) or production of foodstuffs as commodities. Archaeological study of food processing thus illuminates not only nutrition but also the socioeconomic aspects of food production. Only in recent years have archaeologists fully realized the potential of this material archive to allow the study of plant processing systems. Of particular importance in studying plant processing technologies has been the development of plant residue analysis, especially of starches, which has broadened the range of contexts from which plant remains are recovered and greatly expanded the geographical range of those studies, as has the development of high-powered microscopy of tuber and other macrofossil remains.

Key Issues/Current Debates/Future Directions/Examples

It is fair to say that recent decades have seen revolutionary advances in the archaeological *identification of processing technologies and sequences* which have caused major reevaluations of the economic conditions and food systems of past societies. While at one time the function of processing-related artifacts – such as pots, stone tools, and grinders – could only be inferred from sometimes contradictory ethnographic analogues, residue and use-wear analysis are now providing increasingly accurate and widespread tools to identify directly traces of past artifact function. Residue analysis identifies the traces of past use of artifacts and installations through identification of plant, animal, and mineral substances adhering to or absorbed into their surfaces, including starches, phytoliths, and chemical biomarkers. Analysis of starch residues and phytoliths has been particularly effective in identifying plant-related processing tools. In the Asia-Pacific region, such studies have not only demonstrated tuber and seed exploitation 40,000–50,000 years ago (Barton et al. 2005; Summerhayes et al. 2010) – among the earliest in the world – but have confirmed the use of tubers in the independently evolved early agricultural systems of highland New Guinea (Denham et al. 2003) and the evolution of intensive nut exploitation in Holocene Australia (Cosgrove et al. 2007). These examples serve to illustrate the fact that archaeological understandings of plant use in the tropical zone have been disproportionately improved by starch and residue research – a fact that has perhaps gone relatively unnoticed in the traditional Old World centers of archaeobotanical research – in great part because food production systems in the wet tropics are often focused on otherwise poorly preserved tuber, leaf, and fruit crops. Another region which has undergone this revolution is tropical America, which now has a rapidly developing prehistory of crop use supported by microfossil research extending into the earlier Holocene (e.g., Perry et al. 2007).

Use-wear analysis, which aims to identify traces of use via the abrasion patterns found on tools, is a particularly promising area of research for understanding past food technologies. It has been useful for identifying processing artifacts, including both stone blades and grinding stones, though difficulty still persists in unambiguously separating the wear traces from different activities (Goodale et al. 2010). Sickle wear – the glossy sheen on stone blades caused by cutting grasses, including cereals – has long been used as an indicator of cereal use at Natufian and early farming sites, though it is very difficult to separate the harvest of cereals from other grasses, such as reeds. Recent studies of Natufian sites have used experimental references to identify not only an increased focus on plant processing over time but also a great increase in the diversity of processing activities during this period.

Use-wear analysis is strongly dependent on *experimental archaeology* – in which ancient practices are replicated or reconstructed through a controlled series of steps – as a source of analogues. This approach has a long pedigree

with pioneering studies by Jack Harlan first demonstrating the potential of wild cereals as a sustainable source of food in Southwest Asia. It also has been of great importance for understanding the techniques and effects of plant food processing worldwide (see other references in this section). A particularly important set of harvesting experiments established that sickle harvesting positively encouraged the development of domestic traits in Old World cereal crops by selecting for non-shattering crop phenotypes and its introduction could lead to domestication in a few generations (Hillman & Davies 1990). This observation helped refocus archaeobotanical studies on how different crop processing practices could effect and even trigger the trajectories of domestication. Interestingly archaeobotanical studies have demonstrated domestication in seed crops to have actually taken millennia (for a detailed discussion, see Fuller 2007). Beyond Southwest Asia, recent research has used replicative experiments to help identify nut processing techniques from the fracture patterns on the remains of the nuts themselves as a means of testing earlier models of intensive plant exploitation (Asmussen 2010).

Experimental studies have commonly been used in combination with *ethnographic studies*, namely, accounts of actual food processing behavior in societies around the world. Such studies have been important for understanding both the range of food processing techniques and their ubiquity across the occupied continents in very different societies. As noted above, ethnographically informed models of crop processing sequences in Southwest Asia transformed the ability of archaeologists to understand how people processed plant foods in the past by providing the means to directly identify them in ancient datasets and understand some of the variations such processes cause in the archaeobotanical record, thus helping to refine interpretations of harvest and other activities. Such an approach demonstrated that the cultivation of low-return small-seeded grasses in North America may have been adopted as they could be processed in the winter when lack of other tasks meant the return was worthwhile (Gremillion 2004).

More importantly ethnographic and ethnohistorical studies have also extended our knowledge of how foragers utilize and process seeds and other plant resources and have contributed to the *reconceptualization of agricultural origins*. Of special interest are the accounts of foraging behavior in Indigenous Australia, the American northwest, and parts of the Americas, which have shown a close similarity between many "nonagricultural" plant harvesting and processing activities and those of agriculturalists (see papers in Denham et al. 2009a). For example, studies in Australasia demonstrate the relatively late focus on intensive seed and tree-nut exploitation – enabled by the grinding and detoxification of seeds and toxic species – in the case of the Atherton Tablelands within the last 2000 years (Cosgrove et al. 2007). It is increasingly clear that intensive use of seeds, tree nuts, and tubers, including the tending and even replanting of favored food-producing species, as well as storage, detoxification, and grinding, is undertaken by foragers. The distinction between a nonagriculturalist and an agriculturalist is often quite arbitrary and in many cases comes down to the presence or absence of morphologically domestic taxa. This insight is largely derived from work in the Americas, Australia, and parts of Africa and East Asia but has veracity for understanding the transition to sedentary farming lifeways in Southwest Asia and other classic agricultural hearths, where once simple binary transitions from forager to farmer can now be challenged on the basis of ever more detailed archaeological evidence (Zohary et al. 2012).

Within the *narrative of ancient agricultural origins and sedentism*, food processing technologies have a central role. To put it simply, the long-term sustenance of large groups of people living together in a restricted space – as we find in farming societies – in most cases outstrips the capacity of environments to provide it. Sedentary societies are prone to food shortages because they are unable or unwilling to adopt residential mobility as a means of overcoming shortages in

foods caused by seasonal cycles of abundance or less predictable factors such as loss due to fire or pests. As noted above, processing techniques are a means of unlocking the nutrients in potential foods that may be available but otherwise unused to thereby increase the dietary potential and – in ecological terms – the effective carrying capacity of those environments. Processing of otherwise inaccessible foods lies at the core of seed-based agriculture in the Old World, China, and parts of the Americas and Africa and when combined with storability accounts for their prevalence among societies in need of vegetable foods.

Extracting the nutritional value requires considerable energy expenditure in grinding or other forms of processing. The question must arise: why bother? For high-density populous societies such processing of seeds and other crops may be the only means of supplying core calories for people and their animals. For earlier societies, especially late foragers, the question is very pertinent. Recent archaeological research – in great part fuelled by the methods summarized above – has shown that increased reliance on plant processing as a subsistence strategy emerges in the later millennia of the Paleolithic era. We know that nut cracking predates the evolution of *Homo sapiens* – and may be an ancient ancestral behavior as chimpanzee populations also use this practice. However, use of complex processing and a wider range of resources, including tubers and toxic seeds, is seen in parts of Europe, Southeast Asia, and Sahul dating from 30,000 to 50,000 years ago (Barton 2005; Revedin et al. 2010; Summerhayes et al. 2010). In the higher latitudes during the cooler periods of the Pleistocene, the answer is not simply one of supplying base calories. Meat-focused diets can lead to nitrogen poisoning and a significant plant food dietary input (in most places 25 %) is required to buffer the nitrogen input from meat (Jones 2009). In highly seasonal environments, nuts, fruits, seeds, and tubers provide highly abundant and widespread potential sources of such foods, as long as appropriate processing methods are applied. Once considered a late Pleistocene development as part of the preagricultural "broad-spectrum revolution," the exploitation of a wide range of plants may have been a key human adaptive strategy for many millennia and contributed to the successful colonization of the world by early human populations. Processing techniques and sequences in all their complexity and diversity were part of that adaptive range of skills and were fundamentally important in realizing the nutritional potential of exploitable plants in those regions.

Intensive use and eventual domestication of plant species seems to have emerged from this long tradition of plant exploitation in some regions, perhaps as a result of specialization in plant subsistence practices on a narrow range of exploitable resources (see Denham et al. 2009b). As greater evidence emerges of the antiquity and scope of plant food processing and the extended period of domestication itself becomes clear, it is less and less easy to identify processing activities as a trigger for the domestication process, though some new technologies may have increased the chances of domestication happening. Rather, processing activities allowed much greater effective use to be made of a wider range of plant foods, which perhaps empowered communities to experiment with and find plants that could provide the reliable, bulk sources of calories on which sedentary subsistence could be based and that eventually were domesticated and farmed. Processing technologies thus provided the means by which plant selection and domestication could become possible, but their development does explain neither why domestication itself happened nor why the cultivation of domesticates became the chosen means of exploiting plant species for many societies around the world.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Bananas: Origins and Development
- ▶ Capsicums/Chiles: Origins and Development

▶ Domestication Syndrome in Plants
▶ Ethnoarchaeology
▶ Human Evolution: Use of Fire
▶ Kuk Swamp: Agriculture and Domestication
▶ Maize: Origins and Development
▶ Niah Caves: Role in Human Evolution
▶ Paleoethnobotany
▶ Plant Domestication and Cultivation in Archaeology
▶ Squash: Origins and Development
▶ Taro: Origins and Development
▶ Wheats: Origins and Development

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Plantation Archaeology

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Introduction

The post-Columbian expansion of European colonial interests into the Americas, Africa, Oceania, Indonesia, and Southeast Asia resulted in the development of a number of strategies both for the settlement of European colonials and for the exploitation of natural resources, both

endemic and introduced. Among these strategies was the development of large-scale monocrop agricultural establishments that produced tropical and subtropical agricultural commodities for the European and colonial markets. By the early seventeenth century, these establishments became widely known in the English-speaking world as "plantations." Having used a variety of labor extraction strategies to produce a variety of crops, many plantations were abandoned, or their landscapes transformed, by the early twentieth century, resulting in a rich archaeological record that has been systematically explored since the early 1970s. The scope of plantation archaeology extends from the US South through the Caribbean, the Atlantic and Indian Ocean islands, East Africa, and the Pacific.

Definition

Plantation archaeology is a somewhat difficult term to define, largely because the definition of "plantation" is itself somewhat ambiguous. In common practice, a plantation is a large-scale monocrop agricultural estate, generally worked by resident labor. However, the term "plantation" has historically been used to define vanguard colonial settlements, which may or may not focus on the production of agricultural commodities and which may include towns, farms, seignories, and other settlement forms. Hence, the sixteenth-century English settlement of lands escheated in Southwestern Ireland from the rebellious Earl of Desmond and his confederates was known as the Munster Plantation, the goal of which was to "plant" loyal English subjects into a hostile Irish landscape (Delle 1999), while the early seventeenth-century Ulster Plantation brought "British" subjects, both Scottish and English, to the northern counties of Ireland (see Lyttleton & Rynne 2009). The same concept of plantation informed the early English settlement of the New World, including the Plantation of Virginia and Plymouth Plantation; to this day the US state of Rhode Island is officially named the State of Rhode Island and Providence Plantations.

The concept of plantation as colony was similarly transferred to the initial British occupation of the Caribbean island of Barbados, which began in 1627. During the early seventeenth century, the British settlement of Barbados roughly followed the models established in Ireland, Virginia, and New England, inasmuch as the settlement of the island was marked by the establishment of relatively small farms, worked primarily by British yeomen and indentured servants, assisted by a relatively limited number of enslaved Africans. In the 1640s, large-scale sugar production was introduced to Barbados. Based on antecedents in Dutch-controlled Brazil and the Atlantic islands (Madeira, the Azores, and Cape Verde islands), the introduction of sugar cane production to Barbados resulted in the development of the plantation system, worked primarily with enslaved African laborers and their descendants. By the end of the eighteenth century, the term "plantation" would lose its sixteenth-century connotation and would primarily be used to describe a large, privately held estate, worked by coerced labor, and that produced agricultural commodities for export back to Europe.

While some work has been done on the earliest "plantation" sites in Ireland (Lyttleton & Rynne 2009), Virginia (e.g., Noël Hume 1982), and New England (e.g., Deetz 1996), the majority of work defined as plantation archaeology has focused on the later manifestation of the plantation system and includes excavations and analyses of plantation great houses, overseers' houses, industrial works, and the quarters and villages of enslaved and other coerced workers.

Historical Background

Although plantations in the US South were the focus of archaeology as early as the 1930s (e.g., Ford 1937; Noël Hume 1963), much of this early work was focused on reconstructing architectural details of the grand houses of elite plantation owners and rarely if ever considered the plantation as a unit of analysis (see Singleton 1985). The genesis of what is currently referred to as plantation archaeology can be traced to two

projects, one conducted in the US South in the late 1960s and early 1970s, the other on the island of Barbados in the early 1970s. In the former, Charles Fairbanks led a team in the excavation of slave housing at Kingsley Plantation in northeastern Florida (Fairbanks 1974), in the latter, Jerome Handler and Frederick Lange led an archaeological investigation of the Newtown Plantation on Barbados (Handler & Lange 1978). In both projects archaeologists sought to understand the nature of the lives of the workers enslaved on the plantations within the context of the global commodities markets of which they were a part. In the case of the Kingsley Plantation site, Fairbanks and his students excavated slave quarter sites. On the Newtown Plantation site, Handler and Lange concentrated their efforts on analyzing the skeletal remains and material culture recovered during the excavation of a slave-period cemetery. In both cases, the archaeologists analyzed material culture to determine the degree that African cultural traits survived in the New World and in both cases appear to have been surprised that no discernible pattern of survival could be detected archaeologically.

In the later 1970s and into the 1980s, an increasing number of plantation sites were excavated, particularly in the US South. Due in large measure to heritage management laws being passed by both the United States government and by the governments of its constituent states, large development projects in the US South began to incorporate archaeological investigations into preconstruction impact reports filed with various government agencies. Several important archaeological studies resulted from what was generally referred to as cultural resource management (CRM) studies on former plantations. Even where excavations were not mandated, thoughtful landowners occasionally funded excavations before destroying plantation sites.

Among the first plantations to be systematically excavated and analyzed was the Cannon's Point Plantation, the focus of a dissertation project in the early 1970s. The project, led by Fairbanks's student John Solomon Otto, was conducted on one of the barrier islands off of the coast of Georgia; the site was threatened by a planned subdevelopment on the island (Otto 1984). Rather than try to identify continuities with African antecedents, Otto focused his study on examining the plantation as a manifestation of complex society. Understanding that the hierarchical nature of the plantation economy would likely be reflected in the material culture of those who lived and worked on the estate – because plantation society was structured by both race and class – Otto hypothesized that status differentiation should be visible between the planters and overseers, and the overseers and slaves. Although status differentiation could be inferred based on the economic class of the parties involved, Otto's greater contribution was in his methodology which considered the plantation as an integrated system that included a number of cultural and physical features.

Practically simultaneous to Otto's study in Georgia, William Kelso began a series of salvage excavations on the site of the former Kingsmill Plantations near Williamsburg, Virginia. Reportedly as part of a purchase agreement through which the Anheuser-Busch Corporation acquired the land from the Colonial Williamsburg Foundation, the corporate owners of the Kingsmill tract agreed to fund archaeological investigations ahead of brewery, theme park, and upscale gated community development. Over the course of several years in the early 1970s, Kelso excavated 15 sites on the sprawling Kingsmill property that ranged in date from the early seventeenth through the late eighteenth century. The Kingsmill project succeeded in documenting how plantation landscapes had changed during the crucial moment when colonial investors shifted their strategies from rent extraction from tenant farmers to tobacco plantation production using enslaved African labor. At Kingsmill, Kelso was able to document how architectural styles and technologies changed during the seventeenth and eighteenth centuries. Notably, Kelso's project was among the first to identify "root cellars" in slave quarter sites, a feature now commonly recognized in earthfast structures associated with African descent people in Virginia (Kelso 1984). As had been the case with Otto's study, Kelso had

the great advantage of examining numerous components of the site and thus contributed to the developing methodology of plantation archaeology, particularly concerning diachronic changes in plantation landscapes. In a similar project, Wheaton and Garrow analyzed material culture from two plantation sites known as Yaughan and Curribbo in the low country of southeastern South Carolina. By comparing assemblages from three slave quarters from the two plantation sites, the archaeologists focused on interpreting how enslaved populations adapted to their conditions of plantation life and labor, using the processual concept of acculturation to frame their analysis.

Changes in plantation landscape and social organization in the United States did not end with the abolition of slavery following the cessation of the US Civil War. In another landmark plantation study funded by virtue of heritage management legislation, Charles Orser documented the transformation of the plantation landscape of Millwood Plantation, once the property of the Calhouns, one of South Carolina's wealthiest and most powerful families. In his study of post-emancipation Millwood, Orser used archaeological evidence to analyze how both emancipated workers and their former slave masters adjusted to the conditions of the postbellum south and how the material realities of plantation life were transformed in such a way as to reinforce the existing plantation social hierarchy through the agency of tenant farming and sharecropping. Orser's remains one of the few studies of an America plantation to focus specifically on post-emancipation social structures; his study is also notable for being among the first plantation studies to break from the constraints of the methodologies and theoretical constructs of processual archaeology, using a Marxian framework to understand the material record of economic and social constructs (Orser 1988).

The practice of plantation archaeology has not been restricted to the United States. Inspired by the success of plantation archaeology in the US Southeast, several archaeologists subsequently conducted archaeological projects on Caribbean plantation sites. In the early 1980s, Douglas Armstrong undertook the archaeological investigation of Drax Hall, a late seventeenth-/early eighteenth-century Jamaica sugar plantation. Armstrong's study was notable for recognizing the importance of house yards to enslaved African-Jamaican plantation workers, as well as for his theoretical approach which sought to understand how plantation culture was transformative for all those enmeshed within it (Armstrong 1990). In a later study at Seville Plantation, Armstrong and his students were able to document variation in the spatial layout of temporally distinct slave villages within the same site (Armstrong & Kelly 2000). Barry Higman, an Australian historian who lived and worked in Jamaica for several decades, simultaneously excavated a plantation site at Montpelier Plantation.

In Montserrat, the social geographer Lydia Pulsipher collaborated with the archaeologist Mac Goodwin to study historic land use patterns at Galways Plantation. Pulsipher and Goodwin's work was notable as it incorporated the study of provision gardens into plantation archaeology. In much of the English Caribbean, particularly Jamaica, enslaved workers were required to provide food for themselves, which was generally grown both in kitchen gardens found in house yards and on small farms which they maintained in peripheral areas of plantations known as provision grounds. Pulsipher and Goodwin's work was among the first to archaeologically explore this element of the plantation landscape (see Pulsipher & Goodwin 1999).

By the 1990s many plantation archaeologists accepted that individual plantations were systems integrated into wider global socioeconomic systems. Following the political economic turn in anthropology that was then current, studies like that conducted by James Delle on coffee plantations in the Blue Mountains of Jamaica took a regional approach to the archaeological analysis of plantation landscapes. Delle (1998) argued that plantation landscapes were multi-scalar phenomena that could and should be analyzed at several scales, including the individual household, the village of which households were a component part, the plantation, and the

region, defined either geographically or socially (Delle 1999, 2002, 2011). Similar studies were conducted on the Caribbean islands of St. Eustatius and Tobago (see section "Further Reading").

Key Issues

Over the years, a number of key issues have been raised in plantation archaeology. Among the earliest and most persistent is the search for African "survivals," sometimes called Africanisms, cultural traits that survived the middle passage over the Atlantic and that are represented in the material culture of enslaved populations. Early archaeologists were perplexed as to why African cultural traits were so rarely found on plantation sites; some early archaeologists concluded that the process of culture change, initially framed as acculturation, was rapid indeed. By the mid-1990s many plantation archaeologists abandoned the search for African survivals, and those still interested in the concept of culture change began to reimagine plantation communities as creolized communities, the process of creolization being one of ethnogenesis emerging from multiple antecedents and resulting in multiple local variants.

Among the most fascinating of creolized material culture are a variety of low-fired earthenwares recovered from diverse plantation communities throughout the Caribbean and North America. Initially recognized as being produced by indigenous communities in the US Southeast, these ceramics were initially referred to as "Colono-Indian Ware" but were later recognized as having been produced, at least in part, by enslaved Africans and their descendants on southern plantations (Ferguson 1992). Similar ceramics have been identified and analyzed on multiple islands in the Caribbean including Jamaica (where they are called "yabba"), Guadeloupe, St. Eustatius, and Nevis. That some of the ceramics have been found in unusual contexts (like the bottom of rivers) and with unusual markings have led some archaeologists to conclude that these ceramics were sometimes used in syncretic rituals by enslaved Africans and their descendants (Ferguson 1992).

In both Caribbean and US plantation contexts, low-fired, locally produced earthenwares shift from being dominant in seventeenth- and early eighteenth-century assemblages to nearly disappearing by the opening decades of the nineteenth (Higman 1998). This recurring phenomenon has led archaeologists to explore the degree to which enslaved plantation communities exerted some level of economic sovereignty through the establishment of modes of exchange that existed beyond the control of the plantation owners and their white managers, using such exchange systems to purchase refined earthenwares imported from Europe (see section "Further Reading"). In the postcolonial context, phenomena such as this have resulted in some reconsideration of the nature of colonial enterprises and the inherent social relationships that existed on plantations as integrated components of those colonial realities.

One of the key issues facing plantation archaeology is the degree to which plantation landscapes are preserved, and how such preserved landscapes are used to create historical interpretations about the plantation past. Private and public entities in the United States have gone to great lengths to preserve, restore, and interpret houses and landscapes associated with past American presidents. By historical coincidence, seven of the first ten American presidents (Washington, Jefferson, Madison, Monroe, Jackson, Harrison, Tyler) either grew up on or owned slave-based plantations as adults. Each of these houses has been preserve and is open to the public; at some of the houses, notably Washington's Mt. Vernon, Jefferson's Monticello, Madison's Montpelier, and Jackson's Hermitage, archaeology of the quarters of the enslaved has been incorporated into the historical interpretation of the houses and the early decades of US history. Presenting the issue of slavery to the public at such venues remains a difficult and sometimes controversial task.

Like much historical archaeology practiced throughout the world, plantation archaeology

has increasingly incorporated local descendant communities and other stakeholders into the excavation, analysis, and interpretation of plantation sites. Among the most notable of such public archaeology programs is the long-term project conducted at the Levi Jordan Plantation in Texas (McDavid 1997). Again, like many different archaeologies now being practiced, plantation archaeology has increasingly been addressing issues of concern to local populations, including the difficult topics of race and racism, gender and sexuality, and power and resistance which are so deeply imbedded in the history and archaeology of plantations (see section "Further Reading").

International Perspectives

Plantation archaeology is, by its nature, an international pursuit. While plantation archaeology may have begun in the US South, it has been conducted on a number of Caribbean islands including Jamaica, Dominica, St. Croix, Cuba, the Bahamas, Guadeloupe, and Martinique. In recent years plantation archaeology has also been initiated in East Africa and Brazil and at Mexican *haciendas* in the Yucatán and Guerrero, among other localities (see section "Further Reading"). With several notable exceptions, particularly from Great Britain and France, the majority of plantation archaeology projects are still being conducted by historical archaeologists either born in the United States or now living there.

Future Directions

While the future is difficult to predict, there are several directions that plantation archaeology might take. Clearly, the public interpretation of enslavement on plantations will continue to be refined. The scope of plantation archaeology can likewise be expanded; again with some notable exceptions of projects conducted on coffee plantations in the Caribbean (Singleton 2001; Delle 2011; Reeves 2011) and clove plantations in East Africa, the majority of projects have been conducted on sugar, tobacco, and cotton plantations, primarily in the Atlantic Basin, and primarily worked by enslaved African laborers and their descendants. As plantation archaeology moves forward, more sites in the Indian Ocean, Central and Southern America, the Pacific Islands, and the former French Indochina will likely open new avenues for interpretation. Similarly, as the breadth of commodity production expands to, for example, bananas, pineapples, rubber, sisal, and citrus, our understanding of the material life of the plantation will undoubtedly become broader.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Ceramics: Colonoware
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Community Archaeology
- ▶ Consumption, Archaeology of
- ▶ Cultural Heritage and Communities
- ▶ Deetz, James (Historical Archaeology)
- ▶ Engendering Historical Archaeology
- ▶ Estate Landscapes in Historical Archaeology
- ▶ Ferguson, T. J.
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ Historical Archaeology in Latin America
- ▶ Mexico: Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Plimoth Plantation: Public Archaeology
- ▶ Sugarcane: Origins and Development

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Plimoth Plantation: Public Archaeology

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Introduction

Plimoth Plantation, an open-air living history museum located in Plymouth, Massachusetts, uses archaeology to shed light on the past. Established in 1947, the museum interprets the history of the seventeenth-century English colonists later called the Pilgrims and the Wampanoag Native people who have lived in the area for millennia. Today, the museum features a recreated seventeenth-century English Village, a recreated Wampanoag summer Homesite, a Crafts Center, and a replica of the ship Mayflower that brought the colonists to New England in 1620.

Definition

The history of Plimoth Plantation is closely tied to the development of historical archaeology in New England. The museum's founder, Henry (Harry) Hornblower II (1917–1985), prepared himself for a career in archaeology, but, following WWII, poured his energies into founding a living history museum instead, which he established on his family's summer estate three miles south of Plymouth Rock. His encouragement and guidance helped establish historical archaeology as a field in the 1960s and 1970s. Today, more than 60 years later, Plimoth Plantation uses experimental

archaeology, artifacts, and traditional technologies to recreate the seventeenth century.

Key Issues

Narrative/Examples

While summering in Plymouth as a boy, Harry was introduced to archaeology by the estate gardener, Jesse Brewer. While most of their collecting involved surface hunting, in 1934, Harry and his brother uncovered a Contact-Period Wampanoag burial site on the estate. Harry's father Ralph, a Boston stockbroker, called in expert help: archaeologist Fred Johnson from the Peabody Museum at Harvard University, who became a mentor to Harry.

Harry prepared himself for a career in archaeology. He studied at Harvard University with historian Samuel Eliot Morison and archaeologists Doug Byers and J.O. Brew. Additionally, Harry spent a year at the University of California at Berkeley studying anthropology with Alfred Kroeber. After several years of excavating and surveying, Harry decided to focus on "cellar hole archaeology" or archaeology of the English colonists. Along with colleagues from the Harvard Excavators' Club, he dug at two Plymouth County sites in 1940–1941: the RM Site on the Hornblower property and the Winslow Site in Marshfield (Gomes 1985; Beaudry & George 1987; Beaudry et al. 2003).

Another of Harry's mentors was Charles Strickland, a Boston architect with ties to historical Plymouth. Strickland and his father, Sidney, had excavated a site associated with Pilgrim John Howland, just north of Plymouth, in 1937 (Beaudry & George 1987). Strickland worked with Harry on developing a driving trail of Pilgrim houses.

A family friend connected Harry with the National Park Service, which had been using federal relief money to excavate Jamestown in Virginia. As Harry's correspondence indicates, the NPS was considering undertaking a project in Plymouth in 1939. Harry discussed several ideas, including Strickland's proposed driving trail, to present seventeenth-century life in context.

World War II interrupted the Park Service's ideas of coming to Plymouth, as well as Harry's career path. Following service in the OSS in Europe, Harry returned to his wife and son in Boston and joined the family brokerage firm. In 1945, Harry's father Ralph donated $20,000 to the Pilgrim Society, which operated a museum of Pilgrim possessions, located in downtown Plymouth. A traditional museum housed in a neoclassical structure, Pilgrim Hall, displayed Pilgrim relics in cases. Ralph's donation was to further his son's vision of contextualizing the artifacts in reconstructed houses (Gomes 1985; Baker 1997).

It became evident that the project was beyond the scope of the Pilgrim Society, so Plimoth Plantation was founded in 1947. Its purpose was "...to [further] the historical education of the public with respect to the struggles of the early settlers in the Town of Plymouth, with the expansion of that settlement and the influence of the Pilgrim Fathers throughout the world" (Articles of Incorporation).

Harry envisioned a Pilgrim Village, a recreated Mayflower, and a Wampanoag exhibit. To this end, Harry assembled a team of foremost historians, architects, and archaeologists to advise him. To test the idea, two recreated structures were built on parkland near Plymouth Rock. First House opened in 1949, and First Fort two years later. Both buildings reflected current information from excavations and restoration projects (Baker 1997).

In 1955, Harry's grandmother bequeathed him part of the family estate so that Harry could expand his project to encompass an entire village. Four years later, Plimoth Plantation opened at its current site, featuring four recreated houses as well as the replica fort that had been moved from the waterfront.

To implement the museum's original intention of portraying Natives as well as Pilgrims, Harry hired Dr. James Deetz, a young archaeologist from Harvard University, in 1959 to create a Native exhibit, which included stone tool demonstrations and a bark wigwam. Later that year, Harry encouraged Deetz to excavate his first colonial site, the Bartlett Site, located just

Plimoth Plantation: Public Archaeology, Fig. 1 James Deetz and Harry Hornblower at the Bradford Site, Kingston, MA, 1966

south of the museum. Deetz soon began to focus on the new field of historical archaeology, both in his position at Plimoth Plantation, and as a professor at Brown University (Deetz 1977; Deetz & Deetz 2000). Dozens of archaeologists who are still working today studied with Deetz in the 1960s and 1970s (Fig. 1).

Major Impact

In 1965, Deetz led Plimoth Plantation in a self-assessment. Taking into account the new social history and its emphasis on everyday life, the museum began to shift toward living history. The museum added livestock to its recreated landscapes. Hosts and hostesses in tidy "Pilgrim" clothes were replaced by more authentically garbed interpreters, who performed daily chores and activities (Baker 1997; Travers 2010).

Archaeology began to influence the appearance of Plimoth Plantation, as the museum incorporated new evidence from excavations led by Deetz as well as research by architectural historians like Richard Candee and Cary Carson. A new village structure, Hopkins House, was built in 1968, reflecting current research in timber framing. Building activities like thatching were completed in front of the public.

In 1972, a salvage excavation (C-21 Allerton Site) at a construction site in nearby Kingston, MA, yielded an exciting find—posthole evidence for earthfast colonial structures (Deetz & Deetz 2000). Museum staff built the Billington House in the English Village, designed by architectural historian Henry Glassie, based on these finds. The house was earthfast, built to a similar size as the structure at the Allerton Site (Baker 1997; Travers 2010).

That same year, Plimoth Plantation established the Native Studies Program, which worked with local Native communities to improve the Native exhibit. Staff from the Wampanoag, Narragansett, and other nations used a combination of archaeological evidence, oral tradition, and experimental archaeology to construct and interpret a summer Wampanoag Homesite with buildings and cornfields (Baker 1997; Travers 2010) (Fig. 2).

Plimoth Plantation's commitment to experimental archaeology expanded over the next decade. In 1978, staff in the village began first-person interpretation, immersing themselves in the characters of specific Pilgrims. As a result of a 1984 NEH-funded research grant, staff traveled to England and the Netherlands to better understand the villages, towns, and cities where the colonists originated. Museum artisans began working with British architectural historians such as Richard Harris to recreate buildings like the new Fort/Meetinghouse, erected in 1986. Staff built new structures in costume, in front of the public, using period tools and techniques (Baker 1997; Travers 2010).

In 1999, the museum officially identified the historical sources used by staff members to research and fabricate the English Village and Wampanoag Homesite exhibits. In addition to documentary sources, contemporary images, and artifacts, the museum is committed to the use of recreated technologies and experimental archaeology to recreate material aspects of the past.

Plimoth Plantation's Crafts Center has been a center for recreating seventeenth-century technologies since 1992. Staffed by colonial and Native craftsmen, the Crafts Center produces authentic reproductions of period artifacts for

Plimoth Plantation: Public Archaeology, Fig. 2 Women tending gardens at the recreated Wampanoag Homesite

use in the outdoor exhibits. Potters examine archaeological ceramics to reproduce forms and decoration. Reproductions of English pottery include Borderware (aka Tudor Greenware) and North Devon slipware. Native potters examine the incised designs on shards from local excavations to make pots for use at the Wampanoag Homesite.

Experimental archaeology at the museum is closely tied to recreated technologies. In 2001, Crafts Center staff worked with archaeologists David Dawson and Oliver Kent to construct a brick and stone wood-fired kiln (White 2002), using information from excavations in Devon and Somerset. The wood-fired kiln is used several times a year.

Another ongoing project involving experimental archaeology is the construction of outdoor wood-fired bread ovens in the English Village. While staff members have been baking in wood-fired ovens since the 1980s, museum researchers have tried to make ovens more authentic each time they rebuild one. The temporary nature of ovens made of mud allows staff and archaeologists to study what remains in the soil after they collapse. Sources for wood-fired ovens include cloam ovens from Devon, as well as engravings by French explorer Samuel de Champlain (Marcoux in press).

Experimental archaeology is a major part of the house-building program in the English Village. As the village is set in the year 1627, 7 years after the first colonists arrived, houses are continually replaced, so they do not look more than 7 years old. The ongoing program allows museum artisans to use evidence from current excavations. The museum's blacksmith relies heavily on archaeological artifacts in making hardware used in building the village structures. Each time a replica building is taken down, staff and archaeologists carefully examine what traces are left in the ground. Archaeologists like Emerson Baker use this information to help them interpret traces of earthfast structures at sites in northern New England (Fig. 3).

Archaeology is an important source in recreating the Wampanoag Homesite as well. Based on findings from the excavation of a Cape Cod cornfield, as well as documentary sources, Wampanoag Indigenous Program staff plant the corn in mounds, using fish as fertilizer, as was done for centuries (Nanepashemet 1993; Mrozowski 1994; Wall 2002). Plimoth Plantation horticulturalists have tapped into archaeological research to furnish the exhibits with period-appropriate plants like multicolored eight-row flint corn, researched by plant geneticists from the University of Massachusetts.

Plimoth Plantation: Public Archaeology, Fig. 3 Artisans hewing lumber in the recreated English Village

Plimoth Plantation: Public Archaeology, Fig. 4 Artisan Brian Bartibogue (Miq' Mac) demonstrates stone working in the Crafts Center

Today, public archaeology is an integral part of Plimoth Plantation's interpretation. In addition to exhibits in the Visitor Center, the museum interprets archaeology to the public in various ways. Sites on the museum's property, including the Wampanoag Homesite, have been excavated by the University of Massachusetts, particularly by the late Barbara Luedtke (Luedtke 1994). A Native artisan in the museum's Crafts Center displays some of these finds from the property alongside of the reproductions he makes in front of the public. Native interpreters are careful to use slightly different materials in their demonstrations, so reproduction artifacts are not confused with originals by future excavators (Fig. 4).

For more than 60 years, Plimoth Plantation has followed the vision of its founder, Harry Hornblower, focusing on historical archaeology as a means to present seventeenth-century life to the modern public.

Cross-References

- ▶ Beaudry, Mary C.
- ▶ Deetz, James (Theory)
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ North America (USA): Historical Archaeology

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Poland: Cultural Heritage Management

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Introduction

Polish archaeology belongs to the Central European school of archaeological thought (e.g., Härke 2002; Marciniak 2006). It is a specific version of the culture-historical school characterized by diffusion and migration as major causative factors of culture change, spatial and temporal dimensions of material culture presented in the form of archaeological cultures and research strategies applying principles of inductionism and empiricism and concentrated upon describing and cataloguing empirical material, typological methods, and relative chronology. It has deliberately avoided any substantial theoretical debate.

Historical Background

Archaeology practiced in communist-governed Poland (1945–1989) was a state-funded discipline divided into four sectors with clearly defined roles and duties. These comprised (1) the Polish Academy of Sciences in charge of conducting research and setting up academic standards, (2) university departments responsible for education supplemented by research activities, (3) museums aimed at handling collections and presenting them to the public, and (4) a state heritage body known as the Centers for Monument Protection to protect and manage archaeological materials and conduct small-scale rescue excavations. Protection of archaeological sites and objects was regarded as a relatively unproblematic and straightforward enterprise but treated with little esteem by the archaeological community, the politicians, and the general public alike.

Polish archaeology as well as cultural and archaeological heritage management policies

and practices changed dramatically over the last two decades following the collapse of the Iron Curtain and the Poland's ascension to the European Union. This period has been marked by the implementation of European regulations and development of a new doctrine of archaeological heritage. It is further characterized by greater destruction of this heritage due to unprecedented large-scale large investments, intensive agriculture, commercialization, and new dimensions of public engagement (see also Lozny 1998; Kobyliński 2001a: 17). These developments led to the replacement of the hierarchical system of practicing archaeology by the application of neoliberal solutions in the archaeological heritage sector (Marciniak 2011). Investors became major sponsors of archaeological works and the market became a driving force in the archaeological practice.

Key Issues

Cultural and Archaeological Heritage Management

The idea of cultural heritage management was introduced in the post-1989 period following a steady move of funding responsibilities from the state to private developers. The concept of "management" implies decision making regarding the aims and means of attaining certain goals, selection of priorities, and a holistic approach to the research process. Managerial decisions based on argued presentation and justification has led to important changes in capturing archaeological data and assessing their significance and value. It also brought about new concerns regarding professional standards and accountability.

One of major developments in this period was increasing awareness of rapid destruction of archaeological sites and objects. Archaeologists have slowly become aware of their own responsibility to protect them (Kobyliński 2001a: 19). This has resulted in departing from hitherto used term "archaeological record" and replacing it by "archaeological heritage." It has been defined by as a finite nonrenewable physical and material resource. Each element of this heritage arguably possesses a unique value and collectively contributes to the cultural richness of the country and increasing understanding and knowledge of past societies. Consequently, archaeological substance has shifted from the scientific to the public domain and has been ascribed its cultural and social significance (Kobyliński 2001b: 77). Archaeology as a discipline began to be perceived and practiced as a public service. Protection and management of archaeological heritage is then no longer a matter of concern of the academic community but the public at large.

Legal Framework of Protection and Management of Archaeological Heritage in Poland

The last decade of the twentieth century brought about the emergence of a number of significant charters and conventions dealing with the conservation and preservation of cultural heritage issued by ICOMOS and the Council of Europe. They offered responses to emerging conservation and heritage issues. The questions they raised had a profound impact upon establishing a new doctrine of archaeological heritage in Poland as well as across Europe more generally. Particularly important were the 1990 ICOMOS *Charter for the Protection* and Management of the Archaeological Heritage (Lausanne Charter) and the European Convention on the Protection of the Archaeological Heritage of 1992 (Malta Convention). They defined policies for the protection of the archaeological heritage as constituting an integral component of policies relating to land use, development, and planning as well as of cultural, environmental, and educational policies at international, national, regional, and local levels. Less influential proved to be the 2000 Council of Europe's European Landscape Convention addressing protection, management, and enhancement of the European landscape.

Implementation of numerous issues advocated by these conventions has significantly broadened and strengthened the goals of archaeology to include, alongside research and valorization, also the integrated management, protection, and promotion of common shared archaeological heritage. Sites need be integrated within the historic

landscape, viewed holistically and not any longer perceived as consisting of only monumental objects. This approach can be seen as an outline of the new Polish doctrine of archaeological heritage.

These issues were combined in new legislation known as the Protection of Monuments and the Guardianship of Monuments Act, which was passed by the Polish parliament in 2003. The provisions of the Act stipulate that all archaeological sites regardless their quality and significance are protected by law. Investors have been officially obliged to cover all costs of preventive archaeological works including excavations, documentation, analysis, and publication of the results. Their research standards should remain identical to that of research projects. It is required that excavated materials are professionally analyzed and preferably published. They need to undergo proper conservation, whenever needed. A legislative framework for large-scale rescue projects is provided by the Space Management and the Building and Construction Act as well as the Law for Highway Constructions in Poland, both passed in 1994.

Institutional Framework of Protection and Management of Archaeological Heritage in Poland

The new legislation led to considerable changes in the organizational structure of institutions responsible for protection and management of archaeological heritage, in particular in the context of the dynamically growing number of preventive archaeology projects. This structure, however, has been in a constant flux resulting from different solutions put forward by subsequent governments. Consequently, an effective administrative system in this domain is still lacking. At present, there are two major institutions responsible for protection and management of cultural and archaeological heritage operating within two different administrative contexts.

The National Heritage Board of Poland is the state agency responsible for the national heritage. The office reports directly to the Minister of Culture and National Heritage. It is officially responsible for implementing the State's policy in the domain of national heritage. Its major objectives comprise setting up standards in the protection of national heritage, recording, documenting, and maintaining this heritage, and presenting it to the public.

At the same time, protection and management of cultural and archaeological heritage is the sole responsibility of the offices of the Provincial Conservator of Monuments operating in each of the country's 16 country provinces. They are responsible to the Provincial Governor, who himself is responsible to the Prime Minister. These offices are in charge of preparing and implementing the system of protection of culture heritage in their regions, collecting and archiving information about this heritage, monitoring existing cultural resources and integrating cultural heritage with natural landscape, spatial planning, and urban development. They are also responsible for issuing excavation permits and supervising all archaeological works.

Two contradictory solutions were also proposed in regard to management of large-scale preventive excavation projects. The first model assumed a leading role for a special institution operating under the auspices of the Ministry of Culture and National Heritage. It was in charge of selecting the contractor for archaeological works and their subsequent control. The provincial conservator offices were only responsible for issuing formal permits and remained in fact excluded from the decision making regarding other elements of the project. The second model allocated a leading role in these projects to the provincial conservation offices. In both models, some degree of professional control over standards and quality of preventive works was retained.

The current situation is considerably different. A special central governmental body responsible for large-scale preventive works no longer exists. The National Heritage Board of Poland in fact decided to withdraw from this duty leaving a vacuum with no independent quality control of works conducted during large-scale infrastructure projects by any external professional body. Selecting the contractor for archaeological work is now exclusively in hands of the investor. Controlling and reviewing responsibilities of such

work are conducted by the investor-appointed committees made up of investor-employed administrative staff, including archaeologists. This obviously rules out objectivity and neutrality of quality control.

Preventive Archaeology in Large-Scale Infrastructure Projects

The last 20 years were marked by huge infrastructure projects that demanded large-scale preventive excavations in association with pan-European and national investments. In particular, these comprised the pipeline from Siberia to Western Europe and the network of highways and expressways.

Preventive excavations related to the construction of the gas pipe in the early 1990s was the first major undertaking in the post-1989 period. It was carried out under the legal provisions established during the communist period but the wealthy Polish-Russian investor – EuroPolGaz – expressed good will and agreed to finance all archaeological works. The inception of gas pipeline preventive excavation projects initiated serious discussions on legal, organizational, and methodological standards of fieldwork and their implementation in practice. More generally, they set a precedent for the formulation of a new doctrine for the conservation and protection of archaeological heritage in the country. After some modifications, it was later implemented during highways projects.

The Polish highway program was passed in June 1995 and has been aimed at construction of 2,300 km of highways along with numerous expressways. Archaeological preventive excavations have been conducted in a strip of 80–100 m wide and have been pursued continuously since 1997. This huge undertaking involves a complex program which aims to detect, investigate, and document archaeological sites threatened by adverse effects due to scheduled constructions.

Large-scale infrastructure projects associated with these investments, built mainly by public and private investors largely in the Build-Operate-Transfer system, demanded preventive excavations and contributed to the commercialization of archaeological activities. This shift is manifested in the emergence of a large number of private archaeological companies, a tendency reported also in other countries of the region.

Major Challenges in Protection and Management Archaeological Heritage in Poland

Large infrastructure projects demanding archaeological works of unprecedented scale has rapidly and significantly reshaped Polish archaeology and created many unforeseen consequences. The discipline has been confronted with a huge number of excavations to be conducted at a fast pace and at a scale never experienced before. As a result, the vast majority of archaeological fieldwork in present-day Poland is almost exclusively carried out within the framework of preventive archaeology before the planned infrastructural projects. This includes survey, evaluation, recording, noninvasive prospection, and excavations.

One of the consequences of these developments is commercialization of the archaeological profession. The demand for contract work led to the setting up of numerous private archaeological firms and the emergence of a new and previously unknown category of professional group on the market. This move can undoubtedly be regarded as almost "revolutionary," especially considering the previously dominant model of small, almost "family" excavations.

With the advent of free-market regulations, the contractor is now being chosen on a commercial basis in a system of tendering in which the decisive factor is exclusively the proposed price. Offers proposed by private firms are commonly chosen due to their lower costs and possibility to complete allocated tasks in increasingly shorter time slots. Academic institutions are slowly being removed from this market.

The increasingly tight financial conditions and extremely short periods for preventive archaeology work make it clear that an implementation of the standard research routines is difficult to achieve. For example, in one of the 2009 tenders for archaeological works, the investor required excavations of 25 ha be completed in a period

of three months. In September 2008, in order to speed up the construction of highways in Poland, the General Directorate for National Roads and Motorways – the major investor – passed a law requiring a decision of the placement of any highway or expressway be linked with the permission for its construction. This means that all stages of archaeological works (e.g., survey, evaluation, legal and administrative procedures, as well as excavations) are to inevitably coincide with construction works.

To comply with increasingly tight requirements and lower tenders offered by the contractor, archaeological firms reduce a number of professional analyses they do and lower the standards of scientific documentation in order to accelerate the archaeological works and maintain the same level of income. Consequently, the quality of some of these works is below acceptable standards. Another unacceptable practice involves a deliberate falsifying of archaeological documentation to report an incorrect number of features. This situation led also to a growing number of unpublished archaeological data obtained during these excavations (see also Kobyliński 2006: 229–30). Unfortunately, neither the National Heritage Board of Poland nor provincial conservation offices have the necessary tools and resources to stop unethical and illegal practices.

The last two decades also marked the use of archaeological evidence for the creation of collective memories of local communities but in a manner different from past uses when archaeology was used to justify nationalistic claims. The public has become increasingly recognized as a stakeholder in the decision-making process regarding heritage management and its role as a consumer of the products of archaeological activity is apparent. Advances in information technology have enforced greater openness of archaeological activities and resulted in the breakdown of the previously dominant elitist attitudes of the professional archaeological circles.

This tendency has been manifested in a rapidly growing number of popular open-air festivals and fairs. The largest of them takes place annually in Biskupin, the icon of Polish archaeology, and has become a model for similar events organized by local museums across Poland. The first festival in Biskupin was organized in 1995 and was attended by c. 50,000 visitors (Brzeziński 1998: 499), and the number of spectators in succeeding years increased. The festivals proved to be commercially successful, though their anticipated educational functions have largely remained unmet. In order to attract visitors there is a tendency to create a mélange of various episodes from the past. Thus, the ancient Egyptians interact with the Slavs reenacting their medieval appearance, who themselves stand next to the prehistoric flint knappers. Serious public outreach projects do not exist.

Future Directions

Developments in protection and management of cultural and archaeological heritage are very dynamic in Poland. These processes have been recently further shaped by the global crisis and its consequences. Its impact on archaeology in Poland to date has not been as significant as in other countries in Europe and worldwide. Its effects has been diminished by a large number of continuing highway and expressway projects in relation to the Euro 2012 soccer tournament as well as a relatively good situation in the housing construction sector and real estate market.

Rapid changes in the last two decades led to absolute domination of private firms on the market of preventive archaeology contracts. Academic archaeology has had to accept that a vast majority of field activities has already been undertaken beyond its control. This milieu needs to work out an efficient strategy of accommodating the rapidly growing number of archaeological materials that need to be systematically studied, published, and properly stored.

In overall, the last two decades in protection and management of cultural and archaeological heritage in Poland have been characterized by emergence of new challenges solutions but also by a series of unresolved problems and issues. The legal and organizational framework remains imprecise and malfunctioned in places. There is no professional institution in charge of setting up,

effectively controlling and enforcing standards of preventive works, and public procurement law and free-market regulations are unclear contributing to lowering standards and quality of archaeological works.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ European Association of Archaeologists (EAA)
- ▶ Heritage Theory
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Nationalism and Archaeology: Overview
- ▶ Stakeholders and Community Participation
- ▶ UNESCO (1972) and Malta (1992) Conventions

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Polar Exploration Archaeology (North)

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Introduction

Archaeological work on polar exploration of the north is focused in the Arctic region and the

Arctic Circle. The first exploration of the Arctic is debatable, with some sources indicating the earliest being around 320 BCE. It was not until the mid-nineteenth century that exploration in the region was at its height. The search for a Northwest Passage, which would open a trade route linking the Atlantic and the Pacific, was the goal for most of the explorers at the time. Men such as John Franklin and his crew aboard the HMS *Erebus* and HMS *Terror* in 1845 set sail to find the passage, only to never be seen again. The many men who ventured into this region also left behind material culture, remnants of the age of exploration that today can help in the understanding of how other men survived such a harsh environment and how some men succumbed to it. Archaeology in the region to date is helping in solving how Franklin and his men all perished during their expedition, being used in locating the HMS *Erebus* and HMS *Terror*, and helping to understand how exploration expeditions operated at the time and how it can help in the preservation of the Arctic's heritage.

Definition

The archaeology of polar exploration in the north is focused more in the Arctic region or the Arctic Circle which today consists of the Arctic Ocean and parts of Russia, Norway, Iceland, Greenland, Finland, Sweden, and Alaska. Archaeology of exploration is focused on expeditions in locating the Northwest Passage and the North Pole. Exploration in the Arctic can be dated back to the classical period of Ancient Greece up until present times.

Key Issues/Current Debates/Future Directions/Examples

The Northwest Passage Expedition of 1845, led by Sir John Franklin with 129 men onboard the ships HMS *Erebus* and HMS *Terror*, was one of the worst disasters in exploration history with all men supposably perishing (Bertulli et al. 1997). Search and rescue parties found material, remains, and graves of the crew at King William Island and Beechey Island. Personal accounts with the Inuits in the area confirmed the last survivors died from starvation (Bertulli et al. 1997; Rondeau 2010).

Owen Beattie, a professor of anthropology at the University of Alberta, led a team to excavate sites on King William Island and Beechey Island with the aim to find artifacts and skeletal remains of the 129 men from Franklin's doomed expedition. The "Franklin Expedition Forensic Anthropology Project" ran for 10 years; investigations at King William Island led to the discovery of archaeological artifacts and human remains. The human remains showed signs of scurvy and further examination showed signs of cannibalism (Beattie & Geiger 1987).

It was on Beechey Island that Beattie and his team investigated the graves of John Torrington, John Hartnell, and William Braine, all were crew members of the Franklin expedition. Their bodies were remarkably preserved due the conditions of the region and being buried under permafrost for over a hundred years. Autopsies were carried out on Torrington and found that lead poisoning had led to possible mental and physical illness, weakening his body before dying of pneumonia (Beattie & Geiger 1987). The source of the lead poisoning was first linked to poorly made food cans (Farrer 1993), and most recently, a probable cause was linked to the use of a unique water system onboard both ships that was poorly made and resulted in lead poisoning of the crew (Battersby 2008).

To date the wreckage of these ships have never been found but are the first and only designated historic site(s) of Canada that have yet to actually be found (Parks Canada 2012). As of 2012, Parks Canada in association with the Underwater Archaeology Service is resuming their search for the HMS *Erebus* and HMS *Terror* using remote sensing techniques and site excavations (Parks Canada 2012). Inuit knowledge of the wreck is crucial to the investigations; rescue

parties in the search for Franklin and his men communicated with local Inuit people who claimed to have seen some of the men whom all later starved to death. Using oral history that has been passed down from generation to generation could hold the key to discovering the wrecks (Parks Canada 2012).

The lost Franklin expedition and its archaeological research background is one example of a current issue of polar exploration archaeology. Expeditions to the North Pole were also common at the time. The Ziegler polar expedition of 1903–1905 was a failed attempt to reach the North Pole. Unlike the fateful Franklin expedition, the expedition team led by Anthony Fiala were rescued with the loss of only one life (Capelotti 2011). In attempting to reach the pole, Fiala left supply caches at their base camp on Rudolf Island to their main base camp from a previous Ziegler expedition from 1901 to 1902. Very little is known about these sites, but their potential to provide new sources of archaeological data to study American polar ambitions at the turn of the twentieth century (Capelotti 2011). Research into the supply trail suggests that the supply route, which stretches 160 km, is a potential archaeological piece of evidence of American polar exploration in the Arctic. The research also revealed the potential danger of the sites being damaged by unsuspecting tourists, altering the character of the sites and making any archaeological studies problematic (Capelotti 2011). Svalbard, a popular tourist destination in the Arctic region, with cultural and natural heritage sites, is an example of polar tourism's footprint in archaeological and heritage sites. It was up until the 1970s that the collection of artifacts was common in Svalbard. Looting has since become a offense and is policed but, unintentional damage such as trampled surfaces around historic sites with archaeological potential to rock cairns being made by visitors, although it can be argued that it erases some traces of past activities and replacing them with new traces and new narratives of the site (Roura 2011).

Unlike Antarctica, the Arctic region is not defined by a land mass and is mainly a body of water. Under international law, the North Pole and the Arctic waters cannot be claimed by any nation. With reports suggesting that the Northwest Passage is navigational than it has been since the 1970s, Canada has made its claim to the waters as part of their territory (European Space Agency 2011). What this means for the historical and archaeological sites in this region remains unclear and if any mining to the area could cause damage to the sites. The opening of the Northwest Passage as a possible shipping and trade route also allows places like King William Island and Beechey Island to be easily accessible to people for the first time but also means previously unreachable sites could now be explored by researchers.

In 2007 in a meeting of heritage organizations, it was declared that

> "the Arctic region is important for global processes and is to be considered as precious heritage for humankind. The region includes a number of unique and outstanding natural and cultural heritage places which require protection, improved management and international recognition due to their vulnerability" (Nordic World Heritage Foundation et al. 2007).

The archaeology of Arctic exploration and the heritage of sites relating to exploration efforts in the Arctic is becoming increasingly popular among researchers and towards tourists. The opening the Northwest Passage and the thawing of ice will make the area more navigational for both archaeologists and tourists. These sites will have to be continually monitored with information signs explaining their archaeological significance and their heritage value.

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- ▶ Authenticity in Archaeological Conservation and Preservation
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- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)

▶ Ethics of Collecting Cultural Heritage
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▶ Heritage and Archaeology
▶ Heritage Areas
▶ Heritage Tourism and the Marketplace
▶ Historical Archaeology
▶ Modern World: Historical Archaeology
▶ Looting and Vandalism (Cultural Heritage Management)
▶ Polar Exploration Archaeology (South)
▶ Site Visitation and Interpretation: Management
▶ Vandalism and Looting (Ethics)

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Polar Exploration Archaeology (South)

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Introduction

Archaeology in Antarctica has its routes in the work of whaling sites, some of the first examples of human occupation on the continent. In recent times, there has been a focus on the history of polar exploration in the region, most notably exploration during the heroic age from the end of the nineteenth century up until the early 1920s. This age saw a race to the South Pole, the exploration of resources and exploration in the name of science by men of the likes of Roald Amundsen, Robert Scott, Ernest Shackleton, and Douglas Mawson. Their pursuits in Antarctica left behind cultural material, archaeological, and heritage sites in the forms of graves, huts, monuments, and personal items that today are a link and physical reminder of our past in Antarctica.

Definition

The archaeology of polar exploration in Antarctica covers the heroic age of exploration from the end of the nineteenth century to the early 1920s, with further exploration expeditions continuing up until the 1950s. The sites themselves consist mainly of the material culture left behind by the expeditions that came to the continent, such as huts, monuments, graves, and material culture such as equipment and supplies. The sites are well known and well documented in Antarctica, with the main body of archaeological work involving conservation work and the protection of these sites.

Key Issues/Current Debates/Future Directions/Examples

The preservation of huts built and used by explorers and researchers is an issue in the archaeology and heritage in Antarctica. These huts were used as research bases for polar exploration teams from all over the world, mainly from the United Kingdom, Australia, New Zealand, the United States, and Norway. Archaeologically speaking, the surviving huts give Antarctica the attribute of being the only continent where the original human habitation may be seen today (Headland 2010). Of the 22 known sites, including the huts from the heroic age, only seven remain relatively intact, while four have become roofless ruins and ten have become nothing more than fragments (Headland 2010). The huts that remain intact contain many artifacts that relate to the heroic age of polar exploration. These artifacts range from food cans, personal items, lanterns, books, and research equipment. In Mawson's huts, for example, most of these items are literally frozen in time as heavy snow and ice has formed over some of the artifacts (McGowan 1987). The preservation of the huts has become a key issue in archaeology in Antarctica and Antarctic heritage. The huts were merely meant to last for as long as the expedition was to last. However, the huts that have survived did so due to numerous factors, including their location, climate, and the effects of human interference. Yearly, conservation groups assess the decay of the huts and help repair and conserve them from further damage. Conservation teams like the team of "Project Blizzard" visited the Mawson huts in the summers of 1984–1985 and 1985–1986 where some of the first archaeological work in Antarctica begun as well as pioneering survey methods that were suitable to the environment (McGowan 1987).

The huts in recent times have had conservation work done by groups such as the "Mawson's Huts Foundation" (Mawson's Huts Foundation 2012). The huts built by Mawson during the Australian Antarctic Expedition from 1911 to 1914 numbered four in total, later three when two were merged into one hut. The huts included a magnetograph hut, used to measure variations in the south magnetic pole; an absolute magnetic hut, which was used as a reference point for studies in the magnetograph hut; and the transit hut for astronomical observations (Department of the Environment, Water, Heritage and the Arts 2012).

In January 2010, conservationists from the Antarctic Heritage Trust excavated a cache of Scotch whisky belonging to Sir Ernest Shackleton's failed expedition of 1907–909 (Antarctic Heritage Trust n.d). These bottles, still containing the whiskey, were carefully thawed and examined in the UK by museum staff before three of the bottles were sent to the current owners of the Scotch whiskey for testing to help replicate the recipe that has since been lost (Antarctic Heritage Trust n.d). Although the Scotch was later returned to the Antarctic to be reburied, there have been cases of artifacts being removed from site by private collectors. In January 1999, items taken from Robert Scott's Cape Evans Hut were returned 40 years after they were taken by a Royal New Zealand Air Force pilot when he was working in the region. The items were to be sold at Christie's auction house; when the New Zealand government raised the issue to the pilot, they were later given to the Antarctic Heritage Trust and returned to the hut by officials of the British government (Arthy 1999).

The unintentional destruction of sites and archaeological deposits is an important issue that needs to be addressed. "The Madrid Protocol" generated an urgency to clean up the Antarctic environment and, in doing so, increased the risk of the destruction of historic sites. Although the protocol in Annex III states that the cleanup should not damage historic sites or monuments, there was a lack of definition as to what constituted as a site, especially in regard to archaeological deposits scattered around historic sites and monuments (Evans 2007). The debate for "rubbish or relic" still continues; guidelines have been set up. Cleanups in Antarctica sites that date up to and/or before 1958 are protected by law. All artifacts located in these sites are to be disturbed as little as possible until properly recorded and evaluated (Evans 2007).

Antarctica's heritage sites and monuments are protected by numerous acts, one such act is the Antarctic treaty of 1994. The Antarctic treaty of 1994 protects the continent from mining minerals; it also lists all historic sites and monuments as protected, any disruption, looting, or intentional damage under Part II section nine of the treaty.

The archaeology of polar exploration in Antarctica will continue in the conservation and the investigations of the explorers' huts. Their conservation is important as they stand as a physical link to our past on the continent. Issues such as what counts as heritage in the region and the definition of archaeological deposits in Antarctica (i.e., relic or rubbish argument) will have to be settled before further damage to sites deteriorates their potential for archaeological research. The material remains in Antarctica narrate the history of past events in the region. When tourists set foot on these sites, they are helping in maintaining the memory of what happened there. However, tourist behavior may erase some of these traces and replace them with new traces. It must be made aware that the sites in Antarctica are not "frozen in time" but are used for a range of purposes and are transformed as a result (Roura 2011).

Cross-References

- ▶ Antarctica: Historical Archaeology
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Ethics of Collecting Cultural Heritage
- ▶ European Convention on the Protection of Archaeological Heritage (1992)
- ▶ Heritage and Archaeology
- ▶ Heritage Areas
- ▶ Heritage Tourism and the Marketplace
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Modern World: Historical Archaeology
- ▶ Polar Exploration Archaeology (North)
- ▶ Site Visitation and Interpretation: Management
- ▶ Southern Ocean and Antarctic Maritime Archaeology
- ▶ Vandalism and Looting (Ethics)

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Polis

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Introduction

The polis (or "city-state") was a characteristic polity of archaic (c. 700–c. 490) and classical (c. 490–323 BCE) Greece. The ancient Greek

philosopher Aristotle said in the Politics (1253[a]2-4 = 1.1.9) "man is by nature a creature of the polis, and a man. . . without a polis is either subhuman or divine." Through a powerful if discontinuous tradition, the Greek polis set up the artistic and intellectual limits within which western civilization has framed its project.

Definition

Debate surrounds the appropriateness of translating polis (pl. poleis) as "city-state," but as long as the possibility of confusion with other city-state cultures is recognized, the term is adequate. In the classical period, "polis" had four basic connotations. First, a fortified settlement on a height, a sense that may extend back to the terminology of the Greek-speaking Late Bronze Age predecessors of the historical Greeks, still current into the classical period. Related to this locative sense was a second meaning, a nucleated settlement that controlled its agricultural hinterland. The third sense indicates this surrounding territory, though other words (*chora, gē*) differentiated this from the town itself. Finally, polis meant a political community.

Diachronically, its form contrasts both with the Mycenaean palace economies alluded to above and with the cities of the Hellenistic (323–30 BCE) period. Synchronically, it can be contrasted with the *ethnos* (pl. *ethnē*), the other primary category of Greek political organization, which took root mostly in the NW and W of Greek-speaking lands. In *ethnos* regions, urban settlements did not emerge at all or emerged later in the historical period; when they did, they were often bound politically to larger regional associations. It is now understood that *ethnē* developed not before the poleis in a remote prehistoric past, but during the archaic period, subject to forces that caused the polis to rise (Hall 2002, 2007).

The lie of the land in Greece, small plains between often difficult mountains and hills, and inlets and islands, provided the geophysical mold that produced a patchwork of relatively isolated conurbations and likewise a great variety of social, political, and economic regimes. Yet, patterns can be discerned that cut through this diversity, and it is possible to establish at least three key attributes of the polis. First, political autonomy (*autonomia*) was at least a desideratum, even if a community's need for external military or economic assistance could make it impossible in practice. Second, poleis were generally small compared with other ancient polities (empires and federal states) and modern nation states. Some poleis had large territories (Athens, Sparta), but the average has been reckoned at 25–100 km^2, and while demography is murky throughout our period, only about 10 % had populations greater than 10,000 in the classical period. Third, a sense of civic identity was characteristic. This was bound up with an (often imagined) sense of shared ancestry and with locality, as linguistic habits demonstrate. Polis dwellers referred to themselves as *Athenaioi* or *Korinthioi*, deriving their identity from an urban center (*Athenai*, *Korinthos*) in contrast with *ethnē*, the populations of which took their names (*Boiotoi*, *Thessaloi*) from the regions in which they lived (*Boiotia* and *Thessalia*). Thus, while some poleis could imagine being without land, territory was virtually a rule for polis status.

Historical Background

The Mycenaean and Hellenistic periods are not entirely arbitrary chronological limits. That poleis as such existed in the "Dark Ages," the period following the collapse of the Mycenaean world and constituting the Early Iron Age (c. 1150–700 BCE) in Greece, is doubtful, but the roots of the polis system should be traced into this period. The poleis did not disappear when the Macedonians assumed control at the end of the fourth century BCE and Greek cities flourished well into the Roman period. Nevertheless, since autonomy was a characteristic condition for the polis, ending an account with the classical period is justifiable.

The sophisticated apparatus of the Mycenaean palace-based economies collapsed in the decades following 1200 BCE. A period of unsettled life,

depopulation, and radical loss of technologies, notably the Mycenaean administrative script (never widespread), followed. While recent archaeological work has relit this period, it seems to confirm a picture of isolation, stagnation, and poverty, though there are signs of recovery by the end of the tenth century. Continuities between Mycenaean Greece and the archaic period other than basic religious and agricultural forms are obscure, but it is notable that Mycenaean centers were roughly coterminous with regions where the polis emerged (Snodgrass 1980). It was also an age of poorly understood migrations, within the mainland and from the mainland to areas in the eastern littoral of Anatolia, where the major linguistic groupings (Aiolic, Doric, and Ionic) mirror mainland patterns. Whether the ethnic identities attaching to these linguistic groups, clearly marked by the classical period, were originally present is more doubtful (Hall 2002, 2007).

Archaic Period (c. 700–c. 490) The eighth century BCE saw further recovery, not least in the adoption of Phoenician symbols to create regional Greek alphabets (from mid-eighth century), material growth, and apparently a significant increase in population. Attica was seen as representative (Snodgrass 1977), but it is now questionable if the increase was as great as once believed, and likewise a question throughout Greece whether the signs of recovery indicate the presence of poleis.

Poleis in the political sense may have developed slowly. Burials may not correlate directly to population, and urbanism is not pronounced until the following century. One way of tracking urbanization is through *synoikismos* (lit. "living together"), attested by classical writers about their ancient past. A notable example is Thucydides' notice (2.15.1-2) about the mythic Theseus' consolidation of Attica. His account of an original complex of small rural communities brought together politically without settlement change is unlikely in the long term: archaeology indicates a more complex process.

Another important phenomenon was colonization. The sending out of subsidiary settlements from "mother cities" was accomplished in waves beginning in the late eighth century, first westward to S Italy and Sicily, then in the seventh century toward the Black Sea and N Africa, with streams W again as far as Spain. This movement should be distinguished from modern colonization, inasmuch as it was not conducted by an empire to control a large territory with a lasting military presence. Ventures were instead small, and while ties remained with the metropolis, the *apoikia* was largely on its own. Hunger for new land should no longer be seen as the dominant cause; rather, trade, adventure, and personal enrichment should all be considered. Nor were the early colonies strictly a polis affair: Achaia, in the archaic period low on poleis, was a major colonizer (Hall 2007), and emphasis on individual founders points to private enterprise and loose organization, a picture confirmed by ceramic and mortuary evidence. This increase in mobility is part of general outward push by the Greeks, manifested in renewed contacts with Egypt and the Near East during an "orientalizing" century (750–650), with profound effects in art and other aspects of material culture.

Warfare was part of this expansion. Greek mercenaries, acting independently of their home political communities, fought in the East from the beginning of the eighth century BCE and imported objects and ideas from overseas. At home, apart from certain regions where terrain invited it, poleis were deficient in cavalry. The important soldier was the *hoplitēs* or hoplite, a heavy-armed infantryman who fought in open ground in a close-order formation known as the phalanx. The hoplite was clad in bronze helmet and plated body armor and carried a thrusting spear as his primary weapon; the most important defensive item was the shield, which dictated phalanx tactics. Physical evidence for the earliest hoplites comes as burials with arms and then from c. 700 as arms dedications at sanctuaries. The political importance of the hoplite is harder to judge. Aristotle believed that the hoplites became politically important with the support of the tyrannoi (see below), and early archaeological analyses used Aristotle's assessment to postulate a "hoplite revolution" in the early seventh century. This is now doubtful, but the

evidence still leaves questions. As for public control, poleis may not have organized armies on a widespread basis until c. 600.

Fortification walls should be a secure index for the presence of a polis and theoretically provide a register for settlement size. Yet only 11 poleis were walled by c. 600, and since walls are notoriously hard to date, even this figure demands caution, though the prevalence of mud-brick construction and destruction by later occupation could obscure early walls. Recognizably civic architecture did not appear until the beginning of the sixth century. Nor can rule of law necessarily be inferred for the early archaic period. Recent research has shown that laws inscribed on stone (as opposed to later literary accounts) were mostly procedural and not the sweeping codes we might expect for a movement away from the vendetta toward a centralized legal system (Hölkeskamp 1992).

Monumental building was usually religious building, and such building, particularly the Greek temple, is intimately bound with the polis. The Dark Age saw religious activity centered on settlements, but the temple as such is difficult to discern. There are early expressions of the Doric order as early as the mid-seventh century, but fully stone temples do not appear till early in the next century. Some seventh-century projects were large (the Temple of Hera at Argos the largest at 15.1 × 46.6 m) and must have required considerable cost and a strong authority, but it is not clear that this authority was yet the polis. Tyrannoi (see below) were associated with building projects from the mid-seventh century, but it is not until the sixth century that monumentality becomes an obsession – efforts such as the Temple of Artemis at Ephesos were already testing the limits of Greek building techniques by midcentury, and Sicilian buildings are sometimes staggering. The poleis had begun to make their land- and cityscapes grand with projects that suggest unprecedented central control and overall wealth.

Religion also encouraged interaction between poleis. One avenue was the international festival. Tradition held that games began at Olympia in 776 BCE, but whatever the accuracy of this date, it was not until the sixth century that the Olympic model could be reproduced elsewhere. Three major "panhellenic" games were inaugurated in the second and third decades of the sixth century, at Nemea, Delphi, and Isthmia. The circuit of games was fixed in a 4-year sequence, and the fact that the festivals were staggered so that they could be held in concert with the Olympics implies sophisticated interstate planning. Another avenue was the oracular sanctuary. Although Delphi acquired games in the early sixth century, here the oracle attracted attention, muttering prophecy not to predict the future but to provide mantic sanction for major decisions, both for poleis and individuals. After modest eighth-century beginnings, the Pythia (oracle of Apollo) soon gained great repute, as the attentions of Midas of Phrygia and Gyges of Lydia illustrate.

Political authority is key to tracking the genesis and development of the polis: "politics" means at its root the things of the polis. But when did the robust, variegated political lives of the poleis begin? Anthropological analysis has provided important cues and identified in the "kings" in Homeric epic an example of the "big man," a leader whose authority is achieved rather than ascribed. If we accept an evolutionary model, the next step should be the chieftain, the exemplar of ascribed authority in the nascent state. The Greek picture is complicated by the fact that later classical theorizing postulated a period of royal rulership in the period before the advent of aristocracy, but this was mostly invented tradition (Drews 1983). The phenomenon of tyrannoi (not to be confused with modern "tyrants") shows that rule by warlords was still a part of early archaic political life. The first of these dynastic rulers were the Kypselids of Corinth, beginning in the middle of the seventh century. Recent work has shown that tyrannoi were not necessarily "unconstitutional" rulers, rather one of many elite groups vying for political control (Anderson 2005). A controversial inscription from Dreros in Crete involving magistrates called kosmoi has been dated to the mid-seventh century. Yet early to mid-sixth century Argos is chronologically

more typical. The relevant Argive inscriptions list officers (*damiorgoi*), and their language demarcates public and private spheres clearly, indicating central control and civic institutions.

A fundamental question is whether the archaic Greek economy was different in kind from modern economies or only in degree. Embedded in social and cultural milieux (von Reden 1997), the polis economy was unlike the autonomous modern market yet possessed familiar mechanisms such as coined money and even, in the classical period, rudimentary banking. Given its agrarian nature, questions about the character of farming are paramount. The idea that most agricultural producers were yeoman farmers representative of a "middling ideology" has been challenged (Hall 2007). It may be more appropriate to think instead of peasants of varying statuses focused on survival and powerful elite landowners. Nor should the importance of trade be neglected. The earliest Greek expeditions abroad (emporia), at Al Mina in the N Levant and Pithekoussai N of the bay of Naples, were similar to colonies but lacked settlements. Archaic Greek trade abroad culminated at Naukratis, a multiethnic Greek polis dedicated to trade established in the Nile Delta c. 600. Around the same time, the first coins appear at Ephesos. Probably originally a Lydian invention, coinage was at any rate perfected by the poleis, and by the end of the archaic period, nearly all the major poleis were producing coinage with distinctive obverse types.

Classical Period (c. 490–323) The full flowering of polis culture. It begins with the Persian Wars, military efforts that fostered a sense of shared identity among the poleis, at least as defined against a Persian enemy. The canons of architecture, politics, and thought fundamental to western culture find full expression in Periclean Athens in the second quarter of the fifth century. Yet considered over the long run, this efflorescence was brief, with increased fragmentation in the later fifth century and fourth century giving way to the political overlordship of Macedon. Nonetheless, there is no discounting the period's achievements. The movement toward Hellenistic cosmopolitanism should not be seen as inevitable or a decline.

The necessities of agricultural production shaped settlement, but settlement was also intertwined with politics and culture. The general intensification of agricultural exploitation was uneven, with areas showing different patterns at different times. Methana (NE Peloponnesos) seems to have been settled more thickly in the fifth century after the buildup of an urban center, yet declined in the fourth century, and Boiotian Thespiai followed a similar pattern. On the other hand, the S Argolid retains its archaic settlement pattern until the fifth century, when many more rural sites appear (Mee 2011). Other than the larger poleis like Athens, most apparently concentrated their populations in urban centers – it is estimated that rural sites made up only 5 % of the population of the S Argolid in the classical period. While colonization continued, its aims were now different, with larger poleis infringing on the territory or sovereignty of less powerful ones, a pattern visible into the Macedonian period.

War was endemic. The period begins with the surprising success of the Greeks against Persia and ends with the less surprising victory of Philip over a Greek coalition at Chaeronea in 338. In the interim was the Peloponnesian War (431–404), pitting an imperial Athens against a Spartan-led alliance. The traditional pattern, citizen phalanxes fighting small-scale battles in the plains, campaigns limited by agricultural demands, changed significantly. While short of modern total war, the new strategies expanded the arenas traditionally deemed acceptable for fighting. Warfare now clashed with the tempos of the agricultural year and involved more light-armed troops and mercenaries. Defense of both city and countryside became important, and fortification received greater attention, with more completely stone masonry, as opposed to walls of mud-brick socles with only upper courses in stone. Fourth-century walls used terrain contours to provide complete protection, with a concomitant extension of circuit length: the perimeter of the excellent fortifications at Messene ran 9 km. They could be equipped with sally ports, flanking towers, overlapping gates, and buttressed parapets. The formal ephebeia, citizen

youths passing into soldiering adulthood, was first instituted at Athens in the second half of the century, its members given non-hoplite duties such as garrisoning border forts.

Political authority was now more centralized, expressed in monumental civic architecture and urban planning. An example of the latter was the template attributed to Hippodamos of Miletus. In Athens' port, the Piraeus, his ideas are manifested in a systematic accommodation for military installations, public services, and commercial facilities. A selective account of excavations in the Athenian Agora reveals an intense concern with civic building (full coverage: Camp 2001). After the democratic reforms of Kleisthenes (late sixth century) had transformed the political structure of Attica by emphasizing membership in artificial civic kinship groups over traditional regional loyalties, the Agora, transferred from an original location to the E, was made into Athens' civic center. A *bouleutērion* or council house accommodated the new democratic council, and boundary stones delineated public from private. On a ridge SW of the Agora, a facility (the Pnyx) to accommodate the citizen assembly was constructed with room for 8,000–12,000. After Persian destruction, the Agora was rebuilt and reorganized. Included now were *stoai*, multipurpose public porticoes. A round dining hall for the presidents of the council was built, doubling as a receptacle for Athenian weights and measures. During the Peloponnesian War, the Athenians added a new *bouleutērion* on the W side. The Pnyx was altered at the end of the fifth century: at least according to a later literary source, the aristocratic regime of the Thirty Tyrants reoriented the speaker's platform, which previously looked seaward, to face inland because they thought farmers were more sympathetic to oligarchy than members of Athens' powerful fleet. A fourth-century (second quarter) refurbishing of the Pnyx was left incomplete. In the Agora, the temple of Ancestral Apollo took its present form around the same time, perhaps as a part of a larger civic renewal program centered on the figure of Lykourgos. A long base with statues of the Eponymous Heroes of the ten Kleisthenic tribes was set up on the W side, a fitting monument to the complexities and energy of the fourth-century Athenian democracy.

Greek religion was at its heart polis religion, a community of celebrants performing its two essential components, animal sacrifice and ritual. Monumental religious building ranged from borderland temples to the great urban complexes epitomized in the Athenian Acropolis building program (fifth century, second half). But it also included roadside shrines, peak and cave sanctuaries, and shrines attached to springs. Despite commonalities, the religious calendars for festivals celebrated by individual poleis expressed the variety of polis religion. These festivals provided a chance for the community to bond with commensality and competition. Originally a complex derived from annual agricultural changes, from a structuralist perspective (Osborne 1987), the changing nature of sanctuary dedications over the period indicates that worship became increasingly divorced from the springs of agricultural life – land outside the walls was seen as wild and opposed to the civic life of the urban center.

The environment and agricultural life was no less important to patterns of political authority. Agricultural involvement and individual modes of civic life influenced political arrangements (*politeiai*), with complex results (Osborne 1987). As Thucydides noted, the architectural grandeur of Athens belied military inferiority to Sparta, which remained an unwalled collection of villages into the fourth century. Sparta's citizens resided here, insulated from work. Brutal control of the serf-like helots' agricultural production allowed complete dedication to warcraft. Despite living in the town(s), they were nevertheless dependent on subjected labor in the countryside for sustenance. Even among poleis of similar regimes, town-country relations differed. Arkadian Orchomenos, an oligarchic ally of Sparta, had a fortified urban center with some amenities, but residence was largely extramural and included politically dependent surrounding communities, an arrangement suggesting a political sphere divorced from daily life. A variety of countryside-town relations also shaped democratic regimes. Elis had a loose

political organization even after consolidation of its major territorial divisions in the early fifth century. Here were robustly independent outlying communities, and exceptionally, these villages could themselves support tiny outlier communities. Athens was early on populated from an urban center. The resultant system of villages (*dēmoi* or "demes") was after Kleisthenes' reforms made part of a complex system of political interdependence, with linking among demes, of demes to artificial tribes and of demes and tribes to citizen assembly. The city's civic, commercial, and religious facilities attracted resident aliens and its own hinterland population. Thus, Athens was like Elis in terms of the independence of its villages, but unlike in terms of the villages' relations to the political center, with the Attic demes much more tightly linked. Athens also stood apart with the buildup of its "empire" during the fifth century. As a result of the Persian Wars, Athens gained control the anti-Persian coalition. Allies weakened from tribute-paying and when they revolted were reduced by Athens' mighty navy. By midcentury, Athens had gained control of the alliance's treasury, parading its might in long tribute lists inscribed on huge stelai on the Acropolis and in the Panathenaic procession. Athenian hegemony deeply affected coastal and island poleis, often dependent on Athenian assistance but always subject to depredation by the Athenian fleet.

The independent smallholder became more prevalent by the fourth century. His private regime was limited in scope (polyculture was predominant) but could be complex in arrangement (Osborne 1987). A farmer might exploit various interests with differing intensity – flocks, arable land with slaves, a house and garden, and a rural tower where servants worked. Agriculture was preeminent, but trade also flourished, particularly as inter-polis bonds grew. Athenian mining operations at Laurion in S Attica exemplify nonagricultural exploitation (Mee 2011). Production here had started in the Bronze Age, with lead ore exploited for its silver. Early efforts were aimed at exposed deposits, but eventually small tunnels ran to subsurface layers. The discovery of a vein early in the fifth century brought technological and commercial development to the fore. Vertical shafts were set in (some to more than 100 m) with adjoining galleries. Ore was processed in nearby workshops, and the washeries suggest considerable outlay. Working conditions were appalling, but the efforts allowed the Athenians to strike silver coins and fund the navy that built their hegemony. The state benefitted mostly, but powerful individuals were not without interests. The fourth century saw another boom in production, testified in Agora inscriptions set up by magistrates to record leases: while the state retained control, individual contractors made large profits.

Key Issues

Prehistoric Aegean archaeologists were traditionally more receptive to theories and methods from world archaeology, and increased exchange between the prehistoric and classical archaeologist is yielding fruitful results for the study of the polis. Increased emphasis on survey archaeology is one such development, which has been useful for tracking population shifts and land use strategies. Relations between Greece and the Near East, especially in the Early Iron Age and archaic periods, are a fertile field of study, but the classical period is also benefitting from new work on the Achaemenid Empire.

Current Debates

Arising from some 500 years of antiquarian, historical, philological, numismatic, epigraphic, papyrological, art historical, and archaeological work, debates about aspects of the polis are innumerable. Limiting them to some themes addressed above, the question how dark the "Dark Age" remains open. The question of a historical Homeric society is an unfinished chapter: to what extent do social, military, and economic literary episodes correspond with material culture? Snodgrass's pioneering

synthetic methods on the eighth century (Snodgrass 1977, 1980) have been adopted for the archaic period. Early tyrannoi have been contextualized as a phenomenon not of unconstitutional monarchs but competitive elites (Anderson 2005), but the military side of the early tyrannoi needs more attention. Archaic coinage remains controversial, and the possibility that small denominations were more prevalent than previously thought has been a stimulus (Kim 2001). Near Eastern connections have been investigated for most aspects of the early poleis, and while there has been good work on mercenaries in the Near East (Luraghi 2006), resistance to the idea of eastern influence on the hoplite phalanx is perhaps conditioned by overreliance on the Homeric poems. De Polignac's landmark study (de Polignac 1995) on border sanctuaries argued that monumental sanctuaries were sited to mark out territory from other poleis, a thesis challenged on various grounds, but probably still valid for the late archaic period. Survey archaeology has proved a great tool for investigating the poleis' hinterlands and will continue to be invaluable, though particularly in demographic analyses, its limitations should be remembered. These are generally useful and meet the prerogatives of recent historical methods, but should be applied carefully, with the caveat that we will never be as sure about even late classical populations as we are of, e.g., the early modern period. Inscriptional evidence continues to be indispensable, with particular growth for the later poleis of Asia Minor. Dating of inscriptions by letter forms is also controversial, with recent opinion urging caution and favoring a down-dating of fundamental inscriptions from imperial Athens. Ethnicity is an exciting field and has benefited from important recent studies, particularly Hall (2002) and Morgan (2003) (building on Roussel 1976). Economic history is well served in particular by the work of A. Bresson (2007–2008) and looks for ways to add to and advance past the fundamental contribution of M. Finley (1973) and the primitivist/modernist and substantivist/formalist debates. Study of the role of women in the polis is hampered by dismal coverage in contemporary literary sources, but great strides have been made of late, with exemplary efforts at synthesis such as Connelly 2009 for women in polis religion.

International Perspectives

Since 1993 and culminating in the monumental Inventory of Archaic and Classical Poleis (Hansen & Nielsen 2004), the work of the Copenhagen Polis Centre has used both new and traditional approaches and a wide variety of categorizing rubrics to subject the Greek poleis (1,035 communities are included) to massive scrutiny. This is an invaluable resource, with contributions from a host of international scholars. Large international undertakings whether adaptations of venerable projects (e.g., SEG: epigraphy, Brill's New Pauly: all aspects of antiquity) or newer enterprises (e.g., PHI: epigraphy, The Ancient World Mapping Center: historical geography) and myriad recurring conferences and open-access journals supply grounds for international collaboration on polis research at a level unthinkable even a generation ago.

Future Directions

Continued cooperation between historians, classical archaeologists, and prehistoric Mediterranean archaeologists is welcome and will provide new syntheses. Willingness from prehistoric specialists to learn from ancient historians and those of more recent periods may advance study of the protohistoric polis. Classical archaeologists and historians will continue to benefit from cross-fertilization with anthropology and world archaeology and should be willing to let go of too rigid philologically based categorization if necessary. Likewise, excavators and surveyors could do well to learn from traditional ancient historical methods such as source criticism. Survey archaeology methodology and concentration on the Greek countryside will yield

stimulating results, as will technological applications such as GIS, which holds great potential for studying all manner of polis developments.

Cross-References

- ▶ Agora in the Greek World
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Emporion
- ▶ Religion, Greek, Archaeology of
- ▶ Urban Planning in the Greek World

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Polish Pioneers and Traditions

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Brief Definition of the Topic

In Poland, as elsewhere, excavations in the nineteenth century were conducted unsystematically and hastily, with the aim of acquiring interesting finds. Exceptional was Kalikst Jagmin's dig of 1873 at Łęgonice (central Poland) where a large barrow was sectioned along a W-E axis in order "...to uncover the very base of the mound and to expose a section which, showing the layout and quality of layers, would produce a visible proof of the manner in which this grave-mound was raised" (Jagmin 1876: 83). This isolated experiment produced one of the world's earliest examples of the relatively detailed observation and documentation of stratigraphy (Fig. 1). The first excavation manual published in Poland stressed that when digging multilayered mounds, "it is necessary to recognize... the height of every layer above ground level" (Majewski 1902: 195). Innovatory was Leon Kozłowski's method of excavating cemetery in Iwanowice

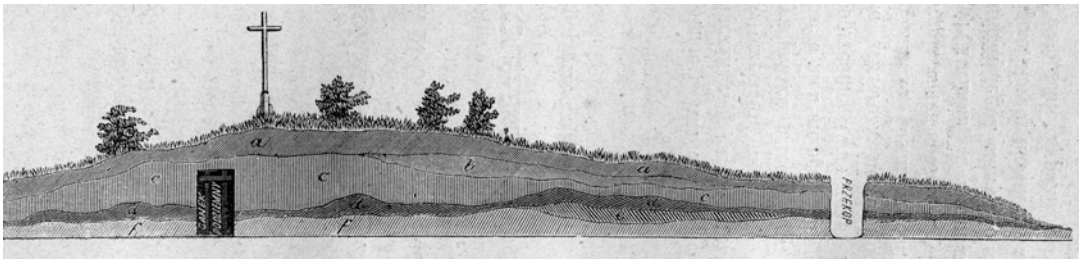

Polish Pioneers and Traditions, Fig. 1 A profile cut by Kalikst Jagmin in 1873 across a barrow in Łęgonice

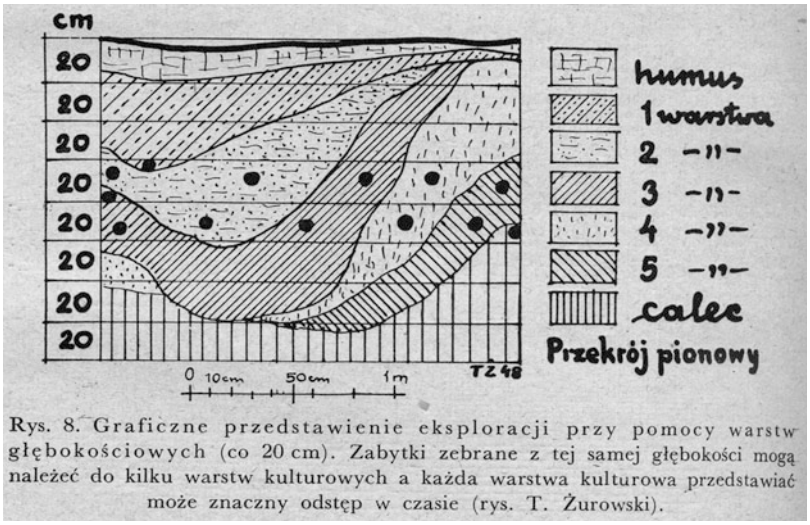

Polish Pioneers and Traditions, Fig. 2 Graphic presentation of the fallacy of the exploration of complex stratigraphy by arbitrary levels (Żurowski 1949, Fig. 8)

by sequentially opening squares of 10 × 10 m (Kozłowski 1917: 2). Careful stratigraphic analysis is testified by multi-strata profiles of a cave site published by Stefan Krukowski (1921: 3-5 and Figs. 3, 4).

In 1928 and 1930, Józef Kostrzewski explored a stronghold in Jedwabne with two small trenches. There he discerned nine layers which served to build the first relative chronology of medieval pottery (Kostrzewski 1931: 6, Fig. 2a, b). At Biskupin ca 3,000 m^2 were uncovered during the 1934 and 1935 seasons, and the five identified culture layers were defined using small tools only (Kostrzewski 1936: 11). Soil was sieved and overhead photography (from planes and balloons) was employed. Experimentally, finds from a limited surface were all recorded three dimensionally (Kostrzewski 1950: 5, 12). In 1936-1937, another 3,400 m^2 were excavated using 10 cm thick arbitrary layers (spits) which were recorded on plans at 1:10. on which all important finds were marked. A geologist analyzed 80 m of profiles (Kostrzewski 1938: 4. 9, 69, 132-9, Tables LXIX and LXX). This promising development was halted in 1939.

The handful of archaeologists who survived the War were confronted with the practical and theoretical problems posed by vast areas that the war destruction suddenly "opened" for archaeological investigation. The theoretical dilemma and the rapid development of unusually sophisticated responses are recorded in the dialogue between the two innovative archaeologists Tadeusz R. Żurowski and Włodzimierz Hołubowicz. In 1947, Hołubowicz stated the principle that "during excavation there are no less or more valuable layers, they are all equally important" (Hołubowicz 1947: 37). Digging and

recording of a multilayer site must be based on a system of contiguous squares, so that "…it should be possible to reconstruct the system of layers with every item precisely localized…" (Hołubowicz 1947: 34). Żurowski had already written down many of his ideas in 1939, but they were not to appear in print until after the war. He maintained that a "culture layer is also a monument of the past (*zabytek*), even when it does not contain any finds of the material culture" (Żurowski 1949). He emphasized that "naturally formed layers may be interlaced with culture layers" (Żurowski 1947: 138) and thus urged the sampling of "every cultural and geological layer" (Żurowski 1947: 140) in order "to execute detailed geological, palaeobotanical, palaeontological, anthropological and other analyses" (Żurowski 1947: 137). He also believed that "topography is best reflected by contour-lines," the principle of his "topographico-stratigraphic" method of excavating and recording that was to ensure "reconstruction of the configuration of the surface in the moment of starting the excavation and of the every lower layer in sequence – period after period backwards" (Żurowski 1947: 137). "This means that we will always be able to show three-dimensionally or by contour-lines a given surface in its shape before so and so many thousand years" and "from the layout of contour-lines we can cut sections in any directions and we can draw profiles" (Żurowski 1947: 138). If we note also that all finds must be recorded "according to precise instrumental measurements" (Żurowski 1947: 137) and that "the interrelation of characteristic points at a drawing must be precise enough to make possible, even after several years, to impose the same measurement system and to achieve the same results in an unquestionable way" (Żurowski 1947: 137), we can see that there was a powerful guide to excavation method.

Hołubowicz in turn published an attack on the technique of "arbitrary levels" (spits) for exploring complex stratigraphic structures, which may be "…studied correctly only by defining cultural layers" (Hołubowicz 1948: 38, 40). Żurowski criticized Hołubowicz's zealotry but he made it clear that "exploration by arbitrary layers without discerning culture layers may lead to serious mistakes… because finds from very recent and very old culture layers may fall in the same arbitrary layer" (Żurowski 1949: 427). He illustrated this with clear drawings (Fig. 2) showing the fallacy of what he called "the most primitive method" (Żurowski 1949: 462). He argued that "all finds must be localised in relation to a culture layer and not an arbitrary layer" (Żurowski 1949: 458). Such an attitude imposed treatment of every part of a site with equal piety, reinforced by the fact that the site "usually undergoes total destruction" (Zurowski 1949: 413).

Unfortunately, this promising "brain storm" died out quickly because almost all Polish archaeological "manpower" became engaged in the extensive "millennial" program which preceded celebrations of the millennial anniversary of the origins of Polish state in 1966. Numerous medieval towns and strongholds were excavated (c. 25 large sites a year), and the results were studied by multidisciplinary teams of archaeologists, architects, ethnographers and historians, which was called the "history of material culture." There was simply no time for discussions that did not offer immediate solutions to daily problems. Polish archaeologists became again very "practical," which meant that effectiveness counted higher than methodological rigor. Methods of excavation and recording that seemed too sophisticated were openly questioned (e.g., Dembińska 1954: 97). Very few archaeologists tried to follow the standards that had been set during the postwar decade, and Poland's important contribution to excavation methodology remains largely obscure despite attempts at its promotion (e.g., Urbańczyk 1999, 2004). The lack of theoretical discussion and of progressive methodology promotion resulted in stagnation. Digging in arbitrary levels found common acceptance (e.g., Mazurowski 1996: 4) and dominates until today.

Quick economic development after the political transformation of 1989 resulted in extensive investments in production and transport infrastructure, which made necessary to excavate

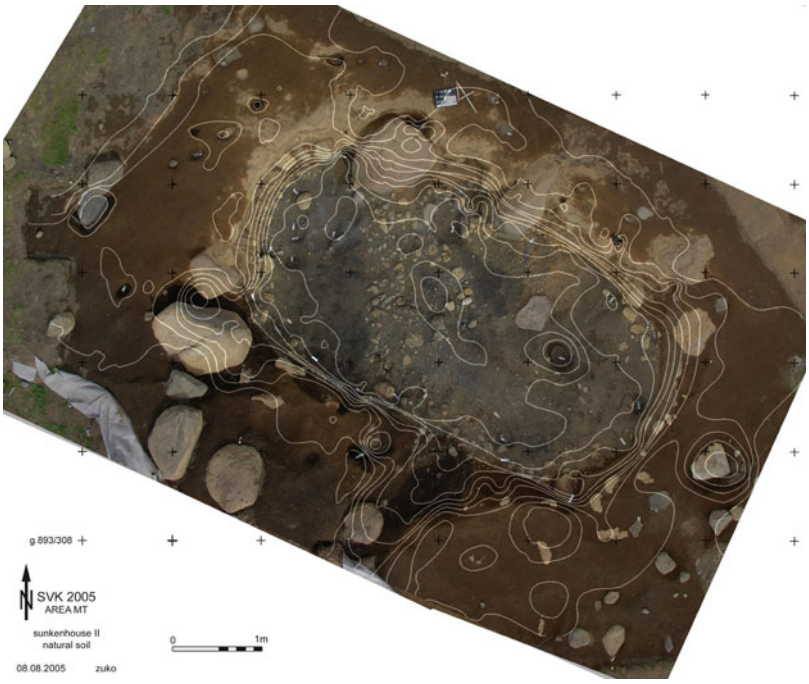

Polish Pioneers and Traditions, Fig. 3 Orthophoto map of a sunken house excavated by P. Urbańczyk in North-East Iceland in 2002–2005

huge areas. Again town centers and hectares of fields have been being excavated to free space for factories, habitation quarters, highways, and pipelines. Only some outsiders lucky to have a chance to dig slowly (usually abroad) have experimented, for example, with new methods of electronic recording (e.g., Urbańczyk 2002, 2011) (Fig. 3). Thus, 65 years later, we may recall Żurowski's bitter observation that "some prehistorians consider excavation technique too easy to learn it. Such attitudes, based on ignorance, inhibit progress. . ." (Żurowski 1947: 136).

Cross-References

- ▶ Archaeological Record
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ France: Field Method Origins
- ▶ Publication in Field Archaeology
- ▶ Recording in Archaeology
- ▶ Scandinavia: Field Methods
- ▶ Stratigraphy in Archaeology: A Brief History

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Basic Biographical Information

Gustavo Gabriel Politis (Fig. 1) is an Argentine archaeologist. He was born in 1955 at Buenos Aires, but he grew up in Necochea, a city 500-km south of Buenos Aires in the Argentine plains or Pampas. In 1978, he graduated as an anthropologist from the Facultad de Ciencias Naturales de la Universidad Nacional de La Plata, where he also made his postgraduate studies. He received a Ph.D. in 1984 on the basis of his dissertation about the archaeology of the "*interserrana*" area (the plains between the Tandilia and Ventania hill ranges) of Buenos Aires province. After his graduation, as a postdoctoral fellow (1984–1985), he stayed at the Department of Anthropology of the University of Kentucky, and was a Visiting Scientist at the Smithsonian Institution's National Museum of Natural History, and Visiting Scholar at the Center for the Study of Early Man at the University of Orono, Maine.

Politis, Gustavo G., Fig. 1 Gustavo Politis

Before that, he held a fellowship of the National Research Council of Argentina (1979–1984) while he began his career in the teaching of archaeology. He was Assistant Professor (1980–1984) at the Facultad de Ciencias Naturales of the Universidad Nacional de La Plata, Argentina, where he taught American Archaeology and was Associate Professor (1987–1989) at the Universidad Nacional del Centro de la Provincia de Buenos Aires. Since 1993, he has held a tenured post at the same institution teaching American hunter-gatherers, while at the Universidad Nacional de La Plata, he continued as Professor teaching Method and Technics in Archaeology. He taught at different universities abroad as Visiting Professor as well, such as the Universidad Nacional de Colombia (1991, 1992), University of Cambridge (1991), University of Southampton (1992–1993), and Stanford University (2001).

In 1987, Gustavo Politis became researcher at the National Research Council of Argentina, where he developed his professional career, progressing up the hierarchies to his current position (2010) as Senior Research Fellow, the highest one. His main research activities were carried at the Museo de La Plata of the Universidad Nacional de La Plata and at the Núcleo de Investigación INCUAPA (*Investigaciones Arqueológicas y Paleontológicas del Cuaternario Pampeano*) of the Universidad del Centro de la Provincia de Buenos Aires (UNICEN), where he still develops his research and is Director. His work at the University also entailed active participation as academic councilor and later as Dean (1989–1992) of the Facultad de Ciencias Sociales (UNICEN), where he also promoted the foundation of the INCUAPA (1995). There he created the Doctorate in Archaeology (2005), where he currently is the Director. As professional archaeologist, he was President of the Sociedad Argentina de Antropología (2006–2009) and Editor of *Relaciones de la Sociedad Argentina de Antropología*, the most important academic journal in anthropology at Argentina.

Major Accomplishments

Through his research, Dr. Politis promoted a renewed emphasis on study of the archaeology of the Pampas, an area traditionally undervalued. From the beginning of his work in the area at the end of the 1970s, he demonstrated the importance of this region in the early peopling of the continent, and renewed discussions on human and megafauna coexistence (Politis 1984). Thanks to his encouragement, new projects and lines of research were opened in the region, and at the present time, many research teams are making important contributions, while recognizing its historical importance.

Particularly interested in hunter-gatherers, Politis spent long seasons between 1990 and 1996 at the Colombian Amazonas forest conducting ethnoarchaeological research among the Nukak, a recently contacted hunter-gatherer group. There he tested many assumptions about forest hunter-gatherers and developed models in relation to settlement and mobility, as well as advanced new insights in relation to subsistence and material culture (Politis 1996). This experience was continued in his ethnoarchaeological research among the Hotï at Venezuelan Amazonia in 2002–2003, and among the Awá, at Brazil, which led him between 2005 and 2009 to make new ethnoarchaeological studies in an international project with Spanish and Brazilian colleagues.

Theory and the history of archaeology have been other major concerns and contributions by Dr. Politis. Within a perspective of the history of archaeology both in relation to theory and to politics, he made many important contributions that placed South American archaeology in the international arena. He was particularly interested in the sociopolitical contexts of knowledge production (e.g., Politis 1995, 2001; Politis & Curtoni 2011) and the positioning of South American archaeology in relation to global counterparts, colonialism, and world theoretical context (e.g., Politis & Alberti 1999; Politis 2003). His experience as an ethnoarchaeologist has informed theoretical considerations of this topic, especially in terms of its ethical implications (Politis 2001).

Gustavo Politis' research with Indigenous people is characterized by his commitment to the people with whom he works and a reflexive stand on the social role of archaeologists. He had an active and conspicuous participation in the first restitution of an Indigenous ancestor at Argentina ordered by law in 1994. This was particularly significant and symbolic as it was about a highly respected chief, Inakayal, who had resisted the advance of the State in nineteenth century over their territories at Patagonia and been kept at the National Museum as a specimen. This first repatriation had deep impact on native peoples, vindicating their struggles, as well as on scientists and ordinary people.

Dr. Politis has received numerous awards for his contributions to the profession including one of the most important recognitions in science at Argentina, the Premio Nacional de Ciencia "Bernardo Houssay" of Argentina, with which

he honored twice both as junior (1987) and senior (2003) researcher. In 2003, he was distinguished by a John Simon Guggenheim Fellowship. He was invited as distinguished Lecturer, banquet speaker and to plenary lectures at international congresses in many opportunities. His book *Ethnoarchaelogy of an Amazonian People* (Politis 2007) was chosen by *Choice*, a premier source for reviews of academic books in the USA, as one of the outstanding academic titles of 2008.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Latin American Social Archaeology
- ▶ South American Archaeology: Postcolonial Perspectives

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Pompeii

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Introduction

The ruins of the Roman town of Pompeii are located within the city of Pompeii, in southern Italy, in the area known as Campania (Palmer et al. 2005: 88). Roman Pompeii was totally destroyed, together with the nearby town of Herculaneum, when the volcano known as Mount Vesuvius erupted in 79 CE. Pompeii had been at the epicenter of an earlier natural disaster (a severe earthquake), in February 62 CE (Ward-Perkins & Claridge 1980: 13), which could be interpreted as a precursor to the catastrophic volcanic eruption in August 79 CE. Roman Pompeii, with an estimated population of between twenty to twenty-five thousand people, was situated eight kilometers southeast of the apex of Mount Vesuvius, which was considered to be a non-active volcano prior to the 79 CE natural disaster, even though the last recorded volcanic action had been in 217 BCE.

> Initially, the settlement of Pompeii covered ten hectares and had a population of between two thousand and two thousand five hundred people. In the fifth century BC Pompeii was re-developed, with an emphasis on the Greek style of town planning; the final acreage was approximately sixty-five hectares. This new Pompeii included a defensive wall outside which the suburbs of Pompeii continued to grow and expand (Ward-Perkins & Claridge 1980: 34).

Key Issues and Current Debates

Excavations of Pompeii started in the middle of the eighteenth century (UNESCO 2013). During the period 130–90 BCE, some of the grandest houses (discovered to date) such as the Basilica and the houses of Pansa and the Faun were erected. Archaeological evidence has shown that these larger luxurious structures were

sometimes built over the foundations or ruins of previous dwellings (Scullard 1972: 180). This evidence of building activity supports the theory that Pompeii was a prosperous metropolis that had not only grand residences, but an amphitheatre, an open area dedicated to exercise (such as running and wrestling) known as a palaestra, taverns, shops, brothels, civic buildings, and a doctor's residence. Excavations have also revealed that Pompeii had five large bath houses for use by its townspeople (Burbank & Cooper 2010: 36), again describing a people who were social and possibly sometimes promiscuous, as illustrated by the murals in Pompeii's Suburban Baths (Santon 2007: 162). The architecture uncovered has revealed that Pompeii was also home to small manufacturers, who sometimes had retail areas attached to the front of their family homes, that opened onto the street, in order to display the saleable goods or services, such as shoes and leather work (Scullard 1972: 335).

Pompeii was a significant cultural and trading center. Together with its surrounding agricultural areas, it was an example of Italy's increasing economic prosperity. Work on the rural estates near Pompeii was carried out by slaves, rather than by the wealthy owners. The owners appeared to divide their time between country estates and town residences that were usually situated in the city center of Pompeii (Scullard 1972: 333–334). Pompeii was also used by the emperor Nero as a solution to the problem of overpopulation in Rome, when he relocated military veterans to Pompeii after the earthquake of 62 CE (Scullard 1972: 317). This re-settlement would also have provided a labor source to carry out repairs and reconstruction after the 62 CE earthquake.

Archaeological evidence found to date confirms that Pompeii was a trade center at the time of the eruption and had been for many years, evidenced by the ruins of businesses, such as bakeries (with their own mill stone), oil storage centers (with the remains of large amphoras grouped together in one place) and market places, where the exchange of goods would have occurred. A lot of the "fine metal furniture and *object d'arts*" including silver ware that were recovered through the excavations at Pompeii were made in the factories of Capua (Scullard 1972: 337). This demonstrates that luxury goods were imported into Pompeii, again indicating that it was a successful trading center.

The excavations undertaken at Pompeii confirm that it was also a cultural center; the architecture and art unearthed provides an insight into the opulence surrounding some of its inhabitants' lifestyles. Art such as murals, frescoes, and portraiture suggest a community with an ongoing appreciation of art and literature. The murals revealed through archaeological recovery at Pompeii can be classified into four styles, which are the Incrustation style, the Architectural style, the Ornate style, and the Intricate style, with the last style, the Intricate period, dating from 50 CE until the natural disaster of 79 CE. Evidence of another style of painting, portraiture, was also found during the excavations at Pompeii (Scullard 1972: 359). Archaeology has also revealed the existence of cult worship through surviving art work, with paintings such as frescoes that seem to indicate initiation ceremonies connected with Dionysus found in the Villa of the Mysteries at Pompeii (Scullard 1972: 373). Archaeologists have found that many individual houses had their own shrines or lararia, which indicates that a system of belief was part of everyday life in Pompeii (Ward-Perkins & Claridge 1980: 47).

Another form of art, not found inside the ruins of luxurious villas but rather on the walls of street buildings, was graffiti. This has provided particular insights into the thoughts of the people of Pompeii in 79 CE. It is an example of uncensored historical opinion and often appears to be related to political events.

The archaeological excavations at Pompeii have revealed that the effects of the major earthquake in 62 CE were still being addressed at the time of the 79 CE eruption; that is, restorations were still being undertaken at the time of the pyroclastic disaster that destroyed the town. The length of time between the disaster and repairs undertaken could be an indicator of an economic depression or perhaps a shortage of skilled labor or scarcity of building materials. There is, however, archaeological evidence that indicates that

there had been some rebuilding undertaken in the period between the two disasters.

The catastrophic event at Pompeii had an unusual lasting outcome. The type of disaster that occurred captured a moment in time, or as Keith Muckelroy states, it represents a "time capsule" (1978: 56) in the lives of the people of Pompeii, albeit one that was terrifying and fatal. Archaeologists today have been able to obtain accurate insights into life in Roman Pompeii as it was on August 24th and 25th in 79 CE. Scientists are able to study the twisted forms that were once human beings through the stabilizing methods, first invented and applied by Guiseppe Fiorelli in 1860, which involved filling the fragile body cavities with plaster of Paris in order to preserve their shapes (Renfrew & Bahn 2004: 24; Palmer et al. 2005: 90). More recently, a technique that uses liquid transparent glass fiber has replaced the Fiorelli plaster of Paris method. The latter method enables bones and other artifacts to become visible (Renfrew & Bahn 2004: 25). These scientific studies have revealed many things including the presence of diseases (such as malaria, tuberculosis, arthritis, and tooth decay), ages, occupations, and diets, but unfortunately, the high temperatures experienced during the disaster destroyed any DNA evidence. Most poignantly, these studies have been able to detail how some of the victims actually died, for example from suffocation or physical trauma. Diets were identified from the actual remains of meals excavated from the tables of the people of Pompeii. The contents of excavated shops similarly revealed what the people of Pompeii were eating and drinking and purchasing in the execution of their everyday lives (Renfrew & Bahn 2004: 310).

Future Directions

Today, Pompeii bears the scars of archaeology (both legal and illegal) and tourism. Ironically, both help support the economy of the surrounding town of twenty-first century Pompeii. However, there is debate concerning whether Pompeii should be closed to tourists and/or archaeologists, in order to better protect the site. Excavations can be a threat to the site since they can destroy evidence and expose new areas of the site to natural deterioration and create additional maintenance needs (UNESCO 2012). The central issue now is whether to focus on preserving what has been discovered, or excavate further in order to obtain new information. This debate was brought into the public sphere with the collapse of the House of the Gladiators in 2010 and the House of Loreius Tiburtinus in 2011. This prompted a formal agreement between the United Nations Educational, Scientific and Cultural Organisation to better conserve the site (UNESCO 2013). The direction for conservation at Pompeii is now likely to focus more clearly on comprehensive maintenance, including improved water collection and disposal, as damage can be caused by bad drainage and the slow deterioration of mortar.

Pompeii's discovery and excavation has enabled unique insights into a way of life, centuries ago and frozen in time, because of the effects of a devastating natural disaster. Even given the considerable amount of archaeological investigation already undertaken, there is still great potential for new knowledge to emerge, especially given the continued advances in archaeological techniques.

Cross-References

- ▶ Disaster Response Planning: Earthquakes
- ▶ Fiorelli, Giuseppe
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Volcanic Activity

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Popular Culture and Archaeology

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Introduction

Popular media has influenced the public view of archaeology for over a century. Before the genesis of digitally based mass media, popular culture as it related to archaeology was based on the accounts of travelers and other print-based media. In the modern age, motion pictures, television shows, print media, and video games have all served to bring archaeology to the masses. Unwittingly, these forms of media often misrepresent the methodological and theoretical underpinnings of the field in favor of adventure and glamour. *King Solomon's* Mines (1950 and 2004), *Indiana Jones* (1981–2008), *Laura Croft*: *Tomb Raider* (2001), and the *Stargate SG-1* (1997–2007) series are just a few examples of how simplistic views of archaeology have been popularized in the mass media. These portrayals of archaeologists in action promulgate a romanticized and adventure-based view of the discipline, a view that frequently overshadows archaeology's scientific goals and practices. In addition to influencing how archaeology is viewed as a discipline, popular culture has an effect on how the public regards archaeological resources and associated geographic areas.

Definition

Archaeology as displayed in movies, television, fictional novels, and other popular media focuses on adventure and ignores the technical and practical elements of archaeological fieldwork while creating a new identity for archaeologists as adventurers and cultural connoisseurs. Additionally, these media also neglect to include the research and preparation necessary to undertake before entering the field. The analysis of data and the ethical implications of research are wholly ignored, leaving these elements of archaeology as a science a mystery to the public who consumes this image of the discipline. Though archaeologists in the field are prone to consider actual archaeological research as absent from the minds of those who produce popular forms of media, those who develop these forms of entertainment – in all actuality – rely on archaeological work for the production of stories for the interested public. Without the archaeologist, popular representations of past cultures – and the way in which they are accessed – would be produced based on pure fantasy and speculation, rather than simply lacking in detail and scientific veracity. Moreover, the many attitudes and ideals that are fueled by popular media have a direct effect on how the cultural patrimony of the world is guarded and understood. However, it is necessary to remember that archaeologists are the primary source of public discourse with the past, and ultimately the interest in these areas on the part of archaeologists is the catalyst for the emphasis on various time and regions – such as ancient Egypt, the classical Mediterranean, or the biblical Near East – in popular media (Kroshus Medina 2003).

Key Issues/Current Debates/Future Directions/Examples

Beyond representations of archaeology and uncovering the past in cinematic formats, there is now an excess of television shows that focus on popular notions of uncovering the past. In some cases, like that of the show *American Digger* on

Spike TV, what is shown can hardly be called archaeology. An unknowing public may take it as such an endeavor and absorb messages that are much more harmful to the archaeological record and the image of the discipline than seeing an archaeologically based adventure film. Despite this fact, archaeology is not without hope in the public eye. As long as there have been television programs and movies for the archaeologist at heart, there have also been publications such as *National Geographic* or *Archaeology* magazine to temper fiction with fact. Thus, while many in the profession may ultimately fess up to being drawn to archaeology by films such as *The Mummy* (1932 and 1999), pop culture does more for the field than lure unsuspecting adventurers into the clutches of scientific rigor.

The placement of archaeology in such a romantic and unscientific light can elicit a trend in response that tends towards a condemnation of these representations as false or misleading (McGeough 2006). However, researchers such as Vergil E. Noble (2007) have pointed out that the way the story is told does not always change the message. Although Hollywood representations of past stories may not be entirely accurate or show the archaeologists as a treasure-hunting adventurer, the reverence and awe of the past that drives so many professionals to enter the field is undoubtedly present. While the public may come away confused as to certain technical elements of the discipline, the basis of their desire to engage with archaeology in cinematic form is not to have a formal lesson on excavation. Rather, they are there to be entertained, and what is deemed entertaining is often a reflection of public interest rather than a choice on the part of the producer. A public interest in archaeology and the past is absolutely vital to the promulgation of the discipline beyond pure academic interest (Sabloff 1999). If people were to stop seeing the past as interesting and exciting, the drive to preserve, protect, and engage with it would ultimately diminish and with it the professional ability to act as stewards of the past (SAA Principles of Archaeological Ethics). Movies, television, video games, and even popular books by authors such as Dan Brown or Steve Berry – authors of *The Da Vinci Code* and *The Alexandria Link*, respectively – all serve to peak public interest in the past and hopefully drive people to learn more about the archaeology of their own areas or the discipline as a whole.

Also at issue here is the perception that archaeology can only happen when artifacts are excavated and removed from their context into a laboratory or museum setting. Professional issues such as curation, the acquisition of permits, and the rights of cultural groups to the protection of their ancestral heritage are not addressed in the popular media. This results in an enthusiastic public that does not fully grasp the destructive nature of archaeology or the importance of the life of the artifacts themselves. Rather than condemning filmmakers for the popularized view of archaeology they have put forth, the discipline should thank them for acting as an inspiration to so many in the field and in the public. Both the Society for American Archaeology (SAA) and the Archaeological Institute of America (AIA) have sought to do this within their respective organizations. In 1996, the SAA recognized the producers of *Star Trek: Voyager* and *Star Trek*: *Next Generation* for their portrayal of archaeology, and in 2008 the *Indiana Jones* star Harrison Ford was elected to the board of directors for the AIA and awarded for his contributions to the public presence of archaeology (Aldenderfer 1996; AIA News 2008). Furthermore, it should be taken on as professional responsibility to find ways to educate the public beyond television and movies so that they may come to know the science of archaeology and the important issues archaeologists deal with when they are not fighting to rescue the past they so eagerly strive to protect (Sabloff 1999). To this end, the AIA and many scholars in the field have worked towards addressing issues of accuracy in popular historical representations such as *Troy* (2004) or Mel Gibson's 2006 film *Apocalypto*. In order to satisfy the public's interest in history and the truth of the past, the AIA and SAA have also made an effort to disseminate scientific evaluations of popular movies and television shows (Waldbaum 2004; Dixon Renoe & Jeppson n.d.).

Though the real world of archaeology may not seem as exciting on the surface as it is in the movies, archaeologists should – and certainly do – strive to make it important and exciting in their own communities. Indeed, Jeremy Sabloff (1999) cogently illustrates how the professional structure of archaeology has prohibited the communication of archaeological practices and findings to the public in popular formats. In recent years, this disconnect between archaeologist and the public they serve has begun to shrink with the expansion of public archaeology and an ethical imperative to make research and results accessible to communities (SAA Ethics in American Archaeology Committee 1996). Professional archaeologists in the popular media are still underrepresented however and are thus inaccessible to the general population. The absence of professional archaeology from these popular formats opens the door for misinterpretation and furthers the glamorous view of archaeology through misguided interpretations of the past and a reliance on famous historical enthusiasts (Sabloff 1999). Archaeology can only benefit from a deeper involvement in the popular presentation of the subject. Only when there are real, accessible, examples to follow will the public form their opinions of archaeologists and their duties on reality rather than the archetypes transmitted through popular culture.

The representation of archaeology in popular media greatly influences the public perception of the discipline. Although there are issues with the way archaeology and archaeologists are depicted in movies, books, and on television, the real issue lies in the general public consensus that has been fueled by these images of the archaeologist as adventurer. Many of the misconceptions that are held about archaeology and those who work in the field are not limited to a single geographical region. In his 2006 article, "Out of the Box: Popular Notions of Archaeology in Documentary Programs on Australian Television", Stephen Nichols summarizes popular misconceptions held in Australia, the United States, and Canada. With the widespread consistency of archaeologists being considered as connoisseurs of all pasts, diggers of dinosaur bones and ancient treasure, and academics with no relevance in today's world, it begs the question of how this global attitude towards archaeology developed and how those in the field can work to address these issues on a global scale.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Cultural Heritage and the Public
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Port of Alexandria: Underwater Archaeology

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Introduction/Definition

Founded by Alexander the Great in the western Nile Delta in 331 BCE, Alexandria developed over several centuries as a result of specific geomorphological features and the systematic development of its coastline. The Pleistocene sandstone bedrock provided a stable foundation for the construction of buildings, while also serving as a quarry. An inland lake was located behind the city, and across from it was an island. This island, named *Pharos* by the Greeks, was connected to Alexandria early on in the Hellenistic period by means of a 1,200-m causeway or *Heptastadium* that created a dual harbor complex, with the port of *Eunostos* to the west and *Megas Limèn-Magnus Portus* (or *Portus Magnus*) to the east. The objective of the research project launched in 1992 by the *Institut Européen d'Archéologie Sous-Marine* (IEASM) in cooperation with the Supreme Council for Antiquities of Egypt (SCA) was to determine the precise ancient topography of the eastern port of Alexandria now underwater (Goddio & Darwish 1998: 1-52; Fabre & Goddio 2010). This study has included both the geodynamic research of natural and anthropic features and the analysis of the coevolution of ancient society and the coastal area of the western Nile Delta.

The scientific approach to the study of the *Portus Magnus* was designed to utilize the full range of geomorphological and archaeological data, as well as literary, epigraphic, and iconographic sources. Extensive historiographical knowledge of the accounts of the first explorers was also essential to the study. This data has provided a crucial link between the monuments from antiquity that were still visible when the early travelers' reports were written and the area under examination, which covers 400 ha of the present day eastern port (Fig. 1).

The scientific approach to the investigation of the *Portus Magnus* has taken into account the specific topography of the areas studied. However, the simple observation of the current state of the seafloor using geophysical and geological prospecting instruments also failed to provide full insight into the ancient topography. One effective method of locating underwater archaeological ruins covered in sediment was to use sensitive nuclear magnetic resonance magnetometers to create a very high-definition magnetic map. This indicates the location of the buried archaeological ruins by continuously measuring the absolute value of the magnetic field, with a sensitivity of about 1/100 gamma. An electronic image of the seafloor has also been created by means of scanning with a side-scan sonar and, more recently, a multi-beam sonar, which has revealed items protruding from the sediment.

The results of this work demonstrate that the sites were subject to both long-term subsidence of the land that commonly affects this section of the southeastern basin of the Mediterranean as well as short-term cataclysmic sediment failure. These factors, which may have operated independently or together, would have caused considerable destruction and explain the submergence of the *Portus Magnus* as well as other large parts of the Canopic region (Goddio 2007; Stanley 2007). All of the evidence has shown that regular subsidence and the rising sea level – observed since ancient times – contributed significantly to the submergence of the *Portus Magnus*. It is generally acknowledged that the sea level in Alexandria has risen by 1–1.5 m, and the land level has dropped by 5–6 m over the last 2,000 years.

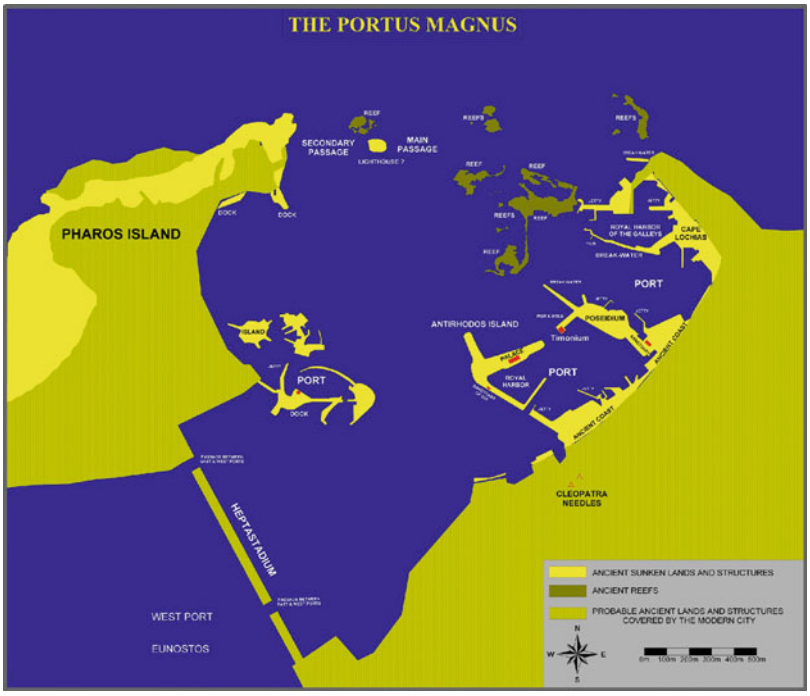

Port of Alexandria: Underwater Archaeology, Fig. 1 The ancient topography of the *Portus Magnus* of Alexandria (Photo: Franck Goddio ©Franck Goddio/ Hilti Foundation)

The southern coast of the eastern Mediterranean has also been subject to various forms of tectonic movement due to the subduction of the African plate under the Anatolian plate. Ancient texts give accounts of earthquakes and tsunamis affecting the region, especially the tsunami of 21 July 365, which affected southeastern Mediterranean coasts, and an earthquake in the mid-eighth century.

Key Issues/Current Debates

An Overview of the Hellenistic and Roman Topography of Alexandria's *Portus Magnus*: Texts Versus Archaeology

While geophysical prospection in the Port of Alexandria and subsequent underwater excavations has failed to reveal the splendor of the palaces of Alexandria, they have generated excellent cartographic details of the eastern port and its surroundings. The research has allowed the contours of the former land surface to be traced with a certain degree of accuracy and in some cases has provided information on the structures and buildings which once stood near the palaces, such as the royal ports, the *Poseidium* peninsula, and the island of *Antirhodos*, as well as the *Basileia* – a seafront palace complex containing a series of government buildings and cultural institutions. The study of the harbors has focused on determining their depths and sedimentation type, identifying shipwrecks, and tracing the plan of the docks (Figs. 2, 3). The numerous architectural elements covering the palace area were identified and studied, and limited excavations were carried out to determine the timeline of the development, abandonment, and destruction of the sites. The layout of the ports turns out to be more technically coherent than previously believed.

More precisely, two channels leading to the large port have been mapped. The main channel, toward the middle of the harbor, was bordered to the west by a large submerged rock. The narrower minor channel allowed ships to pass between this rock and the island of Pharos. The famous lighthouse must have stood nearby. Considering the topographical and geological results along with the literary evidence, and in the absence of

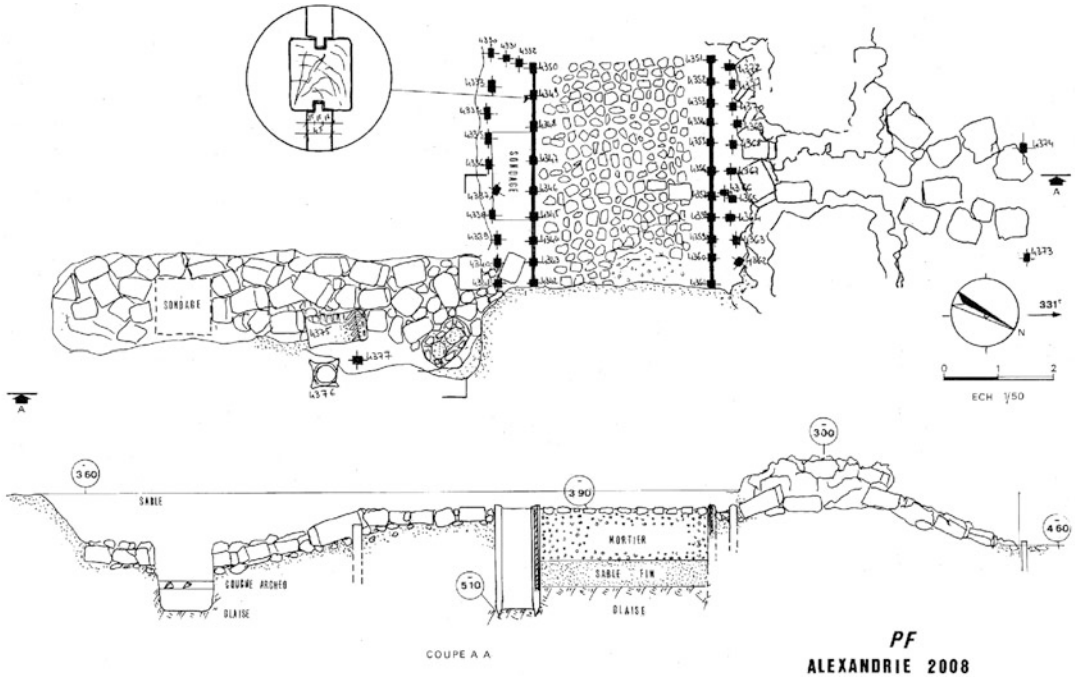

Port of Alexandria: Underwater Archaeology, Fig. 2 Port structures assembled from piles and wood planks that support a structure made of limestone blocks, PF sector, northeastern of the Poseidium peninsula (Drawing: Patrice Sandrin ©Franck Goddio/Hilti Foundation)

archaeological proof showing another position, it is reasonable to posit at this point that the lighthouse was located on the rock situated between the two channels. Nothing visible remains today of this prestigious monument that was a wonder of its day. Its remains are probably hidden by the enormous mass of the current western breakwater, which links Fort Qaitbey to the great central rock, now submerged and mostly covered by the blocks of the modern structure (Goddio et al. forthcoming, *contra* Empereur 1998 for which the lighthouse was situated on the site of the medieval Fort Qaitbey).

Recent archaeological work has identified built-up areas to the west of the "royal port" (in the central area of the Bay of Alexandria), highlighting the complexity of the *Portus Magnus*' infrastructure. While it remains unclear as to exactly how such structures were organized, the results shed light on the navigable routes inside the *Portus Magnus*, confirming that it was "wonderfully concealed" (Strabo, 17.28; Charvet 1997). The eastern part of the great port is, in fact, delimited by a large stretch of land, now underwater, which formed part of the ancient Cape Lochias. Appreciably wider and extending over 450 m west-northwest of present day Cape Silsileh, it provided considerable natural protection for the *Portus Magnus*.

A very sheltered port was established in Cape Lochias, with two docks and a surface area of approximately 7 ha. Jetties, quays, and seawalls combined to form a well-concealed port almost inserted into Cape Lochias. Since the large central reef had to be navigated to enter the port, only rowing boats like galleys would have been able to enter easily. The discoveries here correspond to ancient texts. According to Strabo, "Above these buildings (in Cape Lochias) lies a concealed man-made port, private property of the kings" (Strabo, 17.1.6-10; Charvet 1997). The author of *The Alexandrian War* wrote: "This area of the city (where Caesar was entrenched) contained a small part of the royal palace where he himself had been brought to lodge on arrival, and the theater, adjacent to the palace, which

Port of Alexandria: Underwater Archaeology, Fig. 3 Port structures assembled from piles and wood planks that support a structure made of limestone blocks, PF sector, northeastern of the Poseidium peninsula (Photo: Christoph Gerigk ©Franck Goddio/Hilti Foundation)

served as a citadel and provided access to the port and the royal shipyards" (*Bellum Alexandrinum*, 1; Andrieu 1954).

A large port was established between the southwestern jetty of the inner port and the Poseidium peninsula, measuring approximately 15 ha. The remains of a temple from the Roman period have been excavated where the peninsula meets the ancient shoreline. At the end of a wall of the peninsula, extending toward the center of a port basin, excavations have revealed foundations dating from the end of the first century BCE and redevelopments from the period of the Antonines. The identity of the ruins is not certain, but we know, thanks to Strabo, that Marcus Antonius built the *Timonium*, a small palace retreat at the end of a wall of the Poseidium. He wanted to retreat there and live in seclusion after his defeat at Actium by his rival Octavian. Could the ruins from the end of the Ptolemaic period be those of the famous Roman general's retreat? Excavations in progress may reveal this.

The island of *Antirhodos*, 350 m long by 70 m wide, is located off the southwestern tip of the *Poseidium* peninsula and may be divided into three sections. The main section, with a southeast to northeast orientation, is aligned with the seawall and the pier extending from the tip of the peninsula and lies parallel to the ancient coast. Research has shown that this island had probably been developed before the founding of Alexandria (cf. *infra*) and that extensive work was executed there later, toward the middle of the third century BCE until the Roman period. A large seawall protrudes from the northwestern end of the island, 340 m long by 30 m wide, forming a second section. Recent fieldwork conducted on this area has confirmed the presence of large size buildings characterized by limestone blocks, fragments of wall covering,

Port of Alexandria: Underwater Archaeology, Fig. 4 Priest bearing in his veiled hands an Osiris-Canopus jar. Roman period. Granodiorite. H. 122 cm (Photo: Christoph Gerigk ©Franck Goddio/Hilti Foundation)

mosaics, and friezes. The information indicates the collapse of a building, probably in correspondence with the destruction of the eastern part of *Antirhodos*. This is the same area from which the statue of a priest carrying a Canopic jar (Goddio & Fabre 2008: 161) was found along with sphinxes (Fig. 4). Among these finds was a statue of Ptolemy XII, the father of Cleopatra VII (Goddio & Fabre 2008: 356-7), suggesting the site of a temple dedicated to Isis. At the end of the third section, oriented northwest to southeast, a jetty built from limestone blocks protrudes northeast, forming with the island a small haven fully sheltered from swells and waves, which may correspond to the "small port" described by Strabo: "... private property of the kings, as is *Antirhodos*, the island located before the man-made port, containing a royal palace and a small port" (Strabo, 17.1.6-10; Charvet 1997). Here, the remains of a ship lie some 5 m deep and spread over a surface of about 350 sqm. The ship seems to have been free of any cargo. Nevertheless, the items found on board and in the sealing layer above the wreck, the details of the ship's architecture, and radiocarbon dating results suggest that the ship sank sometime between the end of the first century BCE and the first century CE. Its approximate dimensions (30–31 × 10–11 m) – representing a coefficient of elongation of about 2.7 – correspond to the dimensions of commercial ships of the Roman period (Sandrin et al. 2012).

The ruins of quays and piers were also identified during prospecting on the "ancient coast" (Fig. 5). This alone shows that nineteenth- and twentieth-century reclamation work encroaching on the sea with landfills did not entirely conceal the area that subsidence and land collapse had previously submerged. Visible along the entire eastern part of the *Portus Magnus*, this ancient coast is sometimes paved and contains numerous architectural remains and beautiful remnants of statuary, among which was a colossal head of Caesarion (Goddio & Fabre 2008: 357).

The research carried out in the western part of the *Portus Magnus* reveals the complex organization of the Port of Alexandria. After describing the royal quarter and port and moving from east to west, Strabo continues to examine this area: "Next comes the *Caesareum*, then the *Emporium* and the warehouses followed by the arsenals, extending as far as the *Heptastadium*" (Strabo, 17.50.9; Charvet 1997). Facing the *Heptastadium*, a port protected this long

Port of Alexandria: Underwater Archaeology, Fig. 5 Ruins of quays or esplanade identified during prospecting on the "ancient coast." (Photo: Christoph Gerigk ©Franck Goddio/Hilti Foundation

causeway (Fabre & Goddio 2010). It featured basins ideally suited to receive ships waiting to go from the eastern port to the western port that gave access to Egyptian domestic traffic. Indeed, according to the texts (Strabo, 17.1.6; Caesar, *Bellum Civile*, 3.312), two openings were constructed in this seawall and controlled by forts, allowing passage from one port to another.

Development and Operation of the Port

The discoveries in the eastern Bay of Alexandria show that the entire port infrastructure was designed to optimize the natural environment. Nevertheless, beginning in the Hellenistic period, harbor construction and urban development resulted in dramatic changes to the coastline. This forces us to consider the logic behind transforming an enclosed natural bay into a series of harbors.

Maritime dynamics also hint at the historical workings of the *Portus Magnus*. The map of the submerged port structures in the eastern port of Alexandria suggests a vast bay surrounded by a group of similarly sized harbors. J.-Ph. Goiran correctly notes: "Due to the specific organization of the bay, initially too vast to provide natural shelter, a group of small harbors was needed along the far end of the bay [. . .]. The purpose of these was to break up the coastline as seen in modern marinas" (Goiran 2001: 140). Alexandria's *Portus Magnus* benefited from its specific geography. The archaeological structures found are cut out of the substrate or constructed in the form of straight or curved seawalls. Similarly, the extremely developed coastline has been somewhat artificially extended. Diodorus of Sicily notes: "They [Alexander's successors] enhanced it, some building magnificent palaces, others constructing arsenals and ports, others adding religious monuments and magnificent buildings, so that in the eyes of most people it was the first or second city of the inhabited world" (Diod. Sic., 1.50.7; Vernière 1993). The Romans more than likely optimized the structures of the port and made proactive adjustments to what the Ptolemies had initiated.

It is not completely possible to establish a convincing parallel between the eastern port of Alexandria and the classical port models, such as the ports with merging lagoons or *cothon*-type port. At most, very general similarities may be found with the Port of Tyre (Bernand 1998: 47; Marriner et al. 2008). Yet the Port of Alexandria forms part of a series of major port developments which began in the sixth century BCE and may be attributed to maritime projects and ambitions of great tyrants. The Greek approach was applied to the Bay of Alexandria, by which a man-made port was created or a natural port was enlarged using jetties to provide shelter from the winds, to facilitate landing and to protect the ships. The jetties were often curved in such a manner as to form a port. In some cases, an islet in the bay was used as the base for a single large seawall: Alexandria's *Heptastadium* is the best preserved example of this. By Greek standards, these structures alone

constituted a "man-made port." But there were also ports dug by hand, at least in the Hellenistic period. Such was the case, in Alexandria, of the port known as the "box" (*kibôtos*) in the western harbor (Fraser 1972: n. 182; Tkaczow 1993: 58 n. 6; McKenzie 2007: 176).

Pharaonic Egypt does not seem to have had "constructed" ports on its shores. At most there would have been landing piers and/or anchorage points (Fabre 2004: 19-35), with the exception of the ports in coastal lakes of the Nile Delta. Does this mean that the Port of Alexandria was developed *ex nihilo*? A number of converging factors suggest that the Bay of Alexandria was developed before the arrival of Alexander. The wooden port structures (quays and jetties) discovered in the axis of the eastern – and main – section of the island of *Antirhodos* have been dated as pre-Ptolemaic (Goddio & Darwish 1998: 31). The data should be correlated with recent analyses of the lead contained in the sedimentary archives for the harbors in the eastern Bay of Alexandria, which contradicts the notion that Alexandria was constructed *ex nihilo* (Goiran 2001: 223-4; Véron et al. 2006; Stanley & Landau 2010). These results corroborate certain accounts in the ancient texts, which state that the Bay of Alexandria offered an anchorage point well known to sailors (Homer, *Od*. 4.354-69).

Alexandria obeyed an economic and political logic that had gradually developed over the centuries to become "the largest *emporium* of the inhabited world" (Strabo, 17.1.13; Charvet 1997). Alexandria inherited the administrative and economic structures of Thonis-Heracleion (Pseudo-Aristotle, *Economics*, 2.33e). This locality was the border crossing, customs post, and *emporium* through which Greek imports passed on their way to the trading posts of Naukratis (Fabre 2008). Due to its population size and its activities, Alexandria quickly attracted a large share of Mediterranean and Eritrean trade. Alexandria was a center of eastern navigation in the Hellenistic period, and its commerce benefited from the state organization of the Ptolemaic economy. Later, during the Roman period, Egyptian grain shipped from Alexandria was used as a genuine political weapon by emperors and claimants to the imperial throne alike. This would have required substantial port infrastructure, and thus the port was well equipped with harbors, quays, warehouses, and water supply points (Fabre & Goddio 2010) (Fig. 5).

These zones of the *emporium* of Alexandria, as well as the royal ports, military ports, and shipyards were designed as places of transit and transfer and are distinguished by their technical, political, and economic dimensions. The research currently being completed should provide clues as to the layout of these areas crossed by ancient ships. We should also gain insight into the cultural organization or implicit hierarchies in the *Portus Magnus*. From a technical viewpoint, the results of topographical work in the *Portus Magnus* of Alexandria raise questions regarding the port layout while also taking navigating conditions (winds and swells) and the types of vessels accommodated (sailing ships or row boats) into consideration. From a theoretical viewpoint, the zones of the eastern port are at the core of more general questions regarding the major political and economic intermediary players in the organization, regulation, and administrative and legal structures that served to define the harbor and its integration into the city.

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► Hellenistic and Roman Egypt, Archaeology of
► Mediterranean Sea: Maritime Archaeology

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Portable Art Recording Methods

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Introduction

Although much less well known than rock or cave art, Paleolithic portable art is comprised of graphic and symbolic manifestations represented on objects and on portable raw materials in contrast with parietal or wall art, which is, by definition, "immobile"), which were left by human groups during the Upper Paleolithic period (between 45,000 cal BP and 15,000 cal BP in Europe). The first European portable art was recovered in the 1860s, very early in the history of prehistoric archaeology. Some pieces, such as the mammoth engraved on ivory at La Madeleine (Dordogne, France), played a determining role in the debate on the existence of an "antediluvian" art. For nearly a century, discoveries proceeded at

Portable Art Recording Methods, Fig. 1 Limeuil (Dordogne, France). Perforated baton decorated with three reindeer, a salmon, and a horse (coll. Musée d'Archéologie Nationale) (Photos G. Tosello)

a steady pace, enriching public and private collections; however, the excavation methods often practiced at that time rarely took into account the archaeological contexts of the objects. Documentation is often reduced to the object itself and any new study must begin with a search of the archives regarding the site or the excavator, whenever these are available.

Although the total number of pieces discovered in Europe is unknown (there is no international data base on this topic), it can be estimated to be in the tens of thousands with concentrations at sites in the southwest of France, Spain and northern Italy, central Germany, Slovakia, and the Czech Republic. The distribution of sites having yielded portable art is much greater than that of cave art. However, the number of pieces per site varies considerably; there are sometimes isolated pieces such as at Etiolles (Essonne, France) (Fritz & Tosello 2011), a set of several dozen *decorated* objects such as at Altamira (Cantabria, Spain) (Barandiaran 1973), Romanelli (Puglia, Italy), and Duruthy (Landes, France), and up to a corpus of several thousand objects such as those found in deposits in El Parpalló (Valencia, Spain) (Villaverde 1994), Gönnersdorf (Rhineland-Palatinate, Germany) (Bosinski & Fischer 1974; Bosinski, D'Errico & Schiller 2001; Bosinski 2008), or La Marche (Vienne, France) (Pales & Tassin 1969).

The materials are of great diversity: bone, ivory, antler, shells, and marine fossils, including also limestone, shale, and sandstone. The term portable art applies to objects as diverse as a reindeer antler spear point decorated with crossed line patterns, a flat bone pierced and carved in the shape of a horse head, a statuette of a woman in soapstone, or a limestone slab sculptured into a bison. Typology, combined with experimentations have made it possible to classify these objects into three main categories (Leroi-Gourhan 1965).

The first category includes weapons, domestic tools, and all the objects for which their function determines the morphology. Thus, a perforated baton has a shaft, more or less cylindrical, and an expanded top with a perforation. Consequently, the decorations fit these constraints (Figs. 1– 3).

A second category includes set of ornaments in the broadest sense of the term. The presence of a suspension system (e.g., a pierced hole) is the common attribute to group together seashells, animal teeth, small flat bones cutout (in disc form, zoomorphic silhouette), fragments of rare materials (lignite, amber, fossil tooth), animal or human statuettes or figurives, which are thought to have adorned the body or clothing.

Finally, the third category consists of bones and stones of all sizes, which are engraved or carved into three dimensions. At some sites engraved stones, commonly called "plaquettes" number in the hundreds, even thousands, and whose social functions remain enigmatic (Pales & Tassin 1969; Bosinski & Fischer 1974; Villaverde 1994; Tosello 2003).

However, this classification should be regarded as only a first approach. There are many pieces of portable art that are "unclassifiable," especially those which were transformed or reused, and not even considering

Portable Art Recording Methods, Fig. 2 Limeuil (Dordogne, France). Perforated baton in reindeer autler; from *top* to *bottom*, details of two reindeer, a horse, and a salmon (coll. Musée d'Archéologie Nationale) (Photos G. Tosello)

certain objects or weapons whose actual function has not been established with certainty. The diversity and difficulty of classifying such archaeological materials show that above all the artistic and symbolic practices of these prehistoric hunter-gathers permeated their activities.

Definition

The organic or inorganic (i.e., mineral) nature of the raw material has important consequences for the study of the objects and the techniques used. Contrary to what one might think, stone materials (limestone, sandstone, schist) are often in poorer condition than organic materials. Indeed, the latter, and bone in particular, because of its fibrous and compact structure, offer a high degree of conservation of engravings and traces from shaping (Fritz 1999). By contrast, the surfaces of sedimentary stones have often suffered from chemical damage or carbonate deposits during their long deposition within archaeological layers. The engraved features, clearly legible in prehistoric times, are now weathered and difficult to read; only the use of lateral lighting close to the rock can reveal them. Painted objects are very rare, because the colors are not retained; nevertheless, some pieces with traces of pigment, or even identifiable figures, have survived and prove that portable art was also colorful (Villaverde 1994) (Fig. 4).

Portable art is affected by a very high level of fragmentation; whole pieces are rare, because they suffered conditions of burial in the ground or they were damaged during the excavation: some were intentionally damaged by prehistoric peoples.

Whatever the nature of the raw material, one of the first stages of research (if not the first) is to estimate the state of conservation of the object, determining whether it is "complete" (or almost) and if this is not the case, identifying the origin or origins of fragmentation. While studying pieces from old excavations, it is important to ensure that there are no other fragments of that same piece to be studied. This reconstruction of the pieces is essential when studying engraved or sculptured stone materials, plaquettes, slabs, and blocks. It can often complete figures, which will confirm or modify the zoological identification, for example. By observing the nature of the fractures (modern or ancient), we can begin to reconstruct the life cycle of the object from its origin to its current state (Fig. 5).

The next step in the research is to establish a graphic copy (or "relevé"). All of the traces observed on a surface must be reproduced objectively. The tracing phase is critical for subsequent syntheses of observations, such as the themes depicted; besides being a document for analysis,

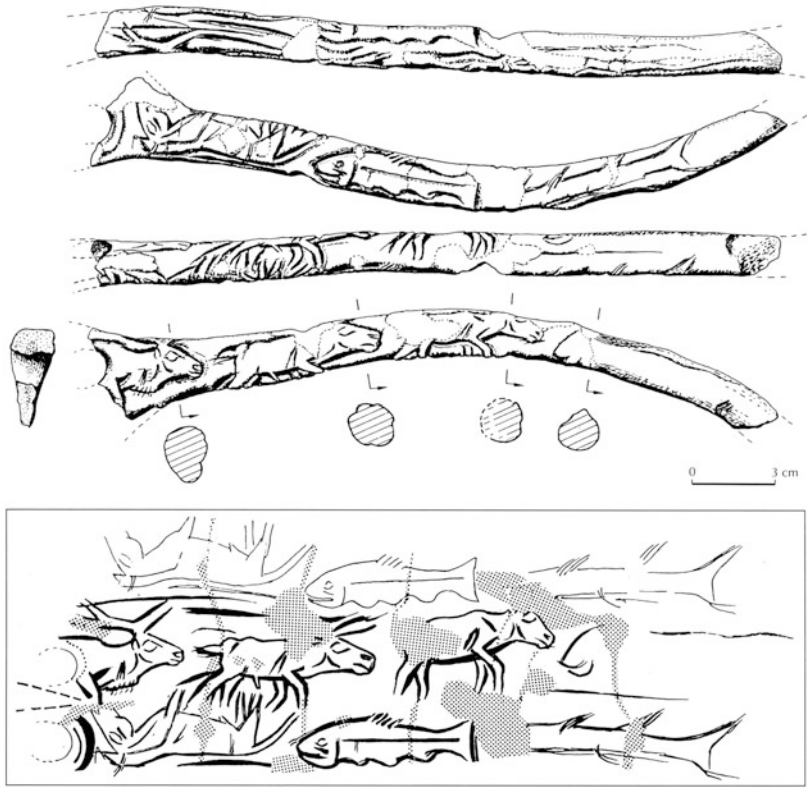

Portable Art Recording Methods, Fig. 3 Limeuil (Dordogne, France). Perforated baton in reindeer autler tracing of the cylindrical decorated shaft and "flattening" of the engraving. (tracing G. Tosello)

Portable Art Recording Methods, Fig. 4 Parpalló Cave (Valencia, Spain). Plate No. 16061A. Photograph of a detail of a figure of a black-painted doe with an overlay of a carved horse. *Right*, a tracing of the plate (Photo and tracing V. Villaverde)

the tracing becomes a substitute for the object, particularly at the time of publication. The different readings of the same object made by different researchers generally show minor variations, which may sometimes be significant, showing that objectivity remains an elusive goal.

Tracing techniques fall into two categories: contact and non-contact tracing techniques.

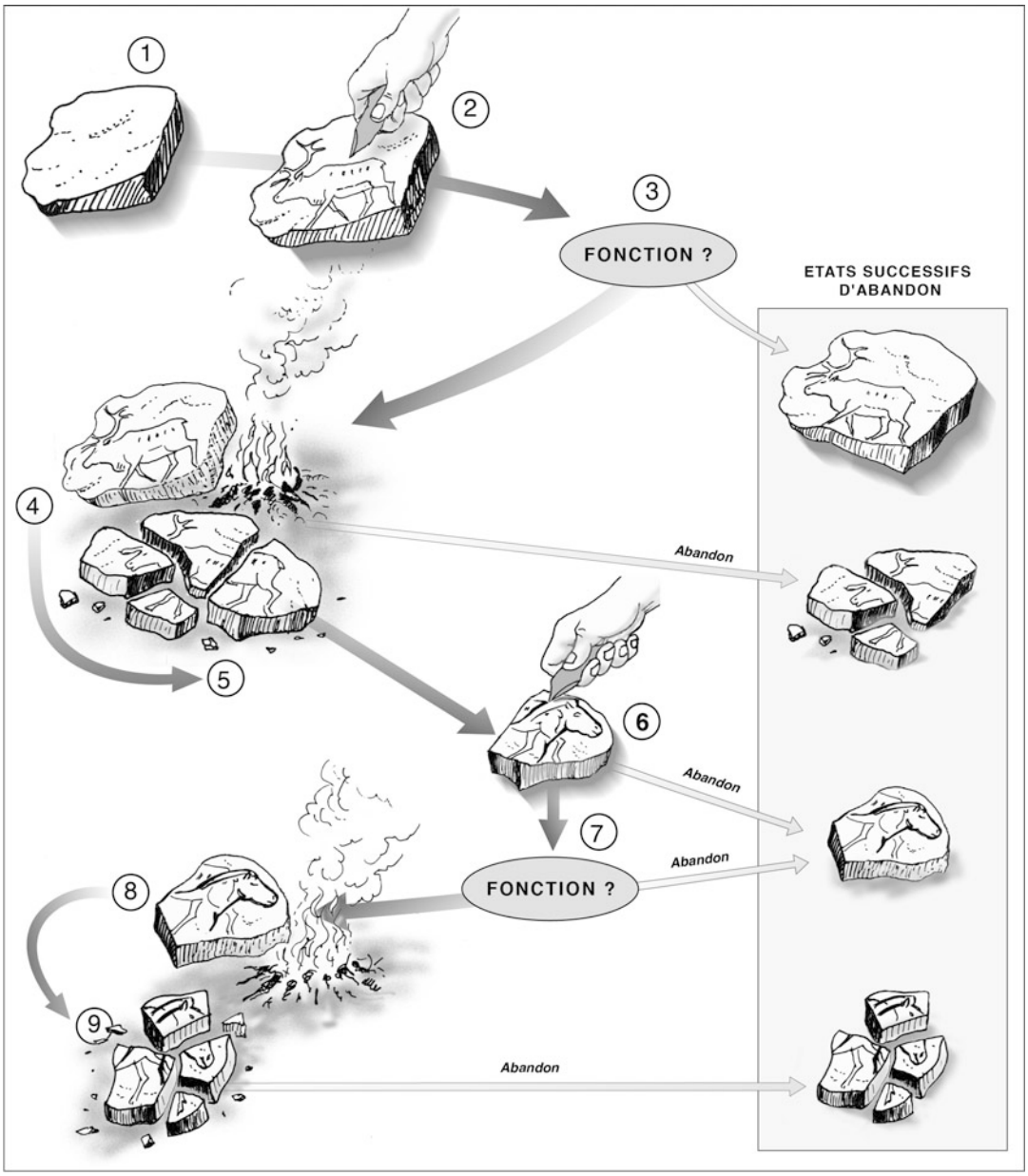

Portable Art Recording Methods, Fig. 5 Theoretical scenario of a "cycle" of an engraving which helps explain the high level of fracturing that affects the engraved plaguettes in Europe, particularly in the Upper Magdalenian (G. Tosello scheme based on site data from Limeuil)

Known for a long time, contact tracing techniques are intuitive and easy to implement. A very fine and perfectly translucent plastic film (of the polythene variety) is placed over the surface; a raking light, moved from time to time as work progresses, can help identify engravings, or any other information, which are then transferred onto the film using thin-tipped markers. This technique offers some advantages: it is cheap, easy to use, and very adaptable on rough

Portable Art Recording Methods, Fig. 6 Gourdan Cave (Haute-Garonne, France). Engraved plaquettes in schist (No. 47264 collection Musée d'Archéologie Nationale) (Photos C. Fritz)

stone surfaces and poses little danger to the original.

When the dimensions of the object are small (only a few cm^2), direct transfer becomes impossible, especially if the incisions are very thin (Fig. 6). It then becomes necessary to work on photographic enlargements; one puts a transparent film on the printed photo, and all that is needed is to replicate the rendition of the photo, constantly checking against the original.

The difference between the original engraving and the photo transfer on a different scale is a mental challenge. A variant of this technique is to trace the lines on a photo of the piece displayed on the computer screen, with the aid of graphics software. In cases where the engravings are not located on a flat surface but on three-dimensional surfaces, it is necessary to test which method is best suited, for example, through a deconstruction of the piece see (Fig. 3). When the engravings are very dense, the process of selecting layers for tracing can isolate each one of them (Fig. 7).

Each of these procedures presents specific advantages: drawing directly on the film covering the object allows, through the reproduction of the same lines, a very close approximation of the prehistoric engraver's gestures. On the other hand, the magnification of engravings through photography (printed or displayed on the screen) provides a stable base for the copy, which thus avoids a sometimes too ephemeral observation of the original piece. On miniature works, the enlargement can reveal minutiae that are almost imperceptible to the naked eye.

When it comes to publication, the tracing plays a major role: it represents the synthesis of the decipherment done by the researcher that is his/her interpretation of the object. The temptation is often great to reproduce as much information as possible (differential readability of the engravings, state of the surface, natural cracks in the rock, traces of shaping, concretions, etc.) which has led in the past to codification charts inspired by geology or cartography (Delluc & Delluc 1984). In our opinion, the use of complex graphic charts should be reduced because it only complicates the reader's task of "decoding" the published tracing. It should focus on the anthropogenic aspects of these objects, which in our eyes is their major interest.

Photography is an indispensable tool in any research on portable Paleolithic art. A long and delicate operation, photographing engravings is performed like deciphering, with a raking light, or of minimum incidence, applied closely. The photographic shot is important as it often provides the opportunity, through the search for optimal lighting, to confirm or reject a hypothetical reading. Photography is thus fully involved in the progress of the analysis while providing a part of the iconography.

For publication, only the photos have the power to evoke in every detail the appearance of decorated surfaces; this is an important point because if the graphic tracings seek to comprehend and try to make sense of documents, photography undoubtedly gives a more objective vision. Conversely, the publication of portable art photos, particularly of engraved plaquettes without their tracing, is an error in method and in communication (Chollot 1964); generally the reader cannot successfully isolate the figures or motifs mentioned in the text. Ideally, each piece of portable Paleolithic art should be illustrated by

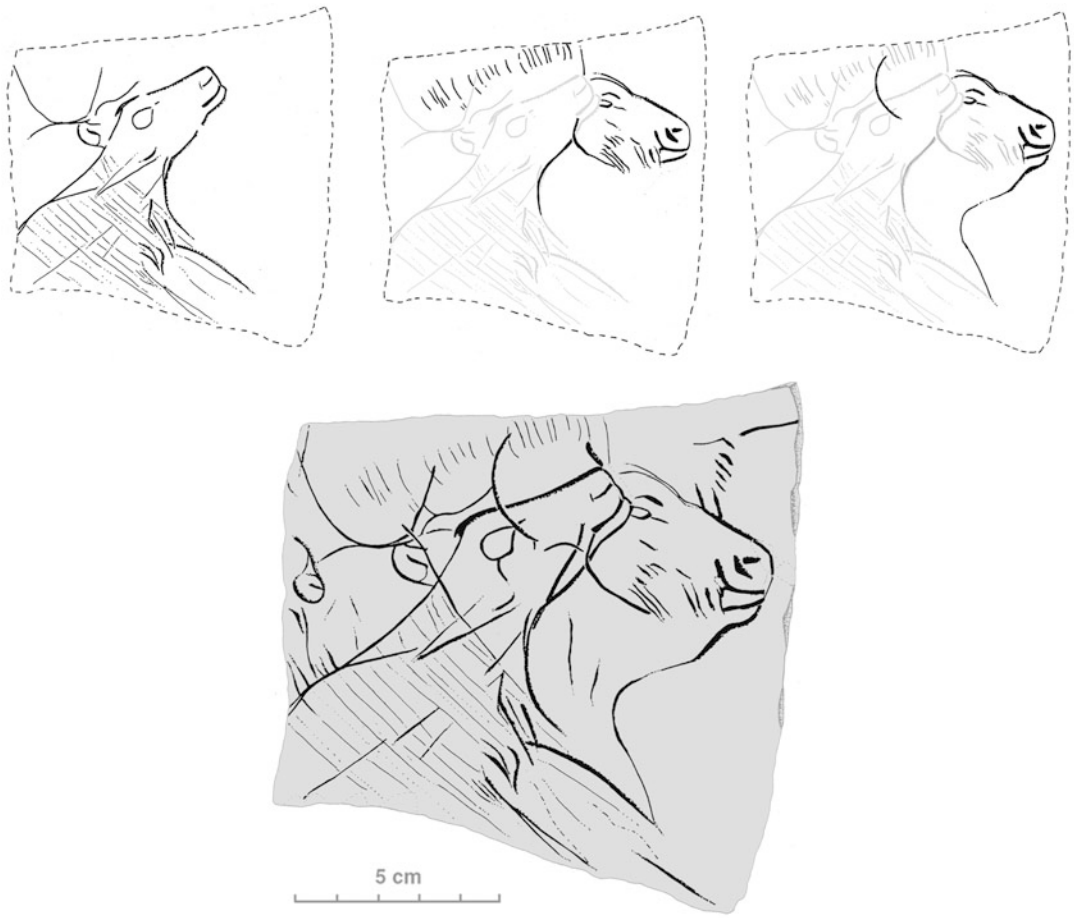

Portable Art Recording Methods, Fig. 7 Gourdan Cave (Haute-Garonne, France). Engraved plaquette in schist No. 47264. Complete tracing of the engraved sen face and selective tracings of three animal heads in the order of superposition: reindeer, horse, and aurochs (?) (tracings C. Fritz)

one or more tracings accompanied by one or more photographs to enable the reader to find how the photos and the tracings can be correlated (Figs. 8–10). The main obstacle is of course the cost of printing, especially when there are many pieces.

In this case, we must focus on publishing the most comprehensive record of the corpus (Sieveking 1987; Villaverde 1994; Tosello 2003) and avoid publishing only the pieces deemed "major" or which concern specific topics (see, e.g., at La Marche, felines and bears: Pales & Tassin 1969) which gives a truncated depiction of the site's corpus.

When the studied objects have preserved traces of paint (associated or not associated with the engraving), imaging processing techniques that are commonly used for rock art, provide an important contribution to the tracing work.

Key Issues/Current Debates/Future Directions/Examples

Since the late 1980s, the constant improvement in the performance of optical observation instruments (binocular magnifying lens, microscopes) has led to dramatic advances in the precision of information, opening new avenues of interpretation (D'Errico 1995).

On bone, ivory, or antler, the observation of drawings by scanning electron microscopy

Portable Art Recording Methods, Fig. 8 La Madeleine (Dordogne, France). Engraved slab in limestone (Photo G. Tosello/coll. Musée d'Archéologie Nationale)

(SEM) has revealed a rich source of information (Fritz 1999). The SEM technique involves taking impressions using silicones; the resin replica, obtained from the silicon mold, is covered by a very thin film of gold or carbon to improve the electrical conductivity. Observation by SEM, even at low magnification (× 20 × 50), reveals microscopic marks (*stigmates*) left by flint tools at the base of the incisions, some of which are invisible to the naked eye (Fritz 1999b). These marks may contain mechanical information, such as the direction of movement of the tool, the inclination of the active part relative to the surface of the object, and the number of passes made by the tool in the incision. The study of the engravings can also describe the engraver's hand, to evaluate their skill or clumsiness (Fig. 11). Multiple analyses of pieces from the same archaeological layer and also from contemporary sites has helped identify local and regional "know-how", and the existence of experienced engravers and "apprentices", which also brings up the question of how technical knowledge was transmitted in the traditions of these societies.

Over the past 15 years, three-dimensional technologies have been used to research prehistoric parietal and portable art. The results obtained in caves have opened up the possibility for the reconstitution of decorated objects in 3D. 3D recording of an object with fine engravings is no longer an insurmountable obstacle, but does remain a major challenge; in fact, the fineness of the engravings (often submillimeter) often approaches or exceeds the maximum resolution for 3D laser scanners. Other solutions such as microtopography exist, which is a complex system of analysis and 3D restoration based on the use of a confocal microscope (Mélard 2010). The resulting images are of very high precision (up to 0.1 μm), which enables the visualization of engravings and their relative chronology, thanks to the tridimensional restitution of their triangulation. The main obstacles to microtopography remain its limitations as to the scope of analysis (20 cm diameter); it requires the object to be moved to the laboratory and extends the length of data acquisition, which can take as long as several hours for a small surface.

Thanks to their high resolution, the 3D readings of engraved surfaces make it possible to obtain measures of the depth of incisions at the microscopic level, allowing the resolution of complex superimpositions of engravings (Güth 2012). On engraved plaquettes that were often reused, we can thus determine the relative chronology of different themes and compositions.

However, these methods are constantly changing, just like the processing power of computers. Similarly for digital photography, applications in archaeology continue to diversify. Among them, photogrammetry (a long standing technique used particularly in cartography and architecture) is experiencing a revival, which is particularly promising for the study of portable art. High-definition shots of the object are taken from different angles, with overlapping margins, thus forming a mosaic, from which it is possible to generate a point cloud, and then a 3D model

Portable Art Recording Methods, Fig. 9 La Madeleine (Dordogne, France). Tracing of the engraved limestone slab (G. Tosello Tracing)

that correlates to the photos. So, for the piece thus reproduced, it is possible to vary the lighting, zoom in, and view the details. Together, these operations can be done using free or inexpensive software, which is obviously a huge advantage for the student or researcher. For museography, the quality of the 3D photo documentation meets the needs of broadcast media and avoids unnecessary handling of original pieces.

The beginning of our third millennium is marked by a constant and dramatic evolution in techniques for analysis and restoration in all fields of science and communication. It is difficult to predict what the recording methods and study of Paleolithic portable art will involve in the near future. Because it approximates human vision in three dimensions and meets the challenges posed by prehistoric decorated objects, we believe that 3D technology (without knowing in what form(s) exactly) will become more commonly used; traditional recording or tracing techniques will gradually disappear, and online publications will increase the quantity and quality of iconography, offering the Internet user the possibility to manipulate the object virtually, offering sequences for animation or modelling, etc.

However, make no mistake: despite the advantages offered by this technology, these

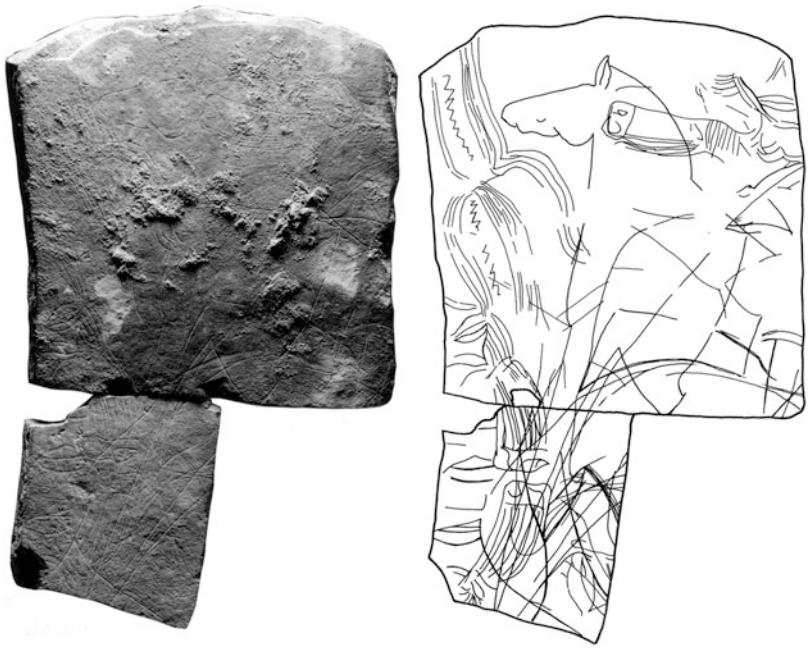

Portable Art Recording Methods, Fig. 10 Parpalló Cave (Valencia, Spain). Plaquette No. 20044. Photo and tracing of the motifs; a horse, three aurochs, an ibex, and various signs from the Upper Magdalenian period (Photo and tracing V. Villaverde)

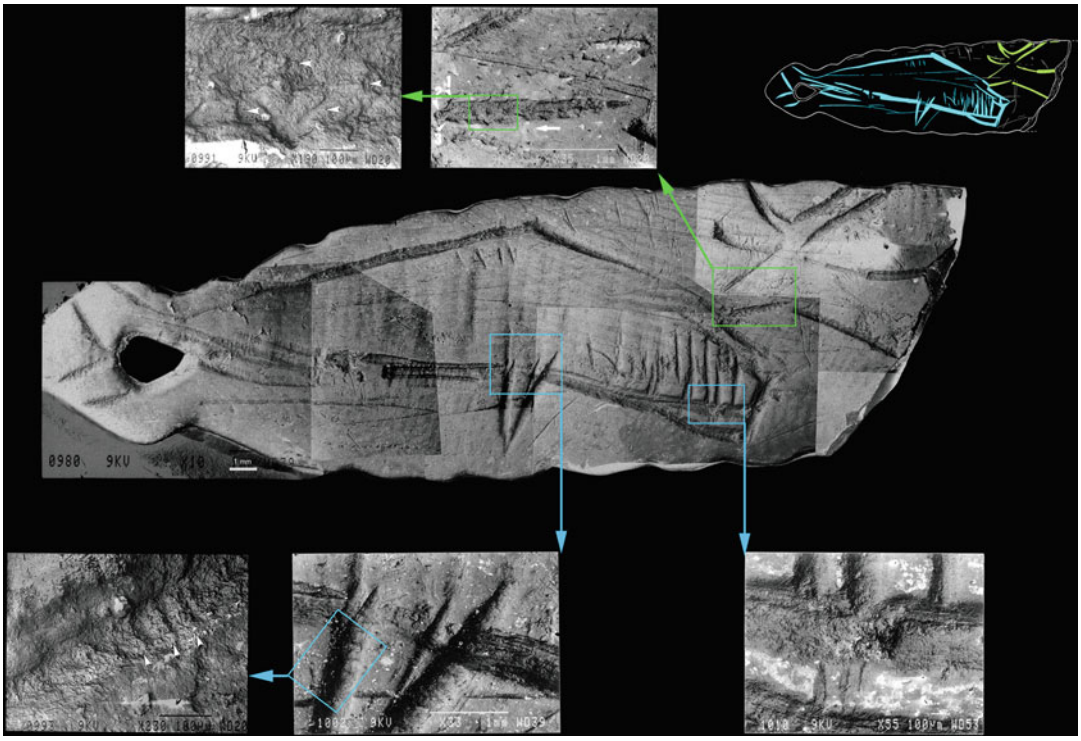

Portable Art Recording Methods, Fig. 11 The contribution of microscopic analysis to study engravings on bone. Various technical features stigmas observed at high magnification can help reproduce the direction of movement of the tool and the number of passes of the tool in the engravings or the chronology of superpositions, especially when the object is miniature (2.9 cm for this engraved bone, Arancou, Pyrenees Atlantiques, France; micrographs C. Fritz coll. MNP)

high-tech devices are yet another supplementary tool for the researcher and will not replace direct observation of original pieces, which remains the foundation for research.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Art, Paleolithic
- ▶ Mobiliary Art, Paleolithic
- ▶ Pigment Analysis in Archaeology
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Switzerland: Upper Paleolithic Living Floor Investigations

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Portuguese Faience and Historical Archaeology

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Introduction

Portuguese faiança or faience (majolica) can be found in colonial contexts in those parts of the New World, Northern Europe, and the coastal ports of Africa and Asia, where Portuguese goods were traded.

Until quite recently this ware was misinterpreted and classified as either Dutch or Italian ceramics in Europe and as the Spanish ceramic-type "Ichetucknee Blue on White" in

the New World. Recent LA-ICP-MS (laser ablation inductively coupled plasma mass spectrometry) analyzes evidence that some of these ceramics were produced in Portugal (Casimiro et al. forthcoming). The lack of publications concerning Portuguese ceramics published in other languages rather than Portuguese delayed for many years the correct identification of Portuguese faience (Casimiro 2011a).

There were two types of production in post-Medieval times. Between the 1550s and the late 1700s, it was produced in workshops. Starting in the 1760s, it began to be produced in factories. This entry focuses exclusively on faience, made in workshops in three different production centers: Lisbon, Coimbra, and Vila Nova (Fig. 1).

Definition

Portuguese faience is a soft-bodied, light buff- or pinkish-paste earthenware covered with a tin-based, lead glaze and normally decorated painted in blue or in blue and an additional color.

Key Issues/Current Debates/Examples

Shapes and Function

Form variation is limited for Portuguese faience from the sixteenth to late eighteenth century. The variability was essentially in the decoration. Plates and bowls are clearly the most common shape, followed by bottles.

Faience objects would serve fundamentally at the table, for personal hygiene, and in pharmacies, plates and bowls being the most abundant. In the second half of the seventeenth century, archaeological records show that many vessels with the same decoration appear together, sometimes as complete table sets. Bowls, plates, and platters exhibit similar decorations and were certainly used together at the table during meals.

However, there are certain vessels that due to its physic and decorative attributes were not designed for their use in daily activities but as household ornaments. The objects found abroad, especially in Northern Europe or in English colonies are always of a finer quality and would certainly serve display purposes.

The 1572 potters' regulations register the production of many forms such as cylindrical pharmacy jars, plates of diverse sizes, pots, and jars. Other shapes, not mentioned in the document, are however known such as plates, bowls, tureens, tea pots, chargers, basins, pots, jars, bottles, boxes, lids, handled bowls, cups, chamber pots, holy water stoups, barbers bowls, spice containers, pitchers, aquamaniles, inkstands, figurines, funnels, candlesticks, and pharmacy pots discovered in archaeological contexts (Casimiro 2011a: 129).

Decorative Grammar

One of the most important characteristics of Portuguese faience is its decoration, reflecting the consumer tastes in Portuguese and European societies. Although some decorations and decorative techniques can be considered to be exclusive to each production center, in general, all three tended to use the same designs.

Foreign influences, especially from Spain and Italy, can be seen from the beginning. The first faiences were clearly an imitation of Sevillian majolicas, especially the plain white plates and carinated bowls known as Columbia Plain. This imitation was so good that until quite recently the Portuguese products had been identified as Spanish (Barbosa et al. 2008). Decorative influences from Spain can be seen in designs that include small spirals inside geometric panels.

Italian influences came from Montelupo, Liguria, and Deruta, with the introduction of mythological images such as Venus and Fortunes presented as central plate designs. In the mid-seventeenth century, lace decoration started to appear. It has yet to be determined if this was a Portuguese creation or if it was inspired by the peacock feathers used to decorate Italian majolica in the late sixteenth century (Calado 2005).

The most significant foreign influences came from China (Fig. 2) through Portuguese maritime trade with the Far East. Chinese porcelain occupied an important role in Portuguese domestic environments, not only in palaces and convents,

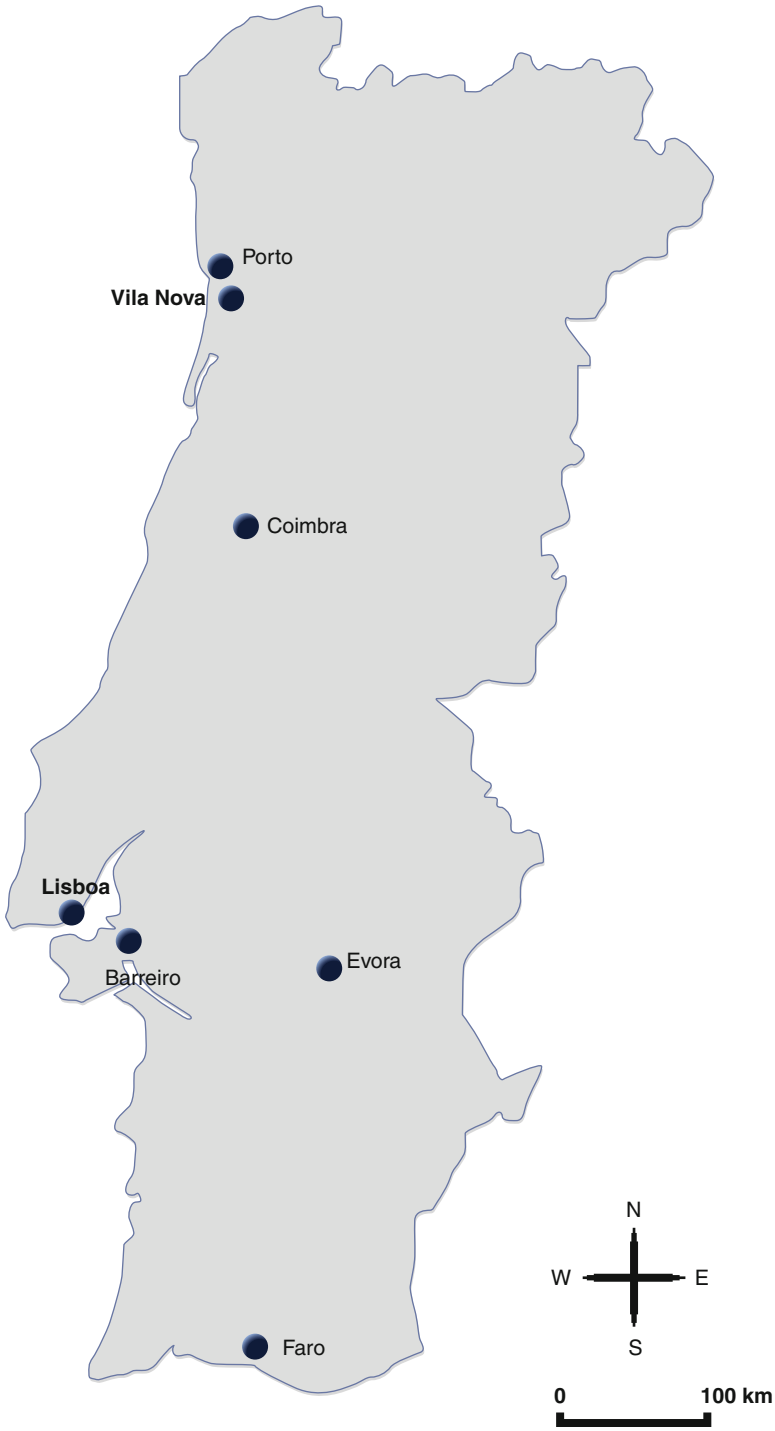

Portuguese Faience and Historical Archaeology, Fig. 1 Map of Portugal with the places mentioned in the text

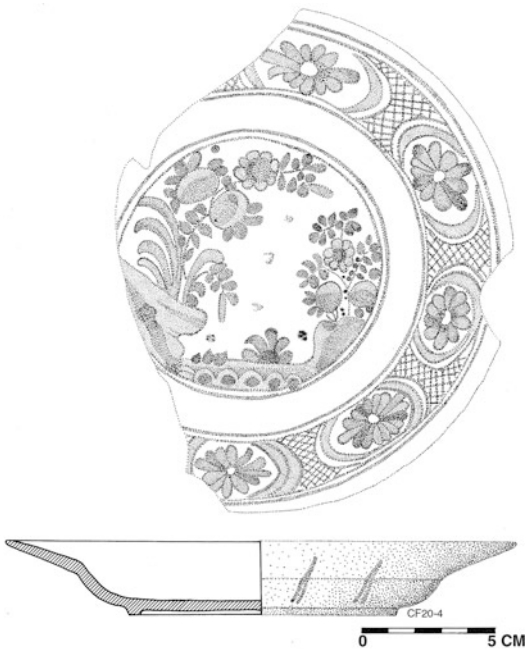

Portuguese Faience and Historical Archaeology, Fig. 2 Portuguese faience plate found in Carrickfergus (Drawn by T. Casimiro)

but also in more modest homes (e.g., Casimiro 2011b).

Lisbon's potters knew that Chinese Wanli patterns were much desired in Europe. In the 1619 *Corpus Christi* festival, potters in Lisbon presented faience vases in perfect imitation of Chinese porcelain (Calado 2005).

It is not known exactly when Portuguese potters started to use Chinese motifs, but it is believed to have been within the last two decades of the sixteenth century (Casimiro 2011a). One of the most significant decorative patterns is the division of the plate rim into panels, each filled with chrysanthemums and fruits, such as peaches and pomegranates, typical of coeval Kraak porcelain.

Around 1610, one of the most typical decorations of faience appeared: the *aranhões* or "big spiders." In Chinese porcelain, artemisia leaves, fans, gourds, sounding stones, and paper rolls were always surrounded by strings ending in tassels. These became key elements of Portuguese *aranhões*, which changed their original meaning and adapted them to a new European style. Other decorations of Chinese influence were also used, such as the beads or *desenho miúdo* (fine drawn) (Calado 1992).

Noble and wealthy families in Portugal and in other parts of Europe frequently requested faience vessels decorated with their respective coat of arms. These particular vessels were symbols of social status both in Portugal and elsewhere.

Chinese and European influences coexisted in Portuguese faience production.

In addition to the display of foreign influences, faience presents decorations that were developed by Portuguese potters, such as the numerous floral designs used essentially from 1635 onwards (Fig. 3). This seems to be the case with the garlands decorating plate rims, known as "baroque strip." Ferns and large leaves were also used to decorate faience plates and bowls up until the end of the seventeenth century (Fig. 4).

Production Centers

Lisbon

Lisbon was the first city in Portugal where faience production started in mid-sixteenth century, with workshops in the Santos-o-Velho and Santa Catarina areas (Carmona & Santos 2005).

Archaeological investigations have uncovered a half-dozen workshop sites, namely, in Rua de Buenos Aires, Largo de Santos, Largo de Jesus, Tercenas, Rua das Madres, and Museu Nacional de Arte Antiga. In 1672 there were 11 workshops in the Santos-o-Velho area (Mangucci 1996; Sebastian 2010).

Lisbon's fine-quality faience has a light buff fabric, while low-grade faience tends to have a pinkish one. In both cases, it is fairly homogenous and compact, and the number of inclusions is rather small.

The thick enamel is of excellent quality, indicating a high percentage of tin oxide in the glaze. There are some examples, however, with low-quality enamels, obviously made for domestic consumption, since rarely are they found in overseas contexts.

The percentage of mineral oxides used in the preparation of colors was probably a little less

Portuguese Faience and Historical Archaeology, Fig. 3 Portuguese faience bowl found in the Low Countries (After Claeys et al. 2010)

than in Coimbra or Vila Nova (discussed below) since the fired colors are lighter than in those centers. However, a vessel made in Lisbon can present different shades of blue.

Coimbra

The earliest document mentioning faience production in Coimbra dates to 1608, when Pedro Fernandes receives a letter allowing him to produce white pottery from Talavera (*malga branca de Talaveira*), although probably this was already in production for some years at this time (Carvalho 1921: 125).

The craft was well organized in the potters' quarter and had other ordinances besides the one indicating that no craftsmen, including potters, could open a workshop without a proper, lifetime license from the municipal council, signed by the craft's judges (Carvalho 1921:120).

In Coimbra, ceramic fabrics are pinkish or reddish, resulting from the low quality of local white clay, compelling potters to add red clays in order to strengthen fired vessels. Inclusions are very frequent with the existence of quartz and ceramic grog. The enamel presents a low percentage of tin oxide, making it thinner and less white than in Lisbon. Coimbra's blue decoration is darker and with fewer shades than the blues of Lisbon and Vila Nova. No evidence of the use of yellow has been found in the workshop excavations, although there are some investigators who believe that the yellow used in Coimbra should be darker, almost orange (Pais et al. 2007).

Vila Nova

The first reference to a kiln in this area dates to 1605, when Cristovão Fonseca sells to Manuel Gonçalves a house and a potter's kiln (Leão 1999). In 2000, an excavation exposed the remains of a workshop dating to the second half of the seventeenth century. They included a kiln, a dumpster, tanks, and an area to grind the clay. The pottery artifacts were essentially fragments of biscuit and finished products (Almeida et al. 2001).

Vila Nova did not have nearby white-clay sources. The white clay used was bought in Lisbon (Leão 1999) and possibly from Coimbra (Sebastian 2010).

The ceramic fabrics are very similar to Lisbon's: very homogenous and hard with some natural quartz and micaceous inclusions. Light buff fabrics are the most frequent although

Portuguese Faience and Historical Archaeology, Fig. 4 Portuguese faience from Silves (Photo by T. Casimiro)

sometimes they have a pinkish tone, probably due to the use of some red clay.

The enamel is of a high quality with an elevated percentage of tin, very thick, white, and shiny. Blue decorations tend to be slightly darker than those from Lisbon and Coimbra, which may imply different ways of production or even variations in the kiln temperature. The use of yellow is not very frequent in Vila Nova productions. Although the decorations are a clear imitation of those produced in Lisbon and Coimbra, the decorative technique can be different from those centers: some vessels have a "relief" decoration.

World Distribution

Portuguese faience is regularly found across the world, especially in Atlantic coastal shores. This distribution cannot, however, have the same interpretation in all these places.

Portuguese colonies such as Brazil, Cape Verde, Goa, or even Madeira and the Azores were considered to be an extension of Portuguese territory. In this sense, the types of pottery found in such places are similar to those found in mainland Portugal ranging from high-quality vessels used by political and religious elites to lower-quality ones used in domestic contexts (Fig. 5).

This business was operated by Portuguese merchants as documented by port books. Pottery occupied just a small amount of space in the ships' cargo list. This was in fact a regular trade with several ships taking pottery around the year towards these colonies (e.g., Gomes et al. 2012).

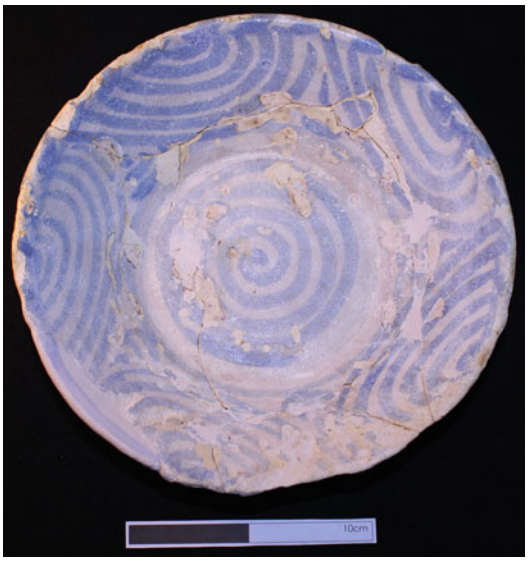

Portuguese Faience and Historical Archaeology, Fig. 5 Portuguese faience plate found in Cape Verde (Photo by T. Casimiro)

Although less frequent, the presence of Portuguese faience in Spanish colonies cannot be ignored. Portugal and Spain were united under one crown from 1580 until 1640, one of the most productive periods for Portuguese faience. The presence of such wares in places such as Florida,

the Dominican Republic, and even Argentina and Uruguay is recurrent.

Considerable quantities of Portuguese faience have been found in England and in its colonies in the North Atlantic, such as Newfoundland, Massachusetts, and Maine, and further south in Virginia and Barbados (Pendery 1999; Straube 2001). At some sites it represents the second largest ceramic import after English wares (Pendery 1999). References to it as "Lisbon ware" can be found in probate inventories (Wilcoxen 1999).

English planters would like to maintain a similar lifestyle to what they had in their home country. In this sense they would import every commodity which allowed the maintenance of their social status, namely, furniture, textiles, pottery, and even food (Pendery 1999; Wilcoxen 1999). Faience was not an everyday export as one can see in England, Ireland, Spain, France, Denmark, Sweden, and Germany. An interesting exception is the pottery found in the Low Countries where the presence of several merchants with Portuguese family backgrounds can in fact support such theory (Bartels 2003).

Future Directions

The occurrence of Portuguese faience in the world has to be considered in diverse perspectives. The evidence found in Portuguese colonies is easy to comprehend and interpret. Portuguese settlers took Portuguese faience with them continuing to use what were their daily ceramic commodities. Spanish colonies, bearing in mind their political proximity to Portugal during six decades, were also privileged in the knowledge and use of Portuguese wares, acquiring easily and transmitting the idea of European and Eastern merchandises.

As for English colonies, the presence of Portuguese faience is related to the ability to acquire a high-quality good, produced in Europe, that could help European settlers to maintain a European lifestyle.

Lisbon was the most preferable workshop and most archaeological samples found in overseas contexts were in fact produced there. Nevertheless, one cannot underestimate Coimbra and Vila Nova since many plates and bowls produced in these workshops were in fact recovered in places such as Ferryland in Newfoundland and Devon in England.

Even though these ceramics are present in large amounts in other countries, it is believed that these were just a complement of a larger trading system involving wine, sugar, and olive oil but where all sorts of products were traded from food stuff to clothes, furniture, and of course pottery, among many other things.

Archaeometric studies are required to provide information to determine the extent of trade and consumption of Portuguese faiences in Europe, Africa, Asia, and the Americas.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Ceramics: Scientific Analysis
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Colony of Avalon Archaeological Site
- ▶ Post-Medieval Archaeology (Europe)

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Portuguese Redwares and Coarse Wares in Historical Archaeology

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Introduction

Portuguese coarse wares (*cerâmica comum*) were the daily ceramic objects used in Portuguese households in medieval and postmedieval times (thirteenth to nineteenth century). It is an unfortunate, nonspecific term that does not take into account regional production differences or the differences between the very fine, thin-walled cups and the rough cooking pots (Fig. 1).

Definition

The term refers to ceramic objects produced with brown, black, red, and orange fabrics tempered with quartz and micaceous inclusions. The types of surface treatment include simple smoothing with a wet cloth, burnishing, and coating with a clay slip. Although coarse wares appear in many different colors, redwares were the most common. All were wheel-thrown. Closed vessels show regular and deep potter's finger marks on their interior surface.

Key Issues/Current Debates/Future Directions/Examples

The Search for a Name: International Discussion

Portuguese coarse wares have been recovered in many countries and former colonies although, until recently, they were given other names by non-Portuguese archaeologists. The most famous designation was Merida-type ware, assigned by John Hurst in the 1960s thinking that this was, in fact, a Spanish product that maintained the Roman tradition of the *sigillatas* from the Merida region. Hurst recognized his error some years later (Hurst et al. 1986), but by then the name had already been adopted in English archaeological literature.

Portuguese ceramics were first identified outside Portugal in 1854 when in England reference was made to *cerâmica empedrada*, or stone inlaid pottery, from the Estremoz region (Hurst 2000: 24). For many years, it was considered to be made exclusively in High Alentejo, Estremoz, where there was an important postmedieval production center. However, it is now evident from the finds being made outside Portugal that they were not exclusively manufactured in that area. Production was certainly more widespread (see Martin 1979: 291).

Alexandra Gutierrez (2007) was the first to define the Merida-type ware as "Portuguese coarse ware" as a result of studying hundreds of shards found in a single site in Southampton, England. Gutierrez was unable to establish secure production centers, but today the vessel shapes presented in the study indicate Lisbon, Aveiro, and possibly Coimbra as three very likely production areas.

In 2008, Sarah Newstead also used the same designation when studying large amounts of Portuguese coarse wares found in Newfoundland, which were also made in different areas of Portugal.

However, other names have been given to these wares. Ian Baart (1992) published some Low Countries finds as *sigillata* from Estremoz, although in this designation he included not only burnished ceramics but also fairly common wares sometimes decorated with embedded small white quartz and feldspar stones (Fig. 2).

Examples of Portuguese coarse ware have been found in New World colonies where it is called feldspar-inlaid redware and orange micaceous ware (Deagan 1987: 40-41), although micaceous pottery was also native to the New World.

The variety of Portuguese productions was such that coarse wares once found outside

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 1 Map of Portugal with the places mentioned in the text

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 2 Pot with small quartz-stone decoration found in Azenha de Santa Cruz, Torres Vedras by G. Cardoso and I. Luna. (A) 50 cm (Photo by G. Cardoso)

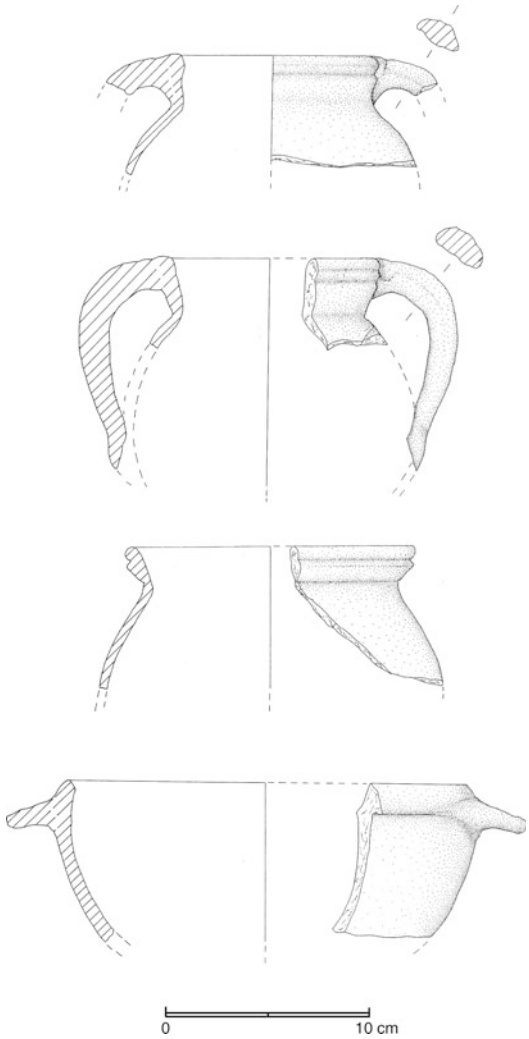

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 3 Cooking pots found in Rua Homem de Cristo Filho, Aveiro (After Barbosa et al. 2008: 127)

Portugal were called by very different names. In this sense, what has been designated so differently in English literature was mainly produced in Lisbon, Coimbra, Aveiro, Porto, Estremoz, Lagos, and possible other Algarve cities such as Silves.

Shapes and Function

Portuguese coarse wares appear in many shapes for daily household activities, for industrial processes, and for commercial activities.

Domestic vessel forms include cooking pots (*panelas, frigideiras, caçoilas*), often with their respective lids (*tampas, testos*); cups (*púcaros*); plates and bowls (*pratos, taças*); bottles and jars (*garrafas, jarros*); costrels (*cântaros, cantis*); large flared dishes (*alguidares*); funnels; chamber pots; and chafing dishes. For industrial use, there were sugar cones (*formas de açúcar*) and syrup pots. For commercial use, there were olive jars (*anforetas*).

Cooking pots used to boil, fry, or stew occur in various sizes that present globular or hemispherical shapes with convex bases, everted plain rims, and horizontal, vertical, or even triangular handles (Fig. 3). The countersunk lids with knob handles are frequent and easily recognizable finds.

Thin-walled cups (*púcaros*) with burnished exteriors, sometimes decorated with vertical

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 4 *Púcaros* and Chinese porcelain dishes found in Convento de Santana, Lisboa (After Gomes & Gomes 2007: 85)

lines, finger impressions, and appliqué are some of the most recognizable Portuguese coarse wear products (Fig. 4).

Bowls vary in shape: hemispherical, convex, or slightly carinated. They can have a concave, recessed base or a foot ring. On the exterior wall just below the plain everted rim, there may be a decoration of incised lines (Fig. 5).

Flared-rim plates, with the same types of bases as bowls, usually have a burnished interior.

Jars and bottles, used to store and serve liquids such as water, wine, and olive oil, have narrow flat bases and straight necks terminating in a multiplicity of rim forms.

Rilled, tall-neck, globular costrels served as water containers and are also frequent finds in archaeological excavations.

Large, flared bowls with everted or plain rims served a variety of functions from food preparation to laundry and dish washing. Their diameters range from 30 to 80 cm. Most are burnished but some examples present an interior yellow and green lead glaze. These might have been expensive items since evidence of repairs when broken is frequent.

Funnels, with a wide round top and a narrow tube coming out at the bottom, were used for pouring liquids into containers. Though extremely functional, it is not a common artifact in Portuguese archaeological sites.

Chamber pots were fundamental objects in every fifteenth- and sixteenth-century house and are usually recovered in every domestic site, though their frequency increases in later chronologies. Characterized by their flat bases, tall cylindrical bodies, everted rims, and usually large flat or concave handles, they can be found glazed or unglazed.

Chafing dishes were used in association with cooking pots to heat and cook food. Their sizes are as variable as those of cooking pots.

Sugar cones and syrup pots were used by the industry and are frequently found across Portugal but especially in the areas around Lisbon and Aveiro where these were produced for local consumption and to the cclones for export.

International literature has often classified olive jars as exclusively Spanish products. Nevertheless, nowadays it has been established that these were made in other countries such as Portugal and some New World settlements. Although earlier vessels usually presented a flat bottom, a narrow neck, and two small handles, from the mid-sixteenth century onward, the shape is rather similar to Spanish olive jars, but the paste is definitely Portuguese.

Although diverse shapes are known, Portuguese workshops tended to produce similar objects, and one can find straight similarities

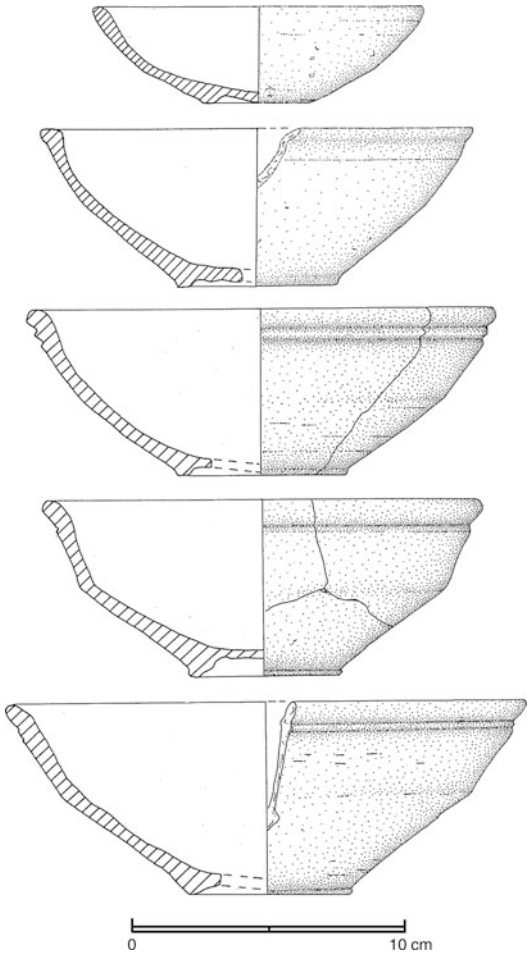

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 5 Bowls found in Rua Homem de Christo Filho, Aveiro (After Barbosa et al. 2008: 124)

between Algarve, Lisbon, or Aveiro productions and sometimes for long periods of time.

Production Centers

Coarse wares were made in almost every city in Portugal. Kilns are not frequent finds in archaeological excavations, and only about half-dozen have been identified in postmedieval contexts. Nevertheless, large ceramic assemblages have been found in major cities, which in some cases, especially where written evidence (such as charters, wills, and price lists) is available, almost certainly point to the existence of potters and production sites (Fernandes 1999).

In 1980, a rectangular kiln, dating from the mid-sixteenth century, was found in Mata da Machada (Barreiro). Although many types of pottery were found at the site, from coarse wares to lead- and tin-glazed ceramics, the coarse-ware evidence indicates the production of sugar cones, and several domestic shapes such as cooking pots, cups, plates, bottles, and others, and also small vessels decorated with inlaid quartz stones, a decorative style thought for many years to be exclusive to the Estremoz area.

News of kiln sites in Lisbon is not rare but no evidence of a postmedieval kiln has been published. Nevertheless, Lisbon must have been one of the largest production centers in Portugal, producing for local consumption and for export. In 1552, for example, there were about 60 kilns producing redwares (*louça vermelha*), mostly in the medieval potter's quarter (Casimiro 2011b) (Fig. 6).

No kiln has been found in Estremoz. Nevertheless, ceramic products from that area were famous in the early modern era among rich and poor, and written evidence confirms this. In the 1610 book *Descrição de Portugal*, Duarte Nunes de Leão mentions that fine and thin Estremoz cups were appreciated across the entire kingdom. This author also refers to similar products in Lisbon, Pombal, and Montemor-o-Novo. In this last site, there was a special type of production. The fabric was full of very small, white, quartz stones. Examples have been identified in Amsterdam and London. Once, during a dinner, King Sebastião drank from an Estremoz cup, while all the guests used silver and gold vessels, claiming that he enjoyed its "earthen" taste, and several members of the Iberian royal family appreciated these cups (Vasconcellos 1921: 32). Moreover, in 1687 two ships set sail from Lisbon to England, and among the diverse cargo there were two boxes of Estremoz pottery (Casimiro 2011a: 181). The Estremoz' kilns produced mostly cups, bottles, jars, and bowls with burnished surfaces and stamped or small, white, inlaid quartz-stone decorations.

One of the most important northern production centers was Aveiro. No kiln has been found

Portuguese Redwares and Coarse Wares in Historical Archaeology, Fig. 6 *Púcaros* with modeled decoration found in Convento de Santana, Lisboa (After Gomes & Gomes 2007: 85)

there, but several terrestrial and underwater archaeological excavations have revealed a rich production area. The coarse-ware vessels present orange micaceous fabrics and often burnished decoration with vertical lines. One of the most important excavations is that of the shipwreck Aveiro A, where an immense pottery cargo was recovered giving an idea of the type of shapes produced and their similarity to many finds made inside the city walls (Alves et al. 1995; Bettencourt & Carvalho 2008; Barbosa et al. 2008).

Many other towns in Portugal produced pottery, for example, Coimbra, Palmela, Porto, and Lagos.

One specific type of Portuguese coarse ware is the so-called black pottery (*cerâmica negra*), traditionally made in the northern part of the country in centers such as Tondela or Bisalhães, among others. It does not seem to have had an important international distribution. Only two vessels are known abroad, in London and Amsterdam, two cities that had commercial relations with Portugal.

A kiln found in Silves (Algarve) in 2002 revealed the production of thin-walled cups, believed for many years to be exclusive to production sites in the center of the country, and other less-fine vessels (Gomes 2008) that tend to give insight into the difference between kitchenware and tableware.

World Distribution

Portuguese coarse wares, with a variety of shapes and decorations, from simple vessels to richly decorated ones, have been found in many countries around the world: England, Ireland, Scotland, the Low Countries, Denmark, Iceland, Germany, Canada, the USA, Brazil, and several African locations (e.g., Hurst et al. 1986; Baart 1992; Orser 2002; Gutierrez 2007).

It is believed that these vessels reached their destinations with two purposes: as household wares and as shipping containers for Portuguese produce. Portuguese ship registers reveal the export of many types of household coarse ware pottery, as can been seen in the lists of goods leaving Porto and sailing to England, Newfoundland, New England, Brazil, and Africa, carrying Estremoz, Aveiro, and even Northern pottery (Barbosa et al. 2008: 134).

The evidence of containers for the shipment of Portuguese commodities such as olive oil, olives, sweets, marmalade, and other items can also be seen in ship registers (Casimiro 2011a: 184).

It is not easy to infer from these documents the major production center for exported Portuguese ceramics, but the archaeological evidence outside the country suggests Lisbon, Coimbra, Aveiro, and Estremoz as four of the major production areas.

Portuguese coarse wares due to their color, micaceous aspect, shape, and decoration are a recognizable product in European, African, and New World settlements. This is confirmed, in part, in paintings by Portuguese and European artists such as Josefa de Óbidos, Velasquez, Frans Francken, among many others, in which Portuguese coarse wares appear (Vasconcellos 1921: 13).

It was on everyone's table in Portugal, used by rich and poor, as shown by written evidence.

It was available in foreign countries and far away colonies as indicated by the archaeological evidence.

Cross-References

- ▶ Archival Research and Historical Archaeology
- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Ceramics: Scientific Analysis
- ▶ Colony of Avalon Archaeological Site
- ▶ Deagan, Kathleen A.
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Posnansky, Merrick

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Basic Biographical Information

Merrick Posnansky's impacts on archaeology are numerous and enduring. His holistic, pragmatic, and inclusive initiatives helped to foster archaeology in Africa (Posnansky 1966a, b, 1969a; Posnansky & DeCorse 1986) and in the Caribbean (Posnansky 1984). Posnansky's approaches to archaeology "prefigured the thrust of many postprocessual analyses of the 1980s and 1990s" (DeCorse 2004: 4). Since the late colonial era, Posnansky worked to enable university archaeology programs and to treat and reorient museums in Africa, making them living institutions with a mandate to serve the public. Posnansky's professional contributions in 11 countries have been recognized with numerous accolades, including the J.C. Harrington Medal in Historical Archaeology from the Society of Historical Archaeology. He is a Fellow or Honorary Fellow of the Society of Antiquaries in London, the British Institute in Eastern Africa, and Rotary International.

Born in Bolton, England, in 1931, Posnansky grew up in a small Jewish community during the interwar era. As a young man, he developed an interest in ancient coins. At age 18, Posnansky won an Open Scholarship to attend the University of Nottingham. After graduating, he completed a Diploma Course in Prehistoric Archaeology at Cambridge University. And, in 1956, Posnansky earned a Ph.D. in History from the University of Nottingham, under the supervision of the distinguished geologist H.H. Swinnerton. During his training and early in his career, Posnansky excavated prehistoric and medieval period sites in England, Wales, and France with archaeologists of renown, including Glynn Daniel and André Leroi-Gourhan. In 1956, Posnansky accepted an offer by Louis Leakey to work as the Warden of Prehistoric Sites in the Royal National Parks of Kenya.

Since the late 1950s, Posnansky's work focused on African archaeology, museums, and heritage education. After two years in Kenya, he transitioned to Kampala as Curator of the Uganda Museum and Head of Uganda's Department of Antiquities. In 1959, he was the first archaeologist in sub-Saharan Africa to take African university students on excavations. After a period as Assistant Director of the British Institute in Eastern Africa, Posnansky joined Makerere University College then affiliated with the University of London. In 1962, he taught the first university classes in African archaeology. A founding figure in historical archaeology, Posnansky integrated oral traditions into interpretations of Bweyorere and Bigo, ancient capital sites in Uganda (Posnansky 1966a, 1969b). In 1967, he and his wife, Eunice, left Uganda, fleeing the political turmoil caused by Idi Amin. At his next job post as Professor of Archaeology at the University of

Legon in Ghana, Posnansky developed the first full academic program (B.A. to Ph.D.) in African Archaeology. He further launched an ethnoarchaeological study of a historical village in Ghana (Posnansky 2004) and completed numerous museum and cultural heritage projects in West Africa. In 1977, Posnansky joined the History Department at UCLA. He subsequently served as Chair of the Archaeology Program and Director of UCLA's Center for African Studies, the latter for 13 years. While at UCLA, his research expanded to Togo, Benin, and the Caribbean. Posnansky is a founding figure in African diaspora archaeology (Posnansky 1984).

Major Accomplishments

Posnansky's publications on urbanization, trade, oral traditions, art, museums, and education in Africa helped to reshape informed representations of Africans. His devotion to building culture histories where none previously existed; attending closely to cultural context; recognizing, valuing, and valorizing oral traditions; and applying multiple sources to solve scholarly questions mark Posnansky as visionary. In his capacities as a curator and administrator, Posnansky developed archaeology programs at universities and trained African and American archaeologists. Professor Posnansky retired from UCLA in 1998 but remains active in the archaeology community, as he continues to write about and promote Africa, Africans, and their pasts.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ East Africa: Museums
- ▶ Field Schools, Archaeological
- ▶ Historical Archaeology
- ▶ Leakey Family
- ▶ Oral Sources and Oral History
- ▶ West and Central Africa: Historical Archaeology

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Postcolonial Archaeologies

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> Cruso raised his head and cast me a look full of defiance. "I will leave behind my terrace and walls," he said.
> "The will be enough. They will be more than enough." And he fell silent again. As for myself I wondered who would cross the ocean to see terraces and walls, of which we surely had an abundance at home; but I held my peace (Coetzee 1986).

Introduction and Definition

> The past is never dead. It's not even past.
> (William Faulkner, Requiem for a Nun)

Since the 1960s, closely linked to the struggles of national liberation, anticolonialism, civil rights, and student uprisings, there has been a growing

concern with the politics of domination in the West's liberal project of academic and intellectual production (Foucault 1980). Specifically in anthropology, and archaeology, this was marked by the presence of (so-called) natives in the subject-production of the discipline, natives which until then had been completely excluded from this noble enterprise other than as objects (and not subjects, creators) of knowledge. This particular political process highlights anthropology's origin as a colonial enterprise. In varied manners, the disciplines of anthropology and archaeology are still essentially invested in reproducing global knowledge in ways that structure us and others. In the process, such reproduction of global knowledge reconstitutes the West as the arbiter of world knowledge (Baldwin 1984).

The postcolonial enterprise marked less the inclusion of natives as the recognition of the central role that these marginalized groups (and identifications) had already played in the excavation (both literally and intellectually) of the past. This postcolonial reconfiguration had differing embodiments throughout the globe, from a politically combative Archaeology as social science tradition in Latin America, the political power of original populations communities from Polynesia to the Americas, and even the creation of the World Archaeological Congress to better represent archaeology as a real global endeavor.

Historical Background

One of the biggest impacts in the development of postcolonial archaeologies is the successful struggle of large indigenous communities throughout the world. Indigenous peoples of many nation-states have reached a new level of political discourse that demanded a shift in the conceptualization of traditional Indian identity, offering a more autocritical definition of themselves (Varese & Kearney 1995). This trend is related to the globalization processes affecting the world in general, particularly what Escobar (1995) has called the post-developmental phase of history. Post-development economies are based on flexible manufacturing and service industries organized on a global scale to take advantage of the most competitive source of supplies labor and market. Not surprisingly, workers in these economies receive low wages, no benefits, and no job security, all factors which contribute to an increasing informal economy.

One of the key components of these economies is transnational corporations that make of the international arena their economic playground. They expand the multinational corporation's role to retrieve raw materials and labor from third-world nations, reaching into the least unexplored regions of the world. It was precisely these marginalized regions to which the indigenous populations had been pushed into during the initial development period of the 1950s and 1960s. This new transnational influx into regions, such as the tropical forests of the Amazon, as well as those in Asia and Africa, has made many indigenous groups into a type of "development refugees." Faced with no alternative areas into which to retreat, indigenous group have been more willing than ever to go on the offensive and assert their rights.

Transnational corporations are highly influential in modern economies, but they are not the only transnational characteristics present. For instance, many indigenous populations do not live in a single nation-state, but rather occupy regions that crosscut two or more countries. The globalization process and the new forms of postmodern capitalism have also produced a long-term migration of indigenous people into urban centers of both their native countries or major industrialized nations like the USA and Europe (e.g., there are large-scale migration of indigenous populations from Mexico living in the United States today). The fact that today indigenous communities' main antagonist are transnational forces, outside of the control of national governments, has forced many indigenous groups to work with transnational sectors from the first world as well.

All of these globalization processes, such as flexible capital, increase of informal economy, transnational corporations, and the

internationalization of social movements, have contributed to the reworking of indigenous identities that go beyond any previous traditional or strictly modern categorization. Varese and Kearney (1995: 219) point out that Indian communities

> who were formerly marginalized are now actively engaged in establishing a transnational civil society in an effort to bypass state mediation and to situate themselves in a global civil society while maintaining strong ethnic, cultural, and local loyalties that contest their own nation-state authority and hegemony.

In archaeology, this native conundrum was marked by a significant paradigmatic shift, away from the (now) traditional postulates of the new archaeology and towards a more relative understanding of the study of the past marked by a post-processual archaeology. As a postmodern enterprise, post-processual archaeology was an umbrella term that marked a host of interests, endeavors, and claims that differ significantly but still vehemently share a more complex understanding of the past than its positivistic ancestors. In this manner, archaeology, as part of the Western academy, had made way for numerous groups of third-world scholars that no longer could be kept to the margins of intellectual production and many times marked the pace of new Western fields of knowledge (e.g., Said 1989; Spivak 1999).

This allowed for many to enunciate the postcolonial project as that of the simplistic inclusion of "native" scholars to the Western enterprise of archaeological research. Although more inclusive than its previous Western embodiments, this project of inclusion fails in quite an essential manner. This cultural undertaking elided the greater paradigmatic implication that it was less about opening spaces to native scholars in as much as the fact that these (supposedly) non-Western scholars had already erupted in a central manner into the scene. Perhaps more importantly, it further overlooked the fact that natives had always played a fundamental role in the production of the world's past, not only as creators of the archaeological sites and making up most of the crews that excavated any of the sites, but also that even in these reified Western territories, the past had always been about natives, elusive natives, that were erased from the intellectual landscape as fast as they were hailed at conferences, international exhibitions, and museums.

Key Issues/Current Debates

But no doubt, one of the more complex findings of postcolonial archaeologies was that the postcolonial project meant recognizing that the colonizer's past is also always that of the colonized, and vice versa. The intellectual commitment of postcolonial archaeologies is, therefore, not only about, literally, excavating a buried past of one oppressed group or community but rather to understand how that past, buried and later reconfigured, is an essential part of everybody's past and history. It is this particular kind of political commitment of third-world archaeologists and the uprising of native communities (and/or original population) all over the world that marked two very different postcolonial ways of connecting to the past, while still highlighting archaeology's essential political enterprise.

At a very basic intellectual level, these postcolonial approaches marked an opening to reidentify the archaeological landscape in the continent with markers of gender, sexuality, race, and class in ways that had not been possible before (Silverblatt 1987; Trexler 1995; de la Cadena 2000). But this new way of envisioning the past also manifested a renewed interest in colonial archaeology, again, not just for the reproduction of a European other but rather as a detailed study of the hybrid consolidation of the different original nation-states (Hall 1987).

This development of historical archaeology highlighted another area of postcolonial focus, the indivisible fusion of native and other, European, Arabs, and Africans (among many other groups), in the reproduction of new populations. This particular historical archaeology approach marks one of the, or even perhaps the, most interesting areas of contemporary research, one of ideological discursive practice.

As mentioned above, the postcolonial archaeological project was not content with merely including natives into the research enterprise, recognizing the political commitment of archaeological discourse, or even the political emancipation of historically oppressed racialized groups but rather the recognition how all of these elements are caught within the web of our own global historical production. That is, we are historical subjects in the making that are fed by continuous discursive practices about the past that can never fully escape our ideological repositioning. In this manner, one of the greater contributions of a postcolonial enterprise is to actively shy away from images of well-intentioned natives or native-saving agents and rather to recognize the global (neocolonial) landscape in which we all work and live in.

In the archaeological landscape, this postcolonial tradition was marked by new journals and publications that looked to reconfigure the manner of reproducing archaeological knowledge no longer as a nostalgic look to the north but one embodied with complete agency from the south (see Van Broekhoven et al. 2010). This same ideal is behind cultural projects at many archaeological sites that are interested in furthering interdisciplinary research by incorporating the native other. And yet, these archaeological projects have attempted to be necessarily aware that even these new postcolonial conundrums could not fully escape the historical conditions of our times, a history not of our making but ours nonetheless. And rather that these new re-foundational shifts about the other are necessarily responding to a global market that looks to reify difference as the essential cultural commodity of the twenty-first century (Hall 1987).

Unlike previous schemes of global domination, the transnational forces at work today are less about eradicating difference (at least no longer in explicit genocidal fashions) but rather about transnational capital essentializing cultural difference as a mechanism of maintaining similar forms of racial differentiation and hierarchies. In the archaeological landscape, this development imperative (to support and funds natives throughout the world) has quite complicated configurations. In this regard, postcolonial archaeologists have to not only seriously contend with transnational forces (e.g., oil, NGOs, transnational companies) that weigh in multiple ways upon their understanding of the past but also quite uniquely understand themselves as a social and political embodiments of these greater global forces at work.

International Perspectives

In Latin America, the postcolonial configuration meant the powerful commitment to an explicit political identification with the archaeologist's role of researching the past was no longer contained within an academic heading but rather marked a direct manner to connect to the Indian and colonial legacy of the American continent's history. Excavating the Latin American past was directly connected to challenging the neocolonial conditions of the present. In that sense, one now excavates one's own past, a past that had been dutifully denied and repressed by the Western-inspired national governments and the "objective" national histories of each of nation-state (see Lumbreras 1981; Vargas 1990).

As an example of a postcolonial archaeology, there are two initial factors on which this Latin American social archaeology approach is based: the first is the strong social and political commitment that an archaeologist, as a social scientist, feels towards the community; the second factor is the historical materialist paradigm that many archaeologists embrace as a tool to analyze and understand history (Bate 1977, 1978). These two factors enable the social archaeologists to reconstruct history and see its continuity and value in contemporary society. This alternative form of archaeology proposes to destroy the false theory-praxis and science-advocacy dichotomies and argues that the archaeologist has an important responsibility and plays a pivotal part in situating historical knowledge at the center of the continent's social struggle. In essence, social archaeology proposes a more political and

socially relevant way of addressing our inquiries into the past.

Furthermore, social archaeologists engaged in this approach see themselves linked to the past that they are interpreting. Rather than seeing themselves removed from their research, they see themselves as the end product of this historical process. Not only does this not interfere in the study of the past due to some limited, ethnocentric, or nationalistic claim, but rather, it demands an even more objective understanding of it. This objectivity is of utmost importance because the past is directly tied to whom we are as a people, and this knowledge is needed for the historical construction of the continent's present and future.

Another explicit postcolonial engagement with the past is the "alternative" national history proposed by the single most powerful social movement today in Ecuador and largely represented by the CONAIE (*Confederación de Nacionalidades Indígenas del Ecuador*), which has been able to bring together the majority (although not all) of the Indian community in their collective grievances and struggle against the Ecuadorian state. These grievances range from land claims to controversial constitutional amendments. This discussion is mainly interested in the CONAIE's own reading of the pre-Hispanic past which legitimizes its struggle and has visibly contributed to it becoming a viable political force in the country.

The two most important claims by the CONAIE that constitute a counter hegemonic discourse to the official history are its demand for territorial self-determination for each Indian nationality and a multinational state. The demand for territorial self-determination relates to both differing understanding of the land, nationalism, and economic development. As Karakras (1990: 5 and 20) explains:

> We are peoples, we are nationalities, we have our own national processes. . . . The Indian peoples are interested in making the proclamation of autodetermination a reality and in taking their historical destiny into our own hands.

The land is seen as an integral part of Indian culture and essential for constructing an independent livelihood, just as a mother is essential for the nurturing of her children. The regaining of the land itself is essential to maintain their culture and developing it, it is a vital necessity (Karakras 1990). This is why the CONAIE presents its claim for the land as an integral part of their demands, reaffirming that the land.

In contrast, the present Ecuadorian state strives to continue its century-long project of constructing a single homogenous Ecuadorian nationality and to locate all the nation's natural and commercial resources under a central state authority that will oversee its development. The Indian proposal presents opposite demands – it wants to preserve native lands, customs, and environment from any outside exploitation, including from that of the central state. It in no way shares the dominant view of capitalist production as the way to prosperity but rather sees it as further contributing to the destruction of their lands and cultures. For the CONAIE, only a communal and autonomous self-government would contribute to the improvement of each national group and, therefore, of the central state (CONAIE 1989).

The second demand of the CONAIE for a multinational state entailed a reform of Ecuador's constitution and defined the state as plurinational in character. According to the CONAIE, this was necessary because each Indian community is a nationality in its own right, with its own culture, heritage, traditions, and language. This constitutional reform, in this manner, did not only benefit the Indian nationalities but also other oppressed groups like Afro-Ecuadorians that could gain from the restructuring of a more pluricultural and democratic state apparatus (CONAIE 1998).

This proposal is a reformed position from previous Indian stances because it recognizes the reality of the Indian nationalities caught within the Ecuadorian nation-state. It also recognizes the complex makeup of the country and the presence of other ethnic and racial groups. In contrast to earlier positions, it appropriates Western concepts to serve Indian interests. A multinational state also inherently speaks to the right of each nationality to autonomous self-determination (CONAIE 1989, 1997). This self-determination

is understood as permitting legal control over their own societies within the structure of a single more representative and democratic state: "that is, you can be of a different nationality but belong to the same state" (Karakras 1990: 23).

Both of the CONAIE's main demands are potentially counter hegemonic, yet it is clear that the state and transnational forces will always be striving to neutralize each of these radical changes, or even worse reincorporate them into their own redefinition of the global landscape.

Future Directions

> To overhaul a history, or to attempt to redeem it—which effort may or may not justify it—is not at all the same thing as the descent one must make in order to excavate a history. To be forced to excavate a history is, also to repudiate the concept of history, and the vocabulary in which history is written; for the written history is, and must be, merely the vocabulary of power, and power is history's most seductively attired false witness (Baldwin 1990).

The contemporary setting highlights processes where interest groups like oil companies decimate contemporary Indian communities while being forced to invest in recuperating their ancestral pasts or quite similarly the support of environmental and other NGOs that coincidentally continue to reify racial hierarchies in ways that can no longer be deemed innocent or well intentioned. One of the greater contributions of a postcolonial archaeological enterprise is to actively shy away from images of well-intentioned natives or native-saving agents and rather to recognize the rocky boat (or ship of fools) that we are all equally members of. That is why new concerns of the past, such as the *Taller Etnohistórico Andino* in Bolivia or the CONAIE's lack of concern with direct ancestral claims to archaeological site, are both equally valid manners to recognize the complex manner in which we are one and the other, Western and not, at one and the same time (Kincaid 1997).

In the same token, it is this necessity to recognize that any active refusal to accept our complicity in this pervasive Western discourse of differentiation could only continue the geno- and ethnocidal paths that have brought us to reflect at this place (Malkki 1995). Perhaps it is the recognition that we are one and the same, from an "odd mixture of continents and blood, of here and there, of belonging and not" that may provide the most singular forms of transient agency (Kureishi 1990: 3). As James Baldwin (1990: 481) states: "Our history is each other. That is our only guide. One thing is absolutely certain: one can repudiate, or despise, no one's history without repudiating or despising one's own." And the postcolonial archaeologies' mind-set means recognizing that the colonizer's past is also one's own and that the opposite is true as well.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Popular Culture and Archaeology
- ▶ Post-Processualism, Development of
- ▶ Practice Theory in Archaeology
- ▶ Professionalization: Archaeology as an "Expert" Knowledge
- ▶ Race in Archaeology
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation: Overview
- ▶ Social Archaeology
- ▶ South Africa: Heritage Management
- ▶ South American Archaeology: Postcolonial Perspectives

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Post-Khmer Rouge Cambodia, Archaeology in

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Introduction

Archaeology in Cambodia has grown exponentially since the end of the Khmer Rouge period and the establishment of the Paris Peace Agreement of 1991. Several institutions are responsible for overseeing this growth including the APSARA Authority, the Ministry of Culture and Fine Arts (MOCFA), the Royal University of Fine Arts (RUFA), and more recently the Royal Academy of Cambodia (RAC). This entry discusses the roles these institutions have played in the revival of archaeological research in Cambodia, Cambodian perspectives on the advance of archaeology in their country, and suggestions for future goals of archaeological research in Cambodia.

Historical Background

Cambodian arts and culture were reinvigorated in 1953 when Cambodia received independence. One focus of this period was an attempt to understand and define "modern Khmer culture" (Daravuth & Muan 2001). In 1965, the Royal University of Fine Arts (RUFA) was established in Phnom Penh as the first truly Cambodian university and included a Faculty of Archaeology

staffed by Cambodian instructors that had studied and trained in France (Daravuth & Muan 2001). By 1971, plans were made for the construction of a large conference hall and space for a library, classrooms, and research center on an expanded Royal University of Fine Arts campus (Key 2001 [1971]). Unfortunately, these plans were not implemented due to the civil war and the fall of Phnom Penh to Khmer Rouge soldiers in 1975. Only three Cambodian archaeologists in Cambodia survived the Khmer Rouge period (Griffin et al. 1999).

Key Issues

As archaeology in Cambodia was reestablished, it was recognized that government bodies overseeing archaeological patrimony were needed. Additionally, training of new archaeologists was necessary to provide human resources for these institutions.

Archaeological Patrimony: The APSARA Authority

The APSARA (Authority for the Protection and Safeguarding of the Angkor Region) Authority was born out of a need to protect and conserve the sites in the Angkor region following the Khmer Rouge period (for a detailed history on the formation of APSARA, see Choulean et al. 1998; Chau Sun 2006). Just one year following the signing of the Paris Peace Agreements, the Angkor region was conditionally inscribed on the UNESCO World Heritage List. The sites within the "Perimetre de Protection" included Angkor Wat, the Bayon, Roluos, Banteay Srei, and others. The listing was provisional provided that Cambodia meet several conditions. These were fulfilled in 1995, and Angkor was inscribed permanently on the World Heritage list. In the same year, the APSARA Authority was established by royal decree and was tasked with the management and protection of the region of Angkor and Siem Reap. As Angkor was becoming a major tourist destination, APSARA primarily focused on preventing illegal construction projects. However, it was also important that APSARA become increasingly autonomous, in order to provide "the institutional structure vital for nurturing the Cambodian expertise required for managing the site over the longer term" (Winter 2007: 51).

Currently, the APSARA Authority describes their mission as "Protecting, maintaining, conserving, and improving the value of the archaeological park, the culture, the environment, and the history of the Angkor region as defined on the World Heritage List" (APSARA Authority 2005). The APSARA Authority contains several departments that oversee these various concerns. These include two departments dealing with Monuments and Archaeology, the Department of Angkor Tourism Development, the Department of Urbanization and Development of the Siem Reap and Angkor region, a Department of Demography and Development, and a Department of Water and Forest Management. Archaeological research and conservation of monuments is undertaken collaboratively between the APSARA Authority and various international organizations. All international projects must include training of Cambodian students as part of their project as well as collaboration with APSARA staff and experts.

As Cambodia's popularity as a tourist destination increases, APSARA has had additional challenges in managing tourism and development in Siem Reap, as well as interacting with the local population, while also following their initial goal of protecting and conserving sites. Recent archaeological research shows that the Greater Angkor Region is approximately 1,000 sq km, much larger than the initial zones included in the World Heritage listing (Fletcher et al. 2007). These additional archaeological features, which include mounds, channels, and water features, are often found in rural areas where people live and work. Several thousand people also live and work within the archaeological park itself. The rapid expansion of Siem Reap as a tourist center has also had environmental consequences especially relating to water management, which has become a new priority (Munthit 2008). Growing numbers of tourists are increasing the wear and tear on the

stone and brick monuments, which has led to the closing off of some areas of temples. As tourist numbers increase, the APSARA Authority will continue to see their responsibilities grow. In turn they will have to balance protection, conservation, and research of the archaeological sites under their purview while also managing the needs of the local community and facilitating the needs of tourists, whose dollars are so crucial for the Cambodian economy.

Archaeological Patrimony: The Ministry of Culture and Fine Arts (MOCFA)

The Ministry of Culture and Fine Arts is the other main body responsible for the protection and research of archaeological sites in Cambodia. MOCFA was established by royal decree in January 1996, and its primary responsibilities include the development of culture and fine arts as well as promoting Cambodia's diverse cultural heritage. Archaeological oversight falls under the General Department of Cultural Heritage and four subdepartments: Archaeology and Prehistory, Antiquities, Museums, and Preservation and Conservation of Ancient Monuments. MOCFA is responsible for all archaeological sites in Cambodia except for the sites located in Siem Reap province and the sites located in the region controlled by the National Authority of Preah Vihear in Preah Vihear province. These include archaeological sites such as temples, and pagodas, as well as ancient mounds, bridges, canals, water reservoirs, and roads.

One of the primary goals of the MOCFA is the broad promotion of archaeological research. Local archaeologists are encouraged to collaborate with foreign institutions and researchers to conduct survey, excavation, and restoration and preservation projects. The MOCFA is also concerned with documenting all archaeological sites on land, as well as those underground and underwater, in order to highlight their importance for Cambodia's national cultural heritage. Recently, more than 4,000 archaeological sites have been documented, mapped, and zoned in a collaborative project between MOCFA and the École Française d'Extrême-Orient (EFEO) (Bruguier et al. 2007). Some of these sites have also been excavated or restored in collaborative projects with local experts and international researchers through external financial support. Prior to starting such projects, MOCFA requires the collaborative organizations to create an agreement clarifying the project plan, its schedule, and budget. The MOCFA also emphasizes the importance of heritage education, as the education of local people, officials, police, monks, and students is key to protecting cultural heritage in Cambodia. In this vein, some sites are slated for development as tourist attractions, and the MOCFA intends to open as many provincial museums as possible.

In addition to these smaller sites, the MOCFA is currently preparing documents for UNESCO and the World Heritage Commission to submit Sambor Prei Kuk to be included on the list of World Heritage sites. If accepted, a Sambor Prei Kuk Authority would be created as a separate unit within the MOCFA. Other sites slated to be nominated for World Heritage status include the Banteay Chhmar temple complex, the temple of Preah Khan of Kompong Svay, Beng Mealea and Koh Ker temples, Phnom Chisor temple, and the site of Angkor Borei. While the MOCFA does not have direct control over the other World Heritage sites of Angkor and Preah Vihear temple, it does work closely with both APSARA and the National Authority of Preah Vihear.

Despite the progress made in recent years, the MOCFA still has many challenges related to the destruction of archaeological sites and illicit trafficking of cultural property. Recently, the acquisition of land by powerful businessmen and institutions has caused the destruction of many archaeological sites. Furthermore, local people often do not understand the importance of preserving sites, which can also lead to looting. Unfortunately, the MOCFA does not have enough resources to address all of these problems or investigate crimes. Additional difficulties include assessment and cultural valuation of various art objects, as there is not enough equipment to appraise the materials. Looting, stealing, and illegal trafficking of art objects in Cambodia are problems that make the protection and conservation of sites and objects complicated.

Archaeological Training: The Royal University of Fine Arts (RUFA)

The Royal University of Fine Arts (RUFA) has played a central role in producing new archaeologists, both before and after the Khmer Rouge period. Although RUFA was reopened in 1980, the first courses offered were only in the School of Fine Arts. It was not until 1989 that RUFA was awarded its full university status and the Department of Archaeology was reopened by its surviving alumni, including professors Chuch Phoeurn and Pich Keo. However, the department faced a great challenge due to limited human resources. The curriculum was based on prewar coursework, which included classes on Khmer history, epigraphy, art history, ethnology, and archaeology. Other courses were focused on civilizations and cultures directly related to Cambodia, such as Indian classical languages and art history, and other Southeast Asian cultures and civilizations including the Cham, Javanese, Burmese, and Thai. Also critical to the curriculum were study trips to major archaeological sites, consultation with national and international experts, as well as internships with various conservation organizations and archaeological institutions.

With funding from the Toyota Foundation via UNESCO from 1995 to 2002, the Department of Archaeology drastically improved its human resources by adding national and international experts to the faculty (UNESCO 2002). Graduates of the 1994 RUFA class and junior faculty members were assigned as teaching assistants for each major topic. It was hoped that these teaching assistants and junior scholars would gradually replace their international professors and reduce the department's reliance on foreign assistance. However, this hope was not realized, as the department lacked funding to maintain a large faculty after UNESCO ended their assistance in 2002. Fortunately, one unexpected and positive outcome of the project was the production of a series of highly competent Cambodian archaeologists, who were students of the UNESCO-funded faculty. Students who earned their degrees from 1995 to 2002 have filled positions in most of the cultural resource management institutions in Cambodia, such as MOCFA, the APSARA Authority, the Royal Academy of Cambodia, and other archaeological and conservation projects. Additionally, several students have continued their education by earning doctoral degrees at institutions in Cambodia and abroad.

Currently, RUFA is beginning to renovate and expand their existing facilities in order to provide more classroom, lab, and library space. Additionally, a group of scholars are working to develop a core curriculum for archaeology students. Despite these developments, RUFA continues to struggle with a lack of funding to support faculty and provide resources for students. Many RUFA alumni have volunteered to offer part-time classes or conference talks to current students. Despite the efforts of dedicated faculty, staff, volunteers, and alumni, RUFA needs additional financial support in order to provide adequate resources for its students and teachers. In spite of these challenges, a new generation of archaeologists has gradually increased and is able to respond to the demand for archaeologists and conservators in institutions such as the MOCFA, APSARA, and Preah Vihear authorities. Since the opening of the twenty-first century, more and more Cambodian archaeologists have gradually risen from field workers and trainees to become collaborators and colleagues in various international institutions in Cambodia and abroad.

Archaeological Training: The Royal Academy of Cambodia (RAC)

In addition to RUFA graduates, Cambodian scholars with advanced degrees are needed to train, teach, and lead research projects. With this goal in mind, the first government-sponsored master's and doctoral degrees were established in 2002 in the Department of Archaeology in the Institute of Culture and Fine Arts at the Royal Academy of Cambodia (RAC) in 2002. The goals of the program include the management and development of archaeological research, the collection and preservation of research finds, the documentation and distribution of research findings, and the expansion of cooperative relationships with other institutions, ministries, and

Post-Khmer Rouge Cambodia, Archaeology in, Fig. 1 Cambodian archaeologists working at the Choeung Ek Kiln site (Photo by Kaseka Phon)

national and international organizations related to archaeological research. During the first phase of this program, five master's and doctoral candidates were selected for training after a rigorous examination.

The program has now moved into the second phase, in which graduates of the program will focus on research with government support. One graduate has already completed his Ph.D. and two others are Ph.D. candidates. Several research projects have already been completed, including the Sre Ampil project (discussed below), mapping and excavation at the Choeung Ek Kiln Site, and most recently a project entitled "Archaeology Research and Management at Prasat Trapeang Prasat" funded by the Royal Government (Fig. 1). Conservation work is currently being conducted at Trapeang Prasat, an important yet unstudied temple located near the Dangrek Mountains in Udor Meanchey province, to preserve the historical and archaeological integrity of the site for future generations (Fig. 2). Conservation of this site will hopefully increase national and international tourism to the region and will provide an important benefit for the local economy.

Since 2002 RAC has organized national and international conferenc es with the joint support of the Royal Government and international institutions. In 2014, RAC, in collaboration with the MOCFA, the APSARA Authority, the National Authority of Preah Vihear, the National Committee of World Heritage, and other NGOs, will host the 20th Indo-Pacific Prehistory Association Congress in Siem Reap. In the future, the Institute of Culture and Fine Arts at the RAC will extend its research projects by seeking funding from both the Royal Government and other resources and expand its international relationships with joint research projects and additional international conferences.

International Perspectives

Currently, Cambodian archaeologists are working to define their role in shaping archaeological research in their country. Since Cambodia has reopened for archaeological research, there have been many international research institutions working in Cambodia. Cambodian archaeologists have had many opportunities to join these projects and gain experience for their future careers. However, these projects are often run and directed by foreigners, and Cambodians are

Post-Khmer Rouge Cambodia, Archaeology in, Fig. 2 Cambodian archaeologists from the Royal Academy of Cambodia working at the temple of Trapeang Prasat (Photo by Kaseka Phon)

often only hired as research assistants. In many cases, the research findings, archaeological materials, and results remain under the control of the director of the project. Under these circumstances, Cambodian archaeologists are not always equal collaborators.

It is for this reason that opportunities for Cambodian-led research projects and in-country training, such as the RAC advanced degree program discussed above, are so important. One successful Cambodian-led project is the Sre Ampil project, a 2-year program funded by the Center for Khmer Studies with archaeologists and students from RUFA and RAC. Cambodian archaeologists and students conducted excavations at the site of Sre Ampil and worked with local villagers to construct a site museum, which includes both artifacts from excavations and objects donated by villagers (Fig. 3). The Sre Ampil archaeological site will also be used as a permanent field training site for RUFA archaeology students and possibly for students in anthropology and tourism studies from other universities (see Phon & Phon 2009). Another step forward in the process of increasing indigenous archaeological research is the establishment of the Khmer Archaeological Society (www.khmeras.org). This Cambodian-led NGO established by Mr. Phon Kaseka seeks to preserve past and present cultural heritage, including the heritage of minority groups such as the Cham and Kuoy. In this way, Cambodians are beginning to take a leadership role in the practice of archaeology in their country.

Post-Khmer Rouge Cambodia, Archaeology in, Fig. 3 Cambodian archaeologists examining a temple foundation at the site of Sre Ampil (Photo by Kaseka Phon)

Future Directions

Archaeological research in post-Khmer Rouge Cambodia has made great strides since the country reopened for archaeological research in the 1990s. Nevertheless, there are still several areas where improvements can be made. First, it is recognized that many archaeological sites in Cambodia are still vulnerable to looters or development. Cultural resource protection and education and implementation of heritage law is lacking in Cambodia. Therefore, a focus on archaeological site preservation and salvage excavations is needed. Furthermore, local involvement and education is a crucial aspect in protecting against site destruction. As part of this goal, it is important to continue with the construction of site museums for the display of artifacts collected at the site. Retention of cultural treasures by the communities in which they are found is good for reinforcing cultural identity, local morale, the economy, and the education of villagers and tourists who will jointly support the museums. This is currently an important goal of the MOCFA, and several local site museums have already been constructed. Site museums and the recognition of important sites outside the Angkor region would also reduce problems related to over-visitation of the principal sites in Angkor. Tour agencies currently neglect other areas in the country where there is tourism potential. Tourism development at these would attract national and international visitors to spend time in other parts of Cambodia beyond Angkor and increase tourist dollars. It is also hoped that training programs for students at RUFA, RAC, and other universities would allow them additional opportunities to practice their skills and assist with job placement after graduation. Lastly, it is essential that Cambodian archaeologists continue to develop relationships with other international scholars, especially those in other Southeast Asian countries. Hopefully, with increased in-country education and training, Cambodian archaeologists, in partnership with foreign collaborators, can lead the way toward achieving many of these objectives.

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▶ Cambodia: Cultural Heritage Management

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Post-Medieval Archaeology

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Brief Definition of the Topic

Post-Medieval Archaeology is the journal of the Society for Post-Medieval Archaeology, founded in the UK in 1966. The Society takes a lead in promoting postmedieval archaeology in Britain and advises government and other national bodies. The journal publishes an annual roundup of fieldwork undertaken in the UK and an annual report of significant finds recorded by the Portable Antiquities Scheme. In addition, the biannual journal aims to publish a diverse range of articles and shorter notes on both British and international archaeology. Its scope is the material evidence of European society, wherever it is found throughout the world, in a period that saw the transition from medieval to industrial society and the foundation of the modern world on new Renaissance and Reformation values, marked by the shift from collective to individual mentalities; increasing social segregation; new notions of privacy, family, gender, and space; global expansion; and revolutions in the modes and scales of production. The journal fosters a multidisciplinary approach to the past, encouraging use of material, textual, iconographic, and scientific evidence, as well as engaging in the latest theoretical debate. Its chronological remit extends right up to the present day. The European Reference Index for the Humanities (ERIH), published by the European Science Foundation in 2007, places *Post-Medieval Archaeology* in its category "A": high-ranking international publications with a very strong reputation among researchers of the field in different countries, regularly cited all over the world. Details on submission procedures can be viewed on the Society's website at http://www.spma.org.uk/journal.php.

Cross-References

▶ Atlantic World: Historical Archaeology
▶ Australasian Society for Historical Archaeology (ASHA)
▶ Contemporary and Historical Archaeology in Theory (CHAT)
▶ Contemporary Past, Archaeology of the
▶ Historical Archaeology
▶ Industrial Archaeology
▶ Irish Post-Medieval Archaeology Group (IPMAG)
▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
▶ Society for Industrial Archeology (SIA)

Further Reading

The Society for Post-Medieval Archaeology. n.d. Available at: http://www.spma.org.uk/journal.php.

Post-Medieval Archaeology (Europe)

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Introduction

Post-medieval archaeology is the term commonly used in Europe for the study of post-CE-1500 society, although there remains debate over the chronological definition of the subject at both its beginning and end points. The archaeology of post-medieval Europe is potentially a vast subject, encompassing a huge variety of material remains across a remarkably diverse linguistic, political, and cultural environment. It is a relatively young branch of archaeology, only really emerging as a distinct field of practice in Britain in the decades after the Second World War. Here, it is now a well-established feature of academic research, national and regional

heritage management policy, and developer-funded commercial archaeology. On the Continent, post-medieval archaeology developed as a natural progression from the study of medieval archaeology, and it is only since the 1970s that archaeological investigations of post-CE 1500 remains have been regularly undertaken and published, most notably in Northern and Western Europe. There are still very few academic posts dedicated to post-medieval archaeology on the Continent, and most post-medieval archaeological research is conducted within the context of development projects. In Central and Eastern Europe and the Mediterranean countries, post-medieval archaeology remains underdeveloped as a distinct subdiscipline, although this is now beginning to change. Cross-European and global perspectives are increasing within the subject, and a wider range of methodological and interpretive approaches are being advocated by leading practitioners in both Britain and the Continent.

Definition

Both the chronological start and end points of the term "post-medieval" have been the subject of widespread debate in European archaeology. The term is used by European archaeologists for the study of post-CE-1500 material remains. It is often used in contrast to the term "historical archaeology," which was first developed in the USA for the investigation of sites of European colonial settlement. The latter term is now widespread internationally and used in two overlapping senses: firstly, as a definition for the archaeology of European settler societies in New World contexts (including North and South America and Australasia) as well as their interaction with and impact on indigenous peoples and, secondly, as a catch-all term for the archaeology of the last 500 years. Many accounts maintain that this period is dominated by European imperialism and the spread of global capitalism and that archaeologists should seek out these phenomena in specific local contexts. However, European archaeologists often counter that both the term "historical archaeology" and the interpretive focus on colonialism and capitalism are inappropriate for their area of study because widespread historical documentation exists for many European countries from the medieval period as well as the classical past, and because colonialism and capitalism were experienced in very different ways in Europe compared to the brutal colonization of New World territories. Anders Andrén has argued that post-medieval archaeology is one branch of a wider "historical archaeology" that encompasses the archaeological study of all literate societies (Andrén 1998). This too has its problems, given that many recently literate societies have well-established traditions of oral history, for example, in sub-Saharan Africa.

These debates highlight the distinctive intellectual traditions from which European post-medieval archaeology emerged. In contrast to American archaeology, which is based within the discipline of anthropology, in Europe the archaeological study of the more recent past emerged gradually from the study of Roman and medieval archaeology, with strong connections to the disciplines of history, art-and-architectural history, and historical geography. On the Continent, the vibrant field of folk studies or "European ethnology" had an equally powerful effect on the early development of the discipline, manifested by the establishment of regional folk-life museums and collections of preserved historic buildings and implements (e.g., the open-air museum at Skansen in Stockholm (Sweden), founded in 1891) (Fig. 1). The growth of social history and the Annalés historical school in the mid-twentieth century, with its emphasis on the material realities of everyday life and the *longue durée* of landscape and cultural change, was a significant influence. This reflects the genuine continuity of the historical and archaeological record between the medieval and post-medieval periods. European rural landscapes and urban centers often have long histories stretching back

Post-Medieval Archaeology (Europe), Fig. 1 Reconstructed nineteenth-century buildings at Skansen living history museum, Stockholm, Sweden (© Paul Courtney)

to prehistoric, Roman, or medieval times, and many aspects of the post-medieval archaeological record, from material culture types to plans of buildings, actually originate in the preceding centuries. This means that European archaeologists often work across the medieval and post-medieval periods and are specialists in particular types of archaeological evidence (such as ceramics, glass, or buildings) rather than period specialists. However, the term post-medieval was first used for the study of the sixteenth to eighteenth centuries only and is arguably less relevant to the growing focus on nineteenth-, twentieth-, and twenty-first-century archaeology. Some European scholars have advocated that "post-medieval" should be abandoned in favor of the more commonly accepted global terminology. They recognize that there is a need to investigate the dramatic changes occurring in post-medieval Europe while avoiding totalizing grand narratives which obscure the complexities of local, regional, national, and global cultures and connections (Hicks 2005).

While post-medieval is the term used by archaeologists, historians more commonly use the terms "early modern" for the period from the sixteenth to the eighteenth centuries and "modern" for the nineteenth century to the present day. The historiographical divide between the "medieval" and "post-medieval" or "early modern" period is a long-standing one in European historical and political thought. It reflects a widespread conception that the sixteenth century witnessed major transformative changes which clearly separate a traditional, feudal medieval past from the development of modern European society. These can be summed up as a series of large-scale historical processes and cultural watersheds, many of which would be expected to have archaeological expressions. Most notable among these could be considered the "Renaissance" of classical literature and art in fifteenth- and sixteenth-century Italy, the dramatic impact of the European Protestant Reformation from the second decade of the sixteenth century which saw the breakup of the unified Roman Church, the European discovery of the New World in 1492 and the establishment of European global empires, the early modern "scientific revolution" and the spread of Enlightenment philosophy and democratic politics, and, in the realm of the economy, the ascendancy of capitalism through agricultural and urban expansion, global trade, and the impact of eighteenth- and nineteenth-century industrialization. However, it must be recognized that these large-scale processes are essentially modern

historiographical constructions which arguably have limited importance for many aspects of the archaeological and historical record. The start date of c. CE 1500 is an arbitrary convention which can conceal important elements of continuity within European social, economic, and religious life.

"Europe" is also a contested concept for this period. In the sixteenth century, Europe consisted of multiple fragmented polities and regional societies, containing a huge variety of languages and cultures. While there were certainly many connections between different areas of Europe, stimulated by trading networks and the important role of the Roman Church, it is debatable whether ordinary people would have shared many cultural affiliations with even regional neighbors, let alone any kind of pan-European identity. The early modern period saw the creation of the nation-states of contemporary Europe, which were in part shaped by new material and architectural expressions such as fortifications and nationalistic symbols. It is vital to remember that large-scale historical processes such as the Reformation or the rise of capitalism affected different regions and communities in different ways and at very different speeds, some being imposed from above, while others emerged organically from small-scale changes in everyday economic and social practices. Furthermore, because the development of post-medieval archaeology has been led by Britain and Northern and Western Continental Europe, there has been a tendency to marginalize the archaeology of other regions of Europe. For instance, in Eastern Europe and Russia, the Orthodox Church remained a major unifying force at the same time as Western European Christendom was becoming fragmented into Catholic and Protestant realms, while a major portion of Southeastern Europe and the Eastern Mediterranean remained part of the Islamic Ottoman Empire throughout the post-medieval period, drawing significant cultural influences from North Africa and the Middle East.

If c. CE 1500 is a widely shared start point for European post-medieval archaeology, there is much greater variety in when the period is considered to have ended. The first practitioners of the discipline tended to focus on the early post-medieval centuries. In Britain, the Society for Post-Medieval Archaeology was founded in 1966, emerging from the Post-Medieval Ceramic Research Group which had been established three years previously, and the first issue of its journal *Post-Medieval Archaeology* appeared in 1967. The Society originally defined its remit as the archaeology of the period from c. CE 1500 to c. CE 1750, arguing that the mid-eighteenth century saw profound changes in the development of industry and society which made a natural cutoff point. At the same time, industrial archaeology had emerged as a distinct subdiscipline in the 1950s, with the Association of Industrial Archaeology being established in 1973. Many early advocates of industrial archaeology had a narrow focus on questions of technological development and the economic impact of industry, but there was a growing concern to record the ordinary experiences of industrial workers, and some advocated that industrial archaeology should be seen as the archaeology of the totality of society in the eighteenth and nineteenth centuries (Nevell 2006). The first synthesis of post-medieval archaeology in Britain by David Crossley concentrated on the early period, covering urban and rural landscapes, building types, material culture, and the evidence of early industrial production (Crossley 1990). In the past two decades, there has been much greater emphasis on the archaeology of the eighteenth and nineteenth centuries, in part stimulated by the influence of historical archaeology in the USA and Australasia, and this is reflected by the content of the most recent survey of post-medieval archaeology in Britain which continues to c. CE 1900 (Newman 2001). The Irish Post-Medieval Archaeology Group was established in 1999 and has published work on both early modern "plantation-era" archaeology and more recent industrial and urban sites. In Britain there has also been increased emphasis on developing archaeological studies of the recent past. This was initially stimulated by the recording of the First World War and Second World War military heritage and, since the late 1990s, has been extended to the

study of Cold War sites and the application of archaeological approaches to contemporary (late twentieth and twenty-first century) material remains including council houses, tower blocks, protest camps, and graffiti (Buchli & Lucas 2001). The recently formed Contemporary and Historical Archaeology in Theory (CHAT) group provides a focus for this work. Recognizing these broad shifts in the methodological and thematic coverage of the discipline, in 2006 the Society for Post-Medieval Archaeology officially extended its remit to incorporate the archaeology of the period from c. CE 1500 to the present day.

Key Issues/Current Debates/Future Directions/Examples

The early focus within post-medieval archaeology in Britain was on developing typological studies of specific material culture categories (such as ceramics, glass, and clay pipes), which could be used for dating excavated sites and for studies of technology and production, and the publication of excavations, especially urban sites and industrial production (kiln or furnace) sites. The 1970s and 1980s saw the growth of "rescue" archaeology within the UK as urban centers were extensively redeveloped, and while much attention was focused on Roman and medieval remains, some important post-medieval sequences were excavated in towns such as London, Norwich, and Exeter. The 1982 televised raising of Henry VIII's flagship *The Mary Rose* from the Solent channel, and the public interest in the wealth of well-preserved organic material culture from the wreck, showed that post-medieval archaeology could be as highly valued as earlier periods, a point which was reinforced in 1989 during the major public controversy over the threatened destruction of the remains of the Elizabethan "Rose Theatre" on London's South Bank. In the mid-1990s, new legislation provided protection for both buried archaeology and listed buildings (Planning Policy Guidance Notes 15 and 16). This has had a dramatic impact on the study of post-medieval remains in Britain, which are now increasingly excavated and published as important parts of the archaeological sequence in their own right rather than being seen as later "disturbance." The study of post-medieval buildings was already well developed as an important subdiscipline following the foundation of the Vernacular Architecture Group in 1952, with the first issue of the journal *Vernacular Architecture* appearing in 1970. Studies of rural landscapes and buildings have increased in number and scope, with a focus on the impact of the enclosure of medieval agricultural landscapes and shifts in settlement patterns in the eighteenth and nineteenth centuries (Newman 2001) (Fig. 2). Within Britain, there is now a strong conception that the "historic environment" encompasses the archaeology, buildings, and landscapes of all periods of the past, which should be protected and adapted to provide a meaningful "sense of place" for contemporary communities, although this is not always applied rigorously to later post-medieval structures which are often undervalued or taken for granted.

Post-Medieval Archaeology (Europe), Fig. 2 Excavations of eighteenth- and nineteenth-century farm buildings at Henllys Farm, Pembrokeshire, Wales (© Harold Mytum)

Post-Medieval Archaeology (Europe), Fig. 3 The Workhouse, Southwell, Nottinghamshire. Built in 1824 as a new type of institution within a reformed system of poor relief, it was designed to classify, segregate, and punish the "undeserving" poor (© Chris King)

Since the early 1990s, a small number of post-medieval academic posts have been established in British universities, and scholars have advocated the integration of explicit archaeological theory and a greater plurality of interpretive approaches within the subject. Rather than seeing post-medieval archaeological remains primarily in terms of technological or economic change, they argue that material culture should be seen as meaningful within social relationships and social identities in the past – for instance, in terms of class, gender, ethnicity, or religion. One major area of focus for both academic and museum-based archaeologists is on the transition between the medieval and post-medieval periods. Studies of a wide range of material culture types including buildings, fortifications, ceramics, dress fittings, and metal toys show that there were significant elements of continuity as well as change in people's material environment. A focused study on the archaeology of the Reformation highlighted that religious change in sixteenth-century Europe involved both top-down and bottom-up transformations in belief and practice and that much older medieval religious culture was incorporated into new Protestant and Catholic religious cultures (Gaimster & Gilchrist 2003). Matthew Johnson studied changes in vernacular farmhouses, material culture, and the enclosure of rural landscapes in sixteenth-century Suffolk, England, arguing that they reflected the transformation of the social order through the rise of privacy and commodification, revealing the spread of capitalist socioeconomic relations (Johnson 1996). More recently, Sarah Tarlow has examined the material remains of eighteenth- and nineteenth-century Britain and argued that rather than simply reflecting capitalism, they are also a product of changing ideologies such as the widespread idea of "improvement," which stimulated new farming practices, the rebuilding of town centers, and the creation of institutions of "moral reform" such as workhouses and prisons (Tarlow 2007) (Fig. 3).

In Continental Europe, post-medieval archaeology emerged more recently than in the UK and currently retains a focus on the immediate post-Reformation centuries. There are few dedicated academic posts in the subject, mainly concentrated in Germany and Scandinavia, and most post-medieval archaeological research is undertaken by archaeologists connected to urban municipalities, state heritage or archaeological services, or museums, within the context of development projects. In Germany, the subject was stimulated by the excavation of well-preserved archaeological sequences from Hanseatic towns including Lubeck and Duisburg in the 1970s and 1980s (Krause 1992). The German Society for Medieval Archaeology *(Deutsche Gesellschaft für Archäologie des*

Post-Medieval Archaeology (Europe), Fig. 4 The mercury distillation plant at Almadén, Castilla La Mancha, Ciudad Real, Spain. Mercury (from the mineral cinnabar) was essential to the expanding silver economy of the Spanish New World, and the mines at Almadén were a major state-owned concern (© Marilyn Palmer)

Mittelalters), which was founded in 1975, extended its remit to cover *Neuzeit*, or "the archaeology of the modern period," in 1990. In 2009 a new German and English open-access journal *Historische Archäologie* was established covering the archaeology of both early modern and more recent periods. Large-scale urban excavations have also taken place in Scandinavian cities including Lund (Sweden), Trondheim (Norway), and Copenhagen (Denmark) (Gaimster 2005) and in many cities in the Low Countries, notably Amsterdam (the Netherlands) and Antwerp (Belgium) (Bartels 1999). In France, post-medieval sites are excavated by the state archaeology service, but there is also a strong tradition of regional rural landscape and vernacular architecture studies. In Eastern Europe, post-medieval archaeology has developed from a strong tradition of ethnology and material culture studies as well as the large-scale urban excavations which have taken place since the collapse of Communism; David Gaimster has suggested that the European Council's funding of archaeology within medieval and post-medieval towns in the former eastern bloc has been a way of reemphasizing older shared traditions in the new Europe (Gaimster 2005). Italy has a dedicated research journal for the subject, *Archeologia Postmedievale* (founded in 1997); there has been extensive work on post-medieval ceramics and glass, reflecting the interest in the material culture of the Renaissance. Spain has seen only limited research on post-medieval archaeology, and in both Italy and Greece, there has been some recent work on post-medieval landscape surveys and vernacular architecture studies (Milanese 1997) (Fig. 4).

In Continental Europe, then, the major focus has been on the excavation and publication of early post-medieval urban sites and their rich material culture assemblages, with more limited work on rural landscapes and buildings. The archaeology of the household and domestic life has been a significant recent area, highlighting the potential for complex social and cultural analyses of material culture drawing on historical documents such as wills and probate inventories of household goods, as well as artistic depictions of early modern domestic interiors. One example of this is David Gaimster's study of the stoneware ceramic industries of the Rhineland, which developed in the fourteenth century and whose products were exported all over Northern Europe, Britain, and the European colonies in North America. Gaimster is able to bring together varied sources to show shifts in patterns of production, trade, and consumption of this distinctive form of ceramic tableware, highlighting its role in new rituals of dining and the display of wealth and culture in middle-class European households (Gaimster 1997).

There remain significant challenges facing the development of post-medieval archaeology in Europe. As the majority of research is undertaken in the context of developer-funded projects, fostering a coordinated research framework is problematic, and the sheer scale and diversity of the material and built archaeology of the last 500 years create huge challenges in terms of management, publication, and archiving strategies. This is compounded by the natural tendency of each European country to publish in its own national language, making synthesis difficult to achieve. Only a few explicitly transnational studies have been undertaken for post-medieval object types, but these highlight the necessity to consider cross-European exchange of material culture in this period (Gaimster 1997; Veeckman 2002). British archaeologists, influenced by global historical archaeology, have pioneered the study of the eighteenth and nineteenth centuries and have recently highlighted the need for an archaeological approach to the material remains of twentieth-century and contemporary society. In contrast, there has been only very limited research on this later period on the Continent, largely through industrial archaeology and studies of buildings and landscapes, while archaeological excavations of twentieth-century material happen only occasionally, usually through the archaeological or forensic study of modern warfare and sites of atrocities. Many people still question the usefulness of archaeology for the study of a period with rich historical and visual records, but archaeologists have successfully demonstrated that the material remains of the recent past can provide unique and valuable insights into the dramatic social, economic, and political transformations which created, and continue to operate within, our present-day world.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Buildings Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Central–Eastern Europe: Historical Archaeology
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Ceramics: European Cream to Whitewares in the USA
- ▶ Ceramics: Stonewares
- ▶ Clay Pipes in Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Consumption, Archaeology of
- ▶ Contemporary Past, Archaeology of the
- ▶ Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)
- ▶ Estate Landscapes in Historical Archaeology
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Johnson, Matthew (Historical Archaeology)
- ▶ Medieval Archaeology
- ▶ Modern World: Historical Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Tarlow, Sarah
- ▶ Western Europe: Historical Archaeology

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Post-Processual Archaeology

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Introduction

Post-processual archaeology stemmed from critical debates about the nature of archaeology in the 1980s in Britain, Scandinavia, and the United States leading to much controversy in the 1980s and 1990s and often dividing the discipline into two camps, processual and post-processual. During the first decade of the twenty-first century, the debate has settled down, and many archaeologists attempt to integrate divergent perspectives within the discipline or pick and choose between them.

Definition

Post-processual archaeology began in the 1980s as a reaction to processual archaeology, and it came to be used as an umbrella term covering a wide range of approaches that engage with contemporary social theory and acknowledge

the historical dimensions of knowledge production. These approaches have included discussions of power and ideology, feminism, shifts to and from the notion that material culture can be read as a text, phenomenology, accounts of agency, landscape, the body, memory, materiality, the links between archaeology and heritage, indigenous rights, and ethics.

Historical Background

In the early 1980s post-processual archaeology identified a series of oppositions that were not being debated within the discipline as a result of the approaches followed by processual archaeology. These were as follows:

System and structure: By focusing on variability in adaptive responses to environments as the main locus of cultural change, processual archaeology seemed to reject those large parts of anthropology and the social sciences and humanities which explored underlying structures (especially structures of power and structures of meaning).

Behavior and agency: Similarly by focusing on how humans responded to environments in predictable ways, and by focusing on material culture as an adaptive tool, processual archaeologists gave little import to the ways in which human agents actively used material culture to transform social worlds.

Anthropology and history: By espousing the view that archaeology was anthropological, comparative, and generalizing, processual archaeologists seemed to deny the validity of theories of history and the long tradition, at least in Europe, of linking archaeology with history.

Object and subject: By adopting a stringent view of science as following the hypothetico-deductive method, processual archaeologists used an outdated view of science that did not engage with a wide range of post-positivist philosophies and could not accommodate multiple conflicting perspectives.

In developing this critique, post-processual archaeologists had a number of influences. There were certainly some historical antecedents within archaeology, including the European tradition of linking archaeology with history seen, for example, in the work of Collingwood and Childe (Hodder & Hutson 2003). In North America some have suggested a precursor in the work of Walter Taylor, and Bruce Trigger and James Deetz were also influential. But the main influences were from outside archaeology. In Britain and Europe these were from social and cultural anthropology (Edwin Ardener, Ernest Gellner, Mary Douglas, Clifford Geertz, Victor Turner, Marshall Sahlins) but mainly from Pierre Bourdieu and the Cambridge sociologist Anthony Giddens. In the United States important influences were from Marxism and critical theory, particularly in the context of historical archaeology, and from feminism and indigenous archaeology.

In the late 1970s and early 1980s in Cambridge, a group of graduate students and professors influenced by these ideas including Ian Hodder, Paul Lane, Danny Miller, Henrietta Moore, Mike Parker Pearson, and Chris Tilley organized seminars and a conference attended by Meg Conkey, Susan Kus, Marke Leone, and Alison Wylie. At the same time ethnoarchaeological research (e.g., by Hodder, Miller, and Moore) demonstrated ways in which the broad theoretical interests could be explored in relation to material culture.

In the resulting publications (e.g., Hodder 1982a, b; Leone 1982; Miller & Tilley 1984; Shanks & Tilley 1987a, b; Hodder & Hutson 2003) a number of themes were apparent. The first was that material culture is meaningfully constituted. This was a response to the ecological and adaptive emphases of processual archaeology, and it involved the analysis of structures of meaning and symbolism (see "Key Issues" below). Another theme was that material culture is active not passive. This was a reaction to the functionalism and behaviorism of processual archaeology. Within both these themes, there was in the European debates a simultaneous rejection of structuralism and an embrace of the work of Bourdieu and his notion of habitus and of Giddens and his notion of structuration. These approaches seemed particularly appropriate for archaeology because they dealt with practice

(how rules and structures are played out in the practices of daily life – including in the material objects and residues visible to archaeologists) and with the transformation of structures (how societies change through practice – again the approaches seemed relevant to a discipline dealing with long-term change). Various forms of post-structuralist critique were incorporated into publications and debates.

These changes in perspective within archaeological theory were not produced by a particular book, person, group, or movement. Rather they were made possible by a general change in archaeology that happened in response to wider shifts in related disciplines and in society at large. The main contributing influences were Marxism, structuralism and the post-structuralist critiques, feminist archaeology, postcolonial and indigenous archaeology, and post-positivist debates within the philosophy of science.

Marxism had long been an important component of theoretical debate in archaeology as a result of the work of Childe, but the specific impetus influencing the emergence of post-processual archaeology in Europe was the structural-Marxism of Godelier and Meillassoux and the archaeology of Rowlands and Friedman in which evolutionary change was dependent on specific historical interactions between the forces and relations of production. But it was the Marxist critique of theory and science that had most influence through the work of Mark Leone in the United States and particularly his work in the public archaeology project at Annapolis. As already noted, in addition to Marxist notions of structure, semiotics, structuralism, and post-structuralism (as in the work of Saussure, Lévi-Strauss, Derrida) all played their role in encouraging a more complex discussion in archaeology of the ways in which material culture is patterned and organized.

Early post-processual archaeology had an ambiguous relationship with feminist archaeology. As noted above, Moore, Conkey, and Wylie played significant early roles, but there was soon criticism of a lack of concern with feminist issues in, for example, the early writing of Shanks and Tilley (Engelstad 1991). It was not until 1990 that the first explicitly feminist archaeology emerged in volume form (Conkey & Gero 1990), and since then there have been many developments in feminist and gender archaeology dealing with issues close to those discussed in post-processual archaeology such as knowledge construction, context, ideology, reflexivity, identity, agency, and materiality (e.g., as seen in the work of Rosemary Joyce). Recent definitions of feminist archaeology overlap considerably with post-processual archaeology.

There is some debate about relationships between the growth of postcolonial and indigenous archaeologies and post-processual archaeology. There is a wide recognition in archaeology today that archaeology was historically aligned with nationalist, colonial, and imperial projects that separated many communities from their pasts and wrote the histories and prehistories of others in ways that reinforced dominant narratives (Trigger 1984, 2006). In its critique of processual archaeology's associations with particular forms of dominant discourse in science, post-processual archaeology was aligned to those groups claiming rights and identity to the material past. For example, the African Burial Ground project in New York has empowered contemporary descendants by giving them tangible, material evidence of their heritage and of the contributions and suffering of their once ignored, silenced, and disenfranchised ancestors (Blakey 1998). The passing of NAGPRA in the United States attempted to safeguard the interests of Native Americans with regard to their heritage. This has led to closer cooperation between archaeologists and Native Americans and to changes in archaeological method which involve Native American oral traditions and ritual observances within the scientific process (Watkins 2001; Wilcox 2009). The collaborative methods that have developed in North America as well as in Australia and other parts of the world parallel those developed in post-processual and reflexive archaeology (see below under "Key Issues"). These indigenous and postcolonial archaeologies were not the product of post-processual archaeology, but they did create an environment in which post-processual theories could become salient.

Another important influence on the emergence of post-processual archaeology was debates within the philosophy of science that critiqued methods embraced by processual archaeology. Over many decades, philosophers of science have demonstrated the ways in which scientific knowledge production is situated historically. In cultural anthropology debates emerged about the ways in which ethnography involved complex interactions between observer and observed. But processual archaeology in the United States, perhaps because of its colonial context, rejected these post-positivist, interpretive, and reflexive moves. Initially some post-processual archaeologists took a strongly constructivist position although tempered with detailed empirical and quantitative research. Gradually through time various types of middle ground have been found between objectivist and constructivist positions (see "Key Issues" below).

It is important to recognize the different contexts of post-processual archaeology in Europe (especially in Britain) and the United States. In Europe archaeology had always been linked to history, and so it responded less enthusiastically to processual archaeology and was consequently more ready to engage in its critique; this was especially true of Britain but also of Scandinavia. The major influences on post-processual archaeology in Britain were Bourdieu and Giddens and the post-structuralist debate. But in the United States, the major influences were feminism and Marxism, and the main initial impact was in historical archaeology. The archaeology of early societies and hunter-gatherers remained very tied to a universalizing approach. When cultural anthropology in the United States took a turn toward meaning, history, and reflexivity in the 1970s and 1980s, archaeologists shied away and took their own path, reinforcing a belief in behavioral universals and a restricted form of positivism. Cut off in this way from the intellectual trends that were influencing the growth of post-processual archaeology, the reaction in the United States was initially very strident. Even today, post-processual archaeology in the United States is usually seen as an accompaniment to a continuing processual archaeology, whereas in Britain the two approaches remain thought of as separate and opposing theoretical movements.

As a result of its complex and contested history, post-processual archaeology today can be defined in two rather different ways. For some it remains a term used to describe the more constructivist positions championed by Shanks and Tilley in 1987and more popular in Britain and Europe. For others, and this is the way the term is used here, it has a broader definition incorporating a wide range of perspectives including feminism, Marxism, heritage, and indigenous archaeologies, as well as the variety of approaches to be discussed below. These approaches are held together loosely by their dialogue with contemporary social theory and by their acknowledgement of the historical dimensions of archaeological knowledge production.

Key Issues

As already noted, key early issues were that material culture is meaningfully and actively constituted. Semiotic, structuralist methods allowed archaeologists to explore the ways in which material culture has a meaning which goes beyond the physical properties and adaptive functions of an object and derives from the network of social strategies within which the object is embroiled. It is used by agents intentionally pursuing strategies and monitoring outcomes – even if the intentions are often not consciously understood and even if much material practice is routinized and produced by nondiscursive daily practices. The development of this perspective was heavily influenced by the "practice" and "structuration" theories developed by Bourdieu and Giddens where structure is the medium and the outcome of action. The emphasis on material culture being actively manipulated in order to legitimate or transform society was also found in Marxist-inspired archaeological studies in prehistoric Europe and in historical archaeology in the United States as well as in feminist archaeology.

If material culture is always meaningfully constituted, then perhaps it can be seen as a text

that is read (Hodder 1986 in Hodder & Hutson 2003). This idea has several attractive aspects. It puts the emphasis on the reader – on the notion that meaning does not reside in the object itself but in the way that the reader makes sense of that object. The "reader" here is both the past social actor and the present archaeologist. The reading metaphor foregrounds the fact that different people will read the same data differently, a tendency for which there is much historical evidence. The text metaphor encourages us to focus on context – "with text." Rather than studying pottery and animal bones separate from each other and from their find context, the emphasis is placed on looking at pottery and animal bones and find circumstance in relation to each other. In each context there may be distinct or subtle changes of meaning. The text metaphor thus invites us to make use of the world of semiotics – the study of signs and the systems in which they are embedded.

But there are also difficulties with the text metaphor when applied to material culture. In particular the meanings of material things are rarely arbitrary; they are usually grounded in the material and practical experience of the world. For example, the symbolism of gold is tied to its rarity and the effort needed to obtain it, as well as to its durability. In the 1990s, post-processual archaeologists began to react against the textual metaphor (see Hodder et al. 1995) and to explore the ways in which material meanings were practically engaged, embodied, and experienced. Again the influences were from theories of practice, but they also derived from the phenomenology of Heidegger and Merleau-Ponty, very successfully taken up in archaeology by Chris Gosden, Julian Thomas, Chris Tilley, and Bjørnar Olsen.

Heidegger's aim, writing mainly in the first half of the twentieth century, was to get away from the long tradition in philosophy and Western thought in which reality is some kind of substance that is approached by detached theoretical reflection. He wanted to get away from a perspective in which things were seen as separate from humans and instead wanted to start in the very midst of practical daily activities, hammering in a nail, pouring water from a jug, and so on. Heidegger emphasized the practical everyday-ness of human existence by using the term "Dasein" (being there) instead of "human subject." He also used the hyphenated phrase "being-in-the-world" to point to the ways in which humans are situated in and inseparable from the world that is around them and into which they are thrown and dwell.

An important and highly influential use of phenomenology was Tilley's (1994) work on landscape. He argued that our own embodied experiences of landscapes and monuments today must reveal to us something of the experiences of the people who once inhabited those same places in the past. The approach, as also in the work of Thomas and Barrett, has been very fruitful in encouraging archaeologists to explore how monuments and landscapes were made meaningful through their practical use. There are dangers since our responses as we walk through landscapes today are situated within our own beings-in-the-world. The approach asks archaeologists to consider how people moved round monuments and landscapes and how architecture and dwelling were embodied. Related issues deal with cultural and historical variation in how bodies, selves, and individuals are understood (Fowler 2004). For example, it is important to recognize that the atomized individual self is a Western product. Conceptions of individuals and body boundaries and the relationship between self and environment vary through time and space.

Another important aspect of the involvement of material culture in our experience of the world is in memory construction (Van Dyke & Alcock 2003). Archaeologists often observe evidence of the holding on to objects (heirlooms) over long periods of time. They have evidence of people reusing earlier settlements, burial locations, or ritual spaces. They have evidence of people digging up earlier remains and commemorating events or erasing monuments. In all these ways archaeologists have access to the ways in which people have remembered or forgotten their pasts. Such engagements with the archaeology of memory today have special salience in contexts in which contemporary societies use

archaeology itself to deny histories or to foreground memories as part of post-conflict reconciliation and healing, whether in South Africa, Bosnia, or Argentina.

Another key recent theme has been the focus on materiality. This derives partly from the approaches identified above but also from engagement with a wide range of material culture studies within anthropology, including the work of Miller, Gell, and Ingold. The emphasis remains on the constitution of self and identity, but the focus shifts to how things act in the world. There is much recent work that explores how materials are construed in different social settings and historical contexts (Joyce 2005). Things, matter, fluids, life, and death – all these are construed differently in different historical contexts. The study of materiality explores these cultural relationships, and the biographies of objects are pursued through varying social contexts. Meskell (2004: 7) notes how in Egypt past and present "persons exist and are constituted by their material world: subjects and objects could be said to be mutually fashioning and dependent."

Running through all these discussions in post-processual archaeology about the ways in which things have meaning and play roles in social lives is the issue of agency. As noted above, the notion that material culture was actively used by people in pursuing discursive or nondiscursive strategies was a key early theme in post-processual archaeology, in reaction to the behaviorism of processual archaeology. The issue of agency has grown to be one of the central themes of post-processual debate, and indeed it has come to be an important bridging concept to other approaches in the discipline (Dobres & Robb 2000).

Agency is itself a complex process that needs to be broken down into its component parts. Different authors in archaeology refer to different aspects of agency. For example, Barrett (1994) mainly discusses the context for action – the fact that the actor has to be situated in relation to power/knowledge in order to have knowledge and resources to act. He discusses the mobilization of space and resources in prehistoric monuments in Britain in these terms. Many authors focus on the resources needed for a social person to act in the world.

A rather different approach argues that there is an intentionality to agency and that this intentionality cannot be reduced to the context for action. Of course, some intentions may be nondiscursive in the sense that actors may not be fully consciously aware of their motivations. Intentions need, therefore, to be interpreted. Archaeologists routinely make these interpretations. When claiming that a ditch is defensive or that a large wall around a settlement was built to provide prestige, intentions are imputed. The defensive nature of the ditch may be determined from its shape and size and position and from evidence of warfare and so on. The prestigious nature of the wall may derive from its nondefensive nature (in terms of construction material or location or effectiveness). Another form of intentional social action is resistance to dominant groups. Many archaeologists have sought to demonstrate that subordinate groups use material culture to counteract dominant forms of discourse.

Any act can have intended and unintended consequences. Indeed another approach to agency takes the focus away from intentionality and focuses more closely on the impact of action on others and on the material world. In addition, the overall attention to the active components of material culture in phenomenology, memory, material culture, and materiality approaches has led to the notion that things too can have agency in the sense of having impact. Things can clearly act in the sense that a door closer closes the door after we have opened the door and walked through, as described by Bruno Latour. But they can also act in the sense that humans often give things powers, whether these powers be apotropaic, religious or spiritual, or involved in memory.

It is important to return to the question of method. Many positivist archaeologists adhere to some notion of objective data and hypothesis testing because they fear that the only alternative is a form of relativism in which "anything goes." In other words, they fear that if there is no possibility of objective testing, then anyone's statement about the past is equally as good as

anyone else's. I know of no post-processual archaeologist who would take this line. There are various forms of relativism, and most archaeologists would accept that archaeological interpretation is and should be answerable to data. The question is really just a matter of "how."

Archaeology is not for the most part an experimental science in which variables can be held constant. Rather, it is, like geology, a historical science that works by fitting lots of different types of data together as best it can in order to make a coherent account (Hodder 1999). This emphasis on fitting rather than testing is at the heart of the hermeneutic or interpretive approach. Theories of interpretation place emphasis on making sense of the event in relation to what is going on around it while recognizing that generalizations have to be used. In the hermeneutic approach, it is recognized that the researcher comes to the data with much prior knowledge and prejudgments. The data are perceived within these prejudgments. The researcher then works by fitting all the data together so that the parts make up a coherent whole. The interpretation that works best both fits our general theories and prejudgments, and it makes most sense of more data than other interpretations. The process is not circular – that is, one does not just impose one's prejudgments on the data. The objects of study can cause us to change our ideas, but never in a way divorced from society and from perspective. There is thus a dialectical (dialogical) relationship between past and present and between object and subject. There is never a socially neutral moment in the scientific process, but equally, socially biased accounts can be transformed by interaction with objects of study.

Thus, like most archaeologists today, we have employed a broad battery of scientific techniques at Çatalhöyük (Hodder 1999). We are trying to do good science at Çatalhöyük and use a wide range of natural science techniques. We build arguments by using as many different crosscutting techniques as we can. But we are also aware of the ways in which our arguments are embedded in our own assumptions and starting points; we always have to be careful and vigilant about where our ideas are coming from. And we also have to be aware that our assumptions and starting points may exclude the interests of others who come to Çatalhöyük with different perspectives.

Early post-processual archaeology paid scant attention to method, and many post-processual archaeologists have continued to excavate and do research employing field methods developed in the heyday of processual archaeology. But in the late 1990s, a debate began to emerge about using field methods that were developed specifically for interpretive research. These reflexive methods (Hodder 1999) focus on encouraging multivocality, collaboration between different interest or stakeholder groups, and the documentation of the documentation process. By the latter is meant the recording of the assumptions and methods involved in research so that future researchers can return to the data and understand their conditions of production. Provision of such secondary documentation opens up the archaeological process to later critique and reanalysis.

The embedding of archaeological science within the contemporary social process has been the most important aspect of post-processual archaeology. It has occurred at a time when archaeology has come to critique its dominant starting points and assumptions, for example, in response to feminism. During recent decades archaeology has also come to play an important role in postcolonial contexts as previously marginalized and dominated groups have used the past to regain rights to land and to legal existence. As noted above, post-processual archaeology is not the cause of these developments, but it has proved an effective ally for those seeking alternative pasts and for those wishing to break away from dominant narratives. The new collaborative methods employed in postcolonial, indigenous, and Native American archaeology are close to those used within this wider sphere.

Post-processual archaeology has played a central role in the emergence of a theoretical heritage discourse. The past is often contested, and the material past is often key to the assertion of rights to land and recognition, as already noted. More widely, material heritage has been involved in conflicts throughout the world from

the destruction of the Bamiyan Buddhas to the destruction of the Mostar Bridge in Bosnia to the competing claims to the religious monuments in Jerusalem. In many countries, dealing with heritage has been central to post-conflict healing and reconciliation, as in South Africa after the end of apartheid. In all these cases the universal values of heritage (e.g., as defined by UNESCO) have to be weighed against local understandings and valences. The different interests of stakeholders have to be evaluated, and ethical positions debated. Increasingly the language of cultural rights and human rights in relation to heritage has been used. In all these ways, a post-processual approach has been active in this area (Smith 2004; Meskell 2009).

Current Debates/Future Directions

Many of the key issues identified above are currently debated within archaeology, particularly the relevance of phenomenology, different approaches to agency, discussions of landscape, the body, memory, materiality, the links between archaeology and heritage, indigenous rights, and ethics. But there are increasingly attempts made to bridge the divide between processual and post-processual archaeology. Several authors over the past two decades have argued for some blending of processual and post-processual approaches (e.g., Pauketat 2001). Today many people consider the processual/post-processual debate largely as historical, and they pick and choose between them pragmatically as seems appropriate.

As a result one can today say that it is difficult to place many forms of archaeology firmly on one side of the debate rather than the other. Thus, one might argue that on the whole, cognitive processual approaches in archaeology as well as behavioral archaeology, human behavioral ecology, and evolutionary and complexity theory approaches tend to derive their heritage mainly from processual archaeology. On the other hand, a post-processual heritage is dominant for materiality studies, phenomenology, postcolonial and indigenous archaeologies, and in critical heritage discourse. In practice each approach today borrows from or reacts to developments within other approaches. Links are recognized between complex systems and the historical contingencies described in much post-processual archaeology. Cognitive processual and phenomenological approaches seem equally engaged in problems of mind, perception, and materiality. Agency is a clear linking domain, central to materiality and postcolonial and indigenous archaeology as much as it is to complex systems, agent-based modeling, and evolutionary archaeology.

Many archaeologists are increasingly concerned with one of the key issues of our time – the relationships between culture and biology – and their relative importance. Many try to find some integration, arguing that culture and biology are both central to the project of being human. Such developments are found, for example, in the dual inheritance approach within evolutionary archaeology but also within discussions of embodiment, materiality, and landscape. Both sides of the debate in archaeology increasingly aim to allow the play of biological processes within culture and society and within social change.

International Perspectives

As noted above, post-processual archaeology originated in Europe, especially in Britain and Scandinavia, and in the United States, especially in historical archaeology. It is clearly a Western discourse, tied to Western social theorists. On the other hand, its critique of the "one science" model and its recognition of the situated and historical dimensions of knowledge construction have meant that it has seemed relevant to archaeology in many parts of the world. A consideration of the wide global range of articles published in the Journal of Social Archaeology, or in Archaeologies, the journal of the World Archaeological Congress, demonstrates the wide global reach and diversity of interests encompassed by post-processual archaeology.

There are, however, regional variations in the debates regarding post-processual archaeology, and I have identified above the important

differences between the development of the perspective in Europe (especially Britain) and in the United States. In the United States post-processual and processual archaeologies are often seen as accompanying each other, whereas in Britain post-processual archaeology is often seen as dominant and opposed to other approaches. Another regional difference occurs in Latin America and in parts of Spain where materialist, Marxist approaches have dominated theoretical debate for some time. Here aspects of post-processual archaeology have often been folded into an archaeology already socially and politically engaged. In other parts of the world too, post-processual perspectives have often become relevant in varied forms as part of postcolonial, indigenous, and political movements. The success of the World Archaeology Congress has demonstrated the need for broad theoretical debate on a global scale.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Critical Theory in Archaeology
- ▶ Engendered Archaeologies
- ▶ Hodder, Ian (Theory)
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Indigenous Archaeologies
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Post-Processualism, Development of

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Introduction

Post-processual archaeology initially developed in the 1980s in Britain, Scandinavia, and the United States as a response to processual archaeology and in particular in reaction to the lack of engagement of processual archaeology with contemporary social theory and the critique of positivism. After a period of controversy between processual and post-processual approaches in the 1980s and 1990s, many archaeologists have attempted to integrate aspects of both programs in their research. However, the epistemological differences remain and have led to the development of post-processual methods such as reflexive archaeology.

Definition

Post-processual archaeology began in the 1980s as a reaction to processual archaeology and it came to be used as an umbrella term covering a wide range of approaches that engage with contemporary social theory and acknowledge the historical dimensions of knowledge production. These approaches have included discussions of power and ideology, feminism, shifts to and from the notion that material culture can be read as a text, discussions of phenomenology, accounts of agency, landscape, the body, memory, materiality, the links between archaeology and heritage, indigenous rights, and ethics.

Post-processual archaeology can be defined in two rather different ways. For some it was a term used to describe the more constructivist positions championed by Shanks and Tilley in 1987 (and more popular in Britain and Europe). For others, and this is the way the term is used in this entry, it has a broader definition incorporating a wide range of perspectives including feminism, Marxism, heritage, and indigenous archaeologies as well as the variety of approaches discussed below. These approaches are held together loosely by their dialogue with contemporary social theory and by their acknowledgement of the historical development of archaeology as a scientific discipline.

Key Issues

Early Development

In the early 1980s, post-processual archaeologists identified a series of issues that were being debated in anthropology, the social sciences, and humanities but that had been closed off from archaeological discussion by processual archaeology. These issues concerned structures of power and structures of meaning, the role of agency, the central importance of history, and epistemological questions concerning the relationships between subjects and objects. The main influences were from social theory, debates concerning Marxism and structuralism, feminism, indigenous archaeology, and postcolonial critiques of western archaeology (Hodder 1982a, b; Leone 1982; Miller & Tilley 1984; Shanks & Tilley 1987a, b; Hodder & Hutson 2003). For a description of the early development of and influences upon

post-processual archaeology, see the "▶ Post-Processual Archaeology" entry by Hodder in this encyclopedia.

Post-processual archaeology developed differently in Europe (especially in Britain) and the United States. In Europe archaeology had always been linked to history and so it responded less enthusiastically to processual archaeology and was consequently more ready to engage in its critique; this was especially true of Britain but also of Scandinavia. The major influences on post-processual archaeology in Britain were Bourdieu and Giddens and the post-structuralist debate. But in the United States, the major influences were feminism and Marxism and the main initial impact was in historical archaeology. The archaeology of early societies and hunter-gatherers remained very tied to a universalizing approach. When cultural anthropology in the United States took a turn towards meaning, history, and reflexivity in the 1970s and 1980s, archaeologists shied away and took their own path, reinforcing a belief in behavioral universals and a restricted form of positivism. Cut off in this way from the intellectual trends that were influencing the growth of post-processual archaeology, the reaction in the United States was initially very strident. Even today, post-processual archaeology in the United States is usually seen as an accompaniment to a continuing processual archaeology, whereas in Britain the two approaches remain thought of as separate and opposing theoretical movements.

Post-processual archaeology has often developed differently in different parts of the world. Another regional difference occurs in Latin America and in parts of Spain where materialist, Marxist approaches have dominated theoretical debate for some time. Here aspects of post-processual archaeology have often been folded into an archaeology already socially and politically engaged. In other parts of the world too, post-processual perspectives have often become relevant in varied forms as part of postcolonial, indigenous, and political movements. The success of the World Archaeology Congress has demonstrated the need for broad theoretical debate on a global scale.

Developments in the 1990s

An early post-processual tenet was that material culture is meaningfully and actively constituted. Semiotic, structuralist methods allowed archaeologists to explore the ways in which material culture has a meaning which goes beyond the physical properties and adaptive functions of an object, and derives from the network of social strategies within which the object is embroiled. Material culture is used by agents intentionally pursuing strategies and monitoring outcomes – even if the intentions are often not consciously understood and even if much material practice is routinized and produced by nondiscursive daily practices. The development of this perspective was heavily influenced by the "practice" and "structuration" theories developed by Bourdieu and Giddens where structure is the medium and the outcome of action. The emphasis on material culture being actively manipulated in order to legitimate or transform society was also found in Marxist-inspired archaeological studies in prehistoric Europe and in historical archaeology in the United States as well as in feminist archaeology.

If material culture is always meaningfully constituted, then perhaps it can be seen as a text that is read (Hodder & Hutson 2003). This idea has several attractive aspects. It puts the emphasis on the reader – on the notion that meaning does not reside in the object itself, but in the way that the reader makes sense of that object. The "reader" here is both the past social actor and the present archaeologist. The reading metaphor foregrounds the fact that different people will read the same data differently, a tendency for which there is much historical evidence. The text metaphor encourages us to focus on context – "with text." Rather than studying pottery and animal bones separate from each other and from their find context, the emphasis is placed on looking at pottery and animal bones and find circumstance in relation to each other. In each context there may be distinct or subtle changes of meaning. The text metaphor thus invites us to make use of the world of semiotics – the study of signs and the systems in which they are embedded.

The early development of post-processual archaeology had focused on the critique of processual archaeology. But in the 1990s, attempts began to be made to focus on the productive components of the theories being used and to offer a more coherent perspective in place of the diversity of views initially expressed. The emphasis on the interpretation of meaning allowed the label "interpretive archaeology" (Hodder et al. 1995). But the use of this term was short lived as it quickly became apparent that there are difficulties with the text or reading metaphor when applied to material culture. In particular, the meanings of material things are rarely arbitrary; they are usually grounded in the material and practical experience of the world. For example, the symbolism of gold is tied to its rarity and the effort needed to obtain it, as well as to its durability. In the 1990s, post-processual archaeologists began to react against the textual metaphor and to explore the ways in which material meanings were practically engaged, embodied, and experienced. Again the influences were from theories of practice, but they also derived from the phenomenology of Heidegger and Merleau-Ponty, very successfully taken up in archaeology by Chris Gosden, Julian Thomas, Chris Tilley, and Bjørnar Olsen.

An important and highly influential use of phenomenology was Tilley's (1994) work on landscape. He argued that our own embodied experiences of landscapes and monuments today must reveal to us something of the experiences of the people who once inhabited those same places in the past. The approach, as also in the work of Thomas and Barrett, has been very fruitful in encouraging archaeologists to explore how monuments and landscapes were made meaningful through their practical use. There are dangers with this method since our responses as we walk through landscapes today are situated within our own beings-in-the-world. The approach also asks archaeologists to consider how people moved around monuments and landscapes and how architecture and dwelling were embodied. Related issues deal with cultural and historical variation in how bodies, selves, and individuals are understood (Fowler 2004). For example, it is important to recognize that the atomized individual self is a Western product. Conceptions of individuals and body boundaries and the relationship between self and environment vary through time and space.

Early post-processual archaeology paid scant attention to method, and many post-processual archaeologists continued to excavate and do research employing field methods developed in the heyday of processual archaeology. But in the late 1990s, a debate began to emerge about using field methods that were developed specifically for post-processual research. These reflexive methods (Hodder 1999) focus on encouraging multivocality, collaboration between different interest or stakeholder groups, and the documentation of the documentation process. By the latter is meant the recording of the assumptions and methods involved in research so that future researchers can return to the data and understand their conditions of production. Provision of such secondary documentation opens up the archaeological process to later critique and reanalysis.

The embedding of archaeological science within the contemporary social process has been the most important aspect of post-processual archaeology. It has occurred at a time when archaeology has come to critique its dominant starting points and assumptions, for example, in response to feminism. During recent decades, archaeology has also come to play an important role in postcolonial contexts as previously marginalized and dominated groups have used the past to regain rights to land and to legal existence. Post-processual archaeology is not the cause of these developments, but it has proved an effective ally for those seeking alternative pasts and for those wishing to break away from dominant narratives. The new collaborative methods (Colwell-Chanthaphonh & Ferguson 2004) employed in postcolonial, indigenous, and native American archaeology are close to those advocated in reflexive archaeology.

Developments in the 2000s

Another important aspect of the involvement of material culture in our experience of the world is in memory construction (Van Dyke & Alcock 2003). Archaeologists often observe evidence of

the holding on to objects (heirlooms) over long periods of time. They have evidence of people reusing earlier settlements, burial locations, or ritual spaces. They have evidence of people digging up earlier remains and commemorating events or erasing monuments. In all these ways, archaeologists have access to the ways in which people have remembered or forgotten their pasts. Such engagements with the archaeology of memory today have special salience in contexts in which contemporary societies use archaeology itself to deny histories or to foreground memories as part of post-conflict reconciliation and healing, whether in South Africa, Bosnia, or Argentina.

Another key recent theme has been the focus on materiality. This derives partly from the approaches identified above, but also from engagement with a wide range of material culture studies within anthropology, including the work of Miller, Gell, and Ingold. The emphasis remains on the constitution of self and identity, but the focus shifts to how things act in the world. There is much recent work that explores how materials are construed in different social settings and historical contexts (Joyce 2005). Things, matter, fluids, life, death – all these are construed differently in different historical contexts. The study of materiality explores these cultural relationships, and the biographies of objects are pursued through varying social contexts. Meskell (2004: 7) notes how in Egypt past and present "persons exist and are constituted by their material world: subjects and objects could be said to be mutually fashioning and dependent."

Post-processual archaeology has played a central role in the emergence of a theoretical heritage discourse. The past is often contested, and the material past is often key to the assertion of rights to land and recognition. More widely, material heritage has been involved in conflicts throughout the world from the destruction of the Bamiyan Buddhas to the destruction of the Mostar Bridge in Bosnia to the competing claims to the religious monuments in Jerusalem. In many countries, dealing with heritage has been central to post-conflict healing and reconciliation, as in South Africa after the end of apartheid. In all these cases the universal values of heritage (as defined for example by UNESCO) have to be weighed against local understandings and valences. The different interests of stakeholders have to be evaluated and ethical positions debated. Increasingly the language of cultural rights and human rights in relation to heritage has been used. In all these ways, a post-processual approach has been active in this area (L-J Smith 2004; Meskell 2009).

Increasingly attempts are being made to bridge the divide between processual and post-processual archaeology. Certainly different traditions of research have been sustained. Thus one might argue that on the whole cognitive processual approaches in archaeology as well as behavioral archaeology, human behavioral ecology, evolutionary, and complexity theory approaches tend to derive their heritage mainly from processual archaeology. On the other hand, a post-processual heritage is dominant for materiality studies, phenomenology, postcolonial and indigenous archaeologies, and in critical heritage discourse. Indeed it is possible to argue that the genealogies of current approaches can be traced to three general perspectives: culture history, processual, and post-processual as shown in Fig. 1.

Despite some blending and slippage to be discussed below, in origin each theoretical position seems to see itself as largely in one or other of these camps. By culture history, I mean approaches in archaeology that are concerned with the descent and affiliation of ceramic and other types through time. The differences between processual and post-processual archaeology have increasingly become aligned with the wider divisions within contemporary intellectual life between universal rationalism and positivism on the one hand and contextual, critical reflexivity on the other.

Many approaches in archaeology are less clearly assignable to one approach or the other. For example, while feminist, Marxist, and indigenous archaeologies can be claimed to be part of post-processual archaeology (Hodder & Hutson 2003), others argue for independent positions for these perspectives (Moss 2005). However one cuts the cake, most archaeologists are aware of

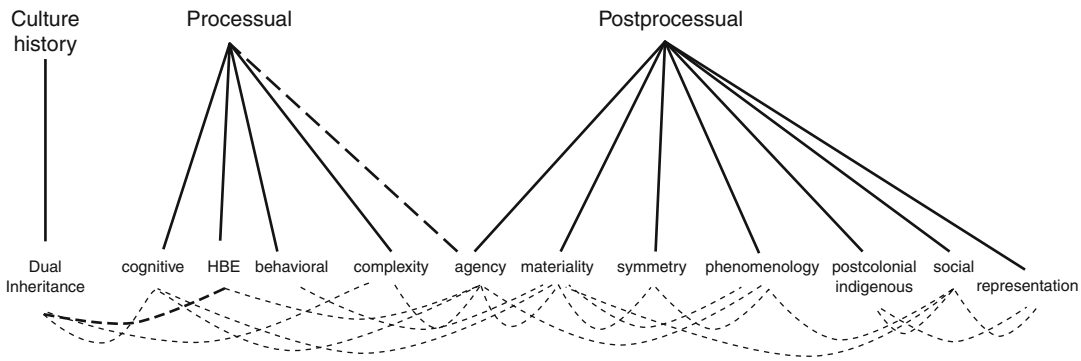

Post-Processualism, Development of, Fig. 1 One possible view of the historical relationships between some of the current theoretical approaches in archaeology

deep differences between approaches in which actors act rationally according to universal principles (optimizing or minimizing) and those in which activity is meaningfully and socially produced in complex historical and cultural contexts; and they equate the former with positivism and hypothesis testing and the latter with some form of critical reflexive science.

These different perspectives and their multiple subdivisions as shown in Fig. 1 are linked to different sites of the production of archaeological knowledge. There are clear underlying differences between the types of interests and questions of those using general evolutionary approaches and those concerned with history and agency. Evolutionary and human behavioral ecology tend to focus on smaller, more egalitarian societies including hunter-gatherers and fishers. Issues of power and agency are most easily dealt with in larger historical societies with complex or hierarchical social structures. Theories of memory construction and cultural rights to the past most readily engage materiality and heritage studies. Phenomenological approaches seem easiest to apply in prehistoric landscape studies. More generally, colonial archaeologies as in the United States seem most wedded to universalizing, behavioral approaches, while postcolonial contexts, as in the rise of indigenous archaeology in the United States and elsewhere, readily lead to critical, historicizing, and collaborative perspectives.

Despite these differences, several authors over the past two decades have argued for some blending of processual and post-processual approaches (e.g., Wylie 1989; Pauketat 2001; Hegmon 2003) though not without critique (Moss 2005). Today many archaeologists consider the processual/post-processual debate largely as historical and they pick and choose between them pragmatically as seems appropriate. Renfrew (1994) has talked of reaching an accommodation between processual and post-processual archaeology in cognitive processual archaeology. Kohler (2012) suggests that current approaches to complex systems incorporate critiques of a simple positivism and he refers to Bintliff's (2008) argument that complexity theory integrates culture historical, processual, and post-processual perspectives. Schiffer (2010: 154) says that in the 1990s, he and others "sought to revitalize the behavioral program by adopting some post-processual research questions." This task was approached by applying the behavioral approach to ritual and religion, symbolic behavior, social power, and landscapes. For example, Walker (1995) examined the material, behavioral practices of ritual rather than the belief systems involved. The life histories of ritual artifacts were seen as leading to particular modes of deposition.

In practice today, each approach borrows from or reacts to developments within other approaches and these connections are depicted in Fig. 1. Links are recognized between complex systems and the historical contingencies described in much post-processual archaeology. Cognitive processual and phenomenological approaches seem equally engaged in problems

of mind, perception, and materiality. Agency is a clear linking domain, central to materiality and postcolonial and indigenous archaeology as much as it is to complex systems, agent-based modeling, and evolutionary archaeology.

Many archaeologists are increasingly concerned with one of the key issues of our time – the relationships between culture and biology, and their relative importance. Many try to find some integration, arguing that culture and biology are both central to the project of being human. Such developments are found, for example, in the dual inheritance approach within evolutionary archaeology but also within discussions of embodiment, materiality, and landscape. Both sides of the debate in archaeology increasingly aim to allow the play of biological processes within culture and society and within social change.

Remaining Epistemological Differences

Despite all the evidence of increased interaction and accommodation between those approaches with processual and post-processual affinities, an apparent epistemological and methodological divide remains. Most of those in the United States who remain uncomfortable with the social theoretical questions posed in various forms of post-processual archaeology do so because they believe that post-processual archaeology threatens science in some way. Thus, Schiffer (2010: 155) argues that many behavioral archaeologists have adopted the research foci of post-processual archaeology and that they will place them "on a scientific foundation." Renfrew's concern in developing a cognitive processual archaeology resulted from similar fears.

What, then, are these key epistemological differences? Most processual archaeologists espouse some version of positivism and adhere to some notion of objective data and hypothesis testing because they fear that the only alternative is a form of relativism in which "anything goes." In other words, they fear that if there is no possibility of objective testing, then anyone's statement about the past is equally as good as anyone else's. I know of no post-processual archaeologist who would take this "anything goes" line. There are various forms of relativism, and most archaeologists would accept that archaeological interpretation is and should be answerable to data. The question is really just a matter of "how."

Archaeology is not for the most part an experimental science in which variables can be held constant. Rather, it is, like geology, an historical science that works by fitting lots of different types of data together as best it can in order to make a coherent account (Hodder 1999). This emphasis on fitting rather than testing is at the heart of the hermeneutic or interpretive approach. Theories of interpretation place emphasis on making sense of the event in relation to what is going on around it while recognizing that generalizations have to be used. In the hermeneutic approach, it is recognized that the researcher comes to the data with much prior knowledge and pre-understandings. The data are perceived within these pre-understandings. The researcher then works by fitting all the data together so that the parts make up a coherent whole. The interpretation that works best both fits our general theories and pre-understandings, and it makes most sense of more data than other interpretations. The process is not circular – i.e., one does not just impose one's pre-understandings on the data. The objects of study can cause us to change our ideas, but never in a way divorced from society and from perspective. There is thus a dialectical (dialogical) relationship between past and present and between object and subject. There is never a socially neutral moment in the scientific process, but equally, socially biased accounts can be transformed by interaction with objects of study.

But is there a real difference in practice between the processual positivist approach and the post-processual critical, dialectic, or hermeneutic approach? Is there any real difference between hypothesis testing and the hermeneutic spiral? The positivist view of science is that hypotheses are tested against data; they are confirmed or contradicted by the data, leading to new hypotheses which are themselves open to scrutiny and testing in the same way. In the hermeneutic spiral, the archaeologist starts with pre-understandings, evaluates the data to see how

much fit there is, recognizes that the data do not all fit, and accommodates understandings, leading to new evaluations of fit. In practice these two approaches seem identical, except that the terms fit and test, understanding, and hypothesis are different.

So is all the fuss about nothing? Is the difference between the two approaches really about the choice of words and about how science is described? Both approaches claim to be scientific, so are the differences just about how science is understood? In many ways the differences have been overdrawn in the archaeological debate over recent decades. In many discussions, the use of analytical or natural science techniques has been associated with positivist science, even though many historians of science would today argue against a positivist account of science. Post-processual archaeologists have used scientific techniques without adhering to a positivist framework.

But apparent differences remain. Within a positivist hypothesis-testing framework, the main emphasis is placed on the role of objective and independent data. Wherever the hypothesis comes from, the data will allow the selection of the hypothesis that best fits. But within a hermeneutic framework, the pre-understandings play a significant role. They determine how the data are seen in the first place. However much fitting/testing is carried out, the pre-understandings exert an influence. A clear example is the way in which Neolithic polished stone axes were for centuries thought to be thunder bolts. Within such a pre-understanding, it was not possible to develop hypotheses about how effective the "thunder bolt" was in woodworking. Such a hypothesis could only be entertained when the pre-understanding shifted and the "thunder bolt" was seen as an axe. Many pre-understandings derive from specific historical contexts of the production of knowledge. It is necessary for these pre-understandings to be critiqued at the same time as fitted to/tested against data. As a result, differences remain between the social engagement of post-processual archaeology and the trust in a distanced objective science in processual archaeology.

Conclusion

Çatalhöyük, where we have been conducting excavations since 1995, is a Neolithic site in Central Anatolia. Like most archaeologists today, we have employed a broad battery of scientific techniques in our attempt to understand life at this site in the distant past (Hodder 1999). We are trying to do good science at Çatalhöyük and use a wide range of natural science techniques. We build arguments by using as many different crosscutting techniques as we can. But we are also aware of the ways in which our arguments are embedded in our own assumptions and starting points; we always have to be careful and vigilant about where our ideas are coming from. And we also have to be aware that our assumptions and starting points may exclude the interests of others who come to Çatalhöyük with different perspectives.

So, in the end, despite the attempt by many to argue that processual and post-processual archaeology are developing close ties and common research questions, there remain important differences in terms of the role of the archaeologist in society. Although there are exceptions, on the whole the approaches identified in Fig. 1 as processual remain committed to the analytical process as the sole sphere of a scientific process. On the other hand, those approaches identified as post-processual tend to be more ready to describe the scientific process as both analytical and at the same time responsive to critical reflection.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Critical Theory in Archaeology
- ▶ Engendered Archaeologies
- ▶ Hodder, Ian (Theory)
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Landscape Archaeology
- ▶ Phenomenology in Archaeology
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Post-Second Temple Judaism Archaeology

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Introduction

Post-Second Temple Archaeology emerged as a result of early twentieth-century discoveries. Prior to that time, the scholarly consensus followed the traditional view that with the destruction of Jerusalem in 70 CE, the Jewish people were scattered among the nations and ceased to be an archaeologically relevant group in ancient Palestine. Early archaeological surveys by European scholars brought to light a wealth of evidence suggesting that Jews continued to thrive as cohesive communities, especially in the northern part of the country, that is, Galilee and the Golan Heights. Survey evidence appeared in the

form of synagogue structures, architectural fragments decorated with Jewish motifs, and inscriptions in Hebrew, Aramaic, and Greek. In addition, important discoveries at sites such as Beth She'arim, Beth Alpha, Hammath Tiberias, and Dura-Europos in Syria paved the way for a new field of Jewish Archaeology (Fine 2005). Often considered a subfield of Roman and Byzantine Archaeology, Art History, or Jewish Studies, the archaeology of post-70 Judaism typically has been approached either through the lens of other cultures (Roman and Byzantine Christian) or within the framework of Jewish history.

Definition

The Second Temple period effectively ended with the destruction of Jerusalem in 70 CE. Although a few post-70 events, such as the siege of Masada, are treated as part of Second Temple Archaeology, the capture of Judaism's capital and holy city, as well as the destruction of the Jewish Temple, brought the First Jewish Revolt against the Romans (66–70 CE) to a close. The end of political autonomy for the Jews and the loss of Judaism's central religious institution mark a watershed in Jewish history that according to the traditional view inaugurated the Rabbinic period. As a result of discoveries relating to the Second Jewish or Bar-Kokhba Revolt (132–135 CE), some archaeologists and historians have reassessed this periodization, suggesting that 135 CE was a greater turning point in the history of the Jewish people.

The use of the term "Rabbinic period" presupposes the rise and ultimate hegemony of the rabbinic class in Jewish society. Rabbis are commonly understood as religious scholars and teachers. The theological precepts of the ancient rabbis are known through their extensive corpus of religious literature composed, edited, and redacted between the end of the Second Temple period and the medieval period. The earliest post-70 rabbis are known as *Tannaim*, and so their works, written primarily in Hebrew, are known as "Tannaitic" literature. The most important Tannaitic work is the Mishnah, edited in the early third century. The second and third centuries are often referred to therefore as the Mishnaic or Tannaitic period by historians, rabbinicists, and archaeologists. The successors of the *Tannaim* are referred to as the *Amoraim*, and their works, written primarily in Aramaic, are known as "Amoraic" literature. The most important Amoraic work is the Gemara, a detailed commentary on the Mishnah. These two works together comprise the Talmud. The fourth and sixth centuries are occasionally referred to as the Amoraic period. More often, the entirety of this period between the second and sixth centuries is termed the "Talmudic period."

The Rabbinic or Talmudic period corresponds with the nebulous term Late Antiquity. In Palestine, these centuries include the Late Roman period (mid-second to mid-fourth centuries) and the Byzantine period (mid-fourth to early seventh centuries). Some Late Ancient studies of Jews in Palestine include the beginning of the Early Islamic period as well. The Early Islamic period in Palestine is sometimes divided into the Umayyad period (mid-seventh to mid-eighth centuries) and the Abbasid period (mid-eighth to mid-ninth centuries).

The geographic scope of Judaism in the post-70 period is fairly broad. The homeland of the Jewish people was ancient Palestine, alternatively known as the Land of Israel or Judea, depending on the source. By the late Hellenistic period (second century BCE), Jews had begun to emigrate to lands all over the Mediterranean and Near East. Writing in the years following the First Jewish Revolt, Flavius Josephus indicates that Jews inhabited virtually every major city of the Roman Empire. It is traditionally assumed that the failure of the First Jewish Revolt exacerbated the dispersion of Jews beyond Palestine, although some now believe that the failure of the Bar-Kokhba Revolt 65 years later played a greater role. Archaeologically, Diaspora Judaism is best attested by a dozen or so synagogues and burials throughout the Mediterranean Basin (see below), with very little material remains from the large communities in Babylonia known from the historical sources.

Historical Background

In 70 CE, the Roman army, under the command of Flavius Titus, besieged and ultimately captured Jerusalem, officially ending the First Jewish Revolt. The city's Temple, which served as the religious and political epicenter of Judaism, was destroyed in the process. To suppress further flares of insurrection, the Tenth Roman Legion (Fretensis) encamped on the ruins of the city, expelling all inhabitants.

This loss was detrimental to Jewish society. Not only did Jerusalem serve as the political and cultural capital, but, as the home of the only Jewish Temple, it was the sole locus of worship, that is, sacrifice, to the God of Israel. Scholars traditionally have maintained that the Jerusalem priesthood, which enjoyed religious and political hegemony in Judaism, ceased to function in its official capacity, since sacrifices could no longer be made. Recent scholarship though has considered a possible reemergence or continuation of the priesthood in a more authoritative capacity beyond 70 CE than has been assumed (see below).

As a consequence of the revolt, the Romans established the province of Judea, thereby introducing permanently stationed troops into the country and direct administration by the Roman military. The end of Jewish political autonomy in part led to a second revolt, led by Simeon bar Kosiba, known by the messianic title Bar-Kokhba (or "Son of a Star") in 132–135 CE The literary sources for the Bar-Kokhba Revolt are very meager, especially compared to the detailed accounts of the First Jewish Revolt. Most information has been gleaned from numismatic evidence and correspondence documents uncovered in the rebels' refuge caves in the Judean Desert (Yadin 1971). Some scholars believe that the Jewish rebels succeeded in capturing Jerusalem during the revolt, a presumed goal, although the evidence is not conclusive. In any case, the revolt was finally suppressed in 135 or 136. As punishment, Hadrian forbade Jews to inhabit the region surrounding Jerusalem, refounding the city as the Greco-Roman polis of Aelia Capitolina. In addition, the province was renamed Palaestina following the term used by the Greek historian Herodotus, based on the biblical Philistines who lived along the southern coast and western lowlands of the country during the Iron Age.

Following the two failed revolts, the majority of the Jewish population migrated northward to Galilee. With the loss of the Jerusalem Temple, Judaism faced a theological dilemma of how and where to worship. By most accounts, Jewish religious life became increasingly centered around the synagogue, or "meeting house," for communal worship (Levine 2005). While the primary means of Jewish worship during the Second Temple period was sacrifice in the Jerusalem Temple, personal and communal liturgy and Torah reading became increasingly important and standardized in the post-70 era. It was during this time that rabbinic literature flourished as the written records of debates surrounding the proper means (*halakhah*) of observing each biblical commandment (*mitzvah*). Over the following centuries, these works were edited and embellished with commentary and tangential anecdotes (*haggadah*), thus providing perspectives on Jewish life. Unfortunately, the highly redacted rabbinic documents amount to a tangled web of details from different lands over the course of a half-millennium, and so they are highly problematic sources for historically reliable information.

The difficulty of the historical sources muddles our picture of Jewish society somewhat during Late Antiquity. One area of perennial debate among scholars is the extent and definition of the "rabbis." The most traditional view is that the rabbis comprised a class of religious scholars and sages who effectively led Jewish society. Critical views, however, contest that this group was marginal in reality and that they merely portray themselves as authoritative in their literary works (Schwartz 2001; Levine 2011). Similarly, recent studies have questioned what role Jewish priests may have played in this period, especially since archaeological discoveries point to priestly and Temple-related concerns in Late Ancient synagogues (see below). Rabbinic literature further attests to the existence of a Jewish Patriarch, seated in the urban centers of Lower

Galilee until the early fifth century. While the role of this figure has been debated, it is generally believed that this official facilitated interaction between the Roman government and Jewish populace with a tenuous sanction by prominent rabbis.

Another recurrent theme in the study of post-70 Judaism is interaction with non-Jews. The proliferation of Greco-Roman culture in Palestine from the first century onward was conceived by many ancient authors as a challenge to the traditional observance of Judaism. However, as archaeological discoveries and critical readings of the rabbinic texts have shown, Jews found themselves increasingly comfortable with displays of figural art, Roman civic institutions, and even the worship of polytheistic deities by non-Jews within their cities. The rise of Christendom in the fourth century posed a new challenge by a faith that claimed the same biblical tradition as the Jews. Between the fourth and seventh centuries, Palestine underwent a demographic shift that brought the majority of inhabitants under a single religious identity. The heretofore neglected province was thrust onto the international stage, as royal endowments catalyzed the construction of churches and monasteries, as well as an influx of pilgrims to the "Holy Land." Despite the theological and social challenge of Christianity, Jews apparently flourished amid the resulting economic boom, building the most elaborate synagogues the country had ever seen or would again until the modern era.

Palestine's prosperity flagged with the Byzantine wars against the Sassanian Persians in the early seventh century. The weakened political and economic circumstances set the stage for the relative ease of the Islamic Conquest of Palestine (636–640). Evidence from several synagogues in both Galilee and the southern part of the country suggests that Jews continued to live in Palestine much as they had under Byzantine Christian rule. While there is little evidence to support the notion that Jews faired any worse under the Umayyad or Abbasid caliphates, the archaeological evidence suggests that the boom of synagogue construction seen in the Byzantine period had come to an end.

Key Issues/Current Debates

There can be little doubt that synagogue studies dominate the archaeology of post-70 Judaism. Between 60 and 70 individual synagogue buildings dating to the Late Roman and Byzantine periods have been identified in Palestine and the Diaspora. Additional evidence in the form of decorated architectural fragments and inscriptions removed from context attests to dozens, if not hundreds, more synagogues that existed in antiquity (Milson 2007). (Several Samaritan synagogues have also been uncovered, though despite their similarity in form to Jewish synagogues, they remain part of a distinct religious tradition).

Considerable debate has erupted over the past few decades concerning the dates of the earliest post-70 synagogues. Rabbinic literature attests to the existence of the synagogue as an institution during the second–third centuries, but there is very little archaeological evidence of synagogues prior to the fourth century (Gal 1995; Ma'oz 1999; Magness 2001; Milson 2007: 22-30). The apparent gap in the archaeological record of the second–third-century synagogue is most likely due to the nature of the building during the Late Roman period. That is to say, synagogues probably were modest and unimposing structures, in the style known from Second Temple period sites such as Masada and Gamla. As a result, they are difficult to find in the archaeological record. The only example with an uncontested mid-third-century date comes from Dura-Europos, where a synagogue was modified from a private home rather than a purpose-built monumental structure and preserved due to an unusual set of circumstances (see below). In any case, the height of monumental synagogue building in Palestine appears to begin in the fourth century and continue into the sixth century, although many synagogues remained in use into the seventh century or later (Milson 2007).

Some synagogues were built as Roman basilicas, with an internal colonnade and triportal façade on the Jerusalem-oriented wall. This type of synagogue is sometimes referred to as the "Galilean" type, after its primary region of

occurrence. Important examples of Galilean-type synagogues include the sites of Capernaum, Bar'am, Meiron, Arbel, Gush Halav, Chorazin, and Nabratein (Kohl & Watzinger 1916; Corbo et al. 1972-2007; Meyers et al. 1981; Meyers et al. 1990; Yeivin 2000; Meyers & Meyers 2009). These synagogues were typically paved with flagstones and decorated with stone relief work. Alternatively, during this same period, Jews constructed synagogues that resembled church architecture more closely, often laid out as a colonnaded hall with an apse on the Jerusalem-oriented wall and preceded by a narthex and atrium, most of which was paved in decorative mosaics. Important examples of this type of synagogue include Beth Alpha in Lower Galilee and Na'aran in the lower Jordan Valley (Sukenik 1932).

Most synagogues, however, did not follow a standard layout, a point which has been underscored through discoveries and studies over the past few decades. Despite early attempts by archaeologists to create a synagogue typology and identify standardized architecture (Avi-Yonah 1978), less regularly planned synagogues such as at Hammath Tiberias, Khirbet Shema', En-Gedi, Sepphoris, and elsewhere have demonstrated the diversity of synagogue architecture (Dothan 1983-2000; Meyers et al. 1976; Barag 1993; Weiss 2005). These synagogues included apses and niches, courtyards and forecourts, or mosaics and relief works as the local communities and architects saw fit. In this way, the overall picture differs somewhat from the more standardized church architecture of Byzantine Palestine, perhaps a reflection of the decentralization of post-70 Judaism.

The synagogue discoveries of the early twentieth century uncovered an unexpected wealth of Jewish art. The earliest finds by the German survey team of Heinrich Kohl and Carl Watzinger in 1905–1906 showed that Jews decorated their buildings with stone relief using some of the same motifs and styles as Classical architecture (Kohl & Watzinger 1916). Likewise, the discoveries at Dura-Europos, Na'aran, and Beth Alpha demonstrated the breadth of Jewish representational art in the form of wall paintings and mosaic pavements (Sukenik 1932; Kraeling 1956). Again, these works utilized Greco-Roman and Byzantine motifs and styles, including animal representation, the Zodiac cycle, and even depictions of the sun god, Helios. Alongside non-Jewish or religiously neutral themes were biblical scenes and motifs referencing Jewish liturgical practices and sacred occasions, such as the ram's horn (*shofar*) used in the celebration of the New Year (Rosh Hashanah), the bound branches and citron (*lulav* and *etrog*) used during the Festival of Tabernacles (Sukkot), and the Torah Shrine façade depicting the elaborately decorated closet in which the synagogue's biblical scrolls were stored. (Alternatively, some have interpreted the Torah Shrine façade as a representation of the Jerusalem Temple, while others have argued that it is a symbolic reference to both the Torah and the Temple at the same time, Hachlili 1988: 272-80).

The most important Jewish motif used during this period was the seven-branched candelabrum or *menorah*. Based on the decorative furniture described in the Bible and later used in the Jerusalem Temple, the *menorah* became a symbol of Judaism in Late Antiquity. Although a few depictions of the *menorah* appear as early as the late Second Temple period, the use of the motif as an ethnic identifier and Jewish symbol became widespread in the fourth century, coinciding with the rise of the cross as the identifying mark of Christianity (Hachlili 2001).

Among the most important testaments to the wealth of synagogue art comes from Syria, at the site of Dura-Europos on the Euphrates River (Kraeling 1956). The building itself is rather unremarkable, but the interior walls were richly decorated with wall paintings depicting a variety of biblical scenes. The walls in the Dura-Europos synagogue were preserved because the building was filled with earth as a defense measure during the city's siege by the Persians in the mid-third century. The scenes depict figures and scenes from the Hebrew Bible, melding Late Roman and Persian styles.

Beyond the synagogue, Jewish art found an important outlet in funerary contexts. The most notable Jewish cemetery is the necropolis of Beth

She'arim in Galilee, where Jewish burials of the third–sixth centuries were identified on the basis of inscriptions in Hebrew, Aramaic, and Greek (Mazar et al. 1973-76). Relief carvings on sarcophagi and tomb walls include Jewish symbols, such as the *menorah*, as well as animals, human faces, and even a scene from Greco-Roman mythology. The inscriptions identify several of the interred as rabbis and indicate that some came from the Diaspora.

These archaeological discoveries of Jewish art came as a surprise to scholars of rabbinics and Jewish history in the early and mid-twentieth century. The rabbinic treatment of the Second Commandment (Ex. 20: 4–6) suggests that Jews adhered to a strict forbiddance of figural imagery, that is, representations of living creatures, especially the human form (Fine 2005; Levine 2011). Depictions of animals, biblical scenes, and Greco-Roman mythological beings would seem to contradict the traditional view of ancient Judaism. Archaeologists and historians have grappled with this dilemma for a century. Among the most thorough studies was that of E. R. Goodenough. Based in part on the richly decorated walls of the Dura-Europos synagogue, Goodenough proposed that a form of "Hellenistic Judaism," running counter to rabbinic traditions, was responsible for such lavish decoration (Goodenough 1953-65).

Although few scholars accepted Goodenough's overall thesis, the notion that alternative forms of Judaism existed in the ancient world was intriguing. The representations of liturgical paraphernalia – such as the *lulav*, *etrog*, and *shofar* (see above) – led some to identify deliberate references to the Jerusalem Temple. Archaeological evidence has been cited to demonstrate that the Temple's former priesthood, once the dominant religious group in Jewish society, became influential in the synagogue during Late Antiquity. The priestly connection is supported by several inscriptions citing donations made by priests and two plaques listing the priestly courses (*mishmarot*) known from the biblical book of Chronicles.

On the other hand, there is evidence that rabbinic attitudes toward figural imagery adjusted to accommodate the realities of their world. Scholars have pointed to rabbinic expositions of biblical texts that incorporate the meanings expressed in the artistic traditions of the synagogue. Other studies have interpreted artistic programs – that is, individual panels or units in a building's art that are "read" as a unified message – in synagogue art through the lens of rabbinic literature. The most detailed example of this method comes from the final report of the Sepphoris synagogue (Weiss 2005). These studies favor a maximalist position regarding rabbinic participation in the synagogue. More telling, however, is the Rehov synagogue, where an extended inscription – the longest ever found in a synagogue – quotes a passage known from rabbinic literature. The passage concerns the agricultural regulations pertaining to tithing and the Jewish seven-year sabbatical cycle.

Over the last decade, an important challenge to the traditional history of Jewish society in the post-70 era was proposed by Seth Schwartz. Schwartz suggested that Judaism all but collapsed in the wake of the failure of the Bar-Kokhba Revolt (132–135 CE), and Jewish society succumbed to the Greco-Roman cultural matrix, abandoning the religious practices developed over the course of the Second Temple period. According to Schwartz, Judaism reemerged in the mid-fourth century, as Christianity became dominant in Palestine and forced a more exclusive form of worship than its polytheistic predecessor (Schwartz 2001).

As many critics have pointed out, the wealth of rabbinic literature from the second to fourth century poses a particular difficulty for Schwartz's thesis. From the perspective of archaeology, Schwartz's case is supported by the redating of many synagogues, especially the Galilean-type buildings, once thought to be Late Roman, but now generally considered products of the fourth century and later. In addition, Schwartz points to figural imagery on city-coins and other finds from Sepphoris and Tiberias in Lower Galilee to suggest that these were typical Greco-Roman cities in the Late Roman period, inhabited by Jews but indistinguishable from their non-Jewish neighbors and suffused with "pagan" culture. By the mid-fourth century, however, the Christianization of the Roman world

marginalized and excluded Jews, forcing them back into the ancestral religion and culture that had been preserved tenuously by a small group of rabbis.

Schwartz's overall thesis is not generally accepted, but like Goodenough's study, it has posed an important challenge to the field, forcing scholars to rethink approaches to the archaeological evidence. For example, does the general absence in the archaeological record of the second- and third-century synagogue in Palestine indicate that Jews did not build synagogues – or even practice Judaism – at that time? Or does it suggest that the synagogue took a wholly different form than archaeologists and historians expect? Or, conversely, are there other processes – such as preservation or the reuse of sites and building materials – at play that might obscure the remains? As a result of Schwartz's study, a reconsideration of how the material evidence should be used in historical reconstruction alongside literary sources has characterized much of the research in the past decade.

Archaeology has made an especially significant contribution to the study of Diaspora Judaism in the post-70 era. A dozen or so ancient synagogues are known from the Roman and Byzantine world outside of Palestine, including examples from Italy, North Africa, Greece, Albania, Bulgaria, Turkey, and Syria. In addition to the third-century building from Dura-Europos (see above), excavations in the synagogue of Ostia near Rome have shown that the building was used for Jewish liturgy from at least the fourth century onward, and perhaps earlier. At Sardis in Turkey, a great hall attests to the largest synagogue known from the ancient world. Interestingly, the building originally was part of the civic center but apparently was acquired by the Jewish community and converted into a synagogue in Late Antiquity, suggesting that Jewish communities enjoyed a high socioeconomic status as late as the sixth century, despite literary sources that attest to occasional persecution.

International Perspectives

As with most subfields in the study of ancient Palestine, the archaeology of post-70 Judaism is fraught with controversies over the cultural heritage. Many of the relevant sites are located in the contested territories of the West Bank and the Golan Heights. As a result, questions surrounding the ownership of sites and finds have played an occasional role in the negotiations between the State of Israel and the Palestinian National Authority and the politics of the region.

Future Directions

Recent and new excavations in Late Ancient Jewish cities and villages over the past decade or two continue to fuel the study of post-70 Judaism. As the results of excavations at Sepphoris and Khirbet Qana during the 1990s and early 2000s emerge, evidence of city and village life for Jews during the Late Roman period will come to light, thereby addressing in part the challenge of Seth Schwartz's thesis (see above). In addition, new synagogue excavations have begun over the past few years at Khirbet Wadi el-Hammam and Huqoq, both in Galilee. Both have incorporated into their project goals a study of the associated village in addition to the site's synagogue. The results will provide fresh perspectives on Jewish life beyond monumental and religious architecture.

Cross-References

- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Israel: Museums
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Second Temple Judaism Archaeology

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Potato: Origins and Development

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Basic Species Information

The potato (*Solanum tuberosum* L.) is one of the most significant food crops cultivated globally. From initial domestication in the central Andean region, potatoes have spread across the world to become the dominant tuberous crop in temperate climates. In contrast to many root crops, several major volumes have been published on the history of potato domestication and cultivation (e.g., Salaman 1949; Hawkes 1990).

The potato (*Solanum tuberosum*) is a flowering plant of the Solanaceae family, which includes several other domesticated plants such as tomato (*Solanum lycopersicum*), aubergine

(*Solanum melongena*), and tobacco (*Nicotiana tabacum*). The potato produces stolons (or underground stems) that under certain environmental conditions enlarge to form tubers (the Potato Genome Sequencing Consortium 2011). Potatoes are propagated vegetatively through the transplantation of "seed potato," namely, the swollen stolon or tuber. The plant is predominantly grown as a source of starch, although it provides some protein, vitamins, and other nutrients.

Major Domestication Traits

Although there is only one domesticated species (*Solanum tuberosum*), there are thousands of cultivated varieties which display considerable genetic and morphological variation. Human selection under cultivation has favored size, shape, color, texture, and taste, including the reduction of bitter glycoalkaloids.

There is considerable diversity in the number and range of wild *Solanum* species in the Americas, many of which are tuber-bearing. However, the greatest diversity of potato cultivars is found in the central Andean zone of Peru and Bolivia. Indeed, the plant is generally considered to have been domesticated in the temperate climates of the central Andes (Harlan 1971; Brush et al. 1981; Hawkes 1990; Vavilov 1992; Spooner et al. 2005).

Although various hypotheses have been proposed, all suggest domestication from a group of morphologically similar, wild tuberous *Solanum* species – referred to as the *Solanum brevicaule* complex in the central Andes (extending from Peru to Argentina). The specifics of the hypotheses vary: most suggest multiple domestications from different members of the *Solanum brevicaule* complex across the central Andean region (e.g., Hawkes 1990), whereas others suggest a single domestication or monophyletic origin in Peru (e.g., Spooner et al. 2005). Potato is generally considered to be a cultigen, namely, it was domesticated through the introgression or cross-fertilization between two species rather than being descended from a single precursor.

The oldest archaeological evidence for potato domestication comes from the central Andean region. Macrobotanical finds of potato tuber fragments at Tres Ventanas caves in Chilca Canyon of coastal Peru have been claimed to date to the early Holocene, perhaps to 10,000 years ago (Engel 1970; Pickersgill & Heiser 1977). Given the morphological range in tuber-bearing *Solanum* species, some of these identifications may require more detailed analysis to determine species and domestication status more precisely. Perhaps tellingly, potato remains are almost absent from the archaeobotanical record from the central Andean region for the following 5,000 years or so; the next oldest sites yielding evidence of potatoes date to c. 4,500–4,000 years ago (see review in Hastorf 2007). Evidence for the likely cultivation of potatoes becomes more common from c. 4,000 to 3,500 years ago in the Casma Valley of Peru (Ugent et al. 1982; Ugent & Peterson 1988), tentatively identified at Waynuna in southern Peru (Perry 2007), as well as at other sites. Potatoes are depicted on ceramics of Andean cultures dating to the last 2,000 years or so.

Over the last 500 years, potato has been distributed widely across the globe to be grown predominantly in temperate climates (Salaman 1949). Initially, only a narrow genetic range of cultivated potatoes was moved to Europe, but this has been deliberately expanded since the nineteenth century. The infamous Irish potato famine of the mid-nineteenth century was caused by blight (*Phytophthora infestans*), which in part was so pernicious due to a narrow genetic stock of potatoes cultivated at that time. The dependence of the Irish population on potatoes led to the major famine with potentially up to a million people dead and a larger number migrating overseas. Given the global significance of the crop, a recent international effort has been focused on sequencing the potato genome with a view of crop improvement to resist blight and other diseases (the Potato Genome Sequencing Consortium 2011).

Cross-References

▶ Agriculture: Definition and Overview
▶ Archaeobotany of Early Agriculture: Macrobotany

▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
▶ Domestication: Definition and Overview
▶ Domestication Syndrome in Plants
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Plant Domestication and Cultivation in Archaeology
▶ Plant Processing Technologies in Archaeology
▶ Tomatoes: Origins and Development
▶ Vegeculture: General Principles

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Poverty Point, Archaeology of

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Introduction

Poverty Point is the name of an archaeological site located in the lower Mississippi Valley in modern-day northeast Louisiana (Fig. 1) dating from c. 1500 to 1150 cal BCE. The site is famous for being exceptionally large (the core of the site is roughly 1000 ha) and for having multiple earthen mounds and ridges indicating exceptional labor investment. In addition, the inhabitants of the site imported remarkable quantities of lithic materials into the site from considerable distances. These qualities set the site apart from almost all of its contemporaries.

Definition

The term Poverty Point culture (Webb 1982) has been applied to sites dating to the same time period in the Mississippi Valley from as far north as southeastern Missouri to the Gulf Coast. Poverty Point "culture" refers to the use of shared material traits, most notably clay cooking balls and certain forms of hafted knives or projectile points. The relationship between the Poverty Point site and so-called Poverty Point culture settlements is ambiguous, and it is probably best to assume that, while there may have been broadly shared material characteristics among groups in this region, political, social, and linguistic relations were complex, fluid, and not dependent on political direction from the Poverty Point site itself. Subsistence studies demonstrate that the inhabitants of Poverty Point and contemporary sites in the Mississippi Valley were entirely dependent on consumption of wild plants, animals, and fish.

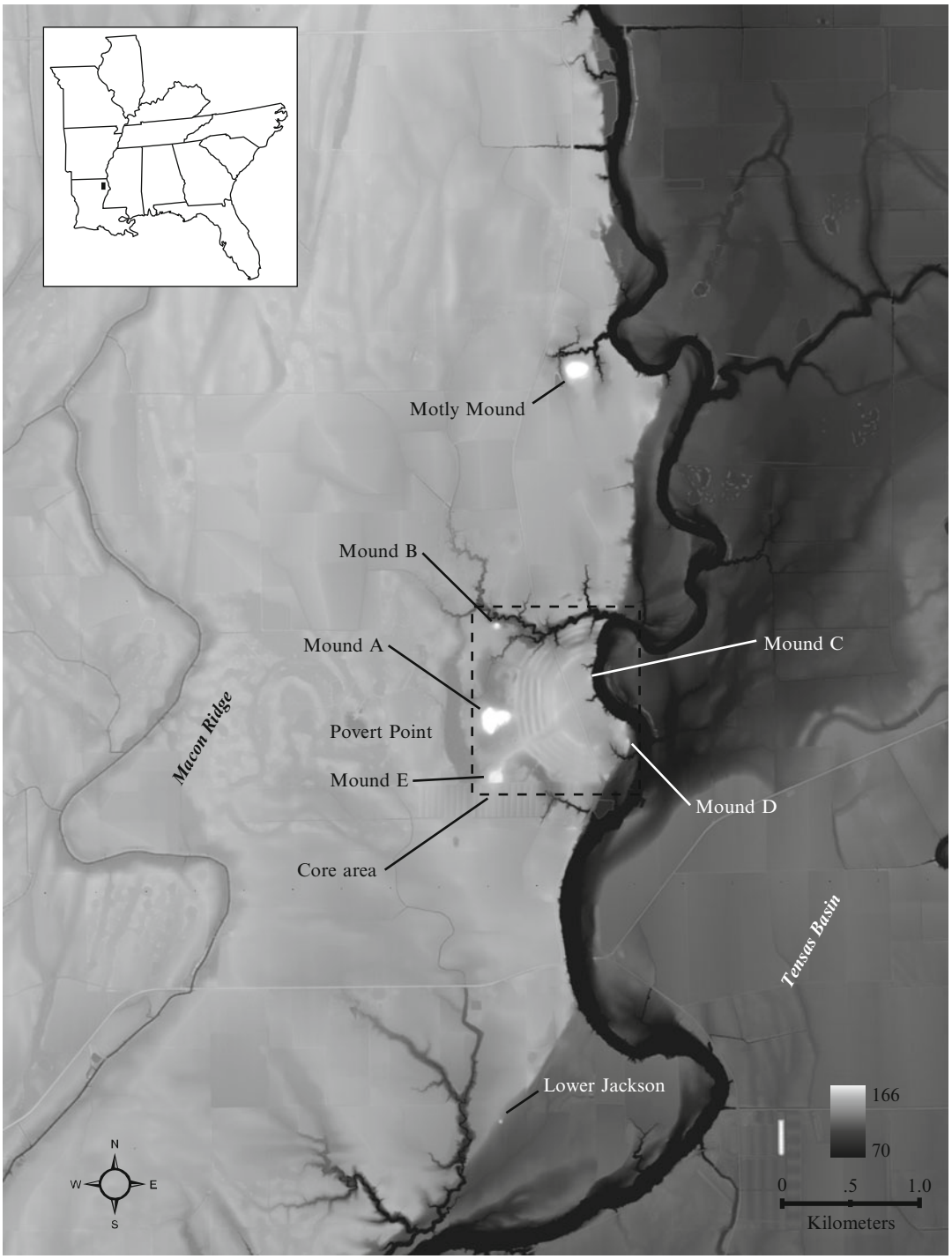

Poverty Point, Archaeology of, Fig. 1 Lidar map of the Poverty Point site, showing mounds and other features. Inset shows location of the figure (*black rectangle*, exaggerated for effect) within the southeastern United States

Key Issues/Current Debates/Future Directions/Examples

The Poverty Point site is entirely unique for its time; in fact, the site is exceptional for any point in American Indian history. Furthermore, on a global scale, the people who constructed and inhabited the site are remarkable for building what is arguably among the largest purely hunter-gatherer settlements anywhere, for erecting what in context was massive monumental architecture, and for participating in a complicated and multifaceted long-distance exchange network that spanned much of eastern North America and that brought to the site literally tons of raw material (in fact, all lithics found at the site must be imported because there are no naturally occurring lithic sources within 50–75 km of the Poverty Point site). In these regards, these people were practicing social, political, and economic behaviors that would be understood as complex even among agricultural groups. Recent work at Poverty Point expands our understanding of the occupation history of the site and contributes to a perspective that suggests the site's inhabitants were engaged in complex ritual and likely religious behaviors that may have been integrating culturally diverse populations over large areas.

The Poverty Point site is located on the eastern edge of Macon Ridge, a 5-m-high Pleistocene terrace overlooking the floodplain of the Mississippi River. Bayou Macon, a small local drainage, is located at the base of the terrace and forms the eastern boundary of the site. To the north, west, and south lies a generally flat to undulating terrace surface broken by small streams and some ponds. The site is composed of a c. 1000-ha. core area of dense habitation remains, earthen ridges, and mounds with contemporary settlement debris in concentrated patches spread over an area encompassing 6–7 km^2. The southern and northern boundaries of the habitation area are marked by earthen mounds, but these mounds were either built at an earlier date (Lower Jackson Mound on the south end of the site was built c. 3000 cal BCE) or their age of construction is unclear (Motley Mound on the north end is assumed to have been built during the Poverty Point-era occupation but has never been directly dated). Small settlements – presumably villages – with direct evidence of contemporary occupation are found to the east along the banks of sluggish bayous draining the Mississippi River floodplain and more rarely to the west, north, and south along the terrace surface. Contemporary settlements are found in an area encompassing roughly 2,000 km^2 around the Poverty Point site; sites of the same age with some evidence of Poverty Point "culture" affiliation are located at greater distances along the Mississippi River and its tributaries.

The core area of occupation is marked by the presence of six "C-shaped" concentric earthen ridges with their open ends facing east leaving a large open area (often referred to as a plaza) at the eastern edge. These ridges averaged 2–3 m tall and were approximately 30–40 m wide at their base. Four mounds are found in the core area. The largest, Mound A, stands 21 m tall at its summit and slopes down to a flat terrace 10 m above the surrounding terrain. The mound is roughly "T-shaped" and measures 211 m north to south along the top of the T and 207 m long east to west. To the north of Mound A is Mound B, a conical mound some 5–6 m tall with a base roughly 55 m in diameter. Mound C is located within the open area or plaza along the edge of the terrace, and today the apex is conical and stands only 2–2.5 m tall. This mound is elongated on its north to south axis but much of the eastern side of the mound may have been lost to erosion. Mound D is located along the terrace on the south edge of the open plaza area. Mound E is located due south of Mound A and is a 3-m-high rectangular platform with a flat summit.

Mounds A, B, and C have been dated and were built during the Poverty Point-era occupation. Mound D was likely built by historic Euro-American settlers as the platform for nineteenth-century burials. Mound E is not yet dated but based on soil profile development could date before the Poverty Point-age occupation although a contemporary occupation cannot be ruled out.

As befits a large site Poverty Point has a complicated occupation history. Surface-collected

remains show that the earliest occupation in the site area goes back to the Paleo-Indian period, and there are modest quantities of Early and Middle Archaic remains scattered across the eastern edge of Macon Ridge within the site boundaries. There is an apparent occupational hiatus c. 2800–1500 cal BCE. Beginning c. 1500 cal BCE, there is a substantial occupation across much of the core area of the site, most notably along and near the eastern edge of Macon Ridge. At the time of initial occupation, there was limited earthen monumental construction. So far, only Mound B has been dated to this initial occupation period. Recent geophysical survey and limited test excavations in the open plaza area indicate that the earliest inhabitants were erecting large 20–40-m-diameter circular structures made up of 60–70-cm-diameter single set posts. These structures were eventually dismantled and the posts removed. The function of these structures or features is unknown, but their size and the use of large single set posts indicates a considerable investment in labor, and these can be considered monumental architecture, especially in the context of a purely hunting, fishing, and gathering subsistence lifestyle.

This initial occupation episode is widespread, and contemporary remains are found beneath the plaza and under what would become the ridges. Limited radiocarbon dating of these remains suggests the occupation lasted some 200 years, from c. 1500 to 1300 cal BCE. At present it is unclear if this was a permanent village or if these remains mark repeated visits to the site area over the duration of the dated occupation span. The early inhabitants of the site are notable for making and using distinctively Poverty Point material culture (notably the ubiquitous baked clay cooking balls ("Poverty Point Objects" or PPOs), hafted knives or projectile points, microlithic tools, and lapidary items such as beads). The site's inhabitants were importing lithic materials from very long distances at this time. One of the most notable lithic raw material types in these early deposits is Burlington chert, sourced to the central Mississippi River area around modern St. Louis, Missouri, nearly 700 km to the north of Poverty Point. One study found that in seven test pits that penetrated to the earliest occupation zone, Burlington chert remains (tools and debitage) from the initial occupation levels weighed nearly 16,000 g. In contrast, only 4,000 g of so-called local pebble chert, which is derived from gravels along the edges of the Mississippi Valley 50–75 km distant from Poverty Point, was recovered from the same contexts. At this time other lithic sources were being tapped, but in much smaller quantities. Still, the network of chert imported to the site encompassed a good deal of the Mississippi Valley and its tributaries.

Beginning c. 1300 cal BCE, the site underwent a dramatic transformation. The most notable occurrence was the construction of the six earthen ridges and some of the mounds. Associated with these physical changes, there are shifts in material culture use and alteration of the raw material resource network. Although the data should be understood as provisional because there are relatively few radiocarbon dates, the sequence of events leading to the radical reconfiguration of the site appears to begin with the termination of use of Mound B and at or around the same time the dismantling of the single post structures within the area known as the plaza. Mound B, which had begun its life as a flat-topped platform mound, was covered with a thick mantle of earth, and the mound and its immediate surroundings seem to have been abandoned and never used again. Similarly, the single post "buildings" were carefully taken apart and the postholes filled.

Following these "terminations," there are several important additions. One is the beginning of the use of Mound C. Here, a series of thin (usually only a few cm thick) use or occupation surfaces were created, briefly used for unknown purposes, and then capped with carefully selected fills. This process of surface construction-use-fill was repeated multiple times creating a low rise (the shape is not known at this time because of erosion on the east side of the mound). Mound C began as a low rise (possibly a platform) and was used for perhaps 100 years before being capped by the addition of a conical mass of earthen fill that covered the underlying use surfaces. This fill was peculiar in that it was not midden-stained or

organically enriched, but nonetheless contained abundant artifacts.

At the same time that Mound C was being erected and used, the concentric ridges were being built. The precise chronological relationships among these ridges are not clear at present – they may have been built in some order or may have been constructed more or less at the same time. In any case, they were built quite quickly, most likely within a generation. They were created by borrowing earth from immediately adjacent to the ridges, creating a shallow ditch between each of the ridges. The ridges are assumed to have been built to support houses or structures on their surfaces, but modern agriculture and over 3,000 years of erosion and soil development have obliterated any obvious evidence of habitations, although some features, notably fire pits and earth-oven cooking pits, have been uncovered. Artifacts are common on the ridges, their flanks, and the ditches at their bases. The surface of the site today is densely covered with artifacts; a longtime collector amassed a surface collection in excess of 500,000 artifacts that are provenienced by ridge and sector. At roughly the same time as the ridges were being built, and after the initial surfaces of Mound C were deposited, the inner or plaza part of the site was covered with up to 75 cm of fill, creating a level surface and burying the single post structures previously erected on the ground surface.

The final construction activity at the site is the erection of Mound A. This mound, which is the second largest earthen monument in the United States, was built at the western edge of the outermost ridge. Excavations and coring of the mound demonstrate that much of the mound was constructed over a seasonally wet, swampy depression roughly 1–2 m deep. There is a reasonably clear sense of the construction sequence for Mound A. First, the vegetation of the swampy depression was burned and then immediately after a thin (5–15-cm-thick) layer of tan to white fine silt was deposited across the swampy depression. The mound was then erected very rapidly. We believe that the western conical portion of the mound was built first. This part was erected at the western edge of the swampy depression and only part of it covers this feature. The western conical part of the mound is built with distinctive, fairly homogenous soils that appear to have been mined or borrowed from the surface or near the surface of Macon Ridge. The platform along the east end of the mound was then added on. Here, the soils are more heterogeneous and appear to come from contexts deeper within Macon Ridge. Shallow depressions to the north and to the west of the mound are likely borrow areas. Once the cone and platform were built, a ramp was added to join the two features.

Three radiocarbon dates from short-lived plant charcoal, and a buried root at the base of the platform date the onset of construction to a mean age of 1252 cal BCE. Our data indicate the mound was built very rapidly. Once construction started there is no evidence it ceased until the mound reached its full form. There are no cultural stages, natural soil horizons, or erosion features within the mound except at the base of the ramp joining the cone to the platform. The absence of erosion features is especially notable because the mound is made of reworked loess, which is especially susceptible to erosion, and the site is located in a humid temperate region where rainfall is abundant, even in the driest months. We posit that the mound was built in as little as three months to probably not much more than a year. It certainly was not erected over multiple years or generations. With a volume of ~238,500 m^3, this duration of construction implies a workforce ranging from c. 1,000 to 3,000 laborers plus families. The function of the mound has never been established. There are almost no artifacts within the parts of the mound that have been cored or excavated, and no cultural features (floors, pits, houses) have been detected within or on the summit of the cone or the platform. The surface of the mound and its flanks are nearly devoid of artifacts, suggesting that if the mound was used for some purposes, the inhabitants were careful not to leave behind material culture residues.

The Poverty Point site was abandoned not long after the construction of Mound A. By c. 1150–1100 cal BCE, there were no longer

any inhabitants who were leaving traces of occupation. The abandonment of the site coincides with an apparent decline in occupation intensity throughout the lower Mississippi Valley. Similar population declines have been registered across much of eastern North America, and there is a large-scale transformation of cultures from Late Archaic to Early Woodland. Climate change and associated flooding throughout the Mississippi Valley have been hypothesized to account for the apparent demise of Poverty Point and the so-called Poverty Point culture (Kidder 2006).

Most explanations for Poverty Point's genesis and reproduction share the underlying assumption that the site exists to fulfill an economically utilitarian function. The dominant assumption is that Poverty Point is an oversized town that takes its economic utility from the need to import lithics into a region where no lithics exist. Alternate models have posited that the site served to facilitate the exchange of economically valued goods among far-flung communities. Poverty Point's earthwork construction has similarly been situated in a utilitarian framework. For Gibson (2000), the mounds represent physical manifestations of magic that buffers against a metaphysical but potentially real threat to the health and wellness of the community. To Hamilton (1999), on the other hand, the construction of mounds diverts human energy from reproduction to production and thereby acts to prevent overpopulation in the face of uncertain economic returns.

The actions of the people who inhabited or visited Poverty Point, however, defy purely rational economic models related to lithic procurement and/or resource buffering scenarios. Functionally unnecessary exotic lithics were imported in vast quantities when local stone was available within a more reasonable distance; steatite was brought in when local pottery was available and nonlocal pottery when local pottery and/or steatite was accessible. The production of nonutilitarian items (e.g., beads, quartz crystals, oversized bifaces, and bannerstones) integral to group identity/alliance formation indicates ritual or religious behavior that has been ignored or undervalued. Compared to amounts of materials imported to Poverty Point sites, little tangible is exported; thus, Poverty Point appears to be drawing people and artifacts to the site from across the Southeast. Earthwork construction was functionally "nonutilitarian" as well; most Poverty Point-age mounds did not support structures, burials, or the accumulation of post-construction occupation debris flanking or atop the construction stages. Instead, building activities are highly ritualized events involving extremely complex construction techniques, including the mining and use of sediments of different colors, the mixing of distinct materials prior to deposition, and submound occupation/surface preparation. The rapid yet structurally ordered events at Poverty Point implies that the act of building these earthworks was itself imbued with ritual meaning.

The material culture points to visitation by people of highly diverse backgrounds. Kidder (2011) hypothesizes that the massive construction projects undertaken at Poverty Point after c. 3400 cal BP were about creating/recreating a new, shared cosmology and cultural narrative to provide *communitas* for participants with varied geographic, ethnic, or social origins. Thus, rather than considering Poverty Point as an outsized village different from contemporaries across the Southeast only in size and quantity of imported goods, it is better to consider Poverty Point a religious or ritual center, what Renfrew (2001) has called a Location of High Devotional Expression akin to Chaco Canyon or Stonehenge.

The idea that Poverty Point is a ritual center is alien in this relatively early North American context because hunter-gatherers – even complex ones – are not given credit for doing these sorts of thing. Traditional models suggest they do not have complex ritual behavior or elaborate religious practices because they are busy eking out an existence in the face of uncertain environments. However, new data from Poverty Point provide an opportunity to reframe the debate from the presumption that economic imperatives must be the sole driver of hunter-gatherer social

change. People living at Poverty Point-era sites did not need to trade vast distances to get their basic tool stone. From a wholly utilitarian position, in fact, the idea that people should go hundreds of kilometers out of their way to get raw material – some which is of dubious quality – is preposterous. We argue instead that economic interactions were trailing behind more ritual-religious processes. Imagining this sort of complexity for Poverty Point may seem extreme, in part because defining why ritual occurred is exceedingly difficult; the reasons may be wholly idiosyncratic or based on the emergence of prophetic persons or theophanies whose manifestations are archaeologically invisible or even intangible. Christian ritual, after all, is based on miracle births, visions, acts of healing, and apparitions on walls, screens, or even in toasted cheese sandwiches. At this point, proving that ritual is the cause for the structure of Poverty Point and its associated sites is difficult. However, it is clear that the explanation for the production and reproduction of Poverty Point communities lies in understanding the ritual histories of these remarkable sites.

Cross-References

- ▶ Chaco Canyon, Archaeology of
- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia
- ▶ Woodland and Mississippian Cultures of the North American Heartland

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Power and Knowledge in Archaeology

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Introduction

Presently, the study of power dynamics and the constitution of knowledge and its multiple connections has a relevant place in social sciences. Much of this discussion is indebted to the work of the French philosopher Michel Foucault (1926–1984). Foucault is frequently defined as a poststructuralist, along with other major references such as Gilles Deleuze, Jean-François Lyotard, and Jacques Derrida. Although he rejected an explicit adscription to this movement, his studies adopted some of its basic ideas (including an interest in discourse and history). Foucault attempted to understand some of the features of modernity, discussing those which were perceived as natural or obvious. He considered that the past was the key to analyze the conditions for the formation and

transformation of subjects, objects, and its constituent relationships. He believed that these conditions were necessary to establish a certain regime of truth and social order at a given moment. Foucault developed a critical history of thought, which should not be confused with a history of the ideas.

Archaeology and genealogy were Foucault's particular ways of engaging with the past (Guting 2011). The archaeological method intended to be a critique to traditional history. While the latter approach relied on individual consciousness, Foucault's archaeology insisted that thought was governed by unconscious rules. These rules were present in discourse, in other words, a set of statements that produced knowledge. Foucault intended to recognize different discursive formations in the history of Western civilization. He eventually found out that the modern way of understanding the world was contingent (not an absolute or ultimate truth). The archaeological method did not provide sufficient tools to account for the transformation of discursive formations. Genealogy proved to be a more diachronic tactic (Foucault 1980). It was based on some ideas proposed by the German philosopher Friedrich Nietzsche. And it considered the way in which certain discourses had given way to what constituted the present. In the genealogical analysis, power became a relevant concept (Bapty & Yates 1990).

Key Issues/Current Debates/Future Directions/Examples

Foucault confronted previous understandings of power. The case of Marxism is particularly illustrative. Marxism understood that social classes in the capitalist mode of production were defined by ownership, and that ownership invested the members of a certain class (the capitalists) with power over the rest of society. Power relationships were thus rooted in economy, and politics (mainly the state) served the purpose of protecting the interests of the owners (Shackel 1993). This had a negative impact on the less privileged classes, which were kept under control through mystification and repression. Foucault believed that power was decentered. It was not something that people could either possess or lack. Power "[was] exercised through a net-like organi[z]ation" (Foucault 1980: 98). Every member of society took part in the network, and most people could simultaneously exercise and be the target of power. Discourses and power were inextricably connected, as power was both the product and producer of truth and knowledge.

In the modern world, power discourses were not limited to coercion. They also relied on discipline (Foucault 1975). Discipline was a key concept in Foucault's work. It referred to a wide range of techniques which sought to control people's actions through time, space, and movement segmentation. Disciplines acted on the material body and generated specific gestures. They had two goals: increase body utility and docility. Disciplinary success depended on surveillance. Surveillance used the gaze as a means to control bodies. Surveillance techniques materialized in space, and panoptical architecture (where people could be watched without knowing exactly when) was an example of that. Information obtained through surveillance encouraged a sanction-gratification system that expected to correct deviations. According to Foucault, discipline participated in the construction of individuals. In this respect, it is important to note that discipline did not act globally. On the contrary, it separated (individuated) people in order to become effective. The construction of individuals relied on an additional factor: the recognition of people's own subjectivity. This went hand in hand with an introspective view, a self-awareness which facilitated the internalization of discourses (as people considered these discourses to have positive effects on their lives).

Foucault argued that discipline sought to create an economy of power (Foucault 1975). Power should be distributed homogeneously, so it was not too disperse or concentrated. Power should be present everywhere in a continuous though subtle way. From a Foucauldian perspective, the analysis of power needed to consider the role of institutions (as they were effective means to distribute

power). Modern states helped to control several aspects of life through an ever increasing number of formal institutions. Foucault was famous for his analysis of the disciplinary character of prisons, schools, hospitals, asylums, military organizations, etc. These institutions inculcated norms of behavior, distinguished between the normal and the deviants, and corrected the inclinations of the latter. Some organizations were also important in the consolidation of what Foucault termed biopower: the control of bodies and populations justified on an alleged protection of life. But state institutions were not the only ones that produced and reproduced the knowledge-power discourses of modernity. Other entities, though smaller and less formally regulated, helped in the process. Among them, it is worth mentioning the family, workplaces, etc.

In studying power, Foucault coined the term governmentality. Governmentality involved a conjoint analysis of the government and the particular modes of thought (historical discourses) which were connected to it. In Foucault's work, the government was understood in a broad sense. It did not only include politics and the state but also other realms of social life (for instance, the household). Furthermore, it did not only entail control over other people but also over oneself. Foucault asserted that in the modern world the development of the sovereign state coincided with the birth of the individual (Lemke 2001). The idea of governmentality eventually gathered the technologies of domination and the technologies of the self. Although most of Foucault's studies focused on the first topic, some of his later works considered the importance of the second. In general, the technologies of the self were defined as a series of operations that individuals effected on their bodies and souls with an aim to achieve a certain state (such as happiness) (Foucault 1988).

Archaeology, not necessarily in a Foucauldian sense, but as a discipline deeply concerned with the study of social life and material culture, did not escape Foucault's influence. After what is usually termed the postprocessual or postmodernist turn in archaeology, some scholars became interested in his work (as well as in the work of other social theorists). Although some archaeologists dealing with premodern settings include Foucauldian concepts in their investigations, most researchers citing Foucault are currently interested in the modern world. This is not surprising, as Foucault devoted an important part of his efforts to understand the dynamics of modern society (and its genealogy in Western civilization). Taking this into consideration, it is clear why some of his concepts cannot be easily applied to any historical context. Just to give an example, discipline, panoticism, and individualism cannot be universalized as they are connected to a particular regime of power-knowledge (that of capitalism).

The works of Matthew Johnson and Martin Hall reflect Foucault's relevance in historical archaeology. Johnson (1996) stressed that historical archaeologists should focus on capitalism, as it was the leading force behind a series of significant changes from the Late Middle Ages onward. Individuality, segmentation, and standardization were key concepts in Johnson's research. These ideas – although not in an explicit manner (Leone 2009) – had several connections with Foucault's understanding of power (its mechanics and outcomes). Martin Hall (2000) insisted that Foucauldian statements could be the building blocks of historical archaeology, as they allowed connecting things (the remains found in archaeological contexts) and words (mainly historical documents). Statements had multiple and changing meanings, giving archaeologists the opportunity to reinterpret the past in the present (and the present through the past). Following Hall, the articulation of statements in discourses (which made social practices regular) was a crucial step in studying the relationship between different scale units. In this way, he thought it was possible to connect local statements and global discourses.

Historical archaeologists also turn to Foucault in order to approach specific problems and case studies. In this context, it is worth mentioning the analysis of etiquette, institutions, the state, etc. The analysis of etiquette frequently considers the role of personal discipline. Just to give an example, Paul Shackel (1993) and Mark Leone (1999)

discussed the multiple ways in which institutions and people themselves produced and reproduced certain practices and ideas which encouraged individualism and social difference (mainly in Annapolis and its surroundings). The study of institutions often considers the role of materiality in the construction of power relationships. Panopticism and disciplinary practices thus appear as relevant issues. Lu Ann de Cunzo (2006) made a review on total institutions and asserted that archaeological works on the issue should include prisons, schools, hospitals, almshouses, and workplaces in different geographical contexts. Some other studies focus on state intervention on different aspects of social life and the discipline. Matthew Palus (2011) used the concept of governmentality to understand how the life of citizens was "colonized" and regulated through the material presence of infrastructure. Meanwhile, Matthew Palus, Mark Leone, and Matthew Cochran (2006) referred to different situations where governmentality could explain the control of the archaeological practice (and the restrictions to critical analysis).

Some fields of study (whether or not connected to historical archaeology) accept the theoretical importance of the author. This is the case of postcolonial studies and the archaeologies of gender and the body. Foucault's influence on postcolonial studies was connected to the imprint he made on postcolonial theorists such as Edward Said (Gosden 1999). According to Said, the concepts of discourse and power were relevant to promote a solid critique to the way in which the West traditionally understood the East (and more generally, other cultures). Western discourses (including state and scientific discourses) represented the East as being the contrary to the West (inferior, passive, irrational). These assertions were seen as natural and materialized in a series of actions which ended up in the domination of the East. Gender archaeologies recognized Foucault's impact on third-wave feminism (Gilchrist 1994). In this particular case, the concepts of discourse and power were relevant to discuss the social construction of femininity and masculinity. Finally, the archaeologies of the body insisted that some Foucauldian notions such as discipline, biopower, and biopolitics could be useful to understand the multiple ways in which power and discourses constitute the materiality of our own bodies and gestures (Hamilakis et al. 2002).

It is important to note that although many archaeologists refer to Foucault and highlight the potential of his work, they do not use any of his concepts in dealing with their own research problems. In general, if somebody compares Foucault's influence with that of other social scientists in contemporary archaeology (for instance, of Marx or Bourdieu), he or she will realize that it is minor. Some scholars suggest that this situation is connected with Foucault's limitations to account for resistance and agency (two hot spots in the discipline) (Meskell 1996). Here it is important to make some things clear. First, although Foucault placed much attention on dominance, his netlike conception of power admitted the possibility of response. Second, his later works opened up an avenue to study individual expression through the concept of "techniques of the self." Third, the work of Foucault can engage in a dialogue with the work of other theorists enriching archaeological analysis. The works of Shackel (1993), Leone (1999), and others are just examples. It would be interesting that in the near future, more and more archaeologists could take advantage of Foucault's insightful ideas.

Cross-References

- ▶ Chronopolitics and Archaeology
- ▶ Decolonization in Archaeological Theory
- ▶ Global Archaeology
- ▶ Local Discourses in Archaeology
- ▶ Nationalism and Archaeology
- ▶ Postcolonial Archaeologies

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Practice Theory in Archaeology

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Introduction

Practice theory represents one of the most influential bodies of thought in contemporary anthropological archaeology. First incorporated into archaeological circles with postprocessual critiques of the 1980s (e.g., Hodder 1982), it has remained a hallmark of archaeological theory over the past three decades and continues to inform current debates over agency, identity, and materiality. Although definitions and applications vary between practitioners, all practice approaches share common interests in action (or agency), context, and history. When considered in terms of the structural-functional and evolutionary frameworks of processual archaeologies, these practice-based foci challenge archaeologists to look beyond large-scale cultural processes to consider the role that individuals played in reproducing their respective social and cultural milieus. At the heart of all practice-based approaches lies a fundamental acknowledgement of the recursivity of social life, an invitation to explore the roles that different social entities – both human and nonhuman – played in reifying, shaping, and even challenging the structures of society. In this entry, I provide basic definitions for practice theory and several other closely related concepts. I trace their historical genesis and impacts in the field of archaeology and outline key issues and debates, including those related to power, agency, identity, cultural interaction, and the dynamism of cultural continuity and change.

Definition

In many ways practice theory defies definition. It is a body of thought first developed in

sociology and cultural anthropology. It builds upon Marxist notions of *praxis* – putting ideas and theories into action – and serves as a general critique of both functionalism and structuralism in the social sciences. Yet it lacks the predictive and law-generating components of other theories employed in archaeology (e.g., cultural evolution), resembling a loose collection of possibilities rather than a deterministic and universalized model for how societies and cultures work, persist, and transform across time and space. Those archaeologists influenced by practice theory focus on the recursive ties between individuals and their surroundings – including other individuals, collectivities, and material culture. These interconnections shape individuals' choices, actions, and representations (*practices*). Because they are recursively entangled, however, there is a "duality of structure" (Giddens 1979): social contexts influence practices, just as practices influence the social contexts in which they occur. Practice approaches thus strive to locate and study the roles that individuals, material culture, and other social entities play within processes of cultural reproduction (and transformation). According to the practice theorists discussed below, the things that people do and the representations that they produce are not mindless behavioral responses following broad-scale evolutionary schemes of adaptation nor are they passive reflections of the cultural laws and regulations nested in actors' heads. On the contrary, they are the active, meaningfully constituted loci of social and cultural reproduction, the dynamic and improvised interplay of individuals and their surroundings, and the arenas in which cultural change and continuity take form.

Historical Background

During the 1970s and 1980s anthropologist Pierre Bourdieu and sociologist Anthony Giddens each produced comprehensive theories of practice, both of which proved foundational for all subsequent practice-based approaches (see also de Certeau 1984, Sahlins 1985, and Butler 1993 for examples of other influential theories of practice in the social sciences). Each model focused on the recursive interconnections between individuals and their surroundings, framing practices (or actions) as "prime movers" in processes of social and cultural reproduction. Although Bourdieu and Giddens employed different concepts in their respective theories, each strove to explore the roles that individuals (not just charismatic "Big Men") played in the reification of social structures through time and across space. Ian Hodder and his students at Cambridge later turned to the work of these thinkers in efforts to address issues of action, context, and history via the archaeological record. Such questions had been overlooked or rendered insignificant within the structural-functionalist frameworks of processual archaeology and thus came to play an important part in the emergence of postprocessual archaeology. Twenty years after these initial postprocessual critiques, Timothy Pauketat (2001a) proposed a move towards *historical processualism*, his term for an integration of processual and postprocessual archaeologies, also rooted firmly in practice theory. I explore each of these innovations below in order to better contextualize the origins and uses of practice in archaeology.

Pierre Bourdieu actually began his career as a structuralist. He conducted ethnographic fieldwork in Algeria among the Kabyle, subsequently publishing his oft-cited description of the organizing principles of opposition inherent in Kabyle households (quoted at length in Bourdieu 1977 and reprinted in Bourdieu 1990). Of note, this analysis first appeared as a chapter in an edited volume dedicated to the work of structuralist Claude Lévi-Strauss. In the initial publication, Bourdieu discussed the sets of homologous oppositions ordering Kabyle households, such as female/male, dark/light, and low/high. Unlike other structuralists of the time that focused primarily on identifying such underlying organizational schemes and treated such patterns as *direct reflections* of the cultural principles stored in people's minds, Bourdieu began to consider the significance of social practices, situated between thoughts and things. In contrast to

standard structural approaches, he came to focus on the dynamic and dialectical relationships between objectification (e.g., the physical structure of the Kabyle house) and embodiment (e.g., bodily experience of the house) as a key component of social reproduction. In his own words:

> The house, an *opus operatum*, lends itself to deciphering, but only to a deciphering which does not forget that the "book" from which the children learn their vision of the world is read with the body, in and through the movements and displacements which make the space within which they are enacted as much as they are made by it (Bourdieu 1977: 90).

Published in French in 1972 and translated to English in 1977, Bourdieu's *Outline of a Theory of Practice* addressed these issues for anthropology and for social theory in general. According to Bourdieu's theory of practice (1977, 1990), cultural reproduction takes place unconsciously in the mundane details of everyday life. These processes operate within the recursive connections between individuals and their surroundings. The things that individuals do and the representations that they produce simultaneously take shape from the practices and representations of others around them while also influencing future practices. Bourdieu (1977: 72) described this feedback loop as follows:

> The structures constitutive of a particular type of environment (e.g. the material conditions of existence characteristic of a class condition) produce *habitus*, systems of durable, transposable *dispositions*, structured structures predisposed to function as structuring structures, that is, as principles of the generation and structuring of practices and representations which can be objectively "regulated" and "regular" without in any way being the product of obedience to rules, objectively adapted to their goals without presupposing a conscious aiming at ends or an express mastery of the operations necessary to attain them and, being all this, collectively orchestrated without being the product of the orchestrating action of a conductor.

For Bourdieu, the stability of social structures and the endurance of societies' schemes of classification and regimes of power are wholly dependent upon an assumed natural order, unquestioned beliefs in the way that things have "always" worked. The arbitrary (and inorganic) nature of certain structures is only brought into focus and questioned when an alternative way of life presents itself, introducing the possibility for practices to become politicized and for social transformation to occur. Bourdieu (1977: 164) used the term *doxa* to refer to this phenomenon. If some component of social life is *doxic*, it is taken to carry no political connotations since there is literally no conceivable alternative way of doing (Silliman 2001: 194). Once questioned and dissolved, doxas are subsequently reestablished through orthodoxy or continually challenged through heterodoxy. Archaeology is particularly well positioned to address issues of doxa given its long-view perspectives on human history (Loren 2001; Silliman 2001, see also Smith 2001 for a critique of doxa in archaeology). For example, archaeologist Stephen Silliman (2001) used this concept to interpret colonial interactions between Native Americans and colonialists in nineteenth-century California. He framed colonialism and its introduction of novel forms of material culture as a break in the doxa of pre-colonial North American societies.

Bourdieu's theory also rests upon the concept of *habitus*, a term that he appropriated from the work of Marcel Mauss. Recursively linked to its surrounding structures, habitus is an individual's embodied predisposition to act in certain ways. The habitus is a durable *but transposable* set of dispositions amalgamated from a person's life experiences and cultural repertoires, simultaneously structur*ed* and structur*ing*. In Bourdieu's (1977: 78) words:

> The habitus, the durably installed generative principle of regulated improvisations, produces practices which tend to reproduce the regularities immanent in the objective conditions of the production of their generative principle, while adjusting to the demands inscribed as objective potentialities in the situation, as defined by the cognitive and motivating structures making up the habitus.

Although similar in some manners to the concept of culture, habitus adds a degree of fluidity and flexibility to processes of social and cultural reproduction. Habitus is "regulated" and "tends

to reproduce" regularities, but it is also improvised and context dependent. In contrast to previous understandings of culture in anthropology, practitioners taking influence from Bourdieu "assume that society and history are not simply sums of ad hoc responses and adaptations to particular stimuli" (Ortner 1984: 148). Practice-based approaches thus acknowledge the ever-present possibility of structural transformation from within.

Sharing many qualities with Bourdieu's theory of practice, sociologist Anthony Giddens' (1979, 1984) theory of *structuration* represents a middle ground between objectivism and subjectivism in the social sciences. On the one hand, Giddens critiqued functionalism and structuralism for their *objectivist* emphases on the social whole over its parts (individuals). On the other hand, he framed hermeneutics and interpretive sociologies as *subjectivist* in their sole focus on the experiences of individuals. Giddens (1984: 2) sought to establish a theory of practice situated between these two extremes, making the basic domain of study in the social sciences "social practices ordered across space and time." Like Bourdieu, he identified practices as the loci of social reproduction by virtue of their recursive connections to systems of social structures. From this perspective, there is a *duality of structure* for Giddens (1979: 5): "structure is both medium and outcome of the reproduction of practices."

In the most basic sense, Giddens (1984: 17) conceptualized structure as the rules and resources that make it possible for similar social practice to exist across spans of time and space. As social practices are reproduced across space-time, they take on increasingly systematic forms. For Giddens (1984: 25):

> Analyzing the structuration of social systems means studying the modes in which such systems, grounded in the knowledgeable activities of situated actors who draw upon rules and resources in the diversity of action contexts, are produced and reproduced in interaction.

According to the theory of structuration, social reproduction occurs as individuals make choices and engage in practices, many of which operate on the level of what Giddens (1984: 6-7) calls *practical consciousness*, a concept sharing several parallels with Bourdieu's ideas of habitus and doxa (see above). This realm of human awareness and belief exists between discursive consciousness – in which people have the ability to explain and express their motivations for acting in a certain way and not another – and unconscious motivations, of which individuals are unaware. Practical consciousness thus encompasses the reasons "behind" all practices that people engage in, of which they are aware, but cannot explain discursively. In other words, as people go about their daily lives, much of the work that they do in recasting social structures takes place beyond the realm of language (including "secondary rationalizations"). Of note, Giddens also recognizes the permeability and context-dependent nature of the divide between practical and discursive forms of consciousness.

With this facet of structuration, Giddens (1984: 9) also offered a broad definition of agency as the capability of doing things: "Agency concerns events of which an individual is the perpetrator, in the sense that the individual could, at any phase in a given sequence of conduct, have acted differently." This definition overlooks the agency that other theorists like Alfred Gell and Bruno Latour attribute to material culture (discussed further below).

In 1982, Ian Hodder outlined the potential of practice theory for archaeology in his edited volume *Symbolic and Structural Archaeology*. In the introductory chapter, Hodder (1982) proposed a shift towards structuration as a means of critiquing the then-dominant strains of functionalism and structuralism in archaeological theory. He saw structuration as a move towards a contextual and cultural archaeology focused largely on "the role of material culture in the reflexive relationship between the structure of ideas and social strategies" (Hodder 1982: 1). The structural-functional frameworks of the New Archaeology (i.e., processual archaeology) operated on analogies between social and organic life à la Radcliffe-Brown (Hodder 1982: 2–6). These approaches focused heavily upon

adaptation and systems theory in efforts to uncover and identify the laws governing cultural processes. According to Hodder, such approaches also operated on universalizing assumptions that change *always* emanated from outside the system (usually in the form of environmental transformations) and that material culture passively reflected the cultural system of which it was a part. Hodder critiqued these emphases on function and utility as inadequate for explaining cultural change, calling attention to the New Archaeology's skewed focus on universalized cultural "laws" over specific historical contexts and its privileging of collectivities over their constituents (e.g., individuals, material culture, space).

Hodder (1982: 7-9) found similar flaws in structuralism, which he again remedied with reference to practice theory. Structuralists fixated upon the codes and rules of culture and society situated in people's heads. They assumed that the regularities of these codes and rules manifested themselves in observable patterns of interrelations in the world like the polarities of the Kabyle household described by Bourdieu. Echoing Bourdieu's critiques, Hodder found structural approaches inadequate due to their lack of a theory of practice, their inability to explain change across space or time, and their disregard for the individuals of which the observed collectivities were comprised. For Hodder, structuration offered a means of challenging the assumed reflective relationships between thoughts and things while acknowledging the ways in which symbols, actions, and materials were meaningfully constituted and active in societies.

In 2001 Timothy Pauketat (2001a) reiterated the importance of practice theory in archaeology by identifying it as the core component of *historical processualism*, what he saw as an emergent paradigm. Pauketat described historical processualism as a reconciliation of processual and postprocessual archaeologies. This new approach shied away from earlier archaeologies' foci on behavior and evolution to consider the importance of context and history via theories of practice (Pauketat 2001a: 73). He framed these new foci in stark contrast to previous generations' interests in behavior and evolution:

> The critical distinction boils down to the fact that behavior (abstract, goal-oriented human activity) is not practice (homologous actions and representations that vary between contexts or events even in the routinized forms—say cooking in pots—seem to remain the same). From a practice perspective, the locus of microscale and macroscale change is people acting out or representing their dispositions in social contexts.

Pauketat reviewed three current approaches in archaeology – neo-Darwinism, cognitive-processualism, and agency theory – in order to demonstrate their shared focus on issues of practice and history. Following thinkers like Bourdieu, Pauketat (2001a: 74) pointed out that practices are loci of change. In contrast to earlier approaches in archaeological theory based upon functionalism and systems theory, cultural practices *are* cultural processes rather than their consequences. Although the term *historical processualism* never fully caught on, practice-based approaches and the cross-fertilization of both processual and postprocessual archaeologies now represent major components of archaeology in the twenty-first century.

Key Issues/Current Debates

In this section I discuss four reoccurring themes studied and debated among archaeologists taking influence from practice theory: (1) power and agency, (2) identity, (3) cultural interaction, and (4) cultural continuity and change.

Issues of *power and agency* loom large in all considerations of practice. Archaeologists often disagree on the potential that actors have to transform the social structures around them. On one extreme are those that see the overarching structures of society – constantly reproduced by the individuals enmeshed within – as rigidly deterministic; these thinkers portray actors as essentially power*less* in relation to the surrounding collectivity or environment. On the other extreme are those that treat actors as all knowing and ever capable of transforming social structures according to their specific intentions and goals

(see Joyce & Lopiparo 2005: 366). Although some archaeologists read these extremes (typically the former) in the theories of practice presented by Bourdieu and Giddens (e.g., Hodder & Hutson 2003: 93), most place Bourdieu's recursivity and Giddens' duality of structure on a middle ground, recognizing the inextricable nature of agency and structure (Jones 1997: 89-90). In addition to these theories, a third and surprisingly underutilized model of practice for archaeologists comes from the work of social theorist Michel de Certeau (1984). His concept of *tactics* emphasizes the recursive relationship between individuals and social structures, acknowledging the roles that individuals play in manipulating and shaping the system while still addressing limitations and unintended outcomes of action.

At the heart of each of these approaches lies the issue of agency (Giddens 1984; Dobres & Robb 2000; Joyce & Lopiparo 2005), or the ability of individuals, groups, and even material cultural to act upon and shape society. Archaeologists often use this concept to address the roles that social entities play in processes of cultural continuity and change (discussed further below). It should be noted that agentive action – both a structured structure and a structuring structure from Bourdieu's perspective – has the potential to result in *both* stability and/or transformation. Although Bourdieu, Giddens, and de Certeau each positioned agency within processes of cultural reproduction in a distinct manner than the next, all emphasized the *simultaneity* of structure and agency. On a similar note, Rosemary Joyce and Jeanne Lopiparo (2005: 365) point out the interpretive dangers of treating agency and structure as intermittent, "as an alternation of moments of the exercise of agency in an otherwise continuous flow of structure," rather than as constant and seamless.

The second theme, *social identity*, represents another key area of study in contemporary archaeology. Practice-based approaches often focus on the ways in which individuals and groups construct and negotiate their identities via the material world. For example, Siân Jones (1997) employed Bourdieu's theory of practice in her considerations of ethnic identity and material culture, while Diana DiPaolo Loren (2001) used the concept of doxa in her study of dressing practices and their roles in both French and Native American identity construction within the colonial politics of seventeenth- and eighteenth-century North America.

Similar to the perspectives it offers identity studies, practice theory also sheds new light on the dynamism of *cultural interaction*, particularly in instances of cultural contact and colonialism. For example, Kent Lightfoot, Antoinette Martinez, and Ann Schiff (1998) used a practice-based approach in their analysis of cultural admixture in interethnic households of the Native Alaskan neighborhood at Colony Ross, a nineteenth-century Russian fur-trading settlement in northern California. The neighborhood was composed of households, usually occupied by couples of Native Alaskan men and local Kashaya Pomo women. Lightfoot et al. (1998: 209-15) found that domestic routines of households usually followed Kashaya Pomo traditions, while the overall village structure was based upon traditional Native Alaskan ordering schemes. In this instance, both Kashaya Pomo women and Native Alaskan men reproduced "traditional" forms of their culture, making their interethnic households *hybrid* in nature (see also Silliman 2001 and 2009 for examples of practice-based approaches to colonialism in North America).

The fourth theme, *cultural continuity and change*, connects closely with all of the themes discussed above. Given this theme's centrality in all forms of archaeology, it may represent the most influential and productive application of practice theory in the field. Tim Pauketat (2001b) frames the insights that practice theory sheds on issues of cultural continuity and change in terms of *traditions*. In contrast to earlier generations of archaeologists that treated traditions as conservative and resistant to change, Pauketat (2001b: 2) views traditions as practices brought from the past into the present. Instead of approaching traditions as the constant variables of culture, Pauketat takes a contextual practice-based approach and frames traditions as arenas of

cultural transformation. As individuals and groups "replicate" the traditional practices of their ancestors, they always introduce some degree of change (e.g., invoking these traditions in new temporal, spatial, and social contexts). Stephen Silliman (2009) takes this general idea one step further by arguing that cultural continuity and change are inseparable, forever fused to one another within the seamless whole of cultural reproduction.

Future Directions

Although not always directly tied to thinkers like Bourdieu or Giddens, contemporary interests in material culture theory embody the recursive spirit of practice theory. The last 15 years or so represent an important stage for the interdisciplinary study of material culture as evinced by the founding of the *Journal of Material Culture* in 1996 and a recent proliferation of books, journal articles, edited volumes, and conference papers addressing the interconnectedness of material culture and social relations. This trend fostered a notable fluorescence of studies that make use of the term "materiality" in fields as diverse as anthropology, archaeology, design studies, history, human geography, museology, philosophy, and sociology. Most thinkers making use of the term "materiality" are dedicated to moving beyond the dichotomous legacies of the Cartesian divide of mind and body which permeates much of social science, cleaving the material and the immaterial, nature and culture, and the object and the subject. In light of the dialectical (and recursive) pull that exists between people and things, thinkers such as Alfred Gell and Bruno Latour recognize that agency is not limited to humans alone.

Archaeologists following in these directions note that the things they excavate and analyze were deeply embedded in past societies and cultures (or networks à la Latour) in relationships far more complicated than mere reflection. By continuing to recognize that humans and objects are dialectically bound and thus inseparable in terms of social analysis, archaeologists have begun to explore the culturally specific manners in which the material world participates in past social relations. This participation hinges upon the recursive interconnections pointed out in Bourdieu's practice theory, Giddens' theory of structuration, and the many iterations of practice theory employed in contemporary archaeology.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Ethnic Identity and Archaeology
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Power and Knowledge in Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Structural Archaeology

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Pragmatism in Archaeological Theory

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Introduction

Over the past 25 years, the dual nature of archaeology has been widely recognized and accepted by scholars working within the field. On the one hand, archaeology is a rigorous search for truth about the ancient past. On the other, it is a political dialogue with the present. This accepted fact has been accompanied by a sea change in philosophy and theory. A number of important critiques by scholars located worldwide have moved archaeology away from empiricist and positivist epistemologies to various "realist" alternatives. These alternatives (1) appreciate that knowledge is constructed and produced from particular social standpoints; (2) support, because of standpoint sensitivity, theoretical inquiries into gender, race, class, and other structuring relationships in human life; (3) recognize that, even though empirical reality constrains what we can say about the past, there is still lots of room for interpretation; and (4) incorporate, because of theory's inevitable underdetermination by data, broader criteria of evaluation beyond an interpretation's correspondence with archaeological facts and its logical coherence. The influence of the "postmodern" turn in intellectual life is evident here, but so are influences emanating from many other "post-positivist" philosophies of science.

These philosophical commitments come together in what has been promoted as a *social archaeology* (e.g., contributors to Meskell & Preucel 2004). Social archaeology is focused on how different people inscribe meaning in space and time and, through these processes of inscription, construct themselves. It looks to engage multiple interests in the past, especially those of historically disenfranchised groups. These include all those indigenous and descendant populations marginalized by expanding capitalism and who have been famously described as "people without history" (Wolf 1982). Social archaeology is thus a more inclusive, democratic practice that appreciates "the multiple entailments of our being-in-the-world" (Meskell & Preucel 2004: 3). This is not simply politics by other means; rather, it is good science. Our ability to grasp and learn from the otherness of the past can be enhanced by an engagement with traditional knowledges. In Bernstein's (1988) words, "it is only by the serious encounter with what is other, different, and alien that we can hope to determine what is idiosyncratic, limited, and partial." While serious engagement with stakeholders located outside the academic realm offers particular frustrations and challenges in reconstructing the past, it nonetheless makes us aware of silences that we have been creating and opens up new research directions. Such engagement is right at home in an archaeology that not only seeks to explain but also emancipate, that is, to foster critical thought about the contemporary

human condition in hopes of impelling positive social change (Saitta 2008).

Definition

Pragmatist philosophical principles are especially compatible with, and indeed crucial for advancing, a critical social archaeology. Preucel and Mrozowski (2010: 28) define pragmatism as the "distinctive American philosophy that holds that the meaning of ideas or action can be determined by considering what idea or action it routinely generates, that is to say, its practical consequences." They note that pragmatism has never been, and is not today, a unified approach. There are many debates about what the founders of pragmatism (Charles Sanders Pierce, William James, John Dewey) meant and about the accuracy of various contemporary interpretations (e.g., those of Richard Bernstein and, especially, Richard Rorty). Preucel and Mrozowski briefly review some of the ways that pragmatism has been employed by archaeologists. This entry focuses on the influences of Dewey and Rorty.

John Dewey captures the essence of the approach with his notion that pragmatism turns from the "problems of philosophy" to the "problems of men" (Dewey 1917). That is, it applies itself less toward knowing or "getting things right" (in terms of capturing some final transcendental truth) than toward living or "making things new" (Rorty 1989). For pragmatists, making things new requires that we improve our ability to respond to the views, interests, and concerns of ever larger groups of diverse human beings – to expand the scope of who counts as "one of us" (Rorty 1989).

Thus, pragmatism seamlessly dovetails with the kind of sensibility that equips practitioners for using the *craft* of archaeology (sensu Shanks & McGuire 1996: a "unified practice of hand, heart, mind" and "emotion, need, desire") to address human needs. Pragmatism does so without abandoning time-honored and still useful concepts of truth, experience, and testing. Instead, it reformulates these concepts in a way more sensitive to meeting human need. In so doing it responds more directly – and perhaps more coherently and honestly – to the widespread consensus that archaeological work occurs in a political context, and that we must therefore be aware of how the results of our inquiries are used within that context. A brief summary of core pragmatist philosophical commitments follows.

The first core commitment is to an antifoundational notion of truth – the idea that there are no fixed, stable grounds on which knowledge claims can be established. Truth is not an accurate reflection of something nonhuman; rather, it is a matter of intersubjective consensus among human beings, one mediated by currently available theories, methods, and data. This notion produces a warrant for aggressively experimenting with theory and method in order to arrive at historical truth. Experimentation is crucial for improving and expanding the conversation between and among interested parties of scientists and citizens. It is the vitality of this conversation that moves archaeology and its constituencies toward the sorts of "usable truths" that can serve human need. So understood, pragmatism moves us in directions other than those stipulated by the earliest commentators on archaeology's social relevance. The "New Archaeology" that burst upon the scene in the 1960s sought to establish such relevance when it explicitly cast archaeology as a science and argued "it is anthropology or nothing." However, advocates like Ford (1973) still saw the "indiscriminant publication of unverified hunches" as an obstacle to archaeology's ability to serve humanity. Today, liberal production and publication of such hunches is seen as critical for advancing archaeology's explanatory and emancipatory project.

The second core commitment is to the idea that truth claims must be evaluated against a broader notion of experience. Specifically, they must be evaluated in terms of their concrete consequences for life today – for how we want to live as a pluralistic community. Instead of simply asking whether a claim about the past is empirically sufficient in light of available data, pragmatism asks *what difference the claim makes*

to how we want to live. What are the implications of theoretical claims from evolutionary archaeology, interpretive archaeology, post-colonial archaeology, or indeed any other current framework for understanding society and history for how we think about, and how we might intervene in, human social life? To what extent does a truth claim expeditiously meet the human needs at stake in, say, reburial or repatriation controversies; that is, to what extent does it facilitate putting human souls to rest and human minds at ease? "Experience," in this view, is relational, interactive, and creative. It acknowledges our status as social and historical beings and thus is self-consciously reflexive. Defining experience in this way means that we must subsume the usual realist "criterial" rationality for judging truth claims (i.e., criteria emphasizing logical coherence and correspondence between theory and data) under something that is still broadly criterial but much more qualitative and humanistic – what Rorty (1989) has termed "fuzzy" rationality.

A third commitment is to a particular notion of "testing," specifically as it relates to the evaluation of truth claims produced by different standpoints, perspectives, and cultural traditions. As noted, especially germane to archaeology these days are those truth claims that divide scientific and various descendant community knowledges of the past, including indigenous, immigrant, working class, and other "folk" knowledges. Many have argued that within archaeology, there is no clear epistemology for uniting descendant community and mainstream scientific understandings of the past. Several scholars have advocated a rethinking of epistemology now that previously disenfranchised groups have places at the table. In contrast to the mainstream scientific view where competing ideas are tested against each other in light of the empirical record, pragmatism stipulates that we test the ideas of other cultures and descendant communities by "weaving" them together with ones we already have (Rorty 1989). Testing is a matter of interweaving and continually reweaving webs of belief so as to increasingly expand and deepen community and, perhaps, create new fields of action. Pragmatism prescribes a "measured relativism" that balances a commitment to evaluation with the parallel belief that cultural pluralism is our best recipe for civil cohesion. Latour (1999: 4) captures the same basic idea with his notion of a "sturdy relativism" in which science allows us to be sure of many things but also seeks to make better connections with the wider social collective. For Latour, this relativism is not one that capitulates to "anything goes" or, in his words, to the "frantic disorderly mob."

The specter of *objectivity* haunts these core philosophical commitments. What does objectivity mean in this context? And do we abandon all hope of attaining it by embracing a pragmatist orientation? The notion of objectivity endorsed by pragmatists, as alluded to above, is one that can be described as *dialectical*. Dialectical objectivity takes a particular stance toward the subjectivity of the knower. Whereas other kinds of objectivity seek either to exclude subjectivity (absolute objectivity) or contain it (disciplinary objectivity), dialectical objectivity adopts a positive attitude toward subjectivity. Subjectivity is seen as indispensable to the constituting of objects, as in fact *necessary* for objectivity. As Heidegger (1927) notes, objects first become known to us through action in the world. Knowing is thus acting, and human acting is always acting in company (Fabian 1994). These arguments close the loop to a concept of "objective truth" as a matter of intersubjective consensus – or solidarity – among human beings, rather than as a matter of accurate reflection of something nonhuman.

This pragmatist notion of objectivity differs a bit from realist notions that are still widely invoked in contemporary archaeology. Realist objectivity stipulates that there is an independent reality, that alternative accounts map it differently, and that, while hope and bias complicate the picture, systematic exploration of similarity and difference can establish credible knowledge claims and produce more complete understandings of the past. Binford (1982) famously characterized this kind of objectivity as "operational objectivity." This qualified notion of objectivity has been endorsed by

archaeologists working across the paradigmatic spectrum. Thus, processual archaeologists have called for a "mitigated objectivity," contextualists a "guarded" or "modified" objectivity, and feminists an "embodied objectivity."

The rub is that such notions of objectivity, no matter how well qualified, still might not be best for regulating a more democratic, inclusive, and critical social archaeology. Pragmatism's commitment to "testing" the beliefs of other cultures by interweaving and continually reweaving them with beliefs that we already have best supports an integrative approach to settling differences between indigenous and scientific knowledges. The navigational guide in these encounters is something fully human – wider, deeper, stronger, and better community – rather than some socially independent object that we seek to accurately represent in theory.

Key Issues/Current Debates

How can a pragmatist archaeology concretely serve this enlargement of community, especially when many public constituencies are still utterly indifferent to whether archaeology exists or not? How can we find some measure of integration in the new, post-colonial world?

One obvious way is through the production of knowledge that takes stock of neglected peoples and histories and that focuses on questions other than the kinds of "origins questions" – about the evolution of humanity, agriculture, and civilization – that have traditionally anchored archaeology's more popular writing. Of interest are questions about the "lived experience" of everyday life – its conditions, variations, rhythms, and disjunctions – with answers developed in such a way that they are accessible to those living peoples having a stake in the interpretations. This ambition is only realizable if those whose lives are affected are directly involved in the research enterprise as partners and collaborators, instead of just subjects or informants. Archaeology has been making good progress in reaching out to these groups. New understandings of the past are being developed by the "subaltern" archaeologies of women and racialized others, and by anti- and post-colonial archaeologies focused on indigenous peoples and their histories.

Efforts to develop a "working class" archaeology in the United States are cut from similar cloth (e.g., Saitta 2007; Shackel 2009). Archaeologies of labor are gaining increasing visibility in the States and catching up with those that have been developed elsewhere. A critical history of early twentieth-century coal miners in southern Colorado (Saitta 2007) is one that has been offered as an antidote to *official* histories of the American West. Official histories – especially in the West – are nationalist, progressive, and triumphal, emphasizing social unity and continuity of the existing social order and its institutions (Bodnar 1992). They gloss over periods of transformation and rupture or spin those ruptures (e.g., the American Civil War) as always having produced a better society, "a more perfect union." Alternatively, critical histories deal with context, transformation, and rupture, addressing both the historical process and different narratives about that process. Both kinds of history often conflict with *vernacular* (Bodnar 1992) histories of the past. Vernacular histories are local histories derived from the first-hand, everyday experience of those people who were directly involved with history's events. They are "passed around the kitchen table," conveying "what social reality feels like rather than what it should be like" (Bodnar 1992: 14). Vernacular histories threaten the sacred and timeless nature of official history, just as critical history threatens vernacular history.

Archaeological work in the American West has produced useful, mutually beneficial dialogue with people steeped in vernacular history, such as trade unionists. The vast majority of these people have never had much use for archaeology, realist, or otherwise. Others in the same unionist company, however, are keenly aware that history is complicated and can be written in a lot of ways, all of them deeply political. The gulf between academic and working class cultures, no matter where it is found around the world, is still palpable. We may or may not need

a working class archaeology, but it certainly seems that we need a different way of *justifying* it. A key to narrowing the cultural gulf is to appreciate that sites of industrial and class struggle are part of a living history and long commemorative tradition and often considered sacred ground by descendant communities.

Progress is also being made in coping with the other, arguably more difficult conflicts in archaeological interpretation, such as surround compliance with the United States' Native American Graves Protection and Recovery Act (NAGPRA). These conflicts, especially, beg for pragmatic interventions more attuned to "living" than "knowing." By law, NAGPRA compliance is governed by a realist, criterial rationality. The success of a claim for cultural affiliation depends on whether it is supported by most of the available biological, linguistic, archaeological, and documentary evidence. In this scheme native oral traditions are assigned an evidentiary status equal to other kinds of scientific evidence. However, NAGPRA's "preponderance of evidence" criterion remains deeply problematic, both because of the elastic nature of evidence in archaeology (resulting from the particular quality of archaeological data combined with the fact that such data only become "evidence" in light of theory) and because of the often deep contentiousness of tribal oral traditions.

Given this situation, a realist, criterial rationality may not be the most appropriate or productive. Instead, we might follow the lead of those pragmatist philosophers and Native Americans who suggest that a more important and relevant criterion is the consequences of knowledge claims for everyday life: for how we want to live, and for the building of a genuinely pluralist community characterized by mutual understanding and respect. In the American Southwest, for example, Pueblo Indian tribal representatives implicitly endorse pragmatist evaluative criteria where they argue, in so many words, that history is less important than survival and the maintenance of harmonious relationships among the tribes. Survival is understood broadly as political, economic, *and* cultural. Naranjo (1996: 249) takes such a stand where she asserts that, in her view, the Pueblo Indian's primary concern is with "the larger issues of ¼ breathing and dying," rather than with the specific details of knowing that focus scientific world views. This concern for the present as well as the past – for living as well as knowing – represents a significant convergence between pragmatist and tribal epistemologies that is worth exploiting for its unifying potential. But this unity can only be established if we are willing to rethink the usual scientific criteria – that is, empirical and logical sufficiency – for judging and integrating knowledge claims.

Other convergences are apparent in the realm of methodology. Speaking at a conference dedicated to the topic of "Indigenous People and Archaeology," Lomaomvaya and Ferguson (2003) note that:

> In Hopi culture, what stands the test of time is substantive information about the past. Collection and analysis of data requires theory, but for Hopi it is the Hopi past itself that is most important, not what we think this past means for the world beyond Hopi.

This primary interest in archaeological "thick description" of a particular past converges with the pragmatist belief that human solidarity is best achieved not by those disciplines – theology, science, and philosophy – charged with "penetrating behind the many private appearances to the one general common reality" but rather by those which sensitize humans to the experience of diverse "others" through exploration of the private and idiosyncratic. Rorty (1989: 94) notes that "novels and ethnographies" are especially well suited to building this kind of solidarity. Archaeological narratives attuned to human cultural variability across space and time, and developed via more reflexive and hermeneutic methodologies, can be just as useful.

Despite its critique of criterial rationality and preference for "thick description" over nomothetics, the pragmatist alternative need not be anti-science. This is a perennial criticism of scholars involved in building a critical archaeology. In the pragmatist view, and all things being

equal, science is an excellent model of human community and solidarity (Rorty 1989: 15). But, unfortunately, all things are rarely equal. Where compromises are required, it is science that must lead the way, since it has for too long (and as a consequence of unequal power relationships in society) dominated and silenced other ways of knowing. In his *Federalist Paper No. 10*, the American founder James Madison noted the threat to community presented by "majority factions." For Madison, the best corrective to the majoritarian threat was enlarging the scope of community, that is, the number of interests represented at the table of democracy. To the extent that mainstream, realist science is a majority faction in American archaeology, it poses the greatest threat to the project of reconciling competing knowledges and expanding community. Archaeologists and subaltern "others" alike tend to cringe at any call for compromise in the service of reconciliation and stronger community. But Rorty (1998: 52) provides some comfort when he reminds us that, in democratic societies, "you often get things done by compromising principles in order to form alliances with groups about whom you have grave doubts."

Future Directions

Pragmatism emphasizes ways of living instead of rules for knowing, the "weaving together" of knowledges instead of their "validation against" experience, and the social utility of narratives instead of the absolute truth of laws and theories. These governing ideals neither forsake reality nor undermine the possibilities for learning, nor capitulate to relativism in the way that term is usually understood. Pragmatism subsumes Enlightenment criterial rationality and nomothetics to more humanistic – but no less explicit and compelling – regulative ideals. In so doing, it converges with the epistemologies of subaltern groups – native peoples and working classes – for whom the social causes and consequences of scientific knowledge claims can be of great concern. This in turn promises a more collaborative and democratic, and less authoritarian, archaeology.

At the same time, pragmatism usefully breaks with both the analytical (empiricist, positivist) and continental (post-positivist) philosophical traditions that so many around the world have found wanting as underpinnings for contemporary archaeological practice. The desirable outcome of pragmatism's advocacy of these particular notions of truth, experience, and testing is stronger community – richer and better human activity – rather than some singular, final truth about the past or some imagined "more comprehensive" or "more complete" account of history. The loyalty in pragmatism is to other human beings struggling to cope rather than to the realist hope of getting things right; the desire is for *solidarity* rather than *objectivity*.

Pragmatist philosophy is thus fully compatible with the theoretical interests of an archaeology of collective action. It also meets those criteria enunciated by scholars seeking a more *ethical* practice (e.g., contributors to Lynott & Wylie 2000). These include the need to be self-conscious of one's subjectivity, accountable for one's presuppositions and claims, and responsive to the various constituencies having an interest in the past. Pragmatism's ethical imperatives dovetail especially nicely with archaeologies of civic engagement and those that employ "service learning" as a pedagogical tool (e.g., Nassaney 2004) whereby we, as contributors to public knowledge, use our knowledge to serve the public good – whatever we take "public good" to mean.

Whether these ethical principles are best theorized as universal (good for all times and places) or situational (a matter of comparing time and space-bound practices with each other) is subject to debate. Rorty's (2001) position that community-building is best served by situationalism or, in his terms, "ethnocentrism" is particularly useful: that there is more to be gained by replacing the Enlightenment rationalist commitment to universal moral obligations with the rather more modest idea that we – as

Westerners, intellectuals, archaeologists, or whatever – merely have some instructive and possibly persuasive stories to tell that might help to build trust across the boundaries that divide us from others. On this view, moral and ethical progress is viewed as an expansion in the number of people among whom unforced agreement can be established through free and open encounters (Rorty 1991).

Pragmatism's emphasis on narrative and conversation is perhaps its greatest gift to a discipline like archaeology. Indeed, these commitments fit well with those who see archaeology today – given the diversity of theories, methods, and voices that have come to characterize it – as less a well-defined, bounded discipline than a fluid set of negotiated interactions, as less a "thing" than a "process." This "community of discourses" (Hodder 2001), while threatening what some might see as an unproductive dispersion of scientific energy, is mostly to the good if it stimulates imagination and experimentation, sustains intellectual vitality, and produces better understandings of the past as well as better and stronger community.

Cross-References

- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Post-Processual Archaeology
- ▶ Social Archaeology

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Prehistoric Human Footprint Sites

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Introduction

Human footprints (Fig. 1) were thought to be rare in the geological record; freak occurrences of sedimentary preservation with prints providing evidence of past presence, biometric data on the print maker, and in the case of examples that predate *Homo sapiens* a rare glimpse into the locomotive behavior of our early ancestors. Recent discoveries, however, suggest that human footprints are more common than previously supposed; it is just that they have not always been correctly identified in cross-section or have paleoanthropologists always known where to look.

Key Issues/Current Debates/Future Directions/Examples

The oldest and most famous footprint site was discovered in the late 1970s at Laetoli in Tanzania and is dated to 3.66 million years ago (Leakey & Hay 1979: 1; Deino 2011). These prints have been widely discussed and where probably made by an ancestor similar to "Lucy" (*Australopithecus afarensis*; Charteris et al. 1981; Meldrum et al. 2011). Bennett et al. (2009) reported details of the second-oldest human footprint site in northern Kenya, dated to 1.5 million years ago and potentially made by *Homo erectus*. In Europe the "devils'" footprints in Italy have recently been dated to 345,000 years old and ascribed to *Homo heidelbergensis* (Mietto et al. 2003; Avanzini et al. 2008). In addition the number of discovered late Pleistocene and Holocene footprint sites has grown rapidly (Fig. 1; Table 1).

Footprint sites can be classified in a variety of ways but tend to fall into one of two broad types:

- Congregation sites occur where humans, and/or animals, gather at a focal point within a cave, around a source of shelter or more commonly around a water source. Here, the print density is often high with a large amount of overprinting and taphonomic modification of prints and with intimate association of human and animal footprints. Footprint trails are relatively rare and when present tend to be short in length.
- Transit sites occur where humans, and/or animals, are moving across a surface forming well-defined trails. It is often easier to make biomechanical inferences at such sites since the trails tend to be longer and the density of prints and associated overprinting is often lower, although the number of prints can often be relatively small such as the case at Laetoli.

Footprints are preserved in any soft-sediment environment but are typically found in low-energy depositional environments where there is (1) rapid still water sedimentation post-imprinting, for example, caused by the transgression of turbid lake/sea, or low-velocity flood waters; (2) rapid cementation by fine-grained debris/mud flows such as lahars or fine-grained ash flows; (3) pulses of airborne ash fall; (4) rapid post-imprinting lithification of sediment via desiccation, and/or salt cementation of silt/clay, as well as the chemical cementation of volcanic ash; and (5) avalanching and/or settling of dry aeolian sediment. Greater knowledge and exploration of these types of environments within the depositional record has the potential to increase the number of known human footprint sites as illustrated in the discoveries of recent years. While prints may be preserved in a wide variety of sedimentary environments, molding of fine anatomical detail tends to be favored by fine-grained substrates (Fig. 1), which need to be sufficiently dry to have the necessary bearing capacity to hold the weight of the

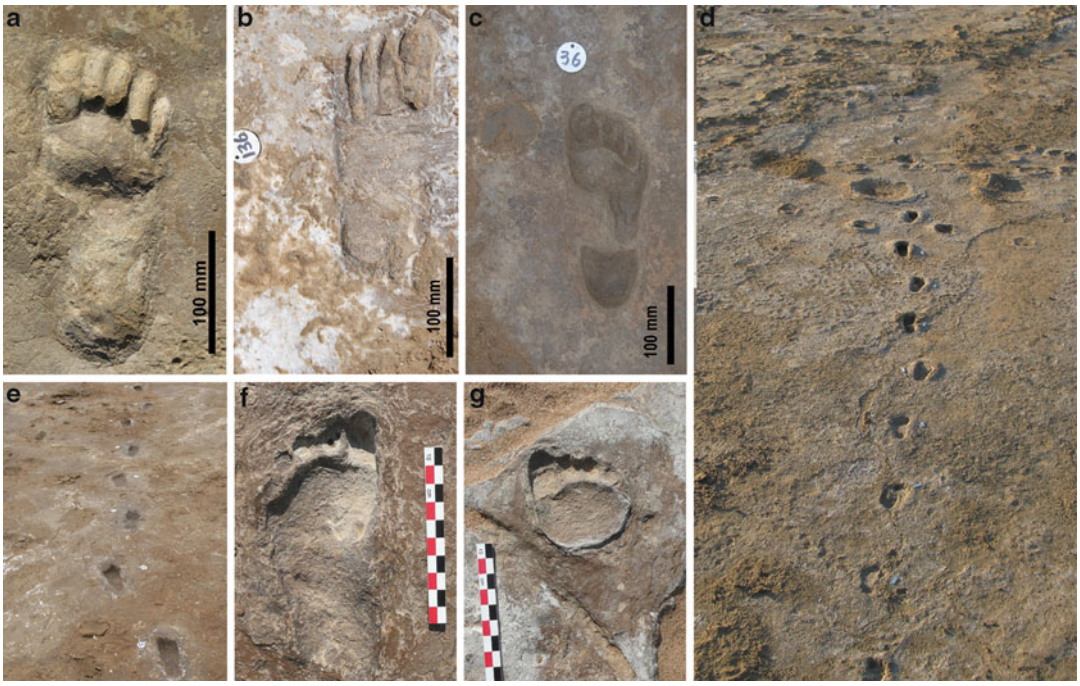

Prehistoric Human Footprint Sites, Fig. 1 Examples of human footprints preserved in Holocene silts and fine sands from Walvis Bay, Namibia. (**a**) Right adult footprint. (**b**) Left adult footprint showing slippage of the toes. (**c**) Right adult footprint with good anatomical preservation in fine sand and silt. (**d**) Trail of prints traversed left to right by an elephant and bovid trail. (**e**) Human footprint trail. (**f**) Child footprint showing detailed preservation including skin texture. (**g**) Child footprint with preservation of the forefoot and toe pads only

individual print maker and sufficient strength so that they do not collapse as the foot is withdrawn. This is often favored by thinly bedded muds and fine sands which provide a relatively firm, free-draining substrate, but with good molding properties. The typology of footprints varies with substrate moisture content within fine-grained sediments as shown in Fig. 2.

The traditional method of preservation and analysis involve the description of individual prints and casting with either plaster or more commonly resin. Manual photogrammetry was used at Laetoli (Leakey & Harris 1987), a process which has now been revolutionized by digital photogrammetry (Falkingham 2012). Bennett et al. (2009) has also pioneered the use of optical laser scanning as another viable method of digital data capture. Whichever way digital three-dimensional footprint data is collected, there is an increasing range of sophisticated analytical tools available to examine this data, not least of which are methods of "whole foot" analysis which allow mean footprints to be determined from trails, allowing more objective hypothesis testing (Crompton et al. 2012). For example, Fig. 3 shows a mean print of a 14-print trail from Walvis Bay in Namibia. The individual prints show considerable typological variation due to subtle variations in substrate properties, but by examining the mean, one is able to remove this noise and make anatomical and biomechanical inferences with a greater degree of certainty. This approach has been successfully applied to the Lateoli prints recently (Crompton et al. 2012).

Whatever analytical approach is used, footprints and trails can be used to infer a range of information about the print maker. In Morton's (1935) seminal work on the human foot, he established a basic anatomical ratio of foot length to stature or approximately 15 % (1:15). This has been refined into a range of empirical relationships which link foot length to subject

Prehistoric Human Footprint Sites, Table 1 A selection of key footprint sites (see Lockley et al. (2008) for a more definitive list of known sites)

Site	Age	Substrate	Transit site	Congregation site	Key reference(s)
Laetoli, Tanzania	3.66 M yr	Volcanic ash	Yes		Leakey & Hay 1979; Leakey & Harris 1987; Deino 2011
Ileret, Kenya	1.5 M yr	Fluvio-lacustrine silt and fine sand		Yes	Bennett et al. 2009
Koobi Fora, Kenya	1.5 M yr	Fluvio-lacustrine silt and fine sand		Yes	Behrensmeyer & Laporte 1981; Bennett et al. 2009
Roccamonfina, Italy	325–385 K yr	Volcanic ash flow	Yes		Mietto et al. 2003; Avanzini et al. 2008
Nahoon, South Africa	127 K yr	Aeolian sediments	Yes		Roberts 2008
Chauvet Cave, France	20–30 K yr	Cave sediments		Yes	Garcia 2001
Willandra, Australia	19–23 K yr	Lacustrine silt and fine sands	Yes		Webb et al. 2006
Jeju Island, S. Korea	15 K yr	Shoreline volcaniclastic sediments			Kim et al. 2009
Jaguar Cave, Tennessee (USA)	4.6 K yr	Cave sediments		Yes	Watson et al. 2005
Uskmouth, Wales	5.7–6.2 K yr	Coastal silt and fine sand	Yes		Alderhouse-Green et al. 1992; Allen 1997
Sefton Coast, UK	5.5 K yr	Coastal silt and fine sand	Yes		Roberts et al. 1996
Acahualinca, Nicaragua	2.1 K yr	Volcanic ash	Yes		Schmincke et al. 2009
Walvis Bay, Namibia	0.5–2 K yr	Fluvio-lacustrine silt and fine sand		Yes	Kinahan 1996

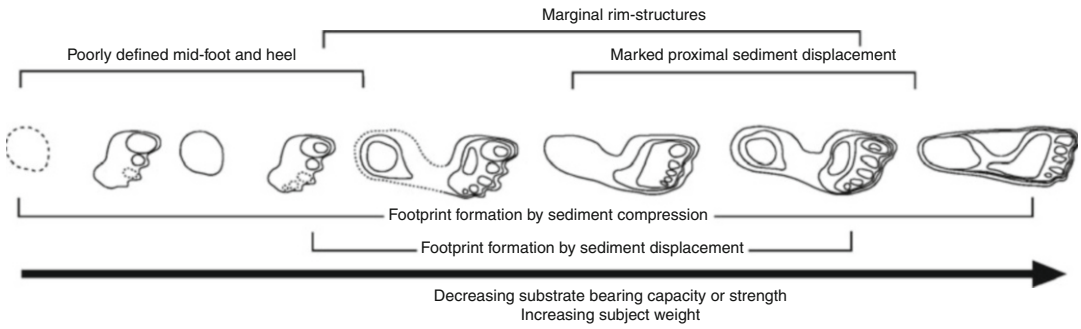

Prehistoric Human Footprint Sites, Fig. 2 Model of the typological variation in footprints with changes in substrate properties

height and weight (e.g., Robbins 1985; Webb et al. 2006). While these relationships provide an approximation for *Homo sapiens*, their applicability to our earlier ancestors is debatable. Inferences on walking speed can be made from step and stride length in trails given an estimate of a subjects leg length (Alexander 1984), although these are again limited by the availability of such

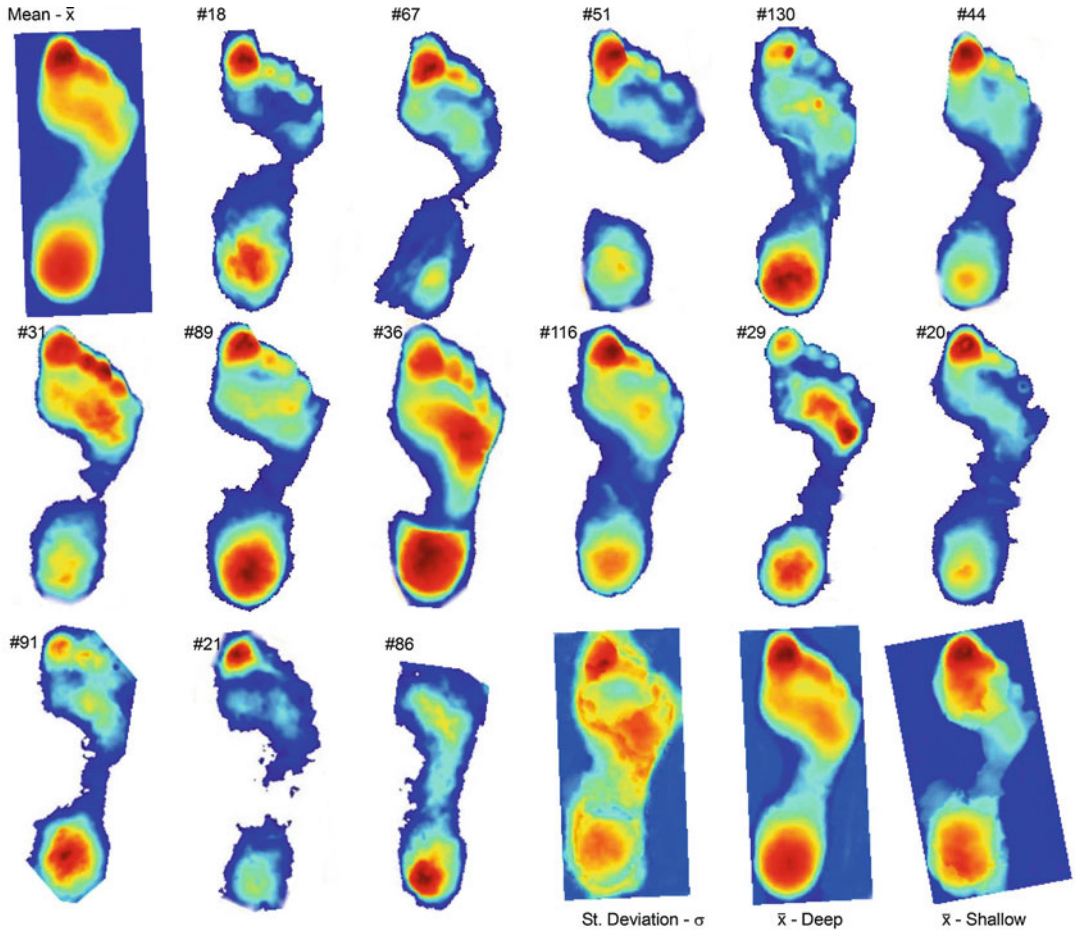

Prehistoric Human Footprint Sites, Fig. 3 Illustration of the typological variation in human footprints within a single trail due to variation in substrate. Using a "whole foot" analytical approach such as that adopted by Compton et al. (2012), it is possible to calculate a mean and standard deviation for this trail

information or the assumptions made in deriving plausible input data for extinct hominins. Human footprints also commonly occur in association with animal prints, providing information about the ecological community in which our ancestors lived, although issues of substrate sampling may bias the nature of this record (Falkingham et al. 2011).

In summary, human footprints are preserved in a variety of depositional settings and have much to offer both the archaeological and paleoanthropological community. The foot is a complex structure of 22 bones held in place by a lattice of soft tissue. It interfaces with the ground to create pressures which decelerate, balance, and accelerate the body during walking and running. Human footprints provide a record of these forces, a record of "fossilized motion," and a record of the forces our forebears applied to the ground to balance and propel their bodies.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Archaic *Homo sapiens*
- ▶ Australopithecines
- ▶ Fossil Records of Early Modern Humans
- ▶ Geoarchaeology
- ▶ *Homo erectus*

▶ *Homo ergaster*
▶ *Homo habilis*
▶ *Homo heidelbergensis*
▶ *Homo neanderthalensis*
▶ *Homo sapiens*
▶ Human Migration: Bioarchaeological Approaches
▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
▶ Kinahan, John
▶ Lucy
▶ Neanderthals and Their Contemporaries
▶ Stature Estimation
▶ Taphonomy in Human Evolution

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Preservation Paradigm in Heritage Management

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Introduction

The idea of preservation is the basic paradigm of all heritage management, including archaeological heritage management. Heritage experts often take for granted that remains of the past are inherently valuable and deserve to be maintained in perpetuity. A common slogan thus proclaims the need to "preserve the past for the future" (cf. Spennemann 2007). Therefore, archaeologists and other heritage experts do their best to preserve sites, objects, and the information they contain for the future. Preservation involves either the conservation of heritage in physical terms ("preservation in situ," "stewardship") or, in case a given site or object cannot be conserved, it involves recording and archiving the information it contains ("preservation by record"; "rescue archaeology").

From a life-history perspective of monuments and landscapes, heritage preservation can be considered as one major way of reinterpreting and reusing a given site or landscape in our age (Holtorf 2006). This history of a site and the story heritage can tell us is not damaged or diminished but actually enriched when something is added, modified, or taken away.

The contemporary conservation ethos in cultural heritage is firmly situated in a specific historical and cultural context of European civilization of the past few centuries. The French architectural historian Françoise Choay (2001 [1992]: 139–42) used the phrase "Noah complex" and referred to "the religion of heritage," "the cult of the historical monument," and widely practiced "rites of an official cult of historic heritage." This was echoed by economic historian Svante Beckman (1998: 32–9) who observed a peculiar "sacredness of cultural heritage" (my translation) in society, evoking piety and reverence, and by historical geographer David Lowenthal (1996: 1) who in his book on *The Heritage Crusade* described the cult of heritage as a popular faith in which the world has now started to rejoice: "heritage [has] become a self-conscious creed, whose shrines and icons daily multiply and whose praise suffuses public discourse."

Key Issues/Current Debates/Future Directions/Examples

References to a Noah complex and a semireligious cult of heritage point to that aspect of the contemporary concept of heritage that is most notorious and that, in a future perspective, is likely to become most noteworthy: the obsession with conservation, preservation, and protection. According to some commentators, conservation and preservation issues have taken over nearly the entire range of legitimate ways of being interested in the past. This is, for example, the main thrust of David Lowenthal's study (1996) in which he argues that the lure of a heritage to be conserved now outpaces all other modes of relating to the past including tradition, memory, myth, memoir, and history. And in the words of archaeologist Graham Fairclough (2009: 158), one might add that

> [t]he obsession with physical conservation became so embedded in twentieth century mentalities that it is no longer easy to separate an attempt to understand the past and its meaning from agonising about which bits of it to protect and keep. It is almost as if one is not allowed to be interested in the past without wanting to keep or restore . . . the remains of the past, which seem to exist only to be preserved. The wide range of how the past is used by society has been reduced to the literal act of preserving its fabric. In that sense, history has been subsumed into heritage, scarcely having any independent existence.

The logic of the preservation paradigm of contemporary heritage insists that what is valuable deserves to be protected and preserved by stewards for the benefit of future generations. Lately, this logic has, however, rightly attracted criticism (e.g., Holtorf 2006; Hollowell 2009). Given the way in which preservation and destruction are often entangled at the moment of discovery, when heritage is presented to various audiences and through the act of visiting and studying it, how can we separate one from the other? Are there conditions under which loss of heritage can be beneficial for future generations? How significant are stories about the past told by vandalized or obliterated heritage? Can the consumption and use of heritage for present benefits be more important than its preservation for the future? Does an obsession with preservation and stewardship of archaeological heritage prevent us from making informed decisions that are in the best interest of a majority of living people? Whom are the stewards of heritage actually accountable to and on what grounds? When will the future arrive in which the heritage can be consumed? If it never arrives, why preserve? Is not cultural heritage and its management always about changes over time anyway?

It is far from certain whether or not preservation is contributing to shaping a future we want to live in. In an interesting debate on BBC News (2009), triggered by a recent cash crisis at the site of Auschwitz, the question raised was: "Should Auschwitz be left to decay?" Historian Robert Jan van Pelt argued that once the last survivor has died, the site as such will have little to tell to future visitors and should therefore be closed and peacefully left to decay out of respect to all those who died there. Wladyslaw Bartoszewski, Chairman of the International Auschwitz Council, on the other hand, suggested that the site should continue to be preserved as a burning wound, to bear witness to the tragedy that happened there and as a future warning against all forms of contempt for mankind. But who is to say whether or not Auschwitz in 100 years from now will still be preserved and appreciated in ways we would approve of? Indeed, as we argued elsewhere (Holtorf & Ortman 2008: 87), it may be counterproductive to become too good at conserving heritage. Since future generations may perceive as less valuable what is common, they might become less appreciative and careful towards abundant heritage than they would otherwise have been – effectively rendering our own conservation efforts meaningless.

The present concern for future generations in the heritage sector (as elsewhere) is neither a matter of altruistic self-sacrifice for the welfare of future human beings nor one of intergenerational equity. As the past and its remains are continuously growing every day, future generations cannot run out of past and there will always be plenty of cultural heritage to study and enjoy. Given changing notions of authenticity and fast-developing techniques of copying and reconstructing, it is also highly dubious whether the values of archaeological heritage are really nonrenewable (Holtorf 2005: Chaps. 7–8).

The reason why people throughout the twentieth and early twenty-first centuries have been so obsessed with preserving heritage has much more to do with the present people who are doing the preserving than with the future people they are supposedly preserving for. As Lowenthal (2005) indicated, the existing concern for the future in heritage management has been "a matter of enriching our own life with depth and purpose." As mortal human beings we pursue meaningful purposes that survive ourselves. Arguably, the widespread desire to protect and preserve heritage is nothing but one outcome of a strong human desire to obtain a sense of purpose by caring for something profound, whether that may be the ozone layer and global climate, homeless people and the fight against poverty, tigers

and the protection of biodiversity or Stonehenge, and other cultural heritage sites (Holtorf & Ortman 2008). As a result of such preoccupation with our own all too human needs and desires to care and give the impression that we care, we have never asked which role we can expect heritage to play in the *actual* future which most definitely will not in its entirety resemble the present and thus require new policies and practices.

Looking at the preservation of heritage from this perspective suggests its cultural and historical specificity and thus the realization that the preservation paradigm will not be forever. Indeed, it might not be too long before the very ideas of heritage and conservation will have turned out to be nothing but temporary fads of the nineteenth–twenty-first centuries. Within 100–200 years, somewhat ironically, heritage sites and related objects may have become a valuable and in part even threatened part of the cultural heritage. Future archaeologists, looking for explanations to the excessive desire to preserve in our age, will be able to draw on a rich material record of reconstructed buildings, restored artifacts, and archived reports (Fairclough 2009). Quite possibly, these future generations will appreciate conserved buildings and sites not so much because it allows them to remember the past (when the structures were built) but because it allows them to remember remembering the past (when the structures were "rescued" and conserved). This raises the intriguing and somewhat paradoxical question whether future generations may appreciate the heritage of heritage.

Graham Fairclough (2009: 163–4) listed the following examples of physical remains that might still be identified in the future and become significant as heritage of heritage: re-pointed walls, repaired earthworks, reconstructed buildings, new roofs, repaired and maintained hedges and walls, red telephone boxes that postdate their usefulness to make phone calls, and not the least many preserved archaeological sites in the landscape and large amounts of archaeological finds kept in cardboard boxes in museum warehouses. One could add roadside signposts, guidebooks, access streets and paths, parking lots, information boards, bins, and other physical objects linked to heritage tourism.

However, these remains may never become heritage of heritage, as the cult of heritage preservation and Noah complex may not prevail in the future. Instead, as the anthropologist Tim Ingold (2010) figured in an intriguing future scenario of the year 2053, archaeologists might appreciate things in terms of persistence rather than preservation. Persistent things originate continuously and like natural processes they carry on growing or decaying. By 2053, heritage experts may no longer take for granted that remains of the past are inherently valuable and deserve to be maintained in perpetuity. There would be no need to "preserve the past for the future" anymore.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Cost and Benefit of Change
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage & Society
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: History and Context
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Preserving Heritage: The Role of the Media

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Preserving Heritage: The Role of the Media

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Introduction

Ever since the modern science of archaeology began to develop from its earlier antiquarianism, there has been a role for the media – from book publishing to newspaper journalism's coverage of discoveries to the depiction of archaeology in various visual arts – in shaping both the profession's and the public's awareness and desire to preserve the world's archaeological and cultural heritage. Then, beginning in the late nineteenth century, electric media began to more rapidly and widely disseminate information for and about archaeology (particularly the more spectacular finds) first through telegraphs and telephones, then in the twentieth century through movies, radio, and television, and, most recently, through the computer and the Internet.

Presently, archaeologists use all of the various types of artistic, broadcast, electronic, and print media to more widely and rapidly promote the documentation and preservation of the many international cultural heritage sites at risk from neglect, war, vandalism, misuse, land development, agriculture, looting, and artificial and natural alterations and disasters. Archaeologists have consistently adapted to the introduction of new technologies that have applications to help better advance the study and preservation of the world's heritage sites. Most recently, the use of "social media" – whereby usually small amounts of information on a variety of topics are shared and disseminated quickly through the electronically linked networks of persons using computers, mobile telephones, and other devices with Internet accessibility – provides a new arena for the evolution of the role of the media in assisting the archaeological community in calling the public's attention to the need to understand, conserve, protect, and document the cultural heritage of the people of all nations.

Definition

The role of the media in preserving cultural heritage can be defined as the use of the full range of journalistic, artistic, print, electronic, and broadcast mass communications to inform the professional archaeological community and the general public on the many methods, activities, and plans for encouraging the understanding, protection, conservation, and documentation of the world's archaeological, historical, artistic, and cultural patrimony for the present and future generations.

Historical Background

The first mass communication medium to be used to promote the preservation and understanding of

archaeological and cultural heritage was *book publishing*. For instance, as early as 1482, the work *Romae instauratae* ("Rome Restored"), written by the Italian humanist, historian, and "father of archaeology," Flavio Biondo (1388–1463), was the first book on archaeology to be published on the recently invented *printing press with movable type*. This and other works of Biondo's were printed posthumously by his sons less than 20 years after the German inventor Johannes Gutenberg's printing press was first brought into Italy around 1464 and only about 30 years after Gutenberg first prepared his famed eponymous bible using this device.

In the Renaissance, encouraged by the more widespread dissemination of information – particularly a better knowledge of classical antiquity based in large part by the revolution in mass book printing and book selling – scholars such as the English antiquarian and historian William Camden (1551–1623) undertook writing about the ancient histories of their own nations, especially those places that were once linked to the Roman Empire. In his work, *Britannia* – first published in 1588 in Latin and then in subsequent English editions – Camden recognized the association between archaeological finds (particularly ancient coins) and an area's history. In writing on the history of Kent, for example, he was observant in noting the existence of crop marks in fields upon the former locations of buildings and the coins that turned up in plowing:

> When the *Romans* govern'd here, the City was exceedingly Famous; from thence they commonly set sail from *Britain* to the Continent: But now Age has eras'd the very Tracts of it, and to teach us, that Cities die as well as Men, it is at this Day a Common Field, wherein, when the Corn is grown up, one may observe the Draughts of Streets crossing one another, for where they gone, the Corn is thinner. Nothing of the City now remains, but some ruinous Walls of rough Flints, and long *British* Bricks, the Cement of which is as hard as Stone. But the Plot of the City, now plough'd, has often cast up the Marks of its Antiquity, Gold and Silver Coins of the *Romans*. . . (Camden 1701).

Notably, despite recognizing the significance of these sites and their relationship to the past, Camden does not advocate for their preservation in his writing.

With a palpable interest being encouraged through literature in understanding the ancient past, more people began visiting the sites described in the various published histories – the early modern version of what we call today "cultural tourism." Artists such as the Venetian Giovanni Battista Piranesi (1720–1778), who had himself been first trained as an architect, began producing for sale to these tourists a series of printed etchings that showed the ancient ruins of Rome. These artistic "views," as they were called, depicted the city's archaeological landmarks and helped to popularize the knowledge of archaeology to both locals and visitors alike and to further spur a revival in the use of the classical orders in Western architecture based upon these images and the increased appreciation of these ruins.

Toward the end of the eighteenth century, the first scientific excavation of an archaeological site was undertaken by the American politician, scientist, and Enlightenment polymath Thomas Jefferson. Described in his now renowned book, *Notes on the State of Virginia*, which was first published in French in 1785 and then in English in 1787, Jefferson fairly systematically undertook a stratigraphic excavation of a Native American burial mound (or barrow) in 1783, correctly hypothesizing that the origins of the mounds were aboriginal in origin and of great age. Importantly, Jefferson also set the standard for publishing his findings relatively quickly (Jefferson 1787).

A few years after Jefferson's book was published, the American naturalist and scientist *William Bartram* (1739–1823) – a close friend of Jefferson – published his own keen observations of ancient Native American archaeological sites based upon his travels throughout the American Southeast in the mid-1770s. Bartram's publication of his famous book, *Travels through North and South Carolina, Georgia, East and West Florida*, in Philadelphia in 1791 led to a further increased awareness of the antiquity of aboriginal culture in North America from comments laced throughout his famous work, such as his observation that "amongst the shells of the conical mounds, fragments of earthen vessels, and of other utensils, the manufacture of the ancients . . ." (Bartram 1791).

These books, along with writings published by a number of other eighteenth- and early nineteenth-century scholars in Europe, such as the Germans Johann Winckelmann (1717–1768) and Alexander von Humboldt (1769–1859), helped to construct an intellectual foundation for a more widespread appreciation for the artistry, diversity, and antiquity of human cultures in the Old and New Worlds. Then, combining the media of book publishing and fine art printing, a multitude of richly illustrated multivolume books – such as von Humboldt's *Voyage aux regions equinoxiales du Nouveau Continent* (Paris 1807), the French Commission des Sciences et des Arts' *Description de l'Egypte* (Paris 1809), and, later, the acclaimed *Incidents of Travel in Central America, Chiapas and Yucatan* (New York 1841) by the American diplomat, explorer, and writer John Lloyd Stephens (1805–1852) as illustrated by English artist and architect Frederick Catherwood (1799–1854) – began to regularly appear to the delight and astonishment of the reading public with visually informed descriptions of the archaeological wonders of the world's past civilizations.

The efforts of those studying archaeology and history in Europe and the Americas, however, did not prevent the widespread destruction of many of these sites within their own communities. There remained the need to develop and inculcate a widespread *conservation ethic* in societies as a whole, to develop an appreciation for what American preservationist and architectural historian James Marston Fitch (1909–2000) would later call – in our modern age of industrialized duplication and facsimilitude – the need to "preserve the prototype" (Fitch 2001). There was, of course, a bias inherent in much of what was being viewed by those doing the viewing and the studying toward those sites with physical remains that were permanent and monumental which we recognize today that went largely without comment at the time.

For an ethic of heritage preservation to diffuse and become instilled in societies across the world, there was required a medium of communication that could carry its *ideas* and the *idioms*. Also, at a time with high rates of illiteracy and poverty, even for those people who could read, the common media for transmitting ideas of heritage conservation – books and art – were expensive and intellectually detached from the lives of most people. Other avenues of instruction were needed.

One development was the recognition of the growing public interest and comprehension of archaeology from book publishing and artistic printing, particularly among the growing mercantile classes with some measure of disposable income and education. Hence, the establishment in the eighteenth century of the modern *museum* provided a forum for the public to view and discuss the exhibits of objects of cultural and natural heritage in their most tangible form. For instance, William Bartram's Philadelphian friend, the artist and naturalist Charles Willson Peale (1741–1827), established his *Philadelphia Museum* as North America's first public museums in 1786. Though other museums – such as the Vatican Museums in Rome and the Ashmolean Museum in Oxford – had opened to limited numbers of the social elite ("the public") in the fifteenth to seventeenth centuries, Peale's museum was envisioned as a more truly democratic institution, open to people of all classes of society, as most museums are throughout the world today.

Peale conceived of his museum's spaces – such as the "Antique Room" along with other galleries that displayed artifacts and ethnographic objects from throughout the Americas, the Pacific, East Asia, and Europe that were tangibly and closely present to visitors – in a way that most people were previously unable to experience. A widely recognizable image is Peale's 1822 self-portrait painting, *The Artist in His Museum*, in which he is depicted lifting the curtain to reveal to the viewer a space of row upon row of his wondrous array of fossils, mounts, objects, and artwork unlike almost anything seen anywhere else in the world up through that time except by a small number of the very rich.

Peale also recognized the power of promoting his museum through the use of *newspapers*.

Long one of the most influential of the communication media, newspapers were the ubiquitous lifeblood of information in the mercantile ports, city streets, and country shops of the Americas and Europe in the eighteenth and nineteenth centuries. Peale's desire was that his museum would serve to educate and entertain both rich and poor about the diversity of the world's cultural and natural heritage (Hansen 2008), and newspapers made it affordable to promote this idea to a mass audience through their articles and advertisements.

Print journalism became one of the more vital media in the early efforts for decrying the destruction of cultural heritage and in the advocacy for the preservation of sites. Notably, one of the first heritage landmarks to be saved from destruction was Pennsylvania's Old State House, best known now as *Independence Hall* and the site of the signing of the Declaration of Independence in 1776 and other momentous events in America's early national history. Transferred from state custody to that of the City of Philadelphia in 1812, the city had proposed demolishing the building and selling off the land for development, but a public outcry to such an action led by the community's newspapers succeeded in ensuring the preservation the building in 1816 (Nash 2006). Notably, Peale's museum was a tenant of the building's second floor.

Another significant development that aided in the development of media networks for the spread of information – regarding cultural heritage or any other subject through the mail and newspapers – was the creation of national *postal services* with uniform, affordable mail delivery rates and the coeval creation of reliable post roads throughout these countries. Thus, the formation of national postal service and post road systems, along with the technological development of steamboats and railroads in the early nineteenth century, created *national transportation and communication networks* that facilitated the ability to send current news, information, and publications to people throughout the nations of Europe and the Americas and elsewhere which coincided with the growing awareness of preserving heritage sites and the creation of national identities. For example, the national postal and transportation system created in the United States allowed Ann Pamela Cunningham (1816–1875), the founder of the Mount Vernon Ladies' Association, to successfully manage a network of supporters across America for soliciting contributions for the purchase and preservation of George Washington's former estate of *Mount Vernon* in Virginia from 1853 to1858 (Murtagh 2006). Her work is considered a watershed event in the preservation movement in North America.

As other technological developments related to communications media occurred, these were also incorporated into the archaeological and heritage conservation tool kit. The advent of *photography* in 1826, and its subsequent improvement by the French photographic pioneer Louis-Jacques-Mande Daguerre (1787–1851) in 1839, permitted detailed imagery of actual archaeological sites to be composed and transmitted more quickly and accurately than drawings or paintings to persons anywhere. In producing these early images, it was not uncommon to photograph a scene that contained a site of archaeological interest which was incidental to the original purpose of the photograph. Many of these early pictures document in great detail the contemporary surroundings and conditions of individual landmarks and remain of great interest to archaeologists, architectural historians, and others interested in the details of a site. A historic image of a landmark can be juxtaposed with a modern photograph – such as a picture of the Roman Colosseum in the 1860s and an image of the same view in the present – to gain a detailed perspective and insight into the changes that have taken place over time (D'Orazio 2004).

The use of photography as a medium of communication within archaeology coevolved with the discipline in the nineteenth century as archaeologists sought to use images to convey the sense of place of the sites they were studying and to document the artifacts that were recovered. During this period, the French army officer, travel writer, and photographer Maxime du Camp (1822–1894)

was among the first photographers to incorporate images of archaeological sites – such as those in Egypt – into books, such as his *Égypte, Nubie, Palestine et Syrie* (1852), which further whetted the popular interest in the past using the new medium. The Greek photographer Dimitrios Constantinou (fl. 1850s–1870s), better known in English as "Dimitris Constantine," is recognized as the second professional photographer in Greece and whose work stands out for being conducted specifically for the Greek Archaeological Society in recording excavations and archaeological sites, as well as for its quality.

The German architect and archaeologist Ernst Emil Herzfeld (1879–1948) was among the first professional archaeologists to systematically use photography as a tool of study and documentation. Herzfeld participated in and later led expeditions in Iraq, Iran, Syria, and Turkey from 1903 to 1934, and his photographs of early western Asian civilizations richly inform his writings and those of his German friend and colleague Friedrich Sarre (1865–1945), director of the Islamic Museum in Berlin (Bloom & Blair 2009). His extensive photographic collection of nearly 4,000 glass negatives from his work forms part of the "Ernst Herzfeld Papers, 1899–1962" of the Freer Gallery of Art and Arthur M. Sackler Gallery Archives of the Smithsonian Institution in Washington.

One of the earliest and best known deliberate uses of photography to document and exploit the popular image of the "romance" of exotic archaeological excavations was by the American archaeologist and explorer Hiram Bingham (1875–1956). In his 1911 expedition to the "Lost City of the Incas," Macchu Picchu, while high in the Peruvian Andes he wrote, "Would anyone believe what I had found? Fortunately, in this land where accuracy in reporting what one has seen is not a prevailing characteristic of travelers, I had a good camera and the sun was shining" (Bingham 1996).

Following photography, the ability to quickly share information about a major discovery or even plan or maintain the mundane logistics of a long-distance expedition to an archaeological site was aided greatly by the independent development of the first commercially practical application of the *electrical telegraph* in both Britain and the United States in 1837. Several decades later, British architect and archaeologist John Turtle Wood (1821–1890), for example, summarized how telegraphic communications could combine with the other technological innovations of the time to aid him in his excavations at Ephesus. Although appended with a personal critique of the waste of resources on less important subjects than archaeology – a refrain still common today in the field – he wrote:

> The explorers of half a century ago had neither steam to convey them to distant coasts, nor the practical knowledge of archaeology which we now possess to guide their researches, nor photographers to record their discoveries, nor an electric telegraph wherewith to maintain communication with a distant base of operations. We, with all of these appliances, and with boundless wealth at the command of individuals, if not of governments, grudge to these great enterprises the money which is daily wasted on trivial and ignoble objects (Wood 1877).

Although telegraph communications would be supplemented by the end of the nineteenth century by the *telephone* and eventually replaced by it in the twentieth century, these two media exponentially increased the ability of archaeologists to communicate their work both within and without the profession.

By the late nineteenth century, another communication medium had developed and was stirring the popular imagination regarding archaeology and heritage sites around the world: the *novel*. One of the most influential novelists was the English author Sir Henry Rider Haggard (1856–1925), creator of the Allan Quatermain character and considered the first to write in the "Lost World" genre of fiction. His first book, *King Solomon's Mines* (London 1885), was inspired by both Robert Louis Stevenson's *Treasure Island* (London 1883) and by the archaeological discoveries of the day. The character of the dashing explorer-archaeologist, itself inspired by a number of seemingly larger-than-life figures of the nineteenth century – such as the Italian adventurer in Egypt Giovanni Battista Belzoni (1778–1823) and the British explorer,

archaeologist, and statesman Sir Austen Henry Layard (1817–1894) – would itself further inspire future generations of students of archaeology and even more fictional characters in both twentieth century literature, such as in the writings of English author Agatha Christie (1890–1976), herself married to an archaeologist, but especially in the new cinematic art of *motion pictures*.

Movies have arguably been the medium that has had the most influence on the popular view of archaeology and cultural heritage. Among the first *silent films* to depict archaeologists – particularly those afflicted with tomb curses and avenging mummies – were *The Vengeance of Egypt* (French, 1912), *When Soul Meets Soul* (American, 1912), and *The Wraith of the Tomb* (British, 1915), among others. Subsequent *talking films* have continued using archaeology as a plot device for cinematic adventure up to the present, from *The Mummy* (1932) to the Indiana Jones character films, beginning with *Raiders of the Lost Ark* (1981) to *National Treasure* (2004) and others. Apparently, after more than a century's worth of books, news articles, artwork, museum exhibitions, and novels, a near universal understanding of the intersection between archaeology and adventure has been created in the popular imagination.

This is not to say that archaeologists themselves have not used the medium of film for more academic purposes. Archaeologists began capturing their field excavations on *documentary films* as early as the 1920s, but the content of these first works was haphazard and the quality often uneven. In 1937, the *Tennessee Valley Authority* in the United States produced a film, *Shell Mounds in the Tennessee Valley*, which was among the first to have a soundtrack and set a high standard for future documentary films for the public. Since that time, with the cost of filming over the years steadily declining and, most recently, the appearance of relatively simple and inexpensive digital handheld cameras, the ability to film excavations and document sites is quite literally within the grasp of virtually any project team to bring its work to the public's attention.

Documentary filming in some contexts, however, remains a significant challenge, particularly in the realm of submerged archaeological sites. Among the earliest underwater archaeology films was *Epaves* ("Shipwrecks," 1943) by the French explorer, marine conservationist and filmmaker Jacques-Yves Cousteau (1910–1997), many of whose later films were made for broadcast for *television*.

In the case of life imitating art, both Cousteau and the American marine geologist and archaeological oceanographer Robert Duane Ballard (b. 1942) are said to have been inspired by the novel *20,000 Leagues Under the* Sea (Paris 1870) by French author Jules Verne (1828–1905). In 1985, in his own version of Verne's fictional submarine, *Nautilus*, Ballard discovered the site of the famed wreck of the *HMS Titanic*. The disclosure of the wreck's location – from which Ballard refused to remove anything from because of his belief that it should be protected as a maritime gravesite – led to it being salvaged by a for-profit the year after Ballard broadcast footage of the discovery to the awe of millions of television viewers in 1986 (Ballard 2010). Then, coming full circle, a fictional maritime archaeological discovery of the wreck was later depicted in the immensely successful film *Titanic* (1997).

In the second half of the twentieth century, imagery and sounds related to archaeological endeavors have been regularly broadcast by *radio* and *television* media. Among the most important and prolific promoters of archaeology through the broadcast media (as well as in print) was the Scottish military officer and archaeologist Sir Mortimer Wheeler (1890–1976) and the Welsh archaeologist Glyn Daniel (1914–1986), both of whom often worked closely together on BBC radio and television programs in the 1950s. In fact, Wheeler became "Television Personality of the Year" in 1954 on the BBC (Noel Hume 2010).

In recent years, archaeology-themed documentaries have become a staple of television. They have, however, been criticized for presenting content that is not very relevant to the audience to which they are being shown.

An Australian study showed that most of the content for local audiences was produced by foreign production companies (such as the BBC) about sites in other countries and were not reflective of the diversity of their audiences (Nichols 2006).

These documentaries, however, are not to be confused with the *reality television* genre that has arisen in recent years. Shows such as *Extreme Archaeology* and *Digging for the Truth* – which focus more on attractive participants (many not even trained in archaeology) in contrived, sensationalized "searches" for information – are becoming ever more commonplace as pay-television broadcasting seeks more "content" to fill its "air time" (Nicholas 2005).

Nonetheless, the prints, paintings, photographs, films, and television imagery of archaeology and heritage sites of the last two hundred years have thoroughly prepared the groundwork for the completely visually oriented society that exists today. Contemporary popular culture is infused with and accepting of imagery of past cultures as a result of the role of mass media. Combined with this, the technological and information revolution brought about since the 1960s in the use of *computers* and the role of the *Internet* over the last 20 years has brought information about archaeology and cultural heritage – in all forms, such as in advertising and *computer games* – to homes in every part of both the developed and developing world. The mass media has made the imagery of archaeology, through its replication and application in all forms, completely ubiquitous.

The use of computers and the Internet has greatly expanded the reach of all media and the ability of information on archaeological site preservation to reach a variety of audiences. Researchers and the public can readily access books, articles, and studies online from the comfort of their own homes. Publications and archival documents and photographs once available from a small number of research collections and usually only used or visited by a small number of researchers are now regularly being reproduced in a digital format and made available to anyone. *Aerial photography* and *satellite imagery*, both long part of the archaeological toolkit for teasing out the possible locations of sites, are now openly viewed on websites offering free map services to the public. In Ireland, as elsewhere, the use of computer-aided Internet tools such as *Google Earth* has made possible the finding of archaeological sites by both professional archaeologists and the public alike (Darby 2007).

Additionally, among the field of archaeology's oldest and most effective forms of media are *magazines* and *scholarly journals*. Journals and magazines, like their cousin the newspaper, have been around quite a long time with some of the earliest that were devoted exclusively to archaeology and heritage arising as publications of local history and antiquarian societies formed in the mid-eighteenth through nineteenth centuries, such as the Society of Antiquaries' *Archaeologia* (1770), the British Archaeological Association's *The Archaeological Journal* (1845), and the Norfolk and Norwich Archaeological Society's *Norfolk Archaeology* (1847) in Britain. The enormous popularity of both the scientific journal and popular magazine format – often accompanied by illustrations, photographs, maps, and figures – is attested by the hundreds of publications produced around the world in most major languages that can inform both professional and nonprofessional alike of current developments in the field, work that is the culmination of years of research and other news of note, including training and educational conferences.

A clear consequence of the mass media's promotion of archaeology is the greater sense of shared history and interest in cultures that now exists across the globe. The discovery of a significant site in a remote part of eastern Asia or the Australian outback is nearly as likely to make the headlines in Rome or New York as one found in more familiar places, such as Europe, Mexico, or the Near East. The increased attention provided to the preservation of heritage lends widespread appreciation and support for the use of national parks and local landmarks and museums. There is recognition among archaeologists and other preservationists of the professional need and responsibility to better engage the public to achieve the support needed for

public funding of research and site protection, to instill a cultural desire to preserve cultural heritage, and to prevent depredations, looting, and vandalism to archaeological sites and other monuments. A 1999 survey in Canada shows that the public is very interested in archaeology and is supportive of preserving heritage sites but has a limited understanding of archaeological interpretation and heritage site protection laws (Pokotylo & Guppy 1999).

Key Issues/Current Debates

Over the past century and still in the present, there exists a debate within archaeology over the depiction of both archaeologists and the field of archaeology in the media. This is not a new debate: it is one that pits the common conception of the field as filled with romance and adventure against that of archaeologist as out-of-touch scientists who are absentmindedly lost in the past. It is a product of two centuries of conflicting media exposure, both fictional and not.

Addressing this is largely a matter of public relations and public archaeology. Unfortunately, there has been very little written in the professional journals about conducting "good PR" that helps to dispel misconceptions of the field and instill a better understanding of the profession in preserving shared cultural heritage with rare exception. McManamon (1991) challenged archaeologists more than 20 years ago to do a better job of engaging and educating the public about the goals and roles of archaeology in preserving heritage.

The ease of access to heritage sites and the information about them also has a more troubling aspect. Archaeological site looting, or pot-hunting as it has long been called, has long been a problem for the field. But the same modern tools, equipment, and access to information that have made work for professional archaeologists better have also made it easier for looters to damage sites as well, usually for profit. The misunderstanding fostered by "reality" television shows has not helped distinguish professional archaeologists from those that are little more than looters. So, amid protests by professionals, it was not unexpected that recent "reality" television programming in the United States, such as the National Geographic Channel's *Diggers* or Spike TV's *American Digger*, disregards the contextual, informational, and conservation goals of archaeology and, instead, focuses narrowly on the potential monetary reward of site destruction and the "adventure" of the find (Kloor 2012). The field of archaeology – keeping in mind its ethical responsibilities to its work and the conservation of sites – has a great opportunity here to do better and offer better programming that is engaging, audience focused, and accurate in its scope.

All of this serves to illustrate that although public-focused archaeology that relies on the media to assist in presenting its message has expanded greatly in much of the developed world, much more still needs to be done and it is a continual process of effort. One example of the successful establishment of a public program is in Florida, where the state legislature established the Florida Public Archaeology Network (FPAN) in 2004 with a headquarters and eight regional offices staffed by professionals who develop local public programming and assist local governments.

Just as the public has found great benefit in having better digital access to formerly difficult to obtain information, there is still a great need for the profession to make use of the millions of archive records, photographs, and artifacts from prior excavations of the past 200 years. The diminishing numbers of certain types of cultural sites due to rapid urbanization in many parts of the world demand that archaeologists use the media available to conserve finite cultural and financial resources.

One of the benefits of the digitization projects is the great availability of digital resources, both in finding specific collections and in accessing difficult-to-find information. As the use of photography in archaeological excavation and for the documentation of sites was well established by

the first half of the twentieth century, there are vastly underutilized photographic archives in universities and museum holdings around the world. Yet, there remains a great need to catalog and make accessible these valuable resources, particularly in countries and places where resources are scarce. For example, the Smithsonian has recently undertaken efforts to digitize the thousands of images created by Herzfeld in his work in the Near East, but thousands upon thousands of photographs from other sites – such as those from nearly a decade of work at Dura-Europos in Syria from 1928 to 1937 – remain largely unpublished and inaccessible (Baird 2011).

International Perspectives

Given the recent conflicts in Syria and the overthrow of governments in North Africa, coupled with the current political instability in the Near East where archaeological tremendous study has taken place for generations, the preserved collections that exist outside these areas take on an added and special importance to both scholars and the public for understanding human history and culture.

Training programs for archaeological and heritage professionals have been sponsored by institutions in North America and Europe for some time in these areas, to better establish a cadre of local professionals that are part of the local community. Foreign government agencies, such as the US Agency for International Development (USAID), recognize that providing local communities with stable sources of income and education helps deter looting, promotes understanding of indigenous cultures among both locals and visitors, and provides a source of income for cultural tourism (Amin & Jones 2008). However, recent events in the civil unrest for the governments of Libya, Egypt, and Syria have put such programs on hold, have led to reports of the damage to or looting of sites, and undermine or eliminate progress in heritage conservation that has taken years to establish.

Another important development is the recognition throughout the profession worldwide that there is a need to better and more formally teach archaeological practitioners how to communicate to divergent public audiences through the audio-visual media. At the University College London's Institute for Archaeology, for example, there has recently been established the *Centre for Audio-Visual Study and Practice in Archaeology* (CASPAR) which seeks to "promote research into the relationship between audio-visual media and archaeology" and to "enable inventive and creative use of audio-visual media by archaeologists" among it several aims.

To spread such information, many of the world's national and international nongovernmental heritage preservation organizations, such as the *International Council on Monuments and Sites* (ICOMOS), rely heavily on the use of electronic media to quickly and cost-effectively reach local and international audiences. The efficiency of the new Internet and social media in reaching large numbers of archaeological and other heritage professionals, interested members of the public, and elected decision makers has made their incorporation into most NGOs communications strategies a prerequisite. For instance, when a rebel military force overran the ancient scholarly city of *Timbuktu* in Mali in the spring of 2012, the international archaeological community and relief NGOs quickly became aware of the threats to the city's ancient mud-brick shrines, libraries, and other structures within days as computer and mobile telecommunication devices were able to send messages, photographs, and video images out of the city despite its occupation.

Similarly, a number of governmental organizations, such as the US military's *Joint Prisoner of War/Missing in Action Accounting Command* (JPAC) which is based in Hawaii, have also taken to the use of the new media formats to disseminate information about their missions. Composed of interdisciplinary teams of archaeologists, historians, forensic anthropologists, and active-duty military, JPAC sends its members around the world to recover the remains of military service

members from sites where they died overseas in battle, but who were never brought back for burial in the United States. JPAC works closely with foreign governments in its fieldwork in other countries and communicates the results of its activities to the public through an effectual media relations program of emails, blog posts, web pages, video links, and other electronic and social media formats that builds support for its work.

As the world becomes increasingly "smaller" through the use of communications media, the opportunities to better understand the archaeology of cultures, such as China, which have heretofore been largely inward looking, become markedly improved. There is a great need in the developed world to better understand the developing world, as the issues of one nation rarely stay confined within its actual – or even "digital" – borders any longer.

Future Directions

Understanding the role that communications media holds in modern society is crucial and unavoidable in modern archaeology and heritage site preservation. Archaeologists and preservationists at all levels must develop a keen awareness of all media in developing plans for the study and conservation of sites and expect to be engaged with the public's appreciation for the past and heritage conservation. Professional archaeologists – who have readily adopted new technologies for communicating their work throughout the history of archaeology – have been much slower to recognize the necessity of public engagement with the field. The rapidity and ubiquity of communications media require the profession to see the great opportunity that now exists to dispel misconceptions about the field, to readily involve the interested public about its work, to lobby for changes in legislation for the better protection and conservation of sites and artifacts from illegal looting or trade, and to inspire people of all backgrounds to use the communications media at their disposal to take an active role in preserving the world's shared cultural heritage.

Cross-References

- ▶ Advertising and the Appropriation of Culture
- ▶ Cultural Heritage in the Digital Age
- ▶ Film, Archaeology in
- ▶ Internet, Archaeology of the
- ▶ Publication in Field Archaeology
- ▶ Television and Archaeology: Views from the UK and Beyond

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Preucel, Robert W.

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Basic Biographical Information

Robert W. Preucel (Fig. 1) is an anthropological archaeologist who is a leading voice in many areas of archaeological theory and practice, from Native North American archaeology to problems of philosophy and epistemology, to the engagement with Native communities in archaeological practice and academia more generally. He received his B.A. in anthropology in 1978 from the University of Pennsylvania. Having interests in both North American and Near Eastern archaeology, Preucel subsequently took a Master's degree (1979) at the University of Chicago where he studied at the Oriental Institute. While at Chicago, he became interested in archaeological method and theory, in particular processual archaeology, and so from there embarked on a Ph.D. (1988) in archaeology at UCLA, where he studied processualist methods and Puebloan archaeology under the guidance of James N. Hill.

After graduating from UCLA, Preucel was awarded a postdoctoral fellowship at the Center for Archaeological Investigations at Southern Illinois University, Carbondale (1988–89), where he organized a conference on the Processual-Postprocessual debate (Preucel 1991a). In 1989, he joined the faculty of Harvard University as an Assistant Professor of Anthropology and Assistant Curator of North America at the Peabody Museum. He was later promoted as Associate Professor and Associate Curator (1993–1995). In 1995, he returned to the University of Pennsylvania, this time as Associate

Preucel, Robert W., Fig. 1 Robert Preucel

Professor of Anthropology and Associate Curator of the American Section of the University Museum. He was promoted to Professorship in 2007 and two years later made the Sally and Alvin V. Shoemaker Professor of Anthropology and the Gregory Annenberg Weingarten Curator-in-Charge of the American Section of the University Museum. He served as the Chair of the Department (2009–2012) and the Director of the Center for Native American Studies (2007–2013). In 2013, he was appointed as the Director of the Haffenreffer Museum of Anthropology and Professor of Anthropology at Brown University.

Major Accomplishments

Robert Preucel has made and continues to make significant contributions to several different arenas of scholarship and practice, most notably archaeological theory, Puebloan archaeology, and engagement with Native American communities. His interest in archaeological theory and epistemology drew him first to study Processual approaches and then consider its critiques over the course of his doctoral studies. While a graduate student, he coauthored an important essay on those debates with Tim Earle entitled "Processual Archaeology and the Radical Critique" (Earle & Preucel 1987). Subsequently, the conference he organized as a postdoctoral scholar at Carbondale resulted in one of the most important volumes on this debate (Preucel 1991a), with his essay "The Philosophy of Archaeology" (Preucel 1991b) remaining a key distillation of the core components of archaeological reasoning. In 1996, he collaborated with Ian Hodder to write the first incarnation of *Contemporary Archaeology in Theory* (Preucel & Hodder 1996), a reader on archaeological method and theory that was as valuable for the short introductory essays that Preucel and Hodder wrote as for the readings it contained.

During his time at Harvard, Preucel had the opportunity to expand his interest in philosophy through interaction with colleagues such as Terry Deacon, David Rudner, and Rosemary Joyce, and at the Peirce Sesquicentennial International Congress at Harvard University in 1989, he first encountered the semiotic writings of American philosopher Charles Sanders Peirce, whose work focused on the production of meaning and the logic of inferences about the world. Preucel felt that Peirce's model, notably being non-foundational and an alternative to both positivist and non-positivist approaches, might be especially productive for archaeological inquiry and its problem of verifiability. He laid out and tested this framework in a series of essays (Preucel & Bauer 2001; Capone & Preucel 2002; Ferguson & Preucel 2005), culminating in his 2006 book *Archaeological Semiotics* (Preucel 2006). Preucel continues to explore Peirce's ideas and in particular the utility of pragmatism generally as a way to produce a more inclusive and ethically engaged archaeology (Preucel & Mrozowski 2010), particularly with respect to bridging Native and indigenous ways of knowing the world with Western scientific approaches.

Preucel has had a long-standing research engagement with the Puebloan communities of the southwest United States. Since 1995, he has collaborated with Cochiti Pueblo in New

Mexico on the Kotyiti Research Project, a multidimensional study of an ancestral Cochiti village from the time of the Pueblo Revolt, incorporating archaeological survey, mapping, oral history study and interviews with elders from Cochiti, and museum and historical analysis. This project seeks to address questions about the links between past and present identities as well as what constitutes responsible and ethical collaboration. Engagement with the Cochiti community is a central pillar of this project and it includes the active participation of Cochiti elders as well as youth through an internship program. Both in the Kotyiti Research Project and in his collaborations with T.J. Ferguson and his former students, Preucel has sought to understand the ways in which Puebloan identity and ideology was expressed materially during the period of the Pueblo Revolt and since (Preucel 2002, 2006; Liebmann & Preucel 2007).

Preucel's involvement with Native Americans and concerns about ethical academic practice have not been limited to his own research agendas, but have guided much of his work at the University of Pennsylvania Museum and in the University as a whole. At the University Museum, he has facilitated collaborative relationships with many Native American communities, and has provided important examples of how NAGPRA works at its best. He has also been active in increasing Native American participation and enrollment at Penn through serving on university-wide committees on diversity outreach, minority recruitment, and pushing to establish the Center for Native American Studies. Through this work, and in complement to his academic research goals, Preucel has sought to increase the visibility of Native Americans in academia and raise the profile of topical concerns of Native peoples more generally.

Cross-References

- ▶ Earle, Timothy
- ▶ Hodder, Ian (Theory)
- ▶ Indigenous Peoples, Working with and for
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Post-Processual Archaeology
- ▶ Pragmatism in Archaeological Theory
- ▶ Processualism in Archaeological Theory
- ▶ Semiotics in Archaeological Theory
- ▶ Theoretical Archaeology Group (TAG)

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Processualism in Archaeological Theory

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Introduction

For approximately 20 years during the 1960s to the 1980s, lively discussion about theoretical and methodological issues characterized Euroamerican archaeology. Much of the debate centered upon an approach called New Archaeology or processual archaeology that originated in the United States. In this entry we provide our perspectives upon the mid-twentieth-century controversies about the nature and goals of archaeology and make reference to some of the more prominent subsequent developments.

Definition

We use the phrases "New Archaeology" or "processual archaeology" to mean a problem-oriented, generalizing rather than a particularizing approach toward archaeological data, with the goal of advancing knowledge about social, cultural, and political processes characterizing past human societies. This view derives from the development of anthropology within the United States during the first few decades of the twentieth century as a holistic study of humankind from origins to the present day. Anthropology was conceived as a social science wherein archaeologists, ethnographers, linguists, and physical anthropologists carried out worldwide comparative cross-cultural research on humankind, past and present, wherever relevant evidence could be found.

Historical Background

Prior to the rise of processual archaeology, however, Americanist archaeologists of the early to mid-twentieth century focused quite narrowly upon chronology and comparative typology. There was such a heavy emphasis upon chronologically diagnostic artifacts and their travels through time and space that the phrase "time-space systematics" was and still is often used to describe 1930s–1950s Americanist archaeology. Although efforts were made during this period by a few archaeologists to broaden the scope of archaeology in the USA, these had no discernible effect. Neither did a closely reasoned, strongly argued, book-length critique that appeared shortly after World War II (Taylor 1948; see Maca et al. 2010). During the early 1960s, however, Lewis Binford began to attract considerable attention to his views concerning anthropological archaeology. Binford's program for change (Binford 1962, 1964, 1965) was labeled "processual archaeology" by many of its advocates (e.g., Flannery 1973) and instigated considerable methodological and theoretical ferment. In his initial manifesto, Binford (1962) begins by quoting the well-known statement of Gordon Willey and Phillip Phillips that "American archaeology is anthropology or it is nothing." He then proceeds to assess the performance of Americanist archaeology with respect to supporting the aims of anthropology as the integrated discipline it was supposed to be. He defines those aims as explicating and explaining

"the total range of physical and cultural similarities and differences characteristic of the entire spatial-temporal span of man's existence," notes that while major contributions have been made by archaeologists to explication of past cultural systems, they have done virtually nothing about explanation of those past cultures as functioning systems. Binford's definition of explanation is:

> . . .simply the *demonstration* of a constant articulation of variables within a system and the measurement of the concomitant variability among the variables within the system. Processual change in one variable can then be shown to relate in a predictable and quantifiable way to changes in other variables, the latter changing in turn relative to changes in the structure of the system as a whole. This approach to explanation presupposes concern with process, or the operation and structural modification of systems (Binford 1962: 217, italics in original text).

He goes on to declare with Leslie White that culture is "the extrasomatic means of adaptation for the human organism" to the total physical and social environment (Binford 1962: 218) and that the "formal structure of artifact assemblages together with the between element contextual relations should and do present a systematic and understandable picture of *the total extinct* cultural system" (Binford 1962: 219, italics in original text). Binford notes that all cultural systems are made up of three subclasses of material culture. These are the technomic, which have "their primary functional context in coping directly with the physical environment"; the socio-technic, which are "the material elements having their primary functional context in the social subsystems of the total cultural system"; and the ideo-technic, which have "their primary functional context in the ideological component of the social system" (Binford 1962: 219).

Binford's subsequent research and publications, however, as distinct from this initial programmatic essay, centered so heavily upon the technomic aspects of past cultures that one of his peers aptly characterized Binfordian processual archaeology as "econothink" (Hall 1977). There were also significant differences in emphasis among processualists about the ultimate goals of their endeavor (Flannery 1973; Watson et al. 1984), but there was general agreement upon the importance of explicitly problem-oriented, hypothesis-testing research designed to secure knowledge of the human past that would advance the goals of archaeology conceived as social science.

Thus, the original debate centered upon archaeology as a very narrow kind of history vs. archaeology as (social) science, but more was at issue than just the difference between particularistic and generalizing goals. It was thought that prehistorians concentrating upon time-space systematics attempted to document the archaeological facts accurately but that they explained those facts by appeals to common knowledge. That is, they relied upon explanations that were untested, and therefore not scientific. A classic example is the issue of migration. Obviously, there have been many migrations in the past, a proposition no reasonable person would deny. To invoke migration as an *explanation* for cultural change, however, is problematic. What is the evidence that there actually was a migration? That is, how does an archaeologist establish that a migration happened at the time and place in question? Even if there is convincing evidence for such a migration, what further evidence indicates that this migration caused the change under investigation rather than some alternative or additional causal event or process? *Why* was there a migration? Binford and other advocates of the processual approach insisted that archaeologists could and should do much more than simply documenting cultural change in the archaeological record, saying a migration caused it, and leaving it at that. Peter Bellwood (2009) provides a good recent example of the alternative approach advocated by Binford as he attempts to understand why farmers migrated successfully under some circumstances but not others.

Another objection to archaeology practiced as narrowly focused cultural history was that the cultural historians were content simply to describe past objects and events with little or no attempt to understand the configurations they were describing. Trait listing and time-space systematics seemed to be the primary goals of archaeological endeavor. Hence, the main point

the processualists were making was not that cultural history is bad per se but rather that it differs significantly from the broader approach they proposed and that it has far less scientific value.

The cultural history vs. cultural process debate – as it took shape in the 1970s – seems to be over. Most archaeologists understood the differences just described, and many broadened their approaches to include explicit problem definition prior to fieldwork as well as formulation of testable hypotheses concerning the expected results of that fieldwork. Even those who continued to be particularistic cultural historians became more careful about the basis for their interpretations of the past.

Processual archaeology was eagerly embraced by most younger Americanist practitioners. By the late 1970s, processual archaeology was so widely accepted in the USA that NSF peer review panels for archaeological proposals, for example, required clearly defined and justified anthropologically significant research problems with clearly defined research designs specifying expectations (hypotheses) to be tested by the proposed fieldwork. One 1970s observer – Robert C. Dunnell – did voice some serious qualms, however:

> The rapid development of CRM has to a certain degree upset the normal progress of disciplinary development (in Americanist archaeology) because it threatens to make permanent the condition of the discipline at a time in which rigidity is least warranted (Dunnell 1979: 449).

As he makes clear, Dunnell's reservations derived in large part from his concern about the impact of Cultural Resource Management in the USA subsequent to the 1974 addition (via what was known at the time as the Moss-Bennett Bill or the Archeological Data Preservation Act) of archaeological remains to federal environmental impact legislation. Fortunately, Dunnell's worst fears did not come to pass, thanks to strenuous and unremitting efforts by both academically based and CRM archaeologists working with each other and with American Indian groups as well as other local communities and stakeholders. Such efforts continue to the present time and have caused significant alterations in the scope and practice of archaeology in the USA, the great majority of which is now CRM archaeology.

While CRM legislation was transforming the organization of archaeology in the USA, however, a different set of powerful challenges to the theoretical core of processualist Americanist archaeology arose in England and Western Europe (Hodder 1982; Shennan 1986). In one of the first formal accounts of major disagreement with the processualist agenda, Ian Hodder (1985) used the term "postprocessualism," which is still a convenient label for the wide array of anti-processualist as well as non-processualist perspectives that emerged within Euroamerican archaeological discourse during the 1980s and after.

As noted above, in Binford's first call to reform Americanist archaeology (1962), he refers to potential recovery from the archaeological record not only of technomic but also socio-technic and ideo-technic data enabling inferences about ancient sociocultural and cognitive systems. Many early processualist studies were well conceived and well executed, and several made careful use of ethnographic data (e.g., see Hill 1970). Moreover, some archaeologists undertook archaeologically relevant ethnographic fieldwork themselves in aid of specific archaeological projects (Binford 1978, and see David & Kramer 2001). The great majority of research by processualists, however (especially that of Binford, the primary role model), centered upon relations among the subsistence-settlement systems of ancient communities and their ecological contexts.

Hence, although many 1960s–1970s processualist efforts were very successful, they were also quite narrowly focused, leaving the practitioners vulnerable to critiques by postprocessualists who pointed out the general lack of attention by processualists not only to what Binford had called socio-technic and ideo-technic realms of culture and society but also to the sociopolitical contexts of archaeology as a disciplinary community and of individual

archaeologists operating within contemporary nation-states. By the mid-1980s, one European archaeologist confidently stated that the center of gravity for theoretical archaeology had shifted from the USA to Europe and that "the days when keen young undergraduates and research students eagerly awaited the next issue of *American Antiquity* are long gone" (Shennan 1986: 327).

Key Issues/Current Debates

As outlined above, key issues for processualist archaeologists initially were definition of significant, anthropologically relevant research goals and the best means for reaching them via scientific methods. In fact, however, most early processualist studies were focused upon investigating past physical and biological environments of archaeological sites and regions with emphasis upon subsistence regimes and settlement systems characterizing communities that once inhabited those ancient environments. Early advocates of New Archaeology or processual archaeology were more intent upon scientific method than upon social theory, more upon epistemology than ontology. Methodological reform of traditional time-space systematics archaeology was certainly warranted, but just as that reform became widely accepted, the narrowness of the original processualist program was vigorously attacked by archaeologists in England and continental Europe who were not committed to archaeology as anthropology or archaeology as science vis-a-vis archaeology as traditional cultural history or art history. They were also conversant with large bodies of literature on social theory that were not then present in the scholarly backgrounds of most Americanist archaeologists.

The initial postprocessualist impact during the 1980s and 1990s was the entering wedge for an enormously broadened scope of archaeological debate well beyond that defined during the 1960s–1970s by processualist archaeologists. A vastly wider array of orientations and goals was strongly advocated, ranging from symbolic-structuralism and other paleo-cognitive orientations to latter-day Marxian and post-colonialist perspectives. There was considerable emphasis upon issues of gender, both past (i.e., seeking evidence of gender-based activities in the archaeological record) and present (e.g., recognizing gender-based differences in contemporary beliefs about appropriate education for male vs. female student archaeologists). Much concern was also directed toward descendant communities and indigenous groups, to contemporary processes of domination and resistance in colonial situations or totalitarian nation-states, and to the political uses of archaeology. Postprocessualists urged archaeologists to practice their profession as self-aware and socially responsible citizens of the modern world.

International Perspectives

Processual archaeology was a mid-twentieth-century development, created and initially promulgated by anthropological archaeologists in the United States. The wide array of orientations and approaches loosely grouped under the rubrics of postprocessual (and by now *post*-postprocessual) archaeology is primarily a product of European archaeologists drawing upon European social theory and philosophical systems. The original global forum for archaeological research, the International Union of Pre- and Protohistoric Sciences, was founded in 1931. The heavily Eurocentric IUPPS was a scholarly organization overtly disengaged from nationalist and global political venues. In 1986, the IUPPS was challenged by a new international organization: World Archaeological Congress (Ucko 1987; Gero 2008). Although the two were originally hostile, even antithetical, at present they are more or less complementary. Whereas the IUPPS maintains much of its original scholarly character, WAC is not only global and cosmopolitan but is also socially responsible, activist, and engaged. The WAC membership is dedicated to what is sometimes called value-committed archaeology, which Gero (2008) says is the archaeology of the future.

Future Directions

New technologies now accessible to archaeologists offer great promise for learning about the past. Perhaps the most spectacular of these is being use of ancient DNA to track specific prehistoric human populations (e.g., the peopling of Asia and Australia, Rasmussen et al. 2011) and interbreeding, or lack thereof, between Neanderthals and archaic *Homo sapiens* (Currat & Excoffier 2011), as well as the histories of domesticated plants and animals (e.g., Marshall & Hildebrand 2002; Zeder et al. 2006). Another fruitful trajectory is the application of techniques long in use, such as obsidian sourcing, to provide empirical means of delineating evidence for ethnogenesis in the archaeological record (Scheiber & Finley 2011: 376-77). Yet another very promising development builds upon the original central concern of processualist archaeologists: interaction between past human communities and their environments. Archaeological data from several locales in the Americas and elsewhere on long-term patterns in human/environment relations are now sufficiently detailed to provide important information that can and should be used to influence national and international policy makers (Fisher et al. 2009; Miller et al. 2011).

For the foreseeable future, WAC will continue to be a global forum for activism by archaeologists everywhere. Such a forum is especially important considering the hard fact – and the commitment necessary to do everything possible to mitigate that fact – of rapid catastrophic destruction of the archaeological record by development of all kinds throughout the world. This includes continuously expanding urbanization; continuously expanding agricultural systems; continuously expanding transportation networks; and increasingly intensive exploration for and exploitation of oil, gas, and coalfields. Concomitantly, there is the equally catastrophic disappearance of once highly diverse traditional lifeways around the globe in the face of increasingly powerful (monolithic, multinational corporate) socioeconomic forces operating everywhere on our planet.

In addition to all the above, myriads of archaeological sites are being and will continue to be damaged or destroyed as will museums, cultural heritage locales, and materials in areas where regional conflict destroys cities, towns, and landscapes. Systematic destruction of the Bamiyan Valley Buddhas is one of the best-known modern examples, but there are a great many more. It appears that both short-term emergency archaeological salvage and long-term restoration of items and institutions pertaining to cultural heritage are permanent necessities in the modern world.

Finally, there will continue to be considerable diversity in the goals of people doing archaeology and, therefore, in the actual practice of archaeology internationally. But the core methodological procedures of processual archaeology are basic to all empirically oriented archaeological endeavors and will remain so far as long as the discipline survives.

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- ▶ New Archaeology, Development of
- ▶ Watson, Patty Jo
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Professionalization: Archaeology as an "Expert" Knowledge

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Introduction

Archaeology as a professionalized practice – with accredited specialists, institutional support, defined methodologies, and a coherent knowledge base – has a convoluted history. By some accounts, that history extends back no more than a half century, to the post-World War II era and, in particular, to the 1960s and 1970s. By other accounts, it stretches across multiple centuries (if not millennia), with a range of interested individuals and materials converging at various times and places in the making of archaeological expertise. Typical reviews of such disciplinary development tend to emphasize intellectual progression or the role of a select number of notable people in creating a professional archaeological environment. Iconic publications such as Trigger's (2006) *A History of Archaeological Thought* and Daniel's (1981) *A Short History of Archaeology* bear witness to these tendencies, compiling the rise of different modes of thinking at the hands of a series of heroic-seeming figures (e.g., the United Kingdom-based V. Gordon Childe or the Swedish archaeologist Oscar Montelius) into a cohesive narrative of the discipline's evolution.

Increasingly, however, fine-grained oral historical research and institutional analyses hint at the more or less unquantifiable, broadly informed, and always changing nature of the field. Herein, archaeology's professional culture is shown to be not so easily contained, having long been built up and molded out of methodologies and contributors from different areas of practice. These include both academic and nonacademic specialists engaging with a range of different modes of labor and publicity – from exhibitions to site visits, magazines and public lectures – that go far beyond traditional excavation and artifact studies alone.

The following entry outlines a history of archaeology that acknowledges the variety of experts and forms of expertise that have manifested in professional archaeological work. It builds upon sociological and anthropological scholarship on professionalization and the constitution of expertise (e.g., Carr 2010) and, in so doing, speaks not so much to the conceptualization of the archaeological record, but to the manner by which people and objects have come together to naturalize these acts of conceptualizing.

Definition

While the history of archaeology has been told by many scholars – both historians and archaeologists themselves – the specific means by which individual interests in old objects were formalized into an internationally recognized speciality legitimated by the university system are less clear. This process of professionalization is typically appreciated as a cumulative and iterative exercise, as people came together through shared concerns and then began to articulate distinctive social and behavioral identities (both spoken and unspoken) linked to specific environments (both formal and informal) that ultimately worked to determine and advance future membership in the group.

Few archaeologists have meaningfully interrogated such exercises in disciplinary formation, but where so, they have tended to draw upon sociological scholarship or social and historical studies of science (e.g., by Pierre Bourdieu, Michel Foucault, Antonio Gramsci, T. Lenoir, J.B. Morrell, Steven Shapin) to define their dimensions (e.g., Moser 1995; Patterson 1999; Smith 2009; Perry 2011). According to this literature, professional culture tends to entail a learned jargon, standard methodologies and conceptual models, recognized spaces of learning (e.g., the field site or laboratory), clear means to disseminate ideas and research results (e.g., publication channels and pedagogical programs), and sustained infrastructure for financing and

otherwise supporting these exploits. Smith's (2009) critical reflections on the components of professionalization go further to suggest that student creativity, collegiality, and informal places of knowledge exchange (e.g., tea rooms) are also among those traits crucial to the construction and perpetuation of worlds of expertise.

While the exact "ingredients" for disciplinary success vary by field of practice, as Moser (1995) outlines, the professionalization process – as applied to archaeology in particular – appears to follow a clear trajectory. In the first instance, a body of foundational knowledge is generated by various individuals who come to interact with one another through their common interests. The practice of knowledge creation leads naturally into the demarcation of specific methodologies and terminologies, which then become increasingly refined and embellished through application in the field. Participating in this process thus works to elaborate a particularized cognitive base, increasing its complexity to the point where instructional manuals and formal means of conveying methods, concepts, and interpretations become necessary to sustain development.

So too does it formalize a community of practice around which a sense of expert identity begins to manifest. Participation effectively becomes a rite of passage, socializing individuals and denoting their belonging and inclusion in a now otherwise exclusive group. These individuals are trained by people who are understood to demonstrate competence in the field and that training tends to be oriented towards advancing specific agendas related to such preexisting competencies. But the fluid and social nature of tuition means that, in its very enactment, students begin to generate new networks, procedures, pupils, and associated outputs that further extend the nature of the practice. They then become key to maintaining and furthering the institutional infrastructure required to prop up the many facets of this work. As per Christensen (2011: 9 citing Larson 1977: 17), it is in this moment when "the production of knowledge and the production of producers are united into the same structure" (and that structure is supported by paid labor) that a profession comes into being.

Together, such activities, products, and people constitute what Moser (1995) calls a disciplinary culture – a community subscribing to an interlinked and self-reinforcing set of cognitive and cultural identities. Such a community holds the monopoly over a body of knowledge and methodologies: its members read similar things, participate in similar pursuits, speak a similar language, cite one another's works, and collectively respond to the needs of a wider public. At once, they exclude this wider public via their apparent solidarity and, in so doing, demonstrate the simultaneously "repressive and productive" Foucauldian power dynamics regularly observed in the manifestation of expertise (see Carr 2010: 18).

Indeed, definitions of professionalization often also revolve around amateur/expert status distinctions, where less-knowing dilettantes or hobbyists are seen to be slowly pushed aside by more informed and "qualified" workers. Such a perspective tends to denigrate or entirely dismiss the contributions of so-called amateurs to the overall institutionalization of archaeology. At the same time, it often separates amateurs out as a self-defined, self-segregating body of individuals who do not make their living via archaeological knowledge making, but who engage in aspects of its practice purely for leisure's sake. It is in these very processes of ostracizing such people from the production of valid knowledge that professionals come to invent themselves as the keepers of expertise. Yet archaeology's professional status depends upon a range of participants – with their differing skillsets and specialties – to sustain itself today. As Carr (2010) notes, on the ground, expertise is born out of its enactment – in its gestures, its spoken words, its apprenticeship of new workers, its engagements with people outside the institution, its application of different forms of specialized media, etc. In other words, it is always in a state of evolution.

Historical Background

To tell the history of archaeology's professionalization is to trace back to the first recorded

instances of collecting practice, where individuals begin to gather demonstrably old objects with an eye towards establishing their age, interpreting their function, and placing them on display (either for personal or wider consumption). Some date such practice to at least 2000 BCE in Egypt, Mesopotamia, and China and suggest that it was often accompanied by attempts at excavation work (Schnapp 2002). The unearthing of unexpected assemblages from prehistoric sites has led to further speculation that humans across time and space have always had a tendency to invest in collecting activities (Schnapp 2002). Others, writing more targeted, method- and region-specific histories of archaeology, situate the earliest excavations in Britain, for instance, to Medieval times (c. 1190) as devotees sought to substantiate the presence of saints or confirm Arthurian mythology. However, it is collecting and work with collections, above any recognizable form of fieldwork, that became the breeding ground for archaeology's emergence (also see Lucas 2001).

In all cases, these activities were pursued by varied individuals not discernable as modern-day archaeologists. Indeed, the entire conceptual and methodological basis for, as an example, prehistoric archaeology arguably derived from heterogeneous practitioners (e.g., clerics) and cognate fields – geology, anthropology, and paleontology (which were themselves all in a state of emergence) – especially across the nineteenth century. Hence, the concept of a professionalized prehistoric archaeology was effectively nonexistent until approximately 100 years ago. However, what is critical is that the roots of such professionalism lie in the systematization and relationships between people and things that grew out of the earliest collecting activities. While these activities might be poorly documented in terms of their initial scope, by the time of the Renaissance, they had begun to proliferate in conjunction with growing trade, travel to the Western Hemisphere, more broadscale appreciation of history and artistic trends, and increasing pressure for individuals to conspicuously display their connections to such pursuits. A unique collection could testify to one's status, education, and networks of affiliation, with the consequence that collecting became a means of affirming the identities of a growing portion of the population.

The resultant assemblages of objects tended to be fairly encyclopedic in terms of their spread. They often included a range of specimens from around the world, some with medicinal or therapeutic properties, some Classical relics, and some purely curious, but all "valued for their intrinsic rarity, for the romantic echoes of the far-away and strange with which they tantalized the imagination, and, sometimes, for their aesthetic virtue and workmanship" (Pearce 1990: 20). Significantly, it was generally in grouping together these objects for showcasing in private spaces that they then became the testing grounds for systematic comparison, theory building, and explanation about the natural and cultural worlds. They were increasingly subject to labelling and categorization, usually according to the prevailing conceptual paradigms of the time (e.g., animal-vegetable-mineral, earth-air-fire-water). From at least the sixteenth century onwards, concerted intellectual work on such collections expanded to the extent that some were supplemented with guidebooks or human guides in an effort to manage viewers' understandings of the materials. Similarly, some were moved out of single, private study rooms into larger galleries – what we might now identify as museum spaces – to allow more considered attention to the presentation and accessibility of the objects.

Concurrent with changes to this physical staging of collections, dissemination beyond the display space itself gained ground via the production of manuals, atlases, and catalogues of objects (e.g., Schnapp 2002; Moser 2013). Indeed, collectors began to invest in artists to record their own personal collections, document other collections of interest, or copy from preexisting collections in manuscripts. That illustrative practice itself was then increasingly refined, with depicted materials becoming more abstract and standardized to allow comparison and structured evaluation. In this sense, early gallery/museum work and illustrative work (circulated via published sources) ran in parallel, feeding back

into one another as regards the construction of object types and the articulation of basic schemas for making sense of artifactual and other materials.

Publication is credited by many as the transformative force in crystallizing professional growth. As per Schnapp (2002: 137), it "provided the means of social and intellectual visibility of the antiquarian discipline." Arguably, however, this emphasis on publication perpetuates the long-lived tension in historically oriented studies to privilege textual outputs above material remains (for a recent discussion of this tension see Lucas 2012). At the same time, it distracts from the many related activities that fed into the building of archaeological communities. Where archaeology finds its bearings is in its privileging of the material, its attention to objects themselves, and in the collectivities (people and other artifacts) that form around these objects. Some see such focusing of attention on artifacts above text as a patently strategic move by interested individuals looking to carve out a distinct niche of practice (e.g., Lucas 2012: 22). Regardless of the intentionality behind it, from the seventeenth century onwards, propelled by Renaissance and emerging Enlightenment developments, an observable shift in concern towards material sources (away from purely literary sources) manifested itself (Moser 2013). More collecting led naturally into more contemplation of those finds; and opportunities for conversation about them were facilitated by the foundation of key learned societies (e.g., the Royal Society in 1660; the Society of Antiquaries of London in 1707) and the first public museums (see Diaz-Andreu 2007; Pearce 2007).

The latter are particularly important as they tended to be characterized by the movement of previously private collections into university or nationally sponsored galleries, making them accessible on a larger scale. Accordingly, these new spaces (e.g., the Ashmolean – the earliest public museum in the world – which opened in 1683 in Oxford, UK) became home to the same mixture of exotic specimens and antiquities once so integral to individual identity building. However, such collections continued to operate here in a similar fashion as before, yet at a larger scale – as resources for study *and* affirmations of institutional and national status. Classical objects, in particular, suggested a direct connection to revered cultures of the past, and as their institutional showcasing coincided with major colonizing activities around the world, we see these original collections expanded often as a result of federally sanctioned missions to elaborate them. Antiquities hence became embroiled in a nationalistic enterprise as states and major organizations sought to legitimate their standing (Diaz-Andreu 2007). This, in turn, fuelled further collecting and dedicated excavation work.

In concert with such institutional development, learned societies continued to grow. Despite their often ephemeral nature, these societies were indispensable to the cultivation of knowledgeable antiquarians, and they are now appreciated by some as the lynchpins of disciplinary development (e.g., Sweet 2004). They provided forums for individuals with shared interests to meet, correspond, exchange transactions, view objects (either physically on display in meetings or illustrated in society publications), avail themselves of associated libraries, and otherwise generally "participate in the wider world of learning" (Sweet 2004: 81). Their networks were wide, spreading across Europe and European colonies into the Americas and Asia (Sweet 2004; Diaz-Andreu 2007). Some such societies were implicated in the establishment of the first major public museums (e.g., the Museum of the Society of Antiquaries of Scotland founded in 1780). However, they also manifested, for instance, in Britain from the early 1800s, in smaller literary and philosophical societies and county archaeological societies, where individuals who perhaps did not have the means to journey abroad (but who nevertheless shared the epistemological impulse to observe, explain, situate themselves in, and order the world around them) sought out local antiquities for their collections (Pearce 1990). Together, these societies helped to propel a trade in artifacts; and at the same time, they facilitated discussion about both the nature of the artifacts themselves and the most systematic means for acquiring them. As such,

they were among the "circulation systems" (also including auction houses and dealers) key to supplying the material remains around which archaeology emerged (after Gosden & Larson 2007: 49, 52). Their interests fed into barrow digging and an increase in excavation activities, and their collections became showpieces for the wave of new museums that opened in the mid-nineteenth century. That wave (evident across Europe) was prompted in part by state concern to educate (and, arguably via such education, placate) citizens and in part by the success of great international expositions (Pearce 1990; Diaz-Andreu 2007). In Britain, for instance, such museums and related exhibitions promised a platform for "social reform and industrial progress," and their viewing became part of the recreational endeavors of middle class individuals (Gosden & Larson 2007: 37). On the ground, though, they were the seedbeds for honing the archaeological eye – that is, for breeding public recognition of an emerging field of artifactual study and for acting as convergence points for those articulating that study.

What is critical is that these museums often assumed a role equivalent to the scientific laboratory, with curators sometimes explicitly acknowledging their lab-like possibilities – where "ideas could be developed, tested, or discarded" (Gosden & Larson 2007: 63, in reference to the curator Henry Balfour's perception of the Pitt Rivers Museum). Like the manuals of antiquities published from the sixteenth century, museums offered room to experiment with concepts, refine categories, and literally institutionalize ways of thinking about the past based on observable materials. Such is true in the broader sciences as well, with some arguing that investment in scientific laboratories actually *followed* that of museums as sites for knowledge making. Either way, they seem to have provided the earliest solid infrastructure for archaeological work, with some claiming that the first dedicated chairs of archaeology were specifically employed with an aim towards training for museum, library, and archival work (Diaz-Andreu 2007). The Peabody Museum of Archaeology and Ethnology in the USA established in 1866, for example, has been credited with crafting "an institutional framework within which scholars could do scientific work" (Christensen 2011: 13). These spaces effectively set in place the first meaningful homes for archaeology, and it is significant that some of the most paradigmatic shifts in archaeological thinking came about via museum-based activities (see below).

While the earliest university post in archaeology is attributed to Uppsala in 1662, such positions were incredibly limited, and their holders tended to simultaneously occupy most other related posts in a given country (e.g., museum, governmental, and university-based) (Kaeser 2006; Diaz-Andreu 2007). In other words, these first professionals were often working in some isolation on all aspects of the antiquarian pursuit at once. Arguably, it was only as museums (and associated cultural institutions) exploded in the mid-nineteenth century that a genuine lack of sufficient specialists to fill related positions exposed itself, and hence, attention to formal means of outputting a competent workforce began to grow (Kaeser 2006). As Browman (2002) has noted, individuals such as the American Frederic Ward Putnam (1839–1915), who held or established many of the foundational disciplinary appointments in the USA, were trained in a bespoke, apprentice-like fashion and tended to replicate such training in their own early practice. Here, again, the museum (the Peabody) was the staging ground for capacity building, and in conjunction with expansion of the museological collections, but without a formal student body for support, Putnam sought out connections with interested people around the USA via correspondence (Browman 2002). Akin to (if not indivisible from) the circulation systems of learned societies, this "correspondence school" of archaeology (Browman 2002: 219 citing Hinsley 1999: 144) allowed for exchanges of ideas and methods of collecting, recruitment of new people onto excavation expeditions to expand the collections, and acquisition of other personal collections. However, it also helped to demarcate the institution as the arbiter of knowledge making, as individuals then began to turn to institutionally sited practitioners to validate their finds and seek

out further training. The advantage, as has been noted for prehistoric archaeology, was that these sites provided an opportunity to "put an end to the previous epistemological confusion," fostering common methodologies and harnessing the seeming authority of the institutional structure to "lay down the heuristic frameworks of the prehistoric science to come" (Kaeser 2006: 153).

Around Europe, the museum was long a driving force in the conceptual solidification of archaeology, as its collections offered the comparative materials necessary to think through chronologies and typologies, which themselves then supplied the fabric for pursuing further intellectual work. Base epistemological frames for archaeological thinking, such as Danish C.J. Thomsen's Three-Age System, were developed and elaborated specifically in the museum environment on collections that were then put on display for visitors and, in their showing, thereby subject to more interrogation. The British-based General Pitt Rivers' typological-evolutionary take on human history and the contrasting culture-historical approach of the US-based Franz Boas (Gosden & Larson 2007) were similarly articulated and debated through active negotiation of collections in museological/display spheres. These same museums often stood as the first lecture spaces for concerted teaching of archaeology, and as per above, their growth in numbers over the course of the nineteenth century subsequently led to a demand for qualified practitioners to take over new managerial and curatorial posts. In tandem with museum work, related heritage institutions began to spread across Europe in the mid-to-late nineteenth century – part of the same ideological drive to unite and propagate identity on a national and regional level (Kaeser 2006). The British predicament, where "demonstration of a preservation ethic came to be seen as a hallmark of a 'civilized' nation" (Emerick 2003), had currency abroad as well, leading to the establishment of governmental posts and associated protective legislation for historical places and monuments and further pushing on the demand for qualified workers (Kaeser 2006). This meant that institutional attention then began to be turned towards producing such workers, leading to the articulation of university-based accreditation in archaeology around the turn of the twentieth century (see below).

From the perspective of professionalization, therefore, it is at this point that archaeology had the scaffolding in place to elaborate a disciplinary culture. Indeed, it follows a general trend evident across the sciences in the late nineteenth century towards increasingly professionalized practice. By this time, foundational concepts had been articulated, some basic procedures for studying material culture were under development, and an authoritative base centered especially in the museum was in place to support the ongoing activities of the community. Expertise in the methodology of excavation itself arguably played a marginal role in the beginnings of archaeology (Lucas 2001), as it tended to be from the observation and handling of objects (directly or indirectly through visualizations), site visits, conversation and sharing of resources, and subsequent intellectual exercises in classification and schema construction using collected materials that the basic infrastructure for the discipline emerged.

While institutionally recognized "professionals" were few and their activities extensive, their connections to learned societies and other productive people, places, and materials (e.g., collections) together created the architecture for the professionalization of the field. These same individuals were often directly linked to the development of the first discipline-specific periodicals and to major congresses and conferences that brought interested people together under increasingly formalized circumstances. Some such circumstances, such as the International Congress of Anthropology and Prehistoric Archaeology (*Congrès international d'anthropologie et d'archéologie préhistoriques*), founded in the 1860s, were among the earliest transcontinental networking spaces, where hundreds of individuals with varying levels of expertise could gather every year or so to discuss emerging knowledge and techniques. With such communities of practitioners thus in place, it was with the ensuing development of a rigorous educational structure (for outputting sufficient workers to satisfy demand) that the professional archaeological industry coalesced.

Key Issues/Current Debates

It is the twentieth century and beyond that perhaps represents the most controversial stage in archaeology's solidification, arguably because consideration of this timeframe has been less concerted and consistent. There is general agreement that it is distinguished by the emergence of university-based expertise, which effectively sets in place a self-perpetuating cycle for the discipline – yielding students specifically trained in "archaeology" who then seek archaeological employment at organizations which scout out that very brand of institutionally sanctioned archaeological knowledge. Some see this period as the second phase in the institutionalization process (Kaeser 2006) – wherein the ensconcing of archaeology in academia provides for its "anchoring in the long term," apart from the often ephemeral constitution of societies, congresses, journals, and even museological institutions in the nineteenth century and before. As per above, scholarly departments of archaeology sometimes evolved out of preexisting museum spaces, at the hands of enterprising specialists, and/or even out of the remnant collections of international expositions (e.g., see Browman 2002). But the growth of the archaeological education business is subject to debate, with suggestions that for most of the early twentieth century, student numbers were minute and employment opportunities comparable. Emerging research hints that the situation was more complex and that the tendency to reduce twentieth-century archaeology to academia alone deserves to be questioned. In Britain, for instance, 1 year after its official launch in 1937, London University's Institute of Archaeology was outputting upwards of 100 students per year in a rigorous, laboratory-oriented archaeological style taught by many of the leading practitioners of the time (Perry 2011). This institution was simultaneously invested in the design and dissemination of major archaeological exhibitions, which were advertised across the country, attracting a viewership that numbered, in some cases, in the thousands. It is also linked to the earliest British television broadcasts of archaeology, which evolved over time to become crucial means of publicizing, attracting support for, and recruiting new pupils into the discipline. Even in the late 1920s, individual archaeology classes run through University College London saw registration of c. 20 students each (predominantly, if not fully, female); and major excavations at sites such as Maiden Castle in the 1930s embraced 100 or more students and assistants per year, with thousands of visitors and tens of thousands of related souvenirs and publications sold (Perry 2011). Moreover, extramural education in British archaeology had its origins as early as the 1940s, and dedicated excavation training schools are documented from at least the 1930s.

Across Europe and North America, such disciplinary growth continued, propelled in particular by the Depression and World War II. In the USA, the former led to government investment in archaeological practice to assist with job creation, thereby fuelling a need for trained workers (Patterson 1999). In Europe, the latter resulted in regeneration efforts (both historical and industrial), ultimately manifesting in documentation work and rescue archaeology that demanded the labor of dedicated commercial archaeological units and associated volunteers (Roskams 2001), again fuelling university enrollment numbers. What is critical for professionalization is that, in all cases, post-WWII is marked by increasing specialization within the discipline as the nature of practice extended itself; an escalating codification of such practice, with the publication of further manuals and textbooks and the drafting of the first codes of ethics; growth in the number and variety of professional organizations, which carry on the networking and convergence functions of earlier learned societies and which themselves continue to contribute to disciplinary codification and publication; greater legal and legislative attention to the nature of archaeology owing to its ballooning relationship to city planning and industrial development; and heightening stratification within the archaeological workforce, generating a full spectrum of laborers – from itinerant fieldworkers to interested volunteers, to full-time unionized staff, office-based professionals, academic elite and transient lecturers (Patterson 1999; Roskams 2001).

Importantly, then, the makeup of the discipline is seemingly no more uniform today than formerly; and the long-standing argument that so-called amateurs have been displaced from archaeology is highly debatable. Key museological collections have been birthed out of, and continue to be amplified by, donations from a range of contributors (both accredited specialists and not) (e.g., Gosden & Larson 2007); excavations still rely on volunteer efforts; and funding for practice is often tied directly into broader public impact. Many people, sites, and materials have always and collectively been indispensable to the cycle of disciplinary knowledge construction. What has changed over time, therefore, is arguably no more than the number of people and things involved and the means by which they are organized and classified.

International Perspectives

Outside of Euro-America, the professionalization process for archaeology has followed a similar path, although there is evidence from both Japan and China that robust antiquarian enquiry and publication (e.g., in the form of antiquities manuals) might have emerged much earlier than in Europe (Schnapp 2002; Lozny 2011). Critically, however, from approximately the nineteenth century onwards, a general trend presented itself of concepts and methodologies spreading from Euro-American institutions abroad, either via movement of Euro-American-trained practitioners to foreign locations (not infrequently in association with colonization ventures) or via training of foreigners at Euro-American institutions followed by their return home to apply such training domestically (see contributions in Lozny 2011). Regardless of the direction of their movement, once ensconced internationally, these various practitioners participated in the production of region-specific terminologies and typologies, societies, journals, and all those related disciplinary constituents that come to form the anatomy of a distinctive professional culture. Their links to Euro-America also worked to facilitate wider exposure for local research and to cultivate systems of patronage on a worldwide scale, which, in turn, fed back into the ongoing validation and scaffolding of archaeological practice overall.

Future Directions

Professionalization is an ever-evolving process, meaning that its study is continuously open to elaboration. Indeed, focused attention on the professionalization process in archaeology is still rare, making the scope for further enquiry relatively vast. Growing attention to institutional histories has been among the catalysts for reconsideration of the constitution of expertise in archaeology (e.g., see Kaeser 2006; contributions in Pearce 2007). This work is complemented by recent fine-grained oral historical research (e.g., interviews with current and retired practitioners), as well as gender-oriented studies of the discipline, and concerted interest in all those "forgotten" participants in archaeological knowledge making whose contributions have played into the everyday articulation of the field of practice, yet whose names have generally been eclipsed by the "great" archaeologists documented in typical disciplinary histories (Smith 2009). Those elements of archaeology that make it seem a coherent subject matter – that supply it with a professional air and an expert identity – are similarly seeing greater deliberation, including research into how archaeologists dress, observe the world around them, and speak and conduct themselves in the field.

As noted by Gosden and Larson (2007: 151), the term "discipline" "implies an attempt to contain and control something that is essentially unrestrained." Such has always been the nature of archaeology: a multipronged, composite pursuit that now stands apart as an accredited profession but that has always impinged upon other specialty areas, drawn on methods from a variety of fields, attracted contributors from comparably varied spheres of interest, and attended to materials from all times and places of human existence. Accordingly, perhaps the most productive line of study today is research into the

networks and movements of people and things across the boundaries of archaeological practice – i.e., enquiry into precisely that set of messy connections and exchanges that has rendered the discipline into something recognizable (e.g., Gosden & Larson 2007). Archaeology, as it is advocated today, is not only a specialist intellectual endeavor but so too a platform for transferable skill development applicable to a range of other fields. In this respect, the boundaries of the professional community are ever-swelling, and the individuals and objects that come together to make it possible and legitimate are likely to continue to challenge its dimensions. Thus, while diverse concerns for the human past may have been consolidated over time into a distinct form of expertise, the professionalization process itself suggests that the nature of that expertise will never be stable.

Cross-References

- ▶ Archaeology in the Enlightenment
- ▶ Archival Research and Historical Archaeology
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Encyclopedic Museum
- ▶ Heritage Museums and the Public
- ▶ Oral Sources and Oral History
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ United Kingdom: Archaeological Museums
- ▶ Universal Museums

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Prospection Methods in Archaeology

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Introduction

The Third Age of Discovery that helps define our modern era is based on remote sensing and the geophysical inventory of earth largely made possible by advancing technologies (Pyne 1988: 190, 1998: *xi*). This includes much of the new territory archaeology explored in the late twentieth and early twenty-first centuries. However, it is important to note that for all the technical innovations of geophysical method and satellite imagery, archaeology remains a discipline of and about people. Archaeology is about understanding what it means to be human and increasingly about marshaling the record of tens of thousands of years of human decision-making to deal with the challenges we face today. But this requires that archaeologists be able to look beyond the obvious and not be limited to what is apparent on the surface – by any definition. What the new technologies of prospection have added to archaeology's repertoire is a glimpse into the "inhuman geography" (Pyne 1998: *xi*) of our human past, the places where we cannot go or where experience indicates that we defer going by more traditional methods like excavation. Necessarily, these technologies have evolved alongside dramatic increases in readily available computer power that allow us to process and find

the meaningful patterns among incoming multitudes of new information.

Data collection continues to be the most straightforward element of archaeological prospection with days often required to process the data collected in a few well-spent hours (Conyers 2010: 122). The published record is noticeably weighted toward case studies demonstrating a particular method's applicability and use, although a trend toward case studies applying archaeological prospection techniques directly to test hypotheses of human behavior has increased since c. 2000. This is tempered by the fact that archaeological prospection is still largely the realm of geophysicists rather than archaeologists per se and that results are perhaps too frequently presented in geophysical rather than archaeological terms. High initial cost relative to traditional forms of archaeological survey plays a major role in determining whether prospection can be included in a project (Jordan 2009). Nevertheless, the results of archaeological prospection, in all its forms, are becoming "a primary data source from which to study the human past" (Conyers 2010: 119).

Definition

Remote sensing began as a collective description referring to both geophysical and imaging techniques. That usage continues (e.g., see papers in Johnson 2006a). With the introduction of *Archaeological Prospection* in 1994 as a peer-reviewed journal covering "the use of a wide range of prospecting techniques, including remote sensing (airborne and satellite), geophysical (e.g. resistivity, magnetometry) and geochemical (e.g. organic markers, soil phosphate)" (Archaeological Prospection 2011), archaeological prospection became the preferred collective term. Remote sensing explicitly refers to satellite and other forms of reflective imagery (e.g., infrared spectral analysis). As geophysical methods become familiar fixtures in the journal literature, they are named and recognized outright by the specific technique employed (e.g., ground-penetrating radar, cesium magnetometer, etc.).

Key Issues

Archaeological Prospection Methods

The four most widely applied techniques of geophysical prospection are ground-penetrating radar, electromagnetics, magnetics, and earth resistance (Conyers & Leckenbusch 2010: 117).

Ground-Penetrating Radar

Ground-penetrating radar (GPR) uses nondestructive electromagnetic waves to locate buried targets or interfaces (Daniels 2005: 1833). A GPR transmits a regular sequence of low-power packets of electromagnetic energy into the material or ground and receives and detects the weak reflected signal from the buried target. Under most conditions, ground-penetrating radar is capable of measurements up to a few meters deep. However, specially adapted systems operating in optimal circumstances can sometimes penetrate up to hundreds of meters. Unlike atmospheric radar, the signal from ground-penetrating radar is subject to being absorbed as it travels down and back through sediment layers. Although the method works well in some solids like granite and ice, it cannot be used effectively in clays with a high salt content, or even saltwater, because these materials drain the signal's electromagnetic energy (Daniels 2005: 1833).

Ground-penetrating radar is especially valuable in deeply buried and stratigraphically complex contexts because it can discriminate important layers and map only specific levels or horizons. This type of complex stratigraphic analysis is usually impossible using other geophysical techniques (Conyers 2010: 183). Results from ground-penetrating radar are compatible with data from more traditional archaeological methods. Such data lend themselves well to a quantitative and scientific approach for understanding the human past.

Electromagnetics

Electromagnetic surveys are a quick way to locate and map large earth features such as leveled mounds and refilled ditches. They work especially well where the surface soil is dry, hard, or rocky or where the vegetation is moderately

dense. As in all geophysical techniques, for electromagnetic surveys to be successful, it is necessary that the archaeological features sought are different enough from the surrounding terrain to register (Bevan 1983).

Electromagnetic instruments use conductivity measures that quantify how materials react when exposed to an electromagnetic field (Bevan 1983; Conyers et al. 2008). The method can be used to explore a range of depths; however, with the instrument carried at about hip height, sensitivity to materials suspended in sediment layers is generally most accurate down to 1.5 m. Depending on field conditions, useful readings are possible from about 1.5 m to about 5 m and then decreases until it is no longer within the instrument's depth range, about 5–6 m (Conyers et al. 2008). There have been claims that electromagnetic instruments can produce independent readings from multiple depths, but to date, these readings have not proved reliable in field tests (Conyers et al. 2008). Soil moisture, stratum thickness, geochemical variation, and changes in the amount of organic material present can all affect electromagnetic readings. Portability in the field and accuracy within its optimal parameters continue to make electromagnetics a favored geophysical method for archaeologists. In experienced hands, it is possible to obtain high-resolution electromagnetic survey data as fast as a person can walk in the field (Wynn 1986).

Magnetics

Magnetometry is one of the most productive and certainly one of the most often applied geophysical methods in archaeology. "(I)t is almost as if nature designed archaeological sites to be made visible by the magnetic variations they exhibit" (Kvamme 2003: 441). Primary among these magnetic variations are:

Soil heated past the Curie temperature – the point at which magnetic materials undergo a sharp change in their magnetic properties (beginning at about 570 °C for the mineral magnetite). Hearths, earthen ovens, kilns, and structure fires can disrupt the spontaneous arrangement of elements in rocks, minerals, and sediments, replacing it with a more general magnetic behavior. The resulting intensified magnetic field is restricted to the heated area. Magnetometry identifies this localized, burned zone. Archaeologists still must ascertain whether the heat source was natural or the result of human behavior.

Fired artifacts, especially ceramics, adobe bricks, and fire-hardened daub, create an identifiably intense magnetic field in the same way as discussed above for natural materials.

Magnetic susceptibility can also be a natural occurrence created by the inclusion of magnetizable materials in the composition of soils, sediments, rocks, etc.

Long-term human occupations of an area can increase the magnetic readings of surface layers when compared to underlying natural layers. The same discard behaviors that help create the archaeological record also introduce fired materials (i.e., ceramics) into the upper soil layers of a site. Such magnetic readings can be a way of locating midden areas. Reverse processes that remove magnetically enhanced upper layers in identifiable patterns, digging ditches or pit houses, for example, provide equally valuable data for archaeologists to analyze.

In the case of sites with coursed wall architecture that has become buried over time, magnetometry readings can identify building materials that are either more or less magnetic than the natural layers of overburden and surrounding sediments.

And the process of smelting metal artifacts, as well as the metal artifacts themselves, produces identifiable anomalies in the surrounding natural layers.

Magnetometry is most successful in locating identifiable anomalies in the first two meters of sediments or soils. However, larger objects (a stone building foundation as opposed to a ceramic sherd) emitting a stronger signal can be detected at lower depths. Magnetometry is "the work-horse of European archaeogeophysics" (Kvamme 2003: 441).

Earth Resistance

In an earth resistance survey, electrical current is emitted into the ground; as it radiates out in an

even wave, any inclusions interrupting the relative uniformity of the sediment layer will alter the resistance to current patterns in measurable ways. Mapping these variations by stratum can help locate buried archaeological remains (Schmidt 2009: 67), although cultural features must still be separated from natural features using another means, like excavation.

When electrical current travels through copper wiring, the charge is carried by freely moving electrons. Since these electrons are traveling in a closed circuit, they neither deplete nor accumulate – the electrons constantly flow through the circuit loop. However, electrical current traveling through natural soils is carried by ions, not electrons. These charged particles are created when salt crystals in the ground break down in the presence of water. Any obstacles to the movement of these ions in the ground that cause a weakening of the current are called the soil's electrical resistively (Schmidt 2009: 68). Ultimately this electrical resistivity is a function of the amount of salts in the soil. There are some salts in all soils, which makes the method viable, but the concentration of salts (and therefore the conductivity/resistivity available to carry the current and be measured at the surface) varies by soil type. Moreover, electrical resistivity depends on the presence of water in the soil to dissolve the salt crystals and transport the residual ions (Schmidt 2009: 68). Resistivity decreases as water becomes ice or soils dry out in arid conditions. The presence and position of water in the soils depends on the size of sediment grains and the spaces between the grains. Water is needed to dissolve the salts into their constituent ions.

Resistivity is the opposite of conductivity (see "Magnetics" above). Earth resistance methods are sensitive to subsurface contrasts caused by resistant natural rock formations and by resistant cultural formations like stone walls. They also can note less obvious variations in soil and sediment layers (Kvamme 2003: 441-2). Soil resistivity is measured through contact probes spaced from 0.25 to 2 m. The spacing between probes controls prospecting depth beneath the surface. When several depth settings are employed within the same area, three-dimensional data acquisition and volumetric computer imaging are possible (Noel 1992; Szmanski & Tsourlos 1993; Walker 2000 – as cited in Kvamme 2003: 442). Magnetometry (conductivity) and earth resistance methods are popular in European archaeology.

Metal Detectors

The most controversial issue concerning geophysical technology for archaeological purposes is the use of metal detectors by interested amateurs, who are often well-intentioned, but sometimes not. In archaeology, the value of artifacts is based on the information they provide. The problem with metal detectors arises when they are used to pull artifacts from the past we hold in common to be sequestered in private collections or when the value of artifacts is based solely on the money they may bring in exchange. Metal detector use is a complex issue that involves property rights, antiquity statutes, and international laws.

Great Britain has the most experience with interactions between research archaeologists, cultural resource managers, and metal detector enthusiasts. A 1995 survey by the Council for British Archaeology found that of the thousands of artifacts recovered by metal detector enthusiasts each year, only a fraction was reported to museums in England. Between 1988 and 1995, illicit metal detector use damaged some 188 archaeological sites that were protected by law (Hunt 2011), and three-quarters of the archaeological excavations in England had experienced "raids" by metal detector users (Hunt 2011).

What appears to offer the most success in resolving this dilemma is a training program that gives interested enthusiasts a way of contributing to the greater body of archaeological research as avocational archaeologists. They agree to follow a code of conduct in return. It is not a perfect system – ethical questions still exist about "whether it is right to amass personal collections of material inaccessible to more detailed research, or to sell such collections on the open market" (Hunt 2011). There are also concerns that the payment of rewards for "treasure" finds sends the wrong message. Including a place at the table for trained avocational archaeologists may

help abate at least one of the modern threats to the archaeological record.

Satellite Imagery

Satellite imagery is the latest incarnation of aerial photography, which is reputed to have started with Gaspard-Félix Tournachon, a French photographer, who took pictures of Paris from a balloon in 1858. By World War I, aerial photography was being used by the military to map battlefields and to gather information.

Space-based images of our Earth also began with military applications and as a means of information gathering – in this case highly classified information gathering for intelligence agencies. As the existence of satellite images became more widely known, and as their availability became less exclusive, applications widened to include tracking global weather patterns, tectonic activity, surface vegetation, ocean currents and temperatures, polar ice fluctuations, pollution, and eventually archaeology during the concluding decades of the twentieth century. Archaeologists are still finding new ways to use the full range of analytical tools available for assessing satellite image data of the earth's surface and subsurface (Parcak & Mumford 2011). Decreasing costs, increasing image resolution, and on-line Internet availability are speeding this process along.

Satellites collect images from hundreds of miles above the Earth's surface. The altitude from which an image is taken, and the physical characteristics of the sensor used, determine the amount and the type of detail available from a satellite image (United States Geological Survey [USGS] 2011). For example, color-infrared images record energy from portions of the electromagnetic spectrum not visible to the human eye. Near-infrared light reflected from the recorded scene appears as red, red appears as green, green as blue, and blue as black. As a result, color-infrared can differentiate between types of vegetation and bodies of water (United States Geological Survey [USGS] 2011). Importantly for archaeologists, it can also penetrate the atmospheric haze that has become a defining characteristic of modern urban areas.

Much of the credit for first recognizing the potential of multispectral imagery in archaeology goes to George Gumerman and Theodore Lyons (Parcak 2009). Their 1971 paper Archaeological Methodology and Remote Sensing (*Science* 172 [3979]: 126-132) moved the state of the art beyond identification and simple interpretation to the types of pattern recognition that are the basis for what has come to be called satellite archaeology (Parcak 2009). Even at an early date in the use of enhanced imagery, Gumerman and Lyons noted what has become axiomatic today: each archaeological site will have its own spectral properties, and, therefore, archaeological prospecting can rely on no single imagery format (Parcak 2009).

In 1972, one year after Gumerman and Lyons' groundbreaking publication, the United States launched its first Earth Resources Technology Satellite, ERTS-1, later renamed Landsat 1 (United States Geological Survey [USGS] 2011). The Landsat series gathered data from sensors measuring a range of wavelengths of electromagnetic energy reflected or emitted from earth – and demonstrated the actual potential satellite imagery holds for archaeology. Landsats 1–5 carried the multispectral scanner (MSS) sensor with a resolution of about 80 m (260 ft). In 1984, the year NASA launched Landsat 5, the United States Congress directed the National Oceanic and Atmospheric Administration (NOAA) to find a commercial vendor for its Landsat 6 project. That satellite, developed by the Earth Observation Satellite Company (EOSAT) under a U.S. Commerce Department contract, failed at launch in 1993 (National Aeronautics and Space Administration [NASA] 2011a: NOAA press release 95-13). The launch program returned to NASA, and Landsat 7 successfully lifted off in 1999. The last of the series, Landsat 7, carried the Enhanced Thematic Mapper Plus sensor that replicated the capabilities of the successful Thematic Mapper instruments on Landsats 4 and 5, and included features for global change studies, land cover monitoring, and mapping larger areas than its predecessors (National Aeronautics and Space Administration [NASA] 2011b).

As this is written, "(t)he evolution of satellite image technology is. . .enabling the manipulation of a greater range of data contained in increasing types of satellite images (e.g., Aster; Corona; Landsat TM, etc.): archaeologists can now examine a broad spectrum of reflectivity signatures and bands within and between archaeological sites, including both surface and sub-surface features" (Parcak & Mumford 2011). For example, combining multiple analytical techniques to detect the vegetation signatures within a satellite image of the El-Markha Plain on the Sinai Peninsula of the Middle East made it possible to identify and isolate water sources within the overall arid environment of Sinai, which in turn revealed potential archaeological sites for surface assessment (Parcak & Mumford 2011). Multispectral satellite data have also allowed archaeologists to model dynamic landscape processes in the Mediterranean Basin (Barton 2004) as well as define survey areas in Spain and statistically eliminate areas of erosion from the survey area (Barton et al. 2002, 2004).

Tools and datasets like Blue Marble from the National Oceanographic and Atmospheric Administration (NOAA) (see http://sos.noaa.gov/datasets/Land/bluemarble.html) and the multiple platforms of Google Earth™ (see http://www.google.com/earth/index.html) have helped to demystify satellite imagery for non-specialists.

Light Detection and Ranging

Light detection and ranging (LiDAR) represents something of a return to the aerial photography origins of remote sensing – with important differences. LiDAR scans the land surface from an airplane or helicopter with a high-frequency pulsed laser beam. By timing the laser signal from transmitter to receiver, LiDAR can determine distance and thus take rapid measures of surface elevation. When combined with Global Positioning System (GPS) coordinates and an inertial navigation system (INS) to account for airplane movement and hold the airborne transmitter constant, LiDAR readings produce high-resolution digital elevation models (DEMs; see geographic information systems [GIS]) of the landscape below (Hesse 2010). What sets LiDAR apart is that its laser signal can be filtered to record only the last return pulse of the laser beam, making it possible to create DEMs of the landscape underneath a rainforest canopy of vegetation (Hesse 2010; Chase et al. 2011). LiDAR-derived data accurately portray not only the topography of the landscape but also structures, causeways, and agricultural terraces with a low relief of 5–30 cm (Chase et al. 2011: 387). Large-scale mapping projects in archaeology have always been costly and time-consuming when using traditional methods. This is especially true in off-the-beaten-track locations and rugged terrain where the modern world has tended to leave viable archaeological sites undestroyed if only rarely untouched. In such conditions, swath mapping with LiDAR (overlapping flight paths that can be integrated together) is a powerful and cost-effective tool.

International Perspectives

Although geophysical and satellite imagery as methods of archaeological prospection are used nearly everywhere in the world where archaeology is a recognized discipline, not all working archaeologists have a positive view of such means. Nor should archaeologists be expected to hold generally uniform views. The modern practice of archaeology lies at the nexus of the social, natural, and physical sciences – with archaeologists varying the degree of emphasis in their approach between the three. Philosophical and operational tensions in the sciences are often beneficial. Thomas Kuhn, the historian of science who introduced the concept of "paradigm" into post-1960s discussions of science (Kuhn 1962/1970), considered such friction to be the essential tension (see essays in Kuhn 1977) that led to scientific accomplishment and greater understanding of the world around us.

Reservations about technological prospection in archaeology include the expensive cost of the instruments and software necessary to collect and

process data; the additional training demands and access to that training, both of which can restrict availability in some cases; and a less than full understanding of the conditions under which the various instruments are likely to produce useful results (Johnson & Haley 2006: 35). Opinions vary as to whether we always apply the most applicable methods for each set of circumstances or whether we tend to rely on the methods we know. Archaeologists understand that geophysical and remote sensing are part of the hard work of gathering data and learning what the data may tell us about the human career. Our level of understanding may not always keep pace with the technology we are able to produce, and archaeologists constantly remind themselves that while new methodology often helps us to see in more detail, actual understanding remains grounded in our traditional commitment to hard work. Archaeology is deeply rooted in a profound respect for the men and women who created the past that has made our moment possible.

It is natural for observers interested in archaeology to wonder whether what may seem like a sudden burst of emphasis on remote sensing could be adding to a sense of remoteness from the humanness of the people who lived the past. "Spectacular images... may convey the impression that most 'good' geophysical surveys... leave little to the imagination.... In fact, well-executed surveys often yield useful results that are not immediately interpretable by many archaeologists" (Hargrave 2006: 269).

Data fusion (Kvamme 2006; Ernenwein 2009) is one of the most important concepts to develop from our growing body of experience with geophysical methods. Data fusion integrates the outcomes of multiple geophysical methods in one study area and applies their combined potential toward an improved understanding of the subsurface. As noted above, each individual survey method comes with its own strength and weaknesses. Integrating information from a number of methods allows the strength of one method (or methods) to compensate for any shortcomings in another. Integrated data can show the relationships between conductive, resistant, magnetic, and thermal noted subsurface anomalies and use this multiple recognition to enhance overall interpretations (Kvamme 2006: 15).

Excavating offers archaeologists a tactile perception of the artifacts in an assemblage. Data fusion offers a roughly similar multisensory insight into an entire subsurface region while including and preserving the surrounding context that we lose in excavation. It is an iterative process. The more often research programs include data fusion, the better at it we become. Integration can yield an end understanding beyond the capability of any discrete method alone (Kvamme 2006: 15). Applying multiple methods of data gathering also results in a broader array of data presentation – some of which are more visual and some more quantitatively interpretive or predictive. All of which, when fused together, offer a more complete understanding of the archaeological record without altering or destroying any irreplaceable part of that record.

Among the great challenges of archaeology, as usually practiced, is the pressure to get everything right the first time. Excavation is the best-known and most frequently employed means of gathering archaeological data. Archaeological excavation, digging, destroys the context that helps confer meaning to artifacts as it proceeds. "(T)he value of archaeogeophysical methodology with its inherently nondestructive nature speaks for itself. Researchers... now have the potential to recover detailed archaeological information from sites – small and large – without destroying them" (Lockhart & Green 2006: 29). Archaeological prospection offers a way to assess the information value of subsurface material and factor it into a decision of whether or not to dig. We can make informed choices to leave non-threatened archaeological material in the ground and reserve it for future archaeologists whose methodology, presumably, will be even better than ours. Cultural resource managers can potentially use geophysical methods to mitigate the presence or absence of subsurface archaeological material for entire swaths of the right-of-way for pipelines, roadbeds, etc., as opposed to relying on surface surveys with test pits or

backhoe trenches to sample the subsurface strata, although it must be noted that the effectiveness of geophysical methods in archaeology has not yet been "fully acknowledged in the laws, regulations, and standards that guide cultural resource management practices and excavation strategies" (Lockhart & Green 2006: 17).

Future Directions

The equipment used in geophysical applications was not developed with archaeology in mind. The satellites gathering multispectral imagery of earth were not funded by archaeology, nor were they launched at the request of archaeologists. As is vital for a constantly evolving discipline at the nexus of the social, natural, and physical sciences, archaeologists are adept at making use of the tools available. It seems reasonable that future developments are more likely to come in the form of increasingly sophisticated data-analysis techniques than in the data gathering equipment we have borrowed from other fields. Hopefully, the staged iteration wherein remote sensing results guide excavation results and excavation results help to refine the remote sensing (Johnson 2006b: 316) will increase in pace.

It is a near certainty that the pace of construction development will continue to impact the archaeological record; the questions we ask of the past will increase in complexity as we continue to look for ways of "treating the world as if we intended to stay" (Gray et al. 1993: 280); and the funding dedicated to archaeological research will continue to vary in amount and priority as a function of economic considerations in the immediate present. All of which make developing effective and efficient methods of archaeological discovery, definition, and analysis increasingly imperative (National Park Service – National Center for Preservation Technology and Training [NPS NCPTT] 2007). In this context, the time and energy archaeologists are devoting to geophysical and imagery-based methods of archaeological prospection seem more well spent all the time.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Metal Detecting in Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Surface Survey: Method and Strategies

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Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology

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Introduction

With the advent of nuclear-based analytical methods in the last 40 years, particle-induced X-ray emission (PIXE) has established a role in the elemental analysis of archaeological material and cultural heritage. PIXE is a technique with a diverse array of applications in biology, geology, materials science, and others and has found valuable wide-ranging applications in archaeology and cultural heritage research. Such applications for archaeology and museum work generally fall into the categories of compositional analysis, provenance, understanding surface treatments and changes, and conservation and restoration.

Definition

The general definition of PIXE is "particle-induced X-ray emission" although this is often synonymous with "proton-induced X-ray emission," which is a specific type of PIXE. Charged particles typically used in PIXE include both protons (p) and α-particles (He^{+2}). Protons are produced in particle accelerators such as Van de Graff instruments; α-particles are produced by radioactive sources (Johansson & Campbell 1988).

Most laboratories use an accelerator to create a beam of high-energy (1–4 MeV) particles. The sample is bombarded by a beam of these particles, resulting in ejection of inner-shell electrons in the sample, followed by the de-excitation of the ion. Electron rearrangements then occur within the atom to fill the resulting vacancies, resulting in emitted X-rays and Auger electrons. The emitted X-rays have specific energies particular to energy transitions in a specific element; the number of X-rays emitted is proportional to the original concentration of the element in the sample. Detection and energy sorting of the X-rays is primarily done using energy dispersive systems with semiconductor detectors and multichannel analyzers (MCAs) (Ehmann & Vance 1991).

Some advantages of PIXE for art and archaeology include its nondestructive analysis capabilities with appropriate experimental setup and simultaneous elemental analysis. Elemental characterization of samples provides data for interpretation on artifact composition, technology, and origins. The technique has high sensitivity (1–10 ppm) for elements with atomic numbers in the ranges $11 < Z < 32$ and $75 < Z < 85$ (Johansson & Campbell 1988). In addition to trace analysis, PIXE is also capable of measuring major elements in the sample (up to percent levels). PIXE is a near-surface analytical method that analyzes the first 1–10 μm of a sample, which makes it ideal for analysis of thin layers of pigments or other surface treatments on artifacts. Depending on the experimental setup, it is also possible to collect data on depth profiling of elements in the sample using a related method, Rutherford backscattering (RBS). As compared to XRF, PIXE generally has a higher rate of data collection and less background spectral effects, due to lower bremsstrahlung interactions and Rayleigh and Compton scattering. The technique is regarded to have high precision and reproducibility. PIXE often has relatively quick analysis times on the order of minutes (Taylor et al. 1994; Johansson et al. 1995).

Historical Background

PIXE was first developed in the 1970s. Over the next decades, the technique developed along with accelerator facility and electronics technology and is now a mature radioanalytical method with applications in many fields. Sample types in the early uses of the technique included ceramics and metals and have since expanded into varied artifact types such as glasses and pigments.

Many standard PIXE systems produce a beam of around 1 mm diameter. Some modern systems now have the capability of micro-PIXE through beams 1 μm in diameter, which allows for spatial resolution analysis over small areas by rastering the beam over the sample. Micro-PIXE may also be used to analyze single spot areas or crystals in a sample.

Most facilities perform PIXE under vacuum; therefore, the sample must fit in the dimensions of the vacuum chamber. However, extraction of the beam from the accelerator allows in-atmosphere PIXE analysis, which is advantageous for samples that cannot be placed under vacuum.

Several facilities routinely perform PIXE. The major laboratories in this area are AGLAE in the (Louvre, Paris, France), University of Guelph, (Guelph, Canada), the STAR accelerator facility at ANSTO (Australian Nuclear Science and Technology Organisation, Lucas Heights, Australia), as well as others worldwide. Of these, AGLAE in France is the only facility dedicated to analysis of cultural heritage materials (Calligaro et al. 2003; Dran et al. 2004).

Recently, the PIXE technology has been adapted to portable technology (Pappalardo et al. 1996, 2003). This technology uses

radioactive sources to irradiate the sample with alpha particles, and Peltier-cooled detectors. These systems allow the instrument to travel to the sample, which is advantageous where an archaeological object may not be able to travel to a laboratory due to size or fragility or other restrictions.

Key Issues

Current Applications

Within the area of archaeological and cultural heritage applications, several classes of material have had successful PIXE analysis and data interpretation. These include metals, obsidian, pigments, paintings, glass, ceramics, and other inorganic materials.

Ceramics are one of the first archaeological materials investigated by PIXE and have since expanded into archaeometric studies and applications worldwide. Some of the initial studies focused on bulk composition of ceramics and provenance studies. While provenance studies are still an important application of PIXE, some current papers are focusing more on surface applications and micro-PIXE of ceramic surfaces. An example of this is a recent paper by Polvorinos et al. that explores the application of PIXE to understanding fourteenth- to eighteenth-century luster glazes on Spanish ceramics including analysis of ceramic surfaces (Polvorinos et al. 2011).

PIXE has been applied to many types of archaeological metals, with coins and metal implements being the most common. There are many examples of compositional analysis of coins from many parts of the world and from many archaeological and historical periods. A recent article by Ben Abdelouahed et al. demonstrates the types of studies, analytical capabilities, and statistical analysis for coin analysis by PIXE (Abdelouahed et al. 2010).

Due to its near-surface capabilities, PIXE has been used widely in paint and pigment analysis. Neelmeijer et al. describe a combination XRF and PIXE methodology for studying the paint layers in modern sample as a case study for artworks. The authors use both methods for elemental analysis and depth profiling of the paint layers (Neelmeijer et al. 2000). PIXE analysis in this case offers valuable information on depth profiling by variation of the incident energy of the particle beam. Another recent study on pigment investigated the chemical composition of prehistoric pigments from Abri Pataud, France. The authors cite the nondestructive capabilities of PIXE as valuable for this application to rare prehistoric objects (Beck et al. 2011).

PIXE has also been applied to the characterization of archaeological obsidian objects. Composed of volcanic glass, obsidian can be characterized by its trace elemental signature, which reflects the material's origins. Other techniques such as NAA (neutron activation analysis) provide similar elements; however, the technique is usually destructive to the object as a sample must be cut from the original object. In contrast, PIXE can provide elemental data in a nondestructive method to the artifact. PIXE has been successfully used by Gazzola et al. to identify the original sources of obsidian found in Teotihuacan through elemental data and statistical interpretation (Gazzola et al. 2010). Berlot-Gurlet et al. provide a comprehensive comparison between PIXE, ICP-AES, and ICP-MS for the characterization of obsidian artifacts in a case study (Bellot-Gurlet et al. 2005).

A related application of PIXE to glass materials includes the analysis of archaeological and historical glasses. Elemental analysis by PIXE can be used to determine the major composition and therefore the original recipe of the glass. Trace elemental analysis can also be used to determine the provenance of the material. Calligaro presents a case study of archaeological and historical glasses, as well as the use of PIXE to study the surface modifications on glass (Calligaro 2008).

Recent advents in micro-PIXE have allowed insights into archaeological materials on much smaller scales than previously achieved by broader-beam PIXE instruments. While the technique allows higher spatial resolution, the time per analysis is longer due to the smaller beam size. Recent updates in technology have allowed

micro-PIXE for use in extracted-beam setups as well. Torkiha et al. describe a laboratory setup of external micro-PIXE and its use on archaeological ceramics (Torkiha et al. 2010). The AGLAE facility at the Louvre routinely uses micro-PIXE for object analysis.

In the past decade, a group in Catania, Italy, has been developing a series of portable PIXE instruments based on polonium-210 radioactive sources for alpha particles. These instruments have been demonstrated on ceramics, coins, statuary, and other applications (Pappalardo et al. 2003; Rizzo et al. 2011). The portable capabilities of these instruments allow analysis of objects as well as frescoes and other materials that cannot travel.

Future Directions

Future developments include advances in instrumentation and electronics. Micro-PIXE analysis allows analysis on small scales previously not achievable with larger beam diameters and the possibility of elemental "mapping" of an object surface. Coupled with external beam facilities, this instrumentation allows microanalysis of objects without vacuum conditions, allowing analysis of objects of varied sizes and composition. PIXE in combination with Rutherford backscattering analysis (RBS) also offers information on the structure of the sample.

Faster and more compact electronics and detectors as well as alpha-source technology have allowed the expansion of portable PIXE technologies. Developments in this area will make portable PIXE instruments more widely available for archaeological and cultural heritage applications.

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Ceramics: Scientific Analysis
- ▶ Pigment Analysis in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Basic Biographical Information

Born in France in 1944 and living in Brazil since 1971, the professional performance of André Prous is intertwined with the history of academic archaeology in Brazil. With a B.A. and M.A. in History from the University of Poitiers, he started his Ph.D. in prehistory in 1967 at the University of Paris I (Pantheon-Sorbonne), participating in field activities coordinated by Leroi-Gourhan and attending seminars on American settlements by his mentor Annette Laming Emperaire at the Ecole Pratique des Hautes Études. His academic career in 1960s Paris was marked by the exchange with a first generation of Brazilian students seeking training in archaeology abroad and whom later became part of the professional staff of the leading universities in Brazil. Through a technical cooperation agreement between France and Brazil, André Prous was hired in 1971 by the University of São Paulo to teach Prehistoric Archaeology in Department of History. That same year also began his first field activities in Brazil as part of the Franco-Brazilian Mission at Lagoa Santa (Minas Gerais State), coordinated by Annette Laming Emperaire. They excavated the site Lapa Vermelha IV until 1977 which featured buried rock panels, human burials, and datings around 9,000 years, indicating the high potential that studies of rock art in this new region could provide. In 1975, facing the possibility of returning to France to work in a center for archaeological research that was being assembled in Valbonne, Prous chose to settle down permanently in Brazil at the invitation of the Federal University of Minas Gerais, where in 1976 he founded the Archaeology Division in the Natural History Museum where he still lectures, as a full professor in the Department of Anthropology. His professional activities at this University influenced the constitution of a new generation of Brazilian researchers, especially his studies of rock art and ceramic and lithic technology, emphasizing the practice of experimental archaeology, analysis of chaîne opératoire, and functional studies. Since 1981 Prous started coordinating the Franco-Brazilian Mission in Minas Gerais and has since conducted extensive archaeological survey projects in different regional contexts of Minas Gerais State such as the Serra do Cipó and regions of the upper and middle São Francisco River, the Doce River valley, and the upper Jequitinhonha River, resulting in the identification of hundreds of sites with rock art dating back to the early Holocene.

Major Accomplishments

Interested in the meanings of the stylistic variations of Brazilian prehistoric art, André Prous developed his Ph.D. thesis, submitted in 1974, on the zoomorphic sculptures associated to funerary contexts at the southern Brazilian coast (sambaquis), conducting extensive surveys in institutional and private collections. The results of this research are published in *Les sculptures zoomorphes du Brésil et de l'Uruguay* (1977). From the stylistic comparison of sculpted art, he demonstrated the existence of regional variations also reflected in the lithic and bone industries, contributing to discussions on territoriality and the emergence of complex

social contexts for hunter-gatherers specialized in the exploitation of coastal resources dating from 5,000 to 2,000 years BP. Studies by André Prous about the variety, complexity, and abundance of rock art in Minas Gerais State have shown that regional theme variation correlates with regional sequences of human occupation, providing methodological support for the establishment of complex chrono-stylistic sequences for the region. Comparisons between Brazilian regional rock art styles are among the main contributions of Prous, being its results systematized in the book *Brasil Rupestre* (2007). Also a noteworthy contribution is his *Arqueologia Brasileira* (1992), the first attempt to synthesize the Brazilian prehistory, taking as reference the contemporary research in the country conducted by different teams. Currently, André Prous has focused his interests on prehistoric art to the iconographic study of the Tupi pottery, contributing to the theoretical and methodological development and innovation in this field in Brazil.

Cross-References

- ► Archaeology of Art: Theoretical Frameworks
- ► South American Rock Art
- ► Style: Its Role in the Archaeology of Art

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Provenance Studies in Archaeology

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Introduction

A primary objective in the study of ancient artifacts is to discern where they were produced. When archaeologists, other scientists, students, the public, or children inquire about an object – "Where is it from?" – there are, of course, two answers. One is the place or location at which the object was found or discovered, for example, the context of its finding, and second, a more difficult question, what is the source of the object. The latter entails a diagnosis of the origin of the materials that comprise the object, the location or site where it was produced or fabricated, who made it, and why and for what purposes. A related set of questions, often with complex answers, is how the object was relocated from its place of origin to location at which it was recovered. In archaeology, these questions apply as much to the composition of a pottery vessel as they do to a lithic tool or stone ornament but also to glass, metals, and textiles as other major artifact classes. To answer these questions, investigators employ tools and techniques borrowed from geology and geochemistry, particularly petrography, physicochemical studies, and stable isotope analyses. A majority of archaeological sourcing studies are devoted to earthenware ceramics, pottery, porcelain, and related objects made from clay as well as stone or lithic materials, notably obsidian, marble, chert, flint, and steatite.

Notable achievements have been made in the analysis of glazes and glass, but there has been limited success in sourcing of other materials such as metals and especially organic substances including textiles, plant fibers, dyes, pigments, oils, tars, protein residues, amber, jet, and bone.

Definition

Provenance (noun, "origin," plural provenances), from the Middle French word *provenant*, present participle of *provenir* ("to come from" or "arise"), ultimately from the Latin *provenio* (to come forth), denotes the origin or source of an object or idea or may indicate its history of ownership. The term was originally used in art history and antiquities to designate the ownership of artworks but is now employed in similar senses in a wide range of fields, including science, computing, and archaeology.

Historical Background

The concept of provenance has been employed in archaeological research for more than 160 years and originally connoted an object's "findspot" or to indicate the source of raw materials or the location of the manufacture of an object, such as in a workshop (Wilson & Pollard 2001: 507). Pioneering research by European chemists led to the acceptance of the concept that some chemical property of an inorganic archaeological artifact could be considered characteristic of the raw material source of the object; hence, the concept of "chemical fingerprinting" was born. Beginning in the 1960s, the chemical provenance of ceramics and other inorganic materials and some organic raw materials were analyzed and aided by the mathematical treatment of data sets and the manipulation of multivariate data. Professional archaeologists embraced fingerprinting as a major analytical tool as they had Willard Libby's radiocarbon dating five decades ago.

In the archaeological literature, the terms provenance and provenience are sometimes used interchangeably, but this is not always the case. Price and Burton (2011: 213-4) oversimplify it, suggesting provenience as "birthplace" and provenance as "resume." Historical archaeologists designate provenance as "the source of geological materials" and provenience as "the location where an artifact was recovered" (Hauser 2008: 162). There are potential semantic differences as, for example, the spelling of the term "archaeology" is used predominantly in the English-speaking world including North American academic institutions, but the term "archeology" tends to be a post-World War II spelling found in more recently established universities and publications oriented to anthropological archaeology. Provenance is used in the United Kingdom and much of the Old World to mean "place of origin."

In North America, provenience has largely replace provenance because for former is restricted to in situ location at the time of the discovery rather that the historical chain (origin to the present) employed by art historians and museums. Provenance may be used to explicate any artifact recovered archaeologically or any fossil recovered by paleontologists and in computer processing to indicate the history of data in a database record. In a review of nearly 700 articles on "provenance" appearing in the British journal *Archaeometry* (1957–2011), one finds the use of archaeology/archeology as well as provenance/provenance; some North American authors employ both spellings, archaeology or archeology, while provenience tends to be employed by North American scholars to mean either the artifact's context or location or its history. A review of a similar set of more than 250 articles on "provenance" in the *Journal of Archaeological Sciences* (1974–2011) and nearly 50 in the *American Journal of Archaeology* (examined 1960–2011) reveals a mixed use of "provenance" to mean origin of raw materials and/or the location where an object was found.

In archaeological and ethnographic studies in North America, the term provenience is used somewhat similarly to "provenance," but readers are advised to determine if an author uses the terms as synonyms or differentiates them by employing provenience to describe the context

in three-dimensional space in which an artifact was recovered and using provenance to designate the source(s) or raw materials used in making the artifact and the object's documented history. The "provenience postulate" (Weigand et al. 1977: 24), initially suggested in a study of turquoise sources, is a significant element in the study of the origin of archaeological materials and states that chemical differences within a single source of material must be less than the differences between two or more sources of the material if they are to de differentiated. This means that if a source is determined to be chemically distinct, materials from it that have been moved some distance from that source would share the same chemistry and can be determined. Ideally, this would (1) involve a natural material that has not been altered after extraction from the source, (2) that there are a small number of potential sources, (3) that the investigator has adequate samples from each source to be able to assess compositional variability, and (4) that there are one or more elements or compounds adequately distinguishes the sources. Hence, obsidian is a more "ideal" material than pottery clays, glass, and metals, since clays can be mixed with other clays, glass cullet (broken recycled glass) and metals – particularly copper, silver, and gold – can be mixed with like materials from widely different sources during remanufacturing processes, and metals can be mixed to produce alloys such as bronze. In addition, comparative techniques, expert opinions, and the results of other scientific analyses may also be used to support the history of an object, but establishing provenance is essentially a matter of documentation.

Archaeological Research

Archaeological research entails the documentation of the precise location of sites, architecture, artifacts, and raw material sources. Placing these in a three-dimensional context and relating the coordinates to a master datum and the use of Cartesian coordinate were traditional practices now supplanted by GPS and GIS. The Global Positioning System (GPS), a space-based global navigation satellite system (GNSS), provides location and time information anywhere on the Earth, while a geographic information system (GIS) also known as a geographical information system or geospatial information system is a merging of cartography, statistical analyses, and database technology that is designed to capture, store, manipulate, analyze, manage, and present a variety of geographically referenced data. Precise locational data for artifacts and raw material resources has become a hallmark of modern archaeology and is a form of "provenance."

The Provenance Hypothesis

The traditional way of determining the geographical source of ancient pottery has been to map the spatial occurrences of pottery styles. For the historic eras, this poses minimal difficulty because historical and archival documents may locate kiln sites or production areas, but for much of prehistory information on production locales, the types of pottery fabricated there and the sociocultural and economic parameters associated with production are elusive. The criterion of abundance, gravity model, or other paradigms have provided assistance, but for the past seven decades, methodologies derived from geology and petrography and a variety of physicochemical approaches have been employed to locate potential places of origin by characterizing the composition of the artifacts with known sources of the raw materials used to fabricate the objects. Provenance studies on pottery, obsidian, turquoise, steatite, chert, and jade have been especially valuable but rest upon assumptions in the "provenance postulate" which is normally formulated in terms of chemical composition. Simply put, the postulate assumes that differences between distinct sources of raw materials may be recognized analytically and that the compositional variations will be greater between the sources than within the sources. Rice (1987: 413-26) provides a valuable, in-depth, and well-documented discussion of ceramic provenance and reviews chemical and petrographic methods, the creation of reference groups, the use of instrumentation

and statistics, the selection of elements for analysis, and comparing sherds and clays. In a more widespread treatment of the topic, Sayre (2000) discusses structure, raw materials and inclusions, multivariate statistical analysis, and characterization through ratios of stable isotopes.

Wilson and Pollard (2001: 507-8) indicate that scientific provenance studies rest on six basic assumptions (presented in abbreviated form here): (1) that some chemical or isotopic characteristic of the geological raw materials is carried through unchanged into the finished object, (2) that the fingerprint varies between potential geological sources available in the past and that this variation can be related to geographical occurrences of the raw material, (3) that such characteristic fingerprints can be measured with sufficient precision in the finished artifacts to enable discrimination between competing potential sources, (4) that no "mixing" of raw materials (before or during processing) or that the mixing can be accounted for adequately, (5) that postdepositional processes either have a negligible effect or that the alteration can be detected, and (6) that any observed patterns of exchange or trade of the finished products are interpretable in terms of human behavior.

Provenance Studies of Archaeological Materials (Raw Materials and Finished Products)

Provenance studies on stone, ceramics, and metals account for the vast majority of all archaeological provenance analyses:

- *Lithics/stone: raw materials*. Lithic raw materials may occur in outcrops or geological beds or as nodules in stream beds. Provenance studies have been undertaken on a wide variety of raw materials and artifacts including alabaster, basalt, chert, chlorite, flint, granite, greenstone (jadeite and nephrite), hematite, limestone (blocks and plaster), magnetite, marble, obsidian, quartzite, rhyolite, sandstone, schist, steatite (soapstone), and turquoise. Because the extraction and fabrication techniques of lithic production do not alter significantly the chemical composition, lithics provide the best material by which to test the provenience hypothesis. Artifact reuse, exposure to heat, postdepositional processes, and storage in archaeological repositories or museums are not likely to modify the bulk chemical composition; hence, stone is theoretically an "ideal" material for provenance assessment. Lime plaster, cement, and concrete derive from rock sources and present complicating issues in provenance studies but not as complex as ceramics (Wilson & Pollard 2001; Tykot 2004; Lambert 2005).
- *Ceramics/pottery: finished products*. Provenance studies have been conducted on earthenware, stoneware, protoporcelain, and porcelain which may occur in various types and classes of ceramic materials: domestic/utilitarian and ritual pottery containers, figurines, spindle whorls, earspools, and other objects. Unlike stone sources or outcrops of source materials, clay is a complex product of rock mineralogy and subject to weathering and found in a variety of locations worldwide. Hence, few chemical studies have directly linked pottery vessels with specific clay sources. Clays being transported long distances from sources may contain naturally occurring organic or inorganic aplastics or tempers, or organic or inorganic materials may be introduced purposefully or by accident during the preparation of the clay. Heterogeneous clays from different sources may be mixed, levigated, and wedged, and pottery may be hand-built or wheel-thrown. The size and complexity of the manufacturing process – household production by one fabricator versus creation by multiple artisans each responsible for one step in a multiphase process versus a factory or industrial level of fabrication – complicate the ability to precisely define ceramic provenance (Rice 1987; Tykot 2004; Kolb 2008, 2011; Reedy 2008).
- *Glass: finished products*. Products that have been studied for provenance include beads, containers and other vessels, faience, glazes, ingots, ornaments, tesserae, and window glass. Glass may have been a by-product of the

technology of either glazed ceramics or metals. Ancient pyrotechnologies were unable to reach silica melting temperatures so that a modifier or flux derived from plant or animal sources was employed to lower melting points. Like ceramics, the composition of glasses and other vitreous silicates affects provenance because of the heterogeneous nature of the original raw materials used in production, the use of cullet, the addition of colorants or decolorants, and that containers used to hold molten glass is itself subject to flux and add impurities. As a result, the scientific assessment of glass provenance has had mixed success (Wilson & Pollard 2001; Lambert 2005; Paynter & Dungworth 2011).

- *Metals: raw materials.* These include native copper, copper alloys, gold, lead, silver, and tin. Metals were among the earliest materials submitted for scientific provenance analyses but, like glass, suffer from the same issues of heterogeneous raw material origins, recyclability, purposeful or accidental mixing, and the creation of desired alloys, as well as high temperatures that alter trace element compositions and the discard of unwanted material removed as slag. In addition, fabrication procedures – cold hammering, annealing, joining, and casting – provide additional issues for determining provenance (Wilson & Pollard 2001; Tykot 2004; Lambert 2005).
- *Other materials: raw materials and finished products*. The sources of amber, antler, bitumen, bone, dyes, horn, ivory, jet, pitch, resin, tar, and various organics such as hair and fibers have been analyzed. Baltic amber was characterized in the 1980s and can be distinguished from non-Baltic sources and imitations. Varying degrees of success have been reported with the studies of jet and ivory, while analyses of human bone and teeth have been useful in determining human migrations, and the assessment of herd animals (particularly sheep, goat, and cattle) have also focused on animal origins and movements. In addition, provenance studies of woolen textiles have increased dramatically during the past decade (Wilson & Pollard 2001; Lambert 2005).

Analytical Methods (Thin- Section Petrographic Analysis, Optical Mineralogy, or Optical Petrography)

The macroscopic analysis of lithics, ceramics, and other clay objects is the initial step in analysis, closely followed by binocular and petrographic thin-section microscopy, derived from the geological sciences or materials science, which has been used for more than seven decades. Petrographic analyses in the 1920s led to the identification of stone sources used at Stonehenge. The technique remains an especially viable tool in the assessment of paste characteristics and ceramic provenance, playing a "crucial role" in provenance studies. The earliest research on pottery dates to Anna Shepard in 1932. Thin-section petrographic analysis (T-S-P), optical mineralogy (OM), and optical petrography (OP) are flexible techniques that can assist in characterizing textural aspects of clays, vessel, and/or sherds from the analysis of thin sections. Raw clays may naturally contain organic and/or inorganic aplastics, or temper may have been added during processing and/or by the potter during the mixture of different clays. These cultural factors complicate T-S-P and other physicochemical analyses such as INAA (Neff 1992; Neff 1998). Petrographic microscopy is the only technique that can describe individual mineral grains within a vessel or sherd. On the basis of cost-effectiveness, ease of sample preparation, and simplicity of analytical procedure, the petrographic microscope offers the best method for identifying and classifying mineralogical compositions of ceramic pastes and relating these to their respective potential aplastics, especially those of inorganic origins. The thin sectioning of sherds or portions of ceramic artifacts (vessels and figurines) and the study of prepared specimens by petrographic microscopy have been demonstrated to be especially useful when the clay minerals and aplastics of a limited geological or geographical distribution are identifiable within the clay body. In these instances, it is a relatively easier task to locate an area or areas from which, based on clay and/or aplastic and/or mineral temper components, a particular ceramic artifact is most likely to have originated. Reedy (2008) has

written the most recent salient assessment on thin-section petrography. Drawbacks include that the technique is destructive of the original object since the analysis of ceramics or lithic material requires a thin section of at least 1 cm^2 for analysis. In addition, there are limitations on mineral identification, notably that minerals <100 μm in diameter cannot be readily identified, and there are difficulties identifying opaque minerals. However, the procedure has been useful in characterizing ceramic types and wares especially in contexts where comparative petrographic data is lacking – such as in Central Asia (Kolb 2008).

A Summary of Major Provenance Methods

The summary format derives from Tykot (2004) and methodological data from Cilberto and Spotto (2000), Glascock and Neff (2003), Goffer (2007), Lambert (2005), Pollard et al. (2007), Pollard and Heron (2008), and Wilson and Pollard (2001) as well as from a review of provenance studies reported in *Archaeometry* (1957–2011), *Journal of Archaeological Sciences* (1974–2011), and *American Journal of Archaeology* (1960–2011). Other relevant journals that publish provenance studies include *Geoarchaeology: An International Journal* and *Journal of Archaeological Research*.

Examples from the literature are noted.

- *AAS*: Atomic Absorption Spectroscopy or *OES*
  Materials: stone, ceramics, glass, metals. Analyte: solution.
  Bulk chemistry: good; trace elements: very good (70+ elements).
  Superseded in the last decade by XRF.
  Examples: prehistoric pottery from Oklahoma; Maya ceramics from Guatemala.
- *EPMA*: Electron Probe Microanalysis
  Materials: stone, ceramics, glass, metals. Analyte: solid.
  Bulk chemistry: excellent (surface); trace elements: low sensitivity.
  Similar to SEM which has a higher sensitivity.
  Examples: stone ballast to elucidate Mediterranean Sea trade routes; vitrified Peruvian wares; ancient Sudanese ceramics; Etruscan pottery.
- *FTIR*: Fourier Transform Infrared Spectrometry
  Materials: stone, ceramics, glass, metals, organics, burned bone. Analyte: solid.
  Bulk chemistry: good; trace elements: very good.
  Examples: southern Ontario chert sources; dyes used on silk (Prussian blue); dyes used on Greek ecclesiastical textiles (sixteenth to nineteenth century); differentiating Italian and Baltic sources of amber; sources of fats and oils used in Greek perfumes; wine residues in amphorae.
- *GC*: Gas Chromatography, *HT-GC* (High Temperature GC), *HT-GS-MS* (HT-MS with MassSpectrometry)
  Materials: organics (hair, fur), resins, oils, fats, lipids, esters. Analyte: gas.
  Some gas chromatographs can be connected to a mass spectrometer which acts as the detector.
  Examples: sheep hair/wool discerning Scandinavian origins; terpenoid resins identifying Yemeni trade routes; pine resins on Great Basin pottery; Mediterranean Bronze Age perfumes; beeswax in Greek ceramics; bitumen sources used by the Mesoamerican Olmec (1200 BCE); sources of jet artifacts in the United Kingdom.
- *ICP-AES*: Inductively Coupled Plasma (Spectroscopy)-Atomic Absorption Spectroscopy
  Materials: stone, ceramics, glass, metals, wine. Analyte: solution.
  Bulk chemistry: very good; trace elements: excellent (a large number of elements).
  Examples: Aegean obsidian; Nuzi ware from Syria.
- *ICP-MS*: Inductively Coupled Plasma-Mass Spectroscopy
  Materials: stone, ceramics, glass, metals, serum blood, urine. Analyte: solution.
  Bulk chemistry: very good; trace elements: excellent (50+ elements); it is replacing INAA.
  Examples: steatite sources in Crete; Egyptian ceramics; sources of French porcelains; copper alloy artifacts from Tepe Yahya, Iran; Sassanian glass vessels from Iraq.

- *ICP-OES*: Inductively Coupled Plasma-Optical Emission Spectrography
  Materials: stone, ceramics, glass, metals. Analyte: solution.
  Bulk chemistry: very good; trace elements: very good.
  Examples: third millennium BCE Iberian ceramics; East Asian storage jars.
- *INAA/NAA*: Instrumental Neutron Activation Analysis
  Materials: stone, ceramics, glass, metals, amber. Analyte: solid/powder
  Bulk chemistry: very few elements; trace elements: excellent.
  Since 1967 it has been commonly used in provenance analyses and is a powerful quantitative analytical technique with application in a broad range of disciplines including agriculture, archaeology, geochemistry, health and nutrition, and environmental monitoring. Because of its sensitivity, great accuracy and precision, and versatility, the technique is a suitable method for analyzing many different types of samples (Glascock & Neff 2003: 1516; Neff (ed.) 1992). Thousands of analyses have been undertaken on lithics, ceramics, and metals.
  Examples: widespread use on obsidian artifacts and sources in Mexico, Guatemala, Peru, central and eastern Europe, the Aegean Islands, Sardinia, Turkey, New Zealand, and New Guinea; North American pipestone artifacts; chert sources in Belize; Samoan basalt; Etruscan marble. Commonly used since 1957 in ceramic and clay figurine analyses in the Mediterranean region (e.g., Tarsus, Rhodes, Corinth, Mycenae, Cyprus, and Italy); Samian ware; Basin of Mexico ceramics; Yuan Dynasty porcelains. Sourcing Sassanian silver in Southwest Asia; European blue glass trade beads in Ontario, Canada (c. 1660 CE); pigments in oil paintings (Rembrandt, Vermeer, and Van Dyck).
- *LA-ICP-MS*: Laser Ablation-Inductively Coupled Plasma (Spectroscopy)-Mass Spectrometry, *TOF-LA-ICP-MS* (Time-of-Flight LA-ICP-MS)
  Materials: stone, ceramics, glass, metals. Analyte: solution.
  Bulk chemistry: very good; trace elements: excellent, high sensitivity (70+ elements).
  Requires small samples and leaves minimum scarring on the artifact
  Examples: used since 2002 to analyze Aegean obsidian artifacts and architectural limestone used in Classic period Teotihuacan, Mexico (200–600 CE). In ceramics: Colonial Mexican pottery; Samoan wares; differentiating Hohokam and Patayan pottery in Arizona. Glass: Near Eastern bead sources (Mesopotamia, Egypt, and Greece); Italian glass mosaic tesserae. Metals: copper alloys at Tepe Yahya, Iran; production loci of Roman coins in Europe.
- *LC*: Liquid Chromatography, LC-MS (LC with Mass Spectrometry)
  Materials: resins, dyes, sera, blood, oils, fats, lipids, esters, wine. Analyte: liquid.
  Examples: ancient dyes from the eastern Mediterranean (Tyrian purple from *Murex* sea snails); textile dyes from Southwest Asian Bronze and Iron Ages; the Shroud of Turin; beeswax in the Aegean. LC-MS is effective in characterizing wine residues in Egyptian pottery and beer residues from Southwest Asian ceramics.
- *M/S*: Mössbauer (German: Mößbauer) Spectroscopy
  Materials: stone, ceramics, glass, metals. Analyte: solid/powder.
  Similar to NMR spectroscopy, M/S probes minute changes the energy levels of atomic nuclei.
  Examples: Peruvian ceramics (Moche, Nazca, and Inka).
- *OCL*: Optical Cathodoluminescence
  Materials: stone, ceramics. Analyte: solid/powder.
  Bulk chemistry: good; trace elements: very good.
  Examples: differentiating local from imported Neo-Assyrian palace ware (934–610 BCE) based on quartz grain analysis.
- *OES*: Optical Emission Spectroscopy or **AES**
  Materials: metals. Analyte: solid/powder.

Bulk chemistry: very few elements; trace elements: fair/good.

Examples: copper alloys in Mesopotamia; steel and cast iron in European artifacts.

- *PIXE*/*PIGME*: Proton Induced X-Ray/Gamma Ray Emission

  Materials: stone, ceramics, glass, metals, organics. Analyte: solid.

  Bulk chemistry: very good (surface analysis); trace elements: fair/good

  Examples: gold and silver coins from Southwest Asia; East Asian storage jars; obsidian from Chiapas, Mexico; South African ostrich eggshell.

- *R*/*S*: Raman Spectroscopy

  Materials: stone, ceramics, glass, metals, liquids, gases. Analyte: solid, liquid, gas.

  Examples: clay types in Argentinian pottery (900–1200 CE).

- *SEM*: Scanning Electron Microscopy, *SEM-EDS* (SEM with X-ray Detector), *SEM-WDS* (SEM with Wavelength Dispersive X-ray Detector)

  Materials: stone, ceramics, glass, metals, textiles. Analyte: solid.

  Bulk chemistry: good (semiquantitative); trace elements: none.

  SEM-EDS has low sensitivity but identifies small inclusions <10 μm in diameter; higher sensitivity with SEM-WDS.

  Examples: microstructural, microtextual, and sintering analyses of Iberian ceramics (third millennium BCE); Nuzi ware distribution (1600–1200 BCE); origins of sheep hair/wool (Scandinavia and New Zealand).

- *SIRA*: Stable Isotope Ratio Analysis

  Materials: marble, metal, bone, teeth, organics, lead-based pigments. Analyte: solid/gas.

  Isotope ratios: C, N, O, S, H, He.

  Examples: Italian marbles and Aegean sculptural stone.

- *SIR*: Strontium Isotope Ratios

  Materials: organics, textiles, leather, bone, teeth, shell. Analyte: solid.

  Isotopes: $^{87}Sr/^{86}Sr$ ratios.

  Important in reconstructing human and animal migration routes.

  Examples: sheep hair/wool (Scandinavia); Oaxacan and Gulf Coast migrants to Teotihuacan, Mexico (200–600 CE).

- *TIMS*: Thermal Ionization Mass Spectrometry

  Materials: stone, metals, glass, bone. Analyte: solid/gas

  Heavy elements: Pb, Sr, Nd.

  Examples: Byzantine and early Islamic glass sources (Egypt, Syria, and Palestine).

- *XRD*: X-Ray Diffraction

  Materials: stone, ceramics, glass, metals. Analyte: solid/powder.

  Bulk chemistry: excellent (surface analysis); trace elements: very good.

  Examples: ceramics: Asia Minor terra-cotta figurines; Iranian, Iberian, and Etruscan pottery; Chinese porcelains.

- *XRF*: X-Ray Fluorescence, *ED-XRF* (Energy Dispersive-XRF)

  Materials: stone, ceramics, glass, metals. Analyte: solid/powder.

  Bulk chemistry: excellent (surface analysis); trace elements: excellent.

  Hundreds of studies have been undertaken on lithics, ceramics, glass, and metals. High-precision XRF analysis does not require a nuclear facility and is preferable to INAA in terms of the ease of sample preparation and analytical procedure. The greater effectiveness of high-precision XRF than INAA in this provenance study is a result of the different array of elements measured and the higher precision obtained for certain elements by XRF. Portable (or handheld) X-ray fluorescence (pXRF) spectrometry has become common for the geochemical characterization of obsidian artifacts and ceramics.

  Examples: lithics: andesite (Mid-Atlantic region of the United States); basalt (Neolithic to Roman era millstones in the Mediterranean region); jasper (Japan and Mid-Atlantic region of the United States); limestone and plaster (Mesoamerican Classic period Teotihuacan and Postclassic Mexica Aztec); obsidian (New Mexico and the Basin of Mexico). Ceramics (since 1999): Tikal, Mexico; southwestern Iran; Attic coral red slips; Rio Grande glaze paint

pottery trade; French white earthenwares (1755–1820). Glass: Mesopotamia; Roman glass in Britain; medieval blue soda glass. Metals: Athenian coins; Roman coins in the United Kingdom; cold-worked copper in Upper Great Lakes North America; pewter flatware in Europe (thirteenth to sixteenth century); Ife and Benin West African bronzes; differentiating native North American from European imported copper.

- *XRPD*: X-ray Powder Diffraction
  Materials: stone, ceramics, glass, metals. Analyte: solid/powder.
  Bulk chemistry: excellent (surface analysis); trace elements: very good.
  Examples: crystalline phases of ceramics during firing (Balearic Islands, 1700–850 BCE).

Key Issues and Future Directions

Early provenance studies focused on the use of one or two methods in combination, such as thin-section petrography (T-S-P) and INAA. The literature review indicates that currently up to a half-dozen methods may be employed in combination to answer a variety of questions. A few characterization examples:

- Flint by ICP–SFMS and MC-ICP-MS
- Marble by T-S-P, PIXE, EMPA, and SIRA
- Lime plaster by T-S-P, SEM-EDS, XRF, and LA-ICP-MS
- Clay cooking vessels by T-S-P, XRF, INAA, XRD, and SEM. XRF, ICP-MS, XRD, and EPMA. ICP-AES, SEM, and XRD. T-S-P, SEM-EDS, INAA, R/S, and X-ray (vessel structure) plus replication studies
- Amphorae by T-S-P, XRD, XRF, and EPMA
- Ceramic crucibles by binocular microscopy, T-S-P, XRD, ICP-MS, ICP-AES, SEM
- Organic dyes by SEM-EDX and HT-GC-MS

T-S-P with computerized point counts and SEM-EDS or XRF correlated with pottery forms, surface treatments, and construction methods create a holistic approach to the thin-section analysis. The goal is to understand the advancement of manufacturing techniques, which are built upon the technical discoveries of individual potters and driven by changes in socio-cultural practices, mortuary traditions, and economics (Kolb 2011).

T-S-P is advancing through the scanning of the thin sections and sherd surfaces and adding images to searchable databases. An advantage is that these images include the entire area of the thin section (under low magnification) rather than just a single field of view as under a microscope, facilitating macrotexture studies. An advantage is that the time and expense of thin-section cutting, mounting, and grinding are eliminated, allowing data to be collected on even larger numbers of specimens for rapid characterization (Reedy 2008).

Future refinements are expected in LA-ICP-MS and XRF and work advances on new topics such as characterizing slag inclusions in iron artifacts and distinguishing sources of alloys in metal and constituents in glass. Greater precision is accompanied by the troublesome question: After great time and expense in provenance studies, do scientists provide appropriate and relevant data for archaeological interpretation? Some contend that there is too much data or too precise information (Wilson & Pollard 2001: 515).

Cross-References

- ▶ Archaeological Chemistry: Definition
- ▶ Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)
- ▶ Archaeometry: Definition
- ▶ Bone: Chemical Analysis
- ▶ Ceramics: Scientific Analysis
- ▶ Dating Techniques in Archaeological Science
- ▶ Ethnoarchaeology
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Geoarchaeology
- ▶ International Symposium on Archaeometry
- ▶ Laboratory for Archaeological Chemistry (University of Wisconsin)
- ▶ Modern Material Culture Studies
- ▶ Organic Residue Analysis in Archaeology

- ▶ Proton-Induced X-Ray Emission Spectroscopy (PIXE): Applications in Archaeology
- ▶ Scanning Electron Microscopy (SEM): Applications in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Society for Archaeological Sciences (SAS)
- ▶ Textiles and Fabrics: Conservation and Preservation
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Public Archaeology, The Move Towards

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Introduction

One of the most evident changes brought by the reflexive turn in archaeology is perhaps the move towards public archaeology. Although in its inception public archaeology was primarily

related to educational concerns and efforts to attain public outreach (McGimsey 1972; Stone & Molyneaux 1994; Jameson 1997), in recent years it has become more complex to define. This slipperiness has to do with the fact that, as an umbrella term, public archaeology now encompasses a wide array of concepts and purposes (Schadla-Hall 1999; Merriman 2004a; Matsuda & Okamura 2011). This turn towards public archaeology, thus, can be better characterized by a gradual and explicit involvement of archaeology practitioners in different and intertwined levels of educational, political, governmental, and ethical issues. In this sense, it relates to and involves concepts such as development, heritage, applied archaeology, and community archaeology.

Definition and Historical Background

The term public archaeology attained recognition in the early 1970s with Charles R. McGimsey's publication with this very title (McGimsey 1972). Then, it was mainly meant to address the dangers of destruction of archaeological remains, raise broader awareness about this problem, and support legislative efforts aimed at protecting them (Schadla-Hall 1999). The increasing pressures of development, observed mainly in the United States and European countries, posed a challenge to professionals and state institutions as they were increasingly confronted with the destruction and loss of historical and archaeological heritage. The rise of independent archaeological contractors, as well as the participation of some universities in the development process, provided some means to mitigate such destruction and gave rise to Cultural Resource Management (CRM) or contract archaeology. Known also as heritage management and archaeological resource management, one of the main tenets of CRM archaeology was the preservation of past remains, conceived as a resource belonging to societies (MacManamon & Hatton 2000). The past, henceforth, came to be seen as a public right pertaining to the interests of the whole society (Carman 2002; Merriman 2004b). As observed by Smith (2004: 6), although the equal accessibility and significance to all comers implied by the term "resource" was subsequently challenged, the prolific efforts to develop outreach and educational programs and prevent the destruction of archaeological remains also contributed to make the subject relevant to a broader audience. Additionally, scholars drawing from critical theory emphasized that a reflexive stand oriented to reinforce stakeholder communities' civic and proactive engagements with the past should be paramount to public archaeology (Leone et al. 1995; Little & Shackel 2007).

In any case, the term public archaeology began to take its current shape with the involvement of archaeology in public debates, traversing the borders of traditional academic archaeology, to respond to public interests about the past. The rationalist and political neutrality of scientific discourse, prevalent in the discipline during most of the 1960s and 1970s, was fiercely challenged in the early half of the 1980s. Theoretically, factions of the post-processual movement in archaeology, strongly influenced by feminist and Indigenous discourses, challenged the authority and ethics of representation of the "other" and echoed the cultural critique about the hegemony of the Western academy (Wylie 1982; Hodder 1986; Pels 1999); most of these critiques called for a more inclusionary archaeological interpretation, in which Indigenous peoples and different local communities and stakeholders could participate (Layton 1989; Hodder et al. 1995). Following the controversies that arose as a result of the creation of the World Archaeology Congress (WAC) in 1986, a much more politicized world emerged for archaeology (Ucko 1987; Shanks 2004).

Authors such as Michael Shanks and Christopher Tilley (1992) and Mark Leone and colleagues (Leone et al. 1987, 1995), for example, emphasized the need for a critical appraisal of the interrelationship between archaeology and politics and to understand the power relations established discursively through historical and archaeological knowledge (see also McGuire 2008). Advocating for an inclusion of the

different emerging voices, then, these contributions set an interpretive movement that came to call into question the prevalent authority over the past held by the discipline. With the advent of politics of identity and recognition, the past became a realm of contestation in which a variety of contemporary interests became interweaved. Thus, steering public archaeology in new directions, the reflexive turn established by an overt critique to objectivity, rationalism, and scientific archaeology coalesced with the politics of cultural recognition and provided the basis for a more inclusive debate, raising issues and categories such as identity, ethnicity, and so forth.

Key Issues/Current Debates

The move towards public archaeology has brought a new array of themes and topics to the discussion about archaeological practice and theoretical consideration. Prominent in the current debate related to this recent turn in the archaeological inquiry are the discussions about transnationalism, tourism, sustainable development, commodification of cultural resources, and global–local relationships (Smith 2006). The impact that this reflexive trend had on archaeological practice can be scrutinized at least in two interrelated aspects: collaboration and heritage. On the one hand, emanating from various angles, critiques to academic authority pushed archaeologists to reconsider their position as the only stewards of the past and prompted them to engage in collaborative programs with a wide array of Indigenous and local communities (Faulkner 2000; Colwell-Chanthaphonh & Ferguson 2010; Gnecco & Ayala 2011). Thus, a more nuanced perspective about public archaeology, although still involving educational and legislative aspects, now incorporates ethical concerns and acknowledges that the practice of "scientific archaeology" can no longer be the only authoritative voice about the past. Moreover, in investigating the past, archaeologists need to be aware about social, "racial," political, and other tensions emerging from dissonant interpretations of the past; the practice of public archaeology, therefore, also incorporates components of ethics and sociopolitical accountability.

On the other hand, although still concerned about protecting the past, public archaeology now actively engages in issues related to the management of sites through a nuanced understanding of cultural and archaeological heritage. Heritage, as a concept, has recently made its way to the core of archaeological theory. Closely related to the politics of recognition mentioned above, the concept of heritage has recently opened a new and vigorous debate, expanding the considerations of what constitutes the public and, therefore, what public archaeology or archaeological practice should entail. The involvement of different communities of stakeholders that stepped forward to express interests or concerns about archaeological sites and archaeological discourse constituted a new challenge for the discipline (Russell 2006; Smith 2006). Barbara Bender's (1998) seminal work about the emblematic archaeological site of Stonehenge provides an exemplary approach to the analysis of the historically dynamic contexts that stakeholders (including archaeologists) can become involved in. Eluding the essentialist thought that commonly portrays Indigenous peoples and descendant communities as the only "other voices" that come forward to question archaeology, Bender's work also reflects on the formation of new groups of stakeholders and the politics that surround them. By the same token, critical awareness about the decisions, interpretation, and management of cultural and archaeological heritage acquired global connotations through the increasing myriad of stakeholders as well as a burgeoning tourist industry related to the consumption of the past.

This global trend of cultural consumption closely relates to a process of shrinking of distances which – fueled by a burgeoning and constant flux of peoples, goods, information, and capital – consolidated globalization as a phenomenon with a wide array of economic, cultural, and political implications worldwide. For many, globalization meant the standardization of culture as well as economics, with the consequent establishment of a single dominant

and global cultural order; however, contradicting the fears of homogenization predicted as part of the effects of globalization, the blooming of cultural diversity set under the auspices of multiculturalism amounted to define tourism as one of the key themes in archaeological theory (Merriman 2002; Meskell 2005). Consequently, archaeologists have started to turn their attention to the relationship of the discipline with the heritage and tourism industries. Related to this current trend, tourism and cultural recreation have become central to archaeologists as the public increasingly demands the articulation of new narratives about the past (Holtorf 2005).

As heritage or cultural tourism consolidates as one of the most important global industries (Urry 2002), the interest in archaeological heritage has gradually increased over the last few decades. With a burgeoning demand of cultural consumption fostered by an exponentially increasing flux of capital and peoples, tourism promoted archaeological heritage to new dimensions. Additionally, the gradual involvement of different stakeholders and local communities in heritage issues brought up several concerns regarding property and propriety of heritage. Archaeologists, in this sense, have been pushed to explore ever more complex and intertwined relationships involving individuals, communities, states, and global agencies at different scales. Local understandings of heritage values, however, as demonstrated by different scholars, can differ significantly from those parameters conceived as universal. The past, once aptly depicted as a "foreign country" (Lowenthal 2003), became the arena in which active – and sometimes dissonant – social constructions continuously take place through heritage and tourism and, therefore, have opened new lines of debate regarding its ownership and stewardship (Smith 2006).

International Perspectives

Arguably, then, heritage tourism has become one of the most profitable industries of recent decades and a global force that increasingly extends its branches throughout the world (Hoffman et al. 2002; Higueras 2008). As part of this global trend in which archaeological heritage is now involved, the heritage industry included in the core of developmental policies of global organizations such as the World Bank has been endowed a reputation of being a determinant factor for economic growth, especially for developing countries (Meskell 2005; Lafrenz 2008). Whereas it is often argued that heritage can play a significant role in overcoming economic adversities, less is said about its detrimental effects on local communities. While some argue for the necessity of making useable pasts, as something that can be assessed to provide economic profitability, others question the beneficiaries of these profits (Lafrenz 2009). As the expectations of tourism and heritage industries have risen, the attempts to attain the inscription of sites in the prestigious World Heritage Site list by different country parties have also escalated. A large percentage of recent nominations, related to the aforementioned search for economic growth, have to do with the fact that the attempt to gain such a reputable designation will help to promote heritage sites as marketable tourist sites.

In this sense, with an exponential number of new local sites and museums that now compete to attain some recognition while others focus on maintaining their high profiles and well-preserved statuses, the values and principles for such recognitions and other tenets heralded by global organizations are being called into question. Questioning the set of values that have commonly been used to define cultural and archaeological heritage, some archaeologists now actively work to emphasize local views and values regarding the past (Faulker 2000). Challenging previous top-down perspectives that were mainly concerned with a rather monumental and conservationist view of archaeological heritage, the intervention of new stakeholders established the need for archaeologists to understand the emergence of new relationships between local interests and global demands (Hodder 2003). Whereas international agencies and organizations such as UNESCO, ICOMOS, and WHC had advanced important contributions

to deal with issues deeply affecting cultural heritage, such as looting and trafficking of archaeological remains, a new approach to heritage also emphasizes ethical concerns pertaining to cultural property and human rights (Brodie et al. 2000; Brodie & Walker 2002; Silverman & Fairchild Ruggles 2007).

In this scenario, as heritage has become the axis where these contemporary social understandings and active constructions of the past come together, public archaeology confronts a wide array of challenges in its efforts to engage with different communities and stakeholders. Related to this, by drawing away from conservative approaches to heritage, public archaeology has also highlighted the importance of including different criteria and considerations, other than those defined by the World Heritage Convention in the definition of valuable heritage sites (Cleere 1996; Lafrenz 2008). As a result, heritage organizations and state agencies have been compelled to take into consideration a more dynamic and diversified understanding in which cultural and heritage value could be also related to political restitution or economic leverage and well-being. Nonetheless, although different countries have adopted the globally sponsored efforts towards the recognition of their Indigenous peoples, for many of these populations, to attain such recognition implies a compliance with guidelines of authenticity in order for them to prove cultural and genealogical continuity so that they may be conferred with the rights to cultural ancestry (Clifford 1988; Hale 1999).

Thus, some of the questions still to be addressed regarding the intersection of public archaeology and tourism are related to the new power relationships and cultural dynamics provoked by the commodification of cultural heritage. For instance, the demand for authentic experiences related to this global trend of cultural consumption has commonly driven heritage managers, cultural planners, and tourism-related policy makers to resort to the use of archaeological discourse to recast "authentic" – or rather essentialist – views of culture (Castañeda 1996; Benavides 2004; Hamilakis 2008). This is particularly the case for Indigenous peoples and other historically marginalized communities that, related to their cultural and political struggle, opt or are compelled to resort to heritage and cultural tourism as strategies to boost their economies (Meskell 2005; Lafrenz 2008); in this sense, Indigenous peoples remain commonly represented as passively reproducing a colonial imaginary in the realm of heritage. Furthermore, it has been generally the case that most of the countries whose archaeological heritage is administrated by state and centralized agencies not only tend to emphasize its economic importance for local development, as part of their policies, but also – and primarily – to reify it as the legitimate roots of nationhood (Rowan & Baram 2004; Hamilakis 2008). Therefore, despite the fact that these strategies have prompted a successful public recognition of multiple ethnic groups, which is one of the reasons why they became widely adopted as part of different state policies, they also exert powerful constrains and fixities determined by the very demands posed by consumption.

Different collaborative projects between local communities and archaeologists have, therefore, been caught up in a series of paradoxes. On the one hand, collaborative projects struggle to protect archaeological sites and to confront the destructive threats of development and sometimes, ironically, even harmful effects of tourism; as it was noted, "cultural tourism can pose a significant challenge to the management of heritage sites, as visitors can have positive and negative impacts, and increased visitation means increased responsibility, especially in terms of on-site safety" (Smith & Burke 2007: 239). On the other hand, public archaeology projects that involve working with economically disadvantaged communities often involve efforts relating to political empowerment and identity issues as well as attempting to orient their efforts to promote heritage tourism opportunities as part of these communities' social and economic sustainability. In that sense, the move towards public archaeology needs to be understood as an ongoing process in which the practice of archaeology itself becomes reconfigured. It comes as no surprise that public archaeology, as part of its response to these new challenges, has adopted and stressed the importance of a rather involved take on the politics

surrounding the conceptualization of the audiences towards whom our work is directed, which – at its turn – implies a strong reflexive slant towards ethics.

Future Directions

The objectives of public archaeology largely remain framed within the original goals, namely, committed to reaching broader and more diverse audience whose needs and demands regarding the past can be advanced and supported by the work of archaeologists. As part of this, public archaeology is still concerned with the protection and preservation of archaeological heritage and seeks to provide adequate management plans to respond to tourism global needs, for instance, while keeping the balance between tourism expectations and the carrying capacity of archaeological sites. Nonetheless, public archaeology is also becoming increasingly involved in collaborative efforts to yield more inclusive considerations of local perceptions of the past, as part of the categorization of archaeological sites as global tourist destinations. Practitioners involved in public archaeology are also aware that such categorization cannot be fulfilled by any standardized set of practices nor unique codes or universal paradigms. Arguably, the present times are characterized by highly politicized contexts in which claims to heritage and identity, however controversial, are part of a struggle for power and still rely very heavily on discourses about the past. Regardless of the aforementioned paradoxes, or perhaps precisely because of them, public archaeology is gradually moving to include developers and tourist operators, as well as state agencies, educational partners, and legislators as part of the equation (Hoffman et al. 2002: 31). Therefore, it can be said that what public archaeology now faces is an urgent need to reconsider previous notions of what has been understood by "the public," in order to achieve even wider conceptualizations.

In this sense, if one contends that public archaeology is mainly meant to take care of the public interest in the past, then it will also be necessary to acknowledge the impossibility of considering a general, single, and homogeneous public (McGuire 2008: 86–7). It follows from here that archaeologists need to keep considering who this public is – or rather, who the different audiences we are addressing and responding to are – and the ways in which it/they become constituted, as well as to recognize the effects, influences, and contentions fostered by a burgeoning process of globalization upon the public's interests in the past. It is crucial, therefore, to take into account the power relationships displayed between micro and macro levels (stakeholder communities, state agencies, and global organizations or corporations) and the way national or global entities' decisions and actions equally impact archaeological resources and upon the different audiences' criteria of value and importance of the past. In order to advance its goals and attain a fully fledged engagement of archaeology with the different stakeholders and constituencies interested in the past, it will be necessary to weave all those parameters into some of the common themes that have, thus far, characterized public archaeology. Then, any education outreach projects oriented to the valuing of the past (and its preservation), as well as any attempt to use archaeology as an effective way to overcome economic imbalances or prompt political action by lobbying for recognition of previously disenfranchised communities, will need to make sense of the conditions and differences in which these activities are going to be carried out as part of this engagement.

Cross-References

- ▶ Community Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Values and Education
- ▶ Heritage: Public Perceptions
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ "Public" and Archaeology
- ▶ Public Humanities and Cultural Heritage
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management
- ▶ World Heritage and Human Rights

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Public Education and Archaeology: Disciplining Through Education

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Introduction

In 1994 Brian Molyneaux suggested that one of the most obvious, yet critical, functions of archaeology for society was education (Molyneaux 1994: 3; see also Stone 2004; Willcock 2004). Since then, the pairing of archaeology with education has gained considerable ground; so much so that while the term "public education" may not necessarily come to mind for all scholars and practitioners working within the field, most will hold an implicit familiarity with its central tenets via their connections to outreach, community archaeology, social inclusion, or public participation. This is because all of these concepts – and the practices they reflect – emerged out of a broader social movement that prompted archaeologists to start thinking about, reflecting upon, and dealing with the complex relationships between "the discipline" and "the public." As with other attempts to engender public participation and support, education operates as a powerful point of connection between scholars, practitioners, politicians, and a vast variety of stakeholders and interest groups. A useful consequence of this arrangement has been the burgeoning of a range of learning tools, public presentations, "archaeology weeks," festivals, and volunteering opportunities. Yet, despite the proactive language often used to describe this area of development, it is important to remember that it can play out in a number of ways, not all of which are positive.

Definition

Archaeology can tell people a great deal not only about human experiences in the past but in the present, too (Henson 2011). It is, by its very nature, educative. Despite this, not a great deal of critical attention has been channelled towards archaeological education as a subject of enquiry in and of itself – with the exception of sustained work by Don Henson, John H. Jameson, Peter Stone, and, more recently, Yannis Hamilakis. What, then, is implied by the heading "Archaeology within Public Education?" To be clear, in this context, the term "public education" does not refer in any way to the classification of a school as it might in the UK, the USA, or Australia. Rather, it refers to the intersection of a broad spectrum of educative activity with the general

public. The term "education" can loosely be described as a process of producing and disseminating knowledge. More sharply defined, it denotes a number of different types of learning, beginning with compulsory schooling, vocational learning, and further education, all of which are captured by the category *formal education* and take place within schools, colleges, and universities. To this can be added *extra-formal learning*, which refers to those who opt to extend their knowledge by participating in less formal classes and courses offered by learning institutions. In the UK alone, Don Henson (2011: 219) estimates that there are somewhere in the region of 15,000 people enrolled in these sorts of formal or extra-formal archaeology courses.

Despite these numbers, the forms of learning most commonly associated with the term "public education" in archaeology are those that fall into the categories of *informal learning*, *nonvocational learning*, and *lifelong learning*, which are united in their association with a "practical knowledge tradition which stresses direct experience" (Livingstone 2001: 3). This is the nub of archaeology within public education. Although the most stereotypical example undoubtedly remains the on-site excavation, these categories of learning produce a plethora of educative experiences, including guided walks, school visits, live interpretation, outreach, storytelling, landscape assessments, artifact handling, work placements, popular publications, programs designed to accommodate public participation, public presentations, heritage open days, fairs, and collaborative projects. Recent additions to the fold are things like museum displays and their interpretation, which have come to be envisaged as powerful learning tools in recent museology literature. Less likely to spring to mind when one thinks about public education are self-directed activities such as volunteering; though not obvious, these sorts of activities are nonetheless important learning experiences within the field. Like formal education, at the core of these activities is the production and dissemination of knowledge.

There is, however, a second, more muted, aspect to education – both formal and informal – that must also be accommodated within its definition; that is, knowledge, once produced and disseminated, goes on to perform particular social, cultural, political, religious, or economic roles in wider social life, based upon how it fits with different identities and their respective access to power and resources. Education, whether public or otherwise, is thus also political. Whether one is referencing high school curricula or a program of lifelong learning, it is always possible to peel away the initial layers concerned with course outlines, content, timetabling, assessment, or delivery and glimpse the deeper ideological currents. Indeed, as Yannis Hamilakis (2004: 295) points out, choices are made, and those choices say something about issues of power, value, and assumption, all of which in turn are revelatory of a society's underlying social structures and the political persuasions of the day. These sorts of arguments are applicable not only in countries where a form of repressive government might already be anticipated but in progressive and democratic countries, too. In the UK, for example, archaeological- and heritage-based public education outlets may have embedded within them assimilatory messages that align with either New Labour's agenda of social inclusion or the more recent Conservative government's attempts to foster national cohesion, both of which are implicitly fuelled by a fear of difference (Waterton 2010). In this scenario, particular narratives of the past, along with their associated cultural symbols, may be foregrounded in museum displays or other interpretative devices because of their ability to facilitate national identity formation and thus support a certain kind of citizenship. At the same time, other educational institutions may bend the same narratives in such a way as to inspire emancipatory thinking. Either way, the point here is that public education cannot simply be accepted as universal, stable, or, indeed, always necessarily "good" (Lewis 2009).

Historical Background

Countries such as the UK and the United States have a relatively long history of promoting archaeology within public education, a point best explained by the arrival of an ethically

engaged program of stewardship in both countries in the 1960s and 1970s, which is today associated with the terms "archaeological heritage management" in the UK and "cultural resource management" in the USA. An important and lasting consequence of this has been the conceptual and theoretical shift felt within the archaeological discipline, which led to a questioning of the legitimacy of its assumed claims to knowledge and control over the past. This, along with the growing intensity of market-driven policies and tropes of accountability, triggered an increase in the acknowledgment of the public's right to be consulted and involved.

In the USA, where archaeology is strongly influenced by anthropological traditions, the relationship between the two was cemented at the governmental level, with the US National Park Service, the US Bureau of Land Management, the US Department of the Interior, and the US Army Corp, for example, all implementing programs or projects aimed at developing public involvement in archaeological activity. A useful example of one such project is that of *Project Archaeology*, a collaboration of the US Department of the Interior, Bureau of Land Management and Montana State University, which is an education program for "everyone interested in learning or teaching about our nation's rich cultural legacy and protecting it for future generations to learn from and enjoy" (*Project Archaeology* website). A focus upon archaeology's educative capacity developed in the 1970s and, as Laurajane Smith (2004: 90) points out, can be attributed to a number of concerns. First and foremost, however, American archaeologists at that time were troubled by the public image of archaeology and sought to redefine the discipline (Smith 2004). From this emerged an emphasis on notions of "common" heritage and public "good," to which archaeological scholars responded by highlighting the discipline's need for a duty of care and responsibility towards the public. As Matsuda and Okamura (2011: 2) have pointed out, this impetus was heavily influenced by debates between processual and post-processual thinking in North American archaeological circles at the time.

The Council for British Archaeology, founded in 1944 with the slogan "archaeology for all," is a prime example of historical agitation for archaeological education at the institutional level in the UK, evidenced particularly by the establishment of the Young Archaeologists' Club in 1973 (Henson 2011: 220). Since then, a range of reports and policy documents have emerged that foreground education within the sector, including *A Common Wealth: Museums in the Learning Age* (1997) and *Opening Doors: Learning in the Historic Environment* (2004). It is important to acknowledge the political climate that continues to surround such developments in the UK, particularly the influence of the New Labour government (1997–2010) and their policy platform of social inclusion. Here, the turn to ideals of public value, issues of access, and a democratization of learning had a powerful affect on the way archaeology was conceptualized at the governmental level, evidenced in part by conferences such as *Heritage for All* and *Capturing the Public Value of the Past* and in policy position papers such as *The Historic Environment: A Force for Our Future*. In turn, these policies, specific to archaeology, heritage, museums, or the historic environment, can be traced to a broader impulse within the UK towards learning, as captured by documents such as *Learning Works: Widening Participation in Further Education* (1997), *Further Education in the New Millennium* (1998), and *Learning for the 21st Century* (1997).

At the more global level, a historical injunction towards public education can be traced through a number of policies and publications. The *European Convention on the Protection of the Archaeological Heritage* (Valetta Convention), revised in 1999, is a case in point, as illustrated by Article 9, "Promotion of Public Awareness," which explicitly references education and public opinion. Likewise, the Ename Charter of 2002 highlights the importance of interpretation at cultural heritage sites as an educational resource. Finally, a third example can be drawn from the more recent *European Landscape Convention* (2004), widely referenced by archaeologists and heritage scholars working

across Europe, which prioritizes education and public awareness in Chap. II, Article 6 of the Convention. All three can be intertextually linked to broader European Union initiatives, such as the *Lifelong Learning Programme: Education and Training Opportunities for All*, established in 1997 by the European Commission, and the *Strategic Framework for European Cooperation in Education and Training 2020*, developed in 2009. Finally, it is worth noting that the World Heritage Centre also operates an educative strand, which includes the international network, *Forum UNESCO: Universities and Heritage*, and the *World Heritage Education Programme*, launched in 1994 (for further information on the *World Heritage Education Programme*, please visit http://whc.unesco.org/en/wheducation/).

Key Issues/Current Debates

Although many of the debates and issues observed within the arena of public education have much in common with those that surround "community archaeology," "ethics," and the "politics of display," they are worth reiterating here as education is one of the most public and – importantly – authoritative domains through which archaeological knowledge is communicated (Hamilakis 2004: 296). A key reason for its prevalence in these debates is that "education" is often argued to be a vital avenue through which particular messages about the past are passed onto the public, thus touching upon topics of power, control, and authority (see Smith &Waterton 2009; Waterton 2010). A number of commentators have created models that capture the way education figures within the wider remit of archaeology, such as Nick Merriman and Cornelius Holtorf, though it should be noted that their explanations are aimed at public archaeology more generally. For example, Merriman (2004) introduces the "deficit model" and the "multiple perspectives model," with public education playing a significant role in the former by virtue of its ability to *inform*. This roughly accords with Holtorf's (2007) "education model" and "public relations model," both of which similarly rest upon a unidirectional flow of information from archaeologist to public. Quite distinct from these essentially closed processes are Merriman's "multiple perspective model" and Holtorf's "democratic model," both of which open up the dialogical relations such that communication – between archaeologists and the public – becomes two way. As Matsuda and Okamura (2011: 13) have recently argued,

> [f]rom this viewpoint, archaeological education does not differ much from engagement with different pasts, in that both approaches need and encourage dialogues between archaeologists and members of the public.

That said, there is still a tendency to assume an educational stance that veers closer to the "deficit model" or "public relations model" within the archaeological discipline. Certainly this is the case at the policy level, although these days there are an impressive array of case studies that can be drawn upon to suggest otherwise, some of which are detailed below. Those case studies aside, it can be argued that at the broader level, individuals and groups that stand outside of the discipline are rarely given a role in defining messages about the past; rather, they are seen as recipients of said information. Public education, in this guise, becomes something that is done *for* the public instead of something that is done *with* them. Holtorf, building upon an argument originally posited by John Cole in 1980, remarks that this sort of approach to teaching people about the past becomes little more than a branding exercise, through which the fostering of a belief in the necessity of its preservation in turn fosters a belief in the necessity of the discipline itself (Holtorf 2007: 155; see also Simpson 2009). Nowhere has this been more powerfully argued than in Denis Byrne's article *Buddhist Stupa and Thai Social Practice*, in which he states:

> [t]he call for public education has been a recurrent theme in the literature of archaeological heritage management (Byrne 1991), where both Western and non-Western archaeologists see it as an antidote to 'indifference' and 'apathy' towards the fate of archaeological sites. Posited here, implicitly, is an infantile condition: prior to education a void exists in the public's mind where knowledge of and respect for the material past should be (Byrne 1995: 278).

As Byrne (1995: 278) goes on to argue, "multiple and mature discourses on the material past already exist in the space archaeology depicts as a void. What archaeology intends, really, is not education but re-education."

Current debates about public education in archaeology are thus inclined to push for the development of alternative ways of thinking about this relationship. Here, in particular, overlaps between education debates and those occurring in broader public archaeology debates can be seen. Like Holtorf's (2007) "democratic model," for these debates the trick lies with changing the channels of communication and inserting the notion of "politics" into the equation. As Matsuda and Okamura (2011: 10) point out, the process becomes less about moving clusters of information from one domain into the next and more about appreciating that the past is understood – and *used* – differently by different social groups. What this means in practice is that there can never be one single education model and certainly not one that attempts to impose ideas onto the public. Indeed, in some scenarios, social groups will seek out archaeological education because understanding the past is central to a larger social justice claim. Here, the role of education would be a collaborative one, geared towards facilitating social, cultural, or political recognition and, perhaps, access to particular social or political resources. In other scenarios, social groups may be seeking a relaxing day out, a pleasurable experience far removed from those struggles for identity that often characterize social justice claims. Here, the role of education may well be an instructive one, which brings with it an increased awareness of a particular aspect of the past. Either way, the role of education is a powerful one, and the archaeological discipline must remain mindful and respectful of that.

International Perspectives

Despite the above concerns, a number of useful and positive examples from the United Kingdom and Europe can be showcased here. A wealth of archaeological digs and training programs are offered across Europe (e.g., in Spain, Greece, Italy, Macedonia, Portugal, Cyprus, and the Netherlands), many of which encourage participation from not only those enrolled in formal education but also those engaged in practices of informal and self-directed learning. Biskupin, an Iron-Age reconstruction site in Poland, is a good example of the utilization of archaeology for public education. The archaeological museum associated with the site offers a range of lessons and experimental opportunities for interested parties and organized school visits, as well as both smaller- and large-scale festivals. In Norway, a process of informal education is undertaken by participants associated with local history societies, who develop and maintain signposted cultural landscape trails that detail archaeological features (Jones 2007). These same societies are also involved in the formulation of local history walks, such as the Heimdal Local History Society in Trondheim, which arranges an annual walk that showcases the memories and experiences of older and long-established residents in the area (Jones 2007).

A range of government institutions have a vested interest in the issue of public education in the UK, too, such as the Department for Culture, Media and Sport, the Department for Education and Skills, the Commission for Architecture and the Built Environment, the National Trust, English Heritage, the Portable Antiquities Scheme, and the Council for British Archaeology. In the UK context, it is possible to see clearly the interrelations between broader social policy and archaeology, particularly if one looks at the influence of the various permeations of policies aimed at alleviating disadvantage, such as the Educational Priorities Areas instigated in the UK in the 1960s, which can be glimpsed in the more recent policies of social exclusion (Smith et al. 2007). These were a form of "positive discrimination" aimed at prioritizing areas characterized by economic depression and associated issues of social exclusion. An area targeted

by this and similar policies is Moston in Greater Manchester, an outcome of which has been the "I Dig Moston" archaeology project, which began in July 2005 and is now often referred to as "Dig Manchester." This runs in conjunction with the University of Manchester and Manchester Museum and was initially initiated by a local archaeological and local history group. It is supported by the Heritage Lottery Fund and the Manchester City Council. In terms of public education, this initiative extends to school groups, community groups, and the general public and includes archaeological training in excavation techniques, finds analysis, geophysical survey, family history, and heritage trails (for further information on the Dig Manchester project, please visit http://www.digmanchester.org.uk/). More than this, the project aims at tackling deeper structural politics and realizing positive change. More recently, the Shoreditch Park community archaeology excavation, funded by the Big Lottery Funds' "Their Past Your Future" program and managed by the Museums, Libraries and Archives Council, the Hackney Council, and Shoreditech Trust, provided opportunities for lifelong learners and schools to engage with WWII, local history, and the practices of archaeology (Simpson & Williams 2008).

Future Directions

Although research and commentary papers on the role of education in archaeology have started to emerge, there still remains a dearth of literature that critically and specifically engages with this topic. Not only are the formal institutions that offer archaeology education ripe for inspection but so too are the ways in which the discipline is spliced together with the public. Never has this been clearer than in today's rapidly changing social and political climate. Add to this the new roles played by the internet and other technologies such as interactive multimedia, video, animation, virtual reality, simulations, and computer-mediated communication – what opens up is thriving intellectual space for innovative, challenging, and sustained dialogue about the place and shape of archaeology within public education.

Cross-References

▶ Community Archaeology
▶ Public Archaeology, The Move Towards

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Public Humanities and Cultural Heritage

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Brief Definition of the Topic

Public humanists – public historians, oral historians, folklorists, curators and museum educators, public art administrators, cultural media producers, and cultural policy planners, as well as cultural heritage workers – encourage the public's participation in the creation of meaning about history, art, and culture. They do this in many ways: sometimes as mediators between the academy and the public, interpreting the work of scholars for the public; sometimes as facilitators of public engagement with culture; and sometimes producing cultural work on behalf of communities. Public humanists work with academic humanists, communities, community cultural organizations, and individuals to explore, preserve, understand, and make use of cultural heritage, values, beliefs, knowledge, and traditions, promoting a shared examination of culture, art, and history to encourage civic engagement.

Public humanists, like workers in the cognate fields of public anthropology and public sociology, strike a balance between serving as translators for the work of academic humanists, on the one hand, and as the spokespeople for the cultural work of communities, on the other. The work of translation (or serving as public intellectuals themselves) represents a traditional approach to the field. Serving as spokespeople for communities, or in Gramsci's term as organic intellectuals, represents the other end of the spectrum. Most public humanists position themselves somewhere in between these extremes, preferring words like "engagement" to describe their interaction with the public. They provide ways to connect academic and public knowledge, thus creating new understandings.

Public humanities provides a useful theoretical framework for work in cultural heritage and a useful expertise on the balance and merging of academic, community, and personal cultures. Its focus on community serves to put the work of cultural heritage into a larger context by framing heritage as part of the ongoing, contested, creation of meaning about the past and about contemporary culture. It connects cultural heritage to both the lives and memories of community members and to community institutions, as well as to academic work. It can open up discussion of community, too often taken as given in cultural heritage work, by asking questions about the nature of community and the relationship of community and culture.

Public humanities can also provide a broader understanding of culture, allowing for greater

integration of intangible and tangible cultural heritage with current concerns by subsuming them under the heading of community cultural production. Its focus on public engagement, on sharing authority with communities, grounds cultural heritage work in cultural policy and ongoing cultural production. And its insistence on the role of community institutions allows for community building that creates longer-term sustainability for cultural heritage work.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Heritage and Public Policy
- ▶ Public Archaeology, The Move Towards

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Public Involvement in the Preservation and Conservation of Archaeology

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Introduction

In the 1970s and 1980s, archaeology began to enlist the knowledge and interest of the public. Today, community participation in archaeological activities and engaging the interest of the public is widely seen as a necessary and useful way to enhance preservation and protection of historical resources and to generate enduring public support for archaeology. Involvement of the nonprofessional public as participants and volunteers in background and archival research, survey, and excavation and as oral history/local knowledge informants, spokespersons, and youth and school program facilitators is widespread, and there is an understanding in the discipline that the goals of public involvement in archaeology can be guided to the best effect by professional archaeologists.

Since archaeological resources cannot by their nature "belong" to a living person and because most projects are supported by public funds, archaeologists have a duty to make discoveries available to the public in museums and other venues such as on-site tours, television, newspaper and magazine articles, movies, blogs, and websites, as well as actively engaging the public in hands-on activities when possible.

Definition

Public archaeology is archaeology undertaken with, for, and, or about the general populace. A. Matsuda and K. Okamura aptly define public archaeology as a "subject that examines the relationship between archaeology and the public, and then seeks to improve it" (2011: 4). Within the ever-expanding definition of public archaeology, there are many subfields: archaeological investigations undertaken for the public, archaeological investigations undertaken with the support of the public, archaeological policies, public education and archaeology, politics and archaeology, archaeology and the antiquity market, ethnicity and archaeology, public involvement in archaeology, archaeology and the law, the economics of archaeology, and cultural/heritage tourism and archaeology (Merrimen 2004: inside cover). Involving the public(s) in all aspects of the archaeological process enriches the archaeological study and the public(s). It is thus a reflexive process and one that ultimately can make archaeology more relevant to the public.

Key Issues/Current Debates/Future Directions/Examples

The Global Emergence of Public Archaeology

In the United States, the *Antiquities Act of 1906* ensured that archaeological materials on lands under the stewardship of the federal government would provide public benefit by requiring that all artifacts located on public land be donated to a museum. *The National Historic Preservation Act of 1966 (NHPA),* the *National Environmental Policy Act of 1969 (NEPA),* and the *Native American Grave Protection and Repatriation Act (NAGRPA)* each contain a legal requirement for public involvement. Prior to the 1970s, however, archaeologists themselves generally avoided public involvement in excavation and interpretation. In 1972, Charles McGimsey coined the term "public archaeology" stating that there is no such thing as "private archaeology" (1972: 5). Beginning in 1975, the city of Alexandria, Virginia became the first US municipality to establish a city archaeology program, and in 1977 Pamela Cressey became city archaeologist. Alexandria archaeology has from its early days included the public in all aspects of excavation and interpretation including public participation through volunteer work, education in the museum, and outreach activities (Cressey 2005: 22).

In 1981, University of Maryland archaeologist Mark Leone began Archaeology in Annapolis, a public archaeology program and field school which incorporated public archaeology training into the traditional field school format for the first time. Field school students were taught to give tours and interpret findings to the public as a routine part of their training (Leone & Potter 1984).

In 1983, Baltimore Mayor William Donald Schaefer, realizing that archaeology could be used as a powerful tool to bring tourists to a struggling city neighborhood, utilized archaeology as community political activism for the first time. The author, a city archaeologist, hired a theater director to teach crewmembers how to script and present tours to the public. Volunteers of all ages were welcomed and trained to excavate as well as participate in all aspects of the investigation. Press events including in-flight magazine articles, almost daily newspaper articles and television news coverage, a daily radio show, and a front page article in the *Wall Street Journal* (Lubin 1985) brought public archaeology to a heretofore unknown level of exposure and spawned similar programs across the country (Comer 1998: 12). Thirty years later public involvement in the archaeological process is considered essential. By the fourth quarter of the twentieth century, countries such as Britain, Canada, and Australia were following a parallel course, adding their own innovations. In 1993, Britain's Channel 4 began airing *Time Team*, a weekly series following a team of archaeologists digging a different site each week. The series attracted a large and passionate audience in the UK and overseas. In Australia, the movement toward greater public involvement in archaeology moved to the forefront of archaeological issues (MacKay & Karskens 1999: 110).

As one might expect, "public archaeology has developed neither uniformly nor equally in every country" (Matsuda & Okamura 2011: 7). Around the world, archaeologists are linking what had been a purely academic field to the fascination that the general public has with the past. In some countries, archaeology has become well integrated with the general education provided to students. For example, in Japan, the public, and especially school students, enthusiastically participate in activities at on-site visitors centers, which include opportunities for students to make a replicas of artifacts and contribute to the interpretative process.

Archaeologists throughout the world are innovating, devising and testing methods to involve the public. Public archaeology is thus "a commitment made by archaeologists to making archaeology more relevant to contemporary society" (Matsuda & Okamura 2011: 4). Public archaeology provides a unique opportunity for non-archaeologists to connect with the past. Successful public archaeology programs have demonstrated broad appeal in various age groups and ethnicities (Cressey 2005; Leone & Potter 1984; Comer 1998). It is clear that public archaeology programs can develop local, regional, national, and international constituencies for archaeology and deepen an understanding of the need to protect archaeological sites through conservation and preservation.

Cross-References

- ▶ Avocational Archaeology
- ▶ Community Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Outreach
- ▶ Heritage Tourism and the Marketplace
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Leone, Mark P. (Theory)
- ▶ McGimsey III, Charles R.
- ▶ Plimoth Plantation: Public Archaeology
- ▶ "Public" and Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Public Education and Archaeology: Disciplining through Education
- ▶ Public Humanities and Cultural Heritage

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"Public" and Archaeology

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Introduction and Definition

Construction works appeal people all over the world. In Mediterranean Europe, a typical image is that of a group of old people organizing improvised gatherings to talk behind the fence that protects public works. This kind of works is called "public" because they are funded by the money contributed by citizens, that is, society. Yet they are also public because these activities have their public, as any artistic performance or installation that takes place in the space of sociability par excellence of modernity: the street. The prevalent notion of public has much to do with this image: a passive audience, who is separated from the events by a visible or invisible barrier and is happy consuming whatever is offered to them. However, one of the meanings of "public," according to the Oxford English Dictionary, has deeper implications: "*concerning* the people as a whole."

Key Issues

From Spectator to Stakeholder

From Renaissance antiquarianism, archaeology has traveled a long way to become a scientific discipline and to accept that it has a responsibility toward its public. Thus, during the phase of institutionalization of archaeology as an academic discipline during the second half of the nineteenth century, an elite of intellectuals contributed, from universities and museums, to legitimize the bourgeois nation-state through teaching, writing scholarly books and articles, and developing regional and national museums. During this period, archaeology's main strategy of communication with society was the so-called educative model (Holtorf 2007a: Chapter 6, 2007b). This model was based on the communication of the results of scientific research to a learned public, which was knowledgeable about the subject. The purpose was to educate patriot-citizens, so that they would see the past in the same terms as archaeologists.

During the first decades of the twentieth century, this model continued to be in force. Experts and bureaucrats appropriated archaeological information for themselves, acted as custodians of the archaeological heritage, and adopted a paternalistic attitude, disregarding the interests of a budding civil society. The end of the Second World War and the consolidation of the Welfare State would provide the material and ideological conditions needed to insert archaeology in the dynamics of mass media. The dissemination of archaeological knowledge started to be considered as a basic function of the management of archaeological heritage. This change is epitomized in the figure of Sir Mortimer Wheeler, whose frequent appearances on TV evinced a novel compromise with the general public. However, this compromise still had its limits. The pioneer book by Charles R. McGimsey *Public Archaeology* (1972) was addressed only to professional archaeologists, heritage managers, and citizens interested in protecting archaeological remains in their neighborhoods. The immense majority of society still remained on the other side of the fence, as a passive observer of archaeological projects. In addition, the New Museology and the growing offer of archaeological sites open to the public provided only closed narratives that were simply consumed by a certain kind of public (Merriman 1991). It is important to remember, also, that most countries continued to be entrenched in the classic model of academic communication – by archaeologists for archaeologists (Venclová 2007).

The transition from the educative model to the democratic model had its origins in the 1970s in the United Kingdom, with a remarkable development later in the United States, Canada, and Australia, where there was already an important sensibility toward the interpretation and promotion of cultural and natural heritage (McManamon 1991). During the 1970s and 1980s, the scope of interaction between archaeology and the public broadened to include all sectors of society and to actively involve amateurs in the archaeological research process. It is in this context where public archaeology, as we understand it today, emerged (Schadla-Hall 1999; Ascherson 2000; Merriman 2004; Moshenska 2009).

During the 1980s and 1990s, archaeology became public spectacle, a resource to transform depressed regions, a tool for the promotion of tourism, and a privileged arena to perform "living history." Following the technical language adopted by heritage managers, the *potential public* of these attractions is identified with the tourist/amateur who spends money to achieve enjoyable experiences set in a (pre)historic scenario (Stone & Planel 1999). This potential public is the one who crosses over to the other side of the fence for a reasonable price. However, this archaeology still does not "concern the people as a whole." The development of post-processual theory added cultural relativism, new ethical requirements, and multivocality to the agenda, as well as the de facto integration of society in all its complexity into the archaeological discourse (Hodder 2008). This brought a radical qualitative change in contemporary social archaeology: A globalized, multicultural, and complex society encompasses different publics and different approaches to heritage (McManamon 1991; Hamilakis 2011; Pyburn 2011). The generalization of the Internet during

the 1990s and the emergence of social networks in the 2000s helped channel the global demand for cultural heritage by different and ever-growing social groups (Matsuda & Okamura 2011). This context partially explains the expansion of public archaeology, materialized in the creation of an international journal (*Public Archaeology*) and postgraduate courses. Public archaeology today is also influenced by the post-modern end of grand narratives, and the subsequent popularization of microhistory, cultural history, and "history from below." In the same line, the "archaeology from below" (Faulkner 2000) has evolved to overcome the unidirectional character of the discipline, which has been rooted hitherto in a noninclusive communication model. The conventional approach considers the interaction with the public an area of expertise within archaeology an optional component in scientific projects, rather than an integral part of the discipline. An archaeology from below, on the contrary extends the social relations of archaeology by involving all publics in the process of knowledge production from the beginning.

These publics include now different stakeholders, local communities, and indigenous groups who have an intimate and long-standing concern for specific archaeological artifacts, sites, and landscapes. Some of these publics, such as indigenous groups in the Americas, are very vocal and critical and directly question archaeologists and heritage managers. Grassroots movements of political dissent, such as those that agitated Spain in 2011, are also an index of the changing attitude of the public: People revolt against the passive role (as consumers of politics, industrial products, or culture) to which they have been relegated by the hegemonic capitalist order. New concepts, such as archaeological ethnography (Hamilakis 2011) or community archaeology (Marshall 2001), intend to express a more active and democratic way of dealing with these stakeholders. There is no longer a target public for archaeological knowledge, but communities, both real and virtual, rooted and global (Matsuda & Okamura 2011). From this perspective, it is assumed that archaeologists have to relinquish partial control of their projects (Marshall 2001) and accommodate the demands of the groups with which (sometimes for which) they are working. Of course, this attitude does not prevent tensions between archaeologists and public/stakeholders to happen. These, however, existed also before, but were negated or unacknowledged. These tensions are not necessarily negative: They can be productive as well and lead to new perceptions of the past and new modes of engagement (Witmore 2009). In fact, the new understanding of "public" also entails a new notion of site: Hamilakis (2011: 406) regards archaeological sites as "a perfect borderland and an ideal zone of contact," which can lead to conflict and confrontation, "but also to detailed, sensitive, ethnographic discourses and perhaps subsequent dialogues and collaborations."

From Stakeholder to Witness

It is widely admitted today that granting public access to historical knowledge is rarely neutral and risk-free: Politics is always involved to some extent and conflict is always a possibility. This is particularly the case when archaeology delves into a dark past that has been concealed for political reasons. By making (hidden) things public, archaeology can destabilize hegemonic discourses that distort the way in which history is told. This meaning of "public" has become increasingly relevant in archaeology during the last two decades, with the growing awareness of the role played by the discipline in conflict and post-conflict situations (cf. Starzmann 2008). In countries that have suffered from war, civil and ethnic conflict, dictatorship or colonialism, it is not enough with doing research that increases social knowledge about the past. It is important to confront recent history critically and provide the tools so that people can see the past in a different way. Making a dark past public is not an easy task: Some people may not want it to be studied because they are related to the perpetrators, because it brings up memories that are too fresh and painful, or because they do not want to abandon the safety of sanitized official narratives. Archaeologists working in places of conflict and trauma have to be ready to face a divided

community and to take sides. Even when people widely agree that dealing with a negative past is necessary, controversies always arise regarding how to investigate it, how to display it publicly, and how to tell the story.

In the archaeology of older periods or less controversial issues, to become part of the audience or not is to a large extent optional. However, this is not the case with the archaeology of contemporar violence. People feel addressed and their beliefs questioned. This is because collective traumas are public in the first OED sense: They concern the people as a whole. It could be argued that by unveiling the traces of atrocities, archaeology forces us to become witnesses by proxy. In that, the discipline works like what has been called "art of witness" or "testimonial art" (MacLear 1999). This is not only the art produced by witnesses themselves, but also by artists after traumatic events with the purpose of manifesting the unsayable. By forcing people to look, testimonial art and archaeology produce the same effect: They transform the public into a kind of witness – a public, therefore, with a moral responsibility. In recent decades, archaeology has become a sort of "art of witness" in different contexts. Three of the most interesting are Germany in relation to the Nazi past; Spain and the legacy of the civil war; and Argentina and the "dirty war" waged by the military. Despite being recent historical episodes, archaeology has played an outstanding role in exposing mass violations of human rights and bringing to the public arena what used to be concealed or restricted to academic debates.

Germany was one of the first countries where archaeology was put at the service of making a difficult past visible. After a generation of silence, the children of the Nazi generation decided to break the veil of silence that covered the fascist period and began a movement of recovery of historical memory which has had lasting effects in the country (Koshar 2000). Many of the popular history projects had an important archaeological component: the documentation, in everyday spaces, of traces of Nazism that had been rendered socially or physically invisible. One of the landmarks in this process was the excavation in 1987 of the former Gestapo headquarters in the heart of Berlin (Bernbeck & Pollock 2007), which had passed virtually unnoticed in a vacant lot. The excavations, originally carried out by amateurs, captured wide public attention and provoked intense political debates. Since then, other traces of the Nazi past have been investigated in Berlin and identified with signs, so that people can be aware of this hidden layer of the city's history (Braun 2002). The goal of the project is not just to make things public, but to *keep* them so. The question is: How to sustain public attention in a traumatic past?

In Argentina, the search for the 30,000 *desaparecidos* ("disappeared") during the military regime started only 2 years after the end of the dictatorship (1976–1982). Forensic work has been later complemented with other initiatives, such as the archaeological investigation of clandestine detention centers, the study of the material culture associated to the *desaparecidos*, and the public display of sites of torture and prisons (see examples in Funari et al. 2010). All these projects have made the crimes of the dictatorship public, but they have also been fraught with controversy: whether to recover or not buried human remains (Crossland 2000), how to turn detention centers into museums, what narrative has to be offered (Parsons 2011), etc. These are debates in which archaeologists and other scholars have just one voice among many others (victims, relatives, authorities, and associations). The Argentinian case poses questions that are pertinent for public archaeology as a whole: Who has the right to decide how to make the past public? How can a dark past be made public without trivialization? What kind of public is a victim or a victim's relative?

If the Germans had to wait for a generation to make a painful history public and the Argentineans only a few years, the delay in Spain has been much greater: Three generations passed since the beginning of the war (1936–1939) for the Spaniards to be capable to fully address the legacy of war and dictatorship. As in the other two cases, it was grassroots associations that took the initiative and since 2000, they have excavated – with the help of

archaeologists and forensic scientists – around a thousand unmarked graves, mostly containing the remains of some of the 150,000 people assassinated by the supporters of General Franco (Ferrándiz 2006; Renshaw 2011). Exhumations were part of a renewed interest in the history of the conflict and the dictatorship. Thus, in addition to the recovery of buried bodies, different projects have been developed on concentration camps, prisons, monuments, and battlefields (González-Ruibal 2007). The process has led to a significant shift in the collective memory of Spaniards and has triggered important political and legal changes at the national level. It has also produced a greater awareness of the (material) legacy of the dictatorship. Although archaeologists, as in the German case, have not been the protagonists, they have decisively contributed to making things public, by bringing in scientific methods and modes of dissemination. The exhumation of mass graves and other activities have not been free of bitter controversies, but these have also helped to clarify the political panorama of Spain, by revealing the extent to which the dictatorial past still conditions the democratic present.

Future Directions

Despite great advances during the last three decades, academic traditions continue to privilege the educative model in archaeology, whose discourses are neither directed to the general public or local communities. The same can be said of different projects devised from above (such as those promoted by administrations), in which the public is conceived as the human resources needed to fill cultural containers. From these parameters, it is difficult that a public archaeology (sensu Shadla-Hall 2006), and even less a community archaeology (sensu Marshall 2001), can be consolidated. Besides, the privatization of archaeology at a global scale promotes commercial archaeology, which is more profitable, but does not usually take into account amateurs and citizens in the process of archaeological research.

However, if we have learnt something in recent years, it is that publics can be very active and take the initiative in process that involves historical memory or the assertion of cultural rights: The things that concern the people as a whole elicit passionate responses. This has been proved in the three cases mentioned here: the archaeology of dictatorship in Germany, Argentina, and Spain. With the global spread of democracy and minority rights, publics are more varied and vocal than ever. Instead of feeling threatened by them, archaeology should face the challenge of engaging in social debates and political controversies. The alternative to this is remaining in an ivory tower and become less and less socially relevant.

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- ▶ Archaeological Stewardship
- ▶ Community Archaeology
- ▶ Public Archaeology, The Move Towards

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Publication in Field Archaeology

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Introduction and Definition

Every publication in any field is designed for the people who are intended to read it. Archaeological fieldwork is carried out for different sectors and sponsors and it therefore generates a variety of output. A recent overview proposed eight different modes of publication designed to serve eight different types of "consumer" (Fig. 1).

MODE	CONTENTS	MEDIUM	CLIENTS
1. Field Records	Site records, primary data	Hard copies	Sponsor, Other researchers
2. Lab Report	Commissioned studies and analyses	e-repository	Sponsor, other researchers
3. Client Report	Description of the investigation and results	Hard copy with limited distribution ["grey literature"]	Sponsors
4. Research Report	Description of the investigation, findings, their interpretation and context	Article (hard copy or on-line), monograph with multiple distribution	Researchers
5. Popular book	Abbreviated research report	book	The public
6. Popular output	Selected significant aspects	Magazine articles, site guide, TV programmes	The public
7. Display	Selected significant aspects	Exhibitions in museums,	The public
8. Presentation/ Interpretation	The site and its surviving parts; local trails	Conserved monuments; display panels;AV	The public

Publication in Field Archaeology, Fig. 1 Modes of publication (After Carver 2009: 316)

Key Issues

The preparation of a *field record* (no. 1) is a primary duty of the fieldworker, whether engaged in CRM or research. These records are generally stored in an archive within the museum that retains the assemblages of artifacts and biota. In principle, records and assemblages are public property and remain accessible in perpetuity. In practice museums often find this difficult to achieve but hope to make the material available to researchers and special interest groups. The increasing range of records and material retained by excavators combined with the enormous quantity of material generated by CRM is creating a major problem of long-term storage for industrialized countries. This is one reason for the development of the online *lab report* (or Field Report) (no. 2), which sets out to present a complete account of the main discoveries from fieldwork in a digital form. This will include summaries of the primary records, an album of selected photographs, an atlas of the main spatial form and relationships, site journals and interpretations made on site, and analyses made in the laboratory after fieldwork was completed. These analyses may include studies of stratigraphy, artifacts, animal bones, plant remains, and scientific dating. In many cases the specialist reports in their original form may appear only in this medium, their essence being summarized for printed forms. The *Archaeological Data Service* (http://ads.ahds.ac.uk) is a major service provider in this field, hosting online archives for research projects as well as many thousands of client reports from CRM operations which are otherwise inaccessible.

The production of a *Client Report* (no. 3) is normally a condition of contract for the CRM firm that undertakes fieldwork in advance of development. The "client" is the organization that paid for the archaeological work. In regulated countries this is often local or national government. In deregulated countries it is more usually the organization that is undertaking the development; archaeology is included in its costs. In both cases, the clients or their consultants provide strict instructions about the content of the report and the timetable for its delivery. These contents include details of the location, the work done there, the methods used, and the discoveries made. In the current profession, many of the methods are standardized and repeated in successive client reports. The value of the archaeological discoveries themselves is expressed in terms of their *significance*, a measure of how far they have added to knowledge. However, CRM projects

rarely include research time, and so client reports can rarely expect to explore this significance in the wider context of modern research. For this reason, the majority of client reports remain as "grey literature" delivered to the client or at best placed in an online archive where it is generally accessible (see above).

Research Reports (no. 4) are intended to report the most significant new discoveries of the day. They are, accordingly, selective in two senses: first, only fieldwork productive of important research is eligible for consideration, and of that, only carefully selected data and succinct argument are appropriate for publication. Research publication is subject to peer review, undertaken on behalf of publishers to ensure the highest standards of integrity and reasoning. The criteria for acceptance usually run along the lines: "Was there a research question?" "Did it need to be addressed?" "Are the results clearly presented, validated, and discussed?" and "Is the conclusion credible?" There have always been numerous other forms of open-ended, unspecific, imaginative, and non-scientific writing about the past, but few have been successfully applied to the publication of results of fieldwork.

The current research community in archaeology overwhelmingly prefers paper-copy publication in journals or monographs over data-rich digital repositories. Research publication is therefore expensive, another reason that it remains competitive and selective. It should also be noted that the main beneficiary of such selectivity is the reader. By filtering the mass of information and opinion that is generated by the archaeological community, the publishing industry hopes to select the fieldwork of most significance and most lasting value at the least cost to researchers and other readers.

The content of a research report will include the basic information about the purpose of the project, the research questions that were addressed, where it took place, the theoretical basis for the design, the methods used, and the results obtained. A site model is argued on the basis of selected analyses of assemblage, space and sequence, and a free-ranging account of its context and wider significance presented in a discussion section. The conclusion assesses the success in answering the questions expressed in the original Project Design, presents new ones, places the fieldwork results in history or prehistory, and announces the planned future of the archive, the site, and its environs.

Members of the public, and indeed students when they are starting out, may not have the background to appreciate or assess research reports. If a field project has become well known, it may become the subject of a range of more general outputs. "Popular" books (no. 5) attempt to place the archaeological discoveries in the mainstream. Commercial publishers do a wonderful job here, usually ensuring good quality and taking the financial risk on themselves. Mainstream publishers may produce a range of summaries and pictures in magazines, newspapers, and on TV (no. 6) over which the field archaeologist generally has less control but may still welcome them on the basis that "there is no such thing as bad publicity."

Direct communication with the public is available in two other media. In exhibitions (no. 7), the findings of fieldwork may find vivid expression in a museum, where artifacts and structures and their sequence are brought together. Some sites, particularly those which have been the subject of research projects (less so those excavated in advance of development), are still conserved and may be visited by members of the public. The art of presenting sites (sometimes known as "interpretation") is to explain to visitors what they can still see and relate what was found and what it might mean (no. 8). This is undoubtedly a form of publication and a special one since it takes place in the landscape, that historic environment which field method sets out to enhance.

Cross-References

► Excavation Methods in Archaeology
► Field Method in Archaeology: Overview

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Pueblo Bonito

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Introduction

Located in Chaco Canyon, in northwest New Mexico, Pueblo Bonito is the greatest of the Chacoan "great houses" (Fig. 1). A massive stone structure built in a "D" shape, Pueblo Bonito consisted of terraced rooms reaching four or five stories tall at the rear and stepping down to a large, divided central plaza. It is known not only for its architectural beauty (*Pueblo Bonito* means "pretty town") but also for the wealth of exotic artifacts found within its rooms – an abundance unparalleled at any other site in the northern Southwest. Pueblo Bonito has been extensively studied for over a century. The Hyde Exploring Expedition (1896–1899) led by George Pepper (Pepper 1920) and the National Geographic Society Expedition (1920–1927) led by Neil Judd (Judd 1954, 1964) excavated almost the entire ruin, revealing the architectural history of the site and recovering hundreds of thousands of artifacts. Archaeologists since then have made comprehensive use of Pepper's and Judd's work in numerous books and articles (see Neitzel 2003 for a recent compendium).

Construction began at Pueblo Bonito in the mid-ninth century and continued through the middle of the twelfth century (Lekson 1986; Windes & Ford 1996). During much of this period, Chaco Canyon was a place of extraordinary power, the focus of a large social and political system that encompassed much of the northern Southwest (northwest New Mexico, southwest Colorado, southeast Utah, and northeast Arizona) and was characterized by widely scattered great houses and their surrounding communities (Lekson 2006, 2009). Prehistoric roads radiated out across this landscape, leading into and out of great houses, suggesting an unprecedented level of connection and hierarchy in the Ancestral Pueblo world.

The American Southwest is an arid region, but Chaco Canyon is especially dry and treeless. Why it was selected for monumental construction of great houses is a subject of extreme interest to scholars today. The Chaco Wash only occasionally contains water, although a slightly more favorable climate may have made the canyon more inviting when Pueblo Bonito was first constructed. However, Chaco Canyon *is* one of the most conspicuous landforms in the relatively flat central region of the San Juan Basin.

Pueblo Bonito was not the only great house in the canyon. Seven other major great houses and many smaller great houses were strung along the north side of the canyon bottom or on the mesa to the north of the canyon. Pueblo Bonito and other great houses, both inside and outside Chaco

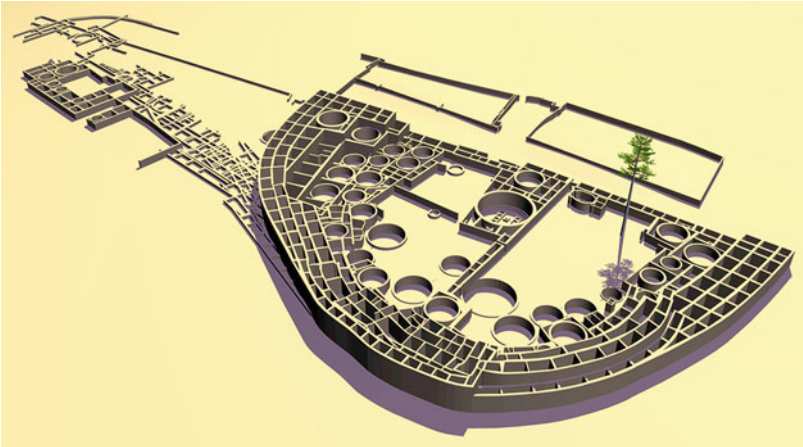

Pueblo Bonito, Fig. 1 Reconstruction of Pueblo Bonito. Note the platform mounds in front of the building and the large ponderosa pine tree in the plaza. The tree was apparently an important element of plaza space at Pueblo Bonito (Courtesy of Dennis R. Holloway, Architect)

Canyon, are argued to have been the homes of powerful leaders while ordinary people lived in small hamlets surrounding the great houses. This pattern was found in Chaco Canyon – houses are located primarily along the south side of Chaco Canyon, opposite Pueblo Bonito and the other great houses.

Definition

The sheer northern walls of Chaco Canyon provide a dramatic backdrop for Pueblo Bonito. It was built opposite "South Gap," a break in the south canyon wall that allowed visitors a dramatic view of this impressive building. It was the first of what eventually became a cluster of great houses in the central part of the canyon that has been called "Downtown Chaco." From the cliff-top above, the entire building appears in plan view and is still an awe-inspiring place, even though it now lies in ruin. In facing Pueblo Bonito toward the southeast, its builders were following normal Puebloan siting practices that maximized solar energy during the cold winter months. Backed up against the canyon wall, the building was also protected from northerly winter winds. Oddly, the structure was built under an enormous but precariously balanced pillar of sandstone that had split from the canyon wall. Called "Threatening Rock" by modern visitors, the distinctive rock formation was apparently an important part of the siting of the building (Stein et al. 2007).

Pueblo Bonito comprised as many as 600 rooms built of finely shaped and chinked sandstone masonry. It was more than 150 m long and 100 m wide, covering almost a hectare. The final form evident today was the result of more than 300 years of construction and remodeling (Lekson 1986). The original building, constructed between about CE 860 and the early 900s, was in the style of normal domestic buildings of the time, a southeast facing arc of rooms fronted by a series of round rooms. Only this original core of rooms was a "scaled-up" version of normal Puebloan architecture: Rooms were two to four times as big as normal Puebloan rooms and included some of the earliest multistoried buildings in the Southwest (Lekson 1986). This part of the great house was used for burial of high status individuals suggesting that the original building represented sacred space around which the rest of Pueblo Bonito was constructed (Plog & Heitman 2010). Around CE 1020, when the rear wall of this original building began to collapse, an enclosing wall of improved masonry was built around it to insure that it continued to stand (Lekson 1986: 132-4).

Subsequent construction continued until the mid-1100s with extensive construction episodes in the CE 1040s and 1080s (Lekson 1986; Windes & Ford 1996). This construction expanded the original D shape of the building, adding rows of rooms adjacent to the plaza (covering some of the original round rooms), extending the "wings" of the D, and enclosing the plaza with a narrow wall of rooms. Pueblo Bonito was never a static structure, but an active and living part of Puebloan construction whose intended trajectory from creation through normal processes of decline and decay has only been arrested by modern institutional efforts at preservation.

Most of the rooms that composed Pueblo Bonito were square or rectangular, but some were round. Round rooms were mostly located close to the plaza or in the plaza adjacent to the main building. Round rooms were likely the major living spaces for the leaders who inhabited Pueblo Bonito (Lekson 1986; these rooms are called "kivas" by some scholars who imply a religious use). Rectangular rooms were very large, ranging from ten to almost fifty square meters, with some variation corresponding to the distance of the room from the plaza (Lekson 1986: 51). These rooms often formed suites, indicated by positioning and connecting doorways. The presence of hearths in some plaza-facing rooms suggests that they may also have been the principal living rooms. Rooms in the rear and lower stories would have been dark and airless. These rooms may have been used for storage of food and the quantities of exotic material that apparently poured into this settlement. Some rooms have the remains of large platforms that might have served as storage shelves (Lekson 1986: 46-8). But archaeologists

have found very little direct evidence of what might have been stored.

The straight side of Pueblo Bonito's "D" was formed by a narrow block of rooms that made the plaza into an enclosed space. Inside the plaza large subterranean round rooms (13 to almost 16 m in diameter) called "great kivas" housed ceremonial activities. Great kivas were already important ceremonial buildings long before construction at Pueblo Bonito began, but developed a distinctive Chacoan form in Chaco Canyon during the eleventh century (Van Dyke 2007). As many as four great kivas may have been built in Pueblo Bonito's plaza at various times during its history, two or three of which may have been in use at one time. They were built on either side of a north-south wall that divided the plaza into eastern and western halves, a duality that has other manifestations in the Chacoan world. Van Dyke (2007: 117-21) explores the ceremonial activities that may have taken place in Chaco Canyon's great kivas (others were found at other great houses or away from great houses in other parts of the canyon).

In front of the plaza are two large-walled mounds built up of trash and other material and separated by a road or pathway that may have led directly to an opening into the plaza wall (Fig. 1). These trash mounds may have served as ceremonial platforms, as they were covered with a plaster surface at least during part of their use-life (Lekson 1986: 143-4; Windes & Mathien 1987: 618-34).

As part of Downtown Chaco, Pueblo Bonito was part of an extensively built landscape that included not only other great houses but also roads, staircases, earthen causeways, and other features (Lekson 1999, 2007, 2009; Stein et al. 2007). Prehistoric roads extended from a great house on top of the mesa north of Pueblo Bonito (called Pueblo Alto), descending into the canyon at a wide formal staircase just around the corner from Pueblo Bonito. Other roads descended from the north mesa at other points on the north canyon wall or entered Downtown Chaco from the south. Stein and colleagues (2007) have identified an extensive earthen platform constructed at the base of Threatening Rock behind Pueblo Bonito, a possible elevated road surface extending from the east end of the eastern platform mound, as well as other earthen features.

Key Issues/Current Debates/Future Directions/Examples

An animated debate surrounds the function of Chacoan great houses. Pueblo Bonito is central to this debate. Pueblo Bonito is the archetypical great house, but is also in many ways unique in the Puebloan world. The debate can be briefly summarized as a series of questions: How many people lived in Pueblo Bonito? Who were they and what did they do there? What was the connection between the people who lived in Pueblo Bonito and other Chaco Canyon great houses to the great house communities spread out across the northern Southwest? Although consensus on answers to these questions has not been reached by Chaco scholars, a review of contrasting interpretations highlights the distinctive role Pueblo Bonito played in the Chacoan world.

The number of people inhabiting Chaco Canyon and its great houses has been a topic of discussion from the very first archaeological investigations there. Initial estimates in the tens of thousands have been revised downward to as few as 1,000 (Windes & Mathien 1987: 383-406). Recent estimates of Pueblo Bonito's momentary population suggest only 12 households or 70 people (Bernardini, 1999). Such a small population in Pueblo Bonito's vast architectural space suggests that only special people resided here, but what they did there is also a point of contention. One group of scholars argues that great houses, especially Pueblo Bonito, were elite residences and that Chaco Canyon was the center of a hierarchical political system that covered much of the northern Southwest during the tenth and early eleventh centuries (Lekson 1999, 2006, 2009; Sebastian 2006). Other scholars see a much more egalitarian structure in Chaco Canyon with priests serving as ritual leaders and a hinterland that emulated Chacoan practices but was not controlled by canyon ritual leaders (Kantner & Kintigh 2006; Mills 2002).

The evidence on which this argument turns includes Chacoan architecture, burials, and imported goods, each of which are most remarkable at Pueblo Bonito. Pueblo Bonito is the largest of the great houses, and most scholars agree that great houses can be considered monumental architecture, in other words, large-scale public construction projects. However, some scholars argue that variability in great house construction outside Chaco Canyon reinforces the independence of outlying Chacoan communities from canyon control (Kantner & Kintigh 2006). Other scholars counter that Chaco Canyon itself includes a high degree of architectural variability including considerable change through time in construction methods especially at the longest-lived great house, Pueblo Bonito (Lekson 1999, 2006). Contrasting views of the existence of hierarchy in Chaco Canyon also extend to the labor force that built great houses: Were laborers coerced by leaders who lived in these "palaces" or were they voluntary laborers who converged on the canyon periodically to build great houses under the direction of benign priests?

Pueblo Bonito has a set of extraordinarily rich burials, unparalleled in the Puebloan world, that have been central to discussions concerning Chacoan complexity. Akins (2003) has identified 131 burials at the site, most located in two clusters of rooms in the oldest part of the site that she terms family burial facilities. But these were no ordinary families, as at least one of these sets of burial rooms also functioned as a repository for elaborate ceremonial paraphernalia. Arguments about the nature of hierarchy in Chaco Canyon have focused on the two richest burials, Burials 13 and 14, two males were found beneath a carefully constructed plank floor and were accompanied by more than 30,000 objects, including 25,000 pieces of turquoise (mostly beads), more than from all other Southwestern sites combined (Plog & Heitman 2010: 19622). Cylinder jars, wooden ceremonial sticks, a shell trumpet, turquoise and shell-encrusted baskets, and wooden flutes were also found here. Additional burials continued to be placed above the plank floor and in immediately adjacent rooms, perhaps as secondary burials, into the late eleventh or early twelfth centuries. Adjacent rooms contained additional wealth of exotic goods.

Scholars who see political hierarchy in Chaco Canyon have argued that these two individuals were powerful political leaders (Lekson 2006; Sebastian 2006). Other scholars have pointed to the fact that these two males, thought to have been deposited in the early eleventh century, were the only evidence of elite rulers in the over 300 years of Chaco's existence. This argument has been recently addressed by Plog and Heitman (2010) who present startling new data about the Pueblo Bonito burials. They obtained C-14 dates on human remains found here and confirm that these internments were actually some of the earliest activities at the site, dating perhaps to the late ninth century. They suggest that these two males could have been among the founders of Pueblo Bonito, beginning a tradition of social differentiation that continued into the late eleventh or early twelfth centuries. Part of the function of Pueblo Bonito, then, was as a long-lived sepulcher where only the most powerful members of Chacoan society were buried.

Evidence of the high status of the residents of Pueblo Bonito is also apparent in the exotic goods found there, both in burials and in other parts of the site. These objects were in some cases unique and in others, occurred in quantities far in excess of those found at any other sites in Chaco Canyon or indeed the entire Ancestral Pueblo world. Much of this material was imported from a considerable distance (Toll 2006): turquoise from mines 100 miles to the east, shell (including shell trumpets) from the Pacific ocean, and macaws, copper bells, and cacao from Mesoamerica. Cacao may have been made into a frothy chocolate drink served in cylinder jars that have been found almost exclusively at Pueblo Bonito (Crown & Hurst 2009). Macaw feathers may have been made into elaborate "badges of office" perhaps distributed to Chacoan leaders at great house communities outside Chaco Canyon (Lekson 1999).

For more than 300 years, Pueblo Bonito was the most important building in the northern

Southwest. This elaborately built structure was home to a small population of people who have been variously described as powerful political leaders or less powerful ritual specialists. Ceremonial activities certainly took place in Pueblo Bonito, both in the central plaza, atop the platform mounds, and in the great kivas located in the plaza. Other ritual activities apparently involved the internment of powerful individuals in a mortuary crypt located in the oldest part of the building. During the many centuries of its use, Pueblo Bonito was a living entity, growing and changing with each generation. Pueblo Bonito was not just another great house, it was THE great house, the center of the Chacoan regional system. Although Chacoan scholars may continue to debate the nature of that system, few will deny Pueblo Bonito's centrality.

Cross-References

- ▶ Chaco Canyon, Archaeology of
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture

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Further Reading

Chaco Research Archive. Available at: http://www.chacoarchive.org/cra/.

Pwiti, Gilbert

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Basic Biographical Information

A jack of two trades and master of both is a befitting statement to introduce Gilbert Pwiti. This biographic entry outlines the illustrious career of the exceptional academic and pioneer of modern archaeological and heritage management research in southern Africa and Zimbabwe in particular. Zimbabwe has enjoyed a comparatively long history of archaeological research starting from the early twentieth century. However, most of the initial archaeological investigations were done by expatriate professional archaeologists of European and American descent, including David Randall-MacIver, Gertrude Caton-Thompson, Roger Summers, Peter Garlake, Tom Huffman, and Robert Soper. It is against this background that we have to assess and appreciate the enormous contributions of Gilbert Pwiti to the archaeology and management of heritage in Zimbabwe.

Gilbert Pwiti was born in 1958 in Mazoe in the then Federation of Rhodesia and Nyasaland that comprised three British colonies, namely, Nyasaland (now Malawi), Northern Rhodesia (now Zambia), and Southern Rhodesia (now Zimbabwe). Twenty-two years later he successfully completed the Bachelor of Arts Dual Honors in History and African Languages at the University of Zimbabwe (*hereafter* UZ). At the same time Zimbabwe was emerging as a new country following a decade of protracted war against minority white regime. The new country, like any other newly independent African country, was in dire need of restoring pride by rewriting its history that was distorted by a century of British colonization. Naturally archaeology was one of the ways to rewrite the precolonial past, a period notable for its lack of written documents. With his passion for history, Gilbert was among the first generation of indigenous historians to receive archaeological training abroad in the postcolonial period. In 1983 he left for Europe to read for an M.Phil. in Archaeology at the University of Cambridge. Upon his return from Cambridge after two years of training, he found himself faced with the task of setting up an archaeology unit, the first one in Zimbabwe, within the Department of History at UZ. He was instrumental in introducing archaeology and prehistory courses to undergraduate students who were majoring in History. By 1990 the first fully fledged archaeology degree program began to be offered at UZ as a result of the commitment to teaching by Gilbert Pwiti and his colleagues, Peter Garlake and Robert Soper (Pwiti 1994). Gilbert was subsequently awarded a Ph.D. in Archaeology by the University of Uppsala in 1996 for his research on the early farming communities and complex societies of northern Zimbabwe (Pwiti 1996a). In 2000 he was once again instrumental in the establishment of the Master of Arts degree in Heritage Studies at UZ. Beyond UZ Gilbert has also assisted his former colleagues and students to establish archaeology and cultural heritage degree programs at Midlands State University (MSU) and Great Zimbabwe University (GZU). Today Zimbabwe has hundreds of professional archaeologists and heritage managers practicing their trade in the country while several have been "exported" to neighboring countries.

Major Accomplishments

During the formative years of his career, he largely focused on the archaeological *terra incognita* regions that included northern Zimbabwe, and more recently he has shifted his attention to unexplored parts of eastern Zimbabwe. Prior to his investigations, archaeological research tended to be much more limited in terms of geographical coverage with most studies concentrating on Great Zimbabwe and the surrounding areas. His research in the mid-Zambezi Valley, a region perceived as marginal for agropastoral pursuits and thus neglected by

archaeologists, documented the appearance of the earliest farmers in southern Africa (Pwiti 1996a). His archaeological investigations at Kadzi documented the occurrence of farming communities in the fifth century CE, at least three centuries earlier than previously assumed. The end result of his research was the revision of the cultural sequence of northern Zimbabwe together with the modification of the purported Bantu population movements that supposedly took place at the beginning of the first millennium CE. His focus on second millennium CE farming communities in the same area broadened our understanding of the complex transformation of non-stratified communities to more complex systems (Pwiti 2004). He also questioned the existence of the second wave of Bantu migrations that had been thought to have occurred at the beginning of the second millennium CE. His research findings on this issue refuted the idea that only population movement could account for the sociopolitical changes that occurred in southern Africa. These conclusions challenged racially biased migration theories that were always used to explain sociopolitical changes in African archaeology in favor of autochthonous developments resulting from changes in economy and ideology (Pwiti 2005).

His research on the archaeology of farming communities subsequently resulted in the development of a sustained interest in the management of cultural resources. He has since extensively published on the inadequacies of heritage management policies and the need to revise statutory instruments that were enacted during the colonial period which still guide the protection and preservation of cultural resources in postcolonial Africa. He initiated a number of innovative concepts that ought to be the guiding principles for heritage managers in postcolonial African countries. He was among the first scholars to advocate for the recognition of the importance of intangible aspects of heritage, reconciliation of modern and traditional heritage management approaches, and championed community participation (Pwiti 1996b,1997b; Pwiti & Mvenge 1996). His work on heritage management practice in southern Africa highlights how colonization alienated the colonized from their heritage physically and culturally (Pwiti & Ndoro 1999; Ndoro & Pwiti 2001). Colonial land resettlement policies and private land holding rights saw the forced removal of people from their immovable heritage, while the education system and churches were used as vehicles to make people despise their own heritage. Vast tracts of land were designated nature reserves, game sanctuaries, and commercial farms. As a result ancestral grave yards, religious centers and shrines became out of bounds since indigenous populations were denied access. It has been Gilbert's agenda to "restore lost cultural values and pride" so that the once colonized people can appreciate their own heritage and eventually participate in its management. The implementation of some of his proposed concepts particularly community participation in heritage management has not been without challenges. The recent stocktaking of heritage management practice in postcolonial Africa has highlighted a new set of challenges that come with the concepts that he prescribed initially (Chirikure & Pwiti 2008; Chirikure et al. 2010). In some cases it has proved difficult for heritage managers to identify "communities," "indigenous groups," and "traditional custodians." In principle, professionally trained heritage managers and policy makers now recognize the importance of involving traditional custodians in the management of heritage resources, but the implementation and particularly the identification of legitimate custodians is easier said than done.

Gilbert Pwiti has (co)edited and (co)authored several seminal publications that focus on a range of aspects on African archaeology and heritage management (Pwiti 1997a; Ndoro & Pwiti 2005). In 2001 he teamed up with his colleagues in East Africa to launch a publication series entitled *Studies in the African Past*. This series has since been the outlet to showcase recent and ongoing research in eastern and southern Africa. To date Gilbert Pwiti has held several administrative positions at UZ, and beyond the university he has acted as an advisor for matters of heritage management. In spite of the demands of these administrative jobs and research commitments,

he has never stopped lecturing. He is an outstanding and eloquent teacher with a lot of enthusiasm in the African prehistory and heritage management. His commitment to the archaeology unit he founded at the university has seen him staying put even in the most difficult times when others went in search of greener pastures. His publications are very useful, but we should acknowledge that they will not always stand the test of time as such may one day become outdated. Having said that, it is through his contribution to the teaching and training of more archaeologists that Gilbert sows the seeds of knowledge that will last forever. He has been instrumental as a mentor of many professional archaeologists and heritage managers in Zimbabwe. Apart from UZ he has been able to share his experience as a visiting professor and external examiner at several leading archaeology institutions and departments in Africa and abroad. This international exposure has allowed him to secure funding for his students who have furthered their archaeological studies at leading archaeological institutions and departments in Africa and Europe. Through his commitment to the training of indigenous archaeologists Gilbert has shown that the economic theory of "kicking away the ladder" once one climbs to greater heights has no place in the world of academia. The present and future generations of archaeologists and heritage managers in Zimbabwe are therefore indebted to him. For his contributions and service to his country and southern Africa, it is not surprising that Gilbert Pwiti became the first professor of Archaeology in Zimbabwe. His services to global archaeology were acknowledged when he was elected the acting president of the World Archaeological Congress (1998–2000). On the final analysis of his career to date, Gilbert has demonstrated that for one to be an archaeologist, one has to be a versatile and passionate researcher, supervisor, and teacher.

Cross-References

► Ndoro, Webber
► Zimbabwe: Cultural Heritage Management

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Pyburn, K. Anne

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Basic Biographical Information

Anne Pyburn is Professor of Anthropology at Indiana University where she is Director of the Center for Archaeology in the Public Interest (CAPI). She is the Director of the Chau Hiix Project in Belize, Director of Community Cultural Resource Management for the Silk Road Project in Kyrgyzstan, and Director of the MATRIX Project for educational development in archaeology.

Major Accomplishments

Dr. Pyburn's interests include archaeological research ethics, heritage and globalization, gender, early cities, the ancient Maya, and the growing emphasis on heritage and national identity in Kyrgyzstan. She is currently serving as Chair of the International Scientific Committee for the seventh meeting of the World Archaeological Congress (WAC-7).

Cross-References

► Ethics in Archaeology
► Kyrgyzstan: Cultural Heritage Management
► Mundo Maya
► Stakeholders and Community Participation
► World Archaeological Congress (WAC)

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Q

Quinoa: Origins and Development

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Basic Species Information

One of the indigenous staple crops of Andean South America is the pseudocereal quinoa (*Chenopodium quinoa* Willd.). While it was traditionally placed in its own family Chenopodiaceae, recent genetic work located it within the monophyletic family Amaranthaceae. It is a tall, little-branched shrub that produces thousands of seeds in a large, exserted panicle (Fig. 1). There are many varieties that are primarily distinguished based on the color of both the plant and seed. Quinoa varieties range in color from white, yellow, red, and purple.

Today, quinoa has gained popularity in North America, Europe, and Japan as a "superfood" because it is gluten-free and high in protein. Quinoa continues to be an important food in indigenous communities throughout the Andean highlands of Peru, Bolivia, and parts of southern Colombia, northern Chile, and western Argentina (Fig. 2). It is a hardy crop well adapted to dry, cold Andean climates (Risi & Galwey 1984).

The wild progenitor of domesticated quinoa has not yet been definitively identified, but there are several potential populations. The most commonly recognized wild species associated with the crop is known as *ajara* or *quinoa negra* for the black seeds it produces (*Chenopodium quinoa* var. *melanospermum* Hunziker or *C. quinoa* spp. *milleanum* Aellen). It shares the same distribution as quinoa and is considered to be its companion weed. Another common, black-seeded Andean species is *C. hircinum* Schrader, which is distributed along the eastern slopes of the Andes, valleys of Paraguay, Uruguay, and Argentina (Wilson 1990).

Major Domestication Traits

Through artificial selection by Andean hunter-gatherers who collected, managed, and eventually cultivated wild *Chenopodium* stands, the plant, and particularly its seeds, underwent several morphological changes. Domesticated *Chenopodium quinoa* plants have larger, more-compact inflorescences than their wild counterparts, and the seeds do not easily disperse. While whole plants do not commonly preserve in the archaeological record, carbonized seeds are very common. The seed underwent several changes that archaeobotanists can observe using a combination of standard microscopy with 5 to 100X magnification and scanning electron microscopy (SEM) with magnifications of between 500 and 5,000X. The standards for identifying differences in wild and domesticated *Chenopodium* populations were first established

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Quinoa: Origins and Development, Fig. 1 Domesticated quinoa field on the Taraco Peninsula, Bolivia

by researchers who studied *Chenopodium* domestication in Eastern North America (*C. berlandieri* ssp. *jonesianum*). Andean archaeobotanists consider a suite of traits to identify domesticated quinoa: seed diameter, seed coat thickness and texture, and margin configuration (Bruno 2006).

New research is examining the attribute of beak prominence (Langlie et al. 2011). It appears to be a trait that varies among quinoa varieties, but is not useful for differentiating wild versus domesticated species. Therefore, it is not discussed in detail here.

Seed Diameter

Like other grain crops, the seeds of domesticated quinoa tend to be larger (1.0–3.0 mm) than the seeds of its wild counterparts (1.0–1.9 mm) as humans select for larger food packages. There is, however, significant overlap in diameter; thus, archaeobotanists consider other traits to identify domesticated seeds (Fig. 3; Table 1).

Seed Coat Thickness

As mentioned above, the domesticated varieties of quinoa tend to have light colors such as white, yellow, red, and even purple, while the wild species have black seeds. The lighter color of the domesticated quinoa species is due to a thin seed coat or testa (Fig. 3). The testa is very small and can only be measured with SEM. Domesticated quinoa seeds have very thin testa ranging between 1.25 and 3.75 μm while wild *quinoa negra* testa are thick, ranging between 22 and 55 μm. Archaeological quinoa can have testa thickness up to 18 μm thick but is thinner than *quinoa negra*, which is generally >30 μm (Eisentraut 1998; Bruno & Whitehead 2003).

Seeds with a thinner testa were likely selected because they germinate more quickly and reliably. The wide range of colors and varieties may have been selected for other reasons such as taste, texture, or resistance to climatic variation (rainfall, frost, pests, etc.). Researchers are just beginning to study the morphometric differences among quinoa varieties that may shed light on these selection processes in the past (Langlie et al. 2011).

Seed Coat Texture

In addition to testa thickness, domesticated and wild quinoa are also distinguished by the patterning found on their surfaces. Like other wild species of the Cellulata section, *quinoa negra* has a reticulate seed coat patterning.

Quinoa: Origins and Development,
Fig. 2 Estimated past and present quinoa cultivation (Based on Risi & Galwey 1984)

This patterning is lost in the thinner-seeded domesticated seeds resulting in a smooth surface. This trait is easily recognizable under both high and low magnification.

Margin Configuration

Examination of the cross-section of seeds reveals differences in overall shape. Wild seeds tend to be biconvex while domesticated seeds are more rounded to truncate. With a thinner testa, the rounded shape of the perisperm and radical is more prominent (Fig. 3).

Timing and Tracking Domestication

The history of quinoa's domestication is still being determined through a combination of botanical, genetic, and archaeological approaches.

Genetic Evidence

Available genetic studies have not yet revealed quinoa's wild ancestor population but suggest it may have been a species of *C. hircinum*. Genetic studies have verified that *C. quinoa* var. *melanospermum*/*C. quinoa* ssp. *milleanum*

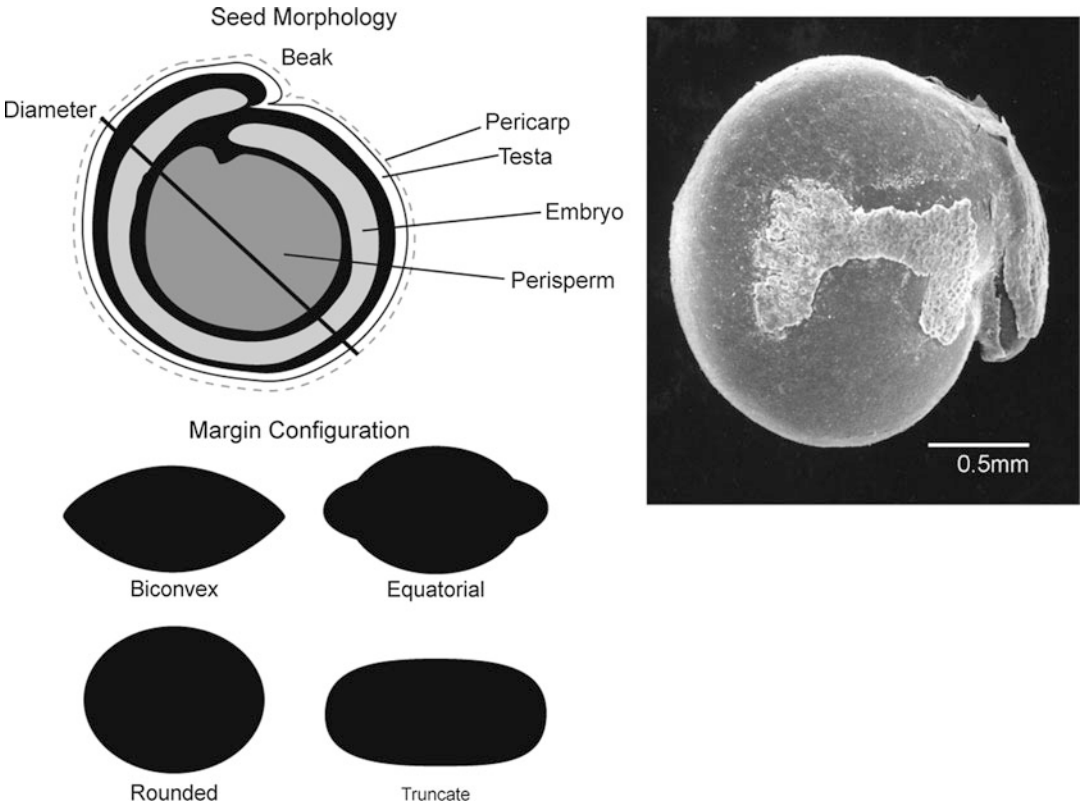

Quinoa: Origins and Development, Fig. 3 *Chenopodium* seed morphology, margin configuration forms, and an SEM image of a modern quinoa seed. Note the smooth seed coat surface and very thin testa peeling back near the beak (Based on Bruno 2008)

Quinoa: Origins and Development, Table 1 Comparison of wild versus domesticated attributes for quinoa

Species	Common names	Seed coat texture	Margin configuration	Seed diameter (charred)	Testa thickness (charred)
***C. quinoa* Willd.**	Quinoa, jupa	Smooth	Truncate	1.0–3.0 mm	1.25–3.75 μm
***C. quinoa* var. *melanospermum* Hunziker**	Quinoa negra, ajara	Reticulate	Biconvex to equatorially banded	1.0–1.9 mm	22–55 μm

populations are not a progenitor but a companion weed that evolved alongside the crop (Wilson 1990).

Archaeological Evidence

Over the past 15 years, improved recovery methods for archaeological plant remains have added to our knowledge of when, where, and in what social context quinoa may have been domesticated. The ideal protocol for documenting domesticated quinoa specimens is to use SEM to identify domesticated seeds using the parameters mentioned above. These should then be directly dated using the AMS radiocarbon technique.

SEM studies have been conducted on samples from central Peru (Panalauca and Panaca Caves), the Lake Titicaca basin (Taraco Peninsula, Quelcatani Cave, Jiskairumoko), and southern Bolivia (La Barca). The seeds from the central Peruvian caves have associated dates of about

3,000 BCE. Direct dates from the sites in the Lake Titicaca Basin all cluster around 1,500 BCE. Direct dates on quinoa identified with light microscopy in central Chile have dates of approximately 1,000 BCE (Planella et al. 2005). In the Ñanchoc valley of northern Peru, researchers have identified quinoa seeds with light microscopy that is associated with a house floor that had wood charcoal dating between 6,000 and 5,500 BCE (Dillehay et al. 2007). It is important to note that the specimens from Quelcatani Cave had associated dates of around 3,000 BCE, but the directly dated seeds were younger (Eisentraut 1998). This difference highlights the importance of direct AMS dating since these small seeds can move through post-depositional processes. Given the available information, it is clear that domesticated quinoa was being cultivated by around 1,500 BCE, in what is known as the Early Formative period, the phase associated with the earliest farmers of the south-central Andean region. It is likely that the process of domestication began earlier, with a conservative estimate around 3,000 BCE but possibly as early as 6,000 BCE.

It is hypothesized that the process of domesticating quinoa began in the Late Archaic period possibly by early camelid pastoralists in the central or south-central highlands. Chenopods are quite common in disturbed habitats and may have been particularly adapted to the camps and corrals being created by semi-nomadic foraging groups. Quinoa seeds have been found in both modern and archaeological camelid dung samples suggesting a coevolutionary relationship between these crops, camelids, and humans (Kuznar 1993). Continued efforts to recover, document, and date sites spanning the Late Archaic-Early Formative transition are essential to furthering our understanding of the domestication of this important Andean staple.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Quiroga, Adán

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Basic Biographical Information

Adán Quiroga (San Juan 1863–Buenos Aires 1904) died at the age of 41, without having assumed the position of Sub-Secretary of the Interior Ministry of the Argentine Republic for which he had been appointed. He had previously held various positions in the Judiciary and had been the mayor of San Fernando del Valle de Catamarca. A trained lawyer (Ph.D. in law with a thesis on *Crime and Punishment*, 1887, University of Córdoba) and poet (*Flowers of the Air*, 1893), Quiroga was known for his studies on archaeology, history, and *Calchaquí* folklore (*Calchaquí*, 1897, *The Cross in America* (Quiroga 2004 [1901]), and *Calchaquí Folklore*, 1897 (Quiroga 1992),are his major works). He lived in a time when these disciplines were being formed; there were no clear boundaries among them, and their respective objects and methods were being defined. Quiroga participated in formative discussions of archaeology in Argentina with original positions and different proposals. The discipline, once formed and institutionalized, forgot him. This short biographical note, which brings him back, is also a reconstruction of his oblivion.

Major Accomplishments

In the last quarter of the nineteenth century, the Argentine national state was consolidating, in a process that was marked by the construction of a political and cultural hegemony of elites linked to foreign trade, over the enormous mass of southern European immigrants. The native inhabitants of the ancient provinces of the territory's interior inherited from the Spanish Empire, indigenous populations of the Chaco, the Pampas and Patagonia (which had been defeated by the army, massacred, dispossessed from their lands, and confined to reservations), and the yearning for autonomous development of the weaker neighboring countries (which, as in the case of the Republic of Paraguay, were the object of genocide by the armies of the Triple Alliance formed by Argentina, Brazil, and Uruguay). As the core of the nationality construction policy, free, basic, general, and state education spread over the whole country becoming a real hegemonic citizenship production machine. In turn, the elites devoted huge efforts to the demarcation of a canonical historiography of Argentina. General Bartolomé Mitre, for example, was the leader of Buenos Aires' elite, commanded troops against the indigenous and against Paraguay, and was one of the leading historians; thus, he was a history protagonist performing historical deeds and writing about them.

Joaquín, Quiroga's father, was appointed Federal Judge in Catamarca by Mitre, and Adán accompanied the Mitrist party all through his life. However, his texts on archaeology and history, and his positions regarding the indigenous, were very different from what the Mitrist canon sought to establish. Bartolomé Mitre himself acknowledges his book *The Cross in America* with a laconic appreciation and a critique of Quiroga's elaborate and passionate prose.

To Quiroga, the Calchaquíes, protagonists of armed resistance to European conquest for nearly a century and a half, were worthy of admiration rather than condemnation or stigma. Quiroga proposed an Argentine nationalism that would seek its basis in the history of resistance that the Calchaquíes led for the love for their land, choosing death when they were defeated by the Spanish military superiority. To Quiroga, the "Calchaquí epic" was the emotional mobilizing force for the feelings of the fatherland; in this, he was clearly different from the Europeanized elite, which did not hesitate in pedagogically focusing on European history at the moment of shaping the new citizenship. In the same way that Indigenism would later propose in Mexico, to Quiroga, archaeology had the value of providing a national epic. At the same time, other leading academics proposed that archaeology should be limited to recover, preserve, and classify remains and to display them in museums, so that citizens would be educated about how the original inhabitants "that became extinct in this land" had been like (as Francisco Moreno expressed). In Argentine archaeology, one of the oldest institutionalization in the Americas, positions such as Quiroga's were discarded and forgotten, and positivist proposals, like Moreno's, prevailed.

Quiroga's archaeology was interested in the interpretation of symbols in rock art and ceramics, which referred to Calchaquí deities of rain and storm, wind and earth. Geography imprinted its most remarkable characters in the town: the language, the gods, symbols, and the Calchaquí's personality were definitely influenced by the landscape. There were no ruptures between the creators of the great artistic and architectural works discovered by archaeology and the Calchaquíes of the epic resistance to the conquest. But Quiroga was not, however, an advocate for the rights of their descendants. He regarded the indigenous as minors, not punishable and deserving protection. Their history had epic value for the whole nationality, but there was no continuity between their history of resistance appraisal and their rights' restoration.

Quiroga moved away from both his Hispanist contemporaries, who valued the conquest and eluded its traumatic effects, and from positivists, who valued the indigenous only as a scientific object to classify and describe. Notwithstanding, Quiroga's indigenous nationalism was not offered in opposition to liberal hegemonic projects. He himself was a notorious politician and a Mitrist intellectual, who, at the same time that he offered alternative content for the national citizenship construction project, did not question the hegemonic sense of that project.

In Quiroga's project, archaeology acquired a very relevant and different position from that his contemporaries had relegated it. To Hispanists it was a lesser form of entertainment dealing with history without indigenous interest, whereas for positivists, archaeology was a discipline cut according to natural history model, concerned with the classification and description of extinct races' remains. Quiroga's archaeology made in advance a project which would acquire physiognomy decades later in Indigenism – notably the case of Mexico. But Argentina's cultural and political winds, whose Europeanized elite had already committed cultural decisions, were unfavorable to indigenous nationalism. Ricardo Rojas resumed Quiroga's legacy posthumously, but the influence of his work was progressively diluted. Quiroga's work and that of his contemporary scholars from the country's interior (Lafone Quevedo, the first Ambrosetti, Toscano, etc., encompassed as "historian philologists") were excluded from the pantheon of archaeology and anthropology classics by disciplinary historiographies. It was not until the 1990s that texts began to appear returning to Quiroga, awakening interest in his work and life.

Quiroga is a pioneer forgotten by Argentine disciplinary historiography, in itself marginal to historiographical narrative hegemonized by European authors. This biographical note on Adán Quiroga cannot end without stressing the contextual bias of the ways in which the discipline is self-narrated. The narratives of the past seem to have as many voices as silences.

Cross-References

- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Indigenous Archaeologies
- ▶ Latin America: Indigenous Peoples' Rights
- ▶ Power and Knowledge in Archaeology

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R

Race in Archaeology

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Introduction

The explicit archaeological interest in race as a topic of inquiry only developed in the 1990s. Before this, but only beginning in the 1980s, many historical archaeologists investigated ethnicity rather than race, seeking to develop ways to use excavated artifact assemblages to identify members of historically known ethnic groups. The goal of much of this research was to correlate specific objects or kinds of objects with certain peoples. Accordingly, for example, many archaeologists equated white clay smoking pipes decorated with shamrocks with Irish men and women. By the 1990s, many historical archaeologists had decided that this sort of easy correlation neither matched the complexities of daily life nor reflected the ways in which perceived personal characteristics created social hierarchies. As a result, some archaeologists began to think explicitly about race rather than ethnicity as a focus of examination.

Definition

Diverse studies by anthropologists have proven that only one human race exists. The physical variations apparent in the world's peoples result from myriad genetic adaptations rather than the presence of true races. The biological fallacy of race, however, does not mean that racial theory has not been a continual force in modern history or that the perception of race has not had consequences, as more powerful groups have used their ideas about racial difference to cement their authority and power. The appearance and application of racial theory has meant that people identified as belonging to an inferior "race" could be justifiably denigrating and discriminated against. People seeking to create or maintain strict social hierarchies used the pseudo-science of racial theory to reinforce their claims of inferiority and superiority, claims that placed them at the top and those they despised at the bottom.

The attribution of racial designation is usually a byproduct of relations of power, and so many scholars find it useful to speak of "racialization" rather than race per se. Racialization is a process of "assigning men and women to essentialist groups, based upon physical appearance or some other readily identifiable characteristics, that allow them to be perceived as biologically inferior or socially unequal" (Miles 1989: 73). This means that people in power can use cultural elements – patterns of dress, language, dialect, religious belief – to assign whole groups of people to a inferior "race" in addition to, or even exclusive of, their physical appearance. Nonetheless, much racial theory rests on physical characteristics that may be real or imagined.

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The racial assignment that results from the process of racialization comes from outside the group being so designated. Racialization allows those classified as members of a specific "race" to be held in contempt by members of the defining group. Those creating and enforcing the classification may believe that their system reflects biological reality, when in truth racialization results from the mere perception of biological reality without genetic substance. The establishment of a social hierarchy is the practical outcome of the process of racialization because racialization creates superior and inferior "races." The creation of races, however, is based upon historically relevant criteria. Racial assignment at one point in history may be based on skin color, but at another time – but in the same setting – the assignment may rest on cultural tradition. In other cases, it may be based on both.

Unlike race, ethnicity – the assignment of ethnic affiliation – is an internal designation, meaning that people in an ethnic group self-identify as belonging to that group. The presence of ethnic groups within a society need not create a social hierarchy. Rather, the various ethnic groups can be viewed as simply working to maintain their own self-contained traditions, customs, and habits based on genealogy.

An ethnic group can be assigned a racial categorization. Most of the immigrant groups that traveled to the United States in the nineteenth century underwent the process of racialization at some point in their collective history. In the late nineteenth century, Italian immigrants faced the same denigration and discrimination that many Irish immigrants had experienced a few decades earlier. Later, at the beginning of the twentieth century, Eastern Europeans faced similar situations and many Mexican immigrants confront the process today.

The process of dividing peoples into disparate groups has occurred throughout human history, but historians who have examined racialization generally agree that its strongest expressions correspond with European global expansion and the rise of the worldwide reach of capitalist economics. As such, "Race is one of the central conceptual inventions of modernity" (Goldberg 1993: 3). At the very least, the subject of race is unavoidable in the United States, South Africa, and other nations where the perceived racial differences between peoples have had a long, antagonistic, and often violent history.

Our vantage point from the early twenty-first century makes it clear that the modern-world historical archaeology is the proper intellectual site from which an archaeological understanding of the racialization process must come. The subject is too important to believe otherwise.

Key Issues and Future Directions

One of the key issues in the archaeological investigation of race rests upon the identification of the material characteristics of racial assignment. Scholars from almost every discipline in the humanities and the social sciences have studied race from many theoretical perspectives using various sets of empirical evidence. The breadth of their studies reveals the complexities of race as a historical element, but they generally shed little or no light on the materiality of racial identification. As a result, archaeologists face significant challenges when attempting to observe the materiality of race in archaeological deposits and artifact collections. The historical mutability of race is a compounding problem. People racialized in one epoch may not be racialized (or may be racialized differently) in another epoch. For example, plantation owners living during in the United States' earliest colonial era often distinguished between "Negroes" and "Christians." This system of designation, which racialized the enslaved as non-Christian and inferior and the free as Christian and superior, was relevant when the proportion of Christianized slaves was small. As the number of enslaved men and women who had adopted some form of Christianity grew, the old system of racial separation was no longer applicable. As a result, the designations "white" and "black" became more relevant as racial descriptors. From an archaeological standpoint, an archaeologist investigating racialization in colonial America would have to understand the historical mutability of racialization and work to devise ways to perceive its many permutations through time. This is

a decidedly difficult project, but its intricacy does not negate the need for sustained archaeological analysis. On the contrary, the persistence of racial categorizations through time mandates serious archaeological examination.

Many ways undoubtedly exist to examine the historical characteristics of racialization using archaeological methods and perspectives. The ways to investigate the racialization process will certainly grow as increasing numbers of historical archaeologists decide to focus on its many historical dimensions. An approach that now appears to offer interpretive promise involves three related elements: the understanding of modern-era artifacts as commodities, the role that spatial practice plays in signaling racial affiliation, and the interaction between commodities and place.

Commodities are things created specifically for exchange. Commodities have assumed an increasing role in most people's lives since about 1500 CE, to the extent that most of us today purchase everything we use. Most of the world's peoples no long make their own material possessions but instead purchase them from commercial retailers and merchants. Historical archaeologists have long appreciated the importance of viewing modern-era artifacts as commodities and considerable literature exists. Regarding race specifically, archaeological analysis has demonstrated the complex linkage that occurs between racial categorization and the availability of commodities through time (e.g., Mullins 1999). Studies such as these, albeit complicated and necessarily site specific, indicate that racialized consumers could combine their need for physical things with a desire to make symbolic statements about their right to personal possessions. Within this perspective, the act of purchasing commodities is simultaneously perceived as an economic imperative and a political statement. Thus, the ownership of a toothbrush might be seen as representing the simple need of dental hygiene combined with an overt statement that by owning a toothbrush, a person racialized as inferior has the same right to hygiene as someone at the top of the racial hierarchy.

Spatial practice refers to the ways in which a particular social setting configures and promotes space both as a physical reality and as the ways in which humans manipulate, use, and recreate life and social relations within physical reality (Lefebvre 1991). Spatial practice thus includes the layouts of towns, villages, houses, rooms, roads, lanes, pathways, and everything else in the built and natural environments and the ways in which residents and visitors use and perceive them. Spatial practice is culture specific: Each culture understands its own space and perceives it as right and proper. Thus, for example, it was customary for medieval Roman Catholics to situate their cathedrals in highly visible, prominent locations because such placement was proper.

Like commodities, spatial practice can have a racialized character. The most obvious expression of racialized spatial practice can be observed in the physical segregation of people of color, immigrants, and others deemed inferior in less-than-desirable settlement areas. For example, mid-nineteenth century Irish immigrants and other financially disadvantaged people in the United States were usually relegated to flood-prone and overcrowded urban zones because they were deemed inferior by society's elite rulers. Spatial segregation is a physical reminder that space is entwined with the relations of power that are created and enforced within a society.

Archaeologists can gain insights into the presence and operation of racialization in particular social environments by combining the analysis of commodities with their spatial appearance. An artifact collection by itself may not be especially expressive of racial assignment, but it may become meaningful when combined with its place of discovery. In other words, the presence and absence of certain commodities in only one place in a settlement may relate to the way in which people in that environment were racialized. The distribution of commodities within a complex society, such as nineteenth-century America or England will also reflect class distinctions. At present, the relationships between race and class – and their archaeological interpretation – have yet to be worked out to the satisfaction of most researchers, and future historical archaeologists will undoubtedly follow this important line of investigation in years to come.

Cross-References

- ▶ African Diaspora Archaeology Network (ADAN)
- ▶ Ethnic Identity and Archaeology
- ▶ Indigenous Archaeologies
- ▶ Multicultural Archaeology
- ▶ Multivocality and Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Overseas Chinese Archaeology
- ▶ Plantation Archaeology
- ▶ Social Identity in Historical Archaeology

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Radiocarbon Dating in Archaeology

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Introduction

Radiocarbon (^{14}C) dating is an isotopic or nuclear decay method of inferring age for organic materials. The technique provides a common chronometric time scale of worldwide applicability on a routine basis in the age range from about 300 calender years to between 40,000 and 50,000 years. With isotopic enrichment and larger sample sizes, ages up to 75,000 years have been measured (Taylor 1987, 2001).

Radiocarbon measurements can be obtained on a wide spectrum of carbon-containing samples including charcoal, wood, marine shell, and bone. Using conventional decay or beta counting, sample sizes ranging from about 0.5 to 10 g of carbon are typical. Direct or ion counting using accelerator mass spectrometry (AMS) technology permits ^{14}C measurements to be obtained routinely on samples of 0.5–1 mg of carbon and, with additional effort, on as little as 20 μg of carbon.

The ^{14}C technique is widely viewed as the geochronological "gold standard" from the perspective of its potential ability to provide generally accurate and relatively precise chronometric age assignments for late Pleistocene and Holocene organics (Pollard 2009). It was developed at the University of Chicago (USA) immediately following World War II by Willard F. Libby (1908–1980) and his collaborators James R. Arnold and Ernest C. Anderson. Libby received the Nobel Prize in chemistry in 1960 for the development of the method.

Key Issues

Basics

Carbon-containing compounds in a wide variety of forms are distributed throughout the earth's atmospheric, terrestrial, and hydrological (primarily marine, but also freshwater) environments. These compounds are cycled through various carbon reservoirs on different time scales by a variety of physical or chemical mechanisms. The carbon cycle processes are dominated by the operation of two major intersecting and interacting physical and geochemical systems.

The first involves the cycling of various chemical species – including dissolved inorganic carbon (DIC) in the form of carbon dioxide, carbonates, bicarbonates, and dissolved and

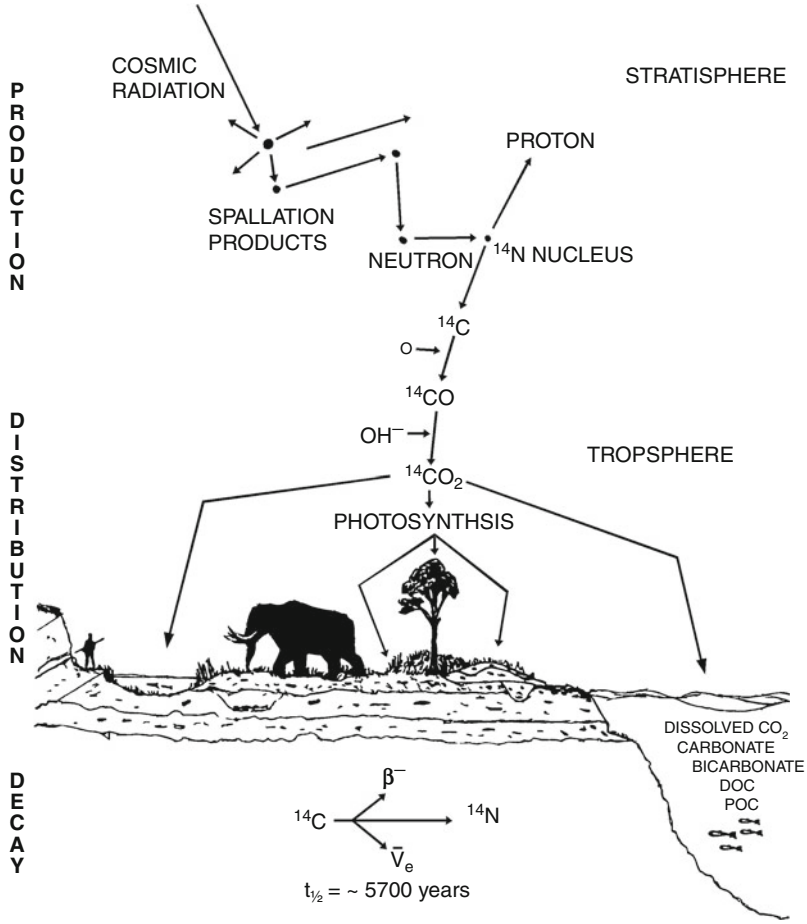

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Fig. 1 Radiocarbon dating model: production, distribution, and decay of ^{14}C (Adapted from Fig. 1 in Taylor (2001))

particulate organic carbon (DOC) – primarily between the oceans and atmosphere. The second involves photosynthetic cycles utilizing several complex biochemical pathways involving the fixation of atmospheric carbon dioxide (CO_2) in plant materials, an incorporation of a small portion of plant biomass into animal tissue, and subsequent decomposition with the release of carbon dioxide (CO_2) and methane (CH_4) back into the atmosphere. Various chemical and physical processes including the deposition of carbonates in terrestrial and oceanic sediments and volcanic activity are also involved in the operation of the carbon cycle on much longer geologic time scales (Trumbore 2000).

Carbon which becomes an active part of the earth's carbon cycles contains three *naturally occurring* isotopes, two of which are stable (^{12}C, ^{13}C) and one (^{14}C) which is, at the nuclear level, naturally unstable or radioactive. The natural radioactive isotope of carbon, or *radiocarbon*, decays with a half-life of ~5,700 years. This half-life is significantly in excess of what would be expected from a comparison with isotopes with similar decay energy characteristics (Currie 2004).

The basis of the use of ^{14}C as a dating isotope is illustrated in Fig. 1 in terms of its *production*, *distribution*, and *decay*. The production of ^{14}C is a secondary effect of cosmic-ray interactions with the nuclei of atmospheric gas molecules. Primary cosmic rays are mostly composed of protons (hydrogen nuclei) and helium nuclei which have been accelerated to extremely high energies. Because they are charged particles, many are deflected by the various components

of the magnetic field of our sun and by the dipole magnetic field of our planet. However, a small percentage of these particles, many of which continue to possess very high energies, reach the top of the earth's atmosphere. These primary particles produce a cascade of secondary particles. Collisions of both primary and secondary particles in the stratosphere with the nuclei of atmospheric gas molecules yield a range of products including free neutrons.

The free neutrons continue to interact with other components of the earth's atmosphere losing energy in the process. As these particles reach appropriate energies, they can react with the nucleus of ^{14}N to form ^{14}C. This natural cosmogenic (cosmic-ray formed) ^{14}C is then rapidly oxidized by OH^- (hydroxide ion), initially to form mostly molecules of ^{14}CO (carbon monoxide), and then rapidly, these ^{14}CO molecules are, in turn, oxidized to $^{14}CO_2$ (carbon dioxide). Even though ^{14}C production at the geomagnetic poles is about five times that at the geomagnetic equator, cosmic-ray produced ^{14}C becomes generally well-mixed by the time ^{14}C-tagged CO_2 molecules reach the planetary surface and become incorporated into various forms of biota or as components of the world's oceans primarily as dissolved inorganic carbonates (DIC) or in the form of carbonates or bicarbonates (Cook et al. 2010).

Because oceans comprise almost three-quarters of the earth's surface, the largest percentage of ^{14}C is found in marine environments with the majority of this marine ^{14}C located in the deeper parts of the world's oceans. A very small percentage of the earth's ^{14}C inventory becomes part of the terrestrial biosphere, first by being incorporated into plant biomass by means of several photosynthetic pathways, then into organisms which depend on various plant communities for food, and then up the entire food chain. Thus, all terrestrial living plant and animal communities which are, directly or indirectly, dependent on plants as a food resource, are tagged with ^{14}C (Usoskin & Kromer 2005).

While individual ^{14}C atoms will decay back into ^{14}N in living organisms, they are continually being replaced through the intake and physiological processing of plant or animal biomass. These metabolic processes in most *living* terrestrial organisms maintain the ^{14}C content in *approximate* equilibrium with atmospheric ^{14}C concentrations. However, once metabolic processes cease, as, for example, because of the death of a plant or animal, the amount of ^{14}C begins to decrease in that organism by negative beta (β^-) decay at a rate characterized by its decay constant or half-life.

The half-life ($t_{½}$) of any radioactive isotope expresses the time interval during which that isotope will decrease by a one-half or 50 %. For every subsequent half-life interval, its concentration will decrease by a factor of 2. In large part because of the very high energies involved in binding atomic nucleus together, the decay constants of radioactive isotopes are highly stable and, with relatively rare exceptions (e.g., electron-capture mechanisms), cannot be altered by ordinary physical or chemical processes operating in any natural environment which has existed on our planet. Since ^{14}C exhibits a half-life of ~5,700 years, the amount of ^{14}C contained in a carbon-containing sample will decrease by 50 % during every 5,700 year interval following its withdrawal from an active carbon reservoir as at death, unless one or more contaminating process causes carbon-containing compounds exhibiting different ^{14}C concentrations to be added to the sample matrix (Taylor 1987).

If all of the assumptions of the ^{14}C dating model as summarized in the next section are fulfilled for a given organic sample, a measurement of its residual ^{14}C concentration can be used to infer an accurate age for that sample. However, there are many factors that can impinge on the ^{14}C activity measured in a carbonaceous sample and thus the degree to which that ^{14}C concentration can be used directly to infer accurately and precisely the age of that sample (Taylor 2001).

Assumptions

The ^{14}C age of a given sample is inferred primarily based on a measurement of its residual ^{14}C content. To be able to infer an accurate age

based on that measurement at a useful level of precision, a set of major assumptions must hold within relatively narrow limits. The major assumptions can be briefly summarized as follows (Taylor 1987):

1. The concentration of ^{14}C in each carbon reservoir has remained constant at least over the last 100,000 years.
2. Complete and rapid mixing of cosmogenic ^{14}C throughout active carbon reservoirs is achieved on a worldwide basis on a time scale of less than a few decades.
3. Carbon isotope ratios in samples have not been altered except by ^{14}C decay since these sample materials ceased to be an active part of one of the carbon reservoirs as at the inactivation of metabolic or physiological processes, that is, as at the death of an organism.
4. The half-life of ^{14}C is accurately known to an appropriate level of precision.
5. Natural levels of ^{14}C can be accurately measured to appropriate levels of precision.

An additional requirement for a critical utilization of the ^{14}C method is that there is a firmly documented and explicit physical contextual relationship established between a well-characterized organic sample whose ^{14}C concentration is to be measured and some specific event or phenomenon to be dated. The various factors leading to violations of the major assumptions are the subject of continuing study by ^{14}C researchers. Satisfactory fulfillments of contextual requirements are in the hands of field archaeologists and geologists collecting and submitting samples for ^{14}C measurement.

Accuracy and Precision

In this discussion, *accuracy* refers to the process of obtaining a valid or correct age while *precision* refers to the degree of uncertainty within which a given value is expressed. In ^{14}C dating studies, what might be considered as an *overall* level of accuracy and precision for a given sample depends on a range of factors. It needs to be emphasized that the measurement precision, which is typically based primarily on counting statistics, should be regarded as providing the basis of defining a *minimum* age interval associated with that single sample. A realistic estimate of the *overall* accuracy and precision of *individual* ^{14}C values involves a consideration of the interaction of multiple factors. When the entire range of relevant data is evaluated critically, a review of these factors often results in increasing the error term associated with a given ^{14}C value and thus decreasing its overall *effective* precision.

One cannot over emphasize the importance of keeping the entire range of relevant variables in mind if one wishes to evaluate critically any single or suite of ^{14}C age estimates to define the effective accuracy and precision of one or more ^{14}C age determinations. Such a consideration highlights the value of duplicate and multiple ^{14}C determinations to increase the quality of ^{14}C evidence used to provide a valid chronometric temporal assignment for a given feature, stratigraphic level, artifact, or cultural context.

Radiocarbon Ages

A set of conventions which have defined and standardized how ^{14}C age determinations are to be expressed are widely employed in the application of ^{14}C age determinations. Three ^{14}C age expressions derive from these conventions: (1) *conventional radiocarbon age*, (2) *reservoir-corrected radiocarbon age*, and (3) *calibrated radiocarbon age*.

A *conventional radiocarbon age* assumes the following: (1) the use of 5,568 (5,570) years as the ^{14}C half-life (the "Libby half-life"), even though the actual value is almost certainly closer to 5,700 years; (2) the direct or indirect use of a United States National Bureau of Standards (NBS) (now known as the National Institute of Standards and Technology [NIST])-distributed oxalic acid ($H_2C_2O_4$) preparations or another standardized sample material with a known ^{14}C content used as a secondary standard to define the "zero" ^{14}C age in the terrestrial biosphere; (3) the use of AD/CE 1950 as the zero point from which to count ^{14}C time (i.e., AD/CE 1950 = 0 [years] BP on the ^{14}C time scale); (4) a normalization of ^{14}C activity in all samples to a common $\delta^{13}C$ value to account for isotope fractionation effects; and (5) that ^{14}C concentrations in living

organisms in all reservoirs have remained constant over the ^{14}C time scale. The fifth convention means that conventional ^{14}C values are *not calibrated* (Stuiver & Polach 1977).

For samples from some carbon reservoirs, conventional contemporary standards may not define a zero ^{14}C age. A *reservoir-corrected radiocarbon age* can sometimes be calculated by documenting the amount of apparent age exhibited in control samples and correcting for the observed deviation assuming that the unknown age and control sample have been subjected to the same offsetting physical or chemical effects. Reservoir corrections can range from less than 100 years to, in exceptional cases, multiple thousands of years. The most wide spread and intensive study of reservoir effects has been undertaken for marine organisms and specifically for the carbonate component of marine shell. Reservoir corrections of marine shell-based age currently employ regionally based numerical expressions that define the offset between the worldwide "average" age offset observed for marine organisms and that exhibited in a particular part of the marine reservoir from which a sample has been obtained. Unfortunately, not only are marine reservoir correction values geographically variable but, in addition, in some regions, these values can also change significantly over time. For carbonate samples from nonmarine environments, it is often difficult to obtain accurate and consistent reservoir corrections. For example, gastropods (fresh water shell) can exhibit great year-to-year variability in their initial ^{14}C concentrations, reflecting annual seasonal changes in sources of carbonates in their environments and other factors.

A *calibrated radiocarbon age* takes into consideration the determination that ^{14}C activity in living or zero age organisms *on a worldwide basis* has not remained constant. The offsets are generally referred to as representing *secular variation* in the ^{14}C time scale (Suess 1965). These offsets are viewed as exhibiting two major components: long-term or major trends and shorter-term higher frequency offsets with the shorter-term perturbations often being referred to as de Vries effects, referring to the Dutch scientist, Hessel de Vries, who first focused attention on them. These shorter-term perturbations are also sometimes referred to as "wiggles" or "warps" in the ^{14}C time scale.

The presence of ^{14}C secular variation reflects the existence of violations of the assumption of constant concentration of ^{14}C in each carbon reservoir over geologically recent times. The long-term variations in ^{14}C concentrations are primarily due to changes in the intensity of the earth's dipole magnetic field. The primary causes of the shorter-term de Vries effects have been traced to changes in components of the sun's magnetic field together with variations in various environmental parameters such as alternations in exchange rates between carbon reservoirs.

Because of these various offsets, "radiocarbon years," as expressed in conventional ^{14}C age expressions, and solar years, that is, "real time," are not of equal duration for most periods. Various terms for "real" time (e.g., solar, sidereal, calendar, or calibrated time) have tended to have been used interchangeably. While this discussion will use "calendar" or "calibrated" to designate "real time," some have argued that the term "solar" years would be more appropriate, since, strictly speaking, there are and have been various types of calendars in use, not all of which used solar years as the basis of recording the passage of time (Stuiver & Suess 1966).

Calibrated ^{14}C values were initially obtained by consulting tables or plots of relationships between ^{14}C and dendrochronologically (tree-ring)-dated samples to determine the amount of offset between ^{14}C and solar time for different periods. With the increasing precision of the calibration datasets, initially for the Holocene and now increasingly for the terminal Pleistocene as well, together with the wide spread availability of microcomputers and the internet, a number of computer/web site-based approaches to the calibration process are now available.

Figure 2 is a plot of the offset (in years) between calendar or calibrated time and ^{14}C time for the period from 0 to 15,000 calendar years using the IntCal09 dataset (Reimer et al. 2009). In that plot, the relationship between ^{14}C

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Fig. 2 Secular variation: major trend – 0–15,000 cal BP. Deviations (in years) between calendar (calibrated) time and ^{14}C time. Offset values = calendar (calibrated) years – ^{14}C years based on InCal09 data set (Reimer et al. 2009) (Plot by J.R. Southon, University of California, Irvine)

time and calendar or "real time" age values from 0 to 12,550 cal BP has been calibrated on the basis of dendrochronologically (tree-ring)-dated wood. The interval from 12,550 to 15,000 years has been calibrated on the basis of paired uranium series/^{14}C samples on corals and foraminifera from marine cores. The known ages based on the dendrochronological or uranium-series values are plotted on the horizontal axis while the difference in years between the known age and the ^{14}C age of the calibration samples is plotted on the vertical axis. The time segment plotted below the "0" line (the period from about 500 to 2000 BP) indicates conventional ^{14}C values are "too old" with reference to calendar time while the data plotted above the "0" line indicates conventional ^{14}C values are "too young" with reference to solar or calendar time.

The data plotted in Fig. 2 illustrates that conventional ^{14}C age determinations are a little over 1,000 years "too young" at 10,000 cal BP. This means that a ^{14}C age of about 10,000 years BP needs to have added to it approximately 1,000 years to align it with calendar time. Figure 3 plots the offset from 0 to 50,000 years using the same calibration data set as in Fig. 2 (Reimer et al. 2009). The time period covered by Fig. 2 is indicated by the rectangle in lower left corner of Fig. 3.

Figures 2 and 3 clearly illustrate the long-term or major trends in ^{14}C secular variation offsets. It is also possible to note in both figures the shorter-term, rapidly changing "warps" in the ^{14}C time scale. An example of the implications for calibration of ^{14}C values due to the magnitude of some of these short-term variations are illustrated by the Fig. 4a and b plots. Calibration of the conventional ^{14}C value of 2450 ± 15 BP is illustrated in Fig. 4a while calibration of 2300 ± 15 BP is presented in Fig. 4b. On the vertical axis of both parts of this figure, the ^{14}C ages of two examples are plotted in terms of their $\pm 1\sigma$ (dark shaded area), $\pm 2\sigma$ (dark and lighter shaded areas), and $\pm 3\sigma$ (the entire area under the curve) statistical ranges on the vertical axis. The dark shaded irregular curves of varying width running approximately diagonally through these plots represent the relationship between the ^{14}C ages and the known ages of the series of samples used for ^{14}C calibration (Stuiver & Reimer 1993).

Because of the variable or "accordion-like" characteristics of the plot of relationship between ^{14}C time and solar time as illustrated in this mid-first millennium BCE period, the calibration of these two ^{14}C age determinations which are only 150 ^{14}C years apart reveals that the "real time" equivalents of these two ^{14}C ages produce significantly different results. The calibration data

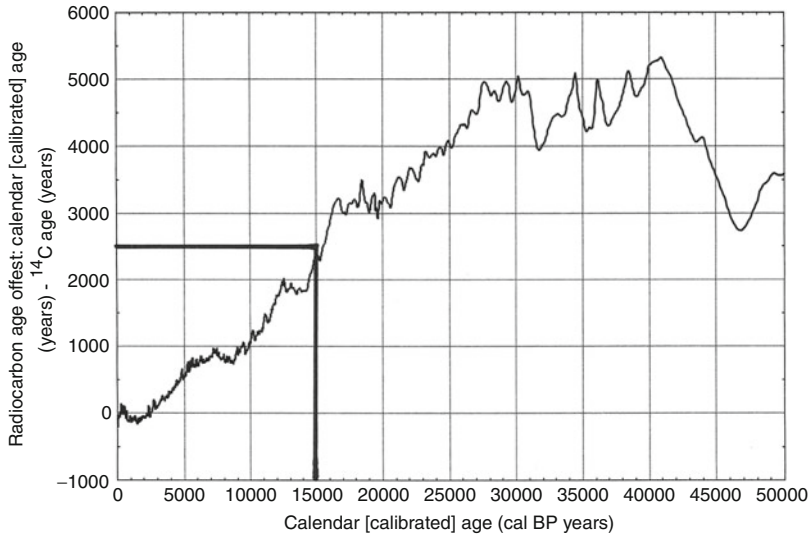

Radiocarbon Dating in Archaeology, Fig. 3 Secular variation: major trend – 0–50,000 cal BP. Deviations (in years) between calendar (calibrated) and ^{14}C time for 0–50,000 cal BP. Offset values = calendar (calibrated) time – ^{14}C years based on InCal09 data set (Reimer et al. 2009). The area within the square in the lower left hand corner represents the 0–15,000 cal BP plot presented in Fig. 2 (Plot by J.R. Southon, University of California, Irvine)

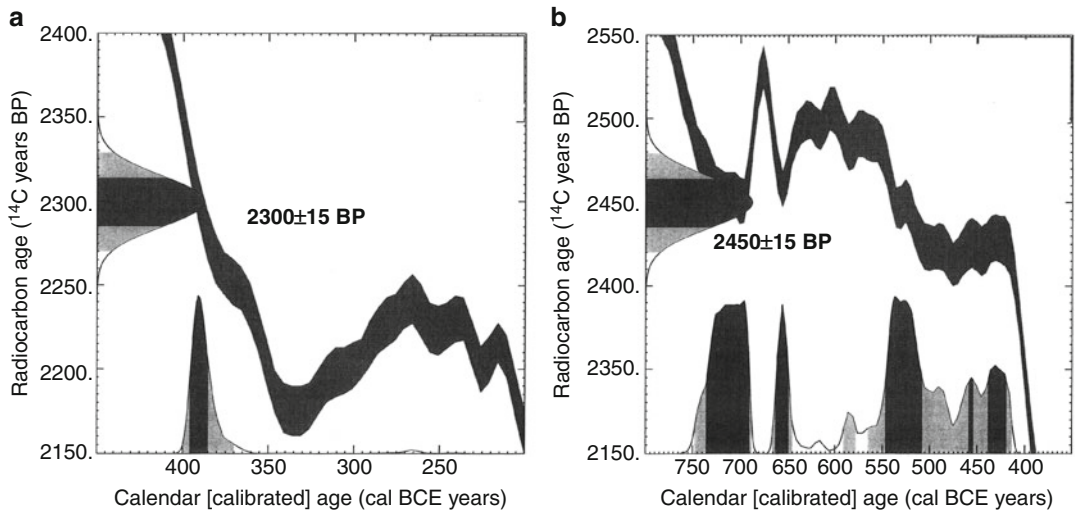

Radiocarbon Dating in Archaeology, Fig. 4 Secular variation: de Vries effects. (**a**) Calibration of 2300 ± 15 BP. (**b**) Calibration of 2450 ± 15 BP (Data from Reimer et al. 2009, Plot by CALIB 6.0, Stuiver & Reimer 1993)

associated with the 2300 ± 15 BP ^{14}C-content inferred age value reflects a period when the contemporary ^{14}C activity in the atmosphere was undergoing rapid change. This allows a much more precise resolution of the real time equivalents of a given ^{14}C concentration measured in a sample. As plotted on the horizontal axis of Fig. 4a, the $\pm 2\sigma$-based calibrated range for 2300 ± 15 BP ranges over a 30-year spread from 400 BCE to 370 BCE.

In contrast, the calibration data associated with the ^{14}C age of 2450 ± 15 BP as plotted in Fig. 4b falls on a lengthy plateau in the ^{14}C time spectrum. In this case, the ^{14}C activity in calibration samples range over about a 350 years period. This data indicate that, during this period, the ^{14}C time scale is "warped" or significantly spread out, that is, the ^{14}C content of samples, on a decade by decade and century by century basis, had not been changing as rapidly

as it had only a 150 years previously. In Fig. 4b, the plotted ^{14}C value intercepts at multiple points at varying levels of statistical significance, the calibration data over almost a 350 year time span of this plateau. Thus, the calendar age equivalents of this particular ^{14}C value as expressed at various levels of statistical significance range over the 350-year spread from about 750 to 400 BCE.

Calibrated ^{14}C values are typically expressed with the notation cal BP, cal BC, and/or cal AD. Some publications employ a terminology which substitutes the expressions "CE" (Common [or Current] Era) for AD and "BCE" (Before [the] Common [Current] Era) for BC.

Future Directions

The "radiocarbon revolution" (Renfrew 1975) which was initiated more than six decades ago by Willard Libby and his research collaborators actively continues, with ^{14}C often playing a central role as the archaeological chronological court of final appeal. Radiocarbon data have been and will undoubtedly continue to be called upon on many occasions to resolve uncertainties and controversies concerning chronological ordering for cultural materials, including, in some cases, historical period artifacts of problematical authenticity, as well as human skeletal remains of disputed age.

For archaeologists and geologists, the most immediate and obvious impact of the ^{14}C method on the conduct of archaeological research has been the availability of a fixed-rate temporal scale of worldwide applicability for the late Quaternary. In providing a common frame of temporal reference for the late Pleistocene and Holocene, ^{14}C data made a *world prehistory* possible by contributing a time scale which transcended local, regional, and continental boundaries. As Grahame Clark (1970: 38) noted, ^{14}C dating "has contributed more than any other single factor to complete the world coverage of prehistoric archaeology, not to mention the way it has helped scholars to synchronize phenomena in different parts of the world." Without the time scale provided by ^{14}C data, prehistorians would still be, in the words of J. Desmond Clark, "foundering in a sea of imprecisions sometimes bred of inspired guesswork but more often of imaginative speculation." (Clark 1979: 7).

For archaeologists, a less immediately recognized contribution of ^{14}C data has been the fact that ^{14}C-based age estimates provide a means of deriving chronological relationships totally independent of assumptions about cultural processes and completely unrelated to any type of manipulation of artifacts. When pressure to derive chronology primarily from the analyses of artifact data was reduced, inferences about the long-term evolution of human behavior based on variations in environmental, ecological, or technological factors could be aggressively pursued employing an independent chronological framework (Bronk Ramsey 2008).

The great success of the ^{14}C method also provided a major impetus for interdisciplinary research in archaeological studies. The ^{14}C dating method provided one of the major catalysts that moved archaeologists increasingly to direct their attention to analytical and statistical approaches in the manipulation and evaluation of data as well as to maintain long-term collaborative relationships with colleagues in other scientific disciplines. Those long-term collaborative relationships will continue to be expanded into more and more areas of research.

It was therefore entirely understandable that Frederick Johnson, an early proponent of interdisciplinary studies in archaeology, became an early advocate of the critical utilization of ^{14}C method among his colleagues. The general theme of his concerns at the inception of the method is still relevant as we look forward to the continuing expanding horizons of the application of ^{14}C in archaeological studies: [P]rogress in the development of... [radiocarbon dating] depends to a large degree upon the character of the collaboration [between archaeologists and other scientists]. The laboratory procedure involves theories in physics and chemistry which for the most part are outside the experience of almost everyone who has a sample to be dated. On the other hand, the

results secured are of little consequence unless they are directly or indirectly related to some stratigraphic sequence. The value of the laboratory results is enhanced by critical evaluation by other scientists. Most particularly, the reverse is true. This involves continual examination of all basic theory and hypotheses by everyone concerned. "The future value and usefulness of the method depends in large measure upon the success of continued collaboration between physicists, archaeologists, geologists, botanists, and others" (Johnson et al. 1951: 62).

This injunction assumed an even greater significance with the introduction of accelerator mass spectrometry (AMS) technology for ^{14}C measurements. AMS methods permit analyses to be conducted on microgram amounts of organics and opens up the possibility of extending the ^{14}C dating range. For archaeologists and Quaternary geologists, the utilization of submilligram-size samples is requiring even more rigorous attention to be given to the evaluation of geological, geochemical, and archaeological contexts of samples. The need for interdisciplinary cooperation and collaboration will become even more critical as AMS technology assumes an ever increasing role in the ^{14}C measurements of archaeological and other late Quaternary paleoenvironmental and paleoecological materials.

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Cross-References

► Clovis and Folsom, Indigenous Occupation Prior to
► Dating Techniques in Archaeological Science
► Kennewick Man Case: Scientific Studies and Legal Issues
► Monte Verde, Archaeology of

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Raposo, Luìs

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Basic Biographical Information

Luìs Raposo (Fig. 1) was born in Lisbon, Portugal, in 1955. He was Director of the National Archaeology Museum, Portugal, between 1996 and 2012, where he became Head of the Research Department since 2013. In 2000, Luìs Raposo was appointed as a member of the Board for the Gulbenkian Archaeology Award. In 2005 he became an invited professor at the University of Lisbon. In 2009 he became Chair of the Board of the Portuguese National Committee of ICOM and a member of the Advisory Committee of the Portuguese National Committee of UNESCO. He became Chair of the Fiscal Committee of the Portuguese Association of Archaeology in 2012, being earlier Chair of the Directive Board (1998–2000), the Chair of the General Assembly (2000–2010), and Chair of the Fiscal Committee of the Professional Association of Archaeologists.

Major Accomplishments

Luìs Raposo is an expert in ancient prehistory (Paleolithic). His main geographic areas of activity are the Lower and Middle Paleolithic of the Tagus Valley and Lisbon region (Raposo 1996) and the Epipaleolithic of the Alentejo Littoral (Raposo 1993, 1994). His main subjects of research are a critical review of the earliest human occupations in Portugal and Iberia; evolution of Acheulean in the Tagus Valley (Raposo 1996); definition of the late survival of Neanderthals in Portugal and Southern Iberia (Raposo 1999, 2000, 2007); macrolithic postglacial industries in river valleys and littoral fossil beaches (Raposo 1982, 1984); and technology and typology of lithic assemblages (Raposo 1975; Raposo & Santonja 1995).

Luìs Raposo has been a collaborator in the installation of local and regional archaeology museums in Portugal and coauthor, scientific consultant, or executive commissioner of national and international exhibitions (Museus de Arqueologia-Tomar, 2009). In his role as an invited professor and recognized expert, he has supervised several postgraduate research projects, including students who hold scholarships from the Calouste Gulbenkian Foundation, and participated in several academic juries, in different countries.

Luìs Raposo has been instrumental in protecting and promoting Portugal's archaeology and cultural heritage at a governmental level and internationally. He has been the representative of Portugal and/or of the Ministry for Culture on various committees, responsible for research projects approved and/or financed by the Ministry of Culture and the Ministry of Science, also having helped to develop several agreements on bilateral international cooperation. He is a member of the Network Coordinating Committee for the project "The Palaeolithic Occupation of Europe," which was created by decision of the European Science Foundation's governing bodies, in December 1992. He is a member of the editorial boards of several journals in Portugal and abroad, namely, "Al-Madan" "Trabajos de Prehistoria," and "Museologia.pt" (Museology.pt), and a participant in numerous national and international scientific meetings.

Luìs Raposo is a coauthor of university textbooks and synthesis works in the fields of museology (Raposo 2009), archaeology, and history (Raposo 1975, 1982, 1984, 1993, 1994, 1996, 1999, 2000, 2007; Raposo & Santonja 1995). He has published around 230 titles between 1972 and 2012 as part of a vast

Raposo, Luìs, Fig. 1 Luís Raposo at the National Museum of Portugal

specialized bibliography on prehistory, archaeology, and museology, published in national and foreign monographs and specialist journals.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Heritage Museums and the Public

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Rapp, George R.

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Basic Biographical Information

Affectionately known as "Rip," George Robert Rapp, Jr. (1931–) began his career as an experimental geochemist, earning his B.A. in geology and mineralogy in 1952 from the University of Minnesota and a Ph.D. in geochemistry from Pennsylvania State University in 1960. His early research focused on the synthesis of minerals such as zoisite and idocrase (doctoral work) and mineralogical studies of materials from South Dakota while serving on the faculty at South Dakota School of Mines and Technology. In 1965, after a year on sabbatical at the University of Minnesota Twin Cities, Rapp joined the faculty there as an Associate Professor of Mineralogy. He remained at the University of Minnesota, on both the Twin Cities and Duluth campuses for the duration of his academic career. Rapp served as Dean of the College of Letters and Science, then of Science and Engineering, as well as Director of the Archaeometry Lab (UMN-Duluth) for many years before retiring as a Regent's Professor of Geoarchaeology in 2003. He retired to Tucson, Arizona, and continued his publishing there.

Major Accomplishments

Rapp's principal contribution to archaeology is his work in developing the field of geoarchaeology or "archaeological geology" (Rapp & Gifford 1982). He founded the Archaeological Geology Division of the Geological Society of America. At the University of Minnesota, Rapp cofounded the Center for Ancient Studies (early 1970s), which later became the Interdisciplinary Archaeological Studies program. This was perhaps the first interdisciplinary graduate program in geoarchaeology and archaeological science. During this time, he produced a number of influential papers defining the field of geoarchaeology and the role of archaeological geologists as practitioners (Rapp Jr. 1970, 1975; Rapp & Gifford 1985). Both the graduate and undergraduate programs that he directed produced numerous students who went on to distinguished careers in the field (Julie Stein, Zhichun Jing, John Gifford, and Christopher Hill). Additional evidence of his lasting influence on geoarchaeology include *The Directory of Graduate Programs in Archaeological Geology and Geoarchaeology* (now maintained by members of the Archaeological Geology Division of GSA) and the Division award (the Rip Rapp Award) so named for its first recipient.

Rapp's first assignment as an archaeological geologist was as associate director of the Minnesota Messenia Expedition and its excavation of the Bronze Age site of Nichoria in southwestern Greece (McDonald & Rapp 1972; Rapp & Aschenbrenner 1978). His work on this project combined a childhood interest in classical archaeology with his research strengths as a geoscientist (Jing 2007). Rapp's research in the circum-Mediterranean later included sites and regions in Cyprus (Swiny et al. 2003), Turkey, Israel (Herzog et al. 1989), Egypt (Rothe et al. 2008), and Tunisia (Gifford et al. 1992). These resulted in some of the first geoarchaeological explorations of coastal landscapes and paleogeography. Most notable among these were his investigations of the coastal regions surrounding Troy (Kraft et al. 2003), the Peloponnese (Kraft et al. 1977), Ephesus, Pylos, and Thermopylae (Kraft et al. 1987).

As with much of Rapp's career, his studies of artifact copper stood at the forefront of new

advances in the discipline of sourcing using trace elements (Rapp et al. 2000). His research on archaeological copper followed nearly every part of the globe where Rapp left his mark, including his long tenure in the Great Lakes region, his retirement in Arizona, and his geoarchaeological research in China. His latest efforts in developing the new field of archaeomineralogy (Rapp 2009) follow naturally from this work and his initial research interests.

Rapp's research in China began in the 1990s, working with K.C. Chang on the Shangqiu project (Jing et al. 1997) and continued with Z. Jing through his retirement as part of the Anyang and Huanbei projects. Employing both traditional coring and more modern geophysical survey and satellite remote sensing, Jing and Rapp discovered important Bronze Age cities under meters of silt (Jing et al. 1997; Jing 2007). His work in China and the Mediterranean illustrate Rapp's strengths in forging and maintaining successful interdisciplinary and international collaborations.

While the research outlined above is central to defining the principal foci of Rapp's career, it would be unfair to characterize his contributions to archaeology as limited to these themes. Rapp is perhaps the consummate driver of new ideas. His graduate students, and undergraduates who trained with him initially, have been involved in many related but diverse facets of geoarchaeology including archaeological sediments and phytolith research (Rapp & Mulholland 1992). His extensive publication record includes the development of textbooks in geoarchaeology (Rapp & Hill 2006) and mineral encyclopedias (Roberts et al. 1974).

Cross-References

- ▶ Chang, Kwang-chih
- ▶ Cyprus, Archaeology of
- ▶ Geoarchaeology
- ▶ Phytolith Studies in Archaeology

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Rathje, William Laurens

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Basic Biographical Information

William Laurens Rathje (1945–2012) was born in South Bend, Indiana. After receiving his B.A. degree in anthropology from the University of Arizona in 1967, he attended Harvard University on a National Science Foundation Graduate Fellowship, where in 1971 he was awarded the Ph.D., also in anthropology. His museum-based dissertation, *Lowland Classic Maya Socio-Political Organization: Degree and Form Through Time and Space*, was directed by Gordon R. Willey. Even before the dissertation had been completed, Rathje in 1970 returned to the University of Arizona as a faculty member, where he remained until retirement in 2000. After retirement, he spent several years at Stanford University teaching with Michael Shanks.

Major Accomplishments

Rathje's contributions to anthropological archaeology were significant in a wide range of research areas. His numerous papers on Mesoamerican archaeology published in 1970–1978 established Rathje as one of the preeminent Mayanists of his generation. These publications, which continue to garner citations, set the agenda for studies of social organization, the role of religion in economic systems, mortuary assemblages, and exchange systems.

Rathje is best known for his study of modern middens. In 1973 he established an entirely new field of applied archaeology that came to be called garbology. The Garbage Project, the first long-term study of modern material culture, analyzed refuse—sometimes very fresh, sometimes from landfill excavations—in Tucson and other cities in the United States as well as from Canada, Japan, and Mexico. Although many prehistorians disdained the Garbage Project, Rathje was successful in obtaining funding from corporations and governments for more than two decades because household garbage could furnish information available through no other means on topics such as the social parameters of diet, household discard patterns and the composition of refuse, food waste, hazardous materials, and effectiveness of recycling campaigns. Not only did these studies furnish substantive results, but they also contributed new unobtrusive methods for measuring human behavior. The project brought to light differences in front door (interviews) and back door (garbage) evidence on consumption patterns. For example, they found that consumption of tobacco and alcohol was significantly underestimated in interviews.

Although Garbage Project findings were often published in journals not read by archaeologists – ranging from *Waste Age* to *Journal of Nutrition Education* – Rathje and his collaborators took pains to bring major findings and methods to the attention of our discipline in many edited volumes and journal papers. He also wrote with Cullen Murphy, *Rubbish! The Archaeology of Garbage* (1992), a popular book that helped to spread the garbage gospel far and wide. For three decades the Garbage Project received more media publicity than any other University of Arizona research project. To millions of Americans, he was the public face of archaeology, highly visible on television and radio, in newspapers and magazines, and as a keynote speaker at trade group conventions. He even testified in Washington before a Congressional committee.

In recognition of the immense public impact of the Garbage Project, Rathje in 1990 received the highly prestigious AAAS/Westinghouse Award for Public Understanding of Science and Technology. And on the basis of his contributions to applied anthropology, in 1992 he was the recipient of the American Anthropological Association's Solon T. Kimball Award.

Rathje's scientific interest in modern material culture and human behavior has had a broad theoretical impact in archaeology. Several interrelated themes run consistently through his research and teaching: the importance of artifacts in human life, the necessity of studying relationships among people and artifacts, and the relevance of archaeological method and theory to addressing societal problems. With J. Jefferson Reid and Michael B. Schiffer, he cofounded behavioral archaeology, which prioritized the study of people-artifact interactions in all times and all places, from both historical and scientific perspectives. Behavioral archaeology, under the impetus he furnished, continues to develop new ways to research the material world.

Rathje was a phenomenally popular undergraduate teacher renowned for lively storytelling, a charming sense of humor, making any aspect of archaeology exciting, and using pithy examples to highlight the many contributions that the discipline can make to an understanding of behavior in modern societies. Although he chaired few dissertation committees, he exerted a profound influence on countless generations of Arizona graduate students, many of whom worked on the Garbage Project or were his teaching assistants.

Rathje's range of interests was breathtaking, as indicated by the many dozens of articles he published in popular archaeology and science magazines, which always melded archaeological insights to issues in contemporary society. It helped that he was an uncommonly good writer, a crafter of sparkling prose; he was also an artist who worked in several media. A kind and generous man, Rathje was one of American archaeology's most creative, prolific, and influential scholars.

Cross-References

- ▶ Consumption, Archaeology of
- ▶ Behavioral Archaeology
- ▶ Material Culture and Education in Archaeology
- ▶ Modern Material Culture Studies

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Recording in Archaeology

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Introduction and Definition

Archaeological field work is a scientific process that relies on recorded observations and measurement. It is accepted that the archaeological record is not an exhaustive rendering of the site, even though it may represent much of what is left of it. However, every anomaly recognized in the field

must be given a location and a description, since without these no analyses or interpretations are possible. Comprehensive recording has become the guiding principle of archaeological survey and excavation, especially where a site is to be destroyed, since the record has to stand as a proxy for the site itself.

A multitude of factors, including the circumstances of deposition (intentional and unintentional in the past), site formation processes and postdepositional activity, terrain and types of remains, and the techniques available, determine what is or could be recorded. We can only record what we know how to detect, something that is in constant evolution, with new research alerting us to fruitful avenues of enquiry. A relatively recent example is the recording of significant chemical traces in floor areas, even though we cannot "see" them (see Carver 2011: 49–56 for an introduction to some of these techniques).

Key Issues, Current Debates, Future Directions, Examples

Recorders strive to strike a balance between measured and intuitive observation, as may be seen in the growing literature on archaeological practice, for example, the essays on practices from the seventeenth to the twentieth century in northwestern Europe (Wolfhechel Jensen 2012), or the discussion by Lucas (2012: 18–73) of philosophies of recording, including different stances on "total" or "selective" recording exemplified by Pitt Rivers and Petrie in later nineteenth- and early twentieth-century Britain and Egypt (Pitt Rivers 1887 cited in Lucas 2012: 45–51). General Pitt Rivers insisted that "every detail should [. . .] be recorded in the manner most conducive to facility of reference" (Pitt Rivers 1887 cited in Lucas 2012: 45), but he was by no means the only one or the first to adopt this stance. Modern archaeological historiography is writing a more varied and less linear account of field experience and precept, for example, the very detailed instructions in 1836–1837 for excavations of barrows in Mecklenburg (Germany) by Friedrich Lisch (Eberhardt in Wolfhechel Jensen 2012: 154–6). Similarly, the emergence of open area excavation has been claimed by many different traditions (Germany and Britain in the 1930s; Denmark in the 1930s; Soviet settlement archaeology in the 1920s–1940s influencing Leroi Gourhan's *grands décapages* of the 1960s).

Recent decades have seen growing criticism of the position that recording can be wholly objective. Reynolds and Barber (1984: 97) noted that "the emphasis on recording technique has been [. . .] an attempt to convert the whole site, lock, stock and barrel, into a physical record. In effect, this too often means that observation (an essentially active process) gives place to passive mechanical recording." For Hodder "The key point is that excavation method, data collection and data recording all depend on interpretation. Interpretation occurs at the trowel's edge" (1997: 693). Lucas's concept that the archaeological record is an *act of translation* (2012: 237–8) is helpful: translating the physical reality of what is in the ground, transferring it into another medium, giving it meaning, and accepting that interpretation is part of the equation. If recording is translation, then the tension between subjectivity and objectivity becomes a positive force.

Recording in Four Acts

So, records must be made, but which records? Introductions to archaeology and textbooks on archaeological practice give primacy to written, drawn, and photographic records (physical or digital) and the definition and recording of sampled materials, and there is much agreement on procedures. A useful way of thinking about the archaeological record – rather than structure it into written, drawn, and photographic records – is to divide it into four *purposes*: recording *location* (position, geometry, distribution), recording the properties of *elements that are observed but not kept* (strata, stratigraphy), recording *elements that are kept* ("finds" including biota, samples), and *monitoring* (recording what has been recorded, how, and why). The summary that follows will be limited to reflections drawn from experience and from literature dealing with

archaeological practice, especially on excavation (e.g., Roskams 2001; Carver 2009; Tassie & Owens 2010). Surface and subsurface surveys make use of some of these procedures (e.g., to record location), although they have their own strategies (e.g., for levels of coverage) and dedicated protocols and software not detailed further here.

Location

The principle of locating a point on the ground is to position it on a horizontal *grid* using an easting and northing (x and y coordinates) and to measure its height above a datum point, for example, sea level (z coordinate). The three-dimensional Cartesian coordinates (x, y, z) give a unique *map reference* relative to the rest of the known world. This can be measured with tapes and compass, with a square and level, with a Total Station Theodolite (TST), or with a Global Positioning System (GPS), depending on the resources available and the accuracy required (TST being the most desirable but fairly expensive) (Tassie & Owens 2010: Chapters 2 and 6). The speed and accuracy of electronic measurement can lead to a more mechanistic and paradoxically more interpretative way of recording site geometry, such as deciding where the outline of a layer lies and just plotting points along it rather than drawing detailed surface plans with planning frames (of course combinations of methods can be used or supplemented, e.g., by photography). Location records produce *maps* (showing sites and areas), *plans* (showing individual contexts, features, and structures), *plots* (showing the distribution of objects) and *sections* (vertical record of deposits). Maps, plans, and plots may be generated digitally on site using basic computer graphics programs.

Recording What Is Not Kept

Let us take a flint tool (an *artifact*) found in a layer (a *context* or stratigraphic unit). The artifact will be kept (see below), but it lies in soil (the context) that will be discarded or sampled, and has a physical, spatial, and stratigraphic relationship that can only be recorded on a unique occasion (when it is lifted) in written, drawn, and photographic form. Not surprisingly the burden of recording what cannot be kept lies heaviest on the recorder and has generated the most print on how to do it, such as Harris' principles of archaeological stratigraphy (whose application is explained in Roskams 2001: Chapters 9 and 11–13); how to record individual stratigraphic units (e.g., in the Museum of London Archaeology Service [MoLAS] (1994) manual and in countless textbooks); or how to capture graphic and photographic data in many ingenious ways (e.g., *Antiquity*'s online Project Gallery, http://php.york.ac.uk/org/antiquity/projgall.php, has published in 2011–2012 papers on real-time 3D field recording in southern Jordan, or photogrammetry for recording archaeological structures on the Upper Tigris).

The development of the definition of basic stratigraphic units (contexts) has been widespread and parallel; it is attributed, for example, to Britain in the 1970s, Sweden in the 1960s (Ambrosiani in Wolfhechel Jensen 2012: 312), or Poland in the 1940s. In excavation, the *context* is the deposit of material that we define as being different from another, in terms of composition, shape, and stratigraphic position. A context does not have to be a layer of soil only, it can be the stones making up a wall (its mortar would be another context). Contexts are not givens (*data*), they are entities that we define (*capta* as they have been called), and therefore, we can also assign a context number to an *arbitrary layer* (or spit). Since contexts are defined, it follows that a cut into the soil (for a feature like a pit) can also be a context (it differs in shape and stratigraphic position from other contexts). *Single-context recording* (see Roskams 2001) focuses on these entities, without features and structures recorded in additional forms (see below).

As well as its location and shape, a context record includes a description of its material: something that has become standardized in the interests of analytical potential. Lucas (2012: 87) gives a typical example: "compact mid greyish brown sandy silt with occasional inclusions of fine charcoal (2 %, <5 mm) and subangular gravel (1 %, <10 mm) [etc.]" and laments the fact that the interpretation of this piece of soil is a laconic "pit fill." Indeed too

Recording in Archaeology, Fig. 1 Recorder at work, showing context record sheets (*right*), feature record sheet (under the tape), drawing (on the knee), and Munsell color chart (*center*) (M. Carver)

much attention appears to be paid to the composition of strata and the geometry of the feature and too little to the human agency behind it (the "pitness" of a pit). It also seems that much of this descriptive detail has little analytical purpose, except perhaps analyses of the presence/absence of charcoal or of Munsell soil colors. This is not to say that we should stop recording context composition, but should look for more analytical outcomes, to match the discoveries of microstratigraphy and micromorphology (Carver 2011: Chapters 2) (Fig. 1).

The need for higher-level interpretations made on site, such as the recognition and study of a pit, a hearth, or a wall, has been met by the formal definition of groups of associated contexts, known in Britain and the USA as *features*. The nature of the feature (also confusingly called master context, locus, structure, group, set, complex, *Befundkomplex*, or *fait*) is well established and a helpful definition is given by Py (1997: 30): "if the context is the atom, the feature is the molecule." Examples of forms devised to record features are given in Carver (2009) and Pavel (2010), the latter a valuable collection and commentary of 60 different systems (all illustrated) used for recording on excavations in Europe, America, and the Near East. By the same token, sets of associated features may merit a site record at an even higher level of interpretation in the form of a *structure*, for example, a building formed by a regular pattern of postholes (Carver 2009: 138–46).

Recording What Is Kept

That artifacts and ecofacts are recorded and kept seems self-evident, but when we consider how small and even "invisible" these can be, it becomes apparent that choices are being made and what is recovered is only a sample of the whole. At one extreme, on sites with huge amounts of pottery (e.g., at Lattes in southern France), it may be that we record the presence of body sherds of dolia with reference to a typological scheme, but do not keep them all. At the other end of the scale, minute fungal spores would only be found if we took samples of soils in which they survived. In general the trend has been to increase the amount that is recorded, because our perceptions of what is important have changed: excavators of the La Tène inhumations at Münsingen-Rain in Switzerland in the early 1900s kept only the skulls. By contrast the advent of routine sieving and flotation in the later twentieth century has vastly increased our knowledge of the environment and economy through the recovery of fish and small mammal bones or insect and vegetable matter. It follows

that a consistent sampling strategy with an analytical purpose is needed. Indeed it would be futile and unmanageable to take 10-l bulk samples of every context just in case there was something there. We need to set out the degree of sampling, processing, analysis, and storage that is intended: for example, what percentage of what type of deposit is dry or wet sieved, put through flotation, or taken for specific purposes. Helpful tables of such purposes can be found in Carver (2009: Chapters 8 and 9) and in Tassie & Owens (2010: Chapter 4, Tables 4 and 9–14). It goes without saying that consistency is important, as it would be pointless to compare in analysis deposits that were similar (e.g., fills of storage pits) but which were treated differently (e.g., some excavated summarily, others treated with full recording and comprehensibly sampled). Obvious as this is, this need for consistency has implications for the recovery levels (see below) deployed on excavations.

Monitoring

As important as recording the stuff on site is recording the recording: what was done, not done, decided, discussed, and interpreted. In short, monitoring, which also includes the metadata (the documentation generated to keep track of what has been recorded, such as numerous indexes). So, in addition to the proformae used on site, a *site notebook* is an essential tool, to record the day-to-day running of the site, evolving ideas, and changes in strategy, in short all the things that are not accommodated in standard forms but which inform the outcome of the excavation. That outcome is dependent on the decisions taken about how to treat different parts of the site; indeed we dig and record at different levels of intensity, for example, removing the topsoil by machine, shoveling rubble, or carefully excavating a skeleton. Most recording proformae have boxes to record the levels at which individual contexts and features have been excavated and recorded, but this can be done more efficiently by referring to a structured scheme, such as *recovery levels*. There are obvious advantages to adopting a recovery level structure – it formalizes procedure and promotes consistency but also allows flexibility. However, that very flexibility has its dangers: having a recovery level scheme should not give license to implement arbitrary "gear changes" (e.g., "we decided to treat this deposit at level B rather than level D because we were pushed for time"). It is therefore important to stick to the recovery levels, once a project design has been agreed, so that like can be compared with like in analysis.

The records generated inform analysis and publication but they also exist for future generations to interrogate. Therefore, they need to be deposited in permanent archives and made easy to consult. Archives typically contain not only the "raw" data and the metadata in physical and electronic form but also the documentation pertaining to the conduct of the project and its analysis up to publication. How this is achieved will vary from country to country, as will the form of storage, whether as a physical archive or electronically; examples of pioneering digital systems can be found for Lattes in France (Py 1997) and in Britain an early example of an integrated archive was presented by Powlesland in 1998 (articles in *Internet Archaeology* 5). Good advice on archives in general, derived from the British experience, will be found in Brown (2007).

Prospect

To sum up, archaeological recorders are objective, subjective, consistent, selective, accountable, and creative all at once. There is no universal prescription, but there is a consensus that location, stratigraphy, composition, monitoring, and archiving underpin recording systems. Whether devised or adopted ready-made (you can, e.g., download the MoLAS manual, or the recording forms from a CD in Tassie & Owens 2010), this is only the beginning: systems should not be set in stone; they can be adapted to suit new analytical purposes. In this way the sophisticated investigations of the future will be integrated with the basics recorded now. Stratigraphic units will become more exciting: the tedious and analytically underexploited "loosely compacted 7.5YR 6/4 silty sand with occasional subangular gravel" will become the container of

much more information: perhaps about tethered cattle which stood there chewing the cud (from chemical residues in a context stratigraphically later than another, which was a secondary deposit derived from a midden containing protein residues from fish processing). To contribute to documenting a (purely hypothetical) change from hunter-fisher-gatherers to an economy based on domesticates is not a bad aim for the hard-pressed recorder struggling in the wind and rain.

Cross-References

- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ France: Field Method Origins
- ▶ Hillfort Investigations in the Czech Republic
- ▶ Inner Ionian Sea Archipelago: Archaeological Survey
- ▶ Klithi Site: Excavating a Rockshelter in Northwest Greece
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Polish Pioneers and Traditions
- ▶ Scandinavia: Field Methods
- ▶ Surface Survey: Method and Strategies
- ▶ Switzerland: Upper Paleolithic Living Floor Investigations
- ▶ Tells in Archaeology

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Red Sea: Maritime Archaeology

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Introduction

The Red Sea extends over 1,900 km in length and is one of the youngest seas on the planet (Fig. 1). Despite its arid and inhospitable desert coastline, it has been an important highway for maritime trade and shipping since antiquity. The Red Sea has a negligible tidal range (max. 90 cm) but is dominated by fierce and persistent NNW winds, particularly in the northern reaches (Whitewright 2007).

The earliest evidence of maritime activity in the region dates to the Middle Stone Age some 125,000 years ago, when Early Modern Humans (*Homo sapiens*) first settled the coast of the Buri Peninsula, modern Eritrea, fueling theories of Paleolithic maritime migrations out of Africa (Bailey & Flemming 2008). In the Pharaonic era, tomb reliefs and texts reference maritime voyages that were conducted down

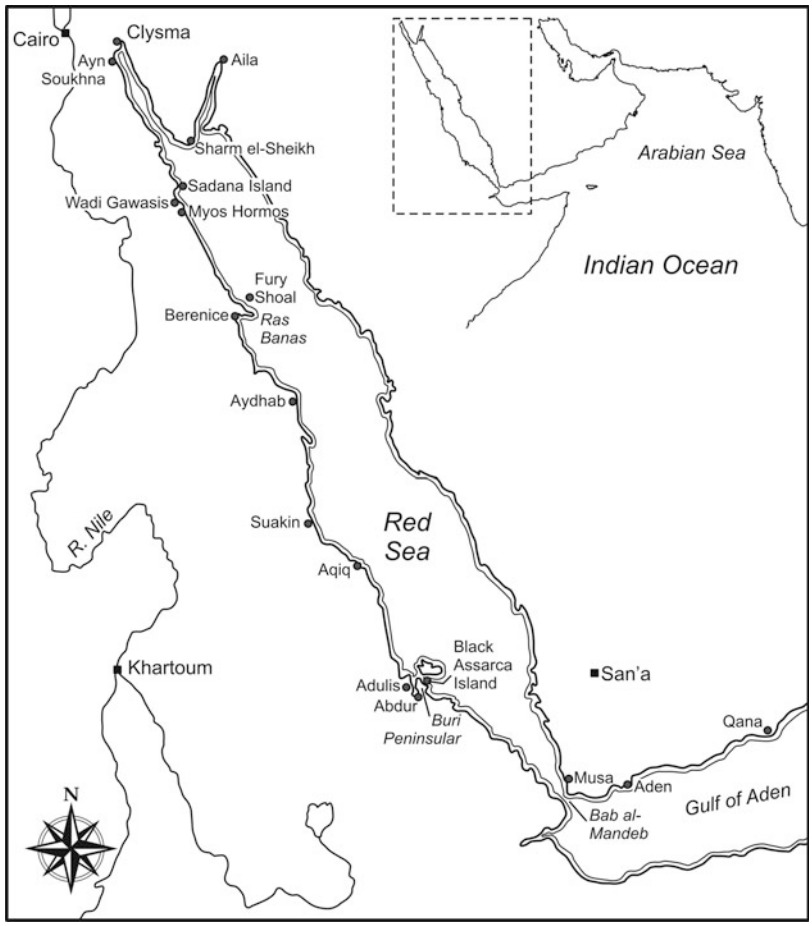

Red Sea: Maritime Archaeology, Fig. 1 Map of the Red Sea indicating the location of sites referred to in the text (Produced by J. Whitewright)

the Red Sea to the mythical land of "Punt" (Kitchen 2009) to acquire frankincense and other exotic commodities. Finds dating to the Old, Middle, and New Kingdom excavated from storage galleries at the sites of Wadi Gawasis (Bard & Fattovich 2007: 135-163) and the recently discovered site of Wadi el-Jarf further to the north, extend knowledge of this trade and also reveal elements of ships rigging and planking. The site of Ayn Soukhna on the Gulf of Suez in the Sinai, where charred remains of Twelfth and Thirteenth Dynasty ships timbers have been found (El-Raziq et al. 2006), further enhances our understanding of the Red Sea ship construction of the period, essentially planks secured by double, unpegged, mortise-and-tenon fastenings with intermittent stitching.

Key Issues/Current Debates/Future Directions/Examples

Trade and Ports

From the Greco-Roman period, we have a wealth of evidence in the form of texts such as the mid-first century CE *Periplus Maris Erythraei* (Casson 1989) that describe voyages within the Red Sea and beyond to the Indian Ocean. Key to the maritime expansion of Indo-Roman trade were ports. Ports facilitated an interface between land and sea and acted as a conduit for the transfer and storage of goods. It would be no exaggeration to suggest that the sister ports of Myos Hormos and Berenice were Rome's gateway to the East. Strabo (*Geography* 2.5.12; Jones 1917-32) indicated that over 120 ships sailed annually from the port of Myos Hormos. Both ports have

Red Sea: Maritime Archaeology, Fig. 2 Myos Hormos – View of the Roman harbor amphorae foundation of the jetty "hard" in the silted lagoon (Produced by the Quseir al-Qadim Southampton University project)

been identified and partially excavated and provide valuable insight into the nature of maritime trade (Casson 1989; Peacock & Blue 2006, 2011; Sidebotham & Wendrich 2007; Tomber 2008).

Excavations in the former lagoon at Quseir al-Qadim, ancient Myos Hormos, revealed part of a late first-century BCE to early third-century CE Roman waterfront consisting of an amphorae wharf or jetty sealed by a trampled earth surface (Peacock & Blue 2011: 35-42; Fig. 2), while at Berenice a series of large coral block seawalls, or quays were identified around the edges of the settlement, dating to the first century CE with one example towards the east of the site, dating to the fifth century CE (Sidebotham & Wendrich 1996, 1999). Additional ports along the Red Sea coast critical to Indo-Roman trade include Clysma, Aila, Ptolemais Theron, Adulis, and Muza (Casson 1989; Peacock & Blue 2007: 135-140).

Ports also reveal evidence for the nature of the ships that sailed the Red Sea during the Roman period, including wooden planks secured by mortise-and-tenon fastenings some with in situ pegs (treenails) (Sidebotham & Wendrich 1999: 316; Peacock & Blue 2011: 179-210). Rigging components, including brail rings and several fragments of sailcloth, have also been recovered, the general form of which is consistent with vessels operating in the Mediterranean Sea during this period, although some materials were sourced in India (Wild & Wild 2001; Whitewright 2007; Peacock & Blue 2011: 179-210). A graffito of a Mediterranean style ship was also found at Berenice reinforcing the idea that Mediterranean style ships plied the Red Sea during this period (Sidebotham & Wendrich 1996: 315-7).

Shipwrecks

Limited shipwreck finds of all periods have been discovered in the Red Sea believed to be primarily due to the warm deep waters and coralline environment (Blue et al. 2012). A number of wrecks dating to the Roman era have been investigated that support the terrestrial port data and textual evidence relating to Indo-Roman trade and ship construction. The Roman ship referred to as the Fury Shoals wreck has no visible signs of hull remains but consists of a cargo of Dressel 2-4 type amphorae that date the wreck to the first century CE (Fig. 3; Blue et al. 2012). Likewise, the exposed and heavily concreted site at Abu Fendera, located to the south of Berenice, reveals the visible remains of at least five different amphorae types, three two-armed, stock iron

Red Sea: Maritime Archaeology, Fig. 3 View of the Roman shipwreck of Fury Shoals (Produced by the Southampton University/British Museum Red Sea Shipwreck Project)

Red Sea: Maritime Archaeology, Fig. 4 Sewn Medieval planks from Quseir al-Qadim (Produced by the Quseir al-Qadim Southampton University project)

anchors and other metal artifacts, including lead hull sheathing that protected the hull from marine borers. The wreck at Abu Fendera was clearly a merchant vessel, and the hull sheathing and iron anchors suggest that it was built in the Mediterranean tradition. The collective shipwreck assemblage indicates that it dates to no earlier than the end of the first century CE and not later than the mid-third century CE (Blue et al. 2012). From the late fourth and early seventh century CE, a wreck was partially excavated off the island of Black Assarca, Eritrea. No hull remains were recovered, but the amphorae cargo has strong parallels with those produced in Aqaba during this period (Tomber 2008: 92).

Medieval Seafaring

The Red Sea was equally important to medieval shipping as it was to Indo-Roman trade, transporting trade goods and importantly pilgrims on route to Mecca through ports such as Al-Quseir, Aydhab, Suakin, and Jeddah. Direct knowledge of ships of the Islamic era in the Red Sea is limited to sewn planks recovered in a secondary context from Quseir al-Qadim that date between the late twelfth and early fifteenth centuries CE (Fig. 4; Peacock & Blue 2011: 179-210). They are one of the few examples of the distinguishing feature of ancient Arab craft of the Indian Ocean and the Red Sea, generally agreed to be constructed with "the use of fiber, rather than nails, to sew the planks of hulls together" (Casson 1989: 141; Hourani 1995).

The primary Islamic-era shipwreck to have been excavated is a large Ottoman period vessel from Sadana Island, Safaga. Dating to the second half of the eighteenth century, the ship is thought to have carried up to 900 ton of cargo. Over 3,500 artifacts were recovered, about one third of which was Chinese porcelain. Despite the nature of the cargo, the excavators believe that the ship was a local vessel possibly Egyptian in origin. Little data on the hull construction has been published, although the vessel is secured with iron fittings rather than being sewn (Ward 2001).

Conclusion

This short entry has attempted to summarize what is known to date of the maritime archaeological record of the Red Sea. Unfortunately, the current archive does not constitute a reliable shipwreck database and has limited iconographic representations of boats, and the documentary evidence is restricted to comments from ancient travelers and sailors guides (Casson 1989). As such, there is much more to be discovered about this critical sea that provided a link between the Indian Ocean and the Mediterranean and that supported maritime activities for thousands of years.

Cross-References

- ▶ Berenike, Archaeology of
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Islamic and Maritime Archaeologies

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Reflexive Approaches in Archaeology, Development of

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Introduction

Although many researchers in archaeology would agree that there has always been an

element of reflexivity in archaeological interpretation, calls for an explicit and systematized reflexivity within archaeology are rather recent (e.g., Potter 1991; Shanks & Tilley 1992; Hodder 1997). These may be regarded as part of a trend, in which archaeology is viewed within an ethnographic perspective and the objects of study are archaeological practices (Edgeworth 2006). The calls for reflexive methods may also be seen as an attempt to bridge the gap between archaeological theory and practice, thereby bringing into focus archaeological field practices and interpretation processes. There have been a few explicit attempts to systematize reflexivity as well as many implicitly reflexive studies in archaeology in recent years. In the following section, case studies that attempted reflexive approaches during archaeological fieldwork are explored.

Definition

Like being reflected in a mirror, to be reflexive is to have something directed back on oneself. The concept of reflexive archaeology is thus an archaeology directed back on itself. This means that the interpretation process and the production of archaeological knowledge are reflected on while in progress, by the person creating this knowledge. However, the reflection does not have to be directed back to the same person, as a reflexive approach may also be more generally applied within the field of archaeology.

Reflexivity has been discussed in fields such as sociology, ethnography, anthropology, and philosophy since the mid-1900s, and the term has been assigned various meanings. Sometimes these meanings overlap and even contradict each other. The different versions of reflexivity that have been in use have been divided into categories, ranging from a mechanical and descriptive to a more radical and interactive view of reflexivity. They include versions of reflexivity in which the observer's self-consciousness and self-criticism are in focus and in which the aim is to correct biases that distort the access to the object of study. They also include versions in which the observer takes a detached position which enables him or her to see through "taken for granteds" in a society and in which what you see is depending on your point of departure. The latter view rejects that an observer can step back from culturally laden prejudice and focuses on different standpoints, for example, gender or culture. There are also versions that attempt to produce alternatives to habitual thinking, as well as versions that regard reflexivity as a part of all communication. Most of these views on reflexivity presuppose a dichotomy between subject and object and aim at maximizing objectivity even though some may question this same objectivity (Lynch 2000).

The many different interpretations of the idea of reflexivity illustrate how the subject-object dichotomy underlies much of our thinking in Western research traditions and the implicit position that if we can reveal the circumstances of a study, there is a possibility to reach a more accurate account of the studied object.

Reflexive approaches have been employed and understood in different ways in the archaeological discipline in recent years. The definition used appears to be context dependent, and some would even argue that the idea of reflexivity has not yet been defined satisfactorily in archaeology (Chadwick 2003). However, what the different approaches seem to share is an ethnographical effort to investigate how the archaeological discipline itself including the archaeologists and the structure of work, methods, and tools influence the resulting images of the past.

A number of projects have attempted to explicitly define the term, and in this regard, two case studies will be explored in this entry. The first case study is the well-known Çatalhöyük – project in Turkey – which centers around archaeological investigations of a Neolithic settlement (Hodder 1997, 1999, 2000). In this project reflexivity is defined as an examination of the effects of archaeological assumptions and actions on the various communities involved in an archaeological process, including participants in the project as well as other archaeologists and non-archaeological communities (Hodder 1997, 1999, 2000).

The project aimed to promote reflexivity and multivocality in the process of creating archaeological interpretations as well as situating the research within a social context. The methodology is built on two main ideas: (1) that archaeology does not produce objective facts and (2) that no interpretation should have preeminence over another. The individual excavator is emphasized as playing an important role in forming the interpretations, and the goal is to record this subjective trait. The field methods are, therefore, aimed at documenting what may influence the archaeological interpretations (e.g., the preconceptions and assumptions of the excavating staff). The underlying objective is to create a non-dichotomous way of thinking, which will ultimately break down barriers both between disciplines and between interpretation categories used in archaeology, such as different materials and features. The context in which archaeological knowledge is created is thus illuminated. This does not only extend to the archaeological field but also to the society as a whole as a variety of stakeholders and interest groups are considered (Hodder 1997, 1999, 2000).

Another project that has attempted to define reflexive approaches is the Citytunnel project in Malmö, Sweden. It was a large-scale project within a developer-funded archaeology context, and the fieldwork took place during the early 2000s. The project aimed at "documenting the documentation process," which was stated in the research design (Lindhé et al. 2001). This was later broken down to a few practical components, partly inspired by the Çatalhöyük project.

In the Citytunnel project, reflexivity was defined broadly as a continuously ongoing process that includes thoughts about one's own thinking and one's own role in the production of knowledge, drawing on a sociological framework (Ehn & Klein 1994). By documenting the interpretation process, it was hoped that the different stages of the thought process and the various preconceptions of the individual excavators would be illuminated. The aim was to allow multiple voices to be heard, as well as to enable a critical evaluation of habitually used categories and interpretations. In the end, the objective was to gain new perspectives that would lead to new questions and new knowledge about the past (Berggren 2002).

Another project investigating the landscape at Leskernick on Bodmin Moor in Great Britain also employed a reflexive approach. This project took as a starting point the statement that archaeological interpretation is an ongoing and open process in which there are always other possibilities and multiple interpretations. The project positions itself against what are called standard archaeological texts which protect themselves from criticism by filtering out the manner in which some interpretations are preferred to others, by excluding the process by which we arrive at certain understandings (Bender et al. 2007: 28).

Historical Background

The development of reflexive approaches in archaeology has to be seen in the context of how archaeology as a field has developed during the past few decades.

A few early attempts of ethnographic approaches to archaeological work appeared in the 1950s and 1960s (see Edgeworth 2006 for a detailed background). These may be seen as the first attempts to apply an explicitly reflexive approach in archaeology. Earlier, archaeologists had written diaries and kept notes in a way that sometimes reflected on their work. However, this was not done in a systematic and explicit way, and they are not included in this discussion.

The attempts of an ethnography of archaeology seem to have ceased during the 1970s and early 1980s, probably as a result of the emphasis on scientific objectivity in the processual archaeology that was developed under the name New Archaeology (Edgeworth 2006: 2). At that time there was a notion of scientific neutrality and objectivity of an existing record in the ground, waiting to be unearthed and discovered (Lucas 2001a). This meant that the social, economic, and scientific circumstances of the archaeological recovery were considered unimportant to the formation of this record. Reflections concerning this formation were thus not seen as useful.

During the late 1980s and 1990s, this notion of scientific objectivity was challenged from a post-processual viewpoint in which interpretation was regarded as an essentially subjective process. Archaeological practices, especially archaeological fieldwork, were starting to be reevaluated, and excavation was no longer seen as a mechanical uncovering and recording of preexisting truths but rather a social and subjective construction of interpretations (e.g., Tilley 1989; Gero 1996; Hodder 1997).

The question of excavation being an objective or subjective undertaking is connected to a separation between data and interpretation in archaeology that can be followed over time. This is not just a theoretical issue but connected to the separation of theory from practice in archaeological fieldwork and of thinking from excavating (which in turn is connected to the separation of subject from object). It has been shown that this separation has developed over a long period of time and has a social basis. From very early on (before the increasing professionalization of the discipline), the excavation process was seen as unskilled and requiring little formal training, which resulted in a gap between the excavator and the interpretation. In later years excavators were required to follow strict positivistic techniques, which were to insure a scientific quality. Contract archaeology was seen as providing scholars at universities with data to be interpreted, rather than producing interpretations in the trench. The moment of discovery was thus separated from the moment of study and data from analysis and interpretation. The excavator was thus regarded as a provider rather than a producer of data (Berggren & Hodder 2003). The hierarchical organization of developer-funded archaeology (Lucas 2001b: 12; Rudebeck 2004), the prioritization of economical over archaeological goals in the private sector (Watson 1991; Hester et al. 1997), the invisibility of the excavator in the record (McFayden 1997 quoted in Lucas 2001b; Cooper et al. 2000), the mechanics of excavation (Chadwick 2003), as well as the standardization of recording (Adams 2000) are a few of the reasons mentioned for this separation. Also, in a research context, unskilled, local workmen or inexperienced students may be used.

There are thus many factors that have acted through time that may explain the separation of theory and practice within archaeological fieldwork. One factor that seems to be overarching is hierarchy. The hierarchical organization of excavations, of the labor market, and of society as a whole are all connected and influence the situation of the excavator. The separation of interpretation from fieldwork thus has deep societal roots.

Key Issues/Current Debates

The key issues relating to the development of reflexive approaches in archaeology are to be found in the historical background described above. It was a reaction to some of the problems mentioned and to what may have been experienced as contradicting trends in contemporary archaeology. These trends include demands for a more formalized and predictable research from authorities (mainly in developer-funded archaeology) and at the same time demands for a democratic and multivocal archaeology, as well as an increasing digitalization of the archaeological record that demands predefined categories and at the same time, therefore, requires a deconstruction of concepts and categories (Berggren 2002; Rudebeck 2004).

There are several characteristics that can be identified in the development of reflexive approaches. First, there was a need to question and problematize concepts and categories that had become so well used and familiar that they seemed axiomatic. Discussions of concepts and categories have always formed a part of the archaeological discourse. However, this kind of problematization became a more explicit part of the problem orientation of developer-funded archaeology, especially in the development of research designs. Secondly, there was also a need to create syntheses of interpretations within archaeology and in collaboration with other disciplines as well as with other groups in society. Syntheses of interpretations have always

been an important component in archaeological research. However, in a reflexive approach, a synthesis of different views and research areas was aimed at from an initial stage of the investigation, influencing decisions of how work was to be conducted, e.g., quick feedback from specialist analyses of materials such as lithics of archaeobotanical material could influence the continuation of the excavation of a certain area or a certain category of remains. Thirdly, there was an increased interest in an ethnography of archaeology and the need to reflect on the role of individual archaeologists in the process of interpretation and the creation of archaeological knowledge, as well as the role of archaeology in society. This concerned both archaeological fieldwork and engagement in public outreach (Berggren 2002).

Reflexive approaches in archaeology were also a way of implementing the post-processual school of thought in practice, which had previously been primarily theoretical. The Çatalhöyük project became well known as a post-processual excavation where the somewhat abstract ideas were turned into practice in the system of work. At Çatalhöyük the excavation and recording methods were designed to solve the recognized problems. These methods have been outlined and elaborated in several publications since the inception of the project (Hodder 1997, 1999, 2000). The methods were designed to promote reflexivity, contextuality, interactivity, and multivocality. Steps towards these four goals were to be taken through a series of strategies that were included in a daily work on site. The strategies, as presented by the project director, included interaction in the field between the excavators and the specialists that were present on site. Such interaction included negotiations about the priorities of what should be investigated in the field and laboratory. The employment of this method was a clear attempt to break down barriers between people in the organization of work. Another strategy employed to promote reflexivity was the process of improving the contextualization of finds. A process of immediate feedback from the laboratories to the excavators in the field was introduced, a so-called fast track, to enable quick analyses and results to influence the decisions being made in the field. An integrated database enabled different participants to take part in the flow of information as it was being formed. All these strategies attempted to integrate people and processes that are often kept separate during archaeological research. Another way of promoting reflexivity was a digital diary that was created to function as a key to the database. In it the field staff were asked to write about the excavation, their assumptions, decisions, and interpretations about particular features or finds. In this way the information in the database was to be situated in a broader context. This was meant to enhance the flow of information while at the same time providing the excavators with additional opportunities to reflect on their work. For the same reasons, short video clips of the excavation were also filmed. Anthropologists were also included in the project to work with the team, studying the construction of knowledge, visualization processes, as well as the impact of the excavation on the local community. To allow other stakeholders and interest groups to have access to the information being generated as a result of the excavations, the database was made public on the Internet. The above approaches thus allowed information to be accessed via multiple pathways. In this regard, it can be argued that the usual restrictions inherent in linear narratives (i.e., that keep data and interpretation separated) can be avoided or at least mitigated. Access to a virtual reconstruction of the site also enabled alternative readings of the information generated. Lastly, as the excavation was conducted by different national teams with different methods this also served to create different views of the site (Hodder 2000: 5ff) (Fig. 1).

After a few years of excavation, a reaction to these methods from the field staff was published (Farid 2000). The reflexive methods that had been implemented, however, did not always produce the desired outcome. In fact, some had been experienced as counterproductive. The demands on the field staff were considered to be imbalanced and one sided in that they were not considered specialists in their own right and were to be told what they were excavating by the

Reflexive Approaches in Archaeology, Development of, Fig. 1 Excavation of the South Area of Çatalhöyük during the season of 2011 (Photo: Åsa Berggren)

laboratory specialists (Farid 2000: 20). This caused some tensions between excavators and laboratory staff that were described as fault lines by one of the anthropologists who studied the creation of knowledge on site (Hamilton 2000). In fact, the field team felt new barriers were created between field staff and laboratory staff by the implementation of the methodology (Farid 2000: 28f). Other parts of the methodology required adjustments such as sampling strategies and the feedback about prioritized units. Generally the field team felt they had to keep a fine balance between time spent on the reflexive methods and time spent on excavating and recording, as the former were experienced as time-consuming additions to normal work (Farid 2000: 22).

Another fault line of the project identified by the anthropologist was created by the database. Its structure was in some ways experienced as restricting interaction between participants and reinforcing of categories instead on breaking down the barriers between them. In addition the film clips were also considered problematic due to the fact that they were directed and thereby concealing the interpretative processes they were supposed to visualize (Hamilton 2000; also Farid 2000).

These difficulties took place during the initial seasons of the project. Indeed, it took some time for the reflexive methodology to be integrated in the normal work procedure on site. However, after some years, certain aspects were integrated, while others were more or less dropped (e.g., in the publication of the first years of excavation, the diaries are used and cited as a source of information in a way that visualizes the various excavators in quite an unusual way – see Hodder 2007). A study of diary entries written when the project was well under way (1996–2008) shows that the use of the diaries has varied over the years. It is concluded that the diaries provide a wealth of additional information not recorded elsewhere. However, the content of the diaries has changed and discussions about interpretations declined over time. Instead, the diaries became used as weekly reports by more experienced excavators and as blogs by students working on site. In general, the diary was mainly used by participants on a low level of the hierarchy of the project, e.g., the students. In addition, the entries were not read by other participants on site to any great extent (Boddington 2012).

Generally, the reflexive methodology at Çatalhöyük has had varying results. The many projects involving the local community as well as other interest groups within the Çatalhöyük project show that the aim of being multivocal has attracted much attention (not discussed further in this text). The implementation of the methods in field practices has failed in some respects but succeeded in others and is subject to further evaluation (Berggren & Nilsson forthcoming).

In part inspired by the Çatalhöyük project, a large-scale attempt to introduce a systematized reflexivity in a developer-funded archaeology context was the Citytunnel project in Malmo, Sweden. While this project is similar in size to

Reflexive Approaches in Archaeology, Development of, Fig. 2 Documentation of the remains of a Neolithic dolmen during the Citytunnel project (2002) (Photo: Markus Andersson)

the Çatalhöyük project, there are many differences primarily due to the fact that the Citytunnel project is developer funded.

This project sets out to "document the documentation" (Lindhé et al. 2001). The idea was to integrate some ethnographic elements to the investigation. The ideas were turned into a few practical components such as digital diaries and film clips. In addition, 4 h per week per person were budgeted for digital diary writing and so-called why-meetings. The goal was to make these procedures a natural part of the work process (Fig. 2).

As was the case with the Çatalhöyük project, the implementation of the reflexive methods was somewhat problematic. An evaluation of the project has been carried out (Berggren 2009), and it suggests that several factors affected the implementation. Factors such as "vague instructions" and lack of follow-up sessions are seen to have created negative impacts. The practical, reflexive components were experienced as either unnecessary or too abstract and detached from the usual work procedures. This was connected to opinions that work was already carried out in a reflexive way or that more specific instructions and goals were needed. The label "reflexive" gave the majority of field staff an impression of the attempt at something detached from usual work. In some cases it was experienced as a separation of something that had previously been a part of normal work which was now taken away and put in a box of its own, and in other cases, it seems to have resulted in an expectation of an almost magic formula that would automatically bring new results. Underlying these problems are complex issues of work hierarchies, the structure of work in developer-funded archaeology and individual motivation, among other things (Berggren 2009).

Other interesting results of the evaluation include an uneven representation of contributors to the diary as well as what was voiced. In practice the diary was dominated by a few opinionated male excavators that were not in positions to make decisions but rather executed decisions made by others. This pattern is similar to the Çatalhöyük project where students without authority were the most frequent contributors to the diary. The discussions were dominated by extraordinary finds rather than larger contexts and connections. Above all, the discussions in the diary did not reflect the importance given to issues in the research design nor in later publications. Thus, the diary was not used to any large extent during the process of writing up the material. This way the diaries give access to interpretation processes that are not visible in the publications such as the site reports (Berggren 2009).

The above case studies reveal that there are interesting results to be gained but also that there are problems connected to the implementation of reflexive methods in the practice of fieldwork. Even though only two case studies are discussed here, it is interesting to note that the many of experiences are echoed in other projects, as the Leskernick project (Wilmore 2007). The problems highlight such issues as the hierarchy of the workplace and the social situations of the excavator. One lesson to take from these projects is the importance of integrating the work procedures that are thought to promote and document reflexivity into normal work so they become a part of the everyday routine.

Another issue connected to the separation of theory from practice is the separation of subject from object. It has been pointed out that the reflexive attempts so far have been rather one sided, prioritizing the subject. Not much attention has been paid to the objects and, in particular, the encounter between the two. The materiality of the objects is rarely taken into account (but see Cooper 2007) as the objects are treated as impassive and passive (Lucas 2001b; Chadwick 2003; Yarrow 2003). This may be described as yet another fault line that has to be dealt with by the methodology.

Future Directions

The future of reflexive approaches within archaeological practice may depend on how the fault lines described above are dealt with. As already noted the post-processual approach to archaeological practice has brought attention to the subjective trait in interpretation. However, it has been pointed out that this line of thought presupposes a distinction between subject and object and that how the subject is constructed through fieldwork is often overlooked in current approaches (Yarrow 2003; see also Hodder 2011: 155).

Further, it has been suggested that this fault line may be overcome by applying a theoretical perspective taken from actor-network theory to investigations of how archaeological knowledge is created (Yarrow 2003). It entails an understanding of how archaeologists and investigated materials modify one another, in relation to each other, in the act of excavation. Instead of discussing an encounter between subject and object at the moment of discovery, one may say the distinction between a subject and an object is created at this moment. On the one hand, archaeologists create objectivity by embodying archaeological conventions, skills, and knowledge in the process of excavation. On the other hand, the objects create the subjectivity of archaeologists as they are excavated, as their material properties modify the thoughts and actions of the archaeologists. This way the things create the people excavating them as archaeologists (Yarrow 2003).

This line of thought may be used as a base to further explore the notions of materiality and embodiment. These concepts have often been used as means of understanding the past in "material culture studies," phenomenological studies, as well as what is called an "archaeology of the senses." However, these concepts are rarely used to study the present process of interpretation and creation of knowledge in archaeology. There is an unutilized potential in these concepts and areas of study. They could point to a future direction for the development of reflexive approaches in archaeology. The symmetrical relations between persons and things, as they may be described in actor-network theory, may be illustrated in entanglements (Hodder 2011). Again, this has been done describing the past, e.g., at Çatalhöyük (Hodder 2011), not including the archaeologists' material engagement and entanglement during excavation. These areas provide fertile ground for future studies.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Hodder, Ian (Theory)
- ▶ Post-Processual Archaeology
- ▶ Reflexivity in Archaeology

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Reflexivity in Archaeology

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Introduction

Reflexivity is a relatively recent theoretical option in archaeology. It deals with a theoretical position that supposes that archaeological knowledge is determined by both the experience and the context of the investigator. This favors narratives in which archaeological facts are presented through stories that revolve around dialogue, a constant questioning, and diverse possibilities for interpretation. Basically, reflexivity supposes an analysis (a reflection) that the author makes of his own place in the story; it also suggests making explicit the conditions of possibility that determine the object under investigation and the forms for describing it as a scientific object. In this sense, reflexivity deals with a landscape of conditions of possibility that shape the archaeological statement. Viewed from another angle, one reflects upon the statements, which means generating a new enunciation that is equally susceptible to interpretation. This possibility of interpretation on multiple levels is what is known as the "hermeneutic spiral" (Gadamer 2004).

The inclusion of a reflexive agenda in archaeology is relatively recent, and as yet it does not form part of any program, unlike other studies (such as the origin of agriculture or the beginnings of domestication). Singularly, and moreover, reflexivity is repellent to archaeological research agendas based on the neo-evolutionary ideas of anthropology. Such is the case of programs that investigate the energy increment in societies, or the complicating of social differences, or the use of nature as an economic resource; in these cases, reflexivity is something to be avoided, a mere literary distraction. Reflecting on these questions, Joan Gero (1999) found that these processual tendencies unleash narratives in which society is treated as a machine and people as mere accidents of chance.

Definition

Reflexivity in archaeology is a theoretical field that investigates the conditions of possibility in the archaeologically observed object, namely, the cultural past. The starting point of reflexive archaeology supposes that the research questions, as well as the analytical tools, are situational; a product of the particular historical conditions of the researchers who produce the archaeological discourse. This means that the concept of episteme of Michel Foucault (1999) is very useful to reflexive archaeology; this notion holds that each era shapes the conditions under which a scientific problem is posed, such that the evolution of knowledge becomes the evolution of the methodology of observing objects under investigation. This orientation prevents researchers from wondering about existing disciplinary frontiers or about any prohibitions to the shaping of research objects that question modern ontological divisions.

As a consequence, reflexive archaeology is not interested in knowing how well a certain archaeologist understands a cultural period. It is concerned with knowing why that particular archaeologist focuses on a certain period or cultural phenomenon. Interesting points have arisen from the reflexive archaeology agenda. For example, reflection has shown, in the broadest perspective, that the production of archaeological knowledge gives material support for thinking about social extinctions. Thus, museums are replete with evidence of "disappeared cultures," which the market uses to justify the appropriation of "waste" territories. Many archaeologists have shown how local communities question this rupture and mark it as a tool of domination (e.g., Gnecco & Hernández 2008).

Key Issues/Current Debates

Reflexivity has been both criticized and upheld, according to the different paradigms that have ruled the production of archaeological knowledge. Within these paradigms, two types can be discerned: those that are determined by the premise that there is a reality that can be captured systematically (scientific paradigm) and those that are influenced by the premise that knowledge of reality depends on the interpretive abilities of the individual (hermeneutic paradigm).

Within the scientific paradigm, reflexivity is unwelcome at the disciplinary table. In his book *Analytical Archaeology* (Clarke 1968), David Clarke argued that archaeology has its own analytical universe and that it should develop its own theoretical models, thus generating its own narratives. For Clarke, archaeological narratives should share nothing with historical narratives that are based on the idea of single, non-universal events.

In an early case recorded in South America, the president of Argentina, Bartolomé Mitre (1862–1868), in 1910 asked the archaeologist Adán Quiroga to suppress the poetic tone of his narrative of the cultural material of Northeast Argentina on the grounds that it would obscure the truth of the data being presented. Adán Quiroga responded that his new work would show the suppression of anything literary (Quiroga 2004 [1901]: 13). This point is not without merit, signaling the criticism of reflexivity as associated with specific academic traditions.

Any thought about the situation of the individual producing archaeological knowledge was simply erased by the rise of processual archaeology. In *Archaeology as Anthropology* (Binford 1962), Lewis Binford pronounced that archaeology was devoted to the study of culture, understanding this to be an extrasomatic adaptive mechanism. In Binford's proposed example, the emergence of a certain type of cultural material was evidence of readjustments within society related to the increase of energy. Archaeological explanations should be limited to presenting evidence of economic adjustments, themselves transforming the social and religious spheres of society. From this perspective, archaeological texts should outline systematic changes in culture. Since one is trying to merely recount energy fluctuations, there is no need to pay much attention to the form of the narrative, the metaphors used, or the strategic position of the author behind the data.

Allegations against processualism as a deliberate form of narrating the past came from various quarters and appealed to different interests. From the feminist perspective (Gero & Conkey 1991), for example, researchers began to make anatomies of processual scientific descriptions. It became clear that many narratives were centered on sexist positions (men discussing power, elite property, domination, and hierarchies), including terming "erratic" some interpretations that could have made more sense of the cultural material that was excavated, especially of objects that had belonged to women.

Another militant front against processualism and its narrative impositions came from local communities (Condori 1994). In various sites around the world, voices were raised, making it clear that sites and objects should not be treated as scientific evidence as they actually formed part of the living traditions of many local communities. From this critical area, narratives began to emerge in which archaeologists were in dialogue with the local communities and at the same time reflecting on those narratives (Londoño 2002). The idea that archaeology should only deal with the description of objects exploded under this intense scrutiny: it was fundamental to acknowledge the places where ideas were put forward as well as the local actors affected by the narratives.

Apart from feminist and local archaeologies, criticism of processualism and its lax understanding of archaeological narrative forms also came about with the introduction of theoretical ideas such as hermeneutics, structuralism, and poststructuralism (Tilley 1990). Perhaps the approach most open to reflexivity in archaeology was hermeneutics, as this is based

on the idea that reality is meaningful and its interpretation is not determined by methodology as much as by the researcher's competence as an effective interpreter of particular facts. Thus, archaeological research is not a question of finding the correct method but the most adequate metaphors to move the researcher closer to the meanings of the cultural material deployed in the past.

Future Directions

A relation between narrative and reflexivity has been developed in phenomenological approaches in archaeology, assumed to be a contemporary reconstruction of forms of being-in-the-world in the past (Tilley et al. 2007). For phenomenology, it is fundamental to reflect on the place the observer occupies in the space of the investigation. This has obligated archaeological theory to fervently explore theories about the body and the landscape (Tilley 2008).

Phenomenology is not the only area in which reflexivity has risen to prominence. Moving beyond the use of ethnography to generate interpretive models, it has been suggested that ethnography has to bear in archaeological investigations (Edgeworth 2006), not only during fieldwork but also in the generation of meaning, the management of heritage resources, and the hiring of professionals, students, and laborers.

Indeed, a very prolific area that will need reflexivity for its development is the analysis of museums, both as objects and as narratives. More and more, archaeologists work intensely on formulating plans to spread their archaeological knowledge. This will require profound reflection about the manner in which exhibitions are configured, the way in which "noisy" discourses are edited, and the possibilities that other voices will be put forward. Paradoxically, archaeology has not been the place where these reflections have been attempted. Standing out from the crowd, as a forerunner, is the work of James Clifford (Clifford 1997), especially his work on local museums.

Reflexivity will be important to analyze how archaeological knowledge is positioned as a hegemonic and vertical practice. In this regard, feminist archaeology will play a fundamental role. Narratives with locally situated actors will also be important in generating representations of the past that are not hegemonic, determined by the restrictions of nationalism. This will be, then, an exceptional field for reflexivity as a political and epistemic tool.

Cross-References

- ▶ Engendered Archaeologies
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Practice Theory in Archaeology
- ▶ Reflexive Approaches in Archaeology, Development of

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Regional/Site Museums

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Introduction

The term "site museum" was first used in the 1950s to describe a museum at a place of scientific or historical significance whose purpose was to interpret the site to visitors (Lewis 1959). Site museum at that time referred both to museums at historic and archaeological sites and to visitor interpretive centers at natural and historic monuments and within scenic parks. Shortly thereafter in the 1960s, the term "regional museum" began being used to identify local and specialized museums that interpreted objects and phenomena from a specific geographical location such as a district, landscape, or village. Like site museums, regional museums encompassed both natural and cultural history and were based in disciplines in addition to archaeology. Subsequently, outside the discipline of archaeology, "site museum" became an overlapping term for outdoor and open-air museums including historic houses, living history museums, folk museums, heritage villages, and historic parks (Shafernich 1993; Moolman 1996; Swanson 2009). And while the original use of "regional museum" suggested multiple sites or locales within a defined area, the term was sometimes applied to individual site museums, community museums, and ecomuseums.

Expansion of these terms occurred in parallel with broadened definitions of heritage and culturally significant places within international policy (see Ahmad 2006). Unfortunately, such expansion has also led to confusion. "Site museum" has erroneously been applied to museums with buildings dislocated from their original sites and reconstructed in configurations that did not exist in the past. "Regional museum" is now used in several countries to designate district museums within a hierarchical museum system organized and overseen by a national-level ministry of culture or heritage trust. Both site museums and regional museums are associated with defined geographical locations and are tasked with interpreting aspects of the culture, history, and/or environment of those locations to visitors. Importantly, site and regional museums often attempt to communicate a sense of place (sensu Davis 2011) that enables visitors to understand the significance of a locale and to feel connected to the past. Archaeological site and regional museums fit within this broad definition but possess unique characteristics and face challenges based on the nature of archaeological sites, archaeological data, and perceived relationships with living communities.

Definition

Despite the large amount of work devoted to creating archaeological museums and promoting public outreach and heritage tourism through them (see, e.g., Stone & Planel 1999; Grabow et al. 2007; King 2011; Okamura & Matsuda 2011), there are few published definitions of archaeological site and regional museums. A notable exception is Silverman (2006: 4), who defines an archaeological site museum as a building at an archaeological site which displays materials excavated from that site and perhaps related sites together with explanatory texts that interpret the site and its archaeological culture for the public. Erturk (2006) and Swanson (2009) similarly identify an archaeological site museum as an archaeological site with associated interpretive elements such as text panels or an on-site museum and require that the site be preserved, protected, and periodically open to the

public. Both definitions stress the integration of interpretation for the public with the archaeological site itself, but only Silverman's definition also requires exhibition of artifacts or other archaeological materials. Additionally, neither definition differentiates site museums from regional museums.

Expanding on this and in line with general definitions of museums, an archaeological site museum collects, preserves, researches, exhibits, and communicates evidence and interpretations of the human activities that occurred at that site to the public. By extension, an archaeological regional museum collects, preserves, researches, exhibits, and communicates evidence and interpretations of past human activities that occurred across a number of sites or landscapes to the public. In both cases, this communication should explain the site's or region's significance or relevance and frame the evidence and interpretations with respect to archaeological research methods and various historic, environmental, and other contexts. The goal of archaeological regional and site museums is to translate the archaeological record, or evidence of the past in a specific locale or region, for public understanding and consumption. Translation or interpretation requires more than simply displaying or documenting the material record; it requires encouraging visitors to ask questions of the material record and about its meaning (Chan 2011).

Key Issues/Current Debates/Future Directions/Examples

The issues and debates faced by archaeological site and regional museums, and by the archaeologists working with them, involve matters of balance and priorities in museological, archaeological, and heritage management theory and practice (see, e.g., Watson 2007; Graham & Howard 2008; Okamura & Matsuda 2011). Challenges stem from the competing needs of the sites, their visitors, their researchers/caretakers, and the communities within which sites are located both geographically and genealogically. Additional, sometimes related, challenges arise from differences among scholars, administrators, and policy-makers over the primary purposes of these museums and the best ways to achieve those purposes. Site museums are seen as a way to enable archaeologists to achieve their ethical responsibilities with respect to public engagement (Silverman 2006), but these museums become a double-edged sword when stakeholders disagree over how, and what, aspects of a site are to be preserved and interpreted, and for whom. Debates center on regional and site museums as stewards, as interpreters, as heritage, and as instruments in cultural policy, tourism, and development.

Archaeological site and regional museums collect, preserve, and exhibit materials and data from one or more archaeological sites and often have roles in the continued preservation and management of those sites. As simultaneous stewards and presenters of the archaeological record, these museums must balance preservation-in-place with excavation and reconstruction, and the use of original items with restorations and reproductions. Attempts to achieve this balance lead to both specific debates over reconstructive techniques and broader controversies over preservation philosophies. A conservation ethos with respect to archaeological sites and artifacts can put museums at odds with tourism and development demands, while also serving as a rallying ground for preservation legislation and activism at the local, national, and international levels. Numerous examples of both cases over the past decade are documented in the journals *Conservation and Management of Archaeological Sites* and *Archaeologies: Journal of the World Archaeological Congress*.

Conservation and preservation issues also play into the technologies chosen for interpretation and the relation of the museum to knowledge production. Contemporary regional and site museums, to the extent that they participate in now globalized professional museological discourse (Muller 2005), approach interpretation as explanation aimed at provoking or enabling visitors to create their own knowledge and make their own meaning about the site(s) and archaeology. This presents several challenges

with respect both to the basis of interpretation and to how visitors are conceptualized and addressed. Because of the overwhelming amount and complexity of information yielded by archaeological sites, interpretive planning within regional and site museums is a highly selective process in which only a limited number of archaeological times, features, spaces, and stories are exhibited and communicated. Decisions about which stories to convey, and from what perspectives they should be told, require a clear understanding of visitor diversity, needs, and capabilities and control over the current state and future potential of archaeological and museological research.

Archaeological site and regional museums act as both interpreters and places of heritage, and because of the power relationships involved in knowledge production, these museums can be caught up in what has been referred to as the politics and poetics of representation (see Bell 2012). The information and interpretation presented by site and regional museums can be read in different ways and put to different purposes by visitors and critics. These museums portray and explain relationships between ideas and things and persons in ways that can promote collaborative generation of knowledge, and support identity formation and expression within particular groups. Conversely, these same actions may provoke contestation and disputes among groups with competing claims on the museum. The role of regional and site museums in the production of identity and heritage is highly variable and involves related issues of authenticity, cultural commodification, and authority. Site and regional museums are also subject to public and scholarly debates over agency and control in the realms of cultural policy, tourism, and development.

In many countries, archaeological site and regional museums are seen simultaneously as part of cultural tourism networks or destinations and as a way to implement government-based heritage management initiatives or cultural policies (Erturk 2006; Demoule 2012). They are seen as new industries in economically disadvantaged areas, as reasons for international development expertise and economic support, and as solutions to strained relations with ethnic minority or other excluded population sectors. These increased expectations and broader roles impact the kinds of interpretation, preservation and conservation practices, and physical configuration possible at regional and site museums. To meet the demands of tourism, regional and site museums must provide interpretation at different levels to accommodate the diverse expectations, interests, and capabilities of an expanded visitor base and may view visitors from a consumer or marketing perspective. These museums may also uncritically alter their missions and programming or adopt various globalizing standards, to accommodate policy initiatives or to qualify for international support.

The issues and debates faced by archaeological site and regional museums are not restricted to particular regions of the earth, and how site museums address these challenges is shaping the future directions and configurations that they will take. What is currently variable across the world is the specific content, emphases, daily operations, and appearance of individual museums. Some regional and site museums address the nature of archaeological investigation or introduce multiple perspectives within their interpretations, while others do not. Some extend reconstruction beyond simple architecture to demonstrate various past behaviors through performances and reenactments. The variability among contemporary regional and site museums is due in part to the incredible diversity of human history, variation inherent in the archaeological record, and local and state level differences in archaeological and museological practice. With the adoption or imposition of international standards, some of this variation may disappear but challenges facing archaeological site and regional museums will not.

Cross-References

▶ Archaeological Record
▶ Conservation and Management of Archaeological Sites

▶ Conservation and Preservation in Archaeology in the Twenty-First Century
▶ Conservation in Museums
▶ Cultural Landscapes: Conservation and Preservation
▶ Heritage Museums and the Public
▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
▶ Interpretation (Including Historic Reenactments): Current Approaches
▶ Site Visitation and Interpretation: Management
▶ Uses of Heritage

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Register of Professional Archaeologists (RPA)

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Basic Information

The Register of Professional Archaeologists (RPA) was formed in April, 1998, and succeeded the Society of Professional Archaeologists (SOPA), which had been formed in 1976. SOPA was self-defined as a professional society, and offered basic certifications in field and laboratory research, with additional certifications in areas such as cultural resource management, teaching, museology, and underwater archaeology. Applicants agreed to adhere to a code of ethics that included a "Code of Ethics and Standards for Research Performance," which applied to individuals, and institutional standards that applied to the program within which the member conducted his or her research. SOPA also had defined standards for field schools (Jameson 2004: 38).

RPA was established as a result of the efforts of a joint task force composed of representatives

from SOPA, the Society for American Archaeology (SAA), the Society for Historical Archaeology (SHA), and the Archaeological Institute of America (AIA). The SAA, SHA, and AIA became sponsors or RPA when it was formed, and were later joined in the same role by the American Anthropological Association. The governing Board of RPA consists of representatives of those four sponsors, while the officers, which include the RPA President, President-Elect, and Secretary-Treasurer, are elected by RPA registrants (Beaudry 2009: 17; www.rpanet.org).

RPA streamlined the registration process and dropped the specialty certifications that had been offered by SOPA. Two types of applications are offered. The Short Form application is offered for an applicant who:

- Holds an advanced degree with a specialization in archaeology
- Has designed and executed an archaeological study that has been reported in the form of a Master's thesis or Doctoral dissertation
- Accepts the responsibilities and standards described in the Code of Conduct, Standards of Research Performance, and Grievance Procedures of the Register of Professional Archaeologists (www.rpanet.org)

The Long Form application is required for those who have an advanced degree, but lack the specialization in archaeology and/or a thesis or dissertation that dealt with a substantive archaeological issue. Both Long and Short forms are reviewed and accepted or rejected by the RPA Registrar, who is elected by vote of the membership (www.rpanet.org).

The RPA "Code of Conduct" and the "Standards of Research Performance" replaced the SOPA "Code of Ethics and Standards for Research Performance." The Code of Conduct states:

> Archaeology is a profession, and the privilege of professional practice requires professional morality and professional responsibility, as well as professional competence, on the part of the practitioner (www.rpanet.org).

The Code of Conduct spells out what archaeologists shall and shall not do when dealing with the public, dealing with colleagues, employees, and students, and dealing with employers and clients. That code incorporates some elements of the SOPA institutional and field school standards, and provides clear ethical guidance to registrants (www.rpanet.org).

The Standards of Research Performance spell out standards that registrants must meet when engaging in any type of archaeological research. In broad terms, the standards require that the registrant "prepare adequately" for the research project, follow the prepared "scientific plan of approach" to the extent possible; ensure that adequate records are kept to ensure that provenience information is preserved in the laboratory; curate the project materials with an appropriate curatorial facility "unless otherwise required by law"; and disseminate the research results to "appropriate constituencies with reasonable dispatch" (www.rpanet.org).

The Code of Conduct and Standards of Research Performance (The Code) are enforced by RPA through a written grievance procedure by an elected Grievance Coordinator. Once a complaint is received, it is within the discretion of the Grievance Coordinator to dismiss the complaint or to appoint a Grievance Committee composed of two RPAs to work with the Grievance Coordinator to investigate it. The Grievance Committee prepares a report at the conclusion of its investigations that can recommend that the case be closed for lack of supporting evidence, that the person investigated be allowed to accept admonishment or censure with no further action, or that the case be referred to the Standards Board, the membership of which is elected by the RPA registrants. The Standards Board then schedules a hearing to hear the case and takes testimony from all those who are involved. The Standards Board is required to render its opinion within no more than 30 days after the hearing. The Standards Board issues a "finding of fact" which includes a determination if any of the allegations are true and imposes disciplinary action if one or more allegations were supported. The actions taken may range from an admonishment to termination of registration (www.rpanet.org).

Major Impact

The major impact of RPA is that the number of registrants has increased from less than 1,000 members under SOPA to well over 2,000 at present. This increase is highly significant because it brings many more archaeologists under the provisions of the RPA Code. The RPA process is viewed by those in other disciplines as a certification process for professional archaeologists that is similar to other professional certifications. This has particular value to archaeologists involved in cultural resource management. RPA now certifies archaeological field schools that are conducted under the guidance of an RPA following a responsible research plan, and offers field school scholarships. RPA has recently begun certifying continuing education programs, which should be a significant benefit for its members. A founding principle of RPA was to "advance professionalism in archaeology," and that goal is certainly being met.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Archaeological Institute of America (AIA)
- ▶ Ethics in Archaeology
- ▶ Field Schools, Archaeological
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Reichel-Dolmatoff, Gerardo

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Basic Biographical Information

Enough has been written on Gerardo Reichel-Dolmatoff to merit due notice (Pineda 2003; Langebaek 2005; Laurière 2010), but there remains much to document in terms of Reichel-Dolmatoff's contribution to the discipline of archaeology. Currently, acknowledgment of Reichel-Dolmatoff's work represents at best an obligatory genuflection despite the fact that his contribution is vital to understanding the main discussions within anthropology and archaeology in the north of South America.

Gerardo Reichel-Dolmatoff was born in Salzburg in 1912 and died in Bogotá in 1994 (Dussán n.d.). At the age of 25, he went to Paris and attended courses in liberal arts in the Sorbonne and in the School of Louvre; it is believed that in this period he was instructed in descriptive ethnography, a subject influence by the work of Marcel Mauss (Laurière 2010: 112). In the year 1939, Reichel-Dolmatoff left Europe and emigrated to Colombia; the connection between Reichel-Dolmatoff and Colombia is given not only by the importance of the country for the ethnological project but also because of an invitation he received (Dussán n.d.). In 1942, Reichel-Dolmatoff obtained his Colombian nationality, and in 1943, he married anthropologist Alicia Dussán, who also became his professional colleague.

Due to Reichel-Dolmatoff's humanist training, he was engaged in several committees, especially in the Parisian Committee to support Spanish republicans. In 1941 he also worked actively as secretary in the Colombia Section of the Free France Committee, directed by Paul Rivet (Laurière 2010).

Major Accomplishments

At the end of December 1941 and in January 1942, Paul Rivet conducted ethnological explorations in Colombia that were supported by the Instituto Etnológico Nacional (National Ethnological Institute), which he had helped to found in 1941 under the commission of President Eduardo Santos. Reichel-Dolmatoff was involved in those investigations, even though he was not part, formally, of the group of students that Rivet was forming (Laurière 2010: 114).

Formed under the French ethnological tradition, Reichel-Dolmatoff was interested in learning the indigenous philosophies that he believed were disappearing by the relentless advance of modernity. This positive assessment of the native was in constant tension with the contemporaneous push for assimilation in Colombia. Maybe the bigger achievement of Reichel-Dolmatoff and Alicia Dussán (and many others) was the proposal of a different frame to interpret what was traditionally seen as the most irrefutable evidence of the Indians' wildness. Nowadays, such an idea seems relatively unremarkable; however, in the 1940s, this represented a significant challenge against the colonization regime that had been mobilizing for decades (Gnecco & Londoño 2008). In a strongly Catholic country, it was almost heresy to assume that the systems of beliefs of the indigenous contributed to the philosophical global set. Although Reichel-Dolmatoff never wanted to openly express his dissatisfaction with the treatment that Colombian institutions gave to the ethnic question, he did stress it in 1969 with a brief article entitled "The missionary in front of the native cultures" (Reichel 2008: 212-28). There he highlighted the asymmetric relation that the missionaries had established with the natives.

Reichel-Dolmatoff's academic life can be divided in two periods. The first was between the 1940s and 1950s. In those years, the most outstanding works were those related to archaeological investigations. As in relationship with Reichel-Dolmatoff's contributions to archaeology, there are occasionally opposing views. While Carl Langebaek's meticulous investigation on Reichel-Dolmatoff's contribution to archaeology shows him as a man engaged with this branch of science (Langebaek 2005), Christine Laurière's work (Laurière 2010) suggests that archaeology could have been a strategic procedure for Reichel-Dolmatoff and not necessarily a passion. As Reichel-Dolmatoff commented to Paul Rivet in 1944, if someone returned from the field with gold, fame and a new agreement with the Colombian government would be easily obtained (Laurière 2010: 110).

Many of Reichel-Dolmatoff's biographers (Pineda 2003; Langebaek 2005; Laurière 2010), agree that the 1960s and 1970s were characterized by a gradual distancing from archaeological explorations and a more vertiginous entrance to the description of the native's philosophical complexes. It was in this way that in 1967 "Desana" was written, which treated the symbolism of the native Tukanos of the Vaupés region (Reichel-Dolmatoff 1986). It must be pointed out that this book had a French version in 1973, by the prestigious publishing company Gallimard (Laurière 2010: 120). The importance of this connection is not that the work was popular internationally but that it entered a market that was sensitive to the description of native communities with their own philosophical systems.

In this turn to the ethnology, Reichel-Dolmatoff set several bases for the archaeology of the intermediate area or of the Circum-Caribbean area (Lange 2004). He left the interpretative frames of the earliest periods defined, those he named as "formative." In his archaeological descriptions, he showed some chronological relation in which it was possible to perceive the evolution from economies depending upon roots to societies depending upon corn (*zea mays*). In the same way, he suggested a significant role of the use of corn (*zea mays*) for the colonization of higher sectors – such as the Sierra Nevada de Santa Marta – which he called the "corn colonization" (Reichel-Dolmatoff 1982). In spite of the fact that the data suggest that agricultural developments were previous to such colonization (Gnecco & Aceituno 2004), Reichel-Dolmatoff's thesis is

still valid because it is the only regional framework that has been elaborated.

Reichel-Dolmatoff's most representative text of the ethnological turn is undoubtedly "Orfebrería y Chamanismo" (Goldsmithing and Shamanism) (Reichel-Dolmatoff 1988). In this work, Reichel-Dolmatoff interpreted various archaeological objects, indicating how these were part of the paraphernalia of the religious leaders or shamans. In these projects of analogical inference, Reichel-Dolmatoff suggested several times the existence of cultural continuity between the natives of the past and those of the present. These statements had a powerful weight at a time when such continuity was denied, without arguments but with the intentionality to declare the areas of the natives uninhabited.

Surely Reichel-Dolmatoff's most important contribution was his interest in registering cultural complexes that he considered to be disappearing. Nowadays, the descendants of these groups use his descriptions to strengthen the local perspectives that still have to deal with the legacy of territorial dispossession. The significance of Reichel-Dolmatoff's work has not been fully recognized in this respect.

Cross-References

- ▶ Gold Museum (Museo del Oro)
- ▶ Latin American Social Archaeology
- ▶ South American Archaeology: Postcolonial Perspectives

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Religion in Islamic Archaeology

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Introduction

As an area of enquiry specifically concerned with one of the principal world faiths, Islamic archaeology has developed mostly within a secular tradition, and the attention paid to religion is fairly limited. The reasons for this are complex and have much to do with the development of archaeology as a secular field of enquiry in Europe and America. The majority of archaeologists working on Islamic material to date have been non-Muslims who perhaps felt ill-qualified to remark on the religious implications of their finds. In addition as with all world religions, there is a potential conflict between the revealed truth of the scriptures and the revelations of archaeology. While this has never become a major obstacle for Islamic archaeology, the scope for

potential misunderstanding has meant that issues concerning the origins of the faith have generally been avoided. With these limitations in mind, archaeology has made some important contributions to the study of Islam both as a religious practice and as a diverse set of beliefs. One of the challenges of Islamic archaeology is to acknowledge the profound sense of unity within the faith while also demonstrating the diversity and variations from contemporary established beliefs.

Definition

The study of Islam as a religion may be firmly placed within the wider concept of the archaeology of religious belief as defined and characterized by Insoll (1999). The importance of this approach is that it does not seek to comment on the validity or otherwise of beliefs but rather investigates the material culture(s) of the religion as expressions of the faith. This approach differs from that of comparative religion where beliefs and practices in one religion are compared to and often equated with those of another faith. While the comparative view allows an overview of religious developments, its tendency to generalize and assumption of an interchangeability of belief both deny the agency of the individual and assume a superior position for the investigator.

As a field of enquiry, Islamic archaeology has been primarily concerned with the development and manifestations of Islamic society and culture. Particular attention has been paid to the first three centuries of Islamic civilization when the religion was largely coterminous with a single Islamic state or caliphate. The breakup of the Abbasid caliphate in the tenth century and the resulting political fragmentation created new power blocks based partly on different interpretations of Islam and partly on ethnic and cultural affiliations. The advent of the Crusades in the twelfth century and increasing political fragmentation has meant that much of the historical and archaeological interest in medieval Islam has focussed on conflict either as holy war (*jihad*) or power struggles amongst competing Muslim rulers. However, in the Indian Ocean and Central Asia, both archaeology and history point to societies where the Muslim faith linked traders across vast distances from Cairo to China. The European discovery and exploitation of the New World coincided with profound changes in the Islamic world. There was a return to larger political entities such as the Ottoman, Safavid, and Mughal Empires, each with their own religious agenda. The archaeology of the recent past in the Islamic world (nineteenth and twentieth centuries) has focussed on an increasing European presence either through trade or colonial encounters as well as warfare.

Historical Background

> [I]n 1343 . . . a resident of Cairo unearthed what he claimed to be an old mosque. A "rowdy" named Shu'ayb could not miss this golden opportunity. He claimed that an apparition revealed to him that the site was an ancient grave of a Companion of the Prophet. . . .Excavations were begun by the commoners, including women, and indeed a "shrine" surfaced. That new discovery further increased the number of visitors, and industrious Shu'ayb organized "guided tours" for fees, in which wives of dignitaries also took part (al-Maqrizi, *Suluk li ma'arifat duwal al-muluk* II: 649-50; Shoshan 1993: 9).

Although Islamic archaeology is currently dominated by a secular European outlook, there are enough examples of Muslims carrying out excavations or studies of ancient material to suggest an archaeological tradition of some antiquity. The example of Shu'ayb (cited above) is interesting because it demonstrates an understanding of archaeological processes by the general public (e.g., buildings collapse, accumulation of material over time, excavation as a means of discovery, and the presentation of archaeology to the public). The other dimension to this discovery is the creation of a religious shrine which according to al-Maqrizi became the site of nightly celebrations until they were discontinued by the religious authorities. Although in this particular instance the orthodox religious establishment did not recognize the shrine, there are many instances where ancient

sites were rediscovered and became shrines and centers of visitation. Such activities were particularly popular during the medieval period with prominent examples of rediscovery including the tomb of the Biblical Moses (Nabi Musa) in Palestine, the tomb of Jonah (Nabi Yunus) at Nineveh in Iraq, and Moulay Idris in Morocco. In each case some ancient remains were discovered and associated with some historical event or personage. Moulay Idris is a predominantly eighteenth-century shrine built around the mausoleum of Idris II (r.803–828) whose body was rediscovered in 1308. The shrine of Nabi Yunus is located on the site of ancient Nineveh and was built directly over the ruins of a Christian church. The shrine complex of Nabi Musa was built by the Mamluk Sultan Baybars in 1269 when the grave of Musa was rediscovered. In each case the shrine was built around an ancient relic or site which was both historically plausible and also tangible providing an authenticity which appeared to be lacking in Shu'ayb's discovery of 1343. All of this indicates that there was an empirical and rational understanding of the relationship between the present and the past which is akin to that of modern archaeology.

The Quran provides a basis for understanding the relationship of the past to the present with the story of the cave (Surah 18) in which a number of youths fall asleep in a cave and are awakened 309 years later. When they try to buy food, they are discovered because of their use of old silver coins which were no longer in circulation. The Quran (Surah 7) also explains how the polytheists of al-Hijr (Medain Salih) were punished for persisting in idol worship so that eventually they were killed and their city left in ruins. An appreciation of the processes of change over time is therefore a fundamental part of being Muslim.

One of the earliest and most important examples of archaeological work in relation to Islam was carried out when the Ka'ba in Mecca was rebuilt after its destruction by Ibn Zubayr in 683. Before the Ka'ba was rebuilt, a detailed investigation of the site revealed earlier foundations interpreted as Abraham's original construction. During the process meticulous notes were made including a detailed analysis of the Black Stone at the corner (Peeters 1994: 62-4).

Later on it is evident that there was an awareness of the value of studying ancient remains; thus, the prominent Egyptian scholar 'Abd al-Latif (1162–1231) had a deep respect for the learning of the ancients and their monuments (Richter-Bernberg 2007). In a statement in his book on Egypt, he summarizes the reason for preserving ancient monuments as follows:

> Antiquities should endure as markers of a remote epoch and reminders of the ages since elapsed. They will serve as witness to the revealed scriptures for the venerable Koran mentions them and their people; thus by seeing them, narration becomes experience and tradition is verified.... They indicate something of the forebears' circumstances and conduct, the ampleness of their learning and the clairvoyance of their notions. ('Abd al-Latif, *Akhbar Misr*; Richter-Bernberg 2007: 365)

In addition to scholars directly interested in ancient remains, it is also worth noting that there was a sophisticated historical tradition in the Islamic world with writers such as al-Tabari providing detailed historical accounts of world history. However, perhaps the most sophisticated appreciation of history is found in the writings of the Ibn Khaldun who developed a philosophy of history based on his analysis of historical events in his native North Africa. This historical awareness provided a framework for understanding archaeological remains.

During the nineteenth century European interest in the antiquities of the Middle East and North Africa was often met with suspicion by local Muslims. Part of this mistrust was a feeling that objects of value might be discovered and exported without benefit to the natives of the region. However, there was also a feeling that Europeans would use antiquities to give their own contrasting interpretations of history. In some cases these misgivings were justified and Edward Said's book *Orientalism* documents how Europeans used archaeological investigations as a means of gaining information to help in their colonial endeavors (Said 1978). However, despite the disproportionate military and economic power of the Europeans, the authorities

in Muslim countries were able to exercise some control on the activities of foreign (and indigenous) archaeologists. Thus, in 1884 Osman Hadi the director of the Archaeological Museum in Constantinople (Istanbul) enacted the first Ottoman antiquities law placing all excavations under the control of the Ministry of Education (Vernoit 1998). In general however from the nineteenth century onwards, archaeology in the Muslim world was dominated by Europeans (and Americans) who had both the resources and the training to carry out systematic investigations.

As Islamic archaeology developed during the late nineteenth and early twentieth century, the main interests were art and architectural history rather than investigation of Islam as a religion. Archaeologists working on Islamic sites were interested in the retrieval of objects of Islamic art for display in museums and in the recording of monumental architecture. There were however some areas where European archaeologists showed an interest in the religious aspect of Islamic material culture. For example, Conrad Preusser made a study of Islamic shrines and Christian churches in northern Iraq while attached to the German excavations at Babylon in the early twentieth century. In early twentieth-century Palestine, there was considerable interest in Muslim shrines partly because it was thought that they may relate to some Biblical sites and partly because archaeologists working in the Holy Land were predisposed to look at religious aspects of antiquity.

The other specifically religious aspect of Muslim culture that interested nineteenth- and early twentieth-century archaeologists and art historians was the question of iconoclasm or prohibition of figural images. Following excavation of Umayyad sites in Syria and present-day Jordan and Palestine, it became apparent that the religious ban on the portrayal of human figures was not universally applied. For example, semi-nude female figures were painted onto the walls of the bath house at Qusayr ‘Amra in Jordan, while at Khirbat al-Mafjar there were stucco figurines of semi-naked women also in the bath house. However, in certain areas and times, the figural ban was implemented, most famously in the 690s when Abd al-Malik (685–705) replaced figural coinage with purely epigraphic coins (Walmsley 2007: 59-64). For some archaeologists the implementation of the ban on figural images was aimed particularly at Christians and was seen as a sign of Muslim intolerance. For example, John Crowfoot commenting on the damaged mosaics of Jarash wrote “. . .all representations of living creatures were ruthlessly destroyed. The sorry way in which the mutilations were repaired shows the wretched plight of the Christians” (Crowfoot 1938: 172-3).

Key Issues

The religious nature of Islamic society expressed through Islamic laws and customs has meant that all areas of Muslim life are potentially relevant to archaeology. However, a number of areas of investigation are of particular relevance to an understanding of the religion. These may be summarized as mosques; *hajj* routes; shrines, mausolea and burials; and *halal* diet.

Mosques

As the most visible symbol of the Muslim faith, mosques are an ideal subject for archaeological research particularly as they have been part of Islamic culture from the start (Figs. 1 and 2). When investigating ancient remains, the presence or absence of a mosque is often the best indicator of whether the former inhabitants had adopted Islam as a religion. It is even possible to get an indication of the possible number of Muslims in a settlement at a particular time. For example, the Byzantine and early Islamic settlement of Shivta in the Negev had three churches and a small mosque attached to one of the churches suggesting a Muslim minority in a Christian town (Magness 2003).

There are however some problems with using mosques as an indicator which may be summarized as (i) the identification of a building as a mosque, (ii) dating the period of construction and use, and (iii) problems associated with investigating mosques still in use.

Religion in Islamic Archaeology, Fig. 1 Mosque of Sayyid Jamal al-Din at Anau, Turkmenistan (built 1446–1457), destroyed by an earthquake in 1948. Note the decorative dragons either side of the main arch

Religion in Islamic Archaeology, Fig. 2 Kutlug Timur Minaret at Kunya Urgench, Turkmenistan (built between 1321 and 1336). Large minarets such as these were not only a visual symbol of Islam but were also memorials to their founders

The easiest way to identify a mosque is by the presence or absence of a *mihrab* which is a concave niche inserted into the wall of the prayer hall to indicate the direction of Mecca and consequently the direction of prayer (*qibla*). Even if a mihrab is not found, the orientation of a building to the *qibla* (direction of Mecca) will suggest that a building is a mosque. However, there are problems with both these indicators. The earliest mosques did not have a *mihrab* in the form of a concave niche.

The first concave *mihrab* was inserted into the Prophet's Mosque at Medina during some restorations carried out by the Umayyad caliph al-Walid I in 706. The date of the introduction of the *mihrab* niche is confirmed by excavations at Wasit, Iraq, where two mosques were found built one on top of the other. The earliest mosque, dated to the seventh century, did not have a concave *mihrab*, while the later eighth-century mosque had a *mihrab* niche. Similarly the orientation of a building may be misleading because many early mosques were misaligned. In most cases however both the alignment and the presence of a *mihrab* will confirm a building's function as a mosque.

In terms of dating mosque construction and use, often it will be possible to get an idea of the date of a mosque from a foundation inscription. However, in many cases this will either be missing or the inscription may come from an earlier building. In addition the fact that mosques are not used for residential purposes means that an excavated mosque will rarely contain dateable material. Once a site has been designated for use as a mosque, it will tend to retain this function through time. In practice this means that many apparently new buildings are built on older foundations or may even incorporate portions of an earlier structure, which are thus not easily accessible to archaeologists.

Hajj Routes

The *hajj* pilgrimage to Mecca is one of the five obligations held by all Muslims. If a person has the necessary means and is physically able, the pilgrimage to Mecca once in a lifetime is obligatory. Given the rapid geographical spread of Islam from the seventh century onwards, this has meant that a network of pilgrimage routes from all over the world converges on Mecca (Petersen 1994). There have been a number of archaeological studies of these routes most notably the Darb Zubayda from Iraq, the Darb al-Hajj al-Shami from Syria, and the Darb al-Hajj al-Masri from North Africa.

Shrines, Mausolea, and Burials

Shrines, mausolea, and burials are three connected issues within the archaeological study of Islam. Firstly it is worth mentioning that all schools of Muslim thought agree that burials should be simple and that graves should not be marked with extravagant structures. However, in practice throughout the Muslim world, there have been elaborate grave markers and mausolea have been built around the graves of particularly prominent individuals (Fig. 3). Where the individual concerned is thought to have been particularly pious, valiant, or important, the mausolea have often become shrines venerated by Muslims (Fig. 4). There have been many archaeological studies focussing on these issues (Petersen 1996, 1999, 2001). Some draw attention to the fact that shrines provide a religious focus for women, illiterate people, and others who feel excluded from more formal religious practices at mosques.

Religion in Islamic Archaeology, Fig. 3 Grave of holy man at Kunya Urgench, Turkmenistan, with rags tied to poles indicating the prayers of pilgrims, visitors, and relations. This form of religious practice with links to shamanism is discouraged by orthodox Islam but is widely practiced

Halal Diet

Muslims are governed by dietary laws dictating what food is permissible (*halal*) and what is forbidden (*haram*). The most well-known prohibition is against eating pigs, although many other categories of food are restricted. Environmental archaeology can investigate deposits to gain an idea of whether a particular society was following Muslim dietary rules (for a discussion see Insoll 1999: 4-107). In southeast Asia the analysis of animal bones has been used to determine at what stages particular communities are converted to Islam (Lape 2005). However, it is

Religion in Islamic Archaeology, Fig. 4 Pilgrims visiting the sixteenth-century tomb of Sultan Ali near Kunya Urgench, Turkmenistan

known that in certain cases, people describing themselves as Muslim have ignored some of these rules; thus, evidence of wine consumption has been found at early Islamic sites, and it is known that some Sufi sects also drank wine as part of their activities.

International Perspectives

Within the archaeology of religion, international perspectives may be interpreted as the interaction with other faiths. Four examples will be used to indicate how archaeology can inform and in some cases inflame conflicts centering on religious sites.

The partition of India into India and Pakistan in 1948 polarized Muslim and Hindu sentiments, and both countries are still dealing with the consequences. In terms of archaeology and heritage, the most well-known incident was the destruction of the mosque (Babur Masjid) at Ayodhya in 1992 by supporters of the Hindu nationalist party (Nandini 1999). The demolition of the mosque led to rioting in which more than 2,000 people were killed, and the incident still incites violence. The mosque was built in 1528 by one of the generals of the Mughal Emperor Babur on a site which according to Hindus marks the place where the Hindi deity Lord Ram was born. In September 2010 following an archaeological investigation which revealed an earlier (Hindu?) building, custody of the site was divided between Muslims and Hindus.

The second example is the Dome of the Rock in Jerusalem which is believed to stand on the site of the Jewish temple which had been destroyed by the Romans. The bitter conflict between Israel and Palestine has focussed on Jerusalem and in particular on the area of the Haram al-Sharif. For Muslims this is the third holiest shrine and the destination of Muhammad's miraculous night flight from Mecca (Necipoğlu 2008). The intensity of the conflict is such that there have been several attempts by Jewish extremists to destroy the building. The plans, a model and even actual fittings made for the new temple, which is planned once the Dome of the Rock has been destroyed, already exist.

At Bamiyan in Afghanistan the situation was reversed when the Taliban destroyed the two monumental Buddhas carved into the cliff. Prior to the destruction the Taliban publicized their intention finally blowing up the statues in 2001. The event was presented as an attack on figural images and idol worship which was intolerable to Muslims. However, archaeological research has indicated that Bamiyan was inhabited by a Muslim population for over 1,000 years without problems (Morgan 2012: 81-130).

Finally it is worth considering the mosque of Cordoba in Spain built by the Umayyad caliph Abd al-Rahman in 784 on the site of a church. The mosque was gradually enlarged over a period of 200 years and became one of the most celebrated mosques in the world (Khoury 1996). Cordoba and the mosque were reconquered by the Christians in 1236, and the mosque was gradually converted into a cathedral. In the sixteenth century major construction work within the former mosque saw the addition of a nave which

while visually intrusive is thought by many to have preserved the building from the excesses of the Inquisition which may otherwise have called for the destruction of the entire building.

Future Directions

A number of difficulties arise when considering the relationship between Islam and archaeology. Three of the most pressing issues are pre-Islamic and Quranic archaeology, Muslim sects and divisions, and Islamic practice in archaeology.

Pre-Islamic and Quranic Archaeology

The general perception of Islamic archaeology is that it investigates the archaeology of Muslim societies from the 630s to the present; however, to some extent it must also consider the pre-Islamic archaeology of Arabia. As a functioning religious center, the *haram* at Mecca is off limits to archaeology, yet we know a certain amount about the shrine from early Arabic authors (Nevo & Koren 1990) which gives a window on to the pre-Islamic archaeology of the site. Similarly there are some sites such as al-Khaf al-Raqim in Jordan (Walmsley 2007: 141-4) which have been identified as the site of the story of the cave as mentioned in the Quran (Surah 18). Both of these examples are fairly unproblematic; however, there is the potential for an archaeological investigation to encounter material which may challenge the orthodox religious view.

Muslim Sects and Divisions

Because Islam is a living religion and because extremists have drawn considerable attention to their faith, the archaeology of Islam is faced with considerable challenges. On the one hand as social scientists archaeologists must adopt a neutral detached approach to the field of study, yet it is inevitable that in some cases a particular view will be regarded as support for a particular position. Although Muslims see themselves as part of a single Islamic community (*ummah*), in practice there are many sects, ethnic and cultural affiliations, as well as political configurations which cause major divisions. The problem for the social scientist is that there is considerable pressure to regard any one of these forms as the normative Islam from which other forms deviate. This question is becoming increasingly important as communications improve and the ability of wealthier nations to encourage their interpretation of Islam increases. One of the main sectarian divisions is between *Shia* and *Sunni* Muslims, although there are also other groups which have political dimensions such as Sufis, Salafis (Wahabis), and Ibadis. In addition there are groups such as the Bahais and the Druze which originated within Islam but are generally regarded as outside the recognized religion.

Islamic Practice in Archaeology

While the majority of nineteenth- and twentieth-century archaeologists investigating Islamic culture were from a secular Christian or Jewish background, the number of Muslim archaeologists working either in the field or as academics is increasing steadily. Should the religious faith of an archaeologist matter? And is it preferable to have Muslims investigating Islamic sites? In most cases the personal beliefs of the archaeologist will be irrelevant, although in some cases it has been argued that only Muslims are fit to excavate mosques and interpret Islamic culture. Such views are obviously extreme and would lead to a situation where the investigation of the archaeology of another religion or culture became effectively impossible. However, such views may be regarded as a reaction to the European-dominated Orientalist narrative which first characterized Islamic archaeology.

Cross-References

- ▶ Cyprus, Archaeology of
- ▶ Greater Syria: Islamic Archaeology
- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ India: Historical Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Iran: Islamic Archaeology

▶ Iraq: Archaeological Heritage
▶ North Africa: Historical Archaeology
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Religion, Greek, Archaeology of

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Introduction

Archaeologies of Greek religion may be divided into three categories: the analysis of artwork, the publication of sites, and the categorization of ritual practices. Topically, boundaries between these are permeable; methodologically, all of them build on the integration of material, epigraphic, and textual evidence. This relationship to textual evidence both characterizes and problematizes Greek archaeology, which is often criticized for its theoretical naïveté, its distance from anthropological archaeologies, and its striking conservatism (Dyson 1993; Morris 1994; Whitley 2001: 11-59). These characteristics are the result of a long intellectual and political history. The identification of ancient Greece as the fountainhead of Western civilization served the nationalism of Greece as it emerged from

Ottoman rule: it helped secure the support of European nations, and the archaeological service was one of the first departments of the new government to be established (Hamilakis 2007). The "glory that was Greece" informed the cultural ambitions of the seventeen nations who established archaeological schools in Athens; the tradition favored a focus on classical sites known from Greek historical texts and shaped a culture-historical approach to the interpretation of archaeological materials. The culture revealed was deemed a priori unique and so beyond comparison with other nations. The great ritual centers were among the sites apportioned to these foreign schools. Greek religion was already well established as a field of textual inquiry when these excavations commenced. The rich epigraphic record from these sites, which named figures familiar from myth and history, reinforced the unproblematized relationship with textual sources and delayed the emergence of a critical body of theory regarding the relationship between the textual and the archaeological record. Although calls for greater integration of textual and material evidence appear in many surveys of Greek religion, literary continues to outweigh material evidence in the key texts for the field (Hägg 1992; Osborne 1994; Morris 2000; Burkert 2011: 1-7). Archaeologists working on Greek cult, moreover, are rarely located in anthropology or religion departments, more frequently in art history, classics, or history – where publications focused on iconography, architectural history, or the relationship of finds to Greek and Latin texts speak most clearly to colleagues judging questions of promotion and tenure.

The archaeology of Greek cult is thus suspended between at least four academic disciplines – classics, art history, religion, and anthropology – and burdened with political and cultural expectations. Some of the most intriguing new work in the field, however, emerges precisely from the efforts to close the gap between these traditional divides. The mid-1970s saw the emergence of critical perspectives on the history of the discipline; these insights are combined with new technologies, increasingly accessible databases, and a more robust theoretical framework for the relationship between the textual and the archaeological record. These are reshaping the boundaries of artifact, site, and ritual studies within Greek archaeology, at the same time that the major locus for publications remain traditional classical studies rather than anthropological journals.

Definition

The archaeology of Greek religion may be defined as the investigation of material evidence for ritual action carried out by individuals who identified themselves as Greeks. Ritual actions are defined here as symbolic, traditional communications designed to bridge the human and divine worlds: there is no ancient Greek category which corresponds precisely to our term "ritual," and while debates about the relationship between religious and secular ritual have appeared in classical studies, these lie beyond the framework of this essay (Bremmer 1994: 38-54; Bell 2007). The chronological and geographical boundaries of Greek religion shape its archaeology in both theoretical and practical ways. The chronological may be situated between the prehistoric period and the Bronze Age on the one hand, Christianity on the other; boundaries between these are permeable. Continuity from Bronze Age use is attested at sites such as the cave of Zeus on Mount Ida (Watrous 1996) and the sanctuary at Syme (Lebessi 2009); Mycenaean burials provided the focus for historical hero cult from the eighth century BCE on (Antonaccio 1995), and Hellenistic architects in the sanctuary of the Great Gods of Samothrace constructed a false door in the style of the late Bronze Age mainland (McCredie 1974). The archaeological signatures of prehistory were thus part of the intellectual landscape of Greek ritual practice into the historic period and provide an ancient context for the reinterpretation and usurpation of the past (Voyatzis 1992; Naoum et al. 2004; Prent 2005). Christian responses to pagan traditions translated into the desecration and destruction of classical material, their transformation into new

sacred spaces and images, or their decontextualization and redistribution as spolia (Pollini 2007; Hahn et al. 2008; Arce 2011). The most violent behavior, more articulate than simple destruction, carved crosses into ancient statuary, or smashed faces, breasts, and genitalia of ancient statues, while leaving the remainder intact as a statement of Christian triumph. More nuanced responses transformed the pagan symbols into Christian iconography, studies of which engage with textual as well as material evidence (Elsner 1995). The transformation of traditional temples into churches begins some 200 years after the Theodosian Code of 391 CE dictated the closing of pagan sacred spaces; causes for the delay may be reflected in legislation, contemporary with the code, which recommended the preservation of the temples as symbolic and practical structures. Examples of these architectural conversions include the temple of Aphrodite in Aphrodisias in Caria, the Parthenon, the Hephaisteion, the Asklepeion, and the Erechtheion in Athens (Ward-Perkins 1999; Arce 2011). The reuse of architectural materials as *spolia* was a pagan as well as a Christian practice: recent publications explore the semantic range of such repurposing, from appropriation to nostalgia to triumphalism to exorcism (Brilliant & Kinney 2011).

Geographically, sites for Greek cult are found far beyond the Greek mainland or its islands. Greek settlements stretched from the Black Sea in the north to Egypt in the East and Italy in the west. The geographic range of study means that excavations relevant to Greek religion are shaped by the political realities of a number of Mediterranean countries. Braund describes the great personal risk undertaken by local people who aided him in his archaeological explorations in the 1970s around Colchis; Davis describes the fieldwork made possible, including the excavation of an archaic temple to Apollo, after Albania opened its doors to the outside world in the mid-1990s (Braund 1994; Davis 2012: 65-8). The opening of former Soviet Bloc countries has redefined the study of Greek religion in the regions around the Black Sea, where some 90 colonies were attributed to one Greek city, Miletus, alone (Tsetskhladze 2006/2008). Theoretical frameworks for cult in these regions have been shaped by studies of Greek colonization which began in the 1980s. These emphasize cult as a mechanism of cultural identity and mediation at ethnic, political, and territorial boundaries. Archaeological foci include the establishment of hero cults, the political uses of temple and monumental architecture, signals of cultural assimilation in funerary ritual, and the emergence of syncretistic celebrations. Sicily has been an especially rich locus for this work, as a place where Greeks interacted with indigenous cultural groups as well as the Phoenician settlers who could serve as both partners and competitors in their colonizing goals (Kleibrink et al. 2004; Marconi 2007). Intellectual models for Greek colonization have moved from models of Greeks vs. Barbarians and center-periphery toward postcolonial models of hybridity and mediation; network models suggest that symbolic expressions of Greek identity are strongest at the greatest remove from territorial centers, reinforcing the importance of ritual at the margins of the Greek world (Malkin 2011).

Historical Background

An archaeology of Greek religion may be argued to have its birth either in the early Renaissance or after the 1970s. The date depends on whether this archaeology is defined by the use of the site in antiquity or by a deliberate methodology and theoretical framework aimed at recovering the religion of the site. The former, which we may consider an incidental archaeology of cult, characterizes much of the earliest archaeology in Greece. The great sanctuaries of Greek history – known from ancient texts and confirmed by inscriptions – were objects of exploration as early as the fifteenth century, when the early Renaissance antiquarian Cyriacus of Ancona toured the Greek world, sketching monuments and recording inscriptions (Belozerskaya 2009). The historical functions of Greek sanctuaries as sites for competitive display also made them treasure houses of sculpture, architecture, finely worked votive objects, and the inscriptions which were

the objects of particular interest for these first explorers.

The nineteenth-century excavations of these sites reflect a range of European intellectual trends – Romanticism, connoisseurship, nationalism, and *Altertumswissenschaft* – which came into being during the nearly four centuries that Greece was ruled by the Ottoman Turks (1460–1830). Romantics of the eighteenth and nineteenth centuries idealized the ancient Greek world and approached archaeological sites as the embodied past of a perfect heroism, now conquered and crumbling. Enthusiasm for the ruins, and the conviction that they offered access which texts could not, drew Romantic travelers, Goethe among them, to Ottoman Greece. Johann Joachim Winckelmann, deemed the father of Greek archaeology (1717–1768), shared some of the conceptions of the early Romantics, if not their itineraries. He never went to Greece, but proposed the first schematization of Greek art history based on his observations of objects in Rome. Winckelmann identified four historic and aesthetic stages of Greek art history, and the principle that changes in style were the key to chronology. His conjectural model received reinforcement from the museum collections which began to grow in earnest in the eighteenth century, when European nobles rushed to collect ancient Greek vases and sculpture. War between France and Britain in the eighteenth century further escalated the appetite for building private collections and public museums, as bitter military conflicts translated into cultural competition. Philhellenic sensibilities also spurred military and political support for the Greek war of liberation against the Ottomans and, subsequent to liberation, to the establishment of archaeological schools in Athens – the French in 1846, German in 1874, British 1876, and American in 1881. The major excavations run by these schools included the sanctuaries of Delos, Delphi, and Olympia. The excavations appear innocent of theory or agenda: the objectives were to excavate, preserve, categorize, and publish the finds. This apparent objectivity was underwritten, however, by the Hellenism which emerged in the Romantics, informed the tradition of the Grand Tour, fed the connoisseurship of the eighteenth century, and became an arena for the competitive nationalism of the nineteenth century (Dyson 1993; Morris 1994; Whitley 2001: 3-42).

The question of ritual practice per se was of minimal or no interest to these early explorers, despite the centrality of prophecy to Delphi, the cult of Apollo to Delos, and ritual competition to Olympia. "The glory that was Greece" did not include its paganism, which was either opposed to Christianity or reconciled with it through allegorizing explanations. Critical approaches to an archaeology of cult did not materialize in classical archaeology until the 1970s, as part of the effort undertaken by some practitioners to redress the distance between classical and world archaeologies. This distance was not inevitable: the fields among which the archaeologies of Greek cult are now distributed – archaeology, classical studies, anthropology, and religion – were at their beginnings more closely tied to each other (Rowe 1965). An education in classical and biblical texts was the general rule for all earlier practitioners of archaeology, and the Romanticism and nationalism which shaped Greek archaeology shaped anthropology as well (Renfrew 1980; Morris 1994). Several historical junctures are identified as the moment at which classical and other archaeologies diverged. Morris points to the 1870s, when classical archaeology became a subdiscipline of classics and thus removed from the broader archaeological world (1994). Whitley notes the conflict between prehistoric and classical archaeology as a cause of the separation. This was exemplified in a paper delivered by V. Gordon Childe in 1943, in which he berated classical archaeology, and his teacher Beazley, in particular, for its simultaneous enthusiasm for fine arts and indifference to the tools and households which were the real record of history. This initiated a separation of classical from world archaeology during the three decades when world archaeology most flourished, from 1945 to 1975. The separation grew even deeper in the 1960s, when classical archaeologists actively retreated from the new theoretical dimensions explored in other archaeologies. The paradigm for classical archaeology in this period is

Beazley's attribution studies, which linked Renaissance humanism with Winckelmann's conjectural scheme and a scientific fastidiousness in matters of detail; the field drew its prestige from classics and its audience from those who read the ancient texts (Whitley 2001: 12-16).

If classical archaeology was absent from theoretical advances in world archaeology between 1870 and 1970, it was also engaged only peripherally in the theoretical advances in Greek religion. Myth, as preserved in literature, was fundamental to the study of Greek religion from the time of the Church fathers. These approaches changed in the early nineteenth century. Lobeck's massive, querulous volume, *Aglaophamus* (1829), demonstrates a determination to gather, critique, and chronologically order all the ancient sources for Greek myth and mystery cults; it may be deemed a philological analogue to the "science of antiquity" which defined German excavations at Olympia. In the last quarter of the nineteenth century, overseas colonies, reports from missionaries, and the emerging discipline of ethnography brought paradigms for comparative study, evolutionary models, and a focus on ritual to British and German scholars of Greek religion. The Cambridge Ritualists emerged in Britain, among whom Jane Harrison was the most archaeologically focused (Harrison 1890; Ackerman 2002). In Germany, Mannhardt (1875) compared European peasant customs with ancient traditions and postulated agricultural festivals of fertility and annual renewal; the Cambridge scholar Frazer extended the range of comparanda to include all ethnographically known cultures, as well as ancient Greece and Rome (Frazer 1890-1915). Dieterich, a follower of Mannhardt, founded the *Archiv für Religionswissenschaft* in 1904 and thus the platform for an independent discipline of the history of religion (Burkert 2011: 1-7). Durkheim's sociology and the discovery of psychoanalysis both impacted studies in Greek religion as well. Gernet brought Durkheimian sociology to Greek religion and to the group known as the Paris school, led by Vernant and Detienne, who inaugurated a trend toward the application of structuralism and functionalism in studies of Greek myth and ritual in publications from the 1960s through to the new century. Detienne (2005) provides a conspectus of these discussions. Kerenyi applied concepts of archetypes developed from Jungian psychoanalysis to Greek myth (Jung & Kerenyi 1941; Kerenyi 1976; Schlesier & Sanchiño 2006); Caldwell employs Freudian analysis (1990); E. R. Dodds, in *The Greeks and the Irrational* (1951), invited investigation of those portions of Greek religion not represented in the shining marble edifices of Athens.

The archaeology of Greek cult remained as aloof from these developments as it did from world archaeology. Changes of the last four decades, however, have begun to close both of these divides. New regional studies balance the traditional overemphasis on Athens; a shift away from attribution studies and toward mentalities has initiated fresh conversations on the insights into ritual provided by vase painting. Quantitative approaches have been brought to cemetery analysis, and field surveys are building new approaches to sacred landscapes. If these represent a lessening of the divide between Greek and world archaeologies, internal divisions within the field have also been lessened through the creation of several key resources. The online publication of the *Supplementum Epigraphicum Graecum* provides a searchable database for all Greek inscriptions; the *Epigraphic Bulletin for Greek Religion* offers an annual guide to new inscriptions relevant to Greek cult, published since 1991 in the journal *Kernos*. The *Lexicon Iconographicum Mythologiae Classicae* provides topical introduction to the iconographic traditions for Greek and Roman divinities and heroes (Boardman et al. 1981). The *Thesaurus cultus et rituum antiquorum* (ThesCRA), published since 2004, offers up-to-date introductions to a range of Greek cult types; the *Chronique archeologique* offers an annual account of new archaeological discoveries relevant to Greek cult, published in the journal *Kernos* since 2001. There is as yet no established canon of theory and method for an archaeology of Greek cult, though Renfrew provided one in 1985 for Bronze Age studies (Renfrew 1985; Osborne 2004b). The changes

of the last four decades have not resolved the distance between classical, prehistoric, and world archaeologies. The relationship between Greek religion and Greek archaeology continues to be uneven, and the footprints of the field's earliest days linger even in the newest approaches. Whitley, for example, has noted that the Romanticism that shaped the emergence of Greek archaeology appears in new survey and landscape studies and suggested that the same idealization may lie behind the relative absence of economic and environmental archaeology in classical archaeologies (2001: 47). An archaeology of Greek cult is still evolving: it is characterized most by its diversity and is apprehended through a range of examples rather than an established canon.

Key Issues

Issues both perennial and current within the archaeology of Greek cult demonstrate the range of advances made in the 1980s and beyond. An exploration of sacred space, and an overview of two ritual types, provides a framework for a number of the recent debates and new methodologies. A more complete list of ritual types and foci of investigation may be found in Motte et al. (1992, 1998).

Greek sacred space was defined by a range of factors, from natural sacrality to political need. Caves, grottos, and mountain peaks were among the natural spaces which were considered either inherently numinous or the location of prehistoric celebration. More recent studies demonstrate that these sites were neither necessarily prehistoric nor natural and served a range of ritual and intellectual functions. Dillon (1997a) surveys the textual evidence for the mentalities which inform these choices; the cave sanctuary in Sphakia, southwest Crete, demonstrates use into the Hellenistic and Roman periods (Francis et al. 2000); Hellenistic Rhodians constructed artificial grottoes which aligned with the city's grid plan and provided loci for the display of votives to unknown gods (Rice 1995). Sacred gardens offer analogous evidence for the man-made creation of naturally numinous spaces, rituals which mediated between the human and the divine as the settings mediated between anthropogenic and natural landscapes (Barnett 2007). Approaches from cognitive psychology and neurosciences have now been brought to the investigation of cult in caves: Ustinova's (2009) study integrates these perspectives with archaeological, historical, and textual evidence.

The location of sanctuaries in civic and natural landscapes received significant theoretical boost in 1984 with de Polignac's study linking sacred space to the emergence of Greek city-states: temple and sanctuaries, he argued, were locations for city-states to contest territorial boundaries and achieve mediation with their neighbors. A flood of studies followed, including Schachter (1992), Alcock and Osborne (1994), and Cole (2004). The focus on sacred space has extended, in the first decade of this century, to studies of landscape: religious applications include the definition of sacred landscape, its memorial, metaphoric and ritual uses, and the balance of ritual and practical functions. Scheid and de Polignac provide an overview of the problems and potentialities of this discussion (2010); Gkiasta offers a review of how these methods and theories have been applied to Crete (2008); del Olmo applies the questions of landscape and religion to southwest Arcadia and Sicily (2005, 2010); Olshausen and Sauer offer a collection of 28 papers from a 2005 colloquium Olshausen and Sauer (2009). Both survey archaeology and regional approaches to Greek religion inform these approaches to sacred space which extend beyond the confines of a single sanctuary. Romano demonstrates the contribution of survey to the sanctuary of Zeus at Mount Lykaion (2005a); del Olmo provides an exploration of the impact of regional approaches to Arcadian religion (2005b).

The date at which sanctuaries emerged in Greek history has been a matter of energetic debate. The first elements have been identified in the eighth and ninth centuries BCE; investigations engage questions of the relationship between sacred space, political identity, and the definition of boundaries. Morgan's studies at

Olympia offer a Peloponnesian case for this emergence; Simon provides an Ionian; Mazarakis Ainan has argued that temples replaced the homes of rulers as locations for cult around the first half of the eighth century (Sourvinou-Inwood 1993; Morgan 1993, 1996; Simon 1997; Mazarakis Ainian 1997). Østby provides an annotated, geographically arranged bibliography on research on Greek sanctuaries since 1965, including new directions in architectural studies which define the functions of discrete areas within the temples (1993).

The boundary of sanctuary space was defined by both physical and behavioral means. Physical boundaries consisted of either a built wall or natural features: see Bergquist (1967) for a study of the definitions of the Greek *temenos* and Patera (2010a) for analysis of the terminology brought to sacred spaces. The "sacred laws" which regulated behavior in ritual areas constitute one of the most important bridges between written and archaeological evidence for sacred space. Lupu's (2005) publication offers an update to Sokolowski's canonical works of 1955, 1962, and 1969; Parker's (2004) essay considers the meaning of the term "sacred law"; Brulé (2009) offers a collection of essays exploring the dynamics of ritual regulations. Calendars varied from one city-state to another and reflect the festivals, sacrifices, priesthoods, and civic groups responsible for the performance of rituals which held the state together. Lambert (2002) offers the first full edition of the Athenian sacrificial calendar; Robertson (1999) uses the calendar to cast light on the Eleusinian mysteries.

The effective boundary of sacred space extended beyond the sanctuary walls, and two recent foci – processions and pilgrimage and the territories owned by the temple for economic gain – integrate archaeological and historical data in their investigation. Graf notes that studies of processions lapsed after the start of the century and proposes a distinction between centripetal and centrifugal (Graf 1996); Connor provides a survey of methodology (1987); Herda provides a detailed analysis of the new year's procession between Miletus and Didyma (Herda 2006). Travel to internationally recognized oracles, festivals, and mystery sites extends the question into the broader Mediterranean; comparanda are drawn from Christian pilgrimage and have particular focus in late antiquity (Dillon 1997b; Elsner & Rutherford 2005). The economic functions of the Greek temple include the owning and leasing of land, sale of priesthoods, the production of goods in the sacred area, and the cost of temple construction (Dignas 2000, 2003; Salmon 2001; Davies 2001). Festivals and emporia demonstrate the integration of ritual activity and economically beneficial exchanges (Naerebout 2001; Stavrianopoulou 2006; Demetriou 2011). The publication of conferences from 1990 to 2005 offers overviews of the state of the question (Linders & Alroth 1992; Nielsen 2009).

The altar is one of the most essential elements of Greek sacred space, and sacrifice has been the object of a flurry of recent publications (Graf 2002; Knust & Várhelyi 2011). Greek cult practice knew both elevated altars and offering pits. The elevated types range from the mounds formed of the remains of previous offerings, consisting of ash, bone, or horn, to the architecturally elaborate monumental altars of the Hellenistic period. Altars made of ash and bone now appear to be more common than previously imagined: examples include the massive ash altars of Zeus at Olympia and at Mount Lykaion (Hägg 2000; Romano 2005). The archaeology of monumental Hellenistic altars on the order of the altar of Zeus at Pergamon has a continuing position in art historical and architectural study. Webb (1996) includes the altars in her study of Hellenistic architectural sculpture; Scholl (2009) explores arguments for the altar of Zeus as an imaginary palace. The ability to distinguish functional differences based on altar types is an ongoing debate: the traditional hypotheses of raised altars for Olympian gods, offering pits for chthonic gods and holocaustic sacrifice, have been challenged (Kearns 1992; Ekroth 1999, 2001, 2002; Kron 1999; Boehringer 2001; Stratiki 2002; Patera 2010b). The frequent representation of sacrificial scenes on vase paintings makes iconography a major resource for altar studies, which may be devoted to typology

(Rupp 1991a, b) as well as to ritual practice (van Straten 1995). The divide between archaeological and textual studies of Greek religion is most thin in connection with sacrifice and feasting. These include anthropologically informed hypotheses for the origins and function of sacrifice (Burkert 1983), analyses of sacred violence (Girard 1972; Georgoudi et al. 2005), and the contributions of the Paris school, drawing on structural analysis of myth and history (Detienne & Vernant 1979; Faraone & Naiden 2012). The study of sacrifice is also one of the relatively few areas in which faunal analysis has come to play a role in the archaeology of Greek cult: overview is provided in Reese (1997) and MacKinnon (2007); Bookidis et al. (1999) bring these technologies to the analysis of the cult of Demeter and Kore at Corinth. Essays collected in Georgoudi et al. (2005) provide a conspectus of current approaches to sacrifice in Greek religion, against which the archaeological studies may be measured; articles in Mehl and Brulé (2008) emphasize archaeological and iconographic approaches to sacrifice. Among the most theoretically bold approaches – and the most distant from the long history of an isolated classical archaeology – is the volume *Architecturer l'invisible: Autels, ligatures, écritures* in which altars are explored in Greek, Assyrian, Medieval, and ethnographic contexts (Cartry et al. 2009).

Sacred space was also defined by votive practice. Archaeological approaches have moved from collection and cataloguing of finds to considerations of function, regulations, and economic impact. Votives in the form of body parts are traditional inclusions in shrines of healing divinities and offer exceptional insight into the intent of the dedicator; studies of the production of votives on site reshape the conception of the Greek sanctuary as experienced in antiquity. Key publications in the recent discussions include F. van Straten (1981, 1990), Bodel and Kajava (2009), and Prêtre and Huysecom-Haxhi (2009). Day has drawn attention to the interactive potential created by inscriptions on dedicated objects; Osborne positions Greek votive practices within the world archaeological perspective (Day 1994; Osborne 2004a).

Among the many ritual types identified within Greek religion, hero cults and rites of passage demonstrate the confluence of methodologies and research agendas which have enlivened the archaeology of Greek religion over the past three decades. In studies of hero cult, the uses of Homeric poetry exemplify the more nuanced relationship between text and archaeology which turns the classical reliance on texts from a liability into a critical asset. Current debates focus on political function of hero cult, its distinction from tomb and ancestral cult, the ancient reuse of Bronze Age remains, and the potential to identify a distinctive sacrificial practice (Popham et al. 1982; Morris 1988; Alcock 1991; Antonaccio 1994; Whitley 1994; Ekroth 2002). The ritual type identified by van Gennep over 100 years ago as Rites of Passage has long been applied to studies in Greek religion. While its heuristic value has been vigorously debated (Dodd & Faraone 2003), it continues to provide a framework of investigation for rituals at the sanctuary of Artemis at Brauron, athletic competitions for both genders at Olympia, analyses of weddings and funerals, and studies of data from Crete from the Bronze Age through the Hellenistic period (Kahil 1983; Koehl 1986; Sourvinou-Inwood 1988; 1990; Barringer 1991; Shapiro 1991; King 1993; Serwint 1993; MacGillivray, Driessen & Sackett 2000; Scanlon 2002; Erickson 2009). These studies combine archaeological, iconographic, epigraphic, and historical evidence. Caveats regarding the historical tenability of van Gennep's paradigm must be balanced against the extent to which the model succeeds in bringing together a range of ritual types and examples and so furthers the movement toward comparative study whose absence once characterized the archaeology of Greek cult.

International Perspectives

Because of the role of non-Greek nations in Greek archaeology, a range of international voices has characterized the archaeology of Greek religion from the onset. Reactive or

dissident schools have emerged in Cambridge, Paris, Hamburg, and Naples, each of which offers some contribution to a new archaeology of cult. Cambridge emerged as a center for theoretically rich studies, led by publications focusing on the emergence of the state and social complexity and the use of quantitative analysis (Snodgrass 1971, 1977; Renfrew 1972; Morris 1987; Morgan 1994). The Theoretical Archaeology Group, begun by the universities of Sheffield, Cambridge, and Southampton in 1979, provides an ongoing meeting ground for the debate of archaeological theories. Structural studies have centers in both Paris and Hamburg: two Paris publications of the 1980s continue to be seminal, de Polignac (1984) for the landscape of Greek cult and Berard et al. (1984) for iconography. The journal *Hephaistos*,established in Hamburg in 1979, is as devoted to theoretical as it is to empirical studies; the journal *Annali di Archeologia e Storia Antica*, published in Naples, offers a range of classical archaeological studies positioned in a contemporary theoretical context (Whitley 2001: 54-6).

Future Directions

Survey techniques, perspectives from neuroscience, and the exploration of network models are three areas in which new directions in Greek archaeology intersect with the study of cult. Survey techniques have revealed previously unidentified shrines, are a natural format for the integration of ethnoarchaeological techniques, and are critical archaeological components in the growing interests in the intersection of religion, landscape, and geography (Lolos 2005). Cognitive and neuroscience perspectives have begun to enter a range of topics in Greek religion, including sacred space, vase paintings, and mystery religions: the interest suggests a lessening of the divide from prehistoric archaeologies, where they have had a longer discussion (Martin 2006; McCauley & Lawson 2007; Whitley 2008; Ustinova 2009; Geertz 2010; Schauer 2012). Network models are impacting models of Greek religion, applied to interactions in the islands (Constantakopoulou 2007), the study of hero and other cult in connecting scattered communities in the Archaic period (Malkin 2011), and the intersection of commercial and religious functions (Gabrielsen 2007).

Cross-References

► Epigraphy, Greek

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Religion, Italo-Roman, Archaeology of

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Introduction

Roman scholars during the Late Republic and Empire credited Etruscan religion with much that was basic to Roman cult and ritual, most notably the "scriptures" of the *etrusca disciplina*, which they believed had been committed to writing in the earliest days of the cities of Etruria. Even though Etruscan culture, like its language, was perceived as radically different from that of the rest of Italy, as early as the Iron Age (and probably before), many sacred places, rituals, and material aspects of religion were shared with the Indo-European, Italic tribes; by the fourth century BCE, the neighboring Faliscans overtly shared sanctuaries (e.g., Lucus Feroniae) and utilized Etruscan art and script for religious depictions and votive dedications. The strong bonds to Etruscan cult were retained even after the Christianization of the empire: pagans exploited the Etruscan scriptures as a foil to Judaeo-Christian revelation, and in 410 CE, Etruscan haruspices offered to summon thunderbolts to defend the city of Rome from Alaric's army.

Religion in Italy was constantly evolving, in tandem with the growing complexity of societies, in response to catastrophes and through exposure to alien cultures. While sacred places and basic attitudes of worship, divination, and expiation were maintained over many centuries, such familiar (to us) features as temples and cult statues were optional or mutable in Italic and Etruscan practice. By the mid-third century BCE, Rome dominated Etruria, the Italic tribes, and Greek southern Italy; Sicily was soon to follow: almost immediately artistic and ritual aspects of many cults began the process of syncretism, interpreted by some scholars as a means of "Romanizing" or achieving favor within the new political system. During the last two centuries of the Republic and the first two of empire (second century BCE – second century CE), conquests abroad would escalate the process through the adoption of foreign cults. Worship of Cybele (Magna Mater/Great Mother) from Asia Minor and Aesculapius (imported from Kos in a time of plague) came in response to state initiatives and consultation of Greek oracles. The cults of Dionysos/Bacchus, Isis, Mithras, etc., begun as popular, sometimes underground, movements were at times suppressed but ultimately embraced by all levels of an increasingly diverse population. Rome developed new cults to commemorate abstract principles such as piety, honor, and hope, quite different from the cults and myths of the chthonic or Olympian gods. As early as the death of Julius Caesar, an imperial cult began to form, asserting the special status of members of the emperor's family and enhancing respect for the imperial regime. The acceptance of Christianity by Constantine in 303 CE was the next, and revolutionary, stage in the process.

Although references to primitive religion appear in the Classical authors and we know that scriptures existed and were consulted, the actual matter of Italo-Roman cults can today only be restored by reference to archaeological evidence. Scholarly interpretations may be skewed by the situation of Roman dominance of Italy and by the failure of Roman priestly colleges to preserve intact the writings of earlier groups. Numerous references to the *etrusca disciplina* and epigraphic finds such as the *Iguvine Tables* (from Gubbio, Italy) attest to such lost documents. The texts themselves may only be reconstituted from references left by Roman authors who wrote centuries after the various scriptures had been revealed or posted: so all such analyses must be appraised with caution. (Main authors: Livy; Cicero, *De divinatione*; Ovid, *Fasti* and *Metamorphoses*; Seneca, *Naturales Quaestiones*; John the Lydian, *De ostentis*; Martianus Capella, *De nuptiis Mercurii et Philologiae*; Censorinus, *De die natali*; Macrobius, *Saturnalia*.)

Historical Background

Pre- and Protohistoric Evidence

Ever since the Neolithic period, burials attest to funerary religious cult, in the placing of offerings with the prepared dead; the evidence culminates in the dramatic change (perhaps inspired by a cult or religious revival?) in the Final Bronze Age (c. 1200–1000 BCE) to highly formalized cremation ritual and the use of biconical urns, sometimes dressed or decorated with clothing or ornaments. In Latium, some cremations were buried in hut-shaped urns with miniature sets of vessels and even figurines placed inside: surely tokens of ancestor cult. Other Iron Age finds, especially certain metal hoards buried on the outskirts of hut villages, may represent boundary offerings, and images used to decorate vessels and metalwork include boats and birds, perhaps recalling the sun-barque or messengers of the gods. At Etruscan Tarquinia (Pian di Civita) burnt sacrifices and animal bones and antlers mark a sacred area of the ninth through sixth centuries BCE (below).

Key Issues/Current Debates

The Primacy of Writing

Written religious documents included the Etruscan received scriptures, the *etrusca disciplina*, believed to have been dictated by the prophet Tages, a supernatural being resembling a child with the features (teeth, gray hair) and wisdom of an old man (*puer senex*). He emerged from a plowed furrow made by Tarchon, founder of the city of Tarquinia, and proceeded to sing or recite the directives of the gods on divination and required ritual. At the end of his mission, he disappeared back into the earth. The verses included the doctrine of *saecula*, time cycles allotted to different humans and cultures, including Rome, the doctrines on boundaries and land (some preserved by the Roman surveyors' guild: the "Prophecy of Vegoia"), and the *libri Acherontici*, texts covering funerary ritual. Some terms incorporated in Etruscan and Italic cults are preserved in glosses by later authors, e.g., *aiser*, Etruscan for "gods," and *camillus* for a youth officiating in certain cults.

The *etrusca disciplina* was not the only recorded/received scripture in Italian culture: the Latin verse "Prophecies of Marcius" was attributed to an illustrious wandering prophet of legendary times and was circulating in Latin literature by the third century BCE (Livy 25.12.2-15). The Sibylline books, also of foreign origin (the sibyl who sold them to King Tarquinius was said to be from the oracle of Apollo at the Greek colony of Cumae), were kept secret at sacred locations in Rome and consulted in times of crisis, at the order of the Senate. Such texts suffered precarious fortunes, being transferred to different temples and archives in times of fire or war and occasionally having to be reconstructed from dispersed copies.

The Umbrians of Iguvium (Gubbio) displayed, on seven large bronze plaques, the "*Iguvine Tables*," inscribed in Umbrian language using either Etruscan or Latin script. Discovered in 1444, they were written during the third to first centuries BCE as transcriptions of much older documents directing animal sacrifices, observation of birds (augury), and purification rituals

linked to Jupiter Grabovius (and other gods). The faithful of Samnium recorded in the *Agnone Tablet* (now in the British Museum) the mystery cult of Kerres (Ceres/Demeter), using the Oscan language of the Bay of Naples.

Rome itself posted the *Laws of the Twelve Tables* and other laws believed to have been created by the pious, early seventh-century BCE king, Numa Pompilius: such laws as the *lex regia de mortuo inferendo*, still attributed to Numa in the era of Justinian (d. 565 CE) (*Digesta 11.8.2 Marcellus 28 dig.)*, instilled a connotation of cosmic, religious significance into some state regulations.

Divination

Religion throughout Italy seems to have embraced a wide array of divination techniques and rituals, many of them credited to Etruria by the Romans. Augury (the study of the flight of birds, clouds, lightning, and thunder), haruspicy (examining the organs, especially liver, of a sacrificial victim), and the study of *prodigia* (unnatural phenomena and creatures) may all be traced to the *etrusca disciplina*; sacrifice and bird augury appear in the *Iguvine Tables* and in the Latin tales of Romulus and the founding of Rome. The bronze "Piacenza Liver" model, inscribed with the names of Etruscan gods on compartments corresponding to the regions of the universe, is believed to have been a symbolic or educational tool for haruspices; some elements of the procedure and terms can be traced to much older, Mesopotamian haruspical models and texts.

The philosopher Seneca (d. CE 40) (*Naturales Quaestiones* 2.32.2) commented on Romans' perception of the Etruscan scriptures and rituals: "This is the difference between us and the Etruscans, with whom resides the utmost learning for interpreting lightning: We believe that lightning is caused by clouds colliding, whereas they believe that clouds collide in order to create lightning. Since they attribute everything to the divine, they are led to believe not that events have a meaning because they have happened, but that they happen in order to express a meaning."

The Umbrian *Iguvine Tables* also contain directives on divination, while under Rome, the College of 60 Haruspices (*Ordo LX Haruspicum*) operated under the Roman state, presumably following a long Etruscan tradition; it was based at Tarquinia. Eventually, official haruspices traveled with Roman armies and practiced in most regions of the Empire. From early times, oracular shrines were maintained, the most famous perhaps that of Fortuna Primigenia at Praeneste, which included caves and an elaborate, multitiered sanctuary inspired by the great Hellenistic Greek shrines but constructed in concrete and other Roman building materials: modern Palestrina conforms to the outline of its second century BCE plan.

Rituals

When divine messages warned of the need for expiation, the books were again consulted for the rituals by which to make amends to the gods (in Rome this included lustration, when the whole city participated in processions, sacrifices, and rededication). Other ceremonies, again attributed to Etruria, site of the peninsula's first cities, were the essential rites by which cities are founded (presumably the source of Romulus' plowing of a furrow with bull and cow to delineate the city's sacred boundaries). Such a furrow may have been identified in seventh-century levels at Etruscan Veii. Other rituals involved processions and displays such as the chants and leaping dances of the Arval Brethren and the carrying of gods' statues in processions. Many rituals surrounded liminal events such as birth, marriage, and death. The Roman state held regularly scheduled rituals of *vota* – vows made by consuls and priestly colleges with special reference to wars, battles, and catastrophes such as epidemics; generals might vow to build a temple with future spoils.

Little is preserved of such personal rites as prayers, but comments in the ancient authors show that such communications had to be accurately recited and must be repeated in entirety if the speaker stammered. Vows must be made and resolved publicly, with promised, meaningful offerings: inscriptions on vases, cult equipment, statues, and personal belongings offered in

fulfillment of vows sometimes give the names of the grateful (in Etruria occasionally including freedmen or their families). In Latin custom, votives often were marked *v.s.* for *votum solvit* ("she/he fulfilled the vow"). Again, in votive religion, writing assumed a significant position in the conduct of religious activities. On analogy to modern Christian customs of offering inscribed representations of objects desired and gained or body parts healed, these represent phenomena already granted to the worshipers by the gods. A significant change in society and belief around the end of the fourth century BCE seems to be illustrated by the rapidly spreading phenomenon of offering anatomical votive models (usually terracotta, but in the Archaic north of Italy, in metal). These take the form of rationalized internal and external organs, heads or complete statues, and figures of swaddled infants; large numbers of uterus models were found in such cults as those of Vei/Demeter, Uni/Hera, and Turan/Aphrodite at Gravisca, an extramural sanctuary of the Tarquinian port. After c. 300 BCE, there is evidence of freedmen participating publicly, as well as large numbers of women, and similar votive models and inscriptions occur in Latin and Campanian shrines also, where even in healing cults, almost any god might be the recipient/patron, including Minerva and Hercules.

Other ritual activities indispensible to Etruscan and Italic cults include sacrifice, usually of animals, often of inanimate foodstuffs. Possible human sacrifice is suggested in rare evidence such as a wounded warrior's skeleton buried anomalously in the sacred area of Tarquinia's Pian di Civita in the mid-eighth century BCE: he had been killed by an axe blow similar to that used for ritual slaughter of sheep or cattle. Rare scenes depicting Etruscan funerals with a costumed character, "Phersu," seem to show blood sacrifice (a wounded, captive performer) but are the only potential evidence of atavism of earlier human sacrifice. The Roman sacrifice of enemy couples (Gauls and Greeks) buried alive in the Forum Boarium (228, 216 BCE, Livy 22.57.6) was considered a response to state crises, rarely repeated and by Pliny's day prohibited (*Natural History* 28.12ff.). Traces of young animals cremated with the deceased at Etruscan funerals (Iron Age through Hellenistic period) may illustrate the practice of creating the *dii animales* which Roman authors attributed to Etruscan scriptures: for the recently dead to metamorphose into "spirit gods"(from Latin *anima*), a sacrifice of living blood was required. The bloody mythological scenes (battle, murder, monsters) often depicted on Etruscan urns and sarcophagi may be tangible reminders of these beliefs.

Many details are known, from art and literature, of Roman ceremonies: Roman men covered their heads, if not with the special priestly headgear, like the *apex* or *galerus*, then with a fold of the toga; many votive heads and statues depict this pose *capite velato* ("with veiled head"). Although they may be found in the same votive deposits (as at Ponte di Nona outside Rome), comparable (male) images lacking the veiled aspect are often considered to represent Etruscan rather than Italic practice. Rome maintained a plethora of religious colleges, cults, and offices, all perceived as in some way aiding the state as a whole. Such offices as the *pontifex maximus*, who determined dates of festivals and law courts, the *flamines* (priests assigned to specific state cults in Rome and the towns), and Vestal Virgins were strictly controlled with harsh penalties for impropriety; priests' wives, too, came under such restrictions. Aristocrats assumed the priestly offices, and many apparently served in multiple cults, to judge from the Etruscan *curriculum vitae* held (as a scroll) in the hand of the effigy of Lars Pulenas, on his sarcophagus (c. 270 BCE). *Netsvis* and *cepen* are read as Etruscan titles for priests, the former indicating a haruspex, to judge from the bilingual epitaph of Lars Cafates/Cafatius, found at Pesaro: he was *netsvis trutnut* and *frontac* – in Latin, *haruspex [et] fulguriator* ("priest of divination by liver and by lightning"). Rome had many religious colleges, staffed mainly by the upper classes, although some allowed freedmen full membership, and certain cults, such as that of Isis, welcomed slaves also.

The Roman year was filled with festivals (*feriae*) of particular cults and state ceremonies, including many celebrations of the agricultural year, the flocks, and historical events; they usually involved a sacrifice and distribution of the meat, followed by games. For instance, the Megalesia included theatrical performances and games honoring Magna Mater, introduced from Asia Minor in the third century BCE (early April). Festivals include Vinalia (April 23 and August 19, wine), Robigalia (April 25, to prevent rust on grain), Consualia (August 21, storage of crops after harvest), Saturnalia (December 17, end of year), and Lupercalia (February 15, purification and fertility of flocks). Later many dates accrued for the anniversaries of temples or cults founded, historical events, imperial birthdays, etc.

Sacred Places and Structures

Places of worship did not require a formal structure and often focused on some special natural feature, with worship conducted in the open air; there is ample evidence across the Italian archipelago for the use of caves as cult places, from the Neolithic through the Iron Age and beyond. Most sacred sites show cult activity in later periods as well. Etruscan cult places included the seashore (Gravisca, Pyrgi, Punta della Vipera), swamps, springs, or lakes (Brolio, Falterona) and mountaintops (Lucus Feroniae, shrine of a Sabine earth goddess, shared with Faliscans). Confederated sanctuaries were often politicized, such as the *Fanum Voltumnae apud Volsinios* (the shrine of Voltumna/Vertumnus in the territory of Volsinii, i.e., Orvieto), where an extramural sanctuary has been identified, with subsequent structures (Christian church) as late as the medieval period. The Latin League celebrated annual festivals in April on the Alban Mount with the sacrifice of a white heifer and communal meal.

One of the most famous cults, both Etruscan and Italic, was that of Soranus (oracular, syncretized to Apollo Soranus) on Mount Soracte. A sanctuary of the goddess Mefitis at Ampsanctus in the Hirpine territory centered around a sulfurous spring. At Rossano di Vaglio in Lucania, the extra-urban cult of Mefitis included a paved courtyard with sacrificial altar; it also featured the worship of the Oscan war-god Mamers (c. 350 BCE to first century BCE or CE). Many modern scholars, following ancient authors in emphasizing the primitive aspects of Italic, supposedly tribal, culture, have undervalued the sanctuaries and monuments of such cultures as the Samnites. Their great rural sanctuary at Pietrabbondante included a temple and theater complex probably used for political and military gatherings which included bull sacrifice and offerings of weapons. Like the Republican-era rural shrine at San Giovanni in Galdo (a *sacellum*, a small shrine, within a rectangular precinct), such sacred places served to reinforce the boundaries of different territories. The Italic cults often favored Hercules or patron goddesses such as Juno of Gabii, whose Republican-era temple still stands. To the south, Lucania has also yielded evidence of crossroad sanctuaries and cults within the households of Italic aristocrats. Pompeian murals (Boscotrecase, House of Agrippa Postumus) illustrate such idyllic rustic shrines and country worship.

The phenomenon of "visiting gods," well known in Greek sanctuaries, was also frequent in Italic cults. At Iguvium, the great bronze plaques cite at least 29 deities, to be honored with rituals such as auspices and sacrifices conducted at the city gates. These were undertaken on behalf of the community in general or the college of the "Brotherhood of the Atiedii" (paralleled at Rome by the Arval Brethren worshipping Dea Dia, or the Salii, the "leaping priests" of Mars).

At Samnite Pietrabbondante, the outdoor shrine only acquired a temple building between the end of the third century and 90 BCE (the period between the Hannibalic War and the Social War). By that time, generals in the midst of military campaigns or battles might vow to build a temple if their patron god(dess) gave victory: in Rome, the temples of Mater Matuta and Fortuna Virilis in the Forum Boarium (now beneath the church of Sant'Omobono) were dedicated by the victorious Camillus (replacing a sanctuary of the regal period), and the small, jewel-like, Republican temples placed close

together along the triumphal route (now Largo Argentina) seem to be similar victory monuments (one dedicated to *Fortuna Huiusce Diei*, "Good Fortune on This Day"). The triumph (a tradition also attributed to Etruria) was essentially a religious ceremony for a victorious general and his army, a procession exhibiting spoils and captives, culminating in a sacrifice at the Capitoline Temple and slaughter of prisoners (as of Vercingetorix after Caesar's triumph in 50 BCE).

The earliest formal temple seems to be a small *sacellum*, a simple, rectangular shrine erected c. 600 BCE in the city of Veii; at port towns such as Gravisca and Pyrgi, Greek residents influenced the building of cult rooms and eventually an early peripteral temple at Pyrgi (Temple B, sixth century), although it was constructed with Etruscan-style terracotta roofing and ornamentation. Pyrgi had a motel-like building possibly for ritual banquets (erroneously associated with "sacred prostitution"), and Temple A, erected c. 460 BCE, was a large Tuscan-style temple with dramatic, narrative terracotta sculpture covering the ridge and other beams in an insert roof. The famous *Pyrgi Plaques*, gold inscriptions nailed to some structure and given ritual burial when the temples were deconsecrated, were inscribed c. 500 BCE to commemorate an event in the reign of "king" Thefarie Velianas of Caere – one is in the Punic/Phoenician language and script and the other two in Etruscan.

At Veii, the famous extramural temple crowned with terracotta statues of Apollo and other gods was built late in the sixth century BCE and included a precinct with a large ritual pool, altar, and other structures. (It was not dedicated to Aplu/Apollo, but probably to one or more goddesses.) Large quantities of votive offerings once displayed there were found buried on the site, including gifts of Aulus Vibenna and members of the once-royal Tolumnii family.

In Latin terminology, *templum* was originally simply a place for public activity, approved by Jupiter, inaugurated when *augurs* (divination priests) consulted the gods by taking auspices in various ways; this activity had to occur inside the ritual city boundary, the *pomerium*, within which burial and armed soldiers were banned. (Inscribed stone *cippi* found at Daunian Bantia (modern Banzi, Italy) may have marked an *auguraculum*, a space designated for taking auspices for this Roman colony.) Crucial for an Etruscan or Italic sanctuary were an altar and precinct wall; altars of different types reflect the character of the cult, such as the *mundus* altar, which had a drain into the earth, for chthonic and underworld gods. The so-called Tuscan temple, a rectangular building on high podium, with deep, colonnaded frontal porch, broad eaves, and ornately decorated, insert roof, was never rigidly canonical in proportion or plan, but can be seen in the remains of terracotta roofing systems and large plans at Etruscan and Latin sites such as Veii, Vulci, Tarquinia, Caere, Satricum, and Velletri. The tripartite cella became characteristic of the Capitolium, the main temple of the Roman state, duplicated in many municipalities as Rome grew; rooms were linked to Jupiter, Juno, and Minerva. By the Late Republican period and Empire, Roman temples were hybrids of "Tuscan" and (Hellenistic) Greek design.

Shrines could also be erected in necropoleis, such as the Cannicella Necropolis at Volsinii/Orvieto, where running water and a nude goddess statue were displayed, along with votives. In the center of the necropolis of Sovana, there was even a healing cult, where anatomical votive models (of the viscera) were dedicated. Several sanctuaries employed running water features, including the fifth-century fountain shrine at the Adriatic colony of Marzabotto. During the period of Roman colonization of Etruria, worship also continued within the ruins of some cult places, where masses of votives were left in nighttime rituals at Gravisca and at Veii Latin names appear on the offerings.

It was assumed (by ancient and modern authors) that when the monarchy ended, the king's priestly functions were delegated to citizens, resulting in a number of fragmented offices such as the so-called *rex sacrorum* ("king of sacred things"). In Rome, the Regia, supposedly the royal palace converted to the headquarters of the state cult (of Jupiter, Juno,

and Mars), was situated in the heart of the Forum near the House of the Vestals and ultimately became the office of the *pontifex maximus*. (Which office was exploited by Julius Caesar among others; certainly politicians took advantage of the opportunities of public religious office, as would the emperors).

Domestic Cults

Little evidence has been detected for permanent structures of household cult in Etruria – although much information has been attributed to the ancestor cult practiced in funerary ritual: some tombs encompass cult rooms fitted with carved furniture as if the family expected to picnic with the deceased occupants of the tomb; statues of venerable personages, enthroned and with footstools, even scepters, in the Tombs of the Statues and of the Five Statues in the territory of Caere, while showing Near Eastern/Syrian inspiration in their design and carving, appear to be monumental versions of such earlier figures as the clay humanoids found in some Latin hut urns or the seated banqueter on the lid of a Volterran Iron Age cremation urn from Montescudaio. The deceased are presumably now ancestors; Etruscan tombs of the fourth century depict a family's earlier generation at banquet in the underworld, enjoying the attention of Hades and Persephone. Images of Vanth, the Etruscan death goddess, show her as beautiful and nubile, sometimes winged, or scantily clad, and other funerary images emphasize sexual aspects of death: ancestors are intrinsically bound with the ongoing fertility of their family.

Strong traditions of funerary ceremonies are found in all cultures of ancient Italy, including artistic or other references to the journey to the afterlife, completion of the course of life (symbolized by steering oars or ships), apotropaic scenes, offerings and consumption of a meal with the dead, funeral games, and the equation of sex and death. Roman funerals displayed effigies, even masks of deceased illustrious family members. The Roman festivals of Lemuria and Parentalia were held in May and February in honor of the spirits of dead members of the Roman household, the former hostile spirits, and the latter benign members of the immediate family.

Roman literature preserves commentary on Italic household and family cults including the Lares and Penates, guardian spirits for the Roman household; Lares may derive from the family land, while Penates protected the larder. The houses destroyed at Pompeii and Herculaneum in 79 CE contain several Lararia, cabinet-like shrines imitating a temple, with paintings and/or figurines depicting dancing Lares (youths with cornucopiae) and venerable bearded snakes, with the occasional offering bowl. The Roman practice of a free-born youth dedicating his golden *bulla* (a "bubble" amulet in essence like a native American medicine bag) in the shrine of the family Lares was preceded in the Iron Age by Picene, Etruscan, and Faliscan wearers of similar, hollow lockets.

Magic, although the dark side of belief, was a prominent feature of ancient Italy, as seen in curses and binding spells, often worked in necropoleis, as in a pair of inscribed lead, nude and bound figurines depicting an Etruscan man and woman, found in a tomb in Sovana. During the Roman Empire, binding spells were often recorded on lead tablets (*defixiones*) and deposited in secret in the circus or court with pleas to underworld gods to affect the outcome of competitions and trials.

Cross-References

► Central Italy: Etrusco-Italic Sanctuaries

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Renfrew, Colin

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Basic Biographical Information

Colin Renfrew (Lord Renfrew of Kaimsthorn) is best known in archaeological circles for his contributions to archaeological theory. He is rather less well known for his work toward protecting cultural heritage, which he has often performed away from professional and public view. He has served in various capacities on the Hampshire Archaeological Committee (1974–1981), the Royal Commission on Historical Monuments (England) (1984–1986), the Historic Buildings and Monuments Commission of England (1984–1986), the UK National Committee for UNESCO (1984–1986), and the British School at Athens (2004–2010). Since the 1990s, he has been an outspoken critic of the illicit antiquities trade and its promotion of archaeological looting (Renfrew 2000, 2003, 2006; Brodie et al. 2001; Brodie & Renfrew 2005).

Major Accomplishments

In 1991, Renfrew became the first director of the newly established McDonald Institute for Archaeological Research at the University of Cambridge, and in 1997, he established as a project of the McDonald Institute the Illicit Antiquities Research Centre (IARC). Staffed by Neil Brodie and Jenny Doole, with the

association of Peter Watson, the mission of the IARC and its newsletter *Culture Without Context* was to research and raise awareness of the damage caused to cultural heritage by the antiquities trade and to promote appropriate public and professional policy responses. In recognition of its work, the IARC was awarded the European Archaeological Heritage Prize (2004) and the Archaeological Institute of America's Outstanding Public Service Award (2006). In 2004, Renfrew retired as director of the McDonald Institute, and in 2007, the IARC was closed down.

While fully involved with the work of the IARC, Renfrew continued his committee work and was active in promoting ethical and legislative change aimed at regulating the antiquities trade. As a trustee of the British Museum (1991–2001), he was instrumental in drafting a new (1998) acquisitions policy, which stated that in future the museum would only acquire an antiquity when there was documentation to show that it had already been out of its country of origin by 1970, the date of the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership on Cultural Property, or legally exported since that date (Renfrew 2000: 124-5). Also in 1998, he encouraged the Council of the British Academy to adopt a similar policy to guide scholarly engagement with traded antiquities (Renfrew 2000: 126-8), and likewise the UK's National Art Collections Fund after he was appointed to its executive committee in 2001. The "bright line" of 1970, initially taken up in 1970 by the Museum of the University of Pennsylvania, has since been adopted by other museums, including the J. Paul Getty Museum (2006) and, acting with Renfrew's advice, the Badisches Landesmuseum in Karlsruhe (Renfrew 2006: 251-5). It is largely through Renfrew's advocacy that the 1970 threshold has now become an international standard, recommended by the UK government in 2005 and by the Association of Art Museum Directors in 2008.

Renfrew was created a life peer in 1991 and since then he has been prepared to use his position in the House of Lords to question the UK government about policy (*inter alia*, the failure of the US-UK coalition to prevent the looting of the Iraq National Museum in 2003 (Renfrew 2003)) and to scrutinize some of the less than transparent out-of-court maneuverings of rich and powerful collectors, such as those involving Lord Northampton and the Sevso Treasure (Renfrew 2000: 46-51) and Martin Schøyen and the Aramaic incantation bowls (Balter 2007). He has not shrunk from exploiting his celebrity to raise issues in the press, using the occasion of his attendance in Paris for the 30th anniversary celebrations of the 1970 UNESCO Convention, for example, to question publicly the acquisition by the Louvre of some Nigerian Nok terracottas (Riding 2000). In 2009, for his work in opposing the illicit antiquities trade, he was awarded the SAFE Beacon Award.

In 2000, Renfrew was invited to be a member of the ministerial Advisory Panel on Illicit Trade (ITAP), convened by the UK government to advise on policy as regards the antiquities trade. Recommendations made in ITAP's report that the UK should accede to the 1970 UNESCO Convention and introduce specific criminal legislation were subsequently realized, with accession to the UNESCO Convention in 2001 and enactment of the Dealing in Cultural Objects (Offences) Act in 2003.

Cross-References

- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Repatriation Acts: Before NAGPRA

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Introduction

As influential as it has been on archaeology, museums, and Indigenous people – well beyond US national borders – many people consider the enactment of the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 in the United States to be the beginning of the repatriation movement. But in the US, repatriations and reburials of human remains, as well as return of sacred objects, started substantially earlier. Even before repatriation and reburial became openly controversial, archaeologist Roderick Sprague and anthropologist Deward Walker, for example, had worked closely with Nez Perce people in the state of Idaho, quietly repatriating remains as early as the late 1960s. As the issues became heated over the next two decades, American Indian demands and attempts by the archaeological and museum communities to respond eventually led to NAGPRA. Before NAGPRA became law, however, Indians and archaeologists had numerous discussions and occasionally bitter arguments about respectful treatment of the dead. As the issue developed, there were efforts to compromise, several repatriations occurred, and many states enacted repatriation laws (Price 1991). The path to NAGPRA was complex and meandering.

Tribes had expressed concerns about the treatment of their ancestral remains for decades but had little power to stop excavations and collections of skeletal remains by the scientific community and museums (Thomas 2000: 52-63). Intense pressure for archaeologists to stop excavating human remains, however, accompanied the intensifying American Indian activism of the late 1960s, which was linked in part to the general social upheavals of the time in the United States. As they found their voice, one activist group, the American Indian Movement (AIM), specifically targeted archaeology in their agenda for change. In 1969, the Onondaga (Iroquois) fought for the return of *wampum* belts from the New York State Museum, and in 1971, AIM disrupted an excavation near Welch, Minnesota. That same year, activists occupied the Southwest Museum in Los Angeles, requested repatriation of human remains and sacred objects, and demanded that other objects be taken off display. In 1972, AIM members confiscated human remains from Colorado State University. In the aftermath of the Wounded Knee II takeover in 1973, the federal legal system distracted the AIM leadership from addressing issues such as Indian concerns about archaeology at the national level (Deloria 1973: 29-35), so not until the late 1970s and early 1980s did AIM again specifically demand ethical treatment of human remains and grave goods by archaeologists and museums. However, pressure continued to grow at the state level, and one of the key pre-NAGPRA events arose in the state of Iowa.

In 1971, archaeologists removed Indian remains from the edge of a pioneer-period 1860s cemetery in southwest Iowa that was being disturbed by highway construction, taking them to an archaeology laboratory to be studied; the numerous non-Indian remains were immediately reburied in a nearby cemetery. *Ihanktonwan* (Yankton Sioux) activist Maria Pearson demanded equal treatment of the dead from the governor of the state, leading to the dismissal of the seated state archaeologist and eventually to the passage in 1976 of the first state reburial law.

The Iowa law became precedent-setting for other states, structuring a collaborative model for the ethical treatment of human remains. To assure equal treatment under the state laws, all human remains deemed to be from 150 years ago or older (roughly the time of the first substantial presence of non-Indians in the region) became the responsibility of the Office of the State Archaeologist (OSA), with more recent remains handled by county and state law enforcement officials. The OSA was to arrange for an "autopsy" by a forensic physical anthropologist, essentially an assessment of key skeletal metrics and examination for gross skeletal pathologies. The remains then were to be returned to genetically or culturally affiliated tribes if identity could be established, but because numerous Indian nations had once lived in the state, affiliation often could not be confirmed. Such "unidentifiable" remains were then reburied in one of four secure, state-owned cemeteries, as close as possible to where the remains were found. All activities were done with the agreement and oversight of the Iowa Indian Advisory Committee and affiliated tribes. The key element in the success of the law proved to be the trust relationship built between the archaeological and Native American communities. The process proved so successful that the state was given an exemption from the processes of NAGPRA when it was enacted 14 years later. Other states copied many elements of the Iowa statute, and some core elements of NAGPRA stem from it.

The Iowa precedent provided impetus for repatriations in other places. Most involved small numbers of remains, but one large repatriation and reburial drew national attention, especially in the archaeological community. The 1978 excavation of nearly 500 individuals from the Crow Creek site in central South Dakota required collaboration between archaeologists, Native Americans, and a federal agency. Archaeologists and the US Army Corps of Engineers (COE) became involved when erosion and looting disturbed the remains. Because the individuals died in a fourteenth-century massacre and represented a large group of people dying at the same time, they represented an almost unique population for anthropological study. At the same time, because the remains were discovered on the Crow Creek Sioux (Lakota) Reservation, the local residents demanded that the archaeologists and the COE hear their concerns about how the remains should be treated and what should eventually happen to the skeletons. The Lakota would let the project proceed only when the archaeologists and the COE agreed that the remains would not leave the state and would be reburied after study (Alex & Zimmerman 1981). In 1981, the remains were reburied near where they were discovered. The project caused many members of the archaeological community to speak out against repatriation and reburial, but Crow Creek was one element among many that made archaeologists pay close attention to Indian demands.

At about the same time, AIM and the International Indian Treaty Council established American Indians Against Desecration (AIAD), directed by Jan Hammil, an urban Indian woman with Mescalero Apache heritage. Hammil pressured organizations such as the Society for American Archaeology (SAA) to listen to Indian demands for repatriation. In 1982, when the SAA Executive Committee determined that the organization should pass a resolution against reburial, Hammil and a small delegation of AIM members met with the committee to convince them not to adopt the resolution (Zimmerman 1989). As a result of events at that meeting, the SAA waited until the following year to do so and without consultation, much to the chagrin of AIAD. Although the SAA appeared to be against repatriation, many archaeologists sought to understand Indian concerns and some continued to work toward some compromises. Continuing demands by Indian people pushed several local, regional, and national organizations, eventually including the SAA, to sponsor meetings and conference sessions during which Indians and members of the archaeological community could present their views. The media, supported by some archaeologists and Indians, generally portrayed the issues as bipolar – Indians versus archaeologists and religion versus science – but there was actually a continuum of opinion about repatriation and reburial. In 1986, Hammil and a number of other Indian people

joined Indigenous people from around the world at the first World Archaeological Congress (WAC) meeting in the UK, where they exchanged views about repatriation in their regions. Archaeologists who attended the meeting were generally supportive of repatriation, and the WAC leadership urged Hammil to organize an international conference on the topic, which was held at the University of South Dakota in 1989 as a WAC Inter-Congress on Archaeological Ethics and the Treatment of the Dead. That conference resulted in the Vermillion Accord, which became the basis for similar statements in Canada and Australia, and was the first time Indigenous people and archaeologists were able to come to agreement on working toward real solutions about reburial internationally. As with the enactment of the Iowa law and the Crow Creek reburial, however, most disputes about repatriation – there were many – occurred at the local or regional level, but they certainly influenced the national scene. All were important to the people directly involved, but a few had a very direct impact on the development of NAGPRA.

For more than a decade, the people of the Omaha nation had sought the return of many sacred objects from Harvard University's Peabody Museum, but especially the return of *Umon'hon'ti*, their sacred pole. In 1888, tribal members were under extreme pressure to abandon their traditional beliefs and accept Christianity. To safeguard *Umon'hon'ti* and other sacred objects, including ceremonial war pipes and their sacred shell, the tribe had turned them over to ethnographer Alice Fletcher who transferred them to the Peabody. After an extraordinary effort to reclaim their objects, the Omaha received the sacred pole in 1989, and the Peabody has since returned other sacred objects (Ridington & Hastings 1997). Although other museums had repatriated sacred objects before the Peabody Museum did, the museum's stature was symbolically important for other museums, making them very aware that Indian concerns involved more than just human remains.

Two related repatriations of human remains were directly relevant to NAGPRA because of the involvement of the Native American Rights Fund (NARF) and the Pawnee nation. One of the NARF attorneys for both cases, and a man of Pawnee heritage, was Walter Echo-Hawk, who was one of the key authors of NAGPRA. In 1985, the Kansas State Historical Society sought to acquire and build a museum around the so-called Salina Burial Pit, a tourist attraction outside Salina, Kansas. Open since 1937, the privately owned business displayed the remains of 146 people. They had been buried in the twelfth to thirteenth centuries, and as most archaeologists agree, they were probably direct ancestors of the Pawnee people. When the Pawnee, who now live in the adjacent state of Oklahoma, heard about the plans, they objected and demanded that the facility be closed and their ancestors reburied. Many archaeologists in the region fought closure of the site, but to his credit, the state archaeologist, Tom Witty, agreed to listen and eventually agreed that the site should be closed. In 1989, Kansas enacted an unmarked burials law similar to the Iowa law. Then in 1990, the Pawnee finally shrouded each body with a blanket or shawl and, after prayers and a funeral feast, covered the entire pit with clean sand, topped by a concrete cap to protect the remains from future disturbance (Echo-Hawk & Echo-Hawk 1994).

In 1988, the Nebraska State Historical Society (NSHS) became embroiled in controversy when it refused to honor several requests from Lawrence Goodfox, Jr., on behalf of the Pawnee nation, to return human remains known to be directly ancestral to the Pawnee and grave goods associated with known individuals, long held by the NSHS. When the society director refused to respond to the Pawnee requests, a nationally visible controversy ensued. With NARF's help, the Pawnee joined forces with other regional tribes to ask the Nebraska legislature for help in the form of a state law. After rancorous debate, in 1989, the coalition saw passage of the Unmarked Human Burial Sites and Skeletal Remains Protection Act, which required Nebraska public museums to return all tribally identifiable skeletal remains and burial offerings to tribes that requested them for reburial.

What is important about these repatriations is they directly set the stage for NAGPRA. National

publicity had an impact on the US Congress, and elements of the Nebraska law found their way directly into NAGPRA because Walter Echo-Hawk helped author both laws. While these local disputes and repatriations were underway, Indian people continued to press the US Congress to work toward a national solution. As much as anything, the Smithsonian Institution, as a federal agency, became a symbolic target because of the large number of remains and objects the Smithsonian housed. After negotiations between Native American groups, the American Association of Museums, the SAA, and others, Congress was willing to pass the National Museum of the American Indian (NMAI) Act of 1989, which 15 years later saw the opening of the NMAI as part of the Smithsonian but also set up a process for repatriation of human remains and grave goods in the Smithsonian's possession. While there are differences, that process became the model for NAGPRA, which was signed into law the next year, but only after intense negotiations and compromises (McKeown 2013).

There are very likely differing assessments of the importance of certain individuals or events leading to a national repatriation law in the US, but NAGPRA stemmed from the many local acts of repatriation that happened from the 1960s until NAPGRA became law in 1990. Many people were involved in the process, from quiet, resolute tribal elders, holy people, and officials to outspoken activists. Many non-Indian archaeologists, museum professionals, and local, state, and federal government employees worked to resolve difficult issues. As many have said, even though repatriation is driven by national law, it is still mostly a local matter that depends on trust and good will.

Definition

In a general sense, repatriation means returning to your country of origin, but in the specific sense of archaeology, it has meant the return of human remains and any associated objects buried with the dead, as well as sacred objects or other items of cultural patrimony that were inappropriately, illegally, under duress, or otherwise taken without permission from a nation or people. Colonized Indigenous people were often the victims of the removal of such objects. In the process of decolonization during the last half-century or so, they have demanded return of these items. In North America, the situations in which human remains and objects of cultural patrimony were removed from rightful, usually Native American ownership ranged from outright theft to a hope that a stronger authority might better be able to protect objects for the future. Acts of repatriation have sometimes been done willingly or carried out after negotiation, but in many instances, the rightful owners have had to act by force or take legal action to have objects returned to them.

Key Issues/Current Debates/Future Directions/Examples

In the United States, a number of issues have surfaced relating to repatriation, some of them similar to repatriation in other places. Many people, especially with the return of human remains, realized that they had no ceremonies or rituals for the process of *re*burial because no one ever considered that such a ceremony would ever be needed. Thus, many adapted some form of contemporary practice, perhaps with minor variations to account for the age of the remains. As well, many Native American people have been subjected to proselytizing by missionaries and are now Christian. For example, when the Crow Creek Massacre victims were reburied in 1971, there were two traditional Lakota ceremonies, a private ceremony by the Arikara descendants and Catholic, Episcopal, and Baptist Christian rituals.

Another problem in the United States is that many skeletons and burial items have been recovered from what is now considered to be private property. Although some state laws protect all human remains, even on privately held lands, in most cases they do not. Federal law rarely applies to private lands unless the federal government is somehow involved. Private individuals often understand that tribes may want the remains of ancestors returned, but do not know to whom they

should give them and often not even precisely where the remains came from, precluding all but a guess of genetic or cultural affiliation. Other private individuals have little concern for the dead and get involved in looting. At the Slack Farm site in the state of Kentucky, looters actually paid a private landowner for rights to "mine" a known precontact Native American cemetery for pottery and other burial objects. Paying no attention at all to the skeletal material, they dug hole after hole and fragmented numerous skeletons. After protests by both Native Americans and archaeologists, Kentucky passed a burials protection law that encompassed remains found on private land. In spite of such laws, however, there is rarely enforcement and only relatively light sanctions.

Finally, a number of archaeologists and museum professionals still resist repatriation. Commonly heard explanations are that some tribes do not know how to properly care for returned sacred items or perhaps that a particular tribe did not care what happened to bodies after death so should not care if the remains are studied or stored in laboratories or museums. Under NAGPRA, many agencies claimed that remains could not be positively identified as to which tribe was affiliated or that multiple tribes might be, so they did not want to return remains fearing legal action if they were returned to the wrong tribe. Although some of these concerns may be legitimate, many have primarily used them as excuses not to repatriate remains and objects.

Generally, the public understands the concerns of American Indians about the return of ancestors and sacred objects, but many do not, especially when they see the remains or objects as their property or somehow important to collections at their local museum. As for professional archaeologists and museum staff members, NAGPRA has now been in place for more than 20 years, so as new professionals are educated they are taught about repatriation and its importance. Most have an understanding about why NAGPRA came into existence, and even though they might disagree with all or some elements of repatriation, they are now compelled by law to take repatriation into account as part of their regular dealings with Native Americans and other Indigenous peoples.

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- ▶ Ethics and Human Remains
- ▶ Indigenous Peoples, Working With and for
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Repatriation: Overview
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Repatriation Acts: NAGPRA Repatriation in Tribal Practice

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Introduction

More than two decades have passed since the Native American Graves Protection and Repatriation Act (NAGPRA) became law in the United States. According to the National NAGPRA program, this law has resulted in the return of the remains of more than 38,691 individuals, one million funerary objects, and 6,000 sacred objects/objects of cultural patrimony to Native American tribes (http://www.nps.gov/nagpra/FAQ/INDEX.HTM). It has also resulted in the publication of numerous books and articles investigating the myriad issues surrounding this law (Mihesuah 2000; Fine-Dare 2002; Killion 2008), including the conditions leading to its passage (Thomas 2000), its legislative background and history (Trope & Echo-Hawk 1992; Lovis et al. 2004), implementation (Anyon & Thornton 2003), and the responses of various stakeholders (Ayau & Tengan 2002; Preucel et al. 2003).

This entry seeks to give insight into the process of repatriation on the tribal side of the law. How does repatriation play out for tribes? How is NAGPRA implemented "behind the buckskin curtain" (Deloria 1995: 1), and what happens to repatriated Native American human remains, funerary objects, and sacred objects after the papers are signed and they leave museum shelves? In what follows, I give some behind-the-scene insights into the repatriation process at one Native American tribe, the Pueblo of Jemez, where I served as NAGPRA program director from 2003 to 2005.

Definition

For tribes, the process of repatriation often begins with the receipt of an inventory or summary from a museum. This written notice serves to inform the tribe about human remains or objects eligible for repatriation that are currently housed in that museum. *Summaries* are estimates of the number of objects (either funerary, sacred, or those of cultural patrimony) in that museum's collections that have been found to be culturally affiliated with the tribe in question. *Inventories* are similar, but are typically more detailed item-by-item descriptions of human remains and associated funerary objects. Sometimes the tribe is well aware of the locations of these collections prior to receiving a summary or inventory, as is the case with many high-profile sacred artifacts and those collected by well-known expeditions of the early twentieth century. But in many other cases, tribes are unaware of the whereabouts of collections and sometimes even unaware that such collections exist at all. The practice of sharing and swapping of artifacts and human remains that frequently occurred among museums in the late nineteenth and early twentieth centuries served to break up and scatter collections across multiple institutions, and it is often only with the receipt of an official NAGPRA summary or inventory that tribal officials become aware of their current locations.

At the Pueblo of Jemez, the receipt of an inventory or summary from a museum triggers

an established protocol for handling NAGPRA claims. Upon receipt of new summaries or inventories, the NAGPRA program coordinator enters a record of the collections into a computer database created specifically to keep track of NAGPRA claims, along with any accompanying relevant information about the objects or human remains they detail. The information from this database is summarized at regular intervals and presented for review to tribal officials. Over the past decade, this review has been performed either by the Governor of the Pueblo himself or by a committee of traditional religious leaders appointed by the Governor. This committee, known as the Cultural Resource Advisory Committee (CRAC), comprises 10–15 representatives from the tribe's religious societies who have special expertise in issues of cultural patrimony. After reviewing the latest inventories and summaries, these tribal officials set the priorities and agenda for future repatriation claims. At Jemez, human remains have typically received the highest priority, followed closely by sacred objects.

Although non-Natives often assume that tribal policies call for claiming everything and everybody deemed eligible for repatriation, this is not necessarily the case. The Pueblos of Santa Clara and Zuni, for example, have declined to repatriate human remains because they have no ceremonies to mitigate the desecration that has occurred to their ancestors (Ferguson et al. 2000: 258; Alvin Warren, *pers. comm.* 2012). At Jemez, tribal representatives carefully consider each summary and inventory they receive, discussing the pros and cons of repatriation in each case. Issues factoring into their decision include whether or not the items can be appropriately curated once in tribal possession, information that could be gained from returning items to active use, where returned items/human remains will be curated/reburied, whether or not reburial is possible, and future research desires and needs. Furthermore, the tribe does not always concur with the findings of museums. In some cases, museums' determinations of cultural affiliation do not accord with those of the tribe (i.e., the tribe does not consider itself to be culturally affiliated with the items/human remains in question). When this happens, the tribe typically declines to continue the repatriation process. In others, the museum may find that a tribe is not culturally affiliated, contrary to tribal beliefs, which can result in difficult negotiations (and sometimes a hearing before the National NAGPRA review committee).

If an item or collection is judged to be a potential candidate for repatriation, representatives from Jemez usually desire to view the objects/materials (in person if possible) before submitting an official claim. At this stage, the NAGPRA program coordinator typically works with the museum staff to organize a preliminary visit to the museum. Funding for these visits may be covered by the host institution, but more commonly, it is paid for out of tribal funds often raised through federal grants administered by the US Department of Interior. Once at the museum, the tribal representatives examine the collections and again discuss the suitability and desirability of repatriation with one another. These discussions are often frank and nuanced as the pros and cons of each repatriation are carefully weighed. On numerous occasions, I have witnessed tribal members peering over an open drawer in a museum storehouse, examining the artifacts within while simultaneously debating whether or not they should be brought home. At times, these discussions acknowledged the irony that those artifacts may not have survived to the present day if they had not been curated in a museum. In some of those cases, the decision was made to postpone repatriation until the day when the tribe possessed appropriate curatorial facilities to properly care for these items in the long term. Following the examination of collections, the tribal representatives commonly meet with museum staff members, who brief them on a proposed timetable for repatriation, any extenuating circumstances, and any likely problems or conflicts. In my experience, these meetings were typically cordial, with both sides working toward an amicable solution; however, in some cases conflicts can arise, particularly if one side (or even just one person) enters into these negotiations harboring resentments or hostilities.

After the preliminary visitation and viewing of artifacts, the tribal officials who examined the materials eligible for repatriation typically report back to a larger contingent of elders and religious leaders to discuss the Pueblo's wishes/desires/plans. Based on that conversation, the Governor or CRAC decides whether or not to pursue a repatriation claim. When repatriation is desired, the NAGPRA program director works with the Governor to notify the museum staff of their intention. In theory, the tribe then submits an official request to repatriate, and the museum prepares an appropriate notice for publication in the Federal Register. In practice, however, some museums need additional time to prepare their collections for repatriation (often due to budgetary and staffing constraints), and they request that the tribe delay submission of an official claim to repatriate until the museum is able to make ready the collection. In one case involving Jemez human remains, this delay lasted more than 6 years – enough time to raise suspicions on the tribal side that the museum was guilty of intentional foot-dragging. In the end, however, even that repatriation was successfully completed. Another issue that can cause delays at this stage is the past conservation practices used by the museum, as toxic chemicals such as arsenic, mercury, and pesticides were used to preserve organic artifacts in the past (Odegaard & Sadongei 2005). Prior to repatriation, objects must be tested for these contaminants and if the tests are positive, a plan for appropriate disposition must be formulated.

Key Issues

Following submission of the tribe's official repatriation request, the museum publishes an appropriate notice in the Federal Register, after which the repatriation can officially take place (30 days after a Notice of Inventory Completion for human remains and associated funerary objects is published; 90 days after publication of a Notice of Intent to Repatriate for sacred objects, unassociated funerary objects, or objects of cultural patrimony). While the museum is preparing the paperwork for publication, the tribal NAGPRA coordinator typically works on the logistics of the repatriation, including how the materials will be transported from the museum back to the reservation, where they will be stored (if necessary), and, in the case of human remains, where and when they will be reburied.

On the day of the return of the human remains and/or artifacts, a contingent from the tribe (often members of the CRAC and the Governor) visits the museum to officially take possession of the collections. This is often a somber occasion, with tribal members conducting any necessary and appropriate ceremonies prior to removal of the materials from the museum. The Governor then meets with museum staff members to sign the necessary legal paperwork, and the artifacts/human remains are loaded into a vehicle for transport. Depending on the size of the repatriation, this can either be a very short process involving one vehicle or a much more involved process involving multiple vehicles. For the 1999 repatriation of more than 2,000 human remains from Pecos Pueblo held at Harvard's Peabody Museum, numerous vehicles, including a tractor-trailer, were required.

At Jemez, once the objects or human remains return to the reservation, there is no single protocol that is followed. Some repatriated objects have been placed on display in the tribal museum (mainly ceramics). Others, particularly in the case of sacred objects and objects of cultural patrimony, are typically entrusted to traditional religious leaders for safekeeping and appropriate ceremonial use. The Jemez policy for human remains is always reburial. In theory, the most desirable reburial location is the site from which the individuals were disinterred. However, because the excavations necessary for reburial could disturb additional graves if performed at the site itself, reburials often take place nearby, but off-site. The locations chosen for these reburials are private, remote, and secret. A backhoe is employed to dig a deep pit in order to ensure that these individuals will not be disturbed again. Then tribal members, overseen by the *Fiscales* (appointed officials responsible for overseeing tribal funerary activities), place

the remains in the pit and perform a short ceremony. Finally the pit is refilled, and the reburial is complete. The ancestors have returned home.

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- ▶ Repatriation and Race in Indigenous Archaeology
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Repatriation Acts: The Politics of Repatriation in North America

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Introduction

In North America, the National Museum of the American Indian Act and the Native American Graves Protection and Repatriation Act are the two laws that regulate the repatriation of materials to American Indian tribes. Since much has been written about these laws, Native American Graves Protection and Repatriation Act (see the entry on NAGPRA in this encyclopedia) will not be discussed in detail here; the reader is referred to numerous websites devoted to discussing these laws and their histories. Since the National Museum of the American Indian Act was the first of the repatriation acts, it will be discussed first, but since the Native American Graves Protection and Repatriation Act has had perhaps the most widespread impact on museums and anthropologists, it will be discussed in more detail.

Definition

Repatriation, in its very basic sense, is the process of returning something to its home country. More often than not, the items returned are soldiers or their remains following a war of some sort. However, in the sense of Indigenous populations,

repatriation generally is used to refer to the return of particular classes of objects held within museum or government collections to the cultures from which they were acquired.

Historical Background

On November 19, 1620, Pilgrim explorers in search of the inhabitants of their new land happened across "a place like a grave." They dug into it and found "the bones and skull of a man [and] . . . the bones and head of a little child" along with cultural material placed with the bodies. Not content to leave the material alone, they ". . . brought sundry of the prettiest things away with us, and covered the corpse up again" (Heath 1963: 27–8). Only eight days after the Pilgrims had anchored off Cape Cod, American Indian graves had already been plundered for their contents.

In the United States, American Indian concerns regarding materials in the collections of museums and government agencies reached a crescendo during the political unrest of the 1960s and 1970s when pan-Indian groups such as the American Indian Movement staged protests about the storage and display of American Indian skeletal materials. American Indians distrusted archaeology and archaeologists; the American Indian Movement's disruption of excavations at Welch, Minnesota, in 1971 exemplifies the physical actions taken to confront the issue, as were organized protests aimed at getting American Indian human remains and sensitive material out of public displays such as the occupation of the Southwest Museum in Los Angeles in 1971. Additionally, tribal groups began addressing the desire for the repatriation of human remains and artifacts with the fight for the return of the Onondaga wampum belts in 1969 from the State Museum of New York.

The National Museum of the American Indian Act (NMAIA) and Its Amendment

The passage of the National Museum of the American Indian Act (PL 101-185) in 1989 established the National Museum of the American Indian and also required the Smithsonian Institution to inventory, document, and, if requested, repatriate culturally affiliated human remains and funerary objects to federally recognized native groups. Congress amended the NMAI Act in 1996 to make it more closely conform to the language of the Native American Graves Protection and Repatriation Act (NAGPRA) passed by Congress in 1990.

The Native American Graves Protection and Repatriation Act (NAGPRA)

Public Law 101-601, the Native American Graves Protection and Repatriation Act (NAGPRA), affirms the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to custody of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony held in federal museums or agencies, or in museums that receive federal funds.

Signed into law by President George Bush in November 1990, NAGPRA places the responsibility for compliance upon federal agencies and museums that receive federal funds. It required all federal departments, agencies, or instrumentalities of the United States (except for the Smithsonian Institution) to complete summaries and inventories of Native American materials in their control (including those held by nongovernmental repositories) and to ensure compliance regarding inadvertent discoveries and intentional excavations of human remains conducted as part of activities on federal or tribal lands.

The system outlined by these two statutes generally provides a framework for resolving issues surrounding the disposition of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony excavated or discovered on federal or tribal lands or held in federal or museum collections. Categories of materials that are eligible for return under the laws include (1) human remains of an individual whose identity is known, (2) culturally affiliated human remains, (3) associated and unassociated funerary objects, (4) sacred objects, and (5) objects of cultural patrimony. In addition, tribes may request the return of objects

transferred to or acquired by museums and federal agencies illegally or under circumstances that render the museums' or federal agency's claim to them invalid.

Culturally affiliated human remains are defined in the legislation as human remains that share a relationship with a present-day Indian tribe that can be demonstrated based on a preponderance of available evidence. Associated and unassociated funerary objects are items that, as part of the death rites of a culture, are believed to have been intentionally placed with an individual of known affiliation at the time of death or later. The only distinction between whether a funerary object is considered unassociated or associated is whether or not the museum or federal agency has the human remains with which it was originally interred. Sacred objects are specific ceremonial objects that are needed by traditional Native American religious leaders in order to continue practicing their traditional Native American religions by present-day adherents. Objects of cultural patrimony are more difficult to define and vary among tribes. In general, they are cultural objects that were originally owned by the entire tribe rather than a single individual, and which have an ongoing historical, traditional, or cultural importance to the native group. Because the objects were tribally owned rather than individually owned, they cannot have been alienated, appropriated, or conveyed by any individual at the time they were acquired. An example of an item of cultural patrimony for American citizens would be the original signed copy of the Bill of Rights or the Liberty Bell.

Repatriation of Native American human remains and certain cultural objects may be made by lineal descendants of named individuals, federally recognized Native American tribes, federally recognized Native Alaskan villages, and Native Hawaiian organizations named in the Acts.

The Acts also required the establishment of special committees to monitor and review the process of inventory, identification, and repatriation covered by each specific law. The Review Committee established by each law reviews findings relating to the origin or the return of human remains and cultural objects. The committees also assist in resolving disputes between groups or between a group and the museum or agency regarding the disposition of collections.

Key Issues/Current Debates

Within repatriation, there are some issues that have arisen due to problems within NAGPRA, among them the failure of NAGPRA to prevent the perceived continuing desecration of American Indian human remains through further scientific study; the failure of NAGPRA to protect human remains on private land; the repatriation of materials from extremely ancient cultures; the ambiguous definition of "sacred objects" and "objects of cultural patrimony"; the failure of NAGPRA to address the needs of non-federally recognized tribes; and the disposition of "culturally unidentifiable human remains."

While NAGPRA itself does not allow scientific study as part of the repatriation process, it does allow study of the materials if necessary for the more correct disposition of the materials to an appropriate tribal claimant. Some tribes are opposed to many forms of scientific testing on human remains and see this as an unnecessary continuation of scientific information gathering at the expense of the tribes.

Many American Indian groups cannot understand why the graves protection portion of NAGPRA was not applied to all lands within the United States, rather than just to federal or tribal lands. Since the entire continent was at one time Indian land, tribes have a difficult time understanding why federal protection of graves should be extended only to federal or tribal lands. In a review of the legislative history of NAGPRA, Trope and Echo-Hawk note that many states have burials protection laws which provide guidelines to protect human graves (1992: 52). While human remains may be protected under various state laws, federal intervention on private land can sometimes been seen as a violation of the "takings clause" of the 5th Amendment to the Constitution if the land owner

is somehow denied access to or free use of property without adequate compensation. Since the majority of land in the United States is held in private ownership, this limits the law's protection to the majority of situations where human remains and objects are encountered.

There are certain objects within museum collections that do not easily fall within the definition of "sacred" items or "objects of cultural patrimony."A Kiowa war chief named Satanta had a war shield that was given to him for his protection in battle, and it worked through his participation in more than a hundred battles. The shield hung in the Kiowa medicine lodge, and Satanta proudly displayed it after every battle for the Kiowa people to see. Even though the shield did not have a specific role in the practice of the Kiowa Sun Dance, the last Sun Dance of the Kiowa was delayed until the shield could be brought from its home to its place of honor. Before Satanta was taken to Texas for imprisonment, he gave the shield to his son, Gray Goose, who kept it until he died. Supposedly Gray Goose bequeathed the shield to the superintendent of the Anadarko Agency of the Bureau of Indian Affairs. Eventually the shield made its way to the Phoebe Hearst Museum in Berkeley, California. The museum had a valid right to ownership, as indicated by the original accessions records. The shield is not sacred under the definition of the NAGPRA, since it never had a formal role within the tribe's traditional religion except within the practice of religion by an individual tribal member (Satanta). Neither is the shield an object of cultural patrimony under the definition of the NAGPRA, since it was an individually owned property that could be legally disposed of (sold or given away) by the owner. However, the shield is both sacred and an object of cultural patrimony to the Kiowa tribe and the family. It is believed to possess powers that were given it by its maker, and it was a part of the tribal cultural inventory relating to the Indian Wars of the 1860s and 1870s, as well as an important object related to one of the last war chiefs of the Kiowa. The descendants of Satanta did not want the shield to go to the Kiowa tribe for fear of its theft. Additionally, the family recognized that the museum had a legal claim to ownership of the shield based on the donation documents. Eventually, a compromise was worked out. The museum sent the shield on permanent loan to the Fort Sill Museum in Fort Sill, Oklahoma, where the family members can more easily visit it. The original museum still technically maintains ownership of the shield but the family does not have to fly to California to see it. It still plays an important role in the Kiowa family's history, even if it does not reside within their home.

There are multitudes of issues regarding the repatriation of objects from ancient cultures, depending on whether one is dealing with human remains or with cultural objects. In relation to human remains, the situation regarding Kennewick Man/the Ancient One is illuminating, while the situation regarding cultural property is well illuminated by the situation regarding the Spiro materials of eastern Oklahoma.

The situation regarding the human remains known alternately as "the Ancient One" or "Kennewick Man" is exemplary for the problems associated with extremely old human skeletal material. Kennewick Man (see Downey 2000; Thomas 2000) was the name given to a nearly complete set of human remains discovered in the Columbia River in 1996. Shortly before the remains were to be repatriated to the tribes in the area of the discovery, eight anthropologists filed suit in court to block the repatriation. The fact that the skeleton was not related to *any* recent human groups, especially any American Indian groups, made it more difficult to justify repatriating it to any particular Indian group and easier to justify continued study. The fact that the people who temporally follow show some resemblance to the Kennewick material hints that they *may* have derived some of their morphological characteristics from the population of which the Kennewick individual was a member. While there were certainly conflicts between the scientific possibilities raised by the discovery of a nearly complete skeleton such as "the Ancient One," the principle issue tested throughout the conflict has been the legal question of whether NAGPRA should apply to materials of such antiquity. Ultimately, the court held that the

material known as the Ancient One did not meet the definition of "Native American" under NAGPRA and was therefore not subject to repatriation.

The disposition of objects from the Spiro Mounds of eastern Oklahoma (Watkins 2004) is a good example of the issues that arise when two groups with seemingly equal claims to materials (but divergent ideas about the disposition of those objects) interact with a willing museum. The University of Oklahoma controls artifacts that were collected from the Spiro Mounds. The Spiro Mounds complex in the Arkansas River valley of eastern Oklahoma is one of the best-known mound complexes in the southeastern United States, "... well known to southeastern archaeologists for ... the extraordinarily rich litter burials of the elite and the shameless looting of the burial mounds during the Depression" (Bense 1994: 223). While these artifacts are indeed special in their size and workmanship, they also meet the definition of "funerary objects" under NAGPRA eligible for repatriation to culturally affiliated tribes. The tribes most likely to be culturally affiliated with the Spiro materials are the Wichita and Affiliated Tribes of Indians and the Caddo Tribe of Oklahoma. Museum personnel made it known that the museum wished to exhibit the artifacts. The Chairman of the Caddo Indian Tribe of Oklahoma indicated that the Caddo Tribe would eventually request their return for inclusion in the Caddo Tribe's Cultural Heritage Center because the artifacts demonstrated the high level of accomplishment of the Caddo tribe in the past and would be a source of pride to contemporary tribal members. The President of the Wichita and Affiliated Tribes believed that the artifacts were not meant to be in any museum display (even a tribal museum) but were meant to be buried away from the sight of individuals who had no right to view them. Each tribe has a "valid" claim to the artifacts based on the shared cultural component of the most likely recognizable Indian tribal group which created the artifacts, but each have an opposite idea of how the materials should be used. The museum continues to maintain control of the artifacts and displays some of them.

Additionally, the repatriation legislation does not address materials associated with groups that are not currently "recognized" by the federal government to have the special relationship of an "Indian tribe" or Native American under the law. Many tribes feel that non-federally recognized American Indian tribes are no less Indian than their federally recognized counterparts, but others are afraid that to allow standing under NAGPRA would allow such groups to bypass the normally tedious process of federal recognition. While all tribes agree that human remains of unrecognized American Indian groups are have been and always will be American Indian, many are concerned about extending rights to groups under NAGPRA. In a statement prepared for the March 1997 Review Committee meeting in Oklahoma, NAGPRA representatives from seven tribes from southwestern Oklahoma – the Apache Tribe of Oklahoma, the Caddo Tribe, the Comanche Tribe, the Delaware Tribe of Western Oklahoma, the Fort Sill Apache, the Kiowa, and the Wichita and Affiliated Tribes – felt that repatriation should occur only to federally recognized groups. While they felt that human remains, regardless of affiliation, should not be left in museums, they expressed a concern that to repatriate human remains to non-federally recognized tribes could potentially assign rights and authority to groups that have come into existence without a legitimate claim of continuity. The working group felt that the human remains associated with such groups should instead be repatriated to the federally recognized tribes on whose aboriginal lands the remains were found, with the Review Committee making decisions in cases of multiple tribes claiming the same ancestral lands.

The most current issue regarding NAGPRA is the disposition of "culturally unidentifiable human remains," defined under the law as human remains for which no lineal descendants or cultural affiliations have been determined. Under recent regulations, museums have been required to identify human remains which do not easily fall within other aspects of the repatriation regulations. These sets of human remains can fall into this category because they are of an

age that makes the adequate attribution to a specific culture (cultural affiliation) or tribal group, and can belong to a known tribal group which is not currently a "federally recognized tribe," or the information regarding the original location of the site where the human remains originated makes adequate determination of geographic information unreliable or unknowable. While each of these aspects which contribute to the adequate determination of which tribal groups should be able to request repatriation under the law, tribal groups believe that such materials should be returned to tribal groups rather than languish within museum collections until such time as the museum determines who should get them.

International Perspectives

Repatriation under the NMAIA and NAGPRA has been major influence on international perspectives regarding the repatriation and return of items within museum and government agency collections which derive from Indigenous cultural groups. While there is nothing within these specific laws that require repatriation to non-American Indian, Alaska Native, or Native Hawaiian organizations, the laws serve as models for the continuing recognition of rights of Indigenous populations to their cultural heritage. In terms of International Repatriation, Article 12 of the UNESCO Declaration on the Rights of Indigenous People (United Nations 2006) is perhaps the more relevant document to be used in support of the rights of Indigenous peoples to the use and control of their ceremonial objects and the right to the repatriation of their human remains.

Future Directions

The repatriation of human remains and other items of importance to American Indian tribes will continue to occur so long as archaeologists continue to excavate archaeological sites. As new items are encountered in construction projects or within controlled excavation, human remains and their associated funerary objects will pass into and through museum collections. American Indian tribes will continue to work with federal agencies and museums to regain those items that have special meaning to their tribal cultures.

Internationally, more and more groups will probably continue to press for the return of human remains and special classes of objects from museums to be returned to the cultures of their origin. The utilization of international accords developed by organizations such as the United Nations and international archaeological organizations such as the Society for American Archaeology and the World Archaeological Congress will also contribute to the return of such objects to Indigenous groups and organizations.

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Indigenous Archaeological Organizations
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice

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Repatriation and Race in Indigenous Archaeology

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Introduction

The success of the racial Native American sovereignty movement during the second half of the twentieth century inspired a new narrative of hope among adherents to racial Indianhood (Wilkinson 2005). The passage of a law known as NAGPRA contributed greatly to this rekindling of optimism, helping to shore up the gradually sinking racial contract that had defined American identity since its founding as a nation.

After World War Two, the loosening of white privilege in American life and the challenges to racial whiteness as a socially acceptable form of bonding helped make possible civil rights initiatives for racial minorities. Moving slowly against white-pride racism, mainstream racial whites necessarily launched into an unacknowledged project to dismantle white identity systems. This meant that the currents of the American social project had begun to shift away from race as the central defining instrument of American identity.

Passed in 1990, the Native American Graves Protection and Repatriation Act (NAGPRA) served as a minor milestone in the historical evolution of racial practice in the United States. By that date, an emerging majority of Americans had become invested in a social narrative that rejected racial identity. These *faux whites* had little or no reason to engage in intraracial bonding – the true hallmark of racial identity. With no inducement to center their selfhood on race, these *white* people had become *faux white*. This process was invisible in an America that believed in race as a biological reality.

NAGPRA sought to strengthen the American racial contract. Swimming against the current of changing racial culture in American life, adherents to racial Indianhood relied on the structures of race in the American world as the basis for advocating passage of federal and state repatriation laws regulating the treatment of racially categorized *Native American* human remains and cemeteries. Race had come to America as a colonialist import, but now NAGPRA signified that racial Indianhood had become remythologized into an *indigenous* identity system.

As a matter of law, NAGPRA reflected an established American legal and political convention that subsumed diverse political entities under a race-based category termed *Indian tribes*. Rather than become integrated into the American union as states or continue as independent nations, *Indian tribes* joined the American political system as subaltern domestic dependencies with no formal constitutional role within either the federal system or state system. Laws, legislation, administrative directives, and court decisions pertaining to this group of racially defined quasi-sovereignties gradually fell under the racial rubric of *federal Indian law*. NAGPRA emerged from this colonialist legal tradition (Fig. 1).

Despite the fact that by 1990 anthropology held a shaky consensus that rejected race as a biological construction, NAGPRA helped to change the face of American anthropology, reshaping the academic relationship with racial Native America, particularly in archaeology

Repatriation and Race in Indigenous Archaeology, Fig. 1 Billboard for a tourist attraction near Salina, Kansas. The State of Kansas and a coalition of tribes led by the Pawnee Nation closed this private business in 1990. (Photograph by Linda Echo-Hawk, March 1988)

(Killion 2007). Empowered by these developments and by the success of other pan-Indian initiatives, the intellectual and political leaders of Indian country entered the twenty-first century fully committed to the continued production of racial identity systems as an American cultural reality. Assisted by faux white supporters and encouraged by an academic preference to confine challenges to race to technical gray literature, racial Indians had no reason to question race. This ensured that racial Indians would deliberately link their social fortunes to the fate of race in America.

Definition

NAGPRA authorized racial Indian sovereign governments and Native Hawaiian organizations to claim culturally affiliated human remains, funerary objects, sacred objects, and objects of cultural patrimony from US federal agencies and from museums receiving federal funding. It also covered new discoveries on US federal lands and within racially designated Native American sovereign homelands.

Federal funding became available in 1994 to help carry out NAGPRA, and in 1995 federal regulations implementing the law were issued by the National Park Service (NPS). Between 1994 and 2010, a total of 660 grants were awarded to racial Indian sovereignties (*Indian tribes*), Native Hawaiian organizations, and museums (National NAGPRA n.d.). These grants funded a variety of NAGPRA implementation projects, which typically involved hiring staff and consultants, purchasing equipment, and paying travel expenses.

Tribal delegations became a common sight at museums across the United States, and some major museums made NAGPRA implementation a part of the museum's public mission. At the Denver Art Museum, for example, the Native Arts Department hosted its 100th post-NAGPRA racial Indian delegation in June 2002 – a daylong NAGPRA training workshop with the Nooksack tribe. Almost half of those visits were funded by National Park Service NAGPRA grants to the Denver Art Museum, and most of the other tribal delegations were funded by NPS grants to racially classified sovereigns. These NPS-funded projects focused on assessing the applicability of the law to collections of human remains and several categories of cultural items.

Key Issues and Current Debates

Sparked primarily by moral concerns over museum collections of racially identified Native

American human remains, NAGPRA took shape during the late 1980s as a response by the United States to a national social justice movement among adherents to racial Indianhood (Preucel 2011). During the 1970s and early 1980s, social momentum on this issue steadily grew. But racial Indian attitudes about human remains in museum collections received little systematic acknowledgement from either racial sovereign governments or from anthropologists. The 1980s saw a swift expansion of public discourse on the issue among racial Indians and in anthropological literature (Green & Mitchell 1990).

By the time NAGPRA became law in 1990, growing outrage regarding museum collections of racially identified Native American human remains had generated a powerful sense of unity among many self-identified Indians. As racial sovereignties began reburying human remains and repatriating cultural items from museum collections, NAGPRA-related storytelling entered the central bonding narratives of racial Indianhood. *Repatriation* among Indians signified the successful assertion of race-based social power; NAGPRA affirmed that racial Indianhood could produce empowering results for racial Indians in America.

Anthropologists were less unified in their response to passage of NAGPRA. It is arguable that a majority of anthropologists – especially cultural anthropologists – quickly adjusted to the new authority of racial Indian sovereignties under NAGPRA, seeing themselves primarily as students of racial Indian cultures rather than as imperialistic white-pride oppressors. But through the decade that followed passage of the law, significant groups of anthropologists and Indians worked to concurrently craft a national narrative of science-versus-religion polarization.

Prominent segments of the anthropological community fretted about the potential negative consequences of the law for academic scholarship, worrying particularly about the potential impact on archaeological inquiry, museum collections, and biological science. They feared that antiscience Indian sovereigns would ally with sympathetic US federal bureaucrats to invasively cripple useful research.

When Indians worried about the law, they suspected that entrenched white racism would thwart an important Indian quest for social justice. Encountering opposition from anthropologists and sensing resentment from academia, racial Indians suspected that white racism would limit repatriation and undermine tribal authority.

Simmering resentments between these elements of the anthropological community and Indian country flared in the wake of the 1996 discovery of ancient human remains in the waters of the Columbia River in Washington. A group of anthropologists successfully sued to prevent *Kennewick Man* from being turned over to a coalition of local racial Indian sovereignties. Reporting on this case, the American media commodified NAGPRA as an exciting culture war battleground, ignoring the fact that a vast collaborative interfacing between racial Indians and archaeologists was well underway across America (Dongoske et al. 2000).

The Kennewick Man situation thrust a facade of extremist voices to the forefront of this cultural interface. Among Indians who distrusted academic anthropology, the Kennewick Man fiasco enflamed suspicions that the academic world was bent on crafting surreptitious plots to undermine an empowered Native America. Among NAGPRAphobic anthropologists, the Kennewick Man fiasco enflamed suspicions that Indian country was bent on replacing science with religion.

In *Skull Wars* (2000), archaeologist David Hurst Thomas sought to reframe the Kennewick Man battleground into a new anthropological cultural consensus. Pondering the history of relations between anthropologists and Indians, this influential book explained the anthropological rejection of race, yet it also adopted a deferential tone to the American racial status quo. In this narrative of Indians versus whites, Vine Deloria Jr. was poised as the leading spokesperson for Indians, while Thomas set up himself as the introspective voice of anthropology. *Skull Wars* argued that anthropologists should develop partnerships with Indians. It also suggested that academic scholars should retain professional analytical skepticism toward racial Indian ambitions related to implementation of NAGPRA.

In *Indigenous Archaeology* (2000), Joe Watkins framed the archaeological component of the NAGPRA culture war as a clear divide separating the practices of white archaeologists from the values of racial Indians. Acknowledging that the master narrative of racial Indianhood included many suspicions about archaeology, Watkins suggested that the future growth of a more fully empowered *indigenous archaeology* would be dependent upon the willingness of racial whites to cede meaningful control of archaeology to racial Indians.

Watkins (2000: 105–15) presented a case study of the Pawnee Nation's efforts to repatriate human remains, contrasting the cooperative tone that unfolded in Kansas with an acrimonious dispute that took place in Nebraska. Launched by the Native American Rights Fund in Colorado, the Pawnee repatriation project ultimately helped give rise to NAGPRA. Carefully orchestrating legislative initiatives, negotiations, and historical research, the Pawnee project showed that the American public supported racial Indian repatriation.

Prior to the 1990s, little dialogue occurred between archaeologists and Pawnees despite the extensive investigations of Pawnee sites that began during the 1920s. As an outcome of the Pawnee repatriation program, new relationships developed that included Pawnees participating in archaeology and conducting research projects in partnership with archaeologists – the first visit by archaeologists with the leadership of the Pawnee Nation occurred in the post-NAGPRA era. Despite this more positive atmosphere, cooperative projects remained sporadic. Indeed, one Pawnee repatriation activist articulated the dominant Pawnee attitude toward archaeology at the end of the 1990s, characterizing the entire discipline as *oppressive and sacrilegious* (Riding In 2000: 106).

Seeking to promote a more collaborative interfacing of the interests of academic archaeology and racial Indians, Joe Watkins and his colleagues in 2001 founded the Closet Chickens. This group took shape as an informal association of self-identified Indian archaeologists and carefully vetted nonracial faux white supporters. Standing up for implementation of NAGPRA by racial Indian sovereignties, the social idealism of the Closet Chickens attached positive meanings to the empowerment of racial Indianhood, but this idealism also promoted racialism in an academy that was slowly abandoning the prerogatives of white racial identity.

The Kennewick Man case was decided in 2002 and upheld in 2004 by the 9th Circuit Court of Appeals. These court decisions gutted the consultation provisions of NAGPRA, dismissed oral traditions, undermined joint claims by multiple claimants, and denied the racial assignment under NAGPRA of Kennewick Man as *Native American*. Efforts soon followed to maneuver around the Kennewick Man court rulings on the racial definition of *Native American* by amending NAGPRA. These efforts failed. But an expansive mechanism for dealing with the NAGPRA class of *culturally unidentifiable* racially identified Native American human remains became finalized in the US federal regulations in 2010. This promoted the repatriation of unaffiliated racially designated Native American human remains to racial Indian tribal claimants and Native Hawaiian organizations.

Despite the confrontational tone set by the Kennewick Man case, NAGPRA eventually helped to establish a new consensus throughout the discipline of American archaeology. Archaeologists increasingly understood and accepted that the accommodation of racial sovereignties would make the profession more inclusive of racial Indian viewpoints. The term *multivocal archaeology* became adapted to characterize this new inclusiveness. But the emergence of multivocal archaeology did not necessarily mean that Indian views on oral literature would gain easy admittance to academic constructions of history.

The NAGPRA cultural affiliation standard encouraged the use of oral traditions, heartening racial Indians who often bonded through complaints that archaeology disrespected oral traditions. Few scholars chose to take up this challenge, however, and post-NAGPRA literature saw only a handful of peer-reviewed publications that integrated the study of oral traditions

and the archaeological record (Echo-Hawk 2000; Whiteley 2002). Though such research would seem likely to appear in time, talk of a *separate but equal* paradigm also took shape. The culturally respectful pedagogy of multivocalism opened the door for the comparison of archaeological models of prehistory and Indian traditions about ancient history, but mainstream archaeology seemed content to treat these as separate racially segregated *ways of knowing*.

During the late twentieth century, Indian activists who sought to advance the Indian sovereignty movement by villainizing archaeology often felt suspicious of Indians who took up anthropology. These Indian activists found it easy to ignore the vast changes that reshaped the profession in the decades after passage of NAGPRA (Riding In 2000; Echo-Hawk 2010: 255–71). Racial Indians entering the discipline of archaeology understood that their social position could sometimes be precarious. Many found a sense of balance by policing archaeology via ethical precepts influenced by NAGPRA. Some helped their communities develop new ways of addressing archaeological inquiry by implementing tribal historic preservation programs. Drawing on the new expertise of these racial Indian archaeologists, racial Indian sovereignties like the Navajo Nation began building their own archaeology programs.

Indian archaeologists embraced the pan-Indian narrative on NAGPRA as a law pertaining to race-based social justice. This meant they also had to preferentially bond through the doctrines of racial Indianhood. Rather than help Indian people wrestle with the anthropological consensus rejecting race, Indian anthropologists chose to maintain a code of professional silence about the nature of American racialism. This communal vow of silence became a new tenet of racial Indianhood. Indian intellectuals conjointly handed down to their heirs an unwavering commitment to race, unaffected by the changing definitions of race in the American world beyond Indian country.

Faux white supporters of social justice for racial Indians were less unified in maintaining silence about the true nature of race (see Thomas 2000; Echo-Hawk & Zimmerman 2006; Colwell-Chanthaphonh 2009; Preucel & Mrozowski 2010: 286–7). The faux white supporters of Indians did not practice race themselves. They did not engage in racial bonding with other members of their own assigned racial group. In fact, they had a professional suspicion of race as a discredited theory of human biological diversity. Unlike colleagues who acted purely as cheerleaders for Indian racialism, urging Indians to stay faithful to race while they themselves abandoned it, these authors seemed willing to experiment with a more nuanced semi-postracial position. They didn't believe in race and they said so, but they still had a heartfelt commitment to NAGPRA and the production of race-based social justice.

Repatriation empowered racial Indianhood, and race helped Indian tribes assert control over human remains and repatriate long-lost cultural items, so the doing of race could not be cleanly separated from the making of social justice. The two were intertwined. For this reason, faux whites could not support one and reject the other. But a vast weakening of white racial bonding and an undermining of white privilege had been unfolding slowly for decades, pushed along by the American civil rights movement. The white abandonment of race declared that the American racial contract was somewhere in the process of getting swept to the edges of American life. In a slowly dawning postracial America, would Indians always hold fast to the promises of racial identity?

As an articulation of over two centuries of entrenched American racialism, the passage of NAGPRA added considerable momentum to the racial Indian sovereignty movement. Renewing a sense of enthusiasm for American racialism among Indian practitioners of race, the NAGPRA narrative of success inspired Indians to work to buttress the wavering American racial consensus. Guided by an energetic investment in the tenets of race, Indians failed to understand the detachment from racial bonding that had emerged among racial whites.

The legal philosophers of racial Indianhood understood that the social project that led to

NAGPRA had to do with exploiting race. The power of racial bonding had been applied to uphold the status of Indian tribes in the American political system as racially defined domestic dependent nations. Indian lawyers also believed that the strengthening of this status would lay the foundation for the production of a viable political independence movement. In fact, the repatriation of cultural items and human remains under NAGPRA did encourage many racial Indian sovereignties to recalibrate their social agendas and reinvigorate their cultural heritages.

The successes of NAGPRA meant much for many racial Indian sovereignties. But these successes did not rewrite the truths that really shaped the status of Indians in the American political system. In affirming the empowerment of race through NAGPRA and in attempting to keep faux white Americans bound to their abandoned racial compact, Indians necessarily reaffirmed the status of *Indian nations* in the United States as racially defined quasi-sovereignties. Indian lawyers had built an active sovereignty movement by looking to the US constitution to protect Indian rights, but this same constitution mentioned racial Indians twice and racial whites not at all. By law, Indians would never have the freedom enjoyed by whites, who could freely abandon race, and were doing so in large numbers by the end of the twentieth century.

Rejecting the nonracial social option embraced among faux whites, Indians rejected freedom from the tyranny of race. Attaching their racial Indian governments to the colossal sinking façade of race through NAGPRA and other pan-Indian initiatives, Indian leaders opted for continued dependence on the US federal trust relationship. There would be no confrontation of a fundamentally unfair system in which all Americans could abandon race except racial Indians. There would be no challenge to an undemocratic system of sovereigns in which racially identified Indian sovereigns lacked official political representation and therefore had no formal voice in their own fate.

Holding fast to the fading fortunes of American racialism, Indians left untapped a huge aquifer of moral authority that could be potentially accessed by strategically confronting the imposition of racial Indianhood under the racialist traditions of US federal Indian law. The Indian sovereignty movement would remain a project devoted to race. Indians would accept dependence within the American racial system over the more uncertain quest for full sovereign independence. Continuing the project of cultivating race as a convenient source of social power, Indian leaders began to repackage racial Indianhood into a more international form of racial indigenism – even aspiring to harvest ideological assistance from the United Nations (Echo-Hawk 2010: 426–60).

Embracing race through repatriation and NAGPRA, adherents to racial Indianhood entered the twenty-first century as optimistic stewards of a race-based sovereignty movement. They won many victories by investing in the social authority of the American racial narrative. Even as this metanarrative steadily evaporated from the hearts of other Americans, Indians persevered, clasping vanishing dreams of sovereignty as they trekked onward to the unknown destinations of race.

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- ▶ Closet Chickens
- ▶ Community Archaeology
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- ▶ Decolonization in Archaeological Theory
- ▶ Deloria, Jr., Vine
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▶ Kennewick Man Case: Scientific Studies and Legal Issues
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Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

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Introduction

The logical and legal link between appropriation and restitution of cultural properties is self-evident. If appropriation of the properties is illegal,

there is an obligation to return them. Any State which is responsible of an internationally wrongful act is bound, first of all, to reestablish the situation that would have existed if the act had not occurred.

The question of restitution of cultural properties (A distinction is sometimes made today between "return," used in a general sense, and "restitution," used for stolen or illegally exported properties. The term "repatriation" is also used. But such questions of terminology do not seem important.) is the subject matter of a number of international treaties which have a world scope of application. Their main provisions can today be considered as belonging also to customary international law. The trend towards the restitution is growing, as the result of the development of principles having also a moral and cultural character.

Key Issues

Restitution After War

The experience of the pillages occurred during the Second World War influenced treaty provisions relating to the protection of cultural heritage in time of war. Article 33 of the Convention on the Protection of Civilian Persons in Time of War (Geneva, 1949) prohibits in general pillage and reprisals against the property of protected persons. Article 4, para. 3, of the Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague, 1954), (124 States are parties to it.) concluded within the framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO), prohibits "any form of theft, pillage or misappropriation of, and any acts of vandalism directed against, cultural property," as well as the requisition of movable cultural property situated in the territory of another party. Article I of the First Protocol (The Hague, 1954) (102 States are parties to it.) to the Convention binds a State Party "to prevent the exportation, from a territory occupied by it during an armed conflict, of cultural property" (Art. I, para. 1) and "to return, at the close of hostilities, to the competent authorities of the territory previously occupied, cultural property which is in its territory, if such property has been exported in contravention of the principle laid down in the first paragraph." The provision adds that "such property shall never be retained as war reparations" (Art. I, para. 3). Under Art. 9, para. 1, of the Second Protocol (The Hague, 1999) (64 States are parties to it.) to the Convention, "(. . .) a Party in occupation of the whole or part of the territory of another Party shall prohibit and prevent in relation to the occupied territory: *a*. any illicit export, other removal or transfer of ownership of cultural property; *b*. any archaeological excavation, save where this is strictly required to safeguard, record or preserve cultural property; c. any alteration to, or change of use of, cultural property which is intended to conceal or destroy cultural, historical or scientific evidence."

Irrespective of the application of any treaty, the obligation to return cultural properties removed in time of war or during military occupation is confirmed by United Nations Security Council Resolution 1483 of 22 May 2003, dealing, inter alia, with measures to facilitate the return of cultural properties illegally removed from Iraq after 6 August 1990 (In fact, after the said date Iraq underwent periods of war, periods of peace, and periods of military occupation). According to the resolution,

> (. . .) all Member States shall take appropriate steps to facilitate the safe return to Iraqi institutions of Iraqi cultural property and other items of archaeological, historical, cultural, rare scientific, and religious importance illegally removed from the Iraq National Museum, the National Library, and other locations in Iraq since the adoption of resolution 661 (1990) of 6 August 1990, including by establishing a prohibition on trade in or transfer of such items and items with respect to which reasonable suspicion exists that they have been illegally removed, and calls upon the United Nations Educational, Scientific, and Cultural Organization, Interpol, and other international organizations, as appropriate, to assist in the implementation of this paragraph" (para. 7).

Restitution in Time of Peace

The issue of restitution of cultural properties is today also related to the problem of illegal trafficking in time of peace. In this regard, the first matter to be addressed is the apparently simple

question of determining in what cases "illegal trafficking" really is "illegal." While such a qualification depends on a given national legislation, in cases of transboundary movements of cultural properties, at least two different domestic legal systems are involved, namely, that of the State of origin and that of the State of destination, to which may sometimes be added that of the State of transit. The relevant regimes may be different.

Under a universally recognized principle of law, the theft, that is, the appropriation of properties without the consent of the owner, is a crime subject to criminal sanction and cannot create a valid title for the thief over the stolen objects. However, even in the case of theft, the domestic legislation of different countries may vary as to whether the rights of a third good faith purchaser should be protected and as to whether the statute of limitation (called also acquisitive prescription) could apply in favor of the possessor after the passing of a certain number of years from the crime. Here two maxims taken from Roman law – *beati possidentes* (possessors have priority) and *nemo plus iuris transferre potest quam ipse habet* (nobody can transfer more rights than those that he has) – play one against the other.

In the case of cultural objects fortuitously found and subsequently removed, national legislation may vary also as to who is their owner, either the private owner of the land or the finder or the State as the trustee of a public interest. Similar differences may exist in the case of objects found in excavations. If the objects are found on the seabed, the alternative as to the holder of title is between the finder and the State.

In the case of illegal movements, the picture becomes more complex because they may be the result not only of thefts but also of the violation of domestic legislation which prohibits or limits the export of cultural properties from the national territory. National legislation for this purpose has been adopted by a number of States, especially those that are rich in cultural heritage (One of the first instances in this regard is a decision taken in 1602 by the grand duke of Tuscany, subjecting to a license the export of "good paintings" and prohibiting altogether the export of the works of nineteen selected masters, namely, "Michelangelo Buonarroti, Raffaello Sanzio, Andrea del Sarto, Mecherino, Rosso Fiorentino, Leonardo da Vinci, Franciabigio, Pierino del Vaga, Jacopo da Puntormo, Tiziano, Francesco Salviati, Bronzino, Daniele da Volterra, Fra Bartolomeo, Sebastiano del Piombo, Filippino Lippi, Correggio, Parmigianino, Perugino."). Rules which prohibit or restrict or submit to an authorization the export of cultural properties can be violated irrespective of a theft and even by the owner himself (for instance, if he delivers the object to a buyer abroad or takes the object with him when transferring his residence abroad). However, the legislation of the State of destination may consider as legal the import of such properties, as if they were any other commercial good, and may refuse to apply a foreign legislation that prohibits or limits their export. Moreover, the definition of cultural property and the kinds of objects belonging to this category may vary depending on the national legislation.

It is evident that only a generally accepted regime adopted at the international level could overcome the problems posed by the differences in domestic legislation as regards international movements of cultural properties. To achieve this objective, two treaties of a universal scope of application have been concluded and are today in force, namely, the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Properties (Paris, 1970) (123 States are parties to it.), concluded within the framework of UNESCO, and the UNIDROIT (International Institute for the Unification of Private Law) Convention on Stolen or Illegally Exported Cultural Objects (Rome, 1995) (33 States are parties to it.).

Taking into account the importance of cultural properties, the 1970 Convention sets forth the duty of every State to respect both its own cultural heritage and that of other countries:

> Considering that cultural property constitutes one of the basic elements of civilization and national

> culture, and that its true value can be appreciated only in relation to the fullest possible information regarding its origin, history and traditional setting,
>
> Considering that it is incumbent upon every State to protect the cultural heritage existing within its territory against the dangers of theft, clandestine excavation, and illicit export,
>
> Considering that, to avert these dangers, it is essential for every State to become increasingly alive to the moral obligations to respect its own cultural heritage and that of all nations (...) (preamble).

The basic assumption of the 1970 Convention is that illegal trafficking must be condemned and fought because it impoverishes the cultural heritage of the States of origin of the objects:

> The States Parties to this Convention recognize that the illicit import, export and transfer of ownership of cultural heritage is one of the main causes of the impoverishment of the cultural heritage of the countries of origin of such property and that international co-operation constitutes one of the most efficient means of protecting each country's cultural property against all the dangers resulting there from (Art. 2, para. 1).

The properties to which the 1970 Convention applies are those that belong to the categories listed in detail in Art. 1 and that have a specific link with a certain State, as specified in Art. 4 ("The States Parties to this Convention recognize that for the purpose of the Convention property which belongs to the following categories forms part of the cultural heritage of each State: (a) cultural property created by the individual or collective genius of nationals of the State concerned, and cultural property of importance to the State concerned created within the territory of that State by foreign nationals or stateless persons resident within such territory; (b) cultural property found within the national territory; (c) cultural property acquired by archaeological, ethnological or natural science missions, with the consent of the competent authorities of the country of origin of such property; (d) cultural property which has been the subject of a freely agreed exchange; (e) cultural property received as a gift or purchased legally with the consent of the competent authorities of the country of origin of such property."). The parties recognize the "indefeasible right" of each of them "to classify and declare certain cultural property as inalienable which should therefore *ipso facto* not be exported" (Art. 13, *d*). They are bound to introduce a specific certificate in which the exporting State specifies that the export of the cultural property in question is authorized and to prohibit the exportation of such property unless accompanied by it. They undertake to prevent museums and similar institutions within their territories from acquiring cultural property originating in another State Party which has been illegally exported (Art. 7, *a*). They also undertake to prohibit the import of cultural property stolen from a museum or a religious or secular public monument or similar institution in another State Party (Art. 7, *b*, i) as well as, at the request of the State Party of origin, to recover and return any such cultural property, provided that the requesting State pays just compensation to an innocent purchaser or to a person who has valid title to such property (Art. 7, *b*, ii).

Although very important for fostering international cooperation in the fight against illicit trafficking, the 1970 Convention has some limits. It does not have a retroactive character, applying to properties involved in illicit movements after the entry into force of the Convention for both the State parties concerned. It covers only certain kinds of illicit movements. For instance, the interdiction to acquire cultural properties illicitly imported is limited to museums and the obligation to return is limited to cultural properties stolen from museums or similar institutions, without extending to cases where private individuals have been the victims or where the objects have been illegally excavated.

While the 1970 Convention envisages diplomatic action at the interstate level to achieve the return of cultural properties, the UNIDROIT Convention aims at providing individual victims with the right to bring proceedings before domestic courts for the return of stolen or illegally exported cultural objects. Under the UNIDROIT Convention, the illicit trade in cultural objects causes an irreparable damage which also affects the heritage of all peoples. It follows that the

return of such objects to the States of origin serves the interest of all. In fact, the States parties declare themselves

> deeply concerned by the illicit trade in cultural objects and the irreparable damage frequently caused by it, both to these objects themselves and to the cultural heritage of national, tribal, indigenous or other communities, and also to the heritage of all peoples, and in particular by the pillage of archaeological sites and the resulting loss of irreplaceable archaeological, historical and scientific information,
>
> Determined to contribute effectively to the fight against illicit trade in cultural objects by taking the important step of establishing common, minimal legal rules for the restitution and return of cultural objects between Contracting States, with the objective of improving the preservation and protection of the cultural heritage in the interest of all (preamble).

The UNIDROIT Convention clearly provides that "the possessor of a cultural object which has been stolen shall return it" (Art. 3, para. 1) and that a State Party may request the court or another competent authority of another State Party "to order the return of a cultural object illegally exported from the territory of the requesting State" (Art. 5, para. 1). Specific provisions, which are subject to certain exceptions, apply as regards the time limitation of claims for restitution or return. Another provision specifies the cases where the return of illegally exported objects must be ordered:

> The court or other competent authority of the State addressed shall order the return of an illegally exported cultural object if the requesting State establishes that the removal of the object from its territory significantly impairs one or more of the following interests:
>
> (a) the physical preservation of the object or of its context;
>
> (b) the integrity of a complex object;
>
> (c) the preservation of information of, for example, a scientific or historical character;
>
> (d) the traditional or ritual use of the object by a tribal or indigenous community,
>
> or establishes that the object is of significant cultural importance for the requesting State (Art. 5, para. 3).

Under certain conditions, the good faith possessor of a stolen cultural object or of an illegally exported object is entitled to a fair and reasonable compensation (Art. 4, para. 1, and Art. 6, para. 1). Also the UNIDROIT Convention has no retroactive application.

In all cases where the 1970 Convention or the UNIDROIT Convention are not applicable, for *ratione materiae*, *ratione personae* or *ratione temporis* reasons, use can be made of the consultative services of the Intergovernmental Committee for Promoting the Return of Cultural Property to Its Countries of Origin or Its Restitution in Case of Illicit Appropriation (ICPRCP), provided that the property has "a fundamental significance from the point of view of the spiritual values and cultural heritage of the people of a Member State or Associate Member of UNESCO" and "has been lost as a result of colonial or foreign occupation or as a result of illicit appropriation" (Art. 3, para. 2, of the Statutes of the Committee). As set forth in Art. 4, paras. 1 and 2, of its Statutes, the ICPRCP is entrusted with the responsibility for "seeking ways and means of facilitating bilateral negotiations for the restitution or return of cultural property to its countries of origin" and "promoting multilateral and bilateral co-operation with a view to the restitution and return of cultural property to its countries of origin." By Recommendation No. 4 of 23 September 2010, the ICPRCP adopted a procedure for mediation and conciliation within its framework.

Future Directions

An Evolutionary Trend

In the last years an evolutionary trend has developed towards the restitution of removed cultural heritage to countries of origin (for some relevant instances, which cannot be recalled hereunder because of space constraints, see Sandholtz 2007; Nafziger & Scovazzi 2008; Nafziger & Nicgorski 2009; Scovazzi 2011: 341). The trend applies in time of both war and peace.

The evolutionary trend is based on a number of principles that are located somewhere between morality and law and that can be instrumental in addressing the shortcomings of multilateral treaties in force regarding the restitution of

cultural properties, in particular their non-retroactive character and the fact that they can create rights and obligations only for the State parties.

The principles in question include the principle of non-exploitation of the weakness of another subject for cultural gain, which applies to situations of persecution, war, colonial domination, and foreign occupation or to situations involving indigenous peoples. This principle has also inspired the legislation enacted by certain countries on property looted to victims of the Holocaust (e.g., the *Holocaust (Return of Cultural Objects) Act 2009* of the United Kingdom), on the basis of the 2000 Vilnius Declaration on Holocaust Era Looted Cultural Assets.

Also relevant is the principle of preservation of the integrity of cultural contexts, which is deeply rooted in the nature of cultural heritage, especially as regards properties having an emblematic character for the country of origin. To divide is to destroy (*diviser c'est détruire*), as the French scholar Antoine-Chrysostome Quatremère de Quincy wrote already in 1796 in his book (*Lettres sur le préjudice qu'occasionneroient aux Arts et à la Science, le déplacement des monumens de l'art de l'Italie, le dé membrement de ses Ecoles, et la spoliation de ses Collections, Galeries, Musées, etc.*), against the looting by France of paintings, statues, and manuscripts found in the occupied Italian States. Cultural properties have a special status and cannot be treated as any other commercial good. There is very little merit in the attitude of those who, in the name of an alleged principle of "cultural internationalism," plead for an almost uncontrolled movement of cultural properties (see Merryman 1986: 847). It is not by chance that such movement goes always in the same direction, following the rules of the market, to the benefit of those who can invest huge amounts of money in purchasing foreign cultural properties and to the detriment of the cultural identity of the countries of origin.

These principles, which play in favor of the State of origin of cultural properties, could be balanced against other considerations, which may play in favor of the State of destination, such as the contribution given by the latter for the preservation of the properties in question and the time elapsed since the removal. The objective is to reach an equitable solution for each particular case in the light of all the relevant circumstances.

Settlements negotiated by the parties concerned can only strengthen the efforts to achieve equitable solutions. Interesting in this regard are the agreements on the return of cultural properties concluded in the last years by the Italian Ministry of Cultural Properties and Activities with a number of cultural institutions located in the United States, such as the Metropolitan Museum of Art of New York, the Princeton University Art Museum, the Paul Getty Museum of Los Angeles, and the Museum of Fine Arts of Boston. The agreements provide for the return of cultural properties that Italy claims were illegally excavated in the national territory and sold clandestinely outside the country. The museums accept to transfer to Italy the requested items, while rejecting any accusation that they had knowledge of their alleged illegal provenance. The second, but not secondary, objective of the agreement is to promote cooperation between the parties by temporary loans to the museums of objects of equivalent value, joint activities of excavations, exchange of information about restorations.

The present trend goes mainly in the direction of the restitution of cultural properties to the countries of origin. Moral and cultural principles that dictate the restitution are being progressively transformed into legal rules. The trend has probably not yet reached the final stage when a body of new customary rules on restitution of cultural properties is definitely created. But it can be considered as already being within the dynamics of the evolution of international law.

Cross-References

- ▶ Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954)
- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and

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▶ Cultural Property, Trade, and Trafficking: Introduction
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Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)

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Introduction

In the United States, the Native American Graves Protection and Repatriation Act of 1990 ("NAGPRA" hereafter) created mechanisms whereby individuals and federally recognized tribes could request the return of human remains, funerary objects, sacred objects, and items of cultural patrimony from museums and federal agencies. These processes have allowed tribal groups to obtain various classes of human remains and material artifacts from federal museums and federal agencies, as well as those institutions which receive federal funding.

Definition

The following definitions are found on the National NAGPRA Glossary (n.d.) at http://www.nps.gov/nagpra/TRAINING/GLOSSARY.HTM. "Human remains" are generally considered to be "(t)he physical remains of the body of a person of Native American ancestry. The term does not include remains or portions of remains that may reasonably be determined to have been freely given or naturally shed by the individual from whose body they were obtained, such as hair made into ropes or nets." "Funerary objects" are defined as "(o)bjects that, as a part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later." If "both the human remains and associated funerary objects are presently in the possession or control of a Federal agency or museum," the funerary objects are considered to be "associated funerary objects". Those funerary objects "for which the human remains with which they were placed intentionally are not in the possession or control of a museum or Federal agency" are considered to be "unassociated funerary objects."

In NAGPRA, "sacred objects" are defined as "(s)pecific ceremonial objects which are needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present day adherents." Additionally, an "object of cultural patrimony" is defined as "(a)n object having ongoing historical, traditional, or cultural importance central to the Native American group or culture itself, rather than property owned by an individual Native American, and which, therefore, cannot be alienated, appropriated, or conveyed by any individual regardless of whether or not the individual is a member of the Indian tribe or Native Hawaiian organization and such object shall have been considered inalienable by such Native American group at the time the object was separated from such group."

Historical Background

In the United States, the passage of Public Law 101-601, the Native American Graves Protection and Repatriation Act (hereafter NAGPRA), in 1990 signaled a different level of interaction between archaeologists, biological anthropologists, museums and federal agencies, and American Indian tribal groups not seen previously. Prior to the law's passage, American Indian groups were lobbying to regain materials that had been taken, collected, or placed into museums of federal agency control. Often such materials were collected by researchers or explorers into relatively unknown regions; other times, materials were obtained under questionable practices by explorers, researchers, or even military personnel.

The passage of NAGPRA was not without controversy, as particular archaeologists lamented about the destruction of archaeology as a possible outcome of the legislation. Clement Meighan was quoted as saying that repatriation agreements "... assume all Indian remains of whatever age are the property of contemporary claimants and that it doesn't matter how old things are" (1992: 39). Others, including the museum profession, feared that the passage of such repatriation legislation would result in the decimation of museum collections that contained ethnographic materials. Neither was NAGPRA the first repatriation legislation passed in the United States. The National Museum of the American Indian Act of 1989, which established the National Museum of the American Indian in Washington, DC, provided repatriation legislation aimed specifically at the collections within the various museums within the broader Smithsonian Institution.

NAGPRA required federal agencies and museums to inventory the materials within their collections (either physically within them or those objects on "loan" to other museums or agencies which they maintained "control") to determine those that met the guidelines and definitions for the classes of materials covered by the law. Once those materials which were covered by NAGPRA were identified, the museum, in consultation with the federally recognized Indian tribes who were most likely to be associated with those materials, was then required to develop a plan for returning or keeping the materials. Once these inventories were completed, the tribe most likely to be "culturally affiliated" with the objects was to be given the opportunity to enter into an agreement with the museum for the proper disposition of the objects. Such "disposition" could entail the return of the objects to the tribe, retention of the objects by the museum for the benefit of the tribe, or any other agreement mutually agreed upon by the groups involved.

If materials within the museum's collections could not be identified to a particular group or if more than one group claimed the objects, the regulations implementing NAGPRA provided a list of ten criteria or types of evidence that could be used in helping determine "cultural affiliation." The ten lines of evidence suggested by the regulations include geographical, kinship, biological, archaeological, anthropological, linguistic, folklore, oral tradition, historical, or other relevant information or expert opinion. Decisions were to be made based on the preponderance of the evidence, not with scientific certainty.

Key Issues/Current Debates

Repatriation of the classes of materials covered by NAGPRA has been ongoing for years, and many Native American tribes and federal agencies and museums have reached workable agreements on the proper disposition of the materials. Most contentious, however, have been classes of artifacts which cannot be easily affiliated with a cultural group because of either the age of the material which makes attribution difficult if not impossible, those materials where the museum or federal agency does not have adequate records to determine general affiliation to either a specific location or time period, materials that are more likely to be affiliated with a tribe that does not have federal recognition (a special government-to-government relationship with the federal government) or other possible reasons for the shared uncertainty.

Museums and federal agencies are allowed to transfer the "culturally unidentifiable human remains" (as well as any other material associated with them as funerary objects) to tribes from whose lands the materials were excavated, to tribes whose once were recognized as the aboriginal occupants of the land where the materials were removed, or to other tribes who can demonstrate a "reasonable" claim to the materials. In the absence of any tribes that meet these three criteria or if no federally recognized tribes claim the materials, the museum or federal agency can turn control of the objects over to a nonfederally recognized tribe or the museum or agency can actually reinter (rebury) the materials if it wishes.

Scientific and museum organizations have been concerned that this section of the regulations creates situations whereby the scientific value of these materials has been ignored. In written testimony before the US House of Representatives' Committee on Natural Resources Oversight Hearing on the Native American Graves Protection and Repatriation Act on October 7, 2009, Susan Bruning, the Chair of the Society for American Archaeology's Repatriation Committee, responded "stewards of the NAGPRA process [should] seek to carry out their responsibilities in a manner that is respectful of scholarly research and appropriate scientific inquiry as tools that assist in determining 'cultural affiliation' and in understanding aspects of the broader human past"(http://saa.org/Portals/0/SAA/repatriation/BRUNING_TESTIMONY.pdf).

In this regard, the interpretation of the regulations on "culturally unidentifiable human remains" has been thought to be slanted toward repatriation and reburial without the "balanced" approach archaeologists had sought for past repatriation actions.

International Perspectives

Other repatriation actions have occurred throughout the global environment. One such example among many is the volume documenting actions in Australia edited by Paul Turnbull and Michael Pickering (2010) which derives from a conference convened in September of 2005 to examine the status of various relationships with the ongoing process of repatriating Aboriginal Australian ancestral bodily remains. The volume situates the context of global repatriation issues in Canada and Great Britain and the ways that external events have influenced Australian actions. Additionally, there have been recent actions in Japan in relation to the development of the Ainu as a globally recognized Indigenous group that has indicated that repatriation of human remains in that country might be on the horizon.

Future Directions

In the United States, NAGPRA will continue to play an important role in the relationships between Native American tribes and the federal government and museum environments. New discoveries of human remains as a result of ongoing or new federal construction projects are covered under NAGPRA, and future projects will continue to operate under this legislation's long reach.

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- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
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Repatriation: Overview

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Introduction

For most members of the general public in the United States (and some other parts of the world), repatriation or reburial (as applied to anthropology and museums) appears to be a straightforward notion – tribes and/or appropriate indigenous groups or relatives ask for the return of one or more objects or burials that are historically or culturally related to the group and the museum or university gives it back, or should give it back. Some are aware that the process can be a bit more complicated, but most people have little idea of the nature and process of repatriation, or the problems and complications that are associated. This is not to say that repatriation is problematic and should not be done, but rather that all parties are obligated to follow an explicit legal process. The biggest difference between repatriation in the twenty-first century and repatriation in the twentieth century is (1) repatriation of human remains and associated objects is now law in the USA and some other parts of the world, and (2) repatriation of human remains is now widely accepted as something that responsible and ethical institutions do.

Definition

The dictionary definition of "repatriation" is the following: "send (someone) back to their own country, or send or bring back to one's own country." Wikipedia defines repatriation similarly:

> Repatriation (from Late Latin *repatriare*) is the process of returning a person back to one's place of origin or citizenship. This includes the process of returning refugees or soldiers to their place of origin following a war. The term may also refer to the process of converting a foreign currency into the currency of one's own country.

The repatriation and reburial of human remains, funerary, and sacred objects is a special case of repatriation. Groups representing indigenous peoples around the world have requested that human remains and sacred objects originally taken from their respective historical territories be repatriated from museums and other institutions. Sometimes institutions repatriate human remains and items because they agree that they should rightfully be in the possession of the group that is descended from them, other times the return is based on the requirements of specific laws.

One reason that repatriation – as applied to archaeology and physical anthropology – is not a simple process is because the motivation for these requests is about people in the present and their perception of the past in the present. Repatriation claims are often associated with politics, ethnic identity, and other debates or problems in contemporary society that have or claim to have a historical link to the object or human remains. Such motivations do not make the claim less valid or less appropriate, but the context of the request can be important to understanding the request. Archaeologists, physical anthropologists, and museum directors do not generally approach repatriation from this perspective; they try to contextualize the materials based on archaeological and historical knowledge and

science. It is a discussion that has often led to misunderstandings and differences because the parties are focused on different matters. However, since repatriation laws have come into effect, it is a discussion that is happening in many places, and consequently, museums are getting better at responding to requests, and indigenous groups are getting better at making their requests. Repatriation is most active in the United States, primarily because repatriation laws have been in effect for the longest period of time.

Please note that although the term "archaeologist" is generally used in this entry, the reader should understand that this is a shorthand or simplified way of encompassing people who are archaeologists, physical anthropologists, human osteologists, museum studies scholars, and those in related fields who deal with human remains, grave goods, and sacred or religious objects. Further, archaeology has historically taken the lead in these discussions about repatriation, so this shorthand approach is reasonably accurate as well.

Historical Background

During the 1960s, 1970s, and 1980s, some US institutions listened and responded to repatriation requests from tribes, subsequently returning human remains and sacred objects before there were specific laws in place. However, there is no question that the passage of two federal laws in the United States – the National Museum of the American Indian Act (NMAIA; 20 United States Code (U.S.C.) 80q et seq.) and the Native American Graves Protection and Repatriation Act (NAGPRA; 25 U.S.C. 3001 et seq.) – dramatically changed the nature and process of repatriation. There is little doubt that the effect of this change in process and change in culture has had international implications.

Buikstra (2006), Lambert (2012), Mihesuah (2000), Trope and Echo-Hawk (1992), and Ubelaker and Grant (1989) provide detailed discussions of the history and some of the problems of repatriation in the United States. During the 1980s, the position held by many institutions, as well as by many national professional organizations, was that the ethics of today supersede those of the past, and museums should consider how to change accordingly. At the basic level, repatriation should be done to living descendants upon request and examination of the claim. As Ubelaker and Grant (1989) note, if a group requested remains where there were no living descendants, that group must demonstrate compelling religious or cultural values that outweigh scientific interests. This position also reflected the position of the Society for American Archaeology (SAA) at the time. However, the SAA increasingly assumed the role of representing the scientific community during the 1980s and their view broadened somewhat.

Since the 1980s, the SAA has been remarkably consistent in their position on repatriation (Lovis et al. 2004). The SAA argued for repatriation, but on a case-by-case basis. Indeed, the SAA Executive Committee passed an initial resolution in 1983, followed by a revised version in 1986, and a reaffirmed position in 1999. The key points of the SAA position include (1) both native and scientific viewpoints have legitimacy, (2) scientific importance must be considered against the strength of affiliation, (3) implementation of repatriation should be done on a case-by-case basis because of the variability in circumstances and histories, and (4) communication and consultation with affected groups is of critical importance. Since 1986, the SAA (Lovis et al. 2004) has recognized the importance and legitimacy of repatriation and worked actively with the Congress to create balanced legislation. Note, however, that tribes did not all welcome the SAA position.

Some native tribes and organizations, archaeologists, and other activists argued that repatriation represented something that was morally and ethically important for the archaeological profession to do, even if archaeology lost access to the remains and artifacts. However, even though several states enacted legislation that in some manner dictated repatriation and/or consultation with native groups, there was no consistent national policy until the 1990s.

During the late 1980s, a number of tribes in the United States argued that repatriation of human remains was a human rights issue – that these were human bodies that had to be treated with respect and respect was not possible if the remains were excavated and placed in a museum. Tribes did not see much difference between archaeologists and looters. One incident that angered many (including many archaeologists) happened in Iowa. A cemetery area was excavated due to road construction. All of the historic white settlers were immediately moved to a new location where they were reburied, and the Native American remains were sent to a museum. The lack of consistency and parity and the continuing idea that Native American remains belong in a museum (in part because they have no clear descendants) represented the perfect example of what was wrong with archaeology and museums. Ironically, it is likely that in the Iowa case, archaeologists and physical anthropologists would have treated all remains the same but would have studied them all before reburying.

A number of issues and events changed archaeological and other perspectives on repatriation. First, there were several instances, like the aforementioned Iowa case, that led many archaeologists to become increasingly uncomfortable over the idea of study and curation. In the 1980s and early 1990s, the archaeologist who perhaps best personified this position was Larry Zimmerman. In one article, Zimmerman reflects on his experiences and the present and future of archaeology (2000). Zimmerman notes (2000: 294-5) that the reburial issue's trajectory has followed classic syncretism, or a coalescing or reconciliation of differing beliefs. Zimmerman (2000: 295) argues that "the problem has been that the belief system of Western science about the past, through archaeology, had imposed itself on belief systems of indigenous peoples about their pasts and those they consider their ancestors." Because archaeologists had little resistance from these indigenous people over a long period of time, they assumed that these people agreed or did not object. The past 25–30 years have demonstrated that archaeologists were wrong. Public discussion – as represented in various polls and forums – demonstrated that the general public supported the Indian position.

As Buikstra (2006: 395-6) points out, another influence on the relationships between archaeologists and indigenous peoples was the development and impact of post-processual theories in archaeology in the 1980s and 1990s. This approach to archaeology moved away from being scientific and was humanistic and contextual in nature, with practitioners arguing for multivocality in interpreting the past (cf. Hodder 1985; Shanks & Tilley 1987). Such an approach was certainly more open and welcoming to resolving repatriation disputes, but not everyone agreed with the approach or the benefit for repatriation.

The first United States law that directly addressed issues of repatriation was the National Museum of the American Indian Act (NMAIA; 20 United States Code (U.S.C.) 80q et seq.), which was signed into law on November 28, 1989. The NMAIA was written and passed primarily to establish a new national museum dedicated to the history, music, and art of American Indian cultures. The collections of the private Heye Foundation in New York formed the basis of this new museum, to be part of the Smithsonian and built on the national mall in Washington, DC.

The new museum opened in 2004. As a part of the new law, Indians had lobbied for a Smithsonian repatriation requirement to be included. In particular, the law affects all collections of American Indian human remains and funerary items held by the Smithsonian Institution (although the vast majority of relevant human remains and funerary objects are in the Smithsonian Museum of Natural History, the law affects all of the Smithsonian museums, the new Museum of the American Indian, American History Museum, etc.). The NMAIA dictates that all designated items are to be inventoried, and, where possible, the Smithsonian will determine tribal or descendant origins. When the law was passed, the Smithsonian was estimated to have 19,250 sets of Native American remains

(Smithsonian Repatriation Office website). As of December 31, 2010, approximately 29 % of this number has been offered for return, and about 20 % of the total has actually been repatriated (estimated from Smithsonian Repatriation Office's website – http://anthropology.si.edu/repatriation/faq/index.htm).

Lambert (2012: 21) makes the point that the NMAIA marks a real "shift in archaeology law from the protection of archaeological resources to the legal acknowledgement of private ownership (or rights of stewardship) by a sector of the American population of a component of the archaeological record."

Legal representatives of appropriate tribes or descendants can request the return of remains and objects. The Smithsonian notifies tribes if they determine an affiliation, but tribes are also encouraged to submit a request for remains to be returned. If there is a disagreement between the Smithsonian and the requesting tribe, the Smithsonian Repatriation Review Committee can examine the case in detail and submit its recommendations to the head of the Smithsonian. The Review Committee is composed of archaeologists, physical anthropologists, tribal representatives, and tribal elders. The tribal representatives on the Committee have one more representative (and therefore one more vote) than the scientific representatives.

One of the most important results of the Smithsonian act is that systematic study of human remains and objects prior to return is a priority, and the law provides funding for a Repatriation Office. As noted by Killion and Molloy (2000), as well as by Ousley et al. (2005), an enormous amount of contextual knowledge and a systematic catalogue have been gained as a result of this law. Data recovered can be used in the future, and data recording has been done in a consistent manner. It is important to realize, however, that the NMAIA *only* affects collections held by the Smithsonian.

The Native American Protection and Repatriation Act was passed on November 16, 1990 (NAGPRA; 25 U.S.C. 3001 et seq.). NAGPRA is a far-reaching law that was crafted as a compromise between Congress, Native Americans, and the scientific community. Note that although NAGPRA does not apply to the Smithsonian, the Smithsonian has generally accepted and incorporated the regulations of NAGPRA, and the NMAIA was amended in 1996 to reflect this incorporation of NAGPRA regulations.

NAGPRA has several components:

1. It applies to federally recognized Native American tribes, as well as native Hawaiian organizations and Alaska native corporations.
2. In addition to human remains, NAGPRA includes the repatriation of associated and unassociated funerary objects (objects clearly part of a burial as well as objects that were likely funerary objects but for which details are unknown), sacred objects (objects required for rituals and ceremonies), and objects of cultural patrimony (objects that are owned by the group and cannot be owned or sold by an individual).
3. NAGPRA requires museums and federal agencies to identify and inventory human remains and associated funerary objects and also produce a summary of unassociated funerary objects, sacred objects, and items of cultural patrimony by November 16, 1995. These inventories and summaries were distributed to the federal government as well as appropriate tribes.
4. NAGPRA established tribal ownership of Native American remains and cultural items recovered from federal and tribal lands after 1990, requiring procedures prior to excavating on such land whether the excavations were inadvertent or intentional.
5. Violation of NAGPRA includes prohibitions against trafficking, sanctions against museums for not meeting deadlines and procedures, and enforcement of the Act by the ability to go to court.

NAGPRA established a Review Committee similar in composition to the Smithsonian's Repatriation Review Committee, with the balance tilted toward Native Americans. NAGPRA also established some grants to museums, Indian tribes, and native Hawaiian organizations (although these funds have been

very small relative to the need), and the law promulgated regulations to make the law work.

As Lambert (2012: 20) notes:

> These laws reveal significant changes in attitudes concerning the scientific value of archaeological human remains over the course of the 20th century, and illustrate the complexities that can arise when secular and religious ethics collide in the conduct of scientific research.

NAGPRA is important – its passage meant that the Federal government was acknowledging that some things in museums were not obtained in a way consistent with modern American ethics, even though the original acquisition may have been legal at the time. Fortunately, NAGPRA was also a legal impetus for beginning conversations between tribes and the scientific and museum communities. Some tribes and archaeologists had already been talking with each other, but NAGPRA mandated such discussions. As Lambert (2012: 22) notes: "In light of the history of disenfranchisement of indigenous people in North America, . . . NAGPRA's passage was an ethical victory that could be shared by all communities impacted by the law."

Key Issues and Current Debates

Archaeologists and museums operating in the USA today adhere to federal laws and policies concerning repatriation. While some were opposed to these laws initially, they now honor the law. More importantly, there has been a significant culture change among the public and among archaeologists and museum professionals, who accept that repatriation is an appropriate federal policy. It is important not to minimize this culture change: repatriation is now considered the de facto result of most burial excavation in the United States.

Under NAGPRA and the NMAIA, repatriation does not have a timetable. Except for specific dates by which museums were required to report their holdings, there is no deadline for the time when repatriations must be completed. This was done deliberately since it was impossible to estimate how long this process would take, and no one wanted to put the burden of a timetable on tribes who were already overwhelmed by the numbers of potentially related remains and artifacts in museums.

A key issue in the passage of NAGPRA was the concept of "cultural affiliation." Cultural affiliation is the basis for decisions about which remains are open to repatriation claims. NAGRPA's definition is "a relationship of shared group identity which can be reasonably traced historically or prehistorically between a present day Indian tribe or Native Hawaiian organization and an identifiable earlier group" (25 USC 3001, Sec. 2[2]). If there is no clear evidence for such a relationship, NAGPRA specifies establishing cultural affiliation based on a "preponderance of the evidence based upon geographical, kinship, biological, archaeological, anthropological, linguistic, folkloric, oral traditional, historical, or other relevant information or expert opinion" (25 U.S.C. 3005, Sec. 7[4]). It is important to understand that preponderance of evidence is a low legal threshold of simply >50 %, and all types of evidence are to be treated equally. The notion of cultural affiliation has been problematic in some cases and is the basis for a number of legal and ethical debates about the meaning and intent of the law.

Many in the public think that the so-called Kennewick Man case legally settled the issue of cultural affiliation, but this is not the case (Thomas 2000). Kennewick Man (found in Washington State) was a legal battle over a very ancient skeleton. A group of scientists and a group of citizens (Friends of America's Past) were on one side, and five Native American tribes and bands from the Columbia River Basin were on the other side (although technically the case was against the USA). Not only did the skeleton date to a very early time, some physical anthropologists argued that the skeleton had characteristics that were more Caucasoid than Native American in nature. The details of the case can be found in Thomas (2000) and elsewhere. Unfortunately, instead of deciding the case on the basis of cultural affiliation – a finding that might have helped clarify decisions made under NAGPRA – the US Court of Appeals for the

Ninth Circuit argued that the Federal Government had failed to prove that the skeleton was Native American and therefore it was not subject to NAGPRA. It was a decision that angered Native Americans and also angered many archaeologists because the decision was based on an idea about which Native Americans and archaeologists generally do *not* disagree – both sides would say that ancient remains found in the USA can generally be considered Native American.

Subsequent to the Kennewick decision, various attempts were made to amend and/or adapt NAGPRA. Most importantly for the present discussion was the Department of the Interior's 2007 decision to address the issue of "culturally unidentifiable human remains" (CUHR). This category includes the largest majority of archaeological human remains in the United States. Included are those remains that museums and federal repositories have not been able to affiliate with a modern Indian tribe or descendant. Following the lines of evidence provided in the definition of "cultural affiliation" (and outlined above), these are remains for which institutions have not been able to assign an affiliation. For the most part, these remains are those of greater antiquity, with fewer ties to the present. Members of the scientific and museum communities had worried about this group of remains from the very earliest repatriation discussions because archaeologists and museums were concerned about the impact of repatriation law on the study of prehistory. Some Native American groups were also concerned about the rule from both practical and legal perspectives.

The final rule for culturally unidentifiable human remains (CUHR) was enacted in May 2010. The original negotiations involved in crafting NAGPRA had carefully maintained a balance between various interests. The new rule ignores that balance and favors native issues over any scientific interests or concerns; it also does not necessarily give tribes much leeway in how they wish to respond to repatriation. It is likely that this rule will be the focus of many future legal challenges.

One issue in the Final CUHR rule focuses on the term "disposition," or the outcome of a repatriation claim. NAGPRA does not mandate the nature or type of disposition for successful repatriation claims, intentionally avoiding use of the term "reburial." The reason for this avoidance is that any particular tribe might or might not wish a particular or mandated outcome. While most tribes would likely wish reburial, if the repatriation decision is that the remains belong to the group, the specifics of the final disposition should also be the group's prerogative. The CUHR Final Rule effectively calls for the reburial of all Native American human remains currently in museums and federal repositories, even if evidence for any relationship of shared group identity is lacking.

Although many contentious issues remain, current debate in archaeology has moved from the question of whether or not repatriation is right or wrong to more complicated issues. Colwell-Chanthaphonh and Ferguson (2006) present one aspect of this new direction. Instead of principles and rules of ethics, they promote the idea of Virtue Ethics. "Instead of beginning with questions of obligations and oughts, Virtue Ethics begins with questions of character, focusing on relationships and the subjectivities of social interaction" (Colwell-Chanthaphonh & Ferguson 2006: 118). They argue that we need to focus on agents and sustained actions, rather than single acts. Effectively, Colwell-Chanthaphonh and Ferguson (2006) argue for a more complex, layered discussion about archaeological practice. They note that archaeologists have a series of unique relationships with multiple interactions, and these interactions have consequences for ethical standpoints.

International Perspectives

In their broad discussion of ethics of bioarchaeology, Larsen and Walker (2004: 114) outline three ethical principles for the study of human remains, whether in the USA or internationally: (1) human remains should be treated with dignity and respect; (2) descendants should have the authority to control the disposition of their relatives' remains; and (3) because of the

importance of human remains for the understanding of our common past, human remains need to be preserved when possible so that they are available for scientific research. From the discussions above, it is clear that there may not be universal agreement on these principles.

Canada and Australia share with the United States a basic issue associated with repatriation: the majority of the contested collections derived from minority indigenous populations where treatment of the dead is an important part of broader indigenous rights issues. Most repatriation efforts focus on trying to redress historical wrongs associated with Western colonialism.

Buikstra (2006: 408-9) notes that Canada has no federal legislation similar to NAGPRA, but relationships between First Nations and archaeologists are strong. Why the difference between countries? First, the Canadian archaeological profession voiced their sympathy with First Nation concerns relatively early, with physical anthropologists practicing in situ analyses and reburials during the 1970s. In other words, Canadian bioarchaeologists were collaborating and consulting with First Nations over a decade before US archaeologists, and they did so without being mandated by legislation, producing impressive work with multivocal perspectives. Interestingly, there are multiple examples of First Nations requesting osteological analyses and allowing destructive tests. The National Museum of Canada stopped accessioning human remains in the early 1970s. As Buikstra (2006: 412) notes, "Canadian museums, physical anthropologists, and archaeologists appear to favor mediation over litigation in addressing repatriation issues."

Lambert (2012: 25-6) notes that while the United States, Canada, and Australia have seen repatriation on a national scale coming from indigenous populations and issues relating to colonialism, some similar historical situations exist in Argentina, Norway, and South Africa. However, to date, repatriation efforts in these countries have been limited and generally involve the return of named, historically significant individuals.

In Israel (Nagar 2011: 8), opposition to the excavation of human remains is associated with sites dating to Classical Antiquity and comes from a group of extremist religious Jews who believe that graves of Jewish dead should remain undisturbed; their political power has been successful in gaining some severe restraints on research. Nonetheless, the Israeli Antiquity Authority created and has maintained a human osteological database since 1994; all time periods are included (Nagar 2011).

In Great Britain, considerable dialogue has focused on repatriation and is in part the result of connections to developments in Canada, Australia, and the United States. However, Parker Pearson et al. (2011) provide a recent summary of the issues and concerns. In 2008, "the British government announced that all human remains archaeologically excavated in England and Wales should be reburied after a two-year period of scientific analysis" (Parker Pearson et al. 2011: 1). Not surprisingly, this announcement caused great consternation on the part of museums and archaeologists. As of the moment, it appears that the policy will not be implemented as stated, but Parker Pearson et al. (2011: 3) point out that

> The weaknesses and contradictions in the legal frameworks that govern archaeology are shocking in many respects, and cannot remain unresolved; archaeologists are pulled hither and thither by property law and planning law, while human remains exist in a peculiar (but ethically and morally appropriate) legal limbo in that they cannot technically be owned.

In sum, outside of Canada and Australia, laws regarding repatriation and reburial are scattered and sometimes under debate; they resemble the issues raised for the United States when there is a similar historical colonial situation. Whether or not the twenty-first century sees an increase in repatriation and reburial remains to be seen.

Future Directions

Larsen and Walker (2004) discuss the ethics of bioarchaeology and their view of the future. They argue that compromise is the key to reaching an ethical solution to skeletal studies of ancient ancestors. Compromise can be legislated, as it

originally was for NAGPRA, or it can come about through working together. However, Larsen and Walker (2004: 118) note that this balance achieved through compromise is now endangered with "a perceptible shift in the balance of power toward extremist native perspectives on repatriation." They close their discussion with the comment that "compromise is developed when there is trust between two parties who have invested time and effort in reaching solutions that may not be perfect, but nonetheless attempt to [address] competing interests of different groups" (Larsen & Walker 2004: 118).

The notion of trust is an important one and will continue to be so in the future, both in the United States and internationally. As noted above, Colwell-Chanthaphonh and Ferguson (2006) use the concept of Virtue Ethics to look to the future without specific reference to NAGPRA. They also discuss the concept of trust and the nature of trust in archaeological practice. They draw on the work of Baier (1994) to outline and discuss "Virtue Ethics," citing Baier's contention that goodwill is an essential component of trust. Colwell-Chanthaphonh and Ferguson (2006: 122-4) outline the complex web of categories of trust relationships in archaeological practice, noting that there are not only relationships within categories but also relationships between them. Trust requires goodwill, but each group has to interpret acts of goodwill as benevolent (Colwell-Chanthaphonh & Ferguson 2006: 127). If we wish to develop trust between archaeologists and museums and indigenous groups, all parties must move to a focus on people and actions over time, rather than things and single interactions at one time. Although it takes time to develop and establish trust, the goal has an excellent reward.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Ethics and Human Remains
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Zimmerman, Larry J.

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Research Laboratory for Archaeology and the History of Art (University of Oxford)

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Basic Information

The Research Laboratory for Archaeology and the History of Art (RLAHA) came into being as a result of a dinner in Christ Church in 1949, hosted by Lord Cherwell, involving Teddy Hall, Christopher Hawkes (Professor of European Archaeology), and Stanley Robinson, a keen collector of Greek coins who subsequently gave his collection to the Ashmolean Museum. Lord Cherwell was a physicist and the Director of the Clarendon Laboratory (as well as Chief Scientific Advisor to the wartime and postwar Churchill governments), and Teddy Hall was a D.Phil. student who had recently carried out an X-ray fluorescence examination of the Piltdown cranium and deduced that it had been artificially stained to give the appearance of age. Christopher Hawkes and Teddy retired to Teddy's flat for port and coffee after the dinner, and by morning, the idea of a scientific lab dedicated to archaeological research had been born. Lord Cherwell was instrumental in raising funds, and the whole venture was facilitated by the fact that Teddy declined to take a salary, using the money instead to appoint a Deputy Director. The Lab started in Keble Road in 1953, and the first Deputy Director, Stuart Young, was appointed in 1955. On his return to South Africa, he was replaced by Martin Aitken in 1957.

Major Impact

From the very beginning, the Lab was populated largely by physicists, who were dedicated to developing instruments and techniques for the benefit of archaeology. Teddy's D.Phil. thesis had involved him building the first X-ray fluorescence spectrometer specifically designed for the nondestructive analysis of museum objects. He quickly turned his attention not only to electron microprobes but also, in partnership with Martin, to the development and testing of proton magnetometers for geophysical survey, both on land and underwater. Martin continued his interest in magnetism to develop instruments, initially for dating using direction measurements (requiring in situ samples) and subsequently using intensity measurements. From the 1960s onwards, he also pioneered the use of luminescence measurements on heated pottery as a dating technique (TL),

followed in the 1980s by OSL techniques. RLAHA still runs an OSL Laboratory, now jointly run with the School of Geography.

Robert Hedges joined the Lab in 1974, initially as an inorganic analyst, but, increasingly from 1977, with a developing interest in radiocarbon dating by accelerator mass spectrometry (AMS), which had also triggered Teddy's passion for designing and building scientific instruments. The heart of the accelerator is made from a 3-m diameter oil pipeline, which was delivered in 1981. The first dates were published in 1984, and the most publicly notable date, that on the Shroud of Turin, was published in 1988. A replacement accelerator was delivered in 2000, and the Radiocarbon Unit now produces more than 2000 dates a year, including providing a national facility for archaeological radiocarbon dating, jointly supported by NERC and AHRC.

The radiocarbon lab is solely focussed on providing dates for archaeological research, and consequently most of the samples measured are either bone (which makes up the majority) or charcoal. Bone, because of degradation, is one of the most difficult materials to date, requiring scrupulous chemical pretreatment to provide clean endogenous samples for dating. Because of this, the Lab has developed considerable expertise in preparing archaeological bone for analysis, including the recently developed protocols for ultrafiltration, which have resulted in considerable changes to the dates published for the Palaeolithic in Europe. Robert Hedges, once the accelerator was up and running routinely, became increasingly interested in the isotopic study of carbon and nitrogen in bone collagen and has published a number of papers on bone diagenesis as well as a large number of dietary studies using bone isotopes. He has supervised an impressive stream of graduate students in this and related areas.

Both Martin and Teddy retired in 1989, with Teddy being replaced by Prof. Michael Tite, previously at the British Museum, and with Robert Hedges moving in to Martin's position as Deputy Director of the Lab. His place as Director of the Radiocarbon Unit was taken by Christopher Bronk Ramsey, who, as well as running the Unit, has been responsible for writing the Oxcal software, initially for calibrating radiocarbon dates but more recently incorporating Bayesian modelling algorithms which have demonstrably revolutionized yet again the applications of radiocarbon dating to archaeology.

Under Mike Tite, the Lab developed a considerable expertise in the technology of glasses and glazed materials, particularly in Egypt and the Near East. This perhaps marked a change of emphasis from the work in the 1950s and 1960s, away from the development and building of new instruments, to the application of more established scientific techniques to substantial archaeological and technological problems, marking the maturation of the discipline of archaeological science. Mike retired in 2004.

The first volume of the journal *Archaeometry* (a word coined by Christopher Hawkes) was published in 1958, originally subtitled the "Bulletin of the Research Laboratory for Archaeology and the History of Art, Oxford University," but including international contributions from volume 3 onwards. This is still published for Oxford University by Wiley-Blackwell.

In 1962, Martin Aitken organized a day meeting in Oxford for archaeologists who had purchased proton magnetometers to compare notes on applications and review new developments, which became an annual meeting. The scope of these meetings broadened in 1969 to become the "Symposium on Archaeometry and Archaeological Prospection," held in Oxford until 1975. In 1976, with the meeting in Edinburgh, it became the "International Symposium on Archaeometry and Archaeological Prospection" and in 1980 (Paris) the "International Symposium on Archaeometry," which continues to this day as a biannual international conference.

Martin Aitken's contribution to science was recognized by the award of a Fellowship of the Royal Society (FRS) in 1983, and Teddy Hall was awarded an Honorary FBA in 1984. Robert Hedges was awarded the Royal Medal of the Royal Society in 2008.

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Revista de Arqueología Histórica Argentina y Latinoamericana

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Basic Information

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A historical archaeology perspective centered on the past of Argentina and Latin America would require the existence of its own publication. In the Republic of Argentina, despite numerous investigations developed within this field of knowledge, peer-reviewed periodical publications did not exist till approximately 5 years ago.

Faced with this panorama, it was proposed in 2007 to undertake a publication mainly aimed at gathering together the recent outputs of Latin-American researchers and to become a regional reference for the discipline.

Under these tenets, the *Revista de Arqueología Histórica Argentina y Latinoamericana*/Journal of Argentine and Latin-American Historical Archaeology (ISSN 1851–3190) was created, an annual peer-reviewed publication, co-edited with the Argentine Anthropology Society.

Its general aim is to publish works that make an original contribution to the field of historical archaeology, as well as to related disciplines and subject matters (history, historical anthropology, and ethnohistory, among others). The articles consider epistemic, theoretical, and methodological aspects as well as presenting the research results of Latin-American case studies.

Conforming to this, it was one of the major propositions to extend in time a publication by Latin-American social scientists that go beyond restricted academic circles. Consequently, the journal was conceived as a medium that would raise consciousness through dissemination of information to the general public about topics such as the value of cultural heritage and of the identities of diverse social groups.

Major Impact

Currently, the journal constitutes a space for scientific communication based on the most demanding editorial standards. It boasts a prestigious national and international Academic Committee, with the endorsement of numerous academic centers and research institutions.

As for the editorial process, all submissions are subject to a peer-review process, which includes revisions by the Editorial Committee and a report from two external scholars of outstanding expertise. The publication is indexed

by Latindex (Folio Nº 18899) and *Anthropological Literature* (Harvard University, Hollis Catalog Nº 011292952).

It was anticipated that the journal be converted to digital form and made available under the open-access modality. This goal is closely linked to the original intention of informing the greatest number of people of the results published within.

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- ▶ Schávelzon, Daniel
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Ribeiro, Carlos

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Basic Biographical Information

Carlos Ribeiro (1813–1882) (Fig. 1) was born in Lisbon in 1813 and died in 1882. He was a pioneer in Portuguese geology and archaeology. He is considered as the "Father" of Portuguese prehistoric archaeology.

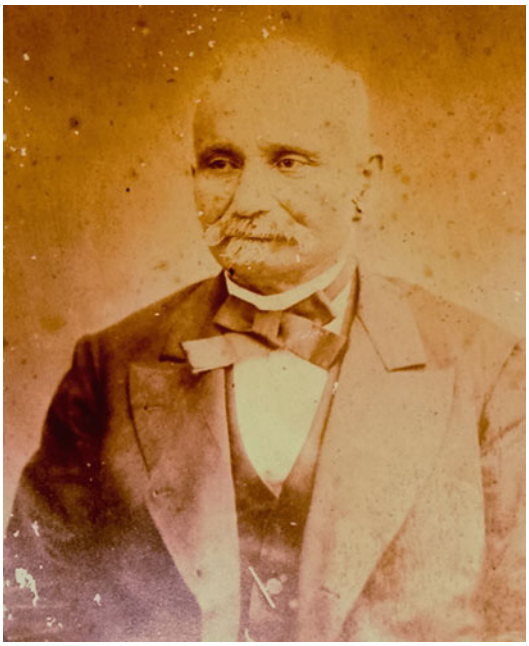

Ribeiro, Carlos, Fig. 1 Carlos Ribeiro

Major Accomplishments

Carlos Ribeiro was an officer of artillery in the liberal army, being promoted to Second Lieutenant in 1840, to Captain in 1851, to Major in 1866, and to Colonel in 1875. A short time before his death, he retired as General. Contact with another artillery officer, José Vitorino Damásio, allowed Ribeiro to acquire knowledge of metallurgy and mines. This provided the experience for him to be the Inaugural Director of the Secção de Minas e Repartição Técnica (Section of Mines and Technical Department) of the Ministério das Obras Públicas (Ministry of Public Works) when this ministry was created in 1852. This position allowed Ribeiro to supervise and stimulate mining research in the country.

Ribeiro's research and professional activities included organization of the Geological Chart of Portugal, which he started in 1862. Participation in several international conferences in the discipline saw him engage in the European archaeological movement, mainly in terms of debates around the so-called Homem Terciário

Português (Portuguese Tertiary Man). This subject, among others, was discussed in 1880 in Lisbon, during the IX International Congress of Prehistoric Anthropology and Archaeology. Before this event, Carlos Ribeiro had carried out a series of archaeological surveys and excavations, gathering an excellent collection of prehistoric artifacts for the Comissão Geológica de Portugal (Geological Commission of Portugal).

In addition to organizing this Congress, Carlos Ribeiro discovered, studied, and published several prehistoric lithic objects that he found at Ota, which he called "sílexes da Ota" (the flint from Ota). The pioneering aspects of his studies into prehistoric materials in Portugal gave him the title of "Father" of Portuguese Prehistoric Archaeology. In 1887, 5 years after his death, several researchers established the *Sociedade Carlos Ribeiro* at Oporto, an association in archaeology and the natural sciences. This association established a journal that published articles by eminent scholars, such as Paul Choffat, José Leite de Vasconcelos, and Francisco Martins Sarmento.

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Rice: Origins and Development

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Basic Species Information

The genus *Oryza* consists of 24 species, among which two domesticated species are recognized. On the one hand, there is Asian rice, *Oryza sativa;* today one of the most widely grown and productive of world crops, which had its origins in southern and eastern Asia. On the other hand, there is African rice, *Oryza glaberrima*, which is native to and mostly restricted to western Africa (see Fig. 1). Asian rice is conventionally divided into two subspecies, subsp. *japonica* and subsp. *indica*, although more recent genetics suggests that five distinct groups should be recognized within *O. sativa* (Garris et al. 2005): *indica, aus, tropical japonica, temperate japonica*, and *aromatic*. Rice is closely related to bamboos but distantly related to the major cereals maize, wheat, and sorghum (Vaughan 1994). *Oryza sativa* and *O. glaberrima* and their wild progenitors are diploids (2n = 24) with AA genomes. Asian rice is closely related to a wild complex of annual and perennial species, often recognized as *Oryza nivara* and *O. rufipogon*, while African rice is domesticated from the annual *O. barthii*, which in turn is close to perennial *O. longistaminata* (Agnoun et al. 2012).

Rice is cultivated in a wide range of ecological habitats, from dryland to wetland fields, to terraces cut in the slopes of hills and even in deep water up to 4 m. It can grow in altitudes from sea level to 3,000 m and is cultivated as far north as 50° in China and as far south as 40° in Argentina (Vaughan 1994; Fuller et al. 2011). Under rainfed conditions, 800 mm of rainfall can be taken as a minimum with higher precipitation preferred. African rice is a traditional staple over major areas of western Africa, while Asian rice is the staple cereal of the most densely populated countries and regions. Many varieties exist,

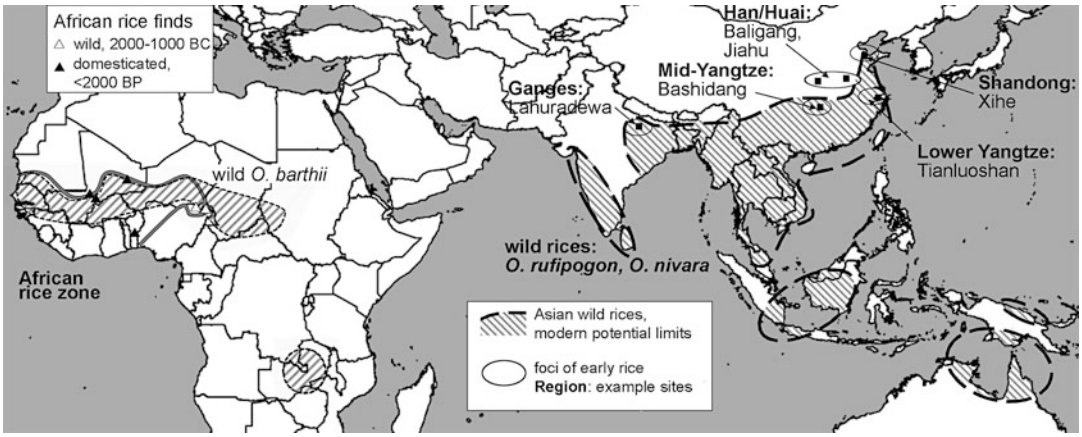

Rice: Origins and Development, Fig. 1 Map showing the distribution of wild progenitor rices in Asia and Africa, locations of sites with important evidence of African rice, and areas discussed in relation to early rice cultivation in Asia

especially in Asian rice, to cater to different tastes. There are sticky and fragrant varieties and colors from white to red and black. The total world production of rice in tonnes is second to maize with China and India being the largest rice producers (FAOSTAT 2012). Asian *Oryza sativa* has been widely grown in western Africa for the past few hundred years, but it remains the case that native *O. glaberrima* tends to be more reliable on poor soils without the application of expensive fertilizers (Richards 1996; Agnoun et al. 2012).

Major Domestication Traits

Rice has been studied in great detail by botanists and geneticists unravelling a complicated history which is still subject to disagreement. Divergent views mainly focus on the origins of domesticated rice. The single-origins model points towards China as the center of origin, whereas the multiple-origins model indicates *O. sativa japonica* was first domesticated in China and *O. sativa indica* later in India (Fuller et al. 2010). The genetic evidence has established that the two subspecies have different mitochondrial genomes and therefore corroborates two distinct origins, with *indica* derived from an annual *O. nivara*-like ancestor and *japonica* from the perennial *O. rufipogon*. However, those who favor a single origin argue that *indica* was derived from *japonica* rice, with some local gene flow from wild populations (e.g., Molina et al. 2011). What is clear is that hybridization, which may represent intentional breeding, has played an important role in the history of rice as has regional diversification and adaptation (Fuller 2011).

Rice caryopses are one of the most easily recognizable archaeobotanical remains (Fig. 2). Grains are long and laterally compressed. These are characterized by an oblique tip with length-wise ridges corresponding to the lemma and palea, which had contained the grain. Grain measurements are highly variable, especially in length, but domesticated forms usually have thicker and wider grains than their wild ancestors, making many domesticated types shorter and plumper in contrast to thin wild forms (Murray 2007; Fuller et al. 2010). Other important lines of archaeological evidence include husk patterns, spikelet bases, and phytoliths (Fig. 3). The husk (lemma and palea) has a distinctive and regular reticular pattern. This is often identifiable from husk impressions in ceramics in which rice was used as temper. Advances in archaeobotany have also made it possible to distinguish wild from domesticated rice by examining the spikelet base rachilla scars (Fuller et al. 2009). Unlike wild rice, domesticated rice does not naturally disperse its seeds when ripe, making the spikelet

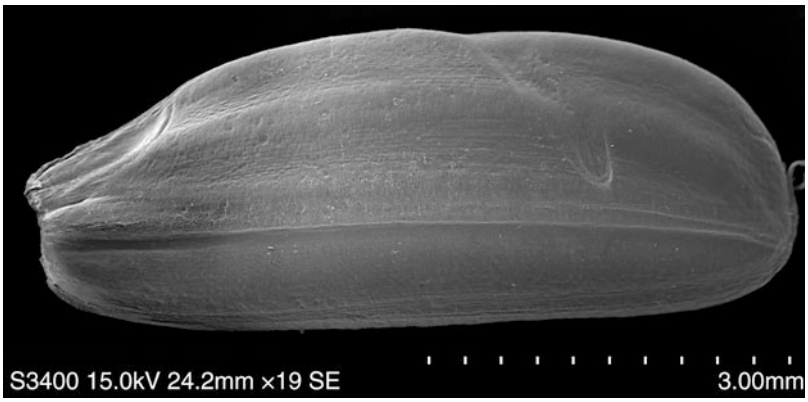

Rice: Origins and Development, Fig. 2 SEM image of caryopsis of modern rice showing the ridges and profile of small embryo

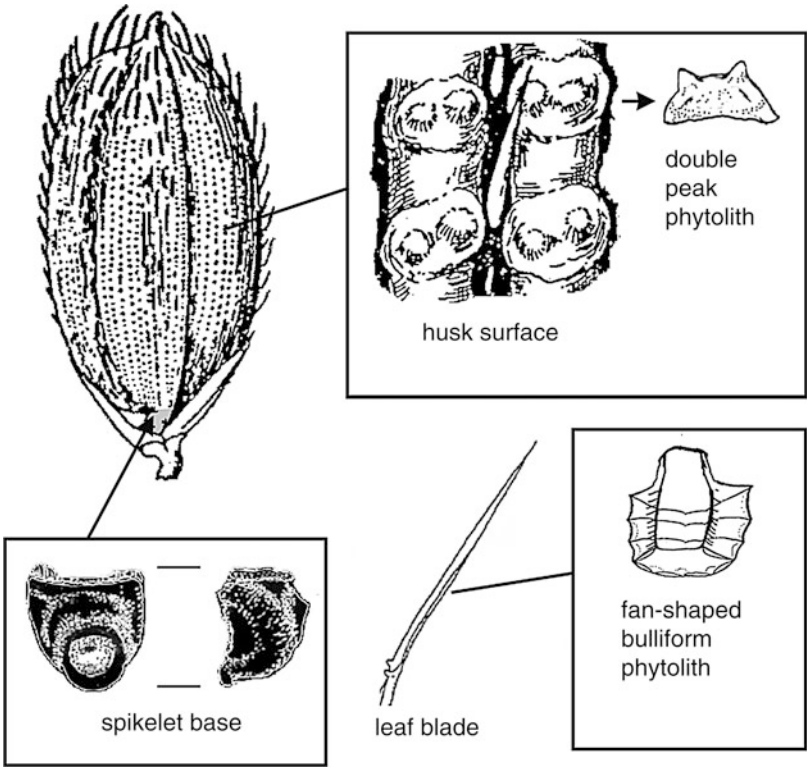

Rice: Origins and Development, Fig. 3 Illustrations of lines of archaeobotanical evidence for rice in addition to grains, including rice husk, spikelet bases, and two main phytolith morphotypes

base a key line of evidence in tracking the domestication process. Other important lines of archaeological evidence are bulliform phytoliths from rice leaves and double-peaked phytoliths from the husks. Both are certainly diagnostic of *Oryza* and show variation within and between species, but there remain debates about the utility of these phytoliths for tracking the domestication process or separating *indica* versus *japonica* (Fuller et al. 2008, 2010). In Africa, there has been less archaeobotanical research on rice (Murray 2007), with little application so far of spikelet base studies or phytoliths.

Domesticated rice exhibits qualities derived from both its wild species. *O. nivara* is an annual species preferring open habitats but also growing in swampy areas, is daylength insensitive, and self-fertilizing. *O. rufipogon* is a perennial

species better adapted to wetlands, is often daylength sensitive, and cross-fertilizing. It is found across a wider geographic range than *O. nivara* including extending to northern Australia and southern China (Vaughan 1994) but previously extending in eastern China northwards towards the Shandong peninsula (Fig. 1; Fuller et al. 2010). *O. sativa* is annual and self-fertilizing like *O. nivara*, though some domesticated rice varieties also grow in deep water and are photosensitive like *O. rufipogon* (Sang & Ge 2007). As rice spread through Asia, hybridization with local wild populations is thought to have provided additional adaptive traits (Fuller 2011). Similar processes are likely in African rice (Richards 1996).

Timing and Tracking Domestication

African rice origins remain obscure. Final Stone Age sites, with ceramics, in the region west of Lake Chad in Nigeria have produced evidence for the gathering and use of wild *Oryza longistaminata* (e.g., Bigga & Kahlheber 2011) by the second millennium BCE, but with no clear sequence leading to domestication. The earliest domesticated rice finds are grain assemblages from the Iron Age at Dia in the middle Niger River valley in Mali, dating after 800 BCE (Murray 2007). Finds from a few other sites in Mali and elsewhere indicate that African rice was associated with urban sites through first millennium CE and into the Islamic period.

In Asia, five regions are discussed in relation to possible centers of rice cultivation and domestication origins. It is plausible that several of these areas were involved in parallel processes of domestication. The best documented is in the Lower Yangtze where Tianluoshan is representative of a regional sequence of evolutionary change towards domesticated rice. A pre-domestication phase showing morphological change is evident in the sites of Kuahuqaio (6000–5400 BCE), Tianluoshan, and Hemudu (5000–4500 BCE), with agricultural field systems based on domesticated rice emerging by the terminal Majiabang culture (by c. 4000 BCE) at sites such as Caoxieshan and Chodun (Fuller et al. 2008, 2009, 2010). The middle Yangtze region provides some of the earliest evidence for rice use from phytoliths in postglacial cave sites (from c. 16000 to 15000 BCE), while cultivation was probably practiced by the time of Bashidang (7000–6000 BCE) with domestication by subsequent phases. Also important in debates is the site of Jiahu on the Huai river (7000–6000 BCE), which lacks clear evidence for rice domestication but has been linked to comparably aged evidence from Baligang some 150 km away on the Han river valley (Zhang & Hung 2013). At Baligang, significant proportions of domesticated spikelet bases occur, suggesting comparability to Tianluoshan or later sites in terms of domestication status. Rice finds from the Houli culture of Shandong are of similar age (Jin et al. 2013) but plausibly wild gathered. While the data from China is rapidly accumulating, they suggest that more than one region may have been involved in parallel development of early rice cultivation and domestication.

By contrast, in India, the search for domestication is focused on the Ganges valley. Combining archaeobotany and genetics suggests that *O. sativa* subsp. *indica* emerged through hybridization from a proto-*indica* that was managed in a morphologically wild state (Fuller et al. 2010; Fuller 2011) with introduced domesticated *japonica* rice, perhaps c. 2000 BCE. The earliest evidence of rice use in the middle Ganges at Lahuradewa has an AMS date of c. 6400 BCE but was plausibly wild gathered or under pre-domestication cultivation. Clear domesticated rice began to become widespread across northern India between 2000 and 1500 BCE. From the Ganges to the Yangtze region, Asian rice cultivation spread to become a major agricultural staple throughout much of monsoon Asia between 1000 and 0 BCE, and it also began to be adopted on a smaller scale as a crop in Mesopotamia (for a review, see Fuller et al. 2010). Asian rice reached eastern Africa during the Swahili period from c. CE 800 (Walshaw 2010), but may not have been added to western African agricultural diversity until the sixteenth century.

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Rivers: Environmental Archaeology

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Introduction

River environments have played a major role in our understanding of the human past. Humans and other hominids have a long record of using the resources associated with river environments. Whether it is short-term use of a specific resource or long-term settlements, riparian systems have provided valuable habitats. The relationship between humans and river environments has changed over time. Humans have always used

the resources found in riverine environments, but over time, they have had an increasing impact on these ecosystems. The environmental archaeology of rivers provides a way to measure changes in riverine ecosystems over time by examining the influence they have had on humans and the effect people have had on these settings. This is done by applying techniques from the natural sciences, in particular the earth sciences and biology, to the interpretation of archaeological sites and their contexts. In addition to providing a natural science approach to interpreting the human past, an understanding of long-term patterns of human and riverine interactions provides a valuable means for developing future sustainable management practices that take into consideration the consequences of climate change and human activities to these important environments. The physical and biologic processes that prevail in river environments can greatly modify patterns of past human activity and therefore have the capacity to transform the archaeological record. The study of river landscapes in archaeology encompasses millions of years of time and every continent inhabited by prehistoric humans.

Definition

The term "environmental archaeology" encompasses the empirical study of the long-term relationship between humans and the physical (abiotic) and biological settings they inhabit. As might be expected, this biophysical contextual approach is rooted in the natural and historical sciences, especially the earth and biological sciences. Because of its emphasis on relationships and interactions, environmental archaeology is connected to ecology, and because it has as a focus human relationships with the environment, it is connected to human ecology. The objective of environmental archaeology is to evaluate the linkages between past ecosystems and people; it examines the relationship between the environment and humans over time. The study of humans and paleoenvironments includes dating methods; abiotic factors such as climate, landforms, sediments, and soils; and biotic components, including vegetation (paleobotany) and animals (paleozoology). Thus, environmental archaeology is commonly divided into three subfields: geoarchaeology, archaeobotany, and zooarchaeology. Some researches further separate the study of the abiotic components of the ecosystem into geoarchaeology and archaeometry. In this approach, geoarchaeology provides a means for examining physical settings, stratigraphic contexts, and site formational processes in contrast to archaeometry, which would include aspects of remote sensing, laboratory techniques for dating, and raw material analysis. Likewise, the study of the remains of plants and animals to interpret past environmental settings or to evaluate their use as resources used by humans may be defined as bioarchaeology. Various scales of time and space can be used in the ecosystem approach to the study of humans and river environments, providing an understanding of the short-term or long-term sequence of events within an archaeological site and its landscape context.

River environments are defined by the presence of flowing water. The flow of water may be perennial (year-round) or seasonal, and it may change in terms of rate of flow on a seasonal basis or over longer intervals of time. These two factors alone have important consequences for humans. For example, if year-round water is present, humans may stay in the vicinity of the river even if there is seasonal availability of particular plant and animal resources. On the other hand, the sporadic availability of water or dramatic changes in water discharge may lead humans to abandon a riparian setting if no resources are available.

There are abiotic and biotic components to a river ecosystem. Besides the flowing water, which is an aquatic habitat, there is the interface between the land and the flowing water known as the riparian (*ripa*, Latin = river bank) habitat. Flowing water is a significant force in the formation of landscapes associated with past and present human activity. It both contributes to the formation of settings or habitats used by people and can modify or transform the archaeological

record. Landforms associated with flowing water are termed "alluvial," while sediments deposited by running water are termed "alluvium"; where the landforms are directly attributable to rivers and streams, the term "fluvial" is applied.

Even though particular local riverine environments can be quite variable, they commonly possess similar functional and structural features. This means, although rivers are found in many different settings, there are some basic patterns. Despite their variety, river environments show similar features. An idealized river system will include the channel, a floodplain, and terraces above the floodplain. The channel may be straight, meandering, or braided. Point bars can form in a meandering river which typically will consist of a single winding channel. Lateral movement of the river channel leads to erosion of river banks. Oxbow lakes form where a portion of the channel has been abandoned. Floodplains can include these oxbow lakes as well as levees which are raised areas along the bank of the river. Braided rivers will typically have many intersecting channels within a floodplain. The type of channel can directly affect the ways humans use a riverine environment. Settings with meandering channels and oxbow lakes may be habitats of high biodiversity or be accessible for human use except during periods of flooding. In contrast, braided streams may be less stable habitats that are used by people on a more sporadic basis.

The rate of flowing water is associated with the amount of water available and the steepness of the terrain. Water flows faster in steep terrain compared to areas where the slope is lower. Larger-size sedimentary particles (including artifacts) are transported in high-energy river contexts, such as channels. Sediments associated with abandoned main channels which form lakes on floodplains are characterized by cross-stratified sands and muds. Especially important for environmental archaeology, channel fills commonly contain plants and mollusk remains and vertebrate bones. Finer-sized sediments are often associated with low-energy overbank deposition, such as on floodplains. Typically, the finest sediments, such as silt and clay, along with lenses of cross-bedded sands can be expected to form overbank floodplain deposits. Terraces, the remnants of former floodplains, can have the same features or they can provide information on previous conditions associated with the river system.

From an archaeological point of view, rivers are dynamic systems. While one part of a river may be dominated by erosion and consequently the destruction of sites, other parts of the river may be locations of burial and consequently the preservation of sites. Thus, one goal of the environmental archaeology of rivers is to account for the basic geomorphic processes that impact individual archaeological sites as well as their surrounding landscapes (e.g., Turnbaugh 1978).

An abrupt movement of a channel belt from one location to another across a floodplain, an *avulsion*, has important implications for the location and preservation of archaeological sites. Dramatic examples of avulsion events are lateral shifts undergone by the Yellow River in China, the Kosi River (a tributary to the Ganges), and the Po River in Italy (Mackey & Bridge 1995). During the late Holocene, over the last 4,000 years, the Yellow River has shifted laterally over 800 km. Over the last 250 years, starting in the 1700s, the Kosi River has shifted about 113 km. The Po River has also seen a series of shifts since about 1000 BCE of about 50 km, with the average avulsion interval of slightly less than 500 years. Some of the youngest avulsions were connected with human actions. Over the last 10,000 years, there have been over 91 avulsion events with the Rhine-Meuse delta with variation over time associated with cross-valley faulting and changes in water and sediment supply (e.g., Stouthamer & Berendsen 2001). These changes in the location of major river channels have serious implications for the location of archaeological sites and the interpretation of settlement patterns.

Biological remains that provide valuable information on environmental settings and resources available for use by people are preserved in river settings. Plant remains are present as macrofossils and also pollen and diatoms, and are also reflected by root casts in soils and

sediments. Important invertebrates include arthropods (such as insects and crustaceans) and mollusks (gastropods and bivalves). Vertebrate remains include fish, amphibians, reptiles, and mammals. As with artifacts, these biotic remains can be in primary (in situ, *autochthonous*) or secondary (redeposited, *allochthonous*) context. Evaluating the degree of transportation is critical because it determines what habitat or mix of environments is represented by the fossils. The types of plants and animals change with the terrain and the levels of moisture. Different sub-environments within a river system will have different amounts and varieties of biotic materials; the abundance and diversity will change throughout the riverine system. Thus, there are aquatic resources associated with the channel, marsh and floodplain habitats, and upland habitats. Each can have its own characteristic plants and animals. Fossil remains that are autochthonous will be representative of the local area, while allochthonous assemblages reflect conditions over a much larger area. There are also general biotic patterns associated with riverine habitats from different climate zones. In fact, the same river can have different biotic elements as it passes through different regimes of topography, precipitation, and temperature. Thus, almost by definition, there are a wide variety of studies that are within the scope of the environmental archaeology of rivers.

Historical Background

Studies of archaeological occurrences in riverine settings date back to the beginning of the scientific investigation of the human past. Even before the 1800s, artifacts were found in ancient river sediments. The first recorded Paleolithic hand axes were found in river gravels in the 1690s close to the present location of the King's Cross railway station in London and in the late 1700s at Hoxne in Suffolk. Besides the discovery of Paleolithic artifacts in river gravels, floodplains were key settings for archaeological discoveries. In the late 1700s, Thomas Jefferson directed excavations of an archaeological mound on the floodplain of the South Fork of the Rivanna River, Virginia. Many mounds located in similar floodplain settings have been modified or destroyed over time by the changes in the course of a river or by plowing connected with farming.

During the 1800s, many advances in archaeology were the result of artifacts recovered from riverine settings. Sir Charles Lyell's *Principles of Geology* (published in the early 1830s) examined present-day processes as a way to understand the record of the biotic and abiotic past or as he described it, "the organic as well as inorganic kingdoms of nature." In *Principles*, Lyell restricted the term "alluvium" to sediments transported by rivers and remarked that bones of animals could get buried in alluvium. He cited the channel changes in the Po River of northern Italy since the time of the Iron Age, as well as the consequences of human constructed embankments along the river. Lyell's comparisons spanned the globe; besides the Po River, he compiled information on the action of running water and the erosion and transportation of materials by floods in the Peloponnese of southern Greece and along the Mississippi, Nile, and Ganges Rivers.

Starting in the 1840s, ancient river terraces became important localities that provided evidence for the presence of humans with extinct animals. In France, within river gravels along the Somme River Valley, Boucher de Perthes found stone artifacts and fossils of extinct animals. These observations were subsequently confirmed by the studies of Rigollot in alluvial deposits at St. Acheul, near Amiens. By the late 1850s, the Pleistocene alluvium in the Somme Valley had gained the attention of several prominent British geologists, including Lyell.

Another early example of the study of humans and river environments is found in *Man and Nature* written by George Perkins Marsh and first published in 1864. Marsh was concerned with the changes to the environment caused by human actions. He noted that human activity such as deforestation connected with agriculture led to

increased flooding and increased sedimentation. He used accounts from the time of the Romans to document the ways people had modified river systems for irrigation, canals, aqueducts, and reservoirs. The use of land for agriculture was linked to rapid runoff and the increased danger of flooding. Marsh also considered the benefits (flood control, supplies of fresh water) and the costs (loss of farm land, sediment storage, possibility of devastating overflows) of barriers or dams across river channels.

Although many examples of discoveries connected with river environments could be recounted in the history of archaeology, the present-day approach to the environmental archaeology developed during the middle of the 1900s. This approach is exemplified by the contributions of Frederick Zeuner, who held the position of Professor of Environmental Archaeology at the University of London, Institute of Archaeology. In the 1930s, Zeuner used evidence from river deposits to examine the orbital forcing theory for climate change. Zeuner's *The Pleistocene Period* contains extensive descriptions of river terraces and their value for understanding past climates and environments. In this classic text, he evaluates both the geomorphic and paleontologic evidence from ancient river deposits to construct a chronology of the Pleistocene. During the 1950s, an ecological orientation to the study of the archaeological record started to become more prominent. For example, Karl Butzer initiated a long-term program encompassing environmental archaeology with his studies of human interactions with abiotic and biotic processes in the Nile Valley and C. Vance Haynes began his geoarchaeological studies of alluvial sequences in North America.

Key Issues/Current Debates

The key issues connected with the environmental archaeology of rivers center on two questions: to what degree does environmental change impact human activity and to what degree does human activity impact the environment? These issues involve examining the processes of environmental change and the types of environmental resources used by people in river environments. In many cases, the debate involves how the evidence from environmental archaeology should be interpreted. For instance, are the changes seen in a particular riverine setting the results of climate change, tectonic events, or human actions? Evidence from environmental archaeology has also played a critical role in evaluating the changing relationships between humans and the environment. In general, environmental archaeology provides support for the contention that hunter-gatherer (foraging and collecting) human groups have a lower overall impact on river ecosystems compared to agricultural/agrarian and urban populations. The environmental archaeology of rivers contributes to examining questions related to the changing patterns of land use and landscape evolution. For instance, what were the environmental consequences of agriculture in different parts of the world?

Late Paleolithic sites along the edge of the Nile River Valley north of Aswan provide an example of the application of environmental archaeology to study floodplain formation processes, environmental dynamics, and subsistence (Close 1989). Dating from about 21,000 to 12,000 years ago, the sites located at Wadi Kubbaniya were preserved because of the interplay between processes of overbank deposition and blowing sands. The sands often provided a surface on which human activities took place which was then buried by overbank Nile silts from seasonal floods. Besides stone artifacts, many biotic materials were preserved providing a unique view of the seasonal subsistence pattern connected with this river environment. The Nile would flood the dune surfaces around September, and harvesting of fish trapped in ponds between the dunes would happen right after the seasonal flood. Remains of migratory birds suggest possible human use of the river environment during the winter. This time of year would have also been the optimal season for the growth of

vegetation along the margins of the floodplain, providing an explanation for the remains of wild cattle and hartebeest. Grinding stones at the sites were used to process tubers during the long interval before and after the onset of the flood. The overall picture is one where humans utilized the diverse resources of the Nile, taking advantage of the seasonal availability of a variety of plants and animals.

A late Holocene archaeological site situated near the border of the United States and Canada in northern Minnesota provides another example where a diverse array of natural science techniques were used to interpret site formation processes and hunter-gather use of riparian resources (Hill et al. 2011). The archaeological site is situated in the active floodplain of the Big Fork River. The stratigraphic sequence shows both lateral migration and aggradation connected with overbank flooding during the last 3,000 years. Human presence begins around 1300 BP and people continued to use the banks of the river as its channel shifted across the floodplain. The floodplain would have been available for human use except when seasonally inundated. By 900 BP, a natural levee was formed along the bank of the river which became a location for human activity. In terms of site formation processes, the artifacts within the site are in primary context, except perhaps for some rearrangement by the overbank flood events that buried the habitation surfaces. Also, artifacts found in point bar deposits appear to have been transported and redeposited and are therefore archaeologically in secondary context. This geomorphic setting was part of an ecosystem that provided fish and aquatic mammal resources. Over time, there was a change from a reliance on spearing sturgeon to taking bottom-feeding fish. Besides the fish, the riparian setting is also reflected by the remains of beaver, porcupine, muskrat, and river otter. The integration of geoarchaeological and zooarchaeological data provides a means to examine both the physical processes of site formation and the biotic resources used by humans along the Big Fork River.

Various natural processes connected with river systems play major roles in the formation of the archaeological record. Tectonics contribute to the evolution of fluvial systems and therefore impact the potential preservation and visibility of sites. The asymmetrical, terraced meander system along the Madison River in southwest Montana is an example (Alexander et al. 1994). This is an instance where there were no major changes in the overall style of channel during the last 10,000 years. It remained a meander belt, but one that was consistently moving towards the tectonically down-tilted area of the valley, leaving a series of abandoned meander belts spanning the Holocene in the uptilted area. Thus, in this situation, faults caused the tilting of a floodplain across a valley which led to lateral channel migration. In terms of environmental archaeology, the abandoned channels contain a record of late Quaternary environmental change within the river valley.

Studies of the evolution of river systems have been used to determine whether climate change affected human choices about the use of the environment. For instance, a period of settlement abandonment along the Rena River in Norway has been linked to increased flood intensity which caused widespread erosion (Balbo et al. 2010). In some instances, the environmental record of river deposits contains evidence for both climate change and human impact to the surrounding landscape. In China, paleoecological studies of a relict oxbow lake contained evidence of cultivation starting around 5,400 years ago with intensification of agricultural activities about 700 years later (Li et al. 2006). Superimposed on this record of human impact is evidence of climate change that can be correlated with the Medieval Warm Period and the Little Ice Age. An example from Mesoamerica where human action appears to have altered a river system is the study of the Rio Verde Valley in Oaxaca (Joyce & Mueller 1992). From about 400 to 100 BCE, during the Late Formative, flooding and alluviation increased within the river system. This increase appears to have been caused by a change in the pattern of the river; initially, the river was meandering and it changed to a braided stream. In the upper part of the river valley, accelerated erosion and runoff were caused by

land clearance connected with farming and settlement. The consequences of these human actions in the upper river valley included increased flooding and river sediment deposition. The flooding and alluviation transformed the meandering stream to a braided stream with high-energy channels, overbank floodplain sediments, and oxbow lakes. This change in the river led to an increase in the agricultural productivity of the lower river valley.

Site formation in alluvial settings is associated with process of erosion, deposition, and post-burial modification. Regardless of whether they are artifacts or ecofacts, objects transported by stream flow are commonly sorted by size, shape, and weight or density. They can be oriented by the current or abraded and broken during transport. They can be transported short or long distances. The longer the transport distance, the higher the amount of expected abrasion and breakage. Quick deposition and burial of biotic materials increase the likelihood of preservation. At site FCW in Bed II at Olduvai Gorge, in Tanzania, artifacts were found in two concentrations that suggested the arrangement was a product of redistribution by river flow. The artifacts appear to have been transported by a flowing river and redeposited on a clay surface and then buried. At the Olduvai site of HWKE-4, the presence of larger sedimentary particles such as sands, pebbles, and gravels indicated a high-energy river environment which would have removed small artifacts (Petraglia & Potts 1994).

Channel settings can be locations for the preservation of macrobotanical remains such as seeds, twigs, logs and leaves, as well as bivalves and vertebrate remains. While mollusks may be in primary context, botanical and vertebrate remains are often transported in channel settings. They may be disarticulated and fractured or abraded, sorted, or preferentially oriented. While providing information on the regional environment, the degree of transport could limit the amount of information provided about the immediate locality. In contrast, channels that become floodplain lakes will contain a mixture of local and watershed plant pollen contributed through the water, along with the pollen transported through the air. Macrobotanical and animal remains recovered from the fill in abandoned channel lakes on terraces above active floodplains will likely provide more reliable information on local environmental conditions. Floodplains can contain both in situ and redeposited fossils. Materials exposed on the surface can become weathered and damaged and disarticulated by processes like trampling and carnivore activity. Frequent flooding in these settings can help preservation as overbank sediments bury artifacts and ecofacts.

International Perspectives

Studies of past river environments and humans extend beyond the description of a particular site or even a series of sites with a restricted river basin. Historically, there has been much interest in correlating terraces sequences in river valleys with glacial-interglacial climate transitions (Blum & Törnqvist 2000; Mishra et al. 2007; Bridgland & Westaway 2008) or smaller-scale climate events such as the Younger Dryas, the Altithermal, or the Little Ice Age. There is also a global-scale or international dimension to evaluating what natural and social processes are reflected in fluvial deposits containing archaeological materials. While attempts to correlate individual river systems with global-scale processes have long been a part of the study of past rivers and humans, it has become a prominent goal of ongoing research. This can be seen in studies that use paleoenvironmental information to evaluate the risk to present-day populations of floods or the vulnerability of societies to changes in land use or climate (e.g., Arnaud-Fassetta et al. 2010). One very practical application is estimating the long-term frequency of floods in a river system which would provide planners and policy makers with an understanding of long-term environmental patterns. For instance, the last 2,000 years of flood history for the Columbia River in Washington State was evaluated using the stratigraphic sequence at an archaeological site (Chatters & Hoover 1986).

The site was on a landform at about the same elevation as the highest historic flood. The stratigraphic sequence consisted mostly of sand and silt along with charcoal, shells, and stone tools. It was determined that there was a high interval of flooding from between CE 1029–1390. Compared to the last 600 years when large floods occurred on average about once every 140 years, during the earlier interval, floods would have been at least three times as common. Thus, the last 600 years has been a period of relative climate stability compared to the interval ending around CE 1390. Examining these types of patterns from a specific riverine site and correlating them to sequences are especially relevant for evaluating broad-scale patterns associated with land use or global climate events.

Future Directions

The potential value of environmental studies of past river systems and their connection with humans has become very apparent. The information from these types of studies is especially relevant for making decisions that affect the sustainability and resilience of these important environments. Some future directions for research include studies linked to landscape evolution, land use, restoration of biodiversity, and landscape management (e.g., Brown 2002; Hudson et al. 2008). In summary, the value of applying natural science techniques and concepts to the archaeological record connected with river environments may ultimately rest on the ways it can contribute to our understanding of the relationships between humans and nature. It can provide decision-makers with a long-term perspective on human land use. Environmental archaeology can also provide a way of examining the ways human actions are a product of both environmental factors and other processes that influence human choices. Thus, a future direction for environmental archaeology may be the application of knowledge regarding the long-term connections between humans and natural systems to broader socially relevant issues of sustainability, resilience, and persistence.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Archaeobotany
- ▶ Butzer, Karl W.
- ▶ Disaster Response Planning: Flood
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Kostenki: Geography and Culture
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Zeuner, Frederick Everard

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Rock Art Recording Methods: From Traditional to Digital

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Introduction

In the twenty-first century, accurate, integral, and noninvasive documentation of rock art has become a priority among researchers and cultural heritage managers, given the fragility of this cultural heritage which is subject to continuous environmental and human threats.

Today the documentation of rock art should meet multiple aims. Along with its main role as a research tool, rock art recordings are essential in monitoring the processes of degradation affecting rock art assemblages in the short, medium, and long term.

Furthermore, these documents are also significant as vehicles for scientific and, more importantly, public dissemination of the art, necessary to raise public awareness of the value of this heritage as a long-term conservation strategy to guarantee the preservation of this heritage resource for current and future generations.

Definition

By rock art recording, we refer to any form of visual documentation of the works of art and their spatial location, by means of photographs (analogical or digital), illustrations (drawings and/or tracings, traditional, or digital), and 3D real or virtual models. These documents are produced to record the formal and technical characteristics of the rock art, including the individual motifs (its shape, color, texture, technique, and conservation state), the spatial relations with the other motifs and the rock surface (including superimpositions), and the location within the site and the natural (Fig. 1) and cultural context.

Rock art recordings are permanent scientific records capturing the state of the art at a specific point in time. Since rock art is a fragile heritage and unfortunately, it is progressively degrading, rock art recordings are of great heritage value. Thus, they have to be accurate, avoid ideal reconstructions (even though they may be of use later on to facilitate public interpretations), and include a reference to the scale of the motifs recorded.

Two-dimensional recordings (either photographs or illustrations) usually capture one of the hundreds of point of views from where the work of art can be seen, with a general preference for the frontal (orthogonal) view to each motif to reduce perspective distortion. Three-dimensional models (real or virtual) usually provide a more realistic volumetric reproduction of the art complexes, and thus a more realistic volumetric approach to the sites themselves at a specific point in time.

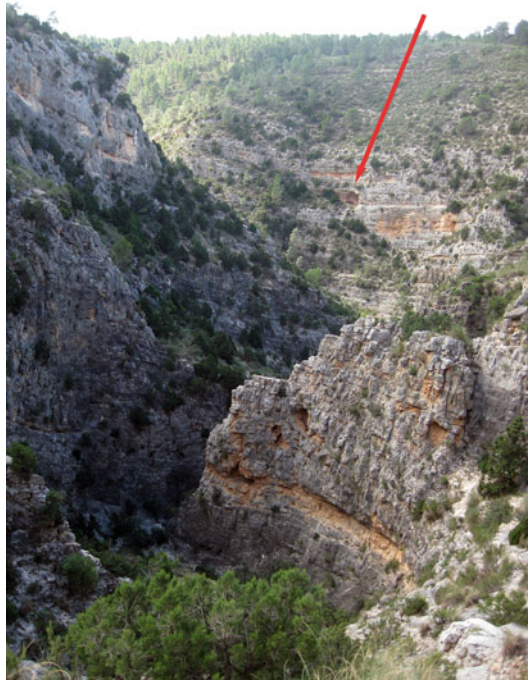

Rock Art Recording Methods: From Traditional to Digital, Fig. 1 Location of El Carche Levantine rock art site (Jalance, Spain) (Photo I. Domingo)

Historical Background

Current rock art recording methods are the legacy of over a 100 years of experimentation leading to a gradual refinement of methods to obtain as complete and accurate working documents as possible, while minimizing the direct impact on the art and the rock surface.

Since the advent of photography, this recording system has been considered the most objective rock art recording method, because of its capacity to reproduce reality with great fidelity. This capacity to provide a controlled picture of the art clearly responds to the principle of scientific rigor required by any archaeological work. Although photography is not exempt from metric inaccuracies caused by lighting conditions, perspective, and/or lens distortion, today both forms of metric distortion can be minimized with different software (e.g., rdf) and with the use of digital calibrated cameras (Domingo et al. 2013).

In the initial stages of rock art research, photography was in its infancy and its use in the underground was problematic because of little available light. In this context, hand drawings and tracings became the main tool for rock art recording and dissemination. Decades later, and despite the great advances in photography, tracings retain their value as a primary rock art recording method because of their capacity to facilitate motif identification, especially when

motifs are faded or part of complex superpositions. Thus, tracings consolidated as a technical tool for rock art interpretation, whose main role is to facilitate the reading of the rock art motifs and to be used for scientific and public dissemination and research (Aujoulat 1987, 1993).

The times have long gone when hand drawings, water colors, and pastels produced by researchers, artists, and illustrators, such as Breuil, Porcar, Cabré, Benitez-Mellado, to name some, were used as evidence of the first findings at the early stages of the twentieth century (Aujoulat 1987; Moneva 1993; Tosello & Fritz 2007). But hand drawings have not been completely excluded from the documentation process, and still play an important role in its initial stages. An initial hand sketching of the panels including the location and numbering of all the remaining motifs provides a good first understanding on how the panel works. And this first approach is necessary to plan the systematic recording of the site.

Continuous advances in research and the interest in answering new questions from the study of rock art led to the need for more accurate formal and metric documents than those obtained from hand drawings. Progressive new developments resulted in a gradual improvement of the results. These new methods can be classified into two main categories: direct recording methods and indirect recording methods.

Direct tracing or *contact tracing* is probably the most widespread rock art recording technique worldwide, among the direct recording methods.

This method involves placing a transparent paper on the decorated surface, on which motifs are identified and traced using a permanent ink pen. Different colors can be used to identify different motifs or to code different types of information related to the motifs (e.g., shapes, techniques, etc.) and the rock surface (e.g., cracks, bumps, etc.). The relatively good adaptability of the cellophane or polythene to the irregularities of the rock surface improved the resulting reproductions both from the metric and the formal points of view. However, one of the most significant disadvantages of this method is the direct impact on the fragile rock surfaces and the motifs, which could accelerate the degradation processes. The location of the tracing paper between the recorder and the motifs obstructing the direct view of the art also hinders the recording process. One last disadvantage is the problematic transformation of the resulting real size tracings, usually of large dimensions, into manageable scales for research and publication, since large format scanners would be needed. In most countries, a permit from the regulatory authority is required for this practice.

Another widespread form of direct recording is the rubbing of engravings. It consists of laying a thin paper on top of the engraved surface and rubbing carbon paper on top to obtain a reproduction of the engraving. As in the previous methods, this technique impacts directly on the rock surface, so the use of other noninvasive methods is more recommended.

Indirect recording methods include, apart from analogical and digital photography, a variety of indirect ways of tracing:

- *Tracing produced using a frame*, with several options based on the use of a rigid or semirigid structure placed at a certain distance from the rock surface to avoid direct contact (Lorblanchet 1993a, b). The main weakness of this method is the struggle to adapt these structures to the irregular surfaces characteristic of most of the rock art sites, with consequent deformation of the final results.
- Tracing on analogue photographs, which involves tracing the motifs on transparent paper placed directly on the photograph. The use of orthogonal photographs, digital calibrated cameras, and specific software (as mentioned before) to correct metric distortion minimizes distortions generated by the camera and the transformation of 3D into 2D surfaces (Domingo et al. 2013). This also applies to the next two indirect recording methods.
- Tracing on slide, in which the projected motif is traced using tracing paper.
- Digital tracings, which are the digital version of the *tracing on photographs* method, are produced using digital image enhancement and processing software. Rock art paintings are generally "traced" from digital photographs using color selection tools to individualize the

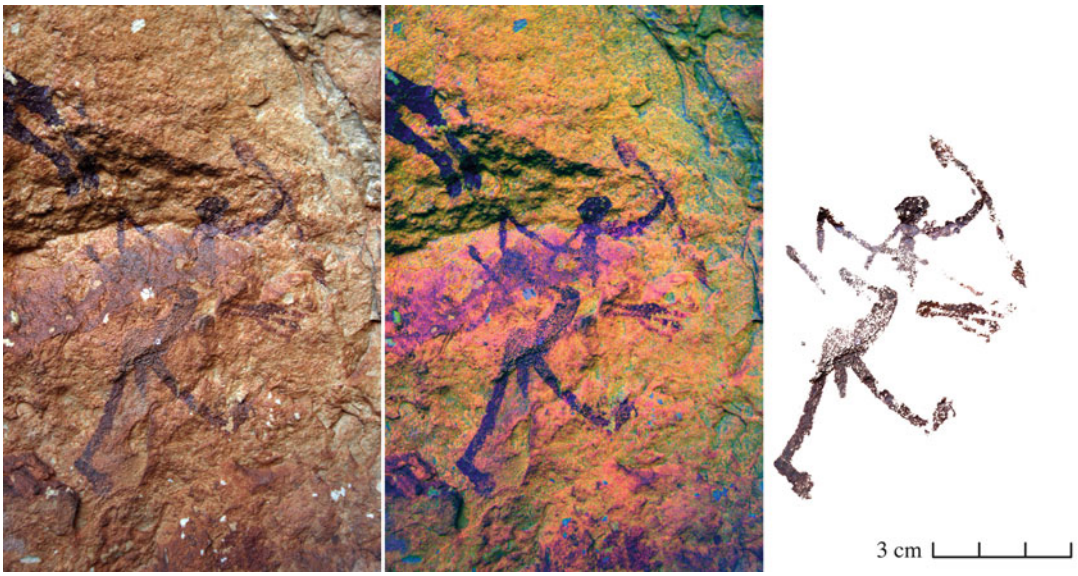

Rock Art Recording Methods: From Traditional to Digital, Fig. 2 Human figure with bow and arrows from El Carche site (Jalance, Spain). Digital enhancement using Dstretch facilitates the visualization of details. Scaled digital tracing produced with Photoshop color selection tools

pigment from the rock surface (Domingo & López-Montalvo 2002). Rock engravings are mostly drawn with several drawing tools on top of the digital photographs taken using oblique light in dark conditions.

Key Issues/Current Debates

Certainly, the quantum leap in rock art recording methods came in the 1990s, with the widespread use of new digital technologies. Gradual technological improvements have broadened the range of rock art recording methods available. They have also provided the tools to facilitate a continuous review, correction, and update of the rock art recordings.

Several software (Adobe Photoshop, Gimp, Corel Photo Paint, and so forth) and specialized plugins (DStretch for ImageJ) for digital image enhancement and processing are used worldwide to facilitate rock art visualization (Clog et al. 2000; David et al. 2001; Brady & Gunn 2012) (Fig. 2). These photo processing software programs have also replaced traditional tracing

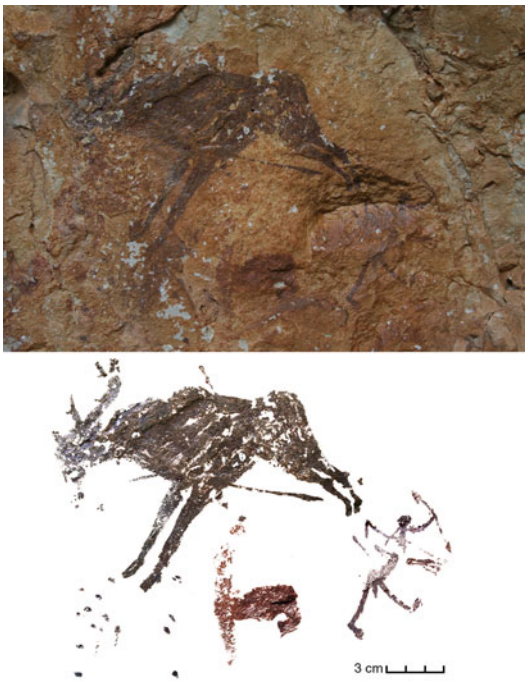

Rock Art Recording Methods: From Traditional to Digital, Fig. 3 Digital tracing showing the relationship of the human figure with the motifs located in the surroundings

Rock Art Recording Methods: From Traditional to Digital, Fig. 4 Snapshot of the photorealistic 3D model of El Carche site, with the location of the human figure (Project HAR2011–25440, ICREA/UB/SERP. Produced by GIFLE)

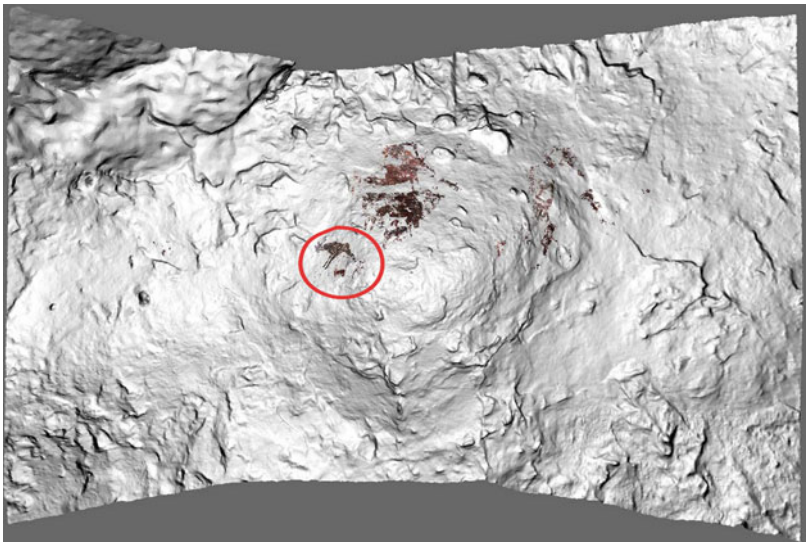

Rock Art Recording Methods: From Traditional to Digital, Fig. 5 Snapshot of the textured 3D model, with tracings of the painted motifs on top (Project HAR2011–25440, ICREA/UB/SERP. Produced by GIFLE)

methods. They provide the tools for digitally drawing rock engravings and to produce digital "tracings" of rock paintings using a range of color selection and drawing tools (magic wand tool and color range tools) (Vicent et al. 1996; Cacho & Gálvez 1999; Clog et al. 2000; Domingo & López-Montalvo 2002; Rüther 2007; Martínez-Bea 2009; Cassen & Robin 2010; Domingo et al. 2013; etc).

The traced motifs can easily be scaled, assembled into panels (Fig. 3), divided into stylistic phases or periods, or used individually for formal comparison with other motifs, and so forth.

The digital era has also provided sophisticated equipment and software to produce virtual 3D models of rock art sites (digital photogrammetry, laser scanner, and so forth) (Robson et al. 2001; Lerma et al. 2010; Ortiz et al. 2010, etc). These models provide a unique approach to the 3D quality of rock art, which is key to understand the art in context (location in the panels, use of the rock surface, and so forth) and to show the multiple perspectives from where the audience can visualize the art.

However, when the rock art panels are faded or the motifs are difficult to identify due to

complex superpositions, photorealistic models are insufficient to identify them (Fig. 4). Thus, recent developments in rock art recording methods recommend the combination of photographs and tracings into the 3D models (Domingo et al. 2013), and the use of several layers within the files containing the 3D model, the photorealistic model, and the tracings to facilitate the reading of the art (Fig. 5).

Furthermore, the addition of old and new records into the 3D model will allow the creation of 4D models displaying changes in the site through time. These models could be of great value in assessing future rates of degradation processes.

While 2D rock art recording methods are currently the most widely used, the value of 3D models for the study, long-term digital preservation, and dissemination of rock art is widely accepted. Nevertheless, the high costs of high-quality reproductions, the storage limitations, and the virtual dissemination of the models are still problematic and will have to be solved in the near future, if 3D and 4D methods are to become the standard methods of rock art recording.

Future Directions

More than a 100 years of rock art discoveries and research have generated a significant amount of visual records (photographs, illustrations, real and virtual models, and so forth) that unfortunately are so dispersed among institutions, publications, and private hands that, as rock art, they are in danger of disappearing. In the past, and still in the present, a significant number of these records have been in the hands of the people who produced them, and thus, they have disappeared together with their authors. But the heritage value of these records requires guaranteeing their long-term preservation, thus, the need to create official repositories (real or virtual) at stable institutions, to guarantee their conservation, and perpetuate their value.

As new technologies develop, new improvements in each step of the rock art recording process will be introduced. This will include reducing subjectivity and direct impact on the art, increasing the accuracy of the records, or reducing the size of the files to facilitate virtual storage and dissemination, to name a few. At the moment, 4D models are with no doubt the most immediate future for rock art recording methods, but certainly, the digital era still hides new unimaginable surprises that will benefit the discipline.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Portable Art Recording Methods
- ▶ Recording in Archaeology
- ▶ Rock Art Sites: Management and Conservation

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Rock Art Sites: Management and Conservation

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Introduction

Concomitant with an increase in site accessibility, digital availability of information, and concern by traditional stakeholders is an increase in the need for explicit management plans, thorough condition assessments, and, whenever necessary, hands-on conservation and maintenance of rock art sites. Significance values concerning rock art sites tend to vary; whereas traditional stakeholders normally value the spiritual aspects of places with rock art, researchers typically look for material samples suitable for physical analysis and dating, and public visitors and tourists mostly look for any destination that they expect to be aesthetically pleasing. Interactions by traditionalists, academics, and the visiting public with the rock surface, albeit in

different ways and to different degrees, are adversely affecting the longevity of the rock art. Being fixed to the surrounding terrain on relatively hard and durable material, art on rock constitutes places that tend to survive the ravages of time. But because painted or engraved marks on the rock are vulnerable to agents of natural and cultural destruction, site custodians, such as private landowners and land-managing agencies, often look for ways to slow the clock of decay, while a few others, such as visitors and traditional users of sites, view decay as part of the natural order. Whichever view prevails, it remains important to devise ways in which rock art sites are managed and conserved so as to best suit the needs of the most prominent stakeholders and/or surrounding communities. In the eyes of both landowners/managers and traditional users, rock art sites suffer negatively when they are arbitrarily "managed" through the unpredictable actions of outside visitors with no long-term or vested interests in those sites and effected communities.

Definition

The most frequently found examples of rock art include painted or drawn pictographs (i.e., where naturally colored clays are applied as ground-up powder mixed with water and a binding medium or applied directly with a lump of clay or charcoal) and engraved or pecked petroglyphs (i.e., where natural surfaces are removed with a sharp implement, typically a hard rock). Pictographs are most frequently found in dark zone caves (e.g., those in the Paleolithic-aged Franco-Cantabrian region or Archaic to Mississippian ones in the southeastern United States), comparatively shallow caves and rockshelters (e.g., Middle to Late Stone Age San site in Africa, various Native American sites in the Americas, and Aboriginal sites in Australasia), or where boulders create rock overhangs. Petroglyphs are more frequently found in rockshelters (e.g., Africa, Australia, and the Caribbean), rock pavements (e.g., coastal Scandinavia), or against boulders. Petroglyphs might be attached to the parent rock or can be on boulders inserted into the ground surface, such as along the prehistoric ball courts of the Taíno peoples in the Caribbean. Proper management of rock art sites includes recommending proactive guidelines concerning acceptable recording, sampling, visitor behavior and numbers, interpretive infrastructure, and conservation and maintenance. Hands-on maintenance and conservation are important components of rock art site management. Actions range from keeping the site free of litter and deleterious agents through regular monitoring through to removing graffiti. A thorough assessment of a site's physical condition helps to determine major conservation problems as well as potential threats to visitors' safety. Determining what section of the population a site should be opened to and/or catered for will usually be based on understanding a site's significance values. Knowledge of the management history and infrastructure of a place helps with decision regarding what has worked in the past and what is likely to fail in the future. Sustainability is also a key concept; management infrastructure and conservation measures should not only be minimalist and repeatable but also compatible with natural materials and prevailing significance values.

Key Issues/Current Debates/Future Directions/Examples

Rock art is found in almost every corner of the globe where people have lived. Antarctica was the only continent without rock art up until the first documented landing of humans in around 1821. Knowing that most rock art we see today is prehistoric (currently the oldest dates range between 40,000 and 70,000 years ago), they are essentially nonrenewable resources; in the absence of their original makers, nothing can re-create rock art panels that have been severely damaged or destroyed. The nonrenewability of rock art is one important aspect that makes preventative management so important, especially in the light of increasing visitation by uninformed people. It is important to realize that rock art that has survived two millennia can be destroyed in

less than 2 minutes of frenzied vandalism. Ways to prevent interference with rock art panels are not clear-cut and have given rise to various debates, both between and within divergent interest groups.

The location and shape of rock art panels are important, bearing in mind that certain locales and rock surfaces are chosen over neighboring ones that appear at first glance to be equally suitable. Every effort should accordingly be made to conserve rock art sites in their original location. Often this becomes impossible, where infrastructure critical to the livelihoods of local communities is constructed: in these situations the best alternative can be to carefully remove and relocate the panels to the interpretive setting of the closest viable museum. Sometimes, such as in the Côa River Valley area of northeastern Portugal, academic and public outcry can be sufficiently loud to stop dam construction activities so that significant rock art sites can be preserved in place.

There is a site in Puerto Rico, which must remain anonymous to prevent looting, where excavated petroglyph boulders have been re-buried, because the condition assessment results indicate that the soil cover provided the best preservation matrix for the 1,000-year-old carved imagery. But the preservation afforded by the soil was not the only reason for this conservation decision: all stakeholders agreed that the spiritual and research significance of the boulders overrode the need for display to outside visitors.

Rock art sites often have ongoing importance to many direct descendants of the makers or by people prehistorically and historically associated with them, most vocally in portions of Australia and North America. Rock art sites are undoubtedly important to direct descendants and related traditional users in other part of the world, but these peoples' voices have yet to be heard in an equal degree. Traditional practitioners who visit rock art sites tend to do so without fanfare, so what these people actually do at sites is difficult to determine. Telltale signs of visitation within some rockshelters in the Americas are the application of traditional-looking pigment on top of fairly recent flake scars. In portions of western North America and Australia, the need for re-painting or over-painting existing imagery has become topics of intense debate, including among traditionalists. Lasting solutions are hard to come by, one reason being that even within a single community, there can be a division between those who support painting and others who oppose it; rock art sites are part of a wider web of contested sociopolitical and economic relations.

In portions of subequatorial Africa, Bantu-speaking agriculturalists are using the rock painting sites of their hunting and gathering predecessors for ritual sacrifices to their ancestral spirits. These rituals, which include spattering sorghum beer onto the prehistoric paintings and vigorous dancing, generate dust that settles on and adheres to the panels, which is deleterious to the ongoing visibility and integrity of the imagery. However, in terms of community concerns and support, it would be difficult, and indeed unethical, for authorities to suppress this long-standing practice. Does the conservation of this imagery have a greater value than the ongoing traditional uses of the imagery by local people? The Kondoa Irangi rock painting sites in Tanzania have great significance for locals selling their goods and services to tourists as well as for local ritual practitioners. As in other parts of the world, the management issues are not straightforward, since communities seldom represent a single interest group or speak with one voice.

The use of the very term "rock art" has been questioned by traditional stakeholders. Both Australian Aborigines and Native American Indians, for example, have requested that terms such as rock imagery, rock pictures, or rock writing be used instead. Their reason for this request is not so much that they deny the aesthetic quality of the paintings or engravings but rather that the place and its associated narrative and ongoing use by far override artistic significance. This is something that agencies responsible for the management of such sites should bear in mind; interpretation and presentation to the visiting public should emphasize, where justified and relevant, that locales with paintings and engravings are significant for reasons other than

artistic merit or aesthetic appeal. Nonetheless, the word rock art is still recognized and used by the vast majority of people.

When dealing with rock art sites, it may be helpful to realize that among most traditional cultures, the division between sacred and profane is not as rigid as it is among post-Industrial peoples. For example, Bantu-speaking women who collect plants from below drip-lines in rockshelters insist that the leaves or fruits are food provided by ancestral spirits residing immediately below the surface. Some Blackfoot Plains Indians used to incise depictions of their everyday exploits, such as during raids or hunting expeditions, as if these were intertwined with their vision quest experiences. Knowing that the divide between practical and spiritual is blurred, it may be rushing to judgment labeling certain sites religious and other secular.

There is no blanket solution that covers all rock art-related management and conservation issues. Although rock types, weather systems, biota, and sociocultural formations share many properties, they combine in unique ways, reminiscent of fingerprints. Due to the unique characteristics of each site and panels within those sites, it is important to assess and manage these on their own terms.

One common reaction among land managers is to close rock art sites for public visitation. While this solution may work for constricted sites that are sensitive to slight changes in air quality or inadvertent physical abrasion of surfaces along narrow passages and low ceilings, particularly within dark zone caves, it is more difficult to close to the public spacious rockshelters that are highly visible and well known. When properly managed, with the necessary protective and interpretive infrastructure in place, rock art sites that show signs of custodial care and attract many visitors tend to suffer less from vandalism.

Successful infrastructural changes at rock art sites in countries such as Australia include removable boardwalks with low handrails and mounted interpretive panels that help visitors identify motifs. Sites opened to the public in this fashion help draw visitors away from nearby sites that are physically more susceptible to visitor-induced damage. Visitor books, kept in boxes that are mounted on pedestals near the entrance to many sites in the United States, serve many functions, including recording the numbers, names, addresses, and comments of visitors as well as providing basic interpretations of the site and its rock art. However, when not properly maintained, the neglected appearance of rock art sites may increase the chances of vandalism. In drier areas, structures such as wooden boardwalks may increase chances of fire damage and sand accumulation at sites. To reduce incidences of unforeseen damage, it is preferable that site managers only make minimal infrastructural additions to a site.

Generally speaking, sites farther from car parks tend to be vandalized less than those in close proximity to motorized vehicle access. Once graffiti appears at a site, it tends to beget more graffiti. For this and other reasons, such as increasingly used enamel-based spray paints bonding with the rock through time, it is important to remove graffiti as soon as possible (Fig. 1). Specialized and experienced individuals, who know the rock art of the area, should be hired to do graffiti removal, as often original images have accidentally been removed by well-meaning conservators that have no knowledge of rock art. It moreover helps to consult all interested parties prior to graffiti removal, bearing in mind that some names and dates may have historic and sentimental value to people from the local area.

Correct conservation and management decisions depend a lot on good background information, such as old photographs, maps, and descriptions of rock art sites and the surrounding terrain. When rock art specialists consult such archival sources, it becomes possible to reconstruct a history of site condition, visitation, and land-use. Reconstruction of this kind often helps rock art specialists identify critical changes in visitation and/or land-use that resulted in damage to the rock support and imagery. But historic photographs can also reveal that no

Rock Art Sites: Management and Conservation, Fig. 1 Example of spray paint graffiti removal at a pictograph site near Las Vegas. (**a**) Graffiti spray paint before removal, (**b**) Graffiti spray paint after removal

change has occurred in the recent past and that observed "damage" to sites has a very long gestation.

Practiced properly, rock art management and conservation is a holistic undertaking; knowledge of both the physical makeup of sites and human context is vital. Where past and present uses and significances of rock art sites can be confidently reconstructed through archaeological and ethnographic research, it is important to include this knowledge when making decisions about the best ways to interpret and present sites to the visiting public. When ethnohistoric background research shows that distant features, such as mountains, rivers, or abandoned towns, are conceptually related to rock art sites, it is important to take this into account and preserve the integrity of the views to these other landscape features whenever possible.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology and Anthropology
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Australian Rock Art
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cueva de las Manos, Río Pinturas Cave Art

▶ Culture in Archaeology
▶ Descendant Communities in French Guiana: Amerindians
▶ Europe: Prehistoric Rock Art
▶ Heritage Museums and the Public
▶ Looting and Vandalism (Cultural Heritage Management)
▶ Media and Archaeology
▶ North American Rock Art
▶ Pigment Analysis in Archaeology
▶ Rock Art Recording Methods: From Traditional to Digital
▶ Rock Art, Forms of
▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
▶ South American Rock Art
▶ Stone: Preservation and Conservation
▶ United Kingdom: Cultural Heritage Management Education
▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past
▶ Vandalism and Looting (Ethics)

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Rock Art, Forms of

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Introduction

The most general and commonly used term, "prehistoric art," refers to forms produced on diverse mediums by human who lived in distinct prehistoric periods, in particular region of the world (Lorblanchet 1999; White 2003; Vialou 2004, 2006).

Definition

It should be understood from the outset that these forms, commonly called pictures or images, are those that have had the capacity to be preserved. Thus, only the forms inscribed in lasting materials and organic mediums, which are resistant to multiple natural alterations and changes in the environment and climate, testify to the symbolic-artistic behavior of prehistoric peoples: their voice and songs have gone; their dances have disappeared in the fleeting animated moments.

Other examples of symbolic behavior have survived from prehistoric times, for example, unusual objects gathered and brought inside habitations. But it is above all the burials of men, women, and children that attest, for nearly 100,000 years, to a metaphysics of life and death, whose religions have been the distant heirs, about tens of thousands of years ago in some scattered crucible of ancient civilizations.

From various prehistoric cultures and from various eras dating back more than one hundred thousand years, graphic representations have reached us (lines incised and sometimes painted – more rarely preserved) on portable or manipulable and hence transportable mediums, decorated weapons, ornamental objects for the body, and sculptured objects. These *portable* forms, as they

are often called, sometimes form considerable groups alongside rock or parietal forms; the best example is given by "Paleolithic art" in Europe during the last thirty millennia of the last ice age (Leroi-Gourhan & Delluc 1995; Anati 2003; González Sainz et al. 2003).

The words "wall" and "rock" describe immobile monumental forms, sometimes of monumental proportions. However, the majority of them fall within the gestural space of their authors; a good portion of them are also small, within the size of the palm, and some even smaller.

The adjective *parietal* commonly used in anatomy, is the most appropriate term for cave walls. The adjective *rupestre* in Romance languages, refers to media formed by rocks or boulders. It is thus less generic than the adjective *pariétal*. In the English language, *rock art* corresponds to *rupestre*, whereas *cave art* refers to art on the walls of caves: it is thus equivalent to the French qualifier *parietal*, specifically applied to Paleolithic cave art and in contrast to portable art. The use of the word *rupestre* has become dominant internationally for designating prehistoric representations on rocky mediums encompassing all of their geological and morphological diversity.

Key Issues/Current Debates/Future Directions/Examples

The Nature of Prehistoric Representations

The concept of *representation* here concerns the image or form in order to emphasize the psychological and semantic dimensions of the relationships established by each one with the outside world: the representation of things or beings is an invention or a personal (psyche/state of mind) and collective (social) construction engaging the meaning that is assigned to them through naming, seeing, or manipulating them; for example, the representation of a weapon can be formulated in various figures (or images), a dagger, a bow. The representation of violence can be expressed visually in a thousand ways (forms), combat, fight, tortured face.... The representation of sexuality engages in a similar way the individual and the group, with even more obviously an unconscious part, both underlying the representation expressed on the wall and the representation in the depths of *moi*. In fact, most prehistoric rock iconography, of varied times and locations, culturally independent, shows treatment, figurative or partially codified, of sexuality: this denotes simultaneously the universal and the cultural side.

The systems of representations shaped by the brain, including the most basic (literally), that is, the language born in infancy, integrate multiple forms of abstraction, the preferred tools of social communication based on intellect. The graphic expression of abstractions is based on codes, socially created and recognized. Prehistoric rock iconography has undoubtedly codified expressions of abstraction, but it is impossible to decode those that may be considered in this way; as examples, it is probable to regard concentric circles or rows of dashes as counting systems: mathematic codifications, such as I + I = II, are made up of graphical representations which are frequent in many rock assemblages. Symbolic activity, totally intrinsic to humans, constantly produces mental images during sleep as well as during wakefulness. Recalling what F. Goya was saying, as an epigraph to his Caprices that reason asleep produces monsters, it appears that many rock art presentations (according to different cultures) fall under these symbolic productions, conscious and unconscious: half-animal-half-human beings, scary monsters, etc. That such myth claiming that the Tapir was the creator of the world comes under the same expressive power; such rock art representation of an antelope, snake, or mammoth could take the same role in telling the story, symbolically the most reliably true of such group.

The graphic expression of symbols which are thought about, spoken, and exchanged within a group for a limited time (over one or many generations) is not only linked to the real world (or considered as such, whenever it involves an animal or a human figure). Christians have the cross and the sign of the cross, the Magdalenians from Perigord 14,000–15,000 years ago had the tectiform sign (in the shape of a roof hut), while

Rock Art, Forms of, Fig. 1 Niaux cave (Ariège, France) buffalos, horses, and symbols Magdalenian. Cl. A and D. Vialou

those, more or less contemporary, of the Cantabrian region symbolically used quadrilaterals with internal partitioning. Visual symbolization (graphic for rock art) passes easily through the geometric abstraction. For example, we could mention the most banal angular sign that can be seen, a V: it can symbolize an injury when it is placed on the side of an animal and an arrowhead when placed over a linear axis (Fig. 1) or even signify hope for an expected victory, drawn by the two raised fingers of a political figure.

Abstract rock art representations, most commonly designated by the semantically neutral term *sign*, abound in some rock art cultures, like on the walls of Paleolithic caves in western Europe or in the rockshelters of the central Brazilian plateau, and are (more or less) absent in others, like in the rockshelters of Tassili n'Ajjer (Algerian Sahara) or in Arnhem Land (Australia).

Anthroposocial Origins of Prehistoric Representations

Whether figurative or abstract, rock (and portable) art representations are rooted in the individual and collective consciousness of prehistoric peoples who produced them, from early hunter-gatherers to later producers in various parts of the world. The domestication of animal species did not suppress the creativity of rock art!

The first known graphic representations, such as the incisions systematically made into portable mediums, which come from the occupation of habitats recently excavated in southern Africa, are dated more than a hundred thousand years ago (Henshilwood & d'Errico 2011). The oldest rock art representations of signs, combining figurative representations, animals and humans, and geometric or abstract, are dated between thirty and forty thousand years (Aurignacian art in Paleolithic Europe).

These most distant origins of representations made in and on durable media are part of the phylogeny of Sapiens (*lato sensu*) and its diaspora throughout the world, which is currently being debated (Otte 2010). The ability to produce these forms, graphically materialized, is not attested before Sapiens and/or contemporary human lineages, which are genetically close in various regions, such as the Neanderthals in the Middle East and Europe. It becomes apparent between, on the one hand, the production of graphic images and the evolution of human lineages and, on the other hand, the production of complex parietal settings, which bring into play figurative expressions and abstract expression of the evolution of Sapiens.

Diverse and multiple symbolic behaviors evidently existed prior to graphic manifestations. But the emergence of these in association with

the development of the Sapiens lineage indicates that it pertains to it: there is indeed a *before* the forms and an *after* the prehistoric forms, which connects us (all Sapiens) to an evolutive modernity, specific to prehistoric Sapiens. The construction of these graphic forms, driven by the representation of the world, emerges from and in the brain (Vialou & Vialou 2005). The most notable evolutionary trait of the Sapiens compared to earlier types of Homo is that of cerebral development. This trend is paleontologically visible with the progressive verticalization of the face of unearthed fossils. The frontal lobe, that is, the cortical area directly involved in the development of systems of representation, benefits from an increase (and more complex) that is crucial for the maturation of symbolic and technical relationships with others. The emergence of prehistoric art is in parallel to these new techniques of fabricating tools and weapons in bone and stone and of new modes of economic acquisition and exploitation of natural resources. Obviously, the systems of graphic representation were born simultaneously and correspondingly within the brain and the Sapiens societies, notably anatomically modern humans from prehistory, over the past forty thousand years.

The Universality of Prehistoric Representations

Prehistoric representations present universal characteristics, derived from their anthropogenic origin, expressed in graphic and artistic behaviors.

The techniques of graphic expression on walls are remarkably uniform. Three major categories can be differentiated, each one offering secondary variations: engravings, drawings, and paintings (Vialou 2003).

What is commonly called *engravings* covers all forms of incisions made with instruments, organic and mineral, harder than the media. One (or more) finger may be used as a natural (and spontaneous) instrument to leave its mark on a wall that is sufficiently soft, such as the mondmilchs in limestone caves. These digital prints, usually more or less long meandering maze lines (the "macaroni"), express a direct, almost fleshy relationship of the body with the material which develops since childhood with the footprints that are left or made involuntary or voluntary in the sand of a river or the beach. But one's touch on a wall, even if superficial, retains its trace, in contrast to the one done in sand or mud. Bones or pieces of wood are also used for equally tracing quite large parietal marks removing a notable quantity of media material.

The use of hard stone tools (flint, quartz, quartzite, etc.) enabled people to carve, pound, or peck on rocky walls that are themselves resistant. A wide range of strokes are found ranging from ultrafine incisions (less than 1 mm) to deep grooves (several cm wide and deep). Often these deep grooves have been polished by intensive rubbing bringing into play other stone tools and granular abrasives (sand). The use of percussion tools, by hammering the medium, has given pecked linear grooves or more or less deeply pounded surfaces.

The removal of material *on* a medium also represents the achievement of surfaces in *relief on* a rock surface: either by making a peripheral withdrawal of the material to raise a surface in the center or by making localized withdrawals within the rocky surface that is worked to represent, for example, the anatomical volumes of an animal. Finally, according to the thickness of the material removed, the representation obtained appears in *bas-relief*, eventually in *semi-relief*, but almost never in *high relief* (as is found on historic monuments).

Whereas engraved (and pecked) representations cover the totality of prehistoric thematic fields, representations in relief (raised up and hollowed) are (almost) exclusively figurative, namely, animals and much less often humans. Representations in relief are rare and indeed absent from most rock art sites, regardless of their chronological position. By contrast, engraved representations are generally the most common and found in all rock art in the world. We can explain the dominance in the engraving technique by two factors of which it is difficult to evaluate the reciprocal influence: the choice of the technique as such, which is proven *a contrario* by the absence of engravings in the rocky regions. These choices

Rock Art, Forms of, Fig. 2 Shelter Mano Aroe, Mato Grosso, Brasil. Group of symbols. Holocene Period. Cl. A and D. Vialou

may have been based on ideological, artistic, or simply technical motifs. The second factor is that of conservation compared with drawings or paintings. Engravings have a better and longer resistance against the multiple effects of weather and geochemical modifications of rocky surface that are affected by them.

What is commonly known as *paintings* covers all inputs of coloring materials on the different medium. The coloring materials of natural minerals, hematite, ocher, manganese, kaolin, etc., taken from the surroundings landscape (sometimes many kms away), have been used as they are found or are well prepared: thus, for example, small flat hematite pebbles (red iron oxides) were directly used as pencils to draw on walls (shorter or longer linear marks); the same types of mineral pigments were reduced into a powder and mixed with a liquid (most commonly water): the paint thus obtained, more or less liquid or as a paste, as desired, is then deposited on the media in the form of linear marks, that is to say, lines or colored tracks; on the one hand, we are dealing with drawings and, on the other, with flat color paintings (solid infill), with all the possible variations in between these two extremes of graphic-pictorial expression.

The *thematic categories* of prehistoric rock art characterize both its universality and its precedence on the global chronological scale compared to historic arts. Figurative representations, abstract representations, and undetermined representations constitute the three thematic categories of rock art, on the five continents, with variations of course, dominant or absent, according to different regions and eras.

The *indeterminate* representations, which occur in varied quantities in different iconographies, include numerous lines or spots, small or large, and shapeless and undistinguishable. Indeterminate representations seem to participate in both the thematic expression of the devices and their structure chart (like prepared backgrounds).

Abstract representations, geometric shapes that are more or less simple (signs) or complex (motifs), are, on the one hand, more numerous than figurative ones, and, on the other hand, much smaller than these (Figs. 2 and 3). Whether they result from the graphic abstraction process or from the graphic process of symbolic expression, they escape immediate identification. They distinguish prehistoric rock art from the historic arts. However, the emergence, only recently, of abstraction within Western graphic (and fine)

Rock Art, Forms of, Fig. 3 Shelter Arqueiros, Mato Grosso, Brasil. Group of symbols, complex motifs, and two archers. Holocene Period. Cl. A and D. Vialou

Rock Art, Forms of, Fig. 4 Shelter 6 of Sefar, Tassili N'Ajjer, Algerian Sahara. Domesticated bovine herd. Holocene Period. Cl. A and D. Vialou

arts raises questions about what could be conceptual affinities in terms of expressive modality that deliberately put aside recognizable reality.

Figurative representations, more spectacular than the others, make people believe, within the imagery of our societies of Western culture, that prehistoric art is an art of animals. Indeed, animal representations are common and numerous: they include wild fauna – hunted or fished – but also domesticated species in rock iconography among Neolithic societies who have domesticated livestock, for example, cattle herds painted in shelters of Tassili n'Ajjer (Fig. 4). Human representations are frequent, sometimes outnumbering animal representations.

This category also includes, but in a very uneven and inconsistent fashion, representations of weapons, clothing, or more rarely with other material objects like gourds or even constructions like fences or huts. There is a near total absence

of the plant world and landscapes. In addition, the stylistic treatment of human figures on rock (as well as on portable mediums) is different from animal representations to the extent that figurative, naturalist realism is almost never applied to them. In this, they differ radically from realistic human representations that occur, here and there, only with history.

Media and Parietal Setups

The chosen *media* guided, by their structures and dimensions, the conception and the construction of parietal setups. In some areas, hardened soil, such as the laterite soils of the tropics, offered sometimes immense surfaces: the representations, more often pecked than incised, unfold themselves in all directions, in contrast to that which occurs on vertical or tilted walls, naturally oriented (top-down and left-right). Sometimes these representations, figurative or not, are very large, because they were produced by moving.

The rocks themselves give the dimensions and the composition of parietal setups: there may be blocks of average size (from a few tens of cm to 1 m) offering one or more faces to engravers. There are the rocks exposed on the surface of streams: rock art in the Amazon is replete with engraved rocks, often with geometric motives such as spirals. There are also engraved rocks scattered, or alternatively, showing on the surface in their hundreds on plateaus, such as in South Africa (Magaliesberg), the sides of valleys, for example, Foz Côa (Portugal), valleys close to Santa Fe (New Mexico), and also in high Alpine valleys like that of Mont Bego. Similarly, rocky chaos on steep hillsides has been filled by thousands of representations, in the Dampier Archipelago (Australia), for example. Powerful rocks or bulging rocky outcrops over several meters were chosen to depict representations reaching impressive proportions.

Walls at the foot of cliffs, glacis on mountains, walls of rockshelters, or the porches of underground cavities were selectively chosen by prehistoric peoples to deploy their symbolic constructions according to the parietal setups responding to the rules of organization of the graphic space. The parietal space offered by rockshelters has morphological and topographical constants, whatever their secondary variations (small-large, high-low, wide-narrow, deep-dish), and these are crucial to the development of representations and their display. The space is oriented in three dimensions: a design space with high-low and left-right and, where required, the depth of space constituted by the ceiling of the canopy, which can, accordingly, be laterally framed by one or two rocky walls, more or less perpendicular to those at the back of the shelter, normally chosen to accommodate the representations. These volumetric dimensions of the space available to those who came to perform representations or/and live there, temporarily or not, condition the parietal setups in shelters.

The *parietal setups* are normally done on the back wall of the shelter. The ceiling of the cave is more often ignored than not. The parietal setups on the wall of a cliff or a large rock, not sheltered, are oriented and structured like those at the back of the shelter. The graphic space most commonly attested is that of the manual field of the author, standing up: there are infinitely fewer representations placed below the knees and even less higher than the limit reached by outstretched arms.

The composition of parietal setups (regardless of their location) are based on three categories of spatial relations: the *juxtapositions* between two or more representations, on the same plan, for example, to simulate a line or a confrontation, or, on fragmented plans, as if the representations floated in space; more or less partial *superpositions* between two or more representations and according to the same variations of previous plans; and finally, the *interlocking* between two representations, which are even more rare. The symbols (and geometric motifs), being always (except in very rare exceptions) smaller than the animal figures, are more often interlocked than are the animals between them. Human representations, often reduced to small, simplified silhouettes, are regularly arranged in rows, in close juxtaposition; they are not frequently superimposed or interlocked with animals. The symbols have little effect on human representations by superposition and even less by

Rock Art, Forms of, Fig. 5 Shelter Game Pass, Drakensberg, South Africa. Elands du Cap, *Sorciers* et archers *volants*. Holocene Period. Cl. A and D. Vialou

interlocking: it is clear that there is like a disjunction between animals and humans in terms of their symbolic links, and this is true in the ensemble of prehistoric rock iconography.

Diversity of Prehistoric Representations

Prehistoric representations and their parietal setups offer an infinite number of special characteristics related to the diversity of cultures with which they identify.

Rock themes generate the dynamic of this inexhaustible diversity. The figurative themes play the most constant role in relation to the abstract theme, because they concern all rock art in the world, across various epochs.

The category of animal representations is obviously the first issue: indeed, in the rock setups in Africa, there exists a purely African fauna, for example, giraffes, tapirs in south America, echidna in Australia, or reindeer in Scandinavia. The animal species clearly characterize the environments in which they live and the climates which are linked to them. But their representations correspond to the choices made by the societies that produced them. The impact of economic behavior and social exploitation and the consumption of animals (hunting, fishing, scavenging, domestication, breeding) are real but uneven according to the societies and their rock iconography. Animal species, represented almost endlessly, in some contexts have been elevated to totems, to emblematic figures, we do not know, in any case representations entrusted with their own meaning. There are wonderful examples attesting to this: the eland in Bushman art in southern Africa (Fig. 5) and the barramundi in Arnhem Land (Fig. 6). Paleolithic representations show variations of animal representations allowing the identification of regional or local traits: we can take, for example, the representations of horses and bison, two species which are extensively represented by Magdalenian, of which the quantitative weights are different depending on the region, Cantabria, Pyrenees, and Dordogne. In other sites there are emphases on horses (in Ekain and Combarelles) or bison (in Altamira and Font-de-Gaume) (Leroi-Gourhan & Delluc 1995). In some cases fauna portrayed in rockshelters and rocks in the Sahara shows adaptation of societies to desertification with the progression of camelids, horses, and finally of Neolithic bovines.

Unlike animals, human representations could reflect a universal thematic unity, but their graphic treatment reveals their symbolic variability. These obviously discriminate the societies and cultures that produced them, with clothes and jewelry (Fig. 7), weapons, and various objects. The most notable of the irreducible diversity of human representation comes from depictions of the naked body, whether it be

Rock Art, Forms of, Fig. 6 Ubir Shelter, Arnhem Land, Australia. Brramundas expressed in *X-rays*. Holocene Period. Cl. A and D. Vialou

Rock Art, Forms of, Fig. 7 Tan Zoumaïtak Shelter, Tassili N'Ajjer, Algerian Sahara. Adorned and dressed characters. Holocene Period. Cl. A and D. Vialou

distinctly gendered or not. It would be more precise to speak of *disfiguration* than figuration, as the symbolic value given to silhouettes and heads, face, and their profile is strong and often strays away from the real anatomy. Some ideologies, however, give clear figurative similarities without suggesting the least cultural kinship. This is clearly the case with bow hunters, more or less schematic, seen as spectacularly stepping over open space, legs fully extended, torsos bulging, and bow stretched forward, elegiac images of famous hunters (Figs. 5 and 8)!

The apparent convergence of basic geometric shapes explains the apparent uniformity of signs through a multitude of rock iconography: in fact, a point resembles a point, a double row of dashes is just like any other, concentric circles resemble concentric circles, etc. By contrast, the most

Rock Art, Forms of, Fig. 8 Shelter 23 de Sefar Tassili N'Ajjer, Sahara algérien. *Flying* bowmen. Holocene Period. Cl. A and D. Vialou

complex symbols and motifs (repetitive or not), such as reticulated rectangles or closed sinuous outlines internal fill-ups, are specific to their own region and period. Within the same rock region, culturally homogenous, the complex symbols and motifs belong to a single site or two or three neighboring sites: these topographic specificities offer the possibility to distinguish symbolic neighboring micro-territories sharing common traits and other individual ones relating to a single regional population. The spatial connections between symbols, between them and figurative representations, which frame the symbolic constructions of parietal setups, accentuate even more the cultural identities which they characterize in different ways.

At this level, we have reached the fundamental nature of prehistoric art and its major function, which is to reflect the most significant cultural traits of societies, in an aesthetic and symbolic dimension extremely elaborated. Art and society have cross-fertilized in this way since modern humans were created in all their universality.

Cross-References

- ▶ Art, Paleolithic
- ▶ Australian Rock Art
- ▶ Cognitive Archaeology
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Form in the Archaeology of Art
- ▶ *Homo sapiens*
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ South American Rock Art

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Rohr, João Alfredo

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Basic Biographical Information

João Alfredo Rohr was born in 1908 at Arroio do Meio, Rio Grande do Sul, in southern Brazil, amidst a community of German Catholic immigrants. At the age of 12, at a time where there were no universities in the southern part of the country, he left to attend a seminary maintained by the Society of Jesus. It was in Pareci Novo, and later, São Leopoldo, that João Alfredo pursued his education for the next 20 years, until finally becoming an ordained priest of the Jesuit Order (Schimitz 2009).

Father Rohr's first assignment was to teach at the traditional school that the Jesuits had established in 1905 at the city of Florianopolis. Father Rohr taught chemistry, physics, and natural sciences at the Catarinense School for 22 years. As a Jesuit, he had a strong background in Humanities and Natural History (Schimitz 2009). The school had a small museum, which Father Rohr expanded into the Museum of the American Man and later into the Museum of the Sambaqui Man (shell mound builders). In 1956 the Anchieta School was founded in Porto Alegre, RS, and with it the Anchietan Research Institute, which gathered together many Jesuit researchers working in South Brazil. The institute disseminated the work done by its associates and preserved and promoted previous achievements.

Major Accomplishments

It was within the field of archaeology that Fr. Rohr became well known. His first achievement was to secure the Carlos Behrenheuser Collection, comprised of more than 8,000 artifacts related to the *sambaqui* (shell mound) builders that abound in the south coast of Brazil and 80,000 artifacts and fragments of pottery related to the Guarani groups. After that, in 1958, Fr. Rohr started his surveying and excavating efforts to locate and identify archaeological sites in the region. This task extended for 24 years, until 1982. At the same time, Paulo Duarte, of the University of São Paulo, and José Loureiro Fernandes, of the Federal University of Parana, were gathering archaeologists from abroad in order to improve scientifically oriented archaeological research in Brazil. Fr. Rohr accompanied the French researcher Annette Laming-Emperaire in some excavations in Paranagua and Lagoa Santa and attended the first seminar held in Brazil by the American couple Clifford Evans and Betty J. Meggers, regarding the research of pottery archaeological sites (Schimitz 2009).

Fr. Rohr recorded more than 400 archaeological sites and excavated many of them. The archaeology that he practiced encompassed all elements present in the State of Santa Catarina's archaeological record. Although the answers to the questions present in those elements could not be addressed exclusively within the state's borders, Father Rohr's approach helped to expand enormously the knowledge about the diversity of the southern Brazilian archaeological record as a whole.

In 1972, along with Brazilian authorities, Fr. Rohr initiated a huge effort to protect the archaeological record from being destroyed, especially the big shell mounds, which were

being explored for commercial purposes. Thanks to these efforts, many of those mounds, built through several millennia, are still standing along the southern shores, allowing archaeological investigation of an enduring coastal culture (Reis 1984).

Father João Alfredo Rohr stands as a true pioneer of Brazilian archaeology. He lived in a time of transition and managed to educate himself and the public in order to establish archaeology as a field of research and secure the way for many other future researchers.

Cross-References

- ▶ Duarte, Paulo
- ▶ Sambaquis Shell Mounds, Archaeology of
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Romanization

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Introduction

This entry addresses the changing meanings of the term "Romanization" since the late nineteenth century. For much of the time between the initial introduction of this concept and the 1960s, the process of Romanization appears to have been viewed in an uncritical light by archaeologists and ancient historians. Romanization was often considered to operate as a relatively simple process through which indigenous societies across Italy and the Western Roman Empire became integrated into a civilized community. During the late nineteenth and early twentieth centuries, the ancient historians Theodor Mommsen (1817–1903) and Francis Haverfield (1860–1919) defined this concept. In many of the works that resulted from the tradition established by these two authors, Romanization was identified as a fairly simple process of social evolution, which derived its logic from the assumption that social change occurred in all societies from a primitive form to a civilized way of living and that this process occurred in a measured and progressive manner. During much of the twentieth century, the theory of Romanization was used to explain the gradual spread of urban life, villas, and "Roman" goods (*terra sigillata*, amphora, coins, etc.) across much of the Roman Empire during the period from the late first century BCE to the third century CE. It was considered that this blossoming of civilization was succeeded by a period of decline that eventually led to the fall of Rome in the West in the early fifth century.

A more critical assessment of Romanization arose as a result the decolonization movements of the 1950s to 1970s, as Western Empires were dismembered. At this time, critical accounts of classical Rome gradually developed which took issue with the ideas of civilization and progress on which the earlier theories of Romanization had been based. At first, these critical approaches focused upon the idea of indigenous resistance to Rome, but during the 1990s, a more focused critique of the concept of Romanization developed in Britain, representing a "postcolonial" turn in Roman imperial studies (Webster & Cooper 1996). Since this time, a number of archaeologists have argued that Romanization theory is too deeply associated with Western imperial discourse to remain a useful term (see Hingley 2005: 2). This argument suggests

that, during the early twentieth century, Romanists took on board contemporary ideas of social evolution and progress and read these concepts back into the evidence derived from the Roman past. As a result, classical texts and the material remains of Roman civilization were interpreted through the lens of a linear and progressive form of social evolution. A number of Romanists have argued as a consequence that the term "Romanization" should no longer be used, and this has, in turn, deeply influenced much of the subsequent scholarship on Roman imperial identities. Despite this, many archaeologists in Europe and the United States of America continue to use the theory of Romanization.

After a consideration of definitions, this entry explores a number of phases in the evolution of the theory of Romanization, although it is important to realize that these do not always represent successive stages in a simple process of the evolution of the theory. Firstly, it addresses the rise of the theory of Romanization in the context of the colonial world order of the late nineteenth and early twentieth centuries. Following this, it explores attempts to provide a rather more decentralized interpretation of Romanization during the 1960s to the 1990s. It then considers the postcolonial accounts that have aimed, since the mid-1990s, to dismiss the concept of Romanization. The section on current debates summarizes recent works that have aimed to provide more nuanced accounts of identities within the expanding Roman Empire. Finally, the current context for studying Roman identities is considered, and it is argued that today, no one explanatory framework dominates the subject.

Definition

The term "Romanization" was first introduced into the English language during the late nineteenth century. It drew upon the common use of the word "Romanized," which has much earlier origins in Europe (Hingley 2008: 436). There is only use of the noun ("Romanization") listed by the *Oxford English Dictionary* prior to the final 15 years of the nineteenth century, and the concept was introduced as a result of the scholarship of the German classicist, Theodor Mommsen, who in 1885 articulated the concept of "Romanisierung" in the fifth volume of his seminal work *Römische Geschichte* (Hingley 2008: 436). The term was adopted and popularized by the Oxford ancient historian Francis Haverfield in his influential work, "The Romanization of Roman Britain," first published as an article in 1906 and republished on several occasions as a small book.

There are many definitions of Romanization, and the meaning of the term has not remained static. The initial idea that a well-defined Roman urban civilization was gifted to the "barbarians" of the Western Empire was long ago replaced by accounts that explored the complexity of imperial relations. For Kathryn Lomas (1995: 109), Romanization means, "The transition [to] a characteristically Roman set of cultural attributes and assumptions, assuming that the speed and mode of transmission and the nature of their reception vary according to the nature of the recipient and the social and economic level at which the transmission operates at any given moment." This makes it evident that Romanization has often focused on the rich and well-connected peoples of the Roman Empire, stressing the material remains left behind by the villa owners, urban dwellers, and soldiers. However, the theory of "osmosis," or trickle-down Romanization, was introduced during the final quarter of the twentieth century to account for the agency of the less privileged people in indigenous communities, suggesting that the less wealthy and well connected adopted Roman ways wherever possible (see Hingley 2005: 43).

Some authors have continued to use the term "Romanization" in a constructive way until the present, while others have critiqued and rejected both the term and the approaches that the theory embodies. For Roman Roth (2007: 10), Romanization is valuable as an "umbrella term" because it is "the most neutral term which can be used in this context—paradoxically—just because its original implications are so widely rejected." For Andrew Erskine (2010: 62), Romanization continues to be used "out of convenience rather than because it is considered to be especially

useful. Nevertheless, it is a term that has proved very useful at provoking useful debate." Neville Morley (2010: 110) writes that "'Romanization' is an ambiguous term that can be understood either as a policy or as a process—as the result of a deliberate attempt by the Romans at civilising their conquests, or as the unintended result of the incorporation of a region into the political, social, and economic structure of the Empire, or as some combination of the two".

Historical Background

Romanization in the Colonial World

Theodor Mommsen drew upon classical texts and epigraphic evidence from the Roman provinces to transform earlier approaches that had developed a rather binary and relatively static ideal in which barbarians became Romans through the adoption of the Latin language. Before Mommsen, no clearly defined idea of a Roman cultural package existed, and the idea that Latin culture could be adopted in a gradual, flexible, and transformative fashion was not very fully conceptualized. A transformative idea of Roman imperial culture was one of Mommsen's gifts to studies of the Roman Empire.

Haverfield helped to build upon this rather more dynamic account of Roman social change (Freeman 1997: 39, 42). In 1906, Haverfield adopted the term "Romanization" for the title and content matter of his influential article, "The Romanization of Roman Britain"; this publication was expanded in 1912 into a small book that was republished on several occasions. The use of this new concept helped Haverfield to consider the available textual and archaeological evidence for Roman Britain and to challenge the earlier approaches that had explored the influence of Rome on this province (Hingley 2008: 436). Mommsen and Haverfield's idea of Romanization drew the archaeological discoveries that had been amassed over the previous centuries into a study previously dominated by linguistic and literary conceptions (Freeman 1997).

Several factors came into play during the twentieth century that encouraged the development of this idea of progressive Roman cultural change. First, a new comprehension of the material culture of pre-Roman, Roman, and post-Roman people was being created—including houses, settlements, pottery, and metalwork—as the result of the increasingly systematic excavation of sites and the study of ancient objects. Alongside this process, there was a growing appreciation of the considerable depth of time that people had occupied Europe prior to the Roman conquest (Hingley 2008: 437). The accumulation of information about the material culture of Roman Britain gradually came to suggest that many artifacts and building types represented an amalgamation between the better-known Roman culture of the Mediterranean and the objects that were now recognized as having been used by the later prehistoric people of Britain. Second, a growing internationalization of knowledge led to the idea that there was a significant indigenous input into much of the Roman culture that was known from the provinces of the Western Empire, including many of the towns and villas. Third, the growth of ideas of social evolution during the nineteenth century, together with the increasingly problematic international political situation at the start of the twentieth, called for explanations of cultural change which emphasized that the conquest and control of indigenous peoples had, in the case of the Roman Empire, resulted in the transmission of civilization (Hingley 2005: 34-6).

New approaches to the cultural assimilation and incorporation of indigenous people in the Roman Empire appealed to archaeologists, ancient historians, educationalists, and politicians because they communicated relevant ideas in the imperial present. It is important that these accounts also drew directly upon some of the available classical texts (particularly Tacitus' *Agricola*: 21). In Haverfield's account, Romanization resulted in a fairly unified empire, since among the towns and upper classes of the empire, Romanization was felt to be substantially complete. Indeed, even the less wealthy rural peasants appeared to have been influenced by the example of Rome (see Hingley 2005: 35).

Comparable approaches to Romanization across the Mediterranean emphasized the incorporation of people into the Roman Empire, the creation of effective imperial unity, and the elaboration of cities and gracious rural living (Hingley 2001: 76; Roth 2007: 11-3). Although the details of national discourses in the various Western European countries varied (see the papers in Hingley 2001), the accounts produced by Mommsen and Haverfield had a deep influence on the development of Roman archaeology across Europe. The focus of attention on Roman urban life and the upper classes was (presumably) inevitable at this time, since it represented the emphasis of the available classical texts and also the particular cultural fixation that had typified the interest of Western Europeans since the Renaissance. By focusing generations of work on the urban dwellers, the villa owners, and the Roman military, this research tradition helped to provide the archaeological evidence that was taken to support the ideas that had promoted the research in the first place. The idea of the highly Romanized landscape across the Western Empire was a colonial image, created by Rome and reproduced by modern scholars (cf. Hingley 2005: 92).

Approaches to the Romanization of provincial societies certainly did not create one entirely standardized international approach to classical archaeology, but there was a strong element of unity to the archaeological works that were published across Europe prior to the 1970s. This was posited on the idea that social change was relatively one sided and was promoted specifically by Rome for the benefit of subservient peoples in Italy and the provinces (Erskine 2010: 58-9). Changes in the political climate, however, were about to result in a sustained challenge to this received wisdom (Hingley 2005: 37).

Decentering Romanization

The decolonization movements of the middle decades of the twentieth century caused a wider intellectual challenge to the theories and methods that were used to study the Roman Empire. From the 1960s and 1970s, new types of archaeological materials started to be collected as the result both of the regional archaeological field surveys that were undertaken across Italy and the excavation of sites in Britain and the Netherlands as the result of development. The new focus on some rather less Roman-looking rural populations began to result in a changing emphasis of research that eventually led to the attacks that came to be mounted on the theory of Romanization (Hingley 2005: 36).

New accounts were developed that argued that monumental towns and villas were just one of the responses to the incorporation of rural societies into the Roman Empire, and the rural background to this urban-based civilization came to be more fully acknowledged. As a result, some Romanists began to challenge the dominant perspective, reflecting growing dissatisfaction with the colonial ways of thinking that in the West had dominated most areas of academia prior to the 1960s. The publication of Marcel Benabou's volume on African resistance to Rome in 1976 proved particularly influential, despite a frosty reception from some Romanists. Steve Dyson's article on revolt patterns in the Western Empire (1975) also led to a new focus of attention that aimed to combat the colonial knowledge inherent in earlier approaches. Direct attacks on the term "Romanization," however, took over a decade longer to develop, while some of these early attempts to redefine provincial identities were "nativist," in that they emphasized resistance to Rome through the active maintenance of indigenous identity in the context of imperial incorporation (Hingley 2005: 40-1).

One work that drew upon this nativist tradition to create a transformational perspective was Millett's *The Romanization of Britain* (1990). The value of Millett's perspective is that it emphasized an idea of Romanization that was of value to a postimperial generation. In order to achieve this, Millett stressed the indigenous input into the process of social change and identity formation in the Roman province but without losing a focus on the central imperial power of Rome. Romanization was far less of a direct policy that was implemented by the imperial center and far more the result of the efforts and desires of members of the indigenous elites that became caught up in the expanding empire. This argument had a deep impact since it enabled

the creation of a less centralized and the less deterministic accounts of the Romanization of societies in Italy and across the empire (e.g., Keay & Terrenato 2001; Roth 2007: 18-9). The idea of indigenous agency also impacted upon influential accounts of the Roman Empire that have consciously avoided the use of the term "Romanization."

Dismissing Romanization

During the second half of the 1990s, a number of British archaeologists turned critical attention to the concept of Romanization. In response, some Romanists argued that Romanization represented a value-free description of the process of Roman social change. For many Anglo-American commentators over the past fifteen years, however, the term "Romanization" is too problematic to continue to be of any value. Since the mid-1990s, a series of works have aimed to replace the term and the intellectual baggage on which it is based (e.g., Webster & Cooper 1996; Mattingly 1997; Hingley 2005; Mattingly 2006). Many British and American archaeologists and ancient historians have rejected Romanization, and some archaeologists in the Netherlands, Spain, and elsewhere have followed suit. The focus of many of these critiques is upon the political contexts in which the idea of Romanization became popular. During the late nineteenth and early twentieth centuries, this concept was popular, specifically, because it projected contemporary (modernist) concepts of progress and social evolution; in turn, such knowledge of the past can now be seen to have provided historical justification for ideas that were used to justify contemporary imperialism (Hingley 2005: 43-5). As Neville Morley (2010: 111) has argued,

> The superiority of Roman civilization, it was assumed, was such that it would then spread through the provinces by osmosis; it was enough for the natives to be brought into contact with Romans, whether soldiers, officials, colonists or traders, to recognize their superior status and wish to imitate them. . . . The close connection between these assumptions and the discourses of modern imperialism, which similarly see the colonized natives as uncultured or culture-free primitives in need of civilizing, is obvious.

The idea of the development of barbarians, or primitives, on the periphery of the Roman Empire to a more evolved and settled, Roman, condition of life matched contemporary interests and concerns for Britain and other Western nations that had empires or held imperial aspirations. In particular, Romanization propounded the positive value of the imposition of imperial order, downplaying the rights of indigenous societies to self-determination. This research tradition drew a direct but usually unacknowledged comparison between the character of imperialism in the ancient and the modern worlds.

These three stages in the development and abandonment of Romanization have been presented above as if they operated according to a simple and progressive logic in all of the regional and national traditions of study across Western Europe, but the fact that many Romanists continue to use Romanization theory today indicates that the situation documented here is not actually so simple.

Key Issues/Current Debates

As a result of the critical postcolonial dismissal of the value of the term "Romanization," many British and American authors have argued that we require new ways to view the process of identity formation and cultural change across the Roman Empire. It is necessary to define ideas that fit our current desire to live in a "postcolonial" world. A number of new approaches to identity and social change have emerged.

For some time, the influential interpretation developed by Greg Woolf (1998) in his research upon Roman Gaul appeared likely to grow to dominate the field. Woolf rejected Romanization as an approach and outlined the idea of "becoming Roman," exploring how the Roman Empire was characterized by "a new, highly differentiated social formation incorporating a new cultural logic and a new configuration of power" (quoted in Hingley 2005: 47). Woolf's account had a deep influence on Roman imperial archaeology, but a number of authors over the past decade have argued that "becoming Roman"

adopts some of the more problematic aspects of Romanization, particularly in that it remains focused on the elite of the Roman Empire (Hingley 2005: 48). It continues to emphasize the ways of life of the powerful and well connected and assumes that most of those involved in the Roman Empire had broadly similar aims and objectives. Carol van Driel-Murray has argued that the application of recent approaches to the Batavi of the lower Rhine Valley in the Roman period have created "undefined, undifferentiated and apparently entirely male" elites, and her critique can be extended to other recent approaches to individual societies of the empire (quoted in Hingley 2005: 91).

As a result, a body of work has developed over the past decade that aims to comprehend the local and perhaps rather fragmented identities that existed across the empire. Jane Webster's study of creolization (2001) has had a considerable impact, and some other works have focused on the identity of groups such as soldiers, traders, and industrialists; these accounts explore the variable ways in which these people were incorporated into empire (see works addressed in Hingley 2005: 91-116). Another influential approach has explored the discrepant experiences of the individuals who found themselves incorporated into the empire, addressing the highly variable nature of individuals and communities that were assimilated (Mattingly 1997). David Mattingly (2006, 2011) has developed this argument in detail in his informative study of Roman Britain as an imperial possession.

International Perspectives

It is unusual in Britain today for scholars to develop accounts that draw directly on Romanization, and when published works do draw upon this concept, a lengthy justification for the use of the term is usually felt to be appropriate. At the Roman Archaeology Conferences (RAC) and Theoretical Roman Archaeology Conferences (TRAC) in Britain and overseas, the term is usually used only in papers that seek to critique the research of past scholars. Romanization appears to have been abandoned by many who seek to study the Roman Empire. Despite the effective banning of the concept in certain circles, other authors—particularly those that address the Roman societies of Italy, Gaul, Germany, Iberia, and Dacia—continue to draw upon the concept of Romanization (for a survey, see Hingley 2005: 18). For instance, useful recent studies of Roman pottery and society in central Italy (Roth 2007) and society in Roman Dacia (Oltean 2007) adopt Romanization as an explanatory concept. The concept has been critically assessed by Germany scholars (Schörner 2005) and continues to influence the research of Roman cultural historians (cf. Wallace-Hadrill 2008: 103-4, 454).

In addition, recent reviews that address aspects of Roman imperial policy sometimes still champion the use of the concept, even if only as a result of the convenience of the term (Erskine 2010: 62). Many recent works that adopt the term evidently conceive that different societies could become Romanized in highly variable manners, ways that project individual cultural responses to their incorporation within the Roman Empire. Such studies take on board many of the critical points outlined by the authors who have sought to undermine the use of Romanization. Numerous others accounts of Romanization, however, remain more traditional in character, perpetuating earlier approaches without any particularly detailed justification. It has even been observed in discussion that the focus on abandoning Romanization is a British fixation, resulting from the United Kingdom's particular imperial history. This is an idea that appears to ignore the impact of classical ideas in national and imperial discourses in other parts of the world and also the role of Roman models in the political actions of the West today.

Those who remain critical of the use of the term continue to emphasize the way that it focuses research on the elite and the more Romanized peoples of the empire and also the way that it creates a rather simplistic interpretation of identity and social change (see Mattingly 2011). The investigation of the nature of the ways that the term has been used in different national traditions has hardly begun perhaps because the interrogation of the term often appears to be felt to be boring or irrelevant to current research

on the people of the Roman Empire. A counterargument is that the study of research traditions needs to form a vital element in archaeological research, since the materials that archaeologists address and the research traditions that the subject is based upon have been passed down though time, although they are also transformed through constructive and critical thought (Hingley forthcoming). Indeed, Romanization should represent a lively area of international debate, but the two sides of the argument are rarely communicated in public discussion.

Future Directions

Currently, the field of Roman imperial archaeology does not have a single concept that serves to unite the study of provincial societies. Whether this lack of consensus represents a problem or an opportunity for Roman archaeologists is open to debate.

At a number of times in the past, particular works have served to focus academics research into agreed sets of approaches, theories, and methods. Mommsen's work had a deep impact across Europe, and this influenced Haverfield, resulting in a tradition of research on Romanization that dominated in Europe for the best part of a century. Martin Millett (1990) and Greg Woolf (1998) have added to this picture by creating powerful new ideas about Roman identity and cultural change that have considerably influenced subsequent studies. These works are useful for particular places and times, but none of these accounts provide an adequate picture of the nature and character of the transformative system that constituted Roman imperialism. Greg Woolf's theory of "becoming Roman" has had a lasting influence but continues, in the terms addressed here, to provide too focused an emphasis on the adoption of a Roman culture by the elite of Italy and the provinces. As a result, a number of other approaches have been developed that aim to decenter such concepts by exploring the variable ways that indigenous peoples were incorporated into the empire at different times and in various contexts.

Another approach that is being explored in current research is that of "globalizing Roman culture" (cf. Hingley 2005). Some Romanists are drawn to the analogy between the imperial Roman and the contemporary worlds precisely because this approach provides a means to appreciate the highly varied local responses to Rome without dismissing the idea of a central dynamic to imperial civilization. Richard Hingley has emphasized that a focus on the globalization of Roman culture helps to emphasize the current context in which knowledge of classical Rome is developing (Hingley 2005: 117-20). Past critiques of Romanization focus on the development of new approaches that are less closely tied to Western imperial discourses, but we need to continue to focus on the ways that ideas about classical Rome continue to be used to articulate the political and military actions of the West today (Hingley forthcoming).

There appears, however, to be no consensus about how we might best approach the issues of Roman imperialism and cultural change, and this means that this field of study is open to a variety of competing approaches. Some archaeologists remain passionately supportive of the term "Romanization," and it is always possible that there will be a revival of interest in the Romanization of Britain in the near future. The concept has, however, been entirely abandoned by others.

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- ▶ Haverfield, John Francis
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Rosenfeld, Andrée

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Basic Biographical Information

Andrée Jeanne Rosenfeld, B.Sc., Ph.D., FAHA (1934–2008) (Fig. 1), was an influential rock art archaeologist and scientist, who worked in Europe and Australia.

She arrived in Australia in 1972 as a well-respected young researcher and joint author of a seminal reevaluation of European Palaeolithic cave art (Ucko & Rosenfeld 1967). Her Ph.D. (Institute of Archaeology, University of London, 1960) under Frederick Zeuner on cave deposits from sites in Devon drew strongly on her science background (B.Sc. Physics, Bristol, 1956) and her interest in caving. Andrée continued her research combining the scientific, environmental, and human aspects of material culture and by 1964 was curating the British Museum Palaeolithic collections, researching European Palaeolithic cave art and assisting her then partner, Peter Ucko, teaching material culture at University College London.

She joined the Department of Prehistory and Anthropology, Australian National University, in 1973 where she remained until her retirement as Reader in 1997. She then moved to Southern Queensland where she built a home surrounded by friends; travelled, often to visit her family; became an accomplished weaver; and continued to write on rock art. Andrée died of pancreatic cancer in 2008.

Born in Belgium in 1934 into a brilliant academic family – both parents were well-qualified physicists – she was surrounded by European scholarship and languages despite experiencing the exigencies of a childhood overshadowed by World War 2. Her father, Professor Léon Rosenfeld, worked with Niels Bohr and Werner

Rosenfeld, Andrée, Fig. 1 Photo of Andrée Rosenfeld in 2001 taken by Tricia Edwards

Heisenberg on the development of the Copenhagen Interpretation of quantum mechanics. Andrée's early family life underpinned her academic career and her combination of rigor and humanity.

Major Accomplishments

Palaeolithic Cave Art (Ucko & Rosenfeld 1967) was a small book of great importance. The authors questioned many existing theories about the interpretation and recording of European Palaeolithic cave art and provided a refreshingly open approach to an area of research still mired in superstition, old-fashioned techniques, and the understandable awe of early researchers such as the Abbé Breuil. In the 1960s Andrée worked at Arcy-sur-Curé with the leading French cave art researcher, Professor Leroi-Gourhan, who was using new, scientifically meticulous recording techniques and producing innovative interpretations of the associations between the animals depicted and the exact placement of the art within the cave system.

These research experiences, combined with her own precise scientific training, encouraged Rosenfeld to tackle new and innovative research in Australia. She arrived at a time when little fieldwork had been carried out in the vast field of Australian rock art. She led a team of colleagues and students to excavate and investigate the rock art of the Early Man shelter near Laura in Queensland – a milestone in the establishment of rock art research in Australia (Rosenfeld et al. 1981).

Andrée addressed the practical as well as the theoretical. She understood that conservation was imperative to the preservation and study of Australian rock art (Rosenfeld 1985). She understood that Aboriginal rock art embodied systems of social being beyond comprehension of symbols and figures. She was keen to make Australian rock art research available to a worldwide audience (Bahn & Rosenfeld 1991). By the late 1990s, she had became deeply interested in how rock art could be used in the understanding of the social contexts, which she demonstrated through her Central Australian field research (Rosenfeld 1997, 2002; Rosenfeld & Smith 2002). Her last paper (Rosenfeld 2005) was a bold analysis of the rich and complex relationship between the art and the song of the Arrernte people in Central Australia in recognition of the deep spirituality, knowledge, and culture that underlies all rock art.

Andrée established teaching courses at the Australian National University in the archaeology of art and the study of material culture and, with firmness and understanding, encouraged students, both at honors and postgraduate level, into active research. She received wide recognition through her election as Fellow of the Australian Academy of the Humanities. At her retirement, her students and colleagues, including Howard Morphy, Mike Morwood, Jo McDonald, Paul Taçon, Bruno David, Iain Davidson, June Ross, Ursula Frederick, and Nick Hall, produced a volume of papers showing the breadth and depth of her influence on the rapidly increasing area of Australian rock art research (Frederick et al. 1999).

Andrée's underlying strength was a rigorous academic discipline combined with creative and artistic flair. She was very self-disciplined and employed meticulous techniques in the field through to prompt publication. Andrée Rosenfeld was a pioneer in the field of Australian rock art, who demonstrated how the controlled application of scientific techniques combined with understanding and respect for indigenous communities would allow all Australians to appreciate the phenomenal richness and importance of Australian rock art.

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Rostain, Stéphen

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Basic Biographical Information

After his first contacts with New World archaeology in Teotihuacan, Mexico, and in the Maya site of Chaguite, Guatemala, Dr. Rostain focused his research on Amazonian lowlands and Caribbean islands. He was employed as an archaeologist in French Guiana from 1985 until he received his Ph.D. from the Pantheon-Sorbonne University in Paris in 1994. His dissertation was written on the archaeology of French Guiana.

Major Accomplishments

Stéphen Rostain is the first French archaeologist to dedicate his work to the Amazonian rain forest. He has developed innovative aerial archaeology along the Guiana coast, where he discovered thousands of pre-Columbian raised fields. From 1994 to 1996, he was the codirector of the archaeological project Tanki Flip in Aruba, which led to the publication of a large monograph. After the organization (with D. Schoepf) of the exhibition *Autoportraits du Nouveau Monde* in Geneva, Switzerland, he lived in Ecuador between 1996 and 2001, where he managed an archaeological project in the Upano Valley, particularly in the prestigious site of Sangay, famous for its

numerous artificial earthen mounds. His main interests are historical ecology of the Amazon, pre-Columbian earthworks, indigenous agriculture, and ethnoarchaeology. One original characteristic of his projects is an interdisciplinary approach with an extensive team of specialists. He is presently Director of Research at the National Center for Scientific Research of France (CNRS) and for the last 10 years has been in charge (with D. McKey) of an interdisciplinary project on the Guiana coast. In 2008, he received the Paris Clio award for French projects in foreign countries. He is the director of the French Institute for Andean Studies (IFEA) in Ecuador and chairman of the 3rd International Congress of Amazonian Archaeology in Quito in 2013.

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Royal Exhibition Building

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Introduction

The Royal Exhibition Building is a unique feature of the built heritage of Melbourne, Australia. Governor Sir George Bowen laid the foundation stone in the nineteenth of February 1879 (*The Australian Sketcher* 1879), and the building was opened to the general public on the 29th of May 1880. The Great Hall, the current building, is a permanent structure and is built of brick, while the basement and base are constructed of bluestone. Removable annexes that were used during the 1880 and 1888 World Exhibitions were constructed using wood and metal. The building itself was purposely built for the 1880 World Exhibition and was funded by the Parliament of Victoria (Official Record 1882). At the time of construction, the Royal Exhibition Building was the tallest building in Melbourne (Fig. 1).

The Royal Exhibition Building is recognized for its heritage value at state, national, and international levels. It is one of the only buildings that were constructed for the Great Exhibitions of the nineteenth century that are still used for their original purpose. The Royal Exhibition Building held both the 1880 and 1888 World Exhibitions and showcased the relatively new colonial city of Melbourne to the world. In 2004, it was the first building in Australia that was recognized on the World Heritage List.

Key Issues/Current Debates/Future Directions/Examples

The 1880 and 1888 Exhibitions played a significant role in the growth of Australia. The historical impact of the Royal Exhibition Building and associated Carlton Gardens marks

Royal Exhibition Building, Fig. 1 Meyers, H.G. The Exhibition Building illuminated at night in 1901 to celebrate the federation of Australia (Museum Victoria: http://museumvictoria.com.au/reb/history/the-building/)

Australia's growth from a collection of colonies to a nation. At the 1880 and 1888 Exhibitions, the Royal Exhibition Building was divided into the exhibiting colonies and nations, which included many of the wealthy industrializing states of the time such as Japan, India, Russia, Germany, Victoria, Britain, the USA, New South Wales, Queensland, Tasmania, and many more. At the time of the Exhibitions, Australia was still far from becoming a nation, but the spread of technological and cultural ideas through the Exhibitions contributed to the development of the newly formed colonies that would later form the nation of Australia. The role the building played in hosting both the 1880 and the 1888 Exhibitions was significant within the context of nineteenth-century World Exhibitions and is the basis for the World Heritage listing of the building.

The architectural style of Royal Exhibition Building incorporates elements of Roman, Byzantine, Lombardic, and Greek classical designs. This reflects the major influences in architecture throughout modern European development. In addition, the Royal Exhibition Building introduced to Melbourne an obscure style of architecture, *Rundbogenstil*, an early nineteenth-century style that was made popular in Germany. *Rundbogenstil* makes use of a round-arched style and was well regarded due to its "rigidity of composition, repetition of identical elements and emphasis on direct structural expression" (Willington 1996: 53). With the assistance of ongoing maintenance and repair, the dome construction and cathedral-like influences have maintained their majestic nature over time.

Some 15,000 people attended the opening ceremony of the 1880 Exhibition on October 2, 1880, while over 24,100 people attended the Exhibition that day (Official Record 1882). The 1880 Exhibition saw an impressive total of 1.3 million people through its doors and captured the imagination of the colony and showcased over 32,000 exhibits from over 29 countries (*Royal Exhibition Building Museum Project Volunteers* 1993). At that time, the Royal Exhibition Building had what was considered the best view in Melbourne; a panoramic view for 50 miles was reported from the dome with the observation that a visitor could see the growing city at their feet. In all, the Exhibition took up an area of 22 acres.

The 1888 Exhibition opened on the 1st of August 1888, and closed on the 31st of January 1890; it was considerably greater in scale and scope than its 1880 predecessor. The Exhibition's buildings covered 35 acres (United States Commissioners 1890) and the Exhibition attracted over two million visitors, surpassing attendance at the 1880 Exhibition.

The 1888 Exhibition saw two major changes to the Royal Exhibition Building itself. The most exciting change was the introduction of electricity over 825 brush arc lamps that were added to light the building in order to extend its hours of operation. The other major change was

a temporary "safety lift" or elevator that gave access to the roof and to a viewing platform. These advancements combined to display the prosperity of the colony of Victoria and its industrial advances.

The social and national significance of the Royal Exhibition Building is an outcome of the various uses of the building. In 1901, the Royal Exhibition Building hosted the opening of the first Australian Parliament, watched by a crowd of over 12,000 people. When the Duke of Cornwell and York stated "I now declare the Parliament of the Commonwealth of Australia open" (*The Argus* 1901), the Duchess pressed an electric button that signalled outside the building for the Union Jack to be raised in all the state schools of the colony. The same parliament infamously saw the introduction of the White Australia Policy in an attempt to remove black laborers from the Queensland sugar industry (*The Brisbane Courier* 1901). The Countess of Hopetoun, who was the Governor of Victoria's wife, was also the first to raise the Australian flag at the Royal Exhibition Building on September 3, 1901.

The Royal Exhibition Building has served as a venue of national significance under the direction of the Australian Defence Forces. In 1922 the Australian War Museum first opened in the eastern annex of the Royal Exhibition Building. During the two and a half years that this museum was open, it was visited by over 800,000 patrons (Dunstan 1996). The museum was a site of national mourning and outlined the World War I and the role of the Australian armed forces in this war. The museum displayed many objects that helped the audience to understand the everyday life of soldiers during the war, including gas masks, uniforms, and maps. The museum and its collection were moved to Canberra in 1935 (Willis 2004). The Australian Defence Forces later used the buildings during the World War II. The Royal Australian Air Force occupied the Royal Exhibition Building and the Carlton Gardens in 1940. At its peak, in 1942, the building accommodated over 2000 personnel. Conditions were tough, especially in the winter months. It was later used for low-cost accommodation for soldiers and sailors on leave in Melbourne.

Although not part of Australia's initial colonial history, the national significance of the Royal Exhibition Building and Carlton Gardens augmented its national significance during the post-World War II period, when it was used as an emergency accommodation center for newly arrived immigrants and refugees from 1947 until 1962 (Lock 1996). The purpose of the accommodation was short-term housing for immigrants while they found work and more permanent housing. For most, the bungalows at the Royal Exhibition Building that housed families, couples, and single immigrants were their first accommodation in Australia. On the whole, the Migrant Reception Centre provided immediate and mostly adequate accommodation for the many poor and hopeful immigrants of the postwar period in Melbourne.

The Royal Exhibition Building and the Carlton Gardens have been utilized for numerous entertainment events including the 1956 Olympics and housing Australia's first aquarium. In between the two Great Exhibitions of the nineteenth century, on the 24th of February 1885, the aquarium at the Royal Exhibition Building opened. The aquarium housed animals such as crocodiles, seals, and penguins, and later after the construction of the fernery, this collection also included monkeys and birds. The aquarium was demolished after a large fire destroyed most of the structure in 1953. Across time the Royal Exhibition Building and Carlton Gardens have held a number of sporting events. Some of the more notable include the world's first 6 day penny-farthing race in 1882 and a scandalous tug-of-war competition in 1892 that included a women's event that was noted as being very improper at the time. Also in 1956, Melbourne Olympics held a number of events at the Royal Exhibition Building including fencing, weight lifting, wrestling, boxing, and the pentathlon.

The Royal Exhibition Building has been further etched in the memory of the Australian nation for its philanthropic utility. In 1930, during the depths of the great depression, Sidney Myer held a Christmas Day dinner. He was known for

his generosity and fed 11,500 people from 10 a.m. onwards; they were fed corned beef and ham and were catered for in waves of 2000. Although the initial invitation to the dinner was for only 10,000 guests, an uninvited extra 1,500 guests arrived and were welcomed. None were turned away (*The Advertiser* 1930). The Royal Exhibition Building has also acted as a hospital during the Spanish influenza outbreak in February 1919, which killed over 3,500 Victorians. The building was able to hold over 500 patients but winter made heating the hall a problem and patient transport was a major concern. The depth of public use of the Royal Exhibition Building and the Carlton Gardens marks out specific events in Melbourne and Australia's past and allows us to understand its unique cultural significance.

In 2012 the Melbourne Museum, the current custodians of the building, was given a 20 million dollar grant from the Australian Federal Government to restore the viewing platform at the base of the dome, which will afford a superb view of Melbourne. Museum Victoria Director Patrick Greene said he considered it to be the "largest object in the museum's collection" (The Age May 2012), and there was also a possibility of extending a tunnel from the museum to the building.

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Rural Life in Islamic Archaeology

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Introduction

The study of the rural world has become a significant area of growth in Islamic archaeology, and its potential as a source of data about past societies has been increasingly realized. As new approaches to the study of archaeological landscapes have become more common (Johnson 2006), features that would be missed in a more traditional focus on sites alone are now being documented by survey projects which investigate multiple strands of information in the extra-urban context. Archaeology visualizes and interprets human activity, often absent from historical accounts, which are primarily urban in their perspective and authorship. Where the countryside is cited in historical sources from the Islamic world, it is largely viewed as secondary or supportive to urban society. The material evidence, however, often points towards the important economic role which rural communities played. This is significant given that the

economies of past Islamic societies were fundamentally agricultural in character and that the majority of the population is likely to have lived in rural areas. Material culture in this setting can include remains of agricultural and hydraulic infrastructure (such as field systems, canals, mills, terraces, and threshing floors) as well as settlements identified by the presence of standing architecture or by the visibility of surface artifacts or distinguishing features in soil or vegetation appearance.

In many rural regions of the Islamic world, less is understood about the traces of human activity from more recent historic periods than those of earlier times, an anomaly when contrasted with knowledge of historical landscapes in Europe, for example, where recent historic periods dominate survey data (Wilkinson 2003: 5). Prior to the mid-twentieth century, archaeological enquiry in much of the Middle East and North Africa focused on biblical or classical antiquity, while scholars of the Islamic past concentrated their attention on monumental architecture and fortified urban settings. Similarly, Islamic pottery studies tended to be centered on finewares, neglecting the establishment of excavated reference typologies and making it difficult to interpret material collected from rural sites, which is primarily composed of more utilitarian classes of ceramic object. Towards the end of the twentieth century, the focus shifted in many archaeological projects towards broader regional perspectives. Zones beyond major urban centers were examined in detail, and research questions began to address directly issues related to rural societies of the Islamic period. This has resulted in a combination of ethnographic and historical approaches and the incorporation of scientific methodologies, including remote sensing; geomorphological, archaeobotanical, and archaeozoological studies; and soil chemical analyses.

Definition

The rural Islamic world encompasses a diverse cross section of geographic, climate, and hydrological conditions, all characterized by agricultural activity as the principal means of subsistence. The inhabitants of this vast geographical area cannot be understood through the perspective of singular ethnic, religious, or linguistic parameters. Similar circumspection is needed in developing models of how rural societies functioned, and the often cited dichotomy of the "desert and the sown" can sometimes be overplayed. Arid and semiarid environments are characteristic of many parts of the Islamic world, but rain-fed agriculture is also widely practised, and diverse landscapes zones (woodlands, marshes, high mountain, and upland plateaux and grassland) must be taken into consideration in a survey of rural life. Recent research has expanded knowledge of how agriculture was practised in arid zones that are no longer agriculturally productive. The reinterpretation of the role of so-called desert castles, or *qusur*, in the Syrian and Jordanian steppe is one such example of site hinterlands providing new interpretations of their function. Skillfully designed water procurement systems in fact permitted extensive agricultural activities, leading to long-term occupation, use, and reuse of many sites into the medieval or modern period (Genequand 2009).

Composed of diverse religious and ethnic elements, rural areas do exhibit characteristics that can be connected to the practice of Islam. This may include such features as cemeteries or individual burials which face the direction of the *qibla*, travel infrastructure linked to the *hajj*, or the remains of built or open-air mosques (Fig. 1). Further cultural commonalities can be detected in the material culture found in many rural contexts, such as the widespread use of lead and alkaline glazing on pottery vessels, or the morphological characteristics of the vessels themselves, such as the *ibriq*, or filter-necked spouted water jug, common in the Eastern Mediterranean after 1000 CE (Fig. 2). In the same region and further eastwards into Iraq and the Iranian plateau, the appearance of calcareous cream or buff fabrics in pottery assemblages in the eighth century has been noted in many archaeological assemblages, from substantially varied sites, and most likely produced in many different

Rural Life in Islamic Archaeology, Fig. 1 Open-air mosque, Qatar (Image: Stephen McPhillips 2012)

Rural Life in Islamic Archaeology, Fig. 2 Fired *ibriq*s at a potter's workshop, Lebanon (Image: Stephen McPhillips 2012)

workshops. Their appearance has been interpreted as one indicator of a gradual shift in material culture from late antique Mediterranean traditions of red fine ceramic wares towards the fine cream vessels that were more prevalent in Iraq and are attested in particular at the major urban excavations of Raqqa and Samarra (Walmsley 2001).

Methodological Considerations

The discipline of Islamic archaeology has developed throughout the twentieth century in tandem with broader theoretical and methodological trends. Shared approaches with other disciplines (anthropology, biology, geography, geomorphology, and prehistory) have characterized some of the more recent large field survey projects. These have given equal weight to remains from all periods of human presence in a given landscape, documenting long-term processes of landscape formation and change.

Even when settlements consist of standing architecture, taphonomic processes may obscure the archaeological evidence or blur chronological

Rural Life in Islamic Archaeology, Fig. 3 Remains of the Nahr Dawrin canal, Syria (Image: Stephen McPhillips 2009)

definitions. In western Syria, tell sites are readily apparent in the landscape, whereas low-lying dispersed settlements, which characterize occupation from the Hellenistic period onwards, are frequently located in open areas away from the earlier tell sites and have undergone intensive agricultural use (Philip et al. 2002: 19-20). In the Byzantine and early Islamic past agricultural lowlands in the Mediterranean also underwent periods of sedimentation and soil deflation (dependant on their location), linked to overly intensive farming practices and deforestation of upland zones (Vita-Finzi 1969; Casana 2008). Ethnographic analogies can be usefully applied when interpreting archaeological data across the Near East. Studies focusing on the rural Islamic environment can produce particularly fruitful results, when modern subsistence strategies are compared with archaeological data, partly because of their close temporal proximity. Pastoral, agropastoral, and sedentary agricultural modes of existence in the Middle Euphrates valley in the 1980s were analyzed in conjunction with archaeological and archaeobotanical data from extensive survey. A diachronic model was then proposed demonstrating how access to primary resources changed through time in direct relationship to settlement patterns and geopolitical factors. The significant investment in hydraulic and agricultural infrastructure that took place here from the seventh century is apparent in the revitalized Nahr Dawrin canal, built in the Neo-Assyrian period, but maintained and flourishing through the Umayyad and Abbasid periods, when the region alimented the large urban populations of the Tigris and Euphrates valleys (Berthier et al. 2001: 32–78, 165–168; Kennedy 2011) (Fig. 3).

New possibilities for interpreting survey and excavation data are being explored using remote sensing methodologies, which are now being applied systematically in archaeological projects. Archaeological evidence of occupation and settlement is often first identified through desk-based analyses, synthesizing many different sources of data, such as satellite imagery, maps, textual, or ethnographic sources. This can be verified by visits on the ground or walkover transects where access allows. The benefit of ground survey is that the collection of surface material may permit the detailed characterization of site function and suggest chronological attributes. More complex approaches to the assimilation of landscape data have been attempted using GIS where these different data sources can be visualized simultaneously,

providing an overview of rural land use. Criticism of this methodology when applied to Islamic periods includes its lack of sensitivity to the recognition of temporary, ephemeral, or seasonal habitation, and it is therefore unsurprising that evidence for these forms of occupation is underrepresented in the archaeological record.

Other challenges are encountered when using material culture to interpret rural settlement and occupation patterns. The tendency to assign ceramic wares to dynastic periodizations, based principally on urban sequences, can sometimes result in an oversimplified classification of rural pottery assemblages and consequently produce chronological models of regional settlement and land use which contain artificial breaks and lacunae. A recurrent problem is posed by the recognition of cooking pots and food preparation vessels, storage, and water transportation jars, typically made in local centers. They are challenging to distinguish from one district to another, although regional trends are often apparent. The problem is compounded for the early modern era, concerning which archaeological research, especially in the rural context, has only really begun in the last twenty years. Along with the development of reference ceramic typologies, a deeper analysis of vernacular architecture is potentially one route forward, with work currently being pursued in both of these directions. A further useful avenue involves collaborative research with historians who work with archival materials. Most areas that came under Ottoman control in the sixteenth century were documented in court records, tax registers, as well as *waqf* (endowment) records, and in many instances, these contain details of rural land holdings and resources. One caveat is that many of the chronicles, treatises, and encyclopedia of the pre-modern era are written exclusively from the perspective of a literate urban elite.

Historical Background

The earliest archaeological survey of Islamic-period remains was unsystematic, focusing on monumental architecture, and was often driven by the search for locations or civilizations associated with biblical or classical history. Scholars such as Smith and Robinson made extensive travels and recorded many observations about villages and landscapes in the Near East, recounting rural environments that are vastly different today (Smith & Robinson 1841). Significant discoveries from Islamic periods were being made known to the western public in the early twentieth century, notably Musil's publication of the Umayyad bathhouse at Qusayr 'Amr in Jordan, while epigraphist van Berchem and the architectural historian Creswell systematically recorded Islamic monuments throughout the Middle East. The main focus of documentary work was on the fortifications and castles of the first Islamic frontiers or the crusades and counter-crusades of the twelfth and thirteenth centuries, while caravanserais linked to the hajj and postal networks saw detailed study in the Near East, Iran, and Central Asia.

Soviet archaeologists were active through much of the twentieth century in Central Asia, excavating at Islamic sites under the auspices of strongly centralized state institutions and within a Marxist theoretical framework. A notable feature of this work was the large "expeditions" and "complex expeditions," which analyzed many aspects of landscapes. For example, the South Turkmenistan Complex Expedition (YuTAKE) compiled extensive data about rural and desert environments, from the archaeological recording of architectural remains to ethnographic descriptions of twentieth-century populations and botanical, hydrological, and geological data. Tolstov's Khwarezmian Expedition also recorded multiple aspects of rural landscapes in the Amu Darya delta region of northwestern Uzbekistan. Rural Islamic society in this period was interpreted as essentially feudal, as in Tolstov's work at Kavat Kala, where a fortified citadel was interpreted as a center of power, and fortified dwellings in the surroundings as the estates of lesser landowners (for an overview, see Fedorov-Davydov 1983).

Large field surveys were also undertaken by expeditions in the Near East. Initially, the concern was the discovery of new archaeological

sites in the light of historical sources, but this shifted towards a more holistic exploration of the hinterlands of urban centers. Islamic-period landscapes and sites were secondary foci for much of this work, but as early as the 1930s in the Balikh valley in the Syrian Jazirah, Mallowan combined historical sources and nineteenth-century traveller's accounts with survey results. He argued for periods of environmental prosperity and degradation, corresponding to tight control of rural resources under Abbasid rule, and of disengagement by the Ottomans (Mallowan 1946: 113). Adams' Diyala basin project in central Iraq, the "Lands behind Baghdad," dated the extensive canal networks and settlements he documented by association with ceramic surface finds and recorded all periods of human occupation discernible in this landscape. Referencing the stratigraphic ceramic sequence he established at the site of Tell Abu Sarifa, he extrapolated a peak in settlement numbers in the Sasanian period, tailing off in the ninth century. Adams' evidence corroborated textual sources for the intensive irrigation of the agricultural plain, supporting the establishment firstly of Veh-Ardashir, the new Sasanian capital, followed by the great Abbasid cities of Baghdad and Samarra. He argued that the diminution in size of the irrigated areas corresponded to the rise of the new Abbasid cities, reflecting a degradation that might be linked to overexploitation of soils and overtaxation of its inhabitants and leading to a subsequent decline in their upkeep and in rural prosperity from the eleventh century (Adams 1965, 1970).

Field projects were now actively addressing Islamic periods as part of comprehensive landscape histories and new surveys undertaken from the 1980s in countries as diverse as the Morocco, Spain, the United Arab Emirates, Jordan, Syria, and Turkey looked directly at questions of settlements and land use in Islamic periods. The application of scientific survey and excavation methodologies, and the analysis of finds, has enabled Islamic archaeology to stand on its own merits, and subsequent work has revised a number of previously held assumptions. Until the mid-twentieth century, past Islamic societies were perceived by many western scholars in terms of social and economic decline. This is most strikingly apparent in the frequent interpretation of the geopolitical changes in the seventh century, the arrival of Islamic rule, as the collapse of a late antique order. Survey and excavation data was interpreted in these terms, and the extensive seventh century and later histories of late Roman and Byzantine village and agricultural life surviving in the Levant and parts of North Africa went unrecognized or were ignored in the archaeological record. It was only as more careful attention was paid to archaeological evidence for Islamic periods, often involving the reinvestigation of previously excavated sites and the revision of ceramic typologies, that abundant evidence for social and economic continuity from late antiquity to at least the tenth century became apparent in many parts of the Mediterranean. Such revisions have accompanied a gradual shift in perception of the Islamic world from the 1970s, with Said's *Orientalism* raising awareness of the pitfalls of an unreflective western view of the Islamic world. The development of postcolonial archaeology has taken into consideration local and global discourses about the past in an attempt to avoid giving dominance to western academic perspective (Said 1978; Gosden 2012). The *Annales* approach to history also influenced archaeological studies of the rural world, concerned as it is with different timescales of change, notably the most gradual, unfolding over centuries (the *longue durée*). Resilience theory, offering a multidisciplinary perspective on human adaptation and reaction to ecological cycles of change, has recently been suggested as ideally suited to exploring the archaeology of the rural environment (Redman 2005; Walmsley 2007: 146-147).

Methodological advances in archaeology after the 1960s have permitted deeper analysis of arid or hyperarid areas of the Islamic world, where water procurement is critical. Site and regional survey in the basaltic Hawran uplands in southern Syria and northern Jordan demonstrate the value in reexamining landscapes once considered marginal, revealing successful management of seasonal and perennial water resources. A range

Rural Life in Islamic Archaeology, Fig. 4 Islamic-period terraced hillside, Ohanes, Almería, Spain (Image: Ma. Teresa Bonet García & José María Martín Civantos)

of techniques were used for the storage and redistribution of ground- and rainwater, such as the sinking of wells along stream courses, the catchment and storage of rainwater, and the diversion of water into side channels and storage cisterns by means of check dams inserted across seasonal streams. The use of GIS to group data from many field projects reveals that the channels functioned over considerable distances, across a large area of the Hawran, and proved their sustained operation from the fourth millennium BCE to the early twentieth century CE. This hydraulic landscape seems most likely to have been maintained cooperatively at the local village level, rather than being more centrally organized (Braemer et al. 2009).

Geographical Range of Archaeological Work

Fieldwork investigating rural societies in Islamic periods has not been uniformly distributed, with Southeast Asia and West Africa only beginning to receive attention. The Iberian Peninsula has witnessed sustained growth in the study of Islamic archaeology after the reorganization of Spanish regions was completed in 1983. Studies of urban hinterlands and landscape surveys have since been undertaken in many areas (for an overview of key issues in Islamic archaeology in Spain and Portugal, see Boone 2009) (Fig. 4). Recent analyses of rural themes include the documentation of the development and modification of hydraulic networks under Islamic rule in Spain and the Balearic Islands (in particular see Kirchner 2009) and the recording of a large number of small fortified dwellings and agricultural estates located in rural areas (Bazzana et al. 1988). The study of material culture in the Vega plain, west of Granada, has more recently produced evidence of the complex processes of Islamic acculturation in the countryside (Carvajal 2013). In Portugal, work has demonstrated that while an expansion in rural settlement took place between the tenth and the twelfth centuries, an overall decline in the number of inhabitations may be linked to soil degradation (Boone & Worman 2007).

In North Africa, work during the twentieth century has focused on classical antiquity, but ethnographic studies of the rural world have also been well represented in Morocco and Algeria. Archaeological and historical studies of Islamic periods have begun to construct an overview of rural life across highly varied terrain, ascending from the coast to the high mountains and down into the fringes of the Sahara (for an overview, see De Meulemeester 2005).

Elsewhere in North Africa, more limited attention has been given to the Islamic rural world. Surveys of the hinterlands of cities such as Carthage and Leptis Magna have demonstrated continuity of rural population well into the Islamic period (see Leone & Mattingly 2004 for a synthesis). In Egypt, the high density of settlement and land-use continuity in the limited cultivated space of the Nile valley and Delta has rendered survey difficult, while much information was lost when Islamic remains were cleared from pharaonic sites such as Medinet Habu without being studied. There has been less documentation of Islamic rural life in southeastern Europe, although recent surveys in Sicily, Crete, and Cyprus have brought forward knowledge of how rural communities related to imperial administration and regional economies. Work in Cyprus has looked beyond sites to seasonal settlements, hydraulic systems, monasteries, and agrarian remains of the Ottoman period in the Troodos mountains, interpreting the connections between settlement, agriculture, and landscape in relation to historical source materials (Given 2000).

The Levant and the Arabian Peninsula figure large in the archaeology of the Islamic rural sphere, and it is here that since the 1980s research projects have been designed with an explicit focus on understanding Islamic rural economy and society. Much progress has been made in constructing regional material culture chronologies, which enable the development of nuanced diachronic regional models of rural life in varied landscapes. Particular foci have been the Euphrates River basin in Turkey and Syria, prompted in part by large dam projects, and areas of western Jordan and Palestine where research resources have been concentrated for historic reasons. The excavations of Khirbat Faris, and the surveys of the Karak Plateau, and Hubras region of northern Jordan have enabled the investigators to characterize later medieval rural settlement, investigating how village economies functioned and changed through time (Miller 1991; McQuitty 2005; Walker et al. 2007). The Jordan valley and Palestinian coasts have seen the excavation and survey of many smaller sites, providing insight particularly into the sugarcane industry which flourished between the thirteenth and fifteenth centuries and revealing how rural populations were impacted by the Frankish occupation of the region. In the Arabian Peninsula, substantial development in the same period has driven much new archaeology in the Gulf countries, and questions of rural subsistence in semiarid zones, involving the analysis of irrigation systems, have been paramount in work undertaken on Islamic-period remains. In Yemen and Oman, life in coastal, upland, and desert regions requires a range of highly adaptive responses to varied climatic and hydrological conditions. Modern agricultural lifestyles continue to employ traditional techniques here, ranging from the use of terraced field systems at higher altitude to carefully managed oasis agriculture and irrigation networks in lowland and desert regions (Wilkinson 2003: 186-195).

In Iran and Central Asia, rural archaeological studies have been strongly divided between those areas practising rain-fed agriculture and those which rely upon the seasonal fluctuations of major river systems or artificial irrigation. Of the latter, the *qanat* systems of the Iranian plateau warrant particular mention (Fig. 5). Although in many cases it is difficult to attribute their establishment to the period after the coming of Islam, many of these systems were maintained throughout the medieval and early modern eras, into the present day. Historical case studies acknowledge the changeability of urban trends and the pressure this exerts on rural production (Bulliet 2009: 1-16). This relationship is also vividly portrayed in the archaeology of the oasis settlements of Central Asia, where intensive, highly structured cultivation of fertile river-fed lands enabled small rural micro-systems to evolve around major urban centers. The geography of Afghanistan presents an interesting challenge to rural models as the impassable mountains of the Hindu Kush brought forth altogether different approaches to agricultural production. Here, settlements nestled in the fertile valleys were as much dependent on the extreme continental seasonal variability as those in desert lands, giving rise to fluid and often

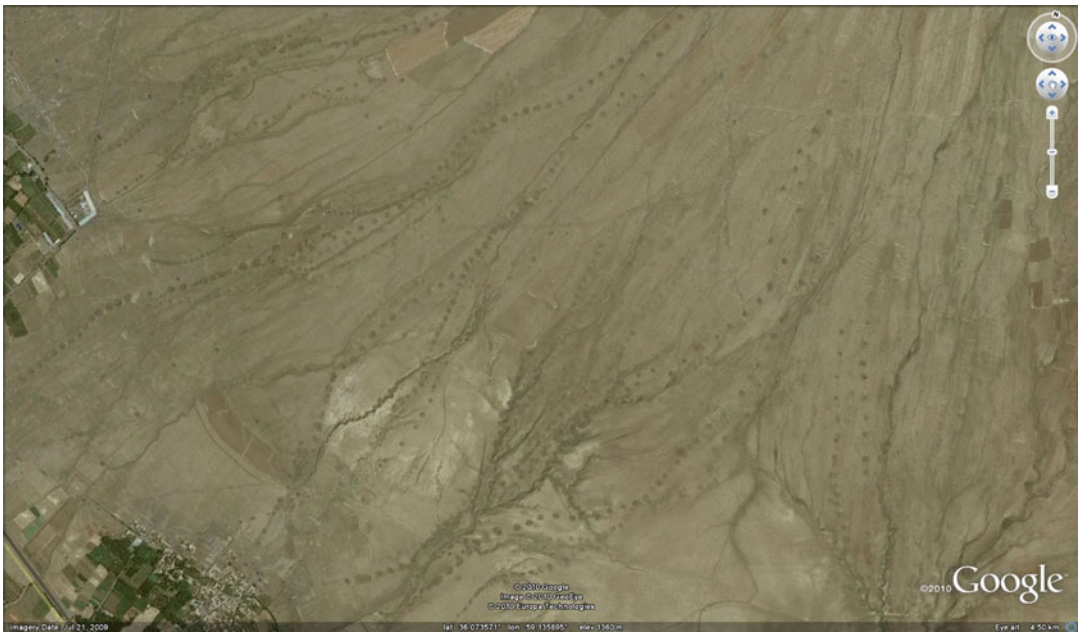

Rural Life in Islamic Archaeology, Fig. 5 *Qanat*s, Nishapur, Iran (Image: © 2010 Google © 2010 GeoEye © 2010 Europa technologies)

mobile rural communities (Thomas 2008). Comprehensive studies such as that undertaken by Ball highlight the potential for analyses across this landscape of extremes, but recent political conditions mean that systematic ground survey is lacking, and more remote rural areas remain underrepresented and poorly understood (Ball 1982).

Key Issues/Current Debates

A range of issues of critical importance to the understanding of past societies has been raised by current archaeological research on the rural world of Islamic periods. The relationship between societies and the environment is foremost, given the potential that study of the Islamic past has for incorporating historical and ethnographic data into archaeological studies. Evidence for environmental change in many areas of the Mediterranean has been detected from late antiquity well into the early Islamic period, with sedimentation of river valleys, soil degradation, and deforestation of upland areas part of a linked chain of processes influenced directly by agricultural and timber procurement practices. For later Islamic periods, isotope and pollen analyses have been used to construct models of colder more arid periods between 900 and 1150, and 1500 and 1650, both in the eastern Mediterranean and Central Asia, using a range of archaeological evidence. Such evidence feeds into broader discussion of social and cultural phenomena, linking rural life to geopolitical change and to ongoing global issues of climate change and sea and lake level fluctuation, as seen, for example, with the degradation of the Aral Sea in Central Asia (Sorrell et al. 2007).

The excavation of more rural sites, the establishment of solid regional material culture references, and the collection of more refined survey data in hitherto neglected regions now allow more subtle interpretations of settlement patterns and landscape use. Work at Khirbat Faris in Jordan has demonstrated that smaller rural sites could enjoy long-term stability based on agricultural activity, exhibiting evidence of integration with urban centers. Architectural units at Khirbat Faris were in use over many centuries, and the excavator

Rural Life in Islamic Archaeology, Fig. 6 Al-Banjukiyya Watermill, Orontes river, Syria (Image: Stephen McPhillips 2009)

suggests that seasonal or permanent occupation is likely to have continued after the sixteenth century, significant given the argument advanced by many scholars that settlement of rural areas of the Levant was then undergoing a major decline. Another current issue is the acculturation of rural populations. The careful analysis of material culture can reveal shifts in technical practices and stylistic choices through time, reflecting regional geopolitical developments. In Spain, this was manifest in changes in irrigation and ceramic technologies, while in the Levant the rural economy underwent a slow tilt away from being centered on a predominantly Mediterranean axis towards having stronger connections with Iraq. In northern Syria and Iraq, survey has corroborated textual evidence for investment in rural areas by the state, and the countryside saw the large-scale redevelopment of irrigation networks needed to support sizeable new urban foundations. Archaeobotanical (botanical, weed-flora, soil composition, pollen, and phytolith analyses) and zooarchaeological studies are at the core of a significant development in the study of Islamic rural life, the study of biological data. While Watson's thesis of an influx of new crops into the central Middle East alongside the arrival of Islam has not been corroborated by this research, many other indications of changes in agricultural regimes can be detected. An important botanical study in the Middle Euphrates valley suggests an importation of sophisticated new irrigation and agricultural regimes in the Umayyad period, continuing until the end of the fourteenth century. Characterized by both winter and summer planting seasons, a wide range of crops was grown in soils prone to degradation and salination (Watson 1983; Samuel 2001).

The rural Islamic world in the archaeological record is complex and changeable and should not be characterized in either positive or negative terms with regard to earlier or later societies. Nevertheless, as studies of archaeological and textual data progress, a picture of economic dynamism and close links to urban society both emerge as frequent themes. Centralized investment is apparent; irrigation development and land redistribution requiring massive investment in human resources and long-term upkeep were undertaken on the state level. Hydraulic technologies underwent major advances in the Islamic world, and in large parts of the former Ottoman Empire, in Iberia and Iran, agricultural products were processed using locally adapted water milling systems, often relying on limited seasonal water supplies (Fig. 6). Combined with the study of archival sources, studying the remains of rural technologies provides rich data about early

modern economies. One new crop that has been significant in this regard is sugarcane, and significant evidence has emerged of the hydraulic organization, both in terms of water supply and milling operations, required behind its massive cultivation in the microclimate of the Jordan valley (Kaptijn 2009). Hydraulic infrastructure and hydraulic energy use could be conceived and managed much more locally, calling to mind the example of the evidence from the Hawran. Artisanal production in the rural setting is one further related area of current archaeological enquiry. Ceramic, glass, and metalworking activities have all been documented at large scales in nonurban settings, indicating a perhaps surprising degree of integration between rural production and urban consumption. New evidence is emerging for expanded mining activities in areas as diverse as Portugal, Jordan, and Iran. As further methodological advances continue to be applied, it is hoped that geographic areas that are currently neglected by scholarship will be able to be examined, building a fuller picture of Islamic rural life. It is significant that the field is attracting new interest from scholars living in the countries concerned, often facing the enormous difficulty of preserving a disappearing rural archaeological heritage in the face of pressing modern economic realities. The destruction of remains is exacerbated when settlements and features are widely spread throughout the landscape, rather than in those areas where sites are highly concentrated. The collection of ethnographic data is now difficult in many parts of the world as traditional agricultural practices and rural traditions slowly disappear, but ways can be found to make this heritage relevant and beneficial to local populations. Initiatives in Wadi Dana in Jordan and at Ovakent in Turkey consider the economic needs of local communities by encouraging sustainable heritage tourism in projects conceived and run by specialists from the regions themselves, while the Turquoise Mountain Foundation seeks to foster traditional artisanal techniques in post-conflict rebuilding in Afghanistan (Coburn & Svensson 2010; Steen et al. 2010: 174-176; Bayazitlioglu 2012). Most landscapes of the Islamic past are living landscapes today, with active economic roles in their respective societies. For that reason, gaining access to the archaeological information they contain can be especially challenging, but the complex interplay between the past and the present is also a greatly rewarding field of enquiry.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Archival Research and Historical Archaeology
- ▶ Bioarchaeology: Definition
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Ethnoarchaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Heritage Landscapes
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
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- ▶ Religion in Islamic Archaeology
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Ruralia: The Jean-Marie Pesez Conferences on Medieval Rural Archaeology

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Basic Information

Ruralia is an international association for study of the archaeology of medieval settlement and rural life. The archaeology of rural life is an important issue, precisely because in medieval and early modern times the majority of the population lived in rural settlements. The *Ruralia* association thus promotes research on such diverse topics including the nature of settlements, environment and landscape, economic systems (e.g., handicraft agriculture, the distribution of food), houses and other farm buildings, hierarchies, and other social dimensions. The temporal range of these covers the early medieval ages up to postmedieval times (500–1700 CE).

The association is an international European society. At present 19 countries are represented: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Grand Duchy of Luxembourg, Great Britain, Hungary, Ireland, Italy, Norway, Russia, Slovakia, Spain, Sweden, Switzerland, and the Netherlands; some of the representatives of these member states also represent other southeastern European countries and eastern and western Mediterranean countries. Further countries are welcome to join the association. The coordinating body of *Ruralia* is the Ruralia Committee, which is made up from national representatives of all participating countries, led by the president and an executive committee. The first president of the association was Jean-Marie Pesez (1929–1998), and further presidents were Alan Aberg and Johnny de Meulemeester. Currently, the association is led by Haio Zimmermann.

Major Impact

The association hosts biennial conferences across Europe in one of the participating countries. These provide a forum, especially for younger researchers, for presentation of new research and more general discussion of the full range of topics of interest to the association. The conference languages are English, French, and German. The first conference was held in 1995 in Prague (Czech Republic) followed by conferences in Spa, Belgium, 1997; Maynooth, Republic of Ireland, 1999; Bederkesa, Germany, 2001; Lyons, France, 2003; Dobogókö, Hungary, 2005; Cardiff, Great Britain, 2007; Lorca, Spain, 2009; and in Götzis, Austria, 2011. The next meeting will be in Smolenice, Slovakia, in 2013. The conference papers are published as edited proceedings, of which eight volumes are now available and listed on the association's website (www.ruralia.cz), where further information can also be found.

Cross-References

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► Deutsche Gesellschaft für Archäologie des Mittelalters und der Neuzeit e.V. (DGAMN)

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Russia: Management of Archaeological Heritage

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Introduction

General Principles of Protection of Cultural Heritage in the Russian Federation

For Russia, the preservation of archaeological heritage means, firstly, the preservation of the 50,000 archaeological sites that are officially registered as archaeological heritage, and secondly, the preservation of an immeasurably larger number of archaeological sites that have not yet been put on record or remain undiscovered and so have not been scientifically described. Protection of archaeological heritage in Russia is of particular significance, because the period of recorded history in this part of Eurasia began much later than in many other areas of the Old World, and archaeological materials are thus the sole or main source for the reconstruction of historical processes until the Middle Ages, and in many parts of the country, until modern times.

The public authorities for cultural heritage protection are the Ministry of Culture of Russia and its regional offices in the administrations of the Russian Federation (committees, management, departments). The regional administration (committees, centers, inspection) carries out state control, registration, protection, and use of historical and cultural monuments in the administrations of the Russian Federation. In accordance with the legislation that underlies the whole system of protection of historical and cultural heritage in Russia, only identified archaeological sites assessed to be valuable historical and cultural sites, ensembles, or systems can be listed for cultural heritage protection by public authorities. Russia has no single inventory of historical and cultural lands, including the diverse archaeological heritage, which is consistent with other codes (e.g., land, water, forestry).

However, more recently, a new factor in the destruction of archaeological heritage has quickly come to the fore. A wave of poaching has swept Russia, throwing on the shelves of antique stores thousands of rare finds. Illegal production of antiquities has become a well-established profitable trade, which involves hundreds of people. Also the European Convention on the Protection of the Archaeological Heritage was ratified by the Russian Government in June 2011.

Definition

Each national tradition in the field of cultural heritage has its own special terms. The basic terms and their definitions commonly used in Russia are discussed below.

Archaeological heritage is a kind of cultural heritage that includes settlements, burial mounds, the remains of ancient settlements, camps, fortifications and military camps, facilities, irrigation, paths, graves and places of worship, megaliths, rock art, sites of historical cultural layer of fifteenth to nineteenth century, ancient battle fields, and remnants of the ancient life of prehistoric people.

Objects of the archaeological heritage are a special type of real estate containing identified cultural heritage sites and are the exclusive property of the state. The objects of the archaeological heritage and land (or part of a water body, within which the object is located) in the legal turnover are separated.

Historical Background

Historical and Cultural Heritage as a Matter of State Regulation

Archaeological sites of Russia were first mentioned more than 300 years ago in connection with the development of Siberia when the Russian government began the search for ways to Eastern Asia. Thanks to a decree of Peter the Great in 1721, antiquities became a matter of national importance, and the foundations for research and scientific collections were laid. In the first months after the 1917 October Revolution, there was a series of historical events in the area of public policy with regard to historic heritage. Preservation of heritage was completely subordinated to the Ministry of Culture, and funding was provided by the residual principle, not nearly enough to solve the simplest problems. By the mid-1990s, there were signs of growing crisis in all spheres of Russian society, and there were radical changes in the field of heritage protection in general such as the development of state programs to protect cultural and archaeological heritage, including developing a series of legislative acts, a system of government protection and use of historical and cultural heritage, and the establishment and development of educational programs. Today, state protection of historical and cultural sites (including archaeological heritage) encompasses the legal, institutional, financial, information, and other measures taken by the state to identify, record, study, develop historical and cultural expertise, establish boundaries and territories of historical and cultural objects, and control their conservation and use.

Modern Legal Situation and Problem

Management of archaeological heritage in the territory of Russia is regulated by the RF Presidential Decree "On Particularly Valuable Objects of Cultural Heritage of Russian Federation Peoples" (1992) and RF laws "On Culture" (1992) and "On Objects of Cultural Heritage (Historical and Cultural Sites) of Nations of the Russian Federation" (2002). These regulations should form a legal basis for management of movable and immovable historical and cultural values. The RF Law "On Museums and Museum Funds" (2002) regulates management, restoration, and conservation of movable values; the RF Law "On Territories of Traditional Nature Management of the Minority Peoples and Other Ethnic Communities of the North, Siberia and the Far East" provides the legal foundations for setting up territories of traditional nature management, as well as environmental, historical, and cultural heritage.

Archaeological works of different complexity should be conducted in conformity with the "Regulations on Open Lists" authorizing archaeological excavations.

These regulations should form a legal basis for management of movable and immovable historical and cultural values. However, in the judgment of many experts, the laws are incomplete and in need of subordinate legislation and adjustment in accordance with international legislation.

In the last few years, transformation of socioeconomic and political conditions of development of regions of Russia, especially Siberia and the Far East, raised additional problems concerning the protection of archaeological heritage. Socioeconomic problems, weak legislation, and an increasing crime rate have led to the growth of "black archaeology." In addition, numerous archaeological sites suffer from unfavorable ecological conditions and natural factors in zones of continental climate (e.g., wind erosion, floods, and mudflows).

Key Issues/Current Debates

Protection of Historical and Cultural Heritage in the Conduct of Business

The main challenge for Russian heritage managers is to expand their understanding of the term "object of cultural and historical heritage" to facilitate fundraising for the maintenance and restoration of numerous archaeological sites and to help integrate heritage management into the economic cycle. In Russia, we can now mark:

- Privatization of monuments (historical places, archaeological sites), imposing burdens on private property owners

- Development of cultural and tourism and the creation of heritage-based tourism products and brands
- Sales of the "aura" of historical and cultural heritage, when the attractiveness of historic districts is used to increase the value of new property

Therefore, if we talk about successful regeneration of heritage sites, as a rule, these methods are used in combination.

Historical and Cultural Examination

The first academic expeditions (1724, 1733–1743, 1768–1772) aimed at investigation of natural resources of Siberia were commissioned to "gather information about different rarities and antiquities." Researchers and explorers, members of the first Russian academic expeditions (D.G. Messerschmidt, F.I. Stralenberg, G.F. Mueller, P.S. Pallas, and others), and political exiles ("Decembrists" and members of the "Narodnaya Volya") collected rather extensive stocks of historical and ethnographical evidence. In the nineteenth century, research priorities were established for the departments of the Russian Geographical Society and, since the 1870s, the Russian Archaeological Society.

The existing system had several significant shortcomings. In particular, huge archaeological researches in the USSR were not provided with the proper degree of resources or personnel. At the same time, full archaeological mapping remained a matter for the distant future, and protection of archaeological heritage was a task of unimaginable scale. The only possible way out of this situation could be the ongoing development of existing and establishment of new regional centers.

Today more than 200 organizations are doing research in the study and conservation of archaeological heritage in Russia. The main research organizations are the Institute of Archaeology RAS, the Institute of Archaeology and Ethnography of SB RAS, the Institute of History of Material Culture RAS, and the Institute of Cultural and Natural Heritage.

Privatization and the Stewardship of Cultural Heritage

The 2002 Regulations of the Government of the Russian Federation allowed the privatization of historical and cultural heritage with the obligations of stewardship placed on the owner. According to Article 50 of Federal Law N73, objects not subject to privatization include monuments and ensembles that are included in the UNESCO World Heritage List; especially valuable objects of cultural heritage of the Russian Federation, which are included in the state list of the most valuable objects of cultural heritage of the Russian Federation (the list № 1487 "On the most valuable objects of cultural heritage of the Russian Federation"); historical and cultural reserves; and sites of archaeological heritage. Thus, the archaeological heritage is completely excluded from commercial traffic and is the exclusive property of the Russian state.

Archaeological Heritage of Russia

The earliest evidence of archaeological cultures in Russia dates to the Lower Paleolithic. The material can be divided into major archaeological provinces, where different objects characterize different local areas – archaeological microdistricts. The main areas of concentration of Paleolithic sites are the territory of the Russian Plain, the Caucasus, the Sayan-Altai district, Transbaikalia, and Yakutia. Notable objects include Kapova Cave in the Urals, a complex of sites in the area Kostenki, Sungir and Avdeevo in Russian Plain, and Malta and Buret in Siberia are examples of Paleolithic art. Denisova Cave in the Altai Mountains represents an opportunity to observe continual development of human culture for more than 300,000 years. Mesolithic and Neolithic times are represented by short-term sites and large necropolises of 200–300 burials, indicating the development of cultures of hunters and gatherers in post-glacial era. A number of archaeological cultures have been identified – the Dnieper-Donets, Lyalovskaya, Kama and Volgokamskaya, Kitoyskaya, Syyalahskaya, Voznesenovskaya, and so on. The era of metal is a crucial time-related change in cultural and

economic types, with an almost universal shift to producing forms of economy – agriculture and cattle breeding and development of metallurgical provinces. The archaeological culture of the Bronze Age – Early Iron Age – is associated with earlier ethnic entities. Groups include the Scythian-Siberian culture, Prebaltic and Baltic cultures, Finno-Ugric culture, Ural-Siberian culture, Huns, hunter-fishers of the East Siberian taiga, early Eskimos, the Okhotsk cultural and historical area, and the Far Eastern culture. Different levels of development have left us with unique pieces of ancient cultures, such as burial mounds (the largest includes Turbino, Pelenger, Sintashta, Andron, Karasuk, Koban, Pazaryk, and Tashnyk), fortified settlements (Archaim, Chicha, Ivolginsk), monumental art, and cave paintings. The Middle Ages – the time of formation of ancient states – produced the Turkic, Uygyrsky, Kyrgyz and Hazar kaganates, Kievan Rus, Volga Bulgaria, and the Mongol Golden Horde. In Russia, many of the cities are known for showing the development of crafts, architecture, temple construction, and building authorities. World-famous ancient Russian cities include Novgorod, Staraya Ryazan, Chernigov, and Pskov; cities on the Volga river in Bulgaria include Bilyar and Suvar; Mongolian cities and settlements include Saray, Tsarevsky, and Hadji-Tarhan.

Large-Scale Archaeological Rescue Work

In Russia, rescue archaeology has been undertaken for more than 80 years. In 1927, archaeologists began to study the archaeological sites in the flood zone of DneproGES (hydroelectric power station on Dnepr River). In 1929, the first expedition of GAIMK – Volga-Don was organized. In 1934, it was accepted by the Executive Committee and SNK that construction funds should be allocated to the excavation of archaeological sites to be destroyed by development. This made it possible to organize archaeological work in the construction of several power plants, the Volga-Don canal, as well as in the construction of the Moscow Metro. After World War II, rescue of archaeological work continued with the establishment of power stations on the Volga, the Yenisei, and the Angara and the development of the agricultural systems in southern Russia.

Today the development of the gas and oil industry, power complexes, and highways in Siberia and the Far East is of geopolitical importance for Russia. Transcontinental oil and gas pipelines, development of power complexes (e.g., Katun and Boguchan hydroelectric power stations), modernization of throughways and building new infrastructure, as well as a private housing "boom," require adjustment of legislation and government control over the discovery and protection of cultural heritage, an increase in the number and quality of specialists involved in the assessment of threats, and monitoring and salvage of the objects of historical and cultural heritage located within development sites.

Public Organizations of Protection of Archaeological Heritage in Russia

At the present time in Russia, a number of different public organizations have emerged in connection with the formation of civil society. They have a significant impact on decision making in public bodies, including the protection of cultural heritage. The Archaeology Fund was established in 2004 as a noncommercial organization but has been actually functioning for almost 20 years. The establishment of the Archaeology Fund was a logical next step for ordinary people to help serve science.

The growing activity and importance of nongovernmental organizations involved in the protection of cultural and historical heritage of Siberia and the Far East is worth noting. The most effective are such organizations as the interregional movement "Siberian People's Council," the association "Cultural Tourism in South Siberia," the Federation of "Internet-Education," the Association of Culture Managers, and the funds "The Cultural Heritage of Siberia," "Society of Historical Archeology," and "ArcheoWorld." The main attention is paid to holding forums, festivals, and conferences, the development of cultural and scientific tourism, providing information about excavation, the organization of tours, and work with mass media.

Protection of Objects of Archaeology

Information support for management of cultural heritage, including discovery and inventory of archaeological heritage in the regions of Russia as well as for the development of schemes, cadastres, registers, and databases enabling consideration of historical and cultural potential of the territory, forms the basis for resource management in programs and projects concerning territorial objects or national parks, reserves, and protected territories.

The step beyond information support is to create museums for objects of archaeological heritage and to organize a series of archaeological parks. Today there are still only a few examples of museums at archaeological sites and of archaeological parks. Examples of archaeological parks include "Archaim" in the Chelyabinsk region, "Tomsk Pisanytza" in the Kemerovo region, "Crossroads of the Worlds" in the Altay region, and "Batakovo" on the Irtysh River. There are other famous projects, such as the "Archaeological Park in Moscow – Mitinsky Park," which includes 30 archaeological sites, and the "Park of Dolmens" on the lower River Jane (Krasnodars region, Couscous). The publicly organized "Taman" Archaeological Center has realized two projects, "Protection of Archaeological Memorials" and "Saving Ghermonassa Necropolis."

International Perspectives

UNESCO Activity in Russia

At present, about 50,000 archaeological objects of federal importance are registered in the territory of Russia. UNESCO World Heritage Sites in Russia make up 2.6 % of the total, and only 12 archaeological sites are on the list of objects.

In the territory of Siberia and the Far East, a number of large-scale UNESCO and ICOMOS network projects in protection of historical and cultural heritage are currently under way. The most known are "UNESCO Associated Schools" (Omsk), "Museum Compass of Siberia" (Barnaul), "Dances of Nations of Siberia," and "Information for All."

Several large state universities (e.g., Moscow, Novosibirsk, Altai) have founded UNESCO international chairs to study problems in cultural heritage, archaeological and ecological education, and problems of the minority peoples of the north.

International Archaeological Heritage Preservation Projects in Russia

Russia supports intensive international contacts in the field of archaeological heritage, especially through scientific projects. In addition, international cooperation in the protection of the archaeological heritage of Russia is implemented through a series of joint research projects, institutions of the Academy of Sciences, state universities, and individual research teams with colleagues from France, the USA, Canada, Germany, South Korea, Japan, and other countries. The largest international projects in cultural and scientific tourism which include Russian territories are "The Great Tea Road" and "China–Mongolia–Russia: Dialogue of Civilizations."

Future Directions

Information Resources in the Management of Historical and Cultural Heritage

Work on an inventory of historical and cultural sites in the territory of Russia is still in its developmental stage. Available resources can be divided into the following structural and thematic categories:

Information storage and retrieval systems, such as the "Museums of Russia" server, which contains links to the Internet sites of Russian museums and mobile exhibitions. Other systems include the catalogue of socioeconomic and humanitarian Web resources of the Irkutsk Interregional Institute of Social Sciences, which encompasses online catalogues of scientific and educational Web resources, the "Siberian Zaimka" and "SIBIRICA" data retrieval systems, and the museum portal "History and Culture of Siberian's and Far East Peoples."

Thematic Catalogues of Sites and Collections of Central Russia, Ural, Siberia, and North and Central Asia

Not all museums have electronic catalogues of archaeological collections as yet. We can get on summary information on collections in major museums – the State Historic Museum, Hermitage, Kunstkamera, Pushkin's Museum, and so on – which comprise several million archaeological artifacts. But there are some other sources, such as the catalogue of "Stone Sculptures of Altai" representing more than 300 sculptures of the Ancient Turkic Period, a virtual museum (digital collection) called "History and Culture of Nations of Northern Asia" which has a database and virtual museum of ethnographic collections of Siberian nations being created, catalogues of Novosibirsk State University's virtual museum "Ancient Art of Siberia," and the Information Center "Trade of War of Siberian and Central Asian Peoples."

Joint catalogues of regional museums of Russian cities, such as the "Catalogue of Rare and Valuable Museum Artifacts from Regional Museums of the Omsk's Oblast," the "Tomsk Regional Museum of Local Lore" presenting unique collections, and the "Archaeological Heritage of Karelia."

There is also the Web portal "Archaeology of the Russian Federation," the main objective of which is the preservation and maintenance of emerging Internet information in archaeology, history, ethnography, and related historical disciplines.

Popularization of Archaeological Heritage

Academic scientific organizations of the Russian Academy of Science possess rich archaeological, ethnographical, and paleontological collections, parts of which are exhibited at permanent expositions of the "Historical and Architectural Open-Air Museum" and the "Museum of Archaeology and Ethnography of Siberian Peoples." The catalogues of a few virtual museums have been created on the basis of these collections. Materials of some archaeological and ethnographic expeditions have been exhibited throughout Europe, in Asia, and also in Australia.

Features of Modern Legislation for the Protection, Utilization, and Conservation of Cultural Heritage

Local communities take measures to protect historical and cultural heritage, but these measures are restricted to territories of traditional land use or places inhabited by ethnic groups and sacral and clan territories. In our opinion, it is advisable to develop a complex of measures related to legislation, organization, information, and recreation at the level of government regulation, through local government and in scientific and cultural communities, so the most important tasks are:

1. Information support for management of cultural heritage, including discovery and inventory of archaeological heritage in all regions of Russia as well as for the development of schemes, cadastres, registers, databases enabling consideration of the historical and cultural potential of the territory as a basis for resource management in programmers and projects aimed at territorial objects and/or national parks, reserves, protected territories, and so on.
2. Monitoring of cultural landscapes on macro level and at the level of individual objects of historical and cultural value. Studies of ethnic differentiation, traditional land use, and economic development of cultural complexes (in the context of the Durban Declaration).
3. Development of property aspects of historical and cultural heritage management on the level of territorial and local administration. Strong regulation of town planning and other forms of economic activity is needed.
4. Maintenance of a common information network of educational institutions, libraries, museums, and archives as a key component for improving the access to information and knowledge.
5. Development of practical strategies, technologies, and new models for enhancing the historical and cultural potential of territories with consideration of geopolitical, economic, scientific, and cultural factors.

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Sabloff, Jeremy Arac

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Basic Biographical Information

Jeremy Arac Sabloff is a leading anthropological archaeologist, specializing in the comparative study of cities and urbanism with a focus on the ancient Maya. His work is characterized by an intellectual commitment to balancing science and humanism. Born in 1944, he grew up in Manhattan. He received his B.A. from the University of Pennsylvania in 1964 and his Ph.D. from Harvard University in 1969 under the direction of Gordon R. Willey. He has taught at Harvard University, the University of Utah, the University of New Mexico (where he was chair of the department), the University of Pittsburgh (where he also was chair), and the University of Pennsylvania where he was Christopher H. Browne Distinguished Professor of Anthropology. At Penn, he also served as the Williams Director of the University of Pennsylvania Museum from 1994 to 2004 and Interim Director from 2006 to 2007. He is currently the president of the Santa Fe Institute in Santa Fe, New Mexico (Fig. 1).

Sabloff has held or currently holds many influential positions in the profession. He has served as president of the Society for American Archaeology, chair of the anthropology section of the American Association for the Advancement of Science, chair of the Smithsonian Science Commission, and editor of *American Antiquity*. He is a member of the National Advisory Board of the National Museum of Natural History and the Board of Trustees of the SRI Foundation and chairs the visiting committee for the Peabody Museum at Harvard University. He is the recipient of numerous professional awards and honors. Among the most prestigious of these are his memberships or fellowships in the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, the Society of Antiquaries of London, and the American Association for the Advancement of Science.

Major Accomplishments

Sabloff is a specialist in Maya archaeology and has made major contributions to the understanding of settlement and urbanism. As a graduate student, from 1965 to 1968, he joined Gordon Willey's project at Seibal, Guatemala. His main focus was the study of ceramics. From 1972 to 1973, he and William Rathje developed the Harvard-Arizona Cozumel Project in Quintana Roo. In the course of two field seasons, they studied approximately 30 sites in order to understand the role of long-distance trade in the development of Mesoamerican states. Although the project results did not support the port-of-trade model, the research provided an important new perspective on the Late Postclassic Period.

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Sabloff, Jeremy Arac, Fig. 1 Jeremy Arac Sabloff (InSight Foto Inc.)

From 1983 to 1988, he and Gair Tourtellot established a long-term project at the site of Sayil in Yucatan, Mexico. This project investigated for the first time the archaeology, environment, adaptation, organization, and history of an entire Maya city in the Puuc region of Yucatan.

Sabloff is equally well known for his contributions to the history of American archaeology. His overview of American archaeology, coauthored with Willey, was the first comprehensive history of the field. Significantly, they provided an intellectual genealogy for the rise of the new or processual archaeology by identifying four broad periods: Speculative (1492–1840), Classificatory-Descriptive (1840–1914), Classificatory-Historical (subdivided into Chronology (1914–1940) and Context and Function (1940–1960)), and the Explanatory (1960–present) (Willey & Sabloff 1974, 1980). Some of the important trends that they identified were the growing emphasis on evolutionary thinking, general systems theory, ecological models, and deductive reasoning in the context of making archaeology more scientific. They also argued that the new archaeology was not a revolution in the Kuhnian sense. Rather, it signaled a field in crisis yet to coalesce around a single theory. In their most recent edition (Willey & Sabloff 1993), they emphasize the importance of avoiding dogmatic thinking in method and theory and of acknowledging that the scientific and humanistic goals of the discipline are complementary rather than antithetical.

Sabloff has made numerous contributions to archaeological method and theory. He published with Willey an influential essay on the importance of history to processual explanation and argued that the Classic Lowland Maya collapse was due to an invasion of non-Maya peoples (Sabloff & Willey 1967). This essay was subsequently critiqued by Lewis Binford for not putting hypothesis testing first. In 1978, Sabloff joined the faculty of the University of New Mexico where Binford was teaching. At this time, he was focusing on the role of simulation in archaeology as a tool for understanding settlement change (Sabloff 1981). Team teaching with Binford led to an influential essay on paradigms and systematics that concluded with a plea for a "science of the archaeological record" (Binford & Sabloff 1982; Sabloff et al. 1987). Sabloff is committed to the comparative method to draw out insights about culture history and process. He coauthored a book on the rise of New and Old World civilizations with C. C. Lamberg-Karlovsky (Lamberg-Karlovsky & Sabloff 1979; also see Sabloff & Lamberg-Karlovsky 1975). A more recent example is his book on ancient cities coedited with Joyce Marcus (Marcus & Sabloff 2008).

Finally, Sabloff is an outspoken advocate of the role of archaeology in the modern world and avid proponent of science communication. As the Williams Director of the Penn Museum, he eagerly embraced the challenges of educating the public about anthropology and archaeology. He published his book *Archaeology Matters* (Sabloff 2008) to demonstrate how archaeology contributes to the understanding and amelioration of present-day problems. Using his research on ancient Maya civilization as an example, he noted that the collapse of Classic Period Maya civilization provides important insights into such contemporary issues as overpopulation, shortsighted agricultural policies, and political competition. In 2010, he delivered the distinguished lecture at the American Anthropological Association's annual meeting, encouraging anthropologists to make their work accessible to their relevant publics and cultivate a new generation of scientist communicators (Sabloff 2011).

Cross-References

- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Mesoamerica: Complex Society Development
- ▶ Science Communication in Archaeology
- ▶ Willey, Gordon Randolph

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Sacred Site Conservation and Preservation

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Introduction

Sacred sites are widely considered to be different from other forms of archaeological sites and

cultural heritage in that they represent and are imbued with sacred or spiritual values by a religion, the adherents of a specific faith, or a group of people in the past or the present. In that respect, sacred sites are among the world's most popular visitor attractions (Shackley 2001) while religious heritage in general is estimated to constitute "perhaps the largest single category of heritage property to be found in most countries around the world" (Stovel 2005: 2). Because of their tangible and intangible associations and meanings and their potential active use for religious or other purposes, sacred sites demand particular attention, and their conservation and preservation often requires special treatment and sensitivity.

Definition

The popularity of sacred sites within the wider heritage industry can threaten their physical integrity, impose changes or impact their contemporary use. At the same time, the contemporary principles of conservation and cultural resource management, that demand preservation for present and future generations, can often advocate interventions and operational strategies that may seemingly compromise the very essence of a sacred site: its sacred or living heritage value and its use by traditional custodians or the people who value it. Therefore, when dealing with this specific type of heritage, archaeologists and other heritage professionals have great responsibility in recognizing both the human dimension of the site in question and the immaterial values it holds.

Key Issues/Current Debates/Future Directions/Examples

There is a very broad range of places that can be termed sacred sites and the differences relating to the geographical location, the antiquity, the size, the cultural and social affiliation, and other special characteristics may be enormous. One common way to categorize these numerous sacred sites is by distinguishing those that are today actively used by a living religious tradition or a group of people for religious or spiritual purposes (e.g., active churches, mosques, temples, monasteries, sites constituting or associated with pilgrimage destinations) as opposed to those that were valued for their sacredness or other intangible values in the past but are not religiously active in the present (e.g., the megalithic monuments of prehistoric Europe or the temples and sanctuaries of Ancient Greece and the Roman Empire). The latter share more similarities to historical monuments or sites with primarily archaeological value. However, in countries such as Greece, it has been argued that the importance of monuments that have served in building and consolidating national consciousness and identity, such as the Parthenon temple on the Acropolis hill in Athens, is subject to a certain form of sacralization (Hamilakis & Yalouri 1999). Even sites associated with long gone cultures or civilizations that archaeologists may consider "dead" can become a contested space and may be appropriated by groups of people that claim to continue old religious traditions, as witnessed in the case of the pagan/neo-shaman worshippers (Blain & Wallis 2007). It is also important to consider, when thinking of the spectrum of examples that the term sacred sites can encompass, that for certain cultures a sacred site may be a landscape thus emphasizing the role of the natural environment in this process – with Aboriginal Australian notions with regard to living landscapes a case in point (Colley 2002). In addition, there are also places such as holocaust sites, war memorials, burial grounds, or political shrines that are vested with certain holiness and religious undertones (Shackley 2001: 155–174). These places, although secular in character, can also be viewed as sacred by specific groups of people.

What becomes evident from the aforementioned range of examples is that, whether belonging to the major world religions or to the individual sacred traditions of indigenous people and descendant communities, dealing with sacred sites also means dealing with the people who value them. Without doubt, sacred sites have always posed certain challenges and problems to archaeologists and heritage professionals that

have strived to conserve and preserve them. Indeed, approaches to the conservation of sacred sites, in order to balance both tangible and intangible values, need to carefully consider issues related to different definitions of sacredness, ownership, right to worship, public access, and the wider meanings and associations placed by stakeholders on a local, regional, national, and international level. Active sacred sites that are valued as cultural heritage present additional complexities because they carry with them the requirements of contemporary life and cooperation among heritage professionals and religious communities can become particularly complex if the worldviews and consequently the aspirations and expectations towards any given intervention are different. Such examples truly demonstrate the difficulties in bridging modern secular standards of conservation and heritage management with traditional ways of life and faith.

It has been claimed that heritage professionals often find religion too hard to tackle because the religious context is too sensitive "to treat with objectivity and fairness" (Stovel 2005: 2) or because they lack the proper approach to understand it and to adequately articulate and communicate their aims to the concerned stakeholders (McNally 2011). The challenge, from the part of the conservator or archaeologist, is finding a way to conserve and preserve sacred sites without attempting to fossilize the traditions they represent and the religious groups that actively use them. On the other hand, custodians of sacred sites usually regard themselves predominantly as "facilitators of worship" and may have very different views on how the elusive spiritual quality of a sacred place may be preserved without serious compromises (Shackley 2001, xv–xvi). As a result, traditional ways of dealing with sacred sites do not often conform to conventional standards of heritage management practice. Furthermore, the way archaeologists and their institutions are perceived can hinder mutual trust and collaboration. For example, archaeologists are often not viewed in a positive light by indigenous communities because they are seen to intrude through excavation on sensitive sacred space and to provide interpretations that are sometimes not valid to local sacred beliefs (Layton 1989; Carmichael et al. 1994). Tensions and conflicts can arise particularly when heritage professionals are acting as an authority that dominates decision-making and excludes alternative voices. The case of the Orthodox monastic community of Mount Athos, a World Heritage Site located in Northern Greece, illustrates the difficulties of achieving mutual understanding and essential cooperation among the national archaeological authorities and the monastic authorities – the area being a self-governed part of the Greek state ruled by century-old customary traditions and laws (Alexopoulos 2010). In order to empower the Athonite monasteries in decision-making about the conservation and preservation of their own area, a special agency has been established (KEDAK = Centre for the Preservation of Athonite Heritage) with an administrative council that consists of representatives of several disciplines (e.g., archaeologists, architects, engineers), practitioners, academics, state officials (politicians), and, most importantly, members of the monastic community.

A very common source of tension and conflict between religious communities and heritage professionals is the adherence of the latter to principles and standards of practice that advocate the preservation of original material fabric and minimal intervention. When these principles dictate that a site should not be used for religious purposes and to accommodate worshippers, for example, for fear of physical degradation, they may clash with the worldview of a group of people that see preservation of continuity and use as primary objectives. In some cases, such as the active Buddhist temples of Sri Lanka (Wijesuriya 2005), authorities responsible for heritage conservation have taken into consideration the requests of the religious communities by offering alternative options to intervention without preventing contemporary use and the accommodation of religious practices. In a very different context, the conservation of ecclesiastical buildings in the United Kingdom has pursued to keep these places primarily in use for worship but often balancing preservation costs by also accepting an alternative or subsidiary purpose (Derrick 2004).

Some religious communities struggle to face the changes of the modern globalized world and are resistant to its extensively secularized societies and the rapid modernization that is fueled by the advances of the information technology. At the same time, reconciling the potential of sacred sites as a financial resource with the widely held view that such places are a priceless public good (Shackley 2001, 80) is not always feasible. Many pilgrimage destinations – such as the sacred sites of the Holy Land for Christians, Mecca and Medina for Muslims, and the Char Dham circuit for Hindus – account for a massive movement of people and are supported by a large industry that is responsible for catering for transport, accommodation, etc. Consequently, another potential obstacle in the smooth cooperation between experts and nonexperts is the impact of mass tourism and the issue of visitor access on the nonmaterial qualities of sacred sites. Particularly challenging is to achieve a balance in relation to the common fear towards the perceived deconsecration of sacred heritage places by touristification or museumification (Alexopoulos 2010). When a sacred site becomes a tourist attraction, not all of the visitors can be expected to be adherents of the faith in question, but nonetheless, custodians and managers have the responsibility to accommodate accessibility, contemporary use, and any conservation interventions with respect towards the people who value the religious or spiritual values. Concerns over the carrying capacity of sacred sites in combination with a tendency to keep religious communities and worshippers uncontaminated by secular tourists often dictate measures for controlling and restricting visitor numbers, dress and behavior, and levels of accessibility (Shackley 2001). The visitor management strategies designed to cope with these problems, when formulated by the religious communities themselves, may often establish rules that exclude large sections of the wider public and limit the right of access to culture. The monasteries of Mount Athos, for example, ban female visitors from accessing the area and operate with a strict visitor quota that favors adherents of the Orthodox Christian faith. However, this measure, respected and not interfered with by-the-state heritage agencies, is deemed as vital for the raison d'être of the community of monasteries (Alexopoulos 2010).

The preservation of sacred cultural heritage has often also been jeopardized by conflicts among coexisting faiths. In the case of Jerusalem, a holy city for the monotheistic religions of Judaism, Christianity, and Islam, the challenge of preserving the several major religious sites existing within its Old City in a manner that supports tolerance and respect to all faiths can be difficult, particularly considering the tensions generated by current politics (Guinn 2006). In several other cases, religious monuments have been targeted for destruction on sectarian and ethnic grounds or as a consequence of religious fundamentalism as witnessed in the case of the Babri Masjid mosque in Ayodhya, India, or during the war that followed the breakdown of Yugoslavia and the creation of separate nation-states (Layton & Thomas 2001). Such deliberate destruction demonstrates the importance that sacred sites can have, as well as their subsequent vulnerability, as symbols of national or ethnic identity and as markers of multiculturalism and religious diversity.

Individual approaches to the treatment of sacred sites benefit from a consideration of archaeological practice and heritage conservation in a more global context. The trend towards recognizing the importance of sacred values attached to cultural heritage and dealing with the implications for the conservation and preservation of sacred sites can be traced in the postwar period. The original impetus for addressing relevant issues was provided by debates over architectural conservation, the desirable limits to restoration interventions, and the much disputed concept of authenticity. However, among the most influential developments underpinning the so-called values-based heritage management has been the Burra Charter (Australia ICOMOS Charter for Places of Cultural Significance), a policy document drafted in 1979 and revised considerably in 1999. This charter – and particularly its complementary guidelines (Australian Heritage Commission 2002) – constituted an important effort to address the notions of sacredness,

Sacred Site Conservation and Preservation, Fig. 1 A view of the Orthodox monastery of Iviron on Mount Athos, Greece – an important sacred site that constitutes a major pilgrimage destination, a World Heritage Site, and is host to a thriving self-governed monastic community with twenty ruling monasteries (Photograph by Georgios Alexopoulos 23.08.2005)

spirituality, and continued traditional use by taking into consideration the associations, meanings, and heritage values of the indigenous Australian Aboriginal people.

Overall, the practice of archaeological heritage management in North America and Australia has paved the way towards an international heritage discourse that emphasized the recognition of indigenous heritage and has advocated the participation and engagement of a wider public in the conservation process. Within this context, the conservation and management of sacred sites has gradually featured in several specialized research programs and workshops of international organizations such as UNESCO (United Nations Educational, Scientific and Cultural Organization) and ICOMOS (International Council on Monuments and Sites). In recent years, ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property) in particular has been actively promoting the conservation of living religious heritage by focusing on integrated approaches and community involvement. One of the most important developments, with potential future implications for sacred sites, is the special emphasis afforded to the notion of intangible heritage, as adopted by UNESCO's Convention for the Safeguarding of the Intangible Cultural Heritage (Ahmad 2006). Despite the criticism addressed towards the tendency to separate tangible and intangible heritage values, the convention itself has underlined the importance of various manifestations (e.g., oral traditions and expressions; performing arts; social practices, rituals, and festive events; knowledge and practices concerning nature and the universe; traditional craftsmanship) that resonate with many sacred sites.

To conclude, the conservation and preservation of sacred sites has never been an easy task for archaeologists and heritage professionals, especially when faced with the task to reconcile the standards and principles of contemporary practice (advocated by the experts) with the values and perceptions of religious communities and traditional custodians (the nonexperts). However, the tensions and conflicts often generated by different stakeholders over the preeminence of tangible or intangible heritage values can be overcome through tolerance, the development and fostering of mutual respect, the ability to formulate compromising solutions, and the recognition that conservation and sacredness can coexist. Archaeologists, in particular, can gain immensely from a better awareness of and a "more refined understanding of the workings and diversity of religious practices and beliefs" (McNally 2011: 172) (Fig. 1).

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Intangible Cultural Heritage
- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Sacred Sites in Indigenous Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Uses of Heritage

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Sacred Sites in Indigenous Archaeology

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Brief Definition of the Topic

Australian indigenous sacred sites are both a place associated with customary practices and beliefs and a legal entity, identified and protected under Australian laws. It is a site in the landscape that is of specific cultural and social custom, a place of significance according to Aboriginal laws and traditions. Sacred sites are tied into the creation myths, song lines, personal histories, and events of the indigenous peoples. They connect individuals, both as traditional owners and custodians of the present with that of the Dreaming and map a totemic geography across the landscape, anchoring spiritual and kinship relationships to

the land (see Elkin 1933; Berndt 1970; Strehlow 1971; Mountford 1976).

The Dreaming is a word to describe the creation time, its associated stories, and sacred sites, when the ancestor beings interacted with the land, created all living things, and formed natural features. Different Australian indigenous groups have their own word and understanding of this concept, like Tjukurrpa for the Arrernte of central Australia or the Pilbara Guruma word Yulurngulurngkamu. Indigenous Australian beliefs link the Dreaming, ancestor beings, sacred sites, and present-day actions into an integrated relational concept.

Sacred sites, although spiritually derived, have a physical manifestation, being natural features like rock outcrops, trees, water holes, or coral reefs or culturally marked places like stone arrangements and rock art. They can range in size and configuration from a single stone to a mountain range and embody both natural and culturally constructed markers. For indigenous Australians, the sacred is manifest in all aspects of nature and the landscape. Knowledge of sacred sites is learned through ritual attendance, initiation, and explanation of traditional law and lore. Singing the country and hearing and participating in the songs are ways of leaning about both the sacred sites and associated traditional knowledge. The act of singing and ritual renews and invigorates the spiritual essence of the land; it keeps the country alive (see Bradley 2010).

Protection of sacred sites is fundamental in ensuring the well-being of the country and people. Aspects of sacred sites may document historical happenings, inform on behavioral dictates and cultural values, and demonstrate personal links to ancestor, both Dreaming and genealogical. Places and knowledge may be restricted to gender, age, and initiation status. Locations and the mythological association of the place may be benevolent or contain great power which can destroy. Some places require the enactment of rituals and songs for the maintenance of species (see Daniel 1990). Other locations necessitate specific customary behavior to placate residing spirits or ensure illness does overcome the visitors.

The patterns of sacred sites weave a tapestry of resource access and control, land ownership, and traveling pathways. Areas and features are natural reference points throughout the landscape, many the physical manifestations of actions and marks created by the ancestor beings in the Dreaming. Some, like the Wandjina figures in the Kimberley rock art, are the shades of the Dreaming spirits (Crawford 1968; see also Lewis & Rose 1988). With these Wandjina figures, as with other sacred places, contain a dormant power that can be access through song and ritual performance.

The current social, educational, and traditional knowledge and land association of the indigenous people across Australia are variable, this often reflecting the timing, extent, and actions of white Australian occupation. Laws enacted for the protection and management of Australia's cultural heritage reflect this situation and what is important to the lawmakers. The *Northern Territory Aboriginal Sacred Sites Act* is undoubtedly the strongest in terms of protection and providing Aboriginal control in the process. Other states place more emphasis on archaeological rather than sacred sites, although, in cases, there are archaeological components to a sacred site. In the situation of the *Queensland Heritage Act 1992*, it specifically excludes places which would be regarded as sacred site but do not have material cultural evidence.

Cross-References

- ► Sacred Site Conservation and Preservation
- ► Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ► Silbury Hill: Environmental Archaeology

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Sacred Traditions and "Art" in Hunter-Gatherer Contexts

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Introduction

Prehistoric hunter-gatherers produced art and practiced sacred traditions, very often in tandem, leaving associated debris at archaeological sites across the world. This section of the encyclopedia provides a summary of aesthetics and sacred concepts in prehistoric hunter-gatherer contexts, as viewed from artifacts and archaeological sites. I define terms and provide a historical background, beginning with the origins of symbolism and language (Lieberman 1998) and progressing to the historical origins of hunter-gatherer art (Lewis Williams 2002; Mithen 2006; Clottes 2008). I then provide a summary of key issues and current debates on prehistoric hunter-gatherer art studies, including method, theory, and interpretation, concluding with four international case studies. Finally, I identify several outstanding contributions to this field which provide further information for the interested reader.

Definition

Art is defined as the production of various modes of expression – music, paintings, sculpture, and literature – that influence human senses, emotions, and thought. Art is very often a reflection of sacred tradition, defined as the transcendence from the human realm to the spiritual one. All human cultures have a conception of what is sacred to their world, usually encompassing beliefs in their origins, morals, and reasons for existence (Bellah 2011). Some anthropologists have proposed that the capacity for religion and sacred belief is an evolved characteristic of the human mind, an adaptive strategy for survival (Mithen 1996; Lewis-Williams 2002).

Art is often used to express such beliefs, but should not be thought to exclusively reflect that spiritual realm (Whitley 2011). Just as humans in the current age, hunter-gatherers in prehistory used art to express a much wider variety of experiences beyond the sacred, including subsistence practices (hunting, gathering, fishing, etc.), various material aspects of their world (animals, people, plants, etc.), historical events (battles, hunting scenes, etc.), and social life (dancing, ritual, etc.). While anthropologists have established the complex nature of both music and literature in contemporary hunter-gatherer society (Patel 2007), no material remains – in the form of sound recordings or books – exist for these forms of art in archaeological contexts. Archaeologists attempt to understand prehistoric music by the study of the few musical instrument artifacts found at archaeological sites (Mithen 2006), while literature study is restricted to the interpretation of rock art panels to gain insight into myths and stories of prehistoric hunter-gatherers.

As such, without music and literature, archaeologists are left to study art of prehistoric hunter-gatherers through objects, paintings, and sculpture found at archaeological sites. Namely, archaeologists study two types of artifacts: (1) art material culture (manufactured objects, sculptures, or portable objects) and (2) rock art (also referred to as parietal art). Art material culture is found as various forms of sculpture, using a variety of mediums, including ceramics, rock modification, plants (e.g., twig figurines), and other physical objects (Fig. 1).

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 1 Human face effigy recovered at Ghost Cave, Montana, United States (Courtesy Montana Fish, Wildlife, and Parks)

For example, this small palm-sized river cobble found at Ghost Cave in Montana was transformed into a human face effigy; it is a good example of art material culture, or portable art. Rock art is identified at archaeological sites in the form of pictographs, or painted images (Fig. 2), and petroglyphs, or pecked images (Fig. 3) on rockshelters, cliff faces, large boulders, and other similar lithic landscapes. Using these two types of art, archaeologists study hunter-gatherer aesthetics in the past. This image shows a human (anthropomorph) and associated animal pictographs painted in red ocher on a cliff face in central Montana, while this petroglyph shows etched human figures engaged in a gun fight on a rock wall in southern Alberta, Canada.

Archaeologists often study art to understand the second topic of this encyclopedia entry, sacred tradition. Art often is produced for, or is at least inspired by, human beliefs in the sacred (Lewis-Williams 2002). For archaeologists who study hunter-gatherers, art is the only means by which we can study ancient religion and spiritual beliefs. Hunter-gatherers, because of the mobile nature of their world, generally did not produce religious architecture, such as kivas used by the Anasazi (see Archaeology of Chaco, this volume). Hunter-gatherers also did not leave behind literature and music, as discussed above, although they surely had myths, stories, and music about these important aspects of their lives (Mithen 2006).

Thus, for purposes of this entry, sacred tradition is reflected in archaeological sites only through art material culture and rock art. For example, Fig. 4 below of a Dinwoody figure in Wyoming is thought by archaeologists to reflect Shoshone Native American vision quest practices, an important aspect of their sacred traditions. Based on ethnographic studies of Shoshone Native Americans, Francis and Loendorf (2002: 110) explain that, "Engravings and paintings were created the morning after a vision was received in order to preserve it, as forgetting the details of the vision could result in death or illness." Hunter-gatherers, thus, often represented their sacred traditions in art, either as portable objects, non-portable sculptures, or rock art, that archaeologists can study to understand human prehistory.

Historical Background

Archaeological sites throughout the world are filled with an enormous wealth of information regarding sacred traditions and art used by hunter-gatherers in prehistory. For at least 100,000 years, people have produced art as a means of social interaction, to form alliances, to establish territories, to express themselves, to practice their religions, and to broadcast important information (Bahn & Vertut 1997; Lewis-Williams 2002; Clottes 2008; Fagan 2010). While subsistence, economy, technology, and settlement systems are thought of as the key points of study for hunter-gatherer archaeology (see "▶ Hunter-Gatherers, Archaeology of" and "▶ Hunter-Gatherer Settlement and Mobility," this volume), the study of aesthetics and religious beliefs is also important. Due in part to the comparatively large size and organizational complexity of our brains, humans are alone in the animal kingdom in having evolved the

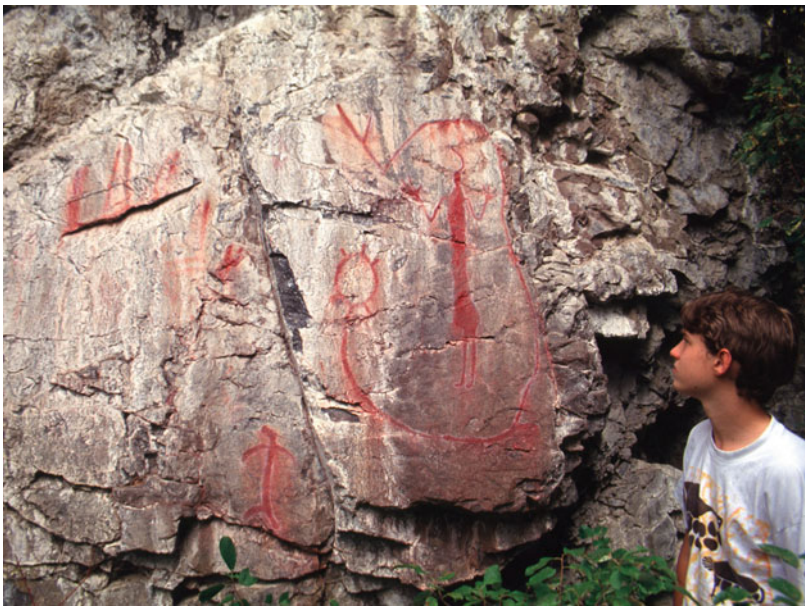

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 2 24JF695 Foothills-Abstract rock art showing a human and turtle painted in *red ochre*, Montana, United States (Courtesy of Mavis and John Greer)

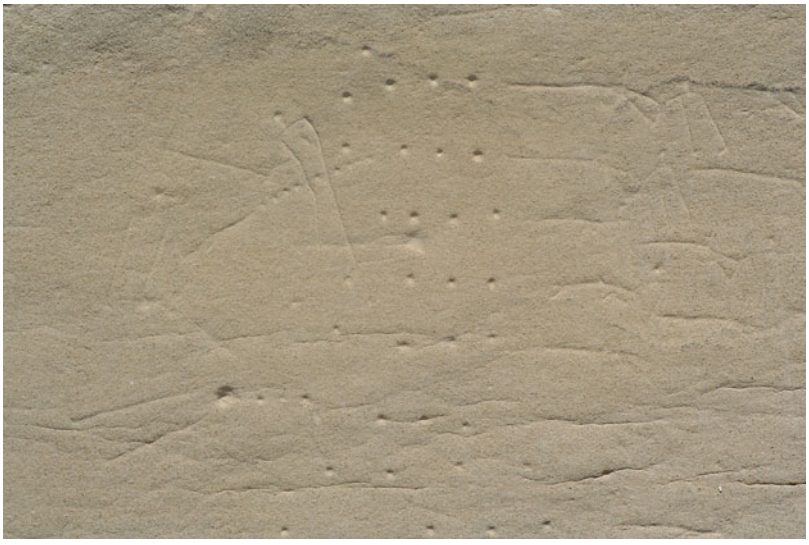

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 3 Battle scene pictograph, Writing-On-Stone Provincial Park, Alberta, Canada

capacity for complex thought (Mithen 1996). With this complex thought, humans evolved the origins of symbolism – the representation of one thing as another – which has also led us to a capacity for three additional uniquely human innovations: (1) language, (2) beliefs in the sacred, and (3) aesthetics (art). As Philip Lieberman (1998: xiii-xiv) states in his study of the evolution of human language, "horses run faster, gorillas are stronger, bacteria adapt faster to different environments. Speech, language, and thought differentiate humans from other species."

The prehistory of early art has long been controversial and, thus, is a fairly well-studied topic. Lewis-Williams (2002), among others (Whitley 2011), provides excellent overviews of the history of study of hunter-gatherer art. Among the early scholars instrumental in the study of prehistoric hunter-gatherer art include

Sacred Traditions and "Art" in Hunter-Gatherer Contexts,
Fig. 4 Dinwoody rock art, Legend Rock, Wyoming, United States

the Abbe Henri Breuil. Breuil's studies of early cave sites such as Altamira in Spain were critical in establishing the antiquity of art into the Upper Paleolithic period. Since then, numerous archaeologists have studied prehistoric hunter-gatherer art, including Andre Leroi-Gourhan and Champion (1982), Paul Bahn and Jean Vertut (1997), and Jean Clottes (2008) in Europe; David Lewis-Williams (2002) in South Africa; David Whitley (2011) and Keyser & Klassen (2001) in North America; and Ronald Berndt (Berndt et al. 1992) and Geoffrey Bardon (Bardon & Bardon 2004) in Australia.

One of the main foci of study of these hunter-gatherer art researchers is the origins of early art in their respective regions of study. Bahn and Vertut (1997) provide a summary of the origins of art that place the production of art material culture (art objects) back to more than 100,000 years ago in both Africa and Europe. Such art consists of ornamental jewelry, including incised bones and other human-modified natural objects (e.g., shells with bored holes) presumed to have been used in decoration/jewelry. In 2011, Henshilwood and colleagues reported in the journal *Science* on a 100,000-year-old red ochre-processing site – Blombos Cave – in South Africa which is the earliest evidence for the sophisticated and organized production of material used in modern human art production (likely used in the painting of objects, rock art, or bodies). Also in 2011 in *Science*, Henshilwood and his colleagues also recorded the earliest production of ornamentation – a string of perforated shell beads – at the same site, dating back to some 77,000 years ago. Finally, in 2002, these same archaeologists recovered a polished red ochre fragment with a motif of three parallel lines and patterned crosshatches that date to approximately 75,000 years ago (Clottes 2008).

Whether ornamental objects and incised rocks, such as those recovered at Blombos Cave, should be considered art is a key research question in dispute by archaeologists and art historians alike; without question, ornamental objects and incised or etched objects represent the earliest examples of human symbolic capacity associated with the origins of the uniquely human mind (Mithen 1996). Along with this, some also propose that this period – c. 100,000 years ago – likely marks the origins of human language, a similarly symbolic, uniquely human invention (Lieberman 1998).

Today, archaeological evidence for the earliest human art – that goes beyond ornamentation and incised tablets – is found at archaeological sites in Eurasia and Africa dating to approximately 30–40,000 uncalibrated years ago (Bahn & Vertut 1997). This marks the important event known as the Middle to Upper Paleolithic

transition in which modern humans emerged in the Old World and migrated out of Africa into Europe, Asia, and Australia. With those major migrations, humans transported their art and sacred traditions, transforming them within their new environments, wherever they decided to settle down and make their home.

In Africa, we commented above on the important work of Henshilwood and his colleagues at Blombos Cave, South Africa, pushing the origins of symbolic thought and art-like objects back to between 75 and 100,000 years ago. The earliest well-dated art objects (not ornamentation) in Africa are from Apollo 11 Cave in Namibia and include several animal figures painted on stone plaques that date to approximately 26,000 years ago (Lewis-Williams 1984: 230).

In Europe, art objects and parietal art date to approximately 30–35,000 years ago, with the earliest being a group of 17 ivory figurines from three caves in Germany; one of these from Hohlenstein-Stadel depicts a transformative figure of a human with a lion's head (Mithen 1996). The earliest painted parietal art in Europe is from Grotte Chauvet in France, at 32,000 years ago. Discovered in 1994, Grotte Chauvet remains the earliest well-dated European rock art site and is the oldest painted cave in the world (Clottes 2008). Its sophistication is unparalleled in Upper Paleolithic rock art; as such, it is assumed by most archaeologists and art historians that art was produced prior to this time but remains undiscovered at Old World archaeological sites.

While Europe has been the major focus of early rock art researchers, Bahn and Vertut (1997: 31–34) provide a summary of the earliest indisputable art in other regions of the world. In Asia, an archaeological site in Shanxi province, China, yielded a perforated stone ornamental disc dated to c. 28,000 years ago. Australia's earliest art sites include Koonalda Cave which contains human-produced striations in the cave walls that are dated to between 15 and 30,000 years ago. Finally, in the Americas, early rock art has been identified in Texas at the Gault Site, with incised bone objects dating to greater than 11,000 uncalibrated years ago. Overall, the earliest examples of art are of a similar age to the first presence of modern humans in those regions, implicating art as a uniquely human endeavor that was carried with humans as they migrated across the continents.

Key Issues/Current Debates

What Is Art?

In addition to studying the history and origins of hunter-gatherer art, the definition of art is another research issue for prehistorians. Some believe that ornamental objects such as those from Blombos Cave should be considered evidence of true art, while still others believe that the definition should be restricted to actual art material culture (portable art), sculpture, and/or paintings, as we have defined here. We leave that debate open for future archaeologists of hunter-gatherers to resolve (see Mithen 1996: 154–163).

Dating of Art

The dating of art is another major focus of archaeologists interested in the study of hunter-gatherer aesthetic and sacred traditions (Keyser & Klassen 2001; Whitley 2011). Dating art can often be quite difficult, but recent methodological advances in dating methods are allowing us to date art in innovative ways. Art of hunter-gatherers can be dated by four main methods: (1) association with dated archaeological sites or objects, (2) datable subject matter, (3) superimposition of designs, and (4) chronometric dates on the art itself. The first method – association with dated archaeological sites or objects – associates the age of an art object to a well-dated archaeological deposit from the site of the art itself or an associated one.

Second, the subject matter of the art might give its age away. In the Late Pleistocene, mammoths and mastodons and other now-extinct animals are pictured in art; we know that these animals went extinct at the end of the last ice age, so therefore we also know that any depiction of these animals predates the end of the ice age, c. 11,000 years ago. In the Americas, the depiction of the horse in Native American hunter-gatherer art means it must postdate 1,600 or so,

the time after the introduction of the horse by the Spanish. Also, the representation of large, full-body shields in prehistoric Native American art of Montana and Wyoming implies that it dates before the introduction of the horse, since such full shields were deemed impractical for riding. Many other similar subject matter interpretations are often used to date rock art.

Superimposition of designs – the third major dating method – is a very common means of dating art, one pioneered by the earliest art researchers. This method is mainly for rock art, with a series of art images painted or pecked atop one another, allowing the researcher to understand the sequence of image formation and, thus, attain a relative dating sequence.

Finally, innovations in chronometric dating are leading to a revolution in the absolute dating of art. Advances in radiocarbon dating by accelerator mass spectrometry (AMS) have allowed researchers to sample minute (less than a gram) portions of organic rock art objects and/or organic materials (e.g., charcoal) in rock art panels. It is by this means that the Grotte Chauvet rock art panels in France have been so well dated. Similarly, the lion figure from Hohlenstein-Stadel in Germany was also dated by AMS.

Another chronometric method of dating gaining some popularity is cation-ratio dating. This method measures leaching of potassium and calcium out of rock varnish in comparison to ratios to titanium in the rock (which does not leach). The Legend Rock site in western Wyoming has been subjected to cation-ratio dating to some success (Francis & Loendorf 2002); however, the method requires initial dating of the art by AMS or other methods to measure the rate of leaching within the rock in the microenvironment of the site. So, this method is untenable if one does not previously know the absolute dates of some art at the site (e.g., AMS). At this time, thus, cation-ratio dating is not considered to be as accurate as AMS or standard radiocarbon dating.

Art Interpretation and Sacred Tradition

Study of the interpretation, or meaning, of art has become a major field of study, with a suite of specialized terms used by scholars, defined well by Keyser and Klassen (2001) in their study of Plains Indian rock art of western North America. We summarize some of their key terms here to facilitate an explanation of rock art research and interpretation. Most of the world's hunter-gatherer art is either representational or nonrepresentational. Geometric designs – in the form of circles, lines, or other shapes – are examples of nonrepresentational art, or images of objects that do not occur in nature. Representational art takes the form of either anthropomorphic (humanlike) or zoomorphic (animallike) images but can depict any real object. Often, representational and nonrepresentational images are superimposed upon each other or used in tandem to form the overall composition. In this vein, art often can be depicted in naturalistic, or lifelike (realistic), form or can be abstract (nonrealistic/nonrepresentational) art that lacks obvious interpretation.

For example, Fig. 3 of a petroglyph in Alberta, Canada, is considered to be a naturalistic, representational image of humans (stick figure anthropomorphs) in combat using guns; bullets are represented in animated form by the lines of dots. Somewhat in contrast, the other image from Wyoming (Fig. 4) shows an anthropomorphic zoomorph, a combination often interpreted to represent spiritual transformation of the individual. For hunter-gatherers, this art very often shows an elongated anthropomorph becoming an animal (zoomorph) and/or attached to an animal with a line (here, a turtle), representative of a spiritual transformation. The integrated nature of both compositions contributes to the overall interpretation. Rather than being solitary images or even juxtaposed (a series of isolated, individual, unrelated images on an art object or panel), these particular works of art are coherent compositions with individual attributes that combine to form a larger meaning. In the former image, the meaning is explicit and biographic in its depiction of a battle scene, while the latter image has implicit meaning due to its largely spiritual content; we may never know this latter image's true meaning, other than to say it represents an individual's transformation from human to sacred. We understand the

basic principle of the transformation, but not the precise meaning of its experience to the hunter-gatherer artist.

While these terms help us to uniformly describe hunter-gatherer art, whether it be portable material culture, sculpture, or rock art, interpreting rock art is extremely complicated and subjective to the researchers' theoretical, cultural, and historical background. Ethnographic analogy is a key method of rock art interpretation. In this method, study of contemporary hunter-gatherers provides concepts useful in the interpretation of art produced by hunter-gatherers in prehistory. David Lewis-Williams' (2002) various books and articles on South Africa rock art have been instrumental in the understanding of the spiritual nature of much of the world's hunter-gatherer art. His methods of study have been adopted by many researchers in other areas of the world as well, namely, that much art reflects sacred traditions of hunter-gatherers, especially the concept of self-transformation that often accompanies the human quest for spiritual guidance, as shown above.

Ethnographic analogy contributes to understanding of various possible means of interpreting rock art (Whitley 2011), whether it be art produced for hunting magic (sympathetic magic) to facilitate success in the hunt, to reflect spiritual transformation through a religious experience (transformational magic), or whether the art is simply representational in an art-for-art's sake sense. The major impact of rock art research was to establish the role of symbolic imagery in art, usually through abstract symbols in combination with representational, naturalistic images of animals and/or humans. Through research of hunter-gatherer art, most archaeologists realize that there is probably more than meets the eye in art interpretation. While the image may appear to be representational and mainly naturalistic, its depiction could have hidden, implicit meaning unfathomable to the archaeologist studying the art.

In his study of trance-induced hallucinations among contemporary hunter-gatherers, Lewis-Williams (1984, 2002) identifies several art images that represent events of hunter-gatherer sacred transformation, at least among the San of South Africa. Hunter-gatherer depiction of such spiritual events often shows death (e.g., hunting scenes or bleeding life-forms), mystical flight (e.g., birds or other images of flight), drowning (to reflect the weightlessness of the spiritual experience), or sexual arousal (e.g., erect phallic representation). He argues that these images in combination with more obvious signs of transformation (combination human-animal forms) connected with lines to other animals and abstract forms likely reflect spiritual activity of the individuals. As we have discussed in this section, such images are present in even the oldest examples of hunter-gatherer art, meaning that the representation of this transformative experience (e.g., from human to animal to spirit) is among the most fundamental of human experiences that dates back to our earliest ancestors 30–40,000 years ago. It is this connection between art and sacred tradition that defines our symbolic ability as humans, which defines us as such and which is visible in the archaeological record of hunter-gatherer cultures throughout the world.

International Perspectives

This final section briefly summarizes four aesthetic systems which show the diversity of hunter-gatherer art and sacred traditions found at world archaeological sites, including Northwest Coast Native American art, Upper Paleolithic Europe portable and parietal art, South African San parietal art, and aboriginal art of the western and northern territories of Australia.

Northwest Coast North American Art

In the annals of world prehistory, many hunter-gatherer cultures exhibit characteristics of generalized foragers, including egalitarianism, high mobility, and risk minimization through expansive kinship networks. Hunter-gatherers of the Northwest Coast of North America lived in semisedentary villages of hunter-gatherer-fishers, exhibiting a complex ranked form of social organization, using storage to offset

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 5 She Who Watches, the Dalles, Oregon, United States

long-term resource stress. Northwest Coast art reflects the hierarchical and organizational complexity of their society (Holm 1965). Northwest Coast art includes a wide variety of mediums, styles, and produced objects. Black, red, and blue/green are the primary, secondary, and tertiary colors, with formlines and ovoids used to represent zoomorphic and anthropomorphic images, often splitting and reshaping the art forms to fit within the space of the produced object (e.g., a wood box). Among the most commonly produced art mediums are blankets, masks, boxes/chests, bowls, rattles, jewelry, and totem poles (MacDonald 1983; Wright 2011).

Totem poles were (and still are) handcrafted by wood-working specialists, carving household crests, representations of characters in stories, and/or household histories into a tree to be placed in front of houses and ceremonial structures. Production of Northwest Coast art dates back at least 3,000 years, with objects of the tradition recovered at sites like Ozette, Hoko River, and Tse Whit Zen in coastal Washington State (Kirk & Daugherty 2007). At the site of Ozette on the northernmost Washington Coast, archaeologists and local Makah unburied a 300–500-year-old village, including thousands of well-preserved art objects in the Northwest Coast style (Kirk & Daugherty 2007: 106).

Portable art objects and sculptures dominate the aesthetic traditions of Northwest Coast, but rock art was produced as well, including the famous image of Tsagaglalal, or She Who Watches, from the Dalles in Washington State (Fig. 5). The complexity of art produced by Northwest Coast Native Americans reflects the organizational complexity of their society, with hierarchical social organization and craft specialization, rare among hunter-gatherers in prehistory.

Upper Paleolithic Europe Portable and Parietal Art

The Upper Paleolithic period of Europe persisted from c. 40,000 to 10,000 uncalibrated years ago. As introduced above, Upper Paleolithic hunter-gatherers of Europe produced some of the most sophisticated examples of portable and parietal art in prehistory (Leroi-Gourhan & Champion 1982; Conkey 1984). The earliest dated examples – Grotte Chauvet, France (parietal art) and Hohlenstein-Stadel Germany (portable art) – are among the most artistically advanced as well. As described by Jean Clottes in his wonderful book *Cave Art* (2008), Grotte Chauvet contains hundreds of painted and pecked images, including mammoth, bison, lion, rhinoceros, horse, bear, and humans. One painting called the "Sorcerer" depicts a human with a bison

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 6 South African San dancers. Courtesy of Jack Fisher

head in a transformative composition. Other important parietal art sites in Europe include Lascaux, Altamira, Niaux, Cosquer, Peche Merle, Trois-Freres, and Le Tuc d'Audoubert, all of which are in France or Spain, the heart of this tradition. Portable art is characterized by the famous Venus figurines found throughout sites in Germany, Italy, Spain, and France. Numerous other art objects and sculptures have been recovered and identified at archaeological sites in Europe that date to the Upper Paleolithic period, making it one of the oldest and best studied prehistoric hunter-gatherer art traditions in the world (Mithen 1996; Bahn & Vertut 1997).

South African San Parietal Art

As reviewed briefly above, David Lewis-Williams pioneered the study of South African San art, especially their parietal art. As shown by the finds at Blombos Cave, art in South Africa is among the earliest in the world. The early innovation of art facilitated a rich prehistory of traditions. The parietal art is particularly wonderful, depicting pictographic and petrographic images of elongated anthromorphs and zoomorphs participating in a wide range of activities, including the sacred trance dance tradition (Fig. 6), hunting practices, and other transformative religious experiences. The eland is the most commonly depicted animal in this tradition, as shown here. Transformative anthropomorphs and zoomorphs in combination with abstract geometric designs and connecting lines denote the spiritual connectedness and compositional nature of many of the murals. Lewis-Williams (1984) argues for the great (Paleolithic) antiquity of this tradition, linking it to early portable art objects that date back 15,000 years. However, he states that the best preserved and most well-dated objects that can securely date the San art tradition are 2,200 years old from Klasies River Mouth (Lewis-Williams 1984: 235).

Australian Aboriginal Art, Western and Northern Territories, Australia

The parietal and portable art of the aborigines of the western and northern territories of Australia is truly unique among world hunter-gatherer traditions (Bardon & Bardon 2004). The art is produced to reflect aboriginal views of the sacred world (Caruana 1993). Visions of the dreamtime are often depicted in aboriginal art, usually accompanied by oral narratives that describe the stories and myths and travels of mythical individuals on their dreamtime journeys through the environment and the sacred world. The mediums

for Australian aboriginal art include rock walls and similar lithic landscapes but also include bark paintings and other portable objects. The earliest examples of aboriginal art occur in northwestern Australia. There, Bradshaw figures – small, pictographic, animated anthropomorphic images – are present on lithic landscapes and date to a minimum of 3,000 years ago (Caruana 1993: 157) to as old as the Late Pleistocene (>10,000 years ago). More recently, within the last few hundred years, this region has witnessed the proliferation of wandjina images, an aboriginal term used to describe pictographic anthropomorphic figures that are associated with the sky and water.

These traditions continue into the ethnographic present, with the art and dreamtime tradition remaining important to Australian aborigines. As with South Africa and the Northwest Coast of North America, the continuation of production of these art traditions into the modern era allowed for a better understanding of the prehistoric art's meaning and aesthetic purpose associated with the sacred beliefs of its producers. The art and sacred traditions of hunter-gatherers are often inseparable, since aesthetic values commonly reflect spiritual and cosmological beliefs of hunter-gatherer individuals in prehistory. Several important volumes are available to better understand these topics.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Australian Rock Art
- ▶ Chaco Canyon, Archaeology of
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Europe: Paleolithic Art
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ North American Rock Art
- ▶ South Africa: Heritage Management
- ▶ Style: Its Role in the Archaeology of Art

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SAFE/Saving Antiquities for Everyone

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Introduction

When properly excavated, documented, and studied, antiquities can tell us how our ancestors lived, and enrich our understanding of our lives today. This information is forever lost when archaeological sites are plundered and artifacts are ripped out of the ground by looters to feed the black market antiquities trade. This is a societal problem that concerns us all.

SAFE/Saving Antiquities for Everyone, a 501(c)(3) nonprofit organization, was founded to educate the public about this problem. By raising awareness, SAFE gives voice to people of all walks of life, and provides a platform to express concern and advocate for change. As the environmental movement has done, SAFE seeks to change minds and attitudes so that behaviors will change (Figs. 1–7).

Definition

SAFE is a coalition of professionals in communications, media, and advertising working alongside experts in the academic, legal and law enforcement communities to make the public aware of the vulnerability of ancient sites, monuments and artifacts, and to take action to ensure the preservation of cultural heritage.

While many organizations focus on on-site preservation and academic research, SAFE centers on public awareness. By creating educational programs and media campaigns, SAFE encourages lawful and ethical behavior to stop the trade in illicit antiquities from destroying the history that belongs to us all. By using traditional advertising and marketing techniques to "sell" cultural heritage preservation, SAFE creates a public dialogue to drive this issue into the mainstream. As a group of concerned citizens, SAFE has no political, economic, career, or academic interests or agendas; unlike private collectors, museums, and academics.

With a positive and forward-thinking approach, SAFE educates people on why preserving culture is essential, relevant, and urgent. We offer *concrete* ways to invest in the preservation of everyone's past. Using classic advertising and communications techniques in combination with educational and academic expertise, SAFE also employs grassroots techniques to engage the public in active participation. Our multi-faceted programs deliver the simple, enduring message that we all share responsibility for protecting cultural heritage. They include:

- *SAFE web site (savingantiquities.org)*, a destination portal for related information, news and events, resources.
- *Awareness materials* such as posters, brochures, postcards, "message" products via an online store.
- *SAFE Tours* guided by art historians, archaeologists, museum specialists and journalists which provide an "insider's look" at museum collections.
- *Podcast interviews* with experts in the field to inform and inspire.
- *Events* such as lectures, panel discussions, and book events designed to reach the general public and offer an opportunity to meet experts in the field.
- *Social media outreach* using simple grassroots tools and open-source communication to bring public awareness about complex issues via Facebook, Twitter, Flickr, YouTube, Ammado, Ning, etc.
- *SAFECONNECT*: *The Cultural Heritage Network*, (safeconnect.org) the online community for like-minded organizations and individuals.
- *E-newsletters* to inform members of the community.
- *Academic outreach* at conferences and in presentations.
- *Educational projects* including the "Give History a Future" program which consists of

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SAFE/Saving Antiquities for Everyone, Fig. 1 SAFE logo

"The World's Ancient Cultures in Danger "Map and other teaching tools, school presentations, student competitions, and internship programs.

- *Global awareness campaign* – The Donny George Candlelight Vigil for Global Heritage (formerly Global Candlelight Vigil for the Iraq Museum).
- *SAFE Beacon Awards* to recognize outstanding achievements in our mission.
- *Question of the month survey* is an informal poll to gauge public opinion.

Historical Background

The plundering of ancient cultures is not a new practice. As early as the Roman Empire, objects were looted from conquered lands such as Egypt, Greece, and the Middle East. The Renaissance witnessed the rediscovery of classical antiquity, followed by rampant looting across Italy. During the seventeenth and eighteenth centuries, gentlemen seeking to complete their education toured southern Europe and the Middle East, bringing back with them antiquities as mementos of the ancient world. During the nineteenth century the race to populate museums with encyclopedic collections in Europe and the US began to accelerate. As more countries tried to establish their rights to cultural patrimony, the black market flourished. Although archaeologists have known about the problem for a long time, the public is generally unaware. Thriving on this relative secrecy, the illicit antiquities trade flourishes and remains one of the largest illegal markets in the world.

SAFE was founded in response to the looting of the Iraq Museum in April 2003 and the cataclysmic destruction of countless Iraqi archaeological sites in its aftermath. The SAFE web site, www.savingantiquities.org, debuted in June of 2004 as a content-driven destination portal providing news, educational information and communications materials to raise awareness about not only the destruction done in Iraq, but the plunder of cultural heritage globally. Since its inception, SAFE has gained the approval and confidence of some of the world's top experts in the field of cultural heritage preservation.

Key Issues

Everyday, somewhere in the world, looters are busy destroying archaeological sites and ancient monuments large and small, both famous and undiscovered, in search of marketable artifacts that are smuggled from their country of origin so they can be purchased by antiquities dealers, private collectors and museums. Even though the practice of looting and trading in looted antiquities is almost as old as history itself, modern-day looting, aided by high-tech methods, heavy machinery and sophisticated transportation networks, has reached epidemic proportions and become a serious challenge to law enforcement. Countries least able to protect their cultural resources are often the primary victims of this illicit activity. The looting of ancient sites will only stop when collectors and museums refuse to acquire ancient objects that have no provenance (history of prior ownership) or provenience (the find-spot or *in situ* location where something is first discovered). Only then can communities where plunder occurs adopt economically sustainable strategies (such as cultural tourism) that preserve their cultural heritage.

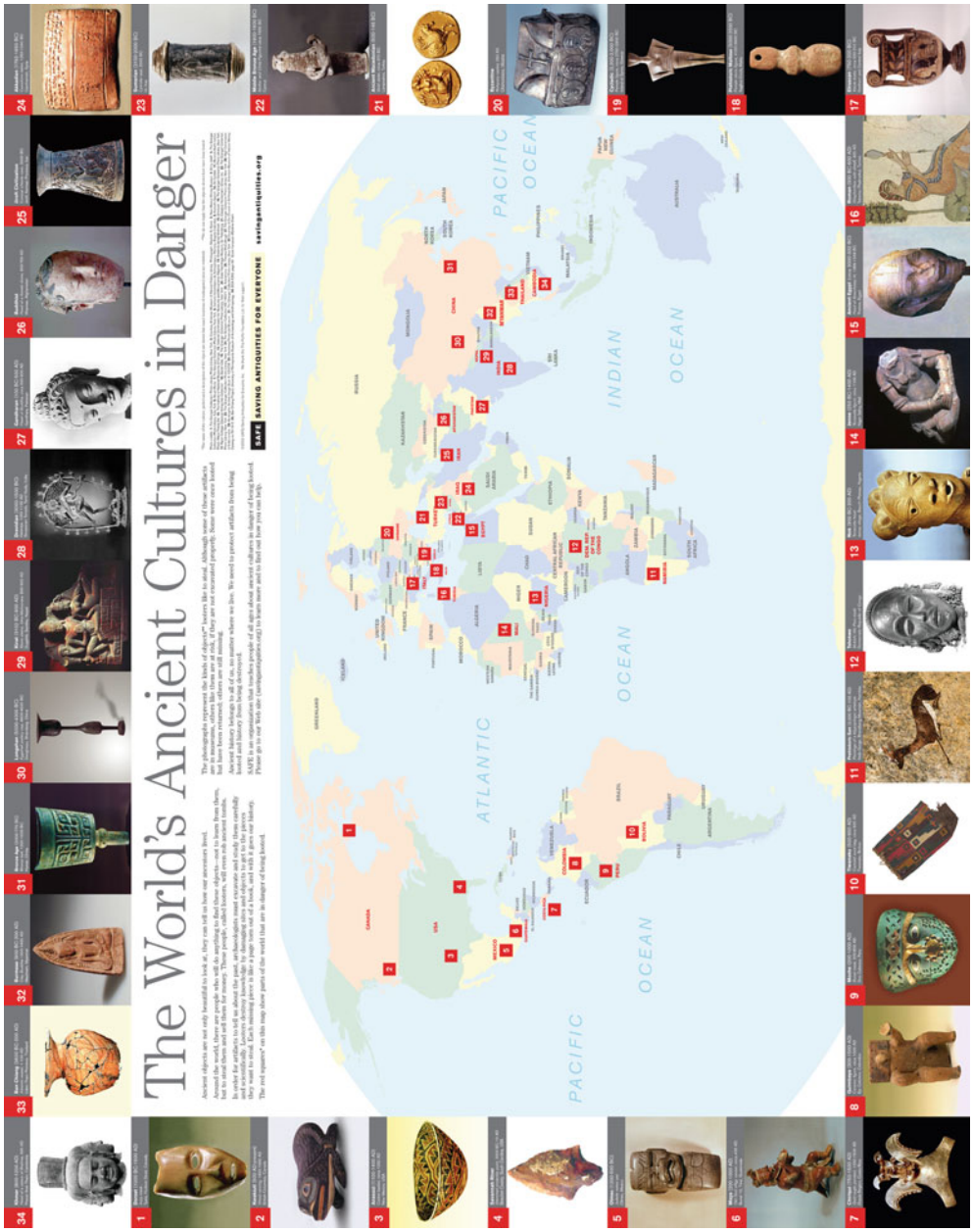

SAFE/Saving Antiquities for Everyone, Fig. 2 The World's Ancient Cultures in Danger Map. Educational tool designed to educate students of all ages about the most endangered sites and cultures around the world

SAFE/Saving Antiquities for Everyone, Fig. 3 SAFE Tour with Dr. Oscar Muscarella. An insider's look through the Ancient Near Eastern Galleries at the Metropolitan Museum of Art discusses how the objects got there

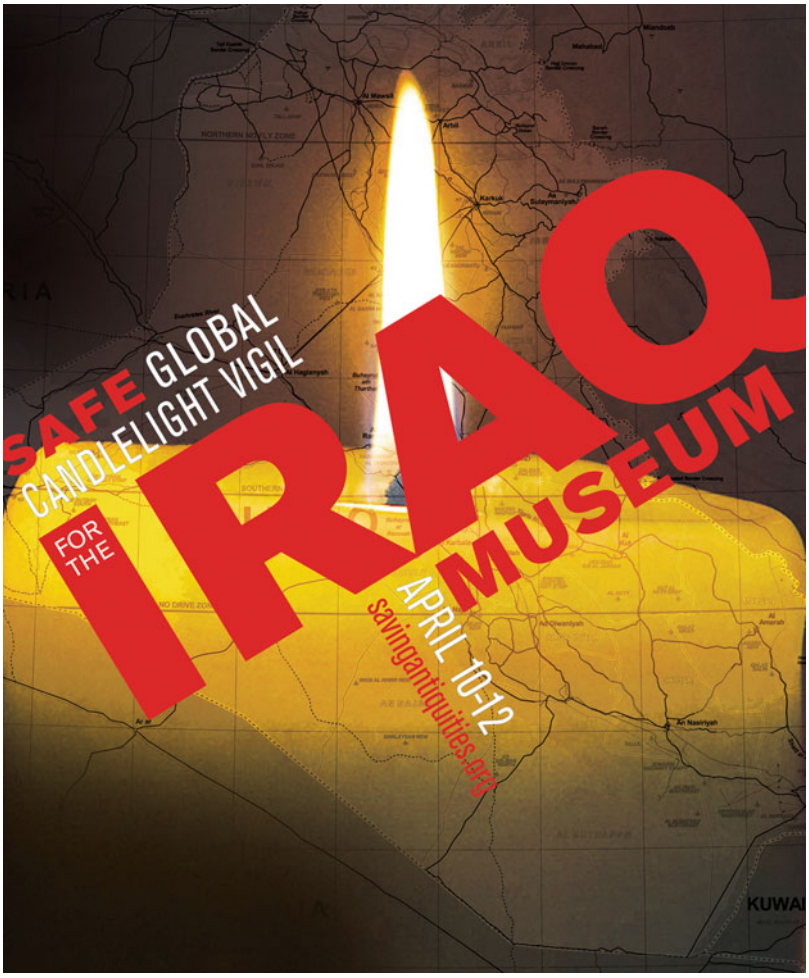

SAFE/Saving Antiquities for Everyone, Fig. 4 Poster. Global Candlelight Vigil for the Iraq Museum to commemorate the anniversary of the tragic looting of the Iraq Museum

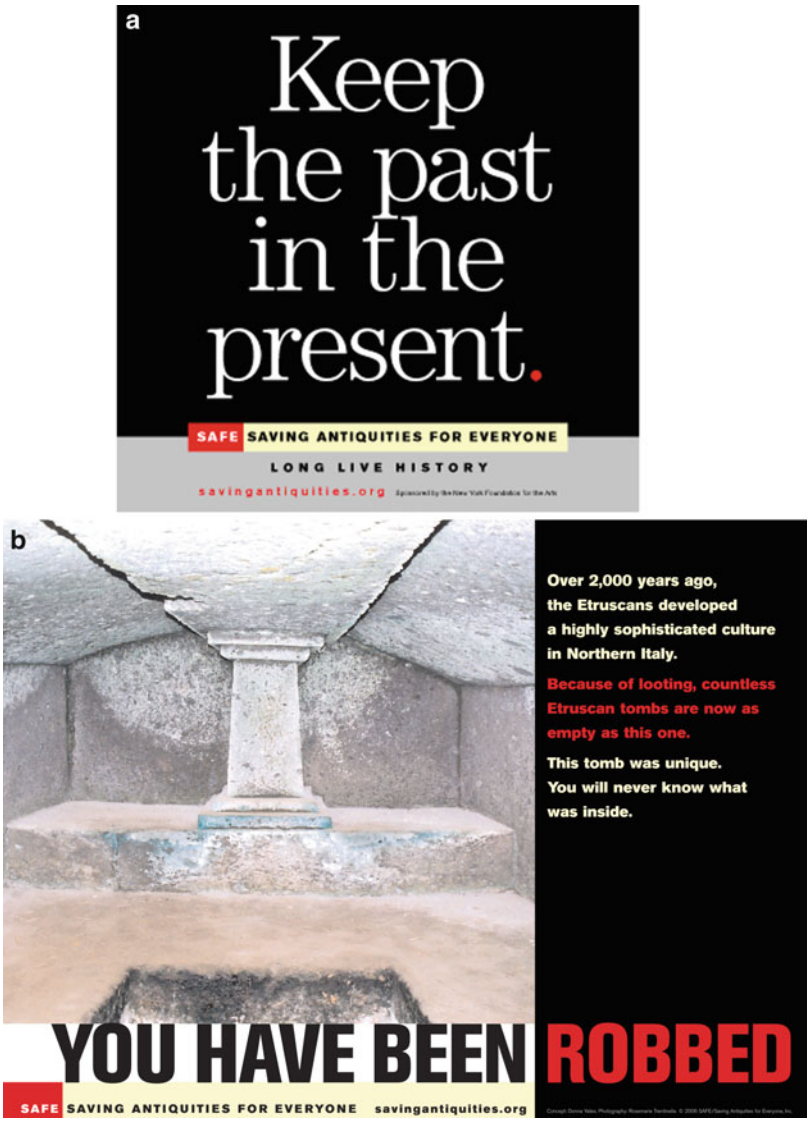

SAFE/Saving Antiquities for Everyone, Fig. 5 Public service announcements

Current Debates

While no one would disagree that the destruction of cultural heritage should end, there is much debate over how this might be accomplished. Often presented with elaborate complexity, the historical, ethical, political and economic aspects of the cultural property preservation debate tends to obscure the most important fact: that the looting of ancient sites and artifacts is illegal in every country where they are found, including the United States. While some stakeholders – such as those who advocate for the unregulated acquisition and trade of cultural property – may question the validity of other countries' cultural patrimony laws and criticize the effectiveness of their enforcement, no meaningful alternative to the 1970 UNESCO Convention, now ratified by more than 120 countries around the world, has been proposed.

With the widely publicized repatriation of antiquities and a general increase in public awareness surrounding these issues, failure to respect national and international laws makes the acquisition of dubious artifacts a high-risk venture. This fact, plus the increasing willingness

SAFE/Saving Antiquities for Everyone, Fig. 6 Candlelight Vigil for the Iraq Museum (renamed the Donny George Candlelight Vigil for Global Heritage in 2011). Individuals and organizations light a candle around the world to commemorate the loss and to acknowledge that we are all responsible for the protection of our shared global cultural heritage

of source countries to sign long-term reciprocal loan agreements with foreign museums, are bringing decades of pushback to an end. Criticism of source countries as "retentionist"; legal actions to impede the implementation of the 1970 UNESCO Convention in the United States by CPAC; calls for fewer restraints on the importation of artifacts to benefit "hobbyist" collectors and "world museums" to stock their galleries with "artistic creations that transcend national boundaries" are being replaced by a new question in the cultural property debate. The question today is: how to reconcile the growing claims made by source countries in Asia, Africa, South America and the Middle East, on cultural property in museum collections outside the countries of origin?

In an era of heightened scrutiny, where facts can be revealed with just a few keystrokes of a computer, the debate about the future of our shared cultural heritage is no longer the exclusive domain of academics, museum professionals, dealers and collectors. Members of the general public are becoming aware. They also demand to be heard. The accessibility of social media virtually anywhere in the world allows this to happen freely and instantaneously.

Along with the global economic shift away from the West (traditionally market countries are) to emerging economies (typically source countries) is a rise in cultural pride in those parts of the world. In the case of China, for instance, the feverish "buying back" of cultural property that had been plundered in an era when the country was less able to protect itself is

a MUSEUM RECORD (KABUL MUSEUM, AFGHANISTAN)

ACCESSION NUMBER / NOMBRE DE REGISTRATION	OBJECT TYPE AND DATE / OBJET TYPE ET DATE
Unknown	Bas-relief sculpture 2nd - 5th c. AD
DIMENSIONS / DIMENSION	**MATERIALS / MATERIEL DE CONSTRUCTION**
H: 33 in.(83.82 cm); W: 14-3/4 in (37.47 cm); D: 6-1/4 in.(15.875 cm)	Grey schist

PROVENANCE

Discovered during the excavation of the Buddhist monastery at Shotorak by the Delégation Archaeologique Française en Afghanistan, 1939. Transferred to Musée de Kabul, 1940

LOOTED

COMMENTS / COMMENTAIRE

The Buddha Dipankara, surrounded by holy disciples, raises his right hand in Abhaya Mudra pose. At his feet, the hermit Sumegha (Sumedha) spreads his hair across the ground to protect the Buddha's feet from the mud. This relief was one of the first masterpieces stolen from the Kabul Museum. It disappeared during the spring of 1992.

Every day other precious antiquities are looted from archeological sites for sale on the black market, robbing us of our cultural heritage.

ACCESSION DATE / DATE D'ACQUISITION

20 February 1940

Photograph taken in 1970. Photo © John C. and Susan L. Huntington / Huntington Archive 2004

THIS IS A FACSIMILE

b

History is an original. Protect it.

Every day, the plundering of cultural heritage continues all over the world to feed the international market for illicit antiquities. As a result, an incalculable amount of information about the history of mankind is lost, forever.

The public is still generally unaware of what is at stake, which is why we need to raise public awareness. SAFE/Saving Antiquities for Everyone is a non-profit organization that creates educational and public programs about the importance of preserving cultural heritage worldwide.

Join us.

Become a member. Be part of our global network of students, professionals, experts, concerned individuals and novices, working with archaeologists, educators, law enforcement and journalists to change the public opinion about ethical behavior in regards to cultural heritage preservation. You can change things when are passionate and ready to take action.

Join us, and help make a difference in the preservation of your past, everyone's past.

Visit us at savingantiquities.org and learn how to become a member.

SAFE SAVING ANTIQUITIES FOR EVERYONE

©2006 SAFE/Saving Antiquities For Everyone, Inc.

SAFE/Saving Antiquities for Everyone, Fig. 7 "LOOTED" cards. These facsimiles of museum catalog cards raise awareness about objects that are missing from museums

widely publicized. Turkey's demands for repatriation are heard the world over.

While SAFE takes no overarching position on repatriation, believing that situations should be assessed on a case-by-case basis, the arguments that favor repatriation will inform the next phase of the decades-long cultural property debate.

With the economic shift, many source countries are also becoming market countries. Still, in SAFE's view, the issue is not who owns cultural property and where it can be traded, but what we are able to learn from these relics of our shared global heritage – and what we are willing to do to protect it. Whether antiquities are bought and sold in or out of their countries of origin, archaeological record is irreparably destroyed if they are looted.

International Perspectives

The plunder of the world cultural heritage is a global concern. Across the world, law enforcement works with governmental, non-governmental and intergovernmental agencies to address this problem.

There are national laws and international treaties, which aim to protect archaeological and historic sites. In 1970, international communities came together and took action in the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Other international treaties include the Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague 1954) the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO 1972), and the UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (UNIDROIT 1995).

SAFE's first project in 2003 was an outreach program consisting of a "Poster Hanging Day," brochure and postcard and a letter writing campaign to legislators in support of the Iraq Cultural Heritage Protection Act.

SAFE has supported restrictions in the importation of antiquities under the Cultural Property Implementation Act, the US enabling legislation under Article 9 of the 1970 UNESCO Convention, as an effective deterrent to the flow of illicit antiquities. SAFE has launched "Say NO To Plunder, YES To Bilateral Agreements" campaigns to rally public support for the signing and renewal of Memoranda of Understanding (MoU) between the U.S. and other parties to the UNESCO Convention, including China, Italy, Mali, Guatemala, Greece and Cyprus. These campaigns provide materials to alert and educate members of the public about the treaties and legislation, and the reasons to support importation restrictions of antiquities. SAFE members have also testified and represented public support for MoUs before the Cultural Property Advisory Committee's public hearings at the US State Department.

SAFE continues to create outreach nation-specific Facebook campaigns such as *Say YES to Egypt*, *Say YES to Cambodia*, *Say YES to Italy*, *Say YES to Greece*, and *Save Old Kashgar, China*. After the 2011 uprising, SAFE launched *Say YES to Egypt* on Facebook, and distributed *Say YES To Egypt's Heritage* buttons to individuals and institutions around the world wishing to show support for the people of Egypt. In response to the 2010 earthquake, SAFE created a photo group on Flickr, entitled *Haiti: Look Back to Look Ahead* designed to collect images that document Haiti's cultural heritage before the earthquake.

The SAFE web site's "Legal mechanisms" and "Situations across the globe" reference sections provide information about the international situation.

Future Directions

SAFE envisions a world in which looting and the destruction of cultural heritage sites and the marketing and collecting of undocumented artifacts would be unthinkable. The current global economic shift could become an unprecedented opportunity to curtail – if not completely eradicate – the destruction of cultural heritage. First, we must increase public awareness.

As the purchase of artifacts without provenance by museums and private collectors diminishes, and law enforcement (national and international) steps up its efforts to pursue looters and smugglers; the time is now to educate everyone that plunder of such material (the ultimately nonrenewable resource) is an inherently self-defeating practice. We must drive home the message that the preservation of cultural property is a much more sustainable, and profitable, alternative.

SAFE will adhere to its core belief that information about the past belongs to us all, and commit to the preservation and protection of this information.

Cross-References

- ▶ Cultural Heritage Objects and their Contexts
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting (Ethics)

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Sagalassos, Archaeology of

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Introduction and Definition

The Pisidian city of Sagalassos is located 109 km north of Antalya (Southwest Turkey) near the town of Ağlasun (Burdur Province). The ruins are located on the southern slopes of the Ağlasun Dağları in the Western Taurus range at an altitude of 1,450–1,700 m. Although discovered in 1706 by P. Lucas, it was only in 1824 that F. V. J. Arundell identified these ruins as Sagalassos. A detailed study of Sagalassos'

ruins and inscriptions was only enacted in 1884–1885 by a team led by Count K. Lanckoroński. Neglected and forgotten during the following century, Sagalassos was included in the British "Pisidia Project" of S. Mitchell, who surveyed and mapped it in 1986–1988. Following a small-scale excavation in 1989 supervised by the Burdur Museum, in 1990, M. Waelkens (KU Leuven, Belgium) obtained full excavation rights (Waelkens 1993: 37–41). Since then, the site and its 1,200-km^2 territory (Vanhaverbeke & Waelkens 2003) have become the study object of one of the largest multidisciplinary archaeological projects in the Mediterranean (Waelkens 2008).

Key Issues/Current Debates

As indicated by surface finds and Hittite sources from the middle of the fourteenth century BCE that mention a site called Salawassa in this region, Sagalassos could already have been occupied during the Late Bronze Age. During this period, the region experienced integration into one of the Luwian kingdoms or pressure from the competing Hittite empire. After the collapse of both the Hittite empire and the Luwian states (twelfth century BCE), the Western Taurus range was settled by a tribe called the Pisidians. Sagalassos was one of their major and most warlike settlements, permanently occupied since the fifth century BCE at the latest. According to Greek sources, from the early fifth century BCE onward, many Pisidians served as "mercenaries" for the Persian Great Kings or their adversaries. This may have brought them into direct contact with the Greek colonies in Asia Minor, from which the Pisidians adopted Hellenizing influences. After the death of Alexander the Great, who captured Sagalassos and conquered Pisidia in 333 BCE(?), Pisidians served for nearly two centuries in his successors' armies. This may be why Sagalassos was governed as a Greek autonomous city-state as early as 300 BCE and had adopted a "Hellenized" material culture sharply contrasting with that of the much larger site of Düzen Tepe, which coexisted nearby and remained virtually unchanged until its late second-century BCE abandonment (Waelkens 2011: 34–36; Waelkens & Poblome 2011: 33–56). The rash adoption and sometimes adaptation of innovations (particularly architectural) would characterize all further developments of Sagalassos' material culture (Waelkens 2002). Already c. 300 BCE, the inhabitants of Sagalassos erected monuments made of large ashlars (Fig. 3, no. 1); around 300–280 BCE, an inscription with a new law issued after an internal strife, written in impeccable Greek, the new *lingua franca*, mentioned elected, rotating magistrates and referred to a still older legislature (Vandorpe 2000; Vandorpe & Waelkens 2007). Before the century's end, the city also produced pottery now inspired by shapes fashionable in Seleucid and Aegean circles (Waelkens 2011: 34–39; Waelkens et al. 2011).

In Hellenistic times (Waelkens 2004), Sagalassos eventually entered the realm of the Seleucids, who possibly established Macedonian colonists in its territory. Because it had refused to receive a Roman consul after the Seleucids' defeat at Rome's hands in 189–188 BCE, the Romans imposed an enormous penalty (Livy XXXVIII. 15; Weissenborn & Mueller 1972; Polybius, *Historiae* XXI.36.3-4; Buettner-Wobst 1957) that halted public construction for nearly a century. But in the first decades of Roman Republican rule (129–39 BCE), Sagalassos enjoyed the construction, around 100 BCE, of a bouleuterion (council house) of pure Hellenistic type seating 220 elected members (Fig. 1, no. 2). Despite the ruthless extortions of Roman tax collectors (*publicani*), regional wars, and piracy on the Mediterranean, Sagalassos' built-up area expanded toward the east, beyond its fortifications, after Pompey the Great's reorganization of Anatolia (mid-first century BCE). Shortly after that, during a short period under the rule of the Galatian king Amyntas (39–25 BCE), a fountain house of the "Greek" type protecting the drinking water from pollution and heat (a U-shaped Doric *stoa*) was built. A Doric temple (probably dedicated to Zeus) may date to the same period (Fig. 1, no. 3).

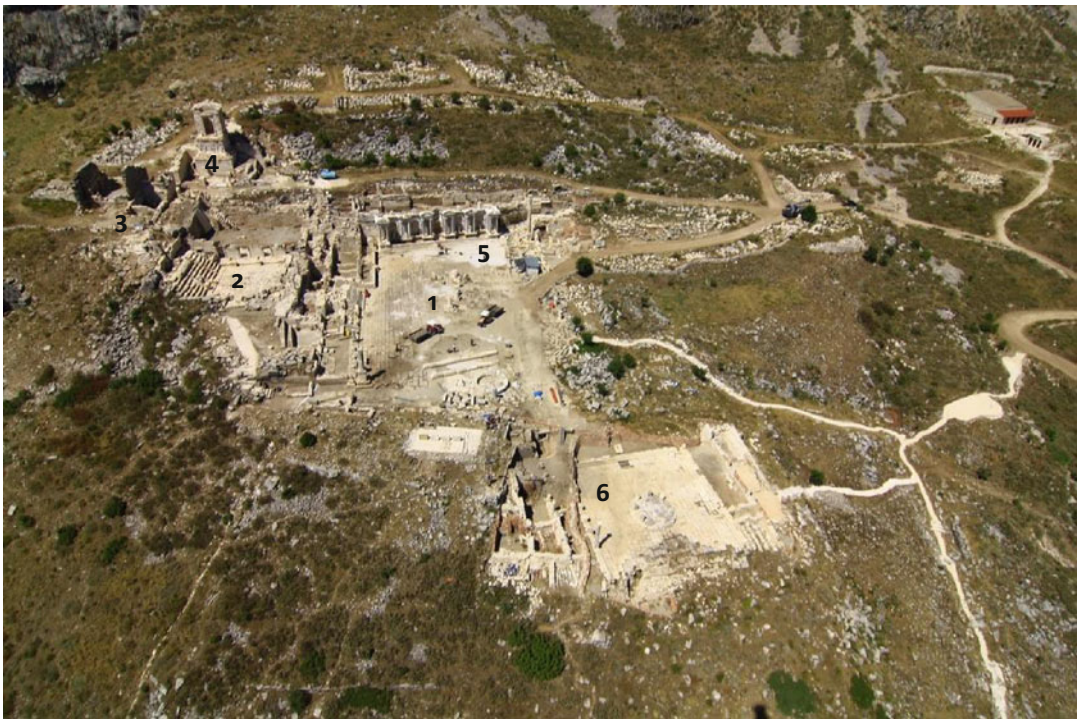

Sagalassos, Archaeology of, Fig. 1 Aerial view from the south of the upper city with: in the center, the Upper Agora (no. 1), the late Hellenistic bouleuterion (no. 2), the Doric temple of Zeus (no. 3), the restored Augustan NW Heroon (no. 4), the mid-Antonine nymphaeum (no. 5), and the macellum of the Emperor Commodus (CE 180–191) (no. 6). © Sagalassos Project

During the reign of the Roman Emperor Augustus (BCE 27–CE 14), who in 25 BCE incorporated Pisidia into the Roman Empire, Sagalassos underwent a complete metamorphosis (Waelkens 2002; Waelkens & Poblome 2011: 57–98). Augustus' foundation of seven new colonies and settlement of other veterans in four existing cities – all located within a radius of 100 km around Sagalassos – expanded the potential market for Sagalassos' farming or craft produce with nearly 80,000 colonists (from southern Gaul and central Italy). Already under Emperor Augustus, Sagalassians, aware that local Italian colonists used fine, red-slipped tableware, turned an already existing local craft tradition of red-burned pottery into an industrial production of "eastern *sigillata*." This "Sagalassos red slip ware" served Pisidia and western Anatolia for more than six centuries and reached eastern and central Mediterranean markets as far as Ostia and Carthage (Poblome 1999; Waelkens & Poblome 2011: 59–63). The construction in 6 BCE of the *Via Sebaste*, a road connecting the major colonies with the Pamphylian ports and managed by Sagalassos for over 42 miles, offered the city a direct access to the Mediterranean. Furthermore, Sagalassos' elite invested massively in agriculture; they burned down large stretches of forest and, with former grazing land, transformed them into fields mainly for growing cash crops such as grain and olives. Thanks to a climatic optimum starting with Augustus' reign and lasting several centuries, olive yards (now confined to 900 m) grew to altitudes of c. 1,400 m. Heavy-metal trace elements found in consumed animal bones indicate that the city's subsistence requirements for its 3,500–4,000 inhabitants could be largely met by the production capacity of its immediate vicinity, one highly polluted by craft activities (Vanhaverbeke et al. 2011). During most of the Imperial period, the output of the large territory of Sagalassos may have greatly

Sagalassos, Archaeology of, Fig. 2 Aerial view from the northeast of the middle city with: the "Imperial Baths" (no. 2), the Augustan layout of the Lower Agora (no. 1) extended south (left) by a 290-m-long and 9.80-m-wide colonnaded street (no. 3). Also Augustan are the shrine of Apollo Klarios (and since Vespasian the "urban" imperial cult) (no. 4) and the start of the construction of the odeon (no. 5). The latter building adjoined the late Hadrianic nymphaeum (no. 7) located above and immediately north of three nymphaea (original construction Trajanic, but already rebuilt by the reign of Hadrian; ultimately renovated in the Severan period: no. 6) along the north side of the agora. © Sagalassos Project

exceeded the subsistence needs of the rural population, estimated at c. 13,000. Owners could thus devote surplus production not used for paying taxes in kind (*annona*) to trade. This explains the numerous mausoleums and very expensive sarcophagi found throughout the countryside, in which the landed gentry were buried near their estates.

Under Augustus and his dynasty (the Julio-Claudians), the city more than tripled in size and eventually covered c. 42 ha. One of Anatolia's oldest and widest colonnaded streets – a purely pedestrian way (Fig. 2, no. 3) – was completed. It connected the city's Lower Agora (Fig. 2, no. 1) with the South Gate. Most other streets were also paved during this period, covering a very dense network of water supply that could even accommodate rich houses. In addition to arranging the city's street and water infrastructure, the Augustan period also saw the erection of early Imperial monumental buildings, including a shrine dedicated to Apollo Klarios (Fig. 2, no. 4). The Sagalassians may have worshipped through him the living emperor Augustus, who had adopted Apollo as his patron. Recently, below the second-century CE "Imperial Baths" (Fig. 2, no. 2), the thus far oldest Roman bath complex of Anatolia was discovered. Most likely, the central Italian origin of many veterans in the region explains why this building – already in use before CE 10–30 – seems to follow Campanian prototypes. The construction of an odeon (Fig. 2, no. 5), only finished two centuries later and eventually displacing the old council hall,

Sagalassos, Archaeology of, Fig. 3 The mid-Antonine nymphaeum c. CE 160–180 built along the north side of the Upper Agora (no. 3). Restored and put back into work in 2010, the monument currently displays copies of original (both corner "tabernacles") and recycled statues of Olympian gods placed in it during the fourth to fifth century, but smashed into pieces during the latter century. Adjoining the fountain to the right, the terrace wall of a storage facility built c. BCE 300 and pierced by a vaulted opening giving access to a postern running below the city's northern fortification (no. 1); on the left, on a higher terrace, the restored Augustan NW Heroon (no. 2). © Sagalassos Project

completed these Augustan building programs, which most likely still were financed by the city proper. After Augustus implemented just tax reforms based on a *census* (population count) system, which placed many revenues in the imperial treasury but not municipal ones, the wealthy elite used its resources to embellish the city, often while carrying out urban magistracies. In return, the city honored them by raising dozens of statues, which eventually filled both city squares or aligned the colonnaded street. The Upper Agora (Fig. 1, no. 1) was thus (re)arranged and paved under Augustus by an aristocratic family, and at this time, the urban elite still erected elaborate monuments, such as the NW Heroon (Fig. 1, no. 4), for members of its own class. After Augustus' death, the elite switched its building policies toward purely honorific monuments (mainly arches, gates) dedicated to the emperors and their family. These served both as an instrument for local self-advertisement and as a means of acquiring Roman citizenship and eventually knighthood. Under the Flavian emperors (CE 69–96), an elite family obtained Roman citizenship, after one of its members had introduced a municipal cult for the Flavian imperial house, albeit in connection with that of Apollo Klarios and housed in his shrine. Amid this trend, T. Flavius Severianus Neon, whose family possessed Roman knighthood, became the greatest benefactor in the city's history, starting his "career" with the construction in 120–125 CE of a public library that simultaneously was a dynastic monument and ending it, perhaps posthumously, with that of the mid-Antonine nymphaeum (see Fig. 3, no. 3).

Sagalassos, Archaeology of, Fig. 4 Aerial view from the south of the auditorium of the theater. The construction of this theater, recycling the seats of an older and smaller predecessor as supports for the new seats, must have started after Hadrian's decision to make Sagalassos the center of the "Pisidian" emperor cult. Most likely due to a lack of funding, it was never completely finished. © Sagalassos Project

The reign of Trajan (CE 98–117) initiated a new century-long building boom that peaked during the reigns of Hadrian, Antoninus Pius, and Marcus Aurelius. Henceforth, local aristocrats still financed the construction of monuments dedicated to the emperors, but now these structures also usually fulfilled a "utilitarian" function for the urban community. These included no less than five monumental fountains – four of which were nymphaea of the so-called tabernacle type (Fig. 1, no. 5; Fig. 2, no. 6–7; Fig. 3, no. 30) – and a macellum or food market (Fig. 1, no. 6). Urban elites especially opted to fund the "tabernacle" type of nymphaea, as the niches in their back wall alternated with projecting columnar "tabernacles" or *aediculae* in ways that offered the possibility to represent their founders and family members next to statues of emperors and Olympians. During the 120 s, Hadrian transferred Pisidia to the province of *Lycia et Pamphylia*, and he selected Sagalassos as the *neokoros* or officially recognized center of the imperial cult to be practiced by all of Pisidia, and granted it the honorific title of "*first city of Pisidia*, *friend and ally of the Romans*" that it proudly carried until the later fifth century. As Pisidia's imperial cult center, Sagalassos hosted festivals and games and attracted yearly visitors and delegations from all over Pisidia. This brought the city additional income and required the construction of buildings, the size of which far surpassed local needs. Thus, this period witnessed the construction of a new imperial cult temple. The "Imperial Baths" (covering more than 6,500 m^2) were built on top of the filled-in Augustan "Old Baths" that enlarged the largely artificial terrace upon which the new bath arose and were most likely inaugurated by CE 165 (Fig. 2, no. 2). A new theater, eventually seating 9,000 (Fig. 4), was completed during the later second century. Because Hadrian (Fig. 5) and his successors Antoninus Pius and Marcus Aurelius had increased Sagalassos' prosperity, six nearly 5-m-tall acrolithic statues representing them, together with their respective spouses, were perhaps erected in the "marble room" of the new bath complex. This highly representative room may have been the space where prior to the event, athletes participating in the Klareia, games associated with the cult of Apollo and that of the emperors, received the oil to cover their bodes and where the victors afterwards were given their prizes.

Although the urban elite still invested in new games that carried their names (e.g., Vareia, Tertulla, Kallipianea) and were connected with the *Klareia* and the imperial cult, public building activities halted at Sagalassos between the reigns of Alexander Severus (ending in 235) and Theodosius I (starting in 379). Not only was the city saturated with all potential urban amenities,

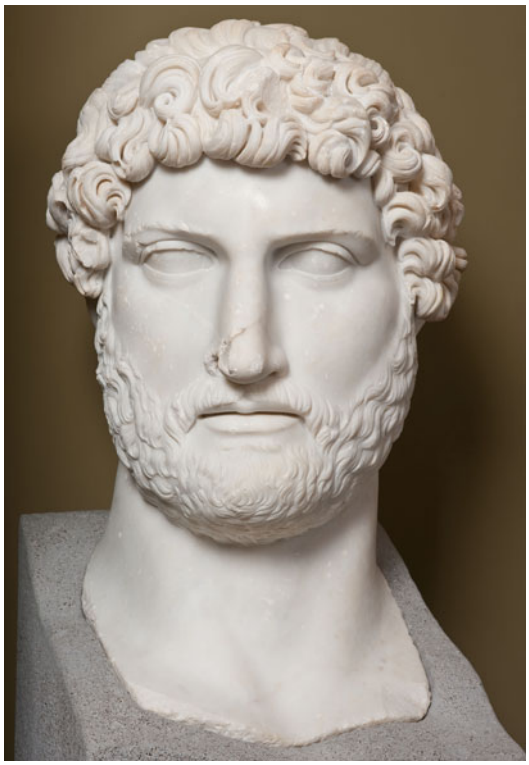

Sagalassos, Archaeology of, Fig. 5 Colossal portrait head, belonging to an acrolithic statue of the emperor Hadrian, sculpted c. CE 120–125 and at that time so perhaps displayed in the "marble room" of the "Imperial Baths." © Sagalassos Project

but a certain stagnation also may have occurred due to shrinking markets, some of which were affected by this century's civil instability and invasions (Goths, Persians). During the later fourth century, public and private constructions resumed. Around CE 400, a new city wall was built to protect only one-third of the city, as it adopted the circuit of the early Hellenistic fortifications. Despite the use of *spolia*, its carefully built walls, especially near gates, do not suggest a hasty construction caused by a specific threat, but rather reflect a new civic pride. During the reign of the Theodosii (CE 379–450), the bath complex also underwent a massive and still lavish renovation, changing the function of many rooms. During this intervention, the "marble room" became a room for hot water bathing (*caldarium*), whereas its colossal, acrolithic imperial statues were dismantled and moved to the southern undressing rooms of the original *frigidarium* (cold space) for men. A mosaic inscription, laid when this room's floor was repaired after an earthquake around CE 500, clarifies that this room henceforth was a multi-functional public hall, also used for communal dining. At first, common meals may still have been organized here to honor the emperors, after distributions of meat of sacrificed animals ceased amid the abolishment of festivals in which the imperial house was explicitly worshipped. In fact, it is likely that the space was rapidly usurped for organizing public meals at the occasion of Christian feasts and as part of Christian charity. During the same period, an older peristyle villa became the nucleus of an enormous urban palace including newly built public and private wings. It may have been the residence of an aristocrat belonging to a newly emerging super-elite. Whereas city councillors and mere municipal magistrates still had to carry all financial responsibilities of their office, which by now were very burdensome, members of this new top class earned exemption from taxation by serving in the imperial administration of the province(s), where they had acquired large landholdings beyond their cities of origin. Although extremely rich, they no longer invested their wealth in their home cities for other than private structures, such as the luxurious urban mansion at Sagalassos (which, however, may also have been the residence of Sagalassos' bishops, first documented as attending the Council of Constantinople in CE 381).

Christianity only gradually became the predominant religion of Sagalassos (Waelkens et al. 2006; Waelkens & Poblome 2011: 131–52), whose elite still sympathized with paganism and "classical" culture deep into the sixth century. By the early fifth century, dilapidated monuments of the "pagan" past, such as the Hellenistic bouleuterion and the abandoned shrine of Apollo Klarios, were transformed into the city's first Christian basilicas. However, these transformations should not be interpreted as symbols of the victory of the new religion; they rather reflect a continuing concern to maintain the

city's aesthetic appearance, as both structures had become eyesores in the cityscape because of their highly visible location. Christian symbols would only appear on locally produced pottery around the middle of the century, at first still competing with Dionysian motifs. Overall, the introduction of Christianity at Sagalassos seemingly coincided with urban tensions expressed by Christian rioting in the late fourth century, antagonism between Arianism and Catholicism in the 370s–380s, and internal strife between two factions during the fifth to sixth centuries, with worshippers of St. Michael (*Michaelitai*) as the ultimate victors.

Between the middle of the fifth and middle of the sixth centuries, many structures were almost entirely rebuilt on a monumental scale. Many of these renovations affected both the urban infrastructure (e.g., the colonnaded street and the adjoining part of the Lower Agora) and public monuments. During the renovation of the colonnaded street, the erection of two completely new monuments – one carrying newly displayed pagan statuary and another one honoring Julian the Apostate (CE 361–364) – testifies to the perseverance of symbols of the old "pagan" culture among some of the decision makers in the city. The CE 525–550 date of many of these renovations suggests repairs after some catastrophic event, most likely the earthquake in the meantime known to have required extensive repairs in the baths shortly after CE 500. However, all these activities ended abruptly, when in CE 541–42, the intermittently recurring bubonic plague (as elsewhere in Anatolia) probably killed one-third of the urban and rural population. Many, if not most, members of the super-elite who survived the disease likely lost their fortunes, as people working their land had either died or fled. After this catastrophe, Sagalassos gradually lost its urban appearance and eventually gave up all municipal services (such as organized waste collection). This coincided with increasing impoverishment and stress on urban subsistence, as farming activities now also happened inside the city proper (Waelkens et al. 2006; Waelkens & Poblome 2011: 153–58).

When a major earthquake occurred in CE 602–620, initial plans for rebuilding were abandoned. Yet, during the course of the seventh century, the city possessed dispersed habitation, and an impressive wall with two towers, perhaps associated with the Arab invasions, closed off the southern extremity of the colonnaded street and the promontory that once housed the shrine of the Pisidian emperor cult. By the end of the century, occupation at Sagalassos disintegrated into at least two isolated hamlets, and this promontory would hold the larger of the two. Protected by a fortification of its own, it was continuously inhabited until the later eleventh century, at which point this site was abandoned.

A mid-Byzantine fortress on the so-called Alexander Hill most likely was destroyed by the Seljuks in CE 1204. However, a cemetery associated with another, not yet identified habitation nucleus, remained in use until the later thirteenth century.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Aesthetics in Archaeology
- ▶ Agora in the Greek World
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Bone Chemistry and Ancient Diet
- ▶ Buildings, Archaeological Study of
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Ceramics: Scientific Analysis
- ▶ Chemical Survey of Archaeological Sites
- ▶ Classical (Greek) Archaeology

- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Culture in Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Domestic Architecture, Roman
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Economy, Roman
- ▶ Geoarchaeology
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Iconography in the Roman World
- ▶ Imperial Cult, Roman
- ▶ Indigenous Archaeologies
- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Material Culture and Education in Archaeology
- ▶ Olives: Origins and Development
- ▶ Polis
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Romanization
- ▶ Social Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Stoa
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Survey Archaeology in the Roman World
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Archaeology
- ▶ Urban Planning, Roman
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Sahara, Makoto

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Basic Biographical Information

Makoto Sahara (1932–2002) (Fig. 1) is a Japanese archaeologist. He was born in Osaka, Japan, in 1932. He picked up a piece of pottery in the park when he was a kindergarten child and decided to become an archaeologist. He participated in an anthropology class for junior high school students organized by the Japanese Anthropological Society and was impressed by Sugao Yamanouchi who founded Jomon studies in 1947. He started visiting Yamanouchi at the University of Tokyo to take private lessons and became absorbed in study of the decoration of Jomon pottery. After graduating from the Department of German at the Osaka University of Foreign Studies, Sahara obtained a doctoral degree in archaeology from Kyoto University. After this, he joined the Nara National Research Institute for Cultural Properties in Nara and took part in excavations of the Heijo Palace site in 1964. He became the Head of the Center in 1992 at the age of 60 and an Assistant Director of the National Museum of Japanese History in 1993. He was Director of this museum from1997 until he retired in 2001. He died in 2002.

Sahara, Makoto, Fig. 1 Makoto Sahara (Photo courtesy of Shin'ichiro Fujio)

Major Accomplishments

Although the Yayoi period was the focus of Makoto Sahara's study, the range of his interests was wide and included the origin and lifestyle of Japanese people. The title of his graduate thesis was "The application of the question of handedness to archaeology." Among his unique works is a comparative analysis of prehistoric pictures on the bronze bells from the Yayoi period with children's pictures, undertaken from the viewpoint of art history and psychology. The archaeology of the Wei-zhi was his last work. He used to comment that he leaned the method of fine observation from Sugao Yamanouchi and how to construct theory from Yukio Kobayashi.

Makoto Sahara strongly insisted that archaeology should not be for a limited number of specialists but for the public. He advocated an accessible and interesting archaeology. He tried to use simple, plain words instead of academic jargon in his writing and suggested that other archaeologists to do the same. In order to make archaeological data and interpretations available

to the public, he worked hard to establish and/or empower museums and to protect and preserve archaeological sites, such as the Yayoi settlement site of Yoshinogari, Saga prefecture. When he retired in 2001, Sahara donated about 7,000 of his own books to the library of Chatan town in Okinawa prefecture.

Makoto Sahara's research into the origin of warfare had implications in terms of contemporary warfare. His analysis of stone arrowheads from the Yayoi period concluded that arrowheads as weapons developed during the Yayoi period as evidence of weapons for killing people did not exist in the preceding period. Based on this data – and with potential lessons for modern warfares in mind – Sahara insisted that we should be able to stop warfare because human beings lived without it until recently (in terms of an archaeological time frame).

After Makoto Sahara's death, a collection of his works was assembled by Hiroshi Kanaseki and Hideji Harunari and published in six volumes in 2005 as *The works of Makoto Sahara*.

Cross-References

► Kanaseki, Hiroshi
► Yamanouchi, Sugao

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Saito, Tadashi

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Basic Biographical Information

Saito Tadashi is a Japanese archaeologist and an Emeritus Professor of Taisho University. He was born in Hokkaido in 1908 and has lived to be over 100 years old. When he was one year old, his parents moved to Sendai in the northeast part of Japan. In 1921, Saito Tadashi entered junior high school (in the old system of education, almost equal to the high school in the present educational system), and during his junior high school days, he loved to walk around watching the local customs and manners and sometimes collecting artifacts on the Daigi-gakoi shell midden of Jomon period. In 1926, he entered Second High School (in the old system of education, equal to the half stage of an undergraduate degree in the present educational system) in Sendai. There, he organized a studying club for students who were interested in field surveys, with Nobuo Ito, who would later become the first professor of archaeology in Tohoku University. As a member of the club, he took part in the excavations of Daigi-gakoi shell middens by Sugao Yamanouchi in 1927, and in 1929 he learned from Dr. Yamanouchi about how the cord-mark decoration had been made on Jomon pottery. Saito Tadashi's first paper was published in 1927 as a report on that shell midden. He subsequently wrote papers on folklore for the journal edited by the great folklorist, Kunio Yanagita.

Following Yanagita's advice, Professor Saito chose to study at the Department of Japanese History of The University of Tokyo in 1929. He also attended various lectures in different faculties such as anthropology, prehistory, and architectural history. During this period, he helped to edit the archaeological journal issued by The Imperial Museum, *Kokogaku Zasshi* (*The Journal of the Archaeological Society of Nippon*), which led him to have broad knowledge and a large network of contacts. In 1932, he wrote his bachelor dissertation on Japanese ancient mortuary practices. He then went to Kyoto University to learn archaeology from Kosaku Hamada, who made him a junior assistant (1932–1935). From 1933 to 1940, he undertook many excavations and surveys in and around Korean Peninsula. He served as a curator of the museum in Gyeongseong in the second half of his overseas mission. This experience would come to fruition in 1955 in his doctoral thesis on the Silla culture.

After returning to Japan, Professor Saito worked in the Ministry of Education and Culture for more than a quarter century (1940–1966), travelling throughout the Japanese Archipelago to conduct cultural heritage management by inspecting archaeological sites. This included his contribution as a governmental officer to facilitating the excavation of Toro in 1948 in which an interdisciplinary team systematically investigated a prehistoric paddy field for the first time, and through which establishment of the Japanese Archaeological Association was promoted. In 1955, Professor Saito received a doctorate from The University of Tokyo, and he started to give lectures there in 1962. He then became a professor of the Faculty of Letters at the university, 1 year before he left the Ministry of Education and Culture. In 1969, he left the university on reaching retirement age and was invited as a lecturer to Taisho University. In the next year, he became a professor, and in 1983 he became an Emeritus Professor of the university.

Major Accomplishments

Professor Saito wrote a large number of books, ranging from the history of archaeology, through Buddhism archaeology and archaeological methodology, to paleology. In his work he placed importance on the following: (a) making full lists of archaeological sites; (b) making a reference list of archaeological books, papers, and other writings; and (c) making comprehensive collections of the information, drawings, and photos of archaeological objects. He has never shirked such basic works and regarded them as essential to the discipline. One of his conspicuous accomplishments is thorough and comprehensive research on the history of archaeology. He once said that he had a sense of mission in studying the history of archaeology because he had graduated from a Department of Japanese History (1997b).

Professor Saito had made every effort to preserve archaeological sites during the decades of his career when he was with the Ministry of Education and Culture. His outstanding contribution to cultural heritage management was to protect significant national heritage sites from military, political, and economic pressure even during and immediately after World War II. It included the development of a Navy military base planned on the location of a shell midden, the construction of a railroad besides a castle for military use, and manganese mining by the local conglomerate planned below a tumulus. These episodes demonstrate his strong sense of responsibility for archaeological materials.

Professor Saito published a textbook on archaeology, *Koko-gaku no Kekyu-ho* (*Methods in Archaeology*), in 1950. A considerable amount of data had been collected since the first textbook of archaeology in Japan was written by Kosaku Hamada in 1922, but a systematic introductory book of archaeology had not been produced for decades. Saito's textbook followed the style of his master of archaeology, Hamada, and looked like a revised edition of Hamada's book, *Tsuron Koko-gaku*, together with upgraded appendix such as a full glossary, comprehensive references, and extracts of relating laws. Saito's

practical experience in the Korean Peninsula and his broad purview on ancient remains obtained as an officer of the Ministry of Education and Culture possibly enabled him to produce this significant book for beginners in archaeology, not later than five years after the defeat of the WWII.

In practical archaeology, Professor Saito takes a comparative approach to study of the ancient East Asian cultures based on his broad knowledge and experience of archaeology there, accumulated since the 1930s. The products of his work include several books on ancient Korean culture, including his doctoral thesis. His interest in burials and temples was combined with knowledge of historiography and paleology, making him a prominent figure in historical archaeology. Above all, his achievements in the archaeology of Buddhism are unparalleled.

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- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Yamanouchi, Sugao

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Basic Biographical Information

Noel B. Salazar received his Ph.D. in Anthropology from the University of Pennsylvania (USA). He is currently Research Professor at the Faculty of Social Sciences of the University of Leuven (Belgium), where he founded the research cluster Cultural Mobilities Research (CuMoRe). He teaches in the anthropology program and the interdisciplinary heritage management module. In addition, he is Senior Researcher of the Research Foundation Flanders (FWO) and Visiting Professor at the Faculty of Foreign Languages and Literatures of the University of Bergamo (Italy).

Major Accomplishments

While at the University of Pennsylvania, Dr. Salazar experienced firsthand the benefits of transdisciplinary research. His involvement within the Department of Anthropology's "Public Interest Anthropology" taught him the necessity of bridging the divide between academia and the wider public. Together with archaeologist Benjamin W. Porter, now Professor at the

Near Eastern Studies Department, University of California at Berkeley, he applied the public interest perspective to heritage tourism. For this work, he was awarded with a Student Achievement Award from the National Association for the Practice of Anthropology. Understanding the changing meaning and value of (intangible) cultural heritage is still high on his research agenda. This forms part of Salazar's broader work within the emerging field of critical heritage studies.

Dr. Salazar's research interests include anthropologies of mobility and travel, the local-to-global nexus, discourses and imaginaries of Otherness, heritage interpretation, cultural brokering, and cosmopolitanism. He has conducted fieldwork at world heritage sites in Indonesia and Tanzania. His anthropological work synthesizes ethnographic findings with conceptual frameworks developed within anthropology, sociology, geography, cultural studies, tourism studies, philosophy, and psychology.

Dr. Salazar has won numerous grants for his innovative research projects, including from the National Science Foundation, the European Commission, and the Research Foundation Flanders. He was involved as expert collaborator in the first UNWTO study on tourism and intangible cultural heritage and the World Heritage Tourism Research Network international survey on the heritage of the Great War, 1914–1918.

Internationally, Dr. Salazar serves as President (and, previously, Executive Committee Member) of the European Association of Social Anthropologists, National Delegate of the Permanent Council of the International Union of Anthropological and Ethnological Sciences, and Chairman of the IUAES Anthropology of Tourism Commission. In addition, he is on UNESCO's and UNWTO's official roster of consultants, an expert member of the ICOMOS International Cultural Tourism Committee and the UNESCO-UNITWIN Network "Culture, Tourism and Development", and an expert panel member of the National Geographic Society's Center for Sustainable Destinations. In Belgium, Dr. Salazar is member of the National Consultation Panel of the European Commission's Joint Programming Initiative on Cultural Heritage and steering group member of the University of Leuven's interdisciplinary Cultural Heritage Task Force.

Dr. Salazar is the author of several books and numerous peer-reviewed articles and book chapters on the anthropology of heritage tourism. He sits on the editorial boards of *Social Anthropology*, *Annals of Tourism Research*, *Journal of Heritage Tourism*, *International Journal of Tourism Anthropology*, and *AIBR – Revista de Antropología Iberoamericana*.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Indonesia's World Heritage
- ▶ Intangible Cultural Heritage
- ▶ Journal of Heritage Tourism
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Tanzania's History and Heritage

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Basic Biographical Information

Dr. Saleh graduated from the Faculty of Engineering of Cairo University and received his Ph.D. from the University of Paris, France. His main interest is the application of the new technologies in the different fields of cultural and natural Heritage. He is currently professor of computer engineering at Cairo University. From 1995 to 1997, Dr. Saleh occupied the position of cultural councilor at the embassy of Egypt in Paris, and from 1997 to 1999, he was Egypt's ambassador to UNESCO.

Major Accomplishments

Dr. Saleh is also the president of Herimed (Association for the Documentation, Preservation and Valorization of Euro-Mediterranean Cultural Heritage). He is a member of the Supreme Council of Culture and of the Board of the Director of the Supreme Council of Antiquities, as well as a member of "Institut d'Egypte."

Dr. Saleh founded the Center for Documentation of Cultural and Natural Heritage (CULTNAT) in 2000 as a national center for documentation of different aspects of cultural and natural heritage of Egypt. CULTNAT is part of Bibliotheca Alexandrina and is supported by the Ministry of Communications and Information Technology. Dr. Saleh currently holds the position of CULTNAT's founder and emeritus director.

In the field of cultural heritage, CULTNAT has documented different aspects of tangible and intangible heritage. One of the major projects in tangible heritage has been building the Archaeological Map of Egypt for which the center has won the Stockholm Chalange Award in 2004. CULTNAT has a series of publications in every field of heritage such as atlases for every region in Egypt with all archaeological sites included, works of the Egyptian musicians, contribution of Arab Civilization in sciences through old manuscripts, the presidential palaces, etc.

A major study was carried by the center and headed by Dr. Saleh entitled "A strategic approach to Egypt's Cultural Heritage." This study was done upon request from UNESCO. The study shows the different steps to be followed in order to properly manage Egypt's cultural heritage.

Dr. Saleh also managed to establish a masters degree in cultural heritage management (CHM) in association with the French University in Cairo.

Dr. Saleh has won several international awards. In Qatar, in 2010, he received the "Information Systems Expert First Award" from the Arab Towns Organization. In 2010, he won the award of ARCHAEOLOGICAL 2.0 from the "Il Congreso Internacional de Arqueologia et Informatica Grafica, Patremonio e Innovacion" held in Seville, Spain, for his work on "Virtual Representation of Egyptian Cultural Heritage."

Besides these awards, he won the World Summit Awards for different heritage contributions three times. The first was in Geneva in 2003, the second was in Tunisia in 2005, and the third was in Abu Dhabi in 2010.

Cross-References

▶ Heritage Areas
▶ UNESCO World Heritage Convention (1972)

▶ UNESCO's World Heritage List Process
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Sambaquis Shell Mounds, Archaeology of

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Introduction

The Brazilian coast was settled by groups of fisher-gatherers who built mounds known as *sambaquis*. These mounds (Fig. 1) are the main archaeological evidence of these groups, known as *sambaquieiros* or shell mound people. *Sambaqui* is a word of Tupi etymology, the language spoken by farmers and ceramic-making groups that occupied the Brazilian territory when Europeans arrived. *Tamba* means shell, and *ki* means mound, which are the most important visual features of these sites.

The oldest dates indicate that some areas of the coast were already occupied around 7,000 years ago, and the territory was intensively populated by mound-building groups between 4 and 3000 years BP. These fisher-gatherers dominated the Brazilian coast until 2000 BP, when ceramic-making groups originating from central South America and Amazonia began to occupy coastal areas and destabilized the *sambaquieiros* way of life.

Definition

Sambaquis are typically characterized by rounded, elevated structures in southern Brazil; some sites reached 65 m in height, although the sites are usually not higher than 5 m in other areas. The archaeological deposits that compose these sites primarily include mollusk shells and bones of fish, birds, and mammals. A variety of stone and bone artifacts, postholes, and hearths have also been identified, often resulting in an intricate stratigraphic record. The most noticeable remains in the composition of these sites are the shells from *Anomalocardia brasiliana*, *Lucina pectinata* and several mussel species. Burials of men, women, and children of different ages have been recovered from the most *sambaquis*, and the skeletons are usually articulated. These sites are a distinct space that becomes conspicuous on the landscape because of their sheer volume and the topographic nature of the coastal plain. They served as the final destination of the deceased, particular places, in which concentration of shells neutralized soil acidity and created conditions conducive to the preservation of human bone.

The prehistoric occupation of the Brazilian coast caught the attention of researchers long ago, and scientific interest in this type of archaeological site has been significant since the second half of the nineteenth century. Initially, the issue that dominated the studies concerned natural versus anthropic origins of the sites. The "naturalist" school argued that *sambaquis* were the result of receding sea levels and the resulting effects of wind upon shells on the beach. The presence of human remains was commonly attributed to shipwrecks. In contrast, scientists that believed in an anthropogenic origin asserted that the sites were the results of human action and proposed multiple explanations for the accumulations of faunal remains.

Sambaquis Shell Mounds, Archaeology of, Fig. 1 Santa Marta Sambaqui, Santa Catarina, Brazil

The advancement of research at several sites and findings of indisputable evidence of human activities made the naturalistic movement lose its followers. However, the origins of *sambaquis* were discussed until the 1940s by some researchers who argued that the sites were created by a combination of natural and anthropic elements. This perspective became known as the "mixed" theory.

Since the nineteenth century, the proponents of anthropogenic origins of *sambaquis* are divided among two distinct views that continue to influence current research. On one hand, *sambaquis* are considered to be the results of casual accumulation of food refuse because of the large quantity of faunal remains found at the sites. The other perspective argues that the sites are mortuary monuments because of the presence of burials (Wiener 1876). These distinct perspectives emphasize different functions of the settlements: the first model suggests that *sambaquis* were habitation sites, while the second supposes that they were cemeteries.

Although the focus of early debate was the origins of *sambaqui* formation, some important contributions were made at the end of the nineteenth century, including observations about formation processes, landscape, composition, chronology, subsistence, and the physical characteristics of the populations. Some of these topics remain current and more fully developed, while others have been dismissed. One of the main issues that dominated the social sciences in Brazil between the end of the Empire and the First World War (1889–1914) was the diversity of the human species and the notion of race, later rejected as a scientific category. Skeletons, especially skulls, were favored by researchers, often to the detriment of other materials, and they were used extensively in the first works of Brazilian anthropology, dating from 1860. These studies were influenced of French and German authors and were strongly affected by deterministic, racial theories (Seyferth 1985). These investigations resulted in extremely descriptive research, focused on characterizing human "types."

Although eventually dismissed, the naturalistic theory resulted in an important contribution to the understanding of *sambaquis*. Some researchers explored the idea that rather than being the result of natural forces, *sambaquis* mark natural processes, and they can be good indicators of sea level variation. For example, Krone (1908) believed that older *sambaquis*, composed predominantly by oysters, were farther away from the modern coast, while more recent sites would be located close to the sea and composed of *A. brasiliana* shells. These studies were significantly developed from the 1970s onward with research focused on comprehending coastal evolution.

Some geomorphologists, considering that the basis of sambaquieiros' diet came from the sea, believed that the groups lived closed to the coastline. For these researchers, a site's spatial proximity to the sea was used to make inferences about coastal dynamics (Martin & Suguio 1976). Despite being considered questionable evidence for some (Scheel-Ybert et al. 2009a), spatial distribution research yielded important results. Recent coastal evolution analyses resulted in indispensable paleoenvironmental reconstructions, allowing the characterization of locales chosen by *sambaquieiros* to erect their settlements, as well as an understanding of the criteria that guided site selection.

Until the 1950s, *sambaqui* studies were focused on individual sites, hindering the broader understanding of coastal occupation. In this same decade, the first systematic works were completed, and radiocarbon dates were recovered. French and North American archaeologists, including Annette and Joseph Emperaire, Alan Bryan, and Wesley Hurt, went to Brazil to study two eminent topics of the country's archaeology: monumental *sambaquis* and the hunter-gatherers of Lagoa Santa, Minas Gerais. At the same time, Brazilian intellectuals, led by Castro Faria, Paulo Duarte, and Loureiro Fernandes, initiated an intense movement aimed at the protection of the sambaquis, which had been continuously destructed for large-scale lime production since the sixteenth century.

Slowly, the number of studied sites increased, along with the breadth of the research questions being addressed. The noteworthy accumulation of knowledge that occurred from 1965 helped to renew the discipline. Two large projects had great repercussions in the way archaeology was carried out in Brazil, leaving strong impressions upon the predominant theoretical and methodological perspectives among Brazilian archaeologists: the National Program for Archaeological Research (Pronapa) was initiated in 1965 and coordinated by Clifford Evans and Betty Meggers, while the French-Brazilian Mission was created in 1973 and coordinated by Annette Laming-Emperaire.

The major concern of Brazilian archaeology until the end of the 1980s had been the investigation on cultural change through time. The discipline was marked by the creation of various phases and traditions used to define economic transformations deemed important. This system prevailed for more than two decades; the site-based approach and the interpretative scheme became practically synonymous with archaeology in the country. Conversely, some isolated studies started to investigate the spatial organization of *sambaquis*' internal features. The distribution of hearths, house outlines, and burials were studied using teachings from French archaeology to understand their complex arrangement (Kneip 1976). One notable exception is Prous (1974), who detected great similarities in the representations of animals in bone and lithic sculptures and suggested the possibility of some form of ideological unity shared by *sambaquieiros* from the southern and southeastern coasts.

Scholars who considered *sambaquis* as deposits of food refuse were particularly interested in investigating faunal remains. At first, this line of research focused exclusively on the identification of animal remains, resulting in long species lists. Later, the lists were supplemented by quantification of the identified elements, and researchers tried to infer the dominant economic activities. Finally, bones and shells were counted, and correlations were made between the remains and the quantity of food they represented. This was a significant advancement, as the visual prominence of the shells was overcome. Shell valves tend to preserve well in the archaeological matrix and are obviously notable because of their color and volume. These characteristics give the impression that collection of shellfish was the primary activity that sustained the population. The goal of investigators was to characterize the diet, treating the sites individually without advancing in the delineation of social relationships of an economy based on aquatic resources.

Systematic studies of food remains were linked to Pronapa's perspective, and this context helped to elaborate a reference model that persisted until the beginning of the 1990s. The model asserted that the sites' different layers were the remains of successive settlement episodes by bands of nomadic gatherers, and

mollusks were the basis of the diet. Environmental alterations related to sea level changes and/or mollusk bed overexploitation were believed to have led the *sambaquieiros* builders to change their economic basis, transforming them into fishers. The location of the sites in relation to the coast was frequently cited as evidence in support of this hypothesis.

The 1990s brought renewed interest in sambaquis, and the representation of these groups changed. They were no longer perceived as bands of nomadic mollusk gatherers searching for food. Researchers began to discuss social organization, site formation processes, and the elaborate funerary ritual, and the grandeur of the sites was now seen as the outcome of more complex social interactions. The paradigm was forever changed, usurping the preconceived notions that had lingered since the nineteenth century, equating the *sambaquieiros* to "primitive" people.

Key Issues/Current Debates/Future Directions

Recently, archaeologists have pursued the idea that *sambaquis* themselves are artifacts, constructed according to social rules making it possible to study not only their content but also their form, function, and settlement implications. As a consequence of their visibility in the coastal plain environments, *sambaquis* are considered landscape markers, further transforming approaches to this type of site.

In the first decade of the twenty-first century, different scales of observation were articulated to build interpretations about the lifeways of *sambaquieiros*. On one extreme, a broad perspective investigates satellite images to study site distribution and function and settlement patterns. On the opposite end, some scholars use a focused approach, employing microscopes to examine evidence like dental calculus, joint conditions, and wood fragments, providing information about some of the more particular habits of coastal groups.

Research focusing on groups of sites attempts to understand the relationships among the units and their characteristics. Since *sambaquis* have different dimensions, the hierarchical relationships among settlements are discussed, and since many neighboring sites were simultaneously occupied, scholars also explore their complementary roles. It has been argued that isolated sites did not have sociological significance and that a set of *sambaquis* is the minimum unit of occupation. It has also been established that *sambaquis* occur in all regions of the Brazilian coast and are concentrated in areas where the coast is interrupted by rivers, estuaries, and lagoons. Some scholars argue that, despite regional and temporal specificities, *sambaqui* builders had a "collective individuality," in the sense proposed by Marcel Mauss (1979). Comparison with other types of sites located in Brazil indicates that the custom of building mounds in the coastal plain through accumulation of faunal materials and interring the dead in these spaces is a custom exclusive to the *sambaqui* population.

Systematic studies interested in landscape use and the spatial distribution of *sambaquis* use an approach that involves detailed knowledge of coastal evolution, site dimensions, site function, and formation processes. Research at Santa Marta paleolagoon, in Santa Catarina state, confirmed an ample territorial overlapping, as in other areas, clearly indicating patterns of community interaction surrounding the lagoon. Lagoons were the epicenter of these groups' social and economic universe. The spatial configuration of sites, along with analysis of several radiocarbon dates, demonstrates that some sambaquis were active for more than eight centuries. Analysis of the visibility of large sites, almost always central within each site cluster, indicates the existence of sedentary communities that grew in the surroundings of the lagoon (DeBlasis et al. 2007). Demographic parameters suggest impressive concentration of people in some areas of the Brazilian coast (Fish et al. 2000).

A fundamental interpretive change occurred regarding *sambaquis*' formation processes: faunal remains cease to be seen solely as indicators of diet, but also as building materials. These changes refer specifically to the shells, since

Sambaquis Shell Mounds, Archaeology of, Fig. 2 Jabuticabeira II Sambaqui, Santa Catarina, Brazil

isotopic studies indicate mollusks did not make a significant contribution to the diet of *sambaquieiros* (De Masi 1999; Klokler 2008). In fact, new zooarchaeological methods and analyses demonstrate that fishing was always an important subsistence activity of these coastal groups (Figuti 1993). Moreover, paleobotanical studies and analyses of plant remains recovered from dental calculus and lithic artifacts show a more diverse diet than previously thought. The diet included a great variety of wild plants, and probably some cultivated species as well, which possibly included some cariogenic species. An incipient form of tending and harvesting (horticulture) of tubers and fruit trees is suggested in many sites located in the southeastern region and at least in some sites of the Brazilian south (Scheel-Ybert et al. 2009b).

Concerning the funerary realm, *sambaquieiros* use of mollusk valves to build their cemeteries assured the preservation of human skeletons. This preservation, associated with the visibility of the dead, who controlled the *sambaquieiros*' territory from the top of the sites, resulted in a particular funerary program. Everything within a *sambaqui* seems to have followed the logic of increasing the height of the monument while at the same time guaranteeing better visibility for the dead.

Studies of several meters of profiles from the site Jabuticabeira II, in Santa Catarina (Fig. 2), indicate that its volume, 320,000 cubic meters, is primarily a consequence of activities related to funerary ritual. The ritual involved the deposition of the body in the top of the mound, inclusion of large quantities of offerings, and long-term maintenance of hearths, resulting in thick deposits of ash.

Hyperflexed bodies were deposited close to each other, delineating funerary areas within the large site. Shallow graves were delimited by posts, occasionally made with hardwood (Bianchini et al. 2007). After the deposition of many burials, the areas were closed with the deposition of successive lenses composed predominantly by shells or fish bones, charcoal, and sand, resulting in an intricate stratigraphic sequence (Fish et al. 2000; Klokler 2008).

Studies of archaeofacies propose that the materials were processed in spaces outside the site and had different treatment before being deposited within the *sambaqui*. In this way, the body and its associated offerings comprise a primary deposit, and the materials covering the funerary areas were secondary or tertiary deposits. The materials that cover the funerary areas may have been accumulated in small *sambaquis* located nearby, whose archaeological layers rarely surpass 40 cm in thickness (Villagran et al. 2010).

The repetition of funerary ceremonies throughout more than eight centuries created a monumental element in the landscape that, due to its size and configuration, perpetuates a message that its builders wanted to transmit (Fish et al. 2000). The successive events, directly related to the process of site growth, inform visitors to the coast that the area is the *sambaquieiros* domain where they interred their dead. In this way, *sambaquis* are the result of intense social processes that resulted in a highly domesticated landscape, marked by sentimental and emotional references.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mesoamerica: Subsistence Strategies by Region

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Sankalia, Hasmukh Dhirajlal

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Basic Biographical Information

Hasmukh Dhirajlal Sankalia (Figs. 1 and 2) was born in Bombay on 10 December 1908 into an

Sankalia, Hasmukh Dhirajlal, Fig. 1 Young Sankalia

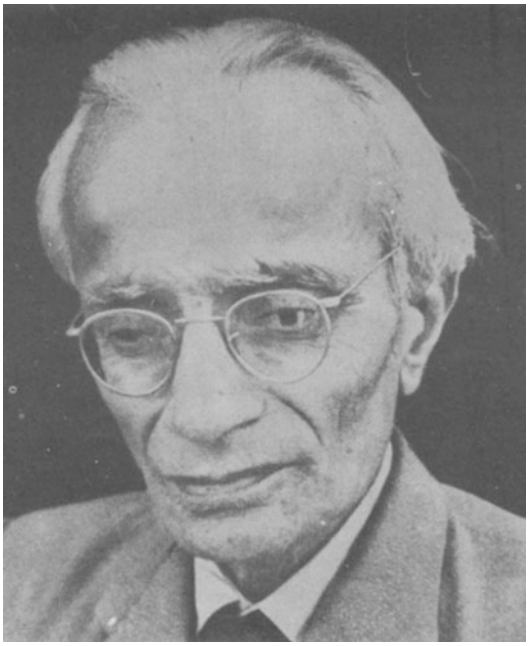

Sankalia, Hasmukh Dhirajlal, Fig. 2 Old Sankalia

upper-middle-class Gujarati family for solicitors. He was born underweight and retained a frail constitution all through his life. Sankalia was dead in 28 January 1989. In 1959, Uma Vasudev, a journalist writing in the *Illustrated Weekly of India*, described Sankalia "as fragile as the pot-sherds he mends." Sankalia passed his matriculation examination in 1925, securing the highest marks in Sanskrit for which he won the Chimanlal Ranglal Prize of Shri Surti Dasha Porwad Hitechhu Sabha. His father and uncle wanted him to follow the family profession of law, but he joined St. Xavier's College to pursue the study of Sanskrit and History. Sankalia studied Sanskrit for his B.A. and History for his M.A. Sankalia passed his M.A. examination in 1933 with a first class and won the Pandit Bhagwanlal Indraji Prize of Bombay University. The thesis was published in 1934 as a book. Simultaneously with his M.A. degree, Sankalia also passed his LL.B. examination to satisfy the wishes of his father and uncle.

In 1934, Sankalia joined London University to do his Ph.D. in ancient Indian History. It was the influence of his teachers in England that eventually turned Sankalia's interest in Archaeology. He wrote his Ph.D. thesis on the Archaeology of Gujarat. This was the study of historical period comprising art, architecture, epigraphy, and numismatics and was based on both field work and library sources. Sankalia got his Ph.D. degree in 1936. The thesis was published as a book in 1941 with financial assistance from London University (Sankalia 1941).

Sankalia was a life member of the Asiatic Society of Bombay; Bhandarkar Oriental Research Institute, Pune; Linguistic Society of India, Pune; and Indian Archaeological Society, New Delhi. He was the founder Chairman of the Indian Archaeological Society and continued in this position until he voluntarily resigned it in 1980 much against the wishes of the society's members. He was a member of the Permanent Council of the International Union of Prehistoric and Protohistoric Sciences from 1961 and Honorary Member of the Instituto Italiano di Prehistoria e Protohistoria, Italy, from 1962. He was a member of the following Advisory Boards

of Archaeology: Government of India (1955–1975), Government of Maharashtra (1955–1974), Government of Gujarat (1964–1980), Government of Madhya Pradesh (1966–1974), and Government of Uttar Pradesh (1969–1978).

Sankalia was selected as a professor of Pro-Indian and Ancient Indian History in 1939 at the Deccan College Post-Graduate and Research Institute, Pune. This was Sankalia's first and last job.

Major Accomplishments

For his academic achievements Sankalia received numerous honors from professional organizations, the central and state governments, and the public at large in the form of fellowships, memberships of academic organizations, prizes, medals, nominations to prestigious bodies, invitations to deliver lectures and preside over conferences and seminars, felicitations by public bodies, etc. Sankalia received the Explorer's Medal from the Explorers Club, New York, in 1984. He was among the first batch of scholars to be awarded the Jawaharlal Nehru Memorial Fellowship in 1968. The President of India in 1974 conferred on him the title of *Padma Bhushan* in recognition of his enormous contribution to archaeological studies.

The citizens of Maheshwar in Madhya Pradesh presented him a manapatra (citation) in 1954 in appreciation of his excavations at Maheshwar. The Municipality of Ahmednagar in Maharashtra presented him a manapatra and a shawl in 1973 "for bringing light in the history of Ahmednagar district form the dim past by excavation and exploration at and around Nevasa." Less than 2 weeks before his death, the Aitihasik Vastu Sangrahalaya of Ahmednagar presented him the Late Principal Naralkar Learning Prize at a function held at Deccan College.

Sankalia's first enterprise in prehistoric research was the expedition that he led to Gujarat at the instance of Rao Bahadur K.N. Dikshit, the then Director General of Archaeological Survey of India, in 1941–1942 to explore Stone Age remains, following the clues provided by the work of Robert Bruce Foote more than six decades earlier. In this expedition he included a geologist, a paleontologist, and a surveyor-draftsman. Sankalia located several new Paleolithic and Mesolithic sites in the Sabarmati valley in Mehsana district. One of the important Mesolithic sites was Langhnaj where Sankalia carried out several seasons of excavation jointly with his anthropologist colleague, Irawati Karve. Langhnaj was the first Mesolithic site to be excavated in India as also the first Stone Age site to yield physical remains of man. With this work Sankalia opened up a new and dynamic phase of research in prehistory. Sankalia published the results of his work both as a monograph entitled *Investigations into the Prehistoric Archaeology of Gujarat, Being the Official Report of the First Gujarat Prehistoric Expedition 1941-42* (1946) and in article in several journals (Sankalia 1942, 1955, 1956; Sankalia & Karve 1945, 1949).

The significance of Sankalia's work at Nevasa and particularly the discovery of a distinct Middle Paleolithic phase were recognized by the prestigious American journal *Science* when it invited him to contribute a paper on the Middle Paleolithic of India and Pakistan (Sankalia 1964).

The Government of India nominated him as a member of the archaeological delegation to the USSR in 1963–1964, cultural delegation to Yugoslavia in 1966, delegation to the International Congress of Orientalists at Ann Arbor, Michigan, USA, in 1967, and again at Paris in 1973.

Sankalia was elected Honorary Fellow or Member of the Ethnographic and Folk Culture Society, Lucknow (1974); Indo-Pacific Prehistoric Association, Canberra, Australia (1976); the Heras Institute of Indian History and Culture, Bombay (1977); and the British Academy, London (1986). He was nominated as a member of the Editorial Board of the prestigious British journal World Archaeology from its inception in 1969 and continued in this position until 1987. He was the Honorary Tagore Professor of Indian History and Culture at the M.S. University of Baroda from 1960 to 1965.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Environmental Archaeology and Conservation
- ▶ Historical Archaeology
- ▶ Spatial Analysis in Field Archaeology
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Sanogo, Kléna

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Basic Biographical Information

Kléna Sanogo (Figs. 1 and 2) is the Director of the Institut des Sciences Humaines, in Bamako, Mali. He is one of the country's leading figures, who has worked throughout his career for the protection and safeguarding of Mali's cultural heritage.

Born in 1948 in Doumanaba (Sikasso), Kléna Sanogo undertook his graduate studies at Voronezh, where he obtained a Masters in History from Voronezh State University (former USSR). He then worked at the Institut des Sciences Humaines as a Research Fellow from 1973 to 1974. This allowed him to participate in a number of archaeological excavations in Dogo (Bougouni) and to participate in archaeological research at Doupwill and Galia (Mopti) in Mali. Kléna Sanogo became the first Malian professional archaeologist. He was Director of the National Museum of Mali from 1974 to 1978. In 1980, he obtained the title of Doctor of Archaeology from Voronezh State University. In his role as Director of the Institut des Sciences Humaines since 1987, Kléna Sanogo has been instrumental in the implementation of numerous national programs of archaeological research.

Kléna Sanogo is an active member of several national, sub-regional and international professional associations and organisations; among these are the International Council of Museums (ICOM), the International Council on Monuments and Sites (ICOMOS), the West African Association of Archaeology (AOAA) of which he was President from 1996 to 1998, the PanAfrican Association of Prehistory and Related Studies (PANAF), and the Society of Africanist Archaeologists (SAFA).

Major Accomplishments

Kléna Sanogo has worked extensively towards the revitalization of archaeological research in Mali and the promotion of Malian archaeological heritage. He took an active part in the development of legislation and regulations on cultural heritage. In his role as Director of the National Museum of Mali in the 1970s, Kléna Sanogo was one of the key figures to set up a national Heritage Day in Mali. He also took an active part in the development of a new museum policy that led to

the construction and inauguration of the National Museum of Mali in 1982. Kléna Sanogo also contributed to a large extent to the design and organization of exhibitions of national and international scope, most notably the exhibitions on the Tellem and on the Vallées du Niger (1993). From 1985 to 1987, Kléna Sanogo led the archaeological components of the first the environmental impact studies in Mali in the reservoir area of the Manantali Dam and the gold mining area of Syama (Kadiolo).

Sanogo, Kléna, Fig. 1 Kléna Sanogo

The establishment in the 1980s of an inventory of archaeological sites in the region of the lakes and the inland delta of the Niger river gave a new impetus to archaeological research in Mali. Kléna Sanogo was one of the major players in the development and implementation of this project, which established the Institut des Sciences Humaines as the center of archaeological research at a national level. Moreover, this project allowed the training of a new generation of archaeologists. The results of this ambitious project were published in 1991 under the supervision of Michel Raimbault and Kléna Sanogo in Recherches archéologiques au Mali: prospections et inventaire, fouilles et études analytiques en Zone lacustre (Raimbault & Sanogo 1991).

Further of work conducted under his supervision includes archaeological research in Nioro du Sahel (1990–1995) and the pursuit of archaeological excavations at stone circle sites in Banamba, Nioro du Sahel, and Koulikoro (from 2003).

Since the early 1990s Mali has witnessed a revival in collaborations with overseas institutions and the implementation of new research projects, including the Togué project

Sanogo, Kléna, Fig. 2 Kléna Sanogo at an excavation site

(an inventory of archaeological sites in the Inner Niger Delta) (1989–1992), the international archaeological excavations at Dia (1998–2002), the findings of which led to the publication "Recherches archéologiques à Dia dans le Delta intérieur du Niger" (Bedaux et al. 2005) and the program "Peuplement Humain et Paléoenvironnement en Afrique de l'Ouest" (Ounjougou) (1998–2010). This period is also marked by the organization of numerous African and international archaeological meetings in Mali. These include the meeting of the West African Association of Archaeology (AOAA) in Bamako in 1978 and at Djenne in 1999 and the 11th Congress of the PanAfrican Association of Prehistory and Related Studies (PANAF) in Bamako in 2001, which led to the publication of the proceedings under the direction of Klena Sanogo and Térába Togola (Sanogo & Togola 2004).

Cross-References

- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Togola, Térába

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Santoro, Calogero M.

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Basic Biographical Information

Calogero M. Santoro (Fig. 1) was born in 1953 in the hyperarid Pacific coastal city of Antofagasta in the Atacama Desert along northern Chile in South America. When he was a teenager, his family moved to live in Calama, in the arid core of the Atacama Desert, with its harsh hyperarid climate.

Santoro, Calogero M., Fig. 1 Calogero M. Santoro at the National Museum of Australia, Canberra, 2007 (Photo courtesy of George Serras)

This experience sparked his interest in archaeology. In Calama he attended public elementary and high school, where he experienced the Atacameño millennial cultural tradition. In 1972 he enrolled in the undergraduate program at the Universidad del Norte in Antofagasta, and two years later he participated as student on the Orongo archaeological field project in Easter Island, led by the late William Mulloy. This superb experience at 20 years of age helped him to discover his passion for archaeology.

Calogero M. Santoro obtained his bachelor's degree in 1980. His master's thesis was advised by Tom Lynch, and he wrote and completed this work while at Cornell University in 1987 on a Fulbright fellowship and the amusement of two delightful and keen daughters. Between 1987 and 1991, with the support of FONDECYT (a program of the Chilean National Science Foundation), Santoro expanded the scope of his research on hunting and gathering societies by collaborating with specialists in paleoecology and botany and participating in Marvin Allison's paleopathology studies. This experience proved to be fundamental to the research undertaken in his doctoral studies at the University of Pittsburgh, funded by the Heinz Foundation and the advisement of Marc Bermann.

Calogero Santoro has been a faculty member at the Universidad de Tarapacá since 1976, and today he is full professor of the Instituto de Alta Investigación. Since 1989 he has been the editor of Chungara Revista de Antropología Chilena, a peer review journal published by this university, which is recognized in the most important index and bibliographic directory such as the Thomson-Reuter in the Social Sciences Citation Index and Current Contents/Social and Behavioral Sciences, Web of Science. From 2002 to 2011, Professor Santoro was the scientific director of the Center for Desert Research (Centro de Investigaciones del Hombre en el Desierto, CIHDE) in Arica, Chile.

Major Accomplishments

At the time that Santoro obtained his bachelor's degree, he also completed a long-term study of an ancient pre-Columbian funerary site with more than 400 burials, with the support of a National Geographic grant led by Marvin Allison. The results were summarized in three journal papers and several presentations in national and international conferences (Santoro 1981). Simultaneously, Santoro initiated exploration in the high Andes of northernmost Chile, with a focus on hunters and gatherers and rock art (Santoro & Dauelsberg 1985).

Santoro has conducted several interdisciplinary archaeological studies in the Atacama Desert, focusing on late prehistoric farming societies and Inca state-related groups, as well as the long-term cultural process of hunting and gathering societies, and recently, with his partner Daniela Valenzuela, on rock art supported by grants from National Geographic, FONDECYT, the Wenner Gren Foundation, PAGES (Past Global Chances), Fundación Andes, CONICYT (the Chilean National Science Foundation), FONDART (National Art Foundation), and Mecesup (Education Ministry of Chile). He has also received fellowship from Fulbright; Heinz Foundation; National Museum of Natural History, Washington DC; American Museum of Natural History, New York; and Dumbarton Oaks, Endeavour award from Australia, and the *Chaire des Amériques* of L'université Rennes 2, France.

Calogero Santoro has a strong commitment to sharing archaeological knowledge with the wider population. He teaches courses on the prehistory of the Andes for the general public, archaeological tour guides, elementary school and high school students, and local community and ethnic leaders to popularize the knowledge on the history of the Atacama Desert. He occasionally contributes to local and national newspapers and radios. He has helped television programs such as the Discovery Channel, Archaeology of National Geographic, BBC, La Tierra en que Vivimos, Al Sur del Mundo, and Catalyst of Australia, among others, which have been instrumental in highlighting Arica and Parinacota provinces as places with long-term unparallel prehistory that includes the world's oldest archaeological evidence of human artificial mummification, the Chinchorro culture.

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► Inca State and Empire Formation

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Sarianidi, Victor I.

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Basic Biographical Information

Victor Ivanovich Sarianidi is a famous Soviet and Russian archaeologist. He was born in September 1929 in Tashkent. In 1952, he graduated from the department of history of the Tashkent State University. For more than 50 years, Victor Sarianidi worked at the Institute of Archaeology in the Academy of Sciences.

The archaeological activities of V.I. Sarianidi started from participation in the excavation of the observatory of Ulugbek in Samarkand (Uzbekistan) in 1948, which was his first field expedition. Since then his life has been devoted to studying Central Asia.

In 1949, still being the student, V.I. Sarianidi started to work in Turkmenistan. As a graduate student, he was already taking part in archaeological expeditions in Uzbekistan and Turkmenistan. Later, he participated in the excavation of such monuments that are known nowadays as Togolok, Takhirbay, and Yaz Dep (1955–1956). In 1959, he joined the Institute of Archaeology in the Academy of Sciences of the USSR in Moscow.

From 1969 to 1979, V.I. Sarianidi participated as a leader (together with I.T. Kruglikova) in archaeological excavations in Northern Afghanistan. There he discovered monuments of the Bronze Age for the first time.

In 1975, V.I. Sarianidi defended his doctoral thesis on the topic of "Afghanistan in Bronze and Iron Ages" and was granted the full degree of Doctor of Historical Sciences.

From 1980 to the present, he has conducted very fruitful archaeological works in Turkmenistan on settlements and burial grounds of Togolok, Gonur-depe, and other objects.

Major Accomplishments

Thanks to V.I. Sarianidi's excavations (1969–1979) on the early urban settlements and burial grounds (archaeological group of Dashli monuments), the new center of agricultural civilization was revealed in Bactria.

He discovered the remains of a Bronze Age culture in the Karakum Desert in 1976. The culture came to be known as the Bactria-Margiana Archaeological Complex.

From 1978, under his supervisor, he organized the archaeological expedition excavating the royal necropolis Tillya Tepe of the early Kushan period. More than 20,000 golden objects were found in this necropolis. He also discovered six undisturbed tombs at Tillya Tepe, dating to the first century BCE. The deceased were richly equipped with the so-called Bactrian Gold.

By 1990 in the ancient delta of the Murghab River, he opened no less than 200 separate settlements of an Epoch of Bronze and the Early Iron Age – so-called the country Margush. Since 1974, V.I. Sarianidi has continued to carry out excavation of the capital city of this country Gonur-depe.

Sarianidi has also been excavating Margiana (Turkmenistan) since 1972. There he found a previously unknown civilization of the late Bronze Age. During the many years, his expedition's works have been concentrated on the urban necropolis Gonur. For 10 years from 1996, V.I. Sarianidi excavated the Gonur's Big Necropolis, where almost 3,000 burials and thousands of valuable artifacts were discovered.

Victor Sarianidi is a Doctor of Historical Sciences at the Institute of Archaeology in Moscow and an honorary member of the Greek Anthropological Society. He is the author of more than 20 books and 200 articles published both in Russia and abroad.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Fortifications, Archaeology of
- ▶ Masson, Vadim M.
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

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Sasanian Empire, Archaeology of the

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Introduction

The Sasanian Empire was the last polity headed by an Iranian dynasty to rule from the geographic entity known as Iran before the advent of Islam, from 224 CE to 651 CE. At its height under Khosrow II in the early seventh century CE, its territorial extent encompassed many of the countries of the Middle East, Central Asia, and the Eastern Mediterranean. Over these 400 years, the political, ethnic, and religious composition of the empire changed continuously, and partly as a consequence of its location, the Sasanian Empire was involved in successive military confrontations with the Roman Empire on its western border, as well as with seminomadic peoples in various locations, including the Caucasus, Central Asia, and the Arabian Peninsula. Notwithstanding this sporadic but ever-present pattern of conflict, this period also witnessed the acceleration of a trend of interregional economic connectivity, especially between Chinese polities to the east and the Roman and then Byzantine Empire to the west. While this complex economic network often tends to be described in simplified terms as trade across a single "Silk Road," it underscores, in fact, a legacy of economic connectivity that intensified during this period.

Compared to its peer western and eastern polities, archaeology has played a relatively minor role in the interpretation of the Sasanian world. Literary sources in Greek, Latin, Middle Persian, Arabic, Syriac, and Armenian continue to inform a chiefly philological (and less often, historical) perspective. A significant portion of prior archaeological research focused on the analysis of monumental architecture, epigraphy, rock reliefs, and elite art objects. While noticeable advances in each of these areas have formed a more nuanced understanding of Sasanian royal culture and history, archaeological excavation has not enjoyed the same level of influence in reconstructing the daily lives of the majority of the empire's inhabitants. In addition, excavations of Sasanian sites in the early twentieth century did not employ contemporary scientific methods (cf. Huff 1987), which has hindered to some extent the reanalysis of material remains of Sasanian date. The sheer size of the empire, stretching across the boundaries of many separate modern countries, has also done much to complicate detailed investigation. Prominent in this regard is the continued

limited accessibility of "core" territories to nonlocal archaeologists.

Despite these challenges, archaeological research has provided an unparalleled glimpse into many aspects of Sasanian imperial and domestic life that have often escaped notice in the literary record. These include the physical conditions of cities, agricultural intensification, variability in religious practice and ideology, and details of the governing imperial bureaucracy. Ongoing and new archaeological research in the "periphery," such as in Central Asia, Arabia, and the Caucasus, has shed light on the social and ecological complexities of life on the frontier. The main contribution of more than a century of archaeological research has been recognition of the material heterogeneity of the empire. This extends to a wide variety of objects such as ceramic vessels, seals, coins, and textiles. Indeed, as many historical assessments of the Sasanian world emphasize a high degree of centralized political authority that was undoubtedly present, archaeological research may be said to have revealed a dynamic dialogue between local and external influences.

Definition

The political history of the Sasanian Empire begins with Ardashir I (224–241 CE), a vassal of the Parthian king Artabanus IV (216–224 CE), who rose in rebellion in the region of Fars in southwestern Iran. Ardashir marched against the Parthian monarch and defeated his army in the Hormozgan plain, an event that symbolized the toppling of the Parthian dynasty that had stood for close to four centuries (see Daryaee 2009 for a detailed social and political history). The victory was at once commemorated on a large rock relief at near Firuzabad, in which he and his son Shapur are shown unhorsing their Parthian opponents. In another investiture scene at Naqsh-i Rostam, famous for its monumental Achaemenian tombs, Ardashir is shown mounted and trampling on Artabanus. In the same relief, he receives the symbol of legitimate royal power, the *kydaris*, from Ahura Mazda, the supreme deity of Zoroastrianism, who himself is trampling Angra Mainyu.

The tradition of commemorating major political events on large rock reliefs and transmitting royal ideologies through them is a defining aspect of imperial practice for the first 100 years of the empire's existence. After Ardashir, the monarchs Shapur I (241–271 CE), Bahram I (271–274 CE), Bahram II (274–292 CE), Narseh (293–301), and possibly Ardashir II (379–383 CE) all commissioned rock reliefs whose meaning, content, and composition have been widely discussed. The construction of cities also became an enduring tradition, beginning with Ardashir's creation of a circular city named Ardashir Xwarrah (or "the glory of Ardashir") in Fars. Newly founded cities acted as spaces where Sasanian elites could create distinct imperial, urban traditions while engaging with perceptions of their own past (Canepa 2010).

In addition to rock reliefs, the early empire is marked by a large number of native Middle Persian inscriptions, especially by Shapur I, the son of Ardashir I, most notable for his success in a series of conflicts with the Roman Empire. In his third campaign, the Roman Emperor Valerian was captured, and this event was enshrined in rock reliefs at Naqsh-i Rostam and Bishapur, in Fars. Shapur I recorded these events in an inscription at Naqsh-i Rostam known as the "ŠKZ," or the Shapur inscription on the Ka'ba-ye Zardosht, a monument whose initial function is still debated. The inscription in question has been a key focus of scholarship for assembling a view of social and elite relations seen through the eyes of the imperial court. In particular, the hereditary, patrilineal nature of the monarchical system is stressed, though with significant acknowledgement of the elites of the empire. The dynamic relationship between regional elites and the monarch had significant long-term repercussions for the stability of the Sasanian polity as there were frequent struggles and negotiations between these two groups over political decision-making – to the extent that some monarchs were deposed by elite collusion and some elite social and political power was curbed by monarchical action. Other important epigraphic sources

for this period include the Zoroastrian *mowbed* Kirdir's inscription at Naqsh-i Rostam and Narseh's (293–301 CE) inscription at Paikuli.

After the reign of Shapur II (309–379 CE), noticeable changes in imperial ideology are visible, especially through royal titles on coins. Yazdegerd I (399–420 CE) began to employ the title *ramshahr*, or "peace in dominion," perhaps to emphasize the end of recurrent military engagements with the Roman Empire. It is during the reign of Peroz (459–484 CE) that new large-scale constructions appear in the archaeological landscape. It is argued that the construction of massive defense systems in the northwest and northeast might have begun in this period due to conflicts with seminomadic peoples. Under Kavad (488–531 CE), adjustments to the imperial bureaucracy continued, as are visible in offices with new seals, changes in coinage, and military positions. For instance, the internal division of the Sasanian Empire initially seems to have been organized around provinces encircling a provincial capital, perhaps from the reign of Kavad, the empire seems to have been quadripartitioned with an elaborate political apparatus established to oversee the fiscal and political governance of these areas (Gyselen 2001).

By the mid-sixth century, military conflict with the Byzantine Empire flared, although defenses against different groups passing through the Caucasus, were sometimes maintained with economic assistance from the Byzantine state. Under Khosrow I (531–579 CE) and especially Khosrow II (590–628 CE), the empire reached its territorial zenith through a series of initially successful, but ultimately ineffective, military campaigns that led the Sasanians to dominate the Eastern Mediterranean and Egypt for over a decade in the early seventh century CE. Architectural evidence such as that supplied by the palace at Taq-i Kisra near Ctesiphon and the rock relief grotto in Taq-i Bostan marks this political ascendancy. The empire began its collapse under Yazdegerd III (632–651), who fled in the face of encroaching, victorious Arab armies until he was eventually murdered in Merv. Although the empire ended as an autonomous political entity, the imprint of its ideologically imbued material trappings reverberated for centuries in the region, above all in its agricultural technologies, architecture, art, coinage, and everyday goods.

Key Issues/Current Debates

Agricultural Intensification

Most of the available archaeological evidence collected over the past 100 years points to a substantive trend of agricultural intensification during the Sasanian period. In some areas it represents the apogee of premodern intensive land use. Physical evidence for the maximization of agricultural output is provided by irrigation canals, dams, and weirs. Differentiating early Sasanian (third to fourth century CE) from late Sasanian (fourth to seventh century CE) irrigation canals remains, however, a problem exacerbated by the frequent reuse of these structures well into the Islamic period. Nevertheless, massive canals, such as the Nahrawan canal that diverted water from the Tigris River, attest to the impact of Sasanian imperial initiatives on the landscape. Initial and influential research in the Diyala region locating its dense, crisscrossing canals has shown that during the late Sasanian period, almost all of the cultivable land on the Lower Diyala was exploited. Improved imaging technologies and resolution have permitted identification of the density of these irrigation networks. CORONA satellite imagery has revealed a complex network of feeder canals and rectangular fortified sites in the Mughan Steppe in Azarbaijan (Alizadeh & Ur 2007). Elsewhere in Mesopotamia, shuttle radar topography has further elucidated the complications that beset Sasanian-period engineers who had to enlarge existing canals and build new ones in a landscape that had been irrigated since the third millennium BCE (Hritz & Wilkinson 2006).

A sophisticated series of drop-mill towers positioned at regular intervals at the edge of a rocky piedmont in the Deh Luran plain in south-west Iran illustrates the technological changes that accompanied new production initiatives (Neely 2011). Nearby, a dam bridge across

the Karun river in Shushtar (Khuzestan), attributed to the early Sasanian period, was constructed to feed two major canal systems. Careful management of hydrological resources is evident at urban sites such as Gondeshapur and in military settings, where soldiers manning the Gorgan Wall maximized their ability to draw water from the Gorgan river in order to build canals for irrigation or to support construction projects. Settlement surveys in core political territories of the empire (discussed below) illustrate a marked quantitative increase of settlements during periods of Sasanian intervention, especially in the late Sasanian period. Pollen cores have provided direct evidence for vegetative transformation in the landscape with significant increases in the cultivation of *Vitis* (grape), *Olea* (olive), *Juglans* (walnut), and other economic species (Djamali et al. 2009). Archaeobotanical reports from Merv from late Sasanian levels also indicate the cultivation of cotton (*Gossypium* sp.), a key for trade in textiles. A late Sasanian burial repository found in Shahr-i Qumis reflects these changes in burial practices, as the bones of an individual were interred with an entire pomegranate, almonds, and patterned cotton textiles.

The degree to which this intensification of production was overseen by the Sasanian state or initiated by local communities has yet to be resolved. There are some indications that the Sasanian state directly oversaw and stimulated the intensification process. For instance, a clay bulla from Veh-Ardashir yields an inscription stating it to be "the king's canal of Valashabad. . .of Veh Ardashir," and another bulla of the late Sasanian period mentions a "chief of the cultivators." These objects hint at the involvement of state authorities in the construction of new irrigation structures and in wide-scale agricultural production.

Economic Intensification

To a large extent, the trend of agricultural intensification was part of a larger process of interregional economic intensification. The archaeological data for Sasanian economic intensification can be divided into two categories: coinage and durable media. The main proxy for identifying trade during this period is the geographic distribution of Sasanian objects, especially coins, far outside the limits of their constituent territories. Researchers in China have documented almost 2,000 (on some counts) Sasanian silver coins at sites throughout China, with western China (Dunhuang, Chang'an) prominent. The contexts in which these coins are found include coin hoards, burials, and even decoration on furniture (Li 2004). The distribution, the eastern origin of the mints, and the appearance of these coins beginning with Shapur II onward (c. 300–650 CE) point to the eastward economic networks that developed in the early Sasanian period and which became more established with time. The distribution of glass goods is also correlated with coinage both spatially and temporally – glass objects of Sasanian manufacture found at Chinese sites appear in fourth century contexts and are found in greater concentration thereafter. An indication of imperial concern for the glass trade is validated by chemical composition studies of glass from Veh-Ardashir in Mesopotamia which illustrate differing sand types utilized after the fourth century CE to increase the quality of the glass.

It is important to note that the Sasanians were probably not directly engaged in this easterly trade in most instances. Excavations at archaeological sites in Central Asia, aided by the discovery of documents known as the "ancient letters," have shown the importance of the Sogdians, an Iranian-speaking people of western Central Asia, as traders and trade intermediaries within these economic networks (de la Vassiere 2005). At Merv, a sixth- to seventh-century CE structure was found containing Bactrian, Sogdian, and Middle Persian ostraca, a testament to the heterogeneous multilingual and multiethnic trading world of Central Asia of which the Sogdians and Sasanians were a part. Nevertheless, there were also direct contacts with Persian merchants, especially in later periods. A bilingual Chinese–Middle Persian inscription in Chang'an, China commemorating the burial of a Sasanian elite represents the outcome of already long-standing contact.

Overland routes were complemented by sea trade that originated in the Persian Gulf.

Both ceramic and numismatic evidence attest to increased trade with South Asia, perhaps in direct competition with Roman trade emanating from the Red Sea. Ceramic vessels such as "torpedo jars" found in Pattanam in southern India, along with Roman and Sasanian coins, reveal a brisk exchange that began in the late fourth century and continued until the seventh (Tomber 2007). The analysis of bitumen-coated vessels from nearby Sri Lanka has been able to identify the source of the bitumen; vessels dating from the third to ninth century appear to have originated near Susa in south-west Iran. The circumscribed nature of this resource pool indicates probable imperial involvement or craft communities in long-distance trade ventures.

Toward the west, Sasanian coins have been found in Roman and Byzantine contexts, even in more "remote" areas such as the Southern Levant. A coin hoard found in Humayma in Jordan contains potentially Byzantine counterfeit and Sasanian coin types. Based on the mark of the official Susa mint, the excavators concluded that the individual(s) carrying these coins and jewelry probably originated outside the limits of the Byzantine Empire (and perhaps within the Sasanian Empire). Other evidence in the Southern Levant points both to the paucity of objects of Sasanian manufacture in the Byzantine world and also the late date at which they begin to appear. In general, trade with the Roman and Byzantine empires has been less visible and less discussed. Apart from literary references to specific trade points such as Nisibis after its incorporation into the empire by Shapur II in 364 CE, Roman coins found as far east as Merv, and Byzantine coins found distributed throughout China, undoubtedly show that the Sasanian world acted as an economic intermediary and that frequent nonimperial economic transactions between these two polities were not an irregular phenomenon.

Border Defense

A complex system of border defense, especially in the northern boundaries of the empire, was initiated in the latter part of the Sasanian period. The longest extension of these structures stretches in an arc from the west to the east of the Caspian Sea. Construction of these massive walls seems to have been due to pressure from both sedentary and seminomadic people to the north, as well as the economic and ideological ambitions of the Sasanian imperial elite in these areas. The Derbent Wall is a massive fortification complex that is 50 km in length and stretches from the western littoral of the Caspian Sea westward through the central mountain range ("Dag Bary") of Dagestan, Russia. In some places the fortress walls in the city of Derbent reach 18 m in height. Middle Persian inscriptions on the walls of the fortress have formed the main criterion for dating its construction, which range from the fifth to the seventh century CE. An earlier mud-brick wall immediately to the south in Northern Azarbaijan known as Ghilghilchay ("clay wall") has been recently identified, perhaps dating to the sixth century, and itself stretches 60 km in length from the Caspian to the Caucasian interior.

To the east of the Caspian Sea, archaeological research has confirmed the presence of a formidable wall which was thought to date to the Parthian period, if not before (reflected in its Persian name, Sadd-i Iskandar, or "Alexander's Barrier"). A nearly 200-km-long wall, around 2 m in width, stretches from the Caspian Sea to the foothills of the Elburz in the east (Rekavandi et al. 2008). Recent studies of the Gorgan Wall have revealed a microcosm of Sasanian military life on the frontier as a series of forts, almost 40 in number, span the entirety of the wall, alongside barracks that may have housed as many as 20,000 soldiers. Numerous brick kilns point to the way in which Sasanian soldiers used available resources, especially local hydrology, in site maintenance on the frontiers. Radiocarbon and OSL dating indicate construction took place between the fifth and sixth centuries CE, which corresponds, in part, to literary sources that link its construction to the Emperor Peroz's (459–84 CE) conflicts with the Hephthalites. Other fortified structures such as the fortress at Turang Tepe and a fortified farmstead at Geotchick Tepe argue for the importance of the protection of this frontier zone.

Non-frontier fortresses imply that the Sasanian state was highly involved in maintaining control in the interior as well as along its borders. Ardashir and Shapur constructed numerous fortifications, in order to secure strategic positions in political centers both before and after full independence from their Parthian overlords. Other sites with notable fortifications include the port city of Siraf, where a large Sasanian-era barracks was identified in the early 1970s. The capital city Ctesiphon was also well fortified with massive walls 10 m wide. Despite literary references to a wall built in the southwest corner of the empire meant to deter Arab tribes, no traces of such a constrution have yet been observed on the ground.

Urbanization

An explosion of urban and village construction occurred during the Sasanian period. The factors that led to this quantitative increase are still debated, but both ideological and environmental hypotheses are suggested. Settlement data from archaeological surveys have revealed how densely settled the empire was; it has been calculated that 75 % of the Lower Diyala in Mesopotamia was occupied by urban sites larger than 10 ha (Adams 1981). Yet this phenomenon seems to have been regionalized, as surveys in other areas, such as near Susa, show a contraction of the total area occupied by settlements in the Early Sasanian Period (Wenke 1975–6), while the Bushehr region near the Persian Gulf shows a marked density of Sasanian-period settlements.

Royal patronage of urban construction is visible in the names of many of the cities themselves. Veh-Andiyok-Shapur, later Gondeshapur, is named after Shapur I's successful capture of the Roman city of Antioch, and excavations have revealed that its foundations are not preceded by prior settlement. Numerous new large cities dotted the landscape, above all in the region of Fars and to some extent in southern Mesopotamia. Cities such as Ctesiphon were expanded by the Sasanians, and in the case of Veh-Ardashir, new settlements were constructed adjacent to cities established in the preceding Seleucid and Parthian periods. Seals and bullae also reflect administrative changes that came with new urban priorities, such as specific offices for cities and territories like the *amargar* ("accountant"), who seemed to oversee financial transactions in them.

Less intensively studied have been the ramifications of life within and outside urban spaces in this period (Simpson 2008). Excavations in the 1960s and 1970s in Ctesiphon yielded a complex system of alleys, domestic structures, and activity areas. Ovens and querns are present in some rooms, and one excavated quarter of Ctesiphon yielded evidence of concentrated artistic production. Many alleyways were covered by a combination of clay and bitumen, making drainage of seasonal rainfall difficult. Using comparative evidence from Merv, it has been argued that this may have caused significant urban pollution in the form of runoff. In Merv, no door hinges were found (unlike in Ctesiphon), implying that the denizens of Merv during the Sasanian period covered their doorways with soft material. The material conditions of these cities should be contrasted with royal centers such as Bishapur, Firuzabad, and Istakhr, where evidence for domestic, nonelite life is less pronounced. Even in Fars, a considerable degree of heterogeneity is encountered in elite residential structures, such as can be seen in the mid-fourth-century-CE manor house at Hajiabad, where elaborate idiosyncratic stucco decorations point to negotiations of the ruling elite with individual expression (Azarnoush 1994).

The Impact of the Sasanian State on the "Periphery"

Identifying the material impact of the Sasanian state on areas beyond its nominal core, namely, Fars and Khuzestan, continues to be an area of debate for archaeologists and historians. In northern Mesopotamia, despite the presence of a large number of ceramic vessels (themselves diverse in style and decoration) from a range of archaeological sites, architectural evidence for an imperial presence is still lacking. In southern Iraq, excavations at Hira in the early 1930s revealed the center of the important sixth- and seventh-century CE client kingdom of the Lakhmids,

who were formally incorporated into the empire by Khosrow II. Yet the excavators were unable to locate any diagnostically Sasanian objects or stratigraphic levels and tentatively associated the earliest Sasanian intervention to the latter half of the empire's history (sixth to seventh century). This is compounded by the continued lack of a formal ceramic typology from the "core" Sasanian territories and regional affinities in ceramic styles. The debate concerning the timing and intensity of the Sasanian presence in Arabia (Eastern Saudi Arabia, Bahrain, and the UAE) continues, with scholars arguing that despite Sasanian epigraphic claims to early control over this area, archaeological evidence is lacking.

In the north, aside from the impressive fortifications of Derbent with unequivocal attachment to the Sasanian state, evidence for changes in daily life is more difficult to detect. A decade of excavation at the site of Dvin, Armenia, has yielded a large number of Sasanian artifacts, many of them dating to the *Marzpanate* period of Shapur II. One church that can be dated by excavations to the late fourth/early fifth century indicates that the local Christian identity was never wholly supplanted despite frequent Sasanian attempts to persuade the population of Armenia of this date to "return to" some form of Zoroastrian practice.

The eastern frontier of the Sasanian Empire has yielded evidence for the presence of imperial officials and their active involvement in daily life in these territories. The decipherment of Bactrian and the discovery of a trove of "Bactrian letters" have provided insight into the administration of an area where excavations have not been able to provide extensive archaeological data. An unambiguous reference to a Sasanian official in these letters dates to the late fourth century, where a nonofficial refers to a "satrap," or governor of Bactria, which is in agreement with a bulla bearing the title of a "satrap" of Balkh in Bactrian and Middle Persian. Another letter refers to a "fortress commander," emphasizing the commercial and military interventions brought about by Sasanian involvement. A recently discovered monumental rock carving at Rag-i Bibi in Afghanistan, Sasanian in style but with local Kushan themes and fauna (such as the royal hunt of a rhinoceros), demonstrates the diverse potentials for imperial and local interaction.

Religious Pluralities and Identities

Throughout the history of the Sasanian Empire, diversity between and within religions was markedly pronounced. Zoroastrianism was not alone, however, Christianity, Manichaeism, Mazdakism, Mandaeanism, Buddhism, and Judaism all had adherents at different times and places within areas of Sasanian political control. A host of other undocumented local traditions, beliefs, and practices probably existed alongside these traditions as well. Archaeological evidence for the development, presence, and variability in religious practice is seen in architecture, epigraphic remains, and domestic objects. The remains of fire temples, places of worship for Zoroastrian adherents, are found throughout the entirety of the Sasanian world. Architectural changes seem correlated to larger political changes, such as the *chahar taq*, or four-arch construction, which only appears during the Sasanian period. At Kuh-i Kwaja in Seistan, Sasanian builders added a *chahar taq* to the temple not long after their political ascendancy.

In addition to large Zoroastrian religious centers such as that at Takht-i Suleiman in Azarbaijan and a more modest temple at Turang Tepe near the Gorgan Wall, recently discovered fire temples contribute additional knowledge of Sasanian Zoroastrian practices. At Mele Hairam in southwest Turkmenistan, a fire temple with Sasanian occupation levels contains a fire altar whose enclosing room displays the floor plan of a *chahar taq* (Kaim 2004). The site of Bandiyan in Khorasan also possesses a fire altar housed inside a cross-shaped room (Rahbar 2008). Elaborate stucco reliefs depicting elite individuals are accompanied by inscriptions in Middle Persian. The extent to which the site of Bandiyan is a religious complex rather than a manor with religious edifices attached is still debated. The site, according to the excavators, was not sponsored by the ruling imperial authorities but instead looked to local architectural styles. The debate reflects a more generalized discussion

concerning the precise function of reticular rooms in particular temples and whether fire altars can be connected to Zoroastrian rituals known from literary texts.

Royal patronage of many of these structures is nevertheless clear. Shapur I records his dedication to the maintenance of official fires in his ŠKZ inscription. Fire altars and their attendees are also prominently depicted on the obverse of Sasanian coins. Bullae record imperial offices such as the *mowbed mowbedan* ("priest of priests"), who seem to be standard functionaries in the provinces. Officials called *driyošan jadaggov ud dadvar*, or "judges and protectors of the poor," have titles directly derived from the *Avesta*, the key religious text of the Zoroastrian community. These artifacts illustrate the entanglement of administration, ideology, and ethnoreligious rule throughout the Sasanian period.

Epigraphic information also shows that early Sasanian officials already had knowledge of some of the beliefs and practices of non-Zoroastrian adherents. The third-century inscription of Kirdir, the "court priest," beneath the ŠKZ, describes how he suppressed "Jews, Buddhists, Hindus, Nazarenes, Christians, Mandaeans, and Manichaeans." It is an explicit indication of the presence, or the perception of a presence, of these groups within the empire. An inscription written in Roman Dura Europos by a scribe of the invading Sasanian army records how he recognized in one of the synagogue paintings the "god of god of the Jews." Numerous personal seals of individuals with either traditionally Jewish names written in Hebrew, or with scenes from the Hebrew Bible, have been found at sites in Mesopotamia. Aramaic "incantation bowls" also found at a number of sites in Mesopotamia, decorated on the interior and lined with text written in Aramaic, Mandaic, Syriac, and Middle Persian, request physical outcomes in the secular world using a wide array of religious language (Morony 2007).

The existence of a Christian community in the Sasanian world increasingly became an ethnopolitical issue, to the extent that conflict with the Roman and Byzantine empires later involved the role of religion after the conversion of the Emperor Constantine I. Nestorian churches have been found both within Sasanian territory and within its sphere of influence, such as in Northern Iraq (Khirbet Deir Situn) and in the capital, Ctesiphon. Some seals display Christian names or portray Christian themes. In Merv a coin displays an image of the Emperor Yazdegerd I flanked by a cross and crescent with flying ribbons (Herrmann & Kurbansakhatov 1995). This underscores the fluid nature of royal involvement with religious communities and their self-representation. This became especially important as native Persians began to convert to Christianity – a Psalter written in Middle Persian found in the Turpan oasis in China is indicative not only of the routes through which religious communication flourished but also of a burgeoning need to communicate religious texts in local languages.

Future Directions

Archaeological research has enriched the perception of the Sasanian world and complicated attempts to portray it as a homogeneous whole. Many archaeologists have sensed a missed opportunity in terms of careful, scientific excavation that incorporates the full panoply of modern archaeological methods. The addition of environmental archaeological analysis, such as zooarchaeology and paleoethnobotany, in recent excavations has revealed important patterns in production and consumption during these periods of economic intensification. This coincides with a need for more excavation of domestic structures and residential sites, of which very little is known outside of scant remarks in literary sources. A strong theoretical framework for these inquiries could help generate hypotheses or provide the lenses through which more could be explored concerning gender, agency, and identity, especially the ways in which individuals or communities in this period negotiated the impact of Sasanian imperial interventions.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Dura-Europos, Archaeology of
- ▶ Economy, Roman
- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Excavation Methods in Archaeology
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Surface Survey: Method and Strategies

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Scandinavia and the Baltic Sea Region: Medieval Archaeology

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Introduction

Scandinavia and the Baltic experienced significant change during the medieval period, including its perception by other European peoples. At the beginning of the period, it was a region largely unknown to the literate societies

in the west. By the end of the medieval era, it was a known entity that had been largely integrated into the west European system both culturally and economically. This change occurred during three major periods of trade, cultural exchange, and armed conflict: the so-called Viking Age, which was centered in Scandinavia but also impacted upon other areas of the Baltic, the Northern Crusades, and the formation of the Hanseatic League.

Definition

The Middle Ages is a particularly problematic term for Scandinavia and the Baltic as both its beginning and end are traditionally dated to events that occurred beyond this region. If the medieval period is considered to have started when the Western Roman Empire collapsed during the fifth century, then choosing a starting date for the Middle Ages in Scandinavia and the Baltic is highly problematic. Although items from the Empire reached northern Europe and occasionally men from Scandinavia and the Baltic served Rome as mercenaries, the region was never part of the Empire so there is no convenient starting date for the Middle Ages. However, the fifth-century migration period, during which groups described in classical sources as *gens* moved south, is often used. Many of these groups, including the Goths, Jutes, Angles, and Burgundians, traced their roots to Scandinavia (Hedeager 1992). The problem is compounded in the southern Baltic where the material culture of the Slavic people is trans-regional, making it difficult to break the early medieval era into periods (Urbańczyk 2008). Attempts at periodization are complicated further by the convention in Scandinavian scholarship for the Middle Ages to start at the end of the Viking Age, at around 1000 CE, when the kingdoms of Denmark, Norway, and Sweden (began to be) unified, Christianity made serious in-roads, and Scandinavia began to have its own, non-runic, written history. The end of the Middle Ages is equally problematic, as conventionally it ends with the start of the Renaissance, a cultural movement which arguably did not directly influence all areas of Scandinavia and the Baltic. For the sake of convenience, the Middle Ages will be taken as ending in c. 1500. Between these two end points, the medieval period up to c.1000 in Scandinavia and Poland and as late as 1200 elsewhere in the Baltic is divided into various sub pre- and protohistoric periods which are often named after developments further west. These terms often vary according to the country and include the Merovinger/Merovingian Period, Vendel Period, Iron Age, Germanic Iron Age, Late Roman Iron Age, Middle Iron Age, and Viking Age. As noted above, the chronologies of these sub-periods are not always well defined, but there is general agreement for the start of the Viking Age. Its traditional historical start is the Norse raid on Lindisfarne, England, in 793, although there is also a possible raid in Dorset, England, recorded in 787. Art historians concur, with the early Viking Age having a native animal ornament style (style E) that appeared from the late eighth century, at roughly the same time as the first raids. Individual sites, particularly those of the earlier period, are often difficult to date precisely unless dendrochronology is available, although the importation of such items as glass beakers, pottery, and especially coins do help in establishing a terminus post quem.

For this entry, Scandinavia comprises the three current day nations of Denmark, Norway, and Sweden. The Baltic Sea ends at the Kattegat (the waterway between Jutland and Sweden) and, in addition to Denmark and Sweden, has shores on the current day nations of Finland, Russia, Estonia, Latvia, Lithuania, Poland, and Germany. Discussion of Russia is generally excluded from this entry and can be found elsewhere in this volume. In terms of cultural groups, "Norse" is used for those speaking Old Norse and excludes the Sámi living across northern Norway and Sweden, as well as northern Finland and the Kola Peninsula in Russia. Outside of Scandinavia, cultural and/or genetic groups are often difficult to locate, and there is uncertainty over the reliability of the tribal names provided by outsiders such as the "Bavarian Geographer" and Tacitus. Finno-Ugric speaking peoples

occupied the south of Finland. Baltic Russia came to be controlled by the Rus, a mixed group of Slavs and Norse. Elsewhere along the Baltic rim, there appears to have been populations of Slavs, Finno-Ugrians, and Balts, and the populations moved and mixed over time.

Historical Background

Written sources provide, at best, tantalizing glimpses into those peoples occupying Scandinavia and the Baltic during the early medieval period. Prior to the Viking Age (c. 780–1000) our knowledge is based almost entirely on material evidence, supplemented by the reports of foreigners, later legendary material including the poem *Beowulf* and post-1100 sagas, and the few characteristically short runic (the alphabet used in Scandinavia) inscriptions (Fig. 1). There were no written sources produced by those living elsewhere around the Baltic Sea, nor by the Sámi living in the north of Scandinavia and Finland. Although the Viking Age is characterized as a time in which speakers of Old Norse ventured from Scandinavia in large numbers and had an impact on many other parts of Europe, the majority of our written information about them comes from non-Scandinavian sources. For those living elsewhere around the Baltic rim, there is hardly any written information available at all, perhaps in part as those living there were not involved in activities away from home that attracted comment. It has been noted that the first consistent and relatively comprehensive account of the peoples living in Scandinavia and around the Baltic did not occur until the 1070s with the work of Adam of Bremen (Blomkvist 2004), which was partly based on information obtained during a stay at the court of the Danish king Svend Estridson. Before this, the most detailed accounts were the travel narratives of the Norwegian Ohthere and Wulfstan, possibly an Anglo-Saxon, recorded in southern England in the late ninth century. They report on sailing journeys that stretched from the White Sea (Russia), around the coast of Norway and into the southern Baltic via Hedeby to Truso (Poland). These presumably first-hand accounts provide information on sailing routes, trading places, and the location of different peoples. Recent multidisciplinary publications have done much to enhance our understanding of these voyages, including the archaeology of the regions in c. 900 (Bately & Englert 2007; Englert & Trakadas 2009). The travel reports make plain the ease of water travel within the Baltic and around the coast of Scandinavia during the Viking Age and the subsequent interactions between different peoples.

This dearth of written material for the first half of the medieval period makes archaeology essential to the study of virtually all aspects of the region, which has resulted in a great deal of inter- and multidisciplinary work. Fortunately, the number of sites available has been steadily increasing in recent decades. Important sites of the pre- and Viking Age period include furnished burials, both inhumations and cremation, such as those at Jelling, Hedeby/Haithabu (Denmark), Gamla Uppsala, Vendel, Valsgärde (Sweden), Oseberg, Gokstad, Borre, Tune (Norway), Truso (Poland), Ėgliškiai (Lithuania), and Grobiņa (Latvia); trading sites and central places, often including a cult site, such as Lundeborg/Gudme, Hedeby, Ribe, Aarhus (Denmark), Helgö, Birka, Uppåkra (Sweden), Kaupang (Norway), Grobiņa (Latvia), Reric, Usedom (Germany), Truso, Wolin, Gdańsk (Poland), and Palanga and Žardė (Lithuania); the chieftains farms at Borg in Lofoten (Norway); and fortifications at Trelleborg, Fyrkat (Denmark), and Daugmale (Latvia). Materials recovered from these sites includes weapons, jewelry, coins, and ceramics, both of local manufacture and imports, and buildings, defenses, particularly the 30-km-long earthwork Danevirke across the Jutland that was built in three phases between 737 and 968, sleds, wagons, and items associated with craft production. The site of Borg in Lofoten is an important reminder of how well connected Scandinavia and the Baltic were to other parts of Europe during this pre-/protohistoric period. Although Borg is the most northerly known Norse settlement in Scandinavia and the furthest north that subsistence farming was possible, the finds included

Scandinavia and the Baltic Sea Region: Medieval Archaeology, Fig. 1 Scandinavia and the Baltic in the medieval period up to 1000 CE (Map drawn by Aurore McLeod)

a number of prestige objects from the sixth to tenth centuries from southern Scandinavia, England, the Celtic world, and western and eastern Europe (Näsman & Roesdahl 2003). As one would expect, underwater archaeology makes a significant contribution to our understanding, and a number of harbors, jetties, and defensive structures have been uncovered throughout Scandinavia and the Baltic. Of particular note is the Viking Ship Museum in Roskilde, Denmark, which includes local discoveries of Viking Age warships, cargo ships, and a fishing vessel; reconstructed medieval ships from throughout the Baltic Sea; and recently recovered vessels being preserved at the Archaeological Workshop.

The contact between those living in Scandinavia and those living across the Baltic Sea reported by the travel account of Wulfstan is attested in the archaeological record. Material evidence for Norse involvement in the southern Baltic stretches back to at least 650 and the establishment of a Norse population in Grobiņa (Valk 2009).

During the Viking Age, Norse involvement elsewhere along the Baltic rim increased dramatically, although in many instances those often referred to as "Rus" or "Varangians" in written sources were simply passing through to reach the eastern trade routes to the Black and Caspian Seas. The routes connected Scandinavia, especially Gotland and Birka in Sweden, with Constantinople and Arabia, often via Staraya Ladoga in Russia. The most tangible evidence of these trade routes is the large numbers of silver dirhams (Arabic coins) found around the Baltic, both in hoards and as single finds, with a concentration of coins on Gotland and mainland Sweden. One anomaly is Lithuania, which has little evidence of Norse trade during the Viking Age (Valk 2009). Some finds, in particular burials with close affinities to some found in Scandinavia, suggest that there were resident communities of Norse in many of the trading centers in the south of the Baltic, such as Truso and Grobiņa (Jagodziński 2009), while Norse mercenaries may have been living in Poland in the late tenth century (Urbańczyk 2008). The island of Åland and possibly the west coasts of Finland and Estonia had a large number of permanent immigrants from Sweden from at least the Viking Age, and these areas were culturally Norse to varying degrees (Markus 2004; Edgren 2009). Meanwhile, there is written and archaeological evidence, in the form of burials, for a resident Slavic population in Hedeby, and it has been noted that there was a "Widespread maritime Baltic Sea culture linked by the water and similar subsistence strategies and lifestyles" (Markus 2004). There are written accounts of intermarriage between royal families in Scandinavia and elsewhere around the Baltic, and such relations are likely to have occurred at other levels of society. Relations between the different communities settled in trade centers appear to have been cordial, but there are instances of Norse attacks on Baltic trade centers. The troubled times on both sides of the Baltic are attested by many initially unfortified trading centers either being fortified or abandoned for fortified ones during the ninth and tenth centuries, such as Wolin, Usedom, and Hedeby (Jöns 2009). Similarly, Viking Age and post-Viking Age settlements in Estonia were inland, probably due to the dangers presented by the Norse sailing along the coast (Valk 2009).

The period immediately following the Viking Age was in many respects a continuation from the earlier period: Norse fleets dominated the Baltic, allowing them to control trade and attack trade centers. The most dramatic example of the latter is probably the attack by the Norwegian King Magnus the Good against Wolin in 1043 which indirectly, in conjunction with the degradation of the local environment, led to the demise of what had probably been the largest trade center in the Baltic Sea (Broich 2001). But in other respects, it was a period characterized by religious change and state formation, although both of these also had their roots in the Viking Age, especially in Norse Scandinavia. Following centuries of influence, evidenced by some Christian objects being found in burials, and some unsuccessful missionary attempts, Christianity had a significant impact from the late tenth century, beginning in the western Baltic and spreading east. The Danish king Harald Bluetooth converted in c. 965 and convinced or forced his people to follow, as he proudly proclaims on his runestone at Jelling, and the Polish king Mieszko I was baptized in c. 966, although pagan practices among the populace continued for some time. Norway converted in the early eleventh century, while Sweden had a Christian king at the same time, but Christianity and Paganism probably coexisted for at least another century. Poland was the only area along the south Baltic to convert to Christianity without a foreign invasion. The archaeological evidence for conversion and Christianization is most readily seen in changing burial customs and the building of churches. The conversion of Scandinavia also had an impact on the non-Christian parts of the Baltic as Norse kings began to focus their attention on the Baltic instead of the west. For example, the Danish king Svend Estridson involved himself in the Lutici (Polabian Slavs in Baltic Germany) civil war in 1057, and Swedes conquered much of Finland during the twelfth and thirteenth century. Yet at the same time,

some Slavic people appear to have migrated to Denmark, as suggested by the appearance of Slavic pottery from the eleventh century and some Slavic place-names (Naum 2012).

The conversion of those living in Scandinavia and the Baltic (predominantly) by the Latin Church has been termed "Europeanization" and involved the imposition of the Catholic World system in the region (Blomkvist 2004). Material evidence for the various pre-Christian religious beliefs is best attested through burials and pendants, including Thor's hammers for the Norse, but temples/cult sites and statues of gods are also known, including at Jaromarsburg on the Baltic island of Rügen (Germany) and on the west bank of Lake Tissø (Denmark) and a possible open-air sacrificial site at Frösö (Sweden). Following largely unsuccessful missionary efforts to covert Balts and Slavs, crusades were launched by the Teutonic Order from Germany during the thirteenth century against various pagan peoples around the Baltic including the Slavs of Prussia and the Lithuanians, with the latter crusade being particularly drawn out and bloody and ultimately unsuccessful. The crusaders also came into conflict with Christian Poland. Earlier, Danes, Germans, and Poles had been involved in the Wendish Crusade against the Plobian Slavs in 1147, and Germans and Danes participated in the Livonian (modern-day Latvia and Estonia) Crusade which began in 1198. The crusades were often accompanied by a colonization effort, particularly in Prussia where the Teutonic Order created around 100 cities and 1,400 villages, resulting in a great amount of material culture (Ekdahl 2005). These foreign invasions effectively made indigenous state formation like that experienced in Scandinavia and Poland (intermittently) all but impossible, although Lithuania managed to survive intact and actually expanded during the crusade (Blomkvist 2004). Important archaeological sites include crusader castles at Karksi, Viljandi (Estonia), Grudziądz and Malbork/Marienburg (Poland), and Pöide church (Estonia). A new development has been an investigation of the ecological impact of these castles and how the crusaders and those who followed transformed the surrounding landscapes.

A major development as part of the Europeanization process was the establishment of the Hanseatic League, a trade network centered on Lübeck (Baltic Germany), by German merchants collaborating with the missionary effort (Blomkvist 2004). The league was involved in armed conflict with trade rivals. This led to the domination of the Baltic trade by German merchants from the thirteenth century to the end of the medieval period and also saw German migrants settling in cities along the east Baltic coast. Material evidence for the Hanseatic League consists of surviving gabled architecture in member cities such as Lübeck, Riga (Latvia), and Reval (present-day Tallinn in Estonia) and shipwrecks of Cogs, a distinctive type of ship only found in areas controlled by the League or under its influence (Smith 2010).

From the period around 1000, an increase in trade led to the formation of new trade centers (Fig. 2), while some earlier Scandinavian centers, including Hedeby, Birka, Uppåkra, and Kaupang, were abandoned and were effectively replaced by the new nearby towns of Schleswig, Sigtuna, Lund, and possibly Tønsberg, respectively. Other important new towns, or those that grew from humbler settlements, post-1000 not mentioned above include Oslo, Bergen, Trondheim (Norway), Stockholm, Visby (Sweden), Copenhagen (Denmark), Kiel, Stralow/Stralsund, Rostock (Germany), Memel/Klaipēda (Lithuania), Turku (Finland), Ventspils (Latvia), Königsberg/Kaliningrad, and Beryozovskoye/Primorsk (Russia). As all of these cities still exist, the opportunity for extensive excavation is necessarily limited.

Key Issues/Current Debates

Ethnicity and the associated territorial identification is a particular problem, and classic methods of identifying territory in terms of material culture are often difficult to apply. Of course, this method itself is a continuing source of debate among archaeologists (Jones 1997). In the southern Baltic, the material culture of the Slavic people in the early medieval period was

Scandinavia and the Baltic Sea Region: Medieval Archaeology, Fig. 2 Scandinavia and the Baltic: new foundations after c. 1000 CE (Map drawn by Aurore McLeod)

trans-regional, making it difficult to break the early medieval era into periods, and it has been suggested that many archaeologists use the term "tribal" uncritically (Urbańczyk 2008). In Scandinavia, there are often significant regional differences in such things as the use of runestones and other aspects of material culture, and in some regions both cremation and inhumation burials were occurring at the same time, suggesting different regional identities if not ethnicities (Svanberg 2003a; Sindbæk 2008). Yet at the same time, there appears to have been a pan-Scandinavian use of material culture among the Norse elite and an acknowledgement of supra-regional identities (Svanberg 2003b; Sindbæk 2008).

A key barrier to our understanding of Scandinavia and the Baltic during the medieval

period is that many of the excavations are in the form of rescue archaeology, and there are large areas with little economic development that remain largely unexcavated. Other finds that may occur are those made by metal detectorists, although the legal requirements differ between the countries. Metal-detecting is effectively banned in Sweden, legally difficult in Denmark and Norway, and a license is required in Poland and Germany. Elsewhere in the Baltic, metal-detecting is easier, leading to enthusiasts from elsewhere visiting those regions. Along with other issues involving metal-detecting, such as a loss of context and find location, this raises the issue of items not being reported and ending up on the black market. As a maritime region, the lack of excavations is compounded by the difficulties involved in locating new underwater sites. A powerful reminder of the gaps in our knowledge is the failure thus far to locate with certainty the trading center of Vineta/Wineta that is thought to have been on the Baltic coast in either Germany or Poland. The descriptions of the port in medieval written sources suggest that it may have been the largest urban center in the Baltic, if not Europe, in c. 1000.

Future Directions

The issue of personal and group identity has been mentioned above, but throughout the medieval period in Scandinavia and the Baltic, it must also be considered in light of the material and written evidence for migration, both between and within Scandinavia and the Baltic, and from further afield, especially of German merchants and Crusaders. How these peoples interacted and what new identities may have been created is a fruitful area for future research. So too are the interactions between the Sámi and their neighbors in Scandinavia, Finland, and Russia. The use of migration theory, which suggests such things as motivations for migration, information networks, and duration, is also likely to lead to new avenues of research.

A field that is likely to revolutionize our understanding of migrant populations at different times is that of genetics. Previously, there have been difficulties in obtaining uncontaminated samples from ancient skeletons, leading to samples from modern-day populations being used and scholars projecting back. However, it now appears that usable genetic samples from ancient skeletons can be obtained (Töpf et al. 2006). Such samples could be used in conjunction with stable strontium and oxygen isotope analysis from ancient teeth (which allows the location/s of a person during childhood to be determined) and the associated material finds, to provide a more detailed understanding of migrant populations and the creation of group and individual identity. The initial challenge will be to obtain a quantifiable sample of ancient skeletons from new excavations.

Significant improvements in our understanding of the eastern Baltic have occurred since the fragmentation of the Soviet Union, which has allowed scholars in the former Soviet states to investigate their past without political "supervision." The political changes have also facilitated the exchange of research and ideas with colleagues from other countries. This is likely to continue as cultural and linguistic barriers are broken down (Ekdahl 2005). An example of these new possibilities is the Institute of Baltic Sea Region History and Archaeology which has existed since 2003 and is based at Klaipēda University in Lithuania. Collaborators include scholars and institutions from Lithuania, Poland, Germany, Sweden, Russia, Latvia, and Denmark.

Cross-References

- ▶ Burial Mound Dissection in Sweden
- ▶ Cremation in Archaeological Contexts
- ▶ Dating Methods in Historical Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ DNA Interpretation Constraints in Archaeology

▶ Early Regional Centers: Evolution and Organization
▶ Ethnic Identity and Archaeology
▶ Europe Incastellated: Medieval Archaeology
▶ Fortifications, Archaeology of
▶ Hanse Archaeology
▶ Islamic and Crusader Archaeologies
▶ Medieval Archaeology
▶ Medieval Russia (Rus'), Archaeology of
▶ Medieval Urbanism
▶ Metal Detecting in Archaeology
▶ Scandinavia: Field Methods
▶ Scandinavia/Northern Europe: Historical Archaeology
▶ Ship Archaeology

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Scandinavia/Northern Europe: Historical Archaeology

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Introduction

The regional term Scandinavia/Northern Europe can be defined in different ways but is used here to refer to the present-day Nordic countries which include the Scandinavian states of Denmark, Norway, and Sweden, along with Iceland and Finland. The Faroe Islands and Greenland are autonomous parts of the Danish realm, whereas the Åland Islands in the Baltic Sea comprise an autonomous province of Finland.

The beginning of the historical period in the Nordic world is conventionally set around the turn of the second millennium CE. However, the number of Scandinavian written documents is rather limited especially before the fourteenth century, and many regions – as well as many aspects of culture and society – are poorly known from documentary sources well into the late medieval and even postmedieval period. The famous medieval sagas of Iceland represent an early development of historical narrative in the Nordic world.

The transition to the historical period in the Nordic world was associated with Christianization and the formation of the Scandinavian kingdoms of Denmark, Norway, and Sweden. Southern parts of Scandinavia became urbanized and integrated into wider European economic, social, and cultural networks by the fourteenth century, whereas traditional ways of life and thought persisted in more peripheral regions. While Denmark was the dominant Scandinavian power especially in the medieval period, Sweden established itself as a great power in the seventeenth century. Sweden acquired new provinces in addition to its old province of Finland and came to dominate the Baltic Sea region after its successful intervention in the Thirty Years' War (1618–1648), but the Swedish empire collapsed at the beginning of the eighteenth century.

Archaeological research into the historical period Nordic world began in the nineteenth century, and large-scale (rescue) excavations have been conducted since the mid-twentieth century, especially in association with urban redevelopment in historic towns. While the initial interest in churches, palaces, and other high-status or special sites continues, the scope of research has broadened to include all kinds of sites from medieval hamlets to modern ruins, and research topics and approaches have similarly diversified. Traditional descriptive and cultural-historical approaches are still in evidence, but theoretical perspectives have been combined with empirical research increasingly since the 1990s.

Definition

Historical archaeology can be defined in several slightly different ways. In the most general sense, historical archaeology refers to the archaeological study of the historical period which began around CE 1000 in Scandinavia and slightly later in Finland. Historical archaeology can also be understood in methodological terms as a form of archaeology which employs literary and documentary sources (e.g., written narratives, tax records, probate inventories, maps) together with archaeological data. Thus conceived, Nordic historical archaeology includes also the study of Iron Age societies with the help of later documentary sources. The term historical archaeology may also be associated, due to US influence, with the global archaeology of the post-Columbian world, though such usage is not common in the Nordic countries.

Rather than a unified field of study, historical archaeology in the Nordic countries is divided into several chronological and thematic subfields. As elsewhere in Europe, the study of the medieval period has dominated historical archaeology, whereas postmedieval archaeology is a somewhat less established field, albeit of growing interest. On the other hand, the conventional chronological boundaries between the Iron Age and Middle Ages and the medieval and early modern period are also being increasingly ignored in current research.

Thematic specialisms are plentiful in Nordic historical archaeology and include, for example, urban, rural, and maritime archaeology as well as church, industrial, and conflict archaeology. General texts on historical archaeology in the Nordic countries are not available, which in part probably reflects the compartmentalized or dispersed character of the field. Thematic surveys of narrower topics, such as urban archaeology, have been published, but those also vary in scope and geographical and chronological coverage. Although studies in Nordic historical archaeology have tended to have a regional focus and/or concentrate on particular (types of) sites or classes of material culture, broader perspectives and theoretically informed approaches have been increasingly emerging over the last two or so decades.

While medieval sites are considered protected heritage in the Nordic countries, the heritage status of postmedieval sites is more problematic and subject to discussion and debate. Teaching is given and research conducted in historical archaeology at archaeology departments around the Nordic countries. Additionally, Lund University in Sweden has a chair in medieval archaeology and Aarhus University in Denmark a section for medieval and Renaissance archaeology. There is, at present, little unity in Nordic historical archaeology with regard to research topics or the methodologies and theoretical frameworks employed.

Key Issues and Current Debates

Three broad themes are considered below which illuminate various aspects of historical archaeology in the Nordic countries. A brief survey is necessarily selective and a number of other topics could also be considered central to Nordic historical archaeology. For example, Christianization and the archaeology of churches and other ecclesiastical sites have been of much interest and caused debate for over a century. Maritime archaeology with its many dimensions, from the excavation of shipwrecks to the study of coastal landscapes, could similarly be identified as a key issue, although it is referred to only in passing below.

Urban Archaeology

Urban archaeology is one of the main fields of historical archaeology in the Nordic countries. The interest in urban sites reflects, first, the significance of towns in large-scale transformations of Nordic societies from the early medieval to the industrial period, that is, the Europeanization and modernization of the Nordic world. Second, urban sites have been subject to extensive fieldwork due to urban redevelopment since mid-twentieth century, which has produced rich and large assemblages of archaeological data. Important excavations have been conducted in,

for example, Lund in Sweden, Trondheim in Norway, and Turku (Åbo) in Finland.

There were a few urban-like central places in Scandinavia during the Viking Age, but urbanization really began with state formation early in the second millennium CE. There were some 175 towns in the Nordic world in the Middle Ages, concentrated mainly in Denmark and southern Sweden. There were important towns also in Norway, a few in the Swedish province of Finland, and none in Iceland. All medieval towns were located in southern parts of Scandinavia, that is, south of the Trondheim-Gävle-Ulvila (Ulfsby) line (see further, e.g., Andrén 1989).

Archaeological interest has traditionally focused on earlier phases of towns, and the research has sought, for example, to reconstruct changes in urban space in relation to broader economic, political, and other historical developments. In addition to conventional cultural-historical approaches, theoretically aware interpretive approaches to built environments have been adopted since the 1990s especially in Sweden but also in other Nordic countries (e.g., see various papers in Ersgård et al. 1992; Andersson et al. 1997; Immonen et al. 2007). Such studies have often focused on social and power relations and how they were expressed in urban or other built environments. For example, the research on the extensively excavated Archbishop's Palace in Trondheim, Norway, has provided insights into the relationship between monumental architecture and power from the late medieval period to the Reformation. The research has explored how changes in the organization and structure of the palace, and craft production within it, were dynamically linked to historical processes and how the architecture of the palace mediated broader social and cultural transformations in the turbulent times of the medieval-early modern transition (Saunders 2002).

Hanseatic trade and German influence on Scandinavia have attracted much interest in Nordic medieval archaeology. German merchants controlled trade in the Baltic Sea and arguably had a major impact on the development of Nordic urban culture (see, e.g., Gaimster 2005). The intensification of trade and German influence is in evidence not only in towns but also in more peripheral regions beyond the urban zone, as manifested in, for example, increased coin finds and emergence of market places in the northernmost coastal region of the Baltic Sea.

Early modern towns are also being archaeologically studied, especially in Sweden and Finland. The seventeenth century was a time of urban development in the kingdom of Sweden. A number of new towns were founded by the Crown in previously nonurban regions, and old towns were reorganized in grid plan, following Renaissance ideals of urban planning. Research has been done, for example, in Göteborg in southwestern Sweden and the small town of Tornio (Torneå) in northern Finland. Archaeological study of postmedieval towns is very limited in Denmark and Norway, but some research has recently been conducted on eighteenth-century deposits in Copenhagen harbor (Høst-Madsen 2005). Some research has also been undertaken in the capital of Iceland, Reykjavik, founded in the late eighteenth century.

Colonization and Colonialism

Although the historical core areas of the Nordic world are located in the southern and western parts of Scandinavia, the north and its resources attracted increasing interest since the early medieval period. Farming settlement spread toward the north from the early second millennium onward. The medieval expansion of farming settlement into northern parts of Sweden and Finland is poorly known archaeologically, although some important sites have been studied. For example, the site of Kainuunkylä-Hietaniemi just south of the Arctic Circle on the Swedish-Finnish border has produced evidence of an early phase of the southern colonization of the north. There was also a market place and non-Christian burials at the site (Wallerström 1995).

Although the northern periphery lacked actual towns, there were market places across the northern fringe of Europe. Archaeological research has been conducted at, for example, Gásir in Eyjafjörđur (Iceland), Vågan in Lofoten (Norway), and Haminasaari in Kemi (Finland).

Recent research on the so-called multiroom houses in northernmost Arctic Norway has also produced interesting results on economic intensification and intercultural contacts in northernmost Europe during the medieval period (Olsen et al. 2011).

In addition to fish and fur, northern mineral resources were also of interest to the Scandinavian states. The great mine of Kopparberg in Falun, south-central Sweden, is a particularly famous medieval and early modern mining complex, and today a UNESCO World Heritage site, but mines and forges were also established in the northern fringes of the Swedish realm, and the sites of Silbojokk and Kvikkjokk in Swedish Lapland have also been archaeologically studied. Archaeological research has also been undertaken on later mining communities elsewhere in Sweden (e.g., Svensson et al. 2009).

Archaeology of the Modern World

The transitional period between the medieval and early modern period, from the fifteenth to seventeenth century, is today an accepted part of Nordic historical archaeology as something of a chronological extension to medieval archaeology. Fieldwork at urban and other multi-period sites, for example, has produced archaeological material also from later historical periods which has so far been little studied, although there are important exceptions (e.g., Rosén 2004; Lucas 2009). Archaeological research focusing specifically on the postmedieval processes of modernization and modernity is relatively scanty but attracting increasing interest (e.g., Lihammer & Nordin 2010).

Although the modern world has until recently received limited attention within Nordic historical archaeology, younger industrial and military sites in particular have been documented and excavated for some time. In Finland, for instance, the national heritage agency has documented WWI fortifications around the Finnish capital, Helsinki, and fieldwork has occasionally been conducted also at WWII sites. Although the fieldwork at modern sites has often been motivated by cultural heritage management, academic research is now also engaging with twentieth-century military sites. For example, some research has recently been done on the landscapes, materiality, and archaeology of WWII German sites in Finland and Norway (e.g., Seitsonen & Herva 2011). Likewise, the study of modern ruins from an archaeological perspective has recently begun in Norway and Iceland.

Future Directions

Future challenges in Nordic urban archaeology will include, for example, understanding how changes in urban environments were linked to broader transformations in ways of life and thought in early modern towns. The local character and diversity of urban life also remain to be properly appreciated; urban experience in southern urban centers was presumably quite different from small peripheral towns (cf. Herva 2010).

While aspects of trade have been central to Nordic urban and historical archaeology, consumption studies have also emerged since the 1990s. The consumption models initially adopted from Anglo-American historical archaeology may not be directly applicable to the early modern Nordic world, and especially its more peripheral regions. The importance of the local cultural background and context of consumption is being increasingly appreciated today, as indicated, for instance, by recent research on artifact biographies in the seventeenth-eighteenth-century town of Tornio (Herva & Nurmi 2009) or the ceramic revolution in nineteenth-century Iceland (Lucas 2010).

Equally, although Sámi archaeology is an established field of study in Norway, Sweden, and Finland, researchers have yet to truly engage with the Sámi past in terms of colonialism, and within the framework of the archaeology of colonialism, which has emerged as a key topic in current world historical archaeology. Specifically, the expansion of farming settlement and the exploitation of northern resources resulted in increased contacts with the indigenous Sámi who inhabited northern parts of Fennoscandia and became subject to Scandinavian colonialism. The southern colonization and colonialism of northern Fennoscandia came to have

a long-standing impact on the Sámi which is still felt today in many ways, including a continuing debate on land ownership in traditional Sámi homelands and the repatriation of Sámi cultural heritage (e.g., Mulk 2009). Much more research on the archaeology of these processes is needed, however.

Sweden and Denmark engaged also in global colonial pursuits, albeit in small scale. Denmark came to dominate Iceland and Greenland and established colonies also in Africa and the Caribbean, whereas the most well-known (albeit short-lived) Swedish colony was established in Delaware. Limited archaeological research has been done on Scandinavian overseas colonies, but they have recently become of increased interest among Nordic archaeologists (e.g., Immonen 2012; Nordin 2012).

Finally, the archaeology of the contemporary and recent past is a new branch of study in Nordic historical archaeology, but a Swedish language introduction to the field has recently been published (Burström 2007). Although still a contested field, the increasing archaeological study of the later historical times suggests a degree of liberation from the so-called tyranny of historical sources which has always overshadowed historical archaeology in the Nordic countries and beyond. Theoretical advances in archaeology and material culture studies have provided historical archaeology with new perspectives and approaches for addressing issues which are pertinent to the emergence and development of the modern world in the last half-millennium. In all these areas, the historical archaeology of the Nordic countries can offer "a view from the periphery" on modernization and its archaeological study.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Contemporary Past, Archaeology of the
- ▶ Hanse Archaeology
- ▶ Scandinavia and the Baltic Sea Region: Medieval Archaeology
- ▶ Sweden: Cultural Heritage Management

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Scandinavia: Field Methods

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Introduction

Scandinavian archaeology has been influenced by three important factors: its embrace by the state, its terrain, and its methodological innovations. The position of Scandinavian archaeology within the state administration descends from the frequent, long, and bloody conflicts between Denmark-Norway and Sweden-Finland. The number of monuments that could be claimed was instrumental in the diplomatic game of the day: the most venerable history gave a higher ranking at peace negotiations. In short, Scandinavian archaeology is the offspring of an "antiquarian arms race." The Danish legal tradition goes back as far as medieval times: all "treasure" found is the property of the King, while in the Swedish tradition, which has been a reference for both the Norwegian and Finnish legislation, sites and monuments belong to the state. Sites and monuments are to be protected or, if this not being possible, recorded professionally, thus making it a public responsibility to maintain a body of archaeologists. The overwhelming majority of excavations are performed within this legal administration, resulting in large-scale archaeological projects, today aided by digital recording (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

Archaeological deposits in Scandinavia vary from Paleolithic deposits and large Mesolithic dwelling sites of the Ertebølle culture, to the heaped clay Bronze Age burial mounds of Jutland ("the mound people," Glob 1974), to large-scale settlements, votive deposits in bogs, ship burials, shipwrecks, and large-scale central places of the Iron Age to early trading and manufacturing

Scandinavia: Field Methods, Fig. 1 A large-scale excavation of the medieval village of Örja, just outside Landskrona, Sweden (Photo by Thomas Hansson, Swedish National Heritage Board)

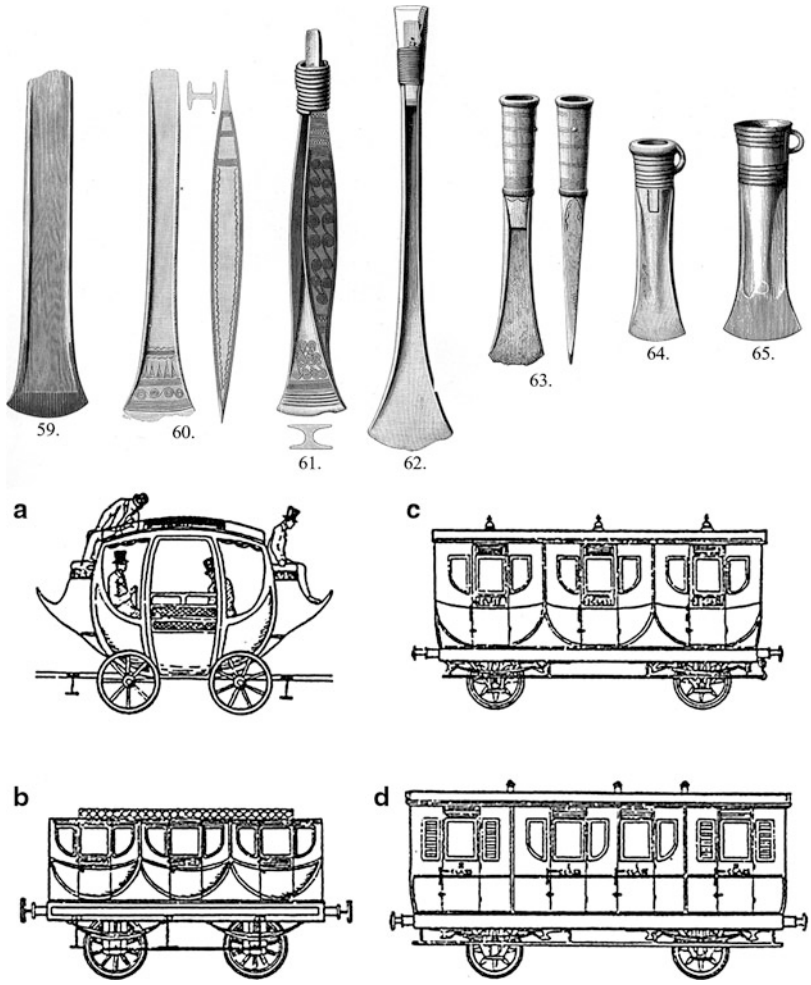

Scandinavia: Field Methods, Fig. 2 Oscar Montelius (1843–1921) used the evolution of carriages, from horse drawn to railway, to illustrate how artifacts develop through time. The method allows an artifact type, and assemblages of artifacts, to be assigned to a particular period

centers of the Viking Age. In upland areas, settlements and burial mounds remain visible above ground level. In lowland areas, they have been located by intensive surveys (Welinder 2009).

Scandinavian innovations include the development of typology, large-scale survey, and different approaches to excavation. Typology became something of a Scandinavian speciality, starting with C.J. Thomsen's (1788–1865) presentation of the "three-age system," i.e., the division of prehistory into the Stone, Bronze, and Iron Ages, which was developed indirectly from the taxonomy developed by C. Linnaeus and his disciples. The system was gradually refined during the course of the nineteenth century by, among others, J.J Worsaæ (1821–1885), S. Müller (1846–1934), and B.E. Hildebrand (1806–1884). Particularly influential was the concept of chronological evolution to explain the changing forms of artifacts by O. Montelius (1843–1921) (Fig. 2).

Since all archaeological remains were (and are) regarded as the cultural property of the state, large-scale surveys pursued the goal of total record. This has empowered geographical methods of historical analysis, such as Bjørn Myhre's early medieval kingdoms in Norway, drawn by Thiessen polygons from hierarchies of burials, ship-sheds, and hill forts (1987), and Åke Hyenstrand's use of Sweden's Ancient Monuments Register for tracing regions and socioeconomical systems (Hyenstrand 1984).

In excavation, Scandinavian archaeologists have been influenced by both the German approach, which divides a deposit into horizontal and vertical slices ("schnitt"), and the British, which gives primacy to the stratification. However, it was the pioneering work of Gudmund Hatt and C.J. Becker in the 1930s and 1940s that led to the development of large-scale open area excavations. These were applied in particular to prehistoric and medieval settlements where survival may be little more than postholes and ribbons of small stones left by turf and timber buildings. These techniques were taken up in Britain and spread widely in Europe. On site pioneering methodologies by Scandinavian archaeologists include the excavation of huge preserved timber ships and their contents from mounds at Gokstad and Oseberg (see Gansum 2004), the recovery and analysis of bog bodies (Asingh & Lynnerup 2007), and the lifting of an entire *burial chamber* at Medelpad, Sweden, in 1952. Modern pioneers have been contributing in particular to the development of methods of electronic *remote mapping*.

Cross-References

- ▶ Burial Mound Dissection in Sweden
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

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Scanning Electron Microscopy (SEM): Applications in Archaeology

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Introduction

Scanning electron microscopy (SEM; this acronym is used for both the instrument itself and the technique) has been broadly used in archaeology for over four decades. The SEM is capable of two basic functions: imaging and providing compositional information. Consequently, it has been utilized for nearly every archaeological application in which one wishes to examine magnified images of a specimen and/or determine its composition on a microscopic scale, everything from determining the raw-material sources of stone tools to examining the five-millennia-old skin of Ötzi the Iceman.

All SEMs permit one to acquire highly magnified images of a specimen. The range of magnifications possible is much greater with SEM than with visible-light microscopy (VLM). Depending on the instrument, the magnification can be adjusted as low as 5X (equivalent to a hand lens) and as high as 200,000X (roughly 100 times better than a powerful VLM) or more. SEM also offers a much greater depth of field than VLM (roughly 300 times better), meaning that more of the specimen will appear in focus.

Most contemporary SEMs are also outfitted to measure the elemental composition of the specimen based on the X-rays emitted under electron bombardment. A closely related technique, which developed alongside SEM, is electron microprobe analysis (EMPA; this acronym is also used for the instrument). Figure 1 illustrates the major systems of SEM and EMPA.

Definition

At the top of the SEM is an "electron gun," which produces a beam of electrons and accelerates

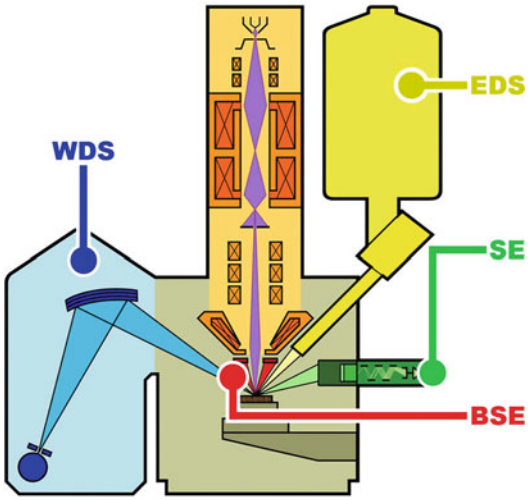

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 1 Simplified schematic of a typical SEM and EMPA. The beam (*purple*) is generated in the electron column (*orange*) and focused onto a specimen (*brown*) in the chamber (*tan*). The secondary-electron (SE) detector is *green*, and the backscattered-electron (BSE) detector is red. X-rays from a specimen are measured by an energy-dispersive spectrometer (EDS; *yellow*) and, in the EMPA, wavelength-dispersive spectrometers (WDSs; *blue*) (Image by Ellery Frahm)

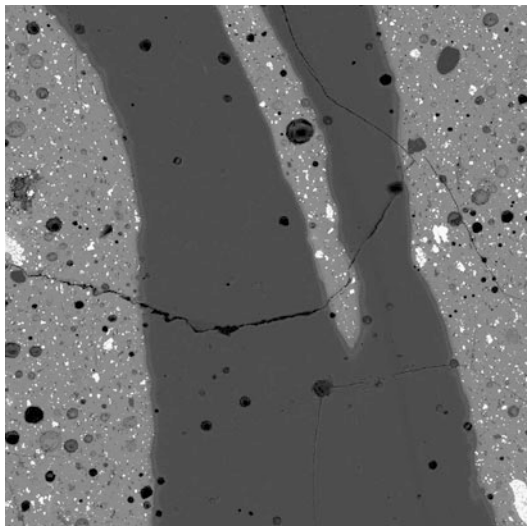

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 2 A BSE image shows the interfaces between two distinct glasses used to manufacture an East Java mosaic bead. The glass that contains lead oxide as an opacifier appears lighter in this image. The field of view is 2 mm across (Image by Ellery Frahm)

them toward a specimen. The electron beam is focused onto a specimen by a series of apertures and electromagnetic lenses. The beam rasters across the specimen to produce an image, much like a CRT-based television set. This process ordinarily occurs under a high vacuum to avoid beam scattering by air molecules and other effects.

When the electrons strike a specimen, a wide variety of information-bearing signals is produced. Some of these signals are useful for imaging. Others may be used for compositional or microstructural analysis, provided the appropriate detectors are present.

One imaging signal is the emission of secondary electrons (SEs). SEs have low energies, so only those emitted within nanometers of the specimen surface can escape. Therefore, SEs are sensitive to the specimen's topography and are useful for imaging surface details. Many people have seen examples of these images: microscopists frequently use SE images of spiders, table salt crystals, or pollen as examples of SEM images.

Backscattered electrons (BSEs) offer another way to image a specimen. BSEs are beam electrons that have "ricocheted" out of the specimen. They have much higher energies than SEs and are less affected by topography. Instead, BSEs are strongly affected by the atomic number of the elements in a specimen. The dependence on atomic number is used to produce images that show compositional contrast (although there is also a topographic component to BSE images for non-flat specimens). BSE images have bright areas where the mean atomic number is higher and dark areas where it is lower (Fig. 2).

Contrast in BSE images, though, reveals only relative differences in composition. The elements present cannot be identified without measuring their X-ray emissions. Characteristic X-rays have wavelengths and energies unique to the elements from which they are emitted, and they are measured using X-ray spectrometers to determine a specimen's elemental composition.

Modern SEMs are commonly outfitted with energy-dispersive spectrometers (EDS) to

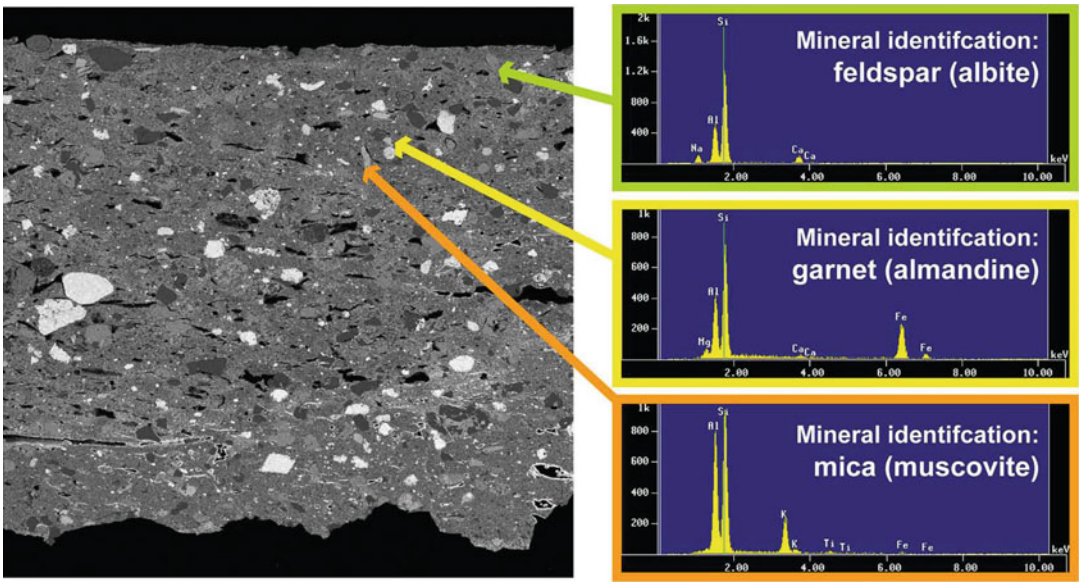

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 3 A BSE image of a ceramic sherd (Khabur ware from Tell Mozan, Syria) and the EDS spectra of three mineral inclusions. The field of view is 8 mm across (Image by Ellery Frahm)

measure such X-rays (Fig. 3). EDS is also sometimes abbreviated as EDX, EDXA, or the trade name EDAX. In SEM-EDS, one searches for and measures the intensity of characteristic X-rays at energies which correspond to elements within a specimen. EDS spectra, though, suffer from overlapping X-ray peaks for some elements, and the system is usually not sensitive enough to measure the tiny signals produced by trace elements.

Characteristic X-rays are measured differently in electron microprobe analysis (EMPA). An electron microprobe is outfitted with several wavelength-dispersive spectrometers (WDS). EMPA-WDS differentiates X-rays by wavelength, rather than energy, for more precise measurements. Like an SEM, a microprobe has also EDS, and it can acquire highly magnified images of a specimen.

SEM-EDS and EMPA-WDS are both spot techniques, meaning the electron beam is focused on a spot and elemental composition is measured for only a small volume, just a few cubic micrometers, not the full specimen. This permits one to obtain highly localized data and to analyze specimens so small that they cannot be studied using other techniques. It also permits one to measure the elemental variation across a specimen surface. Thus, SEM-EDS and EMPA-WDS are well suited to study mixtures, that is, specimens with mixed components (e.g., ceramics, glasses, rocks, slags). Element distributions can be mapped using SEM-EDS or EMPA-WDS, yielding an image constructed from a grid of X-ray measurements (Figs. 4, 5, 6).

Nonconductive specimens (i.e., nonmetals) must be coated with an ultrathin layer (about 100 Å) of a conductive material, normally gold or carbon, to prevent an electric charge from building up on the specimen surface. This coat can be later removed from many specimens.

Historical Background

The earliest commercial SEM model, the Stereoscan, was developed at Cambridge University and sold by Cambridge Scientific Instrument Company. The first batch in 1965 consisted of five instruments. Within 3 years, 100 SEMs were sold each year. It was at this

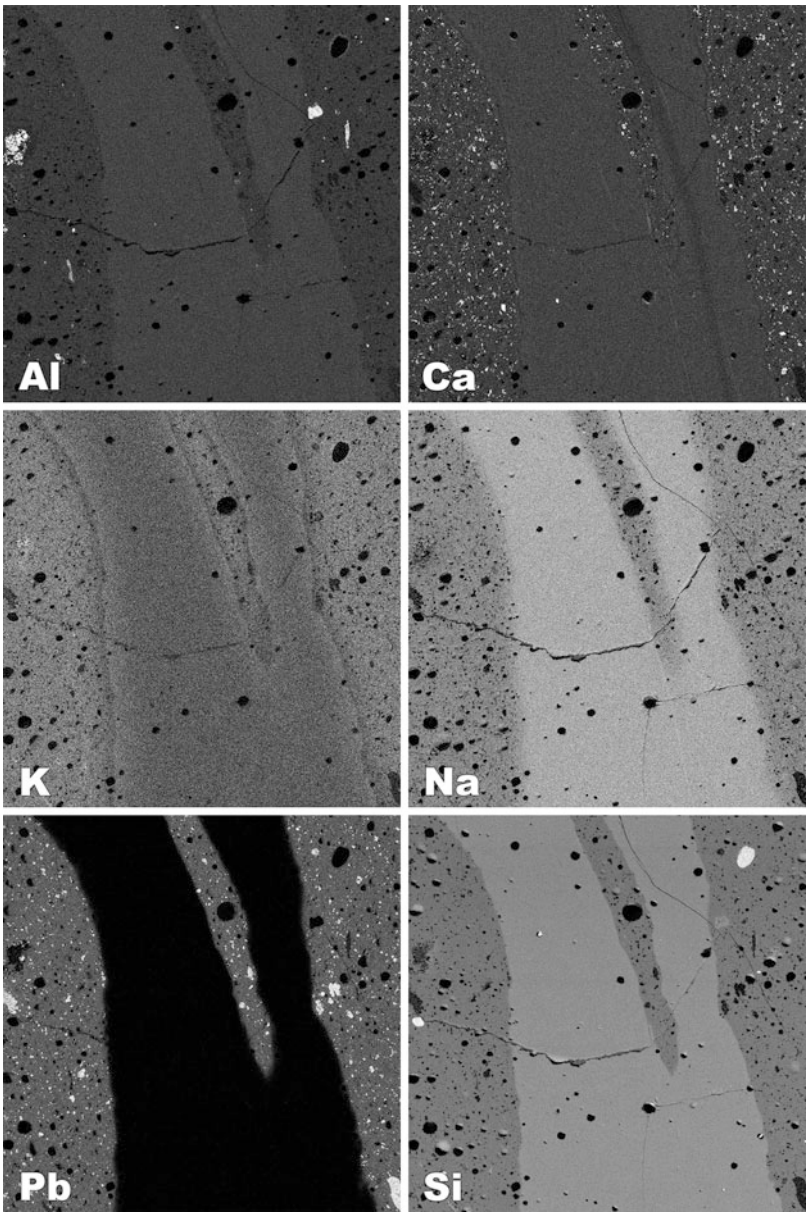

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 4 Element maps of the same area as Fig. 2. These maps show how the two glasses differ in the concentrations and spatial distributions of six elements. The lighter areas have a higher concentration of the element than the darker areas. It is clear that one of these glasses contains lead oxide as an opacifier, whereas the other glass does not (Images by Ellery Frahm)

time that paleoecologist Jonathan Pilcher (1968) published one of the first papers to apply the technique to archaeology. In particular, he used SEM to observe and identify pollen as a means of ecological reconstruction. The next year, archaeologist Don Brothwell (1969) at the British Museum discussed the advantages of SEM for examining such archaeological materials as ancient bone and teeth, fibers, botanical remains, and lithics.

By 1985, about 13,000 SEMs had been sold worldwide, and the technique was frequently used to observe the archaeological materials discussed by Brothwell. A year later, the "Scanning Electron Microscopy in Archaeology" conference was held at the University of London, and the proceedings were published in a book edited by Sandra Olsen (1988). Due to advancements in SEM over the last two and a half decades, particularly regarding hardware and

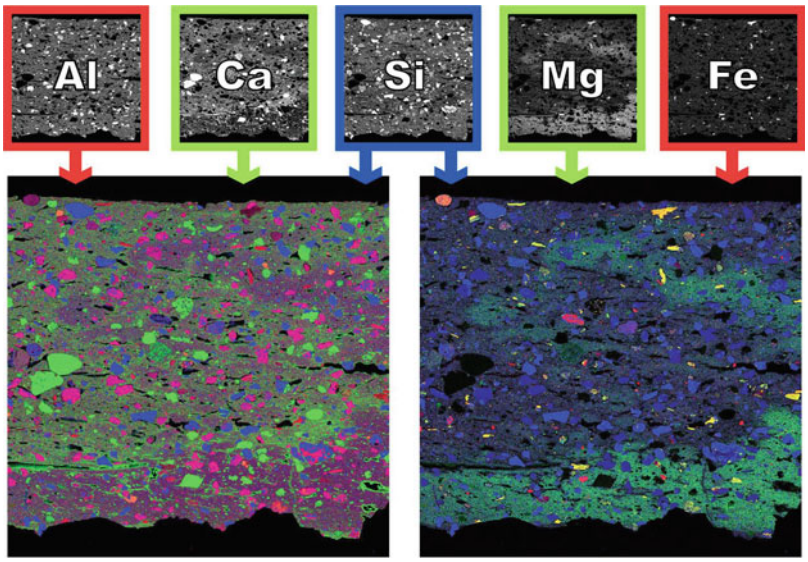

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 5 An example of how element maps can be combined into red-green-blue (RGB) maps to highlight compositional differences in a specimen. The sherd and area shown are the same as Fig. 3. When overlaid, these maps show the abundance, variety, and distributions of different minerals as well as elemental variations within the clay itself (Image by Ellery Frahm)

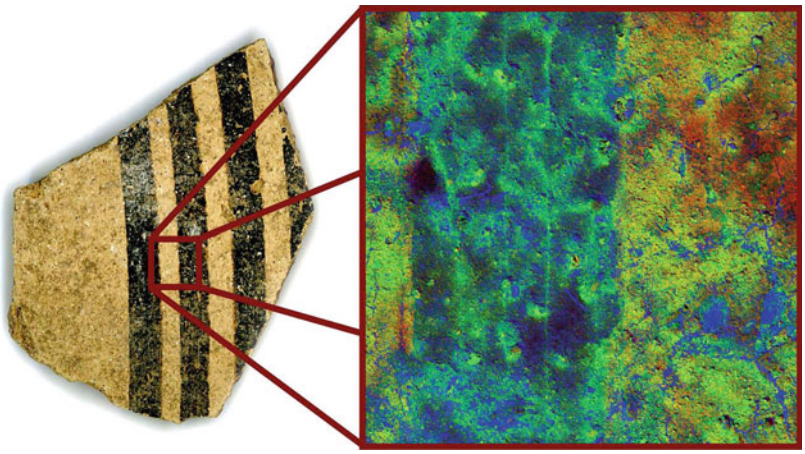

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 6 An RGB element map shows the compositional differences between the slip and paint on this sherd (the same ware as Figs. 3 and 5). The map also reveals a series of incised lines not apparent to the naked eye (Images by Ellery Frahm)

performance as well as data processing, these 1986-era papers are showing their age and nearing obsolescence.

Key Issues

Recent Developments

The instruments discussed at the 1986 London conference date to the 1970s and early 1980s, and SEMs have advanced considerably since the publication of Olsen (1988). For example, most of the backscattered-electron (BSE) detectors in that volume are now obsolete. In a modern SEM, there is a newer type of dedicated BSE detector that offers images superior to those one will see in older publications. Secondary-electron (SE) imaging has improved due to the development and popularity of a new type of electron gun. This new electron gun, known as a field-emission gun (FEG), enables higher-resolution imaging due to an even smaller beam diameter. As a result, the resolution in a modern research-grade SEM is about 2 nm, an order of magnitude better than two decades ago.

Digital imaging is another major advancement. In earlier decades, photographs were taken of high-resolution CRT screens. Now

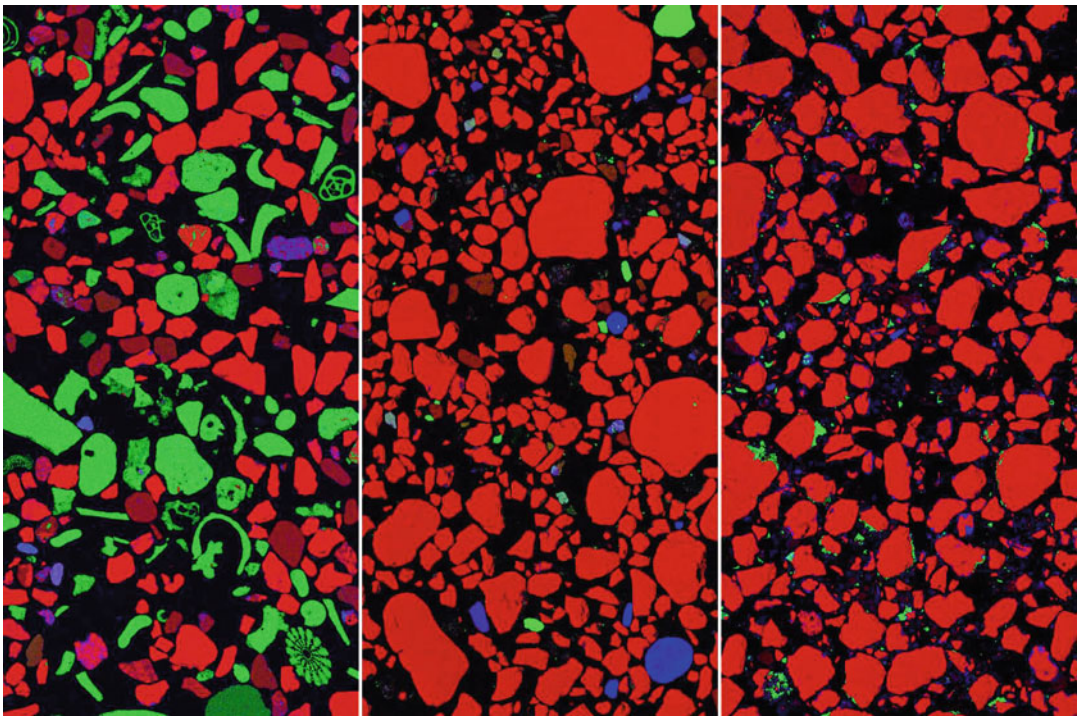

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 7 RGB element maps of sand from Bahrain, Giza, and Petra. Silicon is *red*, calcium is *green*, and iron is *blue*. Examination in the SEM or EMPA reveals differences in the sediment composition, sorting, and roundness (Image by Ellery Frahm)

images are captured, stored, and processed digitally.

Another recent development is imaging at reduced vacuums (i.e., closer to atmospheric pressures), called environmental SEM (ESEM; also sometimes called variable-pressure SEM). Additional air within the specimen chamber reduces the electrical charging of nonconductive specimens so that coating with carbon or gold is often unneeded.

The last few years have seen the introduction by several manufacturers of so-called "tabletop" SEMs. These instruments currently are not what microscopists would consider "research grade," but their lower purchase and maintenance costs as well as their smaller sizes and relative portability are quite attractive for archaeological applications. As a trade-off, their capabilities are limited (e.g., magnification) and highly variable from model to model. Only a few tabletop SEMs have EDS systems.

In addition, SEM-EDS is often used today in conjunction with other analytical techniques not readily available to archaeologists in 1986. SEM-EDS (and EMPA-WDS) data, for example, are often used to calibrate LA-ICP-MS measurements.

Current Applications

SEM-EDS is one of the most versatile analytical techniques in archaeology, applicable to the study of a wide range of inorganic and organic artifacts and archaeological materials. Only a very few of these applications can be considered here.

SEM imaging and analysis is experiencing a renaissance in all fields of archaeological obsidian studies. Geochronologists often use SEM-EDS and EMPA-WDS to analyze volcanic glass shards and chemically match them to a specific volcanic eruption. This dating procedure, called tephrachronology, is quite

similar to obsidian sourcing, so it is not surprising that SEM-EDS can also be useful for analyzing obsidian. After brief experiments with mixed results during the 1980s, archaeologists have recently returned to SEM-EDS as an obsidian sourcing technique. Due to advancements over the last two decades, the results have been promising, especially in the Western Mediterranean (Le Bourdonnec et al. 2006). SEM has been suggested as a way to improve obsidian hydration dating by eliminating the problematic reliance on VLM (Kayani & McDonnell 2008). It has also been utilized for use-wear analyses of Mexican obsidian scrapers (Mandujano et al. 2002).

Artificial glasses, which are typically mixtures, are also well studied by SEM-EDS. For example, Heck and Hoffmann (2000) used this technique to analyze the glass matrix and identify the colorants and opacifiers of Merovingian beads. Bronk and Freestone (2001) took advantage of this spot-analytical technique to analyze submillimeter-sized fragments sampled from glass artifacts with only minimal damage. Weathering and corrosion of Sassanian glass artifacts from Iraq have also been investigated using SEM-EDS (Gulmini et al. 2009).

As mixtures, ceramics are well suited to characterization using SEM-EDS. For instance, SEM-EDS allows tempering materials, such as sands, to be characterized (Fig. 7). Ownby and her colleagues analyzed schist temper in Hohokam ceramic wares and distinguished between schist that naturally occurs in sand and clay versus crushed schist deliberately added as a temper (Ownby et al. 2004). Thin pottery glazes can be studied, and their components, such as opacifiers and colorants, can be identified (Charalambous et al. 2010). Wolf (2002) used SEM-EDS to investigate the production technology of medieval Swiss bricks through examination of their microstructure and mineralogy.

Metallurgy is also well studied by SEM. For example, Giumlia-Mair and her colleagues investigated the Bronze Age metallurgical traditions of the al-Midamman culture in Yemen and contrasted them with Near Eastern traditions (Giumlia-Mair et al. 2000). Experimental alloys, designed to mimic ancient metals, have been examined (Constantinides et al. 2001). Slags can also be characterized by SEM-EDS and the metallurgical processes that produced them identified (Fig. 8), and the analysis of metal ores can complete the picture.

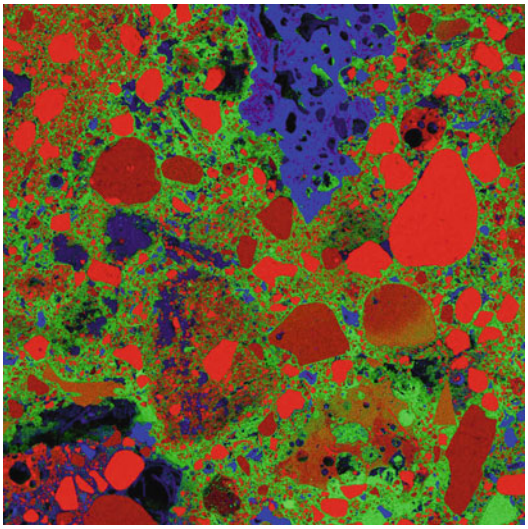

Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 8 Excavation of a historic site near downtown Minneapolis turned up slag specimens, which came as a surprise because maps indicate the area was a residential neighborhood during the nineteenth century. Analyses revealed that it was slag from a puddling furnace. Puddling removes excess carbon, silicon, and other impurities from pig iron to make wrought iron. This causes loss of iron to the slag, so the glassy matrix of the slag is iron rich. Iron is *green*, carbon is *blue*, and silicon is *red*. The field of view is 500 μm across (Image by Ellery Frahm)

Rocks, minerals, and their products, such as lithics and pigments, can also be studied using SEM. Bustillo and her colleagues used BSE imaging and EDS analysis to classify cherts used in Neolithic Iberia (Bustillo et al. 2009). The imaging capabilities of SEM have been used to study use-wear traces and also investigate lithic reduction techniques. For example, traces of a copper-based point used for pressure flaking have been found on chert blades in the Indus Valley (Méry et al. 2007). Layers of mineral-based pigments and plasters can also be studied with an electron beam that can be focused to microscopic sizes (Damiani et al. 2003).

A wide variety of biological materials, too many to list, can also be studied using SEM. Identifying pollen was one of the earliest archaeological uses (Pilcher 1968). This continues to be a popular application, especially when combined with charcoals and other microbotanical evidence to reconstruct the vegetation history and thus paleoclimate of a region. Teeth and bone are frequently examined by SEM to study diagenesis, pathologies, and other phenomena. Coppa and his colleagues identified in vivo drilling of human teeth using flint tools in Neolithic Pakistan (Coppa et al. 2006). SEM examination of eggshell fragments can permit species identification, and using this technique, Beachan and Durand (2007) found evidence of turkey husbandry over eight centuries ago in the American Southwest.

Future Directions

The future of SEM in archaeology will most likely involve (1) the availability of new detector systems to investigate new problems and (2) advances in "tabletop" SEMs. Regarding the first issue, a system already available on certain SEMs detects the beam electrons that diffract out of a specimen due to its crystalline structure. This phenomenon is known as electron backscatter diffraction (EBSD), and it is just now starting to be applied to archaeological specimens (Peruzzo et al. 2011). Its clearest advantage for archaeologists is being able to distinguish in situ minerals with the same elemental composition but different structures and origins, for example, calcite from limestone or aragonite from shell, both $CaCO_3$ and indistinguishable using EDS in isolation. It is possible that in the future new detectors will be developed that combine the speed of EDS with the precision of WDS.

Regarding the second issue, future "tabletop" SEMs will have fewer limitations than current models and will become even more portable. SEM-EDS and EMPA-WDS were developed during the 1970s, in part, as a way to nondestructively analyze lunar rocks, and new instruments will likely take advantage of research to miniaturize SEMs for future Mars rovers. Just as it seems more practical for NASA to send an SEM to Mars than to bring specimens back to Earth, it will eventually be more practical for archaeologists to bring portable SEMs into the field rather than export artifacts to a laboratory halfway around the world.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Imaging Techniques in Bone Analysis
- ▶ Pigment Analysis in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Stone Tool Usewear and Residue Analysis
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Schávelzon, Daniel

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Basic Biographical Information

Born in Buenos Aires, Argentina in 1950, Daniel Schávelzon earned a degree in architecture in the Faculty of Architecture and Urbanism of the Buenos Aires University (1975). He earned a Master (1981) and Doctorate in Architecture (1984) at the National Autonomous University of Mexico (UNAM). Back in Argentina since 1984, currently, he is principal investigator at the National Council for Scientific and Technological Research (CONICET), Professor at Museo Social Argentino University, and at the Faculty of Architecture, Design and Urbanism of Buenos Aires University, where he is the head of the Center of Urban Archaeology. Schávelzon is the director of the Area of Urban Archaeology of the Buenos Aires City Government, emeritus historical adviser of the National Commission of Historical Museums, Monuments and Places, member of the Academy of History of Buenos Aires and of the ICOMOS Argentine Committee.

He teaches graduate courses and conducts seminars in Argentina and other Latin America universities, and frequently serves as mentor, as well as undergraduate and graduate advisor. He has presented more than 180 papers in scientific meetings and gave nearly 170 lectures.

Schávelzon is the author of about 40 books, 200 scientific and divulgation articles, tens of pamphlets and exhibition guides, as well as innumerable mass media articles. His scientific production and his contribution to the preservation of the cultural heritage have received distinctions, scholarships, and prizes both in Argentina and abroad.

Major Accomplishments

The initial years of Daniel Schávelzon´s career were dedicated to the study of Mesoamerican pre-Hispanic architecture, mainly in Mexico on subjects of conservation and restoration. After his return to Argentina, after the military dictatorship ruling the country between 1976 and 1983 was overthrown, Schávelzon´s research focused on a new and until then practically unexplored area: Urban Archaeology. In 1986, he founded the current Center of Urban Archaeology in the Faculty of Architecture, Design and Urbanism of Buenos Aires University, leading an interdisciplinary group of specialists that has carried out archaeological investigations not only in Buenos Aires city and its vicinity, but also in other Argentine cities, with the subsequent study of the archaeological collections. Among others, the Ezcurra House, the Coni Printing House, the Convent of Santa Catalina, 3 de Febrero Park, the Government House and the Town Hall, several tunnels and underground constructions in Buenos Aires city should be mentioned. Other relevant investigations include the areas of the early foundation of the cities of Mendoza and Puerto Deseado.

Schávelzon has been a precursor in the conservation and analysis and of artifacts (ceramics, clay pipes, glasses, metals, etc.) from post-Hispanic archaeological contexts (sixteenth to twentieth century). His publications represent important contributions and his catalogs are remarkable references.

Schávelzon has stimulated the collaboration with research centers of several Argentine provinces and has promoted the formation of local research teams, inspiring the growth and diversification of Historical Archaeology in Argentina and its relations with other Latin American countries. His assiduous activities in favor of scientific divulgation in newspapers, radio, television, and more recently internet contribute to increase both general knowledge and public interest about Urban and Historical Archaeology.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Clay Pipes in Historical Archaeology
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Modern World: Historical Archaeology
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Urban Archaeology

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Schiffer, Michael Brian (Modern World)

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Basic Biographical Information

I was born in Winnipeg, Manitoba, Canada, on October 4, 1947, to Louie and Frances-Fera Schiffer. In 1953 we moved to Los Angeles, where I grew up. My parents enjoyed a happy marriage for 63 years and provided a loving home. Neither parent had finished high school, but both were avid readers and instilled in me a love of learning and the expectation that I would attend UCLA.

At UCLA I took classes from Sally and Lewis Binford, James Hill, and James Sackett. During the summer of 1968, prior to my senior year, I attended Paul Martin's summer program at Vernon, Arizona, whose staff included Fred Plog, Mark Leone, and Ezra Zubrow. These undergraduate experiences familiarized me with processual archaeology, which I expected to practice in graduate school. On December 22, 1968, I married Annette Leve, who remains my lover and best friend. Annette and I have two sons, Adam Joseph and Jeremy Alan, of whom we are very proud.

Turning down generous fellowships at Michigan and UCLA, I attended graduate school at the University of Arizona. During graduate studies, I became disenchanted with the processual approach to inference and, especially, its inept handling of the formation processes of the archaeological record. Also while a graduate student, I collaborated with J. Jefferson Reid and William Rathje to create the research program known as behavioral archaeology, which privileges the study of relationships between human behavior and material culture in all times and all places. These emphases resulted in a Ph.D. dissertation (1973) that became, after much revision, *Behavioral Archaeology* (Schiffer 1976).

In my first job, with the Arkansas Archaeological Survey, I learned about Cultural Resource Management (CRM) from Charles McGimsey and Hester Davis. This experience eventuated in a monograph (Schiffer & House 1975) and book (Schiffer & Gumerman 1977). Some say that these works had a salutary effect on CRM projects in the United States by demonstrating the necessity of conducting cutting-edge research in a management context.

In 1975 I returned to the University of Arizona as assistant professor. Among my first projects was an overview, with Randall McGuire, of the prehistory of southwestern Arizona (Hohokam & Patayan, 1982) and a study of reuse processes in modern Tucson; I also became interested in experimental archaeology and ethnoarchaeology and continued work on formation processes.

Major Accomplishments

One of my proudest accomplishments was editing, beginning in 1978, 23 annual volumes of archaeological method and theory stretching over three series and three publishers: *Advances in Archaeological Method and Theory*, *Archaeological Method and Theory*, and *Journal of Archaeological Method and Theory*.

I was promoted to associate professor in 1979 and 3 years later to professor. In 1983 James Skibo and I built the Laboratory of Traditional Technology, dedicated to experimental studies and equipped with tools for making pottery. Our experiments led to more than a dozen publications (e.g., Schiffer & Skibo 1987) and decisively turned my research interests toward technological change. The publication of *Formation Processes of the Archaeological Record* (Schiffer 1987) closed that chapter of my career.

During the mid-1980s a hobby – collecting portable radios – turned into a study of that artifact's history, which furnished insights into social, economic, and technological change (Schiffer 1991). Next was an early history of the electric automobile (Schiffer et al. 1994). The radio and automobile studies addressed, respectively, then-current issues in American society: the hollowing out of manufacturing and a possible electric car revival.

During the 1980s, postprocessual archaeology stridently attacked processual and behavioral archaeologies. Beyond criticizing the antiscience, intellectual relativism of early postprocessual statements, I encouraged students to engage from a behavioral standpoint the postprocessual research topics such as ritual and religion, symbolism, and social power. My own response was to fashion an artifact-based theory of communication (Schiffer & Miller 1999) and with William Walker an artifact-acquisition perspective on social power.

Curious about the earliest electrical technologies, I first tackled the eighteenth century (*Draw the Lightning Down: Benjamin Franklin and Electrical Technology in the Age of Enlightenment*, *2003*) then the nineteenth (*Power Struggles: Scientific Authority and the Creation of Practical Electricity Before Edison*, *2008*). Both books, which exemplify my best scholarship, challenged from a behavioral standpoint many interpretations crafted by historians. Although the subjects of these books may seem distant from the concerns of prehistoric and even most historical archaeologists, the projects were an opportunity to conduct a kind of ethnoarchaeology that employs historical evidence. Given the copious documentary and published materials available on both the technologies and their behavioral contexts, I fashioned widely applicable generalizations about technological change, which I aimed at archaeologists in a half dozen articles and a book (2011). Drawing on my studies of technology and more traditional topics, I also wrote a "Reader's Digest" version of behavioral archaeology (Schiffer 2010).

In 2004 my colleagues elected me the fourth Fred A. Riecker Distinguished Professor of Anthropology.

Cross-References

- ▶ Behavioral Archaeology
- ▶ Ethnoarchaeology
- ▶ Experimental Maritime Archaeology
- ▶ Journal of Archaeological Method and Theory
- ▶ Modern Material Culture Studies
- ▶ Processualism in Archaeological Theory
- ▶ Rathje, William Laurens
- ▶ Site Formation Processes

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Schiffer, Michael Brian (Theory)

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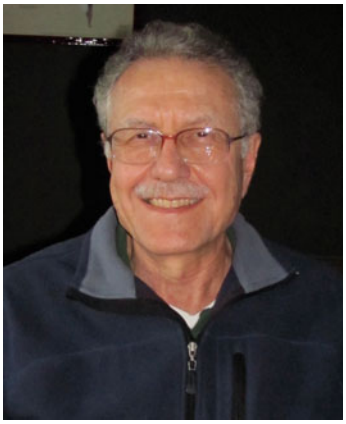

Schiffer, Michael Brian (Theory), Fig. 1 Michael Brian Schiffer in 2012 (Photo by Annette Schiffer)

Basic Biographical Information

Michael Brian Schiffer (Fig. 1) was born on a small farm in Winnipeg, Manitoba, Canada, on October 4, 1947. He moved with his family in the early 1950s to California growing up in the Crenshaw district of south-central Los Angeles. As an undergraduate, he attended the University of California at Los Angeles. Initially he majored in chemistry but changed to anthropology in his sophomore year. He graduated with a B.A. in Anthropology in 1969. As an undergraduate, he was steeped in New Archaeology; his professors included James N. Hill, James Sackett, Lewis R. Binford, and Sally R. Binford. In the summer of 1968, he joined the Chicago Field Museum of Natural History's Southwest Expedition to east-central Arizona directed by Paul Sidney Martin and assisted by Fred Plog, Mark Leone, and Ezra Zubrow.

Schiffer entered the doctoral program in Anthropology at the University of Arizona in 1969 and conducted his dissertation work at the Joint Site in the Mogollon Rim country. He received an M.A. in 1972 and Ph.D. in 1973. His doctoral dissertation, entitled *Cultural Formation Processes of the Archaeological Record: Applications at the Joint Site, East-Central Arizona*, laid the foundation for his subsequent scholarship as a behavioral archaeologist. Upon graduation, he took a job with the Arkansas Archaeological Survey for two years. In 1975, he returned to the University of Arizona as an Assistant Professor of Anthropology. He was promoted to Associate Professor in 1979 and Full Professor in 1982. Upon William A. Longacre's retirement in 2004, he was elected Fred A. Riecker Distinguished Professor of Anthropology.

In 1983, Schiffer and his graduate student, James M. Skibo, established the Laboratory of Traditional Technology at the University of Arizona. This facility is dedicated to studying experimentally the effects of technical choices on the performance characteristics of artifacts, especially ceramic artifacts. Some of their most important collaborations include their article "Theory and Experiment in the Study of Technological Change" (Schiffer & Skibo 1987).

Major Accomplishments

Michael Schiffer is one the founders of Behavioral Archaeology, a social science research program that defines human behavior as interaction between people and objects (artifacts, architecture, and other people). In the beginning of his

career (Schiffer 1976, 1987), Schiffer focused on developing behavioral method and theory to describe and explain archaeological patterning. This included creation of behavioral chain analysis and a synthetic model of inference (Schiffer 1975). As one of the cofounders of the subdiscipline of behavioral archaeology, along with William Rathje and J. Jefferson Reid, Schiffer has consistently developed method and theory that places material objects at the center of behavioral studies of human activity (Reid et al. 1975).

Building on the basic definition of human behavior, Schiffer developed a synthetic model of inference (Schiffer 1976) that takes into account the behavioral and natural processes that create the archaeological record. The synthetic model of inference drew together various sources of actualistic knowledge, including ethnography, ethnoarchaeology, history, and experiments, to create generalizations that could be used in inferences about unknown relationships between past peoples and objects. Such a model necessarily assumes continuities between past and present relationships: (1) the sequential nature of behaviors forming objects' histories, (2) the causal contribution objects make to behaviors that propel the forward motion of activities in life histories, and (3) four kinds of measurement that make possible the empirical study of object performances and life histories (Schiffer 1987).

To call attention to the generalizations concerning artifact disposal activities and subsequent archaeological patterning, Schiffer (1976) coined the terms n- and c-transforms, which denote the effects that natural and human (or cultural) processes have on the formation of archaeological deposits. Correlates, another kind of behavioral generalization, pair dimensions of measurable artifact variability (frequency, formal properties of materials, locations in three-dimensional space, and associations in space between objects) to the organization of behaviors (people-object interactions).

As his career has progressed, he has extended behavioral method and theory across a range of disciplines and has extensively explored human-object interactions in the history of technology, modeling of behavioral processes involved in the invention, development, manufacture, and adoption of technologies (Schiffer 2010, 2011). Several models and constructs have been critical to this endeavor, including the analysis of performance characteristics and performance matrices, which were developed in collaboration with James M. Skibo (e.g., Schiffer & Skibo 1987; Skibo & Schiffer 2008). Performance characteristics, such as heating effectiveness in cooking pots, are capabilities or competences that objects bring to interactions that allow them to take place (cooking) and facilitate the forward motion (feasting) of behavioral events. The rise and spread of new technologies often involves competitions among performance characteristics in different stages (e.g., manufacture, use) in the life histories of artifacts comprising technologies. Use of performance matrices enabled Schiffer to explore the electric automobile in the late nineteenth and early twentieth centuries as well as the history of electric lighthouses (Schiffer et al. 1994; Schiffer 2008). More recently, he completed two studies of the history of electrical science and technology spanning the eighteenth and nineteenth centuries (Schiffer 2008; Schiffer et al. 2003).

Finally, the placement of artifacts at the center of behavioral study has allowed Schiffer to ground seemingly immaterial topics in material-behavioral perspectives. One of the most interesting such treatments has been Schiffer and Miller's (1999) artifact-focused approach to human communication. Inspired by the process of information transmission implicit in the synthetic model of archaeological inference, Schiffer and Miller retasked this model for the behavioral study of communication. Their approach differs from more traditional ones by highlighting the important roles artifacts play in the process and by reversing the analytical emphasis from senders of information to receivers.

Cross-References

► Archaeological Record
► Archaeological Theory: Paradigm Shift

▶ Behavioral Archaeology
▶ Binford, Lewis R. (Theory)
▶ Ceramics: Scientific Analysis
▶ Leone, Mark P. (Theory)
▶ Material Culture and Education in Archaeology
▶ Modern Material Culture Studies
▶ Processualism in Archaeological Theory
▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
▶ Site Formation Processes

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Schliemann, Heinrich

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Basic Biographical Information

International entrepreneur and self-taught archaeologist Heinrich Schliemann (1822–1890), whose excavations are widely credited with discovering the Greek Bronze Age, was born in Neubukow (Mecklenburg, Germany). The son of a clergyman who lost his rural parish for immorality (1831) (Traill 1995), Schliemann attended the Neustrelitz *Realschule* (1833–1836) before becoming a grocer's apprentice (1836–1841) and studying bookkeeping. Shipwrecked off Holland while en route to Venezuela (late 1841), he found work in the import–export business in Amsterdam and began to learn foreign languages. Employment with B.H. Schröder & Co. in 1844 inspired him to learn Russian. In early 1846, he moved to St. Petersburg as agent for several firms, soon founding his own company to sell commodities such as indigo, cotton, coffee, and sugar. In 1850, his brother's death took him to California, where he made large sums buying gold dust. Back in St. Petersburg in 1852, he married Ekaterina

Petrovna Lyshin, a lawyer's daughter by whom he had a son and two daughters. His wealth grew during the Crimean War (1853–1856) as he imported commodities like sulfur, saltpeter, and lead. From 1856, Schliemann turned to banking and the study of the ancient world. He toured Europe, Egypt, the Levant, and Athens (1858–1859) and traded in tea (1862–1864) before exchanging commerce for round-the-world travel. In 1866, Schliemann attended a variety of scholarly lectures in Paris, returned briefly to Russia, and settled in Paris by year's end to enjoy literary-intellectual pursuits funded by investment income. In 1867–1868, he traveled to North America and Cuba, Italy, Greece, and the Troad. In 1869, he published his first archaeological book, inspired by fieldwork in Greece and Turkey, received a Ph.D. from the University of Rostock, obtained US citizenship and a divorce, and married the 17-year-old Athenian Sophia Engastromenos, who bore him a son and a daughter. Concern for Sophia's well-being caused his permanent move to Greece in 1871. Schliemann died in Naples, Italy, on 26 December 1890 of complications from ear surgery.

Schliemann, Heinrich, Fig. 1 Schliemann in 1883 (Courtesy of the American School of Classical Studies at Athens, Gennadius Library Archives, Heinrich Schliemann Papers)

Major Accomplishments

At Troy, Mycenae, Orchomenos, and Tiryns, Schliemann discovered remains of a prehistoric civilization, which he dubbed "Mycenaean" after Homeric epic (Calder & Cobet 1990). During campaigns at Troy between 1870 and 1890, he evolved from novice excavator to experienced scholar. At Mycenae (1876), Schliemann and his wife excavated several tholos tombs, including the "Treasury of Atreus," and Grave Circle A's famous shaft graves. At Orchomenos (1880, 1881), Schliemann cleared the ruined "Treasury of Minyas," noting the distinctive pottery now called Gray Minyan Ware. Excavations at Tiryns (1876, 1884, 1885) uncovered Cyclopean walls and a palace complex featuring frescoes and a bathroom.

Despite the famous treasures of Troy and Mycenae, Schliemann preferred artifacts that led to substantive scientific results; his awareness of stratigraphic method and materials analysis antedates his collaboration with Wilhelm Dörpfeld. His choice of photographs to illustrate the Troy finds was innovative though unsuccessful, his multilingual excavation publications exemplary. With prehistoric archaeology in its infancy, identification and dating errors were inevitable, but his expertise grew through experience and consultation (Kennell 2010).

Relations with officialdom were often strained. His removal of artifacts led to a lawsuit by the Turkish state (1874–1875), and he resisted supervision by the Greek Archaeological Service at Mycenae. His funding of the demolition of the Frankish Tower on the Athenian

Schliemann, Heinrich, Fig. 2 Schliemann and the 1890 Troy Conference participants (Courtesy of the American School of Classical Studies at Athens, Gennadius Library Archives, Heinrich Schliemann Papers)

Acropolis also sparked controversy. After the Turkish lawsuit was settled, Schliemann traveled around Europe seeking comparative material in museums and investigated other sites in Greece (Levadia, Marathon, Ithaka, Kythera) and Italy (Albano, Motya). On the strength of his work at Troy and Mycenae (Fig. 1), Oxford University awarded Schliemann an honorary doctorate in 1883. In Crete, he vainly tried to obtain land at Knossos and a permit to excavate (1884–1889). He toured Egypt twice, visiting Flinders Petrie. Schliemann collaborated with other scholars and organized international conferences at Troy (1889, 1890) (Fig. 2). He left three monuments in Athens: his house, the Iliou Melathron; the German Archaeological Institute building; and his own mausoleum in the First Cemetery. Over decades, he archived tens of thousands of letters from hundreds of correspondents that significantly complement his publications and diaries (Kennell 2007; *Heinrich Schliemann* papers n.d.).

Schliemann's publications excited scholarly interest and impressed the general public, not least because of his personal voice as entrepreneur, writer, and excavator. Academics and amateurs disparaged his reliance on Homer and Pausanias, along with his chronology and interpretations (Zavadil 2009). Even today, his greatest fame comes from his discoveries at Troy and Mycenae, regardless of the nature and circumstances of his results. With his forceful personality and scientific bent, this ex-businessman redefined archaeology, formerly the purview of academic admirers of Classical aesthetics, as the comprehensive study of the material remains of past civilizations (Herrmann 1992). He combined literary zeal with practical skill to organize, finance, run, and publicize large-scale excavations that initiated the rediscovery of the Aegean Bronze Age. In an age when imperialism was often expressed by nationally funded archaeology, Schliemann's projects were as exceptional in being self-funded, broadly promoted, and internationally disseminated as in their tangible finds (Runnels 2007).

Cross-References

- ▶ Baths and Bathing, Greek
- ▶ Oral Tradition: Ancient Greece

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Schmidt, Peter R.

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Basic Biographical Information

Peter Schmidt's impacts on archaeology and African history are theoretical, substantive, and pragmatic. Since the 1970s, his initiatives in Africa have fostered research, institution building, and heritage advocacy. Trained as an archaeologist and historian, Schmidt's approach to archaeology is inclusive, methodologically sophisticated, grounded in structural and symbolic theory, and politically aware (Schmidt 1978, 1983a, b, 1997, 2010; Schmidt & Patterson 1995). His scholarship makes informed representations of Africa and Africans. He highlights the long-term pasts of eastern Africa by integrating material, ethnographic, oral historical, documentary, and environmental sources (Schmidt 1978, 1983a, 1997; for conspectus, see Schmidt 2006).

Born in 1942, Schmidt grew up in northern California and graduated from Stanford University in 1965. He completed his masters degree in African History at UCLA and studied at Makerere University in Uganda with Merrick Posnansky. In 1974, he earned a Ph.D. at Northwestern University, at the time a leading institution of African Studies. Since 1971, Schmidt has been a professor of Anthropology in the United States, including at Brown University (1971–1988) and, his current position, at the University of Florida. His dissertation interpreted Haya kingdoms and the long-term history - technological and otherwise - of northwestern Tanzania using a structural approach to the historical sources of the region. Schmidt's historical archaeology integrated and valorized oral historiographies (Schmidt 1978, 1997, 2006). Thereafter, he worked for a time as the state archaeologist of Idaho, in between his African research and teaching at Brown University. Throughout this period, he continued to practice ethnoarchaeology and experimental ethnoarchaeology as well as to investigate the complex symbol systems of African iron technology. Schmidt's scholarship challenged preconceived notions about African technological inferiority and suggested an independent origin for iron technology on the continent (Schmidt 1997). For popular audiences, *The Tree of Iron*, an award-winning film, recounts the principal findings.

Schmidt's prominence in African Studies and anthropological archaeology expanded during the middle 1980s, when he founded and led the Archaeology Unit at the University of Dar es Salaam in Tanzania (1985–1987). Subsequently, Schmidt spearheaded efforts to establish a human rights center in Uganda and his research on iron technology expanded to Gabon and Cameroon. In 1988, Schmidt joined the University of Florida, serving as director of the Center of African Studies until 1995. As early as 1998, Schmidt began to develop a new stream of research in Eritrea. While in Eritrea, Schmidt served as Dean of the College of Arts and Social Sciences at the University Asmara and as Chief Curator of Archaeology at the National Museum of Eritrea. Based on detailed archaeological survey and excavations in the vicinity of Asmara, he and his team concluded that the Aksumite Empire developed out of the indigenous Ona culture in the first millennium BCE, rather than arising exclusively or primarily from South Arabian influences (Schmidt et al. 2007).

Major Accomplishments

Throughout his career, Schmidt has worked effectively to overcome the conventional separation of history and "prehistory" to examine historical representations and social memory in Africa (Schmidt 2006). More recently, his interests turned to the play of tropes in archaeological interpretations, the anthropology of time and time concepts, community approaches to heritage in Africa, and the postcolonial integration of archaeology and African history into university pedagogy as an act of political liberation. Schmidt's research, teaching, and publications continue to shape and promote informed historical representations of Africa, Africans, and their pasts.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Oral Sources and Oral History

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Schmitz, Pedro Ignacio

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Basic Biographical Information

Pedro Ignacio Schmitz (Fig. 1), priest of the Society of Jesus, is one of the oldest, most renowned, and most awarded Brazilian archaeologists still at work. He was born on the 30th of August 1929, in the city of Bom Princípio, state of Rio Grande do Sul, Brazil, descending from a family of small farmers of European origin and Catholic formation (Magalhães 2011). He thought about becoming a historian at the beginning of his career, but under the guidance of the anthropologist, botanist, and geographer Balduíno Rambo (1906–1961), also a Jesuit, Schmitz chose the Archaeology as his main field of work (Teixeira et al. 2002; Teixeira 2006; Schmitz 2007; Martins & Rogge 2012).

He holds degrees of Philosophy (1952–1954, from Faculdade de Filosofia Cristo Rei), History and Geography (1955–1958, from Universidade Federal do Rio Grande do Sul – UFRGS), and Theology (1959–1963, from Pontifícia Faculdade de Filosofia e Teologia de Cristo Rei).

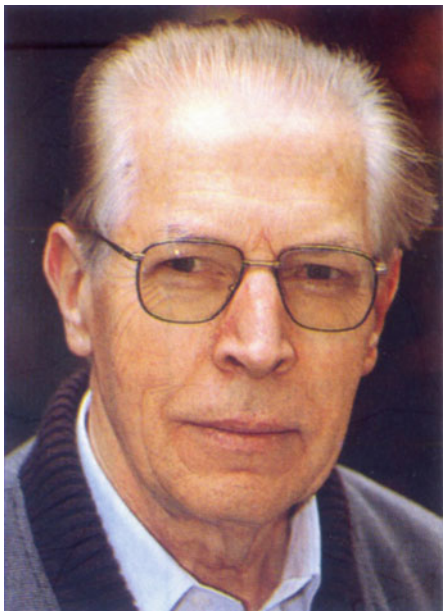

Schmitz, Pedro Ignacio, Fig. 1 Pedro Ignacio Schmitz, picture displayed in his *Curriculum Vitae* (Available at http://to.plugin.com.br/jag-part-inschmitz.htm (accessed 16 September 2012))

He concluded his doctorate degree in History and Geography in 1976 from Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS) with the thesis entitled *Sítios de pesca lacustre em Rio Grande, RS, Brasil* ("Archaeological Sites of Lake Fishing in Rio Grande, Rio Grande do Sul, Brazil"), recently republished (Schmitz 2011), study that earned him the title of full professor at that same university (vide Curriculum Vitae at http://lattes.cnpq.br/1125239815915680).

He received training in archaeology in Brazil and several other countries in the Americas and Europe and participated in courses taught by José Loureiro Fernandes (1903–1977) and Annette Laming-Emperaire (1917–1977), among other renowned archaeologists. Betty J. Meggers (1921–2012) and Clifford Evans (1912–1985) invited him to participate in the "Programa Nacional de Pesquisas Arqueológicas" (PRONAPA –acronym in Portuguese for "National Program for Archaeological Research"), developed in Brazil between 1965 and 1970, but he declined the offer. Nevertheless, he adopted the culture-historical proposal of the project, accepted sponsorship from the couple of American archaeologists from 1965 on, and continued developing archaeological research in several Brazilian states: Bahia, Goiás, Mato Grosso do Sul, Pernambuco, Rio Grande do Sul, Santa Catarina, and Tocantins. He also developed archaeological research in Uruguay and published studies on prehistoric Argentina (Schmitz 2006b; Schmitz 2007; Eremites de Oliveira 2008; Martins & Rogge 2012). His scientific production is very significant quantitatively and qualitatively. Beginning in the 1950s, it comprises hundreds of works, mostly published in Portuguese by the Instituto Anchietano de Pesquisas (IAP), one of the major Brazilian institutions of archaeological research, created in 1956 and currently connected to the Universidade do Vale do Rio dos Sinos (UNISINOS), in São Leopoldo, Rio Grande do Sul, for which Schmitz has long been its greatest name. Among many other studies concluded throughout his academic life, it is worth noting his studies on Guarani language in Paraguay, in 1958, as well as his internship in Archaeology at Universidad Nacional de La Plata, Argentina, between 1970 and 1971. He is thus a pioneer archaeologist of holistic formation, within and beyond the four fields of the boasian lineage, with an intellectual production marked mainly by experiences in the subfield of Prehistoric Archaeology in Brazil. He identifies himself as an archaeologist "of historical and multilinear evolutionist trend" linked to American Cultural Anthropology (Teixeira et al. 2002; Schmitz 2007: 3) (Fig. 2).

He was a professor of anthropology at UFRGS from 1958 to 1985, since the days of the former University of Porto Alegre, institution for which he worked part-time and where he retired. He was also a director of IAP from 1966 to 2009, where he continues with his research, coordinates the area of Archaeology since 1962, and is the editor of the *Pesquisas* journal, established in 1957(Schmitz 2006a) (Fig. 3).

He was one of the founders of UNISINOS in 1969, with which he collaborated since 1963, when he began teaching at the former Faculdade de Filosofia, Ciências e Letras, that originated the

Schmitz, Pedro Ignacio, Fig. 2 Pedro Ignacio Schmitz, the first on the left with glasses, during the 3 ° Simpósio de Arqueologia da Área do Prata ("3rd Symposium of Archaeology of the Areaof Prata"), held at the Instituto Anchietano de Pesquisas, in São Leopoldo, Rio Grande do Sul, in 1969 (Martins & Rogge 2012: 258)

Schmitz, Pedro Ignacio, Fig. 3 Areas where Pedro Ignacio Schmitz coordinated programs of archaeological research in Brazil (Martins & Rogge 2012: 265)

university. Since then, he has taught the disciplines of Anthropology and Archaeology in undergraduate courses, and since 1987, he has composed of the Post Graduation Program in History (M.A. and Ph.D.).

Since 1969, he is a researcher of the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq – acronym in Portuguese for "National Council for Scientific and Technological Development"). Nowadays, he is as representative before government agencies such as CNPq, Instituto do Patrimônio Histórico e Artístico Nacional (IPHAN – acronym in Portuguese for "Institute of National Historical and Artistic Heritage") and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES – acronym in Portuguese for "Coordination for the Improvement of Higher Education").

Major Accomplishments

The major contribution of Pedro Ignacio Schmitz to archaeology is linked to research conducted in various regions of Brazil, besides the institutionalization, development, and popularization of the archaeological science; the instruction of several generations of archaeologists, sociocultural anthropologists, and ethnohistorians; and the preservation and appreciation of the national archaeological heritage.

Schmitz was one of the founders of the Sociedade de Arqueologia Brasileira (SAB – acronym in Portuguese for "Society of Brazilian Archaeology"), established in 1980, an entity that he not only came to preside during several periods (1980–1981; 1981–1983; 1989–1991) but also took part in its board of directors in other moments. He also occupied important spaces in public agencies charged of the promotion, support, and authorization of archaeological research in Brazil. Many archaeologists worked under his direct influence in the beginning of their careers: Adriana Schmidt Dias, Altair Sales Barbosa, Ana Luiza Vietti Bitencourt, André Luiz Jacobus, Arno Alvarez Kern, Fabíola Andréia Silva, Irmhild Wüst, José Luis dos Santos Peixoto, Marco Aurélio Nadal De Masi, Maribel Girelli, Pedro Augusto Mentz Ribeiro (1936–2006), Rodrigo Lavina, Sílvia Moeleck Copé, and others who, like me, had a passage at the IAP at the beginning of their professional careers (Eremites de Oliveira 2008). Some other colleagues, as André Osorio Rosa, Ítala Irene Basile Becker, Ivone Verardi, Jairo Henrique Rogge, and Marcus Vinicius Beber, either worked or still work under his coordination in the institution. All these people received certain influence from the epistemological model of PRONAPA. Schmitz has also been keeping himself up to date, by following the new contributions registered in World Archaeology, which can be noticed in his most recent works.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Laming-Emperaire, Annette
- ▶ Meggers, Betty Jane

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Basic Biographical Information

Born in 1941, Robert L. Schuyler is Associate Professor in the Department of Anthropology (University of Pennsylvania) and Associate Curator-in-Charge of the Historical Archaeology Section (University of Pennsylvania Museum of Archaeology and Anthropology). He received his B.A. in Anthropology from the University

Schuyler, Robert L., Fig. 1 Robert L. Schuyler (Photo credit: University of Pennsylvania Museum of Archaeology and Anthropology, photographer Lauren Hansen-Flaschen)

of Arizona and his M.A. and Ph.D. in Anthropology from the University of California-Santa Barbara (Fig. 1).

Schuyler has directed several fieldwork projects, including investigations of Potomac River Native American sites from the Contact period (seventeenth to eighteenth centuries); the Sandy Ground, Staten Island, nineteenth–twentieth-century African-American oystering community; the boarding houses of female factory workers in the town of Lowell, Massachusetts, which was one of the first large cities in America to undergo industrialization in the early nineteenth century; and the short-lived silver mining town of Silver Reef, Utah (c. 1877–1887).

His current fieldwork research is the South Jersey Project, which is developing the story of Vineland, New Jersey, from the 1860s to the present, in partnership with the Vineland Historical and Antiquarian Society. His innovative approach in this project is historical ethnography, which combines archaeology, archival documents, oral histories, and the study of living communities; it is a framework for historical archaeology that he describes as "the only archaeology in which the subject matter is still forming." The South Jersey Project is part of a new research domain, the archaeology of the twentieth century, and Schuyler's particular interests are in understanding the processes underlying how an agricultural center of the mid- to late 1800s came to have the largest municipal boundaries in present-day New Jersey.

Major Accomplishments

Schuyler is a founding member of the Australasian Society for Historical Archaeology, the Society for Commercial Archaeology, the Society for Post-Medieval Archaeology, and the Society for Industrial Archaeology, among others. He also is a member of the Society for Historical Archaeology (President 1982), the Council for Northeast Historical Archaeology (President 1980–1981), the American Anthropological Association, the Society for American Archaeology, and numerous other national, regional, state, and local organizations.

After arriving at the University of Pennsylvania, he developed a Ph.D. program in historical archaeology based on historical ethnography (see above).

In 2009, he received the J.C. Harrington Medal in Historical Archaeology from the Society for Historical Archaeology for his scholarly, educational, and professional activities in the discipline.

Cross-References

- ▶ Archaeology as Anthropology
- ▶ Archaeology: Definition
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Australasian Historical Archaeology
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology

- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Industrial Archaeology
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ North America During the European Contact Period
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Science Communication in Archaeology

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Introduction

Archaeology is uniquely positioned among the sciences to communicate socially relevant scientific content. Through the interpretation of cultural artifacts and human behavior, archaeology can communicate the human story that lies behind the scientific data. Commitment to public communication by archaeologists brings benefits to both society and the discipline. New communication opportunities that challenge traditional knowledge hierarchies have developed from web-2.0 innovations, post-processual thinking, and changes within academia and mass media. Communicating archaeology to nonscientists requires a flexible approach which emphasizes the relevance of research to contemporary issues. Although public communication is considered important, (it rarely features in the day-to-day work of archaeologists), archaeologists are not typically trained in public engagement techniques and they can find it difficult to transition between academic and public communication platforms.

Definition

Presenting archaeology to nonscientists traditionally means disseminating research produced exclusively by experts to a largely uniformed public. Contemporary ideas of communication, however, focus on how information is received and understood by multiple audiences using dialogue, engagement, and participation. Archaeological communication across print, television, exhibitions, and the web can be educational, public relations, or democratic. Engaging with public audiences is increasingly a core part of an archaeologist's role and involves engaging with challenges, tensions, and differing perspectives.

Key Issues/Current Debates/Future Directions/Examples

Archaeology has always generated fascination outside of academia. As a result, archaeologists encounter media communication issues more frequently than researchers in many other sciences. Successful communication requires archaeology to be *received* and *understood* by the intended

recipients, in addition to the information being disseminated. Communicating archaeology to nonspecialists has become synonymous with wider debates about public engagement in science. Under an engagement model, two-way dialogue and participation are as important as education (Clack & Brittain 2007; Holtorf 2007).

Science communication has benefits for both society and archaeology. Public outreach builds support for research projects and can positively influence archaeological funding. Since1997, the USA's National Science Foundation has required explicit consideration of the broader impacts of research in every funding proposal. Enthusiasm and fascination for archaeology presented in the mass media inspires future generations of archaeologists. Engaging with communities can smooth excavation processes, build positive indigenous relationships, reduce illegal artifact trading and the looting of archaeological sites, and even lead to new research questions and directions. A more informed public can help combat scientific misinformation on issues such as evolution, climate change, environmental degradation, and cultural and genetic diversity. Communities working in partnership with archaeologists also benefit from group participation that enrich shared identities or reduce community divisions (Simpson & Williams 2008; Byrne 2012). The benefits of communication are therefore widely recognized, but knowing how to begin in nonacademic communication is less widely understood (Harding & Vencolvá 2007).

There are many models for communicating archaeological knowledge. Holtorf (2007) outlined three models – the educational, public relations, and the democratic – that address differing objectives of communication. The education model is based on a unidirectional and hierarchical flow of information from knowledge-keeping experts to uninformed nonspecialists. In the public relations model, archaeology is a brand aimed at fostering a positive public image to provide benefits in terms of funding and public support. In the early twentieth century, Mortimer Wheeler was adept at using the mass media to obtain financial support for his excavations (Clack & Brittain 2007). The third model, the democratic model, is directed at the needs of the nonacademic community. From this perspective, communication is equal, participatory, and conducted in partnership. All three models are complementary in addressing different communication needs in archaeology.

Communication is essential to archaeology, but is it the responsibility of the journalist or archaeologist? Increasingly, it is viewed as a core part of an archaeologist's job, but as a time-intensive activity, it requires goodwill as well as skill to be done well. Archaeologists are not formally rewarded for participating in communication activities, and they have to justify time spent away from research to their institutions and colleagues. Although scientists have the ingredients – knowledge and enthusiasm – for successful communication, scientific training does not reflect this growing expectations of archaeologists. Academic communication styles and specialist terms must be abandoned to avoid constructing boundaries with audiences (Harding & Venclová 2007). There is no room for jargon and minute detail in public communication, but these are the standard tools of academic writing.

Confusion about how to communicate, the amount of time to dedicate to it, and who the audience is means archaeologists continue to rely on mass media to communicate the impact of their research. Over the last few decades, changes in both academic and journalistic professions have resulted in both sectors re-prioritizing their relationship to one another. This closer working relationship has required archaeologists and journalists to change their perceptions of each other (Clack & Brittain 2007). Archaeologists understandably fear misrepresentation in the media and are concerned with journalistic appreciations of accuracy, detail, and uncertainty. However, archaeologists often mistake the role of the media as serving the needs of academic publishing. Journalists can, and often do, produce balanced and informative archaeological stories with mass appeal that connect to wider issues despite using completely different rules of communication (Scherzler 2007). Many archaeologists (Brian Fagan, Paul Bahn, Francis Pryor,

and Simon James come easily to mind) have skillfully communicated archaeological messages through online sites and in popular books, radio, and television. Rathje and Murphy's (1992) study of urban rubbish illustrates how seemingly pointless trash can become a hot media story when connected to contemporary social, political, and environmental issues.

Television is the most influential medium for cultivating public perceptions of archaeology to mass audiences (Holtorf 2007). Visual storytelling is far removed from academic communication styles and herein lies much of the tension with archaeology on television and archaeology in academia. Archaeologists have bemoaned the trivialization of complex topics and archaeological stereotypes perpetuated by archaeological programming. On the other hand, such programming has increased fascination and interest in archaeology and can counteract nonacademic and fantasy representations of archaeology (Holtorf 2007). Thoughtful archaeological programming, such as the United Kingdom's *Time Team* or *Britain AD*, can bridge the gulf between popular culture and informative entertainment (Clack & Brittain 2007). The prominence of archaeological programming since the early days of television demonstrates and nourishes the public demand for archaeology. In the 1950s, Mortimer Wheeler and Glyn Daniel were named British Television Personality of the Year for their roles in the archaeological shows *Animal, Vegetable, Mineral* and *Buried Treasure* (Clack & Brittain 2007). *Time Team*, the longest running archaeological series in the history of television, broadcasts its final and 20th season in 2013. This series, along with the "Indian Jones effect", is often held responsible for the increase in British university archaeology applications since the 1990s.

The internet and digital multimedia are increasingly encroaching on the supremacy of television as a medium for communication. Web 2.0 and user-generated content has democratized communication. Consumers of culture are now the producers of culture, and so, the separation of archaeologists and the public in generating knowledge has become blurred. Archaeology is now communicated and accessible 24/7. Conversations and opinions from both experts and the public can happen in real time. While archaeological misinformation abounds on the internet, there is also a wealth of informed and reliable online journals, blogs, websites, and video lectures. Unlike print or television, digital media permits communication to be layered and self-exploratory. Deeper levels of a website can contain research details without cluttering the engaging and interactive content on the upper pages of navigation. *Archaeology Magazine's* interactive dig is a layered online experience that allows audiences to explore the processes of excavation along multiple pathways. In this evolving communication forum, archaeologists must be flexible in their communication approaches and consider how to tease apart their message at differing levels of detail.

Museums are well-established forums for archaeological education and debate and have been embarking upon informal, self-directed, and flexible communication experiences for even longer than digital media. Museum exhibits allow archaeological knowledge to be actively interpreted through individual readings of the past and can challenge traditional communication hierarchies between expert and nonspecialist (Barker 2010). The Darwin Centre at the Natural History Museum London is a revolutionary space that breaks down the physical barrier between curators, objects, and visitors and in which learning is focused on interaction and participation. Museum exhibitions also illustrate the popular appeal of archaeology. For example, international touring Terracotta Army exhibit between 2008/2009 generated vast media coverage worldwide and caused ticket sell-outs and long queues in every country it visited.

The most direct and democratic communication that archaeologists are likely to have with nonspecialists is through public archaeology initiatives. Public archaeology is a diverse enterprise centered on public service through awareness of and engagement with the public in archaeological work. Beyond educational aims, it also encompasses public values, ideas, and

participation (Simpson & Williams 2008). Community archaeology, which emerged out of public archaeology, is specifically designed for, and substantially involves, local communities in research. Community-led communication and dialogue has been popular in historic and battlefield archaeology, postcolonial indigenous archaeology, and urban archaeology projects which have clearly identifiable stakeholder communities. Community archaeology is redefining how archaeologists value and use community knowledge. Rather than archaeologists seeking to impose their own knowledge on the communities with whom they work, communities contribute their own knowledge to the research exercise and in doing so shape and inform developing research questions (Byrne 2012).

Archaeological communication impacts political, ethical, and civic thinking. Communicating archaeology brings a range of benefits for academia, society, and local communities. While the media will always fixate on sensational discoveries of popular interest, such as the discoveries of Lucy (Johanson & Edey 1981) and Otzi (Bortenschlager & Oeggl 2000), much of archaeology is suited to mass communication if connections to contemporary issues are made clear. On local scales, open community dialogue involves cooperation and two-way information flow. Yet, archaeologists face some communication challenges. They must find a way to both conduct and communicate research as part of their daily roles. Communication styles must be designed for each medium and for different audiences. As communication is ever more directed by the recipient rather than the producer, archaeologists must also reorientate themselves as knowledge facilitators rather than knowledge guardians.

The future of archaeological communication is positive. Public appetite for archaeology remains strong, and the diversification of communication channels offers greater opportunities to reach wider audiences. Communicating archaeology in the mass media has, and will continue to have, an influential role on the perception and understanding of archaeology.

Cross-References

- ▶ Activism and Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Outreach
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Heritage: Public Perceptions
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Internet, Archaeology of the
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Material Culture and Education in Archaeology
- ▶ Media and Archaeology
- ▶ Popular Culture and Archaeology
- ▶ Preserving Heritage: The Role of the Media
- ▶ "Public" and Archaeology
- ▶ Television and Archaeology: Views from the UK and Beyond
- ▶ Volunteers in Archaeology

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Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia

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Introduction

Patagonia is the southernmost tip of South America and in general terms is constituted by two sharply contrasting territories. The first corresponds with the eastern slopes of the Andes Cordillera and is characterized by plains and plateaus, a semidesert climate and steppe and shrub vegetation, extending to the Atlantic coast. This part was occupied by land hunter-gatherers from the late Pleistocene to the early twentieth century. The second belt characterized by a vast archipelago occupies the western slope of the Andes from the Chacao Channel (46° south latitude) to Cape Horn (56° south latitude). In this region, ethnographic and historical information describes three ethnic groups, which include from north to south: Chonos, between Chiloé Island and Tres Montes peninsula; Alacalufes or Kawésqar, from the Gulf of Penas to Brecknock channel; and Yamana or Yagan, who lived from Brecknock to Cape Horn (Fig. 1). The three groups shared livelihoods based on hunting, gathering, and fishing of marine species and the use of navigation technologies basically canoes built with sewn planks (Chonos) or bark (Alacalufes and Yamana) (Bird 1946; Cooper 1946; Gusinde1986[1937], 1991 [1974]; Emperaire 2002 [1963] Lothrop 2002 [1928]). From a linguistic point of view, these ethnic groups shared a common trunk that diverged about five millennia ago (Viegas Barros 2005). Archaeological data establishes that the oldest sites of marine hunters for the southern cone of South America are concentrated in the south and reach 6,500 years BP. This period overlaps with the pick of the worldwide mid-Holocene marine transgression and with a general temperature and moisture increase associated with a major outbreak of forest cover. The origin of these adaptations is still under discussion, as well as the colonization of this vast coastal region.

Following, the main geographical features of the archipelagic region, the implications of different geological processes in sea-level changes and coastal evolution, and the main features of early Patagonian marine hunters are considered. Then, after outlining the history of archaeological research in these topics, we will present a brief summary of key issues under discussion for this subject, considering the origins of these adaptations and cultural evolution of marine hunter settlement in the southern cone of South America.

Definition

Environmental Characteristics of the Southernmost South American Pacific Coast

An intricate archipelago develops south of Chacao Channel (46°South Latitude) up to Cape Horn (56° South Latitude); it describes an arc approximately 1,800 km long, with an average width of 120 km from the Pacific coast to the foothills of the Andes Cordillera. The Patagonian archipelago has an estimated length of over 19,000 km of coastline (Bird 1988). The main factor that shaped the topography of this region corresponds to the erosive action of Quaternary glaciations that carved an intricate system of valleys, later flooded during the Holocene rise of

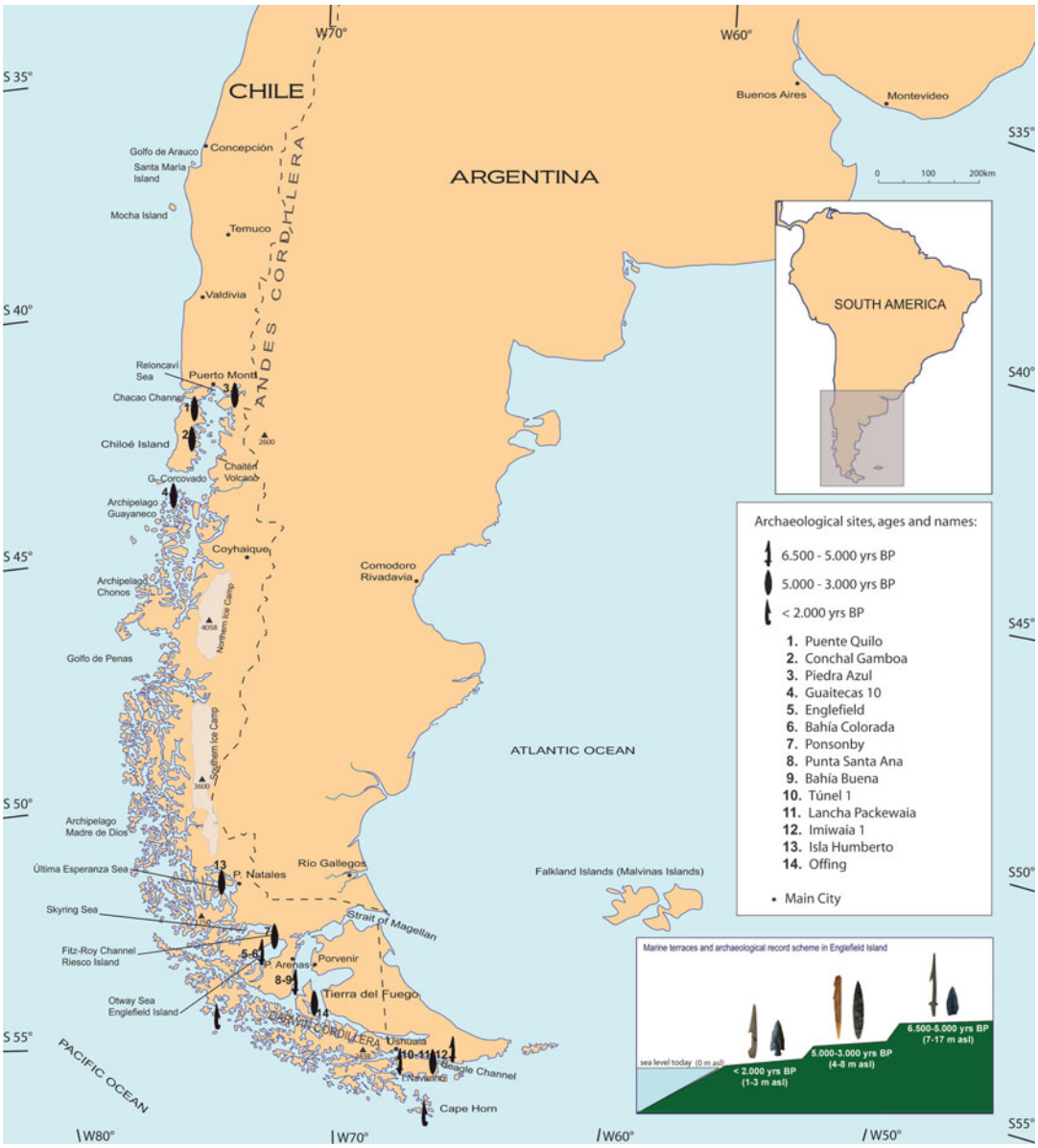

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 1 Localization map with main marine hunter archaeological sites from Patagonia

global sea level. The central zone between the Gulf of Corcovado (43°50′ South Latitude) and Última Esperanza Sea (51°50′ South Latitude) presents two continental ice fields and major mountain ranges that significantly limit pathways between the Pacific and Atlantic basins. In addition, the circulation is severely restricted due to steep coastlines and the presence of many front glaciers that divide the continental shore.

Dominated by a humid climate, with rainfall averaging 5,000 mm per year in the western band, this region is dominated by dense forest and peat

bogs. The marine fauna is rich and varied. The most abundant marine mammals are pinnipeds (*Arctocephalus australis*, fur seal, and *Otaria flavescens*, sea lion), and whales and dolphins are also frequently recorded. Terrestrial fauna is much more limited and includes two species of deer (*Hippocamelus Bisulcus* and *Pudu puda*) and a camelid (*Lama guanicoe*), although the latter is recorded only in the extreme northeast and southeast of the area. Edible vegetables are rare and had a minor role in the human diet.

Coastline Evolution

Since the late Pleistocene period, much of the extensive coastline and mountains were covered by great ice masses, and during the Late Glacial Maximum (LGM), the sea level was about 120 m below the current level. In this period, the Pacific coast was located further to the west of its current position, and large basins and fjords were occupied by ice or proglacial lakes. Hereafter, with glacier retreat and gradual rise in sea level starts a process of maritization, a quick shoreline modification which along the Holocene will shape the archipelago as we know it today. For example, toward 8,000 years BP, Tierra del Fuego Island is separated by the opening of the Strait of Magellan and the same applies to Navarino Island with the formation of the Beagle Channel, in the far south. This process of sea-level rise reaches its peak some 6,000 years ago, and sea reached current levels around 500 years ago. As for the specific case of the central part of the Strait of Magellan, between continental Patagonia and Tierra del Fuego, the marine transgression reached an elevation of about 3.5 masl near 6,000 years BP. Because of isostatic rebound, marine terraces have decreasing elevations from west to east between 10 and 3 masl, as the western areas covered by ice during the last glacial advance have increased isostatic rise, compared to the eastern portion that was ice-free during this period (Porter et al. 1984; McCulloch et al. 2005).

Changes in sea level combined with tectonic and isostatic processes acted differentially in coastal evolution of Patagonian archipelago shorelines. From the Gulf of Penas northward starts tectonic plate contact which stretches for thousands of miles along the Pacific coast of South America, between the Nazca and South American plates. This conjunction gives origin to an important tectonic activity associated with plate subduction, resulting in an intense process of sinking and/or uprising, periodically triggering large-scale seismic activity that often is associated with the generation of tsunamis. There are few measurements for central and northern Patagonian archipelago coastal evolution. However, it has been established that during the mega-earthquake of Valdivia (1960, 9.5 MW), a band between the Chacao Channel zone and Gulf of Penas would have sunk up to 2.4 m while some islands located west of the area rose to 5.7 masl (Plafker & Savage 1970). South of the Gulf of Penas, tectonic activity is less intense and is controlled by other factors. For example, in the east-central part of the Strait of Magellan, Holocene marine terraces of different ages are observed, while in the western portion, these terraces are absent. This is due to tectonic activity associated with a fault system that would have caused vertical movements of the crust in this specific area (McCulloch et al. 2005; Cisternas & Vera 2008).

Early Marine Hunters from Patagonia, Archaeological Assemblages

The available information is concentrated in the southern and northern ends of the archipelago, because archaeological research has focused in these areas. At the moment, the vast central archipelagic zone record is limited to late Holocene sites.

In the southern zone, we find the oldest records of marine hunter-gatherers with navigation media, at sites located within the Otway Sea-Strait of Magellan and Beagle Channel-Navarino Island localities. The archaeological sites have been dated between 6,500 and 5,000 years BP and are located at altitudes between 7 and 17 m, usually associated with ancient Middle Holocene marine land forms. The most important traits of material culture are present on bone tools as detachable harpoon points with one or two barbs and cruciform base, multi-denticulate harpoons,

chisels on pinniped ulnas, cruciform base stemmed wedges on whalebone, and ornament artifacts as pendants on drilled or grooved pinniped incisors. Lithic artifacts are characterized by subtriangular projectile points, knives, other instruments with elongated edges, and fishing-line weights with grooves and/or side notches. We highlight the use of a volcanic rock, a green obsidian whose source is unknown at present and that is recorded in the vast majority of archaeological sites in the southern region. The faunal assemblages are dominated by fur seals, birds, and fish, and shell middens are described as characteristic features. The presence of sites on islands confirms the existence of well-developed navigation technologies. This assemblage has been defined as a cultural tradition called *Englefield* (Fig. 2).

In the same area, between 5,000 and 3,000 years BP, cultural evidence showing technological changes is recorded in archaeological sites including the presence of large lithic lanceolate projectile points, in concordance with less frequent bone harpoon points and the virtual abandonment of green obsidian use (Fig. 3). The quantifications of exploited fauna indicate an increase in guanaco hunting. The sites are located between 4 and 8 masl, associated with sea-level regression and coastline retraction during this period.

The northern end of the archipelago earliest archaeological records are somewhat less antique, spanning from 5,500 to 4,000 years BP, and include sites emplaced between Reloncaví Sea and Gulf of Corcovado (Guayaneco Archipelago). Artifact assemblages are characterized by lanceolate projectile points carved bifacially and fishing-line weights with side notches, among other tools (Fig. 4). Exploited fauna consisted mainly of sea lions, fish, and seabirds, with important shell midden accumulations. The location of sites varies between 0 and 10 m, elevation differences related to local variations in sinking and/or uplifting tectonic processes in this area. Interaction between groups in this area is attested by the presence of obsidian artifacts from a rock source located at Chaitén Volcano.

Historical Background

Research in the pacific southern coast began with ethnological work in the far south, associated with the description of the last Yamana (Gusinde 1986[1937]; Lothrop 2002 [1928]; Martial et al. 2007 [1888]) and Alacaluf ethnic groups (Gusinde 1991 [1974]; Emperaire 2002 [1963]). Nevertheless, the first archaeological excavations go back to the 1870s in Isabel Island, in the central part of the Strait of Magellan (Borrero et al. n.d.). Later, ethnological work led to initial questioning of the antiquity of marine hunter population, and estimates based on observations of shell deposit accumulation rates, elevation of sites above sea level, and isostatic lifting rates calculated for that epoch were made in the decades of 1920 and 1930 (Bird 1946; Lothrop 2002 [1928]). They reached pioneer dates with a maximum around 2,500–5,000 years BP. In this period, Junius Bird carried out test pit excavations in different areas of the archipelago, developing an initial cultural outline and periodification for the southernmost area, but details were never published.

Systematic archaeological excavations would begin in the southern end between the 1950s and 1960s, conducted by the French ethnologist and prehistorian Joseph Emperaire within the Otway Sea. His excavations at Englefield, located on an ancient marine terrace on the homonymous island, led to the first characterization of an early marine hunter group in Patagonia. Another relevant site excavated by Emperaire, called Ponsonby, is located along the Fitz-Roy Channel. The locus offered the first description of an assemblage dominated by lanceolate projectile points and other bone and lithic artifacts that markedly differed from those recorded in Englefield. The site survey was interrupted by the tragic death of Emperaire who died buried by sediments during his excavation work.

During the first half of the 1970s, the work of Chilean archaeologist Omar Ortiz-Troncoso allowed discovering two new sites on the Strait of Magellan shoreline, with a similar assemblage to those described in Englefield Island.

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 2 Lithic and bone artifact assemblage from early marine hunters, Englefield Tradition: (**a**) harpoon points with one and two barbs and cruciform base, (**b**) chisels made on pinniped ulnas, (**c**) pendants on pinniped perforated teeth, (**d**) green obsidian bifacial-knife instruments, (**e**) fishing-line weights and (**f**) subtriangular projectile points (green obsidian)

Excavations at sites Punta Santa Ana and Bahia Buena confirmed the technological and economic relationship, integrating them as a cultural tradition with a 1,500-year phase. The dates obtained in the Strait of Magellan were located in a range between 6,400 and 5,200 years BP.

At the southernmost end of the archipelago, specifically on the north shore of Beagle Channel, archaeological research started in the mid-1970s led by Argentinean archaeologists Luis Abel Orquera and Ernesto Piana. Their research developed and characterized an archaeological

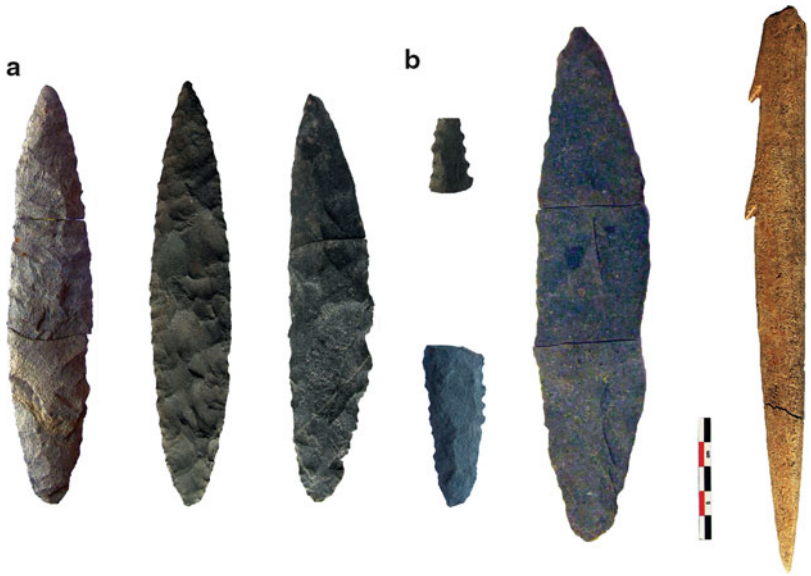

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 3 (**a**) Large lanceolate lithic projectile points and (**b**) harpoon point from sites in Southernmost Patagonia dated between 5.000 and 3.000 years BP

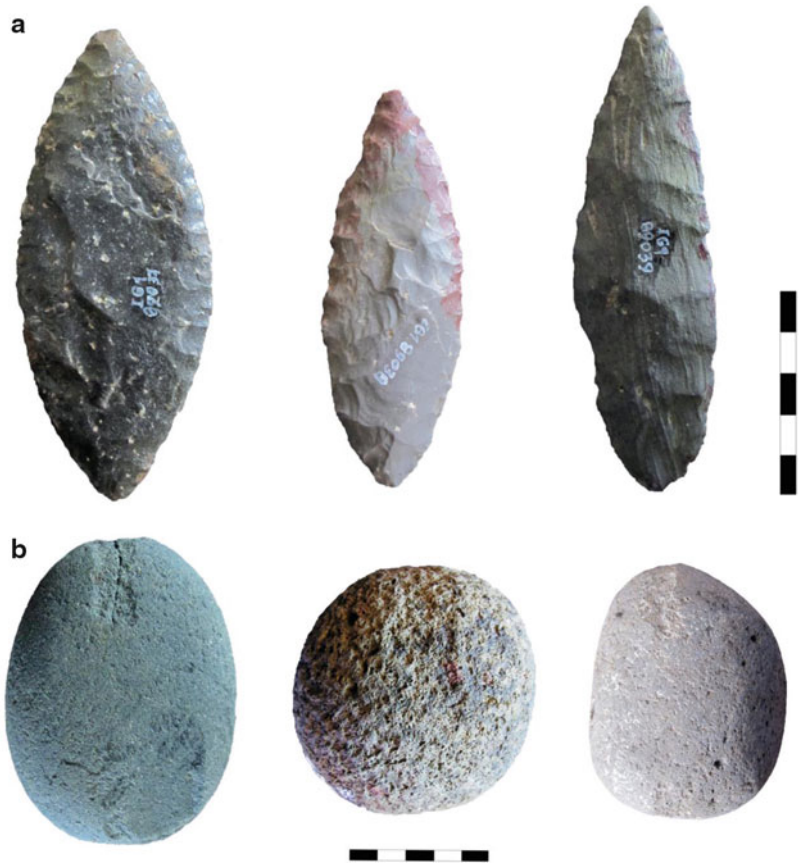

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 4 Lithic artifact instruments from early marine hunters of northern Patagonian archipelago, spanning between 5.500 and 4.000 years BP: (**a**) lanceolate lithic projectile points and (**b**) fishing-line weights

sequence for the settlement of marine hunters in this zone. Excavations at Tunel 1, Imiwaia, and Lancha Packewaia sites, located on the southern coast of Tierra del Fuego Island, allowed recording a peopling sequence spanning the last 7,000 years BP. The earliest evidences, with dates around 7,850 years BP in the layer S of Imiwaia and 6,800 years in the first component of Tunel, were interpreted as brief occupations generated by terrestrial hunters and with no ties to later assemblages of marine adaptation groups. Following the stratigraphic sequence, further above in the second component of the Tunel I site and Imiwaia are dated between 6,400 and 4,300 years BP, the sites render another assemblage. The material cultural verifies an association with the bone and lithic industry described in Englefield, highlighting the same detachable harpoon points with cruciform base, multi-denticulate harpoons, chisels on pinniped ulna, and cetacean bone wedges. Outstanding decoration is invested on bone tools, and various ornament artifacts, including pendants on pinniped incisors, are recorded. A peculiarity of Beagle Channel assemblages is related to morphological variations in harpoon points with cruciform base. The stone tools are similar, stressing the rare but regular record of green obsidian artifacts that attest interaction between early human groups settled in the Beagle Channel and the Strait of Magellan-Otway Sea. In relation to Lancha Packewaia site, there are two stratigraphic assemblages, an old component dated near 4,200 years BP and another recent group of artifacts dated after 1,600 years BP. The former component is noted because of its striking similarities with Ponsonby site, dominated by big lanceolate lithic projectile points and fauna records that attest an important role of guanacos in the diet (Orquera & Piana 1999, 2009; Orquera et al. 2012).

During the 1980s, the French Archaeological Missions in southern Patagonian archipelagos are restarted by Dominique Legoupil. The excavation of Bahia Colorada site, located on a high terrace in the eastern coast of Englefield Island, allowed her to characterize in great detail this assemblage, defined thereon as Englefield cultural tradition. Another landmark was the reassessment of the Ponsonby site, describing an occupational sequence of seven millennia. The earlier component has a chronology in the order of 7,000 years BP, but few materials, of little diagnostic value, were found in association with faunal remains of guanaco. This archaeological level was interpreted as the result of ephemeral terrestrial hunter campsite activities at a time prior to the opening of the Fitz-Roy Channel and Riesco Island. Further up, the main component of Ponsonby site is associated with a rich lithic industry characterized by large lanceolate projectile points and the predominance of guanaco consumption, with dates between 5,000 and 3,000 years BP. This assemblage shows remarkable similarities with the Lancha Packewaia site oldest component and corresponds to a second cultural tradition for southern Patagonian marine hunters.

Research in the northern archipelago started later, noting at the beginning of the 1970s the publication of Chilean archaeologists Cristian Diaz and Marcelo Garretón informing about the systematic excavation of Conchal Gamboa site, a big shell midden located on the eastern coast of Chiloé Island. This work is the first description of marine hunter-gatherers context. From the collection, we can note the lithic lanceolate projectile points and some decorative elements made on bones and shells (Diaz & Garretón 1972–73). This site was not radiocarbon dated and remained an isolated reference to early canoe groups in the area until the late1980s, when researcher Charles Porter discovered and characterized the site Guaitecas 10, located immediately south of the Gulf of Corcovado and dated around 5,000 years BP. Porter's work was pioneer in highlighting the impact of tectonic subsidence phenomena and its relevance in differential preservation of archaeological evidence in the northern Patagonian area (Porter 1993). After the 1990s, new evidence of early settlement of hunter-gatherers resulted from the excavations conducted by archaeologists Carlos Ocampo, Pilar Rivas, and Eugenio Aspillaga at Puente Quilo site, north of Chiloé Island (Ocampo & Rivas 2004), and Nelson Gaete rescue excavation in Piedra Azul site, recovered on the shore of Reloncaví Sea (Gaete et al. 2004). These sites

correspond to shell middens with stratigraphic sequences of occupation ranging from 5,500 years BP until at least the first millennium AD. In general, the assemblages are associated with early industry markers: big lanceolate lithic projectile points carved bifacially, fishing-line weights, and some contexts also include multi-denticulate bone harpoons.

Key Issues and Current Debates

Origin of Maritime Adaptations for the Southern Pacific Coast of South America

One of the main questions of the prehistory of the Patagonian archipelago is the origin of marine adaptations. The explanation of the peopling process is held by two main hypotheses. The first supports a local origin from pedestrian hunter groups that would have developed specialized technologies for the exploitation of marine resources (harpoons, fishing techniques) and a transport media – canoe – which would have allowed colonizing this region. Two likely areas for the development of this process have been indicated: the northern archipelago, which includes the Reloncaví Sea and Chiloé Island (Ocampo & Rivas 2004), associated with a lanceolate projectile point tradition and the southern archipelago, near the Strait of Magellan and/or Beagle Channel, linked to the development of the Englefield cultural tradition (Legoupil & Fontugne 1997; Orquera 2005; Orquera & Piana 2009).

The second hypothesis bases its explication on migration of hunter-gatherer groups equipped with water transport, canoeists which would have arrived in the archipelagic region from the north, along a Pacific coastal route.

Among arguments pro or against the hypothesis of the origins of these prehistoric human adaptations, we must note that older ages for sites in the southern end suggest a local source. But in return, the early records show a high degree of technological specialization (harpoons, deep-sea fishing, navigation aids). A reasonable expectative that could support local origin as explanation of this maritime adaptations would be to find older evidences and cultural traits of evolving local development describing different stages of experimentation and adaptation to marine environments. Nevertheless, this evidence has not been recorded for the area. Furthermore, the second hypothesis of migration of populations from the Pacific coast is not supported by existing data, as the northern coast sites from Chacao Channel upward possess ages considerably lower than early sites from the southern end.

A core issue to verify any of the alternatives for the origins of maritime settlement in Patagonia lies on the scarcity of coastal sites that predate the Holocene marine transgression. This fact could be explained because the shorelines would have been submerged and/or eroded during this period of marine transgression. The only sites currently registered that correspond are Ponsonby – initial occupation – in Fitz-Roy Channel and Tunnel I first component and Imiwaia I ancient occupation in southern Tierra del Fuego. Nevertheless, these assemblages have been interpreted as a result of the occupation of terrestrial hunters (Legoupil 2003; Orquera et al. 2012).

Cultural Trajectories in Maritime Settlement

As for the cultural evolution of coastal settlement, we can state that in the northern archipelago, in Chiloé Island and Reloncaví Sea, researchers describe continuity in technological traditions and subsistence during the hunter-gatherer occupation periods, noting that during the last millennium, pottery is recorded in association to the arrival of horticultural populations of Huilliche-Mapuche ancestry.

South of Gulf of Corcovado prehistoric groups keep a hunter-gatherer lifestyle unto historic times. However, there are different interpretations as to whether or not there was cultural continuity along the sequence, particularly in the case of the southern end. For Piana & Orquera (2007), the archaeological sequence shows a remarkable continuity, homogeneity, and stability over time, considering the subsistence elements, lithic and bone tools, and lifestyle in general. Other researchers argue that there would be a major change from the appearance

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 5 Late marine hunter artifacts dating from the last 2.000 years BP: (**a**) characteristic bone harpoon points that last up to ethnographic times and (**b**) lithic pedunculated projectile points (green obsidian and cherty rocks)

of assemblages related with big lanceolate projectile points, remarking these sites as constituting a different cultural tradition, possibly related to assemblages described in the northern part of the archipelago (Morello et al. 2002; Ocampo & Rivas 2004; Schidlowsky 2004). Evidence supporting the identification of different traditions is based on both the appearance of new stone-tool designs, involving operational chains and methods of fabrication, as well as the abandonment of green obsidian lithic raw material use, particularly in the Strait of Magellan-Otway Sea area, where the source would be located. Among the hypotheses that would account for the emergence of a new cultural tradition, the possibility of migration of marine hunter groups from the northern area is raised. While a common hunter-gatherer marine lifestyle is a constant for 6,500 years, it is clear that there are changes in technology and wildlife resource exploitation. Current discussions are focused on the processes which could explain the changes perceived in the archaeological record through time. The argument that supports the notion of continuity tends to interpret these changes in technology and use of raw materials as innovation or diffusion involving no fundamental cultural change (Orquera et al. 2011). The counter arguments indicate that changes in technology and in the use and knowledge of certain raw materials involve cultural aspects that must be transmitted from generation to generation and characterize a distinct cultural tradition, therefore involving an essential cultural shift (Figs. 2–5).

International Perspectives

The study of the peopling of the Patagonian archipelago has a vast importance in the research on processes of colonization and effective occupation of the marginal end frontiers of the Americas. This region forms a distinctly marine environment, both because of its predominant wildlife

resources and its geographical setting, which makes it necessary the use of navigation media to travel around this intricate system of fjords, channels, and islands. The origins of maritime adaptation in Patagonia face us to a global problem related to the challenge of identifying archaeological evidence previous to the coastal marine transgressive phenomena (Massone et al. 2013). Researches in other areas of the Americas have determined coastal occupation records of at least 10,000 years BP. Some of these sites are located in the coastal desert of southern Perú and northern Chile. Furthermore, the presence of hunter-gatherer populations in late Pleistocene continental areas adjacent to the archipelago makes it plausible to propose a much older appearance of marine adaptations in Patagonia than those reported to date. The search for information that would give support to this idea confronts us with a crucial methodological and theoretical duel, that of designing search strategies that allow exploring conditions that might have preserved this type of evidence.

Future Directions

The current state of knowledge about the prehistory of Patagonian archipelago is restricted to areas located inland, along the continental coast and/or located on islands nearby narrow channels that were covered by glaciers during the LGM. It is a paradox that until now no research efforts have been done to incorporate the extreme western pacific coastline. Free of ice since the late Pleistocene, this area currently concentrates the greatest number and diversity of fauna of the region, something that could not pass unnoticed by hunter-gatherer populations. These characteristics determine the importance of incorporating the area in future research efforts.

In addition to expanding research areas, the incorporation of survey designs based on geomorphological studies to help guide the search for areas that could preserve ancient coastlines from times preceding the Holocene marine transgression should be achieved. In this sense, it is relevant to explore areas where tectonic phenomena and isostatic uplift of the land crust could contribute to the preservation of this type of evidence. This line of work can substantially contribute new evidence to the debate about the antiquity of coastal settlement and mechanisms – being migration or local development and adaptation – that have operated in the colonization of the American border.

Cross-References

- ▶ Bird, Junius
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Monte Verde, Archaeology of
- ▶ Peopling of the Americas

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Second Modernity and the Second Phase of European Colonialism

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Introduction

The impact of European Colonialism upon world cultures has been, and continues to be, undeniably profound. More and more in contemporary archaeology (and heritage studies) this impact is being recognized in the way we formulate our perception of the past. Whether our gaze be cast upon pre-colonial societies or colonial and postcolonial heritages, it is all unavoidably (it can be argued) viewed through the lens of the European colonial influence.

Definition

The term *Second Modernity* is a theory first developed by philosopher Enrique Dussel in relation to the historic period between the seventeenth and the second half of the twentieth

century. It refers to the idea that people who live under colonial rule are subject not only to Western economic and political forces but are also influenced in the way they see and think of themselves (and others) based upon a change in mindset brought about by Western influence and control. The *Second Phase of European Colonialism* is the period of world history when global mercantile activities led to the development of European colonies, most notably by Britain, Holland, France, and later Germany, and largely focused on Africa and India from the seventeenth century until colonial states began to acquire independence in the second half of the twentieth century. This is sometimes referred to as *New Imperialism* and follows the earlier period of European Colonialism (or *First Modernity*) that saw Spanish and Portuguese exploitation in the Americas. The two are inseparably linked in the way that the global historical activity that occurred during the Second Phase of European Colonialism resulted in the development of subaltern non-colonialist social theory such as Second Modernity.

Historical Background

Developed out of postcolonial studies and specifically Latin American Social Theory, the idea of Second Modernity was a response to Marx's lack of analyses of class struggle in Latin America and his apparent skepticism in the development of the bourgeoisie in non-European societies. The bourgeoisie were central to Marx's theory of social change, or "Universal History," as it was the bourgeoisie who represented the first revolutionary class in history and who (through maintaining the ability to control and revolutionize the means of material production) were able for the first time to actively influence and change social relations. This, however, he did not apply to feudal societies. It was the development of international markets through the tool of colonialism that Marx saw as the necessary stage through which a previously feudal society must pass before the creation of the revolutionary bourgeoisie. His assessment was, however, from a purely European perspective and the lack of investigation into the development of capitalism outside that of the European model (i.e., where colonial control implanted European structures into non-European geographies). As Castro-Gómez (2008: 262) observes, "Latin America was, it seemed to Marx, a grouping of semi-feudal societies governed by large landowners that wielded their despotic power without any organized structure." Colonialism is then, for Marx, a tool of capitalism and responsible for the overthrow of feudal societies in the march toward revolution. Colonialism in effect "delivers" capitalism and, by association, the revolutionary bourgeoisie. He did not see, as others have subsequently done, that colonialism is more than an economic or political phenomenon. And it was the study of this more expansive and socially pervasive impact of colonialism that lead to the growth of late twentieth-century subaltern social theories from former European colonies of which Second Modernity and the writing of Enrique Dussel was one.

Dussel argues that European modernity was founded on materiality that had been specifically created after Spain's sixteenth-century territorial expansion (Castro-Gómez 2008: 272). He goes on to argue for the historical existence of two modernities. This first began in the sixteenth century when the Christian Renaissance spread globally via Spain's colonial domination of the Americas, and the second was the colonial expansion into Africa and Asia by Britain, Holland, France, and later Germany.

Enrique Dussel was born in 1934 in La Paz, Mendoza, Argentina, and is best known as one of the founders of the movement known as the Philosophy of Liberation. His writing aims to dismantle the nature of European thinking by critiquing the Eurocentrism of modern philosophy and characterizes the dominant model of philosophy as one of European conquest over the rest of the world (in this way mirroring Said's ideas of "Europe" and the "Other" (Said 1978) and Wallersteins' (1980) world-system with its "Core" and "Periphery." In doing this Dussel (1995: 148-49) aimed to liberate non-European social discourse from the "Eurocentric myth of modernity":

> Modernity is not a phenomenon that can be predicated on a Europe considered as if it were an independent system, but only about Europe if it is conceived as a centre. This simple hypothesis completely transforms the concept of modernity, its origin, development, and contemporary crisis, and consequently it also transforms the content of late and post-modernity. In addition, I would like to introduce another idea that qualifies the former: Europe's centrality within the world-system is not the result of an internal superiority accumulated during the European Middle Ages about and against other cultures. It is instead a basic effect of the discovery, conquest, colonization, and integration (submission) of Ameri-india. This simple fact gave Europe the comparative and determinant advantage over the Ottoman-Islamic world, India and China. Modernity is the result of these events, not their cause. Therefore, it is the administration of that centrality within the world-system that would allow Europe to become something like "the reflexive consciousness" (the modern philosophy) of world history. . .Even capitalism is the result and not the cause of this conjunction between European expansion around the world and the centralization of the world-system.

As a result, any study of world heritages should recognize non-European cultures for the role they have in the reflective dominance of European cultural narratives.

Another important figure in the development of the idea of Second Modernity and its intrinsic tie to colonialism is Walter Mignolo. Mignolo developed a critique of Wallerstein's world-systems theory based upon Dussel's ideas of the (non-bourgeois) Hispanic world, arguing that "World-systems analyses is indeed a critique of Eurocentrism, but a Eurocentric critique of Eurocentrism" (Mignolo 2000: 314).

World-systems analyses are based upon a neo-Marxist model of economic history formulated primarily by Wallerstein in the 1970s and 1980s (Wallerstein 1980, 2005). It attempts to explain economic globalization, or supranational economic activity, through the concept of inequitable interrelation between national economic units. The model's primary supposition is that the economies of "the developing world" are in every way effected by (and should therefore be analyzed in terms of their relation to) the economies of the wider world, a world which is dominated by the USA, Japan, and Europe. Like Marx, Wallerstein argues that the modern capitalist world-system originated in Europe in the sixteenth century via the economic transformation from feudal organization to capitalist (Wallerstein 1980: 2005):

> . . .our original primary purpose was to show that most production within the capitalist world-economy that placed items for consumption on the market was the result of a long chain that did in fact cross frontiers, and that this had been so throughout the entire history of the capitalist world-economy from the long sixteenth-century to today (Wallerstein 2005).

Mignolo bases his criticism of Wallerstein's world-system on the opinion that the theory is simply another example of Western ideas being presented to non-European peoples as *the* model for critical analyses. In his explanation Mignolo quotes Darcy Ribeiro:

> In the same way that Europe carried a variety of techniques and inventions to the people included in its network of domination. . .*it also introduced to them its equipment of concepts*, *preconcepts*, *and idiosyncrasy that referred at the same time to Europe itself and to the colonial people*. The colonial people, deprived of their riches and of the fruit of their labor under colonial regimes, suffered, furthermore, the degradation of assuming as their proper image that was no more than the reflection of the European vision of the world. . .. (Ribeiro 1968: 63 in Mignolo 2000: 13).

In looking at cultural identity and modernity in Latin America, the Peruvian sociologist Aníbal Quijano also put forward the argument during the 1990s that colonial power cannot be reduced to economic, political, and military domination of the world by Europe, but that it also supports and spreads globally European models of the formation of knowledge in modernity (Castro-Gomez 2008: 280). This is what Gómez calls the "coloniality of power" and sees the action of colonization as attempting to replace Indigenous forms of knowledge with those more appropriate to the underlying aims of the controlling Western regime.

This relationship between capitalism, colonialism, and the control of the formation of knowledge can, arguably, be seen in the histories of the expansion of mercantilism across national frontiers throughout the world in the later

European historic period (closely linked to Britain's industrial revolution and France's bourgeois revolution). The period categorized the Second Phase of European Colonialism.

Portugal (in alliance with Spain) was the world's major colonial power during the first phase of European Colonialism in the sixteenth century. This was to begin to diminish in the seventeenth century, a fall which was precipitated by the defeat of the Spanish Armada in 1588. By 1600, the formerly dominant Portuguese maritime establishment was in no state to counter the dual mercantile threat of the new royally chartered English East India Company and, in 1602, the Vereenigde Oost-Indische Comagnie (Dutch East India Company). The East India Company (EIC) was first established in 1600 as a joint-stock association of English merchants under the title of "The Governor and Company of Merchants of London Trading into the East Indies," the "Indies" being defined as the lands lying between the Cape of Good Hope and the Straits of Magellan. The aim in trading in the Indian Ocean for both the English and the Dutch was not Africa or India primarily, but Indonesia or the Spice Islands beyond. During its first 10 years the EIC sent 17 ships to Asia, in contrast to the VOC's 134. The result being that the Dutch were able to establish trade settlements at Java and Moluccas, Batavia (to be capital of their eastern empire) in 1607, Malacca in 1641, Mauritius in 1644, Table Bay in 1652, and Ceylon (taken from the Portuguese) in 1658. By the end of the century their "factories" and forts were dotted all over the East – in the Persian Gulf, on the coast of India, and the Malayan archipelago. The EIC was largely confined to Surat (1612), Madras (1639), Calcutta (1650), and Bombay (1665). This inequality of settlement numbers is also indicative of the different approaches to overseas trade at this time by the English and Dutch. In contrast to the VOC the EIC remained independent of direct state ownership (being answerable instead to company shareholders) and promoted its activities upon the basis of free enterprise.

By 1784 there was sufficient support in the British parliament for Prime Minister Pitt to introduce the *India Act*. The intention of which was to "...take care to prevent the Government from being ambitious and bent of conquest. Propensities of that nature had already involved India in great expenses, and cost much bloodshed. These, therefore, ought most studiously to be avoided. Commerce was our object, and with a view to its extension, a pacific system should prevail, and a system of defence and conciliation" (Pitt's speech in the House of Commons 6 July 1784 in Aspinall & Smith 1969: 826). The bill effectively gave the control of Company occupied lands to the British government by subordinating the Directors to a new government department, the Board of Control:

> It shall not be lawful for the Governors or Presidents and Councillors of Fort Saint George and Bombay...to...issue any order for commencing hostilities or...to negotiate...any Treaty...with any Indian Prince or State (except in cases of sudden emergency or imminent danger, when it shall appear dangerous to postpone such hostilities or Treaty) unless in pursuance of express orders from...Governor-General and Council...or from the...Court of Directors.... (clause XXXV of the 1784 *India Act* in Aspinall & Smith 1969: 830).

Following the Bill, trade to the East Indies was controlled by the newly organized United Company of Merchants of England and the sovereignty of India became Britain's responsibility. Thus, it was to begin that under the newly organized United Company of Merchants of England trading to the East Indies, the sovereignty of India became Britain's responsibility. By concentrating their main center in Java the Dutch had seceded any Indian interest to the English, and the French (who had not entered the competition until 1700s) lacked the support they needed to compete with the already established English.

Prior to the nineteenth century, Germany's maritime activity had concentrated upon internal European trade under the Hanseatic League. Preoccupation with the politics of unification also separated it from the kind of long-distance overseas trade enjoyed by other European rivals. During the nineteenth century, Germany's foreign policy was controlled by Chancellor Otto von Bismarck. Like the involvement of the other principal players in what was to become

the *Scramble for Africa*, movement into the African continent was instigated in equal parts by the desire to increase the nation's economic production in light of burgeoning industry and, by association, the need to maintain economic growth. It was also an attempt to balance internal European political and economic stability. By this note, Africa was for both Great Britain and Germany a tool by which to maintain a European equilibrium. This equilibrium was such a consuming matter that Bismarck himself later told a German explorer, "Here is Russia and here is France…with Germany in the middle. That is my map of Africa" (translated in Packenham 1991: 203).

By 1888 the British government was under pressure from antislavery campaigners and a conference in Brussels was convened under the guise of establishing civilizing legislation designed to end the scourge of the slave trade, but in reality was an opportunistic gathering together of the various European powers with a stake in the control of Africa. For the British government it was also used to reestablish naval supremacy in the Indian Ocean where the rights to stop and search vessels had not previously been fully realized between all nations, thus allowing for greater control of the movement of trade commodities and domination of the regional capitalist system.

The results of the conference were highly influential. For the first time, humanitarian concerns were addressed within an international political arena, with the measures agreed upon by the signatories affectively legitimizing colonial conquest through the agreed strategy of combating slavery by the establishment of colonial administration in the interior of Africa and the restructuring of African society. At the conference it was suggested by the Belgian delegation that the most effective way to establish such an administration was through the development of colonial infrastructure. This was to include the establishment of fortified posts in the interior to act as centers of refuge for emancipated slaves, as well as garrisons for troops able to pursue slave caravans. Roads and railways were to be constructed from the coast into the interior and steamboats were to be placed on navigable rivers and lakes. Although neither Britain nor Germany fully committed to these proposals, their discussion at the Brussels Conference was nonetheless later useful. When either government wished to propose large-scale infrastructure development in Africa it could now legitimately invoke the Brussels Conference and antislavery civilizing rhetoric.

This European drive to control overseas land and populations did not rest solely with Britain and Germany (though it was the antagonism of these two nations which was to drive other nations to develop their overseas "dominions" up to the twentieth century). Britain eventually controlled most of the subcontinent of India, Australia, New Zealand, Canada, and large areas throughout Africa (e.g., Sudan, Botswana, Kenya, Egypt, Gambia, Ghana, Nigeria, Zambia, Malawi, Sierra Leone, Zimbabwe, Swaziland, Tanzania, and Uganda). In Africa, France also controlled large areas throughout the continent (most notably Ivory Coast, French Sudan (now Mali), Guinea, Mauritania, Niger, Senegal, northeast Nigeria, Gambia, Chad, Republic of Congo, Gabon, Cameroon, Eritrea, Madagascar, Djibouti, Comoros, and Reunion). Germany controlled (among others) Burundi, Rwanda, Tanzania, and Namibia. With Italy dominating; Eritrea, parts of Somaliland and Libya.

Economic justification for national policies of colonialism and expansionism led in turn to global sociohistorical change through the development of class formation, political struggle, and cultural perceptions. The ultimate outcome of the Brussels Conference was therefore the partitioning of Africa into colonial blocks controlled by Europe and the full realization of the Second Phase of European Colonialism.

Key Issues/Current Debates

Central to this strand of social theory and postcolonial studies is the question of subjectivity. Accordingly there is a long tradition of Latin American intellectuals addressing this question. Among them were Dussel, Rodolfo Kusch (whose philosophy of Indigenous thinking as

equal to European thought was published in 1970 but not translated into English until 2010), earlier still the "cannibal" movement in early twentieth-century Brazil, and the "Forja" movement in Argentina in the 1930s. During the 1990s, subjectivity and the ways in which people describe themselves to others also became a significant area of interest within archaeology and cultural studies (see, e.g., Hall 1996; Gosden 1999). The primary questions being related to identity, i.e., the process and manner in which individuals, groups, communities, cultures, and institutions define themselves. However, the debate as to the nature of the establishment of identity can be approached in two ways. First, one can argue for fixed categories based upon definable "foundational" differences. Or secondly, one can view one's perception of identity as a more fluid phenomenon based upon reaction/reflexivity and dialogue (both inner and outer) (Meskell & Preucel 2004: 122). This first taxonomical approach can be useful when it becomes necessary to quantify groups of individuals, but can stray into dangerous labels/pigeonholes and meta-identities. The second, more poststructural view approaches the formation of identity as involving the negotiation of "race," class, religion, sexuality, ethnicity, and gender, as well as the environmental and cultural context in which individuals find themselves. Constructivists would even go so far as to argue that identities do not exist but are in reality discursive constructs which are formulated through one's personal dialogue with one's sociocultural, physical, and political environment.

It is the nature of this dialogue and one's autonomy within it that has developed into a philosophical debate as to the role of the self in the formation of identity. In the past the two main protagonists within this debate are Foucault (1972) and Giddens (1991). Both agree that:

> . . .self-identity is negotiated through linked processes of self-exploration and the development of intimacy with the other (Giddens 1991: 97).

However, the debate rests upon the level of autonomy available to the individual within the multiple and competing discourses within the postcolonial/colonialist world. Foucault (1972) argues that the individual is subservient to the dominant social discourse, which is based upon the power of shared knowledge. Alternatively, Giddens' (1991) views the individual within society as less the passive participant and more the creative transformer:

> The self is not a passive entity, determined by external influences; in forging their self-identities, no matter how local their specific contexts of action, individuals contribute to and directly promote social influences that are global in their consequences and implications (Giddens 1991: 2).

Giddens' *structuration theory* (1991) gives the individual an understanding of the social context in which they exist and allows for reaction against it. This not only allows for one to develop multiple situationist identities but also allows for the idea that individuals have an indelible political and social autonomy. This is a concept central to the postcolonial debate on the role of participants in colonial activity. Furthermore, the search for identity, be it individual or society, requires a meta-narrative in order to formulate a dialogue between life experience (meta-narrative) and perception (the self). This meta-narrative takes the form of *culture* while *cultural identity* is the extent to which one is representative of a given culture behaviorally, communicatively, psychologically, and sociologically.

All of these theoretical strands exist within the history of the development of postcolonial identities or, more specifically, the international politicization of identities in the twentieth century. As Hall (1990: 225-26) demonstrates in an essay addressing the African diaspora, wrestling control of contextualizing metanarratives is central to the struggle for equality:

> Not only, in Said's 'Orientalist' sense, were we constructed as different and other within the categories of knowledge of the West by those regimes. They had the power to make us see and experience *ourselves* as 'other'. Every regime of representation is a regime of power formed, as Foucault reminds us, by the fatal couplet, 'power/knowledge' (Hall 1990: 225-26).

International Perspectives

As can be seen from this short explanation of Second Modernity and the Second Phase of European Colonialism, although the social theory and events described above were born within distinct geographical regions of the world (i.e., Africa and Latin America), they possess the common linkage of having been the result of European action based on a capitalist development and world view. The commonality of the two is in the need to recognize the role of the colonized and its impact on the perceptions of Europe and its activity and the manner in which we have subsequently addressed non-European cultures from a dominantly European foundation.

This is a phenomenon that is reflected in the development of archaeology as a practice and it is important to recognize the nature of the "constructedness" within archaeology. The practice and debate of archaeology worldwide has not taken place in a vacuum immune to the influences of those ideas outlined thus far. Likewise, these ideas have not developed without the influence of archaeological and historical knowledge. Archaeology began as a Western colonial science, with a role in the conquest of territories and peoples (represented by antiquarian styled exploration and collection). It has become, through the application of deconstructive philosophies, a potential tool for the study, definition, and voice of subaltern or less well-represented groups within Western-dominated historical narratives, with specific strands of "new" archaeologies (such as historical archaeology – see discussion below) specifically attempting to construct non-European cultural narratives developed outside the world of historical and cultural colonialism.

Future Directions

Our current understanding of colonial processes is largely based upon the development of Western anthropologists. More recent studies have begun to question traditional colonial ethnographies and their close link to colonial powers (e.g., Comaroff & Comaroff 1992; Barker et al. 1994; Mignolo 1995; Benjamin 2002; Gasco 2005). What these studies have in common is their rejection of binary oppositions in colonial discourse. By rejecting the traditional historical view of the "colonizer" and the "colonized," new ideas of sociocultural hybridity have developed in response to the recognition of new societies created through the colonial process. The problematization of these traditional discourses has developed into what we now term postcolonial theory:

> Colonialism broadly conceived, or 'coloniality', when seen as a process including territorial expansion and imperialism, labour regulation processes, and epistemological and discursive 'reorganization', is not therefore only current because of territories which are still formally colonial, but because the relations of difference that mark the 'colonial' period are still very much in operation throughout the world, particularly in the West and wherever 'the West' and its epistemology asserts itself, i.e.: globally (Benjamin 2002: 15).

The second definition of postcolonial theory as an ideological application has been separated by Goldberg and Quayson (2002: xii-xvi) into three interrelated sets of ideas of particular relevance to the question of Second Modernity and the spread of Western capitalism via colonial activities.

Postcolonial study possesses a "theoretical expansiveness" by the way in which it aims to adopt the voice of "otherness" included within all experiences. With this approach the author would promote the role of archaeology and specifically historical archaeology as a means of addressing and examining accepted definitions of social and cultural activity within the colonial context (see Rhodes 2010). It may therefore be that archaeology of the traditionally historic period is able to attempt to strip our understanding of the past of its historical prescription through analyses of subaltern material evidence. Or at least offer new ways of viewing the historic colonial past as long as the unavoidable embedded bias of cultural perspective is recognized and deconstructed along with received historic narratives.

So what of the application of these definitions to the development of non-Western archaeologies? First is the rejection of meta-narratives. Although archaeology is well suited to address the actual material processes of European colonial activity over a large geographical scale, the aim should not be to lay claim to a totalizing knowledge of this process. The author would echo the so-called *Frankfurt School* and the development of *critical theory* (see, e.g., Hodder 1986, 1992 and Shanks & Tilley 1987), with its recognition of the historically conditioned nature of studies of the past, and accept that all archaeological research stands within a specific context and is generated form a specific world view but, nonetheless, aims to highlight shared characteristics within (perceived) events and activities in the past. As Foucault argues, the aim is to demonstrate the nature of discourse within a given context:

> Instead of following the thread of an original calendar, in relation to which one would establish the chronology of successive or simultaneous events, that of short or lasting processes, that of momentary or permanent phenomena, one tries to show how it is possible for there to be succession, and at what different levels distinct successions are to be found (Foucault 1972: 169).

Furthermore, archaeology exists within the postcolonial paradox, by openly beginning from the ideological position of defining one people at the rejection of others. It is hoped that active investigation of the remains of the past in a more ethically transparent way than has been previously attempted can offer a newer and broader insight into the past. The intention is that by applying archaeological techniques to an area that has previously seen little investigation outside traditionally historical interpretation newer perspectives can be created.

Can this be achieved? What is required is the application of a unifying approach which allows for the development or sharing of postcolonial strands of archaeological study over more globally inclusive geographies. This is to say that the issues raised by the experience/history/activity/narrative of colonialism exist in many places and over a wide temporal sphere (the examples above being Latin America and Africa). Dialogue between historically peripheral groups (that is to say groups not focused upon by European-led investigations) would seem the next step in developing truly non-capitalist global heritages. But this is not to say that all "new" or "subaltern" heritages should be essentially reactionary or counter colonial. Rather, scope should be given to define the internally heterogeneous character of cultures based on the ever re-negotiated identities.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Supermodernity and Archaeology

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Second Temple Judaism Archaeology

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Introduction

The term "Second Temple Judaism" refers quite literally to the period of Jewish history when the second Jewish temple stood in Jerusalem, c. 515 BCE to 70 CE. The first temple, traditionally attributed to the Israelite King Solomon in the tenth century BCE, had been destroyed by the Neo-Babylonian Empire during its conquest of the region, c. 586 BCE. When the Achaemenid Persian Empire defeated the Babylonians, it acquired the southern part of the Levant associated with modern Israel, Palestine, and adjacent areas. The Persians allowed Jews to rebuild their temple, c. 515 BCE, and it stood until c. 70 CE, when the Romans destroyed it while suppressing a Jewish uprising, the First Revolt. Jews in the Second Temple period experienced rule by the Persians, Alexander the Great, the Ptolemies, the Seleucids, an independent Jewish dynasty known as the Hasmoneans, and the Romans, who administered Palestine through both appointed Roman officials as well as the Herodian dynasty of client kings. The era was formative for the development of Judaism, as various biblical works were composed and revised, a scriptural canon was nearly finalized, diverse Jewish sects flourished, Jewish territory expanded, and Jewish society was thoroughly integrated into the larger cultural matrix of the Mediterranean world. Although this period also saw the increasing dispersal of Jews beyond their traditional homeland to areas ranging from the Italian peninsula to North Africa to Asia Minor to Mesopotamia, this entry will focus primarily on the area known variously as Israel or Palestine, where evidence is more abundant. In general, more archaeological data is available for the later

centuries of this period than for the earlier ones, particularly in regard to religious practices. Historians are fortunate to have not only the archaeological record but also numerous literary sources written from various perspectives.

Historical Background

Biblical sources credit the Persian King Cyrus II for allowing Jews exiled to Mesopotamia by the Babylonians to return to Jerusalem and the surrounding area of Judah beginning c. 538 BCE. Scholars have often cited the famous cuneiform inscription on the Cyrus Cylinder, found in Babylon in the nineteenth century, as supporting evidence for a Persian policy of returning subject peoples to their native lands. The deportees returning from Babylonia, which were likely a small group, joined with Jews who had remained behind in rebuilding Jewish society and its primary city, Jerusalem. Yehud was the Aramaic name of the Persian province in which they lived, which was a subunit of a much larger Persian satrapy. The exact boundaries of Yehud are disputed, but it is obvious that it was fairly small and limited to the areas surrounding Jerusalem. Its initial population was correspondingly small. Although scholars once proposed that in the late sixth and early fifth centuries, Jerusalem, the major population center, had as many as 5,000–7,000 inhabitants, more recent estimates have been as low as 1,250 or even 400 (Meyers & Chancey 2012). What is clear from both surveys and excavations is that the Persian era inaugurated a period of population growth that would continue for centuries. Biblical sources suggest that construction of the Second Temple began c. 515 BCE, although virtually no archaeological evidence of the structure from this period survived due to the extensive renovations carried out later by the Hasmonean and Herodian kings.

Persian-period finds of various categories (architecture, local pottery, imported pottery import from Greece and the Eastern Mediterranean, inscriptions) from the southern Levant are abundant and have been the subject of considerable scholarly interest since the 1980s, largely due to the publication of an impressive archaeological synthesis by Ephraim Stern. Coins had already entered the region in the early sixth century but became more common under Persian rule. The province minted its own coins, marked by the Aramaic inscription YHD ("Yehud") and decorated with various images including the Athenian owl, the Greek deity Arethusa, griffins, and the Persian kings. Jars and jar handles from multiple sites bearing stamps reading "Yehud" in Aramaic and Paleo-Hebrew scripts were probably components of a tax-in-kind system. Many "Yehud" seals and seal impressions have also been discovered, sometimes accompanied by personal names and administrative titles. Efforts have been made to associate some of the names on the Yehud seals and coins with Jewish figures; it is possible, for example, that the figure "Yehohanan the priest" mentioned in inscriptions was a Jewish priest. The use of Aramaic characters on coins and seals reflects the importance of the language as the Persian lingua franca. Aramaic grew in importance as a written and spoken language throughout the Second Temple period, eventually displacing Hebrew as the primary Jewish language, and the Aramaic script became standard even for most Hebrew texts. That the inhabitants of Yehud held distinctive religious views is demonstrated by the general lack of figurines and cultic objects, which are common finds in surrounding areas (Stern 1982; Betlyon 2005).

The most important evidence from the Jewish Diaspora in this time period comes from the Egyptian island of Elephantine, located in the Nile River near Aswan. Papyri associated with the site preserve letters and legal documents from a garrison of Jewish and Aramean mercenaries stationed there. The military colony had a temple devoted to the Jewish deity YHWH, demonstrating that the later Jewish belief that animal sacrifices could only be carried out in Jerusalem had not yet fully developed. One papyrus preserves instruction regarding unleavened bread that is generally interpreted as a reference to the Jewish Passover festival (Porton 1996; Betlyon 2005).

Alexander the Great famously conquered the eastern Mediterranean coast in 332 BCE. The years between his conquest and that of the Romans in 63 BCE are known as the Hellenistic Period. After Alexander's death (323 BCE), Palestine lay at the meeting point of two of his successor kingdoms, the Ptolemies, based in Egypt, and the Seleucids, situated in Syria and parts of Asia Minor. The Ptolemies initially possessed Palestine until the Seleucids gained possession c. 200 BCE. Jews threw off Seleucid rule in the Maccabean Revolt, which began in 168 BCE, and from the leadership of that rebellion emerged a Jewish royal dynasty, the Hasmoneans.

Under the Ptolemies and the Seleucids, Hellenistic (Greek) influence in Palestine increased steadily, becoming a dominant component of Jewish and other local cultures in the region for the next thousand years. The minting of coins with Semitic inscriptions in Jerusalem initially continued in the Ptolemaic period but then ceased. Aramaic inscriptions YHD and YRSLM ("Jerusalem") appeared on jar handles, but such pottery was soon be joined by amphora handles with Greek stamps imported from the eastern Mediterranean (Arav 1989; Berlin 1997; Tal 2005). Papyrological records associated with Zenon, a third-century BCE agent of the Ptolemaic finance minister, shed light on government holdings and agricultural practices in Palestine, and numerous other papyri attest to the varying fates of Jews in Egypt, some possessing land and wealth, others working as artisans, peasants, and land tenants. Greek inscriptions in Ptolemaic Egypt attest to the existence of buildings there known as *proseuchai*, Jewish prayerhouses (Tcherikover et al. 1957–1964).

Under the Hasmonean dynasty, Jewish territory expanded considerably. With their Seleucid foes weakened, the Hasmoneans pushed in all directions, stretching Jewish territory far beyond the environs of Jerusalem to include Samaria (roughly equivalent to the modern West Bank), Galilee, portions of the Negev, and parts of modern Jordan. Archaeological findings sometimes corroborate literary reports of Hasmonean conquests. Evidence of destruction probably associated with Hasmonean campaigns has been found at sites including Gezer, Tel Istabah near Beth-Shean, Ashdod, Shikmona, and Maresha. In Samaria, a Persian-period temple on Mount Gerizim overlooking Shechem was completely destroyed. By the early first century BCE, Hasmonean forces had taken Galilee, which subsequently became a predominantly Jewish region. Surveys and excavations there have revealed the abandonment of older sites, the establishment of new ones, and dramatic changes in the ceramic repertoire that are best explained by population shifts (Berlin 1997; Tal 2005; Meyers & Chancey 2012).

The general parameters of Hasmonean territory can be traced by finds of their coinage. They minted numerous bronze issues of varying weights and sizes, typically employing Attic denominations, as had the Seleucids, rather than using Phoenician standards. Hasmonean coins differed from most other regional coinage in their less prominent use of Greek. Many coins had Hebrew inscriptions written in Paleo-Hebrew script, symbolically connecting the dynasty with earlier Jewish history, though some had Aramaic legends and those of later kings also used Greek. The symbols on Hasmonean coins also differed from those of surrounding minting authorities in their avoidance of anthropomorphic and zoomorphic imagery. They instead displayed symbols often drawn from the standard Mediterranean repertoire, such as cornucopiae, a lily, and an anchor. Only coins from the last Hasmonean ruler, Mattathias Antigonus, had what might be described as uniquely Jewish symbols: some depicted a menorah, while others portrayed an image often interpreted as cultic furniture from the temple, the Showbread Table. The names and titles on Hasmonean coins also show how Jewish and broader Hellenistic culture interplayed. Early coins bore rulers' Semitic names; only later issues were inscribed with their Greek names. The title of "king" did not appear until the first century BCE, but the title of "high priest" appeared throughout the Hasmonean era, and claims to be the "head of the council of the Jews" marked the currency of some rulers (Meshorer 2001).

Jerusalem grew considerably in the Hasmonean era, stretching beyond the area adjacent to the temple westward onto modern Mount Zion. The Hasmoneans enclosed the city's new territory with a major defensive wall equipped with additional towers. They also undertook occasional renovation of the temple complex, and some attribute particular ashlars in its eastern retaining wall to them because their crude bosses are similar to other Hasmonean masonry. Elites in the city constructed lavish tombs that closely resembled monumental tombs elsewhere in the Hellenistic world, advertising their political stature and wealth. Two of the better-known examples include the tomb of Benei Hezir, which stood just outside the eastern walls of Jerusalem, and the tomb of Jason, located west of the walls. The first is known for its red-painted Hebrew inscription associating it with "priests of the sons of Hezir," a family mentioned in the biblical books 1 Chronicles 24:15 and Nehemiah 10:21. Its interior chambers had the types of burial slots that would be typical of Jewish tombs for centuries, loculi (niches cut perpendicular into the wall) and arcosolia (shelves cut parallel to the wall). Doric motifs and a pyramid decorated its exterior. A pyramid and Doric motifs also marked Jason's Tomb, located west of the city. The walls of its porch bore an Aramaic and a Greek inscription as well as charcoal drawings of a ship, a palm branch (an early example of a symbol that comes to typify Jewish art), and five menorahs that are among the earliest images of the temple candelabrum. In addition, a drawing of a stag shows that not all Jews avoided figural representations of living things, suggesting that modern notions of strict ancient Jewish aniconism are an oversimplification (Berlin 1997; Levine 2002; Fine 2005; Hachlili 2005).

The Roman general Pompey's expeditions into the region started the Roman period, which lasted from 63 BCE until the mid-fourth century CE. The Romans quickly grew tired of infighting between the last members of the Hasmonean dynasty and appointed a new ruler from an entirely different family, Herod (variously called the Great or the First). Herod was a descendent of Idumeans who had converted to Judaism after the Hasmonean conquest.

Herod was deeply influenced by the massive construction he witnessed on his visits to Rome and became one of the most influential sponsors of Roman-style architecture in the Levant. In his own kingdom, he built a variety of monumental buildings, sports facilities, fortresses, and palaces that blended Roman, Hellenistic, and local styles. Roman construction and decorative techniques in his construction projects included *opus reticulatum*, the facing of walls with diamond-shaped blocks; *opus sectile*, the inlaying of multi-shaped and multicolored stone tiles on floors; mosaics with Roman-style floral and geometric designs; and frescoes with colored panels, stripes, dots, and patterns that resembled those in Pompeii (albeit without the images of humans, animals, or mythological characters found there). Limited Greek-style bathing facilities had entered Palestine in the Hellenistic era, but Herod's palaces had Roman baths with multiple chambers devoted to different temperatures and the use of hypocaust technology for warming (Netzer 2008).

Herod's embrace of Roman culture is visible in the layout of the new city he built on the Mediterranean coast outside of Jewish territory. Named Caesarea Maritima after the emperor, the city's streets were organized on a grid, like other typical Roman cities. Its buildings included a long oval-shaped structure that was either a stadium for foot races or a hippodrome for horse and chariot competitions and a 3,500–5,000 seat theater, built in a half-circle shape with a back wall behind the stage, as per Roman conventions. The new harbor reflected the most advanced technology of his day, with long breakwaters consisting of concrete blocks made of hydraulic cement. The centerpiece of the city was a temple dedicated to the emperor standing on a massive platform that made it easily visible from sea; it was one of the earliest temples of the imperial cult anywhere in the Roman Empire. It was one of three such temples Herod built; the others were at Banias, known in antiquity as Paneas and briefly in the first century CE as Caesarea Philippi, and at Sebaste, a new

Roman-style city built at the site of the ancient city Samaria (Netzer 2008).

Herod also strengthened the fortifications of Jerusalem. The lower courses of the so-called Citadel of David now visible at Jerusalem's Jaffa Gate are remnants of a Herodian tower, as are walls visible in the adjoining courtyard. By far, the best known of Herod's projects in Jerusalem, however, is his extensive renovation of the temple and the platform on which it stood, known in Jewish tradition as the Temple Mount and in the Islamic world as the Haram al-Sharif. Herod's engineers expanded the platform northward, westward, and southward; eastern expansion was impossible because of the steep Kidron Valley. Clear evidence of the southern extension can be seen in the eastern retaining wall, where a vertical "seam" separates Herodian ashlars from earlier ones. The size of the modern Temple Mount is largely due to Herod's construction; it measures roughly 315 m on the north, 280 m on the south, 485 m on the west, and 470 m on the east. The retaining walls, of which the most famous is the Western Wall, were themselves massive. Built from local limestone, most of their blocks weighed at least several tons, and some, such as the 14-m long and 4-m high example in a tunnel running along the Western Wall, weighed much more. A special station stood up top of the wall at the southwestern corner for the blowing of the traditional Jewish shofar, as indicated from the discovery of a corner block with the Hebrew inscription "the place of trumpeting. . .." Huge staircases led up to two gates (their outlines still visible) on the southern side of the temple complex, and evidence of four gates has been found on the western side. Porticoes lined the four sides of the courtyard atop the Temple Mount, their existence reflected in the many column fragments found in modern excavations; this extensive use of columns reflected both Hellenistic and Roman influence. Two copies of a Greek inscription have been found that marked the limits on the Mount beyond which non-Jews could not go upon punishment of death. As for the temple building itself, the presence of Islamic shrines (the Dome of the Rock and the Al-Aqsa Mosque) makes archaeological effort to recover it impossible. If, as is typically thought, silver coins from the Second Revolt against Rome (132–135 CE) with stylized representations of a temple preserve memories of its appearance, its facade had four columns and a cornice. Taken as a whole, the temple complex was the largest in the Roman Empire and one of the largest anywhere in the ancient Mediterranean and Near Eastern worlds (Bahat 1999; Levine 2002; Netzer 2008).

After Herod's death in 4 BCE, his territory was parceled out to his sons. Members of the Herodian dynasty would alternate with Roman prefects and procurators in governing his former territory, the complex administrative arrangements not stabilizing until after the First Revolt against Rome (66–73 CE). Herod's successors lacked his resources, though they still attempted their own building projects. His son Antipas, for example, who governed Galilee and Perea (east of the Jordan River) from 4 BCE to 39 CE, rebuilt the older city of Sepphoris (in Hebrew, *Zippori*) and established the new city of Tiberias (named after the emperor), both in Galilee. Modern habitation has limited the archaeological exploration of Tiberias, but excavations have recovered ample evidence of Jewish habitation at Sepphoris in the form of stone vessels and ritual baths (see discussion below). In the second century CE, Sepphoris would become a major center of Jewish thought as teachers known as rabbis settled there and began to compile traditions that ultimately were included in the rabbinic literature that became authoritative for Judaism. The site is noteworthy for the presence of Roman-style architecture (especially a theater) and art (most notably mosaics, including some with mythological imagery), although these appear to postdate the First Revolt, often by considerable margins (Meyers & Chancey, 2012).

Like the Hasmoneans, the Herodian client kings minted bronze coins. Those of some, like Antipas and Archelaus, refrained from depicting living things, but those of others bore busts and images of either themselves, the Roman emperor, or members of the royal or imperial family. Coins of Philip had images of a temple usually interpreted as that dedicated to Caesar at Banias,

while those of Agrippa II went so far as to depict classical deities; both rulers oversaw the northernmost parts of Herod's territory, where Jews were a minority. Most Herodian coinage had Greek inscriptions, although a few issues of Agrippa II had Latin (Meshorer 2001).

Jewish tensions with Rome ultimately led to the First Revolt (66–73 CE). The writings of the Jewish historian Josephus, who served first as a field commander of Jewish forces in Galilee and then as a translator for the Romans, are our primary literary source for understanding events (especially *Bellum Judaicum*; Williamson 1970). After initial successes, Jewish forces suffered a series of devastating defeats. In the north, the aftermath of siege warfare in 67 CE is clearly visible at the Galilean site of Yodfat (in Greek, Jotapata) and at Gamla, in the southwestern Golan Heights. Archaeological finds at the hilltop village of Yodfat include fortification walls, arrowheads, ballista stones, a rolling stone, other pieces of weaponry, portions of a siege ramp, and skeletal remains. Finds at Gamla are similar: some 2,000 ballista stones, 1,600 arrowheads, and 100 catapult bolts, as well as large stones dropped and rolled by the defenders down the steep ravines surrounding the site. Fortification walls are still clearly visible, including a major breach near the village synagogue. The town struck its own bronze coins during the revolt, each bearing the defiant Hebrew inscription "For the redemption of H[oly] Jerusalem" (Meshorer 2001; Berlin & Overman 2002).

Jerusalem was the site of the fiercest combat. Jewish forces there issued both silver and bronze coins with the Paleo-Hebrew inscription "Jerusalem the Holy," but they were not be able to defend the city against the Romans' overwhelming strength. Roman forces succeeded in entering the city and destroying the Second Temple in 70 CE. Excavations carried out since the Israelis gained possession of the Old City in 1967 have found ample evidence of widespread destruction in the elite residences of the Herodian Quarter west of the Temple Mount. In the so-called Burnt House, everyday domestic items lay scattered on the floor, a spear leaned against a wall, and the bones of a woman's forearm and hand remained stuck in the debris. South and west of the Temple Mount, extensive rubble lay on Roman-period streets, consisting of ashlars, pieces of columns, and other architectural fragments thrown down by the Romans as they dismantled the buildings of the sacred precinct above (Berlin & Overman 2002; Levine 2002).

In 73 or 74 CE, Roman units moved east into the Judean wilderness near the Dead Sea to complete their victory by mopping up the last of the Jewish resistance. The chief battle there occurred at the old Herodian fortress of Masada, built atop a massif. Josephus famously records that after a lengthy siege, Masada's Jewish defenders committed suicide rather than allow the Romans to claim a victory, though some modern scholars question the veracity of this account. The outlines of the Romans' siege wall surrounding the site can still be seen today, along with a 4,500-m long siege ramp and the rectangular boundaries of their military camps. A remarkable amount of military equipment has been found, including pieces of scale armor, helmets, spearheads, arrowheads, fragments of swords, and ballista balls (Berlin & Overman 2002).

The Romans advertised their victory over the Jewish rebels by striking coins proclaiming "Iudaea Capta." The Arch of Titus in Rome portrays legionnaires triumphantly carrying plunder from Jerusalem, including the menorah from the temple (Berlin & Overman 2002). The Second Revolt against the Romans under the leadership of Bar Kokhba in 132–135 CE would also prove unsuccessful and end Jewish attempts to reclaim Jerusalem and rebuild the temple.

Key Issues and Current Debates

Among the chief discoveries in recent decades is the ample evidence of ancient Jewish interest in ritual purity. One reflection of this interest was the construction of small pools generally interpreted as ritual baths (in Hebrew, *miqva'ot*) because of their general similarity to the descriptions of such baths in rabbinic sources. Ritual baths were stepped, plastered pools cut into bedrock. Their sizes varied, but they were generally

deep enough to allow full immersion of the body and were sometimes accompanied by a small storage pool to the side. Although the practice of ritually cleansing oneself through immersion is attested in the Hebrew Bible, the appearance of pools built specifically for this purpose was a new phenomenon of the Hasmonean period. By the first century CE, *miqva'ot* were numerous throughout Judea, and examples have also been unearthed in Galilee and in the Golan at Gamla. Ritual baths are found in Herodian palaces, where they served as the cold pool (in Latin, *frigidarium*) of Roman-style bathing facilities; on major roadways near Jerusalem, perhaps for the use of pilgrims; at various points in the vicinity of the temple; near synagogues (such as that at Gamla); near cemeteries (possibly to help remove impurity contracted by contact with or proximity to corpses); in association with wine and oil presses to facilitate production of pure juice and oil; and in both rural and urban domestic contexts (Berlin 2005; McCane 2010).

A related phenomenon was the use of limestone vessels, which rabbinic texts describe as impermeable to ritual impurity. These vessels were found in a variety of forms, including jar stoppers, mugs, kraters, bowls, and large storage jars. Most were clearly intended to hold and thus keep pure liquids. Their manufacture and use quickly extended beyond Jerusalem to other parts of Palestine, and whole vessels or fragments have been found at dozens of sites in Judea and Galilee, in both cities and villages and in the residences of both elites and commoners. Stone vessels are generally absent from sites in Samaria or in surrounding areas that were primarily inhabited by non-Jews (Berlin 2005). Yet to be answered in regard to both limestone vessels and miqva'ot is whether differences in practices between Jews associated with various sects (Pharisees, Sadducees, Essenes) or no sect can be identified archaeologically.

Another new phenomenon of the late Second Temple period was the use of small sarcophagi known as ossuaries for secondary burial. For reasons not yet clear (typical explanations appeal to views of the afterlife, hopes for the expiation of sins, or increasing emphasis on individual identity), some Jews began gathering up the bones of the deceased after the flesh had decayed (roughly a year's time) and placing them in ossuaries. Although the practice of secondary burial within Judaism is attested earlier, the creation of special receptacles for the purpose is apparently unprecedented. Most ossuaries were made of limestone, but ceramic examples are also known. Ossuaries have been discovered at sites in Judea, Samaria, and Galilee. The rate of their geographical diffusion is unclear, as is the date for the end of the practice; once thought to be the end of first century, it now clearly extends into second. Aside from coins, ossuaries are the single most common source of Jewish inscriptions from this time period. Typical content of these inscriptions includes the name, place of residence or origin, and names of family members of the interred. Most are in Aramaic or Hebrew, though roughly a third are in Greek and a few in Latin (Hachlili 2005).

Scholarly understanding of the early history of the synagogue has also made significant advances. Synagogues were categorically different from the Jerusalem temple. For most Jews, the temple was the only place where animals could be sacrificed. In contrast, many towns and villages had synagogues, in which where the local Jewish community gathered for worship, study, and public meetings. The earliest evidence of synagogues comes from Ptolemaic-period Greek inscriptions from Egypt referring to *proseuchai* (houses of prayer) and from a first-century BCE structure often interpreted as a synagogue on the Greek island of Delos. Several likely examples from the late Second Temple period have been found at sites in Israel, including Gamla, Masada, Herodium, Kiryat Sefer, Modi'in, and most recently, Magdala. In addition, the first-century CE Greek inscription from Jerusalem known as the Theodotus Inscription provides important information about a synagogue there. It identified the primary activities associated with the synagogue as teaching about the Law (the Jewish Torah) and the commandments and providing hospitality to strangers, and it mentions three generations of *archisynagogoi* (rulers of the synagogue) (Cotton et al. 2010: 53–6). Jewish

and Christian texts make clear that numerous other synagogues existed by the first century CE, but at present, they are difficult to identify in the archaeological record. A wave of construction beginning in the late third century CE resulted in the creation of over a hundred synagogues in Israel (Levine 2000; Meyers & Chancey 2012).

Like later synagogues, those from the pre-70 CE period are square or rectangular, with benches around their interior walls and columns that sometimes made aisles. Unlike later synagogues, they generally lack inscriptions, extensive decorations such as mosaic floors or external friezes, special shrines to hold the Torah scroll, or the raised platform known as a bema. An excellent example is the Gamla synagogue, which was destroyed in the First Revolt. Built of local basalt, it measured 13.4 by 9.3 m. Columns lined all four interior walls, their capitals in the Doric style, and those in the corner cut in the shape of hearts. Benches provided seating for perhaps 150 people (Levine 2000; Meyers & Chancey 2012).

Aside from Jerusalem, no single site has proven as important for understanding Second Temple Judaism as Qumran, a set of ruins found in the desert less than a mile west of the Dead Sea. The complex there included a tower, a pottery workshop, common dining area, cisterns, and large pools that are usually interpreted as communal ritual baths. A cemetery with roughly 1,200 graves lay nearby. The community was destroyed in the First Revolt, probably in 68 CE. Hidden in caves adjacent to the site were the over 900 manuscripts now known as the Dead Sea Scrolls, which were discovered in the late 1940s and the 1950s. The scrolls were mostly of parchment, though some were made of papyrus. They included a remarkable range of Hebrew, Aramaic, and Greek texts, with fragments of every book of the Hebrew Bible except Esther, apocryphal and pseudepigraphical books, rewritten scripture, commentaries on biblical books, apocalyptic works, astrological texts, legal texts, and liturgical texts. Some scrolls contained sectarian writings describing beliefs and practices similar to those of the Essenes, a group known from other literary sources. On the basis of the proximity of the caves to Qumran and the presence at both sites of an unusual ceramic form, a large lidded storage jar, most scholars have concluded that the group living at Qumran in antiquity was an Essene community. Other scholars, however, dispute the identification of the sectarian writings as Essene and question the wisdom of interpreting the settlement site primarily through the lens of the scrolls. Alternative theories regard the ruins as originally an agricultural villa, a fortress, a center for pottery production, or a trade station (Schiffman & Vanderkam 2000; Meyers & Chancey 2012).

The end of the Second Temple period marked a major transition in the historical development of Judaism. The religion continued its transformation from a tradition centered on a sacrificial cult to one focused on the teachings and practices prescribed in sacred texts such as the Hebrew Bible and rabbinic writings, which were composed in the centuries following the temple's destruction. Although memories of the temple and hopes for its restoration have played key roles in subsequent Jewish theology and liturgy, by the end of the Roman era the synagogue had emerged as the religion's dominant communal institution.

Cross-References

- ▶ Baths and Bathing, Roman
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Sepphoris, Archaeology of
- ▶ Urban Planning, Roman

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Secondary Products and the "Secondary Products Revolution"

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Introduction

The term "secondary products" was coined by Andrew Sherratt in 1981 to refer to three resources that can be provided by livestock prior to slaughter: milk, wool, and labor. He saw these as components in a post-Neolithic "Secondary Products Revolution" (SPR) that fundamentally changed the economic bases of pre- and protohistoric societies in the Near East during the fourth millennium BCE, before spreading to Europe by diffusion: systematic production of milk and wool rendered specialized large-scale pastoralism (geared toward exchange) feasible; cattle-drawn plows permitted both intensification of agriculture and expansion of cultivation to previously marginal soils; and wheeled vehicles pulled by livestock allowed transportation of both arable and pastoral products in bulk.

Sherratt was in fact building on arguments by previous researchers that milking and wool use were not part of the original "Neolithic package," but rather later developments (e.g., Bökönyi 1974). However, by bringing these two strands together with animal traction; by setting out a detailed model of their economic implications; and by providing testable hypotheses regarding the timing and geography of this putative

revolution, Sherratt set an agenda within economic prehistory that remains relevant more than 30 years on. There is some dispute as to whether this model requires the use of secondary products to be a unified post-Neolithic complex of *innovations*, or whether the SPR should rather be seen in looser terms as a revolution in the *scale* of their exploitation (see, e.g., Greenfield 2010). While research over the last three decades has steadily undermined the former, stricter view, there remains considerable empirical support for the broad thrust of Sherratt's argument.

In the decades since the phrase was first coined, the concept of secondary products has caught on more widely and has been expanded to include other preslaughter resources such as blood, hair, and dung. Beyond the geographic and temporal limits of the SPR model itself, Sherratt's ideas have focused the attention of zooarchaeologists and other researchers on the refinement of techniques for characterizing the nature of animal husbandry. The terminology inherited from Sherratt is perhaps unfortunate here: the "secondary" in his SPR referred to the hypothesized *chronological* precedence of exploitation for "primary products" (i.e., meat, fat, hide, and bone) over that for milk, wool, and traction, rather than to the relative importance of pre-slaughter and post-slaughter products. Taken out of this context, however, one must be careful to avoid the erroneous implication that pre-slaughter products are necessarily secondary to meat as a motivation for raising livestock.

Definition

"Secondary products" refers to all resources that can be extracted from domestic animals during their life as opposed to after death, including milk, blood, dung, fiber, and labor/traction. The term has sometimes been extended to certain processed plant products such as olive oil and wine, but is used here only for resources derived from animals.

The "Secondary Products Revolution" is a specific model of economic change set out by Andrew Sherratt with regard to European and Near Eastern pre/protohistory. It holds that a complex of exploitation of several secondary animal products (namely, milk, wool, and traction) spread across the region in the Chalcolithic and Bronze Age, allowing both intensification and extensification of agriculture, promoting development of specialized pastoralism, and ultimately playing an important role in the development of complex societies.

Key Issues/Current Debates/Future Directions/Examples

Milk and Dairying

Of the three secondary products that were central to Sherratt's original argument, milk (and by extension the wide range of foodstuffs derived from it) has probably received the most attention in the literature. Of the four main Eurasian Neolithic domesticates, three – cattle, sheep, and goats – can practicably be milked, with horses later added to this number.

Far from being a purely post-Neolithic development, lipid residue analysis (see below) has now provided fairly conclusive evidence that milking was practiced to some extent from the beginning of the Neolithic in the Near East and southeast Europe (Evershed et al. 2008). It should be stressed, however, that more than a single innovation was required for it to become a major component of husbandry strategies. For one thing, full adult lactose tolerance remains the exception rather than the rule for human populations globally, and its contemporary prevalence in – for example – northwest Europe is believed to have been driven by selection pressure resulting *from* the availability of ruminant milk. In most Neolithic contexts, the contribution of milk to adult diet would thus have been dependent on the development of fermented milk products – cheese, yoghurt, etc. – in which the lactose is broken down.

Meanwhile, Neolithic livestock would not have produced much more milk than was required by their infants, leaving little for human consumption. In recent dairy herds, most young are slaughtered very early to avoid

competition, and this pattern is sometimes sought as a signature of dairying in zooarchaeological mortality profiles (see below). The ability of cows to let down milk without the presence of their own offspring appears to have been a recent development, however (McCormick 1992), and in prehistoric herds, milking probably required calves to be kept alive (the situation for sheep and goats is less clear). Calves might nonetheless have been weaned early to increase the milk available for humans: isotopic evidence from French Neolithic cattle indicates fairly early weaning, at around 6–9 months (Balasse & Tresset 2002).

Fiber

While the milk production potential of early domesticates is debatable, the situation for wool is starker: wild sheep simply do not have woolly fleeces, and it must have taken many generations for domestic populations to develop them. The fine fibers that form the undercoat of wild sheep eventually came to make up the bulk of the fleece, replacing the much coarser outer hair, but despite being the subject of considerable research, the timing of this process remains poorly understood. Although surely a gradual development, the key point from a technological point of view was probably the emergence of wool that could be spun in the same way as flax. The present data seem to uphold Sherratt's view that this was a fourth millennium phenomenon in the Near East (see review in Greenfield 2010), although an earlier date cannot be ruled out. The subsequent spread of woolly sheep across Europe and Asia remains poorly resolved, but appears to have been fairly rapid.

As with milking, specialized production of wool has certain implications for herd structures. Both male and female individuals are likely to be kept alive into adulthood, and the former may also be castrated to improve the quality of their fleeces while facilitating management.

Of course, wool is not the only animal fiber: sheep hair may have been employed for various purposes before it became fine enough to spin, while the use of goat and horse hair in more recent periods is well attested. Nor are sheep the only woolly domesticate: llama wool has a long history of use in the Andean region, as does alpaca fiber (Mengoni Goñalons & Yacobaccio 2006).

Labor

In the present context, labor refers to the use of domesticates as draught- or pack-animals and for riding. Within the geotemporal range of the SPR model, the implicated species are cattle, horse, donkey, and camels (both Bactrian camel and dromedary); elsewhere, other bovines, South American camelids, reindeer, and the Indian elephant can be added to the list.

The development of the cattle-drawn plow is at the heart of the original SPR model, in which it is held to represent a fundamental shift in the relationship between plant and animal husbandry (Sherratt 1981, 1983). Yoking cattle to ards (and later to moldboard plows) allowed for effective cultivation of heavier soils, greatly increasing both the fertile land available for arable crops and the productivity of land already under cultivation.

As with exploitation of caprine fibers, the use of cattle for traction might be expected to increase the value of adult animals – particularly castrated males (oxen) – and hence to promote delayed slaughter. This depends on the scale of stock-keeping and its relationship with arable farming, however, and in many circumstances, it may be more economic to use cows for traction than to support dedicated plow oxen that neither breed nor provide milk (see Isaakidou 2006: 108). A recent survey of draught cattle use through time noted substantial global variation both in the age/sex of animals used and in the degree of training involved (Johannsen 2011).

If cattle can pull plows then they can also pull carts, and figurine evidence suggests that the first wheeled vehicles were cattle-drawn. Within the SPR model, the development of carts allowed for bulk transport of agricultural and pastoral products and was thus important to the development of extensive production and provisioning systems (Sherratt 1981). The domestication of equids and camelids and their use as pack-animals is seen in the same light, although it seems likely that cattle

had been used as *ad hoc* beasts of burden during the Neolithic (Greenfield 2010: 39).

Other Secondary Products

The use of blood from living animals is well-attested in the ethnographic record, particularly among cattle pastoralists. As with milk, blood represents one way of extracting sustenance from herds without reducing their numbers, although it requires considerable skill to carry out without endangering the animal. Unlike systematic milking, however, blood use need not have any impact on herd management.

Perhaps the most overlooked secondary product is dung, despite its often substantial role in agriculture. This may be because its use as fertilizer does not require any real technological innovations or specialized husbandry practices and is thus likely to have begun with the first animal husbandry. Manuring may have played an important role in the Early Neolithic of central and southeast Europe, for example, where intensive garden agriculture was probably integrated closely with small-scale herding (Bogaard 2005). Insofar as the shift toward extensive pastoralism implied by the SPR represented a spatial separation of caprine herding from agriculture, it may in fact have reduced the role of manure. That said, the degree of effort involved in dung collection and the range of uses to which it is put may vary widely: apart from fertilizer, dung may be used as fuel or building material (Moreno-García & Pimenta 2011).

Finally, domestic animals may provide less tangible resources related to their social and symbolic importance and role in exchange, e.g., as bridewealth (Russell 1998). While it would be a stretch to refer to wealth and prestige as secondary products, they may certainly be important motivations for keeping livestock and must be borne in mind when assessing husbandry practices, alongside both primary and secondary products.

Lines of Evidence for Secondary Products Exploitation

Sherratt's original argument relied heavily on artifactual, iconographic, and early textual evidence for secondary products exploitation. In Mesopotamia, Uruk-period (fourth millennium) pictographs and cylinder seals present some of the earliest representations of milking, plowing, and wheeled vehicles; in central and southeast Europe, figurines and clay models play the same role from the Chalcolithic or Bronze Age. Such representations can only ever provide a *terminus ante quem* for the origin of the activities represented, however (Chapman 1982).

Artifactual evidence is also problematic, due largely to issues of preservation. Early plows and vehicles were largely made of organic materials and are thus rarely preserved, although ard marks may provide direct evidence for the use of the former. Occasional finds in waterlogged deposits from across Europe may post-date the earliest use of the technology in any given area by centuries. For textiles, this problem is compounded by the fact that wool survives in very different conditions to plant fibers such as flax, while the associated inorganic material culture (spindle whorls and loom weights) does not unequivocally reveal which fibers were used. Nonetheless, it is notable that while flaxen fabrics are known from the Neolithic in both Europe and the Near East, woolen textile fragments start to appear in Chalcolithic and later contexts.

Neither does milking necessarily have a distinctive material culture. Perforated ceramic vessels from Linearbandkeramik (central European Early Neolithic) contexts have sometimes been linked to cheese production (Bogucki 1984), but this is by no means certain. Recent advances in stable isotope analysis of lipid residues on ceramics have allowed ruminant milk fat to be distinguished from ruminant or porcine body fat, by comparing $\delta^{13}C$ between 16- and 18-carbon chains (Evershed et al. 2008). While this technique reveals widespread use of milk from the early Neolithic in the Near East and Europe, estimating the frequency of milk consumption or its contribution to diet remains problematic.

By contrast to artifactual and iconographic data, animal bone assemblages are near-ubiquitous features of prehistoric sites, and may provide indirect evidence for the use of secondary

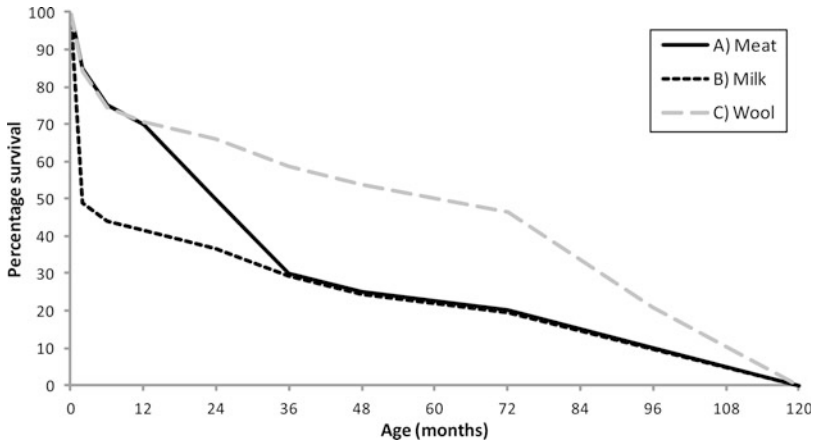

Secondary Products and the "Secondary Products Revolution",
Fig. 1 Idealized survival curves for sheep herds managed for meat, milk or wool, according to Payne (1973)

products. Evidence for traction has been sought through systematic observation of pathologies and activity markers on animal bones (e.g., Bartosiewicz et al. 1997; Isaakidou 2006), but by far the most common approach involves quantitative analysis of age-at-death and sex ratio data (e.g., Greenfield 1988, 2005; Vigne & Helmer 2007). Systematic attempts to analyze herd management from age data began in earnest with Payne's (1973) publication of idealized mortality profiles for caprine herds managed for meat, milk, and wool, respectively (Fig. 1). Similar reasoning can be applied to cattle and their use for traction.

There are various obstacles to interpretation of mortality profiles, however. Firstly, prehistoric herds will rarely have been managed purely for a single resource, and the three models should therefore be seen as extreme cases; indeed, Payne also set out a "mixed meat and milk" profile. More nuanced models have since been proposed for "tender meat" and for nonintensive milk production more suited to primitive breeds and/or small-scale production systems ("type B milk" – Vigne & Helmer 2007). The next problem is one of equifinality: once one moves away from Payne's extreme cases, different production strategies cannot necessarily be distinguished from age data alone. Sex ratios may help to tease out different herd management strategies, although it is usually impossible to link age and sex data directly since different skeletal elements are used in each case. Widespread castration would be a strong indicator of systematic traction or wool use, in cattle and sheep respectively, but is itself difficult to demonstrate unless large numbers of intact limb bones are present.

As a result of these problems, it is not unknown for the same data to be interpreted in contradictory ways (e.g., Greenfield 2005 vs. Vigne & Helmer 2007). Moreover, particular herd structures can only ever indicate *potential* for exploitation of milk, wool, etc. (Halstead 1998). Additional factors such as herd security concerns or social incentives to maintain herds may intervene between theoretical optimal herd structures and reality. The scale of herding is important, with management of smaller herds likely to be more conservative and therefore to appear more generalist, but of course it is notoriously difficult to assess scale from bone remains. The upshot is that while highly specialized herd management might constitute convincing evidence for the type of large-scale specialized pastoralism inherent in the SPR model, the absence of such patterns does not necessarily indicate either small-scale herding or an absence of secondary products exploitation.

Matching observed mortality profiles to theoretical models is thus extremely problematic, but tracking changes over time may nonetheless help to reveal shifts in emphasis (Greenfield 2010). Post-Neolithic shifts broadly in line with the predictions of the SPR are indeed seen in the Balkans (Greenfield 2005; Isaakidou 2006), Anatolia

(Arbuckle et al. 2009), and elsewhere, but their interpretation remains contentious (see Vigne & Helmer 2007; Brochier 2012).

One final line of evidence that is likely to become increasingly important in the near future is ancient DNA. On the one hand, ancient DNA studies are rapidly improving our understanding of the spread of adult lactose tolerance among human populations; on the other, genetics has the potential to trace the development and spread of traits such as woolly fleeces in sheep.

The "Secondary Products Revolution" 30 Years On

In the three decades since its inception, the SPR has been subject to critique on both empirical and conceptual grounds, and the fact that it is still a subject of debate today speaks to the contribution it made to economic prehistory. Three aspects of the model may be reevaluated in the light of recent research: (1) the idea that milking, plowing, etc., were post-Neolithic *innovations*; (2) the existence of a coherent "package" of husbandry practices that diffused from the Near East into Europe and elsewhere; and (3) the core argument for a revolution in scale and specialization of animal husbandry during the fourth millennium.

The first of these is arguably a red herring (Greenfield 2010: 46-7). While Sherratt's 1981 paper did seem to imply that the SPR involved a complex of innovations, his 1983 reprise of the model clarified that elements of this complex probably had Neolithic roots, and that the "revolution" was one of scale. This has not prevented the construction of strawmen, however: it is hard to reconcile Sherratt's statement that "milking was probably practised in Europe by Neolithic populations" (1983: 95) with the view that Neolithic people were "without any abilities other than killing animals for their meat, exactly as did hunters-gatherers" – attributed to him 24 years later in an unusually passionate critique by Vigne and Helmer (2007: 35).

Regardless of Sherratt's original intentions, it is now clear that at least some features of the SPR can be traced well back into the Neolithic of Europe and the Near East. Most notably, the lipid residue evidence makes clear that milking was practiced *to some extent* from fairly early in the Neolithic (Evershed et al. 2008). Likewise, few would deny that sheep and goat fibers may have been exploited before they became fine enough to spin, or that cattle were sometimes used to pull or carry loads before the development of the ard or the wheel. On the other hand, 30 years of new empirical data has done little to overturn the idea that the plow and the wheel *were* fourth millennium developments, or that spinnable sheep's wool developed at a broadly similar time.

The second point – the idea of the SPR as a coherent package of practices that spread together – is also highly problematic. It is increasingly clear that each component had a discrete origin and subsequent take-up and spread (Greenfield 2010).

At its core, however, the SPR model was about the development of large-scale specialized pastoralism on the one hand; systematic use of cattle (and later equid) traction to transform agriculture on the other; and the implications that both had for the development of economic systems. "Large-scale" is of course an ambiguous term, but there remains considerable empirical support for the idea that major changes to this effect took place around the fourth millennium BCE in the Near East, and had taken hold in parts of Europe by at least the third millennium. The most contentious aspect of these changes is the role of milking, with debate continuing to rage over (a) whether or not the available zooarchaeological data indicate a widespread post-Neolithic shift in herd management, and (b) to what extent earlier signatures of dairying can be identified in Neolithic mortality profiles (e.g., Greenfield 2005, 2010; Vigne & Helmer 2007).

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Asses/Donkeys: Domestication
- ▶ Camels: Domestication

▶ Cattle: Domestication
▶ Goat: Domestication
▶ Horses: Domestication
▶ Organic Residue Analysis in Archaeology
▶ Sheep: Domestication
▶ Social Zooarchaeology
▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Secwepemc Cultural Education Society and Simon Fraser University (SCES-SFU) Indigenous Archaeology Program

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Basic Information

The Secwepemc (or Shuswap) are an Interior Salish people of south-central British Columbia, Canada, today comprised of 17 bands. In 1989, the Secwepemc Cultural Education Society (SCES) and Simon Fraser University (SFU) entered into a partnership to develop a unique post-secondary education program for First Nations Students on the Kamloops Indian Reserve in Kamloops, British Columbia. These efforts were led by then-Skeetchestn Band chief Ronald Ignace, Marianne Boelscher Ignace (anthropologist, SFU), and Hari Sharma (sociologist, SFU). The goal was to offer university courses on the reserve in order to enhance the quality of life for the Secwepemc peoples and their indigenous neighbors; to preserve and promote their history, language, and culture; and to provide training in research, and developmental opportunities to assist them in controlling more fully their own affairs (Ignace et al. 1996). Ironically, the program started in several rooms within the former residential school run by the Catholic Church, whose mission it was to "remove the Indian from the child."

The campus sought to provide First Nations individuals, from near and far, with an entry into post-secondary education, but also welcomed non-indigenous students. The location on the reserve was intentional as it provided a comfortable setting distinct from that of regular universities, which many individuals found intimidating. A significant percentage of students were the first in their family to ever attend a university course or complete a university degree. The SCES-SFU program was known informally as Coyote U; the campus logo featured *Sk'elep*, the Coyote, a trickster figure to Secwepemc people known for both good deeds and causing trouble.

Soon after it began, the program quickly expanded into a small campus, consisting of six portable classrooms, adjacent to the residential school. The small permanent teaching and administrative staff was complemented by sessional instructors from other academic institutions in the region. The curriculum was designed to help Secwepemc communities meet their needs, especially those related to cultural heritage. Anthropology, First Nations, Linguistics, Ethnobotany, Archaeology, and museology were all emphasized, with courses also offered in sociology, writing, mathematics, history, and geography. Over 100 lower- and upper-level university courses were offered each year, as well as several graduate courses. Special courses and workshops were occasionally offered on treaty negotiations, film making, theater, wildlife management, and health and safety. In 1993, the SCES-SFU program received the "Award for Excellence" from the Canadian Association for University Continuing Education. The volume *Coyote U: Stories and Teachings from the Secwepemc Education Institute* (Murphy et al. 1999) is a collection of writing by students in the program.

The Archaeology program was developed in 1991 by George Nicholas (archaeologist, SFU), who directed it until 2005. The annual Archaeology Field School component combined a commitment to socially relevant, community-based archaeology with a scientific research program focused on the identification and excavation of pre-5,000-year-old sites and the land-use system they represent (Nicholas 1997). These initiatives contributed to capacity building in field and research skills, as well as cultural resource management services to the communities. The Archaeology Field School (Fig. 1) provided students with a thorough grounding in archaeological survey, site recording, testing and

Secwepemc Cultural Education Society and Simon Fraser University (SCES-SFU) Indigenous Archaeology Program, Fig. 1 Students in the SCES-SFU Indigenous Archaeology program received classroom instruction and field training in all aspects of archaeology – from theory and practice to community engagement (Photo: George Nicholas)

excavation skills, and basic laboratory analysis. The Field School worked closely with the Kamloops Indian Band to mitigate the impact of a large housing development and golf course on and around a location where Nicholas and students had previously conducted extensive field studies, and conducted work on behalf of the Secwepemc Cultural Education Society and the Secwepemc Museum. These and other projects assisted the Secwepemc people in balancing current land-use plans with heritage preservation, and introduced students to the very real demands of mitigative archaeology and to the rewards and frustrations that are part of cultural resource management.

Provincial certification in archaeological training was incorporated into the field school program or offered separately. The Resource Inventory Standards Committee (RISC) program prepares students with technical training in practical field methods to assist archaeologists in cultural resource management projects. This program has been delivered to numerous First Nation communities throughout British Columbia since 1997. For some, RISC training has been an introduction to the discipline of archaeology that has inspired them to pursue a post-secondary education, and for others, it has provided seasonal work. This work has provided networking with the archaeological community and other potential employers (Nicholas & Markey 2002).

The Secwepemc-SFU campus closed in 2010 due to financial cutbacks, increased competition for students, and a shift in priorities by the partnering organizations.

Major Impact

For 20 years, the SCES-SFU Indigenous Archaeology Program provided archaeological courses and field training to hundreds of First Nations students, more than any other institution in Canada. It created opportunities for their involvement in stewardship, heritage management, heritage policy making, developing on-reserve permit systems, cultural sensitivity in heritage research, land-use planning, cultural liaison with industry, and even mentoring for high school students. Through its archaeology, ethnobotany, and language immersion courses, the SCES-SFU campus offered many opportunities for First Nations students to visit, or revisit, parts of their traditional territories, and to work with elders who, as teachers and cultural advisors introduced them to knowledge lost to the language and cultural restrictions imposed through the residential school system and earlier Federal Indian policies.

For its part, archaeology assisted community members in identifying more fully with their culture by supplementing and expanding oral histories, and by giving them the tools to identify, recover, and interpret ancestral sites and the material culture contained therein. SCES-SFU students have subsequently pursued their interests in heritage in a variety of contexts, including:

- As band council or committee members charged with making decisions on land-use planning (including archaeological overview assessments) for their communities
- As archaeological permit holders, project managers, business managers, project

directors, or crew members for cultural resource management companies working on local, national, and international projects
- As managers, researchers, and field workers within First Nation cultural and/or natural resource departments, involved in archaeological and environmental assessments that incorporate both western science and traditional knowledge
- As museum archivists and tour guides
- As graduate students having the opportunity to teach at universities as sessional instructors
- As educators and instructors who have incorporated archaeology, ethnobotany, and language into the curriculum into elementary, high school, and university-level courses

The SCES-SFU program represented a manifestation of Indigenous Archaeology in which First Nations' concerns with heritage were addressed by providing First Nations members with the tools of archaeology that they could employ themselves as CRM practitioners, educators, or decision makers. The approach melded community values and recognition of sensitive and sacred places with scientific collection and preservation of archaeological materials, and has proved pivotal in educating future generations of both First Nations and the general public about First Nation histories, cultural identity, political perspectives, and social dynamics. It has also served to enlighten Industry (private and corporate) and Government with respect to developing better relations and protocols with First Nations (Markey 2010). The program has left a lasting legacy in Secwepemc territory, as well as contributed to the increased breadth of archaeological practice elsewhere.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: Cultural Heritage Management Education
- ▶ Community Archaeology
- ▶ Field Schools, Archaeological
- ▶ Heritage and Higher Education
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Knowledge and Traditional Knowledge

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Seeds: Conservation and Preservation

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Introduction

Not all seeds that are preserved and recovered from archaeological contexts reflect uses by past peoples. Some of the seeds may be of modern origin: they may have been blown in, dropped from local plants (i.e., "seed rain"), or transported by burrowing animals or plant roots. Seed rain also operated in the past and could be a source during site occupation and after site abandonment. At mesic sites where, as discussed below, carbonization is normally deemed necessary for preservation, uncharred seeds are often considered modern intrusions. However, the burning of an abandoned occupation site may result in the deposition of considerable quantities of carbonized seeds incidentally introduced by seed rain. Carbonized seeds can also be a result of indirect sources such as burning dung for fuel (Miller & Smart 1984). At water-logged sites, seeds may be introduced via beach drift (Matthews & Gosden 1997). Understanding depositional history is thus critical to interpreting seeds that have been preserved and recovered from archaeological sites.

Definition

Seeds are plant reproductive structures. In flowering plants, they develop within ovaries, and the ovaries and seeds then develop into fruits. The term "seed" as applied in many archaeological contexts refers to true seeds as well as kernels, achenes, pits, pips, and other kinds of dry fruits. It was the recovery of ancient seeds among other floral remains by nineteenth century researchers like John Harshberger, Oswald Heer, and Carl Kunth which propelled interest in the uses of plants by past societies. By the mid-twentieth century, it became widely recognized that seeds derived from archaeological deposits provide the kind of data needed to answer questions about diet, origins of food production, diffusion of cultigens, biodiversity, land use strategies, medicinal and ritual practices, and technological use of plants.

Key Issues/Current Debates/Future Directions/Examples

There are a number of means by which seeds may survive physical and chemical decomposition to become a part of the archaeological record. These include carbonization, desiccation, quick-freezing, and water-logging. In general, these processes inhibit the growth of decomposers like bacteria or saprophytic fungi, slow the rate of enzyme action, and lower the speed at which chemical reactions occur (Sobilik 2003: 21-28). Desiccation, quick-freezing, and water-logging are remarkable for the types of tissue preserved, if not for the shear abundance of material. The water-logged deposits of the ancient lake dwellers who built wooden houses along the shores of Switzerland's lakes have yielded cultivated grains, fleshy fruits, field weeds, legumes, and nuts, among many other kinds of plant remains, whereas the dry coastal valleys of southern Peru are equally rich in yielding desiccated seeds. Unfortunately, preservation by these means is relatively rare.

Most seeds are derived from open-air archaeological sites in mesic habitats where supplies of moisture are moderate. There the botanical remains are often subjected to oscillations between wet and dry regimes that increase their susceptibility to chemical decomposition. Repeated cycles of wetting and drying bring the seeds into contact with fresh supplies of inorganic and organic acids and bases (Bryant 1989). These substances dissolve or weaken cellulose (a component of most plant cells) to such a degree as to accelerate mechanical reduction. Also, a host of small organisms that facilitate decomposition inhabit mesic environments. Dead plant materials

serve as food for earthworms, millipedes, ants, and mites, among other soil organisms (Bryant 1989). Fungi and bacteria, nature's most effective decomposers, also abound. Under these conditions, dead organic matter tends to decay rather rapidly. There are exceptions. First, seeds that were deeply and quickly buried may preserve. Deep layers of silt or clay can result in relatively anaerobic conditions that inhibit saprophytic organisms. The deeper the material is buried, the better the potential for preservation (Sobilik 2003). Such situations can arise in the case of a mudslide or in the event of the quick burial beneath meters of mound fill.

The second and a major exception are those seeds that have undergone the physical and chemical changes associated with carbonization. During the carbonization process, chemical constituents are converted to elemental carbon, which is extremely durable and offers no nutrients on which saprophytic organisms can feed (Sobilik 2003). Beck (1989) developed and conducted experiments to evaluate basic rates of decomposition for carbonized and non-carbonized remains. She found that rates of decomposition will be greatest at those sites where the sediments are warmer, wetter, have higher organic carbon content, are more alkaline, and have more concentrated soil nutrients (e.g., phosphorus, calcium, nitrogen). However, if a seed is composed of more resistant materials – it has been carbonized – such a state will outweigh environmental factors. In many cases, seeds that have fortuitously carbonized can withstand the rigors of mesic environments.

While carbonization is a mechanism by which seeds can preserve, it is a very biasing mechanism (Wright 2003). Carbonized seed assemblages tend to reflect only a small portion of the population of plants used by past peoples. Miksicek (1987) illustrated this point when he observed traditional saguaro fruit harvesting and processing by members of the Tohono O'odham, and a year later returned to sample the processing loci. Ultimately, he found that "The flotation samples yielded evidence for approximately 0.2 % of a morning's work, of which only 0.02 % was carbonized" (Miksicek 1987: 221-222). Carbonization, hence the likelihood of seed preservation in mesic contexts, is influenced by proximity to a heat source which, in turn, is influenced by how seeds were used and/or discarded. For example, seeds consumed as a part of eating a fleshy fruit would have less of a chance to be introduced to a heat source and carbonize, than the accidental burning of maize kernels while roasting an ear or the partially digested grains contained within animal dung that was burned as fuel.

The culturally dependent phenomenon of proximity represents only a portion of the preservation equation. The ability of plant materials to carbonize is dependent on phenomena such as thermal intensity, length of exposure, the presence of oxygen, and moisture and chemical contents. A number of researchers have experimented with the carbonization process (for examples, see Wilson 1984; Wright 2003; Margaritis & Jones 2006; Braadbaart et al. 2007; Markel & Rosch 2007). Wilson (1984) and Wright (2003) observed that a particular seed accidentally subjected to a high temperature for a very short time may differ in distortions or degree of degradation than one exposed to a lower temperature for a longer time. Markel and Rosch (2007) and Wright (2003 & 2008) noticed differences in the survival of oily versus starchy seeds: oily seeds may have less of a chance of fully carbonizing at lower temperatures than their starchy counterparts. Carbonization can impact the shape and dimensions. For example, Wilson (1984) and Wright (2003) found that there is less size change in drier seeds than in moisture specimens. The potential impact on size has ramification when researchers rely on lengths, widths, and diameters of seeds to determine if a plant remain reflects a wild or a domesticated species (see Braadbaart & Wright 2007).

Carbonization and postdepositional processes can reduce seeds and fruits to simpler structures, as seed coats, embryos, and endosperm are

disarticulated (Pearsall 2000). Mechanical damage due to a host of natural activities such as freezing and thawing, gravity, rodent gnawing, and so on can thoroughly destroy seeds or render them unidentifiable. Seed coats, which are often an important to identification, can be lost, blackened during carbonization, highly eroded when desiccated, and distorted or lost in the event of water-logging (Pearsall 2000). Even the methods used to recover the seeds can impact whether or not the seed will be preserved in an identifiable state as a part of the archaeological record as the wetting of remains during flotation can cause increased splitting and damage seeds that will impact recovery rates (Wright 2005).

Seeds recovered from archaeological sites as well as the associated documentation (e.g., analytical forms, reports, images, and so on) need to be conserved for future reference. Unfortunately, little has been written in the archaeological literature about this topic. Conservation of archaeological remains recovered from marine contexts is perhaps the most researched and published in the archaeological literature. One of the more crucial tasks is the removal of salts from any seeds or other plant materials excavated from salt-water deposits. The Conservation Research Laboratory at Texas A&M University provides details about how to conserve all kinds of archaeological remains recovered from such contexts (see http://nautarch.tamu.edu/CRL/conservationmanual/File1.htm).

Governments, museums, and other professional organizations provide guidelines for conserving organic materials. For example, the U.S. Department of the Interior, National Park Service provides free, online leaflets, referred to as "Conserve O Grams," that treat preservation issues of all kinds of remains including organic materials like seeds. Phenomena to avoid when storing seeds include excessive heat, direct sunlight, radical changes in temperature and humidity, atmospheric pollutants, and pests as all of these can be deleterious. Collections should be regularly inspected to detect and record deterioration of the seeds themselves or of associated labels, containers, and/or archival documents. Also appropriate are procedures used by herbaria. Courses like that offered by the Brooklyn Botanic Garden in conjunction with the Royal Botanic Gardens, Kew, where international and institutional standards of curating plant materials at herbaria and ideas about promoting collections of plant materials to scientific and lay communities are discussed, can be useful sources of information in the curation and conservation of archaeologically recovered seeds.

Cross-References

- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ International Council of Museums (ICOM)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Paleoethnobotany
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes

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Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

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Introduction and Definition

At the time of Alexander's conquest, Iran and Mesopotamia had been regions of ancient civilization that possessed a multi-millenary history of contacts, exchanges, and conflicts, and they had been part of the Achaemenid Empire for two centuries. With the conquest of Babylon by Cyrus the Great in 539 BCE, Mesopotamia lost its political independence, becoming part of a multinational empire that had its center in Iran, homeland of the ruling dynasty. Nevertheless, thanks to its key geographical position and to its rich agricultural resources, the region still played a very important role within the empire. The city of Babylon was cited by Herodotus as one of the royal residences of the Achaemenid kings, together with Pasargadae-Persepolis, Susa, and Ecbatana.

By choosing Babylon as the capital city of his empire, Alexander shifted the axis of the political power from Iran to Mesopotamia. A few years later, in 311 BCE, Alexander's general Seleucus – satrap of Babylonia from 321 to 315 BCE – moved from Babylon with the aim of conquering what was going to be the largest of the Diadochi kingdoms, first annexing Media and Susiana. The centrality of the area was confirmed by the Arsacids, the Iranian dynasty that succeeded the Seleucids in the rule of the Eastern part of Alexander's Empire. They set up their capital in Ctesiphon, which was opposite the Greek metropolis of Seleucia on the Tigris. Ctesiphon also retained its role as capital under the

Sasanians, who displaced the Arsacids in the early third century CE.

From the Achaemenid time on, the political destinies of Mesopotamia and Iran were closely linked; for over a millennium, they were part of complex state structures, characterized by the coexistence and – with different nuances depending on different periods – by the transmission and assimilation of artistic and cultural features of various origins. It was the conquest of the Persian Empire by Alexander the Great that especially opened the Near Eastern and Central Asian territories to Greek culture and led to an extraordinary process of encounter and exchange with the local cultures. The available archaeological data enable one to recognize the significance of this process and to observe some of its results, but unfortunately it does not enable one to follow step by step every single phase of it. Because of their political and cultural centrality, Iran and Mesopotamia must have played a key role in the intercultural dialogue between the Greek culture, the Iranian element, and local traditions; in spite of this, the archaeological documentation coming from these areas is far from being complete.

Key Issues/Current Debates/Future Direction/Examples

The Seleucid Period

The archaeological documentation from the Seleucid period is particularly scanty. In the case of Mesopotamia, the lack of data is at least partly due to the difficult political situation suffered by Iraq in the last 20 years, which has resulted in a necessary reduction if not an almost complete lull in the field activities. This situation has been partly counterbalanced by recent developments in historical research that has offered a more articulated picture of the administrative, social, and economic reality of the Seleucid Empire through its growing attention to the local sources.

In spite of the systematic investigation conducted during the last century on the site of Seleucia on the Tigris, the Seleucid court art and architecture still remain unknown. In fact, 20 archaeological campaigns carried out by the University of Michigan and by the Centro Scavi di Torino only affected a very small portion of the entire surface of the city, which encompasses a surface of about 550 ha on the right bank of the Tigris, approximately 30 km south of Baghdad. Moreover, the Seleucid levels were reached only in some of the investigated areas. Seleucia was founded in the last years of the fourth century BCE by Seleucus I; its location – close to the mouth of the Royal Canal and the outlet of the Diyala Valley – was highly strategic for the communications between the western territories and the far eastern lands of the empire via the Iranian plateau. The city master plan probably falls under the foundation period. The urban layout was organized in accordance with basically Greek planning principles; the main public buildings are concentrated in the northern part of the city, where wide open areas divide the regular grid of rectangular blocks. These are the largest in the Hellenistic world, with an extension of 144.70 × 72.35 m, and they are bound by streets intersecting at right angles. A larger street running along the southern limit of the urban perimeter and a ship canal cutting it in two halves are the main street axes. On the northern limits stood the theater, a major institution in a Greek city. The massive remains of its mud-brick substructures, enclosed later in a Sasanian watchtower, form the artificial mound of Tell ‘Umar that dominates the archaeological area of the city. Immediately south of the theater, the agora is an open area with a long, rectangular shape. On the east wing of the square stands a stoa; the west wing is occupied by the public archives hosted in a building destroyed by fire in the last quarter of the second century BCE and never rebuilt.

The Greek character of Seleucia is hardly surprising. The city was a royal Macedonian foundation, and it was conceived as the eastern capital of the empire. What is remarkable is the ability to adapt Greek features to a different geographic and cultural context, as shown by the huge size of the city, by the presence of a ship canal as a main street axis or by the use of mud brick for the civic theater. Moreover, some data points to the coexistence of different architectural

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 1 Seleucia on the Tigris. Clay sealing with portrait of the Seleucid king Demetrius II (Photo archive Centro Scavi Torino)

traditions; in the agora, a stoa, an edifice with a strictly codified Greek plan, is opposite a building that hosted the archives and whose plan offers analogies with Mesopotamian temple precincts (Messina 2007: 60–3). Also the seal impressions found inside the archival building testify to the complex cultural life of Seleucia. Over 11,000 figured seals offer an overview of the different features of artistic production that existed in the Seleucid period. Hellenistic style and iconography predominate; particularly noteworthy is the large set of representations of Greek gods and the portraits of the Seleucid kings, some of which are true masterpieces of the Hellenistic glyptic (Fig. 1). Besides Greek subjects, one can still find a little but significant number of pre-Hellenistic patterns, both of Mesopotamian and Greco-Persian origin (Invernizzi 2004).

The coexistence – in different proportions – of Greek and local elements appears to be a common feature of the main cities of Seleucid Mesopotamia. With the foundation of Seleucia, Babylon lost its dominant position in terms of internal and international politics. However, it was still an important regional center, as testified by textual sources and archaeological remains. The first phases of the theater, which is located in the northeastern sector of the city known as Homera, may have dated to the last years of the fourth century BCE. The mud-brick cavea leans on an artificial mound formed by debris coming from other areas of the city. The presence of a theater fits well within the framework of the city, whose Greek community was organized as a polis. On the other hand, textual documents and archaeological data both attest continuities in the use of pre-Hellenistic buildings, from the royal palaces to the temples. The texts record Seleucid royal activity in the sanctuary of Marduk. The active role of the Seleucid kings in the religious life of the main Mesopotamian centers – which is clearly testified by the well-known cylinder of Antiochus I from Borsippa, the last known royal inscription written in cuneiform – coheres completely with the political attitude of the new rulers. These were respectful to the different cultures of their composite empire inasmuch as they were particularly concerned with the accomplishment of the duties connected to Babylonian kingship.

The continuity of traditional religious practices is even more evident in the case of Uruk, the most ancient center of Southern Mesopotamia. The main temple complexes of the city – the Bit Resh and the Irigal – were constructed and renovated according to the traditions of Babylonian religious architecture, both in terms of plan and decoration. In charge of the works in the Bit Resh was the governor of Uruk, a member of the Anu-uballit family who received the Greek name of Nikarchos from the king Antiochus II. Subsequent works were undertaken by another member of the family, Anu-uballit Kephalon, governor of the city under Antiochus III. The fact that the local ruling elite was closely connected to the royal dynasty is attested by the royal practice of conferring Greek names on its members; moreover, such important works as the ones carried on in the Bit Resh sanctuary had to enjoy direct or indirect royal patronage. Even Uruk, in spite of its strongly conservative character, shows important traces of Greek cultural presence, as demonstrated by the exceptional discovery of the two

tumuli of Frehat en-Nufegi. In this case, both the funerary practices and the grave goods – which include golden wreaths and iron strigils – are completely foreign to the Mesopotamian milieu and point to the Greco-Macedonian world (Pedde 1991).

If we look at the material culture, the relation between Greek and Mesopotamian tradition seems to go beyond the simple coexistence of features of different origins. In the case of the pottery production, the extremely rich documentation shows that already in the Seleucid period Mesopotamian craftsmen freely employed local techniques – such as glazing – to produce vessels inspired by western shapes. Unfortunately, the thousands of terracotta figurines found in Central and Southern Mesopotamia do not provide precise indications on the first phases of the encounter between Greek and Mesopotamian traditions; examples certainly dating to the Seleucid period are too rare to be informative about the tendencies of the coroplastic production of that époque. Some representations of gods on the seal impressions from Seleucia stand out in that respect, for their western iconography is enriched with Mesopotamian features that allow one to offer a twofold Greco-Mesopotamian interpretation: Athena-Nanaia-Artemis with a helmet, crescent, and torch and Apollo-Nabu with an arrow-stylus in the hand and both a crescent and a tablet in the field.

Archaeological data coming from Northern Mesopotamia is very scanty and seems to suggest a contraction of the settlements in the area. At Nimrud, traces of a third-/second-century village were found in the area of the Ezida. At Nineveh, surface pottery finds that can be closely compared with the materials from Nimrud possibly indicate a Hellenistic occupation of the area east of the citadel. Besides, some epigraphic evidence point to a potential Seleucid origin as regards the organization of the city as a polis (Reade 1998).

French excavations carried out since 1986 at Dura-Europos, a Macedonian foundation on the northwestern corner of Mesopotamia, shed new light on the early history of the site. The city, with its Hippodamian plan and its powerful fortifications, is now dated to the latest phases of Seleucid rule, around the middle of the second century BCE. In early Seleucid times, the site was only the place of a stronghold established on the citadel in order to control the route connecting the two capital cities of the empire, Antiochia on the Orontes and Seleucia on the Tigris. Beyond the southern limits of Mesopotamia, the island of Failaka, near the head of the Gulf, was the seat of a small Hellenistic settlement dating from the end of the fourth to the second century BCE. Both the material finds from the excavations – namely, the pottery and the terracotta figurines – and the epigraphic evidence point to the coexistence and mutual exchanges of Greek and non-Greek elements.

The archaeological data from Mesopotamia allows one to recognize some of the cultural dynamics generated by the encounter of Greek culture and local traditions; by contrast, the information coming from Iran is too fragmentary to enable the creation of a general interpretative framework. The historical sources attest the interest of the Seleucid rulers in Iran. As already mentioned, in 311 BCE Seleucus I started to build his empire by annexing Media and Susiana. Moreover, Seleucid rule in Iran was consolidated by new foundations, by the refounding of old cities, and by the establishment of garrison sites. Unfortunately, the pattern of the Seleucid settlements in Iran has largely been lost, and many of the foundations quoted by the written sources have not yet been identified on the ground. The archaeological remains of the Seleucid period are not homogeneously distributed on the Iranian plateau; on the contrary, they are mainly concentrated in the western regions, namely, Media and Susiana, which were areas of great economical and strategic importance for the ruling dynasty. In the heart of Media, close to Nihavand, the Greek city of Laodicea was founded. A stele found on the site bears a double Greek inscription – dated to the reign of Antiochus III – that identifies the city as a Greek polis and testifies to the spread of the Seleucid dynastic cult in Iran. At Bisutun, on the route connecting Mesopotamia to the Upper Satrapies, there was a Greek sanctuary dedicated to Heracles. To the sanctuary belonged the well-known high relief depicting the reclining

hero, with an inscription dated to 148 BCE. Further north, in Media Atropatene, a Seleucid garrison was established on the site known as the Karafto Caves (Kuhrt & Sherwin-White 1993: 72–81).

The city of Susa was refounded as a Greek polis under the name of Seleucia on the Eulaios. Not much data concerning its Seleucid phases is available. The site was an object of systematic exploration by French archaeologists from the end of the nineteenth century on, but the documentation concerning the recent phases suffered neglect from the lack of interest of the first archaeological missions. A recent reexamination of the data collected in almost a century of excavations has led to the conclusion that the city was not densely populated in the early Seleucid period. The Greek presence became more manifest starting from the second half of the third century BCE. In the meantime, the city underwent a strong commercial development that reached its peak in the period between the end of Seleucid times and the first century CE (Martinez-Sève 2002a). From the excavations of Susa come many terracotta figurines – generically dated to the Seleucid-Parthian period – whose iconography and style represent an original synthesis of local traditions and Greek influences. The presence of types from the coroplastic repertoire of Susa in other sites of Susiana and Elymais testifies to the cultural influence exercised by the city between the Seleucid and the Parthian periods. A fragment of a bronze statue possibly depicting a Seleucid king found in the little sanctuary of Shami, in Elymais, suggests that the sacred area was already in use in the Seleucid period.

In Fars, homeland of the Achaemenid dynasty, the Achaemenid heritage has been evident for a long time, and the reuse of previous buildings was a common practice; at Pasargadae, the archaeological data points to continuity between the Achaemenid and the Seleucid phases. The interest of the new ruling dynasty in the area is evident in the foundation, probably by Antiochus I, of the city of Antiochia Persis, whose localization on the ground is still debated. Fragments of marble statues of Hellenistic taste – some of which are considered to be imports from the eastern Mediterranean – were found in different sites of the region (Callieri 2007). On the whole, the number and variety of the archaeological remains support scholars' quite recent reassessment of the end of the Seleucid rule in Fars. On the basis of the coins minted by the first local rulers, the *frataraka*, the end of the Macedonian control of the region has been shifted from the beginning of the third to the beginning of the second century BCE.

The Parthian Period

141 BCE marks the beginning of Parthian rule in Mesopotamia. This was when the city of Seleucia on the Tigris was taken by Mithridates I, founder of the Arsacid Empire. The attempts of the Seleucid king Demetrius II and his successor Antiochus VII to regain possession of Mesopotamia were in vain and ended with the defeat and death of Antiochus VII in 129 BCE. During the reign of Mithridates II (123–88 BCE), who consolidated the empire, Parthian rule stretched from Central Asia to the Euphrates.

The starting point for the conquests of Mithridates I was Parthia, a region of outer Iran that had been under Arsacid control since the second half of the third century BCE. In Parthia, at the feet of Kopet Dagh mountains, Mithridates I founded Old Nisa/Mithradatkert: not an ordinary seat of the Arsacids, but the center of their dynastic cult. The site is of a primary importance; from Nisa comes the only available evidence of Arsacid court art and architecture, as the royal residences of the Parthian rulers have been so far unknown. The buildings brought to light by Soviet, Russian, and Italian excavations (Pilipko 2001; Invernizzi & Lippolis 2008) conform to the Iranian architectural traditions of Central Asia in their recurring use of centric layouts, organized around a central space and surrounded by perimetral rooms and/or corridors. The architectural decoration features patterns of Greek origin that have been freely adapted to the different exigencies of mud-brick architecture; this is the case, for instance, with the terracotta assembled capitals. The influence of Hellenistic culture is definitely stronger in the works of art. If the marble

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 2 Old Nisa. Fragmentary clay head of Mithridates I (Photo archive Centro Scavi Torino)

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 3 Old Nisa. Ivory rhyton n. 43 (Photo archive Centro Scavi Torino)

statuettes and some of the metal figurines are purely Hellenistic works, the monumental clay statues – unfortunately badly fragmentary – possess western features that find expression in a technique which is meant to bring great fortune in Central Asia, as demonstrated by Kushan and Greco-Buddhist clay sculptures (Fig. 2). The 48 ivory rhytons found in the Square House are the extraordinary result of a synthesis of Greek subjects, Iranian elements, and local tastes and traditions. The drinking horn, a type of vessel widespread in Iran and Central Asia, is enriched with a decorative apparatus dominated by western themes and iconographies, alongside which we can find oriental patterns (Fig. 3). All of the Nisean finds contribute to underlining both the philhellenism of the first Arsacid kings and the ability of local artists to re-elaborate cultural influences of different origins. In fact, the synthesis of Greek, Iranian, and local traditions is a common trait of much of the archaeological evidence from the Parthian period.

Greek culture still maintained a considerable influence at Seleucia on the Tigris. Under the new rulers, the city kept flourishing through its commercial activities and retained a high degree of political and administrative autonomy. This status, however, changed after a revolt of the Seleucian inhabitants in the first century CE. The Arsacid kings were aware of the strategic importance of the site; opposite Seleucia, on the left bank of the Tigris, they founded Ctesiphon, capital of the empire from the first century CE, whose Parthian phases have not yet been identified on the ground. In the area of Seleucia-Ctesiphon – named by the Arabic sources al-Madain, "the cities" – urban settlements flourished up to the Islamic period.

The development of Seleucia in Parthian times respects the outline of the Seleucid layout. Important public buildings, such as the theater, are maintained. By contrast, in the agora dwelling houses and workshops are built on the remains of the archival building and the stoa. The excavation

of a dwelling block in the southern half of the city illuminates the emergence, between the first and the second century CE, of a new architectural feature that characterizes civil and religious Mesopotamian architecture of the first centuries CE: the iwan, a large rectangular room open to one short side. The coroplastic repertoire from Seleucia gives us a reflection of what probably was the richness of the artistic production of the city. Over 11,000 terracotta figurines brought to light by excavations are the product of a sustained process of interaction and synthesis between Greek and Mesopotamian culture that led to new and original results. New western iconographies, styles, and techniques stimulated the renewal of subjects and practices that had persisted for millennia. Very ancient Mesopotamian subjects, such as rigidly standing naked women, coexisted with western subjects, such as women in Greek dresses, reclining figures, and children (Fig. 4). These were all freely reinterpreted according to local taste and sensitivity. This process resulted in the creation of a new and original iconographic and formal language that characterized the coroplastic production of Seleucia and spread throughout the repertories of Central and Southern Mesopotamia.

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 4 Seleucia on the Tigris. Terracotta figurine showing a draped woman (Photo archive Centro Scavi Torino)

Continuity with the Seleucid phases and the strength of local traditions, together with the intensity of intercultural dialogue and the creation of new artistic solutions, are features that Parthian Seleucia shares with the other regional centers. The persistence of ancient local customs is demonstrated by the burial practices. Even though extramural cemeteries are attested, intramural burials appear to have been the norm, both in inhabited dwelling houses and in abandoned areas of the city. Various types of inhumation included simple ditch graves, jar burials, backed brick graves, and vaulted tombs with loculi. Glazed ceramic "slipper coffins" were a particularly distinctive type that was popular in Central and Southern Mesopotamia during the first to the second century CE.

The urban layout of Babylon shows elements of continuity with the previous phases. The theater remained in use until the second century CE; it was accompanied by an adjacent peristyled building variously interpreted as a gymnasium or an agora (Fig. 5). In the Merkes, an area whose occupation goes back without interruption to the neo-Babylonian times, the Parthian houses follow the same plans already in use in the Seleucid period; they are characterized by a peristyled courtyard. On the contrary, during the Parthian period, the big sanctuaries were progressively abandoned. At Babylon, there is no archaeological evidence showing continuity in the use of the Esagila, even though some texts indicate that the sanctuary was still in use in the early Parthian period. A cuneiform tablet from Uruk dating to 108 BCE demonstrates that the Bit Resh and the Irigal were in use at that time. However, both sanctuaries were later destroyed by fire and dwelling areas were situated on their remains. At Uruk, the temple of Gareus provides

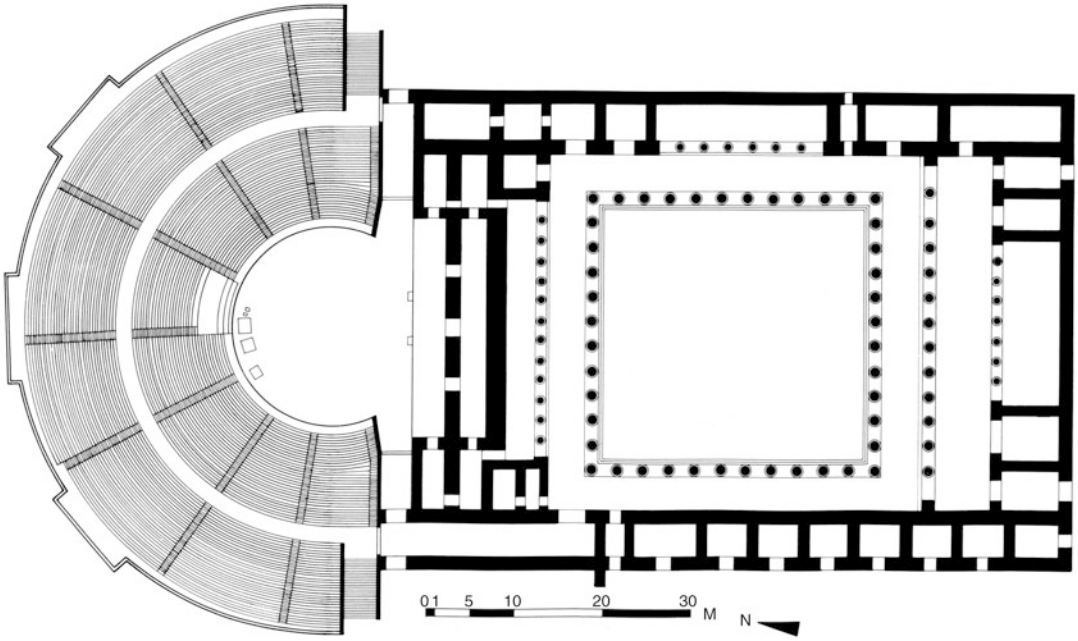

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 5 Babylon. Plan of the theater (Graphic elaboration Claudio Fossati)

a sample of the religious architecture of Parthian period. Its interior follows a plan of Babylonian type, with a forecella and a cella of equal breadth; by contrast, the decoration of its outer walls freely employs architectural details of clear western influence.

The original synthesis of different cultural influxes shown by the temple of Gareus is a common feature of many architectural remains from Northern Mesopotamia. During the Parthian period, this area experienced a great development, as testified by the growth of urban settlements. Parthian-era Assur covered more or less the same extent of the ancient city, and this old Assyrian capital has provided substantial architectural evidence. The persistence of old religious practices is testified by the rebuilding of the Bit Akitu on its old plan. On the contrary, the so-called Peripteros is a combination of very different features; the nucleus, which consists of a broad forecella and cella of Babylonian origin, is preceded by an *iwan* on the façade and a peristyle that surrounds the back and the sides of the building. Likewise, a multiple *iwan* temple is built on the ruins of the old Assur temple. This peculiar feature also recurs in residential architecture, as shown by the palace of Assur; a large *iwan* opens to each side of its central courtyard. The stuccoed decoration of the courtyard's façades was organized in three registers of slender engaged columns that framed niches.

Many of the features evidenced for Assur recur in the architecture of Hatra, the main center of the Jazira. Located on a frontier zone between the Parthian and Roman empires, the city was governed by Arab rulers, while being under the Parthian political sphere of influence. The archaeological data elucidates its extraordinary development in the late Parthian period, between the second and the first half of the third century CE. The heart of the city was the sanctuary dedicated to the sun god Shamash, and its sacred precinct enclosed many temples. Whereas the temple of Maran – rising on a high podium and surrounded by a double peristyle – recalls Romanized Syrian temples, the *iwan* is the dominant feature of almost all the temples built on the western part of the *temenos*. Particularly outstanding is the "Great Iwan" complex, a series of juxtaposed iwans with a number of subsidiary

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 6 Hatra. The Great Iwan complex from southeast, detail (Photo Antonio Invernizzi)

rooms. Its façade, 115 m long, is dominated by arched openings that are framed by richly sculpted archivolts and separated by high engaged columns (Fig. 6). On the contrary, some of the small shrines built outside the sacred precinct, in the dwelling areas, show plans analogous to earlier Mesopotamian religious architecture.

Besides architecture, the city of Hatra has left us a large body of evidence for figurative arts. These include reliefs and statues depicting gods and members of the city elite involved in ritual acts or in devotional attitude. These sculptures are characterized by the strict frontality of the poses, the descriptive taste in the careful rendering of decorative details, and the paratactic organization of the figured scenes. In his essay *Dura and the Problem of Parthian Art*, which focused on the figurative documents from Dura-Europos and was published in 1935, M. Rostovtzeff identified these features as main principles of Parthian art. Thanks to the availability of further artistic evidence from the Parthian world, today we can say that the above-mentioned principles define an artistic tendency that developed in the late Parthian period, has been attested in different areas of the empire – namely, Northern Mesopotamia and Elymais – and spread even beyond its geographical and chronological limits. In fact, Palmyra – whose figurative production shares common traits with the Duran and Hatrean art – falls within the Roman cultural and politic sphere of influence, and many of the mural paintings from Dura-Europos are dated after the Roman conquest of the city. Moreover, some artifacts from Northern Mesopotamia seem to suggest the contemporary presence of different artistic tendencies, even in the same area; this is the case of the statuette of Heracles Epitrapezios from Nineveh, which dates to the second century CE and was strongly inspired by western models. As regards Central Mesopotamia, the above-quoted terracotta figurines from Seleucia offer another different perspective concerning figurative arts in the late Parthian period. In the light of that complexity, a recent essay has pointed out the necessity of a diachronic rereading of the figurative materials of the Parthian period for tracing a history of Parthian art (Invernizzi 2011).

Similar complexity also characterizes the Iranian archaeological remains. The material culture of Iran in the Parthian period is marked by strong regional features and significant gaps in the archaeological documentation. It is nonetheless possible to recognize some of the cultural traits already highlighted within the Mesopotamian context.

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 7 Hung-e Azhdar (Khuzestan). Rock relief (Photo courtesy Centro Scavi Torino and Iranian Center for Archaeological Research)

The strength and variety of local traditions are verified by the different burial practices attested in the various areas of Iran: jar burials in the north, rock tombs in Media, cairn burials in Fars and in the southeast, and vaulted tombs at Susa. In regard to the architectural remains, the temples built on the sacred terraces of Bard-e Neshandeh and Masjid-i Sulaiman, in Elymais, are indebted to Iranian and Near Eastern building traditions. Particularly, the temple of Bard-e Neshandeh – with its portico on the façade and the central, four-columned room surrounded by shallow, rectangular spaces – perfectly fits with the Iranian and Central Asian architectural traditions already mentioned for Old Nisa. Features of Iranian origin – the portico and the circumambulatory corridor isolating the inner spaces of the building – also recur in the Great Temple of Masjid-i Sulaiman, which otherwise show a connection with Mesopotamian religious architecture through its possession of a forecella and cella unit behind a court (Downey 1988: 131–6).

The materials from Parthian-era Susa testify to continuity with the Seleucid phases; epigraphic evidence – still written in Greek – attests the persistence of Greek traditions and institutions. The western influence is evident also in the figurative arts; besides the above-quoted terracotta figurines, which are generically dated to the Seleucid-Parthian period, some fragments of stone sculptures that include a well-known female head with a Greek inscription on the crenelated crown are worth mentioning. In the sculptural production from Susa, iconographies inspired by Hellenistic art coexisted with purely Iranian types, such as men in Parthian dress that closely recall – in spite of the difference in size and material – the famous bronze statue of the Parthian prince from Shami. Hellenistic culture left a clear mark on the plan of Ecbatana, a former Median and Achaemenid capital. Recent excavations have demonstrated that the regular grid of the city dates to the Parthian period. Likewise, the palace of Khorheh in the central Iranian plateau, with its slender columns with Ionic capitals, has been interpreted in the past as a Seleucid temple, but it was founded in Parthian times.

The stuccoed decoration – already seen in Mesopotamian architectural decoration – is a distinctive feature of the palace of Qaleh-i Yazdigird. This palace dates to the late Parthian era and is located on the westernmost slope of the Iranian plateau, not far from the Zagros gates that connect Iran and Mesopotamia. The extremely rich decorative patterns include not only abstract motifs and architectural elements but also figural motifs both of Greco-Roman and Eastern origin. The excavator of the palace also hypothesizes the presence of iwan chambers.

From Elymais comes an important series of rock reliefs that date from the first to the early third century CE, which is otherwise the time when the area was ruled by local dynasts. These reliefs, often carved on boulders, usually depict reclining figures, scenes of devotion, investiture, or homage to the prince; hunting scenes and riding figures are less common. The reliefs from Elymais are the product of a local, provincial

art. Nonetheless, they share meaningful stylistic features with the above-quoted artistic production of Syria and Northern Mesopotamia in the late Parthian period; they are characterized by frontality, paratactic distribution of the figures taking part in a scene, and descriptive taste in the rendering of the details (Fig. 7). These common traits were already highlighted in the late 1960s by D. Schlumberger, who explained their birth in different regions of the Parthian Empire by hypothesizing that they might have been reflections of the lost court art of Ctesiphon (Schlumberger 1970: 152–60).

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- ▶ Antioch, Apamea, and the Tetrapolis, Archaeology of
- ▶ Dura-Europos, Archaeology of
- ▶ Sasanian Empire, Archaeology of the

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Semiotics in Archaeological Theory

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Introduction

Archaeological interest in semiotics, or the study of signs, has a long history due to the centrality of interpreting "meaning" in the archaeological record. It has had particular currency with respect to questions of symbolism and style, two areas traditionally associated with the Saussurean language-based model of the sign that underlies structuralism. Its emphasis on linguistic codes and meanings also found favor among

archaeologists interested in terminological classification schemes and computer applications, especially the use of artificial intelligence modeling. The limited interest in structuralism or even symbolism within Processual archaeology, on one hand, and the turn toward poststructuralist approaches within Post-processualism, on the other, however, reduced the overall impact of Saussure's structural semiotics in archaeology. In spite of this, semiotics has recently been undergoing something of a renaissance as archaeologists have turned to alternative semiotic models, in particular that of the American philosopher Charles Sanders Peirce, best known as being the founder of pragmatism. This entry presents an overview of the two main types of semiotics, that of Saussure and Peirce, and reviews their archaeological applications and key contributions and then closes with a discussion of the current and future prospects for semiotic approaches within archaeology.

Definition

Semiotics is the study of signs and the ways in which they convey meaning. The term comes from the Greek word *semeion* ("sign") and has been the focus of philosophical debate since Plato. At the heart of such debates is the question of how well signs – and most often linguistic signs, or words – represent reality or truth in the world, and what the precise relationship is between the sign or *that which represents* and idea or thing *being represented* by the sign.

The two most influential approaches to semiotics were both developed around the turn of the twentieth century: those of French linguist Ferdinand de Saussure (1857 – 1913) and American philosopher Charles Sanders Peirce (1839–1914). Saussure's has had a lasting effect on anthropology and, to a lesser extent, archaeology, since its adoption as the foundation of structural analysis by Claude Lévi-Strauss. Peirce's approach, largely ignored for the half-century following his death, has more recently found favor in both anthropology and archaeology.

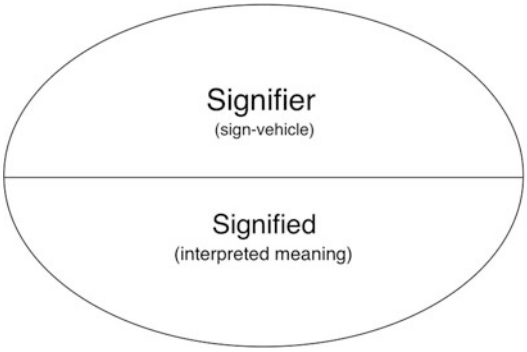

Semiotics in Archaeological Theory, Fig. 1 Saussure's model of the sign

Saussure termed his approach *semiology* and though he acknowledged that nonlinguistic signs such as rites and customs act as signs, he focused mainly on linguistic signs as he felt those were the most complex types of signs. Understanding a language system could thus provide insight into all other dimensions of a culture. In Saussure's model, the sign is the fundamental unit of analysis and consists of two interrelated components, the "signifier" (*signifiant*), or the form of the sign itself, and the "signified" (*signifié*), or the concept being represented by the signifier (Fig. 1).

For example, the word "tree" is the signifier for the concept of that thing with branches and leaves known as a tree. Two key points about Saussure's model follows from this: (1) the concept being signified is not the instantiated thing in the world, but rather the mental concept or idea of that thing and (2) the relationship of the signifier to the signified is arbitrary and based on a social/linguistic group's convention. There is no necessary relationship between the word "tree" and the concept it represents, as other languages have other words for the same concept, such as "arbre" in French and "ağaç" in Turkish. A complete language system depends on the interrelationship among its various words/signifiers, and the aim of linguistic analysis is to understand the structure and rules at the core of that system.

Peirce's *semeiotic* model differs from Saussure's approach in several ways. First, rather than accord special status to language, Peirce conceived of all things in the world, even thoughts and humans themselves as signs.

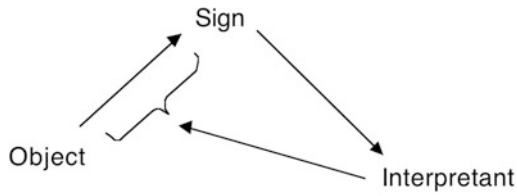

Semiotics in Archaeological Theory, Fig. 2 Peirce's model of the sign (after Parmentier 1994: 10)

To Peirce, words are only one particular (and quite limited) kind of sign. Second, and perhaps most important, Peirce's understood signs to be triadic, rather than dyadic in nature. Rather than consisting of a signifier that stands for a signified idea, Peirce understood the sign as "something which stands to somebody for something in some respect or capacity" (Hartshorne et al. 1938–51: 2.228). In other words, Peirce understood a sign to represent its "object," or thing out there in the world, for some interpreter of that sign. The resulting interpretation in the mind of the interpreter is itself a new sign, termed the "interpretant," which stands in triadic relation with both the sign being interpreted and the object that sign was meant to represent (Fig. 2).

In this way, Peirce both acknowledged that there is a physical world "out there" which impinges upon and constrains interpretation, while at the same time recognizing that any interpretation of the world is not direct but mediated through signs generated through the act of interpretation, interpretation itself being a sign. The implication of this is the third important difference with Saussure's model: that rather than being a closed "system," semiosis may be understood as continually unfolding in two directions, both by endlessly generating new signs in further acts of response and interpretation and by referring back to previous signs in the semiotic chain.

Historical Background

Saussure and Structuralism

Saussure's focus on codes and structures as being key to linguistic analysis was taken up in anthropology by Claude Lévi-Strauss (1963 [1958]) and formed the basis of his structuralist approach. He suggested that anthropology uses Saussure's framework to determine the binary logic of categories that constitute all aspects of social life. Through the analysis of the constitutive elements of various aspects of a society – its kinship terms, its myths, and its cuisine – Lévi-Strauss felt that the researcher could uncover the codes and "deep structures" underlying thought and behavior in a given culture.

While Lévi-Strauss had enormous influence in anthropology (though few will today claim that his results are either replicable or even reliable), structuralism's influence in archaeology was limited. While sharing some of the positivist goals of Processual archaeology, structuralism's emphasis on symbolism and meaning did not easily fit within the largely ecological framework of Processualism. Nonetheless, we can identify several ways in which Saussure's approach influenced archaeological thinking in the 1960s and 1970s.

The most direct archaeological engagement with Saussure's linguistic model and structuralism was that of American historical archaeologist James Deetz in his book *Invitation to Archaeology* (Deetz 1967). In that book, he advocates studying the elements of culture as signs and, taking up Saussure's approach explicitly, argues (1967: 87), "there may be structural units in artifacts which correspond to phonemes and morphemes in language... reflecting an essential identity between language and objects in an structural sense." He then coined the terms "factemes" and "formemes" as material correlates to Saussure's "phonemes" and "morphemes" as a way of categorizing specific artifact types in order to identify the grammatical rules underlying the relationships among them. Deetz's approach was taken up by several of his students, most notably in work by Mary Beaudry (1988) and Ann Yentch (1991).

Structuralism and its focus on grammatical categories have also been influential in analyses of artifact style and meaning. Dorothy Washburn's (1977) symmetry analysis of polychrome pottery design, for example, builds on the

idea that information is encoded within particular design elements like a linguistic code or grammar and that particular design structures displayed on painted pottery is therefore reflective of social interaction among pottery-making groups. Similarly, Hodder (1982a) drew on symmetry analysis and structuralist ideas about grammar in his study of Nuba material culture. At the same time, though, Hodder (1982b, 1986) raised important questions about the limitations of a structuralist approach and (along with his students) began a move away from it toward the discourse and text model of poststructuralist theorists such as Derrida, Ricoeur, and Foucault.

A final important application of Saussurean semiotics within archaeology is built upon the problem of grammar and terminological meaning to focus on how archaeologists themselves name and categorize artifacts and how differences in those terminologies can affect what kinds of archaeological knowledge are produced. This was the problem taken up by French prehistorian Jean-Claude Gardin (1980), whose work drew upon both Saussure's semiotics and elements of Peirce, mediated through the work of Umberto Eco (1976). Of particular concern to Gardin was the issue of how the language of archaeology could be standardized both for the sake of translation among scholars working in different languages and traditions, and for computational and artificial intelligence (AI) applications (Gardin 1987; Gardin & Peebles 1992).

In spite of these applications, a good deal of skepticism remained about the applicability to archaeology of Saussure's linguistic model (e.g., Hymes 1970) and structuralism in general (Wylie 1982). Part of the reason may be due to the poor fit between Processual archaeology and a semiotic approach that was largely concerned with interpreting symbols. More than that, however, is the fact that, as Hodder (1989: 73) argued, material objects depart from the Saussurean linguistic model because their meanings are often nonarbitrary, they are polysemous and ambiguous, and they have durability that spoken words do not.

Current Debates

Recent Engagements with Peirce

In spite of the important critiques of earlier (mainly Saussure-based) semiotic applications in archaeology, semiotics has recently witnessed a resurgence of interest, mainly due to the (re-)discovery of the semiotic writings of Charles Sanders Peirce (Preucel 2006). Peirce's anti-foundational approach (which inspired the philosophy known as pragmatism), coupled with his view that the meanings of signs are not fixed as in a code, but are continually remediated in the process of communication and semiosis, parallels critiques raised by Post-Processualism. At the same time, the growing popularity of Peirce among linguistic anthropologists concerned with problems of discourse and contextual meaning (e.g., Silverstein 1976; Parmentier 1994), as well as a new project dedicated to editing and publishing his entire corpus (The Peirce Edition Project, based at Indiana University), has made his work newly accessible to archaeologists.

Most critically, Peirce's semiotics addresses the very problems with material culture meaning identified by Hodder (1989). In his most oft-cited contribution, Peirce argued that most relationships between signs and the objects they represent are not "arbitrary" in the Saussurean sense, but necessary, and he typologized such relations as either "iconic," "indexical," or "symbolic." This distinction (and trichotomy) was the subject of the earliest archaeological references to Peirce (e.g., Conkey 1982 [via Jakobson, Sebeok, and Eco]; Chase 1991; Byers 1994; Deacon 1997), as most archaeological interpretation is grounded in iconic and indexical meanings (e.g., the distribution of artifacts, how things mediate social relations, how style and function are related to materiality). His semiotic model also offered a way to account for the seeming ambiguity or polysemy in a sign's meaning, since he argued that any given sign may variably function as an icon, index, or symbol, depending on the particular interpretation generated (what Peirce called the "interpretant") in the mind of the interpreter of that sign.

The first substantial engagement with Peirce in archaeology was by Preucel and Bauer (2001),

in which they argued that Peirce offered a way to deal with the problem of ambiguity in material culture meaning and provided a framework for not simply dealing with, but building a rigorous archaeology upon, seemingly incommensurable approaches to archaeological interpretation. Preucel followed this with a book-length treatise on the subject (Preucel 2006), and several of his students took up the challenge of applying Peirce to various questions in archaeology (Bauer 2002, 2013; Capone & Preucel 2002; Coben 2006; Cipolla 2008; Liebmann 2008). Since then, Peirce's ideas have been increasingly invoked, highlighting the broad potential of the approach in helping to answer questions of archaeological interest. While several have focused on epistemological issues (e.g., Knappett 2002; Lele 2006; Watts 2008), Peirce's model has also been applied to understanding material culture style and technology (Capone & Preucel 2002; Joyce 2007; Agbe-Davies 2010); architecture (Ferguson & Preucel 2005; Coben 2006), bodies (Crossland 2000), and religion (Aldenderfer 2011).

Peirce's ideas are particularly relevant to current discussions about materiality and the agency of material culture. As described above, Peirce argued that all signs (including material objects) actively mediate interpretation in the ongoing process of semiosis, effectively generating new signs (interpretants) as interpretive responses. This view intersects recent ideas about material agency, where objects are seen to play an active role and even demand certain actions through their very existence. But while those approaches seek to break down the barrier between structure and agency (Dobres & Robb 2000), and human and nonhuman agents (Knappett & Malafouris 2008), Peirce's model at its core avoids the Kantian dualism underpinning Saussure's model of the sign that these theories seek to transcend. Rather than focusing on how objects do or do not represent "reality," by adding the third dimension to the sign relation, Peirce instead focused on the act of interpretation itself, to consider the ways in which such interpretations about reality were made. This "pragmatic" approach was not meant to suggest that a real world didn't exist, but that it was not directly accessible in the interpretive act. Instead, what something "means" depends on what kinds of interpretations are being privileged in each moment of semiosis. Peirce's model thus offers a way to think through material culture's active and meditative role in social life, but from the perspective of an active interpreter rather than in the object itself.

International Perspectives

Outside of Anglo-American archaeology and anthropology, almost all engagements with semiotics draw upon Saussure's ideas, particularly since his work and ideas were widely disseminated (and critiqued) through the work of a number of important twentieth-century linguists and philosophers, including Louis Hjelmslev, Valentin Voloshinov, Mikhail Bakhtin, Roman Jakobson, and Umberto Eco. Voloshinov and Bakhtin raised important critiques of Saussure's emphasis on language structure at the expense of its experiential, dialogic qualities, criticisms that parallel Peirce's ideas about mediation, though it is unlikely that they ever read Peirce. Jakobson, a founder of the influential Prague School of Linguistics early in his career, both built on and departed from Saussure's model in his analysis of sound systems. After his move to the United States later in his career, he incorporated Peirce's ideas into his thinking, in turn influencing his student at Harvard, Michael Silverstein. Otherwise and until recently, most scholars outside the United States who have engaged with Peirce's ideas have done so through Umberto Eco's (1976) work, which builds on both Saussurean and Peircean approaches.

Gardin's (1980, 1987) work on the relation of language to archaeological terminology and meaning is perhaps the most internationally well-known application of semiotics in archaeology. Gardin's focus on the problem of translation in archaeology has been a particularly important question of how to transcend academic language barriers, which he attempted to address through the use of computer applications and AI modeling. In short, Gardin argued that if some universal

code for categorizing and describing artifacts were developed, scholars from different countries could share and compare data much more easily and without confusion in meaning. While some attempts have been made to employ Gardin's ideas, the issue of translation and artifact meaning remains a difficult problem in archaeology.

Future Directions

While semiotic perspectives that directly build on Saussure's writings have largely fallen out of favor in archaeology, his impact can still be felt in the numerous post-Saussurean approaches popular in contemporary social theory (particularly those of Bakhtin, Ricoeur, Foucault, and Bourdieu). Approaches that build on this work often still wrestle with the dualistic sign at the core of Saussure's system, seeking ways to transcend the objectivism assumed by its oppositional structure of meaning relations. Theories of agency and practice increasingly invoked in archaeology seek to highlight the recursive nature of structure and agency and thus see signs such as material objects as actively reinforcing, shaping, and challenging social life.

One potential impact of a Peircean semiotic approach is in laying the foundation for a pragmatic archaeology, one that is committed to understanding the various ways that individuals and cultures mediate their social lives through signs (Preucel 2006; Preucel & Mrozowski 2010). Such an approach is important for the epistemology and ethics of archaeology in the twenty-first century. In the aftermath of the Processual/Post-Processual debates of the 1990s, the diversity of interpretive approaches has expanded to the point that some fear an irreconcilable disciplinary divide. At the same time, indigenous and other perspectives are challenging many of archaeology's core assumptions and methods and demanding an archaeology that addresses a broader range of concerns. As a non-foundational approach, pragmatism offers a way to recognize and productively build upon multiple voices, perspectives, and ways of knowing the world in the interpretive process, and suggests that such disunity adds strength to our inquiries about the world. Moreover, as Preucel and Mrozowski (2010: 33-4) argue, a pragmatic archaeology is one that continually challenges current understandings and is open to new dialogues leading to "meaningful social action."

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Beaudry, Mary C.
- ▶ Deetz, James (Theory)
- ▶ Gardin, Jean-Claude
- ▶ Hodder, Ian (Theory)
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Post-Processual Archaeology
- ▶ Practice Theory in Archaeology
- ▶ Pragmatism in Archaeological Theory
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Structural Archaeology

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Sepphoris, Archaeology of

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Introduction

Sepphoris was a major ancient city located in lower Galilee, in what is today Israel. Most prominent in the Roman era, the city was located about 6 km from Nazareth. Sepphoris became an important commercial and political center in the first century CE, and likely due to this affluent economic status, its residents did not actively take part in the Jewish rebellion that took place from 66 to 70 CE. Ultimately, Sepphoris fell into decline during the Islamic era. In the twentieth century, largely due to its proximity to Nazareth, the childhood home of Jesus, the site attracted the attention of biblical scholars and archaeologists, and many excavations have taken place over the last several decades. Although never actually mentioned in the Bible, scholars have long sought to uncover any possible links that may exist between this ancient city and Jesus. In addition, ancient historians have maintained an interest in Sepphoris because of its prominent status in the Roman world.

Definition

Known in Hebrew as *Tzippori* (from the word "bird"), Sepphoris was a major Roman city located in lower Galilee that thrived from approximately the first century BCE through the seventh century CE. The name *Tzippori* is a reference to the city's prominent location perched upon the top of a hill (286 m above sea level) in the Beit Netofa Valley (Batey 2001). The city's location was also strategic due to the fact that it sat at the intersection of two major roads. Little is known of the city's early history prior to its rise to prominence in the first century BCE, although it is likely that the city existed much earlier. Archaeological evidence has been found dating as far back as the Iron Age. This evidence, mainly in the form of pottery fragments, is sparse. Scattered pottery sherds as well as vase fragments and a rhyton date from the Persian era (Chancey 2001). However, no firm architectural evidence has survived from this time period. Therefore, the city was likely functional, yet still small, during the Persian era. During the Hasmonean era, around 104 BCE, the historian Josephus notes that the city was attacked by an invading Cyprian king, Ptolemy Lathyrus (*Ant*. 13.338). This, in fact, is the first historical reference to Sepphoris by Josephus, and from this point on, the city is mentioned frequently in his histories. This suggests that Sepphoris was probably an established city by the first century BCE. However, it is only with Rome's ascension to power that Sepphoris rose to its greatest heights.

Several years after the Roman takeover of Palestine at the hands of Pompey, around 55 BCE, Sepphoris was elevated to the status of council seat (for the Sanhedrin) after a visit by the proconsul in Syria, Gabinius (*Ant*. 14.91). By this time, the city was probably largely Jewish and would remain so for the duration of its existence. There is no evidence to suggest a strong Roman presence within the government and everyday affairs of Sepphoris (Chancey 2001). Herod the Great retained the city during his reign (beginning in 37 BCE) until his death in 4 BCE. Upon his death, Jewish nationalists in Sepphoris revolted against the Romans, resulting in a legion being sent in to subdue the city (*Ant*. 17.271). Much of the city was destroyed as a result of the riots. Out of the ashes came a renewal effort instigated by Herod's son, Antipas. Hence, Sepphoris became a fortified, cosmopolitan Herodian city, and Antipas made it his capital until Tiberias replaced it some 20 years later. The city was rebuilt in a typical Roman grid fashion, with a main east–west street (*decumanus*) intersecting with a main north–south one (*cardo*).

During this period of growth and fortification, Josephus refers to Sepphoris as the "ornament of Galilee" (*Ant*. 18.27). It has been suggested that this phrase was only used when referencing strongly fortified and secure cities (Miller 1984). In the latter twentieth century, many facets of the ancient Roman city were uncovered, including a paved road system, a first-century villa, an aqueduct, cisterns, two marketplaces, a cemetery, and a theater. Population estimates for first-century Sepphoris range anywhere from about 10,000 to 25,000. Surveys conducted in the early twenty-first century suggest that several small "satellite" settlements may have sprung up near Sepphoris during the Roman and Byzantine eras, which indicate that the city's robust economy spurred the creation of small support villages nearby (Dark 2008).

During the Jewish revolt of 66–70 CE, most residents of Sepphoris, although mostly Jews themselves, chose a pacifist stance and did not fight against the Romans (*War* 2.574). Archaeologically, the most significant finds from this period are probably the pro-pacifist Roman coins, which date from the year 68 CE. The coins, minted in Sepphoris, were meant to honor the emperors Nero and Vespasian. Most noteworthy, however, was the inclusion of the Greek inscription "City of Peace" (Reed 2000). Also relevant is the fact that none of these coins exhibit a portrait of the emperor, suggesting a willingness to adhere to Jewish tradition, which forbids human images on coins.

Following the revolt, and despite Rome's victory, Sepphoris became a vital center of Jewish learning, as rabbinic texts indicate. The most famous Jewish tradition linked to Sepphoris was the belief that the Mishnah was recorded in the city by Judah Ha-Nasi early in the third century CE. Archaeological remains from the late Roman and early Byzantine periods are plentiful and point to a time of renewed building. This is especially the case in the late first and early second centuries. Revamped water systems, additional roads, an agora, and a Roman bathhouse have all been found, and the city became known in the Roman world as Diocaesarea. Some estimates have placed the size of Sepphoris in the late Roman era at about 35 ha (approximately 86.5 acres).

Yet the population of the city remained mostly Jewish, although Hellenistic and Roman influences may have become more prevalent at this time, as coins now bearing busts of the emperors indicate (Chancey 2001). In addition, Greek inscriptions have been found at Sepphoris dating from the late Roman and early Byzantine periods, further suggesting the presence of pagan inhabitants. Noteworthy archaeological finds from the Roman period include the discovery of a third-century basilica-like building (70 × 95 m) and a private residence (48 × 23 m) containing exquisite mosaics. The former structure, however, remains somewhat of a mystery regarding its function. The two most popular theories are that it was either part of a marketplace or it was an actual basilica. The latter structure has become known as the house of Dionysus, since many of the mosaics pertain to the life and cult of this Greek god of wine and fertility. Most noteworthy, the house of Dionysus contains a mosaic housing what has become known as the "Mona Lisa of the Galilee." This mosaic, found on the floor of the residence, contains the face of a beautiful, unknown woman. The discovery of the "Mona Lisa" has been called one of the "Ten Most Significant Finds" of the twentieth century by Biblical Archaeology Magazine, although some experts downplay the importance of this assertion (Fig. 1).

Sepphoris itself continued to thrive into the Byzantine era, despite earthquakes and periodic revolts. Remains of a fifth- to seventh-century synagogue have been found, containing a floor mosaic complete with a picture of the Zodiac. By this time, it was not unusual to find traces of Hellenistic influence in Jewish buildings, even synagogues. In addition, the remains of two churches have been uncovered on either side of the *cardo*. Christianity likely gained a foothold in Sepphoris by the fifth century (Miller 1984). In recent years, a second-century pagan temple has been found, suggesting that Jews, Christians, and pagans eventually inhabited the city together until the Muslim era. The most noteworthy structure found dating from the Byzantine era may be the Nile Festival building,

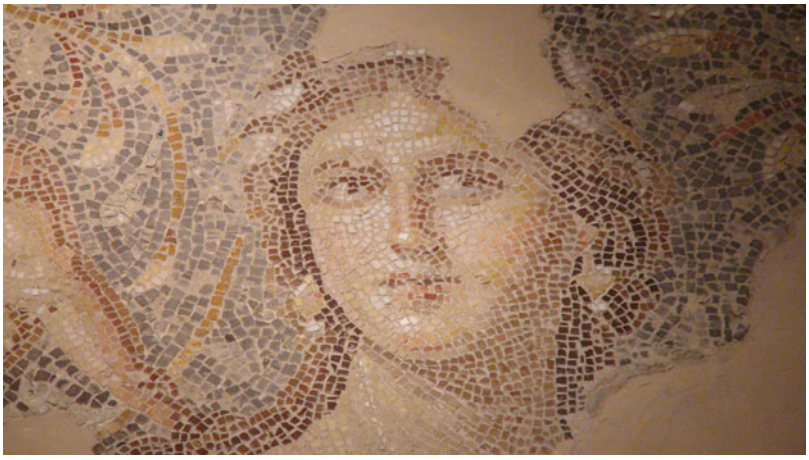

Sepphoris, Archaeology of, Fig. 1 Mona Lisa of the Galilee at Sepphoris

located east of the *cardo*. The mosaic found inside the building, known as the Nile Mosaic, is one of the most famous features of the archaeological site.

After the seventh century, Sepphoris declined as a city, due to many factors, including natural disasters and wars (Ward 2001). The city became known after its Arabian conquest as *Saffuriyya*. During the Crusader era, when Christians briefly inhabited the city, a watchtower was erected on the hill, which is still visible today. Ultimately, the city was under Muslim rule until the modern era. Worth noting is the fact that although in a state of decline, Sepphoris may be the only site in Galilee that was occupied from the Hasmonean era to 1948 (J. Strange *pers. comm.*, February 2012) (Fig. 3).

Key Issues/Current Debates

The earliest major archaeological excavation of Sepphoris was undertaken in 1931 by Leroy Waterman from the University of Michigan, who was looking for a link between the city and Jesus. Virtually no additional excavations were undertaken until 1983, when James Strange (University of Southern Florida) renewed the efforts. In 1985, a joint team from Duke University and the Hebrew University of Jerusalem under the direction of Eric Meyers and Ehud Netzer, respectively, began excavating the site. Since the 1980s, work at Sepphoris has continued. In the twenty-first century, a team from the Institute for Archaeology at the Hebrew University of Jerusalem under Zeev Weiss continues to dig and provide field reports from the site. Other universities also still excavate at Sepphoris. Some tombs from rabbis have recently been found, mostly northwest of the center of the site (J. Strange *pers. comm.*, February 2012).

Although never mentioned in either the Old or New Testaments, Sepphoris remains a relevant site for biblical scholars, historians, and archaeologists. Due to its proximity to the city of Nazareth, where Jesus lived for a time (6 km), Sepphoris has been studied with an eye toward the Bible. Most noteworthy, biblical scholars have debated the cultural and religious composition of the city. In particular, the conflict centered upon whether Sepphoris contained a Jewish, pagan, or mixed population in the early Roman era. Initially, claims were made that Sepphoris was a largely Hellenistic city that attracted the attention of Greek philosophers (Downing 1987). Others argued that the city was almost entirely Jewish. However, it is possible that Greco-Roman culture was not in itself incompatible with Jewish life and practice (Reed 2000). In other words, some aspects of pagan culture (i.e., artwork, decorations) could coexist side by side within a population that still adhered to the Jewish faith. Jews would have considered them to be ornamental only and not a threat to the faith itself. Yet the debate concerning the religious

Sepphoris, Archaeology of, Fig. 2 Synagogue floor (with zodiac) at Sepphoris

Sepphoris, Archaeology of, Fig. 3 Looking across the archaeological site of Sepphoris

nature of Sepphoris continued throughout the late twentieth century (Fig. 2).

At the dawn of the twenty-first century, the controversy seemed to peak over the issue of whether stepped pools (discovered on the western summit) were bathing pools or Jewish ritual baths (Heb. *mikva'ot*). A general scholarly consensus affirmed that they were indeed ritual baths (Meyers 2000; Chancey 2001). Additional archaeological evidence found at Sepphoris, including a lack of pig bones and the discovery of limestone vessels, has resulted in a predominating view that the city was primarily Jewish during the Roman era. James Strange believes that Sepphoris was almost 100 % Jewish, at least until the second century CE (J. Strange *pers. comm.*, February 2012).

One other archaeological feature is still being debated by scholars. A 4,500 seat theater was uncovered on the northern slope of the acropolis, and a controversy has emerged over the date of its

construction. It has been suggested that those attempting to link Sepphoris to the historical Jesus are biased toward an early first century date. However, other scholars refute this claim, dating the theater instead to the late first or the early second century (Charlesworth 2003). Such debates have served to keep Sepphoris at the forefront of archaeological dialogue today, and the city continues to remain a relevant site for historians and biblical scholars.

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Sequence and Date in Field Archaeology

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Introduction

For the field researcher, a primary task is assigning a date and a sequence (order of occurrence) to the features and structures they record. Occasionally an archaeological site has already been recorded in history, for example, the celebrated urban excavation at Five Points, New York City, exposed a plan of buildings and streets that had appeared on a map in 1855. Even sites mentioned in documentary references seldom offer a date as precise as this, and dated events which might *seem* to refer to an excavated site have to be used with great caution.

In general, very few objects, activities, or structures discovered by fieldwork can be given a precise calendar date, and archaeologists are obliged to build a *chronological model*, which balances all the available information (Fig. 1).

Key Issues

Dating Objects

As applied to objects, the methods at our disposal are *typology*, which offers a *relative dating* for artifacts (e.g., pottery) and structures (e.g., architecture). Typology uses the likely order of manufacture, based on form and style, combined with the dates given elsewhere. For example, pottery, one of the most useful of artifacts since it occurs widely and endures well in the ground, has an enormous range of types. Some periods of manufacture are known from kiln sites, but most are deduced from which types occur together; in this way archaeologists have built up extensive typologies that help to date every kind of site built by pottery users.

Artifacts may also be given an *absolute dating*, by scientifically measuring the *age of materials* they are made from. Well-known examples here include *radiocarbon dating*, which measures the age since the death of a living plant (i.e., wood) or creature (e.g., bone); *dendrochronology*, which measure the age of timber since it was felled, from the numbers and spacing of annual growth rings; *archaeomagnetism*, which measures the age of a hearth since it was heated; and *optically stimulated luminescence* (OSL) which measures the time that has elapsed since a layer of sand

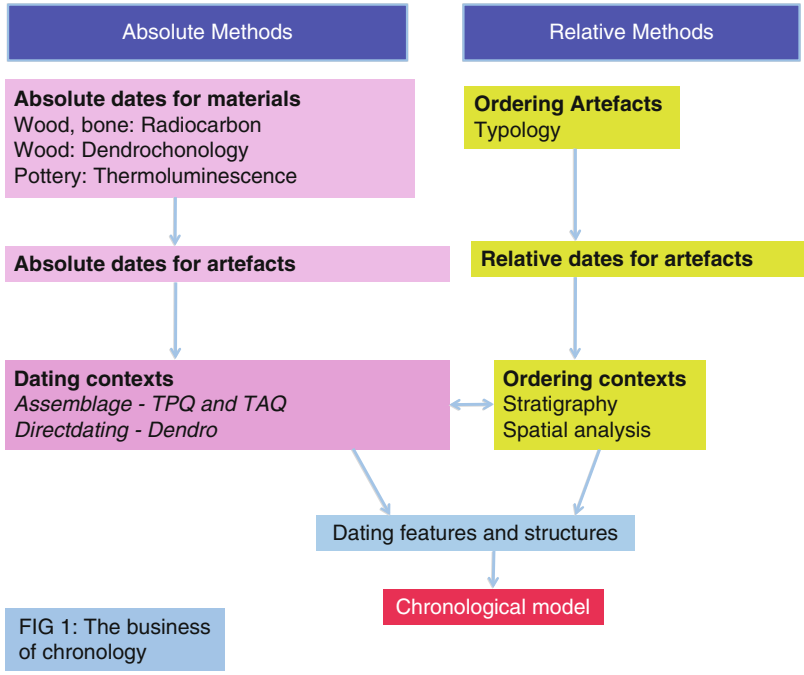

Sequence and Date in Field Archaeology, Fig. 1 The business of chronology (Carver 2009: 267)

was last exposed to sunlight (Hedges 2001). These dates, which have an error range from 1 year (dendro) to 25 % or more, indicate when an organism died or a mineral was buried.

Dating Contexts

Absolute and relative dates for artifacts, or groups of artifacts, can be used to date the archaeological layers they are found in – but the relationship is not a simple one. A layer is always deposited later than the latest object found in it, for example, a floor with a coin of 400 CE beneath it must have been laid in 400 CE or later (since the coin must have existed before the floor was laid). This relationship is called a terminus post quem (TPQ). A wall which has a date written on it (say 1929) must have been constructed before 1929. This relationship is called a terminus ante quem (TAQ). However, these equations are by no means always valid or helpful. A coin may be not just earlier, but centuries earlier, than the floor that covers it. A coin within a floor may be *intrusive* and so later than the floor. A coin found on top of a floor may be later than the floor, if dropped on it soon after manufacture and never moved, or much earlier than the floor if carried around for decades in someone's pocket. Similarly a coin or a potsherd found in a foundation trench is usually earlier than the wall in the same trench, but it may also be much earlier since it has been displaced – is residual – from an earlier phase or site. Since we rarely know the circumstances in which a coin was discarded, it is risky to use coins to date structures. They are at least very rarely contemporary. In spite of this, equating the date of a building with the date of the coins found in it remains a widespread practice.

Structures, features, and contexts may also be dated directly – by typology and by scientific dating. Typology may be applied to the shape of hearths or kilns, or the ground plans of houses, comparing them to others found elsewhere and so presuming that they can be assigned to the same culture and date. Absolute dating can sometimes be applied, for example, *dendrochronology* will date the timbers of a timber-framed house (Kuniholm 2001). However, it is frequently found that such a house, in the form it survives, is composed of structural timbers of different dates. Even the earliest of these may

Sequence and Date in Field Archaeology, Fig. 2 A vertical section through consecutive layers at the early monastic site at Portmahomack, Scotland (M. Carver)

have been recycled from another usage – for example, in a ship. *Radiocarbon* dating is applied to carboniferous materials, such as charcoal or bone, but here the association with the deposit is of crucial importance (Taylor 2001). The charcoal in a hearth may represent the date of last burning but only if it derives from twigs or animals. Otherwise the wood may have already have been cut down long before it was burnt (the 'old wood' effect). Similarly the bones in a grave should date the digging of the grave very well, but animal bone may have been disturbed and redeposited and so give a date before, perhaps long before the deposition of the layer in which it was found.

An important method applied by excavators to contexts, features, and structures is stratigraphic ordering. This does not date them but provides a *relative order* for each deposit in the overall sequence. The traditional method of presenting the order of occurrence is the section, which shows the deposition of layers from the side, and is recorded by drawing (Fig. 2), and these may still be valuable even if they only report the sequence in a specific slice through the strata. A more comprehensive method of stratigraphic ordering that applies to the whole site is the stratification diagram – which models the sequence in two dimensions, the earliest contexts at the bottom and the latest at the top (Fig. 3). These have developed from pioneer examples in the 1970s (e.g., Harris 1989) to more comprehensive models which include features and structures and represent uncertainties in the sequence (Carver 2009: 296). These uncertainties form an important aspect of the modelling process and show where other interpretations are possible.

The stratigraphic ordering of graves containing bone or hearths containing charcoal can be dated with much greater precision by using radiocarbon dating combined with *Bayesian analysis*. The radiocarbon dates give a range of error, but this range is reduced by knowing the order in which deposition occurred. The Bayesian analysis produces shorter ranges of probability for each date (posterior density estimates, Fig. 4). This is giving archaeological sequences of high precision dating back to 20,000 years ago (Buck 2001).

Relative Ordering by Space

The business of establishing a sequence makes also use of *spatial analyses*. For example, a settlement that is spatially coherent (like the grid of a *planned* town) suggests that all the streets and houses were laid out at the

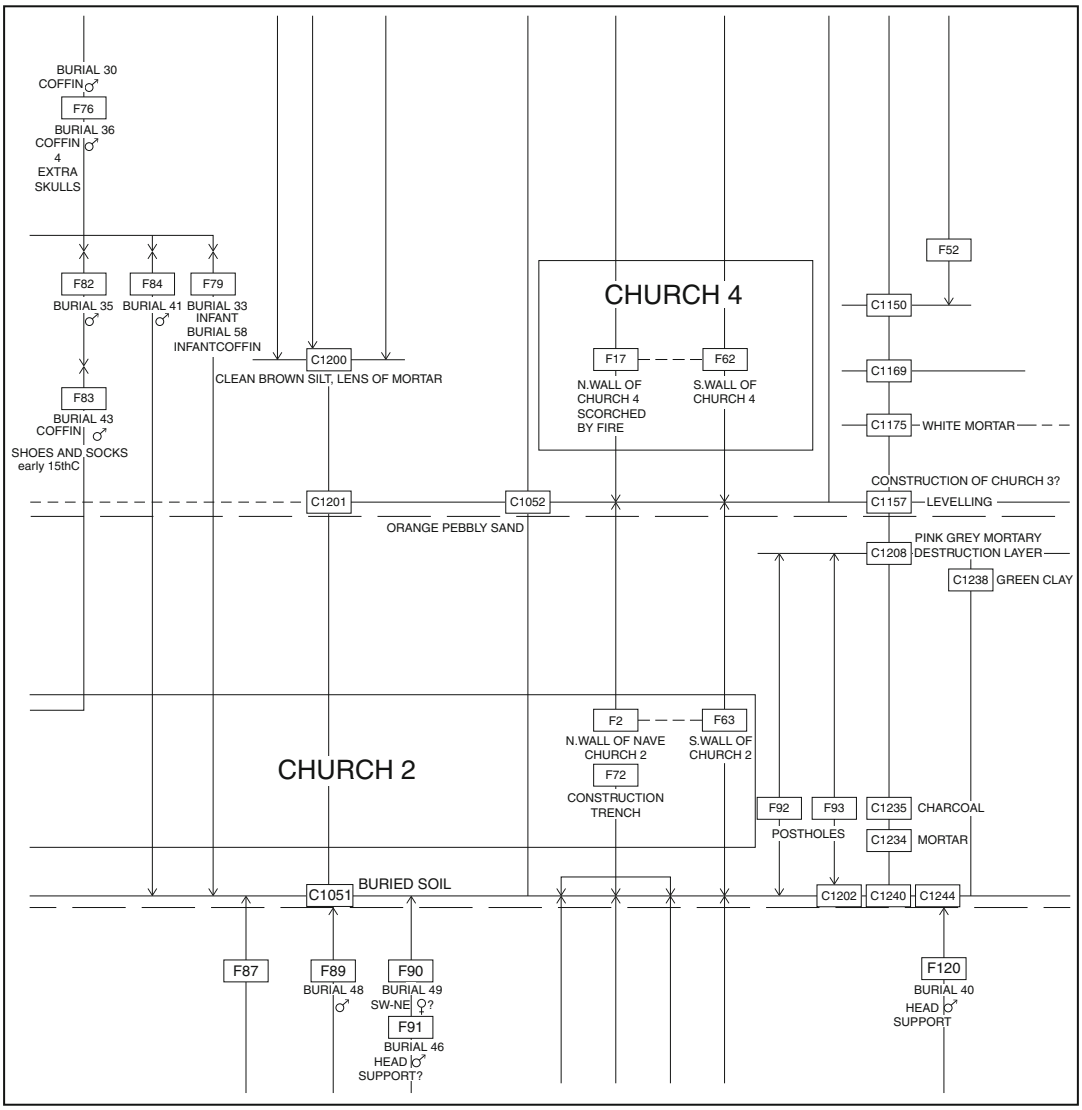

Sequence and Date in Field Archaeology, Fig. 3 Extract from a stratification diagram, showing the sequence of contexts and features at an urban excavation in the Stafford Town, England (Carver 1980: Fig. 51). The features are shown as vertical arrows, locating them in time. Contexts not belonging to features are shown as horizontal lines. This diagram was devised to show the sequence in a deep but poorly stratified deposit

same time. Features that are *aligned* are also thought to reflect contemporary use. For example, inhumation graves in a cemetery may have different orientations, but those that are most closely aligned are said to be close to each other in date. Similarly, graves that mimic the orientation of a building are later in date than the building. On the scale of a landscape, alignments are important indicators of sequence. Roads and field boundaries seen from above may indicate a sequence where they "respect" one other. For example, the field boundaries may join up to a preexisting road, or the road may cut straight across the line of the fields, showing it was imposed on a preexisting agricultural landscape.

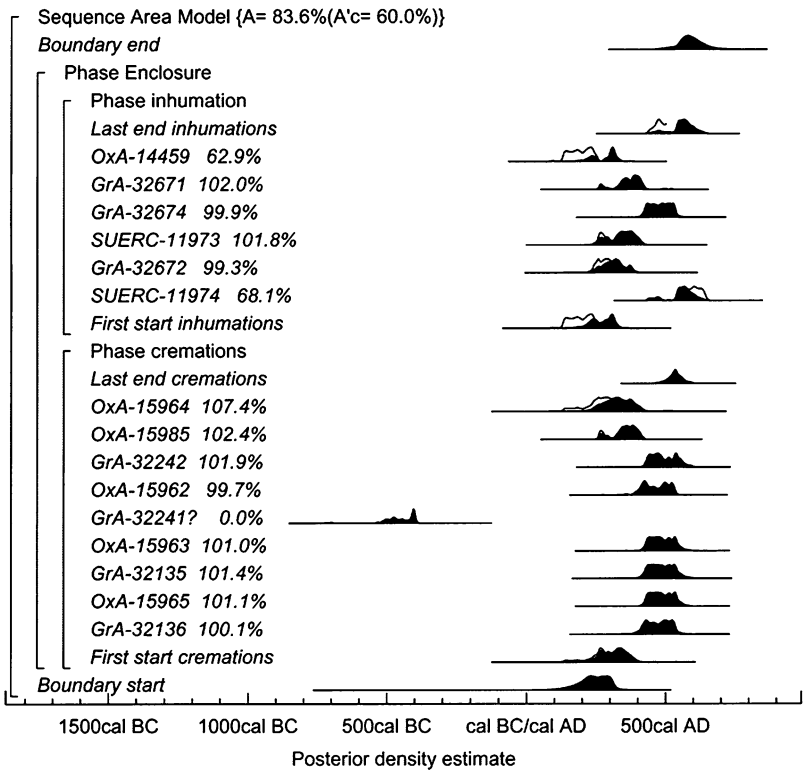

Sequence and Date in Field Archaeology, Fig. 4 A sequence of graves from the Anglo-Saxon cemetery at Wasperton, England, placed in their best order by Bayesian analysis. The outline shows the error range of the calibrated date; the solid black profile is the more precise "posterior density estimates" derived from Bayesian modelling (Carver et al. 2009: Fig. 4.1)

Modelling

At the scale of a landscape, archaeologists use such spatial mapping as an indication of sequence. It is often possible to apply typology, for example, to infer the likely culture and date of cropmark forms encountered in *aerial investigation*. Similarly, forms recorded in *subsurface survey* are sometimes recognized by virtue of their shape alone: a straight road or a circular ditch or a settlement grid. When using *surface survey* to find sites, archaeologists rely on typologies to provide a broad date for the pottery or stone implements or metal artifacts they are mapping. The distribution of this material provides the location of sites belonging to a particular culture and period.

On excavated sites, stratigraphic ordering provides the surest indication of relative sequence. The alignment of features and structures often give an inference of where these might be contemporary. The broad dates of objects and structures (and the very occasional documentary reference) allow a sequence to be anchored more closely in time. In well-stratified sites, such as towns, the stratigraphic sequence is treated as primary. Poorly stratified sites (the majority) rely more on relative and scientific dating of objects and samples. The method is to examine and record the detailed possible relationships of objects and strata in every case and then to use typology, stratification, spatial analysis, and absolute dating to build up a robust chronological model.

Cross-References

- ▶ Aerial Archaeology
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Methods in Historical Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Radiocarbon Dating in Archaeology

▶ Recording in Archaeology
▶ Spatial Analysis in Field Archaeology
▶ Surface Survey: Method and Strategies
▶ Urban Archaeology at Five Points

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Serra da Capivara National Park

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Introduction

The Serra da Capivara National Park, which covers 320,000 acres, is located in Northeast Brazil, in Piauí state. The park has a geological border where a large row of vertical walls separates two distinct formations: the plateaus that form a mountain range, and the sedimentary basin of Piauí-Maranhão (Fig. 1).

Its current climate is semi-arid. There is a brief rainy season when large amounts of precipitation produce lush vegetation, and the power of water flowing across the area causes the land to degrade. The rain period is then followed by a dry season, and the local vegetation loses its foilage. However, the climate in the region has not always been as such. Until 9,000 years ago or so, when the onset of Holocene climate triggered the current desertification process the region was covered by tropical rainforest.

Definition

The Serra da Capivara National Park houses a dense and diverse collection of prehistoric paintings and petroglyphs produced over the millennia. There are rock art sites are located in different ecosystems within the park, in valleys, and canyons. The rock art is more numerous inside the caves where rockshelters are at different heights from the bottom of the valley to the top of the *chapada*. Opposite to the *cuesta* is a chain of limestone outcrop caves. There appear to be no traces of paintings or engravings inside them other than an occasional isolated motif at their entrances.

Key Issues/Current Debates

Since the 1970s, more than a thousand sites with prehistoric paintings and engravings have been identified in the National Park. The continuous research and conservation work in the Park has allowed for new discoveries of archaeological sites to periodically increase the volume of the graphic collection. Due to the cultural value of its archaeological sites, UNESCO's World Heritage Committee included the Serra da Capivara National Park in the World Heritage List in 1991.

The paintings in the archaeological sites of the National Park are diverse, both thematically and technically, as well as in the way the figures are arranged on the rocky surface. The paintings feature mostly recognizable figures and compositions. In many places it is possible to recognize

Serra da Capivara National Park, Fig. 1 Chapadas, valleys, dendrites, and *cuesta* abysses of the National Park

pictures created at different times, by different human groups.

During an initial organization of the National Park's rock art collection, a preliminary general classification was proposed, based on morphological criteria and on the establishment of a thematic typology guided by techniques and scenography (Guidon 1991). One of the proposed types, designated as *Tradição Nordeste* (Northeast tradition), is dominant in the region's conservation unit and its surroundings. It is composed by figures that are recognizable thanks to the presence of essential traits for identification, that graphically represent actions or events.

Assorted anthropomorphic, zoomorphic, and phytomorphic figures can also be recognized – and some figures are arranged to represent scenes. The most frequent themes are hunting, dancing, sex, violence, fighting, and scenes depicting rites around a tree (Figs. 2 and 3). The figures address the themes through identifiable postures and gestures. The graphical representation of the action suggests rhythms. Differentiation among grouped figures is made based on the graphic themes and modes of representation used in each situation. The presence of repeated actions performed by human figures in which the represented theme is not recognizable in an emblematic marker that allows characterizing the narrative. Sometimes, the figures display emblematic features similar to conventional signs that reveal encoded information as image attributes (Fig. 4).

The paintings and engravings provide information on the techniques developed and used for its production. The choice of location and the rock characteristics are primary aspects. As seen in a diversity of surviving paintings, there are sites in the National Park that were painted on across millennia by different human groups.

The features of the engraved or painted lines inform us about the types of instruments used to obtain specific graphic effects. These techniques included a range of means, ranging from the

Serra da Capivara National Park, Fig. 2 Toca da Extrema – ritual scene around a tree

Serra da Capivara National Park, Fig. 3 Toca Subida da Serrinha I – hunting scene

body parts– hands and fingers – to instruments made of reeds, cotton, thorns, and stamps made with clay and rubber plant. The paintings also inform us about the composition of paints prepared with pigments and dyes mixed with other elements, thus providing different degrees of robustness. The differences in thickness of the paints enabled the acquisition of distinct textures. Volume effects were also obtained through successive superimposition of paints of different consistencies applied on flat and uniform surface. A broad spectrum of dark hues that created a series of visual effects was obtained by exposing the paints to high temperatures. Physico-chemical analyses also revealed the use of saps, blood, and other products of organic origin. High rates of calcium, associated with the presence of painted human bones in graves suggest that the

Serra da Capivara National Park,
Fig. 4 Toca do Baixão das Mulheres I – emblematic back to back figure

paints' composition also included ground bones. The identification of composition patterns in rock art, allows for the reconstruction of the graphical profiles of the cultural groups to which the authors of these pieces belonged. Such profiles are formed by different and precise graphic attributes, detectable by the way the paintings are done and through the reconstitution of the operative chain of the art production technique. There are numerous components to the graphic profiles, but they appear standardized according to aspects prioritized in each piece of the work. The accuracy of the records outlines these aspects as it singles out differences allowing for the identification of meaningful patterns.

There are indicators of the symbolic theme choices of these human groups. These compositions are recognizable, while the identification of the action theme may not. They are standardized representations of gestures and postures that do not allow for a functional association to an action. Through their frequent repetition, they become emblematic by theme and not necessarily by technique. In the National Park, there is a figure repeated at several sites, composed of two human figures positioned back-to-back. This is present in all stylistic variations through time, suggesting a symbolic value in a cultural horizon (Pessis 2003).

The state of conservation of the paintings depends mainly on the homogeneity of the painted shelter rock and the exposure of the paintings to the impact of natural agents determined by their positioning on the wall. The National Park covers a geographical area composed mainly by sandstone and conglomerate resulted from the rising of the seabed. The presence of water in the region created a residual surface, which is an amalgam of heterogeneous rock and sediment. Thus, the cortex on the site wall detaches itself more easily, which also suffers the impact of daily atmospheric temperature range.

The paintings of *Tradição Nordeste* (Northeast tradition) are scattered throughout all Northeastern Brazil. Chronologies obtained in archaeological excavations as well as the density of the figures indicate that paintings of this tradition have its origin in the area now known as Serra da Capivara National Park. Between the region of Seridó Potiguar (RN) and the Serra da Capivara (PI), there are sets of paintings with features similar to those of Serra da Capivara. A case of dispersion stands out in the region of Seridó Potiguar (RN) where there are a multiple archaeological sites with paintings of belonging to *Tradição Nordeste* (Martin 2008). Such paintings have specific themes and scenography that suggest a different graphic development compared to the Serra da Capivara

National Park. They appear to have some overlapping features that suggest a close cultural relationship.

Future Directions

Dating prehistoric rock art is still a complex and vague task. With the exception of some sites kept in isolation, the dating of paintings is relative. The action of natural agents on the painted or engraved walls, over the millennia, affects the results of physicochemical analyses on samples altered by sedimentary deposition. In the National Park's sites, the effects of the detachment of rock cortex with paintings are noticeable. Dropped painted fragments are deposited on the sediment, and are retrieved in the course of archaeological excavation. Dating the sediment in which these fragments were collected indicates the moment the detachment happened, thus providing an (minimum) estimate of the dating of the paints.

Natural and anthropogenic agents destroy numerous rock art sites each year. To declerate this process, the sites within the National Park are being systematically monitored using laser scanning which is the most accurate technical resource available. Only the intensive photogrammetric recording of rock art sites will allow us to save this heritage from eventual total loss.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Rock Art Recording Methods: From Traditional to Digital

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Service Learning and Public Archaeology

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Introduction

Public archaeology has experienced exponential growth since the term was coined in 1972 in the context of legislation designed to conserve the archaeological record in the public interest. Public archaeology in the twenty-first century is an increasingly diversified pursuit in which professional archaeologists, employed in a variety of settings including both heritage management agencies and academic institutions, collaborate in a multitude of ways with a diverse array of community partners. Professional archaeologists in academic settings are uniquely positioned to extend the scope of public archaeology through community service learning where students in course-based, credit-bearing experiences actively engage with the public in real-world settings on projects of local interest emanating from the community itself. By integrating learning, service, and research, students develop deeper understanding of course content as they link theory with practice, become sensitive to both community needs and assets, and express greater interest in civic engagement.

Definition

Service learning is a form of experiential learning where students gain knowledge through active

participation in an organized service activity coordinated with the community that affords students the opportunity to critically reflect on their service experience (Bringle & Hatcher 1999). Service learning is a pedagogical initiative undertaken by institutions of higher learning to better integrate liberal arts colleges as well as public and private research universities into their surrounding communities through faculty and student collaborations with community members. As the needs of the community shape the nature of the service project, service learning necessitates engagement between faculty and the community prior to the commencement of any work. Faculty, students, and community partners collaborate within a research framework in which the community benefits from the resources offered by the college and the students profit by developing a greater sense of social responsibility. Most colleges and universities now include service learning as part of their curriculum. In a society thought to be experiencing a disintegration of civic life (Putnam 2000), service learning is a way to reintroduce students to the idea that they are part of a social world beyond their immediate campus environment. Service learning is thus distinguished by its pedagogical underpinnings, and academic archaeologists have incorporated this powerful teaching method into the archaeological curriculum since the early 1990s (Baugher 2007).

Examples

Archaeological applications of service learning have engaged with a wide range of community partners including museums, historical societies, historic preservation groups, elementary schools, churches, and cemetery associations and have had as their focus Mississippian-era Native American mounds (Homsey et al. 2012), seventeenth-century forts (Nassaney 2004), eighteenth-century Spanish missions (Mendoza 2009), and nineteenth-century African-American sites (Levine et al. 2005; Levine & Delle 2009). Service-learning experiences have been successfully integrated into all levels of the archaeological curriculum from introductory courses (Levine & Delle 2009) to graduate-level seminars (Chilton & Hart 2009). Summer field schools are also common sites for integrating service-learning pedagogy into archaeological practice (Nassaney 2009). Service learning can define an entire college course or it can be a component of a regular academic course. Service learning is a flexible pedagogy and, as McLaughlin (2009: 66) aptly points out, is "not a one-size-fits-all teaching strategy." The service-learning component that was incorporated into the Thaddeus Stevens and Lydia Hamilton Smith public archaeology project can serve as an example of how this pedagogy can be incorporated into a college-level "Introduction to Archaeology" course.

The public archaeology program through which this service-learning project developed began when the Historic Preservation Trust of Lancaster County requested that James Delle and I undertake an excavation at the former homes of Thaddeus Stevens (1792–1868), one of Pennsylvania's most famous radical politicians, and Lydia Hamilton Smith (1813–1884), his African-American housekeeper and companion. Thaddeus Stevens was an influential congressman who was a leader of the Radical Republicans who advocated for universal public education, opposed the death penalty, and agitated for the abolition of slavery and equal rights to emancipated blacks. He was a primary author of both the 13th and 14th Amendments to the US Constitution. Lydia Hamilton Smith served as housekeeper for the bachelor Stevens and became a pioneering businesswoman by owning and renting various properties. The houses were in imminent danger of complete destruction to make way for a new convention center-hotel complex in Lancaster, Pennsylvania. The historic preservation laws in the state did not explicitly require that archaeology be done at that site as no demolition or construction funds came from the federal government. Archaeological excavations unearthed evidence of many episodes of Lancaster's history including evidence that a cistern at the Stevens and Smith site had been modified to be a hiding place to harbor fugitive slaves escaping north during the antebellum period (Levine & Delle 2009).

The Stevens and Smith project was undertaken with an explicit commitment to making the project accessible to the community (see Levine and Delle 2009 for examples of our community outreach efforts). Once the excavation was over, we received many requests from various school groups to provide presentations on Stevens and Smith, archaeology, and the Underground Railroad. We responded by partnering with the local inner-city school district to have the undergraduate students enrolled in "Introduction to Archaeology" at Franklin and Marshall College provide presentations designed to expose elementary and middle school children to archaeology in general, the rich archaeological heritage that lies beneath their city streets, and to the historical significance of Thaddeus Stevens and Lydia Hamilton Smith. For their service-learning project, college students brought a traveling kit of artifacts from the excavation, large-scale photos of the excavation, and an archaeological toolbox of equipment used on a typical dig. Schoolchildren learned about the practice of archaeology, principles of stratigraphy, interpreting historic artifact assemblages, nineteenth-century urban life in Lancaster, and the role Stevens and Smith played in the Underground Railroad. After several iterations of this class, nearly 40 college students had engaged an estimated 1,500 schoolchildren with the Stevens and Smith archaeology project and issues of race, slavery, and emancipation. Reflection journals kept by my students report that the experience resulted in understanding course content on a more profound level because they taught it and fostered increased interest in civic engagement. Their interactions with the schoolchildren promoted personal growth and served as a catalyst to reflect on their own position and role in society. As archaeology is not a part of most curricula prior to college, the presentation filled an educational void in the community, and schoolchildren expressed considerable enthusiasm for learning about archaeology, handling artifacts, and hearing about their city's heritage.

Future Directions

Although archaeological applications of service learning can productively extend the current contours of public archaeology, they are still in their infancy. While an increasing number of faculty have embraced service learning, it is far from being a permanent fixture in archaeological pedagogy. Advocates of service learning acknowledge that there are challenges that come with retooling our pedagogical approaches but contend that the benefits of service learning far exceed any difficulties (Baugher 2009; Nassaney 2009, 2012). Implementing a service-learning project can be time-consuming and does create additional responsibilities for faculty. Untenured faculty may be concerned that the extra effort required to create service-learning opportunities for their students will not be rewarded. Nevertheless, many colleges and universities are providing the infrastructure to facilitate service-learning partnerships. As archaeological practice in the twenty-first century continues to reach out and acknowledge multiple stakeholders in diverse communities, the prospects for service learning are promising.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Public Archaeology, The Move Towards

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Sesame: Origins and Development

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Basic Species Information

Sesamum indicum L. (syn. *S. orientale* L.) Pediliaceae. The name sesame is derived from the Late Babylonian *shawash-shammu*, "oil seed" or plant oil, via Phoenician to Greek *sesamon* to Latin *sesamum* (www.etymonline.com). Sometimes sesame is known as gingelly from the Hindi *gingli*, which is from Arabic *jaljala*, the meaning referring to the sound of the seeds rattling within the capsules (http://www.oed.com). Sesame has one of the highest oil contents of any seed, approximately 50 % oil and 25 % protein. The meal left after pressing for oil can be used as a high-protein animal feed. The oil can survive for long periods before going rancid due to the presence of antioxidants, sesamol and sesamolin (Oplinger et al 1990). There are many recorded medicinal uses (Bedigian 2004).

Sesame is an oilseed crop that is self-pollinating and annual but occasionally perennial (Bedigian 2004). The four-segmented seed capsule is grooved, is rectangular in section, and ranges from 2 to 8 cm long/0.5 to 2 cm wide. Once ripe the seed capsules split open to release the seed – "open sesame." The ovate flattened seeds range from 3 to 4 mm long/2 mm wide/1 mm deep and are thinner at the hilum end. The testa is slightly raised and reticulate (Fig. 1), and this is especially marked in wild sesame (*Sesamum* spp.). The seeds are usually white/yellow but can be brown or black. Sesame can be grown from seed in warm climates. Although drought resistant, it cannot tolerate frosts, waterlogging, or salinity (Oplinger et al. 1990; Van Wyck 2005). Sesame takes between 70 and 120 frost-free days to mature, and there is morphological variation between plants (Bedigian 2004). While tolerant of many growing conditions, sesame prefers well-drained fertile soils and neutral pH. Its large branching root system can improve poor soil structure. A non-shattering mutation was not found until 1943, so traditionally sesame is grown in small hand-harvested plots. Instead domestication focused on reduction of germination inhibition which is linked to a thinning of the seed, a reduced seed coat architecture, and an increased tendency for seeds to be black (Fuller & Allaby 2010).

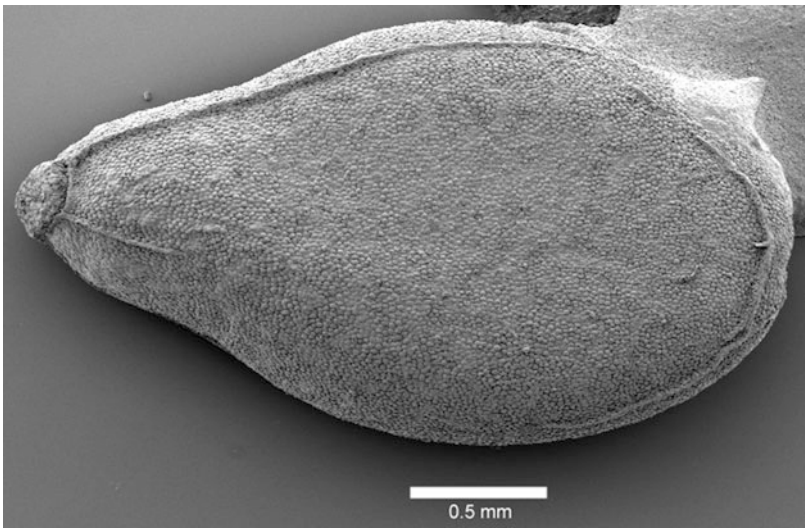

Sesame: Origins and Development, Fig. 1 Scanning electron micrograph of typical domesticated *Sesamum indicum* seed

There has been debate over the correct taxonomy for cultivated sesame (see Bedigian 2004). Wild sesame taxa are widespread with many wild species in sub-Saharan Africa and fewer in India. Studies of wild populations of *Sesamum* sp. support an origin from the South Asian *Sesamum orientale* L. *var. malabaricum* Nar. (syn. *S. mulayamum Nair*) (Fuller 2003; Bedigian 2004). This is likely to have taken place in the Indus Valley, including the Indian Punjab and parts of Pakistan, although the wild progenitor also occurs down the west coast of the Indian peninsula (Fig. 2).

Timing and Tracking Domestication

Archaeobotanical evidence has been slow to accumulate due to preservational biases against oilseeds like sesame in favor of charred preservation of more robust-seeded species like cereals. Early archaeological evidence for sesame stems from Harappan sites in the greater Indus Valley from the Mature Harappan civilization (2600–2000 BCE), including Harappa in Pakistan; Miri Qalat in the Markan region of Pakistan; Farmana in Haryana, India; and Kanmer in Saurashtra, Gujarat, India (Tengberg 1999; Weber et al. 2011; Pokharia et al. 2011). This is in keeping with a domestication in the Indus region sometime prior to 2500 BCE, although this might also have occurred to the east in Saurashtra, Haryana, or somewhere in between. There is a suggestion that starch grain evidence collected from a tool by A. Kashyap from Bagor, a preceramic Mesolithic site (4000–5000 BCE), has evidence for exploitation of possible *Sesamum* (cf. Shinde 2008); if verified this would suggest wild exploitation, although this site may not be within the wild distribution and towards the top of the Indian peninsula. Historical linguistic data suggest sesame was known to early Dravidian speakers, prior to knowledge of many other crops (Fuller 2007), which fits with a Saurashtran origin.

There is limited evidence for the early spread of sesame. First it was taken westward to Mesopotamia by 2300–2200 BCE (Fuller 2003; Bedigian 2004). There are numerous reports from the second millennium BCE across India (Fuller 2003). After 1400 BCE sesame is known from Bahrain and ancient Egypt, famously among seed finds in Tutankhamun's tomb (de Vartavan & Amoros 1997). In the Late Bronze Age (c. 1300 BCE), sesame is apparently mentioned in early Greek Linear B texts, although archaeobotanical finds from this period and region are so far lacking (Kroll 2000). Recently

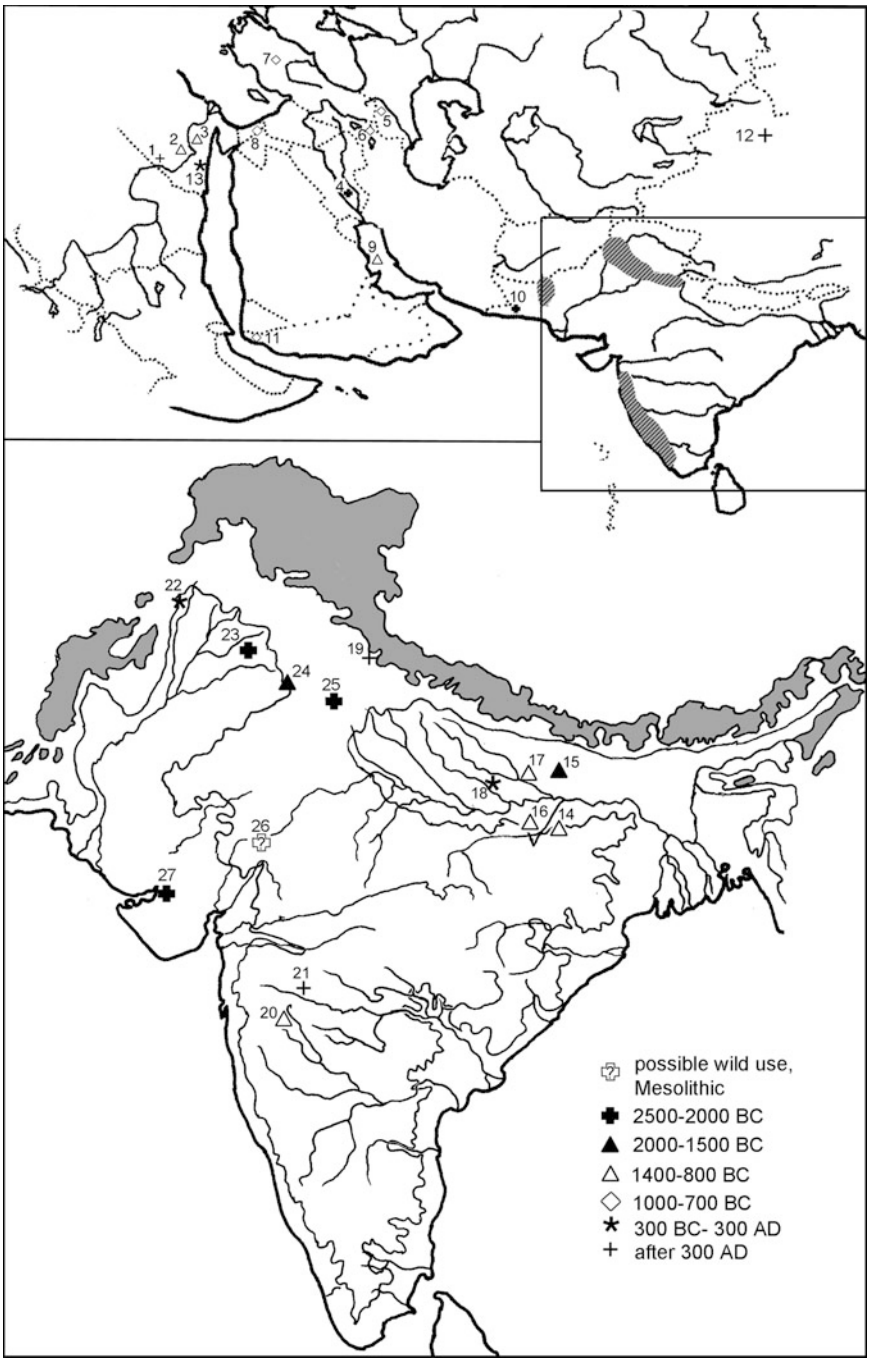

Sesame: Origins and Development, Fig. 2 Map showing the approximate modern wild range of *Sesamum indicum* subsp. *malabaricum* and the distribution of archaeological reports, with an enlarged focus on the India subcontinent. (Map updated, modified from Fuller 2003). Sites numbered *1*. Qasr Ibrim, *2*. Luxor (Tutankhamun's tomb and Deir el-Medina), *3*. Amarna, *4*. Abu Salabikh, *5*. Karmir Blur, *6*. Bastam, *7*. Gordion, *8*. Deir Alla, *9*. Bahrain, *10*. Miri Qalat, *11*. Sabir, *12*. Thousand Buddha Grotto (Xinjiang), *13*. Myos Hormos, *14*. Malhar, *15*. Imlidh-Kurd, *16*. Sunuwar, *17*. Narhan, *18*. Hulaskhera, *19*. Ufalda, *20*. Inamgaon, *21*. Paithan, *22*. Hund, *23*. Harappa, *24*. Sanghol, *25*. Farmana, *26*. Bagor, *27*. Kanmer

finds from Southern Thailand indicate the presence of sesame in the last few centuries BCE (C. Castillo, personal communication). There are also Roman era finds from the port of Myos Hormos (Quseir al-Qadim) on the Egyptian Red Sea coast (van der Veen 2011). Elsewhere in Yemen and Anatolia, sesame appears in the early first millennium CE (Fig. 2).

In China, although sesame is known from written sources going back about 2,000 years to the Han dynasty, archaeobotanical finds have been elusive. The only positively identified sesame comes from a 700-year-old Buddhist monastic cave in Xinjiang province, as well as reports from similarly aged or slightly older graves (Qiu et al. 2012). A few earlier claims for sesame in central China are mostly misidentifications (Qiu et al. 2012).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Sex Assessment

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Introduction

The evaluation of the sex of a deceased person from an analysis of skeletal remains is one of the

first procedures undertaken by anthropologists and osteologists as the sex of a person affects other analyses such as estimation of ancestry and age at death. In forensic cases, the estimation of sex is pivotal in contributing to the identification of unknown bodies as determining whether the individual is male or female halves the number of possible matches.

Definition

The sex of an individual is a biologically determined variable and differs from the gender of a person which is a social construct.

Key Issues

Age of the Individual

There has been considerable research undertaken on estimating the sex of an individual from the examination of juvenile skeletal remains (e.g., Bilfeld et al. 2012). However, estimating the sex of individuals who have not reached puberty is limited because in most cases the degree of sexual dimorphism in the juvenile skeleton is not distinct enough to allow accurate methods for evaluation of the sex, particularly for forensic cases.

Nonmetric Methods

In cases of adult skeletal remains, the estimation of sex can be undertaken using a visual examination of nonmetric traits, that is, the morphology (shape) of sexually dimorphic parts of the skeleton (Phenice 1969). Many studies have demonstrated that the pelvis is the most reliable area of the body to evaluate sex (cf. Spradley & Jantz 2011). The overall shape of the pelvis (broader in females than males as a result of the need for childbirth), the angle of the sciatic notch, the subpubic angle, subpubic concavity, the shape of the ischiopubic ramus, the presence or absence of the ventral arc, as well as the shape of the sacrum are all examined to evaluate the sex.

After the pelvis, the skull is the most sexually dimorphic structure in the body. On the skull, the morphology of the nuchal crest, mastoid process, supraorbital ridge/glabella (Graw et al. 1999), mental eminence, flexure of the ramus, and size of the palate and teeth (Jones Haun 2000) are assessed. In general, within different populations, male skulls illustrate features that are more robust and muscular than those of females.

Metric Methods

In addition, metric criteria in the form of indices (comparison of measurements) and/or discriminant functions (uni- or multivariate statistics) can be used in sex evaluation (e.g., Robinson & Bidmos 2009). A number of skeletal measurements can be taken that are indicative of the sex of an individual. The most commonly used include the ischiopubic index (e.g., Krogman & Iscan 1986), the discriminant function cranial sexing method of Giles and Elliot (1963) and Giles (1970), and the diameters of the articular ends and/or the midshaft circumference of long bones (Krogman & Iscan 1986). Research has been undertaken to attempt to evaluate the sex from measurements from various parts of the body including vertebrae (Snodgrass 2004), ribs (Wiredu et al. 1999), femur (Stojanowski & Seidemann 1999), tibia (Iscan & Miller-Shaivitz 1984), patella (Kemkes-Grottenthaler 2005), clavicle (McCormick et al. 1991), humerus (Rogers 1999), radius (Berrizbeitia 1989), ulna (Purkait 2001), feet (Introna et al. 1997), and metacarpals (Burrows et al. 2003). The decision about which method to use is influenced by the condition and preservation of the skeletal remains and the age of the individual.

Context and Disease

The circumstances of a burial are also important to assess when evaluating the sex of an individual. For example, recognition of fetal bones in the abdominal area will indicate the individual was female. Further, some diseases which affect the skeleton are sex-specific (Ortner 2003).

Molecular Methods

Finally, the ability to extract DNA from skeletal remains of varying ages and preservations has meant that DNA analysis has also been used to determine the sex of both juvenile

Sex Assessment, Table 1 Categories used in the determination of sex

Category	Comment
F	Definitely female
F?	Possibly female
A	Ambiguous (shows neither male nor female characteristics)
M?	Possibly male
M	Definitely male
?	Unable to comment on the sex due to poor condition or preservation of the skeletal remains

(e.g., Townsend 2001) as well as adult (e.g., Gibbon et al. 2009) skeletal remains. "Genetic sex identification is done through the isolation and amplification of a gene or genes in the sex chromosomes (X and Y). The most commonly used sex determining genes are the sex determining region Y (SRY locus), zinc finger protein (ZF) and the amelogenin (AMEL) genes" (Bidmos et al. 2010: 4). While extraction techniques become increasingly less invasive, molecular approaches to the determination of sex are nonetheless destructive and expensive. In addition, the success of DNA analysis is influenced by the relative preservation of the remains and the ability to recover DNA.

Categories and Population-Specific Approaches

Skeletal dimorphism occurs as a result of the differences in hormone levels between men and women. As a result of individual variation (i.e., gracile males and robust females exist), it is not always possible to provide a definitive answer. Consequently, forensic anthropologists and osteologists use a range of categories to describe the sex of the individual (Table 1). In addition, population-specific variation (e.g., in size) are known to influence the evaluation of sex from the skeleton. For this reason, population-specific reference collections are essential for developing standards to assess sexual dimorphism within populations (e.g., Smith 1997; King et al. 1998; Robinson & Bidmos 2011).

Accuracy

If the entire skeleton is present and well preserved and both morphological and metric methods can be employed, the sex of an individual can be estimated with nearly 100 % accuracy. If only the pelvis is examined, accuracy is said to be 95 % and decreases as less skeletal elements are employed (Krogman & Iscan 1986; Duric et al. 2005).

Future Directions

As technology advances and debate continues about the impact on preservation of studying and handling collections of archaeological human skeletal remains, there has been a shift to the virtual analyses of skeletal remains. Virtual evaluation of sex has been demonstrated to be as accurate as examining the physical bone (e.g., Decker et al. 2011).

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy: Definition

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Shackel, Paul

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Basic Biographical Information

Paul Shackel received his Ph.D. from the State University of New York at Buffalo in 1987. After completing his dissertation, Shackel worked for a short time for the Historic Annapolis Foundation coordinating various archaeological projects in the historic district of Annapolis. In 1989 he entered the National Park Service and worked for over seven years at Harpers Ferry National Historical Park. He has served as principal investigator for several projects with the National Park Service in the National Capital Region. Shackel became an Assistant Professor at the University of Maryland in the Department of Anthropology in 1997. In 1999 he became an Associate Professor, and in 2002 he was promoted to Full Professor. He also served as chair of the department.

Major Accomplishments

Dr. Shackel's dissertation research in Annapolis, Maryland, examined archaeological materials, probate inventories, and the development of etiquette books to show the development of a modern discipline. This new behavior helped to create separate and segmented places as well as the development of the individual. Much of this new behavior can be found in the development of Renaissance ideals that helped to standardize behavior necessary for industrial capitalism.

His work at Harpers Ferry National Park focused on the Harpers Ferry Armory, which developed as one of two US installations for the manufacturing of arms for the US military. The armory initially developed with craft manufacturing, whereby the gunsmith made the entire gun, lock, stock, and barrel. However, in the 1820s, the War Department placed John Hall in Harpers Ferry where he perfected the process of interchangeable parts in gun manufacturing. With the implementation of wage labor in the 1840s, the landscape became more formal as new surveillance techniques were implemented. Workers appear to have damaged an increasing number of products and machinery. Families tended gardens, raised pigs, and purchased material culture that was fashionable when they had control over their means of production.

In 2002 Dr. Shackel embarked on a cooperative project with several other institutions to document the founding the settlement of New Philadelphia, a town established by a freed African American in 1836. Frank McWorter and his family sold town lots to whites and blacks and used the proceeds to purchase family members out of slavery. Based on census and deed records, it appears that both White families and Black families lived next to each other. The archaeology shows that material culture differences between households of different ethnic backgrounds is indistinguishable. The archaeological

record is more of a reflection of class rather than ethnic background.

Beginning in 2009, Shackel began exploring issues of race in the anthracite region of northeastern Pennsylvania. In the 1880s and 1890s, people of Slavic and Italian backgrounds migrated to this region, and they were treated poorly by their employers and their established neighbors whose families migrated here several generations earlier. The new immigrant spoke a different language, dressed differently, and had different customs. Lattimer Mines is the site of one of the most deadly labor massacres in US history, although the event has disappeared from the national public memory. Archaeology located the place of the massacre, and work is currently being undertaken at domestic sites in this coal town. The archaeology team notices parallels between the treatments of the historic immigrant with the new Latino immigrants that now make up a significant proportion of the contemporary community's population.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Local Communities and Archaeology: A Caribbean Perspective

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Sharma, Govardhan Rai

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Basic Biographical Information

Govardhan Rai Sharma was born on 13 August 1919 in a rural family of Ghazipur district in Eastern Uttar Pradesh. After his primary education in the village school, he shifted to Allahabad where he had all his subsequent school and university education. G.R. Sharma was a brilliant student throughout and passed his M.A. in History in 1942, securing a first division and standing first in order of merit. It was customary in those days for the above-average students of Allahabad University to go in for the civil services. Nationalist to the core and taking active part in the Quit India Movement, G.R. Sharma shunned the very idea of serving under an alien government. Instead he chooses the teaching profession, joining the Allahabad University as a Lecturer in history in 1944.

G.R. Sharma was appointed as a Professor in 1958 in Allahabad University, remaining there till his retirement in 1981, as a Head of the Department. He was appointed Advisor, Archaeology and Museum, of the Uttar Pradesh

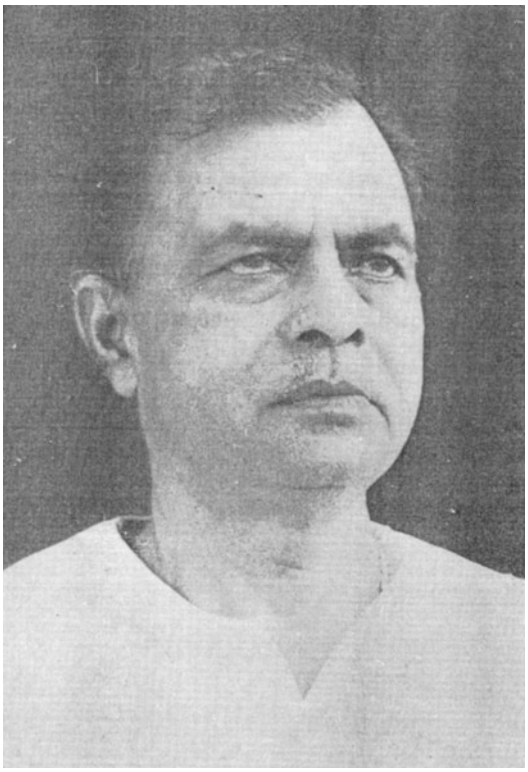

Sharma, Govardhan Rai, Fig. 1 Prof. G. R. Sharma, a pioneer prehistorian of India

Government. Sharma was a Co-director of the Indo-Soviet Commission for cooperation with UNESCO. Sharma was an active member of the Central Advisory Board of Archaeology for well over 20 years. Sharma was also a member of the Indian Council of Historical Research and the National Commission for the History of Sciences. Sharma died on November 11, 1986 (Fig. 1).

Major Accomplishments

G.R. Sharma remained in the archaeological research for over three decades. His entry in the field in the year 1949 was itself an event of far-reaching significance for Indian Archaeology. When in that year Allahabad University, under his direction, began archaeological excavations at the famous site of Kausambi, a new era in archaeological research had been ushered in. This continued until 1966. Sharma's major task in the fifties was introducing archaeology as a subject in the university's teaching and research program. This task is by no means easy even today, and one can imagine how difficult it must have been 30 years back. Sharma had to face an unsympathetic Head of the Department, a hostile Vice-Chancellor, and a totally insensitive state government, a situation almost tailor-made to break the nerves of any ordinary persons. Overcoming various odds coming in his way, he forged ahead to build, nurture, and develop a strong Department of Ancient History, Culture and Archaeology in Allahabad University. In recognition of work done by Sharma and his colleagues, the Allahabad University Department of Ancient History, Culture and Archaeology was brought under the UGC Special Assistance Program which besides creating an adequate infrastructure of archaeological field research also helps many of his younger colleagues to improve their careered prospects.

With the help of A. Ghosh, the then Director-General of the Archaeological Survey of India, G.R. Sharma went on to make discovery after discovery at Kausambi, which was against the wish of K.M. Munshi, the then Chancellor of Allahabad University. His initial digging at the spot near the Asokan Pillar brought to light a textbook sequence of the early historical period. This was followed by the spectacular discovery of Ghositarama monastery dating back to first-second century CE.

The Lower, Middle, and Upper Paleolithic remains of the Belan valley with a rich haul of remarkable faunal finds, the Mesolithic burials of Sarai Nahar Rai and Mahadaha, and the Neolithic settlements of Kaldihwa are some of his significant achievements in this area. It was indeed G.R. Sharma's brilliant insight that led him to achieve a major breakthrough in the identification of Mesolithic settlements in this area.

It is largely to the credit of G.R. Sharma and his colleagues that southern Uttar Pradesh is now firmly on the Stone Age map of the subcontinent. The last 15 years of his career was devoted almost exclusively to researches in the Stone Age Archaeology of the region. The archaeological discoveries made by the Allahabad University

under his leadership have added very significantly to our knowledge of India's past. And the archaeological findings are deposited in the Allahabad University museum.

In recognition of his work, Professor Sharma was invited by the British Academy to deliver lectures at the Universities of Cambridge, Oxford, and Southampton and Institute of Archaeology London. Professor Sharma singly and jointly authored several books and articles incorporating the results of his fieldwork. Notable among them are *Excavations in Kausambi* (Sharma 1960), *Reh Inscriptions of Menander and the Indo-Greek Invasion* (Allahabad, 1980), and *Excavation at Mahadaha* (Sharma et al. 1980). He also coauthored with his colleagues in the *University Beginning of Agriculture and Prehistory of History*, and with Desmond Clark as the coauthor, he published *Palaeoenvironment and Prehistory of the Middle Son Valley*. Professor Sharma also wrote books in Hindi. From his last publication entitled *Bharatiya Sanskrit – Puratattvika Adhara* (Delhi, 1984) which can serve as a model of writing on Archaeology in Hindi.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Jericho Archaeological Site
- ▶ Rice: Origins and Development

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Sheep: Domestication

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Basic Species Information

Sheep, *Ovis aries*, (Mammalia, Artiodactyla, Bovidae, Caprinae) are a highly versatile and adaptable species. From their domestication in the Fertile Crescent, approximately 11,000 years ago, sheep now span the diverse terrains of each inhabited continent where they are exploited for a variety of uses including the production of food (milk, fat, meat) and clothing (skin, wool) (Dwyer 2008). Selection based on environmental tolerance, behavioral, and commercial traits has led to the development of more than 1,400 breeds. These designations are traditionally based upon morphology (e.g., coat color, fleece, and carcass conformation, Fig. 1). Sheep weigh between 25 kg and 160 kg depending on breed, and display significant sexual dimorphism, with males often ~40–50 % larger than females (Dwyer 2008). The key adaptations since domestication have included the selection for thicker wool coats that do not molt (hair sheep are an exception), and an increase in the number of polled breeds. Members of both sexes can either be horned

Sheep: Domestication, Fig. 1 Naturally occurring phenotypic variation within a single breed of *Ovis aries*, the Icelandic sheep. This breed demonstrates a range of color morphs from black spotted (**a**) to full black (**b**) and full white (**c**) as well as the full complement of ornamentation, horned (**a**, **c**), polled (**b**), and the unusual four horned sheep (**d**). (Image credit F. Imsland)

or polled (Fig. 1). Sheep are reproductively mature at 4–8 months of age, gestation occurs over 5 months, and individuals can be expected to live for 10 or more years (Dwyer 2008).

Due to their similar sizes and shared geographic range, it is difficult to use bone morphology to distinguish between ancient sheep and goats. The zooarchaeological record suggests sheep were domesticated in the northern Levant (a large area of the Middle East including modern Israel, Lebanon, Syria, and Turkey, Fig. 2) during the Pre-Pottery Neolithic (PPN), and subsequently transported south in the mid to late PPNB, toward the end of the ninth millennium BP (Haber & Davan 2004). Neolithic farmers are also thought to be responsible for the transport of sheep north to Europe by approximately 7000 BCE, while demographic profiling of the fossil record has dated the expansion of sheep south into Africa and east into Asia to 6000 BCE and 3000 BCE, respectively (Dwyer 2008; Gifford-Gonzalez & Hanotte 2011). There is ongoing debate with regard to which wild sheep species were domesticated to form *Ovis aries*, how many times this process occurred, and to what extent subsequent introgression of wild animals has augmented modern domestic sheep.

The current natural geographic range of wild sheep relative to the Fertile Crescent is illustrated in Fig. 2. Wild sheep are divided into three classes: pachyceriforms (*O. dalli*, *O. canadensis*, both $2n = 54$, Northern America; *O. nivicola*, $2n = 52$, Northern Russia), argaliforms (*O. ammon*, $2n = 56$, central Asian highlands), and moufloniforms (*O. vignei*, $2n = 58$, Aralo-Caspin basin; *O. orientalis*, $2n = 54$, Iran, Armenia, Turkey;

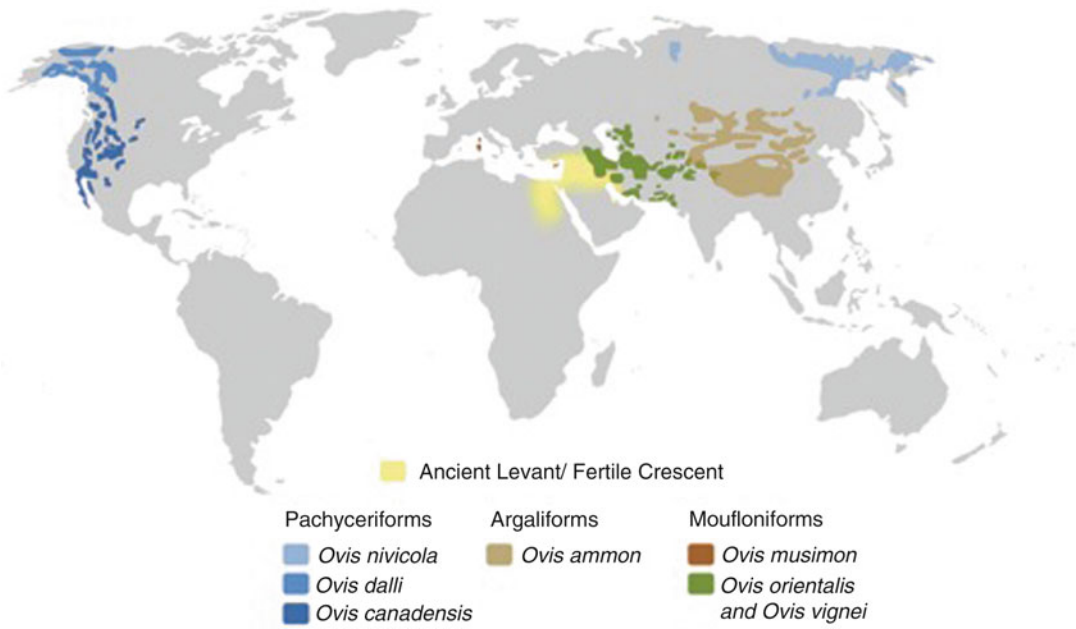

Sheep: Domestication, Fig. 2 Natural global distributions of the seven wild *Ovis species* relative to the center of domestication, the Ancient Levant or Fertile Crescent. *Ovis orientalis* is the proposed progenitor of domestic sheep, *Ovis aries*, although *Ovis species* are known to interbreed where their geographic ranges overlap. Distributions are adapted from the IUCN Red List of Threatened Species. (Image credit D. Meadows)

O. musimon, $2n = 54$, Europe). Based on overlapping cytogenic and geographic data, *O. orientalis* has been suggested to be the progenitor of domestic sheep (*O aries*, $2n = 54$). Unraveling the genetic contribution of other *Ovis sp.* to *O. aries* has been complicated, however, by known fertile cross-species hybridizations which can result in odd numbered karyotypes (Bunch et al. 2006). *O. musimon* is considered a feral derivative of early domestic sheep.

More recently, genetic evidence following maternally (mitochondrial) or paternally (Y-chromosomal) inherited data has been used in attempts to elucidate the process of domestication. In domestic animals with controlled matings, a small number of males are often responsible for a disproportionate number of offspring. Genetic data focused on the Y-chromosome suggests two patrilines in domestic sheep, one with a possible European origin and the other a less restricted distribution (Meadows & Kijas 2009). The female mediated picture from mitogenome data has revealed five distinct matrilineages (A-E) that diverged before domestication (Meadows et al. 2011).

Each of these five signatures is present in modern domestic sheep sourced from the Near East, but the frequency with which they occur together decreases with distance away from the center of domestication (Meadows et al. 2011). To date, only *O. musimon* has been shown to share a matriline (B) with domestic sheep in keeping with its classification as a feral domesticate (Meadows et al. 2011). Global analyses of modern domestic sheep have shown matrilineages A, B, and C to be the most common. Studies of ancient DNA taken from sites spanning Bronze Age China demonstrate that A was originally predominant and that B may have been introduced through later trade with the West (Cai et al. 2011). A similar study using diverse breeds of modern domestic sheep calculated that matrilineages A and B expanded at the same time into Europe from the Near East via the Caucasus (~9000 BCE), and that matriline C was introduced ~3,000 years later (Tapio et al. 2006).

Autosomal data paired with archaeological finds have been used to suggest two distinct entry points for thin and fat tailed sheep into Africa. Thin tailed sheep are thought to have arrived first, entering overland from the Levant and spreading west (tomb paintings, 3100–2613 BCE). Fat tailed sheep appeared later in recorded history and dispersed south past the horn of Africa to the continental cape (first depicted 1991–633 BCE) (Gifford-Gonzalez & Hanotte 2011). Autosomal data (endogenous retroviruses) has also revealed that the global colonization of sheep breeds occurred in waves. Improved breeds were shown to replace their primitive counterparts in a pattern of migration which followed that of initial domestication, i.e., from the Fertile Crescent into Europe and Africa, followed by a later phase east across Asia (Chessa et al. 2009). No signature of extant wild introgression has been recorded.

The ability of sheep, *Ovis aries*, to adapt to a range of climatic and dietary extremes, combined with their specialized production traits and ease of transportation, has made this ruminant one of the most valuable domestic animals to man. As access to the past and current ranges of wild sheep increases, archaeological and genetic studies will continue to combine in an effort to elucidate the complex history of sheep domestication.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Goat: Domestication

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Sherratt, Andrew

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Basic Biographical Information

Andrew Sherratt was a prehistorian whose regional focus was Europe and Eurasia but whose wide-ranging command of archaeological data and interest in large-scale (even intercontinental) questions and syntheses made him an Old World prehistorian rare in contemporary

archaeology. He earned a B.A. in Archaeology and Anthropology at the University of Cambridge in 1968. He continued his graduate studies there and completed a Ph.D. in 1976 on the Bronze Age in the Balkan region, under the guidance of David L. Clarke, whose students at that time included Robert Chapman, Norman Hammond, Ian Hodder, and Stephen Shennan.

Beginning in 1973, Sherratt took up residence at the Ashmolean Museum, Oxford, where he served as Assistant Keeper of Antiquities. His service at Oxford far exceeded what that title suggests, as he was a central figure in the university's archaeological community, such as when he helped establish its joint archaeology and anthropology program in 1993. In 1996, he was named a recipient of the McNeill Erasmus Prize for his contributions to European prehistory. Sherratt was finally made a Reader in Archaeology at Oxford in 1997 and Professor in 2002. In 2005, he moved to the University of Sheffield to assume a new Chair in Old World Prehistory, a move that seemed to promise new opportunities until he died suddenly from a heart attack in the spring of 2006.

Major Accomplishments

The breadth of Sherratt's work resulted in his making significant contributions on a wide range of subjects in archaeology, including European prehistory, plant and animal exploitation, ancient trade and exchange, history of drugs and alcohol, climate and environmental change, and archaeological theory. He is perhaps most widely cited for his wide-ranging analysis of the "secondary products revolution," referring to formative use of animals for their renewable products such as milk, wool, and traction and its impact on human society (Sherratt 1981). The data-rich yet sweeping perspective he took in that analysis was characteristic of his work, so much so that he was often compared to his intellectual forbear, V. Gordon Childe, whose contributions Sherratt both sought to defend and reassess through his own collection of essays on European prehistory (Sherratt 1997).

Inspired by both Childe and Clarke, Sherratt spent much of his energy focusing on the "big" questions of European prehistory – from the beginnings of agriculture and the spread of farming into Europe to first use of iron and coinage in the Mediterranean – but his perspective on these questions combined his predecessors' ideas into an approach that was unmistakably his own. As exemplified by his work on "secondary products," Sherratt was drawn to the study of technological and economic innovations and their impact on society as a whole and would use both his deep grasp of archaeological data and cross-cultural analogy to make his case. Like Childe, he explored how such innovations spread from neighboring regions through communication and trade networks, thus seeking a reengagement with diffusion as an important explanatory idea long after it had fallen out of intellectual favor. Through all his work, Sherratt remained dedicated to the idea that the "Grand Narrative" was important for archaeology and that archaeology was uniquely situated to facilitate such long-term and large-scale syntheses (Sherratt 1995).

Sherratt's interest in long-term and large-scale processes led him to explore the potential of a range of models and tools for archaeological analysis. He had a great interest in the potential of world systems analysis for archaeology, critically thinking through the concept and focusing on dimensions neglected in other archaeological engagements, such as the "margin" between "cores" and "peripheries" and the role of consumption as an instigator of contact and social change (Sherratt & Sherratt 1991; Sherratt 1994). More recently, he turned to geographic information systems and the growing availability of high-resolution satellite imagery for mapping and modeling settlement patterns and interregional route systems (Sherratt 2005), and he began an innovative project at Sheffield called "ArchAtlas" to explore their potential (see www.archatlas.dept.shef.ac.uk).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Childe, Vere Gordon (Theory)

▶ Hodder, Ian (Theory)
▶ Secondary Products and the "Secondary Products Revolution"
▶ Trade and Transport in the Ancient Mediterranean
▶ World-Systems Analysis

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Ship Archaeology

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Introduction and Definition

Ship Archaeology is that subset of Maritime Archaeology that deals with water transport: floats, rafts, boats, and ships. By the analysis and interpretation of excavated remains, archaeologists trace the origins of such vessels, their function, how they were built, propelled, steered, and navigated, the harbors they used, and the origins and destinations of the cargo and the people that they carried. Those who specialize in this subject have to be multidisciplinary: In addition to archaeology and/or history, a sound understanding is needed of seafaring, navigation, naval architecture, woodworking techniques, ancient climates, and former sea levels.

Historical Background

During past millennia, lakes have altered their bounds, and rivers changed their courses; sea levels have varied, thereby altering coastlines, and latterly there have been large-scale drainage projects. Nowadays, therefore, ancient vessels may be found not only in seas, rivers, and lakes, but also on what is now land. Some vessels were ritually deposited – for example, one of the oldest plank-built vessels in the world, Pharaoh Cheops' ship of c. 2,600, BCE, was found entombed in the Egyptian western desert. Furthermore, five medieval ships excavated at Skuldelev in Roskilde Fjord, Denmark, that were subsequently published in standard-setting volumes by Ole Crumlin-Pedersen, had been reused to block sea inlets against invaders. Nevertheless, the majority of excavated, seagoing vessels are found to have been wrecked inshore or in deeper water, or abandoned on what was then the foreshore. River and lake boats (for example, simple logboats) are usually excavated from the environment in which they had been used.

In the intertidal zone, excavation tactics have had to be developed to cope with the conditions encountered underfoot and with the varying stages of the tide. Reliable excavation underwater has been possible only since the post-WW2 development of diving gear and of specialized surveying and excavation techniques.

Related Disciplines

Early accounts and representations of water transport have the potential to increase understanding of excavated remains, but that enhancement may not amount to much. It is often difficult, and sometimes impossible, to

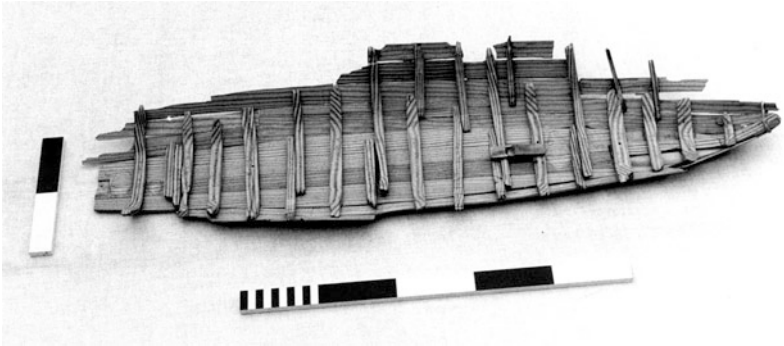

Ship Archaeology, Fig. 1 "As-found" 1:10 scale model of the Barland's Farm boat, based on measured drawings of all timbers excavated (Courtesy and copyright of the Newport Museum)

understand details depicted in early drawings and carvings. Moreover, chroniclers' accounts are usually general in nature, and, even where boats are mentioned, the technological information derived may be minute. On the other hand, technical instructions compiled by ship builders are of exceptional importance, the earliest known being published in sixteenth century CE Venice. Useful accounts have also come down to us from travelers and explorers who were familiar with boats. In recent times, traditional boats have been described in detail as a result of ethnographic fieldwork. Such accounts have proved useful in the interpretation of enigmatic features found on excavated vessels.

The theoretical reconstruction of former environments is essential to a full understanding of each maritime site. Early sea levels and the former run of coastlines and rivers must be ascertained so that a picture is obtained of the environment in which the vessel was wrecked or abandoned. Furthermore, "back-casts" of ancient tidal flows, currents, and weather patterns (especially predominant winds) provide a guide to the sailing conditions prevailing in former times.

Key Issues/Current Debates

Archaeological Research

The focus of ship archaeological projects is initially on the site itself, supplemented by related information drawn mainly from the fieldwork experience of the excavator. Subsequently, research shifts to the laboratory where samples from the excavation are identified and dated, and the constituents of substances such as fastenings, tar, and paint are determined. After the remains have been recorded on site, they are lifted, either as a coherent whole or timber by timber, and stored in water within a specialized laboratory where, before active conservation, each component is recorded by measured drawing, photograph, and written description. The timbers are conserved by spraying with, or immersion in, polyethylene glycol; alternatively, or in addition, freeze-drying may be used. Other methods under development include the use of sucrose, and impregnation with a resin which is then cured. Whichever method is chosen, the process (including the final drying phase) may take years, even for a medium-sized vessel.

While the timbers are being conserved, an "as-found" measured drawing of the vessel is compiled using the results of the recording process. This drawing depicts the remains as they were when excavated, but with displaced timbers reinstated, distorted timbers realigned, incomplete and fragmented timbers made whole, and the resulting structure rotated until it is orientated as was the original vessel when in use. A small-scale model (Fig. 1) may then be built from this "as-found" drawing and used to investigate whether it is possible to reconstruct – in a theoretical way – the complete hull of this vessel: Insufficient surviving evidence may make this impossible. A valid reconstruction of the original form and structure of the hull is likely to result when:

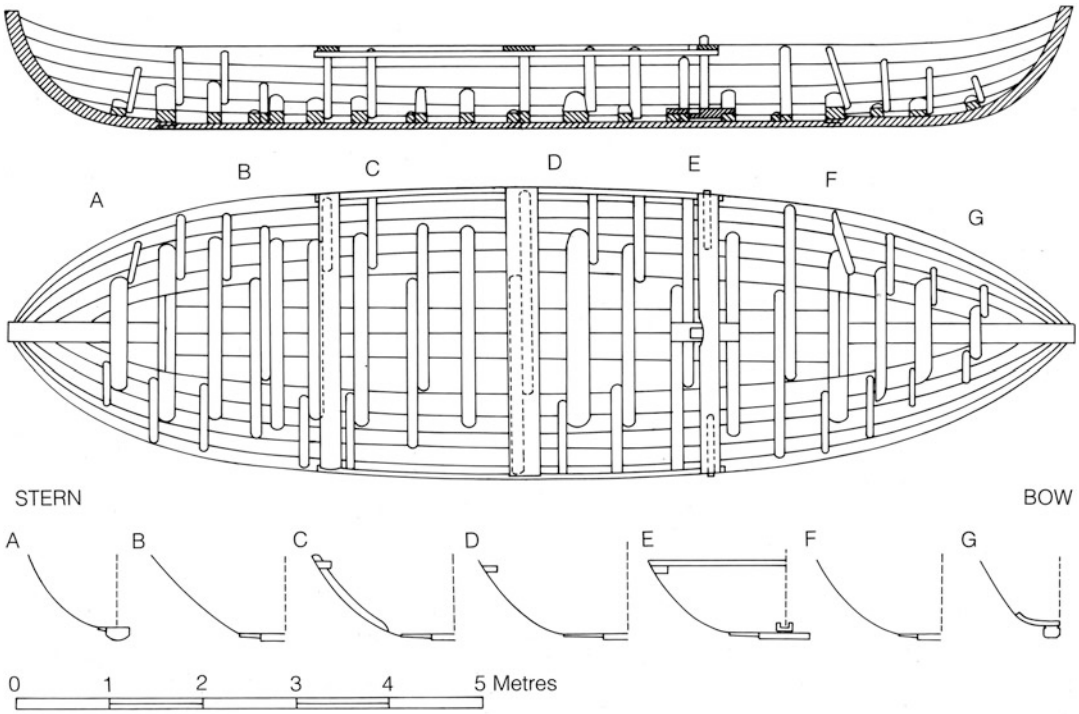

Ship Archaeology, Fig. 2 Reconstruction scale drawing of the hull of the Barland's Farm boat. Elements reconstructed may be identified by comparing this drawing with the "as-found" model in Fig. 1 (Courtesy and copyright of the Glamorgan-Gwent Archaeological Trust)

- (Most of) both ends of a boat have survived, or one end survives and it can be deduced that the boat had been "double-ended"
- Articulated runs of planking survive, up to an undoubted sheerline and/or sufficient framing survives to define the outline of the hull

During such reconstruction, wishful thinking must be avoided: Only those features that are supported by rigorous argument should be added to the "as-found" scale drawing. It is valid, for example, to incorporate hull structure and fittings that it is believed are undoubtedly essential and have been documented in a near-contemporary wreck of the same building tradition. When evidence for sail (such as a mast-step) survives on an excavated vessel, contemporary iconographic evidence – if such exists – may assist in the difficult task of determining details of mast, sail, and rigging. At intervals in this process, findings and intentions should be presented to a "jury" of specialists in this type of research. If the final hypothetical reconstruction drawings (Fig. 2) are validated by such a group, they may be used to estimate performance figures. A scale model may also be built which will probably be more informative to the nonspecialist.

When conservation of the excavated vessel is finished, and timbers can be handled, the remains are reassembled in the area in which they will be displayed. This "rebuilding" of the vessel may result in fresh ideas about the hypothetical reconstruction that if validated can be incorporated in another revision of the drawings and model.

Subsequently, if funding can be acquired and working spaces identified, it may become feasible to use these drawings and the model to build a full-scale reconstruction that, after launch and fitting-out, should undergo rigorous sea trials. This process is known as "Experimental Archaeology" and the vessel built and tested is considered to be a "floating hypothesis."

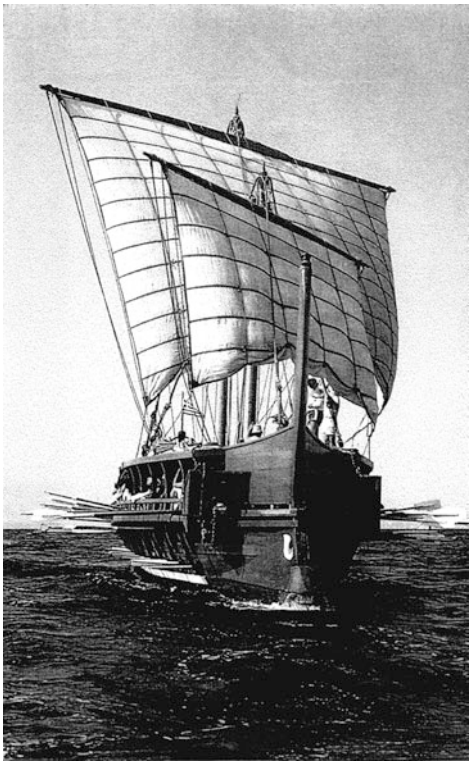

Ship Archaeology, Fig. 3 The "floating hypothesis" *Olympias*: a full-scale reconstruction of a fourth century BCE Greek *trireme*, under sail in the Aegean (Courtesy and copyright of the Trireme Trust)

The reconstruction and the building of a floating hypothesis of a *trireme* (Fig. 3) – an eastern Mediterranean warship of seventh to fourth centuries BCE – is a (possibly unique) example of such an experimental project that was based almost entirely on documentary and illustrative evidence rather than on excavated remains (Shaw 1993; Morrison et al. 2000).

The most difficult processes in such experiments have proved to be:

- The formulation of the academic aims of the project
- The rigorous production of a reconstruction drawing or model
- After each phase, the submission to external criticism of (a) conclusions drawn and (b) the project's intentions for the next phase

Unless these procedures are satisfactorily undertaken, any hypothetical reconstruction will be invalid, and any vessel built will not be authentic (Bennett 2009: 16-23)

Key Issues

Terminology

In the preface to his classic work *Water Transport*, James Hornell (1946: vii; 1970: xv), observed: there are "many devices upon which men, living in varying stages of culture, launch themselves afloat upon river, lake and sea." Since, in earlier times, every raft or boat was individually built, each one was different in some respect from all others. We therefore need a method of grouping together boats that are generally similar so that patterns may be identified and fundamental shifts in technology recognized.

The primary classification of water transport is into the three classes: floats, rafts, and boats/ships. A *float*'s buoyancy is applied directly to the human body which is part-immersed, whereas the buoyancy of rafts and boats is applied indirectly. How that indirect buoyancy is derived differentiates rafts from boats/ships: Rafts are "flow-through"; therefore, a *raft*'s buoyancy is derived from each floating element of its structure; a *boat*'s buoyancy, on the other hand, is derived from the displacement of water by her continuous, watertight hull. In this context, a *ship* is considered to be a large boat.

It is convenient to subdivide these classes into subclasses identified by the principal material used in their construction:

- Four types of float: log; bundle; hide; and pot – plus, in recent years, oil drums
- Four types of raft: log; bundle; hide-float; and pot-float
- Six types of boat: log; bundle; hide; bark; basket; and plank

Building Sequences

In the mid-twentieth century CE, two sequences, "shell-built" and "skeleton-built," were identified as the principal ways in which plank boats were built (Hasslöf 1963). This distinction can also be seen in bark boats and hide boats. In the "shell-built" sequence (Fig. 4), planking is fashioned and then fastened together to form

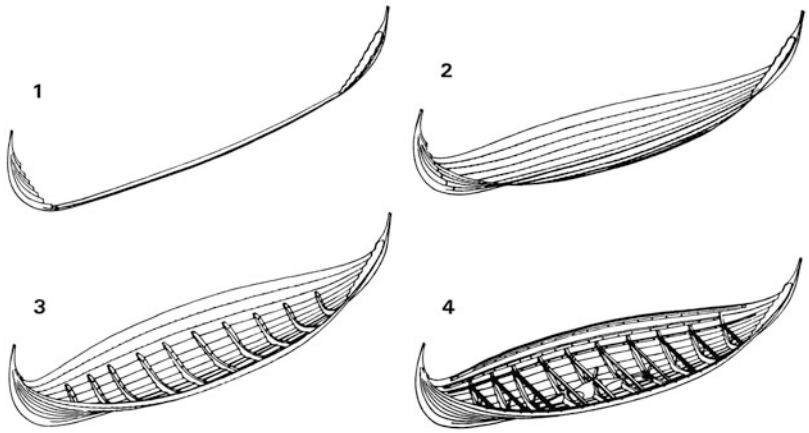

Ship Archaeology, Fig. 4 Four stages in the plank-first sequence of building a medieval Scandinavian boat (Copyright of Seán McGrail, after Ole Crumlin-Pedersen 1983: Fig. 5)

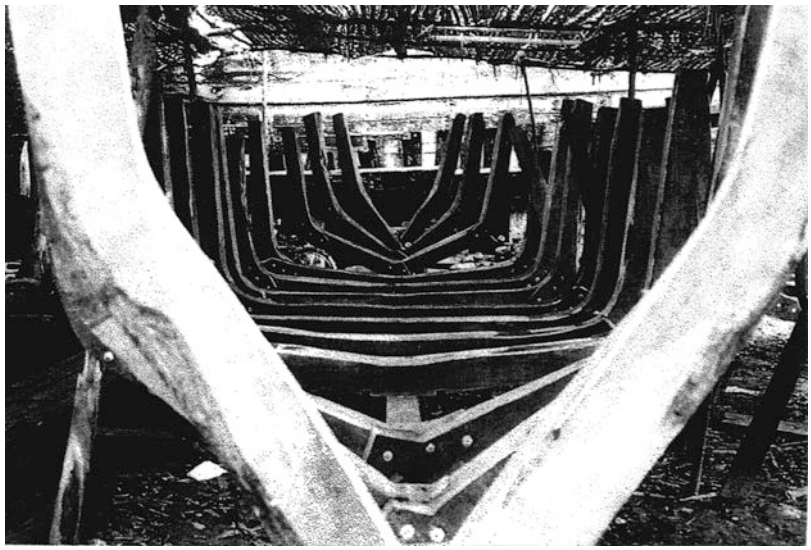

Ship Archaeology, Fig. 5 The frame-first sequence: the framing of a *vattai* fishing boat fashioned to shape and set up in Atirampattinam, Tamil Nadu, before planking was added (Copyright of Seán McGrail)

a watertight hull; framing is then fastened inside that planking. The builder visualizes such a boat as a watertight shell reinforced by framing. This sequence is now known as "plank-first."

In the "skeleton-built" sequence (Fig. 5), framing is fashioned to give the hull shape required; planking is then fastened to that framework. The builder visualizes such a boat as a framework or skeleton made watertight by adding planking. This sequence is now known as "frame-first": It may be further divided into:

- Those built sequentially: first, lower framing, to which planking is fastened; then, upper framing that is then planked. This sequence of building may be described as "framing-first": Such boats are mostly early in date.
- Those that were not planked-up until virtually the entire framework/skeleton had been erected. This sequence is the true "frame-first": Such vessels are mostly from postmedieval times when great ships were built in this way.

Building Traditions

Builders and users today recognize the concept of a "tradition" of building for the range of vessels with which they are familiar. For excavated vessels, it would be desirable to use the original

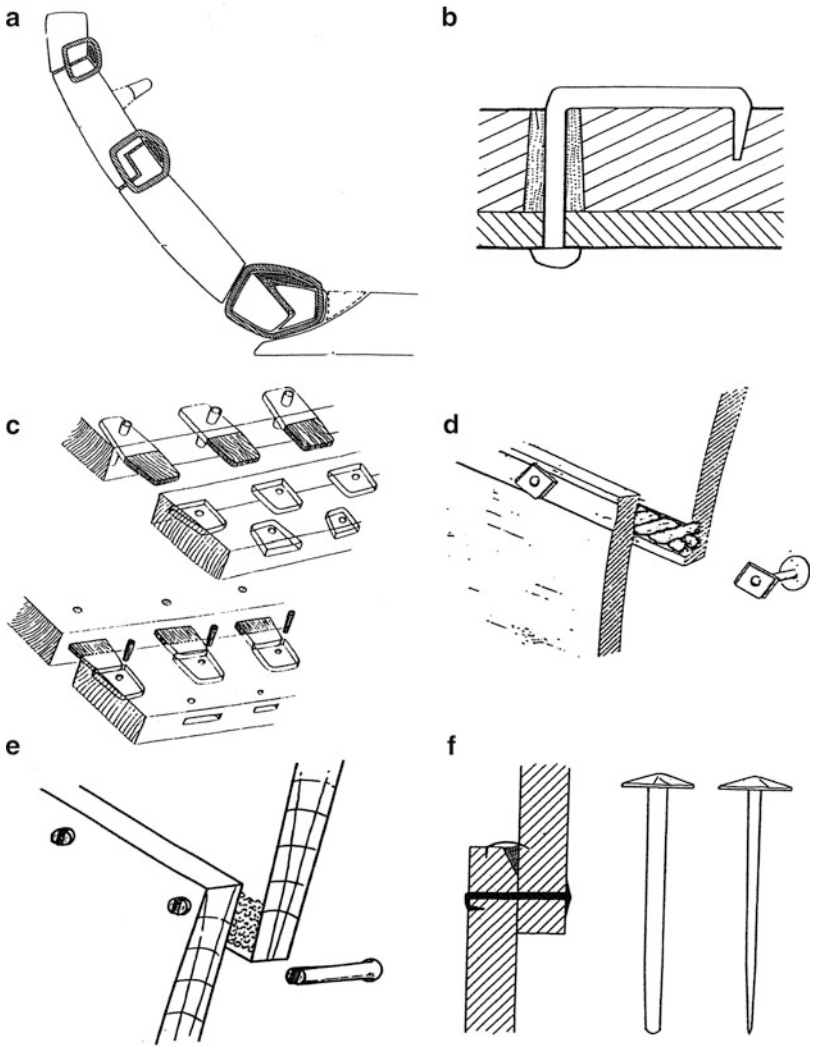

Ship Archaeology, Fig. 6 Plank fastenings. (**a**) Planking lashed together, as in the early, sewn plank boats of southern Britain. (**b**) Planking fastened to the frames of an early centuries CE, Romano-Celtic boat. (**c**) Locked mortise-and-tenon plank fastenings used in early, eastern Mediterranean vessels. (**d**) Early medieval, Nordic fastenings in overlapping (clinker) planking, with hair caulking and nails clenched over a metal rove. (**e**) A Slav variant of (**d**) with moss caulking and treenail fastenings. (**f**) Hooked nail, plank fastenings in the medieval Bremen cog, with moss caulking held in place by metal clamps (Copyright of Seán McGrail)

type-names but, even when names have survived, it can prove difficult to link one to specific excavated vessels. In northern Europe, this link has proved possible in one case: The characteristic features of the medieval merchant ship "cog" were deduced from late medieval texts and from depictions on town seals. Using this key, a number of wrecks have been identified as cogs. A principal feature of the cog, and of several other traditions, is the way the planking is fastened together (Fig. 6).

The distinctive boat-and-ship type used by Scandinavians (and subsequently others) from the early centuries CE to the fourteenth century (and later) CE is not precisely named in early texts but in recent times has been known as "Viking." Since this way of building originated before the Viking Age, and continued in use long afterward, it is now described as "Nordic." Excavations, research and publications by Ole Crumlin-Pedersen, during the past 50 years, have greatly added to our knowledge of this boatbuilding style (Crumlin-Pedersen & Olsen 2002).

For other periods and places, it has been found useful to group excavated vessels with similar features into "traditions." A "tradition" may be defined as: "the perceived style of boat-and-ship

building generally used in a certain region within a given time range." This concept has increased understanding of the way building techniques have changed over time, and has facilitated the recognition that some traditions have induced changes in the building methods of other regions. Such traditions are artificial groupings constructed by archaeologists after the analysis of each excavated vessel over a wide range of characteristics – mostly structural features such as fastening methods (Fig. 6), but also hull shape, propulsive means, and steering arrangements. It is not necessary that the vessels in each tradition should have all characteristics in common. In a *polythetic* group, each boat shares a large number of characteristics with every other boat in that tradition, but no one characteristic has to be possessed by all boats. In this respect, polythetic groups reflect an understanding of the real world (Doran & Hodson 1975: 160), and should be used whenever possible.

Sewn plank boats, excavated or ethnographic, are known throughout the world (McGrail 1996). The group of prehistoric sewn plank boats is generally undifferentiated, although two broad types have been identified in those excavated in northwest Europe:

- Boats with planks *lashed together* by single stitches through large holes (Fig. 6a)
- Later boats with planks fastened by *continuous sewing* through smaller holes

Other traditions, such as "Romano-Celtic" (Fig. 6b) and "Nordic" (Fig. 6d), which were initially identified by intuitive, ad hoc methods, were subsequently placed on a sound basis using evidence from excavated boats.

Design and Building

It is generally considered that the earliest rafts and boats were built by eye, using "rules of thumb." It seems likely that rafts continued to be constructed in this way into recent times. Boats were probably similarly built (in the plank-first sequence) until the early centuries CE, when there is the earliest evidence for frame-first boats built on a designed framework (see below). In time, and in certain places (for example, Europe and China), the size of these designed boats was increased so that they became ships.

Building Frame-First Vessels

Three, seagoing boats of the first to fourth centuries CE have been excavated: from the River Thames at Blackfriars, London; in St Peter Port harbor, Guernsey; and in a former tributary of the River Severn, at Barland's Farm in southeast Wales (Rule & Monaghan 1993; Marsden 1994; Nayling & McGrail 2004; Oleson 2008: 625-27). From them, distinctive structural features of this Romano-Celtic tradition have been identified, the most characteristic being:

- Absence of plank-to-plank fastenings (Fig. 6b), and no plank scarfs but butt joints at frame stations
- Use of the framing-first building sequence (the earliest known)

These features are clearly different from those used to build prehistoric logboats and sewn plank boats, the only other known types of early European wooden boat. The builders of these Romano-Celtic boats appear to have used a unit of measurement (55–56 cm – possibly two human feet) to space the framing. There may also have been a 1:2:3 ratio between maximum breadth, length of plank-keel, and length overall. Moreover, it seems possible that, before planking, longitudinal battens on a master frame were used to give hull shape. In these, characteristics may be seen the beginnings of a formal design method. Early framing-first builders probably handed on their skills by word-of-mouth as "rules of thumb," since not until the late medieval period do we get written accounts and illustrations of such procedures (McGrail 2001/2004: 160-65; Oleson 2008: 613-25).

It may be that this northwest European frame-first building sequence originated in the building of hide boats. No early hide boat has been excavated, but there is documentary and iconographic evidence for their use in the British and Irish archipelago from the mid-first millennium BCE suggesting that, in earlier times, they had a significant role in northwest European seafaring. From postmedieval accounts, we learn that such boats were built – as they still are today – by

covering a wicker framework with hides: first the framework; then the "skin": This is the frame-first sequence.

A similar sequence of construction, but differing in detail from that in the Romano-Celtic ships, was used from the fifth/sixth to the ninth century CE to build several Mediterranean planked vessels excavated from Levant coastal waters. It has been suggested that this framing-first building sequence may have come to mind when replacement planking was fitted to the framing of a plank-first vessel (Kahonov 2011: 161-81).

After the fourth century CE in northwest Europe, and the ninth century CE in the Mediterranean, there is, at present, no sign of the frame-first sequence until eleventh century when it was used in Asia Minor and in southern Europe; from there, the technique appears to have spread along the coast of Atlantic Europe as far as the Baltic. In the fifteenth century CE, this sequence was used to build the European sailing ships that sailed "all the seas of the world" (McGrail 2001/2004: 245-57). During this period, there also seems to have been a shift to building frame-first in China (Xi & Xin 1991; McGrail forthcoming). Some of the medieval ships recently excavated in Chinese waters may well have been built "bulkhead-first" – a variant of frame-first. Like the medieval European ocean-going ships, the hull shape of these late-fourteenth century CE Chinese ships appears to have been determined by their framework (of bulkheads).

In both China and Atlantic Europe, this significant shift from plank-first to framing-first (possibly around the same time) was followed by ocean-going voyages: into the India Ocean by the seven Chinese fleets commanded by Admiral Zheng Ho, and into the Atlantic Ocean by Portuguese and Spanish ships.

Building in the Mediterranean

Although logboats have been excavated in the Mediterranean region (for example, in Italy), plank boats, subsequently ships, dominate the archaeological record (Oleson 2008: 606-37). The earliest known are from late-fourth millennium BCE Egypt: In addition to sewn fastenings, wooden tenons were used within the plank thickness to link planking together. Sewn plank boats were still being used in the Adriatic until the twelfth century CE. From the fourteenth century BCE, however, the locked mortise-and-tenon joint (Fig. 6c) appears to have become the principal eastern Mediterranean fastening. It continued in use through Greek and Roman times and on into the Byzantine period until it was superseded by framing-first vessels (without plank-to-plank fastenings).

As Roman commercial interests expanded, the use of mortise-and-tenon plank fastening spread over much of the then-known world. Several northwest European vessels of the early centuries CE were built with such fastenings, including a third/fourth century CE boat excavated from Lough Lene in County Westmeath, some 50 miles northwest of Dublin (O'Heailidhe 1992). This fastening has also been found in southeast Asia: on an undated wreck at Johore Lama in Malaya, and during recent excavations in northern Vietnam of a first century BCE plank-extended logboat and a second century CE boat planking reused in a coffin (Bellwood et al. 2007).

Boat Operations

Steering and Propulsion

Rivers may be obstacles to land travel (hence the development of fords and ferries) but they can also be used as "highways" across land to the sea. Drifting downstream would have been unreliable until a means of steering had been devised – paddles (examples of which have been excavated from European Mesolithic sites), poles, and oars could have been used to steer as well as to propel. Rudders differ from other means of steering in that they are fastened to the hull of the boat and are rotated by the helmsman around their own, near-vertical axis. There are two types: side rudders fastened to the boat's hull on one (sometimes both) quarter(s); and median rudders fastened at the stern. When the helmsman rotates a rudder so that its aerofoil section blade lies at an angle to the water flow, a horizontal force is generated in the water at the stern; this force

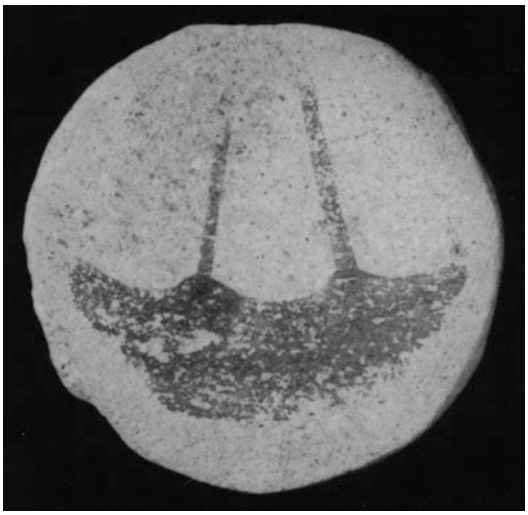

Ship Archaeology, Fig. 7 A painted ceramic disc from Kuwait, dated to the Ubaid 3 period (sixth to fifth MBC), depicting a vessel with a bipod mast (Copyright of Carter 2006: Fig. 4)

causes the boat to turn until the rudder is returned to its neutral position.

The problem of returning upstream against the current was solved in early Mesopotamia by rowing and by towing, the latter from an oared tug or by a team of men walking along the river bank. In Egypt, on the Nile below Aswan where there was generally a northerly wind, sail was used to overcome the northward-flowing current, and propel boats southward. Depictions of the use of sail, dated 3,000–4,000 BCE, have been excavated in Egypt, but earlier evidence has recently been excavated from a site in Kuwait (Carter 2006): a vessel with a bipod mast on a ceramic disc dated sixth to fifth millennium BCE (Fig. 7).

It seems likely that these earliest sails – in both in Mesopotamia and Egypt – could only be used to propel a boat down- or across-wind. How, and when, sailing vessels first made ground against the wind is difficult to determine, but there are indications that it may have been in the second millennium BCE. Interpretation of Egyptian representations of sailing vessels dated to the middle of that millennium suggests that such vessels could have been sailed when the wind was from a point forward of the beam. At around this same time, the methods used to find and settle Oceanic islands appear to have changed significantly. As these pioneering seafarers spread eastward from the western rim of the Pacific, island groups were found to be much more widely spaced. Passages could therefore no longer be undertaken by visual, pilotage methods, and ways of navigating when out-of-sight of land had to be devised (see below – "Early Seafaring"). It may be that at this time, in Egypt as well as in Oceania, a sailing rig was evolved, and procedures established, that resulted in vessels making ground against the wind.

From the dates now given for the earliest depictions of sail in India and China, and in the Eastern Mediterranean, Western Europe, and Scandinavia, it might seem that sail use spread outward from the Egypt–Mesopotamia region through the Mediterranean to Atlantic Europe in the northwest, and through India and SE Asia to China in the east. This may or may not be true, but it is undoubtedly not true that Egypt–Mesopotamia was the sole origin of sail. Early European explorers of the Americas found a range of sail types and rigs on rafts and boats, on both east and west coasts, from the Arctic to Brazil and Peru. Such rigs and sail shapes have no parallels in Europe or elsewhere, and must have had an American origin.

Associated with sail in several European depictions of South American craft was the *guares*, an immersed steering foil or "variable leeboard." These long, wooden boards, of aerofoil cross-section and with a handle at the upper end (Fig. 8), were lowered through gaps between the logs of seagoing rafts. By varying their position and depth of immersion, course could be altered, sailing balance attained, and leeway reduced. Such usage was first noted by Europeans in the eighteenth century CE. Excavated *guares* have been dated to *c*. 300 BCE (McGrail 2001/2004: 401-12).

Sailing Seasons

Periods of storms and of obscured skies were avoided and times of favorable winds used: thus seasonal sailing evolved. In European Atlantic waters, for example, vessels were generally not used on sea passages between mid-October and

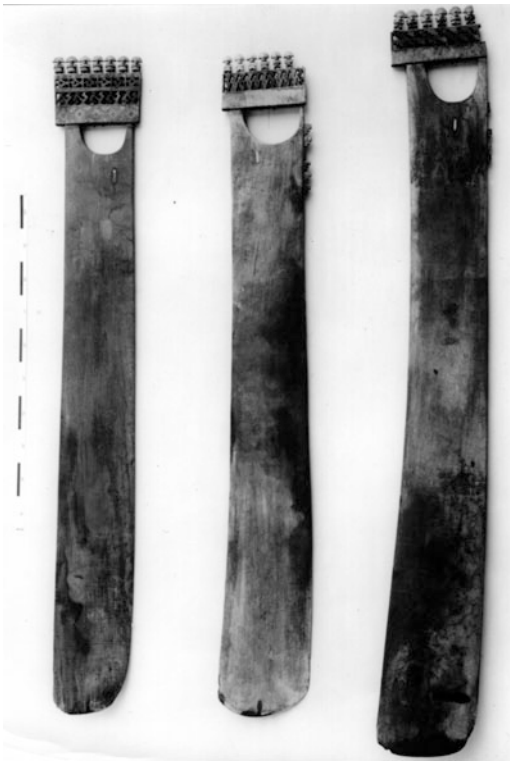

Ship Archaeology, Fig. 8 Variable leeboards ("guares") excavated from graves of c. 300 BCE, at Ica, Peru (Courtesy and copyright of the Museum fűr Völkerkunde, Berlin)

mid-March; similarly, Arabian vessels avoided approaching the west coast of the Indian subcontinent between mid-June and mid-September. In Roman times, ships sailing for India left Red Sea ports in July so that the southwest monsoon wind would take them across the Arabian Sea in August and September. In late November, the northeast monsoon was similarly used for their return passage. Columbus, heir to much seafaring knowledge, timed his pioneering, fifteenth century CE Atlantic voyage so that he would have a generally following, easterly wind for his outbound passage, and, in more northerly latitudes, a fair, westerly wind for his return to European waters (McGrail 1992).

Landing Places and Harbors

In tidal waters, early water transport was used from intertidal beaches where, on each flood (rising) tide, vessels floated. Where beaches and river banks were soft, withies and poles or hurdles and stakes were laid to form a hard. In tideless seas, such as the Mediterranean, on the other hand, vessels were left afloat, at anchor, with their stern moored by line to the shore. Such informal sites are still used in many parts of the world (McGrail 1987/1998: 267-74)

The earliest known harbor walls were built in the eastern Mediterranean during the eighth to ninth centuries BCE to protect landing places exposed to onshore winds and seas. As time progressed, additional features – jetties, lighthouses, silt-dispersal facilities – were incorporated until, by late Roman times, important harbors had many of the facilities seen in nineteenth century Europe. During the tenth to eleventh century CE, as towns in northwestern Europe grew, and economic life became more complex, seagoing ships became bigger. Rather than remaining at anchor, such vessels could more readily be loaded and discharged in deep-water berths, alongside wharfs. These requirements, the state regulation of trade, and the introduction of warehouse marketing methods, all combined to cause a surge in the building of formal harbors at focal points in international networks.

Early Seafaring

There is no direct evidence for any type of water transport before 9,000 BCE, but other archaeological and geophysical evidence demonstrates that Man crossed seas very much earlier (Anderson et al. 2010). Two questions arise about such early voyages:

- What type of water transport was used?
- How did these early mariners navigate?

Water Transport

Since these voyages were undertaken millennia before the date of any excavated example of water transport, it is necessary to work indirectly toward an answer to that first question. Using data from recent examples of all known types of water transport, the technical stage (hence approximate date) appropriate to the building of each one of those types (each with a simple and a complex version)

can be estimated. This method suggests, for example, that the settlement of Australia from southeast Asia in Palaeolithic times could have been undertaken in paddled rafts of bamboo logs (Anderson et al. 2010: 95-107).

Navigation

It seems likely that such early overseas migrations were undertaken over a lengthy period from island to island, with succeeding generations undertaking successive legs. On each passage, in that age of lower sea levels, land would always have been in sight, ahead or astern, or both. Thus, *pilotage techniques*, using the human eye, would have been used to keep track of a vessel's position as she progressed from one island to the next.

From the second millennium BCE, widely spaced groups of Oceanic islands were settled by mariners who must have been out-of-sight of land during much of the passage. It is conjectured that these island groups were first sought on reconnaissance voyages from southeast Asia and from the islands of western Melanesia. Such voyages would have lasted several days during which *deep-sea*, *navigational techniques without instruments* would have been necessary. After these explorers had returned home and thereby "fixed" the position of the newly located islands, settlement voyages in more capacious boats would have been undertaken (McGrail 2001/2004: 339-45).

In the late-twentieth century, Micronesian seaman demonstrated how boats could be navigated without instruments, using methods handed on by their ancestors that are generally similar to those now known to have been used by Arabs and other late medieval seamen. Courses were steered relative to the sea swell or to the wind, or, at night, by reference to specific stars – in the northern hemisphere, especially the Pole Star and its circumpolar constellations. These courses would then be cross-checked during daylight by noting the relative bearing of the sun at sunrise, noon (its highest point), and sunset. The boat's speed was probably assessed by comparison with past performance in the light of the existing wind and sea states, such "speeds" being expressed as "faster" or "slower than usual."

Land may be detected long before it becomes visible, by the sight of cloud sitting over it, by the flight line of birds, and by soundings that reveal decreasing depths of water. The outline shapes of coastlines, especially those with high peaks or distinctive cliffs, would have been memorized for future use. On subsequent passages, navigators would have to identify their actual landfall relative to this known silhouette and thus be able to turn along the coast toward their intended destination. The accuracy of this "navigation without instruments" has been demonstrated during sea trials in which Micronesian navigators, monitored by Australian and American observers, used such methods on Oceanic passages out-of-sight of land.

Future Directions

In conjunction with documentary, iconographic, and ethnographic evidence, excavations have thrown light on the building and the use of the early plank boats and ships of Egypt, the eastern and central Mediterranean, and the European Atlantic seaboard. Furthermore, in Chinese and southeast Asian waters, several important seagoing medieval ships have been excavated and published. In other regions of the world, however, Boat and Ship Archaeology is, at best, still in its infancy. Moreover, direct evidence worldwide for water transport is strongly biased, there is no evidence of early floats and negligible examples of rafts. Furthermore, evidence for boats is almost entirely limited to those built of planks or of logs.

Water transport is its own advertisement: Through the ages, boatbuilders everywhere have been influenced by nearby building traditions, or by the traditions of overseas trading partners. To understand fully the ancient water transport of any one region, a sound knowledge of the ancient vessels of other lands is needed: The early maritime aspects of India, China, and similar regions should be investigated.

By its published research during the late-twentieth to early twenty-first century CE,

ship archaeology has attained a recognized place within the archaeological discipline. To consolidate that position, it is now necessary not only to improve fieldwork techniques, but also to make the study of water transport worldwide, and to trace early examples of every type of float, raft, and boat.

Cross-References

- ▶ Islamic and Maritime Archaeologies
- ▶ Maritime Iconography
- ▶ Mexico: Underwater Archaeology
- ▶ Waterlogged Finds: Conservation

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Shipyard Archaeology

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Introduction

A growing body of international peer-reviewed research on shipyards published since the 1990s is testimony to the rapid expansion of the discipline beyond the traditional focus on shipwrecks and vernacular watercraft. Analytical frameworks such as maritime cultural landscapes

and maritimity, regional and global approaches, ship graveyards, shoreline, and port studies are conducive to the inclusion of shipbuilding and repair facilities (Pastron & Delgado 1991; Pitt & Goodburn 2003). The bulk of the yards that scholars have investigated are located in proximity to active ports in urban areas. The multiple footprints of these sites in the archaeological record, both on land and underwater, are commonly wharves, slipways, docks, sawpits, sandpits for kiln work, warehouses, and specific tools and machinery associated with the shipbuilding process. Researchers have addressed a colorful cross section of themes related to shipyard archaeology including critiques of archaeological methodology, recycling ship parts, innovation and technology, gender, ethnicity, labor, and land use. Management of shipyard sites are associated primarily with concerns about rapid urban development along inland waterways and ports, coupled with lack of training of cultural resource managers to either identify or document these sites (Stammers 1999; Ford 2006; Richards 2008; Harris 2010; Moser 2011).

Definition

A shipyard, generally situated close to the water and building resources, is an industrial site closely linked with labor history and current socioeconomic events. It represents the crucial connecting piece between the product – the ship – manufacturers or shipbuilders, society, and environment in which the ship is designed to operate. There exists a wide variation in the size of the shipyard, services the shipyards offered, and how the yard conducted primary shipbuilding functions through time. Some were located inland on rivers at small towns and others served larger cities and ports.

Moser (2011) proposes a useful typology dividing shipyards into five broad categories or tiers: (1) large state-owned and operated yards like the naval British dockyards of the eighteenth and early nineteenth centuries, (2) well-organized private yards with a large labor force like the Dutch East India Company operatives in Amsterdam, (3) private yards with a substantive labor pool that could build multiple vessels at the same time, (4) smaller private shipyards with single slipways that could only build or repair one vessel at a time such as Wicomico shipyard in Maryland, and (5) shipyards with little permanent infrastructure only constructing or repairing a few vessels and often in dire financial straits.

Key Issues and Current Debates

The limitation of a typology is that most yards, in any time period, went through spiraling stages of economic development and decline influenced by a variety of factors, most prominently war and labor issues. Shipyards in category 3 and 4 often had multiple site identities and served a variety of roles for the local community functions beyond shipbuilding. The multifunctional nature of a "shipyard" further complicates interpretation of the archaeological record. Shipyards were both small and big businesses that survived or thrived, went out of commission, partnered reluctantly or enthusiastically with other enterprises, or dabbled in other economic endeavors in addition to shipbuilding to stay solvent. In the North American colonies, for example, the shipyard labor pool was comprised of a potpourri of immigrants, apprentice and itinerate shipwrights often trained in the large European yards, hired plantation slaves, shipyard-owned slaves trained in shipbuilding skills, and free black and white laborers. Shipyards were supported financially, and often precariously, by family still living in Europe, wealthy local colonial and marriage networks, and lucrative skilled partnerships with other shipwrights. One of the key issues in attempts to add meaning to shipyard research is how to discern the signatures of socioeconomic changes in shipyard status through time. Another dilemma is how to tweak out the essence of contributions of women, family networks, and labor pool to the success and failure of shipyard enterprises from the archaeological record. Lacking that dynamic

socioeconomic context, shipyard archaeology studies are at best only a descriptive site report or database entry.

Between 2003 and 2004 scholars conducted extensive excavations at the *treasure* shipyard or *boachuanchang* in Nanjing. The yard was utilized actively in a period of China's maritime history during the early fifteenth century when thousands of government-commissioned ships ventured from the mouth of the Yangzi River southwards along the Chinese coast to Southeast Asia and the Indian Ocean. Archaeologists recorded multiple pylons believed to provide stable frameworks for ships under construction. Excavators unearthed an assemblage of around 2,000 artifacts. Among the collection were two rudder posts, both over 10 m long. These artifacts complement the 11.6-m rudder post discovered at the same shipyard in 1957, currently stored in the National Museum of China in Beijing. Iron artifacts included shipbuilding tools like knives, chisels, punches, rings, hoops, picks, and nails. Of interest in the archaeological record for shipbuilding processes were iron staples or *bading*. These straight pieces of iron, with the two ends bent at 90° in the same direction, were used to fasten wooden joints. The site also yielded ceramic items including a variety of earthenware and porcelain (Nan Jing Shi Bo Wu Guan 1991).

Shipbuilding yards have been identified in Greece, Italy, and Israel (Baika 2003; Blackman 2003; Raban & Linder 1978: 243). Many ships were simply built on the shores of the beaches, like the Black Sea coastline, with easy access to launching. In Turkey thirteenth-century shipyard buildings survived at Alanya on the Mediterranean Coast. Buildings provided an important study in architecture and further knowledge about the types of warships used by the Anatolian Seljuk. The shipyard is situated within a medieval town, cut into the rock on a hill and surrounded by high walls. The enterprise comprises sheds for building and protecting vessels, metal-working areas, and administrative spaces. Productively utilized, the shipyard not only was a place to build and store ships not in use but also provided facilities for repairs, with the additional capability of producing sails and rigging for the navy (Daggullu 2009: 13–20).

Northern European shipyard scholarship is devoted primarily to military shipyards beginning in the 1970s with work by Courtney (1974–1975) at the Royal Woolwich dockyard. This formative study interpreted land use through time while explaining specific uses of facilities for dockyard operations. While industrial facilities comprise a dominant portion of the work, other ancillary features investigated included the surgeon quarters, the clock house, and roadways. Underwater investigations in the 1990s around the Beaulieu River in England, the London and Amsterdam waterfront centered on slipways, which were the most diagnostic underwater component of a shipyard site. Archaeological interpretation encompassed bathymetric and topographic surveys, followed by documentation of the stylistic features of the slipways (Adams 1994; Gawronski 2003).

In North Wales and North West England, Stammers (1999: 253–264) explored a variety of historical shipbuilder records including census records, court records, trade directories, advertisements, artwork, and ordnance maps showing shipyards. The study identified variation in size of shipyards in urban England and the problem of space in working areas. Stammers reinforces the value of shipyards to the archaeological record as important resources that can show evidence of the construction process of shipbuilding, the materials deployed, information about a workforce, and how it transmitted ideas into tangible form. In Ireland, research of maritime landscapes included phase one archaeological surveys and historical documentation of shipyards such as the industry surrounding Portaferry, a leading port for Strangford Lough during the late eighteenth and nineteenth centuries. The town grew around a sixteenth-century tower house, later expanding into a large industrial operation with three yards that could accommodate the construction of an impressive array of ships for the transatlantic trade (McErlean et al. 2002: 220).

To date, most landscape analysis in the southeastern USA has been devoted to plantation sites rather than industrial sites. In a sense,

Shipyard Archaeology, Fig. 1 Artistic impression of Hobcaw shipyard (Courtesy of Hernandez family)

plantations with slaves trained as craftsmen, including boat and shipbuilders, represent a form of rural and private sector industrialization. Studies of coastal and riverine shipyards including Hobcaw shipyard and Mars Bluff shipyard in South Carolina, McKnight yard in North Carolina, and Willink shipyard in Georgia offer pertinent information about the diverse archaeological signatures of southern shipyards in different time periods and geographic locations (Figs. 1 and 2). The case studies reveal that choice of site, location, and layout plan of the work facility are key elements in understanding the operation of the shipyard. Historical records of these three shipyards like naval recommendations, advertisements for land, sale receipts, probate records, and comments of customers all provide keener insights into social perceptions about suitable shipyard locations, the trade-offs of choices, growth, and fiscal stability of shipyard endeavors.

In 1984 investigations at Hutchinson Island in Savannah Harbor included observations of features such as Willink's marine railway, a shipyard in operation from 1873 to 1898; shoreline spoil edge; and extensive brick scatter. Archaeologists recovered over 2,000 artifacts related to shipbuilding and machinery repair. The material culture record was supplemented by a plat showing wharf lot titles, a floating dry dock, and two useful plans dating respectively to 1879 and 1891 showing landscape features like a fence, engine house, power plant, railway, and city saw mill, and docking area (Babits & Barnes 1984: 48–52). The site was increasingly critical to regional shipping and tracing the sales of this property through time reflected a shift in the use of the harbor and shipyard from small, locally owned companies to a large corporate structure with greater fiscal stability and ability to monopolize the shipping industry.

Shipyard Archaeology, Fig. 2 Caulking tool from Mars Bluff Shipyard (Courtesy of East Carolina University)

During the latter half of the eighteenth century, Hobcaw Creek outside Charleston

became the colony's largest shipbuilding center despite the presence of smaller yards scattered around the colony. An advertisement in the *South Carolina Gazette* on November 30, 1769 by these new partners lists the services of Hobcaw yard and John Rose's other yard, Rose's Wharf in Charleston, including shipbuilding, heaving down, repairing, graving, and mast building. Apart from their service as a shipbuilding depot, the yard also represented a sales depot that supplied the products required for shipbuilding and repair like live oak, cypress, and spars for topmasts, yards, and booms. Despite the existence of several yards on Hobcaw Creek, the success of the yard was attributed to attractiveness of this specific location for naval shipbuilding, sufficient space to heave down three large vessels simultaneously, good depth of water, a freshwater spring close to the shore, and enough distance away from the distractions of the city of Charleston to the laborers. From formative status as a plantation smallholding to small private yard run by two shipwrights, it evolved into the largest state yard leased by the South Carolina Navy during the Revolutionary War. Ultimately, the successful shipyard reverted back to a smallholding in the aftermath of the war, and the shipwright, John Rose, left for Jamaica where he used his shipyard earnings to purchase over 9,000 acres and 221 slaves (Harris 2010: 17–35).

Clients of shipyards also reveal why one shipyard succeeded economically over another – reputable craftsmen, timely completions of tasks, and use of high-quality lumber. Loss of labor, including slave labor, resulted in losing the edge with competing shipyards. Sufficient resources to purchase and train shipyard slaves was more beneficial to business than renting slaves from planters. Consensus between business partners in shipyard businesses about investments and business practices was also a critical part of the equation, as demonstrated in the case of Hobcaw where squabbles about managing shipyard finances ultimately led to a suicide, or murder, of one of the shipyard partners.

By the mid- to late 1800s through years of the Civil War and postbellum period, concerns about the wartime vulnerability of shipyards on the coast and the convenience of shipping hardware materials and machinery by rail became critical planning factors in shipyard location. Southern shipyards served as manufacturing facilities and needed convenient access to transportation networks, building materials, and labor. Other considerations for fiscal success in the investigation of Mars Bluff Confederate War shipyard was proximity of clientele for shipbuilding and repair contracts and a wealthy community to raise funds and invest in the shipyard operation when warfare drained government subsidy of wartime manufacturing.

Shipyard studies primarily consider the role of European men. Less evident are the significant background roles played by women and slaves from the surrounding community in supporting the success of this southern manufacturing industry. Similar to plantations a skilled workforce comprised of slave artisans were an important ingredient for success. Women also played a role in the financing and support behind shipyards, whether through marriage and connections to the local community. Others participated in fundraising and attracting men to the shipyards with social events (Harris 2010: 34–35).

In Australia, ship graveyards or discard areas are frequently also the locale of repairing, modifying, and building ships from recycled parts. In Tasmania ship repairers used the waterway as a demolition yard for vessels beyond repair with floatation problems. Major shipbuilding locations along the Derwent River were situated close to ship dumping grounds (Richards 2008: 88–89). Other places in the world also have correlates between dismantling of ship timbers and shipyards, for example, Egypt, and waterfronts like Dublin in Ireland, Bergen in Norway, and numerous English port cities (Richards 2008: 26). The recycled parts are, in essence, potential chronological records and signatures of socioeconomic trends linked to the life of the shipyard in proximity. A 1,800 shipbreaking yard in San Francisco, California, represents the deliberate salvage of unused hulks along the waterfront subsequent to the Gold Rush (Pastron & Delgado 1991).

Shipyard Archaeology, Fig. 3 Boatbuilding in Tanzania (Courtesy of Lynn Harris)

Future Directions

Possible directions for future research include delving deeper into the historical fabric, ethnographic record, and social narrative from actively working shipyards around the world to develop new frameworks and research questions of a more global character. Neglected geographic areas of scholarship, beyond Europe and North America, suited to shipyard research might be explored to assess potential for contributions to shipyard archaeology and history, for example, sites of traditional dhow shipbuilding at East African Swahili ports (Figs. 3 and 4), along the coast of the Persian Gulf at centers like Qesh, Khamir, Kong, Busher, Ganaveh, Chabahar, and Jask (Fig. 5) (Agius 2008: 142–147; De Leeuwe 2005: 107–113), and in India at Surat, Gujarat, and Alang.

Archaeologists might consider looking beyond seventeenth- to nineteenth-century shipyards to investigate the potential of derelict twentieth century, World War I and II shipyards drawing on a wealth of literature. Historical publications present vibrant and colorful compilations of personal anecdotes and historical information from letters and legal documents. Photographs depicting shipyard facilities, workers, and working scenes add to the appeal of historical investigation and could serve as an essential supplement to material culture studies of shipyards.

Another key direction is exploring appropriate archaeological methodology to interpret shipyard sites and make meaningful contributions to the historical record and management inventory. Ford (2006) and Moser (2011) attempted to create models and typologies using landscape features combined with the historic record to create layers in geographic information systems to predict, locate, and identify shipyard sites in Maryland, USA. While this study contributed to the archaeological and historical database in the state, an acknowledged limitation was that the footprint of substantive archaeological remains was very ephemeral due to shoreline filling, erosion, and development. Artifacts were not specific to shipbuilding and it was impossible to incontrovertibly conclude the presence of a shipyard. These two studies are landmark works towards the archaeological inventory and interpretation of shipyard sites in the new millennium that might be duplicated in other areas of the world.

Beyond basic inventory and exploring reasoning in selecting shipyard location, a productive example of a shipyard study is Goodburn's (1999)

Shipyard Archaeology, Fig. 4 Maintenance on a Tanzanian dhow at low tide (Courtesy of Lynn Harris)

Shipyard Archaeology, Fig. 5 Shipyard in Iran (Courtesy of Sorna Khakzad)

investigation of postmedieval London waterfront where researchers correlated tool marks on wood recovered from shipyards to tools and practices of shipwrights through time. Other diagnostic features of prominence at shipyards are remnants of wharves and docks. There is growing body of unpublished theses and dissertation scholarship since the 1980s on these structures in other contexts, like plantations and waterfront settlements that include critical assessments of typologies, recording methodologies, and theoretical frameworks that might be fruitfully applied to shipyard research. Most recently, a new and less static direction of study by Blackman (2011) that might

be duplicated as an analytical framework is the query into the sociology of landings in the Baltic Sea Region that reaches across time and space, considering shifts in social relations and site functions.

Cross-References

- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Heritage Landscapes
- ▶ Heritage: History and Context
- ▶ Ship Archaeology
- ▶ Shipyard Archaeology

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Siberia: Paleolithic

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Introduction

Siberia is a territory of 13.1 mil km^2 encompassing the northern part of Asia east of

Siberia: Paleolithic, Fig. 1 A: Geographic map of Siberia with the principal regions of Paleolithic research. *1*. Trans-Urals and West Siberia; *2*. Southwestern Siberia (the Altai region, the upper Ob River Basin); *3*. South-Central Siberia (the Sayan Mountains, the upper Yenisei Basin); *4*. East Central Siberia (the Baikal region, the Angara and upper Lena Basins); *5*. North-East Siberia (the Lena, Yana, Indigirka and Kolyma Basins), the Russian Far East

the Ural Mountains to the Pacific coast (the Far East). This vast area has major significance for documenting the evolutionary processes of initial human settlement in the frame of past climates and climate change in the boreal and (circum-) polar regions of the Northern Hemisphere. Particularly, the central continental areas in the transitional subarctic zone between the northern Siberian lowlands south of the Arctic Ocean and the southern Siberian mountain systems characterized by a strongly continental climate regime have been subjected to multidisciplinary Quaternary (paleoecological and geoarchaeological) investigations during the last decades. Siberia is also the principal territory for transcontinental studies and correlations of geological climate proxy records across Eurasia following the East-West and South-North geographic transects (Fig. 1). Among them, loess (fine aeolian dust) represents, together with the Lake Baikal limnological archives, the most significant source of globally indicative paleoclimate and paleoenvironmental data with bearing for reconstruction of the past climate history in the north-central Asia (Chlachula 2003a).

The broader Siberia with the adjacent parts of the Urals and the Russian Far East (the Primorye, Magadan and Chukotka regions) has the key relevance for elucidation of timing and conditions of environmental adaptation of the prehistoric and early historic people to the high latitudes of Eurasia, as well as the initial colonization of the Pleistocene Beringia, including the NW of the American continent. The particular geographic location and the variety in topographic configuration of regional landscape reliefs together with changing Quaternary environments governed by the past global climate change played the key role in this long and complex process over the last 2.4 Ma. The spatial and contextual distribution of the documented archaeological sites reflects a climatic instability and a timely discontinuous inhabitability of particular geographical areas of Siberia. The cyclic nature of glacial and

interglacial stages led to periodic geomorphic transformations and generation of specific ecosystems adjusted to particular topographic settings and responding to acting atmospheric variations. Diversity of the present reliefs and environments, reflecting the past climate change, played the key role in the process of the initial peopling of the immense territory. Paleoenvironmental databases (palynological, paleontological) as well as early cultural records provide unique evidence of strongly fluctuating Pleistocene glacial and interglacial climates, corroborating the continental geological as well as Marine Oxygen Isotope (MIS) chronostratigraphic archives. Because of the large spatial extent and a limited accessibility, particularly the north (eastern) regions of Siberia and the Russian Far East belong to the least explored ones in terms of elucidating the World prehistory.

Definition

The regional geographic diversity with vegetation zonality of Siberia encompassing the southern parkland steppes and semi-deserts, vast boreal taiga forests, and the northern Arctic tundra illustrates the diversity of the present as well as past environments, with the most extreme seasonal temperature deviations in the World ranging from +45 °C to −80 °C. The main physiographical units include the continental basins of the Western Siberian Lowland, the Lena and Kolyma Basin; the southern depressions (the Kuznetsk, Minusinsk, Irkutsk and Trans-Baikal Basins); the Central Siberian Plateau; the mountain ranges in the South (Altai, Sayan, Baikal, and Yablonovyy Range) and in the NE (Stavonoy, Verkhoyanskyy, Suntar-Hajata, Cherskego, Kolymskyy Range). The major Siberian rivers (Ob, Yenisei, Lena, Kolyma) drain the territory into the Arctic Ocean. The Cenozoic neotectonic activity together with the periodic Pleistocene glaciations and interglacial geomorphic processes modeled the configuration of the former relief. During the cold Pleistocene stages, the vast extra-glacial regions of West Siberia south of the NW Arctic ice-sheet were transformed into a large periglacial superzone which became a major sedimentation area of aeolian (silty) deposits cyclically derived by winds from the continental ice-front ablation surfaces. Main paleoenvironmental records, spanning over several hundred thousand years, have been preserved in deeply stratified sections within the major basins (Ob, Yenisei, Angara, and Lena River) that were exposed after progressive erosion triggered by constructions of large dams. Equally important sources of the Quaternary (geological and biotic) paleoclimate proxy data originate from open-coalmines and other modern industrial landscape disturbances.

Because of the complex, multifactorial nature of a long-term climatic and ecology evolution, Siberian geoarchaeology-oriented studies have become increasingly interdisciplinary, integrating Quaternary geology and paleogeography, paleopedology, paleontology, paleobotany, Paleolithic archaeology, and other fields (Chlachula et al. 1999; Prokopenko et al. 2001; Chlachula & Catto 2010). Reconstructions of past environments in the specific regions and the time periods have been used to assess the effects of orbital variations on seasonal and latitudinal distribution of solar radiation and atmospheric circulation patterns, and the consequential changes in regional temperatures, precipitation, and moisture balance. Some long-term models provide means of predicting future climatic evolution in the context of the global climate history and help in the assessment of the modern human factor in environmental change. Because of the pronounced climatic continentality of the territory, even minor variations in atmospheric humidity and temperature led to major transformations in local ecosystems, particularly in the open southern Siberian continental sedimentary basins and the upland depressions.

Geoarchaeology of the Siberian Paleolithic and Mesolithic, framed into the broader scope of Quaternary science, chronologically entails the Pleistocene time span with the documented cultural records dating from the Early till Final Pleistocene depending on the particular geographic area. The evidence of the occupation includes technologically diverse stone and bone

industries, butchered fossil fauna remains, paleoanthropological remains, fireplaces, and other early human behavioral elements stored in geocontexts.

Historical Background

Until the 1980s, Siberia was generally believed to have been colonized by the Late Pleistocene people. Human occupation was traditionally associated with the Late Paleolithic cultures (Tseitlin 1979). Systematic geoarchaeology investigations during the last 20 years across the entire Siberia (with the key research loci in the Tran-Ural region of West Siberia, the Altai region, the Upper Yenisei, Angara and Lena Basins, as well as at the easternmost margins of the Russian Far East in Primoriye and on the Sakhalin Island) revealed several hundred of Paleolithic and Mesolithic sites (e.g., Astakhov 1986; Derevianko 1990; Drozdov et al. 1990; Larichev et al. 1990; Medvedev et al. 1990; Mochanov 1992; Derevianko & Markin 1992; Konstantinov 1994; Marin 1996; Chlachula et al. 1999, 2003; Mochanov & Fedoseeva 2002; Zenin 2002; Vasilevsky 2008; Derevianko & Shunkov 2009). Particularly the discoveries of numerous Paleolithic locations, some of potentially great antiquity (>0.5 Ma), in large-scale surface exposures (river erosions and industrial mining) followed by systematic archaeological investigations within the major river basins of south and central Siberia between the Irtysh River in the west and the Lena River/Lake Baikal in the east (Fig. 1), have provided overwhelming evidence of a much greater antiquity of human presence in the broader Siberia and capability of early people to adjust to changing Pleistocene environments. Cultural remains are located in diverse geomorphic settings (i.e., lowland plains, mountain valleys, upland plateaus) and geological contexts (aeolian, fluvial, lacustrine, palustrine, alluvial, glacial and karstic), with the highest concentrations in the Pleistocene periglacial parkland steppe and the boreal tundra-forest foothill zone. Particularly the geographically extensive and deeply stratified loess-paleosol sections in the southern Siberian parkland zone have revealed a long and complex cultural sequence of human occupation. The variety of cultural finds provides witness to several principal stages of inhabitation of the Pleistocene Siberia, possibly encompassing the time interval close to 1 Ma. The earliest (Early/Middle Pleistocene stages) are represented by "pebble tool" industries, followed by the Middle Paleolithic complexes, including the (Neanderthal) traditions with the Levallois prepared-core stone-flaking technology, and the regionally diverse Late/Final Paleolithic blade complexes eventually replaced by the microlithic Mesolithic cultural facies that developed in response to major natural transformations during the final Pleistocene.

A further northern geographic expansion of humans into the Arctic regions reflects a progressive cultural adaptation to extreme climatic conditions of (sub)polar Pleistocene environments (Mochanov & Fedoseeva 2002). Presence of the Paleolithic sites in North Siberia (Pitulko et al. 2004) provides eloquent evidence that people reached the Arctic coast already before the Last Glacial (>24,000 years ago/ 24 ka BP). All these discoveries logically lead to revision of the traditional perceptions on a late peopling of northern Asia as well as the "late chronology" models of the initial human migrations across the exposed land-bridge of Beringia to the North American continent (Chlachula 2003b). Geoarchaeology studies, particularly in the poorly explored and marginal geographic regions of northern and eastern Siberia (Slobodin 1999; Vasilevsky 2008), are of utmost importance for reconstruction of past climate change as well as the early human history in north Eurasia.

Key Issues/Current Debates

Siberia has principal bearing for elucidating the prehistory of peopling of northern Eurasia, with the key issues of the traditional debate – the antiquity, the chronology of migration processes, and the environmental contexts of the Pleistocene

dispersal of early humans within this vast territory. A specific study issue is the cultural adaptation in the extreme environments of the Russian (sub-)Arctic regions. Interactions of past climate change and the regional relief modeling triggered by the neotectonic activity and reflected by natural transformations of local ecosystems attest to the complexity of the Quaternary landscape development, ultimately affecting timing, intensity, and adaptations of the early human occupation of north-central Asia. Contextual geology, paleoecology, and paleontology records from investigated archaeological sites and stratified geological sections provide evidence of pronounced (paleo) environmental and biotic shifts triggered by the global climate evolution as well as the associated glacial and interglacial geomorphic processes. Quaternary climatic cycles regulated spatial and temporal movements of prehistoric people into the high latitudes of Eurasia. Integrated ecology multi-proxy databases thus document trajectories of the complex and long occupation history of this extensive, but still rather marginally known part of the World.

Southwest Siberia

Natural Context, Paleogeography, and Climate History

The territory of West and SW Siberia, encompassing the West Siberian Lowland, the Altai region, and the Kuznetsk Basin, is characterized by a mosaic physiography with high mountain massifs in the south and east (max. 4,506 m asl), and open lowlands in the north and west (Fig. 1). Hydrologically, the area belongs to the Ob River drainage system with the Katun', Biya, Irtysh, and Tom' River being the main tributaries. The lower relief zone (>1,200 m asl.) includes >50 % of the area and constitutes relics of old denudation surfaces covered by more recent (Pleistocene) deposits derived during glaciations. The territory shows a complex Quaternary history for the last 2.5 Ma governed by climate changes leading to the present pronounced continentality of the inner Eurasia in association with a regional Cenozoic orogenic activity initiated by the Miocene uplift of the Trans-Baikal region and reaching the Sayan-Altai area during the late Pliocene (3 Ma ago). Dynamics of these processes continued until the early Middle Pleistocene leading to construction of a system of mountain ranges separated by deep depressions filled by lakes. The beginning of the Pleistocene period brought a major modification of former landscapes as a result of dramatic climatic changes with progressive continental cooling and aridity. Periodic glaciations caused a regional topographic restructuring with intensive erosion in the glaciated zone and accumulation of (pro)glacial, alluvial, proluvial, lacustrine, and aeolian deposits in the intramontane depressions. The geological records display a wide range of environments and climates. Particularly the deeply stratified loess-paleosol sections deliver most detailed information on high-resolution and globally indicative Late Quaternary atmospheric variations in Siberia.

The climate evolution in the southern mountain regions is witnessed by interglacial alluvial deposits separated by glacial moraine (till) formations with the most extensive dating to the final Middle Pleistocene (MIS 6) glacial stage. The alpine glaciers periodically formed coalescent ice fields supporting large glacial lakes in the central and southern mountain basins of Gorno Altai followed by cataclysmic drainages shaping the paleolandscape topography in the form of prominent glacio-fluvial terraces (Fig. 2). The two Late Pleistocene glacial stages (MIS 4 and 2) are separated by the mid-Last Glacial (MIS 3) warming (59–24 ka BP) associated with accumulation of gravelly alluvial sediment facies from the former ice ablation. The broken mountain relief differentiated the regional climatic pattern during the Last Glacial (24–12 ka BP), with microclimate conditions in protected locations along the northern Altai foothills and in the central Katun' River basin, allowing potential survival of interstadial flora and biota until the Holocene. The Pleistocene climate variations in the lowland extra-glacial areas of SW Siberia and the continental depressions north of the Altai-West Sayan Mountains are evidenced by a massive deposition of aeolian (silty and sandy)

Siberia: Paleolithic, Fig. 2 A system of terraces at the confluence of the Katun' and Chuya River (Gorno Altai) resulting from cataclysmic drainages of ice-dammed glacial lakes. The mountain areas of Siberia provide witness of major past geomorphic processes having impact on visibility and preservation of the Pleistocene occupation sites

deposits during glacial periods and surface stabilization with soil formation during warm (interglacial/interstadial) stages. The extensive loess-paleosol formations on the Altai Plains provide the most detailed multi-proxy records of the climatic cycles for the last c. 300,000 years. The MAT during the Last Interglacial climatic optimum (MIS 5e, 125 ka BP) in SW Siberia was by 1–3 °C higher than at present, with a c. 100 mm increase in annual precipitation. Environmental conditions were broadly similar to the present ones during the following interstadials that were the most suitable time intervals for human colonization and inhabitation.

Pleistocene Environments and Early Human Occupation

Studies of the Paleolithic and Mesolithic occupation have a long tradition in Siberia with the key foci in the Altai region. The transient geographic areas along the margin of SW Siberia are believed to be the main gateway and passages for early human migrations from the southern regions of Central Asia into Siberia (Fig. 1). Reconstruction of the past climate dynamics that shaped the configuration of the regional topography and local ecosystems is essential for understanding timing and adaptations of the initial peopling of northern Asia. The spatial distribution of the Pleistocene sites on the territory of SW Siberia shows a location of most sites within the 75–150 km wide zone of the 300–1,000-m altitude between the southern mountain ranges and the northern plains and lowlands (Baryshnikov & Maloletko in Chlachula et al. 1999). This (paleo)geographic occupation pattern, reflecting specific environmental adaptation strategies to local settings, applies for both open-air localities buried in alluvial, colluvial, or aeolian deposits, as well as cave sites concentrated in the NW Altai (the Anui valley). Formation of the karstic systems is linked to a progressive down-cutting by fluvial erosion through the Devonian-Carboniferous limestone bedrock during the late Middle Pleistocene.

Timing of the Pleistocene human migrations in Siberia was principally governed by climatic change and the associated environmental development. Intensified orogenic uplifts, triggering large-scale erosions in river valleys, reshaped natural occupation habitats. Relatively stable conditions seem to have persisted in the central and northern Altai due to increased regional precipitation and a tempering atmospheric effect of the mountain ranges. Limestone caves provided shelters for a more permanent human inhabitation of the Altai area, particularly in the northern foothills and the central intramontane depressions (Derevianko & Markin 1992; Markin 1996), characterized by warm microclimate conditions. The initial peopling of

the Altai-West Sayan region likely occurred in some of the early Middle Pleistocene interglacials in the process of the northern expansion of warm biotic communities. Mixed coniferous and broadleaf forests established in the mountain areas with elevations 1,500–2,000 m asl. Parklands covered most of the adjacent plains of southwest Siberia with continental depressions filled by lakes and drained by meandering rivers. Rudimentary core and flake ("pebble tool") stone industries scattered on high river terraces and along former lakeshore margins of the present arid basins (Kuznetsk and Zaisan Basin) attest to several stages of early human inhabitation and a relative environmental stability (Chlachula 2010). There is limited evidence on persistence of the Early Paleolithic occupation during glacial stages, although some intermittent semi-continuity in the southernmost areas is assumed in view to finds of weathered lithic artifacts from the old periglacial alluvia in association with cold-adapted megafauna. Mastering the technique of fire making was clearly the main precondition for early human survival in cold tundra-steppe and tundra-forest habitats of southern Siberia.

The Last Interglacial warming (starting at 130 ka BP) is associated with a recolonization of southern Siberia by coniferous taiga forests and the appearance of the Mousterian Neanderthal tradition. Changes in the relief configuration influenced a regional climate regime and opened new niches of habitats for the Middle Paleolithic population concentrated in the karstic area of the NW Altai foothills (Ust'-Kanskaya, Strashnaya, Denisova, Okladnikova, Kaminnaya Caves) as well as at open-air sites in the central valleys (Kara-Bom, Ust'-Karakol, Tyumechin I and II) (Derevianko & Markin 1992; Chlachula et al. 1999). The Middle Paleolithic horizons, encompassing a timespan of up to 140,000 years (180–40 ka BP), represents a marked cultural phenomenon in the Altai (Figs. 3 and 4). Isolated teeth (2) from the Denisova Cave dated to MIS 5 and identified as *Homo neaderthalensis* support the model of biological evolution of premodern humans in Siberia (Derevianko & Shunkov 2009). Major cooling during the early Last Glacial (MIS 4) led to establishment of full glacial conditions in the central and southern Altai, and a zonal geographic replacement of boreal forest by periglacial tundra forest in the northern Altai and by arid tundra-steppe in the adjacent lowlands (the Ob River basin and the Kuznetsk Basin). Accentuated moderate climate fluctuations between cold stadials are evidenced by embryonic regosolic soils in the loess formations on the North Altai Plains and sparse cultural records in protected locations in the Altai foothills.

Siberia: Paleolithic, Fig. 3 Stratigraphy of the multilayer Denisova Cave Site (the Anui River valley, NW Altai) enclosing a series of c. 15 occupation horizons dating since the late Middle Pleistocene until Holocene

Human occupation of the central and southern Altai during the early Last Glacial (74–60 ka BP) was impeded by harsh, ice-marginal environments and expansion of glaciers in the upper reaches of the Katun'-Chuya valleys subsequently filled by proglacial lakes. Progressive

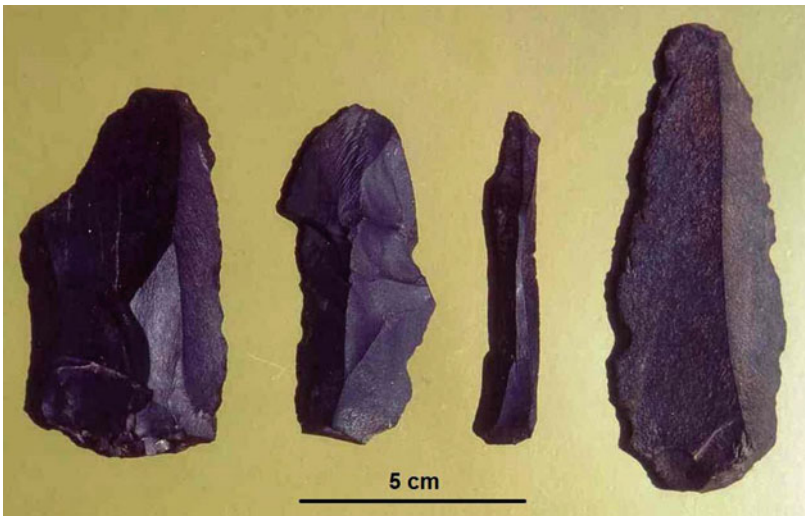

Siberia: Paleolithic, Fig. 4 Denisova Cave, the Anui River valley. A transitional Middle-Late Paleolithic industry including the Levallois as well as the blade stoneflaking techniques

Siberia: Paleolithic, Fig. 5 Krasnaya Gorka Site (Gorno Altai). A view from the Paleolithic locality positioned on a promontory of an alluvial fan (1,780 m asl) over the Chuya River valley with stone artifacts made on highquality raw materials (jasper, chert) exposed by erosion on the present top surface

warming during the early mid-Last Glacial interstadial interval (MIS 3, 59–35 ka BP) caused a dramatic wasting of the ice fields accompanied by cataclysmic releases of ice-dammed lakes and large-scale mass-flow and slope erosional processes (Fig. 2). The former valley glaciers receded to the highest elevations as corrie glaciers. The periodic outbursts of the glacial basins had a dramatic impact on the local ecosystems, but also obliterating most of the earlier cultural records. Enormous erosional processes associated with these major events significantly reduced the site visibility potential in the formerly flooded areas, with traces of former inhabitation locations preserved only at high topographic elevations above the glacial lake basin waterlines (Fig. 5). Mixed forests dominated by birch, pine, spruce, and fir invaded the former periglacial and ice-marginal landscape. The presence of broadleaf arboreal taxa (oak, lime, chestnut, maple) indicates a climate warmer than at the present time.

Siberia: Paleolithic, Fig. 6 Stratigraphy of the Ust' Karakol Site (the Anui Halley, NW Altai) with several Late Paleolithic occupation horizons ^{14}C-dated to 28,700–31,400 year BP. Complex post-depositional processes are evidenced by slope-wash and cryogenic periglacial disturbances of the geological context due to climatic fluctuations in the Altai Mountains during the mid- and late Last Glacial stage

Increased humidity and cooling during the later stage of the mid-Last Glacial interstadial interval (35–24 ka BP) initiated mass gravity slope processes and cryogenic deformations followed by warmer oscillations with formation of podzolic gleysols (Fig. 6). Appearance of the transitional early Late Paleolithic cultural facies reflects human adaptation to mosaic interstadial habitats, including sub-alpine taiga, dark coniferous forests, mixed parklands, and steppes with mixed non-analogue biotic communities. The identical geographical distribution of the Middle-Late Paleolithic sites and the time-transgressive lithic technologies suggests a regional cultural (and biological?) continuity in the Altai area during the Late Pleistocene (Derevianko 2010). A phalanx fragment from Denisova Cave dated to 40,000 years ago and interpreted on basis of DNA as an extinct human species (Dalton 2010) reinforces this scenario. Reestablishment of cold tundra-steppe habitats correlates with dispersal of the developed Late Paleolithic with blade-flaking techniques in stone tool production and associated with a periglacial "mammoth" megafauna that possibly survived in protected and climatically milder locations in the northern Altai throughout the LGM (20–18 ka BP). Emergence of the microlithic stone tool assemblages with wedge-shape cores is linked with a new cultural adjustment during the final stage of the Paleolithic development responding to natural transformations of the former periglacial ecosystems toward the end of Pleistocene.

South-Central Siberia

Natural Context, Paleogeography and Climate History

The south-central Siberia, bordered by the western Mongolia from the South and the Central Siberian Plateau in the North, is topographically and biotically a varied territory structured by high ranges of the Sayan Mountains passing into foothills transected by river valleys draining water discharge from the southern mountain massive (Fig. 1). The regional (paleo)relief is built by the south Siberian continental basin with intermountain depressions modeled by fluvial erosion of the Yenisei River and its tributaries. An extensive loess cover with a series of buried paleosols in the parkland-steppe zone of the Northern Minusinsk Basin, being a continuation of the southern Siberian loess belt, has provided the most complete, high-resolution Late Quaternary paleoclimate record in the north-central Eurasia (Chlachula 2003a). The interglacial periods are evidenced by stages of landscape stabilization and soil formation disrupted by intervals of loess

deposition and cryogenic surface deformation during cold (glacial/stadial) stages. Coupled with the pollen evidence, the continuous loess-paleosol sequences encompassing a time interval of the last c. 300,000 years (MIS 8-1) document periglacial steppe-tundra established during cold stadials, replaced by mixed boreal forests and a mosaic parkland steppe during warm interstadials and interglacials. The associated Pleistocene natural transformations are reflected in the large diversity of fossil faunal species, including non-analogue communities, to modern biota. The variety of the Quaternary faunal communities recorded in the Minusinsk and Kuzbas Basins documents particular evolutionary stages with zonal vegetation shifts triggered by pat climate change. The presence of cold-adapted species in the fossiliferous sedimentary beds indicates a very high biological potential of the Pleistocene periglacial steppe. A major drop of annual temperatures marks the time around the Last Glacial Maximum (20,000–18,000 years BP) that was less dramatic than during the preceding early Last Glacial stage (74,000–59,000 year BP). A progressive warming with several climatic oscillations expressed by an initial pedogenesis characterizes the Final Pleistocene climate development, leading to establishment of the Holocene (MIS 1) interglacial conditions. The present continental climate (with MAT −0.4 °C), with cold and dry winters with little snow cover and warm to hot summers, is strengthened by the geographical location of the territory near the geographical center of Asia.

Pleistocene Environments and Early Human Occupation

The upper Yenisei basin in the southern part of the Krasnoyarsk Region is together with the Altai region and the Angara basin in the Irkutsk Region the key area of the Quaternary climate and Pleistocene geoarchaeology studies. Systematic investigations in the Northern and Southern Minusinsk Depressions, initiated after progressive erosion of unconsolidated aeolian (loess) deposits, revealed a rich series of Early, Middle, and Late Paleolithic stone industries associated with abundant fossil faunas (Drozdov et al. 1990; Chlachula et al. 1999). The main focus of the current studies is on reconstruction of the Pleistocene ecology and chronology of the human occupation in the frame of peopling of Siberia. The loess-paleosol formations, being the principal geological context of the early human cultural remains, also have a fundamental bearing for the high-resolution mapping of the past climate and the environmental history of north-central Asia. The archaeological and paleontological records incorporated in fluvial and subaerial sedimentary formations have provided new insights on timing, processes, and conditions of the initial peopling of this territory, as well as on the ecosystem biodiversity of the Pleistocene occupation habitats.

The earliest archaeological (Early Paleolithic) finds represented by simply flaked, but diagnostic stone artifacts originate, together with the taxonomically rich paleontological remains, from alluvial gravels of the 60–70-m Yenisei River terrace beneath 20–40-m thick loess deposits. The abundant "pebble tool" assemblages bear witness to human occupation of the area prior to the Last Interglacial (>130 ka BP). The formal variability of these lithic industries, displaying a differential degree of patination and aeolian abrasion, points to several stages of peopling with the earliest documented from the Tobol Interglacial (the Berezhekovo Site). The cultural implements also suggest, in conjunction with the cold-adapted megafauna, an early human adjustment to local periglacial environments. The archaeological records from the Minusinsk Basin, together with analogous finds from the Kuzbas and the Angara Basins (Medvedev et al. 1990), indicate a repeated occupation of the broader southern Siberia during the Middle Pleistocene (740–130 ka BP).

Evidence on the more recent Middle Paleolithic inhabitation of south-central Siberia is principally from the foothill areas of the Altai and Sayan Mountains and the local tributary river valleys (Konstantinov 1994; Derevianko 2010). Favorable climatic conditions promoted expansion of the Mousterian (Levallois) tradition during the Last Interglacial (MIS 5) that persisted until the early Last Glacial stage (MIS 4).

Siberia: Paleolithic, Fig. 7 Late Quaternary loess sections at Kurtak exposed along the Krasnoyarsk Lake (the Northern Minusinsk Basin, south-central Siberia) with the Last Interglacial pedocomplex encompassing a time interval of 130–74 ka BP (Section Kurtak 29). The buried parkland-steppe paleosols (MIS 5e, 5c, 5a) correlate with stages of the Middle Paleolithic occupation of the area

Siberia: Paleolithic, Fig. 8 The Middle Paleolithic occupation site Ust'-Izhul' (the Kurtak Archaeological Region) dated to 125,000 year BP. Remains of megafauna (mainly of early *Mammuthus primigenius*) with stone artifacts and fireplaces attest to early human hunting and adaptation strategies in the upper Yenisei River Basin

In the Minusinsk Basins, the Middle Paleolithic is principally found in the Last Interglacial (130–74 ka BP) paleosols (Fig. 7). An exceptional Middle Paleolithic occupation site Ust'-Izhul' produced concentrated fossil skeletal remains incorporated in situ on top of the Last Interglacial (MIS 5e) chernozem IRSL dated to 125 ± 5 ka and overlying the 65 m Middle Pleistocene Yenisei terrace (Chlachula et al. 2003). The well-preserved fauna included an early form of mammoth (*Mammuthus primigenius* Blum.), wooly rhinoceros *(Coelodonta antiquitatis)*, bison *(Bison priscus)*, horse *(Equus mosbachensis)*, elk *(Cervus elaphus)*, as well as small mammals (Fig. 8). The most abundant species – mammoth – was represented by at least 12 individuals, parts of which were recorded in anatomical position. The associated and mostly expedient stone artifacts (200 pcs) were used for processing the slaughtered animals. Human activity is also manifested by flaked/cut ivory and bones of mammoth, rhinoceros, bison, and elk, and

by three fireplaces with a fir-wood charcoal ($^{14}C > 40$ ka BP). The paleogeographic site configuration with the discrete concentration of the skeletal remains point to game hunting by people in the nearby area over a terrace cliff and transported in dissected pieces to the habitation place. In respect to the high age and the contextual completeness, the Ust'-Izhul' locality is unique in Siberia. The megafaunal assemblages bear witness to the rich biological potential of the Yenisei area for early human inhabitation. There is no consensus if the Middle Paleolithic tradition in southern Siberia can be associated with the European and Near Eastern cultural milieu, although some "classical" Mousterian influences in the Altai cave sites are evident (Derevianko & Markin 1992). Analogous cultural finds are exposed on the present surface in low-sedimentation-rate areas of Khakhasia, Tuva, Gorno Altai, and East Kazakhstan (Astakhov 1986; Chlachula 2010). The Middle Paleolithic stone-flaking technology, especially the Levallois technique, is still reminiscent in the Late Paleolithic traditions, suggesting a certain continuity of the cultural and possibly biological human evolution in Siberia during the Pleistocene.

The Late Paleolithic occupation in the southern Central Siberia is documented at both open-air and cave sites. Warming during the mid-Last Glacial interstadial stage (MIS 3) accelerated the cultural development characterized by blade-flaking techniques. The upper Yenisei basin is one of the major loci of the Late Paleolithic sites in Siberia (the Krasnoyarsk – Kanskaya forest-steppe, the Northern and Southern Minusinsk Basin, and the Western Sayan foothills) (Astakhov 1986; Drozdov et al. 1990; Larichev et al. 1990; Vasiliev 1992). The earliest occupations are buried in the Karginsk (MIS 3) pedocomplex (31–29 ka BP), in the early Sartan loess and the intercalated, weakly developed interstadial forest-tundra soils (dated to 25–22 ka BP). Intervals of significant climatic deterioration and onset of full Last Glacial (MIS 2) conditions are manifested by the absence of archaeological records except for biotic refugia in the northern foothills of the Western Sayans. During the LGM (20,000–18,000 year BP), the Yenisei area, as most of southern Siberia was vacated due to very cold and hyper-arid conditions with the biologically productive mid-Last Glacial parkland steppe replaced by barren steppe-tundra. More recent Final Paleolithic finds from the lowland and foothill areas provide evidence of recolonization of the upper Yenisei region during warm climatic oscillations at the end of the Pleistocene. A reindeer, red deer, argali sheep hunting, composite bone tools (spears/harpoons), and a micro-blade stone flaking illustrate major shifts in adaptation strategies in response to changing environments during the warm interstadial (16–13 ka BP), preceding the last cold climatic interval of the Final Pleistocene (Younger Dryas, 12.9 ka BP). The present archaeological records from the larger southern Central Siberia provide definite evidence that this territory was occupied repeatedly by people at several stages during the Pleistocene, including some intervals of glacial stages with productive periglacial natural conditions. Human occupation may have persisted throughout the Last Glacial in protected southern locations despite severe climates over most of the northern plains.

East Siberia

Natural Context, Paleogeography, and Climate History

East Siberia, including the Pribaikal area (the upper Angara Basin), the Trans-Baikal area (the Selenga Basin), and the Lena Basin, is a vast territory of contact of the tectonic structures of the Siberian Platform and the adjoining mountain massifs (Fig. 1). The major orogenic activity initiated during the Pliocene/Pleistocene (the Baikal Tectonic Phase spanning for the last 3.5 Ma) led to formation of the present regional topographic configuration built by a series of tectonic depressions. The Baikal rift zone extends for about 2,500 km from Lake Khubsugul in Mongolia to the upper Aldan River in SE Yakutia. Most of the relief is shaped by smooth mountain ranges (800–1,300 m asl.) separated by river valleys and shallow basins occupied by mixed (spruce, larch, and birch) taiga forests. Cold and extreme continental climatic conditions prevail in East Siberia (MAT −4 °C). Most of the

territory is covered by mountain tundra with larch *(Larix sibirica)*, Siberian pine *(Pinus sibirica)*, and dwarf birch *(Betula nana)* and underlain by seasonally active perennial permafrost.

The paleogeographical and paleoenvironmental evolution over East Siberia during the Quaternary was influenced by a dynamic interaction of global climatic change and the regional neotectonic modeling. The orogenic movement around the Pliocene/Pleistocene boundary (2.5 Ma ago) triggered uplifting of the Pribaikal and West Trans-Baikal regions, reactivated during the early Middle Pleistocene (after 750 ka BP) with accumulation of thick deltaic, fluvio-lacustrine, and slope deposits filling major river valleys and intermountain depressions. The Cenozoic tectonics in conjunction with the mountain glaciations continuously shaped the topography of Eastern Siberia structured by a system of mountain ranges (North Baikalskyy, Verkhoyanskyy, Cherskego, Kolymskyy) separated by the major (Angara, Lena, Viluy, Aldan, Indigirka, Jana, Kolyma) river basins and their tributaries. The sub-rifting regimes of the Mongolian-Siberian mountain zone gave rise to a diversity of geomorphic settings throughout the Pleistocene. The Quaternary glaciations over the East Siberian mountain ranges with the major one of the late Middle Pleistocene (MIS 8) played a significant role in the regional landscape development and environmental shifts in the extra-glacial depressions. Contrary to the Pribaikal Highlands, experiencing the most extensive glaciation during the Last Glacial Maximum (20–18 ka BP) with piedmont glaciers advancing far down into the foothills (Rezanov & Kalmikov 1999), only isolated ice-caps and corrie glaciers formed in the Eastern Sayan Mountains (above 2,700 m) and on the NE Siberian mountain ranges (Verkhoyanskyy, Cherskogo, Kolymskyy) despite very low temperature, but due to a high aridity and lack of winter precipitations.

The Pleistocene climatic variations in the extra-glacial areas are witnessed by a wide range of paleosols indicating mosaic vegetation and a high relief zonation. Increased accumulation rates of aeolian sediments with periglacial deformations point to a gradual cooling during the Late Quaternary. A major drop of temperature following the Last Interglacial climatic optimum (MIS 5e; 125 ka BP) around 115 ka BP (MIS 5d) suggests a major glaciation in the eastern Siberia corroborated by records from Lake Baikal as well loess-paleosol sequences (Prokopenko et al. 2001; Chlachula 2003a). The mid-Last Glacial (MIS 3) optimum (31 ka BP) was thermally approaching the Last Interglacial (MIS 5e) climate conditions. Fossil pollen, fauna, and early cultural records from stratified geological contexts provide evidence of pronounced regional paleoecology changes in occupation habitats. A great variety of the early Quaternary faunal communities became reduced as a result of the long-term climatic cooling, leading to the relative taxonomic species uniformity in the Late Pleistocene.

Pleistocene Environments and Early Human Occupation

Present cultural evidence attests to several stages of human inhabitation of Eastern Siberia during the Pleistocene, with the oldest represented by the Early and Middle Pleistocene records, implying very early hominid migrations into the middle and high latitudes of Asia. Systematic investigations at the occupation sites in the upper Angara, Lena, Vitim, Aldan, Viluy, and Selenga River basins, along the Baikal Range and the Eastern Sayan foothills, contextually associated with diverse paleo-geomorphic zones and geological (alluvial, colluvial, aeolian, karstic) settings, deliver detailed multi-proxy information on the Pleistocene climate evolution and the associated paleoenvironmental trends (Medvedev et al. 1990; Mochanov 1992; Konstantinov 1994; Lbova 1996; Mochanov & Fedoseeva 2002; Ineshin & Teten'kin 2010). Archaeological sites may be partly obliterated or poorly preserved around the Lake Baikal due to the neotectonic activity, triggering intensive erosional processes. The cultural finds, chronologically defined by the stratigraphic geological positions and technological attributes of stone flaking, include: (1) the Early Paleolithic from the Early(?)/Middle Pleistocene alluvial deposits (>130 ka BP); (2) the

Middle Paleolithic buried in the Last Interglacial (MIS 5) pedocomplex and the early Last Glacial (MIS 4) gleysol horizons; (3) the early Late Paleolithic (42–30 ka BP) from the mid-Last Glacial (MIS 3) humic soils; (4) the "classical" Late Paleolithic from the late mid- and early Last Glacial (MIS 2) gleyed soil horizons (30–17 ka BP); (5) the final Paleolithic (17–12 ka); and (6) Mesolithic (12–8 ka BP) from diverse geo-contexts.

The earliest Pleistocene sites are associated with old alluvial formations in the Lena and Angara River basins. The Diring Uriah Site sealed in coarse sandy deposits of the 200-m-high terrace of the Lena River is presently one of the earliest sites found in Siberia (Fig. 9). Despite its indefinite chronological assignment ranging from 2.5 Ma to 350 ka (Mochanov 1992), this site eloquently demonstrates a very early peopling of northern parts of Asia in the principal river valleys during some of the Early but surely the Middle Pleistocene interglacials that also promoted northern expansion of mixed taiga and open parklands. The Middle Pleistocene cultural records from the upper Lena and Angara areas, represented by stone artifacts made of quartz and quartzite cobbles with the typical archaic tool forms (choppers, bifaces, scrapers on flakes, polyhedral cores), display strongly wind-abraded surfaces. The age of these cultural assemblages from the Angara region exposed along the Bratsk Lake (the Igetei locality), referred to as of the Acheulian-Mousterian tradition, is estimated to be c. 200 ka BP, corresponding to the Shirta Interglacial /MIS 7 (244–170 ka BP) (Medvedev et al. 1990). A Middle Paleolithic occupation at the Mungkharyma Site (64*N) located on the 70 m terrace of the middle Viluy River produced a well-made stone industry of the Levallois tradition, including bifaces, bifacial knives, and side-scrapers, found with Pleistocene fauna (mammoth, wooly rhinoceros) (Fig. 10). A luminescence date 150 ± 38 ka BP (RTL-958) from the overlying sandy-silt layer suggests a (late) Middle

Siberia: Paleolithic, Fig. 9 Anthropogenically worked quartz flakes from the Diring site from the 200 m Lena River terrace representing the earliest (Early Paleolithic) cultural inventories found in NE Siberia

Siberia: Paleolithic, Fig. 10 Excavations of the Middle Paleolithic Mungkharyma Site (64*N) on the 70 m Viluy River terrace, east-central Yakutia (Y.A. Mochanov 2009)

Siberia: Paleolithic, Fig. 11 The Middle Paleolithic quartzite tools from central Yakutia (the Kyzyl Syr Culture) (Courtesy S.A. Fedoseeva)

Pleistocene age (Mochanov & Fedoseeva 2001). Climatic cooling, leading to expansion of mosaic steppe and pine-larch parklands, is linked with the onset of the Samarovo (270–244 ka BP) glacial period. A drop of annual temperature and increase in aridity during the Tazov Glacial (170–130 ka BP) hastened the degradation of interglacial forests and extension of open periglacial landscapes. The marked final Middle Pleistocene environmental deterioration is indicated by a cold-adapted tundra-steppe fauna from alluvial deposits including progressive taxa (mammoth, wooly rhinoceros, bison, horse, kulan, giant deer, argali), as well as species specific to the Trans-Baikal area (the Kiakhta antelope, the Baikal yak, dzeren, camel). Human survival in SE Siberia during the Samarovo (MIS 8) and the Tazov (MIS 6) glacial stages with MAT by up to −10 °C lower than at the present time presumes knowledge of fire making. The Middle Pleistocene sites from the central and southern Lena basin and its tributaries (Viluy, Aldan) (Fig. 11) have the principal implications to the initial prehistoric colonization of NE Asia as well as North America.

During the Last Interglacial (MIS 5), mixed taiga forests were widely distributed in the mountain areas, indicating a temperate continental climate with summer air temperatures up to 5 °C higher than at present. Fossil chernozems at the Middle Paleolithic sites Mal'ta and Igetei (MIS 5e and 5c, resp.) illustrate open parkland-steppe settings of the upper Angara basin. Marked cooling, increased aridity, and intensified aeolian activity contributed to accumulations of extensive sandy deposits derived from drying up of river beds in the Irkutsk Depression and the Lena Basin during the early Last Glacial (MIS 4). Cold intervals with increased humidity correlate with cryoturbation processes, solifluction horizons, and pollen records of invading periglacial grasslands and open pine-birch tundra. Despite very harsh conditions, a Middle Paleolithic (Mousterian?) occupation may have locally survived in the Angara area. The mid-Last Glacial interval (MIS 3), with an early cold and arid loess sedimentation phase (59–40 ka BP) followed by a warm and humid pedogenic phase (40–24 ka BP), brought a major change in the distribution of vegetation zones in East Siberia, with a northern expansion of mixed taiga forests and pine-birch dominated parklands. Broad-leaved arboreal taxa (oak, beech, elm, hazel) distributed in river valleys of the Baikal region attest to mosaic habitats with climate conditions possibly warmer than today. Cultural finds from the principal occupation sites (Ust'-Kova in the Angara basin, Mezin in the Kana valley, Kamenka in the Selenga basin, and the Aldan River complex) dated to 30–24 ka BP display a poor preservation due to cryogenesis and solifluction processes persisting until the onset of late Last Glacial (Sartan) stage (MIS 2). Remains of fauna exploited by people (horse, antelope, wooly rhinoceros, mammoth, bison, sheep-argali, and camel) and rodent taxa are indicative of an open steppe and parkland habitat. At the Kamenka Site, specific site complexes of game-processing, wood-working, stone and bone tool production, mineral paint manufacturing, and other behavioral cultural (ritual) activities were documented (Lbova 1996). The fossil fauna variety from different (mountain) ecotones shows a wide (>100 km) mobility range of the local Paleolithic hunters. A northern expansion of the Late Paleolithic occupation ambit into the extreme parts of the East Siberian Arctic is recorded at the Yana RHS site located 100-km south of the Laptev Sea coast (70° 43′ N, 123° 25′ E) (Pitulko et al. 2004).

Siberia: Paleolithic, Fig. 12 A view from the Final Pleistocene Kheta Site onto the Kheta valley, the Kolyma Basin, NE Siberia. River valleys served as the main migration corridors during the Pleistocene colonization of the northern territories of Siberia all photos by the author

The cultural evidence (stone and bone industry) and fossil fauna sealed in frozen and cryogenically distorted silt blocs on an 18 m Yana River terrace dated to 28–26 ka BP indicate late interstadial (MIS 3) climates and an environmental stability of floodplain meadows of the Yana River delta. This site provides evidence of humans migrating along the ice-free northern coast of Siberia/the exposed continental Arctic shelf.

During the late Last Glacial stage (MIS 2) – the Sartan Glaciation (24–12 ka BP) – tundra-steppe covered most of the territory occupied by the Late/Final Paleolithic people represented by the famous sites Mal'ta and Buret' in the upper Angara basin (Tseitlin 1979). Climate deterioration with sparse Arctic vegetation and a progressive loess accumulation around the LGM caused presumably a major decline in the population density over East Siberia despite some adaptation indices to extreme periglacial environments (the Krasnyy Yar Site in the upper Angara with animal bones and fossil coal used as fuel) (Medvedev et al. 1990). A periglacial fauna (horse, wooly rhinoceros, mammoth, bison, giant deer, elk, saiga) implies cold periglacial tundra-steppe in the Angara, Lena, and the Trans-Baikal basins. Climate amelioration after the LGM (18 ka BP) is best evidenced by rodents from the Baikal-Angara-Lena Paleolithic sites (Buret', Krasnyy Yar, Igetei, Mal'ta, Bolshoi Jakor) that indicate a gradual transition from tundra-steppe and meadow-steppe to forest-steppe landscapes corresponding to shifts from a cool and dry climate to milder and humid conditions. This warming trend fostered dispersal of the Final Paleolithic complexes during the late Last Glacial (18–12 ka BP) associated with the Diyuktai Culture with micro-blade stone and bone technologies. The Final Pleistocene recolonization of East Siberia reached the marginal subpolar regions of the NE Arctic (e.g., the Berelekh Site in northern Yakutia at 70° N, dated to 14–13 ka BP). The broad geographical distribution of the new technologies to the most distant parts of Siberia and the Russian Far East Islands (Slobodin 1999; Vasilevskyy 2008; Ineshin & Teten'kin 2010) reflects a successful prehistoric adaptation to the Final Pleistocene environments (Fig. 12). This process culminated in a spatial spreading and presumably a major population increase by the end of the Pleistocene, represented by the early Mesolithic (11–10 ka BP) hunters and gatherers. In sum, the geological and biotic climate proxy records document a complex Quaternary evolutionary environmental development in East Siberia as seen in the gradual cultural adaptation of people and the geographic expansion of occupied areas.

International Perspectives

The geological and paleoecological evidences across western, south-central, and eastern Siberia, including the Ob, Irtysh, Kuznetsk, Yenisei, Angara and upper Lena basins and the adjacent regions of the Trans-Urals, Altai, Western and Eastern Sayans Mountains, Baikal Range and the NE Siberian mountains, disclose cyclic climatic changes during the Quaternary leading to establishment of the present environments. A global trend toward a strongly continental climate, with increased aridity and high seasonal temperature fluctuations, is traced since the late Pliocene. The progressing development during the Quaternary Period (the last 2.5 Ma) is evidenced by the zonal geographic shifts in the vegetation distribution, with the expansion of boreal (taiga) forests northward during the interglacial periods and warm interstadials stages, succeeded by the subarctic periglacial forest-steppe and tundra-steppe during the glacial periods with the tree cover confined to refugia in the southernmost areas of Siberia (the Altai and Sayan Mnt. foothills). Complex paleoenvironmental evolution archives are stored in the high-resolution loess-paleosol sequences, pollen records, and fossil fauna remains from deeply stratified alluvial and loessic formations. The loess-paleosol sections on the Altai Plains and the upper reaches of the Yenisei basin have provided most complete information on the past climatic variations, the landscape development, and the associated changes in the Pleistocene biotic communities on the territory of Siberia. The high-resolution stratigraphic records coupled with pollen and paleontology data indicate marked Pleistocene ecosystem transformations, with arctic tundra and forest-tundra during cold stadial intervals replaced by boreal forest and parkland – steppe during the warm interstadial intervals.

The Early and Middle Pleistocene climates brought major transformations of natural habitats, facilitating the northward dispersal of the Paleolithic people from the southern areas of Central Asia and Mongolia, and their environmental adaptation to the Siberian regional settings. The earliest unequivocally documented Middle Pleistocene (Early Paleolithic) occupation followed the main continental basins and the major river valleys. The human dispersal further east and north is assumed to have principally occurred during warm interglacials in the processes of the northern expansion of mixed parkland forests and the associated fauna communities, whereas only local movements of early human groups are envisaged during cold stages. The Tobol (MIS 9) Interglacial (390–270 ka BP), when the MAT was by c. 3–4 °C higher than at present, is likely to have been (one of) the most favorable time periods for initial migration to northern Asia reaching as far north as 60 °N latitude. The Early and Middle Paleolithic finds bear witness of repeated inhabitation of the Irtysh, Ob, upper Yenisei, Angara, Viluy, Vitim, Aldan, and the upper Lena River basins prior to the Last Interglacial. During the late Middle Pleistocene, glaciers in the Western and Eastern Sayan ranges expanded into the foothills to about 300–400 m altitude preceded by a downslope retreat of dark coniferous taiga forests. In the Minusinsk Depressions, the Kuznetsk Basin, and the northern Altai valleys protected from arctic tundra in the north, propitious (although periglacial) conditions with high biomass concentrations of steppe-parklands may have persisted during the glacial stages. This is evidenced by the abundant fossil remains from the Yenisei and Angara alluvia (60–80 m terraces) found with cultural records, as well as a colluvial reworking of the older (late Middle Pleistocene) loess cover, indicative of a fluctuating moderately cold climate regime, not excluding a continuation of the early human inhabitation of these areas.

Within the Last Interglacial (MIS 5; 130–74 ka BP), most of Siberia was covered by coniferous or mixed forests including broad-leaved taxa (lime, elm, oak), with forest-steppe distributed at lower elevations and in river valleys. At that time, the Middle Paleolithic (Neanderthal or early *Homo sapiens*) people entered the territory from Central Asia and/or the East European Plains. Expansion of the occupation habitat into the mountain areas, following

the Last interglacial climatic optimum, likely occurred in the later (MIS 5c and 5a) interstadials. During the early Last Glacial (Zyriansk) stage (MIS 4; 74–59 ka BP), cold periglacial tundra /tundra-steppe and continuous permafrost expanded across most of Siberia. The approaching glacial maximum disrupted human settlements, although this may have persisted in some protected southern locations. Following the interval of intensive loess deposition at the end of the glacial, renewed warm climate pulses during the mid-glacial (Karginsk) interval (MIS 3; 59–24 ka) preconditioned formation of zonal soils associated with the transitional Middle/early Late Paleolithic stone industries, suggesting a certain regional cultural (and possibly biological) continuity in the Late Pleistocene Siberia. Moderately cold and stable environments during the second half of the interstadial interval (30–24 ka BP) promoted a major enlargement of occupation habitats marking a climax of the Paleolithic peopling in Siberia associated with the emergence of the "classical" Late Paleolithic cultures. Productive interstadial ecosystems with mixed parkland-forest vegetation were gradually transformed into periglacial tundra with the approaching Last Glacial (Sartan) stage (MIS 2; 24–12 ka BP). A reduced population density is assumed around the LGM (20–18 ka BP) hindered by extremely cold climate conditions. Some occupation continuity persisting until the end of the Pleistocene may have applied just for biotic refugia in the protected southernmost locations along the Altay-Sayan foothills. Overall, the spatial and temporal distribution of the early cultural records documents environmental instability over large parts of Siberia during the Quaternary Period (the last 2.5 Ma). Specific geographical and contextual locations of early sites indicate that natural conditions during the earlier periods were generally more favorable for peopling than during the later periods. On the other hand, increased continentality and gradual shifts towards cold and arid conditions accelerated adaptation of Paleolithic populations to harsh periglacial climates promoting a progressive development of sophisticated survival strategies.

Timing and evolutionary processes related to the initial colonization of northern Asia are still insufficiently mapped, although ongoing archaeological investigations supply continuously new evidence about particularities and general trajectories of this evolutionary process. The traditional views, assuming a very late (Late Pleistocene) inhabitation of Siberia and Beringia, have been definitely challenged. The archaeological discoveries disprove the long-held assumption of a late penetration (by Late Paleolithic people) into the middle and high latitudes of northern Asia. Instead, glacial-interglacial and stadial-interstadial climate cycles regulated a geographic movement of early people northward, predetermining the inhabitability of particular geographical areas. During glacial maxima, most of Siberia seems to have been vacated, especially during the earlier periods, because of the expansion of continental glaciers in the north, and inhospitable environments in the southern extra-glacial regions. Gradual adaptation to cold natural habitats accelerated during the Late Pleistocene in connection with the advanced cultural and biological adjustment, enabling people to establish permanently in the vast and geographically diverse Siberian territory.

Future Directions

The studies on the Paleolithic of Siberia have made a major progress during the last 20 years changing radically the once valid paradigm on the Late Pleistocene colonization of north-central Asia. Despite this, most of the presently mapped sites tend to concentrate in the southern geographical regions and reflect a limited accessibility of the northeastern subarctic and Arctic areas which are, however, of major potential for future investigations also with respect to mapping the initial peopling of the American continent. The evolutionary processes in the natural environments and specific behavioral Paleolithic adaptation patterns and material-technological conditions as well as documentation of the sequenced climatic events stored in geological records are the principal objectives of the current

multidisciplinary Quaternary investigations. Equally important are the contextual past climate and paleoecology studies encompassing the last 2.5 Ma, because of increased awareness of the value of regionally reconstructed geological and natural proxy histories for understanding the past and present-day ecosystems and the early human (Pleistocene-Holocene) cultural adjustment strategies to the diverse Siberian environments. The integrated Quaternary geology and geoarchaeology studies are of principal importance for the future field surveys particularly in the marginally investigated areas of Siberia and the Russian Far East aimed at completing the culture-historical mosaic of the early human inhabitation of these geographically very extensive and scientifically fascinating territories.

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ *Homo neanderthalensis*
- ▶ Lithic Technology, Paleolithic
- ▶ Urals: Paleolithic
- ▶ West and Central Asia: Early *Homo* Fossil Records

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Sicily and Magna Graecia, Archaeology of

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Introduction and Definition

The Latin term "Magna Graecia" (in Greek, "Megalē Hellas") means "Greater Greece." In the term's first attested usages, by Pindar and Euripides in the fifth century BCE, it applied to all of the territory inhabited by Greeks around the Mediterranean (Cordano 2005). While it has been suggested that "Megalē Hellas" was used as early as the fifth or fourth century to mean only the parts of modern Italy that were colonized by Greeks – the coasts of Sicily, Campania, Calabria, Basilicata, and Puglia – the texts which might have done so, by Antiochus of Syracuse and Pythagoras of Croton, are not preserved today.

The earliest recorded use of the phrase to mean southern Italy and Sicily is thus Polybius (*Histories* 2.39) in the second century BCE, followed by Strabo (*Geography* 6.1.2) and, for the Latin version, Pliny the Elder (*HN* 3.95). Modern scholars tend to be even more restrictive in their usage, employing Magna Graecia to mean only peninsular Italy where it was settled by Greeks, in contrast to Sicily, which is often considered as a case by itself.

Much of the landscape of Magna Graecia and Sicily is composed of rolling hills and low mountains up to 2,000 m in height. The environment is well suited to a pastoral agricultural economy of sheep and goat herding, supplemented by other animals on a limited basis. Coastal plains were farmed for grain – wheat, barley, and spelt – while hilly areas typically featured olives, grapes, and other plants adapted to the terrain. The climate is generally dry and temperate, with an average annual rainfall of about 40–60 cm.

Key Issues/Current Debates

Bronze Age

The archaeology of the Bronze Age (c. 2200–900 BCE) in southern Italy is largely marked by the transition through successive cultural phases from pre- and proto-Apennine through the Apennine and sub-Apennine periods. The distinctions between these cultural phases do not correspond well to the usual chronological divisions of the Eneolithic (or "Copper Age") and the Early, Middle, and Late Bronze Ages. Dates for the later periods are largely given by the presence of Aegean imports. In the pre-Apennine phase, from roughly 2200 onwards, settlements were placed on low hills to allow control of surrounding agricultural zones. Burials were inhumations in single pit graves organized into cemeteries, and grave goods of a few bronze objects occasionally supplemented by one or two vases. The earliest contacts with Mycenaeans date to the latter part of the proto-Apennine phase, which started in the early second millennium and continued down to c. 1500. Typical imports consisted of Late Helladic I and II pottery. In this phase,

Sicily and Magna Graecia, Archaeology of, Fig. 1 Late Bronze Age rock-cut chamber tombs in the cliffs of Pantalica, Sicily

the coasts of the Adriatic and Ionian Seas (though not the Tyrrhenian Sea) were the locus of many settlements. Funerary practices comprised a wide variety of types, from caves to tumuli, though in every case, burials remained single inhumations grouped together. The Apennine culture ultimately gave way around 1200–1100 to the proto-Villanovan culture, with the introduction of cremation burials. From 900 onwards, Italic-speaking populations south of the Tiber River developed separately from the Etruscan-speaking groups of central and northern Italy, reintroducing inhumation burials.

In Sicily, the Early Bronze Age (c. 2500–1500 BCE) was characterized by multiple burials in chamber tombs. The primary EBA cultural group was identified with the site of Castelluccio, where pottery had black designs on a red background. As in south Italy, Mycenaean artifacts began to appear between 1500 and 1250 BCE, during the Sicilian Middle Bronze Age. At Thapsos, a town on the southeastern coast with notably large storage areas (possibly indicating thriving commercial activity), Mycenaean pottery was particularly well represented. Locally produced pottery is marked by incised decoration and carinated shapes, most strikingly on large pedestaled bowls with zoomorphic features.

Two major typologies have been identified for the Late Bronze Age (c. 1250–1050 BCE) and the so-called Final Bronze Age (c. 1050–900 BCE): Ausonian, in the north, and Pantalica, in the southeast. Affinities with the Apennine culture have led to the suggestion that the Ausonians, known from tombs and huts on Lipari and the Milazzo peninsula, might have migrated from the mainland (as mentioned by Greek authors). Evidence for the later Sikel language from Iron Age inscriptions indicates an Italic ancestry which could have come to the island at this time. Ausonian culture was characterized by inhumation and cremation burials in large jars. Pantalica represented continuity from the Thapsos culture, with baggy vase shapes and pedestaled bowls, usually with incised geometric decoration. Burial was made in thousands of chamber tombs cut into limestone cliffs (Fig. 1). There is little evidence for settlements in the Late and Final Bronze Ages.

Iron Age

Increased contact with the Greek world began again in the eighth century, with the earliest identifiable artifacts arriving in the form of Middle Geometric cups from Euboia. The earliest Greek settlement in the region was made at Pithekoussai, on the island of Ischia just north

of the Bay of Naples, in the second quarter of the eighth century. This town, known mainly from the excavation of a cemetery, seems to have been an *emporion*, or a trading post lacking in agriculture. It seems likely that the foundation of the town at this location was meant to facilitate trade with Etruscans who controlled metal production in central Italy and Sardinia. There is strong evidence of Phoenician and indigenous presence at Pithekoussai, the latter particularly in female burials, which might imply intermarriage with local groups from the mainland. The earliest example of writing in the Greek alphabet is known from Italy rather than Greece itself: an inscription, perhaps reading "euoin," was incised on a vessel found in a tomb of the Osteria dell'Osa necropolis near Gabii, in Lazio, and was dated to perhaps as early as 800–770 (Watkins 1995: 37–39). Likewise, the earliest known reference to Homeric myth was found in a dipinto on a Euboian cup (c. 750) found at Pithekoussai. The text, in dactylic hexameters, refers both to the legendary cup of Nestor and to Aphrodite.

The first true colony (*apoikia*, or "foreign home," in Greek) was founded at Kyme, a mainland promontory facing Ischia, around 750. More colonies followed around the coast of southern Italy and eastern and southern Sicily, with new foundations occurring into the sixth century in Sicily and into the fifth century on the mainland. Greek colonies shared cultural ties with their mother city (*metropolis*) and felt some allegiance to their homeland, but an *apoikia* was politically and economically independent. While colonization of Sicily was mostly carried out by only two *metropoleis*, Chalcis and Corinth, expeditions to south Italy originated from a wider swath of the mainland, including Achaea, Sparta, and even (in one late example, Thurii) Athens. Ancient narratives often described colonizing expeditions that were carried out as a result of an oracular instruction from Apollo at Delphi; these were commonly represented as ignorant of the territory that was their destination. In reality, these expeditions demonstrated significant prior Greek experience with the Italian landscape. Colonies often seem to have displaced indigenous settlements, as at Syracuse and Naxos, and were purposely situated to take advantage of flat arable land, good harborage, and river valleys leading into the hinterland. Such advance planning can be identified at Catane, Syracuse, and Gela in Sicily and Poseidonia, Sybaris, and Taras in Magna Graecia. A system of land division existed in each colony to apportion plots of land to colonists in both their urban and rural areas. Aerial study combined with excavation has brought to light the grid of roadways that were created to divide the countryside of Metapontion; crossroads were marked by groups of tombs. It is not clear to what extent attempts at equitable land division at the time of foundation – as identified, for example, at Megara Hyblaia – reflect political equality among colonists, although some efforts have been made by scholars to suggest it.

Ancient authors (Thucydides, Diodorus Siculus, Dionysius of Halicarnassus, Strabo, and others) identified a number of indigenous groups in Sicily and south Italy at the time of Greek colonization. The Daunians and Iapygians inhabited Puglia, and the Lucanians and Oenotrians were in Basilicata, the Ausonians and Opicians in Campania, and the Sikels in Calabria. In Sicily the Sikels (or the Ausonians or the Morgetians) in eastern Sicily were found, the Sikans in the west, and the Elymians in the northwest. The ancient writers, who were uniformly Greek or Roman, sometimes lacking firsthand experience in the region, and often writing several centuries after contact, did not explain what ethnic or cultural distinctions existed between any of the groups, except to mention divergent lineages extending back to foundational heroes. It is therefore unclear to what extent Greek identifications reflected natives' views of the boundaries between and among themselves.

In striking contrast to the written record, archaeology has not shown significant differences between indigenous groups in Sicily, for example, either before or after contact with Greek or Phoenician settlers. Two types of pottery – one matte-painted, called Siculo-Geometric, or after the type site of Licodia Euboea, and another incised, named for the site of S. Angelo Muxaro,

near Acragas – were produced by the indigenous cultures of Iron Age Sicily. Siculo-Geometric seems to predominate in the supposedly Sikel east, but it is also found in the west, while the opposite is true for S. Angelo Muxaro ware. Rather than revealing a strict dichotomy, then, between eastern Sikel and western Sikan cultures, respectively, the archaeological record shows that individual sites should be placed instead at various points along a continuum defined by these pottery types and other attributes. Indigenous settlements were composed of cellular nuclear-family housing, as at Sabucina or Vassallaggi, or longhouse-type dwellings up to 25 m long for extended families, as at Morgantina.

Bronze hoards are one of the most impressive indicators of Iron Age indigenous culture; the most spectacular deposit was the Mendolito hoard of the eighth or seventh century, found near modern Adrano, consisting of over 1,000 pieces (especially spearheads, plaques, belt-like girdles, and other objects) weighing 900 kg. Brief inscriptions dating into the fifth century have been found in Sikel, employing a Greek alphabet.

Greek Colonization

Equality seems to have been the rule in the distribution of land to colonists, with urban plans tending towards orthogonality – even at Megara Hyblaea, where the plan is not orthogonal but the streets were laid out in straight lines, the house lots were designed to be approximately equal in area (Tréziny 1999). Pottery from Corinth and Euboea continued to dominate in Sicily into the sixth century.

Phoenician Colonization

Phoenician colonial expeditions were also sent to Sicily, though not to south Italy. These began around the eighth century, in the northwest of the island, closest to Carthage. Major settlements were founded at Panormus and Solunto and on the island of Mozia in the seventh and sixth centuries. Phoenician towns do not seem to have had strong agricultural components and on the whole were probably less independent than Greek colonies from their mother city. These towns enabled trade between Carthage and Italy and, to a lesser extent, the northwestern Mediterranean instead. Phoenician-style spaces have been found in these settlements, such as a *tophet* (where first-born sons were ritually sacrificed) on Mozia and several cemeteries with rich burials dating from the seventh through the third centuries at Panormus. Solunto's Roman-period settlement shows a highly Hellenized character, including peristyle-courtyard houses and a theater.

Archaic and Classical Period

The fifth century in both Sicily and Magna Graecia was marked by conflict. In both areas, wars were waged between Greek cities and between Greeks and indigenous groups. The city of Poseidonia was conquered by the Lucani (Strabo *Geography* 6.1.3) at some point in this period, after which the town was renamed Paestum and the two groups lived together, apparently as equals. In Sicily, Greek tyrants fought against each other, against a Sikel league, and against Carthaginians, leading to the destruction or forced evacuation of several major centers. A Carthaginian invasion destroyed many Greek cities between 409 and 405, including Selinous, Acragas, Himera, Gela, and Camarina. Syracuse barely escaped destruction. The appearance of fortification walls across the island, as at Selinous, Gela, Tyndaris, and the Euryalos fort outside Syracuse, is testimony to the violent nature of this period.

Sicilian and south Italian builders began building monumental stone architecture almost as soon as they appeared in mainland Greece. There are Doric temples at Syracuse, Selinus, Poseidonia, and Taras dating to between 600 and 550 (Fig. 2). These early buildings are long and narrow, with small intercolumniations, similar to contemporary mainland temples such as the Temple of Hera at Olympia. Later buildings assumed shorter and wider proportions in their plans (Fig. 3). Colonies often placed extramural temples (especially ones dedicated to Hera) on the edges of their territory as a means of sending a message regarding their claim to the land to natives and other Greeks alike

Sicily and Magna Graecia, Archaeology of, Fig. 2 The early Doric Temple of Hera I at Poseidonia (c. 550 BCE)

Sicily and Magna Graecia, Archaeology of, Fig. 3 The Temple of Hera II at Poseidonia (c. 460 BCE)

(de Polignac 1995). At the same time, however, religious life in Sicily was marked by syncretism of indigenous and Greek beliefs and practices. At Palike, the site of a volcanic spring and an indigenous shrine to chthonic deities, Greek-style buildings including a *hestiatorion* (dining hall) and stoas were built (Maniscalco & McConnell 2003). Greek myth incorporated the worship of female fertility deities around Lake Pergusa by identifying them with Demeter and Persephone; this pair received shrines at sites across the island. A crater rim found at the archaic settlement of Morgantina was inscribed with an inscription in Greek reading "Kuparas emi," "I am (or I belong to) Kupara" (Antonaccio 1997) (Fig. 4). The name Kupara is connected with a Sikel water deity located near Syracuse, perhaps indicating that this Greek vessel had been dedicated as a gift to an indigenous god by a Greek speaker. At the same time, "kupara" can mean "hollow" in Greek, reflecting the crater's large open shape. Such word play was common in the Greek symposium, and thus the inscription can be seen as evidence for linguistic crossing in a mixed cultural environment.

By the mid-sixth century, large stone buildings at Selinous and Poseidonia included stone sculpture in the metopes. Both Sicilian and South Italian colonies maintained strong ties to Greece, most clearly in the construction of numerous treasury buildings at the panhellenic sanctuaries of Olympia and Delphi (where they also competed in the games). Sicilian tyrants were especially successful in Panhellenic

Sicily and Magna Graecia, Archaeology of, Fig. 4 A Lakonian krater rim from the Archaic settlement at Morgantina (Aidone Museum inv. 90-61) with an inscription in Greek reading "Kuparas emi" ("I am Kupara" or "I belong to Kupara")

Sicily and Magna Graecia, Archaeology of, Fig. 5 Terracotta plaque of a gorgon from the Temple of Athena at Syracuse (Syracuse Archaeological Museum "Paolo Orsi," inv. 34540, 34543, 34895, c. 570 BCE)

competitions. Victories were celebrated by sculptures including the Delphi Charioteer (c. 478–474), given by Polyzalos of Gela, and the Motya Charioteer (c. 470). Cities also competed for prestige the construction of massive temples, especially following the Greek victory at Himera over the Carthaginians in 480. Temple G at Selinous and the Temple of Zeus at Acragas vied for recognition as the largest Doric temple in the Greek world. Greek colonies also seem to have featured *heroöns*, or shrines where a colony's founder was worshiped as a hero, in its marketplace, though such a structure is only well identified at Poseidonia.

The lack of marble in the region led to the use of local limestone and sandstone for building material. Sicilian builders made up for the lack of high-quality stone by using brightly colored terracotta revetments and figural sculptures as decoration, such as the relief plaque from the Temple of Athena at Syracuse depicting a gorgon running on bended knee (Fig. 5), and even on structures built in Greece, such as the Treasury of Gela at Olympia. Imported marble was used for smaller works, such as the so-called Ludovisi Throne, which is made of marble from the Aegean island of Thasos. This work, with its remarkable reliefs depicting the birth of Aphrodite flanked by smaller scenes showing a clothed and a nude female worshipper, respectively, was actually one half of the frame for an altar. It was found in Rome, where it had been taken in antiquity. The sculpture's original location has now been determined as the sanctuary of Aphrodite at Lokris (modern Locri Epizefiri). Imported marble was also used for the exposed skin of some sculptural subjects, such as for the heads, hands, and feet of the metope figures of Temple E at Selinous. Free-standing acrolithic sculptures using imported stone were much more common in Sicily than elsewhere in the Greek world. The most important examples are the archaic Demeter and Persephone from Morgantina and the spectacular over-life-size cult statue, probably of Hera or Demeter, that is claimed to be from the same site (in the Aidone Museum since 2011 but formerly in the J. Paul Getty Museum collection, where it was erroneously identified as depicting Aphrodite) (Fig. 6). South Italian and Sicilian sculptors also created a few free-standing sculptures in marble of youths (*kouroi*) and boys from Akragas and Rhegion which show links to contemporary

mainland Greek types like the Kritios Boy from Athens.

The best preserved example of Greek major painting – indeed, practically the only one from the Classical period – was found at Poseidonia, in a grave now known as the Tomb of the Diver (c. 480–470). The interior of the grave's sarcophagus was decorated on its side walls with scenes of a symposium, while the inside of the lid showed a young man diving from a platform into a pool of water, which has been interpreted as possibly being a metaphor for the transition from life to death (Fig. 7).

Sicily and Magna Graecia, Archaeology of, Fig. 6 Over-life-size Greek cult statue of a female deity in limestone and marble (c. 425–400 BCE), today called the "Morgantina goddess"

People in south Italy and Sicily continued to be consumers of imported Greek pottery, primarily Corinthian and East Greek wares (especially Ionian cups – though many of these were also manufactured in the colonies) in the sixth century and Athenian in the fifth. Greek pottery is found in Greek, mixed, and non-Greek settlements and in domestic, religious, and funerary contexts. In the fourth century, with the decline of Athenian exports of painted pottery due to the crisis following the Peloponnesian War, south Italian and Sicilian production grew significantly. In southern Italy, regional groups have been distinguished (especially by A.D. Trendall and A. Cambitoglou) for Apulia, Lucania, Campania, and Poseidonia. The red-figure painted decorations featured mythological stories and especially scenes from theater productions – testimony to the popularity of drama in the western Mediterranean.

The existence and importance of democratic institutions is evident in many cities throughout both regions at various points in time. Both Poseidonia and Metapontion built large circular assembly structures (*ekklesiasteria*) of a type that may

Sicily and Magna Graecia, Archaeology of, Fig. 7 Interior of the lid of the sarcophagus from the burial known as the Tomb of the Diver, Poseidonia (National Archaeological Museum, Paestum, inv. 23103, c. 480–470 BCE)

be related in some way to the shape of the Comitium at Rome. At Morgantina, large flights of stone steps that mitigated the sloping terrain of the city's agora were arranged in a trapezoidal form starting at the end of the fifth century so that they could also be used as seating for the citizen assembly to hear speakers.

Interpreting Cross-Cultural Relations, 800–400 BCE

In the nineteenth and early twentieth centuries, scholarship was defined by the prevailing colonialist attitudes of the time. Greek colonists were seen not only as members of one of the two ancestral societies of western civilization (the other being Rome) but as the initial transmitters of their cultural traditions to the Romans. Greeks appeared urbane, cosmopolitan, and sophisticated compared to the natives they met in Sicily and south Italy. At the same time, scholars approached the process of ancient colonization as analogous to modern colonialism, particularly as carried out by the British empire, where colonies existed for the purpose of controlling and exploiting far-off resources on behalf of the colonizing nation (Dunbabin 1948). For the purposes of historical explanation, then, Greeks were the primary, if not the sole actors, and either indigenes passively received Greek culture or they abandoned their own traditions in order to become as similar to Greeks as possible. The latter process was identified as "Hellenization," a local variant of what anthropologists elsewhere in the world referred to as acculturation. It is true that indigenous populations adopted Greek practices and material culture, and at least in Sicily from the fourth century on, it is no longer possible to distinguish between Greek and indigenous cultures in the archaeological record (Antonaccio 2001). Siculo-Geometric and S. Angelo Muxaro pottery were no longer made, for example, and the shapes and fabrics that survived were Greek.

Recognition of this broad phenomenon has often obscured other important facts, however: first, natives did not abandon their own culture wholesale, but selected aspects of Greek culture that they found useful within their own societies; second, in southern Italy, the process was never fully completed, particularly because Magna Graecia was ultimately conquered by the Romans, who were themselves an Italic group like those who were neighbors to the Greeks; and third, Greeks were also open to adopting some native ideas and traditions, even in Sicily – for example, the greater emphasis on worship of Demeter and Kore in the island's center because of the importance of similar deities for Sikels. Athenian potters made vases in indigenous forms, such as the pair of *nestorides* (an ornate Daunian shape) in the Getty Museum collection (since the findspot of these vases is unknown, it is not clear whether they were intended for indigenous or Greek buyers) (Fig. 8). So acculturation was not inevitable, nor was it a one-way street. Beginning in the 1980s, Classical archaeologists began to adopt new theoretical perspectives from other branches of archaeology, especially world-systems theory (Cunliffe 1988).

Sicily and Magna Graecia, Archaeology of, Fig. 8 Athenian red-figure vase in a Daunian shape, the *nestoris* (Attributed to the circle of the painter Polygnotos, c. 450–440 BCE; J. Paul Getty Museum inv. 81.AE.183.2)

More recently, others have focused on the altered meaning imported objects could be given in new cultural environments, with the process of meaning change given the name "consumption" (Dietler 1999). In these ways, the ability of indigenous populations to make active choices about how to shape and interpret the world around them has been acknowledged and integrated into scholarly discourse about ancient colonization.

The Hellenistic Period

Southern Italy came under Roman control as a result of victory in the Pyrrhic War in 272. Links to Rome grew quickly from the time of the construction of the Via Appia to Capua in 312 and the road's extension to the heel of Italy and the port of Brundusium in 264. Little evidence has appeared to differentiate south Italian culture in this period from what came before it, however, apart from the wide distribution of mass-produced moldmade terracotta figurines at Taranto (Graepler 1997). These sculptures, known as the Tanagra type, generally depicted women in various activities, especially moving rapidly, dancing, or twirling – perhaps to be interpreted as religious or dramatic action. They were exported across the Mediterranean.

Both regions suffered greatly during the First and Second Punic Wars, with several major cities being sacked and their populations sold into slavery. The main exception was Syracuse, which remained independent and prosperous until the death of the tyrant Hieron II (270–215). The kingdom of Syracuse's wealth is shown by evidence from Morgantina, which underwent great development under Hieron's rule. Several public buildings including stoas, granaries, and a fountain house can be dated to this period. A private house at Morgantina revealed the earliest known tessellated mosaics, dating to the mid-third century, and, perhaps most significant, a bath complex built at the same time was found to incorporate the world's earliest known self-supporting domed roof, constructed of interlocking tubes (Lucore 2009). Although these examples are so far known only from Sicily's interior, it appears likely that the innovations of tessellated mosaics and domes were made at Syracuse. Extant monuments known from Syracuse itself in this period include the theater and the 200-m-long Altar of Zeus Eleutherios. Some of the most distinctive cultural products of the Hellenistic period were the pottery produced at Centuripae. This ware, developed in the third century, employed a wide range of bright colors to produce realistic scenes comparable to Hellenistic wall painting, and it was further adorned with ornate molded pieces.

One important trend that is clearly visible in the Hellenistic period was related to the domestic sphere: the size and development of housing. Hellenistic houses tended to be considerably larger than their Classical predecessors, and they included new features, such as second stories and particularly courtyards with a peristyle colonnade, as seen at Megara Hyblaia, Solunto, and Monte Iato. The latter site featured a house with an area of 800 m^2.

The Roman Period

The result of the shift in control to an external power was the advent of peace, if not necessarily prosperity, for both Greeks and non-Greeks by the second century. Sicily became the first Roman province in 241 BCE, and Roman military forces completely conquered Sicily by 211. The island was seen by Rome as a significant source of grain. As a result, slave-run *latifundia* became a dominant part of the economy (though slave revolts occurred twice between 135 and 100). The cultural and economic wealth of pre-Roman Sicily was famously looted in the first century BCE by the governor Verres (Cicero *Verrine Or.*). Overall, the island seems to have been in serious decline during the empire perhaps initially because most cities supported Sextus Pompey against Augustus during the civil war. The town of Centuripae, however, thrived following Augustus' victory; it

alone had been a supporter of the emperor. The town was given control of much of the Catania plain, which led to a building boom in the town, including a large public building (perhaps a *porticus*), baths, and a large suburban nymphaeum (Wilson 1990). There were few other Sicilian centers in this period; Halaesa is the best known, though it, too, had seen its greatest flourishing under the Republic rather than the empire.

The most important archaeological sites for this period in south Italy are undoubtedly the ones destroyed by the eruption of Mount Vesuvius in August of 79 CE, especially Pompeii and Herculaneum. The Via Appia's route was altered under the emperor Trajan in the second decade of the second century CE. The new road split from the old one at the town of Beneventum in order to take a shorter route across the Apennine mountains to the southern ports that linked Rome to the eastern empire. The construction was commemorated by a triumphal arch at Beneventum, decorated with relief sculptures showing the good deeds and welfare projects undertaken by Trajan on behalf of Italians. Saepinum, not far from Beneventum, is a well-preserved Roman town in the mountains of Molise, complete with remains of a basilica, a small theater, and walls built under Tiberius in the masonry style known as *opus reticulatum*.

Late Antiquity

Sicily is best known in late antiquity for several large villas, especially the Villa Casale at Piazza Armerina, where the largest extant collection of mosaic floor decoration has been found. The luxurious nature of the Villa Casale's architecture and decoration led to the initial hypothesis that it belonged to a member of the imperial family, perhaps even one of the Diocletianic tetrarchs. The discovery of similar complexes at Patti and elsewhere shows it instead to be simply the grandest example of a *latifundium* headquarters, owned by a well-connected Roman family. Similar complexes existed in southern Italy (just as they did in Spain and elsewhere); the best known of these is at San Giovanni di Ruoti, where three villa houses were built on the same site between the first and sixth centuries CE. Christianity was well established by the time of Constantine, and catacombs dating as early as the third century are known from Palermo and Naples.

Cross-References

- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Classical (Greek) Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Getty Foundation
- ▶ Greek Colonialism, Archaeology of
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Religion, Greek, Archaeology of
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Basic Biographical Information

Born in Diaramana (Cercle of Bla) in 1952, Samuel Sidibé (Fig. 1) is the Managing Director of the National Museum of Mali. After his secondary studies in Mali, Dr. Sidibé received a postgraduate scholarship, which took him first to Clermont-Ferrand (France), where he obtained a Masters in Art History and Archaeology in 1975, then to the University of Paris I Panthéon Sorbonne for his doctoral studies between 1976 and 1980. He defended a thesis on the theme of funerary archaeology *Archéologie funéraire de l'ouest africain: sépultures et rites*.

On his return to Mali, Samuel Sidibé worked at the Institut des Sciences Humaines (ISH) as a researcher from 1981 to 1987. In this capacity, he actively participated in field missions and was involved in a project to create an inventory of archaeological sites in the lake region and the Inner Niger Delta. The launch of this project coincided with his arrival at the ISH. During the same period, Dr. Sidibé was responsible for courses in Art History at the National Institute of Arts (INA) in Bamako, Mali. In 1987, he was appointed Director of the National Museum.

Dr. Sidibé is an active a member of several professional associations and organisations at the national, sub-regional, and international level, including the International Council of Museums (ICOM), the International Council on

Sidibé, Samuel, Fig. 1 Samuel Sidibé, at his office in the National Museum of Mali

Monuments and Sites (ICOMOS), and the West African Association of Archaeology (WAAA). From 1993 to 2003, he was a member of the AFRICOM (International Council of African Museums), working group, the program of the ICOM (International Council of Museums) for Africa and He was a founding member of AFRICOM as an association and Dr. Sidibé was a member of the scientific committee for archaeological research at the Dia site in the Inner Niger Delta (1998–2002) and of the committee for the rehabilitation of earthen architecture. He has been a member of the screening committee and the acquisition committee at the Musée du quai Branly in Paris, a member of the Advisory Board of the World Festival of Negro Arts (2007–2009), and a member of the Commission of French archaeological excavations abroad (from 2008).

Major Accomplishments

As the head of the National Museum of Mali, Dr. Sidibé brought about profound changes in the management and operation of this institution. The National Museum, a showcase of Malian culture, is now open to the world and has become a place for encounters between, and dialogue about, cultures.

Dr. Sidibé made a considerable contribution towards enhancing the museum's collections by implementing some major research projects and initiating collections on material and immaterial culture. These projects generated research and collections on musical heritage (1991–1996), traditional pottery (1992–1994), material culture of the Dogon people (1996–1997), and ornaments (2008–2010). Taken together, these collections make a substantial contribution to the preservation of culture in Mali. Since 2005, Dr. Sidibé has opened the National Museum to modern art, making it one of the few African museums to have a collection in this domain.

In addition to developing major new collections, Dr. Sidibé's contributions to the National Museum have included expanding and renovating its premises aimed to support the museum's increasing role in promoting of Mali's cultural heritage. This included the opening of new exhibition space as well as a multipurpose hall, the construction of a storehouse for archaeological objects, the redevelopment of the Koulouba caves in the prehistory garden, and the development of the Point G cave as a place to visit. New initiatives in respect to the museum's cultural activities included a revitalization in visitor programs for school groups, aimed at educating young people about the discovery, study, and understanding of Malian cultural heritage. Another public outreach program "Musical Thursdays," was initiated to make the museum more accessible to the public. Every Thursday afternoon from October to May the stars of Malian music perform at the National Museum.

The National Museum of Mali remains true to its original purpose, namely, the dissemination and promotion of Malian cultural heritage. At the same time, it presents many international exhibitions, one of which includes the exhibition Vallées du Niger (1991–1997). Dr. Sidibé was the Deputy Commissioner and Coordinator of the African itinerary for the exhibition which travelled through Mali, Burkina Faso, Nigeria, Mauritania, Guinea, and Niger. Since 2009 the National Museum has hosted the African Photography Biennial and Dr. Sidibé has been the General Delegate of the "Rencontres de Bamako".

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- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)

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Siega Verde Rock Art Sites

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Brief Definition of the Topic

Paleolithic art was always regarded as a product of mystery and deep caves, even in the latest proposals of the great French scholar A. Leroi Gourhan (1971). That idea was overtaken by events when the Portuguese site of Mazouco was discovered and published in 1981 (Jorge et al. 1981), in an area bordering Spain.

The second open-air Paleolithic rock art site discovered was Domingo García in Segovia, the third was Piedras Blancas in Almería, the fourth was Fornols Haut in the French Pyrenees on the border with Spain, and the fifth was Siega Verde, on the Spanish side of the border with Portugal. Other findings in Spain and Portugal ensued.

Siega Verde was discovered in a survey organized within the Museum of Salamanca by the then director Manuel Santonja Gómez. The year was 1989, and after the discovery of the first recorded horse, the team from the University of Alcala de Henares joined the task and finally published the scientific monograph of the site (Alcolea & Balbin 2006).

Siega Verde is located in the middle Agueda River, a tributary of the Douro River, parallel to the Portuguese border in the vicinity of Ciudad Rodrigo, Salamanca. There, among the villages of Castillejo de Martín Viejo, Villar de la Yegua, and Villar de Argañán, the river often passes between the vertical Paleozoic schist outcrops. In some places, its slopes soften, producing fords like the one located in the center of the site.

The site has a length of 1 km, on the left of the Agueda river banks, marking its development with the same organization as cave galleries. The first figure, a horse (Fig. 1), is located south of the site, and to get to the core, two hundred meters without finding artistic elements must be traveled, until a watermill is reached, the construction of which seized several engraved rocks.

The first horse motiv discovered is pecked (outline) the most abundant technique used in the art of this region. There are 443 motifs in total, 241 animals, 3 anthropomorphic, 165 non-figurative representations, and 34 indeterminate. Most are animals, especially horses and bulls (Fig. 2), followed by deer and goats, generally engraved through incision and with smaller size. There are also engraved reindeer, bison, *cervus megaceros*, and woolly rhinoceros. Schemes are the next group, lines, and signs, the latter rarely.

Siega Verde Rock Art Sites, Fig. 1 Picketing horse. Firstly found figure of the ensemble 1, the most southern place of Siega Verde

Siega Verde Rock Art Sites, Fig. 2 Engraved bull in the center of Siega Verde, eroded by the river current

The engravings are distributed in 29 sets and 91 panels. The panels are vertical in the south and center, and horizontal in the north, where they have slightly more recent chronology. Most figures are engraved and there are very few remains of painting, which in any case appear as iron oxides and manganese oxides, with phosphates and silicates in its composition. This demonstrates a probably extensive use of normal colors in Paleolithic art, red and black, here largely disappeared by exposure to the elements.

Siega Verde's rock art started during the Gravettian or the Solutrean, contemporary to most of the engravings from the neighboring Côa Valley, styles II–III of Leroi-Gourhan, but with fewer and unimportant figures in Agueda. Most of the figures were made in the Solutrean-Magdalenian, styles III–IV of Leroi-Gourhan, and the Magdalenian, style IV of the French author, on dates ranging between 17000 BCE and 13000 BCE. Both in the site and in the neighboring Côa, the decoration does not stop with the end of the Ice Age, but continues with dates after 8000 BCE with a style we call V, following Leroi-Gourhan's proposal. In the last phase various signs are marked in the rocks through fine incisions.

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- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Côa Valley Rock Art Sites
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Leroi-Gourhan, André
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Sierra de San Francisco: Great Mural Rock Paintings

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Introduction

In the Baja California peninsula, Mexico, exists one of the most extraordinary repertoires of rock

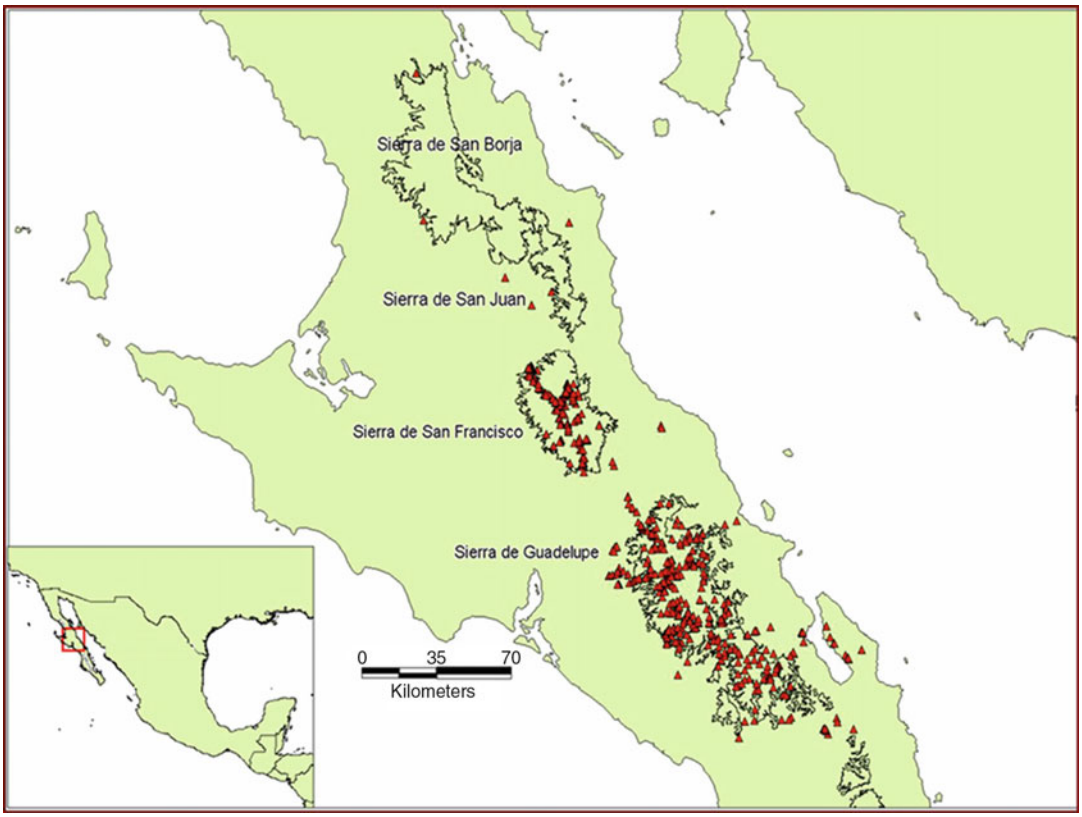

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 1 The central mountain ranges in Baja California peninsula: this is the distribution area of the Great Mural style

art in the country. This long and narrow strip of land sits between the calm, tepid waters of the California Gulf and the impetuous Pacific Ocean. In this peninsula rises an impressive series of mountain ranges that, along with the oceans that embrace it, provides interesting contrasts between the ocean, the desert, and the mountain. This landscape scenario provided optimal conditions for hunter-gatherer-fishing societies, who first inhabited the peninsula in the early Holocene, until the arrival of explorers and Jesuit missionaries at the end of the seventeenth century (Gutiérrez & Hyland 2002).

One of the most salient features of this region's prehistory is that its protagonists produced massive quantities of rock art since very ancient times. They found in the practice of painting and engraving an extremely important medium of ritualistic expression and in the resulting rock art an extraordinary instrument of communication. In this way, the symbolism expressed in the imagery can be considered an essential element in the process of construction and consolidation of the social identities of these peoples through the millennia.

The central mountain ranges of the peninsula represent the densest concentration of rock art (Fig. 1). In these mountains, the imagery is persistently integrated with the landscape, symbolically inscribed, and it gives it a cultural meaning that shows us with clarity the fluid movement of the peoples who created it, witnesses and protagonists of the comings and goings (Conkey 1984: 264-267; Gutiérrez & Hyland 2002: 30).

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 2 Cueva del Batequi, Sierra de San Francisco. The female image is identifiable on the basis of her breasts and probable pregnancy

Key Issues/Current Debates/Future Directions/Examples

The Rock Art Tradition of Great Murals

The Great Mural style (Gran Mural) is one of the most prominent of the region. This term was coined by Harry Crosby (1997) in the seventies taking into account their large size. The Sierra de San Francisco is the one that concentrates the most spectaculars Great Mural sites. The paintings are located in hundreds of rockshelters in the intermountain canyons. The style is essentially realistic and is dominated by human figures and animals painted in red, black, white, and yellow. In 1992, these rock paintings were inscribed in the UNESCO World Heritage List.

On the rock panels of the Sierra de San Francisco, the anthropomorphs are static or unmoving, while the posture of some animals suggests certain movement. The female figures can be identified by the breasts that are positioned under the arm as well as by the demonstration of pregnancy (Fig. 2). The animal that appears most frequently is the deer, followed by the Bighorn Sheep, but there also exists a broad range of land and marine animals depicted (Fig. 3).

Chronology and Cultural Affiliation

One of the key questions surrounding the archaeological investigation of the Great Murals concerns their antiquity. The first references to the murals can be found in the records of the Jesuit missionaries of the eighteenth century (Barco 1973). The impression given by some of these records was that the paintings were "old," while the indigenous people denied knowledge of their origins, attributing them to the work of an ancient and lost race of giants from the North.

Before 2000, there were only six radiocarbon dates for three panels of the Great Murals (Fullola et al. 1994; Gutiérrez & Hyland 2002: 337). There has been a more recent focus on increasing the chronological information about this pictorial tradition. From the radiocarbon dates that have been obtained so far, one stands out. The panel of Cueva San Borjitas has a date as far back as 7,500 B.P. (which signifies Before Present) (Watchman et al. 2002). The investigations surrounding chronology have produced interesting debates but also valuable information about the production process of the paintings and the meaning behind their creation.

Another essential aspect has been to verify the origin of the pigments and explore the possibility of identifying the minerals. The analyses indicate that the paint is composed of local mineral pigments: red and yellow from iron oxides, black from manganese oxide, and white from gypsum. Large deposits of gypsum and of red iron oxide, intense in color, quality, and varying shades, can

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 3 It is common to find maritime animals in some Great Mural sites. To the *left*, the sea lion-whale of site San Gregorio II and to the *right*, hare and stingrays in site Cuesta de San Pablo

be found in the Azufre Canyon, in the Volcanes Tres Vírgenes (Three Virgins Volcanoes) (Fig. 4). Archaeological evidence tells us that this source was used to obtain the pigments. It should be noted that this paint recipe was formulated not only for creating the rock art imagery but also for the development of body painting (Gutiérrez & Hyland 2002; Gutiérrez 2009).

It is interesting to note that as the Great Mural panels are located further away from this source, decreases the intensity of the color in the rock paintings and many of them were only outlines. This may correspond with the difficulty that faced the most distant groups to travel to the volcano and collect the precious pigment and could explain the changes in the chromatic component of the southern substyles. A hypothetical explanation is that the volcano could have been perceived as the dwelling of mythical beings, bearers of unusual properties like the pigments and obsidian; in these terms, the pigment could have been considered rare, and the distant groups would have had limited access to them and thus had to use them in moderation.

Context and Function

In general the panels of the Great Murals present a complex diversity of style, theme, and archaeological context, showing us of the plurality of its origin and function. The presences of human figures or wounded animals have led many researchers to suggest that the painters reproduced scenes or hunting and/or combat, while others describe the shamanistic orientation of the imagery.

Another perspective has been to contextualize the paintings based on the religious concepts and ritualistic practices of the peninsula (Gutiérrez & Hyland 2002). The veneration of the ancestors and of the dead shaped the nucleus of the indigenous worldview around which developed a set of ritual practices; among these practices stand out the communication with such entities through its embodiment, and the spirit possession under a

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 4 Extensive pigment deposits found at Cañón del Azufre in Tres Vírgenes Volcanoes. To the *left*, the end of this canyon and Sierra de San Francisco on the back and to the *right*, pigment deposits

state of trance. The layers of human hair, the wooden effigies, the tables and ceremonial sticks, and the rock art, were elements of the ritual paraphernalia and served as substitute images of mythological heroes and remote ancestors.

The importance and intensity that had image production for the representation of the dead and ancestors, is the key to understanding the meaning and role that played some emblematic panels of Great Mural, those that are characterized by their huge dimensions and by the predominance of human figures, which showing a broad range of headdresses and colored patterns (Fig. 5). Detailed analysis shows that certain figures were repainted, possibly throughout centuries. What motivated this "reactivation" of the images? It is possible that the personages painted in these sites could represent founding ancestors of lineages and/or mythical beings; in this sense, the groups of images concentrated the collective memory of these groups, and, through the ritual of repainting, the people worshipped them, reaffirming at the same time their individual and group identities.

The functions of the rock paintings and the sites that contain them could have been numerous. By analyzing each of the categories of identified panels, we would be in a position to deepen the study around origin, function, and rhythms of the creation of the imagery, the places that contain them, and the resulting symbolic space. Meanwhile, what we can confirm from a general perspective is that the role that the Great Murals played as a codifying system of visual communication was very successful, because their consistency, expands propagation and the permanency of certain emblematic images tells us of the great ability that its makers had in the construction and consolidation of this landscape and the capacity of the society to decode their meaning, on more than one level, throughout the history of the region, and over vast territories of local and regional identities, pervaded with memory and feeling.

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 5 Cuesta Palmarito, Sierra de San Francisco. This Great Mural panel is characterized by the human figures with a wide range of headresses and chromatic patterning

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Australian Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Kakadu National Park: Rock Art
- ▶ Maritime Contact Rock Art
- ▶ "Motif" in the Archaeology of Art
- ▶ North American Rock Art
- ▶ Pigment Analysis in Archaeology
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ▶ Serra Da Capivara National Park
- ▶ South American Rock Art

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Silbury Hill: Environmental Archaeology

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Introduction

Silbury Hill in Wiltshire, UK (NGR SU 100 685), is the largest prehistoric mound in Western Europe. Its lies at approximately 158 m OD

Silbury Hill: Environmental Archaeology, Fig. 1 Silbury Hill is in the top left of the picture. The village of Avebury (lying partly within the Avebury Henge) is seen in the foreground (©English Heritage)

close to the source of the river Kennet, on the western side of the valley bottom within a natural amphitheater formed by the surrounding chalk hills. It is one of a complex of early prehistoric monuments that comprise the UNESCO Avebury and Stonehenge World Heritage Site with Avebury Henge lying 1 km further up the valley to the north (Fig. 1), the West Kennet palisade enclosures 1 km to the east, and the West Kennet chambered long barrow occupying the first chalk ridge to the south east. Silbury Hill is a designated Scheduled Monument (National Heritage List for England 1008445; Scheduled Monument 21707; formerly County Number WI 2SAM 220743) and also a Site of Special Scientific Interest (SSSI) on account of the rare chalk grassland vegetation that grows on its slopes. The site is under the guardianship of the Secretary of State for the Department of Culture, Media and Sport and is managed by English Heritage on the U.K. government's behalf (Whittle 1997; Field & Leary in press).

Today, Silbury Hill takes the form of a flat topped cone 150 m in diameter and just under 31 m high when measured from the original land surface (37 m when the depth of the large external ditch surrounding the mound is taken into account). The mound itself is the result of multiple phases of activity and sits on a truncated old land surface (see below). At the center is a low gravel mound (maximum height 0.8 m, diameter 10 m) over which is a mixture of topsoil and turves, enlarging the central mound to just over 1 m in height with an estimated diameter of 22 m. A series of wooden stakes (recorded as stake holes) around the edge of this lower organic mound may have held the structure in place but could equally have been freestanding. Also believed to belong to this phase of activity are one or more smaller additional deposits

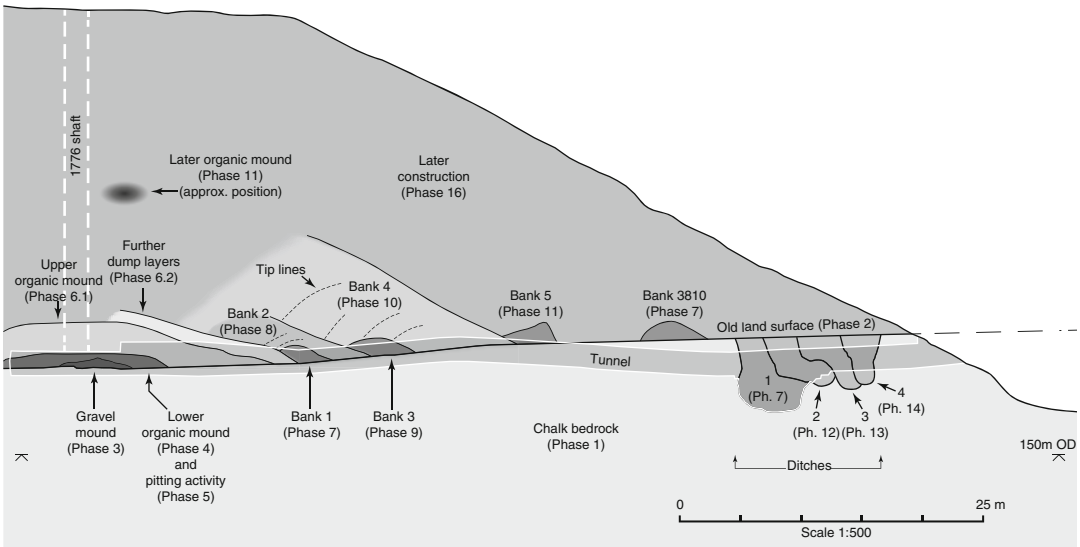

Silbury Hill: Environmental Archaeology, Fig. 2 Section through Silbury Hill showing the different phases of construction (Eddie Lyons ©English Heritage)

(mini-mounds) constructed around the central mound, again comprising turf and topsoil. Following on from this phase, pits were dug into the surface of the organic central mound, rapidly backfilled with turf and topsoil then built up, resulting in a central mound of some 35 m in diameter. This upper organic mound was additionally sealed by a series of further dumped layers made up principally of chalk and silty clay, around which at least five chalk and clay banks were constructed, gradually increasing the mound's size. Many of these banks may be associated with the cutting and recutting of a large ditch dug some 50 m out from the center of the hill. However, the first phase of the ditch is associated with a separate bank thrown up toward the center of the hill (i.e., on the internal side), suggesting that the mound may have, at one time, sat inside an enclosure with an internal bank. The later phases of the hill are less well understood because of the nature of the archaeological interventions (see below) but the deliberate backfilling of the ditch, followed by a series of recuts each slightly further out from the center of the mound, possibly continued until the final form of the ditch surrounding the hill was achieved. Similarly, while the piling of quarried chalk was used to expand the monument above and around the central mound and the surrounding deposits, at some stage a different procedure was adopted which entailed the construction of revetment walls of chalk rubble, behind which fine chalk dumps were built up. It is this technique which is evident from excavations on the summit of the hill (Leary, in press; Fig. 2).

The whole construction process is likely to have lasted somewhere between 55 and 155 years. The lower organic central mound and additional mound(s) are estimated to have been completed between 2460 and 2395 cal BCE with final completion estimated at between 2335 and 2270 cal BCE (Marshall et al. in press). The building of the hill thus falls within the same time period as major constructions at Stonehenge and Avebury.

Definition

The importance of Silbury Hill to environmental archaeology lies in the wealth of biological remains preserved within the organic mounds, and representing the early phases of the monument's construction. As the macroscopic

plant remains, mollusks, and insects are derived from the turf and topsoil incorporated into the organic mounds (and from materials laid down or surviving within the old land surface beneath the hill), they give a unique insight into the nature of the late Neolithic environment within an area of major monuments. The remains are preserved due to the anoxic nature of the deposits within the center of the hill. These preservation conditions result from a combination of reduction and limited gaseous exchange between the deposits in the center of the mound and the outside air caused by the sheer volume of the hill coupled with the results of the extra compression caused by "the enormous weight of the mound" (Evans 1972: 267; Canti et al. 2004; and the entry on Preservation of Environmental Archaeological Evidence in this encyclopedia).

In addition to the delicate biological remains, two other areas of interest from Silbury are the nature of the old land surface and the use of antler as tools. Antler picks are one of the main cultural materials recovered from late Neolithic deposits at the site which generally produced very little cultural material, animal bone, or charred plant remains. This paucity of finds suggests that the site may have been deliberately kept clean (Campbell in press; Leary & Field in press).

Historical Background

There have been four major archaeological interventions into the center of Silbury Hill (Fig. 3). The first comprised the digging of a vertical shaft from the summit down to the center of the hill, carried out by Colonel Drax and the Duke of Northumberland in 1776. The aim of this endeavor was to recover the burial believed to lie under the center, but all that was recovered from the base of the shaft was single sliver of oak (Whittle 1997: 9-10; Leary & Field 2010). The second excavations took place in 1849 funded by the Archaeological Institute. A horizontal tunnel was dug into the center of the hill from the southwest side of the mound with further tunnel extensions excavated in the center. While this excavation also failed to find a central burial, it was the first to record the extraordinary preservation of biological remains deep within the hill. The Very Reverend J. Merewether, in his account of the 1849 excavations, notes both the freshness of the moss found on turves piled up in the center of the hill and also the presence of mollusks, beetles, and other plant remains (Merewether 1851).

The huge potential of the environmental material only began to be realized following the next major intervention between 1968 and 1970 which was sponsored by the British Broadcasting Corporation (B.B.C.) and directed by Prof. R Atkinson. The tunneling works partly incorporated the footprint of the 1849 tunnels but extended further and included the excavation of two lateral tunnels to the east and west. Among the principal aims of this excavation was to gain an understanding of the composition and date of the monument and "to document its environmental setting" in the light of Merewether's findings (Whittle 1997: 11). To this end, a suite of pioneering environmental analyses was carried out on materials recovered from the tunnels including studies on soils, pollen, macroscopic plant remains (including mosses), insects, mollusks, and vertebrate remains (see Cornwall et al.; Dimbleby et al. respectively in Whittle 1997). While these analyses are a major source of information concerning the site, they suffer from a lack of information about where exactly the material came from, and it is not always possible to ascertain whether the assemblages were recovered from the old land surface or from one of the organic mounds, additional mounds, etc. Thus, while the results give a good overall picture, indicating the presence of open herb-rich grazed grassland in the immediate vicinity of the hill in the later Neolithic (Whittle 1997: 140), details concerning the nature of the old land surface and the different deposits making up the mound are lacking (Canti et al. 2004; Campbell in press).

The fourth major and most recent archaeological investigation at the site occurred during 2007–2008. The research took place as part of a major conservation project by English Heritage involving remedial works to the hill. These works were carried out in response to the discovery of

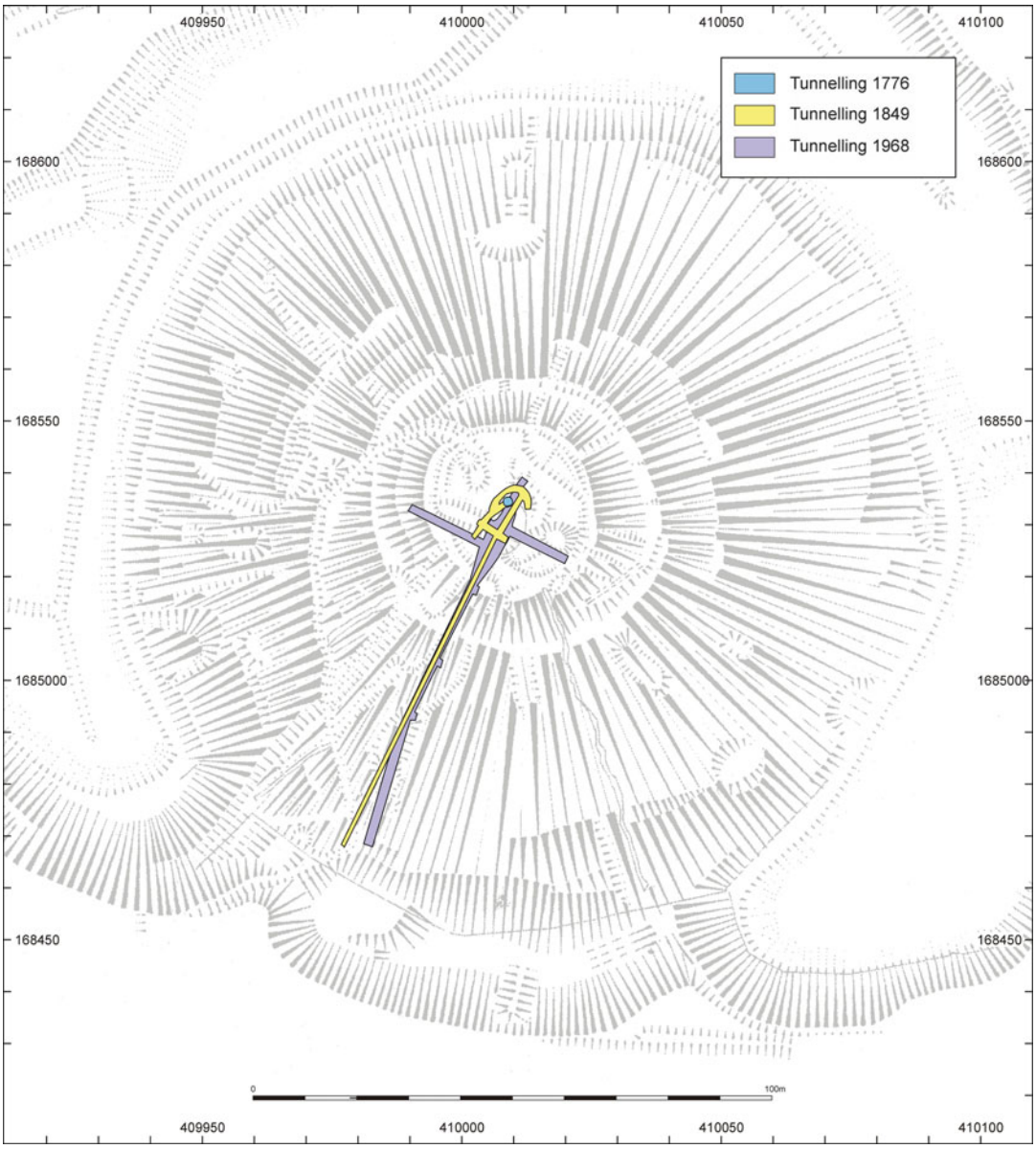

Silbury Hill: Environmental Archaeology, Fig. 3 Plan of Silbury Hill showing the 1776, 1849, 1968–70 interventions. The 2007–8 remedial works reused the 1968–70 tunnels from Leary et al. in press (Eddie Lyons ©English Heritage)

voids resulting from incomplete backfilling associated with the 1776 shaft, the 1849 tunnel, and the 1968–1970 tunnels. It was clear that the voids would continue to migrate up through the hill to eventually be expressed on the surface, disrupting irreplaceable archaeology: a problem first brought to light by the sudden appearance of a hole on the summit of Silbury Hill on the 29 May 2000, caused by the collapse of the deposits in the 1776 shaft. Thus, the decision was made to re-excavate the 1968–1970 tunnels and to directly backfill all the voids in order to conserve

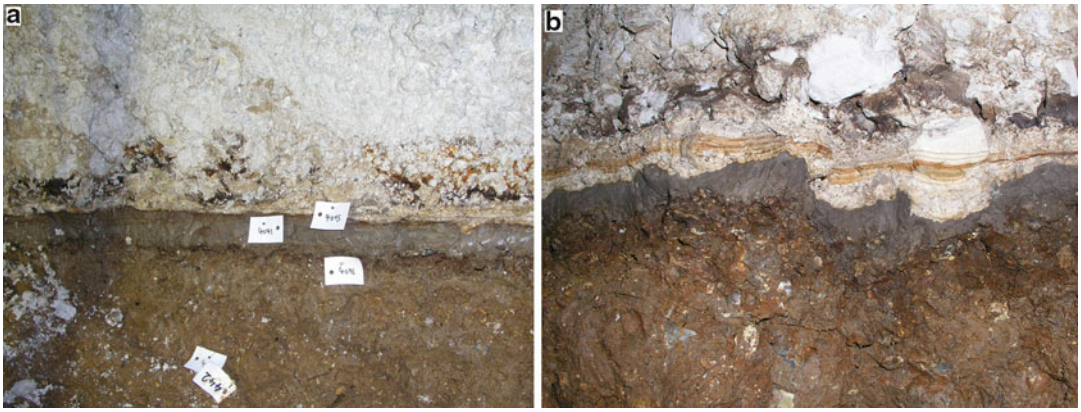

Silbury Hill: Environmental Archaeology, Fig. 4 **a**) Typical example of the thin gray layer overlying clay-with-flints that forms the old land surface beneath the hill. **b**) Irregular upper surfaces of the layer overlying clay-with-flints (Matt Canti ©English Heritage)

the monument and prevent further damage to its archaeology. This work was accompanied by detailed archaeological recording, including extensive sampling of in situ and disturbed deposits encountered in the sides of the tunnels in order to recover artifacts, biological remains, and for geoarchaeological analysis. The results of this work are soon to be published in Leary et al. (in press). Some of the key findings from the environmental archaeology are discussed below.

Key Issues

The Nature of the Old Land Surface

Silbury Hill is situated on a 1–2-m deep layer of clay-with-flints drift overlying solid chalk, so the preconstruction surface of the chalk spur would have had a clay-with-flints soil profile over much of its area. Inside the hill, the old land surface was characterized by a relatively stone-free dense gray silty clay loam or silt loam layer formed at the junction between the chalk overburden and the underlying clay-with-flints. The layer was as little as 3 cm thick in some places (Fig. 4) but tended to gradually thicken downhill (toward the center of the mound) and was as much as 10-cm thick at some points. It mostly had a smooth interface with the chalk above it, but also sometimes showed irregular upper surfaces (Fig. 4b).

The gray clay layer often had a sharp boundary to the underlying clay-with-flints, usually including a marked gravelly band. Variants on this basic morphology were found in the main exposures to the south and in the lateral tunnels. Toward the center of the hill, the gray layer was less pronounced, and showed more gradual changes with depth. Comparisons with local soils on clay-with-flints showed clearly that, even allowing for redox-based color changes, a simple compression (as would occur if the hill was built straight onto the topsoil) could not generate the thin examples of the dense gray layer (Canti et al. in press).

The gray layer and underlying clay-with-flints were characterized using particle size analysis. This showed a strong relationship between the two materials. Although there was a wide variation amongst the samples, the gray layer could, essentially, be derived from the clay-with-flints if most of the stones larger than 2 mm were removed, and the clay content was reduced by 10 %.

Processes to effect this sorting were considered (including trampling and erosion), and some experimentation was carried out to try and simulate it. In the end, earthworm casting was thought to be the only feasible possibility. Earthworm action is capable of deep sorting (see, for example, Canti 2003, Fig. 7), and the Silbury soil represents a fairly intense example.

Although the process is commonly associated with more calcareous soils than those found on clay-with-flints, the unusual lowland position of the Silbury deposit and possible calcareous inputs from upslope would likely overcome any inhibition due to acidity.

The Silbury builders would, therefore, have found a well-developed worm-sorted topsoil on the chalk spur and deturfed it. They cut well above the stone layer in many cases, producing the old land surface examples with a deeper gray clay layer. Toward the south, perhaps stimulated by increasing distance from the turf stack, they tended to go deeper and arrived at just 2 or 3 cm above the stone layer, producing the profiles seen in Fig. 4. The grayness of the gray layer would arise from leaching of the iron compounds chemically reduced (and thus rendered soluble) by decay of the organic matter still left in the earthworm casts.

Silbury Hill: Environmental Archaeology, Fig. 5 Mangold flea beetle (*Chaetocnema concinna*) found squashed on the surface of one of the turves, scale bar 2.5 mm (Gill Campbell ©English Heritage)

The Biological Remains from the Organic Mounds and the Nature of the Later Neolithic Environment of Silbury Hill

Turves that can be cut as soil blocks and used in construction only form under open vegetation types such as grassland, moorland and heaths. This is because, in order for the turf to hold together, there has to be dense vegetation cover and a mat of roots such that the topsoil remains attached to the surface vegetation (Hall 2003; Campbell in press). It is therefore not unexpected that the majority of the biological remains recovered from the organic mounds within Silbury Hill attest to open grassland habitats. However, there is considerable variation between different turf samples and different contexts. This partly results from the nature of the matrix making up the different mounds.

The central lower organic mound is principally composed of turves and topsoil formed on neutral to acidic clay-with-flints material, resulting in pollen being relatively well preserved. In contrast, the upper organic mound contains typically rendzina turves and calcium-rich topsoil, leading to excellent preservation of mollusks but the destruction of pollen evidence. Overall, macroscopic plant remains and insects are preserved well in both mounds (see ▶ Environmental Archaeological Evidence: Preservation). There is also a wide range of preservation states between different specimens, because some material was living or fresh when incorporated (for example, moss growing on the surface, seeds forming part of the soil seed bank, and whole beetles (Fig. 5)), whereas other material was either dead or decayed when incorporated (for example, dead grass, fragmented beetle remains, worn mollusk shells, and partly decayed seeds). These complex taphonomic factors impose limitations on interpretation but also present opportunities. Thus, the month in which a given turf was cut cannot be determined from the presence of the wings of the queen ant *Myrmica sabuleti* since these wings are bitten off following mating flights and would be plentiful around any

ant nests, surviving in the soil for some time (Robinson 1997: 41, 43; Robinson in Campbell in press). On the other hand, the presence of worn mollusk shells of species typical of woodland along with poorly preserved seeds of woodland plants such as *Mercurialis perennis* (dog's mercury) and *Rosa/Rubus* type (rose or bramble) thorns among well-preserved remains of mollusks indicating dry open grassland and well-preserved remains of *Ranunculus* cf. *bulbosus* (bulbous buttercup) within an individual turf can be used to reconstruct the history of the turf; it may have been cut from grassland developed following woodland clearance undertaken probably less than a century earlier (Campbell in press).

Bearing these factors in mind, the results from samples of individual turves from the central organic mounds within Silbury Hill indicate that turves were cut from grassland developed on at least two contrasting soil types, with different land-use histories and subject to varying degrees of wetness, disturbance, and grazing pressure. The moss remains in particular allow aspect (whether the turf was cut from a north or south facing slope) to be postulated (Williams 1976; Hall & Campbell in press) while the presence of *Lasius flavus* gp. ants which build ant hills in old grassland may suggest the harvesting of turves from mature grassland (Robinson in Campbell in press).

The results from the only mini-mound to be sampled gave somewhat different results than those of the central organic mound. Although a grassland element is present, indicators of woodland environments including propagules of *Taxus baccata* (yew), *Prunus spinosa* (sloe), and *Ajuga reptans* (bugle) along with some woodland beetles and well-preserved specimens of shade-loving mollusks such as *Clausilia bidentata* (common door snail) were recorded. Some cereal remains were also recovered, which given the evidence for animal dung obtained from the insect remains could be derived from the droppings of livestock fed on cereal chaff. At the same time, the few water beetles identified from this deposit (*Colymbetes fuscus*, *Helophorus* cf. *brevipalpis* and *Hydrobius fuscipes*) which was otherwise largely devoid of wetland species suggest the presence of temporary pools or puddles. Overall, these results give an impression that the material used to construct this mound may have been gleaned from the woodland edge, where cattle or other livestock sheltered, churning up the ground to create muddy pools (Campbell in press).

The contrasting environments represented in the materials used up to make the different organic mounds could all have been found within the immediate vicinity of the site, though this does not mean that elements could not have been brought from within the wider area of the Marlborough Downs. Indeed, the fact that different habitats were incorporated into different areas of the hill might be taken as evidence that the inclusion of different parts of the landscape into the monument held significance for those building the monument, as has been suggested for the inclusion of sarsens in the upper organic mound and for the monument as a whole (Leary & Field in press; Leary & Field 2010: 119-122).

However, probably more important from an environmental perspective is the clear evidence for the existence of a herb-rich chalk pasture in the environs of Silbury in second half of the third millennium BCE. This is indicated by the presence of plants such as *Sanguisorba minor* ssp. *minor* (salad burnet), *Linum catharticum* (fairy flax, and *Scabiosa columbaria* (small scabious), all of which were recorded both as plant macrofossils and during the first surveys of the vegetation growing on the monument in the mid-nineteenth century (Buckman 1864-66; Williams in Whttle 1997; Campbell in press). In addition, the numbers and percentage of remains of scarabaeoid dung beetles and meadowland weevils that feed mainly on grassland leguminous plants indicate grazing by domestic animals with stocking levels similar to those found in the area today (Campbell in press; Robinson 1997). This implies careful management of the environment by late Neolithic people with grazing rights controlled or negotiated within or between groups (Campbell in press).

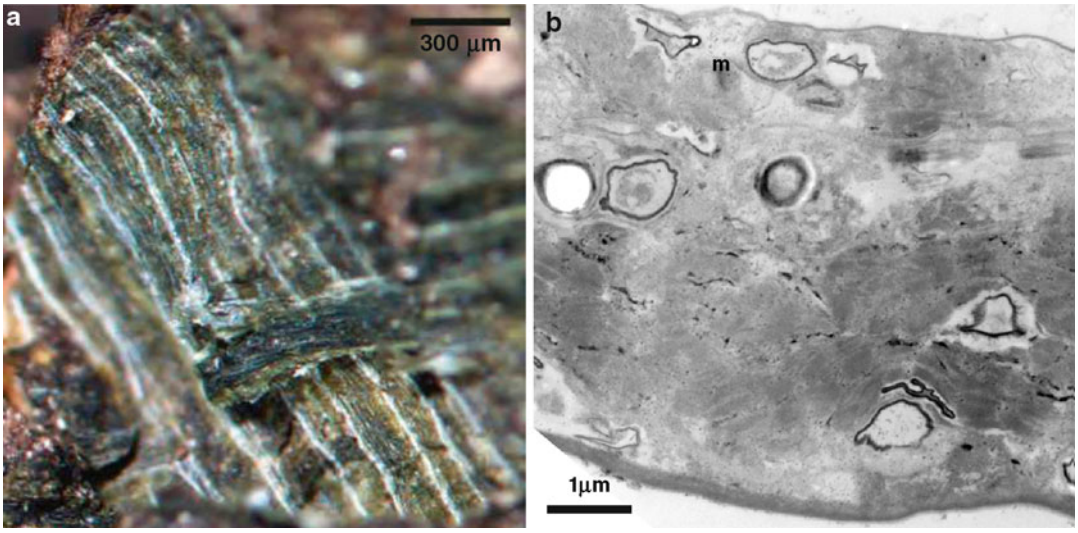

Silbury Hill: Environmental Archaeology, Fig. 6 (**a**) Silbury green plant material as it appears in situ as thin strands with blue green to bottle green color, scale bar 300 µm (Margaret Collinson and Eddie Lyons, ©English Heritage) (**b**) Green plant material in TEM section, scale bar 1 µm (Margaret Collinson, Tony Brain and Eddie Lyons, ©English Heritage)

International Perspectives

The biological remains from Silbury Hill give very little evidence of human occupation, in contrast to sites such as early Neolithic La Draga (see this encyclopedia ▶ La Draga: Environmental Archaeology). Rather, the site provides a snapshot of a late Neolithic landscape with clear evidence for the managed grazing of livestock and the presence of herb-rich chalk grassland. The fact that some of the turves from the organic mounds contain evidence of past woodland strongly suggests that if grazing ceased or was reduced, much of the area would eventually revert to woodland. Indeed, where indicators of woodland were recorded, the taxa found are more typical of secondary rather than primary woodland. These results fit in with the regional picture. Some clearance of primary woodland is attested from the beginning of the fourth millennium cal BCE followed by increased human presence and further clearance. The end of the fourth/beginning of the third millennium cal BCE appears to have been marked by woodland regeneration with the advent of Silbury coming at the same time as evidence for renewed clearance (Whittle 1997: 140; Campbell in press). The presence of a generally wooded environment in the earlier Neolithic in the Avebury region contrasts with that for other areas of the southern chalk which seem to have been more open with larger areas, of grassland. Furthermore, it is suggested that in these areas, postglacial woodland may never have become fully developed and it is no longer valid always to assume that, prior to human influence, a given site would have been wooded (Allen & Gardiner 2009).

Analyses of biological remains present within turves (sods) used in the construction of mounds and other structures have been carried out at a number of other sites and provide valuable information on land-use history and the nature of the environment (Hall 2003; Karg 2008). Recent work on macroscopic plant remains in close conjunction with the geoarchaeological analysis of individual turves used in the construction of the Skelhøjthe mound, near Ribe, Denmark, has provided evidence of the management of heathland vegetation for grazing at around 1350 cal. B.C. The turves from beneath

the iron pan layer represent the first meter of the mound makeup and contained well-preserved plant and insect remains preserved as a result of anoxic conditions. *Calluna vulgaris* (heather) remains, including roots, stalks flowers, and seeds, formed the principal component of the surface vegetation on the turves along with other species indicative of dry grazed heathland. Within the turves charred remains of heather and other plants such as *Rumex acetosella* (sheep's sorrel), *Pimpinella saxifraga* (burnt-saxifrage), and *Carex pilulifera* (pill sedge) showed that the heathland had been previously burnt with the age of the heather and the nature of the surface vegetation, suggesting that this probably occurred between 3 to 10 years prior to the turves being harvested. The regular burning of heath increases fertility, prevents scrub encroachment, and ensures that heather flourishes at the expense of other species. Young plants and shoots of heather are also more nutritious than older growth. The results from the Skelhøj mound show that this traditional method of managing heath for grazing was already practiced in the fourteenth cal B.C (Karg 2008).

Future Directions

Green 'Grass' Remains

The reported evidence of "short grass with square ends" from within Silbury Hill (Whittle 1997: 140) along with descriptions of the vegetation retaining its green color (see, for example, Whittle 1997: 16) is one of the unusual features of the remains from this site. Pieces of green plant material were also recovered during the 2007/8 excavations at Silbury and the majority of these remains appeared at low magnification to resemble fragments of grass leaves or stems with some showing squared ends. However, when investigated further using transmission electron microscopy (TEM), this material was found to lack cellular structure consisting only of two thin outer membranes containing portions of chloroplast thylakoid membranes within an amorphous matrix (Collinson et al. 2011; Fig. 6).

In order to determine what this material might be, and to understand how its unusual preservation might have arisen, it was compared to a number of different modern plant derivatives including fresh, rotted, animal digested, and humanly processed material using TEM. Of the plant materials examined, partially fermented (couched) woad (*Isatis tinctoria*) most closely resembled the green plant material from Silbury Hill as all the others retained cellular structure. While it is not proposed that woad is present at Silbury, the results suggest that the green plant material consists of partially fermented higher plant tissue (further determination is not possible given the lack of diagnostic features). This fermentation may have occurred naturally during construction, but it is also possible that the green plant material was the waste product from some unknown process involving fermentation, with the by-product being placed or discarded into the mound. Further work is required involving the examination of experimentally fermented plant material from known species, as well as material cut, trampled, and then treated in a variety of different ways (Collinson et al. 2011, Collinson et al. in Campbell in press).

Antler

The 2007/8 excavations at Silbury Hill produced a small fragmented antler assemblage probably resulting from the use of antler picks as tools, though only five antler fragments showed wear that could not be attributed to deer behavior. In addition, a chalk block bearing strike marks from an antler pick was recovered during excavations on the summit. There are also a number of other finds of antler from the previous interventions, with these finds often referred to as deer horn in the early reports (Worley in press).

It is postulated that an antler pick can only be used as a tool for a single day during which time it can be used to dig out around 3 m^3 of chalk. Given that the volume of chalk making up Silbury Hill is estimated as somewhere between 236000 m^3 and 23900 m^3, this would mean that over 78000 picks would have been needed over the period of construction (see above), so something like 500 antler picks would be needed each year. While these figures only provide estimates, they do serve to illustrate that the

collection of shed antler would have been an important spring activity for people at this time, and that in all likelihood this commodity would have been traded or exchanged as a valuable resource. Antler could also have been harvested from deer killed for meat (Worley in press).

The small number of fragments retrieved from the various excavations into Silbury Hill, even taking into account the tiny proportion of the mound that has been excavated, suggests that the majority of tools or broken tools were not discarded on site. This could relate to the need to keep the site "clean" (see above) but might also mean that even broken fragments were reused or recycled into other items. This pattern of disposal might further indicate that those antler fragments that were found within the hill represent deliberately placed deposits. Similar practices have been noted at other ceremonial sites. The central zones of such sites (e.g., Avebury, Durrington Walls) tend to be free from antler tools whereas caches of antler picks have been recovered from their ditches where they are interpreted as offerings marking the completion of works (Worley in press).

The question of how and from where the antler picks used to build Silbury Hill were procured has become the subject of new research, funded by a grant from the British Academy. This project aims to discover whether strontium isotope analysis can be used on the antler from Silbury Hill to determine its provenance. If successful, the method could be applied to other sites and other antler artifacts.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ La Draga: Environmental Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Silverman, Helaine

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Basic Biographical Information

Helaine Silverman received her B.A. at Queens College of the City University of New York, M.A. at Columbia University, and Ph.D. at the University of Texas at Austin. She holds the position of full professor in the Department of Anthropology at the University of Illinois in Urbana-Champaign where she is also the director of the university's Collaborative for Cultural Heritage Management and Policy (CHAMP). Prior to becoming involved in cultural heritage research, Dr. Silverman conducted many years of archaeological fieldwork on the south coast of Peru.

Major Accomplishments

Dr. Silverman's Nasca research in the 1980s and 1990s rewrote understanding of this ancient society, which previously had been known almost exclusively on the basis of its exquisite polychrome pottery and the countless tombs from which this material had been looted over the course of almost a century. She overturned the dogma that early Nasca had been organized as a state and that Cahuachi, the greatest early Nasca site, had been a city. Her fieldwork at Cahuachi and in several valleys of the Río Grande de Nazca drainage proved the lack of political centralization in early Nasca society and that Cahuachi had functioned, basically, as an "empty ceremonial center" animated by pilgrimage but without significant residential population. She also was the first scholar to contextualize the "mysterious" Nazca Lines (geoglyphs) within the society that produced them, identifying scores of geoglyph sites of various types on the hillsides of the valleys where the Nasca population lived and demonstrating the relationship between habitation sites and geoglyphs.

In addition to her own publications, Dr. Silverman has been a prolific editor of influential volumes on Andean archaeology: *Andean Archaeology* (Blackwell, 2004) and with William H. Isbell, *Andean Archaeology I: Variations in Sociopolitical Organization* (Plenum/Kluwer, 2002); *Andean Archaeology II: Art, Landscape, and Society* (Plenum/Kluwer, 2002); and *Andean Archaeology III: North and South* (Springer, 2006). She and Isbell also coedited the massive *Handbook of South American*

Archaeology (Springer, 2008), a state-of-the-art compendium and the first to tackle the continent since Julian H. Steward's *Handbook of South American Indians* in the late 1940s.

It was constant media attention to her Nasca investigations that led Dr. Silverman into the cultural heritage field. She became intrigued with public interest in the past and how the past was deployed by the tourism industry and constructed by the Peruvian nation-state. As part of this new work, she also conducted ethnoarchaeological work on modern Peruvian cemeteries and in museums.

Dr. Silverman's current research is a critical analysis of the cooperative and conflictual production of archaeological monuments as cultural heritage sites for visual, performative, economic, and political consumption as undertaken by national governments, regional authorities, local administrations, community stakeholders, and the global tourism industry. In this regard, she has been conducting a long-term study of the historic district of Cuzco, former capital of the Inca Empire and today one of Peru's foremost tourist attractions. She also has worked in Thailand where has been studying the impact of cultural tourism in Phimai, a small town in whose center towers a great ancient Khmer temple that is currently on the Tentative List and intended for inscription on UNESCO's World Heritage List.

Dr. Silverman is a member of Forum-UNESCO, an expert member of ICOMOS' International Scientific Committee on Archaeological Heritage Management (ICAHM), and an affiliate member of ICOMOS's International Scientific Committee on Cultural Tourism (ICTC). She serves on the editorial boards of *International Journal of Heritage Studies, Heritage & Society, American Anthropologist* and *World Art*. She is a former editor of *Latin American Antiquity* (2008–2010). She was the book series editor for "Critical Perspectives in Identity, Memory and the Built Environment" (Routledge) and currently edits the "Heritage, Tourism, and Community" book series (Left Coast Press) and coedits ICAHM's book series, "Multidisciplinary Perspectives in Archaeological Heritage Management" (Springer).

Cross-References

- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ Sustainability and Cultural Heritage
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Singapore: Cultural Heritage Management

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Introduction

Singapore is a small, densely populated country. Five million people live on the main island, which covers about 650 km^2. Competition for land is intense. These considerations are often cited to explain the fact that Singapore is one of the few countries in the world where archaeological resources are not protected by law. There is no official archaeological department; archaeological research in this country has been mainly funded by donations from private sources, with some government grants for specific projects. Research has been conducted by university academics from the National University of Singapore and Nanyang Technological University, students, and unpaid volunteers.

Several official bodies have duties concerned with specific aspects of heritage conservation; these include the National Heritage Board, the Urban Redevelopment Authority, and the Preservation of Monuments Board. The National Heritage Board, and the National Museum which forms part of it, has contributed funds and some administrative assistance to archaeological research projects. Other funds have come from NGOs (the Lee Foundation and the Southeast Asian Ceramic Society) and corporations (Royal Dutch Shell, American Express).

In 2010, the Institute of Southeast Asian Studies established an Archaeology Unit under its Nalanda-Sriwijaya Centre. The Unit conducts research in Singapore and elsewhere in Southeast Asia. The National Parks Board has allocated funds for the construction of an outdoor display on an archaeological site in Fort Canning Park. This is one of Singapore's most important precolonial sites and provides visitors with an opportunity to see a display of artifacts and a preserved example of stratigraphy. The Singapore Heritage Society is a registered nongovernmental organization, and often speaks out on issues of heritage management. The Society publishes books on the subject, and comments on topics of concern to the local media.

Definition

In this entry, the term "cultural resources" is understood to mean all artifacts and man-made structures of the period before 1950, and all sites where concentrations of such artifacts can be found, whether in disturbed or undisturbed contexts. "Management" will be used to refer to efforts by official bodies to preserve or modify these artifacts and sites.

Key Issues

The Singapore government has exhibited a laissez-faire attitude toward its archaeological heritage. Excavations since 1984 have demonstrated that sites exist with artifacts dating from

the early fourteenth century, with some objects (Chinese coins) brought to the island at that time actually dating back to the Tang Dynasty (618–906). These sites consist of a fourteenth-century elite residential/craft zone on a hill now known as Fort Canning, and a settlement of artisans and traders on the left bank of the Singapore River which was occupied from the early fourteenth to the early sixteenth centuries. The government has sponsored archaeological research at these sites, one of which has been preserved and presented to the public as a semipermanent display. However, the government has not adopted proposed legislation which would have required contractors to stop work in case of the discovery of potential archaeological sites within the boundaries of the fourteenth-century urban area. There is no requirement that any impact assessments be conducted in advance of construction projects.

Conservation of individual buildings began in the 1970s when the Urban Redevelopment Authority (URA) and Preservation of Monuments Board (PMB) were formed. Controversies arose in the 1980s regarding the URA's focus on preserving individual building facades while neglecting districts and street life. The URA's policies have evolved as a result.

History of Archaeology in Singapore

Archaeological research in Singapore dates from January 1984, when the Singapore National Museum organized a test excavation at Fort Canning, a park where the museum staff suspected artifacts representing precolonial occupation might be discovered. The project succeeded in uncovering evidence of fourteenth-century occupation. In 1987, the Department of History of the National University of Singapore hired a lecturer to teach courses on archaeology and ancient history; the Parks and Recreation Department, the body which was then in charge of developing the park in which the archaeological site was discovered in 1984, hired the lecturer as a part-time archaeological consultant.

An excavation in 1987 was conducted as part of a sequence of archaeological workshops sponsored by the Association of Southeast Asian Nations (ASEAN). A total of 12 excavation projects has been carried out in Fort Canning Park, built on Fort Canning Hill (Miksic 1985, 2006). The name is derived from a British fort built on the top of the 45-m-high hill in 1859, then largely demolished in 1928 to build a reservoir. Other military structures were built on the hill's lower slopes at the same time.

The Fort Canning office of the Parks and Recreation Department (since 1990 the National Parks Board, NParks for short) has been very supportive of archaeological research. Although there is no requirement to do so, the management of Fort Canning Park often contacts an archaeologist when they discover remains during their normal maintenance activities, and when sizeable earth-moving is contemplated. For example, when handicapped access facilities are installed, they notify the archaeologist so that the location affected can be studied.

Public Archaeology on Fort Canning

In the 1990s, a number of projects were carried out to exploit the historical and cultural resources of the park. These include the redevelopment of a semi-historical, semireligious Muslim shrine called the Keramat Iskandar Shah; the construction of two Walks of History (one with signboards related to the fourteenth century and the other commemorating important sites of the British colonial period which began in 1819); and the development of a permanent display at a part of the archaeological excavation which revealed fourteenth-century artifacts in their original contexts.

The first project to be completed was the redevelopment of the Keramat, in 1990. In 1822, the jungle on the hill's surface was cut down and a number of brick ruins were found on the hill. According to a contemporary description (Crawfurd 1967 [1828]), these ruins were made of good quality brick, and were sufficiently numerous that they covered the greater part of the slope. Among the ruins were scattered Chinese and local pottery and Chinese coins dating from the Tang and Song Dynasties. A tradition rapidly arose, on what grounds it is not known, that the site was the final resting place of Iskandar

Singapore: Cultural Heritage Management, Fig. 1 Keramat Iskandar Shah

Shah, the founder of the kingdom of Malacca and one of the first Malay rulers to accept Islam. According to Chinese sources, he died around CE 1413. A series of new structures were built on the site by devotees upon its discovery. By the 1980s, nothing of the original structure remained.

NParks formulated plans to build a new structure on the site, to call attention to the historical character of the park. The few details noted in Crawfurd's description given just after the site's rediscovery in 1822, together with motifs used for early wood-carving, were combined to create the structure seen there now. A carved stone plaque records what is known of the history of the site and Iskandar Shah. It is one of the main stops on the fourteenth-century Walk of History. These walks are simple in concept: paths, in most cases preexisting, with appropriate plaques set up in suitable locations giving information about the historical significance of the site (Fig. 1).

The next major development was the erection of a roof with similar design to that over the Keramat to protect a partially completed excavation where dense evidence of fourteenth-century activities has been recovered. Dr. John Chen Seow Phun, Minister of State for Ministry of National Development and Ministry of Communications and Information Technology, officially opened the facility on 20 April 2001. Visitors can view an actual excavation which presents a soil profile with an early twentieth-century brick foundation in the top layer, beneath which is a layer of sterile red laterite soil, which changes at a sharply defined boundary to a dark brown loam containing a dense concentration of fourteenth-century artifacts. Around the pit, which measures 100 m^2, is a walkway with captions providing information on the general history of fourteenth-century Singapore, and explanations of general archaeological methods. Within an adjoining gallery are cases containing samples of artifacts excavated from the site, together with posters identifying the artifacts discovered and the methods used to recover and interpret them (Fig. 2).

NParks also conducts archaeology-themed events. These involve families who are given a chance to carry out mock excavations in sand boxes, using genuine artifacts found in the hill, and visiting the archaeological site near the Keramat.

Also in the early twenty-first century, reconstructed versions of colonial-period features were erected at the south end of the park. These include a flagstaff, lighthouse, and time ball. These are principal features of the nineteenth-century Walk of History. Further enhancements include installation of a sequence of carved cement reliefs depicting imaginary scenes from Singapore's history along the staircase at the south slope of the hill.

Singapore: Cultural Heritage Management, Fig. 2 Archaeological display, Fort Canning Park

Singapore: Cultural Heritage Management, Fig. 3 Gateway to Fort Canning Cemetery, 1848

Eleven structures from the British colonial period still stand on Fort Canning. These include six military structures: the main fort gate and a sally port, built in 1859, and the Underground Command Centre and three other military buildings dating from 1928. The other remaining features from the colonial period are part of Singapore's first cemetery, which was in use from 1822 to 1860; they include two gothic gateways built in 1846 (Fig. 3), a monument to the son of a prominent British resident of the colony who died in 1848, and two cupolas built as places for cemetery visitors to rest. These cemetery features have been well preserved, whereas the tombstones which once crowded the graveyard were removed in the 1960s and set into the brick wall surrounding the cemetery.

In 1992, the role of Fort Canning in World War II was commemorated by a short-term exhibition held in the Underground Command Centre, a very large command bunker. Public response to the short-term exhibition was so strong that it was decided to make plans for a permanent exhibition in the bunker. NParks

Singapore: Cultural Heritage Management, Fig. 4 Interior of Underground Command Centre before restoration

leased the bunker to a private firm for development: a bidder who won the right to develop another major British military structure on the hill into a country club. The structure had been the headquarters of the British high command in World War II, where Lieutenant General A.E. Percival, the General Officer Commanding Malaya, had his office.

The redeveloped bunker opened on 15 February 1997 (the 55th anniversary of the fall of Singapore to Japanese forces). The presentation utilizes techniques such as elaborate technology for simulating a bombing attack, narration broadcast over a local FM transmitter to which visitors listen through headsets, and animated wax figures of soldiers. The installation of these displays required the remodeling of the structure including the drilling of new doorways through walls and excavation of floors to facilitate the flow of visitors and installation of simulators. Displays were fabricated using surplus military equipment purchased in Britain, of types which were not used in Singapore. Mock-ups of some rooms were given functions used in other rooms; for example, the Fortress Plotting Room became the Gun Operations Room, while the real Gun Ops Room is used for the bombing simulation. Most of the original fabric and atmosphere have thus been lost (Fig. 4).

Other Archaeological Sites in Singapore

In 1993, a reconnaissance of a site designated for Singapore's new Parliament House Complex yielded evidence that an archaeological record of precolonial activity was preserved there. In 1995, an archaeological team was given two months at the beginning of the rainy season when no construction could take place to attempt to recover more data on early Singapore. This was later extended by another month.

The site occupied a location on the north bank of the Singapore River in a position which seemed likely to have been occupied by residents of the ancient Temasik mentioned in Chinese, Javanese, and Vietnamese sources in addition to Malay texts. Excavations there demonstrated that the site contained undisturbed fourteenth century remains.

Since 1995, ten other sites in Singapore have been excavated, some in order to recover more evidence of the fourteenth century, others to explore the material culture of nineteenth and early twentieth-century Singapore. Artifacts from these research projects are now on display in the National Museum, the Asian Civilisations Museum, St. Andrew's Cathedral, and the National University of Singapore Museum. Most of the artifacts were stored in the Fort

Canning Centre, a building on Fort Canning belonging to the National Parks Board, until 2008, when they were moved to the campus of the National University of Singapore, where cataloging and analysis are conducted by students and volunteers.

Other Singaporean Institutions Involved with CRM

In 2010, the Institute of Southeast Asian Studies announced the foundation of an Archaeology Unit under the Nalanda-Sriwijaya Centre. This unit was officially launched in August 2011. The Unit has no jurisdiction over archaeological resources; it will still have to seek permission to conduct research from the landowner. The Archaeology Unit works closely with the archaeological laboratory which was set up at the National University of Singapore in 2009. The university has not courses on archaeology, but a course on CRM in Southeast Asia has been taught annually since 1999. Several academic exercises and master's theses have been written for the Department of Southeast Asian Studies, which was founded in 1991 as a program, and became a department in 2011.

The National Museum of Singapore has passed through a number of phases since Singapore became an independent nation in 1965, after having formed part of Malaysia for three years, and a British colony since 1819. The museum's building was erected in 1887, and for the next 75 years, it amassed a collection of specimens of flora, fauna, and ethnographia, with a few archaeological remains, from the Malay Peninsula and neighboring areas. The new nation was content to leave the museum mainly as it was inherited until 1984, whereupon the museum's potential as a nation-building tool was acknowledged, and major renovations were instituted (Kwa in press).

In 1994, the works of art and the artifacts from other parts of Southeast Asia were removed from the National Museum's collection and divided among a new Singapore Art Museum and an Asian Civilisations Museum. In 2006, a new wing was added to the old National Museum, and an archaeological gallery was installed. This gallery has a permanent exhibition of artifacts from systematic excavations in Singapore, and an audiovisual presentation in a theater which lasts about 12 min. This presentation is unusually designed, because instead of providing one standard narrative, it compares the interpretation of precolonial sources on the basis of different sources (Malay, Chinese, Javanese, and Portuguese).

In 1995, a Chinese Heritage Centre was founded; it is housed at the Nanyang Technological University. It focuses on the recent history of the overseas Chinese and has no archaeological interest. In 2000, preparatory to the development of a Malay Heritage Centre in a nineteenth-century palace, the Istana Kampung Gelam, archaeological excavations were conducted in the Center's courtyard. Excellent results were obtained in the form of different types of artifacts representing life in the palace in the nineteenth and early twentieth centuries, a period for which very little written documentation exists. A small sample of these was exhibited in the Centre until 2010, when they were removed as part of a major renovation of the Centre. It is not known whether they will be reinstalled in future. They are now stored in the archaeological laboratory of the National University of Singapore (Fig. 5).

An Indian Heritage Centre is the next such institution to be constructed. Plans have been made for a three-week excavation at the site selected for the Centre in March 2012. If artifacts are found, they will be exhibited in the Centre together with artifacts of Indian origin found in fourteenth-century contexts elsewhere in Singapore.

Archaeology is gradually becoming recognized as a part of the Singapore story. One of the ways in which this field may make a deeper impression is connected with an online 3-D multi-player role-playing game entitled World of Temasek (www.worldoftemasek.com). This game was developed by the Media Development Authority of Singapore, the National Heritage Board, and an IT company, Magma Studios, and launched by the Minister for Information, Communications and the Arts, Lui Tuck Yew, on 3 March 2011. The game allows players to put themselves in the position of a character such as

Singapore: Cultural Heritage Management, Fig. 5 Istana Kampung Gelam excavation

a spice trader, a pirate, or a sailor in Temasek (the fourteenth-century name of the island). Illustrations in the game are taken from archaeological data, and levels of information and interpretation available in the game provide illustrations of artifacts, links to historical sources, and other materials.

The Urban Redevelopment Authority and the Preservation of Monuments Board are other governmental institutions with jurisdiction over cultural resources. These resources are defined in terms of buildings, either individually or in streets or districts. Their involvement in archaeology has been minimal, but these two bodies have developed an increasingly sophisticated strategy aimed at preserving examples of colonial period architecture and districts. The Singapore Heritage Society, an NGO, has often lent its support to archaeological projects and preservationist causes.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Areas
- ▶ Heritage: History and Context
- ▶ Historical Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Marketing Heritage
- ▶ Urban Archaeology in Twenty-First Century Perspective
- ▶ Uses of Heritage

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Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture

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Introduction

The canton of Valais contains one of the most important Swiss Neolithic sites: Petit-Chasseur in Sion. While this site is already internationally renowned for its megalithic necropolis dating from the Late Neolithic to the Early Bronze Age as well as for its beautiful anthropomorphic stelae, it also has occupation levels dating to the Middle Neolithic and burial sites of the Second Iron Age. The site of Petit-Chasseur was discovered in 1961, following the work of civil engineers in the heart of the city of Sion. It was extensively excavated by O. J. Bocksberger from 1961 to 1969 and by A. Gallay from 1971 to 1973. New interventions were carried out in 1987–1988 by S. Favre and M. Mottet, in 1992 by M. Besse, and in 2003 by M. Mottet.

Definition

Levels of Habitat in the Middle Neolithic

The Middle Neolithic occupations at Petit-Chasseur are subdivided into three phases (Besse & Piguet 2011). An early occupation phase dating to 4,500 BCE, and attributed to the Middle Neolithic I, was very poorly preserved, and no housing plan can be reproduced. A middle phase, situated between 4,000 and 3,800 BCE, attributed to the Middle Neolithic II – Cortaillod of the Petit-Chasseur type – reveals the best-preserved habitat. At this level, a hamlet composed of at least three housing buildings and a construction interpreted as a space dedicated to penning livestock have been identified (Fig. 1). Finally the third phase, dating from 3,800 to 3,600 BCE is associated with the Middle Neolithic II – Cortaillod of the Saint-Léonard type. This level presents at least two domestic units, but these are poorly preserved, preventing identification of the housing plans.

The homogeneity and the distribution of the remains found are in line with similar ways of life and similar choices of consumer products (Besse & Piguet 2011). Production activities were oriented toward goat breeding and cultivation of cereals (barley and wheat). Subsistence activities and crafts were controlled at the scale of the house. Diverse and varied influences are highlighted by the study of ceramics. The lithic industry was dominated by quartz used for domestic blade production. During the regional Middle Neolithic in general, the knapping of quartz took place off-site, near the sources (Besse & Piguet 2011).

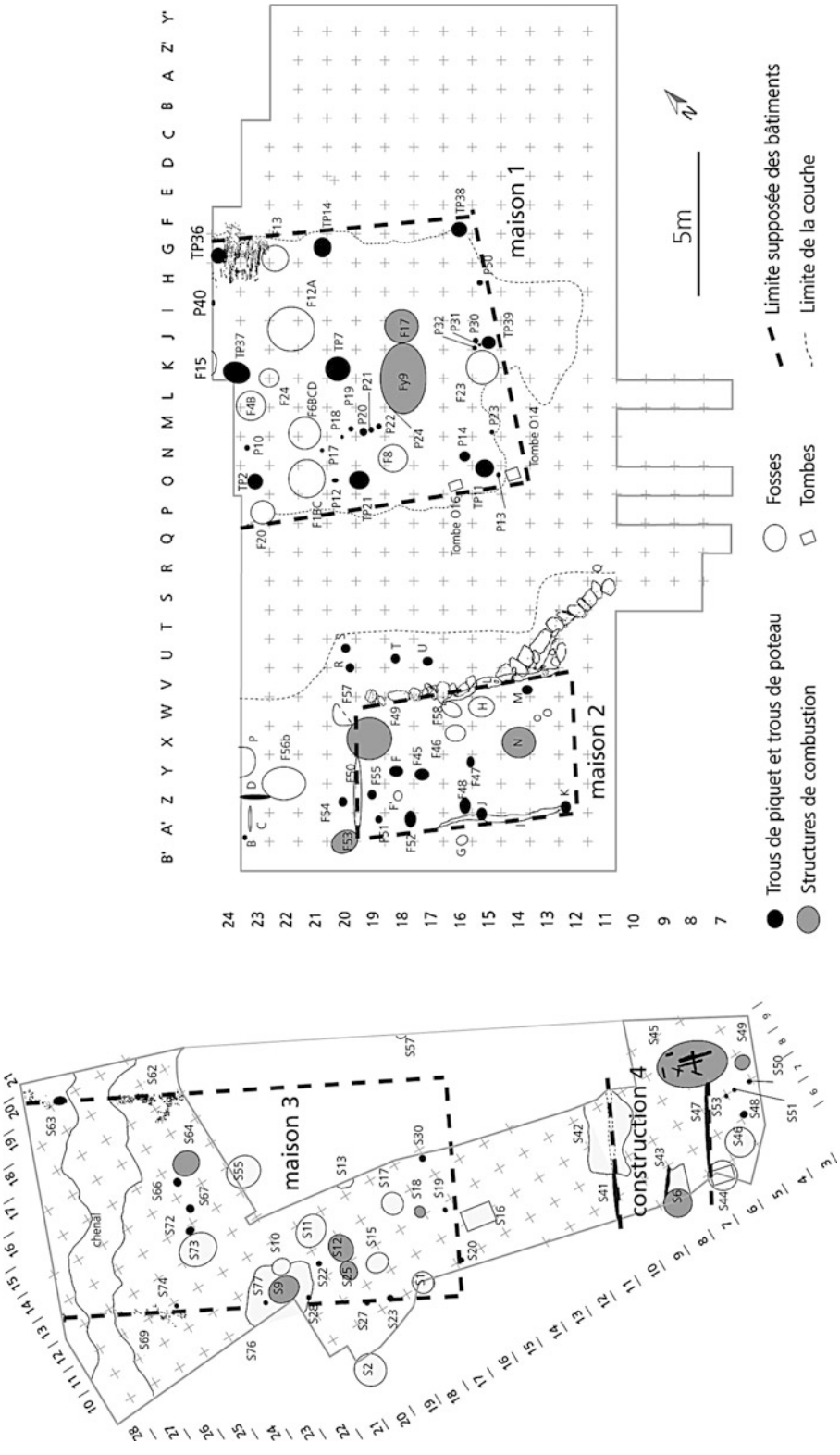

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 1 The structures of the stratigraphic series of Middle Neolithic II, Cortaillod type Petit-Chasseur and the supposed boundaries of the buildings (Besse & Piguet 2011: 64)

Excavations in the Middle Neolithic II habitation levels also revealed seven funerary structures (Besse & Piguet 2011). These are cysts of *Chamblandes* type, burial vaults formed of four slabs in a pit and, in general, a capstone. The chamber is covered with materials from the pit. Each cyst contains one or more individuals, usually buried in left lateral or supine position, with limbs bent. In domestic context, burials of this *Chamblandes* type contain mainly for juveniles (Desideri & Besse 2009).

The Megalithic Necropolis of Petit-Chasseur

The famous megalithic necropolis of Petit-Chasseur reveals an occupation that lasted for nearly 15 centuries. The magnificent collection of anthropomorphic stelae and funerary objects could be correlated to different chronological phases, thus enabling a seriation of several construction stages and use of the 12 monuments– MI to MXIII – of the megalithic area, from the Late Neolithic to the Early Bronze Age (Fig. 2).

Funerary Occupation During the Late Neolithic

The necropolis includes two monuments dating from the Late Neolithic, collective graves MVI and MXII. These are dolmens with a triangular base and antennas.

Dolmen MXII is the oldest megalithic area monument from Petit-Chasseur (Favre & Mottet 2011). It shows an occupation that lasted between five and seven centuries from 3,100 to 2,400 BCE and is the only tomb containing human remains in place for this period. The first phase of burials was completely reworked, and the remains piled northwest of the burial site. The second phase begins with the burial of an individual – in the middle position in the grave – in a slightly lateral right position. Next, those buried were spread in successive layers composed of three lines of two bodies, generally laid in supine or lateral position with limbs bent. Before a new occupation, a regular reorganization took place by leveling the ground and removing the bones disturbing the leveling. The skulls were moved and stored against a slab of the monument. The burial chamber contains at least 115 individuals.

Dolmen MVI, meanwhile, reflects a more diverse history spanning about eight centuries, from the Late Neolithic to the Bell Beaker or from 3,000 to 2,200 BCE (Bocksberger 1976). This monument was erected after dolmen MXII. Three separate moments can be distinguished. The first occupation is Late Neolithic and corresponds to the initial phase of construction use, although information regarding the original position of those buried in the monuments is difficult to precisely determine. This difficulty is linked to the second occupation phase, because the Bell Beakers emptied the burial chamber. However, it was possible to inventory 33 individuals from the first occupation (Gallay 1986).

Funerary Occupation During the Bell Beaker Period

Within the megalithic necropolis of Petit-Chasseur, the Bell Beakers display both mixed and new behaviors, mixed because they both reused earlier monuments and built their own monuments (dolmens and cysts) and new because although the construction of cysts is known in the Bell Beaker cultural area, the construction of collective monuments remains an original behavior (Besse & Desideri 2005).

The Bell Beaker occupation begins with the construction of three dolmens at the side entry (Gallay 1986). Dolmen MI contains no bones, but the remains of five individuals were found outside of the building with Bell Beaker artifacts. Dolmen MV contains the remains of nine individuals. Dolmen MXI contains at least 15 individuals. A reconstruction of the position of those buried inside the monuments was not possible.

Later, the Bell Beakers removed the remains of the first occupation phase (Late Neolithic) from dolmen MVI and laid them outside the monument (Bocksberger 1978). While the skulls were given special treatment – they were found carefully aligned along the wall of the dolmen - the rest of the bones and associated material were thrown in a jumble. It is likely that the evacuation was carried out in a single event, since no refitting between bones inside the room and those outside

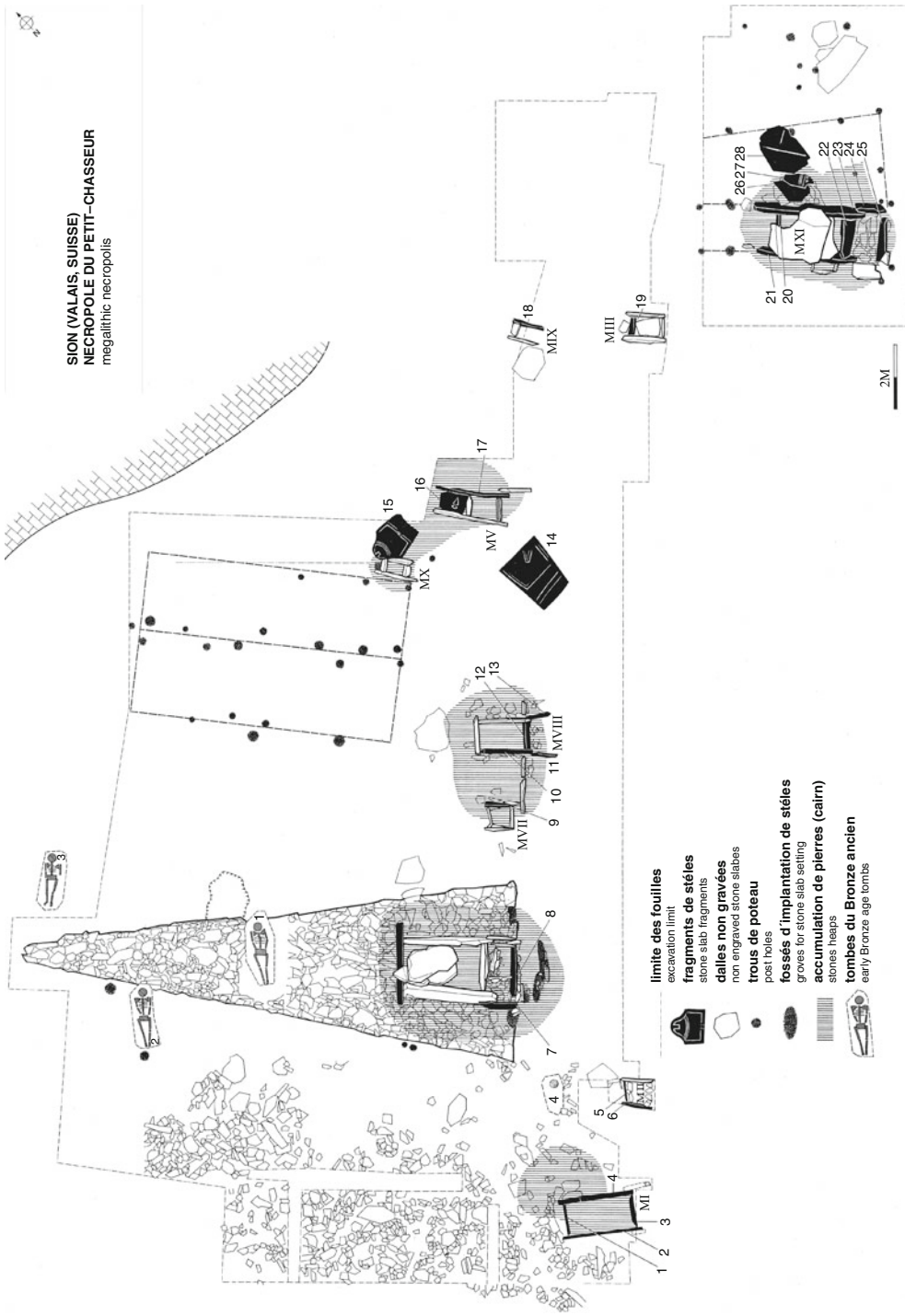

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 2 Map of the megalithic necropolis of Petit-Chasseur (dolmen MXII and cyst MXIII located 100 m from the other monuments not shown) (Favre et al. 1986, plate 1)

could be done. The Bell Beakers thus had a new place to put their own graves. The contents of the inside of the monument were completely disturbed, which does not seem to be related to a single moment, but rather to ongoing and repeated Bell Beaker visits to the grave. There are 14 individuals (Gallay 1986).

Finally, the Bell Beakers built new small graves around ancient monuments, that is, cysts MII, MIII, MVII, MVIII, MIX, MX, and MXIII (Gallay 1986). Some of these did not contain bones, but other contained from one to seven individuals.

Anthropomorphic Stelae

Thirty-one humanoid stelae were recovered in the megalithic necropolis of Petit-Chasseur. Two types of stelae – A and B – were identified, respectively, attributed to the Late Neolithic and Bell Beaker. The stelae were all found in secondary position, being reused in the construction of monuments or simply lying flat next to the graves (Corboud & Curdy 2009).

The stelae of type A present sketchy anthropomorphic elements (limited to the drawing of arms, forearms bent at right angles, and opposing hands) and horizontal bands suggesting belts, double spiral pendants, daggers, and axes (Fig. 3).

The stelae of type B are lavishly decorated with weapons in their sheaths, clothes represented by geometric designs (tunics, loincloths, belts, bags, etc.). The appearance of the bow with a strap worn over the shoulder with one or more arrows can also be seen. Type B stelae can be separated into masculine and feminine stelae, the latter characterized by the absence of weapons (Fig. 4).

These stelae have been interpreted as representations of important people in the community rather than deities. Their discovery in secondary position, notably reused as raw material in the construction of funerary monuments, suggests a change in status and above all a loss in symbolic value associated with either social death (during one's lifetime or at death) or the natural death of the important person it represented (Gallay 2009).

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 3 Stela 24 of type A in reuse in the construction of dolmen MXI: height 193 cm, width 94 cm, 10–11 cm thick (Favre et al. 1986, plate 20)

Funerary Occupation During the Early Bronze Age

The latter occupation phase of the megalithic area of the Petit-Chasseur is attributed to the Early Bronze Age (Gallay 1986), during which we see the appearance of individual tombs. Earlier graves were pillaged and emptied, the human bones regrouped and incinerated. A female individual is buried in dolmen MXI, some juveniles were placed either inside old emptied tombs (MV) or outside in the adventitious cysts (MVI and MXI). Finally, several burial tombs were also recovered in which the bodies were placed on lie on slabs (Bocksberger 1978).

Burials of the Second Iron Age

The site of Petit-Chasseur also contains seven individual burials dating to the La Tène period (Curdy et al. 2009). The entire funerary during the Iron Age is not yet known, and the tombs

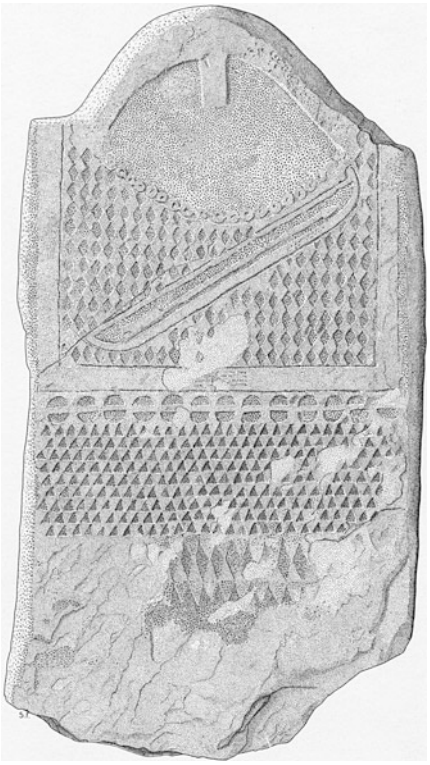

Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 4 Stela 25 of type B in reuse in the construction of dolmen MXI: height 157 cm, width 86 cm, 10–11 cm thick (Favre et al. 1986, plate 21)

discovered demonstrate a relatively wide dispersal. The orientation of the graves is constant (NE/SW), and the dead are in supine position, with the head facing NE. The bodies appear to have been placed in wooden containers (dugouts [*monoxyles*] or planks). Funerary objects are abundant and include ceramics, swords, shield knobs, fibulae, and other ornaments.

Key Issues/Current Debates/Future Directions/Examples

The cultural sequence of Petit-Chasseur is one of the most comprehensive in the alpine area. The exceptional quality of the recovered archaeological remains and the system of field documentation make this site a key reference in understanding the history of Neolithic populations, not only in the Alps but also at a European scale.

The year 2011 marked the 50th anniversary of the discovery of Petit-Chasseur. It is clear that this group has been and still is the source of dozens of university theses (masters and doctorates) and a number of significant monographs; the results of successful collaboration between the three institutions responsible for its promotion (the Cantonal Service of Archaeology in Valais, the cantonal museums of Valais, and the Laboratory of Prehistoric Archaeology and Anthropology – formerly the Department of Anthropology and Ecology – at the University of Geneva).

Cross-References

- ► Megalithic Art: A Visual Repertoire for the Dead
- ► Tombs, Greek (Iron Age)

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Site and Artifact Preservation: Natural and Cultural Formation Processes

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Introduction

One of the best-known archaeological sites in the world is Pompeii, a Roman town buried by the eruption of Mount Vesuvius in CE 79. The disaster stopped daily life in its tracks, felling residents who were unable to escape and covering everything with a thick layer of ash. Millions of modern tourists visit Pompeii each year, now able to walk its streets, inspect its art (and graffiti), and peer into shops and homes. The casual observer might therefore imagine that *most* places of past human activity remain as they were in use, perhaps simply buried under a thick layer of dirt or volcanic ash. In this view, an archaeological site – much like the abandoned home described by Philip Larkin in his poem "Home is So Sad" – "stays as it was left,/Shaped to the comfort of the last to go."

Of course, nothing stays exactly as it was left. All archaeological sites suffer the effects of time, climate, and organisms (including people). Organic materials at Pompeii that were not burnt, subsequently decayed. Remains of the unfortunate residents trapped in the town decayed and could only be reconstructed by pouring plaster into the voids in the ash left by their bodies. Some of those who escaped later attempted to salvage what they could find and remove it from the site. After the rediscovery of the site, the material record at Pompeii was heavily affected by both looting and archaeological investigation.

Looting, decay, disturbance, and other natural and cultural processes affect the archaeological record (Schiffer 1987 for the best overview). These processes do not render it meaningless, but they must be recognized so that we can consider their impact on our sample of sites and artifacts, spatial patterning, and other matters so crucial for interpretation (see also ► Bam: Archaeological and Social Investigations after the Earthquake).

Key Issues/Current Debates/Future Directions/Examples

Natural Processes of Decay (and Preservation in Different Environments)

Some materials survive the vagaries of time better than others (Sease 1994 for an overview). *Highly perishable organic materials* include

skin and soft tissue as well as wood and other plant remains. In most cases, these are very vulnerable to decay and hence do not survive in the archaeological record except under unusual conditions. As a result, at most sites we are unlikely to find baskets, textiles, wooden artifacts, leather, and any remains of people or animals other than bones or teeth.

The exceptions generally occur in arid, frozen, or waterlogged environments, such as deserts, glaciers, and peat bogs, which prevent decomposition and are favorable for preservation. Famous examples of organic preservation come from desert sites such as White Dog Cave (a Basketmaker site in northern Arizona), with conditions that naturally mummified burials, and Cahuachi (a Nazca site in coastal Peru), with cotton and wool textiles; the frozen body of the "Iceman" in the Italian Alps; the waterlogged site of Ozette in Washington state, United States, with wooden houses and artifacts; and peat bogs, including sites from northwestern Europe with Iron Age "bog bodies." Burial by volcanic ash may also seal the environment and prevent decomposition, such as in some contexts at the Cerén site in El Salvador. Decomposition may also be retarded by associated materials; copper, salt, or oil around organic items has been observed to preserve the organic remains.

Organic materials may also be preserved through burning. Charcoal (carbonized wood) and other carbonized plant remains are crucial sources of information about diet and other plant uses. Whole loaves of bread have been recovered from Pompeii because they were completely carbonized and therefore could not decay. Carbonized organic material preserves well in a variety of environments, but it is physically fragile. *Less perishable organic materials* include bone, ivory, and teeth, all of which have both a calcium-rich mineral component and an organic component. (We may also include shell here because it is made of calcium carbonate, although shell has no organic component and does not decay.) All of these materials preserve best in soils with neutral or slightly alkaline pH, as acidic environments break down the calcium-rich mineral component. For example, almost no bone was preserved at the Sloan site, a cemetery in the southeastern United States dating to around 10,000 years ago on acidic terrain. As a result, burial locations could only be inferred through calcium concentrations (into which the bone had disintegrated) and artifact clusters. Bones are also damaged and altered during processing and consumption of the carcass. Damage from human butchery provides important cultural information, but it may also result from carnivore and scavenger activity (Binford 1987).

Nonorganic materials include ceramic, glass, metal, and stone artifacts. Porosity is one factor affecting the survival of these materials, because greater porosity increases vulnerability to wet-dry cycles, freeze-thaw cycles, and accumulation of salts in the burial environment – all of which will lead to periodic expansion and stresses within the body of the piece. For ceramics, firing temperature and temper type can significantly affect porosity and other attributes related to survival. Fiber-tempered pottery, which is the earliest pottery used in North America, is especially vulnerable to freeze-thaw action because of its high porosity. Calcareous temper, such as shell or limestone, will dissolve in acidic environments, leading to voids in the fabric. Such environments also cause acid leaching, or leaching of iron, lightening the color of the ceramic (Rye 1981).

The survival of glass and metal depends considerably upon its composition as well as the burial environment. Acidic soils are favorable for glass, but alkaline soils will cause leaching of the glass matrix. Pure gold resists corrosion from moisture and oxygen, but other metals (including those added to gold as part of the alloy) do not. Iron corrodes easily, producing reddish rust. Copper corrosion leads to a variety of colors, including green, and the chlorides in saline soils dramatically speed copper corrosion.

Stone generally survives well, but as with other material types, the structure and porosity is important. Mica, with its many thin sheets, is especially fragile physically. Limestone will erode or dissolve in acidic environments, as do other calcareous materials; this soft and porous rock may also suffer from erosion from wind,

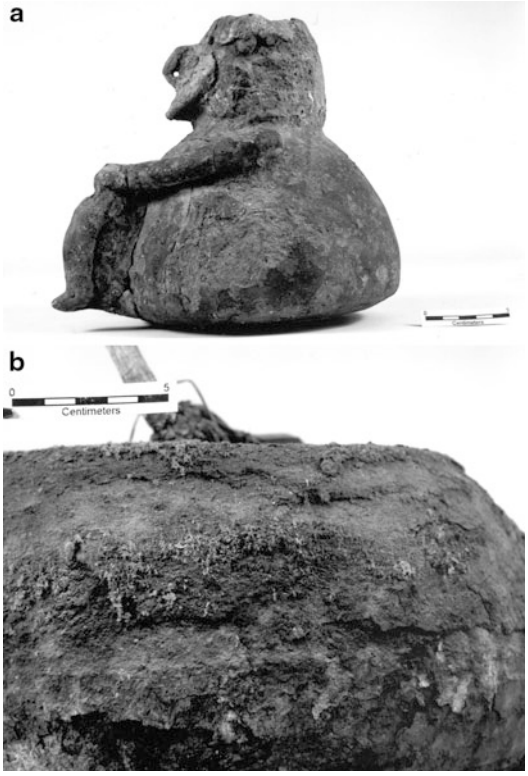

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 1 Damage from accumulated salts in (**a**) a prehistoric Hohokam effigy vessel from Arizona and (**b**) a modern flowerpot from Arizona. The modern flowerpot displays active growth of salt crystals (Photos taken by the author)

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 2 Mottling indicating movement of soil through animal burrows (Photo courtesy of E. Arthur Bettis, Department of Geoscience, University of Iowa)

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 3 Root disturbance (Photo courtesy of E. Arthur Bettis, Department of Geoscience, University of Iowa)

water, and crystallization of salts. Some combination of these factors probably caused the damage visible on the famous limestone monumental sculpture in Egypt, the Great Sphinx of Giza. Salts are of special concern in arid regions, because if not removed, they may continue to damage artifacts, even during curation (Fig. 1).

Natural Processes That Move and Damage Artifacts

Natural processes can move artifacts and disturb features, sometimes so much so that the archaeological site is no longer a "primary" site (where the cultural deposition originally occurred) but a "secondary" site (where materials were redeposited). The effects of gravity seem obvious – for example, materials on slopes often move downhill – but materials deposited on level ground may also move around, up, and down. All of the processes that deposit, remove, and churn soils and sediments also affect soil within that matrix. Such processes include deposition and erosion from wind and water as well as the movement of particles by animals (faunal turbation; Fig. 2), plants (floral turbation; Fig. 3), freeze-thaw action (cryoturbation), and the shrinking and swelling of clay (argilliturbation). These natural processes, and their effects on

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 4 Disturbance of a modern village midden by domestic animals in northern Luzon, Philippines (Photo taken by the author)

archaeological sites, are also studied by geoarchaeology (e.g., Goldberg & Macphail 2006).

Cultural Processes of Site Destruction: Scavenging, Looting, and Site Reuse

People frequently interact with material left by past activities, changing the nature of the evidence archaeologists will find. They may remove or alter traces of human behavior, soon after or long after the fact. This happens in a wide variety of ways at all stages of archaeological site formation, often motivated by a desire for the objects previously deposited or for the space these deposits occupy.

The process of reclaiming discarded or abandoned artifacts happens all the time in all societies, although it plays out differently in rich industrialized nations than in poorer ones. In the United States, the regular discard of usable, edible materials directly into the trash has spawned an entire movement known as "freeganism," in which adherents feed, dress, and entertain themselves from garbage deposits to protest against rampant consumerism and reduce environmental impact. In contrast, rural villagers such as Maya groups in Guatemala and the Kalinga of northern Luzon, Philippines, extensively reuse and recycle items before sending unusable scraps to a midden.

But these middens too may subsequently be modified: many are close to paths and activity areas, and may be dispersed by human and animal foot traffic at least along the margins. Children also collect things from middens for their play, and animals wander in to eat vegetable matter left over from food processing (Fig. 4). If trash deposits start to interfere with village needs (e.g., if they become too large or too smelly, or if they sit on land now desired for another purpose), they will be moved.

Abandoned residential sites may have more to offer in terms of reuse. Building materials are routinely scavenged from old dwellings for the new ones, either in the same community or a nearby one. If a dwelling or community was abandoned quickly or destroyed catastrophically, residents might have been forced to leave many items there, materials worth scavenging later. Some discarded items prove to be useful later for new reasons; for example, Hopi potters in the US Southwest are among those known to collect both sherds and pots to serve as models for designs and to grind up as temper.

Some collectors are looking for wealth, things of beauty, or souvenirs, and this type of collection – like other processes of cultural disturbance – happened thousands of years ago just as it does today. The tombs of Egyptian pharaohs were targeted by robbers long before excavators

such as *Belzoni* arrived in the early nineteenth century. Early visitors to archaeological sites often brought a shovel for souvenirs, a pattern common to many places including the eighteenth-century Spanish *presidio* in Tucson, Arizona, and nineteenth-century ghost towns in the western USA. Once materials have spent a certain amount of time in the archaeological record, many modern societies now have laws regulating their collection, although these laws are not always adequately policed. The illicit trade in antiquities continues, linking looters who dig up the items for sale to the museums who buy them (Watson & Todeschini 2007).

Archaeological sites are frequently reoccupied, reused, or affected by redevelopment and renewal. Boston's Central Artery/Tunnel Project or the "Big Dig" of the late twentieth century, while rerouting Interstate 93, displaced existing structures in use and also encountered abundant archaeological deposits. In the mid-twentieth century, Tucson, Arizona, demolished portions of the city from the nineteenth century, including the Spanish Convento and San Agustín chapel as well as its Chinatown, to make way for a convention center. Needs and values concerning the past change over time, and communities sometimes regret such land-use decisions. In awareness of the potential losses, the *Cultural Heritage Management* profession records sites before they are altered or destroyed to make way for the needs of modern living.

Conclusions

All archaeological sites have been altered in some way since their creation. The question is, how can we identify the types of disturbance and take account of them in interpretation? An understanding of decay processes, and of what we are unlikely to find in certain environments, is crucial for evaluating our sample of the material record. Geoarchaeology can be very helpful for assessing formation of natural and cultural strata, as can the study of artifact damage, fragmentation, and its *spatial analysis*. *Ethnoarchaeological* observations of historical and ongoing site formation processes provide invaluable clues about the range of possibilities we should consider. These alterations do not diminish the value of the archaeological record but add to its richness and complexity.

Cross-References

- ▶ Bam: Archaeological and Social Investigations after the Earthquake
- ▶ Burial Mound Dissection in Sweden
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Frozen Conditions: Preservation and Excavation
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Site Formation Processes

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Introduction

As core concepts in contemporary archaeology, site formation processes (SFP) are indispensable in building strong inferences about the cultural

past (Schiffer 1987). SFP are implicated at every level of archaeological inquiry, from designing research to interpreting variation in artifact form, assemblage composition, feature content, space modification, and landscape evolution. Without question, understanding the origins and significance of variability is fundamental to determining the suitability of certain kinds of archaeological phenomena for particular research questions.

A *formation process* is any event or situation involving the interactions of humans, surfaces, matter, and the environment that affects the characteristics of the archaeological record (such as its spatial extent, depth, surface expression, or content diversity). Such events create anomalies in natural ecosystems (often referred to as "traces") that register these interactions and subsequent modifications to them. In fact, as a contemporary phenomenon, the archaeological record can be considered the *current* expression of the cumulative effects of formation processes (Sullivan 2008a).

Theoretically, the study of the archaeological record is enabled by a consideration of formation processes because archaeologists are interested in understanding which factors have contributed to archaeological variability. These and other concerns are covered by *formation theory*, an integrated corpus of concepts that focuses on understanding how the archaeological record expresses the properties that it does (Shott 2006). As well, formation theory inspires the development of relevant methods for identifying and incorporating an understanding of SFPs and their effects in inferring the histories of archaeological phenomena.

Definition

Typically, SFP are distinguished on the basis of the agents involved in producing traces. Anthropogenic formation processes (AFP, also called "cultural" formation processes) register modifications to surfaces and matter caused by human activity. In contrast, environmental formation processes (EFP, also called "natural" formation processes) modify anthropogenic surfaces and arrangements of matter by the actions of earth dynamics, vegetation growth patterns, and animal behavior (Schiffer 1987).

Anthropogenic Formation Processes

AFP and their archaeological consequences can be discussed conveniently in terms of several classes. First, significant ethnoarchaeological and experimental research has concentrated on documenting the traces that arise on *specific types of artifacts* and how variation in their use-histories (from acquisition to discard) affects their form. The transformation (or flow) model of these processes has focused specifically on investigating how an object's attributes and performance characteristics are manipulated by humans, including variation introduced by discontinuities that arise among stages of artifact production, use, re-fashioning, and ultimately abandonment (Schiffer 2010). Archaeologically, provenance studies using strontium isotope ratios, for instance, have shown that the distances between the sources of ceramic materials (e.g., rock temper) and the locations of ceramic manufacture vary tremendously for different wares (Carter et al. 2011). With respect to organic artifacts, such as domesticated crops, isotopic studies have determined that the areas where such plants were grown differ dramatically and changed through time, from the contexts where they were processed and stored (Benson et al. 2009).

Second, equally consequential AFP studies have been conducted by ethnoarchaeologists and archaeologists on the formation histories of assemblages, that is, how variation arises and is registered by the accumulation, and ultimately the abandonment, of *different kinds of artifacts* on surfaces. Often referred to as "activity area" research, the investigation of these AFP is intended to provide a framework to infer the behavioral or organizational factors that are responsible for differences in the quantities, concentrations, and diversity of "floor-contact" artifacts (Enloe 2008). In addition, exploration of assemblage formation histories has promoted the development of "accumulations" research,

Site Formation Processes, Fig. 1 Bedrock cuttings in the cliff face for multiple-story structures opposite the Chateau de Commarque (twelfth to eighteenth century CE; photo by Jonida Martini)

which is designed to enable archaeologists to develop inferences about the amount of time it took for certain quantities of artifacts to build up in specific contexts (Varien & Mills 1997).

Third, the anthropogenic modification of space is a formation process that has a deep and broad history of investigation by architects, ethnographers, ethnoarchaeologists, and archaeologists (e.g., Nabokov & Easton 1989). In both ancient and modern contexts, studies of these AFP invariably entail consideration of the traces of construction activities – terrain modification, material acquisition, labor mobilization, and relative chronology – that are registered by surface anomalies (e.g., Burks & Cook 2011), stratigraphic relationships among surfaces (e.g., bonding and abutting relationships among walls), interfaces created by the installation of architectural features (e.g., postholes), and alterations to preexisting architectural forms (Harris 1979). In fact, the extent of earlier occupation, the degree of subsequent rebuilding, and even the sizes and shapes of razed structures can be inferred by mapping the traces of buried foundation trenches, the locations of displaced mud-brick fragments, or the remnants of bedrock modifications (Fig. 1).

Fourth, an increasing number of AFP studies, conducted by archaeologists and geoarchaeologists, has focused on determining the authenticity or integrity of "sites" and their contents. For example, in the case of Pompeii, despite the sudden eruption of Vesuvius and rapid burial of the city in CE 79, the integrity of the "snapshot" was greatly altered by post-eruptive anthropogenic activities, such as removal of valuable goods by the fleeing populace, later excavation and retrieval of objects by the Romans, and, much later, by the construction of a large drain in the seventeenth century (Allison 2004). Conversely, the presence of 17 wells completely filled with "typical" demolition debris, adjacent to and dating closely to the same period as the demolition of monumental structures, confirmed the authenticity of "Persian destruction" events that transpired in the Athenian Agora (c. 480/479 BCE [Shear 1993]).

Fifth, as archaeology itself has become institutionally mandated in regional planning studies, many archaeologists have turned their attention to landscape scales of analysis and, understandably, to understanding the formation histories of regional archaeological records. Such studies have become particularly attractive as archaeologists have become more deeply involved in climate change studies (Kirch 2005). In addition, many of the

Site Formation Processes, Fig. 2 The sixth-century CE basilica of San Nicola in Carcere, Rome (photo by Jonida Martini). The basilica was constructed over the foundations and incorporated the superstructure of three temples: the Temple of Spes (c. 250 BCE), the temple of Juno (second century BCE), and the Temple of Janus (CE 17)

Site Formation Processes, Fig. 3 Prehistoric (CE 700–1200) metate (grinding stone) installed as a grave marker in the twentieth-century public cemetery at Grand Canyon National Park, Arizona

millennia-old terrain modifications created by small- to mid-scale societies, such as now long-abandoned reservoirs and rock alignments, not only have resulted in permanent changes to drainages and ecosystems but provide, as well, sources of paleoenvironmental samples that register temporally sensitive rates of change in anthropogenic environments (e.g., McIntosh et al. 2000).

Finally, archaeologists worldwide have been documenting the historic and continuing extent of anthropogenic modifications to archaeological phenomena. For instance, it is not uncommon in prehistoric contexts for abandoned artifacts, such as sherds, to be reclaimed from their discard contexts and recycled as architectural elements; in these cases, the original design and performance characteristics of these ceramics have been "overprinted" and adapted for new purposes (Peña 2011). Similarly, in more recent contexts, ancient materials have been repurposed and given new meanings, as when Roman columns were incorporated in a medieval church (Fig. 2) and a prehistoric metate was installed as a grave marker in a modern cemetery (Fig. 3).

Site Formation Processes, Fig. 4 Modern, illegal woodcutting has altered the surface archaeology of prehistoric fire-cracked-rock piles (*lower left-center* to *upper right-center*), Kaibab National Forest, Arizona

Still, tragically, the vast majority of anthropogenic modifications to archaeological phenomena materialize as modern traces that significantly affect ancient ones. Some of these formation processes are intentional, but the effects are well understood and, hence, can be factored into archaeological interpretation, as in the case of "plow zone" assemblages (Hawkins 1998). Others, such as the effects of camping, hunting, and woodcutting on surface archaeological phenomena (Fig. 4), although inadvertent, are more difficult to incorporate in archaeological interpretation because their effects are just beginning to be studied systematically (Uphus et al. 2006). Of course, modern activities targeted specifically to relieve the archaeological record of "valuable" objects for the antiquities market are globally proscribed but represent, nonetheless, a major AFP that continues to affect the content and contextual integrity of archaeological records worldwide (Lazrus & Barker 2012).

Environmental Formation Processes

For each of the three broad classes of EFP – earth dynamics, vegetation growth patterns, and animal behavior – humans are uninvolved in the production of traces that affect the characteristics of the archaeological record (Schiffer 1987). These SFP add, alter, or obliterate traces involving matter, surfaces, and their relations that have accumulated in the archaeological record as a consequence of any of the aforementioned AFP. Often glossed by the term "turbations" (or disturbances), the study of these formation processes by geologists, geomorphologists, soil scientists, and archaeologists has accelerated significantly during the last two decades (e.g., Goldberg et al. 2001).

One category of earth EFP includes short-term, largely unpredictable events, such as earthquakes (Bottari et al. 2009), volcanic eruptions (Sheets 2006), and tsunamis (Cook & Abbott 2012), that can quickly and dramatically alter prevailing arrangements of matter, including architecture, as well as introduce matter to existing surfaces. Equally important, the fallout from these processes, over which humans have no control, can disrupt social systems, leading to widespread regional depopulation and profound ecosystem transformation (McIntosh et al. 2000). Although potentially devastating for local populations, these events often produce so-called "Pompeii" assemblages, which provide

a "snapshot" of activities at the moment they were discontinued. In these cases, although preservation is often enhanced because of rapid burial, it is unclear how far back in time such arrangements of artifacts and contents of features can be projected; hence, Pompeii assemblages are often considered to be "end-biased," short-term, though comparatively rich, samples of ancient human activity (however, as noted above, even in the case of Pompeii itself, post-destruction AFP can greatly alter the integrity of the "snapshot" of ancient activity).

A second category of earth EFP includes long-term and highly predictable modifications to abandoned objects and surfaces that arise as consequences of erosion or sedimentation. The major archaeological consequence of slope wash and stream action is artifact displacement, which can result in either "false" concentrations of artifacts or dispersal and redeposition of artifacts from their original discard contexts (Dibble 2008). Alleged "hearths" at the famous Paleolithic site of Zhoukoudian in China, for instance, once thought to be the earliest evidence of hominin-controlled fire, have now been determined to be accumulations of fluvial sediments (Goldberg & Macphail 2006). Similarly, in arid environments, deflation (removal of fine-grained sediments by wind) can cause commingling (settling) of objects originally deposited on asynchronous surfaces, thereby increasing artifact density and assemblage diversity (Schiffer 1987). Also, experiments have shown that both fluvial and aeolian processes can affect artifact form by "rounding" or "dulling" artifact edges and surfaces (Skibo 2012). Other studies have demonstrated that chemical changes can occur on abandoned objects when, for example, their ground-contact surfaces become locations for the development of "desert varnish" (Goldberg & Macphail 2006).

Originally developed by paleobiologists to understand the mechanisms by which animals come to be represented in the fossil record, the effects of taphonomic processes are being explored by archaeologists to understand how burial and fossilization may skew the content of archaeological samples (Gifford 1978). For instance, certain kinds of remains, such as soft plants or animal hides, generally do not preserve well, if at all, unless they are carbonized, desiccated, mineralized, or waterlogged (Miksicek 1987). In some depositional situations, therefore, archaeologists now proceed cautiously knowing that the absence of fragile material classes can be considered evidence of absence (i.e., indicative of human selection) only after carefully assessing taphonomic factors (Ward & Larcombe 2003).

The second major class of EFP pertains to traces produced by the dynamics of vegetation growth patterns (e.g., establishment, expansion, and contraction of plant communities). Abandoned archaeological sites, particularly those with architectural remains, provide highly productive microenvironments (composed of soft sediments that preferentially retain moisture) that encourage the development of abnormally dense vegetation, which has a number of consequences for the archaeological record. First, thick vegetation (such as impenetrable thickets in desert areas or jungles) may obscure the very remains that archaeologists are interested in locating either by pedestrian survey or by satellite remote sensing (Sullivan et al. 2012). Second, the presence of archaeological sites is often revealed by concentrations of "anomalous" species (e.g., deciduous trees in a conifer forest) that otherwise should not be present. Third, because of climate change, which can adversely influence ecosystem health (e.g., promote bark-beetle infestations), archaeological sites in conifer forests are highly susceptible to damage from wildfires, which can introduce charcoal to buried horizons, topple trees, and their rooting systems in abandoned structures (Fig. 5); encourage erosion of exposed (vegetation-free) surfaces; and accelerate artifact displacement by destabilizing the surfaces upon which the material reposes. Finally, a common problem worldwide is that of the "tree-throw" (or tree-fall), which has two expressions that can confound archaeological interpretation (Goldberg & Macphail 2006). The first type, rather benign, occurs when large trees are upended and their root balls become exposed to the elements (Fig. 6) Within a short period, rocks embraced by the root system become dislodged

Site Formation Processes, Fig. 5 Late nineteenth-century log cabin, probably affiliated with Navajo households, that has been affected by bark-beetle-infested pinyon trees, which have collapsed and become incorporated in the structure (Grand Canyon National Park, Arizona)

Site Formation Processes, Fig. 6 Exposed and eroding root ball of a windblown tree, Kaibab National Forest, Arizona. Note the wide variety of rock sizes in contrast to those of the fire-cracked-rock pile (Fig. 7 below)

Site Formation Processes, Fig. 7 Large fire-cracked-rock pile that has been affected by tree growth. Note that the rock sizes are relatively uniform in comparison to those exposed in the root ball and mound of the windblown tree (Fig. 6 above), Kaibab National Forest, Arizona

Site Formation Processes, Fig. 8 Destruction caused by a windblown tree whose roots have penetrated a prehistoric structure

from the root ball and accumulate as small mounds that mimic anthropogenic rock piles (however, because humans select rocks, size-class analysis should distinguish anthropogenic mounds (Fig. 7) from tree-throw mounds).

The second type, which is significantly more problematic, occurs when trees established in archaeological phenomena are uprooted, thereby bringing artifacts and other material from deeper levels to the surface (Fig. 8), creating pathways for the introduction of modern material to ancient surfaces, and exposing buried surfaces and perishable materials (which may increase the likelihood of their hastened destruction by exposure to natural forces such as freeze-thaw cycles or wet-dry cycles; Goldberg & Macphail 2006).

The last category of EFP, animal behavior, pertains to traces that are introduced to the archaeological record by virtue of the activities of burrowing (e.g., gophers, badgers) and non-burrowing vertebrates (e.g., deer, cattle, sheep, and carnivores). Burrowing animals tend to displace artifacts on surfaces, move ancient

objects from subsurface to surface contexts (Fig. 9), introduce modern material to ancient surfaces (and vice versa), and create anomalous features in ancient deposits (tunnels or cavities of anomalously soft sediments referred to as "krotovina").

Large-sized non-burrowing animals, principally because of their numbers and "herding" characteristics, have the potential to affect surface-assemblage characteristics (artifact number and density) by trampling objects into ever-smaller pieces (Gifford 1978). Carnivores, such as coyotes, as well as most domesticated dogs and pigs, can consume significant amounts of zooarchaeological material. However, anatomical-element density and growth studies suggest that analyses of fragment frequencies can serve to identify such carnivore-ravaged assemblages (Fig. 10; Lyman 1994).

Site Formation Processes, Fig. 9 Ceramic and lithic artifacts brought to the surface of an archaeological site by a burrowing vertebrate

Historical Background

In many respects, consideration of SFP is as old as the discipline of archaeology itself (Lucas 2012). In both the Old and New Worlds, for example, explanations of the origins of some extraordinary archaeological phenomena (e.g., pyramids, crystal skulls, or "exotic" artifacts) entailed pre-scientific arguments of how the activities of extraterrestrial agents, trans-oceanic adventurers, or marginalized refugees from various population dispersion

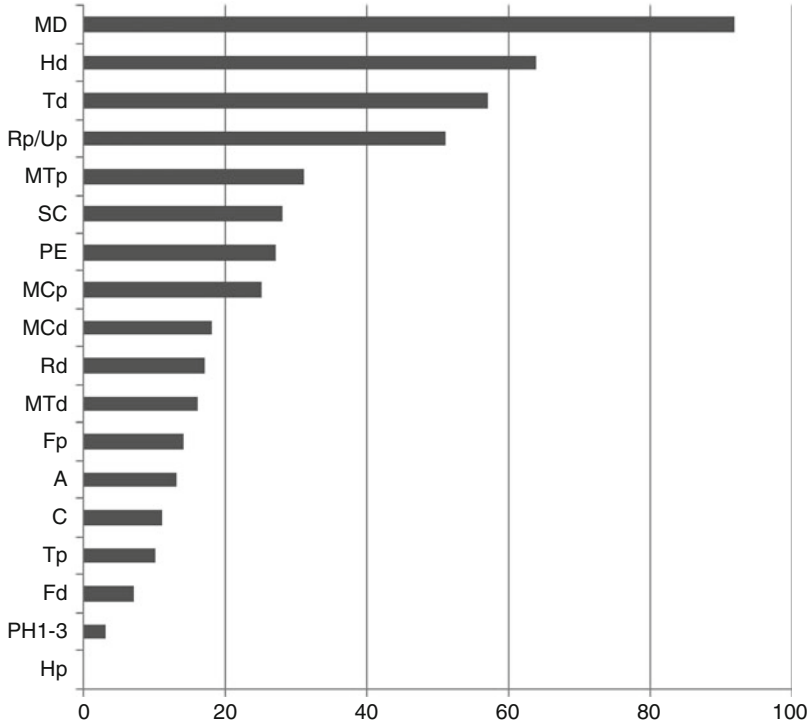

Site Formation Processes, Fig. 10 Percentages of modern goat anatomical elements (MNI 64) that survived after being ravaged by domesticated dogs in a Hottentot village (data from Brain 1980). MD mandible, Hd distal humerus, Td distal tibia, Rp/Up proximal radius or proximal ulna, MTp proximal metatarsal, SC scapula, PE pelvis, MCp proximal metacarpal, MCd distal metacarpal, Rd distal radius, MTd distal metatarsal, Fp proximal femur, A Astragalus, C calcaneus, Tp proximal tibia, Fd distal femur, PH1–3 first through third phalanges, Hp proximal humerus

events were responsible for the formation of a fantastic, if not alien, archaeological record (Fagan 2005).

The centrality of SFP was elevated and became foregrounded in archaeological practice with the publication of Michael B. Schiffer's theoretical article entitled "Archaeological Context and Systemic Context" in 1972. This and subsequent publications (see Schiffer 2010) framed a discourse focused on understanding the properties, origins, and sources of variability of the archaeological record itself that created a vast literature, which continues to proliferate (Shott 2006). Nonetheless, the importance of SFP in archaeological research became forever institutionalized as a consequence of the attention they received in the context of three hotly contested controversies – the "Binford-Bordes" (1966–1970), "Pompeii Premise" (1981–1985), and "Grasshopper-Chavez Pass" (1984–1989) debates. These disputes pivoted around fundamental differences of opinion regarding SFP – do they produce an archaeological record that is a fossil imprint of human activity, a distortion of human behavior, or something else (Sullivan 2008a)?

With the benefit of several decades of research inspired by these and other controversies, archaeologists nowadays are far more inclined to approach variability by thinking in terms of determining the formation histories of archaeological phenomena rather than in terms of being constrained by the archaeological record's interpretive limitations that are inherently attributable to distortions, disturbances, fragmentary remains, or poor preservation (Bailey 2007). In fact, largely as a consequence of the introduction and wide adoption of geoscientific methods during the last 20 years, archaeologists now see what once were considered obstacles to interpretation as research opportunities to explain why artifacts have the properties they do (Weiner 2010) or to ascertain what accounts for differences in the sedimentary composition of occupation levels (Holliday 2004). Similarly, archaeologists have developed their own "internal" concepts and methods to hypothesize, for example, why some ancient settlements, when fully excavated, disclose many intact vessels whereas others have none at all (e.g., "abandonment-mode" analysis [Deal 2008]), and why some highly fragmented artifact assemblages can be reassembled rather thoroughly whereas others cannot (e.g., "refitting analysis" [Chapman & Gaydarska 2007]).

Key Issues/Current Debates

Now that the significance of SFP is firmly established in archaeological practice, it is clear that whatever knowledge and principles have been secured so far are barely sufficient to cover the vast majority of archaeological cases – familiar and unfamiliar – that are implicated by the investigation of increasingly sophisticated archaeological questions. Hence, archaeologists worldwide are exploring two major lines of inquiry that focus directly on expanding the study of formation processes with respect to the following questions: How is knowledge of SFP acquired, and how is that knowledge best applied?

The first line of inquiry for acquiring knowledge of SFPs is broadly *anthropological* and has two interrelated strands. One strand engages the ethnographic record and seeks to establish, for instance, statistical regularities among subsistence economies, environmental variation, and technology that serve as the basis for models whose implications can be independently tested with archaeological cases (Enloe 2008). The second strand is ethnoarchaeological research, which creates new data and empirical generalizations regarding material relationships among architecture, social organization, craft specialization, settlement systems, and ideology (David & Kramer 2001). Together, these strands, once fully developed, would constitute a middle range theory in archaeology that enables archaeologists to refer interpretations of archaeological phenomena and their formation histories to a highly confirmed body of cross-cultural principles.

The second line of inquiry is *archaeological* and has two principal strands, as well. The first strand is experimental, often referred to as actualistic research, where a "known" situation is created in the field using artifacts or other

objects, animal carcasses or bones, and experimental plots of plants, and modifications to the material and their locations are monitored over time, generally several months or years (e.g., Banning et al. 2011). The objective is to gain an appreciation for rates of decomposition, displacement, or changes in soil properties that can be used to interpret the effects of EFP on similar kinds of archaeological phenomena (e.g., Rösch et al. 2002). The second strand consists of investigations of archaeological phenomena that are intended to understand the effects of SFP that materialize over long periods of time (centuries or millennia) and, hence, cannot be studied experimentally. Examples of this line of inquiry include studies of artifact displacement involving measures of artifact orientation (Dibble 2008) and of the composition of "fill" deposits to ascertain whether "termination rituals," for example, were responsible for material that accumulated above the floors of abandoned ceremonial structures (Van Keuren & Roos 2013).

The issues raised by these two lines of inquiry involve considerations of hypothesis testing. For instance, application of SFP knowledge derived from the "anthropological" approach to archaeological phenomena largely entails analogical reasoning, which, depending on the relevance of the cases (and hence the strength of the analogy), can lead to Type I errors (falsely concluding that the same or similar cause of the variability documented in the "anthropological" case is responsible for the variability seen in the archaeological case). Essentially, this type of error prematurely closes consideration of alternative hypotheses for the origins of the archaeological phenomena being investigated, thereby narrowing our views of what the cultural past may have been like (which is a form of presentism or projection of current knowledge of the present into the past). In contrast, application of SFP knowledge developed by the "archaeological" approach relies far less on analogical arguments because it is based on either replicable (highly confirmed) experimental results or well-established geoscientific principles. In these cases, the likelihood of Type I errors is reduced, the biases related to presentism are largely eliminated, and the potential for discovering ethnographically unprecedented cultural pasts is amplified (Sullivan 2007).

A second issue in the study of formation processes involves the units of analysis by which AFP and EFP and their effects can be unambiguously identified. As sketched above, because early (1970s and 1980s) formation process studies sought to understand how the form and location of artifacts changed through time, it is not surprising that they focused on examining factors that contributed to coarse-grained differences in assemblage composition (inventories of complete vs. fragmentary ceramic vessels), provenience categories (fill vs. floor), or refuse categories (primary vs. secondary refuse). By the mid-1980s, it had become clear that the usefulness of these studies was constrained by the incorporation of interpretation-laden units of analysis, that is, the terms of the categories themselves, such as debitage types (e.g., primary flake or biface-thinning flake), room types (e.g., habitation or storage), site types (e.g., limited-activity or habitation), or settlement-system types (e.g., logistical or residential) biased conclusions regarding the origins and subsequent histories of the archaeological phenomena being studied (Sullivan 2008a). With this realization, archaeologists began developing interpretation-neutral units of analysis and more relevant methods, such as micromorphology, size-class analysis, assemblage refitting, and contextual analysis, to understand objectively how variability arises as a consequence of the tandem operation of different AFP and EFP (Matthews et al. 1997).

Another related issue is the extent to which information regarding the performance characteristics of artifacts, largely derived from experimental and replication studies, can be applied to archaeological phenomena (Schiffer 2010). Studies of total assemblages have now revealed that, in many cases, the most common artifacts – on occupation surfaces, in features, and incorporated in architecture – are fragments whose performance characteristics at the time they came to be deposited in those contexts or repose on those surface are largely extraneous to

those that were designed-in at the time of artifact manufacture (Peña 2011). The scope of such widespread "de-correlation" between designed-in performance characteristics of intact artifacts at the time-of-manufacture and their post-manufacture use-contexts is beginning to be appreciated by archaeologists worldwide as a significant AFP affecting assemblage variability and archaeological interpretation (Chapman & Gaydarska 2007).

An emerging issue is renewed interest in the temporal scales at which SFP operate. Advances in the precision of independent dating techniques have alerted archaeologists to the disjunction between when events may have transpired (dated events, which are technique-specific) and how long it took for the phenomena (e.g., ancient matter, surfaces, features) associated with those dated events to materialize (target events), which are of archaeological interest. These considerations fall broadly under "time perspectivism" (Bailey 2007) and oblige archaeologists to reset their thinking regarding palimpsests, abandonment mode, and the significance of equifinality in archaeological interpretation. With respect to palimpsests, which refer to aggregate accumulations of objects, at least four types have been delineated depending on whether the same depositional contexts and surfaces are involved: true, cumulative, spatial, and temporal. Clearly, one "site" may be constituted of any number of these types, depending on its formation history, before it is ultimately abandoned, which raises profound issues for the methods by which archaeologists can infer artifact, surface, and feature contemporaneity (Sullivan 2008b).

An equally important and, surprisingly, unresolved matter raised by these concerns is whether abandonment mode invariably trumps occupation mode (which would mean that the archaeological record indeed is a massive "true and cumulative" palimpsest). That is, do the palimpsests and arrangements of matter on surfaces and in strata at the time of abandonment so thoroughly obliterate or obscure previous AFP traces that reliable inferences about pre-abandonment behaviors are utterly unattainable? Current research suggests that palimpsests actually may work in favor of archaeological interpretation because they serve as different kinds of clocks that measure the formation of the archaeological record in different ways. For example, cumulative palimpsests, such as "middens" (variably dense concentrations of ceramic fragments, lithic artifacts, and other materials), register elapsed "time-averaged" formation histories of entire settlements (and their aggregate discard patterns), whereas spatial palimpsests register "end-biased" formation histories of individual surfaces. Although far from fully confirmed and widely applied, these theoretical SFP concepts are valuable because they provide an interpretive framework for appreciating, and ultimately controlling for, the equifinal origins of the archaeological record (Sullivan 2007).

International Perspectives

With the theoretical maturation of the discipline since the 1970s, variability is no longer seen as something that is "monumentalized," that is, forever limiting the development of archaeological inferences because of the inherent distortions, biases, or incompleteness of the archaeological record itself. To the contrary, consideration of SFP is a global practice in modern archaeology involving the study of a wide variety of phenomena ranging from surface scatters of lithic artifacts in Western Australia (Fanning et al. 2009), flood-control sewer systems in ancient Rome (Aldrete 2007), buried villages in Ohio (Burks & Cook 2011), and the pollen record of historic period land-use patterns in pre-planned industrialized towns in Massachusetts (Kelso 1993). Moreover, SFP studies have evolved from largely theoretical exercises, which were not uncommonly dismissed as "cautionary tales" with little explanatory value or methodological potential, to rigorously tested and widely applied investigations that focus on specific problems involving human behavior and their archaeological consequences, such as determining the extent of prehistoric ecosystem management by fire in North America (Roos et al. 2010), distinguishing differences in the

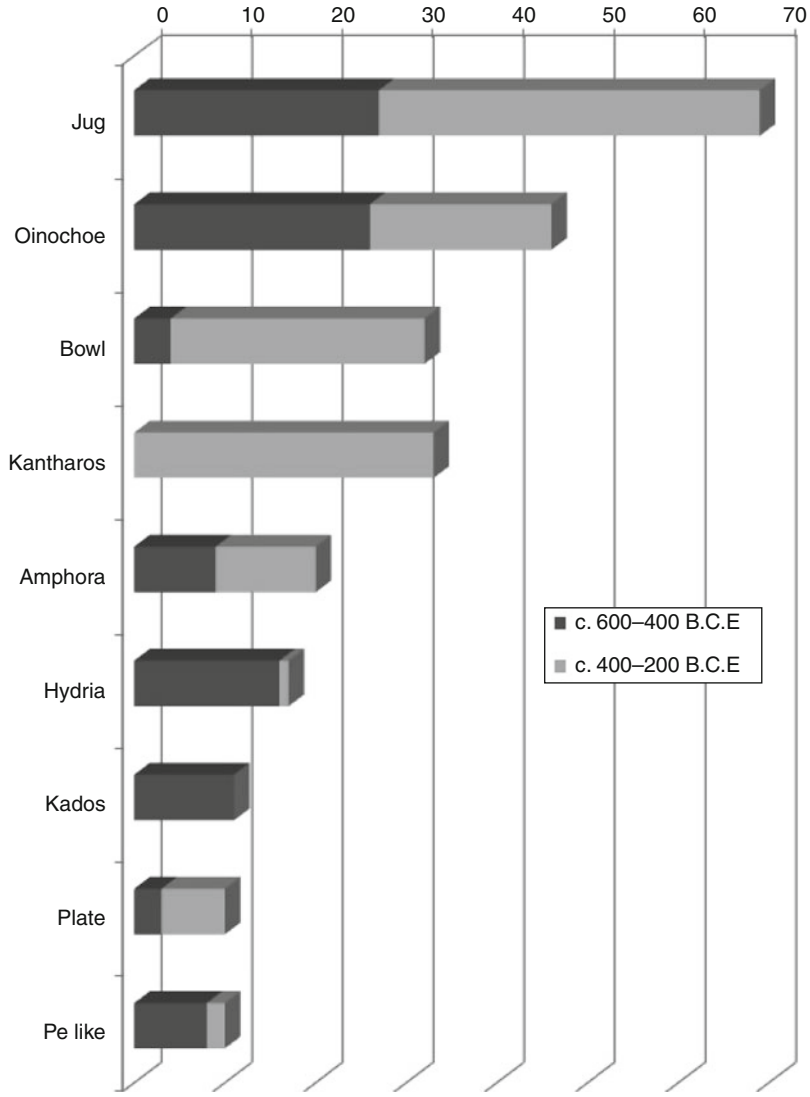

Site Formation Processes, Fig. 11 Counts of published vessels by type found in "period of use" layers from the bottom of Athenian wells (c. 600–200 BCE). Identically shaped coarse-tempered jugs and fine-tempered *oinochoe* ["wine-pouring" jugs], both equipped with a single handle and a spout, dominate such assemblages

origins and uses of small-scale thermal features in Africa (Mallol et al. 2007), and resolving the geochemical signatures of household waste management practices in the Philippines (Beck 2007).

Also, SFP are being used to test and revise historical accounts, thereby resetting the long-standing tradition that texts are privileged, indisputable sources of information about the cultural past. For example, in Greek archaeology, fine-fabric and decorated ceramic vessels have been referred to as *oinochoe* [literally, wine-pouring jugs] because texts and images indicated that they were intended to be used exclusively at wine-drinking parties. However, because both *oinochoe* and identically shaped but undecorated coarse-fabric "jugs" numerically dominate ceramics recovered from "period of use" layers at the bottom of ancient Greek wells, it is reasonable to conclude that both types were used to fetch water (Fig. 11). Similarly, a reanalysis of the construction phases and brick stamps in the Pantheon in Rome suggests that the bulk of its design and reconstruction was completed during the reign of Trajan (CE 98–117) and not that of Hadrian (CE 117–138), despite numerous ancient

historical references in support of the latter interpretation (Hetland 2007).

Future Directions

After some initial indifference, incorporation of SFP in archaeological research is now standard practice worldwide. In fact, most archaeologists would agree that studying the origins, history, and interpretive significance of the archaeological record has the potential to reveal aspects of bygone behavior, social organization, subsistence economies, and land-use strategies that have not been observed or recorded by cultural anthropologists, ethnohistorians, or ancient historians. At the least, such inquiries encourage the development of hypotheses about evolutionary processes and anthropogenic landscape transformations that take generations to materialize and, hence, can be studied only with an archaeological record whose examination is informed by an understanding of how it formed and came to express the properties that it does (Lucas 2012). Hence, the role of SFP in future archaeological investigations is not only secure but will expand as archaeologists endeavor to reduce disciplinary ignorance regarding how information about the past is transmitted to and disclosed in the present (Sullivan 2007).

In fact, we predict that future SFP research will concentrate minimally on four problem areas. First, progress in understanding the AFP of common but poorly understood archaeological phenomena, such as artifact scatters, will occur with the adoption of interpretation-neutral units of analysis because experience has demonstrated that normative categories, such as limited-activity site or special-use site, obscure rather than reveal the origins of these deposits. Second, advances in the application of geoscience (Goldberg et al. 2001) will provide a basis for archaeologists to reassess interpretations of common archaeological phenomena whose formation was thought to be well understood, such as features (whose origins may be attributable more to EFP rather than AFP) and "fill" sequences of abandoned structures (whose origins may be attributable more to AFP than to EFP). Third, developments in appreciating the effects of long-ignored EFP that are widespread but not well understood at all, such as the deterioration and depositional consequences of multi-material structures and the extent of artifact commingling that arises because of pervasive inter-context (subsurface-surface-subsurface) artifact circulation, will emerge as interdisciplinary collaboration accelerates and becomes institutionalized (Killick 2008). Fourth, one persistent problem is understanding the extent to which, and the circumstances under which, variation in abandonment-mode overprints pre-abandonment (occupation) mode dynamics (i.e., determining the prevalence of "true" palimpsests). In contrast to the three preceding problem areas, solutions to this one may require inspiration from tightly controlled experimental studies in ethnoarchaeology and geoscience.

Professor Lord Colin Renfrew (1976: 2) boldly claimed that "every problem in archaeology starts as a problem in geoarchaeology." Updating the scope of his proclamation with the benefit of more than three decades of sustained research on the topic, no archaeologist would be uncomfortable with the friendly amendment that *site formation processes* could be profitably substituted for "geoarchaeology." Looking forward, the study of SFP is poised to accelerate the identification of problematic and unwarranted assumptions about the meaning of archaeological variability that, in turn, will empower archaeologists worldwide to challenge orthodoxy, to unconstrain their interpretations, and to become consequential in revealing the nature and diversity of the cultural past.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Ethnoarchaeology
- ▶ Middle-Range Theory in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes

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Site Stewardship Programs

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Introduction

Archaeological site stewardship programs are organizations of volunteers who assist with the protection, preservation, and interpretation of archaeological sites. The structure of site stewardship programs varies based on the type of archaeological resources protected, landownership, and the position of stewardship activities within volunteer programs (Kelly 2007). These programs operate on both public and private landholdings. In most programs, volunteers help to monitor archaeological sites by documenting any changes to the condition of particular sites at regular intervals. Volunteers in some programs also assist in collection management, laboratory work, site interpretation, and even the excavation of some sites (Davis 1990).

Through careful monitoring, stabilization, and public education, site stewardship programs can be a highly effective means of preventing both natural and human-caused damage to archaeological sites. Archaeological sites are affected by

both environmental and human degradation. Environmental elements including erosion, wind, water, and sunlight can damage archaeological features and artifacts. Vandalism, looting, and unintentional damage inflicted on archaeological sites by humans can also destroy archaeological sites. Many programs report that site damage has decreased dramatically as a result of program initiatives (Kelly 2007).

Definition

Site stewardship programs represent a new movement towards public stewardship of archaeological resources (McManamon 1991; Thorne 1996: 2). State and federal protection strategies for archaeological resources originally limited public interaction with sensitive archaeological materials. In the mid- to late 1980s, however, federal and state governments adopted policies that relied on public education and active involvement in archaeological site protection. Most significantly, amendments to the Archaeological Resources Protection Act (ARPA) required federal land managers to "...establish a program to increase public awareness of the significance of the archaeological resources located on public lands and Indian lands and the need to protect such resources (1988 amendment to ARPA, Sec. 10c)." These new changes in attitude and legislation encouraged partnerships between federal and state agencies that resulted in the creation of the site stewardship programs in almost every region of the United States.

Most site stewardship programs function under a modest budget because nearly all labor is donated on a volunteer basis. Federal and state agencies support and manage some programs, while other programs operate as nonprofit organizations. Funds are typically used to hire a full- or part-time site stewardship coordinator and to pay for supplies related to monitoring or site stabilization activities. Funding sources for archaeological site stewardship programs vary depending on the resources protected and land ownership. Typical sources of monetary support include federal and state agencies, partnerships with local historical and archaeological societies and museums, and external grants.

The most important and sometimes only employee of site stewardship programs is the stewardship coordinator. The coordinator organizes volunteer labor, directs volunteer training and education, leads advertising and recruitment, and is each volunteer's main contact within the program. The coordinator's relationship with volunteers is the backbone of many programs. Regardless of the size of a stewardship program, consistent communication between coordinators and stewards is crucial to the efficient operation of the program and to the motivation of volunteers.

Attracting and maintaining good volunteers is essential to a successful volunteer stewardship program. Site stewardship programs must carefully recruit volunteers who will not divulge sensitive site information. Site stewardship programs often require extensive training for their site stewards to ensure that volunteers will not intentionally or inadvertently cause harm to archaeological sites or artifacts. In most cases, training includes both a classroom and fieldwork component. Through training, programs emphasize the necessity to keep site locations secret. Often programs do not allow site stewards to bring visitors on their monitoring trips and require that volunteers sign confidentiality agreements. These measures help to ensure that only trained persons will visit archaeological sites.

Successful site stewardship programs recognize the reasons why people volunteer and address these motivations in volunteer activities. In many programs, stewards are invited to attend program meetings and presentations as well as regional conferences. Stewards can also participate in other fieldwork activities under professional supervision, such as special recording projects (e.g., documenting rock art panels), site damage assessments, land surveys, and site stabilization.

Regular communication between site stewardship coordinators and volunteers greatly enhances the volunteer experience as well as the efficiency of the program. Interaction with professional archaeologists and other people trained in cultural resource management is one of the

most important things that volunteers seek and respond to in site stewardship programs. Coordinators should keep volunteers abreast of the progress towards program goals.

Volunteer recognition is a critical component of the recruitment and maintenance of site stewardship volunteers. Monitoring volunteers hours allows programs to recognize the contributions of individuals and to demonstrate that the program values the time that volunteers invest. Studies indicate that volunteer retention is higher in programs that monitor volunteer activities and reward volunteer service (Schwartz 1977; Field & Johnson 1993: 1629). In addition, many programs provide additional benefits to volunteers to demonstrate appreciation. For example, the Arizona Site Stewardship Program pays conference fees for volunteers to attend the Arizona Historic Preservation Conference. In programs such as the Nevada Site Stewardship program, volunteers have workman's compensation insurance as agency volunteers.

Many archaeological resources in the United States are related to the prehistoric and historic occupation of Native American tribes. The support and involvement of Native American groups in site stewardship initiatives is essential in areas where the majority of the archaeological sites are Native American. Site stewardship programs can help emphasize the connection between the protection and preservation of Native American archaeological resources and respect for native traditions. In addition, stewardship programs can facilitate interactions among Native American communities and archaeologists. For example, the Alutiiq Museum Site Stewardship Program in Alaska and the California Site Stewardship Program involve Native American communities as advisors, administrators, and stewards. These programs have also tailored program goals to fit those of local tribal governments. Finally, some tribal governments, such as the White Mountain Apache Tribe, have established site stewardship programs through their Tribal Historic Preservation Offices (Welch et al. 2009). These programs are directly run through the tribe for protection of archaeological resources within community boundaries.

Examples

The structure and operation of site stewardship programs depends on the landownership of archaeological sites and the resources that they serve to protect. Archaeological site stewardship programs can be a valuable component of protection plans for archaeological resources on both public and private lands. Programs that operate on public lands provide important assistance to land managers, who are often constrained by limited budgets and staff support. Site stewardship programs on private lands involve landowners in the protection of archaeological resources on private property.

Stewardship Programs on Federal and State Lands

Stewardship programs on public lands either are administered directly by agency land managers or function through nonprofit organizations that have allied with government land managers. Some of the largest site stewardship programs are part of volunteer programs established by major land management agencies. Volunteer programs that are associated with a federal agency and that involve a site stewardship component include the Forest Service's "Passport in Time" (PIT) program, the National Park Service's "Volunteers in Parks" (VIP) program, and the Tennessee Valley Authority's "A Thousand Eyes" program. Some federal agencies have also established independent site stewardship programs, such as the BLM's "Adventures in the Past" and the Forest Service's "Partners in Preservation" programs. State-sponsored site stewardship programs include the Georgia Underwater Archaeology Program, which involves both professional archaeologists and avocational scuba divers in the protection of Georgia's submerged archaeological resources (Burns & Crass 2006). Site stewardship programs can also operate through partnerships among several federal and state agencies. The New Mexico Site Watch program is one notable example of a collaboration among state and federal agencies. This program was established by the New Mexico State Historic Preservation Office in

partnership with the National Park Service, the Bureau of Land Management, and the Forest Service to monitor archaeological resources in various locations in New Mexico. Finally, many site stewardship programs that monitor archaeological sites on public lands are nonprofit organizations that collaborate with federal and state agencies. Examples include the San Juan Mountains Site Stewardship Program in Colorado and the stewardship program run through the New York State Submerged Heritage Preserves.

Site stewardship programs serve as "watchdogs" for archaeological sites. These programs can provide support to federal and state land managers in several critical ways. They can assist land managers by establishing long-term protection strategies for sites. With consistent monitoring, the effects of environmental and human degradation on archaeological sites can be controlled. Site stewardship programs that are external to public agencies can also serve as advocates for the protection of archaeological resources on state and federal lands. Land managers, who are often charged with a myriad of tasks, may not be aware of dangers posed to archaeological sites on particular parcels of land. Volunteers in these programs can provide local knowledge of these threats and can serve as liaisons between land managers and the community. Site stewardship programs can help emphasize the importance of archaeological resource protection while providing support for these safeguards. Many programs have noted that the intentional damage of sites, either through vandalism or looting, significantly decreased after the implementation of their programs (Kelly 2007). The knowledge that site stewards regularly patrol an area is often enough to deter would-be vandals and looters.

As liaisons, site stewardship programs facilitate interaction and collaboration among government agencies, resource managers, archaeologists, and the public. Agency employees may be viewed as outsiders, while site stewards can offer a local perspective on resource management within communities. Site stewardship programs also provide a conduit through which local law enforcement and archaeologists can reach out to the public about the protection of archaeological resources in a positive manner. In general, people do not respond to negative messages that emphasize sanctions against looting and vandalism (Hoffman 1991; Simon 1994).

The Arizona Site Stewardship Program is an example of a program that uses positive public messages to address site destruction. In particular, the program educates the public on the importance of preserving archaeological sites and artifacts in Arizona. The program also highlights the variety of archaeological sites and museums that offer tours and provide additional information about the historic and ancient past of Arizona. Through these initiatives, the Arizona Site Stewardship Program educates the public on the importance of preserving archaeological resources and provides them with a safe and fun way to learn more about local archaeology. Information and access to sites not only provides the public with a positive way to experience archaeology but deters would-be vandals and looters (Hoffman 1991).

Stewardship on Private Lands

Although the majority of site stewardship programs operate on public lands and waterways, some programs protect archaeological sites on private lands. These programs are generally run through the State Historic Preservation Office or through partnerships with other state and local agencies. Some programs use volunteer site stewards to monitor archaeological sites on private lands through agreements with the landowners. In other programs, landowners themselves agree to become stewards of archaeological sites on their land. Stewardship programs on private lands involve the cooperation of landowners who act as stewards of cultural materials on their own property. In most cases, private landowners sign an agreement with the local State Historic Preservation Office (SHPO) to protect archaeological materials.

Site stewardship programs on private lands play an important role in safeguarding sites and involving the public in cultural resource protection (Henderson 1989), because only a tiny fraction of the USA is under government protection. They demonstrate that archaeological sites can be

effectively monitored through a relatively small monetary investment and that site conservation does not always require land purchases. These programs will be increasingly important in the coming years as more land is developed and sites are put at greater risk. For instance, the Archaeological Conservancy, which protects archaeological sites on private lands, now includes parcels from across the country.

Studies have shown that site stewardship programs that actively involve landowners in the protection of archaeological resources on their lands are much more successful than those that do not. These programs rely on incentives from local and state governments to join the stewardship program. Sanctions and restrictions against landowners, nicknamed "big stick" methods of site protection, are often met with hostility and prove ineffective in the long run (Simon 1994).

Underwater Archaeological Site Stewardship Programs

Site stewardship programs devoted to the monitoring and protection of underwater archaeological resources play a vital role in comprehensive site protection (Elliott et al. 2000). Many underwater site stewardship programs were developed in response to the Abandoned Shipwreck Act of 1987 and its advisory guidelines. These guidelines encourage the development of shipwreck preserves and the cooperation of both government agencies and the public in the management and protection of shipwreck sites. Recreational and heritage tourism stimulated by shipwreck preserves provide much needed attention to underwater stewardship programs. In the case of the Rhode Island Marine Archaeology Program (RIMAP), the discovery of the HMS Endeavor was the catalyst for public concern over the protection of underwater archaeological sites in the region. For the stewardship program associated with the New York State Submerged Heritage Preserves, the discovery of the land tortoise initiated the development of a shipwreck preserve system. The Texas Historical Commission established its Marine Stewards Group as a result of diver public interest generated by the State's recovery of French explorer Robert Cavelier Sieur de La Salle's ship La Belle from the waters of Matagorda Bay.

Summary

Archaeological site stewardship programs have become an integral part of archaeological site protection in the United States. These programs use public education and the active involvement of nonprofessional archaeologists to prevent or reduce environmental and human impacts on sensitive cultural resources. The structure of site stewardship programs varies considerably and includes archaeological protection on both public private lands, of both terrestrial and underwater archaeological resources. Stewardship programs originate from new attitudes about site protection that recognize the importance of public education and involvement in safeguarding archaeological resources.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Cultural Heritage and the Public
- ▶ Maritime Historic Site Management for the Public
- ▶ Public Archaeology, The Move Towards
- ▶ Stewardship, Concept of
- ▶ Volunteers in Archaeology

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Further Reading

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Site Visitation and Interpretation: Management

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Introduction

Typical archaeological and historical sites contain a multitude of resources about which they seek to preserve and inform the public. Archaeological resources, cultural landscapes, monuments, tombs, ethnographic resources, historic and prehistoric structures, and museum collections are some of the major categories that must be juggled and integrated into visitation and cultural resources management plans. Archaeological materials are nonrenewable and irreplaceable; these considerations should guide the management of archaeological sites.

Definition

Within the context of site visitation, *interpretation* of heritage serves to communicate information about the origin and purpose of natural or cultural resources. Interpretation provides the means by which to better appreciate and understand archaeological sites through experience and interaction. Interpretation is not simply presentation for that implies a planned arrangement of information providing a one-way form of communication from scholars, heritage professionals, and the like (Silberman 2006). Rather, interpretation goes beyond to consider the totality of activities, research, and general creativity generated by an interaction with a cultural site. The first goal of interpretation at archaeological

sites should be the preservation of archaeological materials at the site, and no interpretive activities that endanger archaeological materials should be permitted. Interpretation at archaeological sites must make visitors aware of site vulnerabilities and should build a constituency for the sustainable management of the site.

Key Issues/Current Debates/Future Directions/Examples

Interpretation

The presentation of archaeological, historical, and present-day heritage sites is incomplete without interpretation. Interpretation, as the term is used here, is provided for a public audience; it is a form of outreach that informs and, ideally, provokes contained interest and conversation. It is a means by which to better appreciate and understand the experience of visiting an archaeological site. Properly done, it is a guide to extracting meaning from the site, which provides the information needed to navigate the site in ways chosen by the visitor. Most importantly, it is a fundamental element in establishing and maintaining site sustainability.

The presentation of interpretation of historical context to a public also serves to highlight what is deemed significant and, through this act, can give strength to communities and provide a sense of place and belonging. Who creates such interpretation, however, raises question of ownership of heritage, social inclusion and exclusion, and the very politics of identity making. Interpretation gives voice to certain views of the past, and, in feasible and deft ways, these voices should be identified by reference to the scholarship and oral or written histories that have been used in preparing interpretive materials.

Site managers, archaeologists, and others seek to address three major questions in any interpretive plan: (1) How, when, why, and by whom was the site and surrounding landscape used in ancient times? (2) Why was the site a center of activity (in whatever manner that is defined)? (3) Why was the site important then, and why is the site important now? In order to disseminate such information, a master narrative is often created which serves as the basis for interpretation of all specific points of interest within the site. These narratives are then used as adaptable texts from which exhibits, brochures, training modules, and other interpretive devices are generated. However, all interpretive plans should accept that visitors have their own individual points of view and therefore should encourage dialogue.

Effective interpretive frameworks link specific tangible artifacts, buildings, and places with ideas, events, and concepts. Importantly, this interpretation should relate to wider social, cultural, historical, and natural contexts and settings (ICOMOS Ename 2007).

Role of Tourists

Clifford (1997) defines tourism as a contact zone, a place where identities are made and transculturation occurs. Archaeological and historical sites, therefore, become not only media through which cultures and events are presented but also where the experience of being a tourist changes one's sense of self. As a result, there are a multitude of protagonists who affect, shape, and delineate the tourist's experience. These actors include scholars and scientists, national governments and agencies, local governments, local indigenous groups, nongovernmental organizations (NGOs), property owners, and the visitors themselves. Tourists can be agents of destruction or support to an archaeological site; the interpretive program should be designed to encourage the latter role.

The Stakeholders

The creation of an interpretive plan should be a community activity so as to include the multitude of their voices and, simultaneously, be informed by archaeological data. As Byrne (1991) and Smith (2000) have noted, the operation of conservation in the heritage management industry has often promoted and maintained dominant colonial positions. The very linearity of how sites discuss past events gives precedence to Western scientific explanation. As a result, the management of sites and the creation of

interpretive plans create tension between national and local government agencies, indigenous groups, and property owners (Meskell 2001).

The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Site (previously called the Ename Charter) is cognizant of these difficulties. This ICOMOS Charter was finalized in 2007 to highlight that role of interpretation and preservation. The Charter lays out the importance of taking into account the cultural contributions of all communities associated with a site, including minority groups as well as the interests of associated communities, property owners, governmental authorities, site managers, scholars, tourism operators, private investors, employees, and volunteers, and including them in the development of interpretive programs. The recent Statement of Menorca (2012), formulated by the International Council on Archaeological Heritage Management, expresses concern that archaeological sites, especially in developing countries, are increasingly seen as economic engines as opposed to being repositories of scientific and historic information or as places that enhance appreciation and understanding of human creativity and accomplishments. To correct this imbalance, it calls for the formulation of standards for the management and protection of archaeological sites, which should include the use of interpretation as a component of effective management. These standards should accommodate non-Western perceptions and thoughts about the meanings of material culture.

Recent scholarship by indigenous scholars and activists (e.g., Condori Mamami 1989; Cojti Ren 2006) demonstrates the, at times, systematic delinking of present indigenous groups to their past. As cultural heritage sites often remain important to current indigenous groups, traditionally associated groups to a site, therefore, should increasingly be permitted to pursue customary religious, subsistence, and other cultural practices at a site. Such continuing access to and use of traditional resources are often essential to the survival of family, community, or regional cultural systems, including patterns of belief, economic, and religious life. Due to the importance of such activities, however, site managers should not direct visitor attention to the performance of religious observances in particular unless these traditionally affiliated with the site lands or resources so desired.

Tourism Versus Protection

The difficulty faced by site managers is to balance tourism against the future protection of the site. Starting as early as the 1970s, researchers began looking at the impact of visitors on national parks and other protected areas (Flood 1982; Jacobs & Gale 1994; Forrest 1995). This research was amplified by investigations into artifact displacement as a result of agricultural practices or natural erosion (Cameron et al. 1990; Schofield 1991). It was not until recently, however, that some researchers turned their attention not just to the unintentional impact of specific categories of visitors on structural longevity but also to more active disturbances, movement, or outright removal of stone or other loose artifacts from sites by tourists. In their study, Migley and colleagues (1998) discovered that disturbance levels of artifacts did not decline evenly with an increasing distance from the central visitor area; as a result, the impact of tourism goes beyond the most traveled paths.

Comer (2011) argues that the most common and often the greatest threat to site preservation is from development associated with providing amenities to tourists. Such developments often change regional hydrology. At Petra, for example, construction of hotels, restaurants, parking lots, roads, and other impervious surfaces produces flooding that damages ancient structures by exposing them to chemical-laden floodwater, which washes away subsurface archaeological deposits. Other sorts of hydrological change produced by tourism can also be catastrophic. At Angkor, water pumped from the ground for use by tourists at hotels and restaurants is threatening soil stability and thus the foundations of the ancient monuments. Other threats arise from social discord promoted by competition among groups for economic gain associated with tourism. Such discord can ultimately promote political instability if multinational corporations eliminate economic

opportunities for local populations. Discord and political instability greatly reduce the capacity to effectively manage archaeological sites.

Signage, Walkways, and the Site Experience

Balancing the protection and long-term management of a site with daily tourists requires, among other things, well-delineated signage and walkways. It is important for walkways to be cleanly cut and maintained but also organized in such a way as to move visitors in and out of major throughways without producing erosion or encouraging tourists to sit on or rest against ancient structures. For this reason, benches or other seating, if possible in a shaded location, should be provided. Paths should never take tourists to remote, unobserved locations at archaeological sites where looting, vandalism (often in the form of graffiti, attempts to obtain rubbings, or even removal of architectural details), vending of looted antiquities, or use of ancient structures as ad hoc toilet facilities will eventually occur. The signage at any site should provide concise, well-worded text and associated images that provide a basic understanding of the meaning and significance of the monuments; limited text is fundamental to maintaining the movement of visitors while at the same time providing the educative material necessary for a pleasant and well-rounded visit.

In all, a comprehensive signage program includes way finding signs to help visitors identify the proper course, interpretive signs (wayside exhibits), orientation signs, trailhead information, consistent safety and warning information, and a Plan Your Visit sign at the entrance.

The site experience, however, begins before a visitor even arrives at the site in question. General information about the history of the site and how to visit it are often disseminated through a multitude of media, such as the Internet, or key hotels that educate individuals about coming to see the specific cultural heritage. This orientation includes maps, what to expect during the course of a visit, information about the services available to visitors, and a site bulletin highlighting points of interest of the specific tours or trails available. The Internet and individual site websites have become fundamental in this task; importantly, such websites manage visitor expectations by providing an introduction to interpretive themes, points of interest inside the park, and rules of behavior.

Site Management

The essence of site management is structuring visitor flow into a site so as not to exceed its carrying capacity. Carrying capacity can be concisely defined as the type and level of visitor use that can be accommodated while sustaining desired resource and social conditions. Visitation exceeds carrying capacity when it damages cultural or natural resources, renders the quality of the visitor experience less than that desired by either the visitor or management, or degrades the quality of life for the inhabitants of local communities.

Interpretation at an archaeological site is a tool of site management. Preservation of archaeological materials is paramount; other interpretive objectives, including generating income and providing an experience that produce shared memories which are important to the development of group identities, must be served in ways that do not damage archaeological materials. For that reason, most interpretive programs and activities should take place outside of the archaeological site, preferably in local communities that can then realize economic benefit from hosting such activities. The experience of visiting the site is as a rule best interpreted elsewhere.

The site experience should be unique to place, or at least exemplary of a type of place. Therefore, it is necessary to eliminate sensory experience incompatible with the experience of that location. This includes viewshed, sounds, smells, and light pollution. It also includes eliminating the press of crowds in locations that were in ancient times places of contemplation or at places that are conducive to contemplation today.

Commercial Uses

Outside of the typical tourist visit and the economic benefits they can bring, archaeological and historical sites also become centers of political, social, or artistic interest that bring

potentially high-impact activities to the site. These could include photography, filming programs, aircraft overflights, and recreational vehicles.

Film and photography of a site are important aspects of promoting protection, information, and general public enjoyment of cultural heritage resources. Managers of these resources may actively assist in filming and photography activities that serve this purpose and would not adversely affect the site. Entertainment interest in cultural heritage sites, however, usually exceeds these parameters. In such cases, a permit should be required for any filming or photography that (1) involves the use of a model, set, or prop; (2) requires entry into a closed area; (3) requires access to the site after normal working hours; (4) requires heavy equipment and its transport around a site. Securing a large performance bond is essential; despite stated intentions, no matter how sincere, it is common that archaeological and historical sites require substantial cleaning and even repair following filming. Film company budgets are often more depleted than anticipated by the film company after work on location.

Aviation is a necessary and acceptable management tool, but its uses go beyond site management and administrative purposes to include military, commercial, and general aviation. Noise and vibrations from touristic overflights can adversely affect a site's resources and values and interfere with visitor enjoyment. As such, these should be mitigated as much as possible.

Similarly, off-road vehicle use should be carefully planned and regulated due to their high impact on a landscape. Roads and areas may be designated for such vehicles only in locales in where studies indicate that there will be no adverse impacts on an area's natural, cultural, scenic, and esthetic values, and in consideration of other visitor uses. Such use should be carefully monitored and regulated. The use of off-highway vehicles by site managers should be limited to what is necessary to manage the public use of designated off-road vehicle routes and areas; to conduct emergency operations; and to accomplish essential maintenance, construction, and resource protection activities that cannot be accomplished reasonably by other means.

Cross-References

- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Stakeholders and Community Participation
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

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Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea

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Introduction

From the 1920s until the 1990s, the Siuren I rockshelter was the only Crimean Paleolithic site with an archaeological sequence that was thought to represent almost the entire Crimean Upper Paleolithic industrial and chronological succession, additionally with an Early Upper Paleolithic component at its base. Siuren I was and is still considered to be a key site for the Crimean Upper Paleolithic. Some archaeologists have also interpreted many of the site's lithic assemblages as Aurignacian, making Siuren I a significant site among the few true Aurignacian sites in Eastern Europe. New excavations at Siuren I in the 1990s yielded both new data regarding the site's archaeological context and absolute dates.

The site (44° 58′ N; 34° 08′ E) is situated near the high road from Bakhchisarai to Yalta, 0.5 km from Tankovoe village (formerly Biuk-Siuren) and 13 km south of the town of Bakhchisarai, in southwestern Crimea. It is one of two rockshelters (Siuren II is a Final Paleolithic site) located on the right bank of the Belbek River at its narrowest point ("Belbek Gate") where it cuts through the cliffs of the second range of the Crimean Mountains. Siuren I is a large south-facing rockshelter, 43 m wide, 15 m deep, and 9–10 m thick with an elevation of 15–17 m above the present-day level of the Belbek River.

Key Issues/Current Debates/Future Directions/Examples

History of Investigations at Siuren I and Its Archaeological Interpretations

The archaeological site at the Siuren I rockshelter was discovered and first excavated in 1879–1880 by the pioneer of Crimean prehistoric archaeology, K.S. Merejkowski (St. Petersburg). The excavations were carried out in the central part of the rockshelter near its back wall over an area of about 60 sq. m (Fig. 1). At the time, two Paleolithic layers were identified, although due to poor publications, Siuren I was considered as a doubtful site for more than 40 years (Bonch-Osmolowski 1934).

It was only after the 1926–1929 excavations by the then famous Soviet Paleolithic archaeologist Gleb A. Bonch-Osmolowski that the site was finally recognized as a key site for Crimean Upper Paleolithic. Up to 120 sq. m were excavated and three cultural layers identified within the deposits. These layers were separated by huge limestone blocks, resulting from different

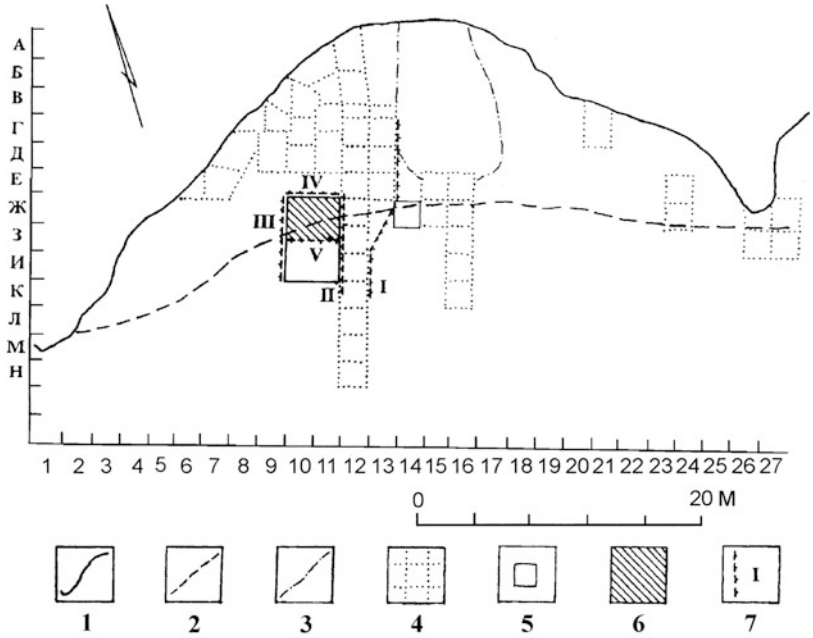

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 1 Siuren I. Map of the excavations (Modified after Vekilova 1957: Fig. 2 on p. 237). *1*: the rockshelter's back wall; *2*: drip line; *3*: Merejkowski's excavation area (1879–1880); *4*: Bonch-Osmolowski's excavation areas (1926–1929); *5*: Tarasov's excavation area (1981–1982); *6*: new excavation areas (1995–1997); *7:* main stratigraphic profiles

rockfall events from the shelter roof (Fig. 2). Although Bonch-Osmolowski distinguished-several artificial horizons and even some hearth/ashy lenses within each layer during the excavations, he later combined the finds from each layer into three assemblages on the basis of the rather homogeneous industrial characteristics of the artifacts and his belief that deposition occurred rapidly. The three cultural layers defined by Bonch-Osmolowski (1934) represented, in his view, three stages of Aurignacian development: (1) lower layer (over 85 sq. m excavated) – "Lower Aurignacian" with some Mousterian-type artifacts, core-like end scrapers and numerous microliths with fine retouch; (2) middle layer (over 95 sq. m excavated) – "Middle Aurignacian" with carinated end scrapers and busked burins; and (3) upper layer (over 120 sq. m excavated) – "Upper Aurignacian" with Gravette points and numerous backed bladelets. Accordingly, he placed the Siuren I Upper Paleolithic into European context, finding similar complexes in Europe.

Such Aurignacian interpretations of the Siuren I assemblages were not, however, supported in Soviet archaeology. Instead, it was proposed that the rockshelter's layers showed the entire developmental sequence of the Crimean Upper Paleolithic with such "epochal dates": "*Aurignacian*" for the lower layer, "*time of Solutrean and possibly the beginning of Magdalenian*" for the middle layer, and "*time of Late Magdalenian and Early Azilian*" for the upper layer (Vekilova 1957). Siuren I and Crimea as a whole were also placed within the "*Mediterranean-African*" Upper Paleolithic zone although the Siuren I assemblages also have analogies in the southern Caucasus (Georgia) to the east. Vekilova's "chronological" interpretations for the Siuren archaeological context, demonstrating the whole Crimean Upper Paleolithic sequence, were widely accepted in Soviet archaeology. The Aurignacian attribution of the assemblages from the rockshelter's lower and middle layers was also lost, which is why they were later assigned to the unclear "*Aurignacoid route of Upper Paleolithic development in Eastern Europe*" and dated to the Last Glacial Maximum (c. 20–18,000 BP) (Anikovich 1992). On the other hand, Bonch-Osmolowski's Aurignacian

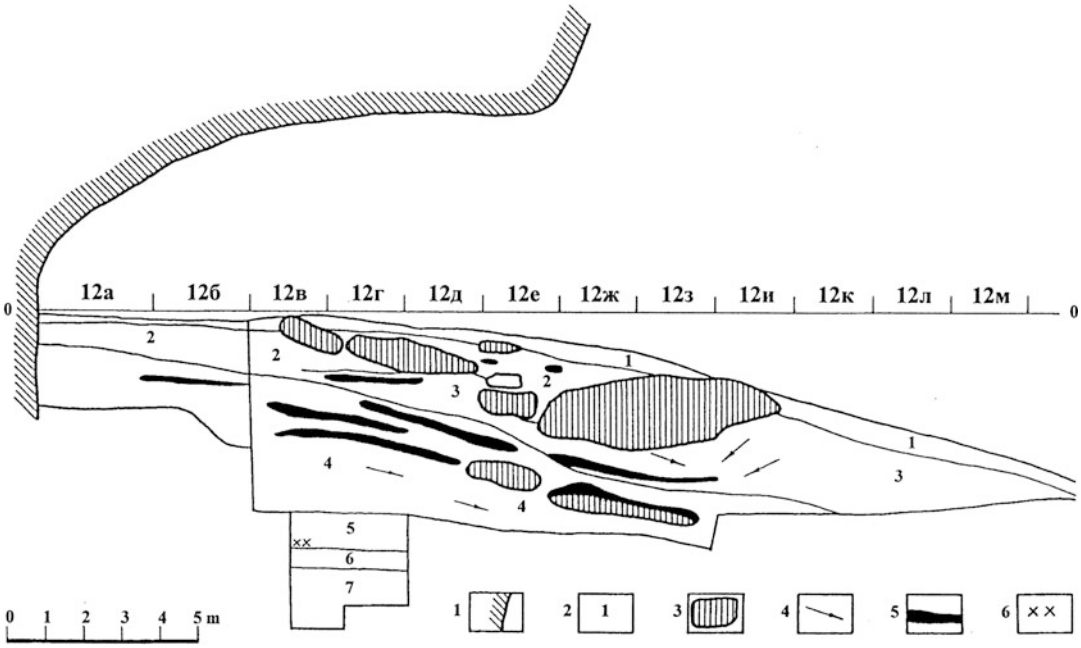

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 2 Siuren I. Stratigraphic profile of Bonch-Osmolowski's 1926–1927 longitudinal trench (*squares* 12 A-M), eastern side (After Vekilova 1957: Fig. 4 on p. 240). *1*: the rockshelter's back wall; *2*: numbers of lithological strata (*2*: upper cultural layer, *3*: middle cultural layer, *4*: lower cultural layer); *3*: huge limestone blocks and slabs representing different rock fall phases from the roof of the rockshelter; *4*: direction of huge limestone blocks and slabs falls; *5*: hearth/ashy lenses; *6*: mammoth bone finds in archaeologically sterile lithological layer 5 (lower part)

definitions for the lower and middle layer assemblages were supported and developed by European archaeologists (since Peyrony 1948). Thus, there were two opposed interpretations of the lower and middle layer assemblages until the collapse of the USSR in the 1990s: mostly non-Aurignacian and simply an Early Upper Paleolithic attribution in Soviet archaeology and definite Aurignacian attribution in European archaeology.

To resolve the non-Aurignacian/Aurignacian question for Siuren I, new excavations were undertaken at the site in 1994–1997 by a joint Ukrainian-Belgian team headed by V.P. Chabai and M. Otte. These took place in an area of 12 sq. m in the western part of the rockshelter (Fig. 1). Correlation between new stratigraphic units and Bonch-Osmolowski's layers could be made: the lower layer corresponds to Unit G, middle layer to Unit F, and upper layer to Units A–E. Additionally, a new unit (H) was discovered below Unit G.

Based on results from modern excavations, reanalysis of the 1920s assemblages, and evaluation of the information available for the original 1879–1880 excavation, the archaeological sequence of the site now includes seven different periods of human occupation from c. 31–30 to c. 12–11 ky BP (all dates discussed here are uncalibrated) within c. 6 m of deposits (Fig. 3). This stratigraphic sequence is represented by alternating limestone *éboulis* layers and sandy, silty-clay/clayey layers, where the rock layers account for more of the sequence than sedimentary layers (Demidenko et al. 1998; Demidenko 2000; Demidenko & Otte 2000-2001; Demidenko et al. 2012).

Assemblages from the 1920s lower layer/1990s Unit G (with stratigraphically distinct sublevels Gd, Gc1-Gc2, Gb1-Gb2, Ga) and lowermost Unit H represent two alternative occupations periods at the rockshelter no later than the Arcy Interstadial (c. 31–30,000 BP).

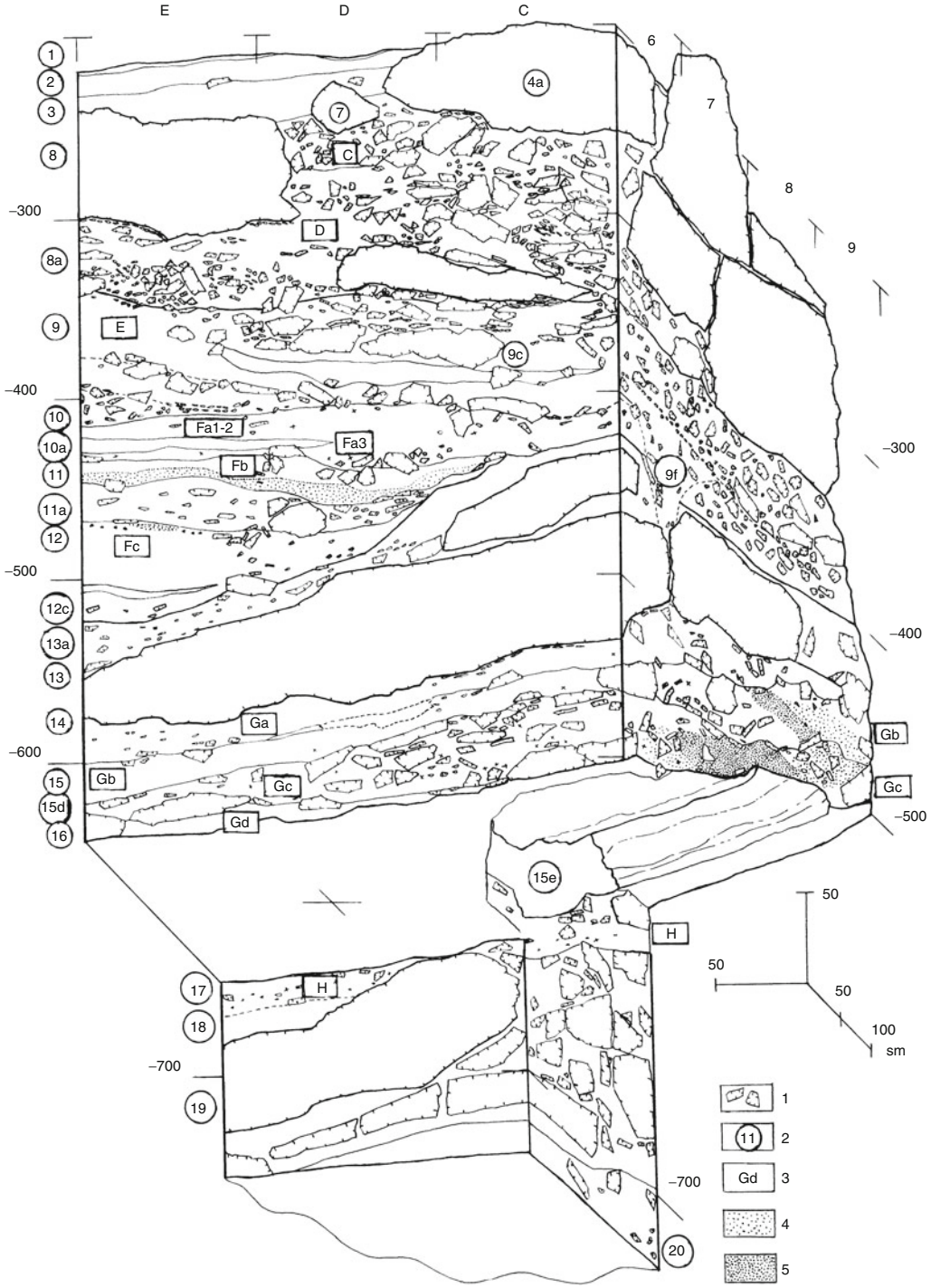

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 3 Siuren I. Combined profiles # III and IV of the 1990s excavations. *1*: limestone slabs and *éboulis*; *2*: lithological strata defined in the 1990s; *3*: archaeological units and levels defined in the 1990s; *4*: charcoal pieces; *5*: hearth/ashy lenses

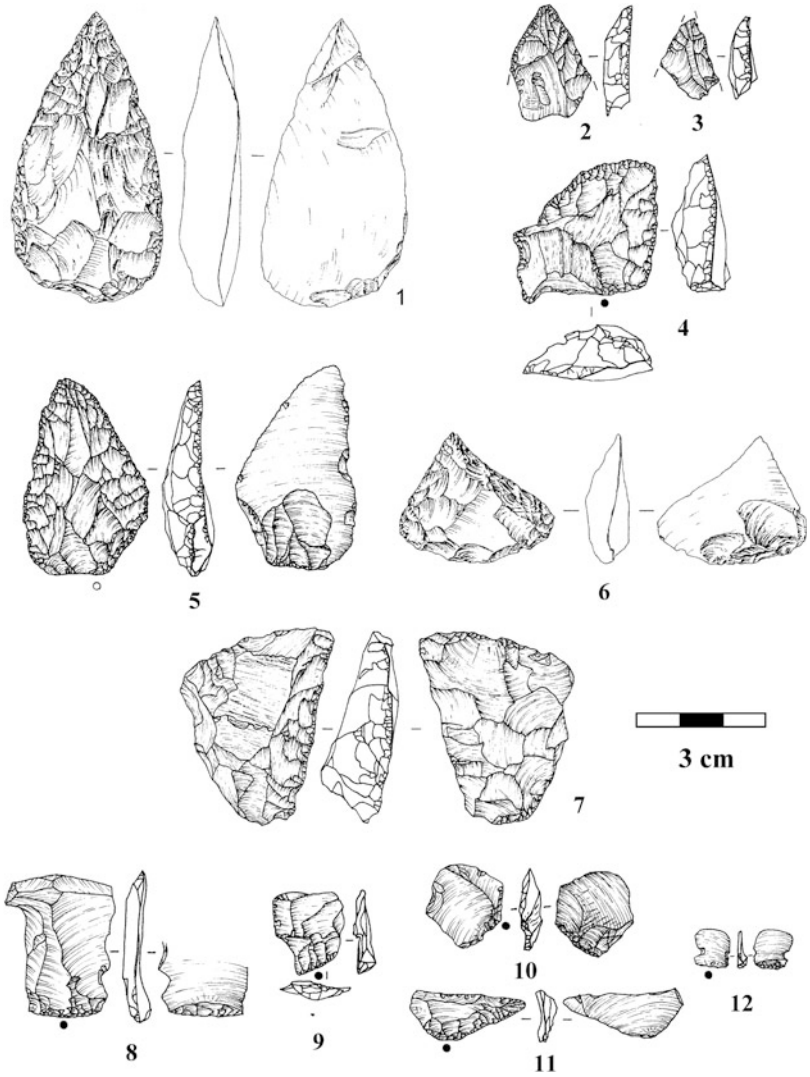

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 4 Siuren I. Units H and G (1990s), Middle Paleolithic Crimean Micoquian Tradition (Kiik-Koba type industry) flint artifacts *1–7*: unifacial and bifacial convergent tools; *8–12*: retouch and rejuvenation flakes and chips from unifacial and bifacial tools secondary treatment processes

The first is attributed to the Middle Paleolithic (MP) Crimean Micoquian Tradition (Kiik-Koba type industry) produced by Neanderthals (Fig. 4), and the second to the European Proto-Aurignacian with Dufour bladelets produced by modern *Homo sapiens* (Fig. 5).

The 1920s middle layer/1990s Unit F (with stratigraphically distinct sublevels Fc, Fb1-Fb2, Fa3, Fa1-Fa2) contains assemblages attributed to the Late/Evolved Aurignacian with Roc de Combe bladelets during either the Arcy Interstadial (c. 31–30,000 BP) or the Maisières Interstadial (c. 29,000–28,000 BP) (Fig. 6a: 1–26).

In the 1920s upper layer and Units A–E, it is possible to identify four human occupation phases:

- Late/Evolved Aurignacian (c. 27,000 BP?): Unit E and part of the lowermost finds in the upper layer (Fig. 6b: 1–2)
- Late Gravettian (c. 24/23,000–20,000 BP?): Unit D and some finds in the 3rd "excavation horizon" of the upper layer (Fig. 7)
- Epi-Gravettian (c. 19–18,000 to 15,000 BP?): Unit A (not in situ), a few redeposited tools in humic deposits and most finds in the 1st and 2nd "excavation horizons" of the upper layer (Fig. 8a: 1–11)

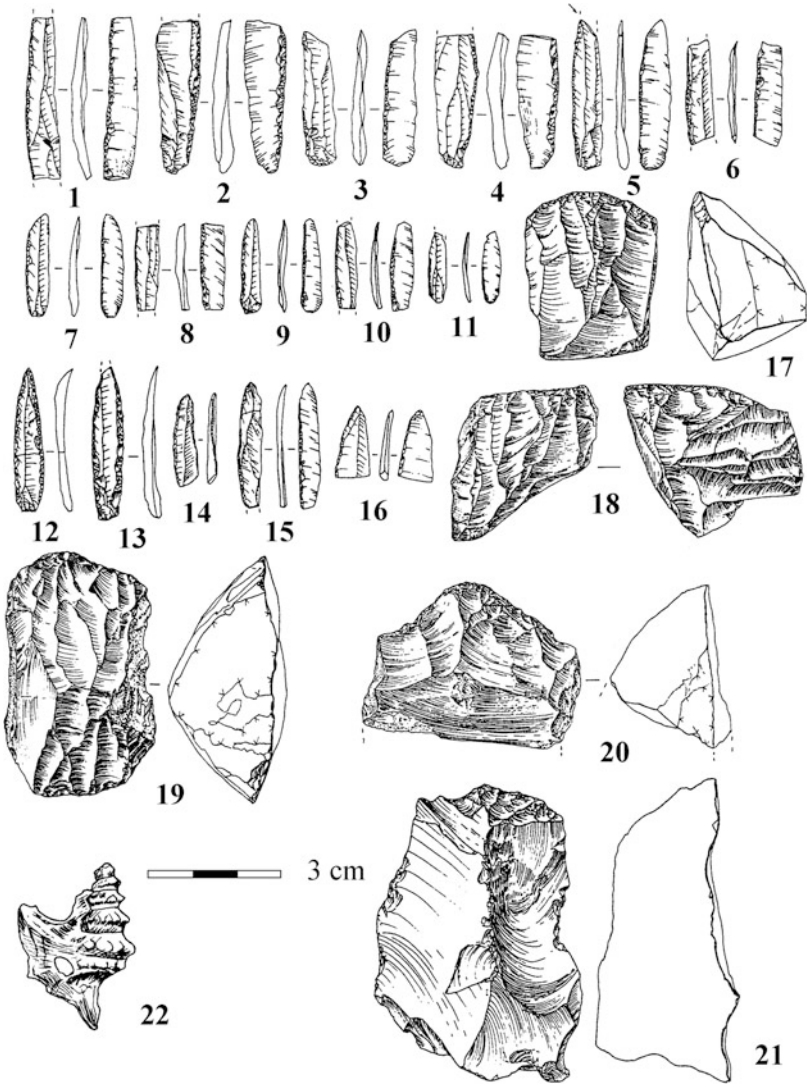

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 5 Siuren I. Units H and G (1990s), Proto-Aurignacian flint artifacts and a shell bead *1–11*: alternatively retouched Dufour bladelets and microblades of Dufour subtype; *12–16*: dorsally and alternatively retouched Font-Yves and Krems points; *17–19*: bladelet "carinated" cores; *20–21*: thick-shouldered end scrapers; *22*: *Apporhais pes pelicani* shell bead

– Final Paleolithic "Crimean Azilian" (Shan-Koba industry) (Allerød Interstadial – c. 12, 11,000 BP): western and eastern discrete "find spots"(c. 8 sq. m each) in the 1st and 2nd "excavation horizons" of the upper layer (Fig. 8b: 1–10)

The proposed chronology for each occupation phase is based on three AMS dates on ungulate bones from Units H, G, and F (Unit H: 28,200 ± 440 BP (OxA-8249); level Ga, the uppermost level of Unit G: 28,450 ± 600 BP (OxA-5154); sublevel Fb2: 29,950 ± 700 BP (OxA-5155)), faunal data indicating a rather temperate climate during sediment deposition of Units H, G, and F (López Bayón 1998; Pettitt 1998) and industrial comparisons of the Siuren assemblages with techno-typologically similar and well-dated industries in Crimea and Europe. It should be also emphasized here that five other ungulate bone samples from Unit F (level Fb1-Fb2), Unit G (one sample from level Gb1-Gb2 and two samples from level Gc1-Gc2), and Unit H (one sample) were not dated by the Oxford radiocarbon laboratory because of collagen problems (Demidenko et al. 2012). At the same time, three dating attempts on charcoal samples by the Louvain-la-Neuve (Belgium) and Oxford laboratories were either too young to be Upper

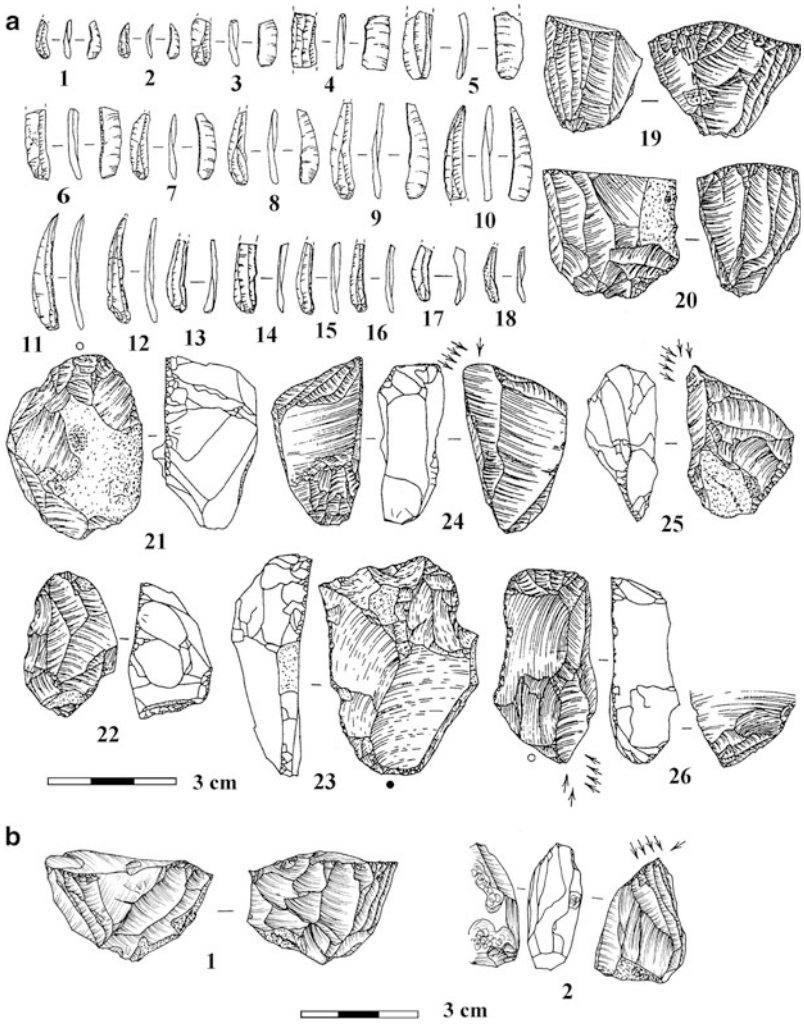

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 6 Siuren I. Units F and E (1990s), Late/Evolved Aurignacian flint artifacts (**a**) *1–26*: Unit F artifacts. *1–9*: ventrally retouched Dufour microblades of Roc de Combe subtype; *10*: alternatively retouched Dufour microblade of Roc de Combe subtype; *11–18*: dorsally retouched pseudo-Dufour microblades of Roc de Combe subtype; *19–20*: bladelet "carinated" cores; *21–22*: carinated end scrapers; *23*: thick-shouldered end scraper; *24–25*: bladelet narrow flaked single-platform cores/"carinated burins"; *26*: simple end scraper/carinated (busked) burin. (**b**): *1–2*: Unit E artifacts. *1* bladelet "carinated" core; *2* bladelet narrow flaked single-platform core/"carinated burin"

Paleolithic or had collagen problems, which is why subsequent dating attempts concentrated on ungulate bone.

Interpretations of the chronology of the Siuren I industries have the following implications for the lower (Units H–G) and middle (Unit F) deposits. The co-occurrence of Micoquian and Proto-Aurignacian artifacts in Units H and G testifies to the geochronological coexistence of MP Neandertals and EUP *Homo sapiens* in Crimea c. 30,000 BP. A chronological gap between the Micoquian and Proto-Aurignacian assemblages (Units H and G) and the Late/Evolved Aurignacian (Unit F) is either nearly absent or quite short, making it possible for modern *Homo sapiens* with a Late/Evolved Aurignacian industry to quickly replace the previous inhabitants of Siuren I. As a result, this site not only occupies an important place within the MP-UP transitional period in Crimea but also serves to support both very late survival of Micoquian Neanderthals and the very late appearance of modern *Homo sapiens* and the Proto-Aurignacian here (Chabai 2000, 2003, 2004; Demidenko 2008). However, such a late Proto-Aurignacian Arcy Interstadial geochronology with AMS dates around 28,000 BP was not accepted by most European colleagues. In Western Europe, the Proto-Aurignacian is usually older, radiocarbon dated from c. 37–36,000 to 34–33,000 BP. The proposed Siuren I Proto-Aurignacian chronology could be too young,

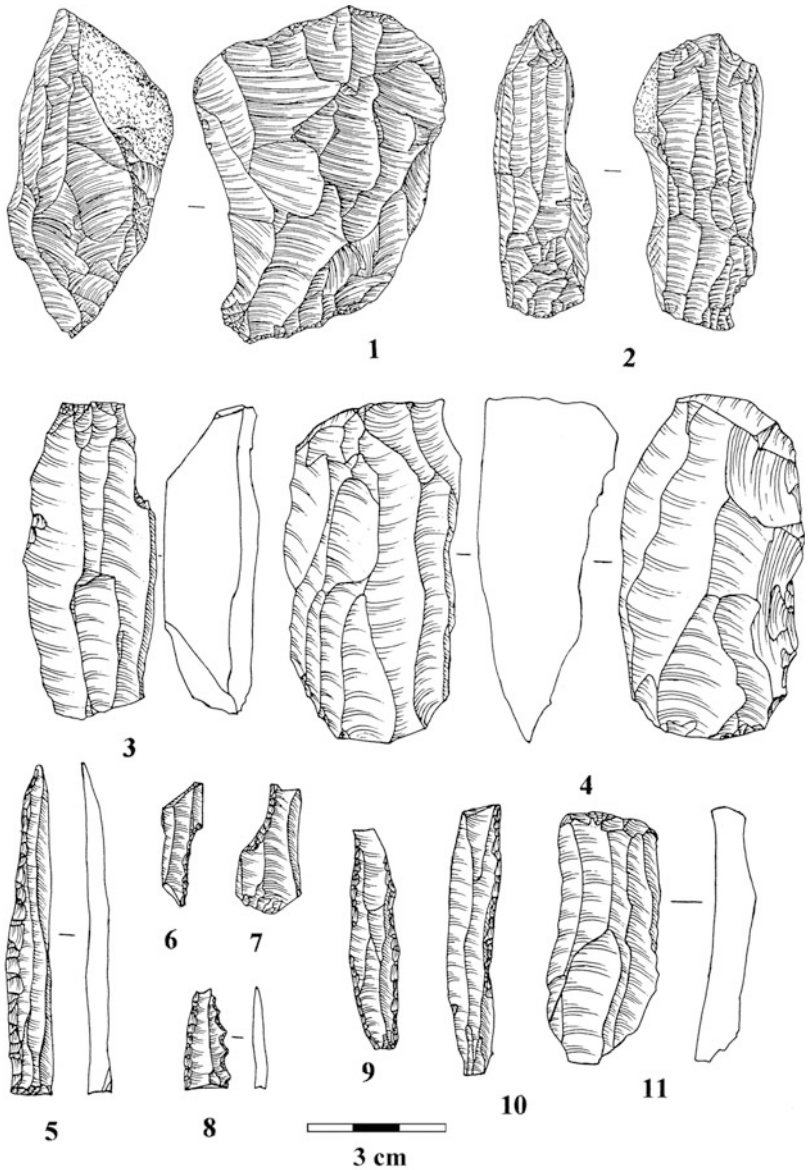

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 7 Siuren I. Late Gravettian flint artifacts. *1–2*: Unit D (1990); *3–11*: 3rd "excavation horizon" of upper layer (1920s) *1–4*: elongated blade/bladelet double-platform bidirectional cores; *5*: Gravette point with truncated base; *6–7*: shouldered/*pieces à cran* on bladelet and blade; *8*: backed bladelet microsaw; *9–10*: backed bladelets with elongated metric proportions and bidirectional scar pattern; *11*: simple flat end scraper

although the period of c. 30–28,000 BP is still within the broader Aurignacian time span. Therefore, it cannot be excluded that European Proto-Aurignacian *Homo sapiens* indeed penetrated into the south of Eastern Europe after occupation of southern and middle territories in Western and Central Europe. The Siuren I Proto-Aurignacian geochronological issue has also led to major debates on the Siuren I Late/Evolved Aurignacian and its significance for European Late/Evolved Aurignacian research. The Unit F assemblage not only perfectly fits the Western European Late/Evolved Aurignacian definition by having the "whole carinated piece package" (bladelet "carinated" cores and both carinated end scrapers and burins) and a single AMS date around 29,000 BP but also has the largest series of Dufour and pseudo-Dufour microblades of Roc de Combe subtype (68 specimens) in all of Europe.

Despite advances with the AMS dates obtained after the 1990s excavations, further

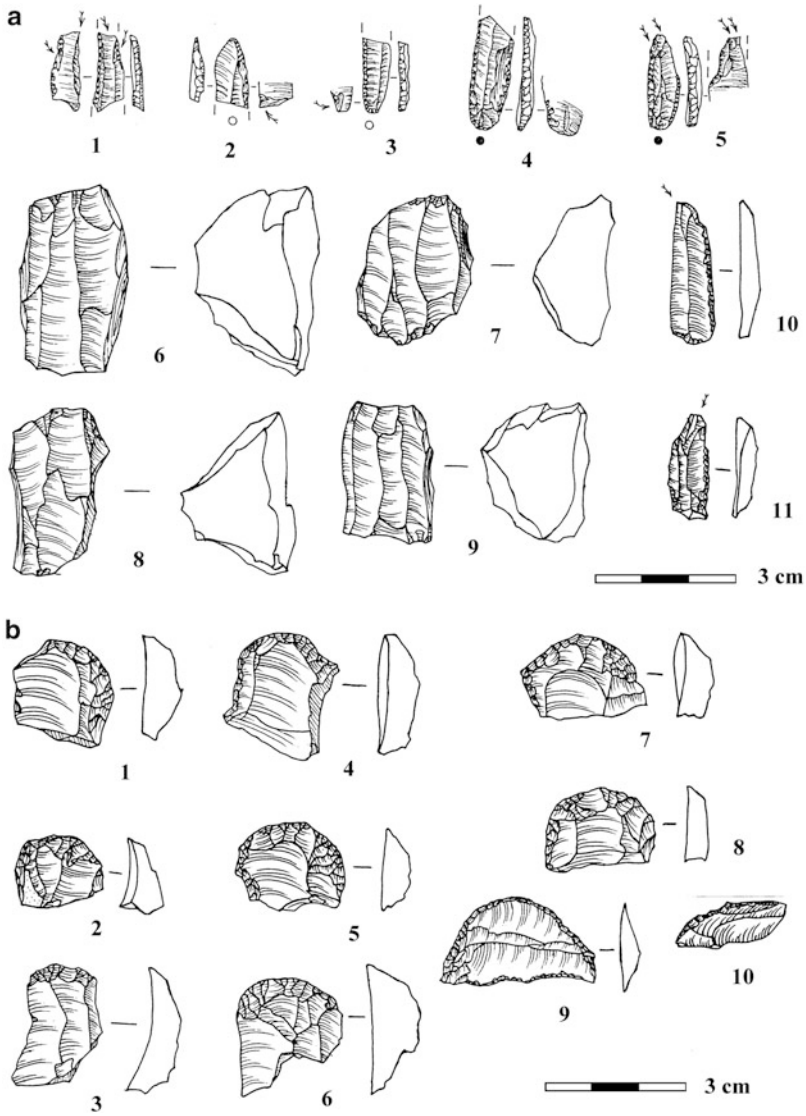

Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 8 Siuren I. Epi-Gravettian and Final Paleolithic flint artifacts (**a**) *1–11*: Epi-Gravettian artifacts (1920s and 1990s excavations). *1–5*: non-in situ finds of Holocene humus sediments (1990s); *6–11*: 2nd "excavation horizon" of upper layer (1920s). *1–5*, *10–11*: backed bladelets with projectile damage; *6–9*: bladelet double-platform bidirectional cores. (**b**) *1–10*: The eastern Final Paleolithic "find spot" of 1st and 2nd "excavation horizons" of upper layer (1920s). *1–8*: simple flat shortened end scrapers; *9–10*: segments

dates were needed to provide additional support, leading to the very recent dating program for Siuren I.

Siuren I Dating Results in 2009–2011

From 2009 to 2011, a team of researchers (Yu.E. Demidenko, M. Otte, and P. Noiret (University of Liège) and Ph. Nigst and S. Talamo (Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany)) joined to systematically date ungulate bones from Units H, G, and F (Demidenko et al. 2012; Demidenko in press). In total, 25 samples were sent to the Oxford, Groningen, and Beta Analytic laboratories. The attempts were carried out on two groups of bone samples. One was composed of samples from eight bone tools: two Micoquian bone retouchers from Unit G, two Proto-Aurignacian points and an awl from Unit G, and two Late/Evolved Aurignacian tool production by-products and a point from Unit F. Dates obtained on these eight samples would ideally provide not only dates for human occupations on human-modified bone but also dates for both Micoquian and Proto-Aurignacian occupations at the rockshelter. The second group was composed of unmodified

ungulate bones: four samples from Unit H, nine samples from Unit G, and four samples from Unit F; their dating was intended to verify the other dates. The dating results, however, did not entirely meet expectations.

Unit F can be considered as successfully dated. All three samples of bone tools were dated by Oxford and ranged between 28.2 and 26.6 ky BP. Of the four ungulate bone samples, three dates were obtained by the three laboratories (30.9–29.4 ky BP) and only one sample had collagen problems. The latter set of dates is somewhat older than the former; although considering dates only for level Fb1–Fb2, the time span is narrower: 30.9–27.8 ky BP. On the other hand, only two dates for the Aurignacian time range were obtained, from Beta Analytic, out of the 18 samples for Units H and G: c. 30.5 ky BP for Unit H and c. 28.0 ky BP for level Gb1–Gb2. Moreover, no samples from the five Micoquian and Proto-Aurignacian Unit G bone tools had sufficient collagen. Four dates for Unit H and level Gb1–Gb2 were too young: 22–13 ky BP. The other six samples had also collagen problems and were not dated.

There is thus a significant difference in dating results obtained from the 1990s and 2009–2011 bone samples between Unit F and Units H–G. Below are data on samples with collagen problems, including those providing dates considered too young. Unit F has only 2 of 9 samples with collagen problems (22.2 %), Unit G 16 of 18 samples (88.9 %), and Unit H 4 of 6 samples (66.7 %). Combined, samples with collagen problems from Units G and H are 20 of 24 (83.3 %).

Such a high percentage suggests that something affected inner content of ungulate bone in Units G and H, causing most of them to have chemical content problems resulting in little or no collagen preservation. This may also explain the dates considered too young (22–13 ky BP). Moreover, with a few Aurignacian-like dates between 30.5 and 28.0 ky BP for Units H and G, statistically identical to the stratigraphically higher dates from Unit F (c. 30.9–29.4 ky BP for ungulate bones and 28.2–26.6 ky BP for bone tools), it is also possible to argue that the four Aurignacian-like dates (30.5–28.0 ky BP) do not represent a true age, being too young although not as recent as the four non-Aurignacian-like dates (22–13 ky BP).

Coming back to the uncalibrated AMS dates known in Europe for the Proto-Aurignacian with Dufour bladelets and Late/Evolved Aurignacian with Roc de Combe bladelets – c. 37–36 to 34–33,000 BP and c. 32–28,000 BP, respectively – recall that the two sets of Aurignacian units at Siuren I correspond well to these European Aurignacian industries. It is thus certain that Siuren I Unit F and its best archaeologically representative level (Fb1–Fb2) are attributable to the Late/Evolved Aurignacian with Roc de Combe bladelets, with six AMS dates around 30.9–27.8 ky BP, and corresponds well to the analogous European industry. On the other hand, the four existing "not too young" AMS dates for Units H and G (30.5–28.0 ky BP) do not at all fit into the known European Proto-Aurignacian chronology. Therefore, the suggestion of chemical content issues for the Units H and G ungulate bones appears more likely.

In sum, aside from the already proposed very late chronological position of Siuren I Proto-Aurignacian in Units H and G (c. 31–30,000 BP) within the European Proto-Aurignacian as a whole (c. 37–36 to 34–33,000 BP), an alternative hypothesis is now proposed that the existing Siuren I AMS dates for Units H and G are too young for their real uncalibrated C14 age. As a result, the Siuren I Proto-Aurignacian could join the European Proto-Aurignacian not only on the basis of artifact similarities but also probably their chronology. Moreover, if this is valid, then the Micoquian in Siuren I Units H–G is also not too late, meaning that Siuren I can no longer serve as a strong argument for late survival of Micoquian Neanderthals in Crimea.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Crimean Upper Paleolithic
- ▶ Lithic Technology, Paleolithic

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Skeletal Biology: Definition

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Brief Definition of the Topic

Human skeletal biology emphasizes the dynamic nature and complexity of the human skeleton. Research in human skeletal biology frequently focuses on human remains recovered from archaeological contexts. Topics of research generally relate to health, the relationships among ancestral populations as revealed in biological distance studies, and functional morphology through related evaluations of behavior and use of the skeleton. Interpretations within the field recognize the mechanisms of growth and development, bone remodeling, sexual dimorphism, adult age changes, and population variation. More specifically, research foci can include skeletal evidence for disease, chemical analyses relating to diet, the growth and maintenance of bones and teeth, demographic reconstruction, trauma, cultural affects, biomechanical adaptation, and postmortem alterations. The term human skeletal biology is frequently used synonymously with the terms human osteology and bioarchaeology.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone: Chemical Analysis
- ▶ Bone, Trauma in
- ▶ Dental Anthropology

▶ Human Remains Recovery: Archaeological and Forensic Perspectives
▶ Osteology: Definition
▶ Pathological Conditions and Anomalies in Archaeological Investigations
▶ Sex Assessment

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Smith, Claire

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Basic Biographical Information

Claire Edwina Smith was born on July 15, 1957 in Sydney, Australia, as the 2nd of three daughters, to James Alexander Smith and Annette (nee Jones) Smith. She spent her youth in Booragul, near Newcastle, NSW, with her working-class parents, of Scottish and Irish background, inculcating her with empathy for the disadvantaged, tolerance toward others, valuing action rather than class or wealth, and respect for learning and progressive causes. Her interest in archaeology was inspired by a first-year course in economic prehistory at the University of Newcastle in 1983 while enrolled in a degree in Economics. It challenged her stereotypes about past and present Australian Aboriginal populations. She transferred to an Arts degree at the University of New England in Armidale, NSW, with a focus on Australian Aboriginal art, mentored by Mike Morwood and Jane Balme. She completed her Bachelor of Arts degree there in 1990, with First Class Honors and the University Medal with the thesis: *Designed Dreaming: Assessing the Relationship Between Style, Social Structure and Environment in Aboriginal Australia*.

Her doctoral work, also with the University of New England at Armidale, focused on style in Aboriginal rock art, in theory and practice. It was based on extensive fieldwork with and for Aboriginal people of the Barunga region, Northern Territory, Australia, and mentored by Jane Balme, Betty Meehan, and Mike Morwood. It culminated in her 1996 Ph.D. dissertation *Situating Style: an Ethno-Archaeological Study of Social and Material Context in an Australian Aboriginal Artistic System*. Following an Australian Research Council Postdoctoral Fellowship, she was appointed to the faculty of the Department of Archaeology at Flinders University as Lecturer (1998), Senior Lecturer (2001), Associate Professor (2005), and Professor in 2010. Presently, she is serving as Head of the Department. She has been the recipient of a Fulbright Postdoctoral Fellowship, hosted by American University and Smithsonian Institution National Museum for Natural History, Washington, DC, in 2000–2001. She has held academic visiting appointments at Columbia University, Lock Haven University, Pitzer College, and the University of Denver in the USA, the University of Cape Town in South Africa, and the University of Newcastle, NSW, Australia. Dr. Smith is married to anthropologist Gary (Jacko) Jackson, the coresearcher for many of her publications and the co-fighter for many of the causes that Dr. Smith has championed. They reside in Blackwood, South Australia, with their son Jimmy and, always, a number of visitors from Barunga and further afield (Fig. 1).

Major Accomplishments

Dr. Smith's scholarship is focused on the art, archaeology, heritage, present conditions, and deleterious outside interventions among postcolonial populations in general and specifically the Aboriginal Barunga community of the

Smith, Claire, Fig. 1 Claire Smith at Barunga, Northern Territory, 2012. With Danielle Bulumbara, Ester Bulumbara, and Nell Brown. Christine Camfoo and Wendy Willika in the background

Northern Territory, Australia. In addition, she has carried out fieldwork with Indigenous groups in India and Indonesia. Also among her research interests are rock art and the teaching of archaeology and cultural heritage, and how that teaching affects students, and also the future of Aboriginal populations and public understandings of the sophistication of Aboriginal cultures (e.g., she was the Instigator of the report: *A Past for all Australians: Archaeology and Australia's National History Curriculum*, submitted to the Australian government as input to the national history curriculum).

Very few people have been as intimately engaged with, and for, the people at the focus of their research as Dr. Smith. She has carried out fieldwork in the Aboriginal community of Barunga in the Northern Territory for more than 20 years now and with the Ngadjuri people in South Australia for more than a decade. Dr. Smith's goal is first and foremost to benefit Aboriginal communities and Indigenous communities in general. This is manifest in Dr. Smith's research and scholarship, in her teaching, and in her prodigious service and outreach.

She has been most visible internationally in her many roles in the World Archaeological Congress, particularly her 11 years as the President of the World Archaeological Congress (2003–2014). In this capacity she worked to transform interpersonal relations in world archaeology. She has worked actively to democratize world archaeology by breaking down the "old-boy" English-speaking network that controlled the field and increasing opportunities for Indigenous peoples and for archaeologists and archaeological students from low-income countries to share their knowledge with their peers and to obtain new knowledge in world conferences and through publications, including the *Encyclopedia of Global Archaeology*. She was the organizer and co-organizer of two WAC congresses, WAC-5 in Washington, DC, in 2003 and WAC-7, at the Dead Sea, Jordan, in 2012 (Fig. 2). The latter conference provided substantial support for 440 participants from disadvantaged groups and low-income countries. In addition, she instigated many of WAC's new ventures including *the Global Libraries Program* (in support of disadvantaged institutions), *Archaeologists without Borders* (an international faculty exchange), *Archaeologies* (its international journal), and its web presence, and she reinvigorated its publication programs (with five book series), its topical Inter-Congresses, and its championing of ethical practices within the archaeology and related disciplines.

Smith, Claire,
Fig. 2 Claire Smith in Amman, Jordan, 2012, with student volunteers for WAC-7: Eman Alghrabli, Fatma Darawad, Rania Ali, Hanin Bitar, Rawan Abusakha, Faten Habarneh, and Hadeel Alturk

Both in her academic and administrative functions, she is frequently voicing concerns in the public arena about policies deleterious to the archaeological record and its cultural custodians, particularly in postcolonial contexts. In Australia, and internationally, she frequently speaks out, and publishes academically and in popular media, about how governments and governmental and nongovernmental organizations can interact with Indigenous populations in a culturally sensitive, fair, and just manner. She is often asked to advise, consult, and help academic institutions, foundations, research museums, and Indigenous governmental bodies with that dimension of their work. Her research has been supported by grants from the Australian Research Council, the Australian Academy for the Humanities, the Fulbright Commission, Wenner-Gren Foundation, Australia Youth Foundation, Australian Institute of Aboriginal and Torres Strait Islander Studies, and Ian Potter Foundation, among others, and has generated considerable corporate support for the causes she champions.

Among her numerous publications, Dr. Smith has completed nine books and more than 40 refereed articles and chapters (in English and in Catalan, German, Japanese, and Spanish), as well innumerable reports, blog pieces, films, interviews, news releases, and more than 20 key note addresses at international professional venues (Argentina, Australia, Brazil, Canada, England, Japan, New Zealand, Nigeria, Portugal, and the USA). Many of her publications have been written with her close colleague, Dr. Heather Burke.

But it is not just in her publications that Dr. Smith has helped to transform her profession. She has been a tireless worker behind the scenes, creating alliances, jumpstarting new cooperative research ventures, and helping along and mentoring young professionals, students, and people from disadvantaged populations. She has been one of the prime movers in the field of Indigenous archaeologies, in the safeguarding Indigenous intellectual properties and cultural knowledges, and in the decolonization and empowerment of Indigenous heritage. She is a passionate fighter for community-controlled research that increases opportunities; improves community control over community resources, knowledges, and patrimony; and leads to more sensitive and constructive treatment of community members by outsiders, be they academic, corporate, or governmental. She has worked ceaselessly to train students in these directions, to facilitate international and interdepartmental

collaboration toward these ends, and to support young professionals from previously underrepresented populations, as in her support for the closet chickens (a mutual support group of Indigenous scholars and their friends). She also was a prime mover behind the massive international cooperative research project, *Intellectual Property Issues in Cultural Heritage* (funded by the Canadian Social Sciences and Humanities Research Council's Major Collaborative Research Initiatives program), and she has organized a number of international conferences to further this agenda, including the Fulbright Symposium "Indigenous Cultures in an Interconnected World" (1997, Darwin, Northern Territory), "Cultural Heritage and Indigenous Cultural and Intellectual Property" (2006, Burra, South Australia), and "Cultural Heritage, Social Justice and Ethical Globalisation" (Adelaide, South Australia).

Her many honors include the Jawoyn Aboriginal kin name, Lamjerroc, being given to her son Jimmy in 1990, a number of prestigious teaching awards including the Carrick Award for Teaching (team category, held jointly with Dr. Heather Burke) and the Prince of Wales Award, appointment to the Australian Research Council's College of Experts, election to Fellowship in the Society of Antiquaries (London), and the frequent invitations to lend her insights and reflections as discussant to international symposia in anthropology, archaeology, Indigenous Studies, Heritage Studies, and other fields. There are few if any people of her generation who have had a greater catalyzing influence on archaeology and related disciplines, to help them break out of narrow disciplinary molds and to direct them to projects that honor not only the past, but also do justice and improve the conditions of the descendant populations who are the rightful custodians of that past today.

Cross-References

- ▶ Australian Rock Art
- ▶ Burke, Heather
- ▶ Closet Chickens
- ▶ Community Archaeology
- ▶ Ethics in Archaeology
- ▶ Indigenous Archaeologies
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
- ▶ World Archaeological Congress (WAC)

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Smith, Laurajane

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Basic Biographical Information

Laurajane Smith earned her B.A. and Ph.D. from the University of Sydney. She has held positions at Charles Stuart University (1990–1995), the

University of New South Wales (1995–2000), and the University of York (2000–2009). At the University of York, she directed the M.A. program in heritage studies. She moved to Australian National University in 2010 and is an ARC Future Fellow there.

Major Accomplishments

Dr. Smith specializes in heritage studies. She is renowned for the concept of "Authorized Heritage Discourse" (AHD), which she featured in her 2006 book, *Uses of Heritage*. AHD is the "dominant Western discourse about heritage… that works to naturalize a range of assumptions about the nature and meaning of heritage" (Smith 2006: 4). AHD focuses on "things" and is dominated by "concepts of monumentality and aesthetics" (p. 4). Dr. Smith is the editor of the *International Journal of Heritage Studies*, coeditor of Routledge's *Key Issues in Cultural Heritage* series, and founder of the Association of Critical Heritage Studies, whose inaugural meeting was held in 2012.

Cross-References

- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Heritage and the Need for Theory
- ▶ Heritage Theory
- ▶ Intangible Cultural Heritage
- ▶ International Journal of Heritage Studies
- ▶ Uses of Heritage
- ▶ World Heritage and Human Rights

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Smith, Mike

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Basic Biographical Information

To my generation, Mike Smith seems one of the godfathers of prehistoric archaeology in Australia. Following in the footsteps of the Australian archaeology greats, like Rhys Jones, John Mulvaney, and Norman Tindale, Mike, a polymath by inclination, has been at the forefront of Australian archaeology debate since the 1980s. In over 30 years of research, Mike has been involved in research exploring the early colonization of Australia; the timing and composition of arid zone prehistoric occupation; the extinction of, and human interactions with, megafauna; the antiquity and mechanics of prehistoric seed grinding; and the late Holocene "intensification" debate. He has been instrumental in the application of new techniques to Australian archaeology, including geochemical

Smith, Mike, Fig. 1 (1986 Puritjarra) – Mike at excavations of Puritjarra Rockshelter 1986

provenancing of ochres, the use of thermo- and optically stimulated luminescence dating, and the routine inclusion of paleoclimatological and paleoecological analysis into excavations. Internationally, Mike is well known within the South American and South African archaeological communities and is regularly invited to participate in conferences and research on both continents.

Mike grew up in Adelaide and much of his early career showed an ongoing interest in South Australia. His early fieldwork experience was pivotal and included Roonka, on the lower Murray, where he joined the museum's excavations in 1971 while still a school boy. Later he worked at Koonalda Cave with Sandor Gallus in 1973 and at Wyrie Swamp with Roger Luebbers, in 1974 prior to starting university. Both his B.A. (hons) and M.A. theses were undertaken at The Australian National University (ANU) and focused on sites in South Australia. His honors research involved a detailed faunal analysis of excavated materials from Devon Downs rockshelter, a 5,000-year-old site located in the Lower Murray River. This site has a long history of investigation, originally excavated by Norman Tindale in 1930, who obtained some of first radiocarbon dates in Australia from this site in 1965, and most recently excavated by Mike himself in 1977 when he reopened part of the old trenches as part of his honors research. Mike's MA involved the systematic survey and investigation of Plumbago historic reserve (near Manna Hill) and was one of the first formal applications of probabilistic sampling techniques to an archaeological field survey.

At the beginning of 1980s, Mike took a job as the field archaeologist with the Northern Territory Museum, with a brief "to survey, record and excavate archaeological sites across the Northern Territory." Initially based in Darwin, Mike soon transferred to an office in Alice Springs and began a 30-year relationship with the prehistory of Central Australia. By the late 1980s, Mike had already surveyed and excavated a plethora of sites across region (Tjungkupu 1 and 2, Wanmara, Illarari kulpi malu tjukurr, Rrewurlpmurlpme Kweke, Kweyunpe 6, Urwemwerne, ORH16, Urre, Intirtekwerle, and Therreyererte), and importantly he had discovered one of the most significant sites in Australia – Puritjarra, a massive rockshelter in the Cleland Hills (Fig. 1). With the data from these sites, Mike completed a Ph.D. thesis (University of New England, 1988) and produced a number of seminal publications (see below), on the timing and pattern of prehistoric occupation of Central Australia. His ideas were critical in the formation of models on the colonization and abandonment of inland Australia during the Last Glacial

Maximum. These studies were also the first to characterize the antiquity of seed-grinding processes in the desert and the first to explicitly explore the archaeology of a desert totemic center. Although his work highlighted the extent of economic intensification in the desert during the last millennium, Mike never formally entered the social intensification debates of the 1980s and 1990s preferring to decouple social and economic changes and empirically track these separately in his analyses.

Puritjarra was a key focus of Mike's research for several decades – with over 10 publications on the site in the last 20 years, each exploring a key theme in desert research. He has recently (Smith 2010) published the complete body of works on the site. It still remains one of the most comprehensive studies of an archaeological site in Australia.

Mike had met Rhys Jones, another key figure in Australian archaeology, on the Wyrie Swamp dig in 1974 and later sought out Rhys as an advisor and mentor on his Ph.D. panel. This developed into a strong partnership when Mike became a research fellow at ANU in 1989 and with Rhys and Bert (RG) Roberts undertook a number of nationally significant excavations at rockshelters in Arnhem Land, Northern Territory. These excavations, at Malakunanja II and Nauwalabila I, provided some of the earliest dates for the colonization of the continent (55 ± 5 ka). And even today, these sites still remain the earliest evidence of human occupation in Australia. This work in Arnhem Land – and that at Puritjarra – was the earliest deployment of luminescence dating at Australian archaeological sites.

Since 1996, Mike has worked for the National Museum of Australia (Canberra), as a Senior Curator and Research Fellow. While his main interests remained focused on Central Australia, the Museum provided a platform for broadening the scope of research to include other parts of the arid zone: looking at Genyornis nesting sites on the west coast with Gifford Miller (Fig. 2), mapping millstone quarries in the Strzelecki Desert, and using pack camels to explore the eastern margins of the Simpson Desert (Fig. 3). Key outcomes of his time at the Museum include his research (with June Ross) on the archaeology of the Glen Thirsty site, and the direct dating of Panaramitee style rock engravings in Central Australia (showing them to be much younger than previously believed); excavations at Lake Gregory (with Peter Veth and Jim Bowler) demonstrating early evidence of Aboriginal occupation; and the application of time-series analysis to explore human-environment interactions across dry lands in both Australia and South America.

Smith, Mike, Fig. 2 (2007 Kallakoopah) – Mike excavating a fragment of megafauna on the Kallakoopah River 2007

Most recently, Mike has brought the growing body of evidence from the arid zone together in a major synthetic book from Cambridge University, which has recently been published (Smith 2013).

Major Accomplishments

- Royal Society of South Australia's Verco Medal for outstanding contributions to the archaeology of Australia's deserts (2010)
- Contributing author to the Royal Zoological Society of New South Wales' Whitley Medal for "Boom and Bust" (2009)
- Australian Public Service Australia Day Achievement Medallion (2009) for outstanding performance relating to special projects or core duties
- Fellow of Society of Antiquaries (2007)
- Fellow of the Australian Academy of the Humanities (2006)
- Rhys Jones Medal for Outstanding Contribution to Australian Archaeology (2006).

Smith, Mike, Fig. 3 (2010 Simpson) – Over the years Mike (*right*) has become a keen cameleer. Inadvertently, this has given him far greater access into the interior of many of the deserts of Australia

- Member, National Committee for Quaternary Research, Australian Academy of Science (2010–)
- Commonwealth Government nominee, Strehlow Research Centre Board, Museums and Art Galleries of the Northern Territory (2010–2013); The Australian National University (2010–present)
- Board of Directors and Research Advisory Panel, Australian Desert Expeditions (2008–present)
- Steering Group, International Geological Correlation Program 413 (Understanding future desert changes from past dynamics), UNESCO (1996–2003)
- Technical and Scientific Advisory Committee, Willandra World Heritage Area, Department of Environment, Commonwealth Government of Australia (2000–2006)
- Advisory Board, Centre for Research into Language Change, The Australian National University (2002–2006).

Cross-References

► Australian Deserts: Extreme Environments in Archaeology
► Australian Rock Art
► Dating Techniques in Archaeological Science
► Geoarchaeology
► Hunter-Gatherers, Archaeology of

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Smithsonian Institution

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Introduction

The Smithsonian Institution is a broad-based cultural institution situated in Washington DC, USA, and offers free entry to all visitors. It was founded by a bequest from James Smithson (1765–1829), a British scientist who left his estate to the United States to establish "at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge." Smithson's bequest amounted to more than 100,000 gold sovereigns (Smithsonian Institution Website 2012). Since its establishment as a trust by President James K. Polk on August 10, 1846, the Smithsonian Institution has become the world's largest combined museum and research complex, with 19 museums, the National Zoo, and nine research facilities. The institutions of the Smithsonian house over 137 million objects and have over 7.4 million digitized objects (Smithsonian Institution Website 2012) (Fig. 1).

Definition

The Smithsonian Institution considers its mission as being instrumental in the increase and diffusion of knowledge. It also promotes its vision as "Shaping the future by preserving our heritage, discovering new knowledge, and sharing our resources with the world." The values of the Smithsonian are Discovery, Creativity, Excellence, Diversity, Integrity, and Service (Smithsonian Institution Website 2012).

As a national body, the Smithsonian Institution covers a large range of cultural interests which are reflected in the large amount of museums and research centers that operate under its umbrella.

The museums and research centers that are incorporated as part of the Smithsonian Institution (Smithsonian Institution Website 2012) are as follows.

Museums

- National Museum of African American History and Culture
- National Museum of African Art
- National Air and Space Museum
- Smithsonian American Art Museum
- National Museum of American History
- National Museum of the American Indian
- National Museum of the American Indian George Gustav Heye Center
- Anacostia Community Museum
- Arts and Industries Building
- Freer Gallery of Art
- Hirshhorn Museum and Sculpture Garden
- National Zoological Park
- National Portrait Gallery
- National Museum of Natural History
- National Portrait Gallery
- National Postal Museum
- The Renwick Gallery of the Smithsonian American Art Museum
- Arthur M. Sackler Gallery
- Smithsonian Institution Building (The Castle)

Research Centers

- Archives of American Art
- Conservation Biology Institute
- Environmental Research Centre
- Marine Station at Fort Pierce
- Museum Conservation Institute
- Smithsonian Astrophysical Observatory
- Smithsonian Institutional Archives
- Smithsonian Institutional Libraries
- Tropical Research Institute

Smithsonian Institution, Fig. 1 Smithsonian Institution Building also known as The Castle (Smithsonian Institution Website 2012)

Key Issues

While all the Smithsonian Institution are funded in part from the original Smithson endowment, most of the financial support for the Smithsonian comes from the US Federal Government. In 2011 the Smithsonian Budget Request for the financial year 2012 requested over $850 million dollars (The Smithsonian Institution Fiscal Year 2012). To offset this cost, some funding bodies have questioned the free entry to the Smithsonian Institution. However, free access by the general public was a condition of the Smithson bequest and is unlikely to change. These museums generate indirect income through the tourists they attract.

Modern museums function in a number of ways that manage to both preserve and absorb material culture while also disseminating culture and knowledge. This complex communication is managed through a number of different functions including acting as keeping places, functioning as research centers, and providing publicly accessible interpretation of collections in the form of exhibitions.

As a national institution, the Smithsonian has had a number of high-profile controversial exhibitions. The political views put forward in some exhibitions have caused some issues for the institution. These controversial exhibitions have since been used to help explore the role of museums in society and were later the subject of a study by the museum (Gavaghan 1995).

Enola Gay Controversy

A major controversy that arose around the Smithsonian's National Museum of American History's exhibition of the Enola Gay, the plane that dropped the first atomic bomb that was used on humans at Hiroshima, Japan, during the Second World War was at the center of much debate. The planned exhibit caused controversy over the interpretation of the events and the historical significance of the Enola Gay (Gavaghan 1995). The proposed exhibition was accused of being anti-American propaganda (Sowell 1995). Subsequently, the exhibition was altered to show only the plane and some film footage with minimal interpretation.

Life and Land Arctic Exhibition

The exhibition of photographer Subhankar Banerjee's work at the Smithsonian National Museum of Natural History was moved to a less prominent space at the institution under what is perceived as political pressure regarding climate change and oil drilling in Alaska. The artist

was also asked to make several revisions to a book that was based on the exhibit, which included any reference to the Smithsonian. The author was told that the work was "just too political" (Bailey 2003).

Publications

The Smithsonian contributes and disseminates knowledge not only through its museums and institutions but also through a number of publications.

Begun in 1970 the *Smithsonian* is a monthly magazine that is aimed a broad selection of topics including the arts, environment, sciences, history, and popular culture. The *Smithsonian* is the official journal of the institution that is based around communicating issues related to the Smithsonian collections and exhibitions.

The magazine *Air and Space Smithsonian* has been produced by the museum of the same name since 1986 and covers topics related to the advancement of technology related to aviation and space exploration.

The Smithsonian has its own *Online Encyclopaedia* that is divided into several sections including Art and Design, Science and Technology, History and Culture, and Kids Favourites.

Cross-References

- ▶ Museums and Memory Experiences
- ▶ Museums and the Distortion of Archaeology for Political Purposes
- ▶ North America (USA and Canada): Museums

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The Argentine Forensic Anthropology Team (Equipo Argentino de Antropología Forense, EAAF), Buenos Aires, Argentina

Basic Biographical Information

Clyde Collins Snow was born in Fort Worth, Texas, on January 7, 1928. He grew up in Ralls, Texas, where his father was a country doctor. From his early years, he followed his father, who introduced him into the world of science, disease, life, and death.

After graduating from junior college at the New Mexico Military Institute in Roswell, New Mexico, he received his Bachelor's Degree in Biology at Eastern New Mexico University, a Master's Degree in Zoology from Texas Tech University, and his Doctoral Degree in Anthropology from the University of Arizona.

In 1960, he joined the staff of the Federal Aviation Administration's Civil Aeromedical Institute (CAMI) where, over the next two decades, he conducted research in factors influencing survivability in aircraft accidents. In this role, he participated in the investigation of major air disasters, specializing in the identification of the victims. He also served as a pro bono consultant to medical examiners, coroners, and law enforcement agencies throughout the United States in cases involving the identification of skeletal remains. In this latter conjunction, he published the first scientific paper containing the term "Forensic Anthropology" (Snow & Luke 1970).

Major Accomplishments

Among his varied research projects was a long-term study of the Tarahumara Indians of northern Mexico who are among the world's most famous endurance runners. Its objective was to determine the factors contributing to their remarkable

physical conditioning. It entailed a number of long trips to their remote villages in the *Barranca del Cobre* (Copper Canyon) over whose rugged terrain they run races of 24–48 h. He and his colleagues studied the physique and diet of the runners and telemetrically monitored their cardiac performance on treadmills and during actual races (Balke & Snow 1965; Snyder et al. 1969; Paredes et al. 1970). He also performed research on factors contributing to survivability such as age, sex, and seat location in major aircraft accidents (Snow et al. 1970) as well as anthropometric surveys of aviation-using populations (Snow 1965; Snow et al. 1975). The last commercial aircraft accident he helped investigate was the crash of an American Airlines DC-8 in Chicago on May 25, 1979 where he supervised the identification of the 273 victims. He also served for 2 years in the late 1970s on the panel of experts called to review all the evidence concerning the assassination of President John F. Kennedy for the US House of Representatives' "Special Committee on Assassinations" (Snow et al. 1979).

In late 1979, he retired from federal service and launched a second career as a full-time forensic anthropology consultant. As such, he was consulted on all skeletal cases from Oklahoma. He was also contracted by the Cook County Medical Examiner to examine all skeletal cases from Cook County which includes Chicago and its suburbs. One of his early Chicago cases was that of the notorious John Wayne Gacy who killed 33 young men and boys, burying 29 of them under his house. Along with the work in Oklahoma and Chicago, he was frequently called on cases in other states, including the "Green River" serial killings in Washington (Haglund et al. 1987) and that of Polly Klass, a 12-year-old girl kidnapped from her home in Petaluma, California, in 1993 and whose case attracted nationwide attention. He also used his skills in the analysis of remains found in historical contexts such as the bones of soldiers killed at the Battle of the Little Big Horn (Snow & Fitzpatrick 1989).

In 1984, his career took another turn when he was called to Argentina to help in the investigation of the thousands of Argentine men, women, and children who had been murdered during the military's self-proclaimed "Dirty War." These victims, the *desaparecidos* ("disappeared ones"), had been kidnapped, held in secret detention centers under torture and interrogation, and, finally, extrajudicially executed with their bodies being buried in clandestine graves scattered throughout the country. Between 1984 and 1990, he spent over 2 years in Argentina helping in these investigations, periodically returning to the USA to carry out his regular case work. During this time, he also recruited a small group of Argentine anthropology and medical students whom he trained up to carry out these investigations. In 1985, that group, the *Equipo Argentino de Antropologia Forenses* (*EAAF*) and Snow were called upon as expert witnesses to present some of their early findings in the trial of the nine members of the military dictatorship which resulted in the sentencing of three of them to life and another three to lesser terms. The trial was a forensic landmark since it was the first in which the testimony of scientific experts was used in a human rights case.

Later that year, he was called to Brazil where he headed the Simon Wiesenthal team, which along with other experts from Brazil, the USA, Germany, and Israel identified the skeleton of Josef Mengele, the infamous Nazi SS physician responsible for the deaths of thousands of Jews (Snow 1986).

In 1988, Snow and the *EAAF* were asked to come to Chile, which had its own *desaparecidos*. There they recruited and trained a team of Chilean anthropology students to help recover and identify the bones of the disappeared in their own country. Later, the Argentines, Chileans, and Snow journeyed to Guatemala and Peru where they formed similar forensic anthropology teams. By the early 1990s, the successes of these teams in their own countries had attracted international attention, and they were being asked by the United Nations and international human rights organizations to help in the investigation of war crimes, crimes against humanity, and human rights violations in other countries.

He has presented his findings as an expert witness in courts and international tribunals at The Hague, Ethiopia, El Salvador, Peru, Mexico, and other countries. In 2006, he went to Baghdad where he testified as a prosecution witness in trial of Saddam Hussein for his genocidal "Anfal" campaign against the Kurds. His testimony was based on investigations of several mass graves that he and the Argentine, Chilean, and Guatemalan teams had excavated in 1991–1992.

Dr. Snow's statistical analyses of the patterns of disappearances have contributed significantly not only to the location and recovery of the desaparecidos but also on the overall modus operandi of repressive regimes (Snow & Bihurriet 1992; Snow et al. 2008).

Through his work in many countries from Argentina to Zimbabwe, Dr. Snow has helped develop forensic anthropology as a key discipline in the investigation of human rights violations. His work has also inspired many young forensic scientists in these countries, particularly Argentina, Chile, Peru, Columbia, and Guatemala. The endeavors of these teams have brought solace and healing to the families of the disappeared in over 30 countries by repatriating their missing loved ones and bringing justice to their oppressors.

Cross-References

- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Forensic Anthropology: Investigating Human Rights Violations
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition

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Soares, Joaquina

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Basic Biographical Information

Joaquina Soares (Fig. 1) was born in 1953. She obtained her Ph.D. in Prehistory from the Universidade Nova de Lisboa in 2011. The title of her doctoral thesis was *Social Transformations in the Third Millennium BC in Southern Portugal: The Settlement of Porto das Carretas*. She was an archaeologist in Gabinete da Área de Sines, from 1972 to 1988, and between 1988 and 2000, she worked in the Natural Park of Sudoeste Alentejano e Costa Vicentina. She has been director of the Museum of Archaeology and Ethnography of the District of Setúbal since 1974. Besides, she has been co-director of the archaeological review, *Setúbal Arqueológica*, since 1974 and editor of the cultural review, *Musa. Museus, Arqueologia e Outros Patrimónios*, since 2004.

Joaquina Soares lectures in prehistory and protohistory at the Universidade Nova de Lisboa and is an associate member of the Archaeological Center (UNIARQ) of the University of Lisbon.

Throughout her carrier, she has produced more than 100 publications.

Joaquina Soares and her husband, Carlos Tavares da Silva, were the first professionals working full time in field and theoretical archaeology in Portugal, starting with the project of the regional development of Gabinete da Área de Sines from 1972 to 1988 (Tavares Da Silva & Soares 1981).

Major Accomplishments

Joaquina Soares has directed and co-directed more than 100 archaeological excavations based on research projects and rescue programs over the last four decades. From 1997 to 2002, she worked on the largest rescue archaeological project of Southern Portugal, in Alqueva (dam of the Guadiana River). Along with Carlos Tavares da Silva and José Manuel Mascarenhas, she also conducted an archaeological and cultural heritage survey for the evaluation of the environmental impact of the dam construction in the phase preceding construction in 1984 and 1985.

Soares, Joaquina, Fig. 1 Joaquina Soares. Southwest Portuguese Coast, August 2012

Since 1975, Joaquina Soares had been dedicated to establishing a new concept of museology oriented to research and regional development in the Museum of Archaeology and Ethnography of the District of Setúbal, Portugal. Since 2003, she has promoted the first Portuguese regional network of museums, the Fórum Intermuseus do Distrito de Setúbal. Joaquina Soares combines research with social interactions and educational and information purposes. She has convened a number of conferences, workshops, and several international symposia, including the following: "Prehistory of wetlands. Landscapes of salt" held in 2011 and "Production and commerce of salted fish and fishsauces from the Atlantic Coast of the Iberian Peninsula, during Protohistory and the Roman Age" in 2004.

She has been the director of several research projects including the archaeological rescue project "Medida A" of the Alqueva dam, the

urban archaeology research "Preexistencias of Setúbal," and the archaeological excavations on the pre- and protohistorical settlement of Chibanes in the region of Arrábida that is in the process of the classification as a World Cultural Heritage by UNESCO.

Joaquina Soares has played a significant part in the development of Portuguese urban archaeology, mainly in the cities of Setúbal and Sines. With Carlos Tavares da Silva, she organized the first national congress on this matter: *I Encontro Nacional de Arqueologia Urbana* (1985). Her main research contributions in archaeology are in the areas of (I) cultural evolution of the Chalcolithic from Portuguese Estremadura, with Carlos Tavares da Silva; (II) identification of the first Chalcolithic fortifications from the III millennium cal BCE in Southern Portugal, with Carlos Tavares da Silva; (III) the Neolithization process in the Southwest Portuguese Coast (Soares 1996, 1997); (IV) the emergence of complexity in the III millennium cal BC on the Southwest of Iberia (Soares 2003, 2008a; Soares, & Tavares da Silva 1998, 2010a, b); (V) prehistoric salt exploitation in the Portuguese Coast (Soares 2008a); (VI) settlement strategy of the Middle Bronze Age of SW Iberia (Cultura do Bronze do Sudoeste); and (VII) urban archaeology in Setúbal (Soares 2008b).

Cross-References

- ▶ European Mesolithic: Geography and Culture
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Heritage Museums and the Public
- ▶ Material Culture and Education in Archaeology
- ▶ Social Archaeology
- ▶ Tavares da Silva, Carlos
- ▶ Urban Archaeology
- ▶ Urban Heritage
- ▶ Western Roman Provinces, Archaeology of the

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Social Archaeology

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Introduction

Societies and social relations have always garnered attention in archaeology. What has changed over the years are the ways in which practitioners define, prioritize, and integrate *the social* into their work. With the emergence of new forms of archaeology (e.g., processual, feminist, public), the significance of the discipline's social dimensions mutates and grows, the term "social archaeology" broadens in scope, and archaeologists' relations to non-archaeologists creep towards the forefront of our professional concerns. All of these trends stem from the complexities of working on the past in the present. The myriad of research projects and publications over the past decade, including the founding of the *Journal of Social Archaeology* in 2001, point to the growing importance and diversity of social archaeologies. In this entry, I offer a working definition for social archaeology, particularly as it pertains to the archaeologies of Native North America; however, I only do so with the acknowledgement that definitions are contextual and in a constant state of flux. In addition to this broad definition, I also provide some historical background and an example of social archaeology from a recent multi-sited research project in northeastern and midwestern North America.

Definition

The introductory editorial statement from the inaugural issue of the *Journal of Social Archaeology*, now a decade old, provides a fitting start for any definition of social archaeology in the twenty-first century. The editor succinctly noted the dual nature of social archaeology, stating, "Our challenge is to understand past societies in terms of their social contexts and lived experience while, at the same time, to remain cognizant of how the knowledge of the past that we produce is used in the present" (2001: 9). Like all archaeologies, social archaeologies maintain a general concern with those that came before. Their specific foci on past social relations, identities, and discourses – as seen in the material residues left behind by past peoples – often lead them in new theoretical directions and sometimes differentiate them from other forms of archaeology. It is, however, the second component of the editors' statement – the cognizance of archaeology's social impact in today's world – that truly defines social archaeology. Given this entry's placement in the *Political and Social* section of the encyclopedia, I focus solely on this important facet, which continues to both challenge and strengthen contemporary archaeology as a whole. In this sense, I see social archaeology as any form of archaeology that takes its potential impacts on the present and future just as seriously as it takes its interpretations of the past. Archaeologies so described range greatly in form. Issues of representation of the past for non-archaeologists, integration of descendent communities into archaeological research, and simply striving to improve the modern world with archaeological knowledge all encompass the spirit of social archaeology. While their specific research objectives vary, most forms of social archaeology

concern issues of cultural heritage and the relationships between archaeologists and the many "stakeholding" publics that surround them.

Historical Background and Key Issues

I limit my discussion of historical background to four interrelated forms of archaeology: public, Indigenous, postcolonial, and applied/pragmatic. I see each of these trends as the key contributors to contemporary social archaeology in North America.

Public Archaeologies

As defined by Charles McGimsey in 1972, public archaeology was originally conceived of as *archaeology by the state*. Since the 1970s, however, the scope of public archaeology has broadened to encompass any process of professional archaeologists – academic or state-funded – managing archaeological sites for the general "public" (Merriman 2004). This transition extended public archaeology to include public-interest archaeology in addition to publicly funded archaeology. Recent developments in the field deal with the public's direct involvement in the archaeological process. Shadla-Hall (1999: 147) defines this more recent version of public archaeology as "any area of archaeological activity that interacted or had the potential to interact with the public." Merriman (2004: 5) sees this new form of public archaeology as primarily concerned with ethics and identity: "Public archaeology is inevitably about conflict over meaning…This broader definition of public archaeology opens up a space in which to discuss not just archaeological products (such as educational programmes, museum displays and site tours) but the processes by which meaning is created from archaeological materials in the public realm." Two models emerged within this concentration in archaeology: the *deficit model* and the *multiple perspectives model* (Merriman 2004). The deficit approach seeks to inform (and perhaps convince) the general public of the relevance of archaeological research. The multiple perspectives approach suggests that Western academic knowledge is only one of many types of knowledge and seeks to incorporate the general public's views on the past. Within this spirit of public archaeology, practitioners question the relevance of their research for the communities it impacts (Mapunda & Lane 2004). Such considerations lead to new methods of incorporating non-archaeologists in various aspects of the archaeological process. This includes directly integrating community needs and interests into the research (e.g., Potter 1994; Cipolla 2013), a key component of other forms of social archaeology, including the many Indigenous archaeologies discussed next.

Indigenous Archaeologies

North American Indigenous archaeologies stem from the Indigenous rights movements of the 1960s (see Atalay 2006). Activists like Vine Deloria Jr. critiqued the discipline of anthropology for what he saw as its exploitation of Indigenous peoples. Indigenous communities critiqued archaeologists mainly for the ways in which they treated Indigenous burial grounds and human remains. This discontent eventually took the form of protests at archaeological sites and other types of social activism, which led (and sometimes forced) archaeologists to begin listening more closely to the concerns of Indigenous communities. In some instances, these early consultations and collaborations were legally mandated by federal and state laws passed in the 1980s and 1990s to help protect Indigenous rights to cultural heritage. In other cases, researchers such as Janet Spector and Larry Zimmerman readily embraced American archaeology's changing relationship to Indigenous communities, embarking in new forms of collaborative archaeology (McGuire 2004). Of course, these new approaches also drew influence from postprocessual archaeologies, which emphasized the fluidity of meaning and the importance of multivocality in understanding the past. Finally, Indigenous people began earning degrees in archaeology, further diversifying the discipline and pushing archaeological research in novel directions.

Although defining North American Indigenous archaeology is a difficult task (see Watkins 2000;

Atalay 2006), many practitioners embrace the definition offered by George Nicholas and Thomas Andrews (1997: 3) as archaeology conducted with for and by Indigenous peoples. Among the many different forms of Indigenous archaeology are tribal archaeology, covenantal/reciprocal archaeology, and collaborative archaeology (Preucel & Cipolla 2008). One of the key variables in these different forms is the presence and role that outsides (non-Indigenous) play in the research (cf. Bendremer & Thomas 2008; Silliman & Sebastian Dring 2008). Some argue for the importance of multiple cultural perspectives in such research while others see Indigenous archaeology as archaeology conducted only by Indigenous people for Indigenous people. It is best to consider the distinctions between the different types of Indigenous archaeology as differences of degree rather than kind since all share common interests in decolonizing methodologies (Smith 1999). Of note, it is the more diverse research strategies in Indigenous archaeology – those that incorporate multiple stakeholders (descendants, non-descendant community members, archaeologists) – that I see as firmly situated within the realm of social archaeology. I provide an example of such research below with my discussion of the Brothertown Archaeology Project.

Postcolonial Archaeologies

Postcolonialism refers to a broad series of critiques of the Western cannon by scholars such as Edward Said (1978), Gayarti Spivak (1988), and Homi Bhabha (2004). In its varied forms, postcolonialism defies definition in many ways. Yet, as Matthew Liebmann (2008: 2) explains, at the most basic level, "postcolonial approaches challenge traditional colonialist epistemologies, questioning the knowledge about and the representation of colonized 'Others' that has been produced in colonial and imperial contexts." These critiques and challenges focus largely on the ways in which colonial populations represent colonized peoples and their histories (Liebmann & Rizvi 2008). Although much of the literature focuses specifically on modes of representation in parts of Asia and Africa, North American archaeologists have begun to draw influence from postcolonial studies. For example, postcolonial theory shares common themes with many iterations of public and Indigenous archaeology discussed above. From the perspective of social archaeology, engagements with postcolonial theory offer archaeologists new means of detecting the Western biases embedded in their practices, creating new spaces in which to redress the injustices of colonialism and the appropriation of Indigenous histories by nonnative archaeologists.

Applied and Pragmatic Archaeologies

Jeremy Sabloff's (2008) recent volume, *Archaeology Matters*: *Action Archaeology in the Modern World*, provides many fitting examples of how archaeological research can be used to solve social problems in the contemporary world. Sabloff draws upon a diverse set of archaeological studies in order to demonstrate how archaeological data speak to contemporary issues of sustainability, warfare, urbanization, and more. Efforts that strive to use archaeological research to serve contemporary social needs are part of a broader trend in archaeology that Robert Preucel and Stephen Mrozowski (2010) label "the new pragmatism." Pragmatism is a broad philosophical framework that concerns itself with the effects that knowledge production has in the world. At the heart of their essay, Preucel and Mrozowski thus ask about the differences that archaeology can and should strive to make in today's world. Those archaeologists working in the spirit of applied and pragmatic research thus recognize that their work does not take place in a vacuum devoid of political and social implications. Simultaneously, they seek out new ways of using their work to solve problems in the present.

Case Study: Social Archaeology at Brothertown

The Brothertown Archaeology Project, a collaborative endeavor between the *Brothertown Indian Nation* and the author of this entry (Cipolla 2013), provides a fitting example of the ways in which archaeological research is becoming more social, incorporating the interests, sensitivities, and needs of more than just archaeologists.

The project was designed to investigate Brothertown history and the legacies of colonialism in Native North America via the lens of collaborative historical archaeology. Since 2006, students, volunteers, and archaeologists, both tribal and nontribal, have worked together on an archaeological survey of the two Brothertown settlements, including an intensive survey of Brothertown cemeteries. For the purposes of this entry, I focus mainly on the implications of this work for the Brothertown Indians and other stakeholding publics. I begin with a brief summary of Brothertown history before moving on to discuss the dynamics of social archaeology at Brothertown.

The Brothertown Indian community formed in the late eighteenth century when Christian factions of several Algonquian tribes from Rhode Island, Connecticut, and coastal New York moved west together in hopes of escaping the politics and corrupting influences of colonial culture on the East Coast. The community settled in central New York State for a time but relocated once again to current-day Wisconsin in the 1830s, where it remains centered today. Also important for this entry is the fact that the *Brothertown Indian Nation* was recently denied federal recognition after spending more than three decades preparing their petition. As I discuss below, archaeology has the potential to speak to social issues and needs such as this.

The research project embodies social archaeology in the sense that it resulted only from the interaction of multiple stakeholders. The collaborative process informed everything from research design and data collection to analysis and interpretation. For example, the project's focus on grave markers emerged through continued dialogue and interaction with tribal members. In fact, it was several tribal elders who first suggested that the research focus on their historic cemeteries. We continued discussing this possibility over e-mail in the months that followed, and I eventually visited a tribal council meeting to discuss the idea with the entire council. The *Brothertown Indian Nation* officially approved the cemetery research after we talked through our respective questions, concerns, and expectations.

In addition to shaping the research design, the collaborative process also informed my interpretations. My understandings of the contemporary Brothertown community influenced me to work towards a deeper understanding of colonial culture and Native American identity politics of the eighteenth, nineteenth, and early twentieth centuries. Like that of all communities making their places in the modern world, Brothertown culture is comprised of things, practices, and ideas that did not originate solely from within the Brothertown community. As the name "Brothertown Indian Nation" implies, however, the Brothertown Indians still make distinctions between insiders and outsiders. Within the shared cultural milieu of the modern world, the Brothertown Indian Nation has its own political organization and communal gatherings. Brothertown Indians recognize and celebrate their unique communal history and their ties to sacred sites. And members continue to work towards maintaining and preserving the community and its future, clearly demonstrated by their 30-year quest for federal acknowledgement. Along with my interactions with members of the Brothertown community and the tribal council, these general observations emphasized the need to move beyond the dichotomous tropes often evoked in archaeologies of culture contact and colonialism. The Brothertown community – past and present – is much more complex than the differences between Native American and European, colonist and colonized, or accommodation and resistance.

Recursively, the research also had practical effects within the Brothertown Indian Nation itself. The cemetery project collected information from a large portion of Brothertown grave markers, including their text inscriptions, imagery, and locations. This is particularly useful for those stones whose text inscriptions and imagery are beginning to fade away. This information is now preserved in electronic and hardcopy catalogues of the stones. A complete catalogue of the stones is available online for all members of the tribe, including those that no longer live in the vicinity of the historic cemeteries. Furthermore, a ground penetrating radar survey of the

largest communal cemetery in Brothertown, Wisconsin, revealed the locations of several unmarked Brothertown graves. At least one member of the community is currently using this information to protect these once-lost graves, and the community may decide to formally remark these graves in the future.

Nonnative landowners and residents of both Brothertown settlements were also exposed to new perspectives on the places and spaces in which they currently live via the archaeological fieldwork. The archaeology emphasized the Native presence in the landscapes of both Brothertown settlements. By interacting with archaeologists and members of the Brothertown Indian Nation in the context of the archaeology project, local landowners and residents were endowed with new senses of their everyday surroundings. More broadly, these experiences also help to challenge widely accepted stereotypes of "Indian-ness" and myths of the vanishing Indian. By confronting contradictions of these tropes, such as stories of the Brothertown Indians building the first Methodist Church in Wisconsin territory or constructing the very roadways that the residents drive on every day, the current inhabitants of Brothertown renegotiated their understandings of Native communities, past and present.

The case of the Brothertown Indian Nation's petition for federal acknowledgment provides one final example with which to consider the future of social archaeology. In December of 2009, Kathleen Brown-Pérez, chair of the *Brothertown Indian Nation Federal Acknowledgment Committee*, contacted me regarding the comment period following the publication of the *Office of Indian Affairs*' negative proposed findings against the Brothertown Indians' petition for federal acknowledgement. During this period, all interested and informed parties were invited to comment on the proposed findings, either supporting or refuting the claims.

As I reviewed the proposed findings, I was surprised to learn that my work had been misconstrued and misappropriated by the authors of the report. For example, the report (United States Department of Interior – Indian Affairs 2009: 12) states that, "Scholarly archaeological excavations, even of sites in Wisconsin, do not provide evidence that any historical observer made a contemporaneous identification of an existing Indian entity (Cipolla 2007)." While the bibliography of the report lists the source of this statement as "Cipolla 2007, Brothertown Indian Nation Archaeology Project," its origin remains unclear since the project had just begun in 2006 and no findings had been published by 2007. This experience served as a harsh reminder of archaeologists' responsibilities to the publics that they impact, intentionally or not. My responsibilities on site went hand in hand with my duty to point these fallacies out to the federal government.

Beyond the poor scholarship that went into the report, however, lies a much deeper issue concerning the relationship between archaeological data and the federal acknowledgment process. In direct contrast to the above quotation, the Brothertown cemeteries that we studied do indeed provide evidence of outsiders identifying an "existing Indian entity" in Brothertown. The spatial distribution of Brothertown and non-Brothertown graves in the cemeteries illustrates this point precisely. In the largest cemetery in Brothertown, Wisconsin, nearly all Brothertown grave markers sit in the southern half of the cemetery, which is known locally as the "Indian half." In other words, the Brothertown Indians consistently chose to bury their loved ones in close proximity to other Brothertown Indians, while Euro-Americans consistently chose to bury their loved ones in close proximity to other Euro-Americans. The importance of this pattern should not be understated. Brothertown Indians and Euro-Americans alike recognized the disparities between their two groups. Other cemeteries surveyed as part of the project provide similar examples of these historically recognized social and cultural distinctions. The fact that local Euro-American residents continue to refer to the southern half of the cemetery as the "Indian half" also suggests that it was known as such since the 1850s, when Euro-Americans and Brothertown Indians began sharing the landscape of Brothertown, Wisconsin.

Although these facts do not change the Brothertown Indian Nation's current political standing, they do highlight an under-explored social use of archaeological data (Mrozowski et al. 2009). One of the criteria that petitioning tribes must demonstrate in order to become federally recognized is that a large portion of its members lived together as an identified Indian community, distinct from other groups (Office of Federal Acknowledgement 2011). Archaeological histories sometimes speak directly to these issues, particularly in cases where the communities in question did not speak and write in the English language as the Brothertown Indians did. In these cases, archaeological remains may represent core pieces of evidence, but archaeologists have yet to fully apply their work in such instances. This is just one direction in which archaeologists can further decolonize archaeology and partially redress the injustices of colonialism in the general spirit of social archaeology.

Future Directions

This brief discussion of North American social archaeology points to three interrelated directions for the future. First, archaeologists will continue to work towards incorporating multiple perspectives on the pasts that they study. This will take place as public and Indigenous archaeologies continue to flourish. Second, the discipline will continue to diversify as it attracts and hopefully welcomes more individuals from underrepresented groups into the field. In the spirit of postcolonialism, this diversity will lead to further scrutiny and correction of the discipline's imperialist roots and colonial biases (i.e., decolonization). Third, the expectation for archaeologists to produce socially relevant (applied and pragmatic) work will increase. Each of these trends suggests that archaeology is in an interesting state of metamorphosis from a discipline solely focused on discovering, classifying, and synthesizing a past for a small and homogenous group of professionals to one that articulates with the diverse social world of which it is a part.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Journal of Social Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

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Social Identity in Historical Archaeology

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Introduction

Since the late nineteenth century, archaeologists have attempted to interpret widely recurring patterns of material artifacts in terms of a sense of distinctive identity. Linking such patterns explicitly to notions of social identity has become almost commonplace in contemporary historical archaeology in the last two decades, rendering it "the most pervasive theoretical term of the last few years" (McGuire & Wurst 2002: 85).

Definition

Psychologist Erik Erikson (1959) is generally credited with introducing the concept of identity to describe a person's psychological development over their lifetime: personal identity, despite periodic crises, is self-sameness, or self-stability, over time. Conceptions of the self, or the set of meanings that are tied to the self as an individual (personal identity), only arise in social interaction within the larger context of society; therefore, individuals are generally thought also to have social identities (Hogg 2006). Such a perspective connects identity with many other measures of social position around which social relations are organized, such as age, gender, occupation, religion, wealth, or education and the relative benefits and costs of each.

Historical and other forms of archaeology tend to approach the concept by assuming there is at least some potential to infer aspects of past social identities through material culture. There are two senses of the construction of social identity that are relevant here: the construction of it in the past, by people living their day-to-day lives in particular social and historical circumstances, and the reconstruction of it in the present by archaeologists relying on material proxies for this behavior (artifacts). A notion of personal identity (and, by extension, group identity) is not a property but a process; like the present, it always "is" and is never completed. Both are politically determined and are always in the process of being created; they cannot be reified as a category or a possession, even though, as archaeologists, we are forced to study them through the possessions of past people and the static patterns of material artifacts.

Historical Background

The study of social identity as a stand-alone goal of archaeology in the late twentieth and early twenty-first centuries has been spurred by four developments in archaeological theory and practice: studies of style as social strategy; the search for, and conceptualization of, agency in past human behavior; Marxist-derived critical archaeology that called for illumination of the origin of contemporary social circumstances; and its contemporary (although less overtly ideologically positioned) derivative – the social justice movement in archaeology.

Deriving from structuralism, analyses of style in the 1970s and 1980s gave an explanatory lift to the concept of social identity by linking it to social, rather than merely physical, strategy. In a now well-worn formula, material artifacts were viewed as part of a strategic process, used by different groups in different ways. Style functioned at the borders of groups to define difference, and inside groups to signal similarity. In this sense, patterning was argued to have both a group and a personal identity dimension, while still operating within the confines of what was socially and culturally possible.

While style brought a personal dimension to studies of social identity, agency perspectives, deriving as they did from sociology, deliberately sought to understand the conscious, creative, and collective practices of generic individuals within the limits imposed upon them by historical process and established social structures (Dornan 2002). Cultural theorists such as Pierre Bourdieu, for example, illuminated the constructed nature of taste to show how social reputation (and regulation) depends on struggles for prestige and position that employ material culture as markers. In the historical archaeological literature, agency is often presented as the local-level contrast to the global processes of capitalism, colonialism, or globalization. The central issues are the extent to which class, status, and other social axes constrain human behavior and to what extent people can operate outside these with material consequences, as well as the extent to which the construction of the individual (and notions of personhood and the self that tie deceptively easily to acceptance of Erikson's concept of identity) and class are in themselves ideological (Patterson 2005).

A strong Marxist strand in historical archaeology in the 1980s focused discussion around issues of how social differences are given particular sets of meanings in the construction and discourse of social identity. Rather than treating identity as a categorical entity, we should use it as the lens though which to view society in a larger sense, since it is within this larger structure that important social processes (such as domination and resistance, power, class and inequality, or poverty and community building) are embedded. Notions of agency, society, and the individual should all be problematized rather than reified, and the many ways in which human action embedded in social relationships are exposed (Barrett 2000: 62).

The fourth and last strand is the increasingly apparent trend within contemporary archaeological practice to contextually justify itself, often through the application of various "action" labels. The current literature abounds with adjectives reflecting both sides of the practice experience: the approach of the archaeologist (applied, engaged, ethically engaged, activist, advocate) and the involvement of some form of community (collaborative, participatory, embedded, public). This trend, and the strong social justice agenda it supports, has widened the search for social identity to encompass the material patterns of contemporary community politics often expressed through processes of cultural heritage management and to a lesser extent of the practice of archaeology as a middle-class activity (Matthews 2005).

Key Issues and Current Debates

The construction of social identity in the past was both a symbolic process and a slippery one; the reconstruction of it by archaeologists in the present is similarly complicated. Exploring notions of social identity highlights four key tensions within contemporary archaeology: the degree to which material patterning in groups of artifacts is

a passive reflection or an active construction of past identity; the degree to which such patterning is produced consciously or unconsciously by the participants; whether or not it is ever possible to understand the individual as a social unit in archaeology, particularly for ordinary people; and the nature of the relationship between human choice and wider social structures.

Social identity operates at both the level of the individual and the collective. For every person there will be facets of their individual identity that are important to their material choices, as well as facets of their family and household identity. For the same individual, there may be a geographic community in which they live that influences their notion of identity (whether suburb, neighborhood, town, or village), various social communities of which they are a part (whether church, union, or social club), a work community (which can sometimes blend both the geographic and the social through the use of planned communities or company towns), and a range of other potential social categories that may well be beyond their individual control. While a person may be able to choose which church they belong to, for example, they cannot similarly choose whether or not to be female or black.

Trying to understand the slippery, contextual, and fluid nature of identity at any of these scales is the challenge of historical archaeology. Many historical archaeologists have used the notions of choice and autonomy that underlie the agency-social identity nexus as a means to reconstruct the lives of particular individuals as a way of personalizing the past. This has often been linked to the narrative turn in archaeology, so that connecting a person's identity to various facets of the material record from a site which they inhabited becomes a tale told of past lives. In historical archaeology, of course, there may be insufficient historical records from which to construct a profile of a particular person or household, and households as recovered archaeologically may or may not represent families, depending on the type and rate of occupancy for a particular building. At this personal level, studies have tended to focus on individual actors, despite the fact that agency as a theoretical paradigm disavows study of the individual per se (see Barrett 2000). Many Marxist studies would go further to argue that social identity should not be concerned with focusing on the individual, even with the best historical records, because our notion of the individual is itself an ideological concept. In this light seeing objects as the conscious creations of individuals or as part of the micro-histories of individual households is in fact dangerous (see, e.g., Johnson 1999: 128; McGuire & Wurst 2002).

At a community scale, archaeologists have focused on how identity is expressed through kinship networks, different modes of land distribution between generations, religion, notions of public and private space, or processes of community building and collective memory. A community can be as simplistic as a collective of individual households that may or may not be geographically bounded, a political construct, or a group of people linked by shared experience, daily interaction, and common class relations.

The ways in which material artifacts function as signifiers of identity in any of these contexts are equally as diverse. Many researchers have noted a distinction between the rapidly changing identity markers associated with the body (chiefly clothing, hairstyles, and language) and more stable markers, such as architecture, that endure and are able to convey a sense of permanence over the long term (see, e.g., Goodwin 1999; Mann & DiPaolo Loren 2001). Rapidly shifting markers are able to signal subtle shifts in political and social statements and in some contexts may have been more symbolically important than domestic goods contained within the private domain of the home (Steen 1999). The ideological value of more stable markers lies in their ability to retain patina (McCracken 1990), which verifies claims to status because it materializes longevity (Goodwin 1999: 144).

In between lie the many other material domains of domestic life. Historical archaeology, by necessity, most commonly approaches questions of social identity through the analysis of particular fields of material culture, such as the form and decoration of tablewares (e.g., Wall 1994);

the political, gender, or class associations of clay pipes (e.g., Beaudry & Mrozowski 2001); meals and dining patterns (e.g., Shackel 1993); alcohol use (e.g., Reckner & Brighton 1999); choices in headstones and cemetery furniture (e.g., Mytum 2006); or the use of items of personal adornment (White 2005). The possession and use of such items was in many ways as important as their cost in terms of what they signified. Several studies of the identity constructs that accompanied the rise of gentility in the middle of the nineteenth century across the Western world (see, e.g., Young 2003) have noted how closely the expression of social identity could be bound to the possession of behavioral knowledge (rules of behavior), as much as the economic ability to acquire specific material forms.

Future Directions

Social identity as a concept under which to cast various aspects of people's material choices is clearly very alluring to archaeologists. Linked to the strength of the concept of style in archaeology as a means to explain certain aspects of social dynamics and to various bases underlying contemporary archaeological practice that demand a more socially accountable archaeology, social identity has become a popular box in which to place many different aspects of past human behavior. At best, it can become a means to highlight the tensions between individual subjectivity and the structuring constraints of broader social and historical circumstances; at worst, it can become diffused beyond the point of serving as a useful analytical category. The challenge lies in understanding both correspondence and variation in material traces as more than just similarity or difference between groups and asking more difficult questions, such as how variation might be the result of, and create, social unity (Chenoweth 2011: 336–7), as well as its opposite, or how material similarity might mask social difference along other axes of identity. McGuire and Wurst (2002) remind us that shared identity is not necessarily the basis for shared action, any more than common goals derive from shared essential identities. The search for social identity hinges on seeing artifacts as parts of a process, not simply as finished end products, and on contextualizing patterning within a wider set of influences.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Community and Archaeology
- ▶ Consumption, Archaeology of
- ▶ Critical Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Engendering Historical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Practice Theory in Archaeology
- ▶ Social Archaeology
- ▶ Structural Archaeology

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Social Memory in Archaeological Theory

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Introduction

Social memory has been studied by historians, sociologists, psychologists, and anthropologists from many different angles. It has been described as a transdisciplinary concept with no single definition. While this varied interest has generated much insight, it has also made it important for researchers to be clear as to how they are approaching the concept. Archaeologists, not surprisingly, have been most interested in the relationship between social memory and the material world of ancient and historic societies.

Definition

Archaeological studies of social memory have centered on how monuments, buildings, objects, burials, and other material traces of human activity and practice create, reflect, or shape a group's social memory. Archaeologists have also been interested in how contemporary groups incorporate these material traces into their understanding of their history and identity.

Historical Background

Any discussion of social memory in anthropology must begin with Maurice Halbwachs (1877–1945), the French sociologist who wrote foundational works on memory in a social context. Originally published in France as *Les cadres sociaux de la mémoire* (*The Social Frameworks of Memory*, first published 1925) and *La topographie légendaire des évangiles en terre saint* (*The Legendary Topography of the Gospels in the Holy Land*, first published 1941), his ideas are best known to English-speaking scholars through the translations of Lewis Coser published as *On Collective Memory* (Halbwachs 1992). A third work, unfinished at the time of Halbwachs' death, *La mémoire collective*, was published posthumously in 1950. The original French edition was translated into English as *The Collective Memory*, but a more recent revised and corrected French edition has appeared and should be consulted (Halbwachs 1997).

Halbwachs argued for an essentially social approach to memory in contrast to existing approaches which saw memory as a function of

the individual mind. He noted that people's memories are shaped by the social context in which they live and the social groups of which they are a part. What an individual remembers depends only in part on his or her lived experiences. For Halbwachs, more important were the events, relationships, places, and things that the collective group wished to remember. Central to his approach is the recognition that memory provides groups with a sense of identity, a sense of belonging, and a sense of history. *The Legendary Topography*, in particular, highlights a connection between place and memory, both in the way that places become memory cues and in the way that places become meaningful through their association with memory. One of Halbwachs' insights is that collective memory is not only social but can transcend the lived experience of any individual. In a striking illustration of this, he discusses how his first experience of London was shaped by his familiarity with Dickens and other authors as well as by conversations with friends. Halbwachs made it clear that memories are made, not just stored and retrieved, an insight since affirmed by social psychological research. He argued that the process of memory making was something that happened through or as part of social interactions. Consequently, people who interacted together regularly were most likely to be involved in this process of memory making. Missing from Halbwachs' work is much of any discussion of conflict or how competing or contradictory collective memories might be resolved. In light of this, more recent work has preferred the term social memory, emphasizing its political as well as social aspects.

Paul Connerton has offered one way of understanding social memory in different types of societies that has been influential in archaeology because he dealt specifically with societies with and without writing (Connerton 1989). He also represents the move towards acknowledging the interplay between individual and social as a counterpoint to Halbwachs' emphasis on collectivities (reflecting Halbwachs' debt to Emile Durkheim). Connerton wants to find ways to recognize and study social memory independent of and in addition to what he calls inscription. The most familiar form of inscription is writing and the production of texts designed to transmit information. Connerton suggests that other ways of remembering exist. He focuses on commemorative ceremonies and bodily practices as forms of remembering that all societies make use of. Central to his argument is the efficacy of ritual in preserving and passing on memories that groups want to remember. This is a performative approach and a practice-based one – it is through performances of ritualized actions that people create a context for the passing on of traditions, beliefs, and what Connerton calls social habits. Bodily practices thus loom large in Connerton's model. These practices help produce what he calls habitual memory. In contrast to inscription, incorporation represents the bodily practices through which habitual memory is developed. Ultimately, Connerton's argument is evolutionary in that he sees a change over time from societies that rely on incorporating practices to those that rely on inscribing ones. This element of his model allies him with the notion that some societies have a sense of history and others do not. Nevertheless, his efforts to move beyond a reliance on texts have been fruitful for archaeologists, especially prehistorians or those interested in social memory created by social groups who, even in literate societies, did not typically inscribe their histories. Michael Rowlands provides one archaeological application of Connerton's ideas by looking at the role of monuments and burials in European prehistoric societies (Rowlands 1993). He argues against the usefulness of separating literate and nonliterate societies along an axis with inscription at one end and incorporation at the other. He also argues that certain kinds of material culture can result from acts of inscription. This latter point has been one that other archaeologists have emphasized, finding the distinction between inscription and incorporation too limiting. Landscapes, the ways they are shaped by people's actions, can be seen as a form of inscription and incorporation.

Another debate that archaeologists must address centers on the relationship between history and memory. Perhaps not surprisingly, many historians want to differentiate the two. Memory

is individual, history is collective; memory is unreliable and mutable, history is as accurate as possible and subject to change through new information but not through new or different perceptions; memory is what nonliterate or non-Western societies have, while the literate Western societies have history – these are all aspects of the debate. Older theoretical perspectives in anthropology such as structuralism accepted this division between those with and without history as exemplary of hot and cold societies. The French historian Pierre Nora's massive project on *les lieux de mémoire* has been influential on archaeologists who have not always perceived the degree to which his concept draws on such structuralist framing. The rendering of *lieux de mé moire* as "sites of memory" in an early translation of his writing (a translation rejected by Nora in the later, more authoritative publication from Columbia University Press) was too tempting for archaeologists to ignore, and the term began to appear in discussions of social memory. However, for Nora, it is only modern societies, because they possess an historical consciousness, that create *lieux de mémoire*, foci of remembering that may be places but may also be songs, books, and other cultural products. Older societies, even "peasants," examples of groups without an historical consciousness, have no history and therefore do not create *lieux de mémoire*. Instead, they create *milieux de mémoire* which allow the repetition of certain ideas and relationships through ritual but do not constitute history (Nora 1996).

Key Issues/Current Debates

More recent anthropological work on the subject has rejected the distinction between societies with and without a sense of history even as this work has endeavored to explore the different ways that remembering occurs. An example is the edited volume, *Making Alternative Histories*, which includes contributions from Latin American, African, and North American scholars assessing the interplay between anthropology, archaeology, and the politics of identity and heritage as part of their efforts to overcome the kinds of dichotomous thinking that reserves history to the West (Schmidt & Patterson 1995). In this endeavor, archaeologists have been joined by historians interested in the variability of social memory and its consequences for social interaction, political control, and cultural change. In the process, anthropologists have both undercut the idea that history can only take one form (that of specific events tied to particular dates) and that there is ever a pure or perfect historical narrative. Peter Schmidt, for example, examines the relationship between history, oral tradition, and memory in *Historical Archaeology in Africa*. In the process, he destabilizes the notion of prehistory or societies without history (Schmidt 2006). In *Houses in a Landscape*, Julia Hendon argues that alternative histories develop through the repeated actions of daily life and ritual at home that provide a counterpoint to the political histories produced by Maya rulers commemorated through monuments with hieroglyphic texts (Hendon 2010). These communities of memory provide localized histories tied to domestic places. Burying the dead at home and engaging in life-cycle rituals tied to the passage of time are two kinds of practices that took place in these domestic settings. These practices are ones that most archaeologists would recognize as ritual and likely to be productive of social memory. Hendon extends the ways that memory is produced, however, by arguing that domestic activities, which are ritualized in their own way, provide additional ways of making connections tied to particular places that endure over time.

Archaeologies of the Pueblo Revolt (Preucel 2002) and *History Is in the Land* (Ferguson & Colwell-Chanthaphonh 2006) explore the persistence of alternative perspectives on historical events by examining Native American (Hopi, Zuñi, Apache, etc.) expressions through oral tradition, art, and material culture of their views on their experiences with colonizers, Euro-American settlers, government officials, as well as with one another, ancestors, and other Native American groups. Archaeologists thus have solid support for applying social memory as a kind of history – or a history-making practice – to all societies. What is at issue is not whether or not

a society has history or an historical consciousness but rather how that consciousness is expressed; how it relates to identity, politics, social relations, and even economy; and to what extent social memory is contested within society.

Recognizing memory as a social process has three important implications: First, as Adrian Forty and Susanne Küchler have argued, memory is as much about what is forgotten as it is about what is remembered (Forty & Küchler 1999). This is not a deficit but rather part of how societies use memory. Second, as *Houses in a Landscape* makes clear, it is more productive to focus on practices of remembering and forgetting rather than on social memory as a reified entity. Third (as already suggested by the first point), remembering and forgetting are inherently social and political. Social memory intersects with other aspects of society that archaeologists have long been interested in studying, especially politics, identity, and social relations.

Archaeologists working on literate societies, whether ancient Rome or the ancient Maya, have found that moving beyond the documentary record to a broader perspective on how social memory develops and what role it plays allows them to contextualize the statements of elites and leaders in the larger social setting. For those archaeologists working without documentary records, recognition of the ways that social memory can be inscribed in the material record has provided insight into the kind of history that leaders, elites, or others in society wished to make their authority visible and permanent. Thus, in *Archaeologies of Memory*, editors Ruth Van Dyke and Susan Alcock divide the chapters between those studying societies with text and those studying societies without (Van Dyke & Alcock 2003). Despite the obvious differences between the two groupings, what is striking is the degree to which the contributors converge on a set of things to study and agree on the role of social memory. Alcock's earlier work on social memory in the classical world, *Archaeologies of the Greek Past*, makes a strong argument for the value of studying social memory from material evidence as well as from textual sources (Alcock 2002). Her three case studies demonstrate how landscapes and monuments become enmeshed in the construction of group identities.

Landscape, burials, and monuments constitute three of the commonly invoked material traces around which social memory coheres. Thus both the edited volumes, *Social Memory, Identity, and Death* (Howard 2003), and *Archaeologies of Remembrance* (Chesson 2001), take the practice of burying the dead or other kinds of rituals related to the dead as emblematic of how groups use social memory to create identities that continue over time, connecting the living and the dead. The recognition that it is the living who decide how to bury the dead is central to the case studies in these volumes. Rather than seeing burials as some fixed and essential reflection of status or individual identity, the contributors consider how mortuary rituals allow the living to reinforce or emphasize those aspects of identity important to their own identity and relationships.

Landscapes have been studied as complex palimpsests, using Barbara Bender's term, of deliberate and habitual actions that shape the land itself and people's understanding of their relationship to the world around them (Bender 1998). The degree to which places, monuments, and buildings – in other words features of the natural and build landscape – persevere beyond the individual human lifespan means that they provide solid, substantial anchors for remembering, a point first made by Halbwachs in his discussion of religious landmarks in Jerusalem and other Holy Land locations. It is this ability to seem permanent that led Rosemary Joyce and Julia Hendon to argue that Connerton's concept of inscription was too limited if confined only to documents or texts (Joyce & Hendon 2000). They used placemaking in the lower Ulua Valley of Honduras to exemplify how long-term relationships and meanings can be inscribed on a landscape. Unlike Rowlands, though, Joyce and Hendon also argue that incorporation and inscription can merge in the meanings ascribed to landscapes. Patricia Rubertone makes a similar point in *Archaeologies of Placemaking*, bringing the process of inscription into the present through her focus on the tension between public

commemoration or acknowledgment of a Native American presence in North America and how those commemorated view these monuments (Rubertone 2008). Here, as with *Archaeologies of the Pueblo Revolt*, *History Is in the Land*, and Martha Norkunas's *Monuments and Memory* (Norkunas 2002), about preservation efforts in Lowell, Massachusetts, the political aspects of social memory become part of present-day attitudes and play into decisions about how to represent that past in public or official contexts.

Inherent in many of the treatments of social memory making discussed so far has been a focus on ritual. Connerton made this explicit in his discussion, arguing that rituals are well suited to remembering because they are less subject to change. Archaeologists have both embraced the importance of ritual and questioned it. Richard Bradley has pointed to its importance and has used evidence of ritual action to understand the construction of social memory in European societies that lacked writing (Bradley 2002). Nevertheless, as Hendon as noted, too strong a reliance on rituals runs the risk of neglecting the history-making potential of daily life at home or away. A more productive approach is that taken by Hendon and the contributors to *Memory Work*: *Archaeologies of Material Practices* (Mills & Walker 2008). Without rejecting the importance of ritual, *Memory Work* and *Houses in a Landscape* focus on *practices* through which people created or deposited or modified places and things. Some of these practices fit a standard anthropological definition of ritual but not all. The focus in both books is on the depositional practices that leave behind traces of actions designed to inscribe on the landscape aspects of identity, significant action, and in the process memories. By shifting the focus to practices, archaeologists have a way to continue to acknowledge the importance of ritual while also recognizing the potential significance of all actions and practices in remembering and forgetting. Social memory does not develop only through specific kinds of actions. The decision to foreground or privilege certain kinds of action or practices is in fact a political one, on the part of either people in the past or researchers in the present.

International Perspectives

The study of social memory has become common throughout the discipline of archaeology. Specialists working on prehistoric, ancient, and historic societies in many different geographic regions have incorporated the concept into their research. As the references and suggestions for further reading at the end of this entry suggest, Mesoamerica, the Andean region, Africa, Mesopotamia, Europe, and North America have been particular sites of social memory research, but the concept is even more widespread than this list suggests. Issues of heritage and identity are not limited to the Americas, and historical archaeologists in particular have addressed the controversies and values surrounding the construction of social memory in many postcolonial contexts. Although this review has emphasized the English-language literature, scholarship on social memory is not restricted to Anglophone archaeologists or to those publishing in English. Latin American and European archaeologists have contributed to the discussion of *la memoria social or la mémoire social* as well.

Future Directions

At this point social memory is well integrated into the conceptual framework of many contemporary archaeologists. Studies of social memory-related practices will continue to appear. Like such other important social facts as gender, power, hierarchy, and heterarchy, social memory should also become incorporated into more general or broader studies as part of what one needs to address if one wishes to understand how past societies made sense of the world in which they lived. Debates about whether or not a group has social memory are no longer enlightening. Likewise, debates over the veracity of texts, oral traditions, or the material practices through which social memory is produced and reproduced are of less interest. What needs to be addressed are the how and why of remembering and forgetting in specific social and historical contexts.

Cross-References

▶ Museums and Memory Experiences
▶ Practice Theory in Archaeology

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Social Movements and Archaeology

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Introduction

With the aim of presenting a contemporary and yet generalized definition of archaeology in relation to social movements, it is necessary to situate both as two fields with origins that are dissimilar, but not necessarily opposing, and increasing in mutual collaboration. The first field, archaeology, is found to be historically bound to the production of academic knowledge around the discipline of the past, usually in agreement with the political interests of the Administrators of the colonies and the modern Nation States. The second, social movements, is linked to emerging collective action and is about eminently practical orientations aimed at broadening the areas of participation in decisions of collective interest. And as such, it primarily contains and promotes, over all, a political meaning.

Archaeology has produced collaborative works with social movements that even gave origin to specific lines of work within the discipline; this is the case, for example, with Feminist Archaeology (e.g., Colomer et al. 1999) and Gender Archaeology (e.g., Gero & Conkey 1991; Gilchrist 1999) which were originally characterized by their questioning of the male-centered standards involved in the production of knowledge within the discipline and the cultural and politically construed character of essentialist categories employed by the discipline to approach the explanation and interpretation of the subject and data of the past. Such work renewed discussions of the subjective position of archaeologists in academic production and their political and social stakes within the social movements in their own societies.

But it was the postcolonial theorists who focused the attention of the discussions on the predicament and political role of the intellectuals starting from the subjective position of the researcher; they based the problem of discursive displacement that the new academics and professionals coming from the old colonies were beginning to produce at the interior of the Humanities and Social Sciences. As Castro Gómez & Mendietta (1998) aptly explain it, the postcolonial theories produce knowledge in a kind of "discursive translocation" starting from a crisis that is produced at the core of these theories. However, the postcolonial intellectuals' realization of their own hegemonic position, in academia and outside of it, necessitated the review of the paper that anticolonial and Third World narratives assigned historically to "critical intellect," a situation that also demanded the redefinition of the relation between theory and practice (Castro Gómez & Mendietta 1998). It is in this way that postcolonial theories, also in archaeology, were characterized by the appearance of these tensions of identity belonging to an era in which local knowledge interacted with global projects in a dynamic and changeable way, blurring the cultural frontiers.

Bound to political outlines of a postcolonial nature, the so-called Indigenous Archaeology, currently considered a subdiscipline within

archaeology, was also developing during the last decades of the twentieth century as part of the agenda of work of various archaeologists especially in countries such as Australia, the United States, and Canada, and in response to the demands put forth by the movements of communities and nations of Indigenous peoples. George Nicholas (2008: 1660) has referred to Indigenous Archaeology "as a form of archaeology where the Indigenous people are involved in the care and excavation of the cultural and corporal remains of their ancestors." However, this definition does not specify a line of work, not exclusively of Indigenous subjects, and that in a broader plan it hopes to be a project of decolonization of the practice of archaeology the world over. That is to say, it deals with a redesign that occurs at the interior of the discipline of the ethical and political role assumed by archaeologists and the form in which they plan their research in relation to the communities with whom they interact (e.g., Ucko 1989; Watkins 1999, 2001, 2003; Endere & Curtoni 2003, 2006, 2007; Smith & Wobst 2005; Atalay 2006a, b, 2007a, b; Smith & Jackson 2006; Smith & Burke 2007; Burke et el. 2008; Bruchac et al. 2010; Jofré et al. 2010a; Nicholas 2010).

The Colombian archaeologist Cristóbal Gnecco (2008) referred to Indigenous or Native Archaeologies as "archaeologies of local meaning" or "reactionary political practices" to the dominant cultural rationale. These new archaeological practices, closer to emerging social movements, promote and contribute to the construction of plural areas and are also, as Alejandro Haber (2008) sustains, displacements that the discipline carries out to rise up in its colonial relation with the local communities. Pedro Funari (2001, 2004) has for his part adhered to the denomination of "Public Archaeology" to refer to these new pluralisms that occur in the field of scientific archaeological practice. He understood them as horizontal expressions and not hierarchical in difference, in terms of political economy like interpretation, that which implicates archaeologies with publics, protagonists, and broader purposes. These collective, public, and plural archaeologies can be conceived "as a coproduction in which the involved sectors collaborate, learn and produce history together, although not without productive conflict" (Gnecco 2008: 101).

Key Issues and Current Debates

International View: Archaeology and Social Movements in South America

To speak of archaeology and social movements, we should refer ourselves to the type of relation initiated between this discipline and the conflicts, interests, and orientations that these social movements pose and or manifest. An always complex and delicate field is that of the processes of patrimonialization in which archaeology is generally implicated as the controlling agent of the State. However, as suggested earlier when I referred to the Indigenous Archaeology, there currently exists a number, fortunately ever-growing, of collaborative works between archaeologists and sectors of society historically passed over in its rights, such as the Indigenous peoples or communities of decedent Indigenous population that acknowledge other types of meanings and values in the remains of the past. In these cases, the archaeological patrimonialization of the remains of the living memory of a people can become the imposition of foreign values on these communities and the exposure can become the expropriation by means of legal mechanisms of intervention operated by state agents, multilateral organizations, private companies, etc. They offer an interesting debate with respect to distinctive archaeologists of the South closely reflecting the implications of the processes of patrimonialization in different ex colonial countries of the world (*Diálogos del Sur* 2007). As for example, Zimmerman contends:

> Academic archaeology should learn to live in the real world and acknowledge that not everybody considers the past public heritage. Many people that are not archaeologists consider archaeological heritage as their own, not as belonging to archaeology; they want to protect it and interpret it themselves or, they strongly wish for it to be left alone (*Diálogos del Sur* 2007: 14).

Patrimonialization is an "act of memory" in which the forces of political conflicts are

implicated, whose finality is the production of a significant heritage for the State, and through which determined social actors try to conserve particular memories of their past. For this motivation, the processes of patrimonialization are accompanied by emerging processes that can be called contra-patrimonialization. These last processes would be something like the contra-hegemonic powers produced in and for the hegemonic conflicts for the definition and establishment of the heritage of a people or nation. From my own experience as an Indigenous archaeologist working in the Republic of Argentina, I offer a case for analysis as a current debate, in which I try to demonstrate how we can think of possible relations between archaeology and the emerging social movements from the perspective of patrimonialization. The case I refer to is, of course, subject to the local peculiarities, but it serves as an example of a situation largely generalized in South American countries today.

The Political Role of Archaeological Heritage in the Demand of the Social Movements of Citizens Assemblies in Argentina

The change of the capitalist accumulation model in Latin America during the last decades of the twentieth century witnessed the expansion and intensification of a project tending toward the control, extraction, and exportation of natural goods (Svampa & Antonelli 2009). This emerged in the 1990s at the height of the era of the politics of privatization, when the majority of South American countries started a profound reform of their regulatory frameworks to benefit the establishment of transnational companies in this region of the world (Svampa & Antonelli 2009). These constitutional and legislative reforms that institutionalized the self-exclusion of the State as a productive agent were stimulated and supported by international organizations (World Bank, Inter-American Development Bank, among others). In this way, Argentina, as in other places in South America, awarded full exclusivity to the private sector to exploit the (inaptly named by capitalist jargon) "natural resources" (Buiteaar 2001; Power 2002; Schiaffini 2004; Clark & North 2006; Ortíz 2007; Bebbington 2007; Solanas 2007; Svampa & Antonelli 2009). In these conditions, the Nation State put into action, under the proposed expansion of a national development model, the suppression of the local economy, consistent in the exploitation of the so-called non-renewable "natural resources" by transnational actors and local partners (Ortíz 2007; Solanas 2007; Svampa & Antonelli 2009).

Only in the province of San Juan (located in the mountainous zone of central eastern Argentina) were more than 20 mega-mining projects put into place (Giovannini et al. 2009) which can be found in different phases of work; among these, the two most important projects belong to the transnational company *Barrick Gold Corporation*. This company possesses the Mina Veladero project, active since 2005, a deposit of gold and silver located more than 4,000 m above sea level in the Andean mountain range in the Departments of Iglesia and Pascua-Lama; the first binational mega-mining project which is also located in the high Iglesian mountain range on the Argentinian side. Another important mega-mining project for the extraction of silver and copper, known as Gualcamayo, is located in the vicinity of the river of the same name in Jáchal. These grand-scale exploitation projects are located near the natural glacier springs and the former mountain pathway used intensely at one time by the communities for cross-mountain activity like shepherding, trafficking of products, and communication that served as local modes of social, cultural, political, and economic integration with varying levels of autonomy throughout local history. The archaeological remains of these distinct territorial occupations that were happening throughout history in this geographical space allow us to today account for the existence of multiple "places of memory" (Nora 1984), or significant spaces of the collective memory, coexisting by way of palimpsest in which they impose long-standing historic meanings (Jofré et al. 2010b).

These transnational extractive economic projects transform the state geographies of inclusion and exclusion. The city biases, and other identities subordinated to the construction of

territorial sovereignties, begin to be reconfigured giving way to processes of confirmed supranational integration (that involves as many processes of inclusion as those of exclusion) for the Binational Argentine-Chilean Pact.

The symbolic conflicts that give transnational or supranational context call on forces of homogenization as well as heterogenization, and they attend to the processes of re-territorialization of the productive processes of flexible capitalism implicating, at the same time, de-territorialization of the social and cultural memory in which local identities have been constituted historically (Jofré 2013). On this point, scientific narratives like those of archaeology play a fundamental role in the installation of these true regimens in which the politics of knowledge oriented to the details of the appropriation-expropriation of territories is imposed (Jofré et al. 2010b).

Over a certain period, archaeological heritage came to be integrated within the heritage of the people threatened by an eminently extractive economic model with high environmental and sociocultural impact, above all, without social license. The increasing installation of mining undertakings in the rural areas with greater archaeological sensitivity in provinces, like San Juan, Catamarca, Tucumán, Salta, Chubut, and Neuquén, generates conflicts that, in some cases, have had greater visibility for their capacity to permeate in social tactics, achieving diffusion in the public media sphere. The case of "Proyecto Navidad" in the Department of Gastre of the Province of Chubut (Claps 2010; Gómez Otero et al. 2010) is a paradigmatic example since, from being located in an Indigenous Community, it had to oppose the distinct logics of territorialization of the social and cultural memory of communities with more than a millennium in the region.

In response to this situation of territorial pillaging instigated by their own State, a heterogeneous sector of the population began to organize social movements of protest throughout the lower part of the country, a new form of assembly. The Citizens Assemblies are new self-convened forms of social organization of citizens that began to crystallize in Argentina from the year 2001. It deals with a process of collective reproduction about the current forms of emancipation; its immediate antecedent is represented by the "picketing groups" who, like the Citizens Assemblies, brought to the public table new forms of social protagonism at one time dismissed from the traditional political process (Colectivo Situationes 2002). Currently, the self-summoned Citizens' Assemblies of neighbors have diverse location and demands throughout the length and breadth of our country, among these stand out the Assemblies that struggle against the undertaking of agricultural businesses, paper mills, and mega-miners. In short, these social movements have been adapted through new forms of discussion, coordination, and collective thought by all who have decided to organize themselves outside of the classical political forums. Something very interesting about these new social organizations is that they crystallize new ways of constructing social links and they are above all active in the demands for work, food, and rights. It could be said that their struggle is for justice and social change, and in this sense, the Citizens Assemblies are a place of practical research because knowledge and new forms of sociability are being created there (Colectivo Situaciones 2002).

Among the claims carried out by the new organizations of the Citizens Assemblies in Argentina, archaeological heritage was notably missing in the initial concerns of these social movements, but with the flow of these in the last few years, they began to incorporate the concern for the remains of the living memory of the people more and more in their demands for the defense of the water and the land. This currently affects the momentum of the emergence of contra-patrimonialization processes to repel scientific discourse and de-historicizing "places of memory" considered "sacred" to Indigenous peoples. This type of learning began to be more evident within the Citizens Assemblies of places such as Catamarca, San Juan, Tucumán, Neuquén, and Chubut, where these social movements began to interact and work well with the claims of Indigenous peoples that were being newly threatened and stripped of their ancestral territories.

Claims for the return of the bodies of our ancestors, taken to museums by university or state commissioned archaeologists, to the land, today reignites the struggle for the land in a broader sense of the term, as a way of reaffirming our identities in a place belonging to history. Clearly, this discourse promotes a political sense of territory, potentially performative of the social relations of domination that made the establishment of highly questioned transnational projects in the region possible, and the exacerbated concentration of lands in the hands of agricultural industry landowners in Argentina.

In the same struggle for land, only a few months ago, in the province of San Juan, the Indigenous Community of Warpe of the Cuyum territory, in collaboration with the cosignatory of archaeologists and social organizations, presented a petition to the National University of San Juan soliciting the application of the recently regulated National Law 25.517 that protects and regulates the right of the Indigenous peoples to demand mass return of human bodies considered to be antecedents and ancestors. Today these bodies are in the hands of a museum dependent on this university, with motives of research and public exhibition in display cabinets and refrigerated coolers. This document states a demand for the return of the bodies to the land, avoiding the possibility that the State, by means of science, would implement the return of these human bodies as a hidden way of exchanging "bodies for land." From the original world view that territory comprises of an encompassing vision of the land and the beings that inhabit it: "We are land, the land is everything, the land is our life." Under this kind of statement, our Indigenous leaders question not only the universities but also the President of the Nation, Cristina Fernández de Kirchner, as previously done on May 20, 2010 (with motive of the Bicentenary of the Argentinian Nation). During that opportunity, the leaders that mobilized a mass protest of 20,000 people asked the President for concrete solutions for the evictions suffered by the Indigenous Communities throughout the length and breadth of the country: in short an historic reparation to meet the demands of the people dispossessed by the Nation State.

This petitionary case carried out by the warpes communities in San Juan, like other similar cases that are happening in our country, highlights the political symbolism that the bodies of ancestors acquired in the field of these social conflicts that face different ontologies of the relations between communities and their lands, at the same time that it also redefines the place that archaeology holds in these movements (Jofré 2010).

Conflicts like those on which I have commented here raise meanings that are incompatible, and sometimes juxtaposed, from the traditional, the modern, the local, and the global, resulting in disastrous consequences due to the imposition of new forms of extreme, disproportionate, and limitless exploitation of the environment and the irreversible destruction of the local ways of life. As retaliation of this situation of extreme injustice, "Water is worth more than gold," in the case of the Republic of Argentina, represents the current determination of the communities and people that is similar to other sectors of South America, where they are rising up against the supposedly generous promises of the extractive models of global capitalism, imposed with the compliance of the serving government.

Future Directions

Possibilities of the Collaboration Between Archaeology and Social Movements: The Right to One's Own History

Today, the common point of intersection between archaeology and social movements is a work of innovative coproduction originating in the context of decolonization projects of the archaeological discipline. In countries in South America, for example, these new collaborative works markedly began in the 1990s as a response to the profound change in global world order connected to the processes of expansion of flexible capitalism. These processes began to take shape in the 1970s, and recently, in the 1990s they acquired a social visibility, crystallized in new conditions of planetary coexistence known now as:

transnationalism, globalization, situations directly related to a new type of neoliberal governability (Gordon 1991). This last condition was characterized by the "rolling back of the State" or privatization of responsibilities through the outsourcing of key social services, and with the consequent concession of regional autonomies as part of an adjustment to new dependency models.

The deep undercurrent of these new scenarios of conflict in South America is the "dispute for land." These countries with colonial history today are threatened by tyrannical and violent endo-colonialisms supported by their own Nation State acting in service of the private transnational capitals mobilized by the economic monopoly of the global market. Disciplines like archaeology see themselves inevitably questioned by emerging social movements that burst, in a truly visible way, onto the public order in the twenty-first century demanding changes in the political-economic agendas of the Nation Sates.

In this way, in current South American contexts, and emerging from a long-standing historical conflict, the disputes for land comprises of claims for the acknowledgement of ethnic difference for the returning of lands, the reestablishment of the subjects' and Indigenous peoples' rights over their cultural and natural heritage, and the defense against the indiscriminate advancement of exploitations with high ecological and social impact carried out on the part of foreign capitals with license from the States. These conflicts generate heated discussions of interest regarding the political, social, cultural, and economic importance of archaeological heritage in these scenarios, and over all, present new reflections around the possibilities of resistance and change that the communities possess in the conflicts facing the States and the new actors in the global market. All this is exacerbated in the Bicentenary of the South American Nation States, where they celebrate their colonial "independence." Now is the time to return to focus on the unavoidable topic of national heritage and calls for the urgent revision of different agreements. This happens in the face of local trajectories marked by the violent silencing of cultural differences, absorbed by the homogenized projects of the modern republics. This is a critical moment and as such it is decisive to rethink the conservationist traditionalisms and strengthen the active social values that archaeological heritage has acquired in the long histories of pillaging and expropriation (Jofré 2010).

The collaboration between a discipline with a colonial history such as archaeology and the social movements of today must be submitted to necessary questions and revised in a global political scenario; in this course, it is strategically unviable to continue defending the autonomy of the communities in terms of the cultural relativism of conservationist intervention. The right to difference in these relativist terms has promoted the perception of a substantive, stable, and permanent cultural heritage. So in this form, culture and its heritage had to be perceived as the result of a historic process, the product of an accumulated historic experience captured like something stable through the concept of culture (Segato 2011).

Contrary to cultural relativism, the accompaniment of the social movements, and this is the challenge for a discipline like archaeology that is accustomed to intervening from a place of power and privilege, anticipates the acceptance of historical pluralism, the right to "*one's own history*." Each people plot their history passing, the inconsistency of their own cultural discourse, overcoming their contradictions, and above all choosing their alternatives, interacting within the heterogeneous index of the nation. Following Rita Segato (2011), this means accepting at least two principles: (a) that the collective subjects of this plurality of histories are the people, and they possess the deliberative autonomy to produce their own historic process; (b) that this collective subject, this living people, is not a stable cultural heritage with fixed and unchanging contents throughout time and space, rather it is the self-perception on the part of its members of a shared history that comes from a past and is directed toward a future.

It remains to be said that this accompaniment and collaborative experience between archaeology and social movements to achieve a successful association founded in common objects toward

the decolonization is more and more compelled to find ways to reinforce and defend the autonomies of the people, therein lies the political and social predicament of the discipline in these times.

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Latin American Social Archaeology
- ▶ Public Archaeology, The Move Towards

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Social Zooarchaeology

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Introduction

Zooarchaeology, the study of animal bones from archaeological sites, began with a straightforward concern with diet, later expanded to include subsistence strategies. The post-processual turn in archaeology eventually filtered into zooarchaeology, bringing a concern with social and symbolic aspects of human-animal relations. This approach seeks to understand the full range of these relations in past societies. While it has roots in earlier work, it has largely come into existence in the last 15–20 years, initially as very much a minority approach. Early concerns included feasting and meat sharing, as well as animal symbolism exhibited by structured deposition of taxa or body parts. At least some recognition of social and symbolic factors now inflects nearly all zooarchaeological work.

Definition

Social zooarchaeology is the manifestation of social archaeology within zooarchaeology, the study of animal bones from archaeological sites in order to learn about human behavior. Social zooarchaeology explores aspects of human-animal relations beyond the dietary and human-human relations negotiated through animals, including the value of animals as wealth and symbols, sacrifice and other ritual use of animals, taboo, and the overvaluation of meat and its use in transactions of status and relationships through meat sharing and feasting.

Key Issues/Current Debates/Future Directions/Examples

Given the rich variety of roles that animals and their products have played in human society, many topics fall within the purview of social zooarchaeology, although some have received more attention than others. Animals serve as key symbols in all societies, intriguingly similar to humans yet different from them. The most obvious evidence of prehistoric animal symbolism is their portrayal in art, from the Early Upper Paleolithic on. There has been a century of debate over the interpretation of hunter-gatherer rock art: is it hunting magic, information transfer about game animals, art for art's sake, or does it depict ritual, myth, trance visions, or animal deities? Zooarchaeology can contribute where there are associated animal bone assemblages and invariably shows that the frequency of species in the art does not match the frequency of those hunted (e.g., Altuna 1996), thus ruling out straightforward explanations of art as hunting magic or teaching aid. Not uncommonly, a florescence of hunting art and elaborate hunting equipment occurs at times when actual hunting contributes less than previously to the diet, suggesting a performative aspect of hunting related to (gender) identity rather than subsistence.

Zooarchaeology can also contribute to classic debates about taboos, where proscriptions on killing or eating certain animals mark social distinctions (gender, age, religion, ethnicity, reproductive status, etc.). While it is always difficult to argue from absence, ethnoarchaeological work has

shown that traces of taboo animals do occur in the archaeological record, but they are restricted spatially and limited in body part selection (Politis & Saunders 2002). Thus, careful attention to rare taxa may reveal the contours of animal taboos and indicate whether the taboo is total or applies only to a segment of the population. Hesse and Wapnish (1998) provide a sterling example of social zooarchaeology in their interdisciplinary treatment of the Israelite pig taboo. Drawing on textual analysis, anthropological ethnicity theory, and zooarchaeological evidence, they show that Israelite ethnic identity was originally based on ties to place, but these were disrupted by the exile in Babylon. Afterward, the pig taboo and other food proscriptions help to construct a more portable ethnic/religious identity.

Many ritual practices incorporate animals or animal parts. Burial rites are the best studied, with careful attention to placement, body part selection, and butchering and cooking traces helping to distinguish among funerary sacrifices, the remains of mortuary feasts, and food provisions for the afterlife (e.g., Méniel 1992). Outside of funerary contexts, sacrifice has received little attention except where historical records attest it, but ethnography suggests it would have been common in most societies with domestic animals. Zooarchaeology has the as yet unrealized potential to resolve the question of whether all meat from livestock in classical Greece derived from temple sacrifices and hence the extent to which sacrificial demand shaped herding practices. An exemplary study (Isaakidou et al. 2002; Stocker & Davis 2004) of animal bone deposits and associated deposits in the Mycenaean Palace of Nestor at Pylos not only establishes that burnt offerings already occurred in this period (a point of controversy based on textual evidence) but also reveals a previously unknown practice in which palace accountants recorded or archived vouchers of sacrifices/feasts (bones, weapons, and drinking cups) prior to the proper disposal of the bones in discrete pits.

Hunting is crucial to the survival of foragers, but a social perspective would argue that hunters might seek prestige as well as protein and calories. In addition to the evidence from rock art and artifacts discussed above, ethnoarchaeological and zooarchaeological studies of various times and places suggest that hunters often target large game even when smaller animals would provide more meat (e.g., Hildebrandt & McGuire 2002). Domestication is a particularly intense human-animal relationship. A long-standing debate concerns how and why domestication occurred (intentionally or through the gradual development of mutualism) and indeed what it is (morphological changes in the body or appropriation as property). Thanks to advances in genetics and the work generated by the famous Russian fox farm experiments, we have a better understanding of the mechanics of domestication, with selection for tolerance for humans the key factor that sets in motion genetic, endocrine, and developmental changes in animals' bodies and behavior (Zeder 2012). This explains how a similar result can be obtained from the rather different paths various species take to domestication, as is increasingly apparent. Recently, social zooarchaeologists have shifted the focus from the exploitative to the caring aspect of human relations with domestic animals (e.g., Oma 2010).

Human-animal relations are not limited to hunting and herding, however. Pet keeping is widespread and both wild and domestic animals can be pets. Studies of the surprisingly common prehistoric human translocation of animals to islands reveal a complex array of relations. While some cases appear to be a matter of bringing domestic animals when settling islands and others are probably stocking islands with game, animals such as wildcats and foxes do not fit comfortably into either category and may have been brought so they would be available for ceremonial requirements. Cyprus has been particularly well studied in this regard (although the earliest phases of human occupation are still being clarified) and exhibits instances of all three of these categories as well as probable commensal hitchhikers such as mice and shrews (Vigne et al. 2011).

Domestic animals provide meat and sometimes secondary products such as milk and wool, but they are also property and therefore can serve as wealth. At the least, animal property

can be exchanged or gifted like objects but with the additional feature that they can reproduce and thus increase the flock. Ethnographically, livestock are very often important stores of wealth and used to create and maintain human relationships through a wide variety of transactions. These include inheritance to perpetuate wealth, contributions to feasts, fines to resolve disputes, and most importantly bridewealth to transact marriages and affiliate the children to the father's lineage. Bridewealth requirements affect the demography of herds and need to be modeled along with productive strategies that maximize meat and milk or minimize risk when interpreting mortality profiles (the age and sex kill-off pattern produced by culling decisions). Animal wealth and particularly bridewealth are powerful inducements to adopt herding and to invest labor in raising as many animals as possible. This expansionary tendency may help explain the spread of agriculture through the Old World following the domestication of herd animals. Animal wealth is also particularly susceptible to raiding and may be associated with an increase in warfare. Most of the zooarchaeological work that explicitly addresses wealth has been done in southern Africa, where livestock arrived in the Iron Age and ethnography attests to the practice of bridewealth. Drawing on mortality profiles and other evidence such as dung accumulations, current evidence suggests that cattle became more important as wealth through time and that this process may have been regionally variable.

Meat is excellent food, a compact source of protein, fat, and vitamins. However, people seem universally to value meat beyond its nutritional contribution. The act of incorporating other creatures into our bodies is fraught with guilt and symbolism: meat makes special meals. In particular, meat is often the focus of sharing, especially when derived from wild game. Hunters are usually obligated to share large prey, at least, beyond their immediate family, according to rules that vary among societies. There has been considerable debate concerning whether meat sharing is a kind of delayed reciprocity, a risk-reducing strategy, a way to gain prestige (and mates), meant to benefit relatives beyond the nuclear family (differentially directed at kin), or a means of building and maintaining social relationships. Evidence suggests that all these functions may occur in different places, sometimes in combination. Archaeologically it is possible to detect the circulation of meat through careful contextual analysis, especially at sites that were occupied for relatively short lengths of time, so with higher resolution. Depending on the rules, sharing may produce skewed body part distributions. Refitting or conjoining studies that match articulating bones or right and left sides from the same animal can also reveal sharing. In some circumstances zooarchaeologists can determine not only whether sharing occurred but whether it was symmetrical or uneven, which helps to sort out the models outlined above (Enloe 2003).

Feasting is another kind of sharing, with the meat distributed after cooking instead of before. The social dynamics are somewhat different, however, with a generous host gaining prestige from a well-executed feast, while hunters are usually enjoined to modesty about their kills. Feasting has received considerable attention in archaeology in the last 20 years, largely thanks to the work of Dietler and Hayden (2001) that assigns it an important place in transforming human societies and creating inequality. The performative aspect of feasts makes them relatively easy to detect archaeologically. Large or fancy serving vessels may mark a feast, for example. Meat (along with alcohol) is often the centerpiece of feasts, so large concentrations of animal bones, often less processed and cooked in larger pieces or unusual ways, can signal feasting remains. Both because the large amount of waste is more problematic and because it may carry ritual power (feasts often forming part of ceremonies), the bones may also receive different or more formal disposal treatment. Recently, some have argued that there has been too much focus on feasting and too great a dichotomy drawn between feasts and ordinary meals. Rather, all meals carry symbolism and varying degrees of ritualization, and there is usually a range of scale and formality (Hamilakis 2008).

While social zooarchaeology tends to be associated with interpretive approaches typical of postprocessual archaeology, in fact it is not limited to a single theoretical school. Adherents of human behavioral ecology are increasingly including social factors in their models, often characterized as costly signaling (performance of behaviors that demonstrate the superior fitness of the signaler by showing they can afford to put themselves at risk). Zooarchaeologists are increasingly recognizing that the social values of animals and meat are key to understanding past behaviors. For the most part, social zooarchaeology does not require new methods: mortality profiles, body part representation, and traces of butchering and cooking contain much social information. Most social questions do require a contextual approach, however, and frequently integration with other lines of evidence. The real key is to build models that take social values into account along with economic values.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Post-processual Archaeology
- ▶ Social Archaeology
- ▶ Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Society for American Archaeology (SAA)

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Basic Information

The Society for American Archaeology (SAA), founded in 1934, is "an international organization dedicated to the research, interpretation, and protection of the archaeological heritage of the Americas" (http://www.saa.org/). It has more than 7,000 members, including professional, student, and avocational archaeologists, and publishes two scholarly journals – *American Antiquity* and *Latin American Antiquity* – as well as a members' magazine, *The SAA Archaeological Record*. Its annual meeting regularly draws more than 3,000 registrants. Policy is set by officers and a board of directors elected by the members of the society, and a professional staff is employed at its office in Washington, DC.

Major Impact

Guidelines for Ethical Practice

Protection of archaeological sites from looting and destruction has been a concern of the SAA since its beginning. In the first issue of *American Antiquity*, the society's first president, Arthur C. Parker, wrote that one of the new organization's goals was "…the conservation of sources. The fact that anyone with a spade has had the right to excavate ancient sites and hawk relics as a commercial venture has had baneful results" (Parker 1935: 3). In 1961, "Four Principles for Archaeology" were adopted by the SAA membership and published in *American Antiquity*. These set forth some broad guidelines for methods, ethics, and training and stated that "collecting practices which destroy data" were to be avoided and that "state and federal statutes regarding preservation of antiquities and permits for excavation must be scrupulously observed" (Champe et al. 1961: 137).

The SAA's current eight "Principles of Archaeological Ethics" (Lynott & Wylie 2000) were adopted in 1996; they place cultural heritage management (CHM) concerns at the heart of archaeological ethics. Principle 1 – stewardship – gives archaeologists an active responsibility to work for long-term protection of the archaeological record and for using that record for the benefit of all people. The second principle – accountability – requires a commitment to consult and attempt to establish working relationships with descendants and other groups affected by archaeological work. Principle 4 urges archaeologists to engage in public outreach and education with the aim of improving the preservation, protection, and interpretation of the archaeological record. The statements describing the other principles, which have to do with commercialization, intellectual property, reporting, records, and training, also point out their implications for stewardship and public benefits.

CHM Outreach and Educational Activities

Currently, the SAA has a number of programs, committees, and task forces that further its goals in CHM. The Education and Outreach Program produces and distributes materials that help archaeologists and educators bring information about archaeology and cultural heritage to students at all levels and to the general public. The "Archaeology for the Public" web site serves as a clearinghouse for a large variety of educational resources. The SAA Public Education Committee provides leadership and advice to the board in

this area, and committee members assist SAA staff on specific projects.

Separate committees are in charge of annual awards for excellence in public education and for outstanding efforts to enhance public understanding of archaeology through the media. There is also a committee charged with encouraging improved coverage of archaeology in the print and visual media; this committee oversees a press office at the annual meeting.

The SAA Government Affairs Program employs a full-time manager, who works with the SAA Board and the Government Affairs Committee to represent the archaeological community on issues of federal-level legislation and policy that have the potential to affect archaeological conservation and/or the practice of archaeology. Monthly bulletins regarding current governmental issues are circulated to members, and collaborations are pursued with colleagues and organizations in the broader historic preservation – cultural resource management community. ("CRM" is a predominantly US term broadly equivalent to "CHM," as used internationally).

The SAA Committee on Native American Relations works to increase understanding by archaeologists about issues of concern to Native Americans and to promote better relationships between both groups. A repatriation committee deals with topics related to the repatriation of archaeological materials to descendant groups under federal, state, and international laws. The SAA maintains an endowment to fund scholarships in archaeology or heritage management for Native American students, and the Native American Scholarships Committee is tasked with overseeing this program and selecting the scholarship recipients.

Publications, Conferences, and Sponsorships

Although the SAA's two peer-reviewed journals are devoted primarily to presenting research results, its magazine – *The SAA Archaeological Record* – regularly publishes articles on topics broadly related to CHM–, e.g., Native American collaborations, collections preservation and access, public education and media treatments, digital data-sharing, and career and professional development.

The program of the SAA Annual Meeting is dominated by paper and poster presentations, but the conference also serves as a locus for meetings of committees and related groups, including federal and state agency CRM staff. For example, the 2011 Annual Meeting featured extended workshops and conferences for managers from the US Forest Service, Park Service, Army Corps of Engineers, Natural Resources Conservation Service, and the Association of Transportation Archaeologists. The annual meeting features an award for excellence in Cultural Resource Management, with the recipient designated by a committee assigned that task. The program also regularly includes a number of forums and symposia that relate to the method, theory, and practice of CRM.

In the mid-1990s, the Society of Professional Archaeologists was transformed into the Register of Professional Archaeologists (RPA), under the sponsorship of SAA, the Society for Historical Archaeology, and the Archaeological Institute of America; subsequently, the American Anthropological Association also became a sponsor. The RPA consists of professionals who have met basic educational and experience requirements and who agree to abide by the RPA Code of Ethics and Standards of Research Performance. Registrants also agree to take part in a formal grievance process if a credible complaint about their professional performance is filed with RPA. The SAA encourages its professional members to register, and a very substantial percentage has done so. Although many archaeologists in academic settings have registered, the majority of RPAs are employed as consultants or managers in the CRM segment of the field.

In summary, the SAA plays a vital role in the establishment and practice of CHM in the Americas.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Archaeological Institute of America (AIA)
- ▶ Register of Professional Archaeologists (RPA)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Society for American Archaeology (SAA): Committee on Ethics

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Basic Information

Committee History

In 1991, in response to growing concerns about the state of the Society for American Archaeology's body of ethics, the SAA's Executive Board created a task force on ethics in archaeology, naming Mark Lynott and Alison Wylie as its cochairs. In November 1993, with funding from the National Science Foundation and the National Park Service, Lynott and Wylie convened a three-day workshop in Reno, Nevada, attended by diverse members of the Society and nonmember individuals to discuss the then-current state of ethics in archaeology. The workshop participants crafted six draft principles of archaeological ethics; eventually, two more were added to create eight principles which were seen to provide a strong basis for continuing development of a stronger archaeological ethics program. Since these were considered "draft" principles, they were presented to the SAA membership in various methods and comments solicited: in position papers at the April 1994 meeting of the SAA in Anaheim, California; as a Special Report of the SAA (with comments from non-workshop attendees) in 1995 (Lynott & Wylie 1995); in numerous presentations at regional archaeological or anthropological conferences; in the SAA *Bulletin*; in two discussion sessions held by Lynott at the 1996 meeting in Milwaukee; and in an *American Antiquity* article by Lynott (1997). After the adoption of the Principles of Archaeological Ethics by the SAA's Board of Directors in April 1996, a second, revised version of the SAA Special Report (Lynott & Wylie 2000) was produced to increase the educational utility of the process and to encourage discussion of ethical issues in the practice of archaeology.

The Committee on Ethics became a standing committee of the Society in 1997, charged by the SAA's Board of Directors with promoting discussion and education about ethical issues in archaeology, and proposing revisions, as necessary, of the Principles of Archaeological Ethics. The committee is not charged with enforcement powers or responsibilities, and therefore does not enforce or oversee claims of ethical misconduct.

Major Impact

Education Programs

The Committee on Ethics maintains an active web presence as a means of fulfilling its educational mission. Its website offers resources for students on codes of ethics promulgated by other archaeological and anthropological organizations, as well as information regarding ethics as a general field of philosophy. In addition to these general resources, the Committee offers another program aimed at including student involvement with the concepts inherent in the ethical practice of archaeology.

One of the primary programs of the Committee on Ethics' educational outreach has been the Ethics Bowl, modeled on a similar program developed by the Association for Practical and Professional Ethics in 1995. The Society's first Ethics Bowl was held at the 2004 annual meeting in Montreal, Canada, and it has been included in the Society's annual meeting since then. Each year, the Ethics Bowl organizers compile hypothetical cases that describe archaeological

dilemmas which contain an ethical dilemma. These cases are used to initiate discussion about archaeological ethics and situations, and teams of college students use a debate-style competition to explore the ethics of archaeological practice. The competition is based on the abilities of the student teams to effectively communicate their arguments, to tie the ethical dilemmas to the legal and social frameworks which influence the discipline, and their ability to analyze the impact of those issues on the discipline as well as non-archaeological stakeholders. The Committee also encourages the use of the Ethics Bowl cases in classes relating to ethics in archaeology and anthropology.

The Principles of Archaeological Ethics has become a foundation upon which archaeological ethics has rested. They have been cited and quoted as a new generation of archaeologists has entered the field. But, while they have been viewed as a semipermanent document, their original authors viewed them as living documents subject to change as need arose. Therefore, the Society is open to revisiting and revising the Principles of Archaeological Ethics as its membership sees the need to do so, and the Committee on Ethics will continue to maintain an active role as a provider of resources and educational material relating to the ethical practice of archaeology in the contemporary world.

Cross-References

- ► Ethics in Archaeology
- ► Ethics of the Archaeological Record
- ► Society for American Archaeology (SAA)

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Society for Archaeological Sciences (SAS)

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Basic Information

The Society for Archaeological Sciences (SAS) is a professional society for those involved and interested in physical and natural science applications in archaeology and paleoanthropology. The purposes of the society include establishing a forum from which current issues and advancements in archaeological science and archaeometry may be presented and discussed; promoting awareness and providing information for archaeologists, anthropologists, and other professionals about the potential and the problems involved in the application of techniques from the physical and natural sciences to archaeological scientific research; and maintaining an active program for the promotion and implementation of interdisciplinary research in archaeology. The current SAS logo is shown in (Fig. 1).

During the International Symposium on Archaeometry and Archaeological Prospection in 1977 at the University of Pennsylvania in Philadelphia, five members of the acting executive board met to lay the groundwork for the formal organization and development of the SAS. The first issue of the *Newsletter* of the Society for Archaeological Sciences was produced in the summer of 1977. The founding SAS acting executive board consisted of Rainer Berger,

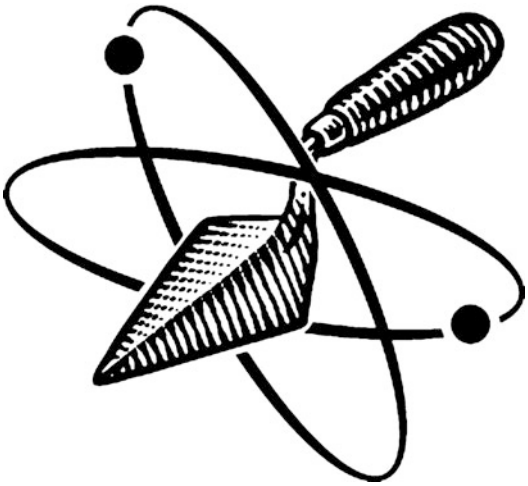

Society for Archaeological Sciences (SAS), Fig. 1 Logo for the Society for Archaeological Sciences

Karl Butzer, James B. Griffin, P. Edgar Hare, Richard L. Hay, Vance Haynes, Robert Maddin, George Rapp, Jr., Max Saltzman, and R. E. Taylor. The articles of incorporation for the Society for Archaeological Sciences were filed in 1979.

SAS had about 100 charter members. Membership cost $5 US per year. The first meeting was held on April 25, 1979, at the Society for American Archaeology (SAA) meeting in Vancouver. Annual business meetings of the SAS now alternate between being held at the SAA and at the biennial International Symposium on Archaeometry (ISA). Membership for the past decade has hovered around 300, with about one-third being from outside the USA. The basic membership rate is currently $20; the quadrupling over the last 35 years is consistent with the increase of the US Consumer Price Index.

The presidents of the society have been (in chronological order) Karl Butzer, R. E. Taylor, Jonathan Ericson, John Weymouth, George Rapp, Jr., Rainer Berger, Joseph Michels, Joseph Lambert, Jeffrey Dean, Garman Harbottle, Doug Price, Suzanne DeAtley, James Burton, Erv Garrison, Pat Martin, Rob Sternberg, Chris Prior, Arleyn Simon, Greg Hodgins, Aaron Shugar, Thilo Rehren, Sandra L. López Varela, and currently Patrick Degryse. The last three presidents have all been from outside the USA.

The office of the general secretary was established in 1981, with R. E. Taylor assuming the post. All business affairs, including the maintenance of the membership files, membership renewals, elections of officers, and archiving of legal records, are organized by the general secretary. R. E. Taylor held this position for more than 20 years until it was taken over by Rob Sternberg in the summer of 2002. The society can be contacted through the general secretary (the author of this contribution, with contact information given above).

Major Impact

The official organ of the SAS has been its *Newsletter*, becoming the *Bulletin* with volume 12. The current annual volume number is 35. These publications have generally been issued on a quarterly basis. Some other milestones are the following: the first stapled issue was volume 7. Bitnet email addresses first appeared in volume 10, with more than half of the officers and editorial staff showing email addresses by volume 12. A CD-ROM containing the first 30 volumes of the *Newsletter*/*Bulletin* is currently available from the general secretary's office. Those who have served as editors of the *Newsletter*/*Bulletin* are (in chronological order) R. E. Taylor; Suzanne De Atley, George Rapp, Jr., Pat Martin, Rob Sternberg, Chris Nagle, Rob Tykot, Christian Wells, and currently James Vanderveen.

Members of SAS are also eligible for discount subscription rates to several significant journals of archaeological science.

Plenum Press and then Kluwer Publishers, now Springer, in cooperation with the SAS, published five volumes in the book series *Advances in Archaeological and Museum Science*. Volumes to date are Mulholland and Rapp (1992), Taylor and Aitken (1997), Shackley (1998), Williamson and Nickens (2000), and Ambrose and Katzenberg (2001). The editorial board for this series has included Martin J. Aitken, Edward V. Sayre, R. E. Taylor, and Robert H. Tykot.

The SAS has sponsored archaeological science sessions at the SAA meeting since 1982.

The R. E. Taylor Poster Award competition was established in 1998 to reward outstanding student posters presented at the SAA and ISA meetings. The SAS Student Research International Travel Award was started in 2012.

James Burton initiated the internet activities of SAS, starting with the electronic bulletin board ArchSci in 1991. This morphed into the listserv SAS-Net and the ftp site SAS-Depot later in 1991. The SAS web site went up in 1997 and can now be found at the domain name www.socarchsci.org. The listserv and web site are still active. In addition, an SAS blog was started in early 2009 by Rob Sternberg, Rachel Popelka-Filcoff, and Destiny Crider, and a wiki containing announcements related to archaeological science was also brought online in 2009 by Rob Sternberg.

Cross-References

► Archaeometry: Definition

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Society for Historical Archaeology (SHA) (Cultural Heritage Management)

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Basic Information and Major Impact

Historical archaeology is the archaeology of the modern world. The field is global in scope and deals with all groups of people, not simply those of European descent, although most historical archaeologists focus on the period after the fifteenth century.

The Society for Historical Archaeology (SHA) is an educational not-for-profit organization established to promote scholarly research and the dissemination of knowledge concerning historical archaeology and to exchange information in this field. It holds an annual conference to discuss problems of mutual interest relating to the study of historical archaeology and to have members and invited guests present topical papers, discuss new or shifting paradigms, and present results of recent research activities. The Society is very active in keeping informed of legislation, policy, rules, and regulations which effect cultural resources in the United States and worldwide. SHA has a long-standing relationship with the Advisory Council on Underwater Archaeology, which shares the society's annual conference in January.

SHA has its beginnings at a conference held in 1967 at Southern Methodist University in Dallas, Texas. The society almost immediately began publishing the journal *Historical Archaeology* which is currently a quarterly publication. A newsletter followed in 1969 also published

quarterly. Special publications have grown as have topical and specialty on-demand publications. The Society maintains a website – http://www.sha.org/ – which contains a variety of information including names of officers, committee chairs, annual conference information, lists of publications, a members area, a research resource area, a link to the Advisory Council on Underwater Archaeology's website, and other relevant information on historical archaeology.

SHA is governed by elected Officers and a Board of Directors. The governing body is composed of a president, president-elect, secretary, treasurer, two publications editors, six directors, and the chair of the Advisory Council on Underwater Archaeology. The officers serve for a 3 year term. The Society is funded by membership dues and other sources including donations and grants.

Today the Society for Historical Archaeology is the largest organization in the world dedicated to the archaeological study of the modern world and the third largest anthropological organization in the United States. Parallel organizations exist in Great Britain, the Society for Post-Medieval Archaeology; Continental Europe; and Australasia, the Australasian Society for Historical Archaeology.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Critical Historical Archaeology
- ▶ Ethics in Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Industrial Archeology (SIA)
- ▶ South and Southeast Asia: Historical Archaeology
- ▶ Southern Africa: Historical Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

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Society for Historical Archaeology (SHA) (Historical Archaeology)

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Basic Information

The Society for Historical Archaeology (SHA) is a scholarly organization devoted to the investigation, interpretation, preservation, and management of archaeological sites associated either directly or indirectly with a literate tradition. SHA's primary period of interest starts with the spread of European peoples into other parts of the world during the late fifteenth century and continues through to the present day, though its subject matter is not limited to European cultures.

SHA traces its origins to a Central States Meeting of the American Anthropological Association held at St. Louis in 1965. Several archaeologists investigating Historic-period sites met there informally and concluded that a new society should be established to promote historical archaeology as a distinct discipline. Edward B. Jelks hosted the founding meeting at Southern Methodist University, in Dallas, Texas, during the first week of January 1967. About 100 attended the "International Conference on Historic Archaeology," which had 17 presentations on the program.

A Special Committee, chaired by Jelks, met there to lay the groundwork for what would become SHA. In conjunction with the formal proceedings, several business meetings convened to discuss the committee recommendations. Critical actions included votes for organization of the new society and the election of officers. Also set in motion were the processes of writing a constitution, publishing a new journal, and planning for the first actual SHA meeting at Williamsburg, Virginia, in 1968. John L. Cotter, then of the U.S. National Park Service, was elected to serve as SHA's first president. Society membership that first year was slightly over 200, including 13 in Canada, and one each in England, Mexico, Chile, and Australia.

For much of its history, the SHA was governed by a board consisting of a president, president-elect, immediate past president, secretary-treasurer, editor, newsletter editor, six directors, and the chair of the Advisory Council on Underwater Archaeology (ACUA), an independently chartered organization whose mission is to advocate, promote, and provide advice on responsible stewardship of underwater cultural heritage. A 2006 amendment to the Constitution and Bylaws increased the presidential term from 1 to 2 years, eliminated the board seat of immediate past president, and divided the position of secretary-treasurer. A more recently approved change, yet to be implemented, will replace the positions of editor and newsletter editor with an editor for research (either the journal editor or co-publications editor) and an editor for communications (either the newsletter editor or website editor), respectively.

To date, there have been 43 presidents of the SHA; 35 of those individuals are still living. The incumbent president at the time of writing, Paul Mullins, will be succeeded by the current president-elect, Charles R. Ewen, in 2014.

Major Impact

Today, with over 1,700 members, SHA has become the largest scholarly organization dedicated to understanding the modern world through excavation and study of material remains. It is also the third largest anthropological society in the United States. Although based in the United States, with most of its members living and working there, the society is now truly international in its constituency. Its geographical scope correspondingly has broadened from a focus on the New World to a global perspective.

SHA has a large contingent of underwater archaeologists and, through the terms of a Memorandum of Agreement, maintains formal cooperative ties with the ACUA. This close relationship is reflected in the fact that, since 1987, SHA's annual meeting has been officially called the Conference on Historical and Underwater Archaeology. The long-standing alliance between the two organizations also figured in accreditation of both SHA and ACUA as nongovernmental organizations (NGO) for consultation and collaboration in the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage.

In addition to its quarterly journal, *Historical Archaeology*, SHA publishes a quarterly newsletter, occasional special publications, readers, technical briefs, and proceedings. The society also holds agreements with certain academic presses (e.g., the University Press of Florida and the University of Nebraska Press) for the joint publication of books relating to the discipline. Other important activities include informing government policy makers and educating the general public about historical archaeology and cultural resource management. Much of its public outreach is accomplished through the official SHA website, http://www.sha.org/, which includes more detailed information about the society and discipline.

Cross-References

- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Historical Archaeology

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Society for Historical Archaeology (SHA) (Modern World Archaeology)

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Basic Information

The Society for Historical Archaeology (SHA) promotes the study of the archaeology of the modern world (CE 1400 to present). It was founded in 1967 and has grown to become the largest international society of its kind, with a business office in the city of Rockville, Maryland. The majority of the SHA's members work in North America and focus on the archaeology of the post-Columbian New World; however, the society's geographical scope extends to the study of colonial encounters between indigenous peoples and Europeans in other continents, especially Africa and Asia. Over the years the society has collaborated with the Society for Post-Medieval Archaeology in the UK and the Australasian Society for Historical Archaeology. It has also embraced underwater archaeology, in addition to terrestrial archaeology, and co-hosts a joint conference in January each year with the Advisory Council on Underwater Archaeology.

The development of the SHA mirrored the growth of professional archaeology in twentieth-century America and was closely tied to advances in legislation to protect historic sites and to the rise of cultural resource management in the late 1960s and 1970s. The origins and history of the SHA have been succinctly described by Richard Veit (http://www.sha.org/about/history.cfm). Veit identifies a number of key academic meetings which contributed to the establishment of the SHA. These included the 1958 meeting of the American Anthropological Association in Washington, DC, where a symposium was organized on the "Role of Archaeology in Historical Research" (Cotter 1993), and an "International Conference on Historical Archaeology" held at the Southern Methodist University of Dallas, Texas, in January 1967 (Schuyler 2001: 1177). The first meeting of the SHA took place in the heartland of colonial historical archaeology in the United States, in Williamsburg, Virginia, in 1968.

Major Impact

In the 46 years which have passed since its inaugural meeting, the SHA has published a large number of specialist monographs, in addition to the quarterly peer-reviewed journal *Historical Archaeology*, which publishes articles and reports on research methods, theories, and findings from global historical archaeological. The SHA has played an important role in popularizing modern world historical archaeology and has actively disseminated the results of archaeological investigations to a wide range of educational and public interest groups. It has also worked tirelessly to lobby for the preservation of historic resources, including both tangible and intangible heritage assets, in political circles.

All members of the SHA and those who participate in SHA activities are asked to adhere to a 7-point ethical policy which serves to protect archaeological resources from needless destruction and highlights obligations to the archaeological record, colleagues, employers, and wider public audiences. The SHA has also sought to raise professional standards and reward individual excellence by presenting

a number of awards at annual meetings. The most prestigious of these awards is the J.C. Harrington Award, for lifetime achievement and scholarship, which was first awarded to Charles H. Fairbanks, in 1983.

Cross-References

► Australasian Society for Historical Archaeology (ASHA)

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Society for Industrial Archeology (SIA)

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Basic Information

Probably the most important group focused on industrial heritage in North America is the Society for Industrial Archeology (SIA). Founded in 1971, this membership organization was created "to encourage the study, interpretation, and preservation of historically significant industrial sites, structures, artifacts, and technology." Inspired by the example of a similar group in the UK, the Association for Industrial Archaeology, and purposefully separate from the contemporary Society for Historical Archaeology, the founders included archaeologists, museum curators, government preservation officials, architects, engineers, planners and historians, academics, and avocational enthusiasts alike. While there has always been a small core of international members, the base remains within North America. The use of the term "archaeology" is based on the principal attention given to the physical evidence of industrialization, but not limited to the use of the traditional archaeological techniques. This terminology has been both a blessing and a curse; while it widens the scope and appeal of the enterprise beyond a focus on buildings and/or history, it also confuses some who respond to the term "archaeology" in its most narrow connotations referring to excavation and/or antiquity. Increasingly in North America, the term "industrial heritage" is used to refer to this area of interest and activism, consistent with practice in much of the remainder of the world, and recognizes the combination of attention to both the research enterprise and the preservation/management dimension of the field.

Major Impact

Throughout its history, the SIA has combined a scholarly approach to the study and understanding of industrial heritage with an enthusiast, preservationist ethic. As an organization that includes significant membership from both professional and avocational ranks, this dual focus is a major defining characteristic. SIA publishes a peer-reviewed journal, *IA*, along with a quarterly *SIA Newsletter,* and a website rich with information. SIA holds two meetings annually in shifting locations to feature a mix of scholarly presentations and highly popular tours of both historic industrial facilities and active production and infrastructure sites. SIA runs occasional international study tours, as well, to showcase exemplars of preservation practice and remarkable site survivals in other countries. In addition, SIA includes several affiliated local and regional SIA chapters that serve as a focus for regional activities and preservation advocacy.

The chapters hold seminars, conduct tours, publish newsletters and websites, and participate in campaigns to recognize the value of industrial heritage resources in their communities.

SIA is a community of like-minded individuals and groups that share an interest in the industrial heritage in its many forms. Increasingly the members communicate via electronic social media, though many traditionalists cling to the more familiar venues of print and direct personal interaction. Publications are shifting to online sources at the same time that ink is laid on paper. To learn more about the SIA, visit http://www.sia-web.org.

Cross-References

- ▶ Arqueologia Industrial
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute

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Society for Medieval Archaeology

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Brief Definition of the Topic

The Society for Medieval Archaeology exists to further the study of the period from the fifth to the sixteenth century CE. It does so by publishing *Medieval Archaeology* (a journal of international standing dealing primarily with archaeological evidence), a monograph series, and by other means of communication such as its newsletter and website, holding regular meetings and arranging conferences.

Medieval archaeology did not exist as a discipline in its own right at the time of the establishment of the Society in 1957, at the initiative of J. G. Hurst and D. M. Wilson. From the outset, this energetic Society has played an active and critical role in establishing and shaping medieval archaeology in Britain and Ireland (a special focus) and beyond. This is reflected in the contents of *Medieval Archaeology*. From the beginning, the journal has been central to the work of the Society and in many senses can be taken as a barometer of the development of the academic discipline and the challenges and opportunities existing in working within an inherently interdisciplinary and fragmented domain, where medieval archaeology has arguably lacked the confidence to establish its "own discipline's ability to write distinctive narratives" (Gilchrist & Reynolds 2009: 5-6). That the subject has expanded and matured across Europe is, for example, reflected in the birth of French, German, and Italian equivalents that in varying degrees have modeled themselves on the Society and its publications: *Archéologie medieval*, *Zeitschrift für Archäologie* des *Mittelalters*, and *Archaeologia medievale*. The iterative relationship between the development of the subject and of the Society is discussed directly and indirectly in two Society-edited volumes, *25 Years of Medieval Archaeology* (Hinton 1983) and *Reflections: 50 Years of Medieval Archaeology, 1957-2007* (Gilchrist & Reynolds 2009); see also Gerrard (2007).

As part of its 50-year celebrations in 2007, the Society made volumes 1–50 of *Medieval Archaeology* available free online to everyone, and the newsletters are also accessible on its website. Subscribing individual and institutional members receive the journal *Medieval Archaeology* (in hard copy and electronically), and individual members also receive hard copies of the all-color newsletter.

Since 1966, the Society has produced over 30 monographs dealing with particular aspects of the archaeology of Britain and Ireland between CE 400 and 1600, ranging from excavation reports to

thematic overviews. Nearly half of these appeared in the last 10 years under the editorship of Christopher Gerrard.

A new development is the inclusion of a postgraduate student on council to represent the interests of students in general and to help promote activities particularly beneficial to them, notably student conferences reflecting the full breadth of interests in the Middle Ages, and careers advice days.

The Society's presidents reflect the interdisciplinary outlook of the Society: R. L. S. Bruce-Mitford (1957–1959), W. A. Pantin (1960–1962), J. N. L. Myres (1963–1965), Eleanora Carus-Wilson (1966–1968), C. A. Ralegh Radford (1969–1971), A. J. Taylor (1972–1974), D. B. Harden (1975-1977), C. E. Blunt (1978–1980), J. G. Hurst (1981–1983), H. R. Loyn (1984–1986), A. C. Thomas (1987–1989), Helen Clarke (1990–1992), M. W. Thompson (1993–1995), M. Biddle (1996–1998), C. Dyer (1999–2001), R. A. Hall (2002–2004), Roberta L. Gilchrist (2005–2007), Leslie Webster (2008–2010), and Mark Gardiner (2011–2013).

Cross-References

► Medieval Archaeology

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Society of the Ship

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Introduction and Definition

The social order of ships occurs in both closed cultural systems that operate within the confines of the vessel at sea and open systems that interact simultaneously with the shore-based community that produces and supports them. The same can be said for shipwrecks as physical units of contemporaneity at the time of loss (so-called time capsules) versus the ways they are embedded in the context of ongoing natural and cultural processes that affect the postdepositional character of the archaeological record.

For our purposes, shipboard societies can be defined as floating communities that operate out of sight of land over variable distances and time. The ship itself can be small, like an ancient Polynesian voyaging canoe – a concept archaeologist Patrick V. Kirch called "the society of the canoe" in the 1980 PBS video production, *The Navigators* (Low 1980) – or it may be an ocean-going warship manned by hundreds of officers and sailors, such as the great eighteenth-century English line-of-battle ships described by historian N.A.M. Rodger in *The Wooden World* (1986). Size is not necessarily important, but the circumstances under which the vessel and its crew operated are. Modern maritime behavior can provide useful comparisons with the archaeological record at shipwreck sites and serves as a source of testable hypotheses. The goal,

however, is to find out "what happened" in the past to account for shipwreck remains that may belong to any culture, including non-Western ones, and to be prepared to recognize situations in the past that may have no modern counterpart.

Key Issues/Current Debates/Future Directions/Examples

One could hypothesize generally, for example, that the need for making decisions and acting on them quickly aboard ships at sea, especially under stress, requires a hierarchical social order and degrees of absolute authority not always found on land in the same society. Many historic examples exist of authoritarian conditions on ships, and these are sometimes encoded as regulations – in the case of naval vessels – or as contracts, in the case of merchant ships. Rodger's (1986: 210) account, however, notes a multitude of ways: "The peculiar nature of seafaring gave to ships at sea a natural cohesion unknown ashore, and perhaps permitted the Navy a legal code which. . .was remarkably lenient by the standards of its day." Rodger's account reveals the complexities of authority aboard eighteenth-century Royal Navy ships and in shore-based institutions like the Admiralty. He cautions against hypotheses that could oversimplify the nature of the social order at sea.

The archaeological record is not always specific enough to provide a detailed characterization of social life aboard ships at sea, but some important connections are at least possible and can be explored. Although isolated at sea, sometimes for long periods, shipboard societies are not hermetically sealed off from land-based institutions. Archaeology can often posit robust connections between land and sea in such cases. There are contemporary practices in maritime behavior that have become institutionalized and can serve as models for comparison when analyzing shipwrecks, especially in maritime commerce. For example, *flags of convenience, preference trading*, and *barratry* are established practices with the potential to produce recognizable archaeological signatures at shipwreck sites that characterize the conduct of maritime commerce in the context of Western, mercantile capitalism:

- *Flags of convenience* involve registering ships in nations which themselves do not have significant merchant fleets of their own, mainly as a way of evading safety rules, manning requirements, or other regulations by major maritime nations that can be costly, especially for shipowners operating on narrow profit margins.
- The *preference trade* is a protected form of commerce in which a nation requires that only ships that are registered in that country can operate legally between that nation's ports.
- *Barratry* is a term that covers various ways shipowners and/or captains intentionally wreck a ship for personal or corporate gain. Many of these wreckings are "insurance jobs," but this can also be good way to get rid of a ship that has become uneconomical or unprofitable to operate, especially when the cargo is more valuable than the ship.

All of these practices have evolved into social institutions in Western maritime commerce that can be hypothesized to produce recognizable patterns in the archaeology of shipwrecks. Flags of convenience and the preference trade, for example, both encourage shipowners to push their vessels one more voyage beyond their intended use lives – something that maritime archaeologist Larry Murphy (1983) refers to as the "one-more-voyage" hypothesis. This kind of behavior can produce shipwrecks that show extreme efforts at repairs to keep the ship in service. For example, large amounts of hardened mastic cement were found in the bilges of the nineteenth-century wooden cargo vessel labeled archaeologically as the "Barrel Wreck" at Loggerhead Reef in the Dry Tortugas, FL (Gould & Conlin 1999). This was a common expedient for ship operators of that period to plug leaks and fill in rotting timbers to keep an otherwise worn-out ship in service. The location of shipwrecks in areas of high risk such as reefs and shoals or in locations dangerously exposed to bad weather and strong currents – termed "ship traps" – can also be a clue to this kind of behavior.

In more modern ships, the resale of supertankers and their continued use at sea under flags of convenience past their roughly 5-year designed use life reveals this same kind of risky behavior – often without regard for the safety of the crew or the environmental consequences of oil spills (Mostert 1974). It may be hard to distinguish to what degree flags of convenience or the preference trade accounts for these archaeological patterns, since they can both produce these effects, but such institutions are as much a part of the wrecking process as the proximate conditions of the vessel's loss.

The physical patterning that results from barratry can be harder to detect, since there may be efforts by the shipowners to conceal their activities. Forensic-like investigation of shipwrecks, however, can identify such behavior as the most parsimonious explanation for such patterning, as happened in the case of the iron barque *North Carolina*, wrecked in Bermuda on New Year's Day, 1880 (Gould 2005). Barratry and these other institutionalized behaviors are all products of mercantile capitalist commence in Western or Western-related cultures. But what about non-Western societies?

As the classic (1922) study by anthropologist Bronislaw Malinowski in the Trobriand Islands of the southwest Pacific showed, maritime commerce may operate in non-market-based economies involving movement and exchange of prestige goods between lifelong trading partners on different islands (termed *kula*). This kind of behavior cannot be explained with reference to Western models of market-based exchange, even though there is evidence that *kula* exchanges and voyaging included large amounts of goods in trade, as opposed to prestige (Gould 2011: 164–170). The canoes used by such voyagers are unlikely to produce identifiable wrecks, but this example and others like it make it clear that archaeologists cannot rely exclusively on Western models of maritime commerce for their hypotheses about ancient trade.

As maritime archaeologists explore shipwrecks of non-Western origin, they must be prepared to account for situations in the past that may have no modern counterparts, even in extant non-Western cultures. For example, how did our species make its way initially from Southeast Asia to Australia/New Guinea at least 40,000 years ago? Land-based evidence shows that this was the earliest known case of oceanic voyaging in human history, but no direct evidence in the form of boat or raft remains has been found archaeologically. Historic and modern watercraft produced by Australian Aborigines were lightly constructed and were poor candidates as models for this kind of voyaging. Similar issues concern the social groups that attempted such early voyaging. They were a colonizing population as well as the vessel's crew, so their size and composition need to be considered along with the implications for provisioning such voyages. We do not yet have the answers to these questions, and in such cases the present cannot serve as a direct guide to the past. It may be the differences rather than similarities to the contemporary society of the ship that will direct archaeologists to what really happened in the past.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
- ▶ Indigenous Peoples, Working with and for
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ United States: Cultural Heritage Management

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Society of Vertebrate Paleontology of China (SVPC)

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Basic Information

The Society of Vertebrate Paleontology of China (SVPC) is an international organization dedicated to the promotion of research and the protection of the paleontological and paleoanthropological remains of China. The society is affiliated with the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences. In October 27 of 1984, more than 150 paleontologists and paleoanthropologists, representing more than 70 institutions, gathered in Laiyang of Shandong Province, where the famous duck-billed dinosaur *Tsintaosaurus spinorhinus* was discovered, and held the inaugural conference of the SVPC. On that meeting, paleomammalogist Min-chen Chow was elected the president and paleoichthyologist Meemann Chang the deputy president. The secretariat office information is as followed:

Address

142 Xizhimenwai Street, Beijing, 100044, China.
The official website: http://www.ivpp.cas.cn/jgsz/gkxh/gjzdwxh/
Tel: 86-10-68351363
Fax: 86-10-68337001
E-mail: bgs@ivpp.ac.cn

Major Impact

Vertebrate paleontological investigations and studies had been carried out for many years around China before the establishing of the SVPC, and the researchers are well represented throughout the country. There was an increasing need for an organization by vertebrate paleontologists and paleoanthropologists in China for many years. The founding of the SVPC has played this role well, and it has been dramatically promoting the study of vertebrate paleontology, paleoanthropology, and paleolithic archaeology in China and continually impacting these fields in the international academic field.

Since 1984, which was the year of naissance of SVPC, 12 annual meetings have been held in different cities in China. Currently, the SVPC comprises more than 300 members. The official language of the SVPC is Chinese and English. The biyearly meeting is held every 2 years, with participants mainly from China and some Asian countries but is now attracting more and more participants from the United States and Europe.

The date and location of these 12 annual meetings are as follows:

The 1st annual meeting: 1984 October 17–24, the city of Laiyang, Shandong Province.
The 2nd annual meeting: 1987 February 22–27, the city of Suzhou, Jiangsu Province.
The 3rd annual meeting: 1989 October 19–24, the city of Beijing.
The 4th annual meeting: 1992 August16–22, the city of Dalian, Liaoning Province.
The 5th annual meeting: 1994 November 24–December 1, the city of Chengdu and Zigong, Sichuan Province.
The 6th annual meeting: 1997 June 1–4, the city of Beijing.
The 7th annual meeting: 1999 April 25–30, the city of Yuxi, Yunnan Province.
The 8th annual meeting: 2001 November 2–6, the city of Shenzhen, Guangdong Province.
The 9th annual meeting: 2004 November 19–22, the city of Nanning, Guangxi Province.
The 10th annual meeting: 2006 November 20–22, the city of Sanming, Fujian Province.

The 11th annual meeting: 2008 September 20–23, the city of Taiyuan, Shanxi Province.
The 12th annual meeting: 2010 September 13–15, the city of Pingyi, Shandong Province.
The 13th annual meeting will be held in the city of Erenhot, Inner Mongolia Autonomous Region.

Cross-References

▶ Animal Paleopathology
▶ Zooarchaeology

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Soil Pollen Analyses in Environmental Archaeology

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Brief Definition of the Topic

Pollen liberated by flowers and spores from non-flowering plants contributes to the atmospheric pollen rain. After settling on the land surface, most is destroyed through oxidation and/or microbial and microfaunal activity. In fortuitous circumstances, pollen may be preserved in certain types of soil and can be extracted to provide data on past vegetation and environment. Pollen analysis is usually associated with lacustrine sediments and peat mires where the upward accumulation of sediments may provide a record of the changing vegetation and habitats at a local and more regional scale. Soil pollen analysis differs in that pollen and spores settling on suitable land where microbial decay is inhibited may be preserved through progressive incorporation into the developing soil profile. Such conditions occur where soils are of an acid character with no faunal (earthworm), mixing such as found on heathland, podzolic soils. In these circumstances, there is a general downward movement of pollen aided primarily by water flow, largely rain. Pollen and spores, however, do not move downward as individual grains but are locked in humic colloids. The downward movement is, therefore, slow and the breakdown and release from colloids depends on various pedological conditions. This results in a crude stratification of pollen within the soil profile with the oldest, irrespective of size, at the base of the profile. A soil pollen profile is, however, not truly stratified and while the youngest pollen is largely at the top and oldest lower down, at any particular level, there may be pollen of various ages (Dimbleby 1985). Longer residence in soils, the effects of bacterial action, and physical and chemical decay reduce the number of pollen grains present, resulting in differential preservation in favor of the most robust types. In Britain, this is often Lactucoideae (dandelion types) and fern spores. In acidic soils, with no faunal mixing, the highest absolute pollen numbers are in the upper levels, decreasing with depth. Thus, calculation of absolute pollen frequencies is an important tool in interpreting soil pollen data/assemblages coupled with knowledge of the differential preservation/resilience of various pollen types (Havinga 1964, 1985) in different soil and sediment types. Long-term study into taphonomic processes has been carried out to aid interpretation of palaeo-pollen spectra (Jewell & Dimbleby 1966; Dimbleby in Evans & Limbrey 1974; Havinga 1985). Interpretation of such stratified soil pollen thus requires a different approach to that of peat and lacustrine sediments

The only principal contradiction to this is in soils where there is a buildup of a surface humus horizon as in a podzolic heathland soil (Ah) and woodland mor humus. Here, there may be a stratigraphical accretion of pollen upward as humus continues to accumulate. High biological

activity and breakdown of plant cellulose is carried out by microorganisms and fungal activity. With the former, ingested pollen is excreted to form *copromor* and the latter, *mycomor* (Stockmarr 1975). Changes in woodland structure through human activity may result in a change of the type of mor humus and rate of accumulation (Iversen 1964; Aaby 1983). In such mor humus, pollen may be remarkably abundant.

Historical Background

Soil pollen studies have been widely used to correlate vegetation history with soil profiles and development (e.g., Iversen 1964; Vuorela 1982). Professor G.W. Dimbleby pioneered and carried out numerous soil pollen analyses throughout Britain especially relating to archaeological contexts (Dimbleby 1955, 1957, 1985). When applied to soils buried (palaeosols) and preserved under archaeological sites, burial mounds, banks and by colluvium or other sedimentation, the technique has proved exceptionally useful in providing records of the vegetation prior to burial and information which may be directly relevant to the site occupation. The decrease of pollen down the profile can also be used to identify the old land surfaces where they are not visible in the overall profile and also to identify turves which (often inverted) were used to make up a funerary mound.

Dimbleby (1962) demonstrated that depletion of brown earth soils developed under deciduous woodland on sandy substrates initially had no pollen preservation. With increasing human activity (woodland clearance and agriculture), they became progressively more acid, resulting in heathland podzolic soil and consequent pollen preservation. Such pollen profiles frequently show an initial phase of scrub woodland (often hazel) with occasional traces of the preexisting woodland which was replaced by heathland vegetation on true podzolic soils. While such (podzolic) acid soils are favored for soil pollen analysis, in some circumstances, useful data can be obtained from calcareous soils developed on limestone lithology. This has proven valuable in establishing the vegetation and environment of the substantial areas of the chalklands of southern England through the analysis of prehistoric, sub-barrow soils in this region (Dimbleby & Evans 1974). In such soils, due to faunal (largely earthworm) mixing, pollen may be distributed evenly throughout the soil. Absolute pollen numbers are generally small, and the potential for differential preservation and overrepresentation of taxa which have a robust pollen wall (exine) is substantially greater.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Dimbleby, Geoffrey W.
- ▶ Environmental Archaeological Evidence: Preservation

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Somaliland: Cultural Heritage Management

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Introduction

The Somali peninsula has a rich heritage relevant to the world. Many ancient world civilizations have left their mark on this area, a connection facilitated by the region's strategic location, connecting Arabia, Africa, and Asia through the Red Sea Coast, the Indian Ocean and hinterland routes to North Africa, and the Swahili Coast. Ancient long-distance trade is confirmed by archaeological finds from Ras Hafun that demonstrate a Greco-Roman trade affiliation (Chittick 1975; Smith & Wright 1988). Furthermore, historical sources in Greek, *The Periplus of the Erythraean Sea* (translation Schoff 1995), and Chinese (Freeman-Grenville 1962) also verify long-distance trade, and Somali's own seafaring traditions in different prehistoric periods (Hourani 1995) attest to contacts with India, China, North Africa, Arabia, Persia, and Eastern Africa, with which Somalis share Swahili culture (Chittick 1969). Arabic (Gibb 1962) and Portuguese sources provide accounts of medieval coastal towns such as Muqdisho, Merka, Baraawe, Berbera, and Saylac. The commercial and cultural contact network in the hinterland is reflected both in archaeological remains (Smith & Wright 1988) and other sources such as oral tradition and historical records. Recent unpublished archaeological discoveries show links with ancient Egypt, Roman, and Greek world, South Arabia, India, and Ming and Yuan dynasty China. It is therefore clear that the region is a cultural crossroads.

Key Issues/Current Debates/Future Directions/Examples

In the last two decades, a man-made disaster has led to the destruction of an entire people's heritage. Somali cultural heritage property has become one of the irreplaceable victims of the longest recorded civil war in the world (Brandt & Mohamed 1996; see also Jama 1996; Abungu 2001). The commencement of the civil war triggered looting of the museums. The Garesa National Museum in Mogadishu and the Hargeisa Regional Museum have both long been emptied. Warlords commission systematic illicit digging of sites. Also the intangible heritage has recently been threatened by strict interpretations of Islam which prohibit the traditional performance arts, dances, songs, and dresses. Somali tangible and intangible heritage continues to suffer the ongoing civil war.

The failed state of Somalia is officially under the UN-backed Transitional Federal

Government, but the country has in fact since 1991 been divided into at least three parts; the northwestern region is reclaiming independence in a quest for re-recognition of Somaliland (a country that existed for a week in 1960 when it gained independence from Britain and joined Italian Somalia voluntarily). Somaliland is now a de facto state and enjoys peace and security. Puntland is semiautonomous but is devastated by piracy, and South-Central Somalia is mostly controlled by Islamist groups.

In addition to the war, however, other factors have also contributed to the neglect of Somali tangible heritage both by Somalis and the international community (Mire 2007). One major issue is the approaches to cultural heritage before the war. Prior to the war, Somali tangible heritage was not managed properly. The Italian colonial administration set up the first sub-Saharan ethnographic museum in Somalia, but after the Italians left, this museum was allowed to deteriorate. The reason seems to be that Somalis did not understand the need for an ethnographic museum when most of the population was living still with the objects that the museum displayed. One of the former directors of this museum suggested that content was "backward" objects from the countryside, things that his grandparents were still using (Mire 2007). This is confirmed by Italian exhibition publications of the time, such as Caroselli (1934) and the exhibition catalogue *Museo della Garesa*. More recently, UNESCO tried to develop this museum by providing museum development experts (e.g., Posnansky 1979; Crespo-Toral 1988), but UNESCO's approach was not endorsed, and its recommendations were neglected by the Somali government. UNESCO failed to understand that the Garesa Museum was not a self-representation of the Somali people. It displayed objects from the nomadic lifestyle as the only identity of the Somali, and this approach was not popular in a time of struggle against colonial mentality and rule. Also the Somali dictatorship failed to ratify the 1972 UNESCO World Heritage Convention, and it did not draft any national heritage laws or policy. Heritage legislation was far from sufficient and in fact almost useless (see Jönsson 1983 for examples; Brandt & Mohamed 1996; Mire 2007). Also archaeological research material was taken out of the country with no reports (Jönsson 1983). Only a few people (Curle 1937; Chittick 1969; Brandt 1986, 1988, 1992) had attempted systematic archaeological survey before the current civil war. A few Somalis (External institutions that made effort to train local archaeologists were too few (see bibliography for references to the Swedish Aid Agency, the SAREC project 1982–1990 by Jönsson 1983; Broberg 1986, 1990, Broberg & Säfvestad 1988).) were involved with archaeological work (e.g., Jama 1996), but it seems all eventually ended up leaving the discipline altogether. All of this contributed to the lack of engagement of Somalis with the significance of their tangible heritage.

There was no infrastructure put in place for dealing with the notion of a museum and its local potential. Furthermore, archaeological research remained almost totally alien as very few locals were involved in it before the war. Hence, one of the reasons for the failure to preserve Somali tangible heritage over the few last decades is also due to the fact that Somalis do not associate archaeology with their heritage and identity. When studying Somalis' views on cultural heritage management and the significance of archaeological remains, it was noted Somalis have their own perceptions of heritage and methods of preservation. Somali have a knowledge-centered approach to heritage and its preservation (Mire 2007, 2008a, 2011). Understanding of this indigenous local approach to heritage and its preservation is paramount to any future and current involvement. Intangible and tangible heritage has been preserved through oral traditions and oral transmission of knowledge. Since there was no writing until 1973, Somalis have developed profound skills in transmission of knowledge and traditions through oral means. Somalis have strong intangible knowledge flowing from their

experience in the landscapes in which they live. All aspects of life – cultural, social, and ritual – are maintained and developed through oral history, poetry, traditional performance art, and crafts production. Somalis regardless of where they reside (countryside, city, and diaspora) seem to keep their knowledge and skills acquired through experience as their heritage. To understand why Somalis do not preserve objects and monuments, it is important to understand their lifestyle. As nomads are always on the move, people carry very little, and instead it is vital to have the knowledge and skills to produce things when needed, to know the landscape and where to find raw materials, and so on. Hence, preservation of objects is not important if one knows how to make these objects. This knowledge helped Somalis when they become refugees and fled their comfortable houses in the city and found themselves in the nomadic landscape. They were able to build portable organic huts and find water as well as use their ethnobotanical knowledge to treat illnesses. This holistic approach to heritage preservation as knowledge is key to Somali nomadic culture.

In post-conflict Somaliland (Mire 2008a, b), cultural heritage is key for development. The Knowledge-Centered Approach is used here to engage communities in heritage management (Mire 2011). Although archaeology is alien to them, through this Knowledge-Centered Approach, Somali communities have a role to play in the preservation of both their tangible and intangible heritage. However, the main obstacles in Somaliland are institutional capacity building and policy and strategy development. Since Somaliland is not a recognized state, it cannot sign or ratify the 1972 World Heritage Convention. Hence, heritage in Somaliland is suffering this lack of status. However, on a national level, cultural heritage is being put into the national agenda by the creation of the Department of Tourism and Archaeology which has a number of programs for implementation and development of heritage management strategies and for sustainable development. This involves, among other things, cultural resource management for sites, monuments, and development of museums.

The Local Education and Safeguarding Program (LESP) aims to assist communities and government staff to acquire basic knowledge of the significance, protection, and preservation of cultural heritage. The Department of Tourism and Archaeology has recruited local people in various areas, particularly to safeguard the most prominent archaeological sites. The program provides capacity building for the staff and communities based in different areas of Somaliland. The Knowledge-Centered Approach is critical here, because it assists in the acknowledgement that the locals possess knowledge about their heritage and can provide insights to its preservation. This empowers locals and after having established mutual interest in a particular site, the government appoints a local person as a custodian of the site. These local ideas are recorded and incorporated into the actual work taking place at the sites.

There is also the National Inventory List (NIL) program in which both tangible and intangible elements and history of the sites are recorded. Recent archaeological interest in Somaliland has produced important sites including the rock art sites of Laas Geel (Gutherz et al. 2003), Dhambalin, Haadh, and Jilib Rihin (Mire 2008b). However, except for conventional surveys of sites, the Knowledge-Centered Approach has facilitated the investigation of what the locals see as significant heritage. Many times there are sites and features in the landscape that the archaeologist does not recognize as something important, such as mountains, springs, or even trees. Such seemingly insignificant landscape features are often more significant to the locals than archaeological sites. When carrying out archaeological survey of selected areas of Somaliland provinces, local people are often involved in the initial creation of data about the sites.

The Department of Tourism and Archaeology runs public education and heritage awareness media programs. Since the Somali culture is

basically oral culture, media such as radios, television, and recently the Internet play an important role in the awareness raising. Through TV programs, the department explained the problem of illicit diggings of archaeological sites and the archaeological excavation process to demonstrate the damage being done to archaeological context and how this impacts the results and history writing of the Somali past. Particular attention was given to the possible benefits of archaeological sites for local populations and measures that stakeholders (governments, communities, business people, etc.) need to take to safeguard cultural property. Photographs are used to show the Somali people the destruction inflicted on their heritage by fellow Somalis. Also, international media have recently been given a role to spread the information about Somali heritage and the work taking place in Somaliland. Awareness films featuring the department's work have been televised by Somaliland National News as well as international news agencies such as National Geographic TV, CNN, and BBC.

The Department of Archaeology and Tourism invests in training of its staff in tourism management. Although infrastructure is poor in Somaliland, the department managed to profile sites near the main cities to become tourist sites. In particular, rock art sites provide a ready resource for income generation through tourist activities. Somaliland receives cultural and environmental tourism, although in small groups. Also the department has students in universities in the Horn of Africa who will be joining the department after completion of their studies. The Department of Tourism and Archaeology's strategy for protecting sites prone to looting is by engaging the elders of the villages in awareness programs. Such awareness programs have prompted the elders to take up their own search of stolen objects. One example of such local initiative is some stolen decorated stelae near the town of Burco that were returned by the locals on their way to Boosaaso to ship the material to the Gulf and sold on the black market.

However, since there are no museums currently in Somaliland, most objects are recorded and documented by the department, and local people are registered as the official custodians of the objects until there is an official museum. The lack of museums contributes to the disappearance of artifacts. Potential collection- and artifact-repatriation projects as well as archaeological-rescue projects are extremely challenged by this lack of storage and research space. The Hargeisa Museum building is awaiting development, although it has been utilized as a hospital since the war. Also in Sanaag region, there are a couple of cultural educational centers. The Department of Tourism and Archaeology has hired some of the local women artists and craftswomen for these educational centers. This enables the local people to engage with their heritage and transfer skills and knowledge to the younger generations. Also the women produce material culture which they can sell to generate their own income. Recently, Horn Heritage Organization, a nongovernmental organization, has been set up to promote awareness and preservation of Somali heritage.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Intangible Cultural Heritage
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Tangible Heritage in Archaeology

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South Africa: Heritage Management

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Introduction

South Africa is the southernmost country in Africa. It covers 1,219,090 sq km, with 2,798 km

of coastline (Central Intelligence Agency (CIA) 2010). South Africa possesses a dominantly semiarid climate, with a subtropical climate along its east coast (Central Intelligence Agency (CIA) 2010). South Africa has a population of 49 million, with four predominant ethnic groups: black African (79 %), white (9.6 %), coloreds (8.9 %), and Indian/Asian (2.5 %) (Central Intelligence Agency (CIA) 2010). South Africa has twelve official languages, with IsiZulu being the most widely spoken, followed by IsiXhosa and Afrikaans (Central Intelligence Agency (CIA) 2010).

South Africa was first "discovered" by Dutch traders in 1652 and was used as a stopover point for trade routes between the Netherlands and the Far East; it was during this time that Cape Town was founded (Central Intelligence Agency (CIA) 2010). The English took control of the Cape of Good Hope in 1806, causing many of the Dutch settlers (Boers) to move further north (Central Intelligence Agency (CIA) 2010). Discovery of gold and diamonds in 1867 and 1886 caused a greater influx of people and the increased degradation of the native peoples (Central Intelligence Agency (CIA) 2010). The Boers resisted the further-reaching control of the English but were defeated in the Boer Wars in 1899–1902 (Central Intelligence Agency (CIA) 2010). The Boers, now the Afrikaners, and the English established a rule together in 1910 as the Union of South Africa (Central Intelligence Agency (CIA) 2010). In 1948, the National Party instituted apartheid, and soon thereafter, South Africa was declared a Republic (Central Intelligence Agency (CIA) 2010). The African National Congress (ANC) opposed apartheid. After global pressure and years of turmoil in the country, the in-power regime negotiated a peaceful transition to majority rule (Central Intelligence Agency (CIA) 2010). The first multiracial elections were held in 1994, officially ending the apartheid and beginning the ANC's rule (Central Intelligence Agency (CIA) 2010).

In the years since, South Africa has been struggling with issues created or exacerbated by apartheid, including housing and education inequalities, poverty and health-care issues, as well as ANC infighting (Central Intelligence Agency (CIA) 2010).

Key Issues

Heritage Management Infrastructure

Heritage Laws

South Africa has one law that governs all heritage management in the country: the National Heritage Resources Act (NHRA) of 1999. This document serves multiple purposes including establishing a system for the management of heritage resources; encouraging good governing of these resources and empowering society to take a role in this governing for future generations; laying out principles and norms for the management of all heritage resources; creating a system for identifying, assessing, and managing heritage resources; establishing the South African Heritage Resources Agency (SAHRA); controlling the export of heritage resources and the illegal import of culturally significant items; allowing provinces to play a role in managing heritage resources of certain types; and creating laws and allowances for local authorities to protect heritage resources (Republic of South Africa (RSA) 1999).

This law takes special care in defining heritage resources, using an entire section to list all possible forms of a heritage resource (Republic of South Africa (RSA) 1999: Section 3). Most simply, heritage resources refer to any place or object of cultural significance (Republic of South Africa (RSA) 1999: Section 2.xvi). This law also mentions multiple times that any type of heritage resource should not be tampered with in any way without prior approval from SAHRA (Republic of South Africa (RSA) 1999: Sections 28–37). This document identifies the responsibility of heritage management as belonging not only to the government but also to the common person, for the sake of future generation (Republic of South Africa (RSA) 1999: Section 5.1.b). Though it does not state this explicitly, this law

also acknowledges the existence of and the need to involve all stakeholders; it declares that heritage should be managed so that it acknowledges the right of affected communities to be consulted and to participate in the management of pertinent heritage resources (Republic of South Africa (RSA) 1999: Section 5.4) and that all relevant cultural values and indigenous knowledge should be taken into account as well (Republic of South Africa (RSA) 1999: Section 5.7.a). NHRA also acknowledges the role that tourism plays in heritage management. This law states that heritage resources contribute to tourism and should be developed and presented for this purpose (as well as for the purposes of research and education) (Republic of South Africa (RSA) 1999: Section 5.5); it also states that the identification, assessment, and management of heritage resources should contribute to economic development (Republic of South Africa (RSA) 1999: Section 5.7.d).

Though this law encompasses many ideas that are crucial to good heritage management, it appears to fall short on some accounts. The document as a whole seems more concerned with the bureaucracy behind the heritage management, rather than the methods and needs of heritage management; it spends a great deal of time describing what permissions are needed from owners and organizations, rather than explaining the government's stance on methods, techniques, and authenticity. It also does not provide enough guidelines for the extent to which all stakeholders should be involved.

Heritage Institutions: Public

The main heritage management institute in South Africa is the South African Heritage Resources Agency (SAHRA). This agency was established by the National Heritage Resources Act (NHRA) in 1999 and is the government agency that is charged with the protection and administration of South Africa's heritage (Association of Southern African Professional Archaeologists (ASAPA) 2010). This agency is based out of Cape Town and has a regional office in each province (Association of Southern African Professional Archaeologists (ASAPA) 2010). SAHRA is run by an interdisciplinary council appointed by the arts and culture minister for South Africa and the chief executive officer; this position is currently held by Lynette Sibongile Van Damme (Association of Southern African Professional Archaeologists (ASAPA) 2010).

As the governmental agency for heritage management, SAHRA has a variety of duties, which are laid out on the home page of their website: "to coordinate and monitor the identification of our national heritage; to set a norm and standards and maintain the management of heritage resources nationally; to encourage and facilitate the development of provincial structures; to control export and import of nationally significant heritage resources; to develop policy initiatives on the promotion and management of our heritage; to nurture an holistic celebration of our history; to set national policy for heritage resources management, i.e. formal protection, general protection and management; and to develop an integrated and interactive system for the management of the national heritage resources" (South African Heritage Resources Agency (SAHRA) 2010a: home page). SAHRA provides protection and management guidelines to all types of heritage resources in South Africa, including archaeological sites, paleontological sites, meteorites, wrecks, burial grounds, and graves (South African Heritage Resources Agency (SAHRA) 2010b). They also supervise the creation of registers that are used to identify heritage resources and the creation of heritage areas (South African Heritage Resources Agency (SAHRA) 2010b).

Other governmental agencies include smaller regional ones, like Amafa aKwaZulu-Natali, which handles heritage resource management in KwaZulu Natal (Association of Southern African Professional Archaeologists (ASAPA) 2010).

Heritage Institutions: Private

The private or nongovernmental organizations (NGOs) in South Africa cover a wide variety of concerns and goals, from the integration of Black heritage and business strategy to the management of heritage resources that are not considered as such by the government to providing free consulting for heritage management groups and NGOs.

One such NGO is the Cape Town Heritage Trust, a private-sector, nonprofit organization. This organization was established by Cape Town's city council to take care of historic buildings and streets in Cape Town (Cape Town Heritage Trust (CTHT) 2010). Their website describes their mission as the conservation of the architectural, cultural, and natural heritage of Cape Town and its environs for the benefit of the inhabitants of the city and of the nation at large (Cape Town Heritage Trust (CTHT) 2010). This NGO works with the city council and the owners of buildings to improve and preserve historic buildings and other pieces of cultural heritage (Cape Town Heritage Trust (CTHT) 2010).

Other heritage NGOs include Nzumbululo Heritage Solutions (www.hessa.co.za), the Africa Heritage Society (www.africaheritage.com), and a number of province- or town-specific organizations that deal with natural heritage.

Examples

Part 1: Heritage Sites

South Africa's first entry onto the World Heritage List was in 1999, with the listing of Robben Island, iSimangaliso Wetlands Park, and the Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai, and Environs (UNESCO World Heritage Center 1999a, 1999b, 1999c). Since then, another five sites have been added to the World Heritage List, along with twelve sites on the Tentative List. At the present, none of these sites are marked by UNESCO as being "at risk."

Sites on the World Heritage List

Of the eight sites South Africa has on the World Heritage List, four are cultural sites, one is a mixed cultural/natural site, and the remaining three are natural sites. My focus is on the cultural sites. The sites are described in the order in which they were inscribed on the World Heritage List.

- *Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai, and Environs*

This site was listed in 1999. It encompasses a variety of sites in Gauteng, Limpopo, and the Northwest Province. These sites contain evidence of early hominids, including the Taung Skull site, where the skull of an *Australopithecus africanus* was found, as well as the Makapan Valley site, where there are archaeological traces of human evolution, such as specimens of early hominids, such as Paranthropus, dating to between 4.5 million and 2.5 million years ago, and traces of human occupation, specifically the domestication of fire dating back to between 1.8 million and 1 million years ago (UNESCO World Heritage Center 1999a).

These sites meet two of the World Heritage criteria for possessing Outstanding Universal Value. The first met criterion is Criterion (iii): the archaeological evidence found here is an exceptional testimony to an extinct species while shedding light on our origins (UNESCO World Heritage Center 1999a). The second criterion met is Criterion (vi): these sites provide a vast reservoir of scientific data that will aid in the study of ancient humans (UNESCO World Heritage Center 1999a).

- *Robben Island*

This site was listed in 1999. Robben Island is a small island off the coast near Cape Town that has been in use since the seventeenth century as a hospital for socially unacceptable groups such as the mentally and terminally ill, a prison for both criminal and political prisoners, and a military base during World War II (UNESCO World Heritage Center 1999c). The prison on Robben Island held a variety of notable figures, including Nelson Mandela, who was incarcerated there for 20 years (Robben Island Museum 2009).

The prison was closed in 1996, and the island has been developed as a museum and nature conservation area since then (Robben Island Museum 2009).

Robben Island fulfills two of the criteria for possessing Outstanding Universal Value. Criterion (iii) is met by the testimony it provides for the history of South Africa (UNESCO World Heritage Center 1999c). It also fulfills Criterion (vi) because it symbolizes the triumph of freedom, democracy, and the human spirit (UNESCO World Heritage Center 1999c, 2010).

- *uKhahlamba/Drakensberg Park*

This is a mixed cultural/natural site that was listed in 2000. This park stretches across KwaZulu Natal and the Eastern Cape Province and is known for its impressive geography and geology, as well as the concentration of native and endangered species, both flora and fauna, that this area is home to (UNESCO World Heritage Center 2003b). This park also contains many caves and rock shelters that hold the largest group of rock paintings found south of the Sahara. These paintings reflect the life of the now extinct San people (UNESCO World Heritage Center 2003b). The paintings show many aspects of San life, including hunting, dancing, food gathering, fighting, and ritual scenes (UNESCO World Heritage Center 2003b).

The uKhahlamba/Drakensburg Park meets four of the criterion for possessing Outstanding Universal Value. It meets Criterion (i) for the rock paintings – they are representative of a masterpiece of human creativity – and it meets Criterion (iii) because these rock paintings were recognized as a unique or exceptional testimony to a vanished culture (UNESCO World Heritage Center 2003b, 2010). The other two criteria met are Criteria (vii) and (x) for natural World Heritage Sites (UNESCO World Heritage Center 2003b).

- *Mapungubwe Cultural Landscape*

This is a cultural site that was listed in 2003. This landscape in the Northern Province at the confluence of the Shashe and Limpopo rivers was once home to the largest kingdom in the sub-Saharan continent, reaching the height of its power between CE 900 and CE 1300, before it was abandoned in the fourteenth century because of a rapid change in climate

(UNESCO World Heritage Center 2003a). This landscape contains the nearly untouched remains of the palace sites and the surrounding settlement and two earlier capital sites (UNESCO World Heritage Center 2003a).

This landscape meets four of the criteria for possessing Outstanding Universal Value. Mapungubwe fulfills Criterion (ii) because the site provides evidence for the exchange of values that created cultural and social changes in Southern Africa during the height of their power; in the same vein, it also fulfills Criterion (iv) because the period of Mapungubwe's height of power and the effect of the cultural and social changes were part of a significant stage in the subcontinent's history (UNESCO World Heritage Center 2003a, 2010). The archaeological evidence found in this area provides a surprisingly complete testimony of Mapungubwe's rise and fall, fulfilling Criterion (iii) (UNESCO World Heritage Center 2003a, 2010). Finally, this landscape fulfills Criterion (v) by showing the impact of climate change and Mapungubwe as a culture that was vulnerable to irreversible change (UNESCO World Heritage Center 2003a, 2010).

- *Richtersveld Cultural and Botanical Landscape*

This is a cultural site that was listed in 2007. This landscape in the Northern Cape Province is home to the seminomadic, pastoral Nama peoples. Their pattern of life has persisted for over two millennia and includes the building of portable rush-mat houses, the only area in which this is still done, and seasonal migrations to grazing grounds (UNESCO World Heritage Center 2007). This way of life reflects old traditions that were once widespread, but no longer are (UNESCO World Heritage Center 2007).

This cultural landscape meets two of the criteria for possessing Outstanding Universal

Value. The Nama peoples' way of life demonstrates a way of life that, when it was still a widespread way of life, played a major role in the history of South Africa; by this explanation, Richtersveld fulfills Criterion (iv) (UNESCO World Heritage Center 2007, 2010). Additionally, Richtersveld fulfills Criterion (v) because this area is one of the few remaining places were transhumance pastoralism, or the seasonal movement of people with livestock, is still practiced; this is an example of a traditional human land use that is now vulnerable (UNESCO World Heritage Center 2007, 2010). das könnte 2007 sein

Part 2: Sites on the Tentative List

South Africa currently has 12 sites on the Tentative List, many of which were added to the Tentative List in 2004 or 2009. Eight of these are proposed as cultural sites; four are proposed as natural sites (UNESCO World Heritage Center 2009a). The cultural sites are, again, listed in the order they were proposed.

- *Pleistocene Occupation Sites of Klasies River, Border Cave, Wonderwerk Cave, and Comparable Sites Relating to the Emergence of Modern Humans*

  This cultural heritage site was proposed in 1998 and fulfills Criteria (ii), (iii), (iv), (v), and (vi) (UNESCO World Heritage Center 1998).
- *Kimberley Mines and Associated Early Industry*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (i), (ii), (iv), and (vi) (UNESCO World Heritage Center 2004a).
- *Pilgrim's Rest Reduction Works Industrial Heritage Site*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (i), (ii), (iv), and (vi) (UNESCO World Heritage Center 2004b).
- *The !Xam Khomani Heartland*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (iii), (iv), (v), and (vi) (UNESCO World Heritage Center 2004c).
- *Liberation Heritage Route*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (vi) (UNESCO World Heritage Center 2009b).
- *The Cape Arc of Meridian*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iv), and (vi) (UNESCO World Heritage Center 2009c).
- *The Cape Winelands Cultural Landscape*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (iv) (UNESCO World Heritage Center 2009d).
- *The Namaqualand Copper Mining Landscape*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (iv) (UNESCO World Heritage Center 2009e).

Discussion of Sites on the World Heritage List and Tentative List

The sites inscribed on the World Heritage List for South Africa are perhaps indicative of what the South African government sees as important in the country's history. The cultural sites on the list favor themes such as the birth of the human race, precolonial civilizations, and the celebration of South African independence. None of these sites acknowledges the role colonialism and Europe played in developing the country. Whether or not these influences were considered unwanted or useful, all parts of a country's history should be considered equally when heritage is created. The omission of the colonial history is also an omission of those who live in the country who are descendants of the Dutch and English colonizers.

However, as the Tentative List suggests, heritage management in South Africa is beginning to acknowledge their colonial period. The Cape Winelands Cultural Landscape, suggested in 2009, acknowledges the role that colonialism, England, and the Netherlands played in the development of the wine industry there, as well as in the vernacular architecture (UNESCO World Heritage Center 2009d). In addition to

this, there are three other sites that have been added onto the Tentative List since 2004. Kimberley Mines and Associated Early Industry, Pilgrim's Rest Reduction Works Industrial Heritage Site, and the Namaqualand Copper Mining Landscape are industrial heritage sites and acknowledge the role that England and the Netherlands played in starting off the industrial revolution of South Africa (UNESCO World Heritage Center 2004a, 2004b, 2009e).

The order in which sites were added to the World Heritage List is also interesting. The first three sites, the Fossil Hominid Sites, Robben Island, and iSimangaliso Wetlands Park, were all added in the same year. These sites reflect, perhaps, a desire to be recognized by the world as a capable country; these sites establish the importance of South Africa to the rest of the world as the "Cradle of Humanity," as a free, self-governed country and as being wealthy enough to pay attention to issues that are a luxury, such as environmental conservation (UNESCO World Heritage Center 1999a, b, c).

Current Debates

Heritage Management Problems

Overall Problems

The predominant issues in heritage management for South Africa are laid out neatly in Colette Scheermeyer's (2005) article "A Changing and Challenging Landscape: Heritage Resources Management in South Africa." The first issue is one of balancing differing views of the same event. People in South Africa have bad memories of the apartheid, but good memories of their neighborhoods, social interactions, and lives during this period of time. It is the responsibility of those who practice heritage management to take both views and represent them fairly, without interference from their personal views or judgments (Scheermeyer 2005). So, despite the desire to portray the apartheid as entirely bad, one has to acknowledge that the injustices of the apartheid did not penetrate every aspect of life.

The second issue is the balance between the tangible and intangible. One must ensure that the intangible cultural aspects of a site are maintained along with the tangible, but on the flipside, the integrity of the site cannot be sacrificed while promoting the intangible heritage (Scheermeyer 2005). This problem manifests itself in the desire of communities to continue using culturally significant sites for ritual purposes.

The third predominant issue focuses on stakeholders. This problem is one that faces every heritage resource around the world. A holistic and fair approach to managing these cannot be achieved unless all stakeholders are identified consulted and involved (Scheermeyer 2005).

Site-Specific Problems

There are few sites with glaring difficulties in the heritage management. The most pressing problem is facing Wonderwerk Cave, one of the sites on the Tentative List. This cave, and the rock paintings within, is currently being threatened by erosion and the possibility of the cave collapsing (UNESCO World Heritage Center 1998).

Future Directions

Heritage management in South Africa is, by no means, an easy task. The presentation of heritage is plagued by negative heritage, conflicting views, and unwanted stakeholders. Despite these problems and inner turmoil, the South African government has made a strong, honest attempt at the competent management of their heritage. Their heritage management law tries to fairly address many of the issues that arise in heritage management, such as stakeholder claims and heritage preservation, though it does this at the expense of in-depth instruction on conservation. The South African government agency for heritage management is set up in an effort to include as many relevant disciplines as possible in heritage management.

However, some would argue that the effort and funding that is being put into heritage management and the World Heritage Sites and nominations is misplaced, given the staggering poverty rate of the country (around 50 %) and the prevalence of HIV/AIDS and other infectious diseases (Central Intelligence Agency (CIA) 2010).

Cross-References

- ▶ African Stone Age
- ▶ African World Heritage Fund (AWHF)
- ▶ Heritage and Archaeology
- ▶ Heritage Conservation Training

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Further Reading

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South Africa: Maritime Archaeology

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Introduction

South Africa has roughly a 3,000 km long coastline scattered with an estimated 3,000 historically recorded shipwrecks dating from the fourteenth century right up to modern times. According to the South African Heritage Resources Agency database, the resource represents 38 different nationalities. Shipwrecks concentrated in "hot spots" like harbors or rough stretches of coastline mostly because the southern tip of Africa was the gateway to the east for the European colonial powers before the construction of the Suez Canal. This heritage is dominated by Portuguese, Dutch, and British shipwrecks. The Portuguese opened up the sea route from Europe to the east, the Dutch colonized the Cape in the seventeenth century, and the British prevailed over the Dutch in the early nineteenth century. Academic interest in historical shipwrecks is a twentieth-century phenomena as in the previous centuries the economic value of salvage was the foremost motive for investigating the remains of old ships.

Definition

Maritime archaeology as a subdiscipline, has had a checkered existence in South Africa. Maritime archaeology arguably started in the late 1980s with the appointment of a maritime archaeologist at the University of Cape Town. There was however an awareness of the importance of the underwater cultural heritage from quite early on with sporadic archaeological interventions. As with most countries with a coastline and shipwrecks, the inevitable scourge of treasure hunting reared its head and a large part of the history of maritime archaeology in South Africa has to do with how this dilemma was handled by heritage bodies in the country. This, of course, implies the development of legislative efforts to control the resource. Although important in understanding the development of maritime archaeology in South Africa, it is not the focus of this review, as it will be discussed elsewhere in this publication (see the entry on ▶ South Africa: Maritime Legal Management in this encyclopedia). This entry will rather look at the development of the subdiscipline at museums and universities, in particular at Iziko Museums, as well as describe some of the archaeological interventions mentioned above. The development of maritime archaeology will also be discussed in the context of a change in the political climate prevalent in South Africa at various times.

Historical Background

The South African Museum as the oldest museum in sub-Saharan Africa did not play a major role in the early years of shipwreck exploration in South Africa. In 1956, however, the director of the SA Museum, Dr. A.W. Crompton, offered the museum's assistance to the legendary physical "culturalist," strong man, and treasure hunter Tromp van Diggelin in his bid to recover "treasure" from shipwrecks in Table Bay (SACHM D1/4). The museum was willing to help with the identification of the items recovered as well as providing display area. An article in the Cape Argus in July 1956 estimated a fortune of 30 million pounds to be found on shipwrecks in Table Bay. Fortunately, not much came from this endeavor.

The situation changed in the 1960s when the South African Cultural History Museum (SACHM) was formed in 1964 by the splitting of the "European" collections from the Natural History and Ethnography collections of the South African Museum. This overtly political move from the Nationalist government of the day would, in the formation of the New South Africa in the 1990s, have an important impact in the direction taken by maritime archaeology in the museum world as will be discussed later in

this entry. As an institution with its focus on European and therefore colonial history, the SACHM's interest in shipwrecks became apparent early on. This could be ascribed to the increased access to the underwater world due to the availability of scuba gear and with the founding of underwater clubs. As an example, the Atlantic Underwater Club (formed in 1953 in Cape Town) became more interested in shipwrecks with the publication by the Johannesburg Public Library's chief Librarian, R.F. Kennedy (1955), titled "Shipwrecks On and Off the Coasts of Southern Africa." It is interesting to note that not much note was taken of the work done by George Bass in the 1960s possibly because shipwrecks were still equated as sources of treasure and interesting artifacts.

This is typified by the SACHM obtaining a Customs and Excise license for the salvage of shipwrecks in 1965. The director of the newly formed SACHM, Dr. G.A. Wacha, mentions that his predecessors in the South African Museum tried several times in the past to obtain a salvage license (SACHM D1/4). This unfortunate association with salvage created an image of the brave divers "rescuing" valuable artifacts from the clutches of the ocean. Still the museum was trying to gain more control of the shipwreck scene, especially with lucrative salvage attempts like that of the British East Indiaman Fame (1822) taking place at the time by members of the Atlantic Underwater Club in Table Bay. A large amount of gold and silver coins, silver spoons and forks, gold jewelry, watchcases, nails, and a broken ship's bell were salvaged from the Fame (Turner 1988). The divers did donate about 299 items to the fledgling museum, starting the SACHM's shipwreck collection.

In 1966, Dr. W. Schneewind, replacing W.A. Wacha as director of the SACHM, contacted the Western Province Underwater Union and the Atlantic Underwater Club in an attempt to salvage artifacts from the wreck of Dutch East India Company 1697 wreck of *Het huis te Crayestein* under the museum's salvage license. The divers did remove several items from the wreck but gave the museum a trifle of what was actually taken out. In a letter to the chairman of the Atlantic Underwater club, Dr. Schneewind asked for more "showy" (sic) objects to arouse the interest of the board of trustees and the government (SACHM D1/4).

Schneewind was aware of the lack of standards and in particular the lack of protection. He wrote to the secretary of Cultural Affairs in 1968 suggesting strict legislation modelled on the Swiss civil code and Danish Legislation (SACHM D1/4). He also realized that public support was lacking. In a letter to Miss M. Shaw, secretary of the South African Museums Association, he suggested the creation of a specific expedition to draw the attention of the public and the government. Not much came of this however.

The South African Museums Association (SAMA) did, however, enter the debate. In 1971 at their Western Cape branch meeting, SAMA voiced concern about the plundering of shipwrecks (SACHM D1/4). Several important recommendations were made:

- Wrecks older than 100 years to become the property of the State.
- Wrecks should be protected like other archaeological sites.
- Permits should be made available through the National Monuments Council.
- Some control measures were also suggested:
  - A special directive should be issued to the police to help control the pillaging of wrecks.
  - A social conscience should be cultivated with the public.
  - Funds to be made available to purchase equipment and employ personnel to investigate and recover material from wrecks in a systematic manner with the voluntary assistance of weekend divers.
  - Not to purchase wreck material from dealers.

Dr. Schneewind was appointed as chair to approach the Department of Customs and Excise with these suggestions. These suggestions were later on referred to the Department of Cultural Affairs.

A reply from the Committee of Enquiry into the Protection of Cultural Treasures, appointed

by the Minister of National Education, came in 1972 enquiring as to the desirability of controlling the export of cultural treasures. In the case of shipwrecks, Dr. Schneewind suggested again the implementation of legislation similar to the Danish model that included some of the suggestions of the SAMA committee, like the protection of shipwrecks older than 100 years. The governments' efforts apparently stopped here for the time being. In a March 1977 (SACHM D1/4) letter, Professor E. Axelson wanted to know what happened to the above suggestions to the government as he was at that moment inundated with calls from the press concerning the looting of the wreck of the *Sacramento*. In his reply, Dr. Schneewind again stressed his awareness of the need for protective legislation for shipwrecks.

In 1977, the Natal Museum's archaeology department (focusing mainly on the South African Iron Age) became interested in early shipwrecks because survivor's accounts contained the earliest descriptions of the southeastern seaboard and its inhabitants. Consequently, they started a project attempting to identify and locate some of the early sixteenth-century Portuguese shipwreck sites. They located and tentatively identified two of these very scattered wreck sites that of the *Sao Joao* (1552) and the *Sao Bento* (1554), but unfortunately did not take the research much further than this (Auret & Maggs 1982; Maggs 1984).

Another development in the 1970s was the discovery of a shipwreck during the excavations for the foundations of the new Civic Centre in the Cape Town foreshore in 1970. The Cape Town foreshore was created by large land reclamation projects in the 1930s and in the process, many shipwrecks were covered unknowingly. Fortunately, for posterity, a City of Cape Town engineer, R.A. Lightley, an avid ship model builder, immediately recognized the timbers being uncovered. He managed to obtain permission to study the remains and eventually tentatively identified it as the remains of the Dutch East India Company ship *Nieuw Rhoon* scuttled in 1776 (Lightley 1976). This project produced the first proper site plan of a shipwreck in Southern Africa as well as a heretofore unmatched technical study of ship construction in the subcontinent.

Mention should probably be made here of the efforts by Graham Bell-Cross in locating several early Portuguese shipwrecks often working with divers and homeowners finding remains of survivor's camps in development of their beach homes (Bell-Cross 1988) along the Eastern Cape seaboard. Although Bell-Cross approached the study systematically often with the help of leading historians and sometimes archaeologists, the result did not go further than purely descriptive work of artifacts found and statements as to the identification of the various possible shipwreck sites.

Meanwhile, the exploitation of shipwrecks continued unabated with recoveries from the Dutch East India Company ship *Meresteyn* (1702) on the Cape West Coast (Marsden 1976) and more troubling the recovery of bronze and iron guns from the seventeenth-century Portuguese wrecks of the *Santissimo Sacramento* and *Nossa Senhore Da Atalaia do Pinheiro* with most of these guns from the famous Bocarro foundry in Macao being sold for scrap. Some of the better examples did, however, find their way to the Port Elizabeth Museum and was probably the reason for the appointment of a curator responsible for shipwreck material in 1980. The other consequence was the amendment of the Heritage Legislation of the day in the form of the National Monuments Act of 1969, which was amended in 1979 by giving the relevant minister the power to declare any wreck older than 80 years as a National Monument (Gribble 2002).

Key Issues

In the 1980s, legislation was improved, the first in 1981 proclaiming wreck sites older than 100 years (Abrahams 1987). The National Monuments Council now issued permits only for wrecks that were scattered and without identifiable structure or stratification. Conditions were that accurate recording techniques of an archaeological standard should be applied and

that 50 % of the artifacts had to be lodged at a collaborating museum.

This attempt of regulating shipwreck exploitation was by no means the solution of the problem as it was difficult to enforce these regulations with almost no funding and a desperate lack of personnel. The treasure-hunting community reacted in naming themselves "salvers" and not treasure hunters. This unfortunate association with salvage created an image of the brave divers "rescuing" valuable artifacts from the ocean.

Archaeologists started to voice their concerns about the exploitation of shipwrecks along the South African coastline possibly because of the changing legislation that brought the low standards and inability of museums to cope with the influx of permit applications, to the fore. At the SACHM, the shipwreck collection came under archaeological control with the appointment of a historical archaeologist in 1981 (Abrahams 1987). The shipwreck collection, however, was more of an onerous duty than a promising field of research as the museum had to respond to requests from divers for letters of cooperation. These letters most often took the form of one-liners promising cooperation with no conditions attached other than that the stipulations of the National Monuments Act need to be followed. The result was a very imbalanced collection as the museum seldom received or asked for the 50 % of recovered artifacts. In fact, of 144 permits issued since 1982, the museum had letters of cooperation for 42 shipwrecks with only 3, 000 artifacts dating from the sixteenth to the nineteenth centuries (Boshoff 2006). No specialized conservation unit existed and the museum was often reliant on the treasure hunters conserving the artifacts received.

The SACHM was however attempting to get the investigation of shipwrecks on a more professional footing as proved by the organizing of a "Symposium on Maritime Archaeology" with a combination of archaeologists, treasure hunters, historians, and heritage specialists as speakers in July 1984 (SACHM D1/4). This was in response to projects like the exploitation of the treasure wreck of the British East India Company wreck of the *Joanna* (1682) that produced numerous artifacts especially silver coins that was sold into the public on the open market and even in diving magazines (Turner 1988). In hindsight, it is almost as if there was a naiveté from museums and heritage bodies in attempting to control treasure hunting by trusting that the treasure hunters would do the "right" thing. The excuse often aired was the lack of funding and qualified personnel at institutions like museums and universities.

The formation of the South African Historical Shipwreck Society in the 1980s was meant to bridge the gap between the academic world and the euphemistically named salvers. They tried to initiate several projects unsuccessfully and unfortunately seemed only to legitimize the activities of treasure hunters. They did however help promote the general amnesty declared by the National Monuments Council in 1986 (Abrahams 1987). The amnesty was an attempt from the NMC to start with a clean slate. The idea was that divers would declare any objects illegally removed from shipwrecks and would be exempt from prosecution. At the end of the amnesty, any items not declared would make the possessor liable for prosecution. The most useful outcome from the amnesty was the files with data on the collections in private hands that could now be used for comparison with what museums have in their possession. This resource was however never utilized until later when the author analyzed the collections (Table 1) of the SACHM in relation to the records in the amnesty (Boshoff 2006).

In 1983, the University of Cape Town instigated a project on the British East India Company ship *Arniston* (1815). Amongst the students was I.H. Gericke, a well-known treasure hunter. Under the supervision of Prof. A.B. Smith Gericke and another student, J. Jobling probably started the first attempt at a scientific investigation of a shipwreck in South Africa (Jobling 1982). Unfortunately, the project was marred by the fact that it did have a profit incentive even though it does seem that Gericke was keen to get archaeologists and treasure hunters working together. This would eventually lead into Gericke

South Africa: Maritime Archaeology, Table 1 Comparison of total artifacts in museums collection with artifacts reported in amnesty

Shipwreck name	Amnesty artifacts	Museum artifacts
Athens 1865	206	3
De Visch 1740	215	0
Fame 1822	165	299
Het Huis te Crayenstein 1697	18	16
Maori 1909	334	5
Meresteyn 1702	287	30
Trafalgar 1839	194	40

sponsoring the post for a maritime archaeologist in the form of the Dutch archaeologist, Bruno Werz, appointed in 1988 in a dual position at the University of Cape Town and the SACHM.

The 1980s would end with the formation of the South African Maritime Museum as a satellite of the South African Cultural History Museum and the appointment of Bruno Werz as alluded to above. At the same time, the curator of the new Maritime Museum, Tom Graham, started an honors degree at the University of Cape Town. He was following up a previous 1984 workshop on the practice of seal hunting in the nineteenth and twentieth centuries on the subantarctic island Marion (annexed by the South African Government in 1947), by doing an in-depth study of historical documentation and visiting the island to record the sites reported archaeologically (Graham 1989). Under very trying circumstances, Graham managed to do two small excavations and record some of the sites. Although he did not manage to return to the island and continue the project, mainly because of his increased responsibilities at the South African Maritime Museum, he did plant the seed for a future project developing another possible direction for maritime archaeology in South Africa. The focus, however, would remain on shipwrecks steered by Bruno Werz. As the first person appointed as a maritime archaeologist, Werz had a huge task in front of him. Whether the strategies he followed to establish maritime archaeology on a firmer footing was successful is a tale of the 1990s and stills a matter of debate. It is interesting to note that Werz's appointment was counter to the academic boycott against the apartheid government.

Werz shared a position at the SACHM and University of Cape Town. He was also consulting for the National Monuments Council. This arrangement however was problematic from the start. The institutions were constantly vying for the loyalty of the maritime archaeologist. This was because the ground rules for this shared arrangement were never properly established. It is pointless to speculate who was at fault and what part internal politics played. Maybe if an infrastructure of some kind had been established before the appointment of a maritime archaeologist, matters would have been different.

Werz however attempted to start with project-oriented research with the investigation of the Dutch East Indiaman, *Oosterland*, wrecked in Table Bay in 1697 as part of his maritime archaeology Project Table Bay (Werz 1999). This wreck was discovered by three local divers who reported it to Werz. An agreement was drawn up between Werz and the treasure hunters regulating the conduct of the project (SACHM D1/4). One important condition was that the archaeologist would have an opportunity to study the artifacts before the division between the museum and the treasure hunters. Although under archaeological control to a measure and not overtly acknowledged, it was, however, still a treasure-hunting project. It seems as if the lessons learned from the Arniston in the 1980s were not properly heeded as in the mid-1990s the project spiralled into disagreement and effectively stopped.

Another important project started in 1991 was Operation Sea Eagle under the archaeological direction of Werz, but more importantly incorporating other bodies like the South African Navy providing the logistical support (Werz 1993). This project was to record all the shipwrecks around Robben Island and was quite successful in the end, but ironic as the island was still a political prison at the time. Unfortunately, the divergent nature of Werz's appointment at the University and the Museum and the various disagreements with museum management as to

the parameters of his position resulted in the museum not renewing his contract. The museum however decided to continue with the post by appointing the author first on a contract basis and then later in 1992 on a permanent basis.

Werz continued his association with the University of Cape Town and during this period produced a number of honors students and two Masters Students. This continued up to 1999 when his association with the University of Cape Town came to an end. He did however also start a project on the wreck of the *Bato* (1806) in Simon's Bay in 1996 and started the South African Institute of Maritime Archaeology (SAIMA) in 1999. After a short stint as a consultant for Archeonautas SA in Mozambique in 2000, Werz started to focus on the activities of SAIMA but has not had much impact on maritime archaeology in South Africa subsequently.

Meanwhile at the SACHM, stricter controls were put in place for permit holders from 1992 onwards. Instead of giving a one-line letter of cooperation, the museum now required a proposal with a clear research rationale. The screening of projects for substantive content saw a sharp decline in applications. With this strategy, the museum started moving away from cooperation with commercially motivated projects counter to the existing legislation and charted a new direction for the future. The museum also started a small conservation laboratory prompted by receiving a collection from the British East India Company ship *Colebrooke* (1778). A large part of this collection consisted of wine bottles with the content still intact and in dire need of stabilization.

In 1993, the National Monuments Council contracted Lynn Harris from the University of South Carolina to compile an electronic database of the shipwrecks around the South African coastline, combining several of the existing paper-based databases in existence at the time. Another major task Harris undertook was the introduction of the Nautical Archaeology Society (NAS) courses to South Africa (Boshoff 1998). With the assistance of the author, courses were run in most of the major coastal cities in South Africa and even one in Namibia. One of the outcomes of the NAS program was the investigation into the British East India Company ship *Brunswick* (1805) lead by the author. Most of the participants in this project were volunteers and it was the first noncommercial underwater investigation into a shipwreck in South Africa.

Although Harris' position at the National Monuments Council was a contract position and she left after a year, the post was retained and T. Durden was appointed on a contract. In 1994, Boshoff, Durden, and Werz together with a group of businessmen formed the Save Our Shipwrecks Trust to promote the running of the NAS courses as well as starting a shipwreck route along the Cape coastline. The trust was mostly successful with the continuation of the NAS courses, but dissolved upon the death of one of the founding members (David Meaker) and with Durden leaving for greener pastures. When Durden left, J. Gribble was appointed on a permanent basis at the NMC. This would put the management of shipwrecks on a firmer footing and continue the partnership between the National Monuments Council and the South African Maritime Museum. In 1997, Boshoff and Gribble visited Australia to investigate the state of maritime archaeology in that country. They also investigated some of the premier maritime museums in Australia but, more than that, presented papers at the Australian Institute of Maritime Archaeology's annual conference. One of the outcomes of this visit was the invitation by the Queensland Museum to Boshoff and Gribble to join the 1999 field season on the wreck of the HMS *Pandora* on the Great Barrier Reef. This gave them the opportunity to gauge their skill levels on a first class large-scale underwater project.

The year 1997 also saw the resumption of the Marion Island project when Boshoff was invited by the National Monuments Council to be the archaeologist. The focus was to complete the inventory of sites started by Graham in 1989. This was largely successful with the archaeological documentation of thirteen sites as well as making recommendations for the future management of the sites (Boshoff et al. 1997). A second

visit to Marion in 1999 saw the documentation of further three sites as well as the excavation of a small boat washed up on one of the beaches (Boshoff & Van Schalkwyk 1999). Unfortunately, changes in the heritage industry would overtake this project and put a temporary halt to it.

International Perspectives

In 1985, H.J. Deacon, head of the department of Archaeology at the University of Stellenbosch, visited Australia on a fact-finding mission concerning maritime archaeology. He was especially interested in the Australian legislation and the agreement made with the Dutch government about Dutch East India Company ships on their coastline. Deacon started to get some of his students interested in maritime archaeology although this was difficult as the facilities at the University of Stellenbosch were not as conducive to marine sciences as at the University of Cape Town that had a Research Diving Unit training students in the scientific mysteries of the underwater world. The author, however, is a product of that program even though it was short-lived and inadequate.

The 1980s in South Africa was, however, politically quite a turbulent time as the struggle against the apartheid government went into overdrive. This was the worst possible timing as maritime archaeology was starting to get serious attention from Universities in this period. In the archaeological world, the academic boycott was instigated against South Africa at the World Archaeological Congress (WAC) in 1986. This was in part brought on by a motion tabled at the 1983 meeting of the Southern African Association of Archaeologists that asked for the condemnation of apartheid and other forms of discrimination by the Association. The motion was never put to a vote and delegates from Mozambique and Zimbabwe resigned in protest (Shepherd 2002). In a sense, this was the end of innocence for archaeology in South Africa as the WAC of 1986 demonstrated that politics could not be separated from the practice of archaeology. This would have a serious influence on the development of maritime archaeology in South Africa.

This naiveté would however take some time to break down and would take a new government in 1994 with the first democratic elections in South Africa before change started to filter through and archaeologists adapted to a new direction in archaeology. This "innocence" was still evident in 1988 at another shipwreck symposium organized by the National Monuments Council, the South African Cultural History Museum, and the South African Historical Wreck Society (SACHM D1/4). Speakers were a mix of treasure hunters and archaeologists. Unfortunately, it seemed as if the divers still regarded archaeology as a technique of approaching shipwrecks rather than a way of interpreting the past (Smith 1988). Archaeologists tried to explain the rudiments of archaeology (Deacon 1988), but it still did not seem as if the treasure hunters took this to heart as no projects by the treasure hunters following on from the conference attempted to address the issues raised there. This conference was further evidence of the complete disregard of the political situation in the country at the time by archaeologists and treasure hunters. One could expect this of the latter as their main motivation was profit, but it seems in hindsight that the archaeological community involved with shipwrecks at the time could have at least attempted to address the future in this context as the writing was on the wall with the many riots taking place in South Africa. Maybe it was an indication of the standing of maritime archaeology in South Africa at the time as a fledgling subdiscipline eating away at the conscience of the mainly precolonial archaeology community with the overt focus on saving a cultural resource from the economic threat of treasure hunting.

In 1999, an important event occurred for South African archaeology as the World Archaeology Congress was held that year at the University of Cape Town. For maritime archaeology, it was the first World Archaeology Congress with a session devoted to maritime archaeology. Although small and only taking place on one day, it would lay the foundation for the larger and more

complex sessions on maritime archaeology at the following World Archaeology Congress in Washington, DC in 2003.

Future Directions

From the first democratic elections in 1994, changes were on the horizon for the heritage industry. Frantic national meetings started in 1995 and many projects were put on hold. In the museum world, this would culminate in the formation of several large national institutions by amalgamating existing ones. In Cape Town, this resulted in the birth of Iziko Museums in 2000. This was a joining of the South African Museum, the South African National Gallery, the William Fehr Collection, and the South African Cultural History Museum. Of this group of museums, the South African Cultural History Museum completely lost its identity and was totally assimilated into the group. The young South African Maritime Museum became the Iziko Maritime Centre moving to much smaller premises after a losing battle with the property owner, the Victoria and Alfred Waterfront. For the next 3 years, the growing pains of the new institution caused a hiatus in new projects. For maritime archaeology at the museum, this will end with new strategic directions and new opportunities.

One of the main foci for the new Iziko Museums was to redress the imbalances of the past. The way this was approached in terms of maritime archaeology was to start an investigation to find the wreck of the Dutch East India Company slave ship *Meermin* (1766) (Boshoff 2003). Another feature of this project was that it was one of the first maritime archaeology projects funded by the National Lotteries. The other major project funded by the Lotteries was the National Survey of Underwater Heritage around the coastline initiated by the successor of the National Monuments Council, the South African Heritage Resources Agency (SAHRA).

The *Meermin* project eventually evolved into a partnership with George Washington University, the US National Park Service's Submerged Resources Center, and SAHRA as the African Slave Wrecks project funded at the start by the Ford Foundation (Lubkemann et al. 2008). Besides looking at slave shipwrecks, the project also investigated ways in which archaeology could be sustainable in the developing world mainly by considering the implementation of the SAVE (Scientific Academic Volunteer Experiential) tourism concept developed by George Washington University. The *Meermin* project also produced the first travelling exhibition on maritime archaeology in South Africa as well as a documentary, *Slave Ship Mutiny*, produced by Off the Fence Productions and screened on PBS network in the USA. Currently (2011/2012) the African Slave Wrecks project is moving into a new phase with the addition of new partners in the form of the National Association of Black Scuba Divers and the Smithsonian's new Museum of African American History by investigating what is believed to be the Portuguese slaver *Sao Jose* (1794) (NCD 1794).

In 2005, John Gribble left SAHRA and was ably succeeded by Jonathan Sharfman. Another important development at SAHRA was the creation of a second permanent post. Sharfman negotiated successfully funding from the Dutch government and with their representative, the Centre for Heritage Activities, started a skills development project to promote Underwater Cultural Heritage. This project uses the Nautical Archaeology Society courses as the basis for running annual field schools.

As the new century progress, there is much hope for maritime archaeology in South Africa. The resumption in 2011 of old projects like the investigation into seal hunting sites on Marion Island and the training of new young nonwhite female archaeologists undertaken by Iziko and SAHRA helps to steer maritime archaeology in South Africa into new and exciting directions that will hopefully establish a unique niche in the world of archaeology.

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► South Africa: Maritime Legal Management

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South Africa: Maritime Legal Management

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Introduction and Definition

The management of maritime and underwater cultural heritage in South Africa has come a long way since legal protection was first given to historical shipwrecks in the late 1970s. Legislators and managers have learned to deal with thorny issues related to the ownership, relevance to changing heritage management priorities, public perceptions and expectations of maritime and underwater cultural heritage, and the significance (real and relative) of this heritage asset's constituent parts.

Shipwrecks have been the objects of particular official and popular attention and exploration since vessels were first wrecked on the South African coast. As early as the late seventeenth century, for example, the Dutch authorities at the Cape were involved in efforts to recover silver and other cargo from the wrecks of the English

East Indiaman Joanna and the Portuguese vessel Nossa Senhora dos Milagros, both lost near Cape Agulhas. Much of this early interest was focused on contemporary shipwrecks and was salvage in the traditional sense of the concept. These historical salvage undertakings set a precedent for the next two centuries and had the effect of birthing and nurturing a popular perception among South Africans of shipwrecks, in general, as exploitable commercial resources. This perception drew no distinction between recent, contemporary wrecks and older sites with historical and archaeological value or significance, and the idea that historical wrecks had a wider meaning and value as precious archaeological windows into our common past did not appear on the national radar until well into the 1970s.

Historical Background

A Rich Heritage Resource

South Africa owes its rich underwater heritage to its geographical position on the sea route around Africa from Europe to the East. More than 2,200 recorded shipwrecks, representing 36 different nationalities are recorded in South African waters. In addition to shipwrecks, South Africa's maritime heritage includes thousands of pre-colonial shell middens, numerous coastal cave sites, and, along the south coast, an assemblage of stone fish traps. A small collection of contact period rock art depictions of sailing vessels, which are believed to have been painted by the indigenous San and Khoi peoples, link European travelers and traders with South Africa's indigenous populations, while shipwreck survivor camps and maritime infrastructure like lighthouses, harbors, and boatyards attest to the extensive and varied European maritime activities in the region.

Treasure and Tribulation

The VOC salvage operations of the seventeenth and eighteenth centuries were superseded in the nineteenth century by treasure hunting and the development of a common view of wrecks as a source of curiosities and saleable "treasure." If anything good can be said about both this early salvage work and treasure hunting, it is that the recovery of artifacts was limited and that the majority of wrecks around the South African coast remained out of reach of the available diving technology, undiscovered and undisturbed. This changed with the birth of the aqualung in the 1960s and widespread plundering ensued as divers were quick to harness the new technology to find and exploit the commercial potential of many wrecks. In a 20-year period prior to the mid-1980s, a number of wrecks with rich cargoes of specie, Eastern exports like porcelain, or nonferrous metals were found and salvaged. Collectively, these discoveries and the resulting recovery of often spectacular artifacts, coupled with the tales of treacherous diving conditions and not a few great white sharks, captured and fed the public imagination, reinforcing the perception that shipwrecks were no less than a source of treasure, to be recovered by those daring and intrepid enough to go out and help themselves. The significance of the wrecks plundered during these years, in as much as it was considered at all, was measured almost exclusively against their commercial potential. The absence of an argument for the heritage value of these sites simply entrenched South African public perceptions of the meaning and value of wrecks further.

The legal position of wrecks for much of this period was a further contributing factor in molding and entrenching the public and official view of shipwrecks. By 1969, coastal and maritime-related pre-colonial archaeological sites were protected by the National Monuments Act, by the inherent ethics of modern archaeological practices, and by virtue of them having little commercial value, but legislative protection for wrecks as a heritage asset was still some way in the future. Although a variety of domestic legislation did apply to historical wrecks, it can be argued that it was aimed primarily at dealing with contemporary or modern wrecks and was only incidentally applicable to historical wrecks (Van Meurs 1980). Nowhere was it "stated or suggested that any significance should be attached to wrecks known to be of historical

and/or archaeological interest, or that such wrecks should be specifically protected" (Van Meurs 1980: 3).

For archaeologists, the immediate impacts of this period of rapid exploration and the discovery of many wrecks were negative. There was no professional archaeological diving capacity in South Africa and archaeologists had no access to these sites or material, except where they were above the water or when material had been recovered by divers. Although some divers did involve archaeologists and museum scientists in their projects (Jobling 1982; Maggs 1984), this was the exception rather than the rule and in most instances was aimed primarily at obtaining advice on artifact identity, and hence value, rather than because there was a real interest on the part of the divers in the archaeology of the sites in question. Acceptable archaeological standards of excavation and recovery were generally not employed, detailed site recording was seldom carried out, site records were not generally made, and the publication of results seldom occurred (and then usually only selectively).

It would be disingenuous to completely disregard research carried out by salvage divers. Many did undertake historical investigations into their sites of interest, but this research was usually limited and generally fell into two broad categories, neither of which addressed the archaeological interest or significance of the sites concerned: initial research centered on identifying the location of a particular wreck, which usually fell short of examining the contemporary historical context in which the events occurred or the wider impacts of the wreck itself or the individuals involved on South African history, and research which revolved around the recovered artifacts. This was also limited and generally stopped short of examining relationships between artifacts or drawing inferences about the people or life aboard the ship and was purely descriptive.

In the final analysis, these activities were like any commercial operation, driven by profit. This meant that only certain shipwrecks and object types were targeted by divers. Wrecks that did not fall into the "treasure ship" category – slave ships, local coasting traders, or whaling vessels, for example – were unlikely to be profitable and were largely ignored. The same was true for artifacts forming the archaeological assemblages on "treasure ships." Only those of potential commercial value were of interest. The rest were ignored or discarded on site or, where recovered, offered to museums. The net result of much of the interest in South Africa's historical shipwrecks between the 1960s and late 1980s was the unquantifiable loss of archaeological and historical material and information as sites fell victim to often indiscriminate commercial salvage. In addition, the significance of this national maritime heritage was being shaped and determined by the small group of individuals who were seeking to profit from it, and this reinforced the already-skewed picture of South Africa's maritime history and heritage and its real significance to the nation and the world.

Legal Protection: National Monuments Act

As the scale of the hugely cosmopolitan underwater archaeological record in South African waters gradually became clear to archaeologists and historians during the 1970s, an appreciation of its true significance and heritage value began to coalesce. This was particularly the case among those working at coastal museums who were the first to see what was being recovered as divers approached them for artifact identification and valuation (Bell-Cross 1980; Gribble 1998). Archaeologists were slower to act on the potential of shipwrecks. The traditional preeminence in South African archaeology of pre-colonial studies meant that with few exceptions (e.g., Jobling 1982; Maggs 1984; Smith 1986), little archaeological interest was shown in colonial period (post-CE1652) archaeology and what lay beneath the waves until the mid-1980s. The national statutory heritage body, the National Monuments Council (NMC) was also slow to engage with underwater heritage and, in the absence of a stated national policy of cultural heritage protection, appeared unwilling to confront the Pandora's Box of legal, ethical, and heritage-related issues the escalating

discovery and commercial exploitation of shipwrecks had opened.

Broad national heritage legislation had been introduced in 1969 in the form of the National Monuments Act (28 of 1969). The Act contained the seeds of a national policy of cultural heritage conservation, but it was not until a decade later, in 1979, that a national cultural heritage policy that was "morally and legally justifiable" (Van Meurs 1980: 6) was crystallized, defined, and made plain in an amendment to the Act. This amendment stated that: "The object of the [National Monuments] Council shall be to preserve and protect the historical and cultural heritage, to encourage and to promote the preservation and protection of that heritage and to coordinate all activities in connection with monuments in order that monuments will be retained as tokens of the past and may serve as an inspiration for the future" (Section 2A, National Monuments Act No. 28 of 1969). This amendment (Act 35 of 1979) also included the introduction of protection for historical shipwrecks. Section 10 gave the relevant minister the power to declare as a national monument any wreck over 80 years of age which was considered to be of aesthetic, historical, or scientific value or interest (Deacon 1993).

Although the process for declaring wrecks proved to be flawed and difficult to implement, the 1979 inclusion of historical wrecks within the National Monuments Act was a critical moment in underwater heritage management in South Africa. For the first time wrecks could be legally protected. More importantly, however, this was the moment when the legal position and heritage view of historical wrecks shifted and they gained a new status and significance as heritage assets. Ironically, it was political pressure from a group of commercial salvors to protect their rights on two historical wrecks – the Santissimo Sacramento and the Dodington, both found near Port Elizabeth in the late 1970s – that was the catalyst for the introduction of this first legislative amendment, and the drafting of what was the first heritage position paper on historical shipwrecks, by the historian at the Port Elizabeth Museum (Nash 1977). This was also the moment when shipwrecks became a contested resource in South Africa. Until then, archaeological interest in wrecks had been minimal and the salvage and diving communities felt that they had both legal and moral primacy on the wrecks around the South African coast. They felt that the amendment constituted an intrusion of heritage interests into their previously exclusive domain.

Despite the inclusion of protection of shipwrecks in national legislation, there were still no diving archaeologists in South Africa, and the salvage community were quick to point out that archaeologists had no experience or understanding of the often challenging physical realities of working on underwater sites on the South African coast. They also accused archaeologists of being out of touch with reality, with rarefied and unrealistic views of what wrecks represented born of too much time spent in their academic ivory towers. In many instances this view still prevails within the South African salvage community. It has also been argued that modern South Africa has historically always tended to look inland and that, as a result, the national psyche has never fully engaged with South Africa's maritime history and underwater heritage. This influenced the nature of activities directed at the shipwreck record and may be responsible for the attitudes displayed by many South Africans towards historical shipwrecks (Brown 1987). These public sentiments and attitudes have, to some extent, guided the actions of the National Monuments Council and the policy frameworks developed for the management of South Africa's historic shipwrecks.

The NMC Grapples with Significance

Establishing and promoting the archaeological and historical significance of South Africa's underwater heritage was a major challenge for the heritage sector during the period between the 1960s and the late 1990s, and it is clear from documents of the period that the NMC was grappling with its own view of wrecks and their significance. For example, shortly after 1979, while acknowledging that the cultural value of wrecks increases with their age, the NMC also expressed the view that the wrecks around the

coast were generally not part of South Africa's cultural heritage but that of the flag state concerned, such as Portugal, the United Kingdom, or the Netherlands (Rudner 1986). Furthermore, the NMC argued, the majority of these wrecks were wooden ships smashed to pieces during violent storms and that they therefore consisted only of scatters of artifacts spread over large areas of seabed. Therefore, went the argument "only the objects themselves are of value and should be salvaged before they are completely destroyed by chemical action, sand abrasion, ... or by treasure hunters who constitute the greatest danger to them" (Rudner 1986: 2). In the NMC's view, therefore, the significance of these sites was tied firstly to "the objects themselves, [and] secondly, with the distribution on the seabed" (Rudner 1986: 2). Encouragingly the NMC did, at this stage, identify treasure hunting as a key threat to shipwreck sites.

From the contradictory nature of the elements of the NMC's de facto policy towards wrecks, it seems clear that the Council was battling to get to grips with this new and unfamiliar heritage asset. It was struggling to reconcile heritage conservation objectives with pragmatic day-to-day management considerations, all within a foggy legal landscape, and was having its first experience of the sort of unhappy salvage versus conservation balancing act that has and still does characterize national shipwreck management policies in many parts of the world. Not surprisingly, the NMC's position on the value of the underwater cultural heritage was opposed by archaeologists and historians who viewed wrecks as sensitive archaeological sites and an important national cultural asset. As far as they were concerned, the investigation of maritime archaeological sites had to proceed on the same terms that applied to terrestrial archaeology (Deacon 1985) and argued that no disturbance of these sites should be permitted by the NMC until adequate national maritime archaeological expertise was in place (Rudner 1986).

During the late 1970s and early 1980s, the repeated use in official documents of terms like "salvage" and "scientific salvage" in relation to activities on, or aimed at wrecks, including archaeological work, is a clear indication that wrecks were not yet being considered to be archaeological sites by the authorities. At the same time, it is evident that after 1979 a clearer view of the nature and importance of South Africa's archaeological record, including wrecks, was developing within the NMC and the South African heritage sector. For example, it became clear from the Parliamentary debate on the 1979 amendment to the National Monuments Act that the legislation proposed did not deal comprehensively with the issues relating to wrecks. As a result, an interdepartmental Government Committee was appointed by the Cabinet to "investigate the preservation and protection of shipwrecks and their contents with a view to possible new legislation ..." (Department of Transport 1983: 1). The Committee had the best interests of shipwrecks at heart and certainly did a good deal to ensure their protection. However, it was composed exclusively of government bureaucrats with non-archaeological views of what contributed to the significance of underwater cultural heritage sites. It is revealing that in one instance the Committee stated: "It is unacceptable ... that a wreck which is still lying on the seabed or even on rocks or on the shore ... be declared a national monument. The wreck cannot be attended to in such a condition, neither (sic) can it be cleaned, repaired or safeguarded and above all, it cannot be of value to the general public" (Department of Transport 1983: 21). This view of what constituted a national monument is clearly based on the traditional definitions of such monuments, drawn from the built environment.

Site significance also did not drive the NMC's attempts to protect underwater heritage in the 1970s and 1980s. Exerting control over activities aimed at wrecks drove protection, rather than the heritage significance of the sites themselves (Brown 1987). This changed in a NMC policy decision in the early 1990s in terms of which the date 1850 "should be taken as the date to divide the ships of higher historical and cultural interest from the later, less significant iron ones" (Brown 1987: 1). Although this division has its

obvious flaws, it can be read as a genuine attempt to engage with the archaeological asset and make a clear statement of value about the remains of earlier, wooden sailing vessels. Following this decision, the NMC only issued permits for activities on pre-1850 wrecks in exceptional circumstances.

Archaeology Begins to Make a Mark

For much of the period discussed above, archaeological interest and involvement in underwater heritage-related work was reactive, driven by the need to have archaeological oversight and guidance on what were, in essence, licensed salvage projects. Only during the late 1990s did a change occur, partly the result of a fledgling maritime archaeological capacity but also because of tighter legislation and the NMC's engagement with, and commitment to, managing historical wrecks as part of the nation's cultural heritage. South Africa's first maritime archaeological appointment was a teaching and research post created at the University of Cape Town in the late 1980s. At about the same time, the former South African Cultural History Museum (now part of the IZIKO Museums of Cape Town) also employed its first maritime archaeologist. The NMC followed in 1993 when it began the compilation of an inventory of historical shipwrecks in South African waters (Gribble 1996). A temporary post of maritime archaeologist was created to develop this database and 3 years later the Council confirmed its commitment to underwater heritage by making the post permanent.

This small core of professional maritime archaeologists was the catalyst for a number of research and conservation initiatives, like "Operation Sea Eagle," a major interdepartmental underwater survey of the waters within one nautical mile of Robben Island undertaken in 1990/1991. This early foray into the holistic management of shipwreck sites took place under the joint auspices of the government departments then responsible for the management of the island and aimed to provide an assessment of its underwater cultural resources at a time when its post-apartheid future was being considered (Werz & Deacon 1992; Werz 1993). Other early areas of research pursued by South Africa's maritime archaeologists include the archaeology of sealing and whaling, which begun with a project to document seal-hunting sites on South Africa's sub-Antarctic Prince Edward Islands (J. Boshoff *pers. comm.*; Boshoff et al. 1997). Work continues on this project and it is also anticipated that it will in future be expanded to include a survey of coastal whaling sites within South Africa.

Key Issues/Current Debates

In 2000 the National Monuments Act was replaced by the National Heritage Resources Act (Act 25 of 1999), which established the South African Heritage Resources Agency (SAHRA). SAHRA's maritime archaeologists have worked hard to change and expand public perceptions of maritime archaeology and to develop a new national understanding of the significance of underwater heritage. The new legislation has facilitated this new focus by providing the same clear level of protection to maritime sites as had been given to terrestrial archaeological sites since the 1980s. One area of the new legislation which has and continues to be an issue for underwater heritage is the provision which allows the controlled sale and export of archaeological artifacts. Included in the Act to control the movement and export of collections of archaeological material in private hands, this provision has been seized on by treasure hunters to question SAHRA's de facto post-2000 ban on historical shipwreck salvage.

Although the Act does not state unequivocally that the commercial exploitation of historical shipwrecks is banned, the inclusion of wrecks under the definition of "archaeological" in the legislation and the fact that ownership of all archaeological material is vested in the State effectively remove shipwrecks and their contents from the realm of commercial salvage. After 2000, SAHRA began closing the door on the commercial salvage of historical wrecks and in 2003–2004 SAHRA introduced a Shipwreck

Policy aligned with the UNESCO Convention on the Protection of Underwater Cultural Heritage and the Annex attached thereto. The Shipwreck Policy essentially outlawed commercial salvage and the issuing of salvage permits for any wreck older than 60 years by requiring the application of the rules of the Annex to any future shipwreck investigations. By 2005, however, SAHRA was forced to repeal its Shipwreck Policy after legal advisors adjudged it to be in conflict with the National Heritage Resources Act of 1999 and its associated regulations and suggested a return to the permitting system introduced in the 1980s. As a compromise a transition period was agreed, during which SAHRA undertook to consider salvage-based applications. A revised National Shipwreck Policy has been prepared by SAHRA and the national Department of Arts and Culture (DAC) but remains unimplemented as DAC considers the budgetary and others costs of implementation. The new Act has put the onus on the archaeologists at the SAHRA and other institutions to promote maritime archaeology and underwater cultural heritage, its significance, and the reasons for protecting of maritime sites. It is now up to archaeologists to develop and encourage a public view of scientific investigation and excavation of this national, publically owned asset as a better alternative to salvage for the personal gain of a few individuals. To do this, maritime archaeologists in South Africa must wean the diving community and the wider public off the traditional, salvage-driven perceptions of historical shipwrecks and persuade them that the real attraction, value, and importance of these sites and objects lie in their archaeological and scientific potential and the human stories they can tell. While legislation can offer wrecks legal protection, real protection – the type that will stop treasure hunting and looting – can ultimately only come from a changed public view. The focus for SAHRA in recent years, therefore, has been on changing attitudes and expanding the public understanding of underwater heritage though education and participation. Its maritime archaeologists have thus been working to create an inclusive culture around maritime and underwater cultural heritage, and this has been marked, inter alia, by projects and work that reflect the heritage value and significance of South Africa's underwater heritage – in contrast to the historical situation where value and significance was defined and driven by a small group whose primary interest in underwater heritage and motivation for being involved was commercial. Projects aimed at the less well-publicized aspects of South Africa's underwater archaeology have been set up and brought into the public eye through the media. These projects include two National Lottery-funded initiatives – the National Survey of Underwater Heritage and the Meermin Project – and a capacity-building program funded by the Dutch government.

International Perspectives and Future Directions

Heritage legislation, the National Survey of Underwater Heritage, and the Dutch-funded Maritime Archaeology Development Programme appear to be bearing fruit with noticeable changes in attitudes towards underwater cultural heritage. Although progress has been slow, divers and others who use these sites are more aware of the legislation and the reasons for it and have taken a greater interest in protection of underwater sites. Local communities living near wreck or maritime heritage sites have begun to take ownership of these sites and are reporting transgressions against the heritage more often. The Department of Arts and Culture is also considering the ratification of the 2001 UNESCO Convention, and there is increasing political interest in underwater cultural heritage.

From a heritage management perspective, archaeologists and heritage professionals are adjusting to their new roles. New initiatives for policing must be developed, including community policing, volunteer programs, and interdepartmental and interagency cooperation. Archaeological foci must change from the simple description of sites and artifacts to social and theoretical studies, and new ways must be found to fund maritime archaeological work, develop and increase capacity, and protect sites. To be

successful, South Africa must begin to look beyond its own shores: its underwater heritage assets represent a multicultural and multinational shared heritage, and for effective future management, it is going to be essential therefore to look more widely at cooperative projects, international partnerships, and global initiatives.

Cross-References

- ▶ Ship Archaeology
- ▶ South Africa: Heritage Management
- ▶ South Africa: Maritime Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime

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South America: Lithic Industries

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Introduction

The lithic industries of South America constitute a privileged archaeological record for the reconstruction of the modalities for human settlement of this region, relatively recent on a global scale, and the techno-cultural identities of the human groups who occupied it.

Often focused on bifacial projectile points, studies have nonetheless demonstrated an impressive range of variability in knapping concepts and technological solutions employed by the first inhabitants of this vast and varying landscape. Our knowledge of such techniques is not yet as refined as in other parts of the world. It is, however, already possible to identify the broad developmental lines of these lithic industries and to distinguish techno-cultural groups relatively well defined in time and space.

Definition

The lithic assemblages form the principal evidence of the very first human activities on the continent, probably starting in oxygen isotope stage 3, less than 50,000 years ago. Use of stone persisted until contact with the first European colonists at the beginning of the sixteenth century and often even after. The major originality of South American prehistory is the expansion of human settlement of this subcontinent, linked in part to two elements: (1) the relative isolation of this area, flanked by two vast oceans and accessible by land via a narrow isthmus and (2) the recent date, on a global scale, of the first human presence. The approach to the history and evolution of techniques on the continent is thus limited to a much more restrained timescale than elsewhere. These techniques underwent a unique sequence of development, which appears to have been linked as much to local dynamics as to external contributions.

From a strictly technological viewpoint, the main characteristics of the South American lithic industries are common to all prehistoric lithic production systems. The broad families of knapping techniques are found in all of the industries in South America: shaping, which can be bifacial or unifacial; reduction processes, represented by concepts considered little developed but also sometimes by laminar, lamellar, and Levallois concepts. Similarly, most of the known knapping techniques are represented here: direct stone percussion, bipolar percussion on anvil, direct organic percussion, and pressure flaking. It is thus with the same methodological kit used elsewhere that these lithic industries are examined and in particular by technological, techno-functional, and use-wear approaches.

However, the South American lithic production systems are not devoid of originality, because while lithic knapping concepts are finite, methods of exploitation of stone and especially knapping objectives, that is, the intended tools,

can be represented by a number of aspects. In the specific context of South American prehistory, new technological solutions were invented. These particularities are discussed below.

Historical Background

Apart from rare ethnographic comments by chroniclers and the first European voyagers, the earliest references to the South American lithic material date to the mid-nineteenth century. As for most of the continents at that time, what really matters is not the lithic artifact as evidence of a specific technological activity but rather as the marker of a human presence in the distant past. This is the case, for example, for the pioneering research of the Danish intellectual P. Lund, who sporadically mentioned the lithic material recovered during his excavations around 1840 in the Lagoa Santa region (Brazil) to support his discoveries of human remains found in stratigraphic layers assumed to be very old (Fig. 1).

It is also in this context of debate on the antiquity of human occupation of the Americas that F. Ameghino would use, at the beginning of the twentieth century, complementary to the bones discovered, the lithic material recovered on the pampas to propose his hypothesis of an Argentine origin for our species. This theory was vigorously discussed, notably by A. Hrdlicka, but the positive effect of this debate led to more detailed analyses of the lithic material. As a direct result, one of the first rigorous and in-depth studies was carried out by W. Holmes, on artifacts collected by A. Hrdlicka during surveys along the northern coast of Argentina. These were principally cobble industries, transformed by pecking, percussion, or knapped using the bipolar on anvil method. This material, coming mainly from surface collection, is of undetermined age. The 1912 publication presents many innovative elements: in addition to an initial typology and many illustrations of excellent quality, we find comments on the criteria for raw material selection by the knappers and on the modes of production for stone tools, with some experiments on knapping techniques (Hrdlicka 1912).

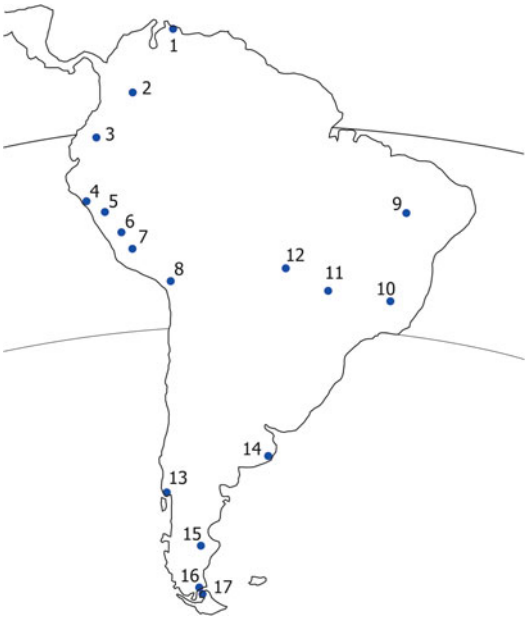

South America: Lithic Industries, Fig. 1 Distribution map of the archaeological sites mentioned in the text. *1*: Taima-Taima, Venezuela; *2*: El Abra, Columbia; *3*: El Inga, Ecuador; *4*: Paiján; *5*: Guitarrero cave; *6*: Telarmachay; *7*: Pikimachay; *8*: Asana, Peru; *9*: Pedra Furada and Sítio do Meio; *10*: Lagoa Santa region; *11*: Serranópolis; *12*: Santa Elina, Brazil; *13*: Monte Verde, Chile; *14*: Cerro La China; *15*: Los Toldos, Argentina; *16*: Fell's cave; *17*: Cabo San Vicente, Chile

It is only in the 1930s that the lithic material was studied in its own right, as evidence of prehistoric human identities and activities. One of the key figures in research at this time is J. Bird, who excavated main sites in Patagonia (Bird 1988). Based principally on bifacial projectile points that he discovered, Bird established a typology structured in successive chronological phases. In 1950, with the invention of radiocarbon dating, Bird's studies took on a new dimension: the dates obtained for the earliest phase that he defined were older than 10,000 years at Fell's Cave, dates much older than anticipated. Considering the settlement theories and data obtained from North America, these dates would imply a very rapid movement of the initial occupants to the south. Following these discoveries, the lithic industries found in South America would have a tendency to be systematically studied through the filter of what is known in the north.

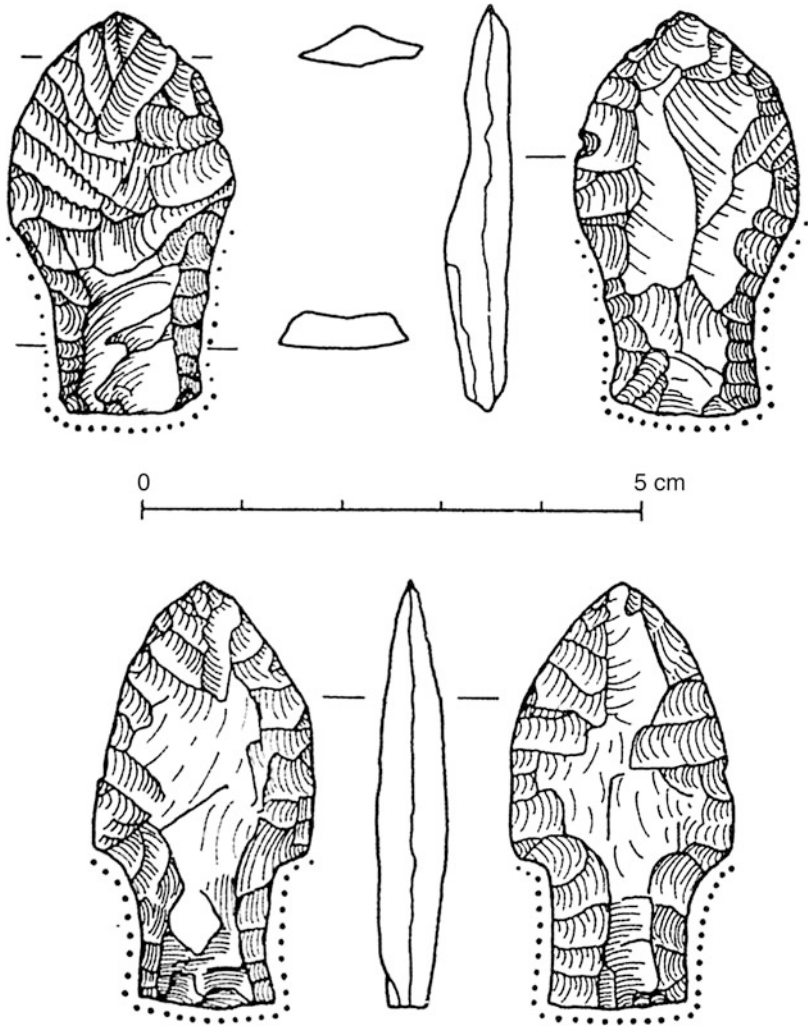

South America: Lithic Industries, Fig. 2 Two fishtail points from Cerro La China, Argentina (From Zárate & Flegenheimer, 1991: 288, detail) (Courtesy of Nora Flegenheimer)

In the South American material, one would thus look for markers typical of the Clovis culture, assumed to be the oldest in the Americas. The Clovis point, a bifacial foliate armature with a fluted base, is the emblematic element of the first assumed industries in North America. It is not found in South America, but the discovery of bifacial projectile points with small thinned tang (called "fishtail" points) by J. Bird in the early layers at Fell's Cave suggested a southern adaptation of the North American point. This hypothesis was all the more followed when it was seen that fishtail points were not confined to Patagonia but were also common further to the north, in the Pampas (Fig. 2) and also on the Pacific coast in Peru and Ecuador, for example, at the site of El Inga.

This view of the Clovis culture as the sole origin of all human (and thus technological) manifestation in the prehistory of the Americas would dominate throughout the second half of the twentieth century and even today still have its supporters. However, in the 1960s and 1970s, a few dissenting voices made themselves heard. Based on the position maintained by A. Krieger, according to which the first American lithic industries lacked bifacial projectile points, A. Bryan argued that South American industries with projectile points at the Pleistocene-Holocene transition and during the

Early Holocene resulted from evolution from a local Pleistocene substrate (Bryan 1999). He thus argued against the idea that all South American lithic technology was due to migration from the north.

Such "liberation" of South American prehistory from its influence from the north would open the field to consider the variability within the lithic industries, both spatially and diachronically. From then on, true technological groups would be described, not only on the basis of bifacial projectile points, thus revealing the considerable variety of industries within South America. So, in the 1960s–1970s, the Abriensian would be defined by G. Correal and T. Van der Hammen, later termed the Edge-Trimmed Tool Tradition by W. Hurt, in central Colombia, the Paijanian by P. Ossa in northern Peru, the Andean Biface Horizon by E. Lanning in the Andes mountains, the Itaparica Tradition by V. Calderón and then P. Schmitz in central and northeast Brazil, the "Cerca Grande" complex by W. Hurt and O. Blasi at Lagoa Santa, the Umbu and Humaitá Traditions by E. Miller in southern Brazil, the Toldensian and the Casapedrensian by O. Menghin, and then A. Cardich in Argentinean Patagonia, to cite only a few (Dillehay 2000; Lavallée 2000).

As on the other continents, the approach to the lithic industries in South America would undergo significant changes during the 1970s. Very generally, two broad trends developed. The first, influenced by the Anglo-Saxon school, is characterized by a new perspective with respect to the material and the questions that can be addressed by it. Cultural questions and definitions of technological groups take second place in particular to processes, spatial organization, social evolution, and modes of adaptation to different environments. Lithic raw material analyses, their nature, provenance, and mode of circulation, develop considerably, especially in Argentina. The second trend is the result of a methodological approach rather than a change in perspective. Questions of a cultural order remain at the heart of research problems, behavioral approaches not being as excluded as in the first trend. This approach is based on the observation according to which the typological approaches to the material thus far are not sufficient for a complete understanding of the lithic material. The definitions of cultural groups by a simple list of types are seen as scarcely operational. A new, more technological, approach to lithic production was thus developed. Research is no longer focused only on the tools made but also examines the technological processes and the knowledge and know-how applied by the knappers. This approach, coming out of French research on lithic technology, is particularly heuristic for the interpretation of the differences observed between collections. Technological studies thus enable reevaluation of the validity of the previously defined cultural units and rationalization of the increasingly marked trend during the 1970s to create a new group, a new "tradition" or "culture" at each new site discovered. We note, among the studies done in this perspective, those of C. Chauchat and J. Pelegrin on the Paijanian industries (Chauchat et al. 2004), H. Nami on the Levallois debitage in southern Patagonia and Tierra del Fuego (Nami 1992), and more recently, the analyses of N. Pigeot, also on Patagonian material (Pigeot 2003).

With the rise of local research centers, the discovery and analysis of lithic assemblages have considerably multiplied in South America over the last two decades. Approaches remain most often more typological than technological, but knowledge has improved in the broad regions previously unknown, and the chronological framework for the analyses has expanded to include the periods as recent as the end of the Pleistocene and the Early Holocene. New methods to analyze the industries has also seen significant development, such as the techno-functional analyses in Brazil, which enables the finished products (tools) to be once again included in the discussion of technological processes and intentions (Fig. 1).

Key Issues

What Do the Points Tell Us (or Not)

Throughout the Americas, projectile points are the most commonly exploited artifacts in the

lithic assemblages to address the questions of human settlement, spread, and circulation during prehistory. The contours of such points enable definition of types, for which one attempts to perceive development through time and to interpret the meaning of their distribution across space. To the north, this typological approach has been proven and the chronological and geographic limits of the different categories of bifacial foliate points (Clovis, Folsom, Plano, etc.) can be clearly followed. In South America, attempts at typology on a continental scale are not lacking, but apart from a few zones, this approach has not been particularly fruitful. This may be due first to the near complete absence of points in vast regions, such as central and northeast Brazil. In addition, the defined types often have a limited spatial distribution and are represented by fairly low frequencies.

Fishtail points are, however, an exception. These short bifacial points, with convex edges and a tang often thinned by what is interpreted as a small flute, have been found in Argentina, Chile, Peru, and Ecuador, in contexts dating to the Pleistocene-Holocene transition (Fig. 2). This flute has led to many publications regarding the possibility of the relationship between the fishtail point and the Clovis point. Dominant in the first half of the twentieth century, this interpretation of the fishtail point as a development of its homologue to the north is today far from being unanimous. The only argument of the "flute" is quite weak since technological studies have demonstrated that, in most cases, these small removals thinning the tang were made during the shaping phase of the piece and not at the end of the production phase. They are thus not truly flutes or grooves. Therefore, several authors attribute a possible South American origin to this type of point (Politis 1991), and some even argue that there is not a single fishtail point type but several, each with its own regional origin and that their similarity is due to morphological convergence (Borrero 1983 cited in Nami 2010). Many other types of projectile points have been defined in South America, such as the "El Jobo" lanceolate point in Venezuela, the long-tanged point of Paiján type on the northern coast of Peru, and the Ayampitín point, one of many Andean point types. These artifacts were made by bifacial shaping with soft percussion, sometimes completed by a phase of pressure flaking. But fishtail points, probably the most studied type and for which the spatial distribution is the largest, are particularly representative of the limited potential of projectile points for approaching questions going beyond a regional scale. The principal danger of all morphological interpretations is the convergence of forms. To prove the existence of a historical link between two types of artifacts, one may ask, "Is the simple criterion of form really valid?" These variations between projectile points indicate limited technological differences, since the technical knowledge and skills needed are overall the same regardless of the kind of point produced and, excluding a few specific cases, the functional intentions appear to be similar. This variability may be linked to technological procedures related to different hafting modes. However, these differences may rather evidence, at least in part, stylistic variability, in other words, relatively versatile traits of technological productions that are difficult to follow for prehistoric periods. These traits are not necessarily markers of significant differences between the human groups studied.

The development of technological approaches to lithic assemblages has shown that, in order to estimate the degree of difference between several assemblages, it is necessary to study them at the scale of shaping concepts and not be limited to simply the forms resulting from application of such concepts. The profusion of publications on projectile points has had a tendency to overshadow the rest of the lithic industry, which forms the overwhelming majority of material recovered, and represent a potential often little exploited to study the development of techniques on the continent and the definition of cultural groups.

Industries of the First South Americans

Often mentioned to question their age or to discuss their human origin, South American industries dating to the Pleistocene are more rarely examined from a technological view. The earliest

lithic productions discovered would date to oxygen isotope stage 3. At Pedra Furada (Brazil), a production based solely on quartz and quartzite cobbles has been found in layers dating between 50,000 and 15,000 BP (Parenti 2001). These cobbles were shaped into different classes of massive tools by uni- or bifacial removals and were knapped in the aim of obtaining flakes. Such reduction was organized into short series of removals, generally unidirectional. Bipolar on anvil reduction has also been identified. Most of the flakes obtained are cortical and sometimes retouched. At Santa Elina (Brazil), the toolkit from stratigraphic assemblage III, dating to around 25,000 BP, was obtained from limestone plaquettes and flakes (Vilhena Vialou 2005). The latter were produced via simple reduction. The supports were sometimes retouched, generally by abrupt retouch, in order to create concave or denticulated edges. In layer MV-I at Monte Verde (Chile), dated to around 33,000 BP, a few pieces of knapped basalt were found, including a core showing the production of small flakes in unidirectional series.

These early lithic industries are thus always very simple. The tools are essentially made of natural untransformed volumes (cobbles or plaquettes) on which only the edges were retouched. Tools are also sometimes made on flakes. These come from reduction processes in which the cores were subject to short series of removals without prior preparation. Shaping is absent in these industries.

Sites dating to the end of the Pleistocene, between 15,000 and 12,000 BP, attest in particular the appearance of bifacial shaping. This appears to be associated from the start with the production of projectile points, as at Taima-Taima (Venezuela) and layer MV-II at Monte Verde (Dillehay 1997). In these two cases, lanceolate bifacial points were found. These are elongated, untanged, shaped by soft percussion, and traditionally associated with the El Jobo type. The production of tools on natural supports (cobbles or plaquettes) and on flakes obtained by short series is still present, either in association with shaping activities, as at Taima-Taima and Monte Verde, or exclusively, as at Sítio do Meio (Brazil) and Pikimachay (Peru). Monte Verde is further set apart by the discovery of ground stones, including two small grooved cobbles.

Flaking Systems and Main Technocomplexes

The objective here is not to list, site by site, the lithic material produced. This section being thematic, a purely chronological organization is not presented but rather an overview based on the principal technological systems encountered throughout South American prehistory. This is, of course, a very general and fragmented summary, the reflection of current knowledge on this topic.

Ubiquitous "Simple" Reduction Process

Flake production from "simple" reduction processes are found throughout the continent, in all time periods and in significant proportions during South American prehistory. Such omnipresence has, in a way, slowed detailed studies of the lithic industries. Indeed, what can be said, from a typological viewpoint, of an industry where no standardization of products can be clearly seen? A technological approach to these industries, and in particular to the cores, enables the observation that reduction is structured in relatively short series, often unidirectional, in which the sequence of removals is based on naturally present criteria of convexity, without advance preparation of the block of raw material. It is possible to differentiate groups of methods by the mode of core management: number of flakes produced by series, organization of removals within a single series, number of series per block, and organization of these series on a single block (Fig. 3). Knapping techniques also offer a second degree of differentiation of the industries: all of this reduction is carried out by direct stone percussion, but some cores were exploited by launched percussion, without support, and others by bipolar on anvil percussion. Bipolar on anvil percussion is effectively common through the continent, particularly when knapping small volumes.

Description of intentions, or the classes of intended tools, forms another criterion of variability for this type of production. This is without

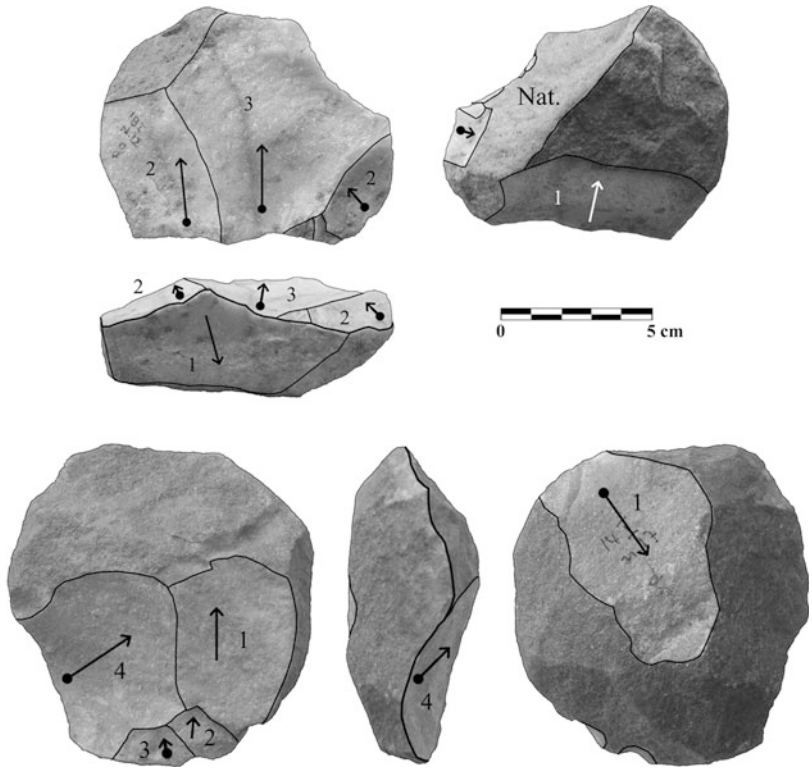

South America: Lithic Industries, Fig. 3 Two cores from Serranópolis, Brazil. Reduction is structured in short unidirectional series, without advance preparation of the block of raw material (Photos by A. Lourdeau)

doubt the most significant criterion to isolate techno-cultural groups. For such industries without standardization of blanks, the typological approach, which aims to identify artifact classes based on form, is not suitable. Determination of flaking objectives must be done by a techno-functional analysis that combines tool production schemas, the volumetric structures of the tools, the functional potentials of their active parts, and modes of grasping or hafting. Such analyses, still rare, have enabled identification, for example, in central Brazil during the Early Holocene, of the systematic intent to create short tools with a concave or denticulated edge opposite a back on flakes produced by "simple" reduction (Mello 2005).

Regions Noted for the Development of Bifacial Shaping

The utilization of bifacial shaping is observed from the end of the Pleistocene in several regions of South America, in particular for the production of projectile points. In addition to these armatures, the use of bifacial shapes also enables the creation of a broad range of tools, varying as much as tools on flakes. One of the areas notable for the development of bifacial shaping to produce a wide range of tools is the Central Andean zone. In several sites dating from the end of the Pleistocene to the Late Holocene, including Guitarrero, Telarmachay, and Asana in Peru, bifacial shaping constitutes a privileged mode of blank production (Lynch 1980; Lavalleé 1985). The different types of projectile points generally represent more than half of such production, but a varied toolkit is also sought. Bifacial artifacts that are not point have had a tendency to be considered, sometimes with reason, as point preforms abandoned during the production process. However, many of these are clearly finished tools, with edges prepared by fine retouch (Fig. 4). They are supports probably destined for different functions and are comparable in this sense to the "bifaces" (or "handaxes") known in the Old World in earlier periods. The Andean bifacial pieces are always associated, in the

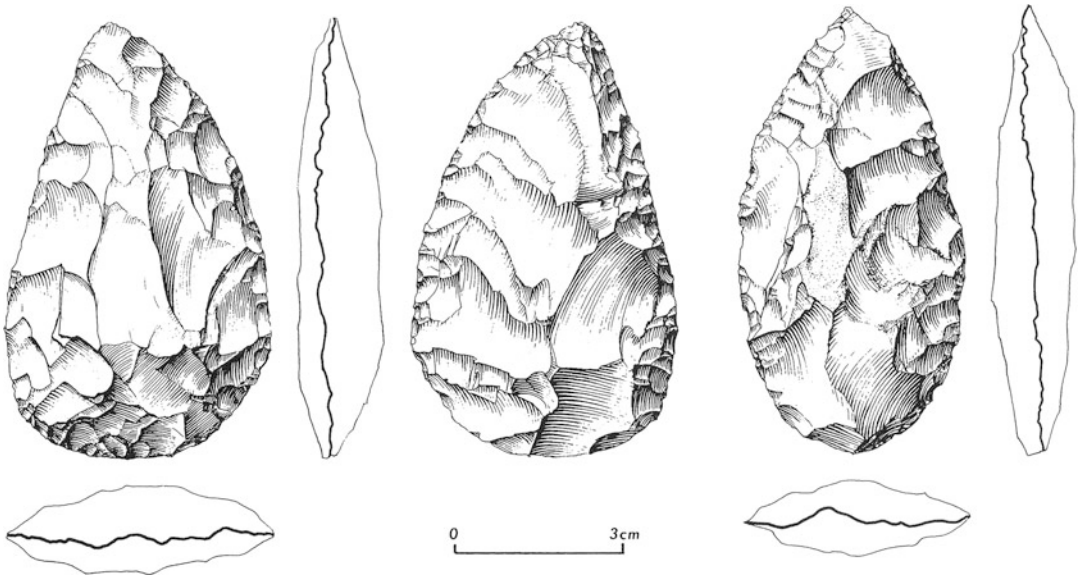

South America: Lithic Industries, Fig. 4 Two bifacial artifacts form Telarmachay, Peru (Drawings by C. Chauveau, from Lavallée, 1985: 170-1, detail) (Courtesy of Danièle Lavallée)

archaeological assemblages, with many unifacially retouched flake tools.

In southern Brazil, bifacial retouch is also a technological solution especially used to obtain tool blanks in archaeological assemblages of the Umbu and Humaitá traditions, dating from the Early Holocene to more recent periods (Hoeltz 2005).

"Complex" Reduction Methods Still Less Tangible

The existence of exclusively blade production has long been known in Patagonia, in particular in the Casapedrense layer at Los Toldos, in Argentina (Middle Holocene) (Cardich & Flegenheimer 1978). Yet the technological traits of this reduction process and its geographic extension and development through time are still difficult to determine, due to lack of technological studies of the collections. Some indices of this type of production are also mentioned for more northern zones, in northwest Argentina and southern Brazil (Hoguin 2012). Based on the available data, this is clearly a reduction system in which the entire core is structured to produce only blade, the angle and front being maintained during the production of these blanks. The block is at least partially prepared (presence of crests), and the technique used is hard or soft percussion. No pressure flaking has as yet been described in South America. "Blades" and "bladelets" are mentioned in several other regions, but, given the lack of detailed description of the cores, it cannot be excluded that such elongated blanks could have been obtained during non-elongated flake production.

Predetermined flake production from cores for which the volumetric structure is identical in all respects to the Levallois system in the Old World has been identified by H. Nami in Patagonia (Nami 1992). Levallois reduction, until then known in quite different geographic and chronological contexts, is present in Patagonia with the same variability as elsewhere: preferential and recurrent flake methods have been described by F. Morello at Cabo San Vicente, Tierra del Fuego (Morello 2005) (Fig. 5). For now, this reduction system is limited to the extreme southern tip of the continent, in contexts dating to the Late Holocene. Based on the traits of some of the published flakes, it could, however, extend across a broader area and go back to earlier periods.

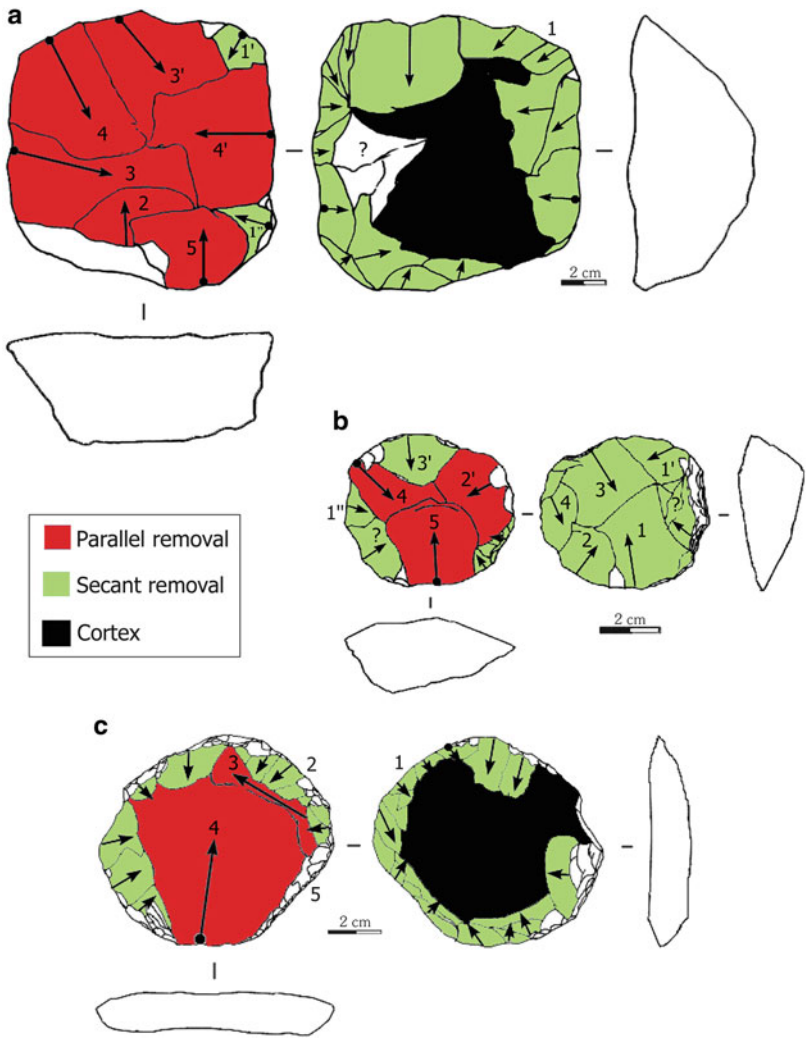

South America: Lithic Industries,
Fig. 5 Levallois cores from Cabo San Vicente, Chile. (**a**) and (**b**) Recurrent flake method; (**c**) Preferential flake method (From Morello, 2005: 40-1, modified) (Courtesy of Flavia Morello)

Unifacial Shaping: An Original Technological Solution?

Unifacial shaping constitutes a fairly common mode of blank production in South America between the end of the Pleistocene and the mid-Holocene. This is a relatively original solution with respect to the history of lithic flaking techniques, situated between shaping and reduction. The procedure consists of shaping large flakes only on their dorsal face, while the ventral face is never directly modified. The volumes obtained in this way are generally elongated, with an overall plano-convex section. Such pieces differ from flake tools with unifacial retouch by the fact that the removals after knapping clearly alter the initial volume of the blank and are not intended only to create or modify the active parts of the tool. Unifacial shaping is observed essentially in central and northeast Brazil in the Itaparica technocomplex (Lourdeau 2010). Detailed analysis of the Serranópolis collections have enabled determination that the tools obtained, often termed limaces, systematically have a symmetrical transformative part at one end, with a rounded, pointed, or transversal rectilinear delineation (Fig. 6). The analysis has demonstrated that these blanks were probably destined for several different functions and a single piece could have several independent functional parts on the ends and/or the

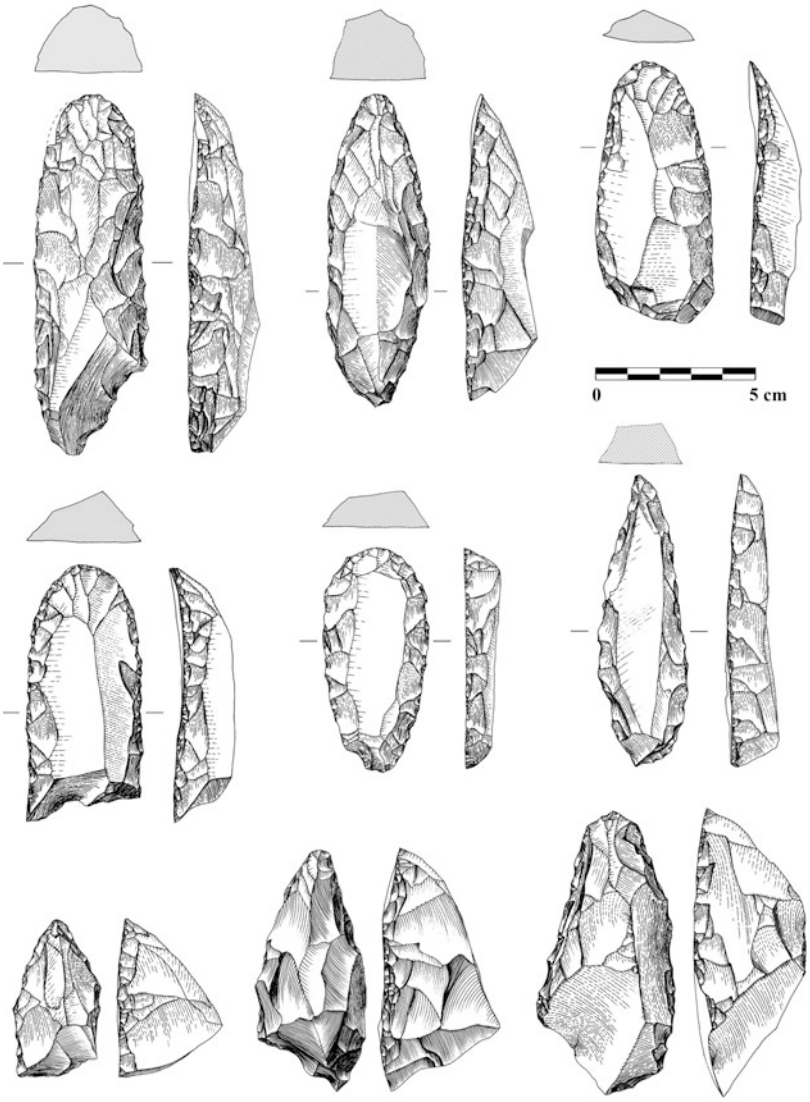

South America: Lithic Industries, Fig. 6 Unifacially shaped artifacts from Serranópolis, Brazil (Drawings by A. Lourdeau)

lateral edges. These are thus, like some bifacial pieces, supports for varied tools. Similar pieces exist further to the west, in Peru, Ecuador and Colombia, and to the south in Argentina, also dating to the Early and Middle Holocene.

This rapid overview of the main technological solutions that can be encountered in the South American lithic industries enables one to appreciate the significant variability in lithic production. One finds most of the concepts, methods, and reduction techniques known in other regions, but their position in time and space remains difficult to determine. To this can also be added certain uniquely South American practices, such as unifacial shaping, a practice that has not as yet been observed elsewhere.

International Perspectives

Despite a certain idea of isolation associated with South American prehistory, full understanding of the South American lithic industries requires an overall vision of these productions. Only such a broad perspective enables us to attempt to interpret the variability in the lithic industries,

determine their local or external origin, and thus explain the dynamics of human settlement of South America.

One can consider the signification of the very first lithic industries here. They are still fairly poorly understood but are based only on natural volumes or blanks produced by simple reduction. These productions are fairly out of sync with the development of contemporaneous industries on other continents (with the exception perhaps of East Asia). Is this local development or should we look elsewhere for the origin of such production systems? One or the other of these alternatives involves in its turn many questions.

As for bifacial shaping, this technique appears abruptly in the form of projectile points without intermediary stages. Based on data for the development of bifacial shaping observable in other regions, its presence in South America could thus be interpreted as an external contribution, already at a certain stage of development.

Unifacial shaping, in contrast, appears to have had its own unique development in South America. A few examples of limaces have been mentioned in North America, but as yet nothing described is comparable to the productions in the Itaparica technocomplex. In Southeast Asia, the Hoabinhian is also known for its unifaces made on cobbles. However, important differences exist between these and the South American industries with respect to concepts of volumes and tools.

The example of the lithic industries of South America, and the singular context of its prehistory, may in addition enable understanding of certain important phenomena for the global explanation of technology (Boëda 2005). How better to illustrate technological convergence, that is, the independent development of two similar flaking systems, than by the example of Levallois reduction in Patagonia? The lack of geographic and chronological continuity with the Levallois of the Old Word is so obvious that it excludes any hypothesis of diffusion. South American blade production, while still lacking detailed technological description, would appear to be another example of convergence.

Future Directions

The next few decades should be decisive for the study and explanation of the South American lithic industries. The creation of new research centers, as well as a return to detailed studies of the material (relatively neglected for awhile in favor of more general considerations) but with more rigorous methods, foreshadow a clear increase in technological analyses of the modes of blank production and the tools which are the objective of such reduction. These new studies, coupled with new dating programs (particularly by OSL), should enable refinement of the regional sequences and offer the possibility of reconstructing a general framework for the development of lithic industries on a continental scale. New approaches, particularly use-wear analysis, will widen the field of knowledge of this material.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Bird, Junius
- ▶ Handaxes and Biface Technology
- ▶ Hrdlička, Aleš
- ▶ Lithic Technology, Paleolithic
- ▶ Monte Verde, Archaeology of
- ▶ Mousterian Industry Tradition
- ▶ Paleoindians
- ▶ Pedra Furada, Archaeology of
- ▶ Peopling of the Americas
- ▶ Technological Studies in Archaeological Science

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South American Archaeology: Postcolonial Perspectives

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Introduction

Problematic Entrance as Entrance to the Problematic

A South American postcolonial perspective on any problem involves, first and foremost, a consideration of whether or not South America is a place from which it is possible to have such a perspective. If such perspectives are indeed postcolonial, this suggests two possibilities: (1) that they were later to a colonial experience or (2) that they were inspired by a body of theory and assumptions designated as postcolonial. Those options are external because they could mean that the colonial experience is a thing of the past – thus post – or that postcolonial theory is something that you can embrace or reject as any other theory. However, that the colonial experience, on the one hand, was not surpassed by political independence and, on the other hand, is constitutive of subjectivity becomes immanent to the perspective and not external to it. Whether we call it postcolonial or otherwise, the colonial experience is immanent to the place of these theories. The postcolonial world, in this case, is more a pre-theoretical condition than a theoretical framework, i.e., more a condition of thinking, of knowledge, than a knowledge about a delimited field of content. Moreover, once introduced into theory, that postcolonial pre-theoretical condition is, at the same time, metatheory, i.e., it is theoretical knowledge about theory and its conditions. Finally, as knowledge about the conditions of knowledge, it leads through to the possibility of overcoming the conditions of coloniality, something which has been designated as a decolonial option.

If, even more, these South American postcolonial perspectives are given in the disciplinary framework of archaeology, two other issues must be weighed: (1) the object-history of archaeology established as prehistory, i.e., a historical narrative of a time without history, i.e., as an anomalous history, and (2) the importance of disciplining and institutionalization in the demarcation of the boundaries of the object-history, demarcation which is, at the same time, of the subjectivity of history.

Finally, if we try to make history of these perspectives – as this entry suggests – we could either consider history as a narrative of what happened objectively and externally or recognize from the beginning that history itself – its idea, its method, and its scope – is an integral and active part of colonialism and the conditions of possibility of postcolonial (and even decolonial) archaeologies in South America.

Key Issues and Current Debates

Colonial Designations and the Place of Theory

I shall begin with the first of the assumptions referred to in the preceding paragraph: that South America is a place from which a perspective on archaeology can emerge. This, again, leads to the colonial question, at least in two senses. It is clear that South America (or Latin America, or Ibero America, or Hispanic America, or any of the usual geographical categories) is the result of the history of colonial designations. America was not a geographical name or its real referent until 1507 when Martin

Waldseemüller baptized it with the name of Amérigo Vespucci (what the Spaniards called then *the Indies*). At this point, it might be thought that this discussion is about a mere question of naming, and to some extent it is. It also happens that the act of naming has implications with respect to what is understood as the external reference to the name. For instance, America began to be *one* thing from that moment, i.e., a thing that was able to be designated by a single name. And, in addition, that thing that became America could, by the mere fact of the designation by European cartographers, be stated by its name from Europe (Mignolo 2007).

The designation of America, therefore, like any colonial designation, involved the appearance as one thing or category of what the name lawfully represented, as well as the appearance of a lawful enunciator of that thing. Whatever America is, then, becomes what is enunciated and written as such from the place of the colonial power, and this place becomes the place from where the colony is enunciated and written. Modern colonial bureaucracy is based on writing procedures, a technical device that needs, among other things, names for things in the world and people giving the names. Thus, the existence of both a proper name and a proper enunciator of the world out there targeted for appropriation is a material condition of modern colonialism. The colonial designation, being a mere question of names, is also a condition of the possibility of the realization of the desire of colonial expropriation. The things to expropriate – i.e., the colonized world – are lawfully enunciated by the colonizer and, as it follows, illicitly by the colonized, who is possessor of a false knowledge and an imperfect language even to enunciate the world and the one's own body; such is the historical material condition of colonialism, or its dark face, *coloniality* (Schiwy & Maldonado-Torres 2006). This *differential constitution* of being and knowledge is one of the central tenets of postcolonial thought. That America has been, much later, a name appropriated by the United States for its self-designation has led to other designations arising to qualify the other America: South America, America of the South, and Latin America.

The existence of South America as a place of enunciation of a theoretical perspective on archaeology is closely linked to the self-awareness of South American archaeologists of their differential designation, i.e., of its constitution in the *difference* from colonial powers. But in the archaeological field, this self-consciousness has not been based in any postcolonial perspective but in the so-called Latin American Social Archaeology (LSA) of the 1960s and 1970s (Politis & Pérez Gollán 2004). This current, specifically inspired by historical materialism, has been perhaps the first to occur, more or less unified, with both a theoretical inspiration and a political sense (hence, it is *social*, beyond what each one understood as such in political terms) and a place from which to establish a new perspective (thus *Latin American*). This movement will not be outlined in any more detail here as other entries in this volume deal with its development.

Although the LSA continues to be a theoretical reference in Latin America (and also in Spain – Castillo et al. 2008 – as well as other countries), towards the mid-1990s the momentum of LSA was already reasonably diluted due to the growing hegemony of processual archaeology of North American origin and the anti-Marxism of the academic contexts in some countries of South America (particularly in the Southern Cone as a long-lasting effect of the military dictatorships of overt anti-Communist orientation and counterinsurgency action).

Also, the notion of a common South American belonging was not present anymore as an inspiration for theoretical reflection. In the mid-1990s South American archaeology was so dispersed that archaeologists from different South American countries read each other in European and/or North American publications. Moreover, it then seemed to be installed a disciplinary common sense of the banality of a local or regional perspective. In reaction to this there came the series of Meetings of Archaeological Theory in South America later known as TAAS (Funari et al. 1999). The meetings of Vitoria in 1998, Olavarria in 2000, Bogotá in 2002, Catamarca in 2007, and Caracas in 2010 were milestones in the emergence

of exchange, research, mutual knowledge, and discussion, at a South American scale (Gnecco & Haber 2005). It was consolidated with the appearance of publications with continental scope, which were published on the continent by South American archaeologists, starting with the bilingual journal *Arqueología Suramericana/ Arqueologia Sul-Americana*, to which *Revista de Arqueología Histórica Argentina y Latinoamericana* and *Vestígios Revista Latino-Americana de Arqueologia Histórica* were added. Thus, the beginning of the twenty-first century sees the recovery of the notion that South America can be a place from which an archaeological perspective can be enunciated. Indeed, the TAAS meetings and the South American publications have provided the forum for discussions about whether or not South America is a singular place from which knowledge about archaeology can be generated.

Peripheral and Critical Theory

In 1984, Trigger published an influential essay that proposed ways in which relations among nations gave rise to the archaeologies in each country. Colonial, national, and imperial archaeologies were influenced by the manner in which each country was globally related (Trigger 1984). The value of the cartography of Trigger was challenged explicitly (Olsen 1991) and implicitly (Funari 1989) from perspectives that characterized the geopolitics of archaeological knowledge in terms of the theories of dependency and the world-system, introducing the concept of *peripheral archaeologies*.

Pedro Funari (1989) characterized peripheral archaeology (particularly Brazilian) according to academic and social criteria. From an academic point of view, a peripheral archaeology is bilingual – and sometimes polyglot – while a central archaeology is monolingual. Multiple linguistic competence of the periphery also implies knowledge of theoretical bodies of various origins, regardless of the nationality of the authors at issue. A central archaeology, on the other hand, has a much more insular and self-sufficient behavior (Funari 1989). This vision of the conditions of the peripheral archaeology in comparison to central archaeology contrasts sharply with common visions, according to which the central archaeologies are role models to peripheral archaeologies. There is, then, a dislocation between the scope of peripheral knowledge and the way in which that knowledge is valued by agents (peripheral and central). The postcolonial sense of this can be better understood through Funari's criticism from a sociopolitical perspective:

> Hodder can write about the 'contemporary West' (Hodder 1986: 167) only because there is a non-West, maintaining economically the so-called 'alternative' perspectives, (western) indigenous, (western) feminist, and (western) working-class archaeology. It is symptomatic that even though the concept of *West* is accepted somewhat unconsciously by *western* archaeologies, it imples (sic) the existence of Third World (or non-Western) archaeology (Funari 1989: 65).

The dependence between central and peripheral archaeologies was framed within neocolonial relationships – both academic and economic – which featured as coloniality. Within coloniality certain knowledge and certain enunciators are underestimated in relation to a "more perfect" knowledge emanating from the central academies. Like Latin American postcolonialism that would spread a couple of decades later, Funari (1989) both established criticism of the geopolitics of knowledge as a boost to the emancipator action (decolonial, as it would be called later) and located the place of liberation to the outskirts of the West: "There are therefore two radical tasks for peripheral archaeologists. First, to oppose inner and outer oppression and second, to promote a *new past*, in order to liberate people in the *present*. In this context, peripheral archaeology can provide central archaeology with a very pertinent critique, by stating the limitations of western archaeology or, at least, its one-sidedness" (1989: 65).

A Meeting of Times

Towards the end of the 1990s, Cristóbal Gnecco's text "*Historical Multivocality. Towards a Postcolonial Cartography of Archaeology*" was published; it would become the primary reference in the introduction of the discipline to the

postcolonial debate. Perhaps the most significant contribution of this work to the postcolonial debate resides in the sharpness with which Gnecco exposes the colonial sense, or better the *endocolonialism* of the scientific program of the archaeological discipline. He writes: "Archaeology is part of the cognitive apparatus of the West and one of the refined expressions of its temporary thought" and "Western time is a tool of political domination and the time that builds the archaeology is Western time, not the time of the others" as well as "These questions are no longer limited to reflections carried to the interior of the disciplinary practice, as happened during the years of formation and consolidation of the scientific archaeology, they involve the same status of the discipline in the context of other knowledges and within the framework of the social contexts of their production; they are related, in short, with what I will call political economy of archaeology. In this sense, the most important question we have to ask ourselves about the role of archaeology in a contemporary context, twice postmodern and unsubordinated" (Gnecco 1999: 17–18). Clearly, for Gnecco it is not just that archaeology should recognize the inheritances of colonialist past to get rid of them. Nor does he say that archaeology, only through recognizing in its history its colonialist origin, is able to deviate from those formerly unacknowledged negative features.

Gnecco's program is critical enough to expose the mechanisms through which archaeology is a part of the arsenal of Western knowledge to subordinate other knowledges. In this sense, the key concept that is introduced is the one of *endocolonialism* or *internal colonialism*. Despite the many multicultural readings that it has suffered, Gnecco's program is not a multicultural program of recognition and respect for differences; on the contrary, what he calls a "multivocal meeting" is a field of political struggle in which archaeology can enter only honestly by renouncing its hegemonism and opening itself to self-transformation. It is not possible for archaeology (or the Western disciplining of time, in general) to recognize in a *locus* vis-à-vis other times, without abandoning, in the first place, the universalism which constitutes the behavior characteristic of Western time, and secondly the alocronism with which it subordinates other times. Gnecco's text meant, at the end of the 1990s, a programmatic statement much more than an already transited path. Signs of that can be read in his provocations to the openness, transformation, and relativism as well as in the optimism with which post-processualism was then characterized as "unsubordinated" knowing of Western hegemonic practices. Such attitudes are common in other texts of the 1990s commented on this entry.

Ruptures and Metaphysics

History-object is marked by the colonial experience, i.e., South American history occurs before and after the colonial experience; there is a precolonial history of autonomy and a colonial history of subjugation. The postcolonial perspective comes to state that the colonial experience did not perish nor was it diluted with independence. The colonial experience has constituted colonial history as *history* and precolonial history as *prehistory*, or as a period without history. Archaeology has come both to liberate the precolonial history of the colonial gaze that constitutes it as without history and to extend the colonial sense of history over non-colonial times.

The subject of history is also marked by the colonial experience, i.e., that both the history of what happened since the colonial experience as the history of what happened before the colony, i.e., postcolonial and precolonial histories (the latter on which archaeology claims exclusivity), are focused, studied, and narrated from postcolonial perspectives. The observations offered by archaeology about precolonial history are, inevitably, still a postcolonial gaze. This is because the subjectivities of both the historian and the precolonial archaeologist are constituted by the same colonial experience.

The *constituent* character of the colonial experience in relation to archaeology is indicated in its disciplinary demarcation. Additionally, it is also interesting to explore its *constitutive* character, that is, the way in which coloniality implicitly constitutes or shapes the facts of experience, and then the scientific understandings of history. To the first constituent relationship,

called *direct*, a constitutive *recursive* relationship is added, "once the matrices that define and frame scientific disciplines are established, and are put into motion, the knowledge of objects is already mediated by this division of labor, although its origins are unnoticed, thus facilitating its reproduction with all the appearance of naturalness" (Haber 1999). Haber explored how coloniality acts upon archaeology, through the analysis of the theoretical-methodological model for the interpretation of the colonial archaeology of northwestern Argentina (called "Caspinchango model" following the fact that it was based on the classical interpretation of a so-called type-site, Haber 1999). The classic report on the Caspinchango site, written by one of the founders of the archaeological discipline, Salvador Debenedetti, thus became a canonical text for archaeology about the long war period between Calchaqui and Castile, designated as the Hispanic-indigenous period by archaeology. It enhanced indexes of subjection (Christian rosary glass beads) and decomposition (the decay of ceramic manufacturing). Classical excavations at Caspinchango, however, offered some notable stratigraphic sequences that could undermine the interpretation of an irreversible trend towards the West, something that was predicted and meticulously observed by Félix Outes (Haber 1999). Despite signs to the contrary of this critique, however, the Caspinchango model won monolithically in the archaeological discipline. The question is not simply about the facts but also about those deep, extrascientific, and immanent conditions for the creation of the facts of experience. If the interpretation of the history-object follows an interpretative canon beyond the facts, it is because the conditions by which those facts are facts do not correspond exclusively to the materiality of things nor to the objectivity of the record but to a cultural assumption, an epistemic understanding of historical time as founded on a momentous event, a rupture or gap that, beyond facts, is, as a consequence, metaphysical.

Indigenous historical archaeology is therefore an impossible endeavor, a no-time that should be moved, either towards a prehistorical past or to a nonindigenous ethnic group (Criollo, Mestizo, Christian, etc.). Preterization of the indigenous (past and present) is necessary for the consolidation of a cultural collective that needs to expurgate its indigenous para-Christian, or non-Christian, and doubtfully Western content. The *metaphysical rupture* in which the colonial understanding of history is based becomes thus encoded within the disciplinary frames of archaeology, i.e., its demarcation of object and method. In this way, being an archaeologist, that is to say, exercising knowledge within the boundaries defined by the disciplinary framework, is exercising a knowledge founded in metaphysical rupture, in a cultural form that colonial difference adopts in history as written from the canon of the national state. But, if archaeology carries even inadvertently, in its most basic internal structure, coloniality, there is no other way for archaeology than to reproduce and expand those colonial conditions of knowledge.

Future Directions

An Uncertain Way Out

The postcolonial debate has some specific areas unique to South America. Long before postcolonial theory was spreading in global academy, various aspects of South American thought interrogated similar issues. The nineteenth-century essayists, and also many and diverse currents of thought in the early decades of the twentieth century – including the reconstruction of the Andean Marxism by Mariátegui, the "cannibalist" current in Brazil, Forja Group in Argentina, to name a few – were of great influence in South America. Dependency theory and development were theoretical elaborations that received strong impetus in the middle of the last century. The theology of liberation, magical realism literature, and social muralism are some currents that transformed critical positions from other areas and many times on a Latin American scale. These and many other thoughts, together with the experience of hundreds of social movements and indigenous and peasant movements, contribute to the fact that the reception of the postcolonial debate has not adopted the

known form of the simple translation of texts from the English-speaking academy.

Many of the postcolonial thinkers were grouped into what is known as the Modernity/Coloniality Program, although this label leaves out hundreds of relevant intellectuals, among them the ones that were gathered by the Aymara Oral History Workshop. So, postcolonial South American theory, rather than aligning itself with any global intellectual current, is a particular space of thought and theoretical practice that dialogues with various intellectual currents (including postcolonial theory, structural history, and queer studies). Such a space is characterized by a theoretical interchange with social movements, indigenous peoples, and peasant organizations in an active anti-colonial struggle. It is within this experience that the postcolonial prospects in South American archaeology must be understood, as participating in these conversations rather than the simple application of a theoretical approach to the field. At the same time, based on the historical continental experience, South American perspectives within archaeology, as well as the rest of the fields, maintain a commitment beyond the deconstructive critical moment, in what has been called "the decolonial turn."

The involvement with indigenous movements has been one of the most visible experiences in the decolonial sense. Unlike the multiculturalists' positions, decolonial positions have attempted to move beyond the aim of respect for the rights to diversity and historic reparation, towards recognizing indigenous thought as real theoretical perspectives capable of establishing symmetry and even move the Western, disciplinary, and intellectual constructions, and not simply as objects of knowledge or a subject of law. What in other cases has been defined in the context of the restitution of material culture to indigenous descendants is reconfigured in South America as an encounter between archaeologies aware of their positions in the postcolonial field (Gnecco & Hernández 2008). What in science is understood as a traditional culture from traditional, ethnoscientific, or *ethic* perspectives is configured as theories of relationality that cannot be known without an epistemic-political shift that involves an openness to move the broader cultural and disciplinary certainties (Haber 2009).

The involvement with social movements (peasants, anti-mega-mining, indigenous peoples) leading the anti-colonial struggle in rural areas where archaeology is usually practiced has led us to consider epistemic priorities and other values other than the traditional basic (truth-oriented) and applied (market- and development-oriented) science, such as life – or even a good life. In all of these developments, archaeology not only expands on innovative fields guided by the goal of helping each other but also enters into a theoretical and epistemic conversation which transforms it (Curtoni & Chaparro 2011; Jofre 2010).

Finally, it is necessary to mention the efforts that, even at an initial stage, apply to the formation of networks of research and debate that link academics and movements of various South American countries with other countries of the geopolitical South, seeking to configure locales of thought and practice that are not mediated by the central academy. A case in this regard is the establishment of the South-South Network on Cultural Heritage and Globalization and the formation of South America/South Africa networks.

This entry cannot be a history of postcolonial archaeology in South America without addressing the history of the colonial constitution of history, archaeology, and South America as colonial categories. But that a history of history (or better an archaeology of archaeology) is not a mere intellectual movement locked in the campuses from where it observes what is happening "out there." If any South American perspective on things really exists, it has to be one according to which the drama of the collective history passes through each molecule of thought. This is a case as demanding for the archaeological discipline as promising for those who think it is simply unbearable to abandon the anti-colonial yearnings. Decoloniality and indiscipline could be the key words of the history that is yet to be written.

Cross-References

- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Latin American Social Archaeology
- ▶ Postcolonial Archaeologies

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South American Rock Art

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Introduction

South American and the Caribbean islands rock art has been produced in practically all known archaeological periods and up to our times. This entry deals with the following:

- The different kind of rock art of this subcontinent: rock engravings, rock paintings, and geoglyphs
- The distribution of rock art throughout South America, found in a great variety of geographic and cultural zones in nearly all regions from North to South and East to West including the Andean highlands and the lowlands of the Atlantic coast
- The history of research from the first reports on rock art till scientific studies as part of current archaeological and anthropological research
- References to the principal regional rock art surveys
- A summary of rock art chronology, from the first manifestations up to those produced in recent times
- Some aspects of rock art interpretation of the art
- References to rock art documentation and analysis, conservation, public and private administration of sites, as well as education campaigns in which local communities are concerned

Definition

The subject of this study is rock art in South America, including the Caribbean islands: rock engravings (petroglyphs), rock paintings (sometimes called pictographs), and geoglyphs. These categories of rock art are distinguished by their mode of production. Petroglyphs or engravings are motifs executed on a rock surface. Could be pecked, incised or abraded. Rock paintings are motifs painted or sprayed with a liquid mixture on the rock surface. Other rock art representations could be executed by a sort of crayon such as charcoal. There are some motifs which present the combination of both techniques: engraving and painting. Geoglyphs are large motifs produced on the ground, usually in desert regions, by arranging clasts (positive geoglyph, stone arrangement) or by removing patinated clasts to expose unpatinated ground (negative geoglyph). Mobile art is another important artistic manifestation which may be related to rock art; it consists of engravings or paintings executed on small objects, such as natural stones (Fig. 2). Grinding basins and cupules are, in many cases, associated to rock art.

South American Rock Art, Fig. 1 Rock painting from Cerro de las Cuevas Pintadas. Guachipas. Argentina. Photo: INAPL Archive

South American and Caribbean rock art has been produced on rock walls of caves and rockshelters, as well as boulders and other rock surfaces of open-air sites, in practically all known archaeological periods, and up to our times. Deep caves with rock art in dark areas that need artificial lighting occur only in the Caribbean region. Rock art is found in all countries and in a great variety of geographic and cultural zones (with the exception of certain regions, generally lowlands) which lack suitable rock surfaces such as the coastal region *Litoral* of Argentina.

Historical Background

South American rock art was noted in colonial times (from CE sixteenth to nineteenth century) by missionaries and numerous travelers (Greer 2001: 678). In the early Republican period

South American Rock Art, Fig. 2 Petroglyphs at Iaguy Guasu (Cerro Guazú/Jasuka Venda, Dept. of Amambay), Paraguay. Museo de Altamira

(CE nineteenth century), travelers, explorers, and ethnographers contributed a wealth of information though in many cases with faulty recording and little care to detail.

Scientific interest in South American rock art began towards the end of the CE nineteenth century. In Argentina, F. Ameghino, J. B. Ambrosetti, and A. Quiroga published their findings between 1870 and 1890; in Uruguay, J. H. Figueira presented reports in the 1890s; and in Colombia, after first recordings by L. M. Girón (1892) and V. Restrepo (1895), systematic rock art research was started by M. Triana in 1922 though he – like many others – considered rock art motifs as a sort of hieroglyphs. In Bolivia, E. Nördenskiöld recorded a few rock art sites partially in 1904–1905 and 1913–1914.

Koch-Grünberg's pioneering work "Südamerikanische Felszeichnungen" (Berlin 1907, published in Portuguese 2010) is one of the first which may be considered scientific. He provided a synthesis and critical review of the state of knowledge of the art and a summary of sites he had registered during his ethnographic studies on the Brazil-Columbian border (1903–1905).

There is a notable increase in scientific work on South American rock art from the mid-1900s to present. Studies became more detailed and attempted to place the art into archaeological, ethnographic, and interpretive contexts.

In the late 1980s Colonial and Republican rock art began being studied in a combination of rock art recordings with ethnohistoric studies. For example, in Colombia, F. Urbina R. 2004; in Peru, R. Hostnig (2004); in Brazil, C. M. Guimarães (1992) (with regard to rock drawings by fugitive Negro slaves); in Bolivia, R. Querejazu Lewis (1992) and F. Taboada (1992); in northern Chile, F. Gallardo et al. (1990, 1999); and in Argentina, A. Fernández Distel (1992).

Key Issues/Current Debates

Main Geographical Areas

Regarding the cultural configuration based on traditions linked to archaeological cultures, historic information, and ethno-linguistic distributions, the following areas may be established:

- *Caribbean islands*: west India or the Antilles, in which two areas are defined as Greater Antilles (Puerto Rico, Dominican Republic, Cuba, Haiti, and Jamaica) and Lesser Antilles.
- *Lowland South America* as defined by Greer (2001: 665): the northern Amazonas-Guianas region of southern Venezuela, southeastern Colombia, southern Brazil, Guyana, Suriname, and French Guiana, as well as lowland regions of Ecuador, Peru, and Bolivia.
- *Central Brazil and northeast Brazil* as defined by Prous (1994: 89-124).
- *Southeastern coastal Brazil* as defined by Prous (1992: 511-513) comprises of areas attributed to the "Meridional Tradition" and "Coastal Tradition" (Prous 1994: 81-85).
- *The Basin of La Plata River* includes its principal tributaries and adjacent areas in Uruguay, Paraguay, south Brazil, and Northeast Argentina, with five subareas – (1) northern, (2) Atlantic, (3) lap of the Meridional Plateau, (4) southern, and (5) Chaco-Litoral (Consens 1995).
- *Andean South America*: divided in northern, central, and southern Andes, comprising the Pacific coast and highlands of Colombia, Ecuador, Peru, Bolivia, Chile, and northwestern Argentina, excluding southern Chile and Argentina.
- *West-central and central Sierras* in Argentina.
- *Pampa-Patagonia*: southern Argentina and Chile, extends to the top end of the continent and includes Patagonian Andes.

Regional Synthesis

Regional overviews have been presented from broad-areal, regional, country, and local perspectives (Greer 2001: 681). C. N. Dubelaar's Ph.D. thesis (1986) provided a synthesis of engravings on the South American continent and the Caribbean islands, detailing history of research, techniques of production, site characteristics, approaches to dating and interpretation, geographical distribution and classification according to "pilot motifs," and a comparison between petroglyphs of the Antilles and those of northeast South

America. In later studies, Dubelaar presented inventories of rock art in the Guianas and adjacent areas, the Lesser Antilles, the Virgin Islands and Trinidad, as well as Puerto Rico.

Notable synthesis were provided for all areas and countries: *Caribbean area*: M. Hayward et al. (2009); *Venezuela*: R. de Valencia and J. Sujo Volsky (1987), J. Greer (1994, 1995, 2001), and F. Scaramelli and K. Tarble (2008, 2010); *Colombia*: G. Muñoz C. (1999) and A. Botiva C. (2000); *Ecuador*: G. González O. (2008); *Brazil*: N. Guidon (1991) on Piaui rock art, A. M. Pessis (2003) on Serra da Capivara rock art, A. Prous (1992, 1994), J. Marcos, A. Prous, and L. Ribeiro on rock engravings of southern Brazil and rock art of Central, Amazonian, and northeast Brazil (2007), G. Martin (1996) on northeast Brazil, and E. Pereira (2003, 2010) on the Central Amazonian *Peru*: J. Guffroy (1999, 2007) and R. Hostnig (2003); *Bolivia*: M. Strecker (1987); *Paraguay*: J. Lasheras et al. (2011); *Chile*: G. Mostny and H. Niemeyer (1983), Berenguer (1999; 2004), Núñez A. (1976) on rock art of Atacama, L. Briones (2008) on geoglyphs of northern Chile, and Troncoso (2008) on Aconcagua river, central Chile; *Argentina*: A. R. González (1977), J. Schobinger and C. J. Gradin (1985), Aschero (1999) on northwest Puna rock art, M. M. Podestá, D. Rolandi, and M. Sánchez P. (2005a) on northwestern rock art, M. M. Podestá, R. Paunero, and D. Rolandi (2005b) on Patagonia rock art, and A. Recalde and E. Berberián (2005) on central Argentina rock art; *Uruguay*: M. Consens (1995), L. Cabrera Pérez (2008), and A. M. Florines (2004). A general view of *South American* rock art is presented by J. Schobinger (1997) and J. Schobinger and M. Strecker (2001). The Thematic Study edited by ICOMOS (2006) presents overviews on rock art in several regions of South America.

Chronology

In some of the South American countries – particularly in those with a long tradition of archaeological research – chronological sequences have been established on rock art which make it possible to assign the beginning of its production to the earliest occupations of hunter-gatherers which in the Northeast and Patagonian region of Argentina go back more than 10,000 years before present. In northern Chile and central-south Peru, somewhat later dates have been proposed for early rock art. Some regions in Brazil (Amazonia, Mato Grosso, Minas Gerais, Piauí, Peruaçu valley) have produced early dates for rock art (12,000–9,000 BP) (Prous 2012). Guidon (2007) has proposed an extremely ancient rock art tradition for northeast Brazil (Serra da Capivara, Piauí) of some 48,000 years ago, while in the Amazonian region of Columbia (Serranía de Chiribiquete), rock paintings are believed to have started some 19,500 years ago; however, the considerable antiquity of these representations in Brazil is not accepted by a large part of the archaeologists and at present does not agree with the standard vision of early peopling of South America.

In the case of southern Peru, Toquepala y Sumbay caves have been related to human occupations dated between 11,198 and 10,413 AP and c. 7,300 AP and c. 6,300 AP, respectively (Muelle 1969 and Neira 1968) (Fig. 3). Some recent research by Guffroy (2007) and Hostnig (in preparation) have shed light on a natural style of archaic paintings with large representations of camelid figures accompanied by small stylized human figures. Most of these sites are located at an altitude of more than 4,000 m above sea level.

In most cases defining a sequence and antiquity of rock art styles is based on stylistic changes between motifs belonging to different superimposed layers and the correlation of the production and use of rock art figures with dated layers excavated at the foot of the rock art panels or in their immediate vicinity obtaining an indirect (estimated) chronology for the art. Frequently stylistic considerations play an important role, based on stylistic or iconographic similarities between rock art and other artistic productions.

On the other hand, there are very few "direct" or absolute dates for rock art which either provide a date for the rock art itself, for the rock surface underlying the art, or accretions overlying it. Dating should always be consistent with other

South American Rock Art, Fig. 3 Paintings featuring wild camelids at Sumbay, Dept. of Arequipa, Peru. Photo: SIARB Archive

archaeological data to be considered reliable. The first AMS dates (radiocarbon dating using accelerator mass spectrometry) of rock paintings have been reported for Argentina: – La Candelaria, Catamarca (Hedges et al. 1998) and Abrigo de los Emplumados or Media Agua 1, Jujuy (Hernández Llosas et al. 1999) – and Brazil: (Toca do Serrote da Bastiana, Piauí).

Rock art representations are present in all moments of human occupation of the South American mainland (preceramic hunter-gatherers, later phases of domestication, and early farmers/ceramists). Among the most ancient figures are non-iconic (abstract) designs, while in other sites figurative scenes occur including the representation of hunting wild animals, above all camelids (such as in southern Peru, northern Chile, Bolivia, northwestern Argentina, and Patagonia). In more recent periods, domesticated camelids are represented in pastoral scenes or in caravans that transported goods.

After the European conquest and initial colonization (CE fifteenth to sixteenth centuries), the indigenous communities continued its production up to the late Colonial and in some cases even to Republican times. Colonial and historical rock art is characterized by the representation of horseriders and other anthropomorphic figures with European garments, Christian crosses, horses, etc. An exceptional site in the highlands of Bolivia features numerous scenes of folkloric dances. Battle scenes have been found in sites around Titicaca Lake, possibly related to the indigenous uprisings of the late eighteenth century (Fig. 4). Among recent petroglyph motifs are the representations of cattle marks which date from the mid-twentieth century (Podestá et al. 2005a). In north Colombia similar engravings in territory of the Wayuu Indians are interpreted as totemic emblems (Delgado 2010).

In some cases, rock art sites in the Andean highlands continue to be the focus of religious rites, as recent indigenous offerings and ceremonies demonstrate.

Interpretation

Interpretation of rock art sites should be the result of long-term interdisciplinary research taking into account many factors concerning the cultural framework of the art, its distribution and natural setting, associations with the regional settlement pattern in the specific time periods, as well as indications regarding the ritual, social, and economic uses of the sites.

In South America, the theory of shamanism and its relation to rock art has been scarcely

South American Rock Art, Fig. 4 Colonial rock paintings at Carabaya, Dept. of Puno, Peru. Photo by Nicolas Merma

brought up, with the exception of some researchers such as J. Schobinger (2010). More widely accepted is the idea that rock art served as a communication system in which petroglyphs, rock paintings, and geoglyphs are interpreted as markings along traditional routes of travelers and llama caravans passing through wide regions of the Andes. Numerous researchers have favored this theory, for example, L. Núñez A. (1976) with regard to the Atacama Desert and C. A. Aschero with regard to the Argentinian puna and northern Chile. The same interpretation has been applied to historical rock art of mid-twentieth century related to cattle herders that crossed the Argentinian-Chilean border (Podestá et al. 2005a). Petroglyphs in another region and ecozone, along Río Negro river in the tropical lowlands of Brazil and Colombia, are now interpreted as territorial markers and symbols-related mythical migration routes.

Interpretation of some rock art sites in northern Chile is based on ancient indigenous myths and ceremonies related to the agricultural cycle and the growth of llama herds.

With regard to the interpretation of Colonial and Republican rock art, as mentioned before, studies in Bolivia, Peru, Chile, and Brazil relate rock art to ethnohistoric documents.

Recording and Analysis

Sometimes it is hard to integrate rock art into archaeological contexts, especially if no dating can be provided for a site. This is one of the reasons why rock art was not taken seriously by archaeologists of some South American countries for a long time, leaving the investigation and recording of these sites to researchers outside the archaeological mainstream. However, in the last four decades, rock art has played an ever increasing role in archaeological research, national inventories of the cultural heritage, and planning of selected sites to be protected in public facilities such as archaeological parks and whose importance is recognized or acknowledged by including them in lists of National Heritage or even World Heritage sites.

Rock art research depends on a data basis with detailed and carefully elaborated recording of sites and their paintings, engravings, or geoglyphs. Colombia, Bolivia, Brazil, Argentina, Uruguay, and Chile have improved their rock art data basis, but in some countries of South America (e.g., Paraguay), no comprehensive and professional archaeological and rock art programs have existed until very recently (Lasheras 2011) (Fig. 5). Many countries have been carried out rock art sites inventories. Caribbean rock art consists of much more than 1,000 sites across the

South American Rock Art, Fig. 5 Rock paintings at Toca do Boqueirao da Pedra Furada, Serra da Capivara, Piauí, Brazil. Photo by Alice Tratebas

South American Rock Art, Fig. 6 Petroglyphs at Caicara, Orinoco river, Venezuela. Photo by Franz Scaramelli

region, with the greatest concentrations in the Greater Antilles (Haviser & Strecker 2006) (Fig. 6). Over 650 sites have been reported for Venezuela (Scaramelli & Tarble 2006) (Fig. 7). In the department of Cundinamarca (Colombia) alone, some 2,000 sites have been registered, while 5,000 sites are known for the whole country (Muñoz 2006: 97, in ICOMOS 2006). Some 1,500 sites were listed for Argentina in 1988 (Renard de Coquet 1988); however, meanwhile this number might be tripled (Podestá, in ICOMOS 2006). In Ecuador, Peru, and Paraguay, some 3,000 rock art sites have been estimated (Strecker, in ICOMOS 2006), but we now believe that the number of rock art sites is in fact considerably higher. No counts of rock art sites are available at present for Chile and Uruguay (Florines *pers. comm.*).

In some South American countries, invasive recording methods (such as chalking out or

South American Rock Art, Fig. 7 Petroglyphs in Cueva de Panchito, Dominican Republic. Photo by Adolfo López

making rubbings of rock engravings) were frequently used till the decades 1960–1970, and the negative effects for the conservation of rock art can still be seen in some sites. However, noninvasive recording methods (including digital photography) are being used more widely, following such models as the IFRAO and SIARB codes of ethics.

Recent analysis of South American rock art have provided insight into engraving techniques and possible lithic tools used for their production (Álvarez et al. 2001). X-Ray Diffraction (XRD), Energy-Dispersive X-Ray Spectroscopy (EDX), Total Reflection X-Ray Fluorescence (TXRF), Fourier Transform Infrared Spectroscopy (FT-IR), and Gas Chromatography/Mass Spectrometry (GC-MS) have been employed to analyze the paint on rock walls and pigments from different occupational levels of archaeological excavations in different sites in Argentina, Uruguay, Bolivia, Chile, and Brazil. For example, analysis of pigments of rock paintings at sites in Argentina has been carried out in Cueva de las Manos and Cerro de los Indios in Patagonia (Aschero 1983-1985; Wainwright et al. 2002), northern Patagonia (Wainwright et al. 2002; Boschin et al. 2011); in Puna de Atacama region (Podestá & Aschero 2012; Yacobaccio et al. 2012) and in Quebrada de Humahuaca, both in northwestern Argentina; Brazil, in Piauí (Duarte Cavalcante 2009) Bolivia, Paja Colorada (Wainwright & Raudsepp 2008); and Chile, sites of Salado river region reveal ingredients of paint mixtures and production processes (Sepúlveda et al. 2009, 2010). Few results have been reported from Uruguay.

Conservation and Management Issues

Rock art sites, which in some cases have been preserved over thousands of years, are extremely vulnerable like all open-air sites. Their conservation depends on natural deterioration factors, such as moisture, physical weathering, biological weathering, pictogram deterioration, climate, as well as destruction of rock art by human visitors which is in many cases the overall destructive factor.

For example, the Nasca geoglyphs (Peru) have been damaged by car traffic crossing the ancient lines and lack of a global management plan. Several important rock art sites in Bolivia have been destroyed by the construction of roads, and many rock art sites from Chile and Uruguay have been deteriorated by mining industry.

Deforestation exposes rock art sites to the negative effects of the natural elements (Venezuela).

On the other hand, there is a recent tendency to include more and more sites in tourist routes without their previous adequate planning and administration. The tourist boom has facilitated access to sites which formerly were protected due to their isolation and inaccessibility. Some rock art sites in the Caribbean have been seriously affected by tourism developments, such as Borbón cave and Cueva de las Maravilla in the Dominican Republic, while the archaeological park at Trois-Rivières in Guadeloupe is a noteworthy exception of an area planned by archaeologists and managed for tourist visits without putting the rock art at risk. In Venezuela a few rock art sites have been implemented with visitor centers and guides available for the public (Pintado in the Amazon state; Piedra Pintado, Vigirima, Carabobo state). In Argentina, the National Institute of Anthropology (INAPL) initiated a program with the aim of preserving some rock art sites of exceptional value. The institute acts as consulting agency; the program aims at an effective collaboration with the provinces and specifically the local communities which have to play their role in managing the sites (Podestá, in ICOMOS 2006).

In theory, rock art sites are protected by state legislation as part of the nation's cultural heritage. However, reality is very different because of the lack of enforcement of existing laws. In consequence, if rock art sites are destroyed, actions are seldom taken.

An indicator of the awareness of rock art sites as cultural heritage in South America is the fact that several sites have been inscribed in the list of World Heritage by UNESCO: Cueva de las Manos (Argentina), Fuerte de Samaipata (Bolivia), geoglyphs of Nasca and Pampas de Jumana (Peru), and Serra da Capivara (Piauí, Brazil), while others have been included in the Tentative List to be considered in the future – Chamangá (Uruguay) and sites of Patagonia (Chile), geoglyph of Chirgua, petroglyphs and megaliths of Vigirima, and petroglyphs of Caicara (Venezuela), between others (Fig. 8). In these cases, rock art serves as a tourist attraction which results in the development of local communities and the economic growth of the respective region. The National Park of Serra da Capivara (Brazil), one of the densest concentrations of archaeological and rock art sites in the continent (more than 1,000 recorded sites), is considered one of the best developed archaeological parks in the Americas; it possesses 128 sites which may be visited and 400 km of pathways (Guidon 2007). At the same time, conservation measures taken may serve as a model for other rock art sites in South America. After inclusion (1999) of Cueva de las Manos (Argentina) in the World Heritage list, visitation increased four times, and today the site possesses adequate infrastructure for tourism (Onetto 2006).

Raised wooden boardwalks provide efficient measures for visitor control at the sites and, at the same time, allow visitors a convenient view of the rock art; they have been implemented at a number of sites such as Cueva de las Manos, Cerro Pintado (Patagonia, Argentina), Calacala and Fuerte de Samaipata (Bolivia) (Strecker & Podesta 2006), and Serra da Capivara (Brazil) (Guidon 2007).

Throughout the world, local communities possess long histories of interaction with their cultural and natural environments, and their involvement is essential in the planning stage and the management of rock art sites. In many of the South American rock art sites which have been incorporated in tourist circuits – such as the abovementioned parks – local communities participated in the planning and development of tourism. Local guides may provide to visitors an authentic message concerning the importance of the site for the cultural identity of their people (e.g., Falchi & Torres 2010).

Education

Education campaigns should play an important role in the management of rock art sites, and some models exist in Venezuela (ANAR, website), Colombia (Martínez & Botiva 2002), Brazil (Fundação do Homen Americano, São Raimundo Nonato, Museu Paraense Emilio Goeldi, Belem, Fundacão Universidade Federal de Mato Grosso do Sul, Corumba), Bolivia

South American Rock Art, Fig. 8 Geoglyphs Los Pintados, Pampa del Tamarugal, Tarapacá, North Chile. Photo by Matthias Strecker

(Strecker 2001), Peru (Strecker 2005), Chile (Museo Chileno de Arte Precolombino, website), and Argentina (Oliva & Panizza 2010; Vega & Bestard 2010).

Unfortunately, with a few exceptions, such as INAPL in Argentina, and some institutions in Chile and Uruguay, South American state institutions responsible for the protection and maintenance of archaeological sites are poorly funded and normally lack professionals in the field of administration of cultural resources. On the other hand, private organizations, such as Fundação do Homen Americano and Museu Paraense Emilio Goeldi, Belem in Brazil, SIARB in Bolivia, and Museo Chileno de Arte Precolombino, are involved in investigation, recording, and protection of sites.

While professional conservation measures at rock art sites are still rare in South America (with the exception of Serra da Capivara, Piaui, in northeastern Brazil, as mentioned), conservation and administration of rock art sites play an increasing role at rock art meetings and in academic publications (Strecker & Taboada 1995).

International Perspectives

The growing interest in South American rock art is reflected in international academic meetings held in the last decades in several countries, such as eight international rock art symposia, the 2009 and 2012 IFRAO congresses in São Raimundo Nonato, Piauí, Brazil and La Paz, Bolivia, respectively. During the last decade archaeological national congresses held in a number of countries (Colombia, Brazil, Peru, Chile, Argentina, Uruguay) included sessions dedicated to rock art studies.

On the other hand, organizations have been formed in various South American countries which promote rock art research and conservation: APAR (Peru), ABAR (Brazil), SIARB and AEARC (Bolivia), CIAR-SAA (Argentina), and CIARU (Uruguay). They all belong to the International Federation of Rock Art Organizations (IFRAO).

The inclusion of some rock art sites in the list of World Heritage (UNESCO) and others in the Tentative List, as mentioned above, places South American rock art in a worldwide perspective of sites with outstanding characteristics.

The significant advances in rock art research in this continent are also revealed in regional articles published in four volumes of the series "Rock Art Studies – News of the World" (Bahn & Fossati 1996, 2003; Bahn et al. 2008, 2012).

Future Directions

There is a great need for documentation of unrecorded rock art sites and the creation of

a data basis of sites. The application of new scientific analytical methods (e.g., Reindel & Wagner 2009) and of image enhancement techniques, such as D-Stretch, will improve considerably the results of research.

Rock art studies play a major role in South American archaeological research, but in some countries have not yet been incorporated in university programs, Argentina and Chile being notable exceptions. As the awareness of the importance of rock art grows, more academic programs to record, study, and protect this cultural heritage are needed.

State and regional institutions responsible for the administration of archaeological and rock art sites have to be strengthened and must rely more on work carried out by specialists. Education campaigns should be realized in close collaboration with universities, schools, and local communities.

Considerable efforts must be made in preservation, visitor management, and interpretation of rock art sites in the future. Conservation projects are practically inexistent, with the exception of Brazil, and, to a lesser extent, Argentina, Bolivia, and Chile. There is a great need for the training of specialists in this field.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of

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South and Southeast Asia: Historical Archaeology

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Introduction and Definition

This entry reviews the historical archaeology of South and Southeast Asia from the inside looking out and from the outside looking in. Most historical archaeological research has conventionally taken place in the New World, where a significant divide exists between pre-Columbian and post-Columbian eras. Pan-Eurasian developments swept across South and Southeast Asia for millennia before Columbus set sail for the East Indies, so no clear break is evident between an earlier period of cultural and physical isolation and a later period of contact, disease, and colonization. To reconcile this dissonance between conventionally defined historical archaeology and the Asian sequences, this entry defines historical archaeology as the archaeology of capitalism, where capitalism involves the operation of intensive interregional economic interaction. Two time periods form this entry's focus: (1) an internally defined historic period, which is signaled by the earliest appearance of decipherable writing, from c. 500 BCE to CE 500 and (2) an externally defined period that is associated with the earliest European penetration in the region, starting in the late fifteenth century CE.

Use of both internally and externally defined time periods honors indigenous frameworks of historical archaeology, offers comparative archaeological data on European contact and colonization, and overlooks formative developments in each region. By the time that European states launched their expansionist projects, many of South Asia's Medieval empires had risen and collapsed, and its northern regions were under Muslim control. By the time the first Europeans reached Southeast Asia, nearly all of its classical agrarian kingdoms (e.g., Angkor, Pagan, Dai Viet, Majapahit, and Sukhothai) had ceded power and influence to maritime-based successor states to their south.

South Asian archaeology's first "historical" period, the "early historic period," lasted from the third century BCE to the fourth century CE. This period includes part of the Mauryan Empire and ends with the collapse of the Guptas. Archaeologists working at large coastal cities (e.g., Sisupalgarh, Arikamedu, Pattinam, Kaundinyapura) from this period recover substantial evidence of interregional trade and cultural elaboration (e.g., reviews in

Fogelin 2006; Smith 2006). Key Hindu and early Buddhist texts and epics in written, oral, and material form wended their way eastward from South Asia to what is now East and Southeast Asia. Abundant interdisciplinary research has been published on the early historic period: by archaeologists, historians, and art historians. From this amalgam has emerged a regional understanding of the early historic period as an urban landscape in which the region's cities were political and economic centers and in which states, empires, and religious institutions emerged earlier in the north (see review in Morrison 1997).

The late Medieval period in South Asian archaeology is associated with the European Renaissance and period of exploration. With few exceptions like the impressive program of archaeological research at the central Indian site of Vijayanagara (work by Sinopoli, Morrison, and others), most work has been undertaken through state archaeological projects and published in the gray literature. Little synthetic or theoretical archaeological research has been published on South Asia's late Medieval period (but see Chakrabarti 2003). Historians, rather than archaeologists, have dominated the discourse on this critical period in South Asia.

Many Southeast Asian archaeologists describe the period from the third century BCE to the fourth or fifth century CE as prehistoric ("the Iron Age") despite substantial evidence for Chinese documentary records about the region near its inception and indigenous documents by Southeast Asians by its closure. This entry employs the "early historic period" designation for both South and Southeast Asia for this earliest "historic" period, although Southeast Asia's archaeological record for this period was almost undocumented until the last 20 years. Like South Asia, Southeast Asia was never isolated from contact with foreigners from all directions. Yet developments from c. 1450 ADE onward, which scholars call Southeast Asia's Age of Commerce or the early modern period, prompted social and economic transformations across the region that merit attention. This period falls within the standard time frame for historical archaeologists working in the west and yields comparative insights on processes of colonization, emergence of social stratification/class, and culture change.

Space constraints also limit the geographic coverage included in the terms "South" and "Southeast Asia." Most South Asian archaeological examples derive from either India or Bangladesh; South Asia's reach far exceeds this area and contains myriad, complex political and economic trajectories that sources in the "Further Readings" explore in some detail. Most Southeast Asian examples come from the Indonesian archipelago or from the Mekong basin (i.e., Thailand, Laos, Cambodia), from regions where particular European nation states engaged in commerce and, later, political control. Just as South Asia varied markedly from one region to the next, so Southeast Asia's mainland and insular regions experienced different historical trajectories based, in part, on their access to outside contacts in South or East Asia. Agrarian states emerged across most of mainland Southeast's river valleys and deltas in the early to mid-first millennium CE; the few early states that arose across insular Southeast Asia, in contrast, took several centuries longer to emerge. With few exceptions, island Southeast Asia at European contact consisted of a socially fragmented landscape of small maritime-oriented polities of variable size (Bacus 1999) that were based on a series of unstable, personalized alliances and which competed with each other for access to trade goods (Junker 2004).

Key Issues

Some of the same methodological issues apply to South and Southeast Asia, and some substantive themes characterize both regions during the early historic period. This entry uses Southeast Asian examples to understand some substantive themes and debates that characterize the archaeology of 1450–1850 CE.

Methodological issues affect archaeological research on both the early historic periods of South and Southeast Asia and the fifteenth- to nineteenth-century research and parallel those found across the broad "historical archaeology." Foremost among these is an overreliance and

uncritical use of documentary data to frame archaeological research in both regions. In the case of South Asia's early historic period, abundant documentary sources, written by contemporary South Asians, require attention. South Asia's great Mahabharata and Ramayana epics thrived during the early centuries CE, when local scribes blended these traditions and local histories to pen the *Puranas*. The rise of western intellectual traditions associated with Indological studies is another reason. British Orientalism, which subordinated archaeological patterns to documentary accounts, was established in South Asian scholarship (Trautmann & Sinopoli 2002: 496).

Southeast Asia's early historic period has also been interpreted through contemporary Chinese dynastic annals and analogies with South Asia. One reason is that most scholarship on the early historic period has been undertaken by epigraphers and historians, the earliest of whom began their careers as Indologists and Sinologists. Another is that most Southeast Asian archaeologists have concentrated their efforts either on prehistoric research (particularly on the Paleolithic, Bronze, and Iron Ages) or on preservation efforts devoted to the ninth- to fourteenth-century monuments that resonate with nationalist claims and also attract cultural tourism. Recent archaeological work has produced archaeological data which challenges extant accounts on which historians have long relied.

South and Southeast Asia remained linguistically, culturally, and geographically discrete from the late first millennium BCE through the mid-first millennium CE. Yet beginning in the early historic period, people, goods, and ideas moved across land and water in both directions. Whether inhabitants of either region immigrated to the other remains a subject of some debate; so does the precise timing of these developments. Yet several substantive themes characterize archaeological research on the early historic period of both South and Southeast Asia:

- Studies of urbanization (the "second wave" for South Asia after the Indus Valley civilization and the first for Southeast Asia)
- Religion and ritual (the adoption of Indic notions of statecraft, the study of early religious architecture and iconography, and the role of trade in Buddhist propagation)
- The emergence of a pan-South/Southeast Asian interactional network that relied on maritime circulation of people and commodities through the Bay of Bengal in what is commonly described as the maritime Silk Road
- Landscape archaeology (ritual landscapes/sacred geography and pilgrimage, agrarian landscapes, and water management)

Substantive themes in the historical archaeology of the Medieval period of South Asia (ninth century to sixteenth century CE) and the historic period of Southeast Asia vary somewhat more, but include:

- The nature of imperialism (ideology, militarism, production, and distribution)
- The nature of urbanism (political economy of craft production and social organization of cities)
- The agrarian basis of states

Some substantive themes in Southeast Asian archaeology of the fifteenth through eighteenth centuries involve the impact of European contact on settlement, political organization, and social structure. Individual European nation states sought control of Southeast Asia both for access to the region's own resources (particularly precious metals and spices from the Spice Islands) and for access to China through the South China Sea. The earliest contact involved the fifteenth-/sixteenth-century establishment of trade networks as Europeans competed with each other for access. During the next two centuries, much of Southeast Asia was taken under European control: by the Portuguese, the Spanish, and the Dutch and, in the nineteenth century, by the French, British, and Americans.

Southeast Asia's trade relationships to the east and west had begun many centuries earlier and intensified in the fourteenth to fifteenth centuries as Islamization swept through island Southeast Asia. Increased commerce between the region and points west accompanied this religious shift; archaeological work documents economic and settlement changes that preceded European involvement (Christie 1996; Lape 2000). Figure 1 illustrates a variety of Southeast cities that were

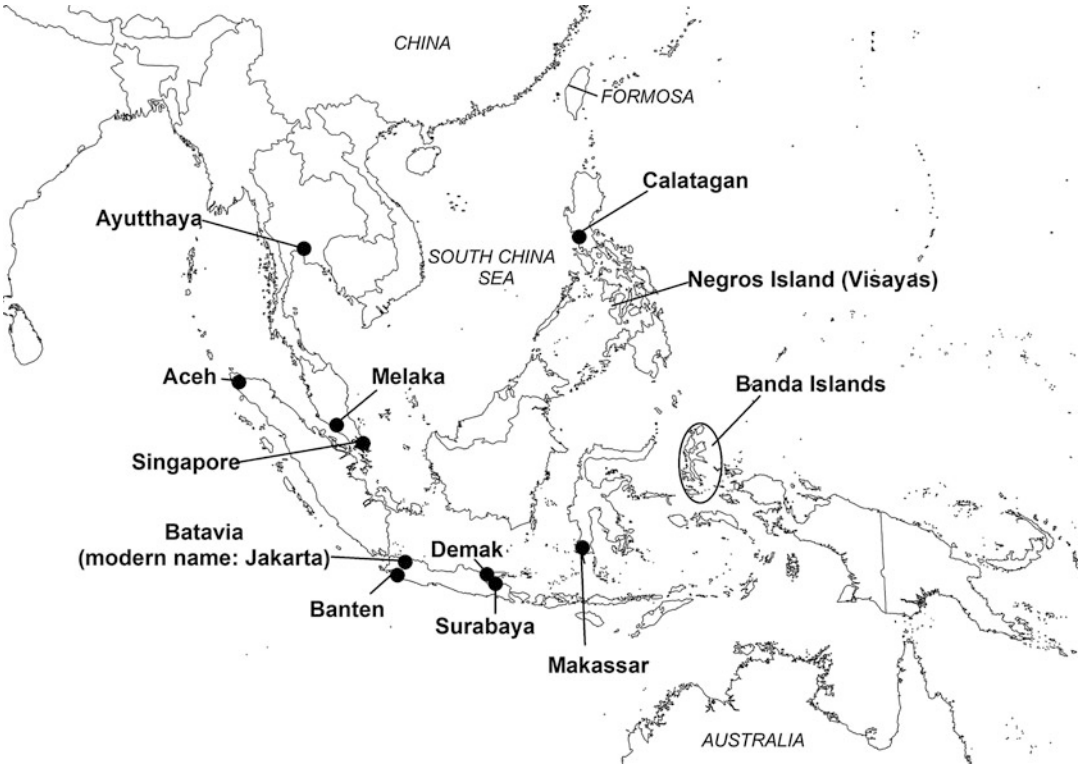

South and Southeast Asia: Historical Archaeology, Fig. 1 Location of sixteenth- through seventeenth-century Southeast Asian cities involved in world commerce (Drafted by Alex Morrison)

established or expanded across the region (some in conjunction with the rise of Muslim polities), from Batavia, Manila, and Singapore to mainland capitals that functioned as inland ports like Bangkok and Phnom Penh (Miksic 2000). Only a few such centers have received archaeological attention, like Singapore and Pattani in southern Thailand.

Fourteenth- through fifteenth-century shifts in Ming imperial economic policy also effected changes in Southeast Asia. Archaeological research in the Philippines suggests that agricultural and political intensification occurred during this period. So did the frequency of maritime raiding and intervalley warfare in export-oriented islands. Manufacturing industries, like stoneware production, also emerged during this time to meet regional needs (Grave et al. 2000; Gutman 2002) and rarely circulated beyond Southeast Asia's borders. Evidence of regional industrial-level production of trade goods, like high-fired ceramics, has been reported from archaeological research on myriad shipwrecks in the region (Fig. 2).

Southeast Asian archaeologists have not only documented shifts that preceded or coincided with European contact. Work has now been done on the impact of European colonization: in settlement, in economic structure, and in socio-political organization. European colonization entailed significant settlement reorganization to meet European demands for local products and Chinese goods and changed through time in response as European colonial policies shifted. Initial resistance to European contact was intense across much of the region outside of Sinicized northern Vietnam and effected settlement changes. In eastern Indonesia's Spice Islands, the Dutch resorted to wholesale slaughter of local populations to gain control of spice-growing islands like Banda (Lape 2000). Some Filipino populations fled into the Luzon highlands to escape Spanish relocation policies of

South and Southeast Asia: Historical Archaeology, Fig. 2 Location of recovered fourteenth- through sixteenth-century shipwrecks in Southeast Asia (From Flecker 2007, with permission from John Wiley and Sons)

reducción in the Philippines (Acabado 2009). Work in northern Thailand illustrates migrations to upland areas in response to lowland Ayutthaya state demand for labor to support new export-oriented production systems (Grave 1995: 258).

European colonization also brought the establishment of the new Manila Galleon network that moved goods between Asia and the New World. This network linked the Spanish Philippines to Spanish Mexico through annual or biannual trips from the sixteenth to nineteenth centuries. Chinese and Southeast Asian goods sailed eastward across the Pacific to reach Acapulco, on the west coast of Mexico. These goods were exchanged for silver bullion and minted coin that returned to the Philippines. More than 100

Manila Galleon expeditions set sail during this period.

European colonization in the seventeenth through nineteenth centuries not only drew Southeast Asia into the western hemisphere; it also knit Chinese commerce more closely with the west. Diasporic ethnic communities and urban ethnogenesis borne of unions between overseas Chinese and European colonials and local women were one by-product of such commerce that archaeologists have not yet studied. Melaka (Malaysia) and Dutch Batavia (Indonesia), for example, housed *Peranakan* (Chinese/Malaysian), *Mardijker* (freed slaves of Malaysian and Indian descent), and "Topass" or "black Portuguese" (descendants of Portuguese and Flores or Solor people) communities.

Archaeological research has begun to illustrate the differential impact of European contact and colonization across the very broad and heterogeneous region of Southeast Asia. Coastal and lowland areas were most receptive to initial contact and most susceptible to subsequent colonization. That European colonization also affected sociopolitical organization in some areas seems evident from research on sixteenth-century mortuary ceramics from Calatagan, Philippines (Barretto-Tesoro 2008: 156-158).

The relative paucity of archaeological work on fourteenth- through eighteenth-century Southeast Asia may explain the near absence of key debates. Perhaps the only salient and persistent issue concerns the ethics of "historical archaeology" that retrieves shipwrecked materials through maritime commercial salvage operations. These materials provide the region's basic chronological sequence. Given the unreliability of the radiocarbon curve for this period and the dearth of alternative dating techniques, most archaeologists date their sites through their association with locally manufactured stonewares and Chinese tradewares. Geochemical analysis of maritime trade ceramics also helps archaeologists reconstruct changing regional and international trade networks through time.

Future Directions

South and Southeast Asian archaeology continue to play marginal roles in studies of the fifteenth through nineteenth centuries, where additional archaeological research could contribute to the expansion and refinement of micro- and macro-histories. Ethnohistorians working through multiple European and Southeast Asian literatures have been extraordinarily interested in economic and political history, two topics on which archaeological research often yields unique insights. Scholars of the Iberian expansion currently lack archaeological knowledge of the easternmost reach of the Iberian empire: while the Spanish colonized the Philippines, the Portuguese spent time in Melaka and in East Timor.

In global perspective, South and Southeast Asia played instrumental roles in the emergence and operation of the Asia's history coinciding with the expansion of a world system that linked New with Old Worlds along both land and ocean routes. Systematic, well-designed archaeological research in South and Southeast Asia might inform on how shifts in key source zones and peripheries reflected and affected other parts of the system. These regions offer rich archaeological data for studying other topics that fall under the purview of historical archaeology, like urbanism and ethnogenesis. Almost no one has yet studied Southeast Asia's Catholic missions, which were established by the seventeenth century in the Philippines, East Timor, Vietnam, and Cambodia. Such research would provide comparative data with studies already done in the New World (and particularly in North America) on Spanish and French missions.

Archaeological scholars of European imperialism would find ample data in both South and Southeast Asia: Europeans colonized every Southeast Asian country except Thailand, and British, French, Portuguese, and Danish all established a colonial presence in South Asia. So, too, would archaeologists in the emerging study of preindustrial and early modern "capitalism." Very little archaeological attention has yet been paid to the political economy of plantations and especially of the rise of nineteenth-century

industrial plantations: rubber in Indochina, Malaysia, and Sri Lanka; sugar in the Philippines, Indonesia, and India; tea in India, Sri Lanka, and Malaysia; spices in Indonesia; indigo and cotton in India; and coffee in Indonesia, Vietnam, and Sri Lanka.

High-quality, long-term research commitment to South and Southeast Asia's fifteenth- through nineteenth-century archaeological record would help redress the current imbalance in which historians have interpreted this period. Focused local studies on the period would complement our knowledge based on documentary data and yield insights on topics that interest historical archaeologists worldwide and that center on long-term responses of social transformation and resistance. The need is increasingly urgent, as many parts of South and Southeast Asia transition out of their status as developing countries and obliterate much of the historical archaeological record.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Mexico: Historical Archaeology
- ▶ Oceania: Historical Archaeology
- ▶ Overseas Chinese Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime

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South Asia: Paleolithic

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Introduction

Numerous biological and technological milestones in hominin evolution have taken place within the last 2 Ma, one of the most important being the multiple dispersals out of Africa. In that regard, South Asia can yield valuable information regarding the adaptations of various *Homo* species as it critically lies in the center of the Old World, i.e., between important paleoanthropological evidence in Africa, Europe, China, and Australasia. It also significantly straddles the eastern end of the *Movius Line* and represents the easternmost distribution of *rich and classic* Acheulean localities in the Old World. (The Movius Line is named after a geographic boundary first recognized and proposed by H. Movius in the 1940s. It essentially represents the easternmost boundary or dispersal extent of Acheulean technology from Africa in the west. In recent years, however, Acheulean-like tools such as hand axes and cleavers have also been found beyond the boundary, mainly in Korea and China, thus fueling debates about whether those tools are Acheulean or represent independent parallel innovations.) The region is also known for the comparative lack of early hominin fossils, a dearth of excavated sites and associated chronometric dates. Consequently, critical information such as the timing of colonization, the factors responsible for techno-cultural change, and the earliest arrival of modern humans and identifying the various hominin specie(s) that occupied the region is not known. The South Asian landmass comprises a temperate/subtropical setting, dominated by a seasonal monsoon regime prevalent since the Miocene or at least the last 18 Ma. The physiographic configuration of India induces the behavior of both the Southwest and Northeast monsoons, during the summer and winter months, respectively. South Asia or the Indian subcontinent generally encompasses the political boundaries of Pakistan, India, Nepal, Sri Lanka, Bangladesh, and Bhutan. The north is dominated by the Greater Himalaya, the Lesser Himalaya, and the Siwalik Hills, all ranges almost geographically parallel and temporally successive to each other. The Gangetic plains are followed (to the south) by the great Thar Desert (in eastern Pakistan and northwestern India) and the Vindhyan range of hills. These hills are located north of the Deccan Plateau, which is a prominent landscape of peninsular India, and includes the Western and Eastern Ghats. In the past, different ecozones provided access to different types and shapes of lithic raw material. For example, for fluvial sources in the Siwalik region, rounded and subrounded quartzite and sandstone clasts dominated the Pleistocene landscape. In parts of north-central India, Acheulean assemblages were made on pink granite. In the Western and Eastern Ghats, however, the primary raw material was basalt and doleritic dykes, occurring as fragments from bedrock outcrops and waterworn clasts belonging to the Deccan volcanic Traps. Further south, in parts of Karnataka, limestone bedrock was the dominant raw material type available in the form of tabular slabs (Fig. 1). The Rohri Hills in Pakistan is a rare occurrence of more or less continuous exploitation of the same raw material source – chert outcrops – from the Lower Paleolithic to Harappan times. From the variety of raw materials exploited extensively by South Asian hominins, quartzite was one of the more dominant types used during the Lower, Middle, and Upper Paleolithic and at various types of sites contexts – quarry, factory, workshop, and occupational.

The most obvious geographic areas of entry into the subcontinent (and subsequent population

South Asia: Paleolithic, Fig. 1 Two examples of diverse rock types for stone tool manufacture: limestone blocks from Karnataka (*left*) and quartzite cobbles from the Siwalik Hills (*inset*)

movements *from* India) are Afghanistan and Pakistan to the northwest and Myanmar in the northeast. Both zones offered coastal routes, as well inland mountain passes and ecologically rich tropical evergreen and deciduous forests, without any major mountain ranges or deserts impeding potential movements. The Thar Desert may have acted as a temporary ecological barrier but also contained numerous isolated raw material sources (e.g., Jayal Gravel Ridge), and once crossed, ample outcrops of Aravalli quartzites were available on the landscape. The northeast region has a rich record of younger non-biface assemblages, most of which may be related culturally to the comparatively younger lithic industries from Southeast Asia. Similar to the Indo-Gangetic landscape in the north and northwest, however, the Bay of Bengal and the Ganges-Brahmaputra drainage system may have also acted as temporary barriers during the Late Pliocene-Early Pleistocene, due to a low occurrence of raw materials in the region and general delta environment. From the current lack of older Paleolithic evidence in NE India, the main point of movement appears to have been NW India.

Definition

Lower Paleolithic

The South Asian Lower Paleolithic evidence has been traditionally divided into two facies or types of lithic assemblages: Soanian (non- or pre-Acheulean) and Acheulean industries, both often occurring independently as well in shared geographical, geomorphological, and stratigraphical contexts. However, most of the Soanian evidence is now known to postdate the Acheulean. Stone tools across South Asia are found in stratified or surface association with fine-grained fluvial and lacustrine sediments, ferricretes, laterites, and gravel or conglomerate deposits. Most of the Indian localities have been directly dated through the uranium-thorium (^{234}Th-^{230}U) and thermoluminescence (TL) or optically stimulated luminescence (OSL) methods and include a predominance of Acheulean sites (Mishra 1995). Ages for other occurrences such as Riwat, Dina, Jalapur, Pabbi Hills, Morgaon, and Satpati Hill have been estimated using paleomagnetism and geostratigraphic correlations. With some possible exceptions in Nepal and in western India, the only unequivocal evidence of

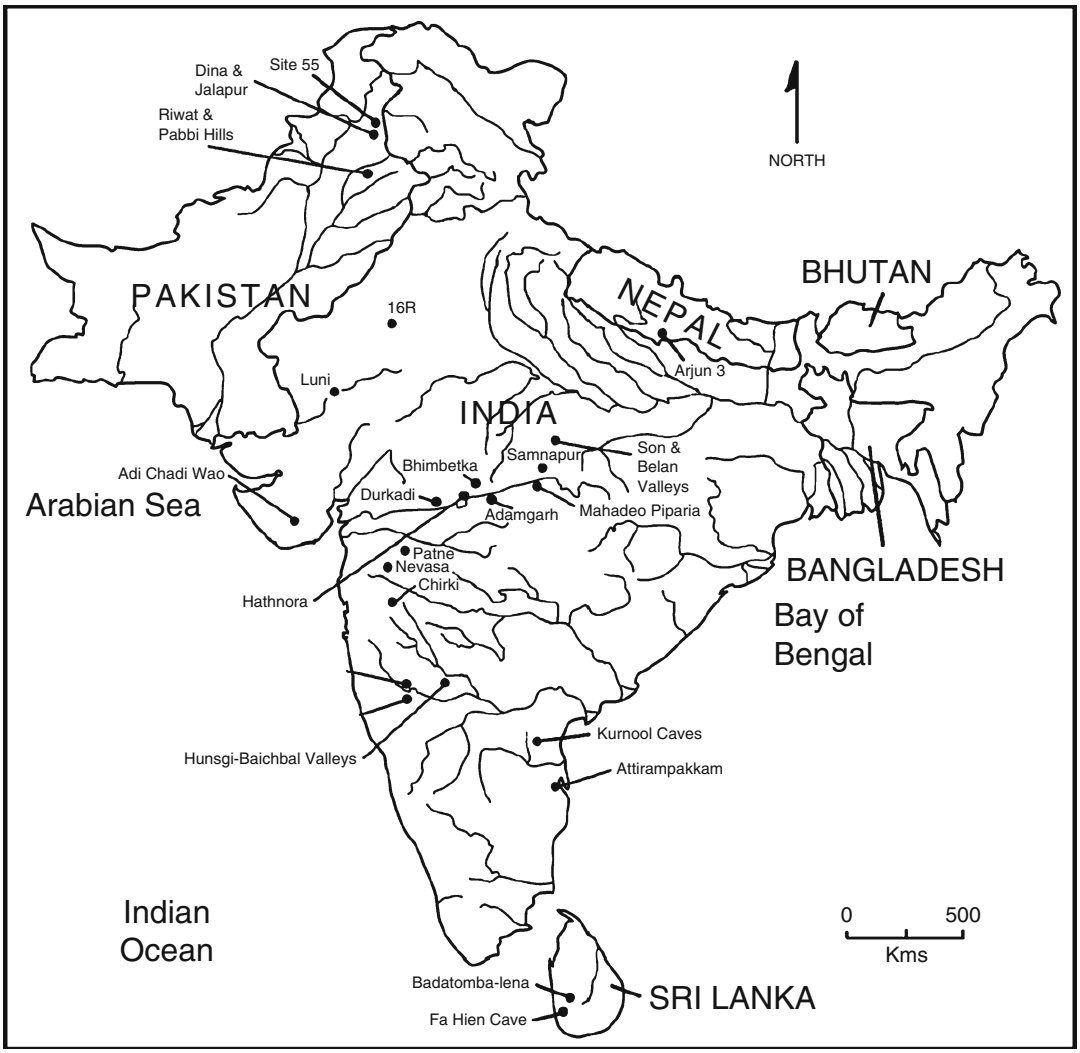

South Asia: Paleolithic, Fig. 2 Map of key paleoanthropological localities in South Asia

Acheulean occupation prior to the Middle Pleistocene in the subcontinent comes from Attirampakkam at between 1.07 Ma and 1.5 Ma. Other Acheulean sites have also been reported to be older but most indicate problems with the dating results, site contexts, or general interpretations. The majority of evidence in Sri Lanka belongs to the Upper Paleolithic, and some Middle Paleolithic lithic assemblages have been reported (Deraniyagala 1992), thus signifying a relatively late colonization of that region from southernmost peninsular India, when perhaps the sea levels were significantly lower. The terminal Acheulean evidence is not well established and the use of diminutive bifaces persisted well into the Upper Pleistocene as parts of early Middle Paleolithic assemblages (Chauhan 2009).

Some unique features of the South Asian Lower Paleolithic record include possible stone alignments and postholes at Paisra and stone alignments at Bhimbetka and Hunsgi. Though viewed as being controversial, a rockshelter at Bhimbetka has yielded cupule marks thought to be contemporary with the Late Acheulean.

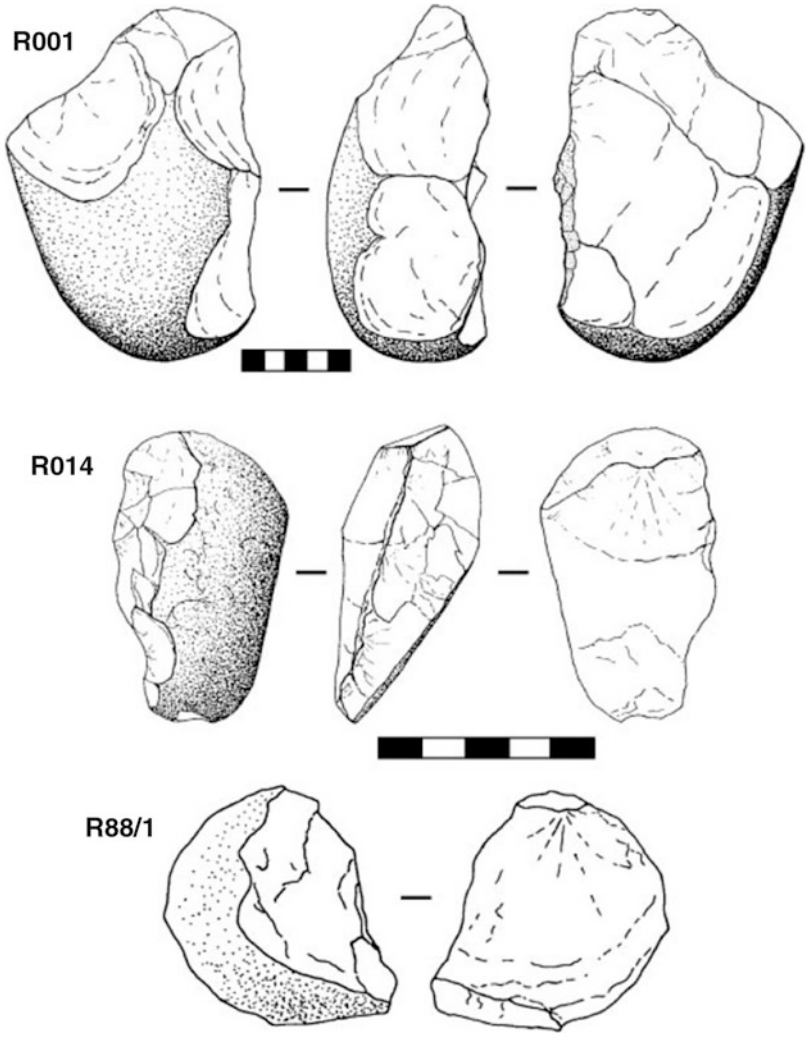

South Asia: Paleolithic, Fig. 3 The main stone tool specimens reported from Riwat, Pakistan

At Singi Talav, an Early Acheulean level – layer 4 – yielded six complete and unmodified quartz crystals (though one may have some use-wear), possibly suggesting the transport of nonutilitarian objects from elsewhere. A similar example comes from the Acheulean layer at Hunsgi, which yielded almost 20 hematite pebbles, geologically exotic to the region, including one with striations interpreted as a sign of utilization. The only known premodern hominin fossils in the subcontinent may be contemporary with or younger than the Late Acheulean and come from Hathnora in the central Narmada Valley (see Patnaik et al. 2009). The Narmada fossil evidence includes a partial calvarium (possibly female) and possibly associated clavicles, and a rib fragment. The calvarium was originally identified as an "advanced" *Homo erectus* and later reclassified as an archaic or early form of *H. sapiens*; most recently it has been classified as *Homo* sp. indet. Modern human fossils and sub-fossils are more abundant in South Asia. In India, examples are known from Baghai Khor, Bagor, Pachmarhi, Mahara-Pahar, Tilwara, Valasna, Sarai Nahar Rai, Mahadaha, Damdama, and Lekhahia. In Sri Lanka, they come from Fa Hien, Batadomba Lena, Beli Lena Kitulgala, Bellanbandi Palassa, Hambantota, Alu Galge, Ravan Alle, and Beli Lena Athula (Kennedy 2003).

The South Asian "Oldowan"

In the 1960s, A.P. Khatri was the first to argue for an indigenous origin of the Indian Acheulean from the Mahadevian industry, equated to the Oldowan, at Mahadeo Piparia in the Upper Narmada Valley. A similar claim was later made by J. Armand who reported a comparable assemblage at Durkadi from excavated contexts in the lower part of the valley. Numerous core-and-flake assemblages have also been reported from the Konkan coast, Karnataka, Uttar Pradesh, Bihar and West Bengal, Orissa, Andhra Pradesh, and northeastern India. Unfortunately, none of these assemblages have been dated and remain techno-chronologically undiagnostic; most appear to postdate the Acheulean (Chauhan 2009). The most systematically studied pre-Acheulean evidence in the subcontinent is also the most controversial and comes from the Siwalik deposits of northern Pakistan. The oldest archaeological evidence here is represented by the c. 2.0 Ma finds from Riwat and the 2.2–0.9 Ma old Mode 1 assemblages from the nearby Pabbi Hills. At Riwat, only three out of 23 specimens have been promoted as being most convincing as artifacts (Fig. 3). The assemblages from the Pabbi Hills comprise a total of 607 lithics (Fig. 4), and the investigators chronologically divided them based on the underlying strata and associated vertebrate faunal assemblages: 102 specimens dated to 0.9–1.2 Ma, 307 specimens to between 1.2 Ma and 1.4 Ma, and 198 specimens to between 2.2 Ma and 1.7 Ma. Unfortunately, the Riwat and Pabbi Hills material come from gravel and surface contexts, respectively, and comparable evidence in excavated contexts is required.

The South Asian Acheulean

With the exception of northeast India and parts of Konkan Maharashtra, western Kerala, south of the Cauvery River in Tamil Nadu, and Sri Lanka, Acheulean assemblages are found throughout most of the Indian subcontinent (Pappu 2001). The South Asian Acheulean is generally divided into Early or Late developmental phases, based primarily on typo-technological features, assemblage compositions, comparative stratigraphy, and associated metrical analyses. Early Acheulean assemblages are known to comprise hand axes, choppers, polyhedrons, and spheroids, usually a lower number of cleavers (but not always) and flake tools, the predominant use of the stone-hammer technique, and a marked absence of the Levallois technique. The Early Acheulean bifaces are often asymmetrical, large with thick butts or midsections, and possess large, bold, and irregular flake scars, indicative of hard-hammer percussion. In contrast, Late Acheulean assemblages are defined by the low proportion of bifaces, the high ratio of cleavers to hand axes, the very high ratio of flake tools such as scrapers, and the extensive employment of the soft-hammer technique and the Levallois and discoid-core techniques. These bifaces are also generally smaller, thinner, and morphologically more refined, with a significant increase in the degree of retouching and controlled bifacial thinning/flaking.

The Earlier Acheulean

The Early Acheulean phase is typologically and chrono-stratigraphically represented by several occurrences, including Nepal, the Thar Desert, and parts of Maharashtra, Karnataka, and Madhya Pradesh. From the available geochronological information and comparative geology and typology, most of these assemblages appear to be older than c. 400 ka. Currently, the oldest securely dated Acheulean evidence in the Siwaliks comes from findspots at Dina and Jalalpur in northern Pakistan (700–400 ka). In the Hunsgi-Baichbal valleys (Karnataka), systematic surveys and excavations were conducted since the mid-1960s by K. Paddayya, revealing numerous occurrences belonging to all Paleolithic phases (Paddayya 2001). Probably the most important Early Acheulean site from the Hunsgi complex is Isampur, representing the first-known occurrence of in situ artifacts in a quarry context in India. The region of Tamil Nadu, where stone tools were first reported in India, has been studied for over a century by various researchers. The most significant site in the region is Attirampakkam, located in the Kortallayar valley and investigated intermittently

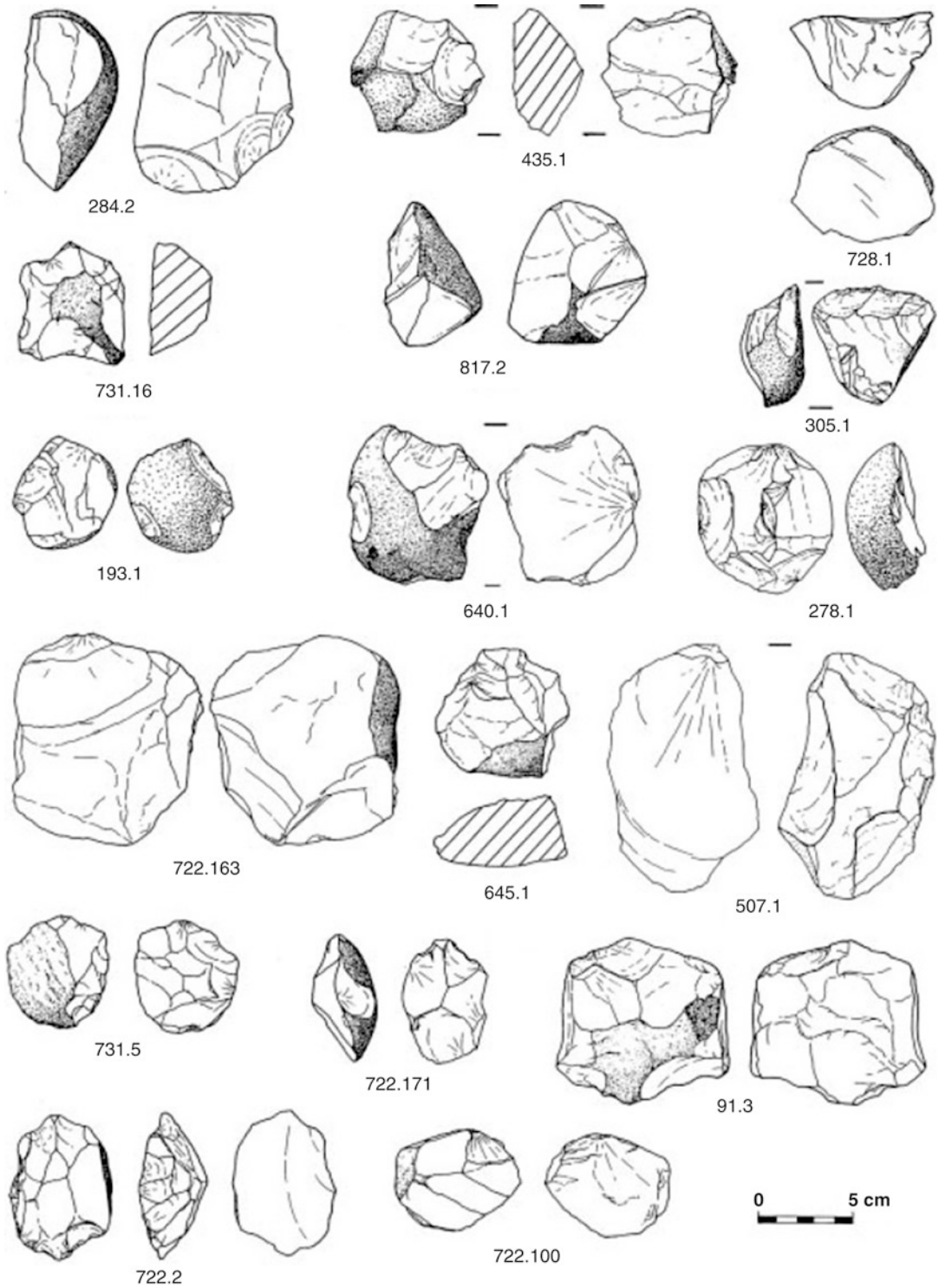

South Asia: Paleolithic, Fig. 4 Some representative stone tool specimens from the Pabbi Hills, Pakistan

South Asia: Paleolithic, Fig. 5 A view of the 16R dune (multi-cultural Paleolithic site) near Didwana and quartz crystals (inset) found in Acheulean levels at nearby Singi Talav (both in Rajasthan, NW India)

for several decades. Cultural levels at the site derive from a 7 m section and, like the 16R dune in Rajasthan (Fig. 5), are thought to range from the Lower Paleolithic to the Mesolithic. Preliminary lithic analyses reveal that a part of the Attirampakkam assemblage exhibits both Early and Late Acheulean characters, and the oldest evidence is now known to be between 1.07 Ma and 1.5 Ma in age from paleomagnetic and cosmogenic dating (Pappu et al. 2011). Indeed, this work signifies the first comprehensive interdisciplinary study in recent years in India. Other earlier Acheulean examples include Chirki and Morgaon in Maharashtra, Singi Talav in Rajasthan, and Pilikarar in Madhya Pradesh.

The Later Acheulean

The South Asian Late Acheulean sites occur in greater numbers, possibly reflecting population dynamics and associated land-use intensity during the later Middle Pleistocene. This evidence marks the earliest, but undated, employment of the prepared-core and Levallois technology in the region, which are in the form of discoidal cores and the Victoria West technique, as well as the initial production of large blades at sites such as Bhimbetka. The Rohri Hills in southern Pakistan are one of the few South Asian Lower Paleolithic occurrences produced on chert (Fig. 6), and the assemblages come from numerous localities comprised of hundreds of artifacts. In Nepal, the site of Gadari indicates occupation along the banks of the Babai River, as the hand axes were recovered from the basal gravels of the alluvium, the oldest period of the Dang dun, a shallow intermontane post-Siwalik valley (Corvinus 2006). Most of the South Asian Late Acheulean evidence, however, is located in central and peninsular India, including parts of Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Bihar, Karnataka, Andhra Pradesh, and Tamil Nadu (Pappu 2001). Some of the best-known Late Acheulean assemblages in north-central India come from Bhimbetka, where hundreds of rockshelters (many with rock paintings) are situated in a hilly and forested area in Madhya Pradesh (Misra 2001). Trenches in a cave (III-F-24) yielded a 3.8 m Lower and Middle Paleolithic sequence as well as Mesolithic material at the top (Fig. 7). It is unclear exactly when hand axes and cleavers disappeared from the South Asian archaeological record but occur as late as 110 ka and 60 ka in central and western India, respectively.

South Asia: Paleolithic, Fig. 6 Example of an Acheulean biface on chert in the Rohri Hills, Pakistan

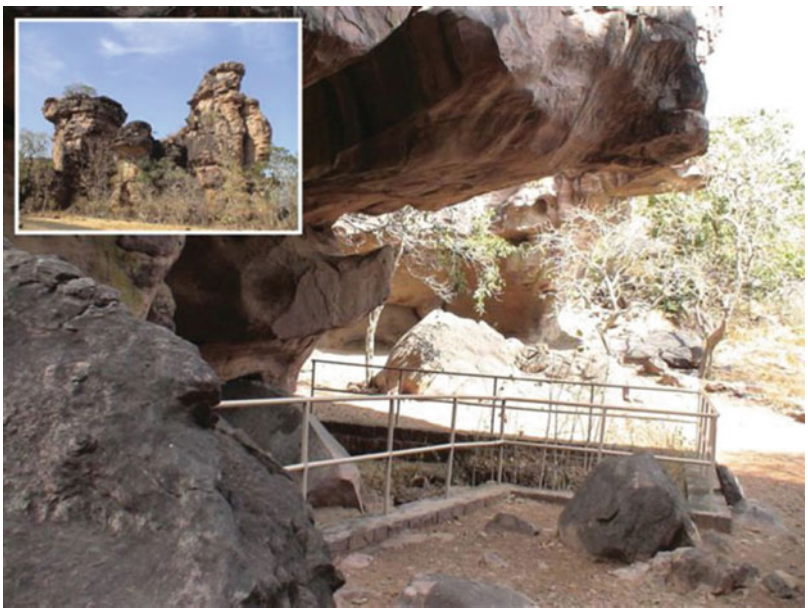

South Asia: Paleolithic, Fig. 7 One of the excavated rockshelters at Bhimbetka in central India

The Middle Paleolithic

The South Asian Middle Paleolithic has been clearly defined from a large number of occurrences found throughout the entire region, and H.D. Sankalia was the first to formally recognize and define the South Asian Middle Paleolithic at Nevasa (Pal 2002). However, separating the Middle Paleolithic horizons from the terminal Acheulean ones has proved to be challenging because the Levallois technique (Fig. 8) and other forms of prepared-core technology originate in the Late Acheulean phase of the subcontinent. Additionally, the South Asian Middle Paleolithic sites often overlap geographically with the Late Acheulean occurrences and indicate successful adaptations and exploitation of

South Asia: Paleolithic, Fig. 8 A Levallois flake from the Narmada Basin, central India

a range of ecological and topographic settings. Older assemblages often appear to contain diminutive hand axes, and younger assemblages may have an increasing blade component. These observations, however, need to be verified through a more robust chronological framework. The features that distinguish Middle Paleolithic assemblages are the following: (a) a decrease in size of the artifacts, (b) a noticeable shift from large Acheulean bifaces to more smaller, specialized tools, (c) an increase in the prepared-core technique, and (d) a preference for fine-grained raw material (such as quartz, fine-grained quartzite, chert, jasper, chalcedony, flint, agate, cryptocrystalline silica, lydianite, and bloodstone). The South Asian Middle Paleolithic sites vary in their assemblage compositions, which generally include cores, choppers, discoids, scrapers, flakes, points, debitage, and so forth. Some well-studied stratified examples are Nevasa in Maharashtra, Samnapur in Madhya Pradesh, evidence from the Kortallayar Basin in Tamil Nadu, and the Jwalapuram lithic assemblages associated with Younger Toba Tephra in Andhra Pradesh (Petraglia et al. 2007). In Rajasthan, they have been found to be stratified in stabilized paleo-sand dunes and fluvial contexts (e.g., Luni and Berach Basins; 16R dune at Didwana). Absolute dating methods on different materials from different sites suggest that the Indian Middle Paleolithic is provisionally bracketed between 110 ka and 50 ka. Though difficult to classify exclusively as Middle or Upper Paleolithic, archaeological evidence at about 45 ka is represented by Kalpi in the Ganga Plains which yielded vertebrate fossil remains as well as core tools and by Site 55 in Pakistan in loess context. Also in Pakistan, Sanghao Cave of Mousterian and Upper Paleolithic cultural affinities also shows broadly comparable ages ranging from 42 ka to 22 ka.

The Upper Paleolithic

The South Asian Upper Paleolithic is also not clearly defined, due to lack of absolute dates and detailed technological analyses/classification. This entity was first recognized based on specific tool types already known from Africa and Europe. Its dominating and defining features include a notable increase in the production of more specialized tools such as blades, burins, borers, and, at some sites, an early occurrence of microliths. Additional tool types of this period include flakes, knives, awls, scrapers, and cores including cylindrical types, choppers, and bone tools. At Bhimbetka, for example, end scrapers dominate the Upper Paleolithic assemblages and are often made from the bases of blades and burins. The use of pressure flaking and the soft-hammer technique for flake detachment appears to increase significantly as compared with the older lithic traditions. The degree or intensity of retouch also appears to increase in general. The South Asian Upper Paleolithic shows a greater degree of regional typo-technological variation as well as an increase in different types of scrapers (e.g., steep, convex, convergent) and backed blades. Additional unique features include (a) the exploitation of ostrich eggshell fragments for making beads at Patne, Mehtakheri, Bhimbetka, Batadomba Lena, and Jwalapuram rockshelter, and nonutilitarian artifacts such as engraved geometric or crosshatched patterns; (b) possibly the oldest evidence of a shrine in the region at Baghor II; and (c) stone platforms at Bhimbetka and Site 55, and bone harpoons from the Belan Valley and Jwalapuram rockshelter. Some of the later Paleolithic assemblages, such as Badatomba-lena and Sites 49 and 50 (Sri Lanka) and Jwalapuram

rockshelter (India), comprise the earliest geometric microlithic evidence in South Asia (see Clarkson et al. 2009). A sound chronological framework for the South Asian Upper Paleolithic is lacking but a broad estimate can be provisionally assigned as 50 ka to 15 ka before the Mesolithic starts. The best-known sites (or stratigraphic sequences with Upper Paleolithic assemblages) include the Son Valley sites and the Bhimbetka rockshelters (shelters IIIF-23 and III-A-28) in Madhya Pradesh, the Kurnool caves and several river basins in Andhra Pradesh, the Belan Valley sites in Uttar Pradesh, the Singhbhum region of Bihar, Patne in Maharashtra, Mehtakheri in the Narmada Valley, Visadi in Gujarat, the Budha Pushkar region in Rajasthan, the Rohri Hills in Pakistan, the Chota Nagpur region in Bihar, the Sanghao rockshelter and Site 55 in Pakistan, and Batadomba Lena and Fa Hien Cave in Sri Lanka. Rock art and other forms of symbolic behavior appear to have started during this time before becoming prolific during the subsequent Mesolithic phase (Table 1).

The Siwalik Hills and the Soanian Industry

The most enigmatic and prominent non-bifacial techno-complex is represented by the Soanian industry, found throughout the Siwalik Hills region in Pakistan, India, and Nepal. As first defined by de Terra and Paterson (1939) from the Soan terrace sequence in northern Pakistan, Soanian artifacts were manufactured on quartzite pebbles, cobbles, and occasionally on boulders, all derived from various fluvial sources on the surrounding landscape. These assemblages generally comprise varieties of choppers, discoids, scrapers, cores, and numerous flake types (Fig. 9), all occurring in varying typo-technological frequencies at individual sites. Such attributes as bifacial reduction, acortical finished tools, extensive platform preparation (i.e., facetted platforms), and plan form and lateral symmetry are absent within the Soanian. The primary issues in accurately characterizing Soanian assemblages include lack of primary contexts and absolute dates and low numbers of diagnostic assemblages. The dynamic sedimentary and tectonic history of the Siwalik region has prevented preservation of Paleolithic sites. Most occur in non-dateable surface contexts with stray artifacts strewn randomly across Siwalik landscapes. Excluding some localities in the Soan Valley of Pakistan, the site complexes of Guler (Beas Valley) and Toka (Kala Amb area) in India, and the Arjun-3 site in Nepal, Soanian assemblages rarely comprise more than a few dozen artifacts. Rendell and colleagues (1989) have shown the Soanian "terraces" observed by de Terra and Paterson to be erosional features in the Soan Valley, rather than true river terraces. Although this challenges the validity of Soanian technological progression based on terrace sequences, current geological evidence suggests a post-Acheulean age for the earliest Soanian assemblages, also supported by preliminary dates from Arjun-3 in Nepal (e.g., Zöller 2000). Although the techno-cultural origins of the Soanian and associated chronologies are obscure, it is clear that the regionally dominant raw material (fluvially rounded quartzite clasts) and associated technology continued to be manifested into the Holocene.

Historical Background

The development of Quaternary and Paleolithic research in India can be divided into three phases: (1) from 1863 to 1964, (2) from 1964 to the early 1980s (see Korisetter & Rajaguru 1998), and (3) from the 1980s to the present day. During the first phase, inferences relating to paleoclimates and paleoenvironments depended on the characteristics of lithological units (such as coarse-grained and fine-grained clastic sediments) and the associated faunal material. Methodology and interpretative frameworks that were prominent in Europe were applied to the Indian context (most especially the glacial climatic sequence). Due to this massive influx of European influence between 1940 and 1960, many regional surveys were conducted to eradicate theoretical gaps, which included Pleistocene chronology and cultural successions. The 1960s formed a decade of important methodological and theoretical applications in the earth sciences

South Asia: Paleolithic, Table 1 Salient paleoanthropological features in the Indian Subcontinent (see Harrod 2007; Petraglia 2007)

Period	Site or region	Age	Significance	References
Lower and early? Middle Paleolithic feature				
O	Riwat*	c. 2.0 Ma	Possibly the oldest Oldowan evidence	Rendell et al. (1987)
O	(Pabbi Hills)*	2.2–1.0 Ma	Oldest Modes 1 evidence in stratigraphic association with vertebrate fossils	Dennell (2004)
O?	Durkadi*	?	The only-known stratified core-and-flake site in India	Armand (1983)
EA	Isampur[a]	1.27–0.73 Ma	Possibly the oldest Acheulian evidence & 1st known quarry	Paddayya et al. (2002)
A	Dina & Jalapur	400–700 ka	Oldest securely dated Acheulean	Rendell and Dennell (1985)
EA	Singi Talav	>800 ka?	Transport of non-utilitarian quartz crystals; 1 of 2 sites in clay context	Gaillard (2006)
EA	Chirki-on-Pravara	>350 ka	Preservation of fossilized tree fragments	Corvinus (1971)
A	Kuliana	?	First Lower Paleolithic site to be excavated	Bose and Sen (1948)
A	Attirmpakkam	?	Bovid and elephant footprints and shell impressions; 2nd site in clay context	Pappu et al. (2003)
A	Attirampakkam	?	Buried bifaces found in vertical and oblique positions	Pappu et al. (2003)
A	Hunsgi Valley	?	Twenty hematite nodules, one with striations (from use?)	Paddayya (1982)
A	Hunsgi locality V	?	Possible stone alignment	Paddayya (1984)
LA	Multiple sites	?	Earliest evidence of the Levallois or prepared-core technique	Multiple publications
LA	Bhimbetka[b]	?	Cupulue and engraving on rockshelter wall	Bednarik (2003)
LA	Bhimbetka	?	Oldest known blade production	Misra (1982)
LA-M	Bhimbetka	?	Largest, lengthiest, earliest and stratified cave/rockshelter complex with rock art	Wakanker (1973)
LA	Paisra	?	Possible stone alignment and post-holes	Pant and Jayaswal (1991)
LA	Zia Piarat Shaban	?	The only chert bifaces known and in quarry context	Biagi and Cremaschi (1988)
LA	Maihar	?	Flat sandstone disc, centripetally flaked	see Bednarik (2003)
LA-MP?	Hathnora	?	Oldest pre-modern fossil hominin, attributed to various species of *Homo*	see Athreya (2007)
LA-MP?	Hathnora	?	Oldest post-cranial fossil specimens (clavicles and rib fragment?)	Sankhyan (1997, 2005)
LA-MP	Daraki-Chattan	?	500+ cupules, 2 engraved grooves, stone floors	see Bednarik (2003)
LA-MP?	Adi Chadi Wao	~69 ka	Youngest dated handaxes	Marathe (1981)
Late? Middle and Upper Paleolithic features				
MP	Jwalapuram	~74 ka	Open-air stratified lithic assemblages above and below Toba ash	Petraglia et al. (2007)
MP	Hathnora	>33 ka	Possible engraved lithic artifact	Patnaik et al. (2009)
MP	Bhimbetka	?	Earliest stone structure in rockshelter context	Misra (1989)

(*continued*)

South Asia: Paleolithic, Table 1 (continued)

Period	Site or region	Age	Significance	References
MP	Kalpi	45 ka	Burnt bones and diminutive choppers; possible cut-marks	Tewari et al. (2002)
MO-UP?	Site 55	45 ka	Stone-lined pit, low wall, blades, microblades in open-air context	Dennell et al. (1992)
UP?	>40 Indian sites	40–20 ka	Numerous sites with ostrich eggshells	Multiple publications
?	Chandrasal	39 ka	Oldest engraved ostrich eggshell fragment	Kumar et al. (1988)
MP-UP	Fa Hien cave	31 ka	Earliest known modern human fossils & geometric microliths	Deraniyagala (1992)
?	Khaparkheda	?	OEB production site	Kumar (2000–01)
UP	Bhimbetka III A-28	?	2 OEBs found with modern human burial	Kumar et al. (1988)
UP	Batadombalena	28.5 ka	Geometric microlithic toolds; bone points & OEB present	Deraniyagala (1992)
UP	Kurnool Caves[c]	?	Earliest known use of controlled fire, bone tools, cut-marked bones	Nambi and Murty (1983)
UP	Patne	25 ka	Incised ostrich eggshell fragment	Sali (1989)
UP	Baghor	8–9 ka?	Oldest Paleolithic shrine (still practiced in the region today)	Kenoyer et al. (1983)
?	Belan Valley	?	Bone harpoon point	Bednarik (2003)
LLP	Jwalapuram	?	Beads and harpoon in rockshelter context	see Petraglia (2007)

Legend: *O* Oldowan, *EA* Early Acheulean, *A* Acheulean, *LA* Late Acheulean, *LP* Lower Paleolithic, *MP* Middle Paleolithic, *UP* Upper Paleolithic, *M* Mesolithic, *LLP Later Paleolithic*, *OEB* ostrich eggshell beads
[a]denotes controversial or ambiguous evidence.
[b]viewed as controversial by James and Petraglia (2005).
[c]called into question by Petraglia (1995).

and archaeology, all over the world. Numerous geographic zones of study were introduced and they included littoral, aeoline, lacustrine, and offshore environments. The first discovery (in 1863) of Lower Paleolithic artifacts was made at Pallavaram near Madras (now Chennai) by Robert Bruce Foote (Kennedy 2003). He was probably the first investigator to attempt establishing their ages as well as reconstructing contemporary climatic conditions, and also the first to apply a geoarchaeological perspective with an emphasis on site formation. A few decades later, the Yale-Cambridge expedition was launched by de Terra and Paterson (1939) to seek evidence of Pleistocene glaciation phases in the Sub-Himalayan region and to highlight its impact on early human cultures, both in concordance with the European model. Following their fieldwork in the Kashmir Valley (Jhelum), on the Potwar plateau (Soan Valley in modern-day Pakistan, discussed below in greater detail), in the central Narmada Valley (between the towns of Hoshangabad and Narsinghpur), and around Chennai, they arrived at a fourfold glacial-interglacial model first established in Europe in 1909. This glacial-interglacial model became a standard for subsequent Pleistocene research in India and prevailed for several decades, until revised by other researchers in the 1980s. In the greater part of the twentieth century, H. D. Sankalia and his colleagues and students placed great emphasis on correlating paleoenvironmental parameters and corresponding technological and behavioral adaptations of early hominids in the subcontinent. An interesting point to be noted is the emphasis placed (at that time) on river valleys and basins for the investigation of Paleolithic sites. Later efforts were directed at sites between river valleys or away from river valleys and expanded the potential of

South Asia: Paleolithic, Fig. 9 Representative stone tool specimen from a Soanian site in the Siwalik Hills of northern India

these sites in peninsular India (Fig. 2 and Table 2). Comprehensive multidisciplinary approaches have been applied only in the last two decades and at very few Paleolithic sites in South Asia. As a result, it is unknown whether various transitions represent technological influences of incoming populations (dispersal of *Homo sapiens* from Africa) or represent indigenous biocultural continuities (independent of external influence). These dynamic transitions probably reflect the collective impact of a suite of factors: demography, raw material type, topographical prominence, water resources, cognitive capabilities, mobility and settlement patterns, and subsequent hominin dispersals from peripheral regions. Research efforts in the last few years have centered on identifying technological dispersals from Africa, pinpointing Early Pleistocene occupations, pinpointing the initial arrival of modern humans, understanding the regional ecological impact of the Toba super-eruption at 74 ka on hominin populations, and establishing the earliest occurrence of microlithic technology.

Key Issues/Current Debates

Most regions of the subcontinent contain assemblages belonging to almost all three Paleolithic phases of techno-chronology, reflecting continuous occupation in various regions but at different levels (e.g., Rohri Hills in southern Pakistan, Hunsgi-Baichbal basins in southern India, the Son valley in Madhya Pradesh). However, continuous stratigraphic and archaeological sequences from the Lower Paleolithic to the Upper Paleolithic and Mesolithic phases at single locations are rare in South Asia. Exceptional

South Asia: Paleolithic, Table 2 Key South Asian paleoanthropological sites and their significances. For further details and relevant reference sources, see Chauhan (2009) and other citations in text

Site name	Age	Significance
Riwat	? – c. 2.0 Ma	Possibly the oldest Oldowan evidence IN South Asia
Pabbi Hills	? – 2.2–1.0 Ma	Oldest Mode 1 evidence in stratigraphic association with vertebrate fossils
Attirampakkam	1.07–1.5 Ma	Oldest Acheulean occurrence in South Asia; possible bovid and elephant footprints and shell impressions preserved
Isampur	? – 1.27–0.73 Ma	First-known Acheulean quarry
Bhimbetka	? – Late Middle Pleistocene to Holocene	Largest, lengthiest, earliest, and stratified rockshelter complex with rock art
Hathnora	? – Late Middle Pleistocene or Late Quaternary	Oldest premodern fossil hominin; attributed to various species of *Homo*
Adi Chadi Wao	69 ka	Youngest dated hand axes
Jwalapuram	c. 74 ka	Oldest well-dated Middle Paleolithic assemblages and in association with Younger Toba tephra (note: below YTT only; the assemblages above YTT are in secondary context)
Kurnool Caves	? – Late Quaternary	Earliest known use of controlled fire, bone tools, cut-marked bones
Patne	25 ka	Incised ostrich eggshell fragment

occurrences have been reported from the 16R dune (Rajasthan), the Bhimbetka and Adamgarh rockshelter complexes (Madhya Pradesh), and Attirampakkam (Tamil Nadu), all of which preserve continuous archaeological sequences. Some sites have shorter behavioral sequences, such as Patne (Maharashtra), which has Middle and Upper Paleolithic and Mesolithic assemblages but no evidence of Lower Paleolithic occupation. Though these sites have variably preserved multiple techno-chronological horizons ranging from the Lower Paleolithic to the Mesolithic, the sequences are not stratigraphically (i.e., chronologically) continuous. Some of these occurrences represent no visible hiatus during the Late Acheulean to Middle Paleolithic transition, while other sites have yielded sterile layers between cultural horizons. The South Asian Middle Paleolithic and South Asian Upper Paleolithic may represent a combination of indigenous development as well as technological and behavioral influences from incoming populations. The Lower-to-Middle Paleolithic transition is often defined by some by the presence/absence of bifaces. Likewise, the regional Upper Paleolithic-to-Mesolithic transition is becoming difficult to characterize because the antiquity of microlithic technology is being pushed back. The absence of Paleolithic evidence in some parts of the Indian subcontinent may be related unique climatic and topographic features. For example, parts of northeastern India are known to receive the highest amount of rainfall in the world, a climatic feature that may have affected regional environmental conditions during the Pleistocene, including sedimentation rates, seasonal raw material availability, and access to required resources for subsistence (as compared to other regions of the subcontinent). One reason for the dearth of Paleolithic archaeological evidence in such regions may be poor visibility for survey purposes or a limited occurrence of time-specific deposits in this thickly vegetated zone.

Many tool types within the South Asian Paleolithic are also known from other regions of the Old World, thus suggesting broad similarities in their overall functional and behavioral aspects, as well as shared subsistence strategies. At the same time, the conspicuous absence or low profile of specific tool types, such as classic tanged bifacial (projectile) points (Costa 2012), may reflect the absence of associated behaviors (e.g., hunting of

large mammals with hafted points on short thrusting spears) in the subcontinent. No convincing evidence of butchery has been clearly demonstrated in South Asia earlier than the evidence from the Kurnool Caves and possibly Kalpi at about 45 ka. Though rare, there appear to be some regional typo-technological variants within the South Asian Paleolithic. For example, the cleaver manufacturing technique from Chiri-on-Pravara is not found anywhere else in the subcontinent. Likewise, the Middle Paleolithic Jamalpur industry from Bihar shows higher than "normal" frequencies of end scrapers, notched tools, and denticulates, as well as typo-morphologically unique knife and scraper types. The paleoanthropological record of the island country of Sri Lanka is comparatively less well known but has a significant bearing on the evolution of modern humans in the subcontinent. Some of the most well-preserved South Asian fossils of modern *Homo sapiens* come from various cave deposits in Sri Lanka such as Fa Hien Cave. Renewed paleoanthropological research is critically required, however, to identify and date the earliest occupation in this region, which currently appears to be no older than 30 ka. The Ratnapura region in the southwestern wet lowlands (Deraniyagala 1992) has yielded quartz and quartzite lithic artifacts, but these remain undated and ambiguous.

Future Directions

Despite over a century of Paleolithic research in South Asia or the Indian subcontinent, a large number of important issues require to be addressed and explained. Some examples include (a) the lack of premodern hominin fossils as compared with other Old World regions, (b) the lack of unambiguous Oldowan evidence (especially if South Asia was a route during Out of Africa I migration from eastern Africa to SE Asia during the early Pleistocene), (c) the potential impact of the Toba super-eruption at 74 ka on regional (and global) climate and hominin adaptations/survival, (d) the number of dispersals and hominin species in the region during the last 2 Ma, and (e) specific subsistence strategies and land-use patterns in relation to the differing ecologies across the entire region. More systematic surveys, multidisciplinary investigations, and rigorous absolute dating projects are crucially required to address all of these problems and related questions (see Dennell 2000-01). A more increased focus on paleoanthropology in South Asia is all the more important as numerous areas with Paleolithic evidence are under constant threat from population increase, growing infrastructure, widespread agriculture, and other destructive agents.

On the lack of hominin fossils: One of the most significant deficiencies in South Asian paleoanthropology is the virtual lack of hominin fossils older than the Upper Pleistocene. This insufficiency appears to be related to a number of possible factors: (1) geological factors such as low rates of preservation and high rates of erosion, (2) the fossils are exposed or preserved in very rare contexts and have not been recovered as of yet, (3) the fossils, especially fragmentary or weathered specimens, have not been recognized as being *hominin* by nonspecialists, since most investigators in the field are archaeologists, prehistorians, and geologists. Qualified physical anthropologists have rarely carried out long-term and systematic surveys for hominin fossils in South Asia.

On lack of Oldowan evidence: Though numerous "Oldowan" assemblages have been reported throughout the subcontinent, unequivocal evidence (if any) continues to remain elusive. Because there is a considerable faunal overlap between the Siwalik Hills region and various early *Homo* sites, it appears that the Pliocene conditions in India during the Pinjore Fm. times were conducive to possibly allow dispersion of early hominin through the region. Moreover, sediments older than the Middle Pleistocene occur only in pockets south of the Siwalik Hills, suggesting that associated Oldowan evidence has not been preserved in primary context or is deeply buried at places. If early hominins with Oldowan technology passed through this region on the way to SE Asia, associated evidence should be (theoretically) preserved in South Asia, even if marginally.

On the possible impacts of the Toba super-eruption: The Toba volcano, located in Indonesia, erupted at least three times in the last 1 Ma. The largest eruption, or super-eruption, is known to have occurred at ~74 ka, and resulting ash was widely deposited in India due to the wind direction following the eruption. Primary deposits of this ash or tephra can be used as chronostratigraphic marker in the field. Current debates are centered on the potential ecological impact(s) of the eruption on Indian Pleistocene flora, fauna, and hominin populations (Williams 2012). A key hindrance has been the challenge in finding undisturbed Paleolithic assemblages in stratigraphic association above, below, *and within* primary-context Younger Toba Tephra deposits.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Art, Paleolithic
- ▶ Central Asia: Paleolithic
- ▶ *Homo erectus*
- ▶ *Homo sapiens*
- ▶ Lithic Technology, Paleolithic
- ▶ Misra, Virendra Nath
- ▶ Movius Line
- ▶ Paddayya, Katragadda
- ▶ Sankalia, Hasmukh Dhirajlal
- ▶ Sharma, Govardhan Rai
- ▶ Zeuner, Frederick Everard

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South, Stanley A.

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Basic Biographical Information

Stanley A. South is one of the most complex and fascinating archaeologists of the past 60 years. Born on February 2, 1928, Stanley was the only son among the four children of Austin E. South and Mae Belle Casey South of Boone, North Carolina. A child of the Great Depression, South grew up in a loving multigenerational family filled with music, singing, poetry, art, and a profound respect for the people and culture of the Appalachian Mountains. In 1934 when others were migrating westward, the South family traveled across the United States to Carlsbad Caverns, the Grand Canyon, Yosemite, and the Chicago World's fair. His formative years ended with service in the US Navy during the final months of WWII followed by photography school and a brief stint as a professional photographer before matriculating at Appalachian State Teachers College (now Appalachian State University) in Boone, NC (1946–1949). After graduation South did some acting and was a public school teacher in a junior high school in Greensboro, NC. There he taught a class on the American Indian, and he began recording archaeological sites in the region.

It was as a student at Appalachian State that South was first exposed to Darwinian evolutionary theory and the then cutting-edge cultural evolutionary theorists Julian Steward and Leslie White. South found his muse in the evolutionary approach and its application to anthropology. He left teaching and entered the graduate program in anthropology at the University of North Carolina. There, under the tutelage of Joffre Coe, he fully embraced the application of evolutionary theory in archaeology (South 1955). Fifty years later he is still an outspoken proponent (South 2005; South & Green 2005).

Major Accomplishments

Over the past five decades, South has made significant contributions in prehistoric and historical archaeology of the Carolinas and the interpretation of same to the general public. This included work at such prehistoric sites as Town Creek Indian Mound in North Carolina and at Charles Towne Landing in South Carolina. He has worked on English (e.g., Brunswick Town [South 2008]; Bethabara [South 1999]; Charles Towne Landing [South 2005]; Ninety-Six), French (Port Royal), Spanish (Santa Elena), and American (Edgefield, Columbia [South 2010]) sites in the Carolinas dating from the sixteenth to twentieth centuries. Known for his exacting field techniques, South drew on his background in photography and drawing and admonished his colleagues to do likewise. This would include the quantifying of findings and their interpretation to the public through reconstruction (South 2002). Significantly South was an early proponent for the timely analysis and reporting of fieldwork.

Over the course of his career, he has completed more than 200 reports, articles, monographs, and books detailing his findings. He was the founder of the Conference on Historic Sites Archaeology in 1959 and a cofounder of the Society for Historical Archaeology in 1967. Through his efforts and the support of the Conference on Historic Sites Archaeology, South compiled and published 15 volumes of papers delivered at the annual meetings and later created two other publication series, *Volumes in Historical Archaeology* and *Historical Archaeology in Latin America*. These number 51 and 16 volumes, respectively.

Just before his fiftieth birthday in 1977, South crossed a watershed in his career with the publication of *Method and Theory in Historical Archaeology*. In it South the anthropologist said that to go beyond simple antiquarianism, we must explicitly engage in scientific archaeology. That is, its foundation must rest on evolutionary theory, using the hypothetico-deductive-inductive paradigm (South 1977: 6). Simply put, the humanistic and particularistic paradigms did not meet the criteria necessary for scientific research.

By using the scientific paradigm, South believed that the historic archaeological record would reveal valuable patterning linked to behavior. Thus began his search for patterning to demonstrate that. Built on two decades of research on English-colonial era sites in the Carolinas, its quantitative approach led to the definition of a variety of material patterns reflecting the behaviors associated with the resident cultures of the past. Embraced by the field for making explicit what was implicit, it would be required reading for a generation of students and would transform the field (South 1978). Today pattern recognition is a de rigueur aspect of the methods associated with historical archaeology. While many have turned to humanistic post-processual "storytelling" or other impressionistic approaches, South and many others continue to recognize that pattern delineation holds great promise for comparing differing cultural adaptations in similar natural and social environments. South sums up his basic philosophical belief as "Science: Seek life's truths to set you free" (Joseph 2010: 135, 141).

Beginning in 1978 and continuing for the next quarter of a century, South worked at the sixteenth-century capital of Spanish La Florida Santa Elena. Now a National Historic Landmark, the site, located on the US Marine Corps Recruit Depot, Parris Island, South Carolina, is one of the most completely investigated and best preserved sixteenth-century town sites in the Americas. A detailed publication on the European material culture from the site is widely cited throughout the hemisphere (South et al. 1988). Information from this site will continue to influence our knowledge of sixteenth-century adaptations for decades to come.

Stanley South has been repeatedly honored for his many contributions to the field of historical archaeology, regional history, and scholarship. In 1987 South was awarded the J. C. Harrington medal in Historical Archaeology, the most prestigious award the profession has to offer by the Society for Historical Archaeology (Ferguson 1987). This was followed with the "Order of the Palmettos" and "The Old North State Award" by the states of South and North Carolina. In 1997 he was awarded an Honorary Doctor of Humanities from the University of South Carolina Trustees for his then four decades of research.

In 2012, at the age of 84, Stanley South retired after 43 years at the South Carolina Institute of Archaeology and Anthropology in Columbia, South Carolina.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ North America (USA): Historical Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Southeast Europe: Archaeological Museums

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Introduction

The establishment of archaeological museums in Southeast Europe is tightly interwoven with the modern, often turbulent, political history of this highly diverse territory, its people, and cultural traditions. The gradual dissolution of the Ottoman Empire through the nineteenth to the early twentieth century and the creation of independent nation-states throughout the Balkan Peninsula (Hobsbawm 1990) – an ongoing process marked in a most traumatic way in the 1990s by the breakup of the former Yugoslavia – inevitably meant that deep history was conceptualized and interpreted in a linear, evolutionary, effectively nationalist perspective. The past, discontinuous and fragmented as it was, was nonetheless put on a high pedestal, as in many other parts of Europe, to be glorified and broadcast as an "entity." This "pure", "innocent" and "protected" image of the past served legitimize and negotiate various, often conflicting, goals and aspirations (e.g., territorial, political, ideological and aesthetical) of the present.

Definition

Archaeological museums in Southeast Europe to a large extent still maintain the focus on artifact-centered, art history, "idealist" narratives, and only recently, since the late 1990s, did some of them begin to explore a different trajectory: one, which departs from the doctrine of proving, confirming or propagating historical continuity, "uniqueness" or remoteness. A reformed scope, admittedly of disparate pace and ideological tendency depending on the country or tradition in question, is emerging which attempts to bring to the forefront the *variability* of past cultural formations, the circumstances and the contingencies of particular socioeconomic contexts and processes and one, that seeks to give room to the *agents or actors* of history, the ancient people, their communities, ideologies, institutions, technologies, etc. However, despite this newer trend, archaeological museums in the Balkans continue to hold the lion's share in the domain of mainstream, top-down, identity-building. Nevertheless, some recent exhibitions explored evolving critical reevaluations and/or redefinitions of the past and a number of them have received international recognition.

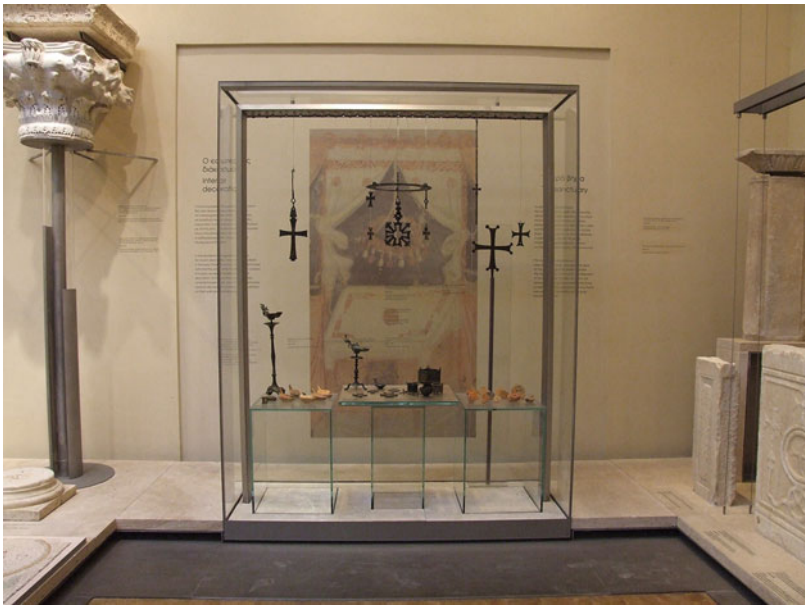

Southeast Europe: Archaeological Museums, Fig. 1 Byzantine and Christian Museum, Athens, Greece. Aspect of the exhibition section "From Antiquity to Byzantium: the Temples of the New Religion" (Photo by E. Kotjabopoulou)

Key Issues/Current Debates/Future Directions/Examples

The *singular* past rationale was, and to some extent still is, nowhere better exemplified than in the case of Greek archaeological and museum displays (Hamilakis 2007; Damaskos & Plantzos 2008). Not least, and this needs to be highlighted, because Classical ruins, especially *white* – yet initially polychrome-painted – marbled architecture and sculpture, not only served as the foundations *par excellence* of Hellenism, but equally, if not even more so as a fundamental image of European identity since the Enlightenment (Settis 2006). However, in a country which is an overwhelming palimpsest of ancient relics, curated at no fewer than 150 museums, the way has been opened to more public-oriented and democratic museum scenarios and practices. Put in other words, the intention is widespread – yet not fully implemented – to break with the tradition of repository-type exhibitions useful only to the *élite* "experts" and pleasing to educated aesthetes. No doubt, the recent influx of European Union support funds for carrying out extensive renovation and re-exhibition projects has greatly contributed to this trend as well as the *loss of innocence* of Greek archaeological theory and museology (Kotsakis 1991; Mouliou 2008). Interestingly, this wave of reform was initiated by two state-run museums not having as a subject matter the "golden" Classical past, but, instead, the somewhat less esteemed and specialized religious art history of the Byzantine (medieval) epoch. The Museum of Byzantine Culture, Thessaloniki, and its annex, the White Tower Museum, which hosts a multimedia enhanced itinerary into the multicultural, cosmopolitan history of that city, the second largest in the country, and the Byzantine and Christian Museum, Athens, constitute groundbreaking, open-minded interpretative exhibitions. In these, ancient peoples and their beliefs are center stage. Thematically instead of being taxonomically organized (Fig. 1), these displays offer sharp insights on long established national historiographies (Gazi 2011). In the last decade or so, among the many rearranged and refurbished and greatly improved regional Greek museums dedicated to antiquity, the Ioannina Archaeological Museum, Northwestern Greece, stands out for its cutting-edge, dialectical approach and appropriate design. In it, material cultural remains, whether of semi-nomadic mountain shepherds or of pilgrims to the oldest oracle site of Greece, that of Zeus (Jupiter) at Dodona, are used as vehicles, and

Southeast Europe: Archaeological Museums, Fig. 2 Archaeological Museum of Ioannina, Greece. Aspect of the exhibition section "The Archaeology of Death" (Photo by E. Kotjabopoulou)

not as self-evident, axiomatic values (artistic, technological or other) for the visitors to explore a multilayered past (Fig. 2) and to question *how* the past relates to the present and vice versa. This issue is most challenging for museums worldwide: it is an issue which touches on various aspects of epistemology as much as of museography, and one which has not been adequately addressed in the recently opened (2009), heavily visited New Acropolis Museum, Athens. Some of the text-book masterpieces of ancient Greek art production – notably votive statues in which the historically contingent anthropocentric spirit of 5th c. BCE democracy was encoded – are now housed in an imposing glass-and-concrete building, albeit elegantly emplaced in direct visual contact with the Athenian sacred hilltop (Fig. 3). Even though the exhibits remain largely un-contextualized (Plantzos 2011), the juxtaposition of the few *original* Parthenon friezes – which escaped Lord Elgin's dismantling project – with *plaster copies* from those on display at the British Museum (London), the Louvre (Paris) and elsewhere, do, however, make an eloquently strong, constructive argument in the debate on the repatriation and illicit circulation of antiquities internationally.

In the rest of the Balkan countries which experienced the former so-called eastern-bloc (communist) regimes, collections of antiquities, whether national or regional, have as a rule formed part of what can be called *diachronic* knowledge building institutions, focusing on the construction and legitimization of national/ethnic identities and visions. In Bulgaria, Rumania, and other new nation-states, relics of antiquity formed part of an "evolutionary" heritage continuum; until recently, in many cases, they were displayed under the same roof as artifacts from medieval times and ethnographic, cartographic, miscellaneous collections, even including those of natural history specimens, in the model of analogous nineteenth century central European establishments (e.g., Guzin Lukic 2011; Lozic 2011; Vukov 2011). In spite of the grave financial and other structural problems currently faced by these countries, some attempts are being made to review form, content, and layout. Site-specific archaeology museums stand at the forefront of this trend, which directs great emphasis on the educational aspect. A most informative case, the Krapina Neanderthal Museum, is situated in Croatia. It is associated with a famous cave site rich in internationally significant remains of Neanderthals and ice age fauna which have been researched for over a century. This contextual exhibition relies on a "simulation of life in the past" model. Modern interactive technology aims to create a sensual experience for the visitor.

Southeast Europe: Archaeological Museums, Fig. 3 Exterior view of The New Acropolis Museum, Athens, Greece. In the background (*right*), the Acropolis hill and the Parthenon (Photo by C. Economides)

Because of its core content, the display embraces a rarely portrayed pan-European perspective on the past. The exhibition challenges the now obsolete paradigm which saw the Neanderthal lineage as marginal to mainstream human history. In Albania, where archaeological remains have been overtly manipulated by its leadership to advance territorial agendas, the Butrint Museum offers a holistic, in contrast to what was formerly a selective, approach to represent the past. In this small local museum, the focus is not overwhelmingly on the important large Roman seashore colony, Buthrotum, a UNESCO World Heritage Site since 1993; instead, even though the display genre remains effectively an artifact-oriented conservative one, a more balanced, *diachronic*, narrative is presented which charts the many transformations that the locale underwent, from its modest status as an Iron Age settlement down to its strategic fortification by Venetian and Ottoman rulers.

Turkey currently invests much energy and funds in modernizing some of its leading archaeological museums (e.g., the Topkapi Palace, Instanbul); a comparable, yet on a much grander scale, reconceptualization of the past is clearly evident at the Museum of Anatolian Civilizations, Ankara. With the aim of validating the new, westernized, Turkish identity, this, the first museum of archaeology of Republican Turkey, was originally assembled (1938–1941) to "construct" a deep national, i.e., autochthonous, past by "acculturating" the remains of the Hittite civilization – an empire born and developed in Anatolia and with no "obvious" descendants (Gürol 2008). After the museum's renovation in the 1990s, an impressive array of artifact collections were often displayed in a "reconstruction" mode – that is, they were arranged in a manner that recreated how they were used in the past. The exhibition encompasses an amplified chronological scheme, from early prehistory to the early twentieth century. Due attention and a more even representation is now placed on the many other cultural manifestations – e.g., Phrygian, Lydian, Greek, Roman, Byzantine, Ottoman – that left their rich imprint on the vast expanses of this westernmost Asian peninsula. This dynamic institution is currently being rearranged.

The traumatic recent history of Cyprus and still unresolved partition of the island has prevented renovation of its archaeological museums on either side of the Green Line (Bounia & Stylianou-Lambert 2011). However, a site-specific museum innovative for its time (the 1990s) is located at Maa-Palaiokastro, in the remote southwest countryside near Paphos. Although this exhibition does not, for security reasons, hold collections of original artifacts, it does provide in its modern building an insightful outlook on everyday life at this Late Bronze settlement and the key-role this resource-rich island played in the wider trading and cultural networks throughout antiquity.

From the above eclectic survey, it becomes evident that there is immense potential for the future development of archaeological museums in Southeast Europe especially intellectually by disregarding old- or neo-nationalist modes of thought. In this portion of the Continent, which incontestably holds a deep and rich past, archaeological museums can and perhaps urgently need to set challenging goals by turning away from unproductive policies which have haunted the modern history of the area and to explore the *tremendous* cultural variability of the region, in time and space. Powerfully singular, archaic, medieval or other, selective or utopian narratives become all the less appealing in the increasingly competitive tourist industry on which these institutions increasingly rely upon for their very existence. Besides, any kind of culturally monolithic and simplistic museum narrative of the past entails dangers for the communities and citizens of today and jeopardizes their future. As some of the examples reviewed above demonstrate, archaeological museums in this diverse region can become bridging rather than dividing institutions of memory.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage: Public Perceptions
- ▶ International Council of Museums (ICOM)
- ▶ Museums and Memory Experiences
- ▶ Nationalism and Archaeology
- ▶ Parthenon (Elgin) Marbles: Case Study

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Southern Africa: Cultural Heritage Tourism Development and Management

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Introduction

Cultural heritage tourism is travel that focuses on admiring and learning about historical landscapes, past monuments, cultural landscapes, archaeological sites, and historical artifacts. These features and material culture can be situated in their places of origin, such as Egyptian pyramids, or can be packaged and placed in a museum setting, e.g., a hub of Smithsonian Museums in Washington DC, USA. The process of deliberate travel to and seeking of interpretation of these features adds the tourism value to these cultural and heritage landscapes and associated material culture.

Cultural heritage resources that sustain cultural heritage tourism are of two categories:

1. *Tangible* (UNESCO 1972) – These include among others archaeological artifacts as well as archaeo-historical sites, monuments, and landscapes.
2. *Intangible heritage* (UNESCO 2003) – constitutes cultural skills, knowledge, and expressions associated with material culture, i.e., the intellect that informs the production of tangible heritage.

The development of heritage tourism in southern Africa needs to be assessed through four key processes in order to come up with a balanced representation of heritage at any particular site:

1. The process of heritage knowledge production (i.e., placement of meanings and values associated with material culture, in a country)
2. Sociocultural, sociopolitical, and socioeconomic landscape within which heritage knowledge is identified, selected, and expressed through tourism
3. The broader context within which tourism developed and resulted in cultural and heritage tourism
4. Extent of local community involvement and development – which in archaeology is represented by what is popularly referred to as public archaeology (Little 2005)

Cultural heritage tourism commercializes historical events related to people's lives. Unlike safari tourism currently taking place in most of southern African countries, the use of cultural and heritage resources in an open market setting requires more attention towards the sensitivity of the cultural resources. Conservation indicators that are specific to cultural and heritage resources are therefore necessary.

Like tourism, the origins of cultural heritage tourism in the south can be attributed to nineteenth-century European travel that inspired exotic travel to most regions including southern Africa. Particular to southern Africa, this travel was largely triggered by the advent of missionaries, ancient traders, and explorers seeking alternative trade routes, all of which exposed African communities and cultures to the outside world. Colonial anthropological research also played a significant role as it placed a spotlight on exotic cultures.

In post-nineteenth century period, environmental protection awareness policies such as the 1972 World Heritage Convention and the 1987 World Convention on Environment and Development (WCED) resulted in natural resources tourism (safari tourism) that became dominant in African wilderness. However, the formal incorporation of cultural heritage resources in safari tourism remained limited if not neglected.

The twenty-first century has seen the development of concepts such as ecotourism (Drumm & Moore 2002), responsible tourism (cf. Revitt & Sanders 2002), and pro-poor tourism. The aim of these concepts is to promote tourism that encourages direct interaction and responsibility towards local communities, thus exposing African local cultures to international visitors. However, of concern is the lack of attention accorded the management of cultural heritage resources. Within the broader rural and local development studies, tourism is gradually being perceived as a medium through which the local "publics" (in archaeological heritage language) or local communities (in social development literature) represent and express themselves to a global world as well as a means to acquire financial gain.

In sub-Saharan Africa, a prerequisite to selecting heritage for tourism is to analyze issues of ownership/affiliation identification, selection, interpretation of heritage resources In addition, a broader theory of the concept of "community" and cultural resources use in tourism also has to be established. In cultural heritage tourism, a balanced point of departure that considers political, social, economic, as well as cultural meanings and affiliations that are imbued within existing archaeological interpretations is necessary to balance presented identities. Case studies in boxes 1 and 2 below provide examples of issues to be considered in packaging cultural heritage resources for tourism in southern African contexts. Others are discussed in detail in a section below, under the heading "Key Issues/Current Debates."

In most cases, the tourism aspect of cultural heritage is not addressed by specific cultural heritage professionals from disciplines such as archaeology, but rather by business-based disciplines. In this regard, cultural resources become vulnerable to destruction as their conservation needs are not attended to.

Definition

Tourism is travel to exotic places. Cultural heritage tourism is a branch of tourism that extends the symbolic value of cultural and heritage resources to economic significance. The extended value is however dependent on conservation of historical sites, archaeological remains, monuments, sites, and cultural landscapes. Archaeological and historical heritage tourism can take place in museums, interpretation facilities, in situ archaeological sites, and historical landscapes, among others.

Smith (1995) provides a summary of salient features that characterize definitions and descriptions of twentieth-century tourism within the mandate of the 1970 World Tourism Organization (UNWTO) as follows:

1937 – Key indicator was 24 h stay.

1950 – Inclusion of student on study tours as tourists and less than 24 h traveler called excursionist.

1963 – Distinction between tourists staying 24 h and those staying less recognized.

1967 – Distinction between tourists who stay overnight and those that do not was drawn as well as recognition of transit travelers as tourists.

1991 – International definitions of tourism emphasized and developed.

Box 1. Botswana case study: Examples of issues to consider when initiating cultural heritage for tourism

Botswana: 1900–Present

Bechuanaland Protectorate became independent in 1966. Pre-independence archaeological heritage protection in the country included Proclamation No. 40, of 18 November 1911 cited as "*The Bushmen Relics and Ancient Ruins Protection (Bechuanaland Protectorate)*" – highlighting the Bushmen/San/Basarwa as a perceived "local community" at the time. This perception of "Bushmen" as the public in what later became heritage management emanated from South Africa where Bushmen rock art was protected from European expedition members who supposedly vandalized it for souvenir purposes as well as protection from resident communities who used the caves in which rock art was found for livestock rearing and shelter. Government of the Republic of South Africa, National Monuments Council (1970–1977).

The heritage "management" approach, as it were, prohibited the perceived "public" from interacting with tangible heritage. Emphasis on the *"Bushmen"* also indicates perception of whose heritage was selected and presented as well as by whom.

It appears that perception of the Bushmen as "ancient" perpetuated their image as a community that could not manage (select, interpret, and present) their heritage to visitors, a characteristic that still prevails to a certain extent in southern African heritage management to date. "Bushmen" heritage is currently managed by either NGOs or governments on their behalf (see Fig. 1 below).

The case study shows that whereas earlier focus on the Bushmen established a basic framework approach for public/local community recognition, their placement as passive participants rather than custodians of heritage has set a negative precedence that they are not empowered to lead a process of identification, selection, and presentation of their heritage through tourism. The question of who places tourism value on the San/Bushmen/Basarwa or any community, heritage and for what purpose becomes relevant. In developing heritage tourism, these historical nuances become very significant in achieving an ethical and sustainable tourism product.

The most substantive archaeological legislation in present-day Botswana came into effect after the revision of the 1934 *Antiquities* Act and it was named *The Monuments and Relics Act, 1970 chapter 59:03*. In contrast with the Bushmen Relics Act of 1911, any feature "...known or believed to have been erected, constructed or used before 1st June, 1902..." was considered of importance. This characteristic broadened the scope of the concept of the public to include those who were not represented in the 1911 and 1934 legislation. Three decades later, the 1970 Act has been revised and reenacted as the *Monuments and Relics Act 2001*, which is currently in operation.

1993 – Tourism concepts at the center stage – identification and refining of these.

In addition to developments on tourism description and definition, The International Ecotourism Society (TIES) was launched in 1990 to guide and control tourism activities in ecologically sensitive areas. Ecotourism is defined as travel to pristine places to experience both environment and cultures of the people without jeopardizing opportunities for others to have similar experiences in the future – in other words, the sustainable aspect of travel. In 1997 TIES included "Ecotourism and community participation" as one of its operational principles which

Box 2: The Republic of South Africa case study: History of cultural heritage legislation and the development of tourism identities

The Republic of South Africa: 1900s–Present

A number of institutions have had either a general interest or a legal mandate for heritage management in RSA over the years. These are the South African National Society (1905–1934), the Historical Monuments Commission (1934–1969), and the National Monuments Council (1969–1999). Since the promulgation of the NHRA, heritage management has been restructured along the national, provincial, and local levels. The South African Heritage Resources Agency (2000–present) is currently tasked with the management of Grade I sites, while the Provincial Heritage Resources Authorities and Local Heritage Resource Authorities are responsible for Grade II and Grade III heritage sites, respectively. Historical accounts from these institutions highlight the events that shaped the selection, presentation, and representation of cultural heritage, some of which is currently used in cultural heritage tourism in the country. In the early 1900s, the South African National Society (1905–1934) was more biased on Bushmen heritage (cf. *The 1911 Bushmen Relics and Ancient Ruins Protection*). By the mid-1930s, focus shifted to the cultural heritage of European origin. This is well illustrated by the quote from van Riet Lowe who was the Secretary of the Historical Monuments Commission:

> "The intrepid Portuguese navigators who originally discovered and explored our coast; the courageous and freedom-loving Dutch settlers who first made South Africa their home and braved the dangers of colonizing a remote and barbarous country; the Huguenots who for the sake of their ideals, sacrificed their all; and the British settlers, who assisted in colonizing the border districts and who gave us the institutions of democracy, including a free press. They have all left us a heritage which should serve as a nerve-ending source of inspiration to our growing nation. . ." (Van Riet Lowe 1941: 08).

The narrow definition of heritage communities from the example above illustrates a common mistake by most heritage managers to fail to proactively inquire, prior to selection, about the type of heritage represented, by whom, and how (Figs. 1 and 2). An all encompassing approach has to always be consciously sought.

Another aspect highlighted by this account is that which concerns the question of whose heritage. Since 1986, however, conceptualizations of public heritage in RSA legislation and practice broadened to encompass social inclusion. Heritages that ". . .constituted historical, aesthetic. . .value" (Annual report 18 1987: 03) were considered under the *War Graves and National Monuments Amendment Act of 1986* (Annual report 21 1990: 03). This 1986 legislation made allowance for a subcommittee which was formulated to coordinate the interpretation of historical sites in a way that encompassed and enhanced all types of community participation in rural areas of the Republic (Annual report 26 1994: 11).

An aspect that the RSA history brings out is one that is common to all countries in sub-Saharan Africa – that of selecting only tangible heritage (monuments, relics, archaeological and paleontological remains, marked landscapes) for heritage expression through tourism. This was mostly the case in the 1970s as the excerpts from the 1970 *National Monument Council* (1970–1998) illustrate:

". . .Indeed, owing to this extreme youth of our culture in SA and the absence of folklore and traditions one finds in older countries, it is perhaps more necessary for us. . . to preserve the relics we have" (Van Riet Lowe 1941: 07). Intangible heritage (UNESCO 2003) in the form of folklore

was not recognized as representative of heritage identity of the country.

However, after independence and into the present, the South African Heritage Resources Agency (SAHRA), under the National Heritage Resources Act No. 25 of 1999, aims to *redress past inequities* relating to identification, recognition, selection, and expression of heritage belonging to all forms of "communities" or "publics" in RSA by consciously *promoting* what officials refer to as: "...new and previously neglected research into our rich oral traditions and customs" (SAHRA annual report 2001: 03).

The once neglected research include material culture that attest to historical archaeologies of Bantu-speaking groups as well as cultural material pointing to interaction between Bantu and San cultures. These identities provide a balanced cultural identity that could be expressed through heritage tourism in the present.

ultimately kick-started a process for recognition of local community with associated cultural, and heritage resources.

The concept of *community participation* is significant in both conservation and tourism product interpretation. There are various definitions surrounding the use of the phrase "the public" and/or community in approaches towards cultural and heritage resources management. In cultural heritage literature, a community is composed of people residing in close proximity to a heritage site and has direct affiliation and emotional connection with the site, hence has acquired a significant level of commitment to the overall cultural landscape (Keitumetse 2005, 2009). In tourism literature, the generic term, "hosts," represents this group well. Within the development field, a community is composed of a group of people who share geographical affiliation and may or may not have historical ties to a particular cultural heritage.

On a more international scale, tourists represent "a public" or a "community" that is neither historically affiliated to a geographical space nor a particular form of heritage, but acknowledge certain cultural heritage as significant enough to be visited, and enjoyed, hence placing tourism values on those. In protected areas of southern Africa, a consciously guided cultural/archaeological heritage is yet to be established, and in this instance the development of heritage tourism faces two options: adopt the existing notions of the public (local community) as per natural resources management processes or modify the existing to suit the needs of the relatively new field of cultural heritage resources management and tourism. While pondering on this dilemma, it is important to consider the public in the context within which each disciplinary research has developed.

Historical Background

Cultural heritage is an offshoot of the discipline of archaeology, from which heritage studies emanated in most European and American universities. Subsequently, cultural heritage tourism falls within the same category although there is reluctance by archaeologists, historians, and anthropologists to directly push the development of cultural heritage tourism due to a lack of knowledge on the subject of tourism in particular. On the other hand, cultural heritage tourism has been hijacked by business management departments, although there is very limited knowledge about conservation needs of cultural resources in these departments. Cultural heritage tourism influences values placed on cultural resources as it provides an interface between the sociocultural and the socioeconomic aspects.

The trend in the demand for cultural heritage tourism is common among a sector of tourists known as *ecotourists*. Ecotourism is travel that respects both the environment and the cultures being visited, with a keen attempt to contribute to the welfare of communities in touristic places. Therefore, in addition to wilderness and wildlife, ecotourists are looking for an interaction with

host communities as a way to understand their history, archaeology, and overall culture.

Cultural heritage tourism as a subdiscipline of both the heritage studies and broader tourism has achieved very limited, if any, formal recognition and home in southern African disciplinary discourses and research. In almost all instances, it is adopted within a department in a haphazard rather than a planned manner.

Southern Africa: Cultural Heritage Tourism Development and Management, Fig. 1 San/Bushmen of southern Africa depicted in international playing cards by other stakeholders

Boxes 1 and 2 are case studies from Botswana and the Republic of South Africa, presented below, provide indicators to look out for in the process of developing a cultural heritage tourism package in southern Africa. Preliminary focus on theorization of several concepts in order to situate its development within sub-Saharan approaches towards identification, selection, interpretation, and presentation is necessary.

As already mentioned, cultural heritage tourism as a subdiscipline of cultural heritage studies is still at its infancy in southern Africa. Archaeology, the discipline within which heritage studies originated in Europe, is not public oriented in Africa, hence alienates other groups that are not of academic focus that could use archaeological products to develop cultural heritage tourism. The alienation of the discipline from the local people is due to technical approaches to archaeological heritage research that focuses on hardcore science approach and neglects to articulate archaeology as a medium between science and construction of social histories and identities.

Southern Africa: Cultural Heritage Tourism Development and Management, Fig. 2 A cultural village setup where members of the local communities become employees hired to perform their cultural heritage aspects to tourists

Against this background, a development of tourism interpretation has to be aware of a basic framework guiding identification, selection, and choice of cultural heritage, anchored upon three main archaeological research approaches being the culture history (1950s), processual (1960s), and post-processual (1980s) approaches. To balance tourism interpretation of African histories, more research on the sociocultural and socioeconomic significance of material culture using alternative methodological approaches is required. Examples of alternative methodological approaches that are more relevant for African heritage contexts include research by scholars such as Cleere (1989), Alison Wylie (1993), Gero and Conkey (1991), Kohl and Fawcett (1995), and Palmer (2009).

Key Issues/Current Debates

Issues surrounding development of cultural heritage tourism in southern Africa are several, but those that deserve a heightened attention are those that relate to the following:

(a) Processes and indicators for identification and selection of cultural heritage for tourism
(b) Conservation of cultural resources relative to the overall environment
(c) Mechanisms of sustainable production and consumption of cultural and heritage resources
(d) Processes that enable host communities to identify, select, and present their own heritage to the tourists

Boxes 1 and 2 below present case studies that illuminate on issues a) to d) above. The presented scenarios on Botswana and the Republic of South Africa illustrate angles to be covered in order to exhaust hidden aspects that may influence a practitioner's point of departure when developing a tourism product. The angles include political, social, economic, communal, intellectual, historical, academic research, and others.

One of the key issues that dominate packaging and presentation of cultural heritage resources for tourism is the relationship between the resources and the various stakeholders. This is not unique to countries in southern Africa. In some parts of sub-Saharan Africa such as Kenya, a prolonged focus on prehistory or "early man" meant to create and project a national identity to the outside world (tourists) have had a negative effect of delaying development of local cultural heritage within the country (Schmidt & Patterson 1995). An added focus on safari tourism in the same country, as well as in most parts of southern Africa, provides yet another example of packaging a somewhat "neutral" and nationalistic heritage for outside tourists. These examples illustrate earlier approaches to packaging cultural heritage resources for tourism to influence tourists consumption. Further examples from other regions include the "...racial and imperialistic policies in archaeological research under the Nazis" (Arnold & Hassmann 1995: 73), during the Third Reich in Germany, as well as an example of the use of the history of the farming class in Denmark to create national identity (Kristiansen 1992). In all these cases the relationship between archaeology, the state, and the local community affects communities' attitudes and perceptions towards a heritage which is consequently extended to the "tourist public" through tourism experience.

Another key aspect in the development of cultural heritage tourism is the need to engage local communities, an approach which emanates from a participatory approach principle of sustainable development (cf. Midgley 1986) within the broader conservation debate. As a starting point, heritage legislation (particularly national) is an indicator of a direction that a budding field such as heritage tourism is taking within a country as shown in boxes 1 and 2 below where the development of heritage legislation illuminates colonial aspects of heritage management that that have to be aligned to the present. Key basic questions that are brought out by the two case studies are:

– What indicators are used to identify and select a particular heritage as significant?
– What is selected? Why?
– By whom is it selected and presented?

International Perspectives

International institutions that deal with cultural and heritage resources conservation are beginning to incorporate tourism into cultural resources management. However, a lot still needs to be done in coming up with tourism procedures that speak to cultural heritage tourism as opposed to tourism in general.

United Nations (UN) has several institutions that are relevant to the development of cultural heritage tourism in southern Africa. United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations World Tourism Organization (UNWTO) are two of the most relevant institutions in this regard. Other international institutions include International Council on Museums and Sites (ICOMOS) and World Commission on Environment and Development (WCED), otherwise known as the Brundtland Commission.

UNESCO's focus on world heritage in the 1970s added a conventional management approach to heritage which was later expanded from tangible (1972 Convention) to intangible (2003 Convention) cultural heritage. In 2008, UNESCO came up with a Sustainable Tourism Programme which is being augmented by the 2011 World Heritage and Sustainable Tourism Programme. Still within UNESCO, the 2005 Convention on the Protection and Promotion of the Diversity of Cultural Expressions that addresses policies and measures relating to conservation of cultural diversity and cultural expressions (www.unesco.org) is yet another convention that augments cultural initiatives towards cultural heritage tourism development.

In addition to UNESCO, the International Council on Monuments and Sites (ICOMOS) provides insight on matters relating to cultural heritage resources management within which principles governing tourism applications on cultural sites are considered (www.icomos.org). In particular to tourism, ICOMOS adopted an "International Cultural Tourism Charter" in 1999, in which it is recognized that "Tourism promotion programmes should protect and enhance Natural and Cultural Heritage characteristics" (ICOMOS Tourism Charter, principle 6).

One other convention that supplements UNESCO and ICOMOS conservation measures is the 1971 Ramsar Convention on Wetlands, (www.ramsar.org). In 2002, the convention secretariat, through its Culture Working Group, came up with Resolution VIII.19 on "Guiding principles for taking into account the cultural values of wetlands for the effective management of sites"; followed in 2005 by the Resolution IX.21 on "Taking into account the cultural values of wetlands." All of these culminated into a 2009 document titled "The future of the WHC: Ramsar contribution," a bilateral cooperation between the international organizations.

Overlooking the implementation of conservation measures is the popular *sustainable development* framework initiated under the World Commission on Environment and Development (WCED 1987) model but with conservation guidelines that are compatible with both cultural and natural resources. The WCED's emphasis on development of conservation indicators provide for resources monitoring strategies to ensure that cultural resources are not vandalized nor depleted in a way that deprive future generations a chance to experience them. However Production and consumption indicators for cultural and heritage resources are currently not available (Keitumetse 2005, 2009), although there are plenty of those for natural resources such as forests, wildlife, and others. Cultural heritage practitioners and associated professionals have to kick-start this process to ensure conservation of cultural heritage resources.

The ecotourism conservation model has brought attention to cultural heritage as a component of tourism in Africa.

With time, tourists are gradually developing interest in cultural landscapes where resident communities live in proximity to monuments and national parks of southern Africa. The realization is that "The unique selling point for destinations in developing countries is likely to be increasingly associated with the uniqueness of unusual cultures, as opposed to the physical environment…" (Burns 1995: 12).

A framework similar to sustainable development (SD) where production and consumption indicators relating to cultural resources and applicable to sustainable heritage tourism are developed, is needed to achieve sustainable tourism using cultural heritage resources.

Future Directions

Cultural heritage tourism in southern Africa is growing at a very high rate. The concern is that it is spearheaded by professionals that are not well versed with conservation needs of cultural heritage components such as archaeological heritage, museums, and social culture. Due to its appeal to tourism business, cultural heritage tourism is currently pursued within the business sectors at a superficial level meant to diversify the tourism product. It is important that various heritage practitioners take the responsibility of situating the growth of cultural heritage tourism within a sustainable framework that recognizes conservation needs of cultural resources.

One direction that could guide the use of cultural heritage resources in tourism is to consider significant placement of cultural heritage resources within the sustainable development framework (cf. WCED 1987; Hall 1992; Keitumetse 2005). Sustainable development emphasizes current use of resources in a way that ensures their continuity for future generations. The question is how can this be achieved? A way forward will be to align conservation ideals of cultural heritage resources with the processes of sustainable development framework whereby production and consumption indicators specific to cultural resources are identified to enable monitoring of use in order to limit destruction. Currently, very few, if any, of these indicators exist for cultural and heritage resources, let alone a clear guidance on what constitutes cultural resources suitable for use in tourism. Preliminary research discourses have been attempted in this regard though at a very localized and limited level as evidenced in Keitumetse (2009) on "Ecotourism of Cultural Heritage Management."

At an operational level, eco-certification of tourism establishments is becoming popular within hotels, game lodges, camping areas, and game reserves. For example, the Botswana eco-certification system for ecotour standards as well as accommodation standards (Botswana Tourism Board 2009) is one such initiative. Within this operational framework, once devised, indicators that support sustainable use of cultural heritage resources can be applied into such frameworks to enhance conservation of cultural heritage resources. For a detailed understanding of eco-certification, refer to Leslie (2001) on serviced accommodation and environmental performance, Sasidharan et al. (2002) on developing countries and eco-labels, Drumm and Moore (2002) on ecotourism development manual, and Botswana Tourism Organization (BTO (2010)) on Botswana eco-certification grading. The equivalent of eco-certification program is necessary in cultural heritage tourism that takes place in protected areas such as world heritage sites that may be in danger due to large numbers of tourists.

Particular to southern Africa is the issue of community involvement. Institutions such as Botswana Tourism Organization (BTO) are coming up with new management models that are more corporate than sociopolitical. This is aimed at avoiding ethnic-based decisions supported by management frameworks within natural resources management, e.g., the Community Based Natural Resources Management (CBNRM) which is ethnic based.

Digital technology provides conservation opportunities that may reduce threat to cultural resources. Virtual exhibitions of sites in open-air museums as well as housed museums have potential to support future development of cultural heritage tourism in southern Africa.

At a scholarly level, cultural heritage studies is still lacking a theoretical framework within which subfields such as cultural heritage tourism could source guidance. Cultural heritage studies are still haphazardly placed in terms of theory and so is the implementation of cultural heritage tourism.

Amid all the opportunities however, it is important to acknowledge that the relationship between tourism and any type of resource is impressionable, hence requires constant alignment.

Cross-References

- ▶ Community and Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Environmental Assessment in Cultural Heritage Management
- ▶ Ethnic Identity and Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage & Society
- ▶ Heritage Landscapes
- ▶ Heritage Museums and the Public
- ▶ Heritage Tourism and the Marketplace
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage
- ▶ Nationalism and Archaeology
- ▶ Tangible Heritage in Archaeology
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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Southern Africa: Historical Archaeology

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Introduction

Several trends in historical archaeology are apparent in southern Africa since the early 1990s. These include, and are not limited to, historical archaeology as a study of African-European contact and interaction, historical archaeology as the study of the emergence of the modern (post CE 1500) world, historical archaeology as the study of the origins of modern historical identities, and historical archaeology as the study of heritage and the recent and contemporary past. These trends and themes are not mutually exclusive but rather demonstrate considerable convergence and overlap with one another. They are largely influenced not only by an emerging postcolonial academic critique in a region where European colonization had a major impact on African societies but also by emerging global trends in archaeological theory.

Definition

While studies up to the 1990s contextualized historical archaeology as essentially the archaeological study of documented African societies primarily by Western sources (see Pikirayi 1993), current approaches are taking a radically different view. This is conditioned by problems arising from the dichotomization arising from our intellectual perceptions of human development, conveniently divided across much of Africa into traditional cultural stages of Stone Age, Iron Age, and the historical period. This approach, which perceives society as having a prehistory prior to history, compromises understanding of the past, largely negating cultural continuities which

European colonialism attempted to disrupt after CE 1500. A major constraint is the narrow time depth and limited spatial coverage of European sources and the exclusion of pre-European, oral histories from many, although not all, such studies. There is an increasing move towards accessing the "voiceless" through the study of their material culture, as these were underrepresented and often falsely represented in written texts (Reid & Lane 2004; Schmidt & Mrozowski 2013).

In southern Africa, European documentary sources have dominated studies in historical archaeology. European travelers', traders', and visitors' descriptions of the coast and inland regions date from the fifteenth century onwards. Though limited in nature, Arabic sources make references to the Indian Ocean coast and parts of the hinterland from the early tenth century. However, southern African scholars have not considered periods prior to the fifteenth century strictly as defining a historical period, and thus there is a divide around CE 1500, when prehistory supposedly comes to an end. The use of "external" texts in framing African societies in this way is now being questioned (see Swanepoel et al. 2008).

An alternative approach to historical archaeology in Africa comes from the use of "internal" sources, dominated mainly by oral traditions, local histories, and folklore, all of which constitute the primary means of preserving and passing on traditional information and knowledge systems. Oral traditions have been criticized for their narrow time depth, selective coverage of information, central focus on ruling dynasties, and narrow content verging on myth. The general perception by many historians is that they are less reliable than written, "external" sources. However, some African historians such as Beach (1994) have shown the usefulness of these "internal" sources, especially if approached more critically (see also Vansina 1985).

Key Issues/Current Debates

A major focus in southern African historical archaeology remains the study of African-European contact and interaction over the last 500 years, with a particular emphasis on European expansion, modernization, and the relationship between colonialism and the formation of local identities (Pikirayi 2004; Swanepoel et al. 2008). A number of research themes have emerged from this. These include the rise of merchant capital in Europe, the development of plantation economies in the Mediterranean, European expansion into the shores of southern Africa post 1500 CE, and their gradual movement into the African interior (Elphick & Giliomee 1980; Schrire 1988, 1995). Gold prompted the Portuguese to outflank the trans-Saharan trade and the trade involving the Zimbabwe plateau and eastern Africa. The migration of plantation economies from the Mediterranean to the Atlantic and later the Indian oceans promoted trade in slaves, initially to the offshore islands and subsequently the Americas. This impacted southern African social formations, as new complex societies emerged to respond to changed circumstances. Contacts were both beneficial and destructive to the parties concerned, although Europeans always wanted to manipulate them for maximum gain. Some societies resisted strongly for their survival, while others adapted to the colonial settings, manipulating them to their own advantage. This process continued until the late nineteenth century when Africans were defeated by renewed European colonization of the region and witnessed marked shifts in power relations in favor of Europeans.

These processes just outlined constitute historical archaeology as an archaeological study of the origins of the modern world (Hall & Silliman 2006), dominated by European colonization. However, this is not to adopt the view that the discipline is primarily defined by external agents which impact on indigenous African societies in some of the ways already described. Rather, studies on the origins of modernity also seek to understand how the colonization process is understood from the view of the colonized, through agency – interpreting the "absent presence" behind the artifacts – as a force driving the process of history.

Another dominant theme in southern African historical archaeological studies is the study of the origins of modern identities. This approach also demonstrates that modernity should not be framed in European terms but was also conditioned by deep, long-term histories which were severely punctuated by colonization. The disciplinary identity of historical archaeology in this regard goes beyond the last five centuries, as some of the contributors to the volume edited by Swanepoel and colleagues (2008) clearly demonstrate. Southern African societies do show remarkable cultural continuities going beyond CE 1500, and when this premise is considered, understanding complexities in local ethnic histories provides refreshing approaches towards the understanding of the past. Studies on the origins of the Nguni and Sotho Tswana are examples (Huffman 2004). Other studies have managed to re-interrogate the nature of cultural and other identities presented in written texts as historical. The study of the Mutapa state in northern Zimbabwe (Pikirayi 2009) shows considerable dualities in archaeological sites often identified in written texts essentially as Portuguese trading sites or forts. Such studies have also demonstrated the need to conduct archaeological investigations for situations where primacy is given to either written or oral texts (see Pikirayi 1997, 1999). Such approaches are extremely helpful as they also invoke the element of agency, as several studies done in Cape Town demonstrate (Hall 1992, 1999; Abrahams 1993; Hall et al. 1993), including consideration of the enslaved (e.g., Markell et al. 1995; Cox et al. 2001). Other examples where material and other identities are also being explored include the context of the expansion of the European "frontier" into the southern African hinterland and how encounters were negotiated with Africans around points of contact (Swanepoel et al. 2008) and the variable responses of different African communities to the expansion on Christianity and the work of nonconformist missions (e.g., Reid et al. 1997).

Future Directions

Historical archaeology now also involves focus on cultural landscapes and documenting memories imprinted therein. Some of these memories include but are not limited to warfare, social formation, movement and migrations, and settlement. Examples include studies of the Ndwandwe kingdom, the Swazi origins, the *mfecane*, the South African war of 1899–1902, the history of the origins of major urban centers such as Pretoria and Cape Town, and industrialization. In this way, historical archaeology may be regarded as a study of contemporary history or heritage, which directly impacts on people's lives and thus represents living histories. Thus, such approaches are dealing with "the past in the present" (Orser & Fagan 1995), a living archaeology affected by contemporary issues such as politics and economics. Here, archaeological research is used to reclaim pasts which may have been denied in one way or the other, given the region's highly checkered colonial histories. Zimbabwe, for instance, is the only country in the world named after an archaeological site. Rhodesian colonization had appropriated the African past and had given Great Zimbabwe and its culture a foreign non-African identity. Recent research in northern Zimbabwe has demonstrated continuity of this culture system to the present and also confirmed its Karanga identity. South Africa, which identifies itself as the "Rainbow Nation," a reference to the diversity of its peoples and cultures, has successfully integrated archaeology into the education curriculum. What is evident is that the Southern Africa of today has been forged from deep historical roots, where current complex politics derive from many centuries of cooperation and misunderstandings between Europeans and Africans. These encounters are well documented historically, but archaeology has added another dimension. However, in situations where the past has not been given serious consideration, or has been manipulated to present only one version for certain groups of people, the consequences can be very tragic.

Cross-References

► Colonial Encounters, Archaeology of
► Contemporary Past, Archaeology of the

▶ Critical Historical Archaeology
▶ East Africa: Historical Archaeology
▶ Hall, Martin (Modern World)
▶ Industrial Archaeology
▶ Malan, Antonia
▶ Modern World: Historical Archaeology
▶ Oral Sources and Oral History

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Southern Africa: Origins and Development of Agriculture

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Introduction

Some 2,500 years ago in southern Africa – the subcontinent of Africa subsuming the basins of Kunene, Okavango, Zambezi, Kafue, Luangwa and Shire rivers, and Lake Malawi and all the regions to the south of these water bodies – foragers were drawn to a process by which greater control over plants and animals gave rise to domestic forms. Gradually, some of these foragers began to work metals. These developments ushered in significant social, cultural, economic, ideological, and political changes on the societies involved. Most of the evidence for farming comes from archaeology through actual remains of cultivated plants and domestic animals, and artistic representations of the latter in rock art or engravings. Although direct archaeological evidence remains poor due to the limited number of samples directly subjected to scientific analyses, a key factor remains the preservation of the evince itself. While the biological evidence suggests that the process of domestication was introduced from elsewhere, and by extension, farming, some evidence however suggests the inhabitants of the subcontinent continued to exercise greater, though not full control of wild resources, a process which required no domestication. This may explain the continued

reliance of both wild and plant resources, as the subcontinent's biomes allowed such interaction to take place.

Key Issues/Current Debates/Future Directions/Examples

Archaeological and Linguistic Background

Up to and until about 1,500 years ago, the inhabitants of southern Africa were largely stone-using hunter-gatherers, most probably the ancestors of the modern San (Mitchell 2002). Some 2000–2200 years ago, some of these hunter-gatherers became cattle and sheep herders. Archaeological evidence attesting to their presence in the region has been found in what is now southern Angola, Namibia, Botswana, the Northern and the Western Cape regions of South Africa (Sadr in press). They also made pottery, with some scholars thinking that they could have ushered in some form of a "pastoral Neolithic" comparable with that from the more northerly and eastern parts of the African continent, but this interpretation remains debatable. What is interesting though is the appearance of domestic sheep in the Western Cape region more than 2,000 years ago, and how they were introduced into the region most probably from eastern Africa remains unresolved.

Subsistence practices directly associated with farming seem to have gathered momentum during the first and second centuries CE. Communities linked to these developments cultivated millets, sorghum, lentils, melons, kept cattle, sheep, or goats. Initially, the farmers did not fundamentally change the subsistence patterns of the autochthonous communities. However, they were to leave their mark on the southern African landscape through pottery making traditions that were so distinct that Iron Age archaeologists have equated this to human groupings, equivalent to early forms of ethnic entities (Huffman 1989, 2007; Phillipson 2005). Archaeological sites of the Chifumbaze complex or tradition, also referred to Early Iron Age or Early Farming Community sites are directly attributed to this development. The spatial pattern points initially to a gradual expansion of the farming population in the subcontinent (Vansina 1994/1995), resulting in substantial village settlements whose inhabitants also specialized in metal, mainly iron, production.

It remains unclear whether these farmers dispersed from the northerly part of the African continent or the knowledge reached the southern African herders and hunter-gatherers, the latter representing an internal transformation within such communities, moving toward a sedentary subsistence lifestyle. Linguistically, they are identified with the ancestors of Bantu speakers, who populate the region today (Huffman & Herbert 1994/1995), leading to the suggestion that the dispersal of the ceramic traditions associated with early farmers correlates with the spread Bantu languages.

The Physiography of Early Farmers

The subcontinent of southern Africa is made up of a number of biomes ranging from extreme desert to the west to savannah in the east, sub-equatorial woodlands to the north to temperate zones further south. The eastern half of the region is summer rainfall area. Here the savannah biome is the largest, covering just over 45 % of the area, characterized by open grassland and woodlands. Brachystegia and acacia are the dominant species. Altitude ranges from sea level to over 2,000 m, where montane forest grows. Summer rainfall ranges from 200 to 1,000 mm per annum. The region also had almost every major geological and soil type contained in it.

It is in these biomes that a wide range of plant and animal foods exist, both wild and domestic; these were at the disposal of the hunter-gatherers, herders, and farmers during the last 2 millennia or so. Specifically, the savannah biome is home to seasonal forest fires, and grazing which is ideal for cattle, game, and goats, though the latter are highly tolerant of drier, hotter, and lower-lying altitudes (see, e.g., Vogel 1989).

Intensification of Farming

The intensification of crop cultivation must have started in the fifth century CE, with the expansion of farming communities in much of the southern African region. The region also witnessed gradual, but significant transformations which shaped the character of early farmers. The second half of the first millennium CE saw the region opening up to the Indian Ocean trade, gold mining, and exploitation of wild resources such as elephants for ivory. This triggered economic specialization, and with the society becoming differentiated following the development of chiefdoms and states. The middle Limpopo valley witnessed some of these developments at Schroda, Ratho, Bambandyanalo, Mmamgwe, and Mapungubwe, and there are indications that much of the Shashe-Limpopo experienced similar developments, as suggested by archaeological evidence associated with the Zhizo/Toutswe (CE 700–1300) and Leopard's Kopje (CE 900–1500) tradition sites in western Zimbabwe and adjacent eastern Botswana.

A significant development from the late first millennium to the early second millennium CE is the increase in the number of cattle. This development is particularly notable within the Toutswe and Leopard's Kopje traditions. Toutswe sites show a definite hierarchy, with large settlements on the tops of hills being occupied for up to 300 years or more, and smaller village and homestead scattered around near water sources and grazing. Well-investigated sites include Toutswemogala, Bosutswe, and Shoshong, and these could have been at the help of chiefdom societies that existed in what is now eastern Botswana, and trading with the Indian Ocean coast. These seem to have lost this trade to villages and towns now attributed to the Leopard's Kopje tradition, clustered further east in the middle Limpopo and Shashe river basins, and who also kept substantial cattle herds, as attested by large middens of vitrified dung located on the central parts of their settlements. One of these centers, Mapungubwe, developed a fully fledged state society during the thirteenth century (Huffman 2007).

The need for storage of agricultural produce becomes apparent, as attested by grain bins on sites associated with the Leopard's Kopje tradition. The state societies at Mapungubwe (CE 1200–1300) and Great Zimbabwe (CE 1280–1550) evidently became dependent on a rich agricultural hinterland to support their ruling elites and craft specialists, as well as large towns with a burgeoning population, all of which needed food. Storage was also an added insurance especially in times of droughts or periods of prolonged aridity, given the fragility of the savannah biomes in relation to global weather systems. Storage was also necessary during conflict situations, as later historically documented events show.

The Introduction of Maize

Maize, *zea mays*, was introduced in Africa in the 1500s following the continent's contacts with the Atlantic world, the Americas – a process triggered by the Columbus voyages and Portuguese sea faring activities, and the slave trade. Since then, it has become one of the most dominant food crops on the continent. Maize is rich in vitamins, is a carbohydrate, and also contains essential minerals and protein. It is also a digestive, containing dietary fiber and calories. No doubt, given its origins in Central America, its cultivation was easier compared to that of sorghum and carried significantly higher yields. Maize seems to have displaced sorghum and millets in medium to high rainfall regions.

Issues and Debates

Several topics require answers when discussing the origins of agriculture in southern Africa. The first issue is whether the region may have experienced earlier forms of food production among stone-using hunter-gatherers and herder-herders as opposed to the Iron Age farmers as is widely thought. Evidence demonstrating more direct connections with eastern Africa and the southerly parts of the Sahara is crucial in this regard. A potential area of study is the assessment of both domestic and wild prototypes, if any, in southern Africa, to determine why there is a limited range of domestic

animals and plants, given the abundance of wild fauna and flora. Was domestication really necessary in this case? A third issue is the role of climate change on domestication of both plants and animals, and human subsistence patterns, given the known shifts from hunting to farming and back. For the more recent periods, it would also be interesting to assess the impact of the introduction of maize on southern African societies. Some of the major population shifts triggered by environmental stress and human conflict are speculatively linked with the introduction of maize on the subcontinent (Huffman 2007). The only challenge is the limited oral histories with direct references to southern African hinterland societies that may provide crucial testimony to this; otherwise, all the answers have to come from archaeology.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ East and Southern African Neolithic: Geography and Overview

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Southern and East African Middle Stone Age: Geography and Culture

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State of Knowledge and Current Debate

Introduction

The term "Middle Stone Age" was introduced by South African pioneer archaeologists Goodwin and van Riet Lowe in 1929 to describe stone tool assemblages technologically distinct from those of the Early and Later Stone Age periods. Originally it referred to assemblages in which convergent flaking on prepared cores was used to produce unretouched pointed flakes with faceted platforms. It is now known that the Middle Stone Age encompasses a much wider range of technological and typological variability. The original definition of Middle Stone Age referred specifically to prepared platforms, but a wide variety of platform types, including plain, punctiform, dihedral, and laminar platforms, occur. According to Goodwin and

van Riet Lowe, prepared core methodology is typical of the Middle Stone Age. Prepared cores are designed to produce preformed blanks for use with little or no further shaping by retouch. This encompasses as Levallois technology. In Levallois technology the core is conceived of as two opposing volumes that play different roles in the production process. End products are only removed from the upper production surface that is methodically prepared before a limited number of flakes are removed. Repreparation occurs before the next set of end products can be removed. The non-production volume is treated much less methodically and plays the role of striking platform only. In both southern and East Africa, this method is used extensively in conjunction with discoid technology for flakes. Blade technologies also occur in these areas. In addition, almost the full inventory of retouched tool types and artistic practices of the Later Stone Age also occurs in the Middle Stone Age. There are so many continuities between the Middle and Later Stone Age that a rigid system in which the two entities are opposed and contrasted serves little purpose. Such reservations have been expressed formally as early as the 1960s at a Burg Wartenstein conference on African prehistory (Barham & Mitchell 2008).

Most prehistorians currently use "Middle Stone Age" simply as temporal stage term to describe sub-Saharan assemblages of the late Middle and Late Pleistocene. The mode system, created by Clark in 1969, describes technological change in terms of key innovations independent of temporal association and is preferred by some researchers. In Clark's system mode 2 refers to bifacially worked tools such as hand axes and cleavers, mode 3 to flake tools produced from prepared cores, and mode 4 to punch-struck blades sometimes retouched into various specialized tool types. Mode 5 assemblages have microlithic components of composite artifacts, often backed or retouched. Middle Stone Age occurrences include mode 2, 3, 4, and 5 elements (Barham & Mitchell 2008). The mode system does unite variously termed industries by a few common technological traits, but it conceals as wide a range of variation as the more conventional Middle Stone Age designation. The "Middle Stone Age" still has currency as a historical and technological stage division and is used here in conjunction with Clark's mode system in spite of its general nature and ambiguity. In southern and East Africa, the first typical Middle Stone Age (MSA) or mode 3 elements emerge sometime before the Middle Pleistocene (~430–127 kya). In this early time range, they appear with late Acheulean mode 2 occurrences with large cutting tools (LCTs) such as hand axes and cleavers.

In this review the variability in stone tool technology from southern and East Africa from the Middle and Late Pleistocene is discussed. Thereafter, the focus is on the behavioral debates and milestones associated with the Middle Stone Age. Southern Africa refers to the area south of the Zambezi and the Kunene which forms an ecological, cultural, and archaeological unit (Mitchell 2002). It includes South Africa, Botswana, Zimbabwe, Lesotho, southern Mozambique, and Swaziland. Most research in southern Africa has taken place in South Africa perhaps due to a favorable sociopolitical infrastructure. There are a number of exceptionally well-known sites on the southern Cape coast that often dominate discussion on the MSA. To a certain extent, this bias is reflected here, but this does not imply that other southern African areas were less well populated in the past or were less important. The Middle Stone Age of Zimbabwe and Botswana is described using nomenclature different from that used in South Africa, Namibia, and Lesotho, and this complicates drawing regional comparisons. Zimbabwe contains many open-air and stratified sites, such as Nswatugi Cave, Tshangula Cave, Pomongwe Cave, and Zombepata Cave (Fig. 1). Political and economic turmoil impede deeper investigation into the significant potential of Zimbabwe to understand regional patterning. In Botswana, Middle Stone Age sites occur, for example, in the Tsodilo Hills at White Paintings Rockshelter and Rhino Cave, at Drotsky's Cave, and at #Gi, an open-air site. Swaziland and southern Mozambique are not well known for its Middle Stone Age occurrences, but future work at, for example,

Southern and East African Middle Stone Age: Geography and Culture, Fig. 1 Map of sites in southern and East Africa mentioned in the text

Sibebe shelter in Swaziland and the areas around Maputo Bay, Inhaca Island, and Bazaruto Island in Mozambique may bring new insights (Mitchell 2008, see also Lombard 2012), while the Middle Stone Age from southern Mozambique is largely unexplored. The Middle Stone Age of East Africa is reviewed by discussing data from Tanzania, Kenya, and Ethiopia, the most intensively researched areas. Cursory reference is made to key sites in central African Zambia where the type sites and very early evidence of characteristic Middle Stone Age behaviors occur. A number

of syntheses cover the Middle Stone Age of southern and East Africa (e.g., Deacon & Deacon 1999; Mc Brearty & Brooks 2000; Mitchell 2002; Willoughby 2007; Barham & Mitchell 2008; Klein 2009), and predominantly new research is cited here to complement these detailed accounts.

The Evolutionary and Environmental Context of the Middle Stone Age

The Middle Stone Age is associated with several hominin types including archaic groups such as *Homo heidelbergensis* and *Homo helmei* and also with modern *Homo sapiens*. This period thus saw the development of anatomically modern humans from archaic forms. It is not known which of these groups were ancestral to *Homo sapiens* or whether archaic groups survived into the Late Pleistocene. Fossils representing premodern groups in East Africa have been recovered from Ileret (Ileret Footprints) and Eliye Springs in Kenya and Ngaloba in Tanzania. The Ngaloba fossils are associated with Middle Stone Age tools (McBrearty & Brooks 2000). An archaic *Homo helmei* fossil from Florisbad (Archaic Homo Sapiens), South Africa, dated to around ~260 kya, was found close to Middle Stone Age tools with no particular diagnostic traits (Kuman et al. 1999). The earliest member of *Homo sapiens* may be the Omo I calvarium, from Kamoya's hominid site (KHS) in the Kibish formation, southern Ethiopia, dating to ~195 kya (McDougall et al. 2008) (Homo Sapiens). The Omo II calvarium was found 2.7 km northwest from Omo 1, at Paul's hominid site. Omo II is of more uncertain phylogenetic affiliation but often mentioned as an early modern human. The lithic assemblages at Omo contain Levallois cores and blades, along with an ovate hand axe (Shea 2008). Four individuals classified as *Homo sapiens idaltu* (White et al. 2003) were found in the Herto member of the Bouri formation, also in Ethiopia. They date to between 160 and 154 kya and are associated with Acheulean and Middle Stone Age tools (Clark et al. 2003). The crania bear intentional modification marks, interpreted as a type of mortuary practice. These early representatives of modern humans display a mosaic of derived modern and archaic features. There is debate on precisely which traits constitute anatomical modernity and the processes underlying speciation of modern human (Schwartz & Tattersall 2010). It is evident that the combination of archaic and more derived features in the populations from ~200,000 years ago continued into the Late Pleistocene. Late Pleistocene *Homo sapiens* in East Africa includes fossils from, for example, Aduma, Porc Epic, and Mumba (McBrearty & Brooks 2000). The co-occurrence of Acheulean and Middle Stone Age elements with the earliest modern humans indicates that there is not a straightforward correlation between hominin groups and technological strategies.

In southern Africa anatomically modern human fossils appear somewhat later than in East Africa, around ~115 kya, and they are invariably associated with Middle Stone Age artifacts. The earliest representatives of anatomically modern *Homo sapiens* in southern Africa come from Klasies River (Klasies River Mouth and Related Sites, Archaeology of) where a relative large collection of cranial and postcranial fossils has been found (Willoughby 2007). Two maxillary fragments that date to ~115 ka are the oldest hominins from the site, with the majority of the fossils dating to between ~100 and 80 kya. These fossils show signs of cutmarks and burning, consistent with cannibalistic practices (Deacon & Deacon 1999). Border Cave provided an enigmatic collection of human fossils, with the earliest reliably dated specimen dating to ~70 kya (Barham & Mitchell 2008). Fossils with no particular diagnostic traits, all probably postdating 80,000 years ago, occur in the Middle Stone Age levels at Die Kelders, Hoedjies Punt, Equus Cave, Sea Harvest (McBrearty & Brooks 2000), Blombos Cave (Barham & Mitchell 2008), and Pinnacle Point (Marean 2010).

Molecular genetic data has played a crucial role in estimating the date of the origin of *Homo sapiens* (DNA and Skeletal Analysis in Bioarchaeology and Human Osteology). Investigations of mitochondrial DNA (mtDNA), the nonrecombinant portion of the Y chromosome (NRY) variation, and autosomal DNA have shown that extant African populations have the highest levels of genetic variation. This is

consistent with an African origin for all modern humans. It has been calculated that the most recent ancestor may have lived between ~200 and 100 000 years ago (see Sheinfeldt et al. 2010 and Klein 2009 for a discussion of the genetic evidence). The technology to develop genetic sequences and undertake genotypical analyses is growing at unparalleled speed and now also allows genomewide studies. New results underline that the genetic processes that gave rise to current patterns of genetic variation are complex and best explored in combination with linguistic and archaeological data (Scheinfeldt et al. 2010). Genetic analyses have also been used to explore the demographic and geographic distribution patterns of early Middle Stone Age populations. There are indications that several bottlenecks, where extreme reduction in populations and genetic variability is followed by rapid expansion, may have occurred in the evolution of *Homo sapiens*. Global climatic changes are sometimes discussed as causal mechanisms in such genetic bottlenecks.

Middle Stone Age populations from southern and East Africa lived in a range of habitats that fluctuated in concert with the 100,000 year rhythm of glacial cycles. For the past 450,000 years, the extremes between cold and warm periods became more pronounced and warm interglacials became shorter than in earlier time periods. Barham and Mitchell (2008) use the global marine isotope record as an overarching framework to discuss the changing climatic and environmental conditions that may have influenced Middle Stone Age lifeways. However, they also note that it is not yet possible to reconstruct the fine-grained environmental changes that might have affected behavioral responses, as the data from proxies for climate change in the Middle and Late Pleistocene provide too coarse a resolution. The analysis of records from marine and ice cores from the northern hemisphere gives some indication of global climatic change whereas the Dome C ice record from Antarctica provides a southern hemispheric record of such changes. The range of proxy data sources used for paleoenvironmental reconstructions in southern and East Africa include non-terrestrial and terrestrial components such as pollens, inorganic sediments, isotope records, and relict landforms (Environmental Reconstruction in Archaeological Science). Extreme environmental events, such as droughts, are sometimes invoked as motors of behavioral change in the Middle Stone Age. Areas from southern Africa and East Africa are suggested as refugias where small groups could have survived in extreme conditions (e.g., Basell 2008; Marean 2010). African landscapes are complex, and the global climatic records do not necessarily reflect local environmental variations. Exploring the effect of past climate on southern and East African Middle Stone Age populations requires paleoclimate and paleoenvironmental data from multiple regional terrestrial proxies that indicate changes on a regional scale (Thomas & Burrough 2012).

The Middle Stone Age of Southern Africa

The transition between the Early and Middle Stone Age in southern Africa is not well understood. Middle Stone Age and Acheulean elements are found together in sites as old as 500,000 years ago, while Acheulean occurrences have been recorded up to ~125,000 years ago. The most recent Acheulean industry in southern Africa, dating to between 125 and 300 kya, may be from Duinefontein 2 in the Western Cape (Klein 2009) (Handaxes and Biface Technology). Three transitional entities are known from southern Africa – the Sangoan and Lupemban in the northern areas and the Fauresmith with a more widespread regional distribution. Very few of these transitional industries are associated with dates, and they are generally not well defined or documented. At Kalambo Falls, Zambia, initially excavated by J.D. Clark and now investigated by L. Barham, the Sangoan and Lupemban occur in stratified context. As one of only a few occurrences in Africa with stratified mode 2 and 3 assemblages, this site plays a central role in understanding these transitional industries. At Kalambo Falls the Sangoan, labelled the Chipeta industry, is typified by core axes, blades, and many scrapers, the elements characterizing most Sangoan assemblages in Africa. Lupemban

layers overlie the Sangoan and also contain core axes and picks, in addition to elongated bifacially retouched (lanceolate) points and backed blades (Barham & Mitchell 2008). Such lanceolate points characterise Lupemban assemblages. The Sangoan, once considered a regional phenomenon restricted to central Africa, has now been identified as far as southern and northern Africa. In southern Africa, Kuman and co-workers investigated Sangoan occurrences. They describe Sangoan-like industries from open-air sites in the Mapungubwe National Park and surrounding farms situated on the border with Zimbabwe and Botswana. These are the oldest archaeological sites known from this area and contain small bifaces and picks, cleaver-like tools, denticulates, and denticulated scrapers, as well as prepared cores with Levallois-like traits. The Sangoan has also been identified at Kudu Koppie, Keratic Koppie, and Hackthorne and along the KwaZulu-Natal coast (Herries 2011). These assemblages may be similar to the Charaman industry of southern Zimbabwe. Sangoan-like picks and core axes of this industry occur in the Matopos region at Bambata and Pomongwe Caves (Barham & Mitchell 2008). The Lupemban is the least known transitional entity in southern Africa and has been recorded in Namibia, as part of its greater Congo basin distribution (McBrearty & Brooks 2000).

The Fauresmith, though not well defined or extensively analyzed, is better known than the Sangoan and Lupemban in southern Africa. The type implements of the Fauresmith are small ovate finely made hand axes. These tools are frequently associated with Levallois cores, large blades, and points. Fauresmith industries occur in Zimbabwe and several sites in South Africa (Herries 2011). Well-known Fauresmith assemblages are from Rooidam, Kathu Pan, and Bundu Farm in the Northern Cape. Fauresmith occurrences have also been recorded at Elandsfontein, on the Vaal and Orange Rivers, in the Seacow Valley, and at Taung. Wonderwerk Cave is the only cave site with stratified Fauresmith deposits, and here it has been dated to ~286–276 kya (Beaumont & Vogel 2006). At Bundu Farm a mean age of 245 kya has been assigned to a transitional ESA/MSA industry that may be Fauresmith in nature, and Rooidam contains a Fauresmith industry associated with a U–Th age of between 209 and 309 kya. New analysis of the Kathu Pan 1 assemblage brings a sharper focus to the Fauresmith (Wilkins & Chazan 2012). OSL and combined U-series–ESR methods provide dates of between 464 and 542 kya for the Kathu Pan 1 Fauresmith. It is of considerable interest that this occurrence is associated with systematic blade production. Hard-hammer percussion was used to remove blades from centripetally prepared cores. Some blades were further retouched into points (Wilkins & Chazan 2012). Although this blade industry is broadly contemporaneous with the blades recorded from the Kapthurin formation (Johnson & McBrearty 2010), the reduction method followed is different.

Southern Africa contains a multitude of Middle Stone Age industries that innovative analysts like Sampson and Volman organized into culture-stratigraphic frameworks without the benefit of adequate chronometric dating estimates (Barham & Mitchell 2008; Willoughby 2007). A relatively large number of radiometric dates have since become available for the Middle Stone Age, and this forms the basis of a recent summary of the Stone Age culture stratigraphy of South Africa and Lesotho (Lombard et al. 2012). A handful of "early Middle Stone Age" (EMSA) occurrences with dates between ~300 and 130 kya occur, for example, at the Sterkfontein and Lincoln Caves, Border Cave, and Wonderwerk Cave. EMSA assemblages are small and await detailed description, but they are associated with low frequencies of retouched tools and blades and flakes sometimes produced with the Levallois technique. The earliest Middle Stone Age assemblage in southern Africa without hand axes and picks occurs at Florisbad and dates to ~279 kya (Kuman et al. 1999). This assemblage is small and is dominated by flakes from multiple platform cores. In cave 13B from Pinnacle Point, a ~162 kya assemblage include Levallois components and bladelets, defined as pieces with a width of less than 10 mm. The stone tools occur in association with shellfish and thus

provide the earliest evidence for coastal occupation in South Africa (Marean 2010). Blombos Cave (Blombos Cave the Middle Stone Age Levels) on the southern Cape coast, about 100 km west from Pinnacle Point, yielded deposits that date to ~130 kya (Henshilwood & Jacobs *pers. comm*), also with shellfish and Middle Stone Age artifacts. At Florisbad, an eponymous industry, dating to ~157 kya (Kuman et al. 1999), has sidescrapers and elongated products. This "Florisbad industry" is broadly contemporaneous with the Pinnacle Point assemblage, but it is not clear whether there are any technological or typological similarities between these industries. The number of Middle Stone Age sites increases substantially from the last interglacial onwards (Deacon & Deacon 1999). In South Africa, Lesotho, and Namibia, a number of long culture-stratigraphic sequences occur that provide insights into temporal and technological patterns of the Late Pleistocene Middle Stone Age. Many of these sites, such as Klasies River, Pinnacle Point, and Blombos Cave, occur on the southern Cape coast. Sibudu Cave situated 15 km inland from KwaZulu-Natal coast contributed most notably in the last decade to changing conceptions of the Middle Stone Age. Important inland multi-sequence sites such as Rose Cottage Cave, Border Cave, Cave of Hearths, Bushman Rockshelter, Wonderwerk Cave, Umhlatuzana, Apollo 11, and Melikane further provide insights into the Middle Stone Age of southern Africa.

The global marine isotope record is frequently used to guide investigations and discussions on Middle Stone Age of the Late Pleistocene. In MIS 5e, the last interglacial that lasted from ~130 to 116 kya, warm temperatures and sea levels as high and higher than today occurred. Thereafter, temperatures dropped until full glacial conditions were reached in MIS 4. Although MIS 5 was predominantly cold, MIS 5b (~93–85 kya) was preceded and followed by the relatively warmer interstadials MIS 5c (~109–93 kya) and MIS 5a (~85–75 kya) (Willoughby 2007; Barham & Mitchell 2008). The spatial and chronological patterning of MIS 5 sites is not clear, as very few assemblages from this time range have both reliable dates and published technological analyses. The MIS 5 deposits from Klasies River possibly contain the largest collection of MIS 5d-a artifacts in southern Africa. The artifacts, from a reliable chronological context, have been described by Wurz (2012). Two techno-complexes occur in the layers dated to between ~115 and 80 kya. The lowermost techno-complex dating to ~115 kya is known as the Klasies River substage (previously known as the MSA 2a or MSA I) (Lombard et al. 2012). This assemblage is much smaller than the succeeding Mossel Bay techno-complex, but the technology is noticeably different. It is characterized by a blade reduction strategy for quartzite blades and elongated pointed end products. The worked-out single and double platform blade cores initially had very convex production surfaces as evidenced by the marked longitudinal curvature of some of the blades. There are only three assemblages with broadly comparable chronometric dates. The MIS 5d/e assemblage from Pinnacle Point Cave 13B is perhaps too small to provide technological information. A substantial assemblage from Ysterfontein 1 has ambiguous dates, but its technology is clear. This assemblage is mainly a flake industry but also contains elongated products and denticulates (Wurz 2012). The Florisbad assemblage, dating to ~121 kya, in contrast has relatively few formal tools (Kuman et al. 1999).

The MIS 5c-a assemblage from Klasies River is large and represents more than 10 m of deposit. It has been termed the Mossel Bay (also known as the MSA 2b and MSA ll). It has been dated to between ~100 and ~80 kya. The Mossel Bay at Klasies River is characterized by a unipolar recurrent Levallois reduction process for points alongside blade production systems. The majority of the end products have large, frequently faceted platforms, associated with prominent bulbs of percussion, and straight profiles. The Cape St Blaize collection analyzed by E. Thompson corresponds to the Mossel Bay techno-complex from Klasies River (Wurz 2012). The only other recently dated site with artifacts from MIS 5c is Pinnacle Point where Thompson and colleagues identify points and blades typologically similar to those from the Klasies River

Mossel Bay but perhaps with technological differences. Volman noted that some of the Nelson Bay Cave and Cave of Hearths assemblages may be similar to the Klasies River Mossel Bay techno-complex. MIS 5c-a covers a period of more than 25,000 years, and it is likely that more technological variation will be recorded in future.

The Still Bay and Howieson's Poort techno-complexes are associated with MIS 4, a glacial period occurring from ~75 to ~58 kya. The Still Bay was one of the first industries described in the formative years of South African archaeology. It was known from Peers Cave and surrounding sites on the coastal belt of the Western Cape Province of South Africa. New investigations at Blombos Cave, Hollow Rockshelter, Diepkloof, Sibudu, Umhlatuzana, and Apollo 11 over the last 15 years brought a much broader and deeper insight into this techno-complex. It has been determined that the Still Bay occurs throughout South Africa and the bifacial foliate point has been confirmed as the marker type for the Still Bay. Still Bay bifacial points occur in a wide range of raw materials and sizes, but there seems to have been a preference for fine-grained raw materials such as silcrete. Some investigations, as discussed in Henshilwood and Dubreil (2011), have demonstrated that hard- and soft-hammer techniques, as well as occasional pressure flaking and heat treatment, were used to produce these points. They were also hafted and used as spear points and knives. A recent publication on the Still Bay from Hollow Rockshelter in the Western Cape is the first to provide technological details of the reduction processes used for blank production. At this site three different reduction strategies were used to produce typologically similar bifacial tools (Högberg & Larsson 2011). At Apollo 11, Diepkloof, and Sibudu Cave, the Still Bay was dated to ~72–71 kya by Jacobs and colleagues, indicating duration of less than 1,000 years. However, other dating results indicate that the Still Bay may date to between ~71 kya and 80 kya, with outlier dates of >100 kya from Diepkloof (Henshilwood & Dubreil 2011; Högberg & Larsson 2011).

The Howieson's Poort techno-complex has (Howieson's Poort Industry: Geography and Culture), since its inception, attracted much attention for its "Upper Paleolithic"-like backed geometrics. It is the most widespread Middle Stone Age industry recorded in southern Africa and is known from more than 32 sites south of the Zambezi. Howieson's Poort sites in South Africa include the Howieson's Poort name site, Boomplaas, Border Cave, Diepkloof, Klasies River, Klein Kliphuis, Rose Cottage Cave, Sibudu, and Umhlatuzana. It also occurs at Melikane and Ntloana Tsoana in Lesotho and at Apollo 11 in Namibia. The Bambatan sites in Zimbabwe and Botswana may have Howieson's Poort affinities (Henshilwood & Dubreil 2011). Several researchers undertook typological and technological analyses of the Howieson's Poort in recent years. Publications, for example, by J. Deacon, Delagnes, Mackay, Mohapi, Porraz, Soriano, Teyssandier, Villa, Wadley, and Wurz provide information on the typological variability and reduction processes followed (Henshilwood & Dubreil 2011). At most sites, blade and bladelet reduction strategies occur alongside the production of flakes. Often, but not always, fine-grained raw materials were selected for the bladelets, blades, and backed artifacts. The Howieson's Poort forms an integral part of the Middle Stone Age, and at most sites, larger quartzite flakes and blades typical of earlier and later Middle Stone Age periods were also produced. However, it was smaller blade blanks that were retouched by marginal backing into geometric shapes such as segments and trapezes. The backed artifacts are larger than those from the Later Stone Age associated with the Wilton industry and are on average around 40 mm in length. Another characteristic typological component of the Howieson's Poort, sometimes overseen, is denticulated and notched blades. The Howieson's Poort backed artifacts were hafted. The smaller pieces were possibly used in bow-and-arrow technology and the larger ones as inserts in spears (Lombard & Phillipson 2010; Lombard 2011). Eight Howieson's Poort sites, Melikane, Ntloana Tsoana, Klein Kliphuis, Klasies River, Apollo 11, Diepkloof, Rose

Cottage Cave, and Sibudu, from different ecological contexts in southern Africa have been dated with the single-grain OSL method by Jacobs and colleagues. This study suggests that the Howieson's Poort lasted for around 5,300 years, starting at ~64.8 and ending around 59.5 kya. Results from other dating methods, thermoluminescence and ESR, indicate that the Howieson's Poort may be older at, for example, Diepkloof and younger at Klasies River (Lombard et al. 2012).

The post-Howieson's Poort period in southern Africa shows continued occupation of sites in a variety of ecological zones (Mitchell 2008). Post-Howieson's Poort sites have been described using various labels, including "MSA lll," "MSA 3," "post-Howieson's Poort," and "informal late Middle Stone Age" (Lombard et al. 2012). The elements typifying assemblages dating to between ~45 and 58 kya are points, often unifacially retouched. This is the case at Border Cave, Klein Kliphuis, Sibudu Cave, Diepkloof, Klasies River, Umhlatuzana, and Rose Cottage Cave in South Africa and Melikane, Ntloana Tsoana, and Sehonghong in Lesotho. The work on the Sibudu post-Howieson's Poort assemblages, with ages between ~46 and 59 kya, has been particularly influential in advancing insight into the post-Howieson's Poort industries in South Africa. The label "Sibudu technocomplex" (Lombard et al. 2012) has been proposed for assemblages of this time range that are characterized by formal retouch, predominantly aimed at producing triangular or elongated unifacial points. Knowledge of the period between 45 and 20 kya, the end of the Middle Stone Age, does not yet allow a coherent assessment of variability. In this period typical Middle Stone Age assemblages and those possibly transitional to the Later Stone Age occur. Characteristic Middle Stone Age elements such as elongated flakes and blades persist until ~25 kya at sites like Boomplaas and Strathalan Cave (Deacon & Deacon 1999) and Apollo 11 in Namibia (Vogelsang et al. 2010). Other final Middle Stone Age assemblages (Lombard et al. 2012) are often associated with a wide variety of types. Hollow-based points and bifacial and unifacial points occur, for example, at Rose Cottage Cave, Sibudu, Heuningneskrans, Klein Kliphuis, Umhlatuzana, Melikane, and Sehonghong. At Border Cave ~38 kya assemblages with small, irregular microlithic flakes in quartz often produced by bipolar reduction and a few retouched tools, including *outils écaillées*, occur. In 1978 Beaumont proposed that this industry should be labelled the "early Later Stone Age" and that it indicates the transition between the MSA and LSA in South Africa. The ostrich eggshell beads and bone tools also associated with this assemblage may be more appropriate markers for the Later Stone Age, but such tools occur in much earlier contexts in South African sites, as will be discussed below. More detailed technological descriptions from sites associated with reliable chronometric dates are needed before the transition to the Later Stone Age can be securely defined in South Africa. In Botswana the transition may have occurred around ~40 kya and in Zimbabwe around ~35 kya (Mitchell 2002).

The Middle Stone Age of East Africa

In East Africa, as in southern Africa, understanding the transition between the MSA and ESA is hampered by poor chronological control and too few relevant multi-sequences. Transitional Sangoan and the Lupemban industries occur in East Africa (McBrearty & Tryon 2006). The Sangoan from this region is characterized by heavy-duty tools, such as choppers, pick axes, core scrapers, and core axes, in addition to small flake tools and Levallois cores. In some instances bifacial points occur as well (Barham & Mitchell 2008). Sites in Tanzania with Sangoan assemblages include Isimila and the Njarasan industry from Mumba Cave (Willoughby 2007). At Lake Eyasi, Sangoan artifacts are associated with cranial fragments, probably of archaic nature (McBrearty & Brooks 2000). The Lupemban succeeds the Sangoan. The work of McBrearty has shown this succession in good stratigraphic context at Muguruk in Kenya. Here Sangoan and Lupemban artifacts are overlain by Middle Stone Age artifacts (Willoughby 2007). Lupemban assemblages contain typical finely

made lanceolate points that may exceed 30 cm in length, blades, and Levallois debitage. The Olkesiteti formation at Olorgesailie, dating to around 220 kya, contains Sangoan-like picks, core axes, elongate bifaces, and Levallois cores interstratified with conventional Middle Stone Age artifacts. This area promises to provide new perspectives on the timing and nature of the ESA MSA transition (Barham & Mitchell 2008).

Currently the best-dated evidence for the transition is from the Kapthurin formation, a Pleistocene sedimentary sequence in the Tugen Hills of the Kenya Rift Valley, west of Lake Baringo. It is visible over an area of ~150 km^2 and is about 125 m thick. The Kapthurin formation stratigraphic succession, divided into five members, from K1 at the bottom to K5 at the top, is well dated through $^{40}Ar/^{39}Ar$ dating of tuffs. Interstratified Acheulean and Middle Stone Age layers occur and some assemblages contain both Acheulean bifaces and Middle Stone Age Levallois technology. A small assemblage of blades, dating to between 545 and 509 kya, comes from two sites, GnJh-42 and GnJh-50, from the base of the K3 deposits (Johnson & McBrearty 2010). The blades have been produced with hard-hammer percussion according to the Hummal volumetric concept in which there is no elaborate preparation of flaking platforms. The blades occur with discoidal cores and flakes. Blades have also been recovered from three younger sites in the Kapthurin formation that date to between 509 and 285 kya. This suggests that the development of blade technology in this region had its origins in the Acheulean and that blades formed a persistent, if small, part of the technological repertoire in the Middle Pleistocene. The base of member K4, with a date of ~285 kya, provides a marker for the change to the Middle Stone Age without core tools. After this time no bifaces occur and typical Levallois production strategies become commonplace.

Early Middle Stone Age sites, occurrences older than ~130,000 years ago (McBrearty & Tryon 2006), are rare in East Africa. Levallois reduction methods form an important component of such assemblages. At the ~200 kya Koimilot sites in the Kapthurin formation, for example, the preferential and recurrent methods for Levallois flakes from centripetal cores and unidirectional and convergent strategies for triangular Levallois flakes and points have been recorded. The Levallois method also occurs at Acheulean sites, for example, at the Leakey Handaxe Area. Here Acheulean assemblages dating to ~284,000–510,000 have boulder-sized cores that were centripetally prepared for the production of large Levallois flakes. Levallois technology is thus associated with Middle Stone Age and Acheulean assemblages in the Rift Valley, northern Kenya. What distinguishes the early Middle Stone Age is not so much the presence of Levallois technology but its diversification (Tryon 2006). Up to ~120 kya, sites tend to be on river or lake margins or the highlands of Ethiopia and western Kenya. These areas could have acted as refugia during glacials or periods of environmental deterioration. After this time, a variety of site locations have been selected (Basell 2008).

Early *Homo sapiens* fossils in the Omo and Middle Awash valleys are associated with mixed Middle Stone Age and Acheulean assemblages. Further investigation of three sites in the Omo Kibish formation shed more light on the technology. The ~195,000-year-old Omo I Kamoya's hominid site (KHS) and Awoke's hominid site (AHS) and Bird's Nest Site (BNS), minimally dated to ~104 kya, have been re-excavated and analyzed (Shea 2008). The exploitation of high-quality raw material such as cryptocrystalline silicate and chert for the production of end products characterizes these assemblages. Radial or centripetal Levallois and discoidal methods occur. Foliate bifaces, hand axes, picks, and lanceolates are common in surface finds but rare in these stratified contexts. The Kibish sites are described as showing technological and typological unity over a period of 90,000 years. Shea (2008) labels it the Kibish industry characterized by Levallois radial, centripetal, and preferential core reduction methods. The association of the Kibish industry with bifacial core tools, such as hand axes, lanceolates, and foliate points, needs to be clarified. Further comparative analysis on these elements is necessary to describe variability

more precisely and to understand to which extent certain bifacial components co-occur with Levallois elements. The broadly contemporaneous Middle Awash Valley sites associated with the Herto *Homo sapiens* similarly contain hand axes and picks and a conspicuous Levallois component (Clark et al. 2003). Assemblages from the Gademotta and Kulkuletti site complex in the central Rift Valley of Ethiopia, dating to between ~140 and 230 kya, are also similar to the Kibish industry. Levallois technology is present but the proportion of retouched triangular flakes and foliate points is higher (Shea & Hildebrand 2010). A somewhat different pattern is presented by the Kapedo Tuff sites in Kenya, dating to ~135–123 kya. Blade production is common but points and retouched pieces are rare. The raw material is predominantly coarse-grained volcanic raw material. Sites in the lower and middle Kapthurin formation in the Lake Baringo Basin show a similar pattern. Stone artifacts from Koimilot Locus 1 and Locus 2 and surface collections at Nyogonyek, dating to ~200 kya, are also characterized by the production of elongated products and coarse-grained volcanic raw material (Tryon et al. 2008). The Nakechichok 1 site (Shea & Hildebrand 2010) from West Turkana, Kenya, with MSA lithics on volcanics also has laminar products and low proportions of points and retouched pieces. The technological and typological differences among Rift Valley MSA sites in northern Kenya and southern Ethiopia may be the result of raw material availability. Chert and cryptocrystalline siliceous raw materials are geologically more abundant towards the north (Tryon et al. 2008).

The first evidence for in situ MSA occurrences from the Wasiriya Beds of Rusinga Island, the region bounding Lake Victoria in Kenya, has been documented recently. Acheulean and Sangoan artifacts have been collected from the Wasiriya Beds in earlier years. Small lithic assemblages at Nyamita and Wakondo, dating to >33–45 kya, include Levallois flakes and diminutive carefully worked points, other types of points, and perhaps blades (Tryon et al. 2010). These elements typically occur in several other sites in East Africa. Examples are GvJm16 at Lukenya Hill, Songhor, Prolonged Drift, and Cartwright's Site in Kenya and the Nasera rockshelter in Tanzania. Assemblages from the Middle Awash Valley, Porc Epic, and Mumba Cave are among the few dated assemblages with such features. The Aduma industry of the Middle Awash Valley, investigated by Yellen and colleagues, dates to ~90 kya. This industry is characterized by diminution of tool size over time, a range of point types, small scrapers, and perforates. Levallois cores for the production of flake and blade tools have been recorded. Porc Epic Cave from Ethiopia is another site with stratified deposit, dating minimally to 60–77 kya. Pleurdeau, who analyzed the artifacts from Porc Epic, notes that there is no significant typo-technological variation through time. It has the same characteristics as many other MSA sites from East Africa, including Levallois and discoid reduction methods and retouched points, in addition to backed bladelets and geometrics (Barham & Mitchell 2008). The similarities between the Kibish sites, Porc Epic, Gademotta and Kulkuletti, and the Aduma industry may indicate that *Homo sapiens* populations used relatively similar technological strategies throughout southern and central Ethiopia between 80 and 200 kya (Shea 2008). The artifact patterning from Mumba Cave, as investigated by Mehlman, may also fit this pattern. New dates for the Mumba Cave deposits indicate a somewhat younger date for the Middle Stone Age deposits than previously estimated. The Kisele industry, with bifacial and unifacial points and scrapers, was estimated to be ~90 kya, but the new OSL and post-IR IRSL ages are between ~74 and 63 kya. The Mumba industry from Bed V in this cave, with backed artifacts similar to those from the Howieson's Poort from southern Africa, was thought to date to ~65 kya (McBrearty & Brooks 2000). This industry is now dated to between ~57 and 49 kya (Gliganic 2011). The MSA to LSA transition in East Africa is best known from the Central Rift sites in Kenya (Willoughby 2007). The Nasampolai industry from Enkapune ya Muto, investigated by Ambrose, is known as the earliest Later Stone Age site in sub-Saharan Africa, dating to more than 46 kya. This blade

industry contains large backed blades and geometric microliths, a few *outils écaillées*, scrapers, and burins. Other Later Stone Age sites in East Africa older than ~30 kya include assemblages from the Kisese II rockshelter, Mlambalasi, and the Nasera industry from the Mumba Cave, recently dated to ~37 kya (Gliganic 2011).

Behavioral Debates

A variety of artifacts in organic materials such as bone and shell and processed ochre occur in the Middle Stone Age. Non-lithic artifacts feature prominently in debates on whether Middle Stone Age populations acted in ways that could be considered typically human, or modern. When and how modern behavior is reflected in the Middle Stone Age is one of the most intensely debated issues in archaeological research (Cognitive Archaeology). This is especially the case for the South African Middle Stone Age. Until recently, the criteria used to recognize modern behavior were decidedly Eurocentric, sourced from the archaeological signals associated with the Upper Paleolithic (Deacon & Deacon 1999). Art, ornamentation, and other advanced behaviors such as widespread shaping of bone, ivory, shell, and spatial organization of camp floors appeared relatively sudden and as a "package" in the Upper Paleolithic of Europe (Europe, Early Upper Paleolithic in). From this perspective it is only when this package of behaviors can be detected in the Middle Stone Age of Africa, from around 50,000 years ago, that behavioral modernity can be inferred. Klein (2009) suggests that a genetic mutation occurred at ~50 kya in African populations that allowed this expression of modern behavior, probably underlain by language and symbol use (Cognitive Evolution and Origins of Language and Speech). Some Upper Paleolithic type behaviors occur already in the early Middle Stone Age of Africa, but they appear and disappear again. This may be interpreted as an indication of a non-modern level of behavior, but it may also be the case that demographic patterns influenced the expression of behaviors and that ongoing transmission of innovations required higher population densities. A distinct possibility is that many of the traits we assume to be modern were present from the mid-Pleistocene after 600 kya (Barham & Mitchell 2008).

The criterion of "symbolically mediated culture" is often used to recognize modern behaviors (see Henshilwood & Dubreil 2011 and critical commentary on this hypothesis). Symbolically mediated culture would reflect the capacity to think in symbols and structure social lives symbolically. This capability may be apparent in abstract patterns engraved on ochre from Blombos Cave. Several pieces of ochre with engravings, dating to between ~72 and 100 kya, have been recovered from Still Bay and pre-Still Bay layers. The signature piece is a ~77,000-year-old small slab of dark-red ochre with a stone tool engraved cross-hatched pattern bounded by parallel lines (Fig. 2). A comparable engraving on a small ochre fragment occurs at Klein Kliphuis in a layer that dates to between ~80 and 50 kya (Henshilwood & Dubreil 2011). Engraved ochreous pieces may occur as early as the Fauresmith. Beaumont and Vogel (2006) describe a fragment of silicified ironstone with subparallel lines engraved with a stone tool, from the Fauresmith industry at Wonderwerk Cave. In the Middle Stone Age of South Africa, the convention of engraving extends to other raw materials such as bone and ostrich eggshell. Engravings on bone occur at Blombos Cave in the Still Bay levels. At Klasies River four parallel lines have been engraved with a lithic point on a midshaft fragment of a limb bone associated with the early Howieson's Poort (Fig. 3). More spectacular is the engravings on ostrich eggshell from Diepkloof in the Western Cape, where 270 fragments of intentionally marked ostrich eggshell have been recovered from the Howieson's Poort levels dated to ~60 kya. A limited number of abstract geometric motifs occur, for example, straight parallel lines, cross-hatching, and a hatched band. These abstract linear engravings were originally made on eggshell containers (Texier et al. 2010). In the Howieson's Poort levels from Apollo 11 in Namibia, potential eggshell flask apertures (represented by 23 pieces) have also been found, together with two small fragments of ostrich eggshell (OES) with

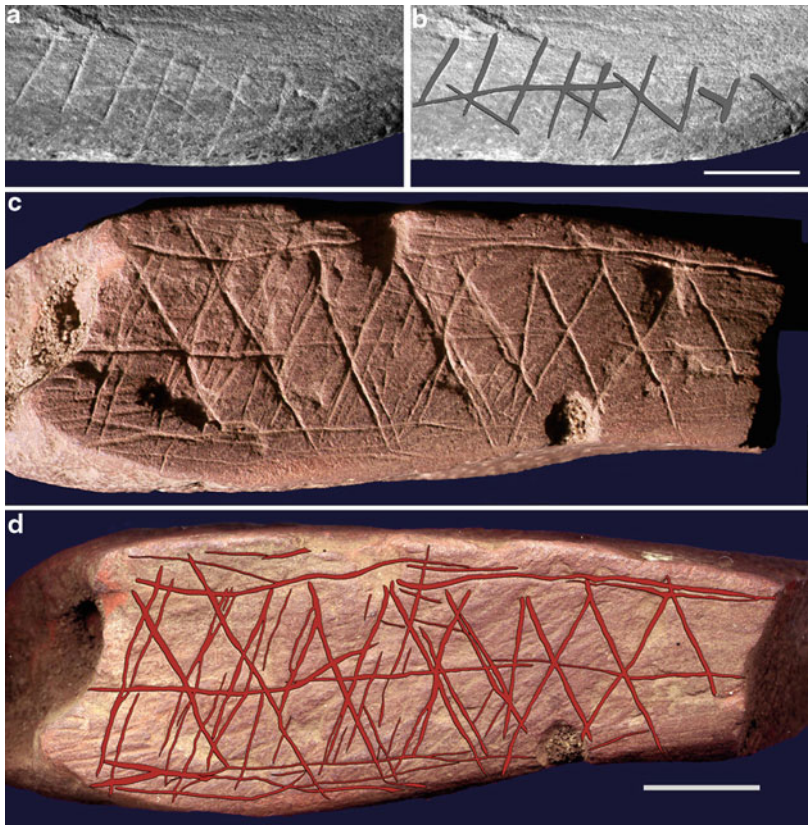

Southern and East African Middle Stone Age: Geography and Culture, Fig. 2 Engraved ochre, Still Bay techno-complex, Blombos Cave

intentionally engraved patterns (Vogelsang et al. 2010).

Another reflection of symbolic culture may be the use of beads as personal ornaments. Beads made from shell occur from around 100,000 years ago in some sites in Africa and the Near East. Vanhaeren, Henshilwood, d'Errico, and colleagues have published a number of papers describing early occurrences of shell beads and the implications of their presence in the Middle Stone Age of South Africa (see Henshilwood & Dubreil 2011 for a recent synthesis). More than 41 *Nassarius kraussianus* shell beads have been found in Still Bay layers dating to ~72 kya at Blombos Cave (Fig. 4). Microscopic study has revealed that the shells were pierced with a bone tool to create a perforation. Discrete use-wear facets on the beads indicate that the tick shells were strung, possibly on cord or sinew, and perhaps worn as personal ornaments. Microscopic residues of ochre inside some beads may have been caused by deliberate coloring or transference of ochre when worn. Six *Afrolittorina africana* shells occur in the Still Bay levels from Sibudu. Three of these were probably beads as they have been deliberately pierced. The first ostrich eggshell beads appear earlier than 40 kya in deposits in southern and East Africa. The earliest indication of the use of ostrich eggshell (OES) for personal ornamentation may be from Apollo 11. Three OES pieces with smoothed edges, similar to LSA OES pendants, have been described from the Howieson's Poort techno-complex (Vogelsang et al. 2010). Ostrich eggshell beads start to appear more regularly in MSA sites postdating ~50 kya. OES beads occur in level V at Mumba Cave, recently dated to ~49 kya. Other sites with early occurrences of OES beads include Enkapune ya Muto in Kenya, Nswatugi in Zimbabwe, and Boomplaas, Bushman Rockshelter, Cave of Hearths, and Border Cave in South Africa

Southern and East African Middle Stone Age: Geography and Culture, Fig. 3 Engraved bone, Howieson's Poort techno-complex, Klasies River

(McBrearty & Brooks 2000). OES beads are very common in the later periods of the Later Stone Age of southern and East Africa.

There is some debate as to whether early beads represent symbolically mediated culture. It has been suggested that they may reflect theory of mind and the capability to pay attention to one's appearance, abilities not specifically related to symbolic culture (commentary in Henshilwood & Dubreil 2011). Art, on the other hand, is a largely uncontested indicator of symbolic thought. The earliest representational art in Africa is the well-known painted slabs from Apollo 11 cave. These drawings, executed with pigment crayon, are on seven loose slabs ("art mobilier") and depict a therianthrope, geometric patterns, and animals. The later Middle Stone Age deposits in which the painted slabs were found have been redated giving an age of 29.4 ± 1.4 ka, confirming that the painted slabs date to ~30 kya as earlier suggested (Vogelsang et al. 2010). Another, less straightforward indicator of symbolic cognition may be the early use of ochre. It is known that pigments have been used at least from around ~285 kya, as ochre occurs in the Kapthurin formation in deposits dating to older than 200 kya (McBrearty & Tryon 2006). The oldest occurrence of ochre use in Africa may be from Twin Rivers in Zambia where utilized ochre have been recorded in layers older than 300 kya (Barham & Mitchell 2008). Striated ochre is present in the Pinnacle Point levels dating to ~162 kya (Marean 2010), and it becomes common in South African sites from the Late Pleistocene onwards (Deacon & Deacon 1999). Even the earliest ochre recovered is modified and bears striations on its surfaces. Such striations occur on fragments and on ochre crayons with smoothed edges, such as the ~90,000-year-old subtriangular ochre crayon from Klasies River (Fig. 5). There are grindstones that retain traces of ochre from many Middle Stone Age sites, indicating that ochre was sometimes powdered before use. Ochre could also have been processed and used in a liquid form. Two ~100,000-year-old ochre-processing toolkits have been recovered from Blombos Cave (Henshilwood et al. 2011). The coeval and spatially associated toolkits consist of *Haliotis midae* (abalone) shells and are associated with grinders, stone artifacts, bone, and ochre (Fig. 6a and b). Inside the abalone shell of toolkit A, adhering to the inner surface, a 5-mm-thick red compound is visible. The compound consists of ochre, fragments of spongy bone of which the fat may have acted as a binder, charcoal fragments, and quartz and quartzite microflakes. These microflakes may have originated from quartzite flakes with ochre traces found underneath the abalone shell in association with three identifiable bone fragments. A quartzite cobble that was used as percussor and grinder was also found inside the toolkit (Fig. 6a). Sixteen centimeters from this toolkit, another abalone toolkit was found (Fig. 6b), also with a thick red

Southern and East African Middle Stone Age: Geography and Culture, Fig. 4 Nassarius kraussianus beads, Still Bay techno-complex, Blombos Cave

compound adhering to the inside of the shell. A small quartzite core, used as a grinder, and a large piece of ochre that was knapped to produce small pieces of ochre, similar to the ochre found inside the abalone shells, were associated with this toolkit. It is not known what the ochre liquid was used for, but it may have been applied as paint on a surface. This find shows that the conceptual capability to source, combine, and store substances that characterize modern humans was present 100,000 years ago.

The quest to identify innovations as markers of modern behavior has stimulated much research on the Middle Stone Age of South Africa. Technological innovations associated with the Howieson's Poort and Still Bay have been investigated most extensively. The production techniques and methods from these industries have been described as advanced or innovative. An important technological milestone was the deliberate heat treatment of lithic raw material to improve flaking capability. Silcrete is a very

hard intractable material, and Brown et al. (2009) have shown that it is significantly easier to produce bifacial tools and bladelets in silcrete after systematic heat treatment with fire. Three independent methods, archaeomagnetism, thermoluminescence, and maximum gloss (Pinnacle Point Methods), were used to infer heat treatment of archaeological silcrete artifacts dating to ~72 kya and ~162 kya, from Pinnacle Point. Heat treatment was also used to produce silcrete bifacial points in the Still Bay at Blombos Cave (Mourre et al. 2010). Another significant technological innovation that occurred in the Middle Stone Age is the production of formal bone tools. These are tools or bone implements that have been fully modified with techniques specific to bone material such as grinding, scraping, or cutting (d'Errico et al. 2012). The largest collection of bone tools is from Blombos Cave from the Still Bay (Henshilwood & Dubreil 2011). The oldest bone tool from this site is a bone percussor dating to ~72 kya. Bone tools also occur at Sibudu. Twenty-three bone tools that have been shaped by scraping and sometimes by percussion flaking have been identified from the pre-Still Bay, Howieson's Poort, post-Howieson's Poort, and final Middle Stone Age (d'Errico et al. 2012). They include specialized types such as wedges, pièces esquillées, pressure flakers, smoothers, sequentially notched pieces, awls, and a possible projectile point. A wedge-like implement from the pre-Still Bay layers also date to older than ~72 kya. Notched bone, most probably with a nonfunctional purpose, occurs in the Mossel Bay levels at Klasies River (Fig. 7), at Apollo 11 in the Still Bay levels (Vogelsang et al. 2010), and at Sibudu Cave in the Howieson's Poort levels. Earlier investigations described Middle Stone Age bone tools from, for example, Border Cave and White Paintings Shelter from Botswana ~38–50 kya, but the barbed and unbarbed bone points from the Katanda sites in the Semliki Valley, dating to ~90 kya, are the oldest formal bone tools discovered yet in Africa (McBrearty & Brooks 2000; d'Errico et al. 2012). Not many Middle Stone Age assemblages have been examined with advanced microscopic techniques, and it is likely that future investigations will significantly

Southern and East African Middle Stone Age: Geography and Culture, Fig. 5 Ochre crayon, Mossel Bay techno-complex, Klasies River

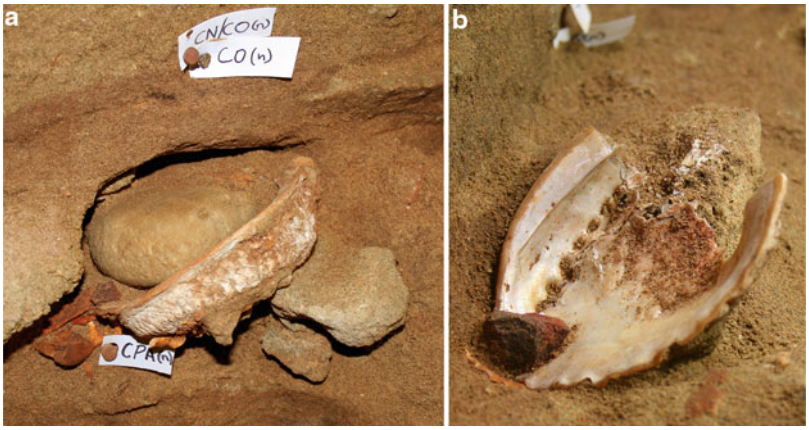

Southern and East African Middle Stone Age: Geography and Culture, Fig. 6 (**a** and **b**) In situ ochre-processing toolkits from Blombos Cave

Southern and East African Middle Stone Age: Geography and Culture, Fig. 7 Notched bone, Mossel Bay techno-complex, Klasies River

increase the number of bone tools from the Middle Stone Age.

Hafting, the practice of setting a bone or a stone artifact in a handle of organic material to produce multicomponent tools, was a major innovation. The transition from handheld to composite tools preceded the evolution of *Homo sapiens* (Barham & Mitchell 2008). Various forms of Levallois and unretouched points and small backed artifacts would have been hafted on spears and propelled by hand. It is this kind of weapon that may have occurred as early as the ~285 kya in East Africa (McBrearty & Tryon 2006; Barham & Mitchell 2008) and somewhat later in southern Africa (Lombard 2011). Bone points, dating to MIS 4, that could have been used to tip arrows have been identified from Peers Cave, Sibudu, and Klasies River (d'Errico et al. 2012). The origins of bow-and-arrow technology, previously associated with the Upper Paleolithic of Europe, may be linked to the Howieson's Poort. Metric analyses and use-wear and microtrace studies show that microlithic quartz backed artifacts from Umhlatuzana and Sibudu have been hafted and used in bow-and-arrow technology (Lombard 2011, Figs. 8 and 9). Howieson's Poort backed artifacts could also have been used as barbs for hand-delivered spears. Experimental research provides an alternative avenue to investigate ancient cognition that may avoid some of the theoretical difficulties involved in identifying symbolic culture in archaeological artifacts. Experiments were undertaken to investigate how mastic was produced to facilitate hafting of Howieson's Poort backed artifacts. Microresidues on the Sibudu Cave backed artifacts provided the clues for the ingredients of the prehistoric adhesive (Stone Tool Usewear and Residue Analysis in Environmental Archaeology). The results indicate that several ingredients including ochre, gum, and a fatty substance had to be mixed and heated to the correct temperature to ensure the correct degree elasticity for successful hafting (Wadley et al. 2009). The production and use of stone-tipped spears and bow-and-arrow technology required multiphase planning and working memory capabilities. These abilities would have allowed individuals to keep design elements, adhesive production, and the combination of different raw materials in mind. This is typical of the thought processes underlying modern

Southern and East African Middle Stone Age: Geography and Culture, Fig. 8 Quartz segments and backed pieces from Sibudu Cave, KwaZulu-Natal, South Africa (Lombard & Phillipson 2010)

technological procedures (Lombard 2012). Investigations into the organization of space and the use of plant materials further allow insights into the minds of Middle Stone Age people outside of the symbolic behavior debate. Lombard (2012) discusses the few instances where preservation allows the reconstruction of spatial patterns. It is highly probable that the same social and cognitive rules structured the organization of space in the Later Stone Age and the Middle Stone Age as shown at sites such as Diepkloof, Strathalan Cave B, and Klasies River. Micromorphological studies also demonstrate that hearths and bedding heaps have been maintained at Sibudu from ~58 kya. Another innovation recently recorded in this regard is the use of sedges and aromatic leaves to construct bedding areas at ~77 kya at Sibudu Cave (Wadley et al. 2011).

The hunting technology and hafting procedures discussed above imply a level of flexibility similar to that of current hunter-gatherer groups (Archaeology of Hunter-Gatherers). The choice of prey in the Middle Stone Age, on the other hand, has led some researchers to question the sophistication of hunting capabilities. Middle Stone Age paleoecology is best known from coastal South Africa, and it is in this context that the cognitive implications of subsistence behavior have been debated. The MSA differ significantly from the LSA in terms of relative species abundance. In LSA assemblages an increased exploitation of dangerous game such as wild pigs and buffalo occurs whereas MSA populations hunted more docile species like the eland. LSA populations also exploited marine mollusks, tortoises, and airborne birds more intensively than MSA people. In the LSA more young seals were hunted and fish was added to the diet. These contrasts are seen as an indication that populations in the LSA were

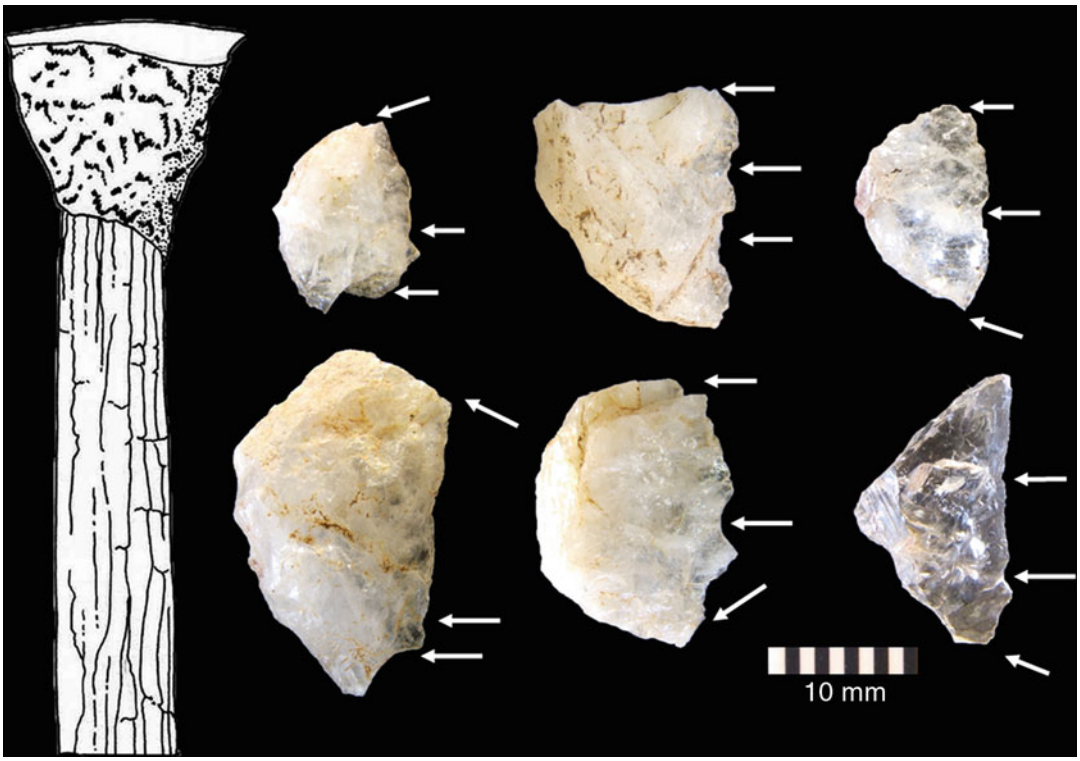

Southern and East African Middle Stone Age: Geography and Culture, Fig. 9 *Left*: reconstructed arrow, tipped with a transversely hafted segment. *Right*: segments and backed pieces from Sibudu Cave and Umhlatuzana Rockshelter with impact fractures consistent to those observed on similar artifacts that were used as transverse tips in experimental arrows (Lombard & Phillipson 2010)

technologically more advanced and efficient and therefore more competent hunters than Middle Stone Age groups (Klein 2009). However, it has been noted that these contrasts are based on assemblages dated to before 60 kya and after 20 kya and that the crucial period between these dates has not been documented. Investigating this time gap is a major priority for future research in subsistence patterns (Steele & Klein 2009). The differences in species abundance in the MSA and LSA need not necessarily reflect cognitive capabilities or the innovation of novel technologies. It has been suggested that the differences reflect resource intensification imposed by higher population densities in the LSA (Deacon & Deacon 1999). The changes in the coastal environment in the previous glacial/interglacial cycles in the Cape Floral Region (CFR), where the southern Cape sites are situated, influenced the carrying capacity of this area. The coastal environment may not have had adequate grassland habitat to support grazing taxa and therefore affected the large ungulate biomass. This would have required expansion of diet breath to include more intensive exploitation of shellfish, flying seabirds, tortoises, and fish in the LSA (Faith 2011). Due to the relative absence of assemblages with fauna in East Africa, relatively few Middle Stone Age zooarchaeological studies have been undertaken, and data from sites from this area do not generally form part of this debate.

Conclusion

In southern and East Africa, the absence of good chronometric control and scarcity of multi-sequence sites prevent a precise grasp of the transition of the ESA to the MSA that occurred

from ~500–285 kya. During the transition Middle Stone Age and Acheulean elements frequently appear together in sites. The earliest date for Middle Stone Age occurrences without LCTs in southern and East Africa is around ~285 kya. In East Africa such assemblages occur first in the Kapthurin formation in Kenya and in southern Africa at Florisbad. In both regions the visibility of archaeological sites increases from ~130 kya onwards. Flakes, blades, and points of various degrees of elongation comprise the unretouched component of Middle Stone Age assemblages. The retouched components of bifacial and unifacial points and backed artifacts occur in both regions and are frequently used as temporal markers in the South African Middle Stone Age. Other types include scrapers and denticulates. In East Africa and across most of the African continent, the transition to the LSA took place around 40,000 years ago (Mc Brearty & Brooks 2000), but in southern Africa timing and nature of the transition are still debated. More progress has been made towards creating an overarching regional culture-historical framework for the southern African MSA than for the eastern African MSA. The multitude of analyses undertaken on all aspects of the Howieson's Poort makes it perhaps the most intensively studied techno-complex in southern and East Africa. The MSA from East Africa is best described as evidencing a mosaic pattern of variation through time and space (Shea 2008). An intriguing topic for future research is the spatial extent of patterning in southern and East Africa. The Still Bay and Howieson's Poort techno-complexes have a southern African distribution and crosscut a variety of ecological zones. Future inter-site comparisons will demonstrate whether variability exists on the same geographical scale in other Middle Stone periods and areas. It is a priority to further develop J.D. Clark's idea that various forms of points can be used to identify regional variations in the Middle Stone Age of East Africa and South Africa. He mentioned, for example, Howieson's Poort geometrics, Still Bay, Pietersburg and Bambata points, and small triangular points from Mumba. Increased research focus may expand the kinds of artifacts that pattern in a regional way. The reconstruction of Middle Stone Age behavioral patterns most frequently takes place within the framework of the modern behavior debate, especially for sites in South Africa. Whether or not Middle Stone Age populations were "modern," this review has shown that they varied hunting technologies by changing hafting configurations and types of insets in composite tools. They invested effort in various forms of artisan activities such as engraving of geometric designs on ochre and shell, making shell beads and formal bone tools, and processing ochre. This indicates that Middle Stone Age hunter-gatherers could adapt to their environment flexibly and creatively.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Clark, John Desmond
- ▶ Clark, John Grahame Douglas
- ▶ Cognitive Archaeology
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Europe: Early Upper Paleolithic
- ▶ Handaxes and Biface Technology
- ▶ *Homo sapiens*
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Ileret Footprints
- ▶ Pinnacle Point: Excavation and Survey Methods
- ▶ Stone Tool Usewear and Residue Analysis

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Southern Ocean and Antarctic Maritime Archaeology

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Introduction

Professional archaeology has been practiced in the Southern ocean and Antarctic region since the 1970s with archaeologists from Australia, Argentina, Brazil, Chile, New Zealand, the United Kingdom, Scandinavia and the United surveying, recording and excavating a number of maritime sites. This work has been undertaken primarily to create inventories of historic places and to aid in the conservation of historic buildings, and as a result, this work has been almost exclusively terrestrially based.

Definition

The Southern Ocean and Antarctica cover more than one-eleventh of the Earth's surface. Antarctica is the fifth largest continent in the world, while the Southern Ocean is the fourth largest ocean, extending from the shores of Antarctica to 60° south to the approximate extent of the Antarctic convergence (although this definition is often broadened to include the Subantarctic Islands south of 45° latitude).

The Southern Ocean comprises the world's southernmost body of water and includes parts of the Drake Passage, the Scotia Sea, the Weddell Sea, the King Haakon VII Sea, the Cosmonaut Sea, the Cooperation Sea, the Davis Sea, the Mawson Sea, the D'Urville Sea, the Ross Sea, the Amundsen Sea, and the Bellingshausen Sea. Throughout its waters are islands within the Antarctic continental shelf, such as the South Orkney Islands, South Shetland Islands, Bellenny Islands, and Scott Islands, and outside this area, the Subantarctic Islands of the Falkland Islands, South Georgia, the South Sandwich Islands, Bouvet Island, the Prince Edward Islands, the Crozet Islands, the Kerguelen Archipelago, Heard Island, the McDonald Islands, Macquarie Island, the Auckland Islands, Bounty Island, Campbell Island, the Antipodes, and the Snares.

The amount of ice within the Southern Ocean is enormously variable and fluctuates seasonally; in winter, the ocean freezes outward from Antarctica to approximately 65° south latitude in the Pacific sector and 55° south latitude in the Atlantic sector a greater than a sixfold increase in area. At some coastal points, intense persistent drainage winds from the interior keep the Antarctic shoreline ice-free throughout the winter.

The Southern Ocean is 4,000–5,000 m deep over most of its extent with only limited areas of shallow water with even the Antarctic continental shelf being generally narrow and deep, its edge lying at depths of 400–800 m. The ocean's greatest depth is 7,235 m at the southern end of the South Sandwich Trench.

The Southern Ocean and Antarctic is characterized by frequent intense cyclonic storms caused by the temperature contrast between ice and open ocean with the area from about latitude 40 south to the Antarctic Circle recording the strongest average winds anywhere on Earth.

World Heritage Sites and Legislation

The islands in the Southern Ocean and their surrounding waters are protected by an interwoven web of legislation aimed at protecting both natural and cultural resources. Each island comes under the legislation of its sovereign nation which provides the framework for the management and protection of heritage sites. In addition, many of the islands including Auckland Island, Campbell Island, Heard Island, and Macquarie Island have been designated as "nature reserves," and in the last two decades, the waters surrounding these islands have been also been made into marine reserves, further restricting activities that may be harmful to natural and cultural resources. Significantly, Heard Island, the New Zealand Subantarctic Islands, Macquarie Island, and the Tristan da Cunha Islands are all UNESCO world heritage sites based on their outstanding universal natural values.

The Antarctic Treaty System (ATS) is one of the most successful examples of international law ever created. Ratified in 1959 by 25 consultative parties including those previously involved in Antarctic action (highly active signatories include Australia, Argentina, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Russia, the United Kingdom, and the United States of America), the Antarctic Treaty created rules and regulations for exploration and exploitation of the southern continent. Drafted in the spirit of peaceful scientific international agreement, all activities may be monitored or "observed" by any nation and disputes must be settled by common vote. Consultative parties cannot resign or be expelled from membership, although nations are allowed to ratify and become a consultative party if conducting research in Antarctica.

Seven nations (Australia, New Zealand, United Kingdom, Argentina, Chile, France, and Norway) claim sovereign rights to territory in Antarctica. Under the 1959 Antarctic Treaty and subsequent 1999 Protocol on Environmental Protection to the Antarctic Treaty, or Madrid Protocol, territorial claimant nations are responsible for protection of cultural heritage under pertinent national legislation. However, signatories remain at odds over recognition of marine claims, an issue that has implications for Antarctica's submerged cultural heritage sites. Marine areas (e.g., the Australian Antarctic Territory [AAT] Exclusive Economic Zone [EEZ]) may not be recognized by states other than the claimant nation, a dubious measure of protection for heritage sites in disputed waters (Fig. 1).

Documents within the ATS that relate to cultural heritage are the Antarctic Treaty Recommendation VII-9, which regulates scientific endeavor, and the Madrid Protocol. The Madrid Protocol entered into force on 14 January 1998, with the goal to, as per Article 3, avoid "degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance." Annex V. Area Protection and Management outline the procedures for site nomination as an Antarctic Specially Protected Area (ASPA) or Antarctic Specially Managed Area (ASMA) and provides for permitting procedures. In order to be recognized as a historic site or monument, sites must first be accepted as (or be located within) an ASPA or ASMA, which requires a process of nomination. All sites are then entered on the Antarctic sites and monuments list. Guidelines (Resolution 5) were submitted at the 2001 Antarctic Treaty Consultative Meeting (ATCH) that offer blanket protection for all pre-1958 historic sites and artifacts and recommend best archaeological practice for necessary disturbance of remains. Oversight is through the ATS and the Scientific Council on Antarctic Research (SCAR) and can be accessed via the International Polar Heritage Committee website (www.polarheritage.com).

Maritime Sites on the Antarctic Sites and Monuments List

While many sites on the Antarctic mainland have associations with maritime activities (such as

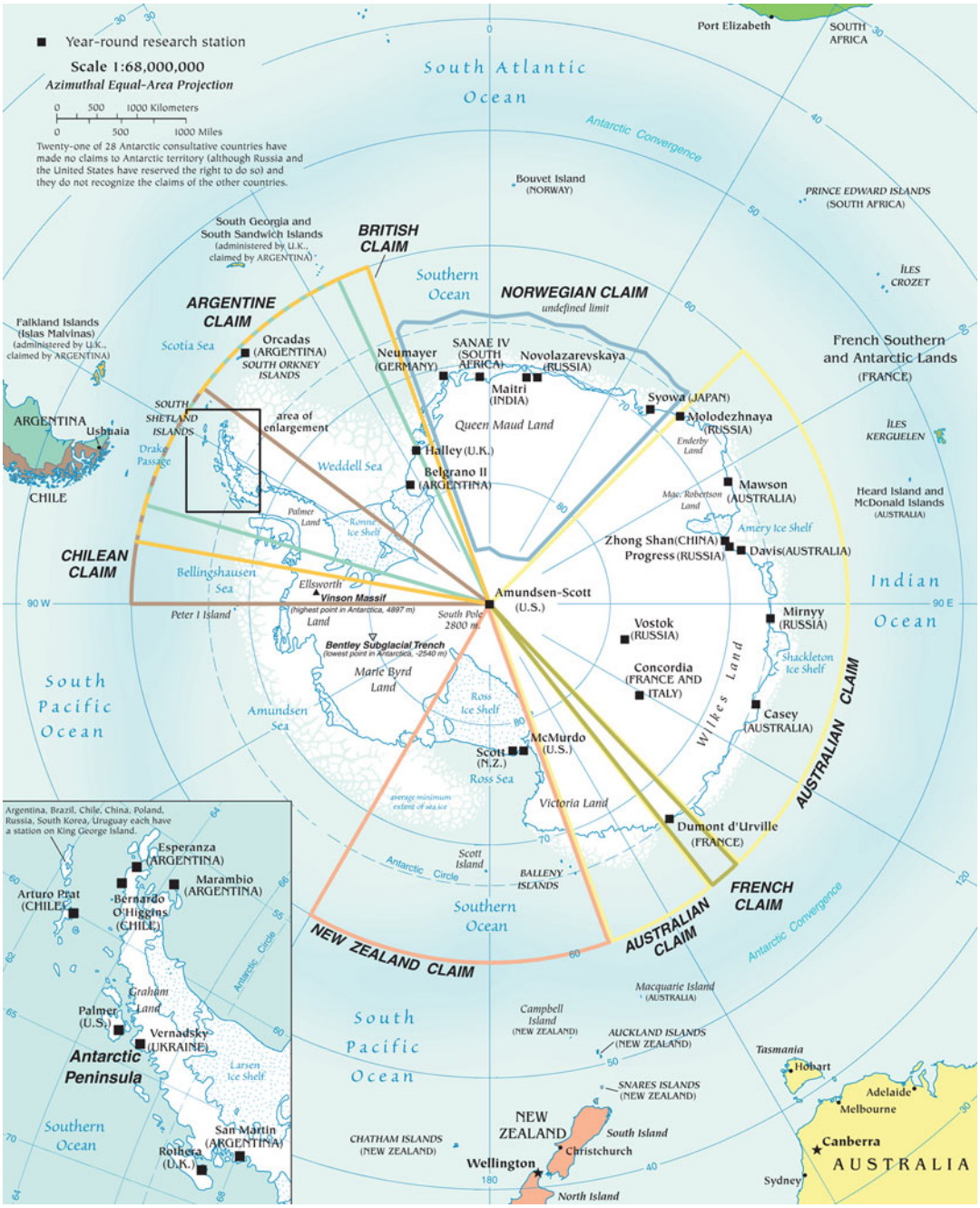

Southern Ocean and Antarctic Maritime Archaeology, Fig.1 *Map of the Antarctic region*. Twenty-one of 28 Antarctic consultative countries have made no claims to Antarctic territory (although Russia and the United States have reserved the right to do so), and they do not recognize the claims of the other countries. The World Factbook, 2009. Courtesy Wikimedia Commons

whaling and sealing sites, and research stations), only three dedicated maritime archaeological sites are currently located on the Antarctic Sites and Monuments List. These sites are the whaling station at Whalers Bay, Deception Island (No. 71); nineteenth-century wreckage located

on the beach at Elephant Island by a Naval expedition in the 1990s (No. 74); and Cape Denison, Commonwealth Bay (No. 77), which is the only listed site that incorporates an underwater object (a bow anchor associated with Mawson's vessel *Aurora*) that has not yet been located. Commonwealth Bay is managed as ASMA 3. Two sites (Whalers Bay and Elephant Island) fall within the United Kingdom territory. The third site (ASMA 3) is located within the AAT and managed by Australia.

Historical Background

Polynesian seafarers were the first humans to venture into the Southern Ocean region with archaeological evidence suggesting that they discovered and briefly occupied the Auckland Islands in the Subantarctic Island group some 650 years ago. European exploration in the Southern Ocean, and the eventual discovery of Antarctica, began with the voyages sponsored by the Portuguese Prince Henry the Navigator in the early fifteenth century. The Portuguese rounding of the Cape of Good Hope in 1487–1488 and the crossing of the Indian Ocean in 1497–1499 distanced both Africa and southern Asia from the hypothesized *Terra australis incognita*, and later, the discovery of the Strait of Magellan 1519–1522 and Drake Passage 1577–1580 also separated South America from the fabled southern land, confirming the possibility of world circumnavigation via the southern hemisphere. The surveying of the coast of Australia by the Dutch explorer Abel Tasman in 1644–1645 provided further information as to the extent of the southern continent while almost a century later, French expeditions from 1738 onwards began to discover isolated Islands in the southern Indian Ocean. Identification of the Southern Ocean however is credited to Captain James Cook who during three expeditions between 1771 and 1780 discovered South Georgia and the South Sandwich Islands and crossed the Antarctic Circle for the first time. The subsequent publication of accounts of Cook's voyages heralded the start of both sealing and whaling in the Southern Ocean region. Descriptions of the abundance of seals on South Georgia led to a rush of sealing vessels into the Southern Ocean from the late 1780s. The search for unexploited stocks of seals led to the discovery of many other Southern Ocean island groups such as the Antipodes (1800), Auckland Islands (1805–1806), Bounty Islands (1807), and Campbell and Macquarie Island (1809–1810). Each island was stripped of its stocks so that by 1850s, there were few southern fur seals left; however, the use of the Great Circle sailing routes by naval and merchant ships travelling through the Southern Ocean from around this time continued the discovery of islands between the latitudes of 50° and 60° south.

Discovering Antarctica

Early Western exploration of the Antarctica continent was attempted for a number of reasons: Some nations were interested in locating new fertile whaling grounds; others sought to locate the Southern Magnetic Pole, and others to acquire territory. The first recorded sighting of the Antarctica continent was by Russian explorer Thaddeus von Bellinghausen who circumnavigated the Antarctic south of Cook's route in 1819–1821, yet American whaler *Nathanial Palmer* is the first to land men on the Antarctica continent in 1821. French explorer Jules Dumont D'Urville was instructed to reach and claim the South Magnetic Pole for France. He relied on coordinates predicted by mathematician Carl Gauss but ended up west of the mark. With ships *Astrolabe* and *Zelee*, he sighted a section of the Antarctic coast and claimed Terre Adelie for France in 1840. Charles Wilkes' United States exploring expedition also searched for the South Magnetic Pole in 1838–1842, encountering the French ship *Astrolabe* in Antarctic waters. Bipolar adventurer James Clark Ross led the British bid for the South Magnetic Pole from 1839 to 1843, with the ships *Erebus* and *Terror*. Ross noted his rivals' routes and headed the other

direction, narrowly missing the pole. Ross explored more of Antarctica than any previous adventurers, naming features such as Mounts Erebus and Terror and the Ross Sea. A British scientific expedition in 1872–1876 on *Challenger* circumnavigated the continent, produced valuable deep sea soundings and helped initiate the next phase of Antarctic exploration.

The first International Polar Year (1882–1883) saw an increase in expeditions, leading to what is known as the "Heroic Age" of polar exploration. Eight nations sent exploratory expeditions to the southlands for national honor, pride, and scientific endeavor. Not until the Space Race of the 1960s would such a feat be seen again. This period is usually said to end with the tragic voyage of Ernest Shackleton in 1914–1916 which resulted in the loss of *Endurance* to pack ice. Only a few survived by rowing to South Georgia (Elephant Island) in the tender *James Caird*.

In 1898, *Belgica* was the first vessel to overwinter in Antarctica, and in 1899, Carsten Borckgrevink's *Southern Cross* was the first to set up a temporary camp on the mainland. Erich von Drygalski's Gauss 1901–1903 expedition became trapped in the pack ice. This expedition charted part of Antarctica, including Drygalski Island. Baron Otto Nordensköld and the 1901–1903 Swedish Antarctic Expedition resulted in the loss of vessel *Antarctic*, which was crushed in pack ice. Robert Falcon Scott's first expedition (in vessel *Discovery*) was from 1901 to 1904, setting a new farthest South record and charting territory. The Scottish National Antarctic Expedition (1902–1904) charted portions of Coats Land along the Weddell Sea, and in 1903, a French team led by Jean-Baptiste Charcot set sail in *Français* to rescue the Nordensköld party. While Nordensköld was eventually rescued by Argentinean vessel *Uruguay*, Charcot charted portions of Graham Land and Loubet Land.

The South Magnetic Pole was finally achieved in 1909 by the Northern Party of the British Antarctic Expedition on *Nimrod*, Ernest Shackleton in command. Charcot returned to Antarctica in 1908–1910 to continue exploration of the continent. In 1910, Nobu Shirase led the Japanese Antarctic Expedition in *Kainan Maru*. It all came to a head on 15 December 1911, when Roald Amundsen's South Pole Expedition beat Robert Falcon Scott, of the British *Terra Nova* Expedition to the South Pole. On the return journey, Scott and his party succumbed to the elements. The 1911–1914 Australasian Antarctic Expedition (under Douglas Mawson in vessel *Aurora*) charted the coastline between Cape Adare and Mount Gauss. Shackleton's Imperial 1914–1917 Trans-Antarctic Expedition (*Endurance*) was 1915–1917. Supported by the Ross Sea Party with Aeneas Mackintosh in charge, they succeed in laying depots across the Great Ice Barrier. Shackleton's final voyage is 1921–1922 on vessel *Quest* continues mapping the Antarctic continent but results in Shackleton's death and burial at South Georgia Island. A final footnote is the first Antarctic flight, made by Hubert Wilkins in 1928. For further information, see Headland (2009).

By the 1870s, the falling number of whales in northern waters saw German, Scottish, and Norwegian whalers exploring and taking whales from the waters of the Southern Ocean down as far as the Antarctic Peninsula. In 1904, this interest was cemented by the establishment of the first Antarctic land-based whaling station on Georgia Island. This success of this station soon saw the establishment of other whaling operations on South Georgia and the extending of their range southward to the southern Scotia Sea and Antarctic Peninsula. By 1912 Norwegian whaling factory ships were operating in the open waters or the Southern Ocean using the edge of the Antarctic ice field to provide the calm waters they needed to hunt and process their prey. The 1920s saw a massive increase in demand for whale oil which saw the rapid growth of the industry; however, overproduction caused the market to collapse, and in 1931 an international convention for the regulation of whaling was established.

After the Second World War, scientific exploration of the Antarctic continent again increased. Fifty-five research stations were established as a result of the first International Geophysical Year (1957–1958). A third cycle of resource

extraction (modern fishing and whaling) led by Soviet, Chilean, and Japanese vessels began in the 1960s and continues today. Fishing below 60° South latitude is now regulated by the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).

Archaeology

The relatively recent exploration and settlement of the islands in the Southern Ocean and of the Antarctic continent itself, the rugged conditions, and the loss of many vessels have combined to create a rich maritime archaeological record which has only recently become the subject of archaeological investigation.

The archaeological remains from various sealing expeditions in the Southern Ocean and Antarctic have been investigated by researchers from Australia, Chile, South Africa, and New Zealand. This work has included the survey of sealing sites on Campbell Island (Palmer & Judd 1981), the Prince Edward Islands (Cooper & Avery 1986), and Kerguelen Island (Le Mouël 2004), while excavations have been undertaken on Auckland Island (Dingwall et al. 2009), Heard Island (Lazer & McGowan 1990), Macquarie Island (Townrow 1989), and the South Shetland Islands (Stehberg & Cabeza 1987). The transient nature of most sealing expeditions means that the archaeological remains from this industry are typically slight; however, the investigation of sealing sites in this area has covered not only the camps that the sealers used but also production and storage sites providing insights into both the domestic and industrial aspects of this industry. The majority of archaeological work directed toward sealing on these islands has been undertaken by government agencies in order to create inventories of historic sites and to gain sufficient information to make appropriate management recommendations for these sites. These surveys and excavations have also raised a number of academic questions including the role of sealing in the expansion of capitalism in the nineteenth century, the organization of the sealing industry, the technology and the international commercial networks, and the archaeology of communities in isolation.

Shore-based whaling sites have been investigated at a number of sites within the region. The earliest whaling station investigated is the 1850 Southern Whale Fishery Company's whaling station at Port Ross in the Auckland Islands. In 2003 a New Zealand Department of Conservation expedition to the Auckland Islands surveyed the remains of this settlement which at its height comprised some 30 buildings and around 200 colonists (Dingwall et al. 2009). This archaeological survey reconstructed from the surface evidence the general layout and many of the features of the settlement, providing insights into the character and composition of this failed colonial enterprise. Whaling stations from the early twentieth century have also been investigated including the Te Awaiti whaling station (1909) and Cook's whaling station (1911) on Campbell Island (Palmer & Judd 1981); the whaling station on Deception Island (1906) (Hacquebord 1992); the Jeanne d'Arc whaling station (1908) on Kerguelen Island (Le Mouël, 2004); and the whaling stations at Husvik (1910), Stromness (1912), Grytviken (1904), and Leith Harbour (1909) on South Georgia (Basberg 2004). The investigation of these sites has generally involved the recording of the above-ground evidence in order to establish the functions of the various parts of the whaling stations. At Kerguelen Island, archaeology accompanied the restoration of a number of buildings at the Jeanne d'Arc whaling station, while the whaling stations on South Georgia were investigated for their functional relationships to one another in an industrial archaeological context.

A notable component of the maritime archaeological record of the Southern Ocean and Antarctic is the presence of numerous shipwrecks which relate to all phases of the discovery and exploitation of the region. Despite the considerable number and importance of such archaeological sites, very few shipwrecks have been investigated in this region and no underwater archaeological investigations have yet taken place. In the Auckland Islands, 11 ships are historically recorded as being wrecked; only one of which has been the subject of archaeological

attention. The 56-t schooner *Grafton* was wrecked in 1864, and in 2003, a small section of the vessel's hull timbering, found above the tide mark, was recorded (Dingwall et al. 2009). The most famous Auckland Island shipwreck is that of *General Grant* which sank in 1866 reputedly with a cargo of gold bullion and as a result has been the target of many salvage expeditions, none of which have been successful in locating the wreck. Archaeologists however have had more success in recording the various castaway depots, boatsheds, and finger posts found throughout the Auckland Islands. In 2007, an expedition to Campbell Island mapped and took samples from two maritime artifacts described as most likely being from an unknown shipwreck that predated the known history of the island (Judd 2007). The subsequent report to the New Zealand Historic Places Trust outlined the possible origins for such material and stresses the need for further research of the maritime archaeology of the island. At least 12 shipwrecks are known to have occurred at Macquarie Island, none of which have been relocated. During an expedition to the island in 1988, archaeologists took 65 samples from exposed, partially buried and buried timbers from around the island including the remains of sealers huts (Townrow & Nash 1990). The analysis of these samples revealed that much of the timber excavated from sealers huts came from the remains of the ships wrecked around the island, providing insights into the postdepositional processes affecting these sites.

Archaeology on the Antarctic mainland began in the late 1960s with a focus on the conservation and preservation of huts and shelters associated with the Heroic Age of Exploration. A number of scholars have completed exceptional studies of aspects of Antarctic and Subantarctic maritime history, archaeology, and heritage assessment. For an overview of maritime sites located within the Antarctic regions, see Headland (2009). For a review of archaeology in Antarctica, see Harrowfield (2005). For current work, see the IPHC website.

Sea level change and coastal erosion provide opportunities for underwater recovery of materials associated with heroic expeditions. During the 2010 Mawson's Hut Foundation expedition, a combination of a low tide and receding ice revealed four fragments from the tail section of a Vickers REP Monoplane near Boat Harbour adjacent to Cape Denison. This "air tractor" was the first brought to the continent as part of the 1911–1914 Australian Antarctic Expedition. Mawson's Hut Foundation staff began surveying in 2008. Terrestrial ground-penetrating radar and magnetometer surveys were conducted in 2009 and 2010, and future investigation is planned (Henderson 2010; Lucas et al. 2011).

Key Issues/Current Debates

Key issues with maritime archaeology in the Southern Ocean and Antarctic regions are project funding and design, managed growth of cultural tourism, cultural heritage in relation to environmental protection, and interpretation of relevant legislation. To date, all proposed projects to survey for submerged shipwreck sites have been unsuccessful. In the 1990s, the University of Zaragoza and the Chilean Antarctic Institute attempted to fund underwater archaeological research to locate the shipwrecked vessel *San Telmo*, lost after reaching the Antarctic mainland in 1819 (Zarankin & Senatore 2005). Numerous private and public entities in Australia and the United Kingdom have attempted to fund expeditions to search for Shackleton's lost vessel *Endurance*. Expedition costs for Antarctic expeditions are well above the funding threshold for most humanities-related projects, and so far, no grants to fund underwater archaeology on the Antarctic continent have been successful. Private sponsorship has also failed to provide the funds needed to survey and recover materials from a Southern marine environment. With the introduction of research vessels such as the Australian CSIRO ship RV *Investigator* – which is rated to Southern oceans and can accommodate up to 40 scientists – more opportunities arise to "piggyback" a small maritime archaeological project on an existing Southern Ocean or Antarctic scientific voyage.

Cultural tourism in Antarctica is an ever-expanding market. The Antarctic mainland is a short two-hour flight from South America and cruise ships regularly run to the Subantarctic islands from Australia, NZ, and Argentina. General guidelines for Antarctic visitors (Resolution 3) were adopted at the 2011 Antarctic Treaty Consultative Meeting that recommends a "take only pictures, leave only bubbles" approach to terrestrial heritage tourism in polar regions. However, limited access as protection for maritime heritage located within polar regions should not be seen to stand alone as a viable method of in situ preservation. Cultural tourism in Antarctica is advised by the International Association of Antarctic Tour Operators (IAATO). Most heritage tourism operators place emphasis on a mix of heroic exploration and natural scenery; downplaying the role of whaling and sealing operations or addressing sites as relics of past negative behaviors (Basberg 2008). IAATO also regularly contributes to heritage funding projects.

Current interpretation of Annex III of the Madrid Protocol places emphasis on "cleanup" of the Antarctic environment. In certain cases, this can lead to negative impacts on the cultural heritage, a perception of artifacts as rubbish, and a need to include cultural resources as part of the environment (Pearson 2004; Evans 2007, 2011). In 2003 and 2004, vessels *Petrel*, *Dias*, and *Albatros* were refloated and emptied of oil, and *Dias* and *Albatros* beached as part of a major environmental cleanup at Grytviken, South Georgia; the station had previously been closed to tourism as a result of asbestos and oil concerns (Basberg 2004). Limited funds prevented further conservation or restoration; the vessels are now managed by the South Georgia Heritage Trust.

International Perspectives

Under the Antarctic Treaty System, the Antarctic continent is internationally legislated and managed. However, as with the islands in the Southern Ocean, all sites should be protected under relevant national legislation – as long as the claimant nation has adequate cultural heritage legislation. For example, all Australian Antarctic Territory (AAT) cultural heritage sites are protected under Commonwealth heritage legislation and the *Environment Protection and Biodiversity Conservation Act* (as amended 2003) which also require that conservation and management plans be drafted for heritage places. This would include submerged cultural heritage as protected under the Commonwealth *Historic Shipwrecks Act* 1976 or blanket protection to all shipwrecks over 75 years located within territorial waters up to the continental shelf.

Prior to UNCLOS, Antarctic territorial seas were only recognized to extend to three nautical miles from the coastline. Extension of territorial seas to the UNCLOS-defined territorial limit of 12 nautical miles *can* be seen as a violation of the Antarctic Treaty (although all claimant nations have since extended their territorial waters to the full 12-nm limit). Two hundred nm continental shelf claims were asserted by Australia and Chile prior to the Antarctic Treaty – although only Argentina and France have made post-treaty claims to further land. EEZs have been claimed by Australia, Argentina, and Chile, mostly for fisheries purposes. The EEZ extension was not recognized under international law until 1961 – after the ATS was formed and may also be considered a violation of the treaty. Exploitation of the "Area" (commonly used to define international waters) may be an issue as a result of overlapping territorial EEZ claims. If the Area begins at 60° South latitude, then all waters between this mark and the Antarctic convergence could be seen to fall outside the Antarctic Treaty area and relevant jurisdiction. Any cultural heritage sites located within this area may not be protected if there is no recognized EEZ claim.

Only nationals and their vessels are subject to laws mandated by their parent nation within "proclaimed waters" – as few of the other claimant nations or non-Treaty nations recognize

rival claims. The United States and Russia consistently deny that any nation has territorial rights to any portion of the Antarctic landmass – although both nations have established research stations in both claimed and unclaimed Antarctic territory. Argentina, Chile, and the United Kingdom have overlapping claims. Attempts to resolve this dispute in 1956 resulted in a stalemate – as both Argentina and Chile refused to acknowledge the jurisdiction of the International Court of Justice.

With unresolved overlapping claims in the balance, investigation of known and unknown submerged sites within Antarctic waters could become an issue – if territories with overlapping claims were to disagree as to dispensation of heritage materials. However, bilateral agreements are a possibility for the "common heritage of mankind" approach international exploration of submerged heritage in Antarctic waters, in line with the original aims of the ATS.

Future Directions

Recent research has shown that there is a high probability for locating shipwrecks in Antarctic waters. Some territory nations have oversight bodies in place: Australia, New Zealand, and the United Kingdom have programs in place (Antarctic Heritage Trust [NZ], Australian Antarctic Division, Antarctic Heritage Trust [UK]) while others do not – Argentina, Chile, France, and Norway. Of these, three have applied for funding to investigate shipwreck sites in Antarctic waters (*Aurora*'s anchor, *Endurance*, *San Telmo*), and all have instigated some heritage conservation programs and provided for management of maritime cultural sites (including whaling and sealing sites, shipwrecked timbers, and abandoned vessels) located on the mainland and associated islands. Strangely, what has yet to take place in Antarctica or the Subantarctic islands is the "traditional" maritime archaeological project – the full-scale investigation of a submerged shipwrecked vessel.

Standard archaeological best practice has moved away from full-scale excavation as a first option. However, Antarctic waters are an untapped resource, nominally protected, and provide an excellent opportunity to use current best practice to regulate future investigation of underwater cultural heritage. In 2010, a Parks Canada team located Arctic HMS *Investigator* – lost while searching for Franklin's exploration vessels *Erebus* and *Terror* – in Mercy Bay, offshore from the Aulavik National Park in the Arctic Ocean. Research conducted by Parks Canada at the HMS *Investigator* site demonstrates the feasibility of deep-ocean and diver-based shipwreck investigation in the polar regions (Parks Canada 2011).

Cross-References

- ► Antarctica: Historical Archaeology
- ► Arctic Ocean and Bering Sea: Maritime Archaeology
- ► Islamic and Maritime Archaeologies

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Southwest United States and Northwestern Mexico: Geography and Culture

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State of Knowledge and Current Debates

The Archaeological Southwest

The Southwest region (Fig. 1) reflects colonial history perhaps more than Native prehistory. The ancient Southwest is seen as a cultural "island" related to, but distant from Mesoamerican civilizations – much like colonial New Mexico vis-a-vis old Mexico. The ancient Southwest was "simpler" than Mesoamerican civilizations, avoiding their complicated political histories. In the received view, modern Pueblos tribes of Arizona and New Mexico are essentially unchanging; thus, Pueblo practices of the nineteenth century can be readily transposed onto ancient sites. That view of the Southwest was crafted in large part by American cultural entrepreneurs in the early twentieth century, building on the work of early archaeologists who sought to link exotic ruins (e.g., cliff dwellings) to modern Pueblos, rather than to vanished Aztecs (the then-popular view). *Continuity in isolation* underwrote Southwestern archaeology through most of the twentieth century.

It has become clear, however, that the ancient Southwest had a diverse and dynamic history, much like human history everywhere. This entry is based on *A History of the Ancient Southwest* (Lekson 2009), which presents a recent reading of that history. Due to editorial limits, detailed citations and extended arguments supporting this entry will be found in that volume. References here identify recent major synthetic works, some of which propose alternate readings of the ancient Southwest.

Southwestern archaeology has enjoyed remarkable investments of funds, energies,

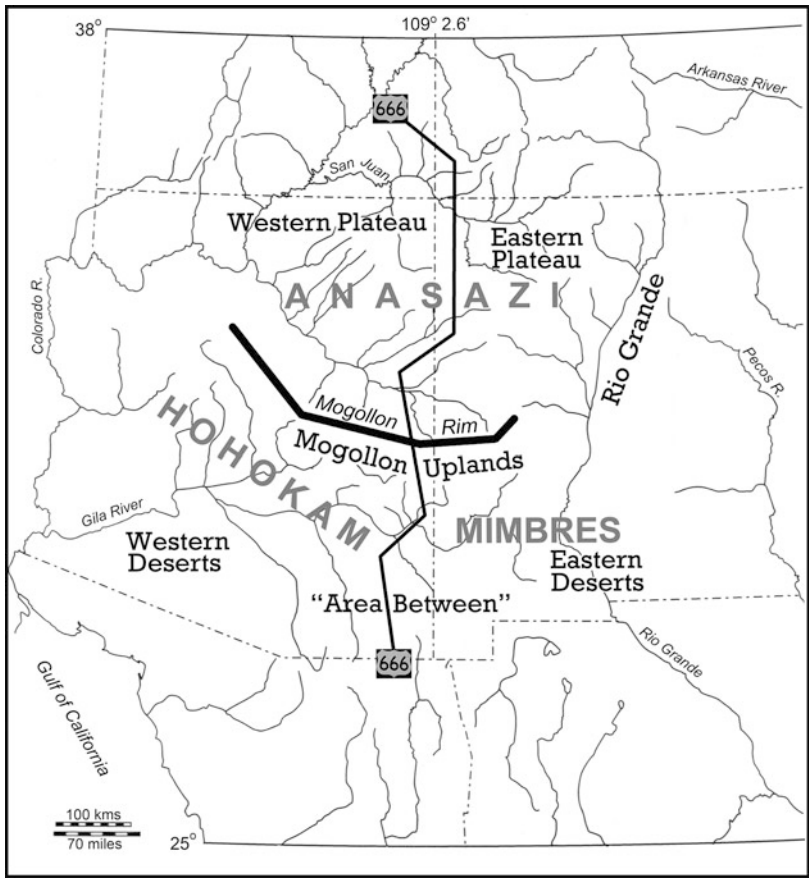

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 1 Map of the Southwest. Four quarters defined by the Mogollon Rim and old Highway 666, which approximates the Continental Divide. The northeastern and northwestern quarters correspond to Anasazi or Ancestral Pueblo; the southwestern quarter to Hohokam; the southeastern quarter to Mimbres Mogollon

talents, and public recognition for a relatively straightforward archaeology (Fowler 2000). Many sites remain clearly visible; preservation is generally excellent; and tree-ring dating provides cheap and accurate chronology. After 1960, large Cultural Resource Management (rescue) archaeology projects in the Hohokam and Anasazi regions have far surpassed academic research; CRM data are fundamental to our understanding of these areas (Roberts et al. 2004).

In recent years, archaeology has attempted to work more closely with indigenous Pueblo and other Native groups in the Southwest, with mixed results. Many collaborations are successful, but Native views of history are sometimes at odds with archaeological data. That conundrum confronts archaeology globally; the Southwest may be a place where these cultural and intellectual challenges can be usefully explored and, perhaps, resolved.

The Region and Its Nomenclature

Most of the Southwest is too dry for farming. Yet many areas were farmed, through chancy rainfall farming (aptly termed "dry farming"), or with more reliable canal irrigation from streams and rivers. The key subsistence crops included maize, beans, and squash; cotton was grown at lower elevations. Large game included elk, deer, pronghorn, mountain sheep and, on region's eastern boundary with the Great Plains, bison. Rabbits and small mammals were eaten, especially when large game resources were hunted out; and domesticated turkey substituted for game in some times and areas. Turkeys and dogs were the only domesticated animals.

Two geographic lines quarter the region (Fig. 1). An escarpment called the "Mogollon Rim" runs roughly from west to east, separating the higher Colorado Plateau (hereafter, Plateau) on the north from the lower Deserts to the south.

A line along old Highway 666 (and roughly approximating the Continental Divide) separates western and eastern Plateaus, and western and eastern Deserts.

Archaeological "cultures" correspond roughly to those quarters: Anasazi (or, Ancestral Pueblo) Culture developed on the Plateau, with significant differences east and west. The Western Desert corresponds to the Sonoran Desert and the Hohokam Culture, with its core in the Phoenix Basin. The Eastern Desert corresponds to the Chihuahuan Desert and two key Mogollon Culture districts, Mimbres and Casas Grandes. Upland Mogollon societies occupied the mountainous Rim.

The Early Agricultural Period (1500 BCE to CE 400)

Maize arrived from western Mesoamerica well before 2000 BCE (Staller et al. 2006). Maize spread rapidly through the four quarters of the Southwest, but the relatively small cobs of early maize did not transform the region (Vierra 2005). Five centuries passed before farming villages took root in the Western Deserts around 1500. New strains arrived, perhaps together with new people from the south, already committed to agriculture. It took special knowledge to grow maize – originally a tropical crop – and to adapt it to new settings. Irrigation was necessary as maize moved from wetter to drier climes. Desert farmers planted first in naturally wet bottomlands (*cienegas*) in the Eastern and Western Deserts. As favored settings filled, farmers created new fields by diverting water from streams through small ditches to terraces above the floodplain.

Knowledge of maize may have been embedded in social structures, ceremonial practices, political relationships, and languages: a Uto-Aztecan mother stock that later became Piman, Hopi, and other Southwestern languages (Hill 2006; see also Merrill et al. 2009). A chain of Uto-Aztecan-speaking groups linked the Western Deserts and West Mexico. Shared histories ensured that desert communities looked south throughout the following centuries.

The Early Agricultural period in the Southwest was part of a much larger, continental phenomenon: from Poverty Point in the lower Mississippi Valley to Olmec in Veracruz, North American was waking up. Villages in the Western Desert, by 1000 BCE, consisted of 20 or more small, shallow pit structures – family homes – around a plaza. Near the center of some villages stood a single large building, a place for community affairs. Defensive sites such as Cerro Juanaqueña (1250 BCE) – a large village on an impressively terraced and walled mountain in the Eastern Deserts – attest to frictions in the Early Agricultural period. Its massive terrace walls were the Southwest's first monumental construction.

Boom times in the Deserts: Uto-Aztecan speakers spilled up over the Mogollon Rim and on to the Plateau. The indigenous peoples of the Plateau – people (presumably) speaking languages that would become Zuni, Keres, and Tanoan – noticed the thriving villages around Tucson and the terraced mountain of Cerro Juanaqueña. Small canals were constructed around Zuni as early as 1000 BCE. But early maize did not prosper on the Plateau. When maize-based villages finally appeared on the Plateau, they probably owed much to the Western Deserts, perhaps a final push of Uto-Aztecan migrations around 500 BCE. The Western Desert people moved north onto the western Plateau, displacing Plateau natives to the east (LeBlanc 2002). The divide between the Uto-Aztecan west and the Zuni–Keres–Tanoan east cast long shadows. Many centuries later, hierarchical governments would rise in the east, among the "locals," but not among the peoples of the west, who harked back to different, desert ways.

Brownware pottery spread throughout both Deserts and the Plateau between CE 200 and 400. Its initial appearance, in the Deserts, may hark back to the South – there must have been constant comings and goings between the Deserts and West Mexico. A brownware "foundation" formed across the region, a craft shared among villages with different histories and backgrounds. After mastering the basics, potters invented techniques and created styles increasingly characteristic of each area. By CE 500, different traditions marked the Plateau (graywares), the Western

Desert (buffwares), and the Eastern Desert (brownwares).

Maize fueled southwestern civilizations, but in fact, the Southwest was a tough place to grow maize. Maize's failures were as important as its successes. The mismatch between maize and the Southwest played out in unequal production, agrarian tensions, droughts, famines, and – above all – the many measures, social and political, taken to support maize-based societies in blistering deserts. Most importantly: canal irrigation systems in the Western Desert. It is not so much that maize worked in the Southwest; it is that *they made it work* – most of the time.

Early Villages (CE 400 to 750)

By about CE 400, more than a millennium after farming villages first appeared in the Deserts, a few hundred small settlements flanked small steams, irrigating crops with small, simple ditches. Three short centuries later, the western deserts were crossed by a dozen massive canals systems – main canals 10 m wide and up to 30 km long, hundreds of distribution canals, intakes, drains, etc. – taking water from major rivers, the Salt and the Gila. Western Desert irrigation was the largest canal system in North America. Small farming villages grew to become very large towns. The remarkable increase in scale probably demanded new political structures, or perhaps new political structures allowed larger village sizes, or a bit of both. New political practices replaced the older, inclusive village-council level of governance.

New ways of living in the Southwest reflected, distantly, a new idea in North America: urbanism at Teotihuacán, far to the south. It was not the first Mesoamerican city but Teotihuacán was by far the greatest. Teotihuacán redefined the possible. No one in the Southwest had to "invent" villages, towns, or cities. Every wandering hunter-gatherer, far into the northern tundra, was at least dimly aware that people could live in densely packed, permanent cities.

The Desert farming villages succeeded and grew. Small, simple ditches got deeper and longer, bringing water out to upper terraces to meet the need for new farmlands. Irrigation – even on these modest levels – demanded centralized decision making, a few making decisions for the many. Around CE 500, at larger villages, a few prominent families with more lands, more wealth, and more power built notably larger residences ("Big Houses") which incorporated ritual features. A ring of multiple Big Houses were built around and immediately adjacent to the central plaza (Fig. 2). Other families built their smaller houses behind the inner circle of Big Houses, farther away from the plaza. The council houses of earlier times disappeared, their governance functions evidently shifting to Big House families. Importantly, the half-dozen Big Houses in each village appear to be equals: no one Big House bigger than the others.

Big House political power was modest, scaled to small, early ditches – insignificant by Mesoamerican measures. When irrigation tapped larger rivers – the Gila and the Salt rivers in the Phoenix Basin – the scope of decision making expanded exponentially. Canals got big and Big Houses got bigger, at towns/sites today called Snaketown, Grewe, and a score of others in the Phoenix Basin. Their spheres of interest and control surely expanded beyond farming and irrigation.

At Snaketown and Grewe, leaders legitimized themselves with exotic objects, badges of office: copper bells and other Mesoamerica regalia. Big House leaders may have traveled to the source, to western Mexico and Mesoamerica, returning with these impressive objects. It seems likely that people to the far south knew of the fertile farmlands, impressively irrigated, of the Western Deserts. People on the Plateau doubtless noticed too. Plateau villages of any size were few and far between and relatively impermanent – short lived and semi sedentary. Plateau farmers discovered that, unlike the Deserts, it was possible to farm away from streams, relying on precipitation: rainfall farming. Rainfall farming was risky, but it reshaped life on the Plateau, for both the Uto-Aztecans of the west and the local populations of the east. The two groups were increasingly difficult to tell apart, but the old divisions remained in language and history.

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 2 Community House at Las Capas, Early Agricultural Period site, near Tucson AZ

Plateau peoples had not yet developed centralized political institutions. Decisions were probably made in a large community or council house: the "Great Kiva." Great Kivas were round chambers, often roofed but sometimes not, and big enough for representatives of families or clans to meet and make decisions, presumably in the context of ritual.

Unlike Desert farming, tied to canal systems, rainfall farming required no investment in infrastructure and therefore no commitment to any particular place. Rainfall varied from year to year and place to place. Groups moved often, on cycles of a generation or less – a fluidity that discouraged political leadership.

Yet, in the end, leaders put themselves forward. Perhaps inspired by desert Big House elites, ambitious Plateau families apparently decided to try it too. In the Deserts, political leaders lived in Big Houses prestigiously near the plaza. And at a few Plateau villages around 500 – such as the remarkably large Shabik'eschee site in Chaco Canyon – the first attempts at political leadership appeared as exceptionally large pit houses, built near the village center and the Great Kiva – much like Desert Big Houses.

Big House-manqué elites at Shabik'eschee and other Plateau villages were not needed to control and coordinate canal systems. Indeed, they may not have been *needed* for any economic or agricultural reasons. Tensions between the eastern and western Plateau may have promoted political leadership. Remarkable things – perhaps alarming things – were happening in Western Deserts, marked by Big House elites. Western Plateau villages had historical and linguistic ties to the deserts. But the East did not. Eastern Plateau societies might have needed (or accepted) tighter organization, but political leadership did not "take" on the Plateau. Unlike canal communities of the deserts, Plateau families – if annoyed by would-be leaders – could simply leave, move to a better or at least different place. Rainfall was equally spotty everywhere. If a leader became obnoxious, the led could leave.

It was different in the Deserts. People were tied to canals – the investment in infrastructure created true sedentism. Canals were essential for farming, so leaving was not an option. Consequently, Desert towns got bigger and bigger; towns in both Western and Eastern Deserts spanned centuries, compared to a generation or two on the Plateau.

Canals on the Salt and Gila rivers created a breadbasket, the richest farming economy in the Southwest. The confluence of those two rivers

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 3 Ball court at Wupatki, near Flagstaff AZ

was the setting, a thousand years later, of the modern city of Phoenix – which "rose from the ashes" of the ruins of the earlier Desert civilization. Phoenix had maize adapted to irrigation, long-growing seasons, abundant water from the rivers, canal technologies to capture that water, and a Big House political system to make it all work. Deserts farming economies needed leadership. Phoenix at 700 was a civilization waiting to happen. The region was primed to produce the food surpluses needed to fuel great things: kings, empires, whatever. But Big House rulers did not become kings. Desert civilizations took a different path.

Hohokam (CE 750 to 900)

Hohokam, as a set of practices, began around 700 perhaps with another wave of people, or a new wave of ideas from western Mesoamerica, drawn by the thriving irrigated farmlands of Phoenix. The ideology united many groups – newcomers, long-settled migrants, and converted locals. It was a supra-governmental or anti-governmental or instead-of-governmental ideology that united large areas and many (perhaps ethnically distinct) people, and got big things done – all without kings.

In the Phoenix core of the Western Deserts, Hohokam presented new ways of life manifested as oval, earthen ball courts (Fig. 3), elaborate (but largely democratic) cremation burial rituals, bold new styles of art, and, apparently, decision-making structures that disguised or diffused political power (Gumerman 1991; Fish and Fish 2007). As at Teotihuacán (but on a far smaller scale), individual political leaders in Big Houses were replaced by a government of bureaus and committees – in the guise, perhaps, of priesthoods and councils. For a few brilliant centuries, Hohokam ideologies allowed an enormous, elaborate irrigation economy without evident centralized political power – and propelled a remarkable cultural explosion out from Phoenix and across the deserts.

Some elements of what became Hohokam already existed in the deserts, part of the continuous interchange from the deserts to western coastal Mexico and back again. Some parts of Hohokam were endemic, local developments. But the key elements were new to the Deserts, introduced almost certainly from the south. Hohokam ideologies replaced and overshadowed conventional Big House leadership (which remained for few more centuries at the village level).

It seems fair to say that people *became* Hohokam. Perhaps the most conspicuous and widespread markers of Hohokam were bracelets or more likely armlets of *Glycimeris* shell. Bivalve shells from the Gulf of California were

carefully shaped into armlets and sometimes carved with symbols – birds carrying snakes, desert toads, and the like. They had once been rarities, but after 700, they were ubiquitous. People in every sizable settlement had this badge of membership prominently displayed on an upper arm.

Inward-facing clusters of three or four shallow pit houses, around a small courtyard, formed the typical home – in both the Western Deserts and in northern Mesoamerica. A dozen or two dozen courtyard clusters were grouped into small neighborhoods or "village segments." Multiple neighborhoods encircled a large plaza which, as in earlier periods, marked the center or core of the villages. Ball courts displaced Big Houses as the iconic architecture, the key monument. Not *re*placed: Big Houses and their elite families continued, but their leadership functions were transferred, apparently, to another arena. The whole village could witness the ball "game" that (as in Mesoamerica) probably played out political issues, territorial dilemmas, and difficult decisions. Each village of sufficient size had a ball court; large villages had two, usually at the edge of town, away from the old central plaza (Wilcox 1991).

Around the central plaza was a ring of low earthen mounds, usually round or oval. Mounds were architecture: A site was selected, fill was brought in and sculpted to shape, and a smooth plaster surface applied. Might these be Big Houses, elevated? No evidence has been found of houses atop these mounds, but most have been trenched as "trash mounds," not excavated as architecture. But, on the evidence, these mounds were not residential. They were relatively low – waist-high, well below the peaked roofs of surrounding houses. These low mounds supported ceremonies and small presentations, presumably performed for comparatively large audiences. The village could view actions or performances atop the mound's elevation, like a stage. Mounds were inclusive; events that would be restricted in the old community house or private in Big Houses were now public.

Hohokam did not emphasize elite individuals or families. Not a return to village councils – Hohokam society was probably far too large and complex for that – but rather a decentralized, inclusive stew of ritual, power, and decision making. Individuals surely had power, but they did not flaunt it with Big Houses, palaces, or tombs. Whatever Hohokam was, it controlled individual political ambitions and curtailed social stratification and hierarchy.

To the south, it was a time of kings and nobles – the Epi-Classic, and the beginning of an age of city-state polities (*altepetl,* in Nahua) and, later, empires. The fall of Teotihuacán (about 550/600) sent ripples – tsunamis – of political power outward, ruling houses looking for places to rule (Nelson 2000). Displaced noble families transformed towns throughout Mesoamerica into small city-states. The aftershocks of Teotihuacán's fall reached the Pacific Coast with the temple-towns of the Aztatlan horizon and reached the very northernmost frontiers of Mesoamerica at La Quemada.

Petty chiefs and Big House leaders must have been tempted to emulate southern kings. As Mesoamerican polities popped up nearer and nearer to home, they provided models of hierarchy. Hohokam apparently rejected seventh- and eighth-century Mesoamerican political models – while using a wide range of Mesoamerican forms and symbols.

For almost three centuries, Hohokam worked. More than worked: Hohokam prospered and expanded – exploded – out from Phoenix in one of the most remarkable events in the history of the ancient Southwest. Ball courts, distinctive pottery, and burial rituals pushed rapidly upstream, up to the very edges of the Plateau. Surprisingly, Hohokam did not go far downstream, stopping at Gila Bend a short distance west of Phoenix.

By 900, there were hints of hierarchy not within but between and among towns, with the largest occupying positions of control at the heads of canal systems. A geographic pecking order emerged. The very largest towns, such as Snaketown, Grewe, and Aztatlan, had the very largest ball courts.

One of the largest ball courts was built at Pueblo Viejo, high up the Gila River, 250 km east of Phoenix. Beyond Pueblo Viejo, Hohokam

elements reached deep into the Mimbres region of the Eastern Deserts, where mountain streams flowed out of the Mogollon highlands into the Chihuahuan Desert (Nelson & Hegmon 2010). Mimbres settlements were initially less permanent than the villages of Western Deserts. Pit house groups moved from one valley to the next, allowing depleted soils, hunted-out game, and gallery forests to replenish and regrow. It was a successful way of life – so successful that rising numbers filled the valleys.

Like the Hohokam societies of the Western Desert, Mimbres farmers dug ditches to water their fields. They almost certainly learned the tricks of irrigation from Hohokam, but Mimbres canals were modest compared to the huge Phoenix systems. Mimbres accepted, selectively, Hohokam beliefs: cremation burial (for some), ideologically charged naturalistic designs on pottery, and – conspicuously – Hohokam *Glycimeris* armlets. Not every Mimbres person wore them, but some were buried with dozens.

Canals pinned Mimbres villages in place. Pit houses, which had a fairly short use-life, stacked up (insofar as pit structures can stack). Newer houses cut into older abandoned structures. Some villages grew large, with several scores of houses – untroubled, it seems, by hierarchy (Hegmon 2002). Much like Hohokam, Mimbres ideologies discouraged conspicuous leadership. Mimbres, however, did not accept the whole Hohokam package; ball courts, essential to Hohokam, were absent. Instead, Great Kivas (a form shared with Plateau pithouse villages) held communities together, serving some of the purposes that ball courts played for Hohokam.

Hohokam reached as far north as east. Western Plateau peoples and Phoenix shared linguistic and historical connections – so deep (by this time) to perhaps be mythical. Hohokam ball courts were built far north in the western Plateau, in the dormant volcanic fields west of Hopi.

With increasingly sophisticated knowledge of land and maize (and decades of favorable weather), Plateau populations grew and villages got larger (Reed 2000). Over generations, people became accustomed to the structures and strictures of village life. They had to: There were fewer open valleys, fewer places to start over – and, thus, more possibilities for hierarchical leadership. Inter-village squabbles escalated after 700, reaching levels approaching warfare by 850. Increasing violence called for leaders, to lead or to avoid war.

Over the short term, shifting rainfall favored some areas over others. In the ninth century, rains fell on the great Sage Plains, northwest of Mesa Verde and population concentrated there. Towns expanded, and lasted longer (Lipe et al. 1999; Noble 2006). There, ambitious families built the first Big Houses on the Plateau since the false start at Shabik'eschee, three centuries before.

Basic house forms had changed, somewhat, since the pit houses of Shabik'eschee. Plateau peoples now used more stone masonry in their architectural repertoire. Behind the pit structure (which remained the primary living space), they added a small masonry building of a half-dozen low rooms used mainly for storage. With food and gear housed safely above, the pit structure itself could be smaller and easier to heat. That combination – six rooms and a pit structure – became the standard for Plateau housing (and a clear contrast to the courtyard homes of the Western Deserts). The new, ninth- and tenth-century Big Houses used that same form: six rooms and a pit house modules, built *really* big: *Great Houses*.

Great Houses – Big Houses by another name – were essentially residences, built on the same ground plan as other houses, but larger, more substantial, and built with greater craft and care. Just like the early Big Houses of the Western Deserts, Plateau Great Houses combined secular and ritual architecture in conspicuous, even (modestly) monumental elite residences. Both Desert Big Houses and Plateau Great Houses were, importantly, *houses* – *not* public facilities like ball courts or Great Kivas.

Great Kivas – the people's council chambers – continued to be built, especially in villages evidently lacking Great House elites. One village might have a Great Kiva but no Great House. Another might have a notable Great House but no Great Kiva. Often both were present but at some distance apart. It seems likely that

Great Kivas were buildings of the people, while Great Houses were buildings of elites.

Great Houses eventually appeared over much of the Eastern Plateau. The Western Plateau stayed out of it, for a while. In western villages, homes were often jammed together in long rows. Each home was essentially identical to the next. Those villages often (usually?) had Great Kivas. Eastern villages were more dispersed, with clusters of freestanding homes or scattered short segments of three or four conjoined homes. Large settlements had scores of these separate housing segments and one or more Great Houses – and no Great Kiva. The people were architecturally fragmented, without a common hall or communal center. Looming over them, the Great House offered the coherence and regulation needed, perhaps, for village life.

Plateau peoples still moved, shifting villages as they had for centuries, but in larger groups and longer cycles than in earlier times. Rising violence urged safety in numbers. Elite lineages – noble families – probably emerged as important families maintained their status from old village to new village, from one generation to the next. They may have begun to think it was their right, or their duty, to rule.

Chaco (CE 900 to 1150)

The decades from 900 to 1150 were momentous in North America. Three centuries of uncertainty and reorganization that followed Teotihuacán's fall ended with the rise of Tula and the beginning of Mesoamerica's Post-Classic Period (950–1500; Smith & Berdan 2003), an era of small polities and long-distance interactions. Mesoamerica was dotted with hundreds of city-states. Short-lived "empires" encompassed multiple city-states, but not until the Aztecs (in the Late Post-Classic) was empire-building truly successful. Yet the Early Post-Classic was notable for long-distance trade and interaction – ideologically charged "international" styles of pottery and architecture that linked cities that are a thousand kilometer apart. In eastern North America, the great city of Cahokia urbanized the middle Mississippi Valley and set the course for subsequent political history, much as Teotihuacán had set the agenda for Mesoamerican urbanism five centuries before. Cahokia was larger than most Post-Classic Mesoamerican cities.

On the Plateau, Great House families had several generations to become accustomed to their status and duties – not unlike Mesoamerican noble families. Great House families moved south of the San Juan River and into Chaco Canyon. Perhaps Chaco was simply the last empty, isolated valley. Perhaps Great House leaders saw themselves as the heirs of Shabik'eschee. At any rate, the people who promoted Great Houses at Dolores and Blue Mesa – their direct descendants or their spiritual heirs – built three Great Houses in Chaco Canyon by 900. Unlike earlier, short-lived Great Houses, these lasted. After a century-long germination, Chaco burst forth to dominate the Plateau from 1020 to 1125 (Noble 2004; Lekson 2006).

Pueblo Bonito was the largest Chaco Great House, a giant "D"-shaped building with massive sandstone masonry walls standing up to five stories tall. Its 600-plus rooms and enclosed plaza covered almost one hectare. It appears that perhaps a dozen or so families (presumably extended families) lived at Pueblo Bonito. They were very important families: elite or noble families. And much of the building was not residential, as was the case at most Great Houses. Chaco's Great Houses were in part elite residences and in part monuments. Eventually, eight major Great Houses were built at Chaco, presumably representing eight elite or noble lineages. Planning, coordination, and labor rivaled Phoenix canals. There was an important difference between Desert canals and Plateau Great Houses: Canals delineated an economy; Great Houses manifested an ideology of power.

Great House families lived privileged lives. They probably did not farm or hunt – maize and meat were brought into Chaco. They probably did not make pottery or chip arrowheads or grind maize. Those too were imported into the canyon. They probably traveled far to the south (almost certainly to Mimbres and very likely to western Mexico and Mesoamerica) and brought back macaws, metals, cacao, and other wonders (see, e.g., Crown & Hurst 2009). When they

died, they were buried with pomp and ritual in the oldest parts of the building (Akins 1986; Plog & Heitman 2010), becoming part of its history. Great Houses were the houses of generations of elites – noble families of the Plateau. Or so they might have seen themselves, modeling their polity on the Mesoamerican *altepetl* – or city-state, the ubiquitous political formation in Mesoamerica during Chaco's era, translated into Plateau idioms, architectures, and cosmologies.

With the rise of noble families at Chaco, the people found themselves redefined as commoners. Villages with dozens of separate individual homes – six rooms and a pit house – dotted the landscape. Set on a low hill or prominence above the village stood a small, secondary Great House, and off among the commoners' homes a Great Kiva – the traditional community center of the people. The two forms coexisted, perhaps uneasily, throughout Chaco's reign.

Chaco created a degree of political integration over most of the Plateau, offering economic and political security. Escalating inter-village violence ended with Chaco's rise (LeBlanc 1999). And there was the fact of the Hohokam. Plateau peoples must have known of the remarkable Hohokam expansion of 750–900. Western Plateau peoples shared (distantly) a language with the Desert civilization. Eastern Plateau peoples remembered the earlier Uto-Aztecan expansion onto the Western Plateau. On some level, Chaco itself may have been a geopolitical response to Hohokam.

Chaco's success was in part a gift of geography and climate. Chaco Canyon itself was a dry and cheerless place, unfit for extensive agriculture, but it was central to a ring of villages, 80–150 km from the capital, around the better-watered margins of what would become Chaco's interior region. Chaco, from its beginnings, served as a center for the interior region, evening out the short-term agricultural problems of surrounding villages. Bulk goods – building timbers, pottery, maize – moved freely within that 150-km radius. Many things came to Chaco and stayed there, in the service of the elites. Maize moved into and through the canyon, perhaps from places that had plenty to places that had none.

Chaco's influence soon reached far beyond that original region. Colony or copy Great Houses popped up, up to 250 km away. Local leaders almost everywhere on the Plateau joined with or deferred to Chaco. And it worked – ultimately, about 150 second-tier Great Houses marked Chaco's greater region (Kanter 2003). They represented local, second-tier elites or noble families who undoubtedly acknowledged and visited Chaco, perhaps regularly, on a network of "roads" radiating out from, and in to Chaco Canyon.

Chaco Canyon itself was decidedly top-heavy – a city of palaces – but the tip of the social pyramid was in fact rather small: perhaps a thousand or fifteen hundred elites. And the pyramid had a broad base: tens of thousands of commoners across the wide Plateau. At a guess, commoners numbered perhaps 40 or 50,000, about the same size as a Mesoamerican city-state, but spread over a much larger region.

As Chaco waxed, Hohokam waned. The high water mark in the deserts came between 900 and 1050; on the Plateau between 1020 and 1250. In the decades after 1000, Hohokam's remarkable expansion reversed and shrank back in on the Phoenix Basin. The hallmarks of Hohokam civilization – ball courts, shell insignia, elaborate cremation burials, low mounds, and (most importantly) polity without kings – continued into the early 1100s, but the energy was gone. Most ball courts fell out of use. Hohokam fragmented into multiple local polities. Phoenix and Tucson went separate and unequal ways.

Even in decline, Hohokam remained far more impressive as an economic landscape than Chaco – or anything else, then or thereafter, on the Plateau or the Rio Grande. The canal systems continued to expand, bringing more of the desert under cultivation. Each canal system was apparently independent, with key social dynamics among multiple settlements strung along the same canal. A dozen independent "irrigation communities" emerged within the Phoenix Basin, and the Hohokam ideology ensured that power was diffused within those communities. Hohokam political life – and social life – was relentlessly modular (Abbott 2000).

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 4 Mimbres Black-on-white bowl, c. CE 1050. UCM 9366 (Courtesy University of Colorado Museum of Natural History)

Population in the Phoenix towns increased, less from local growth than from in-migration into Phoenix. Thousands of people retreated from the edges of the Hohokam world back into the heartland. The demographic implosion accelerated through CE 1300 (Abbott 2003). With all those new people, the farmlands of Phoenix were perhaps reaching their limits.

Mimbres, in the Eastern Deserts, registered the shift from Desert to the Plateau, like a weather vane swinging to the winds. Mimbres pit house villages once looked west to Hohokam; after 1000, they looked north to Chaco. Pit houses were quickly replaced by small masonry homes of a half-dozen rooms, not unlike the Plateau house form, and spectacular black-on-white pottery (Fig. 4) (Hegmon 2002; Shafer 2003). Something like Great Houses, 400 km from Chaco, were built at a few villages, with much larger rooms, more formal layouts, and more massive masonry than was customary in Mimbres pueblos.

Would-be Great House elites never took hold. Through a remarkable combination of old Hohokam ideologies, new Plateau forms, an influx of Mesoamerican ideas, and their own local genius, Mimbres people developed new ways of living that allowed for large towns, complicated canal systems, and interactions with the Chaco world – but that avoided Chaco's hierarchies and political complications.

Going around Hohokam, Mimbres villages evidently established direct trade relations, over the Sierra Madre, with western Mexico and perhaps even the Aztatlan cities of Mexico's Pacific Coast. Mimbres had a straight shot down the east flanks of the mountains to the Post-Classic states of central Mexico.

Mimbres middlemen supplied Plateau rulers. Long-distance trade shifted from the Pacific side of the Sierra Madre to the inland side. Inland routes pioneered by Mimbres reached their fullest expression with the rise, two centuries later, of Paquimé.

Chaco prospered. Then, 300 km west of Chaco Canyon in the western Plateau, a wonderful awful thing happened. A volcano erupted, at the northernmost edge of the Hohokam world and westernmost reaches of Chaco. Sunset Crater was a small volcano, but it was spectacular (Elson 2003; Downum 2012). Its plume of fire was visible from highpoints on the Eastern Plateau – possibly from Chaco – and from Phoenix. The volcano became an important place, perhaps more important than Chaco Canyon.

An extraordinary collection of structures and monuments converged at the volcano's flank, at a safe distance: Wupatki. The place was known to Chaco; a small Great House there preceded the eruption by perhaps a decade. After the eruption, a larger Great House rose after 1135. (By then, Chaco was gone and Aztec Ruins was ascendant on the Plateau.) Wupatki had elaborate turquoise artifacts, macaws, and Mesoamerican objects that rivaled Chaco and eclipsed Aztec. And more: at Wupatki, a Great Kiva was built next to a large masonry-walled Hohokam ball court, perhaps the last ball courts ever built. Chaco and Hohokam met, at last, under the volcano. But by 1135, when Wupatki was built, Hohokam was greatly diminished and Chaco Canyon was at its end.

Chaco ended with political strife. The orientations of major Great Houses marked two competing cosmologies. The old, original worldview (of 850 and perhaps even earlier) was represented by a loose southeastern (solstitial?) alignment. A newer, tighter north–south (cardinal?)

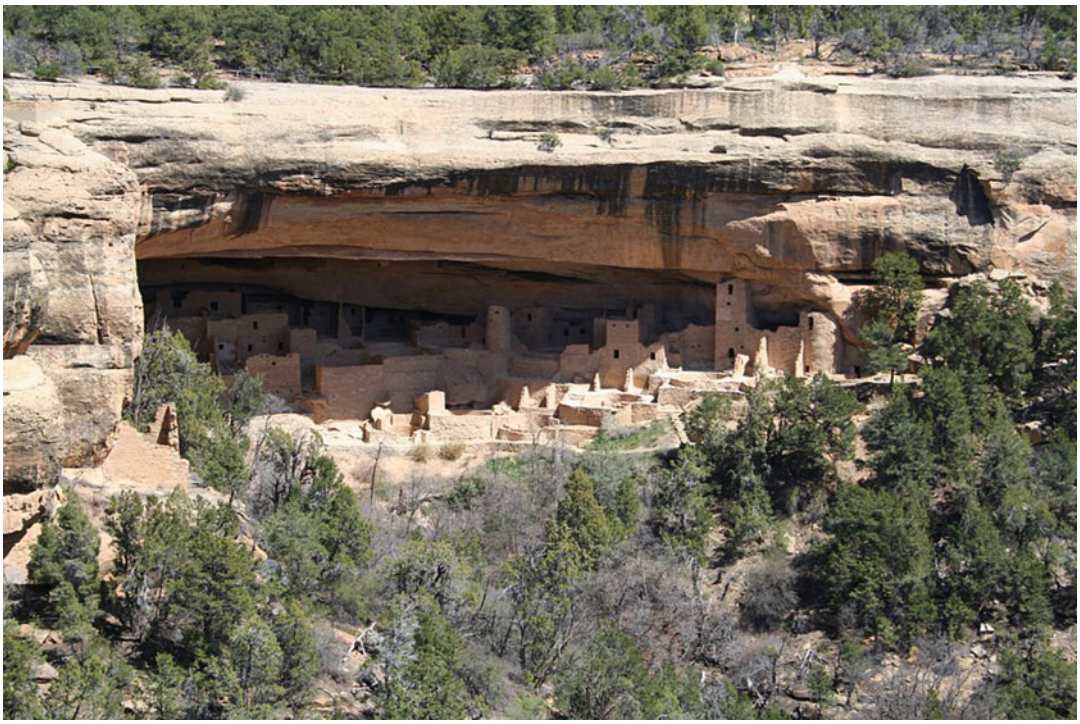

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 5 Cliff Palace, Mesa Verde CO

cosmology was introduced at several Great Houses around 1020. A crisis may have come around 1070, with the construction of a new capital far to the north at Aztec Ruins. The location of the new Chaco was fixed by cardinal direction: due north, up the Great North Road, to the San Juan River. About 1110 construction began at Aztec Ruins. Its plan was profoundly solstitial. It seems that the cardinal party prevailed in the location of the new capital, but the solstitial bloc determined the new capital's form and cosmic vision. The cardinal noble families quite possibly turned away from Aztec, and reversed directions, going south (Lekson 1999).

Retrenchment and Reorganization (CE 1150 to 1300)

The cosmological schism – manifest as solstitial versus cardinal – had real political consequences. Aztec was, literally, only half the capital that Chaco had been (Lekson 1999). And its region was reduced to less than half of Chaco's. Aztec's polity, however, included Mesa Verde and, more importantly, the densely settled Great Sage Plains of southwestern Colorado (Noble 2006; Lipe et al. 1999; Varien and Wilshusen 2002).

Things that worked at Chaco failed at Aztec. The new capital was unable to keep the peace or to bring the rain, as Chaco had done. A major drought hit from 1135 to 1180 – a drought, while Wupatki flourished! A second burst of monumental construction at Aztec marked a brief rebound. But by about 1250, rainfall became erratic and unpredictable. Violence spun out of control. Farmsteads – previously scattered freely among their fields – clustered into large, walled towns or huddled together in alcoves high on the cliffs of Mesa Verde (Fig. 5), defensive patterns seen across the Plateau (Adler 1996).

To enforce its failing rule, Aztec unleashed lethal force (Turner & Turner 1999). At farmsteads, squads of warriors fell upon families failing in their tributary duties. Men, women, and

children were brutally and publicly killed and left to rot, unburied, in the ruins of their homes. But even terror could not hold together.

It was a classic case of unintended consequences. Aztec's use of force apparently drove away already-wavering groups. Beginning as early as 1220 (decades before the "Great Drought" of 1275–1300), villages began leaving Aztec's troubled region. Movement and relocation had always been typical, but within the confines of the Plateau. Now, people moved farther, setting off cascades that rippled out from the Plateau into the Deserts.

Aztec and its region were abandoned, an exodus of tens of thousands of people, complete and permanent, seldom paralleled in human history. A final "Great Drought" from 1275 to 1300 was merely the final punctuation on a story already told – most people were already gone. Only a few of their descendants returned as pilgrims praying over ancestors, never to reestablish villages or farms.

Most who left the Plateau went to the southern fringes of Chaco, the regions of modern pueblos: Hopi, Zuni, Acoma, Laguna, and the many towns of the Rio Grande, spiking Pueblo populations around 1325 (Adams & Duff 2004). Some went farther: whole villages relocated far to the south in the East and West Deserts. In the west, Mogollon pueblos and Hohokam towns grudgingly accepted newcomers. Migrants sometimes settled atop defensive buttes and mesas. A generation later, they were joined by more people from the north, following paths into the upper Gila and the Salt drainages. These newcomers integrated into fading Hohokam societies – on their own terms.

The old order passed. Chacoan nobles, perhaps, and Chacoan ideas of hierarchy survived Chaco and Aztec's fall. Chaco lineages in the deepest south (beyond Acoma and Zuni) maintained their status decades after Chaco removed to distant Aztec. Perhaps, to commoners, Chaco was always a remote, near-mythical place – Rome to an ancient Pict, Jerusalem to a medieval serf. In any event, southern elites kept up appearances, brooding in their Great Houses on hills above their towns. The second wave of immigrants – who knew what was really happening up north and wanted no more Great Houses – drove those relic elites out, and south.

Authority vanished, refugees arrived, and violence ensued. Two centuries of Chacoan peace ended after 1175. Fighting quickly escalated to village-on-village warfare. As in the Mesa Verde region, scattered farmsteads clustered into larger and larger villages. But unlike those in the north, southern villages were not hodgepodge affairs. They were carefully planned, with the organizing principles of Chacoan architecture applied to thousand-room pueblos, with tall perimeter walls laid out as precise squares and circles. Homes in-filled those geometric spaces in a jumble; but within those impressive walls, no single house was "great." From the Rio Grande on the east to the mountains of central Arizona on the west, aggregated towns employed elements of Chacoan planning but rejected Chaco-style ruling elites.

We do not know the fates of the northernmost elites – the lords of Aztec and their allies. Not all who died in the violence of the thirteenth century were commoners. What of the southern Great House leaders, elites, and noble families around Zuni and Acoma? Their lives were disrupted first by the end of Chaco, then by the fall of distant Aztec, and finally by a popular movement – literally a migration – away from hierarchy and toward a new social order. Some elites surely converted; many moved. North – a region and direction of ill omen – was no longer possible. There was no one left to rule. To the south, Hohokam beckoned from the deserts – a civilization without kings.

The causes of warfare on the Plateau did not obtain in the Deserts, but refugees from the violence brought the means and perhaps the disposition. The revival of defensive *trincheras* communities (massively terraced hills) in the twelfth and thirteenth centuries reflects cracks in the tottering Hohokam edifice. For many generations, Hohokam ideologies supported diffuse governance, collaboration, cooperation – at least, no obvious rulers. Desert dwellers lacked clear leaders who could react quickly and decisively. Hohokam institutions could not turn the

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 6 Curtis Site platform mound, near Gila Bend AZ

violence spilling out of the Plateau – or displaced Plateau noble families looking for someplace to rule.

Architecture tells the tale. For centuries, Hohokam homes were loosely clustered in small courtyard groups, and those groups into open neighborhoods. The pervasive modularity of these units reflected the nonhierarchical nature of Hohokam society. By about 1150, the modular house clusters were replaced by adobe walled "compounds": enclosing pueblo-like houses built of puddled adobe. In marked contrast to the open house clusters, compounds were closed, rigid, exclusive spaces. That architectural development (inspired at least in part by Plateau building traditions) marked the breakdown of the old Hohokam way of life (Fish & Fish 2007).

Ball courts – the *sine qua non* of Hohokam – were replaced, around 1150, by platform mounds (Fig. 6). The old courts were not leveled or razed; they were simply forsaken, left open and unused. The contrast between the sunken surfaces of ball courts and the raised surfaces of platforms was a clear indication of new ways of doing business.

Nor could platforms be confused, architecturally, with the earlier Hohokam mounds. In contrast to the low, rounded mounds – which had served as stages for public viewing of ceremonies and rituals – the new platform mounds were large, tall, sheer-sided, and sharply rectangular structures. Some platforms – square, massive, controlling – were built directly over earlier low mounds, making a statement. The height of the platforms lifted their upper surfaces (and the buildings and activities they supported) far above the people. People below could see figures only at the platform's edge – criers, priests, those who reported, ordered, and communicated. Events at the center of the platform were effectively screened from public view. Priests and leaders did their work above and beyond ordinary people's reach. Platforms were the architectural antithesis of both earlier low mounds and ball courts – both of which allowed many to see the activity or performance. Platforms paralleled the shift from open courtyard groups to closed compounds. Something had changed in Hohokam thinking. Indeed, "Hohokam," as a suite of beliefs and practices, effectively ended.

Hohokam fell apart just as Plateau populations spilled into the deserts, into the upper reaches of the Gila River and Salt River. On the upper Salt River (and perhaps elsewhere), massively walled, small, rectangular masonry buildings were built in existing towns. They had no precedent in the deserts – perhaps distant variations on the Great House theme? But the desert peoples did not want Great Houses. Tonto Basin quasi–Great Houses

were quickly converted into rectangular platform mounds – filled with rocks and capped with a flat adobe surface. The old Hohokam world, for at least a few decades, fended off Plateau adventurers and displaced nobility.

While Hohokam shifted shape, Mimbres went through parallel changes. It was probably no coincidence that when Chaco's move to Aztec was complete and construction at the old center ceased around 1130, Mimbres societies rejected, completely, the ideological and political forms that had held them together for a century. The change was sudden and complete – as if someone had thrown a switch. Once-bustling Mimbres towns emptied. Mimbres pottery – for a century, the focus of intense artistic energies, depicting scenes of myth and history – became anti-designs: black, burnished interiors, dimly reflecting the viewer's eyes and nothing more. The people formerly known as Mimbres changed how they built their homes – from stone masonry to puddle adobe, usually at new towns some distance removed from the old pueblos. Many Mimbres people moved up into the hills and declined; others probably moved north and joined the big towns around Zuni and Acoma (see also Gregory & Wilcox 2007). But most Mimbres apparently moved south, out of their valleys and into the desert.

New adobe towns with black burnished pottery were built where there were no permanent streams – just dry desert channels. With no streams, there were no canals. It is not entirely clear how people supported themselves – at small cienegas, perhaps, a throwback to the very earliest farming villages. These short-lived post-Mimbres settlements skipped from valley to valley in a fast-tempo dance. When the music stopped, around 1250, many probably came to rest in the valley of the Rio Casas Grandes, 100 km south of the Mimbres Valley. They apparently became part of the base population, the commoners of the Southwest's last and greatest city, Paquimé.

Not only a push from the north, but a draw to the south: the Middle Post-Classic of Mesoamerica (Smith & Berdan 2003). Tula fell by about 1150. The implications of that fall are a matter of debate: truly momentous or merely legendary? In any event, with Tula's end, the Post-Classic pattern came into focus in vibrant clarity: expansive politics, long-distance dynamics, power plays and upheavals, and a swirling world of migrations, invasions, expulsions, and fragmentation into even more small city-states. That was the world the Southwest knew, of which it was a part.

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 7 White Mountain Redware, c. CE 1350. UCM 9634 (Courtesy University of Colorado Museum of Natural History)

Paquimé (CE 1250 to 1450)

The influx of migrants fleeing the troubled north strained the existing Pueblo communities at Hopi, Zuni, Acoma, and the Rio Grande. Violence flared. Wars broke out, with villages sacking other villages. Larger towns were safer but – without rulers – inherently unstable and often split apart. How to hold together big towns? Native histories suggest that no one wanted the kind of leaders who had created cities like Chaco and Aztec. New ideologies rose and old ideologies were revived to replace political power with ritual authority. The explosion of ideas is reflected in art. The older, Chaco-era, grimly geometric black-on-white pottery gave way to a polychrome revolution. Unprecedented pigments, dynamic symmetries, and new icons mirrored changes in worldview and cosmology (Fig. 7). Images of kachinas and new

supernaturals bloomed on pottery and rock art like flowers after rain (Schaafsma 1994, 2007; VanPool et al. 2006). After several centuries of experiments – competing cults and cures – the foundations of modern Puebloan society emerged from the crucible of post-Chaco chaos: communal, egalitarian, ritually based, purposefully antihierarchical.

Chaco faded to a (bad) memory. For many Pueblos, Chaco and Aztec became White House, remembered as a great city led by rulers who, improperly, had power over other people. White House was a lesson: It came to a bad end, with violence, famine, and forced migration. For Navajo people who lived later in those same lands, Chaco was remembered as a place where a kinglike ruler – neither Navajo nor Pueblo – enslaved all the peoples of the region and forced them to build palatial homes for his family. In this history, the people rose up and overthrew the tyrannical rule.

New town plans and new iconography reflected new ways of living. But the larger picture remained grim. Regionally, population began to fall sharply after 1300 and continued to fall for several centuries. Paradoxically, fewer and fewer people jammed into bigger and bigger towns (Adams & Duff 2004). Several towns might group into a defensive alliance or cluster. Clustering put safe distances between battered populations – de facto demilitarized zones. The frequency of violent incidents declined, but not their severity. Wars still raged between villages, between clusters.

The Plateau's trouble accelerated Hohokam's transformation, but on the opposite tack – away from faceless bureaucracies and toward more visible hierarchy (Fish & Fish 2007). Large areas within the old Hohokam sphere emptied as people retreated back into Phoenix, taxing the diminishing productivity of those long-farmed lands (Abbott 2003). At the largest Phoenix towns, health suffered. Most babies died; those who survived died young. The old Hohokam way of life was gone, the intricate web of beliefs abandoned or discredited. New forms of governance were needed to stem the downward spiral.

Out on the margins of the old Hohokam world, there were out-of-work rulers: Great House nobles pushed off the Plateau. In the upper Gila and the Tonto Basin, local people had earlier rejected Great Houses, filling their rooms with rocks and rubble and converting them to platform mounds. Would-be rulers, either from the north or inspired by the north, riposted by building new houses – Great Houses – atop those same platforms. Great Houses rose from platform mounds along the Desert–Plateau borderlands, and soon after in the Phoenix heartland and the Tucson Basin. Elites had come to the deserts.

Just as platform mounds were built over earlier low mounds, Great Houses atop platform mounds were a blunt architectural statement, a stratigraphy of power. Pima people who live today amid the empty ball courts and eroding mounds of Phoenix and Tucson recall in their histories the elites who lived atop platforms. They were foreigners, even supernatural – certainly not Piman. They came into the heartlands and imposed their rule, tyrannical and oppressive. But the new regime could not reverse the social and economic decline. The people suffered under these rulers for a time and then rose in revolt. They went from platform mound to platform mound, killing the kings. The Pima stories ring true. Something like a class revolt toppled the new governments.

The drought of 1135–1180 marked the end of Chaco. The Great Drought of 1275–1300 closed the book on Aztec. The Phoenix Basin's bitter end was punctuated by huge floods on the Salt River in 1357–1359 and again in 1381–1384 (Graybill et al. 2006). Equally disastrous floods hit the Gila River in 1420. These floods destroyed the canal systems. After centuries of decline, the heartlands were unlivable.

Plateau and Pueblo peoples took themselves out of the Post-Classic world. One Eastern Desert, society more closely engaged the south. Paquimé rose on the Rio Casas Grandes, in the southern Eastern Deserts, while Pueblos jelled and Hohokam fell. Prior to Paquimé, the Casas Grandes Valley had been a quiet backwater with a scattering of pit house villages (for another view, see Whalen & Minnis 2001, 2009) – the

southern margin of the densely populated Mimbres region.

A century later, by 1250, the Mimbres valleys were empty and the Rio Casas Grandes teemed with people – in large part Mimbres peoples, shifted south through a string of short-lived desert town. They knew the Casas Grandes Valley and would have recognized that it was perfect for irrigation, but in their desert hegira, they probably lost the technical skills to tap the large river. The remarkable ideologies that had united Mimbres villages for major public works, such as canals, had been left behind, dramatically rejected a century before. If large populations were to live on the Rio Casas Grandes, major irrigation would have to be grafted into the valley – lock, stock, and barrel.

New towns on the Rio Casas Grandes surely sought help from the West, perhaps from experts fleeing Phoenix. But Hohokam canal irrigation was an intricate balance of enormous public works administered by deliberately diffuse governance, fine-tuned to Phoenix Basin societies. It might be possible to transfer technology, but not that administrative culture (even then on the skids in its homelands). Neither Hohokam nor Mimbres had traditions and institutions of strong central leadership. In the Southwest, Chaco (and its successor, Aztec) had those skills. Chacoan elites knew how to get big things built. They dug canals at Aztec Ruins, their final Plateau capital. And the heirs of Chaco and Aztec Ruins nobility – or at least its cardinal factions – were conveniently available.

Pueblo histories tell us that, after the fall of White House, the people were instructed to go south, (in part) to find macaws. Most stopped at Acoma, Zuni, and other pueblos. But others continued straight south beyond the arc of modern pueblos, in search of macaws (we are told). If they continued south, they probably proceeded through the empty Mimbres Valley, once Chaco's source for macaws and other regalia (Lekson 1999).

Native peoples in southern Chihuahua told Spanish conquistadors of two large groups coming into the region from the north, led by two brothers. The brothers found an old hag perched on a huge iron boulder. At this omen, one brother stopped to found a city. The second brother and his people continued south. An exceptionally large, boulder-sized iron meteorite was found at Paquimé. Was that the omen? Paquimé became a famous breeder of macaws, on commercial scales.

The people who became the modern Pueblos voted with their feet against hierarchy – by moving away from Aztec and by *not* moving on to Paquimé. But many northerners joined the journey to the south. The late thirteenth/early fourteenth century saw extraordinary population increase in Chihuahua – a combination of local populations, Mimbres migrants, Plateau northerners, and other peoples attracted to the new city from south and west. The region became one of the most densely settled areas in the Southwest. Paquimé was a new and brilliant city (Fig. 8) (Di Peso 1974).

Many architectural and organizational details – for example, the verticality of multistoried Great Houses – recalled Chaco, Aztec, and the now fabled cities of the north. Paquimé was constructed of poured adobe, a desert technology adopted by Mimbres people in their wanderings after they had ceased being Mimbres. Adobe was a poor fabric for Paquimé's towering five-story walls. Form trumped function – or, rather, symbolism trumped compressive strength. The city was an aggregate of separate, multistoried compounds, each the scale of an old Chaco Great House. The compounds were palatial – expansive and expensive and filled with treasures. Around the urban core were platform mounds and masonry pyramids, at least three I-shaped masonry ball courts (direct copies of Mesoamerican models, not the peculiarly Hohokam earthen ovals), and, most remarkably, monumental effigy mounds, unique in the Southwest. At least two of these, a four-armed cross and a long north–south snake, commemorated cardinality.

Paquimé was more closely tied to Mesoamerica – both west and central – than any previous southwestern polity. Architectural forms – colonnades, ball courts, and (modest) pyramids – and astonishing quantities of

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 8 Paquimé (aka Casas Grandes) in northern Chihuahua, Mexico

ideologically charged Mesoamerican objects far surpassed Chaco, Mimbres, and Hohokam. While all three southwestern traditions played parts in Paquimé, the city's leaders redefined (or refined) themselves as truly Mesoamerican nobility – not Chaco's wannabes. Southern objects and architecture were no longer simply props or window dressing, reinterpreted in local contexts for local politics.

Paquimé and Phoenix were "peer polities" – one on the way up, the other on the way down. Paquimé undercut Hohokam's commerce. The Plateau's demographic center of gravity shifted dramatically east to the Rio Grande (Adams & Duff 2004; Kohler 2004; Powers 2005; Schaafsma 2007), well away from Hohokam's established trading circuits, but a straight shot north for Paquimé. Phoenix's western sphere was reduced to Hopi – its linguistic cousin – and a dozen large but short-lived towns in the Mogollon uplands that soon were abandoned, one after the other. Paquimé had an up market and Phoenix did not. By 1450, little was left of Hohokam's earlier glories, save stories and histories.

Pueblos and Others (CE 1450 to 1600)

Paquimé fell, sacked by unknown parties shortly after 1450, the last episode in the political history of the Southwest. The densely populated Casas Grandes region emptied. Some may have gone to Hopi or other Pueblos, but many survivors did not return to the north. They probably went west over the mountains to the Rio Sonora, or followed factions gone south centuries earlier. The people who came out of Casas Grandes could not have been the Mexica Aztecs, who founded their empire in 1427. Rather, southwestern peoples were sub-currents in a vast swirl of migrations, mostly north to south, which created a complex patchwork of northern and western Mesoamerican societies later conquered by Spain.

Population continued to plummet over the entire Southwest. The number of towns decreased. Whole districts were depopulated. Scores of towns – big towns! – in the Western Deserts, in the Mogollon uplands, and along the southern Rio Grande were abandoned a century before Spanish conquistadors entered the region in 1540.

The Pueblos from Hopi to Taos absorbed new peoples, not always of the same language or history. The unsettled social conditions must have tempted Pueblos (and Pueblo individuals) to reassert a degree of political authority, to bring order out of chaos. There are hints, even today, of that kind of authority in Rio Grande Pueblos. But the bitter lessons of Chaco and Aztec were still fresh. After 1300, Pueblos avoided political hierarchy and suppressed would-be leaders

through a complex mesh of ritual and social practices. In one researcher's words, they "defeated hierarchy" (Mills 2004).

The fifteenth century saw renewed trade with Mexico, almost certainly tied to the fall of Paquimé, which had controlled inland trade routes. Turquoise was still much in demand in Late Post-Classic Mesoamerica. The eastern Pueblos also forged economic connections to and across southern Plains groups (Adams & Duff 2004).

The people who would become Navajos and Apaches arrived from the north, after the fall of Chaco and probably after the end of Aztec – but not long after. Athabaskan speakers may well have been on the Plateau during Aztec's reign. Navajo clans have detailed knowledge of the times and places of the ancient Plateau cities.

Piman peoples recovered slowly from the final, tumultuous centuries of Hohokam and their rebellion against the platform mound rulers. It would take deserts many years to rebound from centuries of intense canal irrigation, overhunting and overgathering, and the depletion of firewood and other resources. Before they could revive completely, Europe arrived.

Coronado's army entered the deserts in 1540, looking for cities of gold. The memory of a rich, urban Southwest lived on in the stories of Mesoamerican traders. Traders guided conquistadors into what should have been the new Mexico. The stories were true: There had been cities, rich cities. But the Spaniards came a century too late for Paquimé and the Phoenix Basin, two centuries too late for Aztec and Chaco. The pueblos they found were nothing like cities: no gold, no wealth, no commerce, no kings. Discouraged, the conquistadors returned to Old Mexico. Sixty years later, Don Juan de Oñate returned with colonists seeking not cities but farmlands and metals. They stayed. Not without incident of course: Native revolts, political revolutions, Yankee invasions, and all the alarms and excursions of modern history.

The history of the ancient Southwest ends at 1600. After 1600, the Southwest was no longer Native, no longer aboriginal, no longer "ancient." Native people remained, of course, and their stories continued in the face of crushing colonization.

Key Issues in Southwestern Archaeology

Recent research has greatly clarified Chaco (e.g., Lekson 2006) and Hohokam (e.g., Fish & Fish 2007) – two key episodes in Southwestern archaeology. The nature of Hohokam governance pre-1150 remains enigmatic; indeed, what was "Hohokam," as a cluster of beliefs and practices? A horizon of great importance recently emerged with the Early Agricultural Period (Vierra 2005). Agricultural societies (we once thought) began around CE 200 in the Deserts and CE 500 on the Plateau, but now we know that farming towns began a millennium earlier in the Deserts. Equally important are new research and new understandings of the Casas Grandes region in the Chihuahua Desert. In an understudied area, interpretations vary remarkably. One school sees Paquimé (Casas Grandes) as relatively small and local (e.g., Whalen & Minnis 2001, 2009); another school follows the site's original excavator (Di Peso 1974), emphasizing Paquime's role in the larger Post-Classic world (Riley 2005; Lekson 2006). Early Agriculture and Paquimé "book-end" Southwestern prehistory: the first farming villages and the last great city. While many other key questions remain in the Southwest, Early Agriculture and Paquimé stand out as epochal events – as yet, far from fully understood.

Cross-References

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- ▶ Mesa Verde
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- ▶ North American Plains: Geography and Culture
- ▶ Pueblo Bonito

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Basic Biographical Information

Prof. M.A. Sowunmi (nee Jadesimi) is known to many as both a botanist and an environmental archaeologist. But it is in palynology that she is a household name in Nigeria. In fact she is the country's foremost palynologist and environmental archaeologist (archaeobotanist).

Prof. M.A. Sowunmi was born on September 24, 1939, in Kano, Northern Nigeria, where her father, Revd (later bishop), had been posted to pastor the northern province of the Church of Nigeria (Anglican Communion). The young 'Bisi was admitted into the Department of Botany, University College Ibadan (now University of Ibadan) in October 1959 and graduated B.Sc. (Special Botany) (Lond.) in June 1962. She was awarded a University of Ibadan Postgraduate Scholarship in October 1963 to undertake Ph. D. research work in palynology. At that time, because palynology was not taught in Nigeria, 'Bisi had to be sent abroad. So in April 1964 she travelled to Stockholm, Sweden, and spent six months studying palynology in the laboratory of Prof. Gunnar Erdtman, the *Father of Modern Palynology* (Sowunmi 2004). Her Ph.D. work was supervised by Prof. Erdtman. On July 27, 1967, M. Adebisi Sowunmi earned a Ph.D. (botany) degree from the University of Ibadan. She thus became the first Nigerian to obtain such a degree.

In December 1967, at the instance of Prof. Thurstan Shaw, the doyen of archaeology in Nigeria, she was appointed as a postdoctoral research fellow at the Archaeology Unit of the Institute of African Studies, University of Ibadan; she held this position until his unfortunate death in 2006. When she became a lecturer in the newly created Department of Archaeology (now Archaeology and Anthropology), University of

Ibadan. She became Professor of Palynology and Environmental Archaeology in October 1982 and officially retired from the University of Ibadan in 2004, having attained the statutory age of 65 years.

Prof Adebisi Sowunmi was a visiting professor at the Department of African Archaeology, Uppsala University, Sweden, from October 1 to December 23, 1997, and visiting professor at the Institute of Archaeology, University College London, England (January 4 to March 23, 1998). Between April and June 1998, she was a visiting professor at the Departments of African Archaeology and African Archaeobotany, Johann Wolfgang Goethe-Universität, Frankfurt am Main, Germany. She has travelled to at least 23 countries to attend scientific conferences, meetings, and workshops. She is a member of several international organizations, such as the Archaeological Association of Nigeria (member, Board of Trustees), Palynological Association of Nigeria (Foundation and current President), Science Association of Nigeria (life member), West African Archaeological Association (past president), World Archaeological Congress, International Association of African Palynology, Nigerian Environmental Study/Action Team, and the Nigerian Field Society. Prof. Sowunmi has published 31 scholarly papers in scientific journals, four books, ten chapters in books, and six technical reports and delivered over 30 public lectures and conference papers.

Major Accomplishments

Prof. M. Adebisi Sowunmi, having been awarded a postgraduate scholarship by the University of Ibadan (1963–1967), became the first person to earn a Ph.D. degree in Botany from the University of Ibadan, Ibadan, Nigeria. She pioneered the paleo-ethnobotanical and environmental archaeology research in Nigeria and the university palynological research with the setting up in 1971 of the first Nigerian University Palynology Laboratory. The laboratory contains over 3,600 reference pollen slides of present-day Nigerian and some other West African plants; albums of original descriptions, hand-drawn diagrams, and photomicrographs of the pollen grains important Nigerian plants; and 151 overhead transparencies covering various topics in palynology, Nigerian and West African archaeology, and environmental archaeology. Prof Sowunmi supervised the second Ph.D. in botany (palynology) and the first Nigerian Ph.D. in environmental archaeology (with Dr Phillip Allsworth-Jones) in 1981 and 1991, respectively.

She (with Kogbe, C.A.) was the first to indicate the age and paleoenvironment of the Gwandu Formation (Continental Terminal), Northwestern Nigeria. With two others she produced the first descriptions of some Eocene pollen of the Ogwashi-Asaba Formation, Southeastern Nigeria. She published the first paper on the Late Quaternary vegetation and environmental history of Nigeria and the pollen morphology of extant Nigerian plants which are ecological indicators. Prof. Sowunmi also carried out the first pollen analysis of honey from the forest and savanna zones of Nigeria, obtained the first botanical evidence of the beginning of agriculture in Nigeria, made the first pollen analysis of an archaeological site in Nigeria (with E.O. Awosina), and indicated the relevance of archaeology in national development.

In January 2003, M.A. Sowunmi was conferred with an honorary Doctor of Philosophy degree in the Humanities by Uppsala University, Uppsala, Sweden, in recognition of her outstanding scholarship and contributions in research and teaching in the fields of environmental archaeology and paleobotany (Sowunmi 2012). In July 2005, she was one of the keynote speakers (long-term and short-term socio-environmental dynamics in West Africa: the challenge of environmental archaeology) at the Pan African Association for Prehistory and Related Studies Conference, Gaborone, Botswana.

During her academic career at the University of Ibadan, she produced seven Ph.D.s and over 20 M.Sc.s. She was involved in the supervision of Ph.D.s in the Department of Archaeology and Anthropology, University of Ibadan, from 2007 till February 2013. Prof. Sowunmi returned to teaching, being an adjunct lecturer for one undergraduate course, three M.Sc. courses, and the

supervision of two M.Sc. research projects in the Botany Department, University of Ibadan. It is of common knowledge that Sowunmi is a feminist (Folorunso 2004) and has a high degree of intolerance for indolence. She is reputed to be an exceptionally thorough and effective teacher (Egunyomi 2004). At Ibadan and elsewhere, she has taught palynology, paleobotany, environmental archaeology, and ethnobotany. She is revered as the Matriarch of Nigerian Palynology and preaches that to be a good palynologist, one must think, dream, and feel pollen.

Prof Bisi Sowunmi's husband was late Prof. Segun Sowunmi, and they have three children and one grandchild.

Cross-References

- ▶ Archaeobotany
- ▶ West and Central Africa: Historical Archaeology

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Space Archaeology

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Introduction

Space archaeology is the study of the material culture associated with space exploration from the twentieth century onwards. This includes terrestrial infrastructure related to the development, manufacturing, operation, and use of space systems, spacecraft and space debris located throughout the solar system and the landing sites of robotic and crewed missions on other planets and celestial bodies. Space archaeology sits within the field known as "archaeology of the contemporary past."

The era of modern rocketry, which created the first real capacity to break free of Earth's gravity, had its roots in the amateur rocket societies of the first half of the twentieth century. In World War II (1939–1945), Germany developed missiles capable of reaching other continents and, hence, also capable of reaching space. The V2 rocket drew on the expertise of the amateur rocketeers such as Wernher von Braun, and following the war, a diaspora of German rocket scientists and materials seeded the space industries of the nascent spacefaring nations.

Four rocket test and launch sites were established in 1947: White Sands (USA), Woomera (UK/Australia), Kapustin Yar (USSR/Kazakhstan), and Colomb-Béchar (France/Algeria). While these were all military sites, the first satellite launches occurred against the backdrop of international cooperation for the International Geophysical Year of 1957–1958. In 1957, the USSR successfully injected the aluminum sphere Sputnik 1 into Low Earth Orbit. Within the emerging Cold War, the demonstration of superior ideology through space technology became a central feature.

Within six years, the rapid growth of technology enabled the USA to launch the first telecommunications satellite into geostationary orbit, about 35,000 km above the Earth. This ushered in the era of modern telecommunications. Telephone and television were now able to achieve global coverage using just three satellites, as predicted by legendary science fiction writer Sir Arthur C. Clarke in 1945. The "space club" expanded as more nations across the world began to develop their own industries, as both suppliers and consumers of space services.

The landing of humans on the Moon in 1969 captured the imagination of the world.

However, this remarkable achievement had less impact on terrestrial life than the developing industries of telecommunications, navigation, meteorology, and Earth observation, provided by an ever-evolving population of satellites in Earth orbit and their ground infrastructure. Nonetheless, the series of Apollo lunar landings between 1969 and 1972 made humans active agents in shaping an interplanetary cultural landscape (Gorman 2005a).

With over 7,000 spacecraft launched since 1957, there is a growing population of space hardware in the solar system, with most of it located in Earth orbit. In the twenty-first century, private and commercial space enterprises are in the ascendancy, and space tourism is poised to become a major industry. The study of this distinct technology and its social correlates has the potential to offer new insights into contemporary life on Earth.

A Brief History of Space Archaeology

Turning the archaeological gaze on space exploration is far from a recent development. In 1967, historical archaeologist James Deetz suggested that one day archaeologists would look at spaceships as part of the archaeological record. In the late 1990s, William Rathje (1999) extended his investigation of the role of garbage in contemporary human society to include orbital debris. Around the same time, NASA funded the Lunar Legacy Project, for which Beth Laura O'Leary (2009) and her team created an archaeological inventory of the Tranquility Base lunar landing site, where humans first set foot on another celestial body in 1969.

The first decade of the new millennium saw interest in space archaeology gain momentum. Gregory Fewer (2002) explored issues surrounding the protection of historic planetary landing sites on the Moon and Mars, proposing a system of heritage listing. Alice Gorman (2005a, b, 2009a), in her study of orbital debris, proposed a cultural landscape approach to space and applied the Burra Charter (1999) heritage management guidelines to spacecraft in orbit in order to understand their cultural significance. She also highlighted the impacts of space industry on Indigenous people through the location of launch sites on their lands, configuring launch sites such as Woomera and Kourou in French Guiana as places of cultural contact and exchange. Robotic landing sites on Mars were considered by Dirk Spenneman (Spennemann & Murphy 2009). The *Handbook of Space Engineering, Archaeology, and Heritage* (Darrin & O'Leary 2009) provides a comprehensive overview of the entire field.

With India and China planning human missions to the Moon, determining appropriate management strategies for Tranquility Base became more urgent, and O'Leary and others spearheaded a successful campaign in 2010 to have artifacts at the site registered at state level in the USA, preparatory to a nomination for the World Heritage List. In 2011, NASA responded to the growing awareness of lunar heritage issues by creating a set of guidelines for future missions. Both the World Archaeological Congress (WAC) and the International Council on Monuments and Sites (ICOMOS) have recognized that space heritage is a distinct area requiring consideration.

Definition

Characterizing the Archaeological Record in Space and Time

Space archaeology deals with human physical and material interactions with microgravity, technology, and interplanetary environments. Gravity regimes very different to those on Earth have a profound structuring effect on the distribution of space artifacts throughout the solar system. The material of space archaeology could be divided into several zones, all connected to the surface of the Earth through launch and tracking sites:

- Earth (terrestrial infrastructure, terrestrial and marine orbital debris reentry sites)
- Earth orbit (Low Earth Orbit, Medium Earth Orbit, geosynchronous and geostationary orbit, Molniya orbit, Sun-synchronous orbit, and various others)
- Cislunar space (the region of space between the Earth's atmosphere and the Moon)
- Lunar orbit and surface

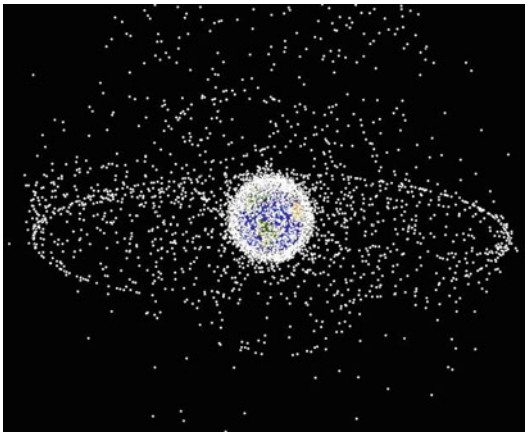

Space Archaeology, Fig. 1 Orbital debris (Image courtesy of NASA)

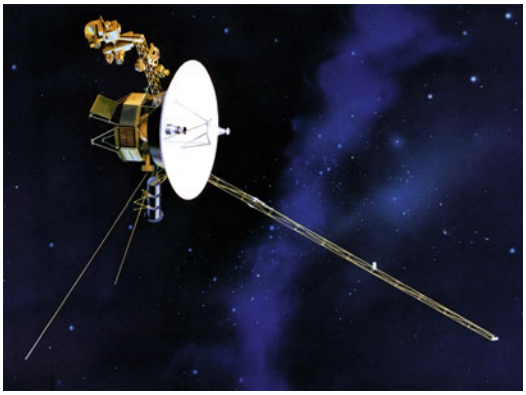

Space Archaeology, Fig. 2 Voyager 2, launched in 1977 by the USA (Image courtesy of NASA)

Space Archaeology, Fig. 3 Antenna pylons at the former Orroral Valley NASA tracking station, Australia (Author's image)

- Heliocentric orbit (around the Sun)
- Venusian orbit and surface
- Martian orbit and surface
- Miscellaneous orbital, landing, and encounter sites
- Interplanetary space

The Earth orbits are most dense in material, with over 19,000 trackable spacecraft and pieces of debris, from Low Earth Orbit up to the "graveyard" orbit above 35,000 km (Fig. 1). This debris includes the Vanguard 1 satellite, launched in 1958 and now the oldest human object in space. Gorman (2005a, b) has argued that orbital debris forms an organically evolved cultural landscape with value in its own right. In doing this, she has proposed a new frame of reference for archaeology, structured by gravity, rather than the traditional division into terrestrial and celestial spheres (Gorman 2009b).

In the rest of the solar system, human material is present on the Moon, Mars, Venus, Titan (a moon of Saturn), two asteroids and a comet, and in orbit around most celestial bodies (Capelotti 2010). Of particular significance are the Martian, Venusian, and lunar sites where crewed or robotic missions have landed. Tranquility Base on the Moon, with its iconic astronaut bootprints, can be compared to the Paleolithic footprints of *Australopithecus afarensis* in volcanic tuff at Laetoli in Tanzania: both can be argued to represent evidence of major evolutionary turning points. At the farthest reaches of the solar system, there are four spacecraft, only two of which are in communication (Voyager 1 and 2; Fig. 2).

The distance from the Earth creates requirements for the ground segments, in terms of their location on Earth and the types of receiving and command antennas. The technology of spacecraft is inseparable from the infrastructure required to send and receive signals, so neither can be studied in isolation. Many early generations of launch and tracking sites are now abandoned, such as the Colomb-Béchar launch site in Algeria and the Orroral Valley tracking station in Australia (Fig. 3), overtaken by changing technology and politics. There are a myriad of satellites which are

no longer functioning and other defunct spacecraft, such as rocket bodies, in Earth orbit.

Early Cold War launch sites are also frequently associated with nuclear testing, as this requires similar infrastructure and environmental conditions. In Australia, the USA, the Pacific, and other places, many of these sites are now abandoned. Rockets were originally developed as nuclear warhead-bearing missiles, and early satellites were ideological weapons in the Cold War, as Gorman and O'Leary (2007) have argued. The Cold War (1945–1991) can be regarded as the first stage of the Space Age, encompassing the "Space Race" and the "conquest" of space as matters of national prestige.

While launch sites tend to be distributed among the spacefaring states (e.g., USA, Russia, Europe, India, China, Japan) and their colonies, most countries have some level of space infrastructure, and all are now users of space-based services. Most nations maintain satellite downlink facilities, even if only at the level of domestic satellite dishes and telephones (Gorman 2009a). The cultural footprint of satellite data can also be considered as the domain of space archaeology. This is particularly so in the period from 1991 until the present, the second stage of the Space Age, when space activities are driven by the telecommunications requirements of globalized economies.

Commercial and private space enterprises, including tourism, are likely to characterize the next phase of space activities. We can expect new forms of propulsion and new ways in which humans relate to technology. They will not arise sui generis: they will be built on the "heritage" of past space activities. Nevertheless, one can imagine a time when the spacecraft of the twenty-first century appear as quaint and outdated as a horse and cart or a biplane. Considering space exploration as an expression of cultural change invites and inspires long-term visions of the future.

Key Issues/Current Debates/Future Directions/Examples

Methods, Theories, and Applications

Space archaeology employs the same methods as historical and industrial archaeology in using survey, excavation, artifact analysis, oral history, documentary research, aerial imagery, and geographical information systems (GIS) to characterize and analyze material remains and landscapes. However, specialist knowledge in areas such as electronics, propulsion systems, telecommunications, aerospace engineering, materials science, and planetary science is required in order to recognize and record features of significance. A limitation is that usually sites and objects in orbit and on celestial bodies can only be accessed by remote sensing, and there is much that is unknown about what actually survives in these locations. Several space agencies and organizations track debris in Earth orbit within the limits of their observation and modelling capacities. Reconnaissance missions have located and filmed previous landing sites on the Moon and Mars. Less frequented parts of the solar system can only be speculated about.

Studying the material record of the contemporary past presents some unique challenges. Because we are immersed in it, we may not be the best judges of what is significant and what is not: we are implicated in the ideologies of our time and place. Theorists of contemporary archaeology speak of the necessity of making the familiar unfamiliar. Techniques used to do this often trespass into the realm of the artist, using juxtaposition, montage, performance, and changes of scale to bring into focus objects and the relationships between them that are normally obscured. Another method of historical and contemporary archaeology is the use of oral history and personal narratives to augment and stand alongside the physical material. Frequently, there is a disjunction between individual memories and knowledge and the published or officially sanctioned histories. In these gaps, we can discern something about human engagement with the contemporary past and the social memories constructed around high technology.

A significant application of space archaeology is in heritage and environmental management. While remoteness has, in the past, protected many space sites from human impacts, this is rapidly changing. For example, the level of orbital debris has now reached a critical point

where it threatens functioning satellites, and plans are being devised to remove or destroy portions of it, while renewed interest in lunar, Martian, and Venusian exploration raises the question of how sites such as Tranquility Base can be best managed. Creating an inventory of space sites, landscapes, and objects and assessing their cultural significance prior to impacts arising from orbital debris cleanup, future missions, and space tourism is a priority for space archaeologists.

The Dublin Principles for the Conservation of Industrial Heritage Sites, Structures, Areas, and Landscapes (ICOMOS and the International Committee for the Conservation of the Industrial Heritage or TICCIH) provide some guidance here. The principles stress the interconnectedness of industrial places across multiple sites, from the extraction of raw materials to the systems of energy and transport. This is particularly applicable to space, where a single strand of operation can span the distance from Earth to orbit and back again across, for example, tracking stations, satellites, and downlinks. To conserve this heritage, inventories of all physical and intangible elements, including documents, objects, and landscapes, need to be made.

Since its inception, space exploration has tended to be the province of industrial elites and has been dominated by the USA and the former USSR. However, given the agenda of historical archaeology to uncover the lives of those often overlooked in official histories, such as women, working classes, ethnic minorities, and Indigenous people, an archaeological approach to space exploration has the potential to tell very different stories than those captured in the popular account of the "Space Race." For example, Indigenous people were frequently contributors to the success of space exploration through the forced surrender of their lands for launch sites, in a form of late industrial colonialism. Rocket launch sites can be conceived as places where ongoing cross-cultural engagements and tight security requirements structured new types of cultural landscape.

In turning a lens on the contemporary or recent past, space archaeology can illuminate aspects of twentieth- and twenty-first-century human existence. Despite a general public lack of awareness of their dependency on satellite-based services such as PNT (Position, Navigation, and Timing), the capacity for global telecommunications and Earth observation has transformed personal experiences of space and time, cultural transmission and hybridization, and national and transnational economies. While it is common for historians, economists, and other scholars of the contemporary world to analyze the movement of information and capital and their cultural consequences, few acknowledge the role that the *material* culture of space plays in enabling these late industrial transformations. In this regard space archaeology intersects with Science and Technology Studies (STS) and Social Construction of Technology (SCOT) studies. Archaeology brings to the investigation of space exploration the traditional focus on material culture, deep-time perspectives, and an understanding of the resilience and flexibility of cultural responses to change.

With the world divided into spacefaring and non-spacefaring states, the United Nations has called for the inclusion of those usually excluded from space: women, Indigenous people, and "developing" nations. Space archaeology can contribute to redressing the imbalance between the haves and have-nots of space by highlighting alternative narratives accessible only through an analysis of what is left behind and discarded and the material impacts of new technologies both in space and on Earth.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Cold War
- ▶ Contemporary Past, Archaeology of the
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Modern Material Culture Studies
- ▶ Nevada Test Site

▶ Rathje, William Laurens
▶ Space Heritage Protection
▶ World Archaeological Congress (WAC)

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Space Heritage Protection

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Introduction

The heavens and the night sky have always belonged to humanity. Celestial bodies have been named and are present in the narratives, calendars, and rituals of the world's cultures. The Moon, especially, features in stories created by cultures from Africa to the Arctic since prehistoric times. In a real sense, everyone owns the Moon. However, it is only within the last 50 years that humans have created technology that has taken them into outer space and

onto the lunar surface. Cultural resources exist on the Earth's surface, in space, on the Moon, and on other celestial bodies (O'Leary 2006: 307). There are archaeological sites, structures, and objects, both on Earth and in space, which are associated in a cultural landscape of humanity's extraordinary scientific achievements in exploration. Objects and sites in space can be looked at as part of a much larger assemblage that until the Space Age – a particular time and level of technological development – were confined to Earth but then entered the archaeological record somewhere else (Staski 2009: 23).

Definition

Space Archaeology is a new field which focuses on the "material culture relevant to space exploration that is found on earth and in outer space (i.e., exoatmospheric material) and that is clearly the result of human behavior" (Darrin & O'Leary 2009: 5). It is most strongly linked to the Cold War and post-Cold War period. The Cold War was played out by military, social, and political maneuvers in space as well as on Earth. In 1945, the USA and USSR engaged in a race to acquire both German rockets and rocket scientists and engineers (Gorman & O'Leary 2007: 73). The descendants of the V-2 rocket launched the first satellites and later propelled the first humans into space and onto the Moon. Former Apollo 8 astronaut Borman (2001) called the Apollo Program a battle in the Cold War. These events changed history and provided the basis for the associated technologies that currently include a satellite-based telecommunication industry and spacecraft that continue to explore farther and farther away from Earth.

The term Space Archaeology is frequently paired with space heritage which focuses on ways to identify, evaluate, and protect significant places and artifacts associated with space exploration that may be lost through deliberate destruction, looting, recycling, or neglect. In some ways, the remoteness of, for example, sites on the Moon or Mars and the costs associated with revisitation have provided a form of protection, at least from human impacts. The preservation of objects in space and on other celestial bodies is, for the most part, in a gray legal area as ownership and the varied post depositional contexts lie within zones of many contested and evolving international treaties and agreements. The goals of space archaeology and heritage are to illuminate the interaction of human behavior in order to understand both the past and the present, provide for preservation of significant sites and objects, and, perhaps, be useful for future space missions (Gorman & O'Leary 2013).

Historical Background

The earliest evidence for Space Archaeology begins with two astronauts. As part of the Apollo 12 mission in November 1969, astronauts Conrad and Bean were instructed to survey and record information about *Surveyor 3*, a robotic probe that had landed on the Moon's surface 3 years earlier (Fig. 1). Conrad and Bean landed their spacecraft 180 m from *Surveyor 3* and conducted the first "archaeological" studies on the Moon by photographing and collecting samples and returning them to Earth for analyses. Although the analyses were designed to help NASA detect changes to the materials from *Surveyor* caused by the lunar environment, Capelotti (2004: 51) notes this as the first example of extraterrestrial archaeology and "formational archaeology, the study of environmental and cultural forces upon the life history of human artifacts in space."

The Space Age is different from other periods in human's technological evolution, both in its speed and the global nature of the massive amount of research and development by nation-states that delivered material culture to a very remote region. The Space Age usually begins with the launch of the first satellite, USSR's *Sputnik 1* in 1957, followed by the successful launch of *Vanguard 1* by the USA (Fig. 2). *Sputnik 1* remained aloft only several months

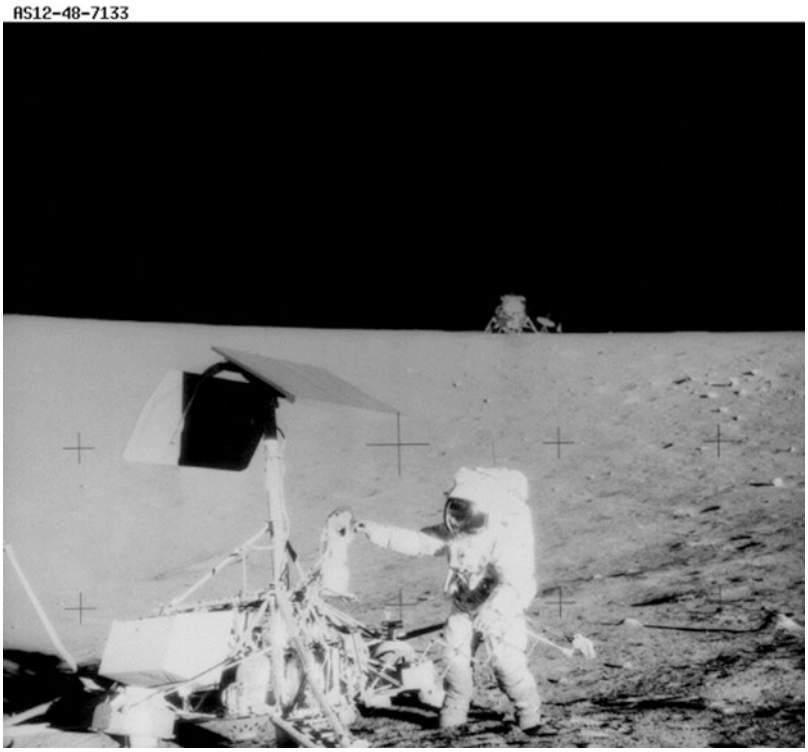

Space Heritage Protection, Fig. 1 Apollo 12 Astronaut Alan Bean and Surveyor 3 on the lunar surface November 19, 1969 (Courtesy of NASA)

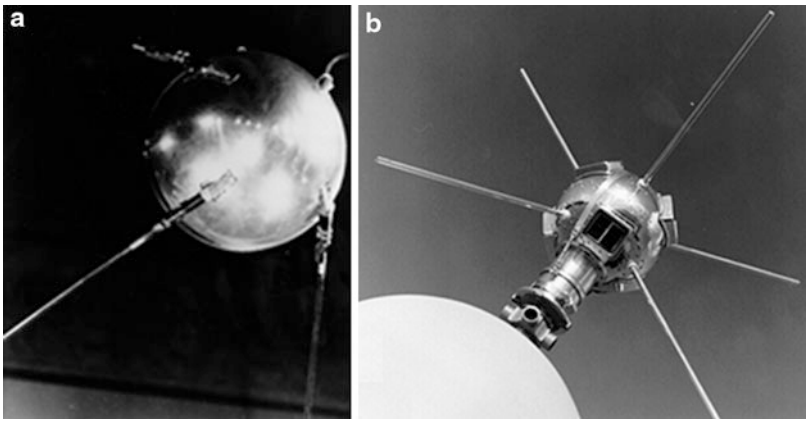

Space Heritage Protection, Fig. 2 Sputnik and Vanguard 1 (Courtesy of NASA)

after its launch, but created the first object and orbital debris which expanded the archaeological frontier into space. *Vanguard 1*, a 15.2 cm sphere with antennae weighing about 1.5 kg, was launched on March 17, 1958, and continues to circle the Earth every two hours. It is expected by NASA to remain aloft for the next 600 years (O'Leary 2009a: 771). *Vanguard 1* is currently the oldest human object in orbit, and its orbit will allow it to be essentially preserved in space.

The history of space exploration is ongoing and includes many kinds of robotics. What lies at the edge of the subdiscipline is interest in the cultural heritage of robots (O'Leary 2009b: 41). Spennemann (2007) focuses on emergent heritage or technologies that are still in use and form an ongoing technological investment. This area includes heritage created by robots in the form of their artificial intelligence. The lunar surface, Mars, and several asteroids are rife with all kinds

of robotics and the places they created or modified, especially during the early stages of exploration (e.g., *Ranger, Luna, Beagle 2*). It is a heritage that is part human and part machine.

Key Issues/Current Debates

Space Archaeology also concerns itself with orbital debris. For archaeological purposes, orbital debris has been defined by Gorman (2009: 382) as "any human manufactured object in orbit that does not currently serve a useful purpose and is not anticipated to in the foreseeable future." There are currently huge amounts of orbital debris varying from small flakes of paint to large defunct satellites and all pieces of spacecraft jettisoned, crashed, and simply existing in space. Low Earth orbit(LEO) and Medium (MEO) and Geosynchronous Orbit (c. 160 – 37,000 km from the Earth's surface) contain the most debris, while vehicles like the two *Pioneer* and two *Voyager* spacecrafts are currently the farthest away from Earth in the interstellar medium. The amount of orbital debris increases yearly as more satellites and exploration vehicles continue to be launched into space. NASA currently tracks over 15,000 pieces of debris over 10 cm in size. Referred to in the popular media as "space junk," collisions of debris can cause future spacecraft to fail, be damaged, explode, and create more space junk. The methods to "clean up" or even to evaluate the "junk" are dependent on finding ways to accomplish this and secure international agreements.

Space Archaeology lends itself well to the concept of a cultural landscape, which has become more prevalent in archaeological and cultural resource management studies, but has to be broadened to include cultural resources off the Earth. UNESCO's World Heritage Convention describes a cultural landscape as the combined works of nature and man (WHC). It focuses on the idea of a site, for example, the first lunar landing site at Tranquility Base, as embedded within a landscape that includes launch Complex 39 at Cape Canaveral, the tracking station in Australia (Honeysuckle Creek), and the facilities that were critical to developing the rocketry (Saturn V Test Stand). It can be argued that the Tranquility Base site on the lunar surface is a critical component of the cultural landscape of space exploration. A cultural landscape approach allows for the perception of broad chronological, technological, and geographical patterns in the human interactions with space. Space ceased being an empty vacuum when humans entered it (Gorman & O'Leary 2007). In effect, it became a place that could be managed and studied in many of the ways that historic places are on Earth. However, in most cases, objects in space or on other celestial bodies present complexities that supersede the disposition of sites on Earth (O'Leary 2009a: 774).

In order to protect heritage in space, approaches must navigate a complex, intertwined area of national and international laws, regulations, treaties, and policies. The archaeological assemblage from the Space Age is from a period that is relatively young and has not been considered worthy of preservation. Also, the exploration and use of space is still a functioning, ongoing, and increasingly complex system. Critical components in space have been, for the most part, inaccessible to the public. The field of Space Archaeology and Heritage requires ways to address interpretation, evaluation, and preservation of this legacy. If it is indeed humanity's heritage – one giant leap for mankind – it needs to be ultimately international or universal in scope. The World Heritage Convention does provide criteria for places on Earth that have "outstanding universal value" (WHC) under which many space sites and objects would qualify, but they are not on Earth. Because the control and management of space heritage lies in a contested legal arena without specific guidance or laws on cultural preservation written into international conventions, agreements, and treaties, most efforts so far have been within nations (especially the USA). The National Historic Preservation Act (NHPA) in the USA of 1966 came 3 years

before the height of the Space Race between the USA and USSR that brought the first humans to the Moon. Historic preservation efforts to date that address space follow USA federal and state laws and the United Nations Outer Space Treaty of 1967 (OST). The Outer Space Treaty asserts that nations which place objects in space or on the surface of celestial bodies such as the Moon are not subject to national appropriation by claims of sovereignty. Essentially, no one nation can own space or, for example, the Moon. But as governed by the Treaty's Article VII, the objects launched into space or on another celestial body are and remain under the jurisdiction of those who put them there (OST; O'Leary 2009a: 774). The Outer Space Treaty also states that space activities should forward humankind's use of space for peaceful purposes, which could include historic preservation. NHPA, the Outer Space Treaty, and WHC do not explicitly cover the preservation of historic sites and artifacts in space. These cultural resources are not on the Earth; they are a recent past property for which archaeologists do not have a large body of expertise and are at a scale different from which most archaeologists work. The resources in space and on other celestial bodies are not within any nation's territorial boundaries. Initial and ongoing costs are factors in any preservation strategy and alternatives for space may be expensive, but these costs and strategies can become part of future mission planning. For the Moon as an ad hoc solution, Stooke (2008) suggests that all early lunar sites (CE 1959–1976) be considered significant and protected from any human impacts in the future. Capelotti (2009: 433) has advocated for lunar parks founded on the same principles that currently guide the protection of sites in extreme environments like Antarctica.

The earliest effort to consider preservation issues of space began with the Lunar Legacy Project in 1999 (Lunar Legacy Website). It is one of the first instances of funded space archaeological research. The New Mexico Space Grant Consortium (NASA) at New Mexico State University, USA, granted monies to B.L. O'Leary and students to focus on the archaeological assemblage at one site, the first lunar landing site created by the Apollo 11 astronauts at Tranquility Base on July 20, 1969. The site was chosen because it is the most iconic of humanity's visits to another celestial body. Also, it was the best test case for the application of US federal preservation law, and one avenue was proposing that Tranquility Base be nominated as a National Historic Landmark (2009a: 775). It is the first time archaeologists looked at a site on the Moon as a historic property and evaluated how it could be preserved for the future. These early efforts presented challenges to NASA, who as a federal agency was responsible for complying with the NHPA, and the USA's Keeper of the National Register of Historic Places, who determines the eligibility of significant cultural properties. There was no doubt that the site was significant but the responses in 2000 of these two entities centered on the perception that the Moon could not have NHLs because it would be perceived as a claim of sovereignty and the USA Keeper did not have sufficient jurisdiction or authority (O'Leary 2009a).

Protection efforts for the objects and structures on the lunar surface at Tranquility Base – not the surface itself – began in three different arenas. The first was involving states within the USA to list these resources on their own registers of significant cultural resources. The objects and structures at Tranquility Base were placed on both the California and New Mexico State Registers of Cultural Properties in 2010 (Westwood et al. 2010; O'Leary et al. 2010). Although largely symbolic, these acts acknowledged that both states had a historic association with the creation of those artifacts and the successful first lunar landing and agreed to protections under state law. Other states are considering similar actions. A draft bill is being considered for the US Congress to declare the Tranquility Base artifacts an NHL.

The second level is at the international level. A resolution by the World Archaeological Congress in 2003 recognized the material culture and places associated with space exploration, and an international Space Heritage

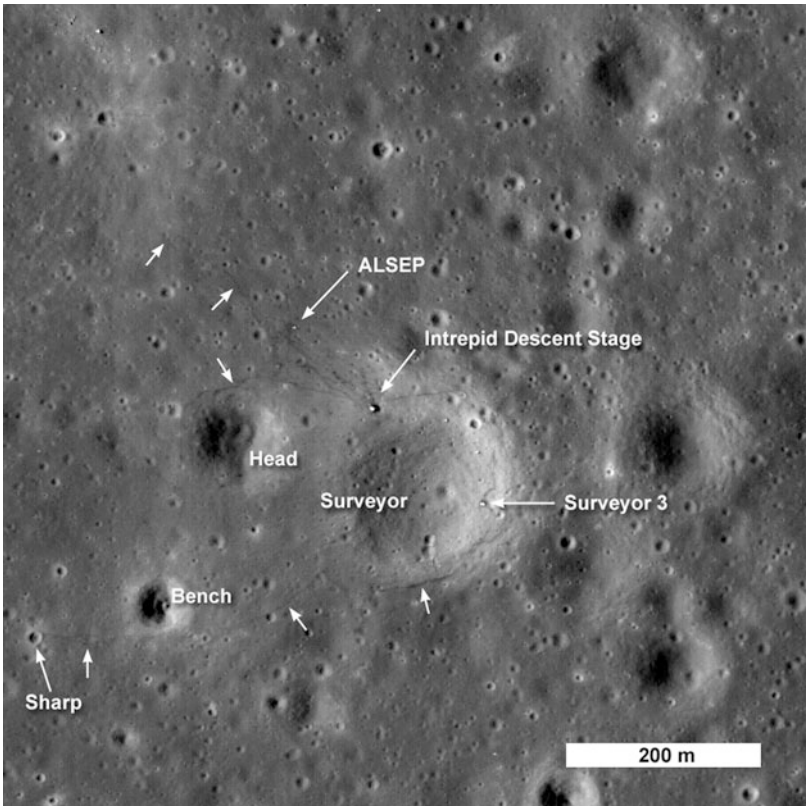

Space Heritage Protection, Fig. 3 LRO Image of Apollo 12 site on the lunar surface (August 2011) (Courtesy of NASA)

Task Force was created that continues to investigate ways of identifying and assessing significance at local, national, and international levels the cultural material in space whose preservation would benefit humankind (O'Leary 2009a: 777). The International Committee on Monuments and Sites (ICOMOS), an advisory body to the World Heritage Convention for placing sites on the World Heritage List, has formally become involved in space heritage by initiating a scientific committee.

Finally, NASA itself has acknowledged the problem of preserving space heritage on the Moon and has become involved in the protection solutions. "NASA's Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts" (NASA 2011) recognizes that there are increased technical abilities of space-faring groups including other nations and commercial entities who will go back to the Moon in the near future and provides guidance on visitation to protect both the historic and scientific values at those lunar sites. Guidance is provided on lunar design, mission planning, and sanctioning actions which would mitigate damage to significant lunar cultural resources until such time as a more multilateral approach is developed which includes other nations. One of the most exciting areas of research conducted by NASA is the Lunar Reconnaissance Orbiter (LRO) which is in use, in part, to map the surface of the Moon. Although not designed for such use, its digital imaging capacities provide archaeologists with the best remote sensing of the sites created by the Apollo Program on the Moon from 1969 to 1972 (Fig. 3). The scope and ability of this tool is critical to look at the condition of all early lunar sites and accurately document and evaluate the objects, foot and rover trails, and structures on the Moon and plan for their management in the future.

Future Directions

Space and the environment on the lunar surface especially are relatively benign when it comes to preservation. There are no erosive forces such as wind, water, and organic processes existing on Earth that occur on the lunar surface. With the exception of the effects of temperature changes and micrometeorite bombardment on the artifacts, they are largely unchanged. The trails from 40 years ago are clearly demarcated. The tools that were developed to explore the universe may be used to greatly enhance the preservation of humanity's first steps off Earth and into the universe. Now is the critical time to protect humanity's heritage in space.

Cross-References

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- ▶ Antarctica: Historical Archaeology
- ▶ Behavioral Archaeology
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage and Archaeology
- ▶ Landscape Archaeology
- ▶ Legislation in Archaeology: Overview and Introduction
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Spain and North Africa: Islamic Archaeology

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Introduction and Definition

Interest in the western Islamic world, essentially the Iberian Peninsula and North Africa, is long standing. The presence of well-preserved buildings and monuments and numerous works of art has generated a particular approach since the mid-nineteenth century, sometimes close to exoticism. Appreciation of the arts and antiquities of these societies, whether wiped out and existing only in memory as is the case with Spain, or still present as with North Africa, contributed to the considerable increase and development of studies on Islamic history in these regions. Without doubt, in the case of North Africa, the fact that the area had fallen under the control of Western political powers, mainly France and Spain, helped the development of research, although frequently with a focus on local custom.

However, archaeology was involved only slightly in this process of historical reconstruction until well into the twentieth century. Indeed, at least regarding Spain, it was not until the 1970s that archaeological studies would bring new ways of developing knowledge of these Islamic societies. Despite this, the excellent advances and the indispensable works that appeared from disciplines such as history of art and history of architecture by authors such as George Marçais (1954), Henri Terrasse (1932), Manuel Gómez Moreno (1951), or Leopoldo Torres Balbás (1949) in the first half of the century should not be forgotten. These authors, the most outstanding among a considerable group, established the fundamentals of the study of the art, archaeology, and architecture of Western Islam.

From the 1970s, the situation changed considerably. Theoretical and methodological progress in the discipline of archaeology throughout the 1960s, particularly regarding the chronological sphere of prehistory, had allowed for the development of the discipline in the Mediterranean area, albeit with a certain delay. The archaeology of the Islamic world was no exception. In the case of Spain, many researchers – mostly coming from the fields of medieval history or prehistory – became involved in applying archaeological methodology with a view to enriching knowledge of medieval Islamic society. This was an important catalyst for advancement in historical and archaeological research carried out in al-Andalus. It led to the birth of a new discipline, medieval archaeology, hitherto scarcely explored, which was to develop into pioneering and innovative work on al-Andalus and a vehicle by which to introduce new streams of research.

For North Africa, the influence of countries external to the region was essential. The pioneer in this respect was without doubt the French school, notably improved since the end of the 1960s, which continued to act as an engine for research with the participation of some local collaborators. The first projects that were put into action were directed at increasing knowledge of ancient times and failed to properly appreciate medieval Islamic levels. It was not until the end

of the 1970s and beginning of the 1980s that work specifically addressing the medieval era began. These first studies, applying so-called extensive archaeology, concentrated on the analysis of territory by means of broad archaeological surveys in northern Morocco. Other teams of diverse origin rapidly became involved, including Americans (Sijilmasa, Basra, Djerba, Qsar as Seghir), British (Volubilis), Italians (Rif), French (Rif), and Spanish (Sus-Tekna), and successfully formed mixed teams. The work carried out in the context of these projects has served as a catalyst for the development of Maghrebian research in recent decades. Some of the projects are still active today (Sabra al-Mansuriya) providing information of great interest. In spite of this, research in North Africa shows a certain delay in comparison to developments in the Iberian Peninsula.

From this time onward, those involved in this research began to intervene as of right in the process of the historical reconstruction of western Islamic societies and not only in the limited fields of art and architecture. With a new technical language, at times no doubt incomprehensible to their historian colleagues, they rejuvenated the academic field. Their work began to open new debates of great importance that today continue to arouse scientific discussion, spur the development of the discipline, and increase our knowledge of medieval Islamic history in this region. We will refer to some of these debates in the following section as they serve to highlight the state of current knowledge.

Historical Background

From the Ancient World to Western Islam

At the turn of the seventh to eighth century, the Iberian Peninsula and North Africa were conquered by Muslims. Until then, the evolution of these territories had been similar, although with some distinctions, to that of the rest of the territories that had been integrated into the Roman Empire. In late antiquity the area underwent considerable upheaval due to barbarian invasions (mostly Visigoths and Vandals, with lesser incursions by Suebis and Alans), and a whole series of transformations of the structures of organization belonging to the Roman era took place. These, however, had already begun to be modified before the fall of the last western emperor. If any single thing characterizes this field of study, it is the presence and influence, in varying degrees, of the Byzantine Empire, which saw itself as affected by the Iberian Peninsula and North Africa, lands that would later be controlled by Muslims.

Regarding the Iberian Peninsula, work on this period has centered on various fundamental aspects. First is the study of cemeteries, with particular interest in the analysis of their organization, location, and funerary practices based on the associated material culture, with a view to clarifying the identity of the buried. Second is a focus on Visigothic architecture, especially that used in known churches and the transformation of rural settlements (the end of the late Roman *villae*, the emergence of new kinds of settlement such as farms and small towns) and in the cities, which underwent a process of significant transformation, especially evident in metropolis as distinct as Mérida, Cartagena, Tolmo de Minateda or Recópolis, all of which have been subject to rigorous archaeological intervention.

For North Africa, research has concentrated especially on the second of these themes, the cities and changes that took place in their rural hinterlands. This includes isolated case studies of great interest, especially in the Tunisian area (notably Uchi Maius: Gelichi & Milanese 2002). The prosperity of these North African cities outlasted the fall of the Roman Empire, although changes are evident as early as the fifth and sixth century (abandonment, transformation of certain public spaces, the building of churches, development of fortified elements). The Arabs established themselves in this network of transformed cities at the time of the conquest, and these settlements lasted into the first centuries of the medieval period, due to their continued occupation by urban elites.

These issues were directly linked with lines of investigation that had developed some time

previously in the rest of Europe, although each with their own local characteristics. This wider debate analyzed the changes that took place after the fall of the Western Roman Empire and into the beginning of the early Middle Ages (Wickham 2005: 902-945). After the Arab invasion and conquest of these territories, the situation changed substantially. The factual account and the archaeological discourse changed to the same degree.

Islam in the West: Al-Andalus and the Maghreb

Transformations in Patterns of Settlement After the Muslim Conquest

The Arab conquest of North Africa and the Iberian Peninsula is a watershed in terms of approaches to research. Traditional theories, at least in the case of Spain, accepted only with difficulty the incorporation of this area into the Islamic world. For a long time it was considered that Islam did not result in more than a few superficial cultural or religious changes in this territory, without implying radical developments to the society of the Iberian Peninsula. There were even those who denied that the invasion occurred, considering it more an "orientalization" of society than a conquest and Islamization of the Peninsula.

The work of Pierre Guichard, from the late 1970s, came to deny this view, acting as a starting point for a comprehensive revision of studies on al-Andalus. Influenced by structuralist/functionalist social anthropology, he argued that medieval society in al-Andalus and North Africa presented a social and familial structure belonging to the Islamic world, very different to that which existed in the feudal-Christian area of the Peninsula. This would confirm that the social impact of the Arab-Berber invasion and conquest of Hispania was wide and profound (Guichard 1976, 1990-1991 and Barceló 1997). Initially based on written documentation, he subsequently undertook archaeological research, carried out in collaboration with other French colleagues (Bazzana et al. 1988), to observe and interpret the documented changes to the organization of settlement and material culture of al-Andalus. The work initiated by these researchers served as strong motivation for the creation of a new school of archaeology, dedicated to the study of al-Andalus, which has made new and rich contributions to the process of historical reconstruction.

The analysis of landholding initially occupied the core of these authors' investigations. Originally focused on the study of the various documented settlements in al-Andalus, research soon began to center on the relationships that existed between them, especially between the fortified settlements; the castles (hisn/husun), very common in Andalusian geography; and the rural settlements under their influence, the farmhouses. A common perspective was that this organization reflected the society established in the Peninsula after the Islamic conquest. The fortifications were central to the organization of rural territories in al-Andalus, but instead of showing a morphology and structure similar to the older (feudal) fortifications, analysis of the settlements showed that they were to a greater extent a reflection of a segmented society, tribally organized, and at the same time an expression of the fiscal implementation of the state in rural territory. Settlement organization was thus a reflection of the delicate balance existing between the Islamic state and the rural communities that organized the cultivation of the land and defended it in case of danger.

The model suggested by these French authors was contested at the time, as much for the chronology of its proposed implementations as for the functions it attributed to fortified space. Despite including a varied typology of fortified settlements, it seems clear that the model suffered from a certain inflexibility and stagnation, so that as studies developed, some of its aspects underwent revision and development.

Rural territories have been documented where the presence of fortified settlements is minor or practically nonexistent. However, in some regions it has been possible to sequence the development of fortifications through the Middle Ages, from an initial stage in which diversity indicates a process of social transition between the Visigothic period and a fully Islamized one. Here, the introduction of Arab-Berber population groups played a fundamental role alongside the integration of the diverse communities present in the initial

Andalusian phases, moving toward Islamization not only in religious terms but also as regards linguistic, cultural, and social practices (Acién 1989).

Authors such as M. Acién (1995), E. Manzano (2006) or S. Gutiérrez (1996) have emphasized this process, including the changes that can be observed in the material culture of this period as well as the fortified settlements and rural centers, in their discourse. These changes refer especially to the practices and centers of production of ceramics and their networks of distribution, as well as to the importance and influence of urban centers, all of which reflect the degree of continuity or disruption between the late Roman and Muslim worlds.

This process of Islamization, which was not without conflict and resistance, started from an advanced stage of destructuralization within the Roman world, which is generally confirmed in various ways: in the transformation of late Roman settlement patterns, with documentation of a clear tendency to occupy high ground and occasionally "marginal" zones; in new forms of cultivation in productive areas; and in the transformation of the urban network, with decline, abandonment, and new foundations. All this was accompanied by profound changes to artisanal productive structures and in networks for the exchange of products. These are most clearly demonstrated by changes to the ceramic corpus, with the appearance of non-standardized repertoires made using basic techniques and with relatively localized distribution. This transitional process continued until the end of the tenth century, when it is generally agreed that the process of Islamization of al-Andalus society was largely complete.

The culmination of the process coincides, according to this view, with the establishment of the Umayyad caliphate of Córdoba and is visible in the consolidation of the settlement model discussed above, as well as in changes to material culture, especially in the ceramic record. From this moment wheel-made vessels and glazed dishes appear more frequently.

Clearly this interpretive model, in incorporating new factors and variables, brings greater complexity to the general discourse, while the localized studies that developed during the 1990s in particular Andalusian geographic zones have shown that the rhythms and profiles of the process vary from one area to another, presenting specific regional characteristics.

This model of land use underwent important transformations over time. During the Almohad era, a process emphasizing the construction of fortresses apparently played out, especially in the east (Azuar 1988), although this phenomenon could equally apply to the rest of al-Andalus. Other changes related to occupation and in places cultivation of the land. For the final stage, the Nasrid period saw fortified nucleation of notable complexity, with the appearance of new materials and elements in these structures indicating the penetration by urban influences of these areas (Malpica 1996, 2008), along with the more obvious presence of Nasrid power (Acién 1999).

Regarding North Africa, research has not allowed similar conclusions to be drawn. The rural settlements, still incompletely studied, do not evidence similar organization. Although the Arab invasion and conquest initiated a process of profound social and cultural transformation, the result in terms of settlement is not comparable. Fortifications, while still numerous in this territory, do not assume the same importance they apparently reached in al-Andalus. However, the occupation of space by small nucleated settlements dedicated to the cultivation of their hinterland and based largely on the use of irrigation techniques does seem to extend through North Africa, although the scales varies at a regional level.

It should be noted that this interpretative change can be attributed as much to developments in archaeological methodology as to the fields of enquiry themselves. If at first, research was fundamentally based on territorial analyses, beginning with extensive landscape surveys from the middle of the 1980s, the development of techniques of spatial analysis, the emergence of urban archaeology, and the development of ceramic analysis have permitted the incorporation of new elements into the discourse. These elements have favored the development of new theories and a surge in new fields of study. We will focus on these below.

Key Issues/Current Debates

Settlement and Resource Exploitation: Hydraulic Archaeology

The explanatory model outlined above was initially directed to a great extent toward rural settlement, without actually excluding cities. It was because of this that some researchers naturally departed from the model and began to highlight the close link between fortifications and the exploitation of resources, in particular cultivated fields and irrigated agriculture (Cressier 1991).

The configuration of Andalusian territory in terms of these parameters from the tenth and eleventh centuries meant the construction of a new rural landscape featuring smaller units of population in the form of small nucleated towns called *alquerías* (from the Arabic *al-qarya*) and their associated hinterlands. The analysis of these small towns, little known due to their long occupation and difficulties of archaeological analysis, has contributed some knowledge of these productive spaces.

In this way the field of hydraulic archaeology has emerged and broadly developed within Andalusian studies. The works of T.F. Glick (1970) and, above all, of M. Barceló (Barceló et al. 1988) and H. Kirchner (Kirchner & Navarro 1993), developed primarily in the eastern area of the Peninsula and in the Balearic Islands, have laid the foundations of this new discipline. Following the proposals of P. Guichard, these researchers have linked the design, construction, and management of these irrigated spaces to the farming communities, generally organized in clans. From this perspective, the existence of these spaces, rather than solely being determined by geographical character or similar variables, is considered to be a social choice, and the criteria that govern them have been developed and should thus be explained by rural communities' own characteristics. The design of these spaces indicates a considerable organizational effort on the part of these communities, and their management cannot be understood unless from cooperation and collective effort within the community. The development and evolution of irrigated land thus denotes strategies and formulas for growth in these groups.

The creation of these agricultural systems marked a considerable modification of Andalusian rural ways of life, although on a local scale. This involved the application of catchment, distribution, and complex storage techniques, on occasion originating from the east. At the same time came the introduction and acclimatization of new crops, previously unknown in the Iberian Peninsula or North Africa, the products of which were not suitable for prolonged storage. This can only be explained in light of an economic context facilitating their dispersal.

Without casting doubt upon the importance of these agricultural areas in medieval al-Andalus and the Maghreb, in recent times new paths of investigation are being explored that incorporate problems associated with nonirrigated land and livestock in the rural Andalusian lifestyle. These issues are currently little known.

The "Alquerías" and Modes of Habitation

These rural groups, which were characterized by high homogeneity and social cohesion as well as administrative autonomy, were established in the *alquerías*. The settlements' morphology, as far as we know, reflected the characteristics of its community of rural landowners or workers. They appear to be very distinct from settlement forms occurring in the rest of the European continent (Guichard 1988). The *alquerías* are perhaps one of the least archaeologically known aspects of the rural Andalusian world. Very few have been carefully investigated archaeologically (Jolopos, Castillo del Río, Torre Bufilla, El Castillejo, Ponta do Castelo –Carrapateira, etc.) and those that have show diverse characteristics (open or walled fields, concentrated or dispersed, etc.), although they present a similar urban organization, comprising various cores connected by intricate lines of communication, which do not follow an orthogonal organization, and where large public spaces are virtually absent.

The inhabitants of these small nucleated villages managed a vaguely delimited territory in which were located areas exploited for

agriculture, livestock, or as woodlands. These spaces or lands were framed by statutes and particular legal recognitions (Trillo 2004).

The dwellings that made up these small towns, despite the existence of variation in dimensions and typological form, reflect a single model from the tenth century onward. This is based on the existence of a central courtyard around which were rooms in an L- or U-shape (Bazzana 1992). The presence of a hall, a space reserved at the heart of the home for the intimate activities of the familial sphere, appears to be a specific feature. The rooms, while still presenting a marked multifunctional character, emphatically separate areas of private repose from those designated as the kitchen or as rooms for daily life. The profiles of these dwellings, where they have been analyzed in detail and in light of data concerning the domestic assemblage, are those of an extended family where characteristics of relatedness were clearly present (García 2001). The materials used for their construction were varied, although walls of rammed earth appear most frequently. In any case, their construction made use of materials found close to the settlements and did not require any complex techniques so that it could be undertaken within the community.

The Urban Sphere

The city is one of the most extensively studied aspects of Andalusian archaeology in recent years and could even be considered to be one of the most dynamic, as the flow of new data coming from archaeological interventions has been continuous; syntheses of the subject, however, have been more scarce. In any case, research has managed to move beyond the milestone that was in its day marked by the work of L. Torres Balbás (1970), who emphasized the topographical characteristics that were present: the planning of roads, the forms of water supply, the presence of certain characteristic elements, etc.

The majority of authors that have dealt with this subject have agreed that there was a lack of continuity between the ancient or late Roman and the Andalusian cities, even where topographical or occupational levels of both periods exist. At this time, changes to the urban network were substantial, erasing any functional heritage and changing its characteristics in a fundamental way that barely conserved the memory of what had gone before.

One of the preoccupations of recent times has been the origin of these cities. There is no doubt that the Arab-Berber invasion and conquest resulted from the occupation of existing urban centers in the Peninsula, whether or not they were already immersed in a process of marked decline. The formation of the first cities in Andalusia during the amiral period was a result of the transformation of certain existing centers, as happened in the case of Toledo; the Visigothic capital itself, Sevilla; Córdoba; Mérida; Valencia; or Zaragoza, among others, and of foundations connected to the new power that emerged in a spontaneous way from preexisting rural settlements. Foundations linked to the process of conquest do not seem to be documented on the Peninsula, as were Kufa and Basra in Iraq, Fustat-Misr in Egypt, or Qayrawan in Ifriqiya.

As noted, the fact that ancient cities remained in occupation after the conquest has not been interpreted by those authors that have studied them as a result of continuity. The documented changes in these cities radically modified their structure and urban physiognomy and have been interpreted as a symptom of a break with the urban past, reflecting a new society, very different from the original. The most typical example is Córdoba, capital of al-Andalus, which experienced spectacular growth, especially in the surroundings closest to the location of an intricate network of recreational houses or suburbs. Some of these have been the object of archaeological intervention, which has allowed us to bring to light a large portion of the city, with planned urbanism, probably a result of the arrival of a new population attracted by the conversion of the city into the residence of amiral and caliphal power. Transformations can likewise be observed at a smaller scale in the other aforementioned cities.

Some cities emerged as a result of the evolution of a more or less complex rural space.

One of the most well-studied examples and the current object of an ambitious research project is Madinat Ilbira (Granada). This city, located just a few kilometers from Granada, is currently buried. Recent archaeological interventions indicate that it originated from a group of distinct dispersed nucleations (Malpica 2006).

Thus, the cities of al-Andalus again show the huge changes produced in the settlement network over the two centuries following the Arab-Berber conquest (as seen above in the case of the fortifications). They highlight the milestones of the process by which Andalusian society was transformed, not in itself dissimilar to that observed in other Islamic areas (Guichard 1998).

Cities, in any case, did not remain unchanging through the Andalusian period. Various authors have considered the evolutionary process of the urban context in recent times, presenting a descriptive and explanatory scheme of its forms of growth and topography (Navarro & Jiménez 2007). A great increase in urbanization occurred during the eleventh and twelfth centuries, lasting until the end of the Middle Ages, during the Nasrid era, when certain specific and differentiated characteristics developed, just before the definitive conquest of the Peninsula by Christians (Malpica & Garcia 2011).

As in the Iberian Peninsula, urban archaeology is one of the most developed areas in North Africa. The cities of Ifriqiya and the Maghreb, as indicated, had survived with some strength during the first medieval centuries, in spite of being occupied by Vandals and Byzantines. The Arabs occupied these cities, privileging some over others or founding new centers as in the case of Qayrawan (670). The present urban forms maintain a direct relationship, as happened in al-Andalus, with the structure of this new tribal society. This society assumed a protagonistic role with consolidating elements such as the mosque and the palace, the seat of power, which as political center acquired major dimensions (Guichard 1998). These cities based their growth and strength on cultivation of the land, converting themselves into nuclei receiving the rural surplus (Boone & Benco 1999). Thus, a dense network of cities of various dimensions was established and hierarchically organized. The transfer of trade routes for ivory, slaves, and sub-Saharan gold from the eastern edge of the desert to the west impacted on this urban network, creating various ideal spaces for the establishment of cities linked to the commerce of these goods, while the old centers linked to agricultural cultivation suffered notable decline (Boone et al. 1990). Ceramics found in various archaeological excavations have shed light on this process (Redman 1983-84), especially in the settlement of Qsar as Seghir, in the north of Morocco (Redman 1986). The pattern can equally been seen in the north of Morocco, in the mountains of Rif, where, following a broad and extensive program of archaeological surveys, it has been observed that the urban centers that emerged in the interior maintained close links with the rural communities of their hinterlands, for the most part occupied by Berbers. The rise of Almoravid and Almohad power, which extended through the Maghreb and the Iberian Peninsula, contributed to the emergence of port cities on the northern coasts of Morocco (Cressier 1992).

Material Culture: The Production of Ceramics

Another development of recent decades in the Peninsula has been the study of the ceramic production. Great advances in this research took place at the end of the 1970s, when G. Rosselló (1978) published the results of studies on the ceramics of Mallorca. This signified a substantial revision of the field, acting as a catalyst for countless subsequent publications in conference proceedings and specialist journals that offered an overview of ceramic production in al-Andalus. Initially, the primary concern of researchers was to construct a new analytical methodology specific to these materials and to create a morphological corpus. This established a firm basis from which successive studies have been launched.

Within only a few years, particular aspects of analysis began to emerge and develop. One of these concerned the ceramics of the first

Andalusian era. The work of S. Gutiérrez (1988) in eastern Spain produced a group of material previously unknown in scientific literature, which was given the name "paleoandalusí" ceramics. These comprised a group of crude, handmade, or wheel-turned ceramics that in many cases show mixed characteristics. Chronologically, the group is placed during the eighth and ninth centuries in the early Andalusian period and has been interpreted by archaeologists as a manifestation of this transitional amiral period. Similar wares have been documented in North Africa of the same date.

It was not until the consolidation of the caliphate that glazed or varnished material of eastern origin appeared (Cano 1996). Thereafter, we see a diversification of forms, the development of specific functional groups (table ceramic, kitchen and storage wares, etc.). Well-formed and well-fired ceramics with complex finishes indicate the establishment of production centers in al-Andalus, with complex techniques applied in each phase of manufacture (selection and manipulation of clays, turning, coating, and firing). This resulted in a new economic and social context. The materials created in these new workshops, located in urban centers of medium and large size, were widely distributed throughout al-Andalus although it would be the eleventh and twelfth century before they reached the last corner.

At this time, and during the last Andalusian centuries, ceramic materials in various forms reached the highest levels of technological sophistication, both as highly decorated luxury pieces and as domestic utensils (Fernandez 2008). These products, of high formal, decorative, and technological quality, would be the object of regular trade throughout the twelfth, thirteenth, fourteenth, and fifteenth centuries when the commercial processes of the West were developing. High demand for these articles explains the frequent appearance of Tunisian and Andalusian materials in eastern contexts and in various faraway places (Italy, France, England and the Northern and Baltic Seas, etc.). In the Nasrid period, the impact of this trade on ceramic manufacture is clearer, with the production of luxuries becoming to some extent detached from that of domestic products. It was during this period that the ceramic artworks known as the "jarrones de la Alhambra" (vases of the Alhambra) and the tiles that decorated Nasrid palaces were created.

Future Directions

It should be noted that medieval archaeology in al-Andalus and the Maghreb exhibits very uneven levels of development. In North Africa, archaeological research still lacks depth in some of the areas outlined above (material culture, rural settlement, exploitation of resources, etc.), requiring a greater volume of basic studies. In al-Andalus, research is developing along new lines as some existing fields of study show signs of exhaustion. Among those aspects that show promise for future development, we should highlight landscape archaeology, material culture studies (especially underdeveloped aspects such as archaeometrical analyses), the archaeology of production, the archaeology of agriculture, zooarchaeology, etc. All these fields of investigation, as yet largely unexplored for the medieval Iberian Peninsula and North Africa but on which there are already publications of interest, offer enriching perspectives on historical and archaeological research.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Islamic Archaeology and Art History
- ▶ Landscape Archaeology
- ▶ Medieval Archaeology

▶ Medieval Urbanism
▶ Military Activity in Islamic Archaeology
▶ North Africa: Historical Archaeology
▶ Plant Domestication and Cultivation in Archaeology
▶ Rural Life in Islamic Archaeology
▶ Spain: Nationalism and Archaeology
▶ West Africa: Islamic Archaeology

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Spain: Archaeological Heritage Management

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Introduction and Definition

After the fall of the dictatorship and the adoption of a democratic political system in 1977, Spain was divided into different regions called autonomous communities. These regions are responsible for managing the archaeological heritage located in their territory, and although there is a national framework law – *Ley de Patrimonio Histórico Español*, LPHE – dating to 1985, each one of them has since passed its own legislation. The way that heritage is defined in these texts, using different adjectives such as cultural, historic, and artistic-historic, has implications for the way archaeological remains are considered and preserved. Ultimately, the regional government decides the general policy and actions that are very much related to their general political tendency in a specific region. For instance, if a region has its own language (e.g., Cataluña or Galicia), the archaeological policy will emphasize local and indigenous sites rather than more recent ones or those that deal with a more homogeneous idea of culture, i.e., the Roman period.

The main responsibilities of the Spanish central government with respect to archaeological heritage management, through its Ministry of Culture, are the looting of sites and the export/import of cultural property (LPHE 16/85, article 6b). This issue has become a very sensitive one since the ratification of the Treaty of Maastricht in 1993, which opened up the borders between the European Union member states. If goods can travel freely throughout Europe, does that include archaeological heritage objects as well? The Spanish law is very clear about this: it is forbidden to export archaeological objects more than one hundred years old or inscribed in the General Inventory of Movable Property (*Inventario General de Bienes Muebles*) without authorization from the Ministry of Culture (LPHE 16/85, articles 5.2 and 30). But then again, what do we do with Spanish Civil War remains (1936–1939) found during an archaeological excavation that are younger than a hundred years old? Are they not eligible to receive the same protection? Some of the regional governments have passed their own legislation regarding this issue, and there is a very engaging intellectual debate about using age as a means to catalog, and therefore protect, archaeological remains (Pérez-Juez 2012).

The other principal contribution of the LPHE 16/85 is the creation of different databases, registers, and legal instruments that provide protection to situations and cases forgotten in previous legal frameworks. Among the new legal instruments, the main one is the BIC – *Bien de Interés Cultural* – that could be translated as property of cultural interest (LPHE 16/85, arts. 9-13). It is a narrowly defined tool which, after compliance with a specific administrative procedure, becomes the subject of very strict

Spain: Archaeological Heritage Management, Fig. 1 Talayotic site in Menorca. This Iron Age settlement is a good example of recent monumental sites excavated and restored in order to incorporate them in tourist itineraries. In this case, Menorca, one of the Balearic Island, receives a high number of tourists that visit restored archaeological sites during the summer

protection. The concept of BIC has given rise to doubts and has not prevented the destruction of heritage not listed in the inventory or any of the rest of the categories created in the law (Perez-Juez 2006).

Key Issues

The new regional administrative model, which transferred almost all cultural responsibilities to the regions, has led to an increased investment in local archaeological sites. Since the first decades of its implementation, investment was focused primarily in those sites that deal with indigenous cultures from before the Roman arrival (Celts in the north or Iberians in the east). Issues of identity and the desire to promote a decentralized political and administrative system influenced the sites that were chosen to be excavated and opened to the public. This policy has resulted in the restoration and interpretation of numerous archaeological sites throughout Spain, many of which are difficult to preserve but necessary to foster local involvement and community awareness. Some of the sites have also been grouped in itineraries or routes that integrate different regions, promoting the touristic side of archaeology. The "Via de la Plata Route," The "*al-Andalus*. Routes: the Andalusian Legacy," or The "Iberian Route" are some good examples of the regional governments' goal to preserve archaeological heritage within a more inter-regional landscape (Fig. 1).

The regional governments have created diverse ways of preserving and managing their archaeological remains, but all are based on the idea that heritage belongs to the entire community, despite location on private or public land. This means that any archaeological site must be open to the public if deemed necessary by local authorities. Landowners of the site are also obliged to preserve it, and the destruction of archaeological remains, even those on private land, is a crime that is already generating some interesting legal verdicts. In this regard, the destruction of part of the Phoenician/Carthaginian necropolis of Puig des Molins, Ibiza, by private constructors provides the best – and first – example of a court decision for crimes against cultural property. In 1994, the final verdict sent the defendants to jail as well as condemned them to the payment of three hundred and fifty million pesetas, or 2.103.542,37 euros (Costa et al. 1996). This decision established

a precedent for future cases and finished with the impunity that crimes against heritage had enjoyed for a long time.

Sites on public land can be managed both privately and publicly. This choice is generally made with regard to the specific location of the site, i.e., near a tourist center, in a place with easy access, close to a big city, etc. As tourism is Spain's most important industry, there has been an important effort to restore and present some monumental sites located near coastal tourist regions. Therefore, Roman and Islamic sites, e.g., Ampurias, Segobriga, or Madinat al-Zahra, with their beautiful architecture, have been the main focus of public investment. However, a renewed interest in prehistoric sites and local cultures has resulted in the restoration and interpretation of non-monumental sites in the last few decades. This is the case for all the caves in northern Spain with rock art (Cueva del Castillo, el Pendo, Covalanas, or Tito Bustillo) and other sites with Paleolithic remains like Atapuerca.

European Union Legislation

In addition to the division of the country into regions, one of the recent major forces of archaeological heritage management has been the compliance of Spanish legislation with that of the European Union. The main piece of legislation is the Council Directive 97/11/EC of 3 March 1997, amending Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, generally known as EIA (environmental impact assessment). These directives have been transposed into Spanish national law in the *Ley 6/2001, de 8 de mayo (BOE nº 111, de 09.05.01)*. and Real Decreto Legislativo *1/2008*, de 11 de enero.

This piece of legislation is based on the principle of preventive action and requires, among other things, that archaeological investigation occur before any new construction proceeds, either private or public. The construction of the high-speed train system, airports, and other types of infrastructure has generated numerous archaeological excavations that have yielded an abundance of archaeological data that need to be preserved and studied. The challenge is where to store and exhibit these millions of pieces, whether to build or expand museums or other cultural institutions, and the means to curate the new collections. Public authorities are responsible for seeking out ways of storing, preserving, and showing all the materials that come from the removal of tons of deposits, but in most cases, it becomes a question of budget and space. Some regions, like the Balearic Islands, are assessing their own ways of dealing with this material that has been produced by the economic growth of Spain. Purging some of the findings is one of the proposals on the table, which entails both positive and negative aspects, but might be against the general idea of preserving the past (Fig. 2).

Spain has ratified almost all of the conventions on archaeological heritage preservation and management (e.g., Lausanne, Malta). However, these documents are not always enforced and in many cases they are an indication of the most common practices or remain pure inspiration for internal decisions. In other words, the recommendations made in these conventions will not always be enforced by national or regional policies.

Current Debates

Despite all the new challenges that democracy, economic growth, development, and new European legislation have brought to Spanish archaeological heritage management, the future looks promising. Thanks to the investment in research, restoration, and opening of sites, there has been an increase in public awareness and, therefore, community involvement and private investment. Foundations, local associations, and even corporate engagement are changing the way in which we look at the entire preservation and enjoyment of our heritage. Research has also benefited from this change and new projects are focusing on non-monumental sites. In fact, projects that include research and public outreach are the ones being

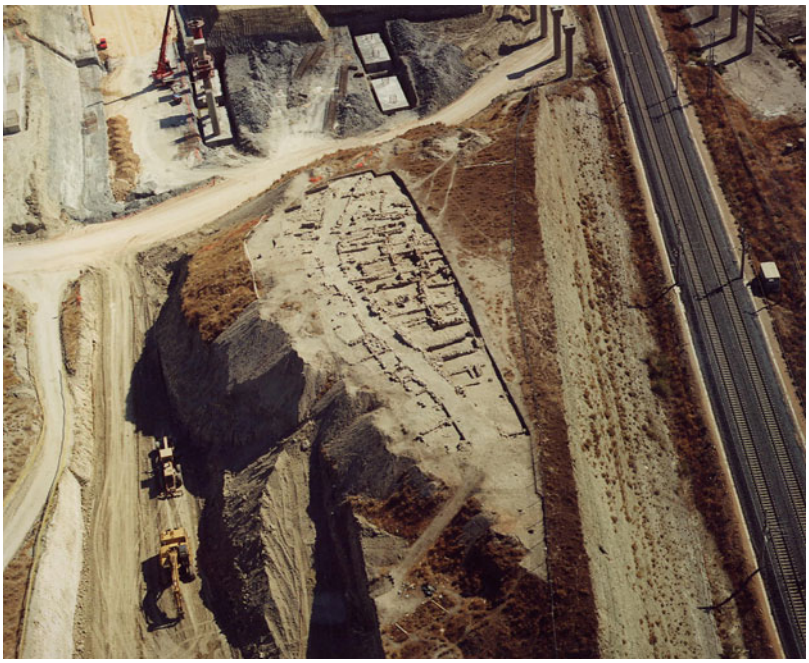

Spain: Archaeological Heritage Management, Fig. 2 El Cerro de la Gavia, Madrid. This Iron Age site was discovered and excavated during the construction of the high speed train tracks in the outskirts of Madrid. The excavation was paid for by public works funds

most supported both by public and private institutions (Pérez-Juez 2010).

A good example of such a joint venture is the project on the paleoanthropological sites of Atapuerca, Burgos, included on UNESCO World Heritage list because of the importance of its fossils for the study of human evolution. In this amazing site, fossils belonging to three different hominin species (*Homo antecessor*, *heidelbergensis*, and *sapiens*.) have yielded important information about the arrival of humans in Europe and their survival and adaptation in the last 1.2 Ma (Arsuaga et al. 2003).

As it relates to heritage management, the sites of Atapuerca have inspired a dual management strategy in which public outreach is equally as important as scientific research, and public outreach programs partially fund research while also promoting community awareness and support. Atapuerca's administration structure involves many entities, including a foundation dedicated to managing private funds and providing legal status to the project. There are also visitor centers, an experimental archaeology park, a research center, and a museum, all of which have promoted the sustainable development of the region, helped to preserve the site, and engaged the community in its preservation.

In 2007, the regional government of Castilla and León (the autonomous community in which Atapuerca is located) created the legal instrument of "Cultural Space" in order to provide a better management framework by expanding the protection of the area beyond the actual sites. In 2009, this same government developed a specific management model with the idea of protection but also of making the sites the epicenter of an economic development in the region: the "Atapuerca System, Culture of Evolution." The Atapuerca System has implemented a more coherent way of managing different bodies and institutions providing a common goal: preservation and sustainable development of the region. It includes most of the abovementioned infrastructure: visitor centers (existing and new ones), the National Center for Research on Human Evolution (CENIEH), the Human Evolution Museum, and others. This integrative formula is new to Spanish heritage management but reveals a current trend that will probably become very successful in the near future (Figs. 3 and 4).

Spain: Archaeological Heritage Management, Fig. 3 Atapuerca site, Burgos. Atapuerca is a good example of a scientifically productive site combined with a very intense public outreach program. In fact, some of the funding comes from private donors that request specific outreach activities for their companies

Spain: Archaeological Heritage Management, Fig. 4 Atapuerca: archaeological summer camps. School kids identifying animal bone. The archaeological camps were developed by the Atapuerca Foundation as part of the public outreach program

Finally, the recently approved "Historical Memory Law" (2007) has raised new questions about archaeological heritage because the excavation of burial sites, bunkers, trenches, battle fields, and other remains from the Spanish Civil War unearths archaeological material that must not only be preserved but also interpreted, displayed, or reburied. The challenge for managing this new heritage not only concerns preservation but also deals with family stories and political messages that can be sent along with the historical information. Although the method used is clearly archaeological, there is still some debate about the remains being unearthed – bullets, water bottles, buttons, buckles, or even guns –some of which will end up in museums and some of which will be reburied, namely, human remains (Fig. 5).

Spain: Archaeological Heritage Management, Fig. 5 Excavated Civil War remains in the Madrid region (1936–1939). These trenches were excavated during the construction of the high speed railway, as part of a contract archaeology project, and shed light on a very important historic period that had not received any attention before the end of the 20th century

Future Directions

The management of archaeological heritage in Spain has evolved from the idea of protecting only beautiful monuments in the nineteenth century to a very broad understanding of what archaeological heritage means. New legal instruments to protect both movable and nonmovable heritage are key for the future, as regional governments gain more responsibility and decentralized policies seem to dictate the actual actions. The challenge for the twenty-first century is to harmonize all the existing legislation – regional, national, and international – and enforce it in a way that brings research and public outreach together.

Another important challenge for the twenty-first century is the revision of the legislation that deals with fiscal incentives in the research and preservation of cultural heritage. The current Law of Patronage approved in 2002 (Ley de Mecenazgo 2002) is short on benefits given to private investment and does not really promote private engagement.

Finally, the new approach to archaeological heritage management within a specific landscape, tightly linked to a community that takes into account all the stakeholders around it, is probably the main idea for the future. Some new challenges arise from this holistic vision of heritage, such as the sustainable development of a region, social cohesion around it, or the construction of an identity. Archaeological heritage management, then, becomes a cultural, social, economic, and political tool that needs some cautious understanding. Heritage can foster a very unique feeling of cohesion within a territory that implies a need and a challenge to use this as a means to preserve and study a site, not to use it as a political weapon (Pérez-Juez 2010).

Cross-References

- ► Conservation and Management of Archaeological Sites
- ► Conservation and Preservation in Archaeology in the Twenty-First Century
- ► Cultural Heritage and the Public

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Spain: Nationalism and Archaeology

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Introduction and Definition

Spain is a nation of nations. It was not always so and this is not an assertion that everybody would agree with. However, it better describes today's political reality than any other possible model. In this entry, the relationship between archaeology and nationalism in Spain will be analyzed, paying particular attention to how this has changed over the last 200 years.

Nationalism is based on the idea that "humanity is naturally divided into nations, that nations are known by certain characteristics which can be ascertained, and that the only legitimate type of government is national self-government" (Kedourie 1993: 1). Although this definition seems to indicate a direct relationship between one nation and one type of self-government, in practice the way in which these two concepts are connected is very flexible and there is a wide range of options on how this link is modelled. At one extreme, it is possible to find nation-states such as the Czech Republic in which a single national feeling exists. In contrast, other nation-states have followed a very different model, and in them several nationalisms exist side by side, complementing another level of nationalism. One example of the latter is the United Kingdom of Great Britain and Northern Ireland, formed by England, Scotland, Wales, and a fourth more problematic nation, Northern Ireland.

In the last two centuries, Spain has moved from one model to the other. The debates about the nature of nationalism in Spain are not unrelated to the development of archaeological practice in the country. These debates are in the background of archaeologists, work. At the same time, new proposals archaeologists make impacts the way in which the nature of nationalism is perceived but through this work archaeologists are also involved in these debates, thus becoming active participants in the negotiations shaping the future of the nation.

Historical Background and Key Issues

Christopher Columbus' arrival in America in 1492 thanks to the sponsorship of the Catholic Monarchs was the beginning of a series of historical events that turned Spain – or, more accurately, the different kingdoms on the Iberian

Peninsula reigned over by the Catholic Monarchs and their descendants – into a mighty early modern empire. After many decades of decadence, the opportunity created by the Napoleonic invasion of Spain (1808–1814) was seized by many colonies to proclaim independence from the metropolis. Spain thus entered the nationalism era as an impoverished country with only a few remaining colonies. Before this, from the sixteenth to the eighteenth century, Spanish antiquarians had actively shared the interest of much of the Western world in the classics and classical archaeology. Excavations of Roman monuments and the search for statues, inscriptions, and coins dominated this research. It was combined with an interest in their own national past, as reflected in Ambrosio de Morales' *Relaciones Topográficas* (1575, 1578). The monumental past left behind by the major civilizations in the Mesoamerican and Andean areas was also the focus of attention of both Spanish and local scholars. Information about American ruins had been known since the sixteenth century, and some archaeological monuments, including Palenque in Mexico, were excavated at the time partly thanks to royal funding. The language of the past became a new way of expressing power, abandoning in this way the religious discourse.

The end of the Enlightenment saw the first signs of the regulation of antiquities within the framework of the creation of the modern state. From 1752 the Royal Academies of History and of Fine Arts had been in charge of archaeological excavations and the Academy of History proposed the first ban on the illegal export of antiquities in 1779. The law passed in 1803 to protect monuments and antiquities would be in place for a century, despite the Napoleonic invasion and the many political changes in the history of Spain.

Nineteenth-Century Archaeology in Spain and Nationalism

Spain satisfied the four criteria that nations had to fulfill to be accepted as such (Hobsbawm 1990: 18). The first was the threshold principle, by which only states dominating large territories could qualify as nations. This principle allowed countries such as France, Britain, and Spain to be considered as nations and included others in the Americas, such as the United States and the new countries born out of the decolonization of Latin America. Spain also met the other three criteria: having a long-established elite with a literate and administrative vernacular, having the ability to conquer, and being a historical state (Hobsbawm 1990: 37-38). It was this last condition that convinced politicians and learned individuals all over the Western world of the importance of history and archaeology. Archaeology was – and is – important to nationalism, because by definition nations have a past. This past is constructed through a narrative with data coming from archival documents, philological genealogies, and antiquities. Archaeology, therefore, was one of a range of disciplines that fed national history and national identity. However, in the nineteenth century, the professionalization of archaeology was only partial, as there was a widespread belief in the preeminence of historical documents over material culture remains. At that time, therefore, most scholars dealing with antiquities generally earned their living by other means and satisfied their curiosity regarding the historical roots of their nation in their leisure time. Spain was no exception to this.

King Fernando VII's death in 1833 brought to an end the attempt to continue with the Ancient Regime status quo that had begun with the defeat of the Napoleonic troops in 1814. The modernization of the country led to the dissolution of the monasteries as a way of controlling ecclesiastical power. This involved a change in the ownership of many buildings and in some cases of large territories previously owned by the Church, as well as a sudden increase in the number of antiquities and works of art in circulation. All over Spain two types of institution were set up to deal with this situation: provincial museums and Provincial Commissions for Historic and Artistic Monuments (Comisiones de Monumentos Históricos y Artísticos). The responsibility of the latter was to care for and protect buildings, monuments, and artistic objects that, because of the "beauty of their construction, their antiquity, their origin, their particular use or the historical memories (recuerdos) they impart," should be

preserved (Royal Order 2 April 1844). The first learned archaeological societies, including the Spanish Academy of Archaeology and the Archaeological Society of Tarragona, were also founded during this period. Antiquities were also discussed in new learned journals such as *El Artista* and *Semanario Pintoresco Español*.

The building of the modern state went one step further in 1856 with the establishment of the Higher School of Diplomacy (ESD, Escuela Superior de Diplomática), set up to educate archivists, librarians, and museum curators (first called antiquarians and then, from 1900, archaeologists). This school would be the main learning center for professional archaeologists until 1900, when its lecturers were integrated into the mainstream university system. Most of those taught there went on to work in museums and also children's secondary schools, and from their posts many engaged in archaeological activities and published in the journal related to the ESD and the professional body for museum curators, archivists, and librarians.

In addition to this institutionalization, the influence of nationalism on Spanish archaeology can be seen in the geographical areas and fields of research and the interpretations proposed. The dominant Madrid-based model of Spanish nationalism, which emphasized the Castile-Andalusia axis as the embodiment of the Spanish national spirit, was clearly reflected in the first major national history, Modesto Lafuente's *General History of Spain* (1850–1867), which would become a key factor in the formation of a Spanish national consciousness. Lafuente's work stressed a series of heroes such as the native Viriatus, one of the "unschooled warriors that Spanish soil has always bred" (Lafuente 1850: 22). It highlighted the heroic resistance of Saguntum and Numantia against the Romans but also showed pride in the Spanish contribution to the Roman Empire. However, Lafuente's account of the medieval period occupied many more pages than those devoted to the previous epochs, giving pride of place to the reconquest of the Christian kingdoms in the territory under Muslim rule. The discourse so well expressed by Lafuente and followed by most contemporary scholars was not however devoid of contradictions. Together with the emphasis on Christianity as a key element in the Spanish spirit came a penchant for the reminiscences of Islamic Spain, including Andalusian folklore and Islamic monuments and antiquities. There were also contradictions regarding earlier periods: whereas Roman ruins were perceived as the embodiment of the pedigree of civilization on Spanish soil, the protohistoric deeds of the Celtiberian town of Numantia were hailed as an early demonstration of the brave and resilient character of Spaniards.

The unification of Italy in 1860 (completed in 1870 with the inclusion of Rome) and Germany in 1871 made it much more acceptable for previously divided territories to claim a common ancestry and to be recognized in the international arena as such. Importantly for Spain, the key role played by the vernacular language in both Italy and Germany also made it conceivable for areas that already formed part of a nation-state, but in which a different language was spoken, to claim their right to political independence. In Spain such areas existed in the most developed industrial regions including Catalonia and the Basque Country (as well as in less prosperous areas such as Galicia, the Balearic Islands, and the Valencian Country and in many other areas of Spain where peasants spoke dialects that were not easy for Spanish speakers to understand). Barcelona, and to a great extent also Bilbao, became culture hubs and in them cultural and social elites developed a sense of a separate ethnic identity. Alternative versions to Lafuente's unitary understanding of Spain emerged, all of them stressing the plural nature of the Spanish nation. Catalan historians delved into one of the most important periods in their own history, the flourishing Middle Ages, and recalled Catalonia's role in the reconquest. The attraction towards the Catalan past as a whole was reflected in the appearance of learned societies whose interests covered not only the province of Barcelona but also the four Catalan provinces and, to a great extent, all the areas of Spain where Catalan was spoken, including the Valencian Country and the Balearic Islands. Examples of these learned associations

were two rival Catalan Societies of Excursions established in 1876 and 1878.

Professional archaeology, however, was still directed from Madrid: official training continued to take place at the Madrid-based ESD and the National Archaeological Museum, opened in 1867, had the largest number of professional archaeologists. The areas in which scholars undertook their studies were revealing – whereas throughout the Spanish territory scholars limited themselves to studying the antiquities found in their own provinces (or language areas as in Catalonia), Madrid-based archaeologists managed to deal with the whole of the Spanish territory, thus mirroring the centralized administration of Spain. Interestingly, most of the studies undertaken by members of the National Archaeological Museum dealt with antiquities from Castile and Andalusia.

Monarchy, Republic, and Dictatorship: The Changing Context of Archaeology in the Twentieth-Century Spain

The twentieth century started in Spain with a sense of gloom –Prime Minister Cánovas had been assassinated in 1897 and the last colonies of the once mighty Spanish empire had been lost the following year. The Spanish role in the scramble for Africa had also been minimal. Politically, however, the regime created by Cánovas in 1875, the Restoration, continued seemingly unaffected for two more decades until 1923. Thus, Spanish politics remained anchored in a *caciquismo* that systematically riddled parliamentary elections and allowed the two major parties to alternate in power. However, this status quo was increasingly challenged, especially by the growth of Catalan and Basque nationalism. A mixed formula was proposed, particularly in the case of Catalonia, where it was not necessarily independence that was being sought but self-rule within a Spanish federal state.

Catalan nationalism had emerged in the last third of the nineteenth century, beginning with a strong sense of regionalism that was increasingly transformed into nationalism. In his seminal book, *The Catalan Nationality* (1906), the Catalan politician Enric Prat de la Riba claimed that the origin of the Catalan nation lay in the pre-Roman Iberian peoples who spread over the whole area where Catalan was spoken, from Murcia to the Rhône. He suggested that even then a special phonetic system seemed to indicate the distinctiveness of the language spoken at the time in comparison to neighboring areas. The Roman conquest had regrettably meant the disappearance of the Iberian peoples, whose ethnos would only be revived during the medieval period.

The new atmosphere in Catalonia encouraged the institutionalization of historical and archaeological research. The Institute for Catalan Studies (Institut d'Estudis Catalans, IEC) was founded in 1907. Its remit was to investigate everything to do with Catalan culture, language, and history and its sections included one for archaeology. One of its founders and presidents, the architect Josep Puig i Cadafalch, began the excavation of the ancient Greek colony of Emporion, seen as the origin of the superior intellectual prowess of the Catalan nation in comparison with other areas of Spain. In 1917 Puig i Cadafalch succeeded Prat de la Riba as president of the Mancomunitat de Catalunya, a limited form of self-government enjoyed by Catalonia between 1909 and 1923. Both the Mancomunitat and the excavations in Emporion came to an end with the imposition of General Primo de Rivera's dictatorship (1923–1930).

Also associated to the IEC was Pere Bosch Gimpera. He became interested in archaeology while in Germany on a training grant and was given the first chair in the field shortly after his return in 1916. Significantly, his Ph.D. dealt with the Iberian culture. Until he had to leave Spain and go into exile in 1939, he was able to develop the teaching of prehistory at the university and form a group of students – mainly Pericot, Castillo, and the Serra Rafols brothers – and in 1935 he had also managed to open a museum with collections coming from older institutions. In his writings Bosch Gimpera clearly followed Prat de la Riva in considering Spanish prehistory as a precursor of a multicultural Spain. This thesis was best expressed in his major work *Ethnology of the Iberian Peninsula* (1932).

In the Basque country, the study of prehistoric archaeology was also encouraged, although the main institution was a learned society, the Sociedad de Estudios Vascos (SEV), known in Basque as Eusko Ikaskuntza (Society of Basque Studies). This meant that the three main experts in prehistoric archaeology had to combine their interest in archaeology with the activities involved in their own jobs. Although two of them, Telesforo de Aranzadi and Enrique Eguren, worked in universities; they taught areas other than archaeology and therefore were not able to train future Basque practitioners of prehistoric archaeology. The third, Father José Miguel de Barandiarán, tried to organize the infrastructure of Basque archaeology from 1916 onwards. He founded the Laboratory of Ethnology and Basque Folklore (Laboratorio de Etnología y Folklore Euskera, in 1916) and the Seminar of Ikuska Prehistory (El Seminario de Prehistoria Ikuska in 1921), later known as the Centre for Prehistoric Research (Centro de Investigaciones Prehistóricas, in 1925, part of the SEV) (Barandiarán 1988: 44). He also fostered the journals Euskalarriaren Alde and Anuario de Eusko-Folklore (created in 1921), which from 1927 included a section on prehistory. Like Bosch Gimpera in Catalonia, Barandiarán stressed a straightforward relationship between prehistoric and modern Basque culture.

Madrid had many more archaeologists than anywhere else in Spain. The university was an example of this. Whereas other universities in Spain had either one chair or none at all, Madrid had one until 1911 and then three: one of Epigraphy and Numismatics for Antonio Vives; one of Archaeology for someone who had long experience in museums and would eventually become the director of the National Archaeological Museum, José Ramón Mélida; and a third of Islamic Archaeology, given to the Andalusian, Manuel Gómez-Moreno. The last two were also involved in setting up a research center, the Center for Historical Studies (Centro de Estudios Históricos). As happened in France, those dealing with the earliest periods of prehistory were involved more in the natural sciences. The person in charge of organizing prehistoric archaeology was Francisco Hernández-Pacheco, Professor of Geology at the University of Madrid from 1910. His alliance with the Count of Cerralbo led to the establishment of the Commission for Paleontological and Prehistoric Research (Comisión de Investigaciones Paleontológicas y Prehistóricas, CIPP 1914). However, during the First World War the exile to Spain of one of the scholars who had held a chair at the Institute of Human Paleontology in Paris, the German Hugo Obermaier, changed the balance of power. Tensions between Obermaier and Hernández-Pacheco led to the creation of a chair of Prehistory for Obermaier at the University of Madrid and the effective isolation of Hernández-Pacheco and the CIPP. Nationalism not only was an influence in politicians´, decisions to provide with more funding for the instittutionalization of archaeology in Madrid, as the capital of the Spanish nation-state but also encouraged archaeologists from Madrid to undertake research in the whole of the Spain, unlike their Catalan or Basque counterparts.

The Franco Dictatorship

The tensions of the first three decades of the century resulted in a bloody Civil War in 1936–1939. In contrast to the abuses of archaeology that would take place in both Italy and Germany, in Spain there are relatively few major examples of misuse of archaeological data. This was simply because the periods archaeologists were researching were not part of the nationalist discourse and politicians did not find it necessary to make use of archaeology to the same degree. However, this does not mean that it was not affected. Despite of only three major archaeologists – Obermaier, Bosch Gimpera, and Barandiarán – having to go into exile, a few died and, significantly, all those who remained in their posts had to survive a political purge. The new regime created an office to organize archaeology. This would have been an excellent idea had the person chosen to preside over it not turned out to be highly incompetent. Prof. Julio Martínez Santa-Olalla proved to be a manager influenced by his own likes and

dislikes and lived in fear of anybody who tried to overshadow his newly acquired power. He kept for himself and his cronies much of the state funding on excavations. The funds he gave himself were related to archaeological projects about which very little was ever published. He also promoted nonprofessionals by funding their fieldwork while starving those working in universities of much needed funds. As a consequence, a divide was created between professionals and amateurs, one that still survives today. The anti-Santa-Olalla alliance brought together professors from Madrid (Antonio García Bellido, Martín Almagro Basch), Barcelona (Luis Pericot, Alberto del Castillo) and other young professors from elsewhere in Spain who had trained in Valencia-Madrid and Barcelona (Antonio Beltrán, Juan Maluquer). They were also the ones involved in the International Congresses of Prehistoric and Protohistoric Sciences.

Declarations of support for the Spanish nation as the regime understood it were very explicit, especially in its first years. They came in the form of exhibitions and introductions and prefaces to publications. Alternative nationalisms were hidden under the rubric of regionalism in Catalonia and the Basque Country. To complicate the situation, the professor in Barcelona for the first 15 years of the regime, Martín Almagro Basch, was not Catalan. He trained most of the future generation of Catalan archaeologists and skillfully placed them in the newly created chairs at universities all over Spain. The Catalan professor, Luis Pericot, mainly devoted his time to finding funds to allow others to work. He managed to convince private sponsors (the British and American magnates Leslie Good and William L. Bryant) and also obtained much funding from the American Wenner-Gren Foundation. In the Basque country, Barandiarán returned from exile in 1953 and some institutions were founded, some similar to those mushrooming in other parts of Spain – mainly the Vizcaya Provincial Government Department of Archaeological Research in1958 and the Province of Alava Archaeological Institute in 1966. There were others that focused more on the Basque country, such as the Aranzadi Institute for Archaeological Research (Instituto de Investigaciones Arqueológicas Aranzadi, created in 1962). Archaeology was first taught at a Basque university in 1964.

The Last Forty Years

It has been almost 40 years since the dictator Francisco Franco passed away in his sick bed and Spain went through a relatively smooth transition to democracy. The country is now a quasi-federal state with many of the state areas of responsibility devolved to the 17 Autonomous Communities. Archaeology is, therefore, managed in 17 similar but distinctive ways, each with its own heritage law which is, however, governed by the Spanish Historic Heritage Law of 1985. At first the Autonomous Communities enthusiastically encouraged archaeology in their territories, either in the form of excavations, research, or museum exhibitions. Gradually, however, with the introduction of commercial archaeology, governments began to realize that they could save money by making building contractors pay for it. The loss of politicians' zeal for archaeology may also be related to the way in which the discipline presents its results today – characterized by a high degree of technicality resulting in a distancing of the knowledge archaeologists are producing from the attention of the general public. National histories need an understandable and credible past in the form of a discrete number of archaeological cultures. These are then identified with a particular ethnic group considered as the origin of the modern inhabitants of the nation. This is not what archaeologists write about in their more specialized publications, and consequently both politicians and the general public favor a more "Disneyfied" version of the past. In the current economic climate, it is not surprising that many archaeologists without permanent positions working for the Autonomous Communities and other bodies, as well as in contract archaeology, are seeing their careers curtailed. It looks like we may be entering a new period in the relationship between archaeology and nationalism in Spain.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology and Politics
- ▶ Nationalism and Archaeology
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Spain: Archaeological Heritage Management

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Spatial Analysis in Field Archaeology

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Introduction and Definition

Spatial analysis deals with the use of space in the past. Such analyses are performed at two main scales: (a) *intra-site level* (some archaeologists argue for further differentiation within a site, defining micro and semimicro levels) and (b) *inter-site* or landscape level. Both analyses are concerned with finding patterns of distribution, whether of finds and features (usually at site level) or of sites and monuments. Spatial analysis at both site and inter-site level may also contribute to the elucidation of *sequence*. While the employment of some methods at both levels is broadly similar – e.g., *GIS*-based mapping or various statistical analyses, others are unique for each level. For example, GPR is more suitable for the establishment of intra-site patterns, while digital terrain modeling is more cost-effective on a landscape level. The number of methods and techniques used in spatial analyses is ever-growing and diversifying.

Key Issues

On Site (Intra-site)

On site, the plotting of artifacts and features allow the identification of certain activity areas

(marked by objects), sleeping areas (blank spaces in a building), community areas (open spaces in a settlement), and so on. The mapping of finds may also indicate intrusions that are natural (the course of a stream) or anthropogenic (the line of a ditch) that are otherwise hard to see. Most often the analyses are performed after excavation and fieldwork is finished, which is why proper recording of locations during the investigations is crucial (see the entry on ▶ Recording in Archaeology in this encyclopedia). Analysis of the context records and an understanding of taphonomy and deposition (see also the entry on ▶ Site Formation Processes in this encyclopedia) is key for the correct understanding of, e.g., whether matching fragments of artifacts found in different contexts alludes to contemporaneity of the features (Kobyliński & Moszczyński 1992) or to the social practice of curation (Garrow et al. 2005). The relative size and disposition of structures and the routes between them are used to infer the relative importance (hierarchy) of buildings and the social routines practiced within a settlement.

At a smaller scale, *access analysis* explores the use of space by mapping the relative ease with which rooms may be approached within a house, allowing archaeologists to propose the location of high-ranking or special users. An eloquent example of access analysis was used to study social inequality on Bulgarian tells (Chapman 1990). Four more or less fully excavated tells (Ovcharovo, Targovishte, Radingrad, Poljanica) served as the basis for an analysis of the development of social space throughout their use (Fig. 1). The settlement maps showed the houses, the number of rooms within them, and access to each room from the main entrance. At Targovishte and Radingrad (Fig. 1a), one or two rooms were accessible from the entrance and two or three further rooms reached in succession with minimal choice. By contrast at Ovcharovo and Poljanica (Fig. 1b), houses eventually contained up to 11 rooms with multiple choice of access, a pattern that was held to reveal to the successful reproduction of social inequality. The simpler access pattern at Targovishte and Radingrad was interpreted as being owed to a relatively unstratified community, and it was suggested that failure to find an adequate material way to contain social rivalry led to the relatively short lifetime of these two tells.

In the Landscape (Inter-site)

In one of the most commonly practiced types of landscape investigation, the documentation of surface finds can provide information about the intensity of discard and, thereby, infer occupation (see the entry on ▶ Surface Survey: Method and Strategies). The mapping of features registered by noninvasive techniques (such as *aerial archaeology* and *subsurface investigations*), supplemented by detailed archival research (including historical records), is also used to create a narrative picture of landscape habitation. In most modern studies, a combination of survey methods is applied. The spatial particularities of the mapped distribution of features and artifacts in a landscape usually provide the basis for studies of settlement patterns; subsistence strategies; political, military, and ideological utilization; and reorganization of the landscape. The recognition of time depth is important in a landscape, as it is in an excavated site. The idea of a *palimpsest* (Aston & Rowley 1974) acknowledges that landscapes are "layered" as century follows century, giving so-called diachronic patterns. Thus, the establishment of changes over time by interrogating the evidence for erased episodes of human occupation, or identification of multiple phases of occupation, is a major task assisted by spatial analysis.

Early examples of spatial analysis at the landscape level generated maps with dots, representing sites and/or finds to which various analyses would be applied to improve the pattern using statistical packages such as *cluster analysis*. Such analyses set out to define not only the location of sites, but their relative importance (from their size or the quality of finds). The sites discovered are most often seen as settlements, but the same principles have been applied to cemeteries, burial mounds, and hill forts. *Central place theory* uses the size of settlements to construct dependent territories around them. The land was also routinely modeled by surveying the surface in three-dimensions and representing it in the form of *contours* or *hachures*.

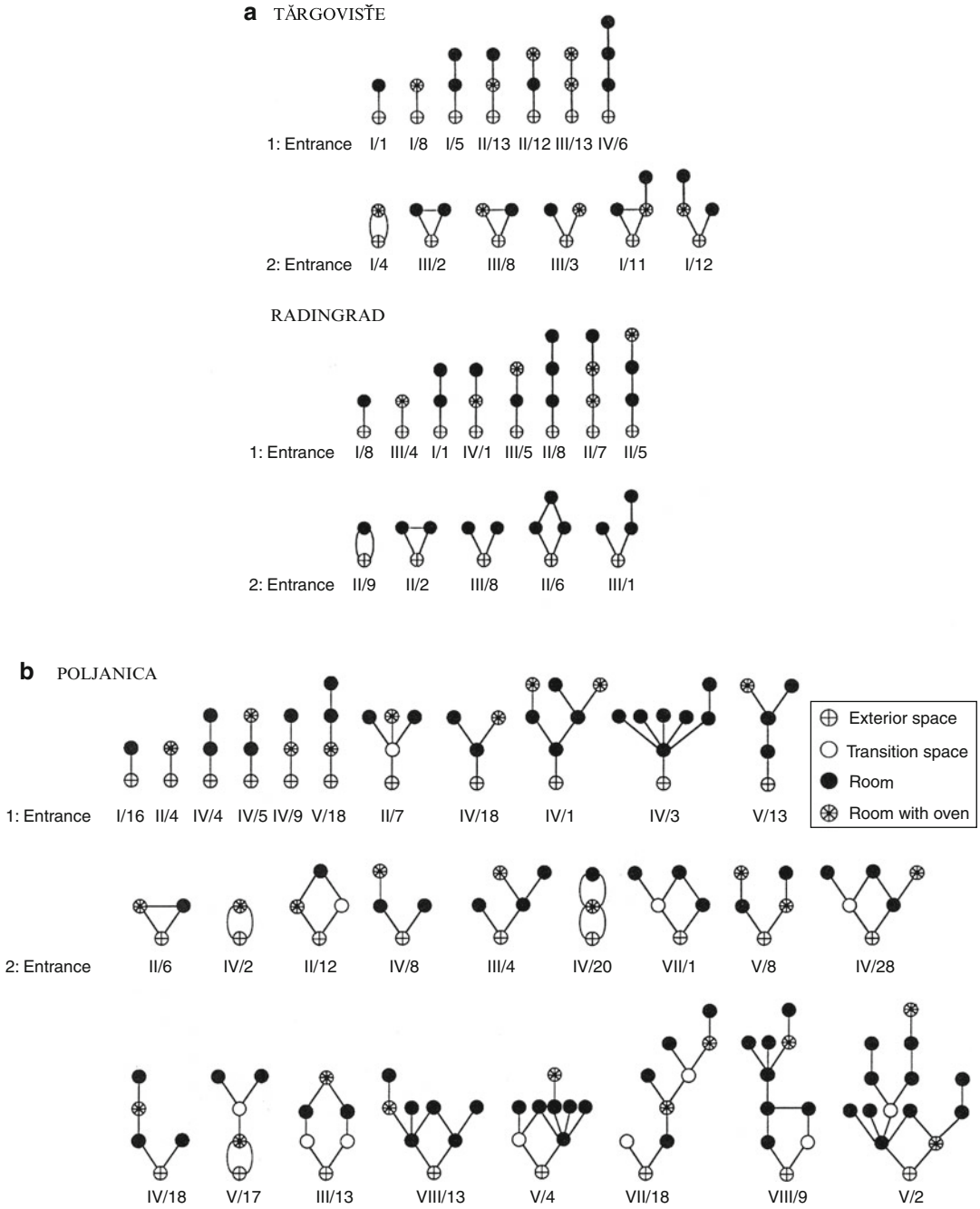

Spatial Analysis in Field Archaeology, Fig. 1 Access levels of Bulgarian tells showing number of rooms and complexity of house organization (**a**) Targovishte and Radingrad; (**b**) Poljanitsa

More recent landscape studies have added to the power of spatial analysis by collecting different variables (for example, placenames, surface finds, settlement locations) and entering their coordinates into a computerized data base to make a series of digital maps. The stack of digital maps forms a *geographic information system* (GIS), which can be interrogated in a large

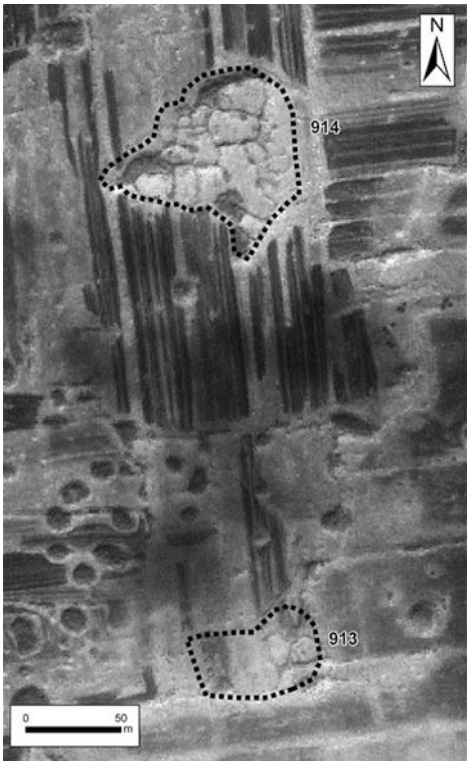

Spatial Analysis in Field Archaeology, Fig. 2 Structures in the North basalt study area of Homs, Syria, showing settlement clusters (After Philip et al. 2011)

number of ways in order to bring out spatial relationships between variables that are often unsuspected. The surface of the landscape itself can also be digitized using *LiDAR* imaging. The data collected from the air is used to generate a three-dimensional surface on the computer – a *digital terrain model* (DTM). Using graphics programs, the DTM can be viewed from different angles to offer a realistic vision of the landscape from different locations, in different periods (*hillshade models*). The same database can be used to generate models showing which parts of the land could be seen at other parts (*viewshed*). These new tools enable the ancient landscape, its settlement patterns, and the routes through it to be envisioned in considerable detail.

A recent project in the area of Homs in Northern Syria examining the distribution of settlement types was able to group them in revealing new combinations (Philip et al. 2011). Traditionally, the area of southwest Asia is perceived as a tell-dominated landscape and the southern marl-based part of the study area confirmed this observation. The northern study area, however, with its basalt environment seemed to have facilitated a different type of occupation. Single and clustered irregular and rectilinear units of different sizes, a stone enclosure, and many cairns mostly on slopes and ridges were mapped, revealing settlement clusters (Fig. 2). Functional and chronological differentiation was established between the grouped irregular and the grouped rectilinear structures, thus suggesting changing strategies of engagement with the landscape. Several "waves" of occupation/settling have been proposed, starting with the well-documented settlement expansion in southern Syria during the Chalcolithic/Early Bronze Age and reoccurring in Roman and Byzantine periods, mostly associated with field systems – a pattern of land use that remained in place till modern times. The presence and mapping of thousands of hitherto overlooked cairns poses questions about the long-term landscape management of a stony environment that is intimately related to perpetuated social practices. The main result of this project is the demonstration of the diversification of the settlement patterns in Northern Syria in both space and time.

Cross-References

- ► Aerial Archaeology
- ► Recording in Archaeology
- ► Site Formation Processes
- ► Surface Survey: Method and Strategies

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"Speculative Phase" of Archaeology

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Introduction

The "Speculative Phase" is so named due to the nature of speculation that was involved in archaeology before it was formed as an academic discipline and established professional practice and training. Archaeology was speculative in every way: financial, individual, exploratory, for publicity, and to aggrandize nationhood. (Unfortunately financial speculation has never left the practice of collecting antiquities.) Many of these factors continued beyond the "Speculative Phase" and played a part before it. This entry covers the move from the collection of antiquities to archaeological excavation during the nineteenth century and also considers how archaeology was sponsored as well as the role of the "explorer-archaeologist." It argues that a shift to classificatory systems and detailed observation was informed by developments in the natural sciences. Further, it contends that "informal imperialism" in Europe and North America was crucial to the development of archaeology in this phase and the role of archaeology in more formalized and military colonialism is examined in this regard.

From my perspective as a museum professional in Britain, I point to the legacy of the "Speculative Phase" in museums in debates around restitution as well as the display and repatriation of human remains. Related to these contentious issues is a greater curatorial comprehension of our own history, which is in turn presented to the wider public, and the re-emergence of the importance of amateurs and local societies in contemporary practice within British archaeology. There is a vast scope for future directions within this field and as a result this entry can only point to the importance of cross-disciplinary and international connections within scholarship, the continuing impact of "hero archaeology" and how this is related to the study of the role of the workforce in this period.

Definition

The "Speculative Phase" of archaeology is defined as covering the move toward excavation in the field and the construction of archaeology as a professional and academic discipline. It describes the shift away from amateur antiquarian organizations and "armchair" scholars to a more formalized involvement of institutions, such as museums, universities, and learned societies as well as the role of related individuals (Díaz-Andreu 2007). These institutions and individuals had an impact on archaeology across the world, but were based in Europe and North America during this period. Nationalist and imperial motivations also became more important in the collection of antiquities for display in museums (Trigger 1989).

The "Speculative Phase" of archaeology could encompass an extremely broad historical period and geographical area, extending from interest in the past in antiquity and ending with the formation of the study of archaeology as a discipline in universities in the early twentieth century. It has been defined previously in relation to American archaeology as lasting from 1492 to 1840 (Willey & Sabloff 1993). This definition begins with the removal of antiquities from monuments and rudimentary excavations in the early nineteenth century, but positions the main "Speculative Phase" as covering excavations from the 1840s to the 1870s. It gradually finishes in the 1880s and 1890s when archaeology was established as a subject in universities in Europe and North America. This period sees a gradual

growth of more descriptive analysis and advanced methods in excavation.

A defining feature of the "Speculative Phase" is the intertwining of archaeology, the history of art and anthropology. These areas were formed as separate academic disciplines at around the same time. Classical archaeology and art history, for example, were closely interlinked due to the aesthetic writings of Winckelmann and Hegel. The Parthenon Sculptures, removed by Lord Elgin and his associates from Athens during the 1800s and bought for the British nation in 1816, were placed within "the territory of art through the deployment of concomitant discourses" through references to the marbles as "works" associated with the artist Pheidias (Whitehead 2009: 83). Archaeology was allied to anthropology in other areas, particularly in North American, Southeast Asian, and African archaeology (Christenson 1989).

Ethnography and archaeology were particularly intertwined with regard to prehistoric periods in all areas of archaeology. This intertwining can be seen clearly in the work of the anthropologist and archaeologist General Augustus Henry Lane Fox Pitt-Rivers. Pitt-Rivers' theory of the "evolution of culture," based on Darwin's *On the Origin of the Species* and ideas around "social Darwinism," was reliant on the idea of typology. Typologies were based on objects with similar functions being placed in a chronological sequence on the basis of design. An idea that was later crucial to the work of the archaeologist William Matthew Flinders Petrie. The Pitt Rivers Museum in Oxford still organizes Pitt-Rivers' collections and objects from across the world in these typologies. Pitt-Rivers also applied this idea to his work in field archaeology on Paleolithic, and other, sites in England and Ireland.

Historical Background

Collections of classical sculpture had been made by wealthy patrons in Europe since the Renaissance (Haskell & Penny 1981). The "Speculative Phase" moves from armchair scholars to excavation and mapping of actual antiquities and sites in the field. An early example of this shift is the scientific expedition of artists, antiquarians and engineers, known as the "savants," who were sent to assist the army in the French military invasion of Egypt in 1798–1801. The savants also mapped archaeological sites, making accurate drawings and collected antiquities. Their observations and findings were published as the *Description de l'Égypte* between 1809 and 1820. The impact was as much on contemporary style and fashion as archaeological practice. However, the *Description* set an exceptional standard for recording investigations of ancient sites and monuments. Arguably, though, the more immediate influence of the French expedition was on the removal of antiquities from sites elsewhere, usually from the South or Eastern Mediterranean, for public display in national museums.

The removal of the sculptures from the Parthenon and other monuments on the Acropolis by the British peer Lord Elgin and his team in the early 1800s was accompanied by a less well-known collection of drawings and maps of the buildings on the Acropolis (Gallo 2009). The subsequent sale of the so-called Elgin Marbles marked a shift from a private collection of antiquities built up through auctions in Italy and elsewhere and the removal of objects either from a building in situ or excavated from the ground. The group of architects and antiquarians known as the Xenion Society excavated sculptures from the Temple of Aphaia in the Greek Island of Aegina and from the Temple of Apollo in Bassae in the Greek Peloponnese. They sold the antiquities at public auction: the Aegina sculptures to the Crown Prince of Bavaria in the first instance for display in his new museum the Glyptothek in 1812 and the Bassae sculptures to the British Commandant of the Ionian Islands for display in the British Museum in 1815. These rudimentary excavations and removals were speculative in a financial sense as well as in a theoretical one and were dictated by contemporary artistic taste for Greek sculpture. Nevertheless, they mark an important shift from collection to excavation, however rudimentary.

Travel and related literary observation was important in developing early archaeology. It was such literary speculation made by travellers around the mounds and ruins found in western parts of North America that gave rise to the myth of the "mound builders." This myth held that the "mounds" could not have been built by Native Americans but must have been erected by a "more civilized race" that had since migrated or disappeared (Willey & Sabloff 1993). This myth continued until late into the nineteenth century, despite surveying of the mounds by E.G. Squier and E.H. Davis in the 1840s, later published as *Ancient Monuments of the Mississippi Valley* in 1848. Squier and Davis' work had the support of the American Ethnological Society and was published by the newly formed Smithsonian Institution. This institutional support for the surveying and connection to a learned society was indicative of the move from an amateur to a more professional focus. The mound builder controversy was also typical of theories around migration and archaeology based on ideas of "racial" hierarchies and diffusionism that existed well beyond the "Speculative Phase."

Emphasis on successive development was supported by the use of classification systems. For example, the periodization of "prehistory" was put into three ages: the Stone Age, the Bronze Age, and the Iron Age by the Danish curator and archaeologist Christian Jürgensen Thomsen. Thomsen based these three ages on accounts from archaeological reports and typologies of different grave goods in the early 1800s. He equated these with different layers in the ground. Thomsen's "three ages" had a profound effect on the understanding of prehistory and typologies more generally; in fact, these ages are still reflected in the display of objects in the Pre-History Galleries of the National Museum of Denmark in Copenhagen today. The publication of Thomsen's *Primeval Antiquities of Denmark* by J.J. Worsaae in 1849 meant that the "three ages" would have a major impact in the English speaking world (Stocking 1985: 72–73). The shift from speculative to systematic archaeology was also assisted by developments in the natural sciences such as Charles Lyell's *Principles of Geology* (1830–1833), which defined geology as "the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature." Lyell's *Principles* illustrated how fledgling disciplines with aspirations to scientific status could define themselves. The process of successive phases of geological development also influenced the idea of the "great chain of being" within art, anthropology, and archaeology. The "great chain of being," or "chain of art," defined civilizations in successive phases of excellence and merit, with the Greek art of fifth-century BCE Athens at the top.

Key Issues/Current Debates

One of the key issues in this period is national aggrandizement and the role of the state in funding international archaeological excavations characterized by the "informal imperialism" of northern European countries. The Eastern Mediterranean particularly documents the move toward large-scale excavation in the 1840s through the expeditions of Charles Texier in Turkey (1833) for the French Ministry of Culture, Charles Fellows in Lycia Turkey (1841–1843) for the British Museum, and Paul Emille Botta in Assyria (1842–1845) for the Louvre and Austen Henry Layard (1845–1851) for the British Museum. Although it should be noted that Britain and France had very different approaches toward funding and the role of the state in archaeological sponsorship. The French Ministry of Culture had a far more direct approach, while the British had a "public-private partnership" between individual "explorer-archaeologists," the British Museum and the Foreign Office (Hoock 2007) for which careful diplomacy was essential. The interest of German States in excavation and purchasing antiquities had already been illustrated by the sale of the Aegina sculptures in 1812. After German unification in 1871, the German Archaeological Institute and related national museums played a much larger role in competing for excavation permits at sites and

"Speculative Phase" of Archaeology,
Fig. 1 "Lions in the Court of Konak," from Newton & Pullan 1862, Plate XV

antiquities well into the twentieth century. Similarly, the formation of societies and museums in the United States of America as well as increasing interest of the Ottomans in the ancient past of their own Empire meant that from the 1870s Britain and France no longer carved up the Eastern Mediterranean between themselves.

The nebulous role of diplomacy within "informal imperialism" was an important factor of the "Speculative Phase" of archaeology and has not been fully investigated. A good example of the connections between excavation, collecting for the nation and diplomacy is in the 1852 appointment of Charles Newton, a former assistant curator at the British Museum, as vice-consul in Lesvos, at that time part of the Ottoman Empire, with a remit to collect antiquities (Gunning 2009). Newton's appointment and subsequent excavations at the Mausoleum of Halicarnassus and surrounding area in 1856–1858 heralded a different approach to archaeological excavation (Fig. 1).

Newton created a team to excavate that was composed of professional engineers, artists, surveyors, and photographers, as well as local Turkish workers and British sailors from the Royal Navy. He made tentative steps in field excavation through mapping and photography, which was followed by Richard Popplewell Pullan's excavation at Priene in Turkey in the 1860s and his grid-mapping system (Fig. 2).

Newton took the credit for the discovery of the Mausoleum of Halicarnassus, a lost "wonder of the world," though it has since been proved that the engineer Robert Murdoch Smith located the site of the Mausoleum. This subsequent discovery damaged Newton's posthumous reputation but illustrates the importance of claiming credit for discoveries.

The "Indiana Jones" image of a charismatic heroic archaeologist was also formed during this "Speculative Phase." The display of these antiquities in a museum, and usually in the national museum, led to public interest fuelled by media coverage as well as the lionizing of the archaeologists themselves (Stiebing 1994). Giovanni Battista Belzonni was an earlier example of a "showman archaeologist" and was literally a showman before travelling to Egypt in 1815 and collecting antiquities.

As noted above, a key emphasis in the "Speculative Phase" is on the archaeologist as heroic explorer. Archaeologists in Britain in

"Speculative Phase" of Archaeology, Fig. 2 "Great Stone Outer Face," from Newton & Pullan 1862, Plate VIII

particular needed to campaign to get funding and public support for their excavations from government and museum bodies. Austen Henry Layard is probably the most high profile example of this kind of "explorer-archaeologist" and he energetically publicized his discoveries in Assyria through publications of travel/archaeological books, lecture tours, newspapers and magazines (Fig. 3).

Layard tapped into public interest in biblical archaeology to gain support from an apathetic establishment at the British Museum. Although these budding archaeologists made claims in advancing scientific methods, and in many cases did so, the hasty practice of Heinrich Schliemann at Troy and the fabricated evidence of Louis Palma di Cesnola in Cyprus undermined their importance in the role of professionalizing archaeology (Challis 2008). Explorer-archaeologists continued in importance after archaeology had been established as a discipline, such as Hiram Bingham III searching for Machu Picchu in Peru in 1911. Archaeologists who also had professional positions in the late nineteenth and early twentieth century, such as William Matthew Flinders Petrie, Arthur Evans or Howard Carter, are still individually associated with particular sites or areas of archaeology (Fig. 4).

The combination of creating teams of people with different areas of expertise as illustrated by Newton's excavations in Halicarnassus combined with public interest in archaeological excavation led to the "big digs" of archaeology, which were "generally centered on a major site of great historical and cultural importance (Dyson 2006: 124)." The term "big scholarship" more properly describes the Olympia excavation carried out under the direction of Ernest Curtius by the German Archaeological Institute between 1875 and 1881 (Marchand 1996). The excavations at Olympia pointed to the future of classical archaeology with an excavation team of around 500 workers with different areas of expertise. At the same time, the charismatic if controversial Heinrich Schliemann was carrying out far less exacting excavations at the site of Hisarlik (Troy) in Turkey (1870–1873, 1878–1879, 1882–1883, and 1888–1890) and then Mycenae in Greece (1876–1878). These were "big digs" in every sense: big in scope, ambition, publicity, ego, and controversy (Traill 1995). Yet even

THE ILLUSTRATED LONDON NEWS

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ANTIQUARIAN DISCOVERIES IN GREECE: OUR ARTIST SKETCHING THE ENTRANCE GATE OF THE ACROPOLIS AT MYCENÆ.

"Speculative Phase" of Archaeology, Fig. 3 An example of magazine interest. "Our artist sketching the entrance gate of the Acropolis at Mycenae," from *Illustrated London News* 1877

Schliemann's last excavation at Troy was informed by new methodologies in archaeological stratigraphy.

The German Archaeological Institute is an example of the growing professionalization of learned societies and their part in establishing the discipline of archaeology. Formed out of the "Instituto di corrispondenza archeologica," founded in Rome in 1829, by 1871, it was a Prussian state institute and then in 1874 it became an imperial institute and a linked department, or "school," was also opened in Athens. The French Academy of Science had been established in the seventeenth century but had become particularly important in disseminating archaeological study and excavation reports after the French expedition to Egypt. It was the "German model" that guided efforts in

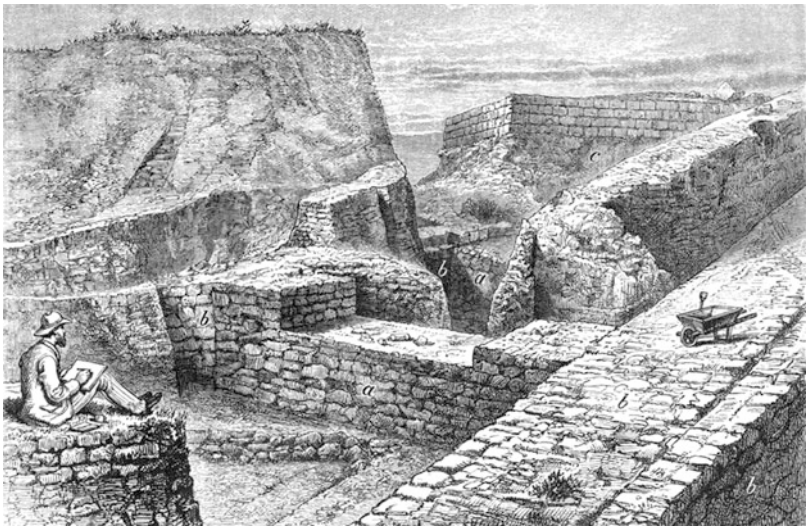

"Speculative Phase" of Archaeology, Fig. 4 Heinrich Schliemann recording Troy, from Schliemann 1886, Plate 19

Britain and America in establishing archaeology as a scientific profession (Kehoe & Emmerions 1999). The British Archaeological Association was formed in 1844 and the British Association for the Advancement of Science, founded in 1831, and its yearly conference covered many areas of both British and international archaeology. Societies around bespoke geographical or historical areas tended to develop separately, such as the Palestinian Exploration Fund in 1865 or the Egypt Exploration Society in 1882.

Positioning archaeology as a science was key in this period. Development in the natural sciences continued to influence the formation of professional archaeology. Charles Darwin's evolutionary evidence in *On the Origin of the Species by means of Natural Selection* (1859) and the work of Alfred Russel Wallace stimulated a change in classification and descriptive procedures as much as the application of Darwinian ideas. Darwinian evolutionism was hugely influential when archaeology began to establish itself as a discipline in universities during the 1880s and 1890s. The advocation of progress predicated in evolutionism was bound up with ideas around the hierarchy of "races" and civilizations, with "white" European races and civilizations considered most advanced. The "mound builders" controversy in North America illustrated that these ideas were entrenched before evolutionism. A "speculative" but culturally diffusionist example of a similar belief that had serious political consequences was the "discovery" of the medieval site (eleventh to fifteenth centuries CE) in Southern Africa known as Great Zimbabwe (Robertshaw 1990). The site was "discovered" by the German explorer Karl Mauch in 1871 and his publication was followed by the surveying work of the British archaeologist J. Theodore Bent in 1891–1892. Both Mauch and Bent considered the large stone city to be too architecturally complex to be built by the African Shona people who lived in that area and claimed that it must have been built by a northern Semitic race, akin to the Phoenicians, who migrated in antiquity (Fig. 5).

This was not based on any empirical evidence. It is a sign of the increased emphasis on evidence and the professionalization of archaeology that Bent's 1892 *Ruined Cities of Mashonaland* was a popular success but criticized for "sketchy records" by scholars. Despite this the colonial impact of his archaeological theory was dramatic. Cecil Rhodes' British South Africa Company occupied the lands around the Great Zimbabwe and "the site became a symbol of the justice of European colonization, which was

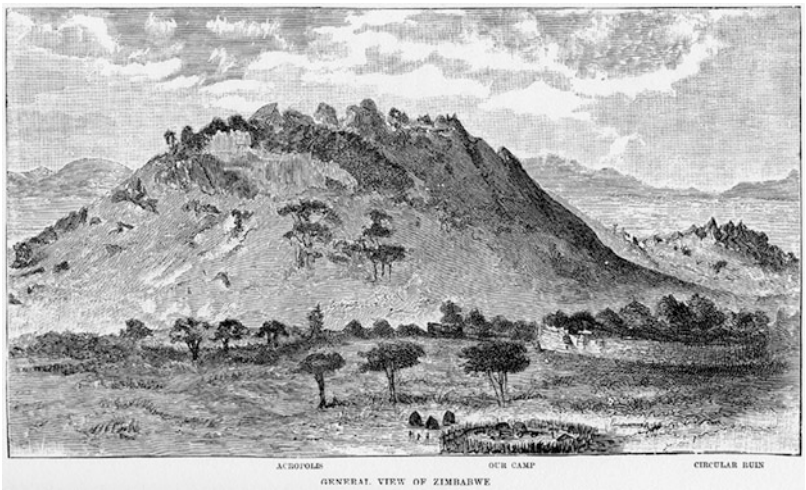

"Speculative Phase" of Archaeology, Fig. 5 "General Views of Zimbabwe," from Bent 1892: 91

portrayed as the white race returning to a land that it had formerly ruled" (Kuklick 1991: 135). Although Gertrude Caton Thompson proved Bent and Mauch wrong in 1928, their views held currency amongst "white" settlers until well into the late twentieth century. Formal colonial policies and land ownership were parallel with the greater professionalization of archaeology.

International Perspectives

One of the greatest legacies of the "Speculative Phase" of archaeology though is perhaps the acquisition of antiquities for museums – an area that would be worthy of another entry in itself. One of the pressing issues for museums today, in Europe and North America in particular, is the issue of restitution or the repatriation of antiquities from museums to source communities and nations. This is particularly pertinent to museums in Britain with regards to the British Museum. Many of the excavations carried out by explorer-archaeologists were covered by related legal agreements made within the networks of diplomatic links and "informal imperialism" that were at work during this period. Some of these agreements, such as the firman with the Ottoman Empire about the "Elgin Marbles," were made between countries or empires that no longer exist and are not recognized as legally binding by the successor modern nation state. Other collections were taken without such agreements, such as punitive expeditionary forces by the British in Ethiopia in 1867–1868, or under a system now considered defunct by the modern nation state, such as the "partage" system in Egypt.

The emphasis in debates about restitution is generally placed on anthropological items, particularly on human remains or items of religious importance, but these claims affect archaeological collections as well and not just cause célèbres such as the Rosetta Stone. The development of nationalisms and the use of heritage in defining a nation has become important in post-colonial societies and nations. Many calls for the demand of antiquities, even if not made formally, are well-known. For example, a punitive expeditionary force was sent by the British government to the Kingdom of Benin in 1897 and took intricate bronze plaques, among other items, from the city. Known as the "Benin bronzes," Nigerian officials and others have condemned their retention in various museums in Britain. There is a vast literature on this area. The point here is that the complexity of these cases requires knowledge of this "Speculative Phase" of archaeology and what impact it has on contemporary ideas about cultural knowledge and ownership.

A related area to the above is the collection, retention and display of human remains for archaeological purposes made during this phase.

The overlapping of archaeology and anthropology is particularly important in this area. Skulls and other human remains were amassed for research around human development and "racial" theory in museums and related research institutions (Fabian 2010). Indigenous communities were/are particularly affected by the collection of both ancestral and recent human remains during the "Speculative Phase" and beyond. Many countries now have ethical codes around the retention and display of human remains in museums and institutions, for example the *Native American Graves Protection and Repatriation Act* (NAGPRA) in North America. In Britain the Department of Culture Media and Sport issued "Guidance for the Care of Human Remains in Museums" in 2005 which was drawn up in relation to the 2004 *Human Tissues Act* and issued on behalf of the museum sector. The *Human Tissues Act* covers material under 1,000 years old but there are also growing sensibilities within the sector and amongst the public about the display of older human remains, such as mummies and bog bodies. Again this is an issue that is not simply limited to current understanding of the "Speculative Phase."

The impact of the "Speculative Phase" on forming disciplines of archaeology and classical archaeology in university museums has become of greater interest for curators trying to understand the history of their collections in order to interpret them within the history of the institution for a wider public. This can be seen in the 2011 redisplay of the Greek and Roman antiquities at the Fitzwilliam Museum, University of Cambridge, in which the collecting history and connecting disciplines of the history of art and philology are considered. The major revamp of the Ashmolean Museum at the University of Oxford, which reopened in 2009, placed the history of the collection of its objects at the center of its museum narrative, including a display on Arthur Evans in Crete that incorporated Schliemann in Mycanae and other related archaeological discoveries made before the discipline of archaeology was formed.

Another direction in Britain related to museums, both the British Museum and local museums, and local archaeological services is the Portable Antiquities Scheme (www.finds.org.uk). The Portable Antiquities Scheme is a voluntary scheme to record archaeological objects found by members of the public in England and Wales. Finds Liasion Officers positioned at museums or archaeological services around the country actively work with metal-detector users and people within their area to record finds. This is partly due to the 1996 *Treasure Act* which means people have a legal obligation to report any finds of material over 300 years old. In some ways this heralds a return to the importance of the amateur through metal-detector users carrying out "speculative" archaeology, but combined with professional expertise and support.

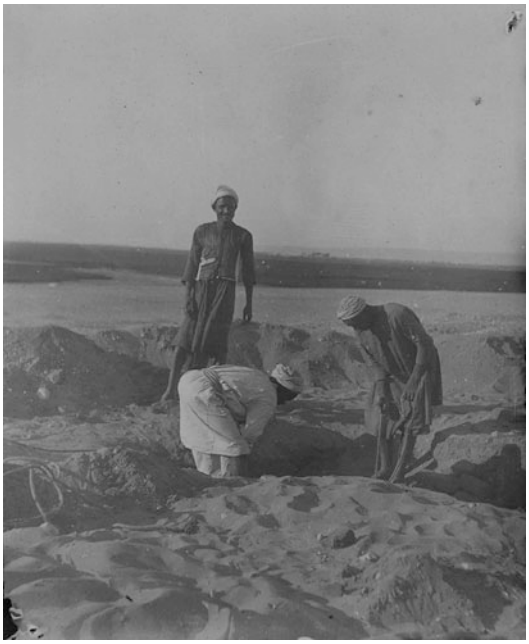

"Speculative Phase" of Archaeology, Fig. 6 Hussein Osman excavating at Abydos, 1899–1900 (On a Flinders Petrie excavation). Photograph Album belonging to Margaret Murray. Petrie Museum of Egyptian Archaeology Archives

Future Directions

Much of the research around the "Speculative Phase" of archaeology is relatively recent, dating to the last few decades with a surge of

scholarly interest from the late 1980s. As a result there are a great many future directions for the study of this area, which are facilitated by cross-disciplinary international groups such as the History of Archaeology Research Network (HARN). Also, as "International Perspectives" records, there are many contentious areas that attract wider public attention needing careful examination and reflection. The future directions highlighted here are just a few of many possible areas.

A current and future direction of work is on the influence of "showman archaeology" from the "Speculative Phase" to the present. The idea of "showman archaeology" (and the male gendering is a feature of interest in itself) has never really disappeared even after the professionalization of archaeology and the formation of different disciplinary areas. Explorer-archaeologists cultivated a public persona to generate more publicity to get recognition for their excavations, objects and themselves. They needed to do this before there was formal government and institutional funding. Arguably "showman archaeology" became even more important in the film and television age as it gives a personal focus and narrative to the distant past. Mortimer Wheeler was one of the first to use film reel to raise awareness of excavations in Britain in the 1920s and 30s, and then enhanced his celebrity by appearing on radio and TV quiz shows in the 1950s and 1960s. Wheeler himself stated that he did this to gather funding and public interest. With the *Indiana Jones* film franchise and other "archaeological" films and games such as *Lara Croft*: *Tomb Raider* and *National Treasure*, archaeology and adventure are molded together in public consciousness. Zahi Hawass, the former Minister of State for Antiquities in Egypt, presented himself as an "explorer-archaeologist" on television and to the public, even merchandising related clothes. Arguably by doing this he attracted more funding and tourists to Egypt, but along the way also generated fierce criticism.

An important future direction is consideration of the role of the workforce in the archaeological excavations carried out during the "Speculative Phase," both the people recruited from the local area around the excavation site and those drafted in by the leading archaeologist to take part, such as members of the armed forces. The continued focus on the explorer-archaeologist neglects the importance of these other people that were directed on excavations, particularly those in colonial or "informal" colonial conditions, and their role in both finding and interpreting material (Quirke 2010). Researching this information is hard, particularly for the "Speculative Phase" in which formal lists of workforces are not frequently retained in archives. However, archaeological reports and journals as well as other media from the period can often give information about the workforce. This information would add to greater understanding about the workforce's role in the "Speculative Phase" of archaeology and give a more nuanced account of the role of European and American explorer-archaeologists and the institutions that supported them (Fig. 6).

Research should be continually interrogating how many of the assumptions made during the "Speculative Phase" are still with us, implicitly or explicitly, particularly those based on out-moded classification systems and ideas of "racial" hierarchies. It is important to point out that the contemporary illicit trade in antiquities, for example, continues to be reliant on speculation in every respect.

Cross-References

► Nationalism and Archaeology
► Spain: Nationalism and Archaeology

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Squash: Origins and Development

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Basic Species Information

Multiple species of *Cucurbita* underwent domestication in the Americas (e.g., Sanjur et al. 2002). The most significant group of crop plants is descended from *Cucurbita pepo*, including pumpkins, acorn–summer squashes, marrow, and zucchini. Today, these vegetables have multilayered cultural associations and significance in the regions around the world in which they are grown.

The reconstruction of the processes involved in the early stages of domestication of *Cucurbita pepo* is complex. However, several key stages of early domestication in the Americas have been documented archaeobotanically and, together with genetic data (e.g., Decker-Walters et al. 1993; Sanjur et al. 2002), suggest multiple "independent" domestication events.

Major Domestication Traits

The archaeobotany of squash domestication has been based on macrobotanical remains of rind fragments, fruit stems or peduncles, and seeds (Smith 2006). Wild and cultivated forms of *Cucurbita pepo* are differentiated in archaeobotanical assemblages based upon seed size and the size and morphology of peduncles. Individual specimens are then directly radiocarbon dated (AMS) to provide a robust chronology, thereby avoiding taphonomic problems arising through the dating of archaeobotanical finds by association (Smith 1997; also see Dillehay et al. 2007). Using this method, two independent domestications of squash have been inferred: "the pumpkin lineage (*Cucurbita pepo*

ssp. *pepo*) in Mexico by 10,000 years ago, and the acorn–summer squash lineage (*Cucurbita pepo* ssp. *ovifera*) in the eastern United States by 5,000 years ago" (Smith 2006: 29).

Timing and Tracking Domestication

A large-seeded form of *Cucurbita pepo* was cultivated in the vicinity of Guilà Naquitz Cave in the Oaxaca Valley of Mexico around 10,000 cal BP (Smith 1997, 1998, 2006). At this time, people also harvested wild *Cucurbita* gourds. The increase in seed size is characteristic of domesticated *Cucurbita pepo* ssp. *pepo* and is considered "good evidence for the adaptive syndrome of domestication—an automatic adaptive response by squash plants to new seed bed selective pressures associated with deliberate and sustained planting" (Smith 2006: 28). By 8,400 cal BP, over 1,000 years after initial cultivation, the increased size of fruit peduncles suggests selection for larger fruits, with a steady rise in fruit size continuing thereafter (Smith 2006).

Another large-seeded form of *Cucurbita pepo* has been identified and inferred to have been cultivated in the vicinity of Phillips Spring, Missouri, United States of America, around 5,000 cal BP (Smith 2000, 2006). The archaeobotanical assemblage indicated exploitation of wild *Cucurbita* gourds and domestication of *Cucurbita pepo* ssp. *ovifera*. Variations in fruit morphology, fruit size, and rind thickness suggest sustained human selection for c. 2,000 years after initial domestication of *Cucurbita pepo* ssp. *ovifera* (Smith 2006: 29). Fritz (2007) and others have postulated that acorn–summer squash was dispersed and planted in North America before 5,000 cal BP.

Microfossil techniques, principally phytolith analysis, have also proven useful to document the exploitation and dispersal of squash in the Americas (e.g., Piperno et al. 2009). Many species of *Cucurbita* were widely exploited by foragers and farmers in the Americas (Piperno & Pearsall 1998), making the differentiation of species and domestication status important aspects of phytolith research (e.g., Piperno & Stothert 2003). Additionally, gourd and squash artifacts have themselves provided evidence, in the form of starch residues, for other plants consumed during Preceramic times in the Americas (Duncan et al. 2009).

By the time of European conquest and colonization, squash was part of the maize–bean–squash diet that sustained communities across the Americas. Bruce Smith (1998: 147) has stated that this domesticate triad was cultivated from "Argentina to Ecuador, up through Central America and Mexico, and as far north as southern Ontario" (Smith 1998: 147). Not only were these crops nutritionally balanced, but they also complemented one another agronomically and were beneficially planted together in mixed plots.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Beans: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Maize: Origins and Development
- ▶ Phillips Spring: Agriculture and Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
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Basic Biographical Information

Peter William Stahl is an archaeologist and zooarchaeologist with primary interests in New World archaeology and ethnography and a geographical emphasis in the Northern Andes and tropical lowlands of South America. Stahl was born December 10, 1953, in Val-D'Or, Quebec, Canada. He is married to Ann B. Stahl, an anthropological archaeologist with research interests in Africa. They have two children.

Peter Stahl received his B.A. in 1975 from the University of Toronto (Victoria College) and M.A. in Archaeology in 1978 from the University of Calgary, where he worked with J. H. Kelley. He attended the University of Illinois, Urbana-Champaign, for the Ph.D., working with D. W. Lathrap. Stahl's dissertation, *Tropical Forest Cosmology: The Cultural Context of the Early Valdivia Occupations at Loma Alta*, was completed in 1984. After positions as a Research Fellow at the University of California, Berkeley (1984–1985), and University College, London (1985–1988), Stahl began a long association with the Department of Anthropology at Binghamton University (SUNY), Binghamton, New York, from which he retired in 2011 as Director of the Archaeological Analytical Research Facility and Professor of Anthropology. He is currently with the Department of Anthropology at the University of Victoria.

Major Accomplishments

Peter Stahl has practiced zooarchaeology – the identification and interpretation of preserved bone assemblages from archaeological sites – for some 35 years. Zooarchaeology assumed a prominent role in archaeology during the final quarter of the twentieth century with the emergence of cultural ecology and ecological anthropology (Reitz & Wing 2008: 11-30). Stahl has participated in significant developments in each of the facets of modern zooarchaeological research, methodology, anthropological research, and biological research.

As faunal data have become increasingly important in archaeological research, understanding the processes of accumulation and deposition of faunal remains, or taphonomy, became a central methodological issue in the

interpretation of archaeological faunal assemblages. Stahl has contributed to this line of research. For example, he studied the structural density of camelid skeletal elements to explore the archaeological correlates for *ch'arki* (dried meat) production in the prehistoric Andes, concluding that faunal data from the Chavin site, Peru, did not support the consumption of imported *ch'arki* (Stahl 1999). His study of faunal materials from a large bell-shaped pit at the Pechichal site, Ecuador, is a textbook illustration of how understanding assemblage accumulation and deposition allows inference of both hunting practices and ecology, the latter inferred from the natural histories of naturally entrapped fauna (Stahl 2000).

Investigating relationships between human populations and animals contributes to anthropological research in diverse and significant ways. Peter Stahl's contributions in this area are many. He has most recently investigated the association between humans and native foxes in early Holocene South America, arguing that humans had an intimate relationship with foxes that predated the introduction of domesticated dogs and which represented an early example of an indigenous cosmology that considers selected animals as social beings (Stahl 2012). Native South American domesticated camelids and *cuy* (guinea pig) appear in Andean Ecuador well before the area was occupied by the Inca Empire, but were not domesticated there (Stahl 2003). Stahl argues from the rarity and the elite context of these finds in Ecuador that animal domesticates were part of ancient terrestrial and later maritime trade linking Ecuador and the Central Andes of Peru, trade controlled by, and benefiting, elites.

Stahl is an articulate advocate for revising standard Amazonian archaeology. In his 2002 invited article in *The Review of Archaeology*, he argues cogently for a perspective on Amazonian prehistory that recognizes the importance of historical circumstance in shaping prehistoric and contemporary cultures and that emphasizes the environmental, cultural, and agricultural heterogeneity of the lowland tropics. He advocates research using complementary sources and methodologies, which "...demonstrate the potential of an integrated anthropological research paradigm for producing nuanced and sophisticated interpretations of a least-known continent and people" (Stahl 2010: 218).

Peter Stahl was an early voice for the contributions of archaeology (1996) and zooarchaeology (2008) for exploring issues related to Holocene biodiversity in the Americas. The archaeological record of environmental transformations during the 10,000 years of the Holocene, while far from perfect, illustrates the dynamism of prehistoric biodiversity and the interplay of environmental events and anthropogenic effects. Zooarchaeologists can contribute greatly to understanding biodiversity through the study of past human landscapes; this is the perspective of historical ecology:

> When we consider humans as conservationists and resource managers or epiphenomenal optimal foragers, we avoid the real position that indigenous populations created the very ecosystems that we wish to conserve.... Archaeologists, by definition, excavate and explore anthropogenic landscapes through time and space; therefore we are historical ecologists. (Stahl 2008: 12, 13)

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Guinea Pig: Domestication
- ▶ Historical Ecology in Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Site Formation Processes
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology

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Stakeholders and Community Participation

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Introduction

From the 1970s, there has been growing momentum in the discipline of archaeology to share significant discoveries with the public. The types of public archaeology programs have changed since this time, from public tours, to public participation at archaeology sites, to stakeholders playing a role in the development of research programs in their communities. Barbara Little's (2002) edited volume on the *Public Benefits of Archaeology* shows how archaeology is becoming much more broadly perceived by the public and practitioners. She writes that archaeologists are increasingly using the discipline for "purposes of education, community cohesion, entertainment, and economic development" (Little 2002: 1). Following is a brief overview of the development of community archaeology programs and the archaeologists' changing role with stakeholder. With several international examples, this overview provides a conceptual framework for why it is important to work with stakeholders and the benefits to the discipline and community. It does not provide a complete overview of the literature. An interactive wiki on community archaeology – http://en.wikipedia.org/wiki/Public_archaeology – furnishes an overview of the growing literature on this topic.

Definition

Community archaeology involves communities in the planning and the implementation of the project. The goal of community archaeology is to make a difference and/or a contribution to the community. Noel Chrisman (2006: 168) provides seven broad principles for scholars collaborating with communities. They are valuable for helping to develop bonds with communities and descendant groups. To summarize, these principles state:

1. Proposals and procedures must be consistent with community's culture, values, and beliefs.
2. Collaboration with the community is necessary in identifying its wants and needs.
3. The participation of community members is integral to realistic planning, delivery, and evaluation of a project.
4. Collaboration with existing organizations and their leaders is a must.
5. The design and implementation of projects must make sense to the community.
6. Anthropologists must respect the people with whom they work.
7. Anthropologists must be agents for change by working with people, not on them.

Key Issues/Current Debates/Future Directions/Examples

The discipline's growing ethical accountability encourages us to include stakeholders in the decision-making process of the research design, fieldwork, and, at times, the interpretation of the archaeological findings, thereby empowering

communities to identify and connect to their past. The basis for a well-run community archaeology program is sharing the decision-making processes between the archaeologist and the stakeholder. The archaeology program at Ozette, a late prehistoric/historic whaling village in northwestern Washington State, is one of the earliest internationally known community archaeology programs. The Makah Tribal Council invited archaeologists to examine archaeological features uncovered by a mud slide. The project ran from 1970 to 1981 with the Makah Tribe playing a major role in the decision-making process along with the archaeologists throughout the project (Kirk & Daugherty 1974). At about the same time, Australian archaeologists were developing a dialogue with indigenous communities. These communications developed as the government recognized that indigenous people had the right to control their cultural resources through the "land rights" movement. This form of inclusion was more about obtaining consent for research rather than developing broader dialogue, greater community participation, and sharing in the decision-making process (Greer et al. 2002: 266).

The sharing of the decision-making process and the building of social capital between different communities and between community and professional is an important matter for archaeologists to consider when working with communities. There are, however, different views about what social capital is and how it can be used. For instance, sociologist Pierre Bourdieu (1977) explains that social capital can be used to produce or reproduce inequality. Bourdieu demonstrates how individuals can gain power through social connections. Robert Putnam (2000) uses the concept in a different way. He shows how social capital produces civic engagement, which can lead to a broad societal measure of communal health. Social capital develops in collectives and it is important for building and maintaining democracy. Putnam believes that social capital can be measured by the amount of trust and reciprocity exists in a community or between individuals.

Putnam also writes about bonding and bridging social capital. Bonding social capital is exclusive and homogenizing and is often exclusionary. Bridging social capital refers to the networking between socially heterogeneous groups. It can help create many benefits for - societies, governments, individuals, and communities. The relationships and networks that bring people and communities together are essential for a healthy self and a vital community (Hirzy 2002: 14). Connectedness through social networking is essential for the social, physical, and economic endurance of a community, and a sense of heritage can develop with consensus building between the different stakeholders.

In many ways, Bourdieu and Putnum's divergent views of social capital can help describe many public archaeology programs and how archaeologists view community participation in them. If a community archaeology program is developed from the outside, or the top down, it stands the chance of alienating people by not recognizing the inequalities that exist in the contemporary community. For instance, when a corporation or a university comes into an unfamiliar place, creates a research design for excavations, and develops a public archaeology program without input from the local population, they are creating a strategy that can alienate a community and separate them from their past. Democracy is not in play, and bridging between communities is not effective. When outsiders control the meaning of a community's past and only emphasize the exotic, or reinforce the consensus history, the public interpretation of an archaeology site stands a greater chance of alienating and disenfranchising the local community.

In 1997, Karolyn Smardz (1997: 103) wrote that archaeology should "stop taking archaeology to the public for archaeology's sake and start doing it to meet the general public's educational, social, and cultural needs." Civic engagement can be one way to address this imbalance. The civic engagement movement in archaeology is about the creation of a shared past. It is a growing trend in many professions, and its implications run much deeper than traditional

public outreach programs. Civic engagement can take many forms and designs, but in all cases, it is a collaborative effort that does not presume what the community needs. Therefore, there is a deliberate shifting from the practice of *outreach* to the practice of *inreach*. *Inreach* is the practice of working with communities on research projects and reinforcing the ideals of collaboration. It is a way of making the discipline relevant to a broader audience. *Inreach* also becomes important when we challenge the consensus views of the past. For instance, archaeologists working with the Northern Cheyenne developed an important collaborative project that challenged the consensus history of a significant event related to their tribal history. Working with the tribe, archaeologists set out to find the escape route and eventual slaughter of many Northern Cheyenne. History relates that they escaped their imprisonment at Fort Robinson and were pursued by the US Calvary. Commonly held accounts, supplied by the military, differed significantly from Northern Cheyenne oral history regarding routes taken. Through this collaborative work, archaeological findings confirmed the correctness of oral history accounts related to the Outbreak of 1879, which differed from the military account. This work allowed for the commemoration of this trail and massacre (McDonald et al. 1991).

Community archaeology programs that develop on a grassroot level can help foster a form of democracy building by creating connections between different groups to present a common past. Carol McDavid (2004: 164-165) proposes that archaeologists should use available media, like the internet, to hold conversations between archaeologists and the public rather than developing presentations for the public. Community participation can become part of a democratizing process whereby the control over the interpretation of the past is decentralized and made more egalitarian. Pearson and Ramilisonina (2004: 236-237) use case studies from the Outer Hebrides and southern Madagascar to propose that archaeologists can work hand-in-hand with indigenous groups, breaking down the cultural and political barriers and work with a common interest in the study of the past.

There are many examples of archaeologists working with American Indian communities, and recently there has been a profusion of historical archaeologists engaged in local communities and making a difference, some addressing questions related to social justice (Swindler et al. 1997; Dongoske et al. 2000; Watkins 2001; Little 2002; Derry & Malloy 2003; Shackel & Chambers 2004; Colwell-Chanthapohn & Ferguson 2007; Little & Shackel 2007). These works include many of the principles noted by Chrisman.

Moser et al. (2002: 229), working in the ancient Port of Quseir, Egypt, detail a unique community project. Traditionally, outsiders have come into Egypt to perform archaeology and the local communities have been excluded from the discovery process. They have also been omitted from developing their own local heritage. The project at the Port of Quseir provides another set of guidelines for the development of a community archaeology program. They include:

1. Communication and collaboration
2. Employment and training
3. Public presentation
4. Interviews and oral history
5. Educational resources
6. Photographic and video archives
7. Community-controlled merchandising

Much like other community archaeology programs being developed around the world, this archaeology project has developed whereby the local community can benefit from the research by participating in the development of their local heritage and also receiving financial gains (Marshall 2002).

Community groups and organizations have significant assets that can lend to the success of any archaeology program. Communities have "a deep knowledge of their communities and constituencies, the capacity to seek nontraditional outcomes, and experience with community building. We have to resist the impulse to dictate the agenda, and ensure that all questions relating to attitude, approach,

ownership, access, and trust are resolved to everyone's satisfaction" (Kertzner 2002: 41; also see Archibald 2002: 3). While some archaeologists are increasingly taking into consideration the needs and desires of the communities, the goal of inclusiveness and developing bridging social capital can be a complex matter, especially when research strategies and interpretations are negotiated with the various stakeholders. Choices are made about research goals, issues of significance, and what issues, interpretations, and conclusions are worth sharing with the larger audience. In every project, archaeologists make decisions about the politics of their research agenda. They are faced with questions of either supporting the consensus history or changing the status quo.

Lisa Breglia (2007: 98), working with communities in the Yucatan, cautions us to recognize that "1) archaeology does not always represent what the local people understand as their heritage; and, what's more 2) public or community outreach, though it may be practiced with the best of intentions always carries the potential danger of ethnocentrism." A case study of a collaborative project whereby the archaeologists were in danger of not understanding the local heritage is situated in Saskatchewan, Canada. There, thousands of Doukhobors fled Tsarist persecution in Russia in 1899. One sect of Doukhobors practices communalism, pacifism, vegetarianism, and the avoidance of alcohol and tobacco. Archaeologists found alcohol bottles and butchered bones in the archaeological assemblage. The descendants were upset with the findings because they were proud of their ancestor's convictions. One descendant told the story that her grandparents had to feed the non-Doukhobor farm workers meat, or they would leave the farms. Therefore, the descendant proposed that the evidence of meat was a product of her grandparents serving farm hands, rather than her grandparents breaking religious prohibitions (Brooks 2007).

Archaeologists can take a role in either a participatory or a collaborative approach. The former develops from the outside, when the latter is part of a shared activity. An increasing number of archaeologists are committed to the idea that communities have a sense of their own past and they want to be part of decision-making process regarding their own heritage development. This changing perspective in the discipline is paralleled by changes in anthropology as a whole, and while the discipline has changed significantly, archaeologists are only beginning to realize the importance of community involvement. Community participation means that scientists are no longer the cultural brokers. Practitioners are beginning to recognize that many histories can exist in any one place, and these stories of the past are continually being shaped and reconstructed. Archaeologists are in a good place to address these changing perspectives and they need to respond effectively to these challenges and opportunities. As practicing archaeologists, our charge can be to help change society for the better.

Cross-References

- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community and Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Indigenous Peoples, Working with and for

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Standardization, Storage, and Dissemination of Environmental Archaeological Data

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Introduction

Archaeological researchers rely on computers for many data collection, analysis, presentation, and scholarly communication needs. Through the

Web, researchers can now disseminate all the information they collect in excavations and analyses, not just the resulting synthetic reports. However, while technologies can store and transmit these data, approaches to data documentation, quality improvement, semantic description, and data preservation see active research and development.

Definition

Most datasets are now "born-digital," giving the researcher community new opportunities for sharing them via the Web. Despite hesitation and incentive concerns (see Harley et al. 2010), there is a growing expectation for access to primary datasets so that other scholars can reanalyze them with new questions and perspectives (Kansa & Whitcher Kansa 2011). However, as data sharing assumes greater primacy in professional communications, researchers need supporting services to adequately describe and document, preserve, disseminate, and understand and reuse digital data.

Documentation, use of appropriate standards, storage, and dissemination are all aspects of "data stewardship." These help ensure that data are sufficiently described and preserved in a way that allows for well-informed future use. To guide researchers in data stewardship, the Archaeology Data Service (http://archaeologydataservice.ac.uk/) and Digital Antiquity (http://www.digitalantiquity.org/) have authored invaluable guides to good practice (http://guides.archaeologydataservice.ac.uk/). These guides introduce metadata ("information about information") requirements, recommended practices for data formats (especially recommendations for use of open and nonproprietary file formats), and archival practices.

Key Issues/Current Debates/Future Directions/Examples

Standards

The term "environmental archaeological data" encompasses a wide range of data pertaining to the study of past human interactions with the environment. These data come from highly multidisciplinary investigations and analyses, including (but not limited to) paleobotany, zooarchaeology, soil chemistry, micromorphology, archaeomalacology, geomorphology, and isotopic analyses. Datasets vary widely in terms of size and character. Some data result directly from the output of instrumentation, and others are created by individual researchers and may include both quantitative and qualitative data.

In order to facilitate informed reuse and preservation, all of these data need alignment to certain standards. However, there are many kinds of "standards." Some standards refer to technical specifics of data formats, instrumentation settings, and the like. Metadata description and documentation represents another type of standard. Finally, some types of standards reflect concerns over the appropriateness of data collection methods and data quality. In all cases, conforming to community expectations regarding standards facilitates data reuse.

As is the case with most archaeological data, metadata about context, broadly defined, is required to make use of paleoenvironmental datasets. Given that resources and human effort are scarce, certain forms of documentation should be prioritized. For example, published data should include some fundamentals, including discussion of methods, research aims, and data collection practices. Baseline contextual information (geographic, stratigraphic, and chronological) also needs to be provided. Shared data need to be decoded (or coding systems need detailed documentation) to facilitate informed reuse and comparison with other datasets. In many cases, it will be important to provide key technical metadata documenting the specifics of instruments used, geographic coordinate systems, other aspects of data collection methods, and information about post-processing software and algorithms. In addition, the "scholarly" provenance and context is also critical. Who collected the data and under what sponsorship and institutional setting? What are the licensing conditions on sharing and adapting a dataset? Many of these

attributes are recording using the Dublin Core metadata standard.

Different repositories may have different specific technical requirements for expressing these metadata. Variability in data documentation results from different institutional settings in research as well as different research needs and traditions. Also, data documentation and metadata needs will not likely stay fixed. Researcher needs and expectations change, and these changes will drive changes in how data need to be documented. Thus, while standards can be very useful in helping others understand and reuse data (Atici et al. 2012), data repositories and dissemination services need to accommodate diverse and changing needs and expectations in different disciplinary communities. Thus, standards and research designs will coevolve, particularly once data dissemination becomes a more commonplace practice.

In many cases, standards have been extremely useful for meta-analyses and collaborative research. While many researchers recognize the value of shared standards, data are often very heterogeneously developed and described, as noted above. In many areas of environmental archaeology, there are only a few instances where researchers adhere to common data collection standards and protocols. For instance, the suite of measurements proposed by Angela von den Driesch in her 1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites* is widely used by zooarchaeologists. However, though many researchers may use this protocol, they may express and encode these measurements in very different ways.

Because it is unlikely (and even ill-advised) for researchers to use only one data collection protocol and database structure, other methods need to be developed to relate researcher datasets together. Most commonly, researchers use ontologies to relate different datasets together. Ontologies are formally described conceptual systems, usually expressed in such standards such as RDF/OWL or RDF/SKOS. Ontologies define different concepts and various logical relationships between concepts. Different datasets can be related to a common ontology so that these data can be compared, even though these datasets individually may have different and idiosyncratic terminologies and organizations. It is often a goal to use the logical rules and relations expressed in an ontology to make inferences on datasets related to the ontology. Digital Antiquity, with the tDAR system (http://www.tdar.org/), is doing pioneering research in relating datasets together using different ontologies. Their initial experiments have focused on zooarchaeology. This approach toward data integration is more feasible in this subdiscipline because of the widespread use of common data documentation conventions.

Ontologies may vary widely in how generalized and how specifically they model different concepts. Open Context (http://opencontext.org) uses a highly generalized ontology to model data, while the ontologies used in tDAR's experiments can have some very specific concepts. Different ontology strategies have different costs and benefits. Generalized ontologies lack the specificity needed for many research applications, while specific ontologies can often be very complicated, difficult, and costly to apply. Research applications will probably help identify the "right" mix between generalized and specific ontological models. In the case of zooarchaeology, some aspects of recording probably can and should see more specific modeling (such as taxonomic identification, bone element identification, and fusion data). While other aspects of zooarchaeological data may see less need to for such specific modeling.

In addition to ontologies, the architecture of data repositories in environmental archaeology plays a role in data interoperability and reuse. tDAR offers powerful features to give researchers options to use multiple ontologies to relate different datasets found within the tDAR repository. Open Context takes a different approach and exposes data on the Web to make it easier to use with the so-called Linked Open Data (LOD) methods. With LOD, Open Context data can be referenced to common vocabularies and ontologies via Web URIs (stable hyperlinks) and related to other data sources published to the Web. Open Context uses LOD methods to

identify biological taxa according to Web identifiers published by the Encyclopedia of Life (http://eol.org), a major database of taxa. Again, the different approaches taken by tDAR and Open Context involve a different set of trade-offs. Open Context's use of Encyclopedia of Life identifiers may help relate data via the open Web to a large interdisciplinary community, but tDAR's ontologies more customized for zooarchaeology may be more immediately useful for research in that subdiscipline. While different, these approaches are not mutually exclusive and can be complementary. These differences highlight how the semantic interoperability of environmental archaeological data remains an active area of research.

Explicitly recorded data documentation and formal ontologies are important and often critical needs. However, they are not the only issues involved in data preservation, reuse, and interoperability. Human factors are also critical needs. The background and tacit knowledge of experienced specialists can be invaluable to understanding an old dataset, even without detailed documentation (see Atici et al. 2012). In addition to understanding domain-specific problems in data collection practices and research methods, the research community also needs to develop informatics skills and expertise, so that they can better understand the use and limitations of different approaches to semantics and data integration.

Preservation and Dissemination

Researchers tend to have poor data curation practices. Most individuals keep data on their own hard drives, perhaps backing them up on some external digital media (optical disks and the like). Such devices and media are prone to failure and obsolescence in very short time horizons. Not only do digital media degrade rapidly, but file formats and supporting software are also prone to rapid change. For digital data to be usable for the long term, they need continual and active curation by dedicated professionals.

Formal digital repositories have developed specifically for archaeology, including the Archaeology Data Service in the UK and Digital Antiquity in the USA. Both of these organizations actively curate data, migrate files to new formats as required, and perform other vital repository functions. A somewhat different approach is taken by Open Context, where it does not act as a digital repository itself, but rather archives data with the digital repository maintained by the University of California, through the California Digital Library (http://www.cdlib.org/). Digital repositories, whether discipline-based or based in a "memory institution" like a library, play an essential role in the long-term secure storage of environmental archaeological data. At the same time, data preservation is complemented by data reuse. Data that sees active use will likely see more investment in preservation.

With regard to data dissemination and reuse, professional expectations are rapidly evolving. Though archaeologists routinely manage complex and highly structured digital data, dissemination and communication objectives traditionally remained decidedly oriented toward print or digital analogs of printed documents (such as PDFs). The prevailing norms and expectations for print publication mean that researchers tend not to share the primary data they collect, thus precluding reuse and reexamination of these data. Though data sharing is still rare, it is gaining traction as a key issue in scientific communications (Costello 2009; Nature Editors 2009). Scholars have discussed a multitude of semantic (Kintigh 2006), technological (Snow et al. 2006), data preservation and longevity (Richards 2004; Carraway 2011), intellectual property (Kansa et al. 2005), and professional incentive concerns (Costello 2009; Kansa 2010) regarding data sharing. In the UK and in now the USA (with Data Management Plans required of National Science Foundation grant-seekers; see NSF press release on May 10, 2010: http://www.nsf.gov/news/news_summ.jsp?cntn_id=116928), funders of research increasingly expect greater data professionalism, archiving, and transparency.

Since use can promote data preservation, the research community also needs innovative approaches in scholarly communication that promote data dissemination and reuse. Many of the data preservation repositories discussed

above also emphasize services for data dissemination and reuse. Different dissemination services require different levels of investment in data documentation and data quality verification and improvement. As discussed above, common data and semantic standards can help make data dissemination and reuse much more efficient. However, semantic standards can be complex and time-consuming to apply, and overly rigid or misapplied standards can also constrain interpretive choices and inhibit methodological innovation. Therefore, the application of different metadata and semantic standards is not necessarily straightforward, and data dissemination services will vary in their expectations.

Besides standard alignment, data dissemination may also involve some degree of editorial review and quality improvement. In some environmental science disciplines, many journals require deposit of data related to an article in Dryad (http://datadryad.org), a disciplinary data repository. While journal editors and reviewers may or may not review the actual datasets deposited in Dryad, policies requiring the dissemination of datasets aim to improve the scientific reproducibility of the analyses and interpretations presented in journal articles. So far, no archaeological journals require dataset dissemination, but the Digital Antiquity and Open Context teams are in active discussions with various archaeological publications to encourage such dissemination.

In the case of Dryad, most datasets entering this repository supplement the content of a journal article. This approach helps align researcher incentives, which reward journal publications, and community interest in data dissemination and preservation. However, this approach may have a disadvantage in that datasets are of secondary importance and shared to comply with policy requirements. These data may or may not see any review or editorial scrutiny, and may not see much effort in data cleanup or documentation beyond the minimal requirements the repository.

Another approach to data dissemination is to make data publication a primary goal of scholarly communication in itself. If data dissemination provided some of the same professional rewards and recognition as conventional journal and book publication, then researchers may invest more effort in improving data quality and aligning data to appropriate standards. Editorially supervised "data publishing" models can make data dissemination reach the levels of quality needed to enable confidence in reuse (see Costello 2009). Editorial review processes may help researchers improve data integrity and intelligibility, promoting greater data quality and facilitating informed reuse. The Journal of Open Archaeological Data (http://openarchaeologydata.metajnl.com/) and Open Context are currently developing data publishing services where datasets see editorial and peer review prior to dissemination.

It is likely that multiple models for data dissemination will be needed to serve the needs of environmental archaeology. In some cases, data repositories will take data directly from researchers, and in other cases data dissemination may follow more elaborate editorial review and quality improvement processes. Appropriate dissemination choices will vary depending on the nature of the data. There may be less need for editorial review for data automatically generated by instrumentation, whereas editorial processes may be more appropriate for data manually created by researchers.

However, in all cases, the goal of data sharing and archiving is to facilitate reuse, possibly including integration of data from multiple sources. In order to facilitate data reuse, the research community needs to pay particular attention to the legal and licensing requirements of data reuse and interoperability. Copyright and other intellectual property restrictions may greatly complicate, if not altogether prohibit, many uses of data expected by the scientific community. To encourage reuse, datasets need to be released either to the public domain, or under very liberal and open licensing conditions. For instance, Digital Antiquity and Open Context both require deposit of data under the Creative Commons Attribution license (http://creativecommons.org/licenses/by/3.0/), which freely permits reuse provided attribution is provided to the data creators. Dryad mandates even greater openness, requiring dedication of

datasets to the public domain using Creative Commons' CC0 "no rights reserved" framework (http://creativecommons.org/about/cc0). Use of Creative Commons licenses is especially encouraged because these widely used standard licenses facilitate legal interoperability of data. In addition, Creative Commons licenses are also represented as standard metadata, facilitating the discovery and explicit identification of legally interoperable content.

Cross-References

- ▶ Archaeological Informatics
- ▶ Archaeology Data Service (ADS)
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management Technology and Training
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Star Carr, Archaeology of

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Introduction

Star Carr is an Early Mesolithic site, dating to c. 9000–8500 BCE. The site is located in the Vale of Pickering, North Yorkshire, UK, near to the coastal town of Scarborough (Fig. 1). During the early Holocene, a large body of water, known as Lake Flixton, was situated at the eastern end of the Vale of Pickering. Star Carr was located on the western shore of this lake. The lake gradually infilled with peat, resulting in excellent preservation of organic remains.

Definition

Star Carr has dominated understandings of the British Mesolithic. This is partly due to the wide variety of organic finds recovered from this

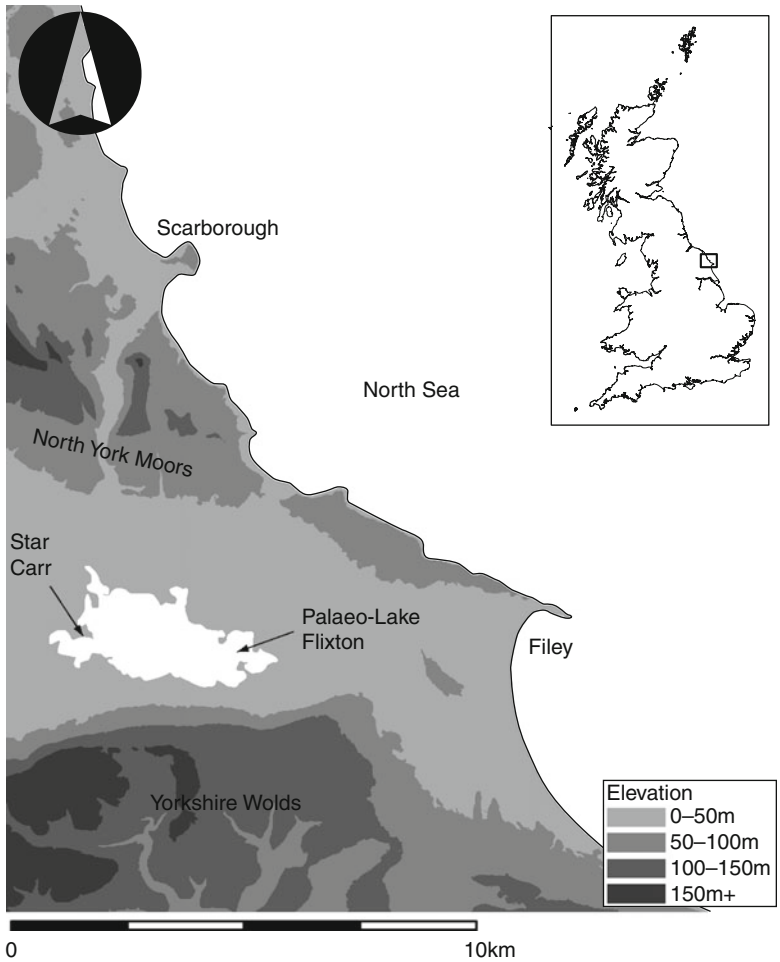

Star Carr, Archaeology of, Fig. 1 Location of the site (Image: Barry Taylor)

waterlogged site, but also due to the influence and interpretation of the original excavator, Grahame Clark. The site has been reanalyzed numerous times, with interpretations varying from a base camp, to a hunting camp, to a ritual site. In addition to Clark's excavations (1949–1951), fieldwork has been undertaken at the site in 1985 and 1989, and more recently between 2004 and 2011. These new excavations uncovered a large timber platform and a small dwelling structure.

Key Issues/Current Debates/Future Directions/Examples

The discovery of Star Carr was due to the exemplary work of a local archaeologist, John Moore, who had been surveying the Vale of Pickering for prehistoric flints since 1947. Star Carr was Moore's site 4, discovered when flint and bone was seen eroding from the edge of a drainage ditch. Moore sent some of the flints he had recovered to Grahame Clark at Cambridge (Clark 1954). Since the late 1930s, Clark had been dissatisfied with the sort of culture-history accounts he himself had undertaken for his Ph.D. Influenced by Scandinavian archaeology which had a long-standing history of interdisciplinary collaboration with the natural sciences, Clark sought a waterlogged site on which to test his new economic theories. Star Carr seemed the ideal candidate.

Clark spent three summer seasons between 1949 and 1951 at Star Carr. While Moore's excavations next to the drainage ditch revealed an extremely dense scatter of lithic material in the

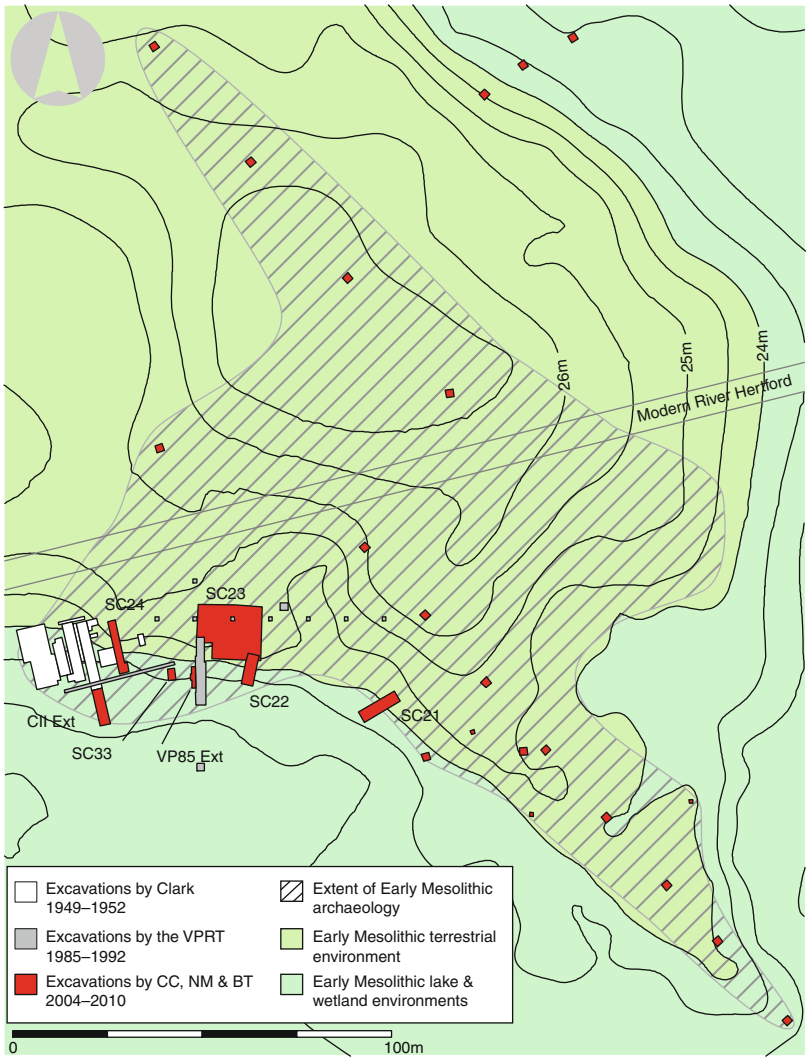

Star Carr, Archaeology of, Fig. 2 Excavations at Star Carr (Image: Barry Taylor)

dryland area of the site, Clark focused on the wetland deposits because he was predominantly interested in the recovery of organic material (Fig. 2). A density of 36 pieces of flint per square yard was taken to delimit the limits of the occupied area, making a settlement 18 × 18 m in extent (Clark 1954). Using these criteria, Clark believed he had excavated the entire site and his subsequent interpretations were predicated on this supposition.

The excavation yielded an extremely broad range of material culture, while the waterlogged deposits, as Clark had hoped, produced numerous organic artifacts. Particularly impressive were 21 antler frontlets. These consisted of trimmed and attenuated red deer antlers, still attached to part of the skull. The interior of the skull had been smoothed, and two holes perforated, presumably to facilitate their use as headgear. Using ethnographic analogy, Clark suggested these could either be interpreted as hunting aids, or as costumes in ritual dances. In addition to the frontlets, stone, bone and tooth beads, elk antler mattocks, bone scrapers and bodkins and 191 barbed antler points were found. To give an indication of how significant these finds were, previously only six barbed points had been known from the whole of Britain. Also recovered were more than

a hundred grooved antler blanks, presumably intermediate stages in the manufacture of barbed points. Also present was an accumulation of wood, which Clark interpreted as an "occupation platform."

In addition to the worked wood, bone, and antler, faunal remains revealed that a wide variety of animals had been exploited: red deer, roe deer, elk, pig, and aurochs; also smaller creatures – hedgehog, hare, and beaver; a number of fur-bearing carnivores – pine marten, fox, dog, badger, and bear; and a great variety of different birds – crane, stork, red breasted mergaster, red throated diver, great crested grebe, little grebe, lapwing, buzzard, and duck. No fish bones were recovered. Pollen analysis revealed that the lake was surrounded by woodland of birch and pine, with willows by the lake edge. The lake itself was fringed with reedswamp, while waterlillies grew in the open water (Clark 1954).

The original site report (Clark 1954) sealed Star Carr's reputation. Clark interpreted Star Carr as a seasonal site, occupied by not more than four or five families for periods of midwinter and spring and abandoned in the summer. He inferred the presence of men by the recovery of hunting equipment, and women (and thus children), on the basis of analogy with Eskimo groups, from skin working equipment. Particularly important for the future directions of archaeological thought were Clark's considerations of seasonality and subsistence. He placed considerable emphasis on the seasonality data (Clark 1972), which Frazer and King inferred from the antlers of red and roe deer and elk to indicate winter occupation. Clark suggested the site had been occupied at least twice, on the basis of the observation that some charcoal spreads were separated by organic mud and also on vertical patterning in the distribution of barbed point types. The food remains would, it was estimated, have been sufficient to feed the occupants for 6 1/4 years; Clark, thus envisioned repeated visits at particular seasons over a period of years.

Although the site of Star Carr has subsequently undergone many revisions and reinterpretations, Clark's investigations remain an impressively vivid picture of the way of life of a group of Mesolithic hunter-gatherers. As an example of what can be achieved by asking new questions and examining new classes of data, they seemed to call into question the value of earlier excavations.

Two decades later, Clark returned to the Star Carr data in order to expand his interpretation of the site (Clark 1972). Influenced by the concept of the ecosystem, he undertook a site catchment analysis of Star Carr, listing the available resources during the supposed winter stay and relating the number of red deer in this territory to the calorific requirements of a human group and thus deducing the necessary level of the annual cull. Clark attempted to reconstruct the whole settlement system by suggesting, on the basis of the migration patterns of red deer, that human groups had a similar upland/summer, lowland/winter pattern as their prey and that the people who wintered at Star Carr spent their summers hunting deer on the North York Moors.

Following Clark's retirement in 1973, the site was the subject of numerous reinterpretations during the late 1970s and 1980s. Over these, the shadow of Clark's work loomed large, as subsequent commentators focused on similar concerns, namely, seasonality, site function, and the relationship of Star Carr to the surrounding environment.

Caulfield (1978), in an early review, made the point that the red deer MNI indicated by antlers substantially exceeds the MNI represented by postcranial remains. This suggests that, because of their use as raw material, red deer antlers were collected and cached, and thus should not be used to indicate the season of inhabitation. More recent authors have pointed out that though Star Carr was originally interpreted as a site of winter occupation, substantial evidence exists for a human presence at other times of the year. Jacobi (1978) pointed to the presence of newborn elk and roe deer, which were likely to have been killed in May or June and of unshed roe deer antlers, a feature habitually used to indicate

summer seasonality in southern Scandinavia. Grigson (1981) noted the presence of migratory birds which probably visited the area between May and June. The macrobotanical evidence reveals burnt reed shoots and aspen catkins which would have grown between March and June (Mellars & Dark 1998).

In their classic study of the site, Legge and Rowley-Conwy (1988) analyzed tooth-wear to assess seasonality of occupation. They found a clear pattern in the roe deer age structure, with all ageable animals appearing to have been killed in May or June, when the youngest animals were about one year old. The pattern among the other animals appears slightly more ambiguous, though Legge and Rowley-Conwy believe none are incompatible with an occupation lasting between May and September, or if an elk mandible is disregarded, between mid-May and the end of June. More recent work by Carter (1997, 1998) based on radiographs of red and roe deer tooth development suggests winter occupation, a return, after half a century to Clark's thesis. It should be noted though that these interpretations follow Clark in attempting to pin down a minimum season of occupation into which all evidence can be fitted; the evidence as it stands could equally encompass visits at a number of different seasons of the year, or even year round occupation.

Site function has equally been an area of some controversy. Some commentators have followed Clark in interpreting the site as a residential base camp (Pitts 1979; Price 1982). Others have suggested more specialist use as a camp for tanning hides (Pitts 1979), a butchery camp (Caulfield 1978), or as a kill site (Andresen et al. 1981). The main support for the interpretation of the site as a base camp is the rich material inventory and evidence of varied activities; the main evidence against is the faunal assemblage, which, with an emphasis on scapulae, mandibles, and lower limb bones does not suggest the sort of prime cuts of meat expected for a base camp. Legge and Rowley-Conwy (1988) compared the faunal assemblage with those recorded by Binford (1978) during his ethnoarchaeological work with the Nunamiut. They found closest similarity between Star Carr and a Nunamiut hunting camp. A hunting camp is a location where faunal remains are brought following minimal processing at the kill site. At the hunting camp more extensive processing of carcasses is carried out and the prime cuts and joints of meat removed to be consumed at the residential site.

While the faunal assemblage is undoubtedly unusual for a base camp, recent excavations at the site and the oral histories of site excavators indicate that Clark was extremely selective in his recovery of faunal remains. Only the best preserved pieces that were identifiable to species were retained. As a result, not too much should be read into the patterns of faunal representation. As many authors have commented (Jacobi 1978; Pitts 1979; Price 1982; Mellars & Dark 1998), attempts to find a single function or a single seasonality of occupation for such a large and complex site are doomed to failure.

In 1985 and 1989, small-scale excavations were undertaken at the site (Fig. 2). The 1985 trench was excavated by Tim Schadla-Hall and the Vale of Pickering Research Trust in order to collect environmental samples. Because it was believed that Star Carr had been excavated in its entirety, artifactual material was unexpected. However lithics, fauna, and a single barbed point were recovered. Most significant was the discovery of a platform of hewn aspen timbers. These were split timbers, lain parallel and perpendicular to the shore. Schadla-Hall's trench was extended in 1989 by Paul Mellars and a series of small testpits were excavated in the dryland area of the site; all produced lithic material, indicating the site was even larger than Clark had envisaged (Mellars & Dark 1998).

In addition to the discovery of the timber platform, the main achievement of the 1980s work came from Petra Dark's program of environmental work that accompanied it. As well as refining knowledge of the vegetation sequence, Dark used close interval radiocarbon dating of charcoal from her cores to elucidate the periodicity of occupation. She suggested, assuming

macrocharcoal as a proxy of human activity, that the site was visited for a period of around 80 years, followed by a gap of around 100 years, when occupation was rare, followed by a period of rather more intermittent occupation lasting around 150 years (Mellars & Dark 1998). These findings further highlight the complexity of the site and the problems associated with a single monolithic interpretation of the activity that generated it.

Further light has been thrown on Star Carr as a result of a long-term survey of the shore of palaeolake Flixton by Tim Schadla-Hall between 1976 and 2005. In addition to the reconstruction of the palaeotopography through auger survey, 2 × 2 m testpits were excavated around the shore of the lake at 15 m intervals. This program has revealed numerous additional Mesolithic sites, and a greater understanding of the local context of Star Carr (Conneller & Schadla-Hall 2003). What is clear from this work is that Star Carr is unique in its local landscape. No other site has the same range of material culture. Clark recovered 191 barbed points at Star Carr; only two additional examples have been recovered from sites elsewhere in the Vale of Pickering, one from Moore's site Flixton 1 and one from Schadla-Hall's site, No Name Hill. No further beads or antler frontlets have been found.

Star Carr thus seems to represent a special place within the landscape of the Vale of Pickering. The site appears to have been a focus for the deposition of animal remains in the shallow waters of the lake edge (Connellier & Schadla-Hall 2003). The respectful, patterned deposition of animal remains can be witnessed among other early Mesolithic groups (e.g., Hansen 2003) and among contemporary hunter-gatherer groups, where it is seen as essential in order to ensure that animals continue to give themselves up to the hunter (e.g., Jordan 2003). At Star Carr, these actions appear most focused on the deposition of red deer antler, suggesting both that red deer was the most spiritually important animal and that the antlers (or perhaps the head more generally) were considered to represent the soul or essence of the deer (Conneller 2004).

In 2004, excavations led by Chantal Conneller, Nicky Milner, and Barry Taylor recommenced at Star Carr (Fig. 2). The first large-scale excavations of the dry land area of the site have revealed a small dwelling structure, consisting of a 2.5-m pit surrounded by a ring of posts 3.5 m in diameter. This structure is surrounded by dense scatters of lithic material and animal bone, indicating a wide range of activities were undertaken on the dry land. Furthermore, fieldwalking and testpitting indicate that a continuous spread of lithic material extends for c250 m. In the wetland area of the site, the wooden platform glimpsed in the 1980s excavations has been found to extend for at least 20 m along the lake edge, suggesting the sort of communal endeavor more commonly associated with Neolithic communities. However, the recent excavations have also revealed that Star Carr is under threat. Recent agricultural drainage has resulted in considerable peat shrinkage. Oxidation of the upper deposits, combined with a seasonally fluctuating water table, has concentrated highly acidic sulfates at the level of the wetland organic artifacts (Boreham et al. 2011). As a result, almost all the bone and antler has entirely decayed, while worked wood is now relatively poorly preserved. Though Star Carr is still yielding new information, in a relatively short period of time, the organic material that made it so famous will be lost forever.

Cross-References

- ▶ Clark, John Grahame Douglas
- ▶ Dog: Domestication
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Star Carr: Environmental Archaeology

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Star Carr: Environmental Archaeology

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State of Knowledge and Current Debates

Introduction

Since its discovery in the late 1940s, Star Carr has remained one of the most famous, and perhaps most important, early Mesolithic sites in Britain. The wealth of archaeological material, including well-preserved organic remains, recorded at the site has revolutionized our understanding of the period. Analysis of the artifact assemblages has led to a new understanding of technological processes, such as antler working (Clark 1954; Elliot & Milner 2010), depositional practices (Chatterton 2003), and even the way Mesolithic people may have perceived and understood their world (Conneller 2004). The discovery of large structures, such as buildings and timber trackways, has also challenged traditional views of early Mesolithic society (Conneller et al. 2012). However, the importance of Star Carr also lies in the long tradition of paleoenvironmental research that has been carried out at the site. From the first excavations in 1949 to the current program of fieldwork, paleoenvironmental analysis has been undertaken as an integral component of the archaeological investigations. As well as describing the nature of the environments that formed at Star Carr, this work has helped to provide a chronology for the human occupation of the site, detected evidence for the deliberate management of plant communities, and described the way in which people responded to changes in the local environment. The result is a detailed record of how early prehistoric hunter-gatherers interacted with the world around them.

Background

Star Carr is an early Mesolithic wetland site located in the eastern Vale of Pickering (North

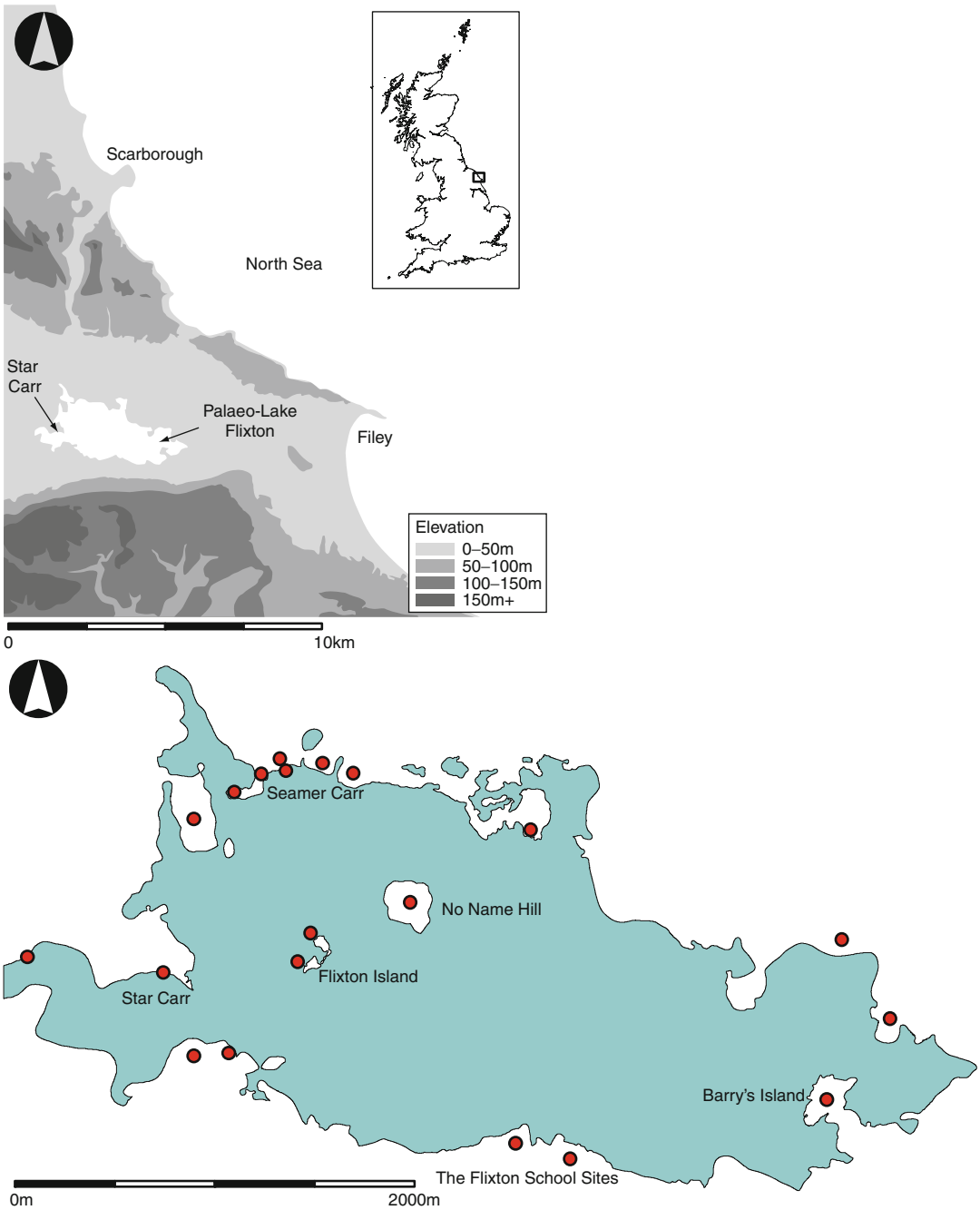

Star Carr: Environmental Archaeology, Fig. 1 (**a**) Location of Star Carr and the paleo-Lake Flixton in relation to Britain and (**b**) the relationship between Star Carr and other early Mesolithic sites around the paleo-Lake Flixton

Yorkshire, UK), a low-lying valley separating the uplands of the North York Moors and the Yorkshire Wolds (Fig. 1a). During the time the site was occupied (c. 9000–c. 8600 cal BCE), it lay on the shores of a large lake (the paleo-Lake Flixton) (Fig. 1b). By c. 6000 cal BCE, the lake had in-filled with deposits of marl, lake mud, and peat, while peat-forming wetlands had expanded

across the dry ground, burying the site and much of the surrounding landscape. This has helped to preserve a range of organic materials, including artifacts made from bone, wood, and antler, faunal remains, and plants and insects, that have provided a wealth of information on the lives of the people who lived at the site.

Evidence for Mesolithic activity at Star Carr was first recorded in the late 1940s by John Moore, but the site came to international attention through the excavations carried out by Grahame Clark between 1949 and 1951 (Clark 1954). For Clark, the importance of wetland sites to the understanding of the Mesolithic had been demonstrated by excavations in southern Scandinavia (such as Mullerup and Holmegård) and northern Germany (particularly Duvensee). The excavators of these sites had recorded a wealth of material culture made from bone, antler, and wood and had employed relatively new paleoenvironmental techniques, such as pollen analysis, to reconstruct the environmental conditions contemporary with the periods of occupation. Lamenting the absence of such sites in Britain and the lack of information they provided, Clark argued that it was necessary to "*. . . excavate in water-logged deposits, either in a bog settlement or immediately contiguous to a settlement on dry land, since here alone were the physical conditions necessary for the survival of a broad range of organic materials. . .*" (Clark 1954: xxi).

Clark's involvement with the Fenland Research Committee (FRC) in the 1930s had also shown how wetland sites could provide entirely new forms of evidence for past societies through the integration of archaeological and paleoenvironmental studies. The careful, systematic excavation of sites such as Peacock's Farm (Cambridgeshire) had allowed archaeological material to be related directly to the analysis of peat and other wetland sediments, pollen, and plant macrofossils. As well as providing information on the ecological setting of the sites, this also allowed archaeologists to consider how changes to the environment had affected patterns of human activity and how prehistoric communities had shaped and manipulated the local vegetation.

The preservation of pollen was particularly important as it provided a means to date sites by relating them to the known succession of vegetation that had developed across northern Europe. Such work had already been undertaken in Scandinavia, where a relative chronology for many of the Maglemosian sites, such as Mullerup, Svædborg, and Holmegård, had been established through the pioneering work of Knud Jessen, Tage Nilsson, and Johs Iverson (e.g., Nilsson 1947). By the late 1930s, Harry Godwin had established a comparable record of British vegetation and, with his wife Mary, had shown that pollen stratigraphy could be used to date artifacts in relation to the well-documented sites in Denmark and Sweden (Godwin & Godwin 1933). In the absence of direct forms of dating, this provided Clark with a method to relate artifact assemblages from Britain with those from continental Europe on the basis of chronology rather than the less reliable methods of typology.

Research into the environmental history of the lake had already begun several years before Clark's first excavations at Star Carr. During the mid-1940s, John Moore had started to record the sedimentary sequence within the basin, successfully identifying the presence of the paleo-lake (Moore 1951), and Harry Godwin had recorded a pollen profile from the area in 1948 (Clark 1954). However, Clark's work was at an altogether different scale, combining the techniques of archaeological and paleoenvironmental research to create a detailed record of the human occupation of the site. In this, Clark was heavily influenced by his work on the FRC, resuming his collaboration with Harry Godwin and engaging a range of other specialists from the Subdepartment of Quaternary Research at the University of Cambridge as well as individuals from numerous other institutions. He was also supported by several members of the zoology department at the British Museum, particularly Francis Fraser and Judith King who undertook the analysis of the faunal remains. This truly interdisciplinary study set a new standard for Mesolithic archaeology and began an era of well-integrated research that continues to this day.

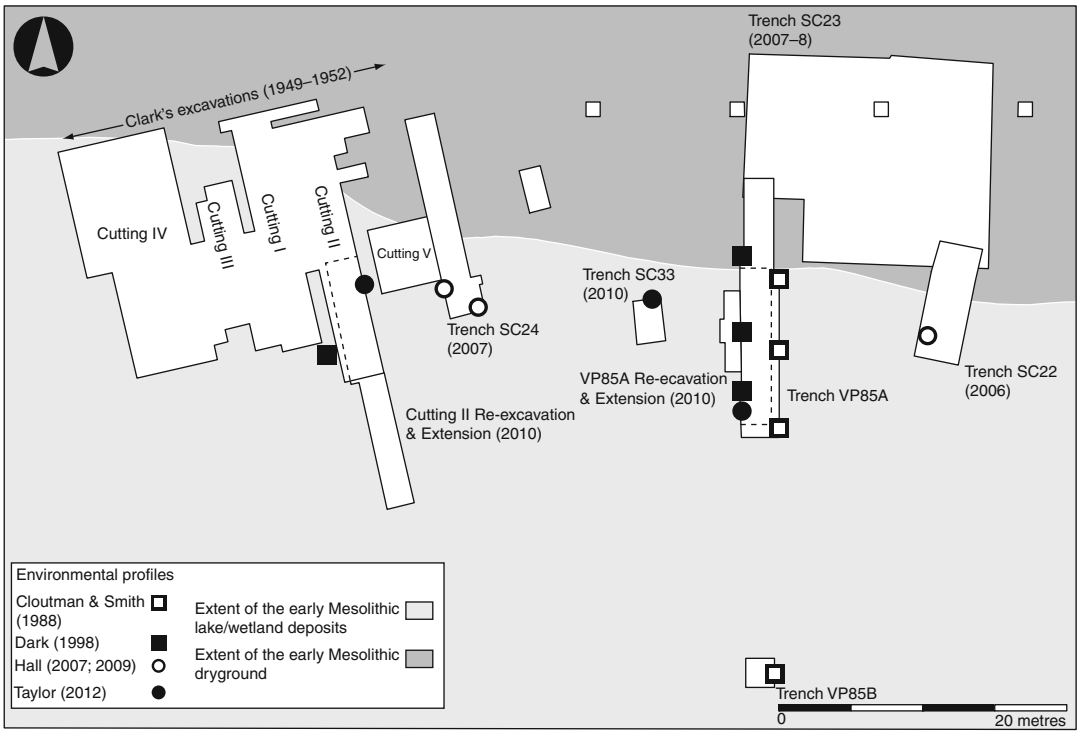

Star Carr: Environmental Archaeology, Fig. 2 The main areas of excavation and the environmental sampling points at Star Carr (excavated areas are colored *white*)

A History of Environmental Research

Clark, Godwin, and Walker 1949–1951

From the summer of 1949, Clark undertook three seasons of fieldwork at Star Carr, excavating a series of long trenches (referred to as cuttings), through the sediments that had formed at the edge of the lake (Clark 1954) (Fig. 2). During the course of these excavations, Clark recorded an incredible assemblage of bone and antler artifacts, as well as worked flint, antler-working waste, animal bone, and antler. Much of this material was associated with a deposit of largely unworked "birchwood," which Clark suggested had been deliberately laid down to form a stable surface, upon which the inhabitants of the site had lived (Clark 1954: 9).

While Clark undertook the excavations, Godwin and his student Donald Walker set about establishing the environmental history of the site through the analysis of the peat and lake sediments exposed in the trenches and the pollen and plant macrofossils that had been preserved within them (Clark 1954: 56-61). By relating the artifacts recorded by Clark to the site's stratigraphy, they were able to place the evidence for human activity within the environmental sequence and establish the ecological setting of the site during the time it was occupied (Clark 1954: 58) (Fig. 3). A series of cores were also taken through the sediments beyond the extent of the excavations, and the results were brought together to map the spatial extents of the environments that were contemporary with the occupation of the site (Clark 1954: 58).

The results of this work not only established the ecological context of the human inhabitation of Star Carr but also provided information on the site's economy and the timing and frequency of occupation. The paleoenvironmental analysis indicated that activity had taken place within an area of reedswamp that had formed at the edge of the lake, with aquatic vegetation growing in the deeper water and a wood of birch, willow, and aspen growing on the drier ground at the shore

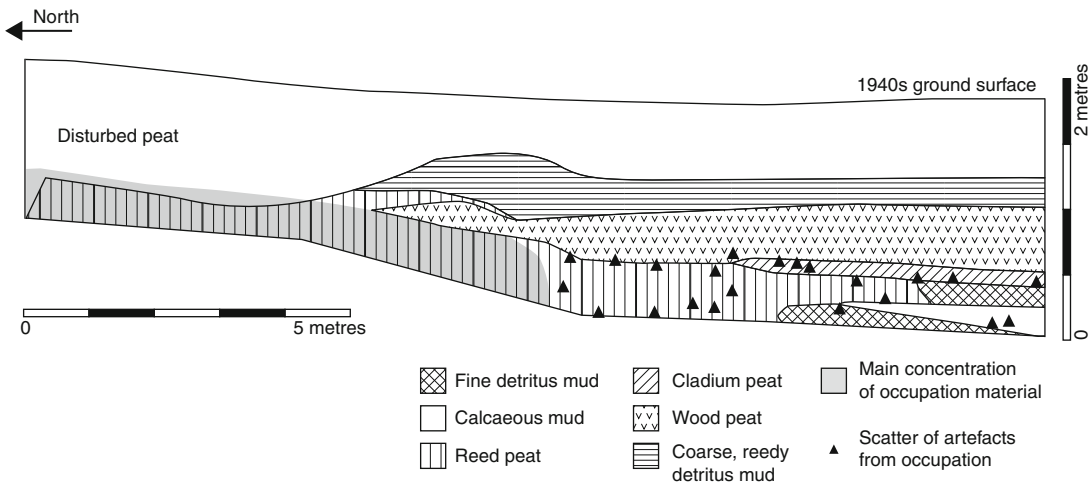

Star Carr: Environmental Archaeology, Fig. 3 The peat stratigraphy recorded by Godwin and Walker and its relationship to the archaeological evidence for human activity (After Clark 1954: 59 Fig. 27a)

(Clark 1954). Although there was no evidence for deliberate management of the local vegetation (Clark 1954: 67), Clark suggested that at least some of the plant species present at the site may have been exploited for food, drawing parallels with other sites where plant remains had been recorded from domestic contexts (Clark 1954: 13-15). Godwin and Walker also noted that reeds had been able to grow within the main areas of activity (Clark 1954: 58), suggesting that the site had been uninhabited during the spring months (Clark 1954: 67).

As well as establishing the character of the environment at the site, Clark used the results of the pollen analysis to relate Star Carr chronologically to the Maglemosian sites of Northern Europe. Typological similarities had already been noted between these and sites in England on the basis of flint technologies, while Mary and Harry Godwin had used comparative pollen analysis to show that two antler harpoon points discovered in North Yorkshire were contemporary with Maglemosian examples from Denmark (Godwin & Godwin 1933). A comparison of the pollen data from Star Carr, however, showed that the site was earlier than many of the Danish sites, a finding that appeared to be supported by differences in both flint and antler-working techniques (Clark 1954: 179-180). This led Clark to conclude that Star Carr represented an earlier form of the Maglemosian "culture" that was still influenced by traits from the Upper Paleolithic (Clark 1954: 191).

In addition to the evidence from the ecological studies, Clark also made good use of the faunal remains that he had recorded from the excavations and that had been analyzed by Fraser and King. They identified the species of animals that were present and established the minimum number of individuals that were represented within the assemblage. On the basis of this analysis, they showed that the inhabitants of Star Carr had hunted a wide range of different animals but that red deer were the most important to the economy of the site. By calculating the approximate amount of meat produced by butchering these animals and estimating the dietary requirement of a postglacial hunter-gatherer, Clark also estimated the total length of time the site had been in use, which he placed at six and a quarter years (Clark 1954: 14-15).

However, by far the most significant (and highly debated) use of the faunal assemblage was in establishing the seasonality of the site. Based on the time of year that red deer are known to lose their antlers, Fraser and King argued that the unshed material must have come from animals that were hunted between

October and April (Clark 1954: 93), while shed antler could only have been collected in April (Clark 1954). From this it was argued that the site was occupied during the winter and spring months (Clark 1954) and that the inhabitants had moved to other locations during the summer. While this idea of seasonal mobility was largely implicit in Clark's original publications, he developed the idea further in his subsequent reanalysis of the site (Clark 1972). Here, he argued that the occupants of Star Carr had moved annually between lowland and upland locations as they followed migrating herds of red deer, an argument that was based upon behavioral studies of modern animal populations.

The Vale of Pickering Research Trust: 1985

In 1985 a new program of work was begun at the site, under the auspices of the Vale of Pickering Research Trust (Cloutman & Smith 1988). The Trust had been formed following the successful completion of the Seamer Carr Project, which had carried out extensive archaeological and paleoenvironmental surveys of the Mesolithic landscape along the northwest shore of Lake Flixton (Cloutman 1988a, b; Milner et al. 2011; Lane & Schadla-Hall forthcoming). Using the skills and experiences that had been gained from this, the Trust aimed to expand upon the work of Godwin and Walker by creating a more detailed pollen record at Star Carr (Mellars & Dark 1998: 14).

Although the work of Godwin and Walker was exemplary for its time, the scope of their interpretations was limited by some of the approaches they adopted. In particular, the pollen analysis, which had only been carried out on a single profile and recorded at a very low resolution, was unlikely to detect subtle or gradual changes to the local vegetation. This, combined with the lack of radiocarbon dates from the environmental sequence, made it impossible to determine the timing and nature of environmental change at the site. However, advances in the techniques of paleoecology, and particularly palynology, and the wider availability of radiocarbon dating provided the opportunity to establish a more comprehensive record of the environments at Star Carr.

Much of this work was carried out by Edward Cloutman, who had undertaken the surveys at Seamer Carr, and was supervised by Alan Smith, who had formerly worked with Godwin at the Subdepartment of Quaternary Research. Based on work they had carried out at other sites, Cloutman and Smith argued that pollen profiles from lake-edge deposits were heavily influenced by the local vegetation and provided an accurate record of the environment that had formed close to the point where the samples were obtained (Cloutman & Smith 1988: 43 & 53). As such, a series of pollen profiles recorded at intervals from the lake edge and into the basin would document the spatial extents of the wetland vegetation and its development through time (Cloutman & Smith 1988). To achieve this, two new trenches (VP85A & B) were excavated through the lake-edge deposits, approximately 25 m to the east of the area investigated by Clark, and a series of pollen profiles were recorded from points along their length (Cloutman & Smith 1988: 38) (Fig. 2). These were correlated using common horizons within the pollen and peat stratigraphies (Cloutman & Smith 1988: 48-51), and an absolute chronology was established by radiocarbon dating.

In contrast to the work carried out by Godwin and Walker, Cloutman and Smith showed that the lake-edge environments had developed throughout the time that Star Carr was occupied. The reedswamp, which had traditionally been associated with the occupation of the site, had expanded into the deeper parts of the lake during the first few centuries of the Mesolithic, and a drier, fern-dominated fen had developed closer to the shore (Cloutman & Smith 1988: 52). Based on the relationship between the pollen and peat stratigraphies and a small assemblage of artifacts recorded during the excavations, Cloutman and Smith argued that it was in this environment that activity had taken place. The pollen analysis also detected an area of wetter ground that had formed around the time the site was first inhabited. This appeared to have been stabilized by the construction of a timber platform, the remains of which had been recorded during the excavation of the trench (Cloutman & Smith 1988).

However, while Cloutman and Smith provided a very detailed record of the changing environments at Star Carr, the chronology established by the radiocarbon dates was problematic. To begin with, the samples taken from the base of the profiles predated the start of the Holocene, leading Cloutman to suggest that older material had become reworked and incorporated into the basal sediments (Cloutman & Smith 1988: 45). Furthermore, many of the dates clustered at c. 9500 BP, which Mellars, drawing on the results of recent dendrochronological work, subsequently argued, were the result of a radiocarbon plateau (Mellars 1990). This, along with the large error range of many of the determinations and the relatively low sample interval of the pollen analysis, made it difficult to establish the date and timing of environmental change in certain parts of the sequence (Cloutman & Smith 1988: 840).

Paul Mellars and Petra Dark (Née Day): 1989–1992

It was partly in response to these concerns that a new program of research was undertaken at the site in the 1990s by Paul Mellars and Petra Dark, again with the support of the VPRT (Mellars & Dark 1998). As well as dealing with the issues of chronology, Dark also sought to refine the environmental record for the site through high-resolution pollen analysis (Mellars & Dark 1998: 112). This, she argued, had the potential to detect discrete changes to the local vegetation, which, if related to human action, could be used to establish the duration and season of occupation, as well as providing evidence for the exploitation of the local flora (Mellars & Dark 1998).

Between 1989 and 1992, three new pollen profiles were recorded from samples taken from Trench VP85A, while a fourth profile was recorded just to the south of Clark's excavations (Cutting II) (Fig. 2). As well as the analysis of pollen, micro- and macro-charcoal were recorded from all of the profiles to identify episodes of localized burning and relate this to evidence for vegetation disturbance (Mellars & Dark 1998: 115-6). A new radiocarbon chronology was also established from AMS dates obtained on terrestrial macrofossils (Mellars & Dark 1998: 117), and "wiggle matching" and Bayesian analysis were used to overcome the difficulties caused by the plateau in the calibration curve (Mellars & Dark 1998: 119-121).

Dark's research broadly supported the environmental sequence that had been outlined in previous work at the site, documenting the expansion of fen and carr across the former lake edge. However, Dark also argued that some of the changes to the wetland vegetation recorded by Cloutman and Smith were unlikely to be the result of natural plant succession (Mellars & Dark 1998: 155) but had, instead, resulted from the deliberate clearance of the lake-edge flora. The most significant of these was a rapid decline in grass (Poaceae) pollen, much of which was thought to have derived from *Phragmites* reeds, which corresponded with an increase in micro- and macro-charcoal (Mellars & Dark 1998: 130). This, Dark argued, had been caused by the deliberate clearance of the reedbeds by fire (Mellars & Dark 1998). A similar decline in grass pollen and a corresponding increase in charcoal was recorded from the profile to the south of Clark's Cutting II, suggesting that the reedswamp in this area was also cleared at around the same time (Mellars & Dark 1998: 158) and a second phase of burning occurred approximately a century later in both parts of the site (Mellars & Dark 1998: 157).

Dark also established the time of year that the first phase of burning occurred, based on the presence of carbonized fruits, bud scales, and juvenile reed tissue within the deposits, and used this to infer the season of occupation at the site (Dark 2004). She argued that the *minimum* period during which the burning took place was between late April and the end of August but that it could have occurred as early as late winter (February) and as late as the end of September (Dark 2004: 41-2). However, Dark noted that occupation did not have to be continuous and that the site may have been revisited at different times of the year. She also pointed out that plant remains would not be able to detect evidence for burning during the winter, as they do not produce identifiable structures, such as fruits or bud scales at this time of the year (Dark 2004: 42).

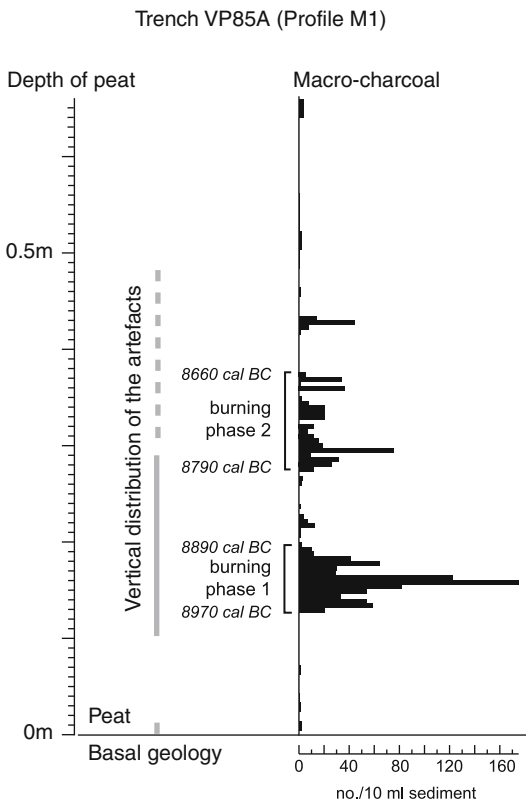

Star Carr: Environmental Archaeology, Fig. 4 Concentrations of charcoal and the vertical distribution of artifacts in Trench VP85A (After Dark et al. 2006: 189)

Both the evidence for burning and the revised dating of the environmental sequence were also used to establish a chronology for human activity at Star Carr. First, Paul Mellars compared the vertical distribution of the artifacts in VP85A with the dated peat stratigraphy, which suggested that the archaeological assemblage had been deposited over a period from c. 8700 to c. 8400 cal BCE (Mellars & Dark 1998: 210). Subsequently, Dark used the deliberate burning of the local vegetation to establish a more detailed chronology of the site (Dark et al. 2006). Based on the dating of the charcoal record, she argued that the first phase of burning began c. 8970 cal BCE, lasted for approximately 80 years (slightly longer at Clark's site), and was broadly synchronous across the site (Mellars & Dark 1998: 159; Dark et al. 2006: 191). In both of the trenches, it also coincided stratigraphically with the larger part of the artifact assemblage, leading Dark et al. to suggest that it represented the main period of occupation (Dark et al. 2006: 191) (Fig. 4). A second phase of burning occurred in the area around VP85A from c. 8790 cal BCE, lasting 130 years, while a further episode occurred approximately a century later in the area covered by Clark's excavations. As these both corresponded with smaller quantities of artifacts, Dark et al. suggested that there had been "a shift in the main focus of activity to other parts of the lake edge zone" (Dark et al. 2006: 198). Crucially, direct dating of the faunal assemblage and material culture has broadly supported these interpretations (Dark et al. 2006; Conneller et al. 2009), indicating that the charcoal record is a reasonable proxy for human activity at the site.

Reinterpretations and Debates

In the decades following the publication of his excavations at Star Carr, Clark's interpretation of the site remained largely unchallenged. However, from the late 1970s, several key points of his work became the subject of extensive critique: the interpretation of the faunal assemblage and what this said about the time of year the site was occupied, and the seasonal basis for mobility and the depositional context of the artifact assemblage. In both cases, the debates surrounding these issues led to new interpretations of the function of the site and its relationship to the wider pattern of activity within the surrounding landscape.

Changing Interpretations of the Faunal Assemblage

Species Representation and the Season of Occupation

The analysis of the faunal assemblage from Star Carr formed the basis for Clark's interpretation of the site as a winter base camp, inhabited by seasonally mobile hunters following herds of migrating red deer. However, in the late 1970s, Seamus Caulfield (1978) argued that the original analysis and the conclusions drawn from it were fundamentally flawed. The central point of his

argument was that Fraser and King had included the shed and unshed red deer antler when calculating the number of animals represented in the assemblage and the time of year they had been killed (Caulfield 1978: 15). However, a reassessment of the data showed that the antler was overrepresented in comparison to the post-cranial elements of the skeleton, suggesting that it had been brought onto the site, possibly for use as raw material (Caulfield 1978: 18). As such, its inclusion by Fraser and King had over emphasized the importance of red deer and had produced a potentially inaccurate record of the time of year the site was occupied.

However, subsequent attempts to establish the seasonality of Star Carr based on the existing data met with mixed success. Discounting the red deer from the assemblage, Roger Jacobi (1978) argued that the faunal evidence indicated that activity had extended into the early summer. In contrast, Mike Pitts (1979) and John Andersen et al. (1981) used a combination of the botanical and the faunal evidence to argue that there was no single season of activity and that the site had either been occupied all year round (Pitts 1979: 33) or had been visited at different times of the year (Andresen et al. 1981). Based in part on the reassessment of the faunal assemblage, Andersen et al. also suggested that Star Carr had acted as a temporary hunting site, where animals had been killed and subsequently butchered, rather than an area of settlement (Andresen et al. 1981).

In the face of these varied and contradictory readings of the data, a comprehensive reanalysis of the faunal assemblage was carried out by Tony Legge and Peter Rowley-Conwy (1988). Accepting that the adult red deer crania with unshed antlers were an unreliable indicator of seasonality, they focused instead on the age-at-death profile of the younger animals based on tooth eruption data. This showed that young roe deer and, where age could be established, young red deer were being killed in the summer (Legge & Rowley-Conwy 1988: 25 & 38), while the presence of adult red deer crania that had shed their antler indicated a kill around April or May (Rowley-Conwy 1988: 30). Furthermore, only one individual (a juvenile elk) showed conclusive evidence for a kill later in the year (Rowley-Conwy 1988: 31-2), leading Legge and Rowley-Conwy to conclude that a summer occupation was most likely (Rowley-Conwy 1988: 94). These conclusions have since been refined through work carried out by Richard Carter who used radiographs of juvenile roe and red deer jaws to establish a more precise season of death. This showed that the young roe deer were killed slightly earlier in the year (Carter 1997 cited in Mellars & Dark 1998: 216), while at least one juvenile red deer was probably killed in the winter (Carter 1998: 855).

Drawing together the work of Carter, Legge and Rowley-Conwy, and Dark, Mellars argued that Star Carr was probably occupied between late spring (April/March) and early summer (June or early July) (Mellars & Dark 1998: 216). However, the ability to draw such conclusions from faunal and botanical data has been criticized by a number of researchers. Nicky Milner, for example, has argued that inferring the season of occupation on the basis of faunal data is fraught with difficulties, noting in particular that seasonally diagnostic material can be imported onto a site (as was the case with the red deer antlers) and that some activities leave no evidence of when they were undertaken (Milner 2005a: 34). Furthermore, indicators of activity at different times of the year are often assumed to form part of the same phase of occupation, rather than separate episodes of activity carried out on separate visits to the site (Milner 2005b: 58). As such, they tend to reduce variable and complex behavior into a single seasonal event (Milner 2005b).

With this in mind, the data from Star Carr could easily reflect multiple visits to the site at different times of the year, especially if the apparently anomalous evidence for the hunting of animals in autumn and winter that was recorded by both Legge and Rowley-Conwy (1988) and Carter (1998) is considered. This point has also been made by Dark, who has stated that while the evidence for burning at Star Carr spanned several months of the year, occupation at the site may have been more intermittent and that the data could reflect a series of discrete events

(Dark 2004: 42). It is also important to note that none of the seasonally diagnostic material has been dated and that the evidence for activities in different months may not be contemporary. Overall, the evidence for a single season of occupation is far from unambiguous, and it remains possible that the site was visited on multiple occasions throughout much, if not all, of the year.

The Economic and Seasonal Basis for Mobility

Clark's model of a seasonal pattern of upland-lowland migration has also been critiqued, most notably by Legge and Rowley-Conwy (1988). They argued that the studies of red deer behavior that Clark drew upon were not applicable to Star Carr as they were based on open rather than wooded landscapes (Legge & Rowley-Conwy 1988: 13). Furthermore, they noted that deer in wooded environments do not migrate over long distances and would not necessarily have been absent from the vicinity of Star Carr during the summer season (Legge & Rowley-Conwy 1988). Similarly, they argued that the other animals that were being hunted and killed at Star Carr either were nonmigratory or would have been present in the area during the time of year the site was occupied (Legge & Rowley-Conwy 1988: 38).

But while the specific details of Clark's argument have been critiqued, the underlying assumption that Star Carr related to a wider pattern of seasonal mobility and resource procurement has persisted. Legge and Rowley-Conwy, for example, suggested contact between Lake Flixton and the nearby coastal areas, stating that these would have provided a range of resources "at seasons complimentary to that in which Star Carr is known to have been occupied" (Legge & Rowley-Conwy 1988: 95). This initially found some support from carbon isotope analysis carried out on the remains of a Mesolithic dog at Seamer Carr (Site K), just 1,200 m to the northeast of Star Carr, which showed evidence for a significant marine component to its diet (Clutton-Brock & Noe-Nygaard 1990) (see Fig. 1b). Arguing that the results could serve as a proxy for the diet of humans (Clutton-Brock & Noe-Nygaard 1990: 649), Clutton-Brock and Noe-Nygaard suggested that the inhabitants of Seamer Carr spent most of their time at the coast and that the sites around Lake Flixton (including Star Carr) represented temporary inland hunting stations (Clutton-Brock & Noe-Nygaard 1990: 650).

However, the veracity of this argument has been questioned on both methodological and interpretive grounds. To begin with, Petra Dark argued that the marine values were the result of carbon from the lake water entering the food chain via animals grazing on aquatic plants (Day 1996), though this has been refuted by Rick Schulting and Mike Richards (2002, 2009). Schulting and Richards (2002) have also questioned whether the diet of a single animal is representative of patterns of human activity spanning several centuries. As they note, visits to the coast may have occurred infrequently and not necessarily as part of a seasonal inland-coastal migration, while the dog itself may have been traded and need not reflect the movement of a human population (Schulting & Richards 2002: 331). These critiques have been supported by a more recent isotopic study on the remains of two dogs from Star Carr, neither of which showed evidence for a marine diet (Schulting & Richards 2009: 502).

Alternative Interpretations of the Faunal Remains

While the interpretation of the faunal assemblage has been dominated by the debates surrounding seasonality, several researchers have focused on the cultural attitudes towards the animals themselves. In particular Pollard (2000), Chatterton (2003), and Conneller (2003, 2004; Conneller & Schadla-Hall 2003) have all suggested that elements of the faunal assemblage and the artifacts made from bone and antler may have been deposited through deliberate acts of disposal that were related to concepts of animal agency. Pollard and Chatterton have separately argued that this involved treating the remains of animals with respect in order to ensure successful hunts in the future (Pollard 2000: 125-6; Chatterton 2003: 78). Conneller has also taken a slightly different view, arguing that the artifacts made from red deer, and particularly the barbed points and the antler frontlets, were used in transformative

practices in which aspects of animal identity could be taken on by humans (Conneller & Schadla-Hall 2003: 102-3; Conneller 2004).

The Context of Deposition and Site Function

The depositional context of the material culture recorded by Clark has also been debated, leading to a number of reinterpretations of the forms of activity that the assemblage represents. Clark himself had argued that the artifacts had been deposited into an area of reedswamp that lay at the edge of the lake and represented an area of occupation (Clark 1954: 12). However, since the late 1970s, several archaeologists have argued that the assemblage was actually deposited into standing water, making it an unlikely place for inhabitation (e.g., Price 1982; Chatterton 2003). As a result, the assemblage has been variously reinterpreted as a dump of material discarded as waste, the remains of specialized craft activity (particularly tanning and antler working), or the results of culturally prescribed acts of deposition and disposal (e.g., Price 1982; Pitts 1979; Chatterton 2003; Conneller 2004). These reinterpretations have themselves been critiqued by Paul Mellars, who has argued strenuously in favor of Clark's original narrative (Mellars & Dark 1998; Mellars 2009).

Unfortunately, Clark's excavation records lack the necessary contextual detail to resolve this debate, and researchers have had to rely upon other, less direct, forms of evidence often leading to contradictory conclusions. Doug Price, for example, cited the preservation of the bone and antler to argue that they were deposited into standing water, while Paul Mellars used the spatial distribution of the flint artifacts to argue for in situ activity in a relatively drier environment (Price 1982; Mellars & Dark 1998: 218-221). Richard Chatterton has pointed out that the deposits from which much of the archaeological material was recorded contained aquatic plant material (Chatterton 2003: 70 citing Clark 1954: 58), though Mellars has countered this, suggesting that this could have been washed in by periodic flooding or represented the waste from plants collected for food (Mellars 2009: 506). Finally, both Chatterton and Mellars have used the paleoenvironmental work carried out by Dark to determine whether the area investigated by Clark would have been beneath or beyond the water level of the early Mesolithic lake (Chatterton 2003: 70; Mellars & Dark 1998: 221; Mellars 2009: 506). Unfortunately, alleged discrepancies in the topographic survey of the site (Mellars 2009: 506) have meant that the two authors came to very different conclusions.

However, recent archaeological and paleoenvironmental research at Star Carr has begun to resolve this issue. Since 2004 a new program of fieldwork has been carried out at the site, which has included the excavation of trenches through the lake-edge deposits and the re-excavation of some of the areas investigated by Clark and the VPRT (Milner et al. 2011; Conneller et al. 2012). This has recorded further evidence for Mesolithic activity, including timber platforms and artifact assemblages, as well as providing an opportunity for new paleoenvironmental investigations. In particular, the analysis of plant macrofossils taken from the section of Clark's Cutting II, VP85A, and several of the new trenches has provided a very detailed picture of the environments that were forming at the site (Hall et al. 2007; Hall 2009; Taylor 2012). By relating this work stratigraphically to the archaeological evidence, it has been possible to develop a precise contextual record of the various episodes of human activity (Taylor 2012).

This work has shown that there was no single context of deposition and that artifacts were deposited into a range of different environments, the nature and extent of which changed during the time the site was inhabited (Taylor 2012: 351; see also Taylor 2011: 78-80). The earliest artifacts were deposited into shallow standing water close to the lake shore, with swamp vegetation growing in situ. However, as the peat began to accumulate, the depth of water at the lake edge became shallower until the area eventually became terrestrialized, and trees and fen plants became established (Taylor 2012: 360). Yet despite the changing nature of these environments, artifacts continued to be deposited across the lake-edge wetlands. In some places, the material appears to have been discarded as waste from

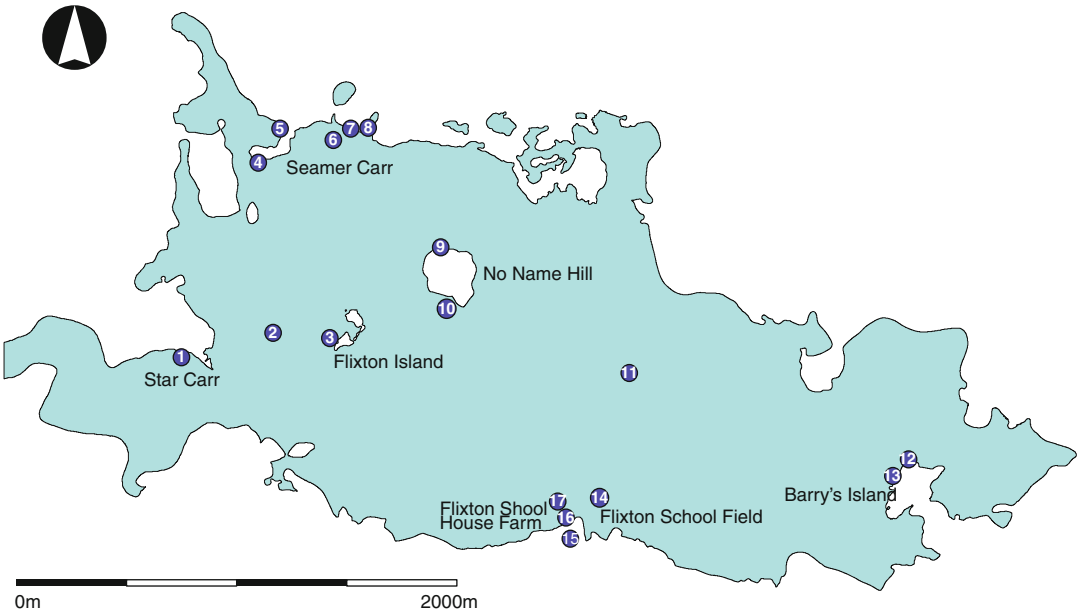

Star Carr: Environmental Archaeology, Fig. 5 Location of environmental profiles within the Lake Flixton basin (excluding those recorded by Godwin and Walker). *1* VP85A1-3 and VP85B (Cloutman & Smith 1988) and M1-3 and "Clark's site profile" (Mellars & Dark 1998), *2* deep lake profile (Mellars & Dark 1998), *3* AK87 (Lane & Schadla-Hall Forthcoming), *4* D1 (Cloutman 1988b), *5* K2 and 5 (Cloutman 1988b), *6* M285 (Cloutman 1988b), *7* CV, CVII, and CVIII (Cloutman 1988b), *8* E77 (Cloutman 1988b), *9* NAQ and NAZ (Cummins 2003, Taylor 2011 & 2012); *10* NM (Cummins 2003); *11* profile D (Cummins 2003); *12* LAL (Cummins 2003); *13* LAP (Cummins 2003); *14* FS95 (Cummins 2003); *15* PCC (Cummins 2003); *16* Trench F (Taylor 2011 & 2012); and *17* core 1(Taylor 2011 & 2012)

nearby areas of craft activity; in others, it may have been deposited more deliberately, while in some parts of the site, the artifacts represent tasks that were being carried out in situ within the wetland environments (Taylor 2012: 351-2). What is more, the nature of activity associated with the wetlands changed as these environments developed. The use of the timber platforms, for example, occurs at a time when the depth of water was becoming shallower and conditions at the lake-edge boggier (Conneller et al. 2012). As the deposits began to form above the level of the lake and the wetlands became more terrestrialized, activities that had formerly taken place on the dry ground, such as antler working, were carried out within the fen itself (Taylor 2007). This explains some of the very contradictory interpretations of the site. Clark and subsequent researchers have treated the faunal and artifactual material as a single assemblage. However, the recent work has shown that the site is, in fact, a palimpsest, reflecting successive phases of activity, taking place in very different environments, and spanning several centuries. It is not, therefore, surprising that studies of the animal bone have been unable to show a single season of occupation nor that the material culture reflects very different forms of activity indicative of different types of environmental conditions. The key to understanding Star Carr is to appreciate the diverse character of activity and its relationship with the changing character of the wetland environments.

Paleoenvironmental Research in the Wider Landscape

Since the late 1940s, paleoenvironmental investigations have also been carried out across much of the basin, documenting the environmental history of the lake and establishing the ecological context of other areas of Mesolithic activity (Fig. 5). As at Star Carr, much of this work

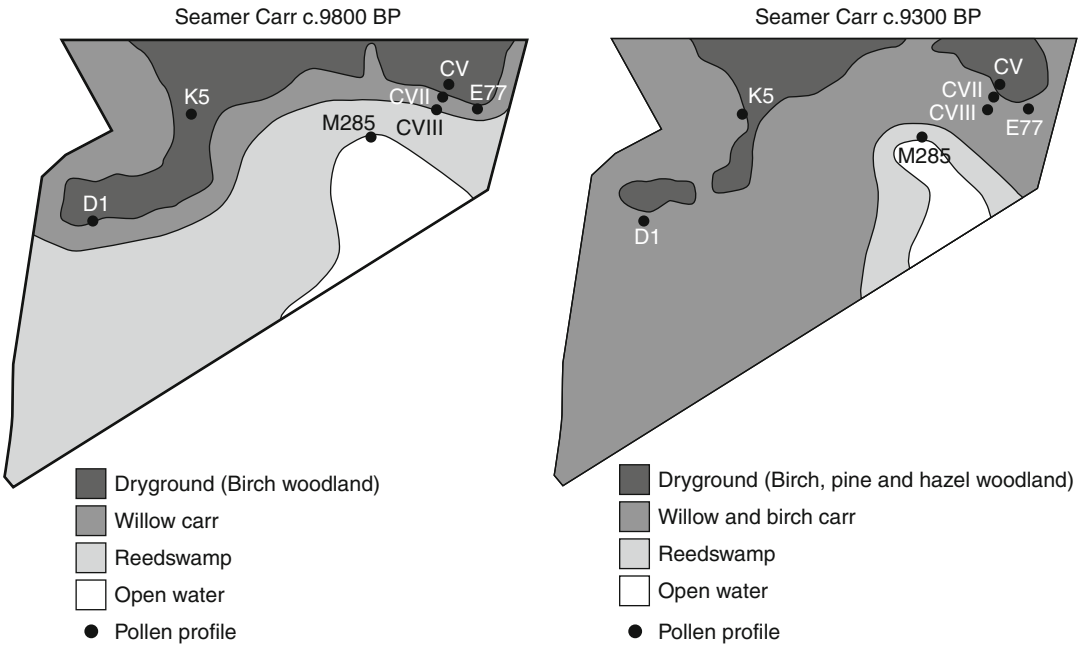

Star Carr: Environmental Archaeology, Fig. 6 The spatial extents of the early Mesolithic wetland environments at Seamer Carr (After Cloutman 1988b: 33 Fig. 7)

has been carried out as part of archaeological investigations, creating a well-integrated record of both the human and environmental histories of the landscape.

The first large-scale investigations were carried out by Godwin and Walker who recorded the stratigraphy of the basin through a series of auger transects and used pollen and plant macrofossils to document the changing character of the wetland and terrestrial vegetation. Their results showed that the lake had formed at the start of the late glacial interstadial but had been colonized by swamp and fen environments during the Mesolithic, leading to the eventual in-filling of the basin (Clark 1954: 61-9). Since the mid-1970s, however, more intensive programs of work have been undertaken, first under the auspices of the Seamer Carr Project and then the VPRT, which have created a far more precise record of both the topography and the vegetational history of the area.

To begin with, large-scale auger surveys have been carried out across the former lake, mapping much of the buried Mesolithic land surface including almost all of the shore, the adjacent terrestrial landscape, and substantial parts of the basin (Cloutman 1988a; Lane & Schadla-Hall forthcoming). The augering has also recorded the sequence of sediments that formed within the lake, while pollen analysis has been carried out in order to document the changing patterns of vegetation. Perhaps the most intensive program of work was carried out at Seamer Carr by Cloutman, who recorded eight pollen profiles from locations along the shore, within the deeper lake margins and on the terrestrial landscape (Cloutman 1988b). By correlating these on the basis of common horizons within the pollen stratigraphies, Cloutman was able to map the expansion of different wetland environments into the lake as well as documenting changes to the adjacent terrestrial vegetation (Fig. 6). Since then, pollen profiles have been recorded by Jim Innes at Flixton Island (Lane & Schadla-Hall forthcoming) and by Gaynor Cummins at No Name Hill, Barry's Island, and Flixton School Field (Cummins 2003), establishing the character of the vegetation around each of these sites. Both Cummins (2003) and Dark (Mellars & Dark 1998) have also documented the regional pattern

of vegetation through the analysis of pollen from the deepest parts of the basin. More recently plant macrofossil analysis has been carried out at Flixton School House Farm and No Name Hill (Taylor 2011, 2012). At both sites profiles were recorded at intervals from the lake edge into the deeper lake margins and correlated using radiocarbon dates to provide a precise record of the timing of wetland succession (Taylor 2011; 2012).

When brought together, this work has created a very detailed record of the environments that were forming within and around the lake at the time that Star Carr was occupied. The lake itself was over 4.5 km long, with a complex and varied shoreline interspersed with embayments, small promontories, and larger hilly peninsulas (Taylor 2011: 65). Around much of the shore, low hills overlooked the lake, while areas of low-lying ground created small boggy hollows and seasonal ponds (Taylor 2011). By the start of the Mesolithic beds of *Phragmites* reed, sedges and other wetland plants were well established along much of the shore, with floating aquatic plants growing in the deeper water (e.g., Cummins 2003: 281). Along the shore, willow, aspen, and birch were growing at the water's edge, and birch woodland, interspersed with areas of open grassland, covered the surrounding terrestrial landscape (Cummins 2003: 280). As at Star Carr, these environments developed rapidly as the accumulation of sediments caused the lake to become shallower, allowing swamp vegetation to expand into the basin (e.g., Taylor 2011: 76). By c. 8500 cal BCE, the sediments at the lake edge were forming above the level of the lake, and fen plants and trees had begun to colonize the wetlands (Taylor 2011).

These analyses have also helped to show how Mesolithic people engaged with their environment. In a detailed study of the lithic assemblages from sites around the lake, Conneller observed that the assemblages that were recorded from the wetland deposits lacked evidence for in situ knapping and were dominated by flakes and blades (e.g., Conneller & Schadla-Hall 2003: 100). These, she argued, reflected the use of flint at the wetland's edge for tasks that included the cutting of material (Conneller & Schadla-Hall 2003: 100). Macrofossil analysis at one of these sites (No Name Hill) showed that some of the flint had been deposited into reedswamp that was growing in shallow standing water over 5 m from the shore (Taylor 2011: 77). This, it has been argued, showed that people were carrying out tasks *within* the wetlands, possibly including the clearance or collection of reeds for use as food or raw materials (Taylor 2011). Other parts of the flint assemblage, again dominated by flakes and blades, had been deposited in waterlogged sediments that had formed at or close to the shore (Taylor 2011). Although this material may reflect a range of different activities, it is possible that part of the assemblage was deposited while working antler, as several pieces of antler-working waste were recorded nearby (Taylor 2011).

As at Star Carr, there is also evidence that Mesolithic people were deliberately manipulating and managing the wetland vegetation in the wider landscape. High-resolution pollen and charcoal analysis carried out by Cummins has shown that the reed and sedge beds at No Name Hill and Flixton School Field were cleared by burning for prolonged periods and on multiple occasions (Cummins 2003). Although the reason for the burning is debated, the most common argument is that it formed part of an economic strategy that was designed to maintain predictable and reliable resources around the landscape. Regular burning of the reed beds would, for example, increase their biomass and encourage their expansion while at the same time preventing other plants from colonizing the area (e.g., Mellars & Dark 1998: 231; Cummins 2003: 297). This would create large, productive, stands of reeds that could then be exploited for either food or raw materials. Alternatively, it has been argued that the burning of the reeds would promote the growth of young shoots and create openings at the edge of the lake, attracting animals to the area and making them easier to hunt (Cummins 298-9; Mellars & Dark 1998: 231-2).

The environmental work that has taken place around the former lake has also helped to relate Star Carr to the pattern of activity within

the surrounding landscape. Cummins, for example, showed that activity at other locations around the lake (No Name Hill and Flixton School Field) was broadly contemporary with Star Carr, based on the dates for the charcoal sequences at each of the sites (Cummins 2003: 292). As at Star Carr, the dating of the charcoal records from these sites also showed that they were occupied (or revisited) for decades at a time (Cummins 2003: 291-2). Similarly, the macrofossil analysis at No Name Hill has shown that activity within the wetlands spanned the period over which these environments changed, with evidence for tool use within the swamp and the later fen and carr (Taylor 2011: 77-8). It also demonstrated that very similar kinds of activity were taking place in the same sorts of environment at the two sites. When seen in this context, it becomes clear that activity at Star Carr was part of a much broader pattern of occupation that was focused around the shores of the lake.

Conclusions

In the closing sentences of the Star Carr monograph, Clark wrote that his excavations had "opened up rather than closed a field of prehistoric research" (Clark 1954: 191), and it is a testament to the importance of the site that this statement remains true to this day. While Clark's work at Star Carr laid the foundations for Mesolithic archaeology in Britain, the subsequent reinterpretations and the new excavations they inspired not only have refined our knowledge of the site but also have changed the way we understand the period as a whole (Conneller 2003). The issues of seasonality that dominated discussions of the faunal assemblage throughout the 1970s and 1980s have led to more critical debates surrounding the idea of seasonal mobility during the early Mesolithic (e.g., Milner 2005a & b). Furthermore, renewed analyses of the faunal assemblage as well as the material culture from the site have led to altogether new approaches to the study of animals and how they may have been perceived by humans (e.g., Conneller 2004). Similarly, the traditional view of Mesolithic society as consisting of small, highly mobile groups has been challenged by many of the new discoveries at Star Carr: the deliberate manipulation of the environment, the temporally extensive nature of occupation, and the construction of large structural features such as trackways (Conneller et al. 2012). Writing almost 50 years after Clark, Conneller wrote that "to change our understanding of Star Carr is to change our understanding of the British Mesolithic itself" (Conneller 2003: 82). Let us hope that over the next 50 years, Star Carr will continue to challenge our perception of early Mesolithic societies.

Cross-References

- ▶ Clark, John Grahame Douglas
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Star Carr, Archaeology of

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Starosele Middle Paleolithic Site with Hominin Remains

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Introduction

The site of Starosele was discovered in the 1950s with Middle Paleolithic artifacts apparently associated with human child remains, possibly transitional to *Homo sapiens* or modern *Homo sapiens*. The discovery was seen as a kind of Eastern European sensation or mystery, mainly due to the Levantine Skhul/Qafzeh hominin discoveries also in Mousterian archaeological context, found in the 1930s. New excavations in the 1990s at Starosele have helped to clarify many archaeological, anthropological, and chronological aspects of the site's finds.

The site is located within the Kanly-Dere, a side, currently dry box canyon in Eocene limestones running north into the Bakhchisaraiskaya valley at the village of Starosele, now within the northern edge of the town of Bakhchisarai in southwestern Crimea. The site is not a cave as was suggested during its excavations in the 1950s but, as became certain during the 1990s excavations, rather an accumulation of sediments on a rock platform along the base of the eastern side of the canyon, 11–13 m above the canyon bottom.

Key Issues/Current Debates/Future Directions/Examples

Starosele: Discovery and the 1950s Excavations

The Middle Paleolithic flint artifacts were found in 1952 on a rock platform in Kanly-Dere canyon by N.P. Katsur, an associate of the Bakhchisarai Museum. A young archaeologist from Moscow, A.A. Formozov, then conducted excavations there from 1952 to 1956. The excavation data were described in a series of articles and a book (Formozov 1958) and can be summarized as follows (see also Demidenko 1998).

Formozov excavated a total area of c. 250 sq. m (Fig. 1). Only during the last two field seasons, in 1955 and 1956, when c. 140 sq. m. were excavated in the main site area, were both a 1-m^2 grid system and several datum points established. Vertical subdivision of the deposits (with an overall thickness of 2–4 m) albeit with no separation of different lithological horizons was also done in 1955–1956 when artifacts and fauna were collected separately from deposits above and below a level of thick limestone slabs. In addition to abundant flint artifacts (c. 12,000 pieces) and fauna (c. 60,000 items), a human child burial was discovered in 1953; separate bones of an adult woman were identified only after the 1954 excavations during analysis of the fauna. The burial came to be known as the famous "Starosele child," while the other remains with fully *Homo sapiens* morphology were generally ignored.

Formozov himself came to the following conclusions after the first Starosele excavations: despite considerable vertical stratigraphic artifact

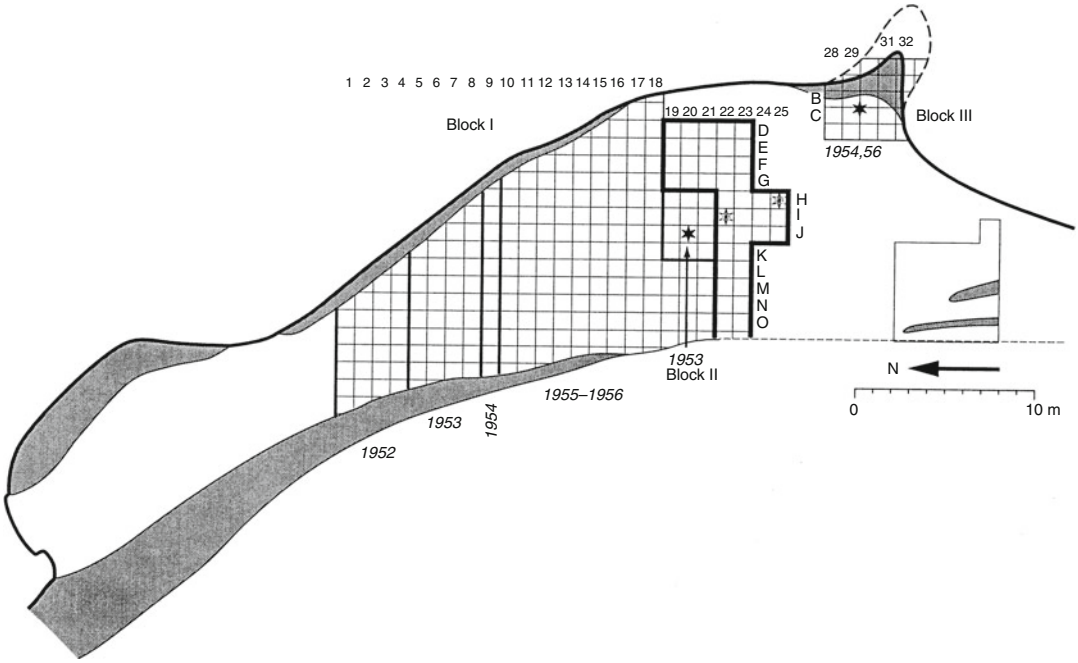

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 1 Starosele site. Plan of the excavations at the site: the 1950s excavations, and the 1990s with heavier line. *Stars* indicate human burials: J-20 – 1953 Starosele child; C-29/30 – 1954 adult female remains found in fauna materials; I-22 – 1993 infant; H-25 – 1994 adult (Modified after Marks et al. 1996: Fig. 2)

distribution, the site represented a continuous human occupation during the Last Interglacial, in the 1950s in Soviet archaeology considered to be Late Mousterian; the flint industry was homogeneous throughout the site and was Mousterian "with a bifacial tool tradition"; the Starosele humans were engaged in specialized hunting of *Equus hydruntinus*; the "Starosele child" was contemporaneous with the site's Mousterian occupation; and the child was evolutionarily "transitional" between Neanderthals and modern *Homo sapiens*.

Starosele: Interpretations after the 1950s Excavations

The Starosele geochronology was considered to be mainly Last Glacial due to the presence of mammoth, woolly rhinoceros, reindeer, and arctic fox (Ivanova 1965; Klein 1965).

Archaeologically, V.N. Gladilin (1976, 1985) proposed the most interesting and valuable interpretations for the Starosele lithic assemblages. He considered the industry to be a separate Starosele type within the East European Micoquian. Although he discussed the site's flints as a single unit, he noted some differences for artifacts above and below the limestone slabs. Accordingly, he considered Starosele to contain two Mousterian layers and hoped for future lithic analyses by layers rather than a single assemblage.

Such analyses were done by V.P. Chabai in the late 1980s in Moscow for his doctorate (Chabai 1991). The presence of Levallois radial cores in "layer 2" (below the limestone slabs) and their absence in "layer 1" (above the limestone slabs) was the only significant difference observed between the two assemblages in the Moscow collections after the 1955–1956 excavations. At the same time, the abundance of both unifacial and bifacial convergent points in both assemblages allowed Chabai to exclude Starosele from the Eastern Micoquian, defining it instead as a separate Crimean Mousterian industry of Starosele type with bifacial tools.

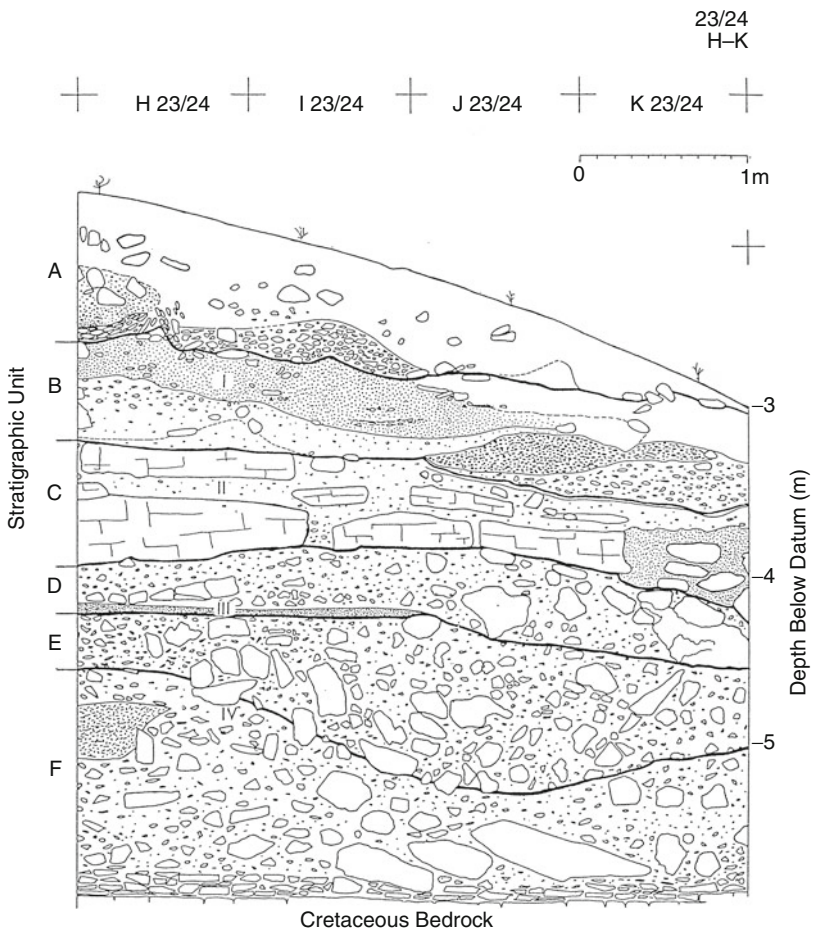

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 2 Starosele site. East/west profile along line 23/24, squares H and K (2 m to the south of Formozov's 1956 profile). *I–IV* – archaeological levels; *A–F* – geological units (After C.R. Ferring) *A* – modern soil; *B* – complex of alluvial and colluvial sediments; *C* – exfoliated limestone slabs with layer of fine sediments in between; *D* – gravels and exfoliated limestone fragments; *E* – boulders in red clayey matrix (Modified after Marks et al. 1996: Fig. 4)

The Starosele child was also viewed differently by different specialists. Doubts were raised about the strict association of the child with the Mousterian layers (e.g., S.N. Zamyatnin, M. Gabori, R. Klein) as well as interpretation of its anatomic features as being transitional to modern *Homo sapiens* rather than fully modern (e.g., G.F. Debets, A. Thoma, V.P. Alexeev). There was thus no common agreement on either the nature of the archaeological context or the anthropological features of the child. It is also worth noting that the Starosele child was never anthropologically defined as a Neanderthal.

As a result, new excavations at Starosele were needed to clarify its geological and cultural stratigraphy, geochronology, and nature of the lithic assemblages throughout the stratigraphic sequence and potentially shed light on the nature of the human remains.

Starosele: The 1990s Excavations

A joint Ukrainian-American research program directed by A.E. Marks was carried out in 1993–1995 (see also Marks et al. 1996; Marks et al. 1997; Marks & Chabai 1998; Marks & Monigal 1998; Chabai et al. 1999; Chabai 2004). An area of c. 40 m^2 was excavated near the southern edge of the 1956 excavation zone (Fig. 1). The c. 4-m-thick profile analyzed by R. Ferring showed the presence of various deposits of different origin (Fig. 2). Four stratigraphically distinct archaeological levels were identified within the sequence. Three of these levels – IV, II, and I (from bottom to top) – are comparable to the 1950s Middle Paleolithic flint industry, containing mainly points among bifacial tools, now attributed as the Starosele industry type of Crimean Micoquian Tradition (Fig. 3). But surprisingly,

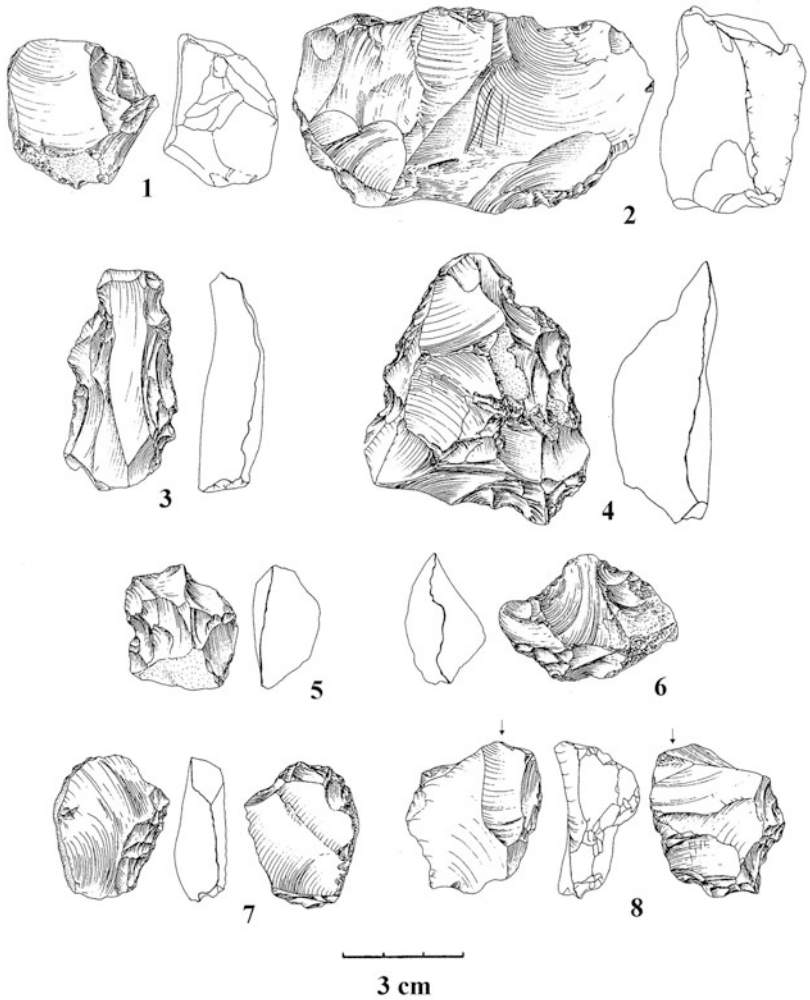

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 3 Starosele, level I –selected flint artifacts. *1–2* – cores; *3–4* – denticulates; *5–6* – notches; *7* – lateral end-scraper + ventral side-scraper; *8* – burin + perforator (Modified after Marks & Monigal 1998)

the level III assemblage lacks any such bifacial tools and at the time had no comparisons within the range of Crimean Middle Paleolithic industrial variability. It was only in the 2000s that the present author (Demidenko 2003–2004) demonstrated that the Starosele level III assemblage (Fig. 4) was quite similar to the assemblage from the lower layer at Kiik-Koba. A systematic dating program was also carried out, as well as analyses of the fauna, microfauna, and malacofauna recovered from the different archaeological levels. The proposed discontinuous geochronological sequence can be presented as follows: Early Last Glacial Interstadials (Amersfoort-Broerup & Odderade) for level IV, Lower Pleniglacial for level III, Moershoofd Interstadial for level II, and Hengelo Interstadial for level I.

Finally, new remains of modern humans were discovered during the 1990s excavations. A destroyed infant burial was found in 1993 protruding from Formozov's 1956 line 21 profile. An additional burial of a middle-aged adult was exposed in 1994, some 2 m south of this infant burial (Fig. 5). The infant burial had no clearly visible pit, but the skeleton lay fully within modern sediments, the top of Middle Paleolithic level 1 being some 10 cm below it. The adult burial had a clear burial pit originating in modern sediment and cutting through the Middle

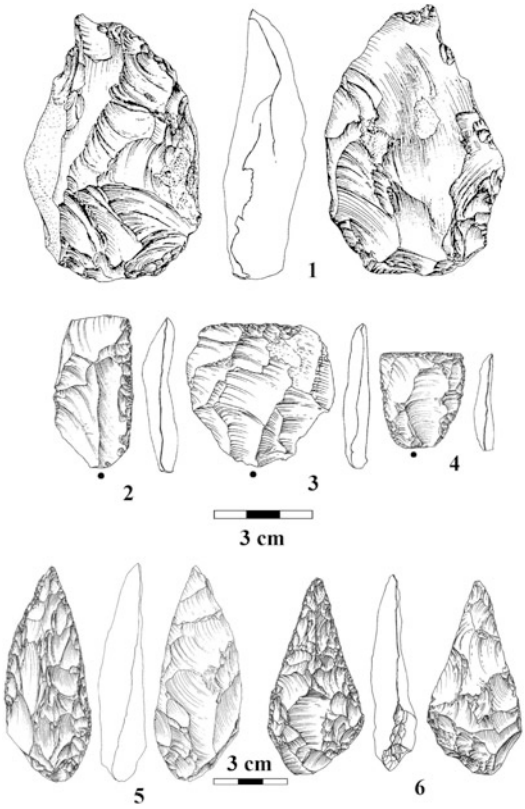

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 4 Starosele, level III – selected flint artifacts. *1* – bifacial perform; *2–4* – various unifacial side-scrapers on bifacial reduction debitage; *5–6* – bifacial leaf points (Modified after Marks & Monigal 1998)

Paleolithic level I sediments, ending on the top of the exposed exfoliated limestone slabs. The infant burial included only the legs and feet, while the rest of the remains were most likely destroyed by Formozov's team when they sealed the 1956 southern profile. The infant's legs and feet indicate that the infant was buried in a semi-flexed position on its right side, with its head oriented to the west. The adult burial, with a complete skeleton in extended anatomical position, was oriented east–west with the head to the west and the face to the south. There were no grave goods, but some Middle Paleolithic flint artifacts and fauna were mixed into the pit fill.

There are many similarities between the 1950s Starosele child and the 1990s modern human burials that make their association highly likely (Fig. 5). All three burials are located within a small area in a line of c. 5 m. Both the 1950s child and the 1990s adult burials were in the same stratigraphic positions – below the uppermost Middle Paleolithic level, resting on top of the exfoliated limestone slabs. There were no grave goods, but some Middle Paleolithic artifacts and animal bones were found above them in the sediments. In addition, both skeletons were in the same position, with the same orientation. Such similarities between the 1990s clearly recent adult burial and the 1950s child burial considered to be of Middle Paleolithic age and being only 3 m apart seriously question the Middle Paleolithic affinity of the 1950s child. Moreover, it is well known that Kanly-Dere canyon was a traditional burial area during late medieval times and a seventeenth-/eighteenth-century Muslim cemetery existed about 100 m from the Starosele site. The two complete 1950s and 1990s human burials at Starosele reflect traditional Muslim burial practices with an extended position on the back, head to the west and face to the south, toward Mecca. Thus, both direct and indirect data strongly support the argument that all of the Starosele human burials, including the 1950s child, are of quite recent, clearly post-Paleolithic age.

Short Summary

The 1990s excavations at Starosele have led to many clarification of site context. Sediment deposition took place during the Last Glacial period over a long period from c. 100,000 to c. 40,000 BP. Human visits of the site were both frequent and episodic, likely separated one from another by no less than 5–10,000 years. Industrially, the Middle Paleolithic assemblages are grouped into two very different industry types – Micoquian (levels I, II, and IV) and Kiik-Koba, lower layer (level III) ones. Finally, the famous 1950s Starosele child is now accepted to be an intrusive late medieval burial with Muslim burial practices, like the other modern human burials discovered at the site.

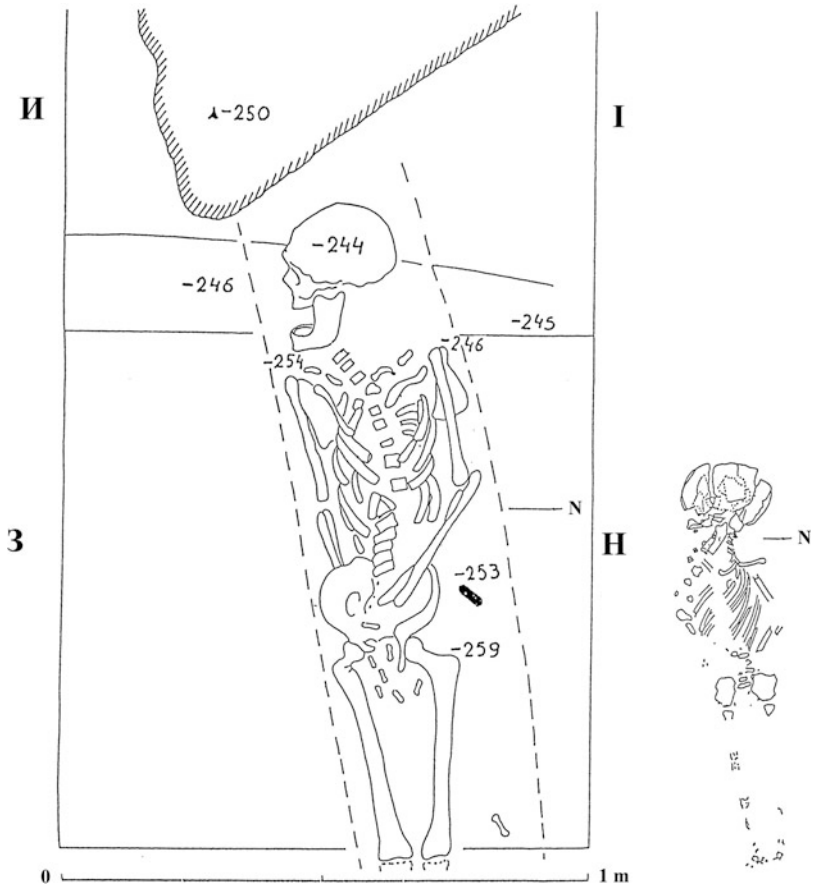

Starosele Middle Paleolithic Site with Hominin Remains, Fig. 5 Starosele. Drawings of the 1994 adult burial and the 1953 child to scale, showing comparable body orientations and positions (Modified after Marks et al. 1996: Fig. 7).

Cross-References

- ▶ Crimean Middle Paleolithic
- ▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union

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Statues and Monumental Art in Archaeology

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Introduction

This entry samples a limited range of monumental art from selected archaeological sites in discrete environments within both continental and island settings. All are unique, yet there are discernible threads of common or contrasting human experience and expression. Monumental architecture and sculptural objects, no matter where they occur, are most often the original products of shared social and aesthetic values or religious belief. The upright bluestones of Stonehenge, the repeated notes echoed by the aligned stone statues of Easter Island, and the buried ceramic legions of Zi'an, China, were all inspired by an intensity of human commitment within societies that differed radically in terms of population size, natural resources, food production, and social organization.

Definition

Monumental art is defined here within the context of megalithism. It occurs widely, at all levels of social complexity and in differing local environments; as such, a universality of monumental art is claimed. Nonetheless, discrete development sequences vary according to regional phases or patterns (Mohen 1989: 285). Megalithic sites in Western Europe postdate the oldest painted caves of France, and most were built there c. 5,000 to 3,000 years before the Christian era. Megalithic cultures existed in the British Isles, Northern and Central Europe, the Near East, and the Central Mediterranean. Megalithism featuring earthworks and burial mounds occurs widely at pre-Columbian sites in the Western Hemisphere. Kalasasaya is an architectural complex near Pucara, Peru, including early zoomorphic stelae and later anthropomorphic sculpture. El Infiernito near the town of Ráquira, Colombia, produced megalithic burial structures. The Fraile stela and other monumental art objects in the Tiwanaku region are world famous. Megalithic sites in such places as Madagascar date to the eighteenth century.

Simply stated, a megalith is a large block of standing or upright stone (from the Greek *mega*, large, and *lithos*, stone). A single, isolated upright stone is a monolith (from the Greek *mono*, one, and *lithos*, stone; Fig. 1). Some upright stones in southern Spain, Portugal, Ireland, Scotland, and certain areas of France, whether isolated or clustered in groups, are embellished by incised or bas-relief symbols, most of which are curvilinear abstractions. Highly stylized representations of a corpulent female figure or the outlines of tools associated with male tasks or activities are also sometimes depicted. An iconographic continuity in such two-dimensional art over a wide area is evident. Explanations for similarities in basic symbols are often hotly contested; one interpretation draws on neuroscience and attributes such similarities to the ancient spiritual practice of shamanism (Lewis-Williams & Dowson 1988, 1990).

Megalithism is a function of burial practices and associated with peoples who were sedentary and practiced agriculture. Population and food production models for Neolithic societies are estimated on the basis of the size and extent of related megalithic remains. It is suggested that

Statues and Monumental Art in Archaeology, Fig. 1 Near Crear, Scotland, 2005, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Statues and Monumental Art in Archaeology, Fig. 2 Rano Raraku, Easter Island (Rapa Nui), 2003, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

populations ranging from 100 to 10,000 persons created megalithic grave sites while living within areas of 3–100 km, respectively (Mohen 1989: 205). The trend over time is from multiple burials to individual graves, suggesting an evolution toward greater social stratification.

Monumental art evolved out of megalithism (Fig. 2). "Monument" and "monumental" are variously defined. It is defined here as an object that is of or related to a sepulcher and may include free-standing, three-dimensional figures as well as architectural embellishment. Figures may be either anthropomorphic or zoomorphic, although distinguishing features of both may be combined and in many areas further stylistic categories are defined (Van Tilburg 1991). Monumental art is characterized as being of good-quality material, immense in bulk or size, durable, and invoking memory. The precise size range varies with individual study areas or regions, and in nearly all cases relative scale is a far better indicator of monumentality than is total length or height.

The monumental art that is the most lasting and of greatest archaeological interest is most often wrought in stone but also fabricated of less durable clay, wood, fiber, and textiles. It is stone, however, that embodies, as material and medium, the virtues of density and durability that translate into symbolic values of power and longevity which, in turn, signal tradition and continuity (Van Tilburg 2006). These inherent qualities have made stone the material in which human culture groups of varying complexity have expressed a denial of time and rejection of death, asserted status, preserved memory, and professed belief.

Historical Background

Discerning the interaction of ancient architectural sites within discrete environments reveals an instructive range of practical, political, and aesthetic variables, as well as patterns of human choice and ecological stasis or change. Modern archaeologists are concerned with how natural resources were exploited by builders and pay close attention to how monumental art objects are situated relative to their respective ancient and contemporary landscape features. Most natural scientists today understand that climates are capable of radical change over long periods of time, and archaeologists, in turn, are concerned with how such changes impact the landscape within which megalithic art objects are situated or were once perceived.

For example, it has been shown in American deserts that basaltic and other hard and dense rocks, when their surface "skin" is broken, subsequently interact with the environment to, in effect, gradually "heal." This takes place over generations and is the result of the surface formation of a patina known as desert varnish. Ancient petroglyphs, created by carvers who incised, scratched, or otherwise pecked away stone surfaces with stone tools, are often re-varnished. More recently made petroglyphs are perceptively different in color, hue, and texture than older ones. This suggests that the stone's changing surface characteristics may be indicators of iconographic progression.

Enduring monumental art objects and architecture in many ancient cultures were produced when observation of the natural world was experimentally combined with human talent, experience, or belief. Nature's extravagant displays of shape and form, for example, may suggest to the perceptive artisan inherent and underlying principles of order. The wind-driven sand dunes of California's Death Valley are natural sculpture in motion. Monument Valley in Utah and the Grand Canyon of Arizona are, to even the unromantic eye, sensitive and captivating natural sculptural installations quite beyond the megalithic scale. The deep, dark caves of Paleolithic France and Spain surely played a role in aesthetic development and ritual behavior.

Statues and Monumental Art in Archaeology, Fig. 3 Tofuku-Ji Temple, Kyoto, Japan, 2000, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

In many cultures the organizing strategy of supernatural belief and social interaction that produced religion was fundamentally related to nature and to the transformative power of nature (Hunt et al. 2010). Many of the world's ancient religions appear to have revered nature. Even today, the Japanese religion Shintō teaches that rocks are endowed with special qualities deserving of respect. Rocks placed sensitively in the landscape are basic elements of Zen gardens (Fig. 3), and complex symbolic meanings are associated with their size, shape, color, texture, and position. A standing stone symbolizes the heavenly realm; a horizontally placed rock symbolizes earth, and a rock placed diagonally represents the whole of humanity.

Statues and Monumental Art in Archaeology, Fig. 4 Kanchipuram, India, 2000, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Statues and Monumental Art in Archaeology, Fig. 5 Kanchipuram, India, 2000, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Creation, procreation, fertility, fecundity, and human sexuality are often referenced in stone work embellishing mortuary or temple buildings, with monolithic male and female figures staged independently or paired (Figs. 4 and 5). Male and female genitalia are depicted both graphically and symbolically in two-dimensional rock art and three-dimensional sculpture of many cultures. At other times, the genitalia on sculptural objects are conspicuous in their absence. Major landscape features in some Pacific island cultures were conceptualized as parts of the human body, including especially male genitalia. Entire landscapes are sometimes seen as reclining or standing human figures, usually named for mythic heroes or gods. On the island of Tongareva in the Cook Islands, a sprawling, complicated, and sacred refuge site (*marae*) called Te Papa-o-Sokoau was constructed of stone walls laid out in the form of a headless, sexless human body (Kaeppler et al. 1993; Kaeppler 2008: 151).

The ancient Olmec emphasized the human head in their megalithic stone sculptural objects (Coe & Diehl 1980). They sculpted massive, elaborate portrait sculpture of ruling male personages embellished with the bas-relief signs and symbols of social status and leadership. These heavy objects, moved over great distances, were carved of specially quarried, dense, and dark basalt.

Social organization and the means of food production are two fundamental variables associated with monumental art. Easter Island (Rapa Nui) was organized as an Eastern Polynesian-type chiefdom, with 10 or 12 individual

patrilineal groups (usually described as "clans" or "tribes") descended from the sons of the founding ancestor. Over time, these lineages aligned as two large political entities characterized as confederations (Routledge 1919; Van Tilburg 1994). The ancient carvers created over 1,000 monumental sculptures in human form under this system, with about half of them transported to lineage agricultural lands bordered by traditional fishing grounds. There they were erected on stone platforms (*ahu*) and presided over what is inferred to be mortuary rituals. Most researchers agree that the vertical stone statues of Rapa Nui evolved from stone backrests raised on other Polynesian sacred sites.

Micronesia, on the other side of the Pacific, includes the Republic of Belau (Palau), the Yap Islands, Kosrae, and the Mariana Islands, among others. The matrilineal society of Palau (the Republic of Belau) raised large stone monoliths, some of which are carved with combined anthropomorphic and zoomorphic features. At Melekeok on the island of Babeldaob, a group of nine ancient and grotesque stone monoliths is known as the "Great Faces" (Van Tilburg 1991). Massive terraced earthworks on the same island were sculpted from natural hill formations.

In the Mariana Islands c. 1000 CE, elaborate wood structures known as *latte* houses were raised on monolithic stone columns and capstones that are, in fact, an abstraction of the upright human form. The largest of these structures, most of which served as community meeting houses, is found on the island of Tinian, northeast of Guam. There, one of 18 aligned *latte* is known as the House of Taga.

The megalithic, elite ceremonial center of Nan Madol is on the island of Pohnpei. The mortuary enclosure of Nandauwas is at the heart of the complex and its greatest megalithic achievement. Built sometime around 1200–1300 CE, Nan Madol is a sprawling marvel constructed of stacked prismatic basalt upon artificially created islets, canals, and inlets (Morgan 1988: 58–85).

In island Southeast Asia megalithic stone and wood statues, stone seats, and ornately embellished sacrificial posts are all known.

The Lapita culture emerged about 2,000 years before the Christian era, and its proximate center is in the Bismarck Archipelago. Lapita people spoke Austronesian languages, developed maritime traditions, and are considered to be the founding culture of Melanesia and Polynesia. On the Southeast Asian island of Nias, off the Sumatra coast, vertical stones, isolated or in groups, were called *behu* (Feldman 1988: 39, 49) and often carved as human figures and associated with chiefly houses and burials.

The ancient Aztec, in contrast to the less stratified societies of the Pacific island groups, created a vast and nearly unmanageable continental empire ruled by fearsome deities conceptualized in dual, quadruple, or quintuple forms (Pohl & Lyons 2010). Ornately carved and painted sculptural objects in clay and stone, as well as complex architectural figures, adorned monuments commissioned by rulers who demanded and extracted extravagant tribute from conquered peoples. Human sacrifice was considered a sacred duty and debt to the gods, and festivals were dedicated to warfare and the promotion of agricultural fertility. Religious ideology was inextricably linked to political supremacy, and monumental art supported rituals of idealistic communication and social domination.

Whether the project is a monumental, communal building task of epic social meaning, or a single statue carved at the behest of a powerful benefactor or commissioning chief, stone carving is a challenging task and valued skill in all cultures. Mastery of tools and technique is required but so, too, is a sensitive discernment of cultural values. Ancient craftspeople were required by the norms of their societies to capture and realize key emotional and spiritual content shared by their entire cultures. Most ancient stone sculpting traditions probably grew out of woodcarving, and large wood pole sculptures are the precursors to stone figures in many megalithic cultures. Quarrying, carving, and sculpting any stone require the reduction of resistant material rather than the building up of form that is the goal when other more pliable mediums such as clay or plaster are used. Stone carving was a profession of high status and power.

Statues and Monumental Art in Archaeology, Fig. 6 Bayon, Cambodia, 2009, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Carvers formed guilds and secret societies with their own proprietary gods, goddesses, and priests. Members had their own emblems and insignia.

The aesthetic success of a three-dimensional carving requires the participation of the viewer as well as the creator. People brought up in Western cultures generally think they perceive three-dimensional form, but few realize that full perception is also the result of being trained to comprehend the empty spaces of landscape or architecture that give shape to objects. Contemplation of an ancient sculpture as an art object in a museum gallery, where it is far removed from its original context, cannot reveal the object's original charismatic or iconographic role and often leads to stereotypical conclusions of dubious value to understanding the past.

Sculpture that is truly three-dimensional should vary when it is looked at from different angles. Sculptures of the human form that are nearly symmetrical provide only half of the potential opportunity the viewer has to perceive the relationship between space and form, setting and object. Fully symmetrical human forms, however, are also unnatural, as anyone can see by studying their own face in a mirror. Symmetry analysis in anthropological perspective has relevance in our attempt to understand the patterns of communications established and facilitated by megalithic and other art forms (Washburn & Crowe 1988).

Sculptures that are presented in relief are most successful when at least some of their elements project outward from the wall (Fig. 6). On some sites the architects and sculptors of the past seem to have used the interplay of sun and shadow on walls carved in relief to create substantial visual drama. That achievement was probably an aspect of stating or creating power through the implied status of the building owners or through ideology.

The natural surface irregularities of unpolished stone are often incorporated into or enhanced as features of two-dimensional rock carvings. Nonrepresentational or supernatural figures of many types are common in the rock art and relief sculpture of many cultures. Uneven, coarse surfaces, natural stone texture, color discontinuation, and other stone surface anomalies often become valuable aesthetic or symbolic assets in carvings that blend opposite imagery (e.g., male/female or human/animal characteristics).

When prehistoric architecture passes into ruin yet continues to remain in the natural landscape of sun and shadow, it inevitably becomes aesthetically the same as a three-dimensional sculpture. Well-constructed stone walls are almost always sculptural, whether they are propped and chinked with skill and an eye to

Statues and Monumental Art in Archaeology, Fig. 7 Ta Prohm, Cambodia, 2009, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

aesthetics or running in linear patterns across a challenging landscape. The ruins of Hadrian's Wall in northeastern England and the more intact Great Wall of China both elicit in modern viewers similar feelings of technological and aesthetic awe.

Key Issues/Current Debates

The study of megalithic cultures is concerned with reconstructing methods of sociopolitical complexity and mechanical engineering, the creation and implementation of ideological structures, iconographic analysis, the natural settings of sites, human and natural resources, and spatial and landscape analysis. Research questions are often posed within such theoretical constructs as experimental archaeology, cognitive archaeology, landscape and ecological archaeology, and iconography. Within each of these subfields are key issues and current debates.

A certain universality of symbol types common in two-dimensional rock art has been discerned in similar natural environment. The neuropsychology of iconography, as noted above, deals with these similarities and their longevity in human culture in the context of the religious beliefs of shamanism. However, also as noted, this interpretation has been aggressively challenged.

The engineering expertise of megalithic societies is examined within the research structure known as experimental archaeology. Sculptural replicas have been devised and manipulated to suggest ancient transport methods. In nearly all cases, common sense has prevailed or provided adequate guidance for these experiments, and variables are usually limited to wood, rope, and the countless hours of motivated human effort. Such methods are most insightful when they seek to elucidate patterns of social organization, religious belief, resource territory size, and food production methods that are well structured (Van Tilburg 1993; Van Tilburg & Arévalo Pakarati 2002; www.pbs.org/wgbh/nova/easter).

All archaeological sites, including especially megalithic sites, must be considered within the physical conditions that prevailed when the site was active (Vita-Finzi 1978). Modern archaeologists often survey large areas and conduct systematic studies of monumental object distribution and spatial patterning (Hodder & Orton 1976). Debate in recent years has dealt not only

with the occurrence of monumental art but also its relationship to natural resource depletion or destruction and social structure collapse. Key issues of global conservation in our modern world have been projected upon the peoples and cultures of the past. The trajectory of stylistic and other changes in monumental art is often related to political complexity but must be anchored by carefully constructed time frames.

International Perspectives

The stone architecture of Cambodia and the toppled statues of Easter Island are instantly recognizable as iconic symbols and graphic reminders that however durable stone is as a material, all prehistoric and other ancient stone buildings and sculpture will diminish with time (Fig. 7). Without strenuous and enlightened global preservation efforts, the forces of weather and time will inexorably wear away the surface of megalithic objects, and the sculptural material itself will ultimately be returned to the natural matrix from which it came. Loss of any part of our shared human heritage is indefensible because science and art pose as yet unanswered questions.

Future Directions

Monumental art often encourages cross-cultural comparisons. This is due to broad pattern similarities such as placement relative to mortuary sites. Yet each culture interacted with the natural environment in its own unique way. Each flourished because food production strategies resulted in surpluses allowing redistribution systems that underpinned building projects. Failure to sustain productivity and to integrate it with social growth is a recurring theme, and the theory of social and political systems collapse is based, in part, on the inferred mismanagement of human and natural resources. Understanding the motivations that created monumental art may provide insight into a more sustainable future.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Andes: Prehistoric Art
- ▶ Europe: Paleolithic Art
- ▶ Form in the Archaeology of Art
- ▶ "Motif" in the Archaeology of Art

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Stature Estimation

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Introduction

The estimation of stature from human remains is important for understanding the osteoarchaeology of previous populations. Osteoarchaeology employs stature estimations to assess trends, document evolutionary and secular changes, and reveal geographic variation as well as sexual dimorphism and health. Because living conditions affect growth and ultimately affect size, adult stature may be altered. Osteoarchaeologists use information obtained from studying the relationship between stress, environment, and stature to compare better and more poorly adapted populations, and more affluent times with poorly adapted groups and more stressful periods.

In addition to applications involving past populations, stature estimations aid identification of more recently deceased unknown individuals in contemporary forensic contexts. Forensic anthropology uses skeletal stature estimation as part of a biological profile, including, for instance, sex, age, and ancestry. When combined with other characteristics, stature may include or exclude a missing individual as a potential match with a recovered skeleton or corpse. Authorities compare antemortem documents with postmortem stature estimations for further consideration of identification or for exclusion from a match.

Although the goals of the two areas differ, methods used to estimate stature are similar in both fields. The methods involve measurement of a whole skeleton or separate limb bones.

Definition

Stature is a living person's standing height, measured from the top of the head (vertex) to the ground surface while standing in an upright posture, heels placed together, and head positioned in the Frankfort Horizontal.

Approaches

Whether in osteoarchaeology or forensic anthropology, two basic approaches are utilized to estimate stature. The first approach is the whole skeleton or anatomical method (e.g., Fully & Pineau 1960; Raxter et al. 2006). It requires a complete or relatively complete skeleton. Further, its application demands time needed to measure all bone lengths and heights constituting living stature and summing those measurements. Bone lengths and heights measured for this technique (Fig. 1) include skull (basion-bregma), all vertebral body heights, first segment of sacrum, femur, tibia, and joined calcaneus-talus. The atlas and axis require special consideration. The axis body and dens epistrophis are included in the assessment, the latter serving as a proxy for atlas height, which is not measured. Following summation of these skeletal measurements, the soft tissue component contributing to living stature is included. Soft tissue height is estimated using the sum of skeletal elements provided as a set figure based on the summation's interval or by estimation with a regression formula.

Advantages of the whole skeleton/anatomical method approach include accuracy of stature estimation regardless of sex, ancestry, time period, and anomalous numbers of vertebrae. Disadvantages, on the other hand, consist of requiring an

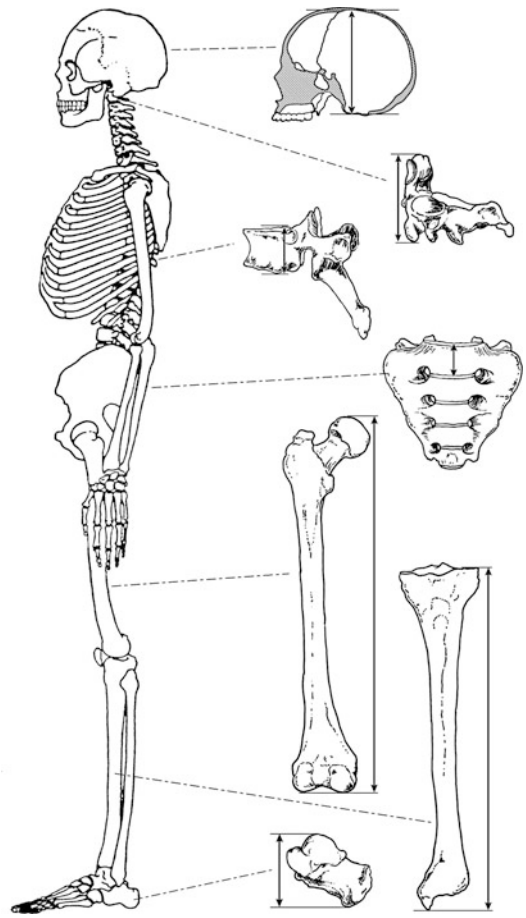

Stature Estimation, Fig. 1 Measurements employed in estimating stature with the whole skeleton/anatomical method following (Raxter et al. 2006)

almost complete skeleton and time needed to measure and sum all elements contributing to height.

The second approach to stature estimation is the regression or mathematical method. One of Karl Pearson's earliest applications of his statistic involved estimating stature of archaeological remains. The mathematical method usually requires complete limb bones (e.g., Trotter 1970), although sometimes analysts employ fragmentary limb bones (e.g., Steele 1970) or smaller, non-limb bone elements (e.g., Holland 1995).

The regression method provides accurate stature estimations when sex, ancestry, and time period are known and if an appropriate standard for those parameters exists. Stature estimations employing this approach are most accurate for the middle of the sample's distribution, those individuals approaching the "average" height of the sample. Shortest and tallest individuals' stature estimations are less reliable. In addition to those previously mentioned parameters, the regression formula with the smallest standard error is the most accurate and should be employed to estimate stature.

The regression approach has advantages over the whole skeleton or anatomical approach if the skeleton is incomplete, or when time for measurement and summation is limited. Its disadvantages, on the other hand, are identifying and having available appropriate standards for the skeleton's sex, ancestry, and time period as well as being near the middle of the size distribution and having "normal" body proportions.

Sometimes both approaches (whole skeleton and regression) are combined to estimate stature. Skeletal or body components are measured and those measurements used in a regression formula to estimate living stature. Examples include regression formulae for flesh-covered, articulated spines, and separate vertebral bodies measured and summed (e.g., Tibbetts 1981).

Key Issues

Some issues related to stature estimation are common to both archaeological and forensic anthropological applications, while others differ depending on goals of the two endeavors. First, common concerns are discussed, and then those issues specific to forensic anthropology are presented, followed by those involving osteoarchaeology.

Common Issues

A person's stature during life varies by time of day (e.g., taller following a night's rest) and the method of measuring (e.g., taller with neck stretched), and presumably shows effects of inter- and intraobserver differences. Such challenges pale beside others, however. Most stature

estimation standards rely on adjusting corpse length to approximate living stature. Few – if any – stature estimation techniques employ base samples with known, measured statures of people while alive and those same individuals' bone lengths following death. This gap in documentation may impact the accuracy of stature estimations.

Issues Related to Forensic Anthropology

One of the aims of forensic anthropology is to identify missing persons, established, in part, by comparing a missing person's antemortem stature with postmortem stature estimation of a skeleton or corpse. Major challenges to making an accurate comparison include assessing antemortem stature records and considering age-related stature decrease of older adults.

Antemortem records often consist of self-reported heights, such as dimensions recorded on a person's driver's license. Those self-reported records may misrepresent actual stature, tending to overstate a person's measured stature. An innovative means of dealing with discrepancies between self-reported documents and actual measurements is "forensic stature" (Ousley 1995). Forensic stature estimates height recorded on self-reported documents rather than actual measured stature. Medical or military personnel records with measured heights may be more accurate sources of living stature than self-reported heights, but this accuracy depends in part on how long before death the measurements were made.

A second challenge in forensic anthropology involves stature decrease in older adults. As adults age, their statures diminish from those of their young adult maximums. Such "shrinkage" is usually attributed to compression and loss of soft tissues. The time when this decrease begins and the rate that it occurs are variously reported. Age when stature decrease commences ranges from 30 to 45 years, and after commencement the claimed rate of decrease varies from 0.6 to 1.6 mm/year or nonlinearly in an exponential fashion. If older adults' antemortem records are accurate and measurements are made near the time of persons' deaths, then age-related reductions in stature estimations should be included when reporting older adults' height estimations.

Issues Related to Bioarchaeology

Archaeological skeletal samples often differ by time period and ancestry from the regression standards employed to estimate stature. Therefore, archaeological applications using the mathematical/regression method pose additional challenges beyond those involved in forensic cases if they deviate from those parameters. On the other hand, the complete skeleton approach is appropriate regardless of body proportions that may change over time and differing ancestries. Unfortunately, complete skeletons are rare in archaeological series, requiring additional methodological modifications.

Combining the best of both approaches, some practitioners apply the anatomical method to those rare complete archaeological skeletons to reconstruct stature using the whole skeleton approach. Regression formulae for those skeletons are then derived employing reconstructed statures and limb bone lengths. The derived regression formulae are applied to other, less complete skeletons from the same time period and region where the standards are established. Alternately, other applications employ prone skeleton length measured in the grave as stature. Recent work, however, shows that skeletal grave lengths measure less than the anatomical method and underrepresent actual statures (Petersen 2011).

Future Directions

Although significant developments have been made in stature estimation during the last several decades, challenges remain.

Forensic Anthropology

The standards and approaches used today in forensic anthropology must be elaborated and developed. Stature estimation should make

continued statistical improvements (e.g., Konigsberg et al. 1998), analyze previously unstudied elements, identify the beginning and rate of age-related decrease in stature, and employ digital imaging techniques. In addition, forensic applications in previously unstudied groups require new stature estimation standards to assess their heights. As international attention turns to areas of recent strife, groups from Latin America, southeastern Europe, Near East, and Africa require special attention in this regard.

Estimating stature from soft-tissue-covered bodies and body segments is a research area ripe for investigation. In mass fatality events (as well as mummified remains from archaeological sites), soft tissues may cloak the skeleton. Lacking time, equipment, or authorization for maceration, stature often goes unestimated. Several recent studies use body segment dimensions to establish height (e.g., Adams & Herrmann 2009). Such approaches employ vertebral column segments, limb lengths, although smaller body segments (e.g., hands and feet) may be useful. Body portion data from anthropometric surveys of living groups exist, and those dimensions provide the raw data needed for accurate stature estimations from body segments.

Subadult stature estimation methods must be developed too. Infants, children, and adolescents die in forensic contexts, and those subadults need identification too. The whole skeleton technique is applicable to estimating stature of subadult remains if the skeleton is complete, has all epiphyses present, and an accurate soft tissue figure can be determined. In most cases, however, there are practical problems with this approach from loss of smaller, fragile elements (e.g., Sutphin & Ross 2011). Employing limb bone diaphyseal lengths in mathematical formulae to estimate stature may be fruitful (e.g., Smith 2007). Beyond the challenges previously mentioned inherent in adult samples (time period, ancestry, and sex), subadult growth allometry (changing proportions among limbs-stature and limbs-trunk-stature) is an additional hurdle requiring attention.

Archaeology

Because applicability of sex, age, and temporally related body portions of modern standards to prehistoric specimens is poorly known, unique approaches have been suggested to overcome these deficiencies. Avoiding the uncertainty and incompleteness of most archaeological skeletons, limb bone lengths (usually femur or tibia) serve as a proxy for overall height. The bone lengths are presented alone without estimating stature. The potential problem with this approach involves allometric changes in trunk-limb and/or interlimb bone ratios through time. Such allometric changes may obscure sexual dimorphism and secular trends.

Application

In previous sections, general principles, challenges, and future directions have been presented. In this section, an example of stature estimation is presented.

To apply these techniques to an individual and examine associated methodological issues, stature is estimated for a donated skeleton with documented height. The selected skeleton is that of an 87-year-old white female (University of California, Davis Donation 05-056). She completed forms as part of the bequeathal process indicating that her stature was 66 in. Following stature estimations employing the approaches presented above, results are compared and discussed.

Whole Skeleton/Anatomical Method

Applying the whole skeleton/anatomical method to this person, all skeletal segments contributing to stature are measured and summed (Table 1). The skeletal sum is employed in a regression formula to approximate the soft tissue component contributing to living stature (after Raxter et al. 2006). Skeletal sum plus soft tissue yields a stature estimation of 166.38 cm (65.5 in.).

Regression/Mathematical Method

The second approach requires sex and ancestry of the person to be determined and formula with the

Stature Estimation, Table 1 Skeletal measurements and lengths used in whole skeleton/anatomical method of estimating stature for a skeleton with documented stature (UCD-05-056). Measurements follow (Raxter et al. 2006)

Measurement	Length (cm)	Comments	Measurement	Length (cm)	Comments
Basion-bregma	13.2		T 8	2.1	T 8-9 fused
Cervical 2	4.0	Osteophytes	T 9	2.3	T 8-9 fused
C 3	1.3		T 10	2.4	Osteophytes
C 4	1.3		T 11	2.6	
C 5	1.3		T 12	–	Congenitally absent
C 6	1.4	Osteophytes	Lumbar 1	2.8	
C 7	1.6		L 2	3.0	L 2-3 fused
Thoracic 1	2.0	T 1-3 fused L 3	L 3	3.0	L 2-3 fused
T 2	1.6	T 1-3 fused	L 4	3.3	
T 3	1.7	T 1-3 fused	L 5	3.2	
T 4	1.8		Sacral segment 1	3.6	
T 5	2.0	T 5-6 fused	Femur length	45.1	Left and right average
T 6	1.9	T 5-6 fused	Tibia length	37.9	Left and right average
T 7	2.0		Calcaneous and talus	6.9	Left and right average
		Skeletal total		155.3	
		Living stature (0.996 × Skeletal total + 11.7 cm)		166.38 (65.6 in.)	

smallest standard error to be identified. Given the sex and ancestry of the person, Trotter's (1970: Table 28) formula for white females' fibula is selected and calculations made. The formula and calculations to estimate stature follow:

$$\begin{aligned} \text{Stature} &= 2.93(\text{fibula length}) + 59.61 \pm 3.57\,\text{cm} \\ &= 2.93(36.8) + 59.61 \pm 3.57\,\text{cm} \\ \text{Stature} &= 167.43 \pm 3.57\,\text{cm} \end{aligned}$$

These regression calculations produce an estimation of 167.43 cm (65.92 in.) with a standard error of $\pm$ 3.57 cm.

Comparison and Discussion

Stature estimations using the two different approaches approximate the person's recorded stature (167.64 cm, 66 in.) as well as one another. The whole skeleton/anatomical method underestimates the donor's stated stature by 1.26 cm, while the regression/mathematical method underestimates her stature by 0.21 cm. Both estimations bracket the person's recorded stature and differ from one another by a mere 1.5 cm (0.41 in.). Considering the challenges to applying these approaches discussed below, the estimations' similarities are remarkable and noteworthy.

First, technical issues for the two stature estimation approaches for this individual are considered separately. Then broader challenges applicable to both approaches are presented.

Complicating the whole skeleton/anatomical approach, this specimen's measurements involve vertebral osteophytes and fusion of vertebral segments. Vertebral fusion may explain the shorter stature estimation of the whole skeletal approach than the person's recorded stature. Attempts to measure around and between vertebral osteophytes, however, might compensate for any fusion-related reduction in stature measurements.

Different complications hinder the regression/mathematical method estimation. Congenital absence of one vertebra (T-12) should make this regression estimation greater and presumably

less accurate than the whole skeleton approach. Apparently, however, it does not.

Another deviation involving the regression/mathematical method occurs. Trotter's (1970, Table 28) white female Femur + Tibia formula has a slightly smaller standard error (± 3.55) than the Fibula formula presented here (± 3.57). Under normal circumstances, the Femur + Tibia formula should be employed rather than the fibula formula. Justifying this deviation in method, Jantz and colleagues (1995) demonstrate that Trotter mismeasured the tibia. She omits measuring the tibia medial malleolus. So, her stature estimation formulae with the tibia should be avoided – as done here.

Those issues are specific to the two approaches. More general issues apply to both estimation techniques.

First, there is the effect of age-related reduction in stature of this individual. The donor died when 87 years old and would be expected to display age-related stature loss. Depending on the standard employed, stature loss from her young adult maximum to 85 years varies between 3.2 and 6.4 cm. From the records available, it is unclear if the stature reported on the donor's materials reflects the individual's stature near the time of her death following, but excluding substantial "shrinking," or earlier at her young adult maximum stature. This issue is not resolvable here.

A second challenge is that the donor self-reported her stature. The individual's stature was not measured and recorded while she was alive by an impartial anthropometrist. Self-reported statures tend to overstate measured stature, falsely indicating a taller person than he/she actually measures. One means of estimating this donor's reported stature ("forensic stature") is a regression formula (Ousley 1995: Table 5). Employing the formula for white females with the smallest confidence interval (femur maximum length + fibula length), forensic stature is 66.57 ± 2.3 in. The donor's reported height (66 in.) falls within an inch of that estimation. So, the two statures seem reasonable indications of her height.

Cross-References

- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition

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Steffy, J. Richard

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Basic Biographical Information

J. Richard Steffy was born on May 1, 1924, in Lancaster, Pennsylvania, and grew up in the nearby town of Denver. From 1942, Dick, as he was known, served in the US Navy, mostly on a destroyer escort in the North Atlantic; he was discharged in December 1945 with the rank of electrician's mate, first class. After earning an associate's degree from the Milwaukee School of Engineering, he joined his brother in his father's local business, which initially did residential electrical work but expanded under Dick to design, install, and maintain electrical systems for factories. He married Lucille Koch in 1951.

From childhood Dick had enormous curiosity about ships. Uninterested in making models for display, his passion was to learn how ships worked, building and destroying research models in order to understand them. Thus, when he read a 1963 *National Geographic* article about a seventh-century Byzantine shipwreck excavated off Turkey, he wrote to George Bass, author of the article, and asked if he might built a research model of the vessel on the basis of its scanty seabed remains. Bass introduced him to Frederick van Doorninck, who was reconstructing the ship's hull on paper for his doctoral dissertation, thereby establishing a collaboration of more than four decades between the three. Steffy was soon lecturing annually to a graduate course on ancient seafaring established by Bass at the University of Pennsylvania.

A visit to Cyprus in 1971, at the invitation of Michael Katzev to study the hull of a fourth-century B.C. Greek ship Katzev had excavated off Kyrenia, led Steffy to abandon his secure job, at age 47 with a wife and two young sons, to make a career as an "ancient ship reconstructor." Partly supported by a UNESCO grant, he spent the next 2 years reassembling the Kyrenia ship's hull from 10,000 fragments of polyethylene-glycol-treated wood, the first such restoration of a Mediterranean shipwreck.

Major Accomplishments

In 1973 he joined the Institute of Nautical Archaeology (INA) Bass and Katzev had created. When INA affiliated with Texas A&M University in 1976, Steffy, Bass, and van Doorninck established a graduate program in nautical archaeology. In addition to teaching a generation of "ship reconstructors," Steffy was soon the "ship expert" on the excavation of the American Revolutionary War *Defence* in Maine, and a colonial vessel raised from South Carolina's Black River. Research as a visiting professor at the University of Haifa in 1981 led to his book, with Lionel Casson, on the Athlit ram. In 1986 he returned to Israel to interpret a first-century BCE boat salvaged from the Sea of Galilee by Shelley Wachsmann. Later he was a consultant for the construction in Greece of a full-scale sailing replica of the Kyrenia ship.

In 1985 Steffy received a prestigious McArthur Award. His 1994 *Wooden Ship Building and the Interpretation of Shipwrecks* is considered the bible of the field he established. Later he coauthored the first volume on the eleventh-century Serçe Limanı wreck. An acclaimed public speaker, he retired from teaching in 1990. He died on November 29, 2007.

Cross-References

▶ Bass, George Fletcher
▶ Hellenistic and Roman Anatolia, Archaeology of
▶ Hellenistic and Roman Egypt, Archaeology of

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Stein, Marc Aurel

Susan Whitfield
The British Library, London, UK

Basic Biographical Information

Born in Budapest, Stein's family life and early education at the Lutheran school in Dresden nurtured his linguistic skills, useful for Central Asia with its polyglot Silk Road past. These were further developed by his university education in Vienna, where he studied Sanskrit and comparative philology, and Tubingen, for a Ph.D. on Old Persian and Indology. After receiving his Ph.D. in 1883, he studied Punjabi in London. He returned to Hungary for military service, equipping him with surveying skills that were to prove essential for desert explorations. Following his return to London in 1887, he secured a post in Lahore. He was to remain in British India for all of his life (Walker 1995; Mirsky 1998).

Major Accomplishments

Aurel Stein was the consummate desert archaeologist, but not of those "tame deserts" of Arabia, America, or South Africa "which might impress the town dweller . . . and in which whole tribes can wander about for long periods sure of finding water and grazing." He fell in love rather with the Taklamakan and Lop Deserts, where "the absence of moisture bans not only human existence but practically all animal and plant life" (Stein 1933: 4–5). His love for these deserts' solitude and harshness was rivaled by that of his passion for interpreting the interaction between history and geography as revealed by archaeology. At their glacier-fed fringes, the Taklamakan and Lop both provided rich evidence of human existence conquering the extreme environments from the second millennium BCE through to the end of the first millennium CE. This was the arena in which Stein spent 30 years of his life exploring and excavating (Whitfield 2004).

He read voraciously from childhood, both of the travels of early travelers, such as Alexander the Great and the seventh-century Chinese monk, Xuanzang, who crossed the Taklamakan on his way to India, and of the excavations of contemporary archaeologists. Among the latter was Flinders Petrie (1853–1942), and Stein noted well the developing archaeological methodology including stratigraphy, seriation, and, most especially, attention to the smallest details. Stein quoted him in the introduction to his first major expedition, "To leave a site merely plundered, without any attempt to work out its history, to see the meaning of the remains found, or to publish what may serve future students of the place or the subject, is to throw away the opportunities" (Stein 1907: ix).

Stein wanted to be a pioneer and set his sights on an expedition to the southern oases of the Taklamakan desert in Western China: it "is not a part of the earth as easily accessible as Greece or Egypt or India" (Stein 1907: x). Among Europeans, only Sven Hedin preceded him to the region, but he had not carried out systematic archaeology.

Steins's First Central Asian Expedition (1900–1901) was meticulously planned and yielded rich finds and documentation about the first millennium Silk Road kingdoms of Khotan and Kroraina (Stein 1907). A second (1906–1908) and third (1913–1916) followed and were equally successful before political changes in China curtailed the fourth (1930–1931) (Stein 1921, 1928). On these he traveled further east into the Gobi and to the sites of Kharakhoto and Dunhuang,

Stein, Marc Aurel, Fig. 1 Stein on his third Central Asian expedition in the Taklamakan surveying using a plane table with his dog, Dash. The British Library, Photo 392/28(739)

Stein, Marc Aurel, Fig. 2 House at Niya, a Silk Road kingdom in the Taklamakan, during excavation by Stein on his second expedition. The British Library, Photo 392/26(191)

where he acquired his most famous manuscript finds (though not through archaeology) (Figs. 1–3).

In the desert, the constantly shifting sands ensured there was little chance for stratigraphy. But Stein was meticulous in his record-keeping, taking notes, plans, surveys, and photographs. Of the Central Asian collections from this period – for Stein was soon followed by others – only Stein's all have a detailed provenance. This feat is the more remarkable, given the difficult conditions, and was achieved by prodigious energy and commitment. His recurring malarial fever and constant dyspepsia did not stop him from working from before dawn to late into the night.

He planned his excavations for the autumn through to the spring: It was not possible to carry enough water for work in the searing summer heat. The winters were equally extreme but he used this to his advantage, taking blocks of ice for water supplies: The settlements he excavated also showed evidence of icehouses. Constantly shifting sands required large teams of local

Stein, Marc Aurel, Fig. 3 The site of Niya today showing the remains of a Buddhist stupa nearby which Stein made his camp on his first visit. Photographer: John Falconer. The British Library, Photo 1235/1(186)

diggers. It is testament to Stein's foresight, preparation, and calm leadership that he managed these expeditions with no loss of human life and minimal loss of animals.

In order to reach the Taklamakan, Stein had to cross over the formidable passes of the Hindu Kush, Karakorum, and Pamir. He planned a different route on each of his expeditions and took advantage to carry out surveys of ancient ruins en route.

But none of these mountains were as challenging as the Kunlun, whose northern slopes provided almost no pasture. It was on a survey here that he had a rare moment when his caution was overruled by enthusiasm, leading to frostbite. He went on forced marches strapped to the back of a yak back across the mountains to Leh, where several toes were amputated (Stein 1921: 1326–7).

His finds in the Taklamakan uncovered unknown languages and cultures and put the eastern Silk Road kingdoms on the map of world history. But Stein did not stop archaeology after 1930. He led four tours of Iran and Iraq (Stein 1940), exploited new technologies in his aerial surveys of the limes of Jordan (Gregory & Kennedy 1985), and in his 81st year finally realized his lifelong dream of archaeology in Afghanistan. Unfortunately, he caught a chill and died within a week of arriving in Kabul: His grave is in the British Cemetery. His Iranian colleague on his fourth Iran tour noted: "Before finishing this report I must inform you of the following: one cannot call this tour a promenade. It should be called a journey of difficulty, of pain, of bitterness, of danger and illness." Stein, on the contrary, wrote that "compared with the Taklamakan and the Kun-lun travel both in these valleys and across the mountains seems very 'tame' work" (Whitfield 2004: 106).

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► Aerial Archaeology

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Stewardship, Concept of

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Introduction

Stewardship is today a concept that concerns the ownership, property, control, and promotion of a broad set of material and intangible goods, which include cultural heritage resources.

Definition

A Classic Definition

The role of steward, as in "steward of the castle" or "steward of the palace," is as ancient as the need to have supervision and organization of household or estate affairs. This administrative role probably occurs very early in prehistory as societies create hierarchical and complex administrations. Many references exist in historical documents to their economic and political role in Egypt of the Pharaohs both in the palace and the temples, in the urban settings of early Mesopotamia and its temples, and, more recently, in England in medieval monarchic times. The function of the steward is often exalted in Shakespeare plays: its importance in the management of the riches, gifts, tribute, and taxes making their way to the treasury of the sovereign or, often, in palatial intrigues.

A Current Definition

An intrinsic historical feature to the role of steward is that it manages property and wealth that belong to their masters and rulers. In this sense, the role of steward has changed entirely in the last two centuries. The tendency in contemporary times is that stewards own the heritage, goods, or valuables that they admire. A vital part of the current stewardship scenario is to have a close control over those goods. While the argument is often that they hold the goods in custody for the public good, the fact is that those goods are held under a private property system and are obtained by the acquisition of goods in the free market or, more specifically, cultural heritage markets in auction houses or privately where objects are obtained from looting, commissions, theft, and legal exports (Kimmelman et al. 2006; Renfrew 2009).

Historical Background

The shift in the role of the steward, and therefore the concept of stewardship, is related to change in the economic structure of Western societies. The role of steward has continued to be a prestigious one, albeit its role has moved away from the governmental or the real estate spheres in which it originated (Cline 2003). The role of the "steward" in the period of rising capitalism of the nineteenth century, in contrast to its traditional role in a land-based economy controlling tenants, moved to spheres of urban settings with the predominance of new wealth based on industrial and trading economies with profits invested in cultural endeavors.

The founding of state museums open to the public in Europe in the nineteenth century, and art museums in the United States at the turn of the twentieth century, reveal the intentions of the new stewards: to show their private rooms with their private possessions and to display their antiquities and art in public spaces (and more rarely in their own homes). The crucial difference between Europe and the United States, along general lines of state versus private property, is that the latter reflects the will of their private holdings to be shown, not unlike the humanists of the fifteenth century in Europe and Italy in particular.

The new museums that opened in the United States in brand new buildings designed in neoclassical style had as their core attraction private collections displayed in custody and often bequeathed to them by the new "stewards" (e.g., the Mellon family as the core of the National Gallery in Washington D.C.). These museums would start building their own collections by various means: financing "research parties" to obtain the goods, buying collections or single

artifacts at home and abroad, and continuing to promote to the collectors their image as a worthy depository for private collections to be displayed for the public good. The exact provenience of the objects is often not an issue: it is their artistic worthiness that is central.

UNESCO Über-Steward of World Heritage

The role of UNESCO in setting the bar for the protection of cultural heritage is crucial. UNESCO became the rightful global steward by setting rules at a time when rules of the game of heritage possession were sketchy, lax, and circumstantial. The UNESCO conventions served as the turning point in the legal backup for combating traffic and heritage smuggling. However, the enforcement power of UNESCO or its training and execution capacity is very limited. Physical management of heritage corresponds to others: national, private, academic, or nongovernmental entities.

In the transition from museum-oriented towards a community-oriented trend in stewardship, some important (but non-binding) UNESCO conventions in the late twentieth century changed the way cultural heritage is protected: The Hague in 1954 for cultural heritage in wartime, after World War II, and, in 1970, the convention on preventing the illicit traffic of cultural property. This latter convention would be crucial in the courts in determining which objects enriching the museums are legal or not. In the process, despite the conventions, cultural heritage becomes an ideal target in wartime for the psychological defeat of the enemy (Gerstenblith 2006; Marlowe 2011).

Later on, the UNESCO conventions of 1972 on *World Heritage*, both cultural and natural, and in 2003 on *Intangible Heritage* drastically improved the breath of the concept of cultural heritage (Francioni 2011). In addition, the 2001 Convention on the *Protection of the Underwater Cultural Heritage* was aimed at tackling the most important source of looting and generation of traffic of cultural heritage: the sunken ships along Mediterranean shores.

The process of acquisition of heritage will not stop with the laws promulgated by UNESCO. It is simply the means of the transactions that change, by increasing smuggling and illegal ways to ensure the continuing buildup of museum collections. The recent controversy between Italy and US museums is an example of the diversification of the ways to not stop such collecting drives.

Key Issues/Current Debates

Stewardship, Ownership, and Philanthropy

Since the creation of UNESCO and the concern over heritage, a strong debate has confronted museum managers and academics over the future directions of property of heritage (Merryman 1986). Under the premise that looting continues and museums are constantly adding to their collections, this debate evaluates the damage caused by this continuing will to keep the pace in artifact acquisition. This trend does not necessarily refer to less controversial acquisitions from in-country collections (which often are not exempt of controversy) but from different, often shady, proveniences, especially from overseas locations. A most memorable and enlightening debate in this regard is between the archaeologist Colin Renfrew (Brodie & Renfrew 2005; Renfrew 2010) and art historian John Boardman (Boardman 2006). These two experts do not agree on how tight the control on the trade of antiquities should be (high, according to Renfrew) nor on the primary role of museums should have for the protection of heritage (a leading role, according to Boardman).

The public exposed to this debate see as many benefits in the role of the museums and their *modus operandi* as they see in the strong will for a moratorium and zero tolerance to museum acquisitions, let alone looting and smuggling (see Bauer 2008). The fact that the latter two events continue to co-occur and are very hard to fight enhances the scenario of museums as ideal repositories of what is found in those same lootings – as they are "stewards" with the financial and physical means to secure the future of those artifacts. However, it is not that museums have a first option over the acquisition of heritage. Rather, there is a strong competition with market-driven

forces between world museums and private collectors. The free-market rules of this trade are increasingly negative for cultural heritage as there is a sizeable financial gain to be obtained from the traffic in cultural heritage. The argument of museums as "stewards" and their commitment to the public are only good as long they are able to secure possession of the cultural heritage they deem important to their collections.

Therefore, museums and states that wish to be stewards of cultural heritage will do so by different means. This scenario depends, of course, on the legal system: some countries consider that heritage found on private property belongs to the owner, whereas another set of countries believes that all heritage resources found above and below ground belong to the state. On the one hand, private stewards curate existing heritage but are geared towards acquiring new holdings. On the other, states, often cash-strapped, are geared towards preventing and stopping traffic of cultural heritage, using the arguments of the 1970 UNESCO Convention and helped by bilateral agreements to reduce the smuggling of heritage. A considerable number of heritage resources have been returned to Peru, for example, thanks to its time-limited agreements with the United States.

Stewardship in the Realm of Cultural Heritage

Stewardship in the realm of cultural heritage is not as recognized today as is the role of state institutions, private foundations, or individuals in dealing with health, animal, or environmental issues as key factors in the current wave of sustainable projects in the social realm.

The essence of the concept of stewardship of antiquities (today regarded as heritage) has been at the core of the philosophy of museums and collectors since the nineteenth century. It is apparent that museums are not pursuing this image anymore. In the news, museums involved with legal issues of heritage ownership seem reluctant to increase their presence in the media. Again, in contrast with other institutions, while zoos have become centers for biodiversity, few museums have become centers for cultural dialogue (e.g., the Quai Branly museum in Paris advertises itself as a place "for dialogue between cultures"). This seems the case in ethnographic museums but not in art museums.

In the realm of cultural heritage, the concept of stewardship translates to different scenarios through time. First of all, it changes in the way the "object" of collection is referred to. This parallels the evolution of the clout, stance, and power of the traditional "steward," owner and caretaker of his/her prized possessions, and their dwindling power replaced by other rightful new actors. The "object" of collection then changes from "antiquities" in the nineteenth century, to "material culture" in the twentieth century, and ultimately to "cultural heritage" in the twenty-first century. These three historical assertions relate to how the artifacts and monuments are considered through time. Sites and burials are depleted of their artifacts to be housed in museums in the nineteenth century, while artifacts and skeletal remains are returned to native groups to be stewarded by their ancestors in the twenty-first century. There is a transition from a museum-oriented towards a community-oriented trend in stewardship, passing by a middle stage of broad academic studies of heritage in the twentieth century.

Stewardship in the Twenty-First Century

The role of a stewardship in the twenty-first century (fueled by a new philanthropic drive: the financial basis to stewardship strategies; see Henaff 2003) is as much a role of prime importance in the social sphere as it is a figure of an actor in strategic decisions regarding heritage or, more often, the environment or health issues. Stewardship has indeed diversified, and the fields of action range now from the closed encapsulated spaces of a museum to the open and dynamic areas of archaeological sites.

An intrinsic feature of the current concept of stewardship is that care of material or immaterial good is made despite not holding property rights of those goods. It is the moral concept of considering those goods valuable to society that leads to the investment and patronage in their preservation, integrity, and sustainability.

This is, therefore, a difficult subject because museums are stewards of their own holdings, obtained in property through the years by different means, including acquisitions from proveniences and means that may not have been well thought-out.

Due to this pattern of acquisitions, museums as stewards of cultural heritage have had important confrontations with national governments in the last decade. No museum or country is exempt of "reclamation" issues and often there are contradictions in the debate. For instance, while Turkey has claims over the Pergamon temple housed in Berlin, the Istanbul museum houses the Alexander sarcophagus from Lebanon. This is due to the geopolitics of the time when the Ottoman Empire had control over Lebanon (Waxman 2006). However, neither England nor Germany or the United States had such control over a region rich in cultural heritage (at least those that interested Western museums) as to warrant a "historical" explanation to the presence of those artifacts in their museums.

Issues with Stewardship in the Twenty-First Century

Two issues are especially important for stewardship as the safeguarding of cultural heritage and for the public dissemination of the importance of stewardship in today's society. These two issues concern, first, the strategies that museums will put in place as they ideally reduce their acquisition of cultural heritage that may be tainted by a shady looting provenience and, second, how stewardship is presented to the wider public by the new stewards, namely, communities of local populations interested in preserving and promoting their heritage.

Academic research is crucial in enhancing the public reach of heritage studies. While stewards aim to control (but do seldom manage) cultural heritage, it is the academic study of that cultural heritage from an art history to an anthropological perspective that are a value-added wealth to the monument, artifacts, or site in consideration. In academic studies, researchers do not own the object of study but do build its knowledge database that may or may not be used in strategies of dissemination. It is not always clear to stewards that a good story to enhance the richness of heritage can come from academic sources. Quite often, the script comes from nationalistic or political sources (Cuno 2008). Academics therefore are not very proficient actors in the public process of creating a solid stewardship of cultural heritage.

On the contrary, it is rather the agenda of stewards that influences the acquisitions, research, and display that a museum might present to the public. What right do stewards have to direct the public display of cultural heritage, art in their eyes, and determine the outcome of that display? Might stewards overlook the wealth of information produced by academics? It would seem apparent that stewards have other values with which to measure their possessions, reflecting the aesthetics rather than the social frameworks directing their "contributions" to heritage. I have a specific case in mind: the recent and expensive renovation of the Roman wing at the Metropolitan Museum of Art that fails, at every level, to set the record straight on the decorative patterns in Roman architecture.

The second issue regards the stewardship drive undertaken by communities to preserve their own heritage, whether because it is inherited from their ancestors or because it lies in their current communal lands and they see it in a proprietarily way (as in the case of immigrated populations) (Stapp & Burney 2002; Welch et al. 2009). Is heritage less their concern because they are recent immigrants? Many attitudes by government agencies have alienated the local populations as they use the "ancestry" argument to lead to legal decisions.

Overall, however, the scenarios of communal concern over heritage do not necessarily imply a positive attitude or adequate management of their heritage. The most relevant point in this debate is that today stewardship requires a central concern for sustainability of the heritage not only for the community but for society at large. Believing that stewards have sole control and profit of that heritage

has a negative impact, whereas consideration of usufruct of that heritage for society at large should be of prime concern. By the same token, it is apparent that museums use the concept of public usufruct in a much more convincing way.

In addition, to complicate the case of future growth of community stewardship, a set of internal factors may lead to these enthusiastic but sometimes disorganized scenarios of managing heritage: scarce education levels in local communities; limited knowledge of potential, risks, and obligations at managing heritage; and a too high political input into decision making procedures (Fennell 2008).

I underline the issue of poor risk management because it is not restricted to small, developing communities that wish to steward their heritage. Complex societies such as the case of the city of Rome face chaos in their stewardship role by not establishing long-term management plans to address in an organic manner the risks and needs of an overwhelmingly complex setting for cultural heritage.

Future Directions

Final Thoughts: Strategies in the Twenty-First Century

I suggest that museums may have to change their strategy of stewardship in future decades. Hopefully they will convince themselves that depleting burials and sites so as to have the artifacts adorning their displays or stacking their storerooms is poor policy. Certainly there is a wealth of heritage in storage rooms with which to create novel and attractive exhibits for years to come. What does the recent evidence show in this regard? If contentious arguments between sovereign nations and museums are any indication, perhaps the latter have not renounced to their old ways.

On the other hand, indigenous, native stewardship is on the rise – but with many caveats. The tendency of the last two decades is to have communities and nongovernmental organizations defend their heritage against encroachment of their lands. These communities have had a difficult time, however, dealing with governments, mainly for their lack of strategies to prove the existence of valuable and worthy heritage. This scenario stems, of course, from ignorance in government circles. For instance to prove the existence of intangible heritage with no apparent commercial value is a difficult task. How to prove that a nomadic society which relies for their survival on large extensions of land for a hunting and gathering economy and that such strategy, that land, *is* their intangible heritage?

These questions are clearly important as we live today in a period where the property of cultural heritage (both in the material and intellectual realms) is fiercely debated. In this scenario, more often than not, societies reach the conclusion that artifacts are the property of the first nations, aboriginals, or natives. But this is not a given in young democratic societies. The number of social conflicts stemming from top-down unilateral decisions by governments impinging on local populations shows the high risk for conflict preserving their heritage (Alderman 2009). Governments are hardly steadfast stewards of the heritage in their very own country. Their attitude towards monumental heritage sites is often a reflection of those same market principles at as well.

The stewardship of the future will continue to develop at both the private level and the community level as both groups claim they are "stakeholders" to portions of heritage. However, the strategies they apply will need to change, not the least because both groups often will be stepping on each others' arenas. Both groups will still claim property over heritage. While aboriginal populations will be greatly favored by the legal baggage behind the issue of heritage claims, museums will persevere, as they do own heritage that is, arguably, beyond the control of native communities and countries of origin. Museums will not disappear, but their stewardship goals and strategies must change in these times of a greater awareness of cultural heritage and their original property.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Site Stewardship Programs

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Stewart, T. Dale

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Basic Biographical Information

Thomas Dale Stewart (1901–1997) was born June 10, 1910, in the Welsh community of Delta, Pennsylvania, USA. Following graduation from high school in 1920 and subsequent employment at the local bank, Stewart enrolled (1922)

Stewart, T. Dale, Fig. 1 T. Dale Stewart. Courtesy NAA, Smithsonian Institution

at The George Washington University in Washington, D.C., focusing on a pre-medicine program. Through family friend John L. Baer and roommate Henry B. Collins Jr. (1899–1987), Stewart was introduced to anthropology, especially as practiced at the nearby Smithsonian Institution (Ubelaker 2000a) (Fig. 1). In 1924, he began to work part-time as a temporary assistant to the legendary Smithsonian Curator of Physical Anthropology Aleš Hrdlička (1869–1943). Hrdlička needed help assembling data and preparing tables for his many publications. With his banking experience, tabulating numbers and balancing accounts, Stewart rapidly became a relied-upon assistant (Ubelaker 2000b). By 1927, Hrdlička's confidence in Stewart had grown to the point that he not only offered Stewart a permanent position but also the opportunity to succeed him eventually if Stewart acquired a medical degree. With such an incentive, following college graduation in 1927, Stewart enrolled in medical school at the Johns Hopkins University in Baltimore, receiving his MD degree in 1931 (Ubelaker 2006).

With his medical degree in hand, Stewart returned to the Smithsonian to work with Hrdlička and began his long and productive career in physical anthropology. When Hrdlička retired in 1942, Stewart was promoted to the position of Curator. Career milestones include initiation of consultation with the U.S. Army Quartermaster Corps in 1948, organization of a human identification project in Kokura, Japan (1954), conducting a seminar in human identification in 1955, becoming Head Curator of the Department of Anthropology (1961), appointment as Director of the Smithsonian Institution's National Museum of Natural History (1962), election to the National Academy of Sciences (1962), organization of a conference on human identification in mass disasters (1968), election as Honorary Member of the American Academy of Forensic Sciences (1974), and recipient of the Physical Anthropology Section Award of the American Academy of Forensic Sciences in 1981 (this award was renamed the "T. Dale Stewart Award" in 1987). Stewart served as President of the American Association of Physical Anthropologists from 1950 to 1952 and as its secretary-treasurer from 1960 to 1964. He received the Viking Fund Medal in 1953 and the Charles Darwin Lifetime Achievement Award in 1993 from the American Association of Physical Anthropologists. Stewart was the Editor of the American Journal of Physical Anthropology from 1942 to 1948. Although he retired in 1971, he subsequently continued research and publication. At the age of 91, his last publication emerged, a monograph on archaeological research at a site in Virginia (Stewart 1992).

Major Accomplishments

Through his numerous publications, meticulous attention to detail, editorial efforts, and congenial manner, T.D. Stewart became internationally recognized as a scholarly leader in physical anthropology. His published works include broad

topics within anthropology but largely center on forensic anthropology, paleopathology (Ubelaker 2012), anthropometry, human paleontology (especially the Shanidar Neanderthals), and the peopling of the New World. Stewart served as consultant to the FBI laboratory on matters relating to forensic anthropology and reported on at least 254 cases for them between 1943 and 1969. He also found time for formal teaching at the Washington University School of Medicine in St. Louis in 1943, the Escuela Nacional de Antropología e Historia in Mexico City in 1945, and the George Washington University School of Medicine in Washington D.C. from 1958 to 1967.

T. Dale Stewart's publications are models of careful research design, broad academic perspective, attention to detail, and accuracy (Ubelaker 2000c). His many contributions to such issues as the complexity of skeletal age changes, Neanderthal morphology, anterior femoral curvature, vertebral osteophytosis, dental alterations, trephination, treponemal disease, and the peopling of the Americas are both highly regarded and long-standing. He published at least 394 works from 1924 to 1992 including several key books and monographs. He provided international leadership in the scholarly development of forensic anthropology, paleopathology, and other areas of physical anthropology.

Cross-References

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- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Forensic Anthropology: Definition
- ▶ Hrdlička, Aleš

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Stoa

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Introduction

Stoa is an ancient Greek term applied to a type of long, narrow, free-standing building with a colonnaded façade. The stoa developed as an architectural form in Archaic Greece, and was most popular from the fifth through first centuries BCE. The stoa should be distinguished from the colonnaded avenues typical of late Hellenistic and Roman cities and from the Roman *porticus*.

Definition

The stoa is a distinctly Greek architectural form of the portico that appears in a variety of

forms from the Archaic (c. 650–480 BCE) through the Hellenistic periods (c. 323–50 BCE) and is found in sites throughout the Greek world. The simplest stoa was composed of three walls and a colonnaded front, yet this simplest form does not appear often in the archaeological record. Typically, the stoa form had a second inner colonnade that supported a ridge roof. Some stoas had small rooms behind the portico, some had two or more storeys, and some had projecting wings at either end, forming L or Pi shapes. The stoa had a variety of civic and religious functions: although the earliest examples appear in religious sanctuaries, the development of the stoa in the Classical period is linked to Athens, where stoas appeared at the margins of the Agora, the marketplace and civic center of the radical democracy. The characteristic appearance of a Hellenistic Agora came from the stoas that framed it. The stoa served a wide variety of purposes: at the sanctuary of Asklepios at Epidauros, the stoa served as the *abaton*, or sleeping dormitory, for the patients. In sanctuary spaces, stoas frequently housed dedications, and offered shelter to priests and priestesses. In the Athenian Agora, stoas housed magistrates, functioned as public indoor space, held dining rooms, and served as display space for art and military spoils while the uniquely shaped South Stoa in Corinth served commercial functions. The stoa was thus an integral architectural building block of the Greek agora and sanctuary, central to Greek civic and religious life. The function and use of the stoa was multipurpose, but Vitruvius (*Arch*. 5.9.1) offers a basic ancient definition when he states that the stoa was a colonnaded building that serves to protect visitors from both the rain and the heat of the sun.

The stoa and the Greek temple share many architectural elements, but the monumentalized stoa, constructed of stone or marble, appears after the first all-marble Greek temples. In general, the building materials of the Greek stoa are more functional than those of the temple. The tendency in construction overall was to use less expensive materials. Marble was frequently reserved for the façade, while walls were often built of local stone, mud brick, or rubble masonry (Coulton 1976: 142-3). In form, the stoa typically had a Doric exterior colonnade and an Ionic interior colonnade, thus forming a two-aisled interior. Multi-storeyed stoas also used the Doric and Ionic orders, along with interior half-columns with Pergamene capitals, and as time went on, a preference for the more elaborate use of the orders predominates. The single-storeyed form predominates, however.

As the building type developed, the columns began to be built in marble carrying a wooden entablature. The earliest stone porticos employed the Doric order, and this order dominates the archaeological record. The first monumental examples appear in the sixth-century BCE, and are concentrated in Athens and Attica, where the radical democracy demanded new purpose-built architecture to support its governmental functions. The Athenian Agora, with its sequence of stoas built between the late Archaic and Hellenistic periods, provides a good example of the architectural form, and includes the first stoa with projecting wings, and one of the first stoas to incorporate rooms. In the Peloponnese, the South Stoa at Corinth and the Echo Stoa at Olympia are particularly noteworthy for their respective form and function. Ionia and the Hellenistic east present the fullest integration of the stoa into the Greek civic center, and forecast the development of the Roman use of the basilica and the *porticus* used to frame Roman *fora* and Roman colonial centers. The construction of a stoa was an expensive undertaking, and literary and epigraphic evidence demonstrate that most of the notable examples built in and after the fourth century BCE were funded by the Macedonian and Attalid dynasties established after the death of Alexander the Great (Schmidt-Dounas 1995: 23-52).

Key Issues/Current Debates/Future Directions/Examples

There is some debate as to whether Mycenaean porticos provided architectural origins for the classical Greek stoa. Origins in Near Eastern

and Egyptian building types have also been suggested, but Coulton argues that the form has its origins in Archaic Greece (Coulton 1976: 18–23). In the Archaic period, the stoa became an autonomous structure, whose building components develop in parallel with temple architecture. Most known sixth-century stoas were small in dimension, and of lower architectural status than temples. In the sixth century, complete stone architecture became typical for temples, while only two known archaic stoas had stone entablatures. Most stoas of this period were found in sanctuaries, where they served as shelter for pilgrims and as places to display dedications. The two exceptions are the Royal Stoa, the earliest of the stoas in the Athenian Agora, and the stoa on the agora at Sikyon.

The earliest known example of the Greek stoa occurs at the sanctuary of Hera in Samos, and dates from the seventh century BCE. In form, the South Stoa at Samos was a long rectangular building, 70 m in length, with a back wall in rubble masonry, turning at either end, and two rows of wooden posts, one internal supporting the ridge roof, and 29 external columns forming the façade. In structure, the stoa was similar in size and shape to the cella of the Second Temple of Hera, and it anticipates the development of the Ionic order with the elements of base, capital, and dentils present (Coulton 1976: 27). In c. 478–470 BCE, the Athenians built an Ionic Stoa at Delphi. This building incorporated the polygonal retaining wall of the Apollo Temple and was erected to display Athenian spoils from the Persian wars. The stoa used seven monolithic Ionic columns that bore a wooden entablature, and carried an inscription on the stylobate.

The development of the stoa in the Classical period (c. 480–323 BCE) is exemplified by the series of stoas in the Doric order built around the Athenian Agora. Each was modest in construction but increased in size and in the sophistication of their interior design. These served to define the borders of the agora space: on the west by the Royal Stoa (c. 500 BCE) and the Stoa of Zeus (c. 430–420 BCE), and on the north by a row of herms, the Stoa of the Herms, and the Stoa Poikile (c. 475–460). When South Stoa I was built (c. 430–420 BCE), it created a long uniform façade in the middle of the south side of the agora (Fig. 1).

The Athenian Agora, while it does not have the orthogonal corners of the Hellenistic agora, was nonetheless the first agora closely coordinated in design (Winter 2006: 54).

The Royal Stoa is the first stoa of the Agora and one of the earliest with a stone entablature. Dating from the mid-sixth century, it had a two-aisled interior, with stone columns in the Doric order on the façade and an inner Doric colonnade located behind every third outer column supporting lighter interior wooden beams, while the outer colonnade bore the stone entablature. The stoa was the headquarters for the *archon basileus*, the official in charge of religious matters and law in the democracy, and was where the laws of Solon were displayed. This building has been securely identified by Pausanias' description and by two inscribed bases, dedicated by king archons, found in situ on the building's steps (Camp 2001: 45). The Painted Stoa, or the Stoa Poikile, is located along the northern side of the Agora, and was built c. 475–460 BCE in the Doric order, with internal Ionic columns. The westernmost end of this stoa was discovered during excavations of the Athenian Agora in the mid-1990s, and is currently under excavation by the American School of Classical Studies in Athens. This stoa was decorated with a series of panel paintings depicting mythological and historical scenes of Athenian military exploits, including the Greeks at Troy, an Amazonomachy, and the Battle of Marathon. The Painted Stoa was a public building without a particular function, open to everyone. The philosopher Zeno, who flourished c. 300 BCE, taught his followers, the Stoics, in the colonnade of this stoa (Camp 2001: 68-9).

The Stoa of Zeus Eleutherios, dated c. 430–420 BCE and built in the Doric order, is one of the first stoas to incorporate short projecting hexastyle wings. These wings were capped with triangular pediments crowned by sculptured acroteria. This stoa is also the first to use a three metope span, a structural device that reduced strain on the architrave. In this stoa,

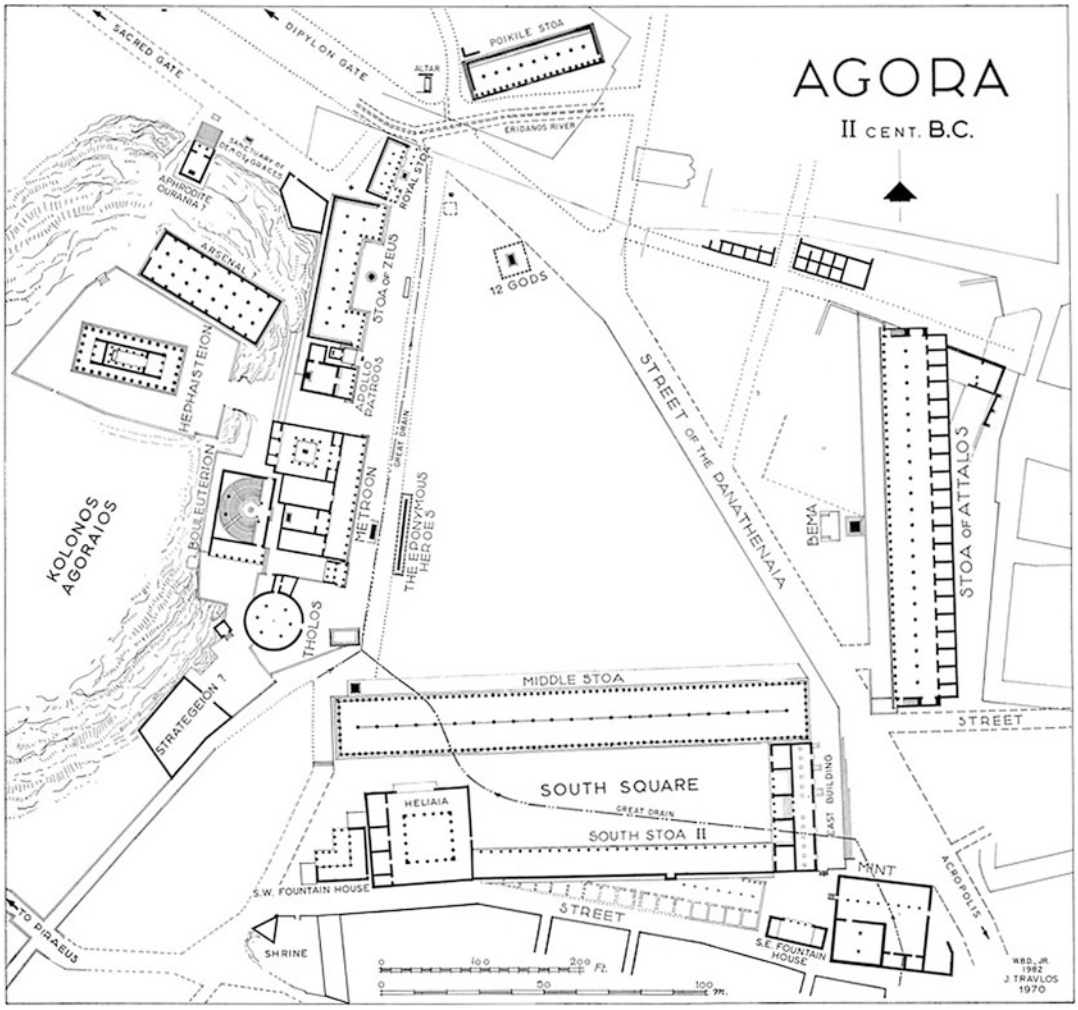

Stoa, Fig. 1 Restored plan of the Athenian Agora in the second century BCE from Camp (1990: 27), Fig. 6

the architects made the frieze out of poros with inset marble metopes to further lighten the load on the columns. Here, too, the interior Ionic columns are spaced twice as far apart as the Doric columns, as will become standard in later stoas. The building is distinguished by the high quality of its workmanship, by the extensive use of marble, and by its dedication to a god. The stoa is the setting for three Socratic dialogues, and according to Pausanias was adorned with paintings celebrating the freedom the Greeks won at the Battle of Plataia, the final battle against the Persians on Greek soil. South Stoa I, a more inexpensive structure built c. 430–420 and dismantled for a replacement c. 100 BCE, featured a Doric colonnade and Ionic interior colonnade in front of 16 rooms. These rooms have off-center doors that allow the space to be identified as dining rooms equipped with couches. Coins found in situ point to the stoa's commercial function, and inscriptional evidence shows that the officials in charge of weights and measures worked here (Wycherley 1957: 46).

The stoas of the Athenian Agora show many of the most significant architectural developments of the stoa in the Classical period, but the stoa in Athens also served a variety of functions, and served to commemorate political and

religious events within a secular building, housing magistrates and their governmental functions, displaying military spoils, decrees, and statues, offering ample public space for general recreation, and acting as dining spaces as well as serving commercial functions.

The Hellenistic period marked the appearance of much larger stoas used to define the space of the agora and the sanctuary. "The stoa is perhaps the most characteristic expression of the spirit of Hellenistic architecture, and determines the architectural form of the Hellenistic agora" (Winter 2006: 55). Some were very long, such as the winged stoa of Phillip II at Megalopolis, which was 155 m in length, or the Echo Stoa at Olympia. Begun in the third quarter of the fourth century, and completed by the mid-third century, the 100 m long Echo Hall at Olympia, located on the east side of the sanctuary, served to divide the Altis into distinct spaces. This stoa is remarkable for its lack of an interior colonnade and its wide roof span (9.97 m), with massive horizontal wooden beams running across the roof above each exterior Doric column. The Echo Hall was intended for viewing the great processions that passed in front of the building, and forecasts the importance of the view toward, as well as the view from, important buildings that is common in Hellenistic design (Winter 2006: 54). The stoa of Phillip II at Megalopolis is the largest and longest of the fourth century stoas, and can be securely assigned to the years between 338 and 330 BCE, after Phillip II of Macedon's invasion of Laconia. In addition to the external Doric colonnade and projecting wings, this stoa unusually had two interior Ionic colonnades to balance the great length of the building.

The orthogonally aligned Hellenistic agoras gained their characteristic form through the framing devices of stoas. In Ionia in Asia Minor especially, the agora was made into a rectangular space through the use of L- or Pi-shaped stoas built on three sides of a rectangular open space with a street along the fourth. The effect was to create a continuous colonnaded façade. While the first Pi-shaped stoa was built at the sanctuary of Artemis at Brauron (c. 420–415 BCE), the most important of the Ionian stoas were found at Miletos, Priene, and Magnesia on the Maeander and were common throughout Asia Minor towns built on the Hippodamian model (Winter 2006: 56).

Height proved a design issue in stoas, utilitarian buildings where space could not be wasted. As stoas grew longer, the height of a single colonnade would tend to disappear into the vastness of the agora space (Winter 2006: 55). In order to create a more pleasing height-to-length ratio, architects adopted two-storey or multiple-storey designs, creating an exterior tall enough to overlook the rooms below. One of the largest known examples of two-storeyed design is the South Stoa at Corinth (c. 165 m in length), expanded in its second phase in the early third century BCE, with 33 shops with rear chambers and a unique water feature. The stoa was two-aisled, with 71 Doric columns outside and Ionic within; behind these columns was a row of 33 shops connected to a second row of storerooms featuring cold storage wells chilled with water from the Priene spring.

The use of two-storeyed stoas grew widespread in the fourth century, and in the Hellenistic period, we also have evidence for multi-storeyed stoas, many of which are associated with the Attalid dynasty at Pergamon. Large multi-storeyed stoas were placed along the terraces of hilly landscapes, and could be created either by placing a second portico above the main one at ground level, or by placing one or more storeys with basement rooms and porticos below the main portico to raise its floor to a higher ground level on the downhill side of a slope and to help retain the terraced ground level. The earliest of these is the East Stoa of the Athenian Asklepieion, built in the mid-fourth century BCE, where there were two superposed Doric colonnades on the façade of a two-aisled portico. The two-storeyed form appears to have developed here to meet the needs of those men and women worshipping and sleeping overnight in the stoa, but is later employed in buildings with a variety of functions.

In the Hellenistic period, there is a special category of Pergamene stoas, built during the reigns of Eumenes II (197–160 BCE) and

Attalos II (160–139 BCE), which have distinctive features. Typically, the Pergamene style preferred a stoa with two storeys and two aisles, and made use of Doric columns on the lower façade and Ionic interior columns, while the upper storey used Ionic columns on the façade and interior double half-columns with palm capitals, supporting a mixed Doric-Ionic entablature (Coulton 1976: 66-72, 126-9). Athens has two representative Attalid stoas, the Stoa of Eumenes II and the Stoa of Attalos II, restored between 1953 and 1956 on the basis of Travlos' drawings by the American School of Classical Studies in Athens and now serving as the museum and warehouse for the Agora Excavations.

Eumenes II built a long stoa, just west of the theater of Dionysus on the south slope of the Acropolis, to shelter the thousands of people who attended the festival and theatrical events (*Vitr. Arch.* 5.9.1). This stoa was built into the steep south side of the Acropolis, so one of its most characteristic features is the large retaining wall and buttresses connected by semicircular arches still visible today. The stoa shows Pergamene style and also the direct influence of Pergamene architects in its construction. The palm capitals and cornice on the upper storey use gray Pergamene marble characterized by large crystalline inclusions, and the mason's marks on the blocks suggest that the stones were carved in Pergamon and imported to Athens after they had been worked. The Stoa of Attalos in the east side of the Athenian Agora was donated by Attalos II of Pergamon to the people of Athens (Thompson & Wycherley 1972: 78). This stoa is also in the Pergamene style, but uses Athenian limestone and Attic marble. Like the South Stoa at Corinth, this stoa had a row of 21 shops behind the colonnades on each storey, and served as the chief market building of the Agora in the Hellenistic period.

Large stoas were also built at the sanctuaries of Samothrace, Delphi, and Delos by Macedonian and Attalid dynasts, such as the Macedonian stoas of Antigonos II on the north side of the sanctuary of Apollo at Delos and of Phillip V on the southwestern corner of the same sanctuary. Comparable in the Hellenistic period are the multi-storeyed market halls exemplified at Aigai, Alinda, and Assos, where the agoras were formed on hillsides with artificial terracing (Dinsmoor 1975: 293). The South Stoa of the Agora at Assos in the Troad in Asia Minor, built in the mid-second century BCE, was one of the tallest buildings in the Greek world with a total height of five storeys, or 22 m, since it was built with two floors below the Agora ground level, and two superposed porticos above ground level (Coulton 1976: 70).

Small two-storeyed stoas from late Hellenistic Delos, such as the L-shaped stoa of the Agora and the Agora of the Italians, may have inspired the two-storeyed porticos and arcades of late Republican and early Imperial Rome (Winter 2006: 56; on the Agora of the Italians, see Trümper 2008). Stoa building declines by the first century BCE. Although new stoas continued to be built throughout the Greek and Roman world, the Roman basilica and portico and the Hellenistic colonnaded avenues largely took over the function of the stoa.

Cross-References

- ▶ Agora in the Greek World
- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ Urban Planning in the Greek World

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Stone Tool Usewear and Residue Analysis

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Introduction

Although strictly speaking the concept of *artifact* refers to what is actually manufactured (e.g., by flaking or grinding), in archaeology the term *stone artifact* commonly refers to any stones that are made, modified, or used by humans (other primates also make and use artifacts; see Mercader et al. 2007). The by-products of manufacture are often also called artifacts in the sense that humans produced them. *Stone tools* are usually defined as those artifacts that actually have evidence of use. For reliable identification of archaeological stone tools and determination of specific functions, analysts rely on *multiple lines of evidence* that might include tool design, usewear, residues, breakage patterns, hafting traces, and archaeological context. Ethnographic and experimental evidence is also important. Usewear and residue analyses have the potential to provide a reliable basis for reconstructing and evaluating the nature of prehistoric tasks, resource utilization, and settlement history.

Definition

Residues in this context generally refer to materials that are transferred and adhere to implements in the course of use or preparation for use. We are particularly interested in residues that are transferred to stone tools (Briuer 1976; Hayden 1979; Loy 1993). Of particular interest is the transfer of residues linked with a specific task (e.g., harvesting cereals or hunting) or processing a particular material (e.g., woodworking or grinding seeds). However, some residues are unrelated to utilization and may reflect incidental contact, burial processes, or even modern contaminants. Some tool residues can survive intact on artifacts for millions of years, while others may deteriorate rapidly and undergo chemical changes depending on their structure and specific taphonomic conditions. Consequently, specific methods of extraction, identification, and analysis have been developed for particular conditions, particular artifact types (e.g., ceramics), and specific kinds of residues (Evershed et al. 1992; Pollard & Heron 1996). The principles of residue analysis are based on the identification of diagnostic microfossils, chemical signatures, atomic structure, and genetic composition, as well as of other properties.

Usewear (or "use-wear") refers to the wear on the edges and surfaces of an implement that is linked with its utilization (Odell 2004). *Microwear studies* sometimes refer to a particular approach that employs

metallographic microscopes at high magnification, especially (but not exclusively) aiming to observe and interpret polishes on stone tools (see below). *Traceology* is a term that may refer to the study of any traces (whether residues or surface alterations), usually in the context of tool use, and can be synonymous with microwear studies. However, these terms are often used synonymously to refer to surface modifications that arise during use, hafting, handling, and storage. Some forms of usewear may incorporate or absorb residues within surface layers, providing a mixture of additive residue and usewear traces. The general principles of usewear analysis are experimentally based and derived from fracture mechanics, tribology, and related sciences. While potentially applicable to all material classes (including artifacts made of wood, bone, stone, glass, shell, antler, ceramic and metal), specific methods and interpretive rules have been developed for particular tool materials (e.g., flint).

Key Issues/Current Debates/Future Directions/Examples

The main forms of usewear on flaked stone tools include scarring, striations, edge rounding, smoothing and polish, and bevelling (Hayden 1979; Kamminga 1982). Each form of usewear provides evidence of function but is rarely sufficient on its own to reconstruct particular tasks. Striations, for example, clearly indicate directionality or motion of tool use but are not diagnostic on their own of particular processed materials such as wood, shell, or skin. On the other hand, hafted flint flakes used for hide scraping sustain highly distinctive edge rounding along with a low incidence of edge scarring and abundant striations perpendicular to the utilized working edge.

The fracture mechanics of flaking indicate that particular properties of scars (e.g., initiation, termination type, orientation, and size) are linked with force application, edge morphology, and the nature of materials worked. For example, low-angled tool edges used to cut even soft tissue are particularly prone to produce scars with bending initiations and axial terminations. Bending scars on low-angled edges like this are rarely diagnostic of particular raw materials. However, low-angled tool edges used to saw bone sustain a highly distinctive bending scar pattern with crushed, rounded prominences, and uniform scar spacing (Kamminga 1982). Particular functional tool types known ethnographically sometimes sustain diagnostic scarring in association with other forms of usewear. For example, stone points used as drills sustain characteristically angled scars oriented at right angles to the circular drilling motion. Stone arrow and spear tips sometimes sustain burin-like impact fractures that, in conjunction with other features (e.g., microscopic striations/polish alignments), may be crucial in determining a projectile's function.

Polish on flint tools has been studied extensively and can be a diagnostic indicator of material worked (e.g., van Gijn 2010). Stone segments hafted as sickle blades sustain a highly characteristic gloss that indicates highly siliceous plants. However, particular forms of usewear are not studied in isolation but in combination with other forms of usewear, other traces of use (e.g., residues), and other lines of evidence such as tool design, breakage, and consideration of the archaeological context.

Grinding and pounding implements (upper and lower stones) sustain surface modifications that include smoothing, striations, and pitting rather than the edge damage that is found on flaked stone tools. Crushing and grinding minerals (e.g., ochre), plants, and animal tissue force residues (including liquids, chemical compounds, and particles) into cracks and imperfections on the tool surfaces. Some grinding stones are selected for the composition of their cemented particles and their suitability for processing particular foods (e.g., grass seeds). Other stones are selected for their toughness and suitability for edge ground tools. Grinding stones and ground stone implements (like axes) with a porous surface or deep cracks provide, under suitable preservation conditions, a reservoir of deeply impacted and absorbed residues related to utilization.

Haft traces can be indicative of particular handles and tool function (Rots 2010). Experiments show that combinations of bindings, sockets, and adhesives affect the type, location, and abundance of scars, striations, and polish.

Residues in archaeology are the minute remains that are transferred to an artifact. The presence of a residue follows Locard's exchange principle which states "with contact between two items, there will be an exchange" (Thornton, 1997). There is a range of residues currently studied by archaeologists, chemists, and archaeometrists. These can include microfossils, fibers, scales, particles, pigments, traces, amorphous residues, and biomolecules. The microfossils studied are predominantly plant microfossils represented by pollen, phytoliths, starch grains, and other inorganic crystals (e.g., schlerieds, raphides, and druzes). The fibers will include natural plant fibers (e.g., cellulose), animal fibers (e.g., collagen and hair), insect fibers (e.g., silk), and historical synthetic fibers. Scales can be observed from fish and reptiles in residues. Particles can include organic particles (e.g., charcoal) or inorganic particles (e.g., metals) which can be found in a residue to indicate metal working. Pigments can also be inorganic or organic but are predominantly inorganic in the archaeological record (e.g., ochre and cinnabar), while traces can include tissues and cells from plants or animals.

Amorphous or absorbed residues can be very difficult to characterize or identify. These amorphous residues can be formed by degraded trace residues including fat from adipose tissues, dried fluids (e.g., blood, milk, egg), or plant exudates (e.g., resins, gums, oleoresins). Many biomolecules can be found in a residue. The most widely analyzed are fatty acids as these are slightly hydrophobic, well preserved, and can be found in large amounts. Many other categories of biomolecules can also be studied, including hydrocarbons, carbohydrates, proteins, nucleic acids, lipids, resin acids, drugs, alkaloids and hormones.

Residue analysis begins with low-power incident light microscopy, continues with high-powered incident light microscopy, and culminates with the removal of the residue off the surface of the artifact for polarized light microscopy and further analysis. This archaeological microscopy approach to residue analysis is usually capable of identifying microfossils, fibers, scales, particles, pigments, and some traces. Further analysis employing histology, immunology, simple biochemical test, absorbance spectroscopy, Fourier transform infrared (FTIR) spectroscopy, Raman spectroscopy, UV luminescence, gas chromatography mass spectroscopy (GCMS), liquid chromatography mass spectroscopy (LCMS), and elemental, genetic, or protein analysis can characterize and identify archaeological residue even amorphous residues and residual biomolecules. Many of these techniques have been developed for specific residues under specific conditions on a definitive artifact type, for instance, absorbed residues on ceramic (which can appear invisible). Residue analysis can be performed on artifacts made from the following materials: wood, bone, stone, textile, metal, shell, ceramic, glass, antler, horn, and feather. Some key residue types include food, resin, antler, wood, bone, lipids, adhesives, sealants, and blood.

Residue analysis characterizes a residue with sufficient detail to interpret the function or process of a particular tool. This interpretation can include post-excavation contamination, environmental contamination, incidental contact, and nonfunctionally related transfer. This will allow the archaeologist to define the tasks with which the tool has been associated. Most residue and usewear analysts will begin by first identifying if there is a residue present on an artifact. This is important in order to identify if an artifact has been used. There are two steps – inorganic or organic and anthropogenic or environmental – that follow the confirmation of a residue. These are critical to determine if the residue is the cause of environmental contamination. Determining if the residue is plant or animal, as well as the tissue and taxa of origin, is critical to establish the association of residue and artifact.

Usewear/residue studies of stone, bone, shell, ceramic, and other implements provide key evidence in the history of hunting technology, food

processing, resource utilization, and settlement history. Complex hafting of flaked stone tools (whether projectile tips or craft tools) may provide an archaeological indicator of technological sophistication and hence human intelligence, with evident implications for tracking aspects of human evolution (e.g., Lombard & Haidle 2012). Similarly, the history of grinding stone functions may provide an indicator of sophisticated resource utilization and the complex processing of toxic foods and medicines, again with implications for the study of human evolution.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Ceramics: Scientific Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Pigment Analysis in Archaeology

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Stone Treatments in Archaeological Conservation and Preservation

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Introduction

Since antiquity, treatments of damaged stone have been carried out with the aim to delay the deterioration of buildings and monuments. Today, the objective of stone conservation is the preservation of these historic and/or artistic values for future generations in the best possible state without compromising the value of authenticity and access. The approach that has been taken to address this challenge has direct links to the emergence of chemistry in the nineteenth century. Chemicals such as water glass, fluorosilicates, linseed oil, and later ethyl silicate were applied as consolidants for stone shortly after their discovery and first synthesis. After World War II, organic compounds, such as acrylic and epoxy resins, were introduced into conservation practice. Nowadays, ethyl silicate and derivatives make up the most prominent group of stone conservation products.

A sound knowledge of the chemical and physical characteristics and of the mechanism through which conservation treatments interact with the

stone is the basis for the selection of the most suitable solution for any conservation intervention. However, only rarely are the products available on the market tailored to meet the specific needs of the field of cultural heritage. Moreover, the extremely wide range of porous building materials (both natural and man-made) corresponds to an equally wide range of decay problems and conservation needs which limits the validity of any hurried, superficial appraisal. Therefore specific, cautious evaluation is needed before choosing any product or equipment for each specific case.

There are two main ways to collect the information needed for such careful evaluation: (1) to survey the condition of monuments that have been treated in the past and for which reasonably good documentation exists regarding the methods and materials that were used and (2) to carry out ad hoc tests (either in the laboratory, in situ, or in both contexts, by outdoor exposure programs). Studying the condition of monuments treated in the past is the closest we can get to a real assessment of the performance of products and methods, after a known time interval and under known environmental conditions. The sine qua non condition is, however, the availability of exhaustive, or at least sufficient, documentation of the work that was carried out. The parameters to measure, the measuring methods, and the evaluation criteria have been under continuous discussion in order to improve the evaluation of the long-term performance of treatments through the past decades.

Definition

The primary goal of a stone conservation treatment is to restore in an efficient and durable way the integrity of weathered zones of the object, improve its mechanical and physical properties to the same level as the sound core, while considering the primacy of "retreatability" over the requirement of "reversibility." Stone treatments, whether for consolidation or protection, involve the use of special products for stone conservation.

Key Issues/Current Debates/Future Directions/Examples

The Athens Charter for the Restoration of Historic Monuments (1931) is the first international document which outlines the principles for the conservation of historic monuments. It recommends "... the judicious use of all resources at disposal of modern technique" to delay the decay, while these measures "should be concealed in order not to impair the aesthetic integrity of the monument."

Thirty-three years later, 1964, the Venice Charter calls in article 10: "[...] Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modern technique for conservation and construction, the efficacy of which has been shown by scientific data and proved by experience." Article 2 states that "the conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of the architectural heritage."

Often, the primacy of reversibility is attributed to the Venice Charter. However, in stone treatment, reversibility remains an only theoretical option. As most treatments, if not all, cannot be considered as reversible, "retreatability" is the desired characteristic of a conservation intervention (Petzet 1993; Giusti 2006), which has been replacing the concept of reversibility in conservation ethics.

Many papers continued to be published on the results of laboratory tests for stone treatments, both specifically referring to the treatment of specific monuments and to the assessment of a given conservation product or method. Requirements have been specified for different treatments. The research aims assumed that the main objective was not the selection of the "best" product but rather the identification and testing of criteria determined by the stone itself that might lead to that selection (Delgado Rodrigues 1996). Tests for cleaning methods and on the effectiveness of biocides were proposed. The growth in the use of laser cleaning has influenced the experimental studies to evaluate its effects and possible damages.

Since 1985, the Italian NORMAL Committee had dedicated a working group to the problem of evaluating water-repellent products with the specific aim of defining a detailed testing methodology. Evaluation procedures for stone treatments have been discussed at length during the International Colloquium organized by ICCROM in 1995 on "Methods of Evaluating Products for the Conservation of Porous Building Materials in Monuments." The five sessions of the Colloquium were dedicated to the specific problems of testing restoration mortars, biocidal treatments, consolidation treatments, treatments with water repellents, and finally to the important issue of weathering. Each session was followed by a Round Table. A critical evaluation of the papers and of the Round Table discussions was published one year later, in 1996, by the experts who chaired the sessions.

H. R. Sasse and R. Snethlage (1997) have proposed a very comprehensive and detailed methodology for the evaluation of stone consolidation treatments based on their own experience and on a previous proposal by D. Honsinger (1990).

Besides the properties to be measured and the related testing methods, Sasse and Snethlage propose to evaluate the results obtained for each parameter making reference to the unweathered stone and to assess them as "% of the optimum." Limits of acceptability are also proposed. According to these authors, penetration depth, hygric dilatation, and E-modulus have the highest priority among the listed properties. The penetration depth must be related to the thickness of the damaged stone or of the zone of maximum mean moisture; hygric dilatation must not increase against the untreated stone, and the E-modulus must not exceed the E-modulus of the unweathered stone by more than 1.5 times.

Accelerated laboratory tests and field-exposure studies, though considered useful and frequently applied, cannot be directly translated into the prediction of the long-term behavior of stone treatments. Nonetheless, many of the difficult points related to field-exposure and to laboratory-accelerated studies are also valid when these conditions are applied to test the durability of treatments. The limited validity of field-exposure tests, as they are constrained by the existing climatic and environmental parameters, and the risk that too high concentration of damage components in accelerated chamber experiments or too high frequency of weathering cycles may lead to results which are far from reality and therefore not useful for the intended purpose are among the main challenges.

For a critical evaluation of the present situation of testing procedures, as they are nowadays commonly carried out, the various steps of the process can be briefly discussed. The aim of the study must be clearly defined in order to select the products (or equipment) to test, the parameters to measure, the type and number of samples, and all the other experimental details.

Once this has been decided, it will be possible to estimate the time needed for the study and its cost. These two points are not insignificant, considering that time and budget constraints frequently limit the possibility to carry out the study, especially when it is aimed at the selection of products for the conservation of a specific monument, within a conservation project where budget and deadlines have already been fixed.

When this is the aim, it is of the utmost importance to refer to the results of preliminary diagnostic studies (characteristics and condition of the stone, main factors of decay, surface typology, etc.) when planning the experimental details of the testing procedure. To that purpose a strict contact between the laboratory where tests are planned and carried out and the project site is always advisable in order to facilitate the exchange of opinions between conservation scientists and conservator/restorers. This collaboration is especially important when testing cleaning methods. Actually, while their harmfulness could even be evaluated on laboratory samples of the same stone type as the monument, their efficacy has to be tested on the real surfaces, due to the complexity of the various forms of deposits or other dangerous materials to be removed and which are impossible to reproduce artificially.

The last important point of the planning phase concerns the products to test. In the large majority of cases, several products are tested together and compared, as such the results have a relative

validity rather than an absolute significance. Whichever the aim and category of the evaluation, the products must be clearly identified (nature and concentration of principal components, solvents, catalysts, additives if any, etc.). Unfortunately, it is not compulsory for producers and retail dealers to declare the detailed composition of products used in conservation; moreover, to characterize these products is not easy for unspecialized laboratories, especially in the case of organic products. It is, however, advisable to reject products that are only vaguely described and to have at least a "fingerprint" of the product to test, such as a FTIR spectrum. This will also help to check afterwards the quality of the product that, having been tested and selected, will be used for a conservation treatment.

When the tests are carried out on stone laboratory samples, they are obtained either from a monument or from the quarry. The first case, however, is not very common, as the amount of samples required for the testing cannot be obtained from a monument, unless some dismantling has to be carried out. In the second case, the quarry stone condition is usually better than the condition of a stone in need of conservation. This may require a preliminary artificial weathering which will, however, introduce an element of uncertainty in the test results.

The problem is even tougher if the tests concern bricks and mortars. If old, damaged samples are not available, as is very frequently the case especially with mortars, it is necessary to produce new samples similar to the damaged ones, and this requires extra work for their production and the subsequent characterization.

Cubes, parallelepipeds, and cylinders are the sample shapes most frequently used; depending upon the different parameters to measure, different shapes may be needed within a single study. The sample size generally ranges from 3 to 7 cm. The more homogeneous the stone, the smaller can be the size. However, when the depth of penetration and bulk properties are considered important in order to assess the efficacy of the treatment, the use of very small samples should be avoided. Working Group 3 within the Technical Committee 346 of the European Committee for Standardization (CEN) is currently preparing further standards for the evaluation of methods and products for conservation works on porous inorganic materials constituting cultural heritage (http://www.cen.eu/).

Nondestructive tests, such as ultrasonic pulse velocity, are given priority over destructive tests, such as for mechanical strength. Parameters that can be measured in profile along the weathered zones are preferred over bulk parameters of the stone as a whole.

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- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Nonstructural Sites: Monitoring
- ▶ Stone: Preservation and Conservation

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Stone, Peter G.

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Basic Biographical Information

Peter G. Stone was born in Manchester, UK, in 1957. After school, he first studied at the University of Stirling, gaining both a bachelor's (B.A.) degree in History and a diploma in Education (Dip.Ed.) in 1979. Over the next few years, he worked as a schoolteacher, teaching History in England, but also teaching English in Greece. In the school summer holidays of 1978 and 1979, and before going to Greece in 1979, he worked as a volunteer at the Coppergate excavations in York with York Archaeological Trust. He was soon drawn even closer to archaeology, completing in 1983 a master's (M.A.) degree in Archaeological Method and Theory at the University of Southampton. This was followed by a Ph.D. at the same university, supervised by Professor Peter Ucko, with the thesis title *Teaching the Past, with Special Reference to Prehistory, in English Primary Education*, combining both his pedagogical experience and his archaeological interests.

Major Accomplishments

Due to working in a number of posts, including as a Project Manager and Coordinator at the University of Southampton for the Archaeology and Education Project set up with Ucko and then in various posts at English Heritage, and with a young family, Peter had the challenging task of carrying out his Ph.D. research on a part-time basis. This achievement both developed in him a wider knowledge and experience of the heritage sector than a full-time student would have gained and also demonstrated his ability to focus on academic research despite many other commitments. It was during his time with English Heritage that he was directly involved with the infamous controversies surrounding the Summer Solstice at Stonehenge, dealing with this issue in the early to mid 1990s, including while working as Acting Regional Administrator for the South West. His experience with Stonehenge helped establish him as an authority on the site, with numerous publications looking at issues around the site's treatment and management (e.g., Stone 1999, 2006), leading to his appointment in 1997 as the Council for British Archaeology's (CBA's) Special Advisor on Stonehenge (later appointing him Special Advisor for Hadrian's Wall, another significant World Heritage Site). The CBA also took advantage of Peter's educational expertise, appointing him Chair of the CBA Education Committee from 1997 to 2003, and he had been

a member of the Schools Committee and then the Education Board for the CBA since the mid 1980s.

However, Peter's involvement in heritage reached beyond the UK into international issues from an early stage; he was instrumental, again with Peter Ucko, in driving the formation of the World Archaeological Congress (WAC). From 1998 to 2008, he was Chief Executive Officer of WAC, and his continued involvement has been credited with providing WAC with administrative continuity and institutional memory (Smith, *pers. comm.* 2011), working from 1986 as head of the unpaid secretariat that enabled the organization to function. During this time too, he was Executive Series Editor for the One World Archaeology (OWA) Series (1999–2003). He also produced as part of the OWA Series several seminal publications on education and interpretation of archaeological and cultural heritage that are still core textbooks (e.g., Stone & MacKenzie 1990; Stone & Molyneaux 1994; Stone & Planel 1999).

He has also been involved with international heritage management issues for much of his career, for example, through extensive involvement with the United Nations Educational, Scientific and Cultural Organization (UNESCO). For example, in 1996 he was appointed as a member of the Advisory and Drafting Team for the World Heritage Education Project and Kit. His work with UNESCO has also included extensive work overseas. He was personally approached by National Museums and Monuments of Zimbabwe (NMMZ) to carry out a review of their education service, compile a report on its future development, and then implement some of that development – in particular a 7-week training program for education and interpretation staff in NMMZ. In addition, sabbatical visits to Australia and New Zealand as visiting lecturer at Flinders and Auckland Universities in 2004 and work in China in 2008 with the International Centre for Chinese Heritage and Archaeology (ICCHA) reinforce the regard in which his expertise is held internationally.

In 1997 Peter joined Newcastle University as a lecturer in Heritage Studies at the Department of Archaeology, which at that time was part of the university's Department of Archaeology. He developed the popular MA program in Heritage Education and Interpretation and was Director of the International Centre for Cultural and Heritage Studies at Newcastle University from its formation in 2001–2005. Following this, he moved to his current position as Head of School of Arts and Cultures at Newcastle University, also becoming a Professor in 2005. He is still involved with teaching at ICCHS, but the extent to which he is able to teach is limited by his Head of School duties. He also continues to supervise a diverse and globally spanning range of Ph.D. candidates.

From a research perspective, most recently Peter has been involved with exploring the controversial issues around heritage management during armed conflict, stemming from his appointment in 2003 as advisor to the Ministry of Defence with regard to safeguarding the archaeological heritage in Iraq in light of the impending conflict. As well as an award-winning publication coedited with Joanne Farchakh Bajjaly (2008) and the development of a touring exhibition in partnership with the Oriental Institute in Chicago exploring the impact of the destruction of cultural heritage in Iraq, this experience has also led to Peter's continued lobbying of the UK government to ratify the Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention 1954. In addition to this, he continues to be interested in other heritage management issues, chairing the Hadrian's Wall World Heritage Site Management Plan Committee and sitting on the National Trust's Archaeology Advisory Panel.

Peter Stone's career has been highlighted with much esteem for his influential and groundbreaking contribution to international heritage studies. The most recent recognition of this occurred in early 2011 when he was awarded the Order of the British Empire (OBE) in the Queen's Birthday Honours list for services to heritage education. Peter currently lives in Northumberland with his wife and four children.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ucko, Peter (Cultural Heritage Management)
- ▶ World Archaeological Congress (WAC)

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Further Reading

For many of Peter's publications, see www.ncl.ac.uk/sacs/staff/profile/peter.stone#tab_publications.

Stone: Preservation and Conservation

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Introduction

Stone represents a hard substance typically composed of mineral and/or rock matter, which is quarried or simply found, and worked into a specific form and size for a particular purpose such as construction, paving, adornment, or as powders (e.g., pigments). Stone is exceedingly varied in its distribution, characteristics, and application; however, before its broad diversity can be discussed, important definitions must first be addressed.

Definition

Mineral: a class of naturally occurring substances comprised inorganic compounds (carbonate) and elements (carbon) that exhibit a specific chemical composition, crystal structure, and optical characteristic. Specific minerals may include diamond, feldspar, quartz, and talc.

Rock: substance comprised of varied minerals either as individual mineral materials (e.g., graphite) or variable mineral constituents (e.g., granite). Rock can be created in nature through heat and/or pressure (marble) or through the actions of water and time (e.g., limestone). Rocks are basically composed of one massive mineral or simply a mosaic of many.

Weathering: rock surface deterioration caused by various mechanical and chemical processes through in situ influences. Causes are grouped as intrinsic and include characteristics of rock type, permeability, and surface texture, while extrinsic agents represent external or noninherent factors such as sunlight and rainfall.

Erosion: rock surface deterioration and weathering specifically due to the moving action of water and/or wind (e.g., waves, rainfall).

Key Issues/Current Debates/Future Directions/Examples

To understand stone use and treatment, it is crucial to understand their classifications that are based upon their primary environments of formation: heat, water, and pressure. Rocks are divided into three rock types of igneous (primarily fire), sedimentary (primary through secondary deposition), and metamorphic (primarily through heat and/or pressure alteration).

Igneous Rock

These rock materials are often the least likely to deteriorate quickly in art, archaeological, and architectural settings. They typically develop in high-temperature environments (crust, mantle) and are divided into two basic groups: intrusive and extrusive. These rocks are classified based on their formation and composition. *Intrusive rocks* and minerals include those materials that formed in high-temperature settings deep within the Earth or near the Earth's surface (e.g., volcanoes). In general, those rocks forming deep below the surface develop coarse particle sizes (like diamonds and granite), while those forming near the surface have smaller particles. Intrusive stones include granite, gabbro, and porphyry. For example, the stone blocks used to build the site of Machu Picchu (Peru) were cut from granite, while the Pyramids of Giza (Egypt) were originally faced in red granite from Aswan. However, the granite sheets have been robbed over the years leaving the limestone core blocks. The monumental columns of the Pantheon in Rome (Italy) were hewn from granite, while its interior's large circular floor panels were composed of a rare, bloodred porphyry. *Extrusive (or volcanic) rocks* form near or on the Earth's surface and have a fine grain size often as"lava" materials including rhyolite (light colored), andesite (gray, brown), or basalt (dark colored). Volcanic rock may be ejected as well (supercooled) to form igneous glasses like obsidian or scorious (with cavities) materials like pumice. For example, rhyolite (tuff) was used for the popular "peperino" building material in Rome (Italy) and the mo'ai statues of Easter Island (Rapa Nui).

Although all extrusive and intrusive rock materials are found in construction or as artifacts, their overall hardness makes them often difficult to work as structural masonry. However their hardness also makes them resistance to scratching and ideal in adornment, and as small tools.

Sedimentary Rock

These rock materials include some of the most widely used rocks in construction and conservation and include limestone and sandstone. Although most of the Earth's crust is composed of igneous rock, a thin veneer of sediments and sedimentary rock covers most of it. These rocks are formed as layers of crustal sediments become compacted, cemented, and hardened (indurated, lithified). Sedimentary rocks are considered secondary, because they are formed as the result of the accumulation of smaller portions of preexisting rock materials like other sedimentary or igneous and metamorphic rocks. There are three categories of sedimentary rocks that are based upon the type of particle from which it developed. *Clastic* sedimentary rocks are comprised of accumulations of small pieces of broken up rock (or clasts) that have accumulated and lithified over time through compaction and/or cementation. For example, accumulated and cemented beach sand develops into sandstone over time. *Chemical* sedimentary rocks develop when chemically rich water evaporates, leaving floating or dissolved minerals to concentrate. Chemical-type rocks are most prevalent in arid environments where seasonal or ephemeral ponds (playa lakes) develop in closed depressions. For example, salt and gypsum deposits form from repeated flooding and evaporation over long periods. *Organic* sedimentary rocks represent the accumulation of organic debris such as large shells (cochina), fine shell material (chalk), and plant material (coal).

Sedimentary rock materials represent the one of the most widely used building materials and include the limestone blocks of the Pyramids at Giza (Egypt), the carved sandstone Buddha of Leshan (China), and the architecture of Petra (Jordan), the travertine of Saint Peter's Colonnade (Italy), and the elaborately carved salt mine architecture of Wieliczka (Poland).

Metamorphic Rock

From "meta" (change) and "morph" (form), any rock can develop into metamorphic rock

through a change in heat and/or pressure. Over time, with increased pressure, limestone becomes marble, the most popular sculptural and statuary material, and mudstone and shale alter into slate. This change may involve the rock moving into a different environment or the environment changing around the rock material. These recooked and restressed rocks include marble, slate, gneiss, and schist. For example, the Taj Mahal in Agra (India), Il Vittoriale in Rome (Italy), and the US Supreme Court Building (USA) are all constructed of white marble. Other metamorphic building materials are much less common; however, schist, phyllite, and gneiss are used in stone architecture. We must be reminded as well that many rock materials do not confirm to one classification, since the transformation processes may be localized or incomplete. Hence, limestone may have marbleized portions, or granites may have gneissic margins.

Weathering and Deterioration

Since stone materials are so varied in composition, texture, density and integrity, their rates of weathering, influences on weathering, deterioration features, and change in integrity over time are as diverse. So to address stone preservation, one must first examine the broad factors involved in stone deterioration as well.

Weathering is the breakdown of rocks (and minerals, soils, metals, glass, etc.) through the interaction with the atmosphere, climate, biota, and anthropogenic factors (e.g., pollution). The processes of weathering occur in situ and are not to be confused with erosion, which involves deterioration and degradation by influences that involve movement including moving water, wind, ice, and gravity. Weathering is conventionally classified into (a) physical and (b) chemical weathering. *Physical* (or mechanical) weathering involves the breakdown or disintegration of stone through direct contact with climatic influences whereby the weathering by-product is the same as the pre-weathered material. Physical weathering causes the disintegration of rocks without chemical change. For example, freezing water can expand surface cracks in rocks that cause the material to break down and off. *Chemical* weathering, however, involves the breakdown of rock surfaces through chemical reactions influenced directly by the atmosphere, biota, and climate. It is a gradual process as the mineralogy of the stone adjusts to the surface environment and/or to the contact changes (wind, water, humans). New or secondary minerals can develop from the original rock minerals – the processes of oxidation and hydrolysis being the most prevalent. For example, acid rain eroding the surface of a marble statue produces a by-product unlike the pre-weathered rock.

Chemical and physical weathering most often work in tandem. One process is rarely the only weathering agent, but instead, the two influences work together to break down rock material. For example, cracks expanded by physical frost action (cryo-fracturing) will increase the surface area of the weathering rock, exposing more material to chemical reactions and further breakdown. Biologic weathering is a term used for the influence of plants and animals on rock breakdown. Plants and animals may create chemical weathering through release of acidic compounds. For example, lichen overgrowth on rock produces fine roots (rhizines) that physically attach, penetrate, and disaggregate the rock substrate, while oxalic acids released from the lichen roots can chemically deteriorate the substrate as well (Paradise 1997).

Many of Earth's landforms, surface features, and landscapes are the result of weathering processes, in conjunction with erosional forces. In the fields of material conservation/preservation and heritage management, it is imperative that an identification and understanding of weathering and erosional characteristics are addressed before assessment and treatment may be undertaken. Questions as to why sandstone weathers differently than limestone or granite, for example, are crucial in stone conservation and preservation. Hence, a discussion of the diverse weathering influences on the assorted stone materials follows.

Physical weathering phenomena include a number of influences that can degrade the surface of stone, and ultimately lead to decreasing the integrity of the structure as well. *Disaggregation* and *spalling*: in rock materials made up of particles (cochina), minerals (granite), or clasts bound by matrix (sandstone), weathering agents can cause decay through disaggregation. With repeated heating-cooling (thermal stress), and freezing-thawing, the aggregate may loosen from the rock material and fall away, causing surface recession. The expansion of freezing water ($\leq$10 %) may be enough to pry a particle from its substrate. Also, the expansion of a heated surface particle, crystal, or clast may also cause its disaggregation. Disaggregation can be common in environments where temperature ranges are greatest, like deserts. Similarly, salt heaving occurs when salts within or adjacent to the weathering material can migrate (when soluble) into the surface particles to evaporate, crystallize, and expand, causing salt heaving and disaggregation as well. Hydration occurs when rock and minerals expand upon saturation and are pried from the substrate and deterioration as well; this can be a process that involves both physical and chemical weathering processes as well. When rock minerals take up water, the increased volume creates physical stresses within the rock and acts again to pry apart particles, crystals, and rock materials.

Since some rock materials (e.g., sandstone, granite) formed deep below the Earth's surface, when erosion and/or uplift exposes them, this removal of overburden represents a huge decrease in material pressure. Hence, the material will expand causing small (micron) to moderate (centimeter) fractures to develop. This "unloading" can cause large-scale surface deterioration and structural damage through sheeting, peeling, and spalling (Smith & Warke 1996).

Chemical weathering influences include a number of influences that can deteriorate the surface of stone, leading to overall deterioration, surface recession, and damage as well. *Dissolution and hydrolysis* is the weathering process whereby acidic solutions (e.g., acid rain, groundwater) degrade rock material through the acidic breakdown of some rocks (e.g., limestone, marble) and minerals. Hydration is a chemical process, for example, when iron oxides change to iron hydroxides and the hydration of anhydrite forms gypsum. Hydrolysis commonly affects silicate (e.g., arenite) and carbonate minerals in rock (e.g., limestone). For example, water can ionize/acidify to react with silicate minerals resulting in the dissolution of the original mineral. *Oxidation* typically involves the transformation of metals and metallic components. In stone, the most process involves the oxidation of iron or copper through the combination of water and oxygen. This change to iron or copper oxides produces a rust-like stain in iron from the development of new minerals like hematite and limonite or a green stain (verdigris) in copper with the transformation into new minerals like chalcopyrite. This rusting or verdigris decreases the overall rock integrity and hardness.

Conservation, Applications, and Treatments

Contemporary conservation efforts now often examine and monitor deterioration influences and conservation at four different scales: (a) molecular material scales (e.g., microscopic examinations: submillimeter), (b) surface material scales (e.g., rock surface detail: millimeter-centimeter), (c) structural levels (e.g., for partial restoration of a temple: centimeter-meter), and at (d) the broadest urban/regional scales (e.g., classical period city reconstruction: meter-kilometer). All examination, conservation, and monitoring levels must address both extrinsic (i.e., climate, humans) and intrinsic (i.e., stone composition, integrity) influences on stone deterioration, so the techniques used in their conservation must affect these factors directly. Conservation procedures can then (1) reduce material susceptibility to weathering and erosion forces and/or (2) increase its resistance to them. At many sensitive sites like Petra (Jordan) or Machu Picchu (Peru), extrinsic deterioration factors such as human touching, climbing, and treading; may be diminished simply through enforced policies that either prohibit or require certain aspects of behavior: banning entrance and prohibiting climbing, or simply climbing over, on

or near sensitive materials and sites. These simple policies have proved effective in decreasing deterioration including human-induced abrasion and humidity shifts (from respiration, perspiration, and transpiration). Such restrictions may act not only to decrease overall stone weathering and erosion but to also create a sense of patrimony and caring among visitors to these sites. Understanding that all people are a part of our Earth's patrimony, protection and salvation may in fact instill a sense of legacy and heritage – a more pervasive conservation concept.

In addition to policies related to restricting or facilitating behavior, the first step in effective stone conservation and material/structural maintenance involves the removal of salts (efflorescence), plants, and lichens from the surface, whereby their removal, in many cases, can decrease the rate of erosion and weathering. New applications are now being tested (e.g., "cocoons") where a thick poultice is applied to the stone surface to absorb salts and particulates, so that upon their removal, surface pollutants and salts are removed as well. However, early tests have indicated that some of the stone substrate is also removed – a dangerous and detrimental circumstance in stone conservation practices; however, the technique shows great promise.

Once the deteriorating materials have been appropriately cleaned, the use of surface consolidants is increasingly conventional in strengthening stone integrity and fabric. Conservation methods and application are meant to address the influences of intrinsic weaknesses that can accelerate rock weathering and erosion. Over the millennia, on rock and mineral structures, artwork, and monuments, liquids and waxes have been applied in the hopes that disaggregation can be controlled through the better adherence of the components of the stone materials. Vitruvius (15 BCE) described the use of beeswax as a means of consolidating and waterproofing stone, and similar applications have been tried since. These organic applications are increasingly rare; however, inorganic washes such as calcium carbonate plaster and slurry were also widely used then and now. In fact, in sensitive stone materials like Petra's sandstones, plaster applications (for consolidation and/or fresco overlay) were widely applied and are still visible today on chamber walls, façades, couloirs, and staircases, where the carbonate coating has been protected from the destructive influences of sunlight, extreme temperature cycles, touching, precipitation, and woodfire sooting (Paradise 2011).

Contemporary stone surface and near-surface consolidants are categorized as synthetic (organic) polymers, silanes (alkoxy), epoxies, and waxes. Early experimental trials from the 1970s utilizing polymer consolidants (i.e., Paraloid©) are still often evident on limestone and sandstone applications across Asia, Europe, and the Mediterranean (Wheeler et al 1984). Organic resins are typically irretrievable, and over time, they tend to discolor, bleach, and peel.

Silane applications have been used since 1980s (e.g., Wacker OH©) and are organosilicon compounds that permeate the voids in stone (e.g., sandstone), strengthening its mineral fabric and decreasing its overall permeability (and active porosity) by creating a silica gel that fills the voids, binds the clasts, and "waterproofs" the stone. Silane applications have proven to be effective consolidating agents when the whole object may be immersed so that the solutions may penetrate all portions of the sandstone in question, such as a statue. However, when applied to stone such as sandstone in situ, like the façade of a monument, variability in penetration depths and coverage permits moisture to become trapped or enter and mobilize behind the silica skins. Once this occurs, rather than the normal disaggregation of the clast from the rock, spalling and sheet collapse can occur. The results of silane use in conservation will either represent an exemplary warning against future use or an excellent model for continued applications on important deteriorating stone architecture (Paradise 2011).

Overall, the field of rock weathering and stone conservation is relatively new, and theoretical research and applied innovation will continue to help us to more effectively and

efficiently protect our stone cultural heritage. Since our architectural and archaeological rock and mineral materials are so diverse, treatments and applications used to decrease their weathering and deterioration must also be as varied. So as research and technology grows and develops, our ability to preserve our precious past will grow, and our stone heritage will remain for us to experience and cherish longer and longer.

Cross-References

- ▶ Bamiyan Buddhas
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation, Restoration, and Preservation in Classical Archaeology
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ Geoglyphs
- ▶ Glass: Conservation and Preservation
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Karstic Landscapes: Geoarchaeology
- ▶ Mosaics: Conservation and Preservation
- ▶ Preservation Paradigm in Heritage Management
- ▶ Rock Art, Forms of
- ▶ Rock Art Sites: Management and Conservation
- ▶ Stone Treatments in Archaeological Conservation and Preservation
- ▶ Valcamonica Rock Art
- ▶ Volcanic Activity

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Strategic Environmental Archaeology Database (SEAD)

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Introduction

Environmental archaeology encompasses a wide range of scientific methods for analyzing the results of past human activities, environments, climates, and, perhaps most importantly, the relationships between these. Many of these methods are referred to as *proxy analyses*, denoting the illumination of the past as interpreted through the evidence of fossil organisms or properties. These lines of evidence, or proxy data sources, are assumed to reflect past conditions by way of their dependence on them. For example, crops will only grow within a specific climate range; organic waste will lead to increased soil phosphate levels, and burning increases magnetic susceptibility. While it is easier to store, manage, and analyze the data produced by these methods

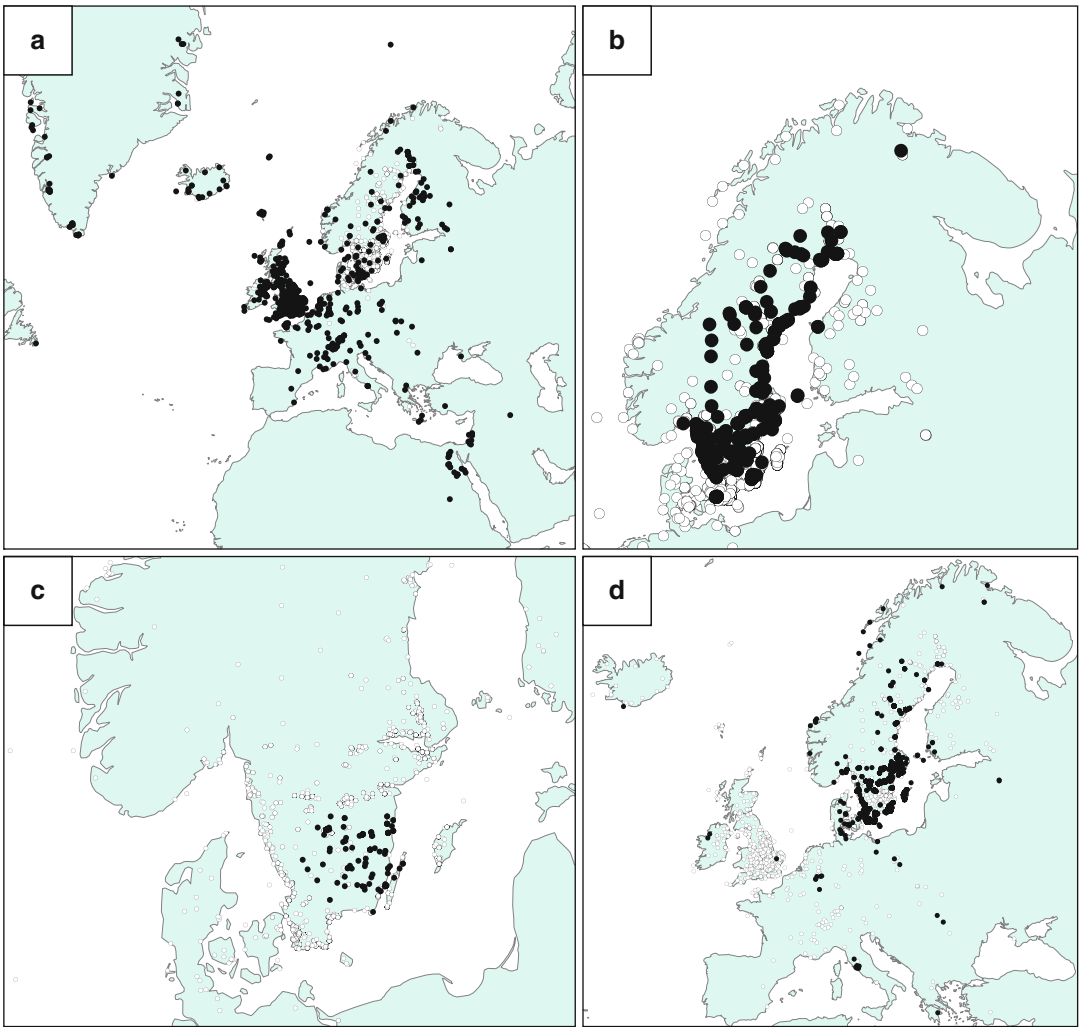

Strategic Environmental Archaeology Database (SEAD), Fig. 1 Geographical location of sites stored in SEAD (as of 27 May 2012), categorized by data source a) BugsCEP b) MAL c) Dendro (pilot project) and d) Ceramics (see Table 2). Black dots indicate sites from each data source and white dots the entire database. Individual sites may include several proxies or multiple variables for any proxy

individually, there is much to be gained from multi-proxy integration at the raw data level. Despite this methodological diversity, the common factors of space, time, and context allow us to compare and integrate the results of analyses. This is, however, easier said than done, and without efficient data handling systems, the data rapidly become unmanageable. SEAD represents one solution to this problem and forms a node in an international web of open-access paleoenvironmental and archaeological databases which are driving archaeological science into new realms of more complex, multi-site, multi-proxy analyses and meta-analyses. This entry sets out to describe the system, the scientific implications of which are covered in Buckland et al. (2010) (Fig. 1).

SEAD is interfaced by either a downloadable software package, for data management, or an online-faceted browser system (Fig. 2) with analysis add-ons (SEAD 2012). The browser facilitates multiple-angle research in that it can

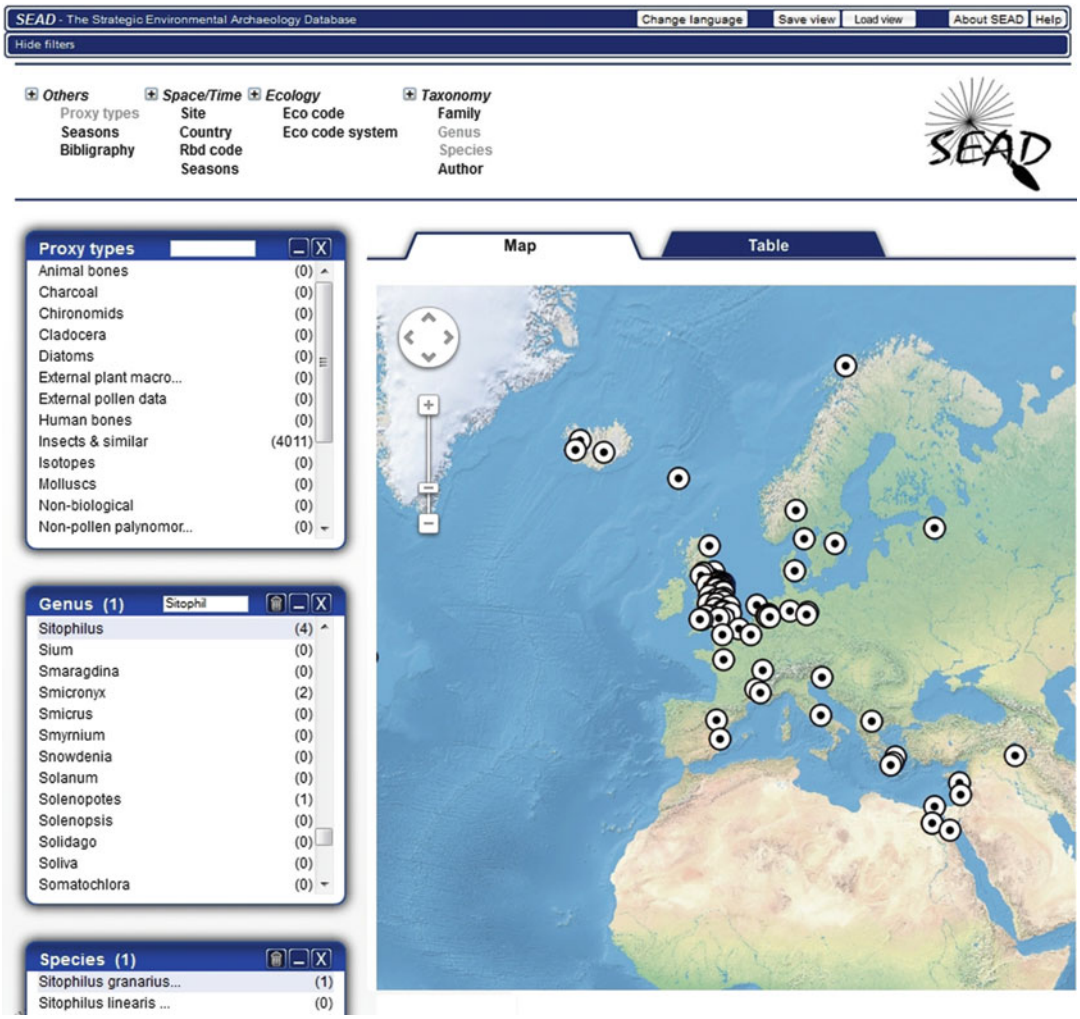

Strategic Environmental Archaeology Database (SEAD), Fig. 2 The SEAD online-faceted browser, QSEAD. Available filters (facets) are labeled across the top of the window. Clicking on a label makes the filter available on the left, showing the available content for (multi-)selection. In this example three filters have been activated: proxy type, genus and species. The items Insects and similar, *Sitophilus* and *Sitophilus granarius* have been selected in the respective filters. The map on the right shows the resulting distribution of sites from which the species has been found. Dating and quantitative value filters are also planned. (Base maps made with Natural Earth)

be ignorant of the origin of datasets. In other words, a user may ask for all incidences of a species (e.g., *Sitophilus granaries* in the right panel of Fig. 3) and retrieve data from multiple investigations. The user may then narrow their search geographically or chronologically, expand by adding other taxa or even soil properties, or just export the data, which is fully referenced. The same browser allows the user to interrogate the data from other angles, such as ecology or through the bibliography, for example. The ecology angle is potentially very powerful, in that it allows rapid visualization of sites where the specific environments/habitats are represented, and thus verges on advanced GIS capabilities. The power of this system derives partly from a flexible query engine, designed at HUMlab in Umeå, and partly from the relational

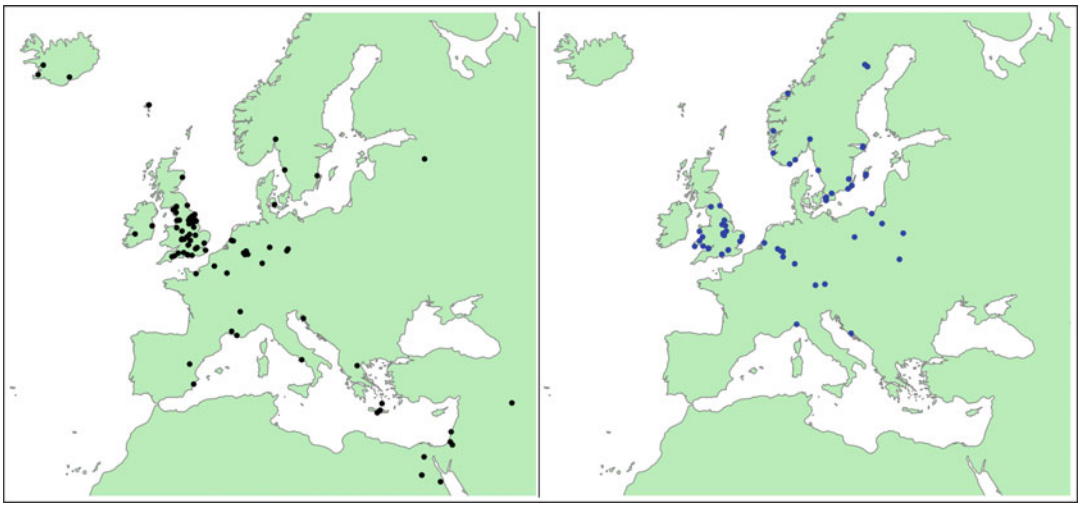

Strategic Environmental Archaeology Database (SEAD), Fig. 3 Fossil and modern distribution of the grain weevil *Sitophilus granarius*, extracted from SEAD (*left*) and GBIF (*right*), respectively, on 29 May 2012. Note that the maps essentially only illustrate the extent of the paleoentomological and entomological record in the databases and not the full extent of the species' distribution (Biodiversity occurrence data from GBIF extracted from portal resources 13289, 7856, 1451, 1454, 693, 12469, 1875, 13690, 13484, 13718, 1477, 14106, 13698, 13777, 11890, 11879, 11872, 12727, 11858, 11927, 12726, 12729, 11900, 1428, 12799, 11569, 11833, 8401; see the *Sitophilus granarius* entry in the BugsCEP database for full data provider list for the fossil record)

database structure which allows intuitive cross-querying between the smallest divisible data entities.

Definition

The Strategic Environmental Archaeology Database (Buckland et al. 2010; SEAD 2012) is a resource for the archiving, management, analysis, and dissemination of environmental archaeology and Quaternary science data. The database covers a large number of proxy data sources, ranging from beetles and dendrochronology to ceramic thin sections and ^{14}C dating (Table 1). It is an open-access project, initially financed by the Swedish Research Council and Umeå University, Sweden, with sub-projects funded by Lund University. The system provides unrestricted access to raw data from archaeological and Quaternary science investigations and has technically no geographical or chronological limits. Although its scope is international, SEAD is registered as a national research infrastructure at both the Swedish National Data Service (SND 2012) and Environment Climate Data Sweden (ECDS 2012). This dual registration reflects the resource's multidisciplinary nature, and the project aims to encourage, support, and empower research that transgresses traditional disciplinary boundaries, just as the data do.

Key Issues

Relating Archaeological and Environmental Data

An essential capacity of an environmental archaeology database is the capability for storing metadata which allows the user to relate sample data and results to the archaeological features from which they are derived. SEAD is not an excavation database and stores only enough information as necessary to locate a sample in an archaeological plan or report. While excavations databases commonly allow the logging of sample names, locations, and purposes (e.g., macrofossil sample, ^{14}C sample), they are

Strategic Environmental Archaeology Database (SEAD), Table 1 Scope of the proxy data currently stored in SEAD as well as potential for expansion and limits. At the time of writing, SEAD contains approximately 1,670 sites from four data sources (Table 2 and Fig. 1), each of which is continually being updated

Proxy data sources	
Biological proxies	*Current:* Insects/arthropods, plant macrofossils, pollen (13 758 taxa) *Future:* Any organism or pseudotaxon can be added to the taxonomic list *Exceptions:* Osteological material, which may be better catered for in other systems (e.g., Neotoma 2009)
Geoarchaeology	*Current:* Soil chemistry (pH, phosphates) and physical properties (conductivity, organic content, color) *Future:* Any quantified or qualified chemical or physical property can be stored *Exceptions:* Spectroscopic data
Ceramics	*Current:* Thin section quantification and properties *Exceptions:* Spectroscopic data
Dendrochronology	*Current:* Support data, historical building metadata, sampling location
Methods	Detailed descriptions and references are stored for all methods (e.g., preparation methods, dating methods, analysis methods)
Dating evidence	
Scope	*Current:* ^{14}C and other radiometric methods, dendrochronology, archaeological typological dates, period classifications, calendar dates and ranges *Future:* Any method and period systems compatible with the current structure
Chronological extent	Theoretically unlimited, but current data range from 2.4 MyBP to present day
Bibliographic data	
References	May be linked to site, sample group, sample and dataset levels as well as to methods, ecological codes, and more
Modern reference data	
Abstracted text	*Current:* Insect habitats and distributions, abstracted from trusted sources, with citations *Future:* Any amount of abstracted text-citation couplets may be entered for a taxon
Coded descriptors or classifications	*Current:* Insect ecology (coded and abstracted texts) *Future:* Any taxon may be classified according to any number of user-defined ecology coding systems. This concept could be extended to cultural classifications (e.g., ethnobotany)
Climate	*Current:* Beetle Mutual Climatic Range (MCR) temperature reference data (see Buckland et al. 2010) *Future:* MCR, or potentially other types of climate reference data, for more insect species and plants
Locational data	
Coordinates	Three dimensional at site, sample group, and sample levels (latitude, longitude, altitude, and project survey grids). Capacity for national grid-based storage
Geographical extent	Mainly European but potentially global
Archaeological data	
	Current: Site, feature, and sample metadata to allow correlation between environmental and archaeological or lithology datasets. Any number of features can be added, and they may be given multiple names (e.g., field label, lab number, museum number). Descriptive information may also be added for structures and ceramics as required *Exceptions:* Coordinates can be stored for samples or groups of samples but not features

generally not designed to hold the results of any analyses. Similarly, archaeological sites and monuments records (e.g., the Swedish FMIS), archiving systems (e.g., the UK's ADS), and inter-archiving portals (e.g., Europeana) do not as yet explicitly store sample metadata, environmental data, or results in a cross-queryable form. However, some systems, such as ADS, do store or link to a number of reports which do hold these data. As well as catering for multiple sample names (e.g., field number, museum number, lab reference), SEAD provides

Strategic Environmental Archaeology Database (SEAD), Table 2 Initial data sources ingested into SEAD. Sites with locational data are plotted in Fig. 1

Current source databases (but no limits to submissions)	
BugsCEP	Bugs Coleopteran Ecology Package database http://www.bugscep.com Buckland & Buckland 2006 See also Buckland et al. 2010
MAL	Environmental Archaeology Lab, Umeå http://www.idesam.umu.se/english/mal/
Dendro	National Laboratory for Wood Anatomy and Dendrochronology, Lund http://www.geol.lu.se/dendro/
Ceramics	National Laboratory for Ceramic Research, Lund http://www.geol.lu.se/kfl/

multiple levels of metadata storage for archaeological features, contexts, and objects. Due to the multi-subject scope of the system, this has had to be flexibly implemented with sets of tables for free text descriptions which are defined by selection from list of predefined types (to which advanced users can add). This also allows for some level of interpreted data into the sample and sample group metadata, setting the context for the environmental data independently of external sources (Table 3).

Taxonomies

One problem with international databases is maintaining consistency of taxonomic records and providing lists of species in taxonomic order when required. SEAD's approach is to provide a taxonomic master list which allows the entry of any taxon, providing it is approved by the clearing house (see below), as well as synonyms and multiple taxonomic ordering systems. This allows, for example, a species which is present in both the British and North American beetle catalogues to be stored, with the lists having their own exclusive content. If data are entered using a taxonomic list which has water beetles after ground beetles, rather than before, then separate taxonomic coding systems can be implemented to provide for the differences. In such an event, the difficult task is defining the coding system rather than making it fit into the database.

Strategic Environmental Archaeology Database (SEAD), Table 3 Samples and groups of samples can be assigned descriptive metadata of specific types, to help relate them to excavation (field or report) or antiquarian objects. This capacity also provides key data for inter-archive linking. Multiple samples can come from the same feature, and in some cases, where the stratigraphy is complex or has been revised, a sample can come from multiple features. Two examples are provided below

Data context	Field	Data
Archaeological	Feature type	Hearth
	Feature type description	Feature with evidence of burning, the base of a fireplace, probably used for cooking, heating, or metallurgy
	Feature name	H1
	Feature description	Sami hearth at top of ridge
Dendrochronological: building antiquities	Object description type	Building category
	Object description	Secular
	Object description type	Building category
	Object description	Residential building
	Object description type	Building function
	Object description	Mångårdsbyggnad
	Object description type	Building function
	Object description	Two floor

Open Access and Datasets

SEAD is committed to open access and transparency, with all datasets being uniquely identified so that updates can be traced. This allows a user to see exactly on which datasets, and which versions of the datasets, analyses have been performed. It allows future users to redo old analyses with new data and allows for

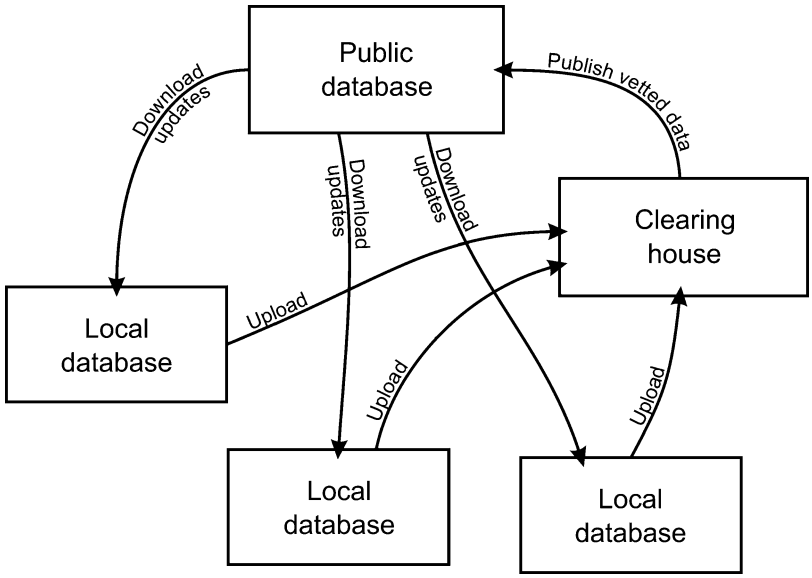

Strategic Environmental Archaeology Database (SEAD), Fig. 4 Three-tier data management system for entry, clearing, and publication

a transparent reproducibility of any analyses using the database. All data are also attributed to their authors, the originating publications, and source databases or archives and released under Creative Commons licensing (http://creativecommons.org/). The SEAD software will also be released under the GPLv2 with classpath exception licensing system (http://netbeans.org/gplv2-faqs.html for information about classpath exception) so that others may easily expand on the original development work.

Three-Tier Data Entry, Clearing House, and Synchronization

Standard data entry is performed through the downloadable SEAD application, which essentially duplicates the public database on the user's desktop, and initially stores newly entered data locally. The local database may be updated to the latest available public data at any time, and users may choose to submit their own data at will. This flexible synchronization system allows work in progress to be kept private while the user has access to the latest public database and can thus analyze their data in the context of the latest global results. Prior to public release, submitted datasets and accompanying metadata are sent to a clearing house for quality assurance. The clearing house vets the data for mistakes, questionable values, duplications, and missing metadata, in dialogue with the submitting user, and finally makes it available online. These three activities, data entry, clearing, and publication (Fig. 4), are performed in the same downloadable software, removing the need for the understanding of complex data structures at all but the developer levels.

Related Systems and Collaboration

The development of SEAD was initiated at the Environmental Archaeology Lab (MAL) and implemented in collaboration with the Humanities Computing Lab (HUMlab), at Umeå University. The database design and user requirements were outlined primarily in discussions with MAL's research network partners and benefitted considerably from close communication with the BugsCEP (Buckland & Buckland 2006) and Neotoma (2009) projects. Discussions and skills sharing between these projects have ensured compatibility between the databases and will help to ensure the efficient use of public funds by negating the inevitable re-inventing of the wheel when similar projects run independently. A dialogue is also maintained with a number of local or regional database projects and archive centers, especially the UK's ADS and the Swedish SND and ECDS, as well as the archaeological community at large.

The Swedish National Archaeological Resource labs for dendrochronology and ceramics, in Lund, joined the project in 2011 and expanded the scope beyond the original design sketches. After some database redesign, this enabled the entry of large amounts of thin section ceramics data and initial test datasets of dendrochronological data from archaeological and building heritage management sites. Discussions are also currently underway to ensure compatibility with and promote the joint use of the Swedish National Heritage Board's databases and online services, especially the sites and monuments records (FMIS 2012).

SEAD's focus is on environmental archaeology data in its broadest definition, including the ecological and archaeological reference data which are necessary for its interpretation. Where the latter are outside of the scope of SEAD (e.g., detailed excavation data, modern species distributions point data), it must provide sufficient metadata for a user or inter-archive system to form the appropriate links. In this respect, all archaeological and biological repositories could be seen as related systems, and the SEAD team engages in continual dialogue with a number of these. In particular, discussions on design, compatibility, and research opportunities have been ongoing with the European Pollen Database (EPD 2009), the Archaeobotanical Computer Database (ABCD 2009), and the Irish Archaeological wood and charcoal database (WODAN 2009) (see http://sead.se/collaboration/ for more details).

At the time of writing, there are few databases available with a similar multi-proxy, multi-site range to SEAD. Neotoma (Neotoma 2009) is perhaps the closest, the primary differences being that Neotoma is perhaps more orientated towards Quaternary geology than archaeology (although it caters for the latter admirably), and it does not currently aim to store modern reference data to the same extent as SEAD does. However, Neotoma can store coded habitat data, giving a similar functionality to SEAD's habitat summarizing capacity. Neotoma is also able to plot pollen diagrams and age-depth curves online, something which SEAD is not yet capable of doing. The US-based Digital Archaeological Record (tDAR 2012) also overlaps the scope of SEAD to an extent, providing an excellent and well-supported infrastructure for archaeological data with the facility for storing environmental archaeology results. tDAR is perhaps, at least at the moment, more orientated towards project/site archiving than site-independent and inter-site analyses than SEAD. Both Neotoma and tDAR feature advanced interfaces for data management and data interrogation, but without the flexibility of faceted browsing.

Future Directions

While an increasingly large number of archaeological, paleoclimatological, and paleoenvironmental research projects include multiple proxies, these are often interpreted independently. By providing a proxy-independent querying system and data aggregation tools, it is hoped that SEAD will allow for a more integrated approach to environmental reconstruction, especially on the multi-site. In the future, it may not be regarded as a problem when proxy sources do not agree with each other, but rather an opportunity to explore the diversity of real systems.

Databases gain more power through linking, and the ability to simultaneously interrogate both modern and fossil biodiversity data would be a powerful tool for understanding modern distribution patterns and faunal origins and provide key data for predicting the impacts of future climate and environmental change. Closer cooperation with biodiversity portals is therefore desirable, an ideal situation being that international maps of fossil and modern species distributions could be overlain. Unfortunately, the resolution of the data in these systems is as yet too poor to be of use in paleoenvironmental reconstruction (Fig. 3). Many national archives (e.g., Artdatabanken 2012; BRC 2012), however, may hold appropriate raw data which is in the process of being uploaded to international portals such as the Global Biodiversity Information Facility (GBIF 2012). Biodiversity and environmental change cannot realistically be

investigated without reference to human, and thus archaeological, impacts on the landscape. Paleoenvironmental databases and the software for interacting with them are therefore becoming key components in the process of integrating the wide range of fields required to effectively study these issues (e.g., Brewer et al. 2012).

SEAD is intended to be an international resource for any science where paleoenvironmental or paleoclimatic data are of interest. The project aims to not only to become an established archive for these data but also provide a set of well-respected online tools for their analysis and prove instrumental in the development of new theories and methods for examining past climates, environments, and human activities. In order to achieve these goals, SEAD needs users, and it is hoped that the project's open-access policies, along with large database and efficient tools, will encourage a broad and productive audience. The SEAD team and its partners are actively committed to seeking funding and collaboration for projects where the system is either used as an archive or analysis tool, as well as developing the existing tools further. SEAD's initial development phase ends in 2013, after which it will enter routine management phase where data entry, support, and quality assurance are prioritized over development. Further development projects are planned, however, primarily orientated towards the development of advanced online tools, teaching tools, inter-archive connectivity, and Arctic archaeology and cultural heritage.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Archaeology Data Service (ADS)
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology
- ▶ Paleoethnobotany
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data

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SEAD related publications will be made available at http://sead.se/publications/index.html.

Stratigraphy in Archaeology: A Brief History

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Introduction

The story told here is a summary of some of the actions that gave form to the scientific field that is archaeological stratigraphy. A story whose true nature lies latent, overlaid by a superficial enumeration of chronological dates, superimposed and outdated by social events, an encyclopedic history records the process of development of the current use of stratigraphy in the majority of archaeological investigations. The reading of this history should be viewed from two perspectives which crosscut this narrative. The first relates to the numerous conflicts that reflect a criticism of modern science. The second refers to a history of excavation techniques that define a decisive point in the scientific nature of archaeological practice.

Historical Background

In the seventeenth-century Europe, a uniformitarian vision of Earth's geological history gave rise to the argument that stratigraphy could be explained from principles of superpositioning and chronology, from types of sediment and forms of strata, or through association with fossil remains. This was a naturalistic model of stratigraphy, which gained strength halfway through the nineteenth century when Lyell proposed his methodology for determining the relative sequence of geological strata based on the study of its fossil remains. After this, European archaeology appropriated the model in order to date archaeological strata by the types of products they contained, treating certain diagnostic artifacts as *guide fossils* (Carandini 1997; Roskams 2003). (There are two exceptions to this statement: (1) Towards the end of the eighteenth century, Jefferson (the North American President) is

purported to be among the first to use a stratigraphic view in an archaeological context, in reference to a funerary mound (Wheeler 1995 [1954]); and (2) in an 1816 publication, Smith announces the stratigraphic ordering of fossils according to the strata they belonged to, carried out in excavations in the south of Great Britain, using the term "*stratum*" for the first time (Harris 1991; Wheeler 1995 [1954]).) In that context the meaning of stratigraphy was related to chronological problems in the historical and evolutionary interpretation of prehistory. In the dawn of the twentieth century, all of these ideas crossed the Atlantic, particularly to North America and Mexico, forming the basis by which stratigraphy would be conceptualized as a modern excavation method that would facilitate temporal interpretation and assignation; for many, this meant a revolution in the archaeological vision of the past, arguing in favor of the first New Archaeology (Browman & Givens 1996; Lyman & O'Brian 1999; Schávelzon 1999).

From these first events, the study of stratigraphy in archaeological deposits would always be dominated by both a naturalist vision oriented by the sedimentary content and an instrumentalist vision using it as an excavation technique. Both perspectives were based on a single naturalist-instrumental strategy, in which the use of stratigraphy in archaeological contexts is justified as the only way to build an objective historical scientific knowledge of the past.

To better understand this historical view of stratigraphy, this entry will outline three distinct schools of thought. The first is linked to archaeology's initial approaches towards introducing the study of stratigraphy: a distinctive vertical observation of the past, associated with particular excavation techniques. The second corresponds to the vision of geoarchaeology, which favors the *sedimentary content* of stratigraphy. And, finally, the third is generated from the perspectives of Wheeler and Harris around the study of *interfacial forms and stratigraphic relationships*. In all these, stratigraphy is perceived as representing a temporal metaphor for building archaeological chronologies, regardless of the subject matter used in those sequences (set of artifacts, sediments and interfaces). (The order of these three currents of thought is not a precise temporal sequence, seeing the proposals of Wheeler as contemporary with the perspectives of the first trend and the proposals of Harris as on par with those of geoarchaeology. Nonetheless, each of the three conceptions has their temporal and geographic reference point: the first began towards the end of the nineteenth century, waning halfway through the twentieth century; at first it flourished in Europe but was methodically instituted into the American scene. The second train of thought was established in North America and was becoming known at the start of the 1960s; and the third current occurred in the United Kingdom in the middle of the twentieth century. Development of the last two ideas occurred unevenly in different parts of the world (the Harris Method excelled in the European continent and certain parts of Asia, while geoarchaeology spread across the American continent), and they spread as opposing points of view relative to each other, a position which continues to this day (Waters 1992; Holliday 1992; Harris et al. 1993; O'Brian et al. 2005)).

Key Issues/Current Debates

Verticality

Stratigraphy rapidly came to be associated with the theory of the linear evolution of species, marked by the fossils, which meant interpreting the archaeological discoveries contained in the strata as belonging to distinct stages of human evolutionary development. This perspective was strongly criticized in North America by historical particularism, especially for its use of stratigraphy as evidence for the progress from primitivism to civilized phases. The debate turned on whether the stratigraphic succession of archaeological discoveries reflected stages of evolutionary development, but the criticisms and queries were not directed at the evolutionary model but at its application in case studies in North America (Lyman & O'Brian 1999; O'Brian et al. 2005). This was a transition period for the strategies and modes of field work, in which importance was

being placed on the context of the discoveries (the deposit, the stratum, the cap, the bed, the arbitrary cut), and not just the providing of samples intended for museums (Lucas 2001; Roskams 2003). In Europe, the meaning of context was related to problems of the interpretation of prehistory (Carandini 1997); while across the Atlantic, in North America and Mexico, it was related to an excavation system which gave scientific validity to the explanations of archaeologists (Browman & Givens 1996; Schávelzon 1999). (The considerations of Pitt-Rivers and Petrie are also pertinent. Their work in Europe and the Middle East stimulated interest in America concerning a sectioning method which would consist of excavating trenches on archaeological sites following arbitrary levels; the recovery of artifacts, innovating a three-dimensional recording method for each discovery and positioning them in projection and in profile in the drawings; and the construction of typologies using seriation (Lucas 2001).) It was in this latter research area that stratigraphy was thought of as an analytical tool for an archaeological method and as such there was a gradual awareness of a change in the techniques for excavating stratified deposits.

The study of stratigraphy was introduced by observing the profiles exposed on the walls of excavated trenches or vertical columns of sediment (sample cores). From diagrams of those profiles, the content was observed by levels, interpreting similarities and differences in the overlaying of objects, fossils, and strata. The aim of these observations was to specify the chronological bearing of archaeological cultures in sequences of horizons, but they did not focus on questions of cultural change (Lyman & O'Brian 1999). Stratigraphy was identified with a structure of simple vertical units, from which discoveries were perceived between vertical limits given by discrete and real entities (arbitrary levels or natural strata), rather than from a possible fortuitous cause of sedimentation. These vertical units were not considered geological, but were used as units of archaeological deposition that were incorporated into a time line of the history of the site. In particular, stratigraphy was thought of as an analytical tool from which inferences were obtained once excavation is finished; it consisted of post-excavation observations or ex post facto interpretations, where the reading of stratigraphic profiles confirmed data from the excavation. From this point the systematic incorporation of stratigraphic method into field practices was instituted (Praetzellis 1993; Browman & Givens 1996; Lyman & O'Brian 1999; Schávelzon 1999), signaling the metaphorical use of stratigraphy to represent the passing of time in the constructive history of an archaeological site. But paradoxically this vertical vision of stratigraphy was not sustained by any stratigraphic excavation. (The excavation technique associated with this stratigraphic view was founded on an arbitrary strategy defined by metered levels of a predetermined thickness. The objective was to identify the different depths of the artifacts, without depending on any distinction associated with observation of the caps or the strata during the excavation. In opposition to [this] strong emphasis on the metric [measured], another excavation technique was proposed which consisted of dividing the deposits according to the natural strata that constitute it, such as sand, ashes, gravel, and other types (Praetzellis 1993; D'Amore 2002)).

The vertical view of the stratigraphic superposition was verified and reinforced by diagnostic chronological sequences of pottery groups, developed using the seriation technique applied to data obtained from excavations (Praetzellis 1993). The seriation of ceramic styles was considered a form of stratigraphic vision (e.g., in the proposals of Kidder; O'Brian et al. 2005), but the vertical vision of the profile and the horizontal vision of the excavation remained separate instances of interpretation. All this simplified the idea of stratigraphy to the superpositioning of artifacts and, principally, to a visible, analytical superpositioning related to the requirements demanded of archaeology as a positivist science: to resolve questions of diachrony and cultural change.

The use of the notion *cultural stratigraphy*, which defined an arbitrary stratigraphy of occupation phases and cultural components, was associated with the term *stratification* without

considering the stratigraphic superposition relationships. The process by which the physical structure of a site is separated and organized in strata or caps, horizontal cuts of a predetermined thickness, was not found to have an analytical correlation with the term *stratigraphy*, which would be the interpretation of the deposition sequence and of the stratigraphic relationships of superpositioned strata (D'Amore 2002). This methodological tendency created a permanent conflict by separating into two analyses that which would be only one field of study (superposition relationships). Despite the many complications of these instrumental and naturalistic representational proposals concerning stratigraphy, it was from both its criticisms and the truths attributed to it that a foundation was laid for the later theoretical and methodological premises of two subsequent schools of thought. In this way, the concept of stratigraphy was gradually introduced in relation to its content, but only because of its archaeological or cultural inclusions, and not the contents of the sediment or any other operative entity such as the stratum, coating, or facies. (Maybe an exception would be the idea of sedimentary content that was held in the cases that came from an artificial excavation through natural layers).

Content

In its opposition to historical–cultural procedures, processual archaeology disregarded archaeological stratigraphy (O'Brian et al. 2005). So that, fearful of once more creating a mistaken and hasty causal relationship between sediment and culture, it resolved to incorporate geology in an interdisciplinary way, in order to take care of the excavation sediments, on the one hand, and the explanations of cultural processes in the dynamics of the past on the other (Lyman & O'Brian 1999; O'Brian et al. 2005). In this intellectual context, oriented by an ecological, geographical, and environmental perspective, geoarchaeology was shaped. A subdiscipline viewed the archaeological record as a natural deposit that incorporates, in its sedimentary matrix, the cultural material of successive past human occupations (Butzer 1989 [1982]; Waters 1992); and it raised awareness of a new way to explain the contextual association of sedimentary particulates in archaeological deposits (Stein 1987). (This arises from the uniformitarian premise that the archaeological record has been formed by the same processes that molded the natural landscape (Butzer 1989 [1982]; Holliday 1992; Waters 1992, Waters & Kuehn 1996). The idea beneath this logic is the following: the terrestrial landscape changes constantly, but the laws of physics and chemistry that govern the processes are immutable over time. This uniformitarian principle is based on the interpretation that those absolute processes produce uniform attributes in past, present, and future strata. Sedimentology presupposes that one can reconstruct the processes that formed ancient sediments, because the forces they are subjected to in the present operated just as uniformly in the past (gravity, thermodynamics, fluid dynamics)).

The unit of analysis was the sediment, which is incorporated through the study of the sedimentary particulates, arising from the sedimentological vision of geology. The stratigraphic interpretation is fixed in a rigorous objective description of the differences in sedimentary content of the archaeological site deposits; it consisted of a sedimentological study that based itself in nomenclatures of geological stratigraphy (Gasche & Tunca 1983; Farrand 1984; Stein 1987). The formation of archaeological sediments is thus reduced to the study of human impact over natural soil formation (Butzer 1989 [1982]; Holliday 1992; French 2003). From the depositional study of sediments (sedimentology) and postdepositional study given for soil formation (pedology) comes the interpretation of the stratigraphy of an archaeological deposit (Holliday 1992; Waters 1992). The stratigraphy of an archaeological site was understood to be constituted of cultural remains (surfaces of occupation) buried by a sedimentation that was, almost always, considered natural (burial between high and low rates of natural sedimentation). Consequently, the archaeological record is found preserved in a stratification of rock sediments (lithostratigraphy), in a soil or paleosoil horizon (pedostratigraphic unit), and

also sedimented between the contact of a sediment and the surface of a soil (Waters 1992; French 2003). In this specialized literature, stratigraphy had a secondary application, complementary to sedimentology, where the key was explaining an archaeological site's sedimentation through evidence derived from the geomorphological formation of the landscape where the human settlement was located.

The program of geoarchaeological study was supported by objectives postulated by Schiffer (1987) to investigate processes of formation, preservation, and destruction of archaeological sites: the study of the physical and chemical properties of the soils and sediments, incorporation of ethnographic and comparative studies of modern sedimentary deposits, and the study obtained by experimental replication of sedimentary processes. The driving importance of formation processes meant that geoarchaeology would concentrate on examining the formation of artifact content in the archaeological record, as regards the N (natural) transformations (Stein 1992, 2001). (Compression of the postdepositional processes of formation centers on environmental modifications to the archaeological remains, as defined by dispersion before burial, the postdepositional alteration, the geochemical modification, and even as far as processes that totally destroy the archaeological site. Within the range of site formation processes are included the geomorphological processes of the Late Quaternary associated with changes in the landscape that significantly altered or preserved, spatially or temporally, the archaeological record's evidence of human occupancy (Waters & Kuehn 1996).) From there followed an emphasis on relating a history of human interaction with the environment, to explain economic and ecological behaviors between episodes of environmental fluctuation. (This was the aim of the contextual perspective initiated by Butzer (1989 [1982]), by which he proposes a study of archaeology that hierarchically contextualizes three units of analysis, the landscape, the sediment, and the artifact, and treats the cultural material as an indicator of the human being as a geomorphological agent in the sedimentary cycle of an archaeological deposit).

One stance even included establishing as a problem the lack of standardization in the stratigraphic method, which could have reduced the pejorative conflicts implicated in using many chosen criteria to form a nomenclature (Farrand 1984; Stein 1992). The solution was to adopt a stratigraphic nomenclature associated with a standard excavation procedure, which would permit a precise and objective naming of distinct sedimentary units and would mediate over a plurality of case studies.

For geoarchaeology, this nomenclature represented a classification tool appropriate to the scientific view of archaeology, because the principal units of stratigraphic analysis were distinguished using lithological criteria based on direct observation of the sediment's tangible attributes and fixed in descriptions that were independent of any interpretive discussions about meaning (Stein 1987, 1992; Courty 2001).

The objective was for the stratigraphy of an archaeological site to be observed as multiple sequences independent from one another (lithostratigraphy, ethnostratigraphy, and chronostratigraphy) but analyzed under a singular standardized nomenclature (Stein 1992). (The stratigraphic classification codes of geology, and those created for geoarchaeology, are supported by a sedimentological and pedological classification above any other type of distinguishing criteria. The fundamental unit is lithostratigraphic, while the ethnostratigraphic and chronostratigraphic units are lithological units grouped firstly by type of cultural content and then by correspondence to a particular time period (Stein 1987; Lucas 2001). The lithostratigraphic units are hierarchically more important than the other two, because they result from rigorous objective descriptions of the sedimentary particulates' attributes (they are observational) while the remaining units are defined by interpretation (they are inferential) (Gasche & Tunca 1983; Stein 1992)).

The use of this classification system meant that, in terms of objective rigor, artifacts would be considered as sediment, or one more

particulate of sediment (in essence they continue being *fossils*), the people would be biological agents of sediment formation, and prehistorical and historical time periods would be geological eras. In the beginning it was assumed that archaeology did not require theoretical and methodological premises just for studying stratigraphy; at the most it would require different units of analysis on a smaller scale (Farrand 1984; Stein 1992). This was because it was thought that if they set up a separation, with one archaeological classification and another geological, there would be conflict when carrying out correlations between the microstratigraphy of an archaeological site and the regional geological stratigraphy (Waters & Kuehn 1996).

For geoarchaeology, in the analytical terms of sedimentary *content*, stratigraphy was becoming established as a study of the vertical order of physical contacts (superpositional relationships) between sediments and soils (observable physical units) and recorded by the order of deposition (aggradation) and stability and erosion (degradation). The different types of elements that make up the cultural material were conceived as archaeo-sedimentary particulates or intrusive archaeological inclusions of the natural sedimentary matrix (Stein 1987). The cultural material was treated as if it were one more component among others: physiogenically and biogenically (Butzer 1989 [1982]). Anthropogenic sediment, from its process of sedimentation (or stratification), was considered natural geological sediment (Farrand 1984, Stein 1987). In this context, archaeological sediment was defined as one which contains particles that are affected and altered by cultural processes and therefore contain information about human occupational activity (Butzer 1989 [1982]; Stein 1987). Also, sediments were different when not affected by human beings but could possess archaeological inclusions among its particulates. Various names were given to this category: anthropogenic facies, anthropic soils and sediments, anthrop-soils, archaeo-sediments, anthropic epipedon, cultural cap or layer, archaeological levels, etc. All those terms try to be empirical in the sense that they manifest the material existence of human intervention at the site. Specifically, the archaeological site was defined by *aggregates of sedimentary particulates*, and those aggregates were defined as deposits distinguished by content or homogenous physical properties, of which one could recognize behaviors and patterns at the artifact level and depositional processes at the level of the sedimentary particles (Schiffer 1987). (Each deposit would be the result of a depositional event that made up the sediment's history: the source, the transport agents, and the deposition environment (Waters 1992). The depositional event is a sedimentation formed under constant physical conditions during a specific interval of time (Courty 2001)). The concept of *deposit* and its extension to the category of *sediment* (the content of the deposit) were considered to be the minimal and basic empirical–analytical contexts for identifying and recording exposed excavation profiles.

Forms

Ever since the school of thought begun by Mortimer Wheeler (1995 [1954]) but consolidated and deepened by Edward C. Harris (1991 [1979]), the unit of analysis was no longer the *content* in terms of the sediment or deposit but the *form* of the stratigraphic units as interpretation of the interfaces. More importantly, one no longer dealt with the isolated interpretation of stratigraphy and its archaeological content, but with an understanding of stratigraphy and its archaeological nature as part of one feasible entity to be studied: *archaeological stratigraphy*.

Incorporation of the term "interface" to designate the contact and relational surface that all stratigraphic units have with one another has prompted a relational study of stratigraphy: the interpretation of types of stratigraphic relationships and their configuration in an archaeological sequence diagram (the Harris Matrix). Principally, the idea of an *archaeological interpretation* of the stratigraphy was established, one that would not be restricted to the nature of sediment and artifact relationships but would account for the many stratigraphic relationships interpreted that were social relations between actions and

practices produced at a certain moment during human occupation of the site.

Harris' intellectual approach gained meaning with the idea of denominating an archaeological stratigraphy in its own formal terms, applied only to archaeology (Lucas 2001; D'Amore 2002). His proposal to define four basic principles for archaeological stratigraphy (Harris 1991 [1979]), adapted from the principles of geological superpositioning, began a race by arguing: (1) in favor of identification and interpretation of a stratigraphy of an archaeological nature independent from a geological superposition and (2) the introduction of stratigraphy into a body of theory which encompasses the relationship dynamic of such singular deposits as the archaeological. (Harris had in mind a scientific tool to particularize archaeology as a distinct discipline in two ways: (1) that archaeology would consciously shake loose from certain realities that only made sense for geology and (2) that would question the theoretical reach of certain problems and interpretations surrounding the practice of archaeological excavation (Harris 1991 [1979])). Many supporters of these theoretical–methodological proposals went on to pronounce in favor of a paradigm that treated archaeological stratigraphy as a science in its own right (Harris et al. 1993; Carandini 1997; Roskams 2003). The paradigm took form from six distinctive aspects.

First, it facilitated the introduction, to the stratigraphic record, of archaeological features that had previously not been considered as stratigraphic units, archaeologically speaking, such as pits, ashes, any soil disturbance (chemical or physical), ramparts, depressions, walls, and other features (Harris 1991 [1979]; Lucas 2001).

Secondly, construction of an archaeological stratigraphic sequence in the Harris Matrix format implied a specific stratigraphic excavation process. This meticulous stratigraphic methodology differed from other types of excavation, which was along arbitrary, naturally occurring levels associated with recording the sections, cuts, and exposed profiles; this will gradually be replaced by the introduction of an *open area* strategy and a *record by singular context* using diagrammatic plans (Barker 1977; Praetzellis 1993).

Thirdly, it gives importance to the horizontality of archaeological stratigraphy, specifically the incorporation of a horizontal view of the projected surface outline of the interfaces. This broke the persistent norm imposed by the vertical perspective of drawings and sketches of exposed cores in profiles, sections, and stratigraphic columns (Harris 1991 [1979]). Deciphering the formation sequence of the archaeological deposits came to depend on the interpretation of the stratigraphic relationships, not from mere observation of the exposed profiles but from how those relationships are recorded while excavating, starting from their horizontal extent in space and time.

Fourth is the configuration of archaeological stratigraphy in a multilineal diagram known as the *Harris Matrix*, which expounded a methodology of graphing on a two-dimensional plane to show distinct types of stratigraphic relationships across time, as a three-dimensional representation, and to deal with the various post-excavation problems of stratigraphic interpretation (Lucas 2001; Roskams 2003). (Relationships of superposition (A is behind and later than B; B is before and earlier than A), of contemporariness (A and B belong to the same moment of formation), and of equivalence (A is B) or, in any case, without a direct stratigraphic relationship.) The Harris Matrix consisted of a structure with the form and content of a sequence, where space does not appear to be bifurcated by the trajectory of the time, but that establishes a colligation of the verticality of time (sections) with the horizontality of space (record plans) (Harris 1991 [1979]; D'Amore 2002).

Fifth is the transforming basis of the Harris Matrix sequence in that it principally represents the stratigraphic nature of the superposition, before the topographic order, thus avoiding having to transfer, to the diagram, physical relationships between the units. Then, the archaeological stratigraphic representation came to be the interpretation of stratigraphic relationships, the symbolic dimension of relative time, and not directly an empirical or realistic record of the physical–topographic superposition (Harris 1991 [1979]; Carandini 1997; D'Amore 2002).

Sixth, and most important of all, was the interpreting and correlating of *interfaces* as separate circumscribed units in an archaeological stratigraphic sequence (Harris 1991 [1979]). (A first approach to the idea of *interface* was Wheeler's proposal to excavate following *the natural contour* of the superpositioned strata and to adopt specific criteria for drawing irregular interfacial lines; this type of record was called the *Wheeler-Kenyon System of Archaeological Stratigraphy* (Harris 1991 [1979]; Lucas 2001). However, the visual representation of the interfaces played a second role, given that they were not recorded with a number, as what was done with the strata and its contents (D'Amore 2002). Otherwise the interfaces would continue to be observed and recorded solely from the verticality of the sections and profiles). In its analytical correlation with the excavation record, the interfaces were the surfaces of the horizontal and vertical strata equal to its total area (surfaces of positive accumulation) and were also the cut or extraction surfaces of the preexisting stratification in the sedimentary matrix (surfaces of negative destruction, or *interfacial elements*). (In geology, in the study of natural soil formation, the positive surfaces are associated with beds, deposits or formations, and the negative with discontinuities (Butzer 1989 [1982]; Stein 1987; Waters 1992). In their stratified state, these surfaces remain semiconsolidated and somewhat stable compared to the dynamics of being exposed to the elements during occupation of the site.) In its interpretative correlation, the surfaces were in direct contact with the gradual formation of the strata. Once these interfaces, through a process of stratification, became buried by other strata and incorporated into a sedimentary matrix forming a stratigraphy, they became the possible interpretive correlation of a level of occupation on which took place human actions and practices (Harris et al. 1993; Haber 1996), or the final extension of a sedimentation and natural degradation, in a given moment of site formation (Schiffer 1987; Carandini 1997). From this view of stratigraphy, the artifacts as much as the sediment's particulates were bound by the interfacial limits of the stratigraphic units; and, furthermore, in an archaeological site, the interface was a much more numerous stratigraphic unit than the strata (Harris et al. 1993). Therefore, the character of the interfaces was the principal unit of analysis for constructing a sequence in terms of the Harris Matrix, and not the artifact or sedimentary content of the deposits. Harris and some of his supporters defined the interfaces together as units that denote surfaces *without content* (neither artifacts nor sediments). Unlike a stratum of positive deposition, the interface did not possess depth or substance (Harris 1991 [1979]; Lucas 2001), but did represent time and the stratigraphic relationships. Thus, the interfaces were not identified by their material content, but because they were *action surfaces*, of either deposition or extraction (Haber 1996; D'Amore 2002). Here arose a new way of thinking about stratigraphy, no longer founded in the nature of the sediment, but in the action that produced it, by humans or by nature.

In this way, it was recognized that even when archaeological stratigraphy was a "*heuristic device,*" it allowed, theoretically and methodologically, the definition of patterns significantly linked to human action and natural events, at the level of superposition of stratigraphic units as much as from the cultural content. Arising from this way of thinking, comprehension of an archaeological site began to view it as a palimpsest of action and discrete events. The archaeological site was fractioned into units or contexts that were excavated according to their position and stratigraphic relationships, but it was being defined by limits in time and space, as simple actions and events that leave a positive record (stratum) and a negative one (the cut). Archaeological stratigraphy was no longer a mere repository of objects, of cultural groups or of a direct normative representation of cultures, or cultural epochs; neither did it deal only with overlaid sedimentary caps. Rather, it was conceived as a deposit of actions and events which, given its relationships, form part of a history or histories that can involve material behaviors or leading patterns of sedimentation, representing sequences of rhythms and natural and cultural changes. (Harris' principles of

archaeological stratigraphy were well received in the realm of the formation processes of Schiffer (see preface in Harris 1991 [1979]). With the theoretical–methodological framework of the Harris Matrix, the formation processes obtained a scientific rigor, supported by a type of archaeological excavation practice. The leading alternative was no longer based solely on a different form of building archaeological theory, but from that, the theoretical entities of formation processes tackled their corresponding material in the archaeological sites, aided by the working categories of the excavation record proposed by Harris: strata, interfaces, and interfacial elements. More importantly, these units of study proved to be potential actions and events (natural and cultural) visually identifiable or materially represented in the context of archaeological practice).

Future Directions

Within the archaeological discipline, stratigraphy has become a structure of thought regarding time and linearity, and as such it conditions and restrains the archaeological interpretation of the past. It is a modern metaphor for representing historical time (narrative) and physical time (relative chronology), but this metaphor would be nothing if stratigraphy were not structured by the modern belief in *succession* in a *sequence*. In the daily tasks of archaeological practice, time is naturalized by the temporal metaphor of the sequence and of the stratigraphy: the passage of time is both vertical and sequential.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Çatalhöyük Archaeological Site
- ▶ Dating Methods in Historical Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Field Schools, Archaeological
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Geoarchaeology
- ▶ Site Formation Processes
- ▶ Tells in Archaeology

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Basic Biographical Information

Chris Stringer studied Anthropology at University College London and subsequently completed his Ph.D. in Anatomical Science at Bristol University in 1974.

He has worked at the Natural History Museum in London since 1973, where he is now a Research Leader in Human Origins and he is also a Visiting Professor at Royal Holloway, University of London. Stringer was awarded a D.Sc. in Anatomical Science by Bristol University in 1990.

Major Accomplishments

Chris Stringer was elected Fellow of the Royal Society in 2004, Fellow of the American Association for the Advancement of Science in 2011 and Honorary Fellow of the Society of Antiquaries in 2010.

For his Ph.D., Stringer studied Neanderthal and anatomically modern human crania in collections across Europe and the Middle East, concluding that anatomically modern humans had not evolved from Neanderthals but had migrated into Europe replacing the earlier Neanderthal inhabitants. As a result he was an early proponent of the Recent African Origin model (also known as Out of Africa) of human evolution which holds that anatomically modern humans evolved in Africa and subsequently migrated across the globe replacing any previous archaic inhabitants.

Recent genetic evidence reveals that living people carry small amounts of archaic DNA and that this is regionally variable, consistent with an African origin for modern humans and limited interbreeding with archaic groups at a local level. Stringer has recently proposed a new model for modern human origins in Africa, which has been termed "coalescent African origin".

Stringer has also had a major role in promoting and collaborating in efforts to produce a sound chronological framework for modern human origins by establishing new dates for key specimens and archaeological sites. This has involved working with specialists in radiocarbon, luminescence, electron spin resonance, and uranium-series dating techniques. Stringer has directed or co-directed excavations at sites such as Westbury-sub-Mendip and Gough's Cave in the UK and Ibex, Vanguard, and Gorham's Caves in Gibraltar.

Since 2001 he has directed the Ancient Human Occupation of Britain (AHOB) projects, bringing together a team of paleontologists, archaeologists and earth scientists to investigate successive

human occupations of Britain and to reconstruct the environments in which these early people lived.

In 2005, the AHOB team revealed new evidence suggesting that humans reached Britain about 700,000 years ago based on the presence of worked flint at a site in Pakefield, Suffolk dating to Marine Isotope Stage 17.

Since then the discovery of more than 70 flint tools and flakes from Happisburgh in Norfolk has pushed back the date for the earliest occupation of Britain and northern Europe to more than 800,000 years.

Stringer has taken a leading role in co-organizing conferences such as:

- "The Origins and Dispersal of Modern Humans" (Cambridge 1987)
- "The Origin of *Homo sapiens* and the Impact of Science-based Dating" (Royal Society 1992)
- "Gibraltar and the Neanderthals 1848–1998" (Gibraltar 1998)
- "Human Origins" (Cold Spring Harbor 2000)
- "The Human Revolution Revisited" (Cambridge 2005)
- "The first four million years of human evolution" (Royal Society 2009)
- "Culture Evolves" (Royal Society and British Academy 2010)

Stringer's books include:

- In Search of the Neanderthals (1993 with Clive Gamble)
- African Exodus (1996 with Robin McKie)
- The Complete World of Human Evolution (2005 with Peter Andrews)
- Homo britannicus (2006)
- The Origin of Our Species (2011)
- Lone Survivors: How We Came to Be the Only Humans on Earth (2012)

Cross-References

- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Neanderthals and Their Contemporaries
- ▶ Out-of-Africa Origins

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Structural Archaeology

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Introduction

To write about the field of "structural archaeology" – where it comes from, what it does, and where we are now – means we must consider structuralism as an intellectual movement and how it impacted archaeology, although this is not all there is to it. It might seem at first that writing about structuralism in archaeology in these first decades of the twenty-first century can only be a historical commentary on an approach, a theory, and a method that we have gone through and beyond. Some researchers today might opine that a structural archaeology has been bypassed by other approaches and subsequent critiques. There are even terms for what developed supposedly "after" structuralist thinking and research, namely, post-structuralism and even structuration. And there are those who might suppose that even these afterlives of structuralism are faded and discarded paradigms and frameworks for the analysis and interpretation of archaeological materials and situations. Furthermore, some would even argue that all of these approaches were never "mainstream" archaeology or, if undertaken, produced only transitory results that have not really stayed with us. But in reviewing what structuralism has

been for archaeology, the case can be made that its influences have been more far-reaching than one might suppose, even in the reactions and rejections of what some structuralist research might appear to be. Robert Preucel (2006: 95) even takes the view that structuralism in archaeology can now be viewed as an "intellectual bridge spanning radically different theoretical programs." Indeed, we are not yet finished with a structuralist legacy and imprint on the archaeology of the twenty-first century.

In this entry, I consider what is meant by structuralism, both in general and especially structuralism in and for archaeology; the historical background to the structuralist movement (what Gellner (1982) called "structuralisme") and to its appearance in archaeology. In some ways, this account will be one in which we can chart the rise of structuralist concerns in archaeology, their impact or what I have called a structuralist "breakout" (Conkey 1989), and then what might be viewed as their "going underground" where they continue to undergird some research and remain a somewhat silent but detectable presence in how archaeologists work. As Alison Wylie (1982) pointed out so astutely in her still salient review and argument for the epistemological issues of structuralism in and for archaeology, archaeology must employ some form of structuralist analysis. From its inception, structuralist theory and analysis have been international in origin and scope, even if they are less manifest in those traditions of archaeological practice that have been primarily cultural historical in approach. But can we consider there to be – to still be – a structural archaeology?

Definition

To begin to cover the definitions and history of Structuralism, with a capital "S," as a major intellectual movement is a daunting task for the landscape of this movement stretches far and wide – from its core incubation in the fields of linguistics and the study of languages to epistemological if not ontological debates and treatises. In this discussion, I take the view that while there is a body of theory and philosophy called *Structuralism*, with its associated methods and analytical imperatives, we can also talk about "structural approaches" that do not necessarily accept all or most of high or "capital S" Structuralism, especially that which is considered to be classic Structuralism. Many entire books about Structuralism have been written over the decades (e.g.,Hawkes 1977; Pettit 1977; Eagleton 1983 among dozens), and anthropology has played a prominent role in the history and development of Structuralism especially through the scholarship of Claude Levi-Strauss (e.g., 1963) and his predecessors in French sociology such as Durkheim and Mauss. Critiques of Structuralism have also been strong in anthropology (e.g., Sperber 1974; Fabian 1983), but as the archaeologist, Chris Tilley (1990), pointed out, Levi-Strauss is indeed a required reading, especially for an archaeology that takes seriously material and visual culture.

As Robert Layton writes in his most useful and admirably succinct chapter on "Structuralism and Semiotics" in the *Handbook of Material Culture*, these two approaches "provide ways of studying human cognition and communication" (Layton 2006: 29). As such, as we will see, there has been some disdain or dismissal (or just plain an ignoring) by many archaeologists who do not believe that archaeology can "recover" cognition or communication of past societies and perhaps certainly not any "meaning," but this is to jump ahead in our account. Structuralist assumptions include a core idea that there are underlying cultural premises to cultural practice and production and that these can be discovered by the analyst. In classic structural thought one might anticipate that the working out of specific cultural structures drew on some universal concerns, usually expressed in the form of binary dualisms, such as male/female, dark/light, wild/tame, public/private, and life/death – dualisms that were often mediated through various cultural acts, productions, or practices, such as myths, or, in the case of Leroi-Gourhan's well-known structuralist study of Paleolithic cave art (Leroi-Gourhan 1965), through image making or art. In this

path-breaking analysis, Leroi-Gourhan was attempting to identify the underlying structures and even "grammars" for the making and placing of specific images of animals or signs in the caves. While recognizing that the meanings of these structural manifestations are not immediately (or ever?) available to us some 20,000 years later, Leroi-Gourhan links the underlying structural generation to cultural mythologies, leading him to suggest that we could understand the patterning of Paleolithic cave art as a kind of "mythogram."

Of course, Structuralism is much more complicated than seeking and finding universals, polarities, and mytho-grammatical structures. Deep debates abound in the literature about fundamental assumptions and subsequent analytical methods by which Structuralists proceed. For example, Gellner (1982) probed this notion of "structuralisme" and its methods with such issues as just how the relevant polarities are to be identified and confirmed: "Not only are the polar extremes (of a text) simply plucked out and then treated as somehow explanatory of the world that the users of said text live in, but no criteria are offered for how one is to identify the crucial polarities of a world from any old contrast that a willing and imaginative observer may locate in it" (Gellner 1982: 122). And he goes on to say, "A descriptive account of the spectra or polarities of a given society or language works with is *not* the same as a generative account of how these spectra are produced. In other words, one should not confuse, so to speak, descriptive or phenomenological structuralisme with a genuinely explanatory kind" (Gellner 1982: 123). So, while strongly critical, Gellner concludes that his criticisms "merely amount to a recommendation of caution in the application of these ideas to fields other than those in which they were originally fruitful" (1982: 123). When we survey the applications of structuralist concepts and methods as put to use in archaeology, we can evaluate them with such critiques and cautions in mind. As we will see below, the "plucking out of polarities" critique is not the only one that archaeologists should take seriously.

Historical Background

There is no doubt that structuralism and one of its handmaidens, symbolic analysis, was one of the more potent theoretical frameworks in the 1960s and into the 1970s in the social sciences and especially anthropology. Although many would readily note that structuralism played an important role in the "turn" to more symbolic archaeologies of the 1980s, structuralism was also an important – but "underappreciated" – role in the development of the processual archaeology of the late 1960s and 1970s (see Preucel 2006: 93-121).

The question here is what is a structural archaeology, as this is a particular approach that first emerged most explicitly by the 1970s. In Anglo-American archaeology it might best be represented by the now-classic work of James Deetz (1977), although structuralism for archaeology was already put forth by André Leroi-Gourhan in France. To a great extent, the kind of structural approach put forth by Deetz (1977) was less concerned with the referential dimension – that is, how the structural patterns that underlay cultural phenomena impact back on the symbolic structure(s) – and more concerned with reconstructing the rules or cognitive patterns that undergirded expressions of folk material culture in early American societies, especially as manifest in such material culture as architecture, gravestone designs, and ceramic preferences. In this classic structuralist study, Deetz was able to take us to a "synthesis of the profound conceptual changes that occurred in America during the 18th century" (Leone 1986: 426) by using oppositions in Middle Virginia folk housing (as analyzed by Henry Glassie (1975)) and using them as a framework for the analysis of many classes of material culture including music. The oppositions included scattered/clustered, framed/open, and artificial substance/natural. With such an analytical framework, the connection to the Levi-Straussian structuralism/*structuralisme* is obvious.

The first sustained archaeological engagement with Structuralism took place at Cambridge

University in 1979–1980. Ian Hodder and his students organized several graduate seminars, the goal of which was to interrogate the dominant views of archaeology, especially the Paleoeconomy school and the New Archaeology more generally. The participants in the seminar included Mary Braithwaite, Steve Cogbill, Sheena Crawford, Linda Donley, Ian Hodder, Paul Lane, Danny Miller, Henrietta Moore, Elen Pader, Mike Parker Pearson, Alison Sheridan, Chris Tilley, and Alice Welbourn, many of whom have gone on to distinguished careers. American scholars were also invited to give presentations including Meg Conkey, Susan Kus, Mark Leone, and Alison Wylie. This seminar resulted in the publication of *Symbolic and Structural Archaeology* (Hodder 1982a), a powerful critique of the New Archaeology. Despite the assertiveness of many of the participants, there was no clear agreement on the ways forward. As Hodder put it in his introduction to the volume, "there are many differences of opinion concerning, for example, the nature of ideology, the degree of determinancy in social changes, the types of structure that should be analysed, and the value of any reference to structuralism" (1982b: 14).

By the 1985 celebration of the 50th anniversary of the Society for American Archaeology, an edited volume was produced that had chapters on what were then considered core topics of contemporary archaeology. One chapter addressed "Symbolic, Structural and Critical Archaeology" (Leone 1986) attesting the recognition of these related but often quite different approaches as having come onto the scene enough in archaeology so as to be included in the volume, along with what might be considered more traditional topics, such as middle-range research, origins of food production, and hunter-gatherer archaeology. In Leone's 1986 chapter, he notes that a key feature of the three archaeologies that he discusses was the recognition and engagement with the idea that the material world (that archaeologists study) is not merely a reflection of past lives and cultures, but that there is a recursive quality to culture: the uses of cultural phenomena "shape our lives, and our lives would be shapeless without" them (Leone 1986: 416).

Thus, a structural archaeology might have several levels at which it would work. The Glassie-Deetz model, along with the Leroi-Gourhan model for Paleolithic cave art discussed above, has focused on trying to discern the underlying patterns or structuring principles that have generated what we can observe today, directly or indirectly, with (in the case of Deetz) or without (Leroi-Gourhan) informing texts. Other analyses in archaeology were also provocative in making inferences regarding the codes or underlying generative patterns that might have produced material culture, ranging from regional wide settlement patterns and architecture, such as at Chaco Canyon in the US Southwest (Fritz 1978), to the making of designs on ceramics. In the latter studies, we would include the work of Dorothy Washburn (e.g., 1977) that identified underlying principles of symmetry for the generation of painted ceramic designs on Southwestern pots. At this level – the making of ceramic designs – Washburn has undertaken a formal analysis of structure and the structuring principles of design, with the suggestion that it is such underlying structures, more so than the use of the actual specific designs, or design elements, that has more potential to inform on the participation by ceramic makers in a "style" and as part of a related social group. Still others began to investigate the idea of practice inspired in different ways by Anthony Giddens and Pierre Bourdieu. Here we can mention the work of Linda Donley (1982) and the Swahili house and the studies of Mary Braithwaite (1982) on design among the Azande in Southern Sudan.

One key feature of these earlier structural approaches in archaeology that derives directly from more classic structural premises is the centrality of *relationships*. In fact, it has been argued by those who have been bold enough to survey the fields of structuralism and semiotics that structuralism induced, as a kind of first principle, a "momentous shift in the nature of perception" (Hawkes 1977: 17-8) that recognized that the nature of things lies not in the things themselves. Rather, the "world is made up of

relationships" – those that we construct and then those that we perceive between things (Hawkes 1977: 17-8). Thus, for the archaeologist, it has been the relationships – between design elements on a pot, between architectural features and concepts of the individual, and between men, what and where they hunt and what they hunt with in comparison with women, what animals they hunt, and what tools they work with – that form the underlying network among "things" that have allowed insightful structural analyses. Seeking out the relationships, the patterns of the relationships and perhaps the cultural referents of the patterns have mobilized many a structural approach in archaeology. On the one hand, this search for/identification of structural relationships has allowed for a recognition and revelation of the connectedness and constructedness of human meaning, especially as a system of signs at a given point in time. Yet, paradoxically, especially for the archaeologist who so often is trying to track changes through time, this feature of the marked synchronicity of a structural analysis – at one point in time – reveals a serious flaw of structuralism, namely, that it was not a social and historical theory of meaning and meaning making; it has been "hair-raisingly ahistorical" (Eagleton 1983: 109). As we will see, with the rise of the 1980s theoretical influences both external to and within archaeology that turned attention onto agency, practice, and the "content" of the cultural productions more so than the "form," such a delimited approach as the more classic structuralist one was subject to serious critique.

Yet before we look at what emerged from structuralism and structuralist approaches to archaeological phenomena, there are important critiques that have been made both more widely and specifically for what archaeology has come to take more seriously since both processualism and early structural studies in archaeology. First, and not surprisingly, as noted above, it was the ahistoricity of much structural analysis that bothered many an archaeologist, and this lack of history and concomitant engagement with change is part of what might be noted as a false contextuality of structuralism. At its most extreme, underlying structures are represented as almost frozen and as static. As such, there is little space or place for the actions of humans; "they play the games but they can't change the rules." That is, many structural analyses sidestep (or ignore) the fact of practical action and the intentions of social actors (which has been a similar critique of the systems approaches of processual archaeology). In fact, the individual subject is "decentered" and the new subject tends to become the system itself (after Eagleton 1983: 112-3).

This concern is also manifest in the usually formalist analyses of structural approaches. As noted (Conkey 1989: 139), the structuralist method, in general, brackets off content and focuses more on forms; it is the structure of relations that is scrutinized. The method, furthermore, is said to be "quite indifferent" to the cultural value of (what might be called) "the text": it is an analytical not evaluative method (Eagleton 1983: 96). While some of the archaeological applications of structural assumptions and premises have attempted to address this and other weaknesses (see in Hodder 1982b; Hodder 1986) in some of the pioneering applications of structuralism to archaeological phenomena (e.g., Leroi-Gourhan 1965), there is no doubt that among the missing are individuals, intentions, and an inquiry into the *contexts* of making and using material culture (in Conkey 1989).

But this is to get ahead of the discussion and to anticipate the retrospectives of the 1980s on inquiry of the 1960s and 1970s, perspectives that view the making of art, architecture, and material culture as a practice rather than as an object. Yet, it could be argued that to take the new views might not have been possible without what can be called the "structuralist breakout." I have previously made (Conkey 1989) an observation that is neither novel nor unique, namely, that inherent in the very nature of what structuralism is predicated upon is the emergence of what became "post-structuralism" in wider theoretical circles and post-processualism in archaeology. For example, with the study of Paleolithic art, what a structuralist approach opened up was that if the images could be understood as a system of

signification, as a system of meanings, then many potential significations were possible. Specific to the studies of Paleolithic art that had previously been dominated by single, all-encompassing "explanations" (such as that the art was "art for art's sake" or it was "hunting magic") was the opening up of the imagery to multiple approaches: the art as a way to solve socio-spatial relationships, as a way to mark time and seasons, and as a way to establish and maintain alliances, among others. Thus, it was then possible to suggest that what we have lumped under one broad category of "Paleolithic art" may well be not just one, but several – and possibly interpenetrating – sign systems.

The wall art of caves – among many other domains of archaeological inquiry – was not something out of scope or reach of a scientific archaeology because now it could be studied systematically and even quantitatively and it put such a previously marginal archaeological phenomenon into a conceptual framework for archaeology that could seriously engage with the cognitive and the symbolic aspects of the human mind. Structural analysis of these images (as with structural analyses of other materials and objects) displaced the question of meaning from the individual boundaries of particular images ("what does this painted horse mean?") to the relationship(s) among the images and their placements within the cave. One could also displace the question of meaning in a different direction, from the individual boundaries of objects, images, and forms to the productive contexts within which the imagery or whatever had become invested with meaning. This displacement anticipated the subsequent concern and focus with the very contexts – and practices, including those of individual agents – that more traditional structural analysis had left out. A "structural breakout" led to more interest not with the structuralism, but with a structural analysis that could begin to make sense of how and why the structures "made sense" in particular historical contexts of social action. To understand the "intentions" that most classic structuralist studies did not really ask about was however another redirection of inquiry. While not inquiring into "intentions" in the sense of getting into the mind of the maker(s), a structural approach could be interested in the intentions of a cultural product so as to "interpret it as being in some sense oriented, structured to achieve certain effects" (Eagleton 1983: 114).

Key Issues

Under the rubric of what constitutes a "structural approach" in archaeology, one can see how many of the goals and perspectives of various different theoretical perspectives can be attempted. Much of the "early" structuralism of the 1970s was congruent with the processual assumptions that understood culture to be an adaptation and to have been systemically organized, including in terms of not just energy and matter but also information. Thus, several studies showed how certain underlying structural patterns – of architecture, material culture – could have been "adaptive" and solutions that contributed to the maintenance of cultural systems. Others suggested that the structures were crucial to the production and continuation of key information, information that was manifest by a kind of resonance among multiple levels at which a structure was operating, from how one arranges people and objects in the local arena to how overarching systems of relationships between polities were played out.

To some extent, the kind of cultural world views that were embedded in and manifest by the architecture of houses and by the kinds of serving dishes used – as expounded by Deetz for colonial America – was structural premises that integrated within and yet differentiated between cultural systems. And above all, one might suggest, despite the objection some might raise about how processual archaeologies were not about the "recovery of mind," the structural studies were simultaneously providing a framework whereby the place of the human mind in constructing meaningful worlds could be within archaeological inquiry. Thus, it is readily argued that one key contribution from earlier structural archaeologies is that material

culture – a key focus of archaeological research and inquiry – was now understood to be meaningfully constituted and that it is formed and ordered by systems of meaning. Further, it conveyed the important idea that categorization and classification organize the social construction(s) of reality. These understandings are, in many ways, integral to some fundamentals of what was to become a post-processual archaeology and the current focus on cognitive archaeology and materiality (Renfrew 1994; Abramiuk 2012).

One current issue is the reexamination of the relationship between Structuralism and the field of semiotics (Conkey 2001; Layton 2006), which simply can be called the "science of signs." Interestingly, in his first version of summarizing and evaluating structural approaches in archaeology (Hodder 1986), Hodder addresses only structural approaches, but by the 3rd edition (Hodder & Hutson 2003), the chapter has expanded to "Structuralist, post-structuralist and semiotic archaeologies." Simplistically, semiotics uses structuralist methods, which treat cultural phenomena that may not be thought of as a system of signs as if it were one. As one of the premier scholars responsible for the formation and elaboration of semiotics, Saussure (a Swiss linguist) has noted: "A science that studies the life of signs within a society is conceivable... I shall call it *semiology*" (Saussure 1959: 16). On the one hand, Saussure understandably developed his ideas in terms of language, recognizing that the linguistic sign has two components: the *signified* or idea and the *signifier* or the spoken sound(s) that conventionally express that idea. On the other hand, he already saw that "there were many other sign systems in human culture that could be studied using the same methods" (Layton 2006: 30).

To use again the example of Paleolithic cave art, a structuralist-semiotic approach meant that one could treat the imagery as a system of signs, and thus attempts at reading the *signification* of the imagery in and on the rock were possible. But as has been noted by many (e.g., Hodder & Hutson 2003: 59-65; Preucel 2006), there are substantively important limitations to the Saussurean semiotics for the study of the material and visual worlds of archaeology, such as the "focus on codes and rules at the expense of social practice" (Preucel 2006: 3). It is a much longer story to discuss the subsequent development of semiotics and how the work of Charles S. Peirce went in important new and different directions that have been shown to have much more viable applications in archaeology (e.g., Preucel 2006). In many ways, semiotic or semiotic-inspired archaeologies are more explicit and more visible on the landscape of contemporary archaeology than are structural ones, which makes for an interesting analysis of why this might be the case.

Another issue is the emerging engagements with theories of practice. Nowhere is this better seen than in the archaeological inquiry regarding gender. This inquiry more fully emerged in the later 1980s and is usually considered as one dimension of the post-processual archaeologies. As with most feminist-inspired theory and research, the trajectory of understanding and studying gender for archaeology has been an evolving one, although one cannot neatly categorize engendered archaeology into subsequent "waves" or even schools. To many, taking on gender has long been a simple expansion of the variables to look at, along with status, class, and ethnic groups, a version of just adding, in this case, gender, with little or no theoretical or methodological ruptures. Often, gender was taken on primarily as yet another structure, as a set of underlying principles or rules about what men do, what women do and how the division of labor was to be organized, and how this, in turn, structured activities and social status. Yet some of the very same critiques of structural assumptions and approaches could be applied to the investigation of gender as structure. In fact, related developments in feminist theory can be said, in their own concerns, to have converged with the critiques of structural approaches as "missing" the social actions, the agency, the practices, and performances of social life. Although classical "practice theory" cannot be heralded for its engagement with gender, performance theory and performing gender (e.g. Butler 1990) were important inspirations for conceptualizing the

workings of gender that went beyond the gender-as-structure and gender-as-structuring approaches, even if some of those were crucial to getting gender on the table as a viable topic for archaeological research.

Future Directions

One of the strongest arguments for what a structural approach can do – and does do – for archaeology was that of Wylie (1982), who advocates that there are various "compelling reasons why archaeologists should adopt some form of structuralist approach" (1982: 39). If you are interested to "the epistemological questions that a structural archaeology raises about the kind of scientific or other knowledge that archaeologists should be striving to realize," you will find in this chapter a still-valid and important discussion. She notes how structural analyses (even those only up to 1980) have opened up domains of not just inquiry but insight and why structural archaeology need not be set aside or dismissed because "its theories are empirically under-determined" (1982: 39). Writing this, on the cusp of what would become post-processual approaches in archaeology, Wylie concludes that the "great value" of a structural archaeology is that archaeologists are now face to face with having to engage with "the cognitive, semiological and symbolic significance of their data as distinctively cultural materials" (1982: 46) and, not insignificantly, of having to figure out methodological ways to do this that, in her view, would help move the discipline of archaeology "decisively beyond" the kind of skepticism and even narrow empiricism that had not just controlled but compromised the potential of archaeological understandings.

Yet some 24 years after the Wylie chapter, Layton notes that archaeology (still) needs to "develop systematic procedures for assessing reconstructions of meanings from past cultures" (Layton 2006: 40). Even though the practice of focusing on dualisms and polarities has been displaced, the critique of Gellner (1982: 123) that the description of the structures is not the same as an explanation of how they came about and were generated may still plague some, but not all, approaches in archaeology that are inspired by structuralisms. At a wider level of inquiry, there has been much debate and discussion about the legacy of the concept of "text" that derives from the early structuralist approaches (and their roots in linguistic theories). As one core concept in the debates and discussion that emerged under the label of "post-structuralism," archaeologists have variously engaged with the relative utility and limitations of the idea that we can "read" the materials of the archaeological record and their relationships "as text" (see in Preucel 2006: 135-46). One legacy of structuralism has been that it often provided an account that was essentializing and totalizing, as in characterizing an entire past culture in terms of a generative underlying structure that itself structured cultural practices. Within-group variations in the construction and reception of meaning(s) were suppressed, along with the already-mentioned features of much original structuralism, namely, history, agency, and the contingency of meaning making.

Yet many of the assumptions and especially the goals of structuralist approaches in archaeology not only did provide the new insights that Wylie was heralding, but also they fused into a variety of approaches that many may see as separate from structuralist ones. Preucel (2006: 120-1) has been especially concerned to note the various seemingly different archaeological programs that have been influenced, if not in part spawned, by a structural archaeology. While partially congruent with many tenets of processual archaeology and, in fact, actually contributors to the formation of processualisms, structural archaeologies also brought an array of new perspectives and insightful other ways of framing archaeological inquiry: information exchange, structural Marxism, World Systems Theory, cognitive archaeology, and even gender. With some of these allied approaches, as with structural ones themselves, there is an inherent critique of the assumptions and an emergence of critiques that move the research framework to another domain (as in the conception of ideology by structural

Marxists that becomes a critique of processual archaeology).

And thus, we can return to an opening point of this summary, namely, that not only have the influence and scope of structural approaches in archaeology been underappreciated but in such initial structural approaches have been the seeds of new and more expansive ways of understanding the past. As such, in the very approaches under the rubric of structuralism in archaeology exist the critiques and a generation of the "beyond structuralism" and, along with it, a "beyond processualism." There continues today a structural archaeology in new forms and with new lines of inquiry.

Cross-References

- ▶ Conkey, Margaret Wright
- ▶ Deetz, James (Theory)
- ▶ Hodder, Ian (Theory)
- ▶ Leone, Mark P. (Theory)
- ▶ Leroi-Gourhan, André
- ▶ Post-processualism, Development of
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Wylie, Alison

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Style: Its Role in the Archaeology of Art

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Introduction

The Relevance of the Concept of Style in the Archaeology of Art

Style has been and still is a core concept in the field of the archaeology of art for several reasons, including the fact that it is a twofold term: on the one hand, it refers to a quality of past human actions which is perceptible in material culture, and on the other hand, it is also an analytical tool that allows archaeologists to find continuities and discontinuities in the archaeological record which are relevant to answering questions about the spatial and temporal distribution and qualities of cultural practices.

The concept of style is particularly relevant to the archaeology of art because, among other material culture products, the creation of artworks (be them artifacts or structures) entails the manipulation of form, color, size, texture, volume, etc. in the creation process, which often show recurrent patterns that evidence the underlying operation of stylistic rules and habits. Thus, style studies tackle numerous aspects of image making and display, including the trends underneath the design of visual motifs, their combinations and layout, the techniques used in their production, as well as the types of objects and contexts in which such images were created and displayed, the functions that they had for their creators, and the effects they generated over their users-viewers (Conkey & Hastorf 1990).

Yet, style has also been an analytical tool used by archaeologists to pinpoint visual similarities between artworks, in order to map their spatial distribution and/or to create stylistic sequences. In turn, these have often been interpreted as evidence of underlying archaeological cultures, which produced such similar traits, although such

interpretations have also been challenged and much debated in the last 30 years (Conkey & Hastorf 1990). Such theoretical approaches and debates are reviewed in this entry.

Definition

What Is Style in the Archaeology of Art

Many archaeological research projects on art materials (rock art, portable art, pottery decoration, sculptures, friezes, etc.) have relied heavily on the concept of style, as a tool to classify artistic assemblages, create evolutionary sequences, and explore the distribution of specific artistic traditions in order to discern past identities. Although commonly understood as a way of doing, particular to a specific time and place, this concept has been defined from different and sometimes conflicting theoretical frameworks (Conkey & Hastorf 1990). Some key elements are explicitly or implicitly common to most definitions of the term *style*, which is recognizable when *comparing* a sample of *archaeological images* which show *shared features*, including (a) a common *repertoire of motifs*, e.g., their form, color, and size; (b) a common way of *displaying such motifs* on the media on which they are laid out (ceramic vessel, bedrock, bone artifact, etc.), e.g., their position, orientation, symmetric arrangement, and use of media features (its concavity/convexity/flatness, volume, topography); and (c) a common set of *image-making techniques* (including raw materials, tools, and technical operations to use them). Other features, such as the contexts in which these artifacts or structures were produced and used, as well as the functions and effects they had on their creators and viewers, do not appear in every definition of "style" and are more dependent on each theoretical approach to this concept (see below).

Historical Background

Style from a Normative Culture-History Framework

The first formal use of the concept of style in archaeology and thus in the archaeology of art was developed by the culture-history framework: it conceived style as a set of mental rules that operated within a broader set of cultural norms and which were projected into the creation of images with certain recurrent features that were recognizable in the archaeological record: types of decorative motifs, color choices, artifact shapes, depicted themes, decorative techniques, etc. (e.g., Breuil 1952; Leroi-Gourhan 1968). Hence, style became a diagnostic trait by which archaeologists identified/created "archaeological cultures." Thus, styles' spatial distribution became key indicators of the diffusion of cultural norms from one site or region to another, while stylistic sequences formed by the diachronic succession of styles became the backbone of archaeological periodifications. In turn, styles became chronological indicators for relative dating, motif types, and forms being used in some cases as "fossil guides" to date artworks.

The shortcomings of such theoretical framework are many and have been clearly pinpointed by several authors (see their contributions below). Firstly, these normative approaches to style clearly saw it as a reflection of a mental set of shared rules and, as such, as a passive factor in human life: persons were seen more as the passive "bearers" of style rather than as its producers and manipulators. Secondly, style was mainly separated from function insofar as it was regarded more as the result of repeated norms than as the result of a social practice with certain practical purposes. Thirdly, this perspective was clearly homeostatic since its emphasis on the *shared* rules disregarded the possibility of manipulations, impositions, negotiations, and/or contradictions within the people who produced, circulated, and consumed specific style-bearing artifacts and structures. These issues where to be tackled by the following theoretical approaches.

Style from a Processual Framework

The deep breakthrough generated by the processual framework in archaeology through its explicit and thorough criticism towards culture-history did have a clear effect on the way style was conceived in art analyses. The pioneer work by Binford (1965) led to two key new ideas

about culture, which was now conceived: (1) as "a system composed of subsystems" (Binford 1965: 203) in which "different classes of archaeological remains reflect different subsystems" (Binford 1965: 203) and (2) as "man's extrasomatic means of adaptation (White 1959: 8)" to the environment (Binford 1965: 205). This meant that "people, things, and places are components in a field that consists of environmental and sociocultural subsystems, and the locus of cultural process is in the dynamic articulations of these subsystems" (Binford 1965: 205). Thus, culture "is not necessarily shared; it is participated in by men" (Binford 1965: 205). Such ideas had a deep impact on the way style was conceived by processual archaeologists: culture – and style within it – was not just in people's minds, was not necessarily shared, and was not detached from the environment: culture involved practice and had adaptive functions to the environment. Did style have functions too? The answers to this question had a broad variety of replies within the processual framework.

Binford himself proposed that stylistic variability could be defined as the continuity of "formal attributes, which vary with the social context of manufacture exclusive of the variability of the use of the item" (Binford 1965: 208); that is, style and use (or function) of an item were seen as separate but interrelated realms. To pursue their study, he devised a complex set of interrelated variables to be approached through a multivariate perspective:

(a) *Formal variation* was seen as integrated by morphological variation and decorative variation, which in turn were intersected by the technical dimension and the design dimension (Binford 1965: 205).
(b) *Cultural variation* was conceived as integrated by four variables: techno-morphological, morphological design, decorative techniques, and decorative designs, which, in turn, were intersected by the primary functional variation (directly related to the specific use of an artifact) and the secondary functional variation (a by-product of the social context of production and use of the artifact) (Binford 1965: 206). This multivariate approach was foundational in the analytical separation between style and function, which was later reelaborated by other authors.

Sackett (1977) also made a clear distinction between the style and function operating in three scales: entire archaeological assemblages, artifacts, and attributes that characterize them (1977: 371-372). Yet he did remark that both were contrasting and complementary features. Function was conceived as a feature perceived in the actions, ends, and roles that an artifact performed within its context, while style was conceived as the choices made by a society within a broad range of equally valid alternate means of achieving the same end (i.e., the same artifact) (1977: 371-372). Such choices were socially transmitted and thus had diagnostic value in the archaeological identification of cultural traditions and of the degree of intensity of social interaction between two historically related loci (1977: 371-372).

Breaking away from the processual framework and proposing a neoevolutionist approach, Dunnell (1978) focused on the concept of natural selection as a key to addressing evolutionary processes underlying cultural change. In doing so, and contradicting the processual approach, he noted that "a substantial segment of the archaeological record is not best understood in terms of adaptation" (Dunnell 1978: 192), because stylistic features of material culture were not adaptive. Thus, he proposed that there existed a fundamental dichotomy between function – accountable in terms of evolutionary processes – and style, accountable in terms of stochastic processes, that is, not subject to the bias of natural selection (Dunnell 1978: 192). These concepts have been challenged as well as revisited and refined (e.g., Hurt & Rakita 2001; Shennan & Wilkinson 2001).

Following Dunnell, Meltzer restricts the term style to refer to "those forms in a cultural system that do not have detectable value: those forms are adaptively 'neutral'" (Meltzer 1981: 314). Style, as a residual attribute, is interpreted as added for purely social purposes. On the contrary, functional features do not depend directly on

transmission factors or interaction between groups but may result from adaptations or the development of similar activities in similar environments.

Contrary to these views, a number of researchers have suggested the coexistence of different styles with different functions within the same culture, with differences between religious and secular art, or between civil and domestic art (Schapiro 1952: 294). Similarly, Smith observes the use of two different styles among the Aboriginal people from Barunga (Arnhem Land, Australia) with different functions: a figurative style for non-ceremonial contexts and a geometric style for ceremonial contexts (Smith 1994: 241).

A different approach to style was developed by Wobst, who defined it as "that part of the formal variability in material culture that can be related to the participation of artifacts in processes of information exchange" (Wobst 1977: 321). The author broke the style/function opposition and proposed instead that "stylistic behaviour does have functions" (Wobst 1977: 321). Following core concepts of communication theory, Wobst viewed artifact styles as media through which messages could be encoded by emitters even in the absence of receivers, while, in turn, messages could later be decoded in the absence of emitters. The longevity of artifacts (though clearly some are highly perishable) and the control of the emission of messages via the use of rare materials or high-cost energy investment in the signals were conceived as particular features of this mode of information communication. He also pointed out that the archaeological expectations of stylistic behavior include:

(a) Artifacts with high visibility.
(b) Artifacts which are "potentially encountered by more individuals" and most accessible to them.
(c) "social-group-specific stylistic form[s] should occur only among those messages that are most widely broadcast, that broadcast group affiliation, and that enter into processes of boundary maintenance" (Wobst 1977: 330).

Yet social interaction interpretations done by other authors were severely challenged by Plog (1978), who pinpointed numerous false assumptions underlying several stylistic ceramic studies (e.g., that "all households made the pottery they used" and that "manufacture of ceramics was a female activity") and thus proposed that "one should not simply calculate a similarity coefficient between design frequencies at two sites and assume that it measures interaction and nothing else" (Plog 1978: 368). Following the work of Wobst (1977), Plog (1978), and others, in the 1980s several authors addressed style as a process of social interaction and exchange, both in the analysis of portable art (e.g., Gamble 1982) and rock art (e.g., Jochim 1983; Schaafsma 1985; Smith 1992a, b, 1994).

Style from Post-processual and Social Frameworks

The post-processual and social frameworks challenged several of the ideas about style mentioned above: they share in common the fact that they see style as an active factor in the production and manipulation of material culture, a factor that stems from human agency, can be used as a source of power to do things and over people and resources, and thus, having crucial effects on the social lives of those involved in the creation, circulation, and display of artifacts and structures fashioned with a particular style, operating within a particular context. However, as will be noted below, these approaches do strongly differ in their epistemology: those labeled here as "social" being more prone to neopositivist and dialectical epistemologies combining induction and deduction, while the post-processual ones being more prone to hermeneutic and interpretive epistemologies.

As a pioneer of post-processual archaeology, Hodder contested the adaptationist and functionalist notions of culture and style and proposed that material culture was better conceived as "the environment within which individuals find their places and learn the places of others, their goals and expectations. Yet it also produces new situations and is . . . the medium through which individuals achieve their ends" (Hodder 1985: 5).

Thus, as part of any material culture item, style involved social action, including simultaneously "meaning and experience, subject and object, interpretation and observation" (Hodder 1985: 4). Moreover, the political dimension of style was stressed by pointing out that pottery decoration, for example, could be interpreted as "part of the negotiation of power, defining boundaries, and producing social differences" (Hodder 1985: 4). Many of these ideas are still in use.

From a more social and ethnographic point of view, Wiessner (1983, 1989) defined two key concepts related to the links between style and identity that have generated an important debate in archaeology: emblemic style was defined as the formal variation that consciously transmits information about affiliation to a group, while assertive style was defined as the formal variation that carries information about individual identity. While this distinction is extremely meaningful in terms of the multiple social implications of style as an identity marker, it also has some shortcomings when applied to certain prehistoric archaeological contexts in which the distinction between assertive or emblemic becomes untestable.

A similar set of concepts was devised by Macdonald (1990), who stated that protocol referred to the set of steps undergone in the production of an item within a stylistic framework, while panache referred to the ability of an individual to negotiate and push the boundaries of such protocol for his/her own aims.

In turn, Sackett (1990) elaborated his previous ideas about style and function and proposed a set of concepts: *isochrestic variation* was related to the choices made between variants that are functionally equivalent and transmitted neither intentionally nor consciously through enculturation within social groups, but rather passively and inadvertently (hence, challenging Wiessner's notion of an emblemic style consciously informing about identity); *iconological variation* was related to the active and intentional communication of contents through the creation and selection of specific images and/or designs. Thus, Sackett had proposed a more complex dichotomy:

(i) passive style = isochrestic variation = function

versus

(ii) active style = iconological variation = communication

To this, Wiessner (1989) replied that both aspects of style – functional and communicative – could be passive and/or active, hence breaking such strict dichotomy.

Finally, from a more openly social and materialist theoretical point of view, Earle has analyzed the manipulative uses of style as a justification of social inequality (Earle 1990). The author has pointed out that, among other factors, artifacts and structures created using elaborated art styles, luxury items, and durable materials generate aesthetic, and affective reactions can be very effective means of conferring individual's roles, status, and power due to the fact that they look not just visually appealing but also solid, permanent, and thus unquestionable (Earle 1990).

Key Issues/Current Debates

Current Uses of the Concepts of Style: Key Elements in Style Analysis

In the twenty-first century, style still plays a significant role as a tool to discern social identities and to establish relative chronologies when analyzing art materials and more particularly rock art. While portable forms of art can be dated through the archaeological context where they are found, direct rock art dating is still problematic, and when possible, it generally dates a particular motif or artwork. But an absolute date would only be meaningful to the archaeological study of art if the motif or the artwork can be assigned to a specific stylistic assemblage or unit defined by the reproduction of a certain set of common principles. Only then will we be able to identify artistic traditions, assign them to specific time periods, and explore their geographic distribution, to study the duration and intensity of specific occupations, the boundaries and interactions of specific human groups, and other aspects related with human geography and exchange

networks and their evolution over time (Domingo 2005, 2012).

In order to obtain information about the past through the analysis of artworks, we need to systematically describe and quantify their main characteristics and compare them, looking for similarities and differences to classify them in meaningful units.

But what are the key elements in style analysis?

Style, or the particular way of doing of a specific individual or group, can be found in any step of the process of production (Leroi-Gourhan's 1964 notion of *Chaine Operatoire*), of an artwork, whether technological, formal, or functional. When producing an artwork, there is a range of choices from which the artist can select, either intentionally or simply by following a set of instructions learned in a specific context. The artists' choices can be unique to them or their group, and thus they become stylistic.

To find traces of identity through the analysis of artworks, it is necessary to systematically decompose their process of production, since stylistic behavior can be identified in different steps of this process:

1. Style can be identified in the formal features of an artwork (form and decoration). The study of the formal features is usually approached through visual analysis, including systematic description of different descriptive categories (always adapted to the type of artwork under analysis, whether rock art, portable art, body art, and so forth) and quantification of their frequency to observe if they change over time and/or space. Some of these categories include:
   (a) Motif types (abstract, geometric, or figurative and their subcategories, such as humans, animals, plants, and objects).
   (b) Shape (proportions, modelling, animation, perspective, and so forth).
   (c) Size.
   (d) Formal relations in space (patterns of composition and scenes). Once motifs have been analyzed, it is important to look for regularities in the way they are distributed through the panel or artifact, in order to discover if different rules of composition and arrangement exist. Similarly, compositions and scenes have to be carefully analyzed looking for changes in subject matter.
   (e) Patterns of addition and superimposition. The way the motifs are added to the panels or artifacts can also be specific to a particular individual or group. Do they use specific areas of the panel or artifact? Do they use new sites or surfaces, or do they reuse previously used ones? Do they respect previous motifs or overlap them? How is the morphology of the decorated surface integrated in the composition or scene? Superimpositions of motifs that are stylistically similar may simply be an artistic license to show group perspective. But those including different styles are quite significant for stylistic analysis since they offer a sequence of events, and thus, they are useful to establish relative sequences.
   (f) Analysis of the spatial distribution in the natural and cultural context. The distribution of portable art may provide information on the geography of specific traditions but also on exchange networks. But rock art is fixed to place, and thus it is a relevant source of data to understand the way space was defined and used by a specific group, the duration and intensity of the occupation, and how the perception of a specific place changed over time in the construction of social identities (Lenssen-Erz, 2008; Domingo et al. 2008). When talking about rock art, this is usually explored through landscape analysis.
2. Technological features (medium and production techniques).The way the artworks are made can also be stylistic. From raw materials and resources to produce binders, paintings, and tools, to the selection and preparation of the decorative surface (rock or portable art), the selection of the techniques (paintings, engravings, or carvings), and so forth may all be constraint by cultural practices. While some aspects of the technological process of

production can be explored through visual analysis (selection of canvas, preliminary preparation of the working surface, decoration techniques), others need to be explored through archaeometry (like pigment analysis) or experimentation (like analysis of gestures, potential tools, and so on). Interestingly, as suggested by Gosselain (1992: 90), while the visual aspects of an artwork can be easily replicated by different cultures, non-visual aspects, such as pigment recipes, are more difficult to reproduce and thus provide the opportunity to explore the more stable aspects of social identities. As an example, Groenen suggests that the identification of different painting recipes and different application techniques in the analysis of the hand stencils from Gargas results from different artistic events, in contrast to the single intervention deduced by Leroi-Gourhan through formal analysis (Groenen 2000: 60).

3. Function. When talking about function, we refer to both the utilitarian function (related to the material use of an object) and the non-utilitarian function (related to social, ideological, or spiritual spheres) (Sackett 1977: 370). The same human group can potentially use different styles for different functions, and thus, two different styles do not necessarily refer to two different periods or cultures. Here, the analysis of the context would be central.

To summarize, any integral stylistic study should combine formal, functional, and technological analysis, in order to achieve a more objective approach to style, trying to define different social units and to determine their limits in space and time (Domingo 2012).

Future Directions

The Archaeology of Style in Art Materials

A review of the concept of style and its use in the archaeological study of art confirms its value as a tool to explore past social identities and to construct relative chronologies of different sorts of artworks. Together with the systematic description, quantification, and classification of the artworks, future stylistic studies would certainly need to be complemented with more accurate absolute dates (especially in rock art) to provide a more precise chronological control of the art traditions; more accurate recording methods, in terms of the images, their spatial setting (landscape, topography, bedrock in rock art, or other materials in portable art), and production techniques; and, finally, controlled uses of ethnographic and historical resources as sources of hypotheses or as analytical tools to search for stylistic trends.

Cross-References

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- ▶ Conkey, Margaret Wright
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Hodder, Ian (Theory)
- ▶ Leroi-Gourhan, André
- ▶ Paleoart Studies: Scientific Methods
- ▶ Smith, Claire
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Submerged Indigenous Sites

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Introduction

Land-based archaeological sites may be inundated through a variety of processes, resulting in submerged and potentially buried evidence of past human behavior. Submerged environments create unique conditions of archaeological preservation, especially for fragile materials such as textiles. In some cases, submerged sites on continental shelves or lake shores that were formerly exposed as dry land may represent evidence that predates the terrestrial archaeological record for that same area. Submerged indigenous sites are particularly informative in studies of human migration and patterns of early colonization and occupation but can be challenging to locate.

Definition

A submerged indigenous site is defined as a spatially defined accumulation of cultural material or anthropogenically altered ecofacts, of sufficient quality and quantity to allow for inferences about past human behavior at that location, that through eustatic (changes in water volume) or isostatic (changes in crustal plate elevation caused by sediment loading, or tectonic rebound) processes or intentional inundation are presently located below water.

Historical Background

In the United States, some branches of the federal government have required systematic surveys for the identification of submerged indigenous sites on the outer continental shelf since 1973. In order to develop accurate survey guidelines and assessment requirements, the U.S. Department of the Interior's National Park Service (NPS) funded a study to determine the archaeological potential of the Gulf of Mexico (GOM) continental shelf for both historic resources and submerged indigenous sites (Coastal Environmentals, Inc. [CEI] 1977). The goals of the study included development of a predictive model for the identification of the most likely resources to be found in an open marine environment, and the highest probability areas for the occurrence of these resources. The methodology outlined by the authors is one early example of research specific to submerged indigenous sites, and their recommendations still serve as the basis for methodologies used in modern studies.

According to the study's authors, submerged indigenous sites do not occur randomly, and the authors argued that correlations exist between specific landform types and artifacts or other evidence of past human behavior (CEI 1977: 331). The authors then made correlations between types of landforms and the effectiveness of different survey techniques in identifying these same features in submerged contexts (Table 1). The 1977 study examined landforms in environments across the entire GOM, but not all of the recommendations are applicable to all environments. The authors suggested that any investigation of submerged prehistoric resources take a three-step approach beginning with remote sensing of the area through either small-scale bathymetry or sub-bottom profiling to resolve the upper 9 m (30 ft) of sediment and acquisition of a grab or drag sample of seafloor sediments. If a probable site was indicated by the data acquired in Step 1, then subsequent data should be collected, either in the form of side scan sonar imagery of the area, bottom cores, and or additional grab or drag samples. The final step, if warranted, was recommended as underwater photography/videography, box core sampling, and or diver investigation (CEI 1977: 341). The majority of the recommendations, such as bathymetric

Submerged Indigenous Sites, Table 1 Correlation of terrestrial landforms, cultural period, and effectiveness of survey techniques from the northwestern Gulf of Mexico

	Cultural Period		Survey Effectiveness	
Landform	Early archaic	Paleo-Indian	Sub-bottom profiler	Piston corer
Quarry sites	V	V	Low	Not effective
Salt dome sites	V	V	High	Medium
Spring/sinkhole sites	V	V	High	Medium
Valley margin sites	V	P	Low	Not effective – low
Natural levee sites	V	V	High	Not effective – low
Point bar sites	V	V	High	Not effective – low
Bay margin sites	V	V	Low	Not effective – low
Coastal Dune lake sites	V	V	High	Medium
Shell middens	U	U	High	Not effective

Key: *V* verified or known correlation, *P* probable correlation, *U* unknown
Source: CEI 1977: 333, 340

survey or diver photography, assume that the landform or site is exposed at the seafloor, which is appropriate for environments that include sinkholes and river channels that are readily apparent on bathymetry and side scan sonar data (e.g., Gaffney & Thomson 2007). For sites or landforms that are buried by subsequent sediment accretion, these methods are insufficient; initial survey requires techniques that image the subseafloor, such as boomer systems or other sub-bottom profiler systems.

The methodologies created as a result of this study were developed specifically for landforms correlating with prehistoric indigenous sites in the United States. This includes highly mobile hunter gatherers of the Paleo-Indian and Archaic periods, groups that are not associated with extensive types of material culture. The predictive model included geological reconstruction and landscape change modeling, but it was recognized that few artifacts would likely exist at submerged indigenous sites on the continental shelf. Cultural signatures of human occupation were therefore identified that went beyond artifacts, such as potsherds and lithics, to include signatures more likely to be recovered in core samples, such as shells, faunal fragments, black earth, burned rock, charcoal, and pollen (CEI 1977: 172).

In the years since the creation of the submerged indigenous site prediction and preservation model used on the United States' continental shelf, subsequent studies have been conducted worldwide that add to the theory and methodology of investigating submerged indigenous sites. In 1981, in recognition of advances in paleocoastline reconstruction, archaeologists, anthropologists, geologists, and oceanographers were invited to participate in a symposium addressing Quaternary coastlines and prehistoric archaeology; the resulting papers were published in one of the first edited volumes on the subject (Masters & Flemming 1983). The participants in this symposium noted that, at that time, the majority of identified submerged indigenous sites were the result of chance finds by recreational SCUBA divers, fishermen, or activities related to offshore construction. Site discovery, they maintained, depended on both physical preservation of the site and ease of detection. The participants presented diverse case studies ranging in location from Siberia to Australia, but concluded that several methodologies could be universally applied to site prediction and detection. At the minimum, local geomorphology has to be modeled to identify areas of probable feature preservation; recognizable features (such as shell middens) must exist; and the landscape had to have offered basic requirements such as access to fresh water, protection from environmental exposure, and or availability of food (Masters & Flemming 1983: 611, 622-623). Recommendations for survey and identification of indigenous features were similar to those outlined by CEI (1977): chiefly, bathymetric or subseafloor survey conducted at tight intervals (no greater than 150 m). The authors stressed, however, that this type of survey cannot prove without doubt the existence of submerged indigenous sites, it can only identify the most probable areas in which sites could be preserved (Masters & Flemming 1983: 624).

Parallel to the Quaternary coastlines and prehistoric archaeology symposium, a follow-up study was being conducted in the United States to analyze terrestrial analogues for potential offshore deposits (Gagliano et al. 1982). The results, developed under contract for the National Park Service, analyzed core samples from verified terrestrial prehistoric sites along the northern Gulf of Mexico coast. Lab analyses of sediment core data indicated that the following variables were credible indicators of human activity and habitation: grain size, pollen content, geochemical composition, point-counts, foraminifera species identification, and radiocarbon dating of appropriate samples. Recognizing that site identification could not be dependent upon the presence of anthropogenic artifacts, the terrestrial corollaries were developed so that landscape features could be tested for indicators of indigenous site occurrence without the presence of obvious anthropogenic artifacts such as projectile points (Gagliano et al. 1982: 115).

In order to test the effectiveness of the predictive model and recommended methodology

proposed by the 1977 and 1982 reports, the U.S. Department of the Interior's Minerals Management Service (MMS) funded a study in the early 1980s, concentrated in the relict Sabine River Valley on the Gulf of Mexico outer continental shelf (Pearson et al. 1986). This area was identified as ideal for testing because of a wealth of preexisting geologic data and existing subseafloor surveys conducted on behalf of oil and gas operators that were available to the researchers through the funding agency (Pearson et al. 1986: xix). Eight targeted areas were selected for inclusion in the project based on a review of existing shallow high-resolution seismic data, and then subjected to tight interval seismic survey over the areas of interest to both relocate and further delineate the features of interest (Pearson et al. 1986: 53-76). Survey grids were located in areas where modern water depths range from approximately 8 to 16 m (27–54 ft). Vibracores were acquired from five of the surveyed areas, each measuring 12 m (40 ft) in length. The collected cores, 76 in total, were subjected to a series of laboratory analyses in efforts to identify potential signatures of anthropogenic activity, based on those identified by previous studies (Gagliano et al. 1982). No artifacts, or distinctly man-made materials, were recovered within the cores; however, two cored features included sediments exhibiting characteristics of archaeological deposits. One was interpreted as a possible shell midden, dating to approximately 8,055 +/– 90 BP and the second was interpreted as an area of burnt bone dating to approximately 8,500 BP. The study's authors were hesitant to identify the features as concrete evidence of human occupation, but stated "that they more closely resemble archaeological deposits than known natural deposits" (Pearson et al. 1986: 76-80, 127-162). The results of the Sabine River Valley study supported the theories behind the predictive model created for use in the Gulf of Mexico, and demonstrated the complicated task of identifying submerged indigenous sites from buried contexts offshore. The study area represents a unique type of submerged indigenous context in that archaeological data is not simply submerged, but also buried underneath a seafloor which gives no indication of the underlying features.

The Sabine River Valley is one example of a study to investigate submerged indigenous sites. Numerous studies have been conducted around the world, but are distinct from the Sabine River Valley study in that these other sites are either exposed at the seafloor, located in relatively shallow water depths, or some combination thereof (e.g., Johnson & Stright 1992; Browne 1994; Faught & Donoghue 1997; Momber 2000; Dix et al. 2004; Benjamin et al. 2011). Some research projects have avoided the complications of working in submerged environments by using evidence from terrestrial contexts to address changes in human subsistence and coastal settlement patterns instigated by changing climate conditions (Bailey & Parkington 1988). Estimates from the late 1990s suggested that approximately 550 submerged indigenous sites have been identified globally, dating from the Lower Paleolithic/Early Pleistocene periods, or approximately within the last 2.5 million years (Dix et al. 2004: 5).

Despite 30 years of research in locations ranging from Beringea to Argentina, the methodology used in submerged indigenous site research has remained relatively unchanged from the 1977 recommendations. As outlined by Gaffney and Thomson (2007: 4), the most common techniques used in the investigation of submerged indigenous contexts include seabed sampling and shallow coring, high-resolution 2-D seismic (sub-bottom) profiling, high-resolution 3-D seismic profiling, and high-resolution bathymetric mapping. The acquired remote sensing data or sediment samples/cores are then put into a locally specific context. These paleolandscape reconstructions remain critically dependent upon accurate understandings of sea-level, including isostatic and eustatic changes, and rates of sedimentation or erosion (Dix et al. 2004: 13-30).

Key Issues/Current Debates

The search for submerged indigenous sites is predicated on an accurate assessment of the

landscape from the point in time it could have been occupied through to the present. The synchronic reconstruction of the landscape, or reconstruction of place at a given point in time, provides information about exploitable resources that would have been necessary to support populations, and discrete areas within the landscape where evidence of past occupation is most likely to be found. Diachronic reconstruction of that same place provides information about changes to the site over time that influence preservation of any archaeological materials from their time of deposition, and influence secondary site formation processes.

Sea-level change has altered the extent and shape of the world's coastlines and river-fed lakes repeatedly throughout the Pleistocene. The landscape available to indigenous populations was expanded and minimized by these transgressions and progradations, but was also altered and reworked by these same mechanisms. Sea-level curve data is used to determine the possible time period of exposure for a given sediment horizon. Final inundation, or the most recent inundation as sea-level approached the present high-stand, marks the last possible date for potential occupation by indigenous populations as the landscape became part of a submerged environment.

Early sea-level studies were characterized by an assumption that the interconnectedness of the earth's oceans would result in uniform eustatic sea-level change, and that data from any tectonically stable region was representative of global sea-level at that point in time. It is now understood that sea-level is highly geographically and temporally dynamic. Factors that influence eustatic sea-level at any given time may include changes in ocean volume, water mass, and water density. Overall global patterns are influenced locally by relative changes associated with regional land uplift or subsidence, meteorological or atmospheric events, gravity, and eccentricity (Pirazolli 1991: 4-6).

Sea-level change can be assessed by identifying evidence of former shoreline stands and related environments, and by absolute dating of samples taken from sediment and ice. Many sea curves are created by extrapolating change between discrete data points, without regard to estimates of error (Pirazolli 1991: 21). Line graphs of age/depth below modern sea-level represent an oversimplified interpretation of sea-level change. Error ranges for individual data points allow for a more comprehensive, although more complex, visualization of sea-level change within a given data set (e.g., Balsille & Donoghue 2004). Furthermore, oscillations and reversals become exaggerated at smaller time intervals. Positive and negative alternations of sea-level observed at a timescale on the order of a thousand years are likely to become insignificant within the overall pattern of sea-level change when viewed on a scale of tens of thousands of years (Pirazolli 1991: 21). The issue of scale becomes pertinent when sea-level curves are applied to archaeology. Sea-level curves may provide significantly different dates for a single given depth, or provide insufficient resolution for sites occupied over a span of hundreds or even thousands of years (Fig. 1).

The majority of researchers now agree that sea-level change is a locally specific phenomenon, and reconstructions must assume some measure of local variability within trends that would otherwise suggest uniform rates of global sea-level change. Factors that complicate the construction of sea-level curves include, but are not limited to, sediment compaction and local subsidence, recognition of marsh and swamp peats, water depth range of peat formation, sediment load compaction, fluid extraction, and other localized changes in conditions. Awareness of these complications has led to reevaluations of regions once considered to reflect homogenous rates of sea-level rise, and has demonstrated high rates of local variability (Lewis 2000). Archaeological studies of submerged indigenous sites must consider the applicability of sea-level curves selected for use in reconstructing the site's environment. In order to be useful in archaeological settings, rates of sea-level rise must be accurate at the site-specific level.

Technology is an important component of submerged indigenous sites research. As discussed previously, the identification of this type of site requires the use of underwater remote

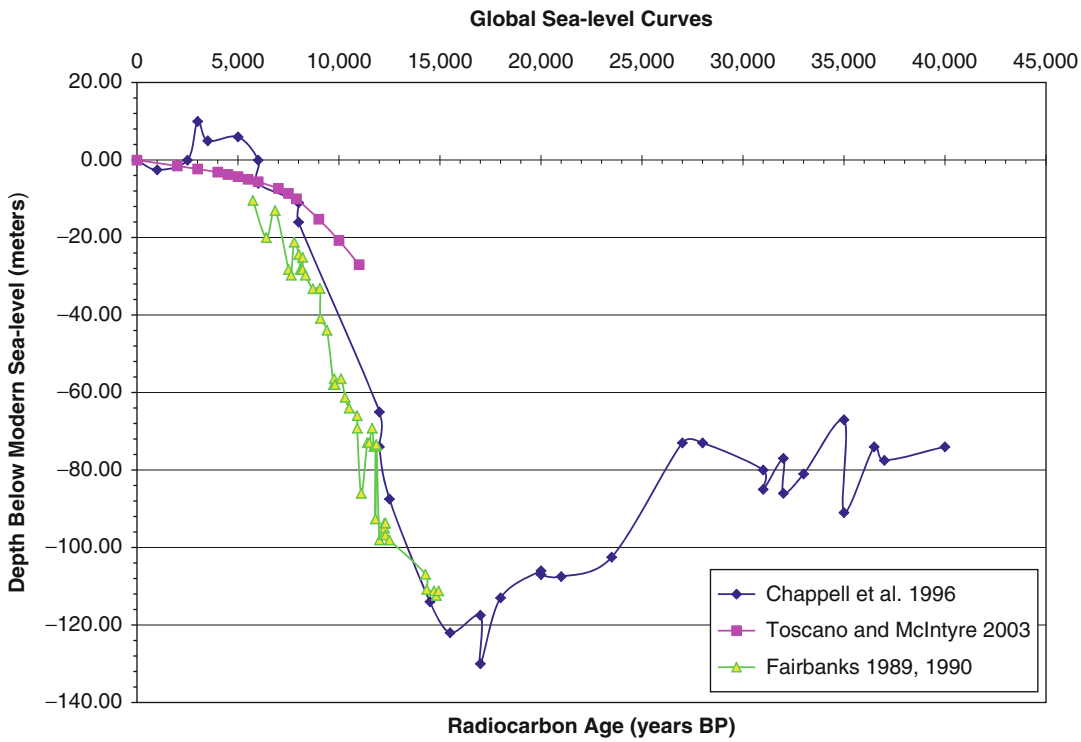

Submerged Indigenous Sites, Fig. 1 Global sea-level curves demonstrate the variability within the record at different positions on the earth in the recent past (Data recreated from Fairbanks 1989, 1990; Chappell et al. 1996; and Toscano & MacIntyre 2003)

sensing. This is useful in lakes and coastal waters where depths exceed 1 m below sea-level (BSL); however, many sites are located in the transitional shorezone, where water depths are too shallow to allow access by boats. Archaeologists working in these environments must often use a combination of terrestrial and underwater techniques. For example, studies along coastlines often combine terrestrial pedestrian survey and probing with coring and, if possible, remote sensing. This is effective in areas where indigenous sites such as shell middens are present, but would not necessarily identify a hearth or postmold. Magnetometers, which are used to successfully identify indigenous features in terrestrial settings, are not effective in submerged contexts where water depths may not allow for acquisition of data at the intervals required. The reliance on technology in submerged sites research can also make the research too expensive to conduct. Remote sensing equipment, boats, and diving equipment may escalate project budgets beyond that of a similar project conducted in a terrestrial setting.

International Perspectives

Submerged indigenous sites worldwide are beginning to receive increased attention for their potential to contribute information about early coastal populations as well as population migrations. Until recently, submerged indigenous sites research has consisted of studies of individual sites. Recent publications, particularly focusing on submerged sites in the North Sea and northern Europe, have incorporated multiple sites into regional discussions of culture at the time these now-submerged sites were occupied (e.g., Benjamin et al. 2011). Archaeologists in Europe and the United Kingdom have demonstrated the importance of data from submerged contexts.

Survey requirements protecting submerged indigenous sites are also more stringent in this part of the world.

In the United States, submerged indigenous sites receive various levels of legal protection and research interest. Increasing numbers of federal and state agencies are incorporating submerged indigenous site survey and research into their management plans. In places were survey is required in order to avoid inadvertent damage to the submerged cultural resource, requirements focus on remote sensing. Particularly in the Gulf of Mexico region, where earlier studies have demonstrated the potential for submerged indigenous sites, coring is not a requirement. In most cases where a potential submerged indigenous site is identified, the responsible government agency assigns an avoidance mitigation on the target, and no subsequent testing is required. In the United Kingdom, submerged indigenous sites are protected during offshore ground-disturbing activities such as aggregates extraction, and surveys require both remote sensing and physical samples, such as cores (Evans et al. 2009).

Future Directions

Submerged indigenous sites research is receiving increased attention in part because of climate change, and related sea-level rise. The same processes that now threaten coastal indigenous sites inundated sites in the past. Studies of submerged indigenous sites can be used to add to the archaeological record of places, but the mechanisms of inundation may also be used to protect modern sites from erosion related to modern sea-level rise.

Archaeologists must continue to investigate submerged indigenous sites. Although previous studies have focused on the methods used to locate and investigate such sites, there must be new emphasis of the context of these sites and what they mean to the local archaeological record. Sites studied in isolation are interesting anomalies. Sites discussed within the context of their spatial or temporal context provide a more complete story, and help to demonstrate the need for submerged indigenous sites research.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Landscape Archaeology
- ▶ Peopling of the Americas
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia
- ▶ Submerged Prehistoric Landscapes
- ▶ United States: Cultural Heritage Management
- ▶ Waterlogged Finds: Conservation

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Submerged Prehistoric Landscapes

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Introduction and Definition

Submerged prehistoric landscapes are those areas of former dry land that have been submerged due to both long-term and short-term processes of environmental change, most commonly sea-level rise since the end of the Last Glacial Maximum (LGM) (c. 26,500 and 19,000–20,000 years ago) during the Late Glacial Maximum (c. 13,000–10,000 years ago) (see Mithen 2004). At the height of its extent, sea levels during the LGM were as much as 120 m lower than the present day, exposing large areas of the continental shelves of the world to human habitation. These submerged prehistoric landscapes have been known about since the late nineteenth century and scientifically analyzed since the 1970s (see, for example, UNESCO 1972; Masters & Flemming 1983). One of the most famous and early excavations of such a site is that of Tybrind Vig in Denmark, where a well-preserved Late Mesolithic (Ertebølle Culture) settlement was excavated during the late 1970s and early 1980s (see Malm 1995). Submerged prehistoric landscapes also include inland prehistoric sites in inundated freshwater environments, such as Little Salt Spring in central Florida (Clausen et al. 1979) and the submerged caves of Yucatan, Mexico (González González et al. 2008). More recently, submerged prehistoric landscape studies have tended to move away from such site-specific analyses to wider landscape analyses

of the palaeogeography of the entire submerged regions (see Benjamin et al. 2011).

Alongside areas submerged as a consequence of long-term sea level rise, some submerged prehistoric sites have been submerged due to more sudden events relating to shifts in local plate tectonics, especially earthquakes and volcanic eruptions that have changed, sometimes quite dramatically, local topography (see Flemming 1971). The former, for example, are the cause of the submergence of the 5,000-year-old city of Pavlopetri that lies off the coast of southern Laconia in the Greek Peloponnese; the latter the cause of the destruction of the settlement of Akrotiri, a Bronze Age Minoan settlement on the Greek island of Santorini.

The loss of prehistoric sites either through long-term change or short-term catastrophe is thought to be the origin of many myths and legends of "lost" civilizations, most famously that of Atlantis, and more broadly of the many "inundation" stories that survive in numerous cultures' oral histories, most famously that of the Genesis flood narrative involving the tale of Noah's Ark in the Book of Genesis in the Hebrew Bible and the Christian Old Testament.

Examples

The best-understood submerged prehistoric landscapes at present are those of the European North Sea. Here, work since 1998 onwards (see Coles 1998) has analyzed with ever-increasing accuracy the range and extent of a former submerged prehistoric landscape known as "Doggerland" that used to lie between (and link) Britain with northwest Europe until flooded around 6,000 BCE (see Flemming 2004; Gaffney et al. 2009). A combination of relatively accessible sites, an extremely active marine industry focused on marine mineral extraction, and a proactive legal/management regime (especially funding provided between 2002 and 2011 by the British government under the terms of the Aggregates Levy Sustainability Fund or ALSF) all combined to provide both site-specific and broader landscape analyses for Doggerland that could be compared to relevant terrestrial datasets. The result was an unparalleled understanding of the range and significance of sites in Doggerland as well as a model for the international management of such locations. Much less well understood but arguably more famous than Doggerland is the submerged prehistoric landscape of Beringia that used to link Asia and the Americas and which functioned as the "land bridge" allowing the peopling of the Americas from c. 20,000 years ago onwards. The extreme cold and inaccessibility of this area, especially those parts of Beringia now flooded by the Bering Sea, has led to relatively limited archaeological fieldwork taking place here, although the basic extent and principle of the Beringian landmass has been known since the 1930s (see Hoffecker & Elias 2012).

Key Issues and Current Debates

The tools and techniques required to access and analyze the submerged prehistoric landscapes are now well refined and understood, and the data from such sites sits within a broader matrix of data from terrestrial prehistoric sites. As a consequence, the key issues and current debates of such sites focus most often on [a] mapping the global extent of such sites, especially in lesser-known locations and [b] agreeing the management of such landscapes, especially in relation, where present, to Indigenous Communities who may have ancestral links to the former occupants of these areas. Submerged prehistoric landscapes frequently cross modern international territorial boundaries, and as a consequence, their management is often confused (see Flatman 2012). In addition, existing domestic and international heritage management models and laws are frequently ill suited to the geographical extent and physical sensitivity of such sites. Most such heritage laws are designed to protect relatively well-preserved historic-era wreck sites that lie within a small and usually easily defined area, not characteristics common to submerged prehistoric landscapes that may

cover, at an albeit low density of data, thousands or even hundreds of thousands of square miles of seabed.

Future Directions

Beyond the examples discussed above, many other submerged prehistoric landscapes are known to exist around the world, many barely explored. For example, on the basis of known sea-level changes since prehistory, large sections of the continental shelves of Central and South America, southern Africa, and the Indian Subcontinent must all have originally been dry land and were, presumably, settled by prehistoric communities. Little is known of the archaeology of such areas, although Bailey (2004) has outlined their potential. Some of the most dramatic archaeological discoveries of the twenty-first century are likely to come from such sites, where the range and extent of submerged materials may in time redraw our understanding of the date and nature of early human occupation and migration. In particular, the submerged prehistoric landscapes of Southeast Asia (commonly referred to as Sunda and Sahul – see Allen et al. 1977) may provide new dates for the earliest human occupation of Australia, potentially revising our understanding of when and precisely how that continent was occupied.

Ongoing changes in global climate leading to the warming of the Arctic and seasonal and/or permanent loss of pack ice may in particular lead to the discovery of new data for Beringia in the twenty-first century. As the Bering Straits and surrounding coastlines of Alaska, Chukotka, and Kamchatka are rendered relatively more accessible through this process, industrial developments (especially the search for oil and gas reserves) and more broadly shipping routes (especially the regular commercial use of the Northwest Passage) seem likely to lead to the discovery of significant remains from this prehistoric landscape. How such industrial impacts on these landscapes will be managed (if at all) and what part the Indigenous Communities of these areas will play in that management remains to be seen, but the worry has to be that the demands of industry will sweep concern for the past as well as present communities of such regions aside in the pursuit of short-term financial gain.

Cross-References

- ▶ Arctic Ocean and Bering Sea: Maritime Archaeology
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Peopling of the Americas
- ▶ Submerged Indigenous Sites

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Sugarcane: Origins and Development

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Basic Species Information

Sugarcane (*Saccharum officinarum L.*) is one of the world's most important crops, primarily to refine into sugar and increasingly for biofuel. Sugarcane is cultivated for sucrose that accumulates in its stalk, although it was also traditionally grown for its edible inflorescences, for medicine, and as a raw material for weaving and a variety of other uses. Sugarcane is cultivated vegetatively by planting a stalk segment that contains a reproductively viable bud. Although widely perceived to be a traditional snack food, sugarcane has been documented as a staple in parts of the eastern highlands of New Guinea (Daniels & Daniels 1993), and its importance in other regions in the past should not be underestimated, especially for fodder (Fig. 1).

Sugarcane: Origins and Development, Fig. 1 Bound stands of sugarcane growing in a cultivated plot in the highlands of Papua New Guinea (Photo: Tim Denham, 1990)

Sugarcane is an interspecific cultivar predominantly derived from the hybridization of *S. robustum* and *S. spontaneum*. The domestication of sugarcane has not been fully defined, and alternative scenarios exist (Daniels & Daniels 1993). In lieu of more intensive genetic investigations, the dominant scenario suggests initial domestication in the New Guinea region with subsequent westward dispersal and interspecific hybridization in Southeast Asia (Grivet et al. 2004).

Major Domestication Traits

The initial stages of sugarcane domestication have been proposed to involve the anthropic

selection and domestication of a wild ancestor of *Saccharum robustum* in New Guinea (Simmonds 1976: 104-108). Lebot advanced the same scenario in his evaluation of the molecular evidence to suggest (1999: 622-623):

> … *S. robustum* is the most likely precursor of sugarcane and was domesticated in New Guinea where human selection of chewing plants with sweet juice and low fibre produced the *S. officinarum* clones. Cultivars were subsequently differentiated in numerous distinct morphotypes via vegetative propagation and selection of somatic mutants.

Lebot (1999: 623) concluded that "*S. officinarum* cultivars are derived from introgressions between wild forms of *S. robustum* and *S. spontaneum* in Melanesia." Lebot envisaged a similar domestication scenario for *Saccharum edule*, a plant cultivated in New Guinea for its aborted inflorescences.

While agreeing that initial domestication of *S. robustum* occurred in New Guinea, Grivet et al. (2004) consider that the resultant cultivar dispersed westward to Island Southeast Asia where it hybridized primarily with wild populations of *S. spontaneum* to produce *S. officinarum*, as well as with other species in various regions to produce other cultivars. Grivet et al. (2004) consider *S. spontaneum* to be a recent introduction to New Guinea.

Timing and Tracking Domestication

Archaeobotanical evidence of any antiquity for sugarcane is almost nonexistent. A putative macrobotanical find from Yuku rock shelter in the New Guinea highlands has been dated by association to 5,750–4,800 years ago (GX-3111B; Bulmer 1975: 31). However, the identification of that find is uncertain (Yen 1998: 31), and its antiquity is also open to question due to disturbance at the site (author's research). A macrobotanical find from Kuk Swamp, collected from a domestic context dating to the last few hundred years, was originally identified as *Saccharum officinarum* by John Hather (Jack Golson *pers. comm.* to Tim Denham, 2012), and the veracity of this identification is still being investigated. Major problems in seeking to identify archaeobotanical samples have been the lack of reference material from other *Saccharum* species and related grasses and the current inability to differentiate *S. officinarum* phytoliths from similar grass morphotypes.

In the absence of reliable archaeobotanical identifications, an inferential method for approximating the antiquity of sugarcane cultivation and domestication comes from historical linguistics. Any derived chronological information is, however, at best tenuous. For example, a cognate term for sugarcane, namely, *CebuS, reconstructs to Proto-Austronesian, the languages on Taiwan before the subsequent differentiation and dispersal of Austronesian languages southward to Island Southeast Asia after c. 4,500–4,000 years ago (e.g., Pawley 2007). Significantly, the word for "chew on sugarcane," which is how the sugar is traditionally extracted within Island Southeast Asia and New Guinea and probably why it was originally selected by people (following Lebot 1999), only reconstructs to Proto Malayo-Polynesian (Pawley 2007); namely, the term was integrated into the Austronesian lexicon only after the languages dispersed southward to Island Southeast Asia.

It is uncertain if the linguistic reconstructions are sufficiently specific, either botanically or chronologically, to anchor an interpretation of sugarcane geodomestication. If they are reliable, then several stages in the domestication of sugarcane occurred before Austronesian language dispersal from Taiwan, including initial domestication of *S. robustum* in New Guinea, westward movement of the derived cultivar to Island Southeast Asia, and subsequent hybridization with *S. spontaneum* to form *S. officinarum*. Linguistic evidence also indicates that the practice of chewing on sugarcane to extract the sucrose-rich juice occurred in Island Southeast Asia before Austronesian languages dispersed there.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Agricultural Practices: A Case Study from Papua New Guinea

▶ Bananas: Origins and Development
▶ Domestication Syndrome in Plants
▶ Domestication: Definition and Overview
▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Kuk Swamp: Agriculture and Domestication
▶ Plant Domestication and Cultivation in Archaeology
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Sullivan, Sharon

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Basic Biographical Information

Sharon Sullivan is an Australian archaeologist and heritage planning and management advisor and former senior public servant. She grew up in northern NSW, going to school in Glen Innes and Armidale before taking an honors degree in Prehistory, Ancient history, and Australian history at the University of New England (1964). Her honors thesis was on the Aborigines of the Richmond-Tweed River valleys. She completed a Diploma in Education (1965) and a master's degree with honors (1972) with a thesis titled *The Material Culture of the Aborigines of North Western New South Wales*, also at UNE. During her undergraduate and postgraduate studies, Sharon took part in extensive fieldwork locating, recording, and excavating Aboriginal prehistoric sites throughout NSW with Dr. Isabel McBryde and worked as her research assistant 1966–1967.

In 1969 Sharon joined the Resources Division within the National Parks and Wildlife Service of New South Wales, where she was responsible for the location, recording, and management of Aboriginal sites throughout the state, and technical advice on the acquisition and management of historic sites by the service. The success of this work led to the establishment of a dedicated Aboriginal and Historic Resources Section in 1976, which later became the Cultural Resources Section in 1983. During this period she also won a Public Service Board scholarship to study heritage site management in the USA for 3 months (1973). In 1985 Sharon promoted to Acting Regional Director Central Region of National Parks with a staff of 320, this position being confirmed in 1986. In 1989 she became Deputy Director (Field Operations) of the NSW National Parks and Wildlife Service.

In 1985–1986 Sharon was appointed a co-opted Commissioner of the Australian Heritage Commission, in which role she coordinated a national workshop on a National Cultural Conservation Strategy. In 1990 she became the Executive Director of the Australian Heritage Commission in Canberra, subsequently promoted to Group Head of the Australian and World Heritage Group of the Australian Government's heritage and environment department. Sharon left the public service in 1999 and established Sullivan Blazejowski and Associates Heritage

Consultants. Since then she has played a major role in the development of heritage management philosophy and management in Australia and internationally (particularly in relation to World Heritage management) and has run training courses in these issues in many countries.

Major Accomplishments

Sharon Sullivan's leading role in the NSW National Parks and Wildlife Service and the Australian Heritage Commission was during a period of seminal developments in the philosophy and practice of heritage identification and management in Australia. She made many significant contributions to the field, including initiation of the first agency-supported research by Aboriginal people into sites of significance in eastern Australia and developing subsequent approaches with Aboriginal people in methodology and the protection and management of Aboriginal sites. These pioneering protocols and programs in heritage management were the basis for what is taken for granted in Australian Aboriginal site management today. She played a major role in developing national systems of regional and thematic assessment of heritage and cooperative and problem-solving approaches to land-use conflicts that have been reflected in evolving legislation at state and national levels and in heritage management practice at all levels.

Sharon's expertise and heritage management skills have resulted in her appointment to many prestigious positions. She worked with the World Heritage Bureau and the World Heritage Committee reviewing nominations, technical guidelines, and the operations of the committee as well as being for a period the Australian Government's main adviser and international representative on the World Heritage Committee. She is the Chair of the Port Arthur Historic Site Authority (a World Heritage site), Acting Commissioner in the NSW Land and Environment Court, Deputy Chair of the NSW Heritage Council, Executive Councilor of the Australian Institute of Aboriginal Studies, a member of the Australian Heritage Council, a National Committee member of Australia ICOMOS, a member of the Australian Research Council's College of Experts on the Humanities and Creative Arts Panel, and a member of the Institute for Professional Practice in Heritage and the Arts at the Australian National University. In 2001 she completed a Getty Conservation Institute Senior Residential Fellowship. She has done consulting work for the World Monuments Fund (Africa, Cambodia), World Bank (China), ICCROM (Africa), and the Getty Conservation Institute (Africa and China). Sharon was Australian project leader of the Australia-China-Getty Conservation Institute partnership in 1999–2000 to develop a set of Heritage Principles for Chinese site management, which were promulgated by China ICOMOS. She worked subsequently with two Chinese World Heritage sites to implement these principles. Sharon has taught and guided site managers in Australia, USA, Cambodia, Africa, and China and is currently part of a multidisciplinary team working together with UNESCO, the Cambodian Government, and the consulting firm Godden Mackay Logan to prepare a Heritage Management Framework for the World Heritage site of Angkor.

Sharon Sullivan's contribution and standing in the heritage field has been acknowledged in many ways. She is an Adjunct Professor in the School of Natural and Rural Systems, University of Queensland, in the Department of Archaeology and Paleoanthropology, University of New England, and in the School of Anthropology, Archaeology, and Sociology, James Cook University, North Queensland. Sharon was elected a Fellow of the Australian Academy of the Humanities in 1996 and made an Officer of the Order of Australia in 2004 for her "service to cultural heritage conservation, including Indigenous heritage, and to influencing conservation practices worldwide." The prestigious Rhys Jones Medal for Outstanding Contribution to Australian Archaeology was awarded to her by the Australian Archaeological Association in 2005; Honorary Life Membership of international ICOMOS was conferred in 2005, and she was presented with an Honorary Doctorate by James Cook University in 2003 and an Honorary Doctor of Letters by University of New England in 2011.

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Australia's Archaeological Heritage
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Supermodernity and Archaeology

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Introduction and Definition

The term supermodernity (*surmodernité*) was coined by French anthropologist Marc Augé in 1992 to define the period commonly known as late modernity. The usefulness of the concept of supermodernity, as compared to other definitions of the later part of modernity, rests on two things: the idea of exaggeration and the retention of the concept of modernity. Regarding the first point, Augé (2002: 26-45) talks of three excesses: factual overabundance (which is associated with an acceleration of historical time), spatial overabundance (the abolishing of distance by electronic media and transportation), and an excess of self-reflexive individuality. We can add a fourth excess: material overabundance. In relation to the idea of modernity that Augé keeps in his definition, it can be said that while some of the notions of modernity might seem to be outdated, as the defendants of postmodernity argue, its core categories are certainly not. I consider that postmodernity is, in fact, a period characterized by an awareness of the risks and flaws of being modern but which has not been able to overcome modernity's troubles. Our current concern with ecological and social catastrophe at a global scale is the demonstration that the

process which started during the fifteenth century is far from finished: we are probably just witnessing its climax.

Key Issues/Current Debates

The term "supermodernity," then, captures well the essence of our present period of modern exaggeration. Another question is when to start such a period. Augé does not give clear indications, although it is implicitly understood that it covers the same time span that others identify with post-, high, late, or liquid modernity (Giddens 1991; Jameson 1991; Bauman 2000) and which begins around the end of the Second World War or later depending on the authors. This is the periodization that some researchers follow to define the archaeology of the contemporary as the study of the time that goes "after modernity" (Harrison & Schofield 2010). Although trying to parcel time may seem to be a fruitless historicist exercise, I think that it can also be a way of reflecting on history and time differently. What we need is a periodization of modernity that fits the archaeological record. It is necessary to privilege in our periodizations not the phenomena identified by sociologists, culture historians, or philosophers but the processes of creation and destruction of matter that archaeology has traditionally employed to make sense of time and change. We have to follow the time(s) of things (Olivier 2008: 247-252).

From this point of view, a moment that seems best suited to start supermodernity is the early twentieth century. It has been pointed out that the transition between the late nineteenth and the early twentieth century inaugurates a period in which globalization reaches its first apex and becomes truly global. Globalization is not just the circulation of people, images, or ideas, it is also (perhaps primarily) the circulation of material objects. This was made possible by technologies of transport and communication that abolished distance in the service of an ever-expanding global capitalism (Harvey 1990). The materiality of the world became more and more integrated – more and more similar – and the mass production of objects played an outstanding role in this process. More importantly, and perhaps not sufficiently appraised, the period that begins in 1914 is marked by mass destruction of human lives, societies, things, and the environment at an unprecedented scale in the history of humankind. Interestingly, although the relationship between globalization, production, and consumption has often been emphasized, the globalization of death has been less discussed. Thus, historians agree that the 1914–1945 period witnessed the collapse of the first globalization (Obstfeld & Taylor 2003: 125-126) as opposed to the late nineteenth century, but this is only the case if we pay attention to the movement of free citizens, capital, and consumer goods. If we look at the circulation of soldiers, refugees, war machinery, and destruction, 1914–1945 is actually a period of astonishing global integration (Fig. 1). High explosive has probably contributed as much to globalization as Coca-Cola, if not more.

In fact, should supermodernity end tomorrow, it would be perfectly identifiable from an archaeological point of view, thanks to global destructive processes. The things that demand the attention of intellectual gurus, social commentators, and their many followers seem somewhat banal compared to other issues that are leaving an indelible archaeological imprint in the world. In the long run, postmodern architecture would seem just like an anecdote (like the difference between Baroque and Rococo), and without new media, the pace of global integration and social change would perhaps be a little bit slower, but it would happen nonetheless. It is on the destructive operations of supermodernity that archaeology can provide a distinct and necessary critical perspective. After all, the transformations that archaeology documents more easily are changes in material organizations with high irreversibility (Lucas 2008), and these are also the ones that have further-reaching consequences historically: consider the collapse of the communist regimes, the Second World War, or the end of peasant societies, all of which have left a wake of razed landscapes behind.

If instead of looking at destruction, we focus on creation, the situation is not different.

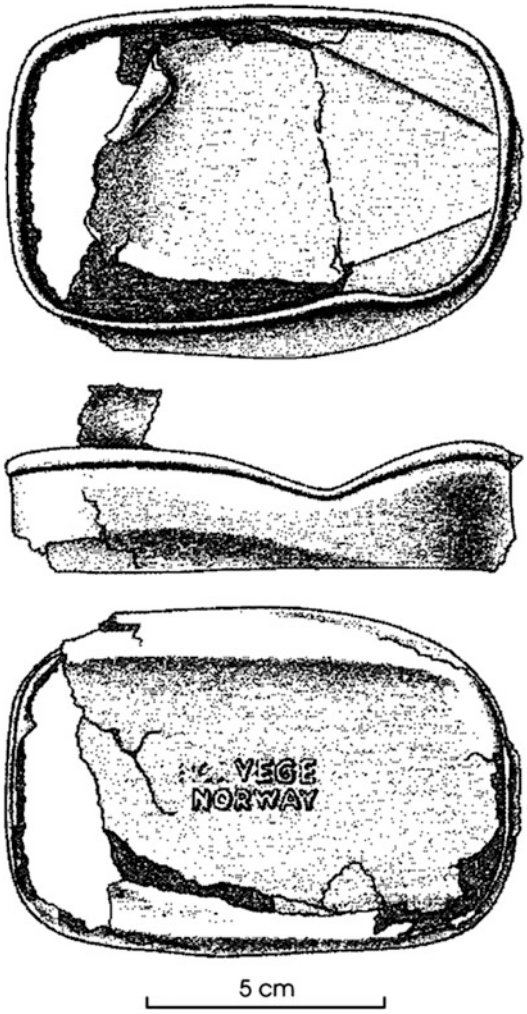

Supermodernity and Archaeology, Fig. 1 Another kind of globalization: a tin can from Norway consumed by Eritrean soldiers at the service of fascist Italy in the frontier between Sudan and Ethiopia

The supermodern landscapes of creation (Penrose 2007) are also landscapes of oblivion and devastation. Urbicide is not only inflicted during wars (Coward 2008), it can also take the shape of urban renewal (Mullins 2006). In fact, destruction and construction should not be opposed; they are inextricably linked. This is obvious in slash-and-burn agriculture: the forest is felled, burnt down, and cultivated, but later the fields are fallowed and the trees revive with further strength. Similarly, the Neolithic houses of Anatolia and the Balkans were regularly destroyed only to be rebuilt again, energized by the seeds of the ancestors. The Neolithic probably marks the beginning of the strong interdependence between construction and destruction and death and the regeneration of life (Stevanovic 1997; Kuijt 2008). In this context, the destruction of houses would be "a matter of continuity rather than ending" (Hodder 2010: 150). It is not strange that this rationality emerged with the appearance of cultivation, which is also based on cycles of life and death.

Yet with modernity, this logic is no longer sustainable: unlike in Neolithic and other non-modern societies (e.g., Küchler 2002), destruction is no longer a form of continuity, regeneration, and remembrance but of rupture and forgetting. Destruction is neither a form of creating and maintaining relations but of cutting them off: death has become an end in itself. In non-modern societies, even war and predation are ways of extending relations (Harrison 1993, Fausto 1999). The change in the nature of destruction in supermodernity is no better exemplified than in the mass production of nuclear weapons that can wipe out the entire humanity: death for death's sake. Robert Oppenheimer's words epitomize the sense of a new age of total destruction: "Now, I am become Death, the destroyer of worlds." Oppenheimer's famous misquotation is meaningful: the original cite from the Bhagavad Gita is "I am become Time, the destroyer of worlds." But time can no longer destroy things with its slow rhythm as it used to. Augé (2003: 110) says that "only a catastrophe can produce today comparable effects to the slow action of time," only Hiroshima or Katrina.

Spatial Excess

One of the points that makes Marc Augé's definition appealing for archaeologists is his concern with places. According to Augé (2002), the time of supermodernity is marked by a shift from places to non-places: "If place can be defined as relational, historical and concerned with identity, a space that cannot be defined as relational, historical or concerned with identity can be defined as a non-place" (Augé 2002: 83). Non-places do not foster symbolic relationships or a shared

heritage. Their purpose is only to facilitate circulation and consumption in a global world (Augé 2003: 101). Non-places have all the appearance of a dejà vu, which is not innocent: their mission is precisely to neutralize the sense of alienation in a foreign environment (Harrison & Schofield 2010: 256). They eliminate the place-ness of places. Airports, highways, malls, and hotels are typical non-places. Elsewhere, Augé (2003: 71) distinguishes between two categories: non-places of refuge and non-places of image (simulacra). The non-places of refuge are related to emigration and escape. We could include here detention centers for immigrants, customs posts, and refugee camps. The non-places of image are best exemplified in theme parks and tourist resorts – all virtually identical from one corner of the globe to the other.

The idea that the supermodern world is filled with simulacra is shared by other thinkers. It was another French scholar, Jean Baudrillard (1994), who employed the term *simulacrum* to define something which is not a copy of the Real but that actually exceeds reality and creates its own truth. This hyperreality of the supermodern Augé finds it not just in new constructions but also in the restoration of heritage, which creates a sort of historical hyperreality. What is interesting is what the anthropologist opposes to heritage sites: ruins. "The contemplation of ruins," writes Augé (2003: 7), "allows us to catch a fleeting glimpse of the existence of a time that is not the one about which history books speak or the one that restoration works try to resuscitate. It is a pure time, to which no date can be assigned."

Although the existence of non-places has been questioned (Bender 2001: 78), it can still be argued that there are certainly spaces in supermodernity that if not totally devoid of identity, relationality, or historicality are at least hostile to the idea of memory and belonging. Archaeologists have started to study non-places in a way that is akin to de Certeau's (1984) approach to everyday tactics of resistance. Against the idea of monolithic non-places, researchers reveal the practices through which non-places can be appropriated and resisted. "The alienating qualities of these places are fragile: they can be challenged," argue Hicks and Hicks (2006). Without negating the dismal aspects of non-places, in this case a retail center in Wales, Graves-Brown (2007) also points out ways in which the physical barriers that enclose the "concrete islands" that are malls are circumvented in practice. Harrison and Schofield (2010: 256-257), in turn, suggest that archaeology itself can become a critical practice: if non-places are presented as neutral and ahistorical, archaeology has to reveal "the specific histories of these places and the ways in which they are concealed from the public. The peeling carpet, the layers of paint, and the traces of previous styles of airport furniture all carry a sense of the specific history of the airport departure lounge, signaling to the passenger that he or she is in 'this' place rather than some other." A similar approach is that of geographer Tim Edensor (2005), whose work has focused on another kind of non-places: abandoned industrial spaces. Although they are commonly perceived as a black hole in the urban fabric, Edensor shows that they are also arenas for creative engagements with materiality, where the regimented space of the supermodern city is actively subverted. The heterodox uses to which these ruins are put are a hint of another possible city and alternative urban experiences. While this is a valuable approach that can reveal an unexpected side to supermodern spatiality, we can wonder: do we not run the risk of overlooking the power structures that support the existence of non-places by trying to find small cracks in the system? How destabilizing to supermodern power actually are the paths open in the gardens of a shopping center, a peeling carpet, or the teenagers smashing windows in a derelict factory?

Non-places are just a variable of supermodern geographies. Other kinds of spaces exist. Bauman (2000: 98-104), following different authors, proposes a typology of mostly dystopic places, which he labels *emic*, *phagic*, and *empty* (in addition to non-places). Emic places create spatial separations (prisons, ghettos), whereas phagic spaces digest people and suspend otherness – consumer spaces fit in this category. Empty places are those that lack meaning, "leftover places." I have suggested a category of place

Supermodernity and Archaeology, Fig. 2 An abandoned radar-guided antiaircraft weapon system (ZSU-23) in the rainforests of southwestern Ethiopia

that tries to make sense of the politics involved in the spatial excesses of supermodernity: places of abjection. Like empty places, they are also a leftover and a memory gap. However, it is important to emphasize that places of abjection are characterized by an excess of wasted materiality: battlefields, scenarios of massacres, industrial disasters, and shanty towns. When one walks around a war site of the last 100 years, one is struck by the enormity of material waste: concrete, cans, and shells litter vast expanses of empty, forgotten land (Fig. 2). A similar impression can be obtained in slums, whose messy material overabundance stands in stark contrast to the sanitized, empty spaces of privatopias (Penrose 2007: 34-35). Unlike other spaces of supermodernity, places of abjection are only produced by political processes of marginalization and exclusion of (subaltern) people, (abject) matter, and (dissonant) memories.

Time Excess

"The time is out of joint." Hamlet's words resound along Derrida's book, *Specters of Marx* (2006). "Time is disarticulated, dislocated, dislodged, time is run down, on the run and run down, deranged, both out of order and mad. Time is off its hinges, time is off course, beside itself, disadjusted" (Derrida 2006: 20). This is a more eloquent way of describing the state of time in supermodernity than the usual idea of accelerated time. Because it is not only that things go faster or that there is a factual excess, as Augé and others suggest. It is also, more precisely, that time is out of joint, which is also saying that time is both unjust and anachronic (Derrida 2006: 25). Derrida, then, links temporality and morality, both of which are put into crisis by supermodernity.

It is probably this feeling that has led archaeologists to focus on alternative, heterogeneous temporalities (Witmore 2007; Hamilakis 2011), which are also a matter of concern in other fields (De Landa 2000). Archaeologists working in the recent past have to be, more than any other practitioners, ready to appraise nonlinear time to make sense of a world where time is deranged. They have to revalue other temporalities, those of subaltern and non-modern communities, which still survive in the interstices of the supermodern world. They have to make visible these slower, bodily temporalities, as a way to challenge the disarticulated ephemerality of supermodern time. A good way of reclaiming other temporalities is showing its persistence in the present, the time of objects that anchor time, instead of disintegrating it: the time of immutable things, which has been forgotten. Think of a knife, an axe, or a stone wall. They do not call the attention of students of material culture, which are fascinated by cell phones and tablet computers. An archaeology of

Supermodernity and Archaeology, Fig. 3 Ephemeral consumption in the West, durable devastation in the rest: an illegal logging camp dismantled by the police in the Brazilian Amazon rainforest

supermodernity does not only study what is new and changing; it should also vindicate the subaltern artifact that resists the annihilation of time: the humble, elementary object (Olivier 2008: 288) (Fig. 3).

Because the time of supermodernity is not only disjointed and accelerated, it is also a time that continuously abolishes itself. For supermodern societies, there is no past or future: only the instant (Bauman 2000: 125). There is an excess of present. From the point of view of material culture, the relationship of this temporality with planned obsolescence and fashion has already been noticed. Archaeology can, of course, study the ephemeral temporality of supermodern technologies, but it can do something else. Archaeology can show the collateral damages of instantaneity: living the instant, with a total disregard for sustainability in the long term, requires an intensified predation on the environment, which leaves a far-from-ephemeral trail of devastation (cf. González-Ruibal & Hernando 2010). The ephemerality of material culture is certainly not new: it was already noticed at the beginning of the supermodern period, when skyscrapers in New York were torn down almost as fast as they were being built, over a 100 years ago (Yablon 2009: 244-246). The supermodern metropolis is hollowed out of a past; it inhabits an amnesic present. Connerton (2009: 88) talks about "the reign of a perpetual present." Here lies another possible contribution of archaeology: by excavating the foundations of post-mnemonic cities, the discipline can simultaneously show that other worlds are possible and that *there exists* a past. Such an assertion, under the prevailing memory regime, can become a truly political one, especially if this past destabilizes the cleansed histories of progress or romanticized heritage pastiches (Hall & Bombardella 2005).

Material Excess

Material excess is one of the defining characteristics of supermodernity. However, sociologists and theorists have tended to downplay the relevance of matter and have preferred to focus instead on the less tangible aspects of supermodernity, either from a critical or celebratory point of view: networks (Castells 1996), fluidity (Bauman 2000), speed (Virilio 2002), and the virtual more generally. Capital flow, fast consumption, new media, and intercontinental travel give the impression that we are leaving a dematerialized existence: Bauman (2000: 113-118) talks about the shift from a "heavy" to a "light modernity." But is supermodernity truly that light? I would contend that, on the contrary, society has never been heavier and that to consider it light is the result of a process of

purification, sensu Latour (1993), that black boxes the material foundations of supermodernity. I do not intend to rule out the metaphor of liquid modernity altogether, which I think is apt and insightful. The problem is that the metaphor can lead us to forget both the true weight of our present time and that this weight is not equally distributed. There are some regions of the world (those who suffer war or capitalist depredation) where supermodernity is heavier than in others.

The problem is that media gurus and journalists always tend to emphasize processes of virtualization. A good case in point is war, which is usually presented as a high-tech video game. Yet the combat gear of supermodern soldiers is bulkier than ever: only their body armor can weigh up to 15 k (Tyson 2009). And it does not matter how light a Predator drone is and that it is operated remotely; its effects are still strongly material and situated: rubble and splintered bones in a Pakistani or Yemeni village. Archaeology can be a counterbalance to the generalized perception of the world as plastic (Olsen 2003; González-Ruibal 2008: 252-254). An emphasis on fluidity and movement, in fact, may lead us to forget all the material strategies of fixation and circumscription deployed by supermodern powers: movement is always controlled. Those who move and the things that circulate have to be allowed to do so. It is a historical paradox that moments of high globalization come hand in hand with walls and fences: Hadrian's Wall, the Great Chinese Wall, the US-Mexico border fence, and the Israeli West Bank barrier.

Archaeologists have not been the only ones to have paid attention to materiality. Art has shown a fascination with material excess for the last three decades at least. Godfrey Reggio's *Koyaanisqatsi* (1982) is a powerful audiovisual account of supermodernity, in which the mass production and mass destruction of materiality are repeatedly overlapped. A similar aesthetics is deployed by Andreas Gursky (2008) in his monumental photographs of cities, buildings, and crowded spaces and Burtynsky's (2009) equally vast depictions of supermodern landscapes altered to the extreme by heavy industry. These and similar works convey the impression of a deeply material world gone excessive, of superhuman scale and irreparable ecological damage and loss – things for which words alone cannot suffice: "a world beyond words" is the tagline of another visual experiment along this line (Fricke 1992). However, it is important to bear in mind that the art of supermodern destruction is an art of the sublime, with the ethical problems that this entails.

Burke (1834: 32) famously defined the sublime as "Whatever is fitted in any sort to excite the ideas of pain and danger, that is to say, whatever is in any sort terrible, or is conversant about terrible objects, or operates in a manner analogous to terror." Terror, in turn, is associated to power: power is sublime because it can inflict pain and terror and only when power is deprived of this ability, "you spoil it of everything sublime and it immediately becomes contemptible" (Burke 1834: 40). Yet the sublime is not only linked to terror and power but also to pleasure and beauty: "When danger or pain press to nearly, they are incapable of giving any delight, and are simply terrible; but at certain distances, and with certain modifications, they may be, and they are, delightful" (Burke 1834: 33). This is what the art of supermodernity achieves: it creates a distance with terror and pain that renders the destruction of the world produced by supermodern power aesthetically pleasurable and in the last instance, safe and consumable. This can be noticed in Dan Dubowitz and architect Patrick Duerden's exhibition: *Fascismo Abbandonato*. They have been documenting abandoned buildings of the fascist period in northern Italy, particularly youth camps. Theirs is an evocative vision of a failed modernist dream. As it happens with other similar undertakings, the exhibition is aesthetically powerful – but perhaps too much. There is an unabashed aestheticization of the subject. Thus, Duerden and Dubowitz describe the ruins as "huge and sublime" (http://www.fermynwoods.co.uk/archive/water-tower/dan-dubowitz-patrick-duerden/) – a description that would have pleased Mussolini. Herein lays the difference between the

Supermodernity and Archaeology, Fig. 4 Victims of fascist violence during the Spanish Civil War. Exhumation by Juan Montero (2009)

work of art and the work of archaeology. Although aesthetics are not absent – and do not have to be – in the archaeology of supermodernity (see Andreassen et al. 2010) as well as in critical artistic practice (Blocker 2009), in the balance between terror and beauty, it is terror and power that should prevail: disgust rather than pleasure. Consider two examples of supermodern excess: garbage and violence.

In William Rathje's research on garbage, there is little room left for beauty (of the conventional kind, at least): what we have are mountains of highly polluting rubbish or daily garbage fresh from the bin (Rathje & Murphy 1992). Likewise, the exhumations of victims of political violence disclose piles of bodies, an excess of shattered human matter, which has become a fossil guide for supermodernity (Montero 2009) (Fig. 4). However, archaeology does not only excel at revealing the abject: it also creates stories out of things – all things, no matter how humble or abject. With Gursky's photographs, we are left in awe, but this is a sublime awe similar to that produced by the manicured space of a military cemetery (Augé 2003: 103). Instead, by carefully dissecting ruins, locating artifacts, studying the relation of small objects and structures, and exploring the sites' afterlife, archaeologists can come up not just with a potent imagery but also with detailed narratives. It is powerful stories that we obtain out of garbage from a landfill, a mass grave, or the place of a disaster (Gould 2007). It is also this production of narratives that allows archaeology to construct a critical discourse on supermodernity, not just to stare at it in astonishment and powerlessness. Archaeology, thus, combines a concern for the manifestation of materiality, akin to art, and a commitment to analyzing reality, which relates it to other social sciences.

Future Directions

Supermodernity has been defined here as a period within modernity characterized by excess. I have defended that archaeology can make a contribution to understanding supermodernity by looking into the excesses of time, space, and, particularly, materiality. While the overabundance of the spatial and the factual has often come under scrutiny, material excess

has repeatedly escaped the gaze of theorists and it has mostly fallen to artists the task of manifesting it. Archaeologists, however, are in a good position to join artists in the examination of supermodern materialities. The study of late modernity has been too focused on the ethereal realms of hyperreality and virtuality: the complex semiotics of simulacra and networks have captured all the attention of scholars and philosophers. As opposed to this, I would argue that the mission of archaeology is to address the Real, sensu Slavoj Žižek: the Real is what resists symbolization, "the traumatic point which is always missed but none the less always returns, although we try – through a set of different strategies – to neutralize it, to integrate it into the symbolic order" (Žižek 1989: 69). Culture students abhor the Real precisely because it escapes hermeneutic efforts, but archaeologists are continuously facing the unconstituted, which is "not simply the unsaid, but the unsayable – it lies outside the said, outside discourse" (Buchli & Lucas 2001: 12). Referring to the Titanic, which has been transformed into a sublime object, Žižek (71) argues that "all the effort to articulate the metaphorical meaning of the Titanic is nothing but an attempt to domesticate the Thing by reducing it to its symbolic status, by providing it with a meaning." What archaeologists have to do is to expose the excess of supermodernity beyond symbolization: the raw, traumatic Thing at the core of the Real.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Chronopolitics and Archaeology
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Industrial Archaeology
- ▶ Modern Material Culture Studies
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value
- ▶ Non-places in Archaeology
- ▶ Rathje, William Laurens
- ▶ Urban Heritage

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Surface Survey: Method and Strategies

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Introduction

Archaeological excavation takes time, and while it provides a great deal of information about the nature of past activities, it provides only indirect information on how these activities were distributed across space. Surface materials, on the other hand, are quicker to record not because the recording is any less detailed but because the

material to be recorded is immediately visible. For a given set of resources, many more surface locations can be recorded and their contents analyzed. As a consequence, archaeologists working in many countries have conducted surface surveys over large areas. In doing so, they have taken advantage of advances in survey technologies like *Global Positioning Systems* (GPS) and total stations together with software like *Geographic Information Systems* (GIS) and relational databases to greatly enhance their ability to record the spatial distribution of artifacts and sites.

Definition

In both the Americas and Europe, modern survey emerged from the 1970s as a means of investigating settlement patterns, past population densities, and socioeconomic complexity (Whitmore 2007; Kowalewski 2008). Cherry (2003), for instance, combined probabilistic designs with systematic, pedestrian survey on Melos involving people separated by regular intervals, walking across the land surface, recording exposed artifacts. Transect lines, 1,000 m wide and orientated north–south, were staggered across the island. Chronology was obtained from the typology of artifacts, established through earlier excavations, and the probable function of the artifacts was assessed in the field to provide an indication of the functional status of the sites identified. This basic scheme characterized later projects although the intensity of survey (as measured by the spacing between field walkers) and the tendency to survey continuous blocks rather than transects changed as did the concern for processes that might have altered or obscured the surface archaeological record.

Changes in the intensity of field survey are correlated with the numbers of sites recorded. However, increasing survey intensity comes at a cost, since the more time spent surveying in one area, the smaller the region that can be covered. Critics suggested that some intensive surveys were too small in extent to reveal useful socioeconomic interpretations (e.g., Kowalewski 2008). One solution to this problem was to combine the results from a number of independent surveys, thereby permitting the analysis of results from large areas; however, as Alcock and Cherry (2004) indicated, there are difficulties involved in combining the results from multiple survey projects where data recording standards are not equivalent. Making inferences based on the number of sites, for instance, depends on site areas being calculated in the same way between projects, with obvious biases introduced if common standards are not adopted**.** Similar issues occur within individual survey projects. Different processes effect *survivorship* of the archaeological record and hence its visibility, both at the scale of the archaeological site and at that of the individual artifact (Terrenato 2004). Pottery, for instance, degrades with age, depending to some extent on the way it was made. Therefore, ancient sites may be less visible than more recent sites. The complexity of the natural processes involved in any one region means that their impact needs to be considered on a case-by-case basis. Equally important, some activities in the past led to the deposition of many artifacts, while others produced many fewer objects.

Key Issues/Current Debates/Future Directions/Examples

Survey work in arid regions of Australia shares many of the issues raised in the Mediterranean. Surface scatters of stone artifacts as well as the remains of hearths with stone heat retainers dominate the surface record of western New South Wales (NSW). Sites are difficult to define since the boundaries of individual scatters are diffuse. The surface carpet of artifacts in western NSW might be thought of as a single archaeological site of variable density stretching over nearly a million square kilometers. Making useful distinctions across this artifact carpet requires that not only artifact density but also artifact assemblage composition be assessed at numerous locations within a landscape. To do this, self-tracking (robotic) electronic total stations together with GPS are used to locate artifacts individually using a nail as a marker (Fig. 1). They are

numbered individually and surveyed with the total station. Artifacts are picked up and attributes recorded before returning them to the ground (a requirement of the Aboriginal Traditional Owners) (Fig. 2). The total station is also used to map the extent of artifact exposure and any features that obscure surface exposure (e.g., sediment islands, Fig. 3). A distributed system based on a relational database design means that multiple instruments and teams can all work at once, and as a consequence, recording is very quick (overcoming to some degree the intensity versus extent criticisms noted above).

Surface Survey: Method and Strategies, Fig. 1 Self-tracking total stations allow the rapid location of artifacts in three dimensions. *Colored nails* are used to mark stone artifacts

Software allows all sets of information to be integrated together based on a relational database design. The total station writes data files in GIS formats, and the GIS software permits the spatial integration of attribute data. Observations on the geomorphic context of the artifacts are also combined in the GIS. Because each object is recorded with an x, y, and z coordinate, its spatial position can be analyzed in relation to other objects to control for a variety of postdepositional processes (Fanning et al. 2008). Data quality is controlled through "intelligent" data entry software that reduces the chance of human error (McPherron & Holdaway 1996) and through the quantitative analysis of observer bias. An understanding of the relationship between past human activity and the nature of artifact deposition is critical which also involves experimental assessment of the attributes recorded on surface artifacts (Douglass et al. 2008).

Surface Survey: Method and Strategies, Fig. 2 Stone artifacts are marked with nails, numbered with preprinted numbers, and analyzed in the field using portable computers (*inset*)

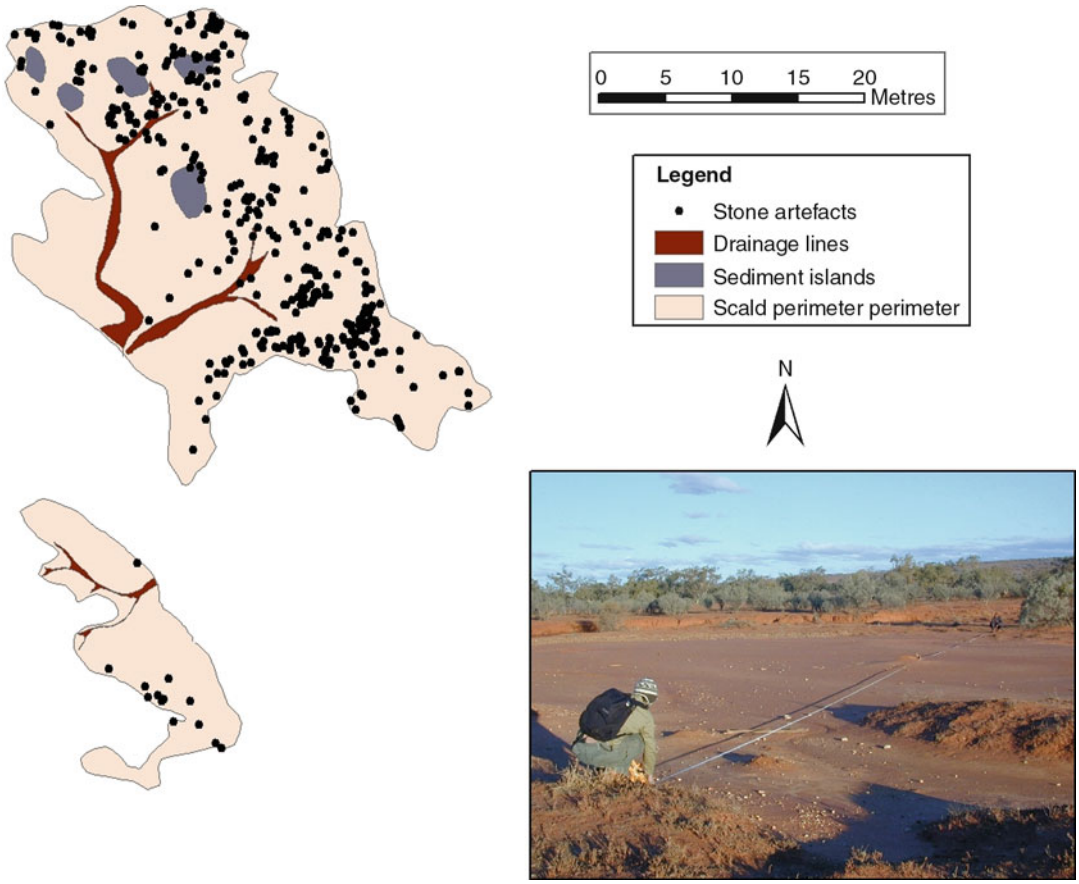

Surface Survey: Method and Strategies, Fig. 3 GIS plot of the location of stone artifacts (*black dots*) in eroded areas (termed scalds, *inset*) that are used as spatial sampling units for landscape scale surface survey. The GIS shows the location of artifacts in relation to the size of the eroded area and the presence of sediment islands that obscure visibility

Key Issues

Despite the desire to understand "big picture" distributions of archaeological sites by undertaking extensive, low-intensity surveys, understanding why archaeological materials are visible at certain points in the landscape requires that the range of processes that leads to this visibility, both cultural and natural, be understood. The cultural resource of arid regions of Australia, like that in other comparable regions of the world, is dominated by stone artifacts. Because vegetation is sparse, surface visibility is often high and full-coverage regional surveys are possible. Stone artifacts are abundant, as are the remains of heat-retainer hearths with smaller numbers of earth mounds and burials in some regions. Recording artifact scatters by *ground surface survey* is thus a common response.

But the remoteness of parts of Australia, coupled with the abundance of artifacts record in some localities, means that the large-scale regional surveys, like those in the Valley of Mexico (Charlton & Nichols 2005) or in the Mediterranean (Cherry 2003), have only been undertaken infrequently. Australia lacks pottery that, when seriated, might provide the means to develop a chronology applicable to an extensive surface archaeological record. In addition, stone artifacts, while abundant, have not proved amenable to the detailed time-space descriptions used to date sites in other regions of the world. Alternative approaches to survey are therefore needed.

While arid regions may give the appearance of an unchanging landscape, the opposite is often the case. In much of Australia, geomorphic dynamics are such that a land surface results from a set of individual erosion and deposition events operating at different temporal and spatial scales. Averaged over tens to hundreds (and maybe thousands) of years, different parts of the landscape will exhibit accumulation of sediment (i.e., dominantly depositional), removal of sediment (i.e., dominantly erosional), or no change (i.e., residual). Maximum exposure of the archaeological record is found in those parts of the landscape that are dominantly erosional, while least exposure is found where deposition of sediments is dominant. Too much erosion, however, will remove the deposits on which artifacts rest effectively, removing any trace of the archaeological record.

Sediment chronologies, developed by obtaining age estimates from valley-fill deposits or the ages of remnant flood deposits, indicate periods of erosion interspersed with depositional periods. Regional discontinuity in deposition is the norm, leading to a patchwork distribution of land surfaces differing markedly in age and therefore accumulating archaeological deposits of different ages (Fanning et al. 2009). Truly ancient and more recent artifact deposits may be separated by distances of only a few hundred meters. Following conventional site survey techniques, it is tempting to interpret artifact concentrations directly in behavioral terms, as though their content reflects the operation of a single settlement system even though different locations reflect accumulation over substantially different periods of time. Using a geomorphically based approach to survey overcomes this problem.

An appropriate survey strategy therefore requires intensive chronological, geomorphological, and archaeological studies at predetermined localities (Holdaway & Fanning 2008). The formation of the archaeological record is a sedimentary process (Stein 1987), and a geomorphological approach to understanding the history of landscape use is employed as part of the survey design. Particular attention is paid to recording data sets with reference to the time scales over which the archaeological record has accumulated.

This approach to fieldwork has influenced the interpretation of early Australian communities. Archaeologists in the 1980s saw communities as changing in the mid-Holocene from highly mobile groups existing at relatively low population densities to groups practicing extended occupation with increased social complexity (Lourandos 1985). Data to support this "intensification theory" included documenting increases in the number of archaeological sites dating to the mid- to late Holocene. However, critics noted that site preservation might also account for the perceived increase in site numbers (Dodson et al. 1992). For example, at the Rutherford Creek catchment in western New South Wales, it was shown that the number of dated heat-retainer hearths relates to the ages of the surfaces on which they rest. Summing the radiocarbon determinations from the hearths produces a pattern similar to that used to support an increase in site numbers (and by implication population size); yet this pattern was the result of differential erosion and site preservation rather than human behavior (Holdaway et al. 2008). As this example illustrates, it is essential to understand the geomorphological history of the deposits before a behavioral interpretation can be made directly from survey data.

Cross-References

- ► Field Method in Archaeology: Overview
- ► France: Field Method Origins
- ► Nondestructive Subsurface Mapping in Field Archaeology

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Survey Archaeology in the Greek Aegean World

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Introduction and Definition

The development and current nature of Greek field survey can be divided into chronological stages and a number of contemporary methodological and theoretical issues. We define field survey as the systematic study of the surface remains of past human activity across the landscape, mainly potsherds and lithics but including building remains and field systems.

Historical Background

The First Era, from the Seventeenth to Mid-nineteenth Centuries

This is the age of the "travelers" and their "topographic tours" in search of visible remains of sites known from their reading of the Greco-Roman literary sources. These detailed travelogues (e.g., Wheler & Spon 1682; Leake 1830; Ross 1851) are still useful in the field as they testify to ruins since demolished and ancient sites that frequently are found to have been first occupied in prehistoric times.

The Second Era, Late Nineteenth Century Till the Late 1950s

With the late nineteenth-century and early twentieth-century recognition of the prehistoric pottery sequences of Greece, the customary "topographic fieldtrip" could now add a prehistoric depth to regional pioneer research and even at times be primarily interested in ascertaining the whereabouts of prehistoric settlements and cemeteries. Regional team research such as that at the British School in

Athens, in Laconia (cf. *Annual of the British School at Athens* vols. 12–13 (1906–1907) 15–16 (1909–1910), and 24, 26, 28 (1921, 1925, 1927)), and even more clearly on the island of Melos (cf. *Annual of the British School at Athens* vols. 2–5 (1896–1899), *Journal of Hellenic Studies* 17–18 (1897–1898)), in its keen interest in every period of the past, in the geography and sociology of each area, shows that catholic intellectual sweep which was characteristic of a vanishing Victorian scholarship. On the other hand, these were still unsystematic surveys concentrating on known historic locations or "likely" prehistoric locations, combined with rather random travels punctuated by "spot checks" for sites. Also striking was the work of Tsountas (1908), Wace and Thompson (1912), and Heurtley (1939) in Central and Northern Greece, identifying and refining the pottery from the abundant and easily recognizable settlement mound or prehistoric "tells" that carpet the large plains of Thessaly, Macedonia, and Thrace. On Crete, the distinctive Minoan Bronze Age fabrics and an indefatigable energy in the field allowed Pendlebury (1939/1971) by the opening of World War II to compile and analyze a remarkable density of sites over many subdivisions from Neolithic to Iron Age. On Crete, after important German, Italian, and French contributions to this tradition (e.g., by Fritz Schachermeyr), the final flowering came as late as the 1960s with the extensive fieldtrips of Hood, Warren, Cadogan, and Faure into parts of this large island where prehistoric sites were little known or poorly recorded (cf. *Annual of the British School at Athens* vols. 50–63 (1964–1967), and *Bulletin de Correspondance Hellénique* 84 (1960), 86–87 (1962–1963), 89, 91, 93 (1965, 1967, 1969)).

Some of those undertaking field survey began with the German tradition of historical geography. With the outstanding example of Philippson (1892, 1950–1959) before them, his students analyzed both the geography of settlement and distribution at particular time periods and the factors underlying the striking changes in settlement location observable over millennia in circumscribed landscapes. Particularly noteworthy are the studies by Lehmann of the Plain of Argos (1937) and of Eastern Crete (1939). In the latter example, overall trends for the region were analyzed via a cumulative series of micro-regional natural settlement chambers (Siedlungskammern), in which it was shown that the key resource zones remained the same against a shifting microlocation of settlements. Regrettably this was the endpoint of a nineteenth-century tradition in continental scholarship, and although a limited amount of similar work continued after the Second World War on classical Greek settlement patterns, notably by Kirsten (1956), there is little of note on prehistoric human geography till the 1970s.

The Third Era, the 1960s to the Early 1970s

By the 1960s we have entered an era of far more detailed regional site survey. A well-defined area is crisscrossed extensively on foot at wide intervals or with a vehicle, and all "likely" locations are investigated together with every previously recorded findspot. The date range and period-by-period extent of prehistoric surface sites are estimated, and settlement distributions and site plans published. One figure stands out for this era in the vast amount of ground he covered, sites he discovered, and the meticulous presentation of survey results, Richard Hope-Simpson. In addition to site prospection in Laconia (cf. *Annual of the British School at Athens* vols. 55–56 (1960–1961)) and the Dodecanese (cf. *Annual of the British School at Athens* vols. 57, 65, 68 (1962, 1970, 1973)), he spearheaded the massive, 10-year survey of the province of Messenia which was part of a now classic interdisciplinary investigation into the Late Bronze Age kingdom of Pylos under the direction of William A. McDonald. The Messenia volume (McDonald & Rapp 1972) used the results of some 10 years' extensive survey of this big province (3,800 km^2) to analyze the settlement, economy, and political organization of a Mycenaean (Late Bronze Age) state. Secondary attention was given to the

pre-Mycenaean and historic periods in the same region, while the geographical component was broad-sweep rather than detailed. Created along the lines of major regional projects in Mesopotamia and Mesoamerica, "UMME" demonstrated a whole new battery of research techniques and specialist support. It has changed the nature of Aegean archaeology and set the pattern for all subsequent regional projects. However, in terms of field survey methodology, the Messenia approach went little beyond the extensive tradition typical of this era. The overall achievements of the Hope-Simpson climax phase of extensive survey were summarized in his *A Gazetteer and Atlas of Mycenaean Sites in Greece*, which appeared in 1965 and which was updated with the assistance of Oliver Dickinson in the form of *A Gazetteer of Aegean Civilization in the Bronze Age* (Crete excluded) in 1979 (Hope-Simpson & Dickinson 1979).

The last-named volume has remained central to all discussions of later Greek prehistory. Its intentional limitation to the Mycenaean mainland and islands was compensated for by using Pendlebury's prewar (1939) compendium of Minoan Bronze Age sites on Crete and David French's impressive extensive surveys of Neolithic and Bronze Age sites in Central and Northwest Greece (French 1967, 1972).

Colin Renfrew, for example, in his magnificent 1972 groundbreaking and seminal book *The Emergence of Civilisation in the Bronze Age Aegean*, relied heavily on these sources. He compared regional growth curves in known sites from Neolithic to Late Bronze Age times, based on the extensive survey data. Two modes were identified, a straight line demographic growth (Crete and Messenia) (A) and a mode with two growth phases punctuated by a standstill or decline in the Middle Bronze Age (the norm elsewhere) (B).

During the early 1970s, my own research into the relationship between environment and human settlement in later Greek prehistory based itself in part on the extensive survey data of Hope-Simpson and his predecessors. I also consciously sought to revive the almost defunct historical geography approach of the Philippson School, combining this with the new approach of catchment analysis and other borrowings from locational theory in geography. I took a series of regional landscapes in Mainland Greece, Crete, and the Cyclades (Bintliff 1977), compiled geology, geomorphology, and soil and land-use potential maps for each region, and then studied every recorded prehistoric site in its physical landscape and in relation to its neighbors, employing in the field a detailed catchment approach on a site-by-site basis. Well over 200 sites and their context were thus analyzed, providing a useful database for defining preferences in terms of soils and suggesting the patterns of settlement hierarchy in relation to resources and to territorial space.

The Fourth Era, Early 1970s to the Early 1980s

But already during my years in the field as a research student, a new survey phase had been inaugurated in Greece, one which I was lucky enough to be involved with through my participation in the "new wave" begun by Jameson's survey of the Southwest Argolid (1994) and Blackman and Branigan's survey of the Agiopharango Valley in Crete (Blackman & Branigan 1978). The crucial novelty was the method: intensive, field-by-field survey without preconceptions about favorable site locations. The results were predictable: an unparalleled density of sites of all periods and a proliferation of smaller and less conspicuous sites than were normally encountered in extensive survey.

In the Agiopharango the correlation of Minoan Bronze Age sites with potential cultivable land led me (Bintliff, in Blackman & Branigan 1978; Bintliff 1977) to hypothesize a social module of several related families sharing the use of a single communal stone tomb (tholos), this monument being placed so as to mark the group's lands and often being associated with dispersed settlement units. An analysis of the number of bodies claimed for tombs of this kind elsewhere, applied to the average number of tholoi in use in the Agiopharango, suggested both the number of families per tomb and in total compared favorably with estimates of the potential carrying

capacity of the valley soils. In addition, the data and location of rural shrines were incorporated in a broader theory concerning the mechanisms behind the rise of Minoan palace society, in particular postulating a rural-central place integration via expanding cult systems.

In the light of the vigorous debate in the United States over the selection of survey areas, their size and number, and indeed the whole business of sampling strategies in survey archaeology, it is not surprising to find considerable variability in the exact approach to these problems among the "new wave" of intensive Aegean surveys. The Argolid surveyed, combined with tackled the region of the South-western Argolid via a series of manageable blocks, totally surveyed, and combined with extensive prospection in the intervening areas. John Cherry's survey strategy for the Cycladic island of Melos involved a 20 % sample arranged in staggered transects across the island, intensively surveyed (1982). In contrast the Boeotia Survey (Bintliff & Snodgrass 1985; Bintliff 2000a) deliberately avoided small survey units and expanded outwards in all directions from a modern village, although subsequently smaller landscapes spread widely across the province were surveyed for comparative purposes. Following the Boeotia model was the "expanding core" of the Laconia Survey (Cavanagh et al. 1996, 2002). Further landmark surveys include that of Kea (Cherry et al. 1991), the Atene deme, Attica (Lohmann 1993), Berbati (Wells & Runnels 1996), Methana (Mee & Forbes 1997), Asea (Forsen & Forsen 2003), and the Mesara (Watrous et al. 2004).

The Fifth Era, from the Late 1980s

A characteristic innovation of this phase was the mapping of non-site surface pottery, the almost continuous scatter of ancient and prehistoric artifacts that lies between those peaks of surface debris traditionally defined as "sites." Since sites once discovered can vanish in subsequent seasons, while new sites can emerge in localities previously fieldwalked and pronounced to be "siteless," it is also clear that the distribution of recorded artifact concentrations (sites) in any particular season is only a partial sample of all surviving sites. To understand the surface sites as a phenomenon, it became clear that surveys should practice replicable non-site recording on all future Greek surveys, as well as revisiting of areas previously surveyed. It is also likely that land-use patterns might be illuminated through the analysis of non-site scatters, where they may include the debris of temporary shelters or areas of manuring (Bintliff & Snodgrass 1988b; Bintliff et al. 2007). This led to a widespread shift to taking the artifact as the focus of recording, whose distributional patterns led to an analysis of permanent or temporary activity foci as well as "taskscapes" where landscapes of work left visible surface traces. Generally surface finds were quantified using handheld counters, which are now being replaced by palmtop computers.

The way sites were studied has tended to fall into two models since this time. One is a structured sample, where strips, squares, or circles are laid out across the site for density counts and find collection. The other is to grid the entire site and study it as completely as possible. Unfortunately little experimentation exists to compare the two methods, although what has been done suggests that partial samples are less representative of the periods of use and the density trends across sites (Bintliff & Snodgrass 1985). It appears advisable therefore to follow total study.

An important new focus of this phase was the tackling of large nucleations, including ancient cities through surface survey (Bintliff & Snodgrass 1988a; Cherry et al. 1991). The city of Thespiae, which required some 100 ha of survey, took just 2 months to analyze through some 1,000 grid units, although the existence of over 25 periods of occupation and the inherent complexities of unraveling their copresence on the surface have delayed the final publication till today.

The Sixth Era, the 1990s to the Present

Three major trends typify this latest stage (Bintliff 2000b). Firstly the appearance of synthetic survey articles and monographs for

diverse regions of Greece has encouraged comparison of results (Alcock 1993; Bintliff 1997, Alcock & Cherry 2004). The aim was not only to identify methodological issues but to gain a wider understanding of particular eras of Greek prehistory or history.

Key Issues/Current Debates

Methodologies and Theoretical Issues

An urgent need to carry out a stricter *Quellenkritik* or source criticism of Aegean survey has been recognized. Although the enormous flow of results of previous decades provided new and unexpected data, their quality, limitations, and interpretation raise fundamental questions about methods and how we can create "history" out of them. A series of issues can be mentioned briefly:

(a) It has long been recognized, initially by J. Rutter (1983), that some periods of the past have less well-preserved and/or recognizable surface ceramics. Moreover, most Greek sites are multiperiod, so that earlier levels are less likely to be plentiful on the surface. For Mainland Greece, for example, much of the prehistoric record is a "hidden landscape" where small scatters of finds may be all that is left of richer settlements or even be undetected in intensive surveys (Bintliff et al. 1999). The Iron Age and Early Byzantine eras may suffer similar discrimination. Special methods must be applied to tackle such situations.

(b) The rise of off-site survey in the preceding era did not lead to a systematic publication and analysis of finds outside sites. A linked problem is the evidence that settlements themselves seem to consist of occupational cores and haloes of peripheral finds (rubbish dumps, smears of finds pushed out of sites by the weather and plowing, kitchen-gardens, etc.), so that estimates of site size and by implication human populations vary considerably on the basis of where to place an assumed "site edge." Analysis of the inter-site "taskscape" finds (remains of temporary activities in the open countryside) moreover became bogged down into an unresolved dispute on the existence of manuring scatters in the wider landscape (Alcock et al. 1994), often discouraging treatment of off-site densities at all. The present writer hopes that the exhaustive treatment of all these problems in *Testing the Hinterland* (Bintliff et al. 2007) has clarified the situation.

(c) An issue that is becoming central to the current active survey community is the conducting of experiments to examine the effects of varying methods of fieldwork and analysis. New projects tend to follow older ones rather arbitrarily without there being a firm basis of experimental data to judge the advantages and disadvantages of the chosen techniques. It is not clear how much material needs to be collected to form a representative assemblage of finds from a site, surprising since it should be clear that the number of periods found there and the size of the site naturally raise such issues. City surveys can be analyzed on the basis of anything from a couple of hundred to tens of thousands of sherds, depending on the decision of the project leaders. In preparation for the publication of the city of Thespiae survey, we recently calculated that some 300 sherds for *each period* of a large multiperiod site would be needed to ensure a realistic map of activity foci per phase. It is necessary to aim for the "cultural biography" of each site, however small, where intensive field study and analysis of finds should be complex enough to reveal the often very different ways each location has been used in the long term. Such an exercise reveals that most multiperiod surface sites undergo considerable changes in their size and function (cf. *Testing the Hinterland*).

(d) A more penetrating approach to survey is being immensely aided by the advent of new technical aids. Geographical information systems (GIS) speed up and make far

more accurate the laying out of fieldwalking units in the landscape and across sites, while handheld computers can record both study units and their contents in real time. Differential global positioning system (GPS) devices allow highly accurate location of both sites and surface objects in all three dimensions, while laser recording can provide relatively fast images of standing ruins or field sections (road or stream cuttings, ruined buildings, excavated deposits and building foundations). The study of the "phenomenology of landscape," whether that means practical matters of estimating how people moved around the landscape, or investigating more emotional issues of human perception of space, can be speedily estimated through GIS. Considered a surface technology but in reality a subsurface one, the increasing use of geophysical methods offers a nondestructive way of looking beneath the surface finds into the complexity of the underlying built environment. Results can be both spectacularly illuminating (where, for instance, the entire street and house-block plan of an ancient city is revealed; cf. Music et al.) and also a failure, highly dependent on geology, soil conditions, climate, and the type of built environment being examined.

(e) The relatively poor recovery of remote prehistoric sites even through intensive survey, by which we mean Paleolithic and Mesolithic hunter-gatherer sites, has encouraged specific adaptations to field techniques. Curtis Runnels has used predictive modeling to identify locations most favorable for hunter-gatherer activities, then focused research in such small districts, with remarkable success (e.g., Runnels et al. 2005). New field projects in presently marginal landscapes such as the high uplands of Greece have also discovered a far greater density of prehistoric sites where later burial, erosion, or human activities have not been active in concealing or destroying their traces (Efstratiou et al. 2006).

Expansion in Period Interest

The third major theme in the last generation of field survey has been a far greater investment in the landscape history of the post-Roman periods, the Medieval, and Post-Medieval eras of Greece. Increasing success in identifying typical ceramics of subperiods of 1–200 years' duration within these eras has allowed integration with historical sources. Moreover, there exist many thousands of deserted villages and installations such as waterworks, roads, and churches which offer documentation of the built environment in connection with often abundant surface artifact finds (Lock & Sanders 1996; Bintliff 2000c; Sigalos 2004; Davies & Davis 2007; Vionis 2008; Bintliff & Stoeger 2009; Bintliff 2012).

Future Directions

I suspect that the current source-critical phase, coupled with advances in digital data collection, recording, and analysis, will make much clearer how we can reach stronger conclusions on the nature and history of surface sites and the evidence of human activities in the surrounding taskscapes. This will offer historians greater confidence in combining survey results with their own textual reconstructions of dynamic landscapes and townscapes. It seems necessary to propose to future surveys that they cover large contiguous areas, quantify surface finds both off-and on-sites, collect large samples of both of the latter environments, and conduct experiments with different field techniques. Improvements in the resolution of ceramic study through moving from diagnostic wares dated by excavations elsewhere, to classification following a local fabric series, will allow local assemblages to be identified more appropriate to the district under study, as well as bringing to light contrasts between local production and imports.

Comparative studies of survey results should increase so that localized scenarios can be compared with the wider picture of a particular era of the past. A neglected theme here is long-term comparison: can we compare population and land-use levels at different phases of

occupation of the same landscape, and what are the implications of such an analysis (cf. Bintliff 2005 for Boeotia)?

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Survey Archaeology in the Roman World

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Survey Archaeology in the Roman World

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Introduction

A considerable feature of Roman civilization was the creation and support of a dense network of urban settlements. In this respect the case of Italy is even more remarkable if one considers that – besides the presence of a megalopolis like Rome (with its one million inhabitants) – there existed about 430 urban centers scattered all over the peninsula. The thousands of cities and towns of the Roman Empire were connected and supplied by a much-celebrated and highly effective infrastructure made up of ports, roads, and aqueducts. More crucially, each urban polity possessed a well-defined territory (*ager*): it was (in part) laid out as a regular grid network of squared cadastral plots (*centuriatio*), and it was specifically meant to provide the inhabitants with most of the resources they needed (e.g., foodstuffs, raw materials). Preindustrial urban populations always required a comparatively higher rural counterpart to support them, and in this regard, the highly urbanized Roman world was no exception. That is precisely why a large number of farmsteads and villages populated the countryside and took active parts in the social and economic life of nearby towns (Lloyd 1991).

This balanced account, however reasonable it might sound, is actually a rather recent achievement. Whereas the archaeological remains of Roman towns, roads, and aqueducts have for long been – and in many places still are – a

prominent feature of the landscape, most traces of rural occupation have gradually faded away or disappeared altogether. Indeed, unlike more imposing stone- or brickwork buildings, most rural houses were simpler structures, often made from perishable materials (e.g., half-timbered wattlework known as *opus craticium*). If it were not for the occasional remains of monumental villas, one would be left to wonder whether the Roman countryside was settled at all. Textual evidence could not be expected to fill such a gap and, more in general, generations of scholars became persuaded that the "Graeco-Roman world was a world of cites" where the "agrarian population, always a majority, most often lived in communities of some kind, hamlets, villages, towns, not in isolated farm homesteads" (Finley 1977: 305).

This would be still the dominant view if it were not for a combination of largely unrelated events that took place following the end of the Second World War (see section "Historical Background"). For the very first time, those feeble archaeological traces of ancient rural settlements were *surveyed* and identified as such. A systematic approach gradually developed and survey archaeology has since provided incontrovertible evidence to the impressive scale of rural occupation and to the liveliness of the ancient Mediterranean landscape (hence it being often referred to as "landscape archaeology"). Given the strong bonds between human settlement and its environmental context, this discipline could have not but embraced a marked holistic attitude and therefore exhibited, since quite early on, a very strong interdisciplinary character. In this way survey archaeology has not just widened our understanding of the Roman world: it has profoundly transformed the way we look at it.

Definition

Survey archaeology is a (sub)discipline which is primarily concerned with the record, analysis, and interpretation of material remains pertaining to past human settlement patterns across the landscape. It relies on a body of techniques that include fieldwalking, aerial survey, and geophysical prospection. It also benefits from its close connection with the environmental sciences (e.g., geoarchaeology, archaeobotany) and further integrates the spatial analysis potential of modern geographic information systems (GIS). When engaged with Roman landscapes, it avails itself of the sheer amount of contextual information which is often available in the form of ancient documents (e.g., literary works, inscriptions, *itineraria*/road maps), later historical accounts (e.g., reporting features that were then visible but are no more), and modern place-names (e.g., often reminiscent of an ancient origin).

Fieldwalking (or field survey) is certainly the cornerstone of survey archaeology everywhere. It requires a group of surveyors to walk across a field in parallel lines set at a regular distance from each other and to look for archaeological materials laying on its surface (Fig. 1). It is based on the awareness that such materials are spread all over the landscape and that their density varies in relation to the intensity of past human occupation.

Although there are several depositional and postdepositional processes involved, this is a phenomenon which is primarily related to the spread of mechanized agriculture: by reaching deep soil layers (up to 1.5 m), modern plows have disturbed or truncated otherwise sealed archaeological contexts, turning them upside down and therefore making them visible on surface (Haselgrove 1985). This "plowsoil assemblage" (Fig. 2) does indeed provide a sample of what is buried below and when the density of material is especially notable – whether in absolute terms or relative to the surrounding context – they are taken to signal the presence of a site (i.e., a settlement proper). Of course, the visibility and potential for recovery of a site are hugely affected by the nature of the material culture originally associated with it and left over when it was abandoned (in terms of both quantity and quality). From this point of view, the Roman period is exceptionally well attested thanks to its everyday use of pottery and the widespread employment of bricks/tiles in buildings (once fired, clay becomes extremely resistant to decay).

Survey Archaeology in the Roman World, Fig. 1 Systematic fieldwalking in Central Italy

Survey Archaeology in the Roman World, Fig. 2 A dense plowsoil assemblage over a freshly plowed field in Central Italy

Roman finewares are an especially relevant case. Besides their relatively sturdy quality and vast distribution network, their shiny gloss colors (black, red, and orange) have made them extremely visible in the plowsoil and relatively easy to recognize as such (Fig. 3). Furthermore, because such features are specific to well-dated productions (Republican black gloss, early Imperial *terra sigillata*, and mid-/late Imperial African red slip), even heavily eroded sherds do present a significant dating potential. This chronological pattern is mirrored by specific types of amphorae and all these elements taken together help to explain why most surveys have adopted a Roman periodization that is broadly the same (Republican, early Imperial and mid/late Imperial) (Launaro 2011: 85-7).

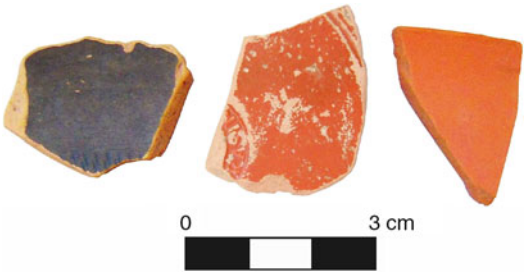

Survey Archaeology in the Roman World, Fig. 3 Color comparison of potsherds of black gloss (*black*), terra sigillata (*red*), and African red slip (*orange*)

Aerial photography (vertical or oblique) has provided another hugely impressive contribution to our understanding of the Roman landscape. Indeed, more or less substantial buried features can turn out pretty neat from above if the right conditions are met (e.g., crop marks), even though general practice seems to favor some degree of verification in the form of aimed fieldwalking. Among the more recent remote sensing techniques (e.g., processing of satellite imagery), LIDAR (Light Detection and Ranging) is certainly adding a further level to aerial survey as it allows the identification of barely perceptible surface variations over extensive areas (e.g., structures or earthworks of various kinds, even obscured by the cover of deep vegetation). In general, traces of Roman field systems (as still preserved/marked by secondary roads, boundaries, and ditches) are especially recognizable, thanks to their regular grid pattern and consistent (Roman) measures. Remarkable work has been carried out which has combined aerial photographs, cartography, and the original prescriptions of the Roman land surveyors (*Corpus Agrimensorum Romanorum*) to identify large tracts of the landscape wherein centuriation is still preserved (e.g., Chouquer et al. 1987).

Geophysical survey is another approach which is now widely employed – and with outstanding results (e.g., Keay et al. 2000). A suite of available remote sensing techniques (e.g., georadar, magnetometry, resistivity testing) that aim to identify notable variations in the physical qualities of the (sub)soil. In this respect, structural remains will often stand in stark contrast to the context they are buried within and, once mapped, they are likely to provide a draft plan of the site. More specifically, magnetometry has proved a very favored choice across Roman archaeology as it allows a cost-effective prospection of extensive/complex sites and it is especially suited to detect brickwork (strong magnetic signature), from which many Roman buildings were built. It is often paired with on-site fieldwalking and test excavation.

Survey projects usually aim at reconstructing the long-term settlement history of a given landscape (Cherry 1983). As such they adopt a diachronic approach, cutting across several periods of human prehistory/history and thus requiring the collaboration of several experts from different fields. Study areas are usually defined as well-bounded and self-contained environmental regions (e.g., a river valley, an inland basin), the main objective being to recover, analyze, and interpret the way different human societies have engaged with a consistent landscape over time, thus highlighting long-term constants (similarities) and period-specific variables (differences). Although this diachronic approach is duly observed in terms of data collection and analysis, research design tends to make some periods more prominent as a result of the interests – and expertises – of the individual scholars involved. This is especially evident when the study area is instead defined according to period-specific political boundaries (e.g., the territory (*ager*) of a Roman town) or when survey is meant to provide a wider context to a prominent site (e.g., the neighborhood of a villa). A case apart is represented by those projects that are launched by local or national institutions in order to improve knowledge, preservation, and management of the cultural heritage within their own territorial jurisdiction (e.g., official archaeological maps). As such they employ modern administrative boundaries that might bear little or no relationship with both environmental units and ancient territories, while (in principle) they are less inclined to favor one period over the others. Broadly speaking, however, the majority of surveys across the Mediterranean Basin – whatever their stated goals – show the

tendency to be primarily focused on the Classical period, with further emphasis on either the Greek phase (in the East) or the Roman one (in the West).

Historical Background

The origins of survey archaeology in the Roman world lay in a long tradition of studies concerned with the landscapes of Roman Italy. As such they developed out of the Italian humanism of the late fourteenth century (early Renaissance): indeed, with the rediscovery and philological reappraisal of Greek and Latin literature, there came an interest in the sites and places that had been mentioned by ancient authors. This prompted early scholars like Flavio Biondo (1392–1463) to research the ancient topography of Rome and the historical geography of Italy. By their very nature, these approaches were heavily informed by textual evidence and therefore primarily biased toward those features which arose more prominently as the setting of ancient narratives: Rome and the other named cities, together with the main roads which connected them. Such an interest further developed into the early modern era (well into the nineteenth century) as local antiquarians and learned travelers from the Grand Tour strove to explore suburban landscapes in search of ancient monumental remains. By this time the "landscape with ruins" had gained much popularity (e.g., in paintings) and, therefore, such early "surveyors" were primarily attracted in their wanderings by the most prominent (i.e., visible) sites, where standing structures could be actually observed (e.g., necropolises, mausoleums, aqueducts, rural sanctuaries, or major rural villas). By the late nineteenth century, this attitude had evolved into "ancient topography," a more structured enquiry which involved a thorough documentation (e.g., mapping, survey) and a systematic analysis of monumental remains (Potter & Stoddart 2001: 4-10). Nonetheless, the resulting picture was still biased toward urban spaces. The rural landscape – set aside as the idyllic setting of so many works of poetry – was then perceived as nothing more than the territorial extension of primarily urban communities, whose population worked the land by commuting everyday between town and country. This is hardly surprising given the fact that these earlier studies were still strongly inspired by and rooted in ancient literary accounts – from which they also derived the very same urban elite bias.

Things were about to change with the end of the Second World War (Potter & Stoddart 2001: 10-16). During the conflict, the Royal Air Force had extensively photographed large tracts of Italy from above in order to monitor military activities and targets. This marked the first large-scale introduction of aerial photography in the archaeology of Italy as hundreds of, previously unnoticed, features in the landscape were discovered and recorded (Dyson 2003: 55-73). Furthermore, following the war, a strong process of extensive urbanization invaded the suburban areas of most Italian cities, especially Rome. This brought about an impressive alteration of the landscape together with an equally impressive destruction of still-standing archaeological remains, the very same remains that had been the focus of earlier topographic surveys. Aware of this critical situation, John Bryan Ward-Perkins (1912–1981), the director of the British School at Rome at the time, launched teams of surveyors across South Etruria (hence the much-celebrated South Etruria Survey: Potter 1979) to record as much archaeological evidence as possible, before it was too late. This took place at the same time as the first large-scale introduction of mechanical heavy plowing (see section "Definition"), and it did not take much time before these early surveyors noticed how such an impressive destruction had the unexpected result of bringing to the surface a vast array of buried archaeology which otherwise would have gone completely undetected, especially as it pertained to small rural sites. Although lacking the imposing structural remains which signaled the presence of major sites (e.g., rural villas), such smaller occurrences were made prominent by the quantity of archaeological materials (e.g., potsherds, fragments of tiles and bricks). This plowsoil assemblage signaled thousands of sites across the landscape, often interpreted as evidence of

farms and, therefore, of an extensive rural population (i.e., settled in the countryside).

The South Etruria Survey did contribute to a "revolution" in landscape studies as a new, formal methodology was eventually developed and introduced all across the Mediterranean region, aimed at a systematic archaeological survey of plowed fields. Rapidly, it also became clear that an exclusively urban-oriented understanding of the rural landscape was misleading and that these rural settlement patterns had to be understood in their own (environmental) setting. This opened the way to the integration of specific expertises devoted to environmental reconstruction (e.g., geomorphology) and affirmed landscape archaeology as a fundamentally interdisciplinary endeavor (see section "Definition"). Research on Roman landscapes has since benefitted overall from such attitudes as more and more projects have followed – in Italy and beyond (Barker & Lloyd 1991; Potter & Stoddart 2001: 16-23). This has called for a more balanced understanding of the complex relationship between town and country and has warned scholars against the indiscriminate use of just one set of potentially biased evidence. Contrary to old views, John Lloyd (1991: 238) could eventually – and rightfully – claim that "the landscapes now being recovered through archaeology suggest a more complex and economically sophisticated world than we have been accustomed to imagine in the past."

Key Issues/Current Debates

Landscape has provided a most fertile context where to explore several important aspects of the Roman world, from economy to imperialism and from demography to urbanization. As already pointed out, the crucial contribution has been represented by the recovery of a lively and densely populated countryside, thus prompting a significant reconsideration of the integrated relationship between town and country. Cities are no longer merely seen as passive "consumers" of the resources provided by their territories but rather as actively engaged in a complex symbiotic pattern of production, distribution, and consumption of goods and services. They obviously created demand for local rural production, but, being also part of a wider network of towns, roads, and ports, they in turn supplied their hinterland with imported goods and created a gateway through which further surplus could be sent/sold elsewhere. The notion that landscape and cities must be approached as distinct features of a unitary process is today firmly established (e. g., Patterson 2006).

Another important achievement of survey archaeology is having brought about the awareness that there existed several Roman landscapes (Barker & Lloyd 1991). As Roman rule gradually extended over many different regions with different environmental characteristics and long histories of previous human occupation, landscape patterns came to reflect a creative combination of imported ideas and local situations. Therefore, survey archaeology has contributed to effectively undermine easy generalizations about the nature of Roman imperialism, and the actual dynamics of these relationships are now understood to have varied as a result of the political and economic place each region occupied within a growing empire (Mattingly 2011: 123-99).

Placing such an emphasis on what is distinctive and different, however, is at risk of ingenerating a kind of relativistic attitude, an empirical myopia that impedes synthesis at a higher level. After all, what is distinctive emerges more clearly once similarities are appreciated. The need to compare, contrast, and combine data from different surveys is a long-debated issue among practitioners of Mediterranean archaeology. The problem rests on the fact that each project is designed in accordance with specific questions and that each research context will prompt the adoption of appropriate methodological choices to cope with its unique conditions (e.g., intensive/extensive, total coverage/sampling). Such a variety of approaches does result in data whose uniqueness might not necessarily relate to original conditions and that would make comparisons difficult – if possible at all. What is remarkable is that a huge amount of data has been collected over the years and scholars increasingly

feel the need to employ them in a way or another (Alcock & Cherry 2004).

From this point of view, Roman Italy has provided a much favored case study, having been extensively explored by a sheer amount of survey projects (Patterson 2006: 72-88). With all their possible differences, it is quite remarkable that most researches have classified Roman settlements according to broadly similar typologies: villas, farms, and villages. It is indeed possible to recognize two main working criteria: quantity and quality of finds. The former refers to the size of the surface spread, the number of finds, and therefore their density. The latter on the other hand is more concerned with what classes of material are recovered as indicative of function, status, and place of the site within the settlement hierarchy. Although the actual definitions might slightly change, villas are generally understood as large-size and high-status sites, farms as small-/mid-size and low–mid-status sites, and villages as large-size and low–mid-status sites.

Whereas farms and villages have been related with the Italian free peasantry, villas have been traditionally connected with large estates, owned by the elite and primarily worked with slaves. Traditional historical narratives pointing to the decline of the Italian free population, being in turn supplanted by slaves, would therefore require both a gradual disappearance of farms and a coeval growth of villas to have occurred. Remarkably, although this seems to have indeed occurred in some areas (central coastal Etruria, southeastern Italy), in the majority of cases, farms appear to have been much more resilient, usually growing in numbers at the same time as villas did (Launaro 2011: 149-164). Although this can reasonably be taken to suggest a growth of the free peasantry, it does not say anything in terms of actual numbers. Deriving absolute population figures from survey evidence is indeed a traditional ambition of Mediterranean landscape archaeology (Bintliff & Sbonias 1999). In principle, it might sound like a rather straightforward exercise by which one multiplies the average number of occupiers by the number of sites. Besides the fact that there is no reliable way to guess such an average, the insurmountable obstacle is that surveyors simply cannot know how many sites they have actually missed. Although the inability to engage with both these crucial variables seems to seriously undermine any such effort, this has been repeatedly attempted following seminal work on the *suburbium* of Rome (Witcher 2005).

Recovery rates have always represented a critical issue. Surveyors have been frequently surprised by the rather limited amount of evidence for rural occupation dating to earlier phases of Roman colonization, and this was made the more striking when contrasted with the number of actual colonists as reported by ancient authors. Although fieldwalking does still represent the best possible choice to detect smaller/poorer sites, it is ultimately dependent on archaeological visibility. By relying on fineware pottery or amphorae as the main diagnostic materials, surveyors often assume such goods/objects to have been evenly supplied in the first place. This has been shown to be not always the case, especially as one moves down the settlement hierarchy and away from the main distribution centers/networks (Millett 1991). This increasing awareness has brought about a general reconsideration of what surveyors should look for, and it has eventually become clear that coarseware pottery could really make a difference as it was more readily accessed by all levels of urban and rural society (being produced locally and at cheaper prices) (MacDonald 1995). Although coarseware have always constituted the larger part of any plowsoil assemblage, their systematic analysis is still at a relatively early stage. Some regional synthesis has indeed started to appear, but their general application is somewhat limited by the very local character of the objects they endeavor to describe.

International Perspectives

As already mentioned (see section "Historical Background"), survey archaeology has its own origins in a long-established tradition of ancient topography to which scholars of many nationalities have since contributed to. Of course, one can

identify some recurring patterns among practitioners and might be tempted to ascribe them to the existence of specific national traditions. For example, the impressive presence of still-standing archaeological structures across the Mediterranean countryside can in part explain the remarkable resilience of more traditional forms of ancient topography in those countries. It is fair to say, however, that such an attitude has evolved over the last 30 years and has since broadly merged with survey archaeology.

If a real opposition ever existed, it is perhaps that between the intensive survey championed by British archaeologists and the more extensive approaches favored by others (most notably, although not exclusively, American scholars) (Terrenato 2004). It is not specific to "Roman" surveys, but it represents the tension – latent in any archaeological fieldwork – between resolution and coverage. Ideally, both are needed. In practice, however, one comes at the expense of the other. If intensive fieldwalking is the only way to detect smaller/poorer sites, too limited a study area is at risk of being insufficient to represent the wider landscape. On the other hand, an extensive survey will certainly convey a much more global picture, but it is also likely to skew it towards the upper end of the settlement hierarchy, thus failing to provide a fair representation of it. The debate has never been settled and sampling strategies have only provided a partial solution to it. Relevant field practice across the Roman world has thus varied a great deal and is one of the reasons that have often prevented worthwhile comparisons from being achieved at the regional level.

Future Directions

Comparative regional syntheses do indeed represent the necessary step forward for survey archaeology in the Roman world. Although new data keep being recovered as new survey projects arise, the lack of integration and coordination between them – even within same regions – runs the risk of narrowing the perspective, thus leading to many unrelated local histories. In fact, if survey archaeology is to contribute to far-reaching debates about general historical processes whose scale transcended the individual landscape (see section "Key Issues/Current Debates"), scholars have to accept the challenge and envision ways in which these data can be profitably integrated. Although definitive results are still ahead of us, the last 20 years have witnessed an increasing number of attempts that – whatever their limitations or flaws – are demonstrating the way forward (Alcock & Cherry 2004; Launaro 2011: 80-83).

The role and significance ascribed to the plowsoil assemblage is also evolving. Although quantity and quality of finds are still eagerly employed to derive chronologies (i.e., in order to date sites), their distribution patterns across the landscape can be viewed from different angles accounting not only for supply but also for deeper social and cultural meanings mediated by choice or preference (Witcher 2006). In this view, the increasing knowledge of local Roman coarsewares might not only provide more refined ways to date "marginal" sites but also could allow scholars to uncover a complex network of human relationships across the landscape(s) that would otherwise remain largely invisible.

Another growing tendency is to recognize the informative potential of "legacy data" (i.e., old data from past projects). While plowing brings to the surface otherwise hidden evidence, it keeps eroding and consuming such evidence until not only its visibility but its very existence is irremediably affected. The same goes for urbanization: it has never stopped and many more areas have been increasingly built over. This is further complicated by the fact that the process of agricultural expansion of the post-Second World War era has now begun to reverse: lands are increasingly turned (back) to pasture or woodland, therefore dramatically affecting archaeological visibility. From this point of view, older surveys (from the 1950s, 1960s, to 1970s) do represent a mine of invaluable information: they documented surface evidence soon after it was plowed for the first time (i.e., higher integrity and better visibility) and explored extensive areas which are by now "concreted over" or, more generally, made unsuitable

to survey. As new knowledge (e.g., more refined pottery classifications) and new techniques (e.g., GIS analysis) are made available, it becomes therefore possible to process the evidence again by answering questions and test theories which were not considered in the original research design (e.g., the reevaluation work on the *South Etruria Survey*: Patterson & Millett 1998).

Cross-References

- ▶ Centuriation and Roman Land Surveying (Republic Through Empire)
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Demography of the Ancient Roman World
- ▶ Economy, Roman
- ▶ Landscape Archaeology
- ▶ Maps, Cartography, and Worldview in the Roman World
- ▶ Surface Survey: Method and Strategies
- ▶ Survey Archaeology in the Greek Aegean World

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Sustainability and Cultural Heritage

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Introduction

The term "sustainability" has multiple meanings and uses in relation to cultural heritage. Most frequently, the term is employed in conjunction with or as part of such concepts as sustainable preservation, sustainable development, or sustainable tourism, though these concepts in practice overlap and are closely intertwined.

Definition

Sustainable Development

These concepts of sustainability derive from and grow out of the World Commission on Environment and Development's (the Brundtland Commission) 1986 report Our *Common Future*. That report defined sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs." (The term sustainable development first appeared in 1972 at the United Nations Conference on Human Environment in Stockholm.) This definition, while vague, called attention well to the problem of overexploitation and damage of natural resources in the pursuit of economic development and implicitly called for the practice of forms of economic development that better utilize and leave adequate natural resources for future generations. Sustainable development thus merges perpetual economic growth with the maintenance and enhancement of environmental values (Throsby 2002), thereby providing sufficient resources for both current and future economic development. The Brundtland Commission's discussion of sustainability also included social and economic responsibility as important components of sustainable development, though in many discussions these components played a secondary role to the environmental one.

Key Issues/Current Debates/Future Directions

Sustainable Development in Cultural Heritage

In the latter part of the twentieth century and early part of the twenty-first century, scholars and governments began to consider and apply a modified concept of sustainable development to cultural heritage (see, e.g., Endresen 1999; MacDonald 2004). At times referred to as sustainable preservation, this discussion of sustainability has followed two distinct though related paths: first, the environmental and energy conservation benefits of the preservation and reuse of historic structures and, second, the potential economic and social benefits of the development of cultural heritage sites as touristic attractions or drivers of economic development.

Sustainable Development and Preservation-Historic Structures

Advocates of sustainable preservation argue that there are tangible ecological and environmental benefits from the reuse and redevelopment of existing historic structures. Such reuse may provide enormous energy savings and preserve resources by obviating the need to mine, harvest, produce, and transport new building materials. These savings may dwarf those of so-called "green" or LEED (Leadership in Energy and Environmental Design)-certified construction, particularly since the energy used to construct an average building is 15–30 times greater than its annual energy use (Rypkema & Chong 2011a). Similarly, a 2011 report of the Preservation Green Lab of the National Trust for Historic Preservation noted, "Building reuse almost always yields fewer environmental impacts than new construction when comparing buildings of similar size and functionality." Current LEED standards give little credit for the environmental benefits of the reuse of historic or existing structures and none for the social and economic benefits.

Various metrics have been developed to measure the environmental benefits of historic preservation, including a building's embodied energy, lifecycle costing, avoided impacts, and reduced carbon footprint. All of these seek to measure energy usage, efficiency, and carbon footprint through the entire process of planning, constructing, and operating a building.

Sustainable Development and Preservation-Economic Development

Recognizing the increasing destruction of cultural heritage and sites from economic development and the potential to create jobs and revenues through tourism and preservation, governments, NGOs, and heritage practitioners have begun to consider the cultural heritage's potential as a driver of economic activity and poverty alleviation. The World Bank in numerous presentations has described its evolving approach toward cultural heritage as one that began with "do not harm," avoiding damaging cultural heritage while implementing other projects (1970–1980), to "specific intervention," investing in particular sites to develop tourism (1980–2000), to the current "integrated approach" that integrates-cultural heritage in local economic development with a focus on historic cities rehabilitation and sustainable tourism. The Inter-American Development Bank's approach has followed a similar arc.

These economic development projects all state that one of their goals is the sustainability or preservation of cultural heritage assets, allowing their use while preserving them for future generations. In addition to the environmental benefits described above, other suggested benefits include the creation of jobs; increased retail and handicraft sales and ancillary revenues, serving as a catalyst for local and regional development; the rejuvenation of declining towns and neighborhoods; gender inclusiveness; and a greater sense of cultural identity for local communities.

Metrics of project success have included jobs and household income, tourism visits and expenditures, and property values, as well as less directly economic social and environmental impact studies (Rypkema & Chong 2011b – see this article for a more detailed discussion of metrics and methodologies). However, measurement of the economic impact of sustainable development has been described as "nebulous" due to the difficulties of data collection (Rypkema & Chong 2011b: 754), and data has been described as "hard to come by" (Silberman 2011: 48). While much anecdotal evidence of the economic benefits of sustainable development exists, to date there is almost no systematic analysis of the economic, social, or preservation benefits or return on investment of these expenditures.

In addition to disputing the economic benefits of sustainable development, critics have argued that sustainable development devalues the conservation and interpretation of cultural heritage. Other critiques of sustainable development have included the funding of projects that are not economically sustainable, damage and potential loss of access to sites as a result of touristic use and development, the commodification of

heritage, displacement of local residents and other changes to local communities, and its lack of applicability to sites without touristic potential.

More recently, sustainability has also been used as a synonym for the stand-alone economic viability of development projects. Organizations such as the Sustainable Preservation Initiative define a sustainable project as one that is self-supporting after an initial grant or investment, in contrast to projects that will not survive without continued funding, normally by an NGO or governmental entity. Sustainable projects do not depend on the continued involvement of such an organization.

Sustainable Tourism

Almost every cultural heritage project includes a tourism component as one of its central features. In response to the potential damage caused by increased tourism, UNESCO, national governments, NGOs, and the travel industry have sought to create a form of tourism that respects and maintains cultural heritage. Sustainable tourism seeks to ensure that travelers conserve and protect both the natural environment and heritage assets, while promoting cross-cultural understanding. In some cases, an important component of this concept is that the tourism supports the community visited and patronizes entities that are locally owned or organized, particularly in poor regions. This issue of who should manage and benefit from tourism and economic development is frequently debated in discussions of sustainability. Many of the benefits and problems associated with this economic development are similar to those described above for sustainable economic development.

Cross-References

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- ▶ Heritage Tourism and the Marketplace
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Sustainable Cultural Tourism Policies: Overview

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Introduction

For millennia, culture has been an integral part of travel and tourism. Travel to cultural and historical sites as well as to festivals, performances, and events has been recorded since antiquity (McKercher & du Cros 2002). However, up until 20–30 years ago, tourism was largely seen as a benign industry with little negative environmental, social, economic, or cultural impact (Murphy & Price 2005). This lack of sustainable tourism planning and preparedness has resulted in cultural, economic, and ecological damage at many tourist destinations. As a way to address these problems, various nations and international entities have created policies calling for increased sustainable tourism planning and management. This entry will briefly discuss the relationship between culture and tourism, the development of international sustainable cultural tourism policy, and several of its prominent charters.

Definition and Historical Background

The relationship between culture and tourism first must be explained and historically traced in order to achieve a deeper understanding of sustainable cultural tourism policy. Cultural tourism can be defined as "visits by persons from outside the host community motivated wholly or in part by interest in historical, artistic, scientific or lifestyle/heritage offerings of a community, region, group or institution" (Silberberg 1995: 361). Even though a great percentage of travelers often have some element of cultural tourism in their travel itinerary, cultural tourism was originally associated as an activity of highly affluent and well-educated travelers (McKercher & du Cros 2002: 151; Richards 2007). In the late 1970s, the tourism industry began to market travel for cultural reasons as a new and specialized form of tourism to the general public (McKercher & du Cros 2002: 1). Then, by the 1990s, it began to be widely accepted and promoted as a mass tourist activity (McKercher & du Cros 2002).

Tourism and culture have a dynamic and symbiotic relationship. An increase in tourism has a potential to benefit a site, a culture, its surrounding community, and the nation in which it is located. Its economic revenue can encourage the conservation and economic development of a cultural site, tradition, or community. For instance, intangible traditions on the verge of being forgotten in the community can become reinvigorated and preserved.

However, an increase in tourism can also cause substantial harm to a site and its host community. Since cultural and natural resources are finite, a surge of tourists and inadequate tourism planning may lead to cultural and natural resource damage and depletion, cultural and community exploitation, economic leakage, etc.

Thus, the regulation of cultural tourism is necessary to mitigate these negative impacts. Considering this, it is not surprising that the increased marketing of cultural tourism activities by the tourism industry coincided with the popular dawn of sustainable tourism and a spur in the creation of sustainable tourism policies (Butler 1998: 25).

Sustainable tourism falls under the multifarious sustainable development umbrella. It has been synthesized from the cultural and environmental concerns and the principles of sustainable economic development of the 1970s and 1980s. Sustainable tourism is not univocally defined; its definition and usage vary not only between stakeholders but also within and across disciplines. Among social scientists, sustainable tourism can be generally defined as the incorporation and monitoring of economic, social, and cultural goals in the planning and management of tourism at a site (Hall & Lew 1998; Murphy & Price 2005; Saarinen 2006). In addition, all

sustainable tourism plans and policies, as Edgell states, should ideally strive to "integrate the economic, political, cultural and intellectual benefits of tourism cohesively with people, destinations, and countries in order to improve the global quality of life and provide a foundation for peace and prosperity" (1990: 1).

Key Issues

Sustainable cultural tourism policy has been influenced and evolved based on the international community's changing prevalent perceptions of and attitudes toward sustainable and cultural tourism. This section provides a chronological overview of key international sustainable and cultural tourism policies.

The first international cultural tourism policy, the Charter on Cultural Tourism, dates to 1976. It was preceded by substantial growth in the tourism industry and an increase in many governments and political entities' involvement in it due to their discovery of tourism's earning potential (Hall & Page 2006: 397). This increase in tourism's popularity and related discussions led to the United Nations XXI General Assembly designating 1967 as the "International Tourism Year," during which it passed a resolution called the "Importance of Tourism" stating that "tourism is a basic and most desirable human activity deserving the praise and encouragement of all peoples and all Governments" (United Nations 1967). However, cultural and sustainable tourism policy discussions did not become prevalent until the 1970s.

ICOMOS Charter on Cultural Tourism

In 1976, the International Council on Monuments and Sites (ICOMOS) held an International Seminar on Contemporary Tourism and Humanism. The Charter on Cultural Tourism is the result of this seminar. This charter was a revolutionary document in that it acknowledges tourism's irreversible "social, human, economic and cultural" effects, which had not been addressed before by an international body in writing (ICOMOS 1976). It also recognizes tourism as an important growing industry, but opposes "tourism's anarchical growth" and its negative consequences (ICOMOS 1976). To counteract tourism's negative effects on cultural and natural resources, it distinctly calls for conscientious tourism planning and policy regulation. It states, "with the future in mind. . .cultural and natural heritage which must take precedence over any other considerations however justified these may be from a social, political or economic point of view" (ICOMOS 1976).

In contrast, the charter also notes that tourism can have economic and cultural education benefits. It calls for the education of tourists, especially children, regarding the importance of the monuments and sites. Also, it recommends training for community members regarding how to evaluate and develop their relevant tourism site in order to safeguard it from tourism-related threats.

Unfortunately, this document focuses its cultural-based discussion primarily on tangible and monumental sites, which is referred to as "that privileged part of the human heritage" (ICOMOS 1976). Discussion regarding intangible cultural heritage tourism is notably absent, but this issue was developed in later policies over the next 20 years.

Manila Declaration on World Tourism

In October of 1980, Manila Declaration on World Tourism was developed at the World Tourism Conference. The declaration states that everyone should have the right to engage in travel and tourism (WTO 1980). It argues that states should encourage and support their populace's engagement in domestic and international tourism in order to increase the following: social solidarity; national and heritage pride; cultural awareness; and international economic, sociocultural, and political cooperation. The declaration also advises states to provide tourism education and training for their populace (especially their youth). The Manila Declaration ultimately views world tourism as a means of promoting further steps toward world peace.

Furthermore, it asserts that world tourism is more than a "purely economic activity" and should not be the only reason a government chooses to endorse it (WTO 1980). Governments are encouraged to look beyond economic development to also consider and advance the social, human, and cultural dimensions of tourism (WTO 1980). Heritage tourism in this document is still perceived as and limited to physical and site tourism.

Brundtland Report and Agenda 21

By the mid-1980s, discussions concerning cultural tourism and sustainable development became prolific (Hall & Page 2006: 397). In 1987, the World Commission on Environment and Development (WCED) developed the Brundtland Report entitled "Our Common Future." The concepts of sustainability and sustainable development discussed in this document were later adapted for the tourism industry and influential in its sustainable tourism policies. A large concern of the WCED was intergenerational fairness and ethics (Butler 1998: 33). It states that current resource use and development should not compromise the future generation's ability to "meet their own [resource] needs" (World Commission on Environment and Development 1987).

This document and the later Agenda 21 developed at the 1992 United Nations Conference on Environment and Development (UNCED) helped spark sustainability discussions in the tourism field (Saarinen 2006: 1122). UNCED's Agenda 21 identified travel and tourism as a key economic sector with the possibility to make a positive contribution toward achieving sustainable development. It then spurred the formation of the Travel and Tourism Industry's Agenda 21 in 1996 (USAID 2005). Even though these policies primarily refer to the physical and natural environment, their perspectives on sustainable development also influenced future sustainable cultural tourism discussions and policies (USAID 2005).

Charter for Sustainable Tourism

In 1995, the Charter for Sustainable Tourism was created by the World Conference for Sustainable Tourism. It is influenced by the "principles set forth in the Rio Declaration on the Environment and Development and the recommendations arising from Agenda 21" (WCST 1995). The charter states that tourism must respect not only the economic and environmental structure of a destination but also the human dimensions and dignity of the local community in order to avoid negative impacts within the region.

The charter proclaims that the sustainable tourism effort should be a respectful and collaborative one with cooperation throughout all the tourism industry levels, including local, national, regional, and global. It calls for all tourism stakeholders and participants to work together toward the implementation of sustainable tourism activities. Moreover, it recommends that all governments and the United Nations try to develop sustainable tourism plans of action.

It advocates for tourism to "be integrated with the natural, cultural and human environment" (WCST 1995). Tourism projects and strategies should consider their effect on a local community's cultural heritage, aiming to protect not only their physical cultural sites but also their intangible elements such as local traditions and identity. In addition, it proposes that environmentally and culturally vulnerable areas as well as areas that have been degraded by high impact tourism receive special priority for aid and technical assistance.

Ultimately, the charter proposes that tourism planning and management should conserve and protect the natural and cultural heritage of a destination and its host community as well as enhance the local economic conditions while concurrently satisfying tourists' needs (WCST 1995).

The International Cultural Tourism Charter

The International Cultural Tourism Charter was established in October of 1999 by ICOMOS at its Twelfth General Assembly meeting in Mexico. The Charter's ethos states that "a primary objective for managing heritage is to communicate its significance and need for its conservation to its host community" (ICOMOS 1999).

The charter notes the presence of a dynamic and reciprocal relationship between tourism and

cultural heritage relating to economics, management, protection, and cooperation. It declares that there should be a tourism planning process dialogue between stakeholders, which focuses on the equitable treatment of present-day host community, indigenous custodians or the owners of historic property, and the descendant communities and cultures from which that heritage evolved.

Additionally, it proposes that cultural tourism activities should be enjoyable and educational for visitors while also respecting and enhancing the heritage and economic conditions of the host community.

The charter proclaims a duty of respect for heritage objects and values and promotes their management in a sustainable manner for current and future generations. It also discusses the importance of protecting a site and community's "authentic" tangible and intangible cultural heritage (ICOMOS 1999). Moreover, it encourages the use of "detailed, measurable goals" in the cultural tourism planning and policy-making process, especially with regard to the promotion, presentation, interpretation, and protection of heritage areas and cultural activities (ICOMOS 1999).

This charter implicitly suggests that when cultural heritage tourism is adequately managed and planned, it will result in economic and community benefits. As a result, it tries to anticipate and mitigate any possible problems. However, in this short document, it is impossible to analyze and cover all the possible factors that can lead to tourism complications and negative outcomes.

Global Code of Ethics for Tourism

In 1999, the General Assembly of the United Nations World Tourism Organization (UNWTO) adopted the Global Code of Ethics for Tourism. This code of ethics advocates "maximiz[ing] the positive economic, social and cultural effects of tourism . . . while minimizing its negative social and environmental impacts" (UNWTO 1999). It states that all tourism participants should be responsible to uphold this code of ethics and to practice ethical tourism. Thus, tourists should try to protect not only themselves but also the environment, culture, and people of their destination's host communities. In addition, governments and other authorities need to be attentive to and spread awareness about the social, cultural, and environmental vulnerabilities that affect host communities as well as tourists. Local communities should be able to express their culture, livelihoods, and religion, but they should be careful to avoid infringing upon the tourists' beliefs and security.

The UNWTO believes "tourism is a user of cultural heritage of mankind and a contributor to its enhancement" (UNWTO 1999). This code promotes a global human heritage of which everyone is a part and shares, but the local community has specific rights and obligations to the maintenance, profits, and safeguarding of its heritage resources (UNWTO 1999). It promotes the use of sustainable policies and plans that will protect and support cultural heritage resources, traditions, performances, and crafts in order to allow them to thrive and flourish and be accessible for future generations to experience.

Future Directions

Since 1999, there have not been any new prominent international sustainable cultural tourism charters. However, there is a need for change since the implementation of the aforementioned sustainable development and cultural tourism policies has proven to be difficult. They have been sporadically and erratically applied, if at all. This is partly due to their vague and fluctuating policy criteria, assessment standards, and definitions (Font 2005; Murphy & Price 2005).

There is a need for a more consistent framework for which to evaluate tourism programs in order to ensure operation is in accordance to international standards. However, the framework would have to be flexible enough to fit the unique needs of each tourism program. Also, the concepts that would be involved in that assessment are quite complex, and one has to be cautious in employing them (Murphy & Price 2005: 178). For instance, it may be found difficult to set a minimum level for sustainability, and if one is set, it can discourage others from going above

and beyond that level especially if financial incentives are involved.

Furthermore, there are often a plethora of tourism stakeholders at various power levels who can negatively affect the regulation of sustainable cultural tourism. The regulation can be viewed as a local, regional, national, and global issue simultaneously, which can result in a higher likelihood of overlapping regulatory agencies and policies. Ultimately, the best way to ensure the utilization of international sustainable cultural tourism policy is through the collaboration and corroboration of all stakeholders.

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- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
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Swahili Archaeology

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Introduction

At the beginning of the first millenium CE, the discovery of the monsoon winds and the means to use them created a nautical revolution, allowing for major water crossings toward India and Ceylon. Trading between East Africa and the Persian Gulf intensified in the eighth century, but African relations with Islamic merchants were of a different nature to those of earlier times, since they settled in Africa, boosting urbanization. From the ninth century onward, Muslim geographers Buzurg b. Shahriyâr and al-Mas‘ûdî mention regular trade relations with East Africa, Zanzibar, Pemba, and

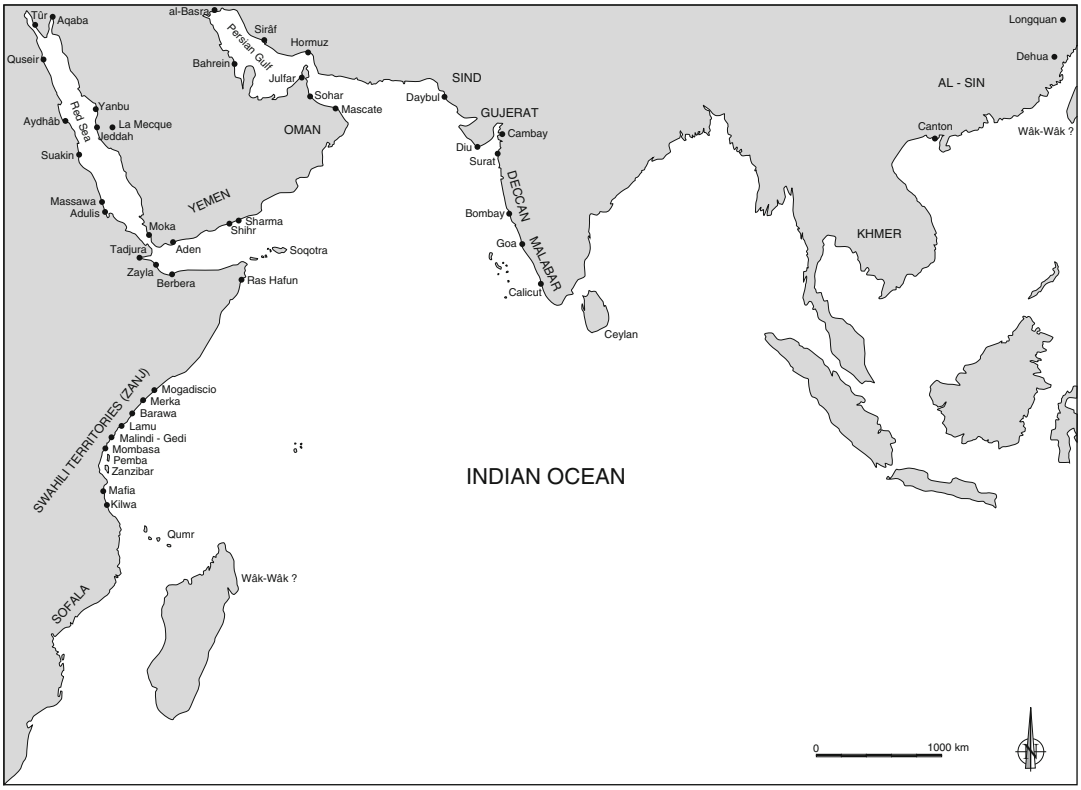

Swahili Archaeology, Fig. 1 Map of the Indian Ocean marking the locations of the principal medieval ports

Sofala (Freeman-Grenville 1962: 9-17), while the most famous story of a Persian navigator is of course that of "Sindbâd the Sailor," who supposedly reached the al-Qumr region, which includes the Comoros Islands and northern Madagascar, between 806 and 807. These sources indicate that as early as the ninth century, there were major shipping routes between Asia and Africa (Fig. 1).

The transition between the eleventh and twelfth century was a period of change. A number of urban East African centers developed at this time as did architecture in stone, used for public buildings, mosques, and enclosure walls. The Swahili city-states were established: Malindi and Mombasa were mentioned in 1154 by al-Idrîsî who spoke also of the island of Angazidja (Anjouan) and Sufala, the golden country. During the reign of Sulaymân b. al-Hasan, from 1178 to 1195, Kilwa made a fortune from the gold trade from Sofala. For this period, the major chronicles of Swahili city-states are precious tools for the archaeologist, the most famous being the Kilwa Chronicle (Freeman-Grenville 1962: 34-49).

A new balance of power developed in the thirteenth century. The Swahili coast was divided into several independent sultanates, including Kilwa, Mombasa, Malindi, Pate, and Mogadishu. In 1212–1229, Yâqût noted the cities of Mogadishu, Merka, and Malindi, but not until Ibn Battûta's work of 1331 do we have a precise description of the cities on the eastern coast (Freeman-Grenville 1962: 27-32). Ibn Battûta noted that Mombasa was large, with wooden mosques. Kilwa was supposedly one of the most beautiful towns in the world with stone houses covered with palm-leaf roofs or *makuti*; only certain mosques and the palace had hard flat roofs. From the fourteenth to fifteenth century, Kilwa continued to hold the monopoly for gold,

trading gold from Yufi, situated a one-month walk from the coast. Sofala, a vassal of Kilwa city, maintained commercial relations with the Shona kingdom of Great Zimbabwe; the rise of Great Zimbabwe was intimately linked to the trading of gold with Islamized peoples.

Vasco da Gama discovered the route to India and the East African coast in 1498. The European objective was to control eastern trade markets. They possessed two important technological advantages that ensured their domination of the Indian Ocean: the use of firearms and large, fast boats, caravels. The Portuguese built some fifty forts around the Indian Ocean, from Mozambique to Malacca, occupying the coasts of Kenya and Tanzania during the sixteenth and seventeenth century. Despite founding some trading posts, they quickly abandoned any attempt at political hegemony and were content keeping control of the sea routes. At the end of the seventeenth century, the area saw significant conflict involving Portuguese and Omani forces. After the fall of Mombasa, the Imam of Oman sent governors and garrisons to large cities such as Pate, Lamu, Mombasa, Zanzibar, and Kilwa. In 1828, an Omani garrison was installed at Fort Jesus, and the Sultanate of Zanzibar was founded.

The Sultanate of Zanzibar required a lot of slaves to maintain its clove plantations, the main export product. Large caravans were organized by the Omanis who destroyed the indigenous populations' economy and introduced firearms in exchange for slaves and ivory. These slave caravans were funded by wealthy Indian merchants, the *banian*s. But the commercial force of the Sultanate of Zanzibar was also its weakness, its plundering economy being based solely on slavery and the export of tropical products such as ivory and cloves, the limited number of these products increasing the precariousness of the economic system. The direct slave trade brought about important social changes, with Swahilis using landward populations rather than venturing beyond the coastline. For the first time in the history of East Africa, Islam took root in the interior lands of Kenya and Tanzania, right up to the Great Lakes region. In 1876, the movement of slaves toward the coast was strictly prohibited. The prohibition of the slave trade and the development of steam navigation eventually destroyed the supremacy of the Omani fleet. The opening of the Suez Canal imposed one last blow on the Sultanate causing it to lose its primary markets. The last sultan, Sa'îd Barghash, died in 1888, and Zanzibar became a British protectorate on 1 July 1890.

Definition

One Territory, One Population, One Religion

Wa-swahili, or "shore people," designates the inhabitants of the East African coastline and signifies above all a culture with a common language, Kiswahili, and the same religion, Islam. Arab-Persian geographers referred to the inhabitants of the East African coast as the Zanj. The Portuguese also noticed a difference between continental Africans and the people of the coast, who in light of their religion and customs they equated with "Moors" or "Kaffirs." It was at the beginning of the nineteenth century that the first use of the term "Swahili" appeared, with settlers trying to classify and differentiate the different populations of Africa. The Swahilis have defined themselves as such since the colonial period but differentiate between themselves according to their region, island, or town of origin. Despite some common ground, Swahili identity remains multiple, incorporating populations of diverse background, both Cushitic and Bantu.

Swahili culture extends from Mogadishu in Somalia, through Kenya, Tanzania, north Madagascar, and Comoros, to the bay of Sofala in Mozambique. As well as religion and language, these coastal populations share the same social organization and architecture. More than 450 Swahili archaeological sites have been registered spread over 3,000 km of the coastline (Pradines 2004: 18-20). The lifestyles on the east coast, Comoros, and Madagascar were homogenous due to the dissemination of new ideas and techniques by maritime travellers. Swahili culture reflects neither a specific ethnic group nor a particular nationality.

The Swahili civilization stands at the periphery of the Muslim and African worlds, resulting in the development of a unique coastal culture based on trade. In fact, its marginal position is linked to our vision of the Indian Ocean, which separates Africa, Arabia, and Asia. But the ocean also provides a connection between these very different cultures: the Swahilis are thus dynamic players, equal to Arab, Persian, and Indian traders. Swahili archaeology is at the crossroads of Islamic archaeology and African archaeology.

Historical Background

The explorers of the late nineteenth century were the precursors for current multidisciplinary research. In 1856, Charles Guillain wrote the first historical report on the east coast of Africa, while R. Brenner visited sites in the archipelago of Lamu, Mambrui, and Malindi in 1868. Richard Burton mentioned ruins in Zanzibar and Tanganyika in 1872. But it was Georges Révoil who carried out the first archaeological research, digging several trenches in Mogadishu in 1882. He published several books and articles on Somalia and northern Kenya, notably his travel accounts in *Le Tour du Monde* (1885, 1888). Révoil's contribution is not only material and textual: he produced many sketches and photographs. These iconographic documents are very important for archaeology, because they show buildings that today have disappeared or fallen into ruin. Photographs were also taken by Sir John Kirk who visited Gedi and Lamu in 1897. Captain J. Stigand published photographs of Lamu, Takwa, and Pate in 1913. F. B. Pearce initiated the first research into Zanzibar and Pemba in 1920; he was followed by W. H. Ingrams in 1931 and L. Buchannan 1 year later. The ruins of Kilwa were declared heritage-listed monuments and were restored by a German team in 1935. The prewar period was thus characterized by a rising awareness of the historical value of Swahili archaeological sites.

The first archaeological dig on a medieval Swahili site can be traced to 1948. A disciple of Mortimer Wheeler, James Kirkman, was sent to Kenya to excavate and develop the Gedi site. Wild stories had been circulating about this lost city, which was believed to be the work of Phoenicians or Egyptians stranded on the African coast. The excavations lasted 10 years, until 1958, and the results were published in 1954 and 1963. Kirkman also investigated two other major sites, the city of Ungwana in the bay of Formose and the fort of Jesus de Mombasa (Kirkman 1966, 1974). The museum of Fort Jesus opened to the public in 1960 and was managed by Kirkman until 1972. As early as 1948, Kirkman founded the Coastal Archaeology Unit of the National Museums of Kenya. This department was originally based in Lamu but was transferred to Fort Jesus. It currently occupies offices in the former courthouse of East Africa, in Mombasa. The role of this department is to record, monitor, and protect more than 120 historical and archaeological sites along the coast of Kenya, its researchers conducting rescue and research operations on endangered sites. Kirkman made numerous excavations and topographical surveys in Takwa, Kilepwa, Kioni, Mnarani of Kilifi, Jumba la Mtwana, Kinuni, and even at Ras Mkumbuu on the island of Pemba. The 1950s were also marked by archaeological surveys conducted by Mortimer Wheeler and Gervase Mathew at Kilwa and at Songo Mnara. In 1964, James Kirkman published *Men and Monuments on the East African Coast*. Significantly, he refused to attribute the invention and use of coral limestone architecture to the people of Africa, preferring to see it as the result of Arab or Persian colonies. Only foreigners could be the cause of urbanization, according to Kirkman; towns were established as Arab trading posts, not as African cities.

A second important figure in Swahili archaeology, Neville Chittick, became the director of the *British Institute in Eastern Africa* in 1962. This institute, founded in 1960, had as its principal goal the promotion of archaeological research in East Africa. Chittick was particularly interested in the medieval cities on the Kenyan and Tanzanian coasts. During the 1960s and

1970s, he undertook two major excavations: one in Kilwa in south Tanzania and the other in Manda in North Kenya (Chittick 1974, 1984). Chittick also initiated excavations in Songo Mnara, in Kisimani on the island of Mafia, in Pate in the Lamu archipelago, explorations in Somalia, and surveys in Mogadishu. Problems with Neville Chittick's work comprise his lack of interest in the successive ancient occupations of Kilwa and the classification of African pottery as a homogeneous group called "cooking pots." This attitude sprang from previous research; even today, the cities of the African coast are studied primarily through their imported material and monumental architecture, with African contributions being minimized or ignored.

In 1966, the work of Peter Garlake, *The Early Islamic Architecture of the East African Coast*, was published and is considered a milestone in the study of Swahili architecture. Garlake created a systematic inventory of all the ruins on the Tanzanian, Kenyan, and Somali coasts. He analyzed the evolution of local Swahili architecture and integrated it into the wider Islamic world. In the 1970s, Thomas Wilson identified 450 to 500 stone establishments extending from Warsheikh to the north of Mogadishu, to the bay of Sofala in Mozambique. Wilson's work arguably initiated reflection on the articulation of Swahili territories (1978, 1980).

In a 1962 publication, Freeman-Greville conceded that Swahili towns could be of African origin. In 1974, James de Vere Allen affirmed the African origin of the Swahili town in his presentation, "Town and Country in Swahili Culture," during the Leo Frobenius symposium in Cologne. In a 1981 article, he argued that Swahili urbanization and culture were the exclusive preserve of Africans. Unfortunately, this research on "africanity" resulted in aberrations during the 1980s. The posthumous work of James de Vere Allen mentions the presence of an African state in the ninth century, the great Shungwaya. Allen argued that this state, located in what is now southern Somalia, consisted of Cushitic-speaking peoples who later dispersed in order to found the Swahili towns. This afrocentrist vision was pure fantasy, not based on any archaeological or historical evidence. More moderate views were presented in the *General History of Africa* published by UNESCO; for example, Henri Mutoro declared: "The material forms assumed by Swahili culture present no analogy with Arab or Persian civilizations. There is no exact correlation between Swahili stone constructions and Middle Eastern, Arabic and Persian architecture, which leads one to suppose that it drew its inspiration from the latter" (Masao & Mutoro 1990: 645).

After the colonialist vision of Arab-Persian trading posts, Europeans and Africans both became engaged in the elaboration of a new ideological construct, the Africanization of Swahili cities, a theory supported by the myth of Shungwaya. Current thinking is that there is no Arab or African culture, but rather a Swahili culture, which is truly hybrid; scholars thus moved away from nationalist or propagationistic debates. In the 1970s, Pierre Vérin initiated archaeological research in the north of Madagascar (1975). His team, engaged too with the study of the Comoros, included Claude Allibert who continued the research started by Henry Wright in the 1980s (Wright 1984).

In 1980, Mark Horton undertook excavations in Shanga, in the Lamu archipelago (1996). Six field excavations, held between 1980 and 1988, clarified the Islamization of this coastal area. Horton was the first archaeologist to focus on the early phases of coastal sites, in keeping with Africanist views and bearing in mind the historical continuity linking the Islamized populations to the cities of the first millennium CE. In 1986, Paul Sinclair launched a project looking at the urbanization of East Africa and in particular of Mozambique. This project united institutions in Botswana, the Comoros, Kenya, Madagascar, Mozambique, Namibia, Somalia, Zimbabwe, Tanzania, and Zanzibar, strengthening archaeological research in these developing countries and collecting and publishing the results of excavations carried out by local researchers (Sinclair et al. 1993). Major African archaeologists emerged in the early 1990s, including George Abungu in Kenya, Félix Chami in Tanzania, Ricardo Duarte in

Swahili Archaeology, Fig. 2 Excavations of the great mosque of Gedi (Malindi, Kenya)

Mozambique, and Ahmed Jama in Somalia, who work on coastal sites in East Africa with complete scientific autonomy (Duarte 1993; Jama 1996).

Key Issues/Current Debates

The Swahili Mosque: Architecture and Islamic Expression in Sub-Saharan Africa

The origins of Islam and the first Swahili mosques in East Africa are evidenced by the results of Mark Horton's excavations in Shanga (Lamu, Kenya) and the author's own research in Gedi (Kenya), in Songo Mnara, and Sanjé ya Kati (Kilwa, Tanzania) (Horton 1996; Pradines 2009) (Figs. 2 and 3). Swahili mosques have a rectangular prayer hall flanked by narrow lateral wings usually comprising one-third of the width of the central hall. These mosques do not have a minaret and are bordered by a small courtyard where ablutions are practiced. Some mosques comprise a central row of pillars, facing the *mihrab*. The niche of the *mihrab* is in the form of a square, not integrated into the wall but jutting outside the mosque. The plans of Swahili mosques have a number of similarities with their counterparts in South Arabia, notably on the shores of the Hadramaut and Oman. Thus, in the fifteenth century, the *mihrab* of the Great Mosque of Gedi was decorated with 13 blue and white porcelain vessels inserted into the tympanum and the lower side of the apse. This use of ceramics as a decorative element of the *qibla* or the *mihrab* is also evident in Oman in the Shawâdhnâ of Nizwa mosque, dated 1530 and decorated with an inlay of cut blue and white porcelain.

According to oral traditions in many Swahili cities, the first stone mosques were associated with the Shirazis. The so-called Shirazi mosques, of eleventh- to twelfth-century date, seem to have had consistent proportions; thus in Gedi, the first mosque was c. 10 by 7 m. In Tanzania, the great mosque of Kilwa was erected between 1131 and 1170 (Freeman-Grenville 1962: 34-38). Its initial rectangular plan does not differ from the model previously described, measuring 11.8 by 7.8 m. Also in the Bay of Kilwa, the Island of Sanjé ya Kati houses a large mosque founded in the second half of the eleventh century; with its lateral wings, the mosque measures 10.21 by 9.46 m. The Shanga mosque, the final construction phase of which dated from the fourteenth century, may have been founded earlier. What is certain is that a mosque was constructed in Shanga between 1015 and 1035, decorated with blocks of sea coral. The eleventh-century building forms a rectangle measuring 11.22 by 7.21 m. During archaeological excavations at Tumbatu (Island of

Swahili Archaeology, Fig. 3 Excavations in front of the *mihrab* of the mosque of Songo Mnara (Kilwa Islands, Tanzania)

Zanzibar), Catherine Clark and Mark Horton unearthed the foundations of a Friday mosque from the twelfth century.

It was during the eleventh century that Swahili builders adopted coral to construct their mosques. This material was used for walls until the twelfth century. Its extraction was not easy, and it was thus used for fine sculptures around the *mihrab*. The sea coral was replaced by limestone coral from the thirteenth century. This fossil rock forms the geological substratum of the entire eastern coast. The blocks were taken from open-air quarries, not far from the construction site. The first buildings were assembled using coral stones cut in rectangular blocks and set in lime mortar. At the end of the fourteenth century, stone mosques became widespread and eventually reached large dimensions, such as that in Gedi, 26 m long. From this period, the walls of the buildings were erected using a formwork of irregular stones embedded in lime mortar.

The Islamization of the African coasts was connected with Shi‘ite communities from the Persian Gulf, and the oldest-known Swahili *mihrab* is indicative of these transoceanic influences. The *mihrab* of Kizimkazi on the island of Zanzibar is decorated with a passage from the Qur’an and bears the date 1107 (Flury 1922). The niche is decorated with floral kufic inscriptions along the capitals and within the apse. The islands of Bahrain and Zanzibar share this particular type of *mihrab* (Kervran 1990: 31, 48). In Bahrain, the Suq al-Khamis Mosque has a floral kufic inscription with a shi‘a inscription mentioning the Twelver imams.

International Perspectives

Ports and Maritime Trade

Archaeological research on the Swahili is linked to navigation and trade in the Indian Ocean. Mogadishu, in Somalia, formed the northern boundary of the Swahili cultural area. The stretch of coast between this city and the Lamu archipelago is nicknamed the *benadir*, an Arabic-Persian word meaning “the coast of ports.” The southern boundary of Swahili culture is the Bay of Sofala in today’s Mozambique. It is within this area that Muslim traders came to search for gold. In the medieval era, Arab geographers divided the African coast into four regions: sailors first reached the land of the barbarians or *Bilâd al-Barbar*; next, they arrived at the land of Zanj or *Bilâd al-Zanj*, situated between the Somali river Shebele and the island of Zanzibar; then, they

arrived at the land of Sofala, *Bilâd al-Sufâla*, a zone between the mouths of the Zambezi and Limpopo rivers, also called Sofala the Golden or *Sufâla al-dhahab*; and finally a number of sailors went all the way to the mysterious land of *Wâk-wâk*, the large island of Madagascar. Long-distance trade is thus at the center of Swahili culture. Coastal cities formed an interface between the African highlands and the merchants of the Indian Ocean.

East Africa exported mostly raw materials; these commercial products are mostly invisible to archaeologists, comprising organic materials such as ivory, skins, cloth, or wood. One of the most prized products was ivory. Tusks were generally sold raw throughout the cities of Vumba, Mombasa, Malindi, Lamu, and Pate. The polishing of ivory occurred in the importing countries, for example, in Fatimid Cairo. In addition to income earned from trade and fishing, Swahili urban elites owned plantations enabling them to meet their needs. Populations from the coastal hinterland provided other agricultural products, from hunting or gathering. Various Swahili agricultural products were exported, such as coconut and rice. Archives from the customs of Aden, dating from the fifteenth century, mention imported rice from Kilwa, but Neville Chittick argued that rice was only transited via Kilwa and actually came from Madagascar. Cloves were introduced in Zanzibar in 1818 by Sultan Sa'îd and became the principal export of Pemba and Zanzibar. Mangrove timber was exported in large quantities to countries in the Persian Gulf, under the Arabic name of *saj* or *mwangati* in Kiswahili. The Swahilis also traded woodwork, such as doors or sculptured pediments, to Oman and Kuwait.

Al-Idrîsî speaks of several large iron-mining centers located between Malindi and Mombasa. Iron might have been the primary source of income for this region, and India may have imported large quantities of the metal to make steel weapons (Freeman-Grenville 1962: 19-20). The author's research in Gedi confirmed that iron production was very important in levels dating from the twelfth to thirteenth century. According to Muktahar ibn Tâhir al-Maqdisî, the Zanj country provided the Arabs with a lot of gold in the tenth century. The profits from trade played a significant role in the prosperity of the kingdom of Great Zimbabwe which operated many mines. The mined gold was sent to Sofala, a vassal locality in Kilwa Kisiwani from the twelfth century. The gold was redistributed by Kilwa, which thus held a monopoly until the fifteenth century. In 1501, Cabral boarded and searched two boats in Kilwa filled with gold (Freeman-Grenville 1962: 59-60). The "yellow metal" became the main African product of interest to the Portugese who later settled in Mozambique in the hinterland of Sofala (Horton 1996: 383). African gold, but also rock crystal, were raw materials that were in high demand under the Fatimids. Elements of rock crystal were found at several sites on the Swahili coast, in Gomani on the island of Tumbatu, in Gedi, Manda, and Shanga. This mineral is foreign to coastal areas and came from the Kerio Valley and the Rift Valley.

The trade in humans was another aspect prized in Arab countries. Before the fifteenth century, most slaves came from Kenya and from the Horn of Africa, where the ports of Zeyla and Berbera were reputed for this merchandise. Few Portuguese texts concern the sale and export of slaves between the sixteenth and seventeenth century. Yet Ibn Battûta recounts that the holy war against Kilwa infidels was undertaken primarily to find slaves, more likely to represent trading on a commercial than a domestic level. The quantity of slaves exported to the Persian Gulf must have been considerable because a reported 500,000 outraged Zanj attacked al-Basra in 869 and retreated to al-Mukhtâra in lower Iraq, where they were defeated in 883. The quest for slaves had begun under the Sassanids in the fifth century and became industrial in scale in the nineteenth century under the Sultanate of Zanzibar. Slave traders collected slaves in the ports of Masselage in western Madagascar, in the archipelago of Kerimba in Mozambique, Kilwa Kisiwani, or in Zanzibar. The *dhow*s then returned through Pate all the way to Jeddah and Mocha in the Red Sea. Some slaves were shipped back to Turkey, Muscat, Sur, and to the Sindh. The French islands of Bourbon and Mascarene (Mauritius and

Swahili Archaeology, Fig. 4 Pillar tomb of Kunduchi with Chinese porcelains, Tanzania

Réunion) exchanged many slaves for firearms especially between 1775 and 1804. Following the British ban on this trade, the Omani slave ships took refuge under the French flag from 1873 to 1891.

Swahili communities imported a lot of goods from the Persian Gulf. In the middle of the ninth century, the port of Siraf became a major trading center with East Africa. Al-Masûdî notes that vessels from Siraf left for Sofala and Waq-Waq (Madagascar). From the thirteenth to the fifteenth century, Africa was connected to other centers, in Yemen with Aden and in India with the Gujarat and the Deccan. This trade continued after the Portuguese intrusion. Finally during the nineteenth century, trade was largely controlled by Oman. The Swahili imported a lot of manufactured products, including Islamic and Chinese ceramics, glass, metalwork, and even carved stones for their mosques and cemeteries (Pradines 2010: 221-237) (Fig. 4). The study of these imports, in particular the ceramics, allows us to draw a new history of the Swahili coast and its contacts with other cultures of the Indian Ocean world.

Future Directions

Urbanization and the Genesis of the Swahili House

The majority of Swahili towns were allegedly founded between the tenth and twelfth centuries. The first stone buildings date to the tenth century in Shanga and to the end of the eleventh century in Kilwa and Gedi (Horton 1996; Pradines 2010: 27). The growth of the population in the fourteenth century created demographic pressure, which led to the abandonment of some sites and the creation of new towns. From the fifteenth century onward, Swahili towns were surrounded by stone walls, as notably at the Kenyan sites of Pate, Ungwana, and Gedi (Pradines 2004: 328-334).

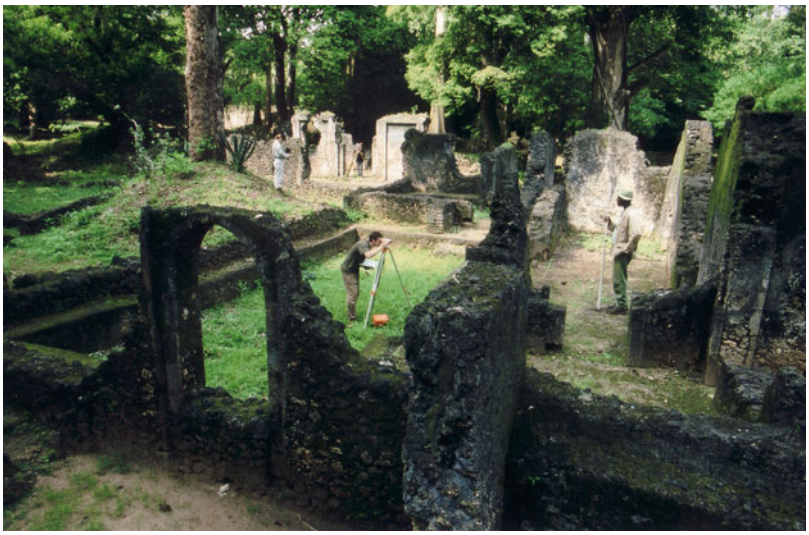

Swahili Archaeology, Fig. 5 Survey of the stones houses of Gedi (Malindi, Kenya)

These urban fortifications gave the developing political power some security and reinforced the distinction between town and country. The emergence of domestic architecture in stone differentiated from traditional African houses symbolized hierarchy among the Swahili community. Only rich merchants and individuals from powerful lineages could live in stone houses. This change in habitation is confirmed by observations at Gedi where architecture profoundly altered at the beginning of the fifteenth century.

The restructuring of the cities on the east coast is related to the apex of Swahili trade. This widespread phenomenon has been observed from the Lamu archipelago, to northern Kenya and all the way to Kilwa in southern Tanzania. In the sixteenth century, many Swahili ports were abandoned by commercial traffic because of the Portuguese intrusion in the Indian Ocean. The towns were then protected by forts, such as the Portuguese fort of Mombasa or the Omani fort of Kilwa. From the eighteenth century, the Omani presence led to a renaissance in Swahili architecture and urbanism. The towns gained height with multistorey buildings.

The genesis of the Swahili house is still subject to discussion, between supporters of a local evolution, including Mark Horton and John Middleton (Horton & Middleton 2000: 119), and those favoring exogenous influences, including Linda Donley-Reid, Abdul Sheriff, and the current author (Donley-Reid 1990: 114-126; Sheriff 2002: 76; Pradines 2004: 111-112). This new technology was first reserved for mosques and palaces, before becoming more widespread, being used for a group of large private houses in the fourteenth century. Stone buildings became emblematic of the power of the *wa-ungwana* patricians/nobility and represented the very notion of the Swahili city (Fig. 5).

Mark Horton has argued for continuity in the evolution of Swahili houses, from traditional earth-built dwellings to large houses in stone, in terms of consistent traits in the plans of the buildings and in the use of space. Unfortunately, examples prior to the fourteenth century are virtually nonexistent. A further problem is the existence of very similar architecture in Yemen, the occupation of which by Indian merchants is confirmed by historical sources. Horton also asserts that stone architecture is a local invention reinforced by Fatimid technologies from the Red Sea. He cites multiple examples of architecture in coral limestone in the Dahlak Islands, Er Rih, Aydhab, and Suakin. However, this technology was not only found on Egyptian and Sudanese shores, with examples existing on the coast of the Hadramaut and in the Persian Gulf, in Bahrain,

and in Qatar where coral blocks are called *hagar al-bahr*, or "stones of the sea."

It is more likely that domestic Swahili architecture from the fifteenth century was strongly influenced by Indo-Persian cultures between the thirteenth and fourteenth centuries. Two elements reflect the role of India in the genesis of Swahili habitations: the division of space into narrow, parallel rooms and the use of niches for wall ornamentation. Linda Donley-Reid has identified three types of Indian house, which are very similar to Swahili habitations. The southern region of Gujarat, from Mumbai to Broach, exhibits houses with two or three parallel rooms and a lateral circulation zone. Women live at the back of the building, which has an exit separate from the main entry situated in the façade. Houses to the north of Gujarat, from Broach to Cambay, have three parallel rooms with a central passage. There is no door at the back, and the walls are decorated with niches in a style very close to that found in Lamu.

In Gedi, the plans of the houses in the northeastern area are very significant: they present narrow, elongated rooms, all parallel except for one forming a side corridor. Some rooms have symmetrically arranged niches in the walls. As just noted, the room layout and the wall decorations are characteristic of Gujurati homes. Domestic units in Shanga had niches during the fourteenth century (Horton & Middleton 2000: 118). These cavities were organized in a symmetrical fashion, with a balancing of space still found in Swahili houses today. From this, we infer that the organization of central secluded rooms (*ndani*) and of niches in modern, traditional Swahili homes dates back to the fourteenth century. The origin of this form of niche comes from Gujurat and not from the African coast, as ornamentation with niches is found in Zabid and Mocha in Yemen, towns strongly influenced by Indian architecture from Surat. Niches found inside homes in Gujurat and Kutch obey a certain harmony, a regularity of space. This balance is based on symmetry of architectural elements. The plaster niches in Indian Bohras' houses are like miniature *mihrabs*; the alcoves, called *gokala*, are often associated with magical squares containing the name of Allah.

In conclusion, it must be said that archaeological research on Swahili settlements is still in its infancy. To progress further, what is needed is collaboration between specialists working in Africa, Arabia, Persia, India, and even China.

Cross-References

- ▶ Abungu, George H.O.
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Chami, Felix Arkard
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Fortifications, Archaeology of
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Iran: Islamic Archaeology
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Sweden: Cultural Heritage Management

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Introduction

Heritage management in Sweden has a long history dating back to at least. This history can be viewed from two perspectives – continuity or discontinuity. The first perspective is the official view, but not without problems. When viewed as a continuing enterprise, heritage management becomes a heritage in itself. This keeps the power over heritage linked to authorities claiming long historical continuity, which conserves the management of Swedish heritage. I will therefore approach Swedish heritage management from the second perspective, namely, discontinuity. Viewed from this point, heritage management can be seen as contextual and dynamic and closely linked to an active society that has a need and desire for heritage because of political and social reasons. Heritage management in Sweden is the history of its legislation, of those institutions that have been and are responsible, and the country's position in a broader context, at first in a European context and later in a global context. Legislation is always related to moral and norms, to identity and being, to power and majority (Derrida 2005). Behind the explicit civic structures of heritage legislation discussed here, a complicated and often hidden

Sweden: Cultural Heritage Management, Fig. 1 The Museum of National Antiquities, 1967. Social Democratic minister of Culture Olof Palme with scull of Stone Age "ancestor" in his hand. Palme later became Prime Minister and in 1986 he was assassinated on the streets of Stockholm (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

idea of ethnic continuity and identity can be found – the idea of a pure Swedish race and a united nation (Hegardt 2011a, b; Hegardt & Källén 2011; Svanberg in press) (Fig. 1).

Definition

Swedish heritage management can be classified into three historical contexts, Heritage as myth, Heritage as genealogy, Heritage as science and nation-narration, and a fourth – Heritage in a cosmopolitan world. Heritage is represented differently in each of these categories. Even the idea of Swedishness and a united nation is expressed differently, because of social, religious, and political needs and desires. Throughout history, many different institutions, academic subjects, museums, and authorities have been engaged in the management of Swedish heritage. The leading actor today is the National Heritage Board founded in the 1930s, but present legislation and centralized power is questioned and debated.

In 2005, I conducted a study with the department Sociology of Education and Culture at Uppsala University to find out who studies cultural historical subjects and heritage management related subjects at the different universities in Sweden (Hegardt 2005; Hegardt & Källén 2011). It turned out that the majority of the students came from native Swedish middle-class families with a desire for cultural capital. Finding a job in the heritage management system was the first wish for these students. This means, in short, that these individuals will reproduce and guard the narratives of Swedish heritage and history, because it is through these narratives that they gain their cultural capital and because they will do this inside a system organized by the State and civil society. The narratives thus become State governed and managed by people employed by the different authorities.

Swedish heritage spans over several millennia, starting with Stone Age remains dating back to at least 14,000 BP and ending in present-day industrial structures, for example. However, cultural heritage cannot be separated from nature and intangible and material cultural heritage exists within environmental contexts. Heritage thus becomes a metaphysical concept inscribed into structures, things, expressions, memories, and nature and has, because of this, been used and is used as a barrier against the outside world. Today, it, in a very problematic way, defines and encloses the Swedish and becomes a safe harbor in a dynamic world (Fig. 2).

Sweden: Cultural Heritage Management, Fig. 2 The Museum of National Antiquities, 1967. "Stone Age Swedes" (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

Historical Background

Heritage as Myth: Seventeenth Century

Swedish heritage management has an ambiguous origin in the laws of the provinces from the fourteenth and fifteenth centuries (Swedish: landskapslagarna). Some of these laws settled what should be done with ancient objects found on someone's property (Jensen 2002). However, there existed no clear historical narrative connected to the laws or to the ancient objects and monuments. The point with these medieval laws was nevertheless to secure the present rather than to guard the past. In the mid-sixteenth century, Archbishop Olaus Magnus (1490–1557) stressed that ancient monuments should be preserved since they were constructed with the aim of commemorating the deceased or an important event (Jensen 2010: 153). In 1523, Sweden became an independent Protestant State after 500 years of Catholic governance, Danish oppression, and the Hanseatic League's control over the economy, according to established historical narratives. Being Catholic, Magnus was in a difficult situation. He had to connect himself to the new society with the help of ancient monuments and historical myths. (It did not help. He died in Rome.) For Magnus and others, heritage signified a mythological and heroic past, present in the landscape as symbols. The present past became useful in the political, religious, and social context of the time. In 1630, Johannes Bureus (1568–1652) was appointed Riksantikvarie (Custodian of Heritage). Being the first, he has had 29 successors up to present date, out of which two have been women. The first explicit heritage legislation was published in 1666. Sweden was a major imperial power in the Baltic region at that time, and myths of Swedish history are presented in thick volumes emphasizing patriotic perspectives and heroic narratives. The most bizarre of these was published in 1675 by Olof Rudbeck (1630–1702), claiming that Sweden was the lost Atlantis.

Heritage as Genealogy: Eighteenth Century

In 1753, Queen Lovisa Ulrika (1720–1782) founded The Royal Swedish Academy of Belles-Lettres with the purpose to encourage historical research, rhetoric, poetry, and the Swedish language. A few decades later, in 1786, King Gustav III (1746–1792) restructured his mother's Academy and moved Swedish language and literature to The Swedish Academy (later becoming responsible for the Nobel Prize in literature) (Jonsson 2003). The Riksantikvarie was linked to the new Academy, named The Royal Swedish Academy of Letters, History and Antiquities. A utilitarian approach, reason, and specialized historical research opened a new approach to heritage and history – genealogy and chronology. Historians such as Olof von Dalin (1708–1763) and Sven Lagerbring (1707–1787) questioned, together with a new generation antiquarians, earlier historians for not being scientific enough. The chronology of the nation and the genealogy of the King and the nobility became important. The legislation from 1666 was still at work and heritage was viewed as genealogical facts rather than symbols for a mythological and patriotic past.

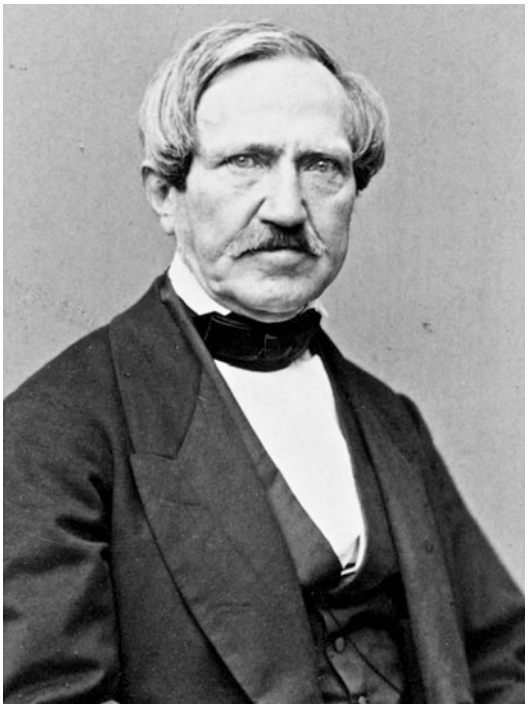

Sweden: Cultural Heritage Management, Fig. 3 B. E. Hildebrand, the grand old man of Swedish heritage management (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

Heritage as Science and Nation-Narration: Nineteenth Century and Early Twentieth Century

Sweden lost Finland to Russia in 1807, which was a traumatic blow to Swedish's self-confidence. The country was also in need of a new king. In 1814, Sweden gained Norway from Denmark, a great triumph. (Norway became an independent state 1905 and took with it an enormous amount of oil). During the nineteenth century, the Parliament obtained more power. The capacity to control and organize the society through civil servants had, however, been significant for Sweden since the mid-seventeenth century. Nevertheless, during early nineteenth century, new sciences such as archaeology, ideas of progression launched by German Enlightenment philosophers, such as Hegel and Kant, positivism and natural science, the idea that the nation is an ethnic and linguistic entity proposed by, for example, Fichte and Herder, contributed to chronological studies of Swedish heritage. An important boost was given to this process by the Dane Christian Jürgensen Thomsen's (1788–1865) publication of his Three Age System, featuring the Stone Age, the Bronze Age, and the Iron Age (Thomsen 1836). In the late nineteenth century, heritage management became centralized and related to bureaucratic institutions and museums in Stockholm, a process criticized by private actors in the provinces. The heritage legislation from the late sixteenth century was rewritten and will again be rewritten several times during the twentieth century to adjust to a changing society and centralized bureaucracy (Fig. 3).

Bror Emil Hildebrand (1806–1884) was impressed by Thomsen's museum and reorganized the Historical Museum in the university city of Lund after Thomsen's Three Age System. In the early 1830s, Hildebrand was called to Stockholm to help Riksantikvarie Johan Gustaf Liljegren (1791–1837) at the

Sweden: Cultural Heritage Management, Fig. 4 The Museum of National Antiquities, 1943. A place for consensus and compromise (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

Museum of Antiquities, a small museum in the Royal Palace. In 1837, Hildebrand was appointed Riksantikvarie and began to rework the museum following the same principles he used in Lund. In 1845, the Parliament decided to build a new National Museum and Hildebrand responded immediately with a memorandum (Hildebrand 1845) to the Academy explaining how the new museum should be organized. The National Museum stood finished in 1866 and the Museum of National Antiquities was placed on the ground floor. It followed Thomsen's ideas in detail, with the Three Age System as the main chronological principle. The galleries illustrated, like pictures in a book and in a proper chronological order, the progression of the nation. Narration was crucial when explaining how the nation has come into being through its heritage and Hildebrand and later Oscar Montelius (1843–1921) and Hildebrand's son Hans Hildebrand (1842–1913) never ceased to emphasize social and cultural progression. It was important to show a united people – one race – through prehistory and history. The museum would become the center for heritage management and archaeological research until the late 1930s.

However, already in the 1920s, the Museum of National Antiquities was bursting at the seams, being overfilled with objects. The bits and pieces of the nation coming into being, once glued together, were now slowly falling apart. At the same time, the Swedish society went through political and economical crises. According to Nina Witoszek (2002), these crises became a proof of temporariness, eliminating the idea of a secure and infinite historical process. To meet these crises, a welfare society – the folkhome – was introduced. Europe was viewed with skepticism as neofeudal, patriarchal, and unequal. Conflicts and tensions were to be avoided by the "imperative of harmony" and the society was to be built on rationalism, compromises, and consensus. According to Witoszek, Sweden from that time defined itself as the nation of goodness. Heritage management and the museums followed (Fig. 4).

Per Albin Hanson (1885–1946), the leader of the Social Democratic Party, introduced the welfare society and the "folkhem" (folkhome), and in the mid-1920s, Sigurd Curman (1879–1966) took over the Museum of National Antiquities, launching new museum policies and heritage politics based on the "folkhem." It was also decided that a new museum must be built, standing at the end of the 1930s. It was time to glue the bits and pieces of history back together again, this time on

Sweden: Cultural Heritage Management, Fig. 5 Sigurd Curman in his office 1926. The painting behind Curman shows Gutav II Adolf, a seventeenth century hero King (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

the principles of the folkhome, which was consensus, compromise, rationalism, and the society of goodness. To make this happen, heritage management and museums had to be reorganized. Until that time, the Riksantikvarie had been associated with the museum, but Curman introduced a new authority, the National Heritage Board (Riksantikvarieämbetet). The Board and the Riksantikvarie became responsible for the Nation's heritage, and the museum was made responsible for the collections of antiquities. The Academy was a third important actor (Fig. 5).

The Museum of National Antiquities worked with an advanced chronological perspective illustrating the united Swedes and how their special race came into being (see also Svanberg in press). In the 1920s and 1930s, these perspectives were emphasized and moved into heritage management under the authority of the Heritage Board. National consensus based on rationalistic epistemology became important, and heritage legislation and organization was founded on civic organization rather than on an explicit ethnic or linguistic principle. Nevertheless, the capacity of civic society to organize heritage is related to the ethnic and linguistic idea of a united Swedish race. Swedishness has been inscribed and narrated as heritage with the aim of guaranteeing stability and the homogenous nation, first disturbed when faced with cosmopolitan diversity and global economies in later decades of the twentieth century. Color consciousness (Appiah & Gutmann 1996) in Sweden is based on the idea that Swedes are a stable historical race of blond and blue-eyed people with a common heritage. Implicit racism is the outcome of such perspectives, becoming a practical reality (if the Sami are not included) in the late twentieth century due to increasing immigration to Sweden. Through heritage and the "good" society, Swedes have viewed themselves as superior without

having to face the people classified as inferior from a standpoint of a racialized discourse. When these "inferior" people suddenly turned up in Sweden as immigrants, Sweden has had to face itself, its history, and its idea of heritage. Swedish public-service authorities have rightly been accused of having profound problems with structural racism (de los Reyes & Kamali 2005; Pred 2000; Hegardt & Källén 2011).

Key Issues/Current Debates

The key issue for heritage management in Sweden since the early seventeeth century has been the definition of heritage as a state-controlled signifier of Swedishness, but without explicit narratives, heritage is rather pointless. Narratives produced by scholars in state-governed universities, academies, and museums have – through history – shaped the idea of a united nation, one people, and one race. The latest debate on archaeology and heritage management in Sweden has been published in Current Swedish Archaeology (Hansson & Källén 2010, 2011). Commercialization of contract archaeology and the relationship between heritage and a right-wing party that has come into parliament has been discussed. In both cases, it is the relationship between heritage and Swedishness, the historical continuity and authority of heritage management, the society as a stable united nation of one people and one race that is the crucial problem. The critical point made is that heritage management and archaeology can no longer build its existence on the idea of national continuity. The question is what to do. Heritage authorities, with their idea of a long historical continuity, the political parties, and the parliament, have few answers to the problem. Yet, heritage as a national and ethnical signifier has shown to be both obsolete and dangerous (Hegardt 2011c).

International Perspectives

As mentioned, Swedish heritage management, archaeology, and the legislation is under pressure in a changing world. Immigrants and cosmopolitan movements play their parts, but a more open Swedish society, the market economy, and political and economical crises have been influential as well. Continuity and Swedishness does not work in a society marching into a global world with cosmopolitan responsibilities. The uncertainty that has followed has opened for right-wing parties, but also for other political groups, local organizations, museums and authorities, and the public to appropriate heritage in line with the old idea of historical continuity, a united nation and Swedishness, and building their arguments on traditional heritage narratives, for example, by replacing the word race with the word culture and striving to enclose Sweden, regions or local areas through its heritage.

Future Directions

Heritage management in Sweden must find a new definition of what it means to be Swedish. From my point of departure, the word "cosmopolitan" (Appiah 2007) describes the situation best. If one looks closer into what is called Swedish heritage, one finds that only a small part of it can be defined as Swedish in accordance with the national definition of the word. Material heritage has been brought to Sweden from all parts of the world by people from all parts of the world. Historical buildings and other structures have been built by workers and paid for by wealthy people who have come from all parts of the world. Intangible heritage is a consequence of people meeting with people from many parts of the world. Every museum in Sweden is filled with objects that strengthen this perspective. What is needed is a definition of being Swedish that expands the boarders of the nation-state, perhaps in line with Bhabha's (2004) ideas of hybridity. Nonetheless, true and authentic Swedishness and heritage only exists inside a very narrow and imagined construction, and as Appiah (2007) has stated it: Cosmopolitanism is not hard work, repudiating it is.

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Swedish Institute of Classical Studies at Rome

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Basic Information

The Swedish Institute of Classical Studies at Rome (Via Omero, 14, 00197 Rome, Italy, http://www.isvroma.it) is a research institute devoted to classical studies with a special emphasis on archaeology. It is the base for Swedish archaeological excavations and academic activities in Italy. In collaboration with Swedish universities, the Institute gives annual courses in classics, art history, and related subjects. The Institute is located in central Rome and has a research library with c. 60,000 volumes. Twenty guest rooms and apartments are at the disposal of visiting researchers and holders of scholarships. The Institute is a state-financed foundation, with its board and secretariat situated in Stockholm, Sweden. The Institute's activities in Rome are supervised by a director educated in classics and a vice director trained in art history.

Major Impact

History, Facilities, and Activities of the Institute

The Institute was founded in 1925 on the initiative of Swedish Crown Prince Gustav Adolf (1882–1973), who was a professional archaeologist with a special interest in classical studies. As King Gustav VI Adolf, he maintained his interest in the Institute's activities, not least the archaeological excavation projects, and his lifelong commitment has been of the utmost importance to the institute.

The original aim behind the foundation of the Institute was to enable Swedish university students, and teachers in classical languages, to study the ancient topography of Rome and Italy, as well as the art and monuments of the same. A main objective of the Institute has always been its educational activities, as manifested in annual courses given to students from Swedish universities. These include courses in archaeology (offered since 1926) and in art history (offered since 1959), as well as other, more temporary, courses.

The Institute awards annual scholarships to support major research in Rome during the academic year in the subjects of architecture, art history, archaeology, philology, and conservation and heritage research. Thanks to a donation from Fondazione Famiglia Rausing, the Institute has broadened its research in other humanities as well, such as the Italian language, comparative literature, social anthropology, history, and the aesthetic disciplines.

The library is primarily devoted to archaeology, classical studies, and art history. The publication series Acta Instituti Romani Regni Sueciae was founded in 1932, and in 1992 the series Suecoromana, specializing in art history, saw the light. Since 2004 the Institute also possesses an on-line publication series, called Projects and Seminars. In collaboration with the Swedish Institute in Athens, the Institute publishes an annual journal called Opuscula.

Since 1940 the Institute has been located on Via Omero 14 in the Villa Borghese Park in Rome, in an area nearby several other international institutes. The Italian government placed the site at the disposal of the Institute for free, on condition that Sweden make the grounds available for the Italian Cultural Institute in Stockholm. The Institute building was designed by the famous Swedish architect Ivar

Tengbom (1878–1968), while several distinguished Swedish designers and artists were responsible for the furniture, textiles, and works of art that furnish the Institute. A new guest wing was added in 1964, an auditorium in 1988, and a new library wing in 2008.

Archaeological Research

The Institute has since its foundation been devoted to the study of Italy's ancient cultures. The research undertaken may be generally divided into following areas: Italic prehistory, Etruscan culture, the topography of the city of Rome, Pompeii, landscape studies, and the cultural heritage of Mediterranean antiquity.

The study of central Italy's prehistoric cultures, primarily the Etruscan and Latin cultures, has long been at the center of the activities of the Institute. The first Swedish excavation in Italy took place in the Latin town of Ardea south of Rome in the 1930s. The period after World War II saw a dramatic increase in the archaeological activity of the Institute, with important excavations in the Etruscan towns of San Giovenale and Acquarossa and the prehistoric site of Luni sul Mignone, in the years 1956–1978, with the aim to explore settlement patterns in Etruria. Moreover, in the 1970s, a joint Nordic excavation was carried out at Ficana south of Rome. Since then, more limited fieldwork has been undertaken, primarily in the form of surface survey and aerial photography.

The Institute also has pursued research on the ancient city of Rome and its hinterland. An important study of the Republican city wall of Rome was followed in 1939–1954 by excavation of the earliest phases of the Forum Romanum and, in the 1980s, by a joint Nordic exploration of the Temple of Castor and Pollux in the Forum Romanum. Other archaeological projects have focused on documentation and survey by nondestructive methods, complemented in some cases with limited excavation. Fieldwork of this character has been done at San Lorenzo in Lucina and the Lateran Baptistery in central Rome and at the imperial villa at Prima Porta on the outskirts of Rome. In the city's hinterland, joint Nordic excavations were undertaken at the imperial villa at Lake Nemi. The recently concluded research project Via Tiburtina studied the road with this name between Rome and Tivoli. It was an interdisciplinary project involving architecture, urban planning, archaeology, history, art history, and conservation and cultural heritage which contributed new perspectives on communication, cultural history, as well as urban and suburban development from the Bronze Age until modern times.

Since 2000 the Institute has pursued an archaeological project at Pompeii, aiming to analyze and comprehensively document a residential block, Insula V 1. Previously excavated and non-published areas are being documented and systematized to make this information available in a new publication and on-line (www.pompejiprojektet.se).

In recent years, the Institute has been focusing more on questions concerning cultural heritage and classical reception. Within this area, research has been undertaken on the preservation, dissemination, and understanding of ancient remains and cultures in modern society.

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Sweet Potato: Origins and Development

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Basic Species Information

The botanical name for the sweet potato is *Ipomoea batatas* [L.] (Lam). The most common indigenous names for the sweet potato tuber in Central and South America include *batata*, *boniato*, *camote*, *batata doce*, and *apichu*. From Peru, Hawaii, and Samoa to the Philippines, sweet potato is known by a broad range of cognates: *kumar*, *uala*, *umala*, and *kamote*, respectively. The sweet potato is called *kumara* in New Zealand. Eastern Africans know the sweet potato as *cileraabana*, "protector of the children," and it is called *ubhatata* in South Africa. It is known as *kara-imo*, "Chinese potato" in southern Kyushu, and in most other parts of Japan, it is known as *satsuma-imo*, "Japanese potato."

Timing and Tracking Domestication

The sweet potato is considered to originate in the New World, although its precise origin is not well defined. Archaeological remains of the storage roots, or tubers, of sweet potato show it was long used as a food source by the inhabitants of Peru. Preserved remains and samples from ancient tombs and burial sites have yielded cloth tapestries and ceramic vessels that occasionally bear woven images and artistic representation, respectively, of the sweet potato (Sauer 1951). Steinhold (2008) states that Peruvian sweet potato remains date back to 10,000 years ago in South America. Towle (1961) reports that dried sweet potato roots have also been found in more recent grave sites at Ocucaje dating to CE 1–600. Alternatively, Austin (1988) proposed a more eastward origin for the sweet potato between the Yucatán Peninsula of Mexico and the Orinoco River in Venezuela.

The sweet potato was domesticated roughly 10,000 years ago in a period when environmental and climatic conditions were completely different to today. During the early postglacial period, several factors, including increasingly arid climate and decreased natural resources, influenced the change from hunting and fishing to the planting of food crops. This intervention led to the domestication of the wild species of sweet potato by humans.

Commercial cultivation of sweet potato began in Hawaii in 1849. However, Asia is now the largest sweet potato-producing region in the world, with an annual production of 125 million tons. China produces roughly 80 % of the world's sweet potato (117 million tons annually), making it the leading supplier of sweet potatoes in the world. Latin America and North America produce about 1.9 million and 600,000 t annually, respectively.

Today, the sweet potato is a staple food source for many indigenous populations in Central and

South America, Ryukyu Island, Africa, the Caribbean, the Maori people, Hawaiians, and Papua New Guineans. The sweet potato contains many nutrients including protein, carbohydrates, minerals (calcium, iron, and potassium), carotenoids, dietary fiber, and vitamins (especially C, folate, and B_6); it contains very little fat and sodium. The chemical composition of the sweet potato varies greatly according to genetic and environmental factors. Protein contents of sweet potato leaves and roots range from 4.0 % to 27.0 % and 1.0 to 9.0 %, respectively. The root has high concentrations of anthocyanin and β-carotene.

Botanical Classification

The sweet potato is a creeping dicotyledonous plant with the following systematic classification (Huamán 1999):
Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Solanales
Family: Convolvulaceae
Tribe: Ipomoeae
Genus: Ipomoea
Subgenus: Eriospermum
Section: Eriospermum
Series: Batatas
Species: *Ipomoea batatas* (L.) Lam.

Within the Series Batatas, there are 13 wild species, which are considered to be related to the sweet potato (Austin & Huamán 1996). The number of chromosomes in the sweet potato plant is $2n = 6x = 90$, indicating it as a hexaploid plant with a basic chromosome number $x = 15$. Although the Series *Batatas* constantly undergoes revision, it contains roughly 12 other species, which are predominantly diploid ($2n = 2x = 30$) and a few tetraploids ($4x = 60$), which are wild.

Polyploid species are *I. cordatotriloba* with 2x and 4x and *I. trifida* with 2x, 3x, 4x, and 6x (Huamán & Zhang 1997).

There are diverse theories regarding the evolution of *I. batatas*. For example, Japanese researchers have considered it an autopolyploid derivative of *I. trifida*. On the other hand, American researchers posit an allopolyploid origin involving *I. trifida* and an unidentified tetraploid parent (Collins 1995). Zhang et al. (1998) suggests northern Peru and southern Ecuador as a secondary center of sweet potato diversity for *I. batatas*. Other important centers of diversity exist in sub-Saharan Africa, Papua New Guinea, and Indonesia. The geographic distribution of the wild species of Series Batatas is within the Americas, with the exception of *I. littoralis*, which is found in Australia and Asia. The cultivated species *I. batatas* includes plants that are very variable in their morphology.

Currently, thousands of cultivars are grown throughout the world and are unique to countries or to smaller regions within countries. All cultivars are more or less sweet flavored. Sweet potato cultivars exist in many colors of skin and flesh, ranging from almost pure white through cream, yellow, orange, or pink, to a very deep purple. For example, white- to cream-colored flesh sweet potatoes are common in the South Pacific, Africa, the Caribbean, and most other developing countries. In contrast, sweet potatoes commonly consumed in the developed countries, normally have yellow to orange flesh. The commercial sweet potato varieties in Hawaii have white, cream, purple, and yellow to orange color flesh.

The sweet potato is among the world's most important root crops today, especially in the developing world. Information on its archaeology, distribution, and genetic variations in ancient times has given scientists a better understanding of how this crop evolved under the selective and protective influences of human.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview

▶ Genetics of Early Plant Domestication: DNA and aDNA
▶ Plant Domestication and Cultivation in Archaeology
▶ Plant Processing Technologies in Archaeology
▶ Vegeculture: General Principles

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Switzerland: Upper Paleolithic Living Floor Investigations

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Introduction

Upper Paleolithic living floors represent moments in the life of hunter-gatherers in the form of scattered finds and ephemeral features. Such sites are naturally vulnerable to later activities and well-preserved examples are rare.

Key Issues/Current Debates/Future Directions/Examples

Investigating how such a site was composed is primarily achieved by fine stratigraphic observation and later by refitting of the recovered flint artifacts, bone fragments, and fire-cracked rocks. The network of lines created by conjoined pieces whose location is recorded three dimensionally allows us to visualize intra-site dynamics and to establish the relative chronology of a site's use. Further crucial information on the time depth of an archaeological horizon is obtained by studying the period(s) of the year during which a site was occupied. Special attention is therefore paid to screening the excavated sediments in order to recover all fragile organic elements that may be used for season determination, notably the teeth from very young animals, less than one year old, and the remains from small hibernating mammals such as ground squirrel and marmot. Another major concern is to differentiate anthropogenic structures (e.g., pits and post holes) from natural features dug by burrowing animals (e. g., collared lemmings or narrow-headed voles). Similarly, it is important to correctly identify naturally accumulated stones or other geological phenomena that may evoke human-made structures. For that reason, the horizontal view of a living floor, however impressive it may be, needs to be completed

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 1 The Magdalenian open-air site Monruz (Neuchâtel, Switzerland). The living floor yielded more than 40 well-preserved hearths and remains from at least 56 horses. The layer, though only c. 2–3-cm thick, has proved to be the result of repeated occupation episodes after successful horse hunts (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

by detailed stratigraphic documentation of all structures and features observed on the surface.

Hearths are of special interest because they acted as focal points around which most of the technical, domestic, and social activities took place. In the vast majority of sites, however, charcoal has been destroyed and the soil shows no traces of heat action, thus making it difficult to precisely locate the combustion areas and other hearth-related structures. The approximate position of the hearths is then endorsed by confronting the spatial distribution of all thermally altered objects, notably flints, bones, and stones. In the rare cases of hearths still containing black sediment, the residues are screened separately in the laboratory and sorted under the microscope in order to extract all discrete remains such as charcoal fragments, charred seeds, bones, and fish scales, relevant for reconstructing the use of the hearths.

An exceptionally well-preserved Magdalenian living floor excavated in Monruz, at the edge of Lake Neuchâtel (Switzerland) in advance of motorway construction, offers an example of these techniques in action. The floor belongs to an open-air living and processing site dated to c. 15,500 years ago. Due to high stratigraphic resolution, it was easy in this case to follow the micro-topography of the thin covering layer (c. 2.5-cm thick), so exposing the intact living surface at the very moment of its abandon (Fig. 1). Since the detailed distribution of finds and features is of paramount importance, it is necessary to avoid treading on the excavated surface: excavators work from platforms supported by scaffolding (Fig. 2). Dense bone and flint scatters, together with extended patches of red ochre, were associated with more than 40 hearths of various types and dimensions (bowl-shaped and flat structures). By refitting several thousands of fractured stones, it could be demonstrated that all had been originally brought onto the site to cover hearths, so conserving heat – a combustion system characteristic of the Upper Paleolithic period. At that time, fuel was scarce and included only twigs of wood species, such as dwarf willow and dwarf birch, that grow low to the ground. By placing stones on top of the brushwood, the use of the hearths slowly released the heat they had accumulated during the short combustion phase. Stones that fractured in the heat were subsequently dispersed.

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 2 In order to not disturb the original position of the finds, excavation of Paleolithic living floors is operated from a slightly elevated platform made from planks. The sediments are filled into buckets to be wet-sieved per ¼ of square meters, a well-adapted spatial unit for interpreting even discrete find scatters (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

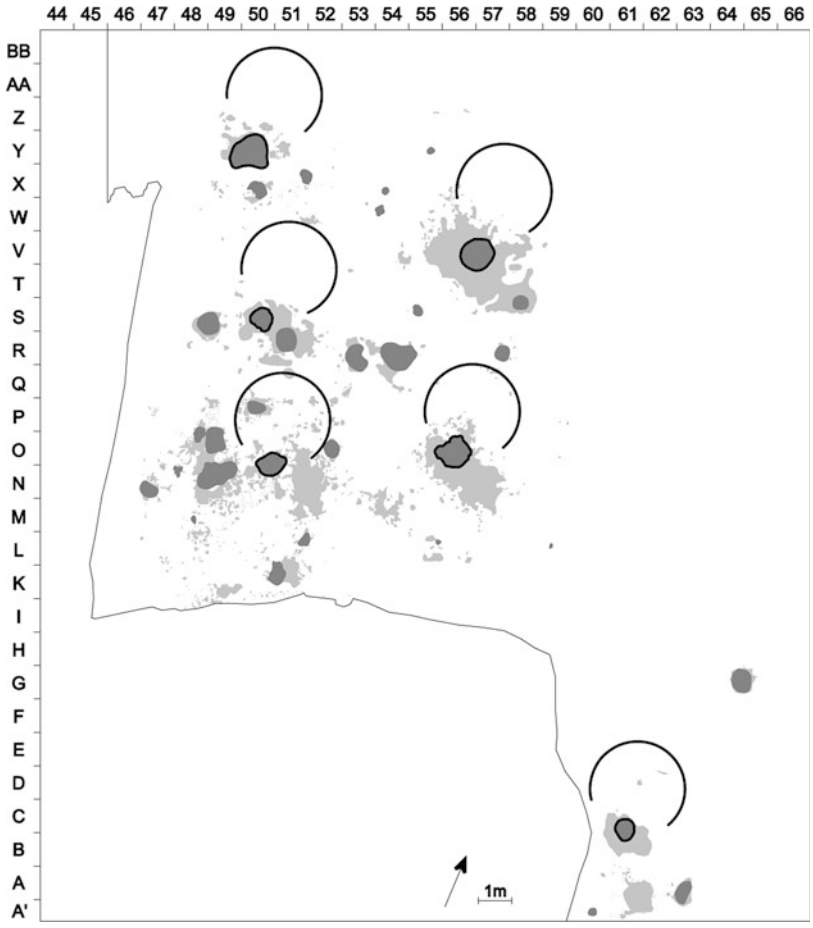

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 3 Model of dwelling units based on the location of the large pit-hearths and charcoal scatters (Leesch & J. Bullinger 2012, fig. 11)

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 4 Transport of a portion of a Magdalenian open-air site. This unusual operation was entirely financed by the Swiss Federal Roads Office (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

Through precise mapping of the activity areas, it could also be demonstrated that most of the hearths were of multifunctional character. Maintenance of hunting weapons was systematically performed less than 50 cm from the heat source, and sewing, as shown by the fractured bone needles, less than 1 m away. Hide treatment, probably because it required more space, took place at a slightly greater distance from the hearth. With the focus on the larger hearths, it was possible to propose living units within the overall pattern of debris (Fig. 3).

The Magdalenian site of Monruz is interpreted as a site that was occupied repeatedly following successful horse hunts. During each hunting event, only one to a maximum of three horses was killed. After the hunt, the whole group moved from its former camp location to this point where the horses were butchered and consumed. According to the number of killed animals, the occupation lasted for one to a few weeks. While staying at this place, diverse smaller species such as ibex, marmot, alpine hare, and various birds and fishes were hunted in the surrounding area and brought to the camp where they were processed and eaten in the immediate vicinity of the fireplaces. No more than three large hearths functioned simultaneously. Thus, what appeared at first sight to represent a single-occupation level was shown by careful excavation to correspond to a palimpsest created by repeated short habitation episodes during spring and summer.

So perfect an Upper Paleolithic picture did the Monruz deposit provide that part of it was extracted as a single block and removed out of the path of the motorway. It was enclosed in a container made from metal sheet piles and underlain by large pipes filled with concrete (dimensions of the block: 11 × 6 m × 2.5 m; weight: 400 t). The "box" was then loaded onto the platform of a trailer and taken to a new location where it could be studied without time constraint (Fig. 4).

Cross-References

- ▶ Excavation Methods in Archaeology
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Leroi-Gourhan, André
- ▶ Site Formation Processes

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Symposion

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Introduction

Since the 1980s, the "symposion," or drinking party, has been studied intensively as a major socio-political phenomenon in ancient Greece. Its origins probably lie in the fusion of local drinking culture with practices learned from the Near East in areas where trade opened up not just the transfer of goods but practices and ideas. However, as part of an Archaic Greek culture it developed its own distinctive rituals, forms, and functions. To understand its sociological, political, and psychological dimensions we must look at written, archaeological and iconographic material together.

Definition

"Let us drink!" With this opening invitation, the late seventh/early sixth-century BCE poet Alcaeus from the island of Lesbos (fr. 346) encapsulates the essence of the symposion imbedded in the name: to drink (*poteô*) in company (*sun*-, "with"). As the poem continues, further features emerge. With night only a fraction away, a beloved youth is instructed to take down large painted cups. Reminded first that the god Dionysus gave care-banishing wine to mankind, the boy is urged to fill them up to the brim with one measure of water to two of wine, as one cup jostles with another. Alcaeus' commands draw attention to some specific accoutrements and processes – a serving boy, decorated wine cups, and the mixing of wine –, and aim at a carefree, eroticized, exuberant atmosphere. Here, then, is one symposion.

Step forward in time to the early fifth century and travel across the Aegean Sea to mainland Athens, and a red-figure drinking cup attributed to the Painter of the Paris Gigantomachy provides a glimpse of another party in progress. On one exterior scene (Fig. 1), many of the same attributes are visible. The presence of four young men reclining side-by-side, facing one another in pairs creates a communal dimension. Cups hang behind them on the walls, or rest in their hands, or stand silhouetted on a border below (this border perhaps stands for the table or the floor). If the appearance of stylized semi-naked, beardless youths is not enough to convey an erotic tone, then the bent elbow, outstretched arm, and raised cups of the youths to the far left and right certainly do. They are playing kottabos, a toasting game in which each player aimed the dregs of his wine cup at a target (here, two high poles) in order to claim kisses. A penis cup also stands cheekily to attention below. In addition, the scene contains signs of luxury. The symposiasts recline upon sumptuous striped cushions. They are apparently on the floor, but this may be a visual shorthand for the raised couch (*klinê*) upon which two more symposiasts lie on the interior of the cup. The potential extravagance of this furniture is hinted at by the molded legs and decorative arm of a bronze couch in Athens' National Archaeological Museum (X18922), which, although from the second century BCE, accords with representations of *klinai* from Archaic Painted pottery (discussed by Boardman 1990). Depicted on the wall behind our nubile youths, furthermore, are animal-skin cases for the pipes (*aulos*) and a lyre, symbols of musical performance. Alcaeus might focus on the drinking, but his poem constituted a musical contribution to the symposion, most probably sung to the accompaniment of the lyre.

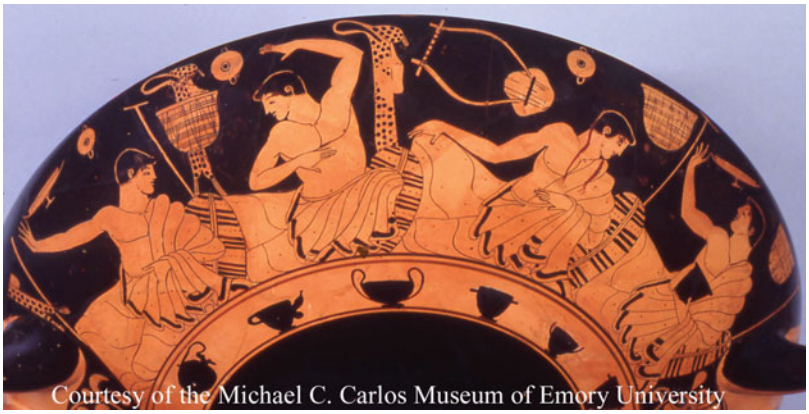

Symposion, Fig. 1 Painter of the Paris Gigantomachy. Kylix: symposion scene. Greek, Attic. C. 480 BC. Terracotta. 1998.8. (© Michael C. Carlos Museum, Emory University. Photo by Bruce M. White, 2005)

Taken from the written and material record, these two snapshots of the symposion provide a cumulative vision of a male homosocial occasion characterized by communal drinking, (homo)eroticism, music, luxury, and game-play. Add to this the archaeological evidence of the andron – the distinctive "men's room" that appears at civic-religious then domestic sites from the sixth century onwards, which is identifiable by its dimensions, architectural details, and more elaborate decoration – and you also have an event that took place within closed walls. These walls were lined with 7 or 11 couches in a circle. Like the figures spread around the exterior of our red-figure cup (the symposion continues on the reverse), the occupants' attention was automatically turned towards one another, away from outside. This lent the symposion an inclusive and exclusive air. The communality attested in the name symposion and its shared ventures was reinforced via the dynamics of the architectural space in which it took place.

Key Issues and Current Debates

To understand the symposion it is necessary to read different types of evidence in tandem. Each has a distinct focus and purpose: monodic poetry of the type attributed to Alcaeus was sung at the symposion; figured drinking vessels circulated amongst symposiasts at Athens and beyond; and excavated sites provide access to the physical space they inhabited. Together they construct a composite form. Yet, approached individually, each can shed independent light on the phenomenon; and from the divides arise discontinuities and differences. For, as is shown by poems composed not only by Alcaeus of Lesbos but also, moving from the late seventh to fifth centuries, Archilochus of Paros, Tyrtaeus of Sparta, Theognis of Megara, Solon of Athens, Anacreon of Abdera (who sang at the court of the tyrants Polycrates of Samos and Hipparchus of Athens), Xenophanes of Colophon, Ion of Chios, Dionysius Chalcus and Critias of Athens, the symposion was a multifaceted affair. Composed on the spot, introduced by the original poet, or memorized and performed by others, their songs may survive mainly in fragments. None the less, they preserve the conversations of the event. Through poetry symposiasts might express political sentiments, outline moral positions, praise or criticize a companion's conduct, pursue erotic relationships (especially with younger males), offer hymns, and make statements about themselves. Moreover, verses could be uttered in self-promotion, challenge, or defense. The symposion could therefore be a place for consolidating political alignments, educating young members of the community, forming personal social and sexual bonds, and expressing one's identity with regards to the present group and the outside world – and also disrupting or disputing these.

Of course, pushing together all this written evidence, generated orally at different parties in

different towns and at different times, minimizes the diversity of opinions and interests between the poets and their audiences. One ongoing task, then, is to understand the particular agendas of sympotic poets, to understand their corpuses as a whole, and also how their verses (however fragmentary they are now) might have been effective at gatherings beyond their original performance occasion. Ceramic drinking vessels can be similarly interrogated. Many are not only decorated with images of drinking parties, like the red-figure cup above, but were in all likelihood used on convivial occasions. We can therefore think about the items themselves, and about the images on them. There is one problem here. Many of the cups, kraters, jugs, amphorae and hydrias that we encounter now in museums have no recorded findspot (Lewis 2002: 5 estimates 50 %), or were excavated in Etruria (Italy), where they may have been used by local elites before being deposited as grave goods. Thus, we need to put the majority of pots back into the Greek andron, but of course we have no direct evidence of who used them, where or when.

There is therefore an unavoidable risk of circularity when approaching the visual evidence: of understanding how the imagery on pots contributed to the symposion's social and psychological dynamics by bringing to bear one's preconceptions of what these might be, based in part on that imagery. For François Lissarrague, close attention to iconographical detail allowed a way through the problem, and demonstrated the role of sympotic imagery in self-exploration and identity construction by the symposiast. His seminal monograph, *The Aesthetics of the Greek Banquet* (1990), set the vessels and their images circulating around the andron in the hands and before the eyes of symposiasts. As drinkers encountered reflections of their own activities, sometimes idealized to fit a generic model, sometimes vulgarized, sometimes undertaken by raucous satyrs or hat-wearing foreigners, they were confronted through association and humor with the pleasures and difficulties of their own drinking practices (see, for example, Sutton 2000; Osborne 2007; Steiner 2007: 231-64). Wine could be a powerful and transformative potion, as reflected in the character of Dionysus, its transgressive, boundary-blurring, and boundary-pushing deity. The images on the pots thus acted as Dionysian mirrors, showing drinkers how they were and how they might be. They thereby echoed the discussion of appropriate modes of drinking and the attendant dangers expressed in sympotic poetry.

However, the imagery on Greek pots extended beyond sympotic themes, to include mythological and "everyday" scenes. In tandem with oral story-telling through poetry, for example the tales of giants and strife that the philosopher-poet Xenophanes (F1) wished to eject from the symposion, painted pots drew symposiasts towards narratives about the (heroic) past and present. Like Tyrtaeus' martial elegy, scenes of Homeric-style fighting might contribute to the creation of shared memory – linking modern-day warriors to their heroic ancestors – or reinforce a martial ethic. Or scenes of men "courting" boys could titillate as much as Anacreon's poetic expressions of his homoerotic desires. Or sexually explicit scenes of men with women might also excite, whether as fantasies or anticipating real-life action; or in the most graphic or violent scenes they may even express gender power hierarchies. (Archilochus' "iambic" poetry similarly subjected women to sexual exposure through verbal abuse). These are only a few examples; the scenes on Athenian figured pottery are multifarious. It is frustrating not to know more about the precise encounter contexts for specific images, and difficult to avoid speculation when proposing the responses of imagined drinkers – even if that is grounded in what we know about Greek society generally, and through other evidence from the symposion. However, contemplating this limited selection already indicates some potential resonances, and highlights the symposion once more as a venue for conversations about self and society.

Occasionally, however, imaginative leaps are not required. Some drinking vessels are preserved in situ in Greek settlements in androne, or close by in rubbish tips or graves. When this does

occur, the results are fascinating. By studying the shapes and images and inscriptions on pottery found in the fifth-century Athenian Agora, Steiner (2002) has demonstrated the incorporation of "élite" sympotic elements into the dining practices of democratic officials (see previously Rotroff & Oakley 1992). Also in the Agora, deposits from the well (J 2:4) of a late Archaic house have revealed more about how Athenians drank at home: the shapes used by inhabitants and the iconographic themes they enjoyed are set by Lynch (2011) within the context of wider household activities and the new democracy. And the physical and chronological dispersal of kraters across three Greek cities in Sicily – Megara Hyblaea, Himera, and Silenus – shows a shift in sympotic activity from public to private events during the sixth to fifth centuries. Rabinowitz (2009) sets this progression against the political tenor of a proportion of sympotic verse, making the symposion a venue for expressing the tensions amongst members of developing communities, between bids for equality and power (On the basis of Doric practice at Sicily, he also argues that Spartan convivial practice of the *syssition*, far from being atypical as is often thought, was an extreme version of the standard symposion). Site-specific analyses of the archaeological evidence afford new glimpses into the practicalities of Greek drinking, and the sympotic experiences of individuals and communities.

The particular focus on the symposion's civic dimension reanimates Schmitt Pantel's (1992) argument that the symposion – and its ceramic ware – belonged within the wider sphere of civic commensality. It also fits with revisionist interpretations of the poetic evidence. Earlier studies of the symposion evaluated political comments in Alcaeus and Theognis as evidence for the symposion as an aristocratic activity of separation and opposition (Murray 1983). Or they divided poetry into two types – "élite" and "middling" – according to whether its singers reveled in or rejected luxury, and correlated this to a divide in political ideology (Kurke 1992). "Élite" symposiasts rejected the dissemination of their culture and power to less wealthy and less worthy citizens; "middling" symposiasts towed a middle line in their ethics and political relationships (Morris 1996). Hammer (2004) has challenged the very basis for this distinction, attributing it to the erroneous imposition of ideological divisions, while Corner (2010) shows that the symposion could act as a microcosm of the polis, linking its socialization processes to the individual within the community as a whole. By this reading, the symposion bridges the (private) household and (public) city.

The ramifications of this new work for understanding the symposion as a socio-political phenomenon need further consideration. On the one hand, the symposion was clearly enjoyed by a wider selection of individuals on a broader range of occasions than the inward-focused, oppositional "aristocratic Männerbund" formerly postulated (Murray 1983). But the relationship between the event articulated through the poetry and pot-paintings and the potential settings for sympotic performances intimated by the archaeological record could be sharpened by closer attention to specific archaeological settings. For example, allowing that standard issues regarding preservation, excavation, and interpretation may influence the picture, the majority of andrones in the Archaic period appear to have been situated in public buildings, especially at religious sanctuaries. Symposia here automatically took place in cultic contexts, presumably amongst specific individuals on particular occasions. How can this setting help us understand individual and group experiences? Hobden (2011) reminds us of the indivisibility of religion from other areas of life in ancient Greece, and, bringing together the poetry and imagery of the symposion, suggests some ways in which a religious dimension might facilitate the communal dynamics. But it would be interesting also to explore the (related) religious-political dimension.

Together, these studies demonstrate the pervasiveness of sympotic culture. Drinking in company is not merely the preserve of disaffected aristocratic élites; it was part of "mainstream" Greek culture. Or at least, there were occasions

when non-élite citizens enjoyed communal drinking, and civic occasions when groups might come together in various guises. Given also variations in settings, membership, and activities from town to town and across time, any single event could be quite distinct. The symposion may have been a major cultural phenomenon, but it was also diverse in expression. Furthermore, the poetic and visual evidence point towards an event that was potentially disputatious, disruptive and dangerous as much as a positive affirmation of identity and facilitator of group bonding. One of the greatest pleasures of the symposion is the continuing challenge to unpack that diversity of experience.

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- ▶ Andron
- ▶ Polis
- ▶ Religion, Greek, Archaeology of

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Syrian Archaeological Heritage Management: "Dead Cities" and Living Communities

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Introduction

Heritage management is at the epicenter of community cohesion and identity construction in modern Syria. Founded as an independent nation-state in 1946, after a significant era of Ottoman and French colonization, the Syrian Arab Republic manages millennia of Syrian heritage, from some of the world's oldest continually occupied cities to transforming expressions of intangible culture. Modern Syria is negotiating the dialectic between tradition and innovation, utilizing the legacy of the past to meet the challenges of the future.

Syria's vast archaeological heritage is managed by the Directorate-General of Antiquities and Museums (DGAM) under the auspices of the Ministry of Culture. The DGAM was founded soon after Syrian independence and serves an integral role in managing the nation's archaeological patrimony and structuring heritage narratives. The national narrative is one of legitimization through antiquity and the assertion of national identity in the postcolonial era. National museum and archaeological site narratives emphasize majority culture over diversity, minimizing difference by highlighting elements of a perceived shared past and striving toward a common future. It is through the medium of archaeological heritage that the past is recontextualized and the process of identity formation negotiated.

Key Issues/Current Debates/Future Directions/Examples

Archaeological Site Excavation and Protection

Syria's cultural patrimony encompasses a rich tapestry of archaeological and historical sites that illustrate the region's ancient and diverse past. These sites represent human settlement and culture in the Near East from the earliest occupations in ancient Mesopotamia to Hellenization and Islam. Many of Syria's archaeological sites have been scientifically excavated through a combination of national efforts and international partnerships with foreign scholars. Excavated artifacts are curated in one of a network of Syrian national museums, where the past is recontextualized in the construction of present identities through regional and national narratives.

Archaeological sites in Syria are protected by strict national laws against looting and destruction. Local branches of the DGAM operate in each of 14 provinces, often from the offices of a national museum. Permanent site guards are required at all archaeological sites under current excavation. All sites are regularly visited by provincial officials of the DGAM to ensure that they are in stable condition, but consistent coverage is difficult with a lack of financial resources.

The rural locations of many sites offer a unique set of conservation challenges. Many of the environmental factors that motivated ancient settlement in these rural regions are equally attractive to modern occupants. Thus, villages are frequently located nearby, if not directly surmounting, ancient settlements. In the ideal scenario, the ubiquity of modern settlement near ancient sites could foster a community of local stewards to protect archaeological heritage and participate in scientific excavation. Presently, it is a continuing challenge to balance modern concerns with the preservation of cultural patrimony.

Syrian law protects archaeological sites from modern cultivation and construction. Archaeological *tells*, or settlement mounds, are the most evident type of site morphology in Syria, which frequently results in legal protection extending solely to the more visible high mound. Lower mounds or ancient outer towns are not as topographically obvious and are thus often hidden or destroyed under modern agricultural cultivation. Irrigation agriculture is most prevalent, as many regions in Syria are in either marginal

environmental zones or reside below rainfall requirements for successful dry farming. Agricultural reliance on irrigation in these regions has artificially raised the water table surrounding many archaeological sites that are not themselves under cultivation. Thus, tells may appear intact on the surface, while access to deep archaeological deposits is rendered effectively impossible by water and salinity. The popularity and economic growth of cotton cultivation, which requires considerably more water than other crops, has only accelerated this process. Numerous well-preserved sites remain, though many have not yet been scientifically excavated.

The DGAM has identified "salvage zones" in regions where archaeological sites require special protections. These salvage zones are usually regions where modern developments threaten to destroy or obfuscate ancient sites. The directorate-general issues new excavation permits to foreign expeditions only in "salvage zones," which carry the incentive of official dispensation of half the excavated material to foreign scholars at the end of the scientific mission. In 1968–1973, the Tabqa Dam Project constructed a hydroelectric dam on the Euphrates River, which created Lake Assad. Prior to completion of the impound lake, a cooperative Syrian and international effort was undertaken in concert with UNESCO to excavate sites that would be flooded (Freedman 1977). As part of this initiative, standing architecture at sites such as Qala'at Jaabr were conserved and reinforced; a brick minaret from the thirteenth-century mosque at Siffin was relocated to Meskene (Bounni 1977; Burns 1992: 204), along with the relocation of a similar minaret from Abu Hureyra (Bounni 1977). Recently, the DGAM designated a salvage zone in the Halebiye-Zalebiye region of eastern Syria in response to the planned construction of a dam and resultant flooding of nearby archaeological sites.

Many famous and historically important sites have undergone extensive conservation efforts. In 1999, the DGAM partnered with the Aga Khan Trust for Culture under the latter's Historic Cities Programme (AGHCP) to conserve and restore a selection of Syria's historic fortresses, including Qala'at Salah ad-Din and the Aleppo and Masyaf Citadels. The AGHCP provided technical assistance with the restorations, which "encompassed the refurbishment of public spaces, the provision of tourism infrastructure and a number of socio-economic programmes" (Aga Khan Development Network 2007). In 2004, the Syrian Ministry of Culture signed a similar agreement with Italy's Ministry of Foreign Affairs to renovate the Damascus Citadel and the National Museum of Damascus.

In addition to national laws protecting Syria's archaeological heritage, six sites in the Syrian Arab Republic are currently protected by UNESCO's Convention Concerning the Protection of the World Cultural and Natural Heritage (1972). These are, in order of acceptance to the World Heritage List, the Old City of Damascus (1979), Bosra (1980), Palmyra (1980), the Old City of Aleppo (1986), Krak des Chevaliers and Qala'at Salah ad-Din (2006), and the Ancient Villages of Northern Syria (2011), more commonly known as the Dead Cities. There are also a dozen other cultural heritage sites submitted to UNESCO's Tentative List for possible future inclusion. The sites that currently reside on the list are some of the most popular and heavily trafficked tourist destinations in Syria.

Syrian National Museums

Syrian national museums preserve and present the archaeological past, recontextualizing Syria's vibrant cultural heritage for a modern audience. The national museums were created as nationalist enterprises during Ottoman rule, expanded and modified for colonial purposes under the French Mandate, and finally adopted by the nascent Syrian Arab Republic as a means of contextualizing and presenting their cultural heritage in a postcolonial era. The two oldest Syrian museums, the National Museum of Damascus and the National Museum of Aleppo, were both formed from collections of independent nationalist societies (the Arab Academy and the Archaeological Society, respectively), before being subsumed under the government-operated *Service des Antiquités* around 1920.

Today, the DGAM maintains national museums in many of Syria's provinces, each of

which draws upon the same corpus of archaeological heritage. Although the network of national museums display similar artifacts exemplifying millennia of Syrian settlement, each museum presents a distinct narrative of Syrian national identity (see Zobler 2011). Several of Syria's archaeological sites, including Palmyra and Mari (modern Tell Hariri), contain small site museums showcasing some of the artifacts discovered. These museums allow visitors to examine artifacts recovered during excavation and provide a broader historical context for archaeological sites and regional histories. These site museums are far more specialized in scope in comparison with the more conglomerate national museums.

Tourism and Historic Site Management

Syria's rich archaeological heritage is presented to tourists with a particular focus on a few sites and national museums. At Syria's most famous and heavily trafficked tourist destinations, local and foreign tourists mingle to explore Syria's cultural patrimony. The drastically reduced entry fees for Syrian citizens encourage national patronage of archaeological sites and museums. In addition to extant ruins, there are also related intangible heritage events such as the Festival of le Crac des Chevaliers and the Valley for Arts and Culture, which was held in Homs in the summer of 2010.

Many of these sites have ongoing excavations and restoration projects, which contribute to the corpus of archaeological data, while opening new tourism opportunities and conserving sites for future visitors. Ongoing research at these sites affords tourists the opportunity to witness excavation and restoration programs in progress, thereby de-abstracting the work of heritage management and highlighting its importance in the responsible stewardship of archaeological resources.

Visitor Flow at Archaeological Heritage Sites

Syrian management of large sites with significant tourist traffic involves a segmented organization of multiple checkpoints at key areas of interest, usually involving separate entrance fees for high-profile monuments. These checkpoints may be used to manage the number of tourists able to enter an area at any one time for conservation purposes. In practice, only a small percentage of a large archaeological complex is visited by a significant number of tourists, usually in direct correlation with tour bus accessibility. Syrian officials have concentrated their management efforts in these popular zones, but are virtually absent in other parts of a large site. Thus, the more persistent visitor can often experience sites virtually in isolation (and without official supervision) by walking beyond the most commonly visited sectors of a site. Syrian officials combat this tourist tendency in remote zones by restricting access to unguarded structures with locked gates, making them only accessible by guided tour.

Even with large numbers of tourists arriving daily at a few select sites, there is minimal effort to direct tourist movement patterns in Syrian site management planning. The paucity of cordoned-off sections (for either safety or site preservation) or directional signs to suggest a route, by which visitors may experience the site, engenders a management strategy significantly reliant on individual responsibility. Syrian site officials frequently adopt a warden-esque approach to site protection from damage, issuing frequent verbal reminders to tourists as to which portions of the site are off-limits. From a conservation and safety standpoint, this often leads to more limited and inconsistent site coverage, particularly when spread over a large surface area, than more integrative methods utilizing barriers and signage in addition to roving guardians.

It is predominantly the responsibility of individual tour guides to ferry their visitors around sites and give them historical context in the absence of signage. Syrian tour guides require an official license to practice in Syria, thus ensuring relative standardization in the quality of information presented. Foreign tour guides are allowed in Syria, but the majority of foreign tour companies usually outsource to local agencies for Syrian guides. Within the framework of the guided tour, tour guides are comparatively

free to construct the narrative for visitors and chart their own course through a site.

Heritage Narratives: Scripting the Past

The narratives presented at Syrian archaeological and historical sites are intimately tied to tourist movement and signage. Small or isolated sites are usually connected in tourist routes by local tour companies or hotels, often constructed as day-trips from a major city. Packaged tours for multiple site visitations reveal how heritage narratives structure tourism marketing. For example, a combination of Byzantine sites outside of Hama has been dubbed the "Dead Cities" and is commonly visited in a single excursion. Sites that may draw a particular audience, such as Krak des Chevaliers and the Saint George Monastery are also frequently packaged together.

Tourists are almost completely reliant on either guided tours or their own tour books to understand the composition and history of a site, particularly at smaller attractions. Signage is often minimal, even at many of the largest and most frequently visited sites, which instead rely on optional tour guides to provide a narrative framework. Print media is relatively scarce at many historic sites and national museums (with a few notable exceptions; see Bonatz et al. 1998; Faraj al-Ush et al. 1999; al Moadin et al. 2006) and virtually absent at smaller sites. Thus, modest or remote sites form a part of Syria's heritage that is often underappreciated because there is so little structuring of the tourist experience. Additionally, the ability of foreign tourists to visit many of the smaller sites is hampered by Syrian tourist visas, which are valid for only short stays. Thus, it is usually only the extremely dedicated traveler, usually one who has visited the country multiple times, who visits these sites.

The appeal of these smaller sites for many tourists is the opportunity to encounter incredibly well-preserved ruins in virtual solitude. For many foreign visitors, this conjures the romance of exploration that was so prevalent in the nineteenth century. Syrian entrepreneurs often capitalize on the Orientalist mythos in the structuring of the tourist experience. Overtly, vendors offer camel rides (terrain permitting) and meals at "traditional" restaurants designed for tourist consumption. In more subtle manifestations, such as the display of T.E. Lawrence's unpaid bill at the Baron Hotel in Aleppo, Syrian heritage tourism is recontextualized as exotic adventure in a grand tradition.

The site of Serjilla represents an exception to the general lack of signage in Syrian site management. The Byzantine Period site includes astonishingly well-preserved ruins of houses, baths, a church, and tombs, and is perhaps the most impressive of the so-called dead cities. Signage is evenly spaced throughout the major buildings in unobtrusive locations, so as not to detract from the experience of encountering the ruined Byzantine settlement. Information is presented in concise, multilingual plaques (in Arabic, English, and French) with accompanying illustrations. The script places the site in broader historical context and offers summaries of important historical and anthropological concepts related to subsistence and environment, trade, and political organization. Text panels offer architectural reconstructions of a few of the structures to aid visitors in imaging how these buildings might have looked and functioned in antiquity. These illustrative reconstructions are an extremely effective method of disseminating the results of archaeological scholarship without physically altering the sites themselves, which is infinitely more costly and open to editorial interpretation.

Souvenirs and Popular Culture

Syria has enjoyed a long history of souvenir production based on its cultural heritage for domestic and international consumption. International souvenirs began with the postcard industry. These images of historic monuments, traditional costume, and Orientalist themes not only disseminated images of the region to a broadening interested public, but also structured expectations of travel in the Near East for future travelers and provided a framework through which existing travelers conceptualized their own experiences. More cynically, postcards also functioned as instruments of propaganda, particularly during the French Mandate. Today, souvenirs marketed

to foreign tourists reference traditional Islamic society, particularly Bedouin culture. Commonly sold souvenirs relate to traditional culture or handicrafts, including woven rugs, water pipes, Bedouin jewelry and metalworking, as well as kitschy Assad memorabilia and wards against the Evil Eye.

Souvenirs produced for a domestic audience often highlight local interests. Among these are the scale models of the water wheels of Hama, one of Syria's most popular destinations for domestic travel. The wheels are fashioned into children's toys, fountains and decorative conversation pieces at varying scales. They are sold in tourist stalls and shops as well as the main bus terminal: the epicenter of Syrian middle-class travel. Another popular icon of Syrian heritage is the so-called Mari Lady, from a fountain statue in the Palace of Zimri-Lim at Mari. Reproductions of the enigmatic, mono-browed goddess of ancient Mesopotamia adorn public squares and private home gardens alike.

Souvenirs are sold in official gift shops at popular sites and in the national museums, but the majority are produced and sold by entrepreneurial vendors. Syria's tourist market supports a thriving kitsch industry, as enterprising individuals sell independently produced handicrafts and postcards (often at a discount from the official site stores) and refreshments to ambling tourists. Traditional-style goods, such as textiles and metalworking, are most commonly sold in the tourist sectors of *souqs* (markets), though today, they are frequently mass-produced outside of Syria instead of handcrafted by traditional artisans.

Vendor entrepreneurship allows a broad community to benefit from tourist revenues. This cottage industry provides a vehicle for individuals to capitalize on their tangible heritage in a way that is nondestructive to sites. However, the majority of sellers reach their customers by motorcycle across large archaeological sites, which is problematic for effective site preservation. The relationship between independent vendors and site officials is tolerant, though site planners might work in concert with vendors to develop a strategy for effectively reaching customers, while protecting the archaeological heritage on which souvenirs are based.

The Future of Syrian Heritage Management

Syrian management of their archaeological heritage encompasses excavation and preservation initiatives, a complex system of national museums, and a burgeoning tourism industry. The DGAM governs the nation's cultural patrimony through a combination of local efforts and international partnerships. Modern communities thrive beside ancient cities, and entrepreneurial tour guides and vendors capitalize on Syria's past, while economically providing for the present.

The discourse of Syrian heritage has, until recently, been framed as a global assertion of unified national identity and as a mechanism for the communication of provincial identities internally, rather than serving as a means for heritage introspection. Perhaps future heritage narratives will address more contemporary sociopolitical conditions, as Syrian identity continues to be negotiated. The nation's archaeological heritage will surely be an important medium through which such conversations take place.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation in Museums
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Experiencing Cultural Heritage
- ▶ Heritage and Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Postcolonial Archaeologies
- ▶ Site Visitation and Interpretation: Management

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Tadrart Acacus Rock Art Sites

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Introduction

The Tadrart Acacus is a sandstone massif range located in the southwestern side of Libya, in the core of the Sahara, close to the Algerian border. The area is today a harsh and dry landscape, inhabited by a few Tuareg families, but it has not always been a desert. During the humid climatic fluctuations occurring particularly in the Holocene, the area was greener and suited for animal and human life. Evidence of the ancient occupations is spread all over the massif and the neighboring areas in the form of open-air sites (isolated finds, scatters of artifacts, or megalithic structures) as well as stratified archaeological deposits preserved in rockshelters and caves. It is in these same contexts that one of the richest concentrations of Saharan rock art is hosted. In 1985, the rock art sites of Tadrart Acacus were inserted in the UNESCO list of World Heritage Sites as an example of "a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared" (Criterion III: http://whc.unesco.org/en/criteria/).

Definition

Rock art sites of Tadrart Acacus represent an outstanding record of ancient human groups who lived in the central Saharan region during the Holocene, from the early hunting-gathering communities to the emergence of the first Pastoral society, to the development of the Garamantian state (Mori 1965; Barich 1987; Muzzolini 1995; Cremaschi & di Lernia 1998; Le Quellec 1998; Liverani 2005), until the Tuareg occupation (Biagetti & Chalcraft 2012). The subjects and scenes are painted and engraved on cliffs, isolated boulders or on the walls of rockshelters, and in the rare deep caves. They mainly represent animals and humans, both isolated, in groups and performing daily or ritual activities. Set into the wider archaeological and paleoclimatic framework, rock art adds important elements to the reconstruction of the environmental, sociocultural, and ideological dynamics of the past cultures.

Key Issues/Current Debates/Future Directions/Examples

Discovery and Outline of Research

The presence of rock art evidence from the Sahara was first reported by European militaries and travellers crossing the region since the late nineteenth and the mid-twentieth centuries.

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Anyway, until recent times, the Tadrart Acacus massif was almost unknown to the international community.

In 1894, F. Foureau reported the first notice about the presence of engravings in the area; in 1926, the Abbé Breuil and his collaborators published the site of In Ezzan, located southeast of Ghat, and about two decades later Paolo Graziosi worked in the southern areas of Selfufet, In Arrechin, and Tachisset (all sites today in the Algerian Tadrart – Graziosi 1942). In 1955, Fabrizio Mori crossed the western cliff edge of the Acacus, discovering the prehistoric paintings and engravings hosted on the walls of rockshelters and caves. Mori's team explored and documented the northern and central area of the massif, focussing on the area of Ti-n-Lalan (1955–1959), and later mainly on the central and southern wadis. Since 1960, for the first time in North Africa, the study of rock art was supported by excavations, a modern multidisciplinary approach and new methodologies, including radiocarbon dating (Mori 1965).

In the 1990s, the research in the area was characterized by a new territorial scale, aimed at enhancing the knowledge of the paleoenvironmental and sociocultural dynamics occurring in the massif and its surroundings (Cremaschi & di Lernia 1998; Mori 1998). The conservation issue was one of the research topics of this phase. Since the 2000s, the main aims of research are devoted to a landscape approach and to the contextualization and systematic recording of the rock art. Emphasis on the state of preservation led to identify various causes of decay due to natural and anthropic factors (Cremaschi et al. 2005; di Lernia & Zampetti 2008). Huge efforts are directed towards active actions for the preservation and management of the rock art sites and the wider cultural landscape of the Tadrart Acacus, to tackle the changes taking place in Libya (Cremaschi et al. 2005; di Lernia 2006; di Lernia & Gallinaro 2011).

Nature and Location of the Art

The Tadrart Acacus is dissected by a fossil drainage network resulting in wide valleys and deep canyons –relicts of a landscape shaped by the tertiary equatorial climate – where prolonged processes of fluvial and pseudo-karst actions caused the formation of rockshelters and caves. These morphological features, located on terraces at different altitude along the steep slopes flanking the wadis and canyons, hosted the human groups since the Late Pleistocene (Cremaschi & di Lernia 1998).

Rock art in the area takes the form of both paintings and engravings and occurs on the walls of the rockshelters and in the rare caves, as well as in open-air locations like cliffs or isolated boulders.

Nearly 500 rock art sites have been recognized in the whole massif (di Lernia & Gallinaro 2011), with a major concentration on the eastern side and inside the major wadi systems (Fig. 1). Rock art sites reflect the geomorphological settings of the massif: small shelters and rock walls characterize the northern area, whereas the presence of a more complex fluvial network in the central and southern areas favored the formation of a higher number of wider rockshelters and caves.

Around 80 % of rock art is presently found inside the rockshelters – which are partially protected from sunlight and main weathering factors – mainly located close to the wadi bottom. The cliffs and the isolated boulders host almost exclusively engravings. The artworks occur as isolated subjects, scenes, or, most commonly, palimpsests of overlapping subjects or scenes differing in technique, style, and chronology.

Styles and Chronology

The definition of styles and their chronology represents one of the main traditional topics of rock art research. In the Central Saharan massifs, including Tadrart Acacus and the nearby Messak Settafet in Libya and the Algerian Tassili N'Ajjer, the debate has been particularly heated, thanks to the richness of the evidence and the intensity of research. The main controversy spreads about the definition of the chronological depth of the rock art. A long chronology proposed by Mori (1965) was opposed by a short one mainly developed by Muzzolini (1991).

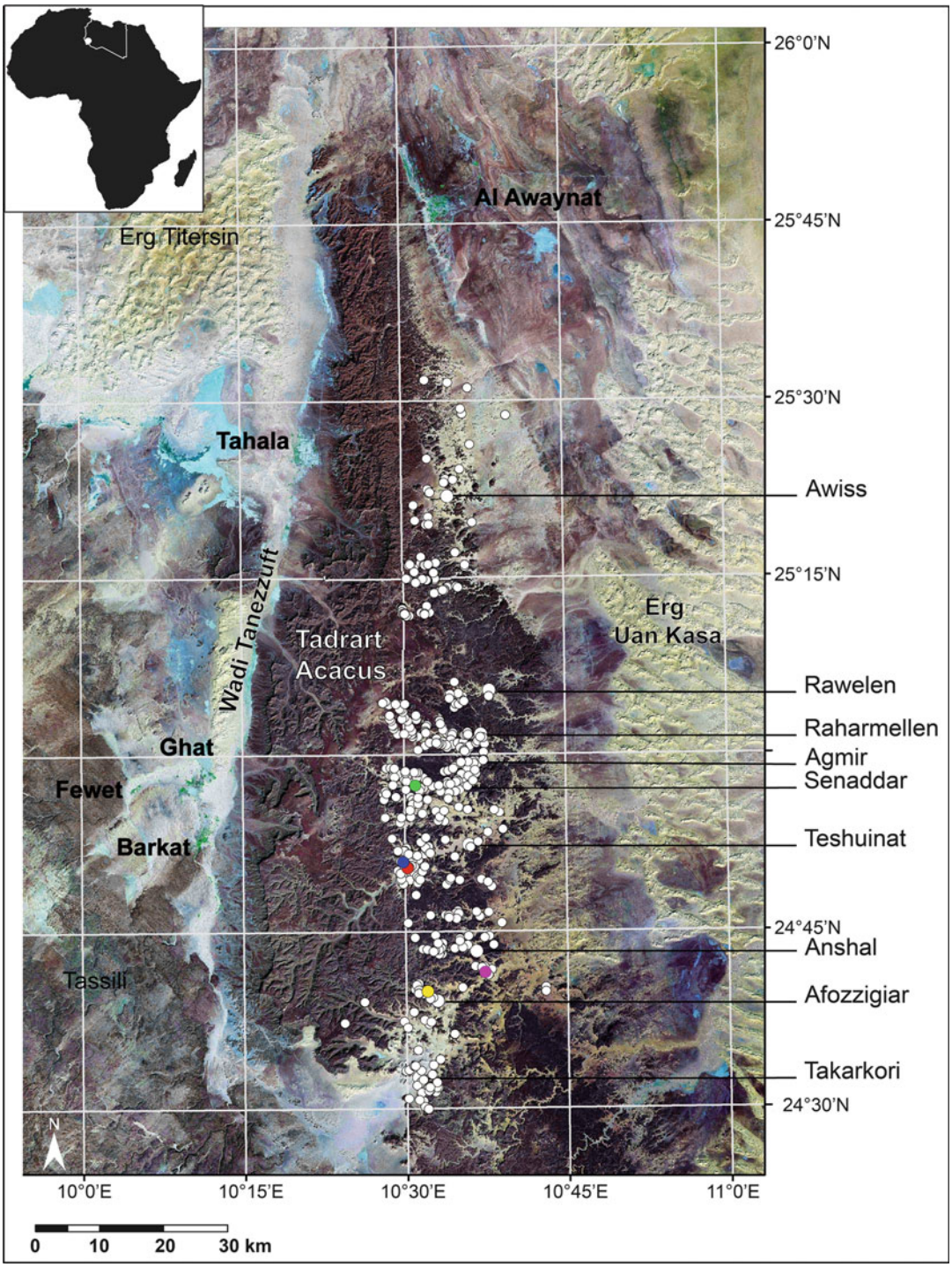

Tadrart Acacus Rock Art Sites, Fig. 1 Satellite image of the Tadrart Acacus, SW Libya, showing the distribution of rock art sites (GIS elaboration of M. Gallinaro – base map: Landsat imagery)

Mori identified the earliest rock art as a Late Pleistocene/Early Holocene production, realized by hunter-gatherers, whereas Muzzolini referred all the rock art evidence to the Holocene, starting with the Pastoral Neolithic. Until recently, the arguments were mainly based on the animal portrayed, stylistic and iconographic considerations, the presence of patina and superimpositions, while few archaeological or environmental data were analytically considered. Even if a precise chronology is still unavailable, the recent archaeological and paleoenvironmental investigations in the area and its surroundings are contributing to better fix the crono-cultural associations of the rock art, suggesting a development at least along the entire Holocene, since pre-pastoral times (Cremaschi et al. 2008; di Lernia & Gallinaro 2010). The definition of "styles" here proposed takes into account the terminologies used by Lhote (1958) and Mori (1965). The proposed chronology is correlated with the main phases of human occupation archaeologically recognized in the last decade of multidisciplinary research. The "styles" can be summarized as follows (*contra* – both terminology and chronology – Muzzolini 1991; Le Quellec 1998):

- *Wild Fauna*: only engravings representing wild animals, typical of more humid, southern environments. Big mammals like elephants, rhinoceros, giraffes, wild bovids, and rarely felines and reptiles are represented, isolated, or in groups. These subjects are often represented almost natural size and occur on cliffs and rockshelters located at the wadi bottom. The sites are widespread in the central wadis of the massifs, with a main concentration along the wadi Rahrmellen. On the basis of superimpositions, the nature and weathering of the rock varnish, the type of subjects, and specific stylistic aspects, these engravings are thought to be the earliest form of Saharan rock art. There are possible cultural associations with Early Acacus hunter-gatherers, archaeologically dated to the beginning of the Holocene, after the hyperarid Pleistocene phase (*ca* IX millennium BCE). A type site of the Wild Fauna Style is Ti-n-Ascigh, a rockshelter located along wadi Senaddar (Fig. 1: green dot), where a wide panel with a complex superimposition of engravings shows subjects referable to different styles, from the Wild Fauna to the *Tifinagh* inscriptions (Mori 1965; Cremaschi et al. 2008).
- *Round Heads*: paintings and some engravings decorating the walls of rockshelters and caves. Anthropomorphic figures with rounded heads are often associated with wild animals, especially Barbary sheep and antelopes. The traits are steady; the figures are generally represented in profile and can be realized with different techniques: a simple contour, in flat color, or polychromy. This "style" is characterized by the presence of hunting scenes and complex scenes of dance and ritual activities, traditionally referred to a sacred and symbolic sphere. The Round Head artworks are spread all over the massif, with major clusters along the middle course of wadi Teshuinat and the southernmost wadis. The Late Acacus foragers, performing a delayed use of food and a first taming of the Barbary sheep (di Lernia 2001), radiocarbon dated in the area to around eighth–seventh millennia BCE, represent a possible cultural and chronological frame for this art form. The painted couple of Afozzigiar I (Fig. 2), a rockshelter in the middle course of the eponymous wadi (Fig. 1: yellow dot), is a masterpiece of this style (Mori 1998: 191–192; Gallinaro et al. 2008: 218–220).
- *Pastoral*: paintings and engravings representing the most common type of rock art, with thousands of sites throughout the Sahara. The main subjects refer to domestic cattle and pastoral life. Scenes of daily activities, as well as milking and management of herds, alternating with hunting or ritual scenes, emphasize the complexity of these pastoral groups. The artworks are in naturalistic style in flat color or polychromy; the subjects are reproduced in various attitudes and with many details like body paintings, clothing, and hairstyles. Pastoral rock art contexts are nearly 50 % of the total; they are widespread all over the massif with dense concentrations

Tadrart Acacus Rock Art Sites, Fig. 2 Couple in Round Head style painted in Afozzigiar I rockshelter (Photo © The Italian Archaeological Mission in the Sahara)

along the main fluvial systems. Indications from excavations both in the Tadrart Acacus (Mori 1965, 1998; Dunne et al. 2012) and Messak, together with radiocarbon determinations on paint samples (di Lernia & Gallinaro 2010, here references), indicate the fifth millennium BCE as the apex of this art style. On the basis of archaeological data, it is possible that this style lasted from around sixth to mid-third-fourth millennium BCE. Uan Amil cave, along wadi Teshuinat (Fig. 1: red dot - Mori 1965: 124–131; Gallinaro et al. 2008: 157–163), is one of the most famous rock art sites of Pastoral style (Fig. 3).

– *Horse/Bitriangular*: mostly paintings with some engravings. This style features the bitriangular geometric representation of human figures in flat color and records the appearance of domestic horses. Humans are engaged in different activities: pastoral scenes, domestic activities, and conviviality, often in an oasis context, alternate with hunting/war scenes with flying gallop chariots, or fights were humans wield spear or lance. The artworks are mainly located on the walls of rockshelters and are widespread over the whole massif, with major clustering along the central and southern wadis, especially along the course of wadi Senaddar. The represented scenes reflect the final phases of the Pastoral period and the early Garamantian culture, approximately between the mid-third millennium BCE to first millennium BCE. The chariot of T-Afozzigiar-t site (Fig. 4), along the eponymous wadi (Fig. 1: pink dot), is a good example of this style (Mori 1998: 219; Gallinaro et al. 2008: 210–211). The earliest occurrence of Libyco-Berber inscriptions has been dated to this phase, as first testimony of writing (e.g., Liverani 2005). Those texts carved or painted on the stone walls of the Tadrart Acacus are anyway hardly datable with precision: they cover a long chronological span, ranging from Garamantian to present times and to present day, as "Tifinagh" alphabet is still used by local Tuareg groups (Biagetti et al. 2012, here references).

– *Camel*: widespread style, featured by the representation of camel (*Camelus dromedarius*). Bitriangular highly stylized, human figures, flocks of goats, caravans, palm trees, and hunting or battle scene, painted or engraved, are the typical subjects represented. The high schematism and the low accuracy of the representations and its late date determined a scarce interest by the scholars. The phase is traditionally associated with the classic and final phases of Garamantian culture (third century BCE to sixth century CE), but a more appropriate study of the evidence can open new scenarios about the most recent phases of the massif's occupation. Ti-n-Abrukin site, along wadi Teshuinat (Fig. 1: blue dot), shows a heterogeneous set of paintings in different styles, where Camel artworks are well represented (Fig. 5 - Gallinaro et al. 2008: 170–174).

Tadrart Acacus Rock Art Sites, Fig. 3 Hairdressing scene in Pastoral style in Uan Amil cave (Photo © The Italian Archaeological Mission in the Sahara)

Tadrart Acacus Rock Art Sites, Fig. 4 Chariot in Bitriangular/Horse style, painted in T-Afozzigiar-t rockshelter (Photo © The Italian Archaeological Mission in the Sahara)

Threats to the Rock Art

The rock art is by its nature one of the most fragile aspects of the cultural heritage. It is affected by natural and anthropic threats that can continuously damage it, and the Tadrart Acacus rock art sites are not an exception. Natural factors, like erosional and chemical processes, determined, according to recent estimates (Cremaschi et al. 2008), the vanishing of nearly 50 % of the artworks. High risks have been represented by the uncontrolled access to the sites by thousands of tourists and even scholars, washing, scraping, and touching the art, therefore accelerating the natural process of vanishing. Vandalism has been recorded as well. Several actions to reduce these threats have been proposed and partially realized, but the major project to create a National Park has never been implemented (di Lernia & Gallinaro 2011, here references). The isolation

Tadrart Acacus Rock Art Sites, Fig. 5 Caravan in Camel style along the rock wall of Ti-n-Abrukin rockshelter (Photo © The Italian Archaeological Mission in the Sahara)

of the region, after the 2011 uprising in Libya, represents a new and uncontrolled threat to the heritage.

Future Directions

The future direction of the research is twofold: a main immediate action has to be directed to the preservation, restoring and monitoring of the rock art, and their management should directly involve the local communities. On the side of rock art research, future efforts need to be addressed to improve the documentation and develop a systematic archaeological approach, including the use of the newest dating methods, e.g., OSL (optically stimulated luminescence). Finally, the contextual study of the artworks should be inserted in a wider reconstruction of local dynamics within the outside world.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ North and Saharan Africa: Geography and Chronology
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of

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Taiwan: Archaeological Museums

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Brief Definition of the Topic

Taiwan has a vibrant museums sector which has seen recent capital developments of older museums and the creation of new ones, both site and regional museums, with strong archaeological and ethnographical departments and exhibitions. At the top of the hierarchy are the national museums in Taipei of which the National Palace Museum (NPM) (National Palace Museum n.d.) is the largest, most visited, and internationally best known. This museum has at its core the very substantial collection of antiquities and works of art from the Palace Museum in the Forbidden City in Beijing. The Palace became a museum in 1925 on the departure of the Puyi Emperor. Much of the collection was taken away by the Kuomintang authorities from 1931 for safekeeping in the face of the Japanese invasion and moved about China for two decades before approximately a quarter of the collections still in their control were taken to Taiwan during the evacuation of the mainland by forces and people loyal to Chiang Kai-shek. This marked the end of the Chinese Civil War and the establishment of the Peoples' Republic on the mainland. The collection includes a great range of objects derived from archaeological sites and casual discoveries to works of art and craft created for the Imperial Court or collected by the Imperial families throughout the centuries. The NPM houses, in recently renovated and extended galleries, extensive exhibitions illustrative of the history and archaeology of China with a strong emphasis on prestige objects of high aesthetic value. The guiding principles are art historical and culture historical. The museum has a strong presence in scholarship, and its activities are supported by a research library which contains many manuscripts and early Chinese printed books of importance, laboratories, and restoration and conservation facilities. The PRC maintains a continuing claim to the island as part of its territory and to the collections in the NPM.

The collections in the possession of the Institute of History and Philology of Academia Sinica in Taipei are of the highest archaeological importance and derive from fieldwork carried out in China under the auspices of the Academy (founded 1928) (Museum of the Institute of History and Philology n.d.). Members of the Academy, who moved to Taiwan following the Chinese Civil War, established the institution in Taipei where, after an initial period of difficulty, it began to flourish with the expansion of the economy.

The Academy maintains a strong interest in Chinese archaeology and ethnology, and its collections reflect recent fieldwork as well as the inheritance from the institution's past.

The National History Museum, Taipei, founded in 1955 has at its core material brought from mainland China principally from Henan Museum and includes substantial amounts of archaeological material. Its wide remit covers history, art history, and decorative arts. It maintains strong links with museums in the PRC (National History Museum n.d.).

The National Taiwan Museum in Taipei, housed in a colonial Japanese building, has important ethnographical collections illustrating the material culture of the indigenous peoples of the island and has the earliest human remains from Taiwan dating to about 12,000 BCE. The scope of this museum encompasses natural history as well as ethnography (http://formosa.ntm.gov.tw/web/en/exhibition.aspx).

The National Museum of Taiwan History in Tainan City opened in 2011 explores the history and archaeology of Taiwan from the Paleolithic to the present day. It has a strong interest in folklife studies (National Museum of Taiwan History n.d.).

Important museums built to display the results of excavations include the Shihsanhang Museum (Shihsanhang Museum n.d.) and the National Prehistory Museum incorporating the results of excavations at Peinan, Tainan City (National Prehistory Museum n.d.). The museum is part of a wider heritage complex which includes a museum of human rights recalling the oppression of the early days of the Kuomintang government of the island (Explore Taiwan's first museum of archaeology n.d.).

Cross-References

- ▶ China: Museums
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethnic Identity and Archaeology
- ▶ Nationalism and Archaeology
- ▶ Overseas Chinese Archaeology

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Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)

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Introduction

The Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects was adopted by the World Archaeological Congress (WAC) in 2006. Drafted by indigenous and non-indigenous people with expertise including cultural heritage, museums, and archaeology, the Accord provides six key principles for decision making around the display of human remains and sacred objects. Developed and proposed in November 2005 at a WAC Inter-Congress held in Auckland on the "Uses and Abuses of Archaeology for Indigenous People," and adopted in January 2006 by the WAC Council, the Accord supplements two other WAC ethical codes that are also relevant to archaeology, museums, and the study of indigenous human remains and

cultural heritage: *The Vermillion Accord* (1989) and *The Code of Ethics of Members Obligations to Indigenous Peoples* (1990). It should therefore be seen as an additional example of development, by indigenous people and archaeologists, of guidelines to ensure consultative and collaborative ethical practice, although focused on display and exhibition rather than current and future research. In its preamble (see below), the Accord stipulates that its definition of "display" includes conference presentation or publications, and thus incorporates display of *images* of human remains and sacred objects as well as the human remains and sacred objects themselves.

Definition

The Tamaki Makau-Rau Accord consists of a preamble and a set of six principles:

> In recognition of the principles adopted by the Vermillion Accord, the display of human remains and sacred objects is recognized as a sensitive issue. Human remains include any organic remains and associated material. Sacred objects are those that are of special significance to a community. Display means the presentation in any media or form of human remains and sacred objects, whether on a single occasion or on an ongoing basis, including conference presentations or publications. Community may include, but is not limited to, ethnic, racial, religious, traditional, or Indigenous groups of people.
>
> WAC reiterates its commitment to scientific principles governing the study of the human past. We agree that the display of human remains or sacred objects may serve to illuminate our common humanity. As archaeologists, we believe that good science is guided by ethical principles and that our work must involve consultation and collaboration with communities. The members of the WAC council agree to assist with making contacts within the affected communities.
>
> Any person(s) or organization considering displaying such material or already doing so should take account of the following principles:
>
> 1. Permission should be obtained from the affected community or communities.
> 2. Should permission be refused that decision is final and should be respected.
> 3. Should permission be granted, any conditions to which that permission is subject should be complied with in full.
> 4. All display should be culturally appropriate.
> 5. Permission can be withdrawn or amended at any stage and such decisions should be respected.
> 6. Regular consultation with the affected community should ensure that the display remains culturally appropriate.

Key Issues

Many museums and other collecting institutions around the world hold human remains. With the rise of the reburial movement in the 1980s, there has been considerable debate about the repatriation of remains whose location in museums without the consent of source communities has been strongly contested by indigenous groups worldwide, but particularly from Australia, New Zealand, Scandinavia, and North America. The reburial movement has led to significant changes in museum policy in these countries and some others, particularly the UK (Simpson 2002; Fforde & Hubert 2006; Turnbull & Pickering 2010; Pickering 2011). Deep concern about the display and scientific use of human remains has been voiced by indigenous groups as a component of the reburial movement (Hammil & Cruz 1989; Fforde et al. 2002; Watkins 2002, 2010), with some groups requesting that remains be taken off display as a first step in negotiations for repatriation with the holding institution (Hubert 1989: 131). In Australia, the early 1970s witnessed the first shifts in museum policy, with some institutions resolving to no longer accept newly discovered Aboriginal remains without express permission from the source community, and to remove human remains and significant cultural material from display.

Analysis of the ethics of display and the adoption of new policy and guidelines has been in response to indigenous concerns (as has the development of particular policies – see Museums Australia 2005) and the Tamaki Makau-Rau Accord should be viewed mainly in this context. However, the preamble to the Accord makes it clear that these principles are not aimed at solely indigenous remains and the debate around display has had broader analysis. Indeed, over the past decade there has been

increasing discussion about the use of curated human remains of any geographical origin and the ethics of their display, including under what circumstances and how remains should be exhibited and viewed, particularly by the public (Sayer 2010: 95-109). Points of discussion have included, for example: respect for the wishes of the deceased; whether or not consent was given by kin; concerns and requests voiced by source communities and the public; the educational value of display; and the meaning of scientific and public interest in human remains and burial practices (Alberti et al. 2009; Sayer 2010: 95-109). In the UK, for example, discussion about Gunther van Hagen's Body Worlds (an exhibition of human and animal bodies in a variety of postures which have been preserved through plastination), arguments raised by Pagan groups about the treatment of the ancient British dead, internal and external debate by individual museums, government and professional organizations, and the work of the Human Tissue Authority (a nongovernmental public body in the UK created by the 2004 Human Tissue Act which, broadly, regulates the use of human bodies, organs, and tissue for purposes that include research, transplantation, education, and training), among others, all demonstrate the work conducted in this area (Swain 2002; Alberti et al. 2009; Sayer 2010: 95–109).

Policies and guidelines developed during this period by museums and professional bodies in relation to holdings of human remains frequently include sections relating to display as well as repatriation, although they vary in their advice (e.g., Wellcome Trust nd; Museum Ethnographers Group 1994; Department of Culture, Media and Sport 2005; Museums Australia 2005; and see Pickering 2011). While the international debate rarely deals with the display of images of human remains (whether in publication, exhibition, or presentation), those in countries with indigenous populations have addressed these issues. Thus, for example, the display of remains and images of remains (and replicas of them) is considered in section 1.4.10 of *Continuing Cultures, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* adopted by Museums Australia in 2005, which states that human remains:

> should not be displayed in public, except in special circumstances where parts of the remains are an integral part of other items, such as human teeth incorporated in an item of personal attire. In such cases the traditional custodians or those authorised by them, must agree to the display of such items. Equally, images and replicas of ancestral remains held in museums must not be exhibited or in any other way made available to the public without the prior permission of the traditional custodians or those authorised by them (2005: 18).

Although the reburial debate has frequently focused solely on human remains, this by no means always reflects the viewpoint of those of indigenous source communities (e.g., Maddra 1996; Tapsell 2000). Thus, it is not surprising that the Tamaki Makau-Rau Accord also encompasses sacred objects. Like human remains, sacred objects in museums and other holding institutions have also been the subject of requests for repatriation and/or removal from display, and the formation of ethical guidelines around their display and exhibition is similarly contextualized. In some instances, issues surrounding display of sacred objects predates discussion about repatriation. Thus, restricted ceremonial objects were removed from display by the South Australian Museum certainly in the 1970s and there is some evidence that this had occurred in the 1930s (Clarke & Anderson 1998: 172, 173).

It is also important to note that national legislation and policy in the USA and Australia encompass both human remains and sacred objects. Thus in the USA, *The Native American Graves Protection and Repatriation Act* (1990) relates to human remains and cultural items (including funerary objects, sacred objects, and objects of cultural patrimony). In Australia, sections 1.5.9 and 1.5.10 of *Continuing Cultures, Ongoing Responsibilities* deals with the display of sacred objects as well as images and replicas of them, setting out that such items should not be displayed to the public without the express permission of traditional custodians, and that museums should make visitors aware of the presence of such items (2005: 19).

The Tamaki Makau-Rau Accord therefore reflects deliberation on the issues of display around human remains and sacred objects that were driven initially by indigenous concerns about the continued curation of their ancestral remains in museum collections, but developed into a broader context internationally. It demonstrates continuing discussion around the ethics of archaeology, particular that of the indigenous past (e.g., Zimmerman et al. 2003; Phillips & Allen 2010). Considered together with the Vermillion Accord and the Code of Ethics on Members Obligations to Indigenous Peoples, the Tamaki Makau-Rau document also reflects the role of the World Archaeological Congress in this debate and the development of the ethics of professional practice in archaeology and related disciplines.

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Human Remains in Museums
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Sacred Site Conservation and Preservation
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

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Tangible Heritage in Archaeology

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Introduction and Definition

The term tangible heritage refers in general to all the material traces such as archaeological sites, historical monuments, artifacts, and objects that are significant to a community, a nation, or/and humanity. The term is often used to distinguish such heritage elements from "intangible heritage," recognized by UNESCO in 2003, to refer to practices, representations, expressions, knowledge skills, as well as instruments, objects, artifacts, and cultural spaces associated therewith of living communities. The term "intangible heritage" replaced what was referred to in an earlier UNESCO document in 1989 as traditional culture and folklore. The designation of an intangible category of heritage led to the distinction of varieties of "material" archaeological and historical elements of heritage – "tangible heritage."

In the UNESCO 1972 convention, what is now called tangible heritage included monuments, sites, and buildings. This designation goes back to the Venice Charter (1964). Mostly concerned initially with archaeological sites, the term was later broadened to refer to groups of buildings, vernacular architecture, and industrial and twentieth-century-built heritage.

By 1992, the UNESCO World Heritage List recognized a category referred to as "cultural landscapes," which included places and areas shaped through human activities over numerous generations such as terraced cultivated fields or desert oases, whether inhabited by living communities or abandoned; natural sacred sites of mountains, springs, wells, rivers, and other natural features; historical gardens; and other landscapes designed and maintained intentionally.

Key Issues/Current Debates/Future Directions/Examples

The emergence and popularity of the term "non-tangible" (later intangible) heritage and hence "tangible heritage" was due to an increasing awareness of the role of culture in politics and economics in the 1960s. The growing interest in culture as a means of defining ethnic identities popularized the use of [cultural] heritage to refer to the "cultural background" of a group. Most of the ethnic groups seeking recognition and equity were distinguished mostly by their language, "folklore," and customs, i.e., more by what came to be known as intangible heritage vis-a-vis tangible heritage.

The recognition of intangible heritage within a sociopolitical context in the twentieth century and consequently the emergence of the term "tangible" heritage were defined previously on the basis of distinguished architectural buildings and monuments. Although the [tangible] cultural heritage was broadened to include "sites," the criteria for selecting tangible heritage on the world heritage list are predominantly biased toward architecture, buildings, human settlements, land use, technology, monumental arts, town planning, or landscape design and refer to the human values, ideas, and beliefs that tangible elements exemplify.

It may be recalled that the World Heritage List has been conceived as a means of celebrating the

monuments and sites of outstanding *universal* (transcultural) value as a follow-up to the salvage of the Abu Simbel Temple and other monuments of Nubia, in the context of the UNESCO mission for peace and intercultural understanding. However, heritage – as the cultural endowment handed down from preceding generations – may be conceptualized on the level of a nation, a society, or a community. Consequently, the sociocultural dimension embedded in the notion of heritage and the inherent attribution of heritage to a "group" of people necessitates not only a reconsideration of the types of tangible heritage but also the relationship between tangible and intangible heritage.

The material remains often selected as tangible heritage consist not only of buildings or groups of buildings, historical towns and gardens, and cultural landscapes but also of any objects or places which have been significantly modified by human actions. This includes objects made from a variety of materials (e.g., glass, textiles, stone, ceramics, metals, wood, paper) and locales such as quarries and rock art sites.

Evidently, the materials regarded as heritage are those deemed to be of *value* by a living group of peoples who *perceive* themselves as inheritors of that heritage. Accordingly what is regarded as tangible heritage is inseparable from an intangible intellectual value judgment. On an international level as in UNESCO, the community that makes the selection of items of "universal" value consists of experts working from their own professional traditions as architects, geographers, art historians, or archaeologists. By contrast, what is regarded as national heritage is often an expression of a state policy (that may or may not be representative of the nation). Thus, in this and other cases, tangible heritage, particularly monuments, is bound not only with a value judgment but also with an "objective." Castles, forts, palaces, and cathedrals and grand mosques signal state supremacy and the preeminence of religion and serve as nodes for symbolic actions, visits, performances, and literary discourses that perpetuate the socialization of people as national subjects and religious followers. On a community level, tangible heritage may be associated with tombs, religious shrines, or ancestral sites and objects. This multilevel conceptualization of heritage explains how in a modern nation state the heritage of ethnic groups or minorities has been marginalized in favor of an "invented" (or "discovered") so-called "common" national heritage as a means for unifying the nation. Monuments, especially buildings; museums displaying certain collections; and specific places have been designed to proclaim national identity. In Europe, for example, tangible heritage in capital cities affirmed an affiliation with the Graeco-Roman civilizations. In modern Egypt, Cairo was redesigned to become a European city to forge a new identity at variance with the traditional "oriental" culture. In this period of cultural transformation (especially the nineteenth century), tangible heritage was intensively manipulated to create the current notion of "West" and "East" preparing the stage for the proponents of the clash of civilizations.

From another point of view, with the growing importance of tourism as an industry with profitable revenues, certain heritage elements were marketed as properties, commodities, and commercial assets. Although heritage is indeed a valuable resource for economic development, the economic exploitation of sites, museums, and buildings may undermine indigenous human development and disrupts existing social structures.

Tourism flourished after the advent of rapid means of travel, in the context of colonialism, industrialization, and a world divided between the industrial rich and the rural poor. As such, tourism engendered feelings of inequity on the basis of material differences in clothing and modes of transportation and places of residence between tourists and locals. It encouraged illicit digging and illegal sale of antiquities, and it favored the selection of specific elements of tangible heritage (exotic, grandiose, mysterious) as heritage icons. The linkage between tourism and "vacation" led to an emphasis on recreation and entertainment, contrary to the initial notion of tourism during the Enlightenment which centered on "cultural pilgrimage." In the making of our

modern world, the role of tourism in manipulating tangible heritage can hardly be ignored.

The effect of tourism has also infiltrated academia as books by archaeologists and historians on treasures and TV series on "discoveries" and "adventures" abound. Here again, tangible heritage is selected and valorized through [intangible] narratives and practices. The objectives in this case are tinted with gaining wealth and fame.

The study of tangible heritage in academia suffers from other problems. Traditionally the study of archaeological or historical objects has focused on categorization, classification, and description with the aim of recognizing "periods" and "cultural areas." Although this has been superseded since the 1960s, with an emphasis on explanation and process, tangible heritage remains culturally under-theorized when it comes to how it articulates with the society it came from or how it can inform us of the role of tangible heritage in the making of history. Beyond an interest in tangible heritage for religious, aesthetic/artistic, technical (dating back to certain stages in the cultural evolution of Europe), is a new horizon for a new agenda, by which it can contribute to a culture of peace, reconciliation, cultural continuities, intercultural coevolution, and creativity. The latter requires a rethinking of "authenticity" and what it implies for a reinterpretation of tangible heritage as a source of innovation and renewal.

In sum, the notion of tangible heritage is inseparable from that of intangible heritage (previously called folklore, customs, and traditions). The previous neglect and current valorization of intangible heritage are related to changing sociopolitical conditions before and after the 1960s. However, tangible and intangible heritage are still regarded as separate categories given the disciplinary divide between those interested in tangible heritage (architects, archaeologists, geographers) and intangible heritage (folklorists). It is therefore crucial to recognize the intangible component of tangible heritage and the materiality associated with most intangible cultural heritage activities. The road ahead depends on how a new generation of scholars, freed from the restrictive fences of professional grounds and equipped with a comprehensive, dynamic view of heritage, will develop new interpretive and curatorial approaches that integrate tangible and intangible strands of cultural heritage elements and how they will contend with conflicts within and between communities, nations, and international organization concerning the criteria of selecting heritage and why we need heritage in the first place.

Cross-References

▶ Intangible Cultural Heritage
▶ International Conventions Pertaining to Heritage Policy: Introduction

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Tanzania's History and Heritage

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Introduction

Tanzania was founded on April 26, 1964, from the union between the former British protectorate of Tanganyika and the Zanzibar archipelago that consists of Unguja, also commonly called Zanzibar Island, and Pemba Island. After 42 years under British rule, Tanganyika gained its independence in 1961 and, similar to the former People's Republic of Zanzibar and Pemba, remained a sovereign state until the two independent countries signed the Articles of the Union treaty to create the United Republic of Tanzania. The second head of state and former

Minister of Natural Resources and Tourism, Ali Hassan Mwinyi (1985–1995), reformed the failing economy from his predecessor Julius Nyerere's socialist administration by promoting the private sector, "free market forces," and export-producing businesses.

It was Mwinyi's reforms that encouraged the growth of tourism and heritage protection. The Ministry of Natural Resources and Tourism (MNRT) adopted the republic's first National Tourism Policy, and the Tanzanian Tourism Board (TTB) was established during Mwinyi's tenure as president. The MNRT oversees the nation's cultural and natural resources along with the tourism sector and enacts policies to ensure sustainable natural and cultural heritage management. The MNRT is charged with protecting Tanzania's cultural and natural resources and developing tourism. It is divided into five divisions: Antiquities, Fisheries, Forestry and Beekeeping, and Tourism and Wildlife.

The National Museum of Tanzania, an institution under the MNRT, is a consortium of five museums charged with "collecting, conserving, displaying and researching" Tanzania's cultural and natural history (MNRT 1999). The Museum and House of Culture's vision is to repurpose Tanzania's culture and heritage to create a "strong sense of value and pride" in current and future generations of Tanzanians. In concurrence with this mission, the museum boasts that the famous fossil skull of Australopithecus boisei "Zinj" in its collection is the pride of Tanzania. Dr. Louis Leakey and his wife discovered Zinj in 1959 at Olduvai Gorge, a ravine with numerous hominid fossils.

Key Issues/Current Debates/Future Directions/Examples

Mainland Tanzania

Northern Tanzania, together with southern Kenya, is known as Africa's "Safariland" (Salazar 2006). Over 28 % of Tanzania's 945,234 km^2 is set aside to safeguard the country's rich natural heritage (Mabula & Bower 2010). This network comprises the Ngorongoro Conservation Area Authority (NCAA) based in Northern Tanzania and national parks including the often visited Serengeti National Park (SENAPA), with most of the protected land dedicated to game reserves and game controlled areas – 15 % and 8 %, respectively (Mabula & Bower 2010). In response to the popularity of nature exploration and the "big five" African animals (Salazar 2006), Tanzania privileges nature preservation and wildlife conservation over cultural heritage management.

The 1964 Antiquities Act of Tanzania vested The Department of Antiquities with the ownership of Tanzania's "tangible cultural heritage resources" (Mabula & Bower 2010). Under the Act, the Director of Antiquities authorizes and manages tangible heritage resources and grants licenses to research heritage sites.

According to ICCROM's legal frameworks for the protection of immovable cultural heritage, the 1964 Antiquities Act of Tanzania vested The Department of Antiquities with the ownership of Tanzania's "tangible cultural heritage resources" (Mabula & Bower 2010). Under the Act, the Director of Antiquities authorizes and manages tangible heritage resources and grants licenses to research heritage sites. ICCROM's legal frameworks for the protection of immovable cultural heritage describe the 1964 Antiquities Act as the "basic legislation" mandating the protection of the following categories of cultural heritage: conservation areas, monuments, protected (ethnographic) objects, and relics. Under this Act, the Minister has the authority to place any area, object, or structure with cultural value under protection (Kamamba 2009).

The Act defines monuments as structures, carvings, incisions, paintings, or modifications to the earth made by humans before 1863 or the remaining ruins. Protected objects are Swahili-style wooden doors and doorframes dated before 1940 or, according to Kamamba, any object the Minister declares merits protection. Ornately carved nineteenth-century doors and doorframes symbolize artistic sophistication and wealth and are particularly at risk for being sold to tourists and hotels for their beauty (Sheriff 2001).

A relic is any movable object including human, fauna, and floral remains that predate 1863 along with fossils and impressions produced by humans before 1863 (Kamamba 2009). The Act charges anyone who locates objects, relics, or sites that may be culturally significant with reporting their "discovery to the appropriate authorities" (Kamamba 2009), but this law is not stringently enforced, and instructions on legally handling cultural objects are unclear. Legal ambiguities allow the destruction, neglect, exploitation, or illegal selling of many heritage objects and sites.

Before commencing development projects, the Tanzanian government recognizes the importance of carrying out environmental impact assessments (EIAs); in fact both UNESCO and the World Bank require investors to conduct EIAs "to ascertain expected impacts on the environment . . . and to prevent destruction damage," but "Cultural Heritage Impact Assessments (CHIA) are not often conducted because they are "not explicit in Tanzania's cultural heritage legislation" (Mabula & Bower 2010). For example, the Ngorongoro Conservation Area Authority (NCAA) is in place to protect the area's rich natural heritage, but no equivalent organizations to safeguard archaeological heritage.

The Ngorongoro Pastoralist Project constructed an earth dam in 2000 in the culturally significant Laetoli site, only 2 km from the famous Australopithecine footprints. Laetoli has a rich deposit of early human and hominid fossils and artifacts – now compromised by rising water levels. The dam was built for the local Maasai to collect water for themselves and their livestock during the rainy season. The NCAA attempted to make the Laetoli hominids more visible and relevant to the local Maasai by inviting local officials, elders, and other community members to perform "a traditional ceremony to bless the site" (Mabula & Bower 2010). Gaining local support for such projects is often challenging because investing in cultural heritage management is often treated as a luxury and only considered after primary needs such as healthcare, food, and "political stability" are met (Mabula 2000).

The Ngorongoro Conservation Area, the only world heritage site in Tanzania categorized under UNESCO's "mixed" criterion with both outstanding cultural and natural heritage, attracts the most visitors of all the tourist destinations in the republic, and nearly 40 % of foreign tourists visited the NCA in 2001 (Charnley 2005). The NCA was added to the UNESCO World Heritage List in 1978 as a natural heritage site and inscribed under the cultural criterion in 2010. In terms of natural heritage, this site contains the Ngorongoro Crater, described by UNESCO to be the world's largest caldera (the collapsed mouth of a volcano), as well as Olduvai Gorge – home to nearly 25,000 animals (UNESCO n.d.) and one of the very most important archaeological sites in the world. This ravine contains the fossils of a series of modern human predecessors including, but not limited to, Australopithecus, Homo habilis, and Homo erectus; each hominid represents stages of human evolution spanning 4 million years. Archaeologists also found handmade tools and animal bones in the gorge; the tools are testaments to human ingenuity and the bones helped shape ideas about early hominid diets. Another noteworthy archaeological site located 45 km south of the gorge is Laetoli, famous for the three sets of bipedal Australopithecus afarensis footprints preserved in volcanic ash. Unfortunately Olduvai Gorge has fallen into disrepair because the fossils and museums have been neglected and vandalized. Grasses and acacia trees have grown over and endangered the Laetoli footprints (Mabula 2000), and although Olduvai Gorge brings in revenue (in 1998 nearly 39,108 tourists spent $60,000 in entry fees), little of the economic gain was reinvested into developing the site (Mabula 2000).

The Kondoa Rock Art cultural sites, added to the World Heritage List in 2006, are collections of painted images found in more than 150 shelters on the sedimentary rock formations that border the Great Rift Valley spanning more than 2,336 km^2 (UNESCO n.d.); several of the rock sites have been repurposed as ritual sites by the nearby Maasai communities. According to UNESCO these sites "provide a unique testimony to the

changing socio-economic base of the area from hunter-gatherer to agro-pastoralist, and the beliefs and ideas associated with the different societies." The Department of Antiquities does not have up-to-date records on the scope of paintings within these sites, so UNESCO encourages any surveys or assessments "to ascertain the scope of the site[s]" (n.d.).

The Ruins of Kilwa Kisiwani and the Ruins of Songo Mnara are on the World Heritage List (in 1981) as well as UNESCO's List of World Heritage in Danger in 2004. These cultural sites are the remains of two trading ports on islands near the coast (nearly 300 km south of Dar es Salaam) where goods such as gold, pearls, perfumes, and porcelain were sold from the thirteenth to the sixteenth century. Housing complexes, public squares, mosques, and domestic dwellings on the islands serve as a chapter in Swahili culture and architecture, "offering important insights regarding economic, social and political dynamics in this region" (n.d.). The Great Mosque of Kilwa Kisiwani is the oldest mosque on the East African coast. Although the two sites are protected under the Antiquities Act and a 2004 Management Plan, uncontrolled urban expansion, coastal damage by beach erosion, and inadequate conservation efforts have resulted in long-term threats.

The Central Slave and Ivory Trade Route was submitted by the Antiquities Department in 2006 as a testimony to the cruel treatment of African slaves in Central and East Africa, including Tanzania. Slaves were held on the coast and many times sent to Zanzibar and then sold to Arab countries. The recommendation for this site to be inducted into the World Heritage List is based on engaging the tragic history of the slave trade, preserving the visible, physical reminders of this trade route remain in Tanzania's landscape and researching and documenting the "memories" of human suffering and enslavement to preserve the cultures and traditions of the people who live along the trade route (UNESCO n.d.).

Zanzibar

The Stone Town of Zanzibar is Zanzibar's most popular attraction. The town is a large, well-preserved former slave-trading port on Unguja Island that was inscribed in UNESCOs World Heritage List in 2000. The stone town of nearly 2,000 buildings is noteworthy for its historic urban landscape developed from more than two centuries of Swahili, Portuguese, Arabic, and Yemeni cultural influences and architectural traditions (Mohamed 2001; Sheriff 2001). UNESCO describes the Stone Town as an example of cultural fusion as its architecture demonstrates the melding of African, Arab, and European cultures. This site is characterized by survivals of Portuguese churches and forts, and Islamic mansions that were eventually "amalgamated and homogenized into a characteristic [vernacular] Swahili architecture" and over time influenced by new styles brought by immigrants to Zanzibar (UNESCO n.d.)

In 2009 the Flemish government helped coordinate and launch a series of historic urban landscape (HUL) workshops on Africa's east coast by introducing HUL to governments and host communities in "World Heritage-designated cities" including the Stone Town of Zanzibar. These workshops are to include training for government officials and the community at large on urban landscape conservation and facilitators to promote research for the development of a "toolkit for urban conservation," revisiting the groundwork of the 1972 World Heritage Convention for establishing urban development, and "management of the World Heritage Cities Programme" (UNESCO n.d.). Domestic as well as international agencies are vested in the Stone City. The Zanzibar Stone Town Heritage Society "Jumuiya Ya Uhifadhi Mji Mkongwe" is an NGO established in 2002. The society's mission is to promote the conservation of the Stone Town's heritage, environment, and the "cultural welfare of its inhabitants" (2010); it works towards this mission with a list of objectives that include raising awareness of the Stone Town's conservation concerns, and, similar to UNESCO's HUL workshops, the society provides community outreach activities, training, services, research, and technical support to improve the Stone Town's urban landscape. The society also

lobbies for conservation policies and builds relationships with other organizations interested in conservation.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Olduvai Gorge Archaeological Site
- ▶ Tangible Heritage in Archaeology
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ World Heritage and Human Rights

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Taphonomy in Bioarchaeology and Human Osteology

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Introduction

Classical Taphonomy

Traditionally, taphonomy was studied by paleontologists to interpret the processes that operate on organic remains that comprise a part of the fossil record. A major focus of taphonomy was to understand the effects of those processes in order to reconstruct the past as it pertains to a particular fossil assemblage (Shipman 1981). Years later, archaeologists began to study taphonomy in order to determine how and why floral and faunal remains accumulated and differentially preserved within the archaeological record. Interpretation of the postmortem, pre-, and post-burial histories of faunal assemblages is critical in determining their association with hominid activity and behavior. Archaeologists typically separate natural from cultural processes when identifying evidence of human interaction with faunal remains (Lyman 1994).

Various models of fossil assemblage formation have been proposed, depicting a general taphonomic history. The *taphonomic history* defines the chronology of taphonomic agents and processes affecting the faunal remains and may include a cyclic sequence of events (e.g., a bone may be buried, exposed, gnawed, transported, and reburied). A *taphonomic agent* refers to the source of modification to the faunal remains (e.g., hyena), while a *taphonomic process* describes the dynamic action of that agent on the remains (e.g., gnawing). The *taphonomic effect* is the result of a taphonomic process (Lyman 1994). The basis of taphonomy is therefore the qualitative and, where possible, quantitative analysis of the taphonomic effects, processes, and agents acting on carcasses and skeletal tissues.

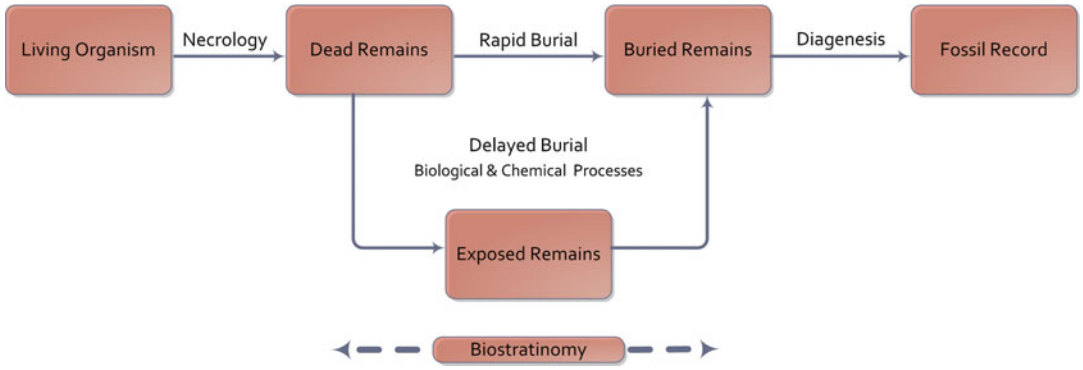

Taphonomy in Bioarchaeology and Human Osteology, Fig. 1 Transformation stages from living organism to fossil (based on Behrensmeyer & Kidwell 1985; Martin 1999)

The geological context in which faunal remains are discovered and their distribution in the stratigraphy may provide important information about the paleoenvironment and formation of the site. However, information about the taphonomic history of faunal remains comes specifically from the recovered animal carcasses and skeletal tissues (Shipman 1981). Postmortem processes affecting skeletal remains, and subsequently the state of preservation of the bone, reflect the sequence of taphonomic events which comprise the taphonomic history. An understanding of the taphonomic history of faunal remains aids archaeologists in explaining their interaction with prehistoric human populations (Micozzi 1991; Lyman 1994).

Fig. 1 provides an overview of the transformation from living organism to fossil (based on Behrensmeyer & Kidwell 1985; Martin 1999).

Organisms must pass through three distinct and separate stages to become a part of the fossil record. These stages span the time frame from death to discovery and/or recovery. The first stage involves the death or loss of a part of an organism and is referred to as necrology. Necrology can be denoted by T_0 and represents the initial stage of the taphonomic history. Processes that occur from death through to burial represent the second stage and are referred to as biostratinomy. These processes result from reworking and destruction of the remains and may include decomposition, scavenging, bioturbation, and postmortem transport. The third stage is termed diagenesis and refers to the physical and chemical processes occurring after burial. Diagenetic processes result in the transformation of organic material to mineral in sediments and include dissolution, leaching, and recrystallization (Micozzi 1991). T_1 represents the time of discovery. One of the many challenges of taphonomic analysis is to identify the processes and agents acting on the remains during the time frame to fossilization (i.e., T_1–T_0).

The postmortem factors that can act on faunal remains are numerous and include both physical and animal-related processes (Ubelaker 1997). Destruction and modification of bone can result from physical factors such as rock fall, weathering, burial, shockwaves, diagenesis, and cryoturbation, as well as animal-related processes including trampling, gnawing, and digestion (Marshall 1989; Micozzi 1991). Dispersal and postmortem transport of remains may also involve animals or may result from gravity or fluvial processes. Discriminating between nonhuman and human agents of bone modification with respect to human subsistence patterns involves analyzing taphonomic factors such as scavenging, hunting, butchering, and transport of prey (Bonnichsen & Sorg 1989). Numerous other chemical, biological, and physical factors can also affect the probability of the remains being preserved.

Forensic Taphonomy

Many of these taphonomic processes are also important in the analysis of more recently

skeletonized remains. As a result, the principles of taphonomy are now utilized in the field of forensic science. Forensic taphonomy involves the use of taphonomic models and approaches to estimate time since death, reconstruct the events surrounding death and pre- and post-burial, and discriminate between bone modifications resulting from human behavior and those caused by taphonomic factors (Haglund & Sorg 1997; Ubelaker 1997). Due to the multidisciplinary approach required in a forensic investigation, forensic taphonomy may encompass experts in anthropology, archaeology, soil science, palynology, and many other disciplines based on the particular requirements of the crime scene.

In a forensic context, taphonomy is used to define all events acting on human remains between death and discovery. This time frame (i.e., T_1–T_0) will be considerably shorter for forensically relevant remains when compared to remains of paleontological or archaeological significance. Additionally, postmortem decomposition varies considerably between geographical regions and can also demonstrate significant variation across and within microenvironments (Ubelaker 1997).

Due to the shorter time frame, forensic anthropologists are also concerned with soft tissue decomposition rates and patterns, in addition to bone modification, disarticulation, and dispersal (Haglund & Sorg 1997). Research in the field of forensic taphonomy must therefore focus on the effects of taphonomic agents on both soft tissue and hard tissue in a range of environments. Influencing factors may include temperature, moisture levels, clothing, burial type, trauma, biomass, soil texture, and other environmental conditions (Micozzi 1991; Ubelaker 1997). Consideration must be given to all of these parameters and many more when interpreting the taphonomic history of human remains in a forensic investigation.

Definition

Taphonomy is the study of the transition of organic remains from the biosphere into the lithosphere as a result of geological, biological, and chemical processes which act on the remains (Shipman 1981; Lyman 1994; Martin 1999). The science of taphonomy has been practiced for centuries. However the term "taphonomy" was first defined by Russian paleontologist, I.A. Efremov (1940), to denote a subdiscipline of paleontology which studied the events that occur between death and fossilization. The term was derived from Greek roots: *taphos*, meaning burial, and *nomos*, meaning laws (Micozzi 1991; Lyman 1994; Martin 1999).

The definition of taphonomy has since been extended to incorporate the study of bone accumulation and modification from a site formation perspective (Bonnichsen & Sorg 1989) and interpreting the life history of a fossil from the time of death to the time of recovery (Olson 1980). The latter definition recognizes the importance of understanding the circumstances surrounding the event and the time since death or deposition.

Key Issues and Current Debates

Early Taphonomic Research

Taphonomic research in the fields of paleontology and archaeology has predominantly been directed towards reconstructing paleoenvironments, identifying factors which cause destruction or modification of bone, understanding dispersal and transport of remains, and discriminating between nonhuman and human agents of bone modification (Haglund & Sorg 1997).

A key issue and one of the major foci of taphonomic research is to understand the biases inherent in the fossil record. When interpreting a fossil assemblage, it is necessary to determine how that collection of skeletal remains was derived from the animal community that once populated the area. Since not all animals, and even fewer plants, are preserved through time, the fossil record provides an incomplete picture of the original ecosystem.

The process of recovering faunal remains is also a biasing factor. Researchers may affect the assemblage by differentially sampling,

collecting, and recording the data based on personal observation and expertise. Archaeologists must therefore be aware of the taphonomic significance of the stratigraphic and sedimentary context of faunal remains when sampling (Lyman 1994).

When the term was first defined, Efremov (1940) determined that the study of taphonomy would focus on four major problems encountered in paleontology. First, the state of preservation of fossils is often poor and the number of skeletons few, due to the increased destruction experienced over time and the variations in the size of fauna sampled. Second, a faunal assemblage may not have been associated in life but rather may have accumulated accidentally either at death (known as thanatocoenose) or after death (known as taphocoenose). Third, the appearance of a presumably new fauna without identifiable ancestors in the site formation may not necessarily represent a new group of species as ancestral species may not have been preserved under the prior environmental conditions. And finally, the preservation of species and skeletal elements will vary in different sedimentary environments, and assemblages may not resemble the same species due to fossilization of a select sample of the original community (Shipman 1981).

For many years it was incorrectly assumed that a fossil record was a snapshot of an animal community which had been preserved through the processes of fossilization. Taphonomic studies have assisted in reducing the assumptions once made about fossil assemblages. It is now understood that animals do not necessarily die in the environment within which they lived and that an abundance of one fossilized species in the fossil record does not represent an abundance of that species in the original community.

It is no longer assumed that two species found in the same assemblage lived together in the same environment or that the lack of a species in an assemblage represents their rarity or absence in the original community (Shipman 1981). By studying taphonomic data and observing taphonomic patterns, paleontologists and archaeologists are now able to provide more meaningful interpretations of the fossil record.

Recent Taphonomic Research

During the period 1970–1986, the field of taphonomy expanded beyond the focus on bias and placed a strong emphasis on actualistic, process-oriented research. Scientists recognized that the original definition of taphonomy failed to encompass the broader focus of how fossil assemblages change during preservation as a result of both the addition and loss of information (Behrensmeyer & Kidwell 1985). Behrensmeyer and Kidwell proposed a new definition for the field as "the study of processes of preservation and how they affect information in the fossil record" (Behrensmeyer & Kidwell 1985: 105).

During this same period, actualistic studies between life and death assemblages became important, and the processes of death and decomposition were extensively studied by Behrensmeyer and colleagues in African terrestrial environments (Behrensmeyer 1978; Behrensmeyer et al. 1979). Despite the difficulties experienced in reconstructing the past using fossil assemblages, their studies demonstrated that modern bone assemblages can resemble the living animal community (Behrensmeyer et al. 1979). This new perspective led to research in middle-to-large scale taphonomic phenomena and the dynamic interactions between biological and geological processes.

After decades of taphonomic research and much debate, the following rules are generally accepted as empirical principles of taphonomy (based on Martin 1999), but by no means represent a complete list.

1. An organism is more likely to be preserved if it comprises hard parts.
2. Preservation is considerably enhanced if the remains are rapidly buried in fine-grained sediment.
3. Preservation is considerably enhanced in the absence of decomposition and scavengers.
4. Chemical and physical destruction resulting from decay, abrasion, transportation, predation, scavenging, and dissolution will cause a loss of information about community structure and species abundance.
5. Taphonomic information loss in terrestrial and fluvial environments predominantly results

from transport, disarticulation, and breakage by water, predators, scavengers, trampling, etc.
6. Bioturbation and physical alteration preferentially mixes sediments upward causing temporal mixing of different communities and leading to an increased diversity in morphological features of fossil ancestries.
7. Taphonomic transformation can lead to information gain for reconstructing the environment and past community dynamics.
8. Catastrophic burials (e.g., Lagerstätten – fossil deposits demonstrating remarkable diversity or preservation) are valuable for providing a snapshot of the population dynamics but are not representative of the temporal variation in populations.

Since taphonomic processes can act on biological remains during the period of death and discovery, it is recognized that some skeletal remains may survive better than others with time. The ultimate goal of taphonomy is thus to identify and quantify the biases associated with the process of fossilization to allow for accurate interpretations of the relative abundance of organisms in a fossil assemblage.

Forensic Taphonomic Research

Taphonomic research in the field of forensic taphonomy faces additional challenges in deciphering the effects of human behavior on human remains. The structural differences between human remains and nonhuman remains will cause variation in their response to taphonomic agents. In addition to analyzing the taphonomic effects such as weathering, gnawing, and trampling, forensic anthropologists must also interpret the effects of cultural processes such as embalming, burial, and cremation (Ubelaker 1997).

While the forensic anthropologist may draw parallels with some of the principles of paleotaphonomy (e.g., Behrensmeyer's (1978) stages of bone weathering), many of these effects must be individually studied on forensic remains in order to understand their taphonomic impact. One of the main challenges in forensic taphonomy today is understanding how postmortem changes to human remains will affect the estimation of time since death. Research in this complex area has many complications, but advances are being made by researchers employing observational and experimental taphonomic studies in a range of forensic environments.

Future Directions and Examples

Over the past two decades, process-based research has provided a valuable understanding of the taphonomic bias in modern environments. However, a key issue that remains is the extent to which taphonomic bias varies with time. Much research has gone into understanding how the taphonomic bias varies with depositional environment, but there is little understanding of how this same bias has changed through time, although there are examples that it potentially has (Allison & Bottjer 2010).

Examples of biomolecular and biological evolution highlight the fact that some organic remains and skeletons are more likely to preserve than others and that this has changed over time. The evolution of burrowing organisms can also alter taphonomic bias by disturbing and potentially degrading faunal remains buried in the sedimentary environment, as it has been shown that the depth of burrowing has increased with time. Additionally, Fossil Lagerstätten represent snapshots of preservation that clearly demonstrate temporal variation in fossilization (Allison & Briggs 1991).

Fossil Lagerstätten refer to rare fossil deposits which have undergone exceptional preservation and include evidence of soft tissues. This concept was first popularized by Seilacher's group at the University of Tübingen (Behrensmeyer & Kidwell 1985; Allison & Bottjer 2010) and led to extensive efforts to investigate current and new Lagerstätten. Research in this area focused on understanding the taphonomic processes leading to exceptional preservation of soft tissue which advanced a new field of experimental taphonomy. Fossil Lagerstätten represent unique but excellent examples of preservation in the fossil record.

Taphonomic research now benefits from a diversity of approaches including field, laboratory,

and database studies. Allison and Bottjer (2010) predict that database studies will be more frequently used in the future but also highlight the need for ongoing field studies to populate those databases. They propose that the major gaps still remaining in taphonomic knowledge relate to Precambrian taphonomy, organic geochemistry, and global biodiversity. Future research in these fields will help to elucidate a better understanding of the early history of Earth, the pathways between organic molecules and the preservation of organic carbon, and the impact of mass extinction events on taphonomic processes.

Although the field of taphonomy is now considered to be well established, the field of forensic taphonomy is still in its infancy. During the past two decades, considerable advances have been made in forensic taphonomy (Micozzi 1991; Haglund & Sorg 1997). However, further research is still required to understand the effect of taphonomic processes and agents on soft tissue and hard tissue in the numerous environments in which decomposition can occur. The random nature by which many crimes are committed means that almost any environment can be utilized to dispose of remains. These environments must continue to be the focus of taphonomic studies to assist forensic anthropologists in accurately understanding the processes of tissue decomposition and preservation.

Cross-References

- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Skeletal Biology: Definition
- ▶ Time Since Death in Bioarchaeology and Human Osteology

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Taphonomy in Human Evolution

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Introduction

Taphonomic research is essential for the interpretation of fossil plant or animal assemblages that are recovered from early archaeological sites. Within human evolutionary studies, it provides a way to reconstruct past processes that have acted on fossil assemblages of direct relevance to our understanding of early hominin and early modern human behavior. Taphonomic research may be applied to the fossil remains of human ancestors themselves, the remains of the animals and plants that were part of their ecological surroundings, or the material remnants of their behavior (e.g., the discarded remains of their meals). Without taphonomy, the many processes that can operate on an assemblage over the long time periods represented by the human evolutionary record could not be reliably untangled.

Taphonomic processes are typically viewed as reductive and destructive, taking away information from a complete picture of the forms and ecologies of living things in the past. However, taphonomic processes can also add information about the circumstances of deposition and subsequent modification of what are now fossil remains. Each intervening taphonomic process that alters a fossil or an assemblage also has the potential to leave a trace, thus allowing information about the processes themselves to be reconstructed. This kind of research has sparked several debates within human evolutionary studies, leading to the interpretation and reinterpretation of some of the most significant archaeological sites over the course of the last four decades.

Definition

Taphonomy in human evolution is taphonomic research used most commonly to aid interpretation of the subsistence behavior of early humans and our ancestors. In this context, it is most often used in reference to fossil animal bones. However, it may also be applied to the interpretation of other remains that are of relevance to understanding the behavior of human ancestors or aspects of their ecological settings.

Key Issues/Current Debates/Future Directions/Examples

Theoretical Frameworks and Key Figures

Charles K. (Bob) Brain was a pioneer in taphonomic research within a human evolutionary framework. In the 1960s, he used observations of how dogs modified bones discarded by people to formulate ideas of what this would look like in the fossil record. He later (Brain 1981) wrote a book entitled "*The Hunters or the Hunted?*" in which he used these observations to interpret the faunal assemblages from Sterkfontein and other early hominin-bearing cave sites from South Africa. Previously, the fossil animal bones from these sites were thought to have been either food debris or even weapons used by early hominins such as *Australopithecus africanus*. Brain's taphonomic work debunked many of these ideas by demonstrating that in fact the majority of the fossil remains – including the remains of hominins – were the result of carnivore predation (Fig. 1). This interpretation has stood the test of time and is currently still accepted as the most parsimonious explanation.

In the same year, another landmark book was written by Lewis R. Binford (1981), entitled "*Bones: Ancient Men and Modern Myths*." Binford argued that within Paleolithic research,

Taphonomy in Human Evolution, Fig. 1 The classic illustration by Bob Brain of a fossil hominin skull exhibiting two puncture marks that fit the tooth spacing of a fossil leopard found at the same site (Image courtesy of the Ditsong National Museum of Natural History)

many of the interpretations about how fossil faunal assemblages were formed were made post hoc, resulting in the perpetuation of unevaluated "myths" about the past. He had spent several years studying how modern hunter-gatherers obtain and discard faunal remains, with a particular focus on understanding how bone accumulations at archaeological sites are created. He also noticed that such accumulations may be modified or independently created by nonhuman processes, such as carnivore denning and scavenging. Binford used these observations to stress the importance of applying middle-range theory to link interpretations of the past directly to observations made in the present. This theoretical framework continues to play an essential role in taphonomic research today.

Actualistic Research

The experiments and observations performed by Brain and Binford are examples of actualistic research. Such research is performed under the uniformitarian assumption that modern processes we observe today also happened in the past. Therefore, by the observing the traces or impacts certain behaviors leave in the modern day, one can infer that the same behaviors also caused similar traces or impacts on fossil assemblages in the past.

Within human evolutionary studies, actualistic taphonomic research has taken three major forms: basic experimentation, naturalistic experimentation, and ethnographic observation. Basic experimentation offers the most control to the researcher. Bones or other objects of interest are subjected to taphonomic processes under simulated conditions where a wide variety of variables can be known and manipulated. Naturalistic experimentation is similar, except that the bone or other object of interest is introduced into a natural setting and the transformation it undergoes is observed more passively as several variables within the system may operate simultaneously upon it.

Arguably, modern hunter-gatherers are not the ideal analogue for all early archaeological sites. However, ethnographic observation of how living humans acquire, process, and discard bones does provide essential information on human decision-making and archaeological site formation. Notable examples that have been applied to the human evolutionary record are Binford's (1981) book, which drew heavily on his experiences with the Nunamiut of Alaska, and the work of Bunn et al. (1988) with the Hadza of the Eyasi Basin of Tanzania. All three forms of actualistic research have underlain some of the largest debates in zooarchaeology and taphonomy as they have been executed in a human evolutionary context.

Key Debates in Human Evolution: Hunting Versus Scavenging

The ability to regularly acquire meat and fat from large ungulate resources is considered to have been an important watershed in the diet and behavior of our ancestors. Prior to the actualistic work that became prominent in the 1980s, it was frequently taken for granted that if fossil animal remains were found in association with stone artifacts, then the fossils were also there as the result of hominin activity. A famous example is the FLK *Zinjanthropus*, or "Zinj" site at Olduvai Gorge, Tanzania, which dates to approximately 1.84 Ma ago. Excavations in the 1960s by Mary Leakey revealed a rich and well-preserved fossil faunal assemblage in association with stone artifacts, which was interpreted by many archaeologists as evidence that the site was a "home base" or "living floor" used by early hominins. Binford's (1981) book took this assumption to task,

concluding on the basis of bone breakage and skeletal part representation that there was little evidence of the site being used as a home base in the same sense that modern hunter-gatherers set up a camp and then bring the results of their foraging back to this central place. Binford argued that the bone accumulations in association with stone tools could be explained simply by hominins scavenging after carnivore kills.

Subsequent researchers such as Shipman and Rose (1983) emphasized the use of microscopic techniques to reliably identify signatures of hominin modification such as cut marks from stone tools. They further cautioned against the assumption that bone accumulations such as that at Zinj represented the remains of hunted meals. However, when Bunn and Kroll (1986) reanalyzed the assemblage, they argued that both skeletal element abundances and bone surface modification suggested that early hominins were actually capable of hunting large mammals and bringing them back to particular sites on the landscape to be butchered. This debate became known as the "Hunting versus Scavenging" debate.

In a naturalistic study conducted in Serengeti National Park, Blumenschine (1988) simulated a series of "hominin-first" and "carnivore-first" scenarios by leaving bones for scavenging by wild hyenas. Both hominins and carnivores would have broken bones for the fat-rich marrow inside, but the study showed that they would have left different traces on the bone surfaces when they did so, and in different proportions. When hominins were first, there would have been more hammerstone percussion marks, and when carnivores were first, there would have been more carnivore tooth marks. When applied to the Zinj assemblage, the large numbers of tooth marks suggested it had been heavily modified by carnivore activity. The implication for human evolutionary studies was that our earliest tool-using ancestors would have only gotten access to meat and marrow through scavenging.

The case seemed to have been closed, until Domínguez-Rodrigo and Barba (2006) introduced a new element to the debate. They argued that full account had not been taken of other agents that can produce marks on bones. Specifically, fungus and bacteria can etch bone surfaces in such a way that they may resemble tooth marks – thus, leading to an overestimate of the role carnivores had in modifying the assemblage. Again they turned to the Zinj assemblage as an example.

The debate is not yet settled, with a new generation of taphonomists now arguing that the evidence for scavenging at the site is still stronger than any evidence of early hominins having first access. Although most researchers doubt that early tool-using hominins were as proficient at hunting as modern humans, no agreement has been reached about how all the bones came to be accumulated at Zinj. However, the debate has spurred the development of taphonomy forward as a discipline by demanding new and more rigorous interpretive models, experimental designs, and actualistic analogues.

Key Debates in Human Evolution: Hunting Proficiency of Early Humans

Taphonomic research has also been instrumental in investigations not just of the origins of hunting per se, but the origins of *modern* hunting ability. The modern human origins debate began to escalate during the 1980s as researchers sought to understand when, where, and how our species first emerged sometime after about 300 thousand years ago, only to later disperse around the globe. The debate has since encompassed both the fossil hominin and archaeological records, with archaeologists focusing on uncovering evidence of the origins of modern human *behavior*, including subsistence. Because fossil animal bones are some of the most commonly preserved material remnants of subsistence behavior, much of the focus has been on large faunal assemblages from early anatomically modern human sites such as Klasies River Mouth in South Africa. Part of the debate has also revolved around questions of the subsistence behavior of our extinct close relatives that were *not* anatomically modern, for example, the Neanderthals in Europe.

Initial work by Klein (1975) at Klasies River Mouth suggested that early people were able to hunt some animals, but not the most dangerous ones. This was based on straightforward

interpretation of faunal abundances at the site, which showed that more dangerous animals such as Cape buffalo (*Syncerus caffer*) and bush-pig (*Potamochoerus porcus*) only became common during the Later Stone Age, after behaviorally modern people had evolved. Again, Binford (1984) had a different interpretation. He proposed instead that most of the faunal remains at the site showed evidence of being scavenged by people and that early anatomically modern humans could not have been adept hunters at all. Because no modern hunting and gathering group is known to purely obtain mean through scavenging, interpretations such as these set up a dichotomy between the evolution of modern *anatomy* (which was already in place) and modern *behavior* (which was in this case interpreted to have evolved later).

Stiner's (1994) study of the faunal remains from Neanderthal sites in Europe also suggested that Neanderthals periodically used scavenging as a primary mode of meat acquisition. A major component to the interpretations by all these researchers was the fact that major meat-bearing limb elements were uncommon relative to head and foot elements at each of the sites they had identified as containing scavenged assemblages. The reasoning was that head and foot elements represent the nutritionally poor "leftover" carcass portions and that a "hunted" assemblage should contain higher abundances of meaty limb portions.

However, many of the sites used by these authors had suffered from serious excavator bias. Certain components of the assemblages that had not been considered to be taxonomically diagnostic had been discarded. Because long bone shaft fragments are challenging to identify, they had frequently suffered this fate. However, the more diagnostic long bone end portions had been retained, and these formed the basis of long bone element counts. What the data at such sites were actually showing was relatively low proportions of *long bone ends only* relative to high numbers of head and foot elements.

In Marean et al.'s (1992) basic experimental study on hyena ravaging of modern bone assemblages in a captive setting, they found that hyenas preferentially consume greasy skeletal elements or element portions compared to other portions, such as dense long bone shafts. Therefore, an archaeological assemblage that has been ravaged by hyenas – or by extension other bone-modifying carnivores – would be expected to have most of the limb elements represented by shaft fragments rather than the greasy (but unfortunately more taxonomically diagnostic) end portions. At sites where shaft fragments had been preferentially discarded by the excavator, most of the remaining evidence for meat-bearing limb bones would have also been discarded (Fig. 2). Without the shaft fragments available, the observed "head and foot" pattern could be explained equally by carnivores scavenging after hominins or by hominins scavenging after carnivores. This sparked a debate that was still being joined by researchers such as Pickering et al. (2003), over a decade after the original hyena study had been published.

Since the early 2000s, the debate has cooled and an array of research has been conducted at other South African early modern human and European Neanderthal sites of similar or even older age. When complete assemblages are used for analysis and bone surfaces are scrutinized for evidence of hominin butchery, the taphonomic research shows that both hominin species enjoyed early access to carcasses. Both were also likely adept hunters of large ungulates, although they may have used different apparatus to do so. The emphasis of current research is now on exploring the variability that existed within subsistence strategies during this time period and using taphonomy to untangle the specific depositional histories of bone accumulations at these sites.

Key Debates in Human Evolution: Origins of Hominin Butchery

Despite the interpretive strength offered by actualistic research, it is not always a straightforward matter to apply it to a fossil assemblage. It is commonly the case that one taphonomic process may imprint over another, and ancient bones have had a lot more time to be exposed to different processes than modern

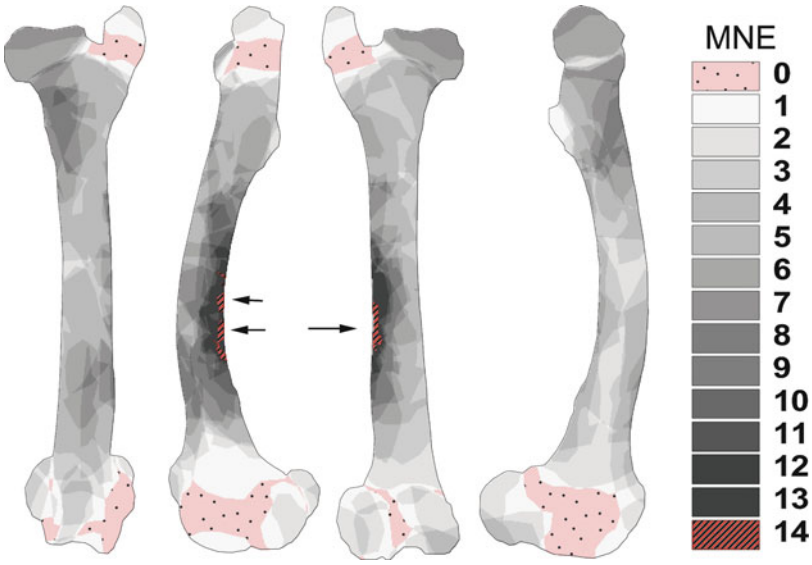

Taphonomy in Human Evolution, Fig. 2 Generic template of the left femur of an ungulate showing differences in preservation between the shaft and the ends. All femoral fragments drawn onto the image were recovered from the South African cave site of Pinnacle Point Cave 13B, which is partially contemporaneous with Klasies River Mouth. Darker areas represent parts of the bone that have several specimens representing that portion, *red* striped areas (with *arrows*) indicate the portions with the most preserved specimens, and *pink* spotted areas indicate regions that are not represented at all in the assemblage. In this case, twice as many individual left femora are represented by the shafts as by the ends

bones (Fig. 3). More dangerously, some processes result in equifinality in fossil assemblages, whereby different pathways produce the same end result. In these cases, the many potential processes leading to the point at which a fossil is studied cannot be reliably reconstructed, and this can have a major impact on the overall behavioral interpretation of a site.

One of the key lines of evidence researchers have used to argue for or against hominin butchery at fossil sites is bone surface modification. Cut, percussion, and tooth marks were initially all thought to be diagnostic of either hominin or carnivore activity. The timing of carcass access was thought to be able to be directly read from relative proportions of these marks or by the locations or intensities of these marks. For example, cut marks superimposed over tooth marks could be taken as evidence of hominins scavenging after carnivores, and the reverse could also be true for tooth marks superimposed over cut marks.

However, the principle of using bone surface modification in taphonomy hinges on the ability of researchers to accurately tie a trace on a fossil to its underlying cause. Fossils are found in a variety of depositional contexts, and the number of possible processes that can damage their surfaces is overwhelming and site-specific. In the early 1980s, there was much debate over the best criteria (microscopic and macroscopic) one could use to confidently identify cut marks. In 1986, Behrensmeyer et al. (1986) showed that even cut marks, which were thought to be diagnostic of stone-tool-wielding hominins, may be mimicked by natural processes such as trampling. Such uncertainties have led to some of the most heated debates in archaeological research pertaining to early hominin diet, and over the last decade, many of the debates from the 1980s have been resurrected in the context of both old and new discoveries.

Recently, McPherron et al. (2010) reported two fossil specimens from the Dikika DIK-55 site in the Afar region of Ethiopia that bore surface modification interpreted to be caused by hominin butchery with stone tools. The two

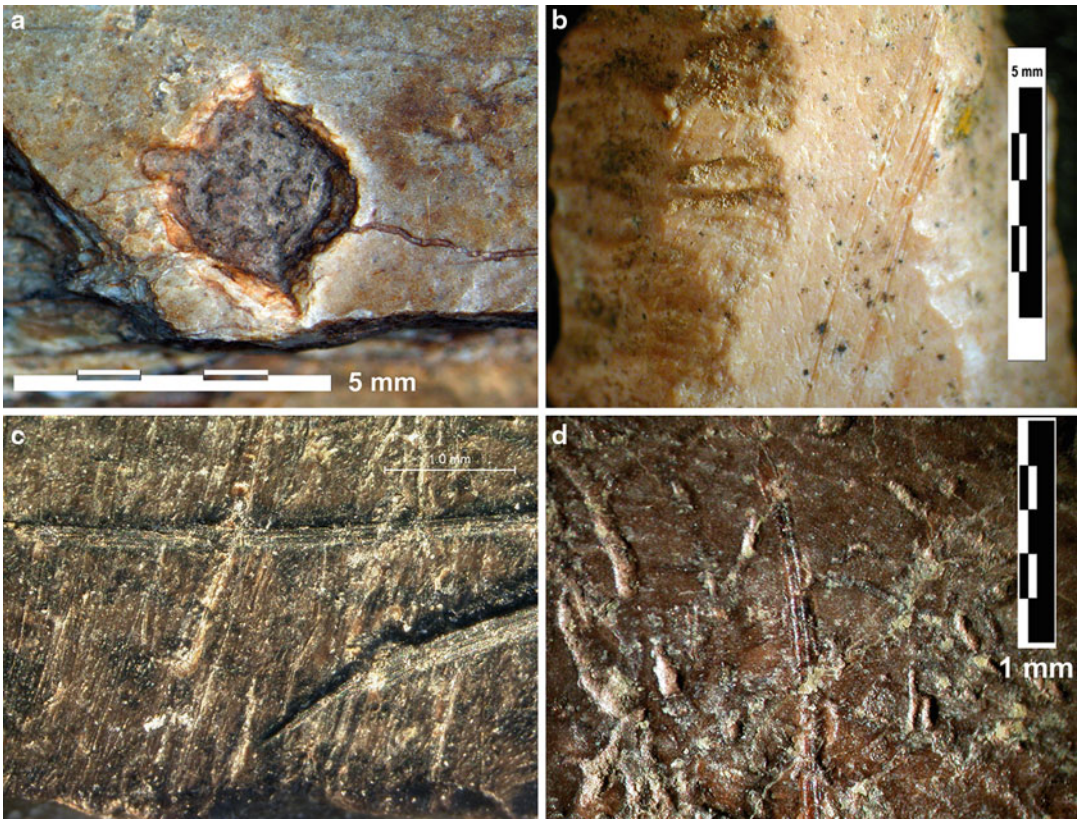

Taphonomy in Human Evolution, Fig. 3 Examples of bone surface modification on fossils, showing the potential overprinting of taphonomic processes in sequence from negligible to extreme: (**a**) a bisected pit filled with matrix thought to be typical of crocodile modification on a fossil specimen from the Ledi-Geraru study area in Ethiopia; (**b**) a cut mark that has been partially erased by rodent gnawing from Sandia Cave, New Mexico; (**c**) a cut mark that has been completely covered by a percussion mark (fine striations) from the site of Blombos Cave, South Africa; and (**d**) a cut mark that has been extensively covered by root or fungus etching and emplacement of matrix from the Loiyangalani site in Tanzania

specimens predated the earliest known flaked stone artifacts by over 800 thousand years, suggesting that taphonomic analysis of fossil bones might be the best way to reveal the earliest evidence for tool-assisted subsistence behavior in the archaeological record. Furthermore, if the marks were produced through butchery, it would mean that hominin exploitation of large ungulate meat and fat resources – and the confrontation this would have sparked with large carnivores over the same resources – began much earlier in our lineage than previously thought. Indeed, it would have meant that our small-brained Australopithecine ancestors were already entering into novel subsistence niches and leaving an early archaeological record as they did so.

However, researchers such as Domínguez-Rodrigo et al. (2010) questioned the identification of the marks as having been produced by stone-wielding hominins. Instead, they have proposed that they are mimics of butchery marks and that they have been produced through natural means. During similar debates in the 1980s and 1990s, the issue of how to diagnose bone surface modification was tackled through actualistic research, blind tests, and the use of advanced methods such as scanning electron microscopy. However, there is a growing awareness in taphonomy that actualistic work normally only addresses one or a handful of the potential processes that can impact a bone from the time an organism dies until the time the fossil is studied.

The debate over the DIK-55 specimens remains inconclusive today, in spite of the wealth of knowledge accumulated over several decades of actualistic research. This illustrates how taphonomy in human evolution is an ever-growing and still relatively nascent field of study. Until more evidence is recovered, the verdict on whether or not Australopithecine hominins used tools to butcher meat will likely remain stalled. However, from a historical perspective, all these debates provide valuable insight into how changing views of human ancestors have shifted along with the prevailing research climate. New evidence has brought old ideas back to the forefront, and in many cases (as at Zinj), the same datasets have been used to argue for completely contradictory interpretations of past hominin behavior. The cyclical nature of these debates suggests that in the future, taphonomists will be looking to draw from novel methods and innovations in both method and theory. They will be seeking to push the boundaries of what is known and striving to move beyond arguing about what is perhaps in the end unknowable.

Cross-References

- ▶ Binford, Lewis R. (Hunter-Gatherer and Mid-Range Societies)
- ▶ Leakey Family
- ▶ Middle-Range Theory in Archaeology
- ▶ Neanderthals and Their Contemporaries
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Taphonomy: Definition

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Taphonomy, Regional

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Introduction

Taphonomy is a discipline common to many fields, like paleontology, geology, paleoecology, or archaeology. Its basic goal is to understand the transition of organic materials, for example, bones or soft tissues, from the biosphere to the lithosphere (Lyman 1994). Taphonomic information is routinely used by archaeologists to assess the quality of archaeological data, to evaluate the loss of cultural and ecological information, to pursue paleobiological questions, and sometimes also to acquire paleoecological information (Gifford 1981; Behrensmeyer 1993; Lyman 1994; Marean 1995). In other words, the conditions which are adequate for the formation of fossils are a central concern of taphonomy. Archaeological applications are usually focused on the preservation of bones, but they also cover cases involving transformations of lithic tools, pottery, or other kinds of materials. In most cases local scales of analysis are used – usually, the site – and indeed those scales are adequate to perform most of these tasks. The literature is full of successful examples of application of taphonomic analysis at a local scale (Pickering et al. 2007; Stuart & Larkin 2010). However, the fact that the scale at which most archaeological problems are usually stated is regional is a valid reason to also advocate for a regional scale of taphonomic analysis (Borrero 1988).

Definition

The basic goal of regional taphonomy is to understand the dynamics of environments at large spatial scales, particularly the processes responsible of bone accumulations. An accumulation of bones is usually defined as any surface or stratigraphy occurrence of vertebrate remains of more than one individual in a well-circumscribed area, around 100 m^2 (Behrensmeyer 1991: 293), and it is the result of a variety of processes. The regional distribution of bone accumulations and its causes constitutes the central subject of the analysis (Haynes 1982; Behrensmeyer 1983; Borrero 1988). These bone accumulations may be the result of the activities of one or more agents, and one important task is that of separating those agents in an effort toward understanding the causes behind the different bone accumulations. Taphonomic analysis can help to separate fossil bone accumulations created by hominins, carnivores, water, or other varied agents (Haynes 1980; Behrensmeyer 1991; Gutiérrez et al. 2010). On the other hand, beyond the identification of

the depositional agents, a regional taphonomy may provide an understanding of the impact of the recent natural "bone rain" on the regional archaeological record. The formation of palimpsests and other issues of contamination of archaeological and recent bone assemblages can be assessed in this way. In other words, an understanding of what bones can be used for a cultural discussion and what bones inform on modern and fossil natural processes at different loci is the expected result of a regional taphonomy.

Historical Background

Taphonomic research in Tierra del Fuego provides a substantial example of some of the properties of a regional taphonomy. This example highlights the importance of the processes of contamination of archaeological sites with modern bones and the necessity to understand the causes creating those palimpsests. The San Pablo region in the Atlantic coast of Tierra del Fuego, Argentina, is characterized by extensive *Nothofagus* sp. forests that alternate with peats and prairies. This region was actively used by hunter-gatherers during the Late Holocene. It is also a place regularly inhabited by guanacos (*Lama guanicoe*). This study showed that most of the known archaeological sites of that region dated between approximately 300 BP and present were contaminated with recently deposited guanaco bones. Longitudinal observations made along several years confirmed the vertical migration of recently deposited guanaco bones contaminated many archaeological assemblages (Borrero 1990). This problem was aggravated by the fact that the modern bones that were contaminating the archaeological assemblages were highly fragmented. Similar mixes of old and recent bones were also noted when other archaeological assemblages were studied on the island or in Patagonia. Given the fact that guanacos were also the main prey for prehistoric hunter-gatherers, the separation of archaeological and "natural" bones is generally difficult to achieve. Generally speaking, taphonomic research produced a suite of taphonomic principles – rates of weathering, ranking of bone destruction, bone selectivity by different carnivores or by running water, etc. – that can be used to separate recently deposited bones from archaeological bones (Borrero 2007). This separation is crucial to acquire a trustable list of the guanaco parts selected for human consumption. Similar problems involve other species in other places (Behrensmeyer 1991; Lyman 1994).

Key Issues/Current Debates

Knowledge about the regional distribution of the archaeological materials is important for any regionally oriented taphonomic research program (Dunnell & Dancey 1983). In other words, this is the only way to know at which places artifacts and natural bones had the potential to overlap in space and also at which places good bone preservation is to be expected. The best way to do this combines taphonomic and geoarchaeological work.

The more useful data collection strategies are those that at the same time will record both archaeological and taphonomic information. Surface bones recorded in transects or blocks (Behrensmeyer 1983) need to be classified by species, element, completeness, degree of disarticulation, abrasion stage, weathering stage, and classes of damage (carnivores, rodents, etc.) (Lyman 1994). When possible, evidence of cause of death, age at death, presence of associated tracks, feathers or scats, and type of substrate must also be recorded. The potential for burial can be evaluated not only by using soil probes but also by analyzing the correlation between weathering stages and bone burial – usually defined as 50 % or more of the element covered by sediments (Behrensmeyer 1991). Frequency information is usually transformed into densities per square meter to facilitate comparisons. The archaeology of the places that show high risk of bone contamination needs to be

stratigraphically examined using test pits. In this way, by using the locally recorded fossil and taphonomic information and general taphonomic principles, the degree of bone contamination can be assessed.

Other regional approaches to taphonomy exist, some of which rely almost exclusively on naturalistic data. One example is the work of Blumenschine (1987) at Serengeti and Ngorongoro, Kenya. This particular study was oriented toward the identification of the scavenger opportunities offered by modern environments. The research goal was to use them as analogs for the Plio-Pleistocene hominin landscapes. This study was criticized for two main reasons. First, it was observed that even the best modern analogs differ significantly from the habitats of the Plio-Pleistocene in the variety and distribution of carnivores and herbivores. Second, it was suggested that places like Serengeti cannot be considered as the best analog for that period in East Africa (Tappen 2001). Anyway, this is an extreme situation in which environments separated by c. two million years or more are compared. In spite of the tremendous differences imposed by this situation, regional naturalistic observations have proved important in the evaluation of many similar situations (Haynes 1982; Behrensmeyer 1983). This is particularly true when these observations are complemented with experimental taphonomic work (Dominguez-Rodrigo 2012). An understanding of the basic processes that govern the deposition and preservation of organic remains provides ways of separating those components of the fossil record that can be attributed to human activities.

Most of the approaches that try to identify regional taphonomic signals principally work with surface records, but there are conditions under which stratigraphic approaches can be used as well. One example is the work at Olorgesailie, Kenya, where the spatial distribution of at least two different time periods was examined and compared using regional taphonomic properties (Potts et al. 1999). In the ideal case, both surface and stratigraphic samples should be employed, and it is their comparative integration that proves to be more informative.

Future Directions

Regional taphonomy is a way to study and understand potential biases affecting archaeological assemblages. It is also a useful way to acquire paleoecological information and to select the most adequate places to answer specific research questions. Effectively, an understanding of the formation of palimpsests can be used to select places with better integrity or with the capacity to inform about particular activities, like scavenging or hunting. In turn, the knowledge about the aggregational history of the deposits can be used to study paleoclimatic and palaeoenvironmental issues (Bobe et al. 2007). For these reasons regional taphonomy is a research strategy that appears to be especially not only useful during the early phases of archaeological research but also capable of obtaining primary information. Most places in the world offer conditions for contamination of older bone assemblages with more recent bones. Regional taphonomy offers one way to respond effectively to that challenge.

Cross-References

- ► Taphonomy in Bioarchaeology and Human Osteology
- ► Taphonomy: Definition
- ► Vertebrate Taphonomy in Archaeological Research

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Taphonomy: Definition

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The term taphonomy (from the Greek *taphos* – τάφος – meaning burial and *nomos*, νόμος, meaning law) is defined as the study of the transition of plant and animal organisms after death from the biosphere (living surfaces) to the lithosphere (underground). Taphonomists study processes such as decomposition or burial that affect organisms after death and which ultimately result in animals and plants becoming part of the fossil record.

Cross-References

► Taphonomy in Bioarchaeology and Human Osteology
► Taphonomy in Human Evolution
► Taphonomy, Regional

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Tarlow, Sarah

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Basic Biographical Information

Sarah Tarlow is a historical archaeologist based in the United Kingdom. She received her B.A. in English Literature from Sheffield University in 1989 and her M.Phil. (1990) and Ph.D. (1995) in Archaeology from the University of Cambridge. She taught at the University of Wales, Lampeter, between 1995 and 2000, before taking up a position as lecturer in Historical Archaeology at the University of Leicester. She was appointed to senior lecturer in 2006 and was appointed to a personal chair in spring 2012.

Among many high-profile professional duties, Tarlow has been an active editorial contributor to the journal *Archaeological Dialogues* and the leading figure in the development of the teaching and research programs in Historical Archaeology at the University of Leicester.

Major Accomplishments

Tarlow's doctoral thesis, supervised by Ian Hodder, was titled *Metaphors of Death in Orkney, CE 1600–1945* and explored how early modern and modern gravestones could be studied by archaeologists as evidence of attitudes to death, and especially to the history of emotion and affect. Developed into a book-length study of *Bereavement and Commemoration* in 1999, Tarlow's Orkney research pioneered research into the archaeology of emotion, actively critiquing previous (especially Marxist) archaeological studies of funerary practices from a distinctive perspective that holds some commonalities with feminist archaeologies.

During the 2000s, Tarlow's studies of modern death came to engage more with social history: both through her account of Oliver Cromwell's head (Tarlow 2008) and her book-length study of *Ritual, Belief and the Dead in Early Modern Britain and Ireland* (Tarlow 2011). In 2011, this led to the award of a large research grant for a groundbreaking interdisciplinary project "Harnessing the Power of the Criminal Corpse" (funded by the Wellcome Trust), which brings archaeological thinking together with medical and criminal history, folklore, literature, and philosophy.

At the same time, she has contributed significantly to methodological and theoretical debates about the relationships between archaeology and history: in her pioneering edited volume *The Familiar Past?* (with Susie West, 1999), in her groundbreaking studies of utopian communities, and in her book-length account of the archaeology of improvement in the eighteenth and nineteenth centuries (Tarlow 2007). Tarlow also played an active role in the early development of the CHAT conference group, hosting the second (2004) meeting at the University of Leicester.

Cross-References

▶ Churchyard Archaeology
▶ Contemporary and Historical Archaeology in Theory (CHAT)
▶ Critical Historical Archaeology
▶ Death, Burial, and Commemoration in Historical Archaeology
▶ Post-Medieval Archaeology (Europe)
▶ Social Identity in Historical Archaeology
▶ Western Europe: Historical Archaeology

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Taro: Origins and Development

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Taro: Origins and Development, Fig. 1 Wild taro (*C. esculenta*) in swamp with *Pandanus* in lowland rainforest, Daintree National Park, Australia (Photo: Matthews 2008)

Basic Species Information

taro (less commonly: *cocoyam, dasheen, eddoe*) (English), *kolokasi* (Greek), *qolqas* (Arabic), *kachu* (Bengalese), *arvi* (Hindi), *pein-u* (Burmese), *yu* (Chinese), *satoimo* (Japanese), *khoai nuoc* (Vietnamese), *gabi* (Tagalog), *kaladi* (Malay), *talas* (Palawan, Bahasa), *taro* (Maori, Samoan), *ma* (Papua New Guinea), *gwaza* (Hausa), *iso koko* (Yoruba), *ede epi* (Igbo), *mayugwa* (Zanzibar). The genus *Colocasia* (L.) contains at least nine and perhaps many more distinct species, all of which are found in humid to semiaquatic habitats in Southeast Asia to southern China. They are soft acrid herbs, often 0.5–2 m tall, leaves large, heart-shaped, with blades supported on long centrally inserted petioles (hence peltate) above an erect or underground corm. Male and female flowers appear on the same inflorescence (spadix with spathe, raised on a peduncle). After pollination by insects, numerous berries with many small seeds are produced. Some species, including taro (*C. esculenta*, Figs. 1, 2), display waxy, non-shining leaves that repel water (wax is on micro-hairs that reduce reflection), while others display non-waxy, shiny, wettable leaves (e.g., *C. lihengiae*, Fig. 3). On taro, two to several fruiting heads may appear in sequence in one season from a single axil. Vegetative propagation of taro is by side-corms with many buds (many or most cultivars) or by long stolons with many nodes (many cultivars and most wild forms).

Taxonomy and Geographical Distribution

Taro was first described by Linnaeus in 1753 based on material derived from the Mediterranean region, where it has been cultivated since antiquity. He put the species in the genus *Arum* under the name *Arum esculentum* L. In 1832, Schott transferred taro from genus *Arum* to

Taro: Origins and Development, Fig. 2 Removing acrid skin from the starchy corm of cultivated taro, Kokoda Valley, Papua New Guinea (Photo Matthews 2008). Starchy residues like those attached to the knife here have been reported archaeologically on stone tools

Taro: Origins and Development, Fig. 3 *Colocasia lihengiae* Long and Liu, wild in Ba Vi National Park, Vietnam (Nguyen 2005; Photo Matthews & Du 2011)

a new genus, *Colocasia* Schott, based on the type species *Colocasia antiquorum* Schott, a name later understood as a synonym for *C. esculenta* (L.) Schott. Many different names have existed for the same plant, including *Caladium esculentum* (L.) Vent. 1801, *Colocasia esculenta* var. *aquatilis* Hassk. 1840, *C. antiquorum* var. *aquatilis* (Hassk.) Krause 1920, and *C. esculenta* var. *antiquorum* (Schott) Hubb. and Rehder 1932. Early taxonomists erected many species of *Colocasia* based on collections of wild plants and diverse cultivated forms of what is now called taro (*C. esculenta*). Recent work in mountainous regions of Southeast Asia has led to the discovery and description of further wild species. Consensus is lacking on the full number of distinct species; nine are noted here and more certainly exist:

1. *Colocasia esculenta* (L.) Schott 1832, highly polymorphic (Plucknett 1983) with diverse wild-type and domesticated forms; cultivated in most tropical to warm-temperate regions of the world; possibly evolved in low mountains of Southeast Asia (vicinity of other wild species in mountains), now distributed in natural and disturbed habitats in subtropical to tropical regions from India to China,

Australia, and Melanesia (the likely natural range), and notably absent from Taiwan as a wild plant.
2. *C. formosana* Hayata 1919, abundant and widespread in Taiwan; forms a morphologically homogeneous wild population and is not known in domesticated form; morphologically distinct, but minimally so, from wild *C. esculenta*.
3. *C. fallax*, Schott 1859, wild in Himalaya.
4. *C. affinis* Schott 1859, wild in mainland Southeast Asia, lower altitudes.
5. *C. lihengiae* Long and Liu 2001 wild in mountains, northern Vietnam to Yunnan, China.
6. *C. menglaensis* Yin, Li, and Xu 2004, wild in mountains, northern Vietnam to Yunnan, China.
7. *C. yunnanensis* Long and Cai 2006, wild in mountains, Yunnan, China.
8. *C. oresbia* Hay 1996, wild on Mt. Kinabalu, Borneo.
9. *C. gigantea* (Blume) J. D. Hook. 1893, a leaf vegetable (petiole only) in Southeast to East Asia and especially popular in Vietnam; wild in karst landscapes of mainland Southeast Asia; a taxonomic and genetic outlier, distant from other *Colocasia* species.

Major Domestication Traits

Rumphius (seventeenth century) may have been the first author to describe with words and illustration a natural wild form of taro (*Caladium aquatile;* syn. *C. esculenta* var. *aquatilis;* cf. Matthews 1991) in Ambon, eastern Indonesia; he saw wild taro growing along rivers, and it was used as fodder for pigs, a usage that is widespread today in Southeast Asia. Wild taro is very acrid, like most Araceae, and is widely known as a famine food that requires special care in the selection and preparation of parts eaten (corms, leaves, stolons). Major domestication traits are:

1. Reduction in acridity of raw tissue or an increase in the susceptibility of the acrid factor (an enzyme) to heat (cooking) or both.
2. Increase in the bulk of the starchy corms, with diverse associated changes in flavor and texture.
3. Distinctive green-white, purple-red, and yellow-orange colors in leaves, stolons, corms, and inflorescences; color variation aids cultivar identification and has aesthetic appeal in gardens and on plate.
4. Cold adaptation (many small side-corms) and day-length sensitivity in northern temperate cultivars.

Acridity helps protect against herbivores, reducing costs for cultivation and storage but increasing costs for processing and consumption. According to cultivar, the corms, side-corms, or leaves (blade or petiole) are main parts eaten; the stolons and spathes of some cultivars are also eaten.

Timing and Tracking Domestication

Cultivars in Eurasia are very ancient since taro is mentioned in ancient texts that date back to around 2,000 years ago in both China and the eastern Mediterranean (Matthews 2006). Northern, temperate-adapted cultivars of taro may have originated in the northern margins of the natural range, in eastern Himalaya, where taro could breed, where triploids often appeared, and where farmers could select traits favorable to winter storage, spring propagation, and summer cultivation. The earliest association of taro with agricultural infrastructure, some 6,400–7,000 years ago, has been found at Kuk Swamp in Papua New Guinea (Denham & Barton 2006). In Papua New Guinea, taro used at early dates could have been a natural wild form or could have been undergoing domestication in response to changes in landscape management, cultivation methods, cooking methods, and food preferences.

Genetic studies have shown that taro cultivars are very diverse and form a number of distinct gene pools; the great diversity within diploid and triploid cultivars ($2n = 2x = 28$, $2n = 3x = 42$) indicates domestication many times. Wild populations have not been studied

in enough detail, or in enough places, to identify source regions and routes of movement. Since cultivars are carefully maintained as clones, some may be hundreds if not thousands of years old and may have spread in many different directions, over vast distances, with trade and human migration. The antiquity of taro in Africa is much debated. Wild populations are not known there, and the crop was possibly introduced from multiple directions at different times: overland from West Asia, via the Indian Ocean from Southeast Asia, and via the Mediterranean Sea to North Africa and the Iberian Peninsula. Taro first reached the Caribbean and Central America as a food of slaves carried from West Africa.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Niah Cave (The West Mouth)
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General Principles

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Tavares da Silva, Carlos

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Basic Biographical Information

Carlos Tavares da Silva (Fig. 1) was born in Portugal in 1944. He obtained his academic qualifications in geology (1967) and biology (1975) from the Universidade de Lisboa. Between 1967 and 1974, Carlos Tavares da Silva was an archaeological adviser of the Educational Ministry (Junta Nacional de Educação) in the municipalities of Setúbal and Palmela. He was an archaeologist in Gabinete da Área de Sines, from1972 to 1974, and he was Director of the Archaeological Service of Gabinete da

Tavares da Silva, Carlos, Fig. 1 Carlos Tavares da Silva (Castro de Chibanes, 2012)

Área de Sines, from 1974 to 1988 (Tavares da Silva & Soares 1981), and he coordinated the archaeological unit of the Natural Park of Sudoeste Alentejano e Costa Vicentina between 1988 and 2000. He has been Director of the Archaeological Center of the Museum of Archaeology and Ethnography in the District of Setúbal since 1974 and co-director of the archaeological review, *Setúbal Arqueológica*, since 1974. He lectures in prehistory at the Universidade de Lisboa.

Carlos Tavares da Silva had been a member of the Scientific Committee of the Portuguese Institute for Archaeology and Cultural Heritage and of the International Union of Pre- and Protohistoric Commission on Neolithic civilizations of the Mediterranean and Europe. He is also a member of the Academia da História in Portugal and researcher of the Archaeological Center of the Universidade de Lisboa. He is the President of the Scientific Committee of the archaeological site of Tróia. He is the author and coauthor of some two hundred publications. In 2004 he was awarded the Gulbenkian Archaeological Award in recognition of his services to archaeology in Portugal.

Major Accomplishments

Carlos Tavares da Silva has directed and co-directed more than 100 archaeological excavations based on research projects and rescue programs. From 1997 to 2002, he worked on the largest archaeological project of Southern Portugal, in Alqueva, (dam of the Guadiana River) and also worked on the preceding archaeological and cultural heritage survey to evaluate the environmental impact of the dam's construction, with Joaquina Soares and José Manuel Mascarenhas.

Carlos Tavares da Silva has played an important role in the development of Portuguese urban and rescue archaeology. With Joaquina Soares, he convened the first national congress on this matter "I Encontro Nacional de Arqueologia Urbana" at Setúbal in 1985. Carlos Tavares da Silva's main contributions in the field of archaeology research are (I) formulation of the first periodization model for the Chalcolithic of Portuguese Estremadura (Tavares da Silva & Soares 1986); (II) identification of the first Chalcolithic fortifications from the III millennium cal BC in Southern Portugal, with Joaquina Soares (Ferreira da Silva et al. 1993); (III) Neolithization process in the Southwest Portuguese Coast, with Joaquina Soares (Tavares da Silva & Soares 2006); (IV) discovery and study of the settlement strategy of the Middle Bronze Age of SW Iberia (Cultura do Bronze do Sudoeste), with Joaquina Soares; (V) identification and excavation of the first Phoenician factory (Abul, in the Sado estuary) currently known in the Atlantic façade of Iberian Peninsula, with Francoise Mayet (Mayet & Tavares da Silva 2000); (VI) the urban archaeology of Setúbal; and (VII) salted fish and fish sauce industry in the Roman Period on the Southwest Portuguese Coast (Tavares da Silva & Soares 1993; Mayet & Tavares da Silva 1998, 2002).

Cross-References

- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Fortifications, Archaeology of
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Social Archaeology
- ▶ Urban Archaeology

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Taylor, R. E. (Erv)

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Basic Biographical Information

R. E. (Erv) Taylor (1938–) is an American archaeologist best known for his work in radiocarbon dating (C14). He received his Ph.D. in anthropology at the University of California, Los Angeles (UCLA), in 1970 with an emphasis on archaeology and archaeological sciences/archaeometry. His doctoral research, under the direction of C. W. Meighan, was undertaken in the laboratory of Nobel laureate Willard F. Libby. From 1972 to 1973, he was an NSF postdoctoral fellow in chemistry at UCLA working with Daniel Kivelson.

From 1969 to 2005, he rose to professor in the Department of Anthropology at the University of California, Riverside (UCR), and has been professor emeritus since 2005. He served as chairperson of that department from 1993 to 2000. He was director of the radiocarbon laboratory at UCR from 1973 to 2003. Since 2003, he has been a Cotsen fellow at the Cotsen Institute of Archaeology, University of California, Los Angeles (UCLA), and, since 2004, has also been a visiting scientist at the Keck Accelerator Mass Spectrometer Laboratory, University of California, Irvine.

Major Accomplishments

Taylor's research has focused on examining the application of dating and analytical techniques in archaeology, with particular emphasis on radiocarbon. He is recognized for his work involving the C14 dating of bone, particularly human bone samples associated or thought to be associated with the earliest human populations in the New World.

In the early part of his career, Taylor published a series of papers focused on the evaluation of C14 data from various sites in West Mexico.

In connection with these studies, he published some of the first papers concerned with defining the marine reservoir effects in the C14 dating of shell for the Pacific coasts of North, Central, and South America and the first large suite of C14 dates on organics extracted from ceramics.

In the 1980s and extending into the early 1990s, Taylor was involved in pioneering applications of the use of accelerator mass spectrometry (AMS) technology to C14 dating of archaeological materials, in association with the AMS laboratory at the University of Arizona. Later, he was instrumental in developing support for establishing the Center for Accelerator Mass Spectrometry for the University of California at the Lawrence Livermore National Laboratory.

Taylor initiated studies with a number of collaborators resulting in major downward revisions in the Pleistocene ages assigned to a series of California Paleo-Indian skeletons, particularly Sunnyvale, Yuha, Los Angeles, and Haverty. The UCR laboratory was also responsible for C14 dates on the Calaveras Skull, the "Piltdown" of the New World (Taylor et al. 1992a). His laboratory obtained the first C14 age determinations on the Kennewick skeleton (Taylor et al. 1998). He has also been involved in continuing studies focused on the accuracy of C14 dates from the site of Monte Verde in Chile and possible regional offsets in C14 calibration data for the mid-1st millennium BCE (Taylor et al. 1999).

In the 1970s, Taylor was involved in early studies in obsidian sourcing and hydration dating and edited the first volume addressing archaeological and geochemical issues involving obsidian (Taylor 1976).

Taylor has authored over 100 journal articles in a wide range of scholarly journals including *Science*, *Nature*, *American Antiquity*, *Antiquity*, *Historical Archaeology*, *World Archaeology*, and *Radiocarbon*. He is the author/editor of several significant books: *Chronologies in New World Archaeology* (Taylor & Meighan 1978), *Radiocarbon Dating: An Archaeological Perspective* (Taylor 1987), *Radiocarbon After Four Decades: An Interdisciplinary Perspective* (Taylor et al. 1992b), and *Chronometric Dating in Archaeology* (Taylor & Aitken 1997).

Taylor's career accomplishments were recognized with the awarding of the 2004 Fryxell Award for Interdisciplinary Research, from the Society for American Archaeology, of which he is a longtime member. He is a fellow of the American Association for the Advancement of Science and the American Anthropological Association. He was a cofounder of the Society for Archaeological Sciences, as well as its first president (1980–1981) and general secretary for 20 years (1982–2002).

Cross-References

- ▶ Archaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Kennewick Man Case: Scientific Studies and Legal Issues
- ▶ Monte Verde, Archaeology of
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ Radiocarbon Dating in Archaeology
- ▶ Society for Archaeological Sciences (SAS)

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Techniques of Paleolithic Art

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Brief Definition of the Topic

Techniques used by Upper Paleolithic groups to produce their graphic works of art provide almost inexhaustible sources on "ways of doing." They also enable us to reflect on the levels of practice of "artists," on the internal organization of societies, and on the implication of the individuals in the procurement of pigments, tools, and mediums.

In studying the techniques of Paleolithic artists, we seek to identify the set of processes of formal construction from the level of a single trace, to their combination into the form of a drawing all the way to the use of the graphic space whether it be on a restricted medium like an object or on a wall.

The study of techniques allows for the understanding of the artists' gestures and the mediums used in the different graphic works.

The mediums of prehistoric representations are multiple and varied from objects of portable art (including bone, stone tablet, ivory, antler) to cave walls, shelters under rock, and rocky blocks in the open air. It is possible to distinguish two main categories of techniques employed: those that add material during the course of the work and those that proceed by removing matter.

In the first category we find the use of pigment for drawing or painting. The coloring is deposited on the medium (bone, rock, or others). The state of the coloring material allows us to distinguish a drawing from a painting. A painting requires a liquid pigment which is applied with a paintbrush, a brush, with the tips of the fingers, or even blown with the mouth, while drawings require a compact pigment, prepared in the form of chalk, pencil, or pastel.

The second category of techniques of Paleolithic art is illustrated by the removal of matter such as engraving, sculpture, and some types of modeling.

These general principles are applicable to all forms of prehistoric art. We see them being implemented on the first decorated representations, for example, the drawings and paintings on the Chauvet-Pont-d'Arc Cave – at 36,000 cal BP.

Upon this theoretical basis, Paleolithic techniques seem relatively simple. It is important to understand as a follow-up how the "artists" combine their gestures and whether the results obtained seem to conform to the goals that we imagine they had set for themselves.

Generally, the fundamental actions of engraving are relatively easy to master if we take into consideration some physical constraints associated with the support (bone, stone, antler) and the tool (flint, finger, stick). Once the bases are acquired, we can evaluate the quality of the designers according to two criteria: the mastery of the drawing and the technical skill. All the know-how of the Paleolithic artist resides in the acquisition of these two foundations.

The most beautiful examples of drawings in the Chauvet Cave perfectly illustrate this double mastery. Admittedly, one should not underestimate the creative imagination of the individual and its capacity for invention or for breaking the rules. Nevertheless, the expertise and graphic innovations remain in the large majority of cases subject to the social codes that govern the artistic production of this cultural group, and the control of society over the individual is highlighted throughout the duration of the Upper Paleolithic.

From the appearance of the first graphic manifestations, all techniques (engravings, sculpture, drawing, painting, modeling) are present and acquired. They persist throughout the Upper Paleolithic.

In Chauvet Cave, the combination of graphic and technical expertise, which characterized the important compositions of black paintings during the Aurignacian, along with the very early dates, destabilized some researchers. To summarize, we can say that all adaptations to the medium are present in Chauvet Cave: the drawing incised with the finger tips, with the flint tool on hard surfaces or softer limestone all the way to the use of more complex techniques requiring combined successive gestures (i.e., on the Panneau des Cheveaux). To start, the artist prepared the surface, removing a portion of the fine film of ochre clay that covers the rock surface. Next, the artist set up the figures by species beginning with the rhinoceros, aurochs, and finally the horses. The contours of the animals are first made with charcoal and then the inner surface of silhouettes is hand faded by mixing directly on the wall, charcoal, chalk, and clay remains. The colors obtained thus present nuances that fade from dark gray to light gray and dark brown gray. The next phase is a clipping of figures with a chisel made of flint to clarify the contours and highlight the black animal heads in contrast to the white limestone.

Throughout the Upper Paleolithic, the prehistoric peoples adapted these processes as well on objects as on cave walls and rock shelters. Thus, in the Magdalenian, we see in some regions the development of monumental friezes carved on hard limestone deep inside rock shelters such as Angles-sur-l'Anglin (Vienne) and Cap Blanc (Dordogne). In the Pyrenees, a specialty of clay modeling is evidenced in several neighboring caves such as Le Tuc d'Audoubert in Ariege and Montespan (Haute-Garonne).

According to 14C dating, portable art shortly precedes parietal art but, from the origin, we note that the same patterns (in technique and symbols) govern the works, with no noticeable difference. However, it is principally during the Magdalenian that we find a large diversity of objects, illustrating the range of techniques and supporting media. And as with parietal art, we find variable expertise according to the authors. Here again, it is the combination of criteria that establishes a qualitative difference. A number of objects of portable art stand out because of the choice of material, such as the tooth of a sperm whale sculptured at Mas d'Azil, or in matching of theme and support, such as the self-licking bison at La Madeleine, not to mention the Aurignacian figurines in Germany or the Gravettian female statuettes.

Today we know that graphic techniques and their degree of elaboration do not have a chronological value. We cannot qualify a culture based only on our reflection of the procedural techniques employed in the realization of images, both abstract and figurative. We must also forget the notion of "technical progress" in the sense of an evolution in artistic knowledge that would improve over time. In rock art, evolutionary progress does not exist and we must rethink our paradigms.

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- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Rock Art, Forms of

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Technological Studies in Archaeological Science

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Introduction

Technological studies are concerned with many of the big questions of archaeology: Who made the objects we find? What materials did ancient people use? Where did they obtain their raw materials, and how did they craft pottery, stone tools, buildings, clothing, and other useful items? How did they communicate technological knowledge to each other, and how and where did they trade raw materials and finished objects? Why did people value certain materials and products over others?

The extent to which scholars can answer these questions depends upon the physical evidence left behind (e.g., pottery kilns, potsherds and broken glass vessels, chert debitage, scraps of preserved textiles), the context of the finds, and the nature of historical information, if any. For example, when dealing with the Roman pottery industry in Italy, France, and Germany, scholars find stamps (Fig. 1) of potters and manufacturers and literary evidence in addition to physical pottery installations for interpretation. In contrast, prehistoric stone pipe and figurine production in North America must be reconstructed from the physical remains (quarry sites and finished objects) alone.

Technological Studies in Archaeological Science, Fig. 1 Manufacturer's stamp on Roman *terra sigillata* (Photo by S. Wisseman, University of Illinois)

Evaluating the evidence is a multidisciplinary endeavor, with teams of specialists collaborating to use appropriate analytical techniques and other approaches such as experimental replication of artifacts to reconstruct early technologies. Success, defined here as arriving at the most likely construction methods and materials used by ancient craftsmen, requires asking the right questions throughout the research process and following a coherent research strategy.

Definition

The study of ancient technologies is really about processes and patterns of human behavior and about tracing the journey of an object from its beginning as a lump of wet clay or a chunk of obsidian to a finished product used and valued by human beings. This research starts with provenance studies (see separate entry) that examine the question of source (where people found their raw materials) and the trade and exchange of materials and products across the landscape.

Technological studies, the primary focus of this entry, reveal material properties and some of the reasons people chose particular materials to fashion into pots, tools, figurines, and cloth, plus the methods they used for fabrication. Such studies are conducted today using a sequence of archaeometric methods (analyzing composition, structure, date, etc., using imaging, microscopic, mineralogical, and chemical techniques). To be cost-effective, most researchers move from macro to micro examination and from simplest techniques (e.g., light microscopy, X-ray radiography) to more complex ones (e.g., neutron activation analysis). Depending on the nature of the research questions posed, it is often useful to perform mineralogical analysis (e.g., petrography, X-ray diffraction) prior to elemental analyses (e.g., X-ray fluorescence) (Emerson et al. 2005).

Understanding the decisions craftsmen made during production (such as how to compensate for bad weather or insufficient fuel during a pottery firing) requires research that goes beyond using instruments for materials analysis. Ethnoarchaeology is the study of living craftsmen who still use traditional practices that can sometimes clarify ancient procedures, and experimental archaeology is the careful replication of artifacts using, as much as possible, materials and methods available to ancient people. Such experiments teach the researchers about the limitations of specific materials, how much skill was required to make tools such as obsidian knives or large ceramic storage jars, and the pitfalls of assuming one knows how something was made just from casual observation or book learning.

For societies who left no written record, detailed examination of the location, layout, and debris of a production site can reveal patterns of behavior that contribute to our understanding of *chaîne opératoire*, or sequence of operations. Social organization and status of craftsmen can sometimes be inferred, although such research is much easier with written or artistic records (e.g., literary sources describing Greek ceramic manufacture and images of potters at work on vases). Cognitive archaeology is the recreation of decision-making and teaching processes used by early craftsmen (e.g., how to judge the correct temperature of an iron forge) through imitation by modern craftsmen. Another area of research is use-wear or use-alteration analysis: the examination of items such as potsherds, cooking pots, or stone tools using magnification, organic residue analysis, and other techniques to determine how artifacts were used and reused over time.

Historical Background

During the early years of archaeometric research, the focus of technological studies was primarily on inorganic materials: clay, metal, and stone. The field was dominated by compositional and authenticity studies using techniques borrowed from chemistry and the physical sciences (various types of microscopy, spectroscopy, radiography, neutron activation analysis, etc.). Early research (in part because some of it was conducted by chemists and physicists rather than archaeologists) focused more on questions of what and how (composition and methods of construction) than on who and why. As archaeologists and anthropologists became increasingly involved in interdisciplinary projects, emphasis shifted to strategies for determining function of artifacts, processes of the craftsmen, and patterns of use and discard.

In the United States, the work of archaeologist Anna O. Shepard (Bishop & Lange 1991) set the stage for careful interdisciplinary studies of ceramics, while physicist Michael Tite's research in Britain applied scientific techniques to the study of composition and structure of ceramics, enamels, glass, stone, and metals. Today, with a host of newer techniques available from the biological sciences, researchers are including organic materials (e.g., textiles, bone, ivory) in their quest to reconstruct ancient technologies of every sort and set the materials and methods used by craftsmen into a broader human context.

This broader human context requires expanding our definition of what was important to the people who made the artifacts we study.

For example, a craftsman's choice of raw material depends not only upon physical properties (e.g., color, hardness, or behavior when heated) but location relative to production sites and perceived value of a material. Early researchers such as Dean Arnold considered factors such as the weight (of wet clay), the method of transport available, and the amount of manpower required to collect raw materials. However, peoples' choices of material are also influenced by a desire for exotica, even when the cost of transport of labor is high. For example, researchers in the mid-continental United States have proven that pipestone workers often chose raw material from far away for reasons that are not always clear to modern archaeologists, selecting Minnesota red catlinite over locally available Ohio flint clay (Emerson et al. 2005).

Key Issues and Current Debates

Archaeologists are interdisciplinary scholars out of necessity. Because excavation usually produces only fragmentary physical evidence, archaeologists must be creative about combining approaches to extract the maximum amount of information from potsherds, stone flakes, and scraps of deteriorated textiles. When time and budgets permit, examination of the technologies employed in making a ceramic or glass container, a stone or metal tool, or a piece of cloth often includes the full range of compositional and structural studies (archaeometry), experimental replication, and ethnographic analogy.

Experimental archaeology is one way to illuminate factors in selection or manufacture of artifacts that are not immediately obvious. Although this approach gives the archaeologist firsthand experience of materials and processes, extrapolation of this experience into the past is fraught with difficulties. The researcher needs to understand the processes well enough to identify the variables involved (e.g., choice of raw materials, type of fuel, time, temperature, and atmosphere in a ceramic firing) and then control as many independent variables as possible (Hamilton 2008). If modern materials or tools are employed in the experiments, these additional variables must be taken into account in evaluating the success of the experiments (Claassen 1981). Also, it is easy for the replicator to assume that because he has discovered one way something could be done (e.g., throwing a large vase in three sections), that it was the only way it was done in antiquity. Experimental archaeology also helps researchers narrow down possibilities: Finding out that a method of construction is impossible is useful information when it forces them to consider other methods. It also teaches archaeologists the value of hands-on experiments: For example, it becomes clear when making round-bottomed cooking vessels out of clay that using a shallow, already-fired bowl as a mold for the base speeds up the coiling process and thus increases the rate of production of multiple molded-bottom, coiled-body bowls. Similarly, burnishing a pot with a smooth pebble for half an hour in many directions makes classical archaeologists appreciate the value of the slave labor used in ancient Athens.

An example of a thoughtful and well-designed ceramic project is Eric Hostetter's recreation of Lydian terracotta roofing tiles from the site of Sardis in Turkey (Hostetter 1994). Local clays and slips and detailed molds were used for authenticity, but a compromise was reached on the nature of the kilns due to time constraints. After an experimental wood kiln produced reducing conditions that affected the clarity of colors of the finished tiles, electric and gas kilns were employed to achieve a consistent final product that could be displayed to site visitors.

One of the best examples of experimental archaeology in recent years is Peter Schmidt's study of ironworking in East Africa. This study successfully blended ethnographic observation of traditional blacksmithing techniques, replication of ancient artifacts, and materials analyses of both the replicates and the artifacts (Schmidt 1997). In addition to conducting his own experiments with other archaeologists in collaboration with a metallurgist, Schmidt organized several modern smelts that were performed by living Haya craftsmen in Buhaya, Tanzania.

He comments, "we needed a method of investigation that exploited the evidence of modern smelts but did not assume that ancient practices were identical to modern ones." This meant the team had to "determine the fingerprints that technological behaviors such as preheating leave behind and then to look for these and other fingerprints in the physical remains of historic or prehistoric smelts" (Schmidt 1997: 129). This approach produced useful information on where slag accumulated in the furnace, temperature ranges, and reuse of some types of slags. Izumi Shimada used a similar combined approach of archaeometric analyses and experimental archaeology to reconstruct the processes and furnace construction used by copper alloy metalworkers at Batán Grande, Peru. Shimada also built a replica pottery kiln at Sícan, Peru, as part of a larger ceramic study (Shimada 2005).

Another example of a metalworking study that combines replication of artifacts with ethnographic observation is Charles Keller's work on African and North American ironworking. While in Africa, Keller served as an apprentice to a blacksmith because he wanted to learn how people learn and how craftsmen communicate valuable technological information nonverbally: by showing or telling rather than using blueprints. This illustrates one of the aspects of cognitive archaeology, trying to understand what a craftsman knows and how he knows it. For example, judging the heat of the forge is often done by color ("red" heat vs. "white" heat), and an apprentice quickly learns by watching someone more experienced about what works and what does not. Or, when making a replica of an eighteenth-century skimmer, a blacksmith holding the historical artifacts but possessing no set of step-by-step instructions must use prior experience and trial and error to achieve the desired result (Keller 1994). Similarly, Raku potters learn that visual cues are the best indicators for when to pull a pot out of the kiln and put it in sawdust: when the glaze looks "like melted ice cream" (Ron Kovatch, *pers. comm.*).

Other examples of combined approaches (experimental replication, archaeometry, and use-wear analysis) include flintknapping and butchering experiments conducted by scholars such as Nicholas Toth. Toth recreated his own Oldowan tool kit at Koobi Fora, Kenya, learning by experience which rocks and methods (e.g., percussion, anvil) worked best to produce hammerstones, choppers, and scrapers. Then he used his tools to butcher elephants and other animals. Such work informs the archaeologist about which tools are best for which tasks (removing skin, stripping flesh, scraping or cutting bone or plant fibers), and microscopy reveals polishes left by different materials.

Technological Studies in Archaeological Science, Fig. 2 SEM of flax fibers from Egyptian mummy wrappings (Photo by M. Raheel, University of Illinois)

When researchers are more concerned with materials and their properties than processes of manufacture, traditional laboratory analysis can answer many questions. Compositional and structural analyses reveal constituents of dyes and pigments in textiles, enamels, ceramic glazes, and glass. Textile chemists such as Kathryn Jakes and Pamela Martoglio have used infrared spectroscopy, scanning electron microscopy (SEM), and other techniques to identify fibers, coatings, and finishes on textiles (Martoglio & Jakes 1990). These methods work particularly well on well-preserved cloth from environments such as Peru or Egypt; SEM has been used to characterize layers of wrappings (Fig. 2) on Egyptian mummies (Proefke et al. 1992).

Many scholars (e.g., M. S. Tite 1987) have employed surface analytical techniques such as X-ray fluorescence (XRF) to identify the elements (e.g., cobalt for blue, copper for green,

iron for red) used to color Roman glass and medieval enamels. Since many extant pieces of ancient glass were isolated from their original contexts and preserved in museum collections, the question of authenticity occurs frequently. For example, the British Museum wondered if the famous Portland Vase, a spectacular luxury piece with cutout white glass overlaying a blue body, was really Roman or much later, of Renaissance date. Tiny fragments left over from an earlier repair allowed researchers to examine structure and composition using scanning electron microscopy/energy-dispersive spectroscopy (SEM/EDS) and determine that the glass' low potash and magnesia content were consistent with Roman production (Freestone 1991).

Glass was often used in combination with other materials, for example, faience (a ceramic body composed mostly of crushed quartz with an alkaline glaze). A true ceramic glaze is a thin layer of glass bonded to clay, and this layering can been seen easily with an SEM examination. Fluxes (e.g., alkalis, iron oxides) were used to lower the melting point of silica in the glaze material so it would vitrify before the rest of the pot. Other crossover technology is enameling, invented by ancient Egyptians, because it involves melting glass over a metal substrate (Lambert 1997).

The black surface finish of Greek vases confounded archaeometrists and experimental archaeologists for many years. Is it a slip (a suspension of clay in water) or a true glaze? The term for Attic "glaze" is sometimes replaced by "gloss" because it was initially assumed to be a fine suspension of the same clay used for the body of the vase Greek clay naturally contains illite and iron oxide, minerals that act as fluxes to lower the melting temperature of the surface coating. While some researchers believe that this composition explains the glossy finish so prized by the Athenians and their customers, one study indicates that the surface coating really is a glaze and that the composition was not accidental. Kingery (1991) concluded that the Greeks probably employed special glaze clays and carefully controlled additions of potassium and iron oxide and demonstrated that there is actually a thin layer of glass on the fired surface.

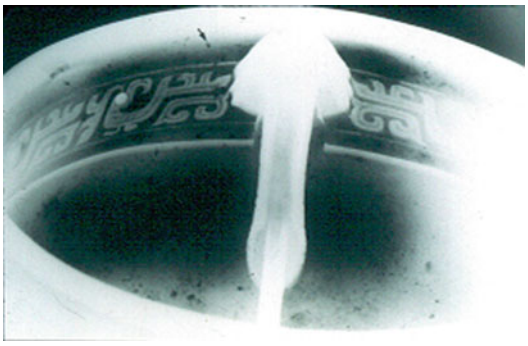

Technological Studies in Archaeological Science, Fig. 3 X-ray of Chinese bowl (Photo by R. Keen, University of Illinois)

X-ray radiography and other imaging techniques continue to help archaeologists and museum curators answer questions about structure and dating of objects that cannot be destructively sampled. For example, X-rays confirmed the late twelfth century CE date of a Japanese wooden statue and the late tenth century BCE date of a Chinese bronze *gui* bowl. In the former case, the issue was one-piece construction vs. multipiece construction, and in the latter case, the X-rays revealed that the Chinese bronze bowl had been cast upside down in a multipiece mold. Also present were bubbles (Fig. 3) in the metal from trapped gas, a feature often present in ancient bronzes but not in modern ones. A pinpoint analysis of the metal (sample taken from the base) showed a leaded bronze with 10–20 % tin and no zinc composition consistent with the early date (Vitali et al. 1986). One of the advantages of X-ray technology is that it is less expensive than CT scanning or other advanced medical imaging and is more widely available (at the University of Illinois, researchers have examined everything from Byzantine necklaces to Egyptian mummies at an on-campus veterinary facility).

Current research includes experimental archaeology in new areas, such as ceramic production and cooking methods for North American grains and seeds in periods before European contact. At the Illinois State Archaeological Survey, replicate cooking pots were used to compare two cooking methods used by Woodland peoples:

rock boiling (inserting preheated rocks into a grain/water mix) and direct heat (placing the grain-and-water-filled pot directly in the fire) to compare speed of heating and cooking efficiency. The experiments demonstrated that both methods worked for cooking quinoa (a modern descendant of *Chenopodium*, a grain used in the Midwest before about 800 CE) to an edible state in about 20 min and that the necessity of reheating the rocks explained spillover marks, charring, and residues near the lips of the vessels and grit in the gruel (Wisseman 2005).

Colorants used in ancient North American textiles have been examined by comparing fragmentary, barely colored archaeological samples with replicate cloth using close approximations of ancient ingredients: ferrous oxide, ground bloodroot, beef fat, etc. Various types of microscopy, ICP-MS (inductively coupled plasma mass spectrometry), and forensic photography were used to establish a protocol for identification of trace amounts of both inorganic and organic colorants (Baldia & Jakes 2007). This study is a good example of a research project that has broader implications than a single, focused study: It sets up future research by demonstrating a workable selection of processes and a sequence of analyses to achieve useable results.

Future Directions

Archaeologists will continue to use combined approaches (laboratory analysis, ethnographic observation, and experimental replication of artifacts) to extract the maximum information out of fragmentary archaeological materials, especially organics. Larger projects that cut across technologies may become more common. For example, metalworking study of silver production at Rio Tinto, Spain, during Roman times has produced surprising results that impact analyses of Egyptian mummies. Some of the lead oxides that are by-products of the process form the red pigment *minium*, recently found by a team from the Getty Conservation Institute to be the major colorant in approximately ten Roman-period "red shroud" mummies now in museums around the world. The discovery of exotic and expensive ingredient (in addition to gold leaf) confirms that the "red shroud" mummies were commissioned by well-to-do families in Roman Egypt. The ever-expanding field of mummy studies combines analyses of human remains for health and dietary information with studies of wrappings (e.g., Egyptian linens and Peruvian textiles), resins, amulets, and tools used in embalming procedures and burial rituals.

As the instrumentation available to researchers becomes ever more sophisticated, new possibilities for analysis open up. However, such innovations can be extremely expensive and inaccessible to all but select research teams. One example is synchrotron radiation-based X-ray fluorescence and X-ray diffraction (available at only a few locations in the world such as Argonne National Laboratory), used by Elizabeth Friedman and colleagues at the Illinois Institute of Technology to obtain subsurface data from metal artifacts that cannot be destructively sampled. Other examples include micro-CT scanning for extremely high resolution imaging of tiny samples and next-generation DNA sequencing, currently employed by European researchers to analyze the genome of the Italian Iceman mummy.

One has to keep in mind that the latest techniques are not always required to answer simple questions: For example, distinguishing between brass and bronze requires identifying only three elements, copper plus either tin or zinc. Thus a technique such as energy-dispersive X-ray analysis may be sufficient and a much more cost-effective choice than synchrotron XRF. Similarly, older techniques such as metallography, the microscopic examination of polished sections of metal artifacts, are still extremely useful for detecting craftsmen's methods, for example, cold working vs. repeated heating and cooling of a copper artifact. Appropriate application of archaeometric techniques requires a sequential approach, beginning with the simplest and most cost-effective techniques, with frequent collaborative discussion at each stage to evaluate not only the results but whether and how to proceed with further tests.

Technological Studies in Archaeological Science, Fig. 4 Experimental stumpware used as firedogs (Photo by S. Wisseman, University of Illinois)

Another future trend is combining traditional laboratory-based instrumentation with portable instruments, for example, X-ray fluorescence spectrometers that can rapidly and nondestructively collect data in the field or museum setting. Protocols are still being developed, and the performance of different portable instruments is being compared for accuracy and precision (Shackley 2010).

Despite all the modern instrumentation available today for the study of ancient artifacts and technologies, there are still questions researchers cannot answer, often because archaeological context or other information is missing. For example, in Mississippian archaeology in North America, a mysterious ceramic artifact continues to baffle archaeologists. Called "stumpware," it is a two- or three-legged fired clay piece (Fig. 4) that may be either a funnel for draining lime-treated maize or a firedog used to support cooking pots. Sometimes the stumpware is perforated, but not always in the same place. Some stumpware has a chalky white residue on the exterior, some does not. Could the holes be added by the potter to speed drying time of these thick ceramic pieces? What is the correct function of stumpware, and does it change function over time? Residue analysis, such as that performed by Richard Evershed at Bristol University in the UK to identify embalming resins in Egyptian mummies, may eventually produce an answer.

Finally, the interdisciplinary nature of research on ancient technologies requires more cross-training of archaeologists. While most archaeologists cannot be equally well versed in archaeology and chemistry or the other natural and physical sciences, more than a passing familiarity with available analytical techniques and their advantages and disadvantages is a necessity. Only then can the kind of sustained and fruitful dialogue between specialists of different backgrounds produce results that help scholars successfully interpret the technological behavior of past cultures.

Cross-References

- ▶ Ceramics, Ancient Greek
- ▶ Ceramics: Scientific Analysis
- ▶ Classical (Greek) Archaeology
- ▶ Cognitive Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Ethnoarchaeology
- ▶ Pigment Analysis in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Quinoa: Origins and Development
- ▶ Woodland and Mississippian Cultures of the North American Heartland
- ▶ X-Ray Diffraction (XRD): Applications in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Television and Archaeology: Views from the UK and Beyond

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Introduction

For millions of people, their primary engagement with archaeology is through the now-traditional medium of linear broadcast television (Merriman 1991: 119-20; Holtorf 2007: 52-54). Though undoubtedly challenged by newer ubiquitous information technologies with rapidly evolving modes of reception, after more than half a century, this largely remains the case (Pokotylo & Guppy 1999; Payton 2002; Clack & Brittain 2007: 14). However, any archaeological message on any media platform is generated, transmitted, and received within a particular sociocultural technological environment. Viewed as material culture, the historical, economic, political, and ideological context of broadcasting might itself be considered as an anthropological or indeed archaeological meta-narrative (see Huhtamo & Parrika 2011).

Furthermore, archaeology, a project almost wholly funded directly or indirectly from the public purse, is granted singular public trust (Hodder 1987: 166). Yet, the TV broadcasts of the twentieth century's economically developed countries – those that created mass audiences for electronic media – inevitably reflected particular geo-historical views of both scientific method and world culture. This context for the establishment of many of the most enduring themes, formats, and common tropes of TV archaeology must be pertinent to any understanding of a dynamic interacting relationship.

As a subject, archaeology perfectly answered the call of Lord Reith – founder and first director general of the British Broadcasting Corporation (1927) – to "educate, inform and entertain." Accordingly, the decades from the early 1950s – especially in the United Kingdom with

this public service remit for its publically funded broadcaster – generated a recognizable genre for TV archaeology. If many of the formats then created have survived because they are somehow fit for purpose, we might still ask if or how this purpose has changed. TV archaeology could certainly be said to have consolidated, if not originated, new areas of research, to have widened public interest and involved new communities in the archaeological process. Nevertheless, we might consider that in the intervening years, beyond methodological advance, archaeological thinking has also evolved.

Definition

Archaeology, ancient story
Television, far sight
Broadcast, to scatter seed

1. Single TV program or series whose content deals with archaeological research or opinion or the historiography of archaeology or otherwise substantially relies on archaeological data or theory to inform a broadcast narrative.
2. Single TV program or series whose content contains archaeological research or opinion or the historiography of archaeology or otherwise deals with or utilizes archaeological data or theory to form some part of a broadcast narrative.
3. Archaeologies of broadcast media, broadcast networks, or associated television technologies.

Historical Background

Archaeology first impacted a popular television audience as that most recognizable and enduring TV staple: the panel game. Broadcast from Philadelphia USA, the long-running Peabody Award-winning network quiz show *What in the World*? ran from 1951 to 1965 (WCAU TV; CBS). The (necessarily) studio-based series saw a distinguished panel of experts asked to identify artifacts from the worldwide collection of the *University of Pennsylvania Museum of Archaeology and Anthropology*. Clearly offered as entertainment – over opening titles, the camera tracked through swirling mist to reveal the first mystery object while a portentous commentator "your offscreen voice," identified the item for viewers – the show did not lack academic substance. The Penn Museum acted as coproducer, and its director, Dr. Froelich Rainey, fronted each program as on-screen host. Eminent archaeologists and anthropologists (and in episode four, celebrity guest, actor Vincent Price) readily tested their expertise – and reputation – while recognizing relics on live TV before viewing millions.

Nor was jeopardy lacking in the UK's more staid response though, BBC's *Animal Vegetable Mineral* (1952–1959) strived less for dramatic effect. Gone were dry-ice, offscreen voices and celebrity guests, or indeed the freedom of panelists to stroll across the studio to a rotating plinth and the article in question. Artifacts were now handed to panelists sat solidly behind their stage-set desk. Whether different production values were due to institutional reticence, seriousness of intent or less developed studio techniques, AVM's guests, and mystery artifacts – picked from the British Museum, regional galleries, and university collections – were as distinguished as those of its American counterpart.

Leading archaeologists of their day, Cambridge professor, editor of the Antiquity journal, and question-master Glyn Daniel, Mortimer Wheeler, Gordon Childe, and Jacquetta Hawkes all played the game. These luminaries, whose collective scholarly publication was unequaled, evidently understood this popular entertainment as a logical extension of their normal educational remit. Just how popular may be judged by Mortimer Wheeler and Glyn Daniel being voted TV Personality of the Year in two successive years (1954, 1955). While following transmissions of AVM, "libraries found that neglected shelves of archaeological books were suddenly empty" (Paul Johnstone: Times obituary of 17.3.1976).

The runaway success of *Animal Vegetable Mineral* established archaeology as a television fixture, and its producers proceeded to set an agenda that determined our views.

Paul Johnstone, Mary Adams "Head of Talks" (factual broadcasting), and then new recruit, assistant producer David Attenborough, helped establish the language and syntax of TV archaeology with a genre which (exceptionally) has never left British television screens.

With *Buried Treasure* (1954–1958), the production team shifted the archaeological question from "what" to "how." If inspired by John Lubbock and Augustus Pitt Rivers, the series introduced experimental archaeology to television. So, Mortimer Wheeler duly grimaced at tasting the last meal of Tollund Man as identified from remains in the gut of the Iron Age bog body. Viewers saw how a prehistoric round house was built and – an enduring TV fascination – how the builders of Stonehenge might have transported 60 blue dolerite stones some two hundred miles from the Preseli Hills of Pembrokeshire to Salisbury Plain.

A defining moment came in 1965 when David Attenborough abandoned his doctorate in social anthropology to return to television as controller of a new color TV channel. Arriving with a mission, Attenborough promptly invited Johnstone, his former boss, to create a unique department dedicated to archaeology and history.

This confluence of a ready audience, the personal support of management within a well-resourced public institution at a turbulent yet broadly progressive historical moment coincided with emergent technologies (for Actor Network Theory see Latour 1993). Development in the design of the Arriflex BL provided a lighter, silent camera that could be handheld, while faster 16 mm colour film stocks allowed for minimal lighting. These together with the introduction of portable Nagra III magnetic tape recorders and an ability to record synchronous sound and picture meant Johnstone's specialist unit could economically film the process as well as the product of archaeology.

Chronicle, BBC 2's flagship series, ran from 1966 to 1991, coinciding with formative years for archaeology. Again, practitioners at the leading edge of archaeology including Colin Renfrew and Barry Cunliffe played their part, but it was the subject matter of *Chronicle* that did much to widen the scope and ambition of archaeological discourse in Britain.

While *Chronicle* was anything but parochial, frequently traveling worldwide to film iconic sites, the series also acted locally as an early forum for community archaeology. In 1970, *Chronicle* helped mobilize amateur enthusiasts to champion nineteenth- and twentieth-century industrial archaeology – a discipline not yet universally accepted by professional archaeologists. Local societies, founded to conserve particular factories or machines, were invited to compete in order to feature in a special series of *Chronicle* films. Consequently, film segments on the restoration of an abandoned needle-making factory at Redditch, research into the history of Manx lead mines, the Faversham gunpowder mill, and salvaging of steam engines from nineteenth-century cotton mills were duly transmitted.

Likewise, Johnstone's enthusiasm for maritime archaeology provided a recurring theme, which helped establish another academic subdiscipline. This saw ever more ambitious archaeological experiment, including the building and sea trial of a 21 foot long replica Bronze Age skin boat. Chronicle also contributed to some of the most daunting industrial/maritime rescue archaeology ever undertaken.

The 1970 return of Isambard Kingdom Brunel's iron steamship SS Great Britain to Bristol and her surprisingly intact construction dock 127 years to the day after the vessel's outward voyage became headline news. Towed from her ignominious berth as a guano-storing hulk ship in the Falkland Islands/Malvinas, the 69-day trip was filmed by onboard Chronicle producer Ray Sutcliffe. Two years in the making, the program on the SS Great Britain (now refurbished and one of Bristol's favorite tourist attractions) had been a major investment but by no means *Chronicle*'s greatest.

From 1968 to 1970, the BBC funded three seasons of excavation at Silbury Hill, Wiltshire Richard Atkinson's investigations into the reputedly largest prehistoric earthwork in Europe meant tunneling through chalk and clay to the core of the 37 m high, late Neolithic mound. This involved not just large-scale archaeology

and specialized mine engineering but for the broadcaster, an ongoing commitment of resources. To supplement filming over four years, outside broadcast (OB) units – newly designed for BBC 2's sports coverage – with their mobile control rooms, live-feed transmitters, lights, generator trucks, camera and sound crews, electricians, riggers and drivers, were regularly commandeered for live updates on the excavation's progress. Although for some journalists not an unqualified success – few artifacts were found and no King Sil on a golden horse – *Chronicle*'s dedication to the Silbury Hill project speaks volumes for how former British television executives valued archaeology.

It might seem extraordinary that archaeology could rank with moon landings, state occasions, or international sporting fixtures as landmark television, but in 1970 and again 10 years later with the raising of the Tudor battleship Mary Rose, archaeology was presented as rolling news and live TV event.

Key Issues

Formatting Archaeology

Television has long held a special place in British culture. Moreover, in the four last decades of the century, a protected UK broadcasting industry could encourage bold experiment allowing controversy or even failure. In this environment, a blueprint for TV archaeology was formulated and much since could be thought variations on a theme. Considering 590 UK programs broadcast between 1999 and 2002 during its millennial "golden age," Karol Kulik identified six distinct categories of TV archaeology (2006: 75-88).

Time Team now in its final season (broadcast 1994–2013) exemplifies the first of these: archaeology as process or "backstage." Despite an emphasis on professional and technological know-how, the Channel 4 format retained an element of jeopardy inherited from its game show origin: the arbitrary time limit of a three 3-day dig. Featuring a different location every week, each show targets a particular period or site type. Archaeological questions are posed and *Time Team* viewers follow the progress of excavation and site interpretation and are offered insight into practical fieldwork. Realistically enough, professional disagreement is not uncommon, and results can be unpredictable. Widely accepted as the market leader with consistent audience brand loyalty, the process-driven "behind-the-scenes" approach of *Time Team* along with protagonists Mick Aston (until 2012) and Phil Harding, for many, came to define TV archaeology.

Particularly popular with cable and satellite networks, Kulik's "detective" format poses a mystery or riddle that – it is proposed – archaeology alone can solve. On-screen archaeologists may offer and evaluate evidence, but the detective story narrative begs solution. Unlike programs focusing on the investigative process, here a script is prewritten to reach a foregone conclusion. The question asked may be more or less valid in presupposing that any single meaningful answer is possible. Its underlying premise – Atlantis, ancient aliens, "lost" civilizations – might also be questionable.

Less overtly sensational, the "expository" model follows John Grierson's documentary style (see Winston 1995). Taking a seriously minded, educational overview, typically of large-scale cultural phenomena, an illustrated lecture is delivered by omniscient "voice-of-god" commentary, which links authoritative screened interviews.

An increasingly ubiquitous format, the "essay" differs from the above in that it is narrated by an on-screen presenter offering a (supposedly) personal point of view on some general archaeological theme. If expert opinion is sought, the presenter asks the questions and – despite taking a greater or lesser part in the scriptwriting – records voice-over commentary. It is not always apparent whose views we really hear.

Kulik describes programs that consist wholly of archaeological experiment as "how-to." These may reconstruct buildings or lifeways, recreate ancient technologies, or solve an ancient engineering conundrum. BBC's *Living in the Past* (1978) in which volunteer families lived for

a year in a simulated Iron Age Village is claimed to have invented "reality TV." This was the prototype for the German *Steinzeit: Das Experiment* (Stone Age: The Experiment SWR/ARD 2007), the biggest TV archaeology event ever. The climactic episode, which saw two reenactors leave their newly built Neolithic pile dwelling on Lake Constance to retrace Otzi's last journey across the Alps, reached a truly astonishing 30.4 million viewers over two consecutive evenings (Bailey et al. 2009).

Lastly, "reconstruction" refers to a TV narrative, which based on archaeological research relies on actors with appropriate costume and sets to dramatize some past event(s). Particularly popular in non-Anglophone continental Europe and while costly, being commentary driven, these lend themselves to language "versioning," thus facilitating resale and universal distribution.

Marketing Archaeology

Commoditization in a globalized television market have seen international coproduction become the norm. These products are characterized by periodic narrative cliff-hangers for the ready insertion of frequent commercial breaks. Meanwhile, an accompanying tendency for multinational corporations to acquire medium sized independent production companies whose chief asset is the exploitation of existing intellectual property – TV format rights – will favor homogenization over experiment and uneconomic risk (Kretschmer et al. 2009).

While game show and "reality television" – the most commercial international formats – have historical associations with TV archaeology, these are perhaps less likely to shape its future. Rather, "pop" archaeology's proven themes of pyramids, mummies, skeletons, treasure, unsolved mystery, or notions of heritage and cultural identity presented as high-gloss factual television may endure as readily tradable commodities.

Since Kulik developed her typology, few archaeology programs defy niche categorization. Among these, BBC 1's costly ill-fated drama series *Bonekickers*, which had a fictionalized university archaeology department as setting for a high-concept adventure serial, is memorable. A second series was not commissioned (Bailey et al. 2009).

Although informed and refreshingly different, the guerrilla-film approach and montage editing of Canadian Simcha Jacobovici's *Naked Archaeologist* (Vision TV) challenged orthodox ideas of both television and archaeology. The show's mischievous humor made it particularly difficult for European terrestrial broadcasters to understand or schedule.

However, up to a third of all Swedish viewers regularly watched the series *Utgrävarna* (Excavators SVT 2005). The reflexive "post-memory work" of archaeologist Jonna Ulin demonstrated that screening views not just of, but from, the subaltern could make popular TV. Inspired by the excavation of her own grandmother's childhood home, Ulin based each episode on an abandoned contemporary site and the memories of neighbors, family photograph albums, and the discarded or treasured things of everyday life – archaeology as evocation.

Some other TV programs dealing with material culture or heritage are not explicitly badged as archaeology (see *Saving Britain's Past* BBC 2; 2010) while magazine formats may include just some archaeological content (*Coast* BBC 2; 2005 to present).

Discussion

Archaeology gripped public imagination long before any dominant TV narrative. Best-selling books, accounts of excavation, fabulous finds, and forgotten civilizations from Egypt or the Near East were popular since at least the 1920s. For their archaeologist authors, such publications needed only to adapt and edit the familiar conventions of report or scholarly monograph with explanatory text and discussion illustrated by drawings and photographs. In the first half of the twentieth century, archaeologists could transmit their message directly.

With the emergence of TV as focus of family life, as electronic hearth in the living rooms of the postwar western world, such communication became a more collaborative venture. Millions, who perhaps rarely explored museums or pored over books on great excavations or paused to

think about how or why one might relate to abandoned things, found analogous enquiry transmitted unbidden into their home. If a historic opportunity for those who considered public communication a central disciplinary concern, archaeologists necessarily approached the small screen on its own terms.

It is the responsibility of the television producer(s) to oversee a protracted, creative, technical process and who is contracted to manage and deliver programs to a licensed broadcast network with access to a complex telecommunications infrastructure. As such, the lead author or final editor of a TV show could rarely if ever be a working archaeologist. Given this, any productive collaboration depends not just on trust and acceptance of different cultures, traditions, and professional imperatives but how producer and archaeologist each *imagine* medium and message. To what extent archaeology is visualized as method, practice, sanctioned treasure hunt, or platform for ideas, or again, television approached as powerful but superficial medium, animated textbook, opportunity for reflexive exercise, or vehicle for original research, determines the outcome.

Any dissonance in academic restraint and lively popular storytelling might be resolved – or in skillful hands even harnessed to creative effect – if the nature of a particular narrative is mutually agreed and understood.

Today, the early adopters of mass media in those same affluent countries broadcast to an increasingly skeptical public. However, for their audiences, which have since come to question many traditional secular or religious authorities, faith in the status of archaeological proof – as seen on TV – seems to be unshaken. This may have much to do with different perceptions of archaeology and what – in the minds of broadcasters – archaeology offers television viewers.

Thus, in what we are constantly reminded is a visual medium, image needs description rather than critique. In this view archaeology is self-explanatory, an end in itself requiring no further justification or contextualization. Seeing is believing, while TV archaeology avoids overt theory and the politics of archaeology remain subliminal.

If any such uncritical accounts – however well intentioned – act as an authoritative source for founding mythologies or help establish dubious notions of identity, this is problematic. The possibility of inferring any special historical or territorial claim from archaeological research must make its popular representation a central disciplinary concern. Or indeed of general concern, for as Stephanie Moser notes, disciplinary boundaries are permeable, and a continuum exists between the interacting spheres of archaeological practice, representations of archaeology, and its public reception (Moser 2004: 262-283; also see Shanks 2007: 274).

Public Image, Public Effect

While a direct causal relationship between TV archaeology and active participation in heritage or archaeological pursuits is difficult to prove (for a critique of the media "effects model," see Gauntlett 1998), limited data suggest a strong correlation. In the UK, negative evidence, at least, suggests that preexisting self-selection was instrumental, in that ethnic minorities have very largely chosen not to watch "heritage" themed TV (Piccini 2006), or join the archaeological profession in any capacity (Aitchison & Edwards 2008: 11, 14), or apply to study archaeology at university (UCAS figures 1995–2006).

Yet, sampling of prospective candidates and first-year undergraduate students at archaeology departments in Bristol and Southampton overwhelmingly suggests previous interest in televised archaeology (Bailey 2007–11, unpublished). For this generation, *Time Team*, frequently watched in the company of at least one parent, was most often cited as favored viewing. So these partial data might suggest the show's consolidation of archaeology's long-standing appeal within the family rather than as initial inspiration.

English Heritage statistics too confirm family background as highly influential but also indicate that intensive generalised TV viewing (over 5 h a day) reduced this groups probability of visits to "historic attractions" by up to 13 %, while for viewers of "heritage TV," including archaeology, visits to "monuments, castles, and ruins" increased by a significant 12 % (Wineinger 2011).

It seems that rather than simple cause and effect, TV archaeology relates to other archaeologies as part of a network of interdependent practices, a key relationship that helps shape a collective cultural consciousness.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Archaeology and Politics
- ▶ Film, Archaeology in
- ▶ Media and Archaeology
- ▶ Public Archaeology, The Move Towards
- ▶ Reflexivity in Archaeology
- ▶ Silbury Hill: Environmental Archaeology

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Tells in Archaeology

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Introduction and Definition

Archaeological mounds form when activities and settlement were conducted at a site over time

Tells in Archaeology, Fig. 1 Aerial view of excavations and large monumental buildings at Tell Brak, Syria (43 m high, >800 m long, and 40 ha in size) (After Gerster 2003: Fig. 32.)

and sediment and material accumulation rates exceed those of truncation or erosion. In Southwest Asia an archaeological mound is called a "tell" in Arabic, "tepe" or "chogha" in Farsi, and "höyük" in Turkish. In the ancient Near East, mounds may vary in size from c. 30 m to 1 km in diameter and in height from c. 1 to >43 m (Fig. 1). The archaeological investigation of these mounds presents a range of major challenges: (1) low mounds and the bases of mounds may be masked by several meters of sediments from rivers, hill-wash, or erosion; (2) early levels may be buried below many meters of later settlement and difficult to access; (3) materials may be recycled and redeposited throughout a mound by successive construction and digging of pits or graves, for example; (4) with shifting settlement patterns and variations in construction and leveling, mounds are not uniform "layer cakes" and include truncated or eroded areas; and (5) mounds may represent only one aspect of settlement patterns and strategies, but may be overrepresented in field investigations due to their predominance in the landscape. Mound sites nevertheless often provide rich sequences of well-preserved deposits and many aspects of ecological and social strategies. The examples below are largely from interdisciplinary excavations in Syria.

Key Issues/Current Debates/Future Directions/Examples

Satellite imagery, aerial photography, surface survey, and *geomorphology* have been applied to study the extensive networks and landscapes of large and small sites in the steppe regions of northern Syria, as in the Tell Hamoukar survey (Ur 2010). Here, satellite pictures showed that many tell sites were connected by radial routeways that formed from at least the fourth millennium BCE. Surveys of artifacts, notably pottery, on large and small tell sites, have identified several major peaks in settlement in northern Syria, notably in the mid-late fourth and mid-third millennia BCE, as well as decline, as in the late third millennium BCE during a period of climatic stress, when many large sites were partially abandoned and smaller sites along watercourses were frequented (Wilkinson 2003).

At the scale of individual tell sites, specific periods and types of activity areas have been *evaluated* by close integration of studies of *surface*

Tells in Archaeology, Fig. 2 Micro-history of a large walled building and surfaces in a street in area HS3, Tell Brak. Location of blocks for microscopic analysis of sequences also shown

materials and tell *geomorphology* and *topography* to detect in situ materials in actively eroding areas of mounds. By these methods, previously unexplored and otherwise deeply buried levels from the Ninevite five periods of the early third millennium BCE were excavated at several points around the large mound of Tell Brak, including a small temple/shrine (Fig. 1; Matthews 2003).

Rapid extensive investigation of subsurface features and buildings at tell sites have been very effectively investigated by *geophysics*, as in the recovery of the whole plan of the lower town of the mid-third millennium BCE at Chuera, by *surface scraping*, as at Tell Brak (Matthews 2003), and by *mechanized sweeping*, as at Sheikh Hamad. Walls, features, and floors were often constructed from compressed mud or mud brick and mud plaster. These may show clearly (Fig. 2), but when the fill around them is from similar materials (e.g., from leveling or collapse), they may be more difficult to detect.

The definition of walls and surfaces depends on close observation of the characteristics of deposits and interfaces between layers. The edges of walls can be identified in plan by shaving clean the excavation surface with a hoe or trowel if deposits are moist or by cleaning briskly with a large brush if dry. During excavation, wall and surface faces can be detected by looking and feeling for changes in composition, texture, structure, and fractures along edges or surfaces using a small pick or trowel. Section profiles provide an important *reflexive* record of deposits and features as they are being excavated and should be kept clean (an artist's palette knife is particularly effective) and regularly examined at the edge of trenches or in strategic sections through features and floors. Records are made of structures (buildings), features (walls, hearths), and layers (floor deposits or fills) using digital photography and videos, high-precision architectural survey, plans, section drawings, and written descriptions.

The detailed histories of buildings and settlements have also been studied using techniques for analyzing sequences of floors and activity residues, such as *microstratigraphy* and *micromorphology* (microscopic analysis of layer content and sequences) (Fig. 2; Matthews 2003) and *chemical mapping* (as at Çatalhöyük, Turkey). An increasing range of analyses can be conducted in the field. These include portable X-ray fluorescence to characterize architectural and artifactual materials and activity residues (e.g., high phosphorus concentrations), and microscopic analysis of spot samples of sediment to look for plant phytoliths and dung spherulites to identify animal pens, for example, and thereby inform excavation and sampling strategies (as conducted by the Central Zagros Archaeological Project (http://www.czap.org/)). Exemplary interdisciplinary scientific analyses of spectacular burials at the mid-second millennium BCE site of Qatna, in western Syria, include study of the human remains, artifact materials and technology, and organic residues within the vessels.

Large-scale long-term research excavations at major tell sites are providing major insights into the diverse structure and histories of these settlements including changing social and political organization, economies, and ritual practices, which are becoming increasingly well defined. Examples in Syria, from regional and local centers, include Ebla, Tell Brak (Oates et al. 2001), and Tell Beydar in the third millennium; Tell Leilan in the second millennium BCE; and Sheikh Hamad in the first millennium BCE. Rescue excavations are also contributing to research. For example, the integration of the archaeobotanical and archaeozoological data

from rescue excavations at several small sites along the Khabur river, sampled prior to their flooding by dam waters, has enabled study of major developments in the intensification of agriculture in the fifth-third millennia BCE in this region (Fortin & Aurenche 1998).

The results from many of these projects have been closely integrated in regional conferences, workshops, and major chronological and environmental research projects and frameworks, such as ARCANE (http://www.arcane.uni-tuebingen.de), and extensively published. Some sites have been conserved and presented for public display and dissemination in situ, within museums and on websites.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Çatalhöyük Archaeological Site
- ▶ Surface Survey: Method and Strategies

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Tenochtitlan (Aztec): Geography and Culture

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Introduction

To understand part by part what Tenochtitlan was, we have to look first into knowing how Tenochtitlan initiated and how it was organized. On the very top of the gods that occupied the most prominent space within temple of their city was Huitzilopochtli. He represented the solar cult, but in this city, there was a long list of gods that were recognized by their people who built and lived there. His pyramid was built as a dual pyramid and had a shrine in the south, and another for a god named Tlaloc was built in the north, who represented legitimacy and antiquity, as well as rain, lightening, fertility, and earth. Gods like Tlaloc, who was risen from a spring. According to Miller and Taube (1993: 93) Tlaloc welcomed Huitzilopochtli when the Aztecs fled the mainland and went to the island in the middle of Lake Texcoco in 1345. Among these two gods was born the conception of war in the shape of fire and water, but it was under Huitzilopochtli's outset human sacrifice and war ("hummingbird of the south"), while Tlaloc was known as "the provider."

Authors suggest (Miller & Taube 1993: 25) that this tribute of human sacrifice became unfavorable at the time of the Spanish conquest, as the Aztecs never imagined this practice of taking enemies from their surroundings to sacrifice through their special type of wars would have taken a toll at end of their culture.

It is possibly that since these times the Aztecs or the people that had arrived to Aztlán were traditionally practicing the *xochiyaoyotl* or the "flowery war."

As Miller and Taube (1993: 42) have pointed out, the name Aztec become popularized by

William Prescott in his book Conquest of Mexico and introduced earlier by Alexander von Humboldt in the nineteenth century, he gave the meaning of "people of Aztlán." Aztlán means "place of whiteness." But these people rarely called themselves under this name; instead, they called themselves Mexica, or sometimes the Culhua Mexica, to denote their linkage with Culhuacan as old Toltec lineages.

Definition

The founding of Tenochtitlan historically belongs to very late Postclassic time 1345 BCE, and through history, it is recognized as a large city almost comparable to Venice in Italy. Although there is no record of what type of people was there before the arrival of the Aztec or Mexica, the type of people that built the city did not take long to build such a large beautiful place that amazed the Spanish. As they advance in the making of the magnificence and efficiency of the city, they advance geographically incorporating two specific things: trade and tribute. In order to be in one end skillfully and the other to keep a tradition, they allowed themselves to incorporate more gods like Xipe Totec from the area of Oaxaca, although sometimes they humiliated their gods by placing them within dark, designed to be their prison (Miller & Taube 1993: 24). They traded with the Pochtecas long distances and become commerce specialists as far as Guatemala and the Veracruz coast; led the way for the Mexica to become an empire, to struggle into battles; and defeated their neighbors the Tepanecs in 1428.

A key issue for understanding of power is that the Mexica replaced their traditional tribal administrative system of four heads for one *tlatoani*, who was the supreme ruler in political and religious affairs. Like many societies around the globe, the power was passed from father to son (as the case of Motecuhzoma I to Motecuhzoma II), even though the system allowed for a new *tlatoani* to be selected by the council from one of hundreds of male nobles, in practice was blood related (Miller & Taube 1993: 168).

One of the amazing aspects of life was to find by the Spanish a type of baptism among the Mexica. This tradition consisted in removing any type of pollution from the parents and was more associated to purification. In the bath ritual the midwife pours water from a vessel placed on a reed mat over the infant and was presented with the tools necessary for adult life. In the sixteenth century, the Mendoza codex appears illustrations of sculptor, feather worker, painter, and goldsmith, each accompanied with feathers and shields of a warrior. The females' illustration comes with sweeping and spinning cotton tools (Miller & Taube 1993: 44).

The city of Tenochtitlan developed a complex organization that allowed for the construction of amazing temples, gardens, exotic animals, and an excellent cuisine. The increase in counted amounts of tribute and regalias took their settlement pattern to incorporate buildings, bridges, and streets along channels, where the boatmen in canoes made this transportation a commodity to navigate from place to place. The length of bridges was so wide that ten horsemen could cross them abreast (Hofstadter 2005).

Spanish conqueror Hernan Cortes describes in his accounts they had a market where over 60,000 people could be trading in goods. One of the rulers known as Motecuhzoma II lived along with its retinue in one of the large palaces to the west of the city. The rest of the people lived in clans, the group of the administration were the *calpullis*, and had barrios or neighborhoods for foreigners and craftsmen.

The city of Tenochtitlan might have been founded under two different migrations of the Mexicas led by Huitzilopochtli. Fray Bernardino de Sahagun accounts that this god was born in 1 pedernal 1168 BCE under the teomama of Cuauhtlequetzqui. Then the Mexicas settled in Tullan, Atitalaquia, and Tequixquiac and built the chinampas or chinamitl, which is an agricultural system based in raised clay bed over their lakes. It might be that originally they were going to Coatepec, but there was a period of conflicts between Huitzilopochtli and the Mexicas; Huitzilopochtli ordered to dry all lakes and

channels, so all native plants and animals perished, which was registered in the year 2 caña.

There is a large quantity of historical accounts about migrations. Migrations are not histories of people leading and leaving one physical space to another but of gods themselves who lead their way to specific tribes.

An earlier migration told also by Fray Bernardino de Sahagun is based in the narration of the birth of Huitzilopochtli in a hill named Coatepec located next to Tula. In this place, a woman named Coatlicue was the mother of the brothers Centzon Huitznahua and the sister Coyolxauhqui. The brothers were ashamed of their sister's pregnancy and prepared a war against her and their mother. Huitzilopochtli was born and helped the brothers to light up a snake made out of teas called Xiuhcoatl, to wound Coyolxauhqui with, which was cut up in pieces up in the mountain falling down from it.

Miller and Taube (1993: 94) account that Huitzilopochtli led his people into the valley of Mexico in Chapultepec at the end of the thirteenth century. As his people was unwelcomed into the region, war was made among the neighbors, this time led by Copil, the son of Malinalxochitl, the betrayed sister of Huitzilopochtli left behind at Chicomoztoc. Later, Huitzilopochtli sacrificed Copil, and his heart was hurled onto a rock in Lake Texcoco, giving birth to the city of the Aztecs.

Years later, Huitzilopochtli was forced to lead his people to Culhuacan, in the other side of the lake, where the noble ancestors of the Toltec lived and become a little more than slaves. Huitzilopochtli saw that this land was not their promised destination and that Tizapan had much more to offer. He suggested to noble lords of Culhuacan to ask to their gods for a noble bride; in fear of the Aztec mercenaries, the lords complied, but the Aztecs flayed her, and a priest put on her skin. During a celebration for the arrival of a new goddess, they saw the priest wearing the princess skin. The Culhua fiercely replied to Aztec barbarism and forced the Aztecs to leave the lake. The survivors refuge in an island there where they found an eagle sitting on a cactus growing from a rock, the very image Huitzilopochtli had told them to seek generations before. The migrations or, like some authors call it, the wanderings of Huitzilopochtli came to an end, according to most sources, in 1345 with the founding of Tenochtitlan.

Another chronicle called Mexicayotl accounts that after leaving several towns, the Mexicas settled in Coatepec and Tula, along with the Chichimecas. The Otomies being early occupants allowed the Mexicas to built their temples and put their gods in it. Huitzilopochtli was the main god among them. The ball games, the *tzompantli* and a dam to plant a variety of cultives, water animals, and native trees gave way to the building of a large city.

The Ramirez Codex mentions the migration of the Mexica in Coatepec during the first pilgrimage, adding that they had a first division of the group in Michoacán and a second one in Malinalco; the rest arrived to Tula, settling in a mountain called Coatepec – Hill of the Serpent. The codex narrates the reasons of why Huitzilopochtli gets into conflict with his own people, as they wanted to remain in Coatepec, after seeing the bountiful and prosperous life they had approached, but this was against the desires of Huitzilopochtli, who executed them all by opening and eating their hearts.

Fray Diego de Duran accounts precisely the reason why Huitzilopochtli kills and opens the chest of Coyolxau – the older sister of Coyolxauhqui and the brothers Centzon Huitznahua – is because of their desires to stay live in a beautiful place they had built and trying to convince Huitzilopochtli to stay there, provoking with this the drought of the channels and lakes they had developed into an agricultural system reaching an economic and social power.

Key Issues/Current Debates/Future Directions/Examples

Other chronicles like Tezozomoc and Tovar repeat the same history. Current debates according to some authors state that Huitzilopochtli led his people out of Aztlán but

to a unknown place located in the same region of Aztlán (Hofstadter 2005) and other suggest to Coatepec (Miller & Taube 1993).

For example, the Boutorini code makes remarks on the ethnic groups of pilgrimage by the aztlameca leaded by cuatro teteutiin or teomama, which had specifics names – Mixcoatl, Cuauhcoatl, Apanecatl, and Chimalma – glyphs, and functions within the organization of the Tenochtitlan state. The roles were in relationship with religion, government, tax, and war correspondent to a chiefdom composed by lineage members, a woman called Chimalma, as priest – numen – two nephews and granddaughter-nieces, all relatives of Huitzilopochtli. Some authors argue that the name Chimalma is also a rivalry title among the descendants of Huitzilopochtli, as was related to rights for lands. Culhua rituals were addressed in specific to sacrifice daughters of the señores or lords. This aspect is amended by the Boutorini code which addresses a change in the political structure by the elimination of the feminine power, based in the historical and mythical events in Malinalco and Coatepec by the killing of Coyolxauhqui.

Another example is based in the fall of Tula at the end of a horizon called early Postclassic for the valley of Mexico. This event marks a change in the ethnic sociopolitical structure. Deities belonging to ethnic groups also change their importance accordingly, for example, Quetzalcoatl in its representation as Ehecatl and Tlahuizcalpantecuhtli no longer has importance as Venus – in correlation with nature reproductive cycles, being Tlaloc as its predecessor – it is replaced by Xipe Totec, as a god related to the earth fertility, and Xolotl, as deities belong to dominated ethnias.

To understand the depth of the Aztec a key issue might be a version that during the fifth sun according to the legend of the suns, the fight among Quetzalcoatl and Tezcatlipoca, the death of itzpapalotl by Mixocoatl, and the death of the Coyolxauhqui all implicates the birth of Huitzilopochtli as the myth. The socioeconomic summit of Tenochtitlan with the birth and life of Huitzilopochtli is explained by an author under a materialist conceptualization like the cycle of life, reproduction, cosmogony, and the necessary energy and sacrifice involved in it (Corona 1981: 22-25).

The legend of the suns is related to the first creation; each sun is presided by a race of people who are either destroyed or transformed into a particular creature. Tezcatlipoca is the god of the first sun, the people are giants that get devoured by jaguars. The second sun is presided by Ehecatl, the god of wind; the people are destroyed by the wind and they become monkeys. The third sun is consumed by rain and lightning, presided by Tlaloc the rain god; their people became butterflies, dogs, and turkeys. The fourth sun is presided by Chalchiuhtlicue; a flood transforms their people into fish. In the fifth sun, Tezcatlipoca and Quetzalcoatl raise the heavens by transforming themselves into great trees. They created the earth by slaying a huge earth monster, described as a caiman as a deity called Tlaltecutli. Quetzalcoatl and Xolotl descend to the underworld to retrieve the remains of the people destroyed in the flood, tricking the god of death Mictlantecuhtli. The bones were carried to Tamoanchan, where the gods grounded the bones and added blood to create the flesh of the current race of people.

The above diverse chronicles allowed for inferences about their ethnic composition and certain aspects of their socioeconomic and political systems, pertaining to myths within chronological events, the magnificence of their settlement patterns to understand their religion, and the level of ideology as far as the dominium of a group within a state (Corona 1981: 13).

The span and cult life under which the god Huitzilopochtli existed is a key issue to understand patrons, leaders, and long-standing lineages of the Aztec or Mexica. For example, the 18 veintenas of the Aztec calendar were based in festivals of primary agriculture dedicated to the rain and maize gods, but of the four of those veintenas, the principal deity is Huitzilopochtli; few other deities repeat like Xiuhtecutli and Tlaloque. The principal celebrations were feasts: feasts of merchants, small feast for death, and bloodletting; for the second are amaranth tamales, feast of the *xocotl* pole; for the third: lifting of posts, planting of trees, stretching of

limbs, bloodletting, first flowers and fruits, sacrifice to Xochiquetzal impersonator, and feasts to water deities (Miller & Taube 1993: 178).

Future directions are to take initial departures based in either migrations, cults, ethnic groups, or lines of socioeconomic development in order to rebuild, separate, and/or join myth from history.

Cult study has to incorporate the ideology of ethnic groups that went from adoring the sun, with Huitzilopochtli, to adoring the moon with Coyolxauhqui, or both at the same time, but as Huitzilopochtli was who allowed Coyolxauhqui to exist, what was the sociopolitical situation pervaded that took Huitzilopochtli to destroy her? was it based in the economic tribute or zones that were tributing less to Huitzilopochtli because Coyolxauhqui was an older fertility goddess in Central Mexico?

One important matter to take into consideration is the time issue, how long before Huitzilopochtli allowed her existence along with many other central gods to come to decay within a controlled zone versus a time with less control and/or pay of tribute and regalias, in behalf of Huitzilopochtli.

Future studies might touch in issues based, for example, in the categorization of tributes or products that were handled according to the spatial distribution of ethnic groups. One of the key issues for such endeavor consists in analyzing closer the use of the sun calendar among the Mexicas and the large region it had influence upon. Each linguistic group had different names for the 365 days calendar. Among the Mexica, it was called *xíhuiltl*, *yza* for the Zapotec, *cuiya* for Mixtec, and *Haab* for the Maya (Marcus 2000: 15).

Cross-References

- ▶ Battlefield Archaeology
- ▶ Mesoamerica: Subsistence Strategies by Region
- ▶ Mexico's Heritage
- ▶ Mexico: Historical Archaeology
- ▶ Oral Sources and Oral History
- ▶ Peopling of the Americas
- ▶ Teotihuacan (La Ventilla): Field Method

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Teotihuacan (La Ventilla): Field Method

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Brief Definition of the Topic

Teotihuacan was a great metropolis during the Classic Mesoamerican period, and its importance

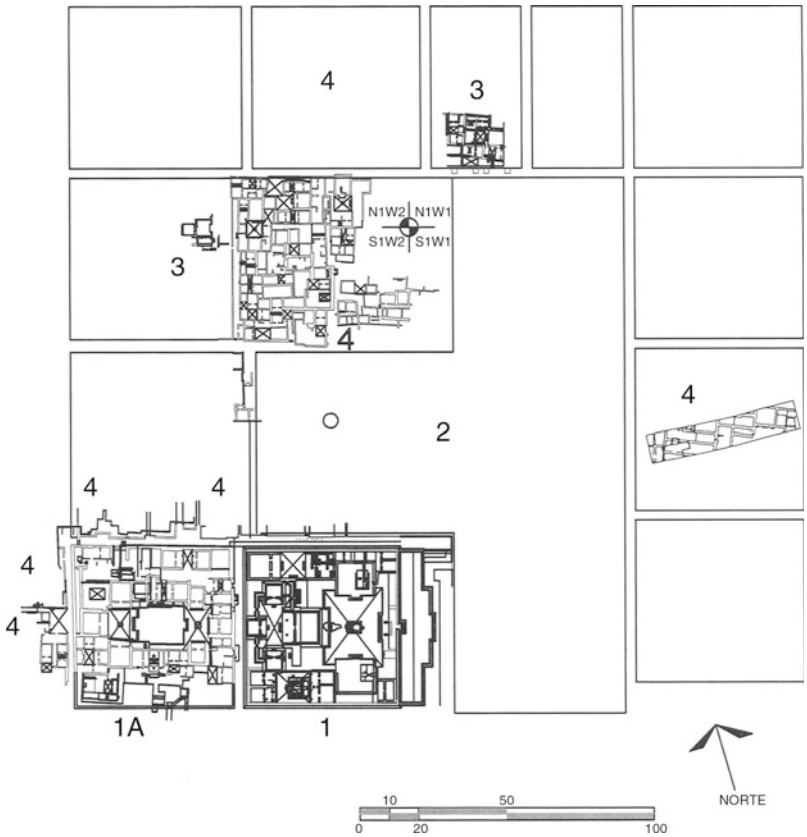

Teotihuacan (La Ventilla): Field Method, Fig. 1 *1*. Neighborhood temple, *1A*. Compound of the Glyphs, *2*. Public Square, *3*. Residential compounds, *4*. Living quarters, *5*. Streets that surround the departmental compounds

and influence marked the political, ideological, and economic development of a great part of the Central Mexican Plateau. The study of the city's architecture and town planning, as well as its internal and external social relationships, is key to understanding the cultural development of this culture. Fieldwork began with detailed mapping of the upstanding monuments, and a high-precision survey of pottery discarded on the surface (Millon 1973). This work aimed to discover as much as possible about the town without damaging the monuments or disturbing the strata by excavation. The pottery distribution proved very informative: the quantities recorded were displayed in the form of contour maps that showed the primary areas of discard (all pottery) and the areas of high-status residence (the distribution of the fine ware: regular thin orange) (Cowgill et al. 1984).

Investigations in the neighborhood of La Ventilla conducted since 1992 have identified a number of structures that are fundamental to understanding social relationships in the city; together, they make up the greatest area excavated and researched of any neighborhood in Teotihuacan (Fig. 1).

The neighborhood temple (4,814 m^2) is defined by a block of houses of 60 × 70 m, integrated by three temples arranged around a central square (1). The Compound of the Glyphs (4,758 m^2) corresponds to an elite monumental complex with political and administrative functions (1A). The residential compounds are defined as a group of houses and workshops mainly involved in lapidary and shell working (3). Between the two elite complexes and the compound of artisans is the Public Square, an area of more than a hectare, without any apparent buildings (2).

The excavation in La Ventilla follows the parameters set by the *Teotihuacan Mapping Project* (Millon 1973). The general grid, oriented

towards the Teotihuacan north, is divided into 1 m^2. The wide area of excavation will allow us to study the full extent of a neighborhood in detail.

All the archaeological strata and objects are excavated stratigraphically and located in three dimensions. Except in cases that merit it, the excavated area is backfilled once all the information has been recorded. The study of the different materials is conducted in specific areas and labs allocated in the archaeological area, although the support of other Mexican institutions, according to arrangements of the Archaeological Council of the National Institute of Anthropology and History of México, is also fundamental.

Cross-References

▶ Field Method in Archaeology: Overview
▶ Teotihuacan: Geography and Culture

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Teotihuacan: Geography and Culture

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Introduction

The city of Teotihuacan is located in the northeast part of the Valley of Mexico. It is delineated by the Cerro Gordo and Cerro de Malinalco to the north, Cerro Patlachique to the south, the Cerro de Cuautlancingo to the east, and Cerro de Tlahuilco to the west. The Teotihuacan Valley contains approximately 600 km^2 of land area and is located at a height of between 2,240 and 2,300 m above sea level.

Definition

Teotihuacan was an essentially urban culture, a multiethnic society arranged according to a precise model of town planning, linked by family relationships and lines of descent (Millon 1973). However, beneath this is concealed a series of complex questions on sociopolitical organization and integration, within a single urban space over six centuries of cultural development. Over the last few years, scholars have drawn attention to the multiethnicity of the inhabitants of Teotihuacan, which is demonstrated by the different ethnic quarters found in the city. During the classical period, the city contained almost 80 % of the population of the Valley of Mexico. However, the rural population experienced exponential growth and had a tendency toward small settlements located throughout the territory (Sanders et al. 1979).

The Pyramids of the Sun and the Moon that are located in the central area of the city are understood as an expression of religious, political, and ideological power (Fig. 1). In addition, a political administrative area has been identified southeast of the archaeological area. This is the magnificent collection of the Citadel and contains the Temple of the Feathered Serpent. Control of the production of green obsidian from the Sierra de las Navajas (Hidalgo) had a decisive role in the expansion of the city (Spence 1981).

Key Issues

Teotihuacan provides an opportunity to study a densely populated, long-lasting city with inhabitants of various origins. This scenario leads to a number of questions regarding the way the city was organized and governed and its expansion across Mesoamerica. While it cannot be said that Teotihuacan is where the Mesoamerican city was "invented," we can say it is where it achieved a high degree of complexity.

Teotihuacan: Geography and Culture, Fig. 1 Pyramids of the Sun and the Moon photo by Miguel Morales INAH-ZAT

There are various interpretations as to the origin of Teotihuacan. In a process of cultural consolidation, these can be grouped into the Altiplano Late Preclassic period, the successive volcanic eruptions that occurred in the Altiplano and the Valley of Mexico, and the subsequent movements of people who would find the Teotihuacan Valley to be not only a habitable but also a religious place to live (Sanders et al. 1979: 106–107; Angulo 1997: 147; Carballo & Pluckhan 2007; Uruñuela & Plunket 2007). However, we should remember that it is not easy to find early traces of occupation and urban growth due to the way the city itself was constructed, which involved constant architectural restructuring and alterations to the evidence in situ. The Tzacualli (1–150 d.C.) and Miccaotli phases (150–200 d.C.) indicate a society with well-defined cultural complexity. However, its political forms of organization are difficult to interpret due to the apparent unwillingness of the Teotihuacanos to highlight individuality. This characteristic differentiates them from their contemporaries such as the Mayas, whose governing elite maintained a public program that depicted their triumphs and established their legitimacy along with personal and family successes and their links with ancestors and the gods. Rather than a royal dynasty, in Teotihuacan we should imagine a tightly knit elite group which superimposed a corporate model for exercising power onto individual interests that were established along family lines of descent (Fig. 2). Research into this corporate model has been carried out by various scholars, with some outstanding work being produced by Linda Manzanilla (2006).

Teotihuacan: Geography and Culture, Fig. 2 Teotihuacan elite member, Tepantitla complex photo taken by Miguel Morales INAH-ZAT

The Tlamimilolpa phase (200–350 d.C.) provides a clear example of a far-reaching program of architectural reorganization for the city, though this is not exclusive to the Classic period. This architectural reorganization can be seen from research carried out in caves to the east and southeast of the Pyramid of the Sun, which

Teotihuacan: Geography and Culture, Fig. 3 Yayahuala complex photo taken by Miguel Morales INAH-ZAT

show the use of quarries and a large-scale post-Teotihuacan process of reoccupation, altering earlier signs of construction (Moragas 1995; Manzanilla 2006). One of the questions that arises concerns when the town-planning model of the Late Preclassic period in the Valley of Mexico changed to the multifamily model that took shape in Teotihuacan during the Classic period. During the Late Preclassic period, each group of housing followed some common patterns (Fig. 3). Many Teotihuacanists believe that during this period each local district became the center of socioeconomic and ideological activity for groups of families linked by a common origin. However, this emergent model can be connected to the city's expansion and the consolidation of the Teotihuacan town-planning model, which broke with the previous socioeconomic structure found in the Valley of Mexico, as demonstrated by Manzanilla in a research she carried out in Cuanalan. The same pattern occurs in the structure of Teotihuacan domestic organization if it is compared with that of the Maya (Cowgill 1997; Manzanilla 1985).

The Xolalpan phase (350/400–550 d.C.) shows the consolidation of all aspects of Teotihuacan culture. The presence of Teotihuacan in Mesoamerica expanded during this period. This has been interpreted as the success of the Teotihuacan model and therefore is associated with cultural success and growth. A competing interpretation is that, on the contrary, this expansion was due to the migration of certain groups from the city to live outside of the territory that was under the control of the city and that this was the first evidence of a profound crisis that led to the collapse of the city (García Chávez 1998).

The Metepec phase (550–650 d.C.) encompasses the collapse of the city. There have been a many different explanations for the fall of Teotihuacan. They can be grouped into two general lines of interpretation: internal reasons (sociopolitical crisis) and external reasons

(ecological-invasionist crisis). These interpretations attempt to identify the key factor that triggered the events that lead to the collapse of the city and the consequences of this for the surrounding area. Although it should be recognized that a single factor will not explain the collapse of Teotihuacan, it is also true that interpretations pointing to multiple causes are not completely satisfactory as they meet the same problem of having to identify an initial factor that prompted the great final crisis. The collapse phenomenon, therefore, also needs to be reassessed from other perspectives, not so much to find its immediate causes but to characterize the different processes that emerge from each study of the case. Some elements that need to be included in a nuanced understanding of the collapse of Teotihuacan include social stratification, the presence of Coyotlatelco culture inside the city during Teotihuacan times, and the contraction of the Teotihuacan state during the Xolalpan phase (Moragas 2005).

Cross-References

► Mesoamerica: Complex Society Development
► Teotihuacan (La Ventilla): Field Method

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Terp Excavation in the Netherlands

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Introduction

Before the first sea dykes were constructed in the twelfth or thirteenth century CE, the coastal area of the Northern Netherlands was dominated by extensive salt-marsh. Habitation in this unstable maritime landscape was concentrated on relatively high ridges, often along tidal gullies. Because such ridges were still subject to flooding several times a year, people had constructed artificial dwelling mounds or *terps* (in Dutch: *terpen* or *wierden*) from the first colonization of the salt-marsh area in seventh century BCE. They started with one or more small house platforms, which were gradually raised and extended with layers of sods, dung, and trash. The present-day terps, often still clearly visible in the flat landscape,

represent the final phase of their development. Although being constructed for a different reason and in a different landscape, terps can be compared to *tells* in the Eastern Mediterranean, also comprising many overlapping habitation layers that may cover a period of several thousand of years at the same site.

Key Issues/Current Debates/Future Directions/Examples

The current method of excavating terps was largely developed during a research project at the site of Wijnaldum-"Tjitsma," in the northwestern part of Friesland (Besteman et al. 1999). Following the discovery of an 17 cm long, gold disc-on-bow brooch (c. CE 600), the universities of Groningen and Amsterdam joined forces to get a better understanding of the archaeological context of this exceptional, probably royal find. Between 1991 and 1993, a total of 8,000 m^2 was excavated, 7 % of the terp's total volume. This project pioneered a new strategy, which involved *stripping* with a mechanical excavator, the systematic use of a *metal detector* (resulting in the unprecedented number of c. 5,000 metal finds), and *wet screening* (e.g., resulting in the discovery of gold drops, sherds of glass vessels, and numerous fish-bones).

A cross of two areas was opened, measuring 210 × 76 m. The top soil was removed by a mechanical excavator in layers of 5 cm or less at a time and the surface checked for metal finds with a detector. The first archaeological horizon generally appeared at a depth of 40–60 cm below the present ground surface, whereupon it was cleaned by hand, drawn, and photographed (Fig. 1). All *negative features* and *sod-walls* were *sectioned* and documented, and the soil from all features was wet screened with a mesh width of 4 mm. Organic- or find-rich features were also sampled for zoological and botanical remains. This process was repeated at the next level, which was usually 20–25 cm below the previous one. Locations of exceptional finds, like sherds concentrations or human and animal skeletons, were examined in greater detail.

Terp Excavation in the Netherlands, Fig. 1 Excavating a horizontal level at the terp site of Wijnaldum-"Tjitsma" (Friesland): After the top soil is removed with a mechanical digger, the archaeological level is cleaned using a flat shovel, revealing the outlines of features cut into the clayey soil. Today, precision machining with a grading bucket may leave a surface clean enough to excavate (Photo: University of Groningen, Groningen Institute of Archaeology)

Some reflections on this methodology suggest future developments. The recording of the site using the *planum method* has the disadvantage of disconnecting finds and features belonging to the same cultural layer and disconnecting the horizontal horizons and the vertical sections, since these are recorded separately. The Wijnaldum experience showed that such links can only partly be made afterwards, even by using three-dimensional reconstructions of digitized drawings. Ideally, the original surface of the cultural layers should be excavated, and recorded in three dimensions. In practice, large-scale terp excavations have already become too

Terp Excavation in the Netherlands,
Fig. 2 Recording a "free section" at Anjum (Friesland). Interfaces between layers are outlined on the surface of the cleaned section and labeled, before being recorded with written descriptions, measured drawings, and photographs. Objects disturbed or located by metal detector are assigned to their layer of origin. The stratified sequence seen in section provides a basic narrative for the occupation of the terp (Photo: University of Groningen, Groningen Institute of Archaeology)

time-consuming and too expensive to encourage the extra burden of stratigraphic excavation.

One new research method that is economic and effective makes use of existing sections already cut through known terp sites. Between 1840 and 1945, about two-thirds of all terp sites in the Northern Netherlands were completely or partly dug away, to be sold as humus to enrich the sand and peat soils in the hinterland. These sites can be investigated by cleaning the escarpment of the surviving intact mound (Fig. 2). In this way sections of 100–200 m long and 3–4 m high can be studied in only four to five weeks without eroding the remaining terp. Added to the results of "traditional" excavations, these *free sections* give valuable insights into the structure, chronology, and conservation of terp sites in different parts of the Northern Netherlands (see Nicolay 2010).

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ Maritime Landscapes
- ▶ Tells in Archaeology

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Terracotta Architectural Sculpture in Classical Archaeology

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Introduction

In Central Italy, hardly anything survives of the buildings and temples, except for the stone foundations and many tons of architectural terracottas. Easily broken and damaged, the decoration had to be replaced frequently, with styles that varied throughout the different regions of

Etruria, Latium, and Campania. Each area had important centers for the production of architectural terracottas and even entire roofs, and exported these to different sites by sea.

To protect the wooden superstructure of houses and temples from weathering, architects adopted the Greek invention of terracotta roof tiles and antefixes to cover and embellish the sloping roofs, revetment plaques to cover horizontal beams, and simas for the raking pedimental and lateral elements. The end of the gables remained open, thus creating space for small pedimental roofs with additional tiles and antefixes. Indeed, the roofs of Etruscan buildings were among the most complex and decorative in the ancient world. Private houses too were regularly adorned with decorative terracotta roofs, although from the middle of the sixth century BCE onward, only temples or public buildings were given decorated roofs. One of the many particular features of Central-Italic architectural decoration that distinguishes it from that in mainland Greece is the presence of figural decoration in the pediments and on the roofs themselves, in the shape of acroteria and ridgepole statues.

Key Issues/Current Debates/Future Directions/Examples

Terracotta Roofs in Etruria

The earliest roofs known to us today had only painted decoration with mould-made elements such as small antefixes with female heads. This early phenomenon appeared primarily in Etruria, mainly at Murlo, Acquarossa, and Tarquinia. In the early Archaic period up to the end of the sixth century BCE, Southern Etruria, with Caere and Veii, seems to have been predominant in producing roofs and roof decoration, Caere being the first center working in a specific Ionian style. This style coincided with the so-called First Phase roofs with mould-made decoration using figural scenes and antefixes with gorgon masks or female heads. During the sixth century BCE, the simple female head was by far the most common type used, with several different types datable to the second half of the century, mostly coming from Caere. The female-head antefixes were very popular, their moulds being much used, varied, and altered. This was not only because of their attractiveness, but also undoubtedly because of the power of the image as such. Their significance must surely be connected to the goddesses venerated in the temples they decorated, who were represented by images of nymphs, priestesses, or perhaps even by an image of the goddess herself. Popular especially during the second quarter of the sixth century BCE were military scenes of departing warriors or armed riders, but later such scenes more commonly included banquets, processions of chariots, and, for the pedimental slopes, chariot and horse races. The open pediments were given reliefs, protecting and covering the ends of the *columen* and *mutuli*. The lateral corners of the roof, as well as the *apex*, were usually given decoration in the shape of acroteria, terracotta sculpture in-the-round. In Etruria especially, the ridgepoles were decorated with abundant terracotta statuary.

Terracotta Roofs in Campania

Overlapping to a degree, but certainly by the end of the sixth century, Campania, with centers like Cumae and Capua, seems to have taken over the market with an especially popular but short-lived roof system, with antefixes set in tongue frames and revetments with floral elements like hanging palmettes and chains of lotuses. The first *columen* and *mutulus* plaques derive from the Campanian system. Modest acroteria in the shape of sphinxes, disks, or single winged figures were placed up on the roof. This style was adopted all over Central Italy, only to be copied and in the end replaced by the local styles and techniques of traveling workshops in Latium; there, local styles and techniques dominated the area until 480 BCE. It is called the Second or Late Archaic Phase, beginning in the last quarter of the sixth century BCE and showing a marked change in the style of the decorative system. This was influenced by the Campanian system, with floral elements replacing figural scenes, and large antefixes with female heads or gorgon masks surrounded by tongue frames slowly developing into entire figures or pairs of figures up to a height

of half a meter. The format of the revetment plaques for the pediments and the lateral sides of the buildings was also enlarged with tall tongues above a flat painted frieze with meander or *guilloche*, under which there was a moulded frieze with palmettes and lotus flowers, or *anthemion* chains linked by volute bands. The pediments were filled with large *columen* and *mutulus* plaques showing hand-made reliefs with figural and mythological scenes. On top of the roofs appeared large statues of gods and warriors, set in pairs or in otherwise complex scenes. This completely new style of revetment was introduced in conjunction with the development of larger temple architecture and continued well into the fifth century BCE. By then, only temples were given these rich decorative roofs.

Terracotta Roofs in Southern Italy

Archaic architectural terracottas from Southern Italy and Sicily are famous for their richness in quality and quantity, and their "transitional" position between the terracotta roofs of mainland Greece and those of Central Italy. It is said that they represent the best of both traditions, showing a rich variation in painted decorative motifs and a fully fledged Greek-oriented styling. Both Sicily and Southern Italy employ two different and incompatible roof systems, one with lateral simas along the eaves and a second with antefixes and eaves tiles. The system using antefix plus eaves tile seems to have been cheaper in production than that with lateral simas along the eaves, and was said to have originated in northwestern Greece. It was particularly popular for modest buildings, such as small temples, *naiskoi*, and grave monuments. Southern Italy in particular quickly adopted the idea of decorative antefixes with eaves tiles for its buildings. These antefixes are invariably combined with horseshoe-shaped cover tiles and a hybrid roof system with flat pan tiles. For the Tarantine antefixes, this has not always been the case. Circular antefixes were used also to cover the *kalypter* in the pediment of small temples. The prime period of production in Southern Italy started around the middle of the sixth century BCE. It continued, especially in the main production center of architectural terracottas in Tarentum, well into the fourth century BCE. The main source of influence on roofs and their characteristics (antefixes and simas) came from Asia Minor (Ionia). Through Sicily its influence permeated into Southern Italy. Corfu, on the other hand, had a direct influence on the production of antefixes in Southern Italy, at Sybaris, Lecce, and Tarentum. After about 550 BCE, both Sicily and Asia Minor seem to have been dominant in influencing the typology in decoration and images in Southern Italy.

Terracotta Roofs in Italy, After 500 BCE

By the end of the Archaic period, this new roof system had developed in Central Italy that was exclusive to religious buildings. The change of political rule, the dominance of Rome, and the impulse from Greek immigrants from Southern Italy, all contributed to influence this process. This new system is known as the Second Phase. The roofs of private houses and elite buildings were no longer given terracotta decoration. Temples grew larger and more monumental than before, and their roofs became more elaborate and complex. The dimensions of each individual roof element became larger, with antefixes, for instance, reaching heights of about half a meter. Large terracotta sculpture was placed on the roof. Reliefs in the open pediments which covered the ends of the beams grew larger, and carried mythological figures and scenes that almost completely filled the pediment. Revetment plaques and raking simas were given floral decoration instead of figural scenes and became more complex in construction. This new style with full-figure antefixes became popular and the most common decoration was a group of dancing satyrs and maenads, *Mischwesen*, along with full-size heads of mythological figures and goddesses. Around the middle of the fifth century BCE, the centers of central and inland Etruria gained in importance at the expense of the coastal cities. Orvieto and Cività Castellana in particular became large production centers for roofs. The models from these workshops spread over a large area, including cities such as Arezzo, Perugia, Talamone, and Tarquinia. This development into monumentality on a large scale continued

in the periods after the fourth century BCE, at pace with the revival of the Etruscan centers after a short period of decline. The previously inset roofs placed on the floor of open pediments (the recessed gable) that had formed part of Archaic temple architecture gradually disappeared, to be replaced by fully fledged pedimental groups set against a closed background. The first of these appeared in Rome itself and is dated to the end of the fourth century BCE. During the Classical period, decoration consisted of large heads of satyrs and females surrounded by large concave frames decorated with floral motifs in relief which alternated along the eaves of large temples. For smaller buildings or for use on the floor of recessed gables, smaller heads surrounded by a frame of long, concave tongues continued to be used, and heads wearing floral wreaths became very popular. In contrast to the nymphs of the Archaic period, the female heads now represented maenads. They were accompanied by heads of satyrs identifiable by their animal ears, and characterized by their ivy wreaths or frames with ivy and bunches of grapes as followers of Dionysos. The same types continued into the fourth century and the Hellenistic period, the heads reflecting contemporary styles of sculpture. Third-century terracotta production was strongly influenced by the destruction of two important Etruscan sites, Volsinii (264 BCE) and Città Castellana (241 BCE), and by the foundation of the Roman colony in Cosa (273 BCE), where a new important production center of roofs was set up. Subsequently, it was in the newly reinforced Latin colonies everywhere in Northern and Central Italy, where the organized urban centers were provided with temples of the Etrusco-Italic type. With the rich decoration of their pediments and mould-made elements, they represented instruments of Roman propaganda. In the following period, between the third and second centuries BCE, when Roman Italy was itself being constructed, Etrusco-Italic temples and roof systems, and their figured terracotta decorations were true *fictiles fabulae*. Placed in a program of renovation that was especially important for the local elites, they underscored the people's Roman citizenship. This period was marked by a strong economic and cultural renewal, when Etruscan cities like Falerii, Telamone, Cosa, Vulci, Luni, and Città Alba commissioned monumental temples with rich pedimental decoration in terracotta. The pediments were filled with statuary groups, taking Greek-Hellenistic pedimental sculpture as an example of style, composition, and *themata*. The scenes displayed were quiet scenes of standing or seated figures from the pantheon (like the myths of Ariadne and Andromeda), or complex scenes from legendary wars and fights, complete with chariots, horses, and monsters (like scenes from the Trojan War or the Theban cycle). Often these scenes represented actual wars and victories, and had a strong political impact.

Terracotta Roofs in Roman Italy

Romanization forged ahead throughout Central Italy influencing the imagery and quality of the old Etruscan models in roof decoration, replacing it slowly but surely by a standardized Roman roof system. In the more southern regions, especially in Campania and Lucania, the decoration of temples was more modest in comparison to that of the temples in Etruria and Latium, the only images used being those in antefixes of a Campanian type with female heads and revetment plaques with Medusa heads. The final monumental stage in the development of architectural decoration was reached in the second century BCE, with the introduction of some new types of antefixes, mostly *Potnia Theroon* antefixes and antefixes with heads of Athena. The closed pediment was now apparent everywhere; its complex and rich statuary groups changed the overall appearance of the temples, fully providing them with Roman political propaganda and a frontal aspect of prime importance. Themes reflected historical events in religious and mythological contexts. It has been called the "Latin triumphal art" and was executed in the Hellenistic, "Neo-Attic" style, a *koine* in an artistic sense, which was omnipresent and dominated the whole of the Mediterranean world. In all Italic territories, architectural terracottas became widely distributed, both in the areas surrounding the great cities and in many distant places on the peninsula. In Roman times, the

terracotta decoration of temples was still much admired. Pedimental decoration in terracotta was visible both in Rome itself as well as in provincial towns Architectural terracottas from the Roman period are plentiful, but in comparison with roofs from the Archaic, Classical and Hellenistic periods, they are much less complex in variation and type. The Etruscan tradition of protecting and decorating temples with terracotta elements was slowly abandoned in favor of the embellishment of public and sacred buildings with stone and marble. Large antefixes disappeared altogether. The dominant production centers of architectural terracottas Città Castellana and Orvieto diminished in importance, and production returned mainly to Rome, where workshops developed new models of Hellenistic origin. Greek artists and artisans dominated the artistic scene and production from the second century BCE onward. They acquired complete autonomy and distributed their products throughout the whole of Central Italy and beyond. One group is predominant, the revetment plaques of the "Campana" type which were produced from the first century BCE onward and which by far outweighed the production of other roof decoration and decorated the exterior of sacred, and other public buildings, as well as private ones, such as villas. Roman antefixes have not received so much attention as "Campana" reliefs, probably due to their simplicity and modest artistic value. Their dimensions are small and their figural motifs limited. Medusa seems to have remained a popular type for both antefixes and other revetments in the Roman period. Production reached its peak in the Augustan and Julian-Claudian periods, coinciding with the explosion in building activities in the early imperial period. Decorative architectural terracottas became unusual after Imperial times, after the second century CE; marble was preferred then everywhere over decoration in terracotta.

Technique and Manufacture

A mould or *matrix*, like no other object in terracotta, informs us about both the production process and the distribution of architectural terracottas in Antiquity. Moulds were used to produce decorative elements when several were needed: raking and lateral simas, antefixes, or revetment plaques. They show the first phase of the creation of parts of the roof decoration, as well as the reproduction of other elements. Moulds were important tools for coroplasts, enabling them to reproduce hundreds of roof elements of the same quality at the same time, as well as enabling distribution over a vast region. Moreover, creating new moulds of existing revetment plaques or antefixes made it possible to use one type of roof decoration over several generations. Moulds are rarely preserved. Not many workshops producing roofs have been located during excavations, so the chance of finding workman's tools is relatively small. It also seems that moulds were not thrown away immediately but kept in use for a long period of time. They were sometimes even repaired. Today, some twenty moulds for antefixes and a few for relief plaques or other roof parts are known, namely, those from Città Castellana, Orvieto, and Capua. Only in one case, that of the Amsterdam mould Cat. no. 36, was a cast ever found during excavations, although some casts seem to have derived from the same type. Reconstructing the production process of terracotta objects is relatively easy, since working in clay has not changed over the centuries. The process of the creation of a mould and its subsequent use is as follows. The perfect model or *patrix*, created by a master coroplast, was covered with wax or oil after firing. Then a thick layer of soft clay was pressed over the *patrix*, thus creating a copy in negative, a mould. Presumably the same clay was used for both moulds and final products. After drying, the mould could easily be taken apart, thanks to the oily layer dividing it from the model. The mould was cut into a manageable format. Thus, all details of the model were copied in the mould. Sometimes extra details were added to the final product, but the moulds we know are all very detailed as regards hairdo, facial features, and decoration. After using the mould for the production of, for instance, the antefixes of a roof (a single mould could be sufficient), they were slipped, and then painted with a mixture of slip and natural pigments such as iron oxides and calcium. The products were fired between

800 °C and 1,050 °C, thus fixing the colors to the surface so as to withstand the weather. In this way, some colors have been preserved right up to the present day.

Cross-References

- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Religion, Italo-Roman, Archaeology of

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Terramara Santa Rosa di Poviglio Alluvial Site

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Introduction

The "Terramare" are banked and moated villages dating to the Middle and Recent Bronze ages (1600–1150 year BCE), located in the alluvial plain of the Po river, northern Italy. They are witness to a complex society, whose subsistence was based on intensive agriculture, pastoralism, and long-range trade (Barfield 1994). The Terramare people first carried out a radical clearing of the Po plain to provide land for intensive agriculture, and changed the natural drainage by digging canals and ditches to feed moats surrounding the villages and to irrigate the fields in the countryside (Cremaschi et al. 2006). The culture reached its apogee, along with a prolific population, at the beginning of the Recent Bronze age, but at the end of this period suffered a societal collapse that led to the abandonment of the villages in a few generations (Cardarelli 2010).

Key Issues/Current Debates/Future Directions/Examples

The Terramare have been a major subject of research by the Italian pioneers of prehistoric archaeology (Pearce 1998), but had been neglected for at least sixty years, and were thought to be almost destroyed by quarrying for soil during the nineteenth century. But at the beginning of the 1970s, geomorphological mapping of the Po plain, using aerial photography, demonstrated that the Terramare had largely survived quarrying. From that period onward, several projects have marked a new stage in their study (Bernabò Brea et al. 1997).

In the framework of this renewed interest, the archaeological excavation of Santa Rosa took on the task of extensively exploring a Terramara village, with the explicit aim of shedding light on its architectural structures and its development

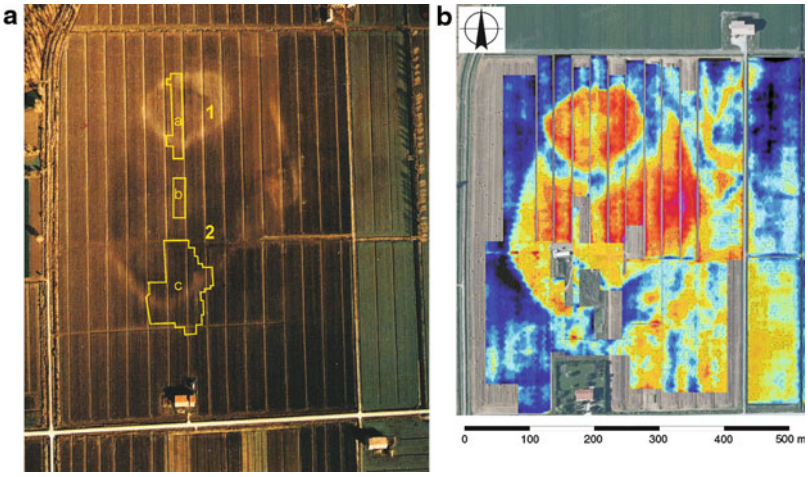

Terramara Santa Rosa di Poviglio Alluvial Site, Fig. 1 The Terramara Santa Rosa as seen on the aerial photograph (*left*) and on the base of near-surface geophysical prospection (*right*). Aerial photograph: *1* – small village; *2* – large village. *Yellow lines* delimitate the areas excavated up to now: (**a**) area in the small village 1984–1992; (**b**) area between the two villages 2008–2011; (**c**) area in the large village and in the moat 1993–2011. Geophysical prospection: *blue colors* indicate conductive media (*clayey deposits*) indicating moat ditches and flood deposits surrounding the site; yellowish/reddish colors indicate resistive media (*sandy-silty deposits*) putting in evidence the Terramara shape (Mele et al. 2011)

Terramara Santa Rosa di Poviglio Alluvial Site, Fig. 2 The area excavated in the large village. The buildings, indicated by clusters of post *holes*, are delimited by peripheral moat. Note the high concentration of *circular wells*

over the 400 years that the village lasted. The Santa Rosa site was selected by virtue of its good state of preservation and because it was threatened with destruction by agricultural work. The site was defined by aerial photography, which revealed its limits in outline (Fig. 1a). Subsequent geophysical survey showed up areas of high and low conductivity, indicating areas dominated by wet and dry features (color coded on Fig. 1b). The interpretation is of two settlements, each surrounded by clay ramparts and moats.

Excavation has been carried out under the aegis of the SoprintendenzaaiBeniArcheologici of Emilia Romagna and the local authority, and performed by a professional team, which also trains archaeology students for the principal research institution (University of Milan). The aims of the excavation are to map the detailed occupation of the larger (7 ha) settlement and explore the relationship between the two. The first 28 seasons have opened an area of 1 hectare, revealing the defenses, post-rows of buildings, and numerous wells (Bernabò Brea & Cremaschi 2004; Fig. 2). The excavation period is limited to the summer season; during the winter/spring seasons, the water tables rise very close to the ground surface, make digging difficult (Fig. 3).

Terramara Santa Rosa di Poviglio Alluvial Site, Fig. 3 Archaeologists at work in the course of a field season in the Terramara Poviglio Santa Rosa

The original settlement was built at the edge of the Po river during the Middle Bronze Age, and consisted of a group of rectangular houses on piles protected by a timber palisade. At the beginning of the Later Bronze age, the Terramara reached its maximum expansion with the construction of the large village. Inside it, the houses were still on piles, but arranged along specific alignments and organized into quarters bounded by roads going through the village and crossing the surrounding moat over wooden bridges thereupon reaching the countryside (Cremaschi & Pizzi 2011). At the end of the Late Bronze Age, the village underwent a radical renovation: the houses were no longer built on piles, but rested on the ground according to the block-house technique. The peripheral wooden fences were replaced by massive earth ramparts.

The region in which the Terramare previously flourished was abandoned for at least five centuries. The Santa Rosa village area became a mound, covered with forest and surrounded by marshes which colonized the former ditches. It was settled again only in the sixth century BCE by Etruscan colonists.

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► Excavation Methods in Archaeology

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Textiles and Fabrics: Conservation and Preservation

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Introduction

A textile is a binary system of fibers or other materials worked into threads. In essence a textile is formed by weaving, but the term can also be used more generically and thus covers flexible products made in other techniques, as, for instance, twining, needle binding, knotting, and knitting. Felting and basketry are also techniques related to textiles. Thus, textiles can be seen as one part of an overall cloth culture, which may include many different materials and techniques (Harris 2012).

Around the world and throughout time, humans have created textiles by exploiting different natural resources and inventing tools and methodologies to change these resources into a viable product. Some areas are rich in traditional textile resources, like materials for fibers, dyes, and tools, but also in less resource plentiful areas, humans have found solutions for fulfilling the demand for textiles.

Definition

Until very recent times, textiles were primarily made from natural fibers of either plant or animal origin. The most well-known plant fibers are flax, hemp, nettle, and cotton, while the most well-known animal fibers are sheep wool and silk. Like any perishable organic material, these fibers are subject to rapid decomposition in archaeological contexts, and their preservation requires special conditions to prohibit their destruction by microorganisms.

Key Issues/Current Debates/Future Directions/Examples

Contexts

Environmental conditions affect the survival of plant and animal fiber materials in various ways. In general, an acidic environment favors the preservation of proteinaceous fibers, while a alcaline environment does the same for fibers of vegetal origin. As most degradation requires the presence of air, many textiles have been found in contexts where anaerobic and/or waterlogged conditions occur. Other conditions like extreme dryness or permanent frost; the presence of salt; exposure to fire, which leads to the creation of carbonized samples; or through mineralization when coming into contact with metal salts have also preserved many textiles.

The find context influences the preservation of archaeological textiles. In Europe, most textile remains have been found in connection with burials, such as costumes, wrappings of human remains and/or grave goods, furnishing, and other utility textiles. In inhumation graves, the organic materials are often exposed to heavy and fast degradation, and, in most cases, it takes special conditions as, for instance, the presence of metal salts from copper or iron to prevent the degradation (e.g., Bender Jørgensen 1992; Rast-Eicher 2008; Gleba & Mannering 2012). Though these textiles are often very small and in a stage where further organic analyses are excluded, they still offer due to their number and firm structure an important source to European textile technology. In dry climates as in Egypt, many textiles have been preserved by desiccation and aided by the burial custom of embalming the dead. In a similar way, the special tradition of embalming and placing the dead in caves, which was performed in the pre-Columbian Inca kingdom, has preserved many colorful textiles made of cotton and wool in South America. Frozen environments like the Norse burials in Greenland have left fabrics almost unaltered, and in the recent years, the melting of glaciers in, for instance, Switzerland and Norway have also revealed well-preserved textile finds. In Denmark, the waterlogged, anaerobic, and acidic environment

in burial mounds has favored the preservation of a large collection of complete Bronze Age textiles and costumes.

Other important contexts where textiles may occur are settlements, harbor areas, garbage dumps, and earth fillings. Many excavations in medieval towns around Europe have revealed new and important textile corpuses that supplement and challenge information based on written sources, and also textiles found in churches and relics provide important perspectives to our textile history. Especially in Northern Europe, many textiles have been found in connection with ritual offerings, as in weapons deposits, or together with mummified human remains. From these lake and bog contexts, many complete wool textiles and other objects made of skin and fur dated to the Iron Age have been preserved. Until recently, it was believed that this acidic environment in the North European high bogs only favored preservation of proteinaceous origin, while it was only larger objects of plant origin like cords and ropes made of tree bast, stems of flax, and wooden objects that could be preserved in bogs. Nevertheless, during the reexamination of the Huldremose Woman (Fig. 1), the last remains of a textile in plant fiber was discovered on her back, and threads from this weave could also be located in many folds in her skin (Frei et al. 2009). This is the first time that a plant fiber textile has been recorded from a bog context in Denmark. This example shows that although a specific context and environment in general favors a specific material, every archaeological find is in itself unique. When excavating new finds or researching already excavated finds, it is important to be open for all possibilities in order not to overlook important archaeological materials.

The scarcity and poor preservation of archaeological textiles are two factors usually cited for the absence of focus on textile studies. Although valid to a certain extent, such reasoning has obscured the fact that textiles are much more abundant in archaeological contexts than generally assumed and should, whenever present, be studied in the same way as any other archaeological finds.

Textile Research and Scientific Analyses

Textiles have an enormous potential in archaeological research, being able to tell about social, chronological, and cultural aspects of past societies, and at the same time providing us with a unique opportunity to come very close to the prehistoric or historic individual. Substantial information about past societies can be gained from the study of textiles, but this information depends on the analytical tools and methods used. A textile contains information about the process and the tools used in the various stage of its production. The decoding of a textile is imperative for the understanding of the many different processes involved in its production, and the methods may vary according to the state of preservation (Andersson Strand et al. 2010). For instance, the processing of a fiber material from the source to the final thread and the weaving and sewing will not only tell about breeding systems and the technological knowledge of that time but also indicate more subtle information about visual preferences and human desires.

Fiber identification is an important starting point in textile research as it indicates the properties of this material as well as the possible use. The identification of fibers is in most cases based on morphological characteristics performed by various types of microscopy. The optical microscopy is the most basic tool which together with scanning electron microscopy (SEM) enables precise photographing and measuring. In these cases sampling is necessary. Fiber identification can be difficult in cases of highly aged and deteriorated samples where fiber characteristics have been changed and/or where sampling is complicated by the fragility or the scarcity of the fibers. In such cases, scanning electron microscopy is especially useful and combined with energy dispersive X-ray spectroscopy (SEM/EDX) inorganic elements in the fibers such as pigments, mordants, and salts, and proteins in animal fibers can also be analyzed. Transmitted electron microscopy (TEM) can provide information on the internal fiber structure such as the pigmentation of wool fibers. Gas chromatography/mass spectrometry (GC/MS) and infrared microspectroscopy (FTIR) are useful

Textiles and Fabrics: Conservation and Preservation, Fig. 1 The Huldremose Woman's costume consists of two skin capes, a woven skirt and a scarf in wool, and an undergarment in plant fiber. The woman and her fantastic well-preserved costume were found in a bog on Djursland in Denmark in 1879 and belong to the National Museum of Denmark. The find is 14C dated to 350–341 BCE

analytical methods for the identification of resins, oils, and balsams that can have been applied to textiles. High-performance liquid chromatography (HPLC) is used to obtain information about dyes or dye components that are not visually detectable anymore. Especially, dye analysis provides important information to the archaeological interpretation that characterize visual preferences, technology, and exchange of know-how and goods (Vanden Berghe et al. 2009). Radiocarbon dating (^{14}C) can be used for textiles from disturbed contexts or contexts where no other datable object exists (Mannering et al. 2010). Textile materials are, in general, well suited and reliable for 14C dating, although the presence of conservation substances should be evaluated before sampling. Stable isotopes can reveal facts about the nutrition (Wilson et al. 2001), while strontium isotopic analysis, which has now been adapted to fibrous material, can reveal whether the textiles are of local or nonlocal origin (Frei et al. 2008). DNA sequencing is useful for the identification of specific species, which are otherwise hard to identify, but the results

highly depend on the preservation conditions (Ørsted Brandt et al. 2011). Detection of species of animal origin can also be done with mass spectrometry-based protein sequencing (MSPS) (Schmidt et al. 2011).

The constant improvement of scientific analytical methods and the development of new ones will often inspire further analyses. Yet, most analytical tools require sampling, and it is important to develop more nondestructive methods in order to secure our common world heritage, and to improve working conditions and the scientific outcome. The importance of taking samples should be evaluated prior to analysis, and sampling should preferably be done before any contamination has occurred. Accurate documentation, preferably by photographs, of where samples have been taken is imperative.

Preservation and Conservation

The aim of an active conservation treatment is to improve the condition of the textile by trying to eliminate some of the causes of deterioration, and the aim of preventive conservation is to slow down the rate of further degradation (Skals 1996). Textiles preserved in archaeological contexts are often weak and tend to be fragile and decompose easily when exposed to changes in the climatic conditions and to touching and handling. A general rule is that dry textiles should be kept dry, wet textiles kept wet, and textiles should be stored in a cool place until the conservation treatment can commence. Adding consolidants during retrieval or biocides to avoid bacterial or fungus growth should be avoided as future scientific analyses thereby will be complicated or prevented (Gillis & Nosch 2007).

The method of drying waterlogged archaeological textiles and the questions of pretreatment with lubricating additives such as polyethylene glycol (PEG) or glycerol are factors which has been the focus of much discussion and research. Freeze drying has been evaluated as the gentlest form of drying. It can be done under vacuum or at atmospheric pressure. The discussions regarding pretreatment are somewhat unresolved because the additives in theory are soluble and the treatment reversible. Nevertheless, it can be very difficult to completely remove additives from archaeological fibers. Lubricants are often added to waterlogged wood to replace the water that has filled the empty spaces in the cell structure. Adding lubricants to textile fibers with the aim of replacing the water in the fiber structure is a different matter. The molecular structure is different from wood, and the empty spaces inside fibers are very tiny. Furthermore, the yarn structure, consisting of many fine fibers twisted together, will cause the liquid additives to run into all the air spaces and coat the fibers. Completely removing them is impossible without much damaging manipulation of the textiles. Also future scientific analyses will be unreliable. Avoiding the use of lubricants is therefore recommended (Peacock 2005).

Cleaning of textiles is an irreversible process, and the effect of cleaning on the condition of the textile must be evaluated before a treatment is chosen. Thorough cleaning of wet archaeological textiles prior to drying should be avoided as should also wet cleaning of dry archaeological textiles. Dirt can be the cause of long-term degradation but also be part of the history of the object. Likewise, the cleaning process may remove less stable substances like dyes and paint which may not be visible to the naked eye, or pollen assemblages stored in the textile, which in turn contain information about human activities and the environment.

The long-term preservation of textiles will be enhanced by good, clean, and cool storage. Fragile textiles should be supported, and shelves and drawers should be well fixed to eliminate mechanical damage. The textiles should be protected from deteriorating effects of light, heat, and high humidity, and regular monitoring for insect infestation is recommended.

Due to the fragile nature of textiles, they will inevitably degrade. Careful handling and ideal storage are preventive methods that can slow down the degradation, but they can never prohibit or stop it. Therefore, it is of utmost importance that archaeological textiles are analyzed and studied when possible. In this work, a useful tool is high-resolution digital photography which provides accurate documentation of the object and its

condition at a certain time. At the same time, this technique also opens for a wider scientific use and dissemination of these fragile objects, which reaches beyond their physical presence.

Conclusion

Textile research is a worldwide occupation which is performed within many different disciplines. This is also the case within archaeological textile research where the theoretical and methodological approach, to a large extent, depends on the research traditions in the different geographical and cultural historical areas. Research in archaeological textiles are performed by, among others, archaeologist, historians, art historians, textile designers, conservators, and crafts people, and each in their way, they are able to contribute with important aspects to the understanding of the production and use of textiles.

Textiles and fabrics are an important part of our common world heritage. Most cultures and peoples around the world use textiles for multiple purposes and the same are true for past societies. Common for this worldwide endeavor is first and foremost the wish to keep warm and comfortable, but textiles also have an important role in expressing who we are – our gender, age, family affiliation, status, occupation, religion, and ethnicity. Knowledge of textile history is hence a key to our understanding of a multitude of human issues.

Cross-References

- ► Authentication and Conservation in Archaeological Science
- ► Domestic Archaeology: Textiles of Northern Mediterranean

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Thailand: Cultural Heritage Management

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Introduction and Definition

Thailand has a long history of cultural development, but the management of cultural heritage under a protective framework did not begin until fairly recently.

It is interesting to note that throughout its history of cultural development, perceptions of the past varied from place to place depending upon influences such as religions, beliefs, and political situations. For example, Thai people as Buddhists generally perceive the past as something that represents change and becoming. It may be abandoned quickly and easily. It is expected that new things can be created, invented, or established. Thus, restoration or reconstruction of old pagodas or stupas, pavilions, and other religious buildings is not culturally wrong. Byrne (1995) brilliantly discussed the use of stupa and conservation conflicts in Thailand. Strictly speaking, the past as interpreted by King Rama VI, during his reign, was a key tool in building nationalism. He convinced the people to be proud of their culture and past (Vella 1978).

Historical Background

Regarding concern about the destruction of cultural heritage in terms of archaeological resource management in modern sense, the first protection law called "Pra Kaad Khet Rang Wat Poo Rai Khut Wat" or "Proclamation on Temple Boundary and Temple Looters" was issued in 1851 during the reign of King Rama IV (Fine Arts Department 1968). The main objective of the law was to prevent temples from being looted.

It should be noted that during his reign (1851–1868), Thailand (or Siam, as it was known at that time) was in an early stage of its development of international relations. While the king wanted to open the country to forge relationships with developed countries such as the United States, England, and France (see Symananda 1993), he was aware of the negative slide of colonization. For this reason, he revived an awareness of the past as a way of supporting nation building or developing a sense of national unity and pride (Symananda 1993).

Through his reign, a number of archaeological research projects, including the preparation of museum displays, were carried out. However, since the works were the result of the king's personal interests – not of government policies – they were conducted only by small groups of elites who worked only on royal projects. Nevertheless, the value and meaning of cultural resources were interpreted as important heritage of the nation, deserving protection.

The revival of the past was continued during the reign of King Rama V, (1868–1910).

King Chulalongkorn, as he was also called, was not only a well-known reformer but also a great scholar. He was interested in a variety of disciplines such as archaeology, ethnography, and history; wrote a number of books concerning archaeology; set up a museum hall in his palace (1874); solicited the return of stolen objects from Museum of Ethnology in Berlin, Germany (1886); established the Museum Department (1888) which was a government agency; founded the Antiquity Club (1907), which promoted the study of archaeology, art, and history; and established the Literature Club (1914) (Fine Arts Department 1989; Charoenwongsa 1994; Ketudhat 1995). It should also be noted that the first scientific excavations that were conducted by Phraya Boranrajathanin in Ayutthaya were another important point that marks the progress in archaeological heritage management.

These greatly increased public awareness of the significance of cultural heritage and eventually led to the development of culture heritage management in the country. It should be stated that in the king's sense, cultural heritage referred to everything that was old. Thus, it is not surprising that, even at the present time, there is no clear and specific definition of cultural heritage used in the legislative context. The commonly used references are ancient monuments, ancient objects, and art objects.

In 1926, 6 years after the end of King Chulalongkorn's reign, the Bangkok Museum Act was enacted. This brought about the establishment of Thailand's first public museum, the Bangkok Museum. In addition, the regulations concerning "transportation of ancient objects and art objects" were promulgated in response to the immense trafficking and smuggling of antiquities. It should be noted that the management of cultural resources mainly involved the protection of archaeological remains.

A remarkable change occurred in the time of Prime Minister Field Marshal Pibulsonggram (1897–1964). Pibulsonggram clarified his role in the government, and tried to use elements of culture as tools to cultivate nationalism and patriotism. For example, he encouraged the people to use and buy only Thai products and required them to be in – what he called "civilized" – dressing, that is, coats, trousers, blouses, shirts, hats, gloves, and ties (Suwannathat-Pian 1995: 135-151).

Furthermore, Luang Wichitwathakan (1898–1962), a prominent scholar and prolific history writer in this period, asserted in one of his studies on the ethnic history of the Tai people that the Thais were the most ancient race, instead of "one of the most ancient" (Charoenwongsa 1994: 1). Kasetsiri (1979: 166-168) interpreted Luang Wichitwathakan's history as an ideological weapon of the new ruling elite, particularly the military, to seek justification for ruling the country.

During Pibulsonggram's government, a large number of acts, regulations, and laws that applied to cultural heritage were passed; the most effective ones were the National Culture Act of 1940, the 1940 Council of Culture, and the 1945 Act of the Ministry of Culture. In 1979, when General Kriangsak Chamananda was the Prime Minister, the Office of the National Culture Commission was established. Later, Prime Minister General Prem Tinsulanonda announced the national culture policy. Most recently, under the administration of Chuan Leekphai's cabinet, the government declared the year 1994 as the Thai Culture Promotion Year to promote public awareness of the value of Thai traditions and customs. This nationwide campaign dealt mostly with nonmaterial aspects of the culture such as beliefs, ideologies, religion, and folklore. In regard to the management of archaeological resources, the Fine Arts Department's Office of Archaeology, Ministry of Culture has taken responsibility since 1926.

Key Issues/Current Debates

The Administration of Cultural Heritage

The "official" management of cultural heritage in Thailand is a government duty operated by the two major departments of the Ministry of Culture: the Fine Arts Department and the Office of Cultural Promotion. The first organization is mainly responsible for tangible heritage

preservation and management, particularly through the administration by the two offices of the Fine Arts Department, the Office of Archaeology and the Office National Museums, while the latter is largely taking care of intangible heritage. As for the tangible or physical cultural heritage, the Office of Archaeology is "the key agency working on the restoration of ancient monuments and archaeological sites. It is also responsible for the preservation and investigation of archaeological remains for the benefit of the nation, for the sake of the study of the nation's history, and for the perpetuation of the cultural heritage of the nation" (Fine Arts Department 1990: 24).

Administratively, the Office of Archaeology is one of the ten agencies of the Fine Arts Department in the Ministry of Culture, which is the only organization responsible for the management of cultural resources in the country. The Office of Archaeology was first formed as a club in 1908 – the Antiquity Club. It was gradually reformed and its status was later changed from a private club to a government agency. In its administrative structure, the Office of Archaeology is divided into seven sections: General Affairs, Planning and Evaluation, Research, Restoration and Preservation of Ancient Monuments, Preservation and Restoration of Mural Painting and Nonremovable Sculptures, Control and Maintenance, and Historical Park Projects.

Furthermore, according to the law, the Office of Archaeology is given full authority to grant permission or reject proposals for undertaking archaeological investigations on public land. In 1995, the Office of Archaeology was merged with the Office of National Museums into the Office of Archaeology and National Museums but was later separated as an individual agency under the umbrella of the Fine Arts Department as is the Office of National Museums.

Broadly speaking, there are two major groups of archaeologists in Thailand. One group, whose work is mostly concentrated on restoration, preservation, and inventory of archaeological sites, districts, and ancient cities, is associated with the Fine Arts Department (FAD), while the other is associated with academic institutions such as universities and colleges. In response to the Historical Park Projects, a great number of surveys of archaeological sites and monuments by FAD's archaeologists during the past ten years were primarily and specifically designed to rescue major archaeological sites and then develop them into "historical parks." Charoenwongsa (1994: 2) remark: "administrators/managers enjoy themselves more towards restoration of ancient monuments. The situation has not changed very much. . .." This seems ironical because Musigakama (1995: 38), a former director of the Office of Archaeology, stated that the Office of Archaeology is responsible not only for survey, maintenance, restoration, and preservation of archaeological heritage but also for scientific study of archaeological records.

After joint expedition projects with foreign counterparts during the 1960s, the Thailand's Fine Arts Department initiated many mobile projects to counter looting activities in the 1970s. Under the direction of Pisit Charoenwongsa, the Northeast Thailand Archaeological Project was established in 1975 out of its predecessor, the Ban Chiang Excavation Project (a joint effort between the Fine Arts Department and the University Museum, University of Pennsylvania which was carried out under the coordination of Pisit Charoenwongsa and the late Dr. Chester F. Gorman). With the success of the Northeast Thailand Archaeological Project, the Office of Archaeology (then called as Archaeology Division) created another three regional – northern, central, and southern Thailand – archaeological projects.

Following that, regional field projects were brought under the central administration of Thailand Archaeological Project (TAP). As director of TAP and the Research Section of Archaeology Division, Pisit advised his younger colleagues to choose among themselves their own project directions. In 1980s, Khemchart Thepchai, Tarapong Srisuchart (current director of the Office of Archaeology as of 2012–2013), Bovornvate Rungruchee, Amphan Kijngam, Sathaporn Khanyuen, Sayan Pricharnchit, and Niti Saengwan were

directors of these regional projects. To enrich their experiences, some of them moved or rotated from one project to another.

In the 1980s, the Thailand Archaeological Projects and its regional field projects produced several hundred site survey reports for the first time and with that came a large data collection which resulted in about 50 publications in book form during the late 1980s and beginning of 1990s.

There are both pros and cons in the cooperation between western and Thai archaeologists. Many good elements brought by western colleagues include the concept of multidiscipline/problem-oriented research programs and systematic study of archaeological remains. However, some projects caused misunderstandings and negative feelings between participants, due largely to differences in culture/traditions and the self-centeredness of certain individuals.

Legislation Relating to the Protection of Cultural Heritage

As mentioned earlier, the first protection law issued in the reign of King Rama IV was short lived and was limited to the protection of royal temples. In 1934, the first comprehensive legislation was drafted and was later amended three times – in 1943, 1961, and 1992. The last amendment was announced in the Royal Gazette on March 29, 1992 in the reign of the present king. This has been called Ancient Monuments, Ancient Objects, Art Objects and National Museum Act of 1961. In addition, a number of separate regulations such as the Act of the Ministry of Education and the Announcement of the Fine Arts Department have been occasionally issued in line with the Act of 1961 (for details, see Fine Arts Department 2005).

The 1961 Act, together with additional amendments and regulations, has broad coverage: it includes definitions of specific terms, regulations, permit applications, ownership, lists of endangered sites, national museum, and illegal trafficking, transportation of ancient objects, and penalties.

Unlike such other countries as the United States and Australia, Thailand has no particular law on burial sites, underwater archaeological sites, and properties belonging to particular ethnic or indigenous peoples. According to the act, any objects buried or left on public land belong to the nation.

Public Education

Public interest in cultural heritage is powerful, as the public becomes the driving force behind efforts to conserve the past. In Thailand, the first formal center for public education in archaeology is the Faculty of Archaeology, Silpakorn University. This institution has the only center of training and recruitment of archaeologists for over a decade. Most Thai archaeologists have been trained at this institution. The courses focus mainly on Thai archaeology and a basic understanding of archaeological practices, and the degrees offered are B.A., M.A., and Ph.D. It was as recent as just in 2006 that an undergraduate course entitled "Cultural Resource Management" was included and taught for the first time in Thailand by the faculty members and experts from other government and private organization throughout the country at Silpakorn University Department of Archaeology. An M.A. program in Cultural Resource Management at Silpakorn University has been offered since 2007, and it has been well received, judging by the increasing number of students.

Interestingly, during the past few decades, many other public schools, colleges, and universities, for example, Thammasat University, Chulalongkorn University, Khon Kaen University, Chiang Mai University, Srinakharinwirot University, Burapha University, and several other colleges (mostly former teachers' colleges which are now known as Rajabhat University Complexes), have developed archaeology programs and have introduced archaeology courses in their curriculum, but none offers degrees in archaeology. Archaeology programs have yet to be introduced to the elementary and secondary schools. Therefore, school children learn very little about Thai history and culture in schools.

Besides formal education, knowledge about the past has been transmitted to the public

through various kinds of nonformal educational mediums. Museums are one type of nonformal education centers; throughout the country, there are more than 30 public museums operated by the Office of Archaeology and National Museum. In 1995, for example, the Thai government granted a budget of about 2 billion baht (about $80 million) to build provincial museums throughout the country.

In addition to the government-owned museums, there are a number of private museums and public organizations such as the Museum of the Siam Society, the Ancient City Co. Ltd, the Jim Thompson House, Princess Maha Chakri Sirindhorn Anthropology Centre, Museum Siam, and the Museum of Prehistory in Siriraj Hospital of Mahidol University. There are also groups of archaeological volunteers who occasionally organize field trips to archaeological and historic sites around Thailand, as well as neighboring countries such as Laos, Burma, Cambodia, and Vietnam. It is an indication that archaeological study tours are now becoming popular in Thailand. It should also be noted that during the past 5 years, there has been an increase in numbers of public magazines promoting natural and cultural tourism in Thailand and neighboring countries.

Major Contemporary Problems

Major problems concerning the management of archaeological heritage in Thailand are basically similar to those found in other countries in the world.

Looting

Looting is probably a never ending problem in Thailand. Through time, many archaeological prehistoric and historic sites have been illegally unearthed. In many cases, the looters are asked by middlemen who are merchants from Bangkok to hunt for antiquities. The ideal sites for looting are prehistoric sites in central and northeastern Thailand where they can easily gain access and where the sites cover large areas. The artifacts hunted in clued pottery, stone bracelets, beads, and bronze weapons. Surprisingly, a man in a team of looters confessed, when arrested, that he learned how to dig by observing archaeologists while they were at work. Another woman in the same team said that they have no choice but to hunt for antiquities for money because they were poor and did not own any pieces of land (Pumathon 1994: 28). In the case of historic sites, the favored artifact classes would be Buddha images and architectural decorative elements (e.g., stone lintels, wooden windows, and doors of Buddhist monasteries).

Government Officials Versus Local People

This problem arises mostly in the context of restoration of monuments which are currently used as shrines or sacred sites. This may be due to different understanding of the value of archaeological resources between government officials and local people. For example, most recently, there was a movement of people in Lopburi Province to protest the restoration of an ancient monument in the city. Archaeologists from the Office of Archaeology wanted to dissemble the monument and restore it by the so-called "anastylosis" method, but the people in the province wanted to know why the monument had to be taken apart first. They were very concerned about the destruction of the monument because it has great spiritual value for the people in the province.

In another case, the Office of Archaeology reshaped a giant pagoda, Wat Chedi Luang, in Chiang Mai, northern Thailand, without enough investigation and public hearings. The restoration resulted in the deformation of a pagoda which disappointed the locals and the scholars so much that they called a meeting to stop the work (Suksawasdi 1993).

There are few well-trained archaeologists working in government agencies, most of them received only basic training and have limited experience in doing archaeology. They often face problems because, many times, they are assigned to carry out work for which they are not trained.

Problem of Contract Work

At present, the preservation and restoration of archaeological remains and historic buildings is

in the hands of technicians, rather than archaeologists. Archaeologists should research essential informational before the restoration begins, as a practical and academic approach, but often that task is left to the technicians. Probably due to the lack of sufficient evidence, a clear explanation of why this problem still remains is impossible. It is strongly recommended that a code of ethics of practitioners must be prepared. These technicians are lacking in basic archaeological knowledge, and they are even lacking in appreciation for the value of cultural resources. They just want to finish their work as soon as possible because of constraints of time and money. Thus, a lot of valuable information has been lost. For example, in the restoration of an ancient ruin in Ratchaburi, workers of a contract company reconstructed the ruin by first disassembling it and then reconstructing it. Unfortunately, the workers did not know what the original shape of the monument had been. The result of their work is archaeologically wrong, and the monument looks very ugly.

Different Perception of the Value of Cultural Heritage

Conflicts between cultural heritage practitioners and the local people have occurred due to different understanding of the value of cultural resources. Archaeologists of the Office of Archaeology and cultural heritage practitioners tend to focus on the informational and economic value of the archaeological resources, while the local people consider their spiritual or symbolic value. A good example is a small simple hillock near a temple in a village of Nakhon Phanom Province. Outsiders may view it as just a normal natural setting in the area, but for people in the village, it is a "sacred place" according to their myth. Annually, the villagers perform religious rites and celebrations at the place which has also been an important meeting area between people from Laos and Thailand (Vallibhotama 1992: 211). My recent pilot research (Lertcharnrit & Niyomsap 2008), conducted in a remote village where archaeological site museum is located in central Thailand, on indigenous perceptions and knowledge about archaeology revealed that when asked what archaeology is, the majority of respondents (41 %) perceived that archaeology is human skeletal remains (see Table 1).

Thailand: Cultural Heritage Management, Table 1 Public knowledge and perception about archaeology in a Thai village in central Thailand when asked "what do you think of when you hear the word "archaeology?" (N = 85)

Archaeology in villagers' perceptions	Percentage of answers
Human skeletal remains	41.18
Artifacts	23.53
Ancient history/the past	17.65
Ceramics/ancient ornaments (beads, bracelets)	14.12
Ban Chiang[a]	9.41
Ban Pong Manao[b]	2.35

[a]Ban Chiang is a widely known prehistoric site in the northeast because it is a cultural world heritage site
[b]Ban Pong Manao is an Iron Age site where an archaeological site museum is located and also the name of the village I conducted the research

Future Directions

The "professional" management of cultural heritage in Thailand has long been developed, and it is still in need of further development. It needs a lot of change especially in term of legislation and policy. To reduce controversy, the protection law should be open for public participation, providing opportunity for the public to offer input into decisions and actions.

Cooperation between the Fine Arts Department and other private and government agencies/organizations and public audiences, on both local and national levels (i.e., the Ministry of Agriculture, Ministry of Education, Department of Highways, Department of Religious Affairs, Royal Irrigation Department, Amateur Cultural Heritage Conservation Clubs, Subdistrict Administration Organizations, village heads, provincial governors, etc.), will help upgrade the quality of the management program.

The Fine Arts Department's Office of Archaeology desperately needs to build nationwide and

worldwide networks in the coming years, while a strong public education program should be considered as part of an essential strategy to change public attitudes toward the past.

It should be remembered that the people who live near the sites are the best protectors of cultural resources. Once people have recognized the value and meaning of cultural resources, protection and management will be more successful.

Lastly, in the globalization era, the Fine Arts Department's Office of Archaeology should also build global alliance with international organizations and professionals, not only the UNESCO and ICOMOS which Thailand is a member but also other nonprofit organizations located in southeast Asian countries, such as the Heritage Watch in Cambodia, and in broader regions of the world (e.g., the Getty Foundation, the World Archaeological Congress, the Southeast archaeological Center). In addition, local and public participation and cultural education programs must be developed as well.

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The Guianas: Pre-Columbian Heritage

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Introduction

Up to recently, pre-Columbian coastal Guianas were almost always forgotten in any study on the

The Guianas: Pre-Columbian Heritage, Fig. 1 Map of the Guianas indicating the coastal Guianas that extend on five countries (Drawing Rostain)

prehistory of Amazonia. In most publications, only the archaeology of the valley of the Amazon was presented, leaving away all the lands north of the Guianas watershed that were completely ignored.

Coastal Guianas are located north of the Guianas watershed line where rivers do not go from north to south toward the Amazon River but flow to the north toward the Atlantic Ocean. This concerns three entire countries that are Guyana, Suriname, and French Guiana and three states that are Delta Amacuro y Bolivar (partially) in Venezuela and Amapá in Brazil (Fig. 1). Remarkable progress and discoveries made these last years in the archaeology of the Guianas have changed the vision on the cultural developments and the role of this territory during pre-Columbian times. Archaeologists are now aware of the importance of the northern part of the lower Amazon, especially the Amapá State, as a crucial cultural cradle, but also of the extraordinary pre-Columbian human developments in the Guianas and particularly along the coast.

Comparing to the Andean societies or even to the cultures of the Pacific coast, many persons believe that there is no prehistoric monument in the Guianas or in Amazonia. It is common to ear that archaeological sites of this region are only constituted of some pottery sherds, few lithic artifacts, and many postholes. However, if it is true that pre-Columbian did not built architecture of stone, they did produce all kind of monumental structures. The most famous are obviously made on rocks or with stone as the petroglyphs, the rock paintings, and the geoglyphs but also the grinder stones that are so frequent on the Guianas. Because the scarcity of stone in the region, pre-Columbian Indigenous also made many earthworks that can be more discrete at a first glance and difficult to see on the ground, so they were unrecognized for a long time. They are raised fields, residential mounds, causeways, canals, and ditched hills.

Finally, it is impossible to ignore one of the main heritages left by pre-Columbian people that is an important part of the vegetational composition. During more than 10,000 years, hunter-gatherers, horticulturalists, and agriculturalist had modified plant species by inbreeding of species, favored plant associations, and created vegetation composition in specific landscapes. An important part of the actual rainforest results from millennia of vegetation manipulation and transformation by the Indigenous.

Key Issues

Pre-Columbian Stone Monuments Heritage

Stone monuments are the most famous pre-Columbian remains known in the Guianas because of their "artistic" value. Four different types of rock sites can be distinguished: petroglyphs (Fig. 2), rock paintings, geoglyphs, and grinder stones.

Petroglyphs are common through all the Guianas but, because the scarcity of investigations, only some of them are known and studied (Dubelaar 1986; Williams 2003). They are found either inland or on the coast, with a preference in the proximity of water but not systematically and almost always close to a hill (Mazière 2008). Anthropomorphic and zoomorphic figures are very frequent. First ones are often with raised arms and spread legs or just represented by a head with eyes and mouth (Fig. 3). Recognizable animals are snakes, fishes, birds, monkeys, caimans, felines, etc. (Fig. 4). There also are many geometric figures. Techniques of manufacture are varied including incision, grooving, staking, and grinding.

As in other parts of Amazonia, rock paintings are more rare in the Guianas than petroglyphs. They are very common in Venezuela but only few sites are known in the Guianas: one in Suriname and another one in French Guiana. The reason can be the destruction of the paintings by the weather and the acidity.

Various monuments made of stones are recognized in the Guianas (Boomert 1981). They can be erected or lay on the ground according to a certain distribution. The most impressive megalithic groups are the stone alignments found in the savannas of Rupununi in Guyana, Sipaliwini in Suriname, and in Parú and Amapá in Brazil. They are very large stand up slabs, eventually slightly modified by percussion, disposed in line, circle, or in triangle. Megalithic sites on the central coast of Amapá are generally found on hills, which are characterized by large panoramas (Meggers & Evans 1957; Rostain 2011). They can be far, up to 10 km, from the closest rock deposit so it had been a substantial work to bring enormous stone slabs to the site. They consist of vertical granite slabs that are arranged in lines, circles, or triangles (Fig. 5). Recent excavations made in the megalithic site of Rego Grande demonstrated a funerary use but also an astronomic function (Cabral & Saldanha 2009). Alignments of slabs laid on their face are found on the rocky top of granitic inselbergs that are free of vegetation and with open panoramas. The most diverse assemblages are located on the Mitaraka sugarloaves, at the southern boundary between Brazil and French Guiana (Hurault et al. 1963). They can be arranged in line or in such a way to form zoomorphic figures, similar to those of the petroglyphs, that have been interpreted as lizards, turtles, or human beings.

Hundreds of grinder stones have been found in the Guianas. A grinder stone is the remain of the result of the grinding and the polishing of stone tools preforms to make axes, chisels, points, etc. (Fig. 6). They are located along the rivers and small creeks and on the coastal outcrops in French Guiana. These marks can be classified in five types (Rostain 1994). The "cupule" is a small circular cavity. The "cupule with bump" is similar to the first one but it presents a central protuberance. The "almond" is an irregular basin, vaguely oval or rectangular, and not deep. The "ship's hull" is a wide and deep spindle-shaped basin. The "groove" is a deep and straight spindle-shaped cavity, with triangular or rounded profile. Different types of grinder can occur on the same rock outcrop. Sometimes, two types are combined that is mostly one, two, or three grooves inside a ship's hull. This last one was made first and reused after to make the grooves. The four first types result from the shaping and grinding of the sides of the tool and the sharpening of the cutting-edge. The groove is made shaping of the edges (and not by the sharpening as it is often said). Ship's hulls are much more common inland than cupules but they are absent on the coast that could indicate technical differences. Ship's hulls result from a short up-and-down grinding while cupules and almonds are made by a circular movement.

Pre-Columbian Earthworks Heritage

Pre-Columbian groups were also landscape makers because they built a variety of

The Guianas: Pre-Columbian Heritage, Fig. 2 Drawing of a petroglyph by Morissot in 1886, Middle Orinoco, Venezuela (Morisot 2002)

The Guianas: Pre-Columbian Heritage, Fig. 3 Petroglyph of the Carapa, near Kourou, central French Guiana (Photo Rostain)

The Guianas: Pre-Columbian Heritage, Fig. 4 Petroglyph of Pascaud, Cayenne Island, French Guiana (Photo Rostain)

earthworks, particularly along the Guianas coast (Rostain 2010). They are raised fields, residential and funerary mounds, causeways, canals, and ditched hills.

Raised fields are agricultural small earth mounds with two main functions: to secure a dry location for cultivation in flooding areas and to concentrate fertile material (Fig. 7). Thousands of pre-Columbian raised fields surrounded by ditches are located in the coastal zone of the Guianas. They are mainly attributed to Arauquinoid populations, which occupied a territory of 600 km long between Guyana and French Guyana from CE 650 to 1650. Raised fields are classified on the basis of their size, shape, and topographical location. This last criterion is indicative of differences of adaptation to the hydrographical conditions and to the nature of the soil. Four types of raised field are distinguished:

- Ridged fields are found in the three Guianas. They are elongated and narrow, measuring between 1 and 3 m in width, 5–30 m in length, and 30–80 cm in height. They take the shape of the slope between the sandy ridges and the swamp. Their distribution can be related to the altitude and the water level. At the foot of the Quaternary sand ridges, elongated raised fields are positioned in the direction of the slope to allow for easy drainage. Near the top of the sand ridges, the ridged fields are arranged perpendicular to the slope for optimal water retention.

The Guianas: Pre-Columbian Heritage, Fig. 5 Megalithic site of Rego Grande, Northern Amapá, Brazil (Photo Rostain)

The Guianas: Pre-Columbian Heritage, Fig. 6 Grinder stone with some stone axes on a beach of Cayenne Island, French Guiana (Photo Rostain)

- Large raised fields range in size from 2 to 5 m diameter and from 30 to 100 cm height. These raised fields are rounded-off rectangular to square (Fig. 8). Their size ranges from 3 to 4 m wide, 4–30 m long, and 50–100 cm high. These large raised fields are located in the most flooded areas and their sizes are smaller in the deepest swamps.
- Medium-sized raised fields are round, square, or rectangular. Their size ranges from 1.5 to 3 m diameter and 20–30 cm high. They occur in large clusters.
- Small, rounded raised fields range in size from 50 to 100 cm diameter and in height from 20 to 50 cm. They cover the entire surface of the seasonally flooded savannas, which become completely dry in August.

Along the French Guiana coast, raised fields generally are arranged in rough squares and, often, the largest are located in the deepest and wettest areas. Raised fields were built and disposed according to the differences of water level during the two annual seasons. In fact, water is the main physical constraint. The location of raised fields between the high and low areas suggests a precise selection by the Indigenous.

The Guianas: Pre-Columbian Heritage, Fig. 7 Raised field in a flooded area, Galibi area, eastern Suriname (Photo Rostain)

The Guianas: Pre-Columbian Heritage, Fig. 8 Raised fields along slope of sand bars, Karouabo area, central French Guiana (Photo Rostain)

However, this was not always enough to prevent drowning of the raised fields. For that reason, it was necessary to surround some groups of raised fields by a belt ditch. In some cases, the checkerboard distribution of the ridged fields also reflects the need to control the water level.

In some areas, the whole surface of the lower area is covered by raised fields, and in other areas, only the edge of the sandy ridges has raised fields. Six main categories of organization and types of raised fields can be distinguished from west to east in the Guianas coast. In eastern Guyana, elongated raised fields are distributed perpendicularly to a river. In western Suriname, complexes are made of small groups of elongated raised fields. In eastern Suriname, up to the Mana River in French Guiana, parallel and ridged fields are in flooded depressions. Between the Iracoubo and Sinnamary rivers, savannas are covered by a large number of rounded medium-sized raised fields. Between the Sinnamary and Kourou rivers, rounded or square raised fields associated

The Guianas: Pre-Columbian Heritage, Fig. 9 Hertenrits artificial clay mound, Arauquinoid culture (CE 650–1250), western Suriname (Photo Geisjkes c. 1950)

with ridged fields are located in the savannas and along the edge of the sandy ridges. Between the Kourou River and Cayenne Island, rounded or square raised fields cover the savannas like the area between the Iracoubo and Sinnamary rivers. These variations can represent cultural, chronological, or technical differences.

Artificial residential/funerary mounds are associated with raised-field complexes in various countries of South America like in the Llanos of Apure, in Venezuela, where several Arauquinoid mounds and raised fields have been found. Between the Berbice River in Guyana and the Coppename River in Suriname, sandy ridges are absent, so local people had to build rounded clay mounds above the water level to erect their villages. At least, nine mounds were erected on a landscape where fresh, brackish, and salt waters met, but other possible artificial mounds have been reported in this area. c. CE 300, a Barrancoid group raised two mounds. From CE 650, Arauquinoid communities built progressively layer-by-layer new mounds that they occupied up to CE 1250. Their territory extended to cover a region some 210 km long and 25 km wide.

Hertenrits is the largest of the mounds, with a raised area estimated at 4 ha (Fig. 9). It measures 200–320 m in diameter and 2.5 m high. The area around the mounds was inundated with freshwater at the end of the wet season. Humans modified some water lines to connect them or to improve natural drainage. A ditch of 20–100 m wide surrounds the Hertenrits mound. Five wharves of 20 m long and at least 1 m deep are disposed on the periphery to receive canoes. Two smaller satellite mounds were built diametrically opposite, equidistant from Hertenrits: Wageningen-1 is 4 km to the east and Wageningen-3 is 3 km to the west. Shallow seasonally inundated canals run radially, connecting the Hertenrits mound to raised fields and to the two other mounds. These canals were used as pathways during the dry season and as waterways during the rainy season, strongly suggesting that the three mounds were occupied at the same time. The inhabitants of Hertenrits organized and managed their territory in a precise and specific manner.

It is important to note here that long before, other pre-Columbian people have developed other solutions to inhabit flooded zones. Between 6800 and 3550 BP (Williams 1992), the fisher-gatherers of the Alaska culture, in western Guyana, raised the floors of their settlements to live close to the shore (Fig. 10). They set aside the shells of marine resources they consumed, gradually forming enormous mounds above the flood level. These *sambaquís* are evidence of the importance of marine shellfish for these populations, who appear to have been attracted by richness of the fauna and flora.

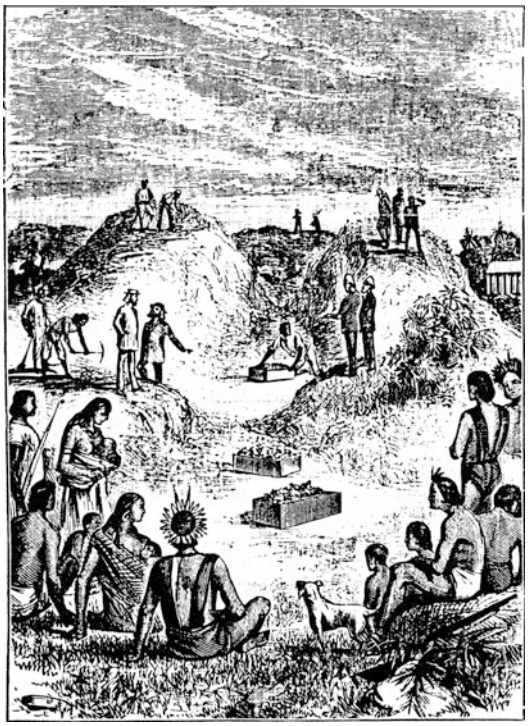

The Guianas: Pre-Columbian Heritage, Fig. 10 Waramuri shell mound during the excavation in the nineteenth century, western Guyana (Brett 1868: 430)

Causeways are frequent near Arauquinoid sites of the Llanos de Apure in Venezuela, but not so common in the Guianas. Some raised pathways have been found in Suriname and French Guiana. They are oriented in a north–south direction and they generally cut through the swamps, connecting two west–east sand ridges or one sand ridge to the shore. They can reach up to 600 m long and 8 m wide.

Ditches made by pre-Columbian groups are difficult to recognize because, after several centuries, alluvium and vegetation tend to obliterate them. Moreover, Creole farmers had also made small canals during the twentieth century, which might be confused with pre-Columbian ones. Stereoscopic interpretation of aerial photographs also shows that there are numerous water lines, which do not follow the natural flow and must have been made by people. Ditches were made to improve water control. Small and curved waterlines perpendicular to the direction of the natural water flow enclose groups of raised fields. They are relatively narrow at their extremities and generally form a pond at the center. These ditches prevented too much water near the raised fields during the rainy season. They also most likely served as water reserves during the dry season. Straight and regular canals were used for the drainage of excessive water and, perhaps, as water tanks or fishponds. They often connect archaeological settlements on sand ridge and raised-field complexes. Some of them are exceptionally long and could serve for canoe travel through the flooded savannas. Ponds were sometimes dug near a sand ridge or in the middle of a swamp. They are generally rounded or irregular. It is probable that they were used as water tanks and fishponds.

During the first millennium CE, specific sites locally named "montagnes couronnées" (literally "crowned hills") appeared in French Guiana, northern Amapá in Brazil, and eastern Suriname. They can be made by trenches surrounding the top of a hill or ditches closing a spur on a riverbank. They are linear, oval, or round with a diameter between 100 and 300 m. Ditches measure 5–15 m wide and 1–3 m deep. Some entrances can be made by embankment through the ditch. Few pottery sherds, very eroded and not decorated, are generally found in these sites. Most of the sites are dated between the first centuries of our era and the thirteenth century (Mazière 1997; Versteeg 2003). Fortification purposes or ceremonial function have been ascribed to these sites.

Future Directions

Guianas are not the favorite spot for tourism so little attention has been given to pre-Columbian remains. Although archaeology still is relatively incipient in the Guianas because scientific programs have been conducted only for 30 years, it is already possible to draw up a panorama of the pre-Columbian occupation of this huge region (Rostain 2008). For the last decade, Guianas has known a remarkable increase in archaeological investigation, especially by the realization of large projects. On the contrary, very few actions

have been carried out to preserve archaeological heritage. Governmental institutions are missing or have neither power, nor fund, to protect this patrimony. Even a simple inventory of stone monuments and earthworks as it is presented in this entry has never been done at the scale of the five Guianas because of patrimony politics and investigations were very nationalistic without consultation with neighbors. There is also no real desire to promote Indigenous past in these countries that prefer to put a slant on historical remains. The result is that pre-Columbian heritage is gradually destroyed by neglecting and vandalism.

To finish, there is a curious phenomenon acting on the preservation of certain archaeological remains. Leaf-cutter ants (*Atta* species) are generally considered as one of the main plagues for rainforest agriculture. These voracious insects are a nuisance for humans because they defoliate crops and destroy plantations. However, the same ant also permits the preservation of raised fields. Ants act as "central place foragers" and as "mound builders" (McKey et al. 2010). They construct deep nests, bringing subsoil to raised-field surfaces. Ants move materials to the raised fields where they set their nest. *Acromyrmex* workers carry large quantities of plants to the nest to feed their fungal symbiont. Moreover, transport of material to surface of abandoned raised fields thus at least partially compensates losses due to erosion and maintains the mound height. By reducing the erodibility of raised fields and by transporting materials to them, thereby compensating erosional losses, communities of ecosystem engineers on raised fields maintain the concentration of resources (and organisms) on raised fields and their depletion in the surrounding matrix. In conclusion, ecosystem engineers are responsible for the preservation of pre-Columbian raised fields up to nowadays. They are ants, earthworms, termites, and even plants. Each of them played a function more or less important.

It is noteworthy to outline that after their abandonment by human social mammals, raised fields were managed and preserved by natural social insects. In the Guianas, Nature tends to preserve Culture.

Cross-References

- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Geoglyphs
- ▶ Landscape Domestication and Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Rostain, Stéphen
- ▶ South American Rock Art
- ▶ The Guianas: Pre-Columbian Heritage

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Theoretical Archaeology Group (TAG)

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Brief Definition of the Topic

A conference that is known as much for its social life as its cutting-edge theory, the Theoretical Archaeology Group (TAG), is a successful and idiosyncratic institution in the prime of life. The organization has a distinctive and somewhat anarchic ethos, consisting of an annual conference that meets once a year, with no membership requirements or dues. The meeting moves from one university to another annually (the Republic of Ireland is included) and is organized by volunteers from the host institution. Efforts are made to keep costs down for each meeting and to provide cheap or free accommodation for students, so that the conference is affordable and available to all. Each conference is run entirely by the sponsoring institution, so that each one differs according to the priorities and interests of the department that hosts it. Representatives of institutions that have previously hosted TAG gather for an informal committee meeting at the annual conference. This committee hears pitches and makes decisions as to where the conference will next be held. In the UK TAG is now in its fourth decade of meetings, with attendances generally in the range of 400–600 participants, including some from overseas. TAG has produced healthy offspring, including Nordic TAG, held biennially in Scandinavia, and TAG-USA, which began in 2008 at Columbia University. Other conferences that have been influenced by the TAG model include the Theoretical Roman Archaeology Conference (TRAC) and, most recently, STAG, the Scottish Theoretical Archaeology Group and TAG Turkey, held at Ege University, İzmir in May 2013. In this entry we will provide a brief overview of TAG's history and development in the UK and the USA.

TAG emerged at the end of the 1970s, in a search for a British venue to discuss archaeological theory. A conversation between Colin Renfrew, then at Southampton University, and Andrew Fleming at Sheffield led to the formation of a Sheffield-Southampton colloquium. Its third meeting, held in Sheffield in 1979, was open to all, and from 1981, when it was hosted by Reading University, the conference started its current pattern of being held at a different sponsoring university every year (a more detailed history may be found in Fleming & Johnson 1990). TAG has developed into a venue where

a postgraduate student can give his or her first academic paper and also mingle with established academics on the dance floor or in the conference room. The conference aims to open a productive space for dialog, with the emphasis on the theoretical and political implications of a topic. Sessions are kept open to encourage participation and to foster a diverse range of perspectives. Since the late 1980s the conference has been something of a nursery for post-processual and interpretive archaeologies (e.g., Bintliff 1991 and response by Thomas & Tilley 1992). It is sometimes said that TAG participants can become obsessed with the quest for new theoretical perspectives (Chippindale 1990: 464), but then again, TAG is a great place to get a sense of the questions that are animating the field at any particular moment; its agenda is driven by its participants. The British meeting has seen less intense debate in recent years, perhaps because of the growth in the number and size of sessions. Experimentation is not restricted to the topics of papers; in recent years participants have tried out a variety of formats and venues for their contributions. Memorable sessions include the video installation "Neolithic Stories Untold" at the 2003 conference at the University of Wales Lampeter (Van Rossenburg 2004: 56), a poetry poster session on landscape and archaeology at Sheffield TAG in 2005, and an "intervention" organized by Ian Russell and Andrew Cochrane at York TAG in 2007. This included the placement of 150 replica Cycladic figurines around the conference buildings and grounds (http://www.iarchitectures.com/irac2.html#show). Reactions varied from enthusiastic collection of the objects to nonplussed indifference.

The US TAG was started in 2008 at Columbia University, where it was imported by two British archaeologists Brian Boyd and Zoë Crossland. Although the US TAG was modeled on the British conference in terms of ethos and organization, it has gone on to develop its own character and theoretical interests. British TAG has a strong core focus on British and European prehistory, whereas the US conference deals with a more eclectic range of regions and time periods and is quite interdisciplinary in feel. Sociocultural anthropologists, geographers, philosophers, historians, and social theorists are regularly included in sessions, whether as discussants or presenters. TAG-USA also has a substantial proportion of international participants, with around 40 % coming from outside the USA at the first conference at Columbia University. Severin Fowles' Thing Theory session from the same conference gives a sense of the feel of TAG in the USA. This session included participants from the USA, Canada, Europe, and South America and counted students and established scholars among the people involved. Participants came from a range of backgrounds, including contributions from outside archaeology, such as those by Jane Bennett and Brian Larkin. The session also had an associated art exhibit entitled "nomadic dresses," a project by Mariana Frochtengarten that used the circulation and modification of clothing between artists to explore the role of material culture in social interactions and exchange.

Links to all the conference websites (some no longer in operation unfortunately) can be found on Antiquity's website (www.antiquity.ac.uk/tag/index.html), which also lists publications arising from the conference, as well as articles about TAG, many of which are affectionate and critical reviews of particular annual meetings. There is also a US website that provides links and information about TAG in the USA (www.tag-usa.org). Pamela Jane Smith has started to record and archive the oral history of TAG, carrying out interviews with archaeologists who were involved in its early days (http://www.arch.cam.ac.uk/personal-histories/tag.html), and recently archaeologists have started to study the history of the conference itself as a means to track the changing profile of archaeology over the years (Gaydarska 2009).

Cross-References

- ▶ Archaeology and Politics
- ▶ Critical Theory in Archaeology
- ▶ Interpretation in Archaeological Theory

▶ Practice Theory in Archaeology
▶ Processualism in Archaeological Theory
▶ Renfrew, Colin

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Thompson, Homer

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Basic Biographical Information

Homer Thompson (1906–2000) is best known for his formative contribution to the excavation of the civic center of ancient Athens. He was born in Ontario and raised in British Columbia, the son of classically minded parents. He received his B.A. and M.A. in Classics from the University of British Columbia, Vancouver, in 1925 and 1927, respectively, and his Ph.D. from the University of Michigan in 1929. That same year he collaborated with the Greek archaeologist Konstantinos Kourouniotes on an investigation of the Athenian Pnyx. On the recommendation of Benjamin Dean Meritt, Thompson was appointed one of the first two fellows of the American School of Classical Studies at Athens' excavations in the Athenian Agora, in 1931. At the Agora he met and married another fellow, Dorothy Burr, a prominent archaeologist in her own right.

Major Accomplishments

From 1933 to 1947 Thompson held the position of Professor of Classical Archaeology at the University of Toronto, concurrently acting as an assistant curator of the classical collection at the Royal Ontario Museum. This term was interrupted by World War II, during which Thompson served as an intelligence officer with the Royal Navy, stationed at Bari. Visiting Athens in 1944, during the Greek Civil War, he was briefly held captive, but talked his way out and parted from his captors on friendly terms. He was appointed field director of the Agora Excavations in 1945, a position he held until 1967. In 1947 Thompson became Professor of Classical Archaeology at the Institute for Advanced Study in Princeton, a position he retained for over 50 years – as emeritus from 1977 onward – until his death in 2000. He received the Archaeological Institute of America's Gold Medal for Distinguished Archaeological Achievement in 1972.

Thompson devoted his career to the study of the Athenian Agora and played a tremendous part in the formation of its current physical and intellectual state. He authored numerous scholarly articles as well as two monographs, including 1972's *The Agora of Athens* (with R. E. Wycherley). He supervised the publication of the first 11 volumes of the Agora excavation series, as well as a series of Agora Picture Books, designed to be easily accessible to a general audience. Thompson was insistent that archaeologists had a responsibility to the public to present and publish the results of their work. Above and beyond his own publications, Thompson's great accomplishment was in bringing together and overseeing a large and diverse group of scholars for over 20 years.

Cross-References

▶ American School of Classical Studies at Athens (ASCSA)
▶ Epigraphy, Greek
▶ Stoa
▶ Urban Planning in the Greek World

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Thomsen, Christian Jürgensen

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Basic Biographical Information

Christian Jürgensen Thomsen (1788–1865) organized the major Danish museum collections in the mid-nineteenth century and became famous for introducing the Three-Age System, the division of prehistoric time in a Stone, Bronze, and Iron Age (Fig. 1). He was born in Copenhagen as son of a wealthy merchant, whose business he carried on after the death of his father in 1833. As a young man, he developed an excellent knowledge of numismatics, history, and art, and he made personal acquaintance with many of the young artists of that time. In spite of having no academic background, in 1816, he became secretary of the Royal Commission for the Preservation of Antiquities, established in 1807, obtaining official membership of the Commission in 1827. Besides being responsible for the Museum for Nordic Antiquities (Fig. 2), Thomsen became the organizer of other museum collections in the 1840s and 1950s. From 1830, he was a member of a commission organizing the Royal Armory Collection. In 1832, he was attached to the Coin Cabinet as inspector and became its director in 1842. From 1839, he also worked as an inspector at the Royal Museum of Art. For his extraordinary efforts to organize the most important Danish museums, he obtained the order of high-ranking councilor. He was succeeded as director for the Museum for Nordic Antiquities by J.J.A. Worsaae.

Thomsen, Christian Jürgensen, Fig. 1 C.J. Thomsen (1788–1865) (Painting by J.V. Gertner. The Danish National Museum)

Major Accomplishments

As secretary of the Antiquities Commission, Thomsen started to catalogue the collection of the Museum for Nordic Antiquities, the embryo of the later National Museum, in 1817. In 1819, he arranged an exhibition of antiquities in a limited space adjacent to the University Library on the upper floor of the Holy Trinity Church in

Thomsen, Christian Jürgensen, Fig. 2 C.J. Thomsen showing the Museum for Nordic Antiquities to visitors at the Christiansborg Castle in 1846 (Drawing by Magnus Petersen. The Danish National Museum)

Copenhagen. It was during recording and arranging the collection that Thomsen developed the Three-Age System, not only as a technological model but as a chronological sequence based on the combination of finds (Gräslund 1981). He emphasized the importance of careful recording of find circumstances during archaeological excavations and thereby introduced a principle fundamental to archaeological practice. In 1825, Thomsen had worked out a definition of the Stone, Bronze, and Iron Ages, which was initially disseminated through his correspondence with learned colleagues. One of them was Bror Emil Hildebrand (1806–1884) at the Historical Museum of the University of Lund, Sweden, who visited Thomsen in 1830 and subsequently arranged the collection of the Historical Museum in Lund according to the Three-Age System (Stjernquist 2005). In 1833, the Museum for Nordic Antiquities had been moved to new premises at the Christiansborg Castle in Copenhagen, where Thomsen could arrange the prehistoric and medieval collections under more favorable conditions and where the Three-Age System came to justice. Thomsen's own description of the Three Ages was not published before 1836 in his contribution to *Ledetraad til nordisk Oldkyndighed*, which was translated into German (1837) and English (1848) and thereby obtained international attention. Thomsen's own literary production was limited, but his work can be followed in his correspondence with colleagues. In 1856–1857, he issued a publication about Nordic gold bracteates with a classification that laid the foundation for later research.

Thomsen became responsible for establishing other museum collections, when the Royal Danish *Kunstkammer* was broken up in the 1840s (Gundestrup 1985): the Ethnographical Museum in 1841 (Hermansen 1941), the Classical Antiquities Cabinet in 1851, and the Museum of Sculpture and Handicraft in 1852. Under Thomsen's leadership, these collections, the Museum for Nordic Antiquities and the Coin Cabinet, were brought together during the 1850s and 1860s under one roof in *Prinsens Palais*, since 1892 the permanent residence of the National Museum. Thomsen was also actively engaged in the establishment of local museums in major provincial towns such as Odense (in 1818), Kiel (in 1834), and Flensburg (in 1852).

Of Thomsen's own collection of coins, the largest in private ownership at that time, more than 12,000 medieval coins were purchased by benefactors after his death and donated to the Coin Cabinet.

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Throckmorton, Peter

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Basic Biographical Information

Peter Throckmorton (1928–1990) played an enormous role in the creation of the field of nautical archaeology. Born in New York, he eventually rebelled against his privileged background, running away from boarding school in Colorado to seek adventure. He worked on various vessels in the Pacific, finally reaching Hawaii, where he learned to dive. After four years in the army, in Japan and Korea, he enrolled in the University of Hawaii and worked on a terrestrial archaeological excavation. Although he never graduated from college, he also studied at the Musée de l'Homme in Paris.

Major Accomplishments

Working as photojournalists, Throckmorton and Herb Greer covered the Algerian War dressed as rebels. In 1958, on returning overland to Europe from shooting a tiger-hunt story in India, he stopped in Bodrum, Turkey, to write about local sponge divers. Sailing and diving with Kemal Aras, he was shown ancient wrecks and was told about the most intriguing, which lay near Cape Gelidonya on the southern coast. He reached that site the following year while guiding an American sailing expedition. Recognizing that the wreck dated to the Bronze Age, he convinced the University of Pennsylvania Museum to organize an expedition, which led in 1960 to Throckmorton and George Bass conducting the first complete excavation of an ancient shipwreck on the seabed.

Throckmorton then moved to Greece where, beginning in 1962, he mapped the remains of two Roman stone carriers near Methone. He sailed his *Archangel* to Italy to explore other Roman stone carriers and, in 1967–1968, with his wife Joan, excavated one at Torre Sgaratta that carried sarcophagi from the late second or early third century. By then he and Gerhard Kapitän had excavated a seventh-century hull partly preserved in a marsh at Pantano Longarini in Sicily.

Back in Greece in 1970, he recognized that an old motor ship was a converted square rigger and determined that she was the *Elissa*, built in Liverpool in 1877; he and Karl Kortum of the San Francisco Maritime Museum acquired the vessel and arranged for her to be purchased in 1975 and restored by the Galveston Historical Foundation; she is now a major tourist attraction and sail-training ship in Galveston, one of her original ports of call. Also in 1970 he partially excavated a cargo containing twelfth-century Byzantine plates at Pelagos in the Northern Sporades and in 1975 located another Bronze Age wreck (2500 BCE) at Dokos near Hydra.

He recognized the importance of the many nineteenth-century hulks preserved in the

Falkland Islands and in 1976 explored and surveyed the clipper ship *Snow Squall* (1851), the *Charles Cooper* (1856), and the Maine-built *St. Mary* (1890), a section of which he sent to the Maine State Museum in 1978.

From 1986 to 1988, Throckmorton was an adjunct professor at Nova Southeastern University. He died at his last home, in Newcastle, Maine.

His books include *The Lost Ships* (1964), the misleadingly titled *Diving for Treasure* (1965), *Shipwrecks and Archaeology* (1970), *The Sea Remembers: Shipwrecks and Archaeology* (1987), and *Spiro and the Sponge Fleet* (1964) for children.

Cross-References

- ▶ Bass, George Fletcher
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Mediterranean Sea: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Underwater Archaeology
- ▶ Visualizing Mediterranean Archaeology

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Time Since Death in Bioarchaeology and Human Osteology

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Introduction and Definition

Time since death (TSD) is defined as the time frame between death and discovery of an organism. When estimated in an archaeological context, this time frame may be referred to as time since deposition and in a forensic context can be termed postmortem interval. Time since death cannot be established with certainty and for this reason is provided as an estimate of the range of time encompassing the period when death occurred. A shorter postmortem interval is typically associated with a narrower time range, while a longer postmortem interval has a broader time range and includes a wider margin of error. Presently, there is no single indicator which provides a reliable or accurate measure of the time since death of an organism.

Key Issues and Current Debates

Current Methods for Estimating Time Since Death

In a forensic investigation, the most reliable estimates of time since death are based upon observations and measurements made by a forensic pathologist during an autopsy. Key indicators can include rigor mortis (process of muscle stiffening), algor mortis (process of body cooling), and livor mortis (gravitational blood settling), while the analysis of the gastric contents and vitreous humor may also assist in estimating the time since death. Depending on the surrounding environmental conditions at the time of death, these indicators are often only applicable for the first few hours to days following death. During this period, the process of decomposition will commence and the pathologist will use collective biochemical indicators such as autolysis, putrefaction, and liquefaction to assess the stage of decomposition and thus approximate time since death.

The process of decomposition will attract insects to the remains if the body is in an accessible location. The life cycle of insects can also be used to estimate time since death through the discipline of forensic entomology. The TSD estimate may span days, weeks, months, or years but becomes limited once insect activity has ceased. Forensic entomologists typically use alternative terminology to denote

the stages of decomposition which includes fresh, bloat, active decay, advanced decay, and dry/remains or skeletonization. Until the point of skeletonization, both the forensic pathologist and entomologist rely on the biochemical degradation of soft tissue to assist with the estimation of a minimum TSD.

Effect of Decomposition on the Estimation of Time Since Death

Once soft tissue degrades from an organism, the estimation of time since death becomes increasingly more difficult. This is an issue commonly faced by the anthropologist or archaeologist as the time elapsed since deposition is considerably longer for archaeological remains compared to forensically significant remains. In an archaeological context, the remains may be partially or completely skeletonized and only hard tissue (i.e., bone) will remain as evidence of the original deposition. When analyzing evidence that is very old, the archaeologist or anthropologist must interpret how the condition of the remains at the time of discovery has varied since the time of deposition. This requires an understanding of decay rates and the taphonomic processes which can act on the remains over time.

Nawrocki (1995) identifies three major classes of taphonomic processes when dealing with human remains recovered from a historical period: environmental, individual, and cultural factors. Environmental factors (e.g., temperature) are external variables which can act on the remains and are specific to the geographical region and microenvironment in which the process of decay occurred. Individual factors (e.g., body weight) originate with the deceased person and can also contribute to the decomposition process. Cultural factors (e.g., embalming) relate to the mortuary activities following ones death. Most of the time, these classes are mutually exclusive; however, certain factors may be classified under more than one class.

Environmental factors can be further divided into biotic and abiotic factors (Nawrocki 1995). A biotic factor refers to any living component that acts on another organism. Biotic factors which can act on bone are numerous and include scavenging and chewing by carnivorous animals, dispersal and fracturing by burrowing animals, tunneling by plant roots, and microbiological degradation by bacteria and fungi. Abiotic factors are the nonliving components which act on the organism such as temperature, moisture, light, wind, altitude, and soil pH (Ubelaker 1997).

There are many factors specific to an individual which cause variation in bone decomposition and subsequently hinder the estimation of time since death. Different bones within the body, and even different areas of the same bone, will show variation across an individual. Some bones will be dense (cortical) while other bones will be spongy (trabecular) yielding a larger surface area per volume of bone which is subjected to degradation. As a result, cortical bone tends to resist degradation better than trabecular bone. Additional factors which may affect the degree of skeletal degradation or preservation include antemortem disease, perimortem trauma, and body size differences resulting from age and gender (Nawrocki 1995).

Cultural factors are unique to humans and can include the preparation of the individual following death, burial below ground or in vaults or tombs, or cremation of the remains. The process of burial in a coffin can enhance soft and hard tissue preservation. Burial is known to slow the rate of decomposition when compared to remains left on the soil surface (Forbes 2008). Retardation of decomposition is predominantly the result of restricted access to vertebrate and invertebrate activity; however, the coffin can also act as a barrier thus protecting the bone from the impact of surrounding soil and vegetation. Since animal carcasses on the surface are often rapidly scavenged, scattered, and dispersed, only buried remains typically become part of the archaeological record. The act of burial may improve the estimation of time since death by preserving the skeletal material but, in doing so, also makes the study of human remains considerably more complex.

Behrensmeyer's (1978) stages of bone weathering represent one of the more commonly utilized methods for estimating time since deposition of bone. During research investigating mammal bones in the Amboseli Basin of southern

Kenya, Behrensmeyer identified six stages of bone weathering. This model has been used to better understand and reconstruct the archaeological record of animal remains. While not commonly employed in a forensic context, the model can assist in differentiating weathering effects on bone from perimortem trauma (Ubelaker 1997).

Effect of Preservation on the Estimation of Time Since Death

Preservation of human remains as a result of natural or cultural processes can reduce the accuracy of time since death estimations if not accounted for. Natural preservation of soft tissue can result from desiccation (rapid drying), freezing and sublimation (freeze drying), adipocere formation, and fixation by tannic acids (Sledzik & Micozzi 1997). Cultural preservation may involve elaborate methods for preserving both soft and hard tissue or may simply involve the injection of chemicals for embalming and funereal purposes. In the archaeological record, one or more of these factors can act on the body over time, and it is not uncommon for archaeological human remains to be mistaken for forensically significant remains when first discovered due to their excellent preservation.

The processes of desiccation and sublimation rely on the rapid loss of moisture. Desiccation results from the drying out of soft tissue in hot, dry climatological regions and can affect the entire body or specific areas of the body depending on the degree of exposure. Mummification is the product of desiccation which restricts postmortem decomposition and promotes preservation of both soft and hard tissue. Climates conducive to mummification have been found in South America (e.g., Chile and Peru), southwestern USA, the desert regions of Africa, and the outback of Australia (Sledzik & Micozzi 1997). Mummification can also occur in enclosed environments and an understanding of this process is important in forensic investigations when estimating time since death. Mummification of recently deceased remains can occur in apartments or houses whereby the continuous heating during winter months produces a hot, dry internal environment.

Sublimation is typically observed in cold or freezing environments and results from the transformation of frozen water to a gaseous phase in soft tissue coupled with the inhibition of decomposer organisms. Regions conducive to natural sublimation include the Arctic and Antarctic circles as well as cold, high-altitude environments. One of the best known natural mummies of the world, "Ötzi – the Iceman," was discovered in a cold, dry environment in the Ötztal Alps along the Italian-Austrian border (Fleckinger 2010). The excellent preservation of soft tissue allowed for the dating of his remains, demonstrating that he is among the oldest, and most well-preserved, natural mummies ever discovered. Dating remains of archaeological significance is readily achieved as typically only an approximate estimation is required (±100 years). On occasion, forensically significant remains are discovered in cold or freezing environments, demonstrating a "fresh" appearance which contradicts their true postmortem interval. However, it is unlikely that sublimation would occur in a forensic context, simply due to the length of time required for the process to be complete (Sledzik & Micozzi 1997).

Adipocere formation is a commonly encountered phenomenon in wet environments; however, its formation is not restricted to waterlogged locations (Forbes 2008). Adipocere results from the chemical degradation of adipose tissue to produce a solid, stable product comprising predominantly saturated fatty acids. Adipocere formation is associated with the inhibition of decay and as a result adipocere-laden corpses are resistant to decomposition. Adipocere can form over the entire body or can be restricted to specific parts of the body depending on the amount and translocation of neutral fats within an individual. Similar to other types of natural preservation, its preserving effects can aid the recovery of soft tissue in the archaeological record, but can complicate the estimation of time since death in a forensic investigation. Adipocere formation can be valuable for suggesting a minimum amount of time since decomposition and can also provide information about the depositional environment (Forbes 2008).

Peat bogs represent an alternative preservation environment often encountered in the archaeological record. Both human and animal remains have been discovered in wetland peat deposits, demonstrating varying degrees of preservation and a range of trauma and pathology (Brothwell & Gill-Robinson 2002). Preservation is thought to result from the action of humic acids and the reduced aerobic and bacterial nature of bogs. To date, more than 2,000 finds have been recorded with the majority of bodies discovered across northern Europe. Estimating the time of deposition for bog bodies is achieved using radiocarbon dating so as to place the remains in a particular time sequence or era. Many of the recovered bodies have been dated between 800 BCE and 100 CE, and there still remains considerable debate about the reason for their deposition. More recently deceased victims are occasionally discovered in peat bogs; however, they rarely display the same level of preservation as historical discoveries.

Future Directions

Research over the past century has focused on improving the accuracy of time since death estimations. Thanatochemistry is a term commonly used in forensic pathology to describe the postmortem chemical processes which occur in the body. Studies in this area have focused on chemical, biochemical, biological, and microbiological methods for accurately determining the time of death. A review of this field in 2005 demonstrated that little headway had been made in improving the accuracy of determining the postmortem interval (Madea 2005). However, during the latter half of the last century, the field of forensic entomology was advanced becoming an alternative method for estimating a minimum TSD of decomposed remains. The combination of these methodologies is currently the most accurate available to the field of forensic science.

A range of alternative methods have been investigated to assist with estimating time since death in forensic investigations. Decomposition chemistry represents a variation of the field of thanatochemistry whereby studies focus on the chemical and biochemical degradation of soft tissue across the entire decomposition period. Vass and coauthors (1992, 2002) have proposed the use of various classes of chemical compounds including volatile fatty acids, amino acids, and other decomposition by-products for estimating time since death. Swann et al. (2010) also identified a series of short- and long-chain fatty acids as well as amino acids and biogenic amines that are periodically produced in decomposition fluid. Additional studies on decomposition chemistry have investigated total nitrogen, soil-extractable phosphorous, lipid-phosphorus (Benninger et al. 2008), and ninhydrin-reactive nitrogen levels (Van Belle et al. 2009; Spicka et al. 2011) in soil environments. All have shown some potential as indictors for time since death over extended postmortem periods.

However, in the field of archaeology, such methods are rarely useful as only skeletal elements are typically recovered. The majority of research in this area has thus focused on improving the methods used for dating anthropological skeletal remains. A range of morphological, chemical, immunological, and radiological studies have been conducted over the past century (Forbes & Nugent 2009). Morphological studies investigated physical characteristics such as bone density, specific gravity, and weight, while the chemical and immunological studies focused on organic components of bone, bone extracts, and bone diagenesis. The major challenge in all of these studies was an inability to account for the effect of taphonomic processes on bone degradation.

One of the more promising areas of investigation has been the use of radioactive isotopes to date archaeological and forensic bone samples. Radiocarbon (^{14}C) dating is commonly employed for dating historical and archaeological material, including human and animal remains. More recently, radiocarbon dating with reference to the modern-bomb curve has been employed to determine the date of birth

and death of recently skeletonized human remains (Ubelaker et al. 2006). The method uses the "bomb pulse" produced in the atmosphere between 1950 and 1963 as a result of extensive nuclear weapons testing. The temporal decay of radiocarbon in cortical and trabecular bone has been successfully employed on adults of known birth and death dates, demonstrating the value of this method for estimating time since death of forensically relevant skeletal remains (Ubelaker et al. 2006).

Cross-References

- ▶ Forensic and Archaeological Analyses: Similarities and Differences
- ▶ Forensic Anthropology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology

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Tobias, Phillip V.

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Basic Biographical Information

Phillip Vallentine Tobias was a South African paleoanthropologist and human biologist. He was born in Durban, South Africa, in 1925 to Joseph Newman Tobias and Fanny (née) Rosendorff. His father was a toyshop owner and his mother was a piano teacher. Tobias was fascinated by natural history from a young age. His wolf-cub scout leader introduced him to osteology and anatomy. His interests in genetics, zoology, and archaeology followed from frequent visits to the Durban Natural History Museum during his teenage years.

Tobias entered the University of the Witwatersrand (Wits) in 1942, where he earned B.Sc. and B.Sc. Honours degrees (1946, 1947), the medical degrees M.B., B.Ch. (1950), and a Ph.D. (1953) in cytogenetics under the tutelage of Joseph Gillman. He then held fellowships to continue his work at Cambridge University (1955) and various academic institutions in the United States (1956). After his return to South Africa, Tobias was mentored by Raymond Dart and was later awarded a D.Sc. degree (1967) for his research on hominin evolution. He was appointed demonstrator and instructor in histology and physiology at Wits in 1945 and subsequently served as Lecturer (1951–1952), Senior Lecturer (1953–1958), Professor and Head of the Department of Anatomy and Human Biology (1959–1990), and as Dean of the Faculty of Medicine (1980–1982). He remained active as Professor Emeritus at the university until his death on June 7, 2012.

Major Accomplishments

Tobias made many contributions to Science, with nearly 1,200 published works on topics including genetics, human evolution, anatomy, growth and development, and the history and philosophy of science. He is particularly well known for his descriptions of early hominins from Olduvai Gorge in Tanzania, especially *Paranthropus boisei*, and for co-naming *Homo habilis* with Louis Leakey and John Napier in 1964. He supervised excavations at the South African fossil hominin site of Sterkfontein for four decades beginning in 1966. Tobias also conducted fieldwork at a number of other fossil sites in southern Africa and studied human variation and cytogenetics of living people and other mammals.

Tobias also worked assiduously on the meaning and political ramifications of race and fought indefatigably against racism. He was elected President of the National Union of South African Students in 1948, the year the Nationalist Government enacted apartheid legislation to define and enforce segregation. Tobias soon after began the first anti-apartheid campaign in a South African University to keep enrollment open to all, participating in protests against these oppressive laws. His activism continued throughout the apartheid era. For example, he coauthored a formal complaint to the South African Medical Council that brought world attention to the mishandling of the Steven Biko case. Biko, the founder of the Black Consciousness Movement, died from injuries sustained during interrogation by police. He also lobbied for repatriation from France of the remains of Saartjie Baartman, a Khoikhoi slave that had been exhibited around Europe as "the Hottentot Venus" in the early nineteenth century.

Tobias is likewise known for his efforts toward reconciliation between science and religion, particularly in the relationship between evolution and theology. He participated in two working groups organized by the Pontifical Academy that contributed to the revision by Pope John Paul II of the Church's attitude toward evolution. Tobias was in fact born into a Jewish family and served during his youth as President of the Junior Hebrew Congregation in Durban. Indeed, the young Tobias even evinced an interest in studying for the rabbinate.

Tobias received numerous accolades for his scientific and humanitarian accomplishments.

These include numerous distinguished metals, prizes, awards, and honorary degrees. He was a Fellow of the Royal Society (London) and a Foreign Associate of the National Academy of Sciences of the United States and the American Philosophical Society, Commander of the Order of Merit of France, and Commander of the National Order of Merit of Italy.

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Togola, Téréba

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Basic Biographical Information

Téréba Togola (Figs. 1 and 2), who died November 5, 2005, was a tireless advocate of Malian cultural heritage. An expert in the field, Téréba Togola distinguished himself by his thirst for knowledge and strong sense of sharing. This open spirit strongly influenced the new

Togola, Téréba, Fig. 1 Téréba Togola (Photo taken during a conference)

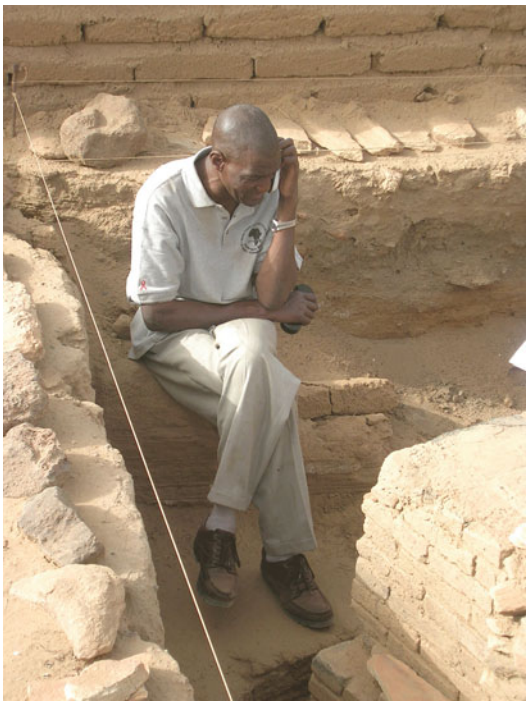

Togola, Téréba, Fig. 2 Téréba Togola (Photo taken at the site of the Kankou Moussa mosque in Gao)

generation of Malian archaeologists, who still take him as a reference point in their own activities.

Born in 1948, Térába Togola began his professional career as a primary school teacher. In 1976, he entered the Ecole Normale Supérieure of Bamako (ENSUP) where he took his first courses in archaeology, a discipline that he would follow for the remainder of his life. The thesis he completed at the end of his studies at ENSUP in 1982, entitled *Inventaire analytique des sites archéologiques du Cercle de Bougouni (Région de Sikasso)*, is testament to his commitment to archaeology. Térába Togola subsequently worked at the Institut des Sciences Humaines (ISH), where he actively participated in numerous archaeological missions across Mali, including the Mema region. He was a member of the team that worked on a project to create an inventory of archaeological sites in the lakes region and the Inner Niger Delta (Togola & Raimbault 1991). It was here that he met Roderick J. McIntosh and Susan K. McIntosh, who integrated him into their team of archaeological researchers working in the Timbuktu region of northern Mali (1983) and at Dia (1986). In 1986, Térába Togola was awarded a Fulbright Scholarship (USA) (1986–1993), which enabled him to further his studies at the Department of Anthropology at Rice University, Houston, Texas, where he obtained a Master of Arts in archaeology in 1988 and a Ph.D. in Archaeology in 1993. His doctoral thesis on the theme: *Investigations of Iron Age Sites in the Mema Region (Mali)* was published posthumously (Togola 2008). On his return to Mali in 1994, Térába Togola joined the ISH and became the head of the archaeology section. In 1998, he was appointed the Director of National Arts and Culture (DNAC) in Mali, and subsequently the head of the National Directorate of Cultural Heritage (DNPC).

Térába Togola was an active member of the following professional organizations and associations: the Society of Africanist Archaeologists (SAFA), the West African Association of Archaeology (AOAA), and the Mande Studies Association (MANSA). He was one of the main organizers of the 11th Congress of the PanAfrican Association of Prehistory and Related Studies (PANAF) in Bamako in 2001, the proceedings of which he coedited and co-published with Klena Sanogo (Sanogo & Togola 2004).

Major Accomplishments

In this capacity as the head of the archaeology section at the ISH, Térába Togola directed the archaeological components of the environmental impact studies in the gold mining areas of Keniéba, Sadiola, Tabakoto (Kayes region), and Kalana et Yanfolila (Sikasso region) between 1994 and 1997. In 1995, archaeological research carried out under his supervision in the Boucle du Baoulé region revealed the richness and the diversity of archaeological sites in the National Park of the Boucle du Baoulé. Térába Togola also took an active part in initiating and implementing an archaeological research program in the southwest region of Gourma, directed by Kevin MacDonald (1993–1996). Funded by the World Monument Funds, Térába Togola codirected archaeological excavations at Jenné-jeno from December 1996 to February 1997.

After Térába Togola became the Director of National Arts and Culture (DNAC) his tasks included the preservation and promotion of cultural heritage. Under his leadership, the DNAC was restructured. This led in 2001 to the creation of two different entities: the National Directorate of Cultural Heritage (DNPC), which manages the inventory, protection, restoration, and the dissemination of national cultural heritage, and the National Directorate for Cultural Action (CAA), which works to promote the creation of artistic works and their dissemination.

Dr. Togola became the head of the DNPC, where under his direction some outstanding actions were undertaken, including the design and realization of the Cultural Map of Mali (2004), the inscription in 2004 of the Tomb of Askia on the World Heritage List, the withdrawal of the ancient city of Timbuktu from the List of World Heritage in Danger (2005), and the listing

of the Jaaral and Degal cultural space (i.e., the crossing of the river *Diaka* in Diafarabé and the descent of cattle in the *bourgoutières* in Dialloubé-Téninkoun) in 2005 as a masterpiece of oral and intangible world heritage. Dr. Togola largely contributed to the restoration of the Komoguel mosque in Mopti, classified as national heritage in 2005, and of the historic city of Hamdallaye, classified as national heritage in 2007. In addition, he contributed to fundraising for the restoration of Fort Medina (Kayes), which was classified as a national heritage site in 1992. Térêba Togola also continued archaeological research, such as on the site of the Kankou Moussa mosque, where an ongoing research program was initiated in 2003–2004 in collaboration with the Swedish International Development Agency (SIDA-SAREC) and the National Museum of Ethnology, Osaka (Japan).

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- ▶ Sanogo, Kléna
- ▶ West Africa: Museums
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Tomatoes: Origins and Development

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Basic Species Information

Although Linnaeus (1753) classified tomato as *Solanum lycopersicum*, the taxonomy of tomato has been subject to great debate. Various alternative taxonomic classifications have been proposed, principally as *Lycopersicon esculentum*, which is still in common usage (e.g., Doebley et al. 2006). Multiple genetic studies now unequivocally confirm the tomato as belonging to the genus *Solanum*. Confusingly, some researchers split tomatoes into the weedy *S. lycopersicum* var. *cerasiforme* and the cultivated *S. lycopersicum var. lycopersicum*, whereas others refer solely to *Solanum lycopersicum*. The latter classification is followed here.

Tomatoes are one of the most significant, in terms of production, crop plants in the world. Although generally considered to be a fruit, the tomato is also classified as a vegetable. Tomatoes are rich sources of several nutrients and vitamins. Tomatoes are herbaceous perennials, although in many growing environments they behave as annuals; for example, they tend to die off after frost or dry periods (Peralta & Spooner 2007). Tomatoes exhibit a wide climatic tolerance, although cultivated varieties require regular watering. They are diploids, are grown from seed, and exhibit considerable morphological variability. Tomatoes are considered a model plant to study the genetics of diploid plants (Peralta & Spooner 2007) and for studying fruit development (The Tomato Genome Consortium 2012).

Wild tomatoes are native to western South America, extending in altitude from near the coast to the high Andes (above 3,000 m altitude) and extending from central Ecuador, across Peru, to northern Chile. The climatic and environmental diversity of environments has contributed to the diversity of wild tomatoes.

Major Domestication Traits

Different theories have been proposed for the region of tomato domestication (following Peralta & Spooner 2007: 14-17). Since De Candolle (1884), a Peruvian hypothesis has predominated based on a combination of botanical, historical, and linguistic inferences. However, Jenkins (1948) proposed an alternative Mexican hypothesis based on multidisciplinary evidence, primarily the center of cultivar diversity (using morphological criteria), as well as more anecdotal historical sources and linguistic inferences. Questions regarding the origin and domestication history of tomato have only recently been clarified by genetic analyses.

Although there are several hundred varieties of cultivated tomato, they exhibit extremely limited genetic variability from each other and from the closest wild ancestor. For example, genomic sequences of an inbred (domesticated) tomato cultivar 'Heinz 1706' and the closest wild relative, *Solanum pimpinellifolium*, exhibit limited genetic divergence and recent admixture (The Tomato Genome Consortium 2012). Despite limited genetic variation, there is considerable morphological variation among cultivated varieties and between cultivars and wild types.

Hybridization between wild and cultivated species of tomato has been documented for *Solanum pimpinellifolium* and *Solanum lycopersicum*. As Peralta and Spooner (2007: 13) observe: "The reciprocal introgression of traits into both taxa generates complex morphological [and presumably genetic] gradation between them that makes their taxonomic identification difficult." Against this backdrop of complexity, specific genetic attributes of cultivated tomatoes have been identified that control for domestication traits, primarily fruit size (*fw2.2*, the "domestication gene" in tomatoes; Zeder et al. 2006), as well as differences between cultivated varieties, such as synchronicity and timing of fruit ripening and fruit shape (Doebley et al. 2006). Although these genetic attributes may be present in wild plants, they are more frequent in cultivated varieties of tomato (Nesbitt & Tanksley 2002). Significantly, recent genetic improvement of tomato has been designed for increased shelf life and synchronous fruiting, which has seemingly occurred at the expense of flavor (ACTI 1989).

Despite limited genetic variation, there is phylogenetic structure that enables aspects of the geodomestication process to be inferred:

> . . . we hypothesize that, based on the molecular and morphological data presented, *S. l. cerasiforme* originated from *S. pimpinellifolium*. The tomato was later domesticated [to *S. l. lycopersicum*] from *S. l. cerasiforme* in a process composed of several phases: first, a predomestication was carried out in the Andean region, during which *S. l. cerasiforme* developed a notable morphological diversity that included bigger fruits, which are even today being cultivated as small-fruited tomatoes. Those materials were then carried to Mesoamerica and it was there that the true domestication occurred, thus creating the traditional big-fruited tomato varieties. From there, the Spaniards took tomatoes to Spain and Italy, and from there they spread to the rest of the world (Blanca et al. 2012: e48198).

Although the terminology of predomestication and "true domestication" may not be helpful and may best be characterized as stages of domestication, Blanca et al. (2012) clearly identify a domestication cline from the most closely related wild tomato species (*S. pimpinellifolium*) to the weedy *S. lycopersicum* var. *cerasiforme*, to the cultivated *S. lycopersicum var. lycopersicum*. Additionally, the staged interpretation of tomato domestication encompasses aspects of both De Candolle's Peruvian and Jenkins' Mexican hypotheses.

Timing and Tracking Domestication

Unfortunately, there is extremely sparse archaeological data for tomatoes to clarify genetically based or earlier scenarios of domestication. No pertinent data predate approximately 1,000 years ago. There are also uncertain claims for depictions of tomatoes on ceramic spindle whorls dating to 500–1000 CE in Columbia (McMeekin 1992), but these may represent other flowering *Solanum* species, including potatoes (Peralta & Spooner 2007: 16-17). Sufficient taxonomic specificity in archaeobotanical and stylistic interpretations is also lacking to assess the relevance, if any, of these finds for understanding tomato domestication.

Historical sources show that tomatoes were grown in Mexico at the time of Spanish conquest. Tomatoes were subsequently introduced to Europe in the early to mid-sixteenth century, in the decades immediately following that conquest. Initially, plants were grown as curios, medicinal plants or ornamentals because they were considered inedible or poisonous (Peralta & Spooner 2007: 17-19). Tomatoes were first grown for food during the seventeenth and eighteenth centuries in southern Europe, especially in Italy.

Although De Candolle (1884) speculated that tomatoes may not have been domesticated long before European colonization of the Americas, in the absence of robust archaeological evidence, this is an open question. At present, the geodomestication pathways of tomato domestication can be tracked using genetics and other botanical attributes. The historical time depth for these processes is unclear. Although historical linguistics can offer valuable insights (e.g., Campbell and Kaufman 1976), the history of tomato domestication awaits an archaeobotanically derived chronology.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Potato: Origins and Development

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Tombs, Etruscan

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Introduction

Etruscan tombs, Etruscan necropoleis/cemeteries, and Etruscan tomb architecture belong to the most interesting, exciting, and expressive groups of monuments of Etruscan civilization. They furnish a great deal of precious information about Etruscan culture, art, architecture, life, burial customs, funeral rites, and religion. They often reflect historical, economic, and social changes as well. Undoubtedly, the Etruscans invested many financial resources and architectural, technical, and artistic skill in their necropoleis and tombs. Thanks to the discoveries and excavations of thousands of tombs since the Renaissance period, we know much more about the world of the dead than the world of the living in Etruria.

The first discoveries of important Etruscan tombs and tomb monuments date to the Renaissance (late fifteenth–early sixteenth century CE), especially in Tuscany and in the area of Viterbo. It is possible that even great Renaissance artists such as Leonardo da Vinci and Michelangelo drew inspiration from some Etruscan tomb or tomb monument. The second half of the eighteenth century CE (the period of the so-called Etruscheria) and the nineteenth century CE (the period of Romanticism and Neoclassicism) were particularly rich in terms of discoveries (Dennis 1848). Even today, new tombs are discovered both by regular and clandestine excavations, although the main scholarly interest in recent decades lies more in the archaeology of Etruscan settlements and sanctuaries.

Among the most recent and important discoveries we can mention the Cutu Tomb at Perugia, the new excavations around the Tomb of the Five Chairs at Cerveteri (Fig. 2), the Tumulo del Sodo II at Cortona-Camucia, the two Doganaccia Tumuli at Tarquinia (Fig. 4), the Tomb of the Demons at Cerveteri-Greppe Sant'Angelo, the painted Tombs of the Blue Demons at Tarquinia, of the Infernal Quadriga at Sarteano near Chiusi, and of the Roaring Lions at Veii, as well as the restoration of the Cuccumella Tumulus at Vulci and the "Little Petra" (rock tombs) in a former quarry at Populonia. There are only a few general, overview publications on Etruscan necropoleis and tombs which we owe mainly to archaeologists such as F. Prayon and J. P. Oleson (Akerström 1934; Demus-Quatember 1958; Prayon 1975; Oleson 1982; Colonna 1986; Prayon 1986; Prayon 2000; Steingräber 2010).

Definition

We have to deal with an enormous amount of monuments and materials dating from the ninth to the first century BCE in all areas of Etruria including even the "colonial" areas in northern Italy (Emilia-Romagna) and Campania in the south. We can distinguish between single tombs, small groups of tombs, and true necropoleis. Some of the Etruscan necropoleis such as the Banditaccia of Cerveteri belong among the most extensive of the ancient Mediterranean world (Drago Troccoli 2006). Concerning typology, we must distinguish strictly between "tombs" on the one hand and "tomb/burial monuments" on the other hand. The most important aspects regard typology, chronology, topographical diffusion/extension, context in the necropolis, architectural elements,

decoration elements, elements for the ancestor cult, and burial gifts. It also must be noted that for Etruria, tomb architecture is a partial and precious source of proxy evidence for the largely destroyed and lost Etruscan domestic architecture (Prayon 1975). There are of course different approaches to this extremely extensive and complex topic – a more technical-architectural one, a more art-historical one, a more religious one, and a more social-economic one.

Historical Background

Etruscan tombs cover a long period from the early Iron Age (so-called Villanovan period) to the late Hellenistic period, which means from the ninth and eighth to the second and first centuries BCE. Often they clearly reflect political, economic, social, and religious changes of Etruscan civilization (Izzet 2007; Riva 2010). Thus, the most robust periods of Etruscan civilization such as the Orientalizing and Archaic phases (seventh–sixth century BCE) and the late Classical and early Hellenistic phases (fourth–third century BCE) offer us particularly monumental and rich examples of tomb architecture and burial gifts both in North and South Etruria. Concerning Etruscan tomb architecture, we must distinguish strictly between the different territories of Etruria characterized by different geological, cultural, and social-economic situations.

Key Issues/Current Debates

The key issues of current research are:

1. Necropoleis: planning, organization, extension, and development

In the Villanovan period (ninth–eighth century BCE), the necropoleis were still isolated from each other, but during the Orientalizing and Archaic periods, they extended until they entirely surrounded the inhabited area and even outstripped it in area. The different geological and geographical conditions in South and North Etruria resulted often in different forms of cemeteries and tombs. In Cerveteri, the Banditaccia necropolis – the most impressive and best preserved necropolis of Etruria – and in Orvieto, the Crocifisso del Tufo necropolis are outstanding and extremely instructive examples, reflecting in part the layout of the cities themselves. During the sixth century with the rise of a new middle class, hundreds of small tumuli (tumuletti), and later cube tombs, were planned and erected according to the direction of the necropolis' streets and accessible directly from them. After the middle of the sixth century, parts of the cemeteries are characterized by a kind of Hippodamian system with an orthogonal network of roads and rectangular squares and mostly uniform cube tombs which is not only a sign of a more intensive use of space but also a clear reflection of new tendencies in urban system (such as in Marzabotto near Bologna after 500 BCE) (Steingräber 2003). At the same time, the necropoleis reflect social changes and probably new laws and norms intended to limit conspicuous consumption as part of the funeral ritual.

2. Tombs: typology, chronology, diffusion, architectural elements, and decorations

The Etruscan word for tomb is "*suthi*." Among the main tomb types, we have to mention pozzo/pozzetto tombs (well/pit tombs) for cremation burials, fossa tombs, loculus tombs, niche tombs, chamber tombs, cassone tombs (Vulci), sarcophagus, and stone cist tombs. According to the different regions, sites, geological conditions, local traditions, and social status, there is a greatly varied typology (Steingräber 1981). A very important change in burial custom took place in the early seventh century with the transformation of larger fossa tombs into chamber tombs destined for the burial of family groups. We can observe this change from single to collective burial particularly well in the extended cemeteries of Cerveteri. The general tendency of monumentalization is well documented in South Etruria not only in Cerveteri and its territory (Blera, San Giuliano, San Giovenale) but also in Vulci, Tarquinia, and Veii, too. In North Etruria, the chamber tombs and the tumuli are mostly built in limestone or sandstone blocks and slabs (Populonia (Fig. 5), Vetulonia,

Artimino, Quinto Fiorentino, Castellina in Chianti, Cortona), whereas in South Etruria, hollowed-out structures in the soft volcanic tufa stone prevail (Fig. 3). Characteristic for North Etruria (especially between Volterra and Florence) in the later Orientalizing period (second half of seventh and early sixth century) are round burial chambers with a false cupola and sometimes a central pillar (the so-called tholos tombs). While these are reminiscent of Bronze Age Mycenaean tholoi from the Aegean world, they in fact reveal special architectural connections with the Sardinian nuraghe. An earlier predecessor, we find only in Populonia toward the end of the ninth and the beginning of the eighth century in a much smaller size but already characterized by a circle of slabs and a small tumulus, a single entrance, a circular chamber, and a false cupola. During the Orientalizing period in Vetulonia and Populonia, the circular false cupola rests atop a square chamber. The tombs of Cortona, Castellina in Chianti, and Artimino are characterized mainly by the arrangement of rectangular chambers with corbelled vaults along a longitudinal axis. The development of tomb architecture during the seventh and sixth centuries BCE in South Etruria – particularly at Cerveteri – is extremely varied and instructive. Prayon (1975) divided these tombs into six main types (A–F) according to their ground plans, type of entrance corridor (dromos), door, and window shapes; types of roofs, ceilings, and "furniture" such as tomb beds, sarcophagus beds, benches, thrones, chairs, baskets and altars, columns, pillars, capitals, and profile bases, and type of monument and exterior architecture. Those tombs often reproduce many details of the interiors of Etruscan houses (Drago Troccoli 2006). The Regolini-Galassi Tomb and the Tomb of the Hut or Thached Roof belong to the oldest chamber tombs in Cerveteri with a long open dromos and the chambers situated on the longitudinal axis. Whereas the corbelled vault of the Regolini-Galassi Tomb is built in tufa slabs, the two chambers of the other tomb are completely hollowed out and – concerning the vaults – clearly influenced by contemporaneous hut architecture. A very characteristic tomb type (Prayon type D) was common in Cerveteri and its territory during the late seventh and the first half of the sixth century and is clearly influenced by house and palace architecture (as in Veii and Acquarossa). It is characterized by a large antechamber and three burial chambers behind it, often with a rich "furnishing" (as in the Tomb of the Shields and Chairs in Cerveteri). The same ground plan is documented after the middle of the sixth century in temple architecture, too (the so-called templum tuscanicum of Vitruvius, *Arch.* 4.7). A major change occurs toward the end of the sixth century when the tombs – especially in the Cerveteri area – no longer imitated actual houses and consisted normally only of one square chamber with simple benches along the walls. This quite simple and monotonous one room type remained typical for the following centuries. Only after the middle of the fourth century BCE some tombs of new aristocratic families – especially in Cerveteri, Tarquinia, and Vulci – become again more richly decorated with architectural elements (pilasters, loculi/wall niches, beds) and painted or stuccoed elements (as in the famous Tomb of the Reliefs in Cerveteri belonging to the Matuna family). These imitated in an abstract way the central part of contemporary dwellings (atrium houses), while the smaller rooms reflected the bed chambers (*cubicula*) of those houses; in the tombs, these are reduced to simple loculi used for burials. The burial of the tomb's founding couple was particularly emphasized normally by a huge alcove in the center of the back wall according to the idea of heroization of the deceased (as in the Tombs of the Reliefs, Alcova, and Torlonia in Cerveteri and in the Mercareccia Tomb in Tarquinia). The huge number of burials of several generations underlines the continuity of the gentilician groups. Quite different is the tomb type with the barrel vaulting built in stone blocks which is documented first in the early Hellenistic period in Cerveteri (Tomb of the Demons in Località Greppe Sant'Angelo) and Orvieto and in the middle Hellenistic period mainly in the territories of Chiusi, Cortona, and Perugia. Completely different is the Velimna/Volumni Tomb at Perugia (second century BCE), with its symmetrical layout

Tombs, Etruscan, Fig. 1 Cerveteri, Banditaccia necropolis: tumulus with chamber tomb (seventh century BCE)

of several chambers grouped around a T-shaped nucleus resembling the patrician *atrium-tablinum* house type, which was obviously of Etrusco-Italic origin and goes back to the Archaic period.

3. Tomb Monuments: typology, chronology, diffusion, and elements of decoration

The Etruscan word for a tomb monument, cippus, or sema is "*cana*" (Steingräber 2010). Among the tomb monuments, we have to distinguish between stone circles (interrupted and continuous, especially in Vetulonia and Marsiliana d'Albegna); tumuli and tumuletti (especially in the seventh and first half of the sixth century); cubes, half cubes, and false cubes (from the second half of the sixth century to the third century); houses (mainly in the sixth century); porticus (mainly in the sixth and third centuries); and temples, aediculae, and tholoi (mainly in the third century). A great change was connected with the construction of large tumuli (diameters up to 80 m) both in South and North Etruria (Fig. 1) replacing the small "Archaic tumuli" and with the definitive confirmation of a new leading aristocratic class, the so-called principes. The large tumuli of the Orientalizing period – characterized normally by a base with a profile – often contain more chamber tombs, in a few cases as many as six or seven. These tombs go back often to different periods and present a different typology. Each tumulus belonged to a particular family or *gens* and served for several generations. The oldest tomb in a tumulus is always oriented toward the northwest, which means toward the section of the underworld gods on the Etruscan celestial partition. After the middle of the sixth century BCE, the cube tombs with their square appearance prevailed particularly in Cerveteri, in the South Etruscan rock tomb area (Blera, San Giuliano, Tuscania), and in Orvieto. In Populonia, the tumuli were replaced by built aedicula tombs with characteristic gabled roofs (Fig. 6) and smaller sarcophagus and stone cist tombs. Tomb monuments of the second half of the fourth and the third century became richer again as their external facades were often revaluated by architectural and sculptural decorations. In some cases, the old fashioned tumulus was used again as a tomb monument (Tomba Torlonia at Cerveteri).

4. Elements for the cult of the dead: typology, functions, and materials for the rites and sacrifices

Etruscan tombs and tomb monuments did not serve only as burial places but also as sites for funeral rites and for the worship of the dead. Particular – mostly architectural – elements

Tombs, Etruscan, Fig. 2 Cerveteri, Banditaccia necropolis: Tomba delle Cinque Sedie = Tomb of the Five Chairs (seventh century BCE)

Tombs, Etruscan, Fig. 3 San Giuliano, Valle Cappellana: chamber tomb of Valle Cappellana I with two columns (around 600 BCE)

were destined exclusively for the cult and rites in honor of the deceased and ancestors (Steingräber 1997). Some of these elements are of monumental character and size. In Cerveteri (Tomb of the Five Chairs) (Fig. 2), Vulci, and San Giuliano (Cima Tomb), we find tomb chambers with remains of altars, thrones and chairs, tables, and chests in stone, but without any burials which functioned exclusively as cult rooms for sacrifices and burial rites. Many tumuli – specially in Cerveteri – have ramps or added platforms (like in Artimino) or terraces. Most cube tombs have lateral stairs which allow one to climb to the top of the monument, obviously for ritual purposes. The upper platforms of the cube tombs have the size and function of

Tombs, Etruscan, Fig. 4 Tarquinia, Monterozzi necropolis: chamber tomb partly reconstructed in the Doganaccia Tumulus (seventh century BCE)

Tombs, Etruscan, Fig. 5 Populonia, San Cerbone necropolis: Tomba dei Letti funebri = Tomb of the Funeral Beds with stone beds (seventh century BCE)

monumental altars. Some special areas with benches could be used for funeral banquets. The most impressive example is the so-called terrace altar of the Tumulo del Sodo II in Cortona-Camucia decorated with palmettes of Ionic style and two sculptural groups dating from the late Orientalizing period. From this monumental terrace altar, one could climb up to a naiskos/aedicula on the top of the huge tumulus. Both structures were clearly intended for funeral rites and ceremonies. Open squares and "ritual theaters" are documented also in Grotta Porcina near Blera (in combination with a round altar), Vulci (in front of the Cuccumella tomb), and Tarquinia (in front of the Luzi tomb).

Tombs, Etruscan, Fig. 6 Populonia, San Cerbone necropolis: Aedicula tomb (sixth century BCE)

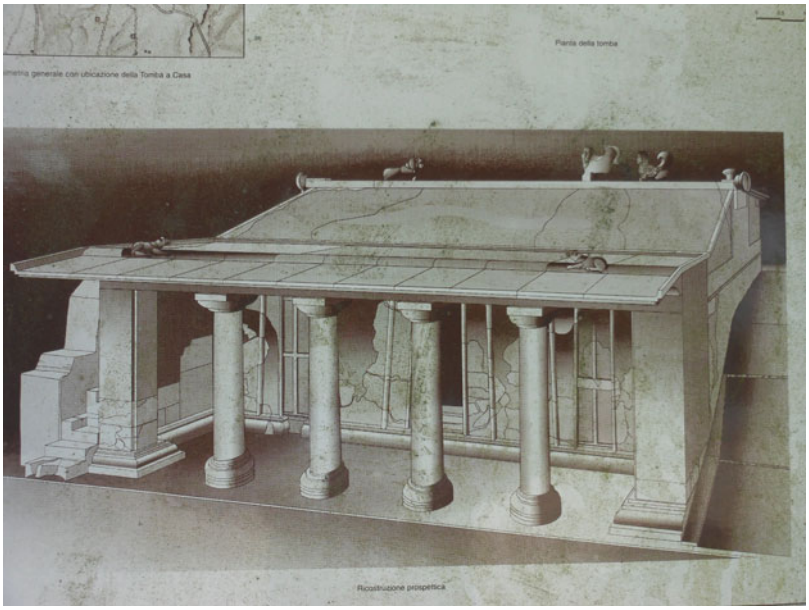

Tombs, Etruscan, Fig. 7 Tuscania, Pian di Mola: rock tomb in house shape with porticus (sixth century BCE)

5. Rock tomb architecture: diffusion, typology, chronology, and "ideology"

This phenomenon is unique in Italy and characteristic of the inner parts of South Etruria (today mainly the Province of Viterbo) from the first half of the sixth to the third/second century BCE (Colonna di Paolo 1978; Steingräber 2009). We find the most important examples of rock tombs – with a rich typology including cube, house, aedicula, temple, porticus, and tholos tombs – in the Archaic period in Tuscania (Fig. 7), San Giuliano, and Blera and in the Hellenistic period in Norchia, Castel d'Asso, and Sovana (Figs. 8–10). The most common type

Tombs, Etruscan, Fig. 8 Sovana: model of the Ildebranda Tomb = rock temple tomb (third century BCE)

Tombs, Etruscan, Fig. 9 Sovana: pediment of the Tomba dei Demoni alati = Tomb of the Winged Demons (third century BCE)

was the cube or half cube tomb most probably inspired by the – partly constructed – cube tombs of Cerveteri. Influences of palace architecture manifest themselves particularly in the facade of the house tomb with porticus at Pian di Mola near Tuscania of the early Archaic period (Fig. 7). The most noble rock tombs such as the temple and porticus tombs of Norchia (Doric tombs, Lattanzi Tomb) and Sovana (Ildebranda (Fig. 8) and Pola Tomb) reveal influences from temple and palace architecture. Great attention and care were paid especially to the external appearance of the rock monuments and facades characterized by profiles, doors, and false doors of the so-called

Tombs, Etruscan, Fig. 10 Sovana: Tomba della Sirena = Tomb of the Siren, an aedicula tomb with a Skylla relief in the pediment and a sculpture of a demon (third century BCE)

Tombs, Etruscan, Fig. 11 Bomarzo: "Piramide" = "Pyramid," a monumental rock altar (first century BCE–first century CE)

Doric type and by painted and sculpted decorations (Figs. 9–10). Most of them not only served as burials but also as cult places and monumental altars.

6. Rock Monuments of the late Etruscan and Roman period

The Etruscan tradition of rock monuments mostly of funerary character continues even in Roman times, specially in the first century BCE and the first century CE and particularly in the area between the Monti Cimini and the Tiber valley around Bomarzo (Fig. 11), Soriano nel Cimino, and Vitorchiano. They offer a rich typology and are partly characterized by Latin inscriptions indicating the names – often of Etruscan origin – of the deceased, the patrons,

Tombs, Etruscan, Fig. 12 Cerveteri, Banditaccia necropolis: monumental stone cippus in house shape near the Tomba delle Cinque Sedie = Tomb of the Five Chairs (seventh century BCE)

and some divinities such as the Bona Dea (Steingräber & Prayon 2011).

7. Burial gifts: composition, materials, quantity/amount, quality/value, provenance, local and foreign elements, and "ideology"

The composition, materials, quantity, and quality of the burial gifts – in most cases unfortunately, not more complete and intact – give us a lot of information about age, sex, social status, and taste of the deceased and of course about chronology and duration of the use of a tomb. In addition, the composition of the burial gifts including often both local and foreign objects informs us about the economic and cultural relations between the respective Etruscan town and other Etruscan towns and foreign areas. Especially in the Orientalizing period, the burial gifts of the aristocratic tombs (*principes*), such as Regolini-Galassi Tomb in Cerveteri, were particularly rich including numerous imported exotic objects from different areas in the Near East, Egypt, and different areas of the Greek world.

8. Varia

Other important aspects concern tomb inscriptions, cippi, tomb sculptures, and tomb paintings. Tomb inscriptions are quite rare in the early periods apart from the Orvieto tombs (sixth century) but later documented on cippi and facades such as in Norchia and Castel d'Asso and in the painted tombs (mainly in Tarquinia). In the case of Orvieto's Crocifisso del Tufo necropolis, the inscriptions give us information about the different provenance of the tomb owners (from Umbria and even from the Celtic area). Stone cippi could be erected in front of the tomb entrance, upon the tomb monument, or sometimes even in the tomb and indicate specific burials (Fig. 12). Their size, material, and typology differ according to local customs and different periods in Etruria. Sculptures of wild animals and monsters as "guardians" in front of the tomb monument or tomb entrance – particularly in Vulci – were probably of an apotropaic character and especially common in the Archaic period. The phenomenon of tomb painting is typically Etruscan but was mainly concentrated in Tarquinia. Painted chamber tombs are documented in Etruria from the early seventh century until the late third century BCE. In addition to those painted tombs at Tarquinia, examples are also known from Veii, Cerveteri, Vulci, Orvieto, Chiusi, and some smaller sites. The rich and colorful iconography of these tomb

paintings furnishes us with a great deal of information about Etruscan life and afterlife (Naso 1996; Steingräber 2006).

International Perspectives

Concerning the international/Mediterranean context of Etruscan tomb architecture and burial gifts, the following aspects are of particular interest:

1. Foreign influences, models, and parallels from/in Asia Minor (particularly in Phrygia, Lydia, Lycia, and Caria), Cyprus (Salamis), Syria (Ugarit), Macedonia, Apulia, Campania, Umbria, Sabina, and *Latium vetus*.
2. The spread of the so-called Macedonian barrel-vaulted tomb type via North Apulia/Daunia and Campania to South Etruria (Cerveteri, Orvieto) and later to North Etruria (Chiusi, Cortona, and Perugia).
3. Hellenistic temple and porticus tombs in the South Etruscan rock tomb area (Norchia, Sovana) clearly influenced partly by the mausolea and heroa of Asia Minor (concerning the general conception and "ideology") connected with the idea of heroization of the deceased and partly by decoration elements from Magna Graecia and Apulia.
4. The burial gifts in Etruscan tombs – especially those of the seventh and sixth centuries BCE – offer us a lot of information about the international connections between Etruria and the Near Eastern areas (Cyprus, Phoenicia, North Syria, Assyria, Urartu, Egypt), the Greek world (Attica, Corinth, Euboea, Aegean islands, Eastern Greece/Ionia, Magna Graecia, and Sicily), Asia Minor, Carthage, and Sardinia.

Future Directions

Some of the main Etruscan necropoleis such as the Banditaccia necropolis of Cerveteri are not yet completely and sufficiently published. We should make every possible effort to close these painful gaps. Main desiderata should be considered by the way more international cooperation, the creation of valid and helpful databases, and still more paleoanthropological, paleozoological, and paleobotanical research for the reconstruction of general living conditions in Etruria and the preparation and publication of a well-organized handbook/manual on Etruscan necropoleis, tombs, and tomb architecture including the most recent excavations, discoveries, and research.

Cross-References

- ▶ Burial Practices and Tombs in the Roman World
- ▶ Central Italy: Etrusco-Italic Sanctuaries
- ▶ Iconography, Etruscan
- ▶ Tombs, Greek (Iron Age)

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Tombs, Greek (Iron Age)

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Introduction

Funerary evidence is one of the traditional fields of Greek archaeology, but only in relatively recent times has it developed as a major source in its own right for the study of Greek culture and

society, the focus being traditionally on great public architecture and figurative art.

Historical Background

Among the many changes that took place in Greece between the end of the Bronze Age and the beginning of the Iron Age are those in burial customs. Multiple burials disappear and individual pit or cist tombs become the new standard. Cremation also establishes itself, even though not across the whole Greek world and not all at the same time. In important regions such as Argolis, Boeotia, and some of the islands (Sporades, northern Cyclades, Kos), inhumation was still in use until the end of the eighth century BCE. In the Peloponnesus, cremation remains a minority practice. On Crete cremation is prevalent, but there the traditional collective graves remained in use. In many regions, the two practices coexist, with a ratio variable from one site to another. The adoption of one rather than the other ritual also depends on sex and age, as illustrated by an exceptional burial of the tenth century BCE, the so-called *heroon* of Lefkandi, a monumental apsidal building with two deep trenches, one for horse burials and the other for a cremated man and a inhumated woman. In general, cremation was reserved for adults, while children were inhumed and infants buried in large pots (*enchytrismos*).

Athens is the best known case study for the development of Iron Age burial customs (Morris 1987). Starting from the Protogeometric period (1050–900 BCE), cremation is standard for adults, or at least the vast majority of them, while children are inhumed. It appears that some burial grounds are used predominantly for adults and others for children. Indicators of sex are objects – weapons and ornaments – and the shape of the ash container, neck-handled amphorae for men and shoulder-handled or belly-handled for women. The cinerary urn is buried in a trench along with pyre debris and burnt offerings. Grave goods are usually few, chiefly pottery vases, pins, fibulae, rings, and bracelets. In the Early Geometric (900–850 BCE) graves,

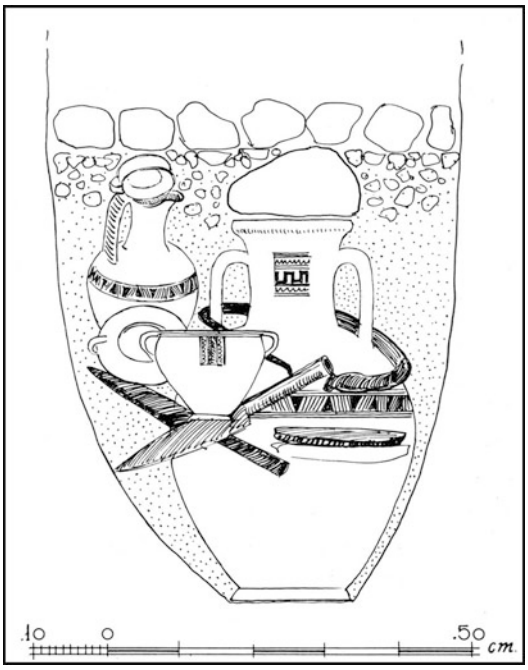

Tombs, Greek (Iron Age), Fig. 1 Athens, male cremation burial, c. 900 BCE (From *Hesperia* 21, 1952)

markers appear, undecorated stones and/or large vases, amphorae or craters, the latter reserved for men. Over the ninth century BCE and especially in its second half appear elite tombs with rich sets of grave goods including weapons, metal objects, gold jewelry, and ivory and faience imports, (Fig. 1) while child tombs become rare and the overall number of graves decreases. In the eighth century BCE, inhumation returns as the main ritual, but cremation is also found, in some cases in burials with bronze cauldrons as ash containers. These may allude not only to banquets and consumption of boiled meat, but also to myths in which cauldrons are used for magic rituals of regeneration and rebirth. Vases used as grave markers grow to monumental size and are decorated with scenes of funerary ritual such as the laying out of the body, and its being borne out to the grave. The second half of the eighth century BCE brings about many changes. Large family burial grounds featuring many tombs of children appear, and there is high variability in the composition of sets of grave goods and in the details of funerary behavior. In the last decade of

the century, elite tombs are found mostly in the rural districts, while burials become more standardized in the city cemeteries. These new developments have been interpreted against the background of the formation of the polis and its ideology.

A very different trend is visible in the seventh century BCE, not only in the number of graves, but also in the burial customs. Cremation returns and there is a strong increase of practices that give the dead a heroic status (e.g., Houby-Nielsen 1996). The body is burnt directly inside the trench (a ritual that in the *Iliad* is reserved to Patroclus), together with very few or no objects, while other offerings are found in deposits separated from the grave, among which the so-called offering ditches. These are remains of table-like structures made of wood and bricks on which food and fine banquet pottery was burnt. After the fire had died down, the ditches were sealed and covered by mounds or funerary buildings topped by large vases or stone markers. Mounds of the seventh century are clustered in family plots and remain in use sometimes for a very long time.

In the sixth century BCE, some aspects of the funerary ritual become simpler (end of the offering ditches, smaller mounds), perhaps as the result of laws against luxury in funerals mentioned by Cicero (*de Leg*. 2.64). However, stone stelai and statues are now largely used as a permanent sign of elite status, which ensure the lasting memory of the name and the rank of the dead. Two new large mounds are also built, one according to some scholars for the *genos* of the Alcmeonids, the other for foreign ambassadors of the period of the tyrants. The archaic cemetery near the agora, used between c. 560 and 500 BCE, has been attributed to the Peisistratids because of its location. However, it seems unlikely that these tombs, which were protected by a wall that was repaired after the Persian invasion and were respected for centuries, actually belonged to the tyrants. More likely this is a burial ground relative to the Areopagus that ceased to be used when the city space was more rigorously defined.

Outside of Athens evidence is less abundant, but some trends are visible. In the eighth century BCE at Argos, where inhumation was the norm, the upper classes used large cist tombs, among which some had full panoplies of weapons, probably alluding to the ideal of the Homeric hero, while ordinary burials are in large jars. In the same period, exceptional offerings, including monumental bronze tripods, were dedicated in the city sanctuaries as a clear demonstration of the emergence of an aristocratic class that publicly displays its status. At the end of the eighth century BCE, weapons are not included in burials anymore, a trend that is also found in the rest of the Greek world. With the disappearance of the tombs of hero warriors, exceptional offerings are exclusively reserved for the sanctuary, the common space where the aristocracy can display its status in a less strictly personal and familiar setting. The formation of an egalitarian ideology within the ruling class may also be reflected in the standardized Argive burial practices of the seventh century BCE, based on multiple burials inside large jars.

The model of the Homeric hero warrior is also important in Euboea. At Lefkandi, tombs cluster around the tumulus built on the Protogeometric *heroon*. At Eretria, adults are cremated either directly in pits or on pyres and their remains are collected in bronze cauldrons. A small group of seven adult graves arranged around a central male burial is exceptional not only because of the use of bronze cauldrons for men and women alike and their select grave goods – weapons and ornaments only – but also because of their location and their later history. When the city wall was built in about 680 BCE, the small cemetery, now just inside the West gate, was transformed into a hero shrine protected by an enclosure and marked by a triangular monument. This transformation is considered by some a strategy of the polis to appropriate the ancient "heroes" turning them into public figures, while others think that it was actually their own *genos* who, by making the tombs of their ancestors the object of public cult, claimed for the family a permanently prominent role in the developing polis.

Aspects of this funerary tradition are passed to the Euboean western colonies in Italy. At Pithecusa, there are no "hero" graves, but the

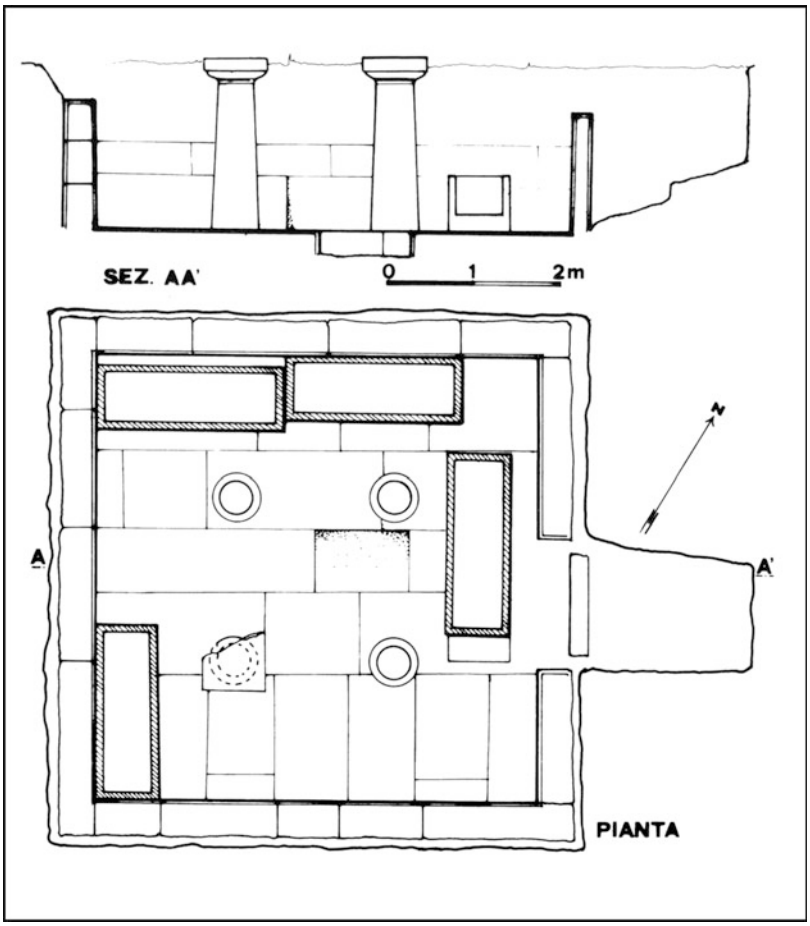

Tombs, Greek (Iron Age), Fig. 2 Taras, chamber tomb (From Lippolis 1994)

burial customs are similar, with cremation for adults, inhumation in pits for adolescents, and *enchytrismos* for infants. The cemetery is organized in tight family clusters. At Cuma, however, are also present elite cremation burials with bronze cauldron. Tomb 103 of Fondo Artiaco stands out for its rich set of personal ornaments and silver vases, which compares with princely burials of contemporary Etruria, Latium, and Campania. Between the late eighth and the early seventh century BCE, Euboean funerary customs influenced those of the elites of central Tyrrhenian Italy and constituted one of the components of a common culture which crossed ethnic difference and emphasized common class belonging.

The development of strong aristocracies in the Archaic age may also account for the reappearance of chamber tombs in some regions of the Greek world such as Cyrene, Thera, Aegina, Samos, Miletus, and Rhodes. Crete is a special case because of its traditionalism, which is the reason for the continuing use or reuse of *tholos* tombs and the fortune of chamber tombs. In some Eastern Greek poleis (Chios, Clazomenae, Ephesus, Smyrna, Larissa-on-the-Hermos, Pitane), elite tombs, frequently in sarcophagi, are covered by tumuli, perhaps after the Lydian model. Chamber tombs, some of which imitate banquet halls (Fig. 2), are also found at Taras until c. 470 BCE, when these and other manifestations of aristocratic culture fall into disuse, probably because of local political developments (Lippolis 1994). More isolated occurrences are found in other areas, such as the monument of Menekrates on Corfu, a massive cylindrical building of a type which is also known at Athens.

In the fifth century, there is a general decrease of funerary luxury while the city structures develop and increase their control. In Athens, funerary sculpture declines sharply and monumental tombs cease, the exception being the continuing use of ancient mounds, probably a surviving privilege of aristocratic *genoi*. In the cemeteries of Athens, inhumation is the prevailing ritual, but cremation does not disappear and is found in variable ratios in different burial grounds. Adults are buried in individual pit tombs, pits lined with slabs, tile graves, and sarcophagi, while children are buried in reused amphorae, pots, clay tubs, small tile graves, and small sarcophagi. Cremation is both primary and secondary, with a variety of ash containers including bronze vases. The overall impression of homogeneity is in part contradicted by the differences between cemeteries both in ritual and selection of grave goods, for instance, in the presence or absence of *lekythoi* (bottles for perfumed oil), on which tombs and grave markers are frequently represented (Fig. 3). In general, burials are accompanied by only a few objects, including vases for perfumed oil, cups, bowls, and jugs, and small lidded containers.

Tombs, Greek (Iron Age), Fig. 3 Athenian white-ground lekythos with woman at a tomb (From *Annali dell'Istituto Orientale di Napoli, sezione di Archeologia e Storia Antica* 1988)

In the last quarter of the fifth century BCE, when the polis structures are under pressure because of the Peloponnesian War, leveling ideology seems to be less effective. Funerary luxury reappears in form of figured stelai, monumental tombs and family enclosures lined along the roads entering the city. Selection of individuals with formal burial is now stricter and the number of tombs of children drops.

In the fifth century BCE, similar trends of standardization of burial practices are also found in the rest of Greece. One of the most spectacular cases is the South cemetery of Poseidonia (Italy), established in the early fifth century BCE following an extremely regular layout (Cipriani 1989) (Fig. 4). Graves uniform in type and size (pits and cists) and arranged in parallel rows occupy intensively all space available. There is no distinction between family plots, which are however visible in the North cemeteries, established when the city was founded c. 600 BCE. When present, objects in tombs are few and mark sex and age of the dead, and its related social role. Strigils and oil flasks alluding to the gymnasium are reserved for young men. This image of an ordered and egalitarian community, where differences depend on age and sex, not on birth and status, is projected at the time when the urban area undergoes significant transformations emphasizing collective identity, such as the construction of a hero shrine of the founder in the late sixth century BCE and of a round assembly building in the early fifth century BCE.

The most striking exceptions to the general rule are mostly limited to peripheral areas at the margins of the polis world, such as Sindos on the Thermaic Gulf, where burials are exceptionally rich. Tombs feature bronze objects, gold jewelry, weapons, miniature models of banquet instruments and wagons (four-wheeled for women and two-wheeled for men), and gold-leaf masks covering the face of the deceased. The burials of Sindos still represent the traditional image of the aristocratic *oikos* based on war, banquet, and luxurious lifestyle, which had

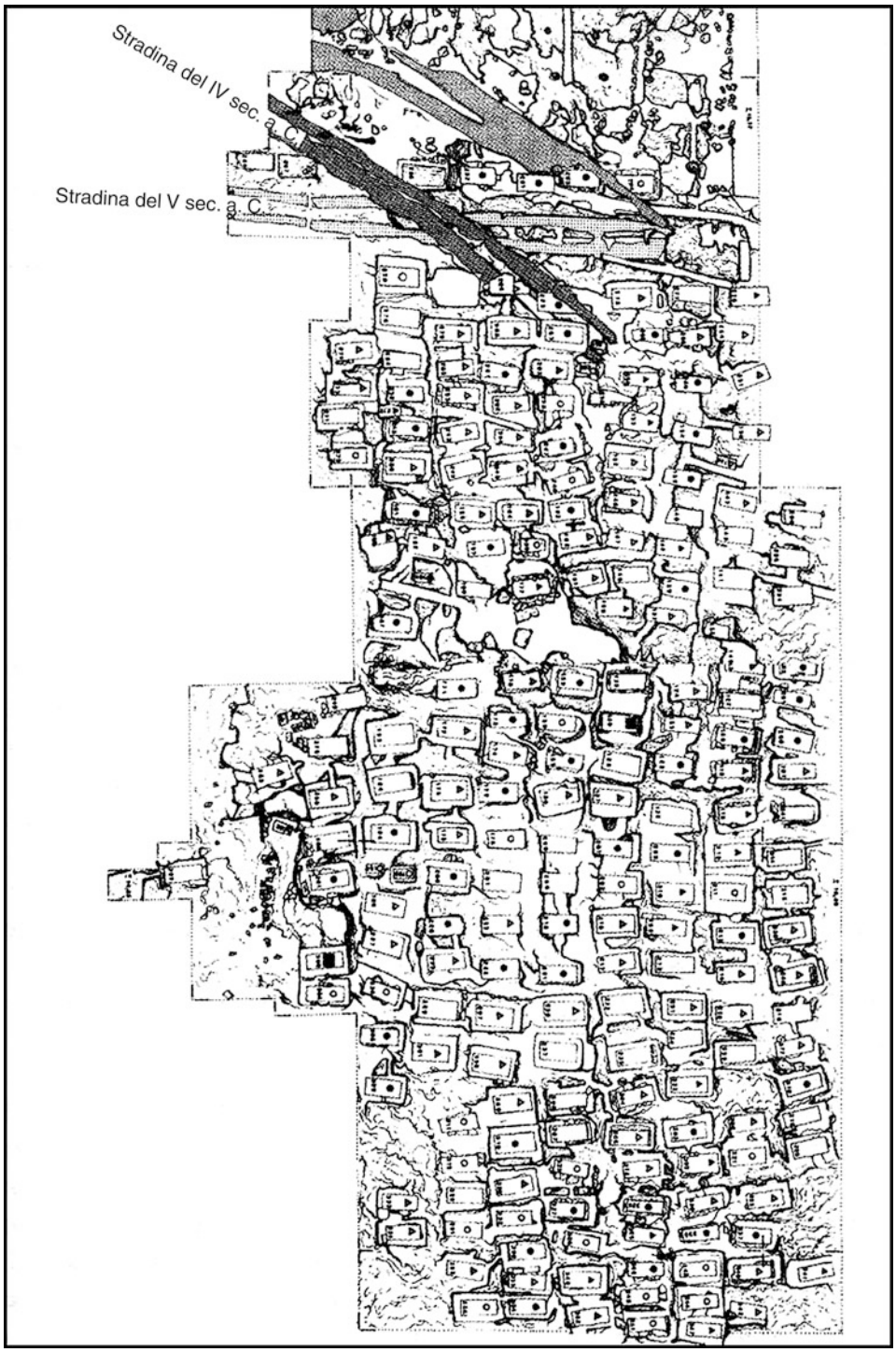

Tombs, Greek (Iron Age), Fig. 4 Poseidonia, cemetery of S. Venera (From Cipriani 1989)

Tombs, Greek (Iron Age), Fig. 5 Athens, Kerameikos cemetery (Photo by Giovanni Dall'Orto, Nov 12, 2009, copyright free – public domain on Wikipedia Commons)

disappeared in the rest of Greece with the full development of city structures.

However, as mentioned for Athens, in the last decades of the fifth century BCE, signs of the crisis of the egalitarian model of classical polis are visible in several areas of Greece, along with the diffusion of practices aimed at individual salvation such as the "Charon's fee." Coins are first found in burials at Corinth and other cities of Peloponnesus, and soon after in the rest of the Greek world including the Western colonies. The interpretation of this practice is not univocal, but its first literary mention in the *Frogs* of Aristophanes (vv. 140 and 270) sounds like the parody of a custom that was well known to the audience and was perceived as alien from the traditional polis culture supported by the playwright.

The fourth century BCE is a period of transition and continuing crisis in the egalitarian principles of the classical polis, as demonstrated by the blooming of Athenian funerary sculpture. The elites compete in the construction of impressive family tomb enclosures, with the wall facing the road in fine ashlar masonry topped by stelai, other markers of different shape, and sculptures of sirens, lions, and dogs (Fig. 5).

Demetrius of Phaleron, governor of the city established by Cassander, reacted against these trends in his laws, probably influenced by ideas developed within the Peripatetic school. Theophrastus, the successor of Aristotle, is said to have explicitly forbidden any ostentation and unnecessary expense for his own burial (Diog. Laert. 5.53). Cicero (*de Leg*. 2.66) mentions the legislation of Demetrius against funerary luxury, which included restrictions on grave markers. The effect of these measures was apparently serious and may have been a major factor in the sudden crisis of Attic funerary sculpture, which did not recover visibly even after the end of his rule. The political and economic decline of the city probably also played a role. In the Hellenistic age, tomb enclosures were still in use, but were not as monumental as they used to be. In Hellenistic Attica, cremation became more frequent, but in general, burial customs did not change much. Among the new elements are gold wreaths that mark the heroic status of the dead, following the cultural trends of the period, and the diffusion of the "Charon's fee."

It is not in Athens but in other regions of the Hellenistic world that change in burial customs is

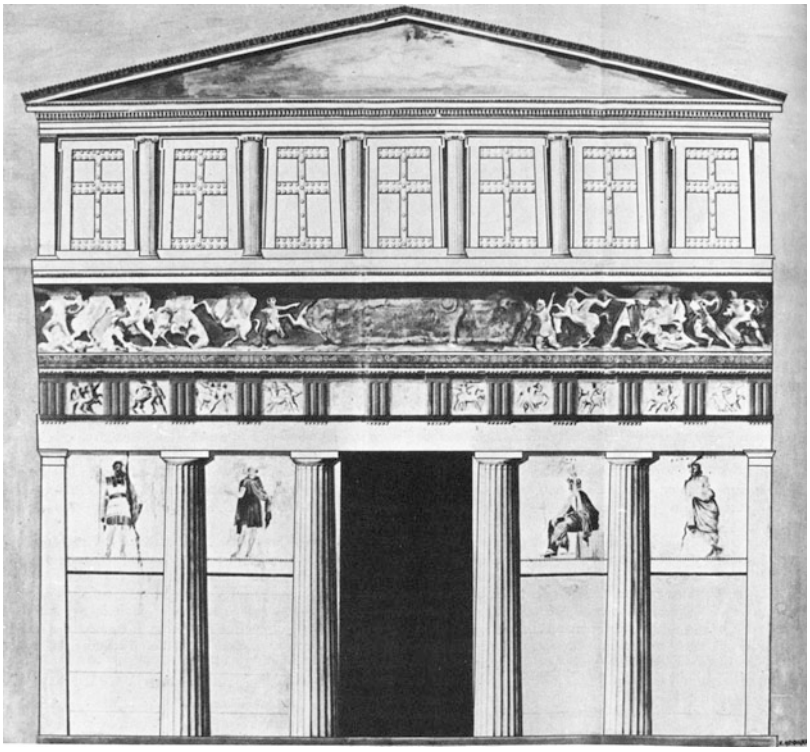

Tombs, Greek (Iron Age), Fig. 6 Facade of the Great Tomb of Leucadia (From Charboneau et al. 1978)

most apparent, frequently influenced by trends that had developed outside the Greek world, in regions where Greek architecture and art had been adapted to meet the needs of very different societies (Fedak 1990).

In Macedonia, the aristocracy was buried in tombs marked by monumental mounds. The "heroic" ritual of cremation in metal urns (including gold and silver) probably alludes to the model of the Homeric poems, which were an integral part of the culture of the Macedonian elite. References to the "Homeric" customs were combined with eschatologic doctrines. The crater used as ash container in a tomb of Derveni is decorated with scenes of complex Dionysiac symbology, and in the pyre debris were fragments of a papyrus containing a philosophical and religious treatise. Grave goods, when they have escaped looting, are very rich. The royal burials were accompanied by precious weapons, sets of silver and bronze vessels, and luxury items of all kinds. In the second half of the fourth century BCE, a specific tomb architecture developed in Macedonia, consisting of a mound covering a barrel-vaulted chamber with an architectural facade, and often enriched by wall paintings and sculptured stone beds and thrones (Fig. 6). This typology remained typical of Macedonia and had limited influence outside the kingdom, mostly in the bordering regions of Thrace, Epirus, and Thessaly, but it might have influenced the development of chamber tombs with architectural facade in other areas of the Hellenistic world.

Another influential tradition is that of the monumental tomb-heroon which had developed in Asia, where local elites had long adopted Greek architectural and stylistic models for original creations. An early example is the Monument of the Nereids at Xanthos in Lycia, a synthesis of the local tradition of tombs set at the top of a rectangular pillar, and Greek temple architecture and sculpture (Fig. 7). This trend is also seen in the Mausoleum of Halicarnassus, an awe-inspiring dynastic tomb decorated by Greek artists, built in the center of the new capital of the

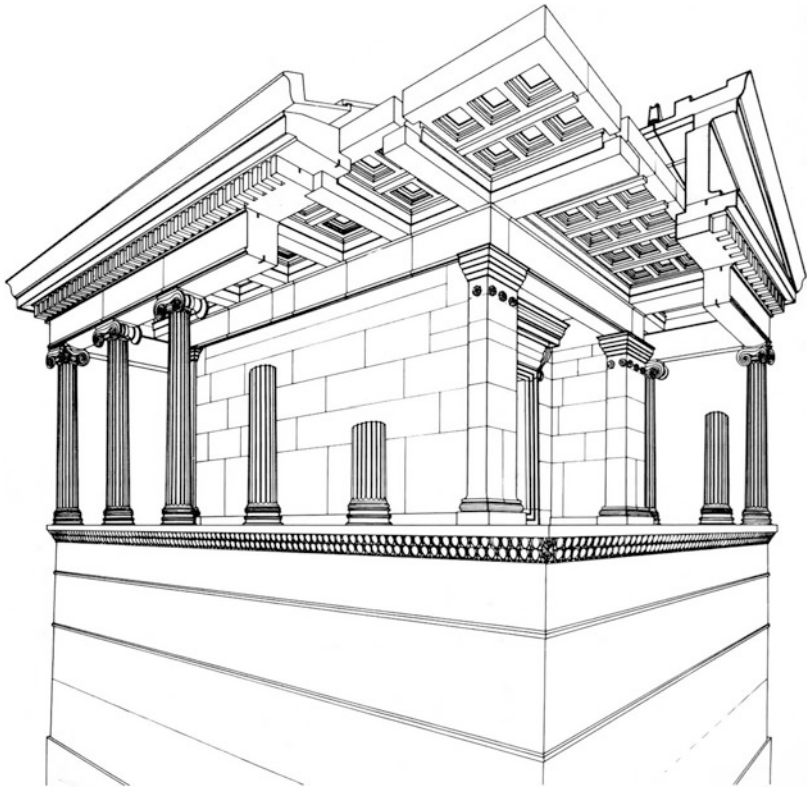

Tombs, Greek (Iron Age), Fig. 7 Reconstruction of the Monument of the Nereids of Xanthos (From Bianchi Bandinelli & Paribeni 1976)

Hecatomnids, which would be the inescapable model and comparison for every later monumental tomb. Monuments influenced by the Mausoleum typology – stepped base, tall podium, temple-like upper level with free or engaged columns, pyramid with sculpture group at the top – are, for instance, the Lion tomb at Knidos and the mausoleum of Belevi. The tomb of Mausolos is also the ultimate model of the many types of towering tombs of the late Hellenistic period, such as the "Tomb of Theron" at Akragas and the tower tombs of Numidia. This typology was also successfully adopted in Roman Italy (Coarelli & Thébert 1988).

In Asia, another kind of tomb architecture developed as well, rock-cut chamber tombs with an architectural facade. They were already known in the Persian Empire, for instance, in the royal necropolis of Naqsh-e Rustem. Elements of Greek architecture are progressively incorporated and their facade assumes the appearance of a temple-like architecture. These tombs are found over a large part of Anatolia, where suitable rock formations exist. The most conspicuous ones are in Lycia and Pisidia.

The tombs of the Hellenistic kings are largely unknown. Our main source of information on most of them is short and not very informative literary accounts. The most famous, the tomb of Alexander the Great in Alexandria, was probably covered by a tumulus and, after the renovation decided by Ptolemy IV, was incorporated into a complex also including the graves of the Ptolemies. The most reliable image of the monument is probably preserved by the Mausoleum of Augustus, who visited the tomb of Alexander and regarded him as a great model. If the tomb in its last version was actually a round monument with cylindrical podium, it may be the model of a series of round monumental tombs found both in the Hellenistic and Roman world. Except for the tombs of Vergina and the tombs of the vassal kings of Rome of the latest Hellenistic period, the archaeological record is

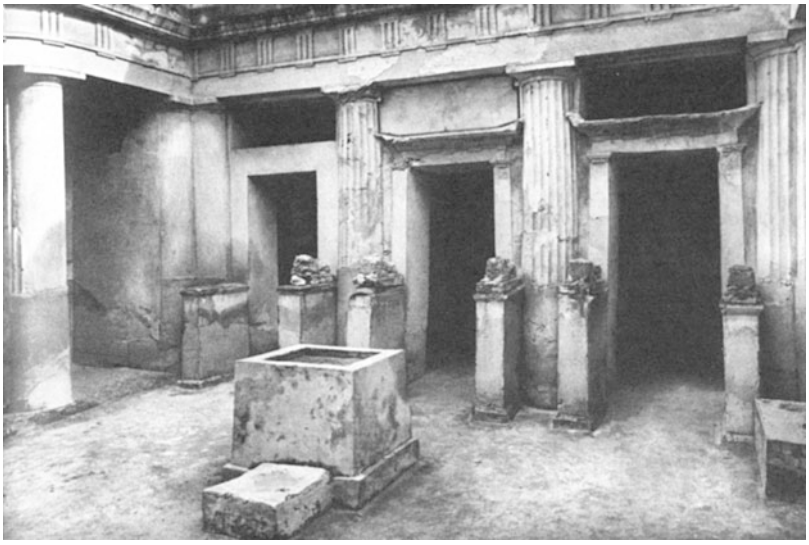

Tombs, Greek (Iron Age), Fig. 8 Alexandria, tomb 1 of the necropolis of Mustafa Pasha (From Charboneau et al. 1978)

quite small. The mausoleum of Belevi near Ephesus, which closely follows the model of Halicarnassus, might originally have been planned for Lysimachus, and some believe it was used for Antiochus II.

In the Hellenistic period, there is tension between the egalitarian classical tradition, which was still a revered ideological model in the Greek cities, and the rise of a select elite who was eager to express its status. In the cities of Asia Minor, the upper classes frequently limit their funerary representation to family enclosures with stelai following the tradition of late classical Attic sculpture, with the addition of banquet scenes where the deceased is accompanied by family and servants. Representations and epitaphs focus on the traditional moral and civic virtues. Nonetheless, especially in the advanced Hellenistic period, urban elites are more and more willing to follow different models of funerary self-representation. The members of the elite are celebrated in cemeteries as heroes and receive exceptional honors (statues and inscriptions) in the urban setting. In the ancient Spartan colony of Taras, a new funerary tradition develops, featuring tomb monuments with complex architectural and figural decoration, chamber tombs, and richer sets of grave goods, while the earlier system, based on very standardized tomb typology and grave goods, slowly disintegrates (Lippolis 1994). In the family tomb of Archokrates on Rhodes, the model of the rock-cut tomb with architectural facade is expanded to form a sort of two-level theatrical stage including altars, a design which fits in with the general "theatralization" of many aspects of public life in the Hellenistic cities. Another monument exemplary of the developing trends is the tomb of Charmylos on Kos, with a semi-subterranean chamber and a two-storey upper building, including an inscription which states that the monument and the surrounding garden are sacred to the Twelve Gods and Charmylos, "hero of the Charmyloi."

In Alexandria, a metropolis of recent foundation, funerary customs are as diverse as its population. One of the most common is secondary cremation in urns of different types, among which is a type of *hydria* (water pitcher) with painted decoration and sometimes inscriptions. Inhumation is also practiced. There are both individual tombs and chamber tombs of different sizes, the largest with open courtyard arranged as a pseudo-peristyle with architectural facades, on which burial chambers open (Fig. 8). These are also found in areas under Ptolemaic authority (Cyprus and Cyrene). Other collective tombs are long corridors with a number of small loculi

closed by slabs. Sometimes, especially in the later Hellenistic period, decoration is a blend of Greek and Egyptian elements.

The great variability of funerary behaviors and strategies of the Hellenistic periods, with some general trends and a number of local traditions, is not interrupted by the Roman conquest. Instead, it becomes a major component of the funerary culture of the Roman world.

Key Issues/Current Debates

In the last half century, the funerary rituals and the attitude to death of Greek society have been investigated by scholars of different schools. Both the Anglo-American Post-Processual Archaeology and the French and Italian Anthropology of the Ancient World have strongly criticized the search for universally valid "laws" in the interpretation of funerary evidence attempted by Processual Archaeology in the 1960s and 1970s (e.g., Saxe 1970; Binford 1971). From different points of view, both schools have stressed the complexity of the relationship between burial customs and society. Funerary rituals, of which burials are the main evidence available to us, are considered as a complex system of symbols, which does not constitute an immediate and reliable representation of the society that produced it. Rather, in those rituals, the image of that society is constructed and re-interpreted through the filter of ideology, using a specific code of symbols (e.g., Hodder 1984; D'Agostino 1985). As a result, funerary practices reflect the identity of the dead as it is constructed and represented by the living based on their vision of life, death, and the relationship between these two dimensions. Therefore, burials, rather than representing the individual, are a major source of information on the group he/she belonged to. The two schools also agree on the need for integration of the funerary record with all other categories of evidence available in order to place it in its specific context and decipher its language.

Burials have been largely used as a major source for the study of Greek society in all its phases, but have played an especially important role for its earliest period, when literary and epigraphic evidence is scanty and the non-funerary archaeological record very incomplete. As a result, burial analysis has been central in the recent debate on polis formation. Scholars have outlined general trends which can be interpreted as products of the developing collective ideology of the polis, such as the abandonment of ostentatious funerary practices and the transfer of the richest offerings from the grave to the common space of the sanctuary. These are very stimulating results, even though the model of classical polis should not be automatically applied to the study of much earlier periods when social dynamics were substantially different (Polignac 1996).

International Perspectives

In the field of the study of Greek burials, the contribution of the Anglo-Saxon school – where theoretical debate has developed especially within Prehistoric archaeology and anthropology – has concentrated especially on the study of the so-called Dark Age. The work of I. Morris on the cemeteries of Athens between Submycenaean and the Archaic age still follows some principles of the Processual approach, namely, the use of quantitative analysis, but takes into account the great problem of representativity of funerary evidence, at least from the demographic point of view. In some phases, the Athenian cemeteries present an acceptable representation neither of the demographic nor of the social structure of the population. This picture is explained by assuming that access to a formal burial was restricted, and in some periods, it became the exclusive privilege of the elite. Statistic methods have been used by J. Whitley in his study of the relationship between artisanal production and social level in the grave goods of the Athenian Dark Age (Whitley 1991). Both works have received appreciation and criticism, especially regarding the issue of quantitative analysis (Shanks 1991; D'Agostino & D'Onofrio 1993). The utility of such methods was defended by Morris, although his theoretical position has become closer to Post-processual archaeology (Morris 1992). The French and Italian schools

have focused especially on the most complex and structured aspects of Greek funerary evidence, such as the iconography of figured monuments, and its relationship to literary sources (e.g., Gnoli & Vernant 1982). Other important academic traditions, such as the German one, have also produced valuable contributions – e.g., the excavation of the Kerameikos cemetery – but the theoretical aspect has been less developed, particularly in classical archaeology. However, in the last decades, German classical archaeology has been more active in this field, with a special interest in the potential of quantitative methods (e.g., Graepler 1997).

Future Directions

In light of the current views of the nature and limits of the evidence, the prevailing attitude today leans toward the selection of relatively homogeneous and sufficiently large samples, especially if the data of the cemeteries can be integrated with those from settlements, cult spaces, literary tradition, etc. The actual availability of such samples has been scarce, though. A very few Greek cemeteries have been extensively excavated, and even fewer are those where adequate procedures have been used, the majority of information being from salvage excavations. Cases like the necropolis of Pantanello in the territory of Metaponto, fully and accurately excavated, studied, and published (Carter et al. 1998), are still exceptions. Therefore, the state of the evidence often obstructs the use of Greek funerary evidence to its full potential. The systematic diffusion of analysis of human skeletal remains – still not a standard practice – is likely to have a dramatic impact. Current debates on demographic trends and representativity of funerary evidence are in fact largely based on reasonable but arguable assumptions about the archaeological indicators of sex and age. It is also to be expected that the increase of quality and quantity of data produced by the advancement of methods of analysis and the refinement of theoretical background will make the issue of the use of quantitative methods especially relevant in the near future.

Cross-References

- ▶ Burial Practices and Tombs in the Roman World
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Polis

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Topography of Rome

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Introduction

Since the topography of Rome is concerned with a range of evidentiary material, any approach must involve a detailed consideration both of landscape and cultural-historical material. It is also notable that while the textual and epigraphic corpora are static (by virtue of being ancient), archaeological material continues to emerge that has direct bearing on the study of the city's topography, as clearly demonstrated by the excavations undertaken for the construction of Rome's newest metro-train line (Egidi et al. 2010). Such new discoveries always carry with them the possibility of rewriting in substantial ways the topography of the city.

Definition

Derived from Greek, topography literally means "place writing" and has, since the Renaissance, constituted a major branch of Roman studies. The topography of the city of Rome has come to be defined as its own subdiscipline within the field of Roman archaeology. As such, this area, by necessity, combines the study of the ancient literary and epigraphic record with the archaeological, architectural, and spatial study of the ancient city. The field is narrow in its purview but extremely interdisciplinary and involves the study of the city from its origins in the early first millennium BCE to the present day. Advances in digital recording and modeling promise to expand the scope of topographic studies.

Key Issues and Current Debates

The Site of Rome

The site of Rome comprises a number of steep-sided hills with relatively flat tops and subsummits in the valley of the Tiber river. The Tiber and Rome are essentially linked in that not only did the river help determine the site ideal for settlement and facilitate commerce but its frequent flooding also provided continual challenges for managing and mitigating flood waters and the damage they caused (Le Gall 1953; Aldrete 2007). From the early Iron Age onward, these hills served as *loci* for human settlement. The initial instances of settlement in the Tiber valley came in the form of small village communities, distinguished in the archaeological record by means of the remains of domestic architecture (often executed in wattle and daub) as well as by means of burials. Prominent villages have been identified on the Palatine, Capitoline, and Esquiline hills, mostly by means of the discovery of outlying necropoleis related thereto; of special note is the Iron Age cemetery known as the

Sepolcretum (Gjerstad *Early Rome II* 1956). The swampy and seasonally flooded valley surrounded by these hills initially served as a necropolis (a key area of which is known as the *Sepolcretum*) but later came to be transformed into a central civic space, the *Forum Romanum* (Coarelli 1983–1992). This formerly inundated space was made usable by a massive program of artificial landfills; those anthropic layers have been sampled and studied by archaeologists, including Giacomo Boni, Einar Gjerstad, and, most recently, Albert Ammerman (Gjerstad *Early Rome III* 1960; Ammerman 1990, 1996), leading to the conclusion that the intentional landfill project occurred during the seventh and sixth centuries BCE.

Early and Archaic Rome

The origins of the settlement we call Rome date to the Iron Age when independent village-sized communities gradually coalesced into a state-level archaic community. The state formation mechanisms remain a matter of scholarly debate, although recent proposals include theories that point to the sharing of power, resources, and territory amongst tribal leaders (Terrenato 2011). The foundation story perpetuated in antiquity from at least the third century BCE onward focused on legendary figures such as Romulus, making him the responsible party for Rome's foundation (Liv. 1.9–13; Ovid *Fast*. 3.167–258; Ovid *Ars* 1.101–34; Plut. *Rom*. 14–15). While some scholars relegate Romulus to the mythical margin, others embrace his historicity wholeheartedly (Carandini 1997; 2007). By the sixth century BCE, Rome was a powerful state and the elite architecture of the city – both private and sacred – had achieved monumentality, with the poliadic temple of the city (*Iuppiter Optimus Maximus*) being the largest structure of peninsular Italy.

Republican Rome

The Republican period (fifth through first centuries BCE) may be characterized by Rome's growth, both in terms of human population and architectural elaboration. Overall, however, the Republican period often witnessed haphazard architectural development as even extensive projects often represented the interests and prerogatives of individuals rather than the organized efforts of a centralized, state-level program. To this end leading aristocrats and those attempting to climb the ladder of the social hierarchy utilized Rome's physical space as a mechanism of message making in order to solidify personal and familial status in full view of the Roman populace. Showy personal monuments such as the *fornix Fabianus* (Val. Max. 3.2.17; Appian, *BellCiv* 1.16), the *Sepulcrum Scipionum* (Cic. *Tusc*. 1.13; Coarelli 1972), or the *Columna Rostrata* of Caius Duilius (Plin. *HN* 34.20) all served to cue collective memory responses on the part of the Roman viewership, all the while appropriately celebrating the dedicant and/or honorand. The commemorative force of Republican public monuments would be reinforced by Augustan dedications like the *Summi viri* in the Forum of Augustus (Suet. *Aug*. 31) and the *Fasti Triumphales* (Degrassi 1954).

During the Republican period (fifth through first centuries BCE), the topographic development of the city of Rome can perhaps best be described as haphazard, given that during some periods (e.g., the fifth century) there is evidence of very little construction, while at other points (e.g., second and first centuries) an enormous amount of development unfolded. Various scholars have been able to produce fairly comprehensive listings of information on monumental building in the Republican period based on the study of the textual and archaeological records (Crawford & Coarelli 1977; Ziółkowski 1992).

The middle of the first century BCE altered the arc of Rome's topographic growth forever as the political arena spawned a series of powerful, charismatic leaders who deftly employed programs of public construction as a means to bolster claims of political legitimacy and endear themselves to the urban populace. Among these men Pompey the Great, Julius Caesar, and Augustus are notable, not only in that their building programs were well conceived (and generally well received) but also in that they provided a paradigm on the basis of which later

imperial patrons would operate. Augustus' building program, described in his own words in his list of achievements (*Res Gestae Divi Augusti*), transformed the city, particularly with respect to its public and sacred architecture (Favro 1996).

Imperial Rome

The Imperial city from the time of Augustus onward may be best characterized by programs of civic architectural patronage interrupted by periodic unrest that generally disrupted the city's fabric and its upkeep. The aforementioned Augustan building program created a high standard of achievement, as the scope and scale of this program would have been difficult to equal. Augustan complexes transformed the city, totaling hundreds of thousands of square meters of built surface in the form of civic, sacred, and familial buildings, not to mention infrastructure projects. Augustus' successors struggled with their roles as civic patrons, although the emperor Claudius notably expanded the *pomerium* of the city (Tac. *Ann*. 12.23.2–24). The great fire of Rome under Nero (64 CE) radically altered the imperial city as, in wreaking havoc in the city center, it cleared a large amount of land that was subsequently reallocated for imperial usage, most famously in the construction of the Neronian palace park known as the *Domus Aurea* (Plin. *HN* 36.111; Suet. *Nero* 31; Ball 2003). While the Neronian fire and subsequent program was radical, it was short lived as the subsequent building programs of the Flavian emperors reallocated a good deal of space for public usage, some in quite ostentatious ways – notably the Flavian amphitheater, *Templum Pacis*, and the Baths of Titus (Suet. *Vesp*. 9; Darwall-Smith 1996). The Flavian program moved Rome into the second century CE in a stable and reasonably well-maintained state, in spite of a second major urban fire in 80 CE. The second century, Rome's most stable and prosperous period, saw Rome benefit directly from the patronage from a string of adoptive emperors stretching from Trajan to the Antonines. Key monumental programs like the Forum of Trajan and its honorific column articulated imperial ideology while taking full advantage of the tableaux of Rome's urban landscape (Packer 1997; Meneghini 2006). Even after the end of the Antonine line, the model of the ideologically informed imperial building program continued to inform the actions of subsequent emperors, even those who found themselves in office in turbulent and uncertain times in the later second and third century CE (DeLaine 1997; Cooley 2007); this continuity is also evident in public, commemorative monuments such as the Decennalia monument (*CIL* 6.1204).

Rome in Late Antiquity

The arrival of the fourth century CE signaled significant changes for the city of Rome. Its diminishing strategic and economic importance spelled a gradual end to monumental public building programs, especially after Constantine I transferred the center of administration to the city of Constantinople in the eastern Mediterranean. Nevertheless, the first third of the century witnessed massive building at Rome, in part to help bolster Constantine's claim to power. These programs included the completion of projects belonging to his predecessors, notably the *Basilica Nova* (Pol. *Silv*. 545), alongside new programs such as the Arch of Constantine adjacent to the Flavian Amphitheater (*CIL* 6.1139). All the while Constantine was further altering Rome's topographic history by making way for Christianity in the public sphere, creating a series of Christian basilicae at the urban periphery; these sites would prove vital in Rome's history as their role as pilgrimage locales would continue to make Rome relevant even after the fall of the western empire. It seems that the notoriety of Rome's monuments continued in Late Antiquity, as demonstrated by notable episodes such as the visit of Constantius II to Rome in the middle of the fourth century when he stopped and marveled at the Forum of Trajan (Amm. Marc. 16.10.15). *Ex novo* construction tapered off after the fourth century; the last ancient monument to be erected in the Forum Romanum was the Column of Phocas in 608 CE. The ancient city, with greatly contracted population, gave way to the Medieval city, wherein ties to the past were broken and ancient monuments both reused and cannibalized

(Arena et al. 2001–2004). It would take the force of the Renaissance to reestablish links to the past.

Organization of the Ancient City

The organization of the ancient city of Rome began with the demarcation of its ritual boundary (*pomerium*), an act ascribed to Romulus. The *pomerium* was an essential and inviolable aspect of an Italic city, as it regulated actions connected to the settlement and the conduct of business inside and outside the limit. The regulation against adult intramural burial stems from the pomerial tradition. The same traditional foundation story holds that Romulus created a settlement centered on the Palatine hill, referred to as *Roma quadrata* (Tacitus *Ann*. 12.24). The meaning of this term remains obscure and scholars debate whether it refers to the *pomerium* of early Rome or perhaps to an augural *templum* of sorts. The growing city of Rome was eventually divided into districts (*regiones*), an act ascribed to Servius Tullius (r. 578–535 BCE). These regions (*regiones quattuor*) were named *Suburana*, *Esquilina*, *Collina*, and *Palatina* (Varro *LL* 5.45; Liv. 1.43; Dion. Hal. *Ant. Rom.* 4.14) and may have corresponded to latent tribal or familial identities in the early city. The fourteen Augustan regions established in 7 BCE replaced these Servian districts (Lott 2004). Each district was further subdivided into neighborhoods (*vici*). This redistricting reflected a need for increased administration in a city whose burgeoning population must have stressed the central authority's resources. These regions (and their neighborhoods) served as administrative districts in the city and also may be connected to the creation of shared, place-based memory and identity. The ancient boundaries of the districts can be determined, although not with absolute certainty, by means of the Late Antique documents known as *Curiosum et Notitia* (The *Curiosum* (Vat. Lat. 1984, 3321, 3227) and the *Notitia* (Vienna *Latinus* 162)). These documents could have originated from the city's administrative apparatus, as the office of the urban prefect (*praefectus urbanus*) was responsible for city administration (for the documents, see Arce 1999).

Rediscovering Rome's Topography

It is difficult to pinpoint the time at which an awareness of Rome's topography started, but Athanasius Kircher (vix. 1601/2–1680), the Jesuit polymath, certainly had an awareness of spatial studies vis-à-vis the archaeology of Rome, as demonstrated by his mapping of the Roman Campagna (Kircher 1671; Evans 2012). This topographic awareness involved the exploration of ruins in the landscape, exemplified by the aqueduct hunter (and Kircher's contemporary) Raffaello Fabretti (vix. 1618–1700) and followed on the previous century in which papal authority had begun to direct the creation of plans of the city of Rome that came to include ancient ruins. The landmark plan of Leonardo Bufalini, published in 1551 under Pope Julius III, included reconstructed plotting of the ruins in the city and represented a new milestone in the mapping of the ancient city (see edition of Ehrle 1911). Bufalini's work would inspire the great topographers Giambattista Nolli (vix. 1701–1756) and Giovanni Battista Piranesi (vix. 1720–1778). The former's *Pianta Grande di Roma* was engraved on 12 copper plates and published in 1748. It is simultaneously an aesthetic masterpiece and a hyper-detailed rendering of the city of Rome from a bird's eye perspective. It, along with Bufalini's plan, proved fundamental, influencing Piranesi in his creation of his various views – both fantastical and realistic – of the ancient city. Piranesi published his *Pianta di Roma e del Campo Marzio* in 1774 and his *Le antichità romane* in 1784. These cartographers certainly changed popular perception of Rome and began the process of contextualizing her many ancient ruins; they perhaps also carry forward an ancient worldview that also had an awareness of the city's topography. The rediscovery of the first fragments of the Severan marble plan or *Forma Urbis Romae* in 1562 represents a major milestone in the study of Rome's topography (viz., Bellori 1673). Incised on marble slabs, the Severan plan presents a view of third-century CE Rome at a scale of 1:240 and provides many clues as to how the Romans conceived of their own world (Reynolds 1996; Trimble 2008). The plan has been studied

exhaustively and continues to be the focus of ongoing work undertaken by Stanford University (Carettoni 1960; Rodriguez Almeida 2002). It is not clear whether the Severan marble plan was meant to be a functional map or a decorative installation; what is clear is that the orientation of the city differs radically from the traditional north-oriented maps used today. The Severan marble plan served as an enormously important influence in the nineteenth century when the pioneering Roman archaeologist and topographer Rodolfo Lanciani (vix. 1845–1929) produced his own landmark *Forma Urbis Romae* between 1893 and 1901. Lanciani's map, divided into 46 sheets, presented the city at a scale of 1:1000 and plotted the ancient topographic features (in black ink) and the modern urban features (in red ink). The *Forma Urbis Romae* influenced twentieth-century projects, including Italo Gismondi's famous model of Rome ("Il Plastico") produced for the Museo della Civiltà Romana from 1935 onward. That model, at a scale of 1:250, shows the city of Rome at the time of Constantine I in the fourth century CE. Lanciani's map remains an important source for topographic studies.

Topographic Scholarship

The early to middle twentieth century saw the creation of other major topographic compendia, including the *Topographical Dictionary of Ancient Rome* produced by S. B. Platner and T. Ashby (1929), that built on major nineteenth-century scholarship (Jordan & Hülsen 1871–1907). In the *Fontes ad topographiam veteris urbis Romae pertinentes* (1952), G. Lugli collected the relevant literary and epigraphic resources for the study of the topography of the city of Rome; these were organized in 8 volumes according to the Augustan regions of the city. The *Fontes* are essential for the study of the city and its monuments in that a great deal of the specific, place-based knowledge that survives is preserved in textual form. The later twentieth century saw the publication of two major topographic lexica, one for the city of Rome itself (Steinby 1993–2000; continuing now in supplementary volumes) and another for its *suburbium* or hinterland (La Regina 2001–2008). These lexica record entries for named topographic features; an additional companion series has now been established to document the history of urban excavation at Rome (e.g., Coarelli & Battaglini 2004, 2006), which taken along with Lanciani's fieldwork diaries (Buonocore 1997-present) provide invaluable insight into the process by which the topography of the city has been explored and, in many cases, clarified. Also worthy of mention is a pictorial compendium to the topography of the city compiled by E. Nash using the photographic archive of the Deutsches Archäologische Institut (Nash 1962). These photographs remain an invaluable resource for the study of the city and its archaeological remains. Series of twentieth-century excavations have produced numerous site- and/or monument-based studies that are invaluable for the study of the city and, in particular, its topographic problems. The recently produced *Atlante di Roma antica* (Carandini 2012) draws on this wealth of excavation information and presents reconstructed plan and elevation views for the ancient city.

International Perspectives and Future Directions

The study of Rome's topography has always been possessed of an international dimension, as the collaboration between English, German, and Italian scholars drove the major advances in Roman topographic scholarship during the nineteenth century. The Anglo-Italian connection in topographic studies remains strong, cemented in the early twentieth century by Thomas Ashby, then director of the British School at Rome. In the twenty-first century topographic scholarship continues to benefit from international cooperation; this is particularly true as digital initiatives, including linked data projects, continue to widen the reach of traditional scholarship. Projects such as Stanford University's digitization of the fragments of the Severan marble plan and the digital modeling of Rome undertaken by the University of California, Los Angeles and the University of Virginia demonstrate that not only

is the study of Rome's topography international in nature but that digital applications represent an important new phase field this field of archaeological scholarship. These visualization studies move the wealth of topographic information and site-based knowledge into the virtual space, allowing for various modeling exercises (e.g., Johanson 2009; Favro & Johanson 2010). Just as field archaeologists have embraced the power and potential of digital visualization approaches, so too has Roman topography. This is true not only in terms of 3D modeling but also in terms of employing Geographic Information Systems (GIS) as an instrument for field recording and post-excavation analysis. The potential of Light Detection And Ranging (LIDAR) is now emerging as a revolutionary tool for studying both landscape and topography; in the case of a built environment like Rome, LIDAR allows for the construction of digital elevation models (DEM) and digital terrain models (DTM) that allow for ancient landscapes to be reconstructed. While these technologies represent the lead edge of today's scholarship, their aim is perfectly in line with the long history of the study of Rome's topography, from the sculptors of the Severan marble plan, to Bufalini, Nolli, and Piranesi, to Lanciani and Gismondi, and to the scholars of today.

Cross-References

- ▶ Ashby, Thomas
- ▶ Boni, Giacomo
- ▶ Domestic Architecture, Roman
- ▶ Forum
- ▶ Lanciani, Rodolfo
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Basic Biographical Information

Ryuzo Torii (1870–1953) (Fig. 1) was a Japanese archaeologist and anthropologist. He was born in Tokushima in 1870, as the second son of a wealthy tobacco merchant. He left elementary school in the second grade and studied anthropology by himself. He became a member of the newly established Tokyo Anthropological Society when he was 16 years old and moved to Tokyo in 1892. He obtained a job organizing specimens for anthropology classes at the Tokyo Imperial University (now the University of Tokyo). Torii undertook his first fieldwork abroad at the Liaodong Peninsula in 1895 by chance and became fascinated with dolmens. This was the beginning of his tireless fieldwork in many areas of East Asia such as Taiwan, Siberia, northeast China, Mongol, the Chishima Islands, and Okinawa, conducted over 50 years. Torii married Kimiko in 1901. She often accompanied him on fieldwork and helped with his research.

Torii, Ryūzō, Fig. 1 Ryuzo Torii (Photo courtesy of Tokushima Prefectural Torii Memorial Museum)

Ryuzo Torii's academic career was not smooth. In 1905 he was appointed as a lecturer with the College of Science, Tokyo Imperial University. He obtained a doctorate degree in 1921 and became an associate professor at the Tokyo Imperial University in 1922, then professor at Kokugakuin University in 1923. However, he left his post at the Tokyo Imperial University and established a private anthropology research center in 1924. He was instrumental in the founding of Sophia University in Tokyo and became a professor and Head of the Department of Literature at this university in 1928. Torii quit teaching at Kokugakuin University in 1933. He was a visiting professor of Yanjing University in Beijing from 1939 to 1951 and continued active fieldwork in Shandong province in China. From 1941 to 1945 he was held under house arrest while the university was closed due to the Second World War. He died in Tokyo in 1953 at the age of 82.

Major Accomplishments

Ryuzo Torii is a unique figure in the history of Japanese archaeology and anthropology because of his lack of formal education. No one equals him in terms of the geographic range of his fieldwork and the width of his research interests, which included prehistoric archaeology, historic archaeology, physical anthropology, cultural anthropology, and folklore. Torii learned observation-centered research methods from Shogoro Tsuboi, who he respected as a teacher. Torii was quick to adopt the new technologies of the day, such as photography and the gramophone for recording audiovisual data. He took the first anthropological photos of the native people of Taiwan during his fieldwork there in 1896. The vast amounts of ethnographic record and photographs that he collected are regarded as important first-rate data today and are now housed in the National Museum of Ethnology, Japan.

Torii was interested in archaeology and carried out a number of excavations in Korea, China, Mongolia, and Japan. Through his archaeological research, he recognized close interregional relationships in prehistory and insisted that Japanese ancient culture had been under significant influence from the continent. In his fieldwork on the Chishima Islands, Torii found that the Chishima Ainu had been using stone tools and pottery and lived in pit houses until the recent past. He concluded that the Ainu people were descendants of the prehistoric inhabitants on the Japanese Archipelago. This hypothesis ran counter to the Koropokkur hypothesis advocated by Shogoro Tsuboi concerning indigenous inhabitants of Japan. At the time of Torii's fieldwork, the Chishima Ainu were on the verge of ethnic extinction due to the emigration policy of the Japanese government. Torii felt deeply sorry for the situation and tried to do his best to record their life and culture. He took part in research in Korea from 1911 for the Japanese government after Japan's annexation of Korea in 1910 and conducted both ethnographic research and archaeological excavations of Stone Age sites and burial mounds. His archaeological collections are now stored at the University Museum, the University of Tokyo.

As with archaeologists from other parts of the world, Ryuzo Torii's work is inextricably linked to colonial processes. He has been criticized as an accomplice of Japan's colonialism. Although he did not intentionally support militaristic colonial policies, his fieldwork was inseparable from the colonization process. His theory that Japanese and Koreans are descended from the same ancestors was used to justify Japan's annexation of Korea.

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- ▶ Japan: Indigenous Occupation
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Torrence, Robin

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Basic Biographical Information

Robin Torrence is an archaeologist and a senior principal research scientist at the Australian

Museum, Sydney, Australia. She grew up in Illinois, USA, and graduated magna cum laude from Bryn Mawr College, Pennsylvania, gaining an B.A. in 1971. She completed a Master's degree (1974) and a Ph.D. (1981) in Anthropology at the University of New Mexico, USA. Between the years of 1969 and 2013, she has been involved in extensive archaeological field and laboratory and museum projects in the USA, Europe, Papua New Guinea, and Far East Russia. More recently, she has turned her attention to the archaeology of ethnographic museum collections.

Early in her career Dr. Torrence undertook graduate teaching roles in the University of New Mexico and later held academic appointments at several universities in the USA, Great Britain, and Australia as lecturer and associate professor. While at the University of Sheffield, UK, she participated in a field school in excavation and surveying at Roystone Grange, Derbyshire. During her career she has taught a wide range of subjects concerning archaeological theory and practice including practical courses in lithics, quantitative data analysis, and computing in archaeology and theoretical subjects predominantly in anthropology, exchange, hunter-gatherer studies, and stone tool technology.

Current research interests include method and theory in lithic studies, archaeology of the Pacific region, prehistoric exchange (with special reference to obsidian), role of natural disasters and risk avoidance in long-term history, Indigenous agency within colonial societies (with special reference to Papua New Guinea), and complexity and diversity of material culture and hunter-gatherers.

Major Accomplishments

Throughout her career, Dr. Torrence has been on national committees such as the Pompeii Committee, UK (1979); Executive Committee, Theoretical Archaeology Group, UK (1979–1989); National Committee for the International Union of Pre- and Proto-historic Sciences, London (1982–1986); Committee on Archaeology and Anthropology, Royal Anthropological Institute, London (1982–1989); Council, Royal Anthropological Institute, London (1983–1986); Institute of Field Archaeology, Committee on Theoretical Archaeology (1984–1985); and Steering Committee, Southampton-York Archaeological Simulation System, Science Research Council (1987–1988).

Dr. Torrence has been on editorial boards of major peer-reviewed journals such as *Man* (1983–1989), the *Journal of Mediterranean Archaeology* (1987–1991), *Bulletin of the Indo-Pacific Prehistory Association (*2007–2009), and *Museum Anthropology (*2009–2012), with current editorial board appointments in *Archaeology in Oceania*, *Lithic Technology*, *Journal of Field Archaeology*, *Australian Archaeology*, and *Heritage Management*. She is a senior editor of the *Journal of Archaeological Science*.

From the years 1973 to 2012, Dr. Torrence has published 1 single authored and 12 edited books and over 100 articles in archaeology and anthropology. She was the founder and chairperson of the Ancient Starch Research Group (1998–2000) and was the treasurer of the World Archaeological Congress (1995–2003).

She has had a key role in developing new methods for studying trade, stone tool use, and ancient starch analysis and currently conducts interdisciplinary research into understanding changes in the nature of western Pacific societies over the past 50,000 years.

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- ▶ Pacific Islands: World Heritage
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Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

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Introduction and Definition

Ethics is a feature found in seemingly every discussable topic. It guides moral decision-making, informs strategic thought, and ultimately influences human behavior. Ethics is based upon the principle that individuals are members of a community, cogs in a much larger machine. There is hence a fundamental responsibility for individual motives to align with the needs of the larger community. This entry briefly elaborates on this concept with a particular focus on the ethical relationship between tourism and archaeology. Key themes that are considered include the respective ethical frameworks for tourism and archaeology and the relationship between their unification. Also examined is how this relationship can effectively be developed within an emerging tourism and understudied archaeological site: the Rupununi region of Guyana.

Key Issues/Current Debates/Future Directions/Examples

Ethics, Tourism, and Sustainability

As one of the world's largest industries, tourism involves much of the world's natural and cultural heritage resources. In 2010 alone, there were 935 million international tourism arrivals who spent an estimated US$ 919 billion worldwide (UNWTO 2011). Within an industry of this magnitude, there has been, and continues to be, a plethora of impacts on the local economy, communities, and natural and cultural heritage. Moreover, there exists a multitude of stakeholders with their own varied interests. Thus, there is an essential need to consider the role of ethics in tourism development (Payne & Dimanche 1996: 998; Malloy & Fennell 1998: 454). Yet, what ethical framework can be used that universally appeals to all tourism stakeholders? How do you balance the interests of one group with another? Ultimately, it is argued that these questions can be answered by referring back to the well-established notion of sustainability.

Defining sustainability has been regarded as an ambiguous process and varied in relation to the context (Shearman 1990: 1). However, Shearman (1990: 2–3) asserts that the contextual definition is irrelevant and the "meaning of sustainability is far from ambiguous." Indeed, the concept, quite simply, revolves around techniques that utilize resources in a manner which does not deplete or permanently damage them. It is a concept which has existed for hundreds, if not thousands, of years and goes beyond the current exploitation of its namesake. Moreover, sustainability does not relate specifically to the natural environment, society, or corporate economic frameworks – instead it is a concept which is broad enough to be applicable to all. But why is sustainability important? What are the ethical reasons for wanting to use sustainable management structures? Ultimately, this desire for sustainability refers to the prolonged positive impacts for present and future anthropocentric and biocentric systems (Shearman 1990: 5).

Sustainability is in alignment with an ethical framework known as teleology. Within this system of ethical thought, moral conduct is determined by the end result (Malloy & Fennell 1998: 455). Teleology is guided by two governing "schools of thought" – hedonism and utilitarianism (Malloy & Fennell 1998: 455). Both of these disciplines are concerned with maximizing benefits and minimizing negative impacts – delivering the notion of "good." However, while hedonism focuses on individual priorities, utilitarianism deals with the "greatest good for the greatest number" (Malloy & Fennell 1998: 455). Sustainability is a pursued end result because it endeavors for the prolonged life of resources for present and future generations – the greatest good for the greatest number.

Teleology does not argue that one should simply "be good" and follow ethical rules as the concept of deontology does. Instead, teleology emphasizes that a desired outcome (such as sustainability) is better for all of mankind. Similarly, American philosopher Henry David Thoreau (1817–1862) once wrote that people should "be not simply good, be good for something." In this manner, teleological utilitarianism demonstrates why tourism resources should be safeguarded and used ethically by all generations. Furthermore, tourism possesses several stakeholders whose interest should be valued equally, and teleology presents a framework to accomplish this task. The following paragraphs discuss the role and placement of archaeological resources in alignment with this ethical tourism framework.

Archaeological Resource Education and Preservation

Archaeology also utilizes a teleological framework but positions this ethical structure with a focus on the greatest good for the archaeological record. Indeed, Lynott (1997: 593–594) argues that first and foremost, archaeologists should promote "stewardship" of archaeological resources to improve their understanding and preservation for future generations. However, he (Lynott 1997: 593–594) also asserts that within the need to conserve and safeguard the record, there is a dual need to use it for educational and interpretation purposes (see also Meskell 2000: 161). It is in this capacity where archaeological resources can be a significant and viable tourism product.

Cultural heritage tourism is one of the fastest growing sectors in the tourism industry and encompasses archaeotourism, a form of tourism focusing on archaeological resources (du Cros 2001: 165; Wurz & van der Merwe 2005: 10; Levine et al. 2005: 401; Karki et al. 2006: 47; Ramsey & Everitt 2008: 909). However, archaeological resources are unique and "highly sensitive" to tourism use and consequently require vigilant preservation (Wurz & van der Merwe 2005: 10; Ramsey & Everitt 2008: 913). The needs of such a growing tourism sector hence require to be balanced with the management of the archaeological record (Wurz & van der Merwe 2005: 11). Whereas equality is usually promoted among stakeholders in sustainable tourism frameworks, Wurz and van der Merwe (2005: 11) argue that when archaeological resources are involved, the record's preservation must always receive priority over tourism objectives. This is justified by the fragile nature of archaeological assets and their importance in representing the heritage of living communities for present and future generations (du Cros 2001: 166; Atalay 2006: 283).

This view echoes the same principles found in a teleological framework for tourism. There is an ethical obligation for archaeologists to protect the record for all generations to benefit and learn from, yet this can often conflict with tourism priorities. However, the need to ensure the "greatest good for the greatest number" has superiority and gives archaeologists the ethical "right" to shelter heritage resources away from tourism development. The sustainable use of archaeological resources is still the targeted end result, and the manner in which this target is achieved is irrelevant (du Cros 2001: 166). Archaeologists do have a responsibility to present their findings to the public today, but they have an equally important responsibility to safeguard material heritage for future generations. In essence, archaeologists should work congruently with sustainable tourism frameworks in order to actively contribute to the preservation of heritage resources while working to interpret their meaning for visitors (Wurz & van der Merwe 2005: 11). This next section examines a contextual location where tourism development is increasing in an area where there are significant but unknown archaeological resources.

Finding the Right Way Forward: Archaeotourism in the Rupununi

The Rupununi is a vast tract of land in central Guyana. The landscape is composed of naturally occurring savannah wetlands and tropical rainforests, and the region has been largely inaccessible until recently. The small population of 16,000 inhabitants is predominantly comprised of three main indigenous groups who occupy most of the land: the Makushi in the north and the Wapishana and Wai-Wai in the south (Nycander et al. 2010: 13). Various archaeological studies

Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana, Fig. 1 Amerindian petroglyphs (Photo by Jared Bowers)

have proven that Amerindians have been living in the region for over 7,000 years, initially as hunter gatherers with land cultivation occurring around 2,000 BCE (Williams 2003: 3–11).

The Rupununi is rich in both natural and cultural heritage resources. As a result, several communities have been increasingly developing tourism programs as their primary source of revenue in an area struggling with diversifying its economic activity. However, with one to two thousand visitors a year, tourism is still in its infancy and remains a low-impact activity. Local cultural heritage used for tourism includes a number of archaeological resources. These resources are primarily comprised of pictographs and petroglyphs (Fig. 1) but also include stone tools, chipping stations, rock circles, and polissoirs (Williams 1979).

Plew (2004: 12) revealed that the Rupununi is host to a wealth of archaeological resources which remain "relatively unexplored." Indigenous Amerindian communities have occupied and used both the savannah and rainforest environments for thousands of years. An exploration of the archaeological record in the region could consequently be useful in addressing significant research questions in northeastern South America (Plew 2004: 7). These questions refer to topics such as ritual sites, food procurement, and hunting strategies among the Rupununi's transient communities. Long-term environmental patterns inside the region could also be documented (Plew 2004: 7). Despite remaining mostly unexplored, the utilization of these archaeological resources for tourism is currently on the increase. This underlines the need for an effective management structure.

As both tourism and archaeology seek to progress their development in the region, the use of a teleological framework will become increasingly important. Within this framework, defining how to simultaneously safeguard and use archaeological resources for economic gain will be the primary focus. However, the guiding principle should be how to use this resource for the greatest good for the greatest number. It is essential that management figures establish both sustainable visitation guidelines such as limits of acceptable change and maximum visitor cap and research tactics with, for instance, community archaeology and public participation. These methods will ensure that the resource remains protected for present and future generations (Marshall 2002: 218; Wurz & van der Merwe 2005: 15).

Conclusion

This entry set out to gain an understanding on the ethical relationship between tourism and archaeology. Individual ethical frameworks for tourism and archaeology were explored, as well as how the unification of both disciplines can be used to achieve a similar ethical goal. This ethical goal is the ingrained concept of sustainability and can be reached through a teleological system of thought. This entry briefly investigated this relationship in the Rupununi region of Guyana and stressed the importance for sustainability in the education and preservation of archaeological resources. The author argues that it is essential for all future use of archaeological resources for tourism to consider and prioritize sustainability – in order to ensure that all are able to experience our cultural heritage.

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Trackways in Archaeological Conservation and Preservation

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Introduction

Ichnology is the branch of paleontology that studies human and animal fossil tracks and trackways, both of which are widespread across the world. That trackway sites are quite common is not surprising: an animal makes many tracks and traces during its life but leaves only one set of remains which, if skeletal, may be preserved in the fossil record. This entry is concerned with the preservation of trackway sites. Through the ICHNOS Project, Lockley and colleagues provide a record of some 63 hominid and human footprint sites, ordered by approximate age (Lockley et al. 2007). All of these are, needless to say, younger by far than the many known dinosaur track sites and the vastly older invertebrate trackway sites from the Paleozoic era. From a preservation point of view, it is not relevant to distinguish between categories of track maker. Hominid and dinosaur track sites in particular fascinate the public and are good exemplars pertaining to preservation and public access to exposed sites.

Definition

A number of aspects make trackways important as sources of scientific, social, and behavioral

information: the size of the track maker, stride, soft tissue morphology, predatory or flight behavior, and so on. Essentially there is no substance to a track, only the imprint of tissue on the surface carries information, and it is this that is the object of preservation. Preservation thus poses challenges. Trackways are found across a spectrum of substrate types. The track surface depends on the geology of the site and varies from soil or mud to hard, weather-resistant rock in some cases of fossilized tracks. However, almost all rock types in which tracks are impressed were soft sediments, although metamorphic or secondary depositional processes after burial (e.g., limonite or calcite formation on the track surface) may alter the petrology. It is obvious that the substrate must have characteristics capable of retaining detail of the track. Thus, mud or volcanic ash fall cannot be too wet or too dry or tracks will not survive or they will be ill resolved and of little value. A further requirement for survival is protection of the tracks by rapid burial through natural processes, or through having been made in a cave as in Chauvet (Clottes 2001: 37), where erosional processes do not erase the prints. That so many traces and tracks survive in the palaeontological and archaeological record is indicative of the frequency and ubiquity of their creation; many more sites than those existing today must have been lost through erosion and clearly many are yet to be found.

Trackways in Archaeological Conservation and Preservation, Fig. 1 When Neil Armstrong trod on the surface of the moon, July 20, 1969, images of his footprints were instantly recognizable as symbolic of humankind's first tentative steps into the cosmos (Photo courtesy of NASA)

Key Issues/Current Debates/Future Directions/Examples

From a preservation perspective two aspects of how trackways are valued by various constituencies are relevant. Scientific and archaeological values, falling under the disciplines of ichnology and palaeoanthropology, derive from the unique information trackways can yield that fossil bones or other archaeological evidence may not afford. Social and symbolic values emanate from public education and the way people respond to these frail traces of the past. Tracks evoke a moment in time, recent or tens of thousands or millions of years ago, and invite musings about the maker of the tracks, whether human or animal, and the circumstances under which they were formed. People thus relate powerfully to tracks, such as the iconic image of Neil Armstrong's footprint on the moon and the Laetoli hominid trails, which bracket a time span of 3.6 Ma and symbolize the journey of the human species (Figs. 1 and 2).

Essentially three options exist for the conservation and preservation of trackways. All have been undertaken at various sites. These are to lift the trackway or some of the individual prints for removal to a museum or place of safekeeping; to bury or rebury the site; to shelter it and open it to visitors; or to leave it exposed without an attempt at preservation. In each of these scenarios, high-level documentation is an essential starting point. Photogrammetry and laser scanning provide noncontact recording of surfaces in three dimensions. This is especially useful in cases where the

Trackways in Archaeological Conservation and Preservation, Fig. 2 At the site of Laetoli, trails of three hominids, two walking in tandem, and crossed by hipparion tracks (*bottom* of image), were imprinted 3.6 Ma ago. The southern part of the trackway is shown after re-excavation and conservation in 1995 (Photo: 1995, J. Paul Getty Trust)

surface is too fragile to allow molding for replication as a cast. The photographic and digital records of surfaces are a fundamental research tool and provide a standard for future condition monitoring.

The decision-making process as to whether the site is to be lifted, buried, sheltered, or left exposed can be contentious when different stakeholders or constituencies are involved if, for example, either the scientific or social values, including economic ones, take the foreground to the detriment of the others. Significance issues that need to be weighed in the decision include the environment and landscape in which the trackway exists. To move a site in toto, or to remove only individual prints which destroy the relationship between them (gait, stride length), is contrary to the accepted ethic of conservation in context. Both are irreversible interventions. Removal ascribes scientific value only and overlooks the cultural and natural significance in the landscape. On the other hand, leaving a trackway in situ requires protection. If exposed, inevitably weather and erosion will destroy the site. Consequently, for many preservationists, the options then become sheltering (Stanley-Price & Matero 2001) or reburial (Nixon 2001; Stanley-Price & Burch 2004). The excavator, scientific community, and the public often regard reburial as the less desirable option: it removes the evidence from access and view. If the trackway site is of high significance, there is a tendency for a decision to be taken for the site to be opened for visitation, usually under a structure that serves a protective and interpretive function. This is a time of great risk for an excavated site since temporary protection and security may not be adequate while design and funding for a shelter are being sought. As a number of case studies reveal, none of these options is ideal, and each has advantages and disadvantages. Examples are considered below.

Lifting a Trackway Site: Glen Rose Dinosaur Trackways

The dinosaur footprints in the lower Cretaceous deposits of the Paluxy River near Glen Rose in Texas serve to illustrate problems that may arise when a trackway site is relocated. The site has been known since 1908 and comprises exceptionally well-preserved carnosaur and sauropod footprints in immediate proximity to each other. A large section of the dolomitic trackway was removed in 1939 and taken to the American Museum of Natural History (AMNH), and a further part went to the Texas Memorial Museum (TMM) where it is housed in a special building. The section in the TMM has displayed severe deterioration, including surface spalling and exfoliation associated with the crystal growth of soluble salts, principally epsomite. The environmental conditions in the building, including excessive humidity and capillary rise from ground water, are reportedly responsible for the condition of the trackways (Shelton et al. 1993).

It is apparent that the inadequate monitoring of the condition of the tracks in the TMM permitted deterioration to occur to an advanced stage before the damage was fully realized. The other part of the contiguous trackway in the AMNH apparently has not suffered damage. The remaining trackways, still in situ, have also shown no deterioration and are protected by the Texas Parks and Wildlife Department in what is now Dinosaur Valley National Monument (Farlow 1993).

A related example is from South Africa: The human footprint site is situated about 130 km north of Cape Town on the Langebaan Lagoon. Here a few tracks were found in dune rock dating to 120,000 years BP. Because the site is frequented by visitors who habitually carve graffiti into the soft dune rock and also because of vulnerability to wave erosion, the tracks were removed by helicopter and transported to the Iziko Museum in Cape Town (Roberts 2008). The fragmentary front print was lost during this rescue, though a cast exists.

Trackways in Archaeological Conservation and Preservation, Fig. 3 Southern part of the Laetoli trackway during reburial in 1995 showing the reburial stratigraphy incorporating sieved local sands and geosynthetic materials with a final boulder capping (Photo: 1995, J. Paul Getty Trust)

Reburial: Laetoli Hominid Trackway Site

The earliest hominid trackway, 3.6 Ma old, is at the site of Laetoli in Tanzania (Fig. 2). The Laetoli tracks exemplify many of the issues and controversies that bear upon highly significant sites and their preservation. When, in 1978, fossil footprints of a purported human ancestor (*Australopithecus afarensis)* were discovered during a palaeontological expedition led by Mary Leakey, scientific and public attention was immense, reflecting both their scientific and symbolic significance. The prints, partly exposed through erosion, were found at the site of Laetoli, to the south of Olduvai Gorge, where Louis and Mary Leakey did their pioneering work researching human evolution. Securely dated, the footprints resolved one of the major debates in palaeoanthropology. At Olduvai and other sites in Africa and beyond, the search for evidence of human evolution has focused on fossil bones; but while fossils have been the primary means of understanding our origins, they cannot answer all the scientific questions. One debate had been the development of the brain in relation to bipedalism. The Laetoli trackway was evidence that bipedalism preceded development of the brain. Excavated in 1978 and 1979, the trackway consists of footprints of three individuals in two parallel trails some 30 m long, preserved in volcanic ash. The Leakey team used various techniques to document the trackway, including molding, casting, and photogrammetry, before reburying the trails in 1979 as a means of protection. After reburial the site revegetated. Although its condition was not known, nor was it monitored because of its remoteness, there was concern that root growth from Acacia trees was damaging the tracks. A multiyear conservation project involved re-excavation, removal of trees and roots, stabilization of the trackway and site, scientific restudy, and reburial (Fig. 3) (Demas & Agnew 2006). A small-scale replica reburial trench was created adjacent to the site to

Trackways in Archaeological Conservation and Preservation, Fig. 4 In the flat barren landscape of the Willandra Lakes, the 20,000-year-old human prints are shallowly buried by layers of permeable synthetic textile to protect them from freeze-thaw cycles and wind scour (Photo: 2007, J. Paul Getty Trust)

provide surrogate monitoring through periodic re-excavation (Agnew & Demas 2004). Reburial removed the trackway from future public access. As a means of compensation, a cast of the trackways and interpretive material was created at the nearby Olduvai Museum. More than 10 years later, a political decision was taken, but yet to be implemented, to reexpose the tracks for tourism.

Another example is from the Willandra Lakes Region World Heritage area. The Willandra Lakes area was the site of discovery in 2003 of human footprints dated to 20,000 years BP (Webb et al. 2006). The site has revealed over 700 prints and 23 trackways of men, women, and children. Apart from the tracks themselves, the Willandra Lakes World Heritage area is also important for an understanding of Australia's prehistory through the skeletal collections (http://www.visitmungo.com.au/world-heritage). Three traditional tribal groups maintain responsibility for the site with the assistance of the New South Wales National Park Service and other organizations. After documentation and scientific study, the footprints were buried under sand and a covering of a synthetic textile as protection from wind scour and to provide insulation against damaging freeze-thaw (Fig. 4). Considerable discussion took place among the traditional communities and professionals regarding the future of the site: whether it should be replicated for display, on site or nearby, or buried permanently, or opened to visitation under a shelter. Based on clear photographic evidence of rapid deterioration of exposed tracks, the decision was made to keep the site buried. Interpretation of the tracks is done off-site.

Sheltering: Lark Quarry Dinosaur Stampede

Known today as the Dinosaur Stampede National Monument, in central Queensland, Australia, the site was one of the first three places to be listed on the National Heritage List in July 2004. Located 100 km south of the town of Winton, the site features unique evidence of a dinosaur stampede, with almost 4,000 tracks clearly visible in an area of some 210 m^2 (Fig. 5). The footprints are interpreted as a fossilized record of a predator stalking and causing the chaotic stampede of around 150 bipedal dinosaurs, varying in size from that of a chicken to larger types about the size of Australia's flightless bird the emu.

The site is claimed to be the only known dinosaur stampede and a record of a few minutes in time during the Cretaceous era, 95 Ma ago. Today an ecologically sustainable building covers the trackways protecting the footprints from weather, humans, and wildlife. The state-of-the-art building is, however, not the first shelter to be built over the site. Excavated in

Trackways in Archaeological Conservation and Preservation, Fig. 5 Some of the 4,000 individual tracks of dinosaurs dating to 95 Ma ago at the Lark Quarry site. Image shows ornithopod and coelurosaur and two of the eleven carnosaur tracks (Photo: 2007, J. Paul Getty Trust)

1977–1978, the significance of the site resulted in a decision, despite its remoteness and lack of infrastructure and personnel, to open it to the public. A number of organizations were appointed as joint trustees of the site, and while funding was being secured for a roof, the site was protected with straw under plastic sheeting. The problems that subsequently arose, during and after construction of the flat pentagonal roof, are numerous. They range from burning of the straw and loss of a holotype footprint during unsupervised construction of the roof, to the occupation by kangaroos seeking shade, to souveniring by visitors since the site was not staffed for security or interpretation. Additional problems were flooding of the site from the uphill slope, dust accumulation in the prints, and a general inability of the trackway to be understood by visitors (Agnew et al. 1989).

Nor was the new building (Fig. 6), erected in 2001, without problems. Collapse of a large rammed earth internal wall, intended to provide thermal stability of the interior environment, onto the visitors' walkway and trackway, occurred not long after the site had been opened to the public (Meiklejohn 2003).

Unprotected Sites: Formby Point

Trackways may be too extensive for practicable preservation measures to be warranted. Nor would the high cost justify attempts to save them from erosion. Under such circumstances, full documentation and recording is the only option. There are many such sites. Well known are the intertidal coastal trackway sites on the west coast of Britain. The Formby site, dated about 5,500 BP, is of high scientific value and the prints of children, women, men, and a number of animals, including deer, aurochs, and birds, have been recorded. About 145 different trails at Formby alone have been noted, and as the succession of silts and sands become exposed during accelerated beach erosion, the imprint bearing sediments are revealed. Photography of the footprints, recording their positions, and lifting and making casts of selected specimens has been an ongoing research project (Roberts et al. 1996).

Discussion

All exposed remains are subject to the vicissitudes of weather and damage, none more than tracks, which are essentially ephemeral traces comprised only of the substrate itself. Stabilizing fragile tracks may require treatments, such as surface consolidation, reversible crack filling, and edge buttressing of the Lark Quarry trackway (Agnew et al. 1989), but should be undertaken with due caution; strengthening of the substrate for purposes of molding is of particular concern, as the experience with the application of Bedacryl on the Laetoli tracks in 1978 demonstrated (Demas et al. 1996). The use of 3-D technologies to capture virtual reconstructions and create physical replicas now offers a noninvasive alternative to molding. Precise, accurate, and accessible archived documentation and periodic monitoring are the most important measures that can be taken for the preservation of these fragile and unique traces regardless of other interventions undertaken.

When the significance of a site is high, the desire to open it to visitation may override sustainable considerations of preservation. Seldom are all the threats or limitations taken fully into account. These may include, to name a few, damage to the site while fundraising and preparations are being made for sheltering and interpretation; lack of security and long-term maintenance of a protective structure; insufficient staffing and

Trackways in Archaeological Conservation and Preservation, Fig. 6 The second protective structure built in 2001 over the Lark Quarry dinosaur stampede trackway (Photo: 2007, J. Paul Getty Trust)

infrastructure; and unanticipated consequences of sheltering such as dust accumulation obscuring the tracks, birds and animals in the shelter, accumulation of damaging soluble salts, plant growth, and so on. It is unusual too for an objective assessment of the visitation potential to guide the decision. Thus, when visitor numbers do not meet expectations, there may be a decline in funding and inevitable neglect over the long term.

Trackways of significance will continue to be discovered. Their preservation requires a complex decision-making process based on thorough understanding of significance, investigation of environmental conditions, careful assessment of threats, and long-term human and financial resources.

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Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australopithecines
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public
- ▶ Descendant Communities in French Guiana: Amerindians
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- ▶ Ileret Footprints
- ▶ Leakey Family
- ▶ Lucy
- ▶ Olduvai Gorge Archaeological Site
- ▶ Sustainability and Cultural Heritage
- ▶ Uses of Heritage

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Trade and Transport in the Ancient Mediterranean

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Introduction

The subject of trade and transport leads into different questions and forms of analysis depending on the perspective adopted. From an economic point of view, trade is part of developing systems of exchange by which the production and consumption of goods are linked over small and longer distances. Major questions include which and what quantities of goods were traded where and by what means, how much of a surplus was available for trade, and how effectively trade, transport, and currency fulfilled their purposes within a specified geographical range. Which social, political, and technological circumstances affected volumes of trade, and what factors stimulated or prohibited the development and expansion of markets? The emergence of price-setting markets is central for economic history. Economic historians are aware that trade via markets is only one possible way of moving goods and services from their place of production to that of consumption, but it is the one with the greatest net profit and thus the condition for growth. Anthropologists do not look for the evolution of markets. From this perspective, exchange is an index for different types of social and political organization. Trade via price-setting markets controlled by supply and demand is only one type of exchange mechanism that developed under particular social and political circumstances in early modern Europe. In other social and political settings, distribution controlled by states (such as tribute and redistribution), or by social networks (in which gift exchange and other morally controlled reciprocal exchanges are practiced), is more suitable for linking production, consumption, and people. Trade itself can take different forms of organization, shading into barter, redistribution, or gift exchange, depending on the type of social organization in which it develops. For archaeologists, finally, trade is above all a sign of cultural exchange, interaction, and contact. Traded artifacts, their style, and material composition signify the combined flow of resources, ideas, and information between groups of distinct identities and resource endowments. Archaeologists investigate the directions and scope of such flows in order to identify the geographical range of cultural influence and development. Economic questions, especially links of production and consumption, are analyzed too, but the nature of archaeological evidence points to quantitative and technological rather than to institutional and

social characteristics of trade. In the last quarter of the twentieth century, economic, anthropological, and archaeological perspectives have been fruitfully combined in order to investigate ancient trade not just as a simpler version of later European trade but as a subset of competing and interdependent forms of exchange which characterize and reflect different types of social organization, cultural interaction, and economic development at different periods of time.

Definition

Trade can also be defined in different ways. It may refer to the peaceful buying and selling of goods in contrast to moneyless barter, gift exchange, piracy, and violent forms of appropriation; it may refer to transactions external to a society rather than to their internal ones; it may refer to an exchange of resources where the material value of the goods exchanged is more central than the celebration of the relationship in which the valuables are exchanged; or it may be defined as a commercial exchange in the hands of a clearly defined social group guided principally by profit rather than other motives. Each of these definitions has been highly contested in recent years, but they are equally valid as long as they are not regarded as the very essence of trade across cultures and time. For classical antiquity, it is most suitable to define trade as the external exchange of material goods (which included slaves and animals) distinct from either barter or gift exchange. It can then be asked how trade, and the social groups undertaking it, interacted and overlapped with barter, gift exchange, piracy, plunder, and their respective representatives. It is not helpful, however, to define ancient trade by the involvement of money, markets, professional traders, or the profit motive. Although all of the aforementioned factors played some, and at times important, roles in ancient trade, their absence did not mean an absence of trade.

The terms closest to the proposed definition of trade are in Greek *emporiē* (seaborne commerce) and in Latin *negotiatio* or *commercium* (commerce). In the early writings of Hesiod and Homer, we also find the term *prēxis* which referred to the kind of trade Greek aristocrats practiced in contrast to the trade pursued by lesser people and foreigners (Tandy 1997: 75). Yet the distinction is no longer found in the sixth century BCE, confirming that it was a social and cultural polemic emerging from social threats associated with anonymous trading contacts.

Key Issues and Current Debates

Sea transport was the cheapest way of carrying goods over distance. From c. 1400 BCE, deep-hulled ships are attested from the Near East and Egypt, which were propelled by a sail, rather than oars, to allow space for the cargo. Ships could vary in size considerably. Some were fairly small (e.g., less than 14 m), carrying loads of 20 t or less. By the Hellenistic period, ships of a carrying capacity of c. 150 t were quite normal, and those of 350–500 t not rare (Parker 1992). Transport by land was long regarded by scholars as too expensive in comparison to seaborne trade. For a bulky commodity like grain, a sea voyage added c. 2 % per 100 miles to the costs, whereas freight charges over land by mule or cart could add over 50 % (Morley 2007b: 26). But costs of transport varied considerably according to both commodity and region. From the fourth century BCE onwards, the road system in Italy facilitated the transport of goods over land, while extensive finds of wine amphorae on sites in Gaul and southern Germany from the early second century show that land transport did not prohibit exchange networks from developing where demand emerged (Patterson 1998). It should be noted, however, that the Greeks in the Hellenistic period were quick to establish their own sea routes to India and Arabia via the Red Sea and the Arabian Gulf to reduce the amount of distance to be covered by caravan routes (von Reden 2007).

The vitality of Graeco-Roman trade emerged within a particular ecosystem and successful human attempts to overcome ecological constraints. The Mediterranean is an ecological zone with similar climate, fauna, and flora that

support similar strategies of production, consumption, and risk management. At the same time, the zone has a great diversity of landscapes, microclimates, and resource endowments, which fosters agricultural specialization and diversification. There is, for example, a great diversity of annual rainfall, which means that droughts and crop failure in one region may not affect another nearby. Raw materials, such as metals, stone, wood, or clay, are not evenly distributed, while the soil produces very different qualities and quantities of staple foods (grain, vine, and olives). The indented Mediterranean coastline, moreover, encourages small-scale autarkic settlement, while the sea with its many islands supports communication and exchange. Large numbers of rivers open up into the sea, connecting dispersed hinterlands with Mediterranean Sea routes and, conversely, facilitate transport of goods from continental sites. The possibilities of transgressing a local ecosystem successfully are thus comparatively easy and at the same time rewarding. "Connectivity" is the term that has been coined for this typical Mediterranean pattern of settlement and communication, providing a helpful concept for understanding the political and ecological conditions of Mediterranean trade during classical antiquity (Horden & Purcell 2000).

Mycenaean Linear B tablets of the Bronze Age are virtually silent about trade, although self-definition through exotic materials is characteristic of the Mycenaean elite from the Shaft Grave period onwards (Bennet 2007: 201). Four documents from the Knossos Ld (i) series mention *xenwia* (cloth), which probably referred to cloth "for export." Three Bronze Age shipwrecks, two found off the southern coast of Turkey and one at Point Iria in the southern Argolid, provide archaeological evidence for the substantial movement of goods in the Aegean during that period. The largest of the three, which was perhaps 16–17 m long, carried 10 t of copper, a ton of tin, 175 blue glass ingots, 150 Canaanite jars, and 10 large Cypriot containers containing over 100 pieces of Cypriot fine-ware pottery. Lead isotope analysis of the copper ingots in combination with the Cypriot pottery suggests that the ship was on its voyage from Cyprus into the Aegean, after having stopped for ivory in Syria and possibly Egypt. High-value objects (glass, copper, and tin) indicate that it moved goods at the highest level of social interaction (ibid.). Contemporary literary evidence from el-Amarna in Egypt suggests, moreover, that such valuables were presented as gifts or tribute to maintain diplomatic ties between royal houses (Aubet 2001: 134-5), although the involvement of professional middlemen or agents in such exchanges is not unlikely.

Archaeological and literary evidence for the movement of goods and people across the Mediterranean increases in the late ninth and early eighth centuries BCE after a period of highly localized interaction during the Early Iron Age. Greek settlements participating in this movement were above all Corinth, Chalkis, Eretria, Miletus, and Phokaia. Yet undoubtedly pioneering were the Phoenician cities of the Levant, above all Tyre. By the end of the ninth century, Phoenicians had founded trading colonies in Cyprus (c. 820 BCE), Spain (early eighth century), North Africa, Sicily, and Sardinia. The Greeks followed with their earliest colonial foundation at Pithecusae/Ischia in c. 750 BCE and some kind of regular presence at Al Mina at the mouth of the river Orontes in Syria. Both of the so-called Lyre-Player seals, originating probably in North Syria, and Euboean pendent-semicircle *skyphoi* and plates attest regular Greek contacts with Syria, the Levant, and the western coast of Italy during this period (Osborne 2007). The directions of trade, shipwrecks, and literary evidence in combination suggest that the Greek demand for minerals continued to dominate the exchange of goods abroad, while manufactured products, above all pottery and textiles, as well as slaves, perfume, foodstuffs, and a range of raw materials completed what were mostly mixed cargoes. Etruscan cities such as Caere, Tarquinia, and Populonia entered interregional trade by the end of the seventh century BCE with contacts concentrating around Massilia and along the southern coast of France (Dietler 2007: 248–250). Much of their activity seems to have been stimulated by the Greek colonists' demand for wine.

The texts of Homer and Hesiod help to understand the social organization of trade and exchange in the archaic period (Tandy 1997). Among the Greeks, most long-distance exchange of high-value goods seems to have been controlled by aristocratic landlords (*basileis*) and took the form of gift exchange in relationships of guest-friendship (*xenia*, Herman 1987). In addition, small local journeys were undertaken intermittently by well-off peasants, such as the Boeotian poet Hesiod, who had enough surplus to dispose of along the nearby coasts in the dead season after the harvest. While this so-called cabotage mattered little in terms of aggregate value in comparison with the large-scale ventures of wealthy chiefs, it is assumed to have made up the bulk of archaic trade (Horden & Purcell 2000). A third type of trade was in the hands of professional traders. In the *Odyssey* these are always foreigners (Phoenicians or "Taphians"; e.g., *Od*. 8.14 ff.), but the Greek trading settlements (*emporia*) abroad, such as at Pithecusae and, from the seventh century BCE onwards, Naucratis (Egypt), Gravisca (Italy), Massilia (France), and Emporion (Spain), show that there were large numbers of Greek professional traders as well. These towns or settlement areas have been identified as trading diasporas of populations that had no social ties among the communities with whom they traded and interacted in special institutional environments (Curtin 1984). One such environment was the port of trade, best exemplified by the Greek town Naucratis in Egypt. This town in the west of the Nile Delta was granted by Psammetichus I to Greek traders in the last quarter of the seventh century BCE and served as an enclave for Greek communities who could establish here places of worship and markets. There is some indication that markets were strongly controlled by the host administration, partly to link different economic systems and languages (Möller 2000), but also for the purpose of taxation. In practice, these trading communities provided a breeding space for knowledge about interregional supply and demand (Osborne 2007). In archaic Naucratis we find Chian *chalices* which seem to have been produced to order (Möller 2000: 136-40), while still in the fourth century BCE it was in Naucratis that a business consortium able to control grain trade and prices between Rhodes, Egypt, and Athens emerged (von Reden 2010: 131).

By the sixth century BCE, migration had dispersed Greeks in settlements around the Black Sea, Sicily, Southern Italy, and the southern coasts of France and Spain. Although the vast majority of these were dominated by agrarian subsistence economies, their urban centers created new demand for Greek products and a supply of raw materials and products from these areas at lesser costs. A series of technological changes both reflected and stimulated further the expansion of trade during the sixth century BCE. Firstly, the traditional Egyptian rigging with a square boom to which the sail was fixed developed into a loose-footed square sail fitted with brails at regular intervals. This made it possible to lift the sail up and shift it to the sides, which allowed full control over the sail according to the strength and direction of winds (Casson 1994: 43–44). Secondly, although some maritime installations are known from the Early Iron Age, the first permanent harbor facilities (breakwaters, ship sheds, and dockyards) appear in the sixth century BCE. There was at first no functional differentiation of military and commercial harbors. But other infrastructural innovations, such as the stone trackway (*diolkos*) for transporting ships and cargoes across the Isthmus of Corinth dating c. 600 BCE, show the general value attached to infrastructural improvement in the demonstration of power between individuals and poleis. The third technical innovation was coinage. Invented in Lydia at the end of the seventh century BCE, it soon spread into Greece where the first coins were struck by about 550 BCE. Monetary payment had been possible for centuries on the basis of bullion and ingots cut to size and certified by local temples, but coinage facilitated monetary transactions and at the same time created a new linkage between trade and the identity of *poleis* and their political allies (von Reden 2010). Gradually, moreover, coinage paved the way for greater monetary coherence and better comparability of prices and value.

The Athenian naval confederacy of 479 BCE was another influence on trade with enormous economic consequences. It began with the expansion of the Athenian fleet in the 480s that was possible only with the supply of an unsuspected windfall of silver from the Athenian mines minted into coinage and with the import of timber from foreign resources. It is unlikely that wood and pitch were imported into Athens via the market rather than through the channels of personal political guest-friendship ties which provided the elite with economic resources to be invested into social and political power (Herman 1987); but coined silver was certainly used for the payment of the labor force. There followed the fortification of the Piraeus at around the same time and the Athenian control of the sea routes as an immediate consequence of her sea power. Other consequences were more gradual: firstly, a massive expansion of Athenian coinage and the gradual supersession of competing, especially Aeginetan, coinages (Figueira 1998); secondly, the growth of the Piraeus into a central harbor and marketplace for Greek and foreign products; and thirdly, the emergence of Athens as a center of consumption at an unprecedented scale. The Athenian League was not a tributary empire where the power to extract goods and services in kind puts limits to the growth of trade. Instead, Athens' commitment to monetary payment stimulated trade and a larger amount of poleis and people to earn and spend money in markets. A substantial part of regular imports in Athens (and presumably other *poleis* of which we are less well informed) was grain with which the cities could compensate for recurring shortages of locally grown cereals and ensure the provision of better-quality wheat available especially from the Black Sea area. A host of other goods, both luxuries and semiluxuries (staples of better quality from elsewhere), made up the substantial volume of imports. Important institutions developed during this period. Money changers, followed by banks (*trapezai*), appear in the second and the last quarter of the fifth century BCE, respectively. Lending and borrowing for commercial purposes increased and led to the invention of a particular kind of maritime credit (*nautica daneia*; first attested in the late fifth century, Eup. *CAF* fr. 43). In such contracts the cargo of the ship, rather than personal surety or landed property, serves as security for a loan. By 415 BCE the revenues from harbor tolls, levied as a 2 % tax on the value of the cargo, were so substantial both in Athens and the harbors of her allies that they could substitute for the tribute Athens was no longer able to extract. In the fourth century, maritime courts were established which provided quick solutions of legal conflicts under the special condition of foreigners being involved. For, despite the enormous economic importance trade had gained during the fifth century, both in aggregate value and in social terms, trade and banking was mostly in the hands of foreigners and resident aliens (*metoikoi*). Athens also tightened the control over its coinage to increase trust in what had become an interregional currency. In addition, we hear of the possibility of making monetary orders in writing to bankers in other places, which, though not being a proper form of giro, allowed the transfer of credit from one place to another (von Reden 2010).

It is contentious, and indeed fruitless, to compare the development of trade in the ancient Mediterranean with that of early modern Europe. But the combined effects of the Athenian Empire, its silver resources, political organization (leading to particularly effective ways of collective decision-making and legislation), and commitment to coinage created an institutional structure for the development of trade in the following centuries. The Macedonians modeled their coinage and law on that of Athens and showed the same commitment to coinage and markets in their payment of mercenaries and the provision of military supplies via local markets. The Macedonian conquest of the Persian Empire also led to the foundation of new cities in which the Greek military settlers and civilians lived a markedly Greek lifestyle. At the same time, the Macedonian kings took over from the Persians a treasure and tribute system which put at their disposal levels of wealth incomparable to those of Greek *poleis*. The fusion of Near Eastern resources, Greek economic structures (including coinage), and the demand for Greek products outside the

Greek mainland boosted the level of trade, measurable by the increase of sea travel, minting, and size of cities. Alexandria's total population is estimated at around 200,000 by the third century BCE, which is almost twice as much as the estimated total population of all Attica in the classical period and four times as much as that of the biggest towns of the former Persian Empire. The fact that the fabulous monetary wealth of the Ptolemies was dependent on silver that, because of the lack of silver mines in Egypt, must have come into the country by circulation shows that their prosperity rested as much on tribute as on export (von Reden 2007). A corollary of Alexandria's role in Mediterranean trade is the movement of the major port of transit from Piraeus to Delos by the end of the fourth and to Rhodes in the third and second centuries BCE, leading the Roman government to declare it a tax-free port in 166 BCE. In much of Hellenistic trade, kings, their administrations, and managers of royal estates were involved. But given that all of them acted in tandem with, and through, agents who pursued their own economic business at the side, it is impossible to disentangle fully trade under royal control from private enterprise. The link between private and public/royal enterprise and control is probably one of the reasons for grain prices staying at surprisingly similar levels from the classical through to the Roman period (Rathbone Forthcoming). Given the unparalleled role of this staple for peace and prosperity, the grain supply of urban markets was a political issue influenced economically by kings, emperors, and local benefactors rather than the supply-and-demand mechanism. For other commodities traded in the Mediterranean, we are lacking the data to analyze price formation. But in the rare cases where this is possible, there seems to have been a regional, rather than a Mediterranean-wide, pattern (Reger 1994).

By the beginning of the third century BCE, the Romans had expanded their trading contacts into the Italian peninsula, the Western Mediterranean, and the Adriatic region. Greeks from Massilia, Northern Greece, and Phokaia had established in continental Europe from the late sixth to the fourth centuries BCE contacts which were dominated by some Italian imports, especially of wine and fine pottery, from the early second century BCE onwards (Woolf 1998: 174-6) The end of the Second Punic War in 218 BCE created Roman hegemony over the Carthaginian sphere of influence in the West. Roman trade in the Adriatic in 229/8 BCE was conspicuous enough to suggest that the conflict with the Illyrians resulted from Roman intervention on traders' request against Illyrian piracy (Polyb. 2.2–6). The gradual increase of Roman participation in Greek trading networks is shown by the gradual spread of Roman amphorae into the Greek East, by commercial settlements of Romans and Italians on Delos and the presence of Roman merchants at Alexandria (Harris 2007). The most important effect of the expansion of Roman trade into the Greek sphere of influence was the spread of Greek financial sophistication into Rome and Italy (ibid.). Greek banking, credit operations, forms of monetary transfer, and transfer of debt claims to third parties became a vital condition for the economy of the Roman elite to function between Italy and the provinces (Andreau 1999). With the expansion of the Roman Empire, the scale of trade in the Mediterranean changed. The number of shipwrecks dated to the period between 100 BCE and 300 CE is far greater than in the periods before and after, suggesting – despite some archaeological bias – a scale of maritime transport not reached again until the high Renaissance (Parker 1992; Patterson 1998). Larger ships of 200–400 t were used more frequently. A certain type of amphora (so-called Lamboglia 2) produced in Apulia is now found everywhere in the Western Mediterranean, while some African amphorae occur on most sites between Britain and Egypt. Amphorae used in any type of interregional trade also became more standardized, which must be taken as another indicator for the regularity with which goods were moved (Morley 2007a). Access to new mines and foreign treasuries created a massive increase in the total volume of coinage circulating in the Roman Empire from the second century BCE onwards. By the time of the first century CE, the Roman denarius currency had become an imperial coinage accepted throughout

the Roman Empire (except Egypt), creating a fairly homogenous monetary zone. The growth of the city of Rome, finally, exceeded by far that of any royal capital in the Hellenistic world; this growth was demographically possible only if external resources kept pace with increasing consumption levels. The major zone of Roman trade was the empire, but there is now massive evidence that trade journeys of considerable scale and value were undertaken beyond the edges of the Roman world. Among the best attestations is the trade in spices, ivory, marble, and fine textiles with the east coast of Africa, as well as areas beyond the Red Sea, and India (Rathbone 2000; Wilson et al. 2013).

The period from the late third century CE onwards is generally regarded as a time of recession, distress, and transformation which affected trade in complex ways. There was recurring stress of the imperial currency and of enforcing central law and taxation and a trend towards greater regionalization. As a result, the diversity of local economic situations becomes more visible, and there is a notable diversity of responses to central policy. There are, moreover, clear indications that the Roman government aimed to reduce the role of private intermediation in the trading of certain products, while maritime transport became a compulsory office (*munus*) rather than a profession left to private contractors (Giardina 2007). But there is as yet no clear indication that, despite changes in organization, the scale of trade declined in aggregate value. Moreover, answers to the question of the degree of change in late antiquity depend largely on how scholars assess the nature of the Roman economy in the preceding centuries. How much did trade conform to the model of a free and integrated market economy?

The first question to be addressed is whether in the first centuries of the Roman Empire there developed new structures of trade and finance. An increasingly differentiated system of banking and financial intermediation – most importantly, legally protected forms of cashless transfer of money over distance – emerged during the two centuries before and after the reign of Augustus (Andreau 1999; Harris 2007). But it seems fairly certain that any long-distance trade and transport continued to be based on midsize transport and maritime loans, while large-scale ventures were achieved by pooling the capacities of several financial and transport resources. Thus is the picture emerging from a papyrus documenting the credit operations related to a huge business journey between a Roman trading post in Muziris on the South Indian coast and Alexandria in the second century CE (SB XVIII 13167 with Rathbone 2003). Thus was also the strategy of Cato the Elder in the second century BCE who spread his credit among an association of 50 traders to reduce the risk of loss and increase his own profit (Plut. *Cat*. 21.6).

The second question relates to the system of exchange behind the movement of goods and money. According to an influential model, the Roman economy in the Mediterranean came to be more integrated than before through taxation, the requirements of the Roman army, and trade (Hopkins 1980). There was an uneven productivity in the provinces of the empire and an uneven demand for military supplies, since armies were stationed above all in the provinces at the frontiers while the provinces with high productivity were those closer to the Roman center. Through monetary taxation, monetary army payment, and army supply via local markets, the Roman government mobilized a large amount of goods and money and thereby stimulated trade and a market economy. The model has been challenged on various grounds, for example, for its lack of consideration of economic activity that did not result, directly or indirectly, from the initiatives of the Roman state (Patterson 1998; Morley 2007a). Both the Roman and provincial elites, and the emperors themselves, had high stakes in long-distance trade in order to increase their wealth and dispose of their agrarian surplus. Though rarely running themselves financial business and trade enterprises, they participated in them through their agents, freedman, and slaves who were merchants, bankers, and business managers (Aubert 1994). Moreover, the trade and financial business of the Roman elite were inseparably intertwined with the financial administration of the provinces they governed (just as there was an overlap

between the imperial economy and the economic business of the emperors), which makes it impossible to disentangle the interests of the state from what appears to be genuine trade.

The third question is whether the Roman Empire was a single economic zone linked by price-setting markets. The empire-wide consumption of wine and its mass production for export in Italy, Gaul, and Africa have been at the center of recent debates. Not only is the movement of these goods archaeologically well documented by the movement of amphorae but the production and distribution of wine, in contrast to that of grain, had always been profit oriented and rarely been interfered with by governments. There does seem to be a notable increase of wine amphorae of provincial origin between 50 BCE and 100 CE that coincides with a decrease of Italian amphorae (both for wine and other agricultural products) during the same period (Panella & Tchernia 2002). But if Italian wine amphorae are taken as a category of their own, the coincidence is less marked, and it has been argued that the increase of provincial imports in Rome and elsewhere was driven by increased consumption rather than price competition (Panella & Tchernia 2002). Moreover, the export of wine to provincial places seems to have petered out as soon as these places became able to meet new levels of demand by local production (Morley 2007a).

Future Directions

While the debates over the role of markets in the Mediterranean are likely to continue, the future of research in ancient trade will lie in the analysis of regional interaction, local economic systems and the question of cultural, social, or political factors that shaped the organization of different types of exchange and their mutual interaction (Wilson et al. 2013). As the interdependence of trade and tribute, the interaction of state-controlled and private trade, and of violent and nonviolent forms of exchange come into focus, analyses of trade in the modern sense become increasingly problematic (Aubet 2001; Bresson 2008: 178–180). Moreover, as global historical approaches and economic world systems analyses begin to influence research on Graeco-Roman antiquity, the nature and consequences of trade across cultural borders receive increasing attention (Shaw 2009; Wilson et al. 2013).

Cross-References

- ▶ Ceramics, Roman Imperial
- ▶ Economy, Roman
- ▶ Emporion
- ▶ Numismatics, Ancient Greek
- ▶ Numismatics, Roman Imperial
- ▶ Numismatics, Roman Republican

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Trade Beads in Historical Archaeology

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Introduction

During the last five centuries, European trade beads markedly influenced political economies at multiple scales. Columbus introduced glass trade beads to the New World, and the Portuguese introduced later European beads to much of sub-Saharan Africa, beginning with coastal regions in West Africa. Indo-Pacific, or Trade Wind, beads already dominated the market for trade beads in the Indian Ocean region (Wood 2011) and, in Asia, as far north as Japan (Francis 2002). Bead production in Amsterdam, in Venice, and at locations in Bohemia gained momentum in the seventeenth century. The Dutch, Spanish, English, and French widely distributed European glass trade beads and exchanged them for desired items, needed services, and slaves in the lands bordering the Atlantic and Indian oceans. The Spanish mission period in Florida

(1633–1704) and the late seventeenth-century to eighteenth-century fur trade of northwestern North America are notable examples. Explorers, such as Richard Burton, and the European and Islamic inspired slave and ivory caravans of the nineteenth century circulated tons of European trade beads into East and Central Africa.

Definition

Beads are small ornaments used singly or in groups. They are suspended from the body as personal adornments, worn in the hair, or sewn onto clothes or household objects. Beads are made from a variety of natural and synthetic materials – for later periods, notably from glass – and meet a range of social purposes. Glass beads and beads of shell deserve particular attention from historical archaeologists. Due to their variety and ease of transport, Europeans and indigenous Americans and Africans exchanged beads, gave them as gifts, or used them as currency. Thus, beads are key indicators of contact and culture change. Non-Europeans often gradually adopted glass beads into their social practices and systems of status. For this and other reasons, archaeologists commonly find glass beads in burials at sites that postdate CE1500 in the Americas. Different European powers and people living in the Americas, Africa, and Asia produced and consumed different beads based on changes in access to raw materials, trends in production and technique, shifts in distribution networks, and local desires for specific bead types (e.g., Wood 2011).

Key Issues and Examples

Trade beads are particularly useful in historical archaeology, but they also present challenges (Spector 1976). Beads of glass, shell, and semiprecious stone tend to preserve well and may serve as valued chronological markers. However, beads tend to migrate across site strata and require detailed comparative study. At a minimum, bead analysis requires a classificatory system based on size, manufacturing technique, structure, shape, and color/diaphaneity (Kidd & Kidd 1970; Karlkins 1985; Wood 2011). For European glass trade beads, artisans used three primary techniques: drawing, winding, and molding. They made red, blue, black, white, and multicolor tubes, barrels, doughnuts, and spheres. In structure, European trade beads are simple (one color/layer of glass), compound (layered multiple glasses), or complex (with applique or inset decorations). Shell beads from the Americas, Africa, and elsewhere during the last 500 years frequently appear as discs or tubes. The great variation in bead types and their shifts in use indicate the prominent role of trade beads in the emerging social entanglements of regional and global exchange.

Cross-References

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- ▶ Dating Methods in Historical Archaeology
- ▶ Deagan, Kathleen A.
- ▶ DeCorse, Christopher
- ▶ European Contact and Global Expansion (Post-CE 1500): Historical Archaeology
- ▶ Mission Archaeology in North America
- ▶ West and Central Africa: Historical Archaeology

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Translation and Indigenization

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Introduction

Translation, broadly speaking, lies at the heart of archaeology. Archaeologists translate their technical recordings of material finds and their contexts into understandings of past human thought and action. They translate the technical findings of other disciplines – geology, say, or physics – into archaeological terms and vice versa. They also translate their work from one language to another, from Vietnamese to French, for instance. Finally, they translate their "technical talk" into lay terms for public consumption. This last is ultimately the most important, because without the understanding and support of the wider, nonprofessional community, it would be well-nigh impossible for archaeologists to access the sites and acquire the funding necessary for them to practice their craft. This entry concerns one special form of "translation for the public," namely, translation of archaeological approaches and results for Indigenous and other descendent communities. This kind of translation is often called "indigenization." It is special because the political and ethical dimensions of such translation are more pronounced than in other cases.

Definition

There are two basic forms of translation. The first is literal information transfer based on word-for-word interpreting. The second is literary transposition, which aims to convey the sense and sensibility of what is being translated, rather than a word-to-word conversion. According to Friedrich Schleiermacher, the nineteenth century German theologian who first drew the foregoing distinction, literary translation "moves the reader toward the writer," whereas literal interpretation "moves the writer toward the reader" (Schleiermacher 1813: 41–2, cited in Munday 2001: 28). The latter is obviously important; one cannot simply ignore the literal meaning(s) of the original words. Yet many translators and scholars of translation believe that it is even more important to capture coherently the significance or conceptual thrust of those original words taken as a whole rather than individually. Translation in this sense is seen as an original, creative act.

Translation for archaeologists working with Indigenous people actually entails something of both approaches, of "moving the (local) reader toward the (archaeological) writer," and "moving the (archaeological) writer toward the (local) reader." On the one hand, the archaeologist needs to know, as intimately as possible, the cultural context into which a translation is to be introduced so that the translation can be sufficiently culturally competent to be comprehensible to the target audience. On the other hand, there is no point in an archaeological intervention where the translation is undetectable, as many translations aim to be, so that the introduced material just slips unnoticed into the local cultural setting. The recipients of a translation need to "feel *das Fremde*," the foreignness, of the translation if it is to make a difference to them (Eco 2004: 192). As Eco (2004) recognizes, translation is thus not a matter of choosing

between literalness or creativity or what Venuti in various publications discusses as "domestication and foreignization" (Munday 2001: 145–8). Rather, it is a matter of *negotiation* between the various parties involved.

Key Issues

The Problem of Negotiation

Any such negotiation is problematic because it must strike a delicate three-way balance between making something culturally competent and comprehensible, accurately representing the original meaning, and behaving ethically towards local perspectives. Misrepresentation of the original can be a "sin of commission" as well as omission, through mistranslation, oversimplification, censoring, or if one's "artistic license" drifts into editorializing. This is why it is often said that to translate is to betray – that it is impossible to translate something without betraying the truth of the original. Inadvertent betrayal is easy because it is often hard to divine the intention of the person who originally produced the words in question. If they are one's own words, it is one thing, but if they are those of another can be very hard to be confident that one's translation does in fact capture what was "really meant."

In translating archaeology for consumption by Indigenous people, there is also the issue of betraying the target audience, of behaving unethically towards local perspectives. This matter is not usually taken up by translators or scholars of translation other than those such as Spivak (e.g., 1993) who are concerned with postcolonial politics. This betrayal can occur in either or both of two ways. The first is when archaeologists translate simply to impose their views more effectively on local people in a straightforward continuation of colonial domination. The second form of betrayal is more subtle. Its discussion is controversial, to the extent that it turns postcolonial wisdom on its head, and that is when archaeologists seek to make their translation "invisible" (Venuti cited in Munday 2001: 146) to its recipients. "Domestication," or what in other contexts is called seeking "resonance" (Lilley 2009), can in fact be insidious "colonization by stealth" rather than what it is presumably intended to be, namely, a strategy of decolonization, of making archaeology "community driven."

The Two-Way Ethics of Negotiated Translation

At root, archaeology is archaeology. The discipline is a theoretically and technically very broad church, and this is not the place to try to define it more closely. Plainly, though, it is not social work or community development work. Nor is it really able to be truly indigenized or domesticated: it is and in the final analysis will always remain part of the Western Enlightenment project. It can, however, be deeply sensitized to Indigenous perspectives and concerns while remaining true to itself. It must do both to be of interest and relevance to Indigenous communities. If it is not sensitized, it will not be culturally competent or comprehensible. Yet if archaeology betrays its own values by attempting to disguise if not eliminate its indispensible scientific basis, it will be without value to anyone, including Indigenous people, because it will not be able to offer anything that cannot be found elsewhere. If archaeologists cannot justify what archaeology is "for" without trying to pretend it is something else, Indigenous and other communities will not see any point to it (Sand et al. 2006).

A crucial question to ask at this juncture is how to advance a translational project in a manner that is ethical rather than just pragmatically effective in its approach both to the discipline of archaeology and to descendent communities. Ethics are central in the latter connection because encouraging people to "take archaeology into their lives" necessarily incurs some degree of change in their beliefs about their worlds. One must reflect in depth on one's rationale: why should I want to change people's minds in this way? What could possibly be the benefit for them? Would any such benefit outweigh any immediate or longer-term negative impact the changes might cause? A standard ethical checklist is a useful guide here. How does one's approach sit with questions of justice,

autonomy, non-maleficence (doing no harm), and beneficence (doing good)? The critical thing to remember in making an assessment is that "the perfect is the enemy of the good." One will rarely, if ever, be able to develop an approach that gets a "perfect score" on all counts. Rather, one should aim for a negotiated settlement where everyone gets enough of what they need to satisfy the requirements they first brought to the negotiation (Eco 2004: 6).

Resonance

Conventional approaches to "translation as negotiation" usually seek to achieve what is known as "resonance" because a new perspective ostensibly "needs to be resonant with cultural traditions and narratives to be appealing" (Merry 2006: 39). Attempting to move the archaeological writer towards the descendent reader is undoubtedly seen to be more ethical insofar as it helps redress imbalances of power and reduces the conceptual violence done to local people. Anecdotally, at least some archaeologists seem to believe that this means they have to give up science and replace it with an application of archaeological techniques somehow shorn of the discipline's larger theoretical and methodological framework. Merry (2006: 41), paraphrasing Ferree, points out though that "resonant discourses are less radical than nonresonant ones... [so] resonance is a costly choice because it may limit the possibility for longterm change." This is because deeply ingrained traditions can profoundly restrict the negotiation, thus "ignoring the continual contestation over meanings, their ambiguity, and their susceptibility to change" (Merry 2006: 41).

On this basis, it can be contended that archaeologists should support "a more dialogic analysis that sees the production of meaning as contested, shaped by both group conflict and by the internal dynamics of the discourse itself" Merry (2006: 41–2). Similar arguments can be heard from descendent communities. Even if local people are not interested in much (or anything) that archaeologists might say, they generally still expect archaeologists to "hold up their end" professionally and do reliable, scientifically credible archaeology. They emphatically do not want to see archaeological techniques applied in a theoretical and methodological vacuum in the hope that this or that empirical titbit might appeal to the local community or part(s) thereof. To paraphrase, the reaction is to ask why descendent communities should take archaeology seriously if archaeologists don't. If so-called professionals are not going to do proper scientific archaeology, why bother descendents with a half-baked version? What exactly do archaeologists stand for, if not the integrity of their discipline?

Archaeology will be much better placed to benefit from the intellectual and practical opportunities that dialogue can offer if archaeologists acknowledge rather than deny the inevitability of, first, some level of conflict or disagreement or dissonance between themselves and Indigenous people and other descendent communities and, second, the constant need to justify what constitutes best professional practice. To take full advantage of these insights, translation should ideally proceed from one particular end of a continuum of variation in the degree to which "local cultural forms and practices are incorporated into imported institutions" (Merry 2006: 44). The end from which the discipline should try to depart is hybridization, a negotiated form of syncretism "that merges imported institutions and symbols with local ones, sometimes uneasily" (Merry 2006: 44). Merry (2006: 48) portrays the resulting conceptual mergers as "thickly shaped by local institutions and structures." At the other end of the continuum, where many past and contemporary attempts at collaboration remained lodged, lies "replication," in which "the imported institution remains largely unchanged from its... prototype... [and the] adaptation is superficial and primarily decorative" (Merry 2006: 44). Replications are only "thinly adapted to local circumstances" (Merry 2006: 48).

Through Thick and Thin

It must be emphasized that nonresonant approaches do not have to be only "decorative. . .thinly adapted" replications. There are many ways to adapt "thickly" to local circumstances: archaeologists do not have to discard science, and local people do not have to give up

their own understandings. Oral-historical and archaeological particulars do not have to match precisely to match effectively. Archaeologists should not feel obliged to prove the details of local narratives nor local communities to look to science to confirm their version of events. Such close congruence between accounts may be possible and even sought out in some contexts, but coherence of even profoundly divergent conceptions of the past can also be achieved at a more abstract, conceptual level. Archaeology and local narratives can agree, for instance, that certain broad forms of activity occurred, perhaps even in generically similar places in roughly equivalent sequences. We might see, for instance, shared interest in initial colonization, changes in specific technologies, introductions of specific domesticates or exotic fauna, or the presence or absence of ongoing population movement, perhaps to or from particular directions.

Thick links can also be created along ethical lines, by archaeologists and local communities accepting with humility and good grace rather than resignation or hostility what each may perceive as the other's willingness or unwillingness to vary or surrender certain aspects of their customary practice. A crucial aspect of this situation is archaeologists accepting that local people may be unwilling to share everything they know about the past, such as certain mythological accounts, genealogical details, or locations of particular sites or sorts of sites. Some archaeologists might believe that people will tell researchers everything they know provided the scientists ask the right questions in the right way and will accept what the researchers say provided the scientists use the right wording in the right language to explain themselves, thus enabling archaeologists to be utterly familiar with local custom and practice. Language obviously plays a pivotal role in effective cross-cultural communication (Lilley 2009: 54–8), but in the end, no amount of eloquent translation or even fluency in local languages will convince people to divulge secret or sensitive knowledge they do not want to (or are not in a social or political position to) divulge. Nor will it make them accept archaeological interpretations they do not want to accept. Recognizing this fact rather than attempting to force the issue with locals or flagellating oneself or one's colleagues for failing to communicate effectively can go a long way towards creating a "thick" adaptation to local circumstances.

Meta-interests

One thing that should greatly assist all involved in this process of translation as negotiation is what observers as different as Andrew Fleming and Tim Ingold have identified as local people's and archaeology's shared interest in "the temporality of the landscape" (cf. Sheehan & Lilley 2008). Thus, Fleming (2006: 271–2, original emphasis) describes how archaeologists as well as native dwellers

> *work* in the field... in the open air. An outsider at first, the landscape archaeologist has no choice but to become engaged in the landscape, to become an insider as a consequence of acquired knowledge... Landscape archaeologists are not obsessed with the attainment of hard-edged objectivity always and everywhere, and our field discourse always and necessarily involves thinking about the intentionality and mindsets of people in the past'.

More lyrically, Ingold (2000: 189) understands that

> For both the archaeologist and the native dweller, the landscape tells – or rather is – a story, 'a chronicle of life and dwelling' (Adam 1998: 54). It enfolds the lives and times of predecessors who, over the generations, have moved around in it and played their part in its formation. To perceive the landscape is therefore to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past.

Coming to "translation as negotiation" from this shared "meta-interest" is surely key to the indigenization of archaeology.

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Trezise, Percy

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Basic Biographical Information

Percy Trezise (1923–2005), who became a pioneer of Australian rock art research, was born in 1923 and raised in country Victoria. He trained as an RAAF pilot in World War II and after the war became a commercial pilot. Following a stint in the Kimberley flying for the Air Beef scheme, he moved to Cairns in 1957 to take up a position with Ansett Airlines. As a pilot for Ansett and the Cairns Aerial Ambulance, Trezise flew regularly across Cape York Peninsula, the Gulf of Carpentaria, and the Torres Straits, transporting freight and passengers to and from remote cattle stations, bush settlements, and Indigenous communities. In his spare time, he developed his skills as an artist and embarked on a parallel career as a landscape painter and author and illustrator of children's books.

Although not professionally trained in anthropology (or archaeology), Trezise developed a serious interest in Aboriginal culture as a result of his experiences in the bush and was inspired to read the Australian anthropological literature, including the publications of Donald Thomson and Ursula McConnel who had worked in Cape York Peninsula. In 1962 at Karumba on the Gulf of Carpentaria, Trezise met Dick Roughsey (1920–1985), a Lardil man from Mornington Island. This was the beginning of a lasting friendship and professional collaboration between the two men. After retiring from flying in the late 1970s, Trezise engaged full-time in rock art research, writing, and painting until his death in 2005.

Major Accomplishments

Trezise was introduced to Aboriginal rock art in 1960 when he investigated reports of rock paintings south of Laura, in a locality which came to be known as Split Rock. Thereafter, he made unofficial aerial surveys for likely rock art locations while flying over the spectacular escarpments and gorges of the vast belt of sandstone country between Cooktown and the Great Divide. He followed up these aerial observations with arduous dry-season expeditions (on foot) to the remote plateaux and escarpments to locate and record the art.

From the early 1960s, Trezise was a recipient of research grants from the Australian Institute of Aboriginal Studies (AIAS, now AIATSIS, the Australian Institute of Aboriginal and Torres Strait Islander Studies) to document rock art in southeast Cape York Peninsula, following recording methods developed by Fred McCarthy,

then Principal of AIAS. Trezise mapped major rock art sites and localities across the region and applied his artistic abilities to produce annotated, scaled drawings of the art in its various techniques (painting, engraving, and stencilling). Knowledgeable Aboriginal people identified rock art subjects (motifs) which became the basis for his classification system. Trezise was the first to report and document the ubiquitous Quinkan spirit figures of the Laura sandstones and to characterize the area as "the Quinkan region." From the 1960s to c. 1986, following his fieldwork, he deposited (variously) photographic, print, audiotape, and graphic records at AIAS/AIATSIS.

Without Dick Roughsey's assistance, it is unlikely that Trezise would have gained the trust of senior Aboriginal men (including Willy Long, George Pegus, Harry Mole, Caesar Lee Cheu, and Mitchell McGreen) whose contributions were crucial to his research. The men led Trezise to sites, provided insights into Aboriginal culture and rock art, related their traditional stories and languages, and narrated personal accounts of the devastating impacts of white colonization on Aboriginal people. As well as contributing to survey and recording in the Quinkan region, Dick Roughsey, who became a distinguished artist and public figure (he was awarded an OBE in 1978 for his services to Aboriginal art and culture), worked with Trezise in documenting the Lardil culture of Mornington Island (Roughsey 1975). With Wally O'Grady of the Cape York Conservation Council, Trezise and Roughsey lobbied state and commonwealth governments for the conservation and protection of Quinkan rock art. As a result of their extended campaign (see Trezise & Roughsey 1975), the Queensland government created the Quinkan Reserves and introduced cultural heritage management strategies in the region. Trezise's efforts also led to the Commonwealth government listing of "Quinkan Country" on the Register of the National Estate. In Cairns, he played a major role in preventing the establishment of a wood chip industry in the North Queensland rainforests.

Trezise's first major publication, *Quinkan Country* (1969), was intended for a general audience but was reviewed favorably in academic circles. According to MacIntosh (1970: 83) "(*Quinkan Country*) opens up an area practically untouched previously, for studies in Australian prehistory." Trezise's (1971) monograph *Rock Art of South-east Cape York Peninsula* was seminal in Australian rock art studies, and its classification scheme provided a basis for later typological analyses of Quinkan rock art. Trezise published numerous articles and papers, and his final account (Trezise 1993) presents an overview of a lifetime in rock art research. Some of Trezise's theories on Australian prehistory were controversial, e.g., his identification of extinct fauna in Quinkan rock art.

From the outset of his research, Trezise assisted, consulted, and worked with archaeologists and rock art specialists who came to work in the Laura/Quinkan region, including Richard Wright, Andrée Rosenfeld, Josephine Flood, Mike Morwood, Alan Watchman, and the author (NC). He was instrumental in having European rock art specialist Andrée Rosenfeld and her colleagues undertake the Early Man excavation in the early 1970s, a project which provided solid evidence for the late Pleistocene origins of Quinkan art. Stylistic analyses of Quinkan rock art conducted by Rosenfeld and other archaeologists have been much reliant on Trezise's graphic records.

In 1998 Trezise donated his personal archive of records to James Cook University, Cairns. In his lifetime, Trezise received various awards, including a Churchill Fellowship in 1972 for overseas rock art studies and an Order of Australia in 1996. In 2004, he was awarded an Honorary Doctor of Letters degree from James Cook University for contributions to Aboriginal studies and conservation. Trezise's legacy includes his many publications, a substantial rock art archive, and a body of ethnographic and ethno-historic work which is highly regarded (and often cited) by anthropologists and others preparing Aboriginal land claims and native title applications (Cole 2011).

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Trigger, Bruce Graham

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Basic Biographical Information

Archaeologist, historian, theorist, activist-critic, Bruce Graham Trigger was born on June 18, 1937, in Preston, Ontario, and died on December 1, 2006, in Montreal, Quebec. He received his undergraduate education at the University of Toronto (B.A. in anthropology, 1959) and took his doctorate at Yale University (Ph.D. in anthropology, 1964) studying under George Murdock and Irving Rouse. He taught briefly at Northwestern University before joining the faculty of McGill University in 1964 as an Assistant Professor. He rose quickly through the ranks, promoted to Associate Professor in 1967 and then Professor in 1969. He was appointed the James McGill Professor of Anthropology in 2001.

Trigger was the recipient of numerous honors and prizes. He was a fellow of the Royal Society of Canada (elected 1976). He is the recipient of the Canadian Silver Jubilee Medal (1977), the Cornplanter Medal (1979), the Innis-Gérin Medal, Royal Society of Canada (1985), and the Prix de Québec (1991). In 2001 he was made an Officer of the National Order of Quebec and in 2005 an Officer of the Order of Canada for his sustained contributions to the social sciences. He received honorary degrees from the University of New Brunswick (1987), University of Waterloo (1990), University of Western Ontario (1995), McMaster University (1999), and the University of Toronto (2003). He was an honorary fellow of the Society of Antiquaries of Scotland (1981) and an honorary member of the Prehistoric Society (UK) (1991).

Trigger's contributions span the entire range of archaeological theory and practice. He carried out archaeological investigations in Egypt, Sudan,

and Canada (e.g., Trigger 1965). He wrote extensively about the Huron and other First Peoples in Canada and their historical relations with early European settlers (e.g., Trigger 1976a). His study of the development of the concept of sociolcultural evolution (Trigger 1998) over the last three centuries and his writings on other theoretical topics (e.g., Trigger 1978, 2003a) stand as models of meticulous argumentation and clarity. So do his scathing commentary and criticism of universities that succumbing to pressures by the New Right have increasingly allowed business interests and government agencies to set their agendas and put profits ahead of open, critical thought (Trigger 1992).

Major Accomplishments

Trigger's archaeological writings move seamlessly from his monumental histories of archaeological thought through his analyses of contemporary issues in archaeological theory and praxis to his comparative studies of the rise of early civilizations. His histories were written at different scales. In some instances, he used a microscope to prepare a fine-grained analysis of the life and thought of individuals like Daniel Wilson or V. Gordon Childe (e.g., Trigger 1966, 1980a). In other instances, he peered through a somewhat wider lens to discern how particular patterns in the mosaic of archaeology appeared in the past and have developed along different pathways to the present day – such as nationalism, romanticism, or regional research traditions (e.g., Trigger 1984, 1995a). Finally, in the two editions of *A History of Archaeological Thought* (Trigger & Glover 1989, 2006), he stepped back to see the larger picture composed of the mutual interactions and interconnections of the parts with one another and with the wider whole as these developed through time; here, the fine-grained texture derived from studying individuals or regional traditions is replaced by perspective, understanding, and appreciation of the totality as a whole.

Archaeology, for Trigger (1981), is an historical science. Consequently, his discussions of contemporary archaeological theory and praxis, their connections with other disciplines, and their relations to the wider social concerns were typically framed in terms of conception of society and history that viewed them as processes involving emergence, formation, reproduction, and transformation. This was a dialectical conception of society and history that was finely tuned to structural inequalities (e.g., Trigger 1976b). He appreciated the significance of structural inequalities: the diverse understandings (standpoints) that groups with different relations to power have of society and the contested terrains of debate that occur as a result. It was apparent in his writings about ancient societies, how archaeologists understood and wrote about those societies, and how native peoples responded to those interpretations. This was perhaps most evident in his writings about the relations between archaeologists and native peoples – especially "Archaeology and the Image of the American Indian" (Trigger 1980b), "The Past as Power" (Trigger 1985), and "A Present of Their Past? Anthropologists, Native People and Their Heritage" (Trigger & Glover 1988). He believed that the accumulation of knowledge had potentially transformative effects, and his writings on the historiography of the relations between First Peoples and European settlers have had a profound effect on the way Canadian history is taught today.

Trigger's approach to archaeology was systematically comparative. This was as true of the collections he coedited with Ian Glover on regional traditions of archaeological research for *World Archaeology* (Trigger & Glover 1981, 1982) as it was of his *Understanding Early Civilizations* (Trigger 2003b). Here, he was less concerned with the rise of civilization per se than with understanding how the sociopolitical organization, economy, and cognitive and symbolic aspects of early state-based societies were articulated with one another; how these articulations came into being as earlier social institutions and practices were distorted, dissolved, and soon replaced by emergence forms; and the ways in which they provided the social cement that at least temporarily held

together these structures of inequality. He paid close attention to the diversity of early civilizations, since he was well aware that they were not all the same. The book's wealth of empirical detail is matched by that of its theoretical underpinnings and comparisons of the standpoints different archaeologists have put forth concerning the rise of civilization. It is easy to imagine the debates Trigger was having with different colleagues and shows that knowledge is produced not merely through the accumulation of more facts but also honing and refining the frameworks we use to understand them.

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Hiep Hoang Trinh holds a Ph.D. in Archaeology from Vietnam Ministry of Training and Education; an M.A. in Archaeology from the University of Social Sciences and Humanities, National University, Hanoi; and B.A. in History from Hanoi University. He is the principal researcher and head of the Department for Metal Age Studies at the Vietnam Institute of Archaeology of the Vietnam Academy of Social Sciences (VASS).

Major Accomplishments

Since 1995, his work at the Institute of Archaeology has focused on several research areas such as pre-protohistorical archaeology of northern Vietnam, pre-Dong Son cultures in northern Vietnam, Neolithic and Metal Age cultural interaction between northeast Asia and northern Vietnam, and ancient social networks.

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Basic Biographical Information

Shogoro Tsuboi (1863–1913) was one of founders of Japanese anthropology and archaeology. He was born in Ryogoku, Tokyo, in 1863. He entered Tokyo University to study biology in 1883 and established the *Society of*

Anthropology with his friends the following year. In 1886 he started publishing the "Anthropological Report" (presently known as the *Journal of the Anthropological Society of Nippon*). He studied abroad for three years, in the UK and France, from 1889. Returning to Japan in 1892, he became a professor at the National University of Science (later, the Department of Science, Tokyo University) and the following year, founded the first anthropology class in Japan. Dr Tsuboi produced a number of excellent students in various disciplines, including anthropology, ethnology, archaeology, and geology. In 1899 he obtained a doctorate of science from Tokyo University. He died in 1913 while attending the Fifth Congress for the Union Académique International (UAI) in St Petersburg, Russia.

Major Accomplishments

Besides being a child prodigy, Shogoro Tsuboi liked collecting, observing, and sketching whatever he was interested in. He also began publishing a journal and setting up study societies as early as his teenage years. In 1883 he wrote his first essay titled "Consideration on Pottery from Meguro Village." After that, he wrote energetically for a variety of academic fields covering anthropology, ethnology, archaeology, folklore, and modernology (the study of modern social phenomena). Over his lifetime, he wrote more than 1,000 essays for a variety of books and magazines for the general public as well as for academic journals published by organizations such as the Tokyo Anthropological Society and the Anthropological Society of Nippon.

In the field of archaeology, besides studies covering all prehistoric times, Shogoro Tsuboi worked particularly on the manners and customs of ancient Japanese people, Ainu culture, *haniwa* figures, and ancient Egyptian culture. Among his numerous works, three stand out as his major contributions to Japanese archaeology.

Shogoro Tsuboi's first major accomplishment was the discovery and identification of Yayoi pottery, later associated with the culture of the first period of farming in Japanese. In 1884, Dr Tsuboi and his friend recovered an unknown type reddish pot from the Mukogaoka shell mound in Yayoi-cho, Tokyo. They found it to be totally different to Jomon pottery in style and decoration and named it "Yayoi"-type pottery after the place name of its discovery while placing it chronologically between pottery of Jomon and Kofun (burial mound) periods.

The second major accomplishment of Shogoro Tsuboi involved the genesis of scientific research and reporting on burial mounds. In 1886 he conducted a very systematic and elaborate excavation of burial mounds in Ashikaga Park, Tochigi. He recorded and sketched in situ every object in the stone chambers as well as the mound. He then published "An excavation report of Ashikaga burial mounds," which had a great impact, not only on later studies of burial mounds but also on excavation methods and techniques in general.

Thirdly, Shogoro Tsuboi did much to vitalize the fields of archaeology and anthropology through academic debates. Among them, the most well known is his "Koro-Pok-Guru" hypothesis. In 1887, Tsuboi proposed that the "Koro-Pok-Guru" (small people from the folklore of the Ainu people of the northern Japanese islands) were the original people of Japan. This initiated a hot discussion on the origin of Japanese people and culture, with his views pitted against those of scientists who supported the hypothesis that the Ainu were the original people. This debate continued until Tsuboi's death in 1913.

Shogoro Tsuboi not only promoted academic fields but also disseminated scholarly knowledge energetically to the general public through plain and clear explanations and with public lectures, sometimes in cooperation with Mitsukoshi Department Store. He loved objects, people, and humor and created a grand network of colleagues with the same interests. He was a titan of knowledge in the liberal atmosphere of the Meiji Period and may be called the first practitioner of public archaeology in Japan.

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▶ Japan: Indigenous Occupation
▶ Torii, Ryūzō

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Tsude, Hiroshi

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Basic Biographical Information

Hiroshi Tsude is a Japanese archaeologist and historian. He was born in Osaka in 1942. He graduated from Kozu High School and entered Kyoto University to study archaeology under mainly Yukio Kobayashi, who was famed for his empirical research on chiefly tombs and society in Kofun period. After his undergraduate studies, Hiroshi Tsude worked as a research associate at Kyoto University, when he excavated several tumuli in Otokuni district, Kyoto prefecture, to launch his own research of Kofun period.

In 1977 Hiroshi Tsude was appointed to the post of Associate Professor of Shiga University near Kyoto. Shortly thereafter, he moved to Osaka University. As an Associate Professor in the Department of Japanese History at Osaka University, Dr. Tsude fostered many archaeologists working on the Yayoi and Kofun period prehistoric periods in Japan through his research and education. Dr. Tsude continued this work until his retirement in 2005. He was promoted to Professor of the newly established Department of Archaeology at Osaka University in 1988, and the following year, he obtained his doctoral degree in archaeology.

In 1989 Hiroshi Tsude received the Seiryo Hamada award, an award which is regarded as most honorable among Japanese archaeologists and historians.

Major Accomplishments

Hiroshi Tsude has made significant theoretical and practical contributions to the studies of social development and state formation in Japan through his use of Marxist theory and of an anthropological approach based on archaeological analysis.

Early in his career, Dr. Tsude attempted to reconstruct the development of an agricultural society in the Japanese archipelago. He undertook a Marxist analysis of iron farming implements, settlement systems, regionality of pottery in the Yayoi period, and reconsideration of farming families and their land ownership and published this in the volume *Nihon noko shakai no seiritsu katei* (*Formation Process of Agricultural Society in Japan*, see Tsude 1989). In the late 1990s, Dr. Tsude centered his research study on chiefly tumuli in the Kofun period. He attempted to reconstruct the political relationships among chiefs buried in these tumuli through a comparative analysis of the size and shape of the mounds and coffins and typological study of their offerings. This analysis was published in *Zenpokoenfun to Shakai* (*Keyhole Shaped Tumuli and Their Social Background*, see Tsude 2006). In this work Dr. Tsude argued that the Kofun period (third to sixth centuries) was an early state in Japan. This stimulated widespread discussions about state formation processes in prehistoric Japan.

Cross-References

▶ Japan: Indigenous Occupation

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Tupi-Guarani Archaeology in Brazil

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Introduction

Tupi-Guarani archaeology is one of the most studied themes in Brazil and South America, mainly because Tupi-Guarani-speaking peoples, living along the Atlantic coast, were among the first contacted by Europeans around 1500 CE. As a result of this early historical contact, a massive written record has been created about these Indigenous peoples. Ethnohistorical and ethnographic records provide a picture of the Tupi-Guarani as living in large villages organized in regional chiefdoms commanded by political leaders (*caciques*) and shamans (*pajés*). Their economy was heavily based on slash-and-burn agriculture (maize, manioc, beans, and squash, among many other crops), but hunting and collecting has always remained vital. The practice of war and anthropophagy has decisive social significance as a means of acquiring status and power as well as expanding territories through conquering, establishing political alliances, and, mainly after contact, enslaving other peoples.

From an archaeological perspective, the continental occupation of the Tupi-Guarani-speaking peoples can be understood as long-term history, a formidable demographic expansion that interacted with other cultures from prehistoric times until today. The principal question for archaeology is, then, to understand the origins of the Tupi-Guarani culture and establish the archaeological correlates for such a deep historical process.

Definition

The Tupi-Guarani live in several groups and have more than 30 closely related languages. They are widely dispersed in the tropical and subtropical lowlands, a polygon that involves Brazil, southern Venezuela, eastern Peru and Bolivia, Paraguay, northern Argentina, and Uruguay. Although demographic data are unclear, there are estimates up to one million Tupi people just before contact (Fausto 1992: 382-383). Nowadays Tupi-Guarani speakers compose no more than 250,000 people.

Key Issues and Current Debates

Despite the friendly first contacts with the Portuguese and other Europeans, the Tupi soon faced the hardship of slavery and genocide wars, as in most places of the New World. Even so, their widespread language and culture have provided common linguistic grounds (the *nheen gatu* or "general language") for the Jesuit and Portuguese expansion in the South American hinterland and have been persevered, throughout historical times, to this day.

Noelli (1993) has detected two academic trends in Tupi-Guarani archaeology, which he has named *ethnological imperialism* and *archaeological domain*. The first is related to ethnographers like Ehrenreich, Von Martius, Métraux, von den Steinen, Nimuendajú, and d'Orbigny, who synthesized written and iconographic historical documents from the colonial period (made by travelers, missionaries, and military) and which

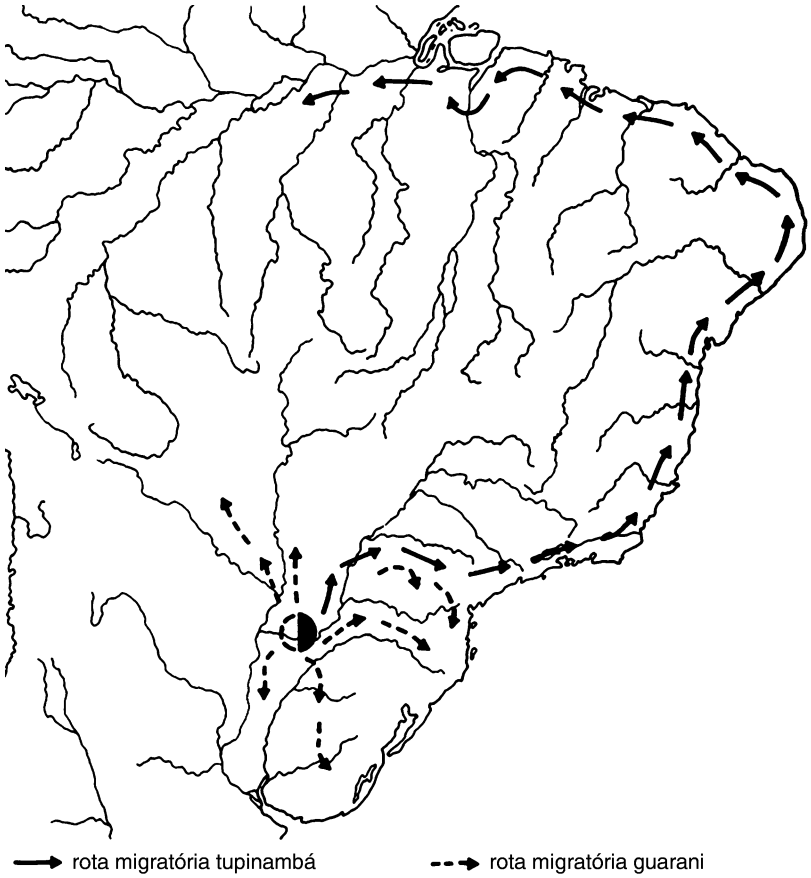

Tupi-Guarani Archaeology in Brazil, Fig. 1 Métraux (1927) expansion model for the Tupi-Guarani (Modified from Fausto 1992: 384)

were sometimes supplemented by ethnographic observations. These approaches were accompanied by linguistic studies and focused on defining cultural traces and explaining the migratory waves across the continent. It did not take long to realize (e.g., by the accounts of the Jesuit priest Montoya and the French chronicler Jean de Léry) that the correlation between the geometric polychrome-painted style of pottery production and Tupian-speaking groups, highlighting the archaeological dimension of the Tupi-Guarani history.

One of the most important researchers of this period is the French ethnographer Alfred Métraux. His assumptions became rather paradigmatic and have had a strong influence on archaeological research, particularly as regards three focal points: (1) The Tupi-Guarani people's permanent search for the "land without evil," historically known as *yvy marane'y* in Tupian language. This ideology would explain the spreading out of the Tupi expansion throughout South American lowlands. (2) The polychrome pottery style would be linked to the Tupi-Guarani culture, thus indicating the extent of the Tupi-Guarani territory before contact (Métraux 1948). (3) The existence of a cultural boundary somewhere in the area of what is today the state of São Paulo, in Brazil. Such a linguistic boundary separates the Tupi peoples to the north from the Guarani speakers to the south. This linguistic and cultural split would inspire archaeologists to look for differences in technology and style of pottery (Fig. 1).

The beginning of the *archaeological domain* is related to the implementation of the National Program of Archaeological Research (PRONAPA), a research project with continental dimensions, coordinated by Betty Meggers and Clifford Evans, from the Smithsonian Institution in the USA, between 1965 and 1970.

The PRONAPA, aiming at large-scale mapping of archaeological cultures (organized in traditions and phases) by its material (mostly ceramic) correlates, has emphasized cultural (material) sequencing and did not put much effort in anthropological or linguistic perspectives. In this sense, the Tupi-Guarani tradition was considered "(...) a cultural tradition characterized by corrugated, brushed and polychrome pottery (red and/or black under engobe white or red), secondary burials in urns, polished stone axes and the use of *tembetás*" or labial adornments (Chmyz et al 1976: 146). This dissociation of archaeological material culture from precolonial times and the ethnohistorical and ethnographic record of the (still alive) Tupi speakers has not taken into account the continuity of Indigenous historical processes and has disarticulated the perception of the native peoples' rights, with political consequences (Noelli 1993). This approach changed only after the 1980s when Brochado (1984), articulating radiocarbon chronology, archaeological, ethnohistorical, and linguistic data, sought a vertical historical long-term perspective relating the archaeological past to living native societies and ultimately recognizing that undertaking Tupi-Guarani archaeology in Brazil is to make Indigenous history.

In spite of its merits, the continuous-historical model suggested by Brochado (1984) has received several critiques as regards the relationships between archaeological cultures and ethnic groups. According to Lima (2011), it contributes to the conception of ethnic groups as internally homogeneous, historically continuous, and externally defined by cultural and linguistic characteristics. In the same way, according to Schiavetto (2003), the continuous-historical model has depicted the Tupi-Guarani culture as a homogeneous block unalterable and static, resulting from the indiscriminate use of archaeological, ethnohistorical, and ethnographic sources. Following this perspective, the continuous model has no resonance of contemporary cultural diversity, as considered from an "emic," fluid, and dynamical concept of culture; thus, a variety of "peoples" would hide behind ceramic and linguistic continuity. The debate continues.

Another research focus is the origins of Tupi-Guarani culture, in both cultural and geographical terms. Based on the historical migrations of Tupi-Guarani recorded by chroniclers and voyagers, Métraux (1927) proposed one of the first models in the twentieth century, suggesting the watershed of Paraná-Paraguay as the provenience area, with a migratory movement from south to north shortly before the arrival of the Europeans. More recently, Meggers (1987) suggested that the origin of this culture would be located somewhere on the Madeira River, with migrations to the south and, later, to the north. Following Métraux, Meggers also considered the Tupi-Guarani movement fast and relatively recent, around 500–1000 CE. From the point of view of historical linguistics (based on lexical-statistical method), Rodrigues (1964) suggested that the origin of the Proto-Tupi culture could be the region between the Madeira and Xingu rivers in the southwestern Amazon around 3000 BCE, with further developments and ramifications as they expanded to the east and south, acquiring distinct cultural characteristics.

Brochado (1984), following Lathrap's (1970) "cardiac model" (the idea that the Amazon was a radiating center of cultures), considers that the origins of the Proto-Tupi-Guarani are related to the Amazonian Polychrome Tradition. From the central Amazon, around 3000 BCE, demographic pressure would lead to a process of differentiation and expansion in two migratory waves. The Guarani went south via Madeira-Guapore watershed, ultimately reaching the Paraná-Paraguay Basin, being already well established around 100 BCE. Afterwards, the Guarani reached the Atlantic coast in successive expansionist movements along the lower Parana (Plata) basin, turning north along the shore. On the other hand, around 500 BCE, the Tupi culture would have gone down the Amazon River to its mouth, in a movement from the west to the east, reaching the northeastern shores of Brazil, and then turning south along the coast (where they are usually called Tupinambás). This migration would have been linear and fast, following the Atlantic coastline. About a few hundred years before the arrival of Europeans, these two

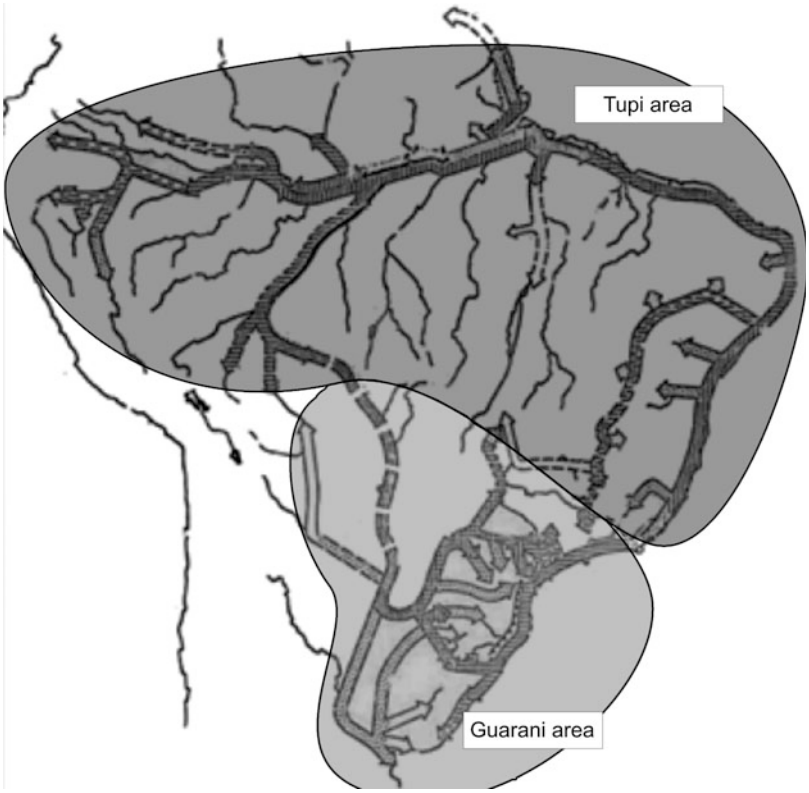

Tupi-Guarani Archaeology in Brazil, Fig. 2 The expansion routes of Tupi-Guarani, with Tupi and Guarani global areas (Modified from Noelli 2008)

opposite migratory waves would have met, configuring a boundary around southeastern Brazil (Fig. 2).

Brochado (1984) and others have identified discrete stylistic differences between Tupi-Guarani pottery assemblages from the southern and northern parts of the country, in close correspondence to the linguistic boundary between the Guarani and the Tupinambá, respectively. Synthetically, Tupinambá ceramics are painted with geometric designs in red, black, and orange, with white or red engobe, in close proximity to the Polychrome Tradition in Amazonia. Tupinambá paintings are extremely well done, with technical refinement and accuracy. On the other side, the southern set called Guarani tradition covers part of the states of São Paulo, Paraná, Santa Catarina, Rio Grande do Sul in Brazil, as well as Uruguay, Paraguay, and the region of northern Argentina. The finishing style of Guarani pottery is predominantly plastic (although painted motifs are always present) with a strict set of vessel shapes and sizes. Pottery decoration employs a variety of finishing techniques such as smoothing, corrugating, ungulating, painting, brushing, slotting, and different kinds of incisions. Despite these differences, it is clear that they belong to the same cultural tradition. In both traditions, the enduring sophisticated iconography suggests enduring teaching-learning relations involving both experienced and beginner potters (Fig. 3).

Noelli (2008), following Brochado's model, states that the Tupi-Guarani culture has its origins in a wide region in the southern Amazon area, a polygon to the south of the middle and lower Amazon, between Tocantins and Madeira/Guapore rivers. This proposal was strongly debated by Fausto (1992), who adopted Métraux's ideas about a territorial expansion from south to north. Moreover, Buarque (2009) has dated Tupinambá sites in Rio de Janeiro coast around 900 BCE, suggesting that the territorial expansion of Tupi-Guarani was older than

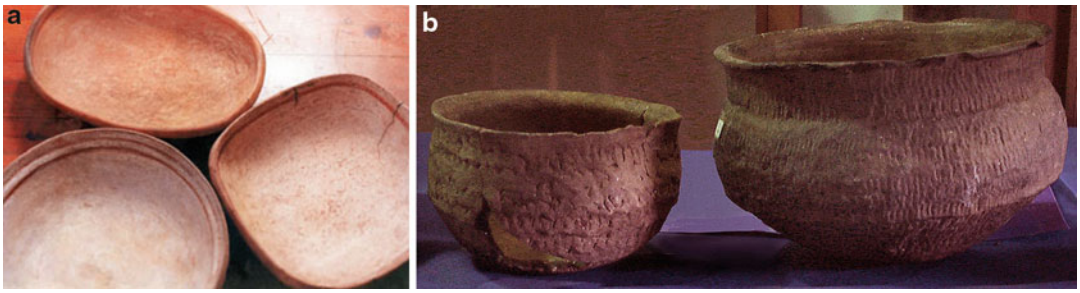

Tupi-Guarani Archaeology in Brazil, Fig. 3 (**a**) Typical Tupinambá-painted vessels with square and elliptical shapes from Araruama, Rio de Janeiro, Brazil (photo Beto Barcelos). (**b**) Typical Guarani-corrugated vessels with complex shapes from the Collection of Farroupilha Museum, Rio Grande do Sul, Brazil

archaeologists had thought so far and that the origins of this culture should not be on the north, but rather towards southern Brazil. So, up to this point, there is still no consensus about the origins of the Tupi-Guarani culture and its obscure relationships with Amazonian polychrome tradition. From a cultural perspective, both models provide the Tupi-Guarani archaeology with an important sociological foundation, explaining the continental scale of the Tupi-Guarani territorial dispersion as a result of a diachronic historical long-term process of demographic expansion, only disrupted by the European conquest.

The Tupi-Guarani culture expands itself by splitting villages into cells systematically subdivided over time. This process, called "swarming" by Brochado (1984), produces a radial expansion of the territory in gradual population waves, thus occupying the territory in a systematic way, acting socially, politically, and economically in the shaping of the landscape; manipulating botanical species; domesticating animals; intervening on topography; and transforming the environment. According to Noelli (1993) and Assis (1996), the territorial organization of the Tupi-Guarani is constituted by the house (*oka*), where lies the nuclear family; by the village (*amundá* or *teýy*), where the extended family resides; by the set of villages included in a territory (*teko'á*); and by the set of *teko'á* that configures a large territory as a nation (*guará*). By definition, *teko'á* constitutes a set of villages and camps (*tapyi*), interconnected by paths (*piabiru*).

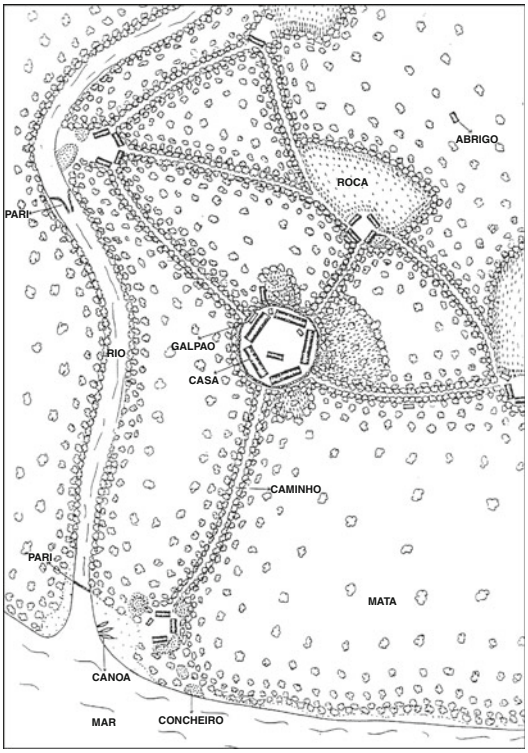

Tupi-Guarani Archaeology in Brazil, Fig. 4 Graphic idealization of a *teko'á*, showing the houses, traps, gardens, ports, jungle, and the pathways linking all the spaces (Modified from Assis 1996)

It configures a territory bordered by landforms such as rivers, hills, and streams. This territorial organization is defined by symbolic aspects and consolidated through political alliances that determine degrees of prestige and social status in relationships between villages (Fig. 4).

In the twenty-first century, Tupi-Guarani archaeology has adopted an Indigenous history approach, integrating and confronting archaeological, ethnohistorical, and ethnographic sources. There is also a concern with the observation of technology and behavioral patterns as a mechanism for understanding the archaeological record. In addition, there is a growing investment in political engagement, adding theoretical reasoning and scientific political agendas in defense of Indigenous heritage and civil rights as regards land reservations and the protection of environmentally threatened territories and heritage landscapes. In this sense, Tupi-Guarani archaeology has overcome the old divide between strict archaeological and anthropological/linguistic perspectives, making it possible to approach the Tupi-Guarani people's history and culture in a holistic way.

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► Meggers, Betty Jane

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Turkey: Archaeological Museums

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Introduction

As archaeological material in Turkey is legally state property, archaeological museums have played a crucial role in state museum policies. In recent years, the Ministry of Culture and Tourism has been investing heavily in the establishment of museums associated with important archaeological sites. The construction program aims to present the excavation results using modern technology to enrich the visitor experience. New museums also engage in educational programs for their communities and include workshops and other facilities aimed at attracting children's attention and enhancing the value of the museums in their respective regions.

Key Issues/Current Debates/Future Directions/Examples

Museums of Turkey

The first museum in Turkey was founded in 1846 by Fethi Ahmet Pasha at Hagia Eirene, which had

Turkey: Archaeological Museums, Fig. 1 Osman Hamdi Bey is one of the most prominent figures in the development of museums and archaeology in Turkey (Public Domain)

previously been used as a military depot in Istanbul. The museum was later renamed *Müze-i Hûmâyun* (Imperial Museum), and Mr. Edward Goold, who had been teaching at *Mekteb-i Sultânî*, was appointed director. *Asar-ı Atika Nizamnamesi*, the first thorough legislation regarding protection of ancient artifacts, was passed in 1869. The legislation required all parties to apply for permission from the Ministry of Education for excavations on Ottoman soil and banned overseas sales and movement of material while permitting local sales. In 1872, Dr. Philipp Anton Dethier was appointed director of *Müze-i Hûmâyun*. During his directorate, artifacts from the Hagia Eirene were moved to the Tiled Kiosk Museum. In 1874, a second law was passed, which was proved unsatisfactory in fighting (abuse). A new age for Turkish museology began after Osman Hamdi Bey was appointed director of the museum. He played a pivotal role in the preparation of the new legislation for ancient artifacts, which forbade all transactions and export overseas. Istanbul Archaeological Museum, Konya Museum (1902), and Bursa Museum (1904) were also built during his directorate. He also played a crucial role in the first scientific excavations in Ottoman territory as well as in the formation of modern museological standards. Following his death, his brother Halil Edhem Bey took up on the role of director. He particularly focused on the development of museums in Anatolia. The Museum of Turkish and Islamic Arts (1914) and The Ancient Orient Museum (1925), both in Istanbul, were also established during his period (Fig. 1).

Istanbul Archaeological Museums consist of the Archaeological Museum, the Ancient Orient Museum (Eski Şark Eserleri Müzesi), and the Tiled Kiosk Museum (Çinili Köşk Müzesi). The museum complex was opened to visitors in 1891. They house a large number of finds from the Ottoman territory, material from Seljuk and Ottoman eras, and a Children's Museum (Fig. 2).

After the War of Independence, Atatürk paid a great deal of attention to museums and personally contributed to the foundation of several. During the early years of the Republic, numerous museums were made accessible through development and restoration operations on a national scale. Besides construction of new museums, several architecturally significant buildings were converted to museums. Ayasofya (Hagia Sophia), built by the Roman emperor Justinian in 537, was designated as a monument museum in 1935. Another Justinian period church, Chora, was also arranged as a museum in 1945. Topkapı Palace, the seat of the administration from the time of Mehmet the Conqueror was converted to a museum by Atatürk's directive in 1924. The museum in Manisa, the core Lydian territory, was created in 1937 in a *madrasa* built by the famous sixteenth-century Ottoman architect Sinan (Fig. 3).

Ankara Ethnographic Museum, the first museum of the Republic, was opened to visitors in 1930 to display and house the cultural heritage of Anatolia beginning from the first Turkish states and principates to more recent times. Stemming from Atatürk's idea to establish a museum devoted to Hittite civilization, the growing number of Hittite objects brought to Ankara necessitated a large building. For this purpose, two Ottoman buildings were restored to establish the Museum of Anatolian Civilizations, which took its final form in 1968, one building having been reserved for the administrative section. The museum houses various objects from Paleolithic

Turkey: Archaeological Museums, Fig. 2 Founded in late nineteenth century, Istanbul Archaeological Museums complex is still one of the most visited national museums (Photo: Soner Ateşoğulları)

Turkey: Archaeological Museums, Fig. 3 The Museum of Anatolian Civilizations, stemming from Atatürk's idea to establish a museum devoted to Hittite archaeology, later developed into a museum presenting the whole ancient civilizations in Turkey (Photo: Soner Ateşoğulları)

times to the Ottoman period, including many prominent examples from Çatalhöyük, the Assyrian Colonies, and the Phrygian, Lydian, and Urartian periods. In the core Hittite territory, namely, Çorum province, the first museum was established in 1940 in Alacahöyük, the site of the Early Bronze Age royal tombs and a Hittite town. The year 1968 saw the opening of two museums in the region, one in Boğazköy, where capital Hattusa is located, and in Çorum. In the Phrygian capital Gordion, a museum was built beside the so-called Tumulus of Midas in 1964. In Uşak, another Lydian territory, a museum was established in 1970. The repatriated pieces from the so-called Croesus Treasure are displayed in the museum.

The museum directorate in Van Province in Eastern Anatolia, the central town of which covers the Urartian capital Tushpa, was established in 1972 for display after decades of

Turkey: Archaeological Museums, Fig. 4 Three-storied Gaziantep Zeugma Mosaic Museum presents the rich collection of mosaics and other finds from the riverside Roman city of Zeugma

collecting and storage of artifacts under state control. A considerable number of museum directorates established close to ancient cities in Muğla, Aydın, and İzmir provinces provide for effective management of the Aegean heritage in Western Anatolia. Those directorates are responsible for numerous open-air museums just as the Nevşehir and Ürgüp museum directorates in Cappadocia, where many rock-cut churches and underground settlements are found.

The Hellenic and Roman past of Anatolia is present in almost all the archaeological museums in Turkey, but museums in the coastal provinces in the Mediterranean, Aegean, Marmara, and western Black Sea regions are exceptionally rich in this material; examples include Antalya, Adana, Mersin, Hatay, İzmir, Bursa, Kocaeli, Sinop, and Samsun museums. Several inland provinces that have the ruins of prosperous ancient cities like Sagalassos (Burdur), Hierapolis (Denizli), Zeugma (Gaziantep), Pessinus (Eskişehir), and Perre (Adıyaman) also have equally remarkable collections.

The museums in southeastern Anatolia (Diyarbakır, Kahramanmaraş, Elazığ, Şanlıurfa, Malatya, Mardin, Gaziantep), the region comprising a remarkable part of Mesopotamia, house rich Neolithic and Chalcolithic finds brought from numerous excavations in mounds, some of which shed light on the beginning of agriculture and the domestication of animals.

As a result of the careful and meticulous work during 1970s and 1980s, there has been an increase in the number and variety of museums. An Act of 1983 (Number 2863) allowed private museums to be established. Today, there are a total number of 364 museums, 190 of which are under jurisdiction of the Ministry and 174 of which are private museums audited by it, among which are some that have won international awards like European Museum of the Year Award. In addition to these, there are 130 open-air museums under jurisdiction of the Ministry. An increasing number of new museums are no longer alienating and cold spaces, but are structures that host conferences, seminars, social and cultural events, exhibitions, publications for the education, and advancement of the public.

New Archaeological Museums

The momentum that has been generated in the past decade has allowed the Ministry to restore over fifty museums and recently to construct several new ones including Gaziantep Zeugma Mosaic Museum (Fig. 4), the world's biggest mosaic museum (2011), Kırşehir Kaman Kalehöyük Archaeology Museum (2009) (the design and construction expenses of which were

covered by the Japanese government), Sivas Museum (2009), Eskişehir Eti Archaeology Museum (2011), Aydın Museum (2012), and Tokat Archaeology and Ethnography Museum (2012).

Cross-References

- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Regional/Site Museums
- ▶ Southeast Europe: Archaeological Museums

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Turkey: Domestication

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The turkey (*Meleagris gallopavo*) is a member of the order Galliformes, which include chickens, guineas, peafowls, and other terrestrial birds. Within the family Meleagrididae, there is one living genus, *Meleagris*, with two living species: *Meleagris gallopavo*, the North American turkey, and *M. ocellata*, the ocellated turkey.

Five wild turkey subspecies currently occupy distinct territories in North and Central America (Fig. 1) (Dickson 1992; Schorger 1966): *M. g. silvestris* (Eastern wild turkey) inhabits the deciduous forest and oak-savannah of the eastern half of the USA, *M. g. osceola* (Florida wild turkey) resides in evergreen and tropical areas of southern Florida, *M. g. intermedia* (Rio Grande wild turkey) ranges over the south central plains and north-eastern Mexico, *M. g. merriami* (Merriam's wild turkey) ranges within the montane-woodlands of the Southwest USA, and *M. g. mexicana* (Gould's wild turkey) occupies the pine-oak forests of southern Arizona and New Mexico, and north-western Mexico. A sixth subspecies, *M. g. gallopavo* (South Mexican wild turkey), which occupied south-central Mexico, is now thought to be extinct (Dickson 1992). The closely related ocellated turkey currently occupies Mexico's Yucatan peninsula and parts of northern Belize and Guatemala.

Meleagrids are characterized by their relatively large-size, naked, carunculated heads and broad square-ended body feathers. Mature males are generally larger than females, with a breast sponge (a fibrous mass of tissue over the breast), a beard (a hairlike appendage on the breast), an enlarged frontal caruncle (or snood, the fleshy protuberance at the dorsal base of the beak), and enlarged tarsometatarsals spurs. As part of the male behavioral displays, the skin of the head and neck can change color rapidly to blue, red, and white,

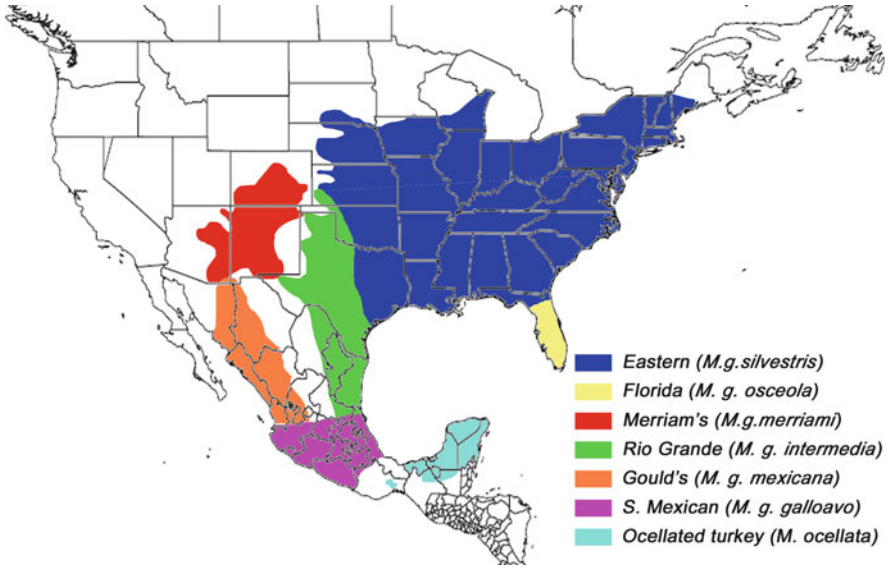

Turkey: Domestication, Fig. 1 Assumed original distribution of the wild turkey subspecies in North America (Based on Schorger 1966)

coupled with expansion and lengthening of the frontal caruncle (Dickson 1992).

Most heritage breeds developed in Europe (e.g., Norfolk Black, Cambridgeshire Bronze, White Austrian, Buff, Blue, and Ronquieres) are smaller than North American wild turkeys, while those raised commercially for consumption (e.g., Broad-Breasted Bronze and Broad-Breasted White) tend to be larger (Marsden 1971). In general, turkeys raised for meat have white plumage, are top-heavy, with hypertrophied breasts and thighs, and reach sexual maturity faster than wild turkeys. Since 1940s, turkeys have been under intense selection for weight, conformation, and an ability to be raised efficiently in confinement, resulting in an overall decline in reproductive abilities and fitness, and a reduction in genetic variability.

The turkey played an important spiritual and secular role in precontact indigenous cultures of Mesoamerica and the American Southwest. In Mesoamerica, sporadic evidence of turkey use appears as early as 800–100 BCE (Breitburg 1988). Domestic turkey stocks were established by CE 180 within the Tehuacán valley and intensify until the Columbian era (Flannery 1967). Current archaeological and genetic evidence suggest that the Mesoamerican domestic turkey was locally domesticated from *M. g. gallopavo* populations (Speller et al. 2010). From historical accounts, it is clear that turkeys were raised in large numbers at many Mexican sites for both food and tribute to local leaders (Schorger 1966). The spread of turkeys into the Yucatan and further south may have begun as early as the late Preclassic (300 BCE–CE 100) (Thornton et al. 2012), becoming more widespread just prior to the arrival of the Spanish. In general, few archaeological turkey bones are found in Yucatan sites (Schorger 1966); instead, large quantities of ocellated turkey bones are recovered in the Mayan region. Turkeys were widely distributed within Central America by Columbian times, reaching Peru in the late 1400s, Ecuador around CE 1587, and Chile around CE 1650 (Crawford 1992).

The Southwest domestic turkey seems to have a separate origin from the Mesoamerican turkey. Previous hypotheses assumed that initial domestication either took place in situ (with

M. g. merriami as the progenitor) or in Mesoamerica with subsequent dispersal of domestic turkeys into the Southwest (following the general pattern of cultigens like maize, squash, and beans) (Breitburg 1988). However, ancient and modern DNA analyses suggest the that either the Eastern or Rio Grande wild turkeys (*M. g. silvestris* or *intermedia*) represent the wild progenitor of the Southwest domestic turkey, with previously domesticated stocks being introduced into the region by 200 BCE (Speller et al. 2010).

The Ancestral Pueblo, the subsistence horticulturalists of the Colorado Plateau, were the predominant exploiters of turkey in the region. The first concrete archaeological evidence for domestic stocks in the Southwest begins c. 200 BCE–CE 500, with the recovery of turkey coprolites from the site of Turkey Pen Ruin, UT, indicating that turkeys were being confined and raised within a human habitation (Breitburg 1988). During the Basketmaker Phases (100 BCE–CE 750), evidence for turkey exploitation and husbandry is restricted to some loose feathers, feather blankets, a few turkey bones, and some complete desiccated bird, indicating that turkeys were prized more for their feathers rather than for their meat (Munro 2006). After CE 900, there is intensification in turkey husbandry, evidenced by greater quantities of turkey bones, as well as higher frequencies of butchery marks, suggesting that turkeys were playing a more important role as a food source, especially in the Northern San Juan region (Driver 2002). This pattern continues until the sixteenth century when the effects of disease and conflict associated with Spanish Colonialism, as well as the introduction of sheep and chicken, all contributed to dramatic declines in local turkey husbandry during the eighteenth and nineteenth centuries, perhaps even resulting in the complete extirpation of the Southwest domestic turkey.

Modern domestic turkey breeds worldwide seem to be descended from the Mesoamerican domestic turkey, and not the Southwest domestic breed. Turkeys were transported from Mexico to Europe in the early sixteenth century, where they quickly spread across the continent. Over the following centuries, several varieties were developed in Europe and subsequently imported onto the US Atlantic Seaboard in the eighteenth century. Hybridizations between the European domesticates and the wild turkeys were widespread with heterosis producing much larger and more vigorous animals (Crawford 1992). These hybrid varieties eventually become the forerunner to the Narragansett, Slate, and Bronze turkeys of today (Marsden 1971).

Cross-References

- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Southwest United States and Northwestern Mexico: Geography and Culture
- ▶ Tenochtitlan (Aztec): Geography and Culture

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Ubelaker, Douglas H.

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Basic Biographical Information

Douglas H. Ubelaker (Fig. 1) is a curator and senior scientist in the Division of Physical Anthropology at the National Museum of Natural History, Smithsonian Institution, in Washington, DC. He received a B.A. with honors (1983) and a Ph.D. (1973) from the University of Kansas. Dr. Ubelaker has served as a consultant in forensic anthropology to the Federal Bureau of Investigations (FBI) since 1978 and has testified as an expert witness in numerous trials and hearings. Dr. Ubelaker has reported on over 875 cases involving human skeletal remains since 1976. He holds the position of adjunct professorial lecturer in the Department of Anatomy and the Department of Anthropology at The George Washington University in Washington, DC, and adjunct professor in the Department of Anthropology at Michigan State University in East Lansing, Michigan.

Dr. Ubelaker has been a member of the American Academy of Forensic Sciences (AAFS) since 1974 and became a fellow of the academy in the Physical Anthropology Division in 1987. He has held many positions in the academy, including president from 2011 to 2012. Dr. Ubelaker is a diplomate of the American Board of Forensic Anthropology, a designation he achieved in 1979. He also served as president of the ABFA from 1995 to 1998. He is a member of the American Association of Physical Anthropologists, the Paleopathology Association, the Society of American Archaeology, Sigma Xi, the International Academy of Legal Medicine in the Forensic Anthropology Society of Europe section, and is a fellow of the American Association for the Advancement of Science and the Washington Academy of Sciences. Dr. Ubelaker is also a member of the Ellis R. Kerley Forensic Sciences Foundation Board of Directors.

Major Accomplishments

Dr. Ubelaker has published extensively in skeletal biology since 1966, particularly in the areas of New World bioarchaeology and methods and techniques in forensic anthropology. He has served on the editorial boards of many publications including the Journal of Forensic Sciences, Forensic Science Communications, Homo: Journal of Comparative Human Biology, Anthropologie: International Journal of the Science of Man, Human Evolution, the International Journal of Anthropology, Global Bioethics, and Revista Española de Antropología Física. He has served as the book review editor of the Journal of Forensic Sciences since 2008.

Dr. Ubelaker has received numerous honors; he was the recipient of the Memorial Medal of Dr. Ales Hrdlicka, Humpolec, Czech Republic;

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Ubelaker, Douglas H., Fig. 1 Dr. Douglas Ubelaker

the Anthropology Award of the Washington Academy of Sciences, the T. Dale Stewart Award by the Physical Anthropology Section of the American Academy of Forensic Sciences; the FBI Director's Award for Exceptional Public Service; the Federal Highway Administration Pennsylvania Division Historic Preservation Excellence Award; and a special recognition award by the FBI, and he was elected Miembro Honorario of the Sociedad de Odontoestomatólogos Forenses Ibero Americanos.

Cross-References

- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Human Skeletal Remains: Identification of Individuals

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Basic Biographical Information

Peter John Ucko was one of the most influential archaeologists of his generation. He played a decisive role in the transformation of the discipline and the recognition that the past is profoundly political. During his career he challenged the way we understand and engage with cultural heritage, raising fundamental questions about ownership, identity, authenticity, and the role of the past in the present. He is perhaps most widely known for his role in the creation and development of the World Archaeological Congress, but the antipathy to racism and social injustice that informed this was an important strand throughout his entire career.

Peter was born in 1938 to intellectual Jewish emigrants from Germany. He was educated at Bryanston School in Dorset and North West London Polytechnic, before taking a degree in anthropology at University College London (1956–1959). He had been fascinated by Egyptian artifacts as a boy and took courses with a strong archaeological bias, subsequently staying on to complete a Ph.D. on Egyptian figurines in 1962. For the next 10 years he remained at UCL lecturing in anthropology. During this phase in his career, Peter's research focused on material culture studies, and he produced a number of brilliant and original pieces of work, including a comparative study of penis sheaths and his work on Paleolithic cave art with his then partner, Andrée Rosenfeld. Peter's intense, thorough, and questioning stance was already apparent, and he developed a profound understanding of cultural diversity. His legendary organizational and editorial talents were also evident in the two influential conferences he

organized and published, *The Domestication and Exploitation of Plants and Animals* and *Man, Settlement and Urbanism*. However, it was his subsequent experience in Australia that crystallized a strong interest in the role of archaeology and anthropology in wider society.

Major Accomplishments

In 1972, Peter was appointed Principal of the Australian Institute of Aboriginal Studies, which proved an important radicalizing moment in his life. On arrival he found the institute was dominated by White people and preoccupied almost entirely with recording the remnants of what was then perceived as a dying "race." Recognizing that the situation was untenable, Peter responded to increasing Aboriginal activism by transforming the internal structures of the institute and bringing in Aboriginal representatives. He also refocused its research culture on contemporary practical and political issues, in particular Aboriginal land claims. Today such matters might seem self-evident, but in the 1970s they marked the start of a seismic shift in the power relations between indigenous people and the predominantly White scholars who studied them (Ucko 1983). For Peter personally, the experience was to have a profound impact leading to a lifelong concern with the archaeology of indigenous societies and the impact of neocolonial relationships on the conservation, management, and interpretation of cultural heritage (Fig. 1, 2).

In 1981, Peter returned to England with the anthropologist Jane Hubert, who became his long-term partner. She was an important influence on his subsequent career and a source of unswerving support in face of subsequent challenges. Peter was appointed Professor of Archaeology at the University of Southampton, but while waiting to take up the post, he worked briefly as a consultant on heritage to the newly independent government of Zimbabwe. There he proposed community-led "culture houses" that would be at the heart of community life (Ucko 1994), as an alternative to European-style museums. That same year, he was also asked to organize and host the 11th Congress of the International Union of Pre- and Protohistoric Sciences at the University of Southampton, which was scheduled for 1986. After some deliberation, he accepted, recognizing that it provided an opportunity to further a comparative and genuinely world archaeology that would include scholars from developing countries and indigenous peoples (Ucko 1987). With characteristic energy and determination, he set about realizing this vision, only to find the whole endeavor threatened by the growing crisis surrounding the South African apartheid regime. By 1984, it became clear that there was growing pressure for an academic boycott of South African scholars in protest at the racist policies of the apartheid government. Furthermore, if the South Africans attended, many of the organizations and individuals whom Peter had worked so hard to include would withdraw from the congress. Under immense pressure and with staunch support

Ucko, Peter (Cultural Heritage Management), Fig. 1 Peter as Principal of The Australian Institute of Aboriginal Studies in the early 1970s (Photo: Jane Hubert)

Ucko, Peter (Cultural Heritage Management), Fig. 2 Peter with Alex Okpoko and Thurstan Shaw in Nigeria in 1989 (Photo: Jane Hubert)

from Jane, Peter eventually decided to exclude the South Africans, leading to international outcry over the principle of academic freedom that would split the archaeological world for some time. The International Union withdrew its recognition and support, but a new committee was formed in early 1986 and the first World Archaeological Congress (WAC) took place later that year.

The congress was an enormous success with over 1,000 delegates from around the world, including indigenous speakers. It also marked a turning point in the history of archaeology, in the form of what Stephen Shennan (2007) called a very public loss of political innocence. The publications that ensued under the *One World Archaeology Series* represented a phenomenal achievement (Wheatcroft 2007). Subject to Peter's keen editorial eye, as overarching Series Editor, they are a lasting testament to his vision of a comparative, inclusive, and politically engaged world archaeology. Among the many thematic titles, there are several that pertain to cultural heritage and which became seminal works. While not disregarding the work of individual editors and contributors, these works are ultimately a product of Peter's energy and foresight (e.g., Layton 1989a, b; Shennan 1989; Gathercole & Lowenthal 1990; Stone & Mackenzie 1990).

Peter remained committed to this vision for the rest of his academic career, leading the way with many new and often controversial developments in the realm of public archaeology and heritage. One area of note from the late 1980s onwards was his concern with the treatment of the dead, an issue of particular concern to many indigenous peoples. Here Peter collaborated very closely with Jane Hubert while also promoting doctoral and postdoctoral research on human remains collections. In 1989, WAC adopted the Vermillion Accord at an Inter-Congress in South Dakota, USA, making it the first organization to recognize the rights of local communities, descendants, or guardians alongside respect for scientific research in relation to human remains. Other areas that benefitted from Peter's penetrating questions and characteristic tenacity include archaeology and education; the archaeology of ethnicity; the history of the discipline, heritage legislation, and management; the treatment of sacred sites and places; the presentation of the past; and more broadly the sphere of public archaeology.

In 1996, Peter was appointed Director of the Institute of Archaeology at University College London. He set about transforming it into a leading international center of excellence in archaeology and inserted the contemporary significance of the past into almost every corner of the institution. New programs in cultural heritage and public archaeology were launched, and along with Neal Ascherson, Peter initiated the first journal dedicated to the ethics and politics of the profession, *Public Archaeology*. He returned to his early interest in Egyptian archaeology, acting as series editor for an eight-volume set, *Encounters With Ancient Egypt*, which included his own volume focusing on how Egyptian heritage has been represented and valued (Ucko & Champion 2003; also Ucko & Quirke 2006). He also built new international arenas of collaboration, particularly with the School of Archaeology and Museology at Peking University, and a joint *International Centre for Chinese Heritage and Archaeology* was founded. During this period, Peter also found time to return to his own research, publishing on a wide range of topics mostly in the realm of cultural heritage and public archaeology. The same themes can be found including indigenous archaeology, repatriation, museum collections, the role of heritage in constructing ethnicity, and ethics of tourist presentations (e.g., Ucko 1998, 2000, 2001; Ucko & Layton 1999; Ucko et al. 2006).

Following his retirement in 2005, the Institute of Archaeology, in collaboration with WAC, organized a conference and edited book inspired by his work, both fittingly titled *A Future for Archaeology: the Past in the Present* (Layton et al. 2006). His untimely death in 2007 was an enormous loss to the discipline and the many people whose lives he had touched throughout his career. His legacy is the realization of his vision of archaeology as a discipline that is socially and politically engaged and in which archaeological heritage management is just one aspect of an all-encompassing public archaeology. Aside from his own research, he inspired and mobilized others, fashioned enormously ambitious and successful conferences and book series, and restructured the discipline of archaeology to make it more accessible to nonprofessionals with an interest in the past, particularly indigenous peoples. Very few would have had the force of personality, charisma, insight, and energy necessary to bring about such a lasting transformation.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Contemporary Past, Archaeology of the
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Human Remains in Museums
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Basic Biographical Information

Peter Ucko (1938–2007) was one of the most influential archaeologists of the second half of the twentieth century. He rejected the claim that archaeology was an "objective science" and emphasized its subjective, frequently political; nature, stressing the central role of those affected by the past and in particular indigenous peoples.

A childhood fascination with Egyptology led Peter Ucko to undergraduate study in anthropology (the only way he could study Egyptology) in London followed by a Ph.D. on prehistoric figurines at the Institute of Archaeology. In 1962 he returned to the UCL anthropology department to teach material culture and later a course on "Primitive Art" that was the basis of the seminal *Paleolithic Cave Art* (Ucko & Rosenfeld 1967). Ucko's move from Egyptology, to anthropology, to the Institute, and back to anthropology foreshadowed his lifelong multidisciplinary approach to the study of the past, as one inextricably mixed-up with an understanding of the present.

Major Accomplishments

The discrepancies between the incomplete and unclear figures represented in the actual Paleolithic art in French caves and the very clear, precise reconstructions of the same art published by Breuil, led Ucko to carry out his own project – at the Spanish cave of Hornos de la Peña (1971–1973). Ucko found the lack of knowledge of the cultural context of Paleolithic art incredibly frustrating, and he began to study more recent hunter-gatherer rock art. This led him to accept the post of Principal of the Institute of Aboriginal Studies in Australia, an appointment that was a major catalyst for a change in the way archaeologists and anthropologists studied Aboriginal society. When Ucko arrived the Institute was a totally white, semigovernmental organization tasked with recording the languages and customs of Aboriginal people before they became extinct. However, Ucko was quickly confronted by active Aboriginal communities who had very strong views on the interpretation by western-trained "objective" scientists of the art that was still very much part of their social structure. Ucko left Australia after nearly a decade of working with Aboriginal people over the interpretation, management, and control of their art and, more fundamentally, of their past, and their present and future role in Australian society. That he was succeeded by an Aboriginal as Principal is a testimony to the astonishing change overseen by Ucko.

Ucko returned to the UK via the newly independent Zimbabwe where he was asked to advise the government on the reorganization of the museum service. Ucko's report recommended the development of 56 culture houses – an approach he had seen in practice in Papua New Guinea – effectively returning the heritage to the control of local communities. This was rejected and the colonial system of five regional museums retained: while unstated, the potentially unifying ideal of a homogeneous past presented through a group of nationally controlled museums was far preferable to the new government to the decentralizing of interpretation and loss of control to local communities.

In 1981 Ucko became Professor of Archaeology at the University of Southampton. He immediately instigated a revision of the traditional archaeological curriculum – introducing anthropology and sending key staff on sabbaticals to the USA, Australia, and the Cameroon. He also headed a national review of archaeology at university that advocated focussing teaching at a few big departments that could offer the wide-ranging world archaeology that he saw as the basis of a valid and stimulating study of the past that was of relevance to the present and future. As in Zimbabwe, his plan was rejected but had instigated a debate concerning the content and role of archaeology that continues to resonate. In accepting that archaeology at university would be the preserve of a tiny percentage of the population and noting the increasingly inward looking school history curriculum of the Thatcher government, Ucko also created a small team to provide support, and to develop educational resources, for teachers.

It was while at Southampton that the above strands came together in Ucko's greatest contribution to the discipline: the creation of the World Archaeological Congress (WAC). Ucko originally declined the invitation to organize the 11th congress of UNESCO's International Union of Prehistoric and Protohistoric Sciences (IUSPP) but eventually agreed on the condition that anyone with a legitimate interest in the past, and not just academic scholars, would be allowed to participate and that funding would be found to enable those from poorer parts of the world to attend. Ucko planned a meeting that was to be academically robust and socially relevant. However, it was a meeting not without controversy as wider political events conspired to demand that WAC either allow colleagues from South Africa to participate or lose the contributions of many others from around the world who would refuse to attend if South Africans were present. It was an astonishingly difficult decision, but the overt and extreme manipulation of the past within schools to serve the political ends of a tiny white majority, coupled with the almost complete lack of access to education for the majority, set within the wider extremes of the abhorrent apartheid regime compelled the organizers, led by Ucko, to ban South African participation. This one act of exclusion opened discussion of the archaeological past to disparate groups from all over the world in an unprecedented way. At the end of the 1986 Congress, participants demanded that the organizers either come to reconciliation with IUSPP or create a new world organization. Reconciliation was impossible as IUSPP clung to an ideal of academic freedom, and Ucko turned his efforts from organizing a one-off conference to the creation of a world organization. It was little surprise that the next meeting of WAC focussed on the archaeological treatment of human remains nor that it was organized by archaeologists in cooperation with the elders at the Indian reservation at Wounded Knee.

In 1996 Ucko became Director of the Institute of Archaeology in London. He once again immediately set about a review of the curriculum and, with significantly more resources than had been available in Southampton, set about making the Institute an international hub of archaeology. He retired in 2005 and was still working on a variety of projects, including a major collaboration with China, on his untimely death in 2007.

Cross-References

- ▶ Andah, Bassey Wai
- ▶ Archaeology and Politics
- ▶ Archaeology as Anthropology
- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Rock Art
- ▶ Contemporary Past, Archaeology of the
- ▶ Heritage and Higher Education
- ▶ Ucko, Peter (Cultural Heritage Management)
- ▶ World Archaeological Congress (WAC)

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Uhle, Friedrich Max

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Basic Biographical Information

Friedrich Max Uhle (1856–1944) (Fig. 1) was born on March 23, 1856, in Dresden (Sachsen) in Northern Germany. Because of his pioneer huge contribution to the Andean archaeology, he is considered by some archaeologists as the "Father of the Peruvian archaeology."

After his dissertation in linguistic in Leipzig, he met for the very first time Peru when working as an assistant in the Royal Museum of Zoology, Anthropology and Ethnography of Dresden. Next he moved to Berlin and therefore was able to study and examine the recent excavated remains from Ancón by Wilhelm Reiss and Alphons Stübel. This last scholar and the eminent ethnologist Adolph Bastian supported Uhle's endeavor to travel to the Andes.

Uhle arrived in South America in 1892 and 3 years later was hired by the University of California to form a collection of ancient Peruvian remains. In 1896 he travelled to Lima to gather archaeological remains from Ancón and the following year conducted excavations in the Pachacamac ruins. The final report of this field research published in 1903 is considered by a number of archaeologists the very first scientific archaeological report in the history of Peru, especially because of its brilliant stratigraphical and contextual lessons, virtual basic notions ever in archaeology. Uhle's archaeological scientific pioneer contribution was previously recognized by his book on the Tiwanaku culture in Bolivia (1892).

Uhle, Friedrich Max, Fig. 1 Max Uhle (Photo: Ibero-Amerikanisches Institut – Preußischer Kulturbesitz, with permission)

On the rise of the twentieth century, Uhle undertook surveys in a number of valleys of the central and northern coast of Peru. Some years later, he conducted fieldwork in the Peruvian Highland. By that time span, he became director of the Museum of Archaeology of Peru. Between 1911 and 1919, he addressed to the Chilean archaeology publishing seminal papers on the archaeology of this country. Uhle also gathered archaeological remains to form the National Museum of Ethnology and Anthropology. Further, upon invitation of Jijón y Caamaño, he went to Ecuador where he also conducted excavations and surveys until 1932

discovering new cultures and contributing to the Andean past.

In 1933 he came back to Germany and held lessons as professor at the University of Berlin. Max Uhle finally in 1944 passed away in Loben, Alemania, muy cerca de la frontera con Polonia.

Major Accomplishments

Max Uhle contributed as a pioneer in Andean archaeology. Among his most transcendental contributions, we can mention:

- Proposing and establishing the very earliest chronological frame to the Andean pre-Columbian times
- Applying the basic principles of modern archaeology, namely, stratigraphy and contexts, in the Andean archaeology
- Introducing the "Horizon concept" in the Andean archaeology to fusion similar cultural traits throughout the Andes
- Publishing the very first complete archaeological reports based on his excavations in key *gisements* of the Andes, Pachacamac, and Tiwanaku
- Applying a vast interdisciplinary study in his archaeological researches including geology, relative chronology, paleoclimate, ethnology, linguistic, and even archaeoastronomy
- Assessing within a real concept some key past activities of the Andean people as ritual graves and "beyond dead." This also implies the relevant importance of sanctuaries in the past Andes
- Promoting preserving and defense of the Andean archaeological heritage

Cross-References

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Underwater Archaeology

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Introduction

Some archaeological features lie under water, either because they were deposited there by accident (e.g., shipwrecks) or design (e.g., votive offerings), or because the ground in which they were originally preserved subsequently became inundated by rising water levels, subsidence, coastal erosion, seismic events, or human agency. The mere fact of submergence, however, does not of itself define the investigative disciplines applied to their study. Sunken cities, for example, are the preserve of investigators familiar with the principles of urban archaeology, who must relate their findings to a wider corpus of studies in this field irrespective of whether they were conducted above or below the water. Isolated finds of prehistoric material brought up from the seabed by trawling or dredging, and the survival of fragments of the now-submerged landscapes that contained them, demand the attention of prehistorians and geomorphologists familiar with the wider contexts to which such evidence relates and can apply the appropriate techniques and resources to their analyses.

The fact that archaeological evidence may be found under water is not directly relevant to its interpretation, other than perhaps as a factor in

its survival. "Underwater Archaeology" is thus a potentially misleading term, for it is no more than the descriptor of an environment in which a variety of archaeological work may be conducted. We do not speak of "desert" or "jungle" archaeology but categorize studies by period, region, or theme (e.g., "Iron Age"; "Polynesian" or "nautical").

Definition

This said, some archaeological themes often involve a significant amount of underwater work. These may include:

Maritime archaeology, which is the interpretation through surviving physical evidence of any activity associated with humankind's past relationship with the sea. Most obviously, it includes the investigation of seagoing ships, boats, and other floating craft, whether as surviving vessels, boat-burials, abandoned hulls, ship components and fittings, or sunken wrecks. It also deals with the purpose, operation, and management of watercraft, the technicalities of their construction, and their characteristics as self-contained social, economic, and political entities which in some (though not necessarily all) ways may be representative of their parent cultures ashore. More broadly, maritime archaeology is concerned with the wider infrastructures of human activities associated with the maritime environment, many of which may be situated wholly or partially on land. Such aspects might include harbors; shipbuilding and related resource extraction; shore structures associated with seagoing activities; navigational aids; exploration; cargoes and trade; predation (fishing and piracy); the projection of power and status; warfare; ritual; and recreation. Maritime topics frequently interface with what might be regarded as more overtly terrestrial activities but attempts to characterize such buffering zones (of which the coast itself is the most obvious) as hard lines of separation are illogical and self-defeating. It is connection and interaction across the interfaces that we seek, not the arbitrary setting of boundaries.

Nautical archaeology is the specialized study of ships, boats, and other past floating craft by examining their surviving remains. It includes freshwater as well as seagoing vessels. Documentary research, iconography, ethnology, and experimental techniques are often combined with archaeology in pursuing such studies.

Submerged-site archaeology is the investigation of any archaeological feature or structure once on land but now wholly or partly covered by water. It may include the study of submerged former landscapes and sunken habitation sites such as inundated cities or lake dwellings. Riverine or lacustrine sites such as the foundations of bridges and other structures built under water may also be included in this category, as may lost items, rubbish, or votive objects deposited in lakes, rivers, wells or *cenotes*. Wetland sites may be waterlogged but not wholly submerged, and techniques for investigating them are adapted accordingly.

Historical Background

Free diving to obtain food and other resources, or to recover lost items, has been practiced since antiquity, while equipment to extend the time spent under water and increase the depth reached has been available for many centuries. The most practical solution for early divers was the diving bell, and its many users over some two millennia supposedly include Alexander the Great. In the 1830s the closed diving helmet and attached watertight suit with air pumped via a hose from the surface was developed, and this practical combination (with many technical refinements) remains in use today.

Helmeted divers with surface-supplied air, usually heavily weighted to maintain contact with the bottom, were mainly employed for engineering and salvage work. Sometimes salvage involved the recovery of valuables from historic shipwrecks, as from the *Mary Rose* in 1836 by John and Charles Deane, who had patented an early form of the helmet diving system (Rule 1982: 42-7). But such activities were primarily commercial, scant attention being paid to

the archaeological significance of the finds. The salvage ethos, particularly treasure hunting, has created tensions between archaeologists and commercial salvers which endure to this day.

On 24 August 1854 three professors from the University of Geneva formed an archaeological diving team (surely the first ever) in which one acted as tender, another operated the air pump, while the third (Professor von Morlot) descended three meters to investigate the remains of prehistoric pile dwellings in Lake Zurich (Delgado 1997: 236-7). In 1867 Rev. R. J. Mapleton from Poltalloch on the west coast of Scotland investigated the submerged remains of a crannog (lake dwelling) in Loch Coille-Bharr using divers from the nearby Crinan Canal. Some years later Odo Blundell, a Dominican monk, dived on other crannogs in Scotland using standard diving equipment (Morrison 1985: 4-6). Blundell was a conventional archaeologist who recognized that the potential of sites under water could only be fully realized by archaeologists who were able to dive. Unfortunately, his example was not widely followed by others, and archaeology under water during the first half of the twentieth century was characterized by the activities of divers (by implication heroic but intellectually marginalized) who brought up uncontextualized finds for examination and study by learned but impractical surface-bound "experts."

In 1942 a French naval officer, Jacques Cousteau, collaborated with an engineer, Emile Gagnan, to produce a regulator which allowed a diver to breathe automatically on demand from a cylinder of compressed air strapped to his back. The "aqualung" (now generally known as Self-Contained Underwater Breathing Apparatus or SCUBA) has greatly simplified the process of diving by removing the need for a hose to the surface and providing three-dimensional freedom of movement in the water akin to weightlessness in space. For the discovery and investigation of sites under water, this system has many advantages, not least in that it has opened up the undersea world to many who might not otherwise have had access to it.

Unfortunately, the first generation of SCUBA explorers, headed by Cousteau, were divers rather than archaeologists, and their projects – perhaps understandably at the time – focused more on public appeal generated by spectacular discoveries than on systematic research. Major excavations of classical shipwrecks in the Mediterranean, notably at Grande Congloué in the south of France (Delgado 1997: 174-5), were disappointing in their outcomes and often destructive in their methodologies. Nevertheless, two of Cousteau's colleagues, Frederic Dumas and Philippe Talliez, subsequently developed strong archaeological sensitivities, and both made major contributions to the early history of the discipline (Dumas 1962).

It fell to a young American classical scholar, George Bass, to bridge the divide between divers and archaeologists. He had been approached by Peter Throckmorton, an experienced underwater explorer and photojournalist. Throckmorton had worked with sponge divers in the Aegean who told him of ancient wrecks off the southwest Turkish coast. One, at Cape Gelidonya, dated to the Late Bronze Age and was threatened by looting. In 1960, with the encouragement of the Turkish authorities, Throckmorton teamed up with Bass to mount an expedition to excavate it (Bass 1967). Bass, a conventional academic archaeologist, learned to dive so he could direct the work at firsthand. Thus, a vital principle was established – archaeology under water must be conducted by trained archaeologists who dive (Bass 1966).

Results of the Gelidonya project were outstanding. They were based on methodologies and recording techniques which followed the well-established precepts of practical field investigation and subsequent analysis, adapted to a watery environment. Much archaeology above and below the water still uses basic survey methods, such as tape measures and grids, while excavation is usually conducted with everyday hand tools (Figs. 1 and 2). Simple mechanical devices, such as the water dredge and air lift, allow the controlled removal of spoil (Fig. 3). Such approaches, though more laborious and time-consuming than the deployment of remote technologies and industrial salvage methods, are more sensitive and bring the archaeologist into

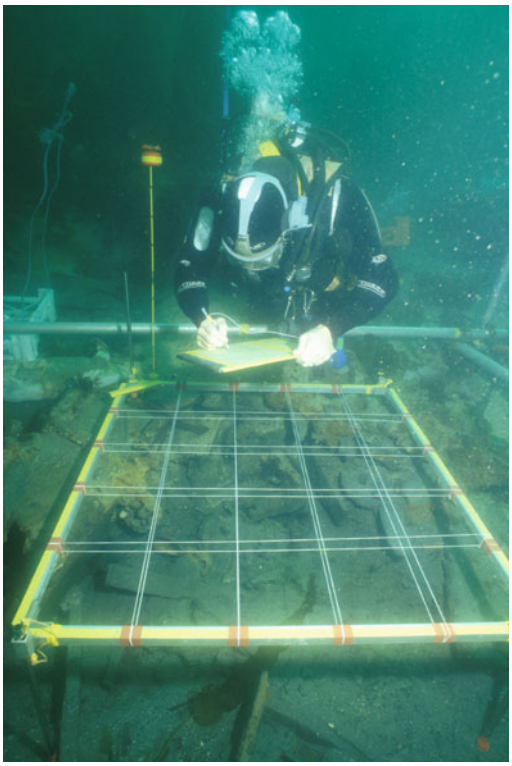

Underwater Archaeology, Fig. 1 Recording archaeological deposits on a shipwreck using a 1-m grid and plumbing device (Colin Martin)

direct contact with the evidence as it unfolds. Archaeology, though a rigorous and systematic discipline, cannot be reduced to uncritical processes. Direct interaction between a sentient human mind trained in archaeological method and the material detritus left by former human activity is a necessary concomitant to interpreting and understanding it. Such an approach is also much cheaper and less likely to go wrong.

This is not to suggest that geophysics and other remote techniques should not be used for wider area searches, survey, and excavation, especially in deeper water where diving may be impractical. However, hightech solutions should not be applied uncritically to archaeological investigations, but brought in as necessary to support or enhance simpler "hands-on" techniques or where depth makes direct diver intervention impractical (Bowens 2009).

Since the late 1960s archaeology under water has been influenced by debates within the wider discipline, notably processual archaeology, with its characterization of cultural evolution as an objective quasi-scientific process driven by external stimuli which can ultimately be explained in absolute terms. This was later

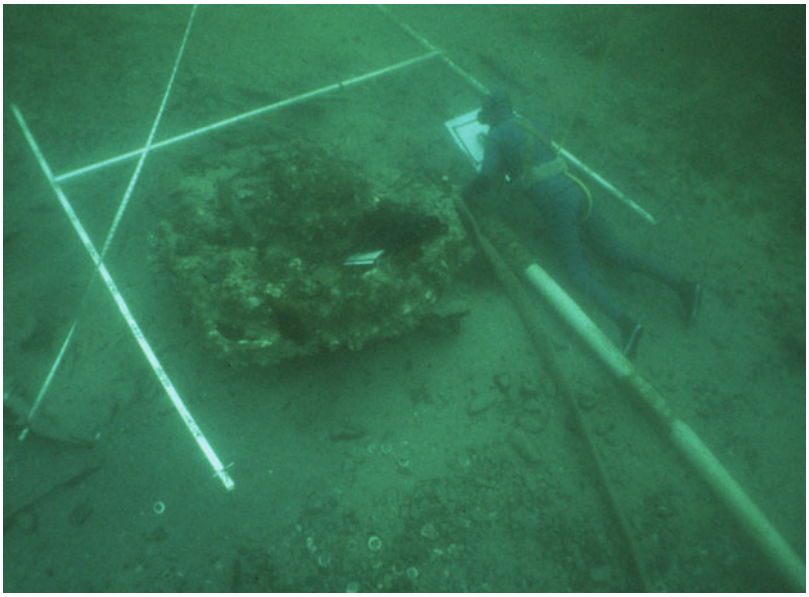

Underwater Archaeology, Fig. 2 Area excavation within a grid system on the Armada wreck *La Trinidad Valencera* (1588). A water dredge is being used to remove spoil (Colin Martin)

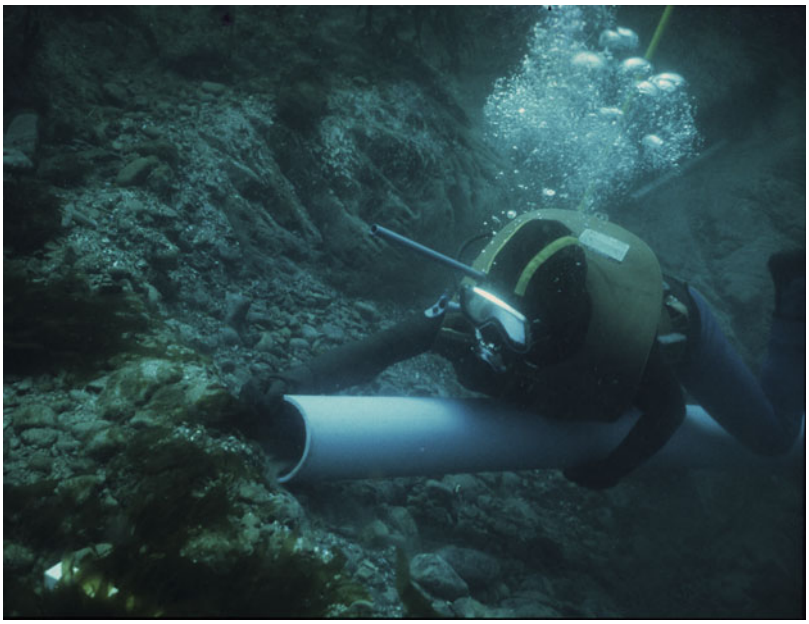

Underwater Archaeology, Fig. 3 An air lift providing heavy suction to remove sterile overburden on the Armada wreck *El Gran Grifón* (Colin Martin)

countered by a post-processual reaction which argued for more subjective and individualistic interpretations of human behavior, on the part both of past societies and of the archaeologists who seek to interpret them. These debates have influenced concepts of underwater archaeology, for which theoretical frameworks have been proposed by Muckelroy (1978) and Gould (2000). A wide-ranging debate among several leading practitioners in 1981 generated a number of important papers on the philosophy and goals of the discipline (Gould 1983).

Key Issues

Shipwrecks

The investigation of shipwrecks is a distinctive specialization within maritime archaeology. When a wreck's remains enter the archaeological record, they become a closed context created by a single catastrophic event. Everything associated with it was once part of a complex and highly organized human enterprise, frozen at the moment of disaster. From a shipwreck archaeologists can, by analyzing the natural processes of deconstruction, reconstruct to a greater or lesser extent interlocking aspects of the ship's original existence as a self-contained entity. The most significant of these is usually the vessel itself, which on occasion may be preserved almost intact. Examples include the *Vasa* (1627) in Stockholm harbor (Fig. 4), the fourteenth-century Bremen

Underwater Archaeology, Fig. 4 The *Vasa*, found virtually intact on the seabed in Stockholm Harbor. Some reconstructive work is evident (Colin Martin)

Cog, and the schooners *Hamilton* and *Scourge* lost in Lake Ontario during the War of 1812. (Delgado 1997: 454-6, 72-3, 187) The Baltic Sea, with its low salinity and temperatures, is a particularly rich repository of near-intact wrecks. Sometimes wrecks settle or disintegrate in such a way as to allow confident reconstructions to be projected from their partial remains, as with the *Mary Rose* (1545) off Portsmouth or the sixteenth-century Basque whaling ship in Red Bay, Labrador (Delgado 1997: 264-6, 336-8).

More frequently, only a small percentage of the articulated hull survives, usually from the lower part which may be pinned to the seabed and protected by ballast or cargo (Fig. 5). In such cases the upper works often decay and disintegrate completely, although isolated components sometimes become buried and preserved during the wrecking process, and these may help inform reconstruction. The best-known examples of this category are amphora-carrying classical wrecks, mainly in the Mediterranean (e.g., the first-century BC Roman wreck at Madrague de Giens (Tchernia et al. 1978)), and early modern warships whose holds were often ballasted with boulders or gravel.

Other notable shipwreck excavations include the Bronze Age sites at Ulu Burun and Cape Gelidonya, the Byzantine wreck at Yassi Ada, and the early sixteenth-century Cattewater wreck at Plymouth, Devon (Delgado 1997: 430-2, 84-6, 469-71, 90-1).

A full understanding of the formation processes which have conditioned the characteristics of a wreck site is an essential prerequisite to the interpretation of its structural remains and internal organization. Even where no hull remains have survived, a careful analysis of other archaeological material and its distribution may still provide information about the nature, proportions, and layout of the wrecked ship.

The potential of examining ship remains extending from prehistory into the recent past has in many respects been under exploited by the archaeological community at large. While ship archaeology is a distinctive specialization, it has implications far beyond its immediate technicalities. Watercraft are among the most complex and resource-consuming structures most societies produce, so apart from their intrinsic interest, wrecks may be unique statements of a culture's technical capabilities, exploitation of resources, and social organization. Even for more recent periods, the examination of a wooden ship's hull is akin to speaking to the shipwright who built it and is thus more immediate and objective than the study of ship plans, models, documents, and pictures (though these too, if they exist, may have an important role in an investigation).

A wreck is also likely to produce evidence of a ship's function and sometimes minute details about its final voyage. Trade is probably the most common activity of seafarers, and underwater archaeology has made an enormous contribution to its study, from Bronze Age cargoes in the Aegean to the ubiquitous amphora-carriers of classical times and casualties incurred during the transoceanic voyaging of early modern European powers such as imperial Spain and the Dutch East India Company (Delgado 1997: 19-20, 26-8, 55-7, 221-2, 456-7). War is another function for which material evidence may be found on shipwrecks, from the classical ram found at Athlit in Israel to the integrated artillery-based tactics of the sixteenth century evidenced by the *Mary Rose* and the wrecks of the Spanish Armada (Delgado 1997: 43-4, 264-6, 399-402).

Wrecks often produce evidence of the ancillary equipment used on ships, whereby human power was utilized to row, work the sails, raise anchors, and pump out water. Information about provisioning, stowage, food preparation, and cooking may also be obtained. The monitoring of stores and the issue of rations required the use of weights and measures, and the standards employed often reflect the nationality and origins of the vessel. Shipboard activities such as navigation, medicine, and various craft skills will often be evidenced by specialized equipment, tools, and instruments.

Finally, a ship is home to a socially stratified self-contained community, often for months on end. This generates evidence reflecting in many ways the everyday life, work patterns, and social structures of the parent society on shore. Personal possessions, domestic utensils, clothing, and

Underwater Archaeology, Fig. 5 The wreck of a small Cromwellian warship of 1653 off Duart Point, Mull, Scotland, partially excavated. Although the hull has collapsed, the wreck has sufficient integrity to allow partial reconstruction (Colin Martin)

Underwater Archaeology, Fig. 6 An intact mariner's compass of wood with brass fittings uncovered on the Duart Point wreck

footwear frequently survive, often in abundance, within a shipwreck context.

From a wider archaeological perspective, this is significant on two counts. First, wet buried environments are especially conducive to organic preservation, and thus material which rarely survives on terrestrial sites may be found in shipwreck assemblages (Fig. 6). Since the material culture of most societies, past and present, is overwhelmingly organic in its makeup (wood, leather, bone, fiber, textile), such survival helps correct a skew towards the inorganic and durable which terrestrial recoveries often imply. This skew is exacerbated by the fact that valuable or attractive items are rarely discarded on land, while (unless salvaged) their survival on a wreck is neutrally determined.

Second, a wreck represents a tightly dated assemblage within a single context. Its date may be established archaeologically by the latest object identified (e.g., a coin) or sometimes, if the event is recorded in documentary sources, as a precise calendar date. Collections of artifacts and samples derived from shipwrecks thus define a secure terminus ante quem, that is, nothing can be later than the determined date of the event unless it is a subsequent intrusion. While some objects may have been old when lost, wreck assemblages, if critically studied, can make valuable contributions to the testing and refinement of established chronological typologies, especially for commonplace items like pottery and clay pipes.

It should be emphasized, though it is sometimes argued otherwise, that shipwreck archaeology and commercial salvage are not compatible. From the perspectives of each side, the motives and anticipated outcomes of the other are contradictory and irreconcilable. Salvage seeks to maximize profit for investors by making valuable recoveries (and by implication ignoring or discarding "worthless" ones), while archaeology aims to maximize the disciplined acquisition of knowledge, irrespective of the monetary value of what may be found. The mind-set which drives each activity reflects these very different expectations. Neither side can properly accommodate the goals of the other, and it is up to society through its legislatures to decide in which ways the two activities (each of which may be valid and desirable on its own terms) should be separated and regulated. The superficially appealing argument often advocated by the salvage lobby that shipwreck archaeology can be paid for by selling the recoveries (itself an unacceptable diminution of the heritage resource) is deeply flawed. Most responsibly conducted underwater archaeological projects cost more in rigorous fieldwork, conservation, study, and curation than their recoveries could ever yield in a sale room, while the conflict between returns on investment and archaeological ethics creates a divide which neither side can realistically bridge. In any case most treasure-oriented projects, despite (or perhaps because of) the hype which often accompanies their inception, ultimately fail to hit the jackpot, and any intention to provide archaeological mitigation, however inadequate, is usually first to be abandoned when the going gets tough (Keisling 1994). The reality is that no treasure-motivated salvage of a historic shipwreck (whether or not accompanied by a "tame" archaeologist) has yet produced a final report that would pass rigorous archaeological peer scrutiny. That said, otherwise reputable archaeologists (above or below the water) who fail to publish their work are just as bad.

Submerged Marine Sites

Rising sea levels due to melting ice, geomorphological processes, or cataclysmic events such as earthquakes have in many parts of the world inundated previously dry land, sometimes preserving elements of former landscapes and the archaeology contained within them. Britain was once joined to the continent by a landmass now known as Doggerland, and until about 6 or 7,000 years ago, some 23,000 km^2 of the southern North Sea extending from Yorkshire to Denmark was still a rolling landscape of hills, rivers, swamps, and coastal margins. Its existence began to be suspected in the early twentieth century when plants, animal bones, and worked flints were brought up in trawl nets. In 1931 the fishing boat *Colinda* recovered a mass of peat from the Ower Bank, 25 miles off Norfolk, in which a barbed antler harpoon point was found. This indicated a former landscape in which Mesolithic hunter-gatherers had been active. Systematic investigation of the area was at first impractical and relied on further chance finds, but in the 1990s Professor Byrony Coles attempted to reconstruct the region by working backwards from its present undersea topography.

These pioneering approaches were dramatically refined by Professor Vince Gaffney of Birmingham University, who with the help of the oil industry has been conducting seismic surveys over the area since 2002. This has allowed detailed 3D mapping of the former landscape, in which topography can be modeled to suggest how it was exploited by its human population and the progress of its slow inundation quantified. The picture has been fleshed out with palaeobotanical and faunal evidence, and the eventual aim is to create a virtual landscape within which probable sites of human activity can be predicted before being investigated in reality underwater (Gaffney et al. 2009).

The potential of this approach has already been demonstrated at Bouldnor Cliff in the western Solent near Southampton, where archaeologists led by Garry Momber are investigating an eroding cliff 11 m beneath the surface which has revealed a buried archaeological landscape incorporating Mesolithic material containing worked wood, hearths, flint tools, food remains, and plant fibers dating to around 8,100 BP. Already, the variety of material evidence – much greater than that normally encountered on terrestrial sites – is suggesting levels of technical competence for this period and region some 2,000 years ahead of what had previously been hypothesized (Momber et al. 2011).

A large number of submerged Mesolithic sites assigned to the distinctive Ertebølle culture have been found off the southern part of Funen Island in Denmark (Andersen 1987). This area may be characterized as the eastern part of Doggerland. One of the sites, at Tybrind Vig, has yielded logboats, paddle blades with complex geometric ornamentation, and a range of artifacts including fish hooks, harpoons, and eelspear prongs (Andersen 1987, 2011). These finds are helping to characterize the Northern European Mesolithic as a far more dynamic and socially advanced culture than studies based on terrestrial sites had previously suggested. The possibility of whole prehistoric landscapes preserved under water awaiting discovery and investigation is currently one of archaeology's most exciting and challenging prospects.

Inundated urban sites have long fired public imagination, and these too are now becoming reality. In 1968 Dr Nic Flemming discovered a vast complex of submerged walls, rock-cut tombs, and other features in shallow water at Pavlopetri in Laconia near the southern tip of mainland Greece. He returned in 2007 with a team from Nottingham University led by Dr Jon Henderson and Dr Chrysanthi Gallou. Over the following years (the project is due to finish in 2013), using a combination of conventional mapping and digital survey, the team has revealed an almost complete town plan covering 9,000 m^2 (Fig. 7). Originally thought to date to the early Mycenaean period (c. 1,600 BCE), pottery now indicates occupation extending back to the Minoan Bronze Age (c. 2,800 BCE), making Pavlopetri the world's oldest known submerged city. Its date range, covering the transition from the Minoan to the Mycenaean periods, makes it a key site for investigating urban cultural evolution in the eastern

Underwater Archaeology, Fig. 7 An archaeologist inspects house foundations at the submerged ancient city of Pavlopetri in Greece (University of Nottingham)

Mediterranean (Henderson et al. 2011). Its role as a harbor adds to its potential for study and links it to the Bronze Age wrecks at Uluburun and Cape Gelidonya (of c. 1,300 and 1,200 BCE, respectively) some 400 km to the east.

A much later submerged urban site is at Port Royal, Jamaica, parts of which were engulfed by an earthquake in 1692. Serious underwater archaeological work has been undertaken there by the Nautical Archaeology Program of Texas A&M University since 1981, in conjunction with the Institute of Nautical Archaeology and the Jamaican National Heritage Trust. The area immediately around the former harbor slid and jumbled as it sank, destroying much of its archaeological context, but other parts collapsed more or less intact, retaining much of their stratigraphic integrity. Catastrophic underwater deposition of this nature, as with shipwrecks, ensures the preservation of a rich sampling of what was in current use, including organics. The remains of brick and timber buildings, together with their contents, thus provide a unique and comprehensive snapshot of one of the largest late seventeenth-century English colonial ports in the Americas (Hamilton 1984).

Submerged Freshwater Sites

In June 2011 six European nations – France, Switzerland, Germany, Austria, Italy, and Slovenia – were awarded composite World Heritage Site status in respect of 111 sites incorporating prehistoric lake dwellings in the Alpine region. This enormous resource, which provides a link between hunter-gatherer societies, early farmers, and the first European civilizations, has been investigated by underwater archaeologists since the mid-nineteenth century. It is now sustaining one of the most productive programs of modern archaeological research (Suter & Schlichterle 2009).

Buildings on artificial islands or piles in lakes or estuarine margins are known in many parts of the world. Scotland is particularly rich in such structures, which are known as crannogs (Fig. 8). In recent years their investigation using underwater archaeological techniques and enhanced methodologies has increased. Like the lake dwellings of the Alpine region, they are no longer regarded as marginal or exotic, but as typical habitation sites set within contemporary landscapes with an exceptional capacity to retain a wide range of organic material and environmental

Underwater Archaeology, Fig. 8 Modern reconstruction of a crannog in Loch Tay, Scotland (Colin Martin)

evidence (Dixon 2004). They lead into areas of knowledge and understanding their terrestrial counterparts often cannot reach.

Future Directions

Underwater archaeology is not, as it is still sometimes portrayed, a peripheral and slightly suspect domain of macho people in rubber suits, whose work is of little relevance to "real" archaeologists. On the contrary, it should permeate to the core of its parent discipline in all possible ways. It is in the underwater environment – distinguished from other archaeological matrices only by its wonderfully preservative wetness, anaerobic sediments, and relative freedom from human interference – that many of the discipline's most consequential advances will in future be made.

Cross-References

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- ▶ Bass, George Fletcher
- ▶ Crannog Investigations in Scotland
- ▶ Crumlin-Pedersen, Ole
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Deep-Water Archaeology
- ▶ Experimental Maritime Archaeology
- ▶ Freshwater Archaeology
- ▶ Frost, Honor
- ▶ Gould, Richard A.
- ▶ Green, Jeremy N.
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Maritime Historic Site Management for the Public
- ▶ Martin, Colin
- ▶ McGrail, Seán
- ▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
- ▶ Muckelroy, Keith (Underwater and Maritime Archaeology)
- ▶ Ship Archaeology
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Underwater Cultural Heritage: International Law Regime

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Introduction

The greatest museum of human civilization lies on the seabed. Until the nineteenth century, almost 5 % of all seagoing ships were lost every year, be it for storms, incidents of navigation, or naval battles.

Today, the capacity of some states and private entities to use advanced technological means to explore the seabed at increasing depths – for instance, the wreck of the *Titanic* was found in 1985 at 3,798 m below the sea level – not only allows access to a huge cultural heritage but also entails the risk of such heritage being looted or used for private commercial gain.

Key Issues

Different Models in National Legislation

Different approaches can be found in national legislation, based on the priority that the states concerned give to public or to private interests. A few examples are given hereunder.

In Italy, the underwater cultural heritage found within the 12-mile territorial sea falls under falls under the general regime set forth in the "Code of Cultural Properties and Landscape" (Legislative

Decree 22 January 2004, No. 42). Research in the field of archaeological and cultural properties is reserved to the Ministry for Cultural Properties and Activities or to the public or private subjects who have been authorized by the ministry. Anyone who fortuitously discovers cultural properties is bound to inform within 24 h the competent public authority. The removal and taking into custody of the properties are permitted only where there is no other means to ensure their security until the intervention of the public authorities.

All the cultural properties found by anyone in the subsoil or on the seabed belong to the state demesne, if immovable, or to the inalienable patrimony of the state, if movable. The finder is entitled to a reward which is paid by the ministry and cannot exceed one-fourth of the value of the properties (if they are found at sea, the reward corresponds to one-third of their value, as provided by the 1942 Navigation Code). The reward may be paid either in money or through the cession of part of the properties.

The state and the other public institutions are bound to ensure the use of cultural properties for the public benefit. Initiatives for the preservation and promotion of cultural properties may be sponsored through contributions by private subjects.

The Italian legislation is a clear example of a legislative model based on priority given to the interest of the state to preserve the cultural heritage for the purposes of public interest, in particular, research and exhibition. Private interests are given a limited weight and are subject to state authorization.

The United States courts apply to the underwater cultural heritage the law of salvage and law of finds, belonging to the body of admiralty law. In many countries, the notion of salvage is only related to the attempts to save a ship or property carried by it from imminent marine peril. But the United States courts apply the concept of salvage also to ancient sunken ships and to objects removed from wrecks which, far from being in peril, have been lost since long time.

For example, the United States Court of Appeals for the Fourth Circuit in the decision rendered on 24 March 1999 (case *R.M.S. Titanic, Inc. v. Haver*) stated that the law of salvage and finds is a "venerable law of the sea." It is said to have arisen from the custom among "seafaring men" and to have "been preserved from ancient Rhodes (900 BCE), Rome (Justinian's *Corpus Juris Civilis*) (533 CE), City of Trani (Italy) (1063), England (the Law of Oleron) (1189), the Hanse Towns or Hanseatic League (1597), and France (1681), all articulating similar principles." Coming to the practical result of such a display of legal erudition, the law of salvage, which applies where the owner of the wreck is known, gives the salvor a lien (or right *in rem*) over the object that can be enjoyed by him until a reward is paid by the owner. The law of finds, which applies when the owner of the wreck or the sunken objects is not known, means that "a person who discovers a shipwreck in navigable waters that has been long lost and abandoned and who reduces the property to actual or constructive possession becomes the property's owner."

The fact remains that the body of "the law of salvage and other rules of admiralty" is today typical of a few common law systems, but is a complete stranger to the legislation of the majority of other countries. For instance, no Italian lawyer (with the laudable exception of a few scholars) would today know what this "venerable" law is, despite the fact that the cities of Rome and Trani, which are said to have contributed to it, are located somewhere in the Italian territory. Nor is it understandable how a body of rules that is said to have developed in times when nobody cared about the underwater cultural heritage could today provide any sensible tool for the protection of the heritage in question. Yet it seems that some American courts are endowed with extraordinary qualities: They do have access to all the ancient sources from where such a "venerable law of the sea" can be inferred, they do know all the mysterious languages in which the relevant rules have been written, they are able to interpret such rules correctly, and they do seize the intrinsic consistency between one source and the other. This is impressive indeed.

But the few people who are not impressed by such a display of legal erudition are inclined to

suppose that the almost theological expressions employed by the American supporters of the law of salvage and the law of finds (such as "return to the mainstream of commerce," "admiralty's diligence ethic," and "venerable law of the sea") are dubious euphemisms. They disguise a "first-come-first-served" or "freedom-of-fishing" approach based on the destination of underwater cultural heritage for the private interest of the finder. Private appropriation and commercial sale are the most likely destiny of the removed artifacts which are considered as "market instruments."

In a number of cases, American courts have granted rights on the basis of the law of finds to treasure hunter corporations which claimed ownership over gold, silver, and artifacts taken from sunken Spanish galleons, such as the *Nuesta Señora de Atocha* (sunk in 1622) or *San Christo del Valle* and *Nuestra Señora de la Concepción* (both sunk in 1715). More recently, by a judgment of 21 July 2000 on the case of the Spanish vessels *La Galga* and *Juno*, lost, respectively, in 1750 and 1802, the United States Court of Appeals for the Fourth Circuit decided that the rights of a state over state ships and property carried by them are not subject to prescription unless they are explicitly renounced by the state concerned.

Sometimes coastal states have resorted to regulations applying on a case-by-case basis. For example, by Order No. 14 of 1995, Ireland defined the site of the wreck of the British liner *Lusitania*, hit in 1915 by a torpedo launched by a German submarine, as a restricted area where no person is allowed to "tamper with, damage, or remove any part of the wreck."

The Counterproductive UNCLOS Scheme

At the international level, the main instrument applying to marine activities is the United Nations Convention on the Law of the Sea (hereinafter: UNCLOS), a treaty adopted in 1982 and today (January 2013) binding on 164 parties. Within such a comprehensive achievement of codification, composed of 320 articles and nine annexes, only two provisions (Arts. 149 and 303) are devoted to the underwater cultural heritage. Yet the UNCLOS regime for underwater cultural heritage is largely insufficient and, as regards the effects of Art. 303, para. 3, can even be considered as counterproductive.

Art. 303, para. 1, UNCLOS puts forward a very general obligation of protection of underwater cultural heritage, providing that "States have the duty to protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose." Although in a very convoluted wording, para. 2 grants the coastal states the right to establish a 24-mile contiguous zone (12 miles of territorial sea and 12 miles of contiguous zone) for the objective of protecting archaeological and historical objects. No specific provision is included in the UNCLOS for the underwater cultural heritage found within the 200-mile exclusive economic zone. However, para. 3, at least in its English official text, subjects any obligation of protection and conservation of the underwater cultural heritage to a completely different set of rules:

> Nothing in this article affects the rights of identifiable owners, the law of salvage and other rules of admiralty or laws and practices with respect to cultural exchanges.

It appears that salvage law and other rules of admiralty are given an overarching status by the UNCLOS. If there were a conflict between the objective to protect the underwater cultural heritage, on the one hand, and the provisions of salvage law and other rules of admiralty, on the other, the latter would prevail. This means that, availing himself of the principle of freedom of the sea, any person on board a ship could explore the continental shelf adjacent to any coastal state, bring archaeological and historical objects to the surface, become their owner, carry them into certain countries, and sell them on the private market.

If this is the case, there is no guarantee that the objects are disposed of for the public benefit rather than for private commercial gain. Nor could a state which has a direct cultural link with the objects prevent the continuous pillage of its historical heritage. The danger of a "first-come-first-served" or "freedom-of-fishing" approach in the field of underwater cultural heritage is far from being only theoretical. Art. 303, para. 3, of the UNCLOS can be seen

as oriented more to the protection of appropriation or looting of underwater cultural heritage than to the protection of the heritage itself.

The second relevant UNCLOS provision (Art. 149) deals with the underwater cultural heritage found in the so-called area, that is, the seabed beyond the limits of the 200-mile exclusive economic zone of coastal states:

> All objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin.

While vague in its content, Art. 149 shows a preference for those uses of archaeological and historical objects that ensure the "benefit of mankind as a whole." Private interests are given little weight, if any. Some categories of states which have a link with the objects are granted preferential rights, although Art. 149 does not specify the content of these rights and the manner in which they should be harmonized with the concept of "benefit of mankind as a whole."

The 2001 UNESCO Convention

On 2 November 2001, the Convention on the Protection of the Underwater Cultural Heritage (hereinafter: CPUCH) was adopted in Paris with the United Nations Organization for Science, Culture and Education (UNESCO). It applies to "all traces of human existence having a cultural, historical or archaeological character which have been partially or totally under water, periodically or continuously, for at least 100 years" (Art. 1, para. 1, *a*).

The CPUCH may be seen as a reasonable defense against the counterproductive regime of the UNCLOS. The basic defensive tools are the elimination of the undesirable effects of the law of salvage and finds and the exclusion of a "first-come-first-served" approach for the heritage found within the exclusive economic zone:

Under Art. 4 of the CPUCH,

> Any activity relating to underwater cultural heritage to which this Convention applies shall not be subject to the law of salvage or law of finds, unless it:
> (a) is authorized by the competent authorities, and
> (b) is in full conformity with this Convention, and
> (c) ensures that any recovery of the underwater cultural heritage achieves its maximum protection.

This provision is to be understood in connection with Art. 2, para. 7, of the CPUCH ("underwater cultural heritage shall not be commercially exploited") and with the rules contained in the annex, which form an integral part of the CPUCH. In particular, according to rule 2 of the annex:

> the commercial exploitation of underwater cultural heritage for trade or speculation or its irretrievable dispersal is fundamentally incompatible with the protection and proper management of underwater cultural heritage. Underwater cultural heritage shall not be traded, sold, bought or bartered as commercial goods.

While not totally excluding the application of law of salvage and law of finds, the CPUCH regime has the practical effect of preventing all its undesirable effects.

To fill the gap left open by the UNCLOS, the majority of the countries participating in the negotiation for the CPUCH were ready to extend the jurisdiction of the coastal state to the underwater cultural heritage found within the 200-mile limit of the exclusive economic zone. However, a minority of states assumed that the extension of the jurisdiction of coastal states beyond the 12-mile limit of the territorial sea would have altered the delicate balance embodied in the UNCLOS between the rights and obligations of the coastal state and those of other states.

To find a compromise, the CPUCH includes a three-step procedure, based on reporting, consultations among the states having a verifiable interest to the underwater cultural heritage concerned and urgent measures to be taken by the coastal state, acting on behalf of the states parties as a whole and not in its own interest.

The annex to the CPUCH sets forth a number of rules concerning activities directed at underwater cultural heritage. They are divided into different sections, namely, general principles; project design; preliminary work;

project objective, methodology, and techniques; funding; project duration/timetable; competence and qualifications; conservation and site management; documentation; safety; environment; reporting; curation of project archives; dissemination.

The text of the CPUCH, which was the outcome of a long-lasting negotiation, could not be adopted by consensus. It was put to vote (87 states in favor, 4 against, and 15 abstentions). Some states could not accept the coastal state's right to adopt provisional measures and the regime applying to warships. However, not only the great majority of developing countries but also several among the industrialized countries cast a positive vote (e.g., Australia, Canada, China, Japan, New Zealand, the Republic of Korea, Austria, Belgium, Denmark, Finland, Ireland, Italy, Luxembourg, Portugal, and Spain).

The CPUCH has entered into force on 2 January 2009 and is today binding only on 41 states. Sadly enough, it appears that the sensible message coming from the CPUCH has not yet been fully appreciated.

The Agreements Relating to Specific Wrecks

Art. 303 of the UNCLOS does not prejudice "other international agreements and rules of international law regarding the protection of objects of an archaeological and historical nature" (Art. 303, para. 4). In fact, some specific agreements have so far been concluded by states interested to protect wrecks of particular importance for their national historical and cultural heritage. These agreements provide for forms of cooperation between the coastal and the flag state.

Reference can be made to the 1972 agreement between Australia and the Netherlands concerning old Dutch shipwrecks, namely, the *Batavia*, the *Vergulde Draeck*, the *Zuytdorp*, and the *Zeewijk* which sank, respectively, in 1629, 1656, 1712, and 1727; the 1989 exchange of notes between South Africa and the United Kingdom on the wreck of the British warship *Birkenhead* (sunk in 1852); the 1989 agreement between France and the United States on the wreck of the *Alabama*, belonging to the Confederate States of America and lost in battle in 1864; the 1997 memorandum of understanding between Canada and the United Kingdom on the exploration, recovery, and disposition of the *HMS Erebus* and *HMS Terror*, two wrecks not yet found but lost during the attempt made in 1846 by Sir John Franklin to search for the Northwest Passage; the 2001 agreement between France and the United States on the French wreck of *La Belle*, which sank in 1686 off the coast of Texas; and the 2000 agreement (not yet in force) between Canada, France, the United Kingdom, and the United States concerning the shipwreck of the British liner *Titanic*, sunk in 1912.

Cross-References

► Underwater Sites in Archaeological Conservation and Preservation

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Underwater Sites in Archaeological Conservation and Preservation

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Introduction

Exceptional preservation is one of the reasons why underwater cultural heritage stands out (Fig. 1). This applies both to sites occurring at

Underwater Sites in Archaeological Conservation and Preservation, Fig. 1 © Deep Sea Productions. The remains of a seventeenth-century shipwreck and the sculptures adorning its deck equipment are a telling example of how exceptional submerged conservation conditions can be. The Dutch cargo vessel, commonly denoted as "The Ghost Ship" (Eriksson & Rönnby 2012), sits upright at a depth of 130 m in the Baltic

the water bottom's surface and to those that are buried deeply in underwater sediments. The waterlogged, anaerobic, and often anoxic conditions warrant that not just stone, ceramics, and other durable materials are preserved but all kinds of organic materials – artifacts and ecofacts – as well. This applies to sites of all periods, including early prehistory (Fig. 2). It is one of the aspects that define the high resolution of archaeological information contained in submerged wetland sites and in sites issuing from wreck.

Exceptional preservation, however, does not mean that the issues involved in archaeological conservation and preservation are any less complicated. Quite to the contrary. Paradoxically, exceptional preservation translates into a high level of vulnerability of sites, contexts, assemblages, and individual objects. All interference disturbs the chemical and physical equilibrium between archaeological material and its environment. That is true on land but is even more pointedly the case for underwater environments. As a consequence of growing attention for underwater sites – both in research and heritage management – the conservation and preservation of archaeological objects from maritime or

Underwater Sites in Archaeological Conservation and Preservation, Fig. 2 © H. Dal. A Mesolithic antler axe with wooden shaft illustrates the level of conservation of submerged prehistoric sites, in this case at Gamborg Fjord, Denmark, where the unconsolidated site is subject to erosion

waterlogged environments has developed into a specific branch of conservation science (e.g., Pearson 1987; Björdal 2000; Memet 2008). At the start it built heavily on experience with conservation for purposes of display, but research into in situ conservation and preservation of objects and sites in an underwater environment

has developed in tandem. It intensified over the last decade (Björdal et al. 2012).

Metals are a special case. Unlike organic materials, the preservation of metals is not exponentially better in an underwater environment. Corrosion and degradation tend to be aggressive, especially in salt water. Iron of different qualities and composition is particularly prone to react strongly. Depending on the material in its vicinity, such as sand and calcareous organic debris, a hard, irregular, and brittle shell tends to form around it. The resulting lumps are called concretions; their significance is unrecognizable and not just to the untrained eye. Despite their ugly appearance, they may be significant information carriers, even if the object which caused their formation has completely dissolved (Fig. 3). For other metals, with the exception of most inert ones, it is as true as for iron that corrosion and degradation processes will slow down and come to a near standstill once a protective cover has formed. These processes will set in with renewed vigor if the equilibrium with the environment is disturbed, even a little.

Providing for as stable an environment as possible is therefore the key to the archaeological conservation and preservation of underwater sites.

Underwater Sites in Archaeological Conservation and Preservation, Fig. 3 © SDU-MAP. Underwater iron objects will transform into so-called concretions, ugly lumps of which the significance eludes the casual observer. Yet, such concretions can hold significant artifacts or significant archaeological information, even if the object which caused their formation has completely dissolved. The *lower image* graphically explains that concretions can form relatively quickly and that it is a bad idea to hammer away on them, and not just for archaeological reasons (Photo: Jens Auer)

Definition

Underwater sites have a special place in archaeological conservation and preservation. Underwater environments have warranted exceptional preservation of archaeological traces and remains. Moreover, underwater environments often preserve archaeological remains that dry land environments do not. Objects retrieved from underwater sites have stimulated fundamental conservation science research. The ongoing exploration of the underwater world and the intensified use of underwater and offshore environments have a profound impact on ongoing preservation and degradation as well as on our knowledge about them. Although underwater sites can be extremely vulnerable, they provide abundant information and stimuli for conservation research. Research relating to in situ preservation is rapidly developing, and so are monitoring techniques. Archaeological conservation and preservation of underwater sites is therefore not necessarily more difficult than conservation and preservation on land, but special challenges remain. Just like on land, the central issues to be resolved are not of a technical nature. Rather, they relate to responsible management and to the compatibility of preservation with access, use, and enjoyment of the cultural heritage that underwater sites entail.

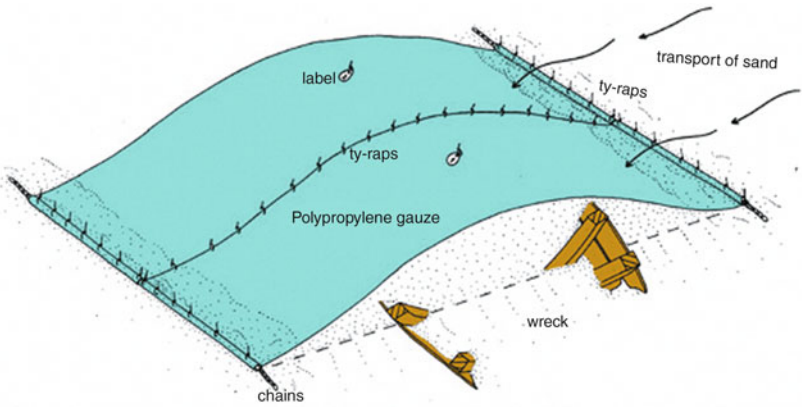

Underwater Sites in Archaeological Conservation and Preservation, Fig. 4 © Martijn Manders – RCE. The principle of using cheap polypropylene netting to catch sediment in transport in order to cover or backfill exposed remains that are vulnerable to mechanical, chemical, and biological degradation has been well proven in many places of the world

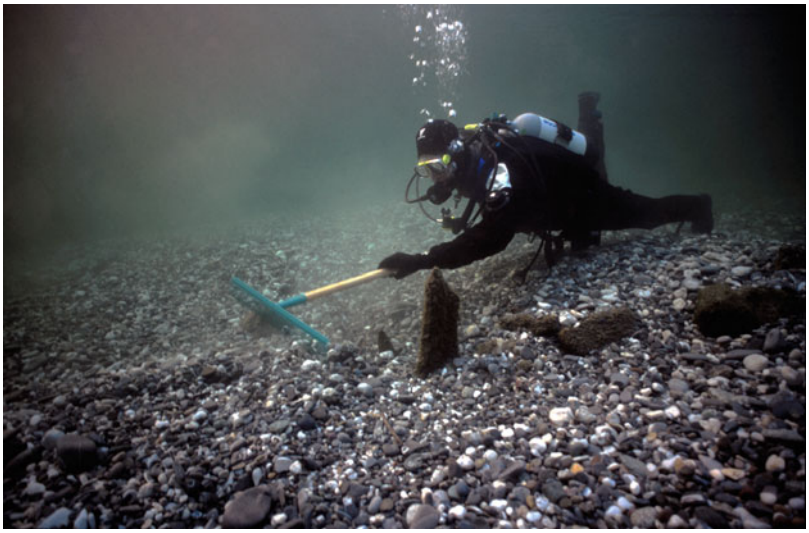

Underwater Sites in Archaeological Conservation and Preservation, Fig. 5 © Landesamt für Denkmalpflege Baden-Württemberg. Gravel is applied as the top layer in the archaeological conservation and preservation of prehistoric sites in lake Konstanz, Germany. Circumalpine pile dwelling sites in Switzerland, Austria, France, Germany, Italy, and Slovenia were inscribed on the UNESCO World Heritage Site list in 2011 (Photo: Joachim Köninger)

Key Issues/Current Debates/Future Directions/Examples

Conservation research and common sense have come together in the deployment of simple but very effective measures of conservation and preservation of underwater archaeological sites. Sandbags and cheap polypropylene netting are not expensive and can be used effectively to isolate vulnerable deposits from mechanical damage, influence of currents, and biochemical degradation (see examples in Grenier et al. 2006) (Fig. 4). Gravel has been used in other circumstances (Fig. 5). Underwater ruins have been consolidated with stones, mortar, and various covers.

A key issue in archaeological conservation and preservation of sites is, however, that all efforts depend on their management. General management policies are an important part of it, but specific measures targeted at the archaeological conservation and preservation of a specific site depend on a site management plan, however rudimentary this may be. Management depends on authority and responsibility, and these are only assumed if there is jurisdiction and control. Successful examples of specific in situ measures, whether they are in inland waters, the North Sea, the Baltic, the Mediterranean, the Indian Ocean, the Atlantic, the Caribbean, or the Pacific (all seven have their examples), are limited to

situations where a "competent authority" takes responsibility and almost all examples are in relatively shallow water and close to shore. Admittedly, these are also the situations where most attention of archaeologists and laypersons has been, but there are many areas where one could wish that developments had taken off as well.

Obviously, zones without any preservation strategies include areas with deficient cultural heritage management. This may be due to the absence of a competent authority, although most countries nowadays have one. It can also happen in cases where heritage management is organized at the local or regional level of government for which the sea is beyond the horizon. Under such circumstances, conservation of underwater sites remains limited or absent altogether. It is remarkable that it can also lead to complete overshadowing of conservation policies at sea. A coastal state has some measure of authority over marine scientific research and an environmental responsibility in maritime zones such as the Continental Shelf and Exclusive Economic Zone, even though these are international waters (Dromgoole 2010). If heritage is generally organized at a lower government level, it can happen that economic, maritime, fisheries, or defense authorities are completely unaware of heritage conservation principles. As a result they may not notice any need or may take badly informed decisions that directly destroy underwater sites for uninformed reasons, profiting the treasure-hunting industry in sheer contravention of what the same country finds acceptable on land. Examples from Europe, the Americas, and Asia illustrate the point and emphasize the importance of further promotion of the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001. That such blank zones continue to exist is the more surprising since very remote sites, such as that of the famous *Titanic*, are now subject to protection (Varmer & Aznar 2012).

On a site-specific level, sandbags and other types of cover may be cheap and effective, but they share the dilemma of many measures of archaeological conservation and preservation in that they make in situ remains inaccessible. The purpose is to make sites inaccessible for destructive agents, but it makes them inaccessible for enjoyment as well. The context determines whether that is a problem or not. In the context of the sturdy submerged classical harbor works of Caesarea Maritima, archaeological conservation only enhances visitor experience (Raban 2009). In the context of the exceptional Grotte Cosquer (Clottes & Courtin 1996), underwater conservation follows the logic of conservation of Paleolithic cave art elsewhere, jointly with making the stunning imagery available. Conservation and management are not targeted at visitors at all, and visiting through a long siphon with its entrance at 37 m below sea level is complicated anyway (Delestre 2005). But the simple covering of wreck sites in the Netherlands, Australia, or Sri Lanka does not add to any visitor enjoyment either (Maarleveld 2009; Firth 2011). Other ways to involve and satisfy visitors and other stakeholders are then essential, as no archaeological conservation and preservation can do without them (Carver 2011). The Internet is an obvious medium (Manders et al. 2009). Despite the understandable focus on shallow sites and inshore locations, attention is gradually extending to deeper, and more remote, locations where environmental parameters are nevertheless subject to change after intervention (Leino et al. 2011; Mann 2012).

Yet again metals are a special case. In order to temporarily delay degradation, sacrificial anodes have occasionally been used in archaeological conservation and preservation (MacLeod et al. 1986; Gregory 1999). The technique is well proven in the protection of contemporary metal structures in seawater and especially on ships with rotating bronze propellers. In the absence of sacrificial anodes, electrochemical reactions will quickly consume their steel axles. Despite the efficiency of the technique, it begs the question whether the more general and long-term application in archaeological conservation would be sustainable, given that maritime industries are hard pressed to find alternatives for sacrificial paints and anodes in view of environmental concerns. Nevertheless, the monitoring and management of electrochemical circumstances on underwater sites featuring substantial iron or light metal wreck are important aspects in

Underwater Sites in Archaeological Conservation and Preservation, Fig. 6 © Ships of Discovery. Wing of a Japanese "Emily" bomber plane on the World War II heritage trail, Saipan Lagoon, Commonwealth of the Northern Mariana Islands

managing their long-term preservation and enjoyment (Macleod 2006).

This touches on a subject that has been the cause for some confusion. Although archaeological sites include artifacts that become "movable antiquities" on removal, the site as such is immovable. This is as true for archaeological sites resulting from wreck as it is for prehistoric kitchen middens. In discussing relatively recent wreck sites that occur at the surface of the (sea-) bottom, it is relatively common to refer to the name of the original craft (Fig. 6). Management of electrochemical processes consists in conservation measures that are specifically targeted at protecting the "object." Nevertheless, such efforts are specifically oriented to preservation in situ and are thus part of conservation and management of the site as a whole. In that sense the efforts are fundamentally different from conservation efforts addressing operating watercraft and other movable items, despite similarity in techniques. It is important to keep this difference in mind because of the legal differences relating to "immovable sites" and "movable objects" and their consequences for protection, salvage, and treasure hunting. Archaeological conservation and preservation of underwater sites, including those wreck sites that for historical reasons are considered significant, are supported by, find their legal basis in, and should elaborate on spatial protection. Salvage practice, rulings, and contracts derive their meaning from the thing, not from the place. Like any other activity, however, salvage activities are subject to spatial policies, regulations, and permits. They are therefore subordinate to heritage protection policies, which is important to keep in mind.

Although a management plan for a specific site is the obvious context for specific measures of conservation and preservation, more general management plans or policies can include very relevant measures that contribute to long-term preservation. Such measures generally need to be integrated with general management schemes such as spatial planning or policies addressing specific activities, be they offshore exploration or fishing. Integration of specific measures in such general policies or in agreements with industry can add enormously to the archaeological conservation and preservation of underwater sites, both directly and indirectly. Yet again, as so often in these pages, reference can be made to treasure hunting in maritime archaeology. Treasure hunters have started to justify their destructive activities by referring to the impact of deep-sea fisheries. Undoubtedly, it is true that fishing impacts archaeological sites. But that is no reason to replace impact with willful destruction. Both the dredging and fishing industries have shown their willingness to consider responsible policies of impact mitigation. It is not in their interest to do otherwise. Moreover, most deep-sea fishing techniques do not impact the bottom at all (Maarleveld et al. 2013, chapter 10).

In preference of discussing general trends, relatively little has been said on archaeological reserves, parks, and memorials. Obviously,

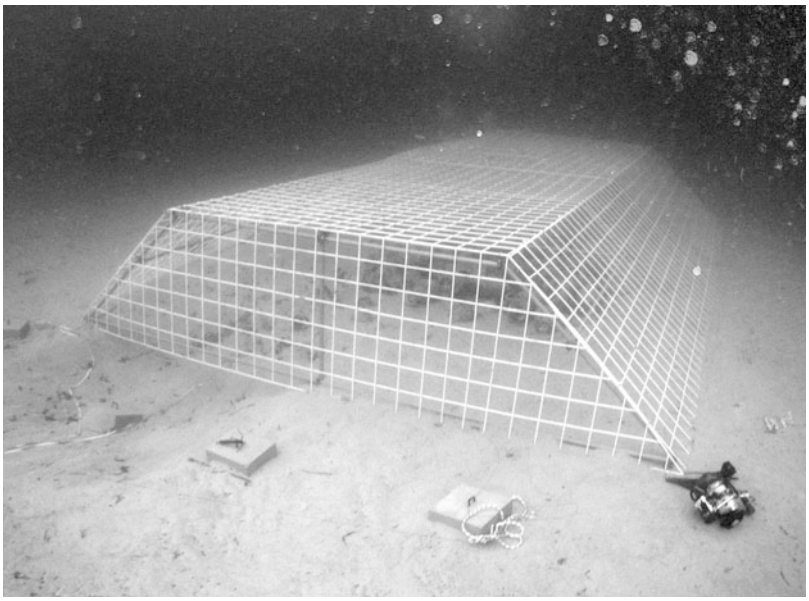

Underwater Sites in Archaeological Conservation and Preservation, Fig. 7 © I. Radić Rossi. A trapezoidal cage protects a classical shipwreck deposit at Rab Rt Sorinj, the north cape of the island Rab, Croatia, from interference by visiting divers. Amphoras have been looted from wrecks all over the Mediterranean

however, they are the perfect examples where site management plans are in place, where at least some of the techniques of archaeological conservation and preservation have been developed and where the experience with managing the compatibility of preservation with access, use, and enjoyment of the cultural heritage is greatest. On the other hand, their number is relatively few and therefore hardly representative for global practices. But a few can be mentioned and add to the discussion. The USS Arizona memorial in Pearl Harbor is an exceptional case. Although not established for predominantly archaeological reasons, it is certainly the site that attracts more visitors each year than any other underwater site. The wreck site of the French 4th rate navy vessel Célèbre that sank in 1758 in the entrance to Louisbourg fortress in Canada is an example where management and monitoring started in 1961 and intensified through archaeological documentation and improving accessibility to the vulnerable site for visiting recreational divers in the 1980s (Grenier 1994). The Louisbourg wrecks are managed in conjunction with the Fortress of Louisbourg National Historic Site of Canada. A third example is Florida's Underwater Archaeological Preserves. These reserves have been established in response to extensive looting and take public archaeology and education as their motto (Jameson & Scott-Ireton 2007). Finally, the protective cages that the Croatian Conservation Institute has mounted over classical shipwreck sites should be mentioned (Fig. 7). They protect sites against visitor interference, while allowing them a see-through in much the same way as visitors watch wild animals in a classical zoo.

Although one can expect creative developments to continue, underwater sites have begun to play a significant role in archaeological conservation and preservation. This is quite different from a couple of decades ago.

Cross-References

- ▶ Avocational Archaeology
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Heritage: Public Perceptions
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Stakeholders and Community Participation

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UNESCO (1970) and UNIDROIT (1995) Conventions

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Introduction

The growth in the international market in art works and other cultural objects following World War II prompted the United Nations Educational, Scientific and Cultural Organization (UNESCO) to begin the drafting in the 1960s of an international convention to control this trade. The 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property ("the UNESCO Convention") was adopted in late 1970; there are currently 123 States Parties.

Recognizing that there were impediments to acceptance of the 1970 UNESCO Convention particularly by European civil law nations, UNESCO asked the International Institute for the Unification of Private Law (UNIDROIT) to draft a new convention to respond to these concerns, and in 1995, the Unidroit Convention on Stolen or Illegally Exported Cultural Objects was finalized. This convention focuses on the creation of private rights of action, through adoption of uniform national legislation, rather than on state-to-state actions, which are the exclusive means of redress under the UNESCO Convention. The Unidroit Convention requires ratifying nations to adopt domestic law that implements the convention and does not allow nations to opt out of sections of the convention.

Views expressed in this article are the author's own and not necessarily those of the Cultural Property Advisory Committee or the U.S. Government.

Definition

The 1970 UNESCO Convention

The UNESCO Convention, in Article 1, defines cultural property as "property which, on religious or secular grounds, is specifically designated by each State as being of importance for archaeology, prehistory, history, literature, art or science" and which belongs to an enumerated list of categories, including paintings, drawings, original works of sculpture, rare manuscripts, coins more than 100 years old, ethnological objects, products of archaeological excavations, and elements of artistic or historical monuments that have been dismembered. To some nations, Article 3 contains the key obligation of the convention: "The import, export or transfer of ownership of cultural property effected contrary to the provisions adopted under this convention by the States Parties thereto, shall be illicit." According to O'Keefe, this provision means that States Parties shall not permit the import of cultural objects whose export from another State Party was illegal (O'Keefe 2007: 41-44).

To other nations, the core obligations of the convention are found in Articles 7(b)(1) and 9. Article 7(b) states:

The States Parties to this Convention undertake:

> (b)(i) to prohibit the import of cultural property stolen from a museum or a religious or secular public monument or similar institution in another State Party to this Convention after the entry into force of this Convention for the States concerned, provided that such property is documented as appertaining to the inventory of that institution.

Because this provision relates primarily to examples of traditional theft from documented collections, its implementation is the least problematic and easiest to enforce of the convention's provisions.

Article 9 of the UNESCO Convention states:

> Any State Party to this Convention whose cultural patrimony is in jeopardy from pillage of archaeological or ethnological materials may call upon other States Parties who are affected. The States Parties . . . undertake, in these circumstances, to participate in a concerted international effort to determine and to carry out the necessary concrete

> measures, including the control of exports and imports and international commerce in the specific materials concerned. Pending agreement each State concerned shall take provisional measures to the extent feasible to prevent irremediable injury to the cultural heritage of the requesting State.

The first difficulty with the implementation of Article 9 is that several key terms, including "cultural patrimony," "jeopardy," and "pillage," are left undefined. "Jeopardy" would seem to involve some sense of futurity – that is, it encompasses a situation in which there is a threat or danger of pillage, as well as contemporaneous, ongoing pillage of the cultural patrimony. O'Keefe focuses more on the question of the extent to which these terms imply a requirement of a crisis or emergency situation and concludes that this is not necessary:

> [P]illage and jeopardy of a cultural heritage occur where the remains of a particular civilization are threatened with destruction or extensive movement abroad or when the sale of certain archaeological objects on the international market sets off a broad campaign of clandestine excavations leading to the destruction of important archaeological sites.... [I]t should not be considered open to a State Party to refuse to act on the ground that, in its opinion, the pillage complained of was not in fact putting the cultural heritage of the requesting State in danger.... Article [9] was against illicit traffic in cultural objects, and . . . the requesting State should not, therefore, be required to produce evidence as to the degree of damage or size of the illicit trade in these objects (O'Keefe 2007: 71).

The last section of Article 9 includes the concept of "irremediable injury" in considering a State Party's obligation to act quickly to avoid such harm. "Irremediable injury" should include the destruction of the stratigraphy of a site, despite the availability of what appear to be substantially similar objects on the market. O'Keefe comments, "[a] general trade in unprovenanced objects from various sites in a country or countries of the same region may destroy any efforts to properly survey, date, and verify the development of national culture" (O'Keefe 2007: 72).

The convention imposes obligations on both market nations and those rich in cultural resources. Countries rich in cultural resources have an obligation to protect their own sites and museums, to police their borders, and to educate their people about the values in conserving their cultural heritage. These obligations more specifically include establishing a government agency or service that will assist in the preparation of laws for the regulation of cultural objects, establish a national inventory of protected property, promote scientific and technical institutions, and supervise archaeological excavations (Article 5); establishing a licensing system for the export of cultural objects (Article 6); and requiring dealers to maintain registers with information on the origin, supplier, description, and price of items sold (Article 10).

The 1995 Unidroit Convention on Stolen or Illegally Exported Cultural Objects

The Unidroit Convention utilizes the same definition of cultural property as that in the UNESCO Convention. Unidroit provides that stolen and illegally exported objects should, in most circumstances, be returned to the original owner or, in cases of illegal export, the nation of origin and that fair and reasonable compensation must be paid to a good faith purchaser of stolen or illegally exported cultural objects. The convention also provides a definitive statute of limitations of 3 years from the time the claimant knows the location of the object and the identity of the possessor and, in any case, 50 years from the time of the theft or illegal export. However, a claim for a cultural object that is an integral part of an identified monument or archaeological site or part of a public collection or that is a sacred or communally owned object is subject only to the 3-year actual discovery rule. Its third significant provision equates illegal excavation with theft when this is consistent with local law. Article 3(2) states, "a cultural object which has been unlawfully excavated or lawfully excavated but unlawfully retained shall be considered stolen, when consistent with the law of the State where the excavation took place."

To be eligible for compensation, the possessor must have "neither [known] nor ought reasonably to have known that the object was stolen and can prove that it exercised due diligence when

acquiring the object" (Article 4(1)). Article 4(4) provides that

> In determining whether the possessor exercised due diligence, regard shall be had to all the circumstances of the acquisition, including the character of the parties, the price paid, whether the possessor consulted any reasonably accessible register of stolen cultural objects, and any other relevant information and documentation which it could reasonably have obtained, and whether the possessor consulted accessible agencies or took any other step that a reasonable person would have taken in the circumstances.

Due diligence thus refers to the conduct of the purchaser in investigating an object's provenance at the time of purchase. Particularly in the realm of antiquities, certain additional factors should be taken as indicating likelihood of theft or illegal export. These include origin in areas with recent large-scale looting, such as Iraq and Afghanistan, or the presence of soil, mud, or straw on the object.

Key Issues

Models of Implementation

Implementation by the United States

Although the United States signed the UNESCO Convention in 1970 and the Senate gave its unanimous consent to ratification in 1972, the Senate also required the adoption of implementing legislation before the convention would have domestic legal effect. This implementing legislation, the Convention on Cultural Property Implementation Act ("CCPIA"), was signed into law in early 1983 (19 U.S.C. §§ 2601-13). The United States implemented (i.e., made effective as part of US domestic law) only Articles 7(b)(1) and 9.

Implementation of Article 7(b)(1), 19 U.S.C. § 2607, pertaining to cultural property stolen from documented collections, did not significantly alter US law, which already prohibited the importation of any form of stolen property worth more than $5000 under the National Stolen Property Act, 18 U.S.C. §§ 2314-15. Unlike the NSPA, the CCPIA does not require that the property have any minimum monetary value and permits stolen property to be seized and forfeited regardless of whether the importer or anyone else knew that the cultural property was stolen.

Implementation of Article 9 has proven to be considerably more controversial. The relevant CCPIA provisions allow the President of the United States to impose import restrictions, following a request by another State Party, upon designated categories of archaeological and ethnological materials pursuant to either an emergency action, 19 U.S.C. § 2603, or a bilateral agreement (or memorandum of understanding (MOU)) between the United States and the requesting nation (19 U.S.C. § 2602).

These import restrictions apply to designated categories of archaeological or ethnological materials rather than to specific documented artifacts. Archaeological and ethnological objects often share the characteristic that they are unrecorded before they are stolen, unscientifically recovered, or illegally removed from their country of origin. Legal mechanisms that require identification of specific, known objects do not apply to and therefore do not deter trade in previously unrecorded objects. Application of import restrictions on categories of artifacts can help to deter the trade in undocumented objects and therefore reduce the incentive to loot archaeological sites. The CCPIA defines an archaeological object, in part, as an object of cultural significance that is at least 250 years old and is "normally discovered as a result of scientific excavation, clandestine or accidental digging, or exploration on land or under water" (19 U.S.C. § 2601(2)). An ethnological object is defined as "the product of a tribal or preindustrial society" that is "important to the cultural heritage of a people because of its distinctive characteristics, comparative rarity, or its contribution to the knowledge of the origins, development, or history of that people" (19 U.S.C. § 2601(2)).

Import restrictions imposed in emergency situations can last a maximum of 8 years (an initial period of 5 years with one renewal period for 3 years), 19 U.S.C. § 2603(c)(3). Bilateral agreements last a maximum of only 5 years but can be renewed an indefinite number of times. The United States currently has bilateral agreements with 13 nations.

Implementation of the 1970 UNESCO Convention by Other Market Nations

Beginning in the late 1990s, many market nations ratified the UNESCO Convention, including France, Japan, the United Kingdom (the largest market for art and antiquities after the United States), Sweden, Denmark, Switzerland, Germany, and the Netherlands. However, these nations have adopted different models for implementing the convention. For example, some States Parties, such as Canada (Export-Import Act, R.S.C. 1985, c. C-51 et seq.) and Australia (Protection of Movable Cultural Heritage Act 1986, Section 14), grant reciprocal recognition to other nations' export controls that pertain to cultural objects under Article 3 of the convention.

The United Kingdom at first took the position that it did not need to adopt implementing legislation. However, in 2003, it enacted new criminal legislation, the Dealing in Cultural Objects (Offences) Act, which created a new offense for dealing in "tainted cultural objects" (Dealing in Cultural Objects (Offences) Act 2003, Ch. 27). One commits this offense if he or she "dishonestly deals in a cultural object that is tainted, knowing or believing that the object is tainted" (Section 1, Subsec. 1). The statute defines a "tainted object" under the following circumstances: "(2) A cultural object is tainted if, after the commencement of this Act- (a) a person removes the object in a case falling within subsection (4) or he excavates the object, and (b) the removal or excavation constitutes an offence" (Section 2, Subsec. 2). Subsection 4 refers to objects removed from "a building or structure of historical, architectural or archaeological interest" or from an excavation. For purposes of the statute, it does not matter whether the excavation or removal takes place in the United Kingdom or in another country or whether the law violated is a domestic or foreign law (Section 2, Subsec. 3). This statute has also been used as the basis for seizures of tainted cultural objects upon attempted import (Vigneron 2008 : 262, 292-93, 295).

Switzerland ratified the Convention in 2003, and its implementing legislation, the Federal Act on the International Transfer of Cultural Property, took effect in June 2005. Switzerland implements the UNESCO Convention through a series of bilateral agreements that impose import restrictions and that are similar to those of the United States. The Swiss Federal Council can enter into agreements with other nations that are party to the UNESCO Convention to protect "cultural and foreign affairs interests and to secure cultural heritage" (Article 7). Unlike the US bilateral agreements, the Swiss agreements are of potentially unlimited duration and do not need to be renewed. Requests for an agreement are not subject to review by a committee of private citizens but rather are directly negotiated by officials of the Swiss Ministry of Culture. The Federal Council can also take additional measures when a "state's cultural heritage [is] jeopardized by exceptional events" (Article 8). Switzerland has entered into agreements with Italy, Greece, Egypt, and Colombia.

Germany enacted implementing legislation for the UNESCO Convention in 2007. Under this legislation, Germany will not allow the import of any illegally exported cultural object that has been individually classified in an accessible inventory by the country of origin 1 year prior to removal. In addition, the country of origin must place archaeological objects in the inventory within 1 year of the time when the country of origin gains knowledge of the excavation (Implementation Act of 18 April 2007, Section 6(2), sentences 1–3. BGBl.I. Nr. 21 (23 May 2007)).

Japan effectively implemented only Article 7(b)(i) of the convention and requires that any objects subject to import control come from a "museum or a religious or secular public monument or similar institution" (Law Concerning Controls on the Illicit Export and Import of Cultural Property). It is the responsibility of the foreign government to notify the Japanese government of the theft of cultural property from such an institution; such stolen property is then designated as "specified foreign cultural property" and subject to import control (Articles 3 and 4).

Hybrid Models of Implementation

Some nations have chosen to ratify the Unidroit Convention at the same time as or after ratification of the UNESCO Convention. For example,

some nations such as Italy and China have ratified both conventions, typically enacting specific comprehensive legislation such as that enacted by Italy in 2004. New Zealand, which joined the Unidroit Convention in late 2006 and the UNESCO Convention in 2007, enacted comprehensive legislation that incorporates implementation of both conventions into its domestic law, Protected Objects Act 1975, as revised 2007. In addition to regulating the export of protected cultural objects from New Zealand, the legislation prohibits the import into New Zealand of unlawfully exported foreign protected objects. The definition of "foreign protected object" tracks the definition of cultural property used in the UNESCO and Unidroit Conventions (Part 1, Section 2(1)). This legislation allows reciprocating states to bring actions to recover stolen or illegally exported protected objects (Part 1, Section 10).

In ratifying the UNESCO Convention, the Netherlands has adopted another hybrid model that focuses on implementing Article 3, rather than Article 9, while incorporating elements from the Unidroit Convention. The legislation prohibits the import of cultural property that was illegally removed or unlawfully appropriated from a State Party, and the primary enforcement mechanism is through a private right of action for the State Party that wishes to recover its cultural property. Dutch officials are also authorized to take such materials into custody when there is suspicion that this provision has been violated, pending the filing of a claim by the foreign nation (Section 10). The explanatory memorandum and notes accompanying this legislation clarify that unlawful appropriation includes unlawful excavation at archaeological sites and refer to the Unidroit Convention's equation of unlawful excavation with theft in Article 3(2).

Future Directions

It remains to be seen whether the Unidroit Convention will ultimately garner the same relatively widespread acceptance that the 1970 UNESCO Convention has. At the same time, the salient question is whether nations that have ratified the UNESCO Convention will take their obligations seriously enough so that the convention will have its intended impact on the incentives to trade in looted, stolen, or undocumented cultural objects. It is necessary for the ratifying nations to continue to seek better methods for implementing and enforcing the convention so that it becomes an even more effective tool in the preservation of cultural heritage.

Cross-References

- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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UNESCO (1972) and Malta (1992) Conventions

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Brief Definition of the Topic

In 1972, UNESCO adopted the *Convention Concerning the Protection of the World Cultural and Natural Heritage*, a treaty that has become UNESCO's most widely accepted international instrument and was ratified by nearly all its member states. Its purpose is to encourage the identification, protection, and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. The Convention (http://whc.unesco.org/) is administered by the World Heritage Committee which consists of 21 elected nations that are party to the Convention.

The Convention names formal advisory bodies to the WH Committee, of which ICOMOS, the International Council on Monuments and Sites, advises on cultural properties and advisor on natural sites is the World Conservation Union. ICOMOS is responsible for the evaluation of nominations of cultural properties made by States Parties against the criteria laid down by the WH Committee. In addition to the basic criterion of "outstanding universal value," as specified in the Convention, these relate to aspects of authenticity, management, and conservation.

World Heritage has become a source of prestige for states and cultural properties on the list are rather strongly biased toward architectural heritage. The list also has an imbalance in that most non-western countries are rather poorly represented. In recent years, attempts are made to remedy such issues. Apart from that, archaeological sites benefit most from a nation's participation in the WH Convention not because some archaeological sites may actually make it to the list, but because the vast majority of such sites, that will never make it to the list, may benefit from the obligations imposed by the treaty, especially article 5 that requests proper management of archaeological heritage.

The Malta Convention (http://conventions.coe.int/Treaty/en/Treaties/Html/143.htm) dates from 1992, when the Council of Europe adopted *European Convention on the Protection of the Archaeological Heritage* (*Revised*). The treaty has been ratified by almost all European countries and has become an important international standard.

The convention revises the Convention of London and was drafted as a result of the economic development in Europe in the 1960s and 1970s that caused massive destruction of archaeological resources (Willems 2007). The rescue archaeology in those days was unable to cope with the consequences of rapid spatial development and it was clear that to accomplish a better survival of archaeological resources, archaeology should become part of the planning process. After all, the expensive rescue operations were a direct result of a failure to do so. In addition, it was considered desirable that in the future some of those resources could be preserved in situ because their importance was recognized at an early stage. This changed rescue archaeology into preventive archaeology. Further, it had become an accepted principle to charge the developer with the cost of archaeological work resulting from the development. And finally, it was realized that the public needed to benefit more from the results of archaeological research that was conducted mostly in an academic setting. These are the central principles enshrined in the Convention.

Cross-References

▶ European Convention on the Protection of Archaeological Heritage (1992)
▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
▶ UNESCO World Heritage Convention (1972)

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UNESCO World Heritage Convention (1972)

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Introduction and Definition

Economic and environmental pressures led to the adoption in 1972 of the Convention Concerning the Protection of the World Cultural and Natural Heritage (better known as the World Heritage Convention) by UNESCO (the United Nations Educational, Scientific and Cultural Organization). This has become the flagship convention for the conservation and management of heritage sites, with almost universal ratification of 189 countries (as of July 2012), referred to as States Parties. Despite its popularity, this legal instrument is still badly understood.

This entry aims to explain the mechanisms to inscribe sites on the World Heritage List. It then will explain the different efforts undertaken since the early 1990s to widen the framework for implementation of the Convention and to ensure that it encompasses the diversity of the world heritage and not only European sites. The second part presents the failures and issues of the implementation of the Convention, in particular in relation to opening it to the diversity of the heritage of the world. A final section presents potential avenues for the future.

Ensuring the Worldwide Implementation of the World Heritage Convention

The World Heritage List, the most famous mechanism of the Convention, registers sites deemed to be outstanding universal value. As of July 2012, 962 World Heritage Sites have been inscribed on this list (745 cultural, 188 natural, and 29 mixed properties located in 157 States Parties). Paragraph 49 of the Operational Guidelines defines "outstanding universal value" as "cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity" (UNESCO 2011b). These guidelines provide key information on the implementation of the Convention and are flexible working documents and have been revised more than 15 times in the past 40 years. These guidelines contain the official form that States Parties need to fill to propose sites for inclusion on the World Heritage List. This form which needs to be signed by a representative of the State Party and sent to the UNESCO World Heritage Centre is then assessed by the Advisory Bodies: ICOMOS (the International Council on Monuments and Sites) for cultural heritage sites and IUCN (the International Union for Conservation of Nature) for natural ones. In the case of nominations of "cultural landscapes" (see below), as appropriate, the evaluation is carried out by ICOMOS in consultation with IUCN. For mixed properties (that satisfy a part or the whole of the definitions of both cultural and natural heritage laid out in Articles 1 and 2 of the Convention), the evaluation is carried out jointly by ICOMOS and IUCN. The evaluations by the Advisory Bodies are presented at the annual World Heritage Committee session. This committee, composed of 21 States Parties, decides whether the nominated property should be inscribed on the List, referred (when minor additional information is requested from the State Party) or deferred (when a more substantial revision of the nomination dossier is required).

The ten criteria (six relating primarily to cultural heritage and four to natural heritage) are essential elements to clarify the notion of outstanding universal value. To be included on the World Heritage List, sites have to fulfill at least one of the following ten criteria:

(i) Represent a masterpiece of human creative genius
(ii) Exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design
(iii) Bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared
(iv) Be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history
(v) Be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change
(vi) Be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria)
(vii) Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance
(viii) Be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features
(ix) Be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals
(x) Contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from the point of view of science or conservation. (UNESCO 2011b)

To be inscribed on the List, sites also need to fulfill the criterion of authenticity and integrity. Up until the 2005 revised version of the Operational Guidelines, authenticity was defined according to a rigid test of authenticity "in design, materials, workmanship and setting." Since 2005, this criterion is defined in these guidelines according to the definition provided in the Nara Document on Authenticity. This text, adopted in 1994, recognizes, particularly in its Article 11 and 12, that authenticity is a relative criterion rooted in specific sociocultural contexts and can only be understood and judged within those specific contexts (UNESCO 1994b). The Nara Document reflects efforts to widen the framework for the implementation of the Convention and to open it to the diversity of ways of caring for the past, which might not correspond to European ones.

Additional efforts to open the framework of the Convention to the diversity of the world's heritage include the 1992 adoption of the notion of cultural landscapes, for sites that reflect the "combined works of nature and of man" (UNESCO 1992). Three types of cultural landscapes have been identified; first, clearly defined landscapes designed and created intentionally by man. This embraces garden and parkland landscapes constructed for aesthetic reasons, such as Aranjuez Cultural Landscape (Spain, inscribed on the List in 2001 under criteria (ii) and (iv)). The second category corresponds to the organically evolved landscapes, which have developed in response to social, economic, administrative, and/or religious imperatives, in association with their natural environment. This includes relic (or fossil) landscape, which main activity has already come to an end, as is the case, for instance, for Blaenavon Industrial Landscape (United Kingdom, inscribed on the List in 2000, under criteria (iii) and (iv)). The second subcategory is the continuing landscape, which has retained its

main activity and role in contemporary society and which includes the Viñales Valley (Cuba, inscribed on the List in 1999 under criterion (iv)). The final category is the associative cultural landscape, characterized by powerful religious, artistic, or cultural associations with the natural element rather than material cultural evidence, which may be insignificant or even absent. This is the case, for instance, for Tongariro National Park (New Zealand, inscribed in 1993 under criteria (vi), (vii), and (viii)).

These definitions of cultural landscapes introduce important ideas and themes that were previously omitted from the World Heritage Convention or past versions of the Operational Guidelines. They represent a shift from a narrow understanding of cultural heritage as monumental to include a prominently non-monumental understanding of heritage. The definition of associative landscapes refers, for example, to the intangible dimension of properties and the intangible links between specific community groups and their natural environment, for instance, sacred landscapes for indigenous groups. These definitions of cultural landscape also denote a concern for the human and anthropological dimensions of sites. This is particularly the case for continuing landscapes, defined as "one which retains an active social role in contemporary society closely associated with the traditional way of life" (UNESCO 1992).

Another key document adopted to prevent a Eurocentric understanding of the Convention was the 1994 text of the Global Strategy for a Representative, Balanced and Credible World Heritage (UNESCO 1994a). This approach aims to help to rectify the imbalances on the List between regions of the world, types of monuments, and periods. The term "balance" as mentioned in the text of the Global Strategy is not about numbers but about the representativeness of the world's diversity of cultural and/or natural heritage sites on the List. This document also identified the following themes, considered to be underrepresented on the List and which representative sites should be selected to help to move away from an architectural, monumental, and Eurocentric conception of heritage to a more anthropological one:

1. Human coexistence with the land
   - Movements of people (nomadism, migration)
   - Settlement
   - Modes of subsistence
   - Technological evolution
2. Human beings in society
   - Human interaction
   - Cultural coexistence
   - Spirituality and creative expression. (UNESCO 1994a)

It was believed that the inclusion of sites representing these broad themes on the List would enable gaps to be filled and a List more representative of the diversity of world's cultures to be drawn. For sites to be considered anthropologically, the values given to them by local populations would also have needed to be better considered. The Global Strategy thus locates the local populations as fundamental stakeholders in the implementation of the Convention.

This need for a more representative and thus credible List was further reiterated as one of the key objectives to guide the implementation of the Convention, as adopted in the 2002 Budapest Declaration. This declaration adopted, as additional strategic objectives, the need "to ensure the effective conservation of World Heritage properties, to promote the development of effective capacity-building measures (...), and to increase public awareness, involvement and support for World Heritage through communication" (UNESCO 2002). These objectives are better known as the four "Cs" for credibility, conservation, capacity building, and communication. In 2007, following New Zealand's proposal, a fifth strategic objective focusing on communities (the fifth "C") was adopted (UNESCO 2007). This proposal argued indeed that the lack of community involvement in heritage protection leads invariably to a failure in the implementation of the Convention's other four objectives.

Following the publication "World Heritage: challenges for the Millennium" (Bandarin & Labadi 2007) and in view of the approaching

fortieth anniversary of the Convention, the World Heritage Committee decided to launch a reflection on the future of the Convention at its 32nd session in 2008. A number of debates have since been held, in particular on "World Heritage and sustainable development," which has helped to link firmly the convention to crucial societal concerns. These reflections have led to changes in the wordings of the Operational Guidelines, with the 2011 version highlighting that "The protection and conservation of the natural and cultural heritage are a significant contribution to sustainable development" (paragraph 6). However, these references have not yet been translated into actual policies or procedures for the implementation of the convention. This reflects the main issues of the Convention and related official guidelines for its implementation: the difficulties in systematically translating its vision and principles into working procedures and practice.

Key Issues and Future Directions

These difficulties are multifarious and are preventing the laudable aims of the Convention to be fully realized. First, States Parties are still associating outstanding universal value with monumental sites and an objectified statement of significance, centered on historical, architectural, and aesthetic values. Such understandings of significance mean that properties are typically seen as having inherent values that reside in the physical fabric of their structures or landscapes, features that ostensibly do not change in time and that can thus be appreciated by all mankind equally, regardless of individuals' backgrounds or their geographical location. States Parties have thus not yet followed the request from the 1994 Global Strategy to move to a more anthropological consideration of sites and a greater consideration of the values associated to properties by local populations. Elsewhere (Labadi 2013), I stress that States Parties still consider values as intrinsic to sites and not as extrinsic. This excludes, de facto, the possibility of drawing a comprehensive statement of significance that would take into account wider socio-cultural values and considerations, in particular values attributed by the local communities associated with the property. This objectified consideration of outstanding universal value can explain why the Nara Document, for instance, is rarely mentioned in nomination dossiers of sites for inclusion on the World Heritage List, despite its inclusion in the Operational Guidelines (Labadi 2010). Indeed, States Parties continue to define authenticity according to the more "objective" references to the permanence of design, materials, workmanship, and setting of the property. This intrinsic consideration of sites is encouraged by the wording of official documents. The latest version of the Operational Guidelines (November 2011), for instance, still refers directly and unambiguously to the intrinsic value of properties (in paragraph 116 and 192b). Revising these documents could act as incentive for States Parties to provide holistic and extrinsic statements of significance.

These problems are exacerbated by the conflicting considerations of local populations. On the one hand, numerous documents, starting with the Operational Guidelines or the fifth Strategic Objective, stress the central need to include local populations in the preparation of tentative lists, nomination dossiers, management plans, and in the day-to-day care of sites. On the other, the official format of nomination dossier that States Parties need to fill when proposing sites for inclusion on the List refer to local populations as a "factor affecting the site." This has led a number of States Parties to focus, in their nomination dossiers, on the negative dimensions of local populations as a threat to the property rather than as its central element (for further information, confer Labadi 2013). These conflicting views might reveal the ambiguous feelings of members of the Committee, the Advisory Bodies, and UNESCO Secretariat towards local populations and their questioning of the relevance of community participation within an "outstanding" and "universal" system, theoretically beyond the particularities of localities. In this context, the need to ensure the participation of

local populations should be included within the official form of nomination dossiers and should become a qualifying criterion for the inclusion of sites on the World Heritage List.

In addition, it has been recognized that the implementation of the Global Strategy has been confronted with many problems (see Labadi 2005, 2013; UNESCO 2011a). First, the central notions of the Global Strategy have not been defined in the Operational Guidelines, and no benchmarks or performance indicators have been clarified, leading to divergent interpretation by States Parties. Second, some issues are rooted in national circumstances. These include the lack of financial and administrative capacity or the lack of a national or regional inventory of heritage. The implementation of the World Heritage Convention is also limited because of internal political instability.

Lastly, the themes identified in the Global Strategy as being underrepresented on the List are, in some cases, problematic. In his in-depth analysis of World Heritage cultural landscapes (1992–2002), Fowler notes that potential cultural landscapes have deliberately *not* been nominated as such by States Parties for inclusion on the List (2003: 22). This situation might be due to the fact that States Parties seem to believe that it is more difficult to submit a successful nomination dossier for a cultural landscape than for a cultural or natural site (Fowler 2003: 22). Cultural landscapes are also perceived as requiring more complex management systems. The 1994 text of the Global Strategy further refers to the heritage of the twentieth century. Some national legislations on archaeology and cultural heritage exclude this type of heritage, making its preservation difficult. The 2011 audit of the Global Strategy presented a number of key recommendations (UNESCO 2011a), including the need for regional harmonization of tentative lists (already attempted many times), the diversification of the geographical origin of experts working with the Advisory Bodies, or the deletion from the List of properties that have irremediably lost their outstanding universal value.

The rush to inscribe is another recent problem in the implementation of the Convention, exacerbated over the past 3 years. This can be described as the overattention towards the inscription of sites rather than other aspects of the Convention, such as the conservation of properties or efforts to actively involve local populations. This overattention has been characterized by the overturn, by members of the Committee of many of the recommendations of the Advisory Bodies, particularly ICOMOS' decisions to refer or defer nomination and the decision to inscribe sites. In some cases, ICOMOS recommendations were justified on the ground that the outstanding universal value of sites was not justified. If we agree that valuation is an extrinsic process, then the justification of the outstanding universal value of sites becomes a subjective consideration and exercise. According to this parameter, the outstanding universal value of sites is in the eyes of the beholder and can change according to who is making the judgment, their frames of minds, their cultures, and their geographical locations. Although these decisions by the Committee can lead to the displacement of the northern hegemony that has characterized the List towards more balanced powers between regions (Meskell 2012: 149), this is not without any problems. Indeed, over the past 3 years, some of ICOMOS recommendations have been overturned and sites (many in non-European countries) inscribed without a proper statement of outstanding universal value, precise boundaries, or a buffer zone. In this situation, what is being inscribed on the List and then supposedly conserved becomes a real mystery.

The upstream process of nomination is increasingly considered as the way forward (see Rao 2010; Labadi 2013). It refers both to the efforts by the international community to help and encourage those States Parties that need assistance for getting sites of outstanding universal value inscribed on the World Heritage List, and to measures aimed at ensuring their sustained conservation. In this framework, States Parties are not anymore on their own to prepare nomination dossiers but are assisted by the Advisory Bodies, World Heritage experts, and the World Heritage Centre. This process would help to ensure that the requirements of the Advisory Bodies and the Committee are met. However, for this process to be successful and for sites to

be properly conserved for future generations, it would be necessary, in parallel, to revise the format of nomination dossier and include local populations at its heart, as well as to assist States Parties in developing working management and tourism plans as well as indicators for monitoring the state of conservation of sites.

Cross-References

- ▶ Organization of World Heritage Cities (OWHC)
- ▶ World Heritage and Human Rights
- ▶ World Heritage Education, Training, and Capacity Building
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

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UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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Introduction

Many countries throughout the world possess rich diverse heritage resources; these are either cultural – humanity's construction and

acquisition over millennia – or natural heritage. In many cases, the cultural heritage and natural heritage are intertwined, thus adding value to the heritage properties (Posey 1999). On realizing that both "the cultural heritage and the natural heritage are increasingly threatened with destruction not only by the traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction," the General Conference of the United Nations Educational, Scientific, and Cultural Organization meeting in Paris from 17 October to 21 November 1972, at its seventeenth session, decided and adopted that UNESCO and the international community would collaborate with every state party to safeguard the heritage from destruction (UNESCO World Heritage Convention 1972). In spite of the great strides made by some countries since declaration of the UNESCO World Heritage Convention and other conventions that followed thereafter, by 2005, almost 50 countries did not have any properties inscribed in the World Heritage List. According to current records, by 2010, 48 countries do not have properties inscribed in the World Heritage List (whc.unesco.org/uploads/activities/documents/activity). By implication, these countries' heritage might be increasingly endangered unless the respective state parties have taken drastic measures to safeguard them from complete destruction. This entry highlights the wide disparities on the UNESCO World Heritage List graphically demonstrating that Africa has the least number of properties; it also explores the causes behind this huge void and suggests ways which Africa could claim a major stake on the World Heritage List.

Definition

Article 4 of the World Heritage Convention clearly states that "Each State Party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State. It will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and co-operation, in particular, financial, artistic, scientific and technical, which it may be able to obtain" (UNESCO World Heritage Convention 1972). In 2001, UNESCO adopted the Universal Declaration of Universal Cultural Diversity after members realized that the 1972 Convention was basically dealing with Western heritage that seemed to favor European and North American state parties (Leask 2006: 11-14). But even before 1994, the committee had established new criteria such as traditional knowledge systems, trade routes, (itineraries), and traditional industrial complexes. Principally this was a move toward more representivity in the listing of World Heritage properties, resultant to which many African and other Third World state parties had their heritage properties inscribed to the World Heritage List.

By 2005, UNESCO had identified World Heritage properties through geographical regions, namely, Africa, Arab States, Asia and the Pacific, Europe, and North America. The total number of properties inscribed in the World Heritage List that year was 836. The Africa region (sub-Saharan Africa excluding the Arab countries) had 65 properties, accounting for 7.78 %. The Arab States (including the North African States of Morocco, Algeria, Libya, Tunisia, and Egypt) had a total of 64 properties constituting 7.66 %, while Asia and the Pacific boasted of 165 properties comprising 19.74 %; collectively Europe and North America had the highest number at 430 properties that accounted for 51.44 %, and finally, Latin America and the Caribbean had a total of 112 properties inscribed in the World Heritage List. This accounted for 13.40 %.

Key Issues/Current Debates

From the foregoing statistics, Europe and North America ranked the highest, followed by Asia and the Pacific, Latin America, Africa, and the Arab States in that order. But even within Europe

and North America region, wide disparities were observed; of the 430 properties, Italy topped the bar with 40 properties, followed closely by Spain with 38 properties and France and Germany with 29 properties each. The United Kingdom and Northern Ireland had 26 properties each, the Russian Federation had 20, and the United States of America had 19. Greece had 16, Sweden and Portugal had 13 properties apiece, while the Czech Republic and Canada had 12 properties each. The rest of the European countries had less than 10 properties; the least was Malta 3 and Ireland 2, and the Holy See, Ireland, and Iceland had 1 property each.

Out of the 165 properties that the Asia and Pacific region had, China ranked the highest with 31, India 26, Australia 16, and Japan 13 properties; Indonesia, Sri Lanka, Iran, and Republic of Korea had 7 properties each, while the rest had less than six properties. State parties like Afghanistan, Malaysia, Mongolia, Turkmenistan, and the Laos People's Republic had 2 properties each. The Solomon Islands and Cambodia were at the bottom of the bar with 1 property each.

In Latin America and the Caribbean, of the 112 properties, Belize, Paraguay, Haiti, El Salvador Nicaragua, Saint Kitts and Nevis, Saint Lucia, and Uruguay were at the bottom of the pool with a paltry 1 property each; Costa Rica, Honduras, and Dominica had 2 properties apiece. On the hand, Mexico topped the region with 24 properties, followed closely by Brazil with 17 properties, Peru 10, Cuba 8, and Argentina 7; the remaining State parties had between 6 and 3 properties.

Of the Africa region, Ethiopia and South Africa topped the bar with 7 properties apiece, Tanzania 6, Democratic Republic of the Congo (DRC) and Zimbabwe 5 each, and Senegal and Mali 4 each, while Kenya had 3; the rest had between 2 and 1 properties. It follows however that, in 2006, the World Heritage List included 830 properties with only 82 sites from Africa (an increase of 17 properties within a year), accounting to roughly 10 % of the total World Heritage properties. The statistics were not very different in the two successive years, 2007 (851 properties: 660 cultural, 166 natural, and 25 mixed) and 2008 (878 properties: 679 cultural, 174 natural, and 25 mixed parties).

Out of the 29 properties inscribed during 2008 32nd session in Quebec, Canada, only 2 properties were from Africa – the Le Morne Cultural Landscape (Mauritius) and the Sacred Mijikenda Kayas which include 11 sites that were given one serial number (these were Kayas Mtswakara in Kauma, Gandini in Duruma, Fungo in Giriama; Kambe, Ribe, Jibana, and Kauma; Mudzimuvya, Bomu/Fimboni in Rabai). During the 33rd session held in Seville, Spain, in 2009, the World Heritage Convention added 13 new properties to the World Heritage List and lost one property; thus, the 2009 World Heritage List includes a total of 890 properties, out of which 689 are cultural, 176 natural, and 25 properties in 148 state parties. In the same year, the Ruins of Loropeni in Burkina Faso were the only property listed from Africa. We have observed a few exceptions in the above analysis; for instance, in sub-Saharan Africa, both Ethiopia and South Africa still rank high with 8 properties each, according to the 2010 World Heritage List. They are followed by Tanzania with 7 properties; the majority of state parties in this vast region have less than 5 properties. In fact, the majority of the Africa state parties fall with the 1–4 property brackets.

In Asia and the Pacific region, China, India, Australia, and Japan had 31, 26, 16, and 13, respectively; Indonesia, Sri Lanka, Iran, and Republic of Korea had 7 properties each, while the rest had less than six properties. Five years later, in 2010, the scenario was not very different: China had 36 properties, India 28, Australia 18, Japan 14, Republic of Korea 10, Sri Lanka 8, and Indonesia 7. The rest of the region's state parties have less than 5 properties.

As for Europe and North America, the high figures are still increasingly predominant. According to the 2010 records which consist of 911 properties, Italy still leads with 43(4.7 %), followed by Spain 41(4.5 %), France 35 (3.8 %), Germany 33(3.6 %), and the United Kingdom 28(3.0). The United States of America has 19 properties; Greece boasts of 17 (1.8 %); and Canada, Poland, Portugal, and Sweden at 13 each (1.4 %), while the Czech Republic prides

UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective, Table 1 The number of World Heritage properties by region 2012 (Source: UNESCO)

Regions	Cultural	Natural	Mixed	Total	(%)	States parties with inscribed properties
Africa	47	35	4	86	9	32
Arab States	67	4	2	73	8	17
Asia and the Pacific	148	55	10	213[a]	22	32
Europe and North America	393	59	10	462[a]	48	50
Latin America and the Caribbean	90	35	3	128	13	26
Total	745	188	29	962	100	157

[a]The property "Uvs Nuur Basin" (Mongolia, Russian Federation) is a trans-regional property located in Europe and Asia and the Pacific region. It is counted here in the Asia and the Pacific region

itself of 12(1.3 %). Both Belgium and Switzerland have 10 each (1.0 %), Turkey 9, and Austria 8, while the remaining state parties within this region had between 7 and 1 properties as of July 2010 (Table 1).

The above statistics lead us to three big questions: Why do the Africa region, the Arab States, Asia and the Pacific, as well as the Latin America and the Caribbean regions have very few heritage properties inscribed to the prestigious World Heritage List? Indeed, why do China, India, Japan, and Australia (and to some extent, the Republic of Korea (Asia and Pacific region)); Mexico, Brazil, Argentina, and Cuba (Latin America and Caribbean region); and Iran, Egypt, and Morocco (Arab States region) have relatively more properties inscribed in the UNESCO World Heritage List than any other state parties in their respective regions? More interestingly – specific European and North American countries – notably, Italy, Spain, France, Germany, and the United Kingdom; the United States of America, Greece, Canada, Poland, and Portugal; and Sweden, the Czech Republic, Belgium, and Switzerland top the World Heritage List. Why is there such a discrepancy?

It should be understood that many countries have the will and commitment to safeguard their heritage for posterity but are hindered by lack of infrastructure especially the technical capacity and financial resources. Developed countries like those in the European and North American region not only have the political will and commitment but also the financial resources and abundant qualified professionals in the heritage sector with well-established networks. Their heritage legislation is always reviewed to be in tandem with global systems and developments.

On the contrary other regions, especially majority of the Third World countries, there are innumerable, glaring, and varied contributing factors key of which are listed herein below:

- The existence of outdated colonial legislation that is mostly biased toward tangible heritage associated with the aspects of archaeological, paleontological, aesthetic, scientific, and artistic values (Negri 2008: 7-10).
- Many African countries have not recognized the importance of intangible heritage properties at global levels, except for a few like Malawi and South Africa. The tangible heritage and intangible heritage are intertwined; the latter refers to heritage resources associated with a place and which are not expressed in fabric but in languages, songs, activities like music making and dancing, storytelling, memory, and routine; places of symbolic meanings; etc. (http://www.unesco.org/culture/ich/index.php?lg=en&pg=0ng 0002). Thus, UNESCO adopted the Masterpieces of Oral and Intangible Heritage of Humanity following which this criterion was proclaimed in 2003. Hence, the *Gule Wamkulu* (the Great Dance) masquerade performances of Malawi were inscribed according to this criterion (http://www.unesco.org/culture/ich/RL/00142).
- Most African governments have different priorities like healthcare, education programs, poverty alleviation programs, and provision of clean water; hence, they give little or no concern to their country's heritage sector.

"This lack of recognition and political goodwill to include culture in the mainstream developmental agenda has resulted in the culture not being included even the development cooperation programmes. This has of course resulted in lost opportunities by not using cultural knowledge, to address serious national issues and projects on HIV/AIDS, and other health concerns, Education, Environment, Rural Development, etc. In addition many countries are losing large numbers of cultural heritage and property in terms of indigenous knowledge, sites, monuments, antiquities and cultural landscapes among others" (Abungu 2006: vi).

- Conservation policies are not integrated into sustainable government policy frameworks encompassing heritage management.
- Poor planning and management of heritage resources where sometimes heritage managers condone the destruction of the heritage they are obliged to protect.
- Heritage management very difficult owing to insufficient and professionally qualified human resources.
- Inadequate financial and infrastructure resources for effective management of heritage properties.
- Incomplete or nonexistent national heritage resource inventories (databases) from which the state party nomination dossier to the World Heritage List originates.
- Lack of networking among heritage professionals – no sharing of information, knowledge, and best practice.
- Traditional heritage conservation methods have not been fully acknowledged in Africa.
- Lack of community participatory mechanisms for involvement of local communities especially the youth in conservation and management planning processes.
- Lack of awareness: politicians, decision makers, and communities unaware of their roles in heritage conservation and management.
- Civil strife, terrorism, and political sabotage (e.g., Rwanda, DRC, Iraq, and Somalia; the recent burning of Kasubi Tombs in Uganda) (Eboreime 2008: 1-5).

As remedies to the African heritage problems, the converse of the above should suffice. Moreover, the Third World countries should produce heritage practitioners with local and global views, who appreciate the diversity and dynamism of heritage and are equipped with the tools to manage their resources. They must be professionals who appreciate that some heritage resources are nonrenewable by ingraining indigenous perceptions of heritage in the legislations, professionals who appreciate and contribute to the democratization of heritage in relation to access, ownership, management of institutions, and knowledge production. To manage the heritage holistically, the legislation must be inclusive of the communities who produced, used, and conserved those heritage resources.

Heritage management is a collective obligation including the corporate sector and not only the preserve for governments, national parks, or communities. The disadvantaged regions should also document and patent their indigenous knowledge systems as security against foreign appropriation: The Kenyan kiondo, a bag made from sisal or bark, and khanga (women's wrapper) which were appropriated by Japanese and British companies, respectively, are examples of African ineptitude. Like the Japanese and Koreans, Third World countries must appreciate and inscribe her griots (storytellers), poets, musicians, craftspeople, and prophets.

Recent and Ongoing Programs

There are notable developments in the Africa region that underscore the essence of training in the methodologies of heritage management. From 2000 to 2009, the AFRICA 2009 program ran the course on the Conservation of Immovable Cultural Heritage in Sub-Saharan Africa that alternated yearly between the Centre for Heritage Development in Africa (CHDA) in Mombasa, Kenya, for the Anglophone- and Lucophone-speaking countries and Benin for the Francophone speakers. However, the course succeeded in equipping participants with among others, tools for writing of Conservation Management Plans. There was therefore pertinent need to equip heritage practitioners on tools for

nominating heritage properties. African professional soon realized that in spite of Africa's rich and diverse heritage resources, the Africa region has continuously been able to have the least number of properties (about 9 %) on the prestigious World Heritage List. Thus, in 2006, the UNESCO World Heritage Centre launched the African World Heritage Fund (AWHF) based in Johannesburg, South Africa.

Future Directions

The African World Heritage Fund (AWHF) was launched in 2006 to support African state parties to implement the UNESCO Convention on the protection of the World Cultural and Natural Heritage. Following its strategic plan 2008–2010 and in collaboration with World Heritage institutions and African state parties, the AWHF initiated a training course in 2010, on the development of nomination dossiers for World Heritage listing by African countries. As part of its objectives, AWHF put in place the training program to build up competence of African heritage professionals in the development of nomination dossiers and management plans required by the World Heritage Committee when considering sites for listing on the World Heritage List.

The objectives of the course were threefold:

1. To give competence to African natural and cultural heritage professionals thereby improving the quality of African nomination dossiers submitted to the World Heritage Committee
2. To increase the number and diversity of African heritage properties on the World Heritage List
3. To reinforce the network of heritage professionals working on African World Heritage sites

Since the inception of the African World Heritage Fund, several training sessions have been conducted in various parts of the African continent with encouraging results.

Conclusion

We have seen that since 1972, regional imbalances have existed in the inscription of heritage properties in the World Heritage List. This entry has raised some poignant issues pertaining to the "imbalanced" scenario where some regions have tens of properties inscribed while other regions are tottering on the margins. This entry pinpoints the challenges affecting the inscription, sustainability, and opportunities in their use, in a fast globalizing period. This entry analyzes some recent landmark developments which have seen more African properties inscribed as World Heritage properties. Despite this improvement, Africa must rise up to the challenges outlined here and fight not only to inscribe its rich heritage resources to the world map but also to maintain them professionally.

Cross-References

- ▶ African World Heritage Fund (AWHF)
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation

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UNESCO's World Heritage List Process

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Introduction

A number of international charters and conventions have been influential in shaping heritage legislation and policy. The leader in these is the United Nations Educational, Scientific and Cultural Organization, known as UNESCO, whose members work to protect and conserve cultural and natural heritage. This entry provides a brief historical background to the creation of the World Heritage list, discusses the nomination process for cultural heritage properties on the List, and describes the roles of the World Heritage Committee, the World Heritage Centre and the functions of the two of the three advisory bodies, the International Council on Monuments and sites (ICOMOS) and the International Union for the Conservation of Nature (IUCN), that are mandated through the Convention to provide evaluations to the World Heritage Committee. The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), which advises the Committee on the conservation of cultural sites, is not discussed.

Key Issues/Current Debates/Future Directions/Examples

Background

International awareness about conservation issues can be traced to the Athens Charter for the Restoration of Historic Monuments, more commonly known as the Athens Charter. In 1931, the First International Congress of Architects and Technicians of Historic Monuments, under the patronage of the League of Nations, adopted the Athens Charter to provide measures to protect monuments, establish international organizational and advisory bodies, and develop legislation to protect historic sites. Although the Athens Charter would be revised, its influence continues by providing a model that shapes conservation and preservation policies in Western countries (Smith 2006).

The period after World War II was characterized by large-scale restorations of war-damaged cities and monuments and a concern for the protection of cultural property. These concerns were central to the Hague Convention of 1954, which resulted in the Convention for the Protection of Cultural Property in the Event of Armed Conflict in 1956. The preamble to the Hague Convention recognized that "cultural property has suffered grave damage during recent armed conflicts and that, by reason of the developments in the technique of warfare, it is in increasing danger of destruction" and required that State Parties work to reduce impacts of armed conflict on cultural heritage properties and prohibit vandalism, misappropriation, or theft (Article 4).

In 1964, the Second International Congress of Architects and Technicians of Historic Monuments met in Venice to rework the Athens Charter. The Congress, made up largely of European representatives, developed guidelines and policies to assist professionals in heritage conservation to "safeguard [monuments] for future generations" (Preamble). The central aim of what would be known as the Venice Charter was to conserve and restore these monuments "no less as works of art than as historical evidence" (Article 3). The Charter reflected the

shared and real concern of lost and damaged cultural patrimony and adopted measures to protect monuments. The ideas and values related to memory, identity, authenticity, and aesthetics became central to the ideology of how monuments were understood within the Charter.

The Venice Charter was part of a larger heritage preservation movement in Western countries (the USA, Australia, countries in Western Europe) and became a guiding text to heritage practitioners (Smith 2006: 93). This conservation ethic, as well as an emphasis on materiality, physicality, universality, and aesthetics, would be readopted and refashioned in subsequent heritage legislation. The Charter also established a "fellowship" of practitioners and provided guidance on what was important to conserve (Smith 2006: 93). For example, ICOMOS, a nongovernmental organization of heritage practitioners founded in 1965 as a result of the Venice Charter, used the Charter to help guide decisions and train experts to undertake heritage work and site missions. ICOMOS will be further described in the next section.

Origins

The impetus for the World Heritage Convention can be traced back to the Athens and Venice charters and to UNESCO's attempt to protect heritage sites, the World Conservation Union (now known as IUCN) and ICOMOS lobbying, and US representatives pushing for an international natural and heritage convention. In the 1960s, UNESCO undertook large-scale projects to protect threatened heritage sites, such as the rescue campaign at Abu Simbel in Egypt, the ancient Nubian site that would be destroyed with the creation of the Aswan Dam. UNESCO also sponsored projects such as renovations at Mohenjo-Daro in Pakistan and Borobudur in Indonesia, and it was these types of interventions that led to discussions on guidelines and protection for international heritage sites (Turtinen 2000: 9). During this time, IUCN representatives were developing a global initiative to protect natural heritage sites and ICOMOS representatives were active in campaigns to protect cultural heritage sites. At this same time, US representatives were lobbying to create a World Heritage trust to preserve the most important cultural and natural sites in the world. Together, these international heritage bodies helped shepherd the creation of one convention to protect both cultural and natural heritage sites.

During its 17th session in 1972, the General Conference of UNESCO adopted the Convention Concerning the Protection of the World Cultural and Natural Heritage, also known as the World Heritage Convention. The Convention aimed to safeguard natural and cultural heritage and was developed by ICOMOS and IUCN, two of the three advisory bodies to the World Heritage Committee. The Convention, administered by the World Heritage Centre at UNESCO, is a "key legal instrument in heritage conservation" and has far-reaching influence and authority (Rössler 2006: 334). The Convention provides the legal framework and the administrative and financial support for the World Heritage list, an inventory of cultural and natural sites deemed of "universal" significance. As of May 2013 962 properties are listed; these include 745 cultural, 188 natural, and 29 mixed properties. Of these, 82 are designated as cultural landscapes, a category created in 1992.

The Convention also established the Intergovernmental Committee for the Protection of the Cultural and Natural Heritage of Outstanding Universal Value within UNESCO, called the World Heritage Committee. The Committee is composed of 21 States Parties to the Convention, elected at the annual General Conference. States Parties are responsible for nominating properties, providing a site management plan, and once a property is inscribed on the List, protecting the "World Heritage values" of the sites (Articles 4 and 6.2). Representatives for the States Parties work directly with members of the Secretariat at the World Heritage Centre in Paris, who provide feedback, oversee the preparation, format, and content of nominations, and ensure adherence to the rules and guidelines set in the *Operational Guidelines for the Implementation of the World Heritage Convention*, also known as the *Operational Guidelines*. The *Operational Guidelines* provide procedures for inscribing properties on the World Heritage list and List of World

Heritage in Danger, protecting World Heritage properties, granting assistance under the World Heritage Fund, and mobilizing national and international support. The *Operational Guidelines* is an evolving document that reflects changes in scholarship and trends in heritage conservation and preservation, and the World Heritage Committee updates these frequently, based on recommendations from their advisory bodies.

Article 4 of the Convention requires that State Parties must ensure the "identification, protection, conservation, presentation, and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2" (UNESCO World Heritage Convention). Cultural heritage, broadly defined, includes monuments, buildings, and sites, whereas natural heritage includes natural features or sites, and geological formations. The Convention emphasizes that properties must have "outstanding universal value" (Article 11.2) and meet conditions of "integrity and/or authenticity." Originally, the Convention presented two separate lists of criteria for nominated cultural and natural heritage sites. In 2004, members of the Sixth extraordinary session of the World Heritage Committee merged the two lists to require that properties meet at the minimum one of their ten selection criteria, which range from representations of "creative genius" to "containing. . .exceptional natural beauty and aesthetic importance."

Nominations to the World Heritage List

Countries who have signed the World Heritage Convention can submit nomination proposals to be considered for inclusion to the World Heritage list, and as of June 2010, 187 States Parties have signed. Fig. 1 provides a model of the nomination process. As a first step, a State Party inventories their natural and cultural heritage sites, which are then included on the Tentative List and forwarded to the World Heritage Committee. To nominate a site to the List, the State Party selects a site from the Tentative List and prepares a nomination file to submit to the World Heritage Centre for review (Fig. 1). Once the nomination file has been completed and evaluated by the Secretariat, the nomination dossier is forwarded to the advisory bodies that are mandated by the World Heritage Convention to evaluate properties. The advisory bodies play a central role in how cultural patrimony is understood and represented. ICOMOS evaluates cultural and mixed sites and IUCN evaluates natural sites. Located in Paris, ICOMOS is an international, nongovernmental organization and network of heritage and conservation practitioners that advise on cultural properties and cultural landscape designations. IUCN comprises a large network of experts who evaluate and report on the conservation, protection, and management of natural heritage properties, and develop strategies to conserve and protect the world's natural heritage and resources. IUCN plays a critical role in the World Heritage process and its members provide advisory services to the World Heritage Committee on nominations of properties with natural heritage values, provide evaluations of state of conservation of World Heritage properties, and train States Parties to identify potential properties. IUCN also advises ICOMOS on nominations for cultural landscapes.

Cultural heritage nomination evaluations involve a range of experts, including National and International committees, World Heritage advisory bodies, ICOMOS internal members, and in cases lacking adequate specialists, non-ICOMOS members. Once the "outstanding universal value" of the nominated sites is determined by ICOMOS, the advisory body calls on internal expert members to conduct a site mission (Fig. 2).

Members are also involved in national and international scientific committees established to provide guidance on cultural heritage issues. Today, 27 International Scientific Committees provide feedback to UNESCO on World Heritage Issues. ICOMOS committees serve as "technical bodies" and "undertake research, develop conservation theory, guidelines, and charters, and foster training for better heritage conservation, promote international exchange of scientific information and carry out common projects" (ICOMOS website). Members of the International Scientific Committee for Cultural Landscapes (IFLA), a joint committee between ICOMOS and the

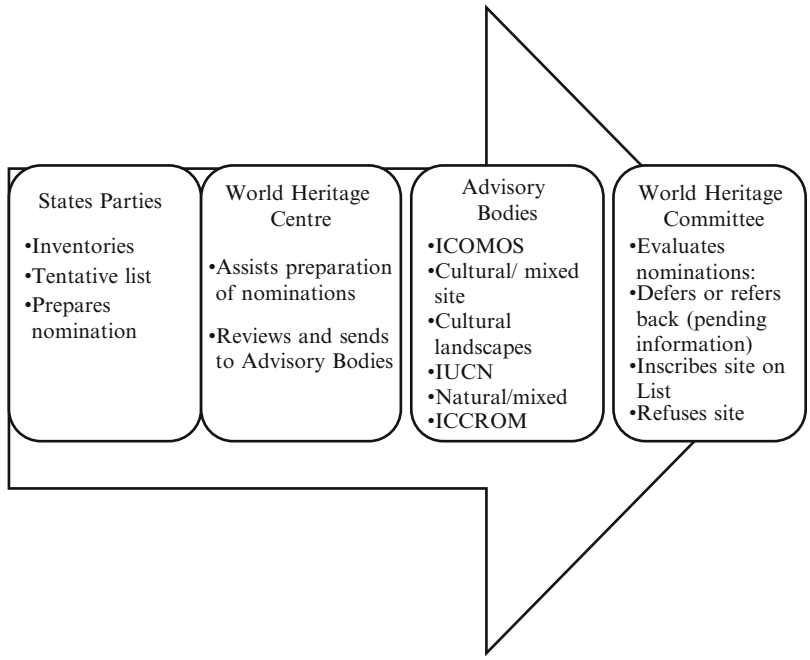

UNESCO's World Heritage List Process, Fig. 1 The nomination process

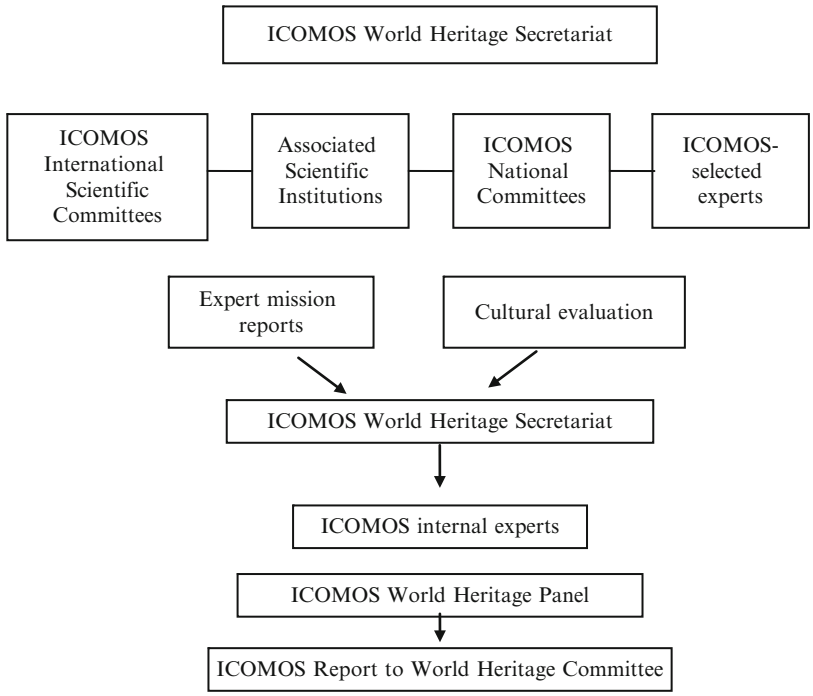

UNESCO's World Heritage List Process, Fig. 2 Overview of the ICOMOS evaluation process

International Federation of Landscape Architects (IFLA), for example, advise ICOMOS on issues related to the cultural landscapes, including nominations of World Heritage sites.

Key Issues and Current Debates

Some of the key issues surrounding the World Heritage List are that it overrepresents western European properties, underrepresents the

heritage of indigenous peoples, and disproportionately represents cultural and natural heritage properties (see Cleere 2001; Fowler 2004; Smith 2006). In 2000, former ICOMOS Director Henry Cleere found that over 55 % of World Heritage properties were located in Western Europe (Cleere 2001: 25). In a study of representations and cultural diversity discourses related to World Heritage, Sophia Labadi (2007) argued that the World Heritage List lacked a diverse representation of minority groups and their values with little or no participation of local communities in the nomination process. Labadi (2007: 161) found that experts involved in these nominations stressed a very linear and conservative notion of history, as related to World Heritage sites, and that these narratives are flawed because they limit the perspectives and disallow competing claims and histories. The cultural landscape designation was created, in part, to address some of these imbalances; it was seen as a way to include non-Western landscapes and other cultural heritage properties that had been overlooked. Still, the majority of nominations to the World Heritage Committee are submitted by European countries and Europeans act as experts, work on World Heritage scientific advisory bodies, and provide recommendations to the Committee.

The criteria for nomination to the List, as defined, emphasize the universal values of a site. The concept of universality has been critiqued as creating a value system that promotes a specific and largely western and European cultural view of heritage (Cleere 2001; Smith 2006). More importantly, the notion that certain cultural properties are more valuable sets up a hierarchy and value system. Those monuments or sites from grand Western contexts are perceived to be inherently valuable, while those things from more modest contexts, presumably non-Western cultural contexts or less grand Western social contexts can, in certain circumstances, acquire or be acknowledged as valuable (Smith 2006: 90). It also creates a system that encourages a shared view of heritage, and emphasizes the scientific, aesthetic, material, and physical nature of heritage. Cleere (2001) argued that the criteria are purposely vague to allow for flexibility and inclusiveness, though Smith (2006: 97) disagreed and argued that the vagueness of the criteria in effect creates a set of assumptions about what constitutes "universal value" or "heritage."

In 2005, Christina Cameron, formerly a Chairperson of the World Heritage Committee, evaluated IUCN's World Heritage nominations and was critical of the process of developing and evaluating nominations, due to the lack of transparency. The sociopolitical contexts of heritage were explored by Baird (2009) in her study of World Heritage nominations (see also Bianchi & Boniface 2002). She argued that World Heritage experts influenced and guided heritage outcomes and practices, and in some cases, adopted a possessive posture in heritage negotiations that excluded third party review and alternative interpretations. This critique of heritage experts had been argued before, and Smith (2006: 88) noted that many of the leading experts in conservation, preservation, and heritage fields give "political legitimacy" and influence policy-making decisions (Smith 2006: 88). As Smith (2006) reminds us, in addition to assessing World Heritage nomination dossiers, members write, edit, and lobby for national and international charters and conventions.

Numerous critiques of the impacts of tourism and development have emerged in the last decade (see, e.g., Harrison & Hitchcock 2005; Rakic & Chambers 2008). Much of the ideas of heritage are open to interpretation and often engage competing claims and negotiations. More importantly, as the former director of the World Heritage Centre, Francesco Bandarin (2005), noted the relationship between World Heritage sites and tourism is fraught with tensions. These tensions include issues of representation, authenticity, financial benefits, ideas of universal heritage, and competing claims, among others. One must recognize that World Heritage status increases international attention to the natural and cultural heritage resources within a property that can bring a suite of challenges, especially when these come into conflict with traditional owners' ideas of conservation and preservation or access to sacred lands. The distribution of local knowledge in international contexts must be

addressed. The designation of a World Heritage status, whether explicit or not, assigns values and creates hierarchies of meaning.

Cross-References

- ▶ Authenticity and the Manufacture of Heritage
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

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UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (1995)

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Introduction

The UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects 1995 came into force on 1 July 1998. As of 6 February 2012, it has 32 States Parties.

In 1983 a meeting of experts at UNESCO in Paris had recommended that UNESCO consult with another organization specializing in the harmonization of what is called "private law" issues, i.e., issues arising from dealings between private citizens. UNESCO already had the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property 1970, but this was a "public law" Convention which dealt with matters between States. The experts in 1983 saw there were developing problems with matters such as time limitations (when a claim for return of an object would be barred because too much time had elapsed since the wrongdoing) and the status of the "bona fide" purchaser (a claim to an object could not succeed because the person who possessed it had bought it not knowing of any defect in the title).

UNESCO then asked UNIDROIT (International Institute for the Unification of Private Law) in Rome to take up the matter, providing

seed money. Two studies were commissioned by UNIDROIT and meetings of experts invited in their individual capacities were held in Rome in 1988 and 1989. These were followed by four meetings of experts nominated by governments and, finally, a diplomatic conference in 1995. This history shows the length of time and the complexities involved in producing a convention dealing with cultural heritage when the rights of citizens are affected. That needs to be taken into account when proposing new conventions or amendment of an existing one.

UNESCO was represented at all stages of negotiation of the UNIDROIT Convention. The two organizations collaborated closely and regard the 1970 Convention and the UNIDROIT Convention as compatible – as do others. For example, the Swiss Working Group on the International Transfer of Cultural Objects stated:

> The two conventions function independently but supplement each other by achieving a common purpose with different means. Therefore they are complementary (Swiss Working Group 1999).

Definition

The UNIDROIT Convention deals with "cultural objects" (Article 2). This phrase was a conscious choice to avoid what some saw as the emotional content of "cultural heritage" and others the legal implications inherent in "cultural property." The objects are those which, "on religious or secular grounds, are of importance to archaeology, prehistory, history, literature, art or science," and they must belong to one of the categories set out in Annex A to the Convention. These include products of archaeological excavations whether regular or clandestine, elements of dismembered historical monuments, or archaeological sites and antiquities more than 100 years old. The categories are the same as those for the 1970 Convention.

Under Article 1, the Convention applies to claims of an "international character." This is not defined but clearly means that an international element must be involved. What precisely is needed to bring a situation within the definition would depend on the relevant facts. The claim must be for restitution or return of either stolen or illegally exported cultural objects.

The Convention does not apply to objects exported during the lifetime of the person who created it and for 50 years after the death of that person (Article 7(1)(b)). This ties in with the period of copyright as it existed at the time the Convention was drafted. It was felt that the creator of a cultural object had the right to export it if he or she so desired and thus earn a living from the work. The free sale of a person's creative work acts as an encouragement for future work. The lifetime exception does not apply to objects made by a member of a tribe or indigenous community for traditional or ritual use by that community.

Key Issues

Theft

Theft of cultural objects is the first issue raised by the Convention. The rule is blunt – if objects are stolen, the possessor must return them (Article 3). States Parties are bound to implement this rule in their local legislation. It can then be relied on by private parties to claim back stolen objects.

The meaning of "stolen" is a matter for the law of the State where the claim is made. This can sometimes be difficult to establish. For example, in the case the *United States v. Schultz* (178F. Supp. 2d 45 (2002); 333F.3d 393 (2003)), the issue was whether the United States National Stolen Property Act is applied. An English conservator – Tokeley-Parry – had arranged for some 2,000 antiquities to be smuggled out of Egypt. A portion of these had been sent to Schultz – a prominent New York dealer – for sale through his network of contacts. Schultz was charged with conspiring to receive stolen antiquities that had been transported in foreign commerce in violation of the Act. The question was whether the antiquities were stolen and Schultz knew of this. The courts found against Schultz on both issues. The federal judge at sentencing said that Schultz knew he was stealing "in every sense of the word" and was no different from "an ordinary thief" (Lufkin 2002: 5). Egypt had passed

legislation declaring all antiquities were the property of the Government. This was actively enforced with the result that their removal from the country without permission meant they were stolen in terms of the United States Act (Gerstenblith 2003: 5).

Other States have claimed ownership of undiscovered antiquities with the objective of being able to claim them if they are clandestinely excavated and removed. The Convention supports this. Under Article 3(2), where a State has claimed ownership, "a cultural object which has been unlawfully excavated or lawfully excavated but unlawfully retained shall be considered stolen." While the Convention provision has full legal force only among the 32 States Parties, it is also influential in arguments whether the ownership claims of other States should be enforced.

There are qualifications on the rule that stolen objects must be returned. Firstly, the abovementioned time limitations. The idea behind these is to have certainty of ownership. A person who claims to own an object should not be liable to have that claim disputed after a certain period of time has elapsed. This principle, in force in a number of legal systems, was hotly disputed during a negotiation of the Convention. The compromise reached is quite complex, taking into account strongly held legal and political positions.

With time limitations there are two factors to be considered – when does the time start to run and for how long? Under Article 3(3) the period begins "when the claimant knew the location of the cultural object and the identity of its possessor." This may be difficult to establish. Suppose the claimant is a State and one of its officials finds out where the object is held. Does that knowledge start the period running? What level within the administrative structure has to be reached before it does? Once the time starts running, the period is 3 years, but there is an overall period of 50 years from the time of the theft.

Fifty years is a relatively short time when the special character of cultural objects is taken into account. Consequently, a specific regime was created for objects "forming an integral part of an identified monument, or belonging to a public collection" (Article 3(4)). The limitation period is 3 years from the time the claimant knew the location of the objects and the identity of the possessor. There is no overall period unless a State, at the time of becoming party, makes a special provision in its law for 75 years or longer. It is not stated when this period should start, but, considering the position of this rule in the text, this would seem to be from the time the claimant knew the location of the cultural object and the identity of its possessor. Where a State implements such an extended period for claims and an object from one of its monuments or public collections is found in another State Party, any claim to the material will be subject to a 75-year limitation period. Consequently, a State needs to carefully consider what it is doing if it opts to impose the 75-year limitation period.

The Convention specifically defines what is meant by a "public collection." This is a group of "inventoried or otherwise identified" objects. It has implications for those collections which do not have accurate inventories. A group implies that there must be more than one object, but there is no requirement of a unifying theme. The collection must be owned by one of four types of organizations specified in Article 3(7), including religious institutions in a Member State. Why these are specially singled out is not clear. It raises difficult practical questions. For example, many collections held by religious institutions are not inventoried; often they are not open to the public; sometimes part of the collection is owned by a religious body and part not. Can a person establish his or her own religion for the purpose of bringing the collection under this protection (O'Keefe 2009: 398)?

Singled out for specific treatment are sacred or communally important cultural objects belonging to or used by a tribal or indigenous community (Article 3(8)). Provided these are used traditionally or ritually, any claim for restitution is subject to the same time limitations that apply to public collections.

In returning a stolen cultural object, its possessor will, in many cases, suffer a loss, of not only the object but also what he or she paid for it.

Should the successful claimant be required to pay compensation? This was, and still is, a controversial topic. However, the Convention makes provision for "fair and reasonable compensation" (Article 4). This will be decided by the courts where the claim is made. So far, there are no precedents. What is required to be taken into account is still debatable. For example, if the possessor has undertaken conservation, should the compensation include its cost and what of any increased value brought about by conservation?

There are two conditions that have to be met before compensation has to be paid. Firstly, the possessor must not have actually known that the object was stolen at the time of its acquisition nor can he or she have turned a blind eye to the circumstances surrounding the acquisition. In other words, if it can be shown that the possessor should have known from the facts at the time of acquisition that the object was stolen, then no compensation will be payable.

Secondly, the possessor must prove that he or she exercised due diligence when acquiring the object. This is also a very controversial issue. In English law the basic rule is that no one can acquire a good title from a thief, so there is no question of paying compensation to recover stolen property. However, if the object has been bought by a person who does not know it is stolen, a good title of ownership is obtained 6 years after the acquisition if no successful claim is made. The rule in the Convention is closer to that in what is known as the civil law, i.e., a system of law found in countries such as France and Germany. There a person obtains a good title if they bought the stolen object not knowing this and have kept it for a set period (e.g., 0–5 years depending on the jurisdiction) with no claim being made.

Requiring that due diligence be performed is one thing – establishing if it was adequate is another. For example, four Byzantine mosaics had been stolen from a church in Northern Cyprus and illegally taken out of the country. An art dealer called Goldberg bought them from a dealer called Dikman in the free port area of Geneva airport and took them to Indiana in the United States. They were claimed back by the Autocephalous Greek Orthodox Church of Cyprus. Goldberg testified in the American courts that in an attempt to enquire into the right of Dikman to sell the mosaics, she had contacted the UNESCO office in Geneva (the main office is in Paris), the International Foundation for Art Research in New York (there was no record of her telephone call), and Customs offices in the United States, Switzerland, Germany, and Turkey (she could not remember the names of any person she spoke to and the Customs services had no documentation of any enquiries). On the other hand, she did not contact the Greek Orthodox Church nor either of the two administrations in Cyprus even though she knew that was where the mosaics originated. Her efforts were judged to be insufficient (*Autocephalous Greek Orthodox Church of Cyprus v. Goldberg* 717F. Supp. 1374 (1989); 917F.2d 278 (1990)).

In Article 4(4) the Convention provides guidance to a person intending to acquire a cultural object. For example, was the price too low compared to what a knowledgeable dealer or collector would expect? Were any databases of stolen objects accessed, e.g., the Art Loss Register in London or the list maintained by Interpol? Regard must be had to all the circumstances of the acquisition. In an American case certain pre-Columbian artifacts were presented to a supposed purchaser (actually an FBI agent) "caked with mud and straw" (*United States v. McClain* 593F.2d 658 (1979) at 663) – surely something to raise suspicions.

Illegal Export

There are some who argue that there is a qualitative difference between theft and illegal export of cultural objects. Others argue that both are morally reprehensible. These points of view were both represented in negotiations for the UNIDROIT Convention when the issue came up of whether it should include provisions on illegal export as well as theft. Those who supported inclusion believed that there should be a more efficient method of obtaining return of an illegally exported object than that under the 1970 Convention. Eventually there was agreement for

inclusion of provisions on illegal export, but the number of objects covered should be limited (Prott 1997: 52).

Article 5 commences with a general rule that a State Party may request the court of another State Party "to order the return of a cultural object illegally exported from the territory of the requesting State." This procedure simplifies return. Under the 1970 Convention, the request for return has to be dealt with on a State to State basis which is cumbersome. The requesting State, if it is the owner of the object, can also sue in the courts of the other State for theft or try to have any export prohibition enforced. In either case it has no special standing.

Under Article 5(3) the State can make its request to the court, and the court must order its return if the requesting State proves that the removal of the object from its territory significantly impaired one or more of the following interests:

a. The physical preservation of the object or of its context
b. The integrity of a complex object
c. The preservation of information of, for example, a scientific or historical character
d. The traditional or ritual use of the object by a tribal or indigenous community

Then there is a much more general interest, namely, that "the object is of significant cultural importance for the requesting State."

Article 5(3) provoked a virulent reaction from some dealer, collector and museum groups. Allegations were made that courts would be obliged to order the return of what a State demanded (Lalive 1999) and that museums would be emptied. Such persons did not credit the courts with the power and integrity to make decisions based on the facts. The procedure is streamlined, but the State still has to prove that the removal impairs the interests listed and produce evidence to this effect. It is then for the courts to decide whether that is indeed the case.

Limitation periods apply. These are 3 years from the time the location of the object and the identity of its possessor was known. There is a maximum period of 50 years from the date of export.

The requesting State is required to pay compensation provided there is lack of knowledge of the illegal export on the part of the possessor of the same nature as for stolen objects. However, compensation is not required if the requesting State comes to an agreement with the possessor that he or she will retain ownership of the object (Article 6 (3)). For example, the owner may find it desirable to lend the object to a museum in the requesting State. This could be acceptable to that State in that it avoids having to pay compensation and yet has the object available for public access. If the object was made by a member of a tribal or indigenous group for traditional or ritual use by that community, then it must be returned to that community (Article 7(2)).

Finally, States that have rules, or introduce rules, more favorable than those in the Convention for the return of stolen or illegally exported cultural objects are not prevented from relying on them by the UNIDROIT Convention (Article 9). This was inserted to make clear that States already giving greater protection to cultural objects should not have to cut down existing protection.

Future Directions

There are no proposals for amendment of this Convention.

Cross-References

▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
▶ Cultural Property, Trade, and Trafficking: Introduction

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Unilinear Evolution and Lineal Time: A Critique

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Introduction

Nineteenth century evolutionism brought about the crystallization of a set of ideas in various fields of the natural and social sciences. That was a time of many conceptual changes that not only placed humans in a higher position in the Universe – defying the preeminent Christian order and history – but also gave an explanation of this new order. Evolution became a principle used to understand the origins and changes through time of many realms of life, from the Universe to the history of Humankind, in steady and lineal processes of transformation from the simplest to the most complex. This established the idea of progress as improvement and as a general goal of existence on Earth, as well. Its impact is so evident that even today, original concepts of those times, such as "progress," "development," "change," or even "primitive," are commonly used. Several evolutionary concepts are still commonly integrated in the way many people understand and explain the world such as gradualism, complexity, adaptation, and natural selection. The concept of time is, particularly, one of most prevalent.

In archaeology, despite criticism and the apparent long abandonment of the objective and lineal idea of time, a similar temporal model underlies many current proposals, at different scales. Ontological assumptions about time, such as its irreversibility and flowing character, seems to be in line with the nineteenth century evolutionism.

Definition

The idea of time according to the classic concept of evolution was a natural and universal phenomenon, external to humans, homogeneous, linear, directional, and quantifiable. As a given dimension, as in all space and to all entities of the universe, time inexorably progressed steadily in a continuous flow. Over time, a more complex ways of living unfolded at different points in different parts of the world, which could be sequentially ordered (according to their increased complexity) in successive periods along a common past. This in turn was a demonstration of human progress. As they moved toward the present, progress became more rapid, as if time were accelerated.

The natural sciences as well as the anthropology and archaeology of the nineteenth century provided the empirical evidence for this. The material, biological, and cultural remains of other life forms found in the same areas inhabited or conquered by Europeans, in conjunction with the same (and strange) customs and other objects found from non-European peoples around the world, were considered as definite evolutionary proof. Material things were the fossilized evidence of the past and its progressive and accumulative changes, while customs were their living testimony. The European and recent North American history were both evidence of the acceleration of time.

For evolutionism, time was not a special concern and did not propose an original idea about it beyond the prevalent one of that era. It did, however, contribute to its consolidation as a concept. The prevailing traditional view was that of a single linear progression: past, present, and future. Thus, a long-held conception of time and history as a long cumulative process was reaffirmed, where progressive complexity led humanity toward better and more complex forms. This was supposed to be a kind of natural fate, showing a single universal time (i.e., "natural" time) in a linear fashion from past to future.

In that process of change, the key resided in the formal differences and similarities, both in the tangible and intangible aspects of societies. With difference comes change (a basic principle of the sensory experience of how we perceive the passage of time). Since change can only occur in time and with time, differences are evidence of its passing, as well the actions of evolution, understood primarily as cumulative change. Similarities among different societies were used as indicators of the rate of evolution, as long as they highlighted "survivals" – such was the evolutionary term – the continuity in time of some ancient traits, at the same time they showed parallelism between societies far away in space and time. Thus, evolutionism established and fully enforced one of the underlying principles of archaeological thought: Material things contain time.

Evolutionism sought to unravel the laws of culture and humanity, as biology does with nature. The quintessential method to achieve this goal was through the use of comparison. Classification and management became its primary tools. Two more theoretical and methodological ideas brought about a basic foundation: uniformitarianism and analogy. The principle of uniformitarianism, where the laws of nature are valid for all times and places, is perhaps the clearest and most explicit expression – if not the only one – on the theory of the evolution of time in the classical writings. The present time as a key to understanding the past – the famous sentence by the nineteenth century geologist Charles Lyell – is the most accurate summary on the evolutionary procedure, together with its concept of temporality.

The classification of the diversity of human life in time and space, combined with the sorting criterion that says that everything evolves from the simplest form to the most complex, helped organize humanity and its history. Humankind came to be perceived as a single, abstract, and ecumenical entity; while its history, was understood as occurring in a single universal development. Humanity and its history reached its highest manifestation only in the lifestyle of the then prevalent Western industrial society. On a more specific level, each culture – past and present – represented some of the conditions or lifestyles known by humankind, from the simplest life forms – those in the wild – to the most complex – those found in civilized societies. Nevertheless, all of them were subject to the same possibilities of progress – although not necessarily following the same orderly progression at every stage – given the unity of origin of humankind and the universality of the laws of evolution.

In this regard, the nineteenth century evolutionism was always considered as unilinear: There is only one course for human history following a natural order for certain types of life, from the least to the most complex, developed in a homogeneously flowing time.

Current Debates

Since the early twentieth century, much criticism has been directed toward this evolutionary

perspective. Franz Boas' anthropological criticism and his followers, as well as the criticism coming from the functionalism movement of the first half of the twentieth century, contributed to dismiss several of the evolutionary principles. This criticism had perhaps a bigger impact on cultural and social anthropology rather than on archaeology. Critics not only denied the unilinearity of a single human history, but also the use of the comparative and social typologies that geared toward a more generalizing and homogenizing perspective.

However, the linear concept of time was not the primary target of criticism. The development of new archaeological analytical techniques to recover past time and order cultures chronologically held basically the same concept of time as a linear homogeneous and quantifiable phenomenon. The traditional diffusionism, the cultural-historical school of thought (important in South America in the first half of the twentieth century), and the North American cultural history also held a similar concept of time. These lines of thought deepened a practical and theoretical consequence not explicitly expressed as a principle in unilinear evolutionism: the spatialization of time (Fabian 1983). While for evolutionists formal differences were mainly time, both post- and anti-evolutionist archaeologists held a similar view in which similarities and differences in space became time. Physical horizontal space, or distance, was regarded as another form in the materialization of time. Greater formal differences and less complexity (compared with the European vision of the world) meant a greater temporal difference. Also, the higher the spatial distance, the greater is the elapse or temporary "difference" (such as in deep geological stratigraphy). Thus, the physical attributes of objects and their spatial relationships were endowed with a significant dimension that defined and indicated time. Objects and distances were understood as material clocks.

From anthropological practice, the conceptualization of spatial distance as time difference led to the denial of the contemporary of the Western world with other different life forms; though coetaneous, they were considered as living in another epoch. This is what Fabian (1983: 31, 32) very well characterized as allochronism of anthropology: "a persistent and systematic tendency to place the referent(s) of anthropology in a Time other than the present of the producer of the anthropological discourse."

With the same concept of time, but conceptually distinct in relation to the causes of change, it was no surprise that those theoretical lines grouped cultures in relative chronological schemes following a linear order. There, time was a uniform and objective, divided into equivalent units, but historically and culturally differentiated. The oldest life forms physically evolved further away from more developed centers. Although these life forms usually continue to live together, they eventually disappear from the chronological schemes and are replaced by other forms of life in the next unit of time, usually in another space. The societies from the oldest time periods – usually corresponding to hunter-gatherers –are located in areas very far from the most modern times – that of people with agriculture and pottery – without actually coexisting in the archaeological narrative, even though that was the case. The coexistence of more complex and late societies with those perceived as less developed is also denied in archaeology.

The revival of evolutionary thinking in the mid-twentieth century in the United States tried to reverse these forms of chrono-spatial schematization. Two scales of action for the evolution of a multilinear concept of time were proposed: synchronic and diachronic, where the uniform and linear passage of time would allow the cumulative change of societies. On the one hand, a general trend, that of humanity or culture as a human phenomenon, with the emergence of forms of increasingly complex organization, from stage to stage. On the other, specific developments of particular cultures in local areas, with variations in different adaptive forms, with high to low in a setting that could be contemporaneous (Sahlins & Service 1960).

The introduction of radiocarbon dating in the mid-twentieth century as a form of absolute dating helped reinforce previous linear conceptions of time. This dating method validated

concepts of time that were already generally held both in evolution, and diffusionism and cultural history. This method was functionally consistent with their views on cultural change, as long as the assumptions of the radiocarbon method are based on the same temporal ontology: time as a natural and homogeneous flow. The notion of time was essentially the same. The difference was that now it was possible to know the *amount* of time separating the events (O'Brien & Lyman 2002). The *when* in the chronologies became a *how much* in absolute chronologies. But, in addition, this was also the most tangible and objective evidence that objects contain time and that it will depend on our technical abilities and theoretical techniques to recover it.

Multilinear evolutionism was criticized for bringing into play many pre-understandings that were subject to be debated by non-positivist perspectives. Criticism on this concept of time was very similar to that directed toward the unilinear notion of evolution: its general cultural types, variability reduction, the direct use of ethnographic analogy, and its principles and explanation of change. But this new line in evolutionism started to hold a multiple and contextual view of time. While equally smooth and linear, and part of the same general process, time was not regarded anymore as a single entity, but as two (or more) simultaneous or superposed times entangled as branches stemming from a common tree of general evolution. There is a relative time, that of the specific evolution of the species (i.e., cultures), relative to their particular environmental and cultural contexts (Sahlins & Service 1960: 2–6). At the same time, there is an absolute time, general, usually sequential, a-historical, in which successive levels of increasing complexity and organizational integration progressively emerged at different stages. Time was starting to be better understood in terms of its length from a dual approach: that of human temporality and that of ecological temporality.

The first theoretical approach in which environmental time is introduced as another time intertwined with the human one originates from what is known as the French Annales school (a periodical journal in which the main articles written by a leading group of French historians were published after 1929). It was not until many years later that these articles were incorporated in archaeological thinking. Maurice Braudel (1966), the main mentor of this school, distinguished, within the constant flow of time, the overlapping of different rates or speeds, understood as layers and fragmentations of history. The main, or the longest rate of time, is the one that involves a slower processing and transformative evolution. It is the time of long-lived structures, continuous and steady over generations and with a long balance with nature, the one that has an almost imperceptible effect on the lives of humans.

This duration of a parsimonious flow is fragmented and changes pace in short-term time. On the one hand, there are those of an intermediate time, of dozens of years, a quarter or half a century long. Intermediate time is the duration of social, political, and economic conjectures. It is the structural history of groups and clusters. On the other hand, there is a short-term time, that of individuals, of everyday life, of events. These short durations are neither perceived nor subjective or social times. Although Braudel referred to them as temporalities, they are only paces of time, the speed of historical phenomena depending on the magnitude of the processes. This time is superimposed and, at the same time, develops simultaneously. It is a multiple time.

The multiple time and the relationship between different temporal scales and the material record were proposed as temporary perspectivism (see Bailey 2007). Time is a process and representation, in terms of its links to the present. This notion basically proposed an archaeological ontology of time: a form of objectification in which the time of phenomena (of varying and relative durations or periods) materializes differentially under different resolutions, in particular concrete forms. Objects and the archaeological record form a temporary and material palimpsest (an aggregate of materials, objects, and meanings accumulated, of different ages and differential

duration, subject to transformation and partial preservation). The ways of relating to the times of phenomena define four temporary perspectives, which enable or constrain different questions, requiring different explanations and methodologies.

Two important aspects are hereby added: the multiplicity of times and its differential materiality. In addition, the fourth perspective of time introduces the subjective time: a socially situated perspective, from the observer as well as from the people of the past. This perspective is conditioned by symbolic representations and cognitive categories about time, specific to each social group. This is the elapsed time that is differentially sensed. It is not just a matter of time, but also a conceptual issue. Time is not only multiple but can also acquire meaningful cultural forms.

A different perspective on lived time and its materiality can be found in the New Archaeology (Processual Archaeology). Time was not, according to this school of thought, a problematic issue and did not contribute substantially to theoretical discussions. Due to its concerns about understanding how the world worked, and how processes and systems functioned, in its beginnings, it gave priority to the reconstruction of the mechanisms of interaction over time trajectories. However, various processual archaeologies indirectly began to deal with time and its relationship to the different issues of change, such as the mechanisms of evolution, adaptation, training processes, behavior chains, etc. These were concerns that involved time as an intrinsic factor in the development of these changes.

In other cases, time was considered a variable and came into play at the individual level. For instance, the proposals about artifact design in relation to conservative or expedient technological strategies (Nelson 1991) involve individuals thinking and considering time. Whatever it is the case, either in conservation strategies where tools are prepared in advance to their use or in expediency where there is availability of raw material and time to manufacture tools at the place of use, both involve a rational individual that takes into account the use and allocation of time. Equally, the analyses of procurement areas, optimal foraging models, or of cost-benefit, for example, put into play other notions of time. In spite of being a lived and perceived time, it is not freed from a Western-European concept of time. Time is seen as homogeneous, chronometric, and capitalist: It is a valuable resource (a form of capital) and decisions are taken based on its administration. Anyhow, it is important that here other time scales were introduced: that of individuals and that of short-term processes, and even of events (such as those of the knapping of a lithic artifact or its use). Although evolution operates inexorably as time itself, at a smaller scale, there are possibilities for the human in handling time. Individuals are active against time, even if this lies outside the individual.

This conception of time is also implied in the idea of surplus production and in current models of domestication – the management of time of others, animals, and plants – as well as in the considerations on the use of deferred resources or the intensification of production, for example. Also in the proposals of social differentiation and forms of social reciprocity, redistribution of resources, construction and maintenance of power, or the exchange of gifts, an active management of short-term time is at stake as it involves the appropriation of time by a few other individuals.

In these cases, it is not always a materialized time that is locked in things, but a relational time. Things are not containers of time. They do not contain the flow of time and they are not material clocks. Time is not the frame for the development of activities. It is, actually, a superimposed time which comes into play in the interactions between people and things. Neither is necessarily a linear time, conventionally flowing (though it well may have a past and a future, as is the case with redistribution, for example).

The possibility of a relational time can also be found in other postprocessual theoretical proposals. This is not the same relational positivist time subject to manipulation, but a time that arises from the practices and the active involvement of individuals with the material and the world (Gosden 1994). It is the short time of individual practices in its active dimension, along

with the subjective time of individuals and their practices, putting at stake in these acts a whole series of socially acquired and incorporated dispositions, social memories, more ways of perceiving and experiencing the duration. In short, as maintained by Elias (1984), it is a relational effect, or what he calls the effect of the put-in-relation. It is a multiplicity of times, overlapping, of various lengths. A time that can acquire multiple shapes, socially and historically situated. Social practices produce and structure time, and there will always be as many forms of time as types of practices (Gosden 1994: 122–126).

Thus, life is composed of many times: The time that it takes to produce a lithic artifact has implicitly several temporalities, such as the time of other future practices (immediate or delayed), in other chains of coordinated actions in networks, leading at the same time to previous longer lengths of time, such as the socialization of the craftsman, or the short period of his training, and the long duration of the social structures of society where that practice takes place. The subsequent movement of that artifact and its participation in other practices, from its first use to its ending on the shelf of a museum, require other multiple times that need to be considered. Without losing its fluid quality and overall linearity, the time of practice links things, people, and time, and from there, it branches out throughout its development into a multitude of other forms of different times and varied additional temporalities. The biographical perspective of objects (Gosden & Marshall 1999), for example, is one of the ways in which the realization of time in objects acquires these multiple dimensions, following a linear accumulation of history.

There is another social dimension of the temporality of the practices that has to do with the construction of social identities and life cycles. Whether it is over the small scales of daily and personal habits, or through the broader ones of sacred times, social rituals, and other public times, meanings are created and reproduced (Gosden 1994: 136). Among them, meanings related to gender, age, and lifestyle (Gilchrist 1999: 80). These are practices that not only deal directly with gender, but also with other practices that may be embodied – such as certain work or food habits, or sacrifices. Undoubtedly, there is a linear time, that of the flow of life which is marked biologically in bodies, but also bodies materialize overlapping stories of various durations.

Other ways of understanding the relational temporalities between objects and people have recently been deepened by some authors. Bearing in mind the timing of things and people, both would find themselves trapped in complex entanglements of moving relations of mutual dependence of human with things, things with things, and objects with humans (Hodder 2012). These entanglements have an important temporal dimension, as the mutual dependence keeps people busy, caring, arranging, and interacting with things. Since humans and things live in different temporalities – the life of things can be much longer or shorter than that of humans – there is no direct linearity in the flow of time.

The past is also involved in these entanglements, in a nonlinear, discontinuous, and fragmented way. This can occur either via the materiality of historical things that persist, which appear and have incidence in the present, or well as long-duration processes, or as other entanglements at a given point in time which guides where actions can be directed in the future (Hodder 2012: 100). The mess of things and people covers multiple times, past and present, short and long term, and, in turn, mutually intertwined, in a combination of different temporalities. Time lies in things, in people, and in relationships. It is constantly flowing in a linear manner, although at different time frames.

Overall, nonlinear perspectives of time, although still trying to break with linearity, take the past as ubiquitous, almost homogeneous in its effect on the present. While they recognize the different forms of temporality, it is as if history acted as a rather fuzzy or blurry whole. Questions like "the past is here, now" or "practices update the past through present actions," reinforce an almost causal linearity between past and present. The prospect of a historical materiality acting in the present, as suggested by Hodder, integrating

with the present, is a nonlinear dimension of the past. The past presents a heterogeneous continuity (Lucas 2005). Our conscience can only perceive time as a flow, thanks to the memory that holds what happened, the past, and relates it to the present, as when we hear a tune or watch a movie. These retentions may have different depths, that is, age, or duration. When they manifest in the present, they work as "echoes" of the past (Lucas 2005: 26). There is then not such a thing as a linearity of the past (or with the past), but fragments and discontinuities that differentially arrive in the present time.

The past, rather than a linear succession of events, can be understood as a network of connected events, unequally distant from each other and the present. Each past period of time is extremely heterogeneous, made of fragments of different pasts (Olivier 2004). In fact, we do not recover events from a linear past, but connections that developed over time and are embodied in objects as memories in the present and not as representations of past events. It is a way of thinking about the different presents that shaped the past, in multiform times, in another kind of actualism.

In short, we can say that the different conceptions of time managed to link different elements, creating different ways of understanding it. Many of the elements are different, with different results. Due to the diversity of analytical units and ontological assumptions, it is difficult to make a critical comparison, although the acceptance of a certain kind of linearity and its materiality in objects emerge as elements in common. This issue is therefore theoretically complex. Even in different kinds of time and temporalities, including even the nonlinear, the idea of flow remains constant. Perhaps mental structures limit the ways in which they can express the passage of time and archaeologists fail at separating their own experiences when analyzing time, in a sort of familiarity that naturalizes certain aspects of common sense. It may also happen that archaeology is still subject to a long duration of the linear conception of time, a vision materialized with modernity.

The materialization of time on objects is a strong assumption common to all archaeologies from even the start of unilinear evolutionism until today. It has, in fact, been effective for the building of knowledge and the recovery of time. Today it is enriched and complex due to the relational perspective, where not only materials carry time, but relationships build it and make it happen.

International Perspectives

The concepts of time in South American archaeology, in a broad and spatial temporal perspective, have followed the successive unilinear international intellectual traditions of from the nineteenth century evolutionism to the present time.

In the nineteenth century (in the academic world at least), a kind of generalized allochrony denied the coetaneity of the "other," ignoring the continuity of the archaeological past with the societies of the present. Time was linear, but local history was interrupted and discontinued by another linearity, that of the Western world since the Spanish conquest. In the formation of nation-states from the nineteenth century, this view was used to justify the territorial expansion into indigenous lands and to define sovereignty, justifying so-called civilization and its development (Piazzini Suárez 2006). Once more consolidated states and archaeology as a discipline, this kind of allochronic thinking facilitated the creation and ownership of the pre-colonial past as heritage and, later on, the definition of the subject of study of a universal archaeology concerned with the study of cultural diversity. This situation began to change after the 1970s with the development of a Latin American social archaeology. In recent decades, other theoretical positions have begun to accept that continuity and respect or incorporate other voices in professional practice. New critical positions also incorporate self-reflection on professional practice and on its relationship to other people, their pasts and their voices (Gnecco 1999).

Future Directions

The recent concepts of multitemporality and on the relational perspectives of time, coupled with new approaches in the social sciences, seem to open new directions in terms of thinking about time and its linearity. In general, there is an increasing concern in archaeology about the short time, almost eventful time, depending also on a more general interest in individuals and subjectivities. Although this archaeology will need other methodological tools in order to define absolute short time lapses. The accuracy of the current absolute chronology is inadequate for an archaeology of short duration or of subjective temporalities. Neither its theoretical assumptions are in accordance with the particularities of relatively short phenomena such as some events and practices.

Also the concerns with the recent past (or more appropriately contemporary past due to its relevance today) are opening new lines of inquiry and expansion of archaeology (González Ruibal et al. 2010), working with the archaeology of warfare, state terrorism, and the disappearance of persons, in continuity with the present.

Inquiries into other ontologies (Henare et al. 2007) are now being considered in the archaeological discipline. Though, in general, this is done from the perspective of the material culture or from human and nonhuman relations, time acts as an ontological category and, from a multirelational stand, is part of a larger whole. The inquiries relating to other ontologies may venture into other temporalities not yet considered.

The nonrepresentational perspectives in human geography are challenging the conceptions of events and the flow, discussing the performative efficacy of the former and debating how to think about change in a world that is constantly being formed on its social aspect. The events make permanent differences, constituting the present, but in a temporality exceeding it, that includes past and future, not as memory but as anticipation, experience, and synthesis of a temporal subject (Rose 2010: 346–347) To think about archaeological time in a nonrepresentational form may enable some further analysis on small scales of events and individuals.

Despite these perspectives more focused on the subjects and their temporalities, and their multiple relationships with things and with nonhumans in general, as well as in their mutual agency, however, they have not yet developed further the analyses of the agency of time in itself. This lack of consideration implies the idea of time as a frame or scene and of an external flow. Time could be another agent in the network of interactions or the entanglements of things and people, and not an emerging entity. To some extent, unilinear evolutionism and the idea of progressive change and the widespread conception of time as a flow that acts on things – making them look older, accumulating time, modifying the archaeological record – imbues certain power of action to time, although closer to the idea of cause. But it is different to think of time with a capacity of agency, as it is the current thinking from posthumanism in relation to things, nature or other humans, as coactors interacting in concrete socio-material relationships (Bastian 2009). The multiplicity of simultaneous times and durations may have their different kinds of agency, as well as relational time. Perhaps a perspective from agency may lead us to rethink its linearity or, on the contrary, help to search for an agency capacity in its inevitable flow and linearity.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Age Estimation
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology as Anthropology
- ▶ Archaeology: The World at 1800–1850
- ▶ Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)
- ▶ Archaeometry: Definition
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Chronological Systems, Establishment of
- ▶ Chronopolitics and Archaeology
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art

▶ Dating Methods in Historical Archaeology
▶ Dating Techniques in Archaeological Science
▶ Electron Spin Resonance (ESR) Dating in Archaeology
▶ New Archaeology, Development of
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United Kingdom: Archaeological Museums

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Introduction

Museums containing archaeological material in the United Kingdom are many and varied. They constitute the principal means by which people can gain direct experience of the past, and in terms of *global* footfall, they continue to rival football matches as a favorite venue for leisure activity. However, some museums are

significantly more successful than others in attracting visitors, with figures for 2012 showing that the British Museum remains far away the most popular visitor attraction in the UK, with over 5.57 million visitors. Many of the smaller museums would count themselves fortunate to attract 10,000 visitors a year.

While there are many fine examples of UK archaeological museums that have been refurbished, or relocated to new premises, in the last decade as a result of funding by central or local Government and/or the Heritage Lottery Fund (e.g., Shetland Museum, Lerwick), many archaeological museums in the UK face serious problems, principally relating to shortage of funds. This crisis in the museum sector means that some museums are being forced to close or to reduce staffing and services. This issue is not limited to the UK but is widespread around the world, and the way in which it is handled relates to broader debates regarding the role and utility of culture in society.

Definition

An archaeological museum can be defined as an institution that possesses a collection of archaeological material – be it obtained locally, regionally, nationally, or internationally – which it curates, displays, and makes accessible for the benefit of present and future generations. Many museums, especially the larger examples, also regard the undertaking of research into the collections (either by their own staff or by others, or both) and dissemination of information about the collections as a core responsibility. In many museums, archaeological material is just one of a range of collections that are held. In the UK, an Accreditation Scheme exists to uphold national standards of museum practice. It is administered by Arts Council England in partnership with CyMAL: Museum, Archives, Libraries Wales; Museums Galleries Scotland; and the Northern Ireland Museum Council. The benefits of achieving accredited status include the eligibility to bid for large grants. Various other recognition schemes exist, including the designation of certain collections as being of national importance; once again, these can assist a museum in securing grants.

The distinction between a museum and a heritage centre is a moot point. Heritage centres generally aim to present the history and archaeology of a particular location and need not necessarily achieve this using real archaeological objects; however, many heritage centres do include such material, and some have collections that are in store as well as being on display. For this reason, the text below will include some consideration of visitor centres. The absence of a legally binding definition of a museum means that some visitor attractions call themselves museums even if they do not possess the kind of material that is normally found in a museum.

Historical Background

There is a long history of collecting and displaying archaeological material in the United Kingdom, extending back at least as far as the seventeenth century. The Ashmolean Museum in Oxford grew out of an early seventeenth-century Cabinet of Curiosities; the British Museum was founded in 1753 and was initially based on the collections of Sir Hans Sloane; the archaeological collections of what is now called National Museums Scotland started to be amassed in 1781, by the Society of Antiquaries of Scotland; and the Hunterian Museum in the University of Glasgow was founded in 1807 and is Scotland's oldest public museum. There are now well over 200 museums, scattered across the United Kingdom, whose collections include archaeological material, whether it be from the UK or from further afield. These museums range in size from the massive (British Museum) to the tiny (e.g., the Findhorn Heritage Centre and Ice House, Moray), and the scope of their collections ranges from the worldwide (e.g., the British Museum and Victoria and Albert Museum) to the individual site or object (e.g., the Mary Rose Museum, Portsmouth). Some, including the university-based museums such as the formerly-named Marischal Museum in Aberdeen, are

funded – directly or indirectly and wholly or partly – by central Government; some (e.g., the Royal Albert Memorial Museum & Art Gallery, Exeter) are funded by City Councils or Local Authorities; and many (such as Bute Museum) are independently resourced, and of those, some have virtually no source of income, depending on volunteers to remain open.

Regarding archaeological material found in the UK, the principal collections reside in the national museums of the constituent countries in London, Edinburgh, Belfast, and (until the displays are relocated to St Fagans National History Museum) Cardiff, although there is no National Museum of England as such; the British Museum, which fulfils that role, presents material from the whole of the UK. Certain regional and local museums contain significant collections. In southern England, these include the Wiltshire Heritage Museum in Devizes, the Salisbury and South Wiltshire Museum in Salisbury, and the Dorchester Museum in Dorset, which house important collections of prehistoric material from Wessex; the Royal Albert Memorial Museum, Exeter and the Royal Cornwall Museum, Truro, whose collections cover much of the southwest; and the Museum of London which, as its name suggests, focuses on material from London and environs. In northern England, the Hull and East Riding Museum in Yorkshire houses the nationally significant Mortimer Collection of prehistoric and later finds from Mortimer's barrow diggings in the East Riding of Yorkshire, while the Weston Park Museum in Sheffield houses the similarly important Bateman Collection, from that antiquary's barrow diggings mostly in the Peak District. The Great North Museum in Newcastle upon Tyne houses the collections amassed by the Society of Antiquaries of Newcastle upon Tyne, principally from Northumberland and Durham, while the York Museum contains a fine collection of Roman material from the city, and Tullie House Museum in Carlisle holds some important finds from northwest England. In Scotland, the museum formerly known as Marischal Museum in Aberdeen possesses sizeable collection of human and artifactual remains from Aberdeenshire and surrounding areas; Kelvingrove Museum and the Hunterian Museum in Glasgow are strong on the archaeology of the west of Scotland; Orkney Museum in Kirkwall possesses a large amount of material from excavations in Orkney; and Shetland Museum in Lerwick has a fine collection of Shetland archaeological material. And in Sutherland, the private museum belonging to Lord Strathnaver at Dunrobin Castle contains, among other material, a good collection of Pictish stones. In Northern Ireland, the Armagh County Museum (which is a branch of National Museums Northern Ireland) holds some significant finds from the county.

Individual treasures are to be found in some of the smaller museums. For example, the Rotunda Museum in Scarborough has, since 1834, displayed Gristhorpe Man, a 1.78-m-tall Early Bronze Age man, along with the lid of his tree-trunk coffin and the grave goods that accompanied him; while the Roman Army Museum at Vindolanda on Hadrian's Wall, Northumberland, houses the best collection of Roman writing tablets from Britain; Dover Museum houses the magnificent Bronze Age Dover Boat; and the Lynn Museum in King's Lynn displays the enigmatic Early Bronze Age "Seahenge" monument, with its central upturned tree base. Not all archaeological collections are housed in museums, however. The Duke of Northumberland's collection at Alnwick Castle, for instance, includes local and non-local (including Irish) prehistoric material, while the Duke of Argyll's collection at Inveraray Castle includes a rare Late Bronze Age flesh hook, an Iron Age massive armlet, a Neolithic Alpine jadeitite axehead, and a jet spacer plate necklace. Small displays are also to be found in some libraries, as at Todmorden Library, West Yorkshire, where most finds from an Early Bronze Age cemetery at Blackheath Cross ended up. Sadly, many archaeological objects remain in private hands and are never, or only seldom, seen by the public. The Crosby Garrett Roman parade helmet, a metal detector find which Tullie House Museum was unable to secure when it was bought at auction for £2 million in 2010, was displayed in the Royal Academy's *Bronze* exhibition in 2012 but otherwise remains with its anonymous owner.

Finds that pass through the Portable Antiquities Scheme in England and Wales and are returned to finders may be made available electronically by means of the Scheme's database, http://finds.org.uk/database, although physical access to these finds (e.g., for research) is dependent on the goodwill of the possessor. Finally, considerable amounts of archaeological material currently reside with their excavators, awaiting a permanent home. The issue of storage is covered below.

Key Issues/Current Debates

The UK's archaeological material culture is therefore dispersed widely and in a dizzying array of institutions, facilities, and private hands. Leaving aside the issues relating to privately held material, what are the principal issues that relate to its curation, research, and accessibility?

By far the most serious problem is that of the shortage of resources which, as detailed below, has caused the closure of many museums and heritage centres, has led to cuts in staff and services, and has jeopardized the ability of many museums to acquire new material, to store adequately the material that they hold, and to make that material available for research. Added to this is an alarming managerial trend, in some quarters, towards regarding curators and conservators as an expensive and anachronistic luxury that can be dispensed with.

The current crisis in museum funding is nothing new: museums have come and gone in large numbers over the last 150 years. However, the current economic climate is particularly harsh, especially for Local Authority-run museums where the culture budget was cut by 7.8 % in 2011–2012. According to a recent report in the *Museums Journal*, 42 museums, galleries and heritage sites (including some containing archaeological material) have closed during the decade 2002–2012, with 30 of these closures occurring in the two years between 2010 and 2012 (Steel 2012). Financial cuts and the generally tough financial climate also mean a diminution in the staffing of museums and, in particular, in curatorial and conservation posts; for example, the trustees of Salisbury and South Wiltshire Museum were forced to take the decision to delete the Collections Manager/Curator of Archaeology post in 2012, while Museums Sheffield announced the loss of 45 jobs across its organization in February 2012 following the loss of £1.4 millions' support from Arts Council England and is facing another round of cuts in 2013. (Museums Sheffield advertised for a Curator of Archaeology in November 2012, but this post was to run only until the end of March 2015.) National museums are not immune from financial cuts, with all the UK national museums suffering significant reductions in their grant-in-aid. National Museum Wales has recently (February 2013) announced that 35 posts will be axed in the current round of restructuring, while others are downgraded (*Museums Journal* February 2013), and National Museums Northern Ireland still lack archaeological curators for their nationally significant collections held at the Ulster Museum.

The problems surrounding the acquisition and storage of archaeological material have been highlighted in the Society of Museum Archaeologists' report, *Archaeological Archives and Museums 2012* (http://www.socmusarch.org.uk/docs/Archaeological-archives-and-museums-2012.pdf), where it is pointed out that many museums have been forced to close their doors to new acquisitions and some 9,000 archaeological archives in England remain "undepositable." A similar situation (albeit smaller in scale) exists in Scotland, where an increasing amount of material that passes through the Treasure Trove system for allocation has no bidders. While the potential solutions to such a problem include the building of regional repositories, such a move would require collaboration between cash-strapped Local Authorities, or else private sponsorship, which is currently hard to secure. Nationalization of the national archaeological archive, which is the case in the Republic of Ireland, is most unlikely to occur.

The impact of the financial crisis on research into archaeological material in UK museums is becoming increasingly severe. Some museums

(including Museums Sheffield: Weston Park) have closed their archaeological collections to researchers, while others limit the time that researchers can spend (e.g., at Hull & East Riding Museum) and/or charge them for access (e.g., Dorchester Museum and Salisbury & South Wiltshire Museum). While these measures may be understandable in terms of the need to budget staff time, they are having a significantly deleterious effect on archaeological research, particularly as undertaken by students. Research on large assemblages, which takes a considerable amount of time, is simply being rendered impossible in some museums. Furthermore, the fact that only a small percentage of those who care for archaeological collections are trained archaeologists and, of the latter, only a few are actively engaged in research means that much of the potential of the collections is not currently being realized. Just as research is adversely affected, so is the dissemination of information about the archaeological holdings, despite worthy initiatives such as Culture24 (formerly "the 24-hour museum," http://www.culture24.org.uk/home) and the proliferation of digitized catalogues, such as the online catalogues of the Hunterian Museum (http://www.huntsearch.gla.ac.uk/) and Wiltshire Heritage Museum (http://www.wiltshireheritage.org.uk/collections/).

This focus on the problems facing archaeological museums and other institutions holding archaeological collections in the UK is not intended to detract from the excellent work that continues to be undertaken by some museums. The phenomenal success of the British Museum's initiatives such as *The History of the World in 100 Objects* (http://www.bbc.co.uk/ahistoryoftheworld/) and of its *Ice Age Art* exhibition (7 February to 26 May 2013, http://www.britishmuseum.org/whats_on/exhibitions/ice_age_art.aspx) shows what can be achieved through tapping into the public's insatiable desire for archaeology. Similarly, the key role played by National Museums Scotland archaeological curators in the success of the Scottish Archaeological Research Framework (ScARF: http://www.scottishheritagehub.com/content/welcome) is widely acknowledged, and archaeological museum curators and conservators are playing an increasing role in the mass media dissemination of archaeological information, as shown for instance in the BBC series *A History of Ancient Britain* (http://www.bbc.co.uk/programmes/b010bg26) and in various web-based initiatives. Publications (both for the specialist audience and for the wider public) by archaeological museum curators and conservators continue to demonstrate that some museums – mainly, but not exclusively, the national museums in England, Wales, and Scotland – remain centres of excellence for archaeological research. This is because the individuals in question are uniquely placed to provide an overview and a depth and breadth of knowledge about archaeological material culture that cannot be matched by full-time excavators or by most university-based academics, who generally lack the in-depth knowledge of museum collections afforded to their museum-based colleagues. Finally, there are many splendid examples of recently refurbished museums (such as the Royal Albert Memorial Museum & Art Gallery, Exeter and The Collection in Lincoln).

As far as current debate within UK archaeological museums is concerned, most centres on the problems mentioned above. These problems eclipse concerns about ownership and repatriation – a topic which had previously set local museums against national museums and, increasingly, had involved local versus local museums and regional vs. regional museums in arguments over ownership. However, initiatives such as shared ownership and of proactive loan program (e.g., by the British Museum) have gone a long way to calming the debate, even though the politics of envy (directed against larger and better-resourced institutions) and competing claims for ownership or right of possession will probably always exist. One debate that tends to remain suppressed, due to fear over consequences, is that concerning the downward transformation in the status and power of curators in some museums over the past two to three decades, as museum management regimes that privilege

other areas such as education, marketing, and collections management have tended to come to the fore.

International Perspectives

The problems and issues outlined above are by no means limited to the UK. Problems of resourcing face archaeological museums around the world, and the change in museum management philosophy that privileges other areas over curation and conservation has led to widespread cuts in the number of professionally trained curators and conservators in several continents. That said, there are still many excellent archaeological museums, and much world-class research is still carried out by museum curators and conservators. The funding model for archaeological museums may vary around the world, but – with a few notable exceptions – a general decline in public funding and a concomitant need to rely increasingly on charitable grants and commercially generated income can be discerned.

Future Directions

What of the future? The public's fascination with archaeology continues unabated, as is demonstrated by the crowds who have flocked to see parts of the (fairly) recently discovered Staffordshire Hoard of Anglo-Saxon artifacts which are on display in Birmingham Museum & Art Gallery (until December 2014) and in the Potteries Museum, Stoke on Trent (until September 2013). Museums must continue to engage the public and maximize the accessibility of the collections while safeguarding their physical well-being for future generations. Advances in electronic technology mean that it is possible to deliver more, and more varied, information than hitherto, both within museum displays (e.g., through the use of applications for electronic media) and on the Internet. Much effort is currently being expended on developing increasingly sophisticated electronic means of access to collections and to the information about them; the challenge remains to ensure that the information that is disseminated by these media is correct, authoritative, and accessible but not dumbed down. There is also useful current research into haptic technology, to address issues surrounding the physical experience of museum objects. Such initiatives will benefit not only the visually impaired but all who wish to gain a sensation of touching an object that is protected in its glass case. Community engagement, through incorporating features such as Twitter, Facebook, and Flickr within a museum's range of communication media, is a rapidly growing area that is likely to continue to expand. By allowing the broader public to register their feelings and share ideas, reactions, and information, this constitutes a democratization of knowledge and an ethos of sharing that is in tune with the Zeitgeist (This should not, however, take the place of scholarship or of hard-won specialist knowledge.).

In UK archaeological museums, issues of storage and physical access to collections will require more creative and "joined-up, bigger picture" thinking than has been the case; the establishment of regional repositories, with facilities for research as well as for storage, would seem to be a sensible way to proceed. Inevitably, more museums will close and some may be forced into partnerships, and it is likely that, for their funding, many museums will have to rely increasingly on the Heritage Lottery Fund (and other charitable institutions) and on private and commercial sources. But the success of past initiatives such as *Renaissance in the Regions* – whereby nearly £300 million was spent on revitalizing certain museums in England between 2002 and 2011 and further monies were subsequently disbursed by Arts Council England under the Renaissance Major Grants Programme – shows just what can be achieved when the political will exists (http://webarchive.nationalarchives.gov.uk/*/http://www.mla.gov.uk/what/programmes/renaissance/renaissance_review_launch). UK archaeological museums find themselves at a time of particular stress and hardship and under increasing pressure to compete with other tourist attractions to deliver a crowd-pleasing "offer." Pulling off that particular trick while not losing sight of their core responsibilities to care for the collections in

perpetuity, to research them and facilitate research by others, and to maximize accessibility is the challenge faced by museum directors throughout the UK.

Disclaimer: The contents of this entry should not be taken to represent the official view of National Museums Scotland.

Cross-References

- ▶ British Museum
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Heritage Museums and the Public
- ▶ International Council of Museums (ICOM)
- ▶ Ireland: Archaeological Museums

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Further Reading

There is a huge literature on UK museums in general; for an up-to-date review of issues, the *Museums Journal* is a useful starting point. See also the *Public Archaeology* journal for a critical review of current developments and the *Journal of the History of Collecting* for an historical perspective on museum collecting in general, including archaeological collecting. The Society of Museum Archaeologists also publishes, as in its 2012 Report on Archaeological Archives and Museums.

United Kingdom: Cultural Heritage Management Education

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Introduction

Cultural heritage management depends on public goodwill as it is funded out of taxpayers' money or out of developers' money at the behest of government. Without education in heritage and archaeology there will be less awareness of the need to manage cultural heritage, and heritage organizations will struggle to gain public funding. Cultural heritage in the UK is managed by various organizations. There have long been museums, which originally were intended to be educational. There are national agencies in different parts of the Kingdom: English Heritage, Historic Scotland, Cadw (in Wales), and the Northern Ireland Environment Agency. These have ancient sites and remains in their care, and education about these sites is part of their work. In Scotland and Wales, there are also Royal Commissions on Ancient and Historic Monuments which also investigate cultural heritage. There is the National Trust, and the National Trust for Scotland, both independent of government and holding many landscapes and historic houses. Local government officials also record and conserve the local historic environment. There are charitable trusts and companies who carry out fieldwork. All these organizations carry out education, either through training or as public outreach programs. There are also some organizations and sites which have education as their main purpose. These include living history or experimental reconstruction centers, the Young Archaeologists' Club, and the education sections of museums which form a distinct professional sector. Of great importance in the UK is the role of the voluntary sector. They run independent museums of all kinds, and also heritage assets such as steam railways. These often work with schools.

It is important to understand the mind-set of the cultural heritage management profession. The remains of the past are seen as a resource for investigating the past. They are thought to be fragile, being eroded and destroyed every year, and so a precious resource that has to be conserved for future generations. The idea that remains of the past have to be conserved is dominant. Encouraging public access to these remains can be seen as a threat to their long-term survival. People erode sites by walking on them and damage artifacts by handling them. Recording and conserving remains is also the main objective of

most heritage management organizations. Senior management in most organizations has come from a research, recording, and conservation background. Education is, therefore, not always welcome, and is often seen as a peripheral part of a service, poorly resourced, lacking trained staff, and the first to be cut when budgets are tight. The problems faced by education within museums were highlighted by David Anderson in his report *Common Wealth* in 1997 which argued for a higher profile and more resources for museum education. Much of what he said is applicable still within the wider cultural heritage sector, even if museums have made great strides in implementing Anderson's views.

Key Issues

Work with schools tends to be with primary schools and children aged 5–11. Schools and colleges do not usually offer courses in archaeology or in heritage, and neither is a subject in the various national curricula in the UK. Each of the four nations in the UK has its own education system with different curricula. England, Wales, and Northern Ireland share similar qualifications, while those of Scotland are rather different. There are formally laid down curriculum expectations, detailing the subject content to be taught up to the age of 14 or beyond. At 14–16, students will study for named qualifications in specific subjects: GCSEs in most of the UK and Standard Grade in Scotland. At 16–18, they will study for AS and A Levels in specific subjects or Highers and Advanced Highers in Scotland. In school curricula, the subject most usually linked with cultural heritage in teaching is history.

However, archaeology does appear at AS and A Level, the qualifications taken at ages 17 and 18 upward. There used to be an Archaeology GCSE, taken at age 16, but this was abolished by its awarding body as being expensive to run for the number of students it attracted. There is both a shortage of teachers with a background in archaeology and a lack of awareness that archaeology is a very good academic subject with high standards of teaching and learning. Heritage can also be taught in a few vocational qualifications as part of leisure and tourism, but this is far from common. This is especially unfortunate when most of the history taught in the UK schools at the ages of 13 and over is modern history, modern being the twentieth century and its world wars. Pupils think that the past only consists of Hitler and Stalin, taught over and over again from the age of 13–18. There is one GCSE in history that explicitly includes heritage management and marketing alongside archaeology as options. This was created specifically to counter the modern history bias, but is not available to all the schools as it is restricted to only around 100 schools.

There are various barriers to good education work in the cultural heritage management sector. These are partly educational, partly archaeological. Among teachers, there is a lack of understanding about archaeology and its links with historic sites. Archaeology is seen simply as excavation, while historic sites are seen in the same light as museums – places that reflect a historical narrative. At best, they offer a story to be read and passively absorbed by pupils. Most teachers lack training in how to use historic sites and rely heavily on the education staff at such sites for ideas and expertise. They also often lack the detailed historical knowledge that would involve the site into its context. Curriculum content also acts to constrain which heritage sites will be used. If the site represents a period that is not taught in the curriculum, then it has to work harder to attract teachers' interest. The amount of curriculum time available for subjects like history is being squeezed by other subjects in secondary schools, where only one third of pupils study the subject at age 14+, and an increasing number are allowed to drop it at age 13. Issues of cost, health and safety, and curriculum time can make it hard for schools to organize trips to heritage sites.

Cultural heritage organizations usually need to subsidize their education work. It is not usually possible to cover all the costs by charging schools. Some organizations are unwilling to spend scarce money on education. In times of recession or spending cuts, education is often

among the first casualties. Within the heritage profession, there are few employees with specialized training in heritage education. Some organizations like to employ former schoolteachers, yet the skills of a classroom teacher are different from those of a heritage educator. There are as yet few postgraduate courses in the UK that teach these skills. Within the cultural heritage sector, there can be a dominance of people with a research and conservation background, for whom education is at best a peripheral concern, and at worst an active distraction from the "real" business of cultural heritage management. Some organizations, therefore, choose not to carry out any education work.

In spite of these educational and archaeological barriers, there are also causes for optimism. Many archaeologists have a zeal for education and a commitment to help the public engage in cultural heritage. The Council for British Archaeology has done much to secure the place of heritage nationally within education. Many organizations that receive public funding realize that it is their duty to serve the people in return for this, and education is one of the key services. The nature of archaeology and heritage is ideal for engaging students. Its physicality is ideal for learners who find classroom learning to be less than inspiring. Students with kinesthetic learning styles or with conditions which have an impact on traditional academic learning, such as dyslexia, will flourish on a visit to a heritage site. It is quite common to see the teachers amazed that the troublemaker or the most disaffected student of their class is taking an interest and engaging in learning when handling artifacts or visiting sites. The fact that we have to tease out the meanings of heritage through analysis makes it ideal as a tool for learning investigative skills. The prevailing kind of education used by good teachers in schools uses constructivist education theory, which is ideally suited to working with heritage where meanings have to be constructed from mute evidence. Teachers have long known this, and there are national initiatives in England that are designed to get teachers out of the classroom and using built resources in the environment: *Learning Outside the Classroom and Engaging Places*.

The state of cultural heritage education in further education (for ages 16+) and continuing education (part-time adults) is somewhat parlous. Changes to stage funding of these sectors of education have been made in recent years as governments seek to allocate scarce resources to more targeted segments of the population. In particular, they have prioritized funding subsidy for teaching courses leading to vocational qualifications. Subjects like history, archaeology, and history of art or architecture are not deemed vocational, lose subsidy, and have become uneconomic to run. A few colleges and universities still feel that it is important to offer opportunities for a rounded education and are willing to put on courses relating to cultural heritage, but these are now few and far between. Up until the 1990s, part-time courses for adults were the major means by which the adult voluntary sector in history and archaeology gained their up-to-date training in methods, skills, and ideas. Continuing education was the way the professional sector of archaeology supported the large voluntary sector. This is now done massively through project-funded community archaeology.

Future Directions

The future for education about heritage or archaeology is mixed. It will never be a mainstream part of school curricula, where history dominates the study of the past. Good teachers will, however, always value the educational benefits of direct physical engagement with the past. Heritage education will also be marginal to the concerns of field research and heritage conservation. On the other hand, the vitality of the voluntary sector demands a response from professional archaeologists and heritage managers. There will be a demand for training and education of adult volunteers that cannot be ignored. Indeed, this demand represents a great opportunity. Professional researchers can extend the reach of archaeology into areas not represented in mainstream archaeology, for example twentieth-century defense structure or the rural medieval economy, through the work of adequately trained and

involved volunteers. The audience for heritage education is there and waiting, it only needs archaeologists to realize it and find the will to go and meet it.

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- ▶ Avocational Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Formal Education Up to Age 18, Archaeology in
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ United States: Cultural Heritage Management Education
- ▶ Volunteers in Archaeology
- ▶ World Heritage Education, Training, and Capacity Building

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Campaign For Learning In Museums And Galleries. Available at www.cultureunlimited.org (think tank for the cultural sector that grew out of the Campaign for Learning in Museums and Galleries).

Engaging Places. Available at www.engagingplaces.org.uk (supports learning through architecture, heritage and archaeology).

Group For Education In Museums. Available at www.gem.org.uk (publish the Journal of Education in Museums).

Inspiring Learning For All. Available at www.inspringlearningforall.gov.uk (developed the influential Generic Learning Objectives as a way of measuring the effectiveness of learning in museums).

Learning Outside The Classroom. Available at www.lotc.org.uk (covers cultural and natural heritage, and offers the quality badge for sites working with schools and guidance on out of classroom education).

OCR History Pilot. Available at www.ocr.org.uk (the awarding body for the GCSE History Pilot).

United Nations Convention on the Law of the Sea and Underwater Cultural Heritage

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Introduction

In 1973, member states of the United Nations met in New York for the Third Conference on the Law of the Sea. From 1973 until 1982, 160 State Parties met to discuss the legislative boundaries of the sea, addressing not just the legal but also the biological, economic, technical, and political aspects across the open bodies of water. As a result of these discussions, on December 10, 1982, the United Nations adopted the Convention on the Law of the Sea. The Convention came into force on November 16, 1994, after the 60th State Party signed onto the treaty. By October 2012, 165 State Parties had joined the Convention. This is the third Law of the Sea Convention adopted by the United Nations, and the only Law of the Sea to identify cultural heritage located underwater.

The first Law of the Sea (1958) consisted of four independent conventions and an optional protocol. The text introduced provisional maritime zones, but they remained ambiguous in regard to the defined breadth of each boundary. At this point, "wrecked ships and their cargoes (including bullion) lying on the seabed or covered by the sand or the subsoil" were consciously excluded from the 1958 Convention

(YILC 1957: 298). The second Law of the Sea (1960) did not yield any new agreements – jurisdictional boundaries remained ambiguous and underwater cultural heritage remained excluded from the legislative text. Throughout this period, there was growing discontent about the continued state of ambiguity concerning the ownership of both living (e.g., fish and molluscs) and nonliving resources (e.g., solid, liquid, or gaseous mineral resources; oil; gravel; or nodules). This led to the third Conference on the Law of the Sea (DOALOS n.d.: 'Economic Exclusive Zone'; UN Convention 1982, Art. 133 [a]).

Definition

After years of discontent regarding ill-defined maritime zones, the 1982 Convention articulated agreed upon definitions for jurisdictional maritime boundaries. The final text of the 1982 Law of the Sea contains 320 articles, set out into 17 parts and 9 annexes. The convention identifies and defines six maritime zones – internal waters, territorial sea, contiguous zone, exclusive economic zone, continental shelf and high seas. The text addresses issues relating to trade, fishing rights, control over natural resources, and the protection of the marine environment within each zone.

Internal waters include lakes, rivers, bays, archipelagic waters, and any waters landward of the baseline of the territorial sea (Art. 8). The territorial sea extends beyond a state's land territory, measuring from the low-waterline, and its internal waters, to a belt of sea adjacent to its coast (Art. 2). This includes the airspace over the territorial sea as well as to its bed and subsoil. Every state has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with the 1982 Convention (Art. 3). The contiguous zone is a zone contiguous to the state's territorial sea, and may not extend beyond 24 nautical miles from the baselines from which the breadth of the territorial sea is measured (Art. 33). The exclusive economic zone (EEZ) was not included in previous Law of the Sea conventions, and is defined as an area beyond and adjacent to the territorial sea (Art. 55). The underlying purpose of the EEZ is to balance the rights and jurisdiction of the coastal state with the freedoms of other states as governed by the Law of the Sea. The continental shelf of a coastal state comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance. The high seas, also referred to as the Area, includes the seabed and ocean floor and the subsoil thereof, beyond the limits of national jurisdiction (Art. 86). High seas includes all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State.

Key Issues and Current Debates

Of the 320 articles provided within the 1982 Convention on the Law of the Sea, only Article 149 and Article 303 address underwater cultural heritage. Article 149 pertains to archaeological and historical objects found within the Area. The text stipulates that all objects of an archaeological and historical nature found beyond national jurisdiction shall be preserved or disposed of for the benefit of mankind as a whole. Particular regard should be paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin. No identified age or date range has been assigned to what is considered archaeological or historical, nor does the text identify the differences between the two terms; the text is not intended to apply to modern objects.

Article 303 (1) also addresses archaeological and historical objects found at sea, and identifies that states have a general duty to protect these objects and shall cooperate for this purpose.

The Article (303 [3]) also claims to not affect the rights of identifiable owners, the law of salvage or other rules of admiralty, or laws and practices with respect to cultural exchanges. Notably, the article is without prejudice to other international agreements and rules of international law regarding the protection of objects of an archaeological and historical nature (Art. 303 [4]). This provision prematurely references the 2001 United Nations Educational, Scientific and Cultural Organization's (UNESCO) Convention on the Protection of the Underwater Cultural Heritage. The 1982 UN Convention also provides for the establishment of four institutions – the International Seabed Authority, the International Tribunal for the Law of the Sea, the Commission on the Limits of the Continental Shelf, and the Meeting of the States Parties to the Convention – however, none of the organizations are regulated under the UN or UNESCO to enforce Article 149 or Article 303 with respect to underwater cultural heritage.

Future Directions

The 1982 and 2001 conventions are both legal contracts entered into by individual State Parties. In total, the United Nations is comprised of 193 participating State Party members; of these, 165 have signed or ratified the 1982 Convention on the Law of the Sea. In comparison, UNESCO is comprised of 195 State members, and as of May 2013, only 43 states have ratified the 2001 Convention on the Protection of the Underwater Cultural Heritage. From this perspective, Article 149 and Article 303 of the Convention on the Law of the Sea have a larger global impact regarding underwater cultural heritage management than the 2001 Convention. However, while underwater cultural heritage is addressed in the Law of the Sea, its inclusion does not afford a robust level of detail regarding identification, appropriate management, or legislative protection beyond the maximum breadth of the contiguous zone. Within the scope of the 1982 Convention, further clarification regarding the ambiguously presented archaeological and historical objects is required to effectively manage underwater cultural heritage within the corresponding maritime zones.

Cross-References

- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Maritime Archaeological Organizations
- ▶ Underwater Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ UNESCO (1972) and Malta (1992) Conventions

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United Nations Declaration on the Rights of Indigenous Peoples (2007)

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Introduction

In 2007, the United Nations adopted a landmark resolution for indigenous issues, the Declaration on the Rights of Indigenous Peoples. As a nonlegally binding, aspirational document, like most U.N. Declarations, the application and legacy of this resolution will also be a source for further research (United Nations Permanent Forum on Indigenous Issues 2007). Its potential lies in how the various nations, regardless of their vote on this adoption, will carry out the legacy of the work invested in this process and the work of so many activists and scholars.

There are currently between 300 and 350 million indigenous people worldwide, as recognized by UNESCO, making up about 5 % of the world population. Another recent estimate by Survival International gives a figure of 250 million, showing the importance of how "indigenous" is defined (de la Cadena & Starn 2007). Identified groups are present in over 70 countries and speak over 5,000 different languages, and they represent a diverse swathe of humanity. They face a variety of problems, such as displacement and unequal access to resources or even outright persecution.

Definition

The U.N. Declaration on the Rights of Indigenous Peoples was formally adopted by General Resolution 61/295 on September 13, 2007, with 144 votes in favor, 4 votes against, and 11 abstentions (Wessendorf 2008). This declaration is the first explicit, international document that lays out the rights particular to indigenous peoples. This declaration draws upon concurrent movements in the work of the U.N. Permanent Forum on Indigenous Issues, established in 2000, and efforts during the Second International Decade of the World's Indigenous People (2005–2014), which was declared by the U.N. General Assembly in December 2004 after deciding to further strengthen initiatives of the first decade (Schnuttgen et al. 2007). It also builds upon the framework of the earlier Universal Declaration of Human Rights, adopted and proclaimed on December 10, 1948, and the two International Covenants of 1966 (Economic, Social, and Cultural Rights for the first and Civil and Political Rights for the second) (Bowen 2000; Silverman & Ruggles 2007).

The U.N. Declaration on the Rights of Indigenous Peoples establishes indigenous peoples as possessing equal rights but also the right to consider themselves different and to be respected as different. It is composed of 46 articles and covers such diverse topics as their right to be free from discrimination and forced assimilation, to practice and revitalize their culture, to establish and control their own institutions, to occupy and access traditional territories, and to self-determination and decision-making. Other issues addressed include labor rights, violence against indigenous women and children, indigenous intellectual property rights, media access and use, relationships to the state, and the commitments of the United Nations to upholding indigenous rights. The final article, however, includes the provision that the integrity and the unity of the sovereign nation-state and international human rights obligations take first priority (United Nations Declaration on the Rights of Indigenous Peoples of 2007, see United Nations 2008).

Key Issues

After more than 20 years of preparation, the vote for the passage of this document was close, mainly due to the strong political pressure of the CANZUS group (Canada, Australia, New Zealand, and the United States) who dissented (Wessendorf 2008). A major problem for the four dissenting states was related to land claims, addressed most explicitly in Articles 25–29. For instance, although several nations already have systems in place for dealing with indigenous land claims, most of these do not meet the full measure of intent presented in these

articles. Land and access to resources are important steps for self-determination. Land and resource-based self-determination, as opposed to merely cultural self-determination, has however raised concerns over the unity of the nation-state. The Declaration is written in such a way as to support internal self-determination, with territorial integrity (Errico 2007). Article 46 was added at a later stage in the process to ensure this was clearly stated, in an effort to address these criticisms. The original statements in opposition to the Declaration from Canada, Australia, New Zealand, and the United States reflect these concerns. Though Australia in 2009, New Zealand in early 2010, Canada in November 2010, and the United States in December 2010 formally signed the Declaration, it is important to note their original oppositions and reasons.

The Declaration is also significant in that nowhere does it include a definition of the term "indigenous," preferring that such peoples self-identify. The inability to recognize indigenous peoples has historically crippled legislation on indigenous rights. The term arises comfortably as a more neutral one in nations like the United States, Canada, Australia, and New Zealand, where there is a clearly defined separation between earlier occupants and their colonizers. In contrast, the Saami people in the Scandinavian nations are now recognized as an indigenous minority compared to the indigenous majority (Sanders 1999). This variability in circumstance is especially problematic in Africa and Asia, where in some areas groups identify themselves as "indigenous," but the governments instead use the terms "ethnic group" or "ethnic minority" (Secretariat of the Permanent Forum on Indigenous Issues 2004). Many governments in the Americas and Australasia distinguish between "indigenous peoples" and other cultural minorities, but there are significant numbers of nations that do not make this distinction (Sanders 1999).

Current Debates and Future Directions

The idea and application of the term "indigenous" has tremendous importance for the field of anthropology and for its political and social repercussions in the contemporary world. The ties between past and present culture groups have always been an area of interest to scientists and laypeople alike, and the intersections of concepts of race, ethnicity, and language continue to be explored today. Beyond the spirit of scientific inquiry itself, these relationships inform public policy. A prime example is land claim legislation.

The term "traditional ownership" appears several times, both in the text of the Declaration itself and in the statements of the dissenting nations. Without a clear definition in the document itself, what constitutes this "traditional ownership" is left to each nation to decide. How this is conceptualized and turned into policy is critical for indigenous land rights, and archaeology is often an important line of evidence. Establishing the duration of occupation in an area and the territorial range of these peoples can be important in corroborating a treaty or in recognizing the existence of such a society if no written records exist. Moreover, there is a tendency to view prehistoric groups as "traditional" and separate from modern indigenous groups, who often do not meet the defining characteristics based on the spread of past material cultures. Demonstrating traditional cultural uses of territory after being removed for long periods of time is difficult, especially as cultures easily change, even without the forced assimilation policies common to colonizing societies.

Contact archaeology is especially important in recognizing the continuity of these peoples and clearing up misunderstandings about cultural and historical processes. Where the peoples themselves have often been marginalized in the colonial written record, archaeology may allow for more direct links by using material evidence of past societies. Both prehistoric archaeology and contact archaeology have provided important information, even though the use of archaeology in land claims depends greatly on the legal system of the nation. New Zealand and Australia have national infrastructures specifically for addressing land claims, while the United States and Canada rely on more general legal processes

for dealing with indigenous rights concerns (Nettheim et al. 2002).

A major problem with the wording of the Declaration in academia has been the notion of "special rights" versus "equal rights." Kuper claims that the designation "indigenous" rests on the assumption that the "descendants of the original inhabitants of a country should have privileged rights, perhaps even exclusive rights, to its resources. Conversely, immigrants are simply guests and should behave accordingly" (Kuper 2003: 90). Errico's analysis of the Declaration denies that this constitutes "special rights," and many scholars in direct response to Kuper's statement also vehemently disagreed (Asch et al. 2004). International legal practice has come to recognize indigenous peoples as having *collective* rights, including those "to the ownership, control and management of their lands and territories; to the exercise of their customary laws; to represent themselves through their own representative institutions" (Colchester 2002: 2). Unfortunately, it seems that this matter has not yet been settled to the satisfaction of everyone. Determining what rights "indigenous peoples" have has become an active discussion with the passage of the 2007 U.N. Declaration, but the impact this debate will have on legal affairs and practiced policies within specific nations remains to be seen.

It is currently unclear how great an impact it will have on the policies of individual nations. Already, for instance, Bolivia has turned the Declaration into national law, completely revising its political constitution. On the other hand, Thailand, another nation that voted for the adoption, has said it will not implement the Declaration unless clearly subordinate to existing laws and the national constitution (Wessendorf 2008). Policy changes or entrenchment of preexisting systems will most likely occur in several other countries, which will be followed closely by indigenous peoples and others worldwide. Anthropology can provide leadership both in academic and political arenas throughout this process and ideally lead to a rise in international standards and cooperative scholarship in considering the unique position of indigenous peoples.

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Peoples, Working with and for

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United States Domestic Archaeological Heritage Law

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Introduction

To understand United States (US) law as it relates to archaeological resources, it is necessary to appreciate two facts.

First: The USA is a capitalist democracy made up of 50 more or less self-governing states (together with a scattering of territories and other associated jurisdictions) – each of which contains multiple semi-independent local governments. Besides these entities, there are over 500 American Indian tribes within the borders of the country, each of which is regarded in law as a sovereign nation and many of which exercise control over land bases of varying scales.

Second: The US legal system circumscribes the rights of the federal government vis-à-vis those of the states, local governments, Indian tribes, and individual citizens (the last category strangely defined to include corporations). The rights of private property owners, though not absolute, are given considerable deference.

One result of these facts is that there is no generally applicable US law protecting archaeological resources or any other part of the environment. Instead, there are:

1. *Prohibition laws* designed to regulate access to archaeological resources *on lands controlled by the federal government* (and those held in trust by government for Indian tribes)
2. *Impact assessment and control laws* that more or less control the impacts of *federal agency actions* (and, less directly, the actions of other change agents under certain circumstances) on archaeological resources
3. *Registration and documentation laws* that authorize and structure programs for the inclusion of archaeological and other heritage resources on official lists and documentation of their characteristics, but do not afford much if any protection for such resources
4. A complex mosaic of *state, tribal, and local laws* designed to achieve similar purposes

In addition, there are government programs at various levels – generally grounded in some sort of law – designed to encourage and facilitate management of archaeological resources, among other aspects of the environment.

Definition

Archaeological heritage law in the United States includes the law per se – that is, *statutes* enacted by the US Congress, state legislatures, tribal councils, and local governments – as well as *regulations*, *standards, and guidelines* issued by official bodies in accordance with those laws, and *executive orders* issued by the president, state governors, and the chief executives of tribes and local jurisdictions. Federal laws are codified in the United States Code (USC), where they are grouped into titles and sections. The Archaeological Resources Protection Act, for instance, is cited as 16 USC 469-469c, meaning Title 16 of the Code, Sections 469 through 469c. Regulations are published in the Code of Federal Regulations (CFR), referenced by title and "part." For example, the regulations for implementing the Native American Graves Protection and Repatriation Act are cited as 43 CFR 10, that is, Title 43, Part 10 of the CFR.

Archaeology practiced under and in response to US cultural heritage law is widely and colloquially referred to as an aspect of "cultural resource management" (CRM), or even as comprising the practice of CRM in its entirety (see King 2008: 1–8, 2011: 1–3 for discussion).

The federal heritage laws – the focus of this discussion – have created, and are interpreted and administered by, several governmental bodies. These bodies structure the conduct of archaeology within the US government, so their roles need to be described at the outset.

Archaeology in the US Government

Unlike many other nations, the USA has no overall ministry or bureau that is responsible for the

nation's archaeological resources, or more broadly for its historic or cultural heritage. To some extent the *National Park Service* fills this role by managing many protected areas (units of the national park system) established in whole or in part to protect and interpret archaeological and historic sites. The National Park Service also manages "external" programs like the National Register of Historic Places, a list of formally evaluated significant archaeological, architectural, and historic resources throughout the country. It provides grants to help support the network of State Historic Preservation Officers (SHPOs) who administer historic preservation programs (including archaeology) in their states. Another general coordinative agency is the *Advisory Council on Historic Preservation*, a small independent agency that advises the president and congress on historic preservation (including archaeological) matters, oversees project review under Section 106 of the National Historic Preservation Act (NHPA; see below), and advises other federal agencies about their responsibilities under the same statute.

Each agency of the federal government in theory has its own program to implement NHPA and sometimes other cultural heritage laws, and those that manage substantial amounts of land usually emphasize archaeology – sometimes, unfortunately, to the exclusion of other aspects of heritage. The Smithsonian Institution and a few research bodies in other federal agencies conduct archaeological research for its own sake, but most agencies manage archaeological and other heritage resources as an adjunct to their core missions.

Under the NHPA, many of the functions involved in administering federal requirements pertinent to archaeology are carried out by State Historic Preservation Officers (SHPOs) and, on the lands of some Indian tribes, by Tribal Historic Preservation Officers (THPOs). Key functions carried out by SHPOs and THPOs include maintaining lists of identified historic properties (including archaeological sites), establishing plans intended to guide the identification and evaluation of such properties, and consulting with federal agencies and other change agents about actions that may affect such properties.

The Laws

As noted above, US laws relating to archaeology can be conveniently divided into three classes: prohibition laws, impact assessment and control laws, and registration and documentation laws.

Prohibition Laws. The oldest of US archaeological laws is the Antiquities Act of 1906 (16 USC 431–433), which forbade the excavation or removal of "antiquities" from federal and Indian tribal land without a permit from the relevant land managing agency. The law also authorizes the president to withdraw federal lands from general use to form national monuments. After suffering a successful court challenge in the 1970s, the Antiquities Act was augmented by enactment of the Archaeological Resources Protection Act of 1979 (16 USC 469-469c; ARPA). This law does essentially the same thing as the Antiquities Act, but with reference to "archaeological resources," defined as things of "archaeological interest" that are over 100 years old. Section 3(d) of the 1990 Native American Graves Protection and Repatriation Act (25 USC 3001–3013; 18 USC 1170; NAGPRA) similarly prohibits the disturbance of Native American (i.e., American Indian, Inuit, Aleut, and Native Hawaiian) human remains and cultural items on federal and tribal lands; NAGPRA goes on to establish a complex system for repatriating such remains and items, and those held by federal government agencies and federally assisted museums, to culturally affiliated tribes and groups.

Another prohibition law – though it does not directly prohibit anything – is the Abandoned Shipwreck Act (43 USC 2101–2106; ASA). The ASA establishes that the federal government owns abandoned shipwrecks in US waters, but also transfers title to them to the several states, which are expected to regulate access to them by archaeologists, sport divers, and commercial interests. Under the Sunken Military Craft Act (10 USC 113), however, the wrecks of military vessels remain US government property, and access to them is theoretically controlled by the various military services.

All the prohibition laws are aimed at controlling the individual (including corporate) citizen

or noncitizen who might for some reason (e.g., research, wealth acquisition, recreation) intentionally disturb something of putative archaeological interest. All directly or indirectly prohibit such disturbance by unlicensed persons, and some (like ARPA) prescribe standards and procedures for the issuance of licenses. Most only incidentally affect the operations of government agencies, if they affect such operations at all. In other words, under most prohibition laws relating to archaeology, the government prohibits *others* from disturbing archaeological resources, but implicitly or explicitly allows *itself* to do so.

To the extent the prohibition laws are enforced – a difficult matter, given the scale of public lands in the USA to which they apply – they are enforced by land management agencies like the Bureau of Land Management, Forest Service, and National Park Service, as well as agencies that manage lands incidental to their missions, such as the military services.

As a signatory to the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property, the USA makes efforts to control trafficking in antiquities across its borders, and ARPA includes a provision prohibiting interstate commerce in artifacts obtained in violation of its terms or those of other laws.

Impact Assessment and Control Laws. With the expansion of government involvement in land use and industry that accompanied the Great Depression and World War II, citizens began to impress upon lawmakers the fact that government itself could do damage to the environment, including archaeological sites. The result, which continues to this day, has been a proliferation of laws, regulations, and guidelines, as well as international instruments, designed to assess and to some extent control the impacts of government actions.

In the USA, the general-purpose federal impact assessment law is the National Environmental Policy Act (42 USC 4321 and other sections; NEPA). Although the national policy promised by the law's title and articulated in its Section 101 is largely ignored, extensive regulations (40 CFR Parts 1500–1508) have been developed by the Council on Environmental Quality (in the Executive Office of the President) for implementing NEPA's *procedural* requirement to prepare a "detailed statement" of the environmental impacts of "major federal actions significantly affecting the quality of the human environment." Among the impacts to be assessed are impacts on "historic or cultural resources" (40 CFR 1508.27(b)(3)), which are widely understood to include archaeological sites. Importantly, NEPA requires consideration of the effects of projects not only on federal and tribal land but wherever they occur in the USA (and to some extent elsewhere) – provided there is some federal involvement in them (via, for instance, federal grants, loans, loan guarantees, and licenses).

Interacting with NEPA compliance, Section 106 of the National Historic Preservation Act (16 USC 470; (NHPA)) and regulations of the Advisory Council on Historic Preservation (ACHP) for implementing it (36 CFR Part 800) require federal agencies specifically to consider the effects of their actions on "historic properties," defined as places included in or eligible for the National Register of Historic Places. As discussed below, the register is a list of recorded and evaluated historic and prehistoric places that is maintained by the National Park Service. Any significant archaeological site can be eligible for the National Register (as may many other types of property), so compliance with Section 106 provides the rationale for funding thousands of archaeological surveys throughout the United States every year. The scope of Section 106 is similar to that of NEPA – it applies to potentially damaging projects *wherever* they are planned, regardless of land ownership, *provided* the federal government is somehow involved. Neither NEPA nor NHPA covers projects in which the federal government has no involvement.

Other sections of the NHPA prescribe additional federal agency responsibilities, authorize maintenance of the National Register, and provide for federal assistance to, and oversight of, SHPOs and THPOs. Another federal law, known variously as the Archaeological and Historic

Preservation Act and the Archaeological Data Preservation Act (16 USC 469-469c-2), requires that federal agencies finance the recovery of archaeological, historical, and scientific data threatened by projects they propose to conduct, assist, or license. NAGPRA also includes a "discovery" provision whose implementing regulations (43 CFR Part 10) effectively require that federal agencies assess the likely effects of their actions on Native American graves and cultural items on federal and tribal land, in consultation with Indian tribes and Native Hawaiian groups.

The collective effect of all these laws and regulations on the practice of archaeology has been considerable. In essence (though not explicitly), they require federal agencies – and through them, the many state, local, and private parties that benefit from federal financial assistance, contracts, licenses, and permits – to sponsor archaeological surveys wherever their projects may result in ground-disturbing activities. Such surveys are in theory conducted as parts of interdisciplinary studies to identify all kinds of environmental impacts under NEPA and as parts of "historic preservation" or "cultural resource management" (CRM) studies under Section 106 of NHPA. In practice, unfortunately, archaeological surveys are sometimes the *only* things done to identify "cultural resources" subject to effect by projects, ignoring resources that are not archaeological but may be of considerable cultural importance, such as culturally valued plants and animals, landscapes, and a wide range of more intangible aspects of the environment (King 2008: 21–2).

The assessment of impacts on archaeological sites and other aspects of the environment usually results in efforts to avoid, reduce, or otherwise mitigate effects that are adverse. Such efforts may be specified in documents prepared and adopted under NEPA and are routinely provided for in "memoranda of agreement" (MOAs) executed under Section 106 of NHPA. MOAs are based on consultation among the responsible federal agency, the SHPO and/or THPO, Indian tribes and Native Hawaiian groups, sometimes the ACHP, and other interested parties. For archaeological sites, impact mitigation often involves "data recovery" – that is, rescue excavation or other forms of information retrieval, followed by analysis, reportage, and management of collections ("curation").

Registration and Documentation Laws. In the Historic Sites Act of 1935 (16 USC 461–467), congress authorized the National Park Service to identify and make records of historic places of significance in interpreting and commemorating the nation's history. Today such places are referred to as National Historic Landmarks; they are nominated through an exhaustive, multilevel process of review and are said to be "nationally significant." When the NHPA was enacted in 1966, it created a more expansive National Register of Historic Places, including places of importance at the state and local levels. The National Park Service continues to maintain both the National Historic Landmarks list and the National Register, both of which include archaeological sites as well as historic buildings, structures, landscapes, and groups of properties referred to as "districts." The 1935 law also allowed the National Park Service to make permanent a Depression-era program that employed architects and draftspeople to prepare meticulous records of historic buildings. The Historic American Buildings Survey (HABS) survives to this day in the National Park Service and has cloned itself to create the Historic American Engineering Record (HAER) and the Historic American Landscapes Survey (HALS). All three programs (especially HAER) sometimes document archaeological sites.

State, Tribal, and Local Laws. Many Indian tribes, states, and local governments have prohibition laws, some applying only to lands directly controlled by government (e.g., public parks and recreation areas) and some (including many Indian tribal laws) applying more broadly. Some jurisdictions have laws expressly prohibiting the exhumation of interred human remains, marked or unmarked, on all lands within their borders.

Most US states have their own environmental impact assessment and management laws, sometimes referred to colloquially as "state environmental policy acts" or SEPAs. Some have their

own state equivalents of the National Register and provisions somewhat like those of NHPA Section 106 for addressing the effects of state-sponsored and state-regulated projects on historic places. Some tribal governments have enacted similar laws, as have a few local governments. Some tribes and local governments have set up their own archaeological, historic preservation, or "CRM" programs that conduct surveys, proactive preservation, and data recovery. Each state's, tribe's, and local government's laws and programs are unique to themselves, however; there is no consistency among sub-federal governments across the United States.

All the states and some tribes and local governments participate in the National Park Service's registration program by nominating properties, including archaeological sites, to the National Register. Some states, tribes, and local governments maintain their own registers as well, and some conduct documentation programs, often in cooperation with the HABS-HAER-HALS program of the National Park Service.

Generalizations. Generally speaking, the following can be said about US law relating to archaeology and archaeological resources:

1. There is no central government organization responsible for archaeology, though both the National Park Service and the Advisory Council on Historic Preservation fulfill some of the functions carried out by central cultural ministries in other countries. Federal land management agencies tend to have their own archaeologically oriented heritage programs, and State Historic Preservation Officers perform coordinative functions with respect to archaeological resource management in their respective states.
2. Excavating or otherwise disturbing an archaeological site on federal or tribal land for purposes other than the conduct of a federal, federally assisted, or federally licensed land-use project requires a permit from the responsible federal agency and/or tribe. Such permits are issued only to technically qualified archaeologists and require that work be done in accordance with research designs, adhere to established fieldwork standards, and produce reports. Recovered artifacts either remain the property of the federal government or are returned to tribes (or Native Hawaiian groups in Hawaii). These requirements are imposed under ARPA and NAGPRA. Similar requirements are often but not universally imposed by state and local governments on lands under their control, under their own laws; some Indian tribal governments impose similar and sometimes more restrictive requirements on tribal lands. Excavation and other disturbance of sites on private land are mostly unregulated, but it is illegal to excavate graves in many jurisdictions, and excavations on private land that are carried out with federal assistance (for instance, under a research grant from the National Science Foundation) are regulated (in theory at least) under NEPA and NHPA.
3. Construction and other land-use projects (mining, forestry, road construction, energy production, etc.) on federal land, or on any other land with federal assistance or permits, must be subjected to impact analysis of some kind under NEPA and must be the subject of review and consultation under Section 106 of NHPA. Archaeological surveys are often done as part of the impact assessment process, along with studies to identify and evaluate historic buildings, structures, neighborhoods, landscapes, and other resources. Multi-party consultation on the effects of such projects usually leads to agreements about how adverse effects will be mitigated; this often involves archaeological excavation. Surveys and data recovery operations, like other kinds of environmental impact assessment and mitigation, are usually financed by project proponents.
4. Archaeological sites are routinely included in the National Register of Historic Places, although the cost of preparing nominations and the fact that nomination does not give a place any particular protection tend to

discourage the practice. Under Section 106 of NHPA, the same consideration is given to a place that simply *meets the criteria for inclusion* in the register as to one that is actually *included*. Some state and many local laws, however, require consideration only of places actually included in the National Register or a state or local equivalent.

5. Artifacts and data recovered from federal and tribal land remain the property of the federal government or the tribe from whose land they came and for the most part must be cared for in accordance with government-wide curatorial policies issued by the National Park Service (36 CFR Part 79). An exception is made under NAGPRA for Native American human remains and cultural items, which are repatriated to culturally affiliated tribes or groups. Ownership and control of artifacts found on nonfederal, non-tribal land are determined in accordance with whatever state and local laws apply. As a general rule, and with the general but not invariable exception of human skeletal remains, archaeological material found on private land remains the property of the private property owner.

Key Issues/Current Debates

Most of the laws under which archaeological sites are managed in the USA were drafted and promoted by environmentalists, historic preservationists, and other non-archaeologists, but over the decades archaeologists have adapted to the laws and sometimes become dominant in their interpretation, particularly in the federal land management agencies. This has generated concern about whether implementation of the impact assessment and control laws has come to be biased in favor of archaeology at the expense of other types of historic properties and more broadly defined cultural resources. Indian tribes and Native Hawaiian groups are particularly vocal in their opposition to an overly archaeological approach to management of their heritage. A widespread equation of cultural resource management (CRM) with archaeology – particularly by academic institutions where the latter is taught – has led to confusion about just what the laws are intended to protect (see King 2008, 2011: 534–49; Sebastian & Lipe 2011).

Implementation of the impact assessment and control laws has created a multibillion dollar cultural resource management industry dominated by for-profit consulting firms that perform archaeological, historical, and architectural surveys, studies, and impact-mitigation work like rescue archaeology under contract. The quality of this work, its value as research, its usefulness to the public, and its cost-effectiveness are sometimes questioned by a range of interests, including members of congress, development firms, nongovernmental organizations, Indian tribes, and archaeologists themselves. The fact that most impact assessment and mitigation work is done by contractors for the proponents of the very projects that threaten or destroy archaeological sites and other aspects of cultural heritage raises questions about whether and how much archaeologists have become shills for development interests (see King 2009). Most archaeologists working in CRM deny that they are stooges for destructive industries, however.

The boom in archaeological fieldwork under the heritage laws has greatly exacerbated the problem of what to do with fieldwork's products – particularly recovered artifacts and other material. The poor fit between burgeoning collections and limited curatorial facilities – for which the term "curation crisis" was coined in the 1990s (see Childs 1995) – remains unresolved, although the US Army Corps of Engineers and others are working hard to address it.

In the 1980s and 1990s, there was considerable conflict between archaeologists and indigenous groups, including Indian tribes and Native Hawaiians, over the treatment of ancestral human remains and associated cultural items. Although the enactment and more or less systematic if often highly bureaucratized implementation of NAGPRA has ameliorated this conflict, treatment of the dead and their belongings, and even of

ancestral artifacts in general, remains something of a prickly subject (see Thomas & DeLoria 2001; Watkins et al. 2008). At the same time, NAGPRA has forced the development of relationships between archaeologists and tribes that would doubtless never have evolved otherwise. Hester Davis (2010: 191) has asserted that NAGPRA "has changed the world of American archaeology . . . forever," by altering the power relationships between archaeologists and indigenous communities and requiring the former, at least, to adapt to new realities. Meanwhile, conflicts continue to arise from time to time not only between archaeologists and Native Americans but between archaeologists and groups whose ancestors are not embraced by the protections of NAGPRA, such as the descendants of enslaved Africans (c.f. Hansen & McGowan 1998).

Offshore, the treatment of shipwrecks and other submerged archaeological resources continues to be a contentious issue. US archaeologists, like their compatriots in the United Kingdom and elsewhere, tend toward reflexive revulsion at the damage ostensibly done to such resources by "treasure hunters," even when such damage is controlled through application of high-quality archaeological methods. As Sean Kingsley (2010, 2011: 223–44) had detailed, the same archaeological communities seem less concerned with the far more extensive destruction of wrecks wrought by modern deepwater fishing.

Academic archaeology in the USA tends to ignore CRM or to treat it as an uninteresting low-grade specialization in which its second- and third-rate students can find employment. This tends to become a self-fulfilling prophecy; academic institutions pump poorly trained, badly motivated, and uncreative archaeologists into the CRM industry, leading to intellectual stultification and ethical lassitude. There are ongoing arguments over who is "qualified" to conduct archaeological work under the heritage laws. Agencies like the National Park Service and organizations like the Register of Professional Archaeologists (http://www.rpanet.org/) promulgate and apply professional standards to resolve such arguments, but these are of little use as long as the academic community fails to produce graduates who appreciate and engage with CRM's intellectual challenges.

International Perspectives

It is probably safe to say that archaeologists in other countries – to the extent they consider the matter – view the US system with a degree of mild bemusement. Just as US archaeology differs from much of the world's archaeological practice by being mostly embedded in anthropology, so its legal management regime for archaeology differs from those of many nations by being integrated (sometimes uncomfortably) into the US historic preservation system. The non-centralized nature of this system and the grudging respect it accords to private property rights also contrast with the legal systems of many other countries.

Because the USA has since World War II been a major player in the arena of international heritage preservation – usually represented by the federal agencies who dominate official US practice and are guided by US policy – there is some tendency to think of the US system as a model for other nations, but this may be ill-advised. The US laws governing archaeological resource management are the products of their own unique evolutionary trajectories and are not necessary relevant to the experiences, political structure, resources, or needs of other nations (c.f. King 2009; 2010).

Future Directions

Predicting the future is always a chancy affair, and doing so in a year like 2012 is particularly problematical. Should the current economic recession continue or deepen, should the revolutions large and small continue that have brought people into the streets of the USA much as they have in Cairo, Sa'ana, and Tripoli, it is possible to imagine substantial change in the economic and regulatory regimes that define how CRM, among many other things in the USA, is carried out. On the other hand, inertia is a powerful force, and the now-existing CRM system, though its history is

not long, is fairly deeply embedded in the government and industrial bureaucracies. The first generation of US CRM archaeologists is dying off, and the new generation seems, on the whole, to be content with the status quo. An interorganizational group calling itself the Federal Historic Preservation Task Force produced a report in mid-2011 calling for a variety of changes in the structure of CRM within the federal government (Federal Historic Preservation Task Force 2011). The changes proposed are mostly of a tinkering sort, however, and like most proposals by such "insider" organizations, the Task Force report mostly calls for more funding and more official attention to its subject – neither of which is likely to be forthcoming under current political and economic conditions. Absent some dramatic change in the US government's approaches to land use and development and environmental protection and regulation – which *could* happen – it is probably safe to expect the current system to continue into the foreseeable future.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management and Maritime Law
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Ethics of Commercial Archaeology: USA
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)

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Further Reading

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Antiquities Act, 16 USC 431–433.

Archaeological and Historic Preservation Act, 16 USC 469-469c-2.

Archaeological Resources Protection Act, 16 USC 469-469c.

36CFR Part 800, Protection of Historic Properties, Advisory Council on Historic Preservation.

36CFR Part 79, Curation of Federally Owned and Administered Archaeological Collections.

40 CFR Parts 1500–1508, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, Council on Environmental Quality.

43 CFR Part 10, Native American Graves Protection and Repatriation Regulations, National Park Service.

Historic Sites Act. 16 USC 461–467.

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United States: Cultural Heritage Management

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Introduction

The protection and management of cultural heritage in the United States comprises a complex mosaic of government, local, and indigenous stakeholders interacting within a federal political system with a strong tradition of private and entrepreneurial involvement (McManamon 2000; Murtaugh 2006). In the United States, the protection afforded to cultural resources depends on where the resources are located and who owns them. One-third of the US landmass, concentrated disproportionately in Alaska and the westernmost states, is federal property, and there are heritage sites effectively owned and managed by the national authorities. The remaining two-thirds is owned by state, municipal, and private entities; the ability to manage heritage sites in this area varies considerably. Properties on state lands may enjoy the full protection of preservation laws, while cultural heritage protection on privately owned lands is generally negligible given the strong influence of private property rights in the American legal tradition. In addition to its 50 states and several territories, the United States is home to 565 federally recognized Indian tribes as well as numerous other tribes recognized at the state level and a host of ethnic and minority populations, all of which have a stake in cultural heritage preservation.

Key Issues/Current Debates/Future Directions/Examples

The preservation movement in the United States began in the nineteenth century when groups of private individuals initiated efforts to preserve buildings and sites associated with important personages in the nation's early history (e.g., George Washington's Mount Vernon Estate and Andrew Jackson's Hermitage). Patriotism and moral instruction were the chief motivating factors driving preservation until the twentieth century, when aesthetic interests relating to the preservation of buildings, furniture, and other cultural objects assumed prominence (Murtagh 2006: 11–23). Little attention as yet was paid to archaeological sites, but historic houses, house museums, historic villages (e.g., Colonial Williamsburg in Virginia and Greenfield Village in Dearborn, Michigan), and historic battlefields (often originally acquired by the military for instructional purposes) were common by the middle of the twentieth century. In 1949, the congressionally chartered National Trust for Historic Preservation was created to promote preservation of nationally significant "sites, buildings, objects, and antiquities" and to facilitate public participation in the same (Murtagh 2006: 172). The National Trust is a private, nonprofit organization that owns a small group of historic properties and continues to serve as a focal point for education, advocacy, and information about preservation in the United States.

The federal government's role in cultural heritage preservation began haltingly in the late nineteenth/early twentieth century but has grown steadily in importance and influence since that time. Today federal involvement dominates the preservation field in terms of legislation, policy, and funding. In 1892, the

ruin of a deteriorating prehistoric pueblo at Casa Grande, New Mexico, was rescued by a presidential executive order following a lobbying campaign led by concerned citizens (McGimsey & Davis 1984: 116–117). Later, a 6-year advocacy effort by scientific and archaeological organizations to deter rampant commercial exploitation and vandalism of other prehistoric sites in the American Southwest resulted in passage of the first federal preservation legislation, the Antiquities Act of 1906 (Harmon et al. 2006). The Antiquities Act outlawed unauthorized excavation, damage, or removals from archaeological and historical sites, monuments, and objects on federal lands and authorized the president to preserve sites, structures, and objects of archaeological and scientific interest by declaring them national monuments. Cultural and natural sites were steadily reserved as national monuments and parks in the years following passage of the Antiquities Act. In 1916, this activity received additional stimulus by the creation of the National Park Service, which assumed responsibility for management of the national parks. Today the National Park Service manages almost 400 national parks in 50 states, comprising 84,000,000 acres of land containing more than 68,000 archaeological sites and 27,000 historic structures (National Park Service n.d.).

Preservation of cultural heritage became the official policy of the United States in the 1935 Historic Sites Act, which declared that "it is a national policy to preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States" (quoted in Murtaugh 2006: 172). This often-overlooked law is significant for the way for its encouragement of public-private partnerships dedicated to preserving cultural heritage; in that sense, it foreshadows some of the provisions of the later National Historic Preservation Act of 1966, which adopt a similar approach. The Historic Sites Act encouraged the collection of data regarding heritage sites, including "a survey of historic and archaeologic sites, buildings, and objects," regardless of whether the sites were publicly or privately owned. The Secretary of the Interior was also empowered to make cooperative agreements – again, with both public and private entities – to protect cultural heritage of significance to the nation and to acquire, restore, and operate the same. The Historic Sites Act became the basis for the creation of the National Historic Landmarks program (McGimsey & Davis 1984: 118; Murtaugh 2006: 43–44).

The federal government's ability to manage archaeological heritage was greatly strengthened by the passage of the Archaeological Resources Protection Act (ARPA) in 1979. This law makes the excavation of archaeological sites on federal and Indian lands without a permit illegal; establishes criminal penalties for looting, vandalism, and destruction of sites; and prohibits the sale, purchase, exchange, transport, export, and receipt of archaeological resources obtained illegally. The 1988 amendments to ARPA require federal agencies to survey their lands for archaeological resources and to promote public awareness of the importance of heritage preservation. During the 1990s, a series of high-profile prosecutions and legal cases confirmed ARPA's status as an effective anti-looting tool, applicable in certain situations even to activities on private land (Hutt et al. 1999: 188–232).

Management of cultural heritage on both public and private lands received a dramatic boost with the passage of the National Historic Preservation Act (NHPA) of 1966. Later amendments, executive orders, and regulations, as well as complementary environmental legislation, have turned the NHPA into an effective tool for protecting and managing historical sites, landscapes, and archaeological resources at not only the federal level but in the state, local, and private spheres as well. The NHPA established an inventory of significant cultural properties, called the National Register of Historic Places (King 2008: 87–107), and encouraged states to create State Historic Preservation Offices (SHPO) in order to develop plans for the identification and management of cultural resources, administer grant programs for local preservation projects, and review projects for compliance with federal law. The NHPA also created a federal agency

called the Advisory Council on Historic Preservation to provide comment and advice on proposed federal actions affecting cultural heritage. The 1992 amendments to the NHPA allow federally recognized Indian tribes to develop Tribal Historic Preservation Offices to carry out the same preservation functions as the SHPO on the state level and created a research unit of the National Park Service called the National Center for Preservation Training and Technology.

One of the most significant features of the NHPA is its "Section 106" provision that requires federal agencies to "take into account" the effect of their actions on significant cultural sites (King 2008: 109–206). This requirement applies not only to direct actions by federal agencies (e.g., construction of a new road in a national forest) but also to federally assisted actions, many of which take place on, or affect, private property. For example, because proposed construction of an interstate natural gas pipeline requires a permit from the Federal Energy Regulatory Commission and is therefore a "federally assisted action," Section 106 of the NHPA would trigger surveys for archaeological sites and historic properties of the areas affected by the construction even if the "impact areas" were all located on private property. The approach adopted in Section 106 is noteworthy and perfectly suited to the US situation. First, it requires every federal agency, not a single authority (the United States, unlike many nations, has no ministry of culture), to assume responsibility for preservation. This diffusion of legal responsibilities for preservation makes sense because multiple federal agencies have direct control over cultural heritage on lands they manage. Overtime preservation planning has become an established, integrated component of US federal agency activities, and most US land-managing or land-developing agencies now have professional staffs including archaeologists, architectural historians, and preservation planners. Second, Section 106 requires preservation on affected private lands without challenging the traditional primacy of private property rights; it does this by imposing regulatory requirements for preservation to ensure that significant cultural heritage is not destroyed through the activities of federally funded or federally assisted projects carried out on private lands. Thus, the NHPA affords welcome, albeit limited, opportunities to identify and protect cultural heritage located on private property, where cultural heritage found on or beneath the soil generally belongs to the private landowner and is otherwise subject to little, if any, regulation.

The NHPA dramatically transformed the US system of cultural heritage management and is largely, though not solely, responsible for shaping the modern discipline of cultural resource management in the country. It enhanced the responsibilities of the National Park Service beyond its park-management functions within the U.S. Department of Interior to the point that the agency has become the premier preservation agency for the country. Home to the National Register of Historic Places, National Historic Landmark Program, Heritage Documentation Programs, and National Center of Preservation Technology and Training, the Park Service provides vital advice and consultation for the numerous federal agencies that have responsibilities for preservation and management under the NHPA, ARPA, and other legislation. The NHPA also is responsible for the creation of the Advisory Council on Historic Preservation, a federal agency, and for state and tribal preservation offices (SHPO, THPO). Today every state and territory has a SHPO; they serve as highly visible centers for the coordination of preservation efforts in their areas. Many states have enacted legislation to protect and manage cultural heritage on state lands or affected by state-funded or state-assisted projects, much as NHPA does on the federal level. There are also currently 118 THPOs performing heritage-related and compliance functions for Native American tribes in 28 states (National Association of Tribal Historic Preservation Officers n.d.).

By requiring review of projects for their effects on cultural sites, the NHPA also stimulated the emergence of a veritable cultural resource management industry that employs thousands of private consultants, entrepreneurs,

and government specialists who are either involved in conducting archaeological and historic preservation studies or reviewing them in accordance with government laws and regulations (McManamon 2000). The growth of nonacademic professional archaeology in particular was affected by this development; the new field of "contract archaeology" not only provided a welcome source of professional employment but also in turn influenced the more traditional, academic field of archaeology as new engagement with public and private stakeholders engendered a rethinking of professional ethics and practice, which has come to be known as "public archaeology."

For most of the twentieth century, federal legislation and policy equated cultural heritage protection with the national interest, that is, a unitary, shared public interest that all Americans might embrace. Two important laws late in the century reflect a more fragmented view of cultural heritage rights. First, the 1987 Abandoned Shipwreck Act removed abandoned shipwrecks in the 3-mile US territorial waters from the jurisdiction of federal admiralty courts, where they had been regularly seized by treasure hunters intent on mining them for commercial profit and assigned their title to the states. Unfortunately many of the states still have regressive laws that encourage commercial salvage of historic shipwrecks while imposing some level of archaeological oversight. The Abandoned Shipwreck Act also recognizes treasure hunters as valid stakeholders, in contrast to the situation on federal lands, where looters of archaeological sites are subject to criminal prosecution (Elia 2000: 46–47).

Second, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 gives two groups – Native Americans and Native Hawaiians – special rights to recover and own affiliated cultural heritage (Hutt et al. 1999: 232–248; King 2008: 260–270). This law establishes a mechanism for the repatriation of certain human remains, funerary objects, sacred objects, and objects of cultural patrimony both from federal lands and from museums and other curatorial institutions. In addition to helping to redress historical inequities in the often-troubled relationship between these indigenous groups and mainstream Euro-American culture, NAGPRA also requires consultation among archaeologists, federal agencies, museums, and the native groups. This obligation to consult has proven to be one of the most salutary effects of NAGPRA and has helped to promote the active involvement of indigenous populations in the US preservation system as well as a greater understanding among the various stakeholders.

The federal government's role in cultural heritage management has been decisive domestically since the 1960s, as has the constructive involvement of the states through their SHPOs and, to a lesser extent, the municipalities through encouragement of preservation through zoning and other local regulations. Even so, the importance of the private sector should not be overlooked. More historic buildings and house museums are certainly owned by private individuals and groups than by government, and the same is true for museums and other cultural attractions. Public ownership of archaeological sites is the only exception to this pattern, in the sense of recorded sites that have been brought under effective control for management purposes, although even in the case of archaeology some private organizations (e.g., the Archaeological Conservancy) are acquiring sites for the purpose of preservation.

At the international level, the United States has a mixed record of participation in conventions relating to cultural heritage. It signed the 1954 Hague *Convention for the Protection of Cultural Property in the Event of Armed Conflict* in 1954 but only ratified the treaty in 2009 after a difficult and controversial experience following the invasion of Iraq in 2003 that witnessed the looting of the Iraq Museum and the pillaging of numerous archaeological sites. The United States ratified the 1970 UNESCO cultural property convention in 1983 but has not ratified the 1995 UNIDROIT *Convention on Stolen or Illegally Exported Cultural Objects* and shows no signs of moving in that direction. It did ratify the 1972 World Heritage Convention and currently has eight cultural properties, twelve natural

properties, and one mixed property listed on the convention, with several nominations pending. Finally, the United States has not taken steps to ratify either the 2001 UNESCO *Convention on the Protection of the Underwater Cultural Heritage* or the 2003 UNESCO *Convention for the Safeguarding of the Intangible Heritage*.

In sum, the US system of cultural heritage management is a thriving, dynamic, and imperfect enterprise involving specialists, entrepreneurs, government and private actors, and a host of interested parties working to protect and preserve historic buildings, landscapes, districts, archaeological sites, national landmarks, national heritage areas, and cultural objects. Although serious problems continue to affect the field, including the challenge of protecting cultural heritage on private property, chronic underfunding for heritage projects, and periodic legal challenges to preservation legislation, cultural heritage management is a well-established fact of American life and public awareness of the value of preservation is at an all-time high.

Cross-References

- ► Cultural Heritage Management and Armed Conflict
- ► International Conventions Pertaining to Heritage Policy: Introduction

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United States: Cultural Heritage Management Education

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Introduction

Since the Society for American Archaeology issued its turn-of-the-century call for a renewed vision for archaeology education (Bender & Smith 2000), a profound change has taken root in this endeavor. Contributors to the 2000 SAA volume noted that the conceptual structure of archaeology's curricula had changed little since the mid-twentieth century, despite significant advances in method, theory, data accumulation, and the contexts in which archaeological research was conducted. Major advances in scientific data acquisition techniques, analytical methods, and theoretical modeling had kept academic archaeologists' vision of the discipline centered on its

historiographic research aspects, yet at the same time the introduction of historic preservation law in the USA introduced a specifically public context for the discipline's practice. In 2000, the call was for those who teach archaeology to acknowledge its public dimensions and begin to train students to understand and function effectively in the latter contexts as well as in traditional research dimensions. Those scholars who adjured their colleagues to take heed of the need for such revision emphasized the notion that archaeological practice extended beyond pure research, but they still conceptualized the archaeological record traditionally: as a finite, material resource to be understood through the methods of science.

In response to those early efforts, which were heavily influenced by the contemporary articulation of the Society for American Archaeology's standards for archaeological ethics (Lynott & Wylie 2000), a new paradigm for archaeological education began to emerge through such initiatives as the MATRIX project (http://www.indiana.edu/~arch/saa/matrix/homepage.html). The conversations engendered by this work encouraged archaeologists to explore the many public dimensions of archaeological practice and their consequences for archaeology curricula. Soon traditional concepts such as "The Past" and its material manifestations, "Archaeological Resources," became subsumed in the more broadly conceived and socially contextualized concept of "Heritage," broadly defined as "the full range of inherited traditions, monuments, objects, and living environments, and [extending to] the range of contemporary activities, meanings, and behaviours that are drawn from them" (Chilton & Mason 2010). As this conversation unfolded, notions of the archaeological practices of historic preservation and cultural resource management became more broadly situated in the attendant domains of heritage studies or heritage management.

Definition

In all their manifestations, heritage studies programs are highly interdisciplinary and require that students develop an understanding of archaeology practice as it is inflected by the theoretical and methodological perspectives of such disciplines as history, sociology, sociocultural anthropology, architecture, environmental biology, communications, historic preservation, literature, and urban and rural planning. Under this rubric, students of archaeology develop a concept of a past that is recorded not only through tangible heritage, commonly thought of as archaeological resources, but also through the intangible, defined as "The practices, representations, expressions, knowledge, skills. . .that communities, groups, and in some cases, individuals recognize as part of their cultural heritage" (Ahmad 2006: 298). Managing a heritage thus defined not only requires knowledge and skills developed through scientific approaches to the past but also those rooted in the humanities.

Heritage studies and management programs are also focused on archaeological practice, as were their predecessors, cultural resource management programs, and, like their predecessors, heritage programs regularly emphasize the applied dimensions of their courses of study – specifically, teaching students to become effective professionals in heritage planning and management (cf. University of Maryland, Graduate Studies; University of Massachusetts, Center for Heritage Studies; Texas Tech University, Heritage Management Program). Beyond this shared concern with professional practice, Heritage Studies and Management programs differ markedly from their forebears in their notions of what is entailed in such practice. Programs moving to a heritage focus are generally heavily centered on developing expertise in arenas originally mapped out by British and European scholars, including such elements as developing an understanding of the effects of collective memory on historical narratives and learning how to engage processes that can articulate the many meanings and values associated with the material fabric of the past (e.g., Lowenthal 1985; Stone & Molyneaux 1994; Stone & Planel 1999; and Zerubavel 1996). Students in programs with a heritage focus are encouraged to think critically about

how best to administer and conserve heritage and landscape in lieu of resources and sites.

Formal degrees awarded through Heritage Studies and Management programs are usually confined to the master's, although a few also offer a doctoral program. In the latter instance, the emphasis on practice is coupled with an emphasis on original research (cf. University of Maryland, Graduate Studies; Indiana University, Center for Archaeology in the Public Interest).

Key Issues

Heritage Studies and Management programs are a relatively new phenomenon in United States academic institutions. The first programs to use this nomenclature emerged at the turn of the twenty-first century, and a number are currently under development or recently announced. This nascent status brings with it several challenges as well opportunities.

The challenges to these programs center on the definition of heritage studies academic structure and, in particular, the role of archaeology within such a highly interdisciplinary undertaking. The student who is interested in pursuing a heritage studies program has to search under many different program umbrellas to find the desired course of study. Some programs reside in independent centers (e.g., University of Massachusetts, Center for Heritage and Society; Montclair State University, Center for Heritage and Archaeological Studies; Texas Tech University, Center for Advanced Study of Museum Science and Heritage Management), although only the latter offers a degree program. Others are imbedded in historic preservation programs (e.g., University of Pennsylvania; University of Florida; Georgia State University), while still others are offered as specialized tracks – frequently applied – within anthropology programs (e.g., Indiana University; University of Maryland; University of Minnesota). In keeping with this variety of disciplinary homes, there is only minimal agreement among proscribed curricula, beyond the requirement of practical training in the form of an internship, practicum, or fieldwork. Method requirements range widely from standard archaeological and/or archival methods through qualitative and quantitative methods to innovative video and digital applications. Only a few core courses in heritage studies or heritage management can be found listed within these programs, and at least some seem to be only marginally altered from earlier historic preservation or cultural resource management programs. It is to be hoped that academic institutions in the United States might move toward a greater uniformity in the institutional placement of heritage studies. Such alignment might go far toward resolving the issues surrounding heritage studies curricula.

Since the theoretical underpinnings of heritage studies rest as much in history and sociology as in anthropology, the relationship between heritage studies and traditional archaeological curricula is particularly unclear. The most interdisciplinary of the Heritage Studies and Management programs decenter the study of archaeology and include it as yet another, sometimes optional, component in the course of study. Such programs emphasize the social dialogue around the interpretation, preservation, and administration of heritage and seek to make archaeological concerns a component in a set of overlapping and equally legitimate perspectives on the academic and social dimensions of heritage. In contrast, programs that imbed heritage management in anthropology curricula tend to proscribe programs of study that emphasize the links between archaeology and sociocultural anthropology through required courses in field and analytical methods, theory, and in some cases ethics. Where the Heritage Management Program is offered as a degree in applied anthropology, the course of study often mimics earlier cultural resource management programs with its emphasis on gaining professional archaeological skill sets – including working knowledge of the preservation law that surrounds archaeological practice. Indeed, as heritage management programs continue to replace cultural resource programs in the academy, it will be critical to resolve the issue of how to integrate a robust study of core heritage theory and practice with traditional training in archaeological practice. Here a key

question is "how much can traditional archaeological training be attenuated to allow for training in allied disciplines that claim the past as their subject of inquiry, as well?" Clarity around the differences between cultural resource and heritage management study is essential, along with a definition of the knowledge and skills that a heritage manager with archaeological expertise should possess. The resolution of these issues might then inform the development of Heritage Management Programs, many of which have been inaugurated without benefit of such clarity.

The opportunities presented by the new Heritage Programs are, at the same time, striking. As students in these programs develop the knowledge and skills involved with practicing archaeology in a broad sociocultural and academic context, professional archaeologists will become engaged in a multivocal conversation about the meanings of the past and the most effective ways of preserving and interpreting it – especially in the service of larger social programs that may seek to develop national or local identities or economic opportunity through heritage tourism. Such a dialogue will inevitably require that archaeologists articulate the meaning and importance of the discipline to a broad and diverse audience. Successful engagement in this exchange should strengthen disciplinary practice as well as recruitment of a diverse group of young professionals. Moreover, since the conversation about heritage is at its foundation international (Ahmad 2006), US archaeologists will need to reflect on their practice in a broader arena, one that includes indigenous voices as well as professional perspectives from around the world and that demands reference to the ethical parameters of studying the past. The professional self reflection required by such developments can only lead to an engaged practice with wider credibility and viability in the United States.

Cross-References

- ▶ Australia: Cultural Heritage Management Education
- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Brazil: Cultural Heritage Management Education
- ▶ Canada: Cultural Heritage Management Education
- ▶ China: Cultural Heritage Management Education
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Ethics in Archaeology
- ▶ Heritage and Archaeology
- ▶ Heritage and Higher Education
- ▶ Heritage Theory
- ▶ Heritage Values, Communication of
- ▶ Intangible Cultural Heritage
- ▶ Japan: Cultural Heritage Management Education
- ▶ Peru: Cultural Heritage Management and Education
- ▶ Society for American Archaeology (SAA): Committee on Ethics
- ▶ United Kingdom: Cultural Heritage Management Education

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Universal Museums

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Introduction

The ideal of universal museums came to prominence in the European Enlightenment and has recently come into new focus with the controversy provoked by the "Declaration on the Importance and Value of Universal Museums," issued in 2002 by a series of prominent Western museums, to defend their institutions against rising repatriation demands.

Definition

The term "universal" or "encyclopedic" museum today refers mainly to famous museums with collections of art and other cultural items from around the world, not just from the nation where they are located. However, the term has also been used for museums focused on technology, science, and other fields. The most recent museum deploying the term may be the Universalmuseum Joanneum in Austria, officially renamed in 2009. It has wide-ranging collections ranging from naturalia to paintings and was founded in 1811 to gather everything that "nature, the changing times, human industry and perseverance have created" (Universalmuseum Joanneum 2012).

Historical Background

The term "universal" itself reflects an underlying yearning for all-encompassing coverage or completeness that is actually shared by most museums. On a psychological level (cf. Muensterberger 1994), this desire for the universal is seen already in the individual collectors' urge to achieve completeness in his chosen genre (stamps, arrowheads, etc.). Amassing and organizing objects in collections offers profoundly satisfying opportunities to exercise mastery and control – difficult to achieve in the external "real" world marked by inhibiting social and power inequalities. For individual collectors, universal coverage (whether conceived and celebrated in private or proudly displayed for an audience) becomes a crowning achievement.

The same yearning for universality is found in museum institutions, only on a much larger scale and usually emphasizing competitive, public display, not inward-looking escapisms as in some private collecting. This is true for many of the early cabinets of curiosities, the collections of naturalia, and other items assembled around Europe in Renaissance times and earlier (Hodgen 1964; Pomian 1990), alongside the compilation of "cosmographies" aiming to organize all knowledge – formal precursors of the Enlightenment's encyclopedias, a project for dispelling the darkness of ignorance. The "cabinets," also known as either *Wunderkammer* or *Kunstkammer*, represent one of the key strands of early modern museums origins, though their organization often lacked the scientific

systematicity of modern museums and instead reflected individual collectors' wondrous eccentricity. But most were subsumed into the main trend towards politically significant competitive display, the hallmark of modern museum-building in the formative era of eighteenth–nineteenth-century Europe. The resulting prominent modern museums also built on the most prestigious royal collections, which had been amassed to dazzle élite subjects and competitors, and impress upon them the superior ability of the king to out-collect everyone else. Such arrangements existed in many parts of the world, but in post-Renaissance Europe, in the new context of competing modern nation-states racing to divide the world between them, they were transformed into something new. In order to enhance their respective country's international prestige, governments and patriotic elites began to invest in national museum institutions, assuming responsibility for existing royal and other collections and making them fully public, sponsoring scientific expeditions and other collecting around the world (including diplomats bribing locals to give up spoils from local monuments), casting the net ever wider, and then organizing and permanently displaying the catch, above all in their respective national capitals, so as to outshine competing countries—in parallel with the (periodic and temporary) universal expositions or world fairs of the same era. The resulting museums' purposeful goals of educating their home citizens into modern subjects, not least by instilling in them a certain awe of the ever-expanding reach and knowledge of their own country, were pursued by scientists, curators, patriotic benefactors, and officials (Hooper-Greenhill 1992; Bennett 1995; Duncan 1995; Duncan & Wallach 2004), also drawing on the universal aims of earlier collections. The competitive pursuit of such permanent encyclopedic displays animated a grand international contest, propelling the formation of today's most famous comprehensive "universal museums" in the imperial-colonial Western powers, such as France, Britain, Russia, and the USA.

Among them, the Louvre is an archetype and is still the world's most visited museum. Founded by a 1791 revolutionary decree, it opened 1793 in a former royal palace which has been continuously elaborated since then (McClellan 1994; Déotte 1995; Duncan 1995; Lee 1997). The Louvre formed a model universal museum not only for Europe but for the whole world. Its key characteristics were the intentional gathering, installation, and display of art and antiquities, from France as well as from foreign lands, including Italy and Egypt which Napoléon targeted for this purpose. Though some Italian items later had to be returned (and some Egyptian spoils were seized for the British Museum), the pattern was set for state-sponsored acquisition on a global scale and stately display with universal pretense.

The grand ambition of displaying all the world's culture and history made the museum a showcase of the global reach and prowess of the new French state in achieving such universality, where other, and therefore lesser, countries could not. It also involved highlighting the dead civilizations of Rome and Egypt, implying that France had inherited their position as the pinnacle of civilization. The museum formed an embodied narrative, a fictional civilizational genealogy, which served as a spectacular challenge to other countries – above all in Europe but also stirring mimicry in the USA, in Japan, and elsewhere, in creating similar symbolically significant object-based narratives of the place of self and others within the totality of human history.

It is very important to note how "art" became the privileged genre of the most prestigious universal museums and how these should be understood as part of a constellation or ensemble of museums, itself aiming for universal coverage. The division of labor between museums seems natural today, but its organization is itself an ethnographic datum open to analysis. Like the singular universal museum, these constellations of museums together reflect a distinctively modern, universalizing macroscale "cosmography" of the world (Fiskesjö 2007; compare Baudrillard 1996). At the core is the new conception of an art/science duality that organizes modern museum constellations, replicated in most national capitals. While the Louvre's

early mission was to gather "all monuments of the sciences and the arts," including those "alien to art" (cf. Lee 1997: 404 – 405), "art" was soon privileged. In 1793 the Louvre was given a "science" counterpart, the Muséum d'Histoire Naturelle, also with universal aims but in a separate range. In the earlier cabinets of curiosities, collections had often been organized in terms of materials – a principle sustained in the fabled Medici collections in Florence even as they were augmented by exotic novelties from the Americas (Turpin 2006). But in the early nineteenth century, the cardinal classificatory divide became a distinction between human-made art on one side and science, nature, technology, and/or industry on the other.

This main divide (which also splits modern archaeology) is both highlighted and perennially challenged by the ambivalence of "primitive" contemporary or recent humans and their cultural expressions, from stone tools to sculptures: Should these be arranged with science? (as they have been, in the American Museum of Natural History, where primitive peoples figure next to dinosaur fossils) – or could they be placed alongside the fine arts normally associated only with "high" civilizations? (as they almost have, in the new Quai Branly state museum in Paris, created by extracting aesthetically qualifying "primitive art" from the ethnographica of other state institutions and purposefully begun with a show inside the Louvre). Asian civilizations present a similar classificatory conundrum: Until 1945 the Louvre housed Asian ethnographic displays later relocated to a specialized state Asia museum, the Guimet. Because Asia's "high" civilizations disrupt the unilinearity of "Western civilization," they are difficult to arrange within the work in progress of universal cosmography orchestrated and embodied in the total ensemble of museums in Western capitals.

But why has art since the nineteenth century come to occupy the top, above science, in an almost universally taken-for-granted value hierarchy of museums? And how did it become possible for art museums like the Louvre or the Metropolitan Museum of Art in New York to claim, virtually unchallenged, a status as "universal museums" – even though they present only aesthetically distinctive artworks as tokens of this universality (i.e., they are restricted (a) to what is human and (b) to one privileged subset of human activities)? The ascendance of art museums unfolded as a drawn-out nineteenth-century struggle (Conn 1998). It involved reshaping the conceptions of both art and science so that artworks from a certain limited range of European genres (painting, sculpture, etc.) became revered as expressions of a superior ideal, namely, beauty. Through the work of Kant and other Enlightenment thinkers, the conception (and worship) of beauty as a universal higher principle to some extent replaced that of religious deities – which accounts for the temple-like character of the new art museums. The "universal" claim of the Louvre as an art museum is built on the corollary notion that the pursuit of beauty is universally human and can be selectively sampled (alternatively, "rescued") from around the living, dying, or dead cultures of the world – as tokens of this noble striving. Equally important is the related sociological explanation that the practical uselessness of fine-arts objects (as opposed to scientific samples or technical tools) renders them more useful on a symbolic level: They become the preferred vehicles of ostentatious investment by wealthy donors, often themselves hands-on industrialists, who seek to acquire social prestige through donations of expensive items dedicated to universal beauty, not industrial or commercial profit. Their sacrifice secures a symbolically valuable affiliation with the ever-growing, increasingly venerated museums (not unlike the donor-adorned churches of the previous era). The art museums' superior wealth and status as arbiter of "the universal" today derives largely from this powerful, mutually reinforcing attraction between donors and the museums that validate and recognize their gifts.

And yet, from the start, this symbiotic relationship became the rallying point of the critics of the new universal museums. Their grandfather is the conservative Quatremère de Quincy (1755–1849), famous for his *Lettres à Miranda* and other attacks on the creation of the

Louvre. He favored the appreciation of art in its living context and, at most, state funding for the adornment of public space. But to do as the Louvre, "to displace all these monuments, to gather up . . . the decomposed fragments and put the debris in methodical order is . . . to constitute ourselves as a dead nation; [. . .] is to attend our own funeral while we are alive; it is to kill Art to write its history; but it is not history, it is its epitaph" ([1989]: 47–8; Sherman 1994; also Déotte 1995; McClellan 2009). However, Quatremère's "we" is the old aristocracy, whereas the new art belongs to the new industrial-commercial bourgeoisie. For them, the art objects' ostensible detachment and installation in museums set apart from marketplace commerce are exactly what makes their investment successful. Thus, Quatremère et al. only managed to abolish the secular Musée des Monuments Francais (1790–1816), whose church adornments were returned as the revolutionary rejection of religion was reversed, but the Louvre survived. It went on to serve as the archetype for the amassing of "debris" and "fragments" of world culture (the decapitated, museumized Buddha heads from Asia may be the most glaring example of such decontextualization) swept up in an unprecedented frenzy of looting and trade, then donated and installed as art, exactly as Quatremère had feared – only on a global scale, with universal aspirations, far beyond the national homeland, Rome or Egypt.

Key Issues/Current Debates

In the present-day era of globalization, the significance of nation-states has declined and shifted towards the management of a transnational economy; the circumstances of national museums have also changed dramatically along with increased global travel and migration – notably with new communications technology. A new awareness has spread regarding the illicit enterprise building the West's universal museums, as part of a history of conquest, colonialism, and unjust exploitation. This has engendered widespread new criticism and demands for repatriation, both within and outside of the post-WWII framework of UNESCO conventions which, even though constrained by their international framing, nevertheless provide a workable global framework for the return of once-stolen objects.

Apart from a wave of demands for human remains from "Fourth World" peoples, the most publicized claims are made in the name of modern nations. They include Egypt's request for the Nefertiti head held in Berlin, Peru's demand for the Machu Picchu materials in the USA, the successful Italian requests to US museums based on stunning police work exposing the international antiquities racket which supplied these museums, Ethiopia's successful repatriation of the enormous Axum obelisk stolen by Mussolini and installed on a Roman square but eventually flown home with UNESCO help, and the long-standing Greek claim on the Parthenon marbles still held by the British Museum in London. The impact is in sharp contrast to the comparatively smaller waves made – in the pre-Internet era – by battles such as that over the lintel (an elaborate sculptural relief) from Thailand, smuggled to the USA in the 1980s, sold to private collectors, and donated to the Art Institute of Chicago, which stubbornly delayed its return despite Thai outrage and slam-dunk evidence for its illicit removal.

In the face of this rising wave, a group of 18 prominent Western art museums (including the Louvre, the Hermitage in St. Petersburg, and the Metropolitan Museum of Art in New York) in late 2002 issued an unprecedented "Declaration on the importance and value of universal museums" (see Prott 2009). Acting in solidarity with the British Museum against Greece and unilaterally self-identifying as "universal museums," they sought to invest new meaning in this concept as an ideal to be defended in the face of repatriation demands – and the rising sympathy for those demands in the global public. They now argued that even though past looting was deplorable, these museums today serve a noble purpose for humankind as a whole by virtue of having amassed cultural artifacts from all over the world and publicly displaying

them in the world's most visited cities, so they should not be disassembled. This ignited a new, still ongoing global debate. A series of prominent voices have sought to praise the universal museums as embodying not the selfish hoarding of stolen goods but a positive, Enlightenment-inspired cosmopolitanism ever more appropriate in the current era of globalization (Appiah 2006; MacGregor 2009; Cuno 2011; etc.). The invocation of the Enlightenment's encouragement of rational inquiry ("Dare to know," as Kant said) harks back to the Louvre's original self-defense (McClellan 2009). More immediately it draws on the apologists for a global "free trade" in "cultural property" (Merryman 2000, etc.) and paints repatriation activists as narrowly nationalistic, or "retentionist." When repatriation demands are raised in the name of modern nation-states like Italy and China, they are accused of ignoring how these nations are themselves recent creations of the modern era, much younger than the ancient civilizations that flourished on their present territories and often even younger than the universal museums – so there is no case.

International Perspectives

These Western arguments provoke particular ire outside the West, where modern nations often purposefully build a present-day identity as inheritors and custodians of past heritage (Friedman 1994), and the declaration is typically seen as reflecting a self-serving "retentionist" strategy on the part of the richest Western museums. From this perspective, it is striking that the signatories *only* included Western museums – in Paris, New York, etc., rather distant from the global public in La Paz or Lagos. This undercuts the idea that these museums cater to a truly global public (though it must be noted that some, like the British Museum in particular, has recently circulated exhibits abroad, such as in China).

The unilateral declaration was made in the name of "the international museum community" but issued outside of any mechanism of representation other than the taken-for-granted acceptance of these grand art museums as preeminent (see above). This prompted comparisons with the contemporaneous US invasion on Iraq, as examples of Western arrogance (even as a preemptive justification for obtaining antiquities from wartime Iraq). Still, the self-appointed group's revival of the old idea of "universal museums" continues to fuel a new debate over the global ethics of museums and what kind of universality is possible or desirable (see, e.g., O'Neill 2004; Curtis 2005, 2006; Mathur 2005; Singh 2008; Fiskesjö 2010a; Flynn n.d.).

In arguing that the universal museum's collections "... have become part of the museums that have cared for them, and by extension part of the heritage of the nations which house them...," the declaration inadvertently illustrates the point that the narratives of human history were as much about establishing a new form of superior self-identity as about explaining the wonders of the world to its cosmopolitan citizens. But the question has also been asked why objects must remain owned – could they not be temporarily borrowed from Ethiopian or Cambodian custodians? The issue of ownership and the possibility of mutual borrowing for exhibits are not even mentioned in the declaration text. Instead, it makes a related argument about how the captive artifacts themselves have "exercised their influence" on visitors, for their benefit and enlightenment. This can be interpreted as based in a fetishistic theory of the objects as efficacious idols, which partly explains the desire for permanent ownership. Another reason is the related insistence on "authenticity," which defined the work of art in the industrial era. Clearly, the self-declared universal museums still fall short of the ideal of universality.

Future Directions

In the increasingly postindustrial era of digital communications and virtual spectacle, the contemporary universal museums' reliance on national property laws as the last line in the sand for the legitimation of their ownership of looted items will increasingly seem anachronistic. Virtual

universal museums could be created that do not require the keeping of fragments in Western capitals. Potentially, Parisian museumgoers could experience visits to a Phnom Penh gallery or a Cambodian site without the Paris institution having to possess the Cambodian artifacts, which could be returned to that country's on-site custodianship. This could be arranged according to the alternative vision sketched by John Carman in his recent work *Against Cultural Property* (2005). This rejects altogether the current normative legal-economic property regime for world cultural heritage items. There are actually precedents for this in the Cold War-era international conventions in which nations mutually agree to not apply earthly modes of ownership to celestial bodies, which are by consent put outside of the property regime (no state can own them, and individual claims will not be backed by nation-states). The same could be agreed for humanity's cultural heritage, which might be universally shared in on a global scale while still protected locally in its proper context.

However, current global trends, such as the development of new centers of economic wealth, like China (Fiskesjö 2010b), may undercut the potential of any such alternative schemes. It is also possible that the world may instead see new versions of the universal museum, replicating the earlier pattern.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Heritage Museums and the Public
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law

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Urals: Paleolithic

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Introduction

The Ural Mountains was a key loci of the Paleolithic and Mesolithic occupation oikumene. The mountain regions with the adjoining areas of the East European Plains and the West Siberian Lowland have principal significance for documenting the processes and natural contexts of the Pleistocene human expansion from the SE parts of the European continent into West Siberia and the northern Russian Arctic. Past climate change and the regional topographic modelling by orogenesis and the Pleistocene glaciations, reflected by the marked environmental transformations of past landscapes and biota, attest to the complexity of the Urals' Quaternary development ultimately determining timing and the extent of the earliest hominid inhabitation of this territory. The initial peopling of the western (Fore-Ural) area is linked to the Paleolithic dispersal into the marginal East European Plain probably during the climatically favorable Middle Pleistocene interglacials. The southern and central river valleys, transecting the mountain ranges, were the main geographic corridors of the later (Middle and Upper Paleolithic) migrations into the eastern (Trans-Ural) regions of West Siberia. A progressing evolution during the Late Pleistocene reflected a behavioral adjustment resulting in formation of specific regional cultural complexes in the mountain areas and the foothills based on exploitation of reindeer and the "mammoth fauna" in the northern periglacial tundra-steppe, respectively. Geoarchaeology records from diverse settings provide insights into the timing and ecology conditions of the Pleistocene colonization of the north-central Eurasia and evidence on the trajectories of the Quaternary environmental development in the broader Urals.

Definition

The Urals and the adjoining regions of the East European Plain (*Priuralye* – the Fore-Urals) and the West Siberian Lowland (*Zauralye* – the Trans-Urals) (Fig. 1) are of a major relevance for the Paleolithic studies in respect to the particular geographical location along the border zone between Europe and North Asia. Except for documenting the cultural development and adaptation strategies in the context of Pleistocene climate and environmental change, the broader

Urals: Paleolithic, Fig. 1 *A* geographic map of the Urals with the main continental drainages of the Fore-Urals (the Kama and the Pechora Basins) and the Trans-Urals (the Ob River Basin). The principal Paleolithic research relates to the southern, central, and the NW region of the Ural territory

territory of the Urals has a principal bearing for mapping timing and natural conditions of the initial human migrations into the subpolar and polar regions of Eurasia. The paleoenvironmental proxy data related to early peopling of this territory originate from the river-eroded subaerial deposits (loess-paleosol sections) in the Kama Basin, the karstic cave sites in the Chusovaya River valley transecting SE-NW the Central Urals, and from genetically diverse (aeolian, colluvial, and alluvial) Quaternary formations along the eastern slopes of the Ural mountain range and the valleys draining the western margin of the West Siberian Plain. The broad variety of the cultural data provides witness to several stages of early inhabitation of the Ural region ecosystems, likely encompassing a time span over 0.5 Ma. The earliest (Middle Pleistocene) finds are represented by the typical "pebble tool" industries, followed by the Middle Paleolithic traditions including the Levallois prepared-core stone-flaking technology, and the Upper/Final Paleolithic blade complexes eventually replaced by a variety of the Mesolithic cultural facies illustrating the major regional ecological shifts during the Pleistocene/Holocene transition (12,000–10,000 years ago) of the Ural region ecosystems.

At present, there are several hundred of Pleistocene sites mapped over the investigated Ural territory. The long-term interdisciplinary research focus is on geology and paleoecology contexts of single localities, taphonomy, and chronostratigraphy. Apart of the spatially confined cultural locations, especially the large-scale fluvial erosions cutting the loess plateau of the Fore-Urals (the Upper Kama Basin) and the floodplain deposits of the Trans-Ural river valleys provide a major source of paleontological and paleobotanic records in the framework of the Pleistocene regional climate change reconstructions. Evolutionary pathways and processes in natural environments, the specific behavioral Paleolithic adaptation patterns and material-technological conditions, as well as documentation of sequenced climatic events stored in the geological records are the principal objectives of the current multidisciplinary Quaternary geology, paleoecology and geoarchaeology studies.

Historical Background

Natural transformations in the Urals and the adjacent foothill/plain areas are evidenced by the stratified geological, biotic (floral and faunal), as well as rich early cultural records. Interactions of the Quaternary climatic variations with the regional topographic modelling by the northern Arctic glaciations and the interglacial transgressions, the Pleistocene neotectonics triggering landscape erosion, and stages of surface stability with pedogenic weathering indicate the complex environmental development of the Ural area. The continental orogenic activity in conjunction with the glacial dynamics and fluvial erosion shaped the regional relief. During the cold Pleistocene periods, the vast extra-glacial areas of the adjoining West Siberian Lowland south of the Arctic ice sheet were periodically transformed into large periglacial zones – major

sedimentation catchment areas of aeolian as well as glaciofluvial and lacustrine deposits transported from the continental NE European and NW Siberian Arctic ice-margin ablation surfaces. The cyclic nature of the glacial and interglacial periods led to a restructuring of the past landscapes and generation of specific ecosystems adjusted to particular topographic settings and responding to ongoing climatic variations, contributing to formation of biotically productive river valleys particularly along the Ural foothills.

The paleoenvironmental transformations promoted the western as well as northern geographic expansion of early humans into the subpolar regions of central Eurasia as well as the progressive cultural adaptation to extreme natural conditions. The mapped occupation sites in the Polar Urals and North Siberia (Mochanov & Fedoseeva 2002; Svendsen & Pavlov 2003; Pitulko et al. 2004) provide proof that people reached the Arctic including the northernmost coastal areas already before the Last Glacial (>24,000 years ago). All these discoveries lead to revision of the traditional perceptions on a late peopling of northern Asia as well as the obsolete "postglacial" chronology models of the initial human migrations across the exposed landbridge of the Pleistocene Beringia into the North American continent (Chlachula 1996, 2003). Geoarchaeology studies, particularly in the poorly explored geographic regions – the Polar Urals and the NW West Siberia – are of utmost importance for reconstruction of Quaternary climate change as well as the early human prehistory in north Eurasia. The present status of the geo- and environmental archaeology research in some of the marginally mapped geographical areas of the Northern Urals reflects a limited accessibility of these territories, visibility, and/or the preservation potential of the Paleolithic records comparing to the better-investigated central and especially the Southern Ural regions.

Key Issues/Current Debates

The Urals with the bordering plains of Eastern Europe and West Siberia are of key importance for multidisciplinary Quaternary investigations focusing on the initial peopling of north-central Eurasia because of the strategic geographical position of this mountain chain, forming the natural borderline between Europe and Asia. Apart from mapping the Pleistocene and Holocene climate evolution and the associated landscape ecology transformations, the territory of the Urals has a major relevance for reconstruction of the time intervals of dispersal of the Pleistocene hominids/early humans into the high latitudes of Eurasia and documentation of cultural adaptation strategies to past climate variations. The current scientific debates primarily focus on the regional chronologies' improvement and interpretations of Paleolithic environmental adaptation strategies.

Natural Context, Paleogeography, and Climate History

The Ural Mountains extend as a major geographic landmark between Europe and Asia for over 2,000 km from the Arctic coast to the arid steppes of western Kazakhstan (Fig. 1). The five physiogeographic zones, connecting the Southern Urals with the Northern, Subpolar, and Polar Urals, are characterized by a marked latitudinal vegetation zonation with polar tundra-forest, taiga, and open steppe being the dominant biotopes. Most of the regional relief (700–1,895 m asl.) is transected by mountain valleys with the E-W oriented fluvial drainage following the continental topographic gradient (Fig 2). The adjoining geographical area in the West (Fore-Urals) includes the loess plateaus of the Upper Kama and Pechora River Basins. The eastern (Trans-Urals) area is delimited by the Tobol and Ob River Basins with the tributary valleys (Severnaya Sosva, Sosva, Tura, Tagil, Neiva, Pyshma) cutting the foothills. Small hills (300–400 m asl.) between shallow river valleys, lakes, and bogs extend further east into the West Siberian Lowland. The present climate over the Ural Mountains is controlled by the NW Atlantic atmospheric circulation. The soil cover is characterized by well-developed parkland-steppe chernozems, mixed/coniferous taiga forest brunisols/gleysols, and forest-tundra regosols.

Urals: Paleolithic, Fig. 2 The Urals, modelled by tectonics and Pleistocene glaciations, create a natural boundary between Europe and North Asia. View of the upper reaches of the Kos'va River valley descending from the western slopes of the Ural Mountains

The topographically and biotically diverse territory attests to a complex paleogeography and paleoecology history reflecting large-scale regional landscape restructurings affected by the Cenozoic orogenesis, periodic sea transgressions and regressions, and the Arctic and mountain glaciations (Velichko 1993; Astakhov 1997, 2001; Mangerud et al. 2002). The Fore- and Trans-Ural plains constitute a continuation of the Eurasian loess belt connecting the European and Siberian loess regions. The regional Quaternary stratigraphy is based on geological, paleontological, biostratigraphic, and paleomagnetic records of the continental basin transgressions and regressions, and stages of loess deposition.

The pre-Quaternary (Miocene-Pliocene) history of the Urals is connected with the formation of the initial hydrological systems in the Fore-Urals (the Pechora, the Volga-Kama, and the Caspian Basins) as well as the Trans-Urals (the Irtysh-Ob Basin) triggered by the contact orogenesis of the Eurasian Plate in conjunction with long-term climate variations. During warm climatic stages, the continental basins were filled by seashore marine, fluvial, and lake deposits superimposed by periglacial alluvial formations (Yakhimovich et al. 1987; Stefanovskiy 2006). The Early Pleistocene interglacial biotic records document a forest-steppe habitat with arboreal taxa absent in the area today (*Fagus*, *Acer*, *Fraxinus*, *Ulmus*, *Tilia*, *Castanea*) and brackish settings inhabited by large faunal species such as *Archidiskodon meridionalis*, *Hipparion* sp., and *Coelodonta* sp. Climatic cooling at the end of the Early Pleistocene (740 ka BP/thousands of years ago) is manifested by glacial deposits distributed in the Pechora and the Upper Kama Basins, with the continental coastline expansion due to the regressions of the Caspian Sea and the Arctic Ocean.

The reactivated tectonics at the beginning of the Middle Pleistocene in the Urals-Caucasus area accelerated a restructuring of the former regional drainage systems. Increased aridity put up to an intensified weathering in the mountain areas. A reduced riverine activity in the adjacent West Siberian Lowland contributed to genesis of closed-lake and boggy basins. Floral and faunal communities indicate dry steppe environments replacing the former Mediterranean-type woodlands with *Pterocarya fraxinifolia*, *Rhododendron* sp., *Taxus baccata*, and *Castanea sativa* (Stefanovskiy 2006). The new hydrological network of the Tobol (MIS 9) Interglacial (390–270 ka BP) corresponds to the 60 m terrace with the Tiraspol Fauna Complex including herbivorous megafauna (*Paleoloxodont* sp., *Mammuthus primigenius* Blum., *Bison priscus gigas*, *Alces alces*, *Megaloceros giganteus*, *Cervus elaphus*, *Equus hemionus*, *Equus*

caballus, *Camelus* sp., and *Ovis ammon* sp.) indicative of warm semiarid parklands. The following Samarovo (MIS 8) Glacial (270–244 ka BP) correlates with the maximum expansion of the Arctic ice blocking the northern Ob/Irtysh River drainage of the West Siberian glacial waters diverted south into the Aral-Caspian Basin. Temperate parklands characterized the following Shirta (MIS 7) Interglacial (244–170 ka BP). A geographic recession of ice masses is assumed for the Tazov (MIS 6) Glacial (170–130 ka BP) with mountain glaciers confined to the Northern and Polar Urals. The late Middle Pleistocene in the south-central basins is associated with fossil fauna of the Khozarian Complex (*Mammuthus primigenius*, *Coelodonta antiquitatis*, *Bison priscus longicornis*, *Megaloceros giganteus*, and *Equus caballus chosaricus*) found in alluvial formations indicative of moderately cold environments. A final Middle Pleistocene neotectotic stage accentuated the regional geomorphological relief restructuring due to continuing uplifts of the Central and Southern Ural mountain ranges.

A reduced regional topographic differentiation during the early Late Pleistocene is associated with planation processes in the Trans-Ural area and the Last Interglacial (MIS 5e, 130–120 ka BP) transgression. The Ural foothills were covered by a mixed spruce and pine-dominated taiga; open parklands occupied the lowlands hosting the "Mammoth Fauna Complex" (Bolikhovskaya & Molodkov 2006). The regional stratigraphy and glacial geomorphology reflect reducing geographical limits of the continental ice masses during the early/Zyriansk (MIS 4) and the late/Sartan (MIS 2) Last Glacial stages. Large ice-dammed lake between the northern Arctic ice sheet and the southern continental water divides inundated most of the West Siberian Lowland during the early Last Glacial (c. 80–60 ka BP). Moraines in the Pechora Basin on the NE European Plains point to the expanding Arctic glaciations from the Kara – Barents Sea ice lobes presumably reaching their maximum Late Pleistocene extent similarly as in West Siberia (Astakhov 1997, 2001). Dynamic climatic fluctuations during the second half of the glacial stage caused a gradual recession of the continental ice limits in the Northern Urals and activation of intensive periglacial gravity-slope processes contributing to massive accumulations of polygenic colluvia in the Trans-Ural foothills. Deposition of up to 20 m of loess sediments on the Fore-Ural plateaus, overlying periglacial alluvia of the Upper Kama, reflects the prevailing dry and cold climatic conditions within the Late Pleistocene periglacial tundra-steppe.

The subsequent mid-Last Glacial (MIS 3) interstadial (59–24 ka BP) correlates with global warming that promoted expansion of the spruce- and pine-dominated taiga. The new glacial advance during the late Last Glacial/Sartan stage (MIS 2), confined to the Polar and Northern Urals with localized ice caps, led to the formation of tundra-steppe and tundra-forests in the southern lowland and the mountain areas, respectively (Velichko 1993). The geographic distribution of glacial landforms and glacigenic deposits provides evidence of the Arctic ice expanding from the Kara Sea Basin along the western slopes of the Urals and possibly merging with some mountain piedmont glaciers (Mangerud et al. 2002, 2008). The eastern slopes of the Urals likely hosted an ice-free environment in view to an increased regional atmospheric aridity. Accelerated loess accumulation in the Fore-Ural area marks the onset of the full Last Glacial conditions with incorporating remains of large Pleistocene animals (*Mammuthus primigenius*, *Coelodonta antiquitatis*, *Equus* sp., *Bison priscus*) and small species typical of periglacial tundra-steppe (Yakhimovich et al. 1987). Fluvial formations on both sides of the Urals illustrate rich Late Pleistocene ecosystems with faunal communities of periglacial tundra-steppe (mammoth, woolly rhinoceros, horse, bison, reindeer, elk, saiga) with smaller open-steppe and semidesert taxa such as wolf, fox, hare, marmot, as well as rodents and other mammals indicative of mixed polar tundra-steppe biotopes. Permafrost limits at the end of the Pleistocene (the Allerød Warming) were still located at 55°N in the Trans-Urals/West Siberia (Velichko et al. 2002). Precipitation values during the late Last Glacial and the early Holocene

(15–10 ka BP) amounted to c. 60–65 % on the East European Plains and 80 % in West Siberia comparing to the present-day values. The modern geographic distribution of particular biotopes in the broader territory of the Urals reflects the Holocene climate development.

Pleistocene Environments and Early Human Occupation

Interaction of the Pleistocene climatic variations with the regional relief modelling by the northern Arctic glaciations, interglacial sea transgressions, and stages of river erosion and sediment weathering attest to the complexity of the Quaternary history of the broader Ural area. During most of the Pleistocene, the North and Central Trans-Urals, sloping east from the central mountain range, were ice free. The bordering foothills and plains of West Siberia constituted parts of the periglacial super zone (Arkhipov 1999) and the place of mass accumulation of aeolian deposits transported from the ablation zone of the NE European-West Siberian ice sheets. The geographic and topographic configuration of the Urals, forming a natural gateway for the early human infiltration further east into the vast parklands and forest lowlands of Western Siberia, predisposed a long occupation history. The initial human inhabitation of the Ural territory, presumably from the northern Caucasus region and East European Plain, was a complex process governed by changing paleoecology conditions in response to the Pleistocene climate variations. Warm Middle Pleistocene interglacial conditions providing rich biotic resources of forest-parklands undoubtedly facilitated early human migrations further north and east along the Ural range via the major river systems (Volga, Kama, Pechora) draining the East European Plains. Mixed coniferous and broad-leaved forests with pine, birch, lime, elm, and beech formed a mosaic vegetation cover during the late Middle Pleistocene (MIS 9 and MIS 7) interglacials.

Presently the oldest-recorded (the Lower and Middle Paleolithic) sites are exposed along the Kama River banks along the western Ural foothills due to erosion of subaerial sediments overlying relics of the Middle Pleistocene (35–60 m) fluvial terraces. The cultural material is represented by archaic core-and-flake stone industries (cores, retouched flakes, scrapers, and other tools) produced on cobbles from the gravelly alluvia (Fig. 3a). Fragmented animal bones with anthropogenic working and use attributes (flaking, splitting, retouching) indicate productive riverine valley occupation habitats and complex behavioral activities (Fig. 3b). The formal technological uniformity of these finds and their patterned geological contexts indicate a gradual and intensified peopling across the mid-latitudes of Eurasia prior to the Last Interglacial (>130 ka BP) (Matyushin 1994; Chlachula 2010). Periglacial subarctic tundra-steppe and forest-tundra expanded during the late Middle Pleistocene (MIS 8 and MIS 6) glacial stages in the northeastern part of Europe

Urals: Paleolithic, Fig. 3 Illinsk Site (the Upper Kama Basin): (**a**) Stone tools from the Middle Pleistocene alluvia buried by 10 m of loess deposits. (**b**) Humanly flaked bones of fossil fauna (mammoth, woolly rhinoceros, Cervidae) found in association with the Paleolithic industry provide evidence of favorable interglacial natural environments in the parkland zone of the central Fore-Urals

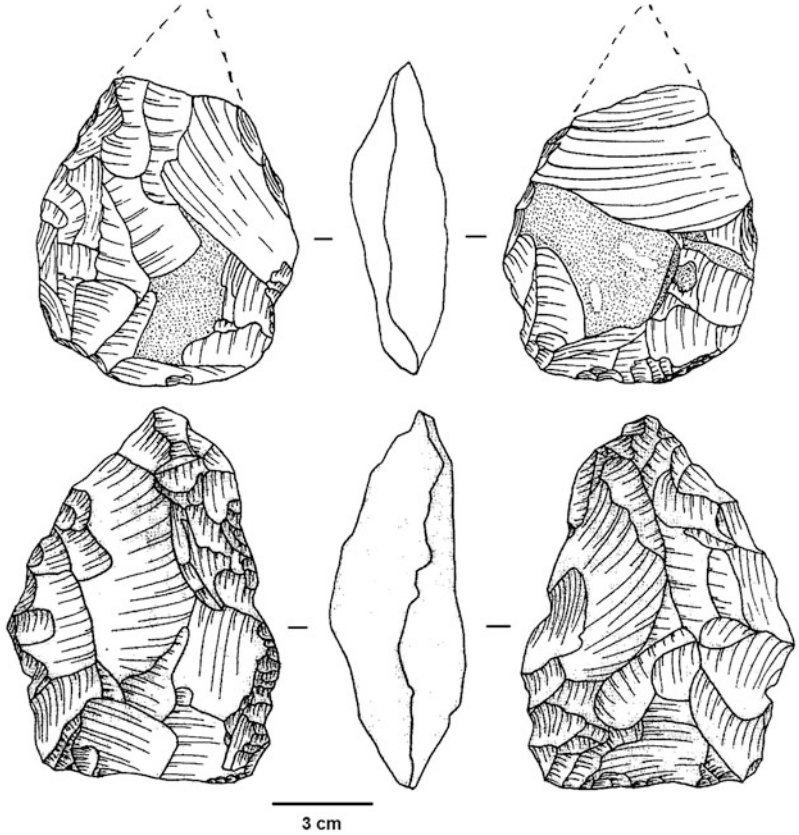

Urals: Paleolithic, Fig. 4 Galyanskaya Site. Bifacial Middle (?) Paleolithic stone tools from an open-air site in the Tura River valley, a tributary of the Chusovaya valley, may represent the earliest cultural records found in the Central Ural region, including the "Neanderthal" Levallois stone-flaking technique (courtesy Yu. B. Serikov)

(the Pechora Urals) over most of the extra-glacial territories hosting periglacial fauna (*Mammuthus primigenius*, *Coelodonta antiquitatis* Blum., *Rangifer tarandus*, *Bison* sp.). These prominent cold periods brought presumably a significant reduction of the former early human occupation areas.

The major climatic warming at the beginning of the Last Interglacial/MIS 5 (130 ka), recorded in the loess-paleosol sections from the East European Plain to southern Siberia, caused inundations and ground saturation of the formerly glaciated areas and thus temporarily impeded free movements of early humans. Increased continentality and MAT led to expansion of parkland steppe facilitating new migrations of the Middle Paleolithic (Neanderthal/early *Homo sapiens*) people (Fig. 4). High summer temperature (increased by c. 4–5 °C in respect to present values) and mean annual precipitation (by c. 100 mm) contributed to the northward distribution of southern taiga along both sides of the Urals by 500–700 km beyond the present limits (Velichko 1993). Pine-spruce-birch forests with oak, hornbeam, lime, hazel, and elm characterized the prevailing warm interglacial mosaic vegetation (MIS 5e, MIS 5c). Recession of human occupation is linked with the onset of the early Last Glacial stage (MIS 4, 74–59 ka BP) reducing the formerly inhabited areas of the periglacial steppe zone around the Southern Urals and repeatedly during the late Last Glacial stage (MIS 2, 24–12 ka BP). The most intensive late Middle/early Upper Paleolithic geographic expansion occurred during the mid-Last Glacial interstadial interval (MIS 3, 59–24 ka BP) reaching the northernmost regions of the Urals and the adjacent territories of Northern Europe and NW Siberia (Pavlov 1996; Pavlov et al. 2001). The progressive biological and cultural adaptation enabled to retain the new lands prior and shortly after the LGM. The Central Urals

Urals: Paleolithic, Fig. 5 The Chusovaya River valley, Central Urals, with karstic limestone formations incorporating Late Pleistocene cultural records. The valley served as one of the main Paleolithic and Mesolithic migration corridors connecting the East European Plains and the West Siberian Lowland

forming the free geographic passage connecting the East European Plain with the vast West Siberian territories most likely played a key role in this historical evolutionary process.

The Upper Paleolithic occupation of the Urals is principally associated with open-air sites in the western foothills and the cave complexes in the Chusovaya River valley cutting E-W through the main Ural mountain range (Fig. 5). The multilayer sites (Bezymyannaya Cave, Kotel Cave, Kamen Dyrovatyy, Bolshoy Glukhoy) distributed in the karstic formation over a 200 km distance encompass a long record spanning from the Late Pleistocene (Middle Paleolithic) till the Iron Age (Fig. 6). Periglacial biotic niches possibly existed in the Chusovaya River tributaries (Koiva, Sylvitsa, Serebryanka) that may have allowed continuity of the local occupation throughout the Last Glacial Maximum (20–18 ka BP). A unique cultural (Late Pleistocene to Holocene) cultic place with >18,000 arrowheads made of various materials (stone, bone, and metal) originates from Kamen Dyrovatyy Cave, with the Upper Paleolithic level dated to 13,800 year BP. Other Central Ural cave sites interpreted as cultic in view to archaeological cultural inventories (Kumyshanskaya Cave, Ignatievskaya Cave, Grot Zotinskyy, Kotel Cave) as well as those in the Southern Urals (Kapova Cave) (Matyushin 1994) suggest a high sociocultural and behavioral complexity (Fig. 11). In the latter mountain zone, spruce and pine taiga forests persisted until the onset of the Last Glacial (c. 22–21 ka BP). A certain regional cultural nonuniformity across the Ural territory manifested in the lithic industry composition may indicate differences in the regional environmental adaptations. The taxonomic diversity of hunted fauna is particularly evident at the Final Paleolithic/Mesolithic sites, specializing on hunting reindeer and mammoth in the montane areas and the eastern lowlands, respectively (Serikov 1999, 2000). A multifunctional character and a variety of particular activities are indicated by the broad repertoire of stone and bone tools, including "hacking" instruments, barbed harpoons, and arrowheads (Fig. 7). A micro-lithization and stone tool polishing in the Mesolithic complexes distributed across the Urals and West Siberia point to an adaptive adjustment and a diversification of exploitation of the Final Pleistocene/early Holocene environments.

In contrast to the forest settings of the central montane valleys, the eastern Ural foothills

Urals: Paleolithic, Fig. 6 Distribution of the mapped Paleolithic cave sites in the Chusovaya River valley: *1* Grot Dozhdevoy, *2* Grot Dyrovatyy (Cave 4), *3* Grot Dyrovatyy (Cave 5), *4* Grot Kirpichnyy, *5* Grot Kotel, *6* Grot Dyrovatye Rebra, *7* Grot Bolshoy Glukhoy

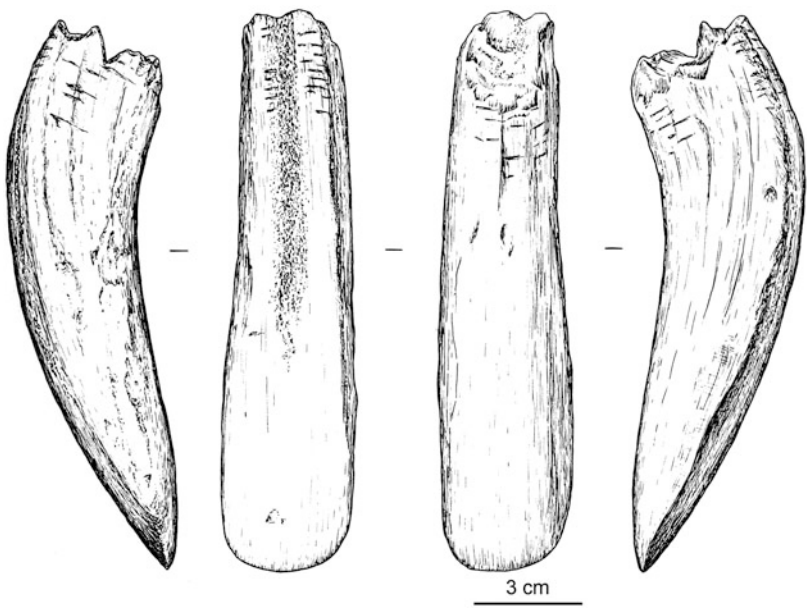

Urals: Paleolithic, Fig. 7 Dyrovatye Rebra Cave (the Chusovaya valley). Final Paleolithic "hacking" tools made of elk antlers

Urals: Paleolithic, Fig. 8 Erosion of the former Sosva River floodplain in the north-central Trans-Ural area delivers rich and partly humanly worked fossil faunal records attesting to biotically very productive Late/Final Pleistocene periglacial tundra-forest and tundra-steppe environments

passing into the West Siberian Lowland hosted a variety of natural settings related to seasonally water-saturated taiga forests with braided river streams, lakes, and bogs. This vast and biotically very rich and diverse territory underwent a paleogeographical and paleoecological evolution reflecting large-scale environmental shifts, partly affected by the Arctic as well as the mountain Pleistocene glaciations. The stratigraphic positions of the mapped Pleistocene sites are determined by past geomorphic processes and biotic shifts in both the lowland and foothill areas with an absence of thick loess deposits that are present on the eastern slopes of the Urals. The Paleolithic in the Trans-Ural regions, predating the mid-Last Glacial, is poorly known contrary to the western regions of the Urals associated with open sites in the NE European periglacial belt (Pavlov 1996). The archaic character of the documented local (Paleolithic as well as Mesolithic) stone industries may reflect their expedient, time-transgressive character predetermined by raw material sources (Serikov 2000).

The easternmost limits of the Trans-Urals provide multiple lines of evidence of Paleolithic peopling of this geographically marginal and still poorly explored territory of West Siberia following the mid-Last Glacial warming (35–24 ka BP). A specific cultural entity represents the Upper Paleolithic complex of open-air sites in the Sosva River Basin on the periphery of the West Siberian Lowland (Fig. 8) contextually associated with massive concentrations of large Pleistocene fauna remains, previously interpreted as natural "mammoth cemeteries" known since the nineteenth century. Other fossil fauna with woolly rhinoceros, bison, horse, reindeer, and other animals characteristic of periglacial tundra-steppe together with small (bird and fish) species indicates a diversity of exploitation of the local Late Pleistocene natural resources and adaptation to subpolar periglacial environments (Chlachula & Serikov 2011). The skeletal remains from the occupation localities suggest both active hunting and anthropogenic scavenging practices during the Last Glacial (with radiocarbon dates of c. 25–12 ka BP). Human behavioral activities at the key site Gari I are also documented by circular concentrations of mammoth and rhinoceros bones (including complete sculls, large bones, and tusk fragments), some of them artificially modified, reminding primitive dwelling structures known in the Upper Paleolithic from the East European Plains. The geological context of the well-preserved fossil records, sealed in cryogenically distorted alluvial deposits of the former meandering Sosva River, indicates complex taphonomic histories of the occupation sites buried in cold periglacial

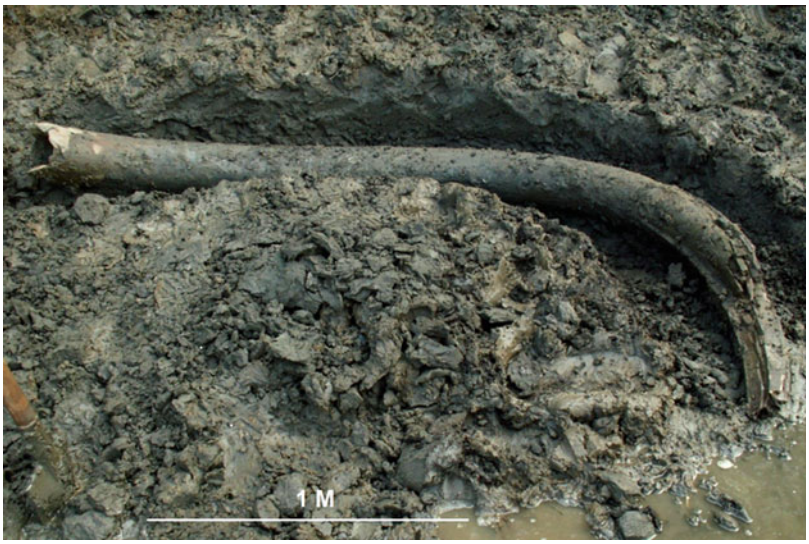

Urals: Paleolithic, Fig. 9 Rychkova Site (the Sosva River Basin). A mammoth tusk buried in the Late Pleistocene clay deposits. *Mammuthus primigenius* is the most-represented species in the Late Pleistocene fossil fauna assemblages of the Trans-Ural area

swampy-riverine settings (Figs. 9 and 10). The paleontological records show an extraordinary biotic potential of the Pleistocene periglacial West Siberian steppe marginally interspersed by the eastern Ural foothill ecosystems. The dominant exploitation of mammoth (98.5 %) corroborates the faunal compositions from other Upper Paleolithic sites on both sides of the Urals (Byzovaya Cave, Mamontova Kurya in the Pechora Basin; Volchiya Griva in West Siberia) (Pavlov 1996; Petrin 1986; Savel'eva 1997; Svendsen & Pavlov 2003; Zenin 2002).

The adjacent West Siberian Lowland is assumed to have been colonized after the Last Glacial Maximum at c. 17–15 ka BP in view of the extreme environmental conditions (a high climate continentality and natural water/stream barriers). The north Trans-Ural and probably the Siberian Arctic regions remained largely ice free even during the LGM, and except for surface-saturated and frozen boggy lowlands, there were no major natural obstacles for free movement of Paleolithic groups further east into NW Siberia prior and after that time interval. Fossil fauna finds display a major biotic potential of these territories. The latitudinal zonal differentiation of the Last Glacial ecosystems of the Urals from the Arctic coast to the Black/Caspian Sea was likely more uniform, largely covered by periglacial tundra-steppe in contrast to the more mosaic interglacial parkland landscapes facilitating a free migration of fauna as well as the Upper Paleolithic groups particularly within the foothill corridors. Regional paleoenvironmental deviations, differing from the overall territorial biogeographic and climatic pattern, may have played a significant role in the process of early prehistoric peopling of the northern regions.

International Perspectives

The present state of the Paleolithic research in the Urals provides evidence of an active process of the early peopling in this strategic geographical territory on the crossroads of Europe and North Asia. The contextual geology and paleoecology records from the investigated archaeological sites and stratified geological sections point to pronounced environmental dynamics and landscape transformations triggered by past climate change as well as geomorphic processes over the mountain as well as foothill areas. The Pleistocene climatic cycles regulated spatial and temporal movements of early humans from the southeastern regions of the European continent as well as the subsequent expansion onto the bordering North and West Siberia.

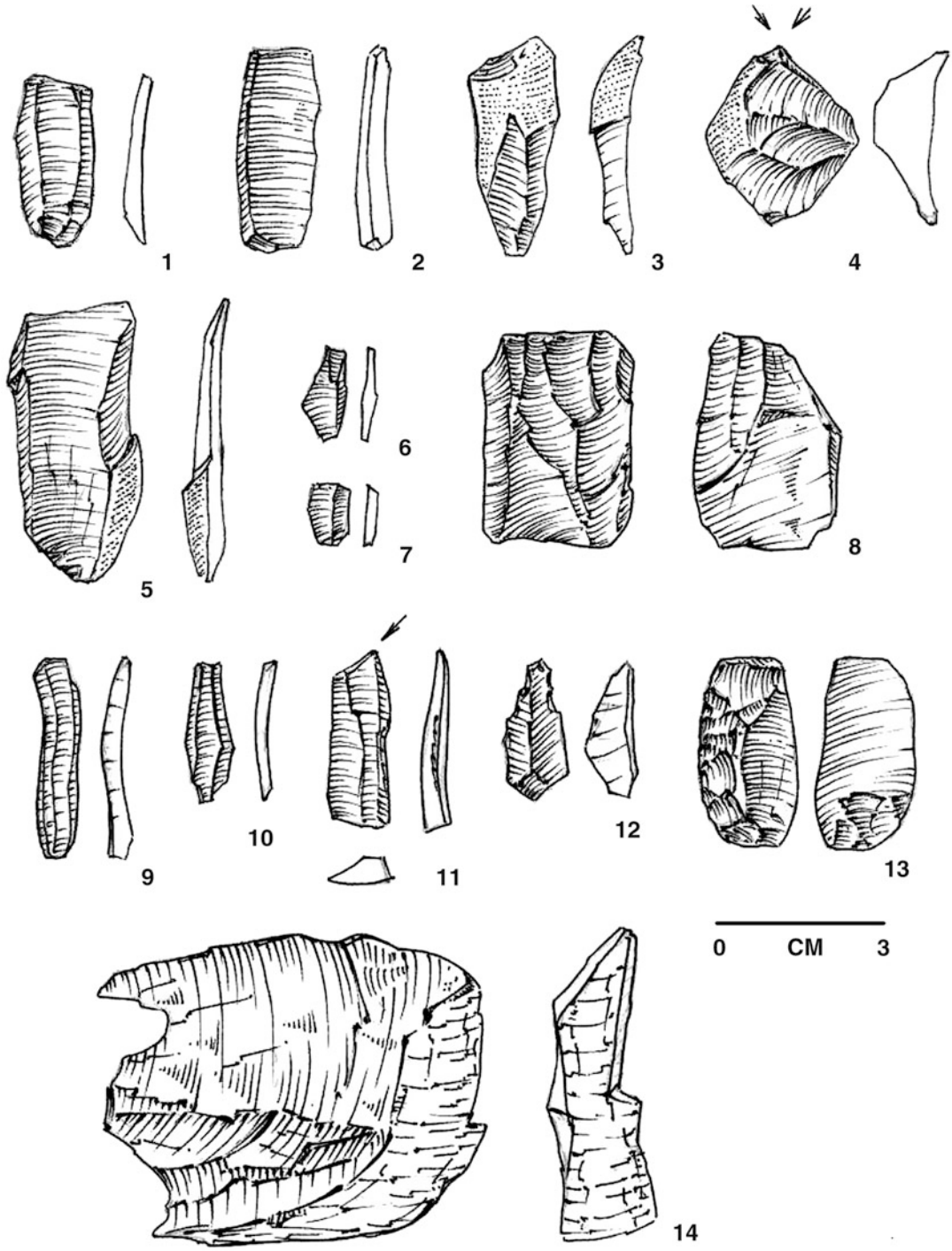

Urals: Paleolithic, Fig. 10 Gari Site I (the Sosva River Basin). The Upper Paleolithic stone industry (nuclei, scrapers, burins, retouched blades, and flakes made from local alluvial gravels) together with utilization of skeletal megafauna remains (10 – a mammoth tusk flake) indicate a successful human adaptation to the Last Glacial ecosystems of the Trans-Urals and the adjacent West Siberia

The first well-manifested occupation, particularly in the western Fore-Ural foothill areas adjacent to the East European Plains, occurred during the Middle Pleistocene interglacials, presumably the Likhvin Interglacial complex (450–360 ka BP) being the warmest and most favorable climatic interval for the last 0.5 Ma years (MAT by c. 4–5 °C above the present values). Abundant expedient core-and-flake stone industries together with anthropogenically worked fossil fauna osteological materials indicate productive riverine valley habitats of the Kama River Basin with mixed (spruce-fir and oak-linden-elm-hornbeam) parklands. Except for the Southern Ural regions, persistence of inhabitation in glacial stages within extremely cold polar tundra-steppe environments predetermines use of fire, but this is unlikely at the time of the most extensive continental Pleistocene glaciations of northern Eurasia reaching the Central Ural limits.

The next stage of the Pleistocene peopling of the Urals is linked to the Middle Paleolithic (Neanderthal) expansion during the Last Interglacial/MIS 5 (130–74 ka BP). The climatic optimum (with MAT 1–3 °C above the present values) promoted mosaic vegetation in the particular geographical zones and topographic settings with mixed pine-spruce-birch forests enriched by broad-leaf taxa (oak, hornbeam, lime, hazel, and elm) in the montane areas, and open-parkland steppe in the lowlands. During the cold Last Interglacial stages (MIS 5d, 5b), these ecosystems were replaced by tundra-forest and periglacial tundra-steppe, respectively. The main river valleys cutting the mountain range with rich rocky material for stone tool production as well as diverse biotic resources were likely occupied repeatedly at various Last Interglacial intervals. Cultural finds are absent from the climatically harsh early Last Glacial (MIS 4).

The following Late Paleolithic dispersal represents a most distinctive cultural marker recorded throughout the Ural territory associated with the climatic amelioration during the mid-Last Glacial stage/MIS 3 (59–24 ka BP). This environmentally favorable time interval with a climatic optimum at c. 31 ka BP correlates with the progressive spatial expansion further north along the western as well as the eastern Ural slopes reaching the ice-free subpolar limits as witnessed by the cultural records from the Upper Pechora Basin and the Siberian Arctic in the biotically productive periglacial tundra-steppe environments. Geographical shifts of the early Late Paleolithic oikumene into the marginal mountain areas across the Central Urals into the adjoining West Siberian Lowland is likely to have occurred still during the warmer interstadials prior to the LGM. The Chusovaya River valley transecting the central mountain range was one of the main corridors for Pleistocene migrations from the East European Plain into West Siberia. The formal diversity of blade-dominated lithic industries suggests regionally specific cultural environmental adaptations.

Probably only isolated human populations occupied the Central Urals around the Last Glacial Maximum (20–18 ka BP) contrary to the biologically more productive periglacial tundra-steppe in the southern Fore- and the Trans-Ural regions (Fig. 11). Milder microclimate conditions in the foothills with a higher diversity of biotic resources of the transient montane-taiga and steppe fauna communities predisposed the periodic occupation recorded in the Central and Southern Ural karstic areas during the Last Glacial (24–12 ka BP). The dominance of woolly mammoth in the lowland parkland (tundra-) steppes and horse/reindeer in the mountain areas illustrates the pattern of animal resource exploitation. The later progressive regional cultural development is manifested by the appearance of locally heterogeneous Mesolithic complexes in response to climate warming and associated environmental transformations at the end of the Pleistocene.

The Trans-Ural Upper Paleolithic complex, best documented in the Sosva-Tavda River Basins, represents a specific cultural entity based on utilization of the Pleistocene fauna attesting to a particular behavioral adjustment to the Last Glacial tundra-steppe/tundra-forest environments with active hunting as well as anthropogenic "scavenging" of naturally deceased animals (particularly of mammoth). The multifunctional use of skeletal remains for

Urals: Paleolithic, Fig. 11 Shulgan-Tash (Kapova) Cave (Southern Urals). The Upper/Final Paleolithic rock art in the Gallery of Paintings discovered in 1959 illustrating the Urals Last Glacial megafauna (Photo courtesy of V. Kotov)

dwelling structures, tools, and artwork also encountered in the contemporaneous cultures of the Upper Kama and the Upper Pechora Basins along the NW Urals correlates with the climax of the Paleolithic evolution in the periglacial zone of the mid- and high-latitude Eurasia. Overall, the Last Glacial climate fluctuations and the associated shifts in natural habitats preconditioned the intensity and timing of the Paleolithic settlement of these marginal and geographically rather extensive areas.

Future Directions

The scientific importance of the Ural Paleolithic studies lies in the documentation of the earliest prehistoric migration processes, the adaptation strategies, and the cultural exchanges between Eastern Europe and West Siberia. Complex paleoenvironmental and climatic multi-proxy data from the stratified geological sections coupled with cultural archives of the presently investigated as well as perspective archaeological localities will contribute significantly to a more comprehensive understanding on the overall trajectories of the Paleolithic and Mesolithic occupation of north-central Eurasia. Detailing the single-site chronologies, and geological and paleoecology contexts should be in the focus of the following geoarchaeological studies. Systematic field reconnaissance in the upper reaches of the Chusovaya River and its tributaries (Koiva, Sylvitsa, Serebryanka) together with the foothill areas of the Northern Urals may provide new evidence on the earliest human settlement from these still poorly studied geographical regions. Application of the integrated Quaternary geology and geoarchaeology field research approach and laboratory analytical methods should constitute a working framework of the future Paleolithic investigations particularly in the marginally mapped formerly glaciated areas of the Northern and Polar Urals, the Fore-Urals loess formations, as well as of cave sites in the central and southern regions. The new results will complete the present culture-historical mosaic of the early human inhabitation, particularly in the largely unexplored northern territories.

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ Lithic Technology, Paleolithic
- ▶ Siberia: Paleolithic

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Urartu, Archaeology of

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Introduction

Urartu was an Iron Age kingdom that flourished between the ninth and the seventh centuries BCE in the northern regions of the Ancient Near East, stretching across portions of the modern nations

of Turkey, Armenia, Iran, and a small part of northeastern Iraq (Dan 2010).

Celebrated as one of Assyria's uttermost rivals (and for a time the most powerful state in the Ancient Near East), this political entity has been the object of numerous studies in the past 15 decades (Piotrovsky 1969; Barnett 1982; Lindsay & Smith 2006). Over this time, the Urartian material culture assemblage has proven to be very characteristic and distinguishable within the archaeological record in the Ancient Near East (Zimansky 1995a). This entry provides a general historical overview of the Kingdom of Urartu while focusing on the development of Urartian studies and Urartian archaeology as well as on Urartian material cultural assemblage.

Definition

Urartu, Bianili, and Nairi

The name Urartu (which is the same as Ararat present in modern bible or the word "*rrt*" in original Hebrew) comes from the Assyrian language and was employed by the Assyrians to refer both to a specific region lying northeast from Assyria (and also written as "Uruatri") and to a particular political entity (comprised across sections of modern-day Turkey, Armenia, northern Iraq, and northeastern Iran) that was conformed around 830 BCE and disappeared in the seventh century. A wide array of the information we currently possess on Urartu comes from Assyrian texts and inscriptions and scholars often employ the term "Urartian" in order to denominate both the language and the culture of the kingdom in question. However it is important to notice that Urartian kings did not refer to their land as Urartu, but as Bianili. Currently, scholars often refer to this latter as Urartu/Bianilli. Therefore, in order to avoid confusions, it is necessary to set this distinction straight. In addition to this, Assyrian sources also mention the term "Nairi" which also is geographical in nature and refers to several minor kingdoms subdued by the Assyrian King Tiglath-Pileser I at the end of the eleventh century BCE. Nairi is also an important term since King Sarduri I left an inscription (which is actually the first inscription that can be attributed to a king of Urartu/Bianili) calling his kingdom "Nairi" (Zimansky & Sagona 2009).

Key Issues

A Historical Overview of Urartu and Urartu/Bianili

Although the region in which the Kingdom of Urartu/Bianili was comprised has a long history, this section focuses mostly on the history of the political entity that was conformed between the ninth and the seventh century BCE.

There is agreement among scholars that the region was already inhabited by the sixth millennium BCE, and the presence of third millennium occupations has been reported in the Lake Urmia area (Zimansky & Sagona 2009). The first written records that mention the region in question were written by the Hittites in the second millennium. In them, Hittite kings mention the presence of two different kingdoms named Azzi and Khayasha. Later on, the area fell under the influence of the Mittani, yet by the thirteenth century BCE, the region slipped out of Mittanian control and was incorporated into the Assyrian sphere of influence as multiple campaigns were launched by different Assyrian kings who sought to dominate and excerpt tribute from this area (Barnett 1982). These campaigns were amply recorded in Assyrian texts and in them are not only clues to the type of relationships Assyrians held with those societies living in the area of Urartu but also the first traces for building the political history of Urartu/Bianili (Barnett 1982; Radner 2011). For example, the Assyrian King Shalmaneser I refers to these lands as "Uruatri" and mentions the presence of at least eight different kingdoms (Piotrovsky 1969; Barnett 1982; Zimansky & Sagona 2009). As for the Kingdom of Urartu/Bianili, its political history begins in the latter part of the first millennium. Smith (1999) subdivides it into three periods that he denotes as formative, imperial, and reconstruction, and this division is based upon historical records and the physical landscapes produced

by state authorities. The formative period (c. 1300–850) is not well understood and the archaeological evidence is scarce especially in the eastern Anatolian region.

In the mid-ninth century BCE, Urartian kings began conquering rival polities in an area that ranges from the area of Lake Urmia in the southeast to the headwaters of the Euphrates in the northwest, as well as the incorporation of the Sevan Basin in the Shirak Plain. This program of military campaigns represents the imperial period. Another important characteristic of this period includes a program for the construction of massive fortresses in the Ararat area under the auspices of Urartian King Argishti I. This period of imperial expansion was brought to an end in the late eight century when Assyrian armies under the King Sargon II advanced north while at the same time Cimmerians irrupted in Urartu/Bianili's northern border. Urartian King Rusa I was able to overcome the critical situation. He inflicted a defeat to the Cimmerians and Assyrian armies eventually withdrew to their homeland (Piotrovsky 1969; Barnett 1982; Smith 1999; Zimansky & Sagona 2009). In addition upheavals and challenges to the Urartian dynastic power arose. In the aftermath of this situation, the Kingdom of Urartu/Bianili managed to survive, and Rusa I was able to regain the political control of the kingdom and suffocated the rebellions. However Urartu/Bianili was never able to experience another expansionist era.

The reconstruction period follows immediately after the imperial period. This is not as rich as the previous period in historical records, yet the archaeological evidence is quite substantial. Among other things, this evidence permits scholars to suggest that the Urartian state authority was fully reestablished and that Urartu/Bianili once again challenged Assyrian power in the highlands. Further, Urartian kings were able to recover control over much of the territories lost during the end of the imperial period (Smith 1999). The reign of King Rusa II represents the zenith of this period, and thanks to a series of foundational inscriptions, the construction of a series of massive fortresses can be directly attributed to him (Zimansky 1995a; Smith 1999). The information regarding the successors of Rusa II is unclear, and by the early sixth century BCE, the Kingdom of Urartu/Bianili was once again immersed in a series of crises. As a matter of fact, it has been suggested that Rusa II's intensive program of massive fortress building was a direct result of the overwhelming pressure nomads such as Cimmerians and Scythians were exercising on Urartu/Bianili at the time, and this fact has also been signaled as a probable cause of both the Urartian and Assyrian collapses (Çilingiroğlu & Salvini 2001). As for the exact time of when Urartu/Bianili collapsed, Piotrovsky (1969) dated it as happening either in 585 or 580 BCE based upon biblical dates. However, Sebastian Kroll (1984), as well as other scholars, thinks this date is uncertain and disagrees with such a long chronology. In any case by the late sixth century BCE, references to the Kingdom of Urartu/Bianili disappear completely from written records.

Urartian Material Culture Assemblage

Urartian material culture assemblage is important because it allows scholars to trace the spread of the Kingdom of Urartu/Bianili through the presence of distinctive styles of architecture, art, and pottery. This is unmistakably distinguishable to the degree that as Zimansky (1995a: 103) states that "these are defined with such precision that things are not Urartian by degrees or with qualifications – they either are so, or are not." However, despite its condition of uniqueness and uniformity, the same author points out that it is important to remember that the Urartian material culture studied by archaeologists and linguists is mostly a governmental production representing the elites rather than a broad segment of the population (Zimansky 1995a). For instance, most of the Urartian archaeological efforts have been oriented towards the excavation of fortresses (Piotrovsky 1969), waterworks (Burney 1972; Garbrecht 1980), and royal tombs (Barnett 1963). Only recently archaeologists have started investigating residential areas nearby the fortresses as is the case of Ayanis (Stone & Zymansky 2001) and Bastam (Kleiss 1980). Since Urartian material culture assemblage is

displayed in a wide array of categories, this section will deal only with the most general of them. One focus is architecture and another is pottery and metalwork.

Urartian architecture is represented by diverse levels ranging from domestic to state sponsored. When it comes to the latter architecture is both massive and impressive. This entry focuses on the best examples of state sponsored architecture which are fortresses and waterworks.

Urartian architects excelled at constructing fortresses and often choose strategic locations at natural eminences where fertile ground, agriculturally productive land and communication routes could be overlooked. Fortresses were emplaced in carefully selected locations allowing defensibility but avoiding isolation from the rest of the countryside (Zymansky 1995a). Urartian fortresses were completely surrounded by walls, and these, conformed a perimeter whose function was to protect, multiple storage magazines, arsenals and administrative facilities. Perhaps the most outstanding characteristic of Urartian defensive architecture are the outer walls. These walls were buttressed and sometimes, at the places when angles changed, major towers were built. Urartian fortress walls were so massive that more than often exceed four meters of thickness and based upon some art depictions it has been suggested that they were several meters tall and topped with crenellations (Zimansky & Sagona 2009).

These types of structures belong both to the Imperial and to the reconstruction period. King Argishti I built several fortresses in the Sevan area while King Rusa II built what are considered the most impressive examples of fortresses during the reconstruction period. Toprakkale (or Rusahinili as it was originally known to Urartians) is a fortress in the outskirts of the modern city of Van. Its importance lies in the fact that its citadel rock was the political center of the empire. This last is located 5 km away from Toprakkale and was placed next to the ancient city of Tuspa which was the capital city of Urartu/Bianili. Most of the artifacts found at Toprakkale are dated to the seventh century BCE, and only very few items belong to the eight century BCE (Zimansky 1995b). In Turkey in the shore of Lake Van, the fortress of Ayanis is found. Archaeological work at the site began in the late 1980s, and as a result of the discovery of some inscriptions in a temple, scholars now know this fortress was named Rusahinili Eidurukai or the city of Rusa in front of Mount Eiduru setting a distinction from Toprakkale (Çilingiroğlu & Salvini 2001).

Another site, Karmir Blur (or the ancient City of Teisheba) lies next to modern Erevan in the Republic of Armenia. Karmir Blur is rich in well-preserved archaeological remains since it was violently destroyed resulting in an outstanding preservation of the archaeological contexts. Archaeologists have excavated the complete ground plan of the citadel, and the function of all rooms found within the citadel has been determined due to the fortuitous finding of the inventories (Zimansky 1995b).

Another fortress built by Rusa II that has been extensively studied by archaeologists is Bastam (Rusai-URU.TUR or Rusa's small city). Discovered in the 1960s by a German archaeological team, it remains as one of Urartu/Bianili's largest fortresses built. In this case the fortifications extend from the plain level to the summit of the hill, and just as in Karmir Blur, multiple magazines for storage have been found. Along with the architectural remains of the wall's stone foundations, archaeologists have uncovered evidence for royal administrative practices such as bullae with imprints of Rusa II's seal and tablets (Kleiss 1980; Zimansky 1995b).

Urartian architects excelled at projects other than fortresses. Reservoirs, terracing, and irrigation works are found through the entire Urartian region (Burney 1972), and as hydrotechnical installations, they are remarkable, elaborate, and well-planned water supply systems (Garbrecht 1980). Perhaps the finest example is the water supply system that provided Tuspa with freshwater, both for daily consumption and for irrigation activities. This 56 km massive water work built by King Menua initially brought freshwater to the royal capital at the Citadel of Van (Van Kale), and later it was extended by either King Rusa I or Rusa II to supply Toprakkale from a spring

located in the neighboring valley of Engil Cayi river (Garbrecht 1980). Besides its importance as a massive construction, the Menua Canal (which is first of several sections of the hydrotechnical system) has been securely dated to the reign of this king (805–785 BCE) due to a series of inscriptions that are found along the aqueduct. This is not only a rare but a fortunate finding for archaeologists since waterworks often lack of archaeological evidence – such as pottery or coins – which allows secure and precise dating (Garbrecht 1980).

Ceramic traditions that precede the presence of Urartu/Bianili as a state are just as difficult to identify as those traditions that immediately follow the kingdom's temporality. As an exception, the ribbed buff ware bowl has been described as an Early Iron Age tradition that continues well into time of Urartu/Bianili's development in the first half of the first millennium BCE. On the other hand Urartu/Bianili's pottery is very distinctive, especially the kind that is associated with state activities. Kroll (1976) argues that ceramics at 95 % of Urartian sites consist of simple, undecorated brown and buff wares. In the case of this simple ceramics, the boundaries of the state cannot be correlated with its distribution (Zimansky & Sagona 2009). Instead, wares associated to the state are much clearer to identify and constitute the core of the Urartian pottery (Zimansky 1995b). "Toprakkale Ware" and pithoi represent examples to illustrate this point. The "Toprakkale Ware" was originally labeled as such by Charles Burney (1957) and can be considered a diagnostic type since it is distinguishable both by color and finishing being red and highly burnished. Zimansky and Sagona (2009) mention that as a result of neutron activation analysis, scholars now know that this pottery was locally made even though it looks the same throughout the extension of Urartu/Bianili and that its essential function was wine and food serving since trefoil-shaped jugs and slightly incurving rimmed plates are the most common forms associated with this type.

The previous section indicated that fortresses included storage facilities. Within these, rows of enormous jars or *pithoi* have been found buried up to their shoulders in the contexts of every major citadel. Because of its shape and size, it has been long argued that liquids were stored in them (Zimansky & Sagona 2009). At Toprakkale, Piotrovsky (1969) calculated the total storage volume at a little over 34,000 l (9,000 gal). However, Wartke (1993) has argued that the storing capacity was quite more substantial estimating 400,000 l. In the opinion of Zimansky and Sagona (2009), this last figure looks more correct.

Finally, metalwork is also an important component of the cultural assemblage of Urartu/Bianili. Metalwork in Urartu is mostly characterized by the production of bronze artifacts such as cauldrons, figurines, shields, helmets, horse trappings, belts, bowls, and plaques. According to Zimansky (1995a), metalwork production is closely associated to the Urartian state since many of these artifacts bear inscriptions that mention Urartian kings. Despite the importance of Urartian metalwork as a component of the Urartian material culture, heavy criticizing has been raised around the way metal artifacts have been studied archaeologically. Muscarela (2006) argues that several problems arise when archaeologists are unaware of crucial details approach the material. Among them he points to the fact that most of the metal artifacts are the product of looting and plunder carried out for many decades thus resulting in unprovenienced material, and he adds that this is problematic since omitting this fact may lead to subjective conclusions. One of the publications discussed by the same author is *Urartian Art and Artifacts* (Azarpay 1968) which according to the author focuses mostly on excavated material although fails to discuss the full corpus. Another important publication brought up in Muscarella's discussion is *Urartu: A Metal Working Center* (Merhav 1991) which shows wonderful illustrations of the full repertory of metal artifacts and compiles excellent scholarly essays written by authorities in Urartian archaeology. The work contains only a handful of the hundreds of pieces displayed and only some

come from actual excavations, while the vast majority lacks from provenience and comes from private collections.

Future Directions

There are many things unknown about Urartu/Bianili and research along specific lines is necessary. In the first place as Zimansky (1995b) points out, Urartian archaeology has been oriented towards fortified sites under state direct control leaving out of the map wider sectors of the Urartian population leading to a subjective homogeneity of the Urartian society. Some efforts have been done in this sense (Stone & Zymansky 2001) yet there is so much more that we need to know about the Urartian society that did not belong to the upper strata. On the other hand, Urartian elites cannot be completely ruled out of the question, and important research lines have been pursued in terms of how they exercised the power and contemplated themselves. Smith's work on political landscapes represents a thriving effort to understand how Urartian elites constructed spaces to exercise their power. In a similar line, Tanyeri-Erdemir (2006) has analyzed Urartian imperial art and architecture focusing on how material culture may have been used by King Rusa II as an active component in the modification, renewal, and reproduction of his rule. In sum, Urartian archaeology offers young scholars not only an open invitation to pursue research careers but a wide variety of subjects that still need to be explored.

Cross-References

- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Fortifications, Archaeology of
- ▶ Landscape Archaeology
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Near East (Including Anatolia): Geographic Description and General Chronology of the Paleolithic and Neolithic

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Urban Archaeology

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Brief Definition of the Topic

The phrase urban archaeology is used to refer to the study of archaeology *in* towns or cities or *of* towns or cities. The former, which is a rather narrow definition, describes the practice of archaeology in urban places, particularly "living" urban places (as distinct from towns and cities which were abandoned in the past and are ruinous). Distinguishing it from other branches of the discipline are the particular challenges posed by working in such contexts: excavation is usually in response to development – or redevelopment, more frequently – rather than research-driven, so the locations of sites for excavation and the areal sizes of those sites are determined by the agencies of development; the timetables are often restricted; the stratigraphies are usually very deep, even in cities of modern origin; and preservation is generally by record only. Urban archaeology thus defined is most commonly practiced in countries where legislation protects potential archaeological heritage from destruction by infrastructural development without prior investigation and where the archaeological profession is large enough to accommodate teams who specialize in working in these environments. Such legislation varies from country to country. So too does the view of what constitutes an urban-archaeological heritage worthy of physical protection (in the case of standing buildings) or preservation by record (in the case of buried structures and deposits): the importance of archaeology of pre-1800 date is uncontested everywhere, but the protection afforded to nineteenth- and (especially) twentieth-century archaeologies is rather more hit and miss, although the development of archaeological research into the contemporary world is currently changing attitudes to the most recent past. There is now a body of literature dedicated to the nature of urban-archaeological practice and, closely related to it, a corpus of publications and "grey literature" pertaining to urban-archaeological strategies and policies. This archaeology-as-praxis definition is a development of recent decades, reflecting on the one hand the great explosion of infrastructural development in urban places in the second half of the twentieth century, particularly post-WWII in certain parts of the world, and on the other the fact that research into the medieval and early modern pasts – the period of foundation of so many "living" towns and cities – was itself sporadic and poorly coordinated until the 1960s.

The second, broader definition presents urban archaeology as the archaeological understanding of urban spaces and urban lives, regardless of their location or date. It is, in other words, the archaeology of *urbanism* as a phenomenon. It draws quite disparate studies – from, say, the study of prehistoric agricultural nucleations in Mesopotamia to the study of nineteenth-century slums and red-light districts in Australia and North America, for example – into the same net, although it has long been the case that histories of urbanism through time tend to be written by geographers and "urban historians" rather than by archaeologists. Most of the research on urbanism in our discipline is focused on understanding the patterns and processes of urban development in shorter time periods and in specific places: thus, for example, there is a voluminous literature

pertaining to, for example, urbanism and ancient state formation, colonial towns in the Americas, and Viking-age towns in Europe, while there is an even greater volume concerned with the archaeologies of individual cities.

The distinction between the two definitions of urban archaeology is a fine one, since the purpose of all archaeological intervention in towns and cities, even in rescue-archaeology situations, is to inform our understanding of them. Indeed, published studies of individual urban places not only make central use of data from development-instigated archaeological excavations but are usually precipitated by such excavations. In any case, whatever the specific motivations for archaeological research, studies of individual cities – London, Annapolis, and Melbourne, to name three obvious ones – have been profoundly influential in the side-by-side development of archaeological praxis and archaeological thought.

The meaning or meanings of the term "urban" have, of course, long exercised scholarly minds, not only in archaeology but also in both closely cognate and distantly cognate disciplines too (e.g., geography and sociology, respectively). While debates about terminology often seem peripheral to the serious business of research, terminology is important because the words we use reflect and shape how we think. As an adjective, it is generally agreed across disciplines that "urban" possesses spatial, functional, and social meanings and that these meanings are bound up in each other.

In terms of space, first of all, urban connotes a place of densely concentrated population relative to its surrounding "countryside," with, *critically*, one being defined in contradistinction to the other in every particular instance. The terms "town" and "city" have historical resonances, but the adjective "urban" usefully bypasses the problems raised by the inconsistencies in their usage from one country (even region) to another; "village," however, is universally taken to connote a settlement too small to be regarded as "urban." The measurement of scale appropriate to the definition is not merely areal – the size of a settlement, in other words. Spatial connectivity is critical too: urban places are not merely central places in particular localities but connect to other urban places, allowing greater flows of people, goods, and ideas than are possible in places of dispersed settlement.

Such networks of connectivity bring us to the second definition. Urban places differ from rural places in their functions, and archaeology has contributed hugely to our understanding of those differences. Towns and cities are places of secondary (manufacturing) and tertiary (trade and service) industries and are capable of such specialization not simply because they are relatively large and populous. Rather, it is because they possess symbiotic relationships with rural places and their primary (food-generating) industries *and* are connected to other, similarly specializing, urban places. Archaeology, uniquely, locates the sites and products of such specialization in individual urban settings, illuminates the networks of connectivity which help to explain those products, and, perhaps most critically, reveals the social matrices in which the activities and patterns of production and service provision are located.

This brings us to the third understanding of "urban": its role as a descriptor of society, or more accurately of social relations, in places where the density of population in itself creates for all inhabitants very particular challenges of socio-spatial negotiation. Town and cities, particularly the latter insofar as that word describes very large settlements, are places where power structures are often overtly expressed in planning, architecture, and commerce and where space is contested according to wealth, class, ethnicity, and other forms of identity. Archaeological research on urban places has moved away in recent years from the mere documentation of the physical heritage to sophisticated social analyses of urban spaces and materialities, a development spearheaded by work on modern (eighteenth-century and later) rather than medieval and more ancient cities.

Looking to the future, urban archaeology continues to face three particular challenges. First, the decades of growth that preceded the recent global economic crash generated in many parts of the world a huge corpus of material from urban

sites. Much of this still needs processing. How do we achieve a balance between the storage and recording of data, both of which are time-consuming and expensive, and the generation of meaningful narratives about urban life? Second, given the speed with which urban places change character, even in a global recession, what constitutes urban heritage and what should be protected from alteration? Whose opinions should be solicited in making such decisions? To what extent should the emphasis shift from individual structures in cities to areas in cities and to the landscapes of parts of cities? Third, as archaeological interpretation becomes more sophisticated, there is a need for the discipline to engage more directly with other disciplines with research interests in urbanism. Thirty years ago, Clack and Haselgrove observed that "archaeologists still have no clear idea of what they are trying to contribute to urban studies." While much has changed, the discipline remains more marginal within the larger urban-studies research cluster than it should be given its data-collecting potential and its rich intellectual tradition.

Cross-References

- ▶ Charter for the Conservation of Historic Towns and Urban Areas (Washington 1987)
- ▶ Medieval Urbanism
- ▶ Organization of World Heritage Cities (OWHC)
- ▶ Urban Archaeology at Five Points
- ▶ Urban Archaeology in Twenty-First Century Perspective
- ▶ Urban Heritage
- ▶ Urban Landscapes: Environmental Archaeology
- ▶ Urbanism in the Ancient Near East

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Urban Archaeology at Five Points

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Introduction

The construction of a new federal courthouse at Foley Square in Lower Manhattan, New York City, by the General Services Administration (GSA) required a cultural resources investigation as stipulated in Section 106 of the National Historic Preservation Act (amended). The proposed location of the courthouse was on a block that was once part of the infamous Five Points, a neighborhood known as New York City's most notorious, nineteenth-century slum. Historical research conducted by Historic Conservation and Interpretation (HCI), Inc. a New Jersey firm headed by the late Ed Rutsch recommended

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Urban Archaeology at Five Points, Fig. 1 Lithograph of Five Points in 1855 (New York State census) (Image: Valentine's Manual, 1855.)

archaeological testing and excavation before construction of the building began. HCI's report, which was done under contract to Edwards and Kelsey, the engineers for the project, made it clear that any intact remains of the Five Points had the potential to provide a less biased picture of life in the neighborhood than the picture drawn by the yellow journalism of the day.

Key Issues/Current Debates/Future Directions/Examples

Before the project began, the site was being used as a parking lot. As is often the case in large cities in the United States, the only open land available for new development is open because buildings that once stood there have been taken down in order to create space for parking. The Courthouse Block was once lined with tenements that faced four streets: Pearl, Park, Chatham, and Baxter. The name, Five Points, derived from the intersection of two of those streets – Baxter and Park – with Worth Street, thus creating five points that emptied into an open area. A lithograph of that open area, dating to 1855, has become the iconic image of Five Points (Fig. 1) and was, in great part, the basis for the set of Martin Scorsese's, *Gangs of New York* (2002), a movie based on a book of the same name, published in 1927.

A *project design* provided the program for the documentary research, survey, and excavation of the site, and its analysis and publication. When the tenements were taken down in the 1960s, their foundations including basements were left in place and covered with about 10 ft of fill. The site area included 14 historic lots, and excavation began with the mechanical removal of the fill that covered the basement walls and former backyard areas on those lots. Once exposed, the building outlines were compared to a series of fire insurance maps that showed the changing configuration of each lot over time. In addition to the configuration of the structures, the maps, in this case by William Perris, include information on

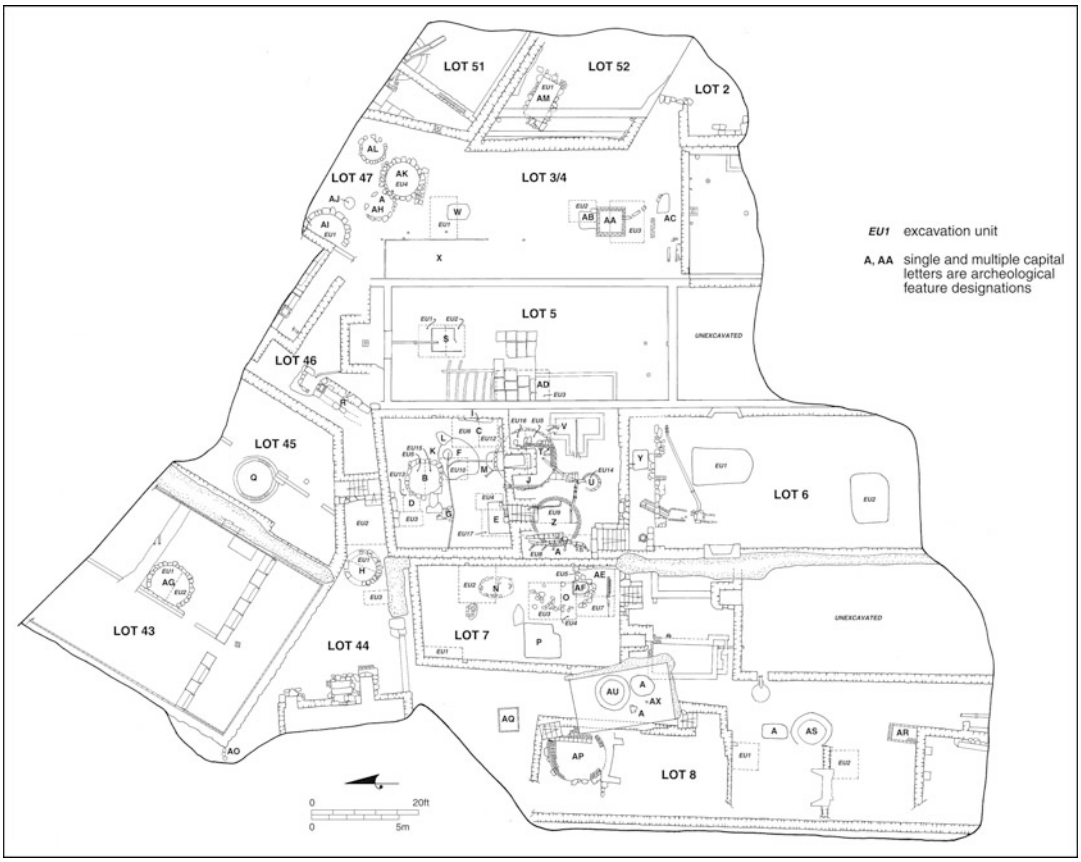

Urban Archaeology at Five Points, Fig. 2 Plan of excavated area

building material, use, and condition. The exposed walls were cleaned by hand (with shovels and trowels), and former backyard areas were cleared in order to locate structural features.

A total of 54 *features* were exposed including privies, cesspools, water closets, sumps, trash pits, at least one cistern, a possible ice pit, and a single bake oven. All were measured and mapped (Fig. 2), but only 22 were excavated. The sample included backyard features on lots facing all four street fronts. Features were generally bisected, one-half excavated *stratigraphically*, a profile drawn, and then the second-half was excavated. Catalog (context) numbers were assigned arbitrarily to each provenience (findspot, layer, or *context*) that was removed separately, and all artifacts were bagged by context. With a few exceptions, features were photographed and tied into one of 23 vertical datum points that were located throughout the site area. A few additional excavation units were used to sample the fill that had been deposited before the block was developed for residential use in the late eighteenth–early nineteenth century and to examine underlying strata that were believed to relate to the tanyards that were present on the block before that development.

Stratification diagrams were used to model the sequence of contexts and features and deduce phases of occupation – analytical units or AU. Specialists in ceramics, glass, clay pipes, and other objects – together with architectural and faunal remains – used these tentative AUs as an initial guide to grouping artifacts. An effort was made to have all analysts working on, or at least

beginning, features at the same time in order to maximize communication. AUs were refined based on cross-mending data, especially from the ceramics, and shared with other analysts. Terminus post quem dates (TPQs) were determined from each artifact category and compared to census and directory data which was being collected by a team of historians at the same time. Artifact and primary historical information were entered into a computerized database, which was available to everyone working on the project. Conservation of fragile materials was conducted in the same laboratory with the artifact analysis. Floral and parasitological analyses were conducted by consultants located elsewhere.

The collaborative approach to analysis provided a stimulating environment in which to consider the research questions posed in the research design and to generate new ones. Artifact analysts used their data, sometimes alone and sometimes in combination with other data, to address predefined general research areas: e.g., family and neighborhood life, work and industry, health and hygiene, the construction of the "slum," and working-class life. In addition to the resulting technical papers, the six-volume report includes a narrative history along with vignettes based on the archaeology, the primary documentary data, an illustrated compendium of smoking pipes, an artifact inventory, and a volume covering conservation (Yamin 2000).

Cross-References

- ▶ Archaeology as Anthropology
- ▶ Archival Research and Historical Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

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Urban Archaeology in Twenty-First Century Perspective

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Introduction and Definition

Cities are among humankind's most complex creations. To do archaeology in a city is to probe into a complicated past that leaves a complicated record. The mere act of excavation is no small challenge, and the analysis of the wealth of data recovered is an even greater one. An entire city may be thought of as an individual site or it may be broken down into a multitude of sites – individual properties that have changed hands, and possibly shape, many times and been used for many different purposes.

Although the archaeology of cities is not new and, in fact, is one of the oldest fields of endeavor – think, for instance, of Rome, Ur, or Teotihuacan where some of the discipline's pioneers concentrated their energies – doing archaeology in younger cities is different and is the focus of this entry.

This kind of urban archaeology is in great part the result of historic preservation laws which require the investigation of places within cities that are slated for redevelopment, places where new construction will destroy remnants of what was there before. This is not always the case though. St. Mary's City, the sixteenth-century capital of Maryland in the United States, is an abandoned city that has been made visible by a long-term archaeological program that, among other things, has revealed its baroque plan, based on the plans that were fashionable in Europe when St. Mary's City was founded (Leone & Hurry 1998: 35). More common in the United States and elsewhere, however, are excavations undertaken ahead of new construction within the

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Urban Archaeology in Twenty-First Century Perspective, Fig. 1 Excavation of a block in New York City, once part of the notorious Five Points neighborhood, where the Patrick Moynihan Federal Courthouse now stands

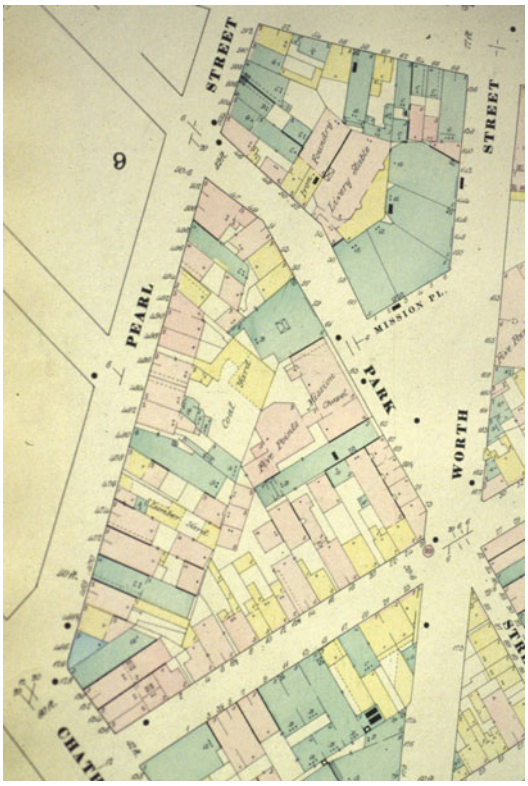

Urban Archaeology in Twenty-First Century Perspective, Fig. 2 1853 Perris Insurance Atlas map of the New York City block shown in Fig. 1

constraints of time and money (Fig. 1). These kinds of projects have made all sorts of unexpected discoveries, from the creation of new land to forgotten burial grounds, from the recovery of Staffordshire tea sets in neighborhoods known as slums to alcohol bottles in the homes of teetotalers.

Any urban project begins with the detailed study of maps which graphically show the growth and change in cities over time. In the USA, nineteenth-century fire insurance maps are particularly valuable when planning an urban excavation as they delineate lot boundaries and the configuration of major structures, and even some minor ones, within those boundaries (Fig. 2). To know who lived in those structures, urban archaeologists consult city directories, tax records, census records, and deeds. If they are lucky, there will be other pertinent documents like diaries, legal case records, or even secondary sources that involve people who lived on the site at one time or another. Such documents are rare, though, since urban projects are more often than not in places where ordinary people lived and worked, people who did not keep diaries and are not mentioned in history books. Historical research is part and parcel of doing urban archaeology, and building a historical context is essential for both investigating the site and especially for interpreting the finds. Urban archaeologists have also adopted scientific techniques developed in other disciplines to squeeze as much information out of the recovered data as possible. Faunal specialists analyze animal bones to reconstruct diet and butchering patterns, archaeobotanists use microscopic plant remains to reconstruct environmental conditions as well as to provide information on diet and medicine,

Urban Archaeology in Twenty-First Century Perspective, Fig. 3 Timber wharves uncovered on the assay site in Lower Manhattan, New York City

and palynologists identify pollen relating to historic plant communities. The microscopic eggs found in night-soil deposits are identified by parasitologists to speculate about diseases in historic populations, soil chemistry is sometimes used to define activity areas, and the identification of bugs (entomology) may be used to define environmental features and household products.

Historical Background

Some of the most dramatic finds in cities relate to the manipulation of landforms. Maps show the changing configuration of New York's shoreline beginning in the seventeenth century, but archaeological excavations have also revealed the depths and contents of the fills used to create new land (Cantwell & Wall 2001: Chapter 13). A project in the 1980s at 175 Water Street in Lower Manhattan encountered a 92-foot-long, 25-foot-wide merchant ship that had been used to contain fill at the eastern end of four water lots stretching out into the East River. At another site in Lower Manhattan (the ASSAY site), a series of late eighteenth-century timber wharves that had been filled and built upon in the nineteenth century was uncovered (Fig. 3). Wharves have also been found under made land in Philadelphia, Boston, Baltimore, Albany, and San Francisco in the United States, and in a variety of European cities including London, Dublin, Amsterdam, Dordrecht, Bergen (Norway), and some sites in Denmark (McDonald 2011). Besides the research value of comparing wharf construction and interpreting waterfront activity, these filled structures reveal the premium put on urban land and the effort that went into creating it before machines were available to do the earth moving.

Wharves are not the only made land in cities where land was at a premium. A whole harbor was covered over in Istanbul leaving at least 22 shipwrecks in situ. The site, known as Yenikapi and discovered during construction of a transportation hub in the early twenty-first century, covered an area about the size of ten city blocks and was dug completely by hand, sometimes down to a depth of 25 ft (Rose & Aydingün 2007). Besides boats, the excavation uncovered a limestone breakwater that protected the city's first harbor, a possible length of Constantinople's original wall, the walls of a charnel house later converted to a tannery, and all the things expected in a harbor – anchors, ships' fittings, and hundreds of amphorae. Less common were well-preserved objects made of leather and wood, preserved because of the waterlogged anaerobic conditions. Extraordinary finds were immediately conserved, removed from the field, and placed on display in the Archaeological

Urban Archaeology in Twenty-First Century Perspective, Fig. 4 Densely packed foundations exposed at the Rocks in Sydney, Australia

Museum of Istanbul, an ideal practice rarely possible while an excavation is still underway.

Most modern cities are built on many layers of fill, and figuring out the stratigraphy in the fill (or fills) is a major task of urban archaeology. This is as true in Istanbul as it is in New York. The strata, or layers, may cover evidence of sequential occupations, often alternating between old living surfaces and material used to cover the surfaces and support new ones. As with the filled wharves that supported made land, fill was also used to fill up ponds, abandoned foundations, and backyard features, such as privies, wells, and cisterns. These features frequently served as repositories for all sorts of household and/or workshop trash which becomes the data urban archaeologists use to learn about peoples' daily lives, their work, their tools, their tastes, and their economic wherewithal. Broken dishes, for instance, are mended to define their functions, and matching ones are identified as sets. The decorations on clay pipes are used as clues to group membership (e.g., Masonic order, Irish Fenians), and butchering marks on bones may indicate ethnicity. A basic difference between urban archaeology in the United States and elsewhere is this emphasis on artifacts.

In the USA, artifact assemblages, used as keys to everyday life, provide the major focus of analysis, whereas in England, for instance, it is the organization of space – the way urban places are configured – that receives the most attention. At the Hungate site in York, UK, a broad horizontal approach to excavation was used to expose the complex pattern of foundations present in this nineteenth-century, working-class neighborhood (Fig. 4). Likewise, at the Rocks in Sydney, Australia, cottage foundations were exposed over a large area revealing the tight crowding in that working-class neighborhood. This difference in emphasis probably has more to do with the nature of the sites and cities where they were found than with choice on the part of the investigators. In general, large urban archaeological projects in the USA are in areas where deep nineteenth-century basements destroyed most of the earlier land surfaces and any remnants of structures built upon them. All that is left are the nineteenth-century basement foundations. To find backyard privies, wells, cisterns, and trash pits that predated the nineteenth-century buildings, it is necessary to lift up the basement floors and look beneath them.

There are exceptions though. Remnants of an eighteenth-century African Burial Ground were found in Manhattan beneath nineteen feet of fill (Fig. 5). The land where the burial ground was built originally sloped steeply down to a freshwater pond that was filled at the beginning of the nineteenth century and the land around it

Urban Archaeology in Twenty-First Century Perspective, Fig. 5 Remains of the African Burial Ground exposed at 19 ft below grade on a site in Lower Manhattan where the General Services Administration was building an office building

was raised and leveled. When buildings were built on top of that land, their foundations did not reach the old ground surface at the bottom of the slope. Over 300 burials were excavated from this surface in the early 1990s, contributing invaluable data on the physical condition of Africans (many enslaved) in eighteenth-century New York and on the origins of the population that had made the Middle Passage (Cantwell & Wall 2001: Chapter 16). Other historic burial grounds have also been excavated on urban sites in the USA including two cemeteries belonging to the First African Baptist Church in Philadelphia, Freedman's Cemetery in Dallas, Texas, Voegtly Cemetery in Pittsburgh, and the UAME Cemetery in Wilmington, Delaware. The covering over of these burial grounds within cities and the reuse of the land are another indication of the premium put on urban land. Rather than treated as sacred space not to be disturbed, they were covered with fill, forgotten, and incorporated into the secular city.

Key Issues/Current Debates

Although the subjects of analysis on urban projects depend to a great degree on the finds, certain subjects recurrently emerge. Class is one of the most important, and urban projects have provided rare access to working-class neighborhoods in several major cities. The Cumberland/Gloucester Street site, investigated in the early 1990s in Sydney, Australia, occupied what had been two half-city blocks where 42 homes had stood. The neighborhood, known as "The Rocks," was cleared in the early twentieth century, but beneath a thick layer of fill, the archaeologists found evidence going back to the earliest occupation of the area. Convict men and women first settled the sloped ground across the harbor from the center of Sydney in the late eighteenth century. Row houses gradually replaced the early terrace ones, and by the middle of the nineteenth century, the neighborhood was regarded by outsiders and historians as "a classic slum" (Karskens 2001: 69). The excavation complicated the picture, producing evidence of refined dining (dinner, breakfast, and tea sets), moralizing china that would have inculcated proper values in children, and wash sets and combs and brushes that indicated an emphasis on cleanliness, all qualities assumed to be lacking in "slum" dwellers (Fig. 6). Even what was left of the houses showed a care for interior decoration and a willingness to spend money on decorative items like china figurines, rugs, and lamps. While there was no question that the inhabitants were workers – many artifacts relating to sewing suggested that women worked as seamstresses and dressmakers – and the neighborhood was overcrowded and unsanitary, it appeared to the investigators that residents' values were not so different than middle-class values of the time.

Urban Archaeology in Twenty-First Century Perspective, Fig. 6 Moralizing China recovered at the Rocks, Sydney, Australia

Seen from the outside, the neighborhood looked dangerous, but from the inside – from the archaeological evidence – it looked very different.

The Five Points project in New York City produced much the same result (e.g., Yamin 2001b). Also excavated in the early 1990s, the site was located on a block that was once part of the Five Points neighborhood, known as New York City's most notorious nineteenth-century slum. One side of the project area was inhabited by Eastern European, mostly Jewish, immigrants, and the other by newly arrived Irish immigrants. While the Eastern European residents, many of whom were in the tailoring or used clothing business, may have been economically better off, artifacts recovered from a large cesspool associated with an Irish tenement indicated that the Irish ate more expensive cuts of meat and owned the same kinds of Staffordshire teawares they would have had at home in Ireland. Their tenement households were overcrowded and households often included borders, but families were more comfortable than they had been in Ireland and did not fit the stereotypes portrayed in the yellow journalism of the day. These two projects in working-class neighborhoods demonstrate the power of urban archaeology to get inside neighborhoods that have previously been portrayed negatively by outsiders through prejudice and fear of "the other."

Another strength of urban archaeology is its ability to bring people close to the past and reveal the connections between past and present. A long-term project in Annapolis, Maryland, invited visitors to view ongoing excavations and talk to the archaeologists who were doing work (Potter 1994). Using critical theory as a framework for interpretation, the archaeologists connected the finds in the ground to the context of the living city. This kind of archaeology has the capacity to demythologize places where excavations are conducted and the people who do them. In Cape Town, South Africa, excavations in District Six, a multiethnic neighborhood that was leveled in the 1970s, revealed the reality of living conditions in yet another neighborhood portrayed as a slum, and the investigators worked with peoples' memories to capture the "complexity, contradictions, and ambiguity" of life in the district (Malan & Van Heyningen 2001: 53). In a different way, the extensive archaeological work done in Quebec City in anticipation of the city's 400th anniversary has made the city's past – its heritage – visible (Moss 2009). Excavations uncovered Jacques Cartier's sixteenth-century fort, the seventeenth-century Chateau Saint Louis including Champlain's house, and the Intendant's Palace which, before it was a palace, was a shipyard and before that, a brewery. Careful attention was paid on this

project to botanical and entomological data which revealed changes in the landscape. Recovered artifacts included French-made wares that were being used by Samuel D. Champlain and his retainers as well as assemblages relating to the earliest interactions with native peoples. What is perhaps most extraordinary about the work in Quebec is the support it received from national, provincial, and local agencies, setting an ideal, though probably unreachable, standard for other cities.

While these large excavations done in public view attract a good deal of attention from the press and from visitors, the written reports, weighed down with exhaustive artifact lists and methodological descriptions, have generally been less accessible. A number of urban archaeologists, however, have experimented with using a variety of narrative styles to bring urban data to life (Praetzellis & Praetzellis 1998). In some instances, the narratives serve to clarify the analysis by bringing the many strands of data – artifact, environmental, historical, etc. – together into one interpretation as well as to make the results readable (Yamin 2001a). In the UK, archaeologists working in industrial cities have brought the past in those places to life by paying particularly close attention to context. The interweaving of still standing architectural remnants with archaeological finds is enormously evocative and a powerful way to make sense of cities that have changed so dramatically over time (Belford 2006; Symonds 2006, 2011). This work is yet another example of archaeology revealing a past that is irreparably intertwined with the present.

Urban archaeology is many things. It can be as intimate as the portrait of a lady that begins with her bodkin, the implement she used to lace up her bodice (Beaudry 2011), or as impersonal as the symbolic meaning of changes in orientations of public buildings (Leone & Hurry 1998). Above all, urban archaeology combines data derived from excavation and the analysis of material culture with information drawn from primary documents as well as secondary historical sources to interpret the growth of cities and the experience of urban life.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Agency in Archaeological Theory
- ▶ Annapolis: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Clay Pipes in Historical Archaeology
- ▶ Historic St. Mary's City
- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Southern Africa: Historical Archaeology
- ▶ Teotihuacan: Geography and Culture
- ▶ Topography of Rome
- ▶ Urban Archaeology
- ▶ Urban Archaeology at Five Points
- ▶ Zooarchaeology

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Urban Dark Earth

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Introduction

Dark Earth is a term used in European urban archaeology to designate thick, dark-colored, homogeneous deposits generally ascribed to the post-Roman period. Often, Dark Earth constitutes an important part of urban stratigraphy. Taking into account that these deposits lack any recognizable internal stratigraphy and that they often formed over several centuries, their study requires an adapted research protocol and case-by-case investigation. The systematic study of Dark Earths from an environmental perspective enhances our knowledge of the array of human and natural events that shaped European cities.

Definition

The term "Dark Earth" does not correspond to a soil classification name (e.g., in soil taxonomy, FAO/WRB, etc.) nor should it imply a univocal archaeological interpretation. The term is used in substitution for other terms present in older literature such as "dark layers," "black layers," "black earth," "made earth," or "dark made earth" (see Macphail et al. 2003; Yule 1990; Brogiolo 2011). In this chapter the adjective "urban" is employed in order to avoid confusion with "Amazonian Dark Earths." Dark Earth indicates dark-colored, humic, and poorly stratified units, often formed over several centuries, frequently rich in anthropogenic remains (brick, mortar, tile, charcoal, bone, pottery, etc.) observed in urban contexts. More specifically, it is often used to define units situated in between stratified deposits of antique cities (between the first and the third to fifth century CE) and medieval ones (from the eleventh to twelfth century CE onward). More detailed discussions of the definition of "Dark Earth" are offered by Macphail et al. (2003), Galinié (2004), Devos et al. (2009), and Fondrillon (2009).

Historical Background

Interest in Dark Earth has developed since the late 1970s throughout Europe alongside the study of the transformation of urban space after the collapse of the Roman Empire. Dark Earth studies have been undertaken at sites in the

United Kingdom (Carver 1987; Yule 1990), Italy (Brogiolo 2011), France (Fondrillon 2007; Borderie 2011), and elsewhere. The homogeneous nature of Dark Earth, together with its thickness, has often led scholars to interpret it as the result of a single process, natural or anthropic, to explain its origin. Such interpretations explain Dark Earths as alluvial deposits, as simple accumulations of urban dumps, as massive backfill units for ground-rising purposes, as gardens, or urban horticultural plots (see Macphail & Courty 1985; Carver 1987; Yule 1990; Brogiolo 2011). However, the application of analytical methods of geosciences to Dark Earths (especially soil physicochemical analyses and soil micromorphology) has revealed that they result from a complex interplay of many diverse anthropic activities and natural processes. The first examples of the use of these analytical techniques date to the early 1980s at urban sites in the United Kingdom (Macphail 1981, 1983; Macphail & Courty 1985). In Italy, a geoarchaeological approach involving the use of soil micromorphology was applied to the study of Dark Earths initially by Cremaschi (1992) in the city of Ferrara and, more recently, by Cremaschi and Nicosia (2010) again in Ferrara and by Nicosia et al. (2012) in Florence. In France, specific reference to Dark Earths appeared in excavation reports in the early 1990s (Fondrillon 2007; Borderie 2011), and the use of an interdisciplinary protocol for the analysis of Dark Earth involving historians, archaeologists, and geoscientists was advocated in 1995 by Cammas et al. (1995). In the Brussels-Capital Region, a similar protocol connecting archaeopedology (physicochemical analyses, soil micromorphology) and botanical analyses (fruits and seeds, phytoliths, pollen, and charcoal) has also been developed (Devos et al. 2007).

The application of geoarchaeological, archaeobotanical, and/or archaeozoological approaches has opened new perspectives on formation processes of Dark Earth. Their implementation in Dark Earth studies in Great Britain and later in France, Italy, and Brussels has demonstrated their importance for understanding urban history.

Key Issues/Current Debates

A key issue in Dark Earth studies concerns the interpretation of these homogeneous units. Soil micromorphological, physicochemical, and archaeobotanical analyses have demonstrated that the formation of Dark Earth involves several syn- and postdepositional processes. The accretion of Dark Earth derives from the input of a vast range of materials, such as kitchen refuse, hearth rake-out, cereal-processing waste, cess, manure, construction materials (stone, brick, mortar, plaster, tiles, wood, earth-based materials, etc.), and artisanal waste. Input of sediments contributing to Dark Earth accretion can also derive from flooding (Cremaschi & Nicosia 2010; Nicosia et al. 2012; Nicosia et al. submitted – see Figs. 1 and 2), colluvial and eolian processes (Devos et al. in press).

Successive phases of human reworking (plowing, digging, robber trenches, etc.), bioturbation (rodents, earthworms, enchytraeids, plant roots) and weathering of earth-based and organic construction materials have been reported to cause the obliteration of any original stratification or sedimentary structure (Macphail 1994; Macphail & Linderholm 2004; Goldberg & Macphail 2006). Under the microscope it is possible to observe that inclusions like charcoal, ceramics, bone, and even coprolites become heavily fragmented and may develop a random and unoriented distribution throughout Dark Earth (Fig. 3). Besides bioturbation, other soil-forming processes are also involved in the genesis of Dark Earth. These correspond mainly to humification of the organic material, decalcification, and oxidoreduction (Macphail 1994; Devos et al. in press). Environmental studies therefore shed light on the activities that characterize the urban environment in which Dark Earths developed. These consist, for example, of repeated dumping of waste (Cammas et al. 1998; Cammas 2004), cultivation and manuring (Cremaschi 1992; Macphail 1994; Devos et al. 2007; Devos et al. 2009) (see Fig. 4), herding (Devos et al. in press) (see Fig. 4), stabling of

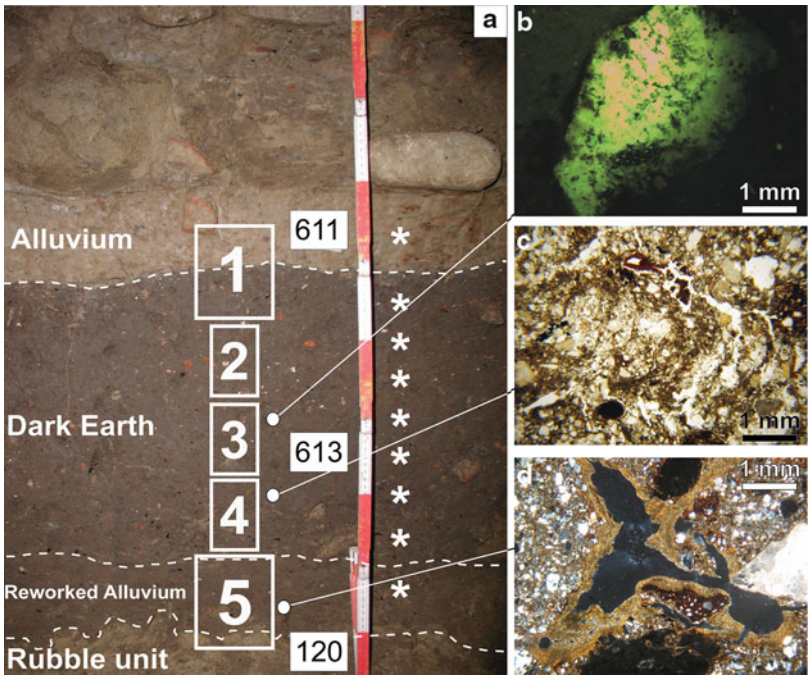

Urban Dark Earth, Fig. 1 Firenze, Uffizi gallery complex (see Nicosia et al. 2012), an example of Dark Earth in an active alluvial setting. (**a**) The stratigraphic sequence, composed from bottom to top by a construction rubble unit (Unit 120); a layer of clay-loamy alluvium reworked by bioturbation and weathering into Dark Earth; a 40-cm-thick Dark Earth unit deriving from night soiling, domestic waste discard, and episodic input of alluvium (Unit 613); alluvial silty clay loam layer from the Arno river (Unit 611; possibly the large magnitude flood of 1177 CE). Note the sampling strategy: a continuous set of thin sections (*rectangles*), intercepting both the basal and top interfaces of Dark Earth, accompanied by a continuous series of samples for physicochemical analyses (*asterisks*), in close association with the undisturbed samples for thin sections. (**b**) Carnivore-omnivore excrement fragment fluorescent under blue light. This type of illumination can be used as an aid to identify organic components in thin section. Additional SEM/EDS analyses highlighted a calcium-phosphate composition, confirming the interpretation as fecal material: 58.1 % Ca; 35.8 P; other elements (<3 %) Na, Mg, Si, and Al (atom%, without oxygen) (blue light fluorescence, 20×). (**c**) Passage feature deriving from the burrowing action of soil fauna (earthworms, beetles, ants, small rodents, etc.). The occurrence of these features is typical in Dark Earth thin sections and testifies to the strong homogenizing effect of bioturbation. At higher magnifications (100×–400×) many finely comminuted charcoal and charred vegetal particles can be seen within such passage features (plane polarized light, 20×). (**d**) Layered silts and clays filling a pore, as the result of flooding and runoff on the soil surface. This type of features forms at depth in seasonally flooded soils, indicating the periodic input of alluvial material during Dark Earth formation. The alluvium brought in was then reworked by bioturbation and human activities into Dark Earth (crossed polarizers, 20×)

animals, and decay of insubstantial buildings (Macphail 1994; Macphail & Goldberg 1995). Taking into account the complex formation history, several models have been proposed, emphasizing the necessity of investigation of the Dark Earth on a case-by-case basis (see, e.g., Macphail 1994; Devos et al. in press) (see Fig. 5).

The second issue concerns the chronology of the events during which Dark Earth formed. Although micromorphological investigations can often reveal the relative chronology of the events, their absolute dating remains a difficult issue. As Dark Earths often formed over several centuries and were subjected to heavy reworking, part of the artifacts and of the datable materials

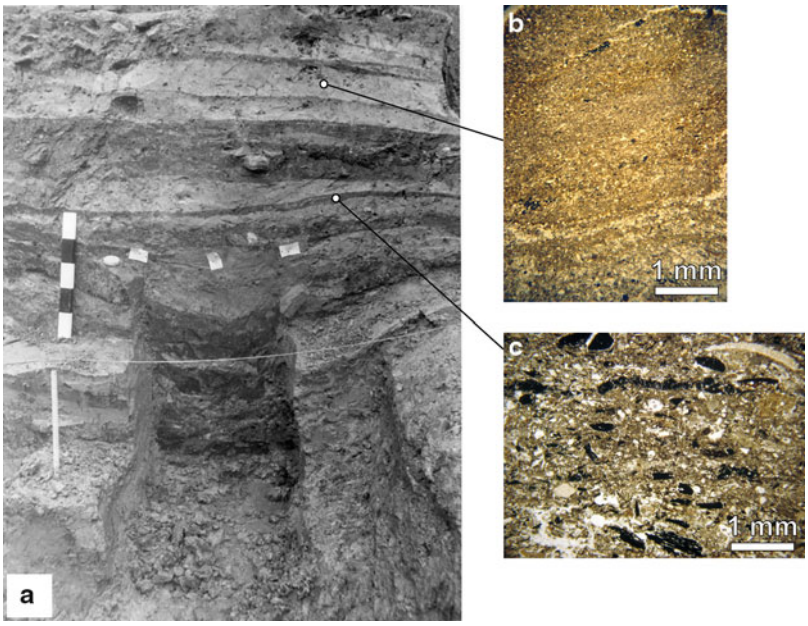

Urban Dark Earth, Fig. 2 Ferrara, Corso Porta Reno site (see Cremaschi & Nicosia 2010), an example of a fast-accreting urban sequence due to the repeated input of alluvium by the nearby Po river. Dark Earths *stricto sensu* did not form at this site because accretion was too fast for soil-forming processes, especially bioturbation, to completely homogenize the deposit. (**a**) The stratigraphic sequence of the site, with occupation deposits (*dark-colored* layers), dating to the eighth to thirteenth centuries CE, intercalated to alluvial layers (*light-colored* layers). (**b**) View in thin section of alluvial fine sands and silts. Note the presence of laminations (plane polarized light, 20×). (**c**) Occupation deposit in thin section: the strong parallel horizontal orientation of the coarser components (mostly charcoal and charred matter) and the massive microstructure are linked to trampling and compaction (plane polarized light, 20 m)

(e.g., charcoal and seeds) were mixed within the deposit, thereby hampering the dating process (see, e.g., the radiocarbon dating of a seventh to eleventh century CE Dark Earth sequence from Florence in Nicosia et al. 2012).

The third issue concerns the potential of Dark Earth to understand urban development and the urban environment. Several attempts have been undertaken to develop maps showing the distribution of activity zones identified within the accumulation of Dark Earth (Borderie 2011; Devos et al. in press), and these can contribute to the understanding of the organization of the urban fabric. Dark Earths often witness the introduction in the post-Roman city of activities typical of the rural world (agriculture, horticulture, herding, soil extraction, etc.). From a historical perspective, they appear in a moment of profound transformation of European cities. Further, according to Galinié (2004) and Brogiolo (2011), Dark Earths do not seem to accompany a moment of de-urbanization, abandonment, and impoverishment, but rather a phase in which agricultural activities possibly acquired a particularly important role in the urban economy. It is important to note that, besides natural sedimentary processes, the parent material for Dark Earths is primarily provided by anthropic sedimentation, which implies the presence of humans and their activities inside the post-Roman city.

The fourth issue concerns the contribution of Dark Earth studies to the understanding of the paleoenvironment. Such studies have shown to be of particular interest to reconstruct the immediate and wider environment of the sites. More in particular information can be gained on the vegetation in the vicinity of the site as well as on the wider environment (Macphail 1994; Devos et al. in press).

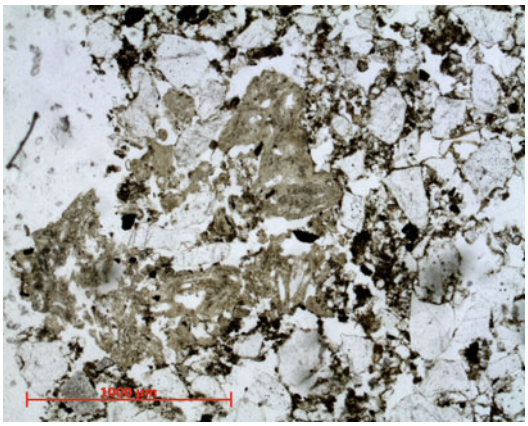

Urban Dark Earth, Fig. 3 Microphotograph showing the fragmentation of coprolithic material (Site of Hôtel d'Hoogstraeten, Brussels, plain polarized light)

International Perspectives

The development of a common research agenda, involving an interdisciplinary approach (micromorphology, in combination with soil physicochemical analyses, archaeobotany, archaeozoology, etc.), appears to be a necessary strategy in order to develop the study of Dark Earths. Recently, scholars from different geographic contexts have begun to share ideas and experiences in the analysis and interpretation of Dark Earths with new focus. One result was a session titled "Geoarchaeology and Dark Earths" held at the Sixth World Archaeological Congress in Dublin in 2008. The session gathered together scholars dealing with both Amazonian Dark Earths and European Dark Earths and helped to highlight the many differences and the similarities between the two. At the recent 137th "Congrès des Sociétés Historiques et Scientifiques - Composition(s) Urbaine(s)" held in Tours in April 2012, a joint presentation by French, Belgian, British, and Italian scholars aimed at presenting the state of the study of Dark Earth formation processes, based upon experiences at various sites in those four countries (Borderie et al. in press).

The research protocols developed for the study of urban Dark Earth are increasingly used to study the so-called rural Dark Earth: thick, humic, homogeneous, dark-colored layers that are found on rural sites (Goldberg & Macphail, 2006; Fondrillon 2007; Devos & Paridaens 2012).

Future Directions

The lack of internal stratification of Dark Earth deposits at the macroscale is particularly problematic for urban archaeologists as it runs contrary to the concept that "one stratigraphic unit equals one action" (Harris 1989). However, many interdisciplinary studies have proven that, in many cases, Dark Earth represents a palimpsest of different activities and natural processes subjected to thorough homogenization and to weathering (Fig. 5). The resulting ostensible homogeneity of a deposit belies its complexity. Although soil micromorphology has proven a powerful tool in elucidating the use of space and the cultural activities associated with Dark Earth formation, its combination with other analytical methods is advocated. Specifically, thin-section study can be integrated with soil physicochemical analyses, instrumental analyses (e.g., electron microprobe, SEM/EDS), phytolith analysis, micro-archaeology, and spatial analysis of artifact distribution. Future study should include research on the origin and evolution of the organic matter in Dark Earth, especially of pyrogenic organic matter, and the collaboration between soil micromorphologists and pedo-anthracologists. Taking into account the complexity of Dark Earth, its study requires a systematic analytical approach. Beginning with appropriate research questions, this includes quality sampling, knowledge of natural processes acting in specific contexts, and the application of solid interpretive models drawn from archaeological excavations.

One final caveat must be issued regarding the expression "Dark Earth." As mentioned above, the term does not indicate a specific soil type according to one of the systems of soil classification. It is widely accepted that, after the collapse of the Roman Empire, generally dark and poorly stratified deposits (or those that anyway mark

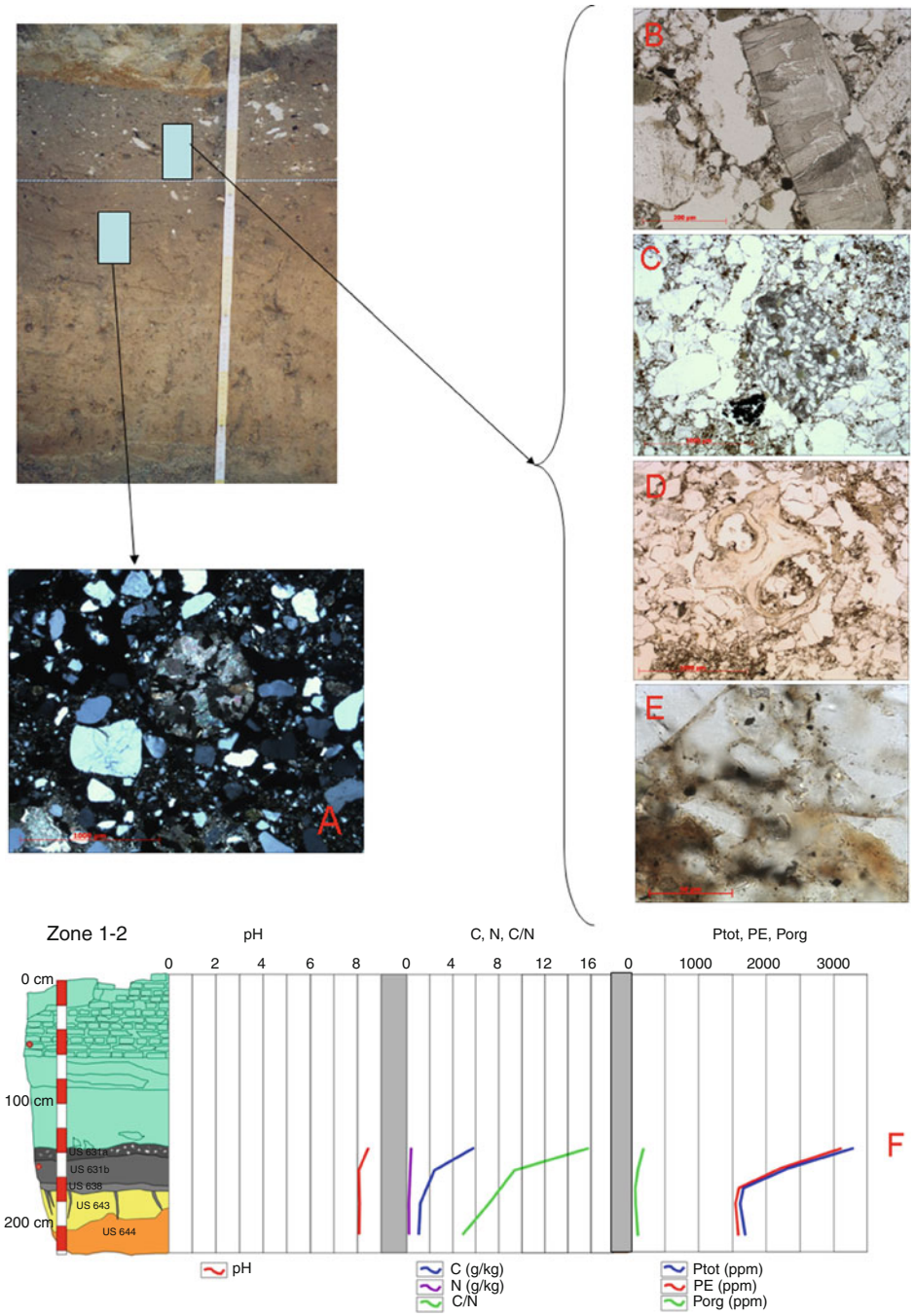

Urban Dark Earth, Fig. 4 Brussels, rue de Dinant (Modified from Devos et al. 2009), an example of Dark Earth formation due to a succession of human activity and natural processes. The lower part witnesses grassland. Evidence is the open microstructure with abundant earthworm granules (biocalcite) (**a**) and a phytolith spectrum typical for grassland (see Devos et al. 2009). The upper part of the Dark Earth results from reworking of the soil and the growing of crop fields. Among the evidence the combined presence of ploughmarks, eggshell (**b**), mortar (**c**), bone (**d**), phytolith markers for cereals (**e**), and enhanced concentrations of phosphorus and bases revealing enhanced chemical fertility (**f**) (see Devos et al. 2009)

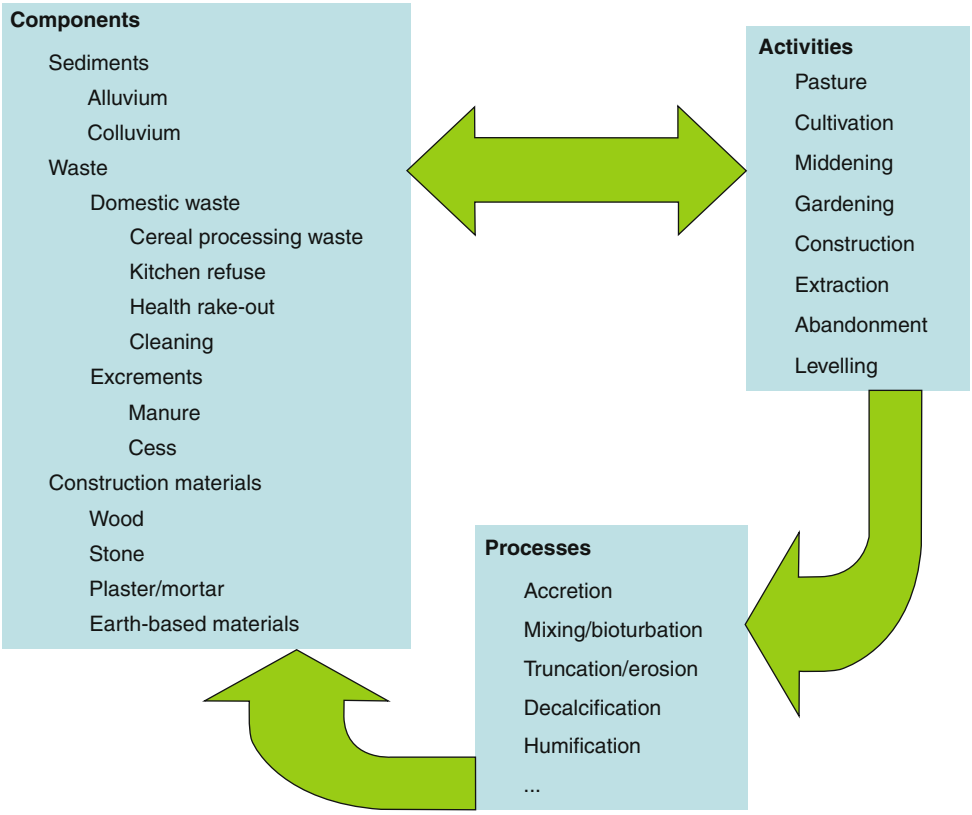

Urban Dark Earth, Fig. 5 Simplified model showing the main components, activities, and processes involved in the formation of Dark Earth (Based upon Macphail 1994; Goldberg & Macphail 2006; Devos et al. in press)

a change with respect to the previous sedimentation style) appear throughout Europe. Archaeological features (burials, walls, hearths, etc.) often appear to "float" in these deposits, and it is often very difficult to identify negative features during excavation. Also, Dark Earths are encountered in both urban and rural contexts, and not necessarily where a previous Roman-age occupation exists. The term "Dark Earth" is useful for identifying these diverse deposits on account of their common features but should be employed as archaeological jargon instead of scientific soil classification. Indeed, as its presence in the Encyclopedia of Global Archaeology suggests, the term has been well established in archaeological literature for many decades. This chapter has attempted to emphasize the importance and commonalities of urban Dark Earths while at the same time demonstrating that characterizations and interpretations of Dark Earth must be made on the basis of context. Moreover, only through multi- and interdisciplinary approaches like those described here will further light be shed on the centuries of history "hiding" in the dark of Dark Earth.

Cross-References

- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ France: Medieval Archaeology
- ▶ Geoarchaeology
- ▶ Italy: Medieval Archaeology

▶ Macphail, Richard I.
▶ Medieval Urbanism
▶ Stratigraphy in Archaeology: A Brief History
▶ Taphonomy: Definition
▶ Urban Archaeology

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Urban Heritage

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Introduction

As a concept, urban heritage is global and has a worldwide scope, but at the same time it harbors a number of notions and must be seen in relation to the different and specific contexts with which it deals. Urban heritage issues engage not only heritage managers and archaeologists but also geographers, landscape and urban planners, engineers, architects, anthropologists, and historians, among others. As cultural heritage issues in general, those concerning the urban heritage are interdisciplinary and multifaceted. The urban heritage often has a position "in between." On one hand, it is constantly changing and under the threat of being destroyed due to the nature of urban development, and on the other hand, it is protected and conserved because of its historical values. Heritage structures are often regarded as a passive setting to the broader scope of the growing modern city. The ultimate goal is to strive for integration so that historic qualities and modern urban conditions can develop side by side.

Definition

Commonly, urban heritage is defined as the layers of historical, physical remains that constitute contemporary urban areas, that is, the built heritage with architectural and historical value or the "monuments" of a city (churches and other religious buildings, castles, city walls, palaces, and institutional buildings). In addition to this, urban heritage includes the urban plan (sites, streets, plots, and block plans of the buildings) and building and land utilization. However, the research complex of cultural heritage in the context of contemporary urban development operates with an expanded concept of heritage, not only including the physical remains and historic preservation and urban development policies, but also considering the political and sociological constitution of the city in regard to its capacity for social integration and local democracy. Urban heritage is both tangible and intangible, that is, including people that live in and are connected with urban areas and places, customs, and beliefs that are of less tangible character but important for the articulation of space and the built environment.

Legislation

Urban heritage is managed differently in different countries and depends ultimately on national legislation. Yet, international key organizations that are dealing with general heritage issues are of considerable importance to urban heritage

planning and to how urban heritage is defined and managed on international as well as national, regional, and local levels. Various of UNESCO's charters, for example, concern urban heritage issues. From being focused on the protection and conservation of built heritage in urban areas, more recent conferences, papers, and adopted charters about cultural diversity and intangible heritage have expanded UNESCO's scope to reflect on the involvement of local communities. Other organizations influential for the definition and managing of urban heritage are ICOMOS (International Council on Monuments and Sites) and ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property). Their conferences, papers, and charters have also moved from being focused on how to protect physical remains toward social aspects of and holistic approaches to urban heritage. In addition to international organizations, there are nongovernmental groups, groups representing developer interests, and research groups that support urban heritage management and protection, such as National Trust, historical associations, local action groups, and universities.

The scale and the scope of urban heritage management and protection vary from World Heritage Cities that ascribe to universal values embraced by existing legislation, through National Heritage Areas and Conservation Areas (entire districts or towns) and individual Listed Buildings that ascribe to more specific and local values but also embraced by existing legislation, to Urban Heritage Parks with specific and local values but no official status.

Historical Background

Most likely, people in the urban centers that existed around the world thousands of years ago were involved in different kinds of management of their milieu, although never defined as urban heritage protection.

The earliest concerted efforts to protect urban heritage, as a response to the processes of industrialization and urbanization that were part of the wider modernization process, started in the eighteenth and nineteenth centuries (see Jokilehto 1999, for an overview of the history of European urban conservation). Focus was exclusively on the protection of monuments and grand architecture, albeit with various approaches, as, for example, "aesthetic restoration" aiming at stylistic unity as an illustration of the ideal, followed by the "antirestoration movement" that wanted (inspired by Romanticism) to preserve the remains even if damaged, and modern conservation that recommended "careful restoration." Another approach was to focus on the building's "historicity," that is, to recognize the different layers of the building.

In the 1960s and 1970s, the approach shifted from individual buildings and their conservation toward a wider interest in areas, streetscapes, and environments and from monuments toward vernacular buildings. By the 1980s and 1990s, aesthetic values had been expanded to include social values, and the "spirit of place" was recognized as being important and valuable to the general community and to local groups within these places. The tendency within urban heritage management pointed toward a holistic approach.

Today, urban heritage and urban areas are being transformed by globalization, industrialization or deindustrialization, by growth of tourism industries, and through developments of national and postcolonial identities and population growth, and the holistic approach is now de facto on the agenda, although not always prioritized.

Current Debates

As a consequence of this contemporary complex situation, the challenges within the urban heritage field have increased. Ongoing debates evoked by these challenges can be divided into the following themes.

Legislation

The main critique against existing legislation is that laws and international guidelines and policies promoting sustainable urban heritage conservation and development have very little

influence in contexts outside the Western world (Birabi 2007: 39). The reason is that these laws, guidelines, and policies, rooted in Europe and directed toward and applicable primarily to situations in the Western world, are not adapted to *non-Western contexts* and are therefore to a large extent neglected in these areas (Zetter & Watson 2006).

Conservation Versus Change and Tangible Versus Intangible Urban Heritage

Another challenging issue concerns UNESCO's World Heritage Cities or Urban World Heritage Sites. There are obvious difficulties of translating traditional conservation concepts, centered around *authenticity* and *preservation*, to the multifaceted and changing contexts urban World Heritage Sites represent (Pendlebury et al. 2009: 349). The result is that the urban experience is ignored and that we get urbanity without urbanness. This debate does not only concern urban World Heritage Sites but rather urban areas and urban heritage in general (Nasser 2003: 467). It is also connected to the debate on tangible and intangible heritage. Even though existing approaches to urban heritage aim at being holistic and have grown wider to embrace both tangible and intangible aspects, there are obvious difficulties to include the intangible, because the basis within urban heritage management is still to protect and to preserve (Tweed & Sutherland 2007: 62), which contradicts the nature of the intangible.

Global and Local

The concept of globalization is a phenomenon with long history, even though the terminology is modern. Its definitions are manifold, depending on the context, but in general we speak about the removal of barriers between (national) borders. Within cultural globalization, this results in a homogenization of culture. Common assumptions about cities throughout the world are that they are essentially homogeneous in both form and definition, that they are based on Western models, and that they are a result of globalization – furthermore, that economic globalization inevitably leads to cultural globalization and that this is connected to the emergence of the urban "explosion," which started with the economic boom in the 1960s and is still proceeding rapidly. These developments result in a growth of a homogeneous "urbanness" and a loss of national and local characteristics and distinctiveness. In this view, globalization presents a major threat to the maintenance of the cultural heritage of urban areas. A reaction against this perspective, evolving from the idea that the situation is more complex, has resulted in the common view that economic globalization instead leads to cultural localism, with increased local resistance to cultural globalization, resulting in an even stronger protection of the local cultural identity as an essential component of sustainable urban development. In other words, globalization and localization occur side by side, and the balance between these forces is ultimately what urbanism is about (Karlström 2010: 554; Logan 2002: xii). The complex connections between the global and the local processes can also be seen as a resource for local economic and social development within the urban heritage tourism field (Green 2001: 191). The global and local must not be regarded as dichotomies but rather as inextricably bound together and acknowledged as a powerful resource harboring and offering something of its own, something uniquely urban.

Urbanism and Identity

In close connection to the debates about urban heritage and globalization/localization are debates concerning urban heritage and identity. The core question is whether there is a particular urban identity that is created in the intersection of and in the space between the global and the local, and what characterizes this identity, or identities. Parts of the debate also concern the challenge of identifying and maintaining these identities, of including them as an important and necessary part of the urban heritage (Evans et al. 2011), and of looking at the relationships between how the urban area is seen, its identities, and how it wants to be seen. Much of the input to these debates draws on involvements in community work and research in the politics of urban space and contemporary urban sociology.

Through a better understanding of the multicultural and ethnic heritage places in urban areas, they can be used as a tool to promote stability and sustainability rather than seeing them as separated enclaves (Lin 2011). The dynamics of cultural diversity, differentiation, and fragmentation must be seen as positive forces counterbalancing homogenization and integration.

Future Directions

Regardless of whether urbanism is a result of, or results in, globalization and localization, and whether the study of urbanism involves individual and specific perspectives and/or collective and universal perspectives, it forces us who deal with past and present urban heritage to consider this new set of multi-scalar engagements. Debates concerning globalization within the urban heritage field have recently paved the way for debates about urban heritage in relation to cosmopolitanism. Globalization is seen as something happening out there, whereas cosmopolitanism happens from within. Cosmopolitanism, which has an overarching framework of global politics but also very specific concerns about the individual and the community, "is not a circle created by culture diffused from a centre, but instead [. . .] centres are everywhere and circumferences nowhere" (Meskell 2009: 5). This and the fact that the majority of the world's population now lives in cities result in that urban areas and urban heritage become a source of both growing cultural conflicts and growing cultural dialogues (Keith 2005). These new forms of cultural hybridity need to be acknowledged and further debated. With the growing pressure from the outside on urban areas and on the urban heritage, questions about sustainable development and urban heritage tourism are also highly important to develop further.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Cultural Heritage and Communities
- ▶ Heritage Ethics, Cultural Base of
- ▶ Heritage Valuation: Paradigm Shifts
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Intangible Cultural Heritage
- ▶ Tangible Heritage in Archaeology

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Urban Landscapes: Environmental Archaeology

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Introduction

Archaeological deposits formed within settlements large, long lasting, and complex enough to be called towns pose interesting challenges for the environmental archaeologist. They are places where large concentrations of organic materials are always likely to have been amassed, used, and discarded. Consequently, in some cases organics – including delicate plant and animal fossils – form a large part of the archaeological record, as in the early medieval towns of Northern and Northwestern Europe (e.g., Carver's (2009: 11) "organic crescent"). By contrast, many urban deposits, particularly if they are well-drained sedimentary contexts, are almost devoid of the remains of animals and plants other than the most decay-resistant charred plant material, bone, and shell. Stratigraphy may be very complicated, however, with repeated reworking of deposits over time.

Definition

Urban dwellers live under conditions very different from those in the surrounding countryside, but nevertheless the town has a landscape of a sort, created primarily by human activity. The substratum was largely the detritus of former occupation, but it supported a mosaic of habitats for plants and animals. This patchy environment was what the human occupants experienced, and it varied greatly with geography and time. This landscape can be considered at scales from that exploited by a minute insect right through to the various zones into which towns inevitably became divided socially and functionally.

Key Issues/Current Debates/Future Directions/Examples

For those times and places where there is a record, the historical approach to past urban landscapes is often extremely evocative (Cockayne 2007). However, the sources for such accounts must inevitably be biased towards the outrageous, emphasizing behavior and environments which by the general standards of the time were considered unacceptable and even requiring civil action. Comments that towns were clean do exist, but are very rare! Archaeology provides a way of reconstructing past environments, living conditions, and human activities where there is no documentation and of countering the bias of documents.

Remains of almost any organism which found its way into the town may be preserved under one set of circumstances or another. The range of surviving evidence reflects what went into the ground, modified by inground preservation during the life of the deposits, including any recent decay. For the purposes of discussion, potential biological remains can usefully be divided into labile (those organisms or tissues which almost inevitably decay very rapidly and are rarely encountered), delicate (those which require special conditions, such as anoxic waterlogging, dehydration, charring, mineral replacement, or the presence of toxic mineral salts), and robust (those, such as bone and shell and also of course charred or mineral-replaced material, which survive in a wide range of deposit types). Some deposits contain almost all kinds of material, presenting what is almost an embarrassment of riches. At the other extreme, an

acidic well-aerated deposit may preserve almost nothing, even bone and shell having dissolved. Taking urban archaeological deposits as a whole in time and space, the majority have limited preservation, yielding robust materials (mostly bone), charred plant remains, and (less often) mineral-replaced fossils. Such remains are usually primarily of value in economic reconstruction and give rather little indication of urban landscapes beyond perhaps certain local craft activities.

What is the nature of the "environmental" evidence? Firstly, there is the sedimentary matrix in which fossils are preserved, itself often composed of both organic and inorganic material. The deposits formed in towns are almost always *not* soils in the sense of surface-forming, biologically stratified, and long-lived systems (so that to call them "soils" is a misnomer; "sediments" is more correct). Nevertheless, many of the techniques of soil science can be applied to elucidating the environments in which deposits formed (e.g., Davidson et al. 2006). Studies of the very fine organics have barely started, but available techniques include various investigations of biomolecules, such as coprosterols and DNA (e.g., King et al. 2009; Bull & Evershed 2012).

Most attempts to reconstruct the environments of ancient towns have been based on the recognizable remains of organisms. These may be microscopic, with pollen perhaps the most familiar, but also phytoliths, diatoms, fungal spores, eggs of intestinal parasites, and rarely even diatoms. At the other extreme are the sorts of large remains which are obvious during the excavation process – larger bones and shells, timbers, nutshell, and fruitstones. In between these lie what are conventionally called "macrofossils" (though they generally require a microscope for analysis): most remains of plants and macro-fungi, the exoskeletons of crustaceans, insects and other arthropods, the smaller molluscs, and small bones. Not all of these have received the attention they deserve; fungal spores and mites have been particularly neglected but probably have considerable potential, the latter for detecting livestock in towns (Schelvis 1994) – the bones of domestic animals obviously cannot be used as evidence that they were *kept* in urban areas, but evidence for large quantities of their dung is usually more convincing. Remains of small vertebrates, on the other hand, may contribute substantially to painting a picture of the urban environment (Boucher 2000; O'Connor 2000).

What is *recovered* from the buried resource depends on the archaeological strategy (the sampling program) and support for post-excavation work, which may be largely a function of political expediency. Research excavations inevitably produce more information about single locations, but the sort of brief assessment preceding development which is *de rigueur* through many areas of the world can be argued to produce a broader picture (Hall & Kenward 2006).

The reconstruction of the past urban environment depends on numerous "point" reconstructions. Towns are (and were) far too heterogeneous for one or a few "sites" to be representative of urban complexity. Unfortunately, almost no towns have been studied to the extent that this complexity can be reconstructed to produce a picture of urban zonation for any period, let alone for their whole history. Even York and London, probably the towns most intensively and extensively studied by environmental archaeologists, have not reached this point. There is certainly considerable potential, however, as shown by some work on insects (Kenward & Carrott 2006), a synthesis of biological evidence from Viking-Age York, England (Hall & Kenward 2004), and studies spanning the Iron Age through to the medieval periods in Novgorod, Russia, and Uppsala, Sweden (Hellqvist 1999).

We can look at the landscape of a town from a number of aspects, notably the evidence for seminatural environments, for the appearance of streets and yards (as perceived by all the senses), for accumulations of waste, for the presence of open water and its quality, for the nature of buildings (a major determinant of the appearance of towns), for urban "wildlife" (including pests, parasites, and commensals), and for the various activities of the occupants both in and outside of the built environment.

In some cases, we can surmise – on the basis of evidence from plants and insects – that areas were

invaded by vegetation and probably took on a seminatural appearance, much like a modern urban wasteland area. In others, the same kind of evidence, as well as the nature of the deposits themselves, points to extremely intensive disturbance, to the extent that only a few hardy weeds were able to establish a roothold (Hall and Kenward 2004). Not surprisingly, in view of this, evidence for urban trees is vanishingly small in older periods, while pollen analyses have provided details on nineteenth century backyards in Lowell, Massachusetts, USA (Kelso 1993). In many cases, where there is preservation of delicate remains in deposits formed on external surfaces (usually in yards), the insect remains suggest for European sites fairly unclean conditions, not at all enhanced by the abundant open cesspits present in many cases.

On the other hand, multiple environmental techniques applied on various urban sites in the region around Boston (USA), probably the most studied urban landscape in North America (e.g., Mrozowski 2006), indicate a different type of yard landscape. These studies suggest that early residential backyards were also mainly composed of disturbed sediment but that these were dry and included gardens of exotic and edible as well as weedy plants. However, with the growth of cities, household gardens tend to disappear from yards.

The visual appearance of structures is fundamental to the urban landscape. While excavation evidence is generally, and quite rightly, seen as the primary source of information concerning the nature of buildings, biological remains have the potential to contribute detail. Many buildings were entirely "biological" in that they were constructed of organic materials: timbers, small wood, plant thatch, stripped bark, and moss for packing crevices. Obviously, archaeobotanical analysis is required to identify such materials before it is reasonable to reconstruct buildings conceptually above the foundations revealed by excavation. The greatest unknown in most such cases is the nature of roofing, for which there is surprisingly little bioarchaeological evidence (however, see Letts et al. 2000).

The insides of buildings were as much part of the urban landscape to the occupants as were outdoor areas. Substantial progress has been made in reconstructing indoor environments at some sites, notably in Europe in the Viking Age/early medieval period. The most substantial study of living floors was that for Anglo-Scandinavian Coppergate, York, where deposits undoubtedly formed during occupation attested to substantial accumulation of filth and to conditions (probably below the surface) moist enough for the invasion of insects more often found in waterside litter (Fig. 1). There was also abundant evidence for

Urban Landscapes: Environmental Archaeology, Fig. 1 A twelfth-century cesspit at 16–22 Coppergate, York, complete with seat, during excavation; the fills of pits like this may be rich in evidence for food waste (Figs. 2, 3) and the remains of parasites (Fig. 3) (Photograph: York Archaeological Trust)

drier conditions, presumably both in the surface levels on which people stood and in the structure of the buildings (Kenward & Hall 1995). At Coppergate, there was a contrast between floors which seem to have been domestic and those which were more probably workshops. This kind of differentiation can sometimes be seen elsewhere, for example, at the eleventh-century workshop at Viborg, Denmark (Iversen et al. 2005).

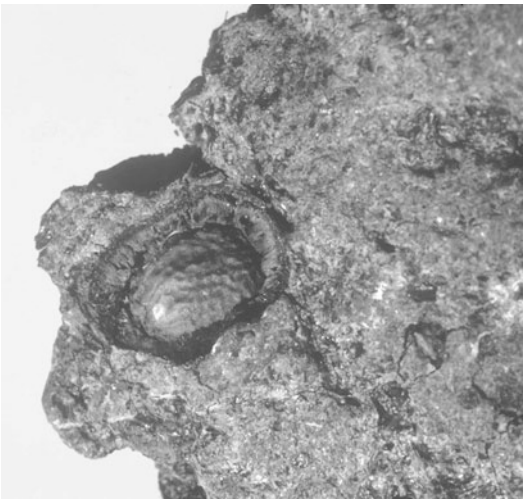

Urban Landscapes: Environmental Archaeology, Fig. 2 Concretion of human fecal material of the kind typically found in pits like that shown in Fig. 1; the fruitstone embedded in the concretion is from a blackthorn fruit (sloe, *Prunus spinosa* L.), a well-collected species

Interpretation of the very "mixed" assemblages of biological remains found in urban deposits can be, to say the least, challenging (Figs. 2 and 3). Two approaches to disentangling such complex mixtures have been taken: the use of species association analysis (Carrott & Kenward 2001; Smith 2012) and identification of activities and materials through "indicator groups" and "packages" (Kenward & Hall 1997; Hall & Kenward 2003). The application of species association analysis to Roman sites in Carlisle, NW England, has given pointers to contrasting conditions across the town (Kenward & Carrott 2006). Indicator groups – based on as wide a range of biological remains as possible – lead us to better understanding of the kinds of materials and activities in particular areas of towns, with obvious implications for local environments. If we establish that slaughtering, skin cleaning, tanning (for skins), or retting or dyeing (for textile manufacture) took place, for example, it is very likely that the locality was blighted by accumulations of foul matter, bad smells, and polluted water (Fig. 4).

Researchers in bioarchaeology tend to emphasize those periods with good organic preservation (itself probably primarily the results of large-scale accumulation of organic matter

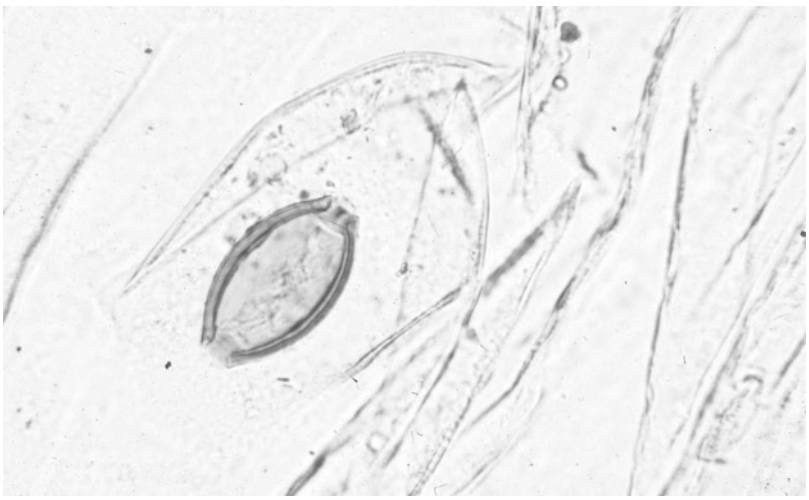

Urban Landscapes: Environmental Archaeology, Fig. 3 An example of extremely delicate plant material preserved in waterlogged urban deposits – leaf epidermis of leek, *Allium porrum* L. Also present (in one of the marginal teeth of the leaf fragment) is an egg of the intestinal parasitic worm, *Trichuris*, probably *T. trichiura* (Linnaeus)

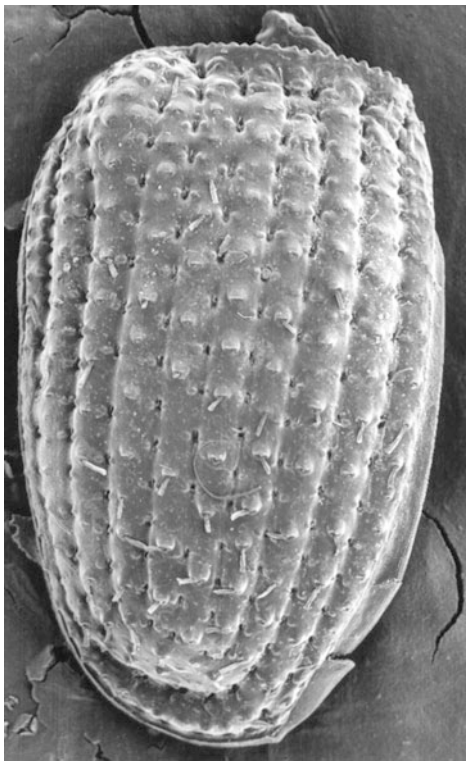

Urban Landscapes: Environmental Archaeology, Fig. 4 An elytron of the heathland weevil *Micrelus ericae* (Gyll.). Found in tenth-century deposits in the center of York, it is part of a group of organisms representing imported material (heather and/or turves from heathland)

Urban Landscapes: Environmental Archaeology, Fig. 5 Taking a sample column for environmental analyses at the Intendant's Palace Site (CeEt-30) in Quebec City, Canada (Photograph courtesy of Université Laval)

incidental to human activity) when discussing conditions in past towns (Fig. 5). Thus, in Northwest Europe the emphasis is on the earlier Roman period of Britain and on the Viking Age to the end of the medieval period. Preservation in surface-lain deposits is rare in Roman stone-built towns and becomes less common in deposits formed in the later in the medieval and into the postmedieval periods. On North American urban sites, studies tend to focus on specific contexts offering better chances of preservation. Within settlements, there is a clear bias towards the less salubrious areas, where organic matter accumulated and self-preserved, with preservation in the more affluent areas often restricted to deep cuts (cesspits, latrines, and wells). Though biased, these areas may provide interesting information on the evolving urban landscape, for example, in privies in Colonial Boston (Bain 1998; Bain & King 2011).

Thus, preservation determines the richness of the information we can recover from biological remains, with the greatest amount of evidence in what are conventionally called "anoxic waterlogged" deposits (Kenward & Hall 2004), but this resource seems to be threatened by recent inground decay. Fortunately, in many periods and places, the abundance of documentary evidence for environments is inversely proportional to that from the ground.

Cross-References

- ► Anthropogenic Environments, Archaeology of
- ► Archaeology and the Emergence of Fields: Environmental
- ► Urban Archaeology

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Urban Planning in the Greek World

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Introduction

Urbanism is one characteristic that binds the ancient cities of Greece to earlier developments in Mesopotamia and the Near East. Cities in east and west shared a number of features in common, including an urban center, a tutelary deity worshipped at a central sanctuary, and dependence on a rural hinterland for sustenance. But monarchs ruled in the east, and Greek cities evolved along a different, complex, and varied path, experimenting with new social and political institutions and an ideology of citizenship. It is therefore remarkable that urbanism first emerges in ancient Greece at the end of the sixth century BCE, at the very same time when increasing contact with the Persian Empire becomes a catalyst for experiments with empire in Greece (Morris 2006: 26-51).

Ancient Greeks were first and foremost agriculturalists; so urbanism, when it appeared, was made possible by stable environmental conditions and an abundant and diverse supply of food, such as grain, olives, grapes, and fish. Geography was also of consequence. The earliest Greek cities were located on or near the coast, and this reflects the importance of maritime trade as a factor for urbanism. The sea also provided natural defenses for civilization to grow and develop with protection from the outside. Peculiar to ancient Greece, the many isolated valleys that formed natural barriers between cities encouraged attitudes about control of resources that ultimately enabled urbanism.

Definition

Urbanism, a state of existence, is quite distinct from the process of urbanization, state formation, and questions about the emergence of civilization. Ancient Greek cities are distinguished by settlement size, density and structure, as well as by topographical organization, occupational pattern, and architecture as an expression of power, identity, and culture. But which of these factors are markers of urbanism? Urbanism is not merely about the size of a city or its population. Nor is the relationship between nucleated settlements and urbanism interdependent: A nucleated settlement was not a prerequisite for an urban center. Urbanism in ancient Greece is found where one also finds mobility, surplus wealth, domination, consumption and exchange of resources and territory, and an administration to manage it all. Any definition more specific would limit the varied and complex nature of the literary and archaeological evidence for ancient Greek cities.

It is also important to distinguish between urbanism as it relates to the physical appearance of cities and the phenomenon of the rise of the polis, or city-state, whose emergence and growth at a remarkable pace in Greece in the eighth century BCE. was accompanied by substantial social and political transformations. As it turns out, urbanism and polis ideology were different, since urbanism required mobility of people and goods beyond a city, and a polis required belonging and obligation to the idea of a community (Whitley 2001: 165-168). Thus, an accurate definition of urbanism for any city must take into account degrees of interaction with the territory and resources around it. This is of some consequence for orthogonal town-plans as a factor for urbanism, especially because by design, they reveal interest in the Greek principle of *isonomia*, which nurtured belonging by granting all citizens equal access to resources.

Political independence appears to have been a prerequisite for urbanism in ancient Greece, but a complete definition of urbanism involves much more than the ideology of independence and citizenship. In ancient Greek cities, only in politically independent units does one find diverse functionality of urban space for politics, religion, commerce, and entertainment. Such activities played out in the standard suite of public buildings for a Greek city, including

sacred architecture, the theater, prytaneion, bouleuterion, and gymnasium, among others. Beyond the city center, extramural sanctuaries enforced a city's claims to territorial control. One challenge to using population size as a factor for urbanism is illuminated by demes in Attica, where one does not find such facilities for diverse function of urban space in demes politically dependent on Athens, even though some of them had populations that exceeded politically independent cities elsewhere in Greece.

At a level somewhat harder to measure, urbanism also concerns the character and personality of a city and its cultural sophistication. Here one must also consider the challenge of escaping the corruption of our perspective by Medieval and early modern urbanism.

Historical Background

Homer and Hesiod, our best sources for early Greek society down to the seventh century BCE in Greece, convey little, if anything at all, about urbanism. Archaeological evidence shows that, in the eighth and seventh centuries BCE, discreet villages coalesced into larger communities for political and economic reasons, especially in southern Greece. Some cities may have had as many as 10,000 inhabitants. Still, few today would argue with the conclusion that "whatever factors made possible the achievement of Archaic Greece, an advanced urban culture was not one of them" (Snodgrass 1981: 157-158). But even in this period, one can perceive a harbinger of forces for urbanism developing in sanctuaries, which dominated city centers, enforced territorial claims on the periphery of communities, encouraged mobility, and were adorned with sacred architecture increasing in monumentality.

It is not until the eve of the Classical period in the late sixth century BCE. when increased diversification of the function of space in a very small number of cities, like Athens and Syracuse, allows for discussion of urbanism. From this point on, urbanism was propelled forward by the rise of imperial administrative centers whose populations estimated at 40,000 exacted wealth and resources from territories far beyond their immediate hinterland (Morris 2006: 27, 36-46). In the fourth century BCE., these trends were imported to Macedonia, whence aspects of Greek urbanism were spread to Egypt and the Near East by the campaigns of Alexander the Great. Here and in the ensuing Hellenistic period, urbanism was concentrated in fewer, larger cities by monarchs who employed synoecism to control subjects and resources. In Asia Minor, especially, the impact of Hellenistic urbanism on Roman cities is clear (Parrish 2001).

Key Issues/Current Debates

Indicators of Urbanism

Were ancient Greek cities "urban"? This enduring question about ancient Greek urbanism is rooted in debate about indicators for it. Osborne and Morris revived discussion over 30 years ago, reacting to M.I. Finley's use of categories devised by Max Weber in 1921. For Finley (1977: 325), "The Graeco-Roman world was more urbanized than any other society before the modern era". On the other hand, Osborne (1987: 194), echoing Snodgrass quoted above, has claimed, "urbanization was unknown in Greece." Morris (2006: 27-32, 1991: 37-38) allows that urbanism does not define cities in Greece prior to the late sixth century BCE, but makes a compelling case for the emergence of urbanism with the rise of imperial administrative centers like Athens and Syracuse shortly after 500 BCE. Instances of such opposing interpretations can usually be traced to sources open to multiple interpretation, and the question of ancient Greek urbanism presents no exception. Still, scholarship over the past three and a half decades has landed on a handful of reasonable indicators for urbanism in ancient Greece and excluded an equal number of others.

Substantial discussion has been devoted to the idea that a city was shaped by its countryside, and that urbanism only occurred when a city grew beyond dependence on its hinterland (Osborne 1987: 16, 194-195). A city's ability to grow beyond the carrying capacity of its hinterland was a mark of urbanism brought on by imperial expansion and control, which, in the formula

proposed by Morris, did not emerge in Greece until after contact with the Persian Empire (2006: 27-32). According to this argument, indicators for urbanism include the evolution of a city beyond the needs of its hinterland for sustenance and an administration of imperial magnitude. The imperial ambitions of Athens were behind the best, and perhaps singular, example of forces for urbanism in the fifth century BCE. With the exception of Syracuse, they are not reflected in other Greek cities, which did not develop beyond means their countryside allowed them. Such interdependent movement of people and resources between cities makes a case for mobility as a reasonable indicator of urbanism, to the degree that mobility can be distinguished from forces at work in imperial administrations and exchange between city and country (Whitley 2001: 167).

Writing can be another important indicator of urbanism (Sweet 1997: 35-49). Writing transformed communities into urban centers because of its impact on social organization. City administrations, especially those dependent on agriculture, needed a way to keep track of things. Writing allowed for recording and organizing information, managing complex relationships between resources and labor, and controlling a community's mobility and security. All of these are ingredients in the recipe for urbanism. But if, with a few exceptions among prehistoric cities of the Near East, writing and urbanism appear at the same time across the ancient world, what are we to make of Archaic Greece, where writing appears in the eighth century BCE., long before the first cases of urbanism? For Greece in the eighth century BCE., the earliest writing served poetry for a seafaring aristocracy in the unique physical landscape and transformative social and political conditions described above (Powell 2007: 45-53, 59-64). Only about two centuries after its invention in Greece does writing become linked to the economic interests of Greek cities and take on value as an indicator of urbanism.

Other components of ancient Greek cities are harder to justify as indicators of urbanism. Substantial discussion has been devoted to trade in specialized crafts, especially pottery, as an indicator of urbanism. When centers of craft production engage in interdependent trade networks, they begin to resemble forces in a market economy. But the scale of this industrial enterprise was probably never sufficient enough to encourage urbanism in cities (Morris 1991: 38-40; Whitley 2001: 174-179). Town-planning is certainly a component of urbanism, but not a requirement for it. Population size seems to be more a consequence of urbanism than an explanation for it. Nor are walls for city defenses indicators of urbanism for ancient Greece, for not only do they appear around settlements of different sizes in most periods of Greek antiquity, they also tend to appear long after the emergence of politically independent cities (Snodgrass 1981: 157-158, 2006: 274-276; Whitley 2001: 313). In addition to the above, Morris (1991: 38-40) also excludes the presence of an agora as a meaningful index for urbanism in an ancient Greek city. Nonetheless, worthy of mention as a hallmark of the Greek agora is the stoa, a long, narrow rectangular building with a roof spanning a rear wall and a colonnade on the façade. Its original function was to aid the operation of sanctuaries, where it provided for storage and lodging at these important markers of territorial control. But it was borrowed for civic architecture in classical times, most notably to flank the agora, where it provided civic space for law courts, commerce, and ad hoc political meetings. The functional evolution of the stoa mirrors the social and political transformations that accompanied the rise of urbanism in Greek cities.

Hippodamus of Miletus

If town-planning per se is not an indicator of urbanism, then this raises questions about the impact on urbanism of Hippodamus of Miletus (498–408 BCE), the architect, urban planner, and namesake of the Hippodamian city plan. First off, city plans of Smyrna in Ionia and Greek colonial foundations in south Italy and Sicily like Megara Hyblaia, which all belong to the seventh century BCE, show that Hippodamus theorized and perhaps refined the orthogonal city plan rather than create it. Such plans had broad, straight streets

with neat intersections at right angles and an open area in the center of the city reserved for public and sacred architecture in the service of community, spectacle, commerce, politics, and cultural identity. Much of Hippodamus's fame is due to Aristotle's criticism of his ideas, which have not been directly linked to cities with types of plans attributed to him (Wycherley 1962: 17-18; Owens 1991: 4-6; Cahill 2002: 3-5). Aristotle (*Politics* 2.8) called him the inventor of the art of planning cities, whose ideal city had 10,000 citizens divided into three classes (artisans, farmers, and soldiers), with loosely corresponding divisions of land: sacred, for worship of the gods, public, to support the soldiers, and private, as property for the farmers. Aristotle called this system impossible and confused, and the actual impact of Hippodamus on Greek city planning must be examined within the context of the polemic in which it is conveyed.

Hippodamian style cities of the Classical period are not hard to find (Owens 1991: 51-73; Hoepfner & Schwandner 1994: 17-67). The only city plan Aristotle attributed to Hippodamus was the Peiraeus, laid out sometime after 478 BCE, with an agora named for its planner (Gill 2006: 1-15). Estimated to have a population of about 25,000, archaeological evidence has revealed an orthogonal plan complete with insulae (city blocks) and courtyard houses of the prostas type also found at Priene a century later (Hoepfner & Schwandner 1994: 22-50).

Without naming the planner, Strabo (14.2.9) implies that Hippodamus laid out the city of Rhodes in 408/7 BCE. There is little agreement about ambiguous evidence for Hippodamus's involvement in city planning at his home town of Miletus in c. 479 BCE and at the Athenian panhellenic foundation of Thurii in southern Italy in 443 BCE (Burns 1976: 414-428; Cahill 2002: 301-302 note 6; Gill 2006: 1-15).

The career and impact of Hippodamus on urbanism are both elusive (Whitley 2001: 315-319). City plans on orthogonal principles predating the career of Hippodamus are found in pre-classical cities like Megara Hyblaia on Sicily, Vroulia on Rhodes, and Marzabotto in Etruria. Cities not attributed to Hippodamus or his influence, but which were laid out with perpendicular streets and regular city blocks, are also known from many other sites in Greece and Asia Minor from the Classical and Hellenistic periods, such as Abdera, Halicarnassus, Ilion, Olynthus, Pergamon, and Priene (Hoepfner & Schwandner 1994; Parrish 2001). It turns out that Hippodamian plans have less to do with a single moment of invention and more to do with circumstances in which Greek cities were formed. Cities that grew out of long established villages, like Athens, were unlikely to have orthogonal plans, whereas new foundations, like the Peiraeus, were more likely to have regular orthogonal plans.

Future Directions

Future study of ancient Greek urbanism is tied to new discoveries in archaeology, especially those with potential to inform on the indices for urbanism described above. At the same time, a substantial challenge to archaeologists and readers of their work, and one far too often neglected by studies that appeal to town plans, is the reproduction of restored plans and conceptual reconstruction drawings by artists. These provide false impressions of completeness and consistently neglect to compare what has been found to what might still lie beneath the surface. Beyond archaeology, research questions will also continue to evolve in new directions. A case in point is a recent Social Darwinist theoretical exercise which, despite controversy over the extent to which genes control behavior, aims to link ancient Greek urbanism to the success of eusocial communities by transplanting genetic models for insect communities to human societies (Bintliff 2010: 15-41).

Cross-References

- ▶ Polis
- ▶ Urban Archaeology
- ▶ Urban Planning, Roman
- ▶ Urbanism in the Ancient Near East

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Urban Planning, Roman

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Introduction

Hundreds of towns were founded, expanded, and redeveloped across the breadth of the Roman Empire, many of which still survive as cities today. Since the standing remains of the Romans' towns in Europe and the Mediterranean region are one of the strongest reminders of their urban-focused culture, the Roman town-building tradition has been a subject of scholarly interest for centuries. Urban planning involved incising the basic layout of a future town into the landscape, creating parameters for its physical development, although other processes are also associated with it. Since the designs of many such towns have survived in the archaeological record, scholars utilize this resource for interpreting the purpose and development of Rome's concept of the city.

Definition

Roman urban planning is the principles and practice employed in the founding, construction, expansion, and infrastructural maintenance of Roman nucleated settlements.

The physical definition and subdivision of a new urban space was to prepare it for construction: its fortifications, paved streets, or buildings.

Thus, the study of Roman urban planning and the study of Roman urban architecture are partly intertwined. Traditionally, urban planning's strongest association is with an orthogonal grid of streets, possessed by many Roman towns. Regular street systems are the most obvious aspect of urban planning to have survived. Yet the founding of a new settlement also involved less archaeologically tangible processes, such as the establishment of a new urban population. After the initial founding, a town's physical development over time usually involved the periodical replanning of areas within it. The methods employed for planning towns were also used to design some nonurban or periurban settlements.

Historical Background

Ascertaining when the Roman practice of town planning began is hampered by the imprecision of the textual and archaeological sources. Although Rome itself grew to a great size, it never possessed an orthogonal grid of streets (Liv. 5.55). Particular areas of the city were replanned during its history, such as the major new fora projects initiated by Caesar, Augustus, and Trajan, yet an overarching unitary plan was lacking – a fact admitted by Roman authors. For the beginnings of Roman urban planning, one has to look instead to the settlements created in the wake of Roman territorial expansion. The first reference to Rome's involvement in the founding of a colony is for the late sixth century BCE. As many as 16 of the so-called Latin colonies are reported to have been created before the mid-fourth century BCE, but they were seemingly founded with the involvement of other Latin city-states. From an archaeological perspective, the sites associated with these early colonies demonstrate settlement histories stretching further back in time than the colonial foundation dates furnished by the written sources. In this sense, the founding of a colony by Rome before the second half of the fourth century BCE appears not to have involved the creation of a new settlement, but rather the sending of colonists to an existing one. Archaeological evidence does not currently support a systematic redevelopment of these settlements' urban centers immediately after, and as a consequence of, becoming colonies.

There is insufficient archaeological data to determine confidently which Roman settlement was the first to be constructed from scratch (*ex novo*). A small coastal fort at Ostia may have been the first (see below), but the first colonial town known to be founded by Rome alone on a site with no known pre-Roman settlement is Fregellae (328 BCE). It was orthogonally planned and placed on the banks of the river Liri to counteract the contemporary Samnite threat. At least by the second half of the fourth century BCE, then, Rome was employing surveyors to plan her new settlements.

Scholars have long debated the source of Roman urban planning practices. Some Bronze Age settlements of the *terramare* cultures on the Po plain were laid out orthogonally, and this prompted a theory, no longer upheld, that this represented the origins of formal town planning on the Italian peninsula. In the 1950s, F. Castagnoli proposed that the orthogonality of Rome's colonies (and that of Etruscan settlements) was derived from the advances made by Hippodamos of Miletus (Castagnoli trans. 1971). This Greek urban planner is known to have been involved in the redevelopment of Piraeus, Athens' harbor town, during the fifth century BCE (Arist. *Pol*. 1267b 24–1269a 29). Although the term, "the Hippodamian plan," is still synonymous with the orthogonal street systems of classical antiquity, it is misleading. Orthogonality was employed in Greek urban contexts before Hippodamos was born, as seen in the Archaic Greek colonies of southern Italy and Sicily. The Etruscans seem to have adapted these ideas, reflected in the early fifth-century-BCE street plan of Marzabotto (Bentz & Reusser 2008). Most recently, the ancient Latin town of Gabii has been discovered to have had a regularized street plan (Becker et al. 2009). The close proximity of Gabii to Rome suggests that the Romans could have learned these methods considerably earlier than previously thought. Yet what is lacking is a proven, planned Roman settlement predating the later fourth century BCE.

Early Roman town planning has much in common with contemporary Hellenistic practices, suggesting that concurrent developments in the broader Mediterranean and in Italy were influential (Sewell 2010). Regularized settlements were being founded on the Italian peninsula in Bruttium and Lucania in the late fourth century BCE (Osanna 2009). The old Etruscan centers and perhaps some in Latium were founding small fortified centers in their territories. On a macro-level, this was the most dynamic period for urbanism in the eastern half of the Mediterranean, with the founding of hundreds of cities by Alexander the Great and his successors. A corresponding increase in the quantity of itinerant experts in urban planning must have resulted. This situation probably contributed to the dissemination of contemporary, town planning practices among the urban cultures of the Mediterranean at this time, including the Romans. Although some Greek concepts are manifest in the earliest examples of Roman urban planning after 338 BCE, others are not. Some older Italic conventions were also adopted. Additionally, the Romans were also innovative from the beginning, employing conventions not seen in the settlement forms of other urban cultures.

Many new towns were founded by Rome on an already highly urbanized Italian peninsula during the republic and under Augustus (Gros & Torelli 2007), and many annexed, existing settlements were subsequently replanned. In the wake of Rome's dramatic territorial expansion across the Mediterranean and Europe between the later third century BCE and the first century CE, in many cases, a settlement model was created with which Rome had most experience: a network of urban centers administering territorial units. Consequentially, the areas of the empire which are closely associated with Roman urban planning are those provinces to which Rome brought the concept of the city for the first time.

Key Issues/Current Debates

Sources

Urban archaeology provides scholars with most of the available evidence on Roman urban planning. Archaeological evidence from the majority of Roman towns is derived from the excavation of only a small percentage of their total surface areas. Many have modern settlements situated above them, prohibiting extensive archaeological investigation in the long term. Thus, the plans of Roman towns created by archaeologists often involve extensive hypothetical reconstruction. When conditions are favorable, modern remote sensing techniques can reveal an abandoned town's plan (Fig. 1), but to establish how the plan developed over time without accompanying excavation is an interpretational challenge.

Few ancient textual sources relate to Roman town planning. An overview is provided by Vitruvius (1.4–7; Rowland & Howe 1999) writing in the Augustan period, who discusses how to choose the site of a new town, the planning and construction of the city wall, the laying out of the streets, and the allocation of public spaces. He also describes some of the technical procedures for the laying out of a city. A surviving collection of surveying manuals, the *Corpus Agrimensorum Romanorum*, was probably compiled in the fifth century CE (Campbell 2000). Although it deals primarily with the procedures and issues related to the division and marking of land outside cities, similar techniques were employed by those engaged in planning urban space. An important testimony from the sixth century CE is provided by the treatise of Julian of Ascalon who set down regulations governing the design and replanning of houses to ensure the continued urban vitality of existing cities (Hakim 2001). Many surviving inscriptions refer to building projects that contributed to the physical development of towns over time.

The Process of Urban Planning

During the Roman Republic, the founding of colonies was overseen by three commissioners (*tresviri coloniae deducendae*), often high-ranking politicians who were responsible to the senate and the people of Rome (Gargola 1995). Some written sources refer to the commissioners being present at the site of the new settlement. The great military leaders of the Late Republic

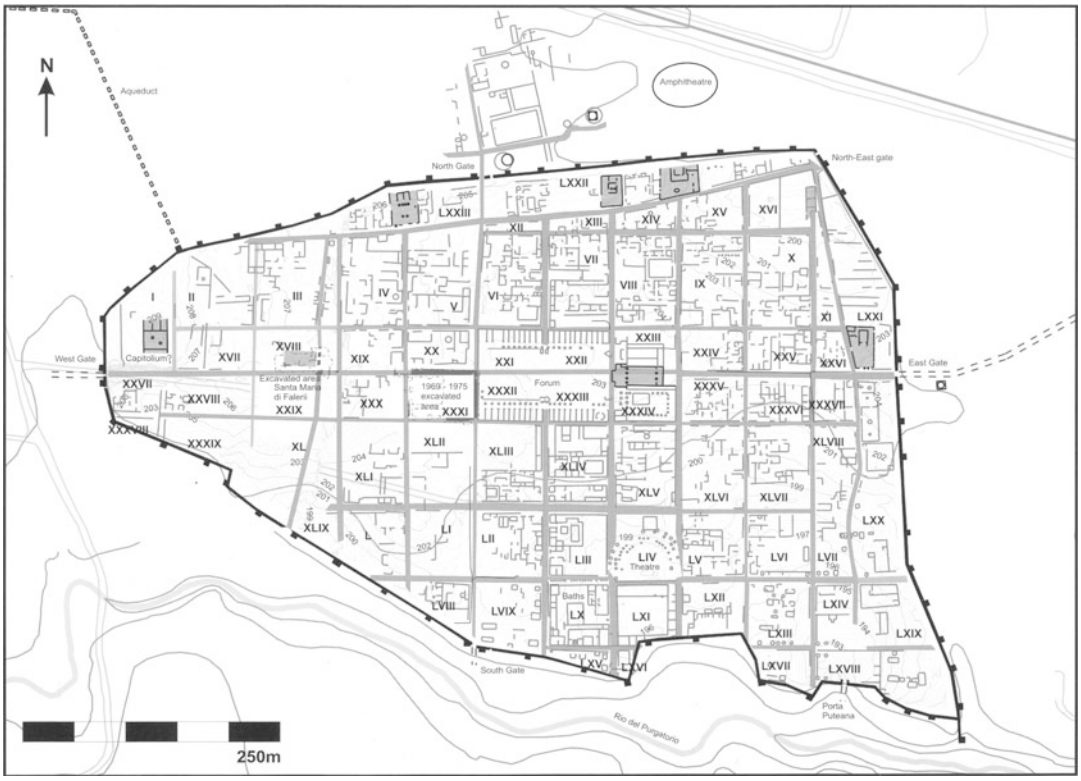

Urban Planning, Roman, Fig. 1 Falerii Novi. Reconstructed town plan based on the interpretation of a magnetometry survey (Millett 2007: 72, Fig. 1. Reproduced with permission from M. Millett and the Journal of Roman Archaeology)

founded many colonies for the veteran soldiers of their wars, although this could involve settling them in an existing town and elevating its status to that of a colony. During the Imperial Period, emperors and their agents founded new colonies. Provincial governors might also have encouraged urbanization. Yet there were other forms of Roman town than just colonies, and for many of them, it is unclear who instigated and oversaw their foundation.

A number of interdependent factors influenced the choice of a new urban site. Curiously, our chief contemporary literary source, Vitruvius, discusses only one consideration: how healthy a site was in terms of its soils, winds, and nearby bodies of water, the qualities of which, in his view, could either be salubrious or lead to illness. Today, it is believed that many other factors were influential. Colonies were frequently founded in newly conquered territory, and, during the republic, defensible positions were often favored to protect the urban population from potentially hostile neighbors or invaders. When no high ground was available, natural water courses could be exploited to provide protection to a town's perimeter. During the imperial period, low-lying sites were chosen even when elevated terrain was available. This is not only a sign of more peaceable times but could also be due to the benefits brought by easy access to long-distance communications routes. With the Romans' habit of building public roads and their utilization of navigable rivers and natural harbors, towns became nodes in the empire's transport network. New Roman foundations were often situated directly within or nearby to existing native settlements, effectively replacing them – true during both the republic and the empire. The Latin word *colonia*, although it came to be more closely associated with a particular legal status during

the imperial period, originally signified a "settlement of cultivators," indicating that the presence of adjacent land suitable for tilling was often a prerequisite. Towns could also be sited in relation to the commercial exploitation of other natural resources such as metals or building materials. Freshwater was a basic requirement for a new town, and securing its supply would have influenced the decision of where to locate it.

Little is known about those who were involved in the planning of the new settlement. In reference to a colonizing project, Cicero (*On the agrarian law* 2.32; Freese 1930) mentions surveyors, architects, clerks, secretaries, and criers. Surveyors who were responsible for establishing the holdings in a town's territory probably also created the street system. Hyginus Gromaticus (*Constitutio limitum* T 144; Campbell 2000) advises setting up the central right-angled intersection of a new system of land division for a colony either in or as close to the town as possible, so that the orientation of the street system and the boundaries of the agricultural land is the same. This method was apparently applied for the planning of Ammaedara (Haïdra) in Africa. During the imperial period, experts from the Roman army could also be involved in urban planning.

The founding of a town could be initiated by the sacred act of taking the auspices (interpreting the flight of birds) and the *sulcus primigenius* (a ritual pulling of a plow) to demarcate the limit of the future town. A monumental definition of this perimeter could be created with the construction of a city wall, an essential element of Roman towns during the republic. Many new towns of the imperial period were originally not given fortifications. Walls were expensive to construct due to their manpower requirements and the time they took to build. It was the army's role to provide security on the empire's borders. In the peaceful inner areas, there is some suggestion that city walls were a privilege conferred by imperial favor.

Some of the tools used for surveying are known (Adam trans. 1994), such as the *groma*, a pole driven into the ground, on top of which was attached the center of a horizontal cross of four perpendicular arms of the same length. Right angles were established with this instrument. An example was recovered at Pompeii in the House of Verus. Measuring rods ten Roman feet in length, the *pertica* or *decempeda*, were also used, and the lines thus created must have been marked on the ground in some way until construction began.

In descriptions of Roman town plans by archaeologists, the terms *decumanus maximus* (main east-west street) and *cardo maximus* (main north-south street) are often employed. This terminology is taken from the writings of the Roman surveyors and was applied to the main intersecting straight axes of land division. It was long assumed that these terms were also applicable to urban streets, and an actual example of an urban *decumanus* is known from two inscriptions from the Latin colony of Aquileia (*Insc. Aq.* 842 and 3495) in Italy. This town's plan is known not to be orientated according to the cardinal points (Fig. 2), indicating that these terms were applied even when the streets were not so aligned. Roman urban street systems could be strictly aligned east-west and north-south, but the majority were not. What factors determined the orientation of a street grid is often difficult to establish. Vitruvius recommends orientating the grid obliquely to the prevailing winds to avoid ill health among the urban inhabitants. Practical considerations such as the site's natural topography could play a role. Some towns were founded along the routes of public roads, the axis of which could influence that of the urban street system.

Archaeologists normally apply the Latin term *insula* (island) to describe the rectilinear blocks framed by streets that made up the town. In antiquity this term was specifically used to denote large apartment buildings, common in Rome from the Augustan period, well-preserved examples of which may be still seen at Ostia. The primary Roman units of measurement used in surveying were the *pes* (Roman foot) and the *actus* (120 ft). Other forms of unit from specific regions of the empire were employed locally. It is often difficult for archaeologists to reconstruct the units employed on a specific site due to inaccuracies in the original surveying. Although the

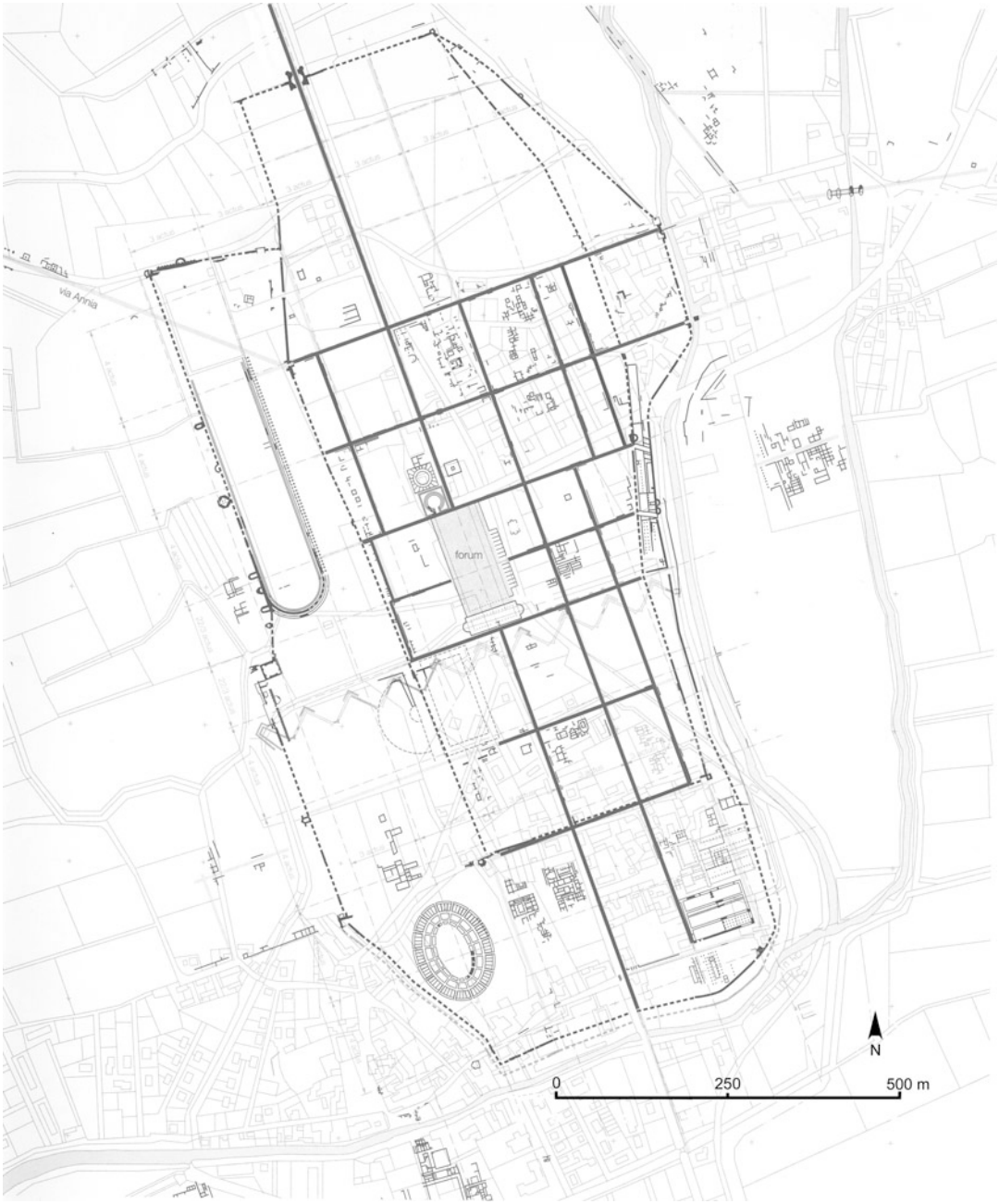

Urban Planning, Roman, Fig. 2 Aquileia. Partially reconstructed town plan (Adapted from Lackner 2008: 335)

reproduced plans of Roman towns often make them appear to be regular, on the ground there are nearly always discrepancies in the dimensions of each city block.

Very little is known about other aspects of the planning process which were probably much more challenging for the founders than marking straight lines on the terrain. Above all, urban planning was about giving structure to a built environment for a new population, usually comprising thousands of individuals. Founders of Roman colonies and their agents were

responsible for establishing the new population at the site, distributing land to farm, and probably also allocating plots destined for houses in the town. This must have been a huge organizational challenge and a stressful process for the colonists who would have needed temporary shelter until their homes were built and food supplies until their first harvest. Founding towns was also a costly business. Finance needed to be managed, and labor and building materials needed to be procured. At least by the Late Republic, public building was often undertaken by contract with complex, legally binding clauses. Time pressure was also an issue. During the republic, the tenure of colonial commissioners is known to have been three years, although they probably remained as patrons of the new town in the long term. Thus, archaeologically speaking, most of the processes involved in urban planning are virtually invisible, resulting in a disproportionate modern emphasis on the physical layout of Roman settlements in publications concerned with urban planning.

Planning Characteristics of Roman Towns

As discussed below, the form of Roman towns differed according to region. No two were the same, and they varied greatly in size, yet certain planning conventions were used repeatedly. Orthogonality is a characteristic of most *ex novo* towns and was usually applied to major extensions of existing cities, such as Pergamon in Asia Minor. Annexed settlements could be replanned with regularized grids, but some continued to develop with no major change to their original, unordered layout, such as Glanum in Gallia Narbonensis, Thuburbo Majus in Africa (Fig. 3), or indeed Athens. Square *insulae* (city blocks) have a strong Roman association (Fig. 4), but this should not be over emphasized. Perhaps the Latin colonies of Placentia and Cremona (founded originally in 218 BCE) were the first to have square city blocks, but rectangular *insulae* continued to be common in Roman planning. A walled town did not always have a street system filling its entire intramural space, but when it did, normally a street ran around the entire inner face of the wall (Figs. 3–5).

Orthogonally planned cities usually had the forum placed so that the main streets running from the main gates would converge on it (Figs. 1, 4–6), but this did not always correlate with the town's geometric center. During the republic, elongated rectangular fora were the norm (e.g., Falerii Novi and Aquileia: Figs. 1 and 2), with more variation seen in the imperial period, including near-square examples (e.g., Thuburbo Majus and Timgad: Figs. 3 and 4). On sites with pronounced terrain, the forum was usually placed on level ground, and an elevated position was often favored (in stark contrast to Greek practice). Multiple fora are known to have existed in some towns, although additional fora were usually created some time after the initial foundation. During the republic, there is some sign that towns were planned with areas reserved for houses of its ruling class situated near the forum.

Fora developed over time to have buildings related to commerce and local government lining their borders, usually with some religious foci (Gros 1996). During republican times, some towns had uniquely sized *insulae* placed along the edges of the forum intended for its future public architecture. Often *tabernae* (shops) were built along a forum's flanks, and, from the Late Republic onward, a *macellum* (market) could be found nearby. The political function of the forum is reflected in the fact that it frequently possessed some form of political assembly place, such as a *curia* (senate house), and it has been argued for several Roman towns that voting took place on their fora. Thus, the presence of a forum is taken to reflect the ability of a community to run its own affairs.

In a town situated on particularly pronounced terrain, often the highest points were reserved for its most important sanctuaries and sacral architecture. If founded on more level ground, major temples could be placed near or on the forum instead. A forum dominated by a large axially placed temple at one end started to become a feature of some Roman foundations from the second century BCE in Italy and Spain. Under the emperors, starting at Rome with the Forum of Caesar, this convention took on a new impetus. The character of the forum changed by becoming pedestrianized and a location for emperor

Urban Planning, Roman, Fig. 3 Thuburbo Majus: plan of the Roman city. Example of an irregular town plan (Adapted Alexander et al. 1980: Plate 34)

veneration. An axially arranged forum with a temple at one end became common in many of the Western Provinces. More common still on western fora from the Augustan period onward was a basilica, a multifunctional hall with architectural origins in the second century BCE, associated particularly with the dispensing of justice, commerce, and local government. It was sometimes situated axially opposite the main forum temple, as at Bavay, Trier, and Amiens. Axiality in architectural compositions is generally a trait with strong Roman associations.

Similar to Greek planning practices, some basic urban zoning was created by town planners. The largest fraction of a city's surface area was intended for domestic architecture. Communal spaces were defined from the start, such as streets, the forum, and sanctuaries. Areas outside the city were reserved for necropolises, but it is unclear whether they were assigned during the initial planning. Cities could develop to have areas dominated by facilities for industrial production, but there is little sign such zones were set aside from the start. Although commerce is strongly associated with the forum, anyone who has visited Pompeii is aware that shops and bars are found in many areas of the town, and they tended to develop along the busiest streets over time.

Urban Planning and Military Installations

It is unlikely that the Romans learned how to plan towns from their experience in creating temporary military camps because their first planned towns predate the tradition of the planned camp.

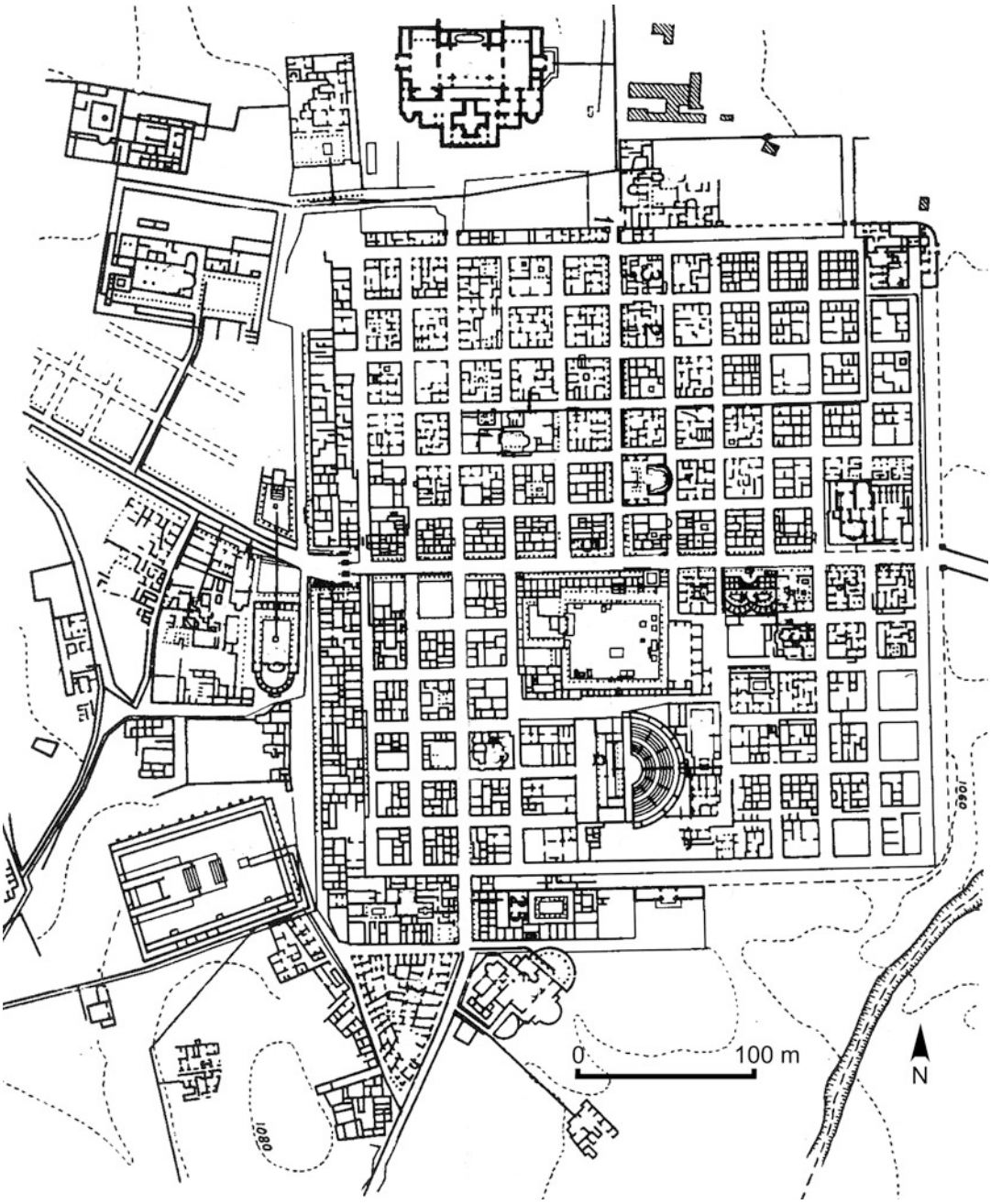

Urban Planning, Roman, Fig. 4 Timgad (Thamugadi): actual state of remains (Adapted Gros & Torelli 2007: 370, Fig. 223)

Most Roman military installations have rectilinear forms for the same reason some Roman towns do: it is an expedient solution to building on level terrain. Yet the situation may be more complex, since among the candidates for the first *ex novo* planned settlement built by the Romans is Ostia, a rectilinear, permanent coastal fort (Fig. 5). It may be described as a fort due to its small size (2.44 ha), its defenses, and a lack of a forum. Most scholars believe it dates to the

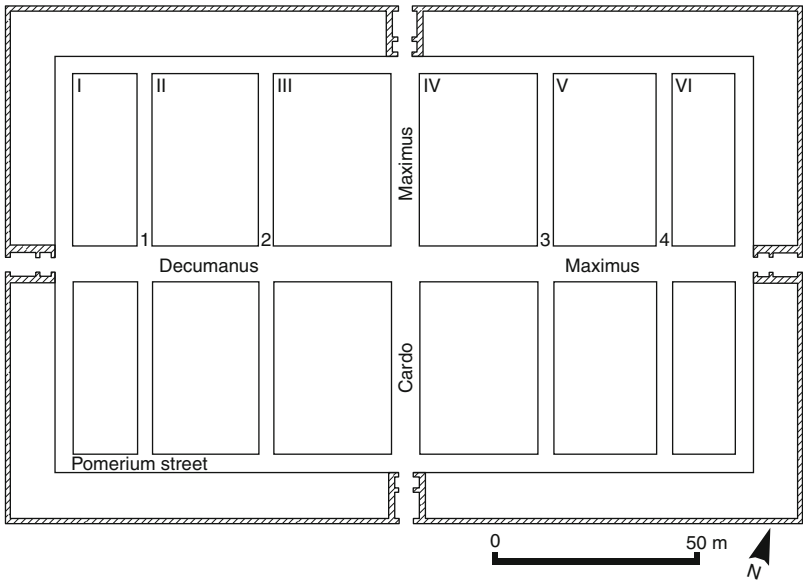

Urban Planning, Roman, Fig. 5 Ostia. Hypothetical reconstruction of the original *castrum* (Adapted from Brandt 1985: 43, Fig. 4)

mid-fourth century BCE or later, and it was a colony of Roman citizens, placed to defend the coast near Rome. As many as ten similar citizen colonies were subsequently built on coastal stretches of the *ager Romanus* (Roman public land) before the end of the third century BCE. From the early second century BCE onward, the character of the citizen colony changed. New examples were much larger and had a forum, making them small towns. An example is Potentia (184 BCE) in *Picenum*. Although nearly 18 ha in size, just like its smaller predecessors it was rectangular in shape, probably with a gate on each wall and a central intersection of the streets leading from them. This design continued to be used, as manifested in the Augustan colonies of Aosta (Fig. 6), Barcino (Barcelona), and Turin. In turn, this form of planned settlement has similar design characteristics to the "playing-card" design of auxiliary forts and legionary fortresses. Timgad, a second-century-CE colony founded for military veterans and planned by the *Legio III Augusta*, has a design seemingly influenced by that of a military base (Fig. 4).

Similarly, planned forts and fortresses could themselves become the basis for towns in the Western Provinces when the army vacated them. In Britain, for example, the street system of the legionary fortress at Colchester became the core of a colony for veterans in the first century CE (Fig. 7). After the army had withdrawn from the legionary base at Wroxeter and demolished it, its street system was incorporated into a civilian settlement which became the *civitas* capital (see below) of the *Cornovii*.

Urban Planning Outside Towns

Periurban settlement is known to exist around many Roman towns (Goodman 2007), but it usually developed with little respect to the alignment of the urban street system (Fig. 3). Some orthogonally planned extramural settlement is known, however, such as that in front of the south gate of the *Oppidum Ubiorum* (which later became Roman Cologne), laid out soon after the town's foundation. Similarly, many secondary settlements in the territories of administrative urban centers developed without regularized street systems. A few were planned orthogonally, such as *Epomanduorum* (Mandeure) in Gaul (Fig. 8), which may have been founded through private initiative. It eventually covered an area of 120 ha and possessed monumental public buildings.

The Three-Dimensional Development of Urban Plans

The physical evidence for urban planning is provided by the archaeological remains of structures

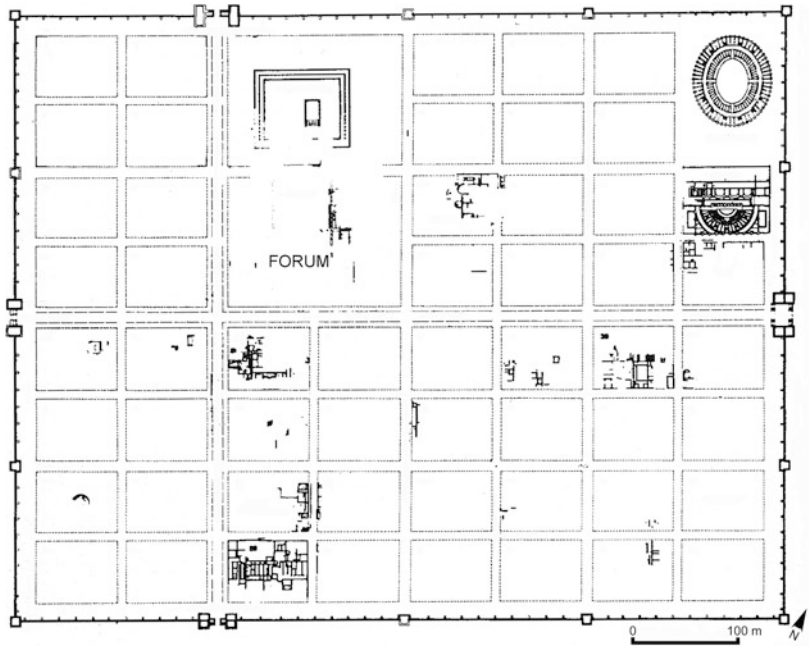

Urban Planning, Roman, Fig. 6 Aosta: Reconstructed town plan (Adapted from Gros & Torelli 2007: 244, Fig. 133)

and streets subsequently built in conformity to the surveyors' lines. After the initial surveying was complete, filling an urban plan with buildings could be a prolonged process. At the Latin colony of Cosa, for example, founded in 273 BCE, no house yet found predates the second century BCE! Public buildings were expensive to erect and depended upon available funds, meaning that they were usually constructed individually over time. From the second century BCE onward, urbanization occurred at a more rapid pace. Although towns could use their public finance for building projects, the process was boosted by a new and rapidly growing convention among the elite to donate their wealth for the good of the public. Euergetism (public benefaction), as it is known, became a driving force for the creation of public buildings, streets, aqueducts, and other amenities in towns across the empire.

Large building projects could transform a town's plan over time. Once all the available empty spaces of the original plan had been filled, new houses and public buildings could be constructed outside the town, as demonstrated at Timgad (Fig. 4). A lack of vacant urban space is one of the explanations why many large structures, such as amphitheaters, were located on the edge of, or just outside, a town's limits. The continued growth of a town was usually not limited by the constraints of its original planning unless it was situated on mountainous terrain. At *Augusta Treverorum* (Trier), a new wall circuit was built toward the end of the second century CE which increased its original surface area from 80 to 285 ha. There are also many instances of intramural areas being replanned to make way for new building complexes. This is most dramatically illustrated at Rome through the building projects of the emperors. The baths of Trajan, for example, created after 104 CE, had a perimeter enclosing an area of more than 10 ha, built directly on top of the *Domus Aurea* (the palace of Nero). Smaller scale projects reshaped urban centers in Italy and the provinces, mutating their original plans. The dynamism of Roman towns is reflected in these patterns of abandonment, replanning, changing property boundaries, and new construction. Towns could also contract, a phenomenon particularly well documented in Gaul and Greece in late antiquity, where many new defenses were thrown up, encompassing a severely reduced urban area.

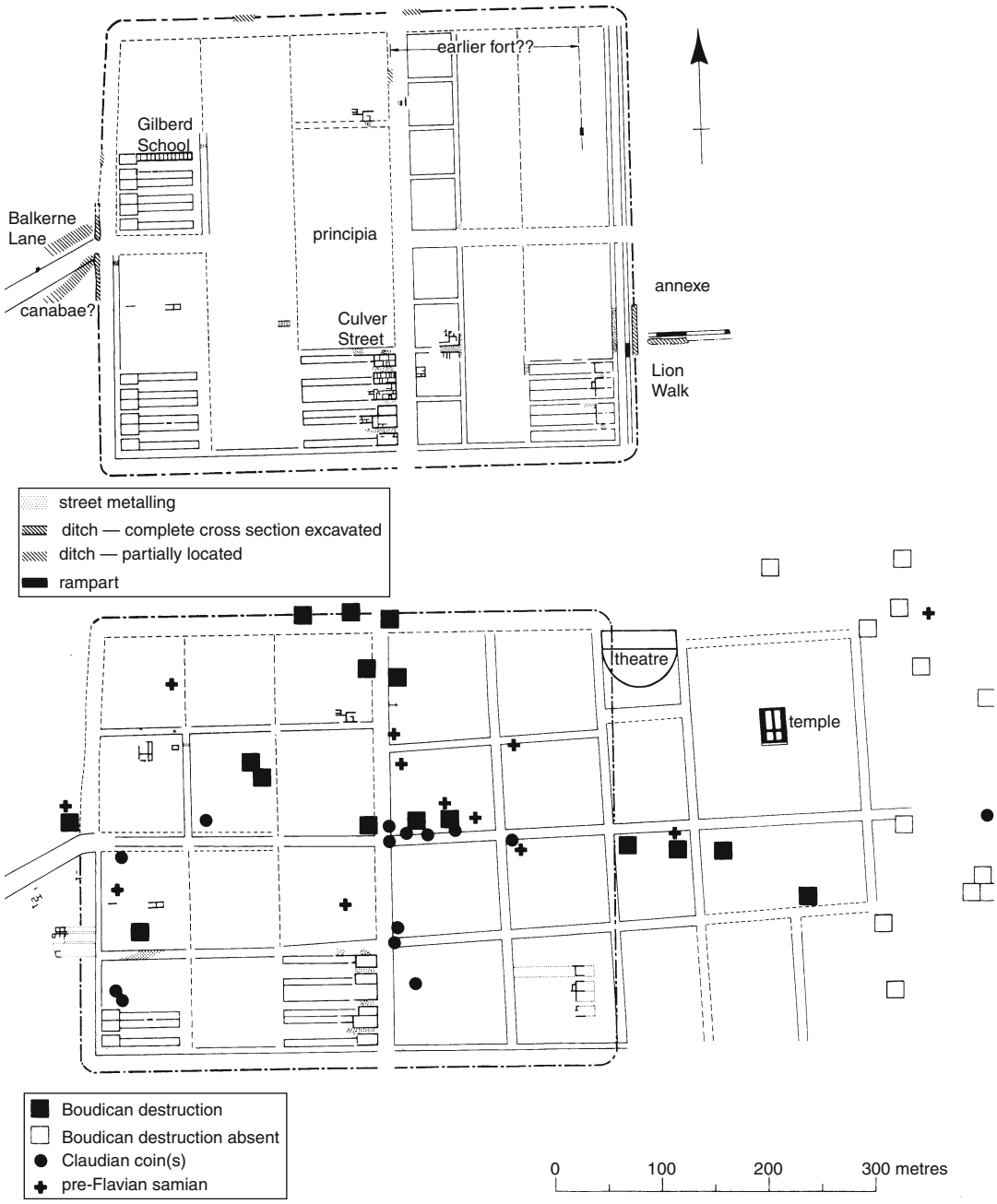

Urban Planning, Roman, Fig. 7 Colchester: plan of the fortress (above) and its development into the first colony (below) (Crummy 1993: 36, Fig. 3. Reproduced with permission of P. Crummy and the Council of British Archaeology)

Efforts to control cycles of abandonment and reconstruction already start to become apparent by the first century BCE. In the *Lex Tarantina* (Crawford 1996: 304, 307), it states that no building should be demolished unless a promise is made to the town's chief magistrate to rebuild it. Provincial governors could order owners to repair buildings, and especially appointed

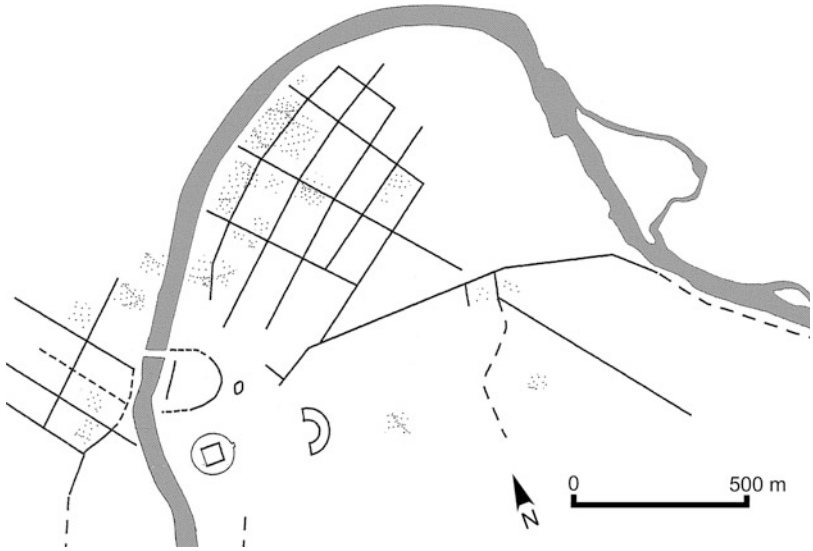

Urban Planning, Roman, Fig. 8 Mandeure: reconstructed plan of a "secondary agglomeration" (Adapted from Petit et al. 1994: 91, Fig. 3)

officials (*curatores*) could be allocated to cities in the west for up to 10 years with the task of restoring their urban vitality (Laurence et al. 2011). The recycling of urban structures became widespread in late antiquity, particularly apparent in the dismantling of pagan sanctuaries and the reuse of their building materials in new churches. A surviving treatise by Julian of Ascalon from the sixth century CE is a compilation of guidelines for the construction of houses (Hakim 2001). He focuses on the general upkeep of the built environment and conflict avoidance among neighbors, dealing with issues such as fire prevention and height restrictions during new construction.

International Perspectives

Although some generalizations may be made about Roman urban planning, pronounced regional variations are apparent in the form, size, and development of towns across the empire. Local traditions clearly had an influence, but establishing why particular differences manifest themselves in distinct regions is often challenging. Due to the size of the Roman Empire and its urban diversity, publications relevant to urban planning tend to focus on individual sites, provinces, or regions.

Roman town planning is more strongly associated with Italy and the Western Provinces because more settlements were founded there than in the Roman east, much of which was already urbanized when incorporated into the empire. In Greece, large-scale Roman interventions there were few: Caesar refounded Corinth as a Roman colony in 44 BCE; Patras became veteran colony under Augustus, who also founded a new city, Nikopolis in Epirus, after the battle of Actium, necessitating the citizens of nearby *poleis* to abandon their ancestral homes to resettle in the new city. Colonies were also founded in Macedonia, Asia, Syria, and Pisidia by Augustus. Towns continued to be founded, sporadically, such as Antinopolis in Egypt by Hadrian, and the new Roman capital Constantinople begun in 324 CE on the site of former Byzantion. Many existing eastern cities were transformed through planned urban expansions and smaller replanning projects associated with large-scale building programs. At some sites, such as Gerasa in Jordan and Aphrodisias in Caria (Turkey), the physical remains of the Roman period dominate the archaeological record. The character

of the public spaces and domestic and monumental architecture of the east under Roman rule was often strongly influenced by local traditions, and the resulting conceptual fusion is a major theme in scholarly literature. Many new planned towns in the previously un-urbanized Danubian provinces were founded on or near bases of the Roman army.

In the Roman west, great numbers of colonies and other forms of urban centers were founded as a consequence of Roman conquest. Some areas, such as North Africa, southern Gaul, and the Iberian coastal areas had already been partly urbanized by the Greeks and the Phoenicio-Punic cultures. The earliest western Roman foundations were in these regions, such as *Italica* (206/205 BCE) and *Narbo* (118 BCE), although little is known about their early development. From the Augustan period onward, towns were founded in previously un-urbanized areas, such as Britain, Spain, and *Gallia Comata*. Territorial units called *civitates peregrinae* (denoting that their inhabitants were not Roman citizens) are most strongly associated with the previously un-urbanized areas of the empire, and those in the west have been well studied. They were loosely based on pre-Roman ethnic boundaries and were often administered by urban centers, the creation of which often involved some form of urban planning. Yet these towns, the *civitas* capitals, were not founded systematically by the Romans but came into existence over time through a variety of processes.

Future Directions

With the increasing use of remote sensing techniques to record the plans of abandoned towns, going forward, the body of evidence for urban planning is sure to increase, encouraging comparative studies; a good example of which is the analysis of the plans of *Falerii Novi*/*Falerii Veteres* (Millett 2007). The developmental trajectory of Roman urban planning practices and the reasons behind regional variations might thus be elucidated as a consequence. It should also be possible to explore further the relationship Roman towns enjoyed with the territories they administered. For example, a recent study has suggested that the replanning of towns in northern Campania was accompanied by changes in the settlement patterns of the territories associated with them (Rescigno & Senatore 2009).

Cross-References

- ► Architecture, Roman
- ► Centuriation and Roman Land Surveying (Republic Through Empire)
- ► Urban Planning in the Greek World

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Urbanism in the Ancient Near East

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Introduction

The Near East witnessed the earliest urbanization process on the globe as part of a broader cultural transformation that led to the emergence of large and complex societies. The historical significance of these developments is enormous and included elements such as the appearance of class societies and the advent of writing. Despite their historical importance, cities in Mesopotamia and the wider Near East remain relatively poorly understood, for reasons that are first, conceptual; second, methodological; and third, political. This entry will summarize the current situation in the archaeology of urbanism in the Near East and will discuss possible ways forward.

Definition

Defining urbanism is a complex issue. To the simple question: what is a city? diverse answers are possible (Smith 2003). First, in some cases "city" is a legal status defining a particular form of administration within a state. Second, cities can be political institutions, as, for example, in the Greek *polis*. Third, a sociological characterization of cities focuses on the structure of social interactions: city dwellers interact as strangers with little solidarity. Fourth, a geographical definition is one in which cities are central nodes that can only exist in relation to a hinterland of smaller villages that supply it with goods and food in exchange for urban services. In addition, the urban settlement harbors full-time specialists of various types, has particular urban facilities, and is marked by zoning of activities. In the Ancient Near East, only the geographical perspective seems pertinent. The famous ten-point

list proposed by Childe (2004: 112-5) is in fact a culturally specific translation of the geographical definition of cities and is too specific to contain many cities from the Ancient Near East.

Key Issues/Current Debates/Future Directions/Examples

Classifying settlements as urban is not a neutral act. The word "city" is etymologically linked to "civilization," and when archaeologist claim urban status for an archaeological site, civilization is often implied (Childe 2004: 108). Many archaeologists have argued that cities and civilizations first emerged in the Neolithic, at sites such as Jericho and Çatalhöyük, which where substantial settlements encompassing several thousands of people (Gates 2003: 18-28). These interpretations are problematic, however, given the nature of settlements such as Jericho, Çatalhöyük, and other large Neolithic settlements such as Abu Hureyra and 'Ain Ghazal. None of these large sites is surrounded by associated subsidiary settlements, and none of them have evidence for full-time specialists, central facilities, or zoning of activities, and it is for this reason that Hole (2000) argued that size is not an index of complexity in the Neolithic.

It is only in the fourth millennium BCE, during the so-called "Uruk" period in Mesopotamia that we can document the rise of the first truly urban settlements in the Near East. In the course of the Uruk period, the size of the largest settlements increases by a factor twenty, from about 10 to 200 ha, and we see the rise of settlement systems consisting of large centers with associated smaller villages (Pollock 2001) and the emergence of monumental architecture within the urban centers, most spectacularly at the eponymous site of Uruk. The most popular explanation for the urbanization processes and the accompanying demographic changes focuses on the idea that in the Uruk period, the southern alluvium was at an ecological optimum during which very high agricultural yields could be obtained with relatively little effort and which could be supplemented with aquatic resources from nearby marshes (Algaze 2008).

Despite the importance of the Uruk period in the history of the Near East, we know relatively little about the urban settlements concerned. Our knowledge of the period derives from two sources mainly: Robert McC. Adams' large-scale surveys in the 1950s–1970s and early excavations at sites such as Uruk, which focused heavily on the monumental buildings. Political developments within Iraq have precluded more detailed survey work and investigations of urban centers, with the result that we know very little about issues such as the density of occupation, the presence of workshops, and whether there was zoning of activities in these settlements. In short, we know little about the nature of the urban economy and society in this period.

In recent decades it has become clear that northern Mesopotamia witnessed a more or less contemporary urbanization as in the south. This is best documented at site such as Tell Brak, Tell Hamoukar, and Arslantepe (Oates et al. 2007). At these sites we have evidence for monumental buildings, long-distance trade, and survey data suggesting that these sites reached considerable sizes: 130 ha (Tell Brak); and 300 ha (Tell Hamoukar). Unfortunately, we know relatively little about the spatial layout and activities that took place within these cities, and thus our understanding is limited, as it is in the south. Interestingly, the ecological optimum argument that has been used to explain the rise of urban communities in the south is less evident for the north, and there appear be only a few large urban settlements in northern Mesopotamia. Further, the urban communities in the north disappear towards the end of the fourth millennium BCE and only reappear around 2600 BCE, whereas those in the south continue and flourish (Ur 2010).

The Early and Middle Bronze Age (3000–1600 BCE) data for urban settlements are much richer than those available for the Uruk period. A large number of urban settlements have been investigated across Mesopotamia and in the Levant, including famous sites such as Ebla, Mari, Qatna, Eshnuna, and Ur. At the latter two sites, large-scale excavations undertaken in the early twentieth century CE

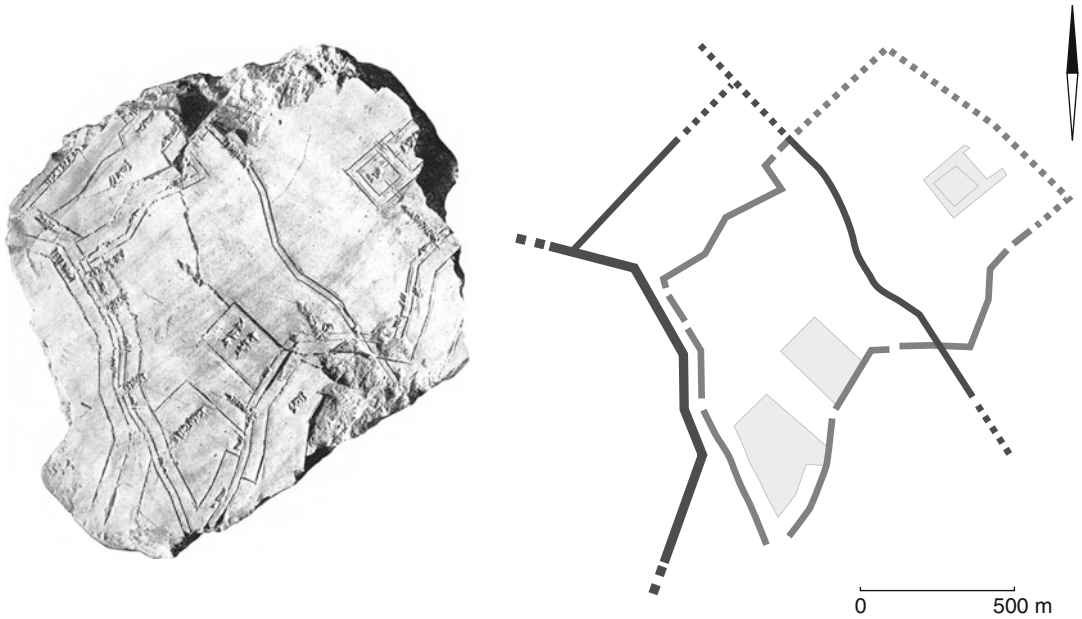

Urbanism in the Ancient Near East, Fig. 1 The Nippur map on a clay tablet juxtaposed to a map produced of the city in the excavations (After Fischer 1905: plate 1 and Pedersén et al. 2010: Fig. 7) (Redrawn by Joanne Porck)

have opened considerable exposures of residential and workshop areas, providing important data on the texture of urban life in Mesopotamia. Houses of various scales are found intermixed in dense neighborhoods, and there are small workshops, shops, and shrines mixed in between houses. A similar spatial subdivision in more or less equivalent neighborhoods consisting of residences, shops and workshops, and a central monumental area has been postulated for Maskhan-shapir, where an exemplary city survey was undertaken (Stone & Zimansky 2004). It has been argued that the mixed neighborhoods were occupied by kin groups in which client relations played an important role and that this type of agglomeration is comparable to that seen in traditional premodern Near Eastern cities (Stone 2007), although the latter are highly specific to a particular period in history and should not be construed as the timeless oriental city. These studies suggest that cities in the Ancient Near East differed substantially from early modern cities of the west in social terms and that neighborhoods operated in ways not dissimilar to villages in the countryside. This point is also made by Steinkeller (2007) who argues that cities and villages differed relatively little in terms of economy and society.

In the Late Bronze and Iron Ages (1600–333 BCE), the general understanding of urban cities in the Near East as composed of mixed neighborhoods with a central monumental complex surrounded by a city wall does not change much, although size of temple and palace complexes depended on the power of the particular urban community. A Mesopotamian map of the city of Nippur dating to around 1500 BCE depicts a city that meets these criteria in remarkably accurate proportions (Fig. 1). Archaeologically the best known example from this period is that of Ras Shamra (Ugarit), excavated on a large scale in the mid-twentieth century CE, for which Schloen (2001) argues that client systems along patriarchal lines were central to neighborhood communities.

In the Late Bronze and Iron Age Imperial, capitals become prominent in the archaeological record. In cities such as Hattuša, Nimrud, Dur-Sharrukin, Nineveh, Babylon, and Persepolis,

very monumental capitals were created with large palaces and temple complexes meant to inspire awe and act as testimony to the power of the empire (Harmansah 2012). These cities were either new foundations or existing cities reengineered on a massive scale. On the whole these cities remain poorly understood as economic or social entities, despite very extensive research at, for example, Hattuša for over a century, because research has focused almost exclusively on the monumental elements of these cities.

The archaeological study of cities in the Ancient Near East remains lopsided in that we know much more about palaces, temples, and ramparts than we do about cities as economic and social systems. This bias results from the entrenched notion in Near Eastern archaeology that monumental architecture is more worthy of investigation than residential and workshop areas. At present, there are also methodological problems: it is no longer ethical to excavate at the scale and pace in which archaeologists uncovered entire neighborhoods and large monumental complexes in the early twentieth century CE. Finally, political developments have effectively closed of many parts of the Near East, including much of Iraq, Syria, and Iran, for archaeological research.

What then is the archaeological way forward for advancing our understanding or urbanism in the Near East? Obviously we need to balance the need for understanding urban settlements in their entirety and in their landscapes with the limited resources available, instead of focusing all our efforts on the monumental components of cities. Various projects have already shown what can be achieved with techniques such as systematic surface survey in combination with small test excavations, geophysical research, and remote sensing, and excellent results have been obtained at sites such as al-Rawda (Castel & Peltenburg 2007), Maskhan-shapir (Stone & Zimansky 2004), Abu Salabikh (Postgate 1983), and (Reade 1973). These projects have added a considerable amount to our understanding of urbanism with relatively few resources, and it is to be hoped that more work along these lines will be executed in the years ahead.

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US National Park Service and World Heritage

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Introduction

In the United States of America, the Assistant Secretary of the Interior for Fish and Wildlife and Parks has responsibility for directing and coordinating participation in the World Heritage Convention. The National Park Service's Office of International Affairs provides technical staff support to the Assistant Secretary in this regard (Public Law 96-515; 16 U.S.C. 470 et seq.; 36CFR73). This work includes coordinating preparation of US nominations to the World Heritage List (which are submitted through the US Department of State), maintenance and updating of the US World Heritage Tentative List, submission of periodic reports on the condition of World Heritage sites in the United States to the UNESCO World Heritage Centre, providing information and assistance to the public and to site representatives, and contributing to the United States' positions on matters of World Heritage policy, in coordination with the State Department. The Office of International Affairs also forms part of the official US delegations to the annual meetings of the World Heritage Committee and other policy and technical meetings.

Definition

As of 2011, there are 21 World Heritage sites in the United States, 17 of which are also units of the National Park System. Of the listed sites, several have significant archaeological components, including Cahokia Mounds State Historic Site in Illinois (inscribed on the World Heritage List in 1982), Chaco Culture in New Mexico (inscribed 1987), Mesa Verde National Park in Colorado (inscribed 1978), and Papahanaumokuakea in Hawaii (inscribed 2010).

The global significance for the first three sites is summarized in the 2008 US World Heritage Tentative List:

Cahokia Mounds State Historic Site: "Located near present-day St. Louis, this largest and earliest pre-Columbian settlement north of Mexico is the pre-eminent example of a cultural, religious, and economic center of the Mississippian culture, which extended throughout the Mississippi Valley and the south-eastern United States. This agricultural society may have had a population of 10,000–20,000 at its peak between 1,050 and 1,150, which was equivalent to the population of many European cities at that time" (National Park Service 2008: 42).

Chaco Culture: "This network of sites preserves outstanding elements of a vast

pre-Columbian cultural complex that dominated much of the southwestern United States in the mid-nineth to early thirteenth centuries. Chaco Canyon, a major center of ancestral Pueblo culture between 850 and 1,250, was a focus for ceremonies, trade and political activity. Its monumental public and ceremonial buildings were linked by an elaborate road system, much of which can still be traced. These achievements are remarkable, particularly given the harsh environment of the region" (National Park Service 2008: 42).

Mesa Verde National Park: "This landscape is considered to be the "type site" of the Ancestral Puebloan culture, which lasted from c. 450 to 1,300. There is a great concentration of spectacular Pueblo Indian dwellings, including the famous cliff dwellings" (National Park Servie 2008: 44).

The official Statement of Outstanding Universal Value for *Papahanaumokuakea* includes statements of how this enormous marine expanse fulfills two of the World Heritage cultural criteria:

> Papahanaumokuakea's remarkable archaeology and significant ritual sites (*heiau*) bear exceptional testimony to the shared historical origins of all Polynesian societies, and to the growth and expression of a culture that evolved from the last and most difficult wave of cross-Pacific Polynesian migration. As the only Mystery Islands (once-inhabited but now abandoned outposts at the farthest reaches of Polynesian migration) that continue a cultural association with their indigenous people, the islands of Nihoa and Mokumanamana can reveal much about cultural resilience in a changing environment.
>
> Papahanaumokuakea, as an associative cultural landscape, represents core elements of Native Hawaiian cosmology and tradition. The islands northwest of the Tropic of Cancer are believed to lie within the region of primordial darkness from which life originates and to which it returns. For a culture that considers nature and civilization to be part of a genealogical whole, Papahanaumokuakea offers a "place of abundance" to reconnect with an ancestral environment, and its seas are also a traditional and contemporary testing ground for the revitalized art of Polynesian wayfinding (WHC: 34COM 8B.10).

Key Issues/Current Debates/Future Directions/Examples

How US Nominations to the World Heritage List Are Made

US nominations to the World Heritage List are subject to certain prerequisites enacted as part of the 1980 amendments to the National Historic Preservation Act (1980 amendments) (Public Law 96-515; 16 U.S.C. 470 et seq). These require that any property nominated must have been previously determined to be of national significance to the United States, that there must be legal protections in place to ensure preservation of the property and its environment, and that the owners of any non-Federal property must agree to the nomination. The requirement for owner consent has limited the types of properties that the United States can nominate: it is unlikely that large districts with many property owners, particularly in urban areas, could meet this requirement. Many such areas in other countries have been inscribed as World Heritage sites.

In 2006, the National Park Service, at the direction of the Assistant Secretary, initiated the revision of the US World Heritage Tentative List. A Tentative List (formerly referred to as an Indicative Inventory) is a national list of properties that appear to meet the eligibility criteria for nomination to the World Heritage List. The World Heritage Committee's *Operational Guidelines* ask signatory nations to provide Tentative Lists to help evaluate properties for inscription. These annotated lists describe the sites that countries are likely to nominate in the next several years. In order to be nominated to the World Heritage List, a property must have been on its country's Tentative List for at least 1 year.

The only prior version of the US Tentative List had been developed in 1982 and had not been updated in many years. Its preparation did not comply with current standards for owner consent, notification of interested parties, or public participation. The revision of the Tentative List was accomplished by requesting voluntary applications from property owners. These applications

were reviewed and resulted in a new US Tentative List, comprising 14 properties, that was submitted to the UNESCO World Heritage Centre in 2008. Inclusion on the Tentative List does not confer any official status on a site; it means only that the site appears to meet the World Heritage criteria and may be nominated by the United States in the future.

The 2008 Tentative List included four sites that are primarily archaeological in nature or include significant archaeological components: Hopewell Ceremonial Earthworks in Ohio, comprising Hopewell Culture National Historical Park, Newark Earthworks State Memorial, and Fort Ancient State Memorial; Serpent Mound in Ohio; Poverty Point National Monument and State Historic Site in Louisiana; and Papahanaumokuakea Marine National Monument in Hawaii, which was nominated in 2009 and inscribed on the World Heritage List in 2010.

Other sites that are archaeological or anthropological in nature also applied for the Tentative List, but were not selected for a variety of reasons. In some cases, the Department of the Interior determined that active debate and continuing discoveries made it premature to identify a site as having outstanding universal value. In those cases, a thematic investigation might well support nomination of some of them to the World Heritage List in the future.

The process for developing and submitting World Heritage nominations in the United States is established in Federal regulations (36CFR73). The regulations established the Federal Interagency Panel for World Heritage, which consists of eight Federal agencies that advise the Assistant Secretary on World Heritage matters, specifically including the inclusion of sites on the Tentative List, the selection of sites for nomination from the Tentative List, and the evaluation of draft nomination dossiers for final submission. The assistant secretary is the chair of the panel. In addition to the assistant secretary's office, the panel comprises the Department of State, the National Park Service, the Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, the Advisory Council on Historic Preservation, the President's Council on Environmental Quality, and the Smithsonian Institution. The regulations also establish requirements for public and official notification and public participation in the process.

The Office of International Affairs plays the primary technical role in shepherding potential nominations through this process. The staff provide representatives of sites on the Tentative List with information on the national and UNESCO program requirements and review draft materials based on a knowledge of how the World Heritage Committee and the technical advisory bodies have evaluated similar nominations. The preparation of the nomination dossier itself is the responsibility of the property owner. The Office of International Affairs draws on the expertise in natural and cultural resources of the rest of the National Park Service in this work, consulting with staff of the National Historic Landmarks Program, the Archaeology Program, and other experts working throughout the country.

Historical Background

The United States was the first country to ratify the World Heritage Convention in 1973. It also played a significant role in shaping the convention as a vehicle to preserve both natural and cultural properties, as the National Park Service does in the United States. In promoting and entering into the convention, the United States sought to apply these conservation ideals on a global scale, to benefit the most important places around the world. When the World Heritage Committee met in Washington, D.C., in 1978, the Committee included Yellowstone and Mesa Verde National Parks among the first World Heritage inscriptions.

The United States continued to make World Heritage nominations with regularity through the mid-1990s. Concern over the increasing size of the World Heritage List, which had become dominated by sites in Western and developed countries, as well as domestic controversy related to the inclusion of Yellowstone National Park on the List of World Heritage in Danger in 1995, resulted in reduced activity related to World Heritage in the United States, and no nominations were made between 1994 and 2009. Following

the creation of the 2008 US World Heritage Tentative List, the USA made two nominations in 2009, one of which, Papahanaumokuakea, was inscribed on the World Heritage List in 2010.

The United States has served four terms on the 21-member World Heritage Committee, including a term as one of the original members. As part of the renewed World Heritage activity that resulted in the revised US Tentative List and 2009 nominations, the USA successfully ran for election to the Committee in 2005; that term concluded in 2009.

Current Issues and Future Directions

In 2008, the World Heritage Committee requested comments from countries signatory to the World Heritage Convention on the future of the convention, in relation to its upcoming 40th anniversary in 2012. Comments submitted from a number of quarters expressed a desire to put more emphasis on the conservation of inscribed sites rather than the inscription of additional sites and noted a rapid increase in the number of World Heritage sites that taxes the capacity of the World Heritage Centre and the Committee. The politicization of many of the committee's decisions has also been noted. The fact that some world regions and thematic areas are underrepresented on the List is a complicating factor in addressing these issues.

There are also a number of open issues related to future nominations by the United States. There is no official policy on the method by which properties may be selected for addition to the Tentative List. When the Tentative List was revised in 2008, the National Park Service acknowledged that the voluntary applications, while including some types of properties not represented among existing US World Heritage sites, did not include a number of important and less-represented property types on the World Heritage List, including those representing achievements in science and technology, such as bridges, skyscrapers, and places of scientific observation and experimentation. In the future, different approaches for selecting Tentative List sites might be considered, such as conducting gap analyses to identify specific properties or property types as priorities for nomination.

Cross-References

- ▶ Cahokia
- ▶ Chaco Canyon, Archaeology of
- ▶ Poverty Point, Archaeology of
- ▶ UNESCO World Heritage Convention (1972)
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective
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USA and Mexico (1970): Bilateral Treaties and Patrimonial Property Restitution

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Introduction

Increases in looting and illegal trafficking of ancient objects or monuments from countries with an important cultural heritage and a great

compulsion for achieving pre-Columbian art from Latin American countries with the objective of increasing private and museums' collections made specialists in cultural heritage, United Nations Educational, Scientific and Cultural Organization (UNESCO), and many countries to propose and establish rules for protect and preserve ancient cultural heritage.

Definition

In the last years of decade of 1960s, United Mexican States and the United States of America were working through diplomatic relations for considering establishing a compromise to protect each other's cultural heritage from trafficking with the goal to decrease illegal activities as looting and/or archaeological sites' destruction. In 1970, both countries signed a bilateral treaty for recovering and restitution of patrimonial properties.

Key Issues

Since 1930s protection and conservation of cultural patrimony was focused by specialists and many countries which originally participate in *Athens Conference* (1931). Up to 1960s many steps on the way for protecting national heritage were done. By 1964, the General Conference of UNESCO, in its thirteenth session, adopts the *Recommendation on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property* (Olivé Negrete 2003: 106-110) asking the Member States to work with these statements on the way to adopt as soon as possible a Convention. It occurs at the General Conference in its sixteenth session on November 1970 (*Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property*) (UNESCO 1970).

Based on *Declaration of Principles of International Cultural Co-operation* adopted by the General Conference of UNESCO on 1966, the IV Regional Conference of National Committees for UNESCO from West Hemisphere, on June 1967, in Mexico City, established the *Tlatelolco Resolution*. In this paper, the Conference suggested to Member States several measures should be taken to protect and promote cultural Latin American patrimony. fifth suggestion is supported on the knowledge of increment on illicit trade of cultural items, and each state should ask UNESCO to promote an International Convention focused on prohibiting and avoiding illegal traffic and trade of art, movable objects, books, and documents (Olivé Negrete 2003: 19-23).

As it happens in the entire world, looting and trafficking always are attached with other illegal activities and it is quite difficult to stop it by itself, specially because the free market for antiques from countries and extinct cultures with a great ancient heritage is not prohibited or ruled with laws based on respect, research, conservation, and diffusion of scientific and humanistic knowledge.

During the decades of 1960s, particularly in archaeological sites in West Coast, Maya lands, and Central Mexico (Teotihuacan), looters' activity and illegal trafficking increased due interest for achieving pre-Columbian art, historical objects, and documents. Many of them were stolen from archaeological sites, churches, and public files and libraries.

On the last years of this decade, diplomatic relations between Mexico and the USA were working on establishing bilateral rules to protect each other's cultural patrimony. In July 17, 1970, the *Treaty of Cooperation between the United Mexican States and the United States of America Providing for the Recovery and Return of Stolen Archaeological, Historical, and Cultural Properties* was signed.

In Mexico this treaty, first, was approved by the Senate and ratified by presidency on November 1970 and then the exchange of ratifying legal instruments of both countries takes place on March 24, 1971, in Washington, D.C. Presidency wrote an ordinance on May 3, 1971, and then it was published to enter into force on *Official Journal of the Federation* on June 9, 1971 (Olivé Negrete 2003:175-178).

The main intention was based on a close cooperation and the desire for stimulating protection, study, and appreciation of goods with archaeological, historical, and cultural importance, and the resolution for promoting recovery and return of such properties.

Through several articles, both countries accorded to define the concepts, meanings, and the period in which properties were produce since pre-Columbian, historical, and modern times and including archives up to 1920.

They also took a compromise for stimulating research, to avoid illegal excavations in archaeological sites and stealing of archaeological, historical, or cultural properties. In the same sense, both parts will give facilities for movements and exhibitions on both countries of archaeological, historical, and cultural items with the intention of having mutual understanding and comprehension of artistic and cultural heritage of both parts.

Another important issue, it is the permission for legal international trade of art items, in accordance with legal statements that regards conservation of archaeological, historical, cultural and national goods.

In this treaty, recovery and return will start with a request from one part, while the other accepts the compromise to apply all legal resources to recover and return goods that had been taken out from its original country after the date of the treaty's operative. Through diplomatic via, application part will give all documentation to establish the request. If it is not possible to recover and return by diplomatic media goods founded in its territory, authorities will promote a legal procedure to achieve this will. In both countries justice procurators are authorized to promote a legal procedure in its respective courts.

When the archaeological, historical, or cultural items will have the legal authorization for the return, all expenses will take charge by the requesting part. In this process any person or part has the right for asking any reimbursement from the part which is returning the item. Finally, items will not cause any charge or penalty as a result of applying trade laws.

This is basically what the treaty is about and had been functioning since then for the benefit and protection of Mexico and US cultural heritage.

On November 1970, the *Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property* was adopted by UNESCO and enters into force in 1972. Mexico accepted in the same year and USA until 1983 (UNESCO 1970).

Cross-References

- ▶ Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970)
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation: Overview
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ UNESCO (1970) and UNIDROIT (1995) Conventions
- ▶ Vandalism and Looting (Ethics)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Uses of Heritage

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Introduction

Published in 2006 by Routledge, the book *Uses of Heritage* argues that there is no such *thing* as heritage. The book aims to offer a retheorization of heritage that identifies heritage as a cultural process or performance that is framed by a range of discourses, the most conspicuous one being what the book terms the "Authorized Heritage Discourse," or AHD. The book de-privileges the idea of heritage as material, as a "thing," and, drawing on the work of the historian Raphael Samuel (1994), explores the idea that heritage "things" are "theaters of memory," where the past and present are negotiated through the performances of heritage management, preservation, and visiting. Heritage is a process of remembering and meaning making, in which understandings of both the past and present are continually negotiated by the performance of identifying, managing, and visiting heritage places or participating in intangible heritage events. All heritage is thus intangible, because heritage is what happens at and around heritage places or events – perhaps organized around a place, artifact, or site, though it may be an intangible event such as a ceremony or artistic performance; it is a moment of action, not a thing or place itself. While the sites, artifacts, and places may be important, they are important only in terms of how they facilitate or are used as cultural tools in the cultural and social "work" that heritage does in society.

Key Issues

The book finds synergy with the arguments by Bella Dicks (2000, 2007), Harvey (2001), and Kirshenblatt-Gimblett (1998) that respectively stress heritage is a form of communicative practice, a verb, and a practice of cultural production. Debates from within the social sciences about memory and remembering, sense of place, emotion and affect, dissonance, identity, and performance are drawn on to develop a nuanced picture of heritage as a process ultimately concerned with the regulation of social and cultural change and conflict. It challenges the idea that heritage is ultimately "good," "comfortable," monolithic, and universally valuable, and argues that ultimately all heritage is fundamentally dissonant and contested.

The contested nature of heritage and the role it plays in the arbitration and regulation of social and political conflict is often obscured by the AHD. This dominant discourse is embedded in the policies and legal frameworks utilized to manage and conserve heritage (or cultural resources), which were developed in many Western countries during the nineteenth and twentieth centuries, and is embedded in intergovernmental agencies such as UNESCO and ICOMOS. This is not to say that there is a single AHD or that such discourses are immutable or beyond challenge; however, within many Western countries and intergovernmental agencies, there is a core of

shared understandings about the nature of heritage. These commonalities of understanding have their origin in Western Europe in the nineteenth century and the agitation of archaeologists and architects for the protection of the material culture that they deemed to be of innate and inheritable value (see chapters 1–3).

Critical discourse analysis (CDA) underpins the conceptualization of the AHD. As such, discourse is defined as being both reflective of, and constitutive of, social practices, as it is "a practice not just of representing the world, but of signifying the world, constituting and constructing the world in meaning" (Fairclough 1992: 64). This means that discourse not only helps define and frame the way we may think, talk, and write about the world, but that a particular discourse will also arbitrate and frame our practices.

The AHD defines heritage as "fragile, finite, and nonrenewable" and as something that must be preserved for future generations. Under the AHD, heritage tends to be defined as aesthetically pleasing and nationally significant material objects, sites, places, or landscapes that represent all that is "good" or worthy of celebration from the past. The value of material culture is assumed to be innate rather than associative or attributed. As something fragile and finite, those possessing appropriate expertise are privileged within this discourse over other stakeholders (such as economic interests, local or other communities, or social or political interest groups), and experts are defined as the "stewards for the past," who have a professional "duty" to safeguard heritage and to communicate the value of heritage to nonexperts.

The AHD also stresses the idea of inheritance; heritage, under the guidance of experts, must be passed onto the future, if not untouched, at least unchanged. Thus, people in the present are dissuaded from actively rewriting the meaning of the past or reconsidering its role in the present. These basic tenets derive from European architectural conservation debates, particularly John Ruskin and William Morris' idea of "conserve as found." Heritage is thus defined as something that is "found" rather than made or conceptualized, and its fabric is understood as inherently meaningful and historically and culturally valuable. The idea that the meaning and value of heritage sites may change, that it may be disputed both over time and within particular contexts, and that ultimately a site is simply a collection of bits and pieces that someone or various groups have attached meaning and value to becomes an uncomfortable perception. My assertion in the book, for instance, that Stonehenge is merely "a collection of rocks in a field" (p. 3), has met with some disbelief and ire (for instance, Soli 2011) from those with an emotional and intellectual investment in the framework of the AHD. However, Stonehenge, like other heritage sites, has acquired new and disparate meanings over time. Its "finding" relates to the way it is conceived, and it has been refound over the centuries and redefined as an archaeological site, tourist attraction, site of druidic worship, and observatory, among other understandings – and at one time (by the then owner of the land it is on) as an inconvenient collection of rocks in a field.

The degree of importance that is placed on the materiality of Western culture, alongside assumptions about the aesthetic worth of certain objects or sites made within the AHD, means that the material artifact or site has often come to be seen as embodying the social or cultural values that have been attached to it. Thus, a monument or heritage site tends to become confused with the cultural and social values that are used to interpret it and give it meaning. For instance, Stonehenge becomes something that "just is" of significance. This process tends to obscure the possibility that heritage may not only have multiple meanings or values for different people or social groups, but that some of these values may conflict or contradict each other. Further, it disavows the possibility that some groups may not value a site or place at all. The AHD places emphasis on the national and universal value of heritage and tends to de-privilege local value, community value, or other values that a place of heritage may have to subnational groups or interests. Certainly, a hierarchy of value is defined and maintained within the AHD.

Assumptions about the innate value of heritage also work to reinforce the idea that heritage represents all that is good and important about the past. This assumption also links to a key construction within the AHD that heritage and identity are irrevocably linked. Not only do heritage sites come to stand in for the values used to give them meaning, they also tend to be seen as standing in for "identity," particularly national identity. Exactly how heritage and identity (and the concept of identity tends to be seen as self-evident within the discourse) are linked is never articulated or defined – again it is a given that "just is."

The AHD constructs not only a particular definition of heritage, but also an authorized mentality and framework that guides and regulates heritage preservation practices and public policy developments in many Western countries. While the specifics of the AHD will vary across time and space, these core concepts have currency and consequences not only for heritage experts but also for all those communities, individuals, and other interests or groups who engage with and regard heritage (however they may define it) as important. The consequences of the AHD are that it tends to regulate and confine professional and academic debate about the nature and meaning of heritage and the way it can be managed, preserved, and interpreted. This means that it also tends to validate the bodies of knowledge and values that contributed to it – it is by definition self-referential. It also excludes those understandings of heritage that may sit outside of the framework defined by the AHD. The AHD tends to be embedded in Western and more particularly international policy, an occurrence that gives authority or authorization and legitimacy to the discourse and the assumptions embedded within it within the West. Although the AHD has been challenged to some degree by increasing international interest in intangible heritage, there is much within the Western AHD that escapes criticism in this development (see chapter 3 and Smith & Waterton 2009a).

In developing my arguments about the AHD, and the idea of heritage as a cultural performance rather than a "thing," the book presents several case studies, drawn primarily from England and Australia, which illustrate the performative nature of heritage and the social and cultural negotiations that are undertaken as part of this performance. These case studies in the first instance look at how the AHD influences engagements with heritage sties. Interviews with visitors to English country houses and an ethnographic study of the Riversleigh World Heritage site in Australia are used to explore the way the AHD constructs certain social and cultural meanings and the consequences this has for underpinning power relations between different social and cultural groups. Three case studies also examine definitions of heritage that sit outside of, or in opposition to, the AHD. Visitor interviews with people at museums of working class life; an ethnographic analysis of the development of a community heritage organization in the deindustrialized town of Castleford, West Yorkshire; and a review of Australian and US Indigenous debates and conflicts over heritage provide examples of heritage discourses that seek to challenge the AHD. The challenges documented in these case studies illustrate the degree to which heritage becomes an important resource in the politics of identity. To understand this process, the work of Nancy Fraser on the "politics of recognition" is drawn on, to illustrate that heritage is not only ultimately political but how it may be actively taken up in political struggles. Fraser (1995) argues that in the latter twentieth century, "identity politics" became an import form of political struggle for those seeking social justice. The recognition of the special and specific claims that particular groups made for the redistribution of resources of power (such as welfare, education, housing, and so forth) was often underpinned by appeals or reference to particular understandings of history and culture (Fraser 2001). The recognition of difference has thus become an important aspect of political conflicts, and heritage is often used to legitimize claims to identity, and as such it has become a key resource in these struggles. These insights, which began to be developed in the last sections of *Uses of Heritage*, have since been developed further (see Smith 2007, 2010; Smith & Waterton 2009b, 2011).

Uses of Heritage has largely met with positive critical attention. For Ian Baxter (2007: 130), the book was identified as being "seminal" in the emerging debates within heritage studies about "power, accord, and dissonance." Others have noted that, while the AHD may be an "annoying acronym" or sounds like a disease, it provides a useful and compelling heuristic devise for exploring the consequences of heritage practices (Feintuch 2007; Warren-Findley 2007: 149). The book has also been praised for, unlike all too much writing on heritage, offering detailed analysis of interview and other ethnographic data to support its arguments (Feintuch 2007; Warren-Findley 2007; Dicks 2007; Day 2009). Others, particularly those heavily invested in the AHD, have been less convinced and note that I "failed to consider the scientific issues entailed in managing resources" (James 2007: 788). The de-privileging of expertise (or science) in the hopes of developing more democratic heritage practices and understandings has been a long-term issue underlying my work with heritage (see Smith 1994), and while this has and continues to receive criticism (for instance, Soli 2011; Carmen 2011), it is not a position I back away from. Indeed, engaging with the ways in which different communities connect with heritage, and understanding that scientific expertise is simply one of many communities of interest in heritage (Smith & Waterton 2009b: 19), is vital if academic and professional debate is to grow and develop. As Baxter (2007: 128) notes, heritage studies are an emerging field of enquiry that will only reach maturity with the development of debates that aim to question and reexplore the established cannon. I actually think that the sort of ultra-defensive claims made by James (2007) actually goes some way to demonstrating the validity of my arguments.

The arguments in *Uses of Heritage* have, as Iain Robertson points out (2012), been widely taken up within the heritage literature (see for instance essays in Graham & Howard 2008; Gibson & Pendlebury 2009; Harrison 2010; West 2010; Benton 2010). While I have developed aspects of the work further, particularly in a 4-year research project founded by the Australian Research Council, which has allowed me to extend the research on visitor responses to heritage to Australia and the USA, others too have started to extend the debate. Emma Waterton (2010), for instance, has documented in more detail the nature of the AHD in England and within UNESCO, and the way it has responded to policy attempts centered on "social inclusion." The concept of the AHD has begun to take on a life of its own and not only within academic and professional debate. A Google search for the term revealed it being used in a mountain bike discussion list based in the UK. The discussion was about finding new places to go bike riding in, and someone suggested that the group should contact the Scottish National Trust to find places, with the reply from a member of the group that national trusts were

> '. . .organisations for people that need their heritage spoon fed. Not real heritage either, heritage chosen by white, middle class, self appointed experts, presenting their own values and narratives of the great and good as though they are appropriate to us all and form what we all view as the national treasures. It's called the AHD, the authorised heritage discourse' (Trailmonkey 2010).

As an author, I find it very gratifying that the book has made an impact in academic discussions of heritage. However, many practitioners and policy makers have told me that the book, and the concept of the AHD in particular, speaks very directly to their experiences of the heritage sector. To actually find a trail bike discussion list, citing the AHD shows that the concept works for some people, and a glance through Google also shows that beyond academic use there is also a growing take-up of the ideas and terminology of the book in heritage policy documents, which is very encouraging.

I would like to finish however by highlighting an element of the work that has not been taken up as much as I would like. That is the emphasis the book places on resistance to hegemonic discourses and in particular the sections on working class heritage. What these sections show (and see Smith et al. 2011 and the *International Journal of Heritage Studies* 17(4) for further developments of these arguments) is that we don't need to go to

exotic non-Western locations to find alternative or oppositional heritage narratives or experiences. What the sections of the book on working class heritage show is that the country house style of heritage experience also documented in the book, though dominating many people's sense of what heritage is or may be, does not sit well with everyone's understanding of heritage and that the emphasis on performance, intangible manifestations of heritage, dissonance, and community found in many non-Western contexts can also be found in the back yard, so to speak, of Western heritage researchers and policy makers. Hopefully, this will change, and more people will explore this aspect of the book.

Cross-References

- ▶ Heritage and the Need for Theory
- ▶ Heritage Theory
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage

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V

Valcamonica Rock Art

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Introduction

The 75-km-long Valcamonica (Camonica Valley) in the Italian Alps includes over 300,000 rock engravings spanning 10,000 years, from the Epipaleolithic period to the Middle Ages. The valley is at the crossing of the Alps from Italy to Central Europe where both ideas and people passed through. This area has been studied for 50 years by the same team, enabling scholars to explore the meaning of stylistic and thematic changes from period to period. Changes in the way of thinking, in the economy, and in the social organization contribute to our understanding of the formative period of the European society.

Valcamonica was declared by UNESCO as being of "World Cultural Heritage" in 1979. It was the first rock art site in the world to obtain such nomination and the first Italian site to become part of the World Heritage list. Valcamonica is also renowned for the new research approach applied, focusing on the use of rock art as a means of historical reconstruction, producing history for periods considered as prehistoric.

The succession of different styles of rock art allows the definition of a sequence of Camunian periods illustrating 10,000 years of events and human adventures. The numerous cases of superimpositions; the depictions of datable weapons, tools, and objects; and the presence of extinct animals in the earliest phases and of datable inscriptions in the later ones make this sequence a chronological pillar of post-Paleolithic rock art in Europe.

The proto-Camunian period dates back to the first phases of the Holocene, 12,000–7,500 years ago. The final post-Camunian period documents the "historic" phases: Roman, Medieval, and recent.

In each period, rock art reflects the interests and concerns of its time, the economy, the beliefs and the cult, the social organization, the political trends, and the international relations. In certain periods, tools and weapons illustrate foreign objects or foreign influence. The introduction of new technology such as the wheel or metalworking or weaving is meaningful for defining the way of life. Changes in the architecture of huts, of shrines, and of other buildings depicted in the rock art, different funerary practices, and other descriptions of habits provide the historical background of the various periods.

Key Issues/Current Debates/Future Directions/Examples

Proto-Camunian Period (12,000–5,500 BCE)

In the pre-Boreal and Boreal climatic stages, this rock art relates to pre-Neolithic culture. Pollen

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analysis from geological logging in Valcamonica shows this period's tall trees were pine trees and birches. Material culture is characterized by a lithic industry of blades and abundant microliths. The iconographic style is defined as a simplified naturalism with figures schematized just by a contour line. Main themes are large animals represented in large, almost natural size. Sometimes they are hit by spears. Elks are exclusive to this period and are not found in later periods. This animal became extinct during the early Holocene. Human figures are absent. Weapons and tools are limited to spears or darts. The essential economic activities are hunting and fishing.

There are stylistic and thematic similarities with the rock art of the Arctic region and archaic hunter phases in the Near East and North Africa. Analogous expressions are known elsewhere in Italy in Levanzo (Egadi) and the cave of Addaura, Monte Pellegrino (Sicily). There are also similarities with the archaic rock art of Austria and Portugal and, with some instances, of rock paintings in Levantine Spain.

In Europe, this style developed in the late phases of the Upper Paleolithic earlier than 10,000 years ago. Such rock art is typical of hunter-gatherers of the terminal Paleolithic and the Epipaleolithic periods.

Camunian Periods I–II (5,500–3,300 BCE)

In this period, style changes drastically and the repertory reveals a social revolution. The main subject matter is stylized anthropomorphic figures mostly with upraised hands. The sharp changes in subject matter and style reveal a new population in Valcamonica practicing a complex economy which included agriculture and animal rearing. Large groups of human figures illustrate assembly and socializing. The previous artists were dependent on their prey which was the focus of their interest and likely of their cognitive concepts. In the new economy, man becomes the focus, and there is awareness in society and socialization reflecting the importance of team cooperation and the need of conviviality. People were organized in larger social units requiring coordination and planning. Hunter-gatherers became food producers, and the social structure was more complex, more sophisticated, and also more problematic. In the late phases of Period II, large ghostlike anthropomorphic figures appear, some of them being over 2 m high. This suggests an ideology concerning humanlike supernatural beings. Figures of anthropomorphic spirits are present in Central and Eastern Europe at the beginning of the sixth millennium BCE.

The Camunian Periods I and II correspond to the Neolithic of the fertile plains. During the *Climatic Optimum*, Valcamonica was a rocky land but had forests of firs, alders, oaks, and some grassland that fostered animal grazing.

The material culture is Neolithic with pottery which is characteristic of cultures generally present in Northern Italy, the so-called Bocca Quadrata (square mouth pots) and that of the Lagozza Culture. This rock art represents figures of axes and other tools used in the same period. It includes also the earliest figures of plows.

Period I includes adoration symbols, such as the solar disc or the axe. In the subsequent period (Period II), there are also representations of rituals and social and economic gatherings. Some scenes represent ceremonial occasions. Cult activities appear to have been diversified and probably occupied a relevant place in daily life.

Period I and II weapons and tools are spears, *boomerangs*, bows and arrows, paddles, and hoes and plows. The first domesticated animals appear (dogs, oxen, and then goats). Sun worshipping and worshipping the dead are added to at the end of Period II with the evidence of animal (especially dog) worshipping.

Neolithic objects excavated from the shelter Riparo Gaban are decorated with repeated ideograms and an anthropomorphic figure similar to the "spirits" of Valcamonica.

The Late Neolithic of Central Europe was a period of international contacts, trade gradually developed, and ethnic entities were aware of the deeds and customs of other human groups. While the Camunian tribes were producing rock engravings, the first urban civilizations were emerging in the Near East.

Toward the end of Period II, the first anthropomorphic images on standing stones or

monoliths appear. The so-called menhir-statues and anthropomorphic stelae are shaped, engraved, or painted on stone blocks. This reflects a new element in the ideology at Valcamonica around 3,300 BCE. Similar monuments appear earlier in various parts of Europe and Asia throughout the Neolithic.

Camunian Period III-A (3,300–2,500 BCE)

Period III has been divided into two sizable stages, III-A and III-B-C-D, that reflect two different types of cultures, beliefs, and social organizations. Period III-A corresponds to the Chalcolithic in the early sub-Boreal climatic stage and marks the beginning of metallurgy in the area.

Menhir-statues and the monumental compositions indicate a new ideological or religious movement which emerged in the sixth millennium and spread over European in the fourth millennium BCE. In the central Alpine region, a highly metaphorical iconography developed. Monumental compositions and menhir-statues represent tripartite "beings." A solar or lunar image represents the head; the central part of the body includes the breast and necklaces for feminine figures or weapons for masculine figures; the lower part is either a pubic triangle, a snake, or two weapons positioned as the legs of vaguely anthropomorphic beings. The concept of a tripartite universe first evolved from the widespread distribution of menhir-statues in the fourth millennium BCE with its very earliest expressions in the Alps in Valcamonica and Valtellina. This leads to interesting speculation about the origins of proto-Indo-European ideology.

The tripartite menhir-statues appear at the same time as the earliest depictions of wheels, daggers, and other metal weapons. Metallurgy was not invented but imported and arrived with a new ideology which was assimilated and reshaped.

Weapons are numerous and represent metal daggers, axes and halberds are like elsewhere in Northern Italy and Central Europe in this period. Wheels and wagons arriving in the valley indicate a new age for communication and transportation.

Domesticated animals include dogs, oxen, goats, and now pigs. These important technological and cultural innovations reveal the essential economic activities, including animal breeding, agriculture and hunting, complementing metalwork, organized trade, and professional craftsmanship.

The rock art compositions of this period are among the most elegant, best-planned, and suggestive works of the whole Camunian cycle. Engraved rock surfaces and menhir-statues are concentrated in cult sites, open-air sanctuaries where tens of such monuments are found in a single area, the presence of fireplaces near the menhir-statues, heaps of stones, and other stone structures, indicating a wide range of performances and cult activities.

As the places of worship grow in number, priesthood is arguably acquiring a dominant role, a privileged class in a regime that looks like an oligarchic-theocratic system.

Toward the end of the Chalcolithic period and the beginning of the Bronze Age, around 2,500 BCE, a new change takes place in the style of rock art. The symbols represented on monumental compositions spread to the entire rock. The daggers and the axes are no longer Chalcolithic; they are Early Bronze Age. The focus of interest is no more the tripartite entity. Single figures that were part of the monumental composition and of the iconography of the menhir-statues in the Chalcolithic period are now represented and probably worshipped individually. An iconographic development is illustrated by strange compositions of weapons which together make a sort of anthropomorphic being.

Camunian Periods III-B-C-D (2,500–1,200 BCE)

In Period III-B-C-D, changes in the themes and style herald changes in the social system. Modes of depiction change, and in each phase, figures of tools and weapons contribute to establish a well-documented chronology. The standard Bronze Age chronology of the region lasts from 2,500 to 1,200 BCE. Period III-B belongs to the Early Bronze Age; Period III-C relates to the end of the Early and the beginning of the Middle Bronze Age, while Period III-D covers the later phases

of the Middle and the beginning of the Late Bronze Age. The transition between the Bronze Age and the Iron Age is tentatively dated in this Alpine area to c. 800 BCE. The phases of the rock art periods are defined by changes in style and subject matter which is correlated to changes in the typology of metal objects and to Bronze Age pottery styles.

The iconographic style is characterized not only by weapons and other objects but also by compositions called "topographic maps" considered to represent fields and other territorial features.

Toward the end of this period, mythological scenes and anthropomorphic figures in action bring a new stylistic approach to the rock art. The change is drastic and anticipates the character of the rock art in the Iron Age. The most common weapons are subtriangular daggers, battle-axes, spears, and shields. The chronological definition of the numerous depictions of metal weapons and tools is supported by comparable finds in datable archaeological excavations.

Dogs, oxen, goats, and pigs continue among the domesticated animals with the additional appearance of the horse which occupies an important place in the iconography of the Iron Age. Technological and cultural innovations represented in rock art suggest an increase in metalwork and weaving. Hunting, fishing, agriculture, and animal breeding continue, but new economic dynamics develop as a consequence of trade and the accumulation of surplus.

Beliefs and religion undergo another change. The rock art shows that the cosmological religion of the Chalcolithic gradually turned into a cult of objects and weapons. Period III, at different moments, shows parallels with the rock art of Mount Bego (France), with that of Southern Scandinavia, and of the Iberian Peninsula. Some areas of Europe have rock art styles and themes evolving in similar orientations, indicating the presence of similar trends over rather vast regions.

In the Mediterranean regions, dynamic political structures developed with thriving city-states. Sea faring promoted trades. In the Alpine regions, introverted tribes gradually opened up to international relations. The trade of amber and precious metals used transalpine tracks, and the mountain regions acquired benefits from these exchanges. Wagons and weapons of Mycenaean type are represented in the rock art of Valcamonica. Figures of wheeled wagons are represented all the way north to Scandinavia.

Camunian Period IV (1,200–16 BCE)

The Camunian Period IV coincides with the later phases of the Bronze Age, the Final Bronze Age, and the Iron Age. Five main typological phases are recognized, the first two in the Bronze Age and the three other in the Iron Age. Climatically, this is the end of the sub-Boreal and the sub-Atlantic.

The character of the iconographic style is realistic narrative with descriptive and anecdotal scenes of daily life, of magic, and of mythological nature. Figures of isolated tools and weapons are typical of the Bronze Age and tend to become rare in the Iron Age. In the Iron Age, weapons and tools are mostly represented, held by people. They include shields, helmets, swords, lances, and axes. Many agricultural instruments are represented in scenes showing people using them: plows, hoes, sickles, and picks. There are numerous figures of structures, huts, barns, shrines, and temples. Representations of handicraft activities include metalwork and the construction of wheels. Domesticated animals are more diversified than in the Bronze Age: dogs, oxen, horses, donkeys, goats, ducks, chickens, and geese. The breeding of rabbits appears at later stages. During this period, writing begins using a local language in the Northern Etruscan alphabet. Essential economic activities are trading, mineral extraction, metalwork, animal breeding, agriculture, and hunting. The categories of professional warriors and priests emerge. In the initial phases, the sociopolitical structure is based on the lordships of the hill forts (*castellieri*). Later, the depictions of groups of warriors and the growing number of fighting scenes present the image of an unstable and warlike political entity.

Beliefs and religion are drastically changed toward the end of the Bronze Age. When compared to previous periods, conceptual innovations are considerable. Rock figures often represent

epical and heroic events similar to those of the Germanic mythology.

In the Final Bronze Age, thematic and stylistic analogies with bronze and pottery decorations of the Urnfield and proto-Villanovan cultures are evident; in the middle phase, there are strong Villanovan and Etruscan influences. Celtic, Raethian, and Venetian influences alternate each other in less than three centuries. International relations and cultural influences appear to move dynamically.

The last pictures preceding the arrival of the Roman legions in 16 BCE display a decadent style. The low-quality of the rock engravings is sometimes embellished by tools, shields, hats, trumpets, and other minor details which reflect Roman influence. The Camunians were conquered by Rome even before the arrival of the Romans.

Conclusions

The custom of producing rock art as a pattern of culture came to its conclusion with the Roman occupation. Sporadic rock engravings were made in Roman, Medieval, and recent times, but the rock art was no longer a cultural and ritual necessity. The rock art of Valcamonica is an archive of 10,000 years of European history. Over 300,000 pictures mirror the events that shaped the evolution of European society, from hunter-gatherers to a more modern way of life. This immense art body has been documented, recorded, and described. It must now be understood. The ancient Camunians did not produce their pictorial "database" just to embellish the rock surfaces. Rock art was used as a means of communicating messages, commemorating events, teaching the candidates to initiation, operating magic, and many other purposes. Research is progressing toward decoding the archives left behind.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Europe: Prehistoric Rock Art
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ UNESCO World Heritage Convention (1972)

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van der Merwe, Nikolaas J.

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Basic Biographical Information

Nikolaas Johannes van der Merwe was born in South Africa in 1940. In 1958, he won a scholarship (offered by a Trans Atlantic shipping line) to attend Yale University, from which he graduated in 1962 with a B.S. in Physics. Yale was then very active in the development of archaeological sciences, and under the joint supervision of the archaeologist Kwang-chi Chang, the radiocarbon scientist Minze Stuiver, and the geochemist Karl Turekian, he investigated for his doctoral dissertation the feasibility of dating iron-carbon alloys (steel and cast iron) by radiocarbon. He received his Ph.D. in Anthropology from Yale in 1966. He was an Assistant, then Associate Professor in the Department of Anthropology of the State University of New York at Binghamton from 1966 to 1974. In 1974, he was appointed as the first Professor of Archaeology at the University of Cape Town in South Africa. In 1988, he returned to the USA as the first Landon T. Clay Professor of Archaeological Sciences at Harvard University, a position he held until 2001, when he was appointed as University Professor of Natural Sciences at the University of Cape Town. He retired in 2005 to Kalk Bay, near Cape Town. Among the honors bestowed upon him are the 1994 John F. Herschel Medal for Interdisciplinary Research (Royal Society of South Africa) and the 1998 Pomerance Medal for Scientific Contributions to Archaeology (Archaeological Institute of America).

Major Accomplishments

Nik van der Merwe is best known for pioneering the use of stable carbon isotopes to infer past diet from the analysis of body tissues. This has been hailed as "one of the great triumphs of scientific archaeology" (Pollard et al. 2007: 183). It is probably the only scientific approach developed within archaeology that has been widely adopted in other fields of science and now provides an extremely important set of tools for biogeochemistry, zoology, ecology, nutrition, and food sciences. By 1970, van der Merwe was aware that radiocarbon laboratories had identified systematic offsets between radiocarbon dates on wood charcoal and on some types of carbonized annual plants. The latter were almost all tropical grasses, a group that includes the major cultigens maize, sorghum, and African millets. He realized that this provided the means to track the spread of maize agriculture through North America. Working in South Africa with the radiocarbon scientist John Vogel, he measured and plotted the stable carbon isotope ratios of human bone collagen in samples spanning the first millennium CE in eastern North America and showed that maize did not become a major cultigen until after 800 CE. Publication of these results was delayed for several years by negative reviews from archaeologists, who insisted that this date was far too late, but their eventual appearance (Vogel & van der Merwe 1977; van der Merwe & Vogel 1978) forced a major reevaluation of the later prehistory of eastern North America. He subsequently tracked the spread of maize into highland Peru and the South American rain forest (e.g., van der Merwe et al. 1981) and with his student Julia Lee-Thorp pioneered the isotopic investigation of early hominid diets from the carbon in tooth enamel (van der Merwe et al. 2003). He has published many studies outside archaeology and is hailed as one of the founders of the field of isotopic ecology.

Although his doctoral dissertation research (van der Merwe 1969) had shown that iron-carbon alloys could be directly dated, the technique was little used because of the large sample size required. The development of AMS radiocarbon dating from the late 1980s allowed the dating of much smaller samples, a development of great potential value for archaeometallurgy (e.g., Cook et al. 2003). His doctoral work also required technical proficiency in archaeometallurgy. He directed a major archaeological survey and excavation project between 1970 and 1974 on prehistoric copper- and ironworking around Phalaborwa in north-eastern South Africa, undertook ethnoarchaeological studies of ironworking in Malawi, and contributed several important syntheses of research on the origins and spread of metallurgy through Africa (e.g., Miller & van der Merwe 1994).

He was largely responsible for introducing African archaeologists to archaeological science, and the doctoral students that he trained at the University of Cape Town have greatly expanded the range of the research that he initiated. These include Julia Lee-Thorp (Oxford) and Francis Thackeray (South African Museums) on isotopes and human evolution, Judy Sealy (Cape Town) on hunter-gatherer and pastoralist diets in southern Africa, David Killick (Arizona) on archaeometallurgy, and Anne Cohen (Woods Hole Oceanographic Institute) on marine isotope ecology. The isotope laboratory that he founded at the University of Cape Town remains at the forefront of research in light stable isotope ecology.

He also played an important role behind the scenes in advising the post-apartheid government of South Africa on the restructuring of universities and particularly on the continuing importance of university-based research. It is probably no coincidence that funding for archaeological research has been maintained at a high level in South Africa, in marked contrast to the woeful state of funding for archaeology in most other nations in sub-Saharan Africa.

Cross-References

▶ Bone: Chemical Analysis
▶ Chang, Kwang-chih
▶ Isotope Geochemistry in Archaeology

▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
▶ Radiocarbon Dating in Archaeology

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Van Project

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Introduction

In July 2006, a team led by Cassie Newland and John Schofield excavated a 1991 Mk 3 Ford Transit van and posed the critical question: what does it mean to do archaeology? One of the seminal projects in an archaeology of the contemporary and recent past, the Van Project followed orthodox archaeological methodology, recording, analysis, and interpretation and challenged core assumptions about the discipline, its objects of study, and the role of archaeology within contemporary society.

Key Issues/Current Debates/Future Directions/Examples

The Ironbridge Museum (Telford, UK) had used the van from 1991 to 2005, first for the museum's archaeological unit and then for its works and maintenance teams. Van excavation strategy was standard, followed the Museum of London's Archaeological Site Manual, and started with library, archive, and oral research. Next, the interior of the van was gridded in 20 cm units, and a first layer of the site was divided into two contexts: the carpets and mats in the front of the van (context 1,059) and the carpets and wooden floor in the back (1,001). Details of importance were drawn to scale and photographed; elevations were drawn at a scale of 1:10 and plans at 1:10 or 1:20. Once these contexts had been recorded and artifacts photographed in situ, objects were collected. A second layer (the metal floor of the van) was then identified and defined by three more contexts: the offside of the cab (1,037), the nearside of the cab (1,039), and the back of the van (1,024). These contexts were recorded and artifacts collected. The five contexts yielded 352 cultural artifacts that were bagged and tagged with context numbers. In addition, each context was sampled for forensic, chemical, environmental, and entomological analyses. Features of the van's chassis were given context numbers, were photographed or drawn, and were examined for evidence of use-wear. Following surface recording and artifact collection, the van chassis and engine were dismantled; individual components were assessed, measured, photographed, and planned on site. Finds and records were archived at Ironbridge; the carcass of the van was recycled at a scrapyard.

Based on Adrian Myer's finds analysis, the majority of artifacts were associated with the archaeological or the maintenance phase of van use. Analysis identified two main artifact categories: mass-produced vehicle components and van parts and deposited artifacts. The latter included historic materials (i.e., ceramics) from the van's use by the Ironbridge archaeologists, objects associated with electricians and their work, and miscellaneous or misplaced objects unassociated with either of the vehicle's two formal use-phases. Further analysis included a detailed typology for screws (and a cache of 36 brass, slotted-drive, flat-head screws) and the standard attributions of categories of use (e.g., wood working, electrics). Further subclassification of electrical artifacts was based on frequency: domestic maintenance artifacts were most common, followed by fuse and bulbs, followed by high voltage and industrial materials. Examination of material associated with Ironbridge archaeological activity identified and dated a ceramic pipe stem, ceramic sherds dating from 120 CE through the nineteenth century, early twentieth-century glass fragments, building daub, and slag from a blast furnace. Other finds were less easily categorized: liquids were classified as multi-stratified and were handled as deposit samples. A final category of objects, nonwork artifacts, included plastic and foil candy wrappers, plastic coffee stirrers, cigarette butts, a fruit stone (*Prunus domestica* ssp. Domestica), an adhesive sticker from an apple, the detritus from tobacco consumption, metallic confetti, decorations and miscellanea from holiday celebrations, and other ephemeral activities not connected to orally documented uses of the vehicle.

Post-excavation analysis included mapping the spatial distributions of artifacts across van strata and contexts, as well as sourcing materials used in the construction of the van and in the artifacts excavated from it. Analysis of environmental samples (by Steve Davis) revealed 60 taxa of beetles (represented by 119 individuals) including woodworm (*Anobium punctatum*) and other woodland taxa and synanthropic taxa (e.g., *Oryzaephilus surinamensis*) which are common in urban contexts associated with stored cereals and seeds, and beetles of the Lathridiidae family which are commonly found in mold or plant debris. This environmental assemblage represents an infestation of the van itself and is not related directly to the vehicle's use.

Forensic analysis (carried out by Anna Nilsson) included fingerprinting (to establish patterns in van use) and hair analysis (to characterize van occupants). The unequal location and concentration of fingerprints suggest frequent driving of the van by a series of different individuals often traveling without a front seat passenger. Human and animal hair was recovered: the latter from a cat (*Felis catus*) and a dog (*Canis domesticus*) and the former long and bleached or dyed, perhaps identifying a woman's presence.

Identification of vehicle function suggests a use for transportation of tools and archaeological finds but also of the supplies and detritus of maintenance crews, as well as for other unexpected, non-sanctioned uses: traveling to celebrations and parties, transport of a personal pet (the museum did not utilize guard dogs), or other mundane activities (snacking and smoking).

Analysis of use-wear on the body of the van suggested a history of misuse and multiauthored reworkings of the vehicle which created a vehicle significantly displaced from its original design and which may best be understood in unique terms of the van's own particular biography. The excavators concluded that the "van-envion emerged through dwelling and eating, resting and sheltering; as lunch-table and lunch; workplace and playground, being site, situation and folk-memory" and thus should be understood in terms of a dwelling perspective (*sensu* Ingold).

At an epistemological level, the Van Project made important contributions to a modern, critical archaeology, to its practice, its objects of study, and its relevance to contemporary society. For the practice of archaeology, the project demonstrated that not every artifact fits easily into the documented phases or functions determined for a site (e.g., the celebratory artifacts, such as the confetti, which oral testimony suggested were deposited during non-sanctioned

use of the van). Also, the project showed clearly how a single artifact will have many different uses and users, meanings, and interpretations, each of which must be acknowledged as equally authoritative in any interpretation. Furthermore, the project provided clear evidence of how the condition of one component of an artifact or site (e.g., the van's engine) may have been affected by (re)workings that another component (the van's body) may not have experienced; thus, sites and artifacts can be disjoint and internally heterogeneous. Finally, artifact analysis demonstrated that some artifacts and traces of past activity will not fit into regular categorization (e.g., the liquids from the van engine, the confetti, the dog hair) and will provide vital unexpected information about otherwise unrecorded, ephemeral behavior and activity.

At a more reflexive level, the project demonstrated that meaning derives not only from an artifact's uses and positions in the past but also from the archaeological actions practiced upon it. Excavation (as well as preservation or interpretation) informs on the people and activities of a site's life history, on the perceptual biases of traditional archaeology, and on the explanatory breadth and refinement of thought that accompanies a study of modern material culture. Thus, the archaeological record that was created as the van excavation proceeded was continuously turned back into the process of excavation, layering new factual strata onto the metal, wood, and artifactual sedimentations of the site.

In addition, the project demonstrated that the most insightful archaeological investigations are multivocal and give equal attention to the opinions and commentary of popular sources as to academic experts. Van Project output ranged from traditional academic articles in *Cambridge Journal of Archaeology* (Bailey et al. 2009) and the *International Journal of Historical Archaeology* (Myers 2011) to more ephemeral, public output: interactive blogs, daily progress reports on the excavation, audio and video diaries, Internet message boards, short films, news reports, public discussions, and opinion gathering. Wide, public debate was enabled and provoked; a "collision of responses" was anticipated and accommodated. Output was live, dynamic, and open, inviting response and critique that were fed into ongoing excavation and interpretation.

On a more general level, the project illustrated the detail and breadth of information that can be obtained from a study of the common and the mundane. It showed how an archaeology of the contemporary or recent past can transform familiar objects into unfamiliar ones and, in doing so, provide original perspectives that open new understandings of what is taken for granted in the modern industrialized world. Critically, the project opened the horizons of archaeology to a world of experience and material far beyond the limits of the ancient past and thus destroyed the traditional boundaries that separate archaeology from modern material culture studies and popular history.

The project showed that the study of modern material culture requires a direct and targeted approach that interrogates the complexities and multiple nuances of a single object. As well as provoking these discussions of discipline, methodology, and epistemology, the Van Project retained its own scientific currency; it was more than mere provocation or intellectual exercise. The project was an independent and self-contained research study of the material culture of mass production in late twentieth century. The archaeological interrogation of contemporary material culture is a powerful means for studying patterns of human behavior and perceptions. Projects such as the van excavation are particularly valuable when practiced in an industrialized modern world of objects that is so vast and plentiful that overarching syntheses are, if not impossible to carry out, of little value beyond their over generalizing conclusions.

While the project can be viewed as a completed, self-contained work, the impact of the van lives on. After the remains of the completely excavated van were sent to a recycling facility, the stripped down ferrous metals were exported to Turkey to be made into construction materials that now form parts of modern buildings. Other metals, such as aluminum, were sent to East Asia; brass, bronze, and lead went to China; and plastic, foam, and fabric went into local UK landfills, continuing a never-ending

material and archaeological voyage. The archaeology of the van (just like the materials of the van and the knowledge and debate created by it) continues beyond the limit of the project; comment, teaching, inspiration, and clone projects roll on.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Ethnoarchaeology
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute
- ▶ Material Culture and Education in Archaeology
- ▶ Modern Material Culture Studies
- ▶ Modern World: Historical Archaeology

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Vandalism and Looting (Ethics)

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Introduction

In dominant archaeological discourse, vandalism in the form of looting is primarily discussed in connection with its violation of archaeological ethics, its assumed profit-related motives, and its material and intellectual impact. Concurrently, ethnographic approaches add their unique conceptualization and deconstruction of vandalism/looting phenomena for they illustrate the historical and sociopolitical contexts within which such acts are embedded, as well as throw light upon the looters' motives and perspectives.

Definition

Looting is predominantly described as the undocumented removal of antiquities from their context without proper scientific documentation. In light of this, acts of looting are commonly believed to disrupt the physical integrity of the archaeological record and violate professionalized archaeological authority and ethics. The dominant thesis that is thus implied is that undocumented digging signifies a form of vandalism of archaeological resources, on par with major natural catastrophes, agricultural development, and warfare.

In archaeological literature, one of the most common references to looting presuppose Colin Renfrew's (2000: 15) definition, which describes looting as "the illicit, unrecorded and unpublished excavation of ancient sites to provide antiquities for commercial profit." This conceptualization applies to a wide range of undocumented excavations discussed in archaeology and it emphasizes two additional and crucial dimensions of the vandalism involved: its illicit context and commercial intent. Nevertheless, not every case of undocumented digging is illegal or profit-related. In avoiding the confusion with such exceptional cases, archaeologists have recently grown more cautious in qualifying the form of vandalism/looting they are concerned with (see Brodie 2006b).

Key Issues/Current Debates/Future Directions

Archaeological writing regarding looting is circulated in print publications (edited volumes and journals), and dozens of web-blogs, all attempting to understand, quantify, and monitor its scale, causes, structure, and intellectual/material impact upon archaeological sites and objects. This information is often employed in order to discover

means for the prevention of looting and to raise public awareness. One of the latest developments in recording the extent of its destruction upon the archaeological past involves the use of satellite imagery (see Contreras & Brodie 2010).

To grasp the magnitude of the problem that looting causes for archaeologists, one needs to understand the centrality of context to archaeological research. Context is considered by some as the "essence of archaeology." That is "where an artefact is found and what is found with it [. . .] the set of relationships among artefacts and between artefacts and their surrounding structures" (Brodie 2006a: 52). Archaeologists maintain that coherent historical information comes about only through the systematic study of context. It is thought that objects, in their context of discovery, can provide insight into past cultures; objects which seem insignificant on their own may acquire great informational value if found next to other objects or far removed from their usual area of distribution. Accordingly, when undocumented and unauthorized digging and removal of antiquities occurs, archaeological context is believed to be destroyed and historical information lost. Archaeologists maintain that antiquities wrenched out of their context of discovery add very little to the knowledge of the past.

Economically driven motives, however, are not considered to be limited to those who unofficially remove objects from archaeological contexts. Some archaeologists have argued that in reality, commercial profiteering implicates those who comprise the wider social network involved in the multilevel economic system of the antiquities market. So, on the one hand, there is the recognition that the looter and the collector are so intertwined that neither could exist without the other. However, on the other hand, it is sometimes acknowledged that the real blame for the destruction of archaeology should be placed not on the undocumented digging itself, but on the underlying demands of the market in antiquities, which brings significant amounts of economic profit and cultural capital to collectors, auction houses, and traffickers. It was in this context that Elia asserted that "collectors are the real looters" (Elia 1993: 17).

Quantitative information about the commodification of archaeological objects "at the high end" has been provided by companion studies of exhibition and sales catalogs. These have shown that more than 70 % of archaeological objects that come onto the market or that are contained in recently assembled collections are without any indication of provenance. The implication of these studies is that antiquities only recently entered circulation and are probably stolen, looted, or fake. It is now widely recognized that various agents such as looters, dealers, middlemen, government officials, private collectors, museum curators, auction houses, and cyberspace trafficking play their role in promoting and maintaining the market for antiquities.

Needless to say, it is because of looting's dominant definition as a form of vandalism that the literature focuses on the quantification and analysis of that destruction. It highlights the lack of authority and morality involved in the act of the undocumented removal of objects. Also, it encapsulates – at least for those who use the term – a double-meaning of destruction: the one caused by the objects' undocumented removal (affecting archaeological sites and contexts), and the one caused by the objects' subsequent transformation into commodities (affecting the objects). In this respect, a key term in archaeological literature on looting is "illicit antiquities" for it refers to antiquities, which are believed to have been illegally removed and subsequently circulated within local or international markets.

Archaeologists who use the term 'illicit antiquities' are concerned with "the illegal excavation and export of archaeological material and the destruction caused" (Brodie & Doole 2001: 2). In other words, archaeological objects "which have been torn from monuments, stolen from museums or illegally excavated and/or exported, have been christened 'illicit antiquities'" (Brodie 2002: 2). As they further note, "this is not a legal term but has been coined by archaeologists to highlight a unique characteristic of the trade in such material, which is that although in most countries of the world (exceptions such as the US and UK) archaeological heritage has been

taken into public ownership, so that its unlicensed excavation or export is illegal, its ultimate sale in a country other than that of its origin may not be" (Brodie 2002: 2).

Not all antiquities appearing on the market are necessarily illicit, however. In such cases, one outlook that is upheld – by the same archaeologists who endorse the above definition of illicit antiquities – is that "[i]n the absence of provenance . . . [t]he only cautious response is to regard all unprovenanced material illicit" (Brodie 2002: 3). Given the illicit antiquities' lack of archaeological context, it is then argued that antiquities shift from a sphere of information to a commodities' sphere, and in turn, are categorized only on the basis of monetary value.

Furthermore, what is believed to distinguish the art market from other illegal markets (comparisons have been made with the international trade in guns and drugs) is its transformation into a "legal" trade. This transformation is founded upon the belief that the trade converts "looted artefact into legal art," based on the argument that once objects are illegally acquired and transported from one country, they "end up being offered for public sale by legal businesses in another" (Elia 1995: 245).

Due to the lack of efficient national patrimony laws, or due to the incompatibility between different State laws regarding the protection of cultural heritage, archaeologists often stress that it is common for an illicit antiquity when transferred across territorial boundaries to be recognized as legal outside its country of origin. Eventually, illicit objects are argued to be granted legal status, provided there is appropriate paperwork that proves a "legitimate" title to the object, "that the assumed owner is the owner and has full rights of ownership" (Carman 2005: 19); or, so long as it is "published in an academic paper or exhibition catalogue or even sale catalogue," it acquires "a new respectable pedigree as an object of scholarly interest or of esteem" and the object's illicit origin is "quietly forgotten" (Brodie 2002: 2).

The persistence of the discussion in the antiquities trade and the vandalism it causes on the archaeological past has, over the years, led to the formulation of a number of ethical statements by archaeologists. The importance that these ethical commitments afford (and have afforded for many years now) is indicated by the fact that most leading archaeological associations subscribe to them, such as the Archaeological Institute of America, the Society for American Archaeology, and the European Association of Archaeologists. Ultimately, as an act of moral leadership, advocates of the "archaeological context" refuse to study, preserve, or acquire "looted" antiquities (that is antiquities without contextual information), because any such act is viewed as a failure of the fundamental ethical duty to preserve and protect the past, as it would reward the looters and private collectors, and, thus, directly condone the ongoing process of undocumented digging and destruction of the past.

The concern with the trade in unprovenanced antiquities and its effect upon of archaeological sites has also produced an international response, as the UNESCO (1970) and UNIDROIT (1995) Conventions indicate. Both conventions support anti-looting measures by promoting legal and educational remedies, and address and facilitate the restitution and return of illegally removed and trafficked cultural objects. Lastly, ICOM (2010) promotes an ethical approach which condemns the illicit trade in cultural objects by stating that "[m]useums should not acquire objects where there is reasonable cause to believe their recovery involved the unauthorised, unscientific, or intentional destruction or damage of monuments, archaeological or geological sites, or species and natural habitats. In the same way, acquisition should not occur if there has been a failure to disclose the finds to the owner or occupier of the land, or to the proper legal or governmental authorities" (Article 2.4). Clearly, the notion of protection is shared among professional advocates of the archaeological record. The idea of refusing any professional association with illicit material, however, has attracted criticism from archaeologists and other professionals and interest groups (see Argyropoulos et al. 2011).

As shown so far, a collective professionalized archaeological response to the study of looting presupposes a dependency on the antiquities trade and thus concentrates on measuring and finding the means to reduce the scale of archaeological vandalism. Concurrently however, there are some less ordinary, yet immensely insightful

and valuable approaches to looting, which shed light upon the social, cultural, and political circumstances that often underlie looting contexts and which dominant literature on the matter usually dismisses.

The conception of "subsistence-digging" constituted an important turn in the treatment of looting. It was first used by archaeologist David Staley (1993) in order to describe the undocumented and commercial digging that was carried out for subsistence purposes by the community of Gambell in St. Lawrence Island (Bering Strait, Alaska). As the author specified, the term "subsistence-digger" was adopted because it did not have the negative connotations that the terms "looter" or "pot-hunter" did. He also argued that it was the appropriate term to describe what was going on, because it defined the person who used "the proceeds from artefact sales to support his or her traditional subsistence lifestyle" (Staley 1993: 348). The use of such an alternative word was not a mere change in the terminology, but was designed to imply a different approach toward looting. For the first time, undocumented and commercial digging was portrayed not as the result of people's greed, but as a viable route for economic survival.

Since that article, a number of sporadic, yet important (archaeological and anthropological) accounts on looting have emerged, focusing attention on the sociopolitical circumstances that surround unofficial diggers in both Western and non-Western contexts. Such studies presuppose that looting responds to various "on the ground" conditions that extend from government corruption to grassroots resistance. They concentrate on diverse motivations and interests, such as subsistence-digging or connection to place, and, more importantly, they explore cases where undocumented digging is legal or is treated as socially acceptable and justified.

Cross-References

- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Ethics of the Archaeological Record
- ▶ Ethnic Identity and Archaeology

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Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Introduction

The llama is an animal from the highlands of the Andes mountain range. The recent identification (Goepfert 2011) of massive sacrifices of these beasts in Moche sites suggests the existence of herds along the semidesert coast of northern Peru. This may be explained by human intervention, which encouragingly testifies our ingenuity for the idea of sustainable development, or, and this is less likely, by subtle changes in climate, which are just as important to our concerns about climate change. There are just as many clues obtained from detailed archaeological research as there are testimonies that may have been destroyed once and for all through looting in a search only for the rich funerary mask, or the beautiful object that can return a substantial profit. The looter and its corollary, the buyer collector, who may even be his sponsor, thus commit theft of information, which is harmful to the common good.

Large parts of the past are gone forever. Regarding ideofacts, tastes, beliefs, and rituals, the loss is immeasurable. Regarding ecofacts and artifacts, even at sites that are well known and identified, it is at the cost of a slow and painstaking work, spread over many years that archaeologists are able to draw relevant information from the preserved relics in order to reconstruct the social life of objects. Conversely, the search for the beautiful object, which is illicit and, consequently, clandestine, can only be undertaken by a brutal, and hence, destructive intervention.

Whereas the archaeologist's task is to ensure the protection of the past and the common interest, by contrast, the collector's task is only motivated by a search for private benefit in a speculative perspective. According to Interpol, after drugs, arms, and human trafficking, the looting of artworks ranks fourth in organized crime. However, it needs to be taken into account that the traffic of works of art is often used in laundering drug money, and that looting is a source of potential revenue for criminal organizations to buy weapons.

Admittedly, these are extreme cases. Collectors and art dealers are quick to reply that what motivates their action is the fact that they will ensure the conservation of works from the past, and in doing so, they contribute to a common struggle against their destruction. It is a fact that many major or minor works, since time immemorial, have suffered from multiple causes of destruction. The first cause is clearly natural destruction, including from slow to rapid disintegration of organic matters to full catastrophes (mudslides, earthquakes, etc.) (Fig. 1). Superimposed over this natural degradation is mass destruction by people: plundering and looting punctuate the history of humanity, whether in Rome, Egypt, right to the recent world wars and the holocausts of books by the Nazis. More recently, and despite the efforts of preventive archaeology (Martínez Muriel 1988), increasing urbanization and the ravages of modernity have amplified these destructive phenomena. Again it should be stressed that the destruction is the work of a collective action whose objective is rarely the obliteration of the

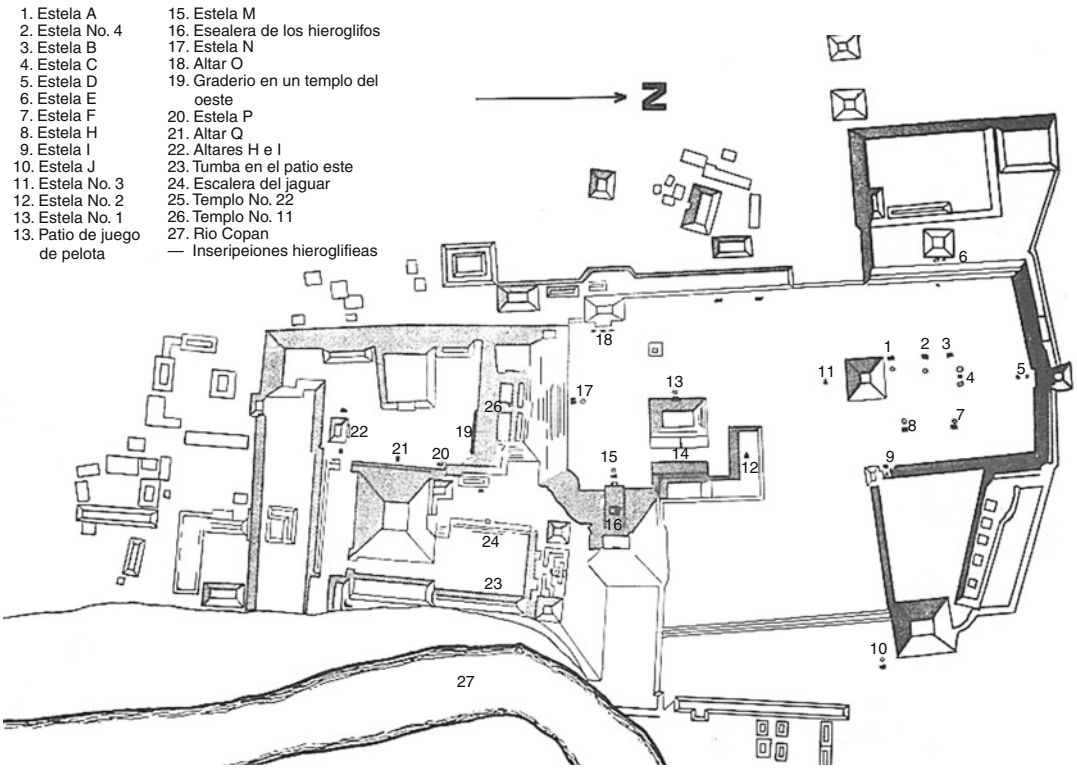

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 1 Map of Copan site (Honduras), showing the erosion of the Acropolis by the river

past. It is essential to clearly differentiate plunder from destruction, plunder being akin to theft for personal interest.

Definition

Closer to our concern is vandalism, which, in an effort to differentiate itself from plunder, still shares a few similarities with it. Less massive, less destructive, it however contributes to inevitable erosion. The visitor who traces graffiti on a monument contributes, through stupidity or ignorance, to its degradation. The unaware tourist, who, happy with his discovery, removes a sherd or an arrowhead on a site, is equally objectionable. Yet these are isolated actions, which simply through their repetition, can have serious side effects. Of greater concern is the use of prestigious sites for staging artistic "events." Concerts with light and sound organized in Egypt, Jordan, and Mexico lead to an uncontrollable influx of spectators who stamp on the remains, and mill around monuments outside demarcated areas. Even more destructive are informal New Age events like those which occur at Stonehenge or Chichen Itza (Fig. 2), whose followers' last concern is to respect the ruins. These vandals' ignorance and contempt finally overlap with fanaticism, such as the Taliban in Bamiyan. This may called damage, vandalism, or even looting, as some Bamiyan objects have allegedly found their way to antique shops.

If vandalism sometimes leads to looting, the latter is more akin to opportunistic or circumstantial looting whose origins date back to Antiquity. Looting is indeed an ancient activity. In Egypt, rich burials had to be protected against grave robbers. Similarly, in Central Asia, evidence of ancient looting has multiplied in recent excavations (Bendezu-Sarmiento & Grizeaud 2011). These ancient lootings are not always intended to recover beautiful objects or wealth. In the

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 2 The celebration of the Spring Equinox at Chichen Itza (Mexico) (Photographed by the author)

tombs of Central Asia, it is sometimes minor parts or bones that were collected rather than offerings. It is possible to also draw a parallel with contemporary examples from sub-Saharan Africa where retrieving objects from burials for other uses than their original indented use is current practice. The same situation has been observed in Guatemala where thieves use the Mayan ceramics and grinding stones for personal use (Hansen 1997). Is that looting? Vandalism?

Examples

It is not intended here to give an historical outline of archaeological looting; however, the case of the New World where the Spaniards seized upon the riches of the Aztec and Inca Empires, in their systematic search for gold should be mentioned. This has resulted in the looting of tombs, or other such excessive depredations, such as in Peru, with the diversion of a stream to cause the collapse of an adobe pyramid (Fig. 3). In parallel, a vast campaign of vandalism is ongoing, with the systematic destruction of the remains of a pagan past that the Spaniards wanted to eradicate (Chamussy et al. 2011). The destruction of the Templo Mayor in Mexico or the burning of Mayan codices by Diego de Landa belongs to the same mind set. These two approaches are "justified" on grounds that are more akin to vandalism or destruction than looting.

During the Renaissance and up to the early twentieth century, we enter the field of antique cabinets of curiosity and museums. Organized collection of archaeological objects, and of natural history by nineteenth-century explorers whose aim was to enrich the collections of European museums, unquestionably comes under the concept of pillage. Some antique dealers, such as Boban (Riviale 2001) in the nineteenth century, played a pioneering role in this questionable area. Whether we are talking about the Elgin Marbles, the sack of the Summer Palace in Beijing, or the removal of Yaxchilan lintels, the topic is controversial (Merryman 2006). There is, however, little doubt that if the victims can rightfully call these acts organized looting, the goal is to enrich public collections, and, in rare cases only, achieve personal enrichment. It differs from artwork thefts that grew from the first half of the last century, with the discovery of American Indian, African, and Pacific Arts (*Mexico en el Mundo de las colecciones de Arte* 1994).

A significant shift occurred in the middle of the twentieth century with the development of archaeological speculation. Looting acquired the dimensions of a systematic, global phenomenon, with gangs and complex laundering circuits. All archaeologists agree on a definition of looting in

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 3 Overview of the Huaca Cortada, Mochica civilization (Peru) (Photographed by N. Goepfert)

three broad categories. Whether we call them opportunistic or occasional, seasoned amateurs or professionals, these terms cover the same reality, even if the boundaries between them are tenuous and permeable (*Arqueología Mexicana* 1996). At the base level, is opportunistic looting, which may follow the fortuitous discovery of an object, or a burial site. Many of the objects discovered in these circumstances constitute, for the discoverer, an exceptional boon. The sale of the object, even well below its market value, may represent for the discoverer the equivalent of several months' income. Under these circumstances, how can one be indignant or make a complaint about them? If the looters limit themselves to selling the fruit of their discovery, they generally escape any conviction. Often, they simply recover or destroy the discovered relics. Here, we find again the notion of vandalism: Many farmers from Petén, for example, recover containers for their personal use (Hansen 1997). Also, think about those communities who prospect, dig, and loot to defend, like in Africa, their territorial claims (Polet 2011). Some Eskimos communities from Alaska assert their right to search and sell their archaeological heritage, thereby denying any justification of archaeological intervention that would deprive them of what is theirs (Meunier 2011).

Whether it involves individuals or communities, there is the temptation to pass from the hazardous discovery to intensive looting, without going beyond a local scale. People steal in their region; they systematically look for objects, but more often than not, without method. In the Valley of Ocosingo (Chiapas, Mexico), looters who became aware of the archaeological interest in mounds near which they had lived for a long time, gutted a minor site in two or three nights, destroying a burial site, but also any objects they found within (Taladoire 2011) (Fig. 4). More seasoned researchers of burial sites in Western Mexico, like some *tombaroli* Italians, know how to identify them and wreak real devastation, even though for the most part, they do not carry out their activities a fair distance away from their village. It takes skill and organization, but they are not looting gangs, acting for sponsors, even though their destruction can reach staggering proportions. In Western Mexico, hundreds of tombs were violated in this way, while the number of examples of scientific digs amounts to only a few dozen. Of the 550 recorded graves in Cerveteri, in Puglia, we evaluate the number of looted graves at 400.

Alongside professional looting, there is organized crime (Meyer 1973, Valdiosera Bermán, 1985). These are organized groups searching for specific objects, who do not recoil from violence. In 1997, A. Anaya, from the National Institute of Anthropology and History in Mexico, accompanied by epigraphist P. Mathews and some workers, sought to transport the Number 4 altar from the El Cayo site all the way to Tenosique (Mexico), in order to keep it secure. Before they could act, they were surrounded by about thirty armed men, who threatened to kill them. At night, they escaped in a makeshift raft down the Usumacinta River (*Mexicon* XIX: 6, 1997). An opponent of looting, Carlos Catalan, a Guatemalan, was murdered in cold blood. As Richard Hansen writes (1997),

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 4 Occasional looting site of Joaquin Rancho Millares, Ocosingo Valley (Chiapas, Mexico) (Photographed by the author)

collecting Pre-Columbian art is often viewed as a justifiable means of preserving the past. It is in fact, a destructive and somewhat violent business, as attested by the recent assassination in Carmelia of Carlos Catalan, a local chiclero who had become a staunch opponent of looting in the Petén.

The same year, the watchman at Tziquin Tzakan in Guatemala was assassinated by looters, and a few days later, the same fate happened to one of the two watchmen at Yaxhá (*Mexicon* XIX: 5, 1997). This violence also manifests itself elsewhere. In 1990, armed men burst on the site of Herculaneum and managed to steal 223 objects from the warehouse. The individuals involved in this violence show no more regard for the pyramids they empty (Figs. 5, 6), the graves they ransack, than for human life. In their search for valuable objects, they destroy without qualms all that they deem unsalable. Nor do they hesitate to break through protection systems installed to protect excavations.

Looting is not limited to single sites. It also involves institutions. In 1999, a jadeite object from Copán was stolen from the National Museum of Anthropology in Mexico (*Mexicon*, XXI: 6, 1999). Another jade figurine from Copan was stolen from the Museum of Tegucigalpa in 2004 (*Mexicon* XXVI: 5, 2004). Thefts are increasing whether they are at the Louvre, The Museum of Cluny (Paris), of Cairo, or elsewhere. Even if this phenomenon remains relatively rare, it is wholly at odds with the argument that implies that these objects be saved to preserve heritage for all humanity, since these objects were heritage listed as such and therefore cannot be sold, at least not publicly.

One borderline case was the massive looting of the Baghdad Museum in April 2003 during the second Gulf War. The museum suffered three robberies, firstly around 40 sculptures were stolen in the galleries; the second one consisted of 3,100 objects from excavations, which were stored in the reserves; and the third one occurred in the cellars, where more than 10,000 small objects were removed. Of these, approximately 5,500 items were recovered, including more than 700 seized by US customs. There are still about 8,000 pieces missing, some of which have reappeared on the art markets in Jordan, Lebanon, Japan, and Switzerland. In 1996, the Swiss police discovered more than 10,000 Italian artifacts in four warehouses, with an estimated value of 35 million francs.

It is not only the magnitude, which horrifies, but also the extent of the destruction that it entails. To transport objects easily, and without risks, looters look primarily for medium-sized objects of high value. Small pieces do not always have a sufficient market value and are often destroyed at the site. Major pieces like stelae and sculptures,

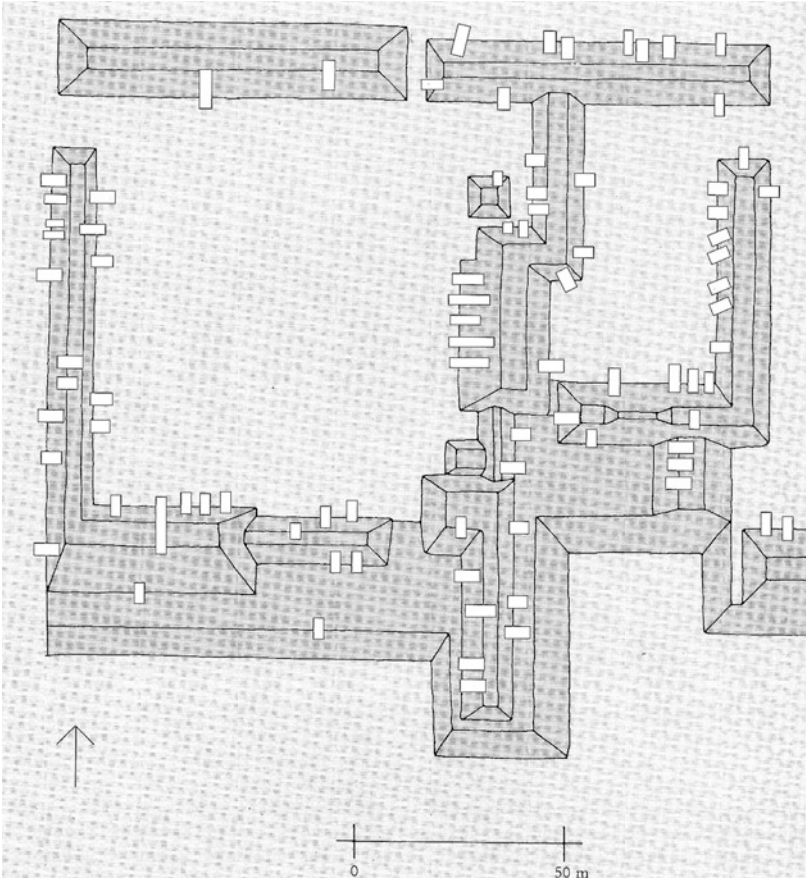

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 5 Looting trenches recorded on La Muralla site (Guatemala) (After O. Quintana & W. W. Wurster 2001)

however, are highly sought. But what to do with a stela measuring 3 m in height, and weighing more than a ton? That is no problem when it is sawn into fragments to be transported by a mule. The case of the stelae of Machaquila, cut into 14 pieces, is far from unique (*Arqueología Mexicana* 1996; Graham 1997) (Fig. 7).

The circulation of stolen or looted pieces in commercial circuits is only possible after a slow process of "money laundering," except when it comes to financed looting, which can be delivered immediately. One must wait years before an object reappears, which complicates the task for those who fight against looting. The objects are sometimes stored in secret places, thus freezing invested funds. Others use complex circuits in order to baffle searchers. In 1998, French customs seized several stolen statues from the San Agustin site in Colombia. They were called "garden gnomes" by their owner. Missing since 1989, they had, before arriving in Nantes, followed a complicated route, via the USA, St. Martin, and Spain to cover their tracks. The major objects are not traded openly, but in what Clemency Coggins calls a black market (*Arqueología Mexicana* 1996). The Internet plays an increasing role, but the majority of major transactions take place in total obscurity. This apparent discretion may give the impression of little activity, largely contradicted by the amount of funds invested. There are in fact only a few quantifiable data on the illicit trade in cultural property, and there is a fast acceleration, parallel to the increase in looting. Traffickers only have their own interests at heart, duping both sellers and buyers. The occasional looter will only receive a handful of dollars; the professional, on the other hand, is able to demand much more. But the difference between the investment cost and the price demanded of the buyer can be very steep.

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 6 Professional looting trench in the Group II of the Río Bec site (Campeche, Mexico) (Photographed by the author)

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 7 Calakmul Stela (Campeche, Mexico). Is heritage better preserved when it is cut into pieces? (Photographed by the author)

The discretion of the market leads to the inevitable consequence of the doubtful authenticity of the objects. The fake market has had a growing success and is attested by catalogs, where the descriptions vary between approximate stylistic attributes and absurdities, such as a piece called "Mexico, Inca period." A code of silence among players in this market does not help collectors. The fake market concerns mostly small objects with little value. Big merchants usually cannot afford to deceive their clients, provided they can avoid falling into their own traps. The experts are far from immune to error in authenticity and within domains that are infinitely better documented; there abound fake Dufy and Modigliani paintings. So, imagine in archaeology! This "industry" of fakes is growing even faster as it meets the tastes of collectors as well as merchants. Selective collecting reflects the owner's tastes and fads, as tastes change and fashion evolves. In the area of Zapotec urns, fake styles have been identified, each one responding to specific years. In this way, we have a fake from 1925, with hair "like a boy," a fake from 1930, and so on (Mongne 1992). While privileging his tastes, the collector, instead of discovering unknown arts, merely reflects his own image. An example of this blindness, which profoundly separates the collector from the archaeologist, is Olmec art. Among some 400 identified Olmec monuments, only the monumental heads, about 20 objects, that is 5 % of the body, experience popularity out of proportion. Could the reason be that apart from their real beauty, these objects refer to a "classic" art with which we are all familiar? The same applies to Mezcala or Inuit art, whose sleek appearance speaks to our fantasies of abstract art. Mezcala culture, appreciated by collectors for its sobriety

and the geometry of its forms, is very popular since a collector argued, without proof, that they were dated Preclassic (Fig. 8). Since then, archaeologists have made progress in the identification of this culture and its dating, but so-called experts continue to authenticate based on obsolete typologies without verification or correction. Rectifying the error would cause major disruptions in the market.

In other words, in using their aesthetic approach, founded on subjective criteria and financial objectives, collectors and dealers show their ignorance of the cultures they revel in, and their indifference to this universal heritage, which they so claim to defend. One of the arguments of dealers and collectors can indeed be found in the following statement: In recovering these objects, the governments of countries, which have suffered from looting, have seemingly been unable to protect – they work for the protection of aesthetic heritage worldwide (Hoog & Hoog 1991). Traffickers and some collectors deny then the notion of national heritage, which is the very foundation for the identity of a number of countries. They consider themselves above this "narrow nationalism," thus demonstrating their contempt, or even their racism.

The notion of heritage is not considered in a uniform way (Devisse 1994), and, depending on the countries, it can simply cover the domain of colonial art, or in others extend to all vestiges of the past, or even include the ethnological field. In this context, contradictory notions crop up of national heritage, state-level responsibility, and world heritage, which imply the existence of transnational institutions, in particular UNESCO, ICOM, or INTERPOL (Graham 1997). Faced with this institutional framework, the notion of globalization "entitles" some to believe in an individual responsibility invested in the preservation of works of art. We also mentioned the concept of community heritage, which led some groups to claim ownership of their relics, and, in keeping with the same logic, to prohibit archaeologists to access the sites.

In this complicated environment, the fight against looting is a daunting task, despite the progress already made. Overall, national and international laws have been strengthened or improved (Litvak King et al. 1980). The implementation in many countries of ministries or agencies responsible for cultural affairs, with large budgets, changes the conditions for protecting and preserving sites. The fight against looting has intensified, and the number of international agencies who dedicate an important part of their activities to this repression has increased. Here and there, this fight achieves satisfying results. The signature by many countries of the Conventions on Illicit Traffic of Cultural Property facilitates negotiations and returns. Several museums or large institutions, like Harvard, have begun a policy of return to the country of origin. Conversely, others, in contradiction with the rules of the ICOM, do not hesitate to buy stolen goods, even when they were reported to the authorities, or even included in the databases readily available. In this way, a museum in Florida acquired a fragment of a sculpture of Seibal, known since 1965, and stolen a few years later

Vandalism and Looting: Destruction, Preservation, and the Theft of the Past, Fig. 8 Figurine Mezcala (Private collection)

(*Mexicon* XXV: 4, 2003). This is far from being the only example. In short, we cannot deny the progress that has already been made, but the art market has in parallel become more structured and more complex. And the monies exchanged far exceed the capacity of law enforcement agencies.

Against the lack of legislative frameworks and their application, the best weapon is through the awareness of the importance of heritage within the population concerned, education, and development. This information is crucial against the disinformation practices by looters, dealers, and even museums where laws are haughtily ignored, objects are decontextualized, and confusion between collecting and archaeology is carefully nurtured. That collectors and dealers are treated as archaeologists is insulting to the professionals who fight against the devastation of sites in order to preserve the past and give it meaning.

A newspaper, which recounts the theft of a Corot from the Louvre in 1998, reported an official response that summarizes the current opinion among specialists in France: "The *less said, the better*." In other words, discretion and the law of silence prevail. This attitude may be justified: Any publicity given to artistic and archaeological looting is likely to encourage more and amplify the problem. Investigations designed to locate stolen objects can only benefit from this silence. However, this position is not satisfactory, because it obscures a recurring phenomenon that affects all countries. The fight against the illicit trafficking of cultural heritage is a global phenomenon. Only large-scale publicity recovered a large proportion of the Iraqi objects that had disappeared. Similarly, it is through training and information that *huaqueros* from Sipan (Peru) have become transformed into vigilant guardians of their heritage, thus benefiting from the upsurge in tourism, an investment of longer duration than plunder (Aimi et al. 2008).

Cross-References

- ▶ Bamiyan Buddhas
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Iraq: Archaeological Heritage
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Parthenon (Elgin) Marbles: Case Study
- ▶ UNESCO World Heritage Convention (1972)
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Vandals in Search of the Past

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Introduction

Whether they relate to the random collection of small relics by unaware tourists or to graffiti on monuments, occasional acts of vandalism are destructive and open to criticism. The intentional destruction of archaeological monuments, whether it involves large works or the ideological eradication of the past for religious, political, or economic motives, is clearly of graver concern. A less serious aspect of vandalism goes more often unnoticed, even when it is not publicized to great fanfare. It essentially concerns sites that are threatened when they are used for private purposes, such as cultural events.

Key Issues/Current Debates/Future Directions/Examples

For about 30 years, it has become a popular trend to use major prestigious sites for public concerts and artistic events, which bring together a large concentration of spectators. If, in Greece, the opening of sites at night has been authorized for a very long time to allow for romantic walks, the phenomenon worsened in 2009 with free access given to 81 sites within the "Greece by Moonlight" program, authorized by the Ministry of Culture. Other events include the Pink Floyd concert in Pompeii in 1971, the show organized by Jean-Michel Jarre on the Giza Plateau (1999), the recital of Placido Domingo "The Concert of a Thousand Columns" at Chichen Itza (2008), which was a follow-up to Luciano Pavarotti (1997), and other artists. If such events use the sites only as a prestigious setting, which for that matter indirectly showcases them, they raise various problems. Despite relatively strict controls, the mere presence of thousands of spectators (17,000 people at Chichen Itza), as well as the required technical support (lighting, sound, construction of platforms) inevitably leads to the damage and trampling of buried remains. It is symptomatic that responsible institutions like the National Institute of Anthropology and History of Mexico, openly express their reluctance to use sites in this way. One can question the consequences if such concerts were to take place in sites as fragile as Çatalhöyük.

Professionals are not entirely exempt from accepting responsibility for such destruction in pursuit of the development of their own work. The recent controversy in Mexico concerning the installation of a sound and light show at Teotihuacan (2008) is a striking illustration of this. The setup of the necessary infrastructure resulted in significant damage that later required

intensive work and expensive restoration. In other cases, site managers, anxious to give their research wide publicity, or even convinced of the emotional value of the sites, do not hesitate to organize cultural events that go well beyond the traditional scientific discourse. In other words, this development corresponds to a passionate approach, which has become popular among some archaeologists and can cause dramatic consequences.

This use of sites for personal or private means can indeed, for a number of reasons, lead to real appropriation by particular groups, such as members of New Age cults, some of whom claim a link to the past, which may be in part, simply imagined. Some of the most well known are those organized at Stonehenge, Chichen Itza, or Teotihuacan. At Stonehenge, since the site reopened in 2000 (after its closure in 1985, following the Battle of Beanfield), thousands of curious people, Druids, and followers of esoteric cults converge on the site each summer solstice. In 2010, there were no fewer than 36,500 people (6,500 vehicles) that occupied the site. While some show relative respect to the site, others, such as the self-styled King Arthur Pendragon come to feast: Their supporters do not hesitate to climb the monoliths, light bonfires, fight against their detractors, and finally transform the site into a nightclub. The sheer mass of participants is already a factor of destruction, in addition to other damage. Similarly, at Teotihuacan, every year, there are thousands of sun worshipers who climb the main pyramid to receive the positive vibrations of the universe. At Chichen Itza, thousands of other sun worshipers attend each year the descent of the serpent of light along the Castillo pyramid. Whether it matters to them or not, this phenomenon is more likely the result of the secondary effects of restoration, and was not intentionally created by ancient Mayas.

While some famous sites are relatively well protected, many others such as Catal Höyük, Carnac (France), El Tajin (Mexico), or the prehistoric temples in Malta, are threatened with the same problems, and many other problems remain unknown. A few years ago, in Chaco Canyon National Historical Park, intruders sought to practice their form worship in spite of the local traditions, and desecrated a kiva in this way. There are many other examples from around the world.

It is not our primary concern to analyze these beliefs, nor the fragility of their archaeological basis, whether it be the eclectic reclamation of ancient cults, questionable interpretations of the past (like the end of the world in 2012), or even pure nonsense, such as the story of crystal skulls (Walsh 2008). Our concern is simply their multiple consequences for archaeology and anthropology. Of primary concern is the unintentional damage caused to monuments and the destructive trampling of relics, resulting in the potential obliteration of the past. More serious is the appropriation of these relics for private use such as the removal of fragments of buildings for spiritual purposes. Sometimes the rituals themselves are accompanied by voluntary and involuntary damages, such as those that recently occurred at Villa Hermosa (Tabasco, Mexico) with the spill of toxic liquids on about twenty Olmec sculptures. The cost of the clean up was $25,000! These practices involve a form of neo-colonialist behavior, which excludes not only the common tourist, but also archaeologists and others who are responsible for the preservation of the past, as well as the descendants of the cultures who built these sites. The desecration of sites, to the detriment of communities is another major issue. We have seen above that the desecration of the kiva shocked the Navajos, and required long purification rites. The Shoshone-Paiute and other groups have also criticized these intrusions that question their cultural identity. This phenomenon occurs elsewhere including, for example, the site of Çatalhöyük. This defiance of local traditions and interests has serious consequences for communities. It can lead to the outright closure of sites to archaeologists and visitors alike. This happened with the Quiches of Guatemala. It can also stir up tensions based on bitter memories of colonization and its atrocities. In other words, the dissemination of these beliefs and the multiplication of these rituals raise the crucial issue of whether the past belongs to humanity, or to a specific group. For archaeological research, there are some essential ethical implications. If humanity

no longer shares a common heritage, both its collective understanding and its specificities must be questioned.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Chaco Canyon, Archaeology of
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mexico's Heritage
- ▶ Olmec: Geography and Culture
- ▶ Teotihuacan: Geography and Culture
- ▶ UNESCO World Heritage Convention (1972)
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past
- ▶ Vandalism and Looting: Destruction, Preservation, and the Theft of the Past

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Basic Biographical Information

Vasiliev Igor Borisovich (1948–2004) was a famous scientist, lecturer, and outstanding leader of archeological science in the Volga-Ural Region of Russia. He completed his studies at Bashkir State University (Ufa city). In 1970 he was invited by the archaeologist U.I. Matveeva to the Kuibyshev University to work as an archaeology laboratory assistant. At the same time, he organized an archaeology club at the Kuibyshev Palace of the Pioneers, which was the genesis of the archaeology school in the city.

From 1974 until the end of his life, all the scientific work of I.B. Vasiliev was connected with Kuibyshev State University, where his career grew from a laboratory assistant position to the head of the archaeology and ancient civilization chair position. He organized an archeological club for students and then established an archeological laboratory. In 1979 he defended a dissertation in the Board of Studies of the Archaeology Institute at the Academy of Science USSR (Moscow). At the same time, working in Samara, in 1988–1994, he accepted the position of Deputy Director of Science in the History and Archaeology Institute RAS USSR (Sverdlovsk). In 1994 he was Director of the Samara History and Archaeology Institute of the Volga Region.

Major Accomplishments

Vasiliev organized archeological expeditions and headed active fieldworks in Samara, Orenburg, Saratov, Voronezh, Kurgan, Tyumen Regions in Bashkiria, and in poor North Caspian Sea Regions. He is the architect of the famous archeological artifact diggings, such as Vilovatoe Settlement, Old Elshanka, Kair-Shak, Tenteksor (Neolithic), I and II Khwalyn barrows, Gundorov Settlement (Eneolith), and Ytevsky Kurgan barrow (the Early Bronze Age).

Due to his active expeditions and museum artifact explorations, Vasiliev discovered previously unknown archeological cultures in Middle Volga Region, such as Elshanskaya (Neolithic), Samarskaya and Khvalynskaya cultures (Eneolithic), and also Potapovsky, Alekseevsky, and Volsko-Lbishensky culture type (the Bronze Age). His academic interest topics included Eastern Europe Neolithization, Indo-Iranian and Indo-European nations protohistory, and the Neolithic, Eneolithic, the Volga Region, and Ural Bronze Age periodization and culture classification.

I.B. Vasiliev was one of the first archeologists to participate in complex interdisciplinary research with agrologists, anthropologists, and paleozoologists. He cooperated intensively with Russian and foreign archeologists. Due to his initiative, more than ten Soviet Union and International conferences were organized in Samara City.

Igor B. Vasiliev was the author of more than 170 research articles and monographs. His efforts and those of his archeological group established one of the most famous museums in Samara City and in Russia as well.

Cross-References

► Urals: Paleolithic

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Vegeculture: General Principles

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Introduction and Definition

Vegetative propagation, or the asexual reproduction of plants, is commonly associated with traditional forms of cultivation in wet, tropical environments of Africa, the Americas, Southeast Asia (mainland and island), New Guinea, and the Pacific. It occurs to some degree in most agricultural systems. Vegetative propagation is implicated in the emergence of agriculture and early plant domestication in the wet tropical rainforests of South America (Piperno & Pearsall 1998) and New Guinea (Denham et al. 2003), as well as potentially in other parts of the world (Weiss et al. 2006).

The term vegeculture connotes forms of plant exploitation, ordinarily agriculture, that are heavily reliant upon the vegetative propagation of plants (Sauer 1952; Hather 1996; Shuji & Matthews 2002). Vegeculture is usually used to refer to a subcategory of agriculture, horticulture, or food production. However, in addition to its economic (food production) meaning, usage of the term is now being expanded to encapsulate the cultural and social associations of vegetative forms of cultivation.

Key Issues

Vegetative (Asexual, Clonal) Propagation

> Most perennial plants possess two modes of regeneration: sexual reproduction through seed and clonal reproduction through some form of vegetative propagation. . . . The relative importance of sexual vs. clonal recruitment may vary widely among plant species as well as among populations within species. For example, there are many anecdotal reports in the literature of species having abandoned sexual reproduction for some form of clonal reproduction, at least in some habitats or parts of their geographic range. . . . (Eckert 2002: 279).

The defining feature of vegecultural practices is that planting involves some aspect of the "body" of the parent plant, such as a piece of root, tuber, stem cutting, or sucker that is removed and set into the ground (Sauer 1952: 25; Nakao 1966; Hather 1996). Planting a portion of the plant body involves asexual propagation, perpetuating a genetic clone that is selected for based on desirable phenotypic traits. Although commonly associated with root crops, a range of food plants may be cultivated vegetatively. Plant families

commonly incorporated into vegecultural practices are generally derived from the clade of monocotyledons that includes a range of staple food plants, such as true yams (Dioscoreaceae), taros (Araceae), sugarcanes (Poaceae), bananas (Musaceae), and palms (Arecaceae), as well as various supplementary and ritual food plants, for example, gingers (Zingiberaceae).

There are various practices through which vegetative propagation is affected. In the case of subterranean storage organs, a whole or substantial portion of a rhizome, corm, or tuber can be dug up, moved, and reburied for propagation, for example, gingers (*Zingiber* spp.), taro (*Colocasia esculenta*), and some yams (*Dioscorea* spp.) (Hather 1996). For vines, a cutting or slip may be taken and partially buried, for example, sweet potato (*Ipomoea batatas*). Similarly, for a variety of other plants, a portion of the stem can be cut and planted, partially or completely, in the ground, for example, manioc/cassava (*Manihot esculenta*) and sugarcane (*Saccharum officinarum*). For other plants, new suckers that grow around the base of the parent are dug up and replanted, for example, sago (*Metroxylon sagu*) and bananas (*Musa* cvs). A few plants can also be propagated by planting sections of aerial roots, for example, marita pandans (*Pandanus conoideus*).

Through asexual reproduction people are able to establish a high degree of control over the gene pool of cultivated plants. Namely, people select for desired phenotypic traits and are able to establish genetic isolation of the cultivated stock through vegetative propagation. Hereby, people establish greater control of phenotypic traits within the natural range of the plant than is possible under sexual reproduction (which entails continual reproduction with wild populations and other cultivated varieties). The clonally reproduced stock is subject to somatic mutation and, as with all plants, genes may be variably expressed in different growth environments (Gremillion & Piperno 2009).

Vegetative (Asexual) and Seed (Sexual) Forms of Plant Cultivation

Arguably, vegeculture represents a different orientation to plants than in seed-based systems of plant exploitation and cultivation. Vegeculture is based on the exploitation of perennials and the faculty of reproduction from plant parts, whereas seed-based reproduction exploits the sexual reproductive capacity of plants, often annuals (including cereals, legumes, and a range of vegetables) as well as a range of perennials (including some fruit and nut trees).

To exemplify using New Guinea as an example, a whole range of plant types are traditionally cultivated using vegetative propagation, including the following: trees (*Pandanus conoideus*), palms (*Metroxylon sagu*), grasses (*Saccharum officinarum*, *Setaria* spp.), fruiting herbaceous plants (*Musa* spp.), leafy herbaceous plants (*Abelmoschus manihot*, *Rungia klossii*), and root crops (*Colocasia esculenta*, *Dioscorea* spp.). These plants are cultivated for various edible plant parts, including efflorescences/flowers, leaves, buds, fruits, nuts, stem pith, and a variety of subterranean storage organs (roots, rhizomes, tubers, corms). Indeed, agricultural practices in the highlands of New Guinea were formerly almost exclusively, and still are predominantly, vegetative.

Furthermore, *Casuarina* tree fallowing, a fallow system involving the planting of nitrogen-fixing trees in the highlands, is undertaken by the transplanting of self-sown seedlings. Similar arboricultural practices occur throughout the lowlands of New Guinea, where tree crops have formed a much larger contribution to diets. Trees are usually transplanted through the digging up, movement, and planting of germinated seedlings and saplings, rather than reproduced from the planting of seed.

A vegetative orientation to cultivation has aided the widespread adoption of several food plants introduced to New Guinea over the last few hundred years, such as sweet potato (*Ipomoea batatas*), and manioc/cassava (*Manihot esculenta*) and taro konkon (*Xanthasoma sagittifolium*). Seed-propagated plants are also being widely adopted, including maize (*Zea mays*) and rice (*Oryza* sp.).

Agricultural or horticultural systems based on vegecultural practices have been contrasted with those based upon sexual reproduction using

seeds, not only in terms of the mechanics of planting but also in terms of other agronomic, cultural, demographic, developmental, environmental, and social aspects (Harris 1969; Diamond 1997; Hildbebrand 2007). However, rather than being seen as strictly demarcated alternatives, these strategies usually co-occur. Vegetative propagation is often practiced by agricultural societies reliant on the seed-based cultivation of cereals, legumes, and trees. Although this is readily apparent to anyone who is a gardener in the western world – where people continually reproduce perennials as ornamentals in their gardens – this probably also occurred in the distant past. The vegetative propagation of figs (*Ficus carica*) in the Lower Jordan Valley has been interpreted to have preceded, or accompanied, the earliest cultivation of plants there (Kislev et al. 2006), despite uncertainties regarding the timing and significance of the earliest finds (Denham 2007). Similarly, most groups reliant on vegecultural practices may also reproduce plants from seed.

Vegecultural Orientations in Foraging/Hunting-Gathering Societies

Although commonly associated with types of cultivation in different parts of the world, there is increasing evidence that vegecultural orientations existed within some foraging, or hunting-gathering societies. This orientation was manifest as an awareness of a plant's vegetative reproductive capacity in the way people exploited plants, as opposed to directly cultivating them. The current understanding of these practices is limited by a lack of the relevant archaeobotanical, ethnobotanical, and genetic data.

Multiple accounts of Australian Aborigines record people replanting a viable portion of a plant when digging for and collecting tubers (Berndt & Berndt 1993). People may have dug up and collected the majority of tubers, but they were sufficiently aware of the vegetative reproductive capacity of plants to know that new tubers would grow if a viable portion of the plant was reburied. In northern Australia there is circumstantial evidence for forms of vegecultural manipulation involving various plants, potentially including taro (*Colocasia esculenta*) and yams (*Dioscorea* spp.), in the distant past (Jones & Meehan 1989; Denham et al. 2009). In more temperate and desert regions, the distributions of some species of yam (e.g. *Dioscorea hastifolia*; Hallam 1989), *Typha* (Gott 1999), and other tuberous plants such as *murnong*, or daisy yam (*Microseris scapigera*; Gott 1983), are suggestive of sustained human management along vegecultural principles, including potential movement, in the past.

The Social Context of Vegecultural Systems

People practicing vegeculture often transpose elements of the vegetative reproductive capacity of plants onto their social relations and even onto human anatomy (Barton & Denham 2011). Recurrent elements include cloning the "body" or parts of the plant and the trans-generational life histories of many vegecultural staples.

The Kawelka at Kuk Swamp in New Guinea articulate their kinship relationships with reference to vegetative propagation. The original people, or principal landowners, are "ground-root-men" (*mae pukl wua* in Melpa) (Ketan & Muke 2001) and people who "hold onto the ground bone" (*mae ombil amborom*) (Strathern & Stewart 1998: 87-88). The root binds the people to the ground like plants. New generations, lineages, and subclans emerge from the original clan through time, as stems, shoots, and cuttings emerge from the root; like transplants, people are adopted by or married into other groups (Muke & Mangi 2006: 42-62; John Muke, *pers. comm.* to Tim Denham 2007).

These types of insight on the social implications of vegeculture are being applied to processes in the distant past that currently have low archaeological visibility. An example is the way domesticated rice (a sexually reproduced crop) was adopted by farmers inhabiting Island Southeast Asia around 4,000–3,000 years ago (Barton & Denham 2011). How was the planting of rice from seed grafted onto preexisting vegetative cultivation practices, and what were the social implications for people inhabiting that vegecultural world? Rather than a model of rapid, widespread adoption for food production, recent interpretations focus on the gradual incorporation of rice as a status crop (e.g., Barton 2012).

Cross-References

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- ▶ Domestication Syndrome in Plants
- ▶ Manioc: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sugarcane: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Yams: Origins and Development

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Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)

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Introduction

The Vermillion Accord is a set of six clauses adopted by the World Archaeological Congress (WAC) which concerns science and the treatment of the dead. It is of high significance to the archaeological profession and Indigenous groups, and its development and adoption is a key moment in the history of the reburial movement. Created in 1989, and adopted by WAC in 1990, the Vermillion Accord was the first document developed *together* by archaeologists and Indigenous people to provide a set of principles for behavior, decision making, and mutually agreed ethical approaches to the question of archaeological (and other scientific) interest in the mortal remains of the dead. At a time of high concern around issues raised by the reburial movement, when tensions could run exceptionally high and the media represented the debate as intractably polarized, the Vermillion Accord stands out as a demonstration that "mutual understanding and respect were possible between Indigenous people and archaeologists" (Zimmerman 2002: 91). Indeed, *respect* is the key word throughout the Accord, and forms the fundamental basis for agreement and decision making. Additional important aspects of the Accord are that it includes fossil hominids and, although developed out of the reburial debate, is not designed to be exclusively concerned with the Indigenous dead.

Definition

The Vermillion Accord reads as follows:

1. Respect for the mortal remains of the dead shall be accorded to all irrespective of origin, race, religion, nationality, custom and tradition.
2. Respect for the wishes of the dead concerning disposition shall be accorded whenever possible, reasonable and lawful, when they are known or can be reasonably inferred.
3. Respect for the wishes of the local community and of the relatives or guardians of the dead shall be accorded whenever possible, reasonable and lawful.
4. Respect for the scientific research value of skeletal, mummified and other human remains (including fossil hominids) shall be accorded when such value is demonstrated to exist.
5. Agreement on the disposition of fossil, skeletal, mummified and other remains shall be reached by negotiation on the basis of mutual respect for the legitimate concerns of communities for the proper disposition of their ancestors, as well as the legitimate concerns of science and education.
6. The express recognition that the concerns of various ethnic groups, as well as those of science, are legitimate and to be respected will permit acceptable agreements to be reached and honored.

Key Issues

The Accord was developed by participants at the first Inter-Congress of the World Archaeological Congress, which was held in Vermillion, South Dakota, USA in 1989. Entitled "Archaeological Ethics and the Treatment of the Dead," the Inter-Congress brought together more than 200 people from 20 countries, many of them Indigenous – including 50 Native Americans from 27 different nations and Indigenous delegates from Australia, Scandinavia, New Zealand, and Africa (Zimmerman 2002: 91). They had come together to discuss a matter of great (and continuing) concern to Indigenous groups – that the mortal remains of their dead were held in museums without the permission of their communities of origin and against their wishes, and that requests for their return were being met with refusal, at that time, from almost all holding institutions.

Many of these remains (and by far the majority that were housed in European institutions) had

been acquired in the nineteenth century for the purposes of racial science. Others, most notably in the previous "colonies," had also been gathered in more recent years for modern archaeological and physical anthropological study. Although little information was widely available in the 1980s, subsequent historical research driven by Indigenous concerns, revealed that collections were extensive, both in number and in terms of geographical region, and were to be located in museums (national, regional, and local), universities and private holdings both in their country of origin and internationally.

While history indicates that Indigenous groups had always been concerned at the removal of remains, opposed it when they could and had in a few known instances requested returns (Gunson 1974: 1, 84; Turnbull 2002; Fforde 2004: 61–75), the reburial issue came to the fore in the mid-1980s. A small number of significant returns had occurred prior to this date, but it was only in the 1980s that Indigenous concerns were made loud and clear to the archaeological, anthropological, and museum professions (Hubert 1989; Mulk 2009). By the time of the Inter-Congress, the reburial issue could be considered the single most important point of debate for these stakeholders: for Indigenous groups it raised deep concerns about the treatment of their dead, and for scientists and museum professionals it raised questions of profound significance about ethics, the future of research, and the role of museums (Layton 1989; Weatherall 1989; Watkins 2003; Turnbull & Pickering 2010).

As noted by US archaeologist Larry Zimmerman, who hosted and helped to organize the Inter-Congress, the Vermillion meeting was not the first cooperation between Native Americans and archaeologists on the issue of human remains (2002: 91). Nor was it the first time that the issue had been debated at an international level – this had occurred at the first meeting of WAC in Southampton, UK in 1986. Indeed, the decision to hold the Inter-Congress had been taken by the organizing committee at the 1986 meeting due to the presentations, discussion and debate about the issue brought to the Congress by its Indigenous participants (e.g., Hammil & Cruz 1989; Hubert 1989; Richardson 1989 and see Turner 1989). However, the Vermillion Inter-Congress was the first time that archaeologists and Indigenous people were "able to come to agreement on working toward real solutions" (Zimmerman 2002: 91), and the result was the Vermillion Accord.

Initial reaction to the Accord from the archaeological community was varied. The Society of American Archaeology disagreed with its contents, whereas the Canadian Archaeological Association and the Australian Archaeological Association adopted the Accord with some changes to reflect local circumstances (Zimmerman 2006: 89 and see Watkins et al. 1995 for a review of policies). Shortly after the Accord was adopted, and following two decades of lobbying by Native American groups, *The National Museum of the American Indian Act* (1989) followed by *The Native American Graves Protection and Repatriation Act* (1990) were made law in the USA. While these significant pieces of repatriation legislation should not be seen as a result of the Vermillion Accord, its adoption demonstrates clear awareness of the need to provide real solutions to the repatriation issue at that time, and it is legitimate to argue that it contributed to the passing of this legislation. WAC continued to develop policy in this area, adopting its Code of Ethics on Members Obligations to Indigenous Peoples in 1990, and the Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects in 2006.

The Vermillion Accord was adopted at the end of a decade which had witnessed considerable efforts by Indigenous communities to seek the return of their dead, had resulted in a small number of returns to communities, and demonstrated that some archaeologists had begun to change their stance around retention. Throughout the 1990s, countries with Indigenous claimants moved to develop pro-repatriation policies, but in Europe only a small number of museums agreed to return remains, and these were almost all from the UK. Changes gathered pace in the 2000s, with more remains returned to Australia and some to New Zealand and North America, including from many UK institutions that had steadfastly refused requests in previous decades.

While the reburial debate was (and in some areas continues to be) deeply divisive (see Hubert 1992; Jones & Harris 1998; Mulk 2009), both within the scientific profession and between scientists and Indigenous groups, the Vermillion Accord was an early signal not only that scientists and Indigenous groups could come to agreement, but also that polarized arguments suggesting that, for example, Indigenous groups were "antiscience" or that all scientists shared the same views, were not the reality. Fundamentally, the Accord may be seen as an early signal of the opening up of dialogue between Indigenous groups and those professions which seek to study their past, the beginning of the ceding of exclusive control by the latter and the emergence of the development of collaborative partnerships around cultural heritage (Zimmerman et al. 2003; Phillips & Allen 2010; Turnbull 2010). It can also be viewed as an example of the significant role that the World Archaeological Congress has played in this shift.

Cross-References

- ▶ Australia: Indigenous Cultural Property Return
- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Human Remains in Museums
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Peoples, Working with and for
- ▶ Kennewick Man Case: Scientific Studies and Legal Issues
- ▶ Media and Archaeology
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Sacred Site Conservation and Preservation
- ▶ Society for American Archaeology (SAA)
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC): First Code of Ethics
- ▶ Zimmerman, Larry J.

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Vermillion Accord on Human Remains (1989) (Legislation)

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Introduction

The World Archaeological Congress (WAC) adopted the Vermillion Accord on Human Remains at its first Inter-Congress, held at Vermillion, South Dakota, in September 1989. The Accord comprises six principles that have since greatly influenced debates and the formulation of ethical policies in respect of scientific use of human remains by archaeologists and researchers in cognate disciplines.

Definition

The first four principles of the Accord commit WAC members to observe and advocate the following:

1. Respect for the mortal remains of the dead shall be accorded to all, irrespective of origin, race, religion, nationality, custom, and tradition.
2. Respect for the wishes of the dead concerning disposition shall be accorded whenever possible, reasonable, and lawful, when they are known or can be reasonably inferred.
3. Respect for the wishes of the local community and of relatives or guardians of the dead shall be accorded whenever possible, reasonable, and lawful.
4. Respect for the scientific research value of skeletal, mummified, and other human remains (including fossil hominids) shall be accorded when such value is demonstrated to exist.

   The Accord further specifies that:

5. Agreement on the disposition of fossil, skeletal, mummified, and other remains shall be reached by negotiation on the basis of mutual respect for the legitimate concerns of communities for the proper disposition of their ancestors as well as the legitimate concerns of science and education.
6. The express recognition that the concerns of various ethnic groups as well as those of science are legitimate and to be respected will permit acceptable agreements to be reached and honored.

Key Issues

The Accord was drafted by members of WAC and representatives of indigenous communities wanting to find common ground after a decade of organized, vigorous campaigning – notably by North American Indians and Australian Aboriginal people – to put an end to the unrestricted exhumation, study, and keeping by museums, universities, and other scientific institutions of indigenous skeletal remains and grave goods. Discussions at Vermillion further brought to light evidence that North American, Australian, and European museums and medical school collections included bones and soft tissue structures from the bodies of indigenous people killed during the nineteenth century in frontier clashes with settlers, police, or military personnel.

In adopting the Accord, WAC committed its members to respect the rights of the dead to burial

in accordance with ancestral or contemporary religious beliefs and practices and to recognize the rights of those with familial, communal, or cultural obligations to care for the dead to do so without hindrance or constraint. At the same time, by the Accord, WAC formally declared its commitment to promoting the scientific study of human remains for the benefit of all humanity.

What was most significant about the adoption of the Accord was that it affirmed the importance of recognizing the value of research on human remains but did so after emphasizing the need to respect the wishes of those with not just familial but obligations of "guardianship" to the dead. WAC members unanimously agreed that only by scientists respecting the continuing rights of indigenous people to treat remains in accordance with their religious or cultural beliefs, would they gain sufficient moral standing to try and convince those with affinities to the dead to permit remains to be used for research.

This was a major step beyond how archaeological and other research communities had previously responded to increasingly determined campaigning by indigenous people for ownership and control of the fate of remains. Up until this time, researchers and museum curators were in general ready to agree to surrender for reburial the remains of known individuals, but publically affirmed their opposition to the reburial or cremation of all other remains on the grounds that this would deny science evidence of potentially great value in producing new knowledge of our species' evolutionary development.

On the face of it, the principles set out in the Accord appear to stand at odds on the fundamental issue of recognizing that both researchers and indigenous people have legitimate concerns in respect of the dead. Indigenous intellectuals and postcolonial scholars have argued that justifying preservation and unrestricted research on remains on the grounds of potentially producing new knowledge of benefit to all humankind, or people sharing a common genetic ancestry, risks promoting the interests and ambitions of scientific practitioners over the religious beliefs and cultural traditions of peoples who, in many instances, continue to struggle to overcome the ingrained psychic and material legacies of colonialism. Researchers with interests in human remains have countered that recognizing culturally based claims of rights to determine the fate of human remains risks losing our means of gaining new insights into our evolutionary history or possibly understanding the causes of disease in specific populations. The most strident opposition to returning remains to the care of indigenous communities came from scientists who believed that they were defending the heritage of humankind against "indigenous creationists."

In practice, however, the Accord has contributed greatly to the development of new and mutually beneficial relations between indigenous communities with affinities to remains, research communities, and museums. Its principles have been adopted by or greatly influenced thinking about the ethics of research on human remains within government circles, international and national scientific societies, and the museum sector. The Accord was used in the early 1990s by several Australian State Governments as the basis for developing new policies in regard to Aboriginal and Torres Strait Islander human remains. In 1991 the Council of Australian Museum Directors (CAMD) drafted a new national policy for museums and Aboriginal Australian people. In regard to human remains, CAMD endorsed the Vermillion principles, reasoning that they would permit acceptable agreements to be reached and honored. Since then, the Accord has informed discussions among museum professionals in many countries worldwide, similarly resulting in the adoption of new policies and practices governing the keeping, or surrender to community claimants' ownership and control, of human remains and cultural property of profound significance.

The Vermillion principles were incorporated within WAC's 1990 Code of Ethics and used in 2006 in developing the Tamaki Makau-rau Accord, which addresses the sensitive issue of displaying human remains and sacred objects in museums and by other media. Moreover, the Code and Tamaki Makau-rau reflect an expansion of the Vermillion principles to recognize that communities with legitimate claims to remains

held in scientific collections may include, but are not limited to, ethnic, racial, religious, traditional, or indigenous groups of people.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation: Overview
- ▶ World Archaeological Congress (WAC): First Code of Ethics

Further Reading

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Vertebrate Taphonomy in Archaeological Research

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Introduction

Broadly applied, taphonomy is the study of what happens to objects after they leave the biosphere (living contexts), enter the lithosphere (buried contexts), and are subsequently recovered and studied. Taphonomy is of interest to any scientific discipline that investigates the buried record, including archaeology, paleobiology, paleontology, and soil sciences. Although the methodological framework of taphonomy can be applied to the study of practically any kind of material that was once buried, including ceramics and lithics, its archaeological application usually involves the study of preserved organic residues. Vertebrate taphonomy is further restricted to the study of preserved skeletal specimens that originate from a subphylum of animals who share a number of characteristics but importantly possess a living endoskeleton of cartilage and bone. These consist of specimens from zoological classes of living jawed vertebrates that are often recovered through archaeological excavation, including Chondrichthyes (cartilaginous fishes), Osteichthyes (bony fishes), Amphibia (amphibians), Reptilia (reptiles), Aves (birds), and Mammalia (mammals).

Definition

Taphonomy has been described as "the study of natural processes of preservation and destruction" (Behrensmeyer 1984: 558). Vertebrate taphonomists are interested in studying all of those processes that contributed to the preservation and/or destruction of bone specimens as they progress through successive, often nonlinear and recursive, stages from death through decomposition, burial, recovery, analysis, and curation. The recovered sample can display preserved evidence of these processes in the form of a taphonomic overprint. Taphonomists attempt to (1) identify the specific agents (physical cause of modification) that have contributed to preservation and destruction based on surviving clues (taphonomic effect, trace, or signature) in the archaeological record, (2) recognize how the recovered samples differ from the originally accumulated and deposited assemblages and evaluate the significance of differential preservation to subsequent interpretation, and (3) infer a relative chronology (taphonomic history) of taphonomic processes (dynamic actions of taphonomic agents) that have affected the assemblage (Behrensmeyer 1984; Lyman 1994).

Historical Background

Taphonomy is a neologism that was first introduced into the literature by Russian paleontologist Ivan A. Efremov. Derived from the

Greek *taphos* (burial) and *nomos* (law), taphonomy concerned "the study of the transition (in all its details) of organic remains from the biosphere into the lithosphere" (Efremov 1940). Although its name is of recent derivation, interest in the processes that form the buried record has a long history in archaeology, one which originates at least with the early nineteenth century curiosity surrounding the relationship between human artifacts and extinct Pleistocene mammals (Grayson 1986). In archaeology, taphonomic studies generated increasing attention during the latter half of the twentieth century and gained more recent momentum due to controversial interpretations about early hominid behavior that were inferred from associated bone assemblages (Binford 1981; Brain 1981). Today, vertebrate taphonomy has become such an essential tool in the analysis and interpretation of archaeofaunal assemblages that it is difficult to consider it as a separate aspect of study and anything other than a standard component of practice which is necessarily basic to all analyses of archaeological bone specimens.

Key Issues/Current Debates

Analysis of vertebrate specimens recovered from excavated archaeological contexts is generally used to establish inferences about past subsistence and ecological contexts. Preserved archaeofaunal assemblages are usually composed of two related subsets of bone specimens that were originally accumulated at the site of deposition: (1) intentionally by humans as by-products of subsistence and (2) by any number of agents that were either incidental to human activities or not. Both subsets can be used in paleoecological inference; however, subsistence inferences tend to emphasize the analysis of specimens that were intentionally accumulated and deposited by humans for subsistence purposes. Although intuitively obvious, it is important to emphasize that both subsets of archaeofaunal specimens in the recovered sample differ quantitatively and qualitatively from the target population of interest, the living organisms that were associated with any area or time of archaeological attention (Fig. 1). Specimens that were recovered from the context of archaeological interest were selectively accumulated and deposited by various human and nonhuman mechanisms. After their deposition, specimens were further affected by a potentially wide range of taphonomic processes that could have subsequently modified their spatial arrangement and/or qualitative and quantitative attributes before and after burial and prior to eventual recovery in archaeological excavation (Clarke & Kietzke 1967; Grayson 1981; Lyman 1987; Wilson 1988). Both subsets are important to archaeological interpretation; however, it is crucial to consider their relationship to the original target of interest and their relevance and reliability in terms of the questions that we ask and the answers that we seek. It is important to consider the potentially different taphonomic histories that formed the sample. Taphonomic evidence is potentially accessible through the study of traces or signatures that might have preserved in the recovered specimens and their associated depositional contexts. The recognition of signatures and their use in interpretation is established through middle range research which experientially examines and evaluates causes and their effects (Binford 1981).

Factors that contributed to these histories can include various processes involved in the perimortem and postmortem accumulation, deposition, dispersal, and destruction of the archaeofaunal assemblage, in addition to technical and methodological aspects involved in its archaeological recovery, analysis, identification, and curation. Although taphonomists search for clues in the study sample and associated archaeological contexts, they must remain ever mindful of pervasive equifinality (similar outcome produced by different events). Multiple effects may be produced by one process, similar effects may be produced by different processes, or observable effects may be obscured through subsequent assemblage formation.

Perimortem Assemblage Accumulation and Deposition

Most vertebrate archaeofaunal assemblages were originally accumulated and deposited through varying processes, and because of the different

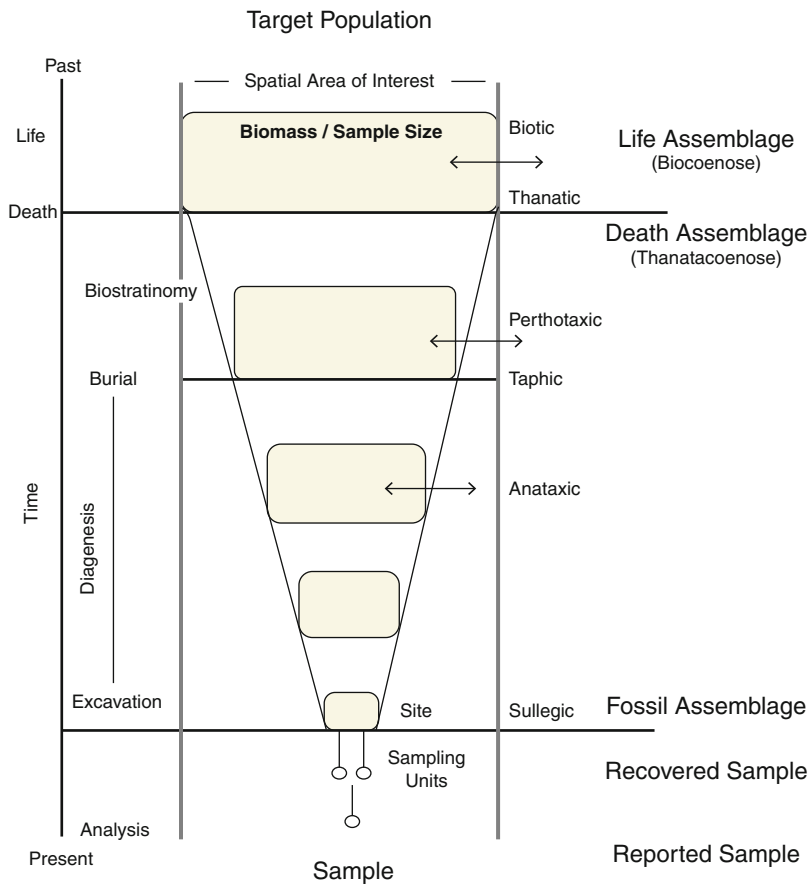

Vertebrate Taphonomy in Archaeological Research, Fig. 1 Schematic taphonomic framework emphasizing the relationship between a recovered and analyzed archaeological sample and the archaeologist's target population of interest

questions asked by archaeologists, it is important to distinguish between the different taphonomic histories represented in the sample. Specimens of animals that were selectively accumulated by humans for subsistence purposes can contribute to paleoecological inferences; however, these are relevant to conditions in areas from which they were selectively procured and subsequently transported. Specimens whose accumulation was incidental to human consumption can provide information about ecological conditions in and around the immediate area of deposition. They may represent the preserved specimens of animals that were deposited at the time of human occupation, or they may embody evidence of later intrusion into site contexts. These specimens often consist of bones from smaller anthropic (associated with humans) taxa, like rodents that are generally treated as nuisance rather than prey items. While alive, they thrive in the conditions that are created in and around human activity, and after death their skeletons can be subsequently incorporated into the immediate sedimentary record through accidental entrapment, fire, flood, or natural death in underground burrows. Relevant signatures can be identified in preserved specimens and their associated contexts. High concentrations of anatomically complete skeletons with relatively, little perimortem damage, and relatively intact anatomical articulation can suggest accidental in situ death and subsequent decay. Pale surface coloration of preserved bone specimens that contrasts with otherwise soil-stained assemblages might suggest intrusion. Associated contextual information as visible krotovinas (soil-filled burrows) or vertical/spatial association with features that inhibit escape can be crucial for establishing the mechanism of

accumulation, as can the ecological and biological characteristics of the identified taxa (Stahl 1996). Bone specimens can be accumulated, modified, and subsequently deposited as prey items by human and nonhuman predators. Prey taxa can be identified through digested bone specimens deposited in scats and pellets, whereas predators can be identified through modifications that occurred during capture, consumption, and digestion. Signature criteria are established through actualistic study and consist of corroborating evidence like tooth marks, acid etching, patterned bone fragmentation, skeletal element representation, adhering scat material, archaeological context, and ecological information (Andrews 1990; Stahl 1996). Regardless of which predator accumulated and deposited them, preserved prey specimens can provide information on ecological conditions. Carnivores, and especially domestic dogs when present, can accumulate, modify, spatially rearrange, and deposit bones that can subsequently be incorporated into the archaeological record. In particular, tooth mark morphology, frequency, orientation, and patterning on preserved bone specimens are compared to results from actualistic studies and used to establish their involvement in assemblage formation (Binford 1981; Brain 1981).

Bones that were accumulated, modified, and deposited by humans for subsistence purposes are often identified by similar criteria, including patterned bone breakage, tooth marks, and carcass disarticulation; however, a wider range of potential data are implicated primarily because of the highly varied nature of cultural consumption. Butchery scars produced by tools are noted for their location, orientation, and morphology, yet these are often rare. Interpretations based solely on patterned breakage and disarticulation are especially prone to equifinality as these forms of alteration are often guided by anatomical rather than predator-specific variables (Hill 1979; Lyman 1987b). Archaeologists record the extent and anatomical location of discoloration on bone surfaces that have been exposed to heat as important evidence for human consumption. Bone discoloration can be compared with results from actualistically derived studies that associate color with temperature in order to assess the degree of exposure to heat (Shipman et al. 1984). However, bone discoloration is not necessarily a product of cooking, as many cooking techniques leave no trace of direct heat modification. Discoloration of bone is more often than not the result of intentional disposal or use as fuel. Sometimes bones used as tools can substantiate human use, as can archaeological context. In any case, the strength of the inference is increased through using multiple lines of evidence.

Postmortem Accumulation, Dispersal, and Destruction

A wide variety of processes can affect the quantitative and qualitative structure of the deposited assemblage prior to burial. Water movement can alternately modify, spatially arrange, winnow, and accumulate bone assemblages. Different velocities and sediment substrates are implicated in the size, shape, and density sorting of bone specimens, particularly those from smaller skeletons which are prone to movement at even low hydrodynamic velocity. Evidence for water movement can be found in patterned spatial orientation of bone specimens, surface modifications, and analysis of sediment matrix (Voorhies 1969; Behrensmeyer 1975). Deposited bone specimens can be subsequently modified or completely removed by animals for mineral consumption and dental maintenance, sometimes leaving visible clues that can lead to the identification of the modifier. Exposed bone that is trampled can produce breakage, surface modification, and size-sorted horizontal and vertical spatial movement. Exposed bone can become weathered over time, and the extent of bleaching, cracking, exfoliation, and disintegration can be used to assess the duration of exposure, ambient preburial environments, sequential burial and reexposure, and attritional and catastrophic accumulation (Behrensmeyer 1975). Bone assemblages continue to be altered after burial and during diagenesis through chemical dissolution as the physical properties of the buried bone complexly interact with ambient matrix conditions. Burial environments can also substitute or

add to buried bone materials and contribute to breakage or vertical and spatial movement through mechanical pressure. Diagenetic modifications are inferred from comparisons with actualistic studies by means of chemical assays, fracture morphology, coloration, surface changes, conjoinability, and archaeological context (Hedges 2002).

Archaeological Recovery, Analysis, Identification, and Curation

Prior to excavation and recovery of archaeofaunal assemblages, the factors that contributed to the unique taphonomic histories of preserved specimens are outside of the archaeologist's purview. However, the different techniques and screen aperture sizes used in field recovery can strongly affect the qualitative and quantitative characteristics of the studied sample. This can, in turn, affect counting statistics and estimations of assemblage diversity. Increasingly meticulous recovery using fine aperture mesh or water flotation augments the recovery of smaller items which can skew assemblage composition toward domination by smaller specimens. The latter can affect assemblage characteristics by increasing the proportion of smaller animals or indeterminately identified specimens that cannot be reliably identified because they are too small. These factors also implicate the differential fragmentation of specimens, a process which can continue during recovery, and subsequent processing and handling. Fragmentation is relevant to analysis and interpretation only if it preceded recovery and can be accordingly identified by coloration of recent fracture surfaces. Correction factors, comparison of retrieved samples with known recovery results, and actualistically derived affects of differing screen apertures (Schaffer & Sanchez 1994) can be used to assess recovery-related influences. Other evidence for understanding assemblage accumulation and deposition is observed in archaeological contexts during field excavation, including skeletal articulation, intrusion, and spatial/vertical association in feature contexts. Specimen identification is also affected by taphonomic history as denser elements, or portions thereof, are differentially resistant to fragmentation and often preserve with enhanced diagnostic potential. Conversely, differential fragmentation can also obscure identification, as when preserved specimens are too small to be reliably identified. Often, preserved specimens of small-bodied animals may be large enough for identification, whereas large-bodied animals can yield larger indeterminate fragments (Watson 1979). The qualitative and quantitative structure of the sample, how representative it is of the target of interest, and its overall utility for answering research questions are direct outcomes of identification.

Equifinality

Equifinality often confounds interpretations of taphonomic histories and evaluations of the relationship between sample and target assemblages using criteria derived from actualistic studies in middle range research. One taphonomic process may produce different preserved effects. Different taphonomic processes may produce the same preserved effect. Taphonomic processes may produce no preserved effect, or preserved evidence that was available at one point in a taphonomic history may have been subsequently obscured by a later process. Bone destruction and preservation, as defining features of taphonomy, are strongly mediated by the differential structural density of osseous tissue within skeletal elements. Relatively fragile portions of elements are more prone to destruction; relatively harder portions are more prone to preservation. Many different taphonomic processes are implicated as ultimate causal factors that can contribute to differential bone destruction, whereas the proximate causal factor is bone structural density. Taphonomists compare differential bone preservation to experimentally derived structural density values from different portions of the vertebrate skeleton in order to assess whether or not survivorship was influenced by attritional forces whose effects were mediated by differential bone structural density. The procedure can be used as a first-order approximation for exploring assemblage survivorship; however, observations from the recovered

specimens and their archaeological context are used to uncover evidence for the ultimate causes behind assemblage preservation. The likelihood that the assessment is a correct one is strengthened through the use of multiple, corroborating lines of evidence (Brain 1981; Lyman 1994).

Subsistence Interpretation

Interpretations pertaining to human subsistence are more reliably derived from the analysis of bones that were originally accumulated and deposited by humans for their consumption. However, the quantitative and qualitative structure of the recovered sample is never isomorphic with the target assemblage. Fluctuations in the basic counting statistic (NISP or Number of Identified Specimens) are affected by various taphonomic processes involved in differential fragmentation, preservation, and recovery (Grayson 1981). Archaeological data are used to identify the kinds of animals that were exploited in the past, which sexes or ages were preferred, and when, where, and how they were procured, processed, and consumed. However, because the exact quantitative relationship between sample and target assemblages can never be known, it is usually difficult to establish anything more than a rough estimate of relative contribution to human subsistence.

Paleoecological Interpretation

Inferential logic in paleoecological study relies on contemporary observations of living organisms. It links existing ecological relationships among analogous living organism with animals identified in the recovered sample that were accumulated and deposited at some earlier period and place of archaeological interest. Findley (1964) previously identified four important problems that are immediately relevant to paleoecological inference building: (1) although the ability to identify animals varies between different elements in different skeletons and can be obscured by taphonomic processes, paleoecological inferences require high-resolution identifications; (2) even where high-resolution identifications are possible, available ecological data may be poorly known; (3) many animals are widely distributed and broadly tolerant of a wide range of ecological conditions; thus, greater emphasis is placed on specific animals that tolerate only a narrow range of conditions; and (4) the relationship between an animal and its not static and can change through time. The quantitative relationship between sample and target assemblages is never isomorphic, and the exact significance of taxonomic abundances in the sample is difficult to determine. Therefore, interpretations that are based on treating identified taxa as variables have a higher likelihood of being incorrect. Treating identified taxa as attributes is the only currently acceptable approach to paleoenvironmental analysis. Interpretation based on presence and absence, with asymmetrical emphasis on the former over the latter, greatly reduces the chances of inappropriate conclusions. Attribute-level treatment is still vulnerable to problems associated with analogical reasoning and to obstacles created during taphonomic history; however, these problems can be mitigated through reconstructing communities of associated vertebrates. Multiple concordance within an identified suite of taxa overcomes problems associated with archaeological resolution and long-distance transport and strengthens the analogy because the niche of the entire community is narrower than that of any individual component. The possibility that all members of the entire community were affected in the same direction and to the same magnitude is far less than the same possibility affecting only one member of the community (Grayson 1981). The validity of inferences based on the recovered vertebrate sample can be further corroborated with other associated archaeological data.

Cross-References

- ▶ Bone Density Studies in Environmental Archaeology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Experimental Maritime Archaeology
- ▶ Middle-Range Theory in Archaeology

▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
▶ Site Formation Processes
▶ Skeletal Biology: Definition
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Vestígios, Revista Latino-Americana de Arqueologia Histórica

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Basic Information

Latin-American Historical Archaeology has been established as a field of study in the last few decades. Although the scope of research among its scholars is diverse, there are some specific issues that have attracted special attention. Among these, theoretical production and the formulation and development of alternative approaches to those produced in the centers of power can be highlighted.

Unfortunately, despite the growth and the variety of research being carried out in

Latin-American Historical Archaeology, it still lacks the adequate amount of channels of exchange among scholars from different countries. In this sense, investigations have been restricted to the boundaries of researchers' own countries. These artificial constraints have resulted in the creation of difficulties in the search for commonalities that would allow the consolidation of a Latin-American Historical Archaeology.

Major Impact

It is possible to state that the establishment of connections between the archaeologies of different countries has become one of the greatest challenges being faced at the contemporary setting. The presence of pluralistic spaces of discussion is essential in approaching issues such as the genesis of modern society in Latin America and the historical connections that help to reconstruct regional social practices, in the contexts in which they occurred, through the study of material culture.

Vestígios, Latin-American Historical Archaeology Journal, intends to create this space of exchange and interaction among scholars of the discipline. The Journal was implemented in 2007 with a solid criterion of excellence – through peer reviews – and an international board of archaeologists such as Mary Beaudry, Randall McGuire, Stanley South, Matthew Johnson, Kathleen Deagan, Pedro Funari, Tania Andrade, among others. The Journal is particularly interested in method and theory as well as in different case studies from Latin-American Historical Archaeology.

The Journal presents two annual issues, with original papers, and the translation of a classic article (either in English or other languages) to Spanish or Portuguese (the official languages of the Journal).

The Journal is published by the Laboratório de Arqueologia da Faculdade de Filosofia e Ciências Humanas da Universidade Federal de Minas Gerais (Archaeological Lab of the Philosophy and Human Sciences College from the Federal University of Minas Gerais), and it has been funded by different agencies such as CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico), FAPEMIG (Fundação de Amparo à Pesquisa do Estado de Minas Gerais), and CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior).

Vestígios is available online (http://www.fafich.ufmg.br/vestigios/), free to read and download.

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Veth, Peter M.

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Basic Biographical Information

For over 30 years, the research and works of Peter Veth (Fig. 1) have become synonymous with the prehistory of the Western Desert of Australia. Along with researchers such as Prof. Mike

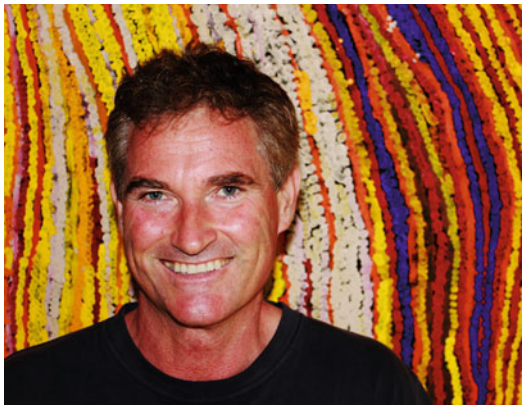

Veth, Peter M., Fig. 1 Photo of Peter Veth

Smith and Prof. Peter Hiscock, Peter has been at the forefront of Australian archaeological debate since the 1980s. He is probably best known for his conceptual model, *Islands in the Interior*, which explored prehistoric hunter-gatherer colonization models, the response of people to climatic fluctuations such as during the Last Glacial Maximum, and more broadly the innate dynamism and resilience of desert hunter-gatherers (see below). More recently, Peter's interests have included global models for the emergence of desert societies, colonization timing and mechanisms in Australia, exploration and analysis of rock art across the arid zone, Native Title processes and investigations, and theoretical and methodological innovations in maritime archaeology. Peter has carried out major research programs in Maluku Province (eastern Indonesia), in East Timor, and in the remote Pacific. Peter has also been heavily involved in consulting archaeology in Western Australia and other parts of Australia; he remains one of the longest serving presidents of the Australian Association of Consulting Archaeologists Inc.

Peter gained an interest in the Western Desert early in his career following a 6-week survey of Sturt Creek and Lake Gregory with Charles Amsden (a Doctoral graduand of Lewis Binford). In 1982, he completed his B.A. (Hons) thesis at the University of Western Australia (UWA) focussing on quarry and open sites on the Burrup Peninsula (Murujuga). Peter's Ph.D. (and subsequent work) undertook the first systematic investigation of the Little and Great Sandy Deserts of the Western Desert. His Ph.D. thesis used both surface analysis and excavation of key sites (Yulpul, Karlamilya, Winakurinjuna, Jalpiyari) around the Durba Hills and Rudall River to explore arid zone behavior and ultimately develop the *Islands in the Interior* model. He works closely with the *Martu* peoples – the last hunter-gatherers in the world to come in to contact with Europeans as late as 1963 and 1976.

The *Islands in the Interior* model emphasized the importance of persistent water sources and the abundance of economic plant resources in piedmont/montane uplands and riverine/gorge systems as refugia in periods of climatic extremes, the three major sand-ridge deserts as barriers, and the rest of the continent as temporary barriers to occupation during the height of the Last Glacial Maximum (see Figure 4 in the entry on ▶ Australian Deserts: Extreme Environments in Archaeology). Despite being based on the first archaeological data retrieved from this area, this model has proved to be robust since its inception and still forms the framework for prehistoric arid zone behavior through climatic extremes today. Peter's doctoral work incorporating this model was the first Australian archaeology thesis to be published internationally (University of Michigan Ann Arbor International Monograph Series) in 1993.

Following his postdoctoral research Peter obtained a position at James Cook University (JCU) as a lecturer in 1992. Peter remained at JCU for the next 11 years, being promoted to associate professor in 1997. During this time, he implemented Australia's first maritime archaeology undergraduate stream with Flinders University (and supervised the first doctoral candidates in that discipline); shifted his research focus toward the islands of the Indonesian archipelago with Prof. Matthew Spriggs and Prof. Sue O'Connor, including the first scientific investigation of the Aru Islands and East Timor and the discovery of Pleistocene-dated shell fish hooks at Lene Hara Cave, East Timor, with Sue O'Connor; and had increasing interest across the Torres Strait Islands

with Dr. Melissa Carter who discovered and dated the first prehistoric pottery in Torres Strait. Peter's interest and research, however, continued in the arid zone, and he undertook several important investigations and discoveries during this time, including his excavations (with O'Connor) at Serpent's Glen rockshelter in the Carnarvon Ranges, which still represents the earliest evidence of human occupation (>23,500 BP) in the Western Deserts; the excavations (with Mike Smith and Michael Hadley) of Kaalpi rockshelter in the Calvert Ranges allowing further investigation of late-Holocene populations in the heart of the Great Sandy Desert; and the characterization of arid coastal occupation and exploitation across the Montebello Islands off the Pilbara coastline. Here occupation has been dated to at least 30,000 years ago.

Between 2005 and 2010 Peter co-discovered the earliest occupation in the Kimberley (between 45,000 and 50,000 BP) at *Parnkupirti* on the shores of Lake Gregory and codirected the first systematic survey and investigation of the rock art, archaeology, and dreaming narratives of the 1,800-km-long Canning Stock Route with Professor Jo McDonald and colleagues. He has carried out the first dating of pigment art from the arid zone of Australia with Jo McDonald and colleagues in the US.

In 2011, Peter moved back to UWA and continues to excel. He has recently been awarded the Inaugural Kimberley Foundation Ian Potter Chair in Rock Art, a Winthrop Chair; received the Australian Research Council (ARC) Discovery Outstanding Researcher Award (Professorial Level 3) – one of the first archaeologists to do so; obtained the largest ARC Discovery Project grant in Australia for the archaeological investigation of Barrow Island off the Pilbara coastline; and is the series consultant on the upcoming ABC Television series on archaeology and indigenous heritage, *First Footprints*. He is currently also the lead chief investigator of the ARC Linkage Grant *The Australian Historic Shipwreck Protection Project* focusing on the archaeological study and in situ reburial of the colonial trader Clarence (1841–1850).

Major Accomplishments

Peter's pioneering and collaborative research has addressed a number of themes in archaeology, including (a) the first global review of the archaeology of desert hunter-gatherers; (b) theorizing information exchange in the archaeology of the deserts; (c) analyzing the role of art and aggregation cycles; (d) articulating mobility models for the Pleistocene and late Holocene; (e) examining the archaeology of desert-coastal occupations; (f) critiquing Neo-Marxist and ecological models for change in desert societies; (g) examining the adaptive role of specialized technologies in the deserts, such as the tula adze; (h) modeling for mobility and assemblage variation in the deserts; (i) progressing studies of linguistic stratigraphy and archaeology; (j) establishing early occupation of the Western Desert; (k) examining the relationship between language boundaries and art style provinces; (l) the first direct dating of pigment art in the arid zone; (m) use of ArcGIS web-enabled DBs for the management of complex and remote sites in the Western Desert; (n) the archaeology of Pleistocene hunter-gatherers on islands within the arid zone; and (o) a paradigm shift in the accepted dynamism of Australian desert hunter-gatherer societies both through time and in space. His distinguished contributions were recognized in his election as a fellow of the Australian Academy of the Humanities in 2005 and five other fellowships and major awards for research excellence since 1992.

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Vicus

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Introduction

The study of the Roman *vicus* involves a wide-ranging consideration of local neighborhoods in both urban and rural contexts. The *vicus* defined the political, administrative, and religious subdivision of Roman settlements. At the same time, such an investigation reveals the framework, articulation, and character of local, everyday life. *Vici* were the basic building blocks of the Roman community.

Definition

Vicus (plural *vici*) is a Latin term that refers to a variety of small settlements, whether in town or in the countryside, in Rome or in Roman territory, or elsewhere. It has been related to the Greek *oikos* (house), but its meaning is closer to *amphodon* (street), *kome* (village), or to the Oscan *eituns* (neighborhood). Like many Latin words, this (seemingly technical) designation has a variety of overlapping and contrasting uses. Much controversy among scholars has resulted, with the debate recently becoming more polarized. Evoking both "house" and "street," *vicus* basically refers to a group of residential buildings around a street, which can be termed a "neighborhood" or "ward" inside a city or a "village" in the countryside. The street itself is seen as a unifier of the local inhabitants and a place for their shared life.

Historical Background

In Rome, *vicus* is the most commonly used name for "street" or "lane," the alternative being *clivus*,

which refers specifically to a road on a hillside ("incline"). There were only four roads called *via* inside the city of Rome (*Appia*, *Sacra*, *Nova*, *Lata*). We are not informed of the size of the various *vici* in Rome (although some in the countryside were certainly very modest groups of houses: Tarpin 2008). As a result, the *vicus* has often been classified as the smallest urban unit recognized by Roman administrators. The landscape of the city changed radically through time so that the number of *vici* was constantly evolving (e.g., after the great fires of 64, 69, and 80 CE).

The names of the *vici* are varied and are commonly taken from a local ethnicity (*Vicus Tuscus* "Etruscan street"), a geographical feature (*Vicus Jugarius* "Yoke street"), a locally practiced trade (*Vicus Argentarius* "Street of the Bankers"), or a local deity (*Vicus Dianae* "Diana's street"). Steinby 1993–2000 has entries for each named *vicus* we know of in Rome. The term *vicus* can often (but need not) have an administrative or judicial meaning, as is explained in a famous definition of Festus (502, 508L with Todisco 2006), who noted the wide range of competencies enjoyed by different *vici*, especially outside town.

Vicus is a term that is related to other geographical units, notably the *pagus* ("country district"), the *mons* ("hill"), and the *regio* ("region"). However, *vici* also existed in relation to the urban fabric as a whole (*urbs*, *municipium*, *colonia*), as well as to the city's ritual boundary (*pomerium*). In some cases, such as in Imperial Rome, the *vicus* was clearly an official subdivision of a designated larger urban district (*regio*). Some information about *vici* also comes from the fragments of the early third century CE Severan Marble Plan of Rome (http://formaurbis.stanford.edu/). During the republican period, the *vici* of Rome apparently overlapped and competed with *pagi* and *montes* in town, while their relationship to the four republican city *regiones* is not directly attested. The republican *vici* also had relationships with the voting tribes. It is notable that extant indications of addresses given in ancient texts and inscriptions nearly all cite only a *vicus* (Castrén 2000). Once you were in the neighborhood, you could easily ask for the particular house or shop you were seeking.

The *vici* were administered by officials called *vici magistri* (or *vicomagistri*), locally elected each year, who were assisted by *ministri*. These local magistrates organized the annual festival of *Compitalia*, which was the main local holiday, a movable neighborhood feast in late December or early January (eventually fixed at 3rd to 5th of January). The *Compitalia* was celebrated with an animal sacrifice, a banquet for all, and games (*ludi*) that could include theatrical productions. On this occasion (and perhaps for other official functions), the *vicomagistri* wore the purple-bordered toga of a magistrate of the Roman people and were accompanied by a *lictor* (attendant with rods and axes). The *vicomagistri* we know of were of humble origin, most of them being freedmen. The *ministri* were nearly all slaves.

The life of the *vici* centered around local shrines (*compita*), most often located at crossroads where two or three roads converged (Varro *de lingua latina* 6.25). These shrines, in honor of the local deities called *lares compitales*, could be simple altars or small sanctuaries according to the size and resources of the *vicus* (Marcattili 2005; Steinby 1993-2000: the few named examples bear the names of local families, unlike the *vici*). The land the shrines stood on was consecrated and marked off from its surroundings. Other gods could be added to the cult of the *lares* and would share with them in protecting the neighborhood. Meanwhile, the nature of the *lares* as deities has been hotly disputed for over a century. Their shrines received private cult on a regular (perhaps daily) basis and public recognition on the local festival of *Compitalia*. Augustus added two more public holidays for the local *lares* (Suetonius *Divus Augustus* 31).

Most scholars tend simply to equate the compital shrine with the *vicus*, thus assuming one designated shrine in each neighborhood. Such an exact equivalency is not, however, directly indicated by ancient writers, many of whom still speak of the compital shrines separately without mentioning *vici* even in the Imperial period (e.g., Pliny *HN*3.66 re. 73 CE). There has been debate about whether an official neighborhood shrine should typically have been located at the middle or on the boundary of the individual *vicus*. Some annual rituals (*lustratio*) were

designed to mark off the boundaries of the *vicus* (although these boundaries are now lost to us). A *vicus* could also contain other street shrines, but these are much less amply documented than the compital shrines of the *lares*. Compital cult, practiced by Italian merchants and their households, is attested on Delos in the second century BCE, when the island was administered by Athens and, therefore, had no *vici* (Hasenohr 2003). It should be noted that the *vicus* is consistently represented as much in terms of local shrines and festivals as in terms of administration or judicial competency. At the same time, the many aspects of the *vicus* (political, religious, social, economic) were designed to affirm identity and local community, whether more or less in connection to other geographical and administrative entities.

Vici and their associated shrines could also be found in diverse patterns across Italy and in the provinces of the Western Empire (Capogrossi Colognesi 2002; Tarpin 2002). Some cities in Italy had *vici* during the republican period, presumably in imitation of Rome (e.g., Capua, Minturnae). A *vicus* outside Rome could, however, indicate either a new settlement or a local village that had been appropriated by the Roman administration or even an indigenous settlement that chose voluntarily to represent itself in Roman terms. The traditional notion that *vici* were always subdivisions of *pagi* in the countryside has recently been challenged by Stek (2009). He has argued that there was no regular hierarchical connection between these two types of administrative units and that *vici* and *pagi* were unevenly distributed across Italy during the republican period. Stek's main proposition is that the Romans spread their culture in Italy through local cults and administrative units, which were often superimposed onto older patterns of settlement and existing rural shrines.

The *vici* of Rome had a long and evolving history, as the city grew over the centuries from a handful of very modest settlements to become the dominant metropolis of the Mediterranean, with a population of over a million people (Tarpin 2002, 2008). It is possible that *vici* existed as/in the villages that predated the foundation of the city (traditional date 753 BCE). On the other hand, Dionysius of Halicarnassus (4.14.3-4, 5.2.2; writing in the early years of Augustus' principate) records a tradition that assigns the creation of *vici* and the neighborhood cult of the *lares* to (legendary) King Servius Tullius, in the context of a systematic urban reform (sixth century BCE, Pliny *HN* 36.204). While the origins of the *vici* remain obscure, they contained elements that were increasingly formalized side by side with patterns of local life that evolved organically at a grassroots level.

Key Issues/Current Debates

There has been a lively debate over more than 20 years concerning the role of the *vici* during the republican period. It has been argued that the *vici* had very little in the way of any formal administrative function before the time of Augustus (Wallace-Hadrill 2003; Fraschetti 2005). According to this argument, the subdivisions of the larger *regiones* (4 before Augustus' reform) were mainly *pagi* (with their annual festival of the *Paganalia*) and *montes* (with their annual festival of the *Septimontium*). Alternatively, the 27 shrines of the Argei may have marked the local areas of this traditional republican city (Rodríguez Almeida 2002). On this view, Augustus would appear as a truly radical reformer, who gave obscure local entities a completely new and central role in his reorganization of the city.

There is, however, ample evidence of the existence of *vici* and of their compital cults in Rome before Augustus from a variety of sources beginning in the third century BCE. Accordingly, the competing view would see republican *vici* as vital political units as early as the later third century, when local distributions of wine and oil are already attested during the war against Hannibal (Tarpin 2002; Lott 2004). The existence of the ancient Latin term *vicatim* ("by vicus" Sisenna fr. 47) provides further evidence for communication from the political center expressed explicitly in terms of *vici*. Such *vici* are thought already to have been administered by freedmen *vicomagistri* for centuries before Augustus. In other words, Augustus may merely have been systematizing a network of *vici* that had played an essential role in city administration for centuries.

The turbulent history of the *vici* in the last decades of republican government has been adduced by each side of this debate in favor of their own very distinct position. As more formal republican politics disintegrated, the *vici* emerged, both as tools of powerful popular politicians like Marius Gratidianus or Publius Clodius, and as vehicles for the expression of local political sentiments, often of anger and frustration (Flambard 1977, 1981). The violence of armed groups (sometimes referred to in English as "gangs"), which drew on recruits through local networks, had become a feature of city life by the year 100 BCE. The increasingly politicized celebration of *Compitalia* grew violent and was banned in 64 BCE, then revived and banned again in the 50s BCE by the senate, and banned yet again in the 40s by Julius Caesar as dictator. Scholars have interpreted all this political ferment either as a sign that the *vici* were already official urban districts with influential local magistrates or as evidence that politics had no official role to play in the republican *vici* and was essentially subversive and unsanctioned.

The long history of *vici* in Rome was decisively shaped by the Emperor Augustus' urban reforms, which were completed in 7 BCE (Lott 2004). Augustus reorganized the city of Rome, which had outgrown the old four *regiones* of the republican city, into 14 *regiones*, of which the official subdivisions were the *vici* (Suetonius *Divus Augustus* 30). He (re)established a pattern of four annually elected *vicomagistri* and four *ministri* for each *vicus*. These neighborhood magistrates were to be (almost all) freedmen and only very few attested names are of former slaves of the Imperial household. Augustus entrusted these local magistrates with new statues of the *lares*, now called *lares Augusti* ("Augustan *lares* = August/holy *lares*"), and perhaps the cult of his own divine essence (*genius Augusti*). The significance of these religious reforms has been much debated, since the nature of the *lares* themselves was under discussion by ancient writers and no ancient source gives any detailed interpretation of Augustus' innovations. There is no consensus as to whether the *lares Augusti* were the same deities with new names, or quite different from the earlier *lares compitales*. Moreover, there is some evidence for *lares Augusti* outside Rome before Augustus. Regardless of precise theological definitions, Augustus clearly undertook a major initiative to restore compital shrines, renew their cults, connect them with local *vici*, and ultimately to use the resulting network to communicate directly between himself and the most humble new citizens in the local neighborhoods of Rome. Many altars and inscriptions survive as evidence for this Augustan reform (Lott 2004 has an appendix). It is not clear whether Augustus initiated similar reforms in any other Roman city; many scholars have simply assumed this to be the case.

The *vici* marked the beginning of a new era on the first day of the new month named for the Emperor (August) in the year 7 BCE, which was to be the day when their magistrates took up their annual office. There is also evidence of Augustus giving gifts of statues of other divinities to individual *vici* from 10 BCE onward. Residents of *vici* gave small monetary offerings as gifts to the Emperor every 1st of January to mark the calendar New Year. The Emperor, in turn, would use this money to pay for gifts to local *vici* throughout the year. Augustus set the pattern for relationships of future Emperors with the *vici* in Rome, as is attested by the great base dedicated to the Emperor Hadrian by the *vici* of Rome in 136 CE (Tarpin 2002, R2 = *CIL* 6.31218). This inscription lists the largest number of names of *vici* known to us from any source.

In the present state of our knowledge, archaeology has only afforded glimpses of *vici*, most notably in Rome and in Pompeii (Van Andringa 2000). Meanwhile, there are real risks in combining ancient evidence from different places and time periods into any kind of general synthesis; the search for a single definition of an ideal *vicus* has tended to hamper progress.

We are on firmer ground in discussing the functions of the *vici* in Rome. The *vici* were traditionally connected to a variety of lists of inhabitants, which were kept quite separately from the official census taken by the republican censors. From early times, the *Compitalia* celebration had included the hanging of woolen dolls and balls at the crossroads, with each doll

representing a free inhabitant and each ball a slave (Festus 273L; Macrobius *Saturnalia* 1.7.34). In other words, everyone was counted. This early form of inventory was supplemented by the lists of local inhabitants kept by owners of buildings, which may also have been posted. Such lists of local people were used as the basis of *vicatim* distributions of goods. The distribution of grain, whether free or at subsidized prices, was initiated by Gaius Gracchus in 121 BCE and evolved over time into a regular system. Julius Caesar initiated a new type of census based on the local *vici* (Lo Cascio 2008). This network of local knowledge was used to constitute what became a privileged class, known as the *plebs frumentaria* ("the people entitled to the grain dole"). In this way, the *vici* served as the basis for the grain dole, even as the list of recipients came to be identified as the true Roman people (Virlouvet 2009).

Similarly, the provision of drinking water at public fountains, protection against fires, and local law and order in the streets were all delegated, at their lowest level, to responsible parties in the *vici*. Augustus continued to draw on this local expertise and manpower, even as he introduced greater systemization into each of these administrative areas. In 6 CE, the *vigiles*, a large professional fire brigade composed of freedmen, was established in separate barracks throughout the city (Sablayrolles 1996). In a Mediterranean urban landscape in which shops and businesses tended to congregate by type in the same geographical area, the local *vicus* will often have had its own economic character. At the same time, each area of the city contained small businesses that catered to local daily needs.

Housing in Rome (as in Pompeii and elsewhere) seems to have been very mixed. There were exclusive neighborhoods, as well as poor ones, but most city streets will have had a wide variety of inhabitants who lived locally and who could be seen walking around on the streets, since vehicular traffic was generally prohibited in town during daylight hours. Many inhabitants of Rome were slaves, at least for some part of their lives. Many others had connections or property in the countryside and were only in town for a few years or at certain seasons of each year. Rome also attracted many foreigners. A study of the *vici* involves the demography of the local population, which was constantly in flux because of high rates of mortality, movement, and the manumission of slaves.

The rhythms of daily life, at the water fountain, the small bakery, the neighborhood shrine, and the local workshop, could be found in each *vicus*. It was here that news or views were exchanged and violence or self-defense could be planned. Consequently, the political élites sought out the locals in their neighborhoods, to influence or patronize their humblest neighbors, even as the *vici* could generate an expression of local political opinion. In a huge city without a formal police force, the *vici* were the basic units that made urban life possible. Even after the Emperor Tiberius built a barracks for the Praetorian Guard in Rome, everyday security still depended on local oversight. Augustus used a network of renewed *vici* to establish himself as Rome's leader in relation to ordinary people. He did this not for merely administrative reasons but because the *vicus* signified "home" for poorer Romans.

International Perspectives

Since the precise definition of a Roman *vicus* is still hotly debated, comparisons with urban patterns in other cultures have proved elusive. The question of size is clearly of central importance. Scholars who see the *vici* of Rome as large are, therefore, more likely to compare them to substantial urban units, such as the ward or district. By contrast, the smaller *vicus* suggests a localized neighborhood on an individual street. In the latter case, a comparison with the traditional Chinese *hu-tong*, especially in Beijing, is suggestive but has not been explored in any detail so far. A *hu-tong* is a narrow road lined with traditional courtyard houses, local shops, and bathing establishments (Meyer 2008). Such small streets are still to be found in Beijing but have mostly lost their local shrines and traditional religious culture as a result of more than 60 years of communist rule.

Future Directions

The best way to move forward with the study of *vici* would be through systematic and scientifically sophisticated archaeological excavation. The exploration of an unexcavated streetscape in Pompeii would provide the most promising opportunity. In Rome, a renewed focus on streets and neighborhoods would also be desirable, although much more difficult in practice. In the country, rural *vici* will emerge through more general surveys of larger areas of settlement and religious centers of local importance.

Cross-References

- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Topography of Rome
- ▶ Urban Planning, Roman

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Vietnam's Archaeological World Heritage Sites

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Introduction

Archaeological research in Vietnam has a long and rich history, formally commencing during

the French colonial period and continuing through today, and the country's archaeological record extends into the Paleolithic (Higham 2002). Today, archaeological projects in the country are executed through the Institute of Archaeology, which is part of the Vietnam Academy of Social Sciences. It is generally a nationally sponsored research enterprise. Much of the field research in recent decades has served to broaden our understanding of various historically significant sites in Vietnam, which has in turn had an impact on their designation as UNESCO World Heritage sites.

Stewardship of many archaeological sites, especially those with a high international profile, involves a mixture of national and local involvement. The Socialist Republic of Vietnam ("Vietnam") ratified the World Heritage Convention in 1987. Currently, Vietnam has seven properties inscribed as World Heritage sites, consisting of two natural heritage and five cultural heritage sites. Vietnam's "Law on Heritage," formulated in 2001, covers all elements of heritage classification, controls archaeological excavation, outlines preservation activities, and also addresses sustainable tourism. Management of each site is largely under the direction of the government, specifically the Ministry of Culture, Sports and Tourism (founded in 2007), with the involvement of various national and local administrative units and offices. The new ministry is the merger of former committees and ministries, including the former National Sports Committee, the National Administration of Tourism, and the former Ministry of Culture and Information. Prior to the merger, all of Vietnam's World Heritage activities were overseen by the Ministry of Culture and Information (Di Giovine 2009: 216). While the headquarters are located in Hanoi, satellite offices are located in most cities and at every World Heritage site (Di Giovine 2009: 216). Between 1995 and 2005, the number of tourist visits to Vietnam and its World Heritage sites increased from 1,351,000 to 2,972,000 at an annual rate of 9.2 % (Di Giovine 2009: 4).

Key Issues/Current Debates/Future Directions/Examples

World Heritage Natural Sites

Hạ Long Bay

Property: 150,000 ha

Ha Long Bay ("Descending Dragon Bay"; Vietnamese: *Vinh Ha Long*) is situated in the Gulf of Tonkin and features a remarkable seascape of islands and limestone pillars. Most of the islands are uninhabited, though archaeological sites such as Cai Beo on the island of Cat Ba have been found (Higham 2002: 36). It is a popular domestic and international tourist destination, located in the Quang Ninh province. The Hạ Long Bay site is overseen and managed by the Hạ Long Bay Management Board of Quảng Ninh People's Committee. Administratively, the bay belongs to Hạ Long City, Cam Pha town, and is part of the Van Don District. Featuring thousands of limestone karsts and isles in various sizes and shapes, Hạ Long Bay is the center of a larger zone which includes Bai Tu Long Bay to the northeast, and the Cat Ba islands to the southwest.

The bay's geomorphology is known as a drowned karst landscape due to the unusual combination of its limestone karst features. One distinctive feature of Ha Long Bay is an abundance of lakes within the larger limestone islands. Additionally, extensive limestone caves represent another important feature. In all, Ha Long Bay possesses a tremendous diversity of caves and other landforms.

The property's extent includes 1,960 islets, most of which are limestone, and the bay is home to 14 endemic floral species and 60 endemic faunal species. The core zone of Ha Long Bay was listed by UNESCO as a World Heritage site in 1994, with an extension granted in 2000.

Phong Nha–Ke Bang National Park

Property: 85,754 ha

The Phong Nha–Ke Bang National Park (Vietnamese: *Vuon quoc gia Phong Nha – Ke Bang*) is in the Bo Trach and Minh Hoa districts of central Quang Bình Province, in north-central Vietnam, about 500 km south of Hanoi. The Phong Nha

Nature Reserve is situated on the edge of the Phong Nha/Ke Bang Karst plateau, and the plateau extends into Laos.

The park derives its name from both Phong Nha cave and the Ke Bang forest. The park was created to protect one of the world's two largest karsts regions with 300 caves and grottoes. Noted for its spectacular and extensive cave and grotto systems, the area is comprised of 300 caves and grottoes, of which only 20 have been surveyed by Vietnamese and British scientists. In April 2009, the total length of the caves and grottoes was extended to 126 km after the discovery of the Son Doong Cave.

Some of the caves have yielded archaeological evidence for early Holocene occupation, while other caves and grottoes show signs of use within the past millennium.

This national park was inscribed as a World Heritage site in 2003. The park is overseen and managed by the National Park Management Phong Nha–Ke Bang of People's Committee of Quang Bình Province.

World Heritage Culture Sites

Complex of Hue Monuments

The complex is located in the Thua Thien Province of central Vietnam. Hue represents a past Vietnamese feudal empire at its apogee during the early nineteenth century. Hue served as the administrative center of southern Vietnam in the seventeenth and eighteenth centuries. The Nguyen dynasty made it the national capital of a united Vietnam in 1802, a position held by the site until 1945. The Perfume River divides the capital in two. A total of four citadels or defended enclosures made up the city: Kinh Thanh (Capital City), for official administrative buildings; Hoang Thanh (Imperial City), for royal palaces and shrines; Tu Cam Thanh (Forbidden Purple City), for the royal residences; Dai Noi (or Inner City); and Tran Binh Dai, an additional defensive work in the northeast corner of the Capital City, designed to control movement on the river. A fifth fortress, Tran Hai Thanh, was constructed a little later to protect the capital against assault from the sea. At the heart of the complex was the Forbidden Purple City, enclosed by brick walls. Originally, there were over 40 buildings within the enclosed area, but most are now in disrepair.

The complex suffered considerable damage due to military conflict in 1885, 1947, and 1968. Due to its historical significance, Huee was inscribed as a cultural heritage site by UNESCO in 1993, and is managed by the Hue Monuments Conservation Center (HMCC) and the Hue People's Committee.

Hoi An (Ancient Town)

Property: 30 ha
Buffer zone: 280 ha

Hoi An is an ancient town located in the lower section of Thu Bon River, the coastal plain of Quang Nam in Central Vietnam. It is an exceptionally well-preserved example of a traditional Asian trading port and maritime commercial center. Most of the buildings are in the traditional architectural styles of the seventeenth to nineteenth centuries, and they include religious buildings such as pagodas and temples. The town is considered to be something of a living museum of architecture and urban lifestyle. Many festivals occur at Hoi An annually, preserving traditional lifestyles, religious ceremonies, customs, and culinary practices. Due to its geographic position, Hoi An was an active international trading port for traffic of merchant ships from Japan, China, and the Western world during the seventeenth and eighteenth centuries.

The current architecture of Hoi An, almost exclusively in wood, combines traditional Vietnamese designs and techniques with those from other countries, such as China and Japan. Reminiscent of Japanese examples, there is a wooden bridge with a pagoda atop it. An inscription indicates it has existed from at least the early eighteenth century. There are also numerous ancient tombs in Vietnamese, Japanese, and Chinese styles.

Archaeological finds and excavations have shown this area to have been an active port and trading center since the Iron Age Sa Huynh

people lived in the area, along the Thu Bon River as early as the second century BCE. The ancient town is situated on the north bank of Thu Bon River, and continued to operate as an important port of Champa civilization. At the epicenter of ancient Champa civilization, Hoi An became one of the most important port cities, a designation that would last for several centuries (Di Giovine 2009: 262).

Starting in the 1980s, the architecture and culture of the Hoi An ancient town gained increasing scholarly and tourist recognition and interest, making it one of the major tourist attractions of Vietnam. Today, most if not all of the homes within the historic center of Hoi An have been restored according to international preservation standards, and most of its residents are actively engaged in the tourist industry (Di Giovine 2009: 265).

The site is managed by the Conservation Management Center for the Relics of Hoi An and the People's Committee of the Quang Nam Province. In 1999, the property was inscribed as a World Heritage site.

My Son Sanctuary

Property: 142 ha
Buffer zone: 920 ha

Located in the Duy Xuyen district of the Quang Nam Province of central Vietnam, the My Son sanctuary is 45 km west of Hoi An and 70 km south of Da Nang. This sanctuary area is known as the most significant Champa architectural and sculptural monuments in the country.

A valley surrounded by mountains, My Son was the site for a religious center for the capital of the Champa Kingdom. The site is an important example of ancient and historical cultural exchange, with the introduction of the Hindu architecture of the Indian subcontinent into southeast Asia. At the start of the first millennium, the Champa civilization increasingly came under the influence of Hinduism, and many Hindu temples were subsequently built. Successive kings in the sixth to eighth centuries continued to construct temples and monuments. Warfare during the medieval period affected the site, leading to the decline of Champa civilization and its eventual absorption into the Dai Viet state in the fifteenth century.

My Son consists of eight groups of tower temples cover a period from the tenth to the thirteenth centuries, and this chronology is reflected in different architectural styles. The temples are constructed in fired brick with stone pillars and decorated with sandstone bas-reliefs depicting scenes from Hindu mythology. The major style of architecture and sculptural motifs derives directly from Indian civilization.

Conflict in the twentieth century also damaged many of the structures at My Son. During the 1960s, My Son periodically functioned as a military base and mines were set on the hillsides and the mountain slopes. Devastation occurred due to heavy bombing by the USA in August 1969, during which many of the temple-towers were severely damaged. Only approximately 20 temple-towers still remain intact. However, most of the surviving inscriptions and archaeological materials are preserved and held in My Son and in various museums.

My Son was inscribed as a UNESCO World Heritage site in 1999, along with Hoi An. It is home to hundreds of thousands of tourists and researchers annually, and the site is managed by the Conservation Management Center for the Relics of My Son and the People's Committee of the Quang Nam Province.

Central Sector of the Imperial Citadel of Thang Long

Property: 18 ha
Buffer zone: 108 ha

Thang Long – Hanoi Imperial Citadel (Vietnamese: *Hoang thanh Thang Long*) refers to a cultural complex located in the heart of modern-day Hanoi, and its traces were recently uncovered during construction of new buildings in 2002. The site at 18 Hoang Dieu Street was chosen for the construction of the National Assembly, but development stopped when traces of the Imperial Citadel were uncovered.

Originally, the Imperial Citadel was first built in the eleventh century by the Ly Dynasty, marking the independence of the Dai Viet kingdom after a millennium of Chinese colonial rule. It was constructed on the remains of a Chinese fortress on drained land reclaimed from the Red River Delta in Hanoi. The site would remain the center of uninterrupted regional political power for the next several centuries. The Citadel enclosed the Forbidden City, constructed in brick in the eleventh century, and was itself enclosed by a defensive wall.

The Citadel reached its apogee in size in the sixteenth to seventeenth centuries. French colonial control of Vietnam began in the 1880s, and Thang Long functioned as the colonial headquarters for French administration of Indochina (modern Vietnam, Laos, and Cambodia). The royal palaces and many structures were destroyed in the late nineteenth century. Several palaces and historic buildings were rebuilt according to a French architectural style. After the First War of Independence (1954) and the division of Vietnam into two entities, the ancient Forbidden City became the military headquarters for North Vietnam. The Ministry of Defense gradually abandoned its use of the property between 1994 and 2004, designating it for cultural and historic purposes.

Due to its historical significance and location within the modern capital of Vietnam, the management of the site is quite complex and has increasingly involved multinational participation. The site is directly managed by the Conservation Center for the Co Loa and Hanoi Citadels (also known as the Hanoi Ancient Wall–Co Loa Vestiges Preservation Center). The Center was established in 2007, and has approximately 100 staff members. In addition to overseeing the Thang Long Citadel (also known as the Hanoi Citadel), the Center also manages the nearby Co Loa site. The Center is overseen and funded by the Hanoi People's Committee, the Ministry of Culture, Sports and Tourism, as well as the Vietnam National Commission for UNESCO. The Center cooperates with the Vietnam Institute of Archaeology (which is part of the Vietnam Academy of Social Sciences).

The central sector of the Imperial Citadel of Thang Long was inscribed as a World Heritage site in June 2010. In October 2010, UNESCO Director-General Irina Bokova made her first official visit to the country and, coinciding with Hanoi's Millennial Anniversary Celebrations, handed over the World Heritage certificate to government officials. Following a request from the Vietnamese government, UNESCO is supporting the Vietnam National Commission and the Hanoi People's Committee to ensure Thang Long's long-term conservation. With technical support from the Tokyo-based National Research Institute for Cultural Properties, the Vietnamese Ministry of Culture, Sports and Tourism, the Conservation Center for the Co Loa and Hanoi Citadels, the Vietnamese Academy of Social Sciences (VASS), the Institute of Vietnamese Studies and Development Sciences (IVIDES), and the Institute of Monument Conservation, a comprehensive site management plan for the complex is being developed and implemented to ensure the long-term conservation and sustainable development of the site (Regional Committee of Tourism Paris Ile-de-France 2008). As part of this effort, a focus will be placed on local capacities for site managers, planners, and research scientists.

Citadel of the Ho Dynasty

Property: 156 ha
Buffer zone: 5,079 ha

The Ho Citadel (Vietnamese: *Thanh nha Ho*) (Figure 1) is located in the Thanh Hoa Province in Vietnam's north-central coast region, approximately 150 km south of Hanoi. It was the capital of Vietnam from 1397 to 1407 during the short-lived Ho Dynasty.

Measuring 877 × 889 m, the citadel is marked by an enclosing wall of stone, which still remains standing. The enclosure has a diameter of over 3,500 m, with a wall height of 5–6 m. Unlike other citadels in the country that were constructed with brick, construction of the Ho Citadel employed massive stone slabs sourced from nearby mountains. The stone materials used for construction were carefully hewn into slabs with uniform dimensions, and the citadel was marked by four arched

gates (south, north, east, and west). Researchers are currently exploring how the stone walls were constructed. According to historical texts, construction was completed in 3 months, seeing the transport and erection of over 25,000 cu m of rock, averaging 10–20 tons per slab (Tong Trung Tin, *pers. comm.*).

The Citadel was inscribed as Vietnam's seventh World Heritage site in June 2011. Approximately 1 month after inscription, a quarry was identified 2 km northwest of the site that may be the source of the stone materials. Researchers from the Ho Dynasty Citadel's Heritage Preservation Center have discovered 21 flagstones scattered across a wide area. Based on clues such as cutting marks on the surface of the stones and comparisons with slabs from the citadel, the researchers speculate that the stones were intended for use at the Citadel but were discarded due to faults. A multiyear excavation project is planned at the quarry site.

The site is managed by the Ho Dynasty Citadel's Heritage Preservation Center in conjunction with the People's Committee of Thanh Hoa and the Ministry of Culture, Sports and Tourism.

Future Directions

The state-sponsored Institute of Archaeology, headquartered in Hanoi, employs hundreds of

South gate

North gate

Vietnam's Archaeological World Heritage Sites, Fig. 1 (continued)

East gate

West gate

Vietnam's Archaeological World Heritage Sites, Fig. 1 The gates of the Ho Citadel (Source: Vietnam Institute of Archaeology)

archaeologists working throughout the country on projects ranging from the Paleolithic to protohistoric and historic eras. Given the volume of archaeological fieldwork, the pace of research, and the number of sites within the country, it is likely that Vietnam's list of World Heritage properties will continue to grow in the coming years. To illustrate, as of this writing, there are currently seven additional properties being considered on the UNESCO Tentative List.

Cross-References

- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ UNESCO World Heritage Convention (1972)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

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Villas and Farms in the Mediterranean World

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Introduction

Farms and villas were ubiquitous in the regions of the ancient Mediterranean. Ancient villas were mansions located outside urban agglomerations including residential quarters displaying a complex architectural and decorative vocabulary and facilities for the processing and storing of agricultural crops. They are usually discussed mostly in the context of the history of architecture, of agricultural exploitation, or of type of management and labor of ancient Classical Greece and Rome, but farms and the so-called proto-villas actually predated the Classical Greek period and are attested in the Etruscan and Punic worlds as well. However, the Greek Classical period and, to a greater extent, the Hellenistic period were defining moments in terms of the delineation of clearer architectural typologies and a more regular diffusion of these dispersed settlements in the countryside. In the Hellenistic period, the number of villas and farms populating the countryside of areas such as mainland Greece, peninsular Italy, and Sicily greatly increased. Both in Rome and in ancient Greece, where the social and political structures were based on census, landed wealth was the criterion determining the belonging to one class or the other. Minimum landownership was therefore what qualified one as a citizen soldier, and for this reason, landownership, i.e., farms and villas, is indissolubly linked with ancient states' social and political history.

Definition

Villas are categorized into three types, using Latin terminology: (1) *villae suburbanae* (suburban villas), located in close proximity of towns and cities; (2) *villae rusticae* (rural villas), located in the countryside, which could be the management center of large agricultural estates (*latifundia*); and (3) *villae maritimae* (maritime villas), located on the seacoast or also on lakeshores. Some scholars make a further distinction between maritime villas (with structures built right on the shore, such as fishponds and bath complexes) and coastal villas, located on the coastline but not having a direct relationship between their architecture and the sea (Lafon 2001).

Villas usually featured a single compact structure with a central courtyard, which

functioned as a connecting element between the different parts. A villa would, in general, consist of (a) *pars urbana*, the part where the owner and his family would live; (b) *pars rustica*, the place where the productive activities of the villa took place, including also the living quarters of the staff and slaves, as well as the farm animals; and (c) *pars fructuaria*, where the products were stored. The villa of Settefinestre near ancient Cosa, Italy, exemplifies this organization of space well.

Ancient literary sources stress that maritime villas, unlike their rural counterparts, were unproductive, a manifestation of elite conspicuous consumption. When maritime villas have been more extensively excavated, however, the presence of a *pars rustica* or of other production activities have often been found. Indeed, all natural resources of the villa estate may have been exploited, e.g., clay beds, quarries, and lagoons (for fishing, fowling, etc.). Maritime villas were often the seat of a particular type of production, *pastio villatica*, i.e., the production of quality foods for the urban market which comprised such things as honey, fish, and game.

For the Romans, the term "villa" could convey a variety of meanings; it was commonly used to refer either to farms or to the opulent country mansions of the elite. A key defining factor, however, was the location outside the urban context, as legal sources make clear. Reading the ancient texts, it is also clear that "villa" indicated different things to different authors at different times. Significantly, Varro, the first-century BCE author of a treatise on agriculture in the form of dialogue addressed to the Roman upper class, starts his work with a discussion over the meaning of "villa" which shows the range of meanings covered by the term in his time. By the late fourth century CE, "villa" no longer indicated the landed estate but the settlement and the land held by several owners, in other words a village (Bowes & Gutteridge 2005).

The elements marking the distinction between farm and villa are size and degree of refinement of the décor. As a very general rule, in a farm the ratio between residential rooms and service spaces is no more than 1:3 of the total area, whereas in villas, the residential part was much larger and more richly decorated. Also in the case of farms, a central courtyard was the main architectural feature; the number of rooms varied depending on the size of the farm. Villa Regina (Boscoreale, Italy) is a good example of a large farm featuring a wine press, threshing floor, and moderate architectural décor. Often, though, the building technique employed in farms was wattle and daub on stone foundations, and the building would consist of a few rooms only. Since excavations have mostly focused on large and, architecturally, more visible buildings, excavated farm buildings are small in number. Therefore, the knowledge about the presence of farms and the chronology in a given territory comes largely from field survey.

Historical Background

Villas and farms were the characterizing elements of the landscape of the Hellenistic and Roman Mediterranean. Considered to be the indication of a particular type of exploitation of the land, featuring on the whole polyculture but with preeminence given to cultivation of vines, olive trees, and fruit trees essentially aiming at the production of surplus for the market, the diffusion of villas and farms can be traced in certain geographic areas alongside states' territorial expansion. In northern Greece, the growth of the Macedonian kingdom in the Hellenistic period facilitated in some areas the creation of large estates which appear to have promoted the introduction of new technologies in order to process crops more efficiently, as in the case of the olive rotary crusher (Foxhall 2007). In Italy, during the third century BCE, farms started appearing in greater densities in the territories conquered by Rome. The South Etruria Survey has recorded thousands of rural settlements comprising farmsteads, farms, and villas. While the exact chronology of occupation of these sites can only be partially determined in field survey, for one is dependent on only the artifacts visible on the ground and on their quality as chronological markers, it was nonetheless possible to define

a broad chronological development which indicated increased number of sites in the archaic period and in the second to first century BCE, a massive peak in the first and second century CE, with decrease in number of sites starting in the late second/third century CE (Di Giuseppe 2005).

The "standard history" of the evolution of farms and villas in Roman Italy put forward by the historiography of the 1970s and 1980s has been characterized by an evolutionist model (Terrenato 2001): small farms appeared in the third century BCE as the result of the Roman conquest; during the second century BCE in the aftermath of the Hannibalic war, which opened the way to Rome's conquests in the East, some developed into villas. The availability of manpower (slaves) and riches that the conquering wars brought about allowed the elite to create slave-staffed villas producing cash crops. The landed estates of the wealthy grew in size, incorporating former small- and medium-sized properties and large tracts of *ager publicus*. The displaced small farmers ended up swelling the ranks of the urban *plebs* in Rome, starting the Gracchan movement for land reforms, the subsequent profound transformation of the army, and the crisis of republican institutions. In fact, data from field surveys carried out across different regions of the Italian peninsula indicate that there was no exclusive relationship between farms and villas. Rather than seeing the former decrease when the latter increase in number, the two seemed to have increased or decreased together (Launaro 2011).

Since the appearance of farms and villas in the territories conquered by Rome is considered a typical Roman way of exploitation of the land, an issue that has interested scholars has been to determine what the origins of the "villa," both in its architectural typology and types of production, were. Farms and villas engaged mostly in producing wine and olive oil were present in the Greek Classical and Hellenistic world, and some have linked the appearance of villas in the Roman world in the third century BCE to the contacts with the southern part of the Italian peninsula and its Greek colonies (Lafon 2001). Others have preferred to stress a link with the Punic world of North Africa. Carthage, before its destruction by Rome in 146 BCE, was surrounded by many farms and villas. The wealth of the city came as much from her agricultural hinterland as from the extensive Mediterranean commercial networks. Although archaeological excavations of Hellenistic Punic farms around Carthage are scant (Brun 2004), it is known that courtyard villas fortified by corner towers were in use both in Sicily and in North Africa as early as the third century BCE. Roman authors, such as Appian (*Pun.* 101; 107), normally refer to Punic farms as *turres* (towers) or *castella* (fortified buildings), stressing their fortified nature. Recent discoveries on the island of Jerba, off the cost of Tunisia, have highlighted the great diffusion in the Hellenistic period of villas producing sweet wine which was widely exported around the Mediterranean (Fentress 2001). In addition, arboriculture and certain cultivations that later characterized the production of Roman villas seem to have been developed to a greater extent in the farms of Carthage. The agricultural treatise by the Carthaginian Mago was judged by the Roman senate in 146 BCE to be the only noteworthy work deserving to be translated into Latin. Agricultural manuals written later by Latin authors, in particular Varro's and Columella's (first century CE), often quote Mago's work as a source.

Fortification of rural dwellings was a feature not limited to the Punic world of North Africa and Sicily. Mainland and insular Greece offer several examples of rural stone towers dating to the Classical and Hellenistic period, at times part of farms and at times more isolated. These structures, for a long time seen exclusively as serving defensive needs, have recently been connected to the productive exploitation of the Greek landscape and to the dependent labor that enabled these activities, since they might have confined unfree labor engaged in agriculture and mining activities on estates of absentee wealthy owners or tenants (Morris & Papadopoulos 2005).

The two alternative models for the origin of the villa, the Greek or the Punic worlds, have been questioned after the important archaeological discovery of the Auditorium Villa in Rome in the late 1990s. Here, a substantial villa existed

already in the years 500–300 BCE; further enlargement of the complex occurred in 300–225 BCE. The name "villa" for this archaic and early republican complex is justified primarily by its size, so far unparalleled for the same period; by the décor (see the figurative architectural terra-cottas of the second phase, similar to those known from Etruscan religious buildings); by the type of plan, featuring a central open court; and by the presence of an oil press (Carandini 2006). The complex had a long occupation history, going out of use after the mid-second century CE. This discovery has led to the reconsideration of finds at other later villa sites, where the recovery of archaic architectural terra-cottas had been explained with abandoned archaic rural sanctuaries which later had been obliterated by the construction of farms and villas. Instead, it has been proposed that these might constitute similar cases as that of the Auditorium Villa: palatial rural structures typical of the Etruscan world, from which the Roman villa evolved (Terrenato 2001). Indeed, one does not need to wait until Rome's territorial expansion in the third century BCE to see indications of the intensification of agricultural exploitation in its environs, especially in the case of viticulture. At various sites in the southeastern *Suburbium* near modern Centocelle, where in the late republic and empire luxurious villas were built, archaeological investigations have revealed numerous trenches dug in the tufa plateau in order to plant vines, dated on the basis of associated ceramic material to the fifth century BCE. The intensification of settlements in the countryside for agricultural purposes resulted in at times massive interventions to make the land suitable to cultivation. In order to develop the marshy Fondi plain for viticulture in the second century BCE, thousands of amphorae were laid head to toe in order to drain the land. In this area, several farms and villas were built starting in this period.

Architectural Typology

From an architectural point of view, it is possible to identify changes in villa architectural typology that mark specific chronological periods. The second century BCE marked a transition in villa architecture in Italy, with the incorporation of elements typical of the townhouse into the plan of typical villas, such as the atrium and the peristyle garden. These architectural elements had no direct practical function in relation to agriculture but added monumentality to the residential quarters. Together with the degree of lavishness in furnishings – statuary, mosaics, and wall paintings – these architectural elements became the indicators of the wealth and social status of the owner and, at the same time, a "must-have" feature if one had aspirations to become part of a socially higher group. Generally speaking, the republican villa was built on imposing substructures housing cisterns (the *basis villae*), creating at least two artificial terraces. On the upper one was the villa building; on the lower were gardens and orchards. The Villa Prato near Sperlonga is a good example of the use of two terraces and of the simple division between residential quarters on one side and service area with two presses on the other (Broise & Lafon 2001). Although the bath quarter excavated at this villa is unusual in typology and early chronology, small bath suites appear regularly in residential quarters of villas up to the early first century CE. These facilities are always located in proximity to the kitchen, a practical planning solution which facilitated the heating of the water for the baths and rationalized the drainage and water supply lines, grouping together the rooms (kitchen, baths, latrine) that needed them. In late republican and early imperial villas, the atrium and peristyle court were often enlarged, while one or more rooms opening onto the peristyle, used for dining and other reception activities, were added. Other changes notable in the period regarded not only the architecture but also the décor. For flooring, earlier examples of *opus signinum* floor with a decorative pattern made with the insertion of pebbles give the way to mosaics and marble tile floors (*opus sectile*).

In maritime villas, also built on various levels and in very scenic positions, the residential quarter was placed on the seaward side, while the service quarters were on the mainland side. Architectural elements that were exploited to great extent in Roman villa architecture starting

from the Augustan period were the portico and the cryptoportico. The use of the colonnaded portico in particular represents the assimilation in the private sphere of an element typical of Hellenistic and Roman public architecture. Portico and cryptoportico were used by villa designers as key elements in determining the circulation space and in providing socially distinct access to the villa's parts (Zarmakoupi 2011).

The late first century CE and early to mid-second century CE mark a change in villa typology. Residential quarters become larger and more elaborated; peristyle courts and gardens are replicated, as are dining rooms and reception areas. In the second century, bath quarters featuring the canonical sequence and layout of rooms (*frigidarium*, *tepidarium*, *caldarium*) observable in the large urban baths appear, often as independent pavilions rather than as part of the central body of the villa. Other architectural features that characterize second-century large villas are large gardens framed by colonnaded porticoes, often with decorative water features; monumental *nymphaea*; and the so-called garden-stadia, i.e., walled gardens in the shape of an ancient stadium.

The suburban villas around Rome continued to flourish and to become more opulent until the late antique period. In other regions, different trends are observable; for instance, luxury villas around Ravenna and in the lakes region in northern Italy appeared only when the imperial seat was moved to Milan first (286–402 CE) and to Ravenna later (402–476 CE). Late antique villas present at least one large reception hall and larger dining rooms no longer accommodating the typical set of three couches, each able to accommodate three diners, which were placed to form a U along three sides of a rectangular room, but the *stibadium* is found instead. The *stibadium* was a semicircular dining couch; one or more could be accommodated in a late antique dining hall, which normally featured at least one apse along one wall but could have up to three apses (*trichonch*). The apse is indeed the defining element of late antique architecture. The ultimate example of a late antique villa is the Villa Casale at Piazza Armerina in central Sicily. The scale and opulence of this complex are such that it is still debated whether it was in fact an imperial palace, the palace of a governor, or "simply" the villa of some powerful member of the elite.

Another element that characterizes architecturally the late antique villa is the presence of mausolea or of monumental tombs within the villa building. Whereas in previous periods, monumental tombs were built on the villa estate, in isolated prominent positions visible from a major road that passed nearby, in late antiquity, the mausolea appear as part of the villa architecture. It has been suggested that such cases reflect the diffusion of Christianity and martyr cults. Augustine in the *De Civitate Dei* (22.8) lists many miracles, which took place at villa martyr shrines. In fact, tying a Christian ritual space to a functioning villa is problematic. Even when early churches are often built near or on top ruins of abandoned villas, to what extent the villa acted as a point of memory for the development of Christian worship and to what extent location was simply determined by the fact that the villa offered readily available building material are not clear.

The development of architecturally magnificent villas was a phenomenon not limited to Italy and the environs of Rome. Provinces where the local and the senatorial aristocracy of Rome established estates at a significant level, such as Epirus, Dalmatia, Hispania, and North Africa, all have examples of monumental villas. These structures developed alongside the occupation of marginal lands by farms. Especially in North Africa, the Roman period is characterized by farms and complex irrigation systems bringing under cultivation marginal lands which in earlier and later epochs were not cultivated.

A region which displays particularly fine examples of villa complexes built in the imperial period on a monumental scale is Istria (Croatia). During the first century CE, particularly on the western coast, several grand villas were built; epigraphic evidence indicates that much of this area was under ownership of Rome's senatorial elite (Tassaux 2003). These estates produced wine, olive oil, and also purple dye. The most impressive example of Istrian villas is the Verige

Bay villa, on the island of Veli Brijun in the Adriatic Sea. At the height of its development, it featured three temple-like structures linked by a semicircular portico, an outdoor apsidal dining area at the end of a c. 150-m long colonnaded area, a bath complex and an adjacent garden, and a major residential quarter unfolding around a peristyle in the main block. One sector of this huge complex was devoted to the processing of olive oil, revealing what type of cultivation was prevalent on this estate (Schrunk & Begović 2000).

Key Issues/Current Debates

Four main issues can be identified in the context of current debates on villas and farms:

1. Recent archaeological and historical studies have been reconsidering the traditional view that Rome's social crisis, centered around issues of land distribution which occurred from the second century BCE onward, was due to the growth of large slave-staffed villas which displaced small- and medium-sized farmers. Field surveys accompanying the excavation at the villa of Settefinestre had indicated that in this area there were few farms when this villa flourished, thus seemingly confirming ancient texts referring, for south Etruria, to a countryside depopulated of free farmers, instead occupied only by large slave-staffed estates. More recent work has on the contrary observed that this phenomenon cannot be generalized, since in many areas of Roman Italy, small- and medium-sized farms continued to exist well into the imperial period. Whether these farms were part of larger estates belonging to the wealthy and were rented out under a sharecropping system or whether they were owned by small proprietors cannot be determined from a purely archaeological point of view. The fact that small farmers were able to be competitive on the market in terms of production has also been pointed out (Kron 2008).
2. After the Roman conquest of Gaul and the Spanish provinces, land distributions and the foundation of colonies occurred in several areas of these provinces in the late first century BCE and early first century CE. On the land plots, the colonists built farms and planted vines. Until then, these regions had been large importers of wine from Italy, but soon, the production of these farms started to replace Italic wine both on regional and transmarine markets. By the Flavian period (69–96 CE), the farms were enlarged into villas, equipped with a well-appointed residential part and service areas, indicating that the successful wine business allowed now the owners to spend on the beautification of their residences (Brun 2005). In Italy, at several villa sites in the second century CE, the subdivision of rooms into smaller units, poor-quality repairs, and even burials placed within the former residential part of the villa were observed. These two phenomena were linked, positing that estates that had been producing wine for export had been affected by the new provincial production and that owners had, in effect, abandoned them; the poor repairs and the burials were, in this scenario, the signs of squatters. When all the available evidence is considered, however, it appears that signs of demise at villa sites do not coincide also with the abandonment of cultivation. The concentration of land in the hands of fewer proprietors led some owners to keep fewer villas equipped with adequate residential quarters for their sojourns, leaving the others to the use of their tenants (Marzano 2007).
3. Despite the apparently straightforward nature of defining what a farm is, from the point of view of archaeological classification, what constitutes a farm is, partly, debated. When looking at excavated structures, it is disputed whether a temporary residence should be called a farm or only a permanent one and whether a distinction should be made between farming and herding (we might think of structures related to transhumance, occupied only seasonally, for instance). In the context of field survey, scholars have been asking whether a sherd scatter in a field necessarily constitutes a farm or whether it only attests to

the ancient agricultural practice of manuring. If a sherd scatter always defines a farm, what scatter size indicates this type of dwellings, and what scatter size indicates a "villa"? It is known that, over time, especially in fields subject to regular deep plowing, the size of a scatter and the quality of the finds recovered can change drastically in only a few years.

4. The popularity of field survey and its rapid methodological developments have not been accompanied by parallel developments in theoretical and interpretative frameworks. While scholars have been asking how to recognize settlement hierarchy from survey data and how to make these data comparable (Alcock & Cherry 2004), more recent work has shifted attention away from methodology, and the limited range of historical and "processual" questions field survey had been used to answer. Focus is now on the wider archaeological developments in relation to the interpretation of material culture and theories of landscape (Witcher 2006).

International Perspectives

The term villa in modern studies is the cause of some debate, since scholars working on different regions of the ancient world use it differently. In studies focusing on areas such as Roman Italy, villa always refers to mansions of a certain size, displaying notable signs of elaborate décor in the residential quarters, such as mosaic and marble floors and wall paintings. Outside of Italy, in the case of studies on the northern European provinces of the Roman Empire, "villa" is used to label also smaller establishments with little indication of elegant décor, what in effect in the Mediterranean regions is called "farm." The reason for this discrepancy is that these territories annexed by Rome had a very different architectural tradition from the one used in the Mediterranean. Rather than building farms with rectangular plans, Celtic populations built round houses; rather than using masonry and roof tiles, they built in timber. Therefore, when a building in these northern European regions displays a rectangular plan and certain building techniques, scholars see it as sign of either direct Roman presence or of clear Roman influence on local population. In other words, they see in these buildings indicators of Romanization. For this reason, the term "villa," which carries with it a baggage of "Romanness," is used. Differences in modern usage are not limited to these two distinctions. In the context of studies on the eastern provinces of the empire, "villa" is commonly used to indicate particularly grand townhouses, which in size and décor outdid the normal scale found in upper-class urban dwellings. The correct nomenclature for such buildings in the Roman context is *domus*.

Future Directions

In future years, the regular application in excavations of a range of scientific techniques which have become more affordable (e.g., paleobotanical analyses, isotope analysis of bones and teeth, DNA) will yield a wealth of new information on the production of farms and villas, the standards of living of their inhabitants, and the environmental changes caused by the establishment of farms and villas in the countryside (deforestation, reclamation of marshes, and the like) or natural environmental changes which affected these human settlements. Scientific analyses coupled with powerful computing tools, such geographic information system, are offering effective ways to model and analyze ancient landscapes, allowing to grasp issues about degree of connectivity between sites, location of natural resources, and settlement hierarchy, among other issues.

After decades of attention devoted to villas, both in archaeology and ancient history, attention is now shifting to properly studying the lower stratum of rural dwellings, the farms and farmsteads. Questions about the spatial and material qualities of this lower rural domestic architecture, the rural exchange systems, and the type of interaction between humans and the surrounding environment can be properly answered only through excavation. Despite the fact that

thousands and thousands of farms and farmsteads have been located in field surveys, new understandings will come in the future as some investigators are leaving the "allure" of excavating rich villas and turning to understand how the majority of the ancient population lived.

Cross-References

- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Demography of the Ancient Roman World
- ▶ Domestic Archaeology: Textiles of Northern Mediterranean
- ▶ Economy, Roman
- ▶ Romanization
- ▶ Terracotta Architectural Sculpture in Classical Archaeology
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Vicus

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Visualizing Mediterranean Archaeology

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Introduction

Mediterranean archaeology has been a territory of intensive methodological experimentation, simulation, and scientific visualization for digital applications in archaeology over the past 30 years. New archaeological discoveries, broader and more intensive archaeological surveys, and multi-stratified sites in need of interpretation and dissemination all demonstrate the need to embrace different and innovative methodological approaches for the reconstruction of the past. The Neolithic site of Çatalhöyük in Turkey, the Paleolithic caves of Lascaux in France, the megalithic temples of Malta in the 1980s and 1990s, and the Acropolis in Athens, for example, turned on a more focused attention to the difficult relation between archaeological evidence, the site, and its perception in present and past societies, through visualization and reconstruction processes. The potential to see and study sites not just through their archaeological evidence, the material culture, but also by their hypothetical original aspect generates new questions and interpretation issues. Debates on representation, multivocality, processualism, and post-processualism (Hodder 1982, 2001) created an important methodological premise to the most advanced use of digital representation and visualization in archaeology. Those debates questioned the authenticity of the digital workflow and its ability to produce virtual models without always having the ability to validate them. Sites were no more considered as frozen snapshots of the past, but diachronic models, digital interactive environments, and dynamic processes. A specific focus of digital representation on Mediterranean archaeology at the dawn of the computing "big bang" is explainable by the concentration of international multidisciplinary research projects in this area with a more specific emphasis on methodologies of representation and communication, beyond the traditional archaeological report. The use of virtual technologies for visualization opened new and unexplored gates in archaeology, creating a strong connection between interpretation and communication processes.

Definition

Scientific visualization in archaeology includes all the digital processes of computer graphic rendering and simulation involving data, models, and spatial information produced by different integrated technologies of data capturing, virtual reconstruction, and visual communication. Data capturing concerns the digital documentation of objects, sites, and landscapes; virtual reconstruction and visual communication regard the final digital output of archaeological models and data and their social interaction with the public and the community of scholars. The final goal of visualization is the performance of digital data at different levels of analysis, interpretation, and modeling. For example, visualization and data processing in the archaeological fieldwork can come from different technologies such as remote sensing, laser scanning, digital photogrammetry, or computer vision. But visualization can be also generated by computer graphics, animation, or real-time renderings such as virtual reality systems, Web, or cyberspaces online (e.g., virtual communities such as Second Life). A first level of visualization is identifiable during the observation and documentation of the archaeological evidence: for example, in an excavation area or in landscape survey. A second level comes from the virtual reconstruction of archaeological models according to their hypothetical colors, materials, textures, contexts, and shapes. It is important to note that the major part of the visualization projects at the beginning was addressed to digital reconstruction and not on the documentation (Forte & Siliotti 1997; Forte 2000). The reason is that it was much easier in that phase to produce models without very analytical studies on site documentation and on validation of archaeological data.

Historical Background

In the field of digital applications and visualization technologies in archaeology, it is possible to distinguish three main categories: digital documentation, virtual archaeology, and cyber-archaeology. Digital documentation regards all the technologies of data capturing (i.e., laser scanners, remote sensing, photogrammetry, computer visions) and the related visualization of these data. It is the bottom-up phase of archaeological research and it is focused on archaeological evidence: artifacts, ecofacts, sites, and landscapes.

Virtual archaeology was born at the beginning of the 1990s (Forte & Siliotti 1997; Barcelo et al. 2000; Forte 2000) with the purpose of virtually reconstructing the past by means of digital (static) graphic renderings. 3D Models were produced with a high level of photorealism, including textures, colors, and geometrical details (Forte & Siliotti 1997). Cyber-archaeology characterizes more specifically this millennium with a focus on interactive models, virtual reality, serious games, and simulation environments.

The first important experiment of digital visualization in archaeology was the reconstruction of the Paleolithic caves of Lascaux in southern France, carried out by Benjamin Britton in the 1990s (Britton 2001). A head-mounted display (HMD) connected with two personal workstations comprised the system: the users dressing the HMD were able to make a virtual imaginary trip into the Paleolithic caves. Another digital experiment simulation was "Virtual Petra" at Brown University (Shape Lab). The scope of this simulation was the reconstruction of the Great Temple at Petra in relation to both archaeological artifacts and stratigraphy (Vote et al. 2002).

Later, the use of visualizing technologies substantially increased, thanks to wider use of personal computers. This technological phase was more oriented to the theatralization of the digital content in virtual environments, virtual theaters, virtual rooms, and immersive visualization systems. In this category, projects like NUME (CINECA, Bologna) and Rome Reborn (UCLA, Los Angeles, and University of Virginia; Frischer 2008) were developed in the late 1990s. NUME (New Electronic Museum of the city of Bologna; Bocchi et al. 2000) was aimed at the historical reconstruction of Bologna, in different phases starting with the twelfth century. Rome Reborn focused on a detailed urban and architectural reconstruction of Rome in 320 CE with a strong emphasis on the monumental and topographical aspects of the reconstruction (Frischer 2008).

At the beginning of the twenty-first century, major attention was paid to applications able to involve users simultaneously and to increase the degree of immersivity. One of the most advanced systems in this category was the AVIE (Advanced Visualization and Interaction Environment), an omni-spatial visualization device for the collaborative interaction of large-scale heterogeneous cultural datasets using 360° stereoscopic visualization environment (Kenderdine et al. 2010). This specific system was used for the immersive simulation of the Mnajdra Megalithic temples of Malta (Flynn & Liritiz 2005) during the exhibit of Spaces of Mnajdra, in Sydney in 2010.

Other projects, such as VITA (Visual Interaction Tool for Archaeology), were wholly oriented towards the development of collaborative systems integrating different types of 3D data (Benko et al. 2004). In the case of VITA, two users wearing see-through, head-mounted displays and tracked gloves were able to explore a portion of the virtual dig site using tangible interfaces and devices. Lu et al. (2007) designed a computer-aided and collaborative system for the reconstruction of archaeological artifacts, which allowed several archaeologists to remotely reassemble artifacts at the same time. Their research work mainly focused on algorithms assisting the reconstruction and support of multiple users rather than the immersive experience of the collaboration. Hall et al. (2001) explored a mixed-reality system SHAPE which allowed for exploration of archaeological artifacts through augmented reality in the public setting of the museum using head-mounted displays.

One of the first virtual collaborative interaction and visualization for archaeological museums was "The Ancient Via Flaminia Project (Forte 2008)"

Visualizing Mediterranean Archaeology, Fig. 1 3D virtual reconstruction of the south part of the imperial Villa of Livia

Visualizing Mediterranean Archaeology, Fig. 2 The virtual Villa of Livia: archaeological evidence recorded by laser scanning and in transparency reconstruction of the atrium (first–second century CE)

hosted at the National Roman Museum in Rome (Forte 2008; Pietroni et al. 2007) involving the virtual reconstruction of the Roman landscape along the Via Flaminia (a consular road connecting Rome to *Ariminum* in North Italy). The main focus of this application was the Villa of Livia (Figs. 1–3), spouse of the Emperor Augustus, a monument virtually reconstructed integrating digital documentation by 3D laser scanning (Fig. 4) and architectural modeling. In this case,

Visualizing Mediterranean Archaeology, Fig. 3 The avatar of Livia in the cyberspace of the virtual villa

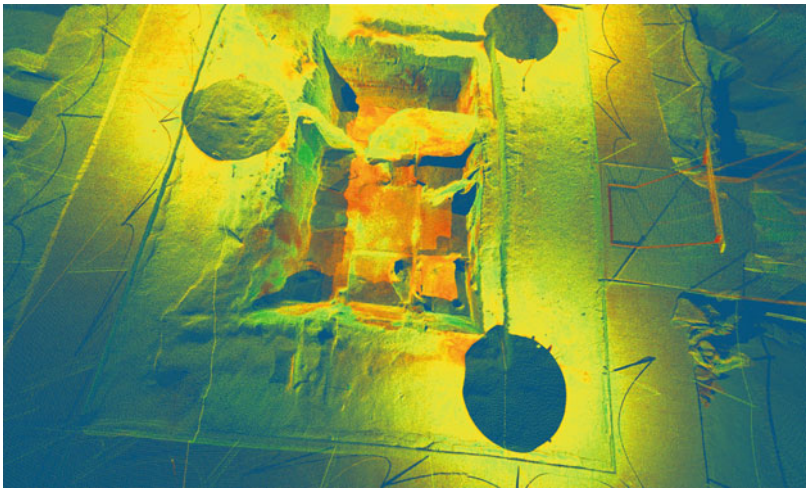

Visualizing Mediterranean Archaeology, Fig. 4 Laser scanning model of the building 77 at Çatalhöyük (a Neolithic house)

the users are able to explore collaboratively the virtual monument using 3D avatars.

Lately, the most advanced use of visualization system in archaeology is tele-immersion (Forte & Kurillo 2010): multiple users from different locations, as human avatars, can share the same cyberspace and operate in that environment almost as a real space. The primary goal of such collaborative frameworks is to facilitate immersive real-time interaction among distributed users. Collaborative applications must provide a communication channel to allow users to verbally communicate and interact with the data. One of the most interesting experiments in this system concerns the reconstruction of the excavation process, and the first case study was the Neolithic site of Çatalhöyük, Turkey (Forte et al. 2012). In this case, all the layers recorded by laser scanner, artifacts, GIS layers, and databases are shared in the 3D space (Figs. 5–6).

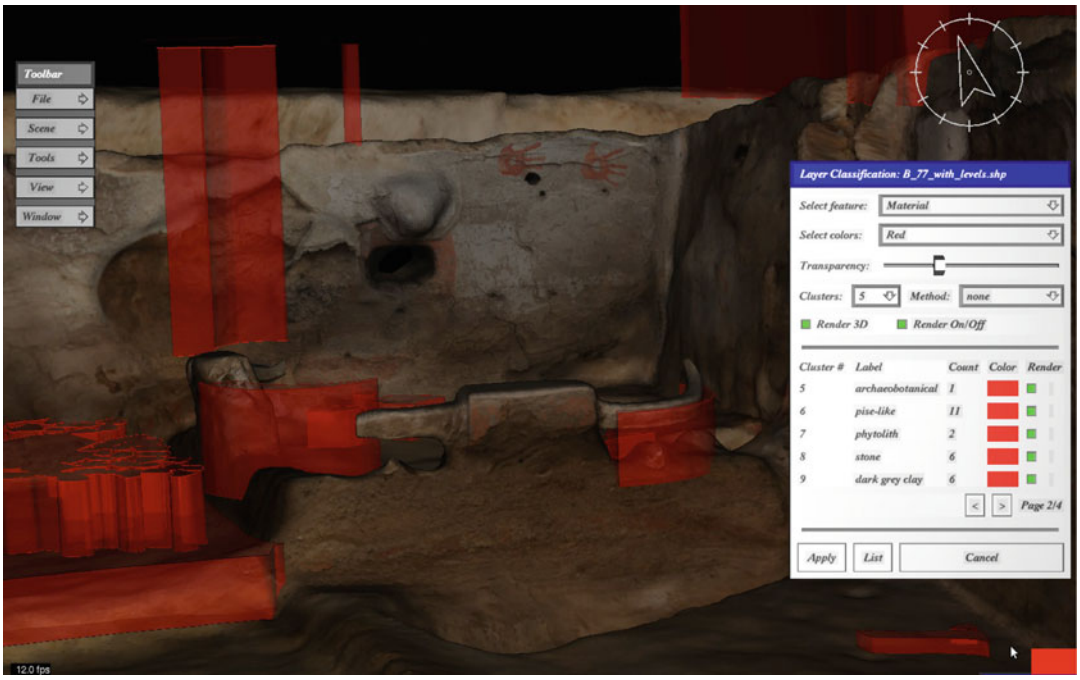

Visualizing Mediterranean Archaeology, Fig. 5 3D visualization of the archaeological informative system of Çatalhöyük (B77) – 3D Digging Project

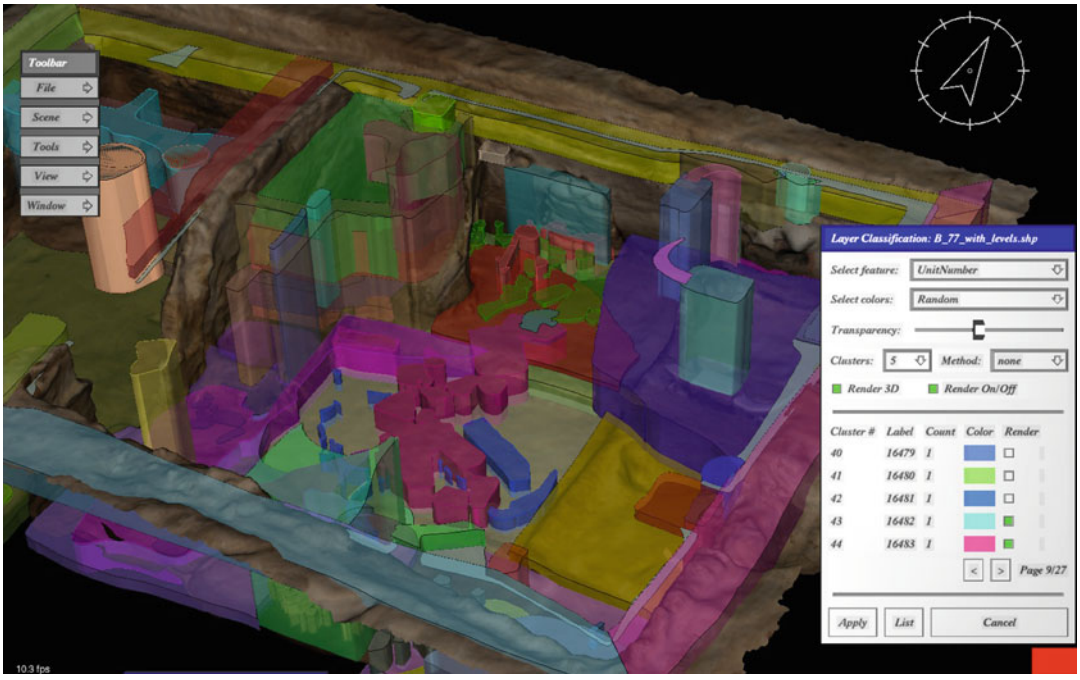

Visualizing Mediterranean Archaeology, Fig. 6 3D visualization of a Neolithic house at Çatalhöyük integrated with the GIS database

Key Issues/Current Debates

In the digital era, interpretation, reconstruction, and communication of the past are based on methods and technologies of visualization. This new era of visualization raises new research questions and concerns in relation to the representation of archaeological data in situ, during data collection, and in the interpretation phase. A big difference between what happens today in the domain of cyber-archaeology and the past archaeologies is that nowadays almost the entire workflow of data collection and visualization is digital, while in the past, it was mostly analog (Forte 2010a, b). The outcome of this phenomenon is that enormous quantities of archaeological data are born digital and they continue to evolve in digital environments, computers, labs, networks, and the Web. In fact, there is a substantial difference between digitizing analog information (e.g., scanning a photograph from a book or a printed map) and capturing data in digital format (i.e., by means of a 3D laser scanner). In the first case, there is a mediation analog-digital since the data are translated by two very different ontologies; in the second case, data are digitally generated directly on site.

Digital visualization and empirical data can have a dichotomous relationship if the methodological process is unclear and not transparent. In other words, a virtual reconstruction of a Neolithic house, for example, could be spectacular and photorealistic but also totally fake if not integrated within a consistent and scientific workflow of transparent data (maps, on-site documentation, databases, etc.). Therefore, authenticity, representation, validation, transparency, and other related factors pushed the community of archaeologists to discuss about standardization, guidelines, and best practice in the realization of digital archaeological models (Ryan 2001).

One of the first initiatives in this debate was the ICOMOS Ename Charter for the Interpretation and Presentation of Cultural Sites (http://www.enamecharter.org/initiative_0.html; Callebaut et al. 2002), aimed at analyzing problems of representation and communication of archaeological sites. Article 2.4 of the Charter reports that "Visual reconstructions, whether by artists, architects, or computer modelers, should be based upon detailed and systematic analysis of environmental, archaeological, architectural, and historical data, including analysis of written, oral and iconographic sources, and photography. The information sources, on which such visual renderings are based, should be clearly documented and alternative reconstructions based on the same evidence, when available, should be provided for comparison." Another initiative, CVRO (Cultural Virtual Reality Organization) was launched in 2001 (Frischer et al. 2002) with the scope to standardize and validate 3D models in virtual archaeology (Frischer et al. 2002: 9). Even if this initiative was unsuccessful, it pointed out some important methodological issues in digital visualization and representation. A more consistent and international initiative was the London Charter (Beacham et al. 2006; Bentkowska-Kafel & Denard 2012). The introduction to the Charter states: "The London Charter for the use of 3-dimensional visualization in the research and communication of cultural heritage seeks to establish what is required for 3D visualization to be, and to be seen to be, as intellectually rigorous and robust as any other research method. The initiative has to be seen in the context of what has become a constant burning issue in 3D visualization applications to cultural heritage: "transparency" (http://www.londoncharter.org/introduction.html)". The last initiative, named the Seville Principles, has tried to reconnect and update the former initiatives: "The spectacular growth of cultural tourism and the amazing technological advances in recent years have led to the development and implementation of a myriad of projects to investigate, preserve, interpret and present various elements of archaeological heritage using computer-based visualization. These projects have demonstrated not only the extraordinary potential of computer-based visualization but also its many weaknesses and inconsistencies. Therefore, there is a clear need for a theoretical debate with practical implications to enable heritage managers use the best that new technology can offer them in this area while minimizing its most controversial applications. In short, some basic

principles must be established to govern practices in this growing field" (http://cipa.icomos.org/fileadmin/template/doc/PRAGUE/096.pdf). Good selection and standardization of these basic principles is very difficult to achieve. All of these initiatives recalled the core of the debate: the scientific validation of the workflow of data producing any process of visualization, representation, and reconstruction. There is no visualization without reconstruction and data integration. In addition, this workflow has to be transparent, accessible, and shareable in order to comprehend the complexity of the digital hermeneutics. Transparency is an important factor in relation to the peremptoriness of virtual reconstruction: once a model is made by digital rendering, one does not offer alternative views to its interpretation. For this reason, it is important to keep track of all the steps undertaken for its production.

International Perspectives

The biggest change in archaeological visualization in the last decade was determined by the evolution of digital technologies and more advanced methods of data capturing and simulation. If the 1990s were characterized by a great development of virtual archaeology (VA), high-resolution static models made in computer graphics, the third millennium is characterized by cyber-archaeology (CA), whereas the models are dynamic and the interpretation is based on the interaction between users and virtual environments.

In cyber-archaeology, data are digitally captured in the field by different 3D technologies (e.g., laser scanners or photogrammetry), immediately visualized by tablet PCs or mobile computers, post-processed in laboratories for further analyses, and finally shared and again visualized on the Web or in virtual reality systems (Forte 2010a). This new and fast hermeneutic cycle generates new research questions and simulations and increases quality and quantity of information. The visualization speed in this new digital hermeneutic cycle is impressive: data are born visual and grow and spread out visually. In CA the entire simulation process is interactive and, in 3D, can process data individually or by a collaborative network or through virtual communities.

Going back to the historical background on the main topic of visualization and Mediterranean archaeology, it is interesting to note that there is a link between the great discoveries of the nineteenth century and the first experiments of visualization and representation. In fact, the first most important excavations in the Mediterranean region (e.g., Egypt, Greece, Italy, Middle East) made several archaeological sites very famous worldwide. Consequently, when the new potential of digital visualization emerged, these sites were the first to be virtually reconstructed and represented in their original hypothetical context (Forte & Siliotti 1997).

Future Directions

The involvement of digital visualization technologies in archaeology is consistently growing; it is possible to estimate that in the near future, most part of the archaeological fieldwork, survey, and on-site research will be based on real-time visualization. Real-time visualization means that all the data are processed simultaneously and the results are immediately available, visible, and interactive on-site and by different communities of users. This approach involves a strong interdisciplinary effort in the integration of different technologies but also in the methods of survey and excavation. This encompasses a deep transformation of archaeological theory and method and generates a new digital hermeneutics for archaeology. If the ontology of data, format, dimension, quality, and quantity changes, the interpretation process is different as well as the reconstruction and communication of the past. The next possible revolution in this domain is in the collaborative systems: in the virtual communities and in the co-participation of many different stakeholders and content managers. The former research in visualizing archaeological data was mainly focused on specific applications and not so much on revolutionary methods for studying and communicating archaeological data. In the future, stronger and distributed interdisciplinary efforts will be

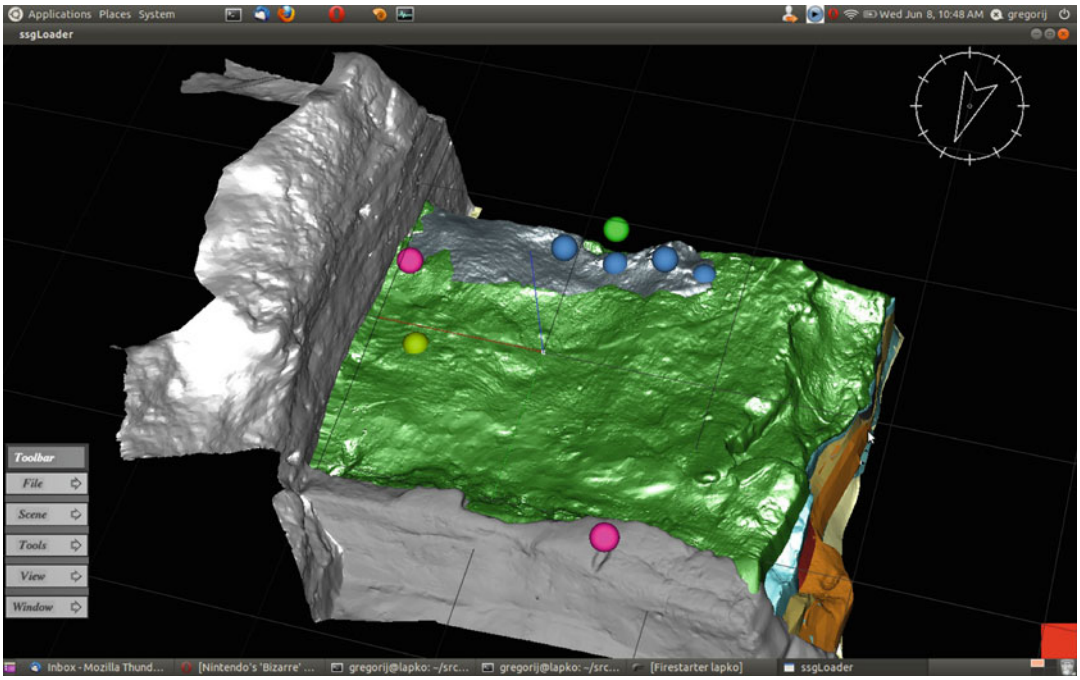

Visualizing Mediterranean Archaeology, Fig. 7 3D visualization of a micro-stratigraphy at Çatalhöyük with a selection of archaeological objects

concentrated on new and different ontologies of data and on the systematic use of "mediated" digital documentation (laser scanners, remote sensing, and so on). Mediated and remote tools of investigation operate almost in real time: it means that when a laser scanner records millions of point clouds (Fig. 4), or a stratigraphy (Fig. 7) is generated by computer vision in a tablet PC, the operator/the archaeologist is still there, comparing digital data on a screen and "real" data on-site. In other words, this is the domain of cyber-archaeology, whereas visualization is a performing activity and generates non-predetermined simulations.

A good example is the Çatalhöyük Research Project at the Neolithic site of Çatalhöyük, Turkey (Forte et al. 2012). The site, dating from 7400–6000 BCE is made up of two settlement mounds: Çatalhöyük East and Çatalhöyük West. Çatalhöyük East consists of 21 m of Neolithic deposits. Çatalhöyük West is 6 m high and is almost exclusively Chalcolithic (6000–5500 BCE). Furthermore, the two mounds span 2000 years and indicate a high degree of continuity though time: the house is the social-cultural pattern of the system, ritual space, and domestic and symbolic space. The site was inscribed in the UNESCO World Heritage list in 2012.

An experimental project of 3D archaeology and real-time visualization is ongoing since 2009 with the collaboration of different international teams. The main scope the project is the three-dimensional digital reproduction of the entire archaeological excavation visualizing and interpreting structures, artifacts, and stratigraphic layers. All fieldwork activities are based on 3D data recording by 3D laser scanning, digital photogrammetry, GIS, and remote sensing. This workflow involves the following stages: 3D learning, 3D digging-data recording, and 3D communication and reconstruction. The creation of an innovative digital workflow entirely three dimensional (from the field to the virtual reality) represents a revolutionary process for archaeological interpretation. This approach makes the excavation process, which removes physically all the spatial relations between layers and artifacts virtually "reversible." This work

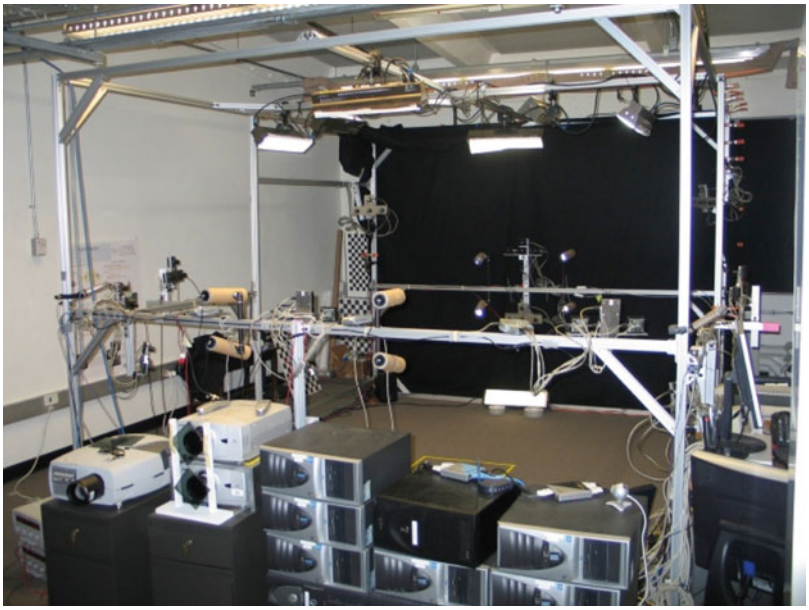

Visualizing Mediterranean Archaeology, Fig. 8 TeleArch: Teleimmersive Archaeology system installed at the University of California, Berkeley

allows the complex stratigraphy of the site to be explored, analyzed, and interpreted, thus promoting new questions about site processes.

After the fieldwork, all the data are post-processed by TeleArch (Fig. 8), a 3D virtual collaborative system (see an example here: http://tele-immersion.citris-uc.org/sites/ti6.citris-uc.org/files/ti_archeology.wmv) developed by the University of California, Merced, and by the University of California, Berkeley. The visualization and integration with TeleArch represents the final step of the digital workflow, starting from the archaeological fieldwork (data capturing), post-processing of models (meshing of point clouds), and digitalization of drawings and outlines to a GIS format. Once all the datasets are in TeleArch, it is possible to elaborate the 3D data in a collaborative way. At this stage, the simulation stimulates new feedback from the operator who can interact with models and data identifying new features not identifiable otherwise. The regeneration and simulation of 3D models in a cross-data platform can stimulate new interpretations and assist the research in the validation of the previous ones. In archaeology, this stage of data collection is crucial since during the excavation, a relevant amount of information is removed or destroyed during the digging procedures.

In conclusion, the future for digital visualization in archaeology is very challenging and not easily predictable, given the revolutionary speed at which digital technologies develop. Visualizing will mean interacting in real time with models, data, virtual reality systems, and simulation environments; visualizing will be a digital interactive performance with a high degree of embodiment for all the users and communities involved. The concept itself of digital visualization in archaeology has changed enormously in the past 30 years: originally involving the graphic rendering of static pictures and then the re-elaboration of dynamic models and environments created by user's avatars. It now includes a digital hermeneutics cycle generating new knowledge not in the reconstruction of a single past but in the simulation of possible pasts.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Aerial Archaeology
- ▶ Archaeological Informatics
- ▶ Archaeological Record
- ▶ Çatalhöyük Archaeological Site
- ▶ Cultural Heritage in the Digital Age

- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Management Technology and Training
- ▶ Europe: Paleolithic Art
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Internet, Archaeology of the
- ▶ Landscape Archaeology
- ▶ Media and Archaeology
- ▶ Topography of Rome
- ▶ Visualizing Mediterranean Archaeology

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Volcanic Activity

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Introduction

When measured on the timescale of a human lifetime, volcanic eruptions are, in most regions of the world, relatively rare phenomena. However, over historical, archaeological, and evolutionary timescales, volcanic eruptions occur frequently and they do so often in areas populated by humans. Nearly 10,000 volcanic eruptions are known from the Holocene alone (Siebert et al. 2010), and more than 2000 such events are known and dated from the late Quaternary. Most volcanologists consider these numbers to be severe underestimates of the actual number of eruptions that have taken place. Volcanic activity has thus been a facet of human life from even before the evolution of the lineage *Homo* in the tectonically and volcanically turbulent landscapes of eastern Africa (King & Bailey 2006). This entry covers the breadth of these interactions illustrated by a series of case studies, which together highlight the salient features of the relationships between humans and volcanism (see also Grattan 2006; Cashman & Giordano 2008).

Considerations of volcanic activity in archaeological contexts can broadly be divided into two categories: (1) volcanic eruptions and their fallout as temporal markers, and (2) volcanic eruptions as causes or catalysts for biological or cultural change. It is the latter aspect that has generated most controversy, but this entry suggests that the two can, should, and are increasingly being combined under a framework that takes account of past human vulnerability in a way that is sensitive both to the physical as well as the political, social, ecological, and historical constellations of the affected species and/or societies.

Definition

Volcanic activity ensues when molten rock (magma) is extruded onto the surface of the Earth; lava, pyroclastic materials, and/or volcanic gases erupt through an opening in the crustal surface termed a vent, and each of these types of ejecta constitutes a hazard to people living nearby (lava and pyroclastic flows, mud avalanches) as well as at some distance (gases and ash fallout). Volcanic activity is ultimately the result of plate tectonic activity (Fig. 1). Consequently, the vast majority of subaerial as well as submarine volcanoes are located along plate boundaries, for instance, along the so-called Ring of Fire that

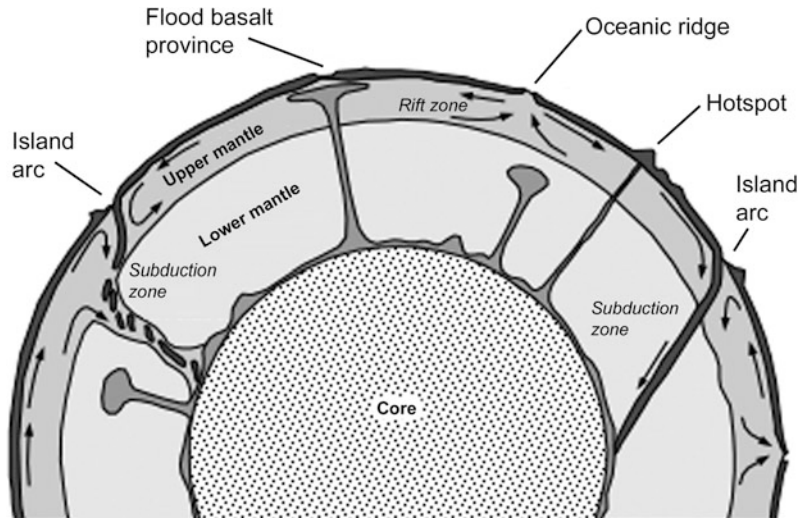

Volcanic Activity, Fig. 1 A schematic model of the Earth's mantle and the different volcanic systems

frames the Pacific Ocean. Here, continental plates either converge (subduction zones) or spread (rift zones) from each other, and both processes can lead to volcanic activity. Volcanoes can also be fed by so-called mantle plumes, which are accumulations of magma at unusually shallow depths in the Earth's mantle. These features create volcanic "hot spots" (e.g., Iceland, Hawaii, the Eifel region), which often persist over very long times and can rapidly build up critical masses of magma. These subterranean blowtorches burn through the mantle, and such mantle plumes underlie some of the world's largest volcanic provinces (e.g., flood basalts) and have fed many well-known eruptions.

Volcanic activity has a plethora faces, ranging from the gentle and barely noticeable extrusion of gas bubbles in water-filled craters to violent super-eruptions that affect climate on a global scale. The products of volcanic activity – for instance, the light and bubble-rich pumice and the durable basalt – have been used in many periods of prehistory and history to fashion tools, and as building material. The focus of this entry is the volcanic eruptions themselves, which are commonly rated using the Volcanic Explosivity Index (Fig. 2; Newhall & Self 1982). This semi-quantitative scale is similar to the better-known Richter scale for earthquakes in that it is logarithmic and it amalgamates several eruption parameters (volume ejected, plume height, eruption duration, and impact on weather systems and climate). Alternative schemes of classification employ more rigorously quantitative measures of eruption magnitude and intensity to make eruptions comparable. Just like volcanism takes many forms, so do the interactions of volcanic activity with human societies vary along a multitude of intersecting axes – volcanic, topographic, technological, economic, religious, and communication related (Blong 1984).

Historical Background

Volcanoes as destructive and productive geological agents have long fascinated scholars of natural history. Volcanic eruptions also hold a special place in the history of archaeology (Harris 2000). The eighteenth-century rediscovery and subsequent excavation of the ancient Roman towns of Pompeii and Herculaneum in the shadow of the still active volcano Mount Vesuvius and the vivid description of their destruction in CE 79 by Pliny the Younger has captured the attention and imagination of antiquarians, archaeologists, and the public alike (Sigurdsson 1999). Pompeii is today one of the most visited archaeological sites in the world and still features regularly in the media, albeit these days mostly for issues of conservation. Although tragic for the inhabitants of these places, the preservative effect of the ash-fall

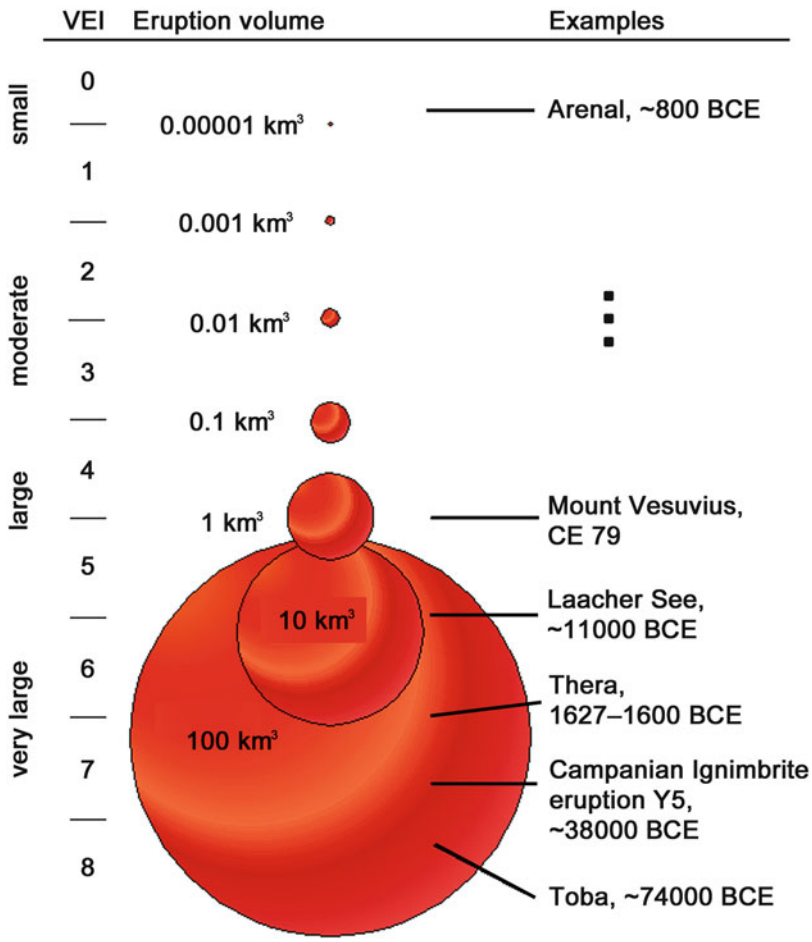

Volcanic Activity, Fig. 2 Graphic overview of the Volcanic Explosivity Index (VEI) with examples of past eruptions that have impacted human societies mentioned in the text

at these sited has been a boon to archaeology, allowing for reconstructions of Roman life with unprecedented detail. Similarly spectacular and at times macabre finds of buried settlements and their inhabitants are rare elsewhere in the world and from other periods, but by no means unknown. Indeed, recent work around Mount Vesuvius has revealed evidence of similar or even larger eruptions that buried earlier prehistoric hamlets and fields in the area. Likewise, the Bronze Age settlement of Akrotiri on Santorini in the Aegean Sea – buried by the cataclysmic Thera eruption (1600–1627 BCE) – also ranks among the most comprehensively researched archaeological sites in the world. In the Americas, the buried village sites of Cerén in El Salvador and Tetimpa in Mexico, for instance, have also provided incredulously detailed snapshots of past life. Much further back in time, the occasional Paleolithic site covered by ash fallout has also been discovered, and key episodes in human evolution and deep prehistory were likely affected in direct or indirect ways by volcanic activity: The first dispersals of hominids out of Africa was, at the almost two million-year-old locale of Dmanisi in Georgia, stopped short by a volcanic eruption; early *Homo sapiens* arguably experienced a severe genetic bottleneck following the Toba super-eruption; the fate of Neanderthals and early European modern humans may have been affected by a paroxysmal eruption at the Phlegraean Fields in Italy whose fallout ash is found as far afield as Russia (e.g., at the site of Kostenki); the re-colonization of northern Europe

Volcanic Activity, Table 1 The human impacts of recent (twentieth century) eruptions. Most eruptions entail several forms of response

Impact/response type	N, events recorded	N, people affected
Killed	~250	~90,000
Injured	~150	~16,000
Homeless/ infrastructure damage	~100	~300,000
Evacuated/migration	~250	~5,000,000

at the end of the Pleistocene was punctuated by the eruption of the Laacher See volcano in western Germany; the colonization of Oceania was both delayed by volcanic eruptions, but may at times also have been accelerated by them as eruption columns may have served as navigational markers for new islands otherwise hidden far below the horizon.

The remarkable discoveries of devastated settlements close to volcanoes do remain exceptional and, while valuable, illuminate merely one facet of past volcanic activity and its impact on human societies. The sheer destructive forces unleashed in the immediate vicinity of volcanic edifices render it unsurprising that towns and villages were occasionally annihilated and people killed. If, however, recent eruptions and their consequences serve as a useful analogue, then the indirect effects of volcanic events – often at some geographic remove from the eruptive center and articulated through migration – are much more significant (Table 1). In this vein, several scholars have put forward volcanic eruptions as prime movers or catalysts for cultural change as observed in the archaeological record. Various settlement crises, collapses, and similarly dramatic episodes have been attributed wholly or in part to volcanic activity. Yet, others have pointed out that the precise dating required to distinguish correlation from causation is often not in place, and also that volcanic events can stimulate creative and adaptive culture change rather than lead to collapse. The popularity of volcanically induced collapse scenarios has thus varied over time, depending as much on which particular case studies are discussed, as on whether a general model of gradual and continuous or episodic and punctuated culture change was en vogue.

Key Issues

Establishing whether and how volcanic activity has affected a given human society requires extensive empirical and usually interdisciplinary efforts. To-date, a substantial number of well-researched case studies from all parts of the world are available (Sheets & Grayson 1979; Torrence & Grattan 2002; Grattan & Torrence 2007). What is lacking, however, is a comparative framework within which these case studies reasonably can be evaluated in relation to each other, and from which general patterns of vulnerability, response, and impact can be extracted. Volcanic eruptions and their attendant ash (=tephra) fallout are in principle ideally suited to such comparative analyses. Unlike more general arguments about the effects of climate change or most other extreme geological events on human societies, the tephra layers produced by any given eruptions act as an archaeologically synchronous time-marker that allows for unique event-stratigraphic dating precision. Such layers can then be used to link proximal and distal fallout areas, facilitating the comparative investigation of the dynamics of impact anchored at a common point in time, and along a given geographic transect. In this way, the changing impact dynamics among different (but most likely linked) groups are thrown into relief; eruptions and their fallout can serve to bring past communities together through migration, but also separate them via their ecological effects. What is more, the proximal-to-distal dynamics of volcanic hazards also change dramatically and detailed empirical studies can make solid arguments for the presence of these hazards. To this end, volcanological and disaster scientific studies from present and recent eruptions can serve as a roadmap to formulating specific and testable hypotheses about how a given eruption in the past may have impacted societies in and near the affected areas.

Past Volcanism and Tephrochronology

Temporal control is essential to investigations of volcanic activity and its impact on communities in the past. The use of tephra in chronological studies is rapidly maturing, and several regions of the world now benefit from robust tephrochronological lattices that link lacustrine, marine, terrestrial, and ice-core records (Lowe 2011). Tephra analysis (especially the analysis of non-visible crypto-tephras) is not yet, however, part of archaeologists' standard analytical toolkit, and linking archaeological sequences directly to the environmental archives most often containing traces of volcanic fallout remains challenging. Efforts at collating large datasets of known tephra find localities of particular eruptions require the sifting of literature from a large number of disparate disciplines: geology, volcanology, soil science, palynology, and archaeology. Despite these difficulties, the ever-expanding regional tephrochronological lattices are now beginning to link more and more volcanic provinces together by eruption events detectible across stratigraphic sequences. This increasing linkage holds the promise of also being able to better synchronize regional archaeological sequences with each other and with relevant environmental archives. Methodological problems persist, however. The geochemical fingerprinting using laser-ablation inductively coupled plasma mass spectrometry as a gold standard remains costly, and not all tephras can be readily distinguished even via such high-powered methods. Miscorrelations and erroneous age-transfers are possible pitfalls. Furthermore, tephra layers – while themselves not organic – preserve best in stable environmental archives, i.e., many archaeological sites do not offer ideal preservation conditions for tephra. In addition, reworking can lead to the dissolution of initially discrete tephra layers, creating tephra "zones" of diffuse spread less useful for precise and accurate dating. Yet, tephrochronology is still a young discipline undergoing rapid methodological development and empirical expansion.

Past Volcanism, Vulnerability, and Impact

Although an ever-increasing number of well-researched case studies now exist, the potential of volcano and tephra studies in relation to past human vulnerability and impact is not yet fully realized. One issue arising out of the great precision with which tephrochronology can date, in particular, early prehistoric cultural sequences lies in the incompatibility of this event-stratigraphic framework with the usually less precise dating of cultural sequences either side of the ash strata obtained by other means. So, while a given eruption (even a very large one) may have been catastrophic for particular *communities* of early hominids or humans, they may not have left a lasting impact on these as a *species*. Given the generally poor chronological and geographic resolution of Paleolithic cultural sequences, a seemingly unchanging archaeological record can thus mask over even significant impacts of a given eruption at a local scale and over short- or medium-term timescales. This problem is further amplified by important differences between proximal and distal impacts, and by the difficulty of disentangling the temporalities of effects and impacts. The controversy surrounding case studies such as the impact of the very large Toba super-eruption (~74,000 years ago, Indonesia) with its claimed impact on human genetic diversity and the somewhat smaller but still cataclysmic Campanian Ignimbrite (Y5) eruption (~38,000 years ago, Italy) and its alleged influence on late Neanderthals and early anatomically modern humans in Europe exemplifies these difficulties. It is arguably first in the Late Glacial (and later) that the temporal resolution of the archaeological record begins to be such that the effects on communities rather than species can meaningfully be addressed: In the Late Glacial of northern Europe, for instance, hunter-gatherer groups living at low population densities were affected by a low frequency/high magnitude eruption of the Laacher See volcano located between the present-day cities of Koblenz and Bonn in westernmost Germany. This volcano erupted after a long period of quiescence just after a cold spell that punctuated the otherwise mild and stable Allerød interstadial. The eruption blanketted an area of over 1,400 km^2 in extent around the eruption site, and so preserved archaeological and

paleoenvironmental features of that time. This includes some of the richest archaeological sites known from this period (e.g., Gönnersdorf) as well as animal tracks, burned woodland areas, and all manner of macrobotanical remains. The nearby River Rhine was dammed up and when this dam broke, flood waves transported vast amounts of rafting pumice and tephra along the Rhine drainage. Flooding features can be far traced downstream and Laacher See tephra has now been found as far as the English Channel. Thanks to the charred tree trunks preserved in the ejecta, the eruption is dated with very high precision to 12,916 calendar years BP, and the tephra fallout from this weeks-to-months long event is found over large parts of Europe. Yet, no sites in the near-vent region exist that attest to the presence of people in the area immediately prior to the eruption. Indeed, there is one site just north of the area of complete devastation, which may be as little as 200 years younger than the eruption itself. Clearly, people did move back after the event, although their presence in the centuries following the eruption seems to have been ephemeral at best. In contrast to the near-vent area, some regions that received medial and distal fallout appear to have been fully deserted by people following the eruption. Several sites directly covered by air-fall tephra from the Laacher See volcano – after nearly 13,000 years of compression still up to 40 cm thick some 230 km and 10 cm thick some 350 km northeast of the eruptive center – attest to this. The ash fallout likely affected plant and animal populations negatively due to its very fine-grained composition posing a respiratory health hazard, due to the hardness of the tephra particles dramatically increasing tooth-wear, and because the tephra was highly loaded with poisonous substances such as fluoride. The seasonal timing of the eruption in late spring/early summer further aggravated the ecological effects on animals and plants as seedlings and young animals were less able to withstand the stress generated by the tephra fallout. Although the resolution of our paleoenvironmental archives is rarely good enough to demonstrate such effects as far back in time as the Late Glacial, observations of the effect of tephra fallout on fertility and soil balance in recent times suggest that fallout deeper than 15 cm effectively sterilizes the soil, requiring a lengthy process of regeneration. In addition to these mechanisms, the eruption also affected climate and weather patterns for some time. It led to unusual optical phenomena, and extremely loud sounds as well as pressure waves were probably also generated. The eruption column alone would, on a fine day, have been visible over large parts of Europe. The very tangible environmental effects of the eruption combined with its extreme multisensory aftermath for a substantial impact on those groups living at the periphery of the contemporaneous macro-community. Groups may already have been stressed by the cold phase immediately preceding the eruption, and the abandonment of the affected landscape disrupted important travel, trade, and communication routes leading, in turn, to the isolation of groups in southern Scandinavia. This demographic isolation appears then to have precipitated notable consequences such as the loss of bow-and-arrow technology, a general reduction of material culture complexity (as measured by the lithic chaine opératoire), and a (perhaps willing) geographic separation from more central continental groups. This separation takes archaeological form in the so-called Bromme culture, the only autochthonous Late Glacial culture in northern Europe (Riede 2008). This argument is not uncontested, with issues of chronology and material culture interpretation being central to such counterclaims – not surprising given that the otherwise elastic timescales of the Paleolithic here need to be contracted to decadal resolution. Future research should, however, be able to resolve these questions, and Bayesian modeling in particular of those dates available may offer a way forward. Such debate notwithstanding, the brief discussion of this case study serves here to highlight that any arguments about the impact of past eruptions should be sensitive to the kind of indirect (often network or migration mediated) "cascade effects" of eruptions. Importantly, these are often most clearly seen in areas not themselves directly affected by a given eruption and its fallout.

International Perspectives

Volcanic activity does not respect current national borders and, as such, the study of past volcanism almost automatically is given an international dimension. In fact, regional research biases can significantly distort the known distribution of tephra fallout. Even if a given volcano and its fallout affected only one country, it is likely that the indirect effects of this event can be seen and explored in the archaeology of another. It is interesting to note that recent years have seen an increasing interest in past volcanic events specifically in regions that are not volcanically very active today (e.g., Europe north of the Alps). Recent eruptions there and their impact, coupled with the evident impact of other extreme geological events (e.g., tsunamis and earthquakes), as well as advances in quaternary science and volcanology have contributed to setting past volcanic activity high on research and funding agendas. The combined power of tephrochronology and of past disaster science in addressing past vulnerability and resilience duly justifies this attention.

Future Directions

Why study past volcanism and its interaction with human societies, and what are the challenges for future research? As noted in the introduction, volcanism is a relatively rare phenomenon over short timescales. Thus, the data available for evaluating the ecological, economic, and social impact of eruptions in the present and future remain scarce. If we want to understand the long-term impact of such events on societies, and if there is a causal relationship between long-term patterns of (pre-eruption) vulnerability and (post-eruption) responses and impacts, only archaeology really has access to the necessary temporal perspective (Fig. 3). In addition, the many case studies of the impacts of volcanic eruptions on societies at different levels of economic and political complexity can be used to reflect on and retrospectively analyze the specific constellations of vulnerability that existed among those affected groups. Using the eruption and its fallout layer as a chronostratigraphic marker in a dual analytical sense, i.e., as a literal chronological as well as a cultural "time zero," it is possible and imperative to look at the societies before *and* after the event. Such an attention to past disasters is worthwhile and pressing as disaster scientists have long argued that any research into vulnerability and post-disaster recovery must be sensitive to the affected groups' history. Disasters are seen as "revealers" of such vulnerability (García-Acosta 2002: 50), which is a composite of economic, ecological, political, and social network factors that require broad knowledge of the societies in question. Ecological and social vulnerabilities are intimately linked, and simplistic scenarios of the human impact of volcanic events are no longer tenable. Indeed, recent eruptions such as the 2010 Eyjafjallajökull event highlight that eruption size always underdetermines the extent of impact and the particular responses chosen. This eruption was small and the volcano located far away from major centers of human occupation. Yet, many people experienced it as a catastrophe (Lund & Benediktsson 2011). Rather than the geophysical parameters alone, the ways in which an eruption intersected with the economy, mobility patterns, and political and religious structures of the affected groups are more important. It has also been shown that, from contemporary to prehistoric societies, religious worldviews have an important role to play in shaping disaster responses. Vice versa, some theologians argue that volcanic events have played a role in shaping the foundations of major religions either through what has been termed "geo-mythology" or, if loss of life and property are involved, via issues of theodicy (the justification of suffering in light of divine benevolence). Yet, archaeologists generally look first or indeed exclusively toward the climatic or ecological impact of eruption for explaining the cultural changes (or lack thereof) documented in the archaeological record. But can we identify, for instance, the religious repercussions and responses to volcanic activity in the archaeological record, and can we use these as explanatory elements for long-term culture

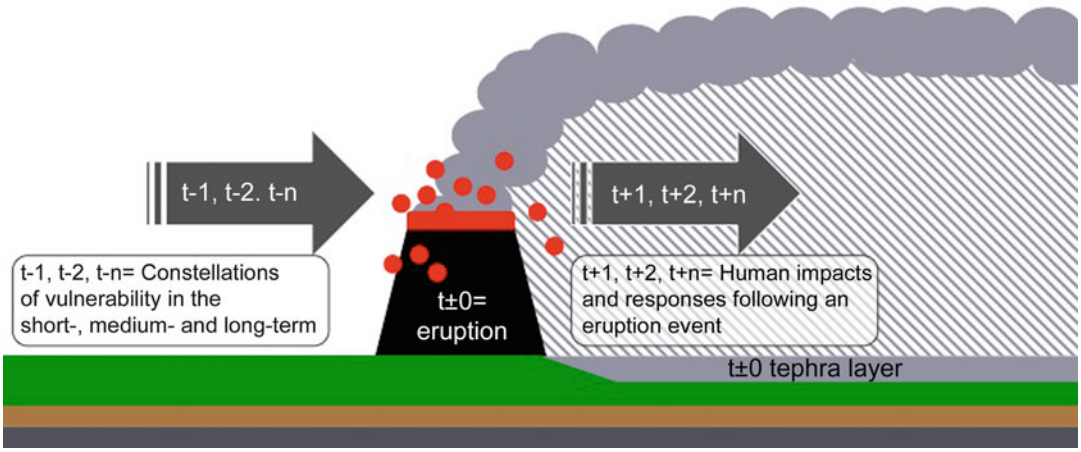

Volcanic Activity, Fig. 3 Volcanic eruptions as temporal and analytical markers, especially for investigating long-term patterns of (pre-eruption) vulnerability and (post-eruption) responses. Disciplines such as anthropology, sociology, and history provide insights into the short and medium term, whereas archaeology provides insights into the long term

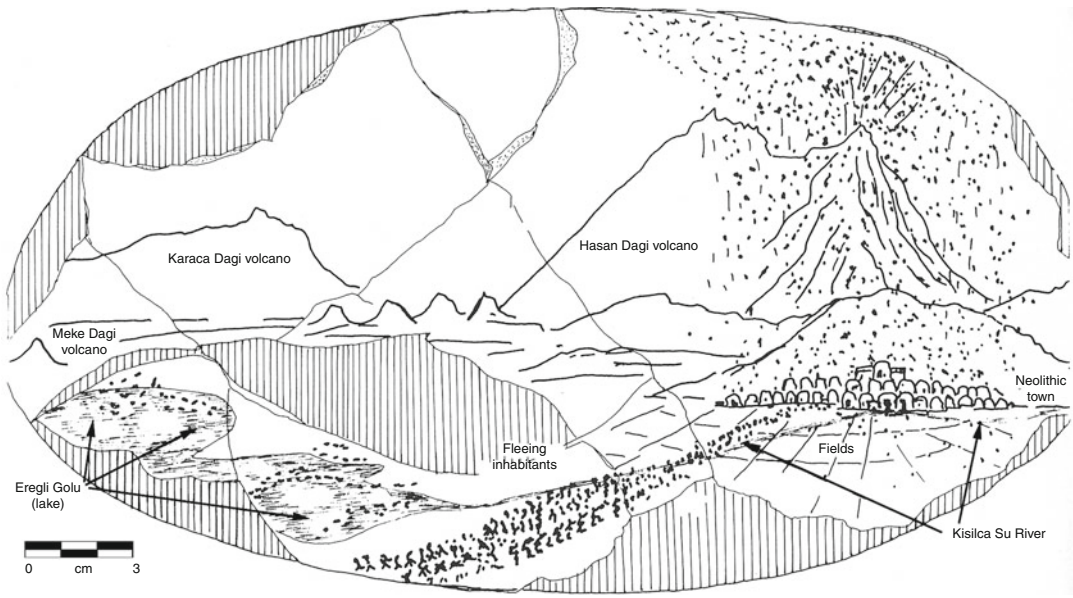

Volcanic Activity, Fig. 4 A mural from the famous early Neolithic settlement of Çatalhöyük (Turkey) arguably showing an erupting volcano, possibly Hasan Dagi, and fleeing villagers. The areas marked with vertical stripes are not preserved

changes? Although contested, some murals at Çatalhöyük in present-day Turkey depict volcanic disasters (Fig. 4). Intriguingly, sites such as Asiklihöyük may be representative of earlier aceramic Neolithic villages affected by ash-fall, and the refugees from this or other yet undiscovered sites may be the founders of Çatalhöyük. Such destruction events may thus have formed an integral part of the early religious systems evident at that site. Similarly, at Arenal

in Costa Rica, it has been demonstrated that religiously motivated mobility – pilgrimages – rather than economic or other concerns drew people back to areas devastated by eruptions (Sheets 2011). It seems clear that religious sense-making structured and continues to structure responses to volcanic hazards, and the climatic and ecological effects of even minor volcanic activity can be greatly amplified by such worldviews (Chester 2005). Much like disaster scientists have called for more attention to history, they have also urged for individual agency to be considered more fully. While at times limited by their data resolution, archaeologists are theoretically well equipped to follow this call. Viewing past societies as internally heterogeneous allows for a more nuanced understanding of past disasters and their impact: Any given volcanic event can be detrimental to some, beneficial to others. Religious movements, for instance, often use such events to drive or suppress social change.

Investigations of contemporaneous disasters, and here especially of volcanic eruptions, have long been the resort of geoscientists. Over the last decades, however, the so-called radical approach emerged in partial opposition to the former dominant way of studying catastrophes and their consequences (Alexander 2000). The radical school attempts to give more room to human individual and collective agency, history, and politics in assessing the impact of a given event on the impacted societies. In this way, the agenda of radical disasters science matches very well that of many post-processual archaeological approaches, albeit without jettisoning the notion of human ecology. If approached from this angle, past disasters hold the potential of bridging the theoretical divide between classic functionalist-ecological and interpretative approaches in archaeology as no single perspective can amply address issues of vulnerability, impact, and response. Finally, future work could benefit from an ethnoarchaeology of volcanic activity. While past eruptions are already routinely used as information sources for future eruption scenarios, volcanological, sociological, and anthropological studies of contemporary volcanic events rarely if ever include considerations of the material aspects of vulnerability and impact beyond basic infrastructural concerns. In line with arguments about the role of archaeology in other disasters (Gould 2007), such a volcanic ethnoarchaeology could also contribute to alleviating the stress in the aftermath of future eruptions. On a broader scale, interdisciplinary approaches that investigate the twin aspects of vulnerability and impact from the present into the deep past will no doubt yield important insights into the diversity, patterns, and determinants of individual and group responses to volcanic activity, and may suggest ways to survive and handle such events in the future (Cooper & Sheets 2012).

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Dating Techniques in Archaeological Science
- ▶ Dmanisi Hominins and Archaeology
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Gould, Richard A.
- ▶ Gönnersdorf (Magdalenian): Geography and Culture
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Kostenki: Geography and Culture

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Volunteers in Archaeology

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Introduction

Archaeology's beginnings in antiquarianism were largely the result of the enthusiasm of amateurs, investigating archaeological sites outside the boundaries of their usual professions. While not true volunteering in a sense, this approach led to many early archaeological studies being conducted in this way and often entirely funded by wealthy benefactors. The development of academic archaeology in the first half of the twentieth century and then commercial archaeology in the second moved archaeology into the realms of a profession and changed the way volunteers were able to be involved. However, archaeology still includes significant contributions from volunteers. The development of these more professional approaches to archaeology has not been without their problems. Indeed it has been suggested that low median wages within the profession are the result of the development of archaeology from what were essentially volunteer roots. For example, Aitchison (2004) has argued that the view still exists that archaeology is something that is conducted for the love of it, rather than for remuneration. Archaeology as a discipline still

struggles today to reconcile these ethical issues of successfully combining professional standards and volunteer labor.

Definition

The United Nations (2001) defines volunteering as any activity that is undertaken by an individual of their own free will, for the benefit of others (and themselves) and without expectation of financial remuneration. The use of volunteer labor is generally considered to be ethically acceptable only when it is used for a not-for-profit motive. It is within this broad definition that we discuss volunteering in archaeology.

Key Issues/Current Debates/Future Directions/Examples

Many opportunities for volunteering exist within archaeology and related heritage fields. While the most obvious involve excavations, these opportunities are often rare, places are competitive, and on occasion travel costs have to be met by the volunteer. When excavations for the purposes of research do occur, they are generally undertaken by archaeologists associated with universities or other similar research institutions. Volunteer places are often more readily available with state and local government departments, museums, and historical societies or as part of professional archaeological organizations. Such positions can involve a wide range of tasks not always directly related to archaeology but can include curating artifact assemblages, undertaking research, or working as guides at heritage places. Institutions like those mentioned are commonly not for profit or rely on grant funding for their research. In such situations, volunteers are essential as budgets rarely extend to pay salaries. In best practice use of volunteer labor, volunteers are considered as unpaid employees, with the same rights and responsibilities as paid workers. Within this paradigm, employers provide training and insurance and cover the out-of-pocket costs for volunteers engaged in archaeological work. However, a study of volunteering within the museum sector (Holmes 2006) suggested that only about half of the institutions who use volunteer labor provide these forms of support.

Archaeological volunteering can be undertaken by people with varying levels of experience, and volunteers can be broken into one of three broad groups. "Students" are those people enrolled in and working towards the attainment of a university degree in archaeology. "Qualified archaeologists" are volunteers with a recognized qualification (usually university level) who may or may not also be working as professional archaeologists. So-called enthusiastic amateurs are people with an interest, but without any specific qualifications, in archaeology.

For students hoping to work in archaeology after graduation, volunteering is a way to gain or refine essential practical skills. Practical training can be rare within structured university classes, and as a result such experience is frequently acquired through volunteer work. Hands-on training is important for teaching both necessary archaeological techniques such as survey and excavation but also essential fieldwork etiquette including not standing too close to the edge of a trench and pitching in with the washing up. A student with a wide range of field experience and a demonstrated ability to work in tough conditions will easily impress future employers over other less experienced candidates.

Often what defines the boundaries of a "volunteer" in archaeology are blurred. While students are encouraged to gain volunteer field experience, in some countries a fieldwork component is a compulsory part of an archaeology degree. In this case what students are primarily engaged in is a program of work experience rather than true volunteering, particularly where they are required to pay to attend field schools or similar. Most students cease volunteering once they receive their archaeological qualification and take up jobs within the profession.

Qualified archaeologists also frequently volunteer their time or expertise. Numerous professional bodies are available for archaeologists to join, and many of these are run by professional

archaeologists often in a voluntary capacity. For example, the *World Archaeological Congress* (WAC), formed in 1986, is an international organization run by archaeologists on a voluntary basis to create a global network of researchers and advocate on the behalf of archaeology (World Archaeological Congress 2010). WAC is also responsible for the Archaeologists Without Borders program, which supports disadvantaged countries by funding professional archaeologists working on a voluntary basis to visit and share their expertise (World Archaeological Congress 2009).

Enthusiastic amateurs are members of the public who are interested in archaeology, heritage, or looking for new experiences. There are a number of ethical considerations with using enthusiastic amateurs to conduct archaeological fieldwork. Based on the concept of excavation as destruction, some practitioners question whether it is ethically acceptable to have volunteers with limited experience engaged in processes which effectively destroy the resource being investigated, suggesting that unqualified volunteers may miss vital data due to a lack of appropriate training. However this argument has been countered on a number of grounds, including that no archaeological project is capable of recording all data and that all members of the community have a right to engage with heritage. This argument suggests that so-called amateurs are not simple passive consumers of heritage, but instead have an intrinsic interest in the process and outputs of archaeology. It is within this paradigm that community or public archaeological projects include nonprofessional volunteers as a standard approach. An example is ongoing excavations at Sedgeford in the UK since 1996. This project is entirely staffed by volunteers at all levels and is designed to be an ongoing, multidisciplinary, inclusive community archaeological project (Faulkner 2000). All participants, whether qualified archaeologists or local enthusiasts, work on the project as volunteers, towards a common goal, and between 50 and 75 volunteers work at the site each year. The inclusion of enthusiastic amateurs in archaeological fieldwork also provides a labor force that allows large-scale projects that may otherwise be impossible. For example, large-scale field-walking over a wide area can be achieved using volunteer labor. Likewise the inclusion of metal detectorist volunteers in archaeological projects is becoming more commonplace. Volunteers are also employed in an ongoing capacity to help create essential records of at risk archaeological sites. Shorewatch, a UK project started in 1997, relies on the efforts of local communities to manage exposed archaeological sites on Scotland's coast which are under threat from environmental pressures (Dawson 2011). As part of this project, local groups are trained in recording methodology and are provided with recording forms and equipment; this allows groups to record sites as well as monitor their ongoing preservation.

The involvement of local community as has been discussed above can provide both essential labor and a strong support base for archaeology and related heritage fields. In this and other documented capacities, volunteers will continue to play an essential role in archaeology both for the successful completion of individual projects and for the ongoing interpretation and care of archaeological sites and collections.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Field Schools, Archaeological
- ▶ Stakeholders and Community Participation
- ▶ World Archaeological Congress (WAC)

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von den Driesch, Angela, Fig. 1 Angela von den Driesch, 1934–2012

von den Driesch, Angela

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Basic Biographical Information

Angela von den Driesch (Fig. 1), née Karpf, was a German veterinarian, archaeozoologist, and university professor. Born in Dresden (Saxony) on July 11, 1934, she grew up in Tegernsee (Bavaria). After graduating from secondary school and attending a language school, she studied veterinary medicine in Munich and Zurich from 1957 to 1962. Two years after obtaining her license to practice veterinary medicine, she received her doctorate in veterinary medicine. When in 1965 Joachim Boessneck (1925–1991) became the first chair of the newly founded Institut für Paläoanatomie, Domestikationsforschung und Geschichte der Tiermedizin (Institute of Palaeoanatomy, Domestication Research and the History of Veterinary Medicine) at the veterinary faculty of the Ludwig-Maximilians-Universität München, he appointed Angela von den Driesch as his assistant. In 1970, she passed her habilitation (German postdoctoral lecture qualification) and was appointed to a professorship at the institute in 1978. After the early death of Joachim Boessneck in 1991, she succeeded him as chair of the institute until her retirement in 1999. She was an active researcher until her death on January 4, 2012.

Major Accomplishments

Angela von den Driesch started her career at a time when the importance of the natural sciences in archaeology and in prehistoric archaeology in particular increased rapidly. Archaeologists realized that archaeozoology among other disciplines could offer valuable data relative to subsistence and ritual practices in prehistoric societies as well as to the local

environmental conditions prevailing during site occupation. Through their cooperation in international teams, Angela von den Driesch and Joachim Boessneck essentially influenced the development of archaeozoology as a discipline in Europe and the Near East, which is reflected in their impressive common publication record (Publikationsliste n.d.). Angela von den Driesch participated in excavations in Europe (mainly Germany, Spain, and Greece), the Middle East, Central and Southeast Asia, and Northern and South Africa. As a dedicated teacher, she not only trained young scientists in the lecture hall and the lab of the institute but offered them the opportunity to gain experience abroad in the field.

Since archaeozoology was and sometimes still is considered an auxiliary discipline to archaeology, it certainly was an advantage that von den Driesch was trained as a veterinarian and therefore advocated for archaeozoology as an independent research discipline with study materials and questions as well as methods of its own. In 1976, she published "A guide to the measurement of animal bones from archaeological sites" – a key reference for documenting bone dimensions in mammals and birds, which soon thereafter became the international standard for archaeozoologists worldwide. Her own research centered on the human-animal relationship in the past, but aspects like animal palaeopathology, ichthyoarchaeology (von den Driesch 1994), or ungulate domestication received particular attention (e.g., Peters et al. 1999; von den Driesch et al. 2008).

Her second field of expertise was the history of veterinary medicine (von den Driesch & Peters 2003). Her studies covered pictorial evidence and texts dealing with animal pathologies, the usage or treatment of domestic animals as passed down by Mesopotamian, Egyptian, Greek, Latin, Arabic, Chinese, and Tibetan artists and authors from early historic to modern times as well as the traditions in veterinarian folk medicine of various peoples – in collaboration with philologists of the respective languages (Maurer & von den Driesch 2006). She was one of only few researchers that combined profound veterinary knowledge with that of the history of veterinary medicine including the diseases of animals evidenced in archaeological sites (e.g., von den Driesch et al. 2004).

When founded, the Munich institute could only rely on a small collection of skeletons so that Boessneck and von den Driesch had to build up a collection for professional archaeozoological use. With their focus on animal remains from prehistoric contexts from Europe, Asia, and Africa, many exotic and meanwhile rare species were needed and could be obtained with the help of zoological gardens and donors or while in the field. First interested in and later a specialist in ichthyoarchaeology, Angela von den Driesch put much effort into the fish reference collection, preparing herself specimens obtained in fish markets from, e.g., the Mediterranean region, Central Europe, North and South Africa, and East and South Arabia. Totaling c. 20,000 skeletons of more than 2,700 vertebrate taxa, the Munich collection today is an extremely valuable and most comprehensive archaeozoological reference.

As many of the so-called small subjects at universities, archaeozoology often has to face the shortage of resources, even to the point of closing down institutions. After Boessneck's unexpected death, this threat became real for the Institut für Paläoanatomie, but von den Driesch could avert it for the time until her retirement. Owing to Angela von den Driesch's farsightedness, the reference collection of the Munich institute was merged with the already-existing Bayerische Staatssammlung für Anthropologie to the new Staatssammlung für Anthropologie und Paläoanatomie München, hence securing beyond her tenure the future of the collections as well as that of the institute. The chair of the Munich institute is now codirector of the state collection.

She was a founding member of the International Council for Archaeozoology (ICAZ) and visiting professor at Pretoria, Cape Town, Phnom Penh, and Madrid, at the *Ecole nationale véterinaire de Toulouse* and Harvard University, Boston. Her merits are also reflected in the honors she received: silver medal *bene merenti* of the Bavarian Academy of Sciences; corresponding

member of the German Archaeological Institute, Berlin, and the Austrian Archaeological Institute, Vienna; professor *honoris causa* in the Faculty of Philosophy at the University of Granada; and the Sarton Chair of the History of Science at the State University of Ghent.

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- ▶ Animal Paleopathology
- ▶ Camels: Domestication
- ▶ Göbekli Tepe: Agriculture and Domestication
- ▶ Ichthyoarchaeology
- ▶ International Council for Archaeozoology (ICAZ)
- ▶ Zooarchaeology

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Walsh, Grahame Leslie

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Biographical Information

Grahame Leslie Walsh was born on the 20th of September 1944 in Roma, Queensland, Australia, and he died on the 18th of August 2007, in Brisbane, Queensland, Australia. Walsh's early years were spent on a Queensland sheep and cattle station where at 13 he was introduced to rock art, an interest he pursued for the rest of his life. After 4 years of high school, he worked as an assistant to a newspaper photographer where he began to develop his photographic skills. In 1977 he became an Aboriginal Site Recorder and later Historic Sites Officer with the Queensland National Parks and Wildlife Service (QNPWS). In this role Walsh undertook systematic recording of cultural heritage sites across Queensland using his own detailed recording system.

In the same year, he began annual visits to the Kimberley area of Western Australia and the Victoria River Downs area in the Northern Territory studying, comparing, and recording the rock art of these two regions.

Walsh established the Takarakka Rock Art Research Centre at Carnarvon Gorge, Queensland in 1984 and began to collate and organize his collection. Supported by the Australian Bicentennial Authority's National Aboriginal and Torres Strait Islander Program, he produced a book on Australia's rock art for the 1988 Bicentenary. In 1989 he took a position as a cultural consultant (specializing in rock art) with the Dreamtime Cultural Centre in Rockhampton, run by Traditional Owners. From thereon Walsh became a full-time independent rock art researcher, and his annual field trip to the Kimberley was extended to 3–4 months.

Between then and his death he focused increasingly on Kimberley rock art, publishing and presenting at numerous conferences, workshops, and private lectures in Australia, Europe, and the USA. He initiated multi-disciplinary rock art research projects and amassed a huge database of sites and associated information. He attracted private funding and a large number of committed volunteers because of his dedication, his mastery of his subject, and his ability to engage others in the possibilities of rock art research, to explain the past.

He was awarded a D.Litt. from the University of Melbourne in 2004. The citation in part read "His contribution to the field of rock art research, management and conservation has been immense, and of international as well as national significance." He was awarded a Ph.D. from Griffith University in 2007 for his *Development of Australian Rock Art Recording Methodologies for the Recording and Interpretation of Cultural and Environmental Histories*.

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Walsh, Grahame Leslie, Fig. 1 Examples of headdress detail, body decoration, and body style identified within the Kimberley rock art sequence (After Walsh 2000: 95)

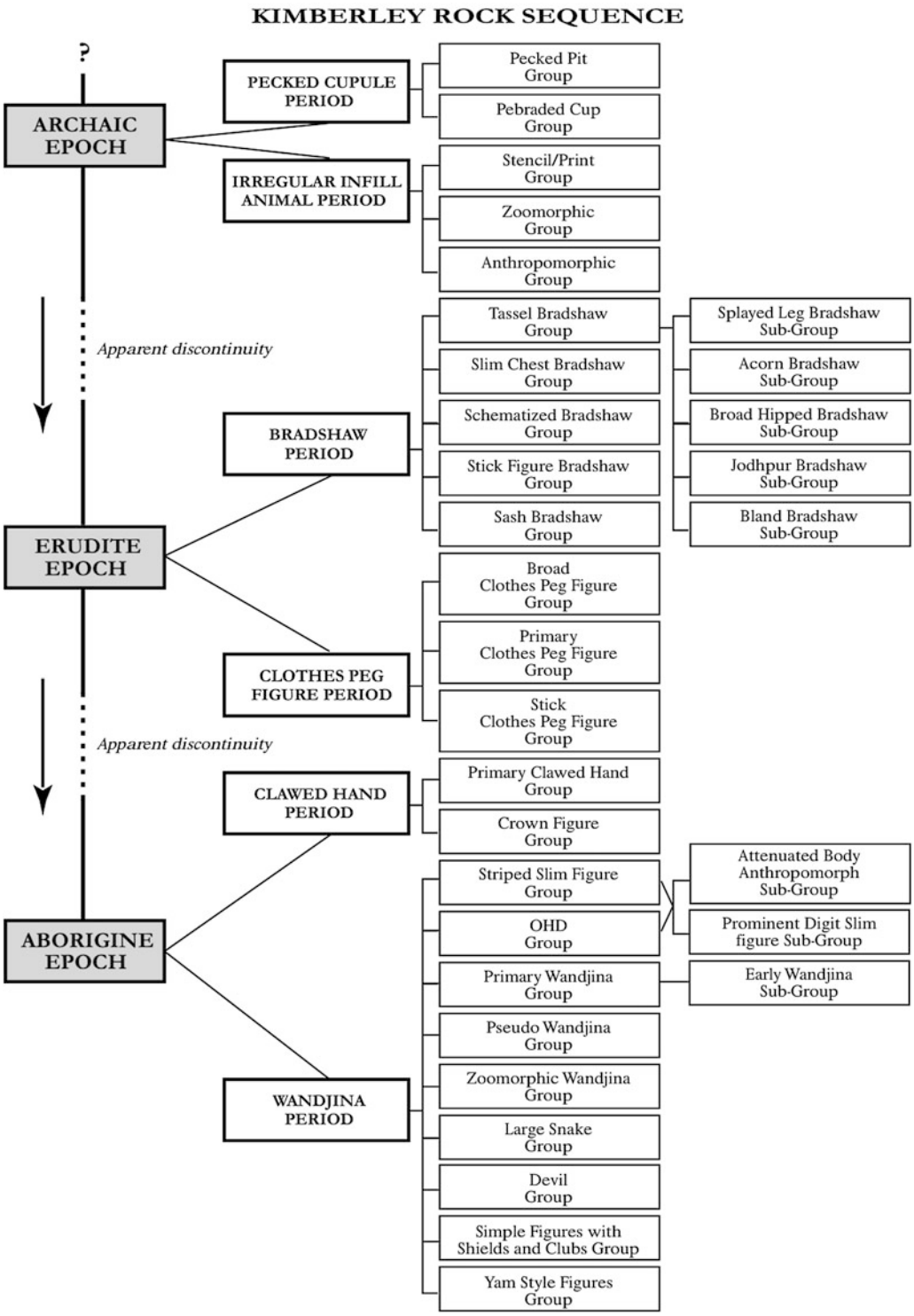

Walsh, Grahame Leslie, Fig. 2 Walsh's Kimberley rock art sequence showing division of the art into major epochs, periods, groups, and subgroups based on style and relative age

Walsh, Grahame Leslie, Fig. 3 G.L. Walsh with Traditional Owner, Dicky Udmarra, recording Ungud mythology, Kimberley, 1989

Major Accomplishments

Grahame Leslie Walsh made a significant contribution to the understanding, protection, and documentation of Australian rock art. He accumulated a vast database of Australian rock art over a period of more than 35 years and developed a sophisticated and detailed recording methodology. He collected many traditional stories and myths from Aboriginal informants across the country. He produced several significant publications on Australian rock art.

In the 1970s, Walsh conducted research throughout the Central Queensland Sandstone Belt (CQSB). He worked on cultural site management and developed the first plans to manage visitor access in the Carnarvon Gorge and Mt Moffatt National Parks by designing and constructing boardwalks and interpretive signage as well as allocating areas for restricted access.

Walsh's documentation of cultural heritage included many other rock art regions in Queensland, and he undertook pioneering recording work in the Mitchell and Palmer Rivers of far North Queensland (1984), the Flinders Island Group of Islands and Princess Charlotte Bay (1983–1986), Lawn Hill National Park (1982–1984), Hook Island, White Mountains (1983), and the Jane Table Hill area of Lakefield National Park (1986).

Walsh's role in the QNPWS encouraged the organization to recognize the importance of protecting cultural heritage sites on lands under its control, changing from its sole focus on natural heritage. Project Duwardi at Lawn Hill (1982–1984) saw Walsh working with Traditional Owners to document the rock art of this area and the development of a management plan for the National Park's cultural sites.

His documenting and photographing of significant rock art across the country culminated in the publication of the highly acclaimed *Australia's Greatest Rock Art*.

Walsh's best-known research was in the Kimberley region of Western Australia. He was the first to recognize and draw attention to the extent, quality, diversity, and significance of Kimberley rock art. His unpublished *Terminology of Australian Rock Art* includes over 900 identifiable elements for Kimberley rock art (Fig. 1). His understanding of these recurring motifs and styles enabled Walsh to develop a relative chronology of Kimberley rock art (Fig. 2). He developed innovative, and sometimes controversial, theories about cultural and environmental changes of the region's past. He produced two major publications: *Bradshaws: Ancient Rock Paintings of North-West Australia* and *Bradshaw Art of the Kimberley*. He also researched widely the most recent Wandjina Period of art (Fig. 3).

Through 30 years of research in the Kimberley, he documented thousands of sites, producing an archive and database including over 1.6 million images.

Walsh's Kimberley work included collaborations with traditional elders, anthropologists, archaeologists, paleoclimatologists, geologists, paleobotanists, geomorphologists, and dating experts. Current research in the Kimberley owes much to Grahame Walsh. His work showed the potential for Kimberley rock art to tell the story of Australia's early history and continues to provide a foundation for research in the region.

Awards received include:

- 1985 JP Thomson Medal from the Royal Geographical Society of Australia
- 1990 Joint recipient of the Australian Heritage Award for *Australia's Greatest Rock Art*
- 2001 Winner of the Australian Award for Excellence in Educational Publishing (Scholarly Section) for *Bradshaw Art of the Kimberley*
- Life Member of the Royal Geographical Society of Australia
- 2009 Member (AM) in the General Division of the Order of Australia "for service to the research and preservation of Indigenous art and cultural heritage"

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- ▶ Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology
- ▶ Australian Paleoart
- ▶ Australian Rock Art
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Techniques in Archaeological Science
- ▶ First Australians: Origins
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War at Sea Archaeology

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Introduction and Definition

"War at sea" today is recognized as armed naval conflict waged by or between sovereign nations or states. Nation states, like the United States with the world's largest Navy, invest tremendous resources in acquiring, equipping, and manning a dedicated naval fleet for the purpose of carrying out force projection. The modern Navy has a multipurposed mission including display of power by showing the flag, conducting humanitarian efforts, and implementing government policies through blockade of ports, combat, or invasion. From the earliest times, the impetus for development of sea power has been to support maritime trade through protection of the merchant fleet, maintaining access to overseas trade and navigation routes, and even restriction of competitors trade.

Archaeology addresses the details of naval war as revealed by the artifacts and the global provenance of the archaeological sites. The questions commonly addressed by data recovery from naval archaeological sites concern the specifics of ship construction, weapons, provisioning, and life on board. Frequently finding naval wrecks answers questions specific to a ship's loss and location, which is exceptionally important for ships whose loss is referenced in historic records but the location and cause of sinking is a mystery. Archaeology can address tactical questions regarding how a sea battle would have been fought. Ships lost together in the same naval battle or invasion are interpreted as an underwater battlefield, thus facilitating the study of naval tactics and strategy. It will be possible to answer more theoretical questions regarding the development of navies and the concept of war at sea when a comparative collection of naval sites is acquired through professional underwater archaeological excavation and publication.

Historical Background

Earliest Evidence of War at Sea

Tribal warfare occurred in prehistoric societies, although more governed by ritual than the wars waged by later complex societies. The technological development of basic weapons such as the spear, sword, and bow increased humanity's early warfare capabilities. Maritime cultures used primitive watercraft types including reed craft, dugouts, and skin boats to deploy warriors and transport captives and booty taken in raids. The earliest evidence of warfare fought at sea comes from Late Bronze Age textual and iconographic materials dating from the late thirteenth to early twelfth centuries BCE. The Tanis stele of Ramses II, texts of the last Hittite King Suppiluliuma II, and texts from Ugarit describe battles with sea raiders who are known to history as the "Sea Peoples." The earliest iconographic image of a naval battle is Ramses III's relief at Medinet Habu, depicting the Egyptian victory over the Sea Peoples. This naval battle and other examples from antiquity illustrate ships engaged in combat with weapons like those used on land – throwing spears, maces, bows, and slings. The Egyptian naval force used one nautical innovation – a grapple and line that was thrown into the enemy ship's rigging and heaved to overturn that enemy ship (Johnstone 1980; Wachsman 1998). Late Bronze Age shipwrecks such as those found at Uluburun and Cape Gelidonya in Turkey substantiate that the swords, knives, and axes carried on ships were similar to those weapons used on land.

One of the first innovations specific to naval warfare was the technique of ramming using a heavy bronze ram to batter the hulls of enemy

ships. Evidence for the use of rams comes from iconographic images, war memorials, and naval inventories (Casson & Steffy 1991; Morrison 1995a: 63). The second-century BCE bronze Athlit ram, which contained bow timbers, was found on the Israel coast in 1980, thus providing important archaeological evidence (Casson & Steffy 1991). Another ram came from the Marsala wreck found in western Sicily. This ram dated to the Punic War of 264–241 BCE and was associated with galley hull timbers marked with Phoenician letters, which the shipbuilders used in the construction process (Frost 1997).

Mediterranean naval warfare was a progressive arms race of ever stronger rams and larger galleys and fleets. Tactical developments in naval maneuvers included the *diekplous* or defensive circle and the *periplous* flanking maneuver. Greeks, Phoenicians, Persians, and Egyptians competed for control of the Mediterranean with their naval fleets. Athens, a city-state, relied on sea power in order to safeguard its essential grain route from the Black Sea and in one summer launched a fleet of 250 oared ships. The Persian King Xerxes attempted to invade Greece with a fleet of 957 triremes, which was opposed by 306 Greek ships. Building and maintaining large fleets required vast economic resources, political and naval organization, and the training of disciplined naval personnel. Battle at sea involved ramming and some naval tactics but continued to be fought like land battles where courage and strength achieved more than tactical skill (Morrison 1995a). Javelins and spears were found on the merchant Kyrenia shipwreck sunk off Cyprus about 300 BCE. These were carried for ship defense or alternatively might represent evidence of an assault on the ship. Land siege weapons such as catapults were deployed on ships in the third century BCE although this has not been confirmed by archaeology (Morrison 1995b). Naval shipbuilders built larger hulls that allowed an increase in the banks of rowers. Rome ultimately built oared ships containing five and seven rower levels. Rome's victory at the battle of Actium, however, curtailed the need for fleets of large naval ships and subsequent fleets consisted of smaller ships used mostly for suppression of piracy and guarding the frontier (Hocker 1995). As Rome expanded into Gaul and Britain, local watercraft were adapted as river lighters, transports, and ferries. Archaeological finds from inland rivers and lakes have produced several watercraft from sites in Germany, Switzerland, France, and the Netherlands. Except for two boats found in Mainz, Germany, that exhibit some Mediterranean influence, none of these inland examples appear to be specifically modified for naval warfare other than being sturdy platforms with an expanded capacity for transport (Arnold 1992; Höckmann 1993; Neyland 1995). As Rome declined, Vandal fleets raided undefended coastal areas. The earliest use of Greek fire in a naval battle occurs from this time and was used by Emperor Anastasius against Ostrogoths in Italy (Hocker 1995).

Chinese naval warfare is mentioned in the Warring States Period from the fifth to third centuries BCE. Although not confirmed by archaeological finds, documents report the use of grapples, ramming, and halberds. In the third century BCE, the Han Dynasty is credited with development of the stern rudder, the junk-building tradition, and the use of fire to destroy a naval fleet. The Han Dynasty is credited with the use of chemical warfare that was used on land but would also have been available to its navy. Chinese naval fleets continued in use during the later Sui and Tang Dynasties, a period from CE 581–907 (Ebrey et al. 2006; Sawyer 2011). India developed strong naval capabilities during the Chola Dynasty from CE 985–1042 (Sasaki 2011). Historical accounts describe episodes of piracy and naval conflict between the Arabian Peninsula and Indus region throughout late antiquity and the early medieval period. Alexander the Great built a large fleet to conquer the Indus region during fourth century BCE. His expedition occupied Indus ports and established shipyards in strategic locations (Kervran 1999: 77-83).

Medieval Naval Warfare

Arabs and Byzantines competed for control of the Eastern Mediterranean. In CE 655, at the "Battle

of the Masts" Arabs successfully defeated the Byzantine fleet by chaining their ships together to form a unbreakable line. In CE 679, a Byzantine fleet used Greek fire to burn an Arab fleet and by CE 840, Arab fleets had mastered the use of Greek fire and utilized it to defeat the Byzantine navy. Arab fleets, organized by city rather than kingdom, operated independently but by the tenth century CE employed standing navies with arsenals, officer corps, and state-owned ships (Hocker 1995). Galleys were relatively light and swift and only rarely survive in the archaeological record. Recent excavations in Istanbul discovered four light war galleys, dating from the late tenth to early eleventh centuries CE. The similarities in construction indicate that the state organized and controlled the galley design (Delgado 2011: 188-91).

In Northern Europe warships from archaeological contexts include the seventh-century CE Saxon ship burial at Sutton Hoo in Suffolk, England, and the Norwegian Viking Oseberg, Gokstad, and Tune ships dating from CE 800–900. These ship burials contained elegant hulls of overlapped strakes fastened with iron rivets and roves. The royal ships transported warriors for raiding and displayed the prestige of their chiefs. Norse raiders attacked undefended coastal settlements but at times fought sea battles such as the Battle of Svolder in which ships were lashed together as fighting platforms (Christensen 1972; Evans 1986).

China's Song Dynasty of the twelfth to thirteenth centuries CE established the first standing navy that at its zenith possessed 20 squadron's totally 52,000 marines. This fleet was equipped with the magnetic compass, paddle wheel watercraft, and gunpowder bombs thrown by trebuchets. The Song Dynasty was seceded by the Mongol Yuan Dynasty of Kublai Khan. The Khan attempted to invade Japan on two occasions using fleets of Chinese and Korean built vessels armed with cannon and transporting soldiers and cavalry (Sawyer 2011). Archaeological finds from this invasion reveal the hurried Chinese ship construction, incorporation of Chinese soldiers under Mongol command, weaponry and supplies for invasion, and the fleet's inability to secure a beach head resulting in its destruction when struck by typhoons (Delgado 2008; Shadbolt 2011). Chinese naval prowess culminated during the Ming Dynasty in the fifteenth century CE when Admiral Zheng He's exploratory fleet was sent out to the southern Pacific and Indian Oceans. Naval shipwrecks have not been discovered, but Chinese merchant ships have been salvaged, including the thirteenth-century CE Quanzhou, fourteenth-century CE Shinan, and sixteenth- to early seventeenth-century CE Ko Si Chang wrecks. Although not naval ships their construction illustrates that China was constructing sturdy ocean-going ships (Sawyer 2011; Green 1987a, 1987b). The salvage of the fourteenth-century CE *Maranei* wreck claims to have discovered a hand cannon that predates by 300 years other examples of such weapons (Kaylan 2001). As professional archaeology in Asia expands more discoveries will be made that will document war at sea in Asia.

The Italian towns of Pisa, Venice, and Genoa built Mediterranean navies to defend their commerce. Sea battles were fought initially against the Arabs, then the invading Normans, and finally with each other. The Genoese and Venetians fought four naval wars, in CE 1253–1284, 1293–1299, 1350–1355, and 1378–1381. Venice was victorious and ultimately dominated the Mediterranean (Lane 1973). During the same period, England and France engaged in constant warfare raiding and fighting for control of sea lanes. The CE 1217 Battle of Dover fought between an English fleet of 40 ships and a French fleet of 80 is credited as the first recorded use of sailing ship tactics. In CE 1340, the Battle of Sluys saw the destruction of the French fleet in a decisive action that gave the English control of the sea during the Hundred Years War (Lewis & Runyan 1990).

Cogs, caravels, hulks, and carracks were principal types developed for the North Atlantic voyages in the late medieval period. Innovations in the development of fore and stern castles on ships allowed defenders to rain weapons down on attacking galleys. These ships incorporated innovations including the stern rudder, square sailing

rig, and navigation with astrolabe, charts, and compass. These ships were built principally for trade but had to also be able defend against pirates and serve a naval function when pressed into service (Rose 2011). The most notable example of a cog is that found in Bremen Germany, although not a naval ship it possessed the fore and after castles features necessary for defense during this period. Other cogs have been found in Northern Europe particularly in the Netherlands and Scandinavia (Hocker & Vlierman 1996; Unger 1997). Artillery on ships would play an increasing role and for the first time allow naval ships to battle with one another at a distance.

Exploration and Conquest: Sixteenth-Century Naval Warfare

Archaeological examples from the Mediterranean include the fifteenth-century CE Cavoli ship wrecked on the Sardinian coast while carrying artillery from the Spanish Levant and the Lomellina wreck dating to 1516 (Bueno 1998; Guérout & Rieth 1998). These guns were in part on board as cargo; however, the shape and form of naval guns were not necessarily different than those designed for armies (Martin 2011b). A well-known example of an early English sixteenth-century CE warship is the 700 t burthen "Great Ship" rated *Mary Rose*, built in 1509–1510 period and wrecked in 1545 while engaging the French in the Solent. She carried artillery that included both bronze and iron breech loading cannon, wrought iron swivel guns located in her fore and stern castles, and a large quantity of shot consisting of stone, iron, lead, and composites of lead and iron, as well as canister shot packed with flint flakes (Hildred 2011). Ships of exploration found in the Americas always carried a complement of wrought iron guns. These voyages were commercial rather than naval, but the distinction between commercial and naval was not clear during much of the late medieval and early modern eras. Japan also used gunpowder and muskets in the late sixteenth century to augment boarding of ships during an invasion of Korea. The Koreans, led by Admiral Yi Sun-sin, defeated the Japanese with superior nautical tactics and the innovative "turtle ship" design (Swope 2005).

How to finance naval fleets and wars was a struggle for the rising states of Northern Europe and the Mediterranean. One method was to defray the fleet cost through regulated piracy. Castile and Aragon hired out their galleys to corsairs in order to defray their ship's maintenance costs. Corsairs were required to leave a deposit with the government in order to compensate damages to friendly parties. State-sanctioned piracy carried the risk of reprisal and war (Mott 2003).

The Ottoman Empire built a powerful navy that dominated the trade and maritime affairs of the eastern Mediterranean Sea. The Ottoman Navy rivaled that of the city-state of Venice and resulted in the Ottoman-Venetian Wars (CE 1499–1503). In CE 1571, the Ottomans suffered a severe defeat at the Battle of Lepanto by the Holy League but rebuilt their navy to adequately defend the island of Cyprus as their possession. A late sixteenth-century Ottoman wreck was excavated at Yassiada, Turkey, and provides a comparison of Ottoman ship construction with that of European shipwrights during this time (Pulak 2005). A number of cannonballs found near the wreck might indicate part of a cargo. European maritime nations eventually bypassed the Ottoman control of the land-based trade routes by exploiting maritime routes around Africa to Asia (Scandurra 1972). In the sixteenth century, the North African Barbary states dominated the Mediterranean Sea. Ships were seized and captives taken from the coasts of Italy, Spain, and Portugal, as well as in Northern Europe and even North America. Barbary pirates might have made advances in windward sailing technology that enabled these successes (Godfrey 1974).

Spain, with ships in the Mediterranean Sea and Atlantic and Pacific Oceans, became the first two-ocean navy. It had to arm both ships and forts, thus relied on wheeled guns that could serve in either location. Spain implemented the convoy system to protect its merchant fleet and thus maintain the flow of specie and goods. Galleon construction was government subsidized and regulated. Galleons were designed to be multifunctional serving as warship, troop and supply transport, and for shipping cargo to and

from the colonies. England and France's naval strategy was to build smaller and swifter ships that could be used as privateers or for piracy, which were less expensive to construct and maintain (Mott 2003). There are a number of archaeological examples of galleons several of which are relatively complete such as the Basque whaling ship *San Juan* sunk in CE 1565 and the Swedish warship *Vasa* sunk CE 1628. Galleons were also built in the colonies shipyards in the Caribbean and the Philippines. The Philippine-built merchant galleon *San Diego* sunk in CE 1600 after ramming a Dutch ship during battle was discovered and salvaged (Goddio 1994).

Naval fleet actions were fought for control of trade in CE 1508 when a Gujarati/Egyptian force destroyed a Portuguese squadron at Chaul, and the following year CE 1509, the Portuguese destroyed that allied fleet at the Battle of Diu resulting in Portuguese domination of the Indian Ocean. In CE 1582, the Spanish fleet defeated the combined Portuguese, French, and English fleets at the Battle of Ponta Delgada in the Azores. In CE 1588, Philip II of Spain assembled a large Spanish Armada to conquer England. Elizabeth I sent Admiral Sir Charles Howard to counter the Spanish naval force. The Spanish fleet was scattered resulting in a number of Spanish galleys wrecked along the Atlantic Coast of Ireland. This resulted in a number of archaeological sites. One of the largest of Spanish Armada ships was the nave *Trinidad Valencera*. Heavily armed with cannon and small arms, she was both a warship and a transport. The excavation of her remains off the coast of County Donegal, Ireland, revealed numbers of both land and sea guns and weapons such as firepots and a wooden fire trunk for flame throwing. These show how she functioned as a artillery transport but also was designed to fight at sea with cannon and utilizing her superior crew size when boarding and hand to hand fighting was necessary (Martin 2011a).

Sovereign Navies and Global Empires

From the seventeenth through the eighteenth centuries, increasingly only sovereign states can afford the great expense of a navy. Navies are used by their respective nations to implement global political and commercial objectives. Sovereigns of maritime nations were sometimes referred to as the "Master of the Sea," which inferred prestige but also implied the potential to use warfare to establish and protect their maritime realm (Sicking 2003). Competition between the English and Dutch commercial fleets led to the Anglo-Dutch naval wars in the seventeenth century. The Dutch fleet under Admiral Michiel de Ruyter came up the Thames River and destroyed the British fleet, thus establishing Dutch naval supremacy during the seventeenth century. Naval battles during this period resulted in more ships captured than sunk. Naval guns lacked the power to pierce ships below the waterline, and most of the tactics involved destroying sails, rigging, and men. Tactics still relied heavily on boarding and hand to hand combat, but by late century the Line of Battle strategy was in use. The line of battle was an orchestrated fleet movement along a line that utilizes the advantage of the cannon broadside while not accidentally hitting ships of its own fleet. In order to fight with this tactic, ships of the line were built large enough to withstand the punishing artillery fire during the battle. Naval warfare utilizing line of battle tactics required more disciplined and professional naval officers and crews and strong centralized governments that regulated the design of warships. The stimulus for these conflicts and maintaining expensive navies was commercial competition (Mahan 1918).

The maritime powers of Europe, during the eighteenth century, were continually at war over global politics. Britain, France, and Spain battled over control of trade and the colonies in the Americas. The United States rose out the American Revolution with naval support from Spain and France. Numerous shipwrecks have been excavated from this time period. The 74-gun French-built HMS *Invincible* lost off the Solent in 1758 is an example of a large ship of the line (Bingeman 2011). Other examples include the 26-gun frigate *Machault* and *Bienfaisant* lost in 1760 during the Battle of Restigouche in Canada, as well as the French flagship *L'Orient* destroyed by ADM Nelson during the Battle of the Nile in 1798. Shipwrecks excavated from the American Revolution provide details on the construction,

provisioning, and weaponry used during this conflict. Vessels in the United States waters include the British transport *Betsy*, privateer *Defense*, and gunboat *Philadelphia* all of which were scuttled in separate events (Johnston 1997; Switzer 2005; Broadwater 2005).

The Napoleonic Wars led to a long series of naval battles, the culmination of which occurred in 1805 at the Battle of Trafalgar in which Admiral Horatio Nelson defeated the combined French and Spanish fleets with his naval tactics. The massive 112-gun Spanish Navy ship *Nuestra Senora de la Santisima Trinidad* lost during the battle may have recently been discovered by the Spanish Hydrographic Service (Bilton 2010). After Trafalgar, the British Royal Navy ruled the world's oceans during the nineteenth century. The nascent United States Navy successfully fought ship to ship engagements with the Royal Navy during the War of 1812 but lacked sufficient sea power to keep the British Navy from blockading United States ports and raiding the east coast and shores of the Chesapeake Bay. Both British and American navies engaged in riverine warfare in the United States inland waterways. Well-preserved examples include the United States War of 1812 sloops *Hamilton* and *Scourge* sunk in Lake Ontario and gunboats such as the USS *Scorpion* from the Chesapeake Bay region and Lake Champlain (Cassavoy & Crisman 1988). The war established the importance to the United States of a blue water navy of sufficient size and quality to defend its shores and commerce and to influence global politics.

The nineteenth century exhibited many advances in ship design, sail and steam power, and weapons. Steam power was used to power paddlewheels as early as the 1810s. It became increasing reliable and the steam-powered screw propeller became a more efficient means of propulsion than sail. Riveted iron hulls reduced reliance on timber and permitted construction of stronger and more durable hulls allowing ships to increase in size. Naval ships by late century developed armored hulls that carried large, accurate guns with rifled chambers that could fire explosive fused shells. USS *Monitor* effectively showed the advantage of the rotating gun turret. *Monitor's* turret and guns have been archaeologically recovered and are under conservation and study. The duel between ironclads CSS *Virginia* and USS *Monitor* marks the change from wooden to iron hulled ships. Innovations were not adopted overnight, wooden ships continued to be used alongside iron built hulls, and steam-powered ships also carried masts and sails. The American Civil War is a period that saw the first successful use of mine and submarine warfare. Recovery of the Confederate submarine *Hunley* brought the latter nineteenth-century submarine experiments into archaeological focus, showing that many of the twentieth-century submarine innovations had earlier precursors. *Hunley* was an extension of mine warfare, a means of keeping enemy warships off the coast and breaking the blockade (Neyland 2007). Ramming, although a tactic of bygone navies, was successfully used in riverine warfare during the American Civil War. CSS *Virginia* successfully sunk USS *Cumberland* by ramming after pummeling her with cannon shot (Watts 1988). The ironclad ships of Austria and Italy engaged in the first fleet battle of ironclads at the Battle of Lissa in 1866 and interest was renewed in ramming after the Austrian flagship sank the Italian flagship. The last naval ship equipped with a ram was the German ship *Emden* launched in 1908. China's naval battles during the nineteenth century amounted to a series of losses against European steam-powered ships during the Opium Wars of the 1840s and from the Japanese in the Sino-Japanese War in 1894 and 1895.

Key Issues/Current Debates

War at Sea Today

The US Navy's Great White Fleet of 1907 demonstrated United States naval power to the world. These early twentieth-century battleships were steam-powered, steel-armored armed, and mounted large ship-sinking guns in rotating turrets along the centerline of the deck. Steam power made it possible to build these large Dreadnought-class battleships. Twentieth-century navies were pivotal in the global warfare

of World War 1, World War II, and the undeclared Cold War. Naval aviation and submarine warfare were the air and undersea innovations that impacted tactics, strategies, and rules of engagement. In 1916, during the Battle of Jutland, sea planes were launched from seaplane carrier HMS *Engadine* and in the Black Sea, Russian seaplanes harassed Turkish maritime routes. Aircraft successfully eliminated Zeppelins, engaged in antisubmarine patrols sinking German U-Boats, and carried out the first successful torpedo attack on a ship. In 1918, the Royal Navy converted an Italian passenger liner to be the first aircraft carrier (Allward 1993).

The conclusion of World War I resulted in the scrapping of ships under the terms of the Washington Naval Treaty, but by the 1930s nations had resumed rebuilding ships in advance of World War II. The Japanese built the largest ship, the 72,000 t *Yamato*. Battleships would prove to be vulnerable to air power as occurred with the sinking of HMS *Prince of Wales* and *Repulse* and the Japanese attack on the ships at Pearl Harbor. Naval aircraft launched from aircraft carriers protected by a fleet of supporting ships became the effective strategy for naval combat in World War II and thereafter. Aircraft carriers played key roles in the Battles of the Coral Sea, Midway, and Leyte Gulf. There have been numerous archaeological projects to locate and document World War II ship and aircraft losses. Examples of such projects are the United States National Park Service mapping of USS *Arizona*, Naval History and Heritage Command's survey of US Navy shipwrecks lost during the D Day Normandy Invasion, and NOAA's survey of German U-boats, merchant, and Navy vessels lost during the Battle of the Atlantic off North Carolina coast (Lenihan 1989; Neyland 2009; Battle of the Atlantic 2011). Aviation crash sites, particularly those in the water, have resulted in a specialization in aviation archaeology. Research into twentieth-century ship and aircraft wrecks focuses on wreck identification, location, loss, and memorials.

Naval aviation after World War II continued to expand with development of jet aircraft, larger nuclear-powered aircraft carriers, and the advent of the use of guided missiles. Ship to ship combat has become infrequent since battles occur at greater distances due to naval aviation and missiles. Submarines were used effectively during both World Wars against enemy naval ships but principally took their toll on merchant shipping. These were first diesel powered but during the Cold War were nuclear powered, thus enabling them to stay underwater for weeks or months. Torpedoes were their main weapon of attack during the World Wars, but during the Cold War and today submarines are equipped to launch dozens of ballistic missiles armed with nuclear warheads. There are ship and aircraft wrecks from the Cold War but only a few such as those sunk at the Bikini Atoll atomic bomb tests have been archaeologically documented (Delgado 1991; Neyland 2011).

The only major naval conflict that took place after World War II was the 1982 Falklands War. A Royal Navy fleet of 100 ships was dispatched over 7,000 miles from Britain to the South Atlantic to protect the Falkland Islands from a takeover by Argentina. British operations were based primarily at sea, which is an element of modern warfare where major sea power nations use their navies as force projection platforms. The Falklands war showed the continued importance of the aircraft carrier, but also the vulnerability of modern ships to sea-skimming missiles. Nuclear submarines are an important element for protecting the battle fleet. Twenty-first-century naval operations today are joint land, sea, and air operations. The United States continues to dominate, maintaining a Navy with more ship tonnage than that of the next 17 largest navies.

Future Directions

Predictions for future war at sea indicate battles will be fought at great distances using unmanned systems above, on, and below the water. These autonomous systems will both operate independently and be integrated into manned counterparts. War at sea is far more technologically advanced, but many of the casual elements are similar to those of earlier periods – maintaining

coastal and national defense, preserving maritime commerce and freedom of the seas and support of military land deployments.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Maritime
- ▶ Caribbean Maritime Archaeology
- ▶ Cold War
- ▶ Freshwater Archaeology
- ▶ Global Archaeology
- ▶ Hanse Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
- ▶ Society of the Ship

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Basic Biographical Information

Born in Auckland in 1943, Graeme Ward completed his secondary schooling in Auckland and Wellington. His university studies at the

University of Otago included a range of science and arts subjects; he graduated in 1969 with a Bachelor of Arts with a double major in anthropology and psychology. He undertook papers in Prehistoric Archaeology and wrote a thesis in 1970–1971, under the supervision of B. F. Leach, entitled "Obsidian and New Zealand Archaeology: A paradigm for sourcing artifact assemblages using X-ray fluorescence spectrography," and graduated with a Master of Arts (First Class Honors). As an undergraduate and master's student, he was involved in fieldwork throughout New Zealand and in Fiji and in advocating national legislation to protect archaeological heritage.

After employment as an assistant lecturer in archaeology, Ward won a doctoral scholarship in the Research School of Pacific Studies at the Australian National University. He conducted fieldwork in the New Hebrides 1973–1975 toward his doctoral dissertation, *Prehistoric Settlement and Economy in a Tropical Small Island Environment: The Banks Islands, Insular Melanesia* (1979). At ANU, making further use of his training in basic sciences, he collaborated with colleagues to explore aspects of raw material sourcing (e.g., Smith et al. 1977) and in clarifying approaches to the use and interpretation of radiocarbon age estimates and of the intellectual arguments behind sourcing studies (e.g., Ward & Wilson 1978).

In 1972, Ward researched places associated with the chert industries of the eastern Solomon Islands as part of the project organized by R. C. Green and D. Yen. In 1979–1980, he assisted Leach with excavations on Kapingamarangi, a Polynesian outlier in Micronesia, and the following year took leave from his Australian employment to act in the role of Director of the Micronesian Archaeological Survey for the (US) Trust Territory of the Pacific Islands. Subsequently, he was involved in contract research in the Mariana Islands. During his work with the Archaeological Survey, he edited and published several MAS Reports for the Historic Preservation Office.

Since 1978, Ward has been employed at the Australian Institute of Aboriginal Studies (later AIATSIS), initially as Registrar of Sites, being responsible for the National Sites Register and assisting in the administration of the Institute's National Site Recording Program, then as Research Fellow (from 1997). He administered the Institute's national Rock Art Protection Program, acted for an extended period as Director of Research, began a series of field researches in Northern Australia, and continued to be involved with writing and editing in both Indigenous Australian and Pacific Island fields.

Ward's current research focusses on the ever-changing connection of Indigenous Australians to various landscapes. During research with Traditional Owners, in various parts of Australia, he came to view cultural heritage places, especially rock-art sites as central to Indigenous Australians' concerns. The range of related research topics extended from detailed recording and condition reporting through protection of physical fabric and the intellectual property of cultural places to matters relating to management and protection legislation (e.g., Ward 1985), the ethics of research (e.g., Cole & Ward 2000), and Indigenous Australian interests in research process and results and particularly in promoting an Indigenous Australian voice in the discourses around rights to manage heritage places and the direction of research (Mowaljarlai et al. 1988; Ward 1992).

Over the last decade or so, Ward has continued to research Indigenous interests in cultural heritage places as they relate to perceptions of ownership and the values of tourism, aiming to establish consciousness, and evaluation, of tourism's impact on heritage places, especially rock markings, in the region centered on Wadeye (Point Keats) in the Northern Territory. Fieldwork with Traditional Owners (TOs) and staff of the Kanamkek-Yile Ngala Museum involves comprehensive recording of heritage places that are, or are intended to be, the subject of tourism and acknowledges the important role of systematic dating of sites in the perception of their cultural significances. Research aims include developing sustainable site management and educational opportunities by investigating and enhancing local control of access and impact on

the sites (e.g., Ward & Crocombe 2010). With TOs and their representatives, he has made numerous presentations at conferences and symposia. Recently, his research interests have extended into aspects of visual representations beyond that of rock markings to explore similarities, symbolism, and changes in cultural significances over time (Ward & Crocombe 2008).

Major Accomplishments

In the various phases of his career, from technical studies of raw materials sourcing and the use and significances of radiocarbon dating, through field archaeology and related ethnographic studies in Australia and the Pacific, to studies of the perception of values held by, and uses made of, Indigenous Australian rock markings, Ward has worked with archaeological and other colleagues and with TOs of various heritage places. Their advocacy of protection for archaeological heritage in New Zealand contributed to the development of national legislation here. Their critical analyses of the bases of sourcing studies have been republished, and their papers evaluating analyses of radiocarbon age estimates are much quoted and provide the bases for techniques in use today. Ward's collaborations with TOs in researching into and supporting their research and conservation interests at conferences and through publications have furthered Indigenous Australians' interests in their cultural heritage places.

Ward has been a member of various professional organizations, ranging from national and state archaeological associations and committees through to areas of specific focus, such as the Australian Rock Art Research Association, serving on the executive of several associations and on the editorial boards of various journals. He has edited, or co-edited, numerous reports, collections of papers, and conference proceedings, encouraging the writing of young scholars and providing opportunities for Indigenous voices. He served as editor of the Institute's journal for several years.

In recent years, his work has focussed on the preservation and appreciation of Indigenous rock art, on educating the public as to its importance and fragility, while also assisting Indigenous communities to participate in the care and management of their cultural heritage resources.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Rock Art
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Ethnoarchaeology
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Rock Art Sites: Management and Conservation

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Warwasi: Geography and Culture

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Introduction

The Warwasi rockshelter is situated in the Tang-i Knisht valley near Baktharan in western Iran. In the 1950s, the site was excavated by R. Braidwood (Braidwood & Howe 1960) who made a trench of 8 × 2 m to a depth of 5.60 m, and distinguished 30 layers. The finds from these excavations are stored in the Philadelphia University Museum, and were published only in the end of twentieth century (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

The sequence of layers from Warwasi comprised Middle and Early Upper Paleolithic layers: the Middle Paleolithic layers (ZZ-JJ) represented the Zagros Mousterian (Dibble & Holdaway 1990), whereas the Upper Paleolithic layers were typical for the Baradostian, described also as the "Zagros Aurignacian" (Olszewski 1999). The review of the materials carried out by M. Otte and J.K. Kozłowski allowed to put forward a hypothesis about the continuity of the Middle and the Upper Paleolithic layers at Warwasi – since layers LL-Y display transitional features in between the Mousterian and the Baradostian (Otte & Kozłowski 2007) (Figs. 2 and 3).

The layers ascribed to the Zagros type Mousterian are characterized by Levallois technique, besides bladelet production which increase in the sequence, a stable index of side-scrapers – also shaped using the Quina retouch – increasing proportion of Upper Paleolithic tool, and a low index of denticulated-notched tools. These features are typical of other Mousterian sites in the Zagros Mountains such as Kundji, Shanidar, Hazaar Merd, and Bisitun; also in the publications of these sites, some differences may occur that result from the subjective classification by different authors.

Layers LL-Y show the co-occurrence of Middle and Upper Paleolithic components which indicates to their transitional nature. These layers correspond to the "Early Zagros Aurignacian" (layers LL-AA) according to D. Olszewski (Olszewski & Dibble 2006). The Middle Paleolithic elements in these layers are represented mainly by side-scrapers, Mousterian points, truncated-faceted pieces, and notched-denticulated tools, also by decreasing frequency of Levalloisian technique (up to layer FF) and the presence of discoidal core technique. The Upper

Warwasi: Geography and Culture,
Fig. 1 Stratigraphic sequence of the Warwasi rockshelter

	Layer	Middle Palaeolithic (H.Dibble)	Upper Palaeolithic (D.Olszewski)	M. Otte & J.K Kozłowski
1	ZZ	Unit A		Zagros Mousterian
2	VV			
3	UU			
4	TT			
5	SS	Unit B		
6	QQ			
7	OO			
8	NN	Unit C		
9	LL			
10	KK			
11	JJ	Unit D		
12	II		Early Zagros Aurignacian	Transitional layers
13	HH			
14	GG			
15	FF			
16	EE			
17	DD			
18	CC			
19	AA			
20	Z		Late Zagros Aurignacian	
21	Y			
22	X			Baradostian "*sensu stricto*"
23	W			
24	V			
25	U			
26	T			
27	S			
28	R			
29	Q			
30	P			

Paleolithic features are, first of all, bladelet production, mainly from carenoidal cores/end-scrapers. These bladelets are, frequently, with marginal retouches resembling lamelles Dufour or Arjenah points (Fig. 4).

In layers X-P the Middle Paleolithic elements vanish while blade and bladelet techniques remain. Bladelets with marginal retouches (Dufour, Krems, or Arjenah types), obtained from cores/polyhedral burins or carinated/nosed cores/end-scrapers, co-occur with blade end-scrapers and typical burins. These assemblages are typical for the Baradostian, described by D. Olszewski as the "Late Zagros Aurignacian."

The discussion around the sequence from Warwasi is related to the question of the origins

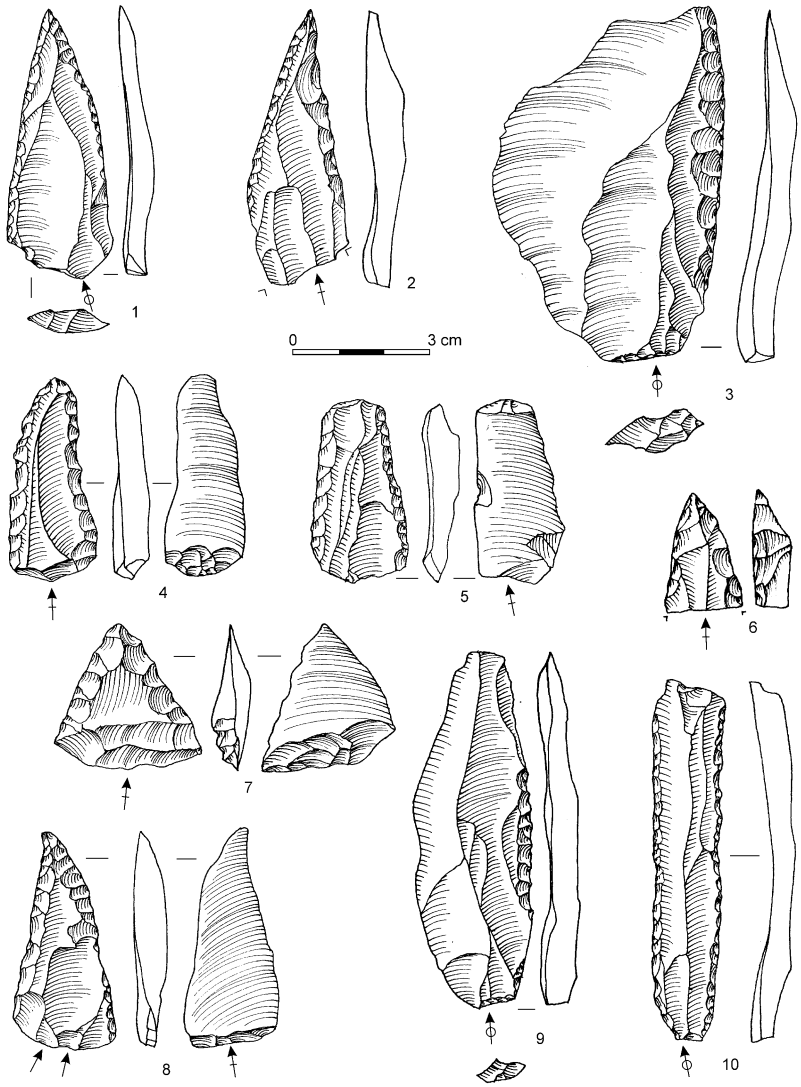

Warwasi: Geography and Culture,
Fig. 2 Middle Paleolithic from Warwasi rockshelter, layer QQ: *1*, *2*, *4*, *6–8* – Mousterian points, *3* – side-scraper, *5* – truncated-faceted piece, *9*, *10* – retouched blades

of the Upper Paleolithic in southwestern Eurasia and the appearance of Modern Humans in this territory. The hypothesis about the continuity between the Zagros Mousterian and the Baradostian is either assumed to be an argument in support of the Central Asian origins of the Aurignacian (e.g., Otte 2004), or was criticized because the transitional layers in Warwasi could be nonhomogeneous. However, the recent investigations in the Yafteh Cave in Western Iran (Otte et al. 2007) have provided arguments in favor of continuity of the Zagros type Mousterian and the Baradostian. An argument against the post-depositional mixing up of Middle and Upper Paleolithic occupations is the considerable thickness of the "transitional layers" at Warwasi (1.5–1.8 m) and the horizontal position of these layers which makes the mixing of finds at the interface of layers fairly unlikely.

Simultaneously, the fact that Aurignacian forms occur in the Baradostian, even fairly early (in the Yafteh Cave 40–29.4 Kyr BP and in

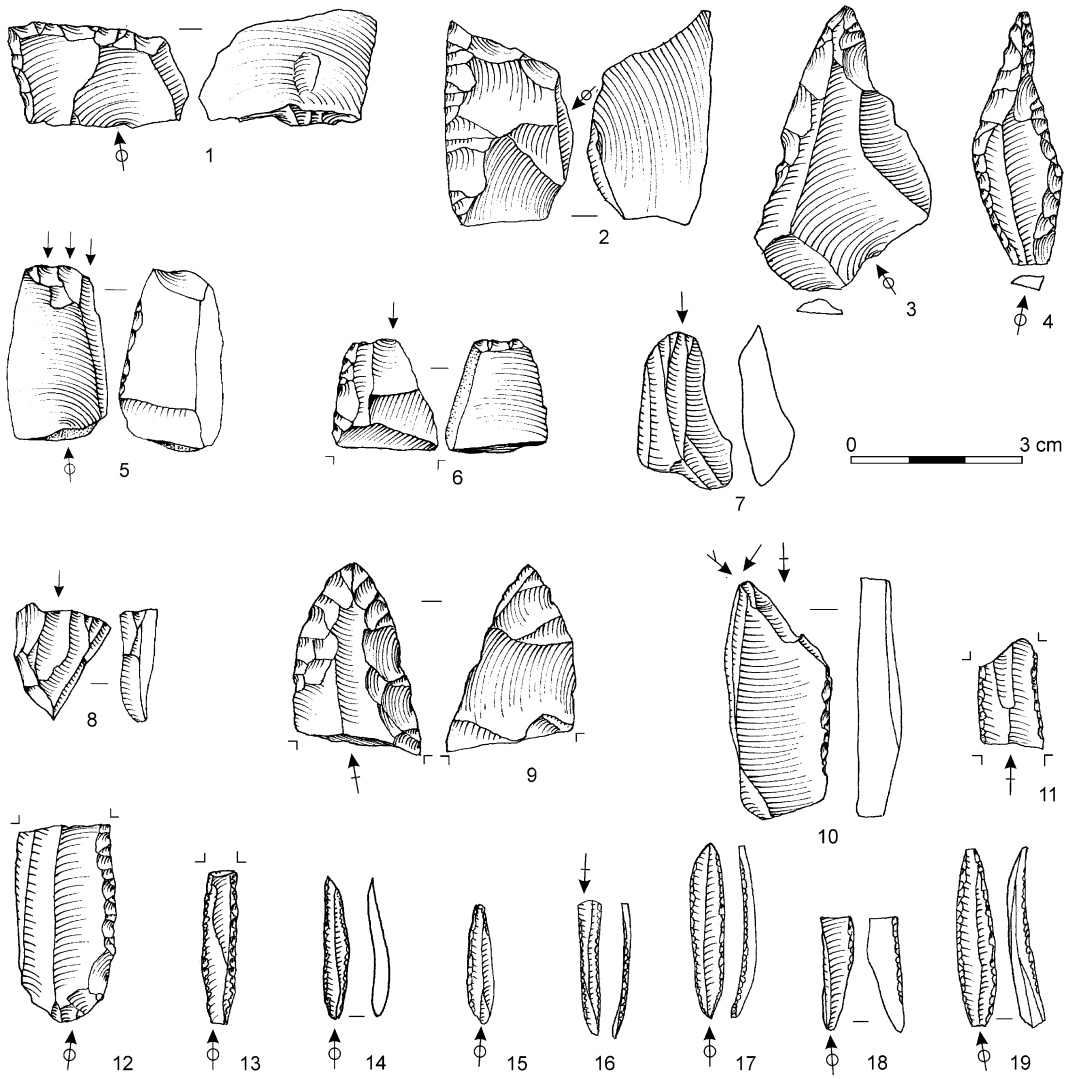

Warwasi: Geography and Culture, Fig. 3 Transitional Middle/Upper Paleolithic from Warwasi rockshelter, layer DD: *1*, *2* – side-scrapers, *3*, *4* – Mousterian points, *5*, *6* – truncated-faceted pieces, *7* – carinated core, *8* – single platform core for bladelets, *9* – carenoidal end-scraper, *10* – dihedral burin, *11*, *12* – retouched blades, *13–19* – retouched bladelets

Shanidar Cave 35.4–24.5 Kyr BP), does not necessarily point to the dominating role of the Baradostian in the origins of the Aurignacian in Western Eurasia – because equally early centers – Proto-Aurignacian in nature – are registered in the Near East (Kozłowski 2010). Also questionable is the spread of the Aurignacian from Central Asia to Europe along a route that is alternative to the route via Anatolia and the Balkans, namely, to the north of the Caspian Sea, directly to the Russian Lowland (Dolukhanov 2008).

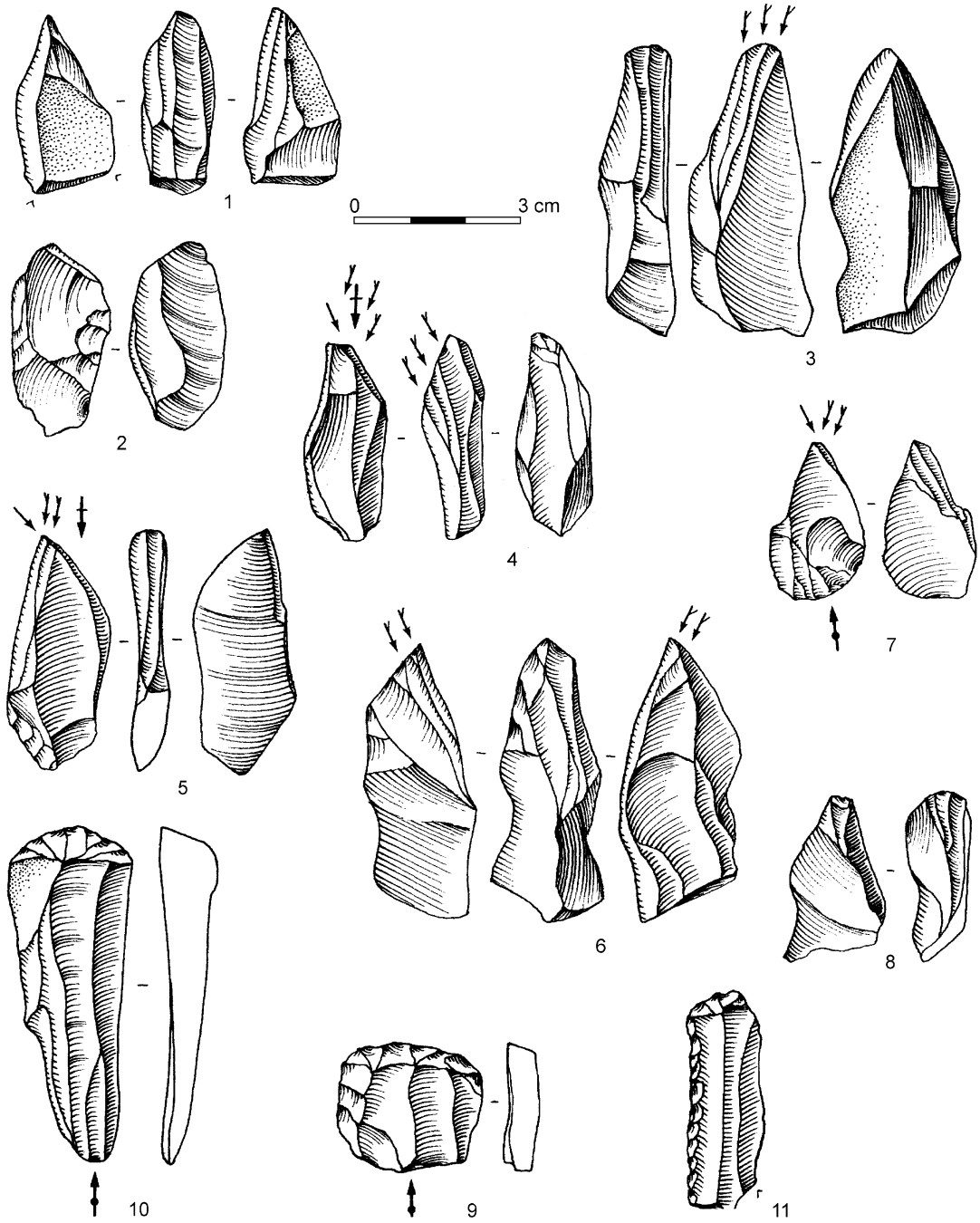

Warwasi: Geography and Culture, Fig. 4 Baradostian from Warwasi rockshelter, layer R: *1–8* – polyhedral burins/cores, *9*, *10* – end-scrapers on blades, *11* – retouched-truncated blade

Cross-References

- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ European Middle to Upper Paleolithic Transitional Industries: A Socioeconomic Approach
- ▶ European Middle to Upper Paleolithic Transitional Industries: Châtelperronian
- ▶ European Middle Paleolithic: Geography and Culture
- ▶ *Homo sapiens*
- ▶ Kostenki: Geography and Culture
- ▶ Lithic Technology, Paleolithic
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries

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Water Buffalo: Domestication

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Basic Species Information

The genus *Bubalus* was widely distributed in Europe and southern Asia in the Pleistocene, but later was restricted to the Indian subcontinent and southeast Asia (Mason 1974). In historical times, the wild Asian buffalo (*Bubalus arnee*, Kerr 1792) ranged across south and southeast Asia from Mesopotamia to Indo-China. It is currently listed as endangered, with a world population fewer than 4,000, potentially fewer than 200, and it is even possible that no purebred wild animals exist (http://www.iucnredlist.org/apps/redlist/details/3129/0). Domestic water buffalo (*B. bubalis*) have been classified on morphological and behavioral criteria into two types: river and swamp (MacGregor 1941). Some have referred to these as separate subspecies, naming river buffalo *B. bubalis bubalis* and swamp buffalo *B. bubalis carabenesis*. Morphologically, the swamp buffalo (Fig. 1) is gray with white chevron (one or two white stripes on the throat), socks and tip of tail, and relatively straight pale colored horns, while the river buffalo (Fig. 2) has a black body without white markings and generally curved horns. The two types are now well known to be genetically distinct, based on chromosome number (swamp 2n = 48, river 2n = 50) and allozyme and microsatellite genotype frequencies (Zhang et al. 2011). Swamp buffaloes are mostly phenotypically homogenous throughout their distribution. There are no recognized breeds and they are used for draught and meat. There are a number of specialized breeds of river buffalo, however, which are primarily used for milk production. Traditional (true) mozzarella cheese, originating in Italy, is made only from river buffalo milk, and its flavor is highly prized.

Water Buffalo: Domestication, Fig. 1 Swamp buffalo (©FAO/K. Pratt)

Water Buffalo: Domestication, Fig. 2 River buffalo (Image provided by Dr. Rakesh Kumar Pundir (from http://www.fao.org/dadis/)

One exception to the morphological distinction of the two types is the native buffalo of Sri Lanka. Although phenotypically resembling the swamp type, they have a chromosome number of 2n = 50 and phylogenetically cluster strongly with river type populations (Barker et al. 1997). They likely represent the type of buffalo from which the present breeds of river buffalo were derived.

The world population in 2010 was reported (http://faostat.fao.org) as 194 million in 40 countries, though this did not distinguish between numbers of the two types. More people in the world depend on this species than on any other domestic animal species (FAO 2000). The river type is native to the Indian subcontinent, but has spread west to the Balkans, Greece, Italy, and Egypt within historical times, while the swamp type occurs throughout southeast Asia, from Nepal, Assam, and Bangladesh in the west to the Yangtze valley of China. The geographical ranges of the two types overlap in eastern India (Assam) and Bangladesh, and possibly also in Myanmar. The two types will

hybridize, but natural mating is more successful when the animals have been raised together. First-generation hybrids (2n = 49) are fertile, and limited data indicate normal chromosome segregation in backcrosses and F2 animals (Cooper 1991). However, 2n = 49 bulls in all generations show increased sperm abnormalities as compared with purebred river or swamp, suggesting reduced fertility. Some swamp buffalo populations in Australia, China, and the Philippines are being upgraded for milk production by backcrossing to river buffalo bulls.

Archaeological, anatomical, and historical evidence supports the contention that both river and swamp buffalo are descended from *B. arnee*, although the swamp type is morphologically more similar to *B. arnee* than is the river type. The time of divergence of the two types (that is, origin of the 2n = 48 karyotype from the putative 2n = 50 karyotype of *B. arnee*) has been estimated in various studies as from at least 10,000 years ago to 1.7 Myrs ago, but probably around 128,000–270,000 years ago. Even given this uncertainty, divergence occurred well before domestication (Zhang et al. 2011).

Genetic evidence clearly points to independent domestication of the two types. Cockrill (1981) stated that the river buffalo was first domesticated about 4,000–5,000 years ago in the riverine civilizations of the Euphrates and Tigris, and the Indus, but recent studies have concluded that the most likely area where this took place is the western region of the Indian subcontinent (Kumar et al. 2007). In contrast, the time and place of domestication of the swamp type is uncertain and subject to debate. Cockrill (1981) suggested that the swamp buffalo was domesticated in the Yangtze valley, also about 4,000–5,000 years ago. However, there is no evidence that the endemic distribution of *B. arnee* included central China, and archaeological and genetic studies of Chinese buffalo do not support domestication in China. Groves (2006) noted that the oldest putative domestic buffaloes come from Neolithic sites (4500–6000 BCE) in southern China, and archaeological findings at Ban-Chiang, northeastern Thailand show that water buffalo were already domesticated there by around 600 year BCE. Genetic data (Zhang et al. 2011) indicate that the domestication center for swamp buffalo was in a region encompassing the far south of China, and northern Thailand and Indo-China. Following domestication in this region, it spread south through peninsular Malaysia to the islands of Indonesia (Sumatra, Java, and Sulawesi), north/northeast into central China, and then through an eastern island route via Taiwan to the Philippines and Borneo.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Cattle: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Yak: Domestication

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Waterlogged Finds: Conservation

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Introduction

Archaeological conservation is an ever-evolving discipline, which traditionally developed to preserve finds removed from their burial environment. Methods used have their roots in the nineteenth century. Today, possible conservation strategies are conservation ex situ, reburial, active conservation in situ, and passive conservation in situ. The purpose of this section is to introduce concepts, challenges, and changes in relation to conservation of waterlogged finds.

Definition

The conservation of waterlogged finds is defined as activity intended to prolong the existence of water-saturated physical remains that are archaeologically significant and undertaken with respect for the integrity of the remains.

Finds

Finds are physical remains of the past that archaeologists investigate to understand our ancestors. A find may be made of organic, inorganic, or metal materials. Organic materials are carbon based. They include animal-derived materials, for example, as leather, wool, and bone, and materials derived from plants, for example, wood and fibers. Inorganic finds are silica-based materials such as ceramics, glass, and lithics. Metals are conductive and usually highly oxidative, for example, iron, copper and tin, lead, silver and gold, and their various alloys. Finds can range from buildings and shipwrecks to grave goods, to human remains, to pieces of rubbish.

Waterlogged

Webster's dictionary defines waterlogged as "excessively saturated with. . .water." Finds in a waterlogged environment, on land or underwater, may or may not be waterlogged. The degree to which a find is waterlogged depends primarily on its porosity and hygroscopicity, which in turn can depend on its degree of degradation. Waterlogged wood is defined as having the entire pore spaces filled with water (Jordan 2001: 47; Jensen & Gregory 2006). On land, a find in a context below the water table is likely to be waterlogged. Such contexts may be in places that are natural (e.g., wetlands) or man-made (e.g., waterfronts, wells, ditches, storage pits, or graves). Underwater (as at the bottom of rivers, lakes, or the sea) a find may be in the water column and/or buried under sediment (Gregory et al. 2012).

The effect of a particular environment on a find depends on varied and complex interactions between the material and its physical and biogeochemical environment. Characteristics defining depositional environments include water and oxygen content, hydrogen-ion concentration (pH), redox potential (Eh), presence of ion species, macro- and microbial activity, temperature, and salinity. Levels of water and oxygen are key factors determining the decay or preservation of a find. If either is limited then finds, particularly organic ones, may be well preserved. In an anoxic waterlogged

environment, finds, particularly organic materials, may survive thousands of years. The presence of water, however, leads to dissolution, hydrolysis, or electrochemical corrosion depending on the material. A find may reach a state of equilibrium with the environment such that its rate of decay is minimal. Finds recovered from waterlogged burial environments may appear to be in a good condition but they may not be physically, chemically, or structurally sound (Cronyn 1990; Jordan 2001; Björdal 2012).

Conservation

Webster's dictionary defines conservation as the "act of conserving, preventing injury, decay, waste or loss" and also the "official supervision of [natural] resources in order to preserve and protect them through prudent management." Conservation of finds traditionally developed to preserve objects removed from their burial environment and to "discover the true nature of the original artifact," thereby contributing to present and future archaeological process (Cronyn 1990: 4). Conservation of finds has been described as "An operation aiming above all to prolong the life of an object by preventing, for a more or less long period of time, its natural or accidental deterioration" (Berducou 1990). Fundamental to conservation is preservation of the *integrity*, or true nature, of the object through the application of science (Clavir 1998). The integrity of a find can be cultural, scientific, aesthetic, religious, historic, and material (Kapelouzou 2012: 180).

Conservation activities, including examination, analysis, cleaning, stabilizing, repair, restoration, recording, documenting, and dissemination of information, are variously applied to gain information from finds while preventing decay and damage. International and national shared guidelines for practice and codes of ethics guide the conservation of finds as a professional discipline. Conservation is rooted in foundations of respect and uniqueness from which arise principles of minimum intervention and treatment reversibility (Kapelouzou 2012: 172–182).

Waterlogged organic finds and metals pose great challenges for conservation, organics because of their susceptibility to biodegradation and structural change, and metals to corrosion. Inorganics are, in comparison, relatively stable materials (Cronyn 1990). Challenges to conserving waterlogged finds ex situ (i.e., removed from a waterlogged environment) are deterioration due to a change in the environment, biodeterioration during wet storage, distortion due to water removal, discovery of "true identity," and long-term stability.

Historical Background

In the nineteenth century, scientific conservation of waterlogged finds began with the need to treat finds from land-based archaeology. In Denmark, from the 1830s, it was recognized that organic and metal finds recovered from waterlogged sites needed treatment to prevent their loss following recovery. Staff at the National Museum in Copenhagen quickly realized that waterlogged organic finds must be kept wet even before treatment began and that water with which wood was permeated needed to be replaced with a different material, a consolidant, in order to prevent disintegration of the find (Christensen 1970: 12–14). In 1859, it was found that boiling wood objects in alum (aluminum potassium sulfate) produced good results (Madsen et al. 2001: 37). Until 1958, alum was used at the National Museum in Denmark to conserve some 100,000 finds (Unger et al. 2001: 373). The use of alum to conserve waterlogged wood was quickly adopted in other countries to treat large and small objects. In Norway it was used to treat parts the *Oseberg* ship, in the early 1900s (Unger et al. 2001: 374).

By the end of the nineteenth century, German and Norwegian chemists had identified the need to remove soluble chlorides from iron objects to prevent corrosion post excavation. Various treatments were developed to remove chlorides from iron by electrochemical and electrolytic reduction and heat treatments (Mardikian et al. 2010). The problems that soluble salts cause for

inorganic finds, particularly ceramics, were also realized as huge numbers of finds began arriving at National Museums in Germany and Britain, from excavations of salt-rich land sites in Mediterranean and Middle Eastern countries (Watkins & Scott 2001). In the 1880s, at the Berlin Royal Museums, a chemical laboratory to research conservation treatments including desalination of ceramics, electrolytic reduction treatments for metals, and consolidation of organics was established under Friedrich Rathgen, the "Father of Archaeological Conservation" (Gilberg 1987). By the early 1920s, a research laboratory under Alexander Scott was established at the British Museum to understand deterioration and develop treatments for objects in the museum's collection. Scott was succeeded by Harold Plenderleith whose book, written with A.E.A Werner, *The Conservation of Antiquities and Works of Art: Treatment, Repair and Restoration*, published in 1956, and revised 1971, was for a long time the standard reference for treatments, including those of waterlogged finds.

From the 1950s, technological developments enabled, and increasingly expanded, access to finds underwater, including those in marine environments (Pearson 1987; Jones 2003). For these finds, conservation challenges include the removal or deactivation of soluble salts, particularly chlorides, from all materials; consolidation and drying of large organic finds, such as ships, as well as their contents; and extraction of finds from concretions. In some environments, finds are encased in concretions of calcium carbonate, shells, sand, and corrosion, within which iron finds may have completely corroded leaving voids. Discovery, excavation, and recovery of large finds, particularly ships such as *Vasa* (Sweden), *Mary Rose* (UK), the Bremen Cog (Germany), *Batavia*, and *Xantho* (Australia), during the 1960s through 1980s, led to further refinement, adaptation, and development of conservation treatments for waterlogged finds from marine environments (Pearson 1987; Jones 2003).

By the 1930s, it was already apparent that alum was not ideal (Unger et al. 2001: 382). Polyethylene glycol (PEG) as a consolidant for wood was introduced in Sweden in the early 1950s and taken up by the National Museum in Denmark following experiments in the late 1950s and early 1960s to find a treatment for five Viking-period ships (Christensen 1970). PEG has been used since to conserve most waterlogged wood finds, including *Vasa*, *Mary Rose*, and Bremen Cog. Other consolidants (e.g., ethylene glycol, glycerol, sugars, resins, silicone oils, and Kauramin), application methods (e.g., immersion, spraying), mediums (e.g., water and organic solvents), and drying methods (e.g., air-drying, freeze-drying, solvent drying) have been tried and tested (Unger et al. 2001: 363–496). The efficacy of these treatments is generally compared to that of PEG.

Mitigating the corrosion by chlorides of waterlogged metals has been a continuing quest since the nineteenth century. The problem of stabilizing copper alloys was essentially resolved in the mid-1960s with the use of benzotriazole (BTA) (Madsen 1967). No universal chloride-removal treatment, however, has yet been found for iron (Mardikian et al. 2010: 92). Early methods involved stripping off corrosion products to bare metal. Since, however, the original surface of an iron or copper alloy find is likely within the corrosion layer, following the principle of integrity requires that corrosion products as well any remaining underlying metal must be stabilized (Cronyn 1990). Research continues to characterize and understand corrosion mechanisms in order to optimize treatment methods. Treatment methods generally seek to stabilize metals by either removing, deactivating, or inhibiting the effects of chlorides. Some methods to remove chlorides involve reduction (by electrolytic, electrochemical, or thermal means) of corrosion products to facilitate release of chloride ions. Other methods aim to inhibit their effects through control of the ambient environment to remove water and/or oxygen (Mardikian et al. 2010: 89–95).

Recovery and treatment of spectacular finds in the 1960s and 1970s led to the development of ex situ conservation methods. Through the 1990s, however, it became apparent that only a small

fraction of finds in waterlogged environments, on land or underwater, could ever be excavated, let alone recovered, and treated with resources available. Instead preservation in situ – by reburial or leaving in place – has become the first, for some the preferred, conservation option rather than recovery and treatment ex situ. This approach is embodied in UNESCO's 2001 *Convention for the Protection of Underwater Cultural Heritage* (Manders 2008). With increasing pressure to leave archaeological remains in situ, conservation research and practice has expanded to include better understanding of physical and chemical aspects of burial environments as well as their effects on archaeological materials, how to monitor environments without changing them, and to determine if preservation in situ can be a reality as well as an aspiration (Corfield et al. 1997; Holden et al. 2006; Caple 2008).

Postwar urban development, in Europe and Scandinavia in the 1960s and 1970s, increasingly threatened archaeological contexts below the water table on land sites. Archaeological conservation labs were established in universities, museums, and archaeology units to treat the influx of archaeological materials, especially organic finds of wood and leather, from "rescue archaeology" preceding development in cities, including London and York in Britain and Trondheim in Norway. Since 1970, archaeological conservation has evolved as an increasingly specialized profession. Courses and programs, including B.S., M.S., and Ph.D. programs, have been established, for example, in the UK, Denmark, Canada, and the USA (Sease 1996). Unifying professional codes of practice and ethics have been agreed (Kapelouskou 2012). The development of conservation of waterlogged finds can be followed in professional journals and conference proceedings, particularly the International Institute of Conservation (IIC) journal *Studies in Conservation* (since the 1950s), journals such as *Journal of Archaeological Science* and *Journal of Cultural Heritage*, and the triennial conference proceedings of the International Council of Museums Conservation Committee (ICOM-CC) working groups for wet organic archaeological materials and for metals (since the late 1970s).

Key Issues and Current Debates

Current interests include pre- and postconservation storage and display, effectiveness of treatment methods, retreatment, reburial, in situ preservation, and the scope of archaeological conservation (Caple 2008; Williams & Peachey 2010; Mardikian et al. 2011; Straetkvern & Williams 2012). The goal of conservation is minimal or no change to the find. This requires attaining and maintaining the find in equilibrium with its environment. Conserving a waterlogged find involves suiting the condition of the find to fit the environment or suit the environmental conditions to the find. Conservation options are conservation ex situ, reburial, active conservation in situ, or passive conservation in situ.

Conservation ex situ involves treating the find removed from its archaeological context.

Conservation can be a decades-long process, requiring researching appropriate methods and materials, gathering resources (e.g., funding, staff, facilities, materials, and equipment), and treating the finds. Finds must be kept wet until treated and dried, thus presenting problems of biodegradation of organics and corrosion of metals. Options for preventing biodegradation of organics include use of biocides, filtration, ultraviolet radiation, chilling, anoxic conditions, and high humidity (rather than immersion) (Jones 2003; Straetkvern & Williams 2012: 181–183). For metals, particularly iron, conservation options include electrolytic and/or storage in alkaline solutions (Pearson 1987; Mardikian et al. 2010: 89–95). Recently, display aquariums are being investigated to keep finds accessible and visible for archaeologists and the public during wet storage and treatment (Björdal et al. 2009).

The ideal consolidant for the conservation of organics would be long lasting, give dimensional stability, not alter appearance, not cause

shrinkage or swelling, be compatible with preservatives, allow post treatment repairs, penetrate the structure, be nontoxic, be nonflammable, resist insects and fungi, and be reversible (Unger et al. 2001: 363–364). For some projects (e.g., *Vasa*), PEG remains the best option in terms of reliability, repeatability, ease of use and economy (Hocker et al. 2012). Even so alternative consolidants are being sought that are specific to the find, either previously treated (e.g., Oseberg ship) or recently recovered (e.g., Roman ships in Italy) (Giachi et al. 2011; Christensen et al. 2012).

Conservation of iron remains an intractable problem. Research is focusing on characterizing iron corrosion post excavation to determine and clarify the role of chlorides, as well as how best to remove or deactivate them (Rimmer et al. 2012). Some projects continue with refinements of traditional treatments (e.g., electrolytic reduction and desalination via soaking in alkaline solutions). Others are experimenting with new methods, for example, the use of subcritical fluids (e.g., Mardikian et al. 2011: 39–49). Instead of removing chlorides, other projects are relying on removal of another of the agents of corrosion – water – through storage or display in very dry relative humidity to prevent corrosion (Williams & Peachey 2010: 187–200).

Reburial – following excavation, recovery and recording ex situ – allows finds to be kept in the same or similar waterlogged environment.

In an early (1985) reburial, timbers from sixteenth century Basque whaling ships were placed within a cofferdam constructed at the excavation site in Red Bay, Canada. The timbers were buried beneath sand, rock, and silt bags. Monitoring of the site in 1986, 1988, and 1992 found that an anaerobic reducing environment had been achieved; thus, preservation was presumed (Waddell 2007: 149–153).

In 2002, approximately 9,000 finds from *Fredericus* (1719) were reburied in Marstrand Harbor, Sweden, in trenches and covered by at least 50 cm of sand and clay (Gregory et al. 2012). Findings from the RAAR (Reburial and Analyses of Archaeological Remains) project, started in 2001, indicate that reburial of materials in Marstrand Harbor may be a long-term option only for large wood timbers. From examination of materials after 7 years, reburial is not recommended at all for iron, low-fired earthenware, glass, plant fiber, or horn; and up to 7 years might be considered for tanned leather, animal bone, and antler. The feasibility of longer reburial for copper alloy (bronze), medium- to high-fired ceramics, and wood is an ongoing study. Long-term survival of packing materials and labeling materials is also being tested. Polyethylene-based packing materials, graphite pencils, and permanent marker ink have survived well so far. Optimal burial depth is location specific with many contributing factors including sediment type, porosity, and organic content (Straetkvern & Williams 2012: 23–48). Continuous monitoring needs to be part of reburial strategy in line with curation of archaeological archives in repositories ex situ. Reburial removes finds from their original contexts hence the importance of cataloguing, recording, and labeling pieces.

Active conservation in situ – following excavation or survey and recording – keeps the find in its archaeological context, under active control of its condition and/or the environment to maintain equilibrium between the find and its environment.

Underwater finds, such as shipwrecks, may be physically covered, with or without their contents to provide physical protection and an anoxic environment through covering with sufficient layers of, for example, sandbags, rock, and/or devices, such as artificial sea grasses or netting, to promote sedimentation at the site (Gregory et al. 2012). In addition, rates of corrosion may be reduced through attachment of sacrificial anodes to an iron find in situ. The success of conservation in situ of large iron finds, such as vessels, cannon, and anchors, depends on monitoring through in situ corrosion measurements (MacCleod 2002: 697–714, 2005: 310–316).

On land, re-covering waterlogged finds may also involve physical covering with soil, clay, aggregates, concrete, and/or geotextiles, to

mitigate the effects of development, particularly construction work in urban sites, where finds are below the water table. Provision for continued monitoring should also be part of the mitigation strategy (Caple 2008: 216; Gregory et al. 2012). Physical protection to isolate a find does not necessarily prevent its decay – for example, the materials used may change the local chemistry at the site and/or change the hydrological conditions, with consequent deterioration of finds (Davies 2009: 56–57). Characterization of the burial environment, determination of threats (physical, chemical, biological, and/or sociological) to the find and of the condition of the find, should be made to determine measures needed to mitigate decay of the find.

Passive conservation in situ – the find may or may not be excavated, surveyed, or recorded but is left in its archaeological context – involves the natural burial environment and natural processes being relied on to maintain waterlogged conditions and to continue to preserve the find.

Relative to the number of finds that remain in waterlogged environments on land and underwater, resources are so insufficient that it is inevitable that most finds will be left, unattended or modified, in situ, where, it is hoped, the environment remains unchanged and will not present a physical, chemical, or biological threat to them (Manders 2008). Unfortunately, as more investigation and monitoring are done, it is clear that no change to a burial environment or the archaeological remains within can be guaranteed.

Research in Scandinavia and England suggests that the corrosion rate of iron and copper alloys still in the ground is increasing due to air pollution, climate, and hydrological changes. In England, all ancient monuments in 1945 contained an estimated four billion iron and copper objects. Over 50 years to 1995, an estimated 14 million were lost per year due to site loss or damage, with an additional 5 million lost due to corrosion. (Caple 2008: 215). For waterlogged land sites, not only is maintenance of groundwater levels crucial but also its level of contamination and degree of oxygenation. Hydrological changes at a site may be a consequence of changes in land use, climate change, and sea-level change occurring many miles from the site (Davies 2009: 15–16). For effective preservation in situ, monitoring of a site within its environment, not just of the environment of the site, is essential (Holden et al. 2006: 61).

Underwater, environments presumed to provide preservation of finds are also changing with consequent acceleration of decay of finds. For example, wood-destroying shipworms are appearing in the deep cold waters of the Baltic Sea (Straetkvern & Williams 2012: 9–14). "Preservation in situ" is potentially misleading since research indicates that while finds remain buried, not all are being preserved – the rate of decay may simply be slower than it might be if they were at the surface (Caple 2008: 215). Continuing corrosion and decay of large iron shipwrecks, such as USS *Arizona*, may lead to collapse of hulls, loss of remains, disturbance of grave sites, and pollution (e.g., release of fuel) (Mardikian et al. 2011: 400–408).

Changing the Scope and Concept of Archaeological Conservation?

Archaeological conservation traditionally developed to preserve finds removed from their burial environment. To prolong the integrity of finds, conservators sought to attain a situation of minimal or no change (Cronyn 1990; Kapelouzou 2012). Since the 1990s, preservation in situ and reburial have increasingly become alternative conservation options to recovery and treatment ex situ. Research and observation, however, indicate that neither leaving nor reburying finds in a waterlogged environment prevents change in condition.

Most training courses for archaeological conservators focus on treatment of individual objects and care of museum collections. Should the remit and scope of archaeological conservators now be extended to include preservation of finds in situ? Should conservation education and training expand to include additional knowledge and associated skills (e.g., in hydrology, geological sciences, engineering, land management) with understanding and awareness of moral judgments concerning economic impacts of changing

land use, the effects of natural habitats on wildlife, and ethical implications of taking actions to preserve objects which cannot be seen (Caple 2008: 216).

Such an expansion of scope also raises the question of reexamining concepts that have defined archaeological conservation since the 1970s, including to what extent can principles developed for conservation of finds ex situ be applicable for finds in situ? To what degree is it possible, or reasonable, to control change of the environment and or the find if it is left in situ? Does prolonging the existence of an object necessarily mean no change? For how long is a find's existence to be prolonged? Does the definition of archaeological conservation need to be altered to embrace the inevitability of change? For example, English Heritage's definition of conservation of the historic environment; "the process of managing change to a significant place in its setting in ways that will best sustain its heritage values, while recognizing opportunities to reveal or reinforce those values for present and future generations" (English Heritage 2008: 7).

International Perspectives

Since the establishment of the ICOM-CC working groups for wet organic archaeological materials and metals in the mid-1970s, conservation of waterlogged finds has become an international practice. For example, by the mid-1980s, over 450 papers and reports from 30 countries on waterlogged wood had been published (Jones 2003: 6). The published proceedings include transcripts of discussions that provide additional insight into issues, debate, and controversy over the years. The evolution of conservation research and practice can be followed, in which projects increasingly involve collaborators from different countries. Current international perspectives on conservation of waterlogged finds appear in the 2010 conference proceedings for ICOM-CC WOAM and are summarized below (Straetkvern & Williams 2012) and for ICOM-CC Metals (Mardikian et al. 2011).

Researchers in various countries collaborate to undertake and contribute to the conservation of waterlogged finds from land and underwater sites, including research into new conservation materials and methods, assessing effectiveness of traditional treatments, and contributing expertise and experience gained to other nation's projects. For example, conservators from Norway, Sweden, and Denmark are investigating retreatment of alum-consolidated wood, including the *Oseberg* ship. Investigations and research to understand and improve the condition of *Vasa*, in Sweden, include researchers from Denmark (National Museum), the United Kingdom (Mary Rose Trust), the USA (Texas A&M), and Australia (Western Australian Museum). Relatively new projects started since the 1990s may include advisory panels drawing on international expertise – for example, the Newport Ship (Wales), in the USA *Hunley* and *Monitor* conservation projects, and the Yenikapi ships in Turkey.

The search for the ideal consolidant for waterlogged wood continues at centers in several countries; for example, in France (Arc-Nucleart in Grenoble) and Australia (Western Australian Museum, WAM), testing use of azelaic acid; in Japan (Toyo Feather Industry Co. Ltd, and Kyoto University) and Australia (WAM), use of feather-derived keratin; and in Canada (Canadian Conservation Institute, CCI), different types of PEG, and in the USA, Texas A&M has pioneered the use of alkoxysilanes or silicone oils. The presence of sulfur and/or of iron in wood affects the penetration of consolidants and their long-term stability. Researchers in Australia (WAM) and Sweden are seeking to improve wood consolidation by researching methods to remove iron from wood. Extraction of sulfur from wood is being investigated in France (Arc-Nucleart). In England, the Mary Rose Trust and University of Canterbury as a treatment method for Mary Rose timbers are researching sulfur deacidification with nanoparticles of strontium carbonate (Streatkvern & Williams 2012: 419–424).

Removal or deactivation of chlorides in iron finds continues as a research focus in the UK and

the USA. At Cardiff University, Wales, conservators and scientists have been researching and evaluating methods of chloride extraction for over 30 years. Collaborative research projects now include conservators at the British Museum and English Heritage. In the USA, conservators and scientists at the Warren Lasch Conservation Lab and Clemson University are investigating stabilization options for *Hunley* submarine hull, including use of subcritical drying fluids.

International collaborative projects are investigating aspects of preservation in situ – including characterizing burial environments, understanding the decay of materials, and mitigation strategies to inhibit change, in waterlogged environments on land and underwater. The RAAR project, based in Sweden, includes researchers from Denmark (National Museum) and Australia (WAM). Scientists and conservators at WAM pioneered in situ corrosion monitoring and use of sacrificial anodes, for conservation management of iron ships and artifacts still underwater, and provided advice and expertise to projects worldwide (MacCleod 2002: 697–714, 2005: 310–316).

Future Directions

Conservation is an ever-evolving discipline. As examination techniques and available expertise improve, particularly in understanding the evidence that may be preserved and retrievable, conservators are better able to understand the short- and long-term effects of treatments. Feedback from dissemination of findings and constant review, particularly as conservation research deepens understanding of how materials deteriorate in different environments and effects and effectiveness of treatments, should lead to continuous evaluation and reassessment of methods and treatments used.

Conservation of archaeological finds traditionally developed to preserve finds removed from their burial environment. Research needs to continue to improve old methods and develop new methods for treatment of finds ex situ. Since the 1990s, preservation in situ and reburial have become alternative options to treatment ex situ. Preservation in situ is still a nascent discipline; more work is needed to ensure this option combines understanding of the environment, the find and processes of deteriorations, with a commitment to continuous monitoring (Gregory et al. 2012). With increasing single-site data and multisite data synthesis, prediction modeling may help inform decisions as to the best conservation option for a particular find, whether to conserve ex situ or in situ. Technological advances for imaging sites and finds are not only providing opportunity to better record and share information about finds and their condition but may also provide another conservation option – that of virtual conservation. A find may or may not be recovered, but it is recorded such that it continues to have a "virtual" existence, even if its remains are abandoned, discarded, and lost. In deciding future options for conserving waterlogged finds, it needs to be determined whether maintaining constant condition or managing change is the ultimate goal. If the definition of archaeological conservation is altered, underlying principles including those of reversibility and minimum intervention may also need to be reframed.

Conservation has become a profession guided by unifying codes of practice and ethics (Kapelouskou 2012). Conservation of waterlogged finds, however, is not an activity that can be done in isolation – conservators are part of the archaeological process and have a key role in the archaeological team. Understanding and mitigating the effects of environments on finds – whether in the burial or museum environment – is increasingly a multidisciplinary exercise, including expertise from, for example, the geological, biological, and social sciences. The decision to conserve a waterlogged find requires not only an archaeological commitment but also social and political ones. Commitment of resources in the present and long term will be needed. Whichever conservation option is chosen to prolong the existence of finds *for* present and future generations, its achievement will require commitment *by* present and future generations.

Cross-References

- ▶ Authentication and Conservation in Archaeological Science
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Wood: Conservation and Preservation

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Watkins, Joe (Indigenous Archaeology)

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Basic Biographical Information

Joe Watkins (1951–), a member of the Choctaw Nation of Oklahoma, is a tireless worker in the development of indigenous archaeology, who, for three decades, has broken new ground in conducting collaborative work with indigenous communities, in encouraging indigenous persons to enter the field of archaeology and in promoting self-reflexivity within the discipline toward its relationships with descendant communities.

Joe E. Watkins was born February 18 at Talihina Indian Hospital to Irving and Thelma Watkins. He is a nephew of Joseph Oklahombi,

a Choctaw Code Talker and World War I hero. Growing up, Joe learned Choctaw traditional philosophy and culture during stays with his Choctaw-speaking grandparents in southeastern Oklahoma and was encouraged by them to respect and preserve indigenous history. He received a B.A. in anthropology from the University of Oklahoma in 1973, cultivating an interest in material culture. The same year, Joe went to France to study morphological typology and flintknapping with Francois Bordes. Soon he developed a tremendous artistic talent, not only in flintknapping but also in carving, beadwork, and featherwork. In 1977, Watkins received an M.A. in anthropology with an archaeology specialization from Southern Methodist University (SMU). He then completed fieldwork in experimental archaeology for a doctoral dissertation, only to have it rejected before defense.

During the turbulence between Native Americans and archaeologists in the 1970s, Joe found himself in occasional internal conflict, but also in a unique position for understanding both groups' viewpoints. In the late 1970s and 1980s, he drew upon this perspective to serve as a representative to the American Indian Religious Freedom Act Task Force, as an archaeologist/Native American specialist for the Department of the Interior, and as an archaeologist for the Oklahoma Archaeological Survey, where he completed more than 300 projects. Joe and his (then) wife Isabella Peralta-Romas were blessed with two children, Ethan in 1991 and Sydney in 1992. In 1993, he participated in a workshop sponsored jointly by the Society for American Archaeology (SAA) and the National Science Foundation, which led to the formation of the Principles of Archaeological Ethics. Joe conducted a second dissertation project at SMU, analyzing archaeologists' responses to questions about interaction with Native Americans, and, in 1994, became one of the first Native American archaeologists to attain a Ph.D. His dissertation (Watkins 2001), one of the seminal works in indigenous archaeology, closes with the insight: "That is what indigenous archaeology can bring to the discipline: a viewpoint that refuses to be 'objective' and embraces the emotional, one that pursues not "truth" but understanding, and one that includes all facets of what it is to be human on the brink of an exciting adventure" (Watkins 2001: 181).

Dr. Watkins worked as an archaeologist for the Bureau of Indian Affairs Anadarko Agency from 1993 to 2003, concurrently serving as an instructor at the University of Oklahoma, Indiana University, the University of Nevada-Reno, and Flinders University, Australia, teaching courses on archaeological ethnics and Native American consultation. He also began serving as a consulting archaeologist for the Choctaw Nation. He received the SAA Presidential Award in 1997 and again in 1999 and the Oklahoma State Historic Preservation Officer's Citation of Merit in 1999. During this period, Dr. Watkins chaired the Committee on Native American Issues for the Register of Professional Archaeologists and the Committee on Ethics for the American Anthropological Association, as well as the Committee on Native American Relations and the Native American Scholarships Committee for the SAA. In 2001, he co-organized a conference at Dartmouth College that explored the relationship between Native Americans and archaeologists; out of this came the "Closet Chickens," a networking and support group for Indigenous archaeologists. From 2003 to 2007, Dr. Watkins served as an Associate Professor in the Department of Anthropology at the University of New Mexico. In March 2006, Joe Watkins married Carol Ellick: archaeologist and illustrator. In 2007, he accepted directorship of the Native American Studies (NAS) Program at the University of Oklahoma, where he was instrumental in setting up both a NAS masters program and a program to train Tribal Historic Preservation Officers. An indefatigable worker, Watkins has authored 3 books, 55 articles, 30 book chapters, and 20 scholarly reviews, over the last 17 years, principally concerning Indigenous archaeology and archaeological ethics. He has also given nearly 200 professional presentations and has served on nearly 3 dozen boards and committees. Currently, he serves on the Choctaw

Nation NAGPRA Advisory Board, is a member of the Indigenous Advisory Committee of the World Archaeological Congress, and chairs the SAA Committee on Ethics in Archaeology. Recent research involves collaboration with Ainu communities in Japan and the Beswick and Barunga communities of the Northern Territory in Australia.

Major Accomplishments

Joe Watkins' professional work and personality contributed to the formulation of Indigenous archaeology and continue to influence its development to this day. Through the turbulent 1970s to 1990s, he maintained a humanistic approach, advocating respect, communication, and understanding between the Native American and archaeological communities. As Indigenous archaeology has matured, he has helped to shift the dialogue from a focus on repatriation to broader issues of maintaining cultural continuance and communication and making long-term commitments for increasing the relevance of archaeology (e.g., Watkins 2010a, b). Through his prolific writing and presentations, his work on many boards and panels, and his university teaching, he has a broad and lasting influence on upcoming generations of archaeologists, indigenous and nonindigenous alike (e.g., Watkins & Ellick 2011).

Cross-References

- ► Closet Chickens
- ► Indigenous Archaeologies
- ► Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ► Watkins, Joe (Theory)

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Basic Biographical Information

Joe Edward Watkins (Fig. 1) is an American archaeologist and anthropologist and a member of the Choctaw Nation of Oklahoma. He is currently the Director of Native American Studies at the University of Oklahoma, Norman, where he teaches courses on indigenous archaeology, tribal historic preservation, and contemporary issues in Native American studies. Watkins received his B.A. in Anthropology from the University of Oklahoma and both his M.A. (1977) and Ph.D. (1997) from Southern Methodist University. After completing his M.A. degree, he held the position of Archaeologist/Native American Specialist for the Heritage Conservation and Recreation Service of the US Department of the Interior, in Atlanta (1978–1980). This led to several years running his own CRM company, American Indian Cultural Associates, in Oklahoma. Following that he served as Archaeologist/Environmental Coordinator for the Branch of Land Operations, United States Department of the Interior, Bureau of Indian Affairs, in Anadarko, Oklahoma (1993–2003). Watkins was also Assistant Director of the Oklahoma Indian Legal Services (1982–1984), Business Manager of the Millicent Rogers Museum in Taos, New Mexico

Watkins, Joe (Theory), Fig. 1 Joe Watkins (Photo by Carol J. Ellick)

(1984–1987), and Archaeologist for the Oklahoma Archeological Survey (1990–1993). More recently, he was Associate Professor of Anthropology at the University of New Mexico from 2003 to 2007.

Watkins' interest in archaeology developed when, as a 10-year-old, he discovered a projectile point near his grandmother's homestead, which led to an early lesson in the complexities of cultural heritage from his grandmother who told him that the artifact related to someone else's past, not his, since the Choctaw had been relocated to Oklahoma from Mississippi in the 1830s. Addressing challenges relating to the legacy of colonialism would become an underlying theme dominating Watkins' career. During the early part of his academic life, inspired by the archaic point, his interests focused on material culture, lithic analysis, and experimental archaeology. In 1973, he spent time in France working with François Bordes at the site of Pech de L'Aze IV, where he learned flintknapping and Bordes' classification system from the master himself and also worked with Jacques Tixier and Bruce Bradley. In 1975, he built in a full-sized late prehistoric-style, subterranean, earth-covered pit house at the Fort Burgwin Research Center near Taos, New Mexico, which he lived in throughout the winter and engaged in a variety of traditional activities – from corn grinding and food preparation to pottery and basket manufacture to flintknapping, arrow making, and hide-working – to gain insight into the lifeways of ancient Southwesterners.

As a young Native American scholar, Watkins found himself increasingly questioned by archaeologists as to his objectivity and by indigenous community members as to his "Indianness." Such encounters contributed to his interest in European and later sub-Saharan African archaeology, which afforded the opportunity to avoid having his credibility and integrity questioned. However, Watkins' reentry into North American archaeology came about through his post-M.A. foray into the legislative side of archaeological heritage through a position he held with the Heritage Conservation and Recreation Service of the US Department of the Interior. He participated in a series of national consultations on the American Indian Religious Freedom Act of 1978 and the impact of the federal policies on tribal communities that sought input from community members. These consultations brought forward many perspectives on the effects of archaeological and heritage management practices upon sacred sites, access to sacred objects, and human remains and cemeteries. Deeply affected by the testimonials he witnessed, his interests subsequently shifted to the ethical practice of anthropology and the study of anthropology's relationships with descendant communities and aboriginal populations, topics that have dominated his career ever since.

Major Accomplishments

Over the course of more than 40 years, Watkins' research and writing has spanned the realm of archaeology, from culture history to

processual and postprocessual archaeologies, with significant contributions to each, in addition to more than 25 years' involvement in cultural resource management. His interests include the history and application of heritage legislation in the United States and elsewhere; CRM policy and practice; archaeological ethics; Plains archaeology; public archaeology; lithic technology, experimental archaeology, and material culture studies; Native American studies; indigenous archaeology; education; identity and nationalism; and intellectual property.

Watkins' most recognized and valued work is focused on the dynamic and multifaceted relations between indigenous communities and the discipline of archaeology. His dissertation, *Ethics and Value Conflicts: Analysis of Archeologists' Responses to Questionnaire Scenarios Concerning the Relationship between American Indians and Archeologists* (1994) - provided a critical review of the controversies surrounding the Kennewick Man/Ancient One, the Wenatchee Clovis Cache, and other cases. This work was later revised and published as *Indigenous Archaeology*: *American Indian Values and Scientific Practice* (Watkins 2000), which is today the most widely cited title in the realm of indigenous archaeology.

In 1993, Watkins participated in the joint Society for American Archaeology/National Science Foundation – sponsored workshop that led to the formulation of the Society for American Archaeology's Principles of Archaeological Ethics (and he continues to press for review and revision). He has also been very active in the American Anthropological Association; in addition to other AAA roles, he was a member of their "Darkness in El Dorado" Task Force in 2002, charged with the difficult task of assessing charges brought against James Neel and Napoleon Chagnon by journalist James Tierney. He was an advisor to the MATRIXX (Making Archaeology Teaching Relevant in the XXI Century) project, sponsored by the SAA Task Force on Curriculum. Since 2009, Watkins has been a member of Time Team America, an archaeology/reality television program produced by the (US) Public Broadcasting System. He is also a Steering Committee member of the Intellectual Property Issues in Cultural Heritage (IPinCH) Project.

Watkins is an accomplished educator and administrator, with an outstanding record of advisory board, committee chair or member, and executive service for such state, national, and international organizations as the Alfonso Ortiz Center for Intercultural Studies, American Anthropological Association, National Museum of Natural History, Oklahoma Council for Archaeological Preservation, Plains Anthropological Society, Register of Professional Archaeologists, Society for American Archaeology, Society of Professional Archaeologists, University of Oklahoma, Wenner-Gren Foundation, and World Archaeological Congress. He has been a Fulbright Scholar and a Ford Foundation Fellow, has received a Citation of Merit from the Oklahoma State Historic Preservation Office, and has been twice awarded a Presidential Recognition Award by the Society for American Archaeology.

Watkins' contributions to archaeology and anthropology have been substantial, as they have also been to indigenous communities in North America and beyond. His integration of indigenous, anthropological, and historical perspectives reveals similarities and differences in the experiences of Native Americans and other colonized, marginalized, and underrepresented populations. Such efforts have also provided important insights into the impacts archaeology has had on Indigenous peoples and vice versa. In May 2013, Watkins accepted the position as Supervisory Anthropologist and Chief, Tribal Relations and American Cultures program of the National Park Service, an opportunity that allows him to develop more effective and satisfying relationships between this organization and communities. He has also worked with aboriginal groups in Australia and is currently involved with indigenous Ainu communities in Japan to compare their struggle with that of American Indians in historical, political, social, cultural, and economic spheres.

As an archaeologist and a Choctaw, Watkins straddles two different worlds and ways of

knowing – one based in Western scientific tradition, the other traditional knowledge – each with often very different needs, goals, values, and demands. At the intersection he has worked to promote ethically sound and mutually satisfying archaeological practices, a desire likely instilled by that lesson on heritage provided to him by his Choctaw-speaking grandmother when he was young. As a Native American scholar who has experienced formidable challenges in his career, and whose work has always promoted relevance and responsibility in archaeological practice, Joe Watkins serves as an important role model not only for aboriginal youth but also for established scholars of any background.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
- ▶ Kennewick Man Case: Scientific Studies and Legal Issues
- ▶ Media and Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Public Education and Archaeology: Disciplining Through Education
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Watson, Patty Jo

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Basic Biographical Information

Patty Jo Watson (Fig. 1) is an American archaeologist whose theoretical writing was instrumental in the development of an explicitly scientific

Watson, Patty Jo, Fig. 1 Patty Jo Watson

archaeology. Her research interest focused on agricultural origins in western Asia and eastern North America. Born in 1932 in Superior, Nebraska, she grew up in rural Nebraska and Iowa before attending the University of Chicago in the 1950s. She received an M.A. in anthropology in 1956 and a Ph.D. in 1959 working under the direction of Robert Braidwood, a pioneer of modern archaeology.

Watson's first field training was at the University of Arizona Point of Pines Field School in 1953. In 1954–1955, she was a field assistant on Braidwood's Iraq-Jarmo Project, an important multidisciplinary project to investigate the origins of agriculture in the Hilly Flanks of the Zagros Mountains, northern Iraq. This model of problem-oriented, interdisciplinary research was championed by Watson throughout her career. In addition to research in Iraq and Iran, Watson conducted major fieldwork in Turkey, New Mexico, and Kentucky in collaboration with colleagues and students, including her husband, Richard Watson, a philosopher of science and a geologist.

In the 1960s, Watson taught at Los Angeles State College, University of Southern California, University of California–Los Angeles, and University of Michigan, before being appointed assistant professor at Washington University in St. Louis in 1969. Watson spent the remainder of her career at Washington University, retiring in 2004.

Watson was appointed Edward Mallinckrodt Distinguished University Professor of Anthropology at Washington University in 1993, a title she continues to hold as professor emerita. Throughout her long and distinguished career, Watson has held office in many professional organizations, received numerous awards for her achievements, and elected to several prestigious scholarly organizations, including the National Academy of Sciences (1988), American Academy of Arts and Sciences (1997), and American Philosophical Society (2000).

Major Accomplishments

Watson's dissertation research and early postdoctoral work in contemporary Iranian villages pioneered the use of ethnographical data as an analog to aid in the interpretation of past remains, a subspecialty now known as ethnoarchaeology. This work was published much later (Watson 1979) when archaeological ethnography became a subspecialty in its own right.

In the 1960s, Watson maintained her affiliation with the Oriental Institute of the University of Chicago, shifting her research focus to a Halafian site in the Diyarbakir region of southeastern Turkey (Watson & LeBlanc 1990), while Braidwood and his Turkish colleague Halet Çambel were conducting excavations a the nearby site of Çayönü. During this period, Watson formed important collaborations with Steven Leblanc, her first Ph.D. student, and Charles Redman, a student at the University of Chicago. LeBlanc and Redman's research interests in the Southwestern USA briefly drew her into field research in

New Mexico (Cibola Archaeological Research Project); however, it was the publication of a short treatise on the philosophical underpinnings of archaeological inquiry for which they are best known.

In 1971, publication of *Explanation in Archeology: An Explicitly Scientific Approach* (Watson et al. 1971) was the first comprehensive statement of the "New Archaeology" or what came to be known as "processual archaeology." The book helped foment a new approach to archaeology that emphasized the nature of scientific explanation, the scientific method, systems theory, and an ecological view of culture. This was followed by a second volume, published in 1984, that updated and extended their original arguments (Watson et al. 1984). By the late 1980s, advocates of post-processualism – the backlash against scientific archaeology – rejected the scientific method and processualism because of its overreliance on deterministic models and scientific objectivity, had become prominent. Watson spent the next two decades countering the critics of processual archaeology and a general antiscience bias among post-processualists (e.g., Watson 1991).

Watson remained ensconced in theoretical debates on the origins of agriculture and the philosophy of archaeological inference; however, in the late 1960s, her fieldwork began shifting to eastern North America. This happened somewhat by default because of her involvement with the newly organized Cave Research Foundation, of which her husband was a founding member. Unable to interest any North Americanists in the rich, well-preserved archaeological remains in caves of the Central Kentucky Karst, Watson began systematic documentation of prehistoric remains in Salts Cave, one of the large caves within the boundaries of Mammoth Cave National Park (Watson 1969). Salts and Mammoth caves had been extensively mined for mineral resources between 2,000 and 3,000 years ago. Among the perishable remains preserved in these caves were thousands of desiccated human paleofeces. In collaboration with the paleoethnobotanist Richard Yarnell, analysis of the paleofeces revealed a suite of indigenous plants in the early stages of domestication, known as the Eastern Agricultural Complex (Watson 1974). At the time, it was still thought that agricultural development in eastern North America was secondary to and dependent on developments that first occurred in Mesoamerica.

Armed with the exceptional data on early plant domestication from Salts Cave, Watson, in collaboration with her second Ph.D. student, William Marquardt, initiated the Shell Mound Archaeological Project to investigate prehistoric plant use just prior to the time period represented at Salts Cave. The middle Green River valley, just downstream from Mammoth Cave, was well known for large, freshwater shell middens dating 5,000 to 3,000 years ago. Marquardt and Watson employed the systematic use of water flotation recovery techniques to obtain carbonized plant remains from these sites. Their discovery, in 1976, of carbonized fragments of squash rind from 5,000-year-old midden deposits was the oldest record for a domesticated plant in eastern North America at the time. It has since been shown that not only does squash appear even earlier in the archaeobotanical record but that it was also independently domesticated in the Eastern USA (Marquardt & Watson 2005).

Watson's cave research and the Shell Mound Archaeological Project are still active, carried on by her students and a new generation of their students. The science wars have largely receded, replaced by a variety of interpretive archaeologies that emerged from the post-processual critique. However, as a model for archaeological inference, the scientific method, as advocated by Watson, is still the dominant model for selecting among competing knowledge claims and advancing archaeological knowledge.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Braidwood, Robert John
- ▶ Ethnoarchaeology

▶ Ethnoarchaeology: Building Frames of Reference for Research
▶ Hypothesis Testing in Archaeological Theory
▶ Near East (including Anatolia): Origins and Development of Agriculture
▶ Processualism in Archaeological Theory

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Waynuna: Agriculture and Domestication

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Basic Site Overview

Waynuna (15° 16' 01" S, 72° 44' 55" W) is a multicomponent, open-air site located at 3,625 m above sea level (masl) on the eastern side of the Cotahuasi valley in southern Peru. The earliest component dates to the Late Preceramic (or Late Archaic) Period between 4,000 and 3,600 cal year BP based on the presence of diagnostic lithic artifacts and 10 radiocarbon dates (Perry et al. 2006). This component is significant for evidence of early highland plant domestication and interregional interaction (Perry et al. 2006, 2007). Later components are ceramic bearing and date to the last ~3000 years (Jennings 2002).

Waynuna lies on a flat agricultural terrace in the shadow of Cerro Aycano (4,443 masl), about 400 m above and south of the modern village of Huillac or Huilla. Overlooking the Cotahuasi river (~2,700 masl), the site receives sunlight during most of the day. The ecotone between maize (*Zea mays*) and potato (*Solanum* spp.) cultivation zones today is at about 3,600 masl, where the site is located. Today, vegetation around Waynuna is dominated by thorny scrub growth (Figs. 1, 2).

Justin Jennings (2002) discovered Waynuna (site CO-38 in his survey) in the late 1990s. He noted extensive terracing and four circular enclosures 8–10 m in diameter interpreted as animal corrals. In the center of the site were three 7-m diameter circular subterranean structures containing sub-chambers, niches, stone doorways, and beehive-shaped domed roofs, which perhaps served a special or religious function. Jennings found other surface architecture that he believed dated to the "Inchoate Period" (c. 2,850–1,200 cal year B.P.), and he recovered three diagnostic obsidian points that suggested an

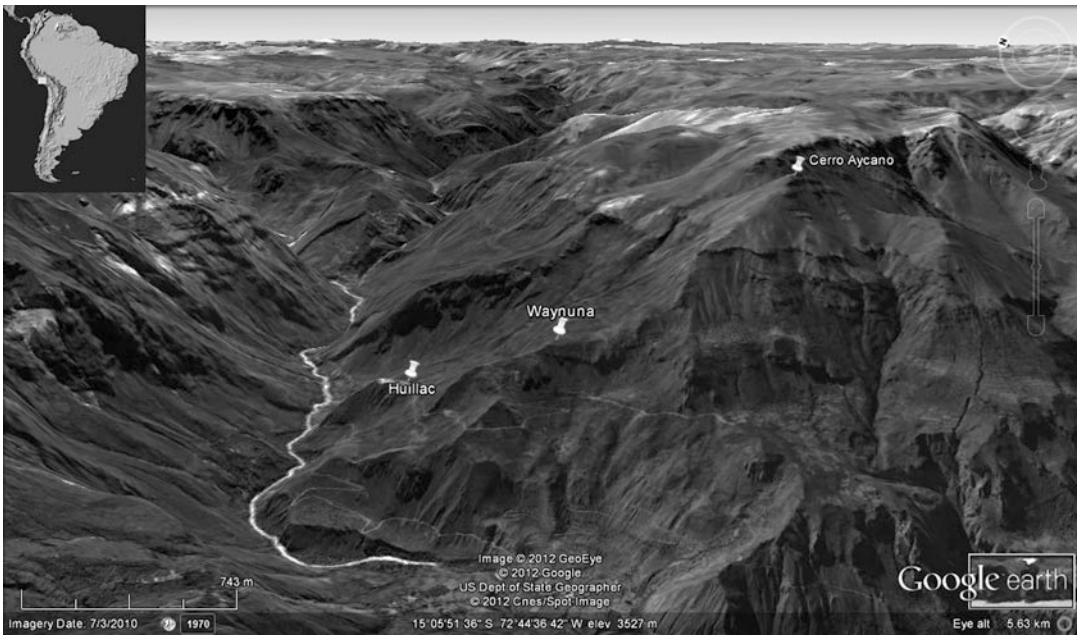

Waynuna: Agriculture and Domestication, Fig. 1 Google Earth oblique view of Waynuna, Huillac, and Cerro Aycano in the Cotahuasi valley, Peru; *inset* map of South America shows location of Waynuna as a *white rectangle*. The Cotahuasi river and valley run through the *center left* of the image

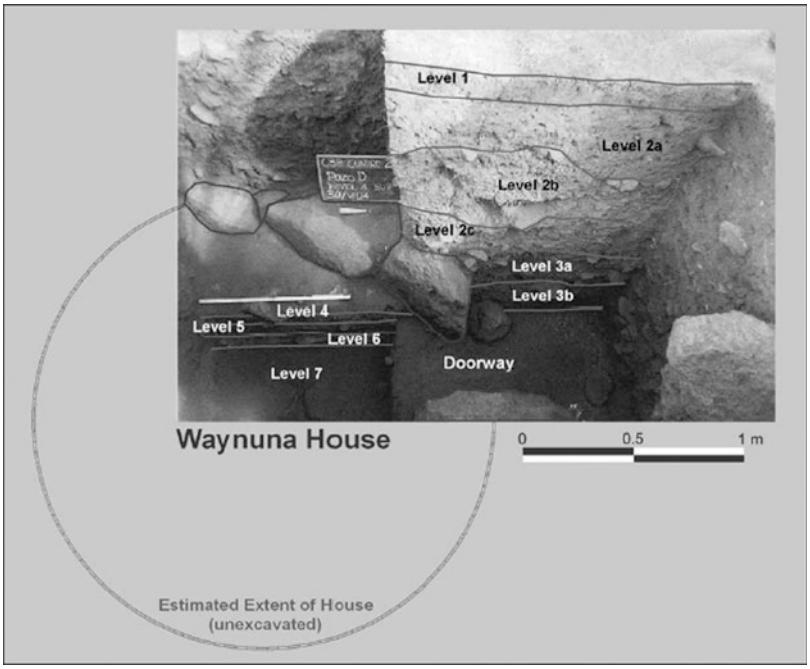

Waynuna: Agriculture and Domestication, Fig. 2 Photograph of the west wall profile at Waynuna showing 2004 stratigraphic excavation. *Outlined arc* of stones in the photo is part of the Preceramic house, and the additional extent of the house is estimated

origin for the site in the Archaic Period, but he did not find evidence for a substantial domestic settlement on the site.

Subsequent test excavations by Sandweiss in 2004 found Middle Horizon (1,200–950 cal year BP) potsherds in the terrace fill. Underlying the terrace fill was a midden deposit lacking pottery and surrounding a circular stone house foundation approximately 2.1 m in diameter. It was these preceramic deposits that dated to 4,000–3,600 cal year B.P. The most abundant artifactual remains were fragments of obsidian, most of which were chemically sourced by Rademaker (2006, subsequent research) to the Cerro Condorsayana Alca-1 outcrops some 4.5 km distance at 4,700 masl; a few fragments came from Alca-5 outcrops, located 30 km away in the Pucuncho Basin at 4,400 masl.

Evidence of Early Agriculture

Linda Perry and Dolores Piperno (Perry et al. 2006, 2007) analyzed starch grains and phytoliths from the preceramic house floor, and they found evidence for domesticated maize, potato, chili pepper, and arrowroot. These data add to our understanding of early plant domestication in Peru. Early Holocene squash (*Cucurbita* spp.) macro- and microfossils have been recovered from northern Peru at Nanchoc sites on the western slopes of the Andes (Dillehay et al. 2007) and at the Siches site near the coast (Piperno 2011); Nanchoc also has early peanut (*Arachis* sp.) and cotton (*Gossypium barbadense*). The earliest known domesticated gourd in Peru comes from Early Holocene contexts at Quebrada Jaguay (Erickson et al. 2005), on the Pacific coast, some 150 km south of Waynuna. The microfossils from Waynuna constitute the earliest evidence for domesticated plants in the southern highlands of Peru.

Starch grains from maize, potato, arrowroot, and chili pepper were found adhering to grinding stones, suggesting that food was processed at the site. Patterns of damage on the maize starch grains indicate grinding, possibly to make *chicha* or corn beer, later a staple of the Andean diet (Perry et al. 2006). The chili pepper starch grains were identified as probably *Capsicum pubescens*, a species that includes *rocoto*. Today, *rocoto* is the signature pepper for Arequipa Department where Waynuna is located. Added to the suite of domesticates that are all still cultivated in the area today, the possible *chicha*-making, and the ecotonal site location, this specific identification supports the other indications that Waynuna stands at or near the beginning of a tradition in lifeways that continues to the present.

Maize and potato affirm the strategic ecotonal position of Wayuna. Arrowroot (*Maranta* sp.) only grows below 1,000 masl on the humid eastern side of the Andes, and the presence of this species in the arid, western Andes at Waynuna demonstrates long-distance (>300 km), interzonal interaction with the eastern lowlands. The obsidian sourcing data show regional interaction with higher-elevation zones at near and medium distances. Despite its location high on a mountain side above a remote Andean valley, these data show that Waynuna was not isolated but rather participated in an extensive trade or resource acquisition network, possibly on a camelid caravan route (see, for instance, Lynch 1983).

In summary, Waynuna was first occupied about 4,000 years ago by farmers who grew and processed potatoes, maize, and chili peppers. These first inhabitants maintained widespread relations with regions as near as the adjacent puna (high altitude grasslands) and as far as the eastern slopes of the Andes leading down to the Amazonian jungle. Later occupants of the site built terraces and other structures but apparently resided elsewhere. In modern times, although the agricultural terraces surrounding Waynuna are still farmed, the local people inhabit the village of Huillac, situated on the same ridge crest at slightly lower elevation north of the site.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Andes: Prehistoric Period
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis

▶ Potato: Origins and Development
▶ Sweet Potato: Origins and Development

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Wegener, Corine

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Basic Biographical Information

Corine Wegener received her Bachelor of General Studies degree in political science from the University of Nebraska-Omaha and Master of Arts degrees in both political science and art history from the University of Kansas. She is the Cultural Heritage Preservation Officer in the Office of the Under Secretary for History, Art, and Culture at the Smithsonian Institution in Washington, DC.

Major Accomplishments

As a major in the U.S. Army Reserve, Corine Wegener served as the Arts, Monuments, and Archives Officer for the 352nd Civil Affairs Command in Baghdad, Iraq. Her duties included assisting the staff of the Iraq National Museum with the recovery and preservation of their collections after the looting during the US invasion of 2003. As a result of that experience, she founded the U.S. Committee of the Blue Shield in 2006, a nonprofit organization dedicated to US ratification and implementation of the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. She continues to serve as President. In 2007, Wegener developed a Blue Shield training program for US military personnel, designed to familiarize them with the 1954 Hague Convention. Over the past 3 years, she has organized nine military training sessions for approximately 570 US military personnel, working closely with partner organizations, the Archaeological Institute of America (AIA), the American Institute for the Conservation of Historic and Artistic Works (AIC), and the Smithsonian Institution, all of which provide volunteers, travel funds, and/or facilities. Wegener helped establish the Smithsonian Haiti Cultural Recovery Project after the 2010 Haiti earthquake. As the International Project Coordinator, she helped launch and equip the Cultural Recovery Center in Port-au-Prince and led the first teams of conservation volunteers to arrive in Haiti. Volunteer conservators and Haitian colleagues and trainees recovered, restored, and treated over 30,000 works of art, works on paper, books, and historical documents over the course of 18 months. She has written and lectured widely about her experiences with cultural property protection and the Blue Shield. She serves on the

board of the U.S. Committee of the International Council of Museums (ICOM), the ICOM Disaster Relief Task Force; is secretary of the Association of National Committees of the Blue Shield; and vice president of the U.S. Military Civil Affairs Association.

Cross-References

- ▶ Blue Shield
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ International Council of Museums (ICOM)
- ▶ Iraq: Archaeological Heritage
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Basic Biographical Information

Franz Weidenreich was born on 7 June 1873 in Edenkoben, Germany, and died in his New York City home on 11 July 1948. Gregory (1949: 85) described Weidenreich as "the flower of German science and true culture" with an "indefatigable energy and constructive intellect." He graduated from the Humanist Gymnasium in Landau, later spending some 6 years studying medicine and general sciences from a number of German universities in Berlin, Kiel, and Munich. He eventually received an M.D. from the University of Strasbourg in 1899. His research interest was the anatomical structure of the mammalian cerebellar central nucleus, and after his graduation in 1901, he worked under the direction of Gustav Schwalbe in the Department of Anatomy at Strasbourg. Upon expanding his research into blood and lymphatic systems, which took him briefly to the University of Frankfurt, he returned to Schwalbe's lab in 1902 where he was appointed Professor of Anatomy two years later. By 1914, Weidenreich had published 55 research papers, primarily on the topic of hematology. But in his early writings were found a scientific curiosity of human evolution, where he published a couple of papers on the origins of the human chin and its relationship to speech, and a comparison of human and ape pelvic and lower limb anatomy to locomotion. In 1926, he published his first "official" paper on Anthropology, an anatomical description of the Weimar-Ehringsdorf fossil human skull.

Between 1914 and 1921, he wrote few scientific discourses and instead focussed his energies as a member of the Municipal Council of Strasbourg, and President of the Democratic Party of the disputed territory of Alsace-Lorraine. With the French takeover in 1918, Weidenreich lost his Strasbourg academic position, but by 1921, he was established in the Department of Anatomy at the University of Heidelberg. Seven years later he took the position of Professor of Anthropology at the University of Frankfurt, where he stayed until 1934 when a visiting professorship in Anatomy at the University of Chicago became available. In the fall of that year, Weidenreich was considered for a teaching position at the Peking Union Medical College with the death of Davidson Black, in Beijing, China. This consideration was confidently

recommended by one of Black's closest friends, (Sir) Grafton Elliot Smith.

Weidenreich's appointment as Visiting Professor of Anatomy at the PUMC and Honorary Director of the Cenozoic Research Laboratory, a collaborative facility (between the PUMC and the Geological Survey of China) that focussed on the analysis of fossil and cultural materials from the Zhoukoudian (Peking Man) site began on January 1, 1935. With intense fighting between various Chinese factions and the Japanese, Weidenreich eventually left for the United States in 1941, where he took his last research position, this time at the American Museum of Natural History in New York City.

Major Accomplishments

During Weidenreich's tenure at the Peking Union Medical College, he took on similar responsibilities to Davidson Black: describing and publishing on the *Sinanthropus* fossil material from Zhoukoudian, collaborating with Chinese and other foreign scientists, and working with the Rockefeller Foundation to continue funding the excavations and the Cenozoic Research Laboratory work.

However, he added new dimensions to the Zhoukoudian scientific program. First, he recognized an anatomical similarity between the Chinese *Homo erectus* (*Sinanthropus*) and Indonesian *Homo erectus* (or *Pithecanthropus* originally found by Dubois in the 1890s), developed in collaboration with G.H.R. von Koenigswald whom he visited in Java in 1937. Together, they "sank" *Sinanthropus* into the older *Pithecanthropus* label, eventually leading to the combining of the Chinese and Indonesian fossils into a single genus (originally speculated by Black) known as *Homo erectus*. The following year, these two scientists announced a new fossil skull from Java (*Pithecanthropus robustus*).

Second, he took a unique taphonomic perspective to the stratigraphic levels at Zhoukoudian, suggesting that some of the scattered fossil remains were the result of activities by carnivores. In one publication, he even suggested that some human skulls (only represented by the skullcap) were victims of murder, claiming that lengthy cracks and deep punctures in the bony structure were the result of violent blows to the head!

Third, he examined the more modern human skeletal remains from Zhoukoudian's Upper Cave as possibly representing different racial origins, including Mongoloid, Melanesian, and possibly Inuit, creating a hypothesis of interracial heterogeneity for the upper reaches of the Peking Man site.

Fourth, and most significantly, with continued military incursions around Zhoukoudian and infiltration into Beijing, Weidenreich and his Chinese colleagues (in particular Pei Wenzhong) arranged for the manufacture of a series of replica casts of the original *Sinanthropus* fossils, which would eventually be housed at the American Museum of Natural History. In addition, the originals of the most significant of the *Sinanthropus* fossils would be transported out of Beijing, and out of China. Sadly, the original fossils became lost, but the replicas (and further discoveries) of *Sinanthropus* are still available for scientific study.

Cross-References

- ▶ Black, Davidson
- ▶ Java Man
- ▶ Peking Man
- ▶ Zhoukoudian, Archaeology of
- ▶ Zhoukoudian: Geography and Culture

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Basic Biographical Information

Christian Wells received his B.A. from Oberlin College and his M.A. and Ph.D. in Anthropology from Arizona State University. He was trained in economic anthropology and environmental archaeology. He is an Associate Professor of Anthropology at the University of South Florida.

Major Accomplishments

Dr. Wells is the founding Director of the Office of Sustainability and Deputy Director of the Patel School of Global Sustainability at the University of South Florida. He focuses his research on understanding how cultural and natural resources are increasingly impacted by global tourism. Over the past 15 years, he has undertaken field research in Honduras, Guatemala, Belize, and Mexico. His current research encompasses Project Roatán, a binational collaborative research program and archaeology field school in sustainable tourism and heritage preservation on Roatán Island, Honduras. His latest book (2012, coedited with Sarah Lyon), *Global Tourism: Cultural Heritage and Economic Encounters*, brings together ethnographers and archaeologists to explore the various ways in which hosts, guests, cultural patrimony, and natural resources intersect in the global economy.

Cross-References

► Community Archaeology
► Cultural Heritage and Communities
► Stakeholders and Community Participation
► Sustainable Cultural Tourism Policies: Overview

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West Africa: Islamic Archaeology

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Introduction

Unquestionably, West Africa is presently on the periphery of the discipline of Islamic archaeology, even more so than other "peripheral" areas such as the East African coast. This position within the discipline relates principally to Islamic archaeology's origins in the study of Middle Eastern material culture and its emphasis on art and architectural models that are simply not present in West Africa. West Africa, though, has been home to Islam for over 1,000 years and like elsewhere in the Islamic world has seen the development of wide-ranging cultural networks, powerful Muslim dynasties, and varied

architectural and material-culture traditions. It represents perhaps one of the greatest untapped zones of Islamic archaeology, with major settlements never touched and material traditions of whole dynasties poorly understood. For an increasingly global Islamic archaeology, West Africa's "difference" actually becomes a strength (Whitcomb 2004) as we seek to diversify ideas of the cultures and material remains of Islam. Additionally, increasing prominence of West Africa within the contemporary landscape of Islam will almost certainly lead to growing interest in its past cultures and remains.

Definition

The most commonly accepted definition of Islamic archaeology is that it represents the study of all material remains in areas where the ruling elite was Muslim (Milwright 2010: 6–8). This certainly poses major problems in West Africa where Islam seemingly moved into territories not with rulers but with small enclaves of traders, and in some areas centuries passed before ruling elites adopted Islam. Based upon experiences in West Africa, Insoll (1999) has sought an alternative definition, maintaining that there are a range of Muslim behaviors that consistently create distinctive material-culture signatures and that this knowledge can be the basis for studying past Muslim societies regardless of the presence or not of a ruling Muslim elite. Within the West African context, Islamic archaeology is perhaps most usefully approached in a very open way as the research of remains relating to all past Muslim communities and their cultural networks, as well as of non-Muslim groups controlled by Muslim elites.

The material evidence defined as Islamic archaeology in West Africa has tended to be either material remains which are *excavated* from the earth or standing *ruins* of past settlements. Standing buildings which still function and ethnographically documented material-culture traditions have generally been the domain of art historians or anthropologists (e.g., Prussin 1986). Arabic inscriptions on rocks and tombstones have been the preserve of epigraphy (Moraes Farias 2003).

There is in fact really no such recognized discipline as "Islamic archaeology" in West Africa, and very few people actively seek Islamic remains or position themselves as an "Islamic archaeologist." Therefore, even though remains related to Islamic societies are recovered, they are often not properly investigated for the insights they can provide into the Islamic past. Going further, Islamic elements of past West African societies have often been actively sidelined, due to negative associations with the colonial-era belief in the importance of "Arab stimulus" for past cultural developments in West Africa. Related to this, the archaeology of Islamic societies is often approached as just one element of a wider concern with "precolonial" societies (i.e., those preceding the presence of European colonialism). The archaeology of the Islamic period is also often described using the terms "medieval" or "postmedieval," terms which have been heavily criticized as having little relevance to West Africa's past.

There does seem to be a relatively broad consensus concerning the definition of periods in the history of West African Islam, despite the process of Islamization having been a long and complex one from around the eighth or ninth century until the nineteenth when Muslim presence first roughly approximated today's landscape (see "Historical Background" section). This picture broadly corresponds to the "early Islamic," "later Islamic," and "modern" periods discussed in the Central Islamic lands. While it would be inappropriate to apply this periodization or these labels too strictly, this does provide some means of relating Islamic history in West Africa to movements elsewhere.

Within the context of this entry, "West Africa" should not be too simplistically understood as all the territory occupied by modern West African states, as these territories are relatively arbitrary creations of the colonial and postcolonial era and provide a weak basis for discussing the Islamic past. For instance, the West African state of Mauritania extends c. 1,000 km further north of the southern extremity of the North African state

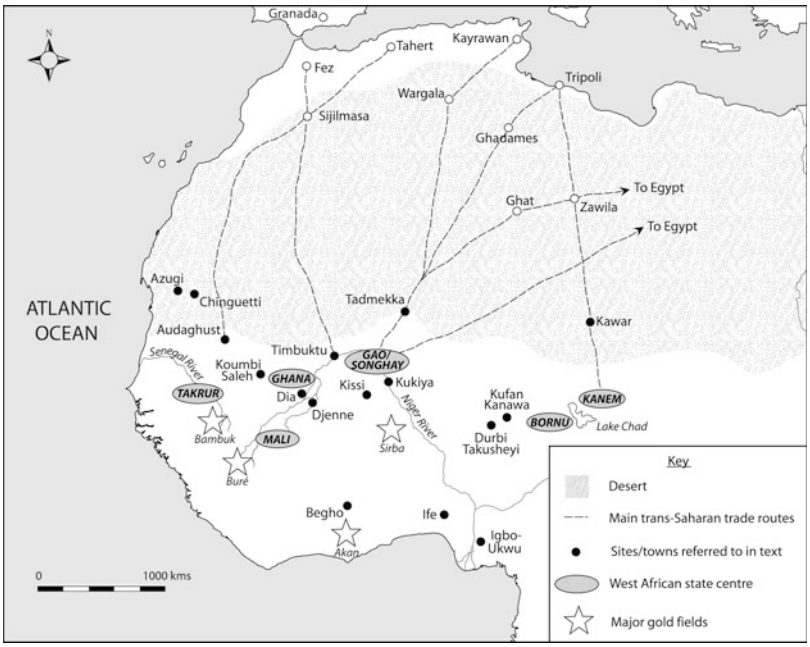

West Africa: Islamic Archaeology, Fig. 1 Map of West Africa showing key locations referred to in the text and trans-Saharan trade routes

of Algeria. This said, contemporary West Africa broadly approximates to a clearly defined zone within the *Bilād al-Sūdān*, or "land of the blacks," defined by early Arabic authors in Central Islamic lands. The area south of the Sahara from the Atlantic to Lake Chad was understood as an extremely rich zone of gold and slaves (as well as ivory and the mild stimulant the kola nut), becoming known particularly as "the land of gold" throughout the Islamic world. This area also had a rich tradition of states and empires, from Islam's arrival up to the colonial era. While West Africa represents a useful geographical category for thinking about Islamic archaeology, the diversity of this region must be recognized. This includes the gradual shift from the nomadic semi-desert in the north to the dense agriculturalist-occupied forest zone in the south, and a broadly related shift from a Berber (principally Tuareg) population in the north to a black population in the south.

Today, West Africa is a mosaic of Islamic, Christian, and animist groups. Arabic has historically not been the dominant language throughout Muslim West Africa, though it certainly has scholarly status, and in Mauritania is the official language.

Historical Background

External Arabic historical sources first describe Islam in West Africa around the eighth century CE, associated with traders seeking the wealth of gold, slaves, and ivory to be found there (Levtzion & Hopkins 2000). These traders used camel caravans to cross the Sahara (see Fig. 1), in an era before sea transport along the Atlantic coast (only commencing with Europeans in the fifteenth century) and prior to east–west routes connecting with the Horn of Africa (likely commencing *c*. fourteenth century). For several centuries Islam was largely restricted to traders, albeit converted indigenous traders as well as immigrants. Islamic settlement was also largely restricted to the southern Sahara and the zone immediately below the Sahara known as the "Sahel" (in Arabic, "shore"), at places such as Audaghust, Tadmekka and Kawar (see Fig. 1). This arid, sparsely populated area was the first habitable zone after the Saharan crossing and therefore was an ideal point to serve as a trading base supplying Saharan caravans with products collected from throughout West Africa. From the eleventh century, Islam began to spread further south, a process which in the western regions was

West Africa: Islamic Archaeology, Fig. 2 View across modern Timbuktu, Mali, with the Djinguereber Mosque shown in the foreground (Image courtesy UNESCO Serge Negre)

significantly aided by the militant Almoravids, who waged holy war, including converting the ruler of the most powerful early kingdom, Ghana (not to be confused with the modern state of Ghana). The other most important early kingdoms, Gao and Kanem, also now appeared to experience increased Islamization. The start of the "Golden Age" of West African Islam however came in the thirteenth/fourteenth centuries and is particularly associated with the growth and expansion of power of the Empire of Mali (not to be confused with the modern Republic of Mali) and its most famous ruler, Mansa Musa, known throughout the early Muslim world for his wealth in gold. The first significant records of West African rulers' *hajj* journeys also occur now (both of Mali and Kanem), as does the development of Timbuktu (Fig. 2), West Africa's most famous city, which became a celebrated center of Islam noted for its libraries and mosques. During the fifteenth and sixteenth centuries, Songhay, the last of the great premodern empires (developing from the ancient state center of Gao to inherit Mali's power), helped push Islam beyond its traditional heartlands deeper into the savanna and forest regions. Songhay's expansion even encroached on the kingdom of Bornu, now the successor state of Kanem in the east. The Moroccan invasion of West Africa in the late sixteenth century destabilized Songhay, and it was not until the nineteenth-century jihadist movements that Islam truly became a religion of the common people and the village. Despite a European coastal trading presence from the fifteenth century, it was not until the colonial era that Christianity developed significantly.

West African archaeology began in the mid-nineteenth century, a process intertwined with the European exploration of the African "interior" (Timbuktu itself was only finally visited and returned from by a European in 1822). Explorers pursued living cities but also the remains of past civilizations which the growing study of external Arabic records and local Arabic *tarikh*s was helping to reveal (Es-Sa'di 1900; Cooley 1841). Mainly, however, there was a focus on

understanding the "traditional" or indigenous African past and this was often contrasted with Islam, despite Islam's very long history here. Already though, it could be seen that Islamic ruins in West Africa were of a very different character to those found in much of the Islamic world, including an apparent lack of monumental tiled and Arabic-inscribed architecture. While the vast majority of scholars were not fundamentally interested in Islamic remains, certain important studies were done, including the groundbreaking work of De Gironcourt (1920) who recorded the relatively extensive presence of funerary and non-funerary Arabic inscriptions (found mainly in the modern Republic of Mali, dating from the eleventh to fifteenth centuries CE). One crucial idea put in place at this time was the belief that cultural advances among West African populations had been due in large part to the "stimulus" of Arab contact.

Huge progress came in the 1950s and 1960s, largely through the work of Mauny who systematically charted "medieval" sites throughout West Africa (Mauny 1961). Focused studies also took place at such important sites as Gao, Koumbi Saleh, and Tegdaoust (associated with Audaghust). The latter in particular saw commencement of systematic investigations lasting decades (Devisse 1983). These investigations uncovered compelling evidence for sophisticated early Islamic architecture and trade imports. Certain broader reflections also started to be made concerning West African Islamic material culture, including observation and discussion of the distinct absence of locally produced Islamic coinage. Within this same era archaeology continued to uncover new evidence for the richness of West African cultures not documented by Arab sources, such as Ife and Benin, and this perhaps attracted more research interest than sites seemingly already well documented by Arabic sources.

The 1970s and 1980s began to turn up evidence that enabled scholars to begin to overturn the "Arab stimulus" hypothesis for complex society development in West Africa. A key discovery was made close to the important later Islamic town of Djenne, namely, a pre-Islamic urban site with evidence of significant long-distance trade contacts (McIntosh 1995). Further east, in the zone of Kanem-Bornu, similar evidence also emerged at Daima and Kursakata (see Gronenborn 2001).

While the preference for investigating "indigenous" pasts in contrast to Islamic pasts has been dominant, certain important studies of Islamic remains have occurred. Since the 1980s the epigrapher Paulo de Moraes Farias has illuminated the corpus of Arabic inscriptions, demonstrating their ability to provide detailed and fascinating accounts of early Islamic cultural processes (2003). Timothy Insoll's excavations, most notably at Gao (see 2003), but also at Timbuktu, provided further evidence of archaeology's potential to investigate trade and architectural history. Among other works, Cressier addressed the study of Sufi archaeology in the Sahel (Bernus et al. 1999). More recently, work at Tadmekka by the author (Nixon 2009) reconsidered how archaeology can provide insights into trans-Saharan trade. As archaeology of the last two millennia in West Africa continues apace, other projects not specifically concerned with Islam continue to turn up Islamic remains, including work within the Kanem-Bornu region at sites such as Garumele or Birni Gazargamo.

Key Issues/Current Debates

Most investigation of Islamic archaeology in West Africa has taken place within the context of wider investigations of West African culture of the past two millennia, with little reference to developing debates elsewhere within Islamic archaeology. Often, investigations have related to agendas created by historians grounded in the study of the Arabic records of the region. Despite this, a clear and distinct body of debates has developed which recovery of Islamic remains feeds into.

The Chronology, Geography, and Culture of Early Islamic Contact

Arabic sources clearly indicate how Islam's arrival in West Africa occurred within the context

West Africa: Islamic Archaeology, Fig. 3 Excavation of Islamic stone towns in the West African Sahel: *left*, excavation of a continuous, superimposed sequence of houses at Tadmekka, Mali (Image Sam Nixon); *right*, excavation beginning to undercover the stone, pillared congregational mosque at Koumbi Saleh, Mauritania, rebuilt successively between *c*. eleventh and fifteenth centuries CE (Image copyright Bernard Nantet)

of trading ventures across the Sahara for gold, slaves, and ivory. A core ongoing debate has been attempting to understand the early chronology and geography of this trade. Although it is clear from Arabic sources that by the tenth century CE, significant trade contacts were in place across all Saharan routes, the question of whether historically undocumented trade occurred before this, and if so where, has long divided opinion. Archaeological excavations associated with the main trading town on the westernmost route, Audaghust, have not recovered clear evidence of pre-tenth-century contacts (Devisse 1983), but recent excavations at Tadmekka further east provided compelling evidence of trade at least back to the ninth century (Fig. 3; Nixon 2009; Nixon et al. 2011). The major oasis center of the Central Saharan route, Kawar (Lange & Berthoud 1977), has never been excavated, and therefore suggestions of pre-tenth-century trade here have been impossible to verify. It is in fact increasingly believed that early Islamic trade was built on strong pre-Islamic commerce in gold and slaves across the Sahara. The most compelling argument for this comes from the site of Kissi (Burkina Faso) where evidence for trans - Saharan imports can be traced from the first to the twelfth century CE (Magnavita et al. 2009).

Clarification of when trade developed is paramount, as it is central to debates over the extent to which external contact contributed to West African development. Likewise, understanding the geography of early Islamic connections is obviously important for a basic understanding of Islamic networks, but also relates to understanding the development of the states with which early Muslims traded. While Ghana in the far west has long been seen as the preeminent early West African power, evidence of early trade further east asks us to consider whether other early West African states such as Gao or Kanem were equally important.

The identity of the first Islamic traders has been strongly debated by historians. The most prominent traders were long seen to be North African Zenata Berbers. Other historians have pointed to documentary evidence also indicating the important trading role of the Ibadi, a splinter sect of Islam who dispersed into the Sahara soon after Islam's arrival in North Africa. There is some documentary basis for suggesting that the Zenata were mainly concentrated on the westernmost route, with the Ibadi on routes further east. Excavated material culture from Tegdaoust and Tadmekka shows distinct differences between the western and eastern routes, but there is little comparative "Zenata" or "Ibadi" material from North Africa to test this against. Surface remains of mosques and cemeteries at Tadmekka and Kawar (see Insoll 2003: 206–262) are however suggestive of the early Ibadi. Clarification of this

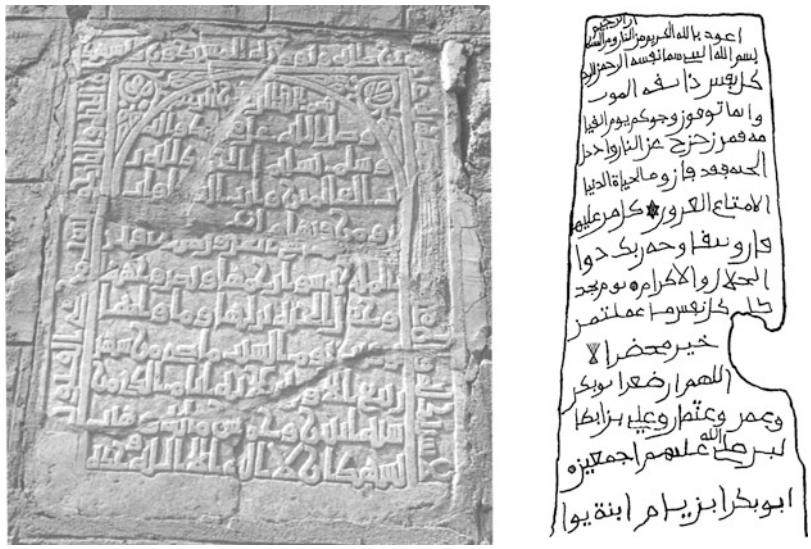

West Africa: Islamic Archaeology,
Fig. 4 Arabic inscriptions from the Republic of Mali: *left*, imported early twelfth-century gravestone from Gao; *right*, drawing of locally made gravestone from Kukiya (© The British Academy 2003)

issue is important in order to understand the ethnic and religious nature of the first populations who communicated Islam to West Africa.

The Landscape of Settlement

There has been considerable interest in understanding how Islamic settlements developed throughout the landscape. Unsurprisingly, focus has been on the first settlements created at the southern edge of the Sahara. The excavations at Tegdaoust and Tadmekka suggest a lack of pre-Islamic urban phases but the existence of permanent architecture from *c*. ninth century CE. These towns appeared to continue as central places right up to the thirteenth/fourteenth century, despite the development of competing regional centers. While their vicinities are not systematically surveyed, it appears they were largely isolated in a wider nomadic environment, which accords with historical descriptions.

Away from the desert's edge, the model for initial Islamic settlement has long been one of small enclaves of traders developing close-knit communities in proximity to, but clearly separate from, capitals of local states. Archaeology has provided solid evidence of this at Gao, where a trading settlement appears to have developed 2 km from the royal settlement (Insoll 2003), and epigraphy (e.g., Fig. 4) has provided great insight into this process. While a similar "dual town" scenario is described by Arab records for Ghana, its capital has never been clearly located, although Koumbi Saleh has contentiously variously been seen as either Ghana's capital or its traders' town (see Insoll 2003). Further east, the earliest capital of Kanem has also not been found. Examples of similar "dual towns" have been proposed for other locations, including for Kukiya, downriver of Gao. While the Sahel/savanna zone would become the heartland of West African Islam through the twelfth to fourteenth centuries CE, we have little idea of the growth of fully fledged Islamic towns. While some evidence exists from Gao, not only have we not found the capitals of Ghana and early Kanem, whose rulers supposedly converted to Islam, the capital of Mali remains undiscovered. Supreme Islamic towns such as Timbuktu and Djenne have also yet to be properly investigated. Excavations have taken place at Dia (Bedaux et al. 2005), seen as a regionally significant early Islamic center, but so far there is no clear idea of how this relates to the larger picture of Islamic settlement.

At some point during the fourteenth to sixteenth centuries, there was a further spread of Islamic traders and settlements southward to the forest fringes. The Arabic historical sources however provide limited insight into this, and therefore archaeology takes on even greater importance. One significant settlement which

has been excavated and shows Muslim presence at the forest fringe from this era is Begho in modern Ghana (Stahl 1994). The whole question of settlement in this zone is, though, poorly understood. Accounts of later phases of settlement, including the nineteenth-century *jihad*s, are almost entirely based on historical records and oral tradition.

Islamic Architecture

Traditional Muslim building in West Africa is most associated with mud architecture and particularly with the Western Sudanese style, most synonymous with the legacy of Mali and Songhay (i.e., Fig. 2). This architectural style is most commonly linked to mosques, with characteristic features including flat roofs, vertical buttresses, and pyramidal minarets, with protruding wooden beams/branches acting as both structural support and decoration (Prussin 1986). While structures are mainly composed of mud-brick, wet mud is periodically added during renovation like plaster. Architecture in a broadly similar style is found right across the Sahel and savanna belt of West Africa. The Western Sudanese style has long been linked with the influence of the fourteenth-century immigrant Andalusian architect al-Saheli, but modern commentators, seeing this story as mythical, point out strong relationships with early Ibadi architecture or claim it as an entirely indigenous building style (Aradeon 1989). The oldest standing structures in this style supposedly date back to the fourteenth century but have clearly undergone extensive renovation. There are no clear excavated examples of the Western Sudanese style, or pre-fourteenth-century documentary evidence, to help us understand its origins.

Mud-brick architecture in West Africa is a highly developed tradition, linked to specialist "masons," but it is still unclear whether this "technology" is associated with Islamic influence. Archaeology has shown broad zones of difference in mud-brick form, most importantly a difference between a rectangular mud-brick tradition in the Mali/Songhay zone and the cone-shaped *tubali* bricks of northern Nigeria. Fired brick has also been found in significant quantities, especially in the Kanem-Bornu zone (e.g., Garu Kime). Fired brick is also present at Gao, in the form of a fired-brick *mihrab* and portions of what appears to be a *caravanserai*. There is no evidence of tiling, though such a tiled structure might still be found, especially given Arabic records' apparent indication of an elaborate audience hall at the still undiscovered Malian capital of Niani. Plaster and paint are both evidenced in early excavated contexts, including abstract painted designs at Koumbi Saleh and thick ochre plaster at Tadmekka, tying in with ethnographic examples (Prussin 1986).

Stone architecture, while little present today (e.g., Chinguetti, Mauritania), was clearly more common in the past. The early sites of Tegdaoust and Tadmekka (Fig. 3) are defined by stone ruins. The trading town of Ghana was also supposed to have been of stone in the eleventh century. Other stone ruins include Koumbi Saleh (Mauretania) and the Almoravid settlement of Azugi (Mauritania). That the majority of these stone towns are in the northern Sahel certainly relates to the distribution of available stone but also to the greater presence of Berber populations here who have stronger traditions of stone architecture.

A core formal division is made in West African archaeology between Muslim and non-Muslim architecture based, respectively, upon the presence of rectilinear or circular forms. This does not always apply though, as observed by Insoll (2003: 325). Again, it would be important to recover building forms from significant early towns such as Timbuktu to progress this debate. Studies of individual building form, functional types, and decorative design in Islamic architecture in West Africa are a lively tradition in art-historical studies (Prussin 1986), but this has so far not translated into archaeology. Most strikingly, there has been a relative inattention to mosque design. There is, however, already a relatively useful collection of archaeologically occurring evidence, including the fired-brick mosque in Gao, the stone mosque of Koumbi Saleh (Fig. 3), surface evidence of mosques at Birni Gazargamo and at Tadmekka (including a *musalla*), and excavated examples of Sufi mosques from Niger (Bernus et al. 1999).

West Africa: Islamic Archaeology, Fig. 5 Ceramic window grill from Djenne, Mali (Image B. Grishaver, Collection National Museum of Ethnology Leiden, nr. 5591–1)

Beyond building materials and basic formal distinctions, there has been an interest in certain other additional elements in building design. Wooden doors are known from historic-era towns of the Sahel, and the recovery of keys and locks from early northern Sahelian ruins indicates the long history of this (Berthier 1997; Nixon 2009). While the presence of window glass is open to debate, we do have evidence of ceramic window grills (Fig. 5) and wooden windows from museum collections.

Another strain of research briefly to note concerns town walls. We see these particularly in both the Malian zone, in northern Nigeria, and in Niger. Not only are walled towns well documented from recent historic periods, they have also been evidenced at older abandoned sites, including one of the ancestral Hausa sites, Kufan Kanawa (Haour 2003).

Trade

Since the start of excavations in West Africa, there has been research into Islamic trade goods

West Africa: Islamic Archaeology, Fig. 6 Reconstructed early Islamic glass vessel excavated at Tegdaoust, Mauritania (Image copyright Bernard Nantet)

from across the Sahara. The most common goods evidenced are glass beads, vessel glass (often merely fragments, but also some reconstructable vessels: e.g., Fig. 6), and glazed ceramics. Core commodities that also travelled and are found in relative abundance are brass ingots, most strikingly at the abandoned Saharan caravan site of Ma'aden Ijafen in Mauritania (2,085 brass bars). Other obvious but less common durable markers of trade include ornately inscribed brass bowls (e.g., Gronenborn et al. 2012) and tombstones from Spain (Fig. 4). While many sites do not feature these goods, this likely indicates not lack of trade but rather movement of other goods more difficult to detect archaeologically. A core item which has largely eluded us are textiles (see however Nixon 2009), suggested by historical sources as perhaps the most important early trade good. We are now also starting to think more critically about the trade goods which are present. Restriction of vessel glass and glazed ceramics largely to the Sahelian towns suggests perhaps that these were commodities mainly for consumption by traders themselves. The wider distribution of glass beads is more complex, especially as their greatest concentrated occurrence has been in non-Islamic graves far to the south (Igbo-Ukwu, Nigeria) in very early contexts (radiocarbon dated eighth to twelfth century CE; see Insoll 2003: 347-8).

The core commodities which the central Islamic world desired from West Africa are all

items which are of poor archaeological visibility: gold, slaves, ivory, and kola nuts. Despite this, the crucial gold trade at least has seen some good archaeological insights. A mainstay of the study of the gold trade has been analysis of North African dinars, the majority being made of West African gold (dinars have also been recovered in West Africa at Tegdaoust and Gao). Increasing evidence of locally worked gold has been found, at Tegdaoust (ingots), Djenne (earring), Gao (bead), Durbi Takusheyi (jewelry), and Tadmekka (coin-blank moulds). The Tadmekka evidence demonstrated that West African gold attained an extremely high purity (98–99 %), further explaining the Muslim world's fascination with it. While early Arabic sources refer mainly to the gold mines of Bambuk and Buré (Fig. 1), wider distribution of gold finds requires us to consider other important sources, including the Sirba gold fields (Niger and Burkina Faso). Archaeological finds of ivory exist (e.g., the hippo ivory cache at Gao), and slave-trade archaeology is developing, but the kola trade has so far seen little input from archaeologists.

The Tadmekka moulds have provided the only concrete evidence to date of locally produced coinage in West Africa, being proof of the "bald" (i.e., unstamped or blank) "coinage" described by early Arabic sources here (Nixon et al. 2011). While there may have been a range of such unstamped "coinages," the only documentary records of inscribed coinages are a fourteenth-century reference to Kanem silver coinage and a fifteenth-century description of West African silver coinage in Egypt (see Nixon et al. 2011). We do however have clear evidence for the adoption of the Islamic weight system, in the form of not only Fatimid glass weights (Tegdaoust) but also rudimentary, locally produced ceramic disc weights, and locally produced metal weights. Archaeology also provides extensive evidence of cowrie shells, a major import from the Indian Ocean to serve as money.

Technology and Local Material Culture

Since early in West African archaeology, much discussion has concerned whether certain technologies present in West Africa should or should not be attributed to Islam's arrival. Metalworking technology is the most contentious topic. The basic starting point for discussion is certainly that indigenous metalworking was highly proficient before Islam's arrival, particularly iron and copper. One specific technology that has led to an extensive but unresolved debate is the highly complex "lost wax" casting process, present in West Africa seemingly as early as the tenth century CE. In addition to evidence for imported brass, there is also evidence now for local brass working (Stahl 1994). Recent metallurgy studies at Tadmekka also indicate the presence of highly technical crucible steel working. Another important area of debate is textile production. Arabic sources strongly indicate the prevalence of skins for clothing prior to Islam's arrival, but it is unclear whether this was allied with an indigenous textile tradition. Certainly, restrictions on exposing the body would have led to an increased need for clothing, and all archaeobotanical evidence of cotton and spindle-whorl finds indeed postdate Islam's arrival.

Among glazed ceramics recovered, none appear to be locally produced. Likewise, analysis of vessel glass suggests that this was all imported. Glass-bead production is not totally absent from West Africa, there being evidence for both primary glass and glass-bead production at Ife in Nigeria (*c*. twelfth century CE) and also evidence for powder glass beads from Mauritania in historic times. Suggestions of a more widespread and early tradition of glass-bead making are rather questionable, being based mainly on the presence of malformed beads or bead wasters, actually commonly included in large bead exports. We have already spoken about the apparent absence of inscribed coinage. The lack then of West African examples of these material-culture types has certainly gone a considerable way to placing West Africa outside familiar territory for many in Islamic archaeology.

Art historians and anthropologists have been highly engaged in demonstrating the wide range of material-culture forms of the historic and

West Africa: Islamic Archaeology, Fig. 7 Muslim male potters in Niger placing pots in preparation for a firing (Image courtesy Olivier Gosselain)

contemporary Muslim world in West Africa (Bravmann 1983; Prussin 1986). Archaeologists have been less successful, leading perhaps to a perception of early material-culture poverty of Islam in West Africa. Certainly, archaeology has not been well aided by the perishability of the materials which ethnographic collections suggest much early Islamic material culture in West Africa would have been created in, such as leather, wood, and textiles. Locally produced Islamic material culture is certainly not absent, however. Ubiquitous pottery naturally comes to mind, and while traditions of pottery associated with Islamic groups in West Africa are perhaps better defined in the anthropological literature (Fig. 7), the implications of this for archaeologists appear promising. Survey also shows various other distinctive types of durable, archaeologically recoverable material culture, including ceramic fabricated items, such as spindle whorls, jewelry, and functional metal objects of everyday use (e.g., Fig. 8).

West Africa: Islamic Archaeology, Fig. 8 Padlock and key produced by Hausa metalworkers (Nigeria) and traded to Ashanti (Ghana) – collected in Kumasi (Ghana) in 1818 (© The Trustees of the British Museum)

International Perspectives

West African Islamic archaeology has involved a wide range of non-West African national research teams but principally French, English, German, Dutch, and American, as well as a recent Japanese collaboration in Mali (Gao). West African national researchers are largely associated with government heritage and research agencies (see particularly Mamadou Cisse's work at Gao).

To date, West African Islamic archaeology has mainly been researched in Mali, Mauritania, Nigeria, and Niger. Contemporary politics in these countries linked to recent Islamic fundamentalist movements have obviously problematized this focus. The broad shift of international projects to other countries will likely see more results relevant to Islamic archaeology from countries such as Senegal, Ghana, and Benin. Changing patterns of relations between Islam

and the West presents a more nuanced situation for West African national agencies. Certainly though radical Islam sees all archaeological practice as problematic. However, more moderate development of a stronger Islamic consciousness might lead to more investment in the study of Islamic remains than the emphasis so far on prehistoric or "indigenous" archaeology.

While practical and political problems currently dominate the international outlook for Islamic archaeology in West Africa, we should highlight the need also for new impetus to link West African research more into the international scene. Certainly, there should be renewed efforts at establishing broad theoretical connections, but also this might be aided by comparative approaches with other more peripheral areas of the Islamic world. Most obviously, there is the East African coast, but also perhaps Silk Road archaeology, which is allied to a similar long-distance trade network in a region expanding beyond the Arabized Islamic heartlands.

Future Directions

Other than progressing the key issues and debates outlined above, there are a number of core research areas that would improve understanding of the West African Islamic past in itself and insert West African Islamic archaeology into wider global debates.

1. *The archaeology of religion*. Research on this core area of Islamic archaeology has been relatively poor. Firstly, a more systematic assessment of evidence for mosque architecture is required, including analysis of style and space, but also *qibla* orientation, and site location. In addition, it is necessary to use the available evidence, particularly from epigraphy, to communicate early conceptions of Islam among West African populations, the epigraphic corpus in itself containing numerous Koranic passages and other Islamic lore and local renderings of these. Surface remains from burial grounds also offer a fascinating resource, including funerary stelae, enclosures, and monuments. Existing excavated burial evidence is also important (e.g., Gronenborn et al. 2012; Paris 1996), particularly for what this shows about crossovers between animism and Islam.
2. *Secular architecture and settlement planning*. So far a synthetic and analytical understanding of the secular built environment of Islam in West Africa is less developed even than understanding of religious architecture. There is in fact a relatively wide range of evidence, particularly from the northern Sahelian stone towns, not only from excavated data but also from aerial photographs. This aerial photography also represents an ideal resource for thinking about settlement planning of Muslim towns. This certainly requires engagement with the extensive work done by art historians and anthropologists.
3. *Locally produced material culture*. It has already been stated how little archaeologists have generated insights into locally produced Islamic material culture in comparison to their insights into imports. Anthropology has begun to gain certain detailed insights into how pottery making and technical style, as well as form, changes with Islam (O. Gosselain *pers. comm.*), and therefore this represents a potentially ideal point for archaeologists to commence.
4. *Diet*. While archaeology is well equipped to deal with this crucial topic due to the widespread preservation of bones and botanical material, as yet a systematic treatment has not been attempted. Recovery of evidence at Tadmekka provided positive signs of the potential of investigation, including unexpected evidence of dog and wheat consumption (Nixon 2009).
5. *Cross–Saharan connections*. Throughout the majority of its history, West African Islam has been closely linked to other distant parts of the world and in particular had a strong history of interchange with North Africa. Given this, it is somewhat surprising that there is an almost total lack of archaeological exchange across the Sahara. This is not only an issue for studies of trade goods and immigrant communities as

there were important episodes within African Islamic history which involved both North and West Africa. Most obviously, the Almoravid movement came from Mauritania to conquer Morocco and Spain. Also, early Ibadi culture spanned the Sahara, and the Fatimids had major involvements with West African trading towns. Lastly, in the late sixteenth century, it is impossible to consider West African history without the Moroccan conquest, and likewise this movement left impacts and archaeological remains in Morocco.

In addition to new research themes, there are innumerable important Islamic sites that have never been investigated, from Chinguetti in Mauritania, referred to locally as "the seventh city of Islam," to the early Songhay capital town of Kukiya, to the Kawar oases in Niger where some of the first Islamic populations in West Africa settled. Also, there is the rarely discussed and underexplored Senegal river zone (see McIntosh et al. in press). This is not withstanding the as yet undiscovered capital cities of the states of Ghana and Mali whose kings were some of the most important converts to Islam. The archaeology of Islam in West Africa has already provided many insights, but in some ways the surface has hardly yet been scratched. When and how this is explored further certainly though relates to larger patterns of international politics and currents of Islam in West Africa.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Greater Syria: Islamic Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology
- ▶ Islamic Archaeology and Art History
- ▶ Islamic Industry, Archaeology of
- ▶ Medieval Archaeology
- ▶ Orientalism: Islamic Archaeology and its Colonial Context
- ▶ Religion in Islamic Archaeology
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Swahili Archaeology
- ▶ West Africa: Museums
- ▶ West and Central Africa: Historical Archaeology

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West Africa: Museums

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Introduction

West African museums are as diverse as West African cultures. They include history museums, research institutes, open-air museums, privately owned museums, and religious sites. Major influences on the type, size, and constitution of the museums include factors such as remnant or sourced artifacts and collections, religious prominence (Islam, Christianity, and African traditional religions), and the availability of financial support. A common thread is the display of vibrant and dynamic cultures.

While the treasures and artifacts of West Africa are routinely displayed in the museums of former colonial powers, such as the British Museum in the United Kingdom and the Ethnologisches Museum in Germany, support is needed to protect, conserve, and display the collections held by museums in West Africa itself.

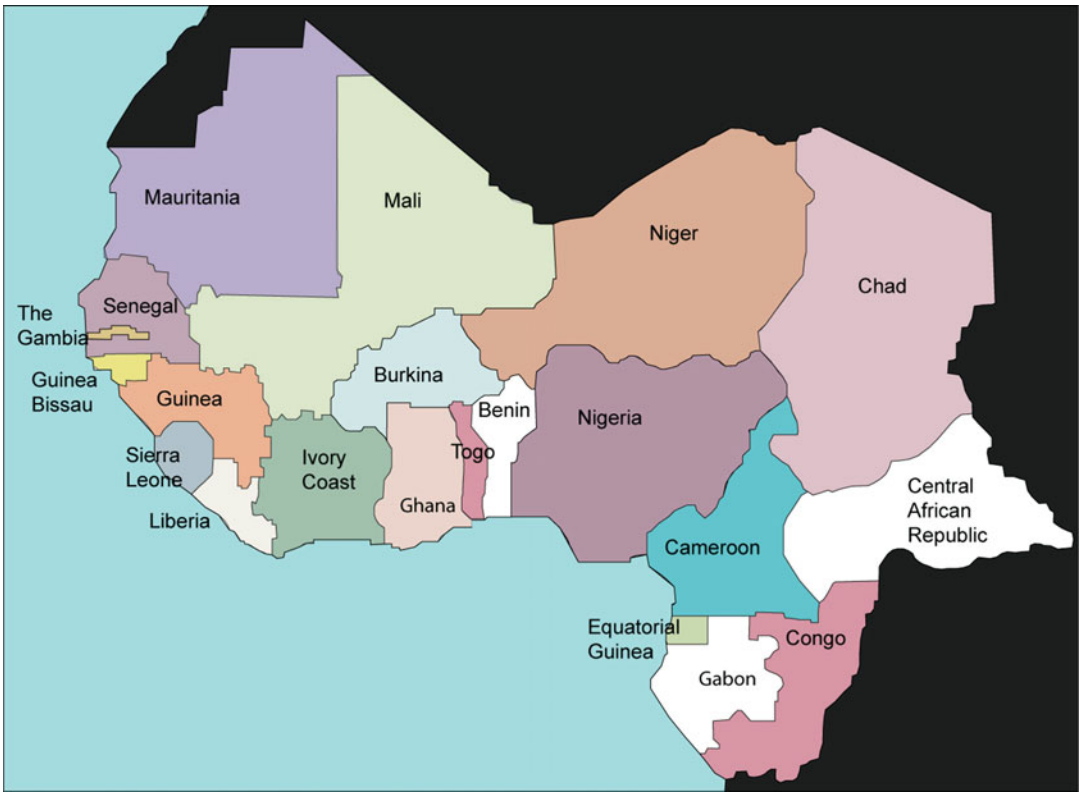

West Africa: Museums, Fig. 1 Map of West Africa (Map drawn by Kylie Lower) (Source: United Nations 2005)

Definition

The Sahara Desert to the north borders the region of West Africa while the Atlantic Ocean borders the western and southern areas of the region. The region of West Africa includes Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo (Fig. 1). The region's natural cultural and linguistic diversity was reinforced by varied influences from European colonization by the British, French, German, and Portuguese. Accordingly, there is great variety in both the content and form of museums in West Africa.

Key Issues and Current Debates

The key issues for museums in West Africa concern the professional training of staff to curate artifacts and prepare exhibitions, obtaining sufficient funding to conserve and protect materials and dealing with the legacies of colonialism, including the repatriation of materials from former colonizing countries.

While some people had accompanied archaeologists on fieldwork or were employed as cleaners or attendants at museums, until recently, few curators in West African museum had undergone professional training in museum management skills. The lack of trained staff and dedicated funding to manage and analyze collections, and undertake training and educational programs led to many museums failing to develop a vision or mission consistent with national goals (Ardouin & Arinze 2000).

The Bendrologie Museum of Manega in Burkina Faso provides an example of a private museum that has successfully integrated local cultural traditions into museum displays. This museum has three functions: collection, conservation, and the study of art objects. Several buildings

West Africa: Museums, Fig. 2 Old Towne of Djenné (Source: Stephen Davies)

are used for exhibitions, while others are administrative. In addition, the museum houses dwellings built using traditional techniques, including Bobo, Senufo, and Fulbe houses. The museum's collections include masks, musical instruments, weapons, tombstones, books, paintings, currency, jewelry, and over a hundred stuffed animals (Ardouin & Arinze 2000: 65-6). One of the interesting places in the Museum is "The Pavilion of Death," which houses objects and displays relating to death. When visiting this space, visitors must enter and exit backward, and remove their shoes and hats, in deference to Mossi cultural customs regarding death, death being the opposite of life (Bendrologie Museum of Manega 2013).

Though funding is a major issue for museums throughout Western Africa, the establishment of the African World Heritage Fund in 2006 provided an additional source of revenue for protecting and conserving those museums that are located on World Heritage sites in West Africa.

Two of the 32 places from West African countries inscribed on the World Heritage List in 2013 are museums. These are the Royal Palace of Abomey in Benin and Old Towne of Djenné in Mali. The Royal Palace of Abomey is the remnants of a vanished kingdom, which ruled from 1625 to 1900 (Fig. 2). The world heritage area is inclusive of 10 palaces, which are no longer inhabited. Two of the palaces were restored to house a collection of royal objects. The Historical Museum of Abomey illustrates the history of the kingdom and its desire for independence against colonial occupation. The collection is used in exhibitions and educational programs and includes murals, sculptures, and a series of intricate earthen bas-reliefs (Ardouin & Arinze 2000: 164; UNESCO 2013b). The Old Towne of Djenné is one of the oldest towns of sub-Saharan Africa, being inhabited since 250 BCE. Around 2000 traditional houses have survived. The houses are built on hillocks to protect them from

West Africa: Museums, Fig. 3 Royal Palace of Abomey (Source: Stephen Davies)

seasonal floods (Fig. 3). This place is an open-air museum that includes public buildings and family dwellings. Excavations have discovered remains of traditional brick structures (djénné ferey), funerary jars, millstones, and various terra cotta artifacts. The buildings are earthen construction and include several monumental houses, the reconstructed Great Mosque, Koranic schools, and the Tombs of the Saints (Ardouin & Arinze 2000: 24; UNESCO 2013a). Though families normally have a duty to maintain their architectural heritage, at Djenné family dwellings are in a poor state due to internal conflicts and disputed successions.

The West African Museums Programme (WAMP) started in 1982. WAMP is an African nongovernment organization dedicated to the development of private, community, specialized, and public museums in West Africa. Its mission is to improve the capabilities of museum professionals and organizations and increase attendance at museums in West Africa, regardless of language and geographical barriers. WAMP organizes various training opportunities, such as workshops, courses, symposiums, and regional programs. WAMP has individual and institutional membership (WAMP 2007). WAMP has hosted several major workshops focusing on different themes. The first workshop in 1985 in Lomé, Togo was on "Museums and the Community in West Africa." This was followed by "Museums and Archaeology in West Africa" in Abidjan, Côte d'Ivoire, in 1993, "Museums and History in West Africa" in Ouidah, Benin, in 1995 and "Museums and Urban Culture in West Africa" in Accra, Ghana, in 1996. WAMP has a website (WAMP 2007) and various publications such as a regular Bulletin, books, videos, and audios. In 2000, WAMP published a *Directory of Museums in West Africa*, listing the museums by country and type. The proceedings of the above major workshops have also been published. Arinze (1988: 37) advises that WAMP has played a positive role for stimulating more representative collections and the establishment of more local museums. The Small Grants Programs run by WAMP has also been successful in stimulating practical activities in museums.

Future Directions

The establishment of many museums during the colonial era in West Africa served the colonial agendas of the time, particularly that of articulating the devolution of political authority with

building more modest reforms through progress in education (Hargreaves 1996: 107). From the 1950s, museums were used as a mechanism to rewrite history and in fostering national consciousness. Efforts were made to train Africans to work in museums. Governments started to take responsibility for museum funding. In 1963, UNESCO established a training center in Jos, Nigeria, which trained many museum professionals (Arinze 1988: 32).

The repatriation of cultural objects has long been a matter of concern for museums in West Africa. Throughout West Africa, objects of movable heritage have been plundered from archaeological sites, due to a lack of local awareness and unregulated tourism. Indeed, Bausu (2012: 163) argues that one of their primary flows of antiquities is into European and North American museums and art markets. The most renowned repatriations in more recent times include the repatriation of the Benin Bronzes to Nigeria (O'Neill 2004).

Dealing with the legacies of colonialism is a challenge for museums throughout West Africa. In the postcolonial era, one response has been to neglect the parapets of colonialism, including museums. In Sierra Leone, for example, Basu (2012: 146) argues that the neglect of the National Museum in the postcolonial era can be regarded as intentional, as a "tacit act of resistance against the hegemonic forces of colonialism, against even the memory of colonialism."

Throughout West Africa, museums are adopting different models to present interesting and new experiences. Various mechanisms have been set up to tackle issues surrounding museum management. For instance, at Djenné, surveillance teams were set up to fight unauthorized excavations of archaeological sites and an information and awareness center was established to educate visitors to the city (Ardouin & Arinze 2000: 27). Although they may share similar goals of social inclusion and righting historical wrongs, the approach taken to museums in other countries that portray African heritage and culture is a contrast to the approach taken within African museums, the latter which is more empowering to Africans (Oldfield 2012).

One critical issue facing West African countries today is that of reclaiming and curating their pasts. For some museums, the priority is to undertake further research into identified or unattributed objects in their collections, while for others, there is a need to prepare interpretative materials for visitors or conserve their collections. Irrespective of the issues faced by each individual museum, it is clear that museums in West Africa have an important role to play for international visitors, visitors from different parts of Africa, and nationals of the particular country.

Cross-References

- ▶ African World Heritage Fund (AWHF)
- ▶ British Museum
- ▶ Buildings Archaeology
- ▶ East Africa: Museums
- ▶ Heritage Museums and the Public
- ▶ Museums and Memory Experiences
- ▶ UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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West and Central Africa: Historical Archaeology

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Introduction

The region of West Africa – extending from Senegambia in the west to Cameroon in the east and bordered by the Atlantic Ocean in the south and the Sahel to the north – is ripe for archaeological research focused on early global interactions. In the mid-fifteenth century CE, notable European figures, such as Christopher Columbus, navigated along the West African coast and exchanged ideas and goods with speakers of the Niger-Congo language, who dominated local political relations (DeCorse 2001: 3). Likewise, the region of Central Africa – encompassing the area in, and between, the states of Cameroon, Chad, and the Democratic Republic of the Congo – offers a prime setting in which to investigate the emerging relations between fifteenth-century CE Portuguese traders and Bakongo. Researchers who engage in historical archaeology in West and Central Africa use methods and theories aimed at elucidating the intense interconnectedness that defines modern life. Yet, absolute definitions of the term are impossible and debates rage over the moment marking the start of the historic era and the relative agency exerted by African groups and outside ones.

Definition

In early programmatic statements, historical archaeology was defined by the expansion of Western European people across the globe and attendant social, economic, and political changes experienced by the non-European groups they encountered. Americanist researchers set the pace for such theorizations and looked to the mid to late fifteenth century as the period when explorers connected continental Europe to the broader Atlantic World. In turn, they distinguished historical sites as ones where archaeologists could intermingle European lines of evidence such as artifacts, settlement patterns, aesthetic qualities, and documentary sources to measure the frequency and amplitude of local changes. Early historical archaeological efforts in West and Central Africa followed Americanist research paradigms and focused on European monumental architecture and political prominence (Posnansky & DeCorse 1986). Thus, stone trading forts along the Ghanaian coast and colonial buildings in Angola served as benchmarks for European dominance in local political arenas (Fig. 1). Researchers used a similar investigative frame to interpret archaeological sites associated with Arab traders, who were in the Sahel of West Africa by the end of the first millennium CE. In both cases, sites associated with outside groups were associated with literacy and urbanism, while sites associated with local groups were interpreted as nonliterate, prehistoric, and village or town dwellers.

More recently, researchers have critiqued definitions of historical archaeology underpinned with Eurocentric notions of cultural exchange and the omission of African oral testimonies as a valid line of comparative evidence (Andah & Okpoko 1979). The subdiscipline has been further broadened by questioning the assumption

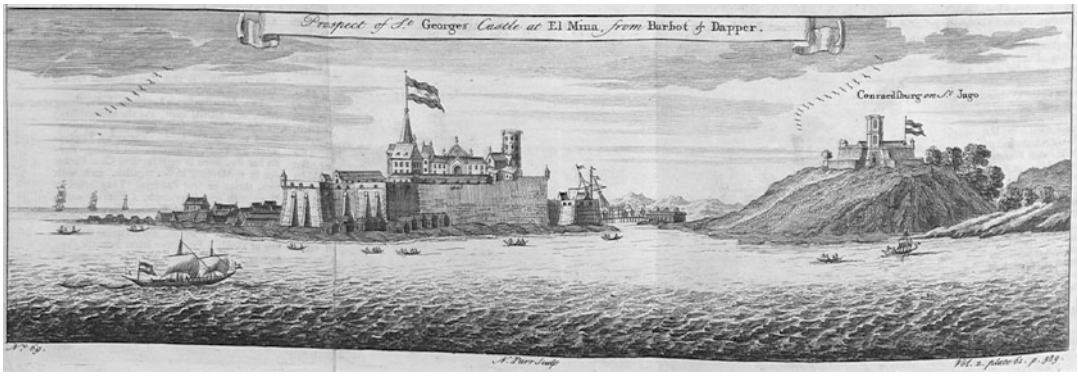

West and Central Africa: Historical Archaeology, Fig. 1 View of Elmina Castle from the sea in 1745–1747 (Astley 1745–1747: vol. 2, plate 61, facing p. 589)

that European/African power dynamics associated with colonialism were analogous to those in the deeper historical past (Cusick 1998; Lane 2005). Rather than a focus on the impact of Europeans, these more holistic efforts now theorize Europeans as intrusive and part of a broader historical process through which outside traders and diplomats were seamlessly integrated into local negotiations of power and authority. Research paradigms accordingly shifted to understand the long-term historical processes impacting local political economies and the ways that Europeans were latecomers to such interactions (Stahl 2001). Africanist researchers are still at pains to define the "historical" element of historical archaeology. Rather than attempting to define fixed moments in the past where history begins and prehistory ends, Africanist archaeologists argue that interpretations of the past are constructed in the present. Thus, the past and timelines dividing it are products of modern political negotiations and the agendas of individual researchers (Reid & Lane 2004). Despite its arbitrary and political nature, historical archaeology provides a means of drawing West and Central Africa into debates over modernity, cosmopolitanism, and globalization. While the earliest examples of historical archaeology in West and Central Africa highlighted the presumed political sea change caused by European interlopers, more recent projects focus on placing events associated with European contact and colonialism along a much longer historical arc.

Key Issues

Current longitudinal studies do not assume that West and Central Africa are on an evolutionary trajectory toward a Western prototype. The investigation of African urban forms nicely illustrates this point. Roderick and Susan McIntosh (1995) convincingly argue that cities emerged in the Middle Niger Delta region in the late first millennium CE. The urban forms, at sites such as Jenne-jeno, predate the entrance of European and Arab traders into the area and exhibit unique kinds of settlement types and political arrangements. Rather than a palatial citadel surrounded by an urban warren, Jenne-jeno exhibits a massive town wall surrounding individual urban clusters, each of which contains house compounds similar in size and appointment to one another. This heterarchial arrangement of structures does not fit standard models of urbanism in other parts of the globe where cities are often found nested within hierarchical settlement systems and contained within state-like political systems. Roderick McIntosh uses the Jenne-jeno example, alongside ethnographic and linguistic research in the surrounding region, to explore the deep symbolic reservoirs contained within the modern oral histories. He argues that these accounts hold the key for understanding how archaeological actors actively manipulated their local environments and then passed along detailed knowledge of landscapes to future generations. Moreover, he questions whether or not it

is necessary for a city to be supported by a state-like political structure. Indeed, it appears that dense arrangements of people – urban centers surrounded by related rural countryside – were possible in the Sahel without the support of broad state-like political interactions.

While the McIntoshes focused on recreating the dynamic relationships connecting Jenne-jeno to its nearby hinterland, Timothy Insoll (1997, 1998) has documented the trans-regional networks that connect Timbuktu and Gao. Through archaeological survey and detailed mining of local Arabic archives, Insoll has traced the vibrant trade networks that moved gold, salt, ivory, and war captives between the Sahel, North Africa, and the broader Mediterranean region (see also Haour 2011). Attempts to connect local political economies to trans-regional ones is a classic research agenda in the historiography of historical archaeology, as is creating social biographies of trade goods. David et al. (1991) used a detailed ethnoarchaeological investigation of local hand-built earthenware ceramic vessels to reveal the ways that material culture frames ethnicity and identity in present-day Cameroun. Analogous decorative styles and depositional patterns in the archaeological record suggest that similar dynamics were at play in the deeper archaeological past. In a similar vein, Akin Ogundiran (2002) has investigated the shifting regimes of value associated with cowry shell "currency" used across West Africa. This study traced cowries from the Maldives Islands and into shrines, ancestral offerings, and ritual regalia.

Whereas documentary sources, such as ship's manifests and diarist's accounts, discuss cowries in economic terms, Ogundiran demonstrated that Yoruba oral sources and modern ethnoarchaeological observations can broaden the interpretation of cowries into social and political realms as well. Furthermore, his study illustrates the utility of addressing issues of the Atlantic World at both local and global scales of interaction. Gouda and English pipe makers, who created the iconic white clay pipes ubiquitous on Atlantic era sites, never intended for their wares to be included in Bight of Benin ancestral shrines (Norman 2009). Granular histories, which work from the specific domestic contexts up to instrumental transnational ones, hold the potential to challenge conventional interpretations underpinned by Western European notions of materiality. The interpretation of cowries and pipes in West Africa has been modeled on the work of Ann Stahl (2001), who suggests working "upstream" from the present to the deeper archaeological past. Stahl's longitudinal research project began with intensive ethnohistorical and archaeological research conducted with people living in and around the site under investigation. These oral sources were then carefully compared, and contrasted, with archaeological material sequenced from the present to the Iron Age. Through identifying tensions between oral, documentary, and archaeological sources, Stahl elucidated the changes in aesthetic preferences and daily practices as the Banda region of Ghana was drawn into regional urban networks and Atlantic spheres of exchange.

As the above examples illustrate, archaeologists in West and Central Africa regularly push the bounds of the "historic" into what once was considered the deeper "prehistoric" past. Yet for this broad region, historical archaeology remains synonymous with the investigation of the emerging Atlantic World and the dislocations associated with colonialism. Attempts to understand the African Atlantic or colonialism must address the forced removal of approximately 12 million people from West and Central Africa to slave societies in the Americas. In return, tons of mass-manufactured trade items from Europe, tobacco from the Americas, and cowries from the Maldives poured into the area. Due to the global reach of trade associated with war captives on the African coast, there is a long-standing research agenda of integrating West and Central Africa alongside related locales of the African diaspora as one unit of analysis (Agorsah 2011). Merrick Posnansky was one of the first researchers to initiate research on the coastal West African states that profited from the Atlantic slave trade. Kings and elites associated with the polities of Allada, Dahomey, and Hueda (Fig. 2) controlled coastal outlets into the Atlantic and in turn taxed traders and used the surplus to

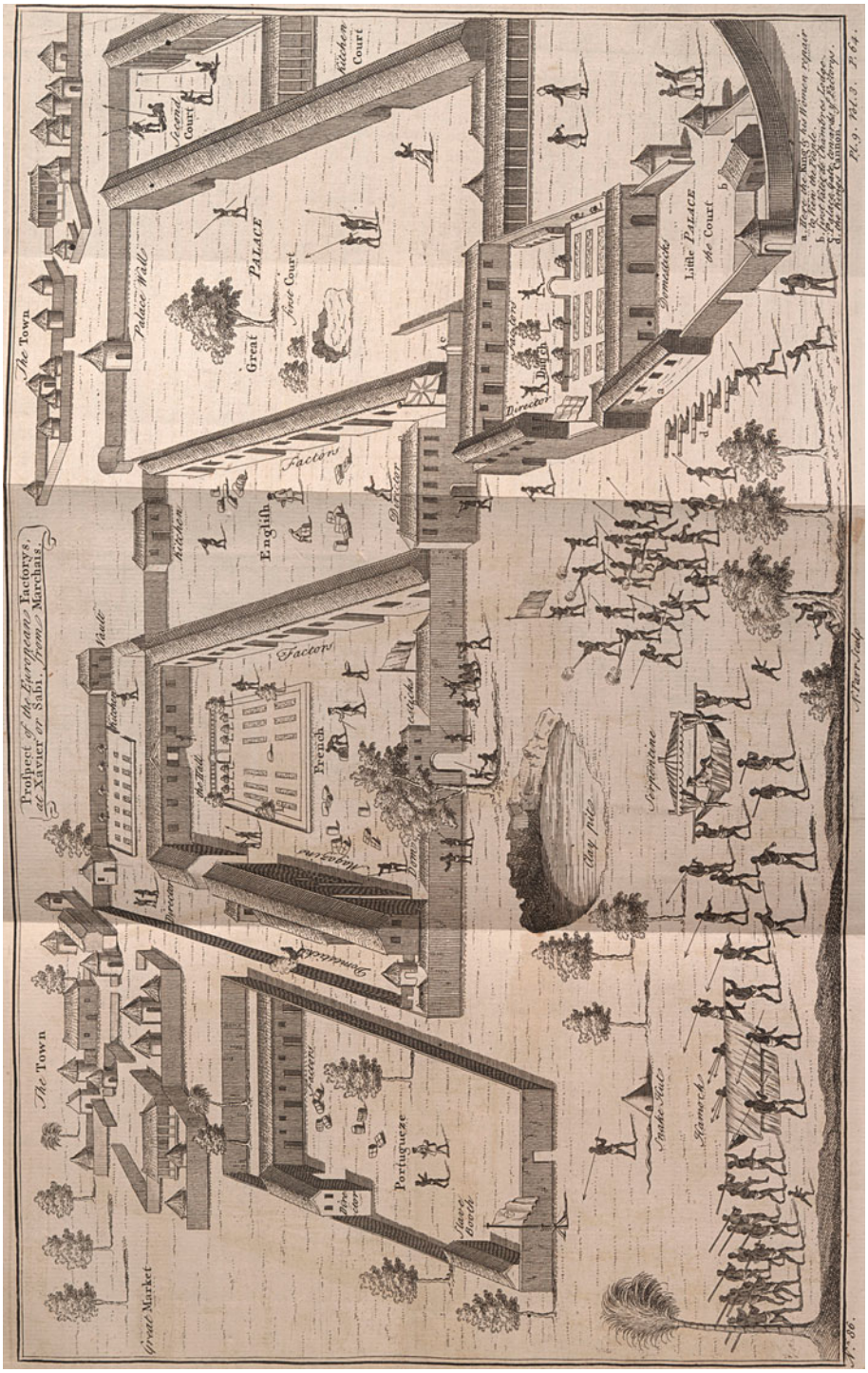

West and Central Africa: Historical Archaeology, Fig. 2 View of the Huedan palace complex at Savi in 1745–1747 (Astley 1745–1747: vol. 3, plate 9, facing p. 64)

lavish gifts on political followers (Norman 2009). Amassing such "wealth in people" fits within local understanding of power and authority, which involves mobilizing people, rather than specie. Although each of these polities experienced population expansion and settlement nucleation inward toward their central palace complexes, archaeological research reveals that political structures, economic networks, and social processes were expanded rather than radically altered during the Atlantic era. The investigation of interregional and intraregional relationships between West African states has brought into clearer focus the massive movement of people and things away from the Sahel in the fifteenth and sixteenth century and toward the coast. It has also provided poignant vignettes of people in smaller-scale sites and border regions, who were caught between larger warring states and buffeted by demands for war captives (Usman et al. 2005).

As with the emergence of urbanism and transregional trade, researchers vigorously debate the origins of slavery (see Lane and MacDonald 2011). Questions emerge over whether enslavement – as a political designation where one person, or group of people, forcibly claims ownership of others – represents an internal or external phenomenon. As discussed above, heterarchy appears to be a common political arrangement in at least some areas of West and Central Africa. At the same time, hierarchial political arrangements where political leaders collect wards, concubines, political captives, and pawns appear to have a deep history throughout the region as well (e.g., Swanepoel 2011). Researchers are thus faced with the problem of how to identify enslavement in the archaeological record. At the level of the domestic unit – house or palace compounds – identifying enslavement appears problematic. The houses of "free" rural agricultural and enslaved laborers might present very similar archaeological signatures. Given that West and Central African leaders often circulated material wealth, rather than amassing it themselves, identifying the residences of elite African "slave owners" presents problems as well. Most researchers turn to broader landscapes as a means of identifying regional level warfare and intensive agriculture that may represent the results of slaving as a political strategy.

Increasingly, historical archaeologies of West and Central Africa draw on landscape studies in an attempt to highlight the active role that monuments, spaces, and places play in the human experience (Monroe & Ogundiran 2012). Such studies have been particularly successful in engaging the interests of local stakeholders through research efforts focused on local concerns (Apoh & Gavua 2010). Landscape studies also work to disrupt conventional narratives focused on European agency associated with the built landscape. Brempong Osei-Tutu (2007) demonstrates that, while massive, European forts can be fonts of memories documenting the dislocations associated with European trade and colonialism.

Future Directions

It should be noted again here that no unifying theoretical, methodological, or chronological definition for historical archaeology exists for West and Central Africa. Yet, researchers working on sites from c. 1000 CE to the twentieth century commonly focus on the ways that relentlessly interconnected lives impact people at local and global scales of interaction. The robust interplay of landscape, material culture, documents, oral sources, and archaeological material is a common – but not universal – research design for such projects. In terms of theory, many recent historical archaeology studies of West and Central Africa embrace a critical stance where researchers acknowledge their own place in global politics; the history of colonialism, enslavement, and racism; and the scarcity of African researchers. Indeed it is surprising that the amount of research by African diaspora researchers in the Americas (e.g., Fennell 2007) on the Bakongo region dwarfs that generated by Africanist researchers. Moving forward, it seems necessary for greater direct collaboration between researchers in the Americas, Caribbean, and Africa. These research strategies should include multisited projects that document the forced removal of specific groups, or

individuals, into the Atlantic World as well as the ways that they reconstituted life in diasporic places. Nonetheless, historical archaeological projects in West and Central Africa need not recreate the dynamics of colonialism, where research designs and project funds are controlled by outside groups. If historical archaeology is to embrace calls to decolonize the discipline, it is clear that African researchers require an interpretive space to put forward their own narratives of the past, funding to make projects possible, and universities from which to foster local dialogs. Perhaps (re)awakening local interests is the key for historical archaeology to thrive in West and Central Africa and archaeologists should, as Robertshaw (2004) suggests, adopt storytelling to fit with the regional aesthetic for passing along important knowledge about one's past.

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- ▶ African Diaspora Archaeology
- ▶ Andah, Bassey Wai
- ▶ Clay Pipes in Historical Archaeology
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- ▶ Fortifications, Archaeology of
- ▶ Jenne-Jeno, Archaeology of
- ▶ Modern World: Historical Archaeology
- ▶ Ogundiran, Akinwumi
- ▶ Posnansky, Merrick
- ▶ Postcolonial Archaeologies
- ▶ Schmidt, Peter R.
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West and Central African Neolithic: Geography and Overview

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State of Knowledge and Current Debates

Introduction: Sub-Saharan Africa and the Elusive Notion of the Neolithic

The very concept of the Neolithic on the African continent is the subject of considerable debate, as is highlighted in the introduction of the collective work *The Archaeology of Africa*: *Food*, *Metals and Towns* (Sinclair et al. 1993). The definition of the Neolithic, originally designating the presence

of polished stone tools, has rapidly been enriched by association with the presence of ceramics and especially the concept of a transition from predation to production, thus resulting in a very broad definition used at once to define chronological stages and cultural entities (Sinclair et al. 1993). The classic concept of the Neolithic is in fact articulated around the appearance of economies of production (livestock, farming), involving the settlement of populations and the development of some technical innovations (grinding equipment, ceramics). While, broadly speaking, this schema corresponds particularly well to the situation known in Europe, it is not at all applicable under the same form to the African continent, where ceramics, agriculture, livestock, and settlement appears independently, with more or less important differences in time and space according to the region. In addition, the economic systems that have developed throughout the Holocene in sub-Saharan Africa are extremely varied, making it even more difficult to define a concept better suited to the continent.

This situation is reflected in the archaeological literature by considerable terminological diversity. Although the term "Neolithic" was quite widely used by Africanist researchers until the early 1980s and its use continues today, the terms "food production," "Late Stone Age," "Ceramic Stone Age," and "Later Stone Age" have gradually become more frequently used (Sinclair et al. 1993).

Several definitions of the Neolithic have been proposed by researchers working in West Africa. R. Vernet and G. Aumassip have argued that if the Neolithic is indeed a "new attitude of man toward nature," we may use criteria other than direct evidence of agriculture and livestock and that "any new evidence of a change in thinking can be considered: new attitudes vis-à-vis the tool itself, new types of behavior, habitat structure" (Vernet & Aumassip 1994: 255, editor's transl.). As a major technical innovation, the appearance of pottery constitutes a real change in the relationship between man and his environment, and some authors consider its presence as a sufficient criterion for discussing the Neolithic. The definition of an "African Neolithic" has also been suggested out of archaeological and ethnoarchaeological reflections based on West African actualistic examples (Huysecom 2012). Within this definition, the term Neolithic is applicable to societies possessing a control of the environment through transformation and presenting at least one of the particularities often associated with Neolithization, whether livestock, agriculture, ceramics, or settlement. The precise establishment of a group's lifestyle from the archaeological material being often the problem, the author recommends the use of the term African Neolithic to design all cultural groups associated with the presence of ceramics and before the onset of metallurgy. S.K. McIntosh (2001) defined a "West African Neolithic" as characterized by the transition to economies of production (agriculture and livestock), succeeding the "West African Late Stone Age" and preceding the "West African Iron Age." The presence of ceramics is thus not taken into account in these definitions. S.K. McIntosh, however, states that the sites attributed to the "Late Stone Age" with a production economy and Neolithic sites with the presence of livestock can be contemporary, just as sites with a production economy with or without the presence of metal can coexist in the same chronological range. The terms Neolithic and Iron Age, generally considered to be directly successive in time, thus do not imply a chronological independence in West Africa (McIntosh 2001: 323).

The term Neolithic is also used in Central Africa. In Gabon, an "Early Neolithic" beginning in the late 3rd millennium BCE and a "Late Neolithic" between the end of the 2nd millennium and the middle of the 1st millennium BCE have been described in this way (Clist 2005; Oslisly & White 2007). The criteria defining a Neolithic village in Gabon are notably the presence of polished stone tools, ceramics, grinding equipment, and pit dumps ranging chronologically between the Late Stone Age and the Early Iron Age (Clist 2005). In Central Africa, we should also note the use of the "Stone to Metal Age" concept (or SMA), corresponding to a transition period between "Late Stone Age" occupations

and the appearance of metallurgy (de Maret 1995), which could be considered as another appellation of the regional Neolithic (Oslisly & White 2007). The Neolithic/SMA in Central Africa refers to a period corresponding to the appearance of ceramics and the development of new subsistence strategies, which varies from a chronological perspective in terms of the geographic zones considered, but is mainly included between the end of the 3rd and the beginning of the 1st millennium BCE.

We therefore note considerable variability in the concepts, which essentially can be explained by geographic, environmental and chronological factors. When it is used, the term Neolithic, however, often refers to the appearance of economies of production, either the presence of livestock or agriculture. Some cultures characterized by the early presence of ceramics or the exploitation of wild grasses were also considered as representatives of an Early Neolithic, appearing on the current borders of the Sahara and the Sahel at the beginning of the Holocene around 10,000 BCE, (Huysecom et al. 2009; Huysecom 2012) (Fig. 1). In Africa, the production of pottery is indeed a phenomenon appearing independently from the domestication of plants and animals. The development of ceramics was probably facilitated by the exploitation of new resources, becoming available at the beginning of the Holocene with the extension of tropical grasslands rich in edible grasses over previously barren areas (Huysecom et al. 2009). Although the appearance of ceramics thus seems connected to a type of open environment, we observe its early and occasional presence several times during the mid-Holocene in southern areas of West or Central Africa, at least partly in relation with some northern cultural groups. Pottery remains from the SMA 1 dated from the 7th/6th millennium BCE at Shum Laka (Cameroon) could thus reflect the southern displacement of populations used to exploiting savannah environments or savannah-forest mosaics following the climatic deterioration occurring toward the end of the seventh millennium BCE (de Maret 1995; Lavachéry 2001) (Fig. 1). Ceramics dated to the 6th millennium BCE in Konduga (Nigeria) indicate the occupation of savannah woodland environment or forest on the old southwest banks of Lake Chad, presumably by populations originating from eastern central Sahara in search of a more favorable environment (Breunig & Neumann 2002) (Fig. 1). Although the early appearance of ceramics at Shum Laka seems to be linked to the beginnings of the exploitation of some oil-producing fruit trees (Lavachery 2001), the phenomena described above are attached neither to the appearance of domestic species nor to real settlement phenomena and do not constitute in any way a Neolithic in the classical sense of the term.

Livestock and especially agriculture involved only very late, and sometimes only temporarily, forest areas (Mbida et al. 2000; Neumann et al. 2012a). It is thus logical that the term Neolithic is used less frequently by researchers working in southern zones of West Africa as well as Central Africa. Nevertheless, it is crucial to highlight the existence of an important common point in the history of subsistence modes in both regions. In these variable environmental, cultural, and chronological conditions, we observe the development throughout the Holocene of economic strategies based on the more or less intensive exploitation of nondomestic resources; these systems continued after the introduction of agriculture, and most of them are still operating today (Kahlheber & Neumann 2007). During the Late Holocene, between 2500 and 500 BCE, agriculture, moreover, occupied a secondary place in the mosaic of subsistence strategies, and we thus find ourselves in a general context of a "low-level food production" economy (Smith 2001), the first large, truly sedentary farming communities appearing only during the Iron Age, from the 1st millennium BCE but mainly during the first millenium AD (Kahlheber & Neumann 2007). This economic particularity is no doubt one of the main factors explaining the problems linked to the use of the term "Neolithic" in Africa.

Although the classic concept of Neolithic consequently seems inadequate to describe the history of Holocene economic systems in sub-Saharan Africa, important changes in terms

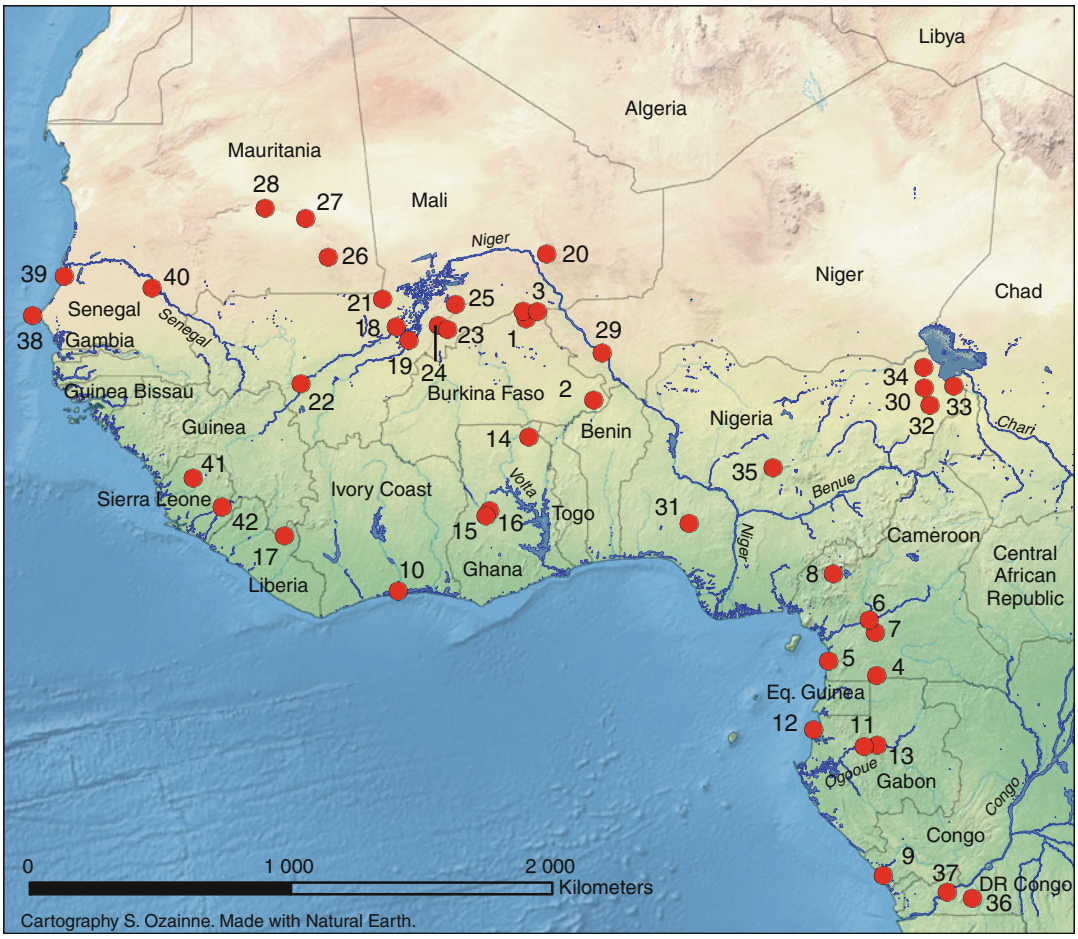

West and Central African Neolithic: Geography and Overview, Fig. 1 Sites mentioned in the text. Burkina-Faso: *1*. Oursi. *2*. Pentenga. *3*. Tin-Akof. Cameroon: *4*. Abang Minko'o. *5*. Bwambé-Sommet. *6*. Nkang. *7*. Obobogo. *8*. Shum Laka. Congo: *9*. Tchissanga. Ivory Coast *10*. Tiebiessou. Gabon: *11*. Epona, Otoumbi. *12*. Okala. *13*. Okanda. Ghana: *14*. Birimi. *15*. Boase. *16*. Kintampo. Liberia: *17*. Sopie. Mali: *18*. Dia-Shoma. *19*. Djenné-Jeno. *20*. Karkarichinkat. *21*. Kobadi. *22*. Kourounkorokale. *23*. Nin-Bèrè 3. *24*. Ounjougou. *25*. Windé Koroji Ouest. Mauritania: *26*. Dhar Nema. *27*. Dhar Oualata. *28*. Dhar Tichitt. Niger: *29*. Kirkissoy. Nigeria: *30*. Gajiganna. *31*. Iwo Eleru. *32*. Konduga. *33*. Daima, Kursakata, Mege. *34*. Zilum. *35*. Ungwar Kura. DR Congo: *36*. Ngovo. *37*. Sakuzi. Senegal : *38*. Cap-Vert. *39*. Khant. *40*. Walalde. Sierra Leone: *41*. Kamabai. *42*. Yengema

of the relationship between nature and societies occurring since the Early/Middle Holocene have motivated some authors to define an Early Neolithic beginning around 10,000 BCE. From around 2500 BCE, the Late Holocene is then characterized by the rapid expansion of pastoralism and agriculture south of the Sahara, and thus the development of real strategies for production, motivating the use of the term Neolithic by a large number of authors. In recent decades, the suffix "Stone Age" is, however, often used to refer to all cultures before the onset of metallurgy. Finally, although there is no concept to synthesize the economic and technical diversity observed for the Holocene in West and Central Africa, the majority of regional definitions, whether or not they use the term Neolithic, refer to the existence of a more or less extended period before the beginning of the Iron Age characterized by the development of new subsistence

strategies involving increased use of wild resources and/or the presence of domestic animals.

Environments and Subsistence of the Late Holocene in West and Central Africa

The Appearance of Livestock South of the Sahara

Livestock was introduced in West Africa from the central Sahara through migrations influenced by the end of the climatic optimum of the Early/Middle Holocene and the establishment of more arid conditions. The movement may have begun between 5300 and 3500 BCE with the progressive abandonment of the eastern Sahara in favor of safe havens and the beginning of seasonal transhumance of pastoralists (Jousse 2004; Kupper & Kröpelin 2006). This first wave of introduction of domestic species in West Africa, with the arrival of beef, caprines, and also certainly dog, occurred between the 3rd and 2nd millennium BCE. Men and animals thus migrated together (Linseele 2007). The impact on the environment of more arid conditions from the Late Holocene, in fact, made previously unfavorable areas progressively more accessible for pastoralism. Until about 2000 BCE, the conditions favorable to the presence of the tsetse fly, transmitting trypanosomiasis (sleep disease), would have been maintained in the Sahel region which was therefore unsuitable for livestock keeping (Smith 2005). Southern regions and more particularly forested zones consequently remained adverse to farmers. The first evidence of domestic fauna in Central Africa occurs in fact very late, the oldest known dating to the 1st millennium BCE (Mbida et al. 2000).

It is possible that, during their southward migrations, nomadic pastoralists who came from the Sahara were able to move by adapting their transhumance strategies to minor ecological changes, albeit moving quickly over long distances in case of severe drought (Linseele 2007). Clearings, leading to a gradual consolidation of areas on the boundary of the endemic tsetse area, also probably accompanied the spread of pastoralism southward. The colonization of the Sahelo-sudanian zone by livestock farmers may have also assisted the rapid appearance of breeds of cows tolerant to trypanosomiasis, contributing in turn to boost the expansion of livestock. In central Ghana, bones of small size cows dated to the beginning of the 2nd millennium BCE have indeed been interpreted as representative of possible ancestors of the current N'dama cow, capable of living and reproducing in environments where the tsetse fly is found (Gautier & Van Neer 2005) (Fig. 2). This hypothesis considers that bovines of Saharan origin were able to rapidly acquire a smaller size by adapting to the more humid southern regions. The forested zones logically remain unfavorable to the presence of livestock farmers, and the remains of domestic fauna from the 1st millennium BCE are associated with a period of high climatic and environment disruptions resulting in the opening of the landscapes in forested areas (Mbida et al. 2000; Neumann et al. 2012a, b).

The Emergence of Agriculture in Sub-Saharan Africa

The emergence of agriculture in sub-Saharan Africa corresponds to the beginnings of pearl millet cultivation. Belonging to the Poaceae (grass) family and to the Panicoideae subfamily, pearl millet is ecologically and physiologically adapted to dry conditions in the semiarid zones of sub-Saharan Africa and is characterized by a rapidly growing cycle and a capacity to grow with annual precipitations of only 250 mm. The quantity but above all the seasonal distribution of precipitations characterizing the climate of savannahs are thus ideal for its cultivation (Kahlheber & Neumann 2007).

The oldest known remains of domestic pearl millet were discovered in the northeast of Mali, in the low valley of Tilemsi, and dated between 2500 and 2000 BCE (Manning et al. 2011). The presence of pearl millet at the Sahara-Sahel limits around 2500 BCE implies that the zone of its domestication was certainly situated further away in time and space. Hypothetic centers of millet and sorghum domestication have been placed by J.R. Harlan (1971) to the east of Lake Chad and in the West African Sahel, based on the current distribution of their wild ancestors, but this certainly extended further north during the humid phases of the Holocene. The appearance of

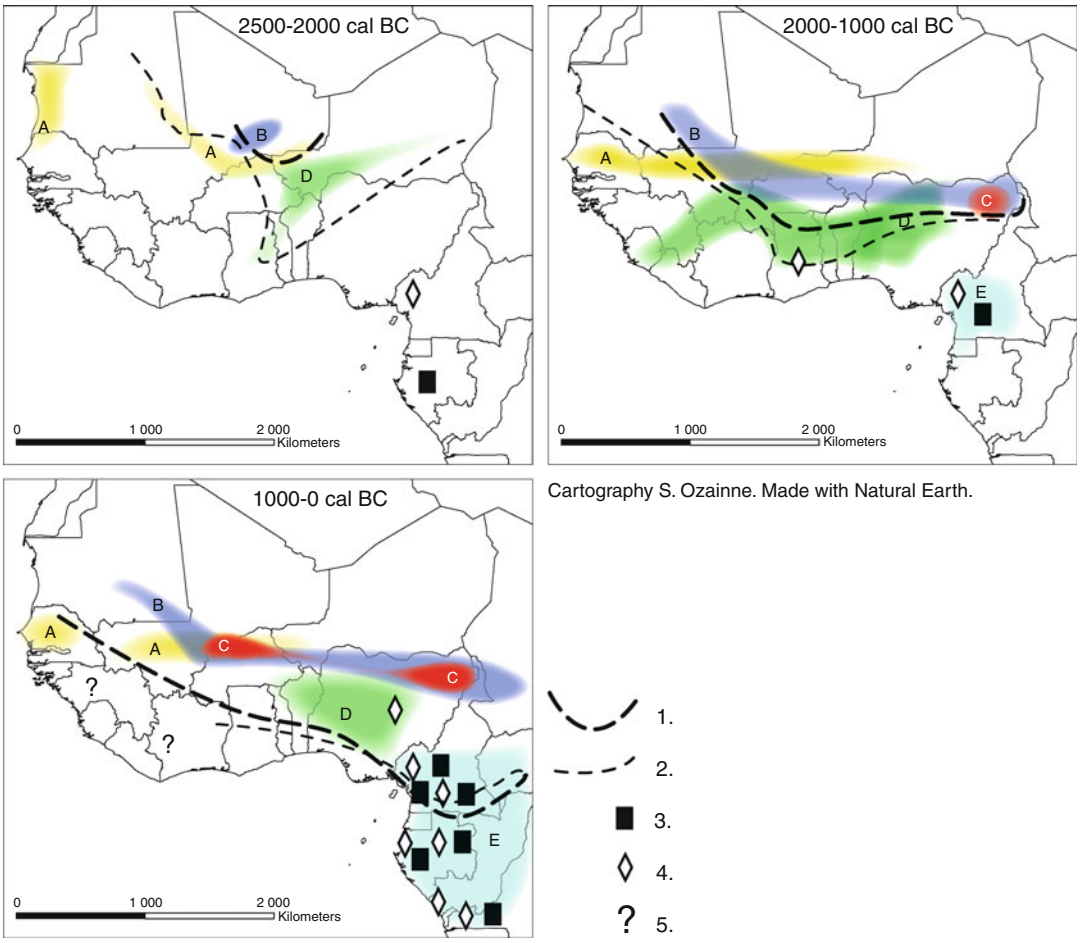

Cartography S. Ozainne. Made with Natural Earth.

West and Central African Neolithic: Geography and Overview, Fig. 2 Cartographic representations of the principal cultural and economic phenomena during the Late Holocene in West Africa and Central Africa. *1* Southern limit of agriculture (pearl millet). *2* Southern limit of herding. *3* Pit sites in Central Africa. *4* Exploitation of oily fruit trees. *5* Zones with little or no documentation. *A* Saharan cultural influences. *B* West–east Sahelian cultural current. *C* East–west Sahelian cultural current. *D* Sudanian cultures. *E* Cultures of the Late Neolithic in Central Africa. Chronology in calendar years BCE

agriculture in sub-Saharan Africa is thus unlikely to be due to local domestication of wild plants by hunter-gatherer societies, and millet culture was probably developed by groups of Saharan pastoralists who adapted to the new environmental and economic constraints around the end of the Middle Holocene (Neumann 2003, 2005; Ozainne 2013). It is certainly a desire for the predictability of the availability of resources and thus for greater security in the supply of food which was the main generator for the domestication of plants (Marshall & Hildebrand 2002).

After its appearance in the south of the Sahara in the 3rd millennium BCE, agriculture rapidly spread through the whole of the Sahelo-sudanian zone in West Africa (Fig. 2). Pearl millet has thus been well documented since the beginning of the 2nd millennium BCE in southeast Mauritania, in eastern Mali, and northern Burkina Faso but equally more southerly in northern Ghana (Kahlheber & Neumann 2007). The culture of millet is then documented in northeast Nigeria, in the Lake Chad Basin since the final centuries of the 2nd millennium BCE, and then in central

Nigeria since the beginning of the 1st millennium BCE. Westward, in the Middle Senegal Valley the first known remains of pearl millet also date back to the middle of the 1st millennium BCE (Kahlheber & Neumann 2007).

Remains of pearl millet dated to the second half of the 1st millennium BCE have also been identified in southern Cameroon (Eggert et al. 2006). In the same region and during the same period, the discovery of Bambara groundnut remnants (*Vigna subterranea*) has also been documented (Kahlheber & Neumann 2007). The presence in forested zones of these two species characteristic to the Sudano-Sahelian zone constitutes a special event in the history of African agriculture, contemporaneous with a period of disturbance of the tropical rainforest, due to increasing aridity and/or stronger seasonnality (Neumann et al. 2012b). In southern Cameroon, the establishment of a more pronounced dry season after 400 BCE indeed resulted in a significant disruption in the balance of the rainforest and the appearance of vegetation that could be cleared more easily, all of these conditions offering a suitable context for pearl millet cultivation. However, the presence in forested zones of this agricultural system adapted to the northern savannahs corresponds only to a single episode of about 200–400 years in the history of Central African settlement, with the forest beginning to regenerate and other types of subsistence being established during the first centuries CE (Neumann et al. 2012a, b).

Agriculture thus appears very late in sub-Saharan Africa, at least 6,000 years after its beginning in the Middle East. This particular situation could in part be explained by the environmental context peculiar to the savannahs, which offers ideal conditions for the exploitation of wild plants as well as for pastoralism. The group of savannah landscapes, broadly speaking (semiarid to grassy landscapes and scrubland), is in fact an environment that abounds with animal and vegetable resources and constitutes more than 80 % of the vegetation in sub-Saharan Africa, thus covering a much wider surface than other ecosystems (Neumann 2003). By offering pastoralists an ideal ground for their nomadic lifestyle that was dependent on the seasonal availability of wild plant resources, the savannahs may have been paradoxically responsible for the delay of the onset of agriculture (Neumann 2003; Smith 2005).

Pearl millet cultivation in all likelihood remained in the first instance a secondary strategy of subsistence (Kahlheber & Neumann 2007). Based on current archeobotanical knowledge, many late Neolithic groups cannot indeed be considered as being made up of real farmers, but rather as populations cultivating certain plants within a diversified subsistence strategy, including the intensive exploitation of wild plants, probably inherited from the Early Holocene, as an important component (Kahlheber & Neumann 2007; Huysecom 2012). We also observe in West Africa a mosaic of economic systems during the 2nd millennium BCE. The appearance of genuine settlement agriculture in West Africa would only come with the Iron Age, probably from the first centuries AD (Kahlheber & Neumann 2007).

Economic Systems in Forest or Forest-Savannah mosaic zones

The impression of economic diversity in the Late Holocene is amplified by the distinct strategies that developed in the forest and forest-savannah mosaic zones, where the resources were different and where some mixed systems appeared. Central Africa and more generally the more humid zones of sub-Saharan Africa are thus more typically characterized by the development of agroforestry systems, as pastoralism was not adapted to these regions, mainly because of the presence of the tsetse fly. During the 2nd millennium BCE, we note the progressive development of the exploitation of oil palm (*Elaeis guineensis*) in the center and south of Ghana (Logan & d'Andrea 2012). Oil palm does not grow in dense tropical forest, favoring open areas and climates with a less pronounced dry season as well as high rainfall, and is currently found in the forest and savannah boundary areas but also in areas of secondary forest and zones cleared for agriculture. Sometimes interpreted as a marker for the anthropization of landscapes, the presence

of this pioneer species in the archaeological record seems to have a particular climatic significance. In central Ghana, the charred macrofossils coming from the archaeological levels of sites of the Kintampo tradition represent, nonetheless, a robust indicator of relationships between populations and oil palm (Logan & d'Andrea 2012).

In Central Africa, the importance of oil palm is also demonstrated during the opening of landscapes occurring in the 1st millennium BCE (Neumann et al. 2012a) (Fig. 2). The incense tree (*Canarium Schweinfurthii*) is another oil-producing fruit tree species which was also found in Central and West Africa. Its presence is signaled in low quantities in central Ghana in the 2nd millennium BCE (Logan & d'Andrea 2012). In western Cameroon, this species has been visible since the end of the 7th millennium BCE, and its presence increased significantly between 2500 and 400 BCE (Lavachéry 2001). We also find traces of it during the 1st millennium BCE at sites in southern Cameroon as well as in the southern forest zone in the Democratic Republic of Congo (de Maret 1990; Mbida et al. 2000). The hypothesis of the development of arboriculture during the Holocene in West and Central Africa has thus been put forward by several authors (Lavachéry 2001; Oslisly & White 2007; Logan & d'Andrea 2012), but the presence and increase of fruit trees in archaeological records could also result from the intensification of wild tree exploitation in a degraded and semi-open environment (Neumann et al. 2012a).

In forest-savannah mosaic zones, mixed systems also appeared during the Late Holocene, with the example of the joint production of pearl millet and legumes like the *Vigna unguiculata* (cowpea) combined with the exploitation of oil-producing fruit trees (oil palm, incense tree). This type of mixed economy is demonstrated at the beginning of the Iron Age during the 1st millennium BCE in the Lake Chad Basin and in central Nigeria but could have been established since the 2nd millennium BC in central Ghana (Kahlheber et al. 2009a; Watson 2010; Logan & D'Andrea 2012).

Finally, the hypothesis of the early cultivation of bananas in Central Africa remains controversial. In fact, banana phytolites (*Musa* sp.) were identified in southern Cameroon at the Nkang site, dated to the 1st millennium BCE, in an economic context of production with the presence of domestic animals (Mbida et al. 2000). Originating from South and Southeast Asia, the banana was introduced by humans in Africa in an already domesticated form, and its presence at Nkang has been interpreted as proof of the early existence of agricultural systems in forested zones, which could be the cause for the increase of villages that was documented for the same period (Mbida et al. 2000). However, the attribution of phytolites in Nkang to *Musa* and not to *Ensete*, a genre of the banana family which appeared independently in Africa, does not take into account recent criteria for morphological differentiation, and the chronological and environmental context of the site could additionally indicate the unfavorable conditions for the farming of *Musa* (Neumann & Hildebrand 2009). The issue remains unresolved and requires the acquisition of more data.

Emergence of Food Production and Population: A General Scenario

Climatic Changes and Migrations in the Sahara-Sahel in the Third Millennium BCE

Between 4000 and 3000 BCE, the end of the humid period of the Early/Middle Holocene marked the beginning of a long-term trend of aridity. Between 3000 and 2500 BCE, pastoral populations reached the Sahel in West Africa from the east and central Sahara (Jousse 2004; Kuper & Kröpelin 2006). The opening of the landscapes in the Sahelian belt indicates a southward shift toward the vegetation zones during the same period. Pastoralist groups who progressively settled in the south of the Sahara seem to originate from several distinct cultural contexts but share common origins in the central Sahara; some among them may be linked to the origins of agriculture (Fig. 2). Pastoralists thus reached the Niger Bend from the large massifs of the Sahara, probably from the north of Mali and Niger as well as the south of Algeria. It is possible

that some populations originating from the Sahara reached the Sahel zone much earlier, without in this case propagating livestock (Ozainne 2013).

The second half of the third century BCE was characterized by important environmental changes south of the Sahara, where general climatic degradation resulted in a gradual desiccation of the landscapes. The Sahelo-sudanian belt strip is thus affected by the arrival of cultural traits clearly indicating Saharan origins, including wide-mouthed pottery, often hemispherical, as well as decorations made with single or pivoting comb impressions. In Dogon Country (Mali), the Ounjougou site complex also shows the presence of ceramics between 2600 and 2200 BCE, indicating links with northeast Mali, southwest Niger, and central Sahara in general (Figs. 1 and 2). It is likely that, from this period, the Dogon Country was occasionally visited by groups of pastoralists during seasonal transhumance or in the context of reconnaissance of new territories (Ozainne 2013). Generally, in Sahelo-Sudanian West Africa, we find several examples of cultural traits of the Sahara on Late Holocene sites. This is the case, for example, for some pottery at the site of Pentenga in southwest Burkina Faso (Frank et al. 2001), as well as the lithic industry (geometric microliths and chisels) and ceramics (wavy decorations or pivoting impressions) in the Neolithic of the Cap-Vert peninsula in Senegal (Huysecom 1990; Thiam 2010). The phenomenon of shell middens, which mainly concerns the Mauritanian coast during the Middle and Late Holocene, appears on the Senegal River delta at the Khant sites, from the 4th millennium BCE (Thiam 2010). On the coast of the Guinea Gulf, in Ivory Coast, shell middens would more likely appear around the 2nd millennium BCE (Chenorkian 1983) (Figs. 1 and 2).

Between 2500 and 2000 BCE, pastoralists arrived in Mauritania, whereas the Inner Niger Delta in Mali, still too humid, certainly remained adverse to the presence of livestock. The expansion of livestock in the Sudanian zone was rapid, and pastoralists already reached the center of Ghana around 2000 BCE (Gautier & Van Neer 2005). This early southern penetration of pastoralism could explain the presence within the Kintampo tradition (Ghana) of cultural traits of Saharan origin since the end of the 3rd millennium BCE, particularly bifacial armatures or pivoted comb decorations on ceramics (Stahl 1994; Watson 2010). This Saharan heritage is, however, included within the development of a cultural ambiance which seems proper to the Sudanian and Sudano-guinean zone, asserting itself from the end of the 3rd millennium BCE (Figs. 1 and 2).

Pearl millet cultivation, which had been known from 2500 BCE at Karkarichinkat in the Lower Tilemsi Valley (Mali) (Manning et al. 2011), expanded rapidly in the Sahelo-sudanian belt from around 2000 BCE. The spread of agriculture seems linked to the development of a new "Sahelian" cultural trend, essentially characterized by the presence of pottery with a reduced opening, with simple or everted rims, and decorations of fibre roulette impressions (Ozainne 2013) (Fig. 2).

In the grasslands of western Cameroon, the "Stone to Metal Age 2" of the Shum Laka site, which ends between 2400 and 2000 BCE, is characterized by an economy founded on hunting but also by the growing use of *Canarium schweinfurthii* seeds. Pottery associated with the SMA 2 of Shum Laka includes some Saharan attributes, particularly with decorations of pivoting impressions which were interpreted to reflect a progressive southward movement of ceramic technology from the Middle Holocene (Lavachéry 2001) (Fig. 2).

Expansion of Agriculture and Cultural Diffusions in the Second Millennium BCE

During the 2nd millennium BCE, sub-Saharan West Africa was characterized by a gradual trend toward aridification, which coincides with the beginning of the impact of agropastoral activities in the Sahelian and Sudanian environments (Ballouche & Neumann 1995). Between 2000 and 1500 BCE, agriculture progressed very quickly indeed in areas favorable to the presence of pearl millet, essentially along the Sudano-Sahelian belt as well as in some specific

environments of the southern fringe of the Sahara. The appearance of millet cultivators is then documented in southeastern Mauritania (Dhar Tichitt and Oualata, characterized by the occurrence of large resurgences of water), in eastern Mali (Ounjougou, Winde Koroji West), in northern Burkina Faso (Oursi Tin-Akof) but also further south at Birimi in northern Ghana (Kahlheber & Neumann 2007) (Figs. 1 and 2). In forest and forest-savannah mosaic environments of West Africa, other types of economies seem to have appeared in the same period, with notably the exploitation of oil palm (Logan & d'Andrea 2012). In Central Africa, the "Early Neolithic" in Gabon, dated between 2100 and 1700 BCE at the site of Okanda in the Ogooue valley, is characterized by the presence of pit dumps containing ceramics, but no precise data on the modes of subsistence are associated with them (Oslisly 1998) (Figs. 1 and 2). In the majority of sites of the 2nd millennium BCE, we additionally almost systematically find polished stone axes, which can be either imported or manufactured at sites relatively close to habitats, such as in central Ghana (Watson 2010).

By contrast, there are not necessarily systematic and exclusive associations between environmental contexts, types of economy, and cultural groups. The geographic distribution of the Kintampo tradition, principally represented in Ghana, is an excellent example as we find it in the savannah zone, the forest-savannah mosaic but also in the semi-deciduous forest during the entire first half of the 2nd millennium BCE (Stahl 1994; Watson 2010). In the north of Ghana, the Kintampo tradition is clearly associated with pearl millet cultivation at the site of Birimi (Figs. 1 and 2). At the central and southern sites of the country, we more often observe economies based on herding and the exploitation of nondomestic plant resources, including oil palm, with only one isolated case of pearl millet known at Boase (Gautier & Van Neer 2005; Watson 2010; Logan & d'Andrea 2012). These economic variants within the same cultural tradition could be explained either by the adoption of agriculture by a local culture or, in contrast, by the adaptation to the ecological potential of the forest of populations which have migrated from the Sahel (Watson 2010). Additionally, in central Ghana, the Kintampo tradition overlaps partially in time and space with another cultural entity named "Punpun," associated with a different material culture and type of economy. The overlapping at the same sites of these two cultures, differentiated by very distinct technical and stylistic characteristics of ceramics, was first interpreted as the succession of two populations, then as a local change in lifestyle, the Kintampo culture marking a local economic and cultural evolution with the transition to an economy of production (Stahl 1994). It was also explained as a social frontier between two contemporary groups, one of hunter-gatherers (Punpun) and the other of agro-pastoralists originating from the Sahel (Watson 2010). More generally, we observe a cultural ambiance proper to the Sudano-Guinean zone during the first half of the 2nd millennium BCE, for instance represented at the Kintampo sites in Ghana or Iwo Eleru in Nigeria (Shaw & Daniels 1984; Stahl 1994; Watson 2010) (Figs. 1 and 2).

During the first half of the second century BCE, a coherent cultural tradition seems to have also developed between Sierra Leone (Yengema, Kamabai) and Liberia (Sopie), concerning in all likelihood Guinea and southwest Mali (Kourounkorokale) and corresponding partially with the "Guinea Neolithic" described in the literature before 1970 (Ozainne 2013).

Between 1500 and 1000 BCE, agriculture continued its progression toward the east and southeast along the Sahelo-sudanian belt and appeared in the southern Lake Chad basin (Gajiganna culture) from 1200 BCE (Figs. 1 and 2). Archaeological data attributed to the same chronological interval suggests the establishment of an important Sahelo-sudanian cultural current between Mauritania and the basin of Lake Chad. This phenomenon is well recorded at the sites southeast of Mauritania (Dhar Tichitt and Oualata), Méma (Kobadi), Gourma (Windé Koroji), and Dogon Country (Ounjougou) in Mali, southwest Niger (Kirkissoy), and northeast Nigeria (Kursakata). It is characterized notably by the rapid eastward progression of ceramic

traditions with fibre roulette decorations (Figs. 1 and 2). This axis to be related to migrations and/or cultural diffusion developing along the Sahelo-sudanian belt during the 2nd millennium BCE and also in all likelihood to the rapid expansion of agriculture in the savannah environments (Ozainne 2013). The rapidity of this phenomenon was certainly enhanced by mobile seasonal lifestyles based on animal husbandry, in which pearl millet cultivation was probably first integrated as a secondary livelihood (Kahlheber & Neumann 2007). This schema thus implies a border effect more or less in line with forest environments, where other resources were exploited. The existence of mixed economic systems at the forest-savannah boundaries, but also of homogenous cultural traditions occupying several climatic zones, is nonetheless not excluded, as is demonstrated by the specificities of the Kintampo tradition in Ghana.

In Central Africa, the end of the 2nd millennium BCE corresponds with the beginning of the Late Neolithic (or the last period of the SMA, the Stone to Metal Age) which developed especially during the 1st millennium BCE with the progressive expansion of village communities in forestry zones. These Late Neolihtic sites are characterized above all by the presence of numerous pit dumps (Clist 2005; Oslisly & White 2007) (Figs. 1 and 2).

Climatic Changes and Socio- Economic Transitions of the First Millennium BCE

During the 1st millennium BCE, drier climatic conditions were recorded in sub-Saharan Africa, and several regions in the Sahel faced decreasing occupations from 800 BCE, possibly reflecting an increase in the mobility of populations (Breunig & Neumann 2002). Between 800 and 400 BCE, the opening of landscapes following climatic changes enabled agriculture to spread in more southern zones. Previously flooded areas southeast of Lake Chad (Kursakata, Mege) were occupied by pearl millet cultivators from the beginning of the 1st millennium BCE (Kahlheber & Neumann 2007). In central Nigeria, sites from the beginning of the Iron Age (Ungwar Kura) are associated between 800 and 400 BCE with a mixed economic system combining pearl millet and "cowpea" and the exploitation of wild oily fruit trees in mosaic forest/savannah woodlands (Kahlheber et al. 2009a) (Figs. 1 and 2). Westward, the appearance of pearl millet occured later from around 800 BCE in the Middle Senegal Valley (Walalde) in an Iron Age context (Deme & McIntosh 2006).

During this period we observe the persistence of cultural currents on an east–west axis along the Sahelo-sudanian belt, and roulette decorated ceramics appeared from the end of the 2nd millennium BCE in southeast of Lake Chad Basin and in northern Cameroon (Livingstone Smith 2007). On this same axis, an inverse phenomenon could also be involved, with the appearance in southwest Niger (Kirkissoy) and in Dogon Country in eastern Mali (Nin-Bèrè 3) of some ceramic features (carinated containers, decorative geometric motifs) previously documented in northeast Nigeria (Gajiganna) between the end of the 2nd millennium and the middle of the 1st millennium BCE (Vernet 1996; Breunig & Neumann 2002; Ozainne 2013) (Figs. 1 and 2). This cultural countercurrent in the Sudano-Sahelian zone, however, is documented only by a small number of archaeological sites and needs to be confirmed. A new wave of migration from eastern central Sahara may also have occured at the beginning of the first millennium BCE (Ozainne 2013).

In West Africa, the 1st millennium BCE is also generally regarded as a period of transition between the Neolithic and Iron Age, often characterized by the emergence of new cultural and technical specifications within contexts that are still essentially Neolithic. The final centuries before our era, however, are often marked by an important cultural and economic disruption, some Neolithic heritage being likely to survive within the early traditions of the Iron Age. Contemporary to the beginning of rice cultivation and the presages of urbanization in the Inner Niger Delta in Mali (Dia and Djenné-Jeno), the Faïta ceramic tradition is linked, for example, with the Neolithic of Dhar Tichitt, Oualata and Nema (Bedaux et al. 2005; McIntosh & McIntosh 1980; MacDonald 2011) (Figs. 1 and 2). Sahelian cultures from the Neolithic to Iron Age transition

also appear to be characterized by rarer and more rudimentary lithic industries (Vernet 1996).

In Central Africa, we observe during the second half of the 1st millennium BCE an important rainforest disturbance, that can be attributed to increasing aridity and/or stronger seasonality (Neumann et al. 2012b). It is in this context that the presence of domestic millet is attested at the sites of Bwambé-Sommet and Abang Minko'o in southern Cameroon (Eggert et al. 2006; Neumann et al. 2012a). The opening of the forest landscape also promoted the use of oil palm and/or incense tree in the same region; the exploitation of nut trees is also attested in many other locations in Central Africa in the same period, e.g. in Gabon (Otoumbi) but also in the southwestern Congo (Tchissanga) and the Democratic Republic of Congo (Sakuzi, Ngovo) (Figs. 1 and 2).

From the end of the 2nd millennium BCE, the opening of landscapes also facilitated the dissemination of village communities southward through the forest areas of Central Africa, where many sites of the 1st millennium BCE are characterized by habitats often associated with sets of pit dumps containing charred remains and ceramics (Abang Minko'o, Obobogo, Okala). Comparable sites are also known in the south of humid forests in the southwest Democratic Republic of Congo (Sakuzi) (de Maret 1990; Clist 2005; Eggert et al. 2006; Oslisly & White 2007) (Figs. 1 and 2). During the first half of the 1st millennium BCE, the presence in Gabon (Okala, Epona) of one or many ceramic traditions characterized particularly by bilobed vases and incised or pivoting comb decorations illustrating the advance of neolithic groups through the forest, along the coast and the valley of the Ogowe but perhaps also following the ridge lines from southern Cameroon (Clist 2005; Oslisly & White 2007) (Figs. 1 and 2). The sites dated from the second half of the 1st millennium BCE then demonstrate a rapid transition between the Neolithic and the Iron Age in Central Africa. As in West Africa, this period seems to be also characterized by a decrease or loss of lithic industries, perhaps associated with the beginnings of iron tools, whose arrival, however, did not eradicate the polished stone axes (Clist 2005).

Generally speaking, it seems that the ceramic traditions at the end of the Neolithic and the beginning of the Iron Age in Central Africa integrate multiple sources including at once elements from Saharan traditions, such as pivoting imprint decorations, but also cultural groups that develop south of Lake Chad from the 2nd millennium BCE, particularly characterized by geometric designs, incisions, and carinated containers. Rouletted decorations appeared in northern Cameroon around the beginning of the 1st millennium BCE within the context of major savannah cultural trends initiated during the 2nd millennium BCE. This decoration technique however affected only marginally forest areas of Central Africa and spread to the east and the Great Lakes region along the forest boundaries (Livingstone Smith 2007).

More arid climatic conditions and the opening of landscapes in the 1st millennium BCE thus appear to have resulted in a coherent sequence of cultural and economic events. In the Sahelo-sudanian belt, we observe an increased mobility of populations in some environments but also an intensification of occupations in other environments, with notably the appearance of large settlement mounds and even fortified sites in areas previously flooded such as in the Inner Niger Delta in Mali (Dia and Jenne-Jeno) or the southern Lake Chad Basin (Daima, Zilum) (McIntosh & McIntosh 1980; Connah 1981; Breunig & Neumann 2002; Bedeaux et al. 2005; Magnavita et al. 2006) (Figs. 1 and 2). In the savannah environments, the first millennium BCE appears thus to be a period of social and economic transition, after which agricultural practices have become more extensive. After 500 BCE, the disturbance of forest areas in Central Africa coincides chronologically with the establishment of populations practicing millet cultivation as well as breeding small livestock and exploiting oil palm or incense tree. Finally, the appearance of iron is documented in most parts of West and Central Africa during the same period.

Conclusion

We may retain a general definition of the major cultural and economic changes in the Holocene in

West and Central Africa according to a schema divided into three main stages. Firstly, from the Early Holocene, populations developed techniques of ceramic production within the confines of the Saharan and Sahelian zones, in the context of a rational exploitation of wild plants including the use of ground material, thus constituting a "proto-producer" period, sometimes called "Early Neolithic." The presence of ceramic and incense tree remains has moreover been signaled since the Middle Holocene in southern Cameroon. Secondly, during the Late Holocene, we observe the development of a "Low-level production Neolithic," characterized by a still partially mobile lifestyle, in which herding was very important and agriculture played mainly a complementary role, as well as the exploitation of wild plant resources. This sub-Saharan Neolithic (called "Later Stone Age," "Final Stone Age," or even "Stone to Metal Age" according to the region and the researchers) begins around the middle of the 3rd millennium BCE with the arrival of the first farmers and then the rapid development of pearl millet cultivation in the Sahelo-sudanian zone. From the end of the 3rd millennium to the beginning of the 1st millennium BCE, West and Central Africa thus present a mosaic of economic systems within which agriculture remains a secondary component. Thirdly, the 1st millennium BCE was characterized by the appearance of new domestic species and the development of large and more sedentary communities at the beginning of the Iron Age in the savannah zones. From this period of socio-economic transition, agricultural practices changed and became gradually more extensive during the first half of the 1st millennium CE.

The arrival of pastoralists south of the Sahara and then the emergence and diffusion of agriculture thus constitutes a set of events which are articulated in a consistent manner over time and space, and seem to be attached to a number of demographic and cultural phenomena, all suggestive of a "Neolithization-like" process. We first observe a general dynamic of north–south migrations coinciding with climatic and environmental changes at the beginning of the Late Neolithic. In the 3rd millennium BCE, the arrival of pastoralism in the Sahel is in fact linked to Saharan ceramic traditions, although the first cultivators seem to have initiated new cultural currents proper to the Sahel, clearly drawing their origin from the Saharan world. The period of the 2nd millennium BCE is characterized rather by a process of migrations and acculturations on a general east–west bidirectional axis, coinciding at least in part with the expansion of agriculture along the savannah zones and accentuated by partially mobile lifestyles still strongly influenced by pastoralism. To the south, forest environments probably induced an economic and cultural border effect likely to support the emergence of intermediary systems in the savannha-forest transition zones, either by the adaptation of cultivators or by the adoption of pearl millet cultivation by local populations. From the 2nd millennium BCE, the agriculture frontline progressively shifted south. Then, around the middle of the 1st millennium BCE, an important climatic threshold caused new migration from the Sahara to the Sahel as well as an opening of the rainforest of Central Africa. This latter event temporarily allowed the cultivation of pearl millet at very low latitudes and enhanced the growth of village communities in forest environments.

It remains difficult to identify possible cultural interactions between early farmers and hunter-gatherer societies having already acquired pottery, since ceramic remains prior to the 2nd millennium BCE are very rare south of the Sahara. It is likely that populations living in more closed environments in southern zones during the Middle Holocene implemented economic systems requiring a lesser use of pottery than those developed by groups exploiting wild grasses in the Sahelo-sudanian belt, thus leaving behind only a small archaeological footprint. The rare examples of pottery in the sub-Saharan area during the Middle Holocene, moreover, often evoke the Saharan world and could represent the reconnaissance and gradual occupation of the southern regions by northern populations, occurring in parallel with the contemporary environmental changes.

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Cross-References

- ▶ Jenne-Jeno, Archaeology of
- ▶ Nkang: Early Evidence for Banana Cultivation on the African Continent
- ▶ Ounjougou Site Complex, Archaeology of the

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West and Central Asia: Early *Homo* Fossil Records

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Introduction

West and Central Asia is an enormous territory that extends from the Mediterranean to the Hindu Kush and Pamir Mountains and from the Indian Ocean to the southern edge of Siberia (Fig. 1). West Asia comprises the Arabian Peninsula, the Levant (Israel, Lebanon, western Jordan, and western Syria), Turkey, Iraq, and Iran. Some but not all researchers would also include the countries of the Caucasus – Armenia, Azerbaijan, and Georgia. Central Asia consists of the "Five Stans" of Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, as well as northern Afghanistan. West and Central Asia vary enormously in their climate and relief. Climatically, they lie west of the Indian summer monsoon (apart from the Yemeni Mountains) and are thus areas of winter/spring rainfall, most of which is delivered by westerly winds from the Mediterranean. The Mediterranean coast and hinterland of the Levant and Turkey have the highest rainfall and mildest winters. Most of the Arabian Peninsula, the interior of West Asia (Jordan, eastern Syria, Iraq, and the Iranian Plateau), and much of Central Asia are now desert, and aridity is the key climatic variable. Rainfall varies from c. 600 mm along parts of the Levantine coast to annual averages (over 30–40 years) of <100 mm

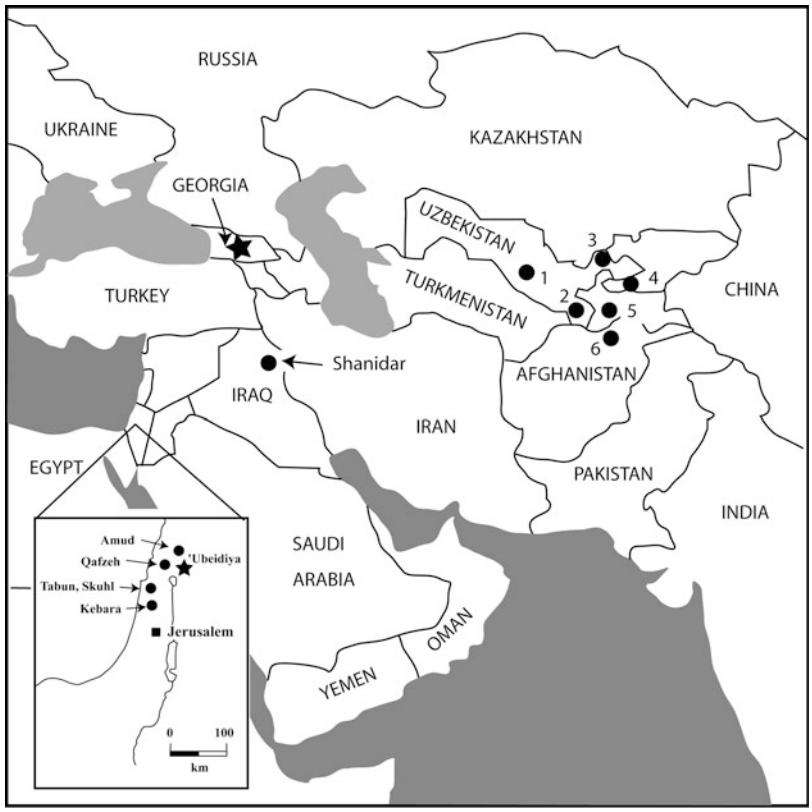

West and Central Asia: Early *Homo* Fossil Records, Fig. 1 Principal sites with hominin remains in West and Central Asia

in the deserts of the Negev, southern Israel, much of Arabia, the Iranian Plateau, and Central Asia. Consequently, it is likely that the core areas of hominin residence would have been in those areas such as the Levant, western Turkey, and the Caucasus where rainfall was highest.

Rainfall can vary enormously from year to year, so that annual averages are not particularly useful climatic indicators, particularly in desert regions, even when evaporation rates are also taken into account. Annual temperatures vary enormously, with some areas such as Arabia and Iran routinely experiencing daytime summer temperatures of >40 °C but cool (and generally frost-free) winters. Other areas, notably eastern Turkey, the Caucasus, parts of the Zagros Mountains, and Central Asia, have slightly cooler (but nevertheless still hot) summers but very cold winters, with temperatures sometimes below −20 °C and deep snow.

In terms of relief, West Asia contains the Dead Sea Valley (400 m below sea level) and mountains (mainly extinct volcanoes) over 5,000 m high in eastern Turkey (Mt. Ararat, 5,165 m), the Caucasus (El'brus, 5,642 m), and northern Iran (Mt. Demavend, 5,604 m). The Zagros Mountains are a major mountain chain over 1,500 km long along western Iran with peaks over 4,000 m that divides the lowlands of Mesopotamia from the Iranian Plateau, which has an average altitude of 1,000 m. Apart from the Tigris-Euphrates river system of Iraq, Syria, and Turkey, the Orontes in Syria, and the Oxus in Central Asia, Southwest and Central Asia have few large perennial rivers. This is especially true of Arabia, which now has none, and Iran, which has only one, the Qara Su, which flows through the Zagros Mountains into the Euphrates. Availability of perennial water would thus have been a major constraint on early hominins throughout West and Central Asia. In areas away from major rivers, the main water supplies would have been lakes and springs, especially along some mountain ranges. Most of the evidence for Early

Pleistocene hominins in Southwest Asia comes from the edges of extinct lakes and streams.

Climatic History

The Pleistocene climate of West and Central Asia experienced numerous small-scale fluctuations in the Early Pleistocene (2.4–0.8 Ma) between warm, moist periods and cooler, drier ones, with an average duration of 30–40 ka. Around a million years ago, there was a shift to more severe fluctuations on an average cycle of c. 100,000 years, with longer and much cooler periods (= glaciations) punctuated by shorter warm and moist (= interglacial) periods. Since 600 ka, there have been four particularly long and severe periods when temperatures and rainfall were considerably lower than today. Throughout the Pleistocene, hominin settlement was likely centered in areas with higher rainfall and dependable supplies of water (notably the Levant) such as perennial rivers, lakes, and springs, and the most arid parts were probably uninhabited or only sparsely settled. In cold and dry periods, much of inland Western and Central Asia was probably uninhabited.

Role as a Crossroads and Corridor

Neither West nor Central Asia was a closed system that had no links to neighboring regions. The Levant in particular is often envisaged as a corridor that linked – when conditions were favorable –West Asia with Africa, Europe, and continental Asia. Western Turkey was likely the main corridor between Europe and Asia. The Arabian Peninsula was probably also a major corridor between Africa and Asia via the Sinai Peninsula at the head of the Red Sea, the 1,000 mile (1,600 km) coastline of the Red Sea, and the Bab al Mandab strait at its southern end. Central Asia is another open system, with potential links with North China to the east, and India and Pakistan to the southeast via Afghanistan.

Historical Background

Paleoanthropological research in West and Central Asia has been very piecemeal and low-key for the most part, and many parts remain very poorly known. The longest and heaviest concentration of research has been in Israel. The British were very active before 1939 in what was then the British Mandate of Palestine, and Dorothy Garrod from Cambridge, UK, undertook a major series of excavations of caves such as Tabun and Skuhl. Since 1948, Israeli archaeologists have been extremely active, as have American teams, and the literature on the Paleolithic of West Asia is dominated by that on evidence from Israel. Much less research has taken place in the rest of West Asia: state-sponsored research is often overshadowed by the need to invest scarce resources on later historic sites and monuments, and major Paleolithic sites have often been excavated by foreign teams operating under license – Ralph Solecki's excavation over several seasons at Shanidar Cave, Iraq, is one obvious example. In Central Asia, some paleoanthropological research occurred in Soviet times, such as Okladinov's excavation of the Neanderthal child's skeleton at Teschik Tasch. This tradition continued after 1989, and the late Andrei Dodonov and Vadim Ranov jointly conducted outstanding investigations of the Paleolithic and climatic record of Tajikistan. Paleoanthropological research in other countries formerly within the Soviet Union has prospered since 1989. Georgia is an outstanding example, with the 1.8 Ma evidence from Dmanisi – fortuitously found beneath a medieval castle – one of the most important discoveries in paleoanthropology from the past 100 years. At present, there are outstanding prospects for Paleolithic and paleoanthropological research across most of West and Central Asia: when so little is known, there is so much still to learn.

Key Issues/Current Debates

The Fossil Evidence for Homo in West and Central Asia

West Asia has an exceptional fossil record for our genus for the Early Pleistocene, 1.8 Ma ago (see Dennell 2009), and for Neanderthals and our species in the last 150,000 years. Sadly, there is

a major gap in the fossil record between these two time lines. Central Asia has very little fossil evidence for our genus and only from the last 100,000 years. The earliest and most informative evidence for our genus outside Africa comes from Dmanisi, Georgia; there is also a small amount from 'Ubeidiya, Israel.

Dmanisi

The paleontological site of Dmanisi lies directly underneath a medieval castle, and over a basalt laid down c. 1.8 Ma, during the Olduvai Subchron of normal magnetic polarity. The lowest deposits (unit A) over the basalt contain artifacts, fossils, and stone artifacts. Paleomagnetic analysis shows that this unit has a normal polarity and was formed during the Olduvai Subchron, c. 1.77–1.95 Ma. Shortly after 1.77 Ma, the top of unit A was eroded, and a series of cavities developed inside it. The sediments inside these cavities have a reversed polarity and were thus formed after 1.77 Ma. These cavities contain most of the non-hominin fossils and artifacts and two hominin crania (D2280 and D2282) that came from the same level as the mandible D211 that was found in 1991. Overlying unit A and the cavities, there is an abrupt erosional layer along the base of some stream channels that cut into unit A and then filled with sands and gravels (unit B1). These channels contain artifacts, a toothless hominin cranium (D3444) (Lordkipanidze et al. 2006), and a mandible (D3900). Unit B1 is covered by an archaeologically sterile layer of sand (unit B2) with reversed polarity, i.e., <1.77 Ma. The entire fossil hominin and associated stone tools date from and shortly after the Olduvai Subchron and are thus c. 1.75–1.8 Ma.

The hominin remains found so far comprise four published crania, three mandibles, the partial skeleton of an adolescent associated with skull D2700/D2735, and the postcranial remains of one large and two small adults. The crania are very small brained: 775 cc^3 for D2880, 650 cc^3 for D2282, c. 625 cc^3 for D3444, and only 600 cc^3 for D2700, which was associated with mandible D2735 in layer B1. D2700 was from a subadult, probably male, whose head was likely at or near its fully adult size. The classification of these remains has proved problematic. There is general agreement that they represent a very early form of our genus, with affinities to the East African *H. habilis* and *H. rudolfensis* that dispersed out of Africa between 2 Ma and 1.8 Ma (Gabunia et al. 2000). The crania have been classified as the earliest form yet found of *H. erectus*, including those from Africa (a.k.a. *H. ergaster*). Indeed, some researchers have suggested that they may even be ancestral to *H. erectus* in Africa – in other words, some of their descendants dispersed southwards into Africa (Rightmire, Lordkipanidze & Vekua 2006). The mandibles, however, tell a different story at present. Following the discovery of a robust mandible D2600, a new taxon, *H. georgicus*, was proposed (Lumley & Lordkipanidze 2006). More evidence is needed before we can choose between *H. georgicus* and a primitive form of *H. erectus* or determine whether two populations are present.

The postcranial evidence offers some fascinating insights into the anatomy of the earliest-known Asians (Lordkipandize et al. 2007). It shows that these individuals were small, with an estimated height of only 144.9–166.2 cm and a weight of 40–50 kg. These figures overlap with those for australopithecines (110.0–151.00 cm; 29–49 kg), earliest *Homo* (125.0–157.0 cm; 32–52 kg), and the 1.53 Ma skeleton of *H. ergaster* from Nariokotome (KNM WT 15000) (150.5–169.1 cm; 45.5–70.6 kg) but are generally intermediate between australopithecines and early *Homo*, on the one hand, and KNM WT 15000 and later hominins on the other. Their encephalization quotient (or EQ, the ratio of brain to body size) of 2.57–3.13 was also intermediate between early *Homo* (3.1) and KNM WT 15000 (2.71–3.78). Additionally, there was an absence of humeral torsion, meaning that their hands would have faced forward instead of hanging sideways, as with modern humans, and the foot was orientated more medially than in modern humans, despite its modern arched appearance.

As might be expected for such an early form of our genus, the stone tools are very simple and

show no evidence of standardization or core preparation, as the main objective of flaking appears to have been the production of a sharp-edged flake. The tools are most like Oldowan ones from East Africa that date back to 2.6 Ma, but because so few were retouched, they have been classified as "pre-Oldowan" to emphasize their technological simplicity (Lumley de et al. 2005). Nothing is yet known about their subsistence, although the fact that the individual D3444 survived without teeth implies either that soft foods were available or that he was fed altruistically by others who softened food for him by chewing it first.

'Ubeidiya

The lake-side site of 'Ubeidiya has a remarkable sequence of over 80 occupation levels that date to between 1.0 Ma and 1.4 Ma and contain numerous assemblages of Early Acheulean artifacts and fossil animal bones (Bar-Yosef & Goren-Inbar 1993). In the early excavations, four cranial fragments and two teeth were found that were assigned to *Homo erectus*, but the cranial fragments were probably intrusive. Recently, a hominin right lower incisor (UB 335), with the same type of fossilization as the other faunal material, was discovered in a faunal assemblage. This tooth could not be distinguished from comparable teeth in *Homo habilis*, *H. ergaster*, and *Homo erectus* and was assigned to *Homo* sp. indet. (Belmaker et al. 2002). On the grounds of its age and affinities to the incisors of KNM ER 15000 (the 1.5-Ma-old skeleton from Lake Turkana) and DM 211, Dmanisi, it could be classified as either *H. ergaster* or *H. georgicus*. As hominin incisors are not particularly useful for taxonomic identifications, it is hoped that more informative evidence will be forthcoming.

The Big Gap in the Fossil Record: 1.8 Ma to 200 ka

West Asia has been described as a "black hole of paleoanthropology" (Dennell 2009: 192) because of its lack of hominin fossil between the time of Dmanisi and the appearance of *Homo sapiens* c. 125 ka ago, despite its excellent archaeological record, particularly for the Levant. At around 800 ka, new types of Acheulean hand axes and cleavers similar to ones in Africa were used at the site of Gesher Benot Ya'aqov in Israel and may indicate an influx of new groups from Africa, but their identity and morphology are unknown. After c. 400 ka, the Acheulean is followed by a very different type of tool assemblage known as the Jabrudrian (makers unknown), and this in turn was replaced by Mousterian assemblages after c. 250 ka. In Central Asia, the earliest tool assemblages date from c. 900 ka; these were not Acheulean, but very small flakes, and were used with little change throughout the Middle Pleistocene. The identity of these earliest inhabitants of Central Asia is currently unknown.

Because almost nothing is known about the type of hominins that inhabited West Asia between the time of Dmanisi and c. 200 ka, or about Central Asia between 900 ka and the last glaciation (see Table 1), many major issues of human evolution are difficult to resolve, particularly the relationships the inhabitants of West and Central Asia may have had with Europe, Africa, and the rest of Asia. For example, the earliest European fossil evidence for our genus is a mandible from Atapuerca, Spain, that is classified as *Homo* of indeterminate species and dated to c. 1.2 Ma (Carbonell et al. 2008); its source population in West Asia is unknown. According to Krause et al. (2010), the ancestors of the Denisovans – a population currently known only from analysis of the ancient DNA of a 30–48 ka human bone from Denisova Cave, Siberia – may have entered Southwest Asia from Africa c. 1 Ma ago; an alternative view is that they originated in Asia (Martinon-Torres, Dennell & Bermúdez de Castro 2010). Either way, there is no relevant skeletal evidence from West Asia. Around 800,000 years ago, Atapuerca was inhabited by *H. antecessor* (Carbonell et al. 1995). Both these populations were probably immigrants from West Asia and descendants of the Dmanisi hominins, but there is no equivalent to *H. antecessor* in West Asia. After 600 ka, the resident hominin in Europe was *H. heidelbergensis*, which some researchers believe also inhabited sub-Saharan Africa and perhaps even China. The only relevant find from West Asia is

West and Central Asia: Early *Homo* Fossil Records, Table 1 Hominin remains from West and Central Asia 1.0 Ma to 200 ka

Site	Age	Hominin remains	Classification
Azych, Azerbaijan	Mid-Middle Pleistocene	Mandible	*H. heidelbergensis*
Sel'ungur, Kyrgzstan	Late Middle Pleistocene	10 teeth, humeral fragment	Neanderthal/non-hominin?
Kara'in III.2, Turkey	c. 200–250 ka	3 1st phalanges, 1 3rd phalange, left mandible fragment, cuboid, radius fragment	Neanderthal?
Kara'in, III.3	c. 300–350 ka	Two vertebrae, femoral diaphysis	
Zuttiyeh	c. 300 ka	Cranial	Various
Tabun E, Israel	c. 400 ka	Molar, femoral fragment	*Homo* sp. indet.
Koçabas¸ Turkey	Middle Pleistocene	Two cranial fragments	*H. erectus*
El Khowm, Syria	Middle Pleistocene	Cranial fragment	*H. erectus*

Sources: Dennell 2009; Glantz et al. (2008) (doubts over the Sel'ungir teeth); Kappelman et al. 2007 (Koçabas); Le Tensorer et al. 2006 (El Khowm)

a mandible from Azykh Cave, Azerbaijan, that dates from the mid-Middle Pleistocene and was identified as *H. heidelbergensis*. In Europe, the descendants of *H. heidelbergensis* evolved into Neanderthals, and several examples are known from before the Upper Pleistocene (125–10 ka), but not for certain in West Asia (see Dennell 2009). The cranial specimen from Zuttiyeh Cave, Israel, is probably c. 300 ka old, but there is no consensus over its identification (Sohn & Wolpoff 1993). Recent finds of cranial fragments from Koçabas, Turkey, and el Khown, Syria, have been identified as *H. erectus*, but in the absence of facial and mandibular evidence, this identification seems tenuous. Although West Asia was likely a major corridor for hominins migrating into Europe and eastwards to South and East Asia between 1 Ma and 200 ka, there is sadly almost no evidence of the hominin traffic that used it during this time.

Neanderthals and *H. sapiens*

The fossil hominin record of West Asia improves enormously for the last 150 ka. The evidence from the Levant is especially important for the large number of Neanderthal remains and also the earliest examples of *H. sapiens* outside Africa (see Table 2).

Early *Homo sapiens*

Two cave sites in Israel have produced unambiguous evidence of *H. sapiens* that is older than 70 ka (Shea 2003). The cave of Skuhl in Mount Carmel contained the remains of 16 individuals in levels B1 and B2 which have been dated by ESR and TL to between c. 80 ka and 100 ka. The cave of Qafzeh has also produced evidence of 16 individuals, both on the terrace in front of the cave and from levels XVI to XXI inside. These are dated from between 80 ka and 120 ka by ESR and TL techniques. The evidence from these two sites implies that *H. sapiens* dispersed from Africa in the last interglacial (c. 125–115 ka), during a very warm and moist interval when the corridors between the Levant and Africa were open. If so, they left Africa scores of millennia after their first appearance in Africa, where the earliest from Ethiopia are c. 190–160 ka and, in North Africa, 160 ka.

There is also some potentially important but ambiguous evidence from the cave of Tabun, Israel, which lies immediately adjacent to Skuhl and has the most important and best-dated sequence of Middle Paleolithic stone tool assemblages in Southwest Asia. Two hominin finds are particularly important. The first (Tabun I) is a skeleton that was initially thought to have come from layer C but more likely was an intrusive burial from layer B, dated by ESR to 122 ± 16 ka, and the second (Tabun II) is a mandible from layer C, which has been dated to 140 ± 21 ka (ESR) and 165 ± 16 (TL, on burnt flint). Both the mandible and skeleton have been identified as Neanderthal, but the mandible is

West and Central Asia: Early *Homo* Fossil Records, Table 2 Principal sites in the Levant with evidence of Neanderthals or early *H. sapiens*

Site	Skeletal evidence	Age (ka)
H. sapiens		
Qafzeh, levels XV–XXII	Two adults, five juveniles, several isolated teeth	96 ±13, 115 ± 15
Skuhl, level B	Seven adults, three juveniles	119 ± 18, 81 ± 13
Neanderthals		
Amud, level B	Two adults, four juveniles	65.5 ± 3.5
Kebara, levels VII–XII	Infant skeleton (KH1); one partial skeleton (KH2), isolated bones	55–65
Dederiyeh, Level 11	Two juveniles	
Shukbah, level D	Tooth, cranial fragments, two distal femorae, astragalus	
Tabun, level B/C	Adult female skeleton	76 ± 14, 122 ± 16
Indeterminate		
Tabun C	Adult mandible	140 ± 21, 165 + 16

Source: Shea, 2003. Note that for Tabun, there are several suites of dates, and only a few are shown here. Further details can be found in Shea (2003, Table III) and Dennell (2009, Table 8.2). Dederiyeh is in Syria; all other sites shown are in Israel

unfortunately taxonomically ambiguous as some have identified it as *H. sapiens* and others as Neanderthal. The Tabun II specimen is thus either an early Neanderthal or the earliest example of *H. sapiens* from outside Africa (or perhaps a hybrid, or a descendant of an indigenous, and currently undocumented, population). If the Tabun II mandible is regarded as that of a Neanderthal, it implies that Neanderthals were resident in the Levant before the last interglacial and also made the Mousterian assemblages before the appearance of *H. sapiens*. If, on the other hand, the mandible is that of *H. sapiens*, it implies that it left Africa before the last interglacial and used Mousterian assemblages.

Neanderthals

If we exclude for the moment the Tabun II mandible, all Neanderthal finds from the Levant are younger than 70 ka (see Table 2). Many of these were deliberate burials. In level B of Amud Cave, Israel, a Neanderthal skeleton and other remains have been dated by TL and U-series to c. 60–70 ka old, and at Kebara Cave, Israel, parts of a juvenile (Kebara I) were found in level F (later subdivided into units VI–XIII), and in later excavations, most of the postcranial skeleton of an adult male (Kebara II). These remains are dated to between 55 ka and 65 ka by ESR and TL. On current evidence, Neanderthals persisted in the Levant until 40–50 ka, when they are replaced, this time permanently, by *H. sapiens*.

Neanderthals are also widely distributed across West and Central Asia in the Upper Pleistocene in marine isotope stages 3 and 4, c. 70–40 ka. One of the best known Neanderthal sites in West Asia is the cave of Shanidar, northern Iraq, where numerous remains were found from c. 10 individuals in layer D. The youngest of these (Shanidar 1 and 5) lay above a charcoal sample that was radiocarbon dated to 46,990 ± 1,500 and 50,600 ± 3,000 BP. The oldest lie at depths beyond the range of radiocarbon carbon dating and may date from shortly after, or even before, the last interglacial. The Shanidar finds include a partial skeleton, Shanidar 1, which exhibited multiple trauma even more severe than that routinely seen in many Neanderthal skeletons (Trinkhaus & Zimmerman 1982). In Central Asia, the most important Neanderthal find is a child's skeleton from Teschik Tasch in Uzbekistan that was found in a late Mousterian context. For a long time, this was believed to be the most easterly example of a Neanderthal, but recently some examples have been found in the Lake Baikal area of Siberia, 1,500 km to the east, so Neanderthals had a very wide distribution during the last glaciation. Other evidence for Neanderthals in Central Asia has recently come to light. At Obi Rakhmat Grotto, Uzbekistan, six

permanent maxillary teeth and 121 cranial fragments (all probably from the same individual) have been found in level 16 associated with a Middle Paleolithic assemblage; the age of the hominin remains is c. 60–90 ka. At Anghilak Cave, also in Uzbekistan, a fragment of an adult fifth metatarsal (AH-1) was found in stratum IV, for which there are radiocarbon dates of 43,900 ± 2,000 and 38,100 ± 2,100 uncalibrated years BP (Glantz et al. 2008). There is also a recent find of a second deciduous incisor from the open-air site of Khudji, Tajikistan. This was found in horizon 8 in a late Middle Paleolithic context, dated by radiocarbon to c. 40 ka uncalibrated years BP (Trinkhaus et al. 2000). The only pertinent evidence from Afghanistan is a right temporal bone that was found in 1966 in a late Middle Paleolithic context at Darri-i-Kur, dated by radiocarbon to 30,000 BP, and identified as Neanderthal. In the Caucasus, there are numerous caves with Middle Paleolithic and Mousterian assemblages, and Neanderthal remains have been found at the caves of Mezmaiskaya, Barakaevskaya, and Monasheskaya (Golovanova & Doronichev 2003). The first of these contained the remains of an infant Neanderthal from layer 3, dated at ≥36 ka. Analysis of the ancient DNA from one of its ribs showed that Neanderthals were genetically different from ourselves (Ovchinnikov et al. 2000).

A prevalent interpretation of this evidence is that Neanderthals greatly expanded their range eastwards and southwards in the last glaciation. Their appearance in the Levant after 70 ka has been attributed to worsening conditions at higher latitudes that forced them further south. As conditions improved, so they were able to expand eastwards to the Zagros Mountains and thence into Central Asia. We should bear in mind, however, the virtual absence of fossil evidence from Central Asia before 70 ka, so their apparent expansion eastwards may reflect our ignorance of what happened before this time.

Later *H. sapiens* in West and Central Asia

There is disappointingly very little evidence for the earliest populations of *H. sapiens* that succeeded Neanderthals in West and Central Asia. The earliest skeletal evidence for our species in West Asia is the skull of an adolescent from the base of a long Aurignacian sequence at the cave site of Ksar Akil, Lebanon, dated to c. 40 ka. The changeover from Neanderthal to *H. sapiens* is likely to have been a complex process given the archaeological evidence for the replacement of Middle Paleolithic, Mousterian assemblages to Upper Paleolithic ones between 45 ka and 30 ka.

Future Directions

There are several obvious directions in which future research into human evolution in West and Central Asia could proceed. The most obvious need is to increase greatly the number of hominin specimens (particularly cranial and mandibular ones) for Central Asia before 30 ka and for West Asia between 1.75 Ma (the age of the Dmanisi specimens) and 150 ka (the age of the Tabun II mandible). At present, the fossil record for *Homo* in West and Central Asia is relevant to two separate themes: the earliest appearance of our genus c. 1.8 Ma ago outside Africa (as evidenced by the Dmanisi finds) and the earliest examples of *H. sapiens* outside Africa and their Neanderthal contemporaries in the last 100,000 years. These themes need to be linked to provide a record of what happened between these two events.

Six gaps are especially important to fill in West Asia: (1) the identification of the source population that first colonized Europe (on current evidence), c. 1.3–1.4 Ma; (2) the identification of the source population of *H. antecessor*, c. 1 Ma to 800 ka; (3) the identification of the African immigrants that introduced African types of cleavers and hand axes to the Levant, c. 800 ka (as evidenced at Gesher Benot Ya'aqov); (4) the identification of the source population of *H. heidelbergensis* that entered Europe after 600 ka; (5) to determine whether Neanderthals in West Asia developed indigenously or were immigrants; and (6) to determine

the type of hominin that inhabited the Levant before the last interglacial (i.e., in MIS 6 and 7). This is especially important because it affects the timing of when *H. sapiens* first left Africa: because the taxonomically ambiguous Tabun II mandible is the only specimen from the Levant between 125 ka and 200 ka and because the earliest examples of our species in East Africa date back to c. 190 ka, we need to establish whether the Levant was inhabited during MIS 6 by Neanderthals or *H. sapiens* (or both). The Central Asian fossil hominin record before 50 ka is so poor that any new material is welcome.

Another direction for future research is to establish the climatic context of hominin settlement. At present, very little of the archaeological and fossil hominin record of West Asia can be confidently linked to a specific type of climate. A useful beginning would be to establish whether hominins were present in warm, moist (interglacial) periods or cool, drier periods (=glaciations). One of the best examples in Asia of this type of linkage is from Tajikistan, where Paleolithic sites are consistently found in interglacial paleosols and not in glacial loess deposits (Ranov 1995): hominins were thus present in Tajikistan in warm periods, but not cold ones. As mentioned above, aridity was one of the key variables affecting Pleistocene human settlement in West and Central Asia, and the core, or long-term resident, populations were likely restricted to areas with dependable, year-round water, as these were the ones most likely to persist throughout cold, dry periods as well as moist, warm ones. Until we can establish the climatic context of hominin settlement, it is not possible to investigate how hominins responded to climatic and environmental changes, expanded or contracted their distribution, or colonized neighboring regions.

Future directions need also to include conceptual developments. One particularly relevant to investigations of Neanderthals and early *H. sapiens* in Asia is to move away from a rigid, dichotomized framework in which the Neanderthals and *H. sapiens* are mutually exclusive terms. One major justification for doing so is that one might expect a variable fossil record if populations repeatedly, under the changing conditions of the Pleistocene, expanded and contracted their distribution, overlapped and interacted with others, fused with others, or fragmented. Another justification is the recent evidence that Neanderthals and early *H. sapiens* interbred, with the result that all Eurasians contain some Neanderthal genes (Green et al. 2010). There is also, particularly in Central Asia, the currently unseen presence of the Denisovans (see above). If they were a sister species of Neanderthals, they will also need to be accommodated in assessments of fossil hominin specimens. Assuming that the Denisovans will be confirmed as a genetic reality, we may find that a simple binary choice between Neanderthals and *H. sapiens* is insufficient for correctly identifying Upper Pleistocene specimens and populations.

Finally, the expansion of *H. sapiens* into West and Central Asia needs to be envisaged as a process that involved several dispersal events, some of which may have been short term and thus failures. The early presence of *H. sapiens* in the Levant before 70 ka may be a good example of a failed dispersal event (Shea 2008), and its eventual expansion into Central Asia may well have involved several dispersal events as well as occasional contractions and extinctions. Likewise, Neanderthal population demography is also likely to have been complex under the highly variable conditions of MIS 6–3, 160–40 ka.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Dmanisi Hominins and Archaeology
- ▶ *Homo erectus*
- ▶ *Homo ergaster*
- ▶ *Homo habilis*
- ▶ *Homo heidelbergensis*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Neanderthals and Their Contemporaries
- ▶ Out-of-Africa Origins

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West Asia: Paleolithic

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Introduction

West Asia is a key locale for the investigation of Paleolithic human migration and adaptation because of the area's location at the crossroads between Africa and Eurasia as well as its diverse environmental settings. Geographic units in west Asia comprise the Levant, the Zagros and Taurus Mountains, Anatolia, the Caucasus, and the Arabian Peninsula. In the Levant, east Mediterranean coastal plains and the rift valley extending between the Red Sea and the Afrin Basin provided significant habitats and migration routes for early humans during the Paleolithic. To its east, inland areas of the Syrian Desert and the Jordanian Badia are presently under arid environments, but the inland basins, often associated with oases, such as el-Kowm, Palmyra, Azraq, and Jafr, used to hold Pleistocene lakes, around which prehistoric sites are clustered. The rugged terrains and cave systems in the Zagros–Taurus and the Caucasus Mountains have also been important fields for the study of early human habitations. In the Arabian Peninsula, a number of Paleolithic sites have been located in various environmental settings, including coastal plains, foothills of the Asir and Hadhramaut Mountains, as well as near wadis and lakeshores in interior plains.

Geographic connections between west Asia and surrounding regions are structured by water mass and mountain ridges (Fig. 1). One of the routes to Africa is through the northern Sinai between the Southern Levant and the Upper Nile area. Another is Bab el-Mandab between the Lower Awash River and the southwestern corner of the Arabian Peninsula. Land routes to northern areas are bounded by the Mediterranean Sea, Black Sea, and Caspian Sea, and the one between the latter two is truncated by the Caucasus Mountains. The landmass to South and Central Asia is the Iranian plateau flanked by rugged terrains of the southern Zagros Mountains along the Persian Gulf and the Alburz Mountains at the southern Caspian shore.

Definition

Early, Middle, and Late Pleistocene

In 2009, the International Union of Geological Sciences lowered the base of the Pleistocene epoch to include the Gelasian Stage that began c. 2.6 Ma. Thus, the former "Late Pliocene" corresponds to the current "Early Pleistocene." However, the stages for the Middle and Upper Pleistocene are unchanged with their beginnings at the Brunhes–Matuyama reversal and the last interglacial, respectively.

Hominin

The term "hominin" is used to denote human ancestors instead of the old term "hominid," which is currently used to mean ancestors of humans, chimpanzees, gorillas, and orangutans.

Historical Background

Investigations of some key Paleolithic sites in west Asia were initiated in the 1920s and 1930s, as exemplified by the excavations by Dorothy A.E. Garrod at Mt. Carmel and Southern Kurdistan, René Neuville at the Judean Desert, and Turville-Petre at the Galilee area and Kebara Cave. These early systematic excavations provided fundamental archaeological records for the definition of Paleolithic cultures and their chronological sequences. Initial influence from European prehistory on cultural names

West Asia: Paleolithic, Fig. 1 Map of west Asia showing sites mentioned in the text. The following site names are in alphabetical order and associated numbers correspond to those in the map: Abu Hureyra (63), Abu Noshra (70), Abu Sif (34), Ain al-Buhayra (48), Ain Difla (47), Ain Mallaha (10), Ain Qasiyya (36), Ain Rahub (18), Amud (15), Antelias (6), Azariq (42), Azraq (36), Azykh (56), Beidha (49), Berekhat Ram (9), Bezez (8), Bisitun (75), Boker (44), Boker Tachtit (44), C-Spring (36), Dawādmi (83), Dederiyeh (60), Dhofar (82), Dmanisi (55), Douara (66), Dursunlu (58), Ein Aqev (44), Ein Gev (16), el-Kowm (64), el-Wad (24), Emireh (15), Erq el-Ahmar (33), Eshkaft-e Gavi (79), Evron (11), Far'ah II (40), FAY-NE 1 (81), Fazael (31), Gar Arjeneh (78), Gesher Benot Ya'aqov (13), Gharmachi 1b (65), Hatoula (29), Hayonim (12), Holon (27), Humian (77), Hummal (64), Jayroud (5), Jerf Ajla (66), Jilat (39), Karain (59), Kebara (25), Keoue (1), Khallat Azana (35), Kharaheh IV (38), Ksar Akil (6), Kudaro I (53), Kunji (78), Lagama (67), Latamne (65), Lion Spring (36), Mar Gurgalan Sarab (76), Mureybet (62), Mushabi (68), Naamé (7), Nachcharini (3), Nadaouiyeh (64), Nahal Aqev (44), Nahal Ein Gev I (16), Nahal Oren (23), Nizzana (43), Ohalo II (17), Öküzini (59), Ortvala Klde (54), Palegawra (73), Pa Sangar (78), Qafzeh (21), Qesem (26), Quneitra (14), Ramat Matred (45), Raqefet (22), Ras el-Kelb (6), Rasfa (20), Revadim (30), Rosh Ein Mor (44), Rosh Horesha (46), Rosh Zin (44), Saaide (2), Saflulim (46), Salibiyah (32), Shanidar (71), Shekaft-i Ghad-i Barm-i Shur (80), Shukba (28), Shunera (41), Skhul (24), Tabaqa (48), Tabun (24), Tor Faraj (52), Tor Fawaz (52), Tor Hamar (69), Tor Sabiha (51), Tor Sadaf (48), Tor Sageer (48), 'Ubeidiya (17), Üçağizli (61), Umm el-Tlel (64), Umm Qatafa (33), Uwaynid (37), 'Uyun al-Hammam (19), Wadi Aghar (52), Wadi Fatimah (84), Wadi Hammeh (19), Wadi Judayid (51), Wadi Mataha (50), Warwasi (74), Yabrud (4), Yafteh (78), Yarimburgaz (57), Yutil al-Hasa (48), Zarzi (72), Zuttiyeh (15)

(e.g., Aurignacian, Levalloiso–Mousterian, and Tayacian) was subsequently modified into or replaced with locally defined cultural entities (e.g., Levantine Aurignacian, Ahmarian, Levantine Mousterian, and Yabrudian). While early investigators tended to focus on deep cultural deposits at caves in an effort to establish Paleolithic cultural sequences, subsequent surveys, and excavations of open-air sites in the inland areas, such as Negev, Sinai, Badia, and Syrian Desert, led to the recognition of greater diversity of Paleolithic entities as well as dynamic adaptation of prehistoric populations to various environments.

The progress and intensity of Paleolithic research in west Asia varies depending on geographic areas. The Levant has been most intensively studied since the 1920s, providing fundamental data sets for studying Paleolithic populations in west Asia. Although the Zagros region received early investigations from the 1920s to 1950s, subsequent fieldwork has been prevented by geopolitical instability. Renewed investigations of Paleolithic sites have recently increased in Anatolia, the Caucasus, southern Iran, and the Arabian Peninsula in relation to the study of early *Homo* species and *Homo sapiens* dispersals out of Africa.

Key Issues/Current Debates

Lower Paleolithic

Earliest Hominin Occupation in West Asia

Currently, the earliest evidence for human occupation in west Asia is known at Dmanisi, Georgia, in the southern Caucasus (e.g., Gabunia et al. 2001). Archaeological deposits at Dmanisi overlie the Masavera basalt that was dated to c. 1.8–2.0 Ma by $^{40}K/^{40}Ar$ and $^{40}Ar/^{39}Ar$ dating. This basalt and the lower archaeological layers (units A1 and A2) show normal polarity directions (the Olduvai Sub-chron), while the upper ones (units B1 and B2) have a reversed polarity (the Matuyama Chron). Well-preserved bone remains include four hominin crania, three mandibles, and a number of postcranial specimens. These hominin remains have been identified as the primitive form of *Homo erectus*/*ergaster* or placed in a new taxon named *Homo georgicus*. Rich faunal remains at Dmanisi include Early Pleistocene types mostly of Eurasian species and indicate grassland with some forest as the local environment. Chipped stone artifacts from the site primarily consist of unmodified flakes and chopping tools, and this lithic industry is called "Pre-Oldowan." These observations let researchers to consider that the first colonization of west Asia took place at the early stage in the evolution of genus *Homo* before the appearance of the handaxe technology or the Acheulian tradition. Some researchers also propose the possibility that *Homo erectus* originated in Asia and that some of them migrated into Africa.

Acheulian Tradition

Much of the Lower Paleolithic records in west Asia comprise Acheulian assemblages with a varying amount of bifaces, i.e., hand axes and cleavers (Fig. 2). A large number of Acheulian finds are reported in west Asia, and their accounts accumulated in the last decade particularly in

West Asia: Paleolithic, Fig. 2 Hand axes from the middle Euphrates region

Anatolia, the Caucasus (e.g., Azykh and Kudaro I), and the Arabian Peninsula (e.g., Wadi Fatimah and Dawādmi) in addition to the Levant. However, the number of sites with clear contexts and dates is limited. The dates are estimated by several different methods, including radiometric dating, paleomagnetic analysis, paleontological comparison, and the paleoenvironmental examination of marine and fluvial deposits. Researchers proposed several chronocultural entities within the Acheulian tradition, such as Early, Middle, Late, Late evolved, and Final Acheulian on the basis of technotypological attributes of bifaces (Bar-Yosef 1994).

The earliest assemblages with bifaces in west Asia are currently known from the Early Pleistocene lake deposits at ’Ubeidiya, Israel, located 3 km south to the Sea of Galilee. The site has numerous publications on the geological and sedimentological studies as well as lithic and faunal analyses. The comparison of fauna with those dated in the African and European sequences provided a date estimate (c. 1.4 Ma) of the site. Only a small portion of animal bones show cut marks, and recent sedimentological and faunal analyses suggest that archaeological remains at ‘Ubeidiya were deposited as a result of low energy fluvial processes rather than “living floors” at the lakeshore. The industry of chipped stone artifacts from ‘Ubeidiya has been identified as Early Acheulian or Developed Oldowan, characterized by core choppers, polyhedrons, spheroids, and crude bifaces that occur in varying frequencies in different layers. These tool types tend to differ from each other in the selection of raw materials: bifaces are often made from basalt, chopping tools, and polyhedrons from flint, and most spheroids from limestone.

The water-logged site of Gesher Benot Ya‘aqov (GBY), also located in the Jordan Valley, is dated to c. 0.7–0.8 Ma by paleomagnetic analyses, which show that lacustrine deposits with archaeological remains deposited over the Brunhes–Matuyama boundary. Lithic industry of GBY, designated as Acheulian, is characterized by the preferential use of basalt for bifaces, i.e., hand axes and cleavers, the blanks of which are frequently provided by the Kombewa technique. These technological features have been interpreted as evidence for a hominin dispersal from Africa. Both African and Levantine taxa constitute micromammalian remains. Notable is the recovery of an elephant skull from an archaeological horizon at level 1 in layer II-6. Whether this skull resulted from hunting, scavenging, or natural mechanisms has been investigated through a series of taphonomic studies. Well-preserved plant remains include fruit, seeds, bark, and wood, and the excavators suggest that numerous pitted stones from the site were used for cracking nuts. In addition, the use of fire at GBY has been suggested through taphonomic examination of burnt remains (Alperson-Afil & Goren-Inbar 2010).

The accounts of Latamne in the Orontes Valley and Joub Jannine II in the Beqqa Valleys often classify their lithic assemblages as Middle Acheulian or estimate their age to the Middle Pleistocene. In contrast to these Middle Acheulian sites that are clustered in the Mediterranean environmental zones, the Late Acheulian or late Lower Paleolithic sites are more widely distributed both in the Mediterranean areas (e.g., Holon, Tabun, Umm Qatafa, and Garmachi 1b) and at inland areas (e.g., Lion Spring, C-Spring, and the sites in the el-Kowm basin), suggesting the adaptation to drier settings or climatic amelioration during the Late Acheulian period.

The date of Berekhat Ram in the northern Golan Heights is broadly estimated as c. 230–780 ka, and its lithic assemblage is characterized by the high proportion of Levallois products and Upper Paleolithic tool types, i.e., end scrapers and burins, with few bifaces. The site is well known for the stone “figurine,” which has been accepted as an artificially modified object after rigorous examination by microscopes and experimental production.

Hominin fossils associated with Acheulian artifacts are very limited. A right lower incisor from ‘Ubeidiya has been broadly assigned to the genus *Homo*. At the site of Nadaouiyeh Aïn Askar in the el-Kowm basin, a fragment of left parietal bone was found in an Acheulian level

that is characterized by oval hand axes and estimated as 450 ka. The bone was classed as *Homo erectus*.

Technological Variability: Flake Assemblages and the Yabrudian Complex

Some Lower Paleolithic assemblages lack bifaces. Such examples include the sites of Evron Quarry, Bizat Ruhama, Tabun layer G, Hummal level 13–14, and some sites in the Orontes and Euphrates Valleys. These occurrences have been explained in several different ways. The first one regards them as representing separate cultural entities, naming them the Tayacian or the Khattabian. Another position is to see them as a response to limited availability of raw materials. In addition, insufficient sample size has been pointed out as a reason for the absence of bifaces at some sites.

A more numerously documented example of the Lower Paleolithic technological variability is the Yabrudian complex (also called the Acheulo-Yabrudian or the Mugharan) (Ronen & Weinstein-Evron 2000). The complex comprises flake-based industries with heavily retouched scrapers and a varying amount of bifaces (i.e., the Yabrudian and the Acheulo-Yabrudian) and blade-based industries with higher proportions of Upper Paleolithic tool types (i.e., the Amudian and the Pre-Aurignacian). The distribution of this complex is currently known in the central and northern Levant. The southern end is at Qesem Cave, the northern limit is at Dederiyeh Cave (Fig. 3), and the easternmost site is in the el-Kowm basin. This complex always occurs stratigraphically above the Late Acheulian and below the Tabun D type of the Levantine Mousterian tradition as seen at Tabun, Yabrud I, el-Kowm, and Dederiyeh. Along with this stratigraphic evidence, radiometric dates obtained from Qesem, Yabrud I, and Tabun layer E suggest the age of the Yabrudian between 200 and 400 ka at the end of the Lower Paleolithic. The Acheulian tradition, however, may have continued during this period in the Southern Levant, where the Yabrudian complex is not distributed. Zuttiyeh Cave has yielded hominin fossil associated with this complex. The skull from this cave has been placed in several different taxons, including archaic *Homo sapiens*. More recently, human teeth from Qesem Cave have been suggested to represent a new, locally developed, post *Homo erectus* lineage.

In Anatolia, the cave of Karain E yielded flake-based assemblages in the first two phases of the archaeological sequence (called Clactonian and Charentian), followed by the Mousterian in phase 3. Another flake-dominated assemblage without bifaces or the Levallois technique has been documented from Yarimburgaz Cave, whose estimated age is mid-Middle Pleistocene on the basis of the faunal remains. The apparent contemporaneity of these industries with the Yabrudian complex in the Levant may have implications for some of their common technological aspects.

Middle Paleolithic Period

Cultural Variations and Their Chronology

The account of the Middle Paleolithic cultural variability usually refers to three lithic industries, the Tabun B-, C-, and D-types (or phases 1, 2, and 3: Shea 2003), which have been defined by the techno-typological attributes of lithic assemblages from layers B, C, and D of Tabun Cave. The three industries are grouped under the Levantine Mousterian tradition (Fig. 4), and their common use of the Levallois technique distinguishes themselves from the preceding Yabrudian complex. The Tabun D-type is characterized by the production of blades and elongated points both with the Levallois method and the "laminar system." A significant number of Upper Paleolithic tool types occur in the D-type assemblages. In contrast, unilateral sidescrapers are representative in the Tabun C-type industry, which often produces oval flakes with some points and blades from centripetally and/or bidirectionally prepared Levallois cores. The Levallois cores of the Tabun B-type are frequently prepared by unidirectional convergent flaking that produces broad-based points with some blades. Sidescrapers are dominant in retouched tools with few Upper Paleolithic types. The attribution of some lithic assemblages to these industries is shown in Table 1.

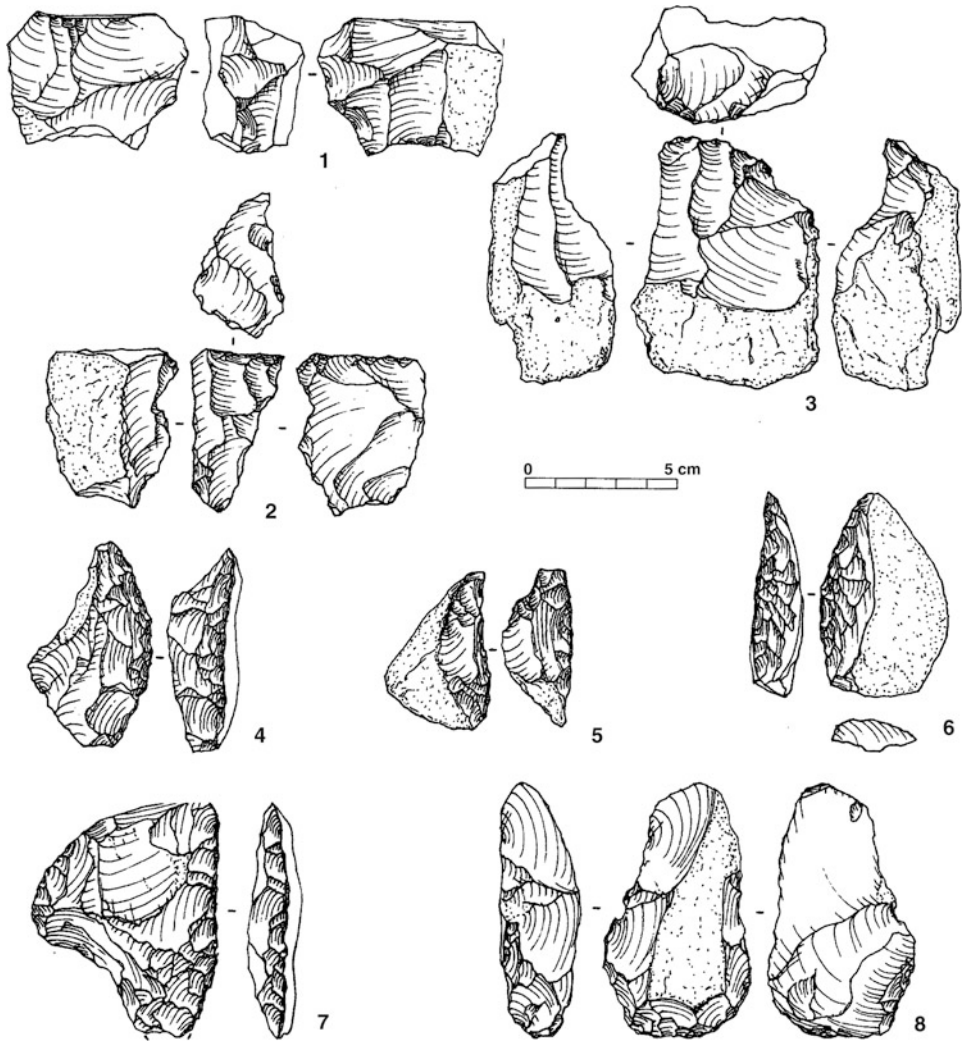

West Asia: Paleolithic, Fig. 3 Yabrudian stone artifacts from Dederiyeh Cave (layer F in K22 and K23) (after Nishiaki et al. 2011a)

Besides Tabun Cave, the stratigraphic sequence of the Tabun B-, C-, and D-type industries is observable at only a few sites, such as Hayonim Cave (the D-type in layers F and lower E followed by the C-type in upper layer E), and probably Douara Cave (the D-type in unit IV followed by the C-type in unit III). As such, the current scheme of the Levantine Mousterian chronology primarily draws upon radiometric dating methods, e.g., TL, ESR, U-series, and amino acid racemization, which have been applied to the sites including Tabun, Hayonim, ‘Ain Difla, Rosh Ein Mor, Qafzeh, Skhul, Naamé, Kebara, Amud, Tor Faraj, Tor Sabiha, Quneitra, Ksar Akil, and Far’ah II. These radiometric dates overall indicate that the three industries occurred in a general order from the Tabun D- through C- to B-type between 250 and 47 ka.

There are several dating results that could suggest the temporal overlap between different industries. For example, the dates proposed for ‘Ain Difla (c. 100 ka) and Nahal Aqev (c. 70–90 ka) indicate that the Tabun D-type industry lasted longer in the southern arid areas, while it was replaced by the Tabun C-type in

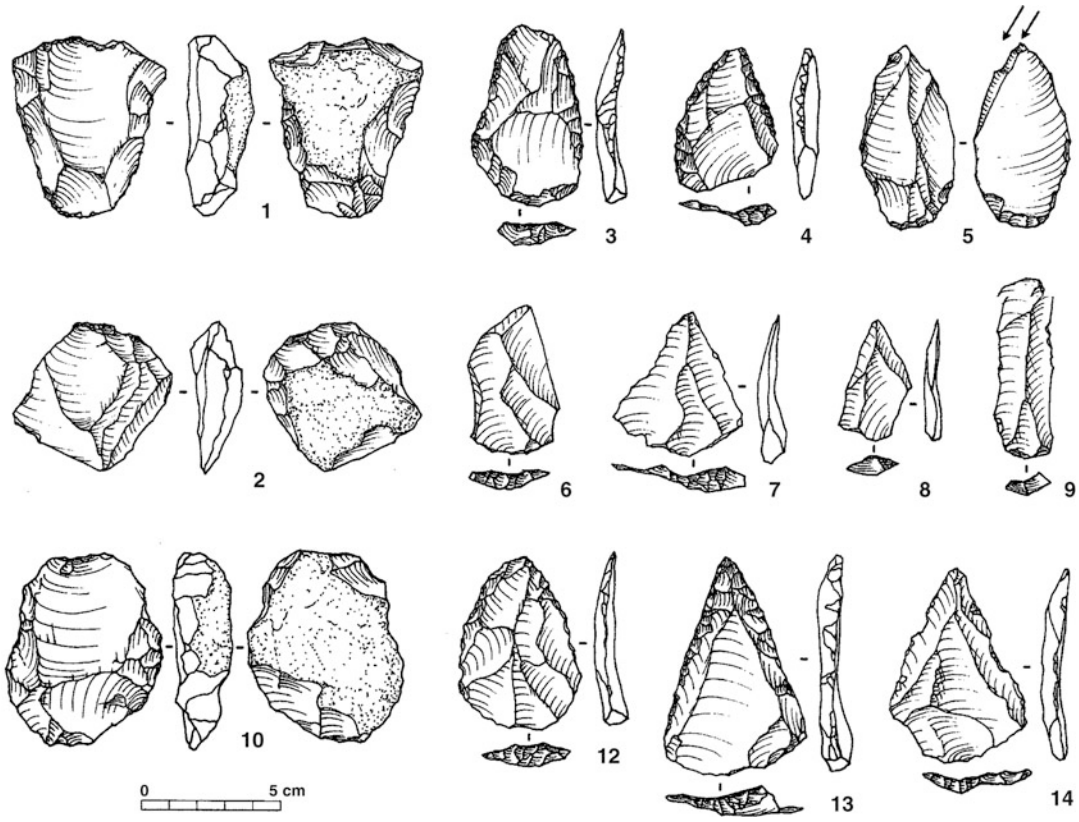

West Asia: Paleolithic, Fig. 4 Mousterian stone artifacts from Dederiyeh Cave (layer E in K22) (After Nishiaki et al. 2011a)

the north. In addition, revised ESR dates (c. 100–120 ka) for Tabun layer B is closer to the dates of the Tabun C-type assemblages at Qafzeh and Skhul than those of Tabun B sites, such as Kebara and Amud. However, these anomalous dating results remain to be verified by additional samples with more secure contexts.

The faunal sequence has also contributed to the establishment of the Middle Paleolithic chronology. For example, faunal assemblages, particularly micromammals, from layers XV to XXV of Qafzeh, associated with the Tabun C-type assemblages, are characterized by the increase of Afro-Arabian elements adapted to savanna conditions. This is interpreted to represent the northward expansion of Afro-Arabian species with anatomically modern humans during MIS 5. In contrast, almost all the Afro-Arabian elements are eliminated in the faunal assemblages at Tabun B sites, such as Kebara and Amud, where Palearctic–European elements are dominant as a result of their southward dispersal with Neanderthals during the cold and dry climate of MIS 4. The faunal assemblages of both Hayonim lower and upper E, associated with Tabun D-type and C-type industries, respectively, are characterized by the presence of earlier Pleistocene elements and the dominance of Palearctic mammals, indicating their chronological precedence to Qafzeh. These accounts for bio-cultural chronology generally fit the radiometric dates of Qafzeh, Kebara, Amud, and Hayonim E, although the suggested correlation of the fauna from Tabun layer B to MIS 4 does not fit the ESR dates mentioned above.

Middle Paleolithic assemblages are profuse also in other areas in west Asia. Those in the Zagros–Taurus regions are classed as the Zagros Mousterian, which is characterized by the frequent application of retouch that produces

West Asia: Paleolithic, Table 1 List of Paleolithic entities in west Asia and their principal information

	Archaeological entities		MIS[1]	Dates (Ka)[2]	Sites with hominin remains[3]	Some of other excavated or systematically surveyed sites[4]
Epipaleolithic	Zarzian		2			Mar Gurgalan Sarab (B–C), Palegawra, Pa Sangar, Shanidar (B2), Warwasi (A–O), Zarzi
	Late Epipaleolithic	Late Natufian	2	13–11/10	Abu Hureyra (1), Ain Mallaha, Hayonim, Nahal Oren, Saaide II, Shukba	Abou Sif, Ain Rahub, Jayroud, Khallat Azana, Mureybet, Raqefet, Rosh Horesha, Rosh Zin, Saflulim, Salibiyah I, Wadi Humeima
		Early Natufian			Ain Mallaha, Ain Saratan, Azraq 18, El-Wad (B), Erq el-Ahmar, Hayonim (B), Kebara (B), Wadi Hammeh 27, Wadi Metaha	Beidha, Dederiyeh (B), Fazael VI, Salibiyah XII, Tabaqa, Wadi Judayid, Yutil Hasa (D)
	Middle Epipaleolithic	Mushabian-Ramonian		16/15–13		Azariq XII, Ein Qadis II, Har Harif K V, Mushabi V, Mushabi XIV/1, Nahal Sekher 23, Ramat Matred II, Shunera XXI
		Geometric Kebaran			Neve David and ‘Uyn al-Hammamm	Azariq II, Douara II (A&B), Ein Gev III, Fazael III & VIII, Hamifgash I, Haon II, Hayonim Terrace, Hefzibah, Kharaneh IV (D), Lagama North VIII, Mushabi XIV/2, Nadaouiyeh, Nahal Oren, Palmyra Site 50 (Spots B, C, F), Raqefet, Umm el-Tlel
	Early Epipaleolithic	Nizzanan		22/20–16/15		Azariq IX, Azraq 17 (Trench 1), Hamifgash IV, Jilat 6 (A)
		Nebekian-Qalkhan				Ain Qasiyya (Area D), Tor Hamar (E), Uwaynid 14 & 18, Jilat 6 (C), Yabrud III (6–7), Yutil Hasa (C, E)
		Kebaran			Ain Qasiyya (Area A&B), Ein Gev I, Kebara (C), Kharaneh IV (B)	Fazael III, Hayonim (Ca-Ce), Nahal Oren (9), Raqefet (I), Urkan el-Rubb II
Upper Paleolithic	Baradostian (Zagros Aurignacian)		3–2			Eshkaft-e Gavi, Gar Arjeneh, Mar Gurgalan Sarab (D–E), Pa Sangar, Shanidar (C), Shekaft-i

(*continued*)

West Asia: Paleolithic, Table 1 (continued)

	Archaeological entities		MIS[1]	Dates (Ka)[2]	Sites with hominin remains[3]	Some of other excavated or systematically surveyed sites[4]
						Ghad-i Barm-i Shur, Warwasi, Yafteh
	Levantine Aurignacian (a former grouping)	Arqov/ Divshon		30/26–17		Boker BE (I), Boker C, Ein Aqev, Har Horesha I, Tor Fawaz?
		Atlitian		27–26	Nahal Ein Gev I	Antelias (I & II), el-Wad (C), Ksar Akil (6)
		Classic Levantine Aurignacian		32–26	el-Wad (D)	Antelias (III & IV), Hayonim (D), Kebara (1 & 2) Ksar Akil (8–7), Raqefet (III)
		Levantine Aurignacian A?		36–32		Ksar Akil (11–13), Umm el-Tlel
	Ahmarian	Late (including Masraqan)		25–16	Ohalo II	Ain al-Buhayra (Unit C, F, and H-I), Ein Aqev East, Fazael X, Lagama X, Yutil al-Hasa (Areas A and B)
		Early		43–25	Ksal Akil (14–20) and Qafzeh (D)	Abu Noshra I, Boker A, Boker BE, Erq el-Ahmar (E–F), Jebel Humeima, Kebara (III-IV), Lagama VII, Thalab al-Buhayla, Tor Aeid, Tor Hamar (F–G), Yabrud II (5–6)
	Initial Upper Paleolithic (Emiran)		3	47/42–38/ 33	Üçağızlı Mughara?[5]	Boker Tachtit, Ksar Akil (21–25), Tor Sadaf (A & B), Umm el-Tlel (IIBase & III2A), Wadi Aghar
Middle Paleolithic	Zagros Mousterian		7?–3	200/250 (Karain E, Layer III.2). 148 (Humian)	Neanderthals from Bisitun, Karain E (III.2)[5], Shanidar (D)	Humian, Kunji, Warwasi
	Levantine Mousterian	Tabun B	5/4–3	75–47	Neanderthals from Amud (B1 & B2), Dederiyeh (3, 11, & 13), Kebara (VII–XII), Shukba (D), Tabun (C1)?[5]	Bezez (B), Erq el-Ahmar (H), Far'ah II, Keoue, Quneitra, Sefunim, Tor Faraj, Tor Sabiha
		Tabun C	6–5	160–75	Qafzeh (XV–XXII), Skhul (B), Tabun (C2)?[5]	Dederiyeh (D), Douara (III), Hayonim (upper E), Naamé, Nahr Ibrahim, Ras el-Kelb

(*continued*)

West Asia: Paleolithic, Table 1 (continued)

	Archaeological entities	MIS[1]	Dates (Ka)[2]	Sites with hominin remains[3]	Some of other excavated or systematically surveyed sites[4]
	Tabun D	8/7–6	250/ 200–160		Abu Sif, Ain Difla, Dederiyeh (E), Douara (IV), Hayonim (lower E and F), Hummal (II), Jerf Ajla, Nahal Aqev, Rosh Ein Mor, Tabun (D), Yabrud I
Lower Paleolithic	Yabrudian/Acheulo-Yabrudian/Amudian/Pre-Aurignacian/Hummalian	11–7	c. 400–200	Qesem (post *Homo erectus* lineage), Zuttiyeh (variously identified, including Archaic *Homo sapiens*)	Adlun, Dederiyeh (F), el-Kowm, Masloukh, Tabun (E), Yabrud I (11–25)
	Flake-dominant assemblages with no or few bifaces	–	c. 750–200		Bizat Ruhama, Evron-Quarry, Hummal (14–13), Karain E (Phases 1&2), Tabun (G), Yarimburgaz
	Acheulian (including assemblages that have been classed as Middle or Late/ Upper Acheulian)	19–7	c. 800–200	Nadaouiyeh Aïn Askar (*Homo erectus*)	Azych, Berekhat Ram, C-Spring, Dawādmi, Gesher Benot Ya'aqov, Gharmachi 1b, Holon, Joub Jannine II, Kurdaro I, Latamne, Lion Spring, Revadim, Tabun (F), Umm Qatafa (D & E), Wadi Fatimah
	Early Acheulian or developed Oldowan	–	c. 1,400 ('Ubeidiya)		'Ubeidiya
	Assemblages dominated by cobbles/pebbles and unmodified flakes	–	c. 1,750 (Dmanisi)	Dmanisi (*Homo georgicus*)	Dursunlu, Hummal

[1]MIS correlation is uncertain for most Lower Palaeolithic sites
[2]Dates for Upper and Epipaleolithic entities are uncalibrated radiocarbon years, and those for Middle and Lower Paleolithic are other radiometric dates including TL, ESR, U-series, AAR, and OSL, as well as age estimates from faunal spectra
[3]*Homo sapiens* unless indicated
[4]Layer numbers/alphabets are shown in parentheses
[5]Either identification of hominin types or association with lithic industries is unclear

various forms of scrapers. Recent studies suggest that core reduction technology involves Levallois methods that tend to produce elongated blanks by linear flaking directions. Similar technological characteristic is noted at Ortvala Klde in the southern Caucasus. Revised TL dates for the earliest Mousterian assemblage (F) at Karain E are c. 200–250 kya, indicating that the Mousterian tradition in this region started before the last interglacial like the Levantine Mousterian. In addition, recent finds in southern Iran and southern Arabia report the association of bifacial foliates or Nubian Levallois products, indicating greater variability of Middle Paleolithic assemblages in west Asia.

The Timing of Neanderthal and Modern Human Occurrences

The Neanderthal occupation in west Asia is attested by the fossil evidence from Kebara, Amud, Tabun,

Dederiyeh, Shukhba, Shanidar, and Bisitun Caves. The contexts of Neanderthal fossils are mostly dated to the late Middle Paleolithic between 47 and 75 ka during MIS 4 on the basis of radiometric dates, stratigraphic positions, faunal spectra, and/or lithic-technological attributes. In contrast, early modern humans recovered in the Middle Paleolithic strata of Qafzeh and Skhul have been given earlier dates (c. 75–130 ka) corresponding to MIS 5 by a series of radiometric dates and the analyses of faunal assemblages.

There are some fossil records that indicate the earlier occurrence of Neanderthals in west Asia, but these cases need further supporting data to be accepted. For example, layer III.2 of Karain E, associated with human remains with some Neanderthal traits, has been dated around 200–250 kya by TL. Another case is the Tabun C1 skeleton, which is broadly recognized as representing Neanderthal features, but some researchers, including excavators, consider that the specimen may have infiltrated down from layer B on the basis of the field observation as well as the more recent analysis of U/Th ratios. Although this makes the fossil stratigraphically later, the revised ESR date for Tabun layer B (c. 100–120 ka) is significantly older than the dates of other sites with Neanderthal fossils, such as Amud and Kebara, and closer to those of Qafzeh and Skhul with early modern humans. In addition, the stratigraphic affinity of the Tabun C2 specimen to layer C is unequivocal, but its biological affinity has been controversial, representing both Neanderthal and modern human attributes. If the Neanderthal affinity is accepted, the TL and ESR dates of Tabun layer C (120–180 ka) suggest that Neanderthals appeared in the Levant before modern humans at Qafzeh and Skhul. In contrast to these possibilities of the early appearance of Neanderthals, there is currently no evidence for the existence of *Homo sapience* during the age between 47 and 75 ka in west Asia.

Hunting, Residential, and Symbolic Behavior

Faunal remains deposited as human refuse in the Middle Paleolithic include various ungulates (e.g., gazelle, fallow deer, red deer, roe deer, aurochs, and onager) and large reptiles that are easy to capture (e.g., tortoise and legless lizards). The seasonality of site use and mobility appears to have been variable. For example, the analyses of cementum increment of gazelle teeth suggest multi-seasonal occupation of the sites with Neanderthal fossils, such as Tabun layer B and Kebara, in contrast to shorter-term occupation at sites associated with *Homo sapiens* fossils, such as Tabun layer C and Qafzeh XVI–XXIII (Lieberman 1993). The relatively high residential stability at Kebara, indicated by dense accumulation of refuse and the prolonged use and maintenance of hearths, contrasts to the ephemeral occupation at Hayonim layer E (Meignen et al. 2006). At the rockshelter of Tor Faraj, associated with the Tabun B-type assemblage, the structured use of living space has been documented through the examination of the arrangement of hearths and the distribution of artifacts and phytoliths (Henry 2004). The evidence for symbolic objects is limited, but the use of ochre in burials and ochre-stained ground stones at Qafzeh is well known (Hovers et al. 2003). In addition, perforated sea shells from Qafzeh and Skhul may have been used as beads.

Upper Paleolithic Period

Origin: Initial Upper Paleolithic

The beginning of the Upper Paleolithic period is marked by the Initial Upper Paleolithic (IUP or Emiran) industry that is technologically characterized by the introduction of prismatic cores and the production of pointed blades with relatively large, sometimes facetted, striking platforms. The IUP is also typologically defined by the high occurrences of Upper Paleolithic tools, i.e., burins and end scrapers, with some fossil indices, such as Emireh points and chamfered pieces. A series of ^{14}C and TL dates from IUP sites range between 47 and 33 ka, within which Boker Tachtit is dated older than northern IUP sites at Üçağızlı Mughara, Umm el-Tlel, and Jerf Ajla. Despite the recent accumulation of IUP assemblages, the debate over their origin continues (Bar-Yosef & Belfer-Cohen 2010) with a view of this industry as representing a transitional phase from the Middle to Upper

West Asia: Paleolithic, Fig. 5 Upper Paleolithic chipped stones from the middle Euphrates region

Paleolithic period and the other position maintaining that the IUP culture was brought by *Homo sapiens* dispersing from Africa.

Upper Paleolithic Cultural Variations

Accounts for the techno-typological variability of Upper Paleolithic chipped stones after the IUP often refer to two cultural traditions, i.e., the Ahmarian (Fig. 5) and the Levantine Aurignacian. The former appeared earlier at c. 43/38 ka, following the IUP, and it features dominant production of blades/bladelets that are modified into pointed or backed forms. In contrast, the beginning of the Levantine Aurignacian is dated to at least a few millennia later around 35 ka, and it is characterized by numerous flakes created into burins and scrapers, and high occurrences of twisted bladelets detached from carinated tools/cores.

The variations within the Levantine Aurignacian tradition have been traditionally grouped into phases A, B, and C on the basis of stratified assemblages from Ksar Akil layers VI–XIII. Among the three phases, part of the Levantine Aurignacian B and C (i.e., layers VII and VIII) shows "classic" Aurignacian elements, such as flat frontally carinated and nosed scrapers along with bone and antler artifacts, such as split-based points, similar to the European Aurignacian. The origins of the Levantine Aurignacian tradition are usually assumed outside the Levant, such as southeastern Europe and the Zagros region (Olszewski & Dibble 2006). Relevance of flake-based assemblages mainly distributed in the arid marginal zone to the Aurignacian tradition has been debated, and they have recently been classed as a separate industry called the Arqov/Divshon (Goring-Morris & Belfer-Cohen 2006).

The Ahmarian tradition is often subdivided into the early and late phases. The Late Ahmarian is characterized by the increase of Ouchtata bladelets replacing el-Wad points, as well as the employment of multiple core-reduction strategies for bladelet production. In addition, some of the Late Ahmarian assemblages, such as Ohallo II, include microlith types that are hallmarks of the Kebaran, one of the early Epipaleolithic entities. As such, the Late Ahmarian has been renamed by some scholars as Masraqan (Goring-Morris 1995). In either way, Late Ahmarian/Masraqan lithic assemblages are likely to represent a transitional phase from the Upper to Epipaleolithic period. Their continuous transition is also indicated by the overlapping range of ^{14}C dates between the Late Ahmarian and the Early Epipaleolithic, particularly the Nebekian sites in Wadi el-Hasa.

Settlement, Subsistence, and Symbolic Behaviors

The extensive distributions of Upper Paleolithic settlements, particularly those of the Ahmarian

and the Arqov/Divshon, in the steppe/arid zone have been documented in the Negev, northern Sinai, and southern Jordan. In contrast, the sites of the "classic" Levantine Aurignacian and the Atlitian tend to occur in the Levantine core areas. In both regions, the sites are small with relatively thin deposits containing several hearths at most, indicating their ephemeral nature and the high residential mobility, which are consistent with the circular settlement pattern proposed for the Upper Paleolithic inhabitants in the central Negev. A similar view on Upper Paleolithic occupation has been presented by the seasonality study of gazelle hunting (Lieberman 1993) and the decreasing trend in the proportions of commensal species (e.g., house mice) from the Middle to Upper Paleolithic layers at Qafzeh, Sefnim, and Kebara caves.

Large mammal bones from Upper Paleolithic sites mostly consist of ungulates including gazelle, fallow deer, red deer, aurochs, wild goat, boar, and equid with greater focus on smaller species (i.e., gazelle) than that of the Middle Paleolithic. In addition, intentional exploitation of small prey (e.g., hares, birds, and small turtles) is suggested at sites like Ksar Akil, Hayonim, Kebara, and Ohalo II. At the latter site, evidence for fishing is also present. Although botanical remains from Upper Paleolithic sites are scarce in west Asia, they are exceptionally well preserved at a waterlogged, Late Ahmarian/Masraqan site of Ohalo II at the lakeshore of Galilee. The record suggests the exploitation of a wide range of grass species, including wild barley and emmer wheat, which were probably processed on ground stones, as suggested starch grain analysis (Piperno et al. 2004).

Art objects rarely occur in the west Asian Upper Paleolithic, but animal teeth pendants and incised limestone slabs from Hayonim Cave offer common features between the Levantine and European Aurignacian. In addition, numerous sites of both the Ahmarian and Levantine Aurignacian traditions yielded ochre fragments, ochre-stained stones, or marine shells, the latter of which are sometimes perforated, as reported at Üçağızlı and Yabrud II. Rare human burials have been discovered at Nahal Ein Gev I and Ohallo II, while isolated human bones have been recovered from Ksar Akil, Antelias, Qafzeh, Kebara, and el-Wad. The paucity of burials may be related to the ephemeral nature of Upper Paleolithic settlements.

Epipaleolithic Period

Cultural Chronology

Like preceding Paleolithic periods, Epipaleolithic material cultures are primarily defined by lithic evidence but classed into much greater numbers of categories. This is mainly related to the variability in the morphology and production technique of Epipaleolithic microliths, on which researchers draw to define cultural entities (Goring-Morris 1995; Olszewski 2008). In the Levant, Epipaleolithic cultures are often grouped into the early, middle, and late phases (Table 1). In general, non-geometric forms of microliths are dominant in the early phase, while geometric microliths mark the middle (e.g., trapeze/rectangle and triangle) and late phase (e.g., lunate) (Fig. 6). Furthermore, the presence/absence of microburin technique, a specific method for segmenting bladelets, shows temporal and geographic patterns, providing a criterion to distinguish between the Kebaran (absent) and the Nebekian (present) in the early phase, and between the Geometric Kebaran (absent) and the Mushabian (present) in the middle phase. The microburin technique is more widespread in the Late Epipaleolithic, or the Natufian cultural complex, which is divided into the early, late, and sometimes final phases. Recent recovery of some Early Natufian sites in steppe areas in Jordan indicate that a range of environment inhabited by Early Natufian foragers was wider than previously envisioned.

Microlithic assemblages in the Zagros region are classified as the Zarzian, although their chronological data are limited. Numerous Epipaleolithic cave sites have also been discovered in the Antalya area, Turkey, including Öküzini Cave, where stratified assemblages show a diachronic trend from non-geometric to geometric microliths as in the Levant and the Zarzian. Another microlithic industry with geometric microliths, the Trialetian, has been

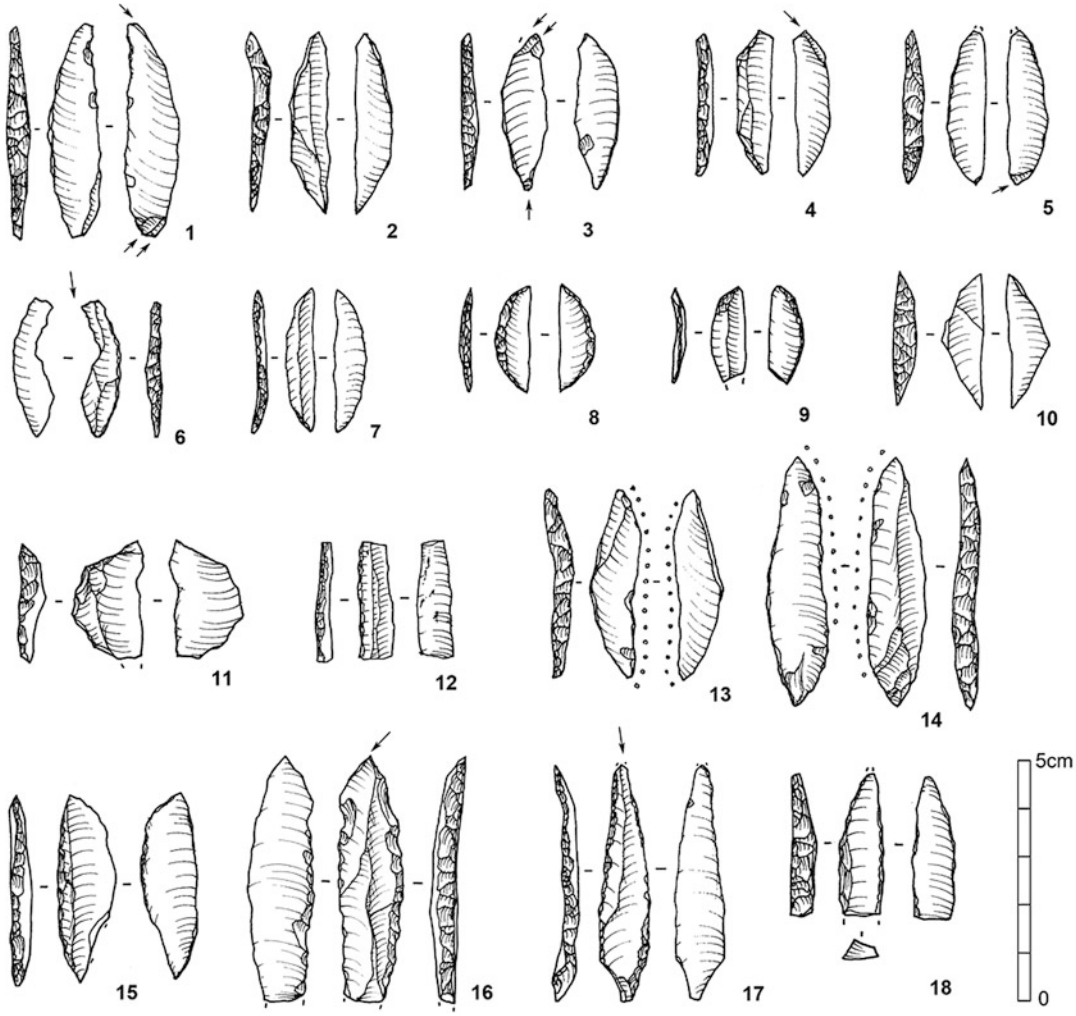

West Asia: Paleolithic, Fig. 6 Late Epipaleolithic chipped stones from Dederiyeh Cave (After Nishiaki et al. 2011b)

proposed for the assemblages in the Caucasus, eastern Anatolia, and the Iranian plateau.

While some researchers suggest that morphological variability of microliths can be caused by their re-modification for prolonged use rather than by intentional stylistic differences, others consider that both functional and stylistic variability recognized for distinguishing between different entities is likely to represent social groups with different technological traditions, adaptive strategies and/or territories. In the case of the Natufian complex, its regional and temporal variability is also manifested in groundstone artifacts, architecture, ornamental objects, decoration motifs, and burials.

Mobility Pattern, Subsistence, and Society

Early and Middle Epipaleolithic sites are generally small and have thin occupational deposits, indicating that inhabitants have continued high residential mobility since the Upper Paleolithic period. The seasonality analysis of gazelle hunting also suggests that Kebaran and Geometric Kebaran occupations were seasonal in contrast to multi-seasonal occupations during the Natufian and Mousterian periods (Lieberman 1993).

However, a few Early and Middle Epipaleolithic sites are quite large, even allowing for the effect of deflation and sheetwash (e.g., Jilat 6), associated with hut structures (e.g., Ein Gev III, Kharaneh IV, and Umm el-Tlel), and/or human burials (e.g., Neve David, Kharaneh IV, and 'Uyun al-Hammam). These sites point to a long-term change rather than a sudden shift in settlement system towards the Natufian culture. The increased sedentism of Natufian foragers is illustrated by many lines of evidence, including stone-walled structures, storage facilities, numerous human burials, large site size, dense archaeological remains, and the increase in human commensals, such as house mice (Valla 1995). Multi-seasonal occupation is also indicated by seasonally available faunal and botanical species and the analysis of cementum increment of gazelle teeth.

Game species during the Epipaleolithic period include gazelle, equids, aurochs, cervids, caprines, hare, tortoise, and birds. While similar range of species was exploited in the Natufian, gazelle hunting was more intensified. Direct evidence for plant diet during the Epipaleolithic is rare, but botanical remains from a few Natufian sites, such as Abu Hureyra, Dederiyeh Cave, Wadi Hammeh 27, and Hayonim Cave, attest the use of wild cereals (e.g., barley, einkorn, and rye), wild legumes (e.g., lentils and vetches), wild nuts (e.g., almonds and pistachios), and wild fruits. Intensive exploitation of cereals during the Natufian is also suggested by indirect evidence, such as glossed blades and numerous food processing tools, particularly mortars and pestles.

Long-distance distribution of marine shells continued, and possibly was enhanced, from the Upper to Epipaleolithic period. Their occurrences at inland sites and patterned associations with particular lithic industries are interpreted as representing social interactions through the exchange of shells that are often pierced (Ritcher et al. 2011). Some Early Natufian sites (e.g., el-Wad) yielded numerous shell/bone beads as grave goods, such as a necklaces and a headdress, but their social significance remains controversial. The increase of human burials also distinguishes the Epipaleolithic from the Upper Paleolithic culture. In early Natufian villages, burials are often placed in and near residential space.

In sum, the generally increasing trend in sedentism and cereal use, as well as the development of burial customs and exchange of exotic materials during the Epipaleolithic, is widely considered precursors of sedentary villages, food production, and social practices in the following Neolithic period, although the transitional process was complex and variable at different parts in west Asia.

International Perspectives

Although Paleolithic research in southern Arabia and southern Iran has been underdeveloped in comparison to those in the Levant, recent fieldwork in the former areas discovered Middle Paleolithic stone assemblages that are technotypologically distinct from the Levantine Mousterian or the Zagros Mousterian. More specifically, bifacial foliates associated in the FAY-NE 1 assemblage C and Nubian Levallois products in the Dhofar region show affinities with Middle Stone Age assemblages in eastern and northeastern Africa. OSL dates indicate that these recent finds in southern Arabia represent the southern dispersal of early *Homo sapiens* out of Africa during MIS 5 in addition to the northern route to the Levant at Qafzeh and Skhul (Armitage et al. 2010; Rose et al. 2011). Although the southern route hypothesis still needs to be verified with fossil remains in the future, the investigation of the southern and eastern parts of west Asia can contribute greatly to archaeological testing of the southern dispersal route of *Homo sapiens*, linking the population history in west Asia to those in southern and eastern Asia.

Future Directions

Although Paleolithic records in west Asia are well organized on the basis of numerous cultural entities and their chronological sequences, as a result of almost a century of research history,

increasing number of new assemblages indicate greater material variability, as exemplified by various non-bifacial Lower Paleolithic assemblages from the Levant and Turkey, Middle Paleolithic assemblages with bifacial foliates in southern Iran and Arabia, and variable flake-based assemblages of the Levantine Upper Paleolithic. On the other hand, the validity of numerous cultural labels assigned for local Epipaleolithic assemblages is becoming under reexamination. Regardless of the theoretical orientations in the interpretation of cultural entities, their definition and chronological placement continue to be significant issues, particularly along with the progress of radiometric dating methods that allow researchers to make chronological correlations among archaeological assemblages both at the local and regional scales.

Explaining the variability, both synchronic and diachronic, of archaeological entities is a challenging task. Recent accumulation of radiometric dates and paleoenvironmental records led some researchers to reexamine temporal correlations between the occurrences of archaeological entities (Epipaleolithic and Neolithic) and climatic events (Maher et al. 2011), although such examinations would be more difficult for earlier time periods due to greater range of estimated dates. Functional interpretation of material variability has been pursued by several regional studies in Negev, southern Jordan, Azraq, and Wadi Hasa in relation to raw material availability and proximity to water sources, i.e., factors that vary according to daily and seasonal mobility patterns. The continuation of these regional studies should accumulate data regarding the ecological aspects of material variability. On the other hand, the interpretation of lithic industries as representing social groups can add evidence from other material records, such as the association of specific types of bone/antler objects in the Classic Levantine Aurignacian and the composition of imported shells in the Epipaleolithic industries, although the preservation of organic materials can vary under different environmental settings.

In depth studies of particular Paleolithic behaviors include the use of fire, the use of space, hunting behaviors, diets, hunting weapon technology, land-use patterns, burial practices, and creation of symbolic objects. While the synchronic variability of these behaviors can provide insights into the repertoire of adaptive strategy and cultural variability, their diachronic examination can contribute to such issues as the behavioral evolution of early *Homo* populations, the socioeconomic and cognitive aspects of the so-called Upper Paleolithic Revolution and the increasing complexity of subsistence/settlement systems and social structures in the Epipaleolithic period.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Acheulean Industrial Complex
- ▶ African Stone Age
- ▶ ‘Ain Difla Rockshelter
- ▶ Archaic *Homo sapiens*
- ▶ Dmanisi Hominins and Archaeology
- ▶ East Asia: Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Fossil Records of Early Modern Humans
- ▶ Handaxes and Biface Technology
- ▶ *Homo erectus*
- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Theory and Progress
- ▶ Human Evolution: Use of Fire
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic
- ▶ Material Culture and Education in Archaeology
- ▶ Middle East Middle to Upper Paleolithic Transitional Industries
- ▶ Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic
- ▶ Middle East: Epipaleolithic
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries
- ▶ Oldowan Industrial Complex
- ▶ Out-of-Africa Origins

▶ Radiocarbon Dating in Archaeology
▶ South Asia: Paleolithic
▶ West and Central Asia: Early *Homo* Fossil Records
▶ Zooarchaeology

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Western Europe: Historical Archaeology

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Introduction

Archaeology is traditionally divided into two subdisciplines: prehistoric and historic archaeology. The latter might seem as an ambiguous subdiscipline of being neither history nor prehistory (Deagan 1988), or prahistory, or protohistory, as it is called in some European countries (France, Germany, Poland, Russia). There is a significant distinction, however, in how European and American archaeologists understand and practice historical archaeology. The term is commonly used in the USA, where historical archaeologists study the colonial and postcolonial times, while European archaeologists prefer using specific terms, such as postmedieval, industrial, urban, and military archaeology. The term "historical archaeology" has several meanings but it generally relates to researching societies living at times for which we have written records, thus it is about peoples who recorded themselves and others, who may not have access to script, in writing and produced complex cultures. There are, however, two ways of understanding what historical archaeology is about: broad, favored by many European archaeologists, and narrow, followed by some European and most American archaeologists. The broader understanding refers to the methodology of researching past societies and identifies the

interest of historical archaeology as a discipline to study all societies who recorded themselves and historical events they either caused, or to which they related, through the use of script supported by the archaeological records. If such understanding is followed then historical archaeology incorporates all societies and cultures from the origins of script until modern times and therefore includes the archaeology of Mesopotamia and Egypt, Indus River Valley and southern China, archaeology of the Maya and the Aztecs, classical archaeology of Greece and the Roman Period, medieval and postmedieval archaeology, archaeology of European colonies, urban archaeology, industrial archaeology, etc. Whereas the narrow understanding is strictly about timeline and relates to a multidisciplinary field of research with interest in the world's last 500 years of history, focused on the expanding role of western Europe worldwide, but especially its economic and political domination, and such understanding is favored in this entry. Depending on the preferred view of historical archaeology, the organizing concept for the field is either a history of the literate world (broader view), or a history of European political and economic domination and the cultural context which produced suitable socioeconomic conditions for the origin of capitalism (narrower view). Either way, the unique position of historical archaeology as a research field is the intersection of archaeological data and written and oral records which allows simultaneous access to a variety of sources. Modern western European historical archaeology crosses the artificial boundaries between classical (Mesopotamia, Egypt, Greece, Rome), biblical, medieval, postmedieval, urban, industrial, underwater, etc., archaeologies; it utilizes common data, methods, methodology, and theory. Historical archaeology also provides the means to study societies who for various reasons have not produced written records of themselves.

Generally, European archaeologists consider archaeology as an auxiliary subfield of history (part of the humanities), whereas in the USA it mostly operates under the umbrella of anthropology (part of the social sciences). Presently, archaeologists view historic archaeology less as an auxiliary subfield of history, which traditionally has been regarded as a method of obtaining historic facts undocumented in script, and emphasize a claim to stand on its own. Moreover, current developments in historical archaeology strongly suggest that the field refocused from studying sheer historical events and following historical methodology rooted in empirical (logical) positivism to researching historical processes through the use of anthropological methodology which includes evolutionary and comparative outlooks. This trend is clearly visible in the USA and is gaining popularity in Europe, although the majority of topics studied by European historical archaeologists still remain oriented on histories of events. Nevertheless, whether viewed as part of anthropology or history, historical archaeology operates in two distinctive scales: diachronic scale – to observe changes over time, and synchronic – comparative analysis of cultures from the same time period. Modern historical archaeology, whether European or American, is interested in addressing large-scale processes, visible in global scale. It also dominates the practice of professional or contract archaeology across the globe, as urban development and historic buildings conservation yield massive archaeological data sets deriving from recent centuries. Therefore, even if historical archaeology is viewed as "history with a spade," it must not be seen as simply a method of providing data to illustrate historical events. Modern historical archaeology is interdisciplinary and transdisciplinary, linked to anthropology and history, and seeks to understand the global nature of modern life (cf. Orser & Fagan 1995: 14). Although it is mostly practiced in Europe and the USA, archaeologists in other regions develop strong interests in this discipline (see various chapters in Lozny 2011).

Definition

According to the narrower meaning of historical archaeology pursued in this entry, whether in Europe or the USA, the discipline concerns the post-Columbian (post-Quincentennial) era and

emphasizes Eurocentricity and the period of European domination in the world at times of geographic discoveries, the beginnings of mercantilism and the origin of capitalism related to colonialism and European political domination worldwide. In this respect, both American and European scholars agree that historical archaeology relates to primarily the times around and after 1500 CE.

Historical archaeologists argue about setting the parameters for defining the discipline. The strict definition of historical archaeology is usually explored according to such factors as chronology (American approach) and methodology (European concept), drawing a distinction between the American tradition that defines the subject as "post-Columbian" and the European approach that establishes broader connections with what has been called the "documentary archaeology" of all literate societies. The American definition is chronological and points out to a specific historical event (1492) as the apical point of the timeline, while European colleagues pay attention to sources and methodology defining historical archaeology. In sum, traditional European definitions enlarge the scope of historical archaeology to include all "documentary archaeology" (more on this issue in Gilchrist 2005), whereas recent definitions focus on specific chronological periods. Thus, briefly defined, historical archaeology is about studying the evidence and consequences of European cultural [socioeconomic and political] domination from around 1500 CE until recent times. It is chiefly about studying histories of European colonial nations, namely, the British, Spanish, Portuguese, French, Dutch, German, Italian, and also Russian and their interactions with and consequences of economic and political domination over regions and peoples worldwide, dated from the end of the fifteenth century (the end of the Middle Ages) to modern times, and examined through the use of both archaeological and historical methods. Viewed in such a way, historical archaeology is interdisciplinary and its methodology involves the use of methods to recover and process data on material culture, past ecosystems (historical ecology), language (historical linguistics), geography (historical geography), but it also dwells on methodologies and theories offered by cultural anthropology (ethnology), sociology, political science, economics, demography, etc.

Historical Background

Archaeology in general has its roots in the "Great Tradition" of European scholarship (Renfrew 1980: 289). Archaeologists of the eighteenth and particularly the nineteenth century became intellectual followers of this tradition of learning focused on antiquity, which, during the Enlightenment, was freed of its biblical and theological contexts. Scholars of this tradition were primarily concerned with investigations related to the early civilizations of the classical world (Mesopotamia, Egypt, Greece, and the Roman Empire). The leading at the time German position on archaeology viewed all evidence of human past as historic and this view influenced the practice of archaeology in several European countries. Subsequently, besides writings and art also other, less spectacular remains of material culture have been accepted as historical records. In the beginning of the twentieth century, German archaeologist Carl Schuchhardt (1908: 944ff) expanded the concept of *Altertumswissenschaft* (science of antiquity) that defined archaeology of the time by expressing that also "excavated prehistory" could be transformed into "real" history – and in this way prehistoric archaeology was also included into the realm of the "Great Tradition." A more systematic and broader scholarly interest in the studies of the past societies was introduced when history, geography, and ethnology were accepted as professional disciplines in Germany and later in other European countries. Historical archaeology, as archaeology in general, emerged in Europe and was exclusively related to researching the classical periods, especially histories of ancient Mesopotamia, Egypt, Greece, and the Roman Empire. Interests in medieval archaeology originated in the last decades of the nineteenth century and postmedieval sites were studied even later. Medieval archaeology is now well established in western Europe, but

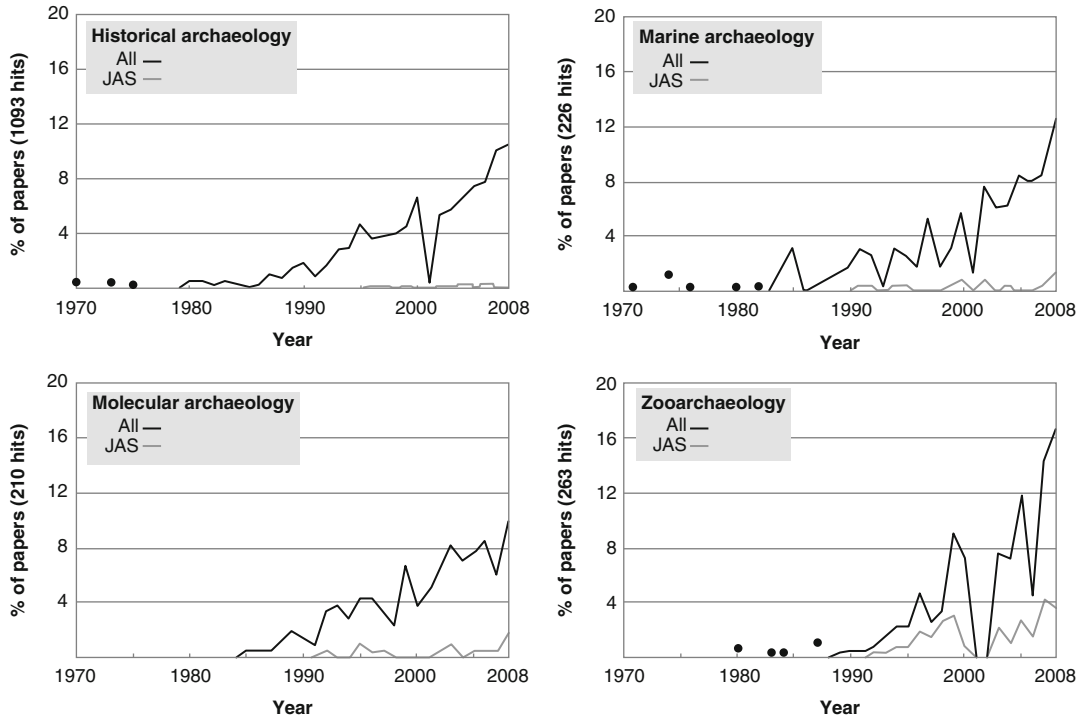

Western Europe: Historical Archaeology, Fig. 1 Growth of the themes *historical archaeology*, *marine archaeology*, *molecular archaeology*, and *zooarchaeology* between 1970 and 2008 (After Marriner 2009, Fig. 2)

postmedieval and industrial archaeologies are relatively new subdisciplines which originated within the last 50–60 years. An outbreak of postmedieval research focusing on the time after 1500 CE happened in Europe during the 1970s and 1980s and the interest is still growing (Fig. 1). Much of postmedieval archaeology sprung out from urban rescue archaeology and studies on material culture. Industrial archaeology, which deals primarily with still largely intact industrial buildings, plants, and machines of the last two centuries that should be restored and conserved, developed as "the social history of the working class" and is presently practiced in many western European countries to address the material evidence for the industrialization of the modern world. Thus, if we consider the wider meaning of historical archaeology related to the definition based on the methodological aspects of practicing the field, historical archaeology originated in the nineteenth century, whereas if the narrower meaning, which favors the chronological definition is followed, historical archaeology although rooted in the tradition of the late nineteenth century archaeology, is a young field which matured in the second half of the twentieth century but is still developing and searching for identity. Thus far western European historical archaeology has been dominated by the British, German, Dutch, French, and Scandinavian research, and to date there has been little comparative work across the European continent (Gilchrist 2005). PostMedieval Archaeology remains the principal society and journal in Britain to focus exclusively on the period after 1500. Historical archaeology has been Eurocentric but is recovering from this domination as American, African, and Asian historical archaeologies develop (see chapters in Lozny 2011 for discussion).

Key Issues/Current Debates

Although western European historical archaeology is traditionally interested in, for instance,

Western Europe: Historical Archaeology, Fig. 2 Mountmaurin, southern France. Gallo-Roman villa. (Photo by Ludomir Lozny)

examining the process of acculturation such as the Romanization of western Europe (Fig. 2), issues such as imperialism, colonialism, military expansions, globalization, domination and resistance, rise of capitalism (commodification), industrialization, exploitation, ethnicity, gender, social conflict, identity, etc., are gaining popularity. The key topics presently studied by western European historical archaeologists concern historical events but also focus on researching historical process and include archaeology of colonialism, migrations, and culture contacts, archaeology of atrocities, archaeology of power, archaeology of capitalism, archaeology of identity, archaeology of conflict and war, archaeology of religion, industrial archaeology, etc. One of the most significant issues to which historical archaeology contributes is documentation of groups and societies who otherwise did not record themselves in writing. This is especially significant, for instance, in studying former colonies including North America, South America, Africa, and South Asia. The archaeology of African Diaspora very much concerns Europe, Africa, and the Americas. There is also an emerging interest in the British imperial diaspora that unites the historical archaeology of Britain, Ireland, Canada, the United States, India, the Caribbean, Australia, and New Zealand by exploring the legacy of involuntary transportation from Ireland to Australia and contrasting historical and contemporary perceptions of British penal transportation in the two countries. Historical archaeology must not be, however, understood as just the history of European colonial and postcolonial times, a concept that dominates the American version of historical archaeology (Fig. 3).

The focus of French historical archaeology (see Bellan and Journot 2011 for a review of recent projects) is on local monographs and long-lasting craft traditions. Urban archaeology is emerging and studies of architectural monuments (chateau) are common (Fig. 4). Industrial archaeology and military archaeology (battlefields) are increasing in popularity throughout Europe (Figs. 5 and 6). Historical archaeology is, understandably, gaining momentum in Italy, especially its urban fraction and the study of the Renaissance but new trends like landscape studies are becoming popular. Postmedieval, urban archaeology is also popular in Scandinavia and recently focused on researching postmedieval farmsteads. Studies on cities, countryside, and the relationship between towns and countryside

Western Europe: Historical Archaeology, Fig. 3 St. Augustine, Florida. The oldest continuously occupied Spanish colonial village in North America. (Photo by Ludomir Lozny)

Western Europe: Historical Archaeology, Fig. 4 Carcassonne, southern France. (Photo by Ludomir Lozny)

form the core of historical archaeology in the Netherlands and other Low Countries (Figs. 7 and 8).

Theory and Methodology

The epistemology of historical archaeology, as all other archaeologies, is framed within modernity. Historical archaeology whether European or American was until the late 1980s to early 1990s inherently theory-free. Atheoretical particularism characteristic of the culture history approach was typical for European historical archaeology which is currently changing to incorporate a range of theoretical views. Historical archaeology, as any other archaeology, has no theory of its own. Theories of material culture are common to

Western Europe: Historical Archaeology, Fig. 5 An aerial view of the World War I trenches recovered in eastern France. Daily Mail, 10 February, 2012

both prehistoric and historic archaeology. As in history, interpretive approaches prevail over empirically driven explanations and are often mixed with Marxism (dialectical materialism is especially popular), structuralism, and their epigones like agency, symbolism, and practice, and other social theories borrowed from sociology, political science, literary theory, and economics among other disciplines. Processual, evolutionary-inspired approaches are not very common in Europe, while postprocessualism has influenced scholars in several European countries to replace traditional empiricism and positivism. Postprocessual thought gained popularity in Britain and also Scandinavian historical archaeology has been influenced by postmodern theories. Paul Courtney has recently (2009) reviewed the state of theory in postmedieval archaeology in Europe and concluded that: "...post-medieval archaeology is still largely entwined with medieval archaeology. The main driving force for post-medieval archaeology has tended to be from urban archaeology (...). Rural archaeology has been relatively undeveloped (...). The intellectual roots of post-medieval archaeology across Europe (...) clearly lie in history, though anthropological influences have grown (...)."

Western Europe: Historical Archaeology, Fig. 6 Industrial archaeological park of Rhineland Industrial Museum, Germany. (Photo by Ludomir Lozny)

Western Europe: Historical Archaeology, Fig. 7 Lauriergracht, Amsterdam, the Netherlands. (Photo by Ludomir Lozny)

Western Europe: Historical Archaeology, Fig. 8 Zuiderzeemuseum – Enkhuizen near Amsterdam, the Netherlands. (Photo by Ludomir Lozny)

Fragmentation of practice and theory has become another problem, however. One area in which historical archaeology has begun to realize its unique potentials is that of basic research in archaeology, or the development of middle-range theory to link our observations of the archaeological record to a reasonable approximation of the past events that formed that record (Deagan 1988: 10).

In order to better understand the interest and key issues researched by historical archaeology and also appreciate the current debates, the following two questions need to be addressed: "How can studying archaeology and history together contribute to better understanding of the human condition past and present?" and: "How can archaeology contribute to history and history to archaeology?" A combination of these two

disciplines offers a new and unique methodological perspective on studying human culture and in effect produces results that neither one of the two disciplines can achieve separately, simply because texts present views on very selective historical events and, on the other hand, archaeological data cover a much wider range of events and processes which are better understood and assessed chronologically when supported with written records. Generally, topics of study within historical archaeology concern both processes and events. All are concerned about timelines and chronology supported by written sources. Methods to date processes and events are easier in historical archaeology than in prehistoric archaeology because in historical contexts either written sources or specific artifacts, like coins, produce accurate dates. The problem is to link such finds with the archaeological context in which they occur because coins often date not the time of their circulation but the event of deposition into the archaeological context and therefore suggest a date ex post, and this problem relates to methodology of research and not dating techniques. There are many topics researched by historical archaeology that can only be understood through the use of methodology that makes reference to both documentary and material accounts of the past conditions, mostly related to the development of new means of production, accumulation of wealth and power, distribution of goods and services, and human sociopolitical organization. Slavery, imperialism, class formation, cultural syncretism, the manifestation of economic inequality among classes, consumer choice behavior, and accelerated environmental degradation are a few of the related topics that can be accurately described and understood only by a historical archaeological approach – that is, through the use of written records in combination with material evidence (see Deagan 1988: 8 for discussion). Because of its unique methodology to utilize archaeological evidence supported by written sources, historical archaeology also contributes to examining interconnections among various social groups and culture change in a multiethnic context of modern nation-states.

Historical archaeology is diversified in respect to methodology followed. Practitioners usually follow the methodology of history but some also engage in studying various topics by employing an anthropological perspective. Because one of the key problems in historical archaeology is to investigate the concurrence of texts and artifacts (see Andren 1998 for discussion), historical archaeology might seem as not fitting in the traditional anthropological framework of American archaeology, but on the contrary it inevitably establishes links with history and other related disciplines, like linguistics, history of arts, but also political science and economics. While the availability of documents has sometimes led to a particularistic brand of historical archaeology, in which theory may be underdeveloped, the rich combination of sources has frequently promoted wide-ranging methodological and theoretical innovation. The French contribution to the methodology and theory of historical archaeology has been the approach identified as *le longue durée* the history of long-term processes (changes) introduced by Fernand Braudel. It is appropriate to emphasize that due to its unique methodology, historical archaeology may contribute to the advancement of theory in archaeology in general.

There is growing use of archaeometry, scientific analysis of artifacts, especially ceramic (composition of paste) or metal objects (physical attributes of metals are used in addition to stylistic analysis to trace the origin of certain objects), but in historic archaeology certain dating techniques are more useful than others. For instance, absolute dating techniques, like carbon dating is not always handy in historic contexts because the margin of error it offers (25, 50, or 100 years) might cover a significant portion of the studied time period. Dendrochronology seems more appropriate, for it offers a calendric date but its use is limited by the existence of local tree-ring sequences and the fact that wood is not always present in archaeological sites or does not always date the event but, like coins, suggest ex post dates (the "old wood" syndrome must be kept in mind when using this method). On the other hand, written sources do not document all historical events but selected ones. Therefore, the

application of archaeological methods to research traditional historical events and processes for which there is simply inadequate documentation constitutes a valid and important focus in the field, and one that boasts the most successful contributions of historical archaeology to date.

Future Directions

Fragmentation of practice and theory has become a significant problem for historical archaeologists during the twentieth century. Modern historical archaeology offers a different outlook and it frequently crosses the interdisciplinary boundaries to utilize various methods, methodology, and theory. As observed by Deagan (1988: 7), in current approaches to the past there is often little difference among studies in historical archaeology, cultural anthropology, and social history.

New methodology of historical archaeology incorporates the use of all kinds of written records, not just narratives but also census data, personal accounts, diaries, etc. The study of material culture has been expanded to also examine the material evidence of space and place often manifested in the cultural landscape symbolically. The focus is also on intangible aspects of human culture like memories, symbolic meanings, etc. All these allow the use of a range of new methods to record and manipulate the data. Therefore, modern historical archaeology is not just about written records and material archaeological data but it presently relates to oral histories and memories, archaeology of place and space and narratives of places. A combination of sources, such as written sources and oral histories, including myths and local legends, are used in designing specific research approaches (see various chapters in Lozny 2006).

Historical archaeology provides good training to critically examine especially written sources and evaluate how they relate to the archaeological record. In this sense, historical archaeology requires very specific methodology in the use of resources which might be or simply are biased. Because it deals with written records, knowledge of various languages, including those presently not in use such as Latin or ancient Greek is essential (if we accept the broader view of historical archaeology). Landscape archaeology although not exclusive to it has become a significant new nondestructive approach to study histories of space (Lozny 2013; and Fig. 9 Pyrenees).

Western Europe: Historical Archaeology, Fig. 9 The author and students conducting landscape archaeology project in the Labas Valley, Central Pyrenees. (Photo by Ludomir Lozny)

Significant changes are expected in the use of new theories as the atheoretical particularism characteristic of the culture history approach is being replaced by a range of theoretical views both processual and postprocessual in origin. Historical archaeology must also continue to be interdisciplinary and transdisciplinary.

There has recently been an attempt to claim a universal character to historical archaeology. The most comprehensive and articulate argument for a global historical archaeology has been formulated by Charles E. Orser (1996), pledging for the definition of the discipline as the study of the modern world, characterized by a single economy that is colonial, international, and expanding. There are four key concepts defining this new reality: global colonialism, eurocentrism, capitalism, and modernity. The call for a global "modern-world archaeology" addresses the "grand historical narratives" of the last 500 years and specifically such phenomena as capitalism, economic improvement, and consumerism. This approach may, however, channel archaeological thinking into certain more general directions seeking explanations at the global scale and may in effect hamper intellectual advancement in so many other subjects needing research on local scales. Nevertheless, the larger point here is that some consensus between European postmedieval and American historical archaeology is necessary in order to break free from the parochial approach to study the past, as it happened throughout the twentieth century.

Historical archaeology has been, and in some cases still is, politicized and often used for political gains to promote a range of nationalistic agendas (Arnold 1990; Galaty & Watkinson 2004; Lozny, in preparation) and such use to justify political claims has been common (ample examples from around the world are discussed by various authors in Lozny 2011). Regrettably, such practice will probably continue as the research offered by the social sciences and the humanities is often used for political gains.

Practitioners of historical archaeology must also be concerned with ethical practice and what constitutes the right conduct, and in this instance disagreement arises over exactly where ethical responsibilities lie. Historical archaeologists, as all other scientists, must not cross the line that separates scholars from activists, they must honestly report on their findings following the code of scientific conduct and not their personal political agendas. The ethical responsibility here is to the public who are not just the consumers of archaeological knowledge but also our sponsors and any violation of such ethical conduct must be pointed out and censured. The very fact that historical archaeologists engage in an open exchange of ideas about how they affect the people whose heritages they study is an optimistic sign. As discussed by Beaudry (2009), because historical archaeology deals with issues still remaining within memory of many individuals and groups, we must follow an explicit ethical code. The ethical issues are relevant to all studies and will continue to be applied to the traditional interests of historical archaeology like urban archaeology, archaeology of rural areas, archaeology of power, domination and resistance, or material studies. Ethical issues might become particularly significant in the European theater should the interest grow in studies of phenomena related to the recent history such as forced migration and displacement of large groups in Europe, diasporas, ethnic cleansing and violence, the historical significance of the two most potent social systems of the twentieth century – fascism and communism – war atrocities, social movements, and also larger social phenomena like colonialism and postcolonial environment evidenced in multicultural societies in Europe and elsewhere, the significance of cultural heritage in multiethnic societies and its relation to sustainable development, etc. These are the most pressing issues to be studied by historical archaeologists in the twenty-first century.

Historical archaeology is taught at several mainland European universities in Germany, France, Italy, Spain, the Netherlands, Belgium, as well as widely in the United Kingdom and in some Irish institutions, and many aspects are also

covered in classes related to medieval archaeology or art history.

Historical archaeology forms a core of many culture/heritage management and preservation (conservation) institutions and services in western Europe, like the English Heritage (especially its Historic Buildings and Monuments Commission for England division), the French *Institut National de Recherches Archéologiques Préventives* (INRAP), the German *Denkmalschutzämter* and *Stadt-und Kreisarchäologien*, the Dutch *Rijksdients voor het Oudheidkunding Bodenmonderzoek* (ROB), the Swedish *Riksantikvarieämbetet*, offices of the Italian *Ministero per i Beni e le Attività Culturali*, and the Spanish *Instituto del Patrimonio Cultural de Espana*, to name a few.

Cross-References

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- ▶ Historical Metallurgy Society Ltd.
- ▶ Historische Archäologie
- ▶ Irish Post-Medieval Archaeology Group (IPMAG)
- ▶ Medieval Archaeology
- ▶ Post-Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Scandinavia/Northern Europe: Historical Archaeology
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Western Roman Provinces, Archaeology of the

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Introduction

By the end of the first century CE, all of the modern countries of Western Europe up to the Rhine river, including Spain, Portugal, France, Belgium, the Netherlands, Germany, Switzerland, and much of Britain, had been incorporated into the Roman Empire. They eventually became the Roman provinces of Hispania Baetica, Hispania Lusitania, Hispania Tarraconensis, Gallia Narbonensis, Gallia Aquitania, Gallia Lugdunensis, Gallia Belgica, Raetia, Noricum, Germania Superior, Germania Inferior, and Britannia (Fig. 1).

Greco-Roman goods had been flowing into most of these areas before their formal incorporation into the empire, and after the conquest and the establishment of the provinces, some areas accepted Roman and/or Mediterranean traditions more than others. This is particularly true in the provinces of Gallia Narbonensis and the eastern and southern parts of the provinces of the Iberian Peninsula, particularly because of the presence of Greek and, in the case of Spain, Phoenician colonies that predated incorporation into the empire. Even so, it is clear that Mediterranean goods were circulating in the entire region, even in Britannia, prior to their official conquests.

Key Issues

Urbanism

It was in the provincial towns and cities where much of the cultural interaction between the indigenous populations, merchants, soldiers, and Roman officials took place. Here patrons could expect more people to witness their benefactions, and so most acts of euergetism occurred in these locales. It was also in urban locations that members of the indigenous population became familiar with Greco-Roman traditions.

The Roman-period towns of the western provinces can be divided into four categories, *coloniae*, *municipia*, *civitas* centers, and *vici*, of roughly descending importance. In most instances, *coloniae* consisted of settlements of Roman veterans, but some cities, such as *Eburacum* (York) in Britannia or *Vesontio* (Besançon) in Germania Superior, were promoted to this status. Some towns of considerable size fell into none of these categories, for example, *Aquae Sulis* (Bath), which seems to have been more of a resort town (Dark 1993). Moreover, these designations did not always reflect the importance of a town. *Mogontiacum* (Mainz), for instance, an important legionary base, the capital of Germania Superior, and an important economic center along the Rhine was only a *vicus* until its promotion to a *municipium* in the fourth century CE. The large urban centers, primarily the provincial capitals and the colonies, have received the greatest level of archaeological scrutiny, but particularly since 1960s and 1970s, attention has increasingly turned to small towns and other types of nucleated settlements (Burnham & Wacher 1990).

The provincial capitals had a particularly important role to play in the diffusion of Roman traditions. The capitals of the Iberian provinces were *Emerita Augusta* (Mérida) in Hispania Lusitania, *Corduba* (Córdoba) in Hispania Baetica, and *Tarraco* (Tarragona) in Hispania Tarraconensis. Those of the Gallic provinces were *Burdigala* (Bordeaux) in Gallia Aquitania, *Durocortorum Remorum* (Reims) in Gallia Belgica, *Lugdunum* (Lyon) in Gallia Lugdunensis, and *Narbo Martius* (Narbonne) in Gallia Narbonensis. The capital of Germania Inferior was *Colonia Claudia Ara Agrippinensium* (Cologne), and the capital of Germania Superior was *Mogontiacum* (Mainz). Although the capital of Britannia was originally *Camulodunum* (Colchester), eventually *Londinium* (London) became the home of the provincial governor. The capital of Noricum was *Virinum*, which was not even officially founded until 50 CE. Lastly, while it does not appear to have

Western Roman Provinces, Archaeology of the, Fig. 1 Map of the western provinces. Public domain

been the original provincial capital of Raetia, by the second century CE, *Augusta Vindelicum* (Augsburg) had assumed this role.

In addition to the provincial capitals, other *coloniae* and *municipia* functioned as important urban centers. The Iberian provinces had 27 *coloniae* and as many as 37 *municipia* altogether (Curchin 1991: 103-22; Fear 1996: 63-104). Many more *coloniae* were founded in western Spain because this part of the region was not as urbanized from the start. In the south and east, the important cities of *Gades* (Cádiz), *Carthago Nova* (Cartagena), and *Emporiae* (Empúries) predate formal Roman activity in the region by centuries. *Gades* (Cádiz), founded by the Phoenicians perhaps as early as c. 1100 BCE,

was the oldest city in Spain. *Carthago Nova* (Cartagena), established by the Carthaginians in 223 BCE, was described centuries later by Livy as *opulentissima omnium in Hispania* – the richest of all the cities in Spain (Liv. 26.48). *Emporiae* (Empúries) was founded in the middle of the sixth century BCE by Greeks from the colony of *Massilia* (Marseille). Despite these examples, Spain was not particularly urbanized prior to incorporation into the Roman Empire.

On the other side of the Pyrenees, the earliest of the colonies were founded in the southern part of the region. By the end of the Augustan period (27 BCE to 14 CE), veteran colonies had been established at *Narbo Martius* (Narbonne), *Arelate* (Arles), *Baeterrae* (Béziers), *Arausio* (Orange), *Forum Julii* (Fréjus), most likely *Noviodunum* (Nyon), *Augusta Raurica* (Augst), *Carpentoracte Meminorum* (Carpentras), and *Lugdunum* (Lyon), and possibly even *Valentia Julia* (Valence) and *Vienne* (Vienna). It was not until the middle of the first century CE and beyond that colonies were founded in the north, with veteran colonies at *Colonia Claudia Ara Agrippinensium* (Cologne) founded under Claudius (r. 41–54 CE), possibly at *Aventicum Helvetiorum* (Avenches) under Vespasian (r. 69–79 CE), and *Vetera* (Xanten) under Trajan (r. 98–117 CE).

In order to determine the size and importance of the urban centers in the Gallic provinces, Goudineau ranked them on a set of 35 different criteria, including size of territory, number and scale of monumental structures, degree of urban planning, level of industry, and legal status, among others (Goudineau 1980). Based on his analysis, he identified the 18 largest towns in the region and divided them into four groups: first, *Lugdunum* (Lyon), *Narbo Martius* (Narbonne), *Nemausus* (Nîmes), *Augusta Treverorum* (Trier), and *Vienne* (Vienna); second, *Arelate* (Arles), *Burdigala* (Bordeaux), *Augustodunum Aeduorum* (Autun), and *Durocortorum Remorum* (Reims); third, *Vasio Vocontiorum* (Vaison), *Mediolanum Santorum* (Saintes), *Aventicum* (Avenches), *Baeterrae* (Beziers), and *Arausio* (Orange); and finally *Forum Julii* (Fréjus), *Aquae Sextiae* (Aix-en-Provence), *Divodurum* (Metz), and *Tolosa* (Toulouse). Although not part of Goudineau's study in the two Germanies, *Colonia Claudia Ara Agrippinensium* (Cologne) developed into the most successful commercial center and was perhaps second only to *Lugdunum* (Lyon) in the continental provinces (Drinkwater 1983: 130).

Unfortunately, no such study has been undertaken in Britain, but it is evident that the island had fewer large urban centers than the continental provinces (Mattingly 2006: 260-3, 289). There were only four *coloniae*, *Camulodunum* (Colchester), *Glevum* (Gloucester), *Lindum* (Lincoln), and *Eburacum* (York), and the only known *municipium* was *Verulamium* (St. Albans). *Londinium* (London) demonstrates, however, that this system was not rigid because, although the capital and the most important city in Britannia, no firm evidence has survived to indicate that it ever became a *colonia*.

Noricum had only one colony, *Ovilava* (Wels), a town that was elevated to this status and did not have any veterans (Alföldy 1974: 86-96). This lack of *coloniae* seems to indicate that not many Roman citizens ever immigrated to the province. In addition to this colony, the province had eight *municipia*, a particularly large number of towns given that much of the province consisted of mountainous and uninhabited areas.

Very few towns of status are known in Raetia. Its capital, *Aelium Augustum* (Augsburg), is the only confirmed *municipium*. Although Tacitus does mention a *splendissima Raetiae provinciae colonia*, a most splendid colony of the province of Raetia, unfortunately he does not give the name of the town (*Germania* 41). It seems, however, that the two most important towns in Raetia were *Curia* (Chur) and *Tridentum* (Trent).

Although all of the western provinces had such urban centers, they were unevenly distributed. Some areas, such as Normandy and Brittany in France, Wales, and southwestern England, showed hardly any urbanization. Likewise, these regions had little in the way of Roman-style development, with, for example, few Roman-style architectural features, inscriptions, or sculpted monuments (Mattingly 2006: 296, 509; King 1990: 106, 120).

The Countryside

Despite the urban development that took place after the incorporation of the region into the Roman Empire, the rural population in all parts of the region always exceeded the urban one. In Britannia, for example, the urban population has been estimated to have been no more than 200,000 compared to a rural population of 1.6 million (Mattingly 2006: 256). The types of settlements in the countryside varied widely, and the ways in which they are defined alter our understanding of their development distributions. Moreover, these areas have not often been subjected to the same level of archaeological scrutiny as the urban centers.

The most outstanding archaeological feature of the countryside is the villa. The term villa is complicated. Here the term indicates a rural structure with some Roman-style features, such as rectilinear architecture, stone or ceramic building materials, mosaics, and public baths, that may also have had productive elements including grape and olive presses or grain dryers.

The placement of rural residences was not unrelated to the placement of the urban centers, largely because of the economic opportunities they provided to agricultural producers but also the importance of landholding to the urban elites. Clusters of villas are known around, for example, many of the towns of Noricum, including *Virunum*, but especially *Juvavum* (Salzburg). Such patterns are not entirely straightforward because, for example, very few villas are located near *Londinium* (London), the largest city in Britannia, while many appear around *Cunetio* (Mildenhall, Suffolk), a relatively small settlement.

The heyday of the villa in most parts of the region was in the early fourth century CE, but their number and size varied temporally. For instance, in Britannia the villas of the first century, such as the large and extravagantly decorated villa at Fishbourne (West Sussex), averaged more than 2,000 m^2 in built area (Cunliffe 1971). Such villas were located almost exclusively in the southern part of the province. Over the course of the following three centuries, villas spread across a wider area of the south, but while they were increasing in number, they were at the same time decreasing in size. Villas are essentially absent in some parts of Britannia, particularly Wales and the military zone in the north near Hadrian's Wall, particularly in the modern counties of Cumbria, Durham, Northumberland, and Lancashire. While it seems possible that the heavy military presence in these areas stifled economic development, it is equally if not more likely that in these areas the segment of the population wealthy enough to construct villas felt no need to display their wealth in this way.

Villas are abundant in the Gallic provinces, especially in the area from across Gallia Belgica southwest across Gallia Lugdunensis to Gallia Aquitania (King 1990: 92-7). The regions of Picardy and southern Aquitaine have been particularly well studied thanks to aerial photography undertaken in the 1960s and 1970s CE. Although many different arrangements existed for the villas in this area, one of the most popular types consisted of a main residence building with a forecourt adjacent to a large rectangular courtyard, sometimes as large as two hectares, which was surrounded by subsidiary buildings. Such villas are known in Picardy, for example, at Warfusée-Abancourt, but also in Aquitaine at Montmaurin and Chiragan and further afield at Anthée, Echternach, Otrang, Oberentfelden, Seeb, Levet, and Noyers-sur-Serein. Despite the widespread nature of this style of villa, certain regions had their own preferred arrangements. An example is the "hall villa," peculiar to the Germanies and northern Gallia Belgica, which had larger open rooms instead of clusters of smaller ones, while the villas of Gallia Narbonensis were much more like their Italian counterparts, with a residence wing and often an area with facilities for the production and storage of both olive oil and wine.

Architecture

Although most of Spain, and particularly the south of France, was incorporated into the Roman Empire by the late second century BCE, in both areas the development of monumental architecture did not occur until the Augustan period (Ward-Perkins 1981: 219). After the Augustan period, towns throughout the region contained

Roman-style structures, including fora, aqueducts, baths, and entertainment facilities.

The forum complex at *Augusta Raurica* (Augst), dating from the mid-second century, is typical of city centers and public architecture throughout the western provinces (Ward-Perkins 1981: 220-1). The monumental core of the town occupied three entire blocks of the city's grid and consisted of a basilica, forum, and a temple, which together formed a single unit, unified by a series of porticos. As is typical in the western provinces, the basilica ran transversely across one end of the space of the forum, while the temple faced it at the opposite end. Similar complexes can be found at *Lutetia* (Paris), *Lugdunum Convenarum* (Bertrand-de-Comminges), and *Virinum*, just to name a few in the continental provinces. In Britain, the pattern was altered somewhat, often with the omission of the temple, as at *Venta Silurum* (Caerwent), Caistor, *Calleva Atrebatum* (Silchester), and *Viriconium Cornoviorum* (Wroxeter).

Some of the finest Roman-period architectural elements to survive in the western provinces revolved around water (Sear 1998: 210-3, 217; Ward-Perkins 1981: 214-8, 224-5). In fact, perhaps the most impressive architectural elements in Spain were the aqueducts and bridges, including the bridge over the Tagus river (Tajo) in Alcantara, the highest in the Roman world, as well as the aqueduct bridges at Segovia and *Tarraco* (Tarragona). The most famous of the aqueduct bridges in the western provinces is, however, the Pont du Gard (Fig. 2), which was part of the channel that provided water to *Nemausus* (Nîmes). Most aqueducts were underground and lacked these dramatic aqueduct bridges. On the continent, *Augusta Raurica* (Augst) had an aqueduct, and *Colonia Claudia Ara Agrippinensium* (Cologne) had two, while *Aventicum* (Avenches) had at least six (Carroll 2001: 50-1). With the exception of a timberlined channel in *Cambodunum* (Kempten), no aqueducts have survived in Raetia (Herrling 1943: 119). In Britain, the nature of the terrain as well as the availability of water also made aboveground channels largely unnecessary (de la Bédoyère 2001: 213-4).

Western Roman Provinces, Archaeology of the, Fig. 2 The Pont du Gard (©S. McGowen)

The water from these aqueducts was used for many purposes, one of which was baths (Ward-Perkins 1981: 233-6; Carroll 2001: 49-50; de la Bédoyère 2001: 38-9, 104-8). Towns of any significance had public baths, sometimes several sets. Some bathing establishments in the western provinces, for example, those at *Glanum* (St.-Rémy), have an arrangement of the traditional bathing rooms (*frigidarium*, *tepidarium*, *caldarium*) along the edge of *palaestra* as found in Pompeii, for example. An alternative design seems to have developed in the Gallic provinces. In this case, the bathing rooms were arranged linearly, as in the Great Southern Baths at *Conimbriga* (Condeixa-a-Velha) in Hispania Lusitania (Ward-Perkins 1981: 217-8). Interestingly, these baths replaced an Augustan-period complex of the traditional Pompeian type. Baths fed by springs were also common architectural

features in the western provinces. These types of baths often included numerous plunge pools. Such baths are known at *Ivaonum* (Évaux) and *Rubiacum* (Royat) in Gallia Aquitania, Badenweiler in Germania Superior, Les Fontaines Salées in Gallia Lugdunensis, and Amélie-les-Bains in Gallia Narbonensis, but perhaps the best surviving set is found at *Aquae Sulis* (Bath) in Britannia.

Structures used for entertainment – theaters, amphitheaters, and circuses – were also particularly important to the development of Roman-style architecture in the region. The western provinces and Gaul in particular are home to some of the earliest known theaters outside of Italy (Sear 2006: 97-102, 196-254, and 258; Ward-Perkins 1981: 230-2). Several theaters are known in the Gallic provinces, including those at *Arelate* (Arles), *Lugdunum* (Lyon), and one at *Arausio* (Orange), the latter of which is preserved almost entirely. The largest of the Gallic theaters, with a capacity of c. 7,000 people, was in *Augustodunum Aeduorum* (Autun). The Iberian provinces had at least 15 theaters, including those at *Italica* (Santiponce), *Emerita Augusta* (Mérida), *Tarraco* (Tarragona), *Saguntum* (Sagunto), and *Acinipo* (Ronda la Vieja), most of which were constructed in the first and second centuries CE (Keay 1988: 125). In the Germanic provinces, theaters have been discovered at *Augusta Raurica* (Augst), *Aventicum* (Avenches), *Mogontiacum* (Mainz), *Nida* (Heddernheim), *Lopodunum* (Ladenburg), *Epomanduodurum* (Mandeure), and Lenzburg, all of which were built of stone with the exception of the one at Heddernheim (Carroll 2001: 51-2). In contrast, only three theaters have been identified in Britannia; those at *Durovernum Cantiacorum* (Canterbury), *Camulodunum* (Colchester), Gosbecks, and *Verulamium* (St. Albans) have been identified (de la Bédoyère 2001: 102-4). It is likely, however, that *Londinium* (London) and the other *coloniae* also had theaters. In Noricum, theaters are known at *Virunum* as well as at *Carnuntum* (Pfaffenberg). So far no theaters have been identified in Raetia.

Although not as numerous as theaters, several amphitheaters existed in the western provinces. Many were made of wood, as at *Aventicum* (Venches) or *Xanten* (Vetera); in Britannia, most consisted of earthen embankments with timber or stone revetments (de la Bédoyère 2001: 99-102). Although most were located in the larger towns, an amphitheater has been identified using aerial photography at *Venta Icenorum* (Caistor St. Edmund), one of the smallest *civitas* centers in Britain. In the western provinces, circuses were the rarest of the entertainment structures (Keay 1988: 120-3; King 1990: 80-82). The Gallic provinces had only five, and the only known example in Britannia is at *Camulodunum* (Colchester) (Crummy 2005).

With a few important exceptions, imperial benefaction was rare in the western provinces. Euergetism by provincials led to the construction of public buildings, but in the western provinces, competitive building by members of the elite was comparatively rare. In Britannia, most public benefactions were actually made by outsiders (Mattingly 2008). For example, a certain Lucius Viducius Placidus built an arch and a gateway in York, although he appears to have originated from the area around Rouen (*AE* 1977.512; *AE* 1983.643).

Infrastructure

As true of most of the Roman Empire, the western provinces had well-developed infrastructure. These regions had pre-Roman roads, as, for example, the Venetic road linking *Julium Carnicum* (Zuglio) with a settlement on the Gurnia River in Noricum. After the conquest of each region, however, extensive road networks developed throughout the provinces. Although originally constructed for the military, once in place they were used for civilian purposes, speeding communication and facilitating the transportation of goods. These roads were also powerful symbolically, as they marked a territory as unquestionably Roman.

In the Iberian provinces, many of the roads followed the major rivers such as the Ebro, Tagus, and the Duero and divided the tribal territories. The so-called *Camino de la Plata* started as just such a road and eventually became a major artery between *Asturica Augusta* (Astorga) and

Emerita Augusta (Mérida) (Keay 1988: 49). The Via Heraclea (later the Via Augusta), one of the most important roads in Spain, ran along the coast and linked Spain with both Gaul and Italy. The earliest roads in the central European provinces were constructed in the south. In the late second century BCE, an important road linking the Pyrenees and the Rhône was established (King 1990: 39). Then, in the later first century BCE, the road network was extended northward: initially from *Lugdunum* (Lyon) to the Moselle, then to *Colonia Claudia Ara Agrippinensium* (Cologne) and the Atlantic, as well as east-west through *Bagacum* (Bavay) to the Atlantic coast (King 1990: 55-6; Carroll 2001: 32-3; Drinkwater 1983: 124). An important route eventually developed along the west bank of the Rhine to the North Sea, passing through *Mogontiacum* (Mainz).

Similar roads, which undoubtedly began as military supply routes, also crisscrossed Britannia. The three most important roads in Britannia were Watling Street, which extended from London to Chester and points north, the Fosse way, running from Exeter to the colony at Lincoln, and Ermine Street, which went from the south through London and on to Lincoln and then on to York (Mattingly 2006: 134, 142-3). In Noricum, the most important Roman road connected Aquileia with the Tagliamento valley. This thoroughfare crossed the Alps from Italy at the Sella di Camporosso (Saifnitzer Sattel) to *Virinum* where it turned north to *Ovilava* (Wels) and on to the Danube River (Alföldy 1974: 11-3). In Raetia, the southern part of the province was not as well equipped with roads as the north, and certainly this reflects the military origin of the road network (Herrling 1943: 100-16). Numerous roads also fed into the capital at *Augusta Vindelicum* (Augsburg) from all directions.

Although these networks were extensive, travel by road was slow and expensive, and so wherever possible travel by water was preferred. In the Iberian provinces, grain, olive oil, and minerals were transported along the Guadalquivir River from *Corduba* (Córdoba) to points downstream and onto seafaring vessels. Likewise, one of the reasons for the success of *Londinium* (London) was its placement not only at the hub of the road network but also at the navigable end of the Thames. *Lugdunum* (Lyon), too, was a hub in the road network as well as a point where riverboats could travel north up to the Saône to *Cabillonum* (Chalon-sur-Saône). *Arelate* (Arles) also gained importance from its location at the mouth of the Rhône, where seagoing vessels could transfer goods onto riverboats. Additionally, the Rhine and the Danube were navigable and served as major trade routes in the Germanic provinces, Noricum, and Raetia.

Art

Pottery, jewelry, metalwork, and other smaller-scale objects could certainly qualify as art objects. Gaulish Samian ware, with its major production center at La Graufesenque near Millau, was exported throughout the western provinces (Bémont & Jacob 1986). The major artistic outlets were, however, wall painting, mosaic, and sculpture.

Before the Roman period, no tradition of wall painting or plasterwork existed in the area that would become the western provinces. In the Roman period, wall painting was almost ubiquitous in the homes, temples, and public buildings, but unfortunately it has not survived well. What has survived has often been removed from its context and, perhaps more detrimentally, divided between different museums and collections. No doubt the spread of this type of wall decoration was uneven, but the limited remains make a thorough analysis of the pattern of diffusion difficult.

All of the four Pompeian Styles appear in the western provinces (Ling 1991: 168-74; Henig 1995: 118-20). The Pompeian Second Style decoration appears in four houses in *Glanum* (St.-Remy), including the so-called House of Sulla, which dates to the 40s BCE. Architectural illusionism and trompe-l'œil, hallmarks of the Second Style, also appear in wall painting from the Dover Painted House, a second-century building at Southwark in Britannia. The Third Style was especially popular in the western provinces. An example dating to the mid- to late Augustan period from Magdalensberg shows Dionysus and several Greek heroines on red backgrounds,

and the mature Third Style appears at a villa in Commugny in Switzerland, with similar examples at both *Vesunna* (Périgueux) in Gallia Aquitania and *Aventicum* (Avenches) in Gallia Belgica. The Fourth Style, though often simplified with less fantastical architecture, is particularly popular in Gaul, the Germanies, and the Iberian provinces. Some instances contain extra detail not usually found in Italy. For example, in the baths at *Virinum*, foliage consisting of flowers and fruit containing birds and other objects took the place of the typical candelabras, and at *Asturica Augusta* (Astorga) in Hispania Tarraconensis, attributes of various gods and goddesses, such as the winged hat of Mercury or the lyre of Apollo, were introduced. Although only two, these cases demonstrate the type of excess detail and creative use of motifs that could be found in provincial wall painting.

After the destruction of Pompeii, wall painting continued in Italy as well as in the provinces. At a house at Leicester appears a trompe-l'œil podium together with fine and delicate architectural decoration typical of the Pompeian Fourth Style. Such eclecticism is fairly typical of wall painting in the second and third centuries. At this same time, mythological iconography became increasingly rare. Two fine exceptions, both dated to the Antonine period (mid-second century CE), survive in Germany. At *Augusta Treverorum* (Trier), Jason and Medea appear in the central panel of the so-called green wall, and at a frontier fort in Echzell, a panel containing an image of Fortuna handing over a cornucopia to Hercules is flanked by a pair of Cretan scenes: Daedalus making the wings of Icarus and Theseus killing the Minotaur. It also appears that particular patterns were preferred in certain contexts. For example, curvilinear motifs were favored on ceilings, as, for example, at Hölstein and Bösingen in Switzerland. Dating to late second or early third century CE, both ceilings are decorated with intersecting circular garlands, similar to ceiling paintings in the Neronian *Domus Aurea* in Rome. Paintings from *Augusta Treverorum* (Trier), capital of the prefecture of Gaul under the tetrarchy, demonstrate the fine quality possible in provincial painting. One room in particular, perhaps part of an imperial residence, has an elegant ceiling decorated with portrait busts and cupids. Though the identity of the portraits is debated, the execution of the paintings is highly naturalistic, with bodies well proportioned and drapery fully plastic. Such features were, however, short lived. With the increasing Byzantine influence, illusionistic architecture was replaced by patterning in bright, contrasting colors as, for example, at Lullingstone and *Venta Silurum* (Caerwent) in Britannia. Moreover, pagan iconography gradually diminished in favor of Christian subjects, such as the *orantes* from the villa at Lullingstone.

As with painting, no native tradition of decorated pavements existed (Ling 1998: 61-76; Dunbabin 1999: 73-87, 144-59). Fragments of pebble mosaics perhaps dating to the fifth and fourth centuries BCE have survived at *Cástulo* (Cazlona) in southern Spain, but otherwise the tradition is largely nonexistent. Early mosaics are closely tied to Italian prototypes, but as local mosaicists trained others, regional workshops developed with their own localized and distinctive styles. For example, a school of mosaicists operated in the Rhône valley and had production centers at *Lugdunum* (Lyon) and *Vienna* (Vienne); the development of regional workshops is particularly well documented for Britannia (Smith 1965).

Early examples of decorated floor coverings come in the form of *opus signinum* pavements from *Emprion* (Ampurias), *Glanum* (St.-Rémy), and *Massalia* (Marseille). Black and white mosaics, which were predominant in Italy during the early Imperial period, have been found throughout the region, with some fine early examples known at *Emporiae* (Ampurias) and *Forum Julii* (Fréjus) on the continent, and also at the large early villa at Fishbourne in Britannia.

In addition to the black and white mosaics, figured mosaics, primarily mythological in nature, also appeared. Literary or academic themes were particularly popular in the area of the Mosel Valley and the Rhineland, coming from workshops centered on *Augusta Treverorum* (Trier) and *Colonia Claudia Ara Agrippinensium* (Cologne). Such mosaics often

Western Roman Provinces, Archaeology of the, Fig. 3 Vergil panel from the Monnus mosaic at *Augusta Treverorum* (Trier) (©S. McGowen)

Western Roman Provinces, Archaeology of the, Fig. 4 Gladiator mosaic from *Arelate* (Arles) (©S. McGowen)

represent the Muses or important artists and authors. For example, a mosaic from *Augusta Treverorum* (Trier), known by the name of its artist, Monnus, depicts the Muses with literary figures such as Homer and Aratus as well as a gallery of the greatest Greek and Latin authors including Hesiod, Menander, Cicero, and Vergil (Fig. 3). One example of such a literary mosaic has been found at Low Ham in Britain. This mosaic depicts episodes from book four of the *Aeneid* in a narrative sequence. On the whole, however, depictions of Roman legends are rare. Scenes from daily life, such as chariot racing, gladiatorial combat (Fig. 4), and hunting also appear, although they too are relatively uncommon.

Little tradition of sculpting in stone existed in the western provinces before incorporation into

Western Roman Provinces, Archaeology of the, Fig. 5 Bronze head of Minerva from *Aquae Sulis* (Bath) (©S. McGowen)

the empire. It is possible, however, that wood could have been the preferred medium and that it simply does not survive. Nevertheless, after formal incorporation, use of stone for sculpture increased dramatically. In addition to sculpture in stone, bronze sculpted monuments did exist throughout the region, for example, the head of Hadrian (r. 117–138 CE) from the river Thames in *Londinium* (London) and the head of Minerva from the sanctuary of Sulis Minerva in *Aquae Sulis* (Bath) (Fig. 5). Because of the inherent value of bronze, which can be easily melted down and recast, they have not survived well.

Stone sculpture appeared in four main contexts in the western provinces – private, civic, funerary, and sacred. Sculpture adorned some homes and villas throughout the region (Stirling 2005: 29-90, 190-5). For example, at the villa in modern-day Lullingstone in Britannia, two portrait busts made of Greek marble were discovered, and in a private home in *Limonum Pictonum* (Poitiers) in Gallia Aquitania was found a statue of Minerva in a Greek archaic style. An astounding collection of sculptures was also found at the villa in Chirgan in the province of Gallia Aquitania about 60 km from *Tolosa* (Toulouse). Sculptures such as these certainly said much about the wealth and status of their owners. Sculpture was, however, more prevalent in public contexts. Funerary monuments, from monumental structures such as the Mausoleum of the Julii at *Glanum* to smaller stelai such as the tombstones of M. Favonius Facilis from *Camulodunum* (Colchester) and L. Cantius Secundus from near St. Leonhard in Noricum, were erected with varying density throughout the region. Public places, such as the fora at *Lugdunum* (Lyon) or *Tarraco* (Tarragona); the theaters at *Arausio* (Orange), *Tarraco* (Tarragona), and *Italica* (Santiponce); or the baths at *Virinum*, were decorated with sculpture. Finally, architectural sculpture and sculpted votives appear at numerous sacred sites, including the sanctuary of Sulis Minerva at *Aquae Sulis* (Bath), decorated with a sculpted pediment depicting a fierce, mustached male gorgon, or the sanctuary of Hercules at Deneuvre, where more than 50 reliefs and freestanding statues of the god have been discovered (Fig. 6).

Much sculpture from the western provinces is of high quality and naturalistic, in keeping with the Greco-Roman traditions. Most works from Lyon (*Lugdunum*) and *Vienne* (Vienna), catalogued in the *Nouvel Esperandieu* series, are naturalistic and entirely Greco-Roman in style (Darblade-Audoin 2006; Terrer 2003). Moreover, the sculpted heads of Jupiter Ammon from the forum at *Tarraco* (Tarragona) seem directly inspired by the Forum of Augustus at Rome and are executed with a high level of skill. Much of the Roman-period sculpture from the western provinces is not of such high quality. Instead, in contrast to Greco-Roman naturalism, it tends to be highly schematic, displaying a so-called Celtic style, hallmarks of which are flowing hair, oversized heads and eyes, and fondness for patterning. (Green 1998) has even suggested that such stylistic features may be "…conscious attempts by indigenous populations…to make a positive and independent statement…" In contrast, (Johns 2003) has presented a strong counterargument advocating that the skill of the artists and the nature of the material highly influenced style,

Western Roman Provinces, Archaeology of the, Fig. 6 Relief of Hercules from the spring sanctuary at Deneuvre (©S. McGowen)

often regardless of the desires of the patrons or even the intentions of the artists.

Religion

Not much is known of religious traditions in the area of the western provinces prior to incorporation of the region into the empire. That it was polytheistic is clear, but almost nothing is known about the names of the deities, and those that are known come from Roman-period sources. Pre-Roman religious practice does not seem to have involved temples generally. It does seem to have been concentrated around natural features such as rivers, springs, and groves, as, for example, described by Lucan in his account of Caesar's campaigns in Gaul (Lucan, 3.394-452). Based on the quantity of objects discovered in sacred contexts, it is apparent that the practice of making dedications to the gods was widespread.

Western Roman Provinces, Archaeology of the, Fig. 7 Statue group of the Capitoline Triad from *Augusta Treverorum* (Trier) (©S. McGowen)

The invasion and the subsequent incorporation of these regions led to an influx of new people who brought with them the gods of the official Roman state religion, including the Capitoline Triad of Jupiter, Juno, and Minerva (Fig. 7), and it was effectively a requirement that each *colonia* has a temple for these gods. The most important part of official religion in the provinces was, however, the imperial cult. Each province had its own provincial temple, where representatives of the population gathered every year to make offerings and take part in ceremonies. Such temples existed at *Tarraco* (Tarragona), *Emerita Augusta* (Mérida), *Narbo Martius* (Narbonne), *Lugdunum* (Lyon), and *Camulodunum* (Colchester) (Fishwick 1987: 82-8, 235-46). Early phases of the provincial cult in the west usually consisted of an altar provided for the worship of living emperors, while temples were reserved for the cult of the deified, deceased emperors. Although the precise form of these temples is not always known, it does appear that the types of temples used for these official cults were very much Roman in form. The introduction of these official cults into the provinces illustrates how the Romans used religion for political ends: official religion and the imperial cult in particular served to unify the diverse populations of the empire (Allason-Jones 2008: 120-1).

Not all gods were, however, new. Pre-Roman gods were incorporated into Roman religious life in three main ways. In some instances, a Roman deity took over completely. For example, while pre-Roman religious activity occurred at Uley in Britannia, in the Roman period, Mercury became the chief deity of the sanctuary. Here the Roman messenger god took on a martial capacity, as demonstrated by the dedication of model spears to alongside caducei. In some instances, a deity from the Roman pantheon was paired with a pre-Roman one. For example, the Celtic deity Sulis was paired with Roman Minerva at *Aquae Sulis* (Bath) in Britannia, and in *Aquae Granni* (Aachen) in Germania Inferior, the Roman god Apollo was paired with the Celtic Grannus. In some instances, however, the pre-Roman deity remained and was sometimes venerated with inscribed and sculpted dedications, a Roman religious tradition. Generally, such deities are referred to local deities. Coventina, for instance, had a center of worship at *Brocolitia* (Carrawburgh) on Hadrian's Wall, and for a long time, she was considered a local deity. Altars dedicated to this goddess have also been found in northern Spain. It is not entirely clear whether her worship traveled from Britain to Spain or Spain to Britain, and adding to the complication, all of the devotees whose ethnic origin is known are Germanic (Allason-Jones 2008: 118-9). Thus, the identification of deities with non-Roman names as local is more complicated than it may first appear.

This same sort of blending is also apparent in religious architecture. A distinctive type of temple existed in the western provinces, particularly northern Gaul and Britannia. Though some variation of shape did occur, they consisted primarily of a square central cella surrounded by a concentric ambulatory or passageway. Such temples are largely confined to civilian areas. In Britannia, for example, most of the more than 50 temples of this type have been discovered in the southern and eastern parts of the province away from the military areas in the north. Worship in the military area, by contrast, was marked by the erection of inscribed stone altars, which are largely absent in the rest of Britain.

The Military and the Borders

The military also left an enduring archaeological mark on the western provinces, particularly the frontier regions of the Germanies, Britannia, Noricum, and Raetia but also northwestern Spain (Hanel 2007). Throughout these areas, permanent bases were constructed for both the legionary and auxiliary forces. Camps of the early empire were often polygonal in plan and constructed of less durable materials, particularly turf and timber. By the middle of the first century CE, however, permanent fortresses of the typical playing-card shape were the standard, as, for example, the stone fort at Hofheim. Stone as a building material became predominant in the late first and second centuries, especially following the civil wars of 69 CE. During the process of consolidating the empire under Hadrian, permanent boundaries were constructed, the most famous of which is Hadrian's Wall, which extends the entire width of Britannia at its narrowest point between the Solway in the west and the Tyne in the east (Fig. 8). These borders brought with them the development of new forts and other types of military structures such as milecastles and watchtowers.

In proximity to the camps often developed civilian settlements called *canabae* for legionary bases or *vici* for auxiliary forts. The best understood of the *canabae* in the western provinces are *Isca Silurum* (Caerleon), *Noviomagus* (Nijmegen), and *Bonna* (Bonn), and the *vicus* at *Vindolanda* has

Western Roman Provinces, Archaeology of the, Fig. 8 Hadrian's Wall (©S. McGowen)

been well excavated. Though it is not clear whether these settlements served agricultural purposes, certainly various types of manufacturing, such as bronze working and terracotta production for both pottery and tile, occurred in most. Some even had features resembling fora, the precise function of which is uncertain.

Current Archaeological Trends

Along with numerous subsidiary regional journals, there are four main academic journals for archaeological material from Western Europe. *Britannia*, sponsored by the Society for the Promotion of Roman Studies, is the primary publication for the province of Britannia. *La Revue Archeologique*, published by the Société Archéologique d'Alep, is the main venue for archaeological material from the French provinces, although its purview extends to material from much of the Mediterranean and even into Central Asia. *Bonner Jahrbücher*, published through the Rheinisches Landesmuseum Bonn and the LVR-Amt für Bodendenkmalpflege im Rheinland, has as its focus primarily material from the Rhineland areas, but it also includes articles on all aspects of archaeology in Europe. Finally, the primary resource for archaeological activity in Spain is Archivo Español de Arqueologia, which is sponsored by Archivo Español de Arte y Arqueología.

Many interdisciplinary and international conferences have either been instituted or have developed dramatically on particular topics relevant to the western provinces. For example, the International Congress of Roman Frontier Studies, also known as Limeskongress, which was first held in 1949, will conduct the twenty-first meeting in September 2012 in Ruse, Bulgaria. Similarly, the International Colloquium on Roman Provincial Art is held biennially. This conference series, which began in the 1980s, had as its original focus the countries of Western Europe, but in 2007 it was opened to the eastern provinces as well. In addition to the papers presented at these conferences, they have also generated monographs important to the study of this region.

The archaeology of the western provinces has also seen dramatic growth in the availability of online resources. For instance, an international research project conducted from 2004 to 2007 and funded by the European Commission, General Directorate for Education and Culture within the framework of the sponsorship program, "Culture 2000," has produced a website detailing the archaeology of all the western Roman provinces (http://www2.rgzm.de/transformation). Pottery from the region is well catalogued and analyzed as part of the Potsherd: Atlas of Roman Pottery project (http://potsherd.net). Similarly, much of the Gallo-Roman sculpture has been digitized and catalogued by the Centre Camille Jullian (http://nesp.mmsh.univ-aix.fr/). This project is part of a larger effort to update the printed catalogues of Gallo-Roman sculpture, compiled in the late nineteenth and early twentieth centuries by Émile Espérandieu. Three volumes in this new series, under the title *Nouvel Espérandieu*, have already been published with more volumes currently under production.

Cross-References

- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Ethnicity and Identity in the Ancient Mediterranean World
- ▶ Imperial Cult, Roman
- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Romanization
- ▶ Urban Planning, Roman
- ▶ Villas and Farms in the Mediterranean World

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Wheats: Origins and Development

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Basic Species Information

Wheat is one of the world's most widely grown crops today. Together with its typical companion cereal and barley, wheat was the staple cereal crop of several early civilizations extending from the Indus, to Mesopotamia, to ancient Egypt, and throughout the Mediterranean. However, the term, wheat, is to some degree a misnomer, as it is not a single crop species but a complex of several related crop species that belong to the genus *Triticum* (i.e., *Triticum* spp.). The various species within this genus derive from hybridizations and multiple domestications, including the hybridization of wheat and the closely related goat-faced grasses (*Aegilops* spp.), and from post-domestication evolutionary advances, such as the evolution of free-threshing spikelets.

The first major spectrum of variation in the wheats is at the ploidy level (i.e., variation in the number of sets of chromosomes). Figure 1 illustrates the approximate maximal extent of crops of each ploidy level based on traditional agriculture and archaeobotanical data. In current taxonomy, each ploidy level is recognized as a separate species, with traditional cultivar groups and both wild and domesticated forms grouped as subspecies. In this system, there are three main biological species, *Triticum monococcum* (diploid), *T. turgidum* (all tetraploids), and *T. aestivum* (all hexaploids). For example, wild emmer wheat should be *T. turgidum* ssp. *dicoccoides;* domesticated emmer wheat, *T. turgidum* ssp. *dicoccum*; and free-threshing hard wheat, *T. turgidum* ssp. *durum*. However, in practice

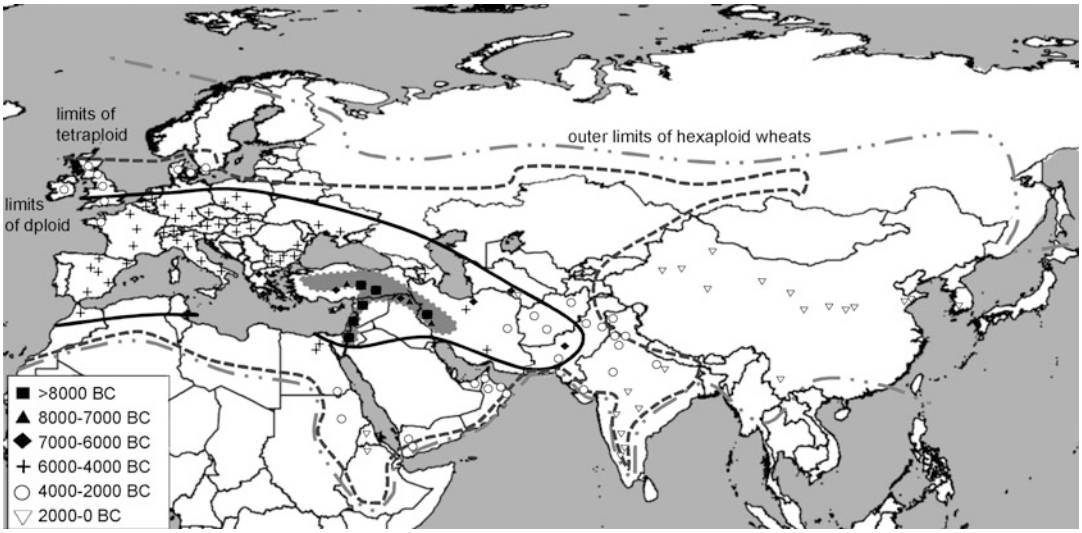

Wheats: Origins and Development, Fig. 1 Geographical distributions of wild wheats (*Triticum* spp.), with different lines representing the approximate limits of the spread of wheats of different ploidy level. Representative archaeological evidence for the earliest wave of wheat dispersals is indicated by broad time horizons

most archaeobotanists continue to use a somewhat more traditional binomial system in which hulled (e.g., *Triticum dicoccum*) and free-threshing varieties (e.g., *T. durum*) and wild varieties (e.g., *Triticum dicoccoides* and *T. boeticum* instead of *T. monococcum* ssp. *boeticum*) are considered distinct species (see Zohary et al. 2012, for a comparison of these systems). This classification system makes more explicit the communication of archaeological findings and makes available valuable data-table space. These variations in wheats are culturally significant, as each species has a different potential in terms of agricultural ecology and food use. Further, this classification scheme distinguishes between the wheats based on the archaeological implications, including evidence suggestive of agricultural and food processing practices, specifically whether the grains are from a wild or domesticated and hulled or free-threshing variety.

Major Domestication Traits

The domesticated varieties can be separated based on their response to threshing, specifically, whether the product of threshing is spikelets or grains. In hulled varieties, including *T. monococcum*, *T. turgidum* ssp. *dicoccum*, and *T. aestivum* ssp. *spelta* (spelt wheat), the grains are tightly encased in the glumes that do not release the grains during threshing. This is in opposition to the free-threshing varieties, including tetraploid durum-type (i.e., *T. turgidum* ssp. *durum*) and hexaploid bread wheats, which are not enclosed tightly and release easily during threshing with the result a naked kernel. The archaeological implication is related to the end product of threshing (i.e., spikelet or grains) and how the crop is stored and distributed thereafter. The hulled varieties can be stored for longer periods because they are protected by the glumes. They are distributed as spikelets and will need to be freed from the glume before further processing, unlike the free-threshing varieties which are ready to be milled after winnowing and sieving (Zohary et al. 2012).

Timing and Tracking Domestication

Although all of the wild wheat varieties have a restricted distribution in southwest Asia, mainly in the "Fertile Crescent" and Anatolia (Fig. 1),

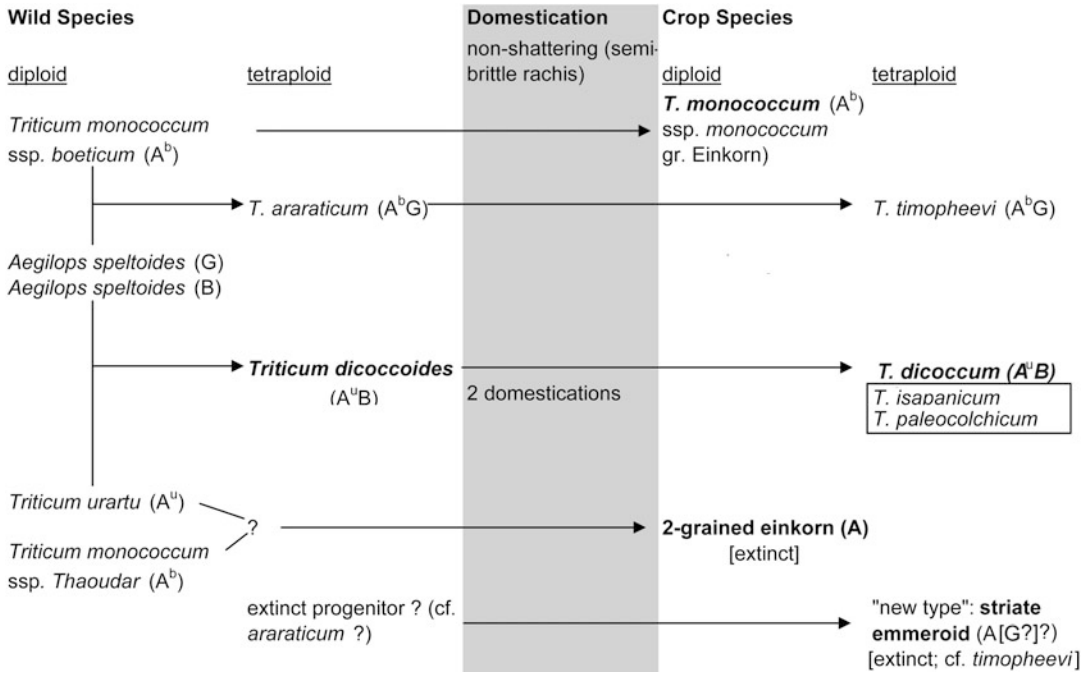

Wheats: Origins and Development, Fig. 2 Diagram representing the current understanding of the selection for non-shattering rachises that resulted in the glume wheats of *Triticum* spp.

wheats are likely to derive from several domestication events across this geographical range. This issue has been the focus of debate in recent years between scholars who favor a single focus of all Near Eastern agricultural origins in a restricted part of southeastern Turkey (e.g., Abbo et al. 2010; 2013), where wild wheats, barley, lentil, and pea overlap with wild chickpea, and those who favor the archaeobotanical evidence for a gradual domestication process of diverse sets of crops over a very wide geographical range of the Fertile Crescent (e.g., Fuller et al. 2012; Asouti & Fuller 2012).

While there are debates on the pace and geographic distributions of domestication, all scholars accept that there were at least three domestications of wild wheats, from wild einkorn (*T. boeticum*), wild emmer (*T. dicoccoides*), and wild Timopheev's wheat (*T. araraticum*). However, archaeobotanical evidence is suggestive of additional domesticated forms of wheat that indicate additional domestications, such as two-grained einkorn and a recently recognized "emmer" type, or striate emmeroid. The former may have been domesticated from *T. urartu* and the latter an early Timopheev's wheat (*T. timopheevii* domesticated from *T. araraticum*), although confirmation supported by genetic evidence is not yet available. In addition to these four or five morphologically distinct domestication events, growing genetic data suggest that there were multiple regions of early cultivation, certainly for emmer wheat (Fuller et al. 2012).

The existence of now extinct domesticated morphotypes highlights the incompleteness of the presence of modern landraces for representing the original genetic diversity of early cultivars. Figure 2 represents the current understanding of domestication processes of wheat, specifically the selection for non-shattering rachises, which results in domesticated glume wheats. In each case, this was also accompanied by a gradual increase in grain size over the course of the Pre-Pottery Neolithic in southwest Asia, i.e., between c. 9500 BCE and 6000 BCE, after which changes in grain sizes in glume wheats were negligible. In the case of

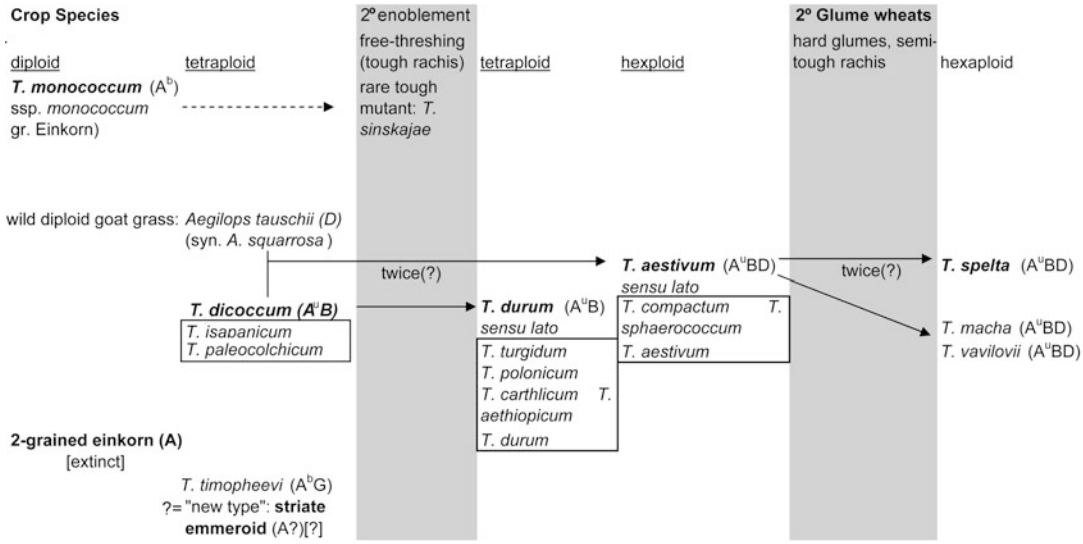

Wheats: Origins and Development, Fig. 3 Diagram representing the post-domestication improvement of wheat through the evolution of free-threshing forms and retro-evolution of hexaploid glume wheats

two-grained einkorn (probably from wild *T. urartu* but plausibly *T. boeticum* ssp. *thauodar*), domestication appears to have been focused on the upper Euphrates region in Syria (Willcox et al. 2008) and it quickly spread to Cyprus shortly after the first signs of domestication in this region (Lucas et al. 2012). In the case of one-grained einkorn (*T. monococcum*), an early focus might have been further to the northwest in Syria and/or in southeastern Turkey. In the case of emmer wheat, the current evidence suggests two foci, one in southeastern Turkey and the other in the southern Levant (Jordan Valley and/or Damascus basin). In the case of striate emmeroid (Possibly form *T. araraticum*), a wheat which was to become an important Neolithic crop at Anatolian sites, such as Çatalhöyük, and in Neolithic and Bronze Age Europe (Kohler-Schneider 2003), as well as spread to Turkmenistan, a domestication somewhere in eastern Anatolia seems most likely. Free-threshing (or naked) wheat evolved early in the history of wheat cultivation, as a form of secondary ennoblement. This took place at least once from tetraploid emmer and at least once by hybridization to produce hexaploid bread wheats (Fig. 3). These free-threshing wheats have the advantage of requiring less crop-processing stages and labor, although they may be more prone to spoilage in storage. Forms of hexaploid glume wheat, such as spelt (*T. spelta*), evolved from free-threshing hexaploid wheats (Fig. 3), presumably in part as better adaptation to primitive storage conditions and cooler climates. Spelt wheat became widespread in Europe from the Middle or Late Bronze Age.

Wheats were an essential part of the founder crop package that dispersed from the "Fertile Crescent" (Fig. 1) westwards through Neolithic Europe, starting about 7000 BCE and reaching the British Isles just after 4000 BCE. It similarly spread rapidly eastward to the Indus Valley and Turkmenistan, where there is evidence of wheat by 6000 BCE. The dispersal into Egypt and up the Nile is later, while the spread of wheat in monsoonal India or to southern Arabia took place after 3000 BCE. The first wheats in southern India appear to date more recently than 2000 BCE. In China, the earliest directly dated wheat is around 2400 BCE and a fair number of sites have evidence of wheats at c. 2000 BCE (Flad et al. 2010). Different species of wheats, or sets of wheats, spread along these different trajectories; each was suited to varied ecologies and different culinary traditions. In general, it was glume wheats that were most important early on,

e.g., emmer wheat in ancient Egypt or Yemen and einkorn wheats in Neolithic central Europe (Colledge & Conolly 2007). In the eastward spread of free-threshing wheats, mainly hexaploids were prominent in the case of the Indus Valley. Based on the current evidence, hexaploid free-threshing wheat was the only species that was adopted in eastern Asia (Boivin et al. 2012).

Identification of the different domesticated varieties of wheats in the archaeological record can be distinguished by comparison of grain morphology and size, spikelet fork morphology, and with the free-threshing wheats, the rachis segments (for additional criteria on identification, refer to Jacomet 2006; Zohary et al. 2012). For einkorn wheat, the two domesticated varieties can be distinguished by grain morphology. Grains of the one-grained variety are "spindle-shaped," whereas the grains of the two-grained variety are straight and flat, as opposed to curved when viewed ventrally. The spikelet forks of einkorn wheat can be distinguished in abaxial view as the angle between the lower parts of the two primary keels (glumes) is relatively small and measures less than 90°, as opposed to the angle observed in emmer wheat which is larger than einkorn and measures greater than 90°. When viewed in cross section, the shape of the lower part of the glume base is rounded and almost rectangular as opposed to clearly rectangular as in the glume bases of emmer wheat. When viewed laterally, the internode is broad in relation to the width of the spikelet. The grains of emmer wheat are generally more rounded at the apical end when viewed dorsally and are tapered at the embryo ends. In lateral view, the grains have a flat or slightly concave ventral surface with the highest point above the embryo on the rounded dorsal side. There is considerable overlap in the morphology of the free-threshing wheat grain varieties, but generally the grains of naked wheat, when viewed dorsally, are slender to round, with the apical and embryo ends bluntly rounded. The morphology in cross section is generally symmetrically rounded as is the dorsal ridge when viewed laterally. The rachis remains of the free-threshing wheats (tetraploid versus hexaploid) can be distinguished based on the glume base remnants and cross section. For the tetraploid durum-types, the glume remnants persist with two protrusions on the top of the rachis segment. In cross-section the segment tends to be rounded and thick. In hexaploid wheats the glumes bases are entirely torn off leaving concave scars. In cross-section the hexaploid rachis is thin with sharp edges.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Barley: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Wheeler, Mortimer

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Basic Biographical Information

Sir Robert Eric Mortimer Wheeler, commonly known as Mortimer, was born in Scotland in 1890, to a father who was a journalist (Piggott 1977: 623). He attended Bradford Grammar School, and went on to complete a degree in archaeology at University College in London. In 1913, Mortimer Wheeler began the studies that led to his postwar doctoral research on Roman pottery in the Rhineland (Piggott 1977: 624). After completing a Masters degree at the University of London in 1912, Wheeler was awarded a Franks Archaeological Studentship, which allowed him to undertake doctoral research in the Rhineland (Wheeler 1958: 31-32). However, this was temporarily delayed by the First World War, in which he served, and from which he emerged as a Major with a Military Cross. After serving in World War I, he conducted excavations of Roman sites in Essex. Mortimer Wheeler was awarded a Ph.D. from the University of London in 1920. The identity of his doctoral supervisor is unknown, and the topic of his thesis seemed to hold little importance to him, especially in later years, when he stated in his autobiography that "nothing need be said" of the trip (Wheeler 1958: 32).

From 1920 to 1926, Mortimer Wheeler held the joint positions of Keepership of Archaeology in the National Museum of Wales and Lecturer in Archaeology at the University of Cardiff (Piggott 1977: 626). In 1924, he became Director of the National Museum of Wales (Wheeler 1958: 58). In 1926, he moved to London, where he obtained the post of Keeper of the London Museum, which he held until 1946 (Piggott 1977: 628). From 1948 to 1955, Mortimer Wheeler was Chair of the Archaeology of the Roman Provinces at the University of London (Piggott 1977: 638).

Mortimer Wheeler's primary research interest was Roman archaeology. He undertook excavations of Roman sites in Wales, from 1920 to 1926, and in Hertfordshire, from 1930 to 1933, where he unearthed a pre-Roman settlement (Wheeler 1958: 56, 88). Wheeler undertook a second period of military service during the Second World War and rose to the rank of Brigadier (Piggott 1977: 635). During this war, he took advantage of the discipline of his fellow soldiers to enlist their help in recording potential sites.

In 1941, Mortimer Wheeler was elected as a Fellow of the British Academy (Piggott 1977: 638). Two years later, he was appointed Director-General of Archaeology in India (Wheeler 1958: 162), and in 1950, he was also appointed as the Archaeological Adviser to Pakistan (Piggott 1977: 637). He was the elected President of the Society of Antiquaries in London from 1954 to 1959 (Piggott 1977: 640). In 1952, he received a knighthood from Queen Elizabeth II in recognition of his contributions to archaeology. He was a steadfast and active archaeologist up to his death in July 1976.

Major Accomplishments

The majority of Wheeler's work centered around Roman sites in Wales, forming the subject of his first seven published works, but his later work was in India, subsequent to him being appointed

the head of a museum in Pakistan. However, his major contribution to archaeology lies in contributing to significant improvements in archaeological methods, especially through the stratigraphic trenching method that developed with Kathleen Kenyon (Davis 2008); in his publications for the general public (Wheeler 1958, 1961); and in his role as the public face of archaeology in the early years of television during the 1950s.

Wheeler was strongly influenced by the work of his contemporaries, General Pitt-Rivers and Flinders Petrie, who were also committed to rigorous excavation and recording methods. Wheeler was deeply concerned with the practice of excavation, and in ensuring that this was done correctly and methodically, as opposed to the rather ad hoc and frequently destructive excavation methods employed up to that time. The accurate and careful study of different cultures was important in his work, especially in terms of the significance of stratigraphy. Wheeler believed that the true value of excavation lay in the recovery of primary information from sources that were not documents (Piggott 1977: 625).

Wheeler made a significant contribution to the development of archaeological excavation methods. His respect for each site, and desire to keep excavation damage to a minimum, is a consistent theme throughout his publications. He was also one of the first archaeologists to recognize the importance of stratigraphy, and to use it to date sites and determine the number of cultures in a particular area (Wheeler 1961: 56-59). He argued vigorously that careful excavation and analysis, and continuous use of stratigraphical references, were key to determining information about early cultures.

Mortimer Wheeler's final research project culminated in his book *Civilizations of the Indus Valley and Beyond*, written in 1961 and revised in 1966. By this time, his focus on methodical excavation had led him to develop the grid method of excavation, in collaboration with Kathleen Kenyon, based upon the premise that the easiest and most systematic method to survey a site is by using squares (Wheeler 1961: 83). Throughout his book *The Indus Civilization*, Wheeler reiterated the importance of correctly observing the location of artifacts and the systematic and recorded excavation of sites to allow for meaningful re-excavation (Wheeler 1962).

Sir Mortimer Wheeler made a major contribution to public education in archaeology in Britain. During the 1950s, he became one of the main public faces of archaeology when he made regular appearances in the BBC series *Animal, Vegetable or Mineral* (Brass 1955) in an effort to place archaeology in the public psyche. As a result, Wheeler was voted Television Personality of the Year for 1955 (Brass 1955). During this period, Wheeler continued to publish work about his excavations, in particular focusing on the importance of stratigraphy, and the influential grid method of excavation that he developed in collaboration with Kathleen Kenyon (Wheeler 1961: 83).

Throughout his life, Sir Mortimer Wheeler worked assiduously to achieve better standards in archaeological method and analysis, and to create greater public awareness of the discipline. He accomplished both aims. His methods of excavation became the standard and the public developed a growing interest in archaeology. He published a plethora of books and papers over his lifetime and left a far-reaching legacy that revolutionized the archaeology of his era and which still has impact today.

Cross-References

- ▶ British Pioneers and Fieldwork Traditions
- ▶ Excavation Methods in Archaeology
- ▶ Petrie, William Matthew Flinders
- ▶ Stratigraphy in Archaeology: A Brief History

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White, J. Peter

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Basic Biographical Information

John Peter White is an Australian archaeologist and editor. He was born in New Zealand (1937), raised in Australia, and educated at the University of Melbourne (B.A. 1961, History), University of Cambridge (B.A. 1963, M.A. 1967, Archaeology and Anthropology), and the Australian National University (Ph.D. 1968, Prehistory). He was awarded British Commonwealth Undergraduate and Graduate Fellowships (1956–1959, 1961–1963, 1964–1967) and a postdoctoral Harkness Fellowship (1970–1971). He held appointments at Melbourne (Tutor, 1960–1961), the Australian Museum (Assistant Curator, 1967–1970), and the University of California at Berkeley (Postdoctoral Fellow, 1970–1971) before joining the Department of Anthropology at the University of Sydney in 1971, where he remained until 1992 (Lecturer 1971–1974, Senior Lecturer 1974–1978, Reader 1978–1992). Successive University reorganizations shifted his appointment as Reader to the School of Archaeology, Classics and Ancient History (1992–2000), the School of Philosophy, Gender, History, and Ancient World Studies (2000–2002), and the School of Philosophical and Historical Inquiry (2002), the post from which he retired in 2003. While employed at Sydney, he held visiting appointments at UC Berkeley (1976), ANU (1977, 1979, 1997–1999), and the Universities of Arizona (1979), Auckland (1981), and Papua New Guinea (1984). Since 2003, he has been Adjunct Professor of Archaeology at the University of New England (Armidale). He served as Editor of the journals *Mankind* (1974–1978) and *Archaeology in Oceania* (1980–present [2012]). He has been appointed to numerous editorial boards and advisory panels and has been honored by election to the Australian Academy of the Humanities (1985) and by collected papers in a special issue of *Australian Archaeology* (Specht et al. 2003).

Major Accomplishments

White has published or edited more than 130 books, journal articles, book chapters, and notes on a wide range of topics, within Australia and beyond, including regional prehistory, ethnoarchaeology, lithic, ceramic, faunal and raw material source analysis, economic change, artifact "style" and society, radiocarbon dating, rock art, and the history and politics of archaeology. He pioneered new approaches to lithic analysis through direct observation of stone tool manufacture, use and discard in the New Guinea Highlands, forcing a shift away from standard culture historical taxonomies based on overall artifact form toward the definition of functional tool categories based on working edge attributes as units of analysis (White 1969). His comparative analysis of Australian versus European lithics drew attention to the limits of conventional inferences about connections between tool form and makers' cognitive and behavioral capabilities (White 1977). His archaeological fieldwork produced the first evidence for Pleistocene human occupation of the New Guinea Highlands (White et al. 1970) and (in collaboration with other members of the Lapita Homelands Project) yielded similarly early dates for colonization of the Bismarck Archipelago (Allen et al. 1988). His several syntheses and edited volumes on the prehistory of Sahul (Pleistocene Australia-New

Guinea) have drawn global scholarly attention to the similarities and differences that distinguish this region from other parts of the world, particularly with respect to time of arrival, the identities of founding populations, and their impact on regional biota, including megafaunal extinctions and the development of agriculture (e.g., Denham & White 2007; White and O'Connell 1982). As a public intellectual, he advocated scientific rigor in opposition to unsupported speculation about the human past (White 1975). As editor, he made *Archaeology in Oceania* for three decades the key outlet for regional research on the human material record.

Cross-References

- ▶ Australia and the Origins of Agriculture
- ▶ Ethnoarchaeology
- ▶ First Australians: Origins
- ▶ Hunter-Gatherers, Archaeology of

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Wilkinson, Tony James

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Basic Biographical Information

Tony Wilkinson is the foremost landscape archaeologist working in the Near East with a geoarchaeological bent that I know. I first met Tony at Francis Pryor's major excavations at Fengate, Peterborough, England, in June 1975 (Fig. 1). Tony was a great digger with an eye for stratigraphic detail, setting him apart from most of the Fengate crew, and an easy ability to impart his skills in stratigraphic reckoning to those for whom it was more challenging. This talent has remained with him and enabled his students and field assistants to learn quickly under his guidance. Also at this time Tony introduced me to the delights of the various 1960s and 1970s Motown and Blues artists through secondhand record stalls in Peterborough market. This love of music was his second and unsung talent that he much enjoys, especially when he was living in Lincoln and Chicago. Indeed, Tony plays a mean harmonica.

Tony was born in August, 1948, and grew up in Essex before going to London to read Geography at Birkbeck College (1966–1969). He then crossed "the pond" to McMaster University in Hamilton, Canada, where he continued his training as geographer (1970–1972). Here his research focused upon the hydrology of overland flow in the Canadian High Arctic. He then returned to England and started working as a circuit digger. After Fengate, Tony was taken on by the Central Unit, essentially a "flying squad" of hard drinking excavators working for the Chief Inspector of Ancient Monuments for England and Wales, Geoff Wainwright. He survived some very severe winters working with the Central Unit at sites such as Shaugh Moor on Dartmoor, before taking on his own English Heritage-funded project with Peter Murphy:

Wilkinson, Tony James, Fig. 1 Tony Wilkinson at the Iron Age and Romano-British settlement site of Cat's Water Fengate, Peterborough, Cambridgeshire, in July 1975

The Hullbridge Survey (1982–1988). This involved intensive survey of the coastal and river estuarine landscapes of the Rivers Stour, Colne, Blackwater, Crouch, and Roach as well as the north shore of the Thames estuary in Essex (Wilkinson & Murphy 1995), and excavations of the drowned Neolithic site at The Stumble (Wilkinson et al. in press). This is where Tony developed his particular combination of archaeological survey and geomorphological skills that he has employed to great effect in all his subsequent work in the much drier climates of the Near East, in countries such as Iraq, Oman, Yemen, Saudi Arabia, Syria, Turkey, and Iran over a period of more than 30 years.

By the time that Tony became a Research Associate and Associate Professor at the Oriental Institute in Chicago (1992–2004), he had already undertaken extensive fieldwork in the Near East and had been the Assistant Director of the British Archaeological Expedition to Iraq in Baghdad between 1989 and 1992. I again worked with Tony in the Dhamar region of the highlands of Yemen in the late 1990s where new field survey revealed hundreds of new prehistoric sites, many of which were buried by substantial hillwash-eroded deposits. This research led him to suggest that the combined influences of human impact and underlying climate change acted as the twin drivers of major landscape change in semiarid landscapes such as these (Wilkinson 2003a, 2005a).

Major Accomplishments

This extensive and groundbreaking survey work in the Near East and southern Arabia was brought together in the publication of his book on the *Archaeological Landscapes of the Near East* (Wilkinson 2003b). For this Tony received the prestigious Book Prize from the Society for American Archaeology in 2004 and also the Wiseman Book Award of the Archaeological Institute of America in 2005. This book establishes a new framework for understanding the settlement structure and evolving landscape of the ancient Near East set against the backdrop of contemporary environmental, social, and economic conditions.

At this same time Tony used his unique combination of geomorphology and settlement distribution type of field survey work to inform modeling approaches to investigating the organization of irrigated landscapes and site territories in southern Arabia and Syria (Wilkinson 2005b; Wilkinson et al. 2007). This brought his geographer's background to bear on archaeological site distribution data, and led to the award of a large National Science Foundation grant (2002–2005)

for "Settlement systems within a dynamic environment and economy: contrasting northern and southern Mesopotamian city regions."

Tony then remigrated back across the Atlantic with his wife Eleonor to take up a Lectureship in the Department of Archaeology at the University of Edinburgh, briefly in 2004–2006, before moving on to a new Professorship position at the University of Durham in 2006. There his most recent research project is the Fragile Crescent Project (2008–2012) funded by the Arts and Humanities Research Council, which aims to advance our understanding of the settlement landscapes of Upper Mesopotamia and the northern Levant (Galiatsatos et al. 2009). This project brings together data drawn from archaeological surveys and satellite imagery into one analytical framework to provide a data source to rival that available for southern Mesopotamia. Projects such as this must be seen a significant culmination to most of a lifetime of archaeological and geoarchaeological survey work in the Mesopotamian region and beyond.

In honor of Tony's lifetime achievements to archaeological landscape survey, he was aptly made a Fellow of the British Academy in 2008 and awarded the John Coles Medal for Landscape Archaeology in 2009, also by the British Academy.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Soil Micromorphology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Near East (including Anatolia): Origins and Development of Agriculture

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Willems, Willem J.H.

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Basic Biographical Information

Professor Dr. Willem J.H. Willems (1950) is one of the most prominent Dutch archaeologists. He steered three main national organizations, played a major role in the restructuring of the archaeological heritage management system in the Netherlands, has an impressive list of academic publications, and is also very active in the international arena of heritage management. Without doubt, Willems also takes the lead in committee and board participations, in presidencies, in academic professorships, in network size, and in air miles. During his long and impressive career of already nearly 40 years, his professional

passion has been threefold: Roman archaeology, archaeological heritage management, and international collaboration.

After his academic training in Roman archaeology and anthropology at the University of Amsterdam and in anthropology at the University of Michigan (USA), he started his professional career in 1979 as the provincial archaeologist of Limburg, the province in the southern part of the Netherlands where he was born. He continued in Roman archaeology with a Ph.D. dissertation (1986, *cum laude*) entitled *Romans and Batavians* and with numerous articles and monographs. Both in the Netherlands and internationally, he is considered as one of the leading Roman specialists. In 1985, he became project manager for the Roman period at the State Service for Archaeology (ROB, now *Rijksdienst Cultureel Erfgoed*, www.cultureelerfgoed.nl) in Amersfoort, and two years later, he also became professor of Roman archaeology at the University of Leiden (http://archaeology.leiden.edu/organisation/staff/willems.html).

Major Accomplishments

Inspired by the CRM developments he witnessed in the US, he not only developed his taste for excavating Roman sites but also grabbed the challenges to preserve them, as well as some of the other types of sites. Heritage management even became his main concern when in 1989 he became the director of the ROB. As such, he also developed an interest in the social role of archaeology, especially the relation between science and society. He could also bring these interests into practice on an international scale, when in the early 1990s he was part of a committee of experts from the Council of Europe that drafted the Convention for the Protection of the Archaeological Heritage (also known as the Malta convention). His approach and view on heritage management and academic quality was probably ultimately challenged when he was asked (in 1999) to become the director quality management for archaeology at the Ministry of Education, Culture and Science. His main task was to direct the adaptation of the Dutch archaeological heritage management system to the implementation of the principles of the Malta Convention, a complex and delicate process. He however accomplished that the future commercially based heritage management system would be accompanied by quality assurance measures. Subsequently, he vigorously chaired the committee that successfully developed the Dutch Quality Standard. After its completion, he was appointed as Inspector General for Archaeology (2001) and could start to mold the State Inspectorate for Archaeology (now Heritage Inspectorate, www.erfgoedinspectie.nl). It had to monitor in practice the quality of the archaeological work that was undertaken under the new regime and in a commercial setting. In 2006, he exchanged this position for one in Leiden, where he got a second professorship at the university, for the chair of archaeological heritage management. At the same time, he became the Dean of the Faculty of Archaeology. He established a heritage management research group with Ph.D. candidates from all over the world and started the first master's degree specialization in heritage management with a global orientation. He has also published extensively on this subject (Fig. 1).

His wide horizons and endless affiliation with archaeological matters are reflected in the huge number of Dutch committees, executive boards, and editorial boards he participates or

Willems, Willem J.H., Fig. 1 Willems opening a seminar of the Inspectorate, March 2003 (Photo: State Inspectorate for Cultural Heritage)

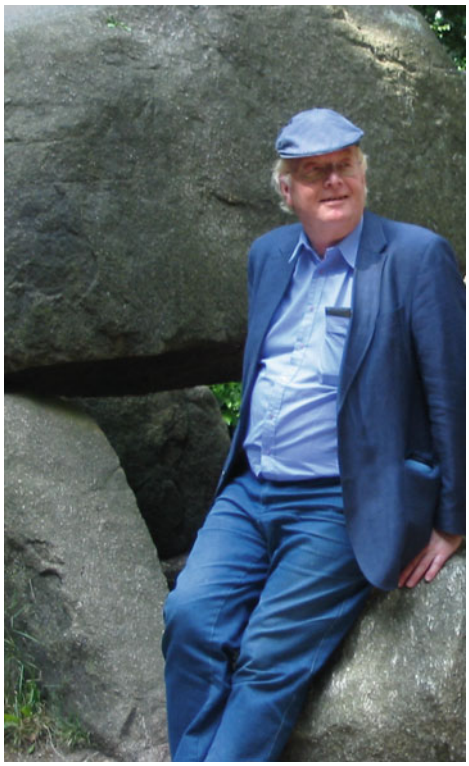

Willems, Willem J.H., Fig. 2 Willems on excursion with Ph.D. candidates on heritage management subjects, July 2009. (Photo: M. van den Dries)

participated in (such as the Dutch Archaeology Foundation, the RAAP Foundation, RING Foundation, Central Committee of Experts for Archaeology – CCvD, the Van Es Award Committee, ICOMOS Netherlands, the Centre for International Heritage Activities (CIE)). On the international level, the list is even longer. Ever since his studies in the USA, he remained intensely involved in the international arena, for instance, through his membership of the Society for American Archaeology and of the Register of Professional Archaeologists. In Europe, he has been vice president for Europe of the ICOMOS Committee for Archaeological Heritage Management, the founding president of the Europae Archaeologiae Consilium, and the president of the European Association of Archaeologists. After that, he chaired the latter's Archaeological Heritage Prize Committee. In 2010, he was elected copresident (with Douglas C. Comer) of ICAHM. Also in 2010, Willems was elected as one of the twelve members of the European Union's academic committee Joint Programming Initiative on Cultural Heritage and Global Change. On top of this all, he occasionally evaluates nominations for World Heritage Sites if time allows him (Fig. 2).

For many of his achievements, Willems was honored with prizes and honorary memberships. To mention just two of the most prestigious ones, in 2004, he was the Recipient of the Rheinlandtaler, which is awarded by the Landschaftsverband Nordrhein-Westfalen in Bonn, and in 2010, he received the Special Achievement Award of the Register of Professional Archaeologist's for his efforts in the Malta Convention and in heritage management in Europe and internationally.

Cross-References

► Netherlands: Cultural Heritage Management
► UNESCO (1972) and Malta (1992) Conventions

Further Reading

An extensive bibliography is available at http://archaeology.leiden.edu/organisation/staff/willems.html#publications.

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Willendorf II: Geography and Culture

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Introduction and Definition

Willendorf II, a site originally excavated about a century ago, is one of the more important

European Upper Paleolithic sites in part for the discovery of the famous Venus I figurine but also for the data it can provide on the earliest Aurignacian. Excavations at Willendorf II have yielded a long loess-paleosol succession with a rather high paleoclimatic resolution. Embedded in this sequence are ten archaeological horizons separated by sterile loess deposits. The archaeological horizons are attributed to an unspecified Early Upper Paleolithic, the Aurignacian, and the Gravettian. Radiocarbon dates on abundant high-quality conifer charcoal provides a reliable chronological framework. Willendorf II is one of the rare sites to offer a good chronostratigraphic framework for the period between 45,000 and 25,000 ^{14}C BP in Central Europe.

The site Willendorf II is located about 80 km west of Vienna, Austria, in the Danube valley. This part of the Danube valley is called Wachau, which belongs to the geological unit of the Paleozoic Bohemian Massif. The Danube valley cuts deep into this massif and is characterized by rather steep and sometimes cliffy slopes. In this narrow part of the valley on the loess covered left/west bank of the Danube, a cluster of 8 Paleolithic sites is known consisting of Willendorf I, Willendorf I-Nord, and Willendorf II to VII. The deposits of the site Willendorf II lie on top of a lower terrace of the Danube. The archaeological horizons are found in the upper half of about 20-m-thick loess, loess-like, and loamy deposits.

Key Issues/Current Debates/Future Directions/Examples

Excavation History

The first mention of Willendorf II as a Paleolithic site goes back to the second half of the nineteenth century. Later, in 1907, during more extensive work at the nearby site of Willendorf I, M. Much excavated for a few days at Willendorf II. Also in 1907 the construction of the railroad in the Danube valley started. The associated earthworks resulted in a whole series of new sites in the Danube valley, among them Willendorf I-Nord and Willendorf III to VII. From May to July 1908, H. Obermaier and J. Bayer (Naturhistorisches Museum, Vienna) visited the railway construction sites on a daily basis and documented the archaeological occurrences. On 29 July 1908 the first scientific excavation at Willendorf II was started. J. Szombathy (Naturhistorisches Museum, Vienna) directed the excavation, while Obermaier and Bayer directed the work in Szobathy's absence. During that first excavation most of the sequence was exposed. Archaeological horizons (AH) 3–9 were identified. The most important and obviously most famous object ever found at Willendorf II is the *Venus I* figurine, which was found on the 7th of August 1908. The work in the course of this first excavation campaign at the site lasted until September 1908 (Felgenahuer 1959).

Szombathy directed a second excavation from 19 April to 5 July 1909; Bayer was responsible for site supervision. During this excavation, the lower part of the sequence containing AHs 1 and 2 was exposed. Also, more surface in AH 4–9 was excavated.

In 1912, Szombathy conducted fieldwork east of the railway tracks in the area of the old brickyard to explore the potential for future excavations in this area of the site. From 1913 onward, Bayer continued the fieldwork on a small scale. After a break of some years, Bayer continued his excavations in 1926 and 1927. During these excavation campaigns the *Venus II* and *Venus III* figurines were discovered.

In 1955, Willendorf II was re-excavated by F. Felgenhauer (1959). Besides a 25-m-long test trench, Felgenhauer's team excavated a surface of approximately 10 × 20 m in the north of the earlier excavations. During this work, geological work was conducted by F. Brandtner (Felgenhauer 1959). After Felgenhauer's excavation finished, severe destruction was done to the site through different agents.

In 1981, P. Haesaerts (Royal Belgian Institute of Natural Sciences, Brussels, Belgium) started his work in Willendorf II. His team cleaned a small section and took a number of samples for radiocarbon dating, sedimentological analysis, and paleoclimatic/paleoenvironmental reconstruction (Haesaerts 1990). About 10 years later,

in 1993, P. Haesaerts, F. Damblon (both Royal Belgian Institute of Natural Sciences), and G. Trnka (University of Vienna) started a collaborative research program on Willendorf II to enlarge the 1981 section and to collect more well-provenienced samples for dating and reconstruction of the paleoenvironment. The results of this work form the basic description of the sequence up to now (Haesaerts et al. 1996; see also Nigst & Haesaerts 2012).

Since 2006, an interdisciplinary team is conducting new fieldwork at the site (Nigst et al. 2008a, 2008b). The goals of this work are to get a better understanding of the site formation processes, to establish a more reliable chronostratigraphic framework for the archaeology at Willendorf II, and to reconstruct the paleoenvironment and climate. Archaeologically, the fieldwork focuses on the Aurignacian archaeological horizons three to four.

Chronostratigraphy

The stratigraphic sequence consists of six loessic and loamy bodies lying on top of a low terrace of the Danube. For the lower half of the sequence (stratigraphic units (SU) H to E), we have only limited information from the fieldwork and geological studies during the early excavations (Brandtner, in Felgenhauer 1959). For the upper part of the sequence (SU D to A), much more information is available based on the work of Haesaerts (Haesaerts 1990; Haesaerts et al. 1996; Nigst & Haesaerts 2012).

The base of the sequence (see Fig. 1) is formed by Danube gravels (SU H), followed by a pale yellowish loess (SU G), a reddish brown partly reworked paleosol (SU F), and a unit of pale yellowish loess (SU E). No information is available on the age and chronostratigraphic correlation of these lower units.

SUs D and C represent the Middle Pleniglacial. SU D is described as a 2.5–3.0-m-thick stony heterogeneous brownish loam (Haesaerts et al. 1996; Nigst & Haesaerts 2012). The rich mollusk assemblage preserved in SU D1 is indicative of a rather mild climatic environment with some wooded patches near the site (Frank & Rabeder 1994), and pedosedimentary characteristics evoke a rather humid climate with drier conditions at the end. This well-expressed climatic episode, probably centered around 41,500 ^{14}C BP and also recorded in a similar position at the nearby site of Schwallenbach, was named the Willendorf Interstadial (Haesaerts et al. 1996). During the 1909 excavations AH 2 was described within the SU D. Later fieldwork attempted unsuccessfully to relocate AH 2.

SU C, about 1.5–2 m thick, consists of a complex set of stratified pale yellowish sandy loesses, bleached light gray horizons, and three humiferous horizons (Haesaerts et al. 1996; Nigst & Haesaerts 2012). The lowest of the three humiferous horizons, SU C8, occurs in parts as brownish gray lenses stretched by solifluction and contains ash stripes with concentrations of charcoal. The lithic assemblage of AH 3 is reported in the old fieldwork to be associated with SU C8 (Felgenhauer 1959). This observation was verified during the 1993 fieldwork (Haesaerts et al. 1996) and the excavation since 2006 (Nigst et al. 2008a). The ^{14}C-dates from charcoal of the humiferous horizon SU C8 give an age estimation for the AH 3 of about 39,000/38,000 ^{14}C BP (Haesaerts et al. 1996; Nigst & Haesaerts 2012). This age estimation is based on the two ^{14}C dates GrA-896 and GrN-17805. The ^{14}C date GrN-11192 provided an age of about 34,100 ^{14}C BP. This charcoal sample was not subject to the same detailed sample cleaning and identification processes (for details see, e.g., Damblon et al. 1996) prior to submission to the dating laboratory as the later dates samples, and it was at the minimal carbon weight limit for conventional ^{14}C dates (Haesaerts et al. 1996). Therefore, it has to be considered as a minimum age, and the best age estimation for SU C8 (and AH 3) is about 39,000/38,000 ^{14}C BP. The second humiferous horizon (SU C4) is less developed but almost in situ. AH 4 is located in SU C4. It has been described as an Aurignacian with numerous carinated and nosed end scrapers (e.g., Hahn 1977). The associated ^{14}C-dates on charcoal (natural origin) date the SU C4 to 32,000/31,000 ^{14}C BP. The upper one of the three humiferous horizons, SU C2, is best expressed and occurs as a decimetric, dark

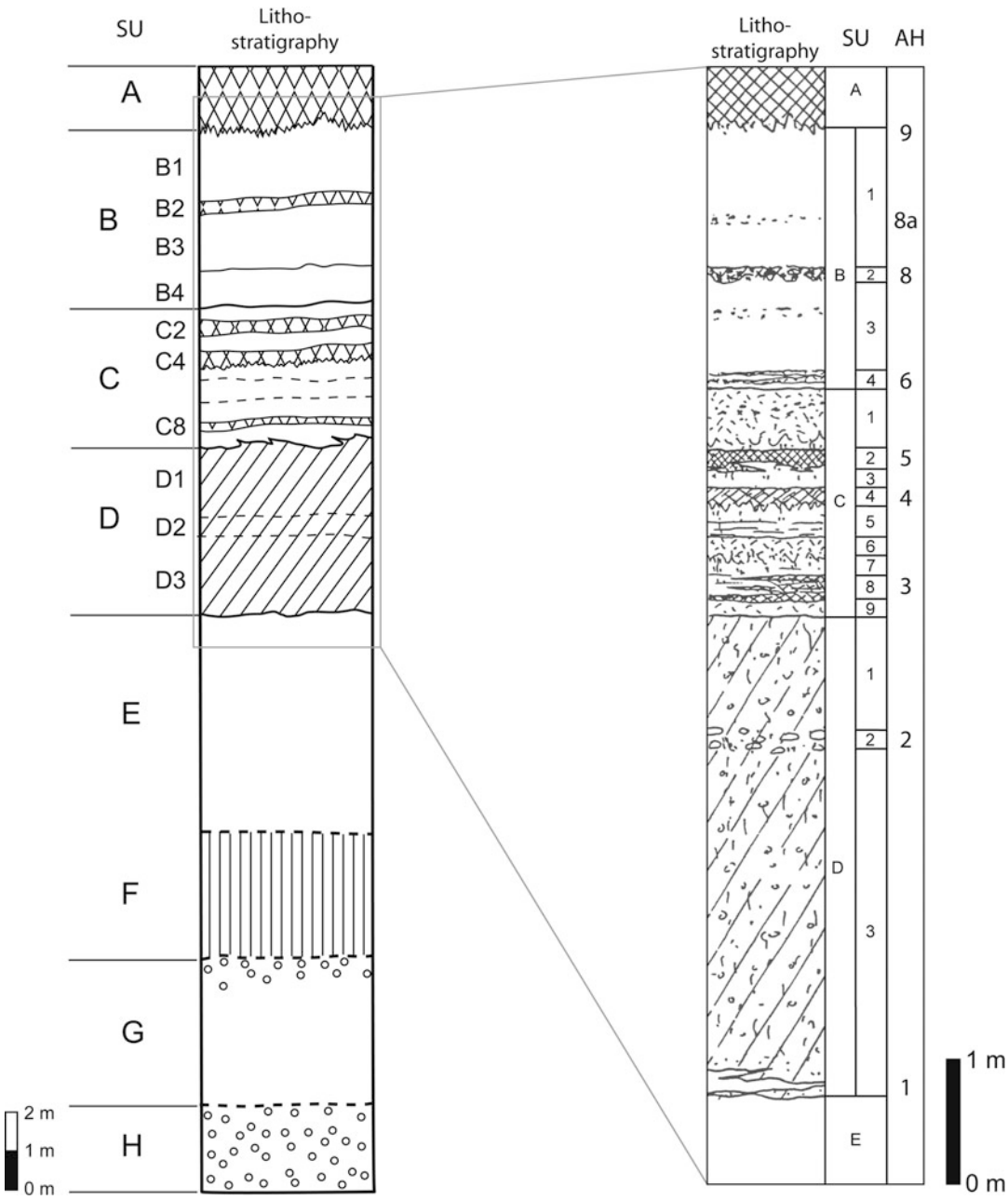

Willendorf II: Geography and Culture, Fig. 1 Willendorf II: sequence. *Left*: schematic section of the entire deposits exposed between 1908 and 1993. *Right*: stratigraphic log of the upper part of the sequence, documented in 1993 fieldwork. Abbreviations: *SU* stratigraphic unit, *AH* archaeological horizon (Graphic: P. Haesaerts and P.R. Nigst)

brown layer slightly stretched by solifluction. The AH 5, assigned to the Gravellian, is located in this SU. The correlation of the AHs 3, 4, and 5 and these three distinct, dark-colored humiferous horizons has been observed by all excavators at the site (Felgenhauer 1959; Haesaerts 1990; Haesaerts et al. 1996; Nigst & Haesaerts 2012; Nigst et al. 2008a, 2008b).

Altogether, SU C represents the upper part of the Middle Pleniglacial (between 39,000 and 26,000 ^{14}C BP) and records a complex succession of climatic episodes. While the sandy loess layers (SUs C7, C5, C3, and C1 pro parte) represent cold episodes, the bleached horizons (SUs C9, C6, and C1 pro parte) show characteristics of tundra gley indicating very cold conditions (deep frost or permafrost). The tundra gley of sub-SU C1 pro parte is most developed and occurs as a marker at the boundary between the Middle and the Late Pleniglacial (Haesaerts 1990; Haesaerts et al. 1996). Moreover, the three humiferous horizons (SUs C8, C4, and C2) containing AHs 3, 4, and 5 are related to interstadial episodes, such an interpretation being in good agreement with the pedological characteristics (Haesaerts et al. 1996) and the malacological content (Frank & Rabeder 1994). Taking into consideration the section of Schwallenbach – located roughly 4 km downstream on the left bank of the Danube – where three well-developed humiferous soils are preserved within a similar stratigraphic and chronological background, these three interstadial episodes were named Schwallenbach I (between 39,000 and 37,400 ^{14}C BP), Schwallenbach II (around 32,000 ^{14}C BP), and Schwallenbach III (around 30,500 ^{14}C BP) (Haesaerts et al. 1996).

SU B represents the Late Pleniglacial loess cover, which shows evidence of a progressive trend towards a cold and dry climate based on pedological characteristics and the malacological content (Haesaerts et al. 1996; Frank & Rabeder 1994). SU B comprises pale yellowish homogeneous loess layers (SUs B1 and B3), thin lenses of pale gray loess (SU B4), and a light brownish horizon (SU B2). The loess of SU B caps the thick tundra gley of SU C1 posterior to 28,560 ^{14}C BP overlain by Gravettian AH 6, reworked by solifluction, and dated to 26,500 and 26,100 ^{14}C BP. Gravettian AH 8 occurs in the middle part of SU B in association with an incipient humiferous horizon (SU B2). Charcoal from this horizon provided consistent ages between 25,800 and 25,230 ^{14}C BP. The in 2006 newly discovered Gravettian AH 8a is located in the middle part of SU B1. No excavations after 1955 were able to observe AH 9. SU A is formed by the thick humic horizon on top of the section and represents the recent soil.

A similar stratigraphic sequence was documented at the nearby site Schwallenbach (Haesaerts et al. 1996). Figure 2 shows the correlation of the two sites. This shows a similar stratigraphic sequence and the reproducibility of the record documented at Willendorf II at another site, a few kilometers downstream.

Archaeological Sequence

The archaeological sequence comprises ten AHs including six Gravettian (AH 5–9), two Aurignacian (AH 3 and 4), and two archaeological horizons which cultural attribution is unclear, but which in general are considered as Early Upper Paleolithic (e.g., Felgenhauer 1959; Hahn1977; Otte 1981; Haesaerts et al. 1996; Nigst 2006; Nigst et al. 2008a; Nigst & Haesaerts 2012).

For both AH 1 and AH 2 the cultural attribution is unsecure and the exact stratigraphic position unclear. Both have been observed only during the 1909 excavation. Several authors have described AH 2's lithics as undiagnostic and attributed them to the Early Upper Paleolithic in general (Hahn 1977; Teyssandier 2003; Nigst 2006).

AH 3 is the lower of the two Aurignacian horizons and was excavated for the first time during the 1908 and 1909 fieldwork (Fig. 3). Further excavation is documented for 1955, but only in a test trench. Since 2006, the AH 3 has been excavated on a limited surface (Nigst et al. 2008a). Based on the lithic artifacts including carinated/nosed end scraper-cores, AH 3 is attributed by most scholars to the Early Aurignacian technocomplex (e.g., Hahn 1977; Teyssandier 2003; Nigst 2006; Nigst & Haesaerts 2012).

The upper of the two Aurignacian horizons, AH 4, was first identified in 1908 and excavated in all fieldwork seasons since then. It is located in SU C4, a paleosol rich in charcoals dating to 32,000/31,000 ^{14}C BP. The assemblage consists of abundant lithics, bone/antler tools (Fig. 4), and a mollusk shell. Based on the lithics (Fig. 5) – including abundant evidence of the production of small bladelets from carinated/nosed end

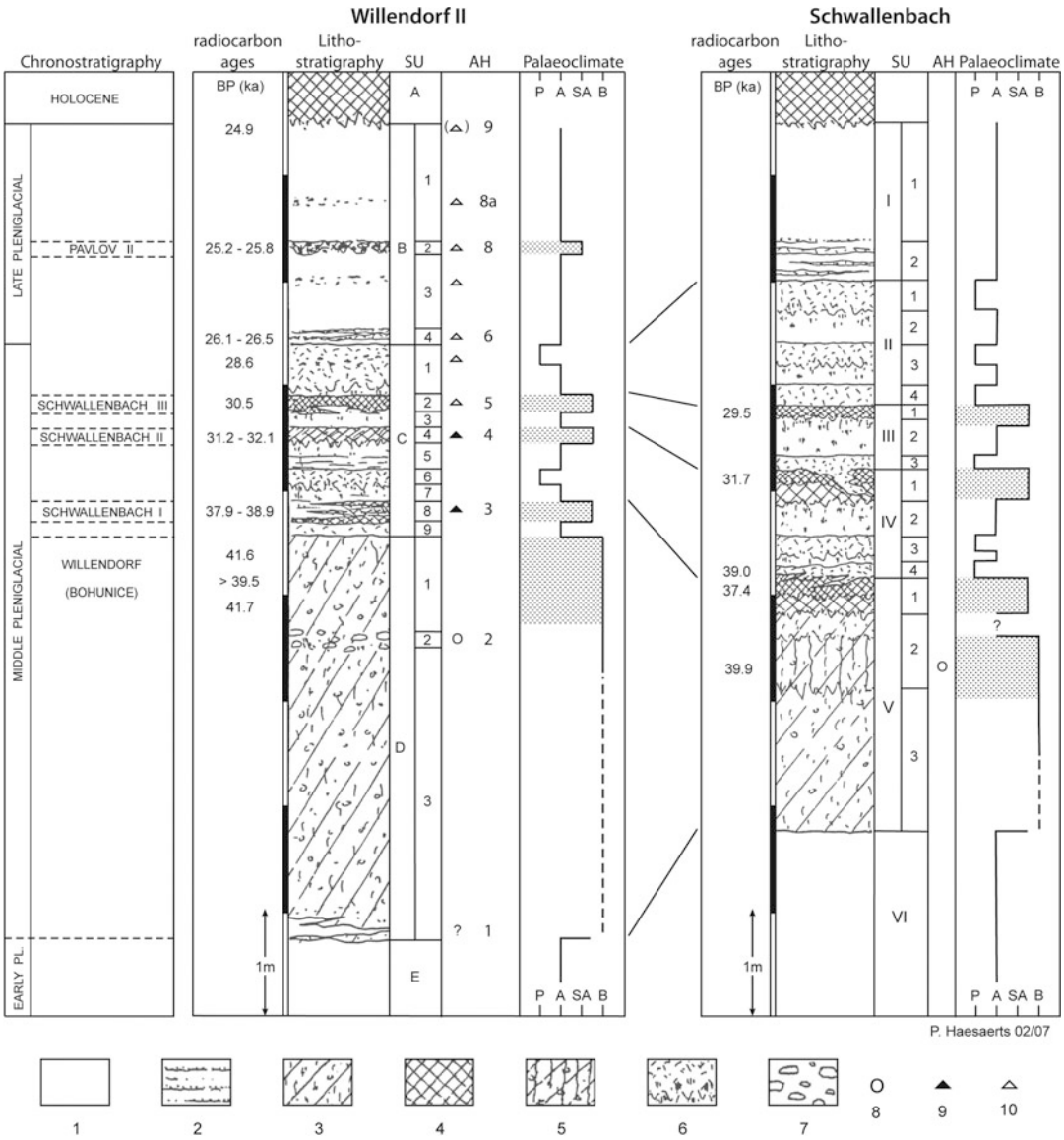

Willendorf II: Geography and Culture, Fig. 2 Willendorf II and Schwallenbach: comparative sequences. Graphic symbols. *1*. loess; *2*. sandy loess; *3*. loam; *4*. humiferous horizon; *5*. B horizon; *6*. light gray horizon (tundra gley); *7*. stones; *8*. Early Upper Paleolithic; *9*. Aurignacian; *10*. Gravettian. Abbreviations: *SU* stratigraphic unit, *AH* archaeological horizon, *P* periglacial, with deep frost or permafrost, *A* arctic, *SA* subarctic, *B* boreal (Graphic: P. Haesaerts)

scraper-cores – AH 4 is attributed to the Early Aurignacian or Late Aurignacian.

AH 5 is documented in SU C2, which is a dark brownish humiferous horizons with charcoal concentrations and partly reworked by solifluction (Haesaerts et al. 1996). The archaeological assemblage includes – besides abundant lithics – worked bone/antler/ivory remains. The lithic assemblage includes pointed blades, end scrapers, Microgravette points, Gravette points,

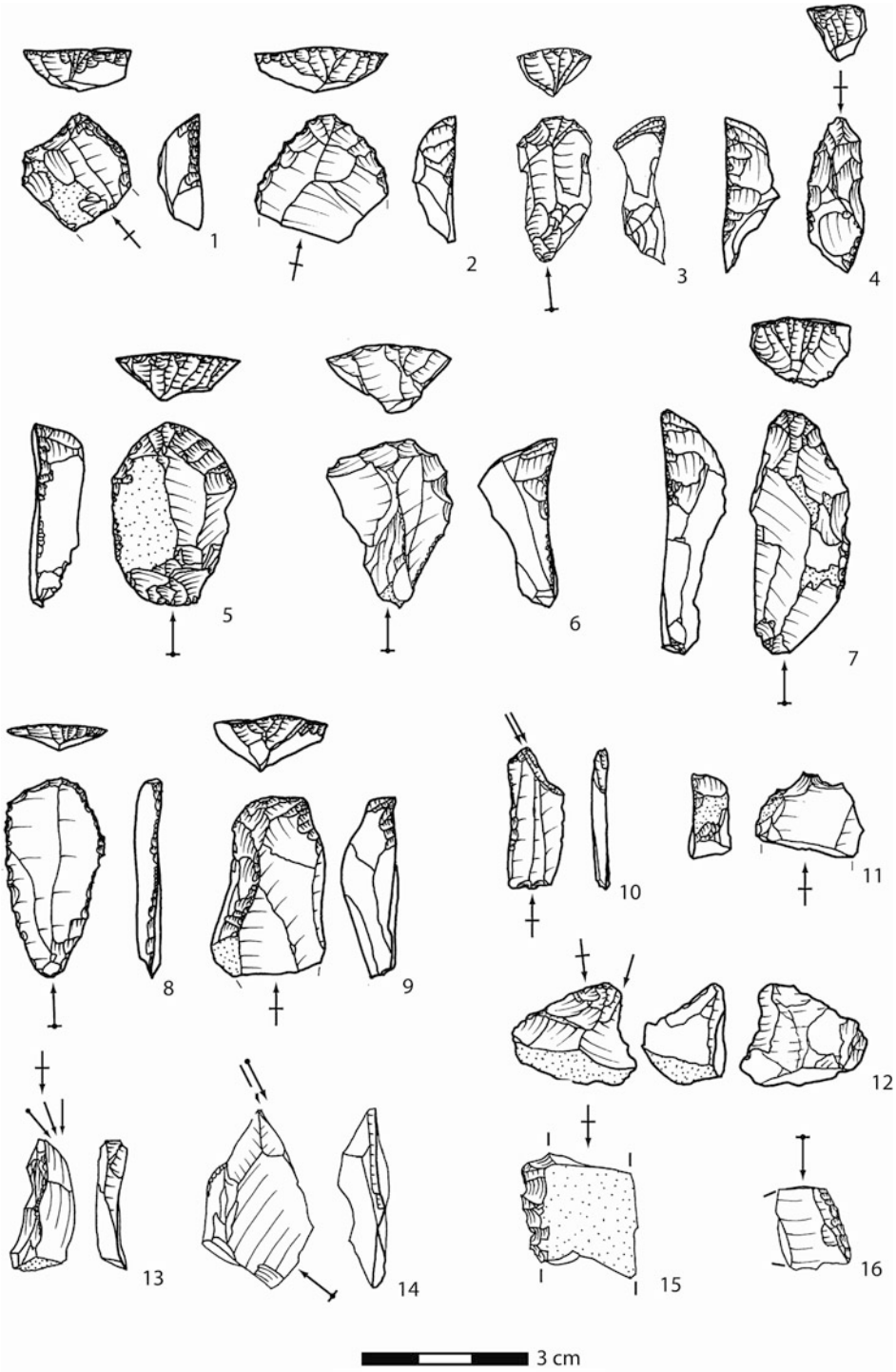

Willendorf II: Geography and Culture, Fig. 3 Willendorf II-AH 3. Selected lithics. *1*. nosed end scraper; *2*, *5*, *6*, *8*, *9* single end scrapers; *3*, *4*, *7* carinated end scrapers; *10*, *12*, *13*, *14* burin; *11*. borer/bec; *15*, *16* unilaterally retouched piece (Graphic: Ph.R. Nigst)

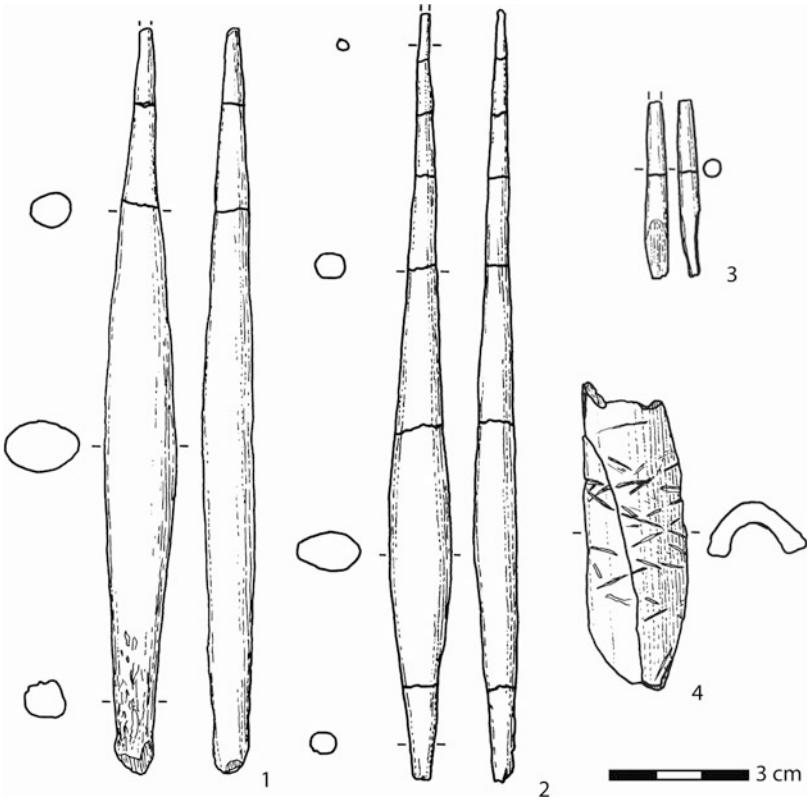

Willendorf II: Geography and Culture,
Fig. 4 Willendorf II-AH 4. Selected bone/antler/ivory tools. *1*, *2* bone point; *3*. fragment of an ivory stick; *4*. bone fragment with crossing lines (Redrawn after Hahn (1977) by P.R. Nigst)

backed pieces, fléchettes, and burins and attributed to the Early Gravettian (Moreau 2009) or Early Pavlovian (Svoboda 1994).

The Gravettian AH 6 is located in SU B4, consisting of several thin lenses of pale gray loess. AH 6 is – like AH 8 and 7 – attributed to the Middle Gravettian or Evolved Pavlovian. AH 7 is attributed to the Middle Gravettian or Evolved Pavlovian as well. It was documented only in the early fieldwork and not observed in the very limited excavation in upper SUs during the most recent fieldwork.

The Gravettian AH 8 has been excavated since 1908 during several fieldwork opportunities (e.g., Felgenhauer 1959; Haesaerts et al. 1996; Nigst et al. 2008b). This AH in located in the SU B2, an approximately 5 cm thick continuous light brownish horizon, underlined by abundant traces of rootlets. AH 8 is either attributed to the Middle Gravettian or to the Evolved Pavlovian (e.g., Svoboda 1994).

In the course of section cleaning and stabilization of the western section in 2006, the new Gravettian AH 8a was discovered about 30 cm above SU B2 in SU B1 (Nigst et al. 2008b). In the same stratigraphic position Haesaerts et al. (1996) describe a horizon of charcoals, but only in 2006 also archaeological remains could be observed.

The Gravettian AH 9 is by far the richest of the archaeological horizons. It is attributed to the late (Upper) Gravettian or Willendorf-Kostenkian (Svoboda 1994). None of the fieldwork since 1955 could locate AH 9, as its richest parts were in the eastern part of the site partly destroyed by the railway construction and the remaining parts excavated in the early excavations. Lithic raw materials are dominated by various cherts occurring in the close Danube gravels but also contain far-distance transported flint most probably originating from northern Moravia or southern Poland (Antl-Weiser 2008b). Among the

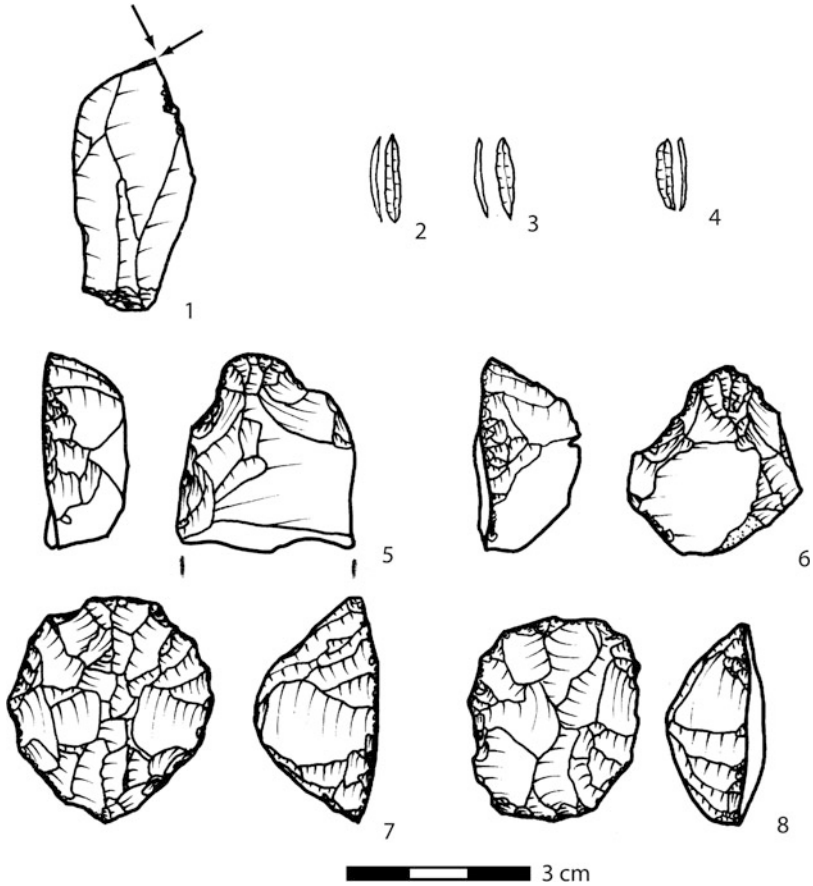

Willendorf II: Geography and Culture, Fig. 5 Willendorf II-AH 4. Selected lithics. *1*. burin; *2–4* bladelets; *5*, *6* nosedend scrapers; *7*, *8* carinated end scraper (Redrawn after Hahn (1977) by P.R. Nigst)

retouched lithics are shouldered points, hence the attribution to the Willendorf-Kostenkian (e.g., Sovobda 1994). The Venus II and Venus III figurines originate from AH 9, while the famous Venus I figurine was found about 25 cm below AH 9 (see below).

The Venus Figurines of Willendorf II

In total three so-called Venus figurines have been discovered at Willendorf II. The most famous one is the Venus I figurine that was found on 7th of August 1908. The anthropomorphic figurine is about 11 cm tall and depicts an obese woman. The head does not show a face, the arms are resting on the breasts, and the feet are not shown. Originally the figurine was covered with red ochre, most of which was accidentally removed when it was washed. The raw material of the figurine is oolithic limestone that most probably originates from the Stránksá skála outcrops in southern Moravia (Antl-Weiser 2008a). Traditionally the Venus I figurine is attributed to AH 9, but reanalysis of the original documentation shows that its correct stratigraphic position is actually about 25 cm below AH 9 and associated with a horizon of charcoal (Haesaerts et al. 1996; Antl-Weiser 2008a, 2008b). On the contrary, the Venus II and III figurines originate from AH 9.

The Venus II figurine, discovered in 1926, is made from ivory and in a very bad state of preservation, as preservation of organic finds at Willendorf II in general is not good. It was found together with mammoth bones in a pit that was dug from AH 9 down into the loess and some of the underlying AHs. The so-called Venus III is a piece of ivory showing some traces of working; its interpretation as a Venus figurine was often questioned (Antl-Weiser 2008a, 2008b).

Cross-References

- ▶ Art, Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Europe: Paleolithic Art
- ▶ Lithic Technology, Paleolithic
- ▶ Mobiliary Art, Paleolithic

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Willey, Gordon Randolph

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Basic Biographical Information

Gordon Randolph Willey is widely regarded as the preeminent Americanist. He was born in 1913 in Chariton, Iowa, but grew up in Long Beach, California. He studied at the University of Arizona under Byron Cummings where he received his bachelors and masters degrees. He pursued doctoral work at Columbia University with Duncan Strong and completed his dissertation on the Chancay Valley, Peru, in 1942. The following year, he joined the Bureau of American Ethnology at the Smithsonian Institute to work for Julian Steward in editing the *Handbook of South American Indians*. In 1950, he accepted the Bowditch Professorship in Central American Archaeology and Ethnology at Harvard University, a position he held until 1987. Willey participated in or directed major fieldwork projects in eight different countries.

In the United States, he has worked in Arizona, Georgia, Louisiana, and Florida. Outside of the United States, he has worked in Belize, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru. He died on April 28, 2002.

Willey was honored with numerous professional awards and prizes. Among the most prestigious of these are the Viking Fund Medal for Archaeology (1953), the Order of the Quetzal of Guatemala (1968), the American Institute of Archaeology's Gold Medal (1973), the American Anthropological Association's A. V. Kidder Medal (1974), the Royal Anthropological Institute's Huxley Medal (1979), the Society for American Archaeology's Distinguished Service Award (1980), and the University of Pennsylvania Museum's Lucy Wharton Drexel prize (1981). He held honorary degrees from Cambridge University, the University of Arizona, and the University of New Mexico. He was a member of the National Academy of Sciences, the American Academy of the Arts and Sciences, the American Philosophical Society, the British Academy (corresponding member), and the Sociedad Mexicana de Antropología. He was a fellow of the Society of Antiquaries, the Royal Anthropological Institute of Great Britain and Ireland, the American Anthropological Association (President, 1961), and the Society for American Archaeology (President, 1968).

Major Accomplishments

Willey is perhaps best known for creating the field of "settlement pattern" archaeology. In the first half of the twentieth century, most archaeological research was concentrated upon excavating a few big urban centers with relatively little attention paid to the more numerous, smaller villages and hamlets. Willey's settlement pattern approach was a significant departure from this standard. He regarded the distribution of human settlements provided a natural starting point for the functional interpretation of archaeological cultures (Willey 1953). Different sites were best understood not in isolation, but rather as part of complex economic, social, and political landscapes. Because this approach required the study of the common people as well as rulers, it marked a shift to a more democratic orientation that recognized the dynamic interplay between elites and commoners. The widespread popularity of Willey's approach is due in part to the fact that it provided a workable methodology for addressing questions of social structure, demography, and subsistence patterning.

Willey devised his settlement pattern approach as part of the Virú Valley project, one of the first multidisciplinary research programs in the New World involving archaeologists, anthropologists, and human geographers. The goal of the Virú project was the reconstruction of the archaeology and ethnology of a small coastal valley in Peru. Willey's role was to record the forms, settings, and spatial relationships of the sites within the valley and to make inferences about the societies that created and inhabited them during successive cultural periods. Willey always attributed the idea of a settlement pattern approach to Julian Steward and downplayed his own contributions. But, in fact, his implementation of and modifications to this idea went far beyond what Steward had previously accomplished in his Southwestern studies. For example, Willey developed a more sophisticated community-based approach that allowed him to make inferences about changes in population size and sociopolitical organization over a period of 1,500 years.

Willey has often been characterized as the "grand synthesizer." There are good reasons for this. Willey provided the definitive synthesis of the archaeology of the Americas for his time (Willey 1966, 1971). He also synthesized the history of American anthropological archaeology from the speculative to the modern periods (Willey & Phillips 1958; Willey 1968, 1988; Willey & Sabloff 1974, 1993). However, Willey also synthesized different kinds of archaeological theory. Throughout his career, he sought to bridge the "great divide" between humanist and scientific traditions. For him, the goals of archaeology are twofold, namely, to narrate the process of the human past and to explain and understand the

events that comprise that past. Willey was a strong advocate of a comparative generalizing approach, but not at the expense of a specific particularizing one. He argued that it is impossible to make meaningful comparisons unless the specifics of at least two contexts are well controlled.

Willey's influence on archaeological method and theory is considerable (Sabloff & Fash 2007). His work on settlement archaeology established a new field that is regarded as the starting point for all investigations of culture process and social change. His syntheses of New World prehistory and the history of American archaeology are major achievements and are commonly used as textbooks. His work has anticipated many of the recent trends in the last 30 years. For example, his functionalist and processualist approach was reinterpreted to become the centerpiece of the New Archaeology (Willey & Phillips 1958). His writing style exhibits a critical self-consciousness favored by some postprocessual archaeologists. His interest in ideology and the Mesoamerican worldview resonates strongly with new developments in cognitive archaeology. Willey consistently took theoretical stances that were not dogmatic or rigid, but rather flexible and pragmatic.

Cross-References

- ► Landscape Archaeology
- ► Processualism in Archaeological Theory
- ► Sabloff, Jeremy Arac

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Winckelmann, Johann Joachim

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Basic Biographical Information

Johann Joachim Winckelmann (1717–1768) is among the most influential founders of the modern disciplines of art history and classical

archaeology. Born in poverty at Stendal, in Prussia, his abilities allowed him to obtain a gymnasium education, followed by unsatisfying university studies in subjects such as theology and natural sciences before he became a reluctant schoolteacher. In 1748, he seized the opportunity to become librarian to Count Heinrich von Bünau at his estate near Dresden, a post that brought him into contact with the lively culture of the city, including the royal collections of fine and decorative arts. He began to study and write on art, and, encouraged by the Papal Nuncio to the Saxon court, Count Alberigo Archinto, he converted to Catholicism and in 1755 went to Rome. There his reputation grew among artistic and papal circles. In 1763, he won the important posts of Commissario delle Antichità della Camera Apostolica (papal antiquary) and Scriptor Linguae Teutonicae (responsible for German-language manuscripts in the Vatican Library). His writings won him international fame that extended far beyond the scholarly audience. While returning to Rome from Vienna in June 1768, he was murdered at Trieste.

Major Accomplishments

Winckelmann's importance derives primarily from his publications on ancient, especially classical, art. His first publication, *Gedancken über die Nachahmung der griechischen Wercke in der Mahlerey und Bildhauer-Kunst* (*Reflections on the Imitation of Greek Works in Painting and Sculpture*), was produced in Dresden in 1755; although he had then seen scarcely any examples of ancient Greek art in person, his essay called for no less than a complete renewal of contemporary artistic and social values through adopting the superior ones of the Greeks. Residence in Italy enabled him to study original works in the collections in Rome and other cities, and in an era when the corpus of ancient monuments was not yet comprehensively organized or available, his publications helped disseminate information about both already-known works and new archaeological discoveries. While he continually insisted on the importance of first-hand examination, often criticizing the work of previous scholars on the basis of his own observations, his own reliance on the textual tradition of the ancient Greek and Roman writers for both documentation and interpretation is clear. His most famous work, the *Geschichte der Kunst des Altertums* (*History of the Art of Antiquity*) of 1764, is built on the chronological and developmental framework established in antiquity and used by the post-antique writers whom he also read, one that valued Greek art over Roman and High Classical works over those of earlier and later periods. Always passionate, frequently polemical, and perpetually an outsider no matter how celebrated, Winckelmann made crucial contributions not only to the academic study of the material remains of classical antiquity but also to the Western classical tradition in the art and culture of his own and subsequent times.

Cross-References

► Classical (Greek) Archaeology

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Wobst, H. Martin

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Basic Biographical Information

H. Martin Wobst (Fig. 1) was born on December 12, 1943, in Eickelborn, Germany, and received a classical education at the Kaiser-Whilhelms-Gymnasium in Hannover, Germany. He arrived in the United States in May 1963 to study classical archaeology at the University of Michigan. After one classical archaeology class in his freshman year, he decided to switch to Anthropology. At Michigan, he earned his B.A. in 1966, his M.A. in 1968, and his Ph.D. in 1971. Wobst's dissertation, entitled *Boundary Conditions for Paleolithic Cultural Systems: A Simulation Approach*, was directed by Robert Whallon, a student of Lewis Binford. He became a member of the faculty of the Department of Anthropology of the University of Massachusetts Amherst in 1971. Wobst retired from full-time teaching in the fall of 2010 after a remarkable career as an internationally recognized scholar, a superb teacher, and an effective administrator.

Wobst, H. Martin, Fig. 1 H. Martin Wobst

Wobst was a member of the faculty at the University of Massachusetts Amherst who ushered the anthropology department onto the national and international stage, developing its reputation for European Studies, for biocultural anthropology, and for its theoretically informed archaeology. He served as department chair from 1978 to 1984, and again in 1988. He nurtured generations of graduate students as the long-term Graduate Program Director of the department's committee-based student-centric program, in his seminars on Theory and Method in Archaeology, Professional Anthropology, and Indigenous Archaeology, and in his hours of one-on-one advising. He chaired more than 25 completed Ph.Ds and 30 completed M.As, and was a member of approximately 100 committees.

Wobst is best-known as an archaeological theorist and a strong advocate for indigenous rights and participation in higher education. He has worked with indigenous students, young professionals, and community members in their efforts to transform archaeology, including by raising travel funds for attendance at the World Archaeological Congress (1999) and the American Anthropological Association (2000), as Chair of the Funding Committee of the World Archaeological Congress (2004), as a Founding Member of the Doctoral Program in Indigenous Archaeology at the University of Catamarca, Argentina, and as a Research Team Member of the Intellectual Property Issues in Cultural Heritage Project (IPinCH) of Simon Fraser University (2009-present).

Major Accomplishments

Wobst has made and continues to make major intellectual contributions to the theory of materiality, exploring its implications for all forms of human culture. His often cited "Stylistic Behavior and Information Exchange"

(Wobst 1977) developed a general theory of style as information exchange, analyzing Yugoslavian folk costume by way of example. It is one of the foundational papers in archaeology's move away from the New Archaeology's focus on energetics and toward a more holistic understanding of culture process.

He incorporated agency in this theory by conceiving of material culture as "product of and precedent for" cultural action, and has most recently pursued this line by considering material culture as an "intervention" in ongoing social and ideological processes (Wobst 1999, 2006). Published for his professional colleagues, these concepts also formed the basis for his very popular undergraduate course on the "Archaeology of US," that taught students how to question our culture's taken-for-granted ways conveyed, for instance, in the arrangement of seating in classrooms, the location of sidewalks and informal paths on the campus, and the furnishings found in women's, men's and gender-free bathrooms (Wobst 2007). The study of how humans manufacture, use, and think about material culture was for him the encompassing and distinctive definition of the field of archaeology.

His second major area of contribution was to broaden the discipline's understandings of hunter-gatherer/band/egalitarian ways of life. He challenged the field, through intricate computer simulations and abstract thought experiments, to move beyond tacit culture-bound preconceptions that ancient hunter-gatherer life was small scale, repetitive, and dull, instead offering on the basis of reasonable scientific assumptions that this way of life was and is constituted by lives filled with considerable variety, enmeshed in complex social processes, full of action and imagination. A major foil to illustrate these points was the European Paleolithic, of which his working knowledge of 13 languages gave him unusual scholarly command. Surveying the portable artifacts, rock art, and settlement systems of the Paleolithic, his articles pointed to heretofore underanalyzed dimensions of material variability that could only be accounted for by imagining dynamic and diverse ways of life (Wobst 1974a, 1974b, 1976).

To these areas Wobst has added theoretical and institutional contributions furthering indigenous archaeology. He has coedited two foundational volumes on the topic, one of original papers with Claire Smith (Smith & Wobst 2005) and another that compiles key articles and excerpts in the development of indigenous archaeology with Margaret Bruchac and Siobhan Hart (Bruchac et al. 2010). In these volumes, and in other venues, his contributions point out how and why archaeology is better archaeology when it engages indigenous peoples, be they in the Australian desert, the Arctic tundra, the former Soviet Union, or his community of Leverett, Massachusetts (Wobst 2005, 2010).

Wobst is widely known for his razor-sharp and often amusing analyses, qualities that make him one of his generation's commentators par excellence. His articles, afterwords, professional presentations, and discussant's comments capture archaeology's historical trends and contemporary interests, dissect their internal contradictions, comment on their unexplicated frames of reference, and show that human culture is capable of extraordinary variability. For Wobst, the future of the discipline lies not in establishing new orthodoxies, but in continually pushing at the boundaries of how archaeology understands the breadth of the human experience through the distinctive lens of our creative materiality.

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Ethnic Identity and Archaeology
- ▶ Europe: Middle to Upper Paleolithic Transition
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Style: Its Role in the Archaeology of Art

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Basic Biographical Information

American anthropologist Milford H. Wolpoff was born in 1942 to Ruth (Silver) and Ben Wolpoff in Chicago, Illinois. He was educated at the University of Illinois in the field of physical anthropology, evolutionary biology, and ecology and was a student of Eugene Giles. He was awarded a bachelor degree from the University of Illinois, Urbana, in 1964. In 1969 the University of Illinois awarded him a Ph.D. on the basis of his dissertation, Metric Trends in Hominid Dental Evolution. He has been at the University of Michigan, Ann Arbor, since 1971. Since 1977 he has held the position as Professor of Anthropology at the University of Illinois.

Milford H. Wolpoff is an Honorary Life Member of the Honor Society of Phi Kappa Phi and a Fellow of the American Association for the Advancement of Science. In 2011 he won the Darwin Lifetime Achievement Award of the American Association of Physical Anthropologists as well as the Honorary Member of the Golden Key International Honour Society.

Major Accomplishments

Milford H. Wolpoff has made major contributions to both the research and teaching of paleoanthropology. He is the author of *Paleoanthropology*, which has been the leading textbook for undergraduate and graduate courses in human evolution since it was first published in 1980. He is the coauthor, with Rachel Caspari, of R*ace and Human Evolution: A Fatal Attraction*, which reviews the scientific evidence and conflicting theories of human evolution and how these interpretations are related to views about race.

Much of Professor Wolpoff's research focuses on the evolution of European Neanderthals (e.g., Wolpoff 2009), the role of culture in early hominid evolution, the nature and explanation of allometry, robust australopithecine evolution, the distribution and explanation of sexual dimorphism, hominid origins (Wolpoff 2002), the pattern and explanation of Australasian hominid evolution, the contributions and role of genetics in paleoanthropological research, and the taxonomy of the genus Homo.

Milford H. Wolpoff's major contribution to paleoanthropology is the development of one of the two most recognizable theories in human evolution – the multiregional model. His basis for advancing the multiregional interpretation of human evolution derives from his disbelief in punctuated equilibrium, the idea that changes occur when new species are formed and only rarely are slowly and gradually accumulated during the stable periods between species, as an accurate model for Pleistocene humanity, noting that speciation played a role earlier in human evolution.

The multiregional theory is a scientific model that provides an explanation for human evolution. In his vision, multiregional evolution describes evolution within a widespread species by normal evolutionary mechanisms (Wolpoff 2004). This differentiates from the replacement theories that he believes describe evolution between species, within changes at the time of speciation, as one species replaces the other.

The theory suggests that humans first arose near the beginning of the Pleistocene, about two million years ago, and successive human evolution has been within a single, continuous human species. This continuous human species includes archaic humans including *Homo erectus* and Neanderthals and evolved worldwide to the diverse populations of modern *Homo sapiens sapiens*. This theory suggests that humans evolved through a combination of adaptation within various regions of the world and gene flow between those regions. Supporters of the multiregional origin find supporting evidence in the fossil record, genetics evidence, and the continuity of archaeological cultures as support for this theory. Wolpoff and his colleagues first published the multiregional evolution in 1981 (Thorne & Wolpoff 1981), before the current understanding of mitochondrial DNA and nuclear sequencing in place. Finally it should be noted that Wolpoff's studies of migrations and gene flow out of Africa in human evolution prefigured the out-of-Africa theory of human evolution.

Cross-References

- ► Human Evolution: Multiregional Origins
- ► Human Evolution: Theory and Progress
- ► Out-of-Africa Origins

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Wood: Conservation and Preservation

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Introduction

Archaeological wood is a wood with a recognized archaeological value (UNI 11205: 2007). The archaeological value is due to a recognized cultural value. Being strictly related to cultural heritage, the material itself is somehow connected to artefacts partly or completely made of wood. Ancient trunks or stem portions (or even roots or branches), not in strict relation with an ancient artefact, however, must be considered as archaeobotany.

Wood is a biodegradable material because it can be destroyed by some categories of living organisms, such as insects, fungi, marine borers, and bacteria (from the most to the less aggressive). Nevertheless, archaeological artefacts made of wood, preserved in the world' museums, are not rare and the wood itself must be conserved in order to preserve the artefact.

Archaeological wood artefacts fall under two different categories: dry archaeological wood and waterlogged archaeological wood. The first comes not from underground or underwater typical excavations but from aerial dry environments (Fig. 1a): an important example is the desert areas for ancient Egyptian objects; in these situations, wood is protected by dry conditions against fungal attacks. More frequently found, however, are the artefacts of the latter category, waterlogged archaeological wood, coming from underwater or terrestrial, but below the water table, excavations (Fig. 1b). In this peculiar environment, wood is protected against insect and fungal attacks by the waterlogged conditions; moreover, the frequent low oxygen availability slows down even the rather slow bacterial attack (Florian 1990).

Wood: Conservation and Preservation, Fig. 1 (**a**) A coffin of dry archaeological wood from the cliff tombs in Longhushan (China, VII – IV cen. B.C.); (**b**) one of the three Roman ships found in an excavation in the center of Naples (Italy, I cen. B.C.)

In the other excavation environments, it is very rare to find wooden archaeological objects because the conditions are aggressive toward the material that is then transformed into humic substances within decades.

Wooden artefacts can be found even as charcoal artefacts. But in those cases, wood has been already transformed into a different material and the conservation of charcoal will not be discussed here.

Definition

Wood conservation is defined as the guaranteed operations on wooden cultural heritage through a coherent, coordinated, and planned activity of study, prevention, maintenance, and restoration applied to archaeological wood constituting in total or partially archaeological artefacts (UNI 11205: 2007). The preservation is aimed to extend the life of the conserved artefacts as much long as possible. From the methodological point of view, the whole conservation of ancient objects previews three different phases: analyses, conservation, and preservation.

Key Issues/Current Debates/Future Directions/Examples

The key issues and current debates within this discussion are strictly linked to the three aforementioned phases of conservation. But, before that, wood protection and conservation starts within the excavation site.

According to the ICOMOS Charter on the Protection and Management of Underwater Cultural Heritage (1996), once the presence of wood has been identified, if it is not absolutely necessary, retrieval must only be carried out if suitable conditions for safeguarding the wood can be ensured beforehand. In advance, the real economic and technical possibilities for carrying out the following operations in a given time frame must be verified: characterization of the site where the wood is found, storage in suitable and controlled microclimatic conditions, and the characterization of the wood, restoration, possible showcasing in temporary exhibitions, and/or museum use. Where resources are deemed insufficient, retrieval must be postponed and only the documentation and implementation of the suitable measures for protection and temporary conservation must be undertaken.

Wood needs specific care during the retrieval. Before carrying out retrieval operations, measures to protect it from direct radiation and high temperatures (with screens, roofs, and constant spraying in the case of waterlogged wood) must be put in place, and the level of water, if present, must be regulated (with suction pumps etc.) so as to operate in controlled environmental conditions.

If wood comes from confined subaerial sites and underground sites of environments characterized by a dry climate, an apparently unaltered appearance of the wood must not lead to underestimating the importance of caution in the retrieval phase. The general rule applies also in these cases, that is, to prevent the wood from being exposed to sudden variations of relative humidity in order to avoid drastic shrinkages or swelling that can lead to deformations and breakages. Therefore, there is a basic importance to thermo-hygrometrical control the site and the environment in which the artefact is placed after it has been retrieved, so as to put in place systems to enable wood to gradually reach equilibrium in the new conditions, without undergoing damage. It is also necessary to implement measures to guarantee the preservation of wood from biotic attacks. The addition of a suitable biocide must be subject to the evaluation by expert sectorial technical-scientific personnel.

The retrieval of waterlogged wood must be carried out avoiding the evaporation of water from the wood. It is preferable that small size wood be placed in hermetic containers, possibly incorporating sediment and a quantity of water adequate to maintain the waterlogged conditions. For large size wood requiring more time for retrieval, it must be constantly wet to avoid irreversible damage. Since the presence of water in wood in conditions in which it is exposed to environmental contaminants constitutes a factor

of high risk for biological colonization, particular attention must be paid to preserving wood.

Then, a characterization is necessary in order to define in qualitative and quantitative terms the degradation undergone by wood and the mechanisms and agents that caused it. This operation has crucial diagnostic value in the preparatory, fact-finding stage, in order to design a project that aims to make suitable choices for the conservation of wood.

Wood characterization cannot operate in isolation from knowledge of the peculiarities of the site where it lies and the environmental parameters during excavation to be identified (an example can be found in UNI 11206: 2007 "Cultural heritage – Archaeological and archaeo-botanic wood – Guide lines for recovery and first conservation").

Keeping in mind that when possible, while characterizing wood noninvasive enquiries take precedence, sampling must be carried out so as to gather significant data with the least removal of material. The sample must be conserved in containers that are suitably sealed and closed so as to maintain the original humidity of the wood. In the case of waterlogged wood, the sample must be conserved in water that is microbiologically pure. The sample must be maintained in conditions that are unfavorable to biological growth ($T < 4$ °C, no light). The sample must preferably be taken, insofar as possible, from preexisting fractures or surfaces that are not visible. When sampling during excavation, the sample must be taken in the context of the recovery of the wood. The size of the sample depends on the type and number of enquiries laid down. In sampling operations, the environmental parameters of the site in which the wood was found must be noted.

Wood characterization supplies data for the definition of its state of conservation and for carrying out technological evaluations. These characterizations must include at least (Macchioni et al. 2012):

- Wood species identification, through macroscopic and/or microscopic observations.
- Macroscopic description, to define the morphometric characteristics of wood, of some technological characteristics (presence of sapwood and defects, such as, e.g, knots), of the presence of carbonization, traces of workmanship, etc.
- Micromorphological characterization of the anatomical features that define the state of wood such as the effects of abiotic and biotic degradation. In the case of biodegradation, the entity of degradation of wood must be evaluated, and the typology of attacks by organisms (insects, molluscs, crustaceans) and microorganisms (bacteria, fungus) must be distinguished.
- Chemical analysis aimed at determining chemical components of wood residue apparent in quantitative and qualitative results. Quantitative results define the amount of residue of both organic (in particular, cellulose, hemicellulose, holocellulose; lignin, organic extractives; some aqueous extractives) and inorganic nature (in particular, some aqueous extractives, ashes). Qualitative results identify chemical alterations undergone by the constituents of wood. Chemical characterization of mineral contents enables defining the diagnostic framework. Each evaluation must be carried out on the basis of comparison with analytical results obtained from the same unaltered species of wood recently.
- Physical analysis in which humidity and density values of wood are determined. In the particular case of waterlogged wood, the volume mass must be determined as basic density and residual basic density; moreover, the maximum content of water and equilibrium humidity must be determined.

On the basis of the obtained results, it will be possible to produce a diagnostic report, aimed to take any decision on conservation of archaeological wood.

The suitable choices to conserve wood could then be divided into three branches:

1. The general state of preservation of wood is good/very good, and the future preservation environment is quite similar to the previous one, that is, before retrieval. The decision must be that deep consolidation treatments are not necessary, eventually just a surface makeup.

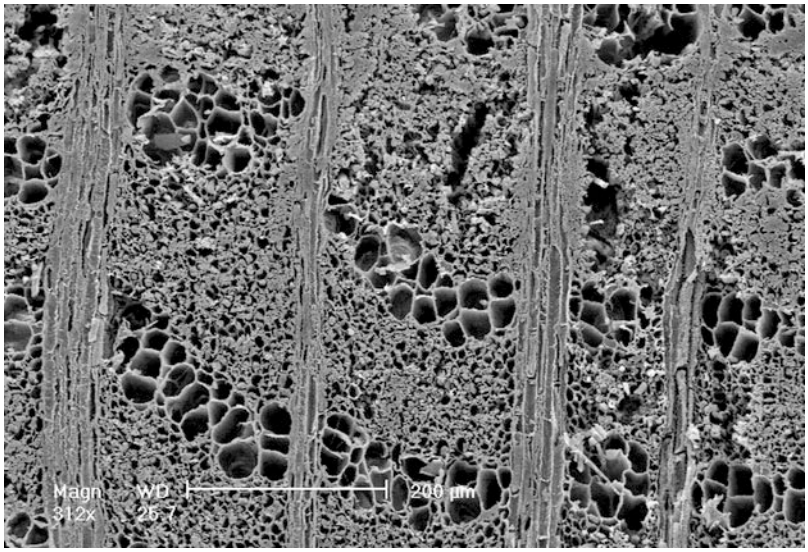

Wood: Conservation and Preservation, Fig. 2 Transverse section of elm (*Ulmus* sp.) wood by SEM. The fiber cell walls have been destroyed by bacterial attacks

2. The general state of preservation of wood from the anatomical, physical, and chemical point of view is not good, and the future preservation environment of the artefact is completely different from the previous one. A consolidation treatment can be necessary. The artefact typology, the diagnostic report, and the future preservation of environment will suggest the most suitable treatment, in terms of materials and methods.
3. The general management of the excavation site, the financial constraints, the lack of scientific support to perform a consolidation treatment, the lack of decision chain in terms of future preservation/exhibition of the artefacts are all elements that could support the decision of an in situ preservation activity for wooden objects. The excavation site and the relevant wooden artefacts are recorded and then reburied, both in terrestrial and underwater sites.

More in depth:

1. Deep impregnation treatments on a porous material, and particularly on wood, can never be considered really reversible. The only achievable results are a reduction of the concentration of the consolidant or the retreatability of the new composite made of wood and the consolidant. The future behavior of the new composite during time (at least decades or centuries), its physical and chemical stability, is never completely foreseeable; thus, the consolidation of a wooden artefact through a deep impregnation must be planned only when it is absolutely necessary.
2. In waterlogged archaeological wood, when the anatomical, physical, and chemical decay is high, the reduction in thickness and in strength of the wood cell walls is high, and the pressure of water ensures the maintenance of the shape of the cells, and in last analysis of the whole artefact. The loss of water during an eventual air drying frequently causes partial or total collapsing of cells and the partial or total loss of the original shape of the artefact (Fig. 2).

Consequently, the conservation of waterlogged archaeological wood involves the removal of water by means of treatments whose goals, as suggested by Grattan and Clarke (1986), can be summarized in the ability of the treatment to stabilize shape and dimensions of the artefact and the ability of the artefact (by means of the treatment) to withstand the future preservation environment. Moreover, the approach to conservation must also ensure the safeguarding of physical integrity of wood and, as much as possible, of its mechanical properties, when the wooden

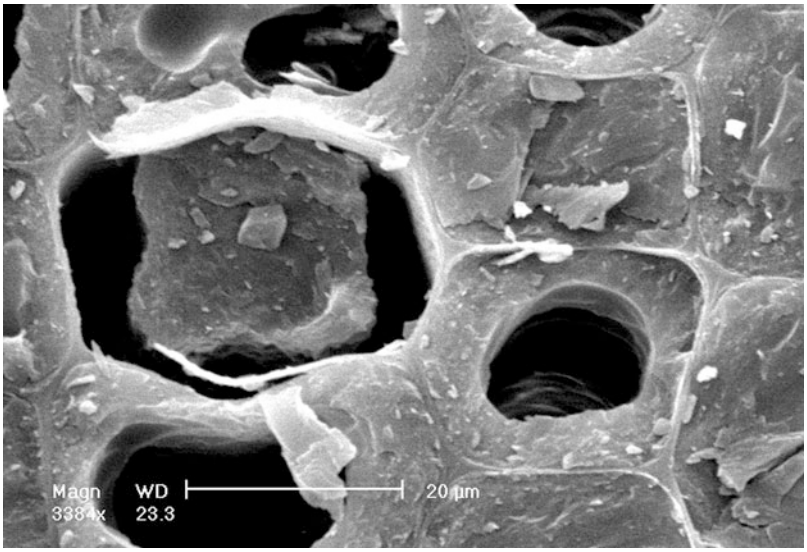

Wood: Conservation and Preservation, Fig. 3 Transverse section of a fir (*Abies* sp.) archaeological samples treated with PEG 400 and 4000. The treatment both consolidates degraded cell walls and fills some cell lumens

findings consist of large-sized structures with a complex architecture, made of several wood species differently decayed. Various methods have been tested and used so far for the conservation of degraded waterlogged wood (Giachi et al. 2010, 2011). Recently, Hoffmann (2009) compared some of the treatments currently most used and found that whereas the success of a stabilizing intervention depends on several factors, each method presents advantages and disadvantages. Generally, a compromise between contingent conservation exigencies, maintenance requirements, costs, safety, and easiness of procedures is chosen. At present, the most used techniques to conserve waterlogged archaeological wood are based on the impregnation of artefacts by natural or synthetic products, which penetrate into the objects through the diffusion and permeation processes (Grattan & Clarke 1987). Treatments using PEGs [polyethylene glycols of various molecular weights (Fig. 3)] are by far the most diffused, although methods using sucrose and other sugars (Cott & Strigazzi 1999) and more recently sugar alcohols (Zhang et al. 2009) and Kauramin®, a melamine resin (Wittköpper 1998), are also used. A new methodology through a "gentle" controlled drying in vacuum chambers is taking off (so far there have been no scientific studies published on this methodology).

3. Reburial in terrestrial environments and covering with natural or artificial sediments in underwater excavations must be designed with particular accuracy because the goal must be the obtaining of the same conditions that ensured the conservation of the artefacts before the excavations. Particular care must be paid to the oxygen availability and the risk of quick and highly destroying fungal attacks in terrestrial excavations, while, in underwater marine excavations the risk of quick destroying attacks is from marine borers, especially from shipworms (*Teredo* sp.). The presence of a thick (at least 50 cm) layer of sediment reduces the oxygen availability and protects from the shipworms attacks (Björdal & Gregory 2011).

The artefacts, treated or not, reburied or not, will need continued maintenance that must be designed together with the treatment methodology.

Wood is a hygroscopic and anistropic material and it maintains these features through time. Its treatment with different chemical consolidant can vary, but not block, the eventual and differentiated movements of wood due to thermohygrometric variations of the environmental conditions. As such, the chemical stability of

untreated and mostly of treated artefacts needs continuous monitoring because the real behavior of a new composite made of decayed wood and consolidant cannot be completely foreseeable. Such was the case of the warship Vasa, which is well known and has been scientifically described in several Ph.D. thesis, papers, and books (e.g., Sandström et al. 2002). Additionally, wood is a biodegradable material and the component of the cell walls can be severely degraded by new attacks on already degraded cells of archaeological wood. The new eventual components added to wood for preserving artefacts could avoid new attacks, but also cause new ones. In the end, the stability of the treated artefacts must be controlled through time and the design of the preservation treatment should precisely describe the analyses to be made and their timing.

Cross-References

- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Conservation in Museums
- ▶ Dry/Desert Conditions: Preservation and Conservation
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Ship Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime
- ▶ Waterlogged Finds: Conservation

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Woodland and Mississippian Cultures of the North American Heartland

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State of Knowledge and Current Debates

Introduction

Since the early days of North American archaeology, one area of particular interest has been the North American heartland, which is found in the Midwest and Midsouth of the continent, stretching from the eastern margins of the Great Plains to the Appalachian Mountains (Fig. 1). The first Europeans venturing west of the Appalachians encountered thousands of mounds, enclosures, and other earthworks in this area, which stood as testaments to the ancient people who lived in these regions. At first these constructions, many of which were laid out with startling geometric precision, were attributed by some European Americans to a lost race of mound builders, who perhaps had been eradicated by the indigenous people then inhabiting the area. Although some of the earliest students of archaeology in North America, including Thomas Jefferson, concluded that these constructions were built by the ancestors of American Indians, it was not until the end of the nineteenth century that the debate about who the mound builders were was settled, and these mounds were understood to have been built by Indians (Silverberg 1986). Deprived of popular fantasies about lost races and ancient wonders, the public became much less interested in the mounds and earthworks of the heartlands. Progressively, many of the tumuli were destroyed for the fill dirt they contained or in order to make farming of the land easier during the nineteenth and twentieth centuries.

Today, most Americans know very little of the mounds and earthworks of the heartland, and the preservation of those remaining is threatened. Even those who do know of a particular mound group have little understanding of the cultural context in which mounds and earthworks were built. Instead, superficial and stereotypical ideas about "primitive" or "ecological" Indian tribes of the heartland are common.

Nevertheless, at first stimulated by early debates about mound builders and then carried on by the universities and museums of the area as well as under government auspices and through contemporary CRM projects, the archaeology of the heartland has been an important focus for American archaeologists since the late nineteenth century. Not only have archaeologists learned about mounds, earthworks, and their constructions, but the cultural sequence for the area now is well understood. The lifeways of people inhabiting this area in the pre-Columbian past have been partially delineated. Archaeologists working in the heartland also contribute significantly to theoretical and methodological debates within American archaeology. Between 1000 BCE and European contact, two broad periods generally are recognized for the heartland. These periods, the Woodland and the Mississippian, which encompass much of the time when significant mound and earthwork construction took place, are the focus of this entry.

History of Concepts

By the 1930s, North American archaeologists generally agreed that there were two broad pre-Columbian Eastern Woodland pottery-making patterns both of which were associated with more sedentary lifeways and possibly horticulture. These were called the Woodland pattern and the Mississippian pattern by McKern (1939: 309) and distinguished on the basis of trait lists. A further attempt to define the Woodland pattern was made at an archaeological conference held in Chicago in 1941 when a more detailed

Woodland and Mississippian Cultures of the North American Heartland, Fig. 1 The heartland region showing the location of key sites

list of Woodland traits was constructed that was linked to semisedentary lifeways; grit-tempered, cord-marked pottery of subconoidal form; and stemmed or notched projectile points. In contrast the Mississippian pattern was believed to be distinguished by sedentary lifestyles; shell-tempered, incised, or modeled pottery in various shapes; and small triangular projectile points.

As archaeologists grew more interested in human adaptations and adopted more explicitly evolutionary models of the past, the concepts of the Woodland and Mississippian patterns were reformulated. Archaeologists came to recognize a Woodland period, extending from approximately 3,000–1,000 years ago, and a Mississippian period beginning around 1,000 years ago each with different lifeways. The Woodland period was associated with the appearance of pottery and burial mounds as well as with the first evidence of horticulture. It was also generally subdivided into Early, Middle, and Late subperiods with the Early Woodland marked by the initial appearance of pottery and burial mounds and the Middle Woodland distinguishing the era of Hopewell cultural developments and interaction (see below). In heartland taxonomic sequences, the Late Woodland usually was described as an interlude between Hopewell and Mississippian fluorescences. Outside the heartland, where Mississippian culture did not develop, the Late Woodland period, more often than not, was understood to continue until contact with Europeans. The Mississippian period distinguished societies that were dependent on agriculture and, thus, fully sedentary. It was also characterized by population growth and aggregation, social ranking, specialization of labor, and elaborate religious ceremonies (Griffin 1967).

The seminal formulation of Willey and Phillips (1958) placed the Woodland and the Mississippian into an evolutionary scheme by insisting that these patterns were stages of cultural development rather than periods. While these authors viewed the Early Woodland as at an "Archaic level" of development, Middle Woodland and later cultures of the Eastern Woodlands including the Mississippian were presented as examples of the Formative Stage. This stage had two central defining characteristics: agricultural economies and settled village life.

Today North American archaeologists use the concepts of Woodland and Mississippian periods and stages more or less interchangeably, overtly ignoring the evolutionary implications of these designations even while implicitly accepting many aspects of the formulation. There is a general understanding that the peoples of the heartland after roughly 3,000 years ago used pottery, built mounds, and engaged in elaborate mortuary ceremonialism while living in more or less sedentary villages and growing both native and tropical cultigens as parts of mixed economies that also incorporated many wild resources. These people are also understood to have participated in regional trade networks that moved raw materials, foodstuffs, and finished goods great distances. Significant population growth and aggregation are believed to have characterized the Woodland and the Mississippian. Although data now indicate both considerable variability in Woodland and Mississippian societies and economies and the presence of "Woodland traits" during the preceding Archaic period, Woodland and Mississippian remain important general concepts for heartland archaeologists.

Woodland and Mississippian Cultures of the North American Heartland, Table 1 Temporal breakdown of the Woodland and Mississippian periods in the North American heartland

Cultural period	Subperiod	Approximate dates
Mississippian	Late Mississippian	CE 1400–1550
	Middle Mississippian	CE 1200–1400
	Early Mississippian	CE 1000–1200
Woodland	Late Woodland	CE 500–CE 1000
	Middle Woodland	200 BCE–CE 500
	Early Woodland	1000 BCE–200 BCE

The Woodland

As mentioned above, the Woodland period in the heartland of North America is typically broken down into Early, Middle, and Late periods (Table 1). The Early Woodland period is usually dated from approximately 1000 BCE to 200 BCE, while the Middle Woodland period includes the interval between approximately 200 BCE and CE 500. There is some variation within the heartland in dating with some authorities starting the Middle Woodland closer to 100 BCE and some not ending it until CE 600. The Late Woodland period follows the Middle Woodland interval and extends until around CE 1000 in the heartland, although in adjacent non-heartland areas Late Woodland persists to contact with Europeans in the sixteenth century.

Early Woodland

During the Early Woodland interval, the production and use of pottery became very widespread in association with how food was stored and prepared. Some Woodland communities in the heartland notably constructed burial mounds and developed increasingly sophisticated mortuary rituals. This ceremonialism peaked during the Middle Woodland period, when the Hopewell people of southern Ohio, Illinois, and other regions constructed large, elaborate mounds and enclosures. These Hopewell communities participated in a pan-regional, ceremonially based interaction sphere that is associated with the certain characteristic iconographic themes, the acquisition of exotic raw materials, and the production of elaborate ceremonial paraphernalia. Many subsequent Late Woodland groups no longer performed complex funerary rituals or constructed large elaborate mounds, but their lifeways were often characterized by increased sedentism, larger population size, and a reliance on cultivated crops in ways that anticipate the Mississippian period.

Early Woodland people in the heartland have sometimes been characterized as having Archaic adaptations with pottery, but this is an oversimplification of complex, time-transgressive, and variable changes. The first pottery in the Eastern Woodlands was produced along the Atlantic Coast in parts of the Carolinas, Georgia, and Florida during the Archaic period. However, this innovation did not quickly diffuse over the heartland. Instead, it appears that the production and exchange of steatite (soapstone) bowls, especially the social networks these interactions established, may have delayed the diffusion of ceramic technologies in some parts of the Eastern Woodlands (Sassaman 2002). Vessels, bowls, and bottles made out of gourds, wood, basketry, and other perishable materials also may have contributed to the slow adoption of pottery. Some peoples in the heartland did adopt pottery earlier than others, which may reflect lower mobility, new land tenure systems, the incorporation of new subsistence strategies, or some combination of these factors. Notably by approximately 1500 BCE, Late Archaic people living along the middle Tennessee river were making pottery. By the beginning of the Early Woodland period, most groups in the heartland region were probably aware of how to produce pottery. Yet it is unclear how much pottery some Early Woodland people made and whether it was central to their lifeways.

While many Early Woodland people maintained a high degree of mobility and probably did not construct permanent structures, some sites suggest a greater degree of permanence. Similarly, the majority of these people continued to be hunter–gatherers, but some groups supplemented earlier subsistence practices with various indigenous domesticates such as goosefoot (*Chenopodium berlandieri*), knotweed (*Polygonum erectum*), sumpweed (*Iva annua*), sunflower (*Helianthus annuus*), and squash (*Cucurbita pepo*). Several cave sites in northwest Arkansas and also in eastern Kentucky contained caches of these domesticated seeds (Fritz 1993). Nuts were also important foodstuffs because they could be gathered by the bushel in a good year and placed in storage pits to be eaten during lean seasons. People hunted white-tailed deer (*Odocoileus virginianus*), rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), squirrel (*Sciurus* spp.), and wild turkey (*Meleagris gallopavo*). Many Early Woodland groups also hunted waterfowl and fished and collected freshwater mussels and other aquatic fauna.

While many aspects of Early Woodland life were remarkably similar to earlier lifeways, some groups of people placed a growing emphasis on conducting elaborate mortuary regimes at specific regional centers. The interactions at these ceremonial centers presented opportunities to "work out" competing claims on the social persona of the dead and its economic consequences, as well as to feast, negotiate alliances, smoke pipes, exchange goods, play games, and possibly acquire brides/grooms from other social groups.

These Early Woodland mortuary regimes had considerable continuity with earlier practices from the terminal Archaic period, c. 2000–1000 BCE. For example, the Glacial Kame and Red Ocher mortuary complexes of the heartland are often considered to straddle the transition between the Late Archaic and Early Woodland periods. The Glacial Kame mortuary complex, of Illinois, Indiana, Ohio, and further north around the Great Lakes, derived its name from the practice of placing the dead in gravel ridges or kames left by glaciation. These burials usually were tightly flexed inhumations in circular pits that were covered with red ocher and sometimes elaborate ceremonial objects, such as sandal-sole shell gorgets, circular shell gorgets, bar gorgets, birdstones, tubular pipes, wolf and bear masks, and copper and shell beads (Converse 1980). The Red Ocher mortuary complex refers to burials in Indiana, Ohio, and Michigan that were covered in red ocher and associated with diagnostic turkey tail points. These bodies were sometimes covered by low artificial mounds and interred with cache blades and tubular pipes. The deposition of large caches of ceremonial objects, such as turkey tail points and cache blades, is a notable development associated with the Red Ocher complex because it portends some later Early and Middle Woodland rituals. While historically these two "types"

of sites have been considered distinct, it is probably more apt to refer to Red Ocher and Glacial Kame as regional interaction spheres of closely related groups of peoples.

After 500 BCE, there was an even greater emphasis placed on funerary ceremonies, since the construction of burial mounds and associated earthen enclosures accelerated, especially in portions of Ohio, Kentucky, and West Virginia. Many of the mounds and enclosures are connected to the Adena archaeological complex. The archaeological patterns found in Adena burial mounds are notoriously complex and variable. Many Adena mortuary regimes appear to have begun with some sort of charnel structure or screened area, whose use was eventually discontinued after which the area was covered with a mound. These charnel structures often were circular "paired post" structures in which the dead may have been processed. Some of these paired post structures were quite large and it appears unlikely that they were roofed, given the absence of central support posts. Circular earthen enclosures, colloquially dubbed "sacred circles," are also often associated with Adena. These earthen enclosures generally have a moatlike outer ring that was bridged by a narrow gateway and an interior earthen embankment. A mound was sometimes constructed inside these earthen rings, and in particular cases, it grew so large that the underlying circular embankment was no longer visible (Clay 1998).

Adena burial mounds usually were accretional tumuli with log tombs or crypts dug into the primary mound. Deceased individuals were interred in these log tombs and then the mound was capped with additional soil. In some cases, there were a number of different accretional burials and levels added to Adena mounds, resulting in the remains of large numbers of individuals accumulating in these places through time. There is also considerable diversity in Adena interment styles, since extended burials, cremations, and bundle burials may occur in the same mound. Some of these burials were interred with a variety of different types of objects, including stone axes, gorgets, pendants, celts, mica crescents, copper beads, shell beads, pearl beads, tubular pipes, animalistic headdresses, and copper bracelets and rings.

Elaborately carved stone and clay tablets are considered diagnostic of Adena, but it is notable that four serpentine examples were found in Hopewell Mound 1, at the Middle Woodland Hopewell site located northwest of Chillicothe, Ohio. A close examination of the primary evidence reveals that few of these tablets are derived from well-dated archaeological contexts so assigning them to a particular period is problematic. Nevertheless, these small rectangular, engraved tablets portray a rich assortment of iconographic imagery. Some of the more consistent iconographic themes they portray are raptorial birds and human–bird hybrid beings, although other types of images also occur. These tablets were often interred with bone awls and/or various pigments. The bone awls seem to correspond to the grooves found on the back of many of these tablets, which suggests they were used to sharpen the awls. Based on this evidence, archaeologists have suggested that these tablets could have been used in two ways. First, these tablets may have been used to stamp the illustrations they bear onto clothing or other objects. Second, they may have been part of tattooing kits. This second scenario posits that the bone awls were sharpened on the tablets and dipped into the pigments. The bone awls were then used to impregnate different areas of the body with tattoos, a practice that was common historically in the heartland region.

Middle Woodland

Archaeologists date the beginning of the subsequent Middle Woodland period earlier in some parts of the heartland than in others. This is because many of the diagnostic traits used to mark the Early–Middle Woodland transition are time-transgressive traits that occur earlier in particular areas and later in others. For example, the Early Woodland (Tchefuncte) people of the Lower Mississippi River Valley produced ceramic vessels with curvilinear incising and rocker stamping: two attributes that are often used to differentiate Middle Woodland,

Hopewell assemblages. Some of the most characteristic motifs are incised depictions of raptors and ducks on ceramic vessels. Middle Woodland, Hopewell people in Illinois also produced similar pottery styles by around 200 BCE. It appears that these decorative techniques were only later adopted by peoples in southern Ohio as well as in other parts of the heartland region. In many areas of the central Ohio River Valley, Middle Woodland groups simply continued to make pots very similar to those they traditionally used, a pattern often associated with the continuation of the Adena complex. Yet the Adena complex is not, realistically, a viable taxonomic unit because it encompasses too much internal variation. Future work should refine our chronological understanding of these Middle Woodland groups (Clay 2005).

While an early perspective was that Middle Woodland, Hopewell people lived in hierarchical societies that had corn-based agricultural economies and permanent villages, subsequent archaeological work has revised our understanding of their lifeways. Settlement surveys have found little evidence of domestic dwellings among Ohio Hopewell earthworks. Instead they have documented the presence of small, dispersed occupations that served as sedentary farmsteads or nodes in more itinerant hunter–gatherer lifeways. Middle Woodland settlement patterns seem to have been oriented differently in the Illinois River Valley, since Illinois Hopewell occupations are more regularly spaced and located at the base of bluffs below clusters of burial mounds. Other regions also seem to have dispersed settlements.

Analyses of Middle Woodland subsistence practices generally show continuity with earlier food ways. Nevertheless, increased utilization of indigenous seeds is evident in the Illinois and central Ohio River Valleys. This pre-maize horticulture emphasized the cultivation of oily seeds, sunflower, and sumpweed, as well as small grains like chenopodium, knotweed, maygrass, and little barley. All of these seeds had been cultivated by heartland peoples for several millennia, but in Middle Woodland times, they became even more important to some groups (Scarry & Yarnell 2011). The diets of other Middle Woodland peoples do not reflect an increasing use of indigenous domesticates. There are also regions, such as the central Mississippi River Valley, where the diet of Middle Woodland people remains to be delineated.

Middle Woodland mortuary practices also varied considerably, but many of the Hopewell funerary regimes involved secondary burial rites. It was probably during these secondary burial rites that Middle Woodland mounds were constructed to cover charnel precincts or facilities. Two important centers of mound building in the heartland region are the Illinois and Ohio Hopewell archaeological complexes, although there are a number of other regional expressions.

Illinois Hopewell is known primarily from the Illinois River Valley, where many burial mounds have been found on bluffs and in the floodplain. The Gibson–Klunk mounds, located along the western bluff line of the Illinois River Valley at Kampsville, Illinois, have been particularly well studied. These mounds had central vaults, often lined with logs, in which the dead were placed and allowed to decompose. Many of these bones were collected and then interred as secondary burials in the corner of the tomb or in a pit along the side of the primary mound (Brown 1979). Some of the dead were interred as primary burials in these crypts. Grave goods were frequently buried with both types of burials. Distinctive Hopewell artifacts were recovered in abundance. At the end of the ritual cycle, Illinois Hopewell people covered these crypts with mounds. Some status differentiation is evident in the burials, but sex and age rather than heredity seem to be the primary determinants of burial treatment. Earthwork sites are rare in Illinois, but one is known from Golden Eagle, near the confluence of the Illinois and Mississippi Rivers.

Ohio Hopewell people, in contrast, constructed charnel houses to store the dead before they were cremated. These Ohio Hopewell charnel houses were roofed, sometimes two storied, rectangular structures with rounded corners that had rectangular fired clay basins on their floors (Brown 1979). The fired clay basins were

constructed from puddled clay and it is possible the dead were cremated in some of the larger examples, but they may have also served as multipurpose hearths. Cremations and burials along with rich grave goods were placed on the floors of these charnel houses. Large ritual caches sometimes were deposited in these structures in (or adjacent to) the fired clay basins. Large ritual caches are a distinctive feature of Ohio Hopewell rituals. They often contained more elaborate objects and ritual paraphernalia than the burials. At the end of these mortuary regimes, it appears that Ohio Hopewell people razed these charnel structures and constructed a mound over them (Giles 2010). Moreover, on floodplains or alluvial terraces, these mounds often were enclosed with large earthen embankments that were constructed in a variety of geometric shapes. Ohio Hopewell hilltop enclosures were constructed to conform to the natural topography of hills and summits.

The elaborate paraphernalia found with burials and in ritual caches in Hopewell mounds indicate that increased interaction, exchange, and possibly long-distance forays occurred during the Middle Woodland period. The term "Hopewell Interaction Sphere" has been used to describe the interaction and exchange noted in this period (Carr & Case 2005; Charles & Buikstra 2006). The movement of specific types of objects and raw materials, including copper, marine shell, and exotic cherts, points to continuity with previous exchange networks. A great deal of the copper came from northern Michigan and southern Ontario, although a smaller amount was derived from the Appalachian Mountains and other sources. The marine shell likely came from the Gulf and Atlantic Coasts. Various types of chert also moved through Hopewell exchange networks, sometimes in huge quantities, given the large numbers of exotic bifaces found in particular ritual caches. For example, there was a cache of over 8,000 bifaces made of Wyandotte chert from Harrison County, Indiana, found on a charnel house floor under Mound 2 at the Hopewell site near Chillicothe, Ohio.

Other materials were acquired in unprecedented quantities by Middle Woodland people, such as obsidian from the Rockies and mica from the Appalachians. One important example is the 300 lb of obsidian interred under Hopewell Mound 11, which appears to have been directly procured from outcroppings at Yellowstone National Park in Wyoming. The direct acquisition of this obsidian is also supported by depictions of bighorn rams in Hopewell iconography. Bighorn rams are not local to Eastern North America, but live to the west in the Rocky Mountains near the obsidian sources indicated by recent chemical analyses. Similarly large quantities of mica were acquired by Ohio Hopewell people probably from Middle Woodland groups who lived in the Carolinas. Ohio Hopewell people cut some of the mica into representations of circles, human hands, and human decapitated or dismembered bodies.

Woodland and Mississippian Cultures of the North American Heartland, Fig. 2 Falcon effigy pipe from the Mound City Site

Certain finished objects were exchanged during the Middle Woodland, Hopewell horizon, such as copper panpipes, copper "reel-shaped" gorgets, Hopewell series pots, and plain and effigy platform pipes. For example, large caches of exquisitely carved Hopewell animal effigy platform pipes were deposited next to fired clay basins under Mound 8 at Mound City in Ohio as well as at the Tremper mound, which are located along the Scioto River in central Ohio (Fig. 2). Smaller quantities of animal effigy platform pipes also occur with burials in various other Ohio and Illinois Hopewell mounds. These animal

effigy pipes depict a veritable menagerie of different mammals, reptiles, and birds. Most of these animals are represented in a naturalistic style, although some stylized motifs do occur. While archaeologists have believed that most of these pipes were made of pipestone from central Ohio, recent mineralogical analyses suggest a variety of pipestone sources were used that are spread over a wide geographic area. Three of the most important sources are Sterling pipestone from northern Illinois, Feurt Hill pipestone from central Ohio, and red catlinite from Minnesota and southern Ontario (Farnsworth et al. 2004).

Hopewell exchange objects have been found in sites outside the heartland. For example, burial pits excavated at the Mandeville site, a Deptford/Swift Creek tradition site located on the Chattahoochee River in Georgia, contained copper panpipes and earspools, clay platform pipes, prismatic blades, ceramic figurines, mica, and greenstone celts suggesting Hopewell ceremonialism. After approximately 50 BCE, sites in the vicinity of Kansas City to the west of the heartland contain ceramics similar to those from Illinois Hopewell sites as well as other Hopewell objects. The Abbott Farm site, located near Trenton, New Jersey, also contained pottery suggestive of Hopewell in association with mica sheets, argillite and jasper bifaces, conch shell fragments, and platform pipes. These and other sites indicate the influence of the Hopewell ideas far outside the heartland during Middle Woodland times (Carr & Case 2005).

The Late Woodland

The Late Woodland begins at approximately CE 500, when Hopewell mounds and earthwork complexes were no longer being built. There are a number of places at which terminal Middle Woodland or early Late Woodland people continued to build mounds, such as the Firehouse mound near Cincinnati, Ohio, and the Russell Brown Mound near Chillicothe, Ohio. There also was some rebuilding or repair of Hopewell earthworks during the Late Woodland. Similarly the Hopewell Interaction Sphere appears to have broken down around CE 400–500. However, a more limited interaction sphere continued in the Ohio River Valley that had a more northerly centered distribution in which materials such as mica, shell, and possibly slate were still exchanged (Seeman & Dancey 2000). The end of the Middle Woodland was not abrupt even in Hopewell core regions, and the archaeological taxonomic units associated with this Middle to Late Woodland transition can vary considerably across the heartland. The Late Woodland period ends around CE 1000 when a number of societies in the heartland have characteristics associated with the Mississippian pattern.

Traditionally, archaeologists have considered the Late Woodland period as the time of the "good gray cultures." This designation reflects the idea that the Late Woodland was a drab period of decline, sandwiched between the Hopewell and Mississippian cultural climaxes. More recently archaeologists have begun to view the Late Woodland as a pivotal historical period with considerable variability that was marked by several important transitions.

Late Woodland ceramics were most often plainer than those made during the Middle Woodland, with cord marking a common surface treatment. The Late Woodland stone tool industry also is characterized by the disappearance of various exotic stone types as well as a reliance on utilized or minimally worked flakes rather than more formal tools. With respect to settlement and subsistence, there was considerable diversity in the heartland during the Late Woodland period. For example, some Late Woodland peoples had subsistence and settlement strategies that emphasized logistical mobility that was consistent with earlier periods. Other Late Woodland groups began to settle in nucleated communities. In general, groups in the heartland were probably more mobile during the early Late Woodland interval, but became increasingly sedentary through time. Since there are greater numbers of sites and the sites often become progressively larger through time, the increasingly sedentary lifeways associated with Late Woodland people may have been a response to overall population growth.

Archaeologists have found strong evidence for the nucleation of settlements in the Ohio Valley

above the Falls of the Ohio, while in the lower Ohio and along the Illinois drainage, settlements decrease in size as the Late Woodland begins. Stonewalled enclosures often called "stone forts" first were made in southern Illinois and Kentucky at this time. The nucleated settlements in Ohio that have moats and fortifications, as well as the "stone forts," may indicate defensive concerns. Towns with mounds begin to appear at the end of Late Woodland in the central Mississippi Valley, northern Georgia, and other parts of the heartland. Other traits associated with Mississippian societies also started to emerge during the later portion of this period. These include the use of shell to temper ceramics, wall trench construction for houses, and intensive maize agriculture (Anderson & Mainfort 2002).

Another Late Woodland development was the widespread adoption of the bow and arrow around CE 700, marked by the predominance of small notched and unnotched triangular projectile points. These points often were made from flakes instead of directly from bifacial cores. Although the bow and arrow may have been known earlier, people now were making predominantly small points that archaeologists believe were arrow points. This shift to the bow and arrow is significant due to its presumed efficiency as a hunting implement and as a weapon. Archaeologists also debate whether the rise of the bow and arrow was associated with intensified deer hunting or conflict and warfare. Some archaeologists suggest that higher population levels in the Late Woodland caused resource stress and the adoption of second-line resources like small mammals and shellfish.

One response to this competition over resources was to intensify the agricultural production of native seed plants and later tropical cultigens like maize. However, Late Woodland people did not uniformly intensify agricultural production. Within the major Midwestern river valleys, archaeologists have documented intensification of the plant cultivation as evidenced by the widespread presence and large quantities of native seeds. People also used some corn and tobacco, as well as many aquatic resources, including fish species that spawn in river backwaters. However, proportionately lower use of seed plants and greater reliance on white-tailed deer are evident in upland sites.

The end of the Late Woodland period in the heartland is marked by the widespread shift to maize agriculture around CE 900–1000. This shift is evident both in the greater amount of maize found in sites and in changes in the ^{12}C:^{13}C ratio found in human bone. Corn had been present before this period, but only in small amounts. Apparently, a new variety of corn known as Eastern Eight Row or Northern Flint corn developed, perhaps in Ohio, at some time between CE 900 and 1000. This variety of maize was apparently hardier and more cold tolerant than earlier types of corn, which had 10 or more rows of kernels per cob. While this type of corn successfully spread around CE 950–1050, archaeobotanical studies show that it was never important in the American Bottom near St. Louis, even though this was where maize agriculture was first adopted in the heartland. Native cultigens also remained more important in the agricultural economies of the American Bottom than in areas to the east.

Beans (*Phaseolus vulgaris*) were not yet present at the end of the Late Woodland. AMS dating of beans from Eastern Woodland contexts indicates that beans did not arrive until approximately CE 1200 at the earliest. Thus, the maize, bean, and squash polyculture that is iconic for American Indians was not yet practiced, and each of these crops has its own history of spread and adoption (Hart et al. 2007).

Mississippian Period

Given the amount of diversity in Late Woodland adaptations, the development of Mississippian cultural phenomena cannot be attributed to the same factors everywhere. However, around CE 1000, a number of groups in the heartland rapidly developed traits that characterize Mississippian societies, including a growing reliance on maize agriculture, shell-tempered pottery, wall trench structures, and aggregated village settlements. Many of these Mississippian societies became complex political polities or chiefdoms with hierarchical social structures. These polities

often were centered on large towns that had public plazas, platform mounds, and residential spaces. It appears that ceremonial structures, possibly the residences of chiefs or elites, were constructed at the top of Mississippian platform mounds. Mississippian chiefdoms generally first developed in the American Bottom and central Mississippi River Valley and then gradually spread further east until these complex polities extended throughout most of the heartland. There are also some cultural traditions in the heartland that, despite certain distinctions, have been considered regional variants of Mississippian. The most notable are the Fort Ancient societies of the central Ohio River Valley.

The Mississippian period is divided into the Early Mississippian from CE 1000–1200, the Middle Mississippian from CE 1200–1400, and the Late Mississippian from CE 1400–1550 (Table 1). During the Early Mississippian period, the traits associated with Mississippian societies, such as maize agriculture, shell-tempered pots, wall trench structures, and a site layout that included both platform mounds and raised earthen plazas, spread to many regions of the heartland. It was also during the Early Mississippian period that hierarchical chiefdoms emerged. The largest political polity of the period was Cahokia, located east of modern-day St. Louis. Mississippian polities were not particularly stable and their power rose and fell. The Middle Mississippian period marks the height of these polities. In contrast, the Late Mississippian was a time of increased warfare, population aggregation, and political turmoil, as well as decreased mound building.

In some areas, Mississippian societies persisted into the Protohistoric era and certain polities have been linked with the indigenous groups De Soto's expedition encountered between 1539 and 1543 (Cobb 2003). The accounts of the De Soto expedition and other ethnohistoric records are often used as a baseline for the social organization and practices of Mississippian societies (Urban & Jackson 2004). Nevertheless, the arrival of Europeans did create a volatile period with increased violence and epidemic diseases that led to a massive depopulation of indigenous communities. During this turbulent period, the social and political landscape was dramatically transformed as particular peoples were essentially eliminated, while sometimes new ethnicities were created from their remnants. The ethnohistoric evidence also establishes that a number of different languages were spoken. It is therefore clear that Mississippian societies were not one people, but rather different cultural groups that had similar lifeways.

Mississippian people were some of the first easterners to settle in large permanent towns that contained central plazas, public buildings, platform mounds, and encircling stockades. These large permanent towns served as centers for political polities that included some outlying farmsteads and hamlets. The size and scale of Mississippian polities varied a great deal, but some of the largest were comprised of multiple towns that were politically aligned together. Some polities probably had one central "power" or chief. Migrations also appear to have been common and some areas experienced quite rapid population increases and decreases. For example, there was an influx of people right before the emergence of Cahokia in the American Bottom around CE 950. In contrast, the lower Ohio Valley and adjacent areas of southern Illinois and northern Kentucky was largely abandoned after approximately CE 1450. This area has been dubbed the Vacant Quarter (Cobb & Butler 2002).

Mississippian people were maize agriculturalists who also cultivated native plants and exploited deer, fish, waterfowl, and wild plants. After the Early Mississippian, native cultigens became less important in most of the heartland, and the maize–bean–squash polyculture began to be developed. It has been argued that Mississippian populations were adapted to a specific meander belt habitat in the major river valleys of the Midwest and Southeast. Yet more recent investigators believe that Mississippian adaptations were more varied, both geographically and temporally.

On the basis of ethnohistorical accounts, there were probably fairly distinct social roles for men

and women in Mississippian communities. Mississippian women were responsible for agricultural production, although men probably helped clear the fields of large stones and trees prior to planting. Mississippian women used stone hoes that were often made out of Mill Creek or Dover chert to till the land. At some sites, like Ocmulgee in Georgia, ridges and furrows associated with prehistoric agriculture have been found. Mississippian men actively engaged in hunting, warfare, and politics. Men in these societies likely earned prestige through hunting, military accomplishments, and/or their skill at negotiating treaties and keeping the peace.

There has been considerable discussion about prehistoric Mississippian politics and social organization. Archaeologists have sometimes classified Mississippian societies as simple, complex, and paramount chiefdoms, but contemporary archaeologists are much less focused on fitting these societies into typological schemes. Instead they are interested in understanding these societies' historical trajectories and political economies (Cobb 2003). Some archaeologists believe that long-standing Eastern Woodland beliefs associated with membership in communities and lineages were replaced during Mississippian times with ideologies that elevated particular individuals to hierarchical positions of power. More recently archaeologists have reconsidered this position and discussed the potential importance of heterarchical or lateral political positions, possibly linked to moieties, clans, age grades, and/or other sodalities (Blitz 2010).

During the Historic period, most heartland societies were organized into dualistic moiety and social systems, although there were some specific differences between them (Urban & Jackson 2004). For example, some tribes in the heartland, such as the Creek, were divided into red and white organizations. The red organization dealt with warfare and external relations, while the white organization was more inward-directed and devoted to peace and municipal order. Certain towns were considered as either red or white, although these associations could shift through time as a result of wars and ball game competitions.

Another important subject is the way that different material symbols were linked to particular social positions in Mississippian polities. For example, it appears that Mississippian elites commissioned an array of symbolically charged icons, which asserted their (possibly ancestral) connections to important deities and religious beliefs. These symbols and icons have been referred to as the Southeastern Ceremonial Complex (SECC). SECC objects include elaborate repoussé copper plates, ornate (sometimes effigy) pots, human and animal effigy pipes, human figurines, "chunkey" stones, chipped stone "swords," stone maces, monolithic axes, and engraved shell gorgets and cups. Many of these Mississippian icons were differentially interred with burials or in ritual caches. The largest quantities of ceremonial paraphernalia were deposited at important Mississippian mound centers, such as Moundville, Etowah, Spiro, and Cahokia. However, the distributions of other symbols, including Mississippian maces, illustrate more varied depositional patterns that included some smaller centers.

In recent years, there has been a focused effort on understanding Mississippian iconography and linking it to the ethnohistoric beliefs of Native American people. Research has also refined the chronological sequence for SECC representations based on the large elaborate imagery found at four Mississippian mound sites: Cahokia, Etowah, Moundville, and Spiro. These Mississippian symbols seem to focus on a number of iconographic themes, including warfare, fertility/renewal, eschatology, and cosmology, although there is considerable variation in the subjects represented by these depictions. Abstracted representations of cosmos, such as cross, cross-in-circle, and triskele motifs, are some of the most common SECC symbols (Reilly & Garber 2007). These cosmograms occur in a wide variety of material media, but most notably on Mississippian shell gorgets that were often pierced for attachment and worn as adornments. Other SECC representations include avian, anthropomorphic, and animalistic "subjects" that probably were associated with the upper and lower worlds in a three-tiered cosmos.

Woodland and Mississippian Cultures of the North American Heartland, Fig. 3 One of the copper Rogan plates from the Etowah Site showing a birdman holding a mace and a decapitated head

For example, one of the copper Rogan plates from Etowah, Georgia, portrays a now famous representation of a falconoid birdman holding a mace in one hand and a decapitated head in the other (Fig. 3). Similar representations have been found at Moundville, Alabama. This image almost certainly depicts a warfare-related theme, although it could have as its justification a mythic narrative about the Siouan god-hero: Red Horn or Morning Star (Reilly & Garber 2007).

Utilitarian objects were also produced and exchanged by Mississippian people. For example, Mill Creek chert hoes were made in southern Illinois and then widely exchanged throughout the heartland. There are also several Mississippian sites associated with salt production. Other raw materials, such as copper and marine shell, were widely exchanged by Mississippian people. However, it is not clear how much elite control was exercised over the movement and exchange of these different objects and materials. Ethnohistoric documents suggest that the indigenous people of the heartland employed a number of social mechanisms for establishing and maintaining exchange networks.

Some of the large important Mississippian polities were centered at Cahokia in Illinois, Moundville in Alabama, Kincaid in Illinois, Etowah in Georgia, and Spiro in Oklahoma. Cahokia and Moundville were two of the largest Mississippian sites and usually these are interpreted as paramount chiefdoms. Nevertheless, there are important scalar differences between them, suggesting the uniqueness of the larger Cahokian polity (Wilson et al. 2006).

Located across the Mississippi from modern-day St. Louis, Cahokia was the center of one of the earliest and largest Mississippian chiefdoms. Cahokia consisted of at least 104 mounds, a series of large plazas, palisades, and woodhenges, as well as several residential areas. Plazas were large raised public spaces that were periodically cleaned, while the woodhenges were circular wooden structures resembling Stonehenge that may have tracked astronomical events. The mounds at Cahokia were used for a variety of different purposes that included the designation of elite residences, charnel precincts, and other ceremonially charged areas. These mounds included Monks Mound, the largest earthen tumulus in Eastern North America, which is about 30 m (100 ft) high, 291 m (955 ft) long, and 236 m (775 ft) wide with an access ramp on its southern side. Monks Mound is such a large feature of the landscape that you might mistake it for a hill if it were not in the middle of the floodplain.

The Cahokian polity was unique in a number of ways. For example, it encompassed a number of other large Mississippian towns, such as the St. Louis Mound Center, the East St. Louis Mound Center, Pulcher, Mitchell, and Lohmann, and several other small mound centers. Notably, the East St. Louis Mound Group was the second largest Mississippian mound center, while the St. Louis Mound Group was the fourth largest (Wilson et al. 2006). Consequently, the Cahokian polity was larger by a scale of magnitude than any other Mississippian polity, since it contained three of the four largest sites from this time

period. This Cahokian polity actually encompassed an area over 17 times larger than Moundville located in Alabama, which was the largest Mississippian center outside of the American Bottom region. At its height the Cahokia polity probably had a population that was 6–14 times larger than Moundville's. There are also indications that the residential population surrounding Cahokia, especially the upland Richland complex of communities, was probably multiethnic. The pluralistic nature of the population at Cahokia appears to be different from most other Mississippian polities in the heartland, a characteristic that also distinguishes it from most chiefdoms.

The Cahokian polity seems to have been the center of the Braden art style, which was likely the foundation for later Mississippian iconographic styles, such as the Hightower (Etowah), Hemphill (Moundville), and Craig (Spiro) styles. Moreover, iconographically charged objects may have perpetuated an ideology that promoted Cahokians as important mediators with cosmos. Such mediators would have been essential in enacting ritual renewal through green corn ceremonialism and renewing the new fire. For example, Pauketat and Emerson (1991) have argued that Ramey Incised pots served to legitimate chiefly authority in which comestibles were "redistributed" and elite ideas were diffused to regional nonelite (often) peripheral populations.

The Moundville site was the center of another large Mississippian political polity, probably a paramount chiefdom. It is located on a high terrace on the Black Warrior River in western Alabama. The site is composed of 32 mounds and a rectangular plaza. The mounds positioned around the plaza seem to have been paired. Knight (1998) has suggested that the spatial arrangement of the mound and plaza complexes at Moundville mirrored its social organization. Correspondingly, he has argued that these mounds were built and controlled by a number of politically and ceremonially integrated groups, possibly with a dualistic social system. There were also dense occupations at Moundville, especially soon after it was founded, but later the site was used primarily as a necropolis to bury the dead. In the broader region, there are also four smaller mound sites that are probably associated with Moundville. However, there is relatively little domestic debris around the mounds at these sites so they may not have been aggregated villages (Wilson et al. 2006).

There are, of course, other large important Mississippian mound centers, including Etowah in Georgia, Spiro in Oklahoma, and Kincaid in Illinois among others, as well as numerous smaller mound sites. In general, many of these Mississippian polities seem to have followed a similar developmental trajectory marked by an initial period of political consolidation and population aggregation. Later, when these Mississippian polities were declining, the population living at these mound centers dropped, and they were used increasingly as ceremonial centers. In certain cases, this ceremonial use focused on burying important deceased individuals with elaborate ritual objects, and these sites became essentially necropolises.

The influence of Mississippians extended out of the heartland into Florida and the Upper Midwest where cultural groups with many Mississippian traits and possibly ethnic connections have been identified by archaeologists. These include the Oneota groups of northern Illinois, Wisconsin, Iowa, and adjacent regions and the Fort Walton culture of northern Florida as well as others.

Within the heartland itself the Fort Ancient tradition was an important regional variation during the Late Prehistoric period. The Fort Ancient tradition developed in the central Ohio River drainage after around CE 1000. On the basis of highly similar ceramics, greater interaction among Fort Ancient populations seems probable after CE 1450, but breakdown of the tradition occurred after approximately CE 1700 (Drooker & Cowan 2001). Fort Ancient groups produced shell-tempered ceramics that have some Mississippian stylistic elements and similarities. Their subsistence economy centered on maize and native cultigens but also included wild plants and animals. Fort Ancient settlements are primarily found in the floodplains, and they included nucleated villages after approximately

CE 1100. Central plazas and large, possibly communal structures and stockades have been observed at Fort Ancient sites after CE 1200. Late Fort Ancient settlements of the Madisonville horizon sometimes became quite large villages. There are a number of SECC shell gorgets and other icons found at Fort Ancient sites that point toward interaction with Mississippian groups further south. Other artifacts, such as some Iroquoian-style pipes, point to relationships between Fort Ancient groups and communities further north (Drooker & Cowan 2001). Studies of grave goods suggest that there was little ascribed ranking among Fort Ancient populations, and archaeologists believe these people may have been organized into a tribal confederacy rather than a hierarchical chiefdom (Drooker & Cowan 2001).

Issues and Debates

Given the rich archaeological record for Woodland and Mississippian peoples of the heartland, it is not surprising that there are many substantive and theoretical debates among contemporary archaeologists studying these cultures. We have space to introduce only some of these issues in this entry. We briefly introduce ten topics of debate in this section and organize these subjects into three broad areas of interest: (1) ecology and economics, (2) sociopolitical organization and interaction, and (3) ceremonialism, religion, and mortuary behavior. Each of these broad areas of interest has been stimulated by changing theoretical perspectives as heartland archaeologists moved from an initial focus on culture history to a processualist emphasis on adaptation and cultural evolution. Most recently, there has been a movement to incorporate aspects of the post-processualist critique by variously focusing on human agency, gender, material culture, and symbols.

Ecology and Economics

Interest in human–environment interactions has been significant since the beginning of North American archaeology. Initially debates often centered on the degree to which the environment shaped culture. For example, an issue was whether particular social forms including the presumably more sociopolitically complex societies of the heartland developed because of the relative richness of regional resources or as a result of historical forces and diffusion. Since the 1960s and 1970s, this debate has become less generalized. As the amount of evidence for human use of environmental resources has grown, it has been possible to explore detailed patterning in subsistence and economy over time and across the heartland. Critiques of the processualist and adaptationist perspective have not reduced interest in the variable ways in which humans have interacted with the environment. Instead, attention has been refocused on the complex social and ideological factors that affect human choices about resource use as well as on how humans, intentionally or unintentionally, shaped the landscapes in which they lived.

One key area of debate and research surrounds the development of indigenous agriculture. As previously discussed, several seed-bearing plants native to the Eastern Woodlands and adjacent areas that were first grown in the Archaic period also were cultivated by Woodland and Mississippian people in the heartland. Although the use of these plants became widespread, their role in local economies does appear to have varied. For example, maize was present hundreds of years before it became a staple. In some cases, reliance on native cultigens decreased when tropical cultigens such as maize and beans were adopted, while in others people continued to grow native cultigens even after increasing their consumption of maize. The causes of this variation are not yet fully understood.

A second, related topic of debate has to do with how the iconic Native American maize–bean–squash polyculture came into being. Maize and beans, the two principal tropical cultigens eventually adopted by heartland societies, have different histories with beans arriving only between CE 1200 and 1300 (Hart et al. 2002). Though well known from ethnohistorical and ethnographic accounts, this polyculture was not developed in the heartland and other parts of the Eastern Woodlands until after this time. Thus, the diversity of agricultural

systems developed by both Woodland and Mississippian societies has become clearer, as more data have been accumulated. We can now document archaeologically that environmental, historical, economic, demographic, and ideological factors all may have influenced the specific nature of Woodland and Mississippian agricultural production and political economies.

Other questions have to do with the ways in which Woodland and Mississippian people enhanced the natural environment in order to acquire more food and raw materials. There has been debate about whether human agents intentionally disturbed particular environmental niches to promote the growth of certain oily and starchy seeds (Smith 2011). Certainly many actions of heartland peoples promoted the kinds of early successional habitat types that contain more food for humans. In the mature forests of the heartland, most of the biomass is trapped in forms such as cellulose that humans cannot digest. Disturbed habitats, old fields, and natural forest clearings and edges contain many more edible fruits, seeds, and shoots. These niches also attract important game species like the white-tailed deer, rabbits, and many birds. Garden hunting for these animals likely was practiced by Mississippian peoples. Some Woodland and Mississippian peoples likely cleared and burned the forest to create fields and gardens, but it also was accomplished as groups established and moved their villages. Thus, the growth and aggregation of Woodland and Mississippian populations disturbed more forest, and these actions favored mast-bearing trees like oak and hickory. These people probably also transplanted fruit-bearing trees to open areas within the forest and broadcast some native seed plants on river banks. Archaeologists are just beginning to realize the many ways that heartland peoples managed and structured the environments in which they lived.

Sociopolitical Organization and Interaction

Neoevolutionary ideas have had a major influence on archaeological conceptualizations of the Woodland and the Mississippian periods in the heartland. Early archaeologists tended to see both the Hopewell and Mississippian patterns as representing sociopolitically complex, ranked societies made possible by agricultural economies. Archaeologists started to recognize that the sociopolitical organization and economy of these societies varied more extensively as knowledge about their subsistence and settlement strategies accumulated. Today, Woodland peoples including the Hopewell usually are understood as tribal people, whose elaborate ceremonial life symbolized and reinforced kin groups, social identity, and cosmological beliefs. In contrast, Mississippians have continued to be understood as internally differentiated chiefdom societies, and key debate centers on how power was distributed, how resources were controlled, and how ceremonial life symbolized religious belief.

One key debate of this type has been about the nature and size of Hopewell communities (e.g., Carr & Case 2005; Charles & Buikstra 2006; Byers & Wymer 2010). Although large Hopewell mound centers have long been known in Ohio, Illinois, and elsewhere, settlements often seem small and ephemeral in comparison, and domestic structures have not been well documented. Hopewell mound centers certainly do not contain large numbers of domestic structures, but instead were centers for series of ritual events that often involved the disposal of the dead. If Hopewell people did not live at these sites, where did they reside? While the settlements of the Illinois Hopewell may or may not have included large residential villages, as well as mound complexes and small hamlets, it does appear that residential sites were grouped into spatially integrated communities that probably linked related lineages and utilized distinct mound complexes (Carr & Case 2005). Ohio Hopewell settlement is less well understood. In Ohio, some researchers propose a dispersed sedentary community model in which single or sometimes multiple household units were dispersed across the landscape although they shared a corporate ritual space at mound centers that were periodically visited. Mound ceremonialism thus reinforced kinship-based identity and community that may not have been linked to spatial proximity. Other archaeologists question the

duration of occupation or sedentary nature of Hopewell hamlets (Charles & Buiksta 2006). There also is related debate about how territorial Hopewell people were.

The nature and significance of exchange and interaction among Hopewell and other Middle Woodland people also is a subject of active debate and research. As we have noted, there is considerable evidence for the exchange of Hopewell material culture and raw materials across the heartland and beyond during the Middle Woodland. This phenomenon was coined the Hopewell Interaction Sphere (Caldwell 1964) and linked to both economic and religious interaction. Mound centers may have been nodes in elaborate regional trading networks as well as sacred places. However, interaction implies some level of cultural pluralism and the diversity in many ceramics or other aspects of material culture indicate the ethnic diversity of the people who participated in Hopewell ceremonialism. As data have accumulated, some researchers have even questioned the utility of terms like Adena and Hopewell that suggest cultural uniformity across the heartland (Clay 2005).

Another area of considerable debate is over the nature of Mississippian polities. Neoevolutionary concepts, especially Service's concept of a chiefdom characterized by hierarchical ranking, have been important concepts in modeling the nature of Mississippian societies even though these concepts were originally formulated for Polynesian societies (Peebles & Kus 1977). While not denying the sociopolitically complex nature of Mississippian societies, contemporary archaeologists have suggested that there was much more variability in how hierarchical and centralized power was in Mississippian polities (see Cobb 2003; Beck 2003). Pauketat (2007) has even suggested that the chiefdom model has limited our archaeological understanding of Mississippian culture by preventing an appreciation of cultural variability and human agency. Today, archaeologists debate the nature of leadership and power and also may view Mississippian societies as culturally plural (Blitz 2010).

Another topic of recent debate related to sociopolitical organization focuses on the nature and causes of conflict and warfare in Mississippian times. Despite popular characterizations of American Indians as peaceful, "noble savages," conflict and warfare have long histories in North America. Nevertheless in the heartland, warfare does not appear to have been more than periodic raiding and trophy taking until the Mississippian period (Milner 2007). The establishment of chiefdoms at this time can be linked to a shift from small-scale conflicts to large-scale internecine warfare between polities or within pluralistic polities, like the one centered at Cahokia. The widespread construction of stockades both within the heartland and elsewhere in the Eastern Woodlands is suggestive of intergroup conflict as well. However, there is debate about whether these conflicts result mainly from resource stress resulting from larger and more aggregated human populations or from elites jockeying for power and legitimization of their authority (Dye 2009).

Ceremonialism, Religion, and Mortuary Behavior

A final area of broad research interest that has generated considerable recent debate and investigation is the evidence for ceremonialism, religion, and mortuary behavior. The processualist materialist emphasis, which historically has strongly influenced heartland archaeologists, has certainly affected the study of these topics. Under the processualist approach, technomic artifacts, which were defined as those that functioned to aid people in their survival pursuits, were privileged as being more directly linked to the actions of people than sociotechnic and ideotechnic artifacts whose symbolic meaning was intangible and abstract. Although processualists believed that the systemic nature of culture enabled archaeologists to use artifacts to understand past social systems and ideologies, the study of ritual objects and iconography was not common, while interpretations of religious belief were seen as more speculative than studies of subsistence and settlement patterns. As new theoretical perspectives have developed, interest in religious beliefs, symbols, and iconography

has grown especially in studies of Hopewell and Mississippian phenomena (Brown 1997; Hall 1997). However, there is debate about the extent to which linkages with historically known Eastern Woodlands religion and cosmology documented by other disciplines can be archaeologically traced. Certainly there are artifacts that can be directly linked to ethnographically known ritual functions and cosmological associations.

Another issue related to ceremonialism and ritual in the Eastern Woodlands is the construction of different mounds, enclosures, and other architectural features to correspond with astronomical events. It is certainly clear that beginning in, at least, the Early and Middle Woodland periods, certain mounds and enclosures were constructed that aligned with solar, lunar, and/or other celestial events. In particular, the large Ohio Hopewell geometric enclosures and ritual architecture indicate a complex understanding of plane geometry, measurement, arithmetic, and observational astronomy closely tied to ritual practices. Mississippian people also constructed mounds and other architectural features that correspond to different astronomical alignments. While these astronomical alignments were certainly intertwined with the rituals and beliefs of Woodland and Mississippian peoples, the importance different celestial cycles and events played in their calendric systems has probably been underestimated. For example, it would make sense for dispersed Ohio Hopewell groups to time their rituals to correspond with different celestial events because these occurrences would have been visible in the day/night sky.

Another research issue has been the interpretation of Mississippian mortuary practices. Interest in the social dimensions of mortuary behavior at first centered on the distinctions among Mississippian burials, some of which contain elaborate funerary objects. Following Saxe (1970) these distinctions were viewed as representations of the deceased role or status in the social structure. Thus, internment of elaborate funerary objects and indeed elaborate mortuary programs themselves were viewed as indicating the high status of the deceased. Contemporary Mississippian scholars find this perspective too limiting, since mortuary ritual and spectacle may have served to reinforce the structure of the larger community, enhance the power of leaders, and make connections with ancestors and cosmic forces (Sullivan & Mainfort 2012). Thus, mortuary activities are now understood as arenas in which many aspects of social life are played out. For example, demonstrating the status of a deceased individual may have served the social purposes of the living in a variety of ways that encompass more than simply representing how important a person was when they were alive.

Finally, as we have mentioned already, there has been a great deal of recent interest in Mississippian iconography. The various objects associated with the Southeastern Ceremonial Complex have long fascinated archaeologists. These were once understood to represent a pan-Mississippian phenomenon, a religious cult, or prestige goods that circulated widely among the various Mississippian groups. More recent iconographic studies have demonstrated the existence of regional styles, which were linked to variations in meaning and belief. Specific studies of art styles and the meaning of specific motifs and themes are now being undertaken, which has led to increased discussion and debate about their implications for Mississippian beliefs and cosmology (Reilly & Garber 2007).

Conclusion

The study of the Woodland and Mississippian peoples of the heartland in Eastern North America has been a major focus for North American archaeologists since the mid-nineteenth century. Today the Woodland period is considered to have encompassed the period from approximately 1000 BCE to CE 1000. The Woodland period is commonly broken into Early, Middle, and Late subperiods. The (Early to Middle Woodland) Adena and the Hopewell complexes stand out as particularly important cultural phenomena. After CE 1000, Mississippian polities of varying organization and complexity came into existence in the heartland. Archaeologists have accumulated a great deal of evidence about Woodland and Mississippian people, which makes possible the discussion and debate of many significant

methodological and theoretical topics. Nonetheless, a tremendous potential for future research on Woodland and Mississippian cultures in the heartland remains.

Cross-References

- ▶ Cahokia
- ▶ Hopewell Culture, Archaeology of the
- ▶ North American Mound Builders: Hopewell, Natchez, Cahokia

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World Archaeological Congress (WAC)

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Introduction

What eventually became the World Archaeological Congress emerged from what was initially planned as the 11th Congress of the International Union of Pre- and Protohistoric Sciences (IUPPS) to be held in Southampton, England, in September of 1986. The Southampton organizing committee had hoped to make the 11th Congress a more inclusionary meeting than previous Congresses. Mostly the IUPPS was organized by and for Western European archaeologists, and while not specifically excluded from membership, archaeologists from non-Western nations had virtually no role in the organization. In response, several other organizations such as the Pan-African Congress and the International Congress of Americanists sought to alleviate the IUPPS's geographic biases. As well, Indigenous people, particularly from North America and Australia, had accelerated their demands for repatriation of the skeletal remains of their ancestors stored in archaeology laboratories and museums as well for a say in how their pasts were studied and represented. In response to these pressures, the 11th Congress organizers, particularly Peter J. Ucko, Chair of the Archaeology Department at Southampton University, made plans to assure the presence and participation of Indigenous people and archaeologists from a much wider range of countries than those usually at IUPPS World Congresses.

At the same time, growing violence associated with South Africa's apartheid policies had prompted organizations including the African National Congress, the National Union of Students, the Association of University Teachers,

and several others to call for a ban of participation by South African and Namibian scholars in academic meetings. When the labor-dominated city government of Southampton announced that it would withhold financial support from the meeting unless IUPPS respected the ban, the local organizers agreed. However, the IUPPS and other archaeological organizations such as the Society for American Archaeology objected on the grounds of academic freedom for research and the free exchange of ideas. In early 1986, the IUPPS Secretary-General and International Executive Committee disavowed the Southampton meeting, which led to the withdrawal of many scholars from the meeting, but archaeologists from Eastern Europe, South America, Africa, and India supported the ban. The Southampton organizers agreed to proceed with the meeting as the World Archaeological Congress. The reasons that many either boycotted or chose to attend the meeting were complex (see Ucko 1987 and Gero 1999 for a detailed discussion of both events and attitudes), but what emerged was a very successful and exciting academic meeting, one that considered the usual scientific aspects of archaeology as well as openly exploring its political nature.

Approximately 850 people attended WAC-1 from 71 countries (more than twice the number present at the 10th IUPPS Congress in Mexico City). At the closing plenary of WAC-1, attendees resoundingly agreed that the World Congresses should continue, and the World Archaeological Congress emerged from that consensus. More than a quarter century has passed since the Southampton meeting. Since then WAC has become a vibrant organization, and given its origins in the shadow of apartheid, it is significant that WAC 4 was held in Cape Town, South Africa, with Nelson Mandela as its patron. Relationships with the IUPPS and the Society for American Archaeology have been mended, and while WAC is not the largest archaeological organization in the world, it certainly can lay claim to being the most active organization of archaeologists in terms of international influence.

Definition

WAC is both a quadrennial meeting and an organization. As a nongovernmental organization, the World Archaeological Congress is the only fully international and representative organization of practicing archaeologists (WAC 2010). WAC works to promote interest in the past in all areas of the world, exploring both the scientific and humanistic aspects of archaeology. As well, WAC has a specific mission to (1) promote professional training for disadvantaged nations and communities; (2) broaden public education, involving national and international communities in archaeological research; (3) develop archaeological practice so that it empowers Indigenous and minority stakeholders; (4) contribute to the conservation of archaeological sites threatened by looting, urban growth, tourism, development, or war; and (5) redress global inequities among archaeologists. WAC openly recognizes and explores the political role archaeology plays in the construction of accounts of the past and the uses to which the accounts are put.

Governed by statutes that are regularly examined and revised (WAC 2009), WAC has 14 Regional Electoral Colleges designed to reflect geography and meant to foster development of regional networks that can facilitate study of the cultural heritage of each region. Members living in each region elect both a Senior and a Junior Representative to serve on the WAC Council. WAC also has an elected Executive with four officers (President, Vice-President, Secretary, and Treasurer) and those they appoint, usually the editor(s) of *Archaeologies*, the WAC journal, a Membership Secretary, a Student Representative, and the Coordinator of the major Congress meeting. Executive members communicate as needed by e-mail and often meet at WAC Inter-Congresses. Eight Indigenous Representatives, appointed by various Indigenous organizations, also serve as Council Members. The full Council tries to meet every 2 years but always meets as an Assembly during the quadrennial WAC Congress. The Assembly is WAC's principal policy-making body, elects officers, and

determines the organization and location of future Congress meetings.

WAC Congresses generally have met every 4 years, but occasionally political or organizational issues at the selected venue have caused shifts in locations or slight delays. The initial Congress took place in England in 1986, followed by Venezuela (1990), India (1994), South Africa (1999), United States (2003), Ireland (2008), a 2013 Congress scheduled for Jordan, and WAC has offers to host the meeting well beyond 2013. Each Congress has produced about 10 published volumes of proceedings that comprise the One World Archaeology series. Historically, each Congress has at least partially supported the attendance of a large number of participants from traditionally underrepresented areas and groups, exactly those people who contribute to the essential diversity of WAC's purpose and who enhance the international scope of the conference.

Subject to approval by the Executive, WAC also sanctions Inter-Congresses, which are organized by members of the regional colleges, usually around a primary topic. Inter-Congresses have focused on topics as diverse as Heritage Management in East and South East Asia (Beijing, China 2011), Overcoming Structural Violence (Ramallah, West Bank 2009), and Kyosei-no-koukogaku: Coexistence in the Past – Dialogues in the Present (Osaka, Japan 2006). Since the first Inter-Congress on Archaeological Ethics and the Treatment of the Dead in 1989 (Vermillion, South Dakota USA), WAC has approved nearly 20 Inter-Congresses. WAC also sponsors Workshops and Symposia, usually in association with other national and international meetings.

WAC operates a Global Libraries Program, which provides publications to add to the archaeological literary collections of disadvantaged institutions. WAC publishers provide copies of all WAC publications, but many other print and digital materials come from members and philanthropic organizations. Archaeologists Without Borders supports archaeology education and training in countries where the development of archaeology has been economically difficult. Invited by host institutions, WAC members from different parts of the world provide advice, lectures and workshops, and other educational opportunities. WAC also operates an active listserv, accessible by both members and nonmembers, to foster exchange of information and opinion.

When WAC began it published *The World Archaeological Bulletin*, which ran through 2004. In 2005 WAC began publication of *Archaeologies: The Journal of the World Archaeological Congress*, now published in print and electronic versions by Springer. WAC also publishes the *Newsletter of the World Archaeological Congress*, now distributed only in electronic form. WAC also supports publication of two other peer-reviewed journals, *Arqueología Suramericana/Arqueologia Sul-Americana*, which is intended to promote and spread the production of archaeology and related disciplines in South America and the *Journal of Environment and Culture*, which provides a forum for debates on how culture and environment can be mutually complementary in Africa.

WAC has developed an active book publishing program, working with some of the world's finest archaeological publishers. The organization continues to produce its One World Archaeology series, numbering more than 60 volumes, growing by 10 or more volumes after each Congress. Most are edited volumes usually derived from Congress themes and sessions, but sometimes with additional papers solicited later. The Worlds of Archaeology series presents the global diversity of archaeology, foregrounding many different voices, particularly those silenced by colonial processes. The Archaeology and Indigenous Peoples series examines the current relationship and possibilities for collaboration between archaeologists and Indigenous peoples. The Research Handbooks in Archaeology provide comprehensive coverage and state of the art articles on key topics in the field. The Global Cultural Heritage Manuals seek to provide information for researchers planning archaeological or other heritage projects in a particular region, considering everything from environmental conditions to law. All royalties from all series publications go to support

travel for disadvantaged scholars, students, and Indigenous people to attend WAC meetings.

The growth of the World Archaeological Congress has rarely been smooth. WAC makes a determined effort to keep membership fees very low and has a variable fee structure to support membership for Indigenous people, archaeologists from disadvantaged nations, retired and jobless archaeologists, and students. Although WAC receives substantial royalties from publications, those funds are directed toward travel support for the major Congresses. This has meant that WAC has always been dependent on volunteers, funds from host institutions, and gifts to support most operating costs. WAC has no professional administrative staff, and with the exception of occasional paid consultants and short-term, paid administrative support for meetings, it operates entirely with volunteers who serve roles in governance, editing and most translating, and on a variety of Task Forces and Standing Committees.

Because WAC has openly acknowledged and embraced the political side of archaeology, some archaeologists still tend to think of WAC as a political, rather than a scientific or scholarly, organization. For members, especially in Eurocentric countries, it is not uncommon to hear the charge that "WAC does politics, not archaeology." This has been especially the situation in the United States where archaeology has been epistemologically science-centered for decades. WAC certainly "does science" but maintains that all archaeology is political, yet such perceptions have worked to keep membership lower than it might be, usually about 1,200 members. Membership, however, has steadily grown as the journal has improved, as high-quality book series have appeared and as more archaeologists recognize that diversity serves the discipline well.

Key Issues/Current Debates/Future Directions

The core issues related to diversity within archaeology that led to the origin of WAC are still something of a problem. For example, WAC has worked very hard to select venues for its quadrennial Congresses and Inter-Congresses, which has rarely been easy. Some archaeologists argue that there is still a Eurocentric, economically advantaged country bias in venue selection, as well as a Northern Hemisphere bias (Shepherd & Haber 2011). Hosting a major international conference or even a smaller Inter-Congress is no simple undertaking financially or logistically. Given WAC's meager financial resources, the organization can be of little help with funding, although with several Congresses and nearly 20 Inter-Congresses, WAC can provide a lot of advice and logistical support. Financial and logistical issues for the host countries are one matter, but their archaeological, international, and internal political situations at the time also can cause problems. WAC 2 (1990), for example, was to have been in Colombia, but drug-based terrorist activities in the host city forced a shift to nearby Venezuela. WAC 3 (1994) in India proved difficult due to the destruction of the Ayodhya temple, which divided the Indian public and even the archaeological community, so much so that fights broke out at the closing plenary. WAC 5 (2003) in Washington, DC, took place 2 years after the 9/11 terrorist acts, and the resulting security in the United States proved to be so paranoid and strict that many delegates could not get visas to enter the country. WAC 6 (2008) was initially planned for Jamaica, but last-minute economic issues forced a shift to Ireland where a national dispute over possible damage from highway construction to the important cultural landscape surrounding Tara spilled over into the meetings. In spite of these difficulties, all the meetings proved to be intellectually successful and very rewarding for attendees, so much so that many attendees to WAC meetings remark that they are "life-changing" experiences.

Even though WAC may sometimes be criticized for economic or geographic biases, other concerns actually stem from the substantial diversity that WAC does have. As might be expected, in an organization that embraces the political nature of archaeology, there are diverse opinions about how archaeology should be done

and what policies and actions are ethical. Most such issues relate to WAC's interaction with non-archaeological entities such as the military or multinational corporations (Shepherd & Haber 2011; Smith 2011). At the simplest level the WAC Executive has been asked to intercede on behalf of particular issues within countries, usually on behalf of protection of important sites endangered by development activities, looting and sales of antiquities or human remains, allegations of ethical violations, or pending laws or policies regarding heritage. The Executive has sometimes done so but occasionally receives criticisms for engaging with the problem before it has adequate data or because it is seen as an extranational entity without a right to be involved. Often the matters are international in scope. Shepherd and Haber (2011) have raised concerns about how WAC engages with multinational corporations that cause environmental and heritage damage as well as impinge on Indigenous lands, cultures, and rights. Before and at WAC 6 in Ireland, several WAC members challenged WAC's engagement with any military personnel or military-related activities, urging that no members of the military or archaeologists working with the military be allowed to present papers at the Congress. The WAC Executive has certainly struggled with many of these issues and has relied on the WAC Ethics Committee for advice about policies of engagement. Many questions get explored at sessions during the major Congresses and at some Inter-Congresses. Resolutions generated during the closing plenary sessions may be discussed and voted on, and if they are affirmed, they are passed along to the Executive for consideration and possible enactment as WAC policy, statute, or ethics codes.

WAC's diversity actually presents something of a structural contradiction. Diversity brings a wide range of opinion on almost every issue, and the need for fairness demands that those opinions be openly discussed. That makes decision-making slow and to some makes the organization seem cumbersome and conservative, perhaps even cowardly. Many members want WAC to be political and progressive, but were it to act decisively, it would risk being unfair or biased toward particular viewpoints. In spite of this conundrum, most archaeologists now recognize that archaeology is indeed political and the politics must be discussed openly; heritage issues of concern to Indigenous people and other descendant communities are now a regular part of archaeological consideration; archaeologists from economically disadvantaged and previously colonized nations are partners in the development of the discipline. Certainly issues and concerns remain, but WAC truly must be seen as a resounding success having moved well beyond the vision of Peter Ucko and the Southampton organizing committee.

Cross-References

- ▶ Archaeology and Politics
- ▶ Postcolonial Archaeologies
- ▶ Repatriation: Overview
- ▶ Ucko, Peter (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC): First Code of Ethics

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World Archaeological Congress (WAC) and Cultural Heritage Management

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Basic Information

> "The World Archaeological Congress is a non-governmental, not-for-profit organization and is the only representative world-wide body of practising archaeologists" (http://www.worldarchaeologicalcongress.org/about-wac).

The World Archaeological Congress (WAC) is dedicated to protecting, promoting, and preserving the cultural heritage of all cultures. WAC plays an active role in cultural heritage management by providing an international platform for researchers and Indigenous groups to unite, share knowledge, and enhance the protection of global cultural heritage.

Every 4 years, WAC hosts an international congress; archaeologists, members of First Nation groups, and Indigenous peoples from across the globe attend these congresses. Cultural heritage is a focus of all of these major conferences. Some 1,800 archaeologists attended the WAC-6 Congress in Dublin in 2008 and over 1,000 people attended WAC-7 at the Dead Sea in Jordan in 2013 (http://www.worldarchaeologicalcongress.org/events/congresses). WAC supported the attendance of over 230 participants from Indigenous and economically disadvantaged countries at WAC-6 and 440 people at WAC-7. This is part of a process of democratizing knowledge dissemination by scholars from around the world. WAC Congresses allow for the inception, intensification, and transferral of new ideas between participants and create an ever-strengthening, interconnected network of knowledge as a resource that can be used by current and future generations of researchers and stakeholders in cultural heritage.

WAC also holds smaller, themed inter-congresses in the area of cultural heritage. These have included *Indigenous People and Museums* (Indianapolis, USA, June 2011), *Archaeological Invisibility & Forgotten Knowledge: Ethnoarchaeology, Hunter-Gatherers, Ephemeral Cultural Aspects* (Lodz, Poland, September 2007), and *Threats to Archaeology: Its Importance, Its Values and Its Development* (Kingston, Jamaica, May 2007). The inter-congresses serve a similar purpose to the international congresses but focus on specialist discussions of a specific theme. Inter-congresses are held at shorter intervals than full Congresses, and there can be multiple inter-congresses in 1 year. These conferences, along with the many WAC publications, illustrate WAC's commitment to facilitating global dialogue on cultural heritage matters.

WAC's publications that focus on cultural heritage include the refereed journal, *Archaeologies*, which is published three times a year. The aim of *Archaeologies* is to make research and relevant issues accessible to a wider audience in a timely manner. WAC publishes several book series, including *One World Archaeology*, *Indigenous Archaeologies*, and the *Global Cultural Heritage Manual Series*. Contributors to these publications come from many backgrounds and countries. These WAC publications accelerate expansion of the archaeological literature and knowledge in cultural heritage.

Major Impact

WAC plays a proactive role in the cultural heritage management of Indigenous and First Nations peoples and indeed members from economically disadvantaged nations. WAC's Archaeologists without Borders and the Global Libraries Programs aim to overcome economic disparity in education and training and provide some necessary tools for archaeologists in economically disadvantaged nations as well as sharing knowledge from, and within, these nations. These initiatives, together with subsidized membership, further WAC's goal to make participation in global archaeology and cultural heritage management accessible to all peoples, to lessen economic and geographic barriers to the growth of knowledge in archaeology and cultural heritage.

WAC congresses, publications, and workshops facilitate Indigenous voice when such groups need international support and an avenue into mainstream media. Part of WAC's remit is to empower Indigenous and First Nation peoples' involvement in the heritage management of their culture. WAC does this by providing sponsorship for Indigenous people to attend its events and by providing support for members from economically disadvantaged countries. WAC's discussion list server supplies members with a direct line of communication to heritage experts seeking to undertake ethical best practice procedures in heritage research and management when working with Indigenous groups.

WAC provides a means to protect culturally sensitive heritage through its codes of ethics: the First Code of Ethics (1990), The Vermillion Accord on Human Remains (1989), and The Tamaki Makau-rau Accord on the Display of Human Remains and Sacred Objects (2006) (http://www.worldarchaeologicalcongress.org/about-wac/codes-of-ethics). According to these codes, consultation with relevant communities must be sought, and respect must be taken when working with sensitive cultural matters. While the codes are not legally binding, WAC members have a professional and ethical obligation to abide by them.

WAC produces an informal newsletter several times a year that updates members about issues in global heritage and instigates dialogue between the executive and members to deal with the issues effectively. The importance of this dialogue surfaced in early 2011, which was a tumultuous period for heritage protection. The April newsletter outlined the threats to Ugandan, Bangladeshi, Egyptian, and Libyan cultural heritage due to development and military action and declared WAC's opposition to these events (http://www.worldarchaeologicalcongress.org/images/pdfs/enews_37.pdf). As outlined in the newsletter, WAC continues to monitor these events and lobby the relevant governing bodies to protect their sites.

WAC plays an integral role in expanding the archaeological discipline and ensuring that all of its global, interconnected members undertake cultural heritage management ethically and that the cultural heritage of all peoples and all nations can be protected equally.

Cross-References

▶ World Archaeological Congress (WAC)
▶ World Archaeological Congress (WAC): First Code of Ethics

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World Archaeological Congress (WAC): First Code of Ethics

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Introduction

Following on the success of the 1986 World Archaeological Congress (WAC) in

Southampton (UK) in 1989, the organization held its first Inter-Congress on the topic Archaeological Ethics and the Treatment of the Dead in Vermillion, South Dakota (USA). Attendees at that meeting passed the Vermillion Accord, a six-clause statement recognizing the rights, obligations, and concerns of Indigenous people and scientists relating to ethical treatment of the dead. Several Indigenous people who attended that meeting went to the WAC II meeting in Barquesimeto, Venezuela, the following year. A Maori representative, Hirini Matunga, organized a small session of other Indigenous attendees and one archaeological advisor to discuss a possible code of ethics that would move beyond repatriation issues into broader concerns about the rights of Indigenous people to have a voice in how their own heritage is studied or represented.

Matunga presented a draft document to the group asking their concerns about what they wanted from their interaction with archaeologists and other heritage scholars, how they could best assure that this might happen, and what behaviors they expected from archaeologists. The two sections of the code reflect many of their concerns. The section entitled "Principles to Abide By" primarily focuses on acknowledgment by WAC members that Indigenous people have primacy over all aspects of their heritage and that members should seek to collaborate with those whose heritage they study, including them in everything from setting research agendas to funding. The second section, "Rules to Adhere To," is a more precise set of expected behaviors of members that recognize the need for fully informed consent, clearly stated boundaries for research, obligations related to reporting of findings, and long-term treatment and protection of Indigenous heritage.

Committee members expressed concern about whether the language of the draft code would be too strong for the WAC Executive and Council to accept, but when the Indigenous Representatives to the Council offered it the next day, Executive and Council easily adopted the *First Code of Ethics: Members' Obligations to Indigenous Peoples* (Zimmerman & Bruguier 1994).

Definition

Although it is usually just called the WAC Code of Ethics, the official name of the document is *The World Archaeological Congress First Code of Ethics: Members' Obligations to Indigenous Peoples*. The title recognizes that this listing of principles and behaviors specifically addresses only concerns about Indigenous heritage and that it is not a full set of ethical obligations of archaeologists to all aspects of heritage. The idea that it is a *first* code recognizes that ethics are constantly changing and will eventually need alteration as conditions shift. The code is as follows (World Archaeological Congress (WAC) n.d. a):

Principles to Abide By

Members agree that they have obligations to indigenous peoples and that they shall abide by the following principles:

1. To acknowledge the importance of indigenous cultural heritage, including sites, places, objects, artefacts, human remains, to the survival of indigenous cultures.
2. To acknowledge the importance of protecting indigenous cultural heritage to the well-being of indigenous peoples.
3. To acknowledge the special importance of indigenous ancestral human remains, and sites containing and/or associated with such remains, to indigenous peoples.
4. To acknowledge that the important relationship between indigenous peoples and their cultural heritage exists irrespective of legal ownership.
5. To acknowledge that the indigenous cultural heritage rightfully belongs to the indigenous descendants of that heritage.
6. To acknowledge and recognise indigenous methodologies for interpreting, curating, managing, and protecting indigenous cultural heritage.
7. To establish equitable partnerships and relationships between Members and indigenous peoples whose cultural heritage is being investigated.
8. To seek, whenever possible, representation of indigenous peoples in agencies funding or

authorising research to be certain their view is considered as critically important in setting research standards, questions, priorities, and goals.

Rules to Adhere to

Members agree that they will adhere to the following rules prior to, during and after their investigations:

1. Prior to conducting any investigation and/or examination, Members shall with rigorous endeavor seek to define the indigenous peoples whose cultural heritage is the subject of investigation.
2. Members shall negotiate with and obtain the informed consent of representatives authorised by the indigenous peoples whose cultural heritage is the subject of investigation.
3. Members shall ensure that the authorised representatives of the indigenous peoples whose culture is being investigated are kept informed during all stages of the investigation.
4. Members shall ensure that the results of their work are presented with deference and respect to the identified indigenous peoples.
5. Members shall not interfere with and/or remove human remains of indigenous peoples with the express consent of those concerned.
6. Members shall not interfere with and/or remove artefacts or objects of special cultural significance, as defined by associated indigenous peoples, without their express consent.
7. Members shall recognise their obligation to employ and/or train indigenous peoples in proper techniques as part of their projects, and utilise indigenous peoples to monitor the projects.

Key Issues/Current Debates/Future Directions/Examples

Soon after the WAC Executive and Council passed the code, several other organizations including the Australian Archaeological Association and the Canadian Archaeological Association adopted similar codes, using the WAC code as a model. To date the code has remained unaltered, but was extended when the WAC Council adopted The Tamaki Makau-rau Accord on the Display of Human Remains and Sacred Objects (World Archaeological Congress (WAC) n.d. b). The WAC Standing Committee on Ethics is charged with monitoring WAC ethics and has begun development of a general code of ethics as well as an international code of ethics. In a 2007 meeting, the committee agreed to a set of core values and processes to be used to evaluate future consideration of WAC ethics. They also prepared a draft general ethics code that will remain under discussion for the foreseeable future (World Archaeological Congress (WAC) n.d. c).

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Ethics and Human Remains
- ▶ French Guiana: Archaeology and Minority Communities
- ▶ Indigenous Archaeologies
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Stakeholders and Community Participation
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)
- ▶ World Archaeological Congress (WAC)
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

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World Heritage and Human Rights

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Introduction

In a new book series called "Critical Perspectives on Cultural Heritage," editor Beverly Butler describes an intellectual program whose goal is to disrupt Eurocentric cultural heritage theory and practice, propose "alternative intellectual, moral-ethical, and also grounded concerns," and center "cultural heritage discourse within a wider concern for the preservation of human dignity and human justice and to use these alternative discourses as a resource for future action in terms of creating a proactive (rather than reactive), responsive and just future for a new critical cultural heritage studies" (Butler 2007). Critical heritage scholars are deeply concerned about social, economic, and political inequities worldwide. It is not surprising, then, that human rights have become an important focus in this domain of the cultural heritage field as well as among progressive archaeologists. Nor is this interest new, although interest in it has lagged until recently. In 1968 – on the twentieth anniversary of UNESCO's "Universal Declaration of Human Rights" – UNESCO held a meeting on "Cultural Rights as Human Rights" in which experts discussed community or group rights (Aoyagi 1970), the notion of universal culture and its engagement with national culture (N'Daw 1970), elite and majority culture (Debesa 1970), and other topics now current (such as the role of mass media and access to science and technology) (UNESCO 1970). Unfortunately, UNESCO's 1970 monograph on this subject went largely unnoticed, although the field of heritage studies was exploding onto the scene in the 1980s and 1990s, resulting in the twenty-first century bounty we see today.

Definition

Defining human rights is the crux of the issue. They are a particular category of rights whose definition has varied widely over time. The philosophical framework for the contemporary notion of human rights emerged out of the Enlightenment. As currently conceived, at least in the West, they are best defined by the United Nations 1948 Universal Declaration of Human Rights. Since promulgation of that charter, there have been further declarations. The human rights we speak about today are those recognized in international law rather than (or more than) being predicated upon earlier moral or philosophical premises. The reader is directed to the various international documents.

Key Issues

Cowan et al.'s (2001) *Culture and Rights* and UNESCO's promulgation of the 2001 "Universal Declaration on Cultural Diversity" and 2003 "Convention for the Safeguarding of the Intangible Cultural Heritage" revived interest in the topic of human rights. In March 2006, *American*

Anthropologist published a themed set of papers dealing with human rights (Goodale 2006). Independently and at the same moment, the Collaborative for Cultural Heritage Management and Policy (CHAMP) at the University of Illinois (called at that time Collaborative for Cultural Heritage and Museum Practices) hosted its first annual international conference and chose "cultural heritage and human rights" as the topic for discussion (Silverman & Ruggles 2007). In 2007, ICOMOS-Australia, Deakin University, and the University of Ulster held two important research workshops at which multiple rights were debated (Langfield et al. 2010). In 2010, the Princess Maha Chakri Sirindhorn Anthropology Centre in Bangkok launched a national culture and rights project in Thailand. In February 2011, the Office of the United Nations High Commissioner on Human Rights (in UNESCO's Geneva office) convened a dozen cultural heritage experts to consider the issue of access to cultural heritage as a human right. A few weeks later, ICOMOS-Norway held a meeting to promote a rights-based approach to cultural heritage (see Ekern et al. 2012).

Clearly, we are witnessing the emergence of an important new paradigm within the field of critical heritage studies. But its consensual form remains to be worked out. What do we actually mean by human rights applied to cultural heritage? This is a temporally shifting definitional terrain as some cultural rights once defended have come to be criticized and vice versa. Indeed, what is "culture" now that it has been unmoored from its antiquated conceptualization of bounded entity?

Fundamentally, the linkage of cultural rights and human rights must signify social, political, and economic equity in the vibrantly creative embodied lives of actors at the local level of stakeholders and communities. Therefore, can and should cultural rights and human rights be universalized as encompassed by UNESCO's various declarations – beyond the idealistic notion of all of humankind being enriched by the enjoyment of everyone's cultural heritage ("outstanding universal value")? Cowan (2006) worries appropriately about a hegemonic rights framework. William Logan, who holds the UNESCO Chair at Deakin University, cogently identifies "the clash between universalism and cultural relativism" and sanguinely recognizes the pragmatic need to negotiate between absolutism in human rights and "broader community, regional and national interests, and, indeed, between various interests within the same local community" (2007: 50). Elazar Barkan is pessimistic about the ability of human rights scholars to elaborate a theory of "group rights" that can withstand the reality of "people everywhere [who] hold to cultural and political beliefs that they see essential to their own identity and culture, yet that are at the same time offensive, at times violently so, to others, both members of the groups themselves, and outsiders" (2007: 199). My position is that we must be very careful not to diminish the concept and advocacy of vital human rights by uncritically and automatically placing cultural rights on the same plane. Human rights such as: life itself without fear of intimidation or physical abuse by the state or its agents; adequate food and health care; freedom of religious practice (or not to practice religion); group expression of cultural traditions (and the right to leave that tradition); freedom of political expression; unfettered mobility; gender equality. Not all cultural rights rise to the level of these human rights. Indeed, some cultural rights as locally practiced might be argued to abrogate human rights. The challenge is to defend those cultural rights that are human rights – but who decides? and how? – without provoking disastrous resistance by oppositional forces. Much work remains to be done on cultural rights, human rights, and heritage. The issue should not be abandoned because of its complexities. The field can advance by interrogating the concepts and improving the methods used to investigate these problems and, especially, by deploying ethnographically grounded studies of culture and rights that are "undertaken in a theoretically informed, reflexive and critical way" (Cowan 2006: 21).

Kirshenblatt-Gimblett has recognized the fraught issue of proprietary rights and cultural rights (1998: 65), a topic which has grown in

importance. Concerning some sites already on the prestigious World Heritage List and others awaiting consideration by UNESCO's World Heritage Committee, there is a recurring problem of property rights for those who reside (especially if there is legal title) on land that lies within the officially delimited borders of the site. Some governments, such as Indonesia and Thailand, have removed settlements in their process of implementing a site management plan and opening of a site to increased tourism through the World Heritage Site moniker. Is residential tenancy a human right? Other interesting cases involve what a national heritage organization considers to be appropriate and inappropriate use of a site by local people. Do they have free (no entry fee required) access (availability at any time) to a site with which they have coexisted for generations? Are local stakeholders allowed to perform ceremonies on sites that they regard as important? Are these cultural rights or human rights?

A particular contribution of the international lawyer Rosemary Coombe is her recognition of the importance of governmentality in cultural heritage and her explanation of its object and instrument nature. Just as anthropologists comfortably speak of social constructivism, which was a paradigm shift only a generation ago, so now we must understand legal constructivism: "Identities do not exist before the law but are forged in relation to law" (Coombe 2010). The legal, social, and other technologies by which law is deployed generate and constrain opportunity, bringing this perspective into alignment with anthropologists' and archaeologists' greater familiarity with theories of agency, practice, and materiality.

The work of another international lawyer, Yvonne Donders (2008, 2009, 2010), in the field of social and cultural rights, human rights and cultural diversity, and human rights and development relates to the elaboration of the content, nature of obligations, state of implementation, indicators, and justiciability of economic, social, and cultural rights (see also Vrdoljak 2009, 2010). Lawyer Jane Anderson (2009) is especially concerned with philosophical and practical problems for intellectual property law and the protection of indigenous/traditional knowledge and cultural heritage.

Rights are becoming a major concern in the critical heritage field: rights *to*, *in*, and *as* heritage (Smith et al. in preparation). Here there is a great and necessary opportunity for heritage scholars to analyze, theorize, and recommend policy. The problem of a "universal validity of the language of rights" (Nussbaum 1998: 77) is readily translatable to debates about World Heritage under today's conditions of globalization, frequent inter-ethnic conflict, internal political unrest, and the tension between local/national identity and the constitution of world citizenship.

Also related to the issue of rights is the issue of peace. Logan (2010) eloquently propounds the use of heritage conservation to strengthen the defenses of peace, following the Preamble to UNESCO's 1945 Constitution and arguing against the politicization of the World Heritage List program (see also *The Economist* 2010; Silverman 2011). Logan (2010) and Silverman (2011) share a belief in the value of transnational or transborder/transboundary inscriptions for mitigating conflict.

Human rights and cultural rights are complicated by UNESCO's World Heritage framework. Barbara Kirshenblatt-Gimblett precisely recognizes the "fundamental contradiction. . . between [UNESCO's] celebration of diversity, on the one hand, and [its] application of a universal standard" (2006: 187). Clearly, human rights will remain an important topic in heritage studies and heritage practice.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Management and Poverty
- ▶ Culture in Archaeology
- ▶ Engendered Archaeologies
- ▶ Ethics in Archaeology

▶ Ethics of Collecting Cultural Heritage
▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
▶ UNESCO's World Heritage List Process

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World Heritage Education, Training, and Capacity Building

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Introduction

Since the 1990s, many universities have launched Heritage studies programs, seven being listed on the UNESCO web site as having specialized in the study of World Heritage issues (UNESCO n.d. (a)). Other universities include World Heritage alongside studies that are more focused on heritage at the national and local levels. UNESCO, the World Heritage Committee, and its secretariat, the World Heritage Center, have taken a number of initiatives to encourage universities to support its World Heritage mission, including recently encouraging the development of a new set of Category Two Centers (C2Cs).

Definition

At the heart of the ongoing debates about the role of universities and particularly about the C2Cs is the important distinction between "education" and "training." In simple terms, university education has breadth and depth of teaching based on research and analysis. Training, by contrast, is narrower in focus, shorter in program length, and more directed at meeting the specific needs of employer or special interest groups. A third term – capacity building – is commonly used which also focuses on the needs of heritage protection agencies. It embraces education and training but goes beyond both to strengthen institutions, communities, and networks in other ways (UNESCO & Kingdom of Bahrain Ministry of Culture 2011: 3).

Historical Background

The UNESCO World Heritage Convention 1972 was radical in its time in envisaging heritage as both natural and cultural and bringing the two together into a single normative statement and protective system. In the ensuing 40 years, both the community and professional views of what constitutes cultural heritage have broadened in many countries around the world. Educational programs have responded to this broadening conception of heritage and its value for contemporary society. Several important shifts can be discerned.

Moving from a mid-twentieth century focus on iconic monuments and archaeological sites, the criteria adopted for evaluating cultural nominations to the World Heritage List encompassed values that enabled the inscription of a wider range of places, such as vernacular building ensembles, historic towns and villages, and designed parks and gardens. In 1993, cultural landscapes and their associative values were added, while the last decade has seen a greater emphasis on the intangible values of places and debate about the addition of historic urban landscapes.

Another major trend has seen heritage discourse and practice move from a narrowly technical focus to a more ethics-based approach. The World Heritage system has moved to a values-based approach to managing heritage places, and there has been an increased weight put on associative values, especially of indigenous communities. Questions about "Whose heritage?" and "In whose interest is a place being inscribed?" have been given higher priority, as, too, is the development of more inclusive heritage registers.

The global debates have led to the recognition that wide variations exist in the way heritage is understood from one world region to another and from one culture to another and that variation is part of the world's rich and creative cultural diversity. The Nara Conference on Authenticity in November 1994 had a major impact on heritage conservation theory and practice, concluding as it did that the ways of conserving heritage should be in accord with local ways of

understanding heritage. This widening is seen in the debates about philosophy and practice in the key global organizations – UNESCO, ICOMOS, ICOM, ICCROM, and IUCN – and is reflected in the programs taught and the research undertaken in educational and training institutions at the national and global levels.

Educational Responses

Initially education and training providers responded to the global conservation effort spearheaded by UNESCO by creating a series of specialist courses, some dealing with the conservation of monuments and sites and drawing heavily on the disciplines of archaeology and architecture, others focusing on science- and laboratory-based materials conservation, and yet others on museology or public history (Logan 2010). In the 1970s and 1980s, ICCROM in Rome and the University of York in England were key training institutions. During the 1980s and 1990s, other universities moved into the heritage field, and courses were developed that, in relation to heritage places, shifted from technical restoration to focus on broader planning and management issues, often connected to economic development through tourism.

Within the last 15 years, the increasingly holistic conception of heritage has led to new batch of courses drawing together at least heritage places and museum studies and beginning to focus on intangible heritage and traditional knowledge systems. In some countries such as the United Kingdom, Australia, and, more recently, the United States, "heritage studies" has emerged as a new interdisciplinary area in its own right bringing together history and geography, architecture and archaeology, economics and town planning, anthropology, ethnology and folklore studies, art history, and museum studies and with strong emphases on the interconnections between philosophy, theory, and practice.

UNESCO Engagement with Education and Training

Article 5 of the World Heritage Convention 1972 calls on States Parties to "foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field." Despite this unambiguous statement, little was initially done within the UNESCO system to link heritage and education. Since the 1990s, there has been a more concerted effort by the World Heritage Center to influence curricula and bring students and teaching staff in schools and universities into actively supporting UNESCO's World Heritage program. For a discussion of initiatives taken at the school level, see Logan (2012a).

UNESCO's connection with universities has a long and honorable history, dating back to the appointment of former Oxford scholar, Julian Huxley, as its first director in 1946 and continuing with the regular commissioning of university scholars such as Claude Lévi-Strauss to write key reports. In 1991 UNESCO's General Conference decided to create and set up a network with the UNITWIN program under which universities agreed to collaborate, usually across the North/South divide, and the appointment of UNESCO Chairs (UNESCO n.d. (b)). The aim of both components is to facilitate knowledge and skills transfer and institutional capacity building through training, research, information sharing, and outreach activities in UNESCO's major program areas of education, natural sciences, social and human sciences, culture, and communication and information. As of 31 May 2011, there were 715 UNESCO Chairs. Of these, 23 are designated to the field of cultural heritage, although several of the earlier ones created in the 1990s appear to now be defunct (UNESCO n.d. (c)). There are no Chairs in the natural sciences focusing on natural heritage.

Apart from a 10th anniversary meeting held at UNESCO Paris headquarters in November 2002, there has been little linkage between the various UNITWIN programs or the UNESCO Chairs. A number of other networks have tried to fill this gap but have also been less successful than hoped. The Forum UNESCO: University and Heritage (FUUH) network was established by

UNESCO in 1995, initially under the management of the Valencia Polytechnic University in Spain but now jointly managed by that university and the World Heritage Center. The FUUH mission is broad and emphasizes supporting UNESCO action in favor of cultural and natural heritage protection, enhancement, and conservation. FUUH is an informal network whose main collaborative activity has been the annual, now biennial international conferences, and it has run in 13 university locations across the world (FUUH n.d.).

Other networks have been established at a regional level. For instance, in 2001, ICCROM joined forces with UNESCO's Office of the Regional Advisor for Culture in Asia and the Pacific based in Bangkok to form the Asian Academy of Heritage Management (AAHM). This is a network of institutions, mostly universities, that offers professional training in the field of cultural heritage management (UNESCO Bangkok, AAHM n.d.). Such training is seen to be critically important given the Asia-Pacific context of rapid environmental degradation, urban infrastructure development, and mass tourism. Since 2008, the network has become more self-governing, and its principal activity has been a major regional conference held every 18 months or 2 years.

Key Issues/Current Debates

While reference is conventionally made now to the conservation of cultural heritage as being a multidisciplinary activity requiring a holistic approach, both in management and education, in reality many obstacles make this difficult to achieve. It is regrettable that the definition and management of heritage is divided between UNESCO conventions and programs and in administrative arrangements at the global level and commonly, too, at the national level. Faculty divisions within universities continue to make it difficult to educate students across the range of disciplines needed to practice heritage conservation in a more holistic way, even to deal with natural and cultural values under the World Heritage Convention let alone working with intangible values, cultural expressions, and heritage representation in museums or to deal with growing concerns about heritage sustainability, environmental degradation, and the potential impacts of climate change.

Increasingly, however, heritage is seen not simply as a reflection of the world's rich and creative diversity but as the very underpinning of the cultural identity of people, and its maintenance is considered a basic human right. In other words, heritage conservation can no longer be seen just as a technical issue; it always involves fundamental philosophical and ethical questions, and these must be incorporated into heritage courses in universities: Why are we doing it? Who for? Who said? Are the local people whose heritage is being "protected" involved? How does it fit with other human rights? How does it fit with sustainability?

This shift has also been reflected in teaching and research in a number of university courses where heritage is understood as being produced through sociopolitical processes reflecting society's power structures. The close link between heritage and identity is recognized, as is the link between official heritage definitions and nation building and the misuse of "heritage" in some countries to reinforce the power of political elites and dominant ethnic groups. This means that while there remains a very clear need to produce graduates with practical architectural and archaeological conservation expertise and heritage planning and management skills, the social sciences can add skills for analyzing the social, political, and economic context and for negotiating heritage conservation outcomes in situations where the identification, evaluation, and interpretation of heritage items is contested between various groups within the community.

This shift toward a more critical approach to heritage practice encourages scholars and practitioners to consider the human rights implications of conservation interventions and to devise ways in which local people, including indigenous

peoples and ethnic minorities in particular, can be empowered to play a meaningful role in determining how their heritage is identified and managed. This ties in closely with the work being done by Ms Farida Shaheed, Independent Expert at the UN Human Rights Commission in Geneva, who focused in 2011 on access to and enjoyment of cultural heritage as a cultural right (UNHRC 2011). It also resonates with efforts by the Advisory Bodies, notably the IUCN and ICOMOS, to move the World Heritage system toward a rights-based approach to site management. This new approach has already encouraged a rich stream of research in universities, and a number of books are now available that deal with the links between cultural diversity, heritage, and human rights (see, for instance, Silverman & Ruggles 2007; Langfield et al. 2010; Ekern et al. 2012).

International Perspectives

World Heritage education appears to have started moving in two directions – toward Critical Heritage Studies on the one hand, but toward a greater emphasis on skills training designed to meet the World Heritage system's specific needs on the other hand. In a carefully managed education system, both of these approaches should coexist so that students and researchers are able to ground theory in an understanding of practice. The signs are, however, that we are moving toward a dual system based on conflicting rather than complementary approaches.

In a sense, the division is occurring as a result of wider problems in the World Heritage system, especially the proliferation of inscribed places with severe management and sustainability issues. There are now 35 properties on the World Heritage in Danger List, and a further 135 were subject to close scrutiny in 2011 by the World Heritage Committee (UNESCO World Heritage Committee 2011). The World Heritage Committee's attempt to contain the problem through its "state of conservation" and periodic reporting mechanisms is not sufficient. There is a sense among some in UNESCO's cultural sector that there is a need for training that is more focused on meeting the specific demands of World Heritage sites.

Reemphasizing Skills Training

The World Heritage Committee called on the advisory bodies to revise its 2001 training strategy. Moving beyond training to cover institutional capacity building more widely, this new strategy was presented to the Committee at its 35th session in 2011. There had been some small representation of the UNESCO Chairs in the drafting sessions as well as an increasingly large participation by the Category 2 Centers. These centers, while not legally part of UNESCO, are associated with it by way of formal arrangements approved by UNESCO's General Conference. There are now 20 such culture-related centers of which six focus on World Heritage. Many States Parties are keen to establish a C2C, which is in line with their responsibilities under the Convention, but they must guarantee funding, possess staff with sufficient experience, and, perhaps most importantly, have a genuine commitment to making the C2C function effectively.

The majority of strongest universities in the heritage field will be outside the "Category 2 family" that is being created. There is a concern that the C2Cs will be perceived as having UNESCO's imprimatur but may not attain the same standards of teaching and research. The situation is exacerbated by confusion between the notions of education and training (Logan 2010). These are two different processes and can involve different agencies, universities focusing more on the former although also providing training while professional bodies, government departments, and other agencies focus on training. University education is broad, questioning, liberating, and improving. With regard to World Heritage, university teachers are not trainers seeking merely to serve the needs of the World Heritage system. Of course there is a necessity to provide such technical expertise, but they have also to engage students

in the larger philosophical concerns, to inculcate in them an appreciation of ethical responsibility, and to encourage critical analysis and debate.

Critical Heritage Studies

Critical Heritage Studies also takes the stance that heritage is not simply a reflection of the world's rich and creative diversity but is the very foundation of the cultural identity of people, and hence, its maintenance is basic human right. Again this means that heritage conservation can no longer be seen merely as a technical issue but needs to be seen in an ethical context; indeed, when talking of World Heritage, conservation should be seen more clearly as a tool for attaining the ethical mission set by UNESCO in its Constitution and other statements. An Association of Critical Heritage Studies has been established, and an inaugural conference was held in June 2012 at the University of Gothenburg, Sweden.

Future Directions

It is quite clear that growth of World Heritage system requires new responses, probably including a realignment away from serving the political and economic interests of the States Parties and toward the original UNESCO mission (Logan 2012b: 125-7). It is perhaps unfortunate that, given the increasingly difficult situation in which UNESCO's flagship World Heritage program finds itself, World Heritage education and training seems to be moving toward a dual system comprising C2Cs and the rest. It also be seen as running against the advice of the Independent External Evaluation of UNESCO when it recommended five strategic directions, the fifth being to develop a partnership strategy that included renewing, not scaling down, links with and between institutes, programs, universities, and centers of excellence that can improve UNESCO's performance (UNESCO Executive Board 2010: 11).

There is currently a sense of dismay in some universities. It is likely that Critical Heritage Studies will expand in the non-C2C universities and possibly assume a more questioning stance toward UNESCO and its World Heritage program. Other institutions may also be affected. The AAHM, for example, will no longer be in line with UNESCO's approach. ICCROM has already begun adjusting. The UNESCO Chairs in the cultural heritage field are likely to be brought under the direct control of the World Heritage Center, if they survive at all. The encouragement of a new batch of C2Cs may in some parts of the world draw students away from existing university courses, making them unviable. This is a risky experiment. It is too soon to know the consequences, but the collateral damage could be high.

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- ▶ Heritage and Higher Education
- ▶ Heritage Values and Education
- ▶ World Heritage Sites and Education: UNESCO's World Heritage Education Programme

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World Heritage Journals

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Brief Definition of the Topic

Given the interdisciplinary and global reach of "heritage" in academic, professional, and community contexts, it should come as little surprise that journals that deal with the topic represent a great variety of subject matters and perspectives. Indeed, journals that include "heritage" in their title may just as likely be focused on conservation science as tourism, subjects that seem at first quite distant but are connected by their shared concerns with authenticity and preservation. As attention to heritage has grown over the past half century, in large part intertwined with the founding and expanded reach of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and other international bodies such as ICOMOS, so the number of journals devoted to heritage issues has increased. What follows is a summary of these publications, both those which are exclusively devoted to heritage (along its various dimensions) as well as those whose primary focus is elsewhere but nevertheless publishes a good deal of material important to the study of heritage.

Early Journals

Any review of the history of world heritage journals must begin by acknowledging the important role played by a more traditional "archaeology" journal, the *Journal of Field Archaeology*, founded in 1974 largely by faculty at Boston University's Department of Archaeology. Long before any other journals were focused on heritage issues, the *JFA* included from its outset a regular section called

"The Antiquities Trade," whose aim was to "provide a forum for commentary on the illicit traffic in antiquities" (Wiseman 1974: 1). This feature remained an important part of *JFA* until 1993 and was revived in 2005 under the editorship of Morag Kersel and Christina Luke. In 1977, the *JFA* established a second section entitled "Preservation and Rescue," under the editorship of Thomas F. King, which was a regular feature until 1982.

Several national and international organizations also published journals that included content on heritage preservation and policy. Upon their founding in 1948, UNESCO published *Museum International* and ICOM published *ICOM News*, magazines that regularly include articles on heritage issues. In 1978, the U.S. National Park Service began publishing its *CRM Bulletin*, which then became the more broadly construed *CRM Journal* in 2003.

It was not until the early 1990s, however, that journals devoted entirely to heritage issues were founded. In 1991, the *International Journal of Cultural Property* began publication, aimed at being an interdisciplinary law and policy journal on cultural property and heritage disputes. In 1994, the *International Journal of Heritage Studies* began publication, mainly on issues of heritage preservation and tourism. These were followed by *Art, Antiquity, and the Law* (1996); *Culture without Context* (1997–2006); and the *IFAR Journal* (1998), all focused on art and antiquities trade issues.

Recent Expansion of Heritage Journals

Since 2000, the number of journals focused on world heritage has greatly expanded to deal with the many different dimensions of the subject. There are now journals that focus on problems of conservation (*Journal of Cultural Heritage* [2000], *Conservation Science in Cultural Heritage* (2001), tourism (*PASOS: Journal of Tourism and Cultural Heritage* [2003, e-journal], *Journal of Heritage Tourism* [2006]), intangible heritage (*International Journal of Intangible Heritage* [2006]), architecture and the built environment (*International Journal of Architectural Heritage* [2007]), and digital heritage (*ACM Journal on Computing and Cultural Heritage* [2008], *International Journal of Heritage in the Digital Era* [2012]). Finally, two recent journals have been founded that focus on the larger context of heritage in contemporary social life, *Heritage and Society* (founded in 2008 as *Heritage Management*) and the *Journal of Cultural Heritage Management and Sustainable Development* (2011).

In addition, several more general archaeology journals regularly include content on heritage issues. Aside from the revived "Antiquities Trade" feature in *JFA*, the *Journal of Social Archaeology* (2001) and the journal of the World Archaeological Congress, *Archaeologies* (2006), both seek to examine the social and political context of archaeological practice and thus often include articles on conflicts and policies dealing with heritage worldwide.

Cross-References

- ▶ Heritage & Society
- ▶ International Council of Museums (ICOM)
- ▶ International Journal of Cultural Property
- ▶ International Journal of Heritage Studies
- ▶ Journal of Cultural Heritage Management and Sustainable Development
- ▶ Journal of Heritage Tourism
- ▶ Journal of Social Archaeology
- ▶ King, Thomas F.
- ▶ UNESCO World Heritage Convention (1972)
- ▶ US National Park Service and World Heritage
- ▶ World Archaeological Congress (WAC)

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World Heritage List: Criteria, Inscription, and Representation

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Introduction

It has been said that World Heritage is a category, and the World Heritage List is its instrument (Hafstein 2009: 108). While categories themselves are mechanisms for organizing information and making meaning of them (cf. Evans-Prichard 1976: 222-225; Lévi-Strauss 1966), a list "brings greater visibility" to them, rendering them bounded and defined yet at the same time abstracted (Goody 1977: 81). The category of "world heritage" is not universally comprehended but rather must be effectively constructed, communicated, and standardized in meaning to meet the world's varied understandings of culture, heritage, and patrimony, and to convey UNESCO's principle objectives. The World Heritage List accomplishes this; it converts places primarily of local import into sites publically recognized as possessing universal value through a complex, ritual process that engages actors from local, regional, national, and transnational realms. This entry will outline the major turns of thought in the development of the List, process of inscription, criteria used to define the sites, and key issues and current debates surrounding the List's representative quality.

Definition

The World Heritage List is the primary instrument that constructs the universalized category of "World Heritage" by cataloguing the diverse worldwide sites that are determined to possess "outstanding universal value." Because the individual sites are so disparate and the criteria for their inscription so conceptual, the List's construction of world heritage exists through its inherent juxtapositionality. That is, the List allows each site to be seen in juxtaposition to all of the other World Heritage sites, and therefore, what constitutes world heritage is complexified, conceptually deepened, and expanded as more sites are inscribed on the List over time (Di Giovine 2010). It is a "mechanism of display" akin to a public speech (Hafstein 2009: 97) or a map, which lends conceptual coherence to what Di Giovine (2009) calls UNESCO's heritage-scape, an alternative geographical rendering of the world in which World Heritage sites, rather than political capitals, are the focus. Critics have argued that, over time, the List has changed from a measure aimed at preservation to a branding mechanism for touristic consumption (Ryan & Silvanto 2009).

Although the List strives to be inclusive enough to construct the World Heritage Convention's metanarrative of "unity in diversity," like all lists, it innately indexes a particular structural order and value-based hierarchy (Schuster 2002), which often creates a high level of competition at numerous levels. On the one hand, since the List is organized primarily by state-party, it is often implicitly believed that the more sites a state possesses, the higher the value and legitimacy of that nation. On the other hand, the List maintains a level of exclusivity and competition within a nation-state by including only sites that are deemed to meet its criteria of "universal value." UNESCO itself has asserted that not all sites "of local or natural interest, which are quite justifiably a source of natural pride" possess universal value (cf. UNESCO 2005b: 4). Competition therefore may occur when one community, group, or nation succeeds in designating its site, while another fails in its effort to designate a similar property.

Key Issues

The World Heritage Criteria

The World Heritage Criteria consists of a set of ten typologies, or idealized categories, which are used to evaluate, and offer the conditions for, a site's inscription on the World Heritage List. They are concerned with identifying a site's

"outstanding universal value," which, in turn, would guide state-parties in constructing management and conservation plans for their World Heritage properties (UNESCO 2005b: 12). The *Revised Operational Guidelines* defines "outstanding universal value" as:

> cultural and/or natural significance, which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole. The Committee defines the criteria for the inscription of properties on the World Heritage List (2005a: 24).

The typologies were established in the World Heritage Convention (UNESCO 1972) and identified in the first *Operational Guidelines*, passed in 1978. At this time, cultural and natural sites were evaluated separately, based on "two sets of criteria" (1978: 1), but 25 years later, the two criteria were merged into one set of ten typologies, with the first six being the "cultural" criteria and the last four being the formal "natural" criteria (see UNESCO 2003b). This went into effect in the 2005 *Revised Operational Guidelines*, which stated that a property is recognized as possessing "outstanding universal value" if one or more of the following criteria are met:

1. Represent a masterpiece of human creative genius.
2. Exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning, or landscape design.
3. Bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared.
4. An outstanding example of a type of building, architectural or technological ensemble, or landscape which illustrates (a) significant stage(s) in human history.
5. Be an outstanding example of a traditional human settlement, land use, or sea use which is representative of a culture (or cultures) or human interaction with the environment, especially when it has become vulnerable under the impact of irreversible change.
6. Be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria).
7. Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.
8. Be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features.
9. Be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal, and marine ecosystems and communities of plants and animals.
10. Contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The criteria's wording is extremely important for assimilating disparate sites into a cohesive List and for crafting the universalizing narrative individual sites possess. Instead of indicating concrete categories, the typologies are purposefully vague, so as to be applicable to a wide variety of places across the globe. Rather than *being* something definite, these sites are intended to *represent*, *exhibit*, *bear testimony to*, *exemplify*, or be *tangibly associated with* generalized forms, cultural traditions, ideas, and human abilities that are loosely defined and easily interpreted in multiple ways. They are, in a way, empty signs whose values and meanings can be filled in by different parties throughout time. It is a testament to the universal applicability of the criteria that, while the *Operational Guidelines* have progressively modified the conceptions of

what constitutes "outstanding universal heritage," the actual typologies have remained the same as they were outlined in the Convention.

Authenticity and Integrity

Furthermore, the World Heritage Convention stipulates that a site must also meet a standard of "authenticity" (for cultural sites) or "integrity" (for natural sites). Like the typologies, these were originally separate categories but were merged in the 2005 *Revised Operational Guidelines*.

Stemming from the Venice Charter (ICOMOS 1964) and reconceptualized most significantly in the Nara Document on Authenticity (UNESCO 1994b), UNESCO's understanding of authenticity rests on the notion that a property's outstanding universal value is "truthfully and credibly expressed" through the form, design, materials, and functionality. This includes "subsequent modifications or additions" (1978: 4). Following the "Cairns Decision" (UNESCO 2000), intangible heritage, spirit, and sense of place were also added in an attempt to better accommodate non-Western value systems (2005a: 21).

The *Revised Operational Guidelines* expanded "integrity" to encompass all sites under consideration, and state-parties are now required to submit a Statement of Integrity for each property nominated. By integrity, UNESCO means "the measure of the wholeness and intactness of the natural and/or cultural heritage and its attributes" (2005a: 22). The typologies for integrity are both conceptual and concrete: On the one hand, a site must include "all elements necessary to express its outstanding universal value"; on the other hand, the designated site itself must be of an adequate size to appropriately represent such values. Furthermore, the Statement must include a thorough assessment of the site's state of conservation as well as ongoing development projects that may threaten the integrity of the proposed World Heritage site (such as its geographic boundaries and buffer zones, its cultural or natural resources, or its aesthetic qualities and vistas). Threats to a site's integrity are most often invoked when protesting subsequent government interventions in and around a World Heritage site.

The Process of Inscription

The process of inscription has changed little since it was originally outlined in the 1972 World Heritage Convention, despite substantial changes in UNESCO's conceptualization of what constitutes "heritage."

Because UNESCO is an intergovernmental body, the inscription process begins with a participating state-party, which must offer up its cultural property for inscription; the few exceptions to this rule include Cambodia's Angkor Archaeological Park and Afghanistan's Bamiyan Buddhas, which were both designated while the countries were under United Nations-led transitional governments. To nominate a site, the state-party must be a signatory to the World Heritage Convention, paid its annual dues to the World Heritage Fund, and included the site on its Tentative List. Each signatory has its own Tentative List, an inventory or wish list of properties it intends to nominate. It can be as extensive or as brief as the nation deems appropriate and can be indefinitely modified as the state-party adds or withdraws a property from the nomination process.

Once a property is added to the state-party's Tentative List, a Nomination File is opened at the World Heritage Centre in Paris, which will contain all of the appropriate documentation concerning the site: maps, figures, images, precise coordinates of the area to be considered (including proposed buffer zones), relevant historical records, letters of endorsement by important figures, previous academic studies on the site, current and future management and preservation plans, as well as an official description of the site attesting to its universal value, authenticity, and integrity that is based on the World Heritage Criteria.

These data will then be analyzed by UNESCO-approved Advisory Bodies, nongovernmental organizations specializing in historic preservation or nature conservation. Cultural sites are assessed by the International Council of Monuments and Sites (ICOMOS) and natural sites by the International Union for Conservation of Nature (IUCN); both also conduct on-site research to evaluate the proposed

monument and its management. A third Advisory Body, the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) will be contacted should the site require an assessment of past or proposed restoration work. In their written report, the Advisory Bodies assess how the proposed property meets or falls short of the criteria outlined in the World Heritage Convention. This is less an act of evaluation as it is of idealization, for it effectively changes the property into an idealized material form of UNESCO's metanarrative of "unity in diversity" (Di Giovine 2009: 199).

Once the File is complete, it can be presented at the annual meeting of the World Heritage Committee, which is composed of 21 representatives of state-parties who are elected from the General Assembly. The Committee examines each nomination based on the technical evaluations and votes to inscribe or reject a site. They may also vote to defer judgment on a site, requesting additional information from the state-party. Along with a site's inscription, the Committee confirms the textual wording of the site's designation; often it is a slight modification of the Advisory Body's statement of the site's "outstanding universal value." However, the importance of this act should not be underestimated; it is often subject to politicking as other parties struggle to determine the site's specific narrative, which will translate to the ways in which the site is conserved and packaged for touristic consumption (Di Giovine 2009, 2010). Finally, the World Heritage Committee inscribes the new World Heritage site's name and geographic location on the List, along with other similarly valorized places.

The List of World Heritage in Danger

At its annual meeting, the World Heritage Committee also reviews the state of conservation and management of World Heritage sites. If they find threats to a site's integrity or other characteristics that determined its inscription on the World Heritage List, the Committee may vote to inscribe the property onto the List of World Heritage in Danger, a separate List designed to alert the international community to elements threatening a World Heritage site. These can be "ascertained" dangers – "specific and proven" threats such as warfare, pollution, destruction, or other risks to the site's integrity – or "potential" dangers that may threaten the characteristics for which the site was designated (UNESCO 2005a: 47-49). The List is perceived differently by state-parties; some see it as an instrument to raise awareness of their site and to generate international support (monetary and technical) to help protect it; others see it as a dishonorable sanction. Nevertheless, upon inscription on the List of World Heritage in Danger, a state-party must take corrective action.

Delisting

The *Operational Guidelines* also provides the possibility that a site can be delisted if a state-party does not comply with the corrective measures required when the property was inscribed on the List of World Heritage in Danger. Informed by Article 4 of the Convention – "Each state party to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles 1 and 2 and situated on its territory, belongs primarily to that State"—this rare action has, to date, been exercised when the state has failed to adequately protect a site's integrity. For example, Oman's Oryx Sanctuary was delisted in 2007 after the nation-state reduced the boundaries of the natural park by 90 %, began fossil fuel extraction within the sanctuary, and did not enforce animal poaching laws, which resulted in nearly eradicating the Oryx population (when the site was delisted, only four breeding pairs remained). While national policies affected Oman's World Heritage site, Germany's Dresden Elbe Valley was delisted in 2009 after the federal government was legally unable to halt the Saxony region's construction of a bridge over the Danube, which UNESCO deemed would threaten the integrity of the panorama for which the site had been inscribed. While it is incumbent for a state-party to be a member in good standing before designating a site, UNESCO has indicated that a site cannot be delisted if the state-party's status

changes, as occurred in 2011 when Thailand announced its withdrawal from the World Heritage Convention over Cambodia's contested designation of Preah Vihear.

Representation and the Transformation of the World Heritage List

The World Heritage List is very much a process and must be seen in its ongoing sociohistorical context (cf. Francioni 2008: 5). Since its inception in 1972, the List has changed from including predominantly Western religious monuments to living cultural landscapes, transboundary itineraries, and contemporary constructions. Indeed, these marked changes best illustrate the criteria's effectiveness to adapt to changing conceptions of heritage while maintaining the same wording of the typologies.

The Nature/Culture Dichotomy and the Creation of "Cultural Landscapes"

Article I of the 1972 World Heritage Convention lists three general forms of cultural heritage that were to be considered for listing:

- *Monuments*: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science
- *Groups of buildings*: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science
- *Sites*: works of man or the combined works of nature and man, and areas including archaeological sites, which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view

These are built structures ("architectural" and "archaeological" are the main terms used) and are valued predominantly for their aesthetic qualities, scientific import, and historical longevity. Indeed, they are all considered monumental, in that they are specifically meant to be devices to trigger one's memory and can be keys to scientifically understanding past peoples and their cultures. Preservation of their authentic, material forms is therefore a primary concern. As UNESCO wrote in a treatise that predated the Convention, "Historic monuments are the adornments with which Man has decked the earth; they are the common heritage of mankind and remind us that civilization is made up of contributions from all peoples, and that technique has ever gone hand in hand with the cult of the beautiful, and the taste for the new with the search for the imperishable" (1970: 9). Such conceptualization of material culture as monumental, valued for its imagined existence in the past, has been subject to critiques that argue that the List artifactualizes or museumifies otherwise living cultural properties (cf. Lowenthal 1998).

Just as Article I of the World Heritage Convention identified "cultural" sites in terms of their aesthetic or scientific value, so too did Article II define "natural" sites:

- *Natural* features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view
- *Geological and physiographical formations* and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation
- *Natural sites* or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty

Natural sites, then, were conceptualized as "exceptional natural sites and national parks without people" (Rössler 2006: 334). Just as it is incumbent to preserve cultural monuments from the natural transience of time, so too is it imperative to conserve natural sites from human intervention (Fowler 2003: 15). Such oppositional definitions, therefore, not only created a problematic distinction but also antagonism between the two categories. Indeed, although the Convention allows for sites to be designated

as "mixed" – an almost one-to-one "combination" of natural and cultural elements – there are comparatively very few, and experts have found it not only ineffective but "intellectually flaccid" (Fowler 2003: 18).

This Enlightenment-era division between nature and culture has been critiqued by social scientists, who point out that these two categories are rarely, if ever, mutually exclusive. Humans are a part of nature (cf. Papayannis and Howard 2007), and places, by their very demarcations (which are necessary for the nomination File), are cultural (Pearson and Richards 1997: 5). Furthermore, since these "parks without people" often did have human communities living within their boundaries, a "natural" designation seems to implicitly consider them as *naturvölk*, primitives lagging behind the world's civilizational trajectory (cf. Morgan 1877; Herder [1891]1966). Particularly when such indigenous communities espouse different views of material culture and monumentality, this frequently causes an undervaluation of indigenes' culture, leading to their marginalization; under the guise of conservation, these minorities are considered a nuisance to be educated, modernized, or removed (cf. Smith 2006; Di Giovine 2009: 234-259).

In response to social scientists' critiques of this dichotomy, a third category of "cultural landscapes" was added to the *Operational Guidelines* in 1992 after many years of debate within UNESCO. Coined by human geographer Carl Sauer (1925) and subsequently retheorized a number of times since (see Wagner & Mikesell 1962; Birks et al. 1988), the term focuses on the interactions between humankind and the natural environment. Its justification rests on Article 1 of the Convention text, which points out that World Heritage broadly consists of the "combined works of nature and man" (UNESCO 1994c: 13-14). As with natural and cultural sites, UNESCO specifies three forms of cultural landscapes:

1. *Clearly defined landscapes* designed and created intentionally by humans, such as many gardens and parks. Such landscapes had been already included on the World Heritage List in the early years such as Versailles in France, but the concept opened the List for sites such as Kew Gardens in the United Kingdom or the large-scale extended designed area of the Lednice Valtice Cultural Landscape in the Czech Republic.
2. *Organically evolved landscapes*, which can be either relict landscapes or continuing landscapes. This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. These include a number of agricultural landscapes ranging from the tobacco landscape of Vinales Valley in Cuba, the Rice Terraces of the Philippine Cordilleras, or the Puzta pastoral landscape of Hortobagy National Park in Hungary.
3. *Associative cultural landscapes*. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic, or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent. This type is exemplified by Uluru Kata Tjuta in Australia, Sukur in Nigeria, and Tongariro National Park in New Zealand (Rössler 2006: 335-336).

Rather than eliminating the nature-culture divisions, the category therefore was meant as a bridge between the two, to provide a category where human interaction upon the natural environment was clearly evident. In particular, "associative cultural landscapes" were meant to accommodate alternative forms of heritage by minority groups whose cultural production is primarily immaterial; examples of such sites are Uluru in Australia, Sukur in Nigeria, and Tongariro in New Zealand. In addition to nominating properties as "cultural landscapes" outright, "mixed" sites can be recategorized as cultural landscapes, as Uluru, Sukur, and Tongariro were. Cultural landscapes are marked as "cultural sites" on the World Heritage List and its associated map (http://whc.unesco.org/en/list).

Thana Sites and "Negative World Heritage Sites"

While the List is intended to reveal the unity of humanity in the diversity of its creations (Di Giovine 2009, 2011), a few sites have been inscribed which are neither valued for their aesthetics nor reveal their physical endurance throughout time. These are places of warfare, genocide, and destruction, "dark" or thana sites that are of interest to the newly increasing trend of "dark tourism" or "thanatourism" (see Seaton 2009; Sharpley & Stone 2009). Rather than revealing "unity in diversity" as traditional World Heritage sites do, they can be considered "negative World Heritage sites" (Di Giovine 2009: 124-132; cf. Meskell 2002) for they were designated as exemplars of the destructive nature of war and cultural intolerance, as were the Nazi concentration camp of Auschwitz (designated in 1979, the second year of World Heritage inscriptions), Hiroshima's "A-Bomb" Dome, or the empty spaces in Afghanistan's Bamiyan Valley where the immense Silk Road-era Buddhas stood before they were destroyed by the Taliban in 2001. Although each of these examples viscerally reveal the more destructive side of humanity, UNESCO puts a unifying spin on the narrative by downplaying specific geopolitics in favor of generalities concerning humankind and the need to create world peace, issuing a warning of future strife should diversity be universally undervalued.

Disproportionate Representation and the 1994 Global Strategy

From the mid-1980s onward, it was generally perceived inside and outside of UNESCO that its definition of "cultural heritage" as solely aesthetic and monumental was outdated (Pressouyre 1993; UNESCO 1994a: 2-3). In response, UNESCO commissioned a sweeping study of the List. The study found certain "overrepresentations" of Western categories of what was considered of universal value, including monuments, historic towns, religious buildings, and "elitist" architecture; these sites came mostly from "historical periods" rather than from prehistoric ages or the twentieth century. It also found that Christianity and Europe were overrepresented compared to other religions and other parts of the world. The ensuing *Global Strategy for a Balanced, Representative and Credible World Heritage List* (1994a) addressed these issues by broadening the definitions of cultural and natural heritage, paying particular attention to alternative forms of cultural heritage found in underrepresented parts of the world. A primary goal of the *Global Strategy* was to encourage nation-states in underrepresented regions – such as Africa and the Pacific Islands – to join the Convention by providing incentives and sending Advisory Bodies to work closely with these countries to nominate their properties. In the "Cairns Decision" (UNESCO 2000), the World Heritage Committee definitively established a quota system whereby each nation could only nominate one new property per year; this was an attempt to lessen the ever-increasing gap between underrepresented nations and Western European countries such as Italy who would consistently inscribe several sites per year. The "Budapest Declaration" of 2002 reaffirmed UNESCO's commitment to encourage developing nations to join the Convention by pledging to help ensure sustainable development and more community involvement.

The Cairns Decision also allowed an important exception to this rule: In addition to requesting an unlimited amount of extensions (increasing the geographic size of a preexistent World Heritage site), countries could nominate an unlimited amount of transboundary or multisited World Heritage properties. While originally conceived as sites that straddle the borders of multiple countries (i.e., large natural parks in Africa or the Americas), they also include networks of individual properties that are thematically linked, such as the archaeological remains of the "Frontiers of the Roman Empire," the Jesuit missions of Guaranis in Argentina and Brazil, or the colonial Mountain Railways of India. The network paradigm is becoming increasingly popular within nation-states themselves; the "Longobards in Italy, Places of Power" network consists of seven

locations across Italy in which the Lombard invaders established power centers. "Itineraries" that trace pilgrimage or trade routes have also become popular, although the medieval European pilgrimage route to Santiago de Compostela is listed separately under France and Spain instead of as one transboundary site. To inscribe more "contemporary" properties, the Global Strategy has also reconceptualized the importance of aesthetics. While "industrial heritage sites," such as the UK's perfectly planned workmen's city of Saltaire or Delhi's Victoria Station, have a classic aesthetic quality to them, others such as the abandoned salt and coalmines northeastern Europe do not. And although "underwater cultural heritage" is regulated by a different, less-binding Convention (UNESCO 2001), it is conceivable that the World Heritage List may include these sunken remains of human interaction (such as shipwrecks or the submerged city of Alexandria, Egypt) in the future.

If the goal of the Global Strategy was to engage more nation-states and to distribute World Heritage designations more evenly throughout the world, it has proven to be fairly effective. When the Strategy was enacted in 1994, only 135 nations had ratified the Convention; in the span of a decade, nearly all became signatories. While Western Europe still counts the highest density of World Heritage sites, the List is indeed becoming more evenly distributed. Most importantly, the Global Strategy has helped complexify the very notion of heritage, allowing more flexibility and greater anthropological understanding of the ways in which "heritage" is conceived of, manifested, and valued.

Future Directions

The Representative List of Intangible Cultural Heritage

While explicitly attempting to address alternative notions of heritage, the creation of "associative cultural landscapes" and the *Global Strategy* did little to alleviate tensions among developing nations and aboriginal groups whose cultures were predicated more on immaterial practices than the creation of monumental material cultural forms. UNESCO responded by taking progressive steps toward defining, valorizing, and safeguarding intangible cultural heritage. Building on a failed 1989 *Recommendation for the Safeguarding of Folklore and Traditional Culture*, a Korean proposal to create a "World Living Human Treasures List, similar to the World Heritage List" (UNESCO 1993: 2), and a sweeping study of intangible heritage (UNESCO 1996), in 1997 UNESCO adopted a resolution creating the *Proclamation of Masterpieces of the Oral and Intangible Heritage of Humanity*, a type of List that was not, however, subject to a Convention and had no financial resources at its disposal (Hafstein 2009: 95). Though it was intended to "proclaim" the top forms of immaterial heritage, it went largely unnoticed in comparison to the World Heritage List; it was also criticized by many of the same indigenous groups as being too hierarchical and elitist and without adequate reliance on the participation of the communities producing such masterpieces. While all groups pushed for a Convention that would provide legal instruments similar to that of the World Heritage Convention, they were divided in their desire for a List; one faction felt that a selective List would be the only adequate way of raising the necessary awareness for safeguarding these practices, while the smaller nations wished to eschew lists altogether (or at least a selection process), which they perceived as unconditionally elitist. The final product, *The Representative List of the Intangible Cultural Heritage of Humanity*, and its associated *List of Intangible Heritage in Danger* (2003a), represents a compromise between the two: While still selective in its process of inscription, it eschews "universal value" as its primary criterion in favor of "representivity" (Hafstein 2009: 108); each signatory draws up a complete inventory of its cultural practices and is encouraged to submit one for inscription during the Intangible Heritage Committee's biennial meeting. It thus builds on the basic structure of the World Heritage List yet purports to be more democratizing and even less

determinate in its standards of selection – thus attempting to preclude a situation of unbalanced representationality that the Global Strategy was forced to correct.

The Representative List of Oral and Intangible Cultural Heritage seems to be a key development for the evolution and survival of the World Heritage List. While separate, both lists are inexorably linked historically, conceptually, and, to a certain extent, even procedurally. One was born from the other so that the other could remain relevant amid changing conceptions of heritage. Indeed, the World Heritage List has progressively moved from including sites primarily conceived of as artifactual and monumental to those that espouse more holistic, living notions of heritage. Importantly, intangible heritage designations have quickly been met with similar celebrations at the local level in many societies across the world, and in its early years, locals often conflated the Intangible Heritage List with that of the World Heritage List. Particularly following the Yamato Declaration, in which participants agreed to create a more integrated approach toward safeguarding both tangible and intangible heritage (UNESCO 2004), it is conceivable that the Intangible Heritage list, while remaining separate and decidedly less place-oriented, will implicitly inform future nominations by state-parties, as well as future actions by the World Heritage Convention.

Cross-References

- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Intangible Cultural Heritage
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage Objectives and Outcomes

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World Heritage Objectives and Outcomes

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Introduction

UNESCO's 1972 World Heritage Convention describes its purpose primarily in terms of preserving "natural" sites and built "cultural" structures, such as unique landforms, monuments, and archaeological remains. Yet by the fortieth anniversary of the Convention's ratification, Irina Bokova, UNESCO's director general, reacted to the destruction of World Heritage-listed properties in Timbuktu, Mali, in these words: "Let's be clear. We are not just talking about stones and building. This is about values, identities and belonging. . . . [W]e must start seeing cultural heritage as an international security issue" (Bokova 2012). While her statement may at first signal a shift in the World Heritage Convention's goals – from preservation

to peacemaking – a closer analysis of UNESCO's major documents, pronouncements, and practices reveal multiple, complex, and intersecting objectives, which are met with varying degrees of success and produce often unexpected outcomes. This entry will examine the World Heritage Convention's objectives in the short term, medium term, and long term, arguing that they nested and are interdependent; it will also show how these interrelated goals ultimately factor into UNESCO's broader, global peacemaking objectives.

Definition

Founded in 1945 as a specialized arm of the United Nations, UNESCO was born in the wake of the tragedies of World War II. UNESCO's role as the United Nation's Education, Scientific, and Cultural Organization was to delve beyond traditional diplomacy and economically oriented programs and engage directly with publics at more intangible levels for the ultimate goal of building "peace in the minds of men" (UNESCO 2003b: 1). This tactic of public diplomacy is predicated on the idea, espoused in the Preamble to UNESCO's Constitution, that "the wide diffusion of culture, and the education of humanity for justice and liberty and peace are indispensable to the dignity of man and constitute a sacred duty which all the nations must fulfil in a spirit of mutual assistance and concern," and that "a peace based exclusively upon the political and economic arrangements of governments" is insufficient and "must therefore be founded, if it is not to fail, upon the intellectual and moral solidarity of mankind" (UNESCO 1945: 1). While this statement does not mention heritage sites per se, it provides the foundation for the World Heritage Convention's emphasis on the collective responsibility towards promoting "the wide diffusion of culture" and education concerning "each other's ways and lives" (1945: 1) – for which World Heritage sites would become metonyms.

Historical Background

Abu Simbel: A Precursor to the World Heritage Convention

In the mid-1950s, Egyptian president Gamal Nasser announced plans to construct the Aswan High Dam at the first cataract of the Nile to regularize the river's flooding, improve the region's agricultural landscape, and symbolically modernize the country in the eyes of the world. The plan called for the construction of a reservoir which would completely submerge a temple complex constructed by Pharaoh Ramses II (1303–1213 BCE). At the behest of Egypt and the Sudan, in 1960 UNESCO launched an unprecedented international campaign to move the temples to higher ground through a technologically ambitious plan (see *Time Magazine* 1963; UNESCO 1980). Over 40 member states raised $80 million – nearly double the planned cost – and sent teams of archaeologists to excavate the "practically virgin land" together (UNESCO 1982: 30), while international engineers succeeded in saving the temples. Abu Simbel had a profound effect on the future of World Heritage, and UNESCO proclaimed it "a triumph of international solidarity" (UNESCO 1982). It revealed the strong emotional relationship that such heritage properties – and the prospect of their transience – could exert on the international community, irrespective of national origins, and brought nations and experts together for the common goal of researching, and preserving, these monuments.

The World Heritage Trust and Creation of the World Heritage Convention

It was in the glow of the Abu Simbel success that, in 1965, a White House conference called for the creation of a "World Heritage Trust" to engage the international community in the preservation of exemplary sites "for the present and future of the entire world citizenry" (quoted in UNESCO 2008b: 7). A plan of conservation was adopted which was similar to that of the US National Parks service. The idea of a World Heritage Trust undoubtedly gained international traction when, the following year, UNESCO launched the

immensely successful "Save Venice" campaign in response to the devastating floods that rocked the northern part of Italy. In 1968, the International Union for the Conservation of Nature (IUCN) followed suit in adopting a similar framework for its membership. These proposals were combined in 1972, when delegates to the United Nations Conference on Human Environment in Stockholm called for a new Convention that could better ensure the safeguarding and management of cultural and natural properties. Later that year, it became the World Heritage Convention (*Convention Concerning the Protection of the World Cultural and Natural Heritage*) spearheaded by UNESCO, which created a World Heritage Committee that oversees the general body of state-party delegates to the Convention, and a small World Heritage Fund comprised of mandatory donations by each member state. Implicit in the Convention text, and in subsequent publications sponsored by UNESCO and the World Heritage Centre, are a number of interlinked short-term, medium-term, and long-term objectives.

Key Issues

Short-Term Objectives: Knowledge Creation and Dissemination

While the World Heritage Convention is explicitly concerned with preserving tangible natural and cultural heritage, interestingly, the Convention grants the World Heritage Committee only limited power to affect such ambitious goals as cultural preservation, sustainable development, and peacemaking. Rather, the Committee is only invested with the short-term ability to create and diffuse alternative narratives concerning the universal value of heritage sites by evaluating and inscribing a property onto the World Heritage and World Heritage in Danger lists and by disseminating these lists through diverse channels and global networks. These are fundamentally acts of knowledge creation and dissemination. Furthermore, moneys can be disbursed from the relatively small World Heritage Fund primarily for use in needs assessments and Advisory Body evaluations (necessary for the nomination of a site), publicity campaigns by state ministries to raise awareness of a site's World Heritage designation, and capacity-building and technical assistance programs, such as exchanges between site managers in developing countries with those in Europe (Di Giovine 2009a: 315–319; UNESCO 1972: 12–13). While it is believed that these awareness-raising campaigns will inspire international conservation and tourism efforts in the medium term, they are also directed towards locals, "to strengthen appreciation and respect. . .of the cultural and natural heritage as defined in Article 1 and 2 of the Convention" (1972: 13).

Although UNESCO has some control over the knowledge they produce and diffuse, they have little control over the way it is interpreted, used, and reproduced by state parties and other actors. In particular, while each site is meant to reveal UNESCO's claim of "unity in diversity," actors may emphasize a particular aspect of the place's history to valorize certain groups and marginalize others, as frequently occurs to minority or indigenous populations living on or near the designated site and who may attribute alternative use values to it. Designations, however, are intended to increase the "prestige factor" of a site (cf. Dure 1974) – important for the generation of preservation and tourism campaigns – but often lead to emotionally charged competition between nation-states who quantify their value based on the number of sites they have on the list. In some cases, this may even exacerbate geopolitical tensions, leading to civil strife – such as periodic riots between Cambodians and Thais over Angkor Wat or the political and military actions taken by these same countries upon the designation of Preah Vihear as a Cambodian World Heritage site in 2008.

Medium-Term Objectives: Preservation and Tourism Development

Safeguarding Cultural and National Properties

Although it is not invested in the direct ability to conduct historic preservation and natural conservation projects, UNESCO's *Convention for the Protection of the Cultural and Natural Heritage*

is first and foremost aimed at safeguarding cultural and natural resources deemed to be of "universal value," the "heritage of mankind" (1972: 1). UNESCO attempts to fulfill this objective first through *normative actions* and second through *coercive actions*.

Normative actions involve the institution of norms, procedures, and requirements a state party must satisfy before nominating their site for World Heritage status. These include thorough research concerning the proposed site's history, topography, universally valorized qualities, authenticity, and integrity; the intervention of expert "Advisory Bodies" who assess the site's integrity and level of authenticity on behalf of UNESCO; and the drafting of conservation and management plans. State parties in good standing to the World Heritage Convention may receive some funding for these endeavors, although the Operational Guidelines specify that the Fund should ultimately "be used to mobilize additional funds for International Assistance from other sources" (UNESCO 2008a: 60). Such actions contribute to UNESCO's goal of knowledge creation while, at the same time, also induce the nation-state to ensure the site's preservation by cooperating with the international community (cf. UNESCO 1972: 3). Furthermore, once a site is inscribed on the World Heritage List, state parties are required to submit periodic assessments both on the site ("reactive monitoring") and on the implementation of the World Heritage Convention in its territory ("periodic reporting") as well as to make any modifications to the management of its site (2008a: 45–47, 54–56).

Should these norms not be fulfilled, UNESCO may take *coercive action* by inscribing the property on the List of World Heritage in Danger and calling for specific, time-sensitive responses on the part of the state party in question. Noncompliance may result in the site's delisting (UNESCO 2008a: 28, 52–53). However, coercive actions should not simply be understood as a means of compelling nation-states and groups to act through negative reinforcement and threats of sanction, but also through the prospect of raising a group's symbolic capital in the international community. In its *World Heritage Information Kit*, UNESCO makes clear its belief that such claims to prestige directly foster conservation projects (2008b: 9).

While inscription on the World Heritage List in Danger is sometimes perceived by a state as a penalty, it also is intended to serve as an extra awareness-raising mechanism directed towards international communities, one that creates a sense of urgency for sites that are in particular danger, as the cases of Abu Simbel and Venice successfully revealed. Further underscoring the believed link between knowledge dissemination and preservation, in 2002 the World Heritage Committee adopted *the Budapest Declaration on World Heritage*, which invited "all partners to support World Heritage conservation through key strategic objectives known as the 'Four Cs': strengthen Credibility of the World Heritage List; ensure effective Conservation of World Heritage properties; promote the development of effective Capacity-building measures; increase public awareness and support through Communication" (2008b: 8; see UNESCO 2002a).

Although grounded in egalitarianism, UNESCO's emphasis on preservation, as well as its tactics, has drawn criticism. On the one hand, while a World Heritage site is "supposed to be protected by the world community, under normal circumstances it is directly managed by the nation in whose political boundaries it is located" and who may not share in UNESCO's ideological interests (Di Giovine 2009a: 7); a site's conservation is ultimately carried out at the country's discretion and is subject to national law (UNESCO 1972: 3–4). Should UNESCO's coercive power fail, it has little recourse but to delist a site, which does nothing to directly protect it from further destruction. On the other hand, scholars have pointed out that conservation often denies a monument's total life history, taking the site back to an idealized and historicized state that "tempts us to ignore our own influence on them" (Lowenthal 1998: 114), conserving only one of many possible narratives embodied in the structure through time and destroying or erasing others (Di Giovine 2009a: 359). In the name of conservation, site managers often prevent alternative

uses by indigenous populations while at the same time paradoxically prohibiting those same populations to "modernize" their technologies or living practices in the name of preserving authenticity (see Di Giovine 2009b; Smith 2006). There also runs the risk of privileging the needs of international tourists, rather than those of local communities. Indeed, it was only in 2007 that the World Heritage Committee officially recognized "the fact that conservation, capacity building, credibility and communication are all intrinsically linked to the role of community" (UNESCO 2008b: 8; cf. UNESCO 2007).

Heritage Tourism and Development: An Uneasy Alliance

UNESCO has historically expressed ambivalence towards tourism development, even while conducting limited normative actions (requiring management plans to account for tourism impacts), and promoting *inspired actions* among tourists by supporting publicity campaigns by governmental ministries and industries involved in tourism. "Tourism" is not mentioned in the World Heritage Convention, and the phrase "tourist development projects" appears only among a list of possible threats to World Heritage sites that could provide the basis for inscription on the World Heritage List in Danger (see UNESCO 1972: 6). Interestingly, though, a majority of the early World Heritage sites were already well known to, if not also well visited by, international audiences.

UNESCO's ambivalence towards tourism seems to stem from the early failures by the UN and other intergovernmental organizations in tourism development. The World Heritage Convention was ratified when expectations of tourism as a means of peaceful economic development were at their height. The United Nations granted the nascent International Union of Tourism Officers (IUOTO) consultative status in 1954; the UN held its first conference on international tourism in Rome in 1963, where it outlined a framework for tourism development; it declared 1967 International Tourism Year (ITY) with the slogan "Tourism: Passport to Peace"; and finally absorbed IUOTO into the newly created United Nations' World Tourism Organization in 1970 (UNWTO 1974; UNWTO 1975; Jafari 1975). More concretely, in 1969 the World Bank had created a dedicated Tourism Projects Department which lent over $525 million between 1970 and 1979 to "support tourism as an economic growth tool" for 18 countries that met specific criteria (Hawkins and Mann 2007:354; Di Giovine 2009a: 216). It is important to note that UNESCO stayed on the sidelines. Indeed, a study commissioned by UNESCO – which was published as the monograph, *Tourism: Passport to Development?* (de Kadt 1979) – found that the predicted "multiplier effect" of direct and indirect employment that could revitalize developing countries did not materialize (UNESCO 1976: 81); rather, the industry's proclivity to vertical and horizontal integration created foreign monopolies that largely relegated locals to the sidelines and allowed for notable "leakages" – the proportion of monies invested or earned in the tourism sector that ended up overseas (Markandya et al. 2005: 231), mostly in the hands of the tourists' countries of origin (Bryden 1973). Furthermore, it did not stave off a "flight from the land" by farmers who continued to move to cosmopolitan urban centers in search of work (UNESCO 1976: 81). In 1979, the World Bank followed suit, issuing its own study, which acknowledged drawbacks to tourism development in the absence of adequate planning on the part of the developing nation (Norohona 1979), and by the mid-1980s, it ceased taking on tourism-related projects (Hawkins & Mann 2007: 356); responsibility was ceded to multilateral corporations and NGOs. Meanwhile, some academics argued that tourism creates inauthenticity, museumification, "stress," and socio-cultural imbalance akin to imperialism (cf. MacCannell 1976; Nash 1977; Murphy 1985: 1,3).

While the UN's top-down, economics-heavy focus on tourism was problematic to the peace-making and safeguarding rhetoric of the World Heritage Convention, the Convention found resonances in the UN's Millennium Development Project and the "sustainable tourism" turn of the mid-1990s, which focused on preserving

a destination's structural and contextual integrity, facilitating a closer engagements with local stakeholders, fostering a better understanding of the multiplicity of meanings and values attributed to a tourist destination, and ensuring a more equitable distribution of economic and social benefits from tourism development initiatives (Smith & Eadington 1994; Stronza 2001; Telfer 2002; Mbaiwa & Stronza 2009). Revealing a *rapprochement* with the tourism industry, in 1999 UNESCO hosted its first workshop at the International Tourism Exchange (ITB), one of the tourism industry's largest trade fairs, and in 2001 the World Heritage Committee in Helsinki founded what would become the World Heritage Sustainable Tourism Programme, whose aims would be to "engage in dialogue and actions with the tourism industry to determine how the industry may contribute to help safeguard these precious resources" (UNESCO n.d.; see UNESCO 2001: 63). Reflecting the program's mission of "using tourism as a positive force to retain WH site values and to help mitigate site threats," it pursues a threefold strategy of raising awareness, developing partnerships, and providing technical support to aid the World Heritage Committee, UNESCO field offices, and site managers in assessing and managing tourism-related issues at World Heritage sites. In particular, the World Heritage Centre offers a seven-point "framework for utilizing tourism to benefit site protection" (UNESCO n.d.: 1):

1. Building the capacity of the site management to deal with tourism
2. Training local community members in tourism-related activities so that they can participate and receive tourism's benefits
3. Helping to market these products through their promotion at the local, regional, country, and international levels
4. Raising public awareness and building pride in the World Heritage site with local communities and visitors through a conservation education campaign using a symbolic specie upon which to base a social marketing and public awareness campaign (e.g., a Manta Ray in Komodo National Park, a Toucan in Sian Ka'an Reserve)
5. Using tourism generated funds to supplement unmet conservation and protection costs at the sites
6. Spreading the lesson learned to other sites and other protected areas
7. Building an increased awareness of World Heritage and its activities and policies in the tourism industry and to the clients of the industry

These statements also reveal an articulated shift from considering tourism as a threat to socioeconomic stability to embracing tourism's perceived communicative and awareness-raising abilities. Indeed, in UNESCO's action plan of sustainable tourism development for poverty alleviation in the Sahara Desert – which draws on the cooperation between nation-states, international organizations, travelers, the tourism industry, and local populations (2003a: 5) – UNESCO pointedly reveals its change in position: "There is no contradiction between an economically efficient tourism and an ethical and qualitative tourism, respectful of societies, cultural diversity and environment" (2003a: 2).

Long-Term Objective: Peacemaking

"UNESCO's mission is to contribute to the building of a culture of peace, the eradication of poverty, sustainable development and intercultural dialogue through education, the sciences, culture, communication and information" (UNESCO 2010: 2). To satisfy this peacemaking objective, its World Heritage Convention relies on the prospect of what can be considered *inspired action* – long-term, often subtle changes in the ways in which individuals and groups perceive the meaning and value of not only World Heritage sites, but the universality of cultural diversity for which these monuments illustratively stand. In line with some globalization theories' emphasis on individuality over that of collectivities, in which one's imagination negotiates between individuals and "globally defined fields of possibility" (Appadurai 1996: 31; cf. Robertson 1992: 8), UNESCO seems to posit that "peace in the minds of men" can emerge through the reordering of individuals' sense of place; rather than identifying exclusively with sites of local or

national interest, individuals may also entertain a "common recognition and identification with the world's shared cultural heritage" as exemplified in these monuments (Di Giovine 2009a: 34) and enacted through collective participation in their preservation and touristic visitation.

While acts of violence include both ethnic cleansing and the destruction of a group's cultural property (UNESCO 1996), activities linking "peace and cooperation" (cf. Sandwith et al. 2001), which are marked by "mutual understanding [and] a plural approach to history," can create a global "culture of peace" (UNESCO 2008a: 90). This notion is made most explicit in UNESCO's 2001 *Universal Declaration of Cultural Diversity*, which, defining culture as the "distinctive spiritual, material, intellectual, and emotional features of a society or group," argued that "respect for the diversity of cultures. . .[and] an awareness of the unity of humankind, and of the development of intercultural exchanges. . .are among the best guarantees of international peace and security" (UNESCO 2002b: 1). Ratified shortly after the September 11 terrorist attacks on New York and Washington, DC, the Declaration further acknowledges that UNESCO's "specific mandate" within the UN system was to "ensure the preservation and promotion of the fruitful diversity of cultures" (2002b: 1), "as necessary for humankind as biodiversity is for nature" (2002b: 2). Acknowledging that "diversity is the essence of identity" (Matsura 2002a: 3), UNESCO's then-director general, Koïchiro Matsura, comments that the Declaration "makes it clear that each individual must acknowledge not only otherness in all its forms but also the plurality of his or her own identity, within societies that are themselves plural" (2002b: i). By simultaneously celebrating the differences that mark human life and yet positing some unanimously recognizable (and valued) universal culture, UNESCO proposes a peaceful world system based on the structural unity of difference – a "culture of cultures" (Sahlins 2000: 488) that Di Giovine terms a world "heritage-scape" (2009a; 2010; 2011). "If a heritage object temporally connects individuals with the socio-spatial milieu from which they came, UNESCO's World Heritage objects are intended to transcend the temporal and spatial situatedness of one culture's heritage claims, ensuring that everyone equally possesses each World Heritage site; rather than basing identities on collective antagonism toward difference, tourists consuming the World Heritage narrative can celebrate and internalize diversity" (Di Giovine 2010: 9).

This ultimate objective is clearly utopian, and while UNESCO and its representatives talk of peacemaking in some of their documents and decrees, it is clear that such a lofty goal is largely implicit and contingent on the successful outcomes of multiple medium-term objectives that are themselves difficult to fulfill. While only time will tell if such a broad plan can work, UNESCO's major challenge – other than ensuring success in the equally idealistic aims of creating sustainable and inclusive preservation and tourism development initiatives – is ensuring that the list remain current and representative of the heritage-scape's audience, which is ever expanding as new populations enjoy greater mobility, global communication, and connectivity. Through the 1994 *Global Strategy for a Balanced, Representative and Credible World Heritage List*, the periodic updates to its Operational Guidelines, and the passing of associated Conventions protecting other forms of tangible and intangible heritage, UNESCO has demonstrated that it is capable of, and willing, to make changes in the forms and meanings of "world heritage" while maintaining its meta-narrative of "unity in diversity" (cf. Rössler 2010).

Future Directions

The objectives of UNESCO's World Heritage Convention are ambitious and far-reaching: to ensure the protection of endangered cultural and natural resources, to enhance sustainable development primarily through heritage tourism, and, ultimately, to fulfill UNESCO's "unique mandate" (2001: 1; cf. 2011), established in the Preamble of UNESCO's Constitution, of fostering "peace in the minds of men" (1945: 1).

Yet because UNESCO is an intergovernmental organization that derives its legitimacy from nation-states and its World Heritage program is based on an international convention to which state parties voluntarily adhere, UNESCO has limited ability to affect real policy change in these areas; direct action is limited to creating and disseminating information concerning World Heritage sites in the short term. Instead, UNESCO depends on normative and coercive actions to contribute to safeguarding cultural and natural resources in the medium term, which are believed to lead to inspired action towards tourism development and, ultimately, to peacemaking among global publics in the long term. But since UNESCO relies on the interpretation of its Convention by individual state parties, who have different needs, goals, and understandings of "heritage," unintended consequences often arise. This entry has traced the historical context of UNESCO's logic, examined its various and contingent objectives, and described the major outcomes of each.

"The World Heritage Convention is a noble, vital force in the world, fostering peaceful coexistence and honoring our past in equal measure with our future," remarked Koïchiro Matsura at UNESCO's celebration in Venice honoring the thirtieth anniversary of the Convention's ratification (UN News Service 2002). Paying particular attention to the Convention's historical and cultural context, this entry has argued that UNESCO's primary objectives are linked in a complex chain of logic that is contingent upon the successful fulfillment of each short- and medium-term goal: UNESCO's direct act of designating World Heritage sites can increase prestige, thereby fostering preservation and tourism development, which, if implemented correctly, can create a peacemaking understanding of "unity in diversity" in the myriad "minds of men" who interact with, or otherwise consume, these sites and their representations. It is "inevitable" that tourism, preservation, and peacemaking are interlinked, writes Francesco Bandarin, the longtime director of UNESCO's World Heritage Centre in Paris:

> It is an inevitable destiny: the very reasons why a property is chosen for inscription on the World Heritage List are also the reasons why millions of tourists flock to those sites year after year. In fact, the belief that World Heritage sites belong to everyone and should be preserved for future generations is the very principle on which the World Heritage Convention is based (Pedersen 2002: 3).

Bandarin's quote is telling, for it equates tourism and preservation with the mutual identification with cultures that are not immediately one's own. UNESCO believes it is this celebration, internalization, and preservation of cultural diversity that can ultimately create peace, at least in the minds of men. This is arguably a slow process, one akin to acculturation and which is constantly complicated by inter- and intrastate politics, but only time may tell of its ultimate success.

Cross-References

- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Protection: The Legal Sphere
- ▶ Heritage Tourism and the Marketplace
- ▶ Stakeholders and Community Participation
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ UNESCO World Heritage Convention (1972)
- ▶ US National Park Service and World Heritage
- ▶ World Heritage and Human Rights
- ▶ World Heritage List: Criteria, Inscription, and Representation

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World Heritage Sites and Education: UNESCO's World Heritage Education Programme

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Introduction

Article 27 Paragraph 1 of UNESCO's 1972 Convention *Concerning the Protection of the World Cultural and Natural Heritage* states that

> The States Parties to this Convention shall endeavour by all appropriate means, and in particular by educational and information programmes, to strengthen appreciation and respect by their peoples of the cultural and natural heritage defined in Articles 1 and 2 of the Convention.

Given this emphasis, UNESCO has developed the World Heritage Education Programme (WHEP) which has the following objectives:

- To encourage young people to become involved in heritage conservation on a local as well as on a global level
- To promote awareness among young people of the importance of the UNESCO 1972 World Heritage Convention and a better understanding of the interdependence of cultures among young people
- To develop new and effective educational approaches, methods, and materials to introduce/reinforce World Heritage Education in the curricula in the vast majority of UNESCO Member States
- To create a new synergy among educators, heritage experts, environmental specialists, States Parties, development actors, and other stakeholders in the promotion of World Heritage Education on a national and international level

The WHEP, which is regarded by UNESCO as one of its most successful flagship programs for young people, comprises a number of interrelated projects:

- Development and publication of innovative educational and informational materials, notably the *World Heritage in Young Hands* kit
- Development initiatives for multimedia educational resource material production, including the production of episodes of a cartoon series starring *Patrimonito*, the young World Heritage helper
- Youth Forums and summer camps
- National subregional and regional training seminars for teachers and educators
- Skills development and training courses for young people

For further information concerning the WHEP please see: http://whc.unesco.org/en/wheducation

Definition

The *UNESCO Young People's World Heritage Education Programme* seeks to encourage and enable tomorrow's decision makers to participate in heritage conservation and to respond to the continuing threats facing our heritage.

Key Issues/Current Debates/Future Directions/Examples

Background

Despite education being emphasized in the World Heritage Convention, it was not until 1994 that UNESCO itself began to address this aspect of the Convention in a joint project between the UNESCO World Heritage Centre (WHC) and the UNESCO Associated Schools (ASPnet) in a project entitled *Young People's Participation in World Heritage Preservation and Promotion*.

The idea of an education program relating to World Heritage fitted UNESCO's broader agenda perfectly as it was the lead agency for the United Nations 1988–1997 *World Decade for Cultural Development*. UNESCO had convened a *World Commission on Culture and Development* and documents emphasizing the importance of educational projects, and in particular those stressing cultural diversity, had been circulated to all UNESCO's National Commissions. The Canadian Commission suggested the development of an educational program relating to World Heritage.

Initially, staff from the WHC and ASPnet produced a very simple pack of information outlining the functions of the 1972 Convention and detailing conservation efforts at World Heritage sites that were sent out to any Schools asking for information. Within the year, with this information, projects were produced by schools from 16 Member States and it was clear that there was a real interest in World Heritage education.

In June 1995, a *World Heritage Youth Forum* (WHYF) was organized in Bergen by the Norwegian National Commission for UNESCO in conjunction with the WHC and ASPnet. Young people and their teachers from 25 Member States were present. To raise the profile of the event, the WHYF was timed to coincide with the General Assembly of the *Organisation for World Heritage Cities* (OWHC) and the Director General of UNESCO and city mayors, who were attending the OWHC, were invited to address, and attend parts of, the WHYF.

While the WHYF discussed a wide range of issues relating to World Heritage, two stood out as being particularly urgent: first, the potentially negative impact of tourism and second, the impact of conflict on World Heritage, and other, sites. Tourism pressure on sites was a particular worry for the mayors of some of the cities participating in the OWHC meeting and the issue of conflict had been brought into close focus, given the war in the former Yugoslavia, where the World Heritage city of Dubrovnik had been specifically targeted. An offer by the Mayor of Dubrovnik to host a second WHYF was immediately accepted by those attending the WHYF (ASP net 1995: 23). Participants from other countries also brought examples of their work relating World Heritage to Identity (Egypt), Conservation (Greece), Peace (Senegal), and Nature (New Zealand). A key issue to emerge was that if World Heritage education was to be successful, it needed to be practical:

> Teachers agreed that teaching about the past often remains too theoretical. It has to come alive for young people and be made interesting for them. New approaches in the classroom are needed as well as field visits, excursions and extra-curricular activities (ASP net 1995: 15).

It was also noted, however, that while such a practical approach was regarded as essential for any WHEP to be successful, that relatively few teachers internationally were comfortable with such an approach to the curriculum.

Following the success of the Bergen WHYF, the WHEP was adopted as a medium-term "Special Project" (1996–2001) by the UNESCO General Conference in November 1995. Work focused on the production and piloting of a WHE kit for teachers and holding of regional youth fora.

As agreed in Bergen, the First European World Heritage Youth Forum was held in

Dubrovnik in 1995. Following from the Bergen WHYF, teachers and students from 21 European States Party worked in small groups on draft materials based on six topics:

- The 1972 Convention
- Educational approaches
- World Heritage and the Environment
- World Heritage and Tourism
- World Heritage and a Culture of Peace
- World Heritage and Identity

These draft materials were further refined by a small international advisory group and retested at two more WHYF, in Zimbabwe and China, before a final "experimental" version of the WHE kit was produced in 1998 for testing by ASPnet Schools. In total, 4,000 copies of this experimental version of the kit were produced, 2,500 in English and 1,500 in French. Copies were circulated to all Associated Schools declaring an interest and teachers were asked to complete an enclosed evaluation form. An external evaluation of Young Hands was undertaken in 2000 by the English Heritage Education Service and the information contained in these forms was drawn on in the evaluation. The evaluation was generally positive and, after minor modification, the kit went into full production.

The *World Heritage in Young Hands* kit, aimed primarily at secondary school teachers, has been published in over 30 national language versions. An estimated 57,000 copies have been printed and distributed. The kit has been tested and adapted to national needs and introduced in over 130 Member States of UNESCO through close to 1,000 UNESCO ASPnet Schools. Through the WHC website, the different versions of the kit are gradually being made available free of charge online. UNESCO claims that "at a very conservative estimate, at least a million young students will be reached by all Kit versions" (http://whc.unesco.org/en/wheducation/).

World Heritage Youth Fora

Since the first WHYF in Bergen, some 27 international and regional youth fora have been held with an estimated 1,560 young people participating. Numerous national fora have also been held. These fora provide young people and their teachers with an opportunity to exchange experiences and ideas on how to become involved in heritage conservation and presentation. The fora serve as an inspiration to develop World Heritage educational and participatory activities and help to establish networks for further cooperation at the regional and international level (Fig. 1).

An important development has been the organization of a WHYF in conjunction with the annual World Heritage Committee meeting. One of the exciting highlights of the Forum is meeting

World Heritage Sites and Education: UNESCO's World Heritage Education Programme, Fig. 1 Students at the Newcastle World Heritage Education Forum working with a local TV crew on heritage and tourism at Hadrian's Wall. (Credit: Newcastle University)

members of the World Heritage Committee and its advisory bodies to discuss the Convention and its implementation. A Youth delegation also presents the result of the Youth Forum to the Committee.

Patrimonito: The Young Heritage Guardian

Patrimonito was created in 1995 by a group of Spanish-speaking students during the first WHEF in Bergen. The young students designed Patrimonito on the basis of the World Heritage Emblem which symbolizes the interdependence of cultural and natural sites: The central square is a form created by people and the circle represents nature, the two being intimately linked; the emblem is round like the world and at the same time a symbol of protection. Patrimonito means "small heritage" in Spanish, and the character represents a young heritage guardian and has been widely adopted as the international mascot of the WHEP.

In 2002, a cartoon series entitled *Patrimonito's World Heritage Adventures* was launched where Patrimonito introduces World Heritage sites, the threats they are facing, and proposes solutions to preserve them. Storyboards were chosen following a competition among secondary school pupils to raise their awareness of the importance of World Heritage and their role in preserving it. The competition was organized by UNESCO on the occasion of the celebration of the thirtieth Anniversary of the World Heritage Convention in 2002. The selected storyboards are professionally animated and produced in CD-ROM format for global diffusion to schools and at World Heritage Youth events.

The World Heritage Volunteers Campaign

The World Heritage Volunteers campaign is coordinated by the WHC in cooperation with the Coordinating Committee for International Voluntary Service CCIVS and mobilizes youth NGOs operating in the nonformal sector for World Heritage promotion and preservation through involvement in international voluntary work. Projects are organized by local youth organizations or NGOs which determine the project goals and activities in collaboration with a range of partners (local community, site management, local authorities, and other stakeholders), train work camp leaders, and host international volunteers. Activities themselves are undertaken by young volunteers, aged 18–30 years, coming from different countries. Youth camps generally last between two to four weeks and accommodate between ten to thirty volunteer participants encouraging young people to play an active role in the promotion and preservation of World Heritage.

Skills Development Training Courses

Skills development training courses relating to the WHEP have trained nearly 1,250 teachers and educators have been trained through nearly 40 seminars and workshops at national, subregional, regional, and international level. Skills development training courses have been provided to over 200 young people.

The Future

The WHEP has now moved into its second phase, seeking to reinforce the involvement of young people in World Heritage preservation, pursuing efforts to integrate World Heritage Education in school curricula, and encouraging communities and States Parties to participate in and promote heritage preservation and intercultural learning.

The WHEP has been funded by a number of extra-budgetary sources including the Norwegian Agency for Development Cooperation (NORAD), the Royal Norwegian Ministry of Foreign Affairs, Rhône-Poulenc, the Dutch Government, the Italian Government, and the World Heritage Fund.

Cross-References

- ▶ Formal Education up to Age 18, Archaeology in
- ▶ Heritage Values and Education
- ▶ UNESCO World Heritage Convention (1972)
- ▶ World Heritage Education, Training, and Capacity Building

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World Monuments Fund (WMF)

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Introduction

World Monuments Fund (WMF), with headquarters in New York, is the leading independent organization devoted to saving important cultural heritage sites around the world. For over 45 years, working in more than 100 countries, WMF's highly skilled experts have applied proven and effective techniques to the preservation of important architectural and cultural heritage sites. Through partnerships with local communities, funders, and governments, the organization inspires an enduring commitment to stewardship for future generations. WMF projects span the history of human civilization, from the earliest known cultures to the recent past.

Key Issues/Current Debates/Future Directions/Examples

WMF's Program Areas

The organization's work encompasses five core program areas.

Cultural Legacy: WMF has a long history of protecting monuments that represent a cultural era or a particular period of artistic expression, such as the moai of Easter Island (Charola 1994); sites in Venice, Italy (Kaley 1980); the Taj Mahal, in Agra, India; or the Qianlong Garden, in Beijing's fabled Forbidden City. These are sites of universal importance, for which the organization raises funds, brings together support, and works toward long-term, sustainable preservation. WMF's conservation work in the Qianlong Garden is undertaken in full cooperation with the Palace Museum. The project is notable not only for the fine craftsmanship of the conservators, but the program has resulted in a great flowering of opportunities strengthening the ability of conservation in the Qianlong Garden to serve as a springboard for international exchange of ideas through colloquia; specialized conservation training for specific materials; publications; and the development of an exhibition, *The Emperor's Private Paradise*, which allowed the public to understand the context of the objects created for this extraordinary imperial retreat (Berliner 2010).

Capacity Building: In addition to working on physical restoration, WMF helps local communities build the governmental, financial, and technical infrastructures needed to preserve and sustain their heritage. One of WMF's most successful capacity-building programs is at the vast temple complex of Angkor, in Cambodia, where the organization has been working for 20 years. Conservation and capacity building activities have resulted in several important publications. Most notably a monograph on Preah Khan Monastic Complex (see Coe & Stubbs 2011). For Phnom Bakheng, the oldest temple at Angkor, publications have resulted that provide site management plans, environment surveys, and artistic and historical interpretations (Chermayeff et al. 2006). Another capacity-building program is its Iraq's Cultural heritage Program, which has the aim to assist the State Board of Antiquities and Heritage in rebuilding its capacities as steward of Iraq's rich archaeological and historic heritage. This program has included several courses on site documentation, condition assessment, and site management planning organized with the Getty Conservation Institute, and continues today with the development of a web-GIS of Iraq's known cultural heritage sites (Palumbo et al. 2009). In Central and South America, WMF has promoted various capacity-building programs, centered on national conservation policies (Horton et al. 2010) or specific groups of monuments (Charola & Magadán 2009).

Advocacy: Through its advocacy programs, WMF speaks out in support of architectural and cultural heritage around the globe (Giurescu 1989; Conference Abstracts 2002; Chusid 2011; Haney et al. 2011). Its signature advocacy tool is the World Monuments Watch, a biennial list of endangered sites. Launched in 1996, the World Monuments Watch is a powerful call to global action on behalf of sites needing immediate help. Hundreds of Watch sites have been preserved or are now out of danger. Special advocacy themes have emerged from the Watch through which WMF has focused on areas that deserve increased public attention. Modernism at Risk became the vehicle through which WMF communicated to the public the increasing alarm by many that icons of twentieth century architectural and design heritage were being lost. Sustainable Tourism is another vehicle for WMF to deliver a message emphasizing the fragility of sites and the need for sensible approaches to assist the public in enjoying a wide range of cultural sites. Too often, visitors are not provided with sufficient information to understand that there can be many historic places to visit and not only the most famous sites. Sustainable Tourism encourages greater exploration of the cultural riches to be encountered around the world and ways that the visitor experience can be improved and travelers can become engaged in the preservation process.

Education and Training: WMF takes a multilayered approach to education, promoting the exchange of information among professionals, educating the public, and training craftspeople in both lost arts and modern standards. Through site interpretation, international symposia, and field schools, such as the ones held in New Orleans in the aftermath of Hurricane Katrina, WMF helps to ensure that heritage preservation remains a vital field. WMF has provided opportunities for high school students in Newburgh, New York, to work on a historic structure through summer field schools, but the project also became a portal to learn about the history of Newburgh, a city once famed for its role in the American Revolution. WMF facilitates graduate and postgraduate research projects, which have allowed emerging preservation professionals to work on sites as varied as the landscape connecting Lednice and Valtice estates in the Czech Republic, Horace Walpole's Strawberry Hill in the UK, the Gertrude Vanderbilt Whitney Studio in New York City, and the historic urban centers and colonial churches of the Colca Valley in Peru.

Disaster Recovery: WMF's work in disaster recovery has ranged from its response to the Venice flood over 40 years ago to its recent work in Iraq and Haiti. While it cannot plan in advance for damage wrought by natural or man-made disasters, WMF is nonetheless ready to step in wherever possible, providing rapid-response experts, damage assessments, and assistance in conservation planning and implementation. Notable among WMF's projects are the complete restoration of the Abbey of San Clemente a Casauria after the 2009 earthquake in Abruzzo, Italy; a series of missions to Haiti in 2010, following the earthquake, which led to the publication on the Gingerbread Houses of Port-au-Prince to assist homeowners and policymakers in developing alternatives to demolition (Langenbach et al. 2010); and participation in the Lower Manhattan Emergency Preservation Fund after the destruction of the World Trade Center.

WMF and Archaeology

WMF's activities span the full breadth of human artistic achievement from the earliest settlements of antiquity through the twentieth century. WMF's concern is to conserve sites of cultural merit and increase public awareness of the significance of these sites that embody cultural traditions giving special character to historic places cherished by local residents and international visitors. While WMF does not have a formal program in archaeology, nor does the organization engage in active archaeological exploration, archaeological investigation can be an essential element in the conservation process. Additionally, the presentation of archaeological sites and interpretation for the public has figured prominently in many WMF projects. These activities have ranged from the implementation of complex documentation and assessment projects to the

design and installation of protective shelters, and from the development of site management plans to the creation of visitor itineraries and interpretive materials. Of special note is WMF's work at Babylon in Iraq, where WMF is working closely with the State Board of Antiquities and Heritage to complete a site management plan and conserve key architectural structures on the site. WMF is also working in Bulla Regia, Tunisia, in a complex project that involves surveys, documentation, management planning, interpretation and site presentation, conservation, and sheltering, all conducted in cooperation with the Institut National du Patrimoine of Tunisia, providing training opportunities for its staff. Documentation is an essential component of all WMF projects, which benefit from a vast array of tools and technology available in the field today.

When appropriate and feasible, 3D laser scanning has been employed as part of the documentation process at WMF project sites. At Lalibela, in Ethiopia, WMF and University of Cape Town have completed one of the largest laser scanning projects conducted on a cultural heritage site, with the resulting data now used by the architects and conservators to map conditions and develop their conservation plans. WMF has employed laser scanning at numerous sites around the world and continues to employ the technology in coordination with other documentation efforts to assure the most accurate data possible at project sites.

At the temple of Amenhotep III in Luxor, Egypt, WMF assists the mission directed by Hourig Sourouzian in an ambitious project that sees archaeological excavation and conservation proceed hand in hand to reveal and eventually reerect parts of the largest Egyptian temple known, including the colossi of the second and third pylons of the temple.

Conclusions

WMF is committed to disseminating information to professional colleagues and the interested public. WMF staff members and consultants regularly present information on projects at professional workshops, conferences, and colloquia. All WMF's publications have been digitized and made freely available on its website, www.wmf.org. Further, information on more than 300 projects and all past World Monuments Watch sites can be found on www.wmf.org.

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- ▶ Conservation and Management of Archaeological Sites
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- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
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World-Systems Analysis

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Introduction

From its beginnings, archaeology has discussed the pervasive role of regional and interregional interaction in accounting for local records of prehistoric society. Because field archaeologists are generally confined to local excavation sites, their various understandings of the nature of such supra-local connections and influences have been contested and often speculative. Postulations of migration, diffusion, and long-distance exchange as explanations of widespread similarities in the material record have thus generated voluminous debate. Concepts such as "interaction spheres" have been resorted to as a way of acknowledging extensive areas united by exchange in prehistory but often without suggesting a specific sociocultural or institutional framework that may have generated this exchange and without identifying its consequences for the populations involved. The recognition that much prehistoric social organization was regional or even interregional in scope has prompted archaeologists to turn to social sciences such as sociology, anthropology, political science, and economic history for models of long-distance societal interaction. Following Wallerstein's (1974) proposal for a "world-system" analysis of sixteenth-century exchange in early capitalist Europe, several researchers from different disciplines have suggested that a similar model should be used to interpret archaeological indications of long-distance exchange in precapitalist societies. Wallerstein's and other such early "global" models (e.g., Ekholm & Friedman 1979) emerged from a yet earlier "dependency theory" originally articulated by Andre Gunder Frank to account for the polarization of developed and "underdeveloped" nations in the modern world. Much of the discussion regarding the use of world-system analysis in archaeology has thus predictably concerned the extent to which assumptions about social processes in the modern world can be applied to prehistoric societies.

Definition

The central argument of the world-systems approach is that the specific trajectories of local, territorially bounded, or culturally homogeneous societies will largely be the result of much wider and less easily mapped fields of interaction. In Wallerstein's (1974) study, the economic development of individual nations in sixteenth-century Europe is explained in terms of an international division of labor within and beyond Europe. For Wallerstein, this sixteenth-century world-system comprised a "core," a "periphery," and an intermediate buffer zone or "semi-periphery." The core is the main locus of capital accumulation, based on an "unequal exchange" of its manufactured products for raw materials from its impoverished periphery. This model clearly draws on Frank's use of the concepts of "metropole" and "satellite" in dependency theory. Wallerstein emphasized the trade in bulk goods such as food and fuel (with

low value-to-weight ratio) in generating core-periphery polarities and suggested that trade-in "preciosities" (prestige goods or luxuries) would not in itself have such systemic effects. For this and other reasons, Wallerstein has discouraged the application of world-system models to precapitalist contexts, except when dealing with politically unified "world empires." Others, such as Schneider (1977), while seeking to promote the world-systems approach to precapitalist societies, including its emphasis on regional inequalities, argue that precapitalist "world economies" were often based precisely on the exchange of preciosities.

The exchange of exotic prestige goods controlled by social elites is indeed a familiar theme in archaeological research and often appears to be geared to regional asymmetries. Several edited collections (Rowlands et al. 1987; Champion 1989; Chase-Dunn & Hall 1991) focus on relations between "centers" and "peripheries" in ancient societies, discussing the extent to which economic, political, or cultural asymmetries can be detected in the archaeological record. Chase-Dunn and Hall distinguish between core-periphery "differentiation" and core-periphery "hierarchy," observing that not all seemingly asymmetric relations in precapitalist world-systems entail exploitation or political domination. They also propose that a world-system perspective can be applied to different kinds of supra-local interaction networks with different geographical extent, ranging from far-reaching exchanges of information and prestige goods through a more restricted zone of regular military interaction to a spatially even more circumscribed domain of bulk-goods exchange. The boundaries of such networks are conceptualized as thresholds, where the density of interactions sharply decreases. Such a wider definition of "world-systems" would accommodate a variety of modes of long-distance interaction in prehistory, and several prominent archaeologists have adopted the term in their analyses of such interaction, both in the ancient Old World and in the pre-Columbian New World. Edited collections have appeared which discuss the relations between the "world-system" terminology and similar concepts such as "civilizations" (Sanderson 1995) and "interregional interaction" (Schortman & Urban 1992). The objection has been raised, however, that a looser, more inclusive definition of "world-system" risks making the category amorphous and analytically useless.

Key Issues

The usefulness of applying the concept of "world-system" to non-capitalist societies has been the subject of much discussion. For several of its advocates, a criterion by which a "world-system" can be identified is the occurrence of correlations between cycles of growth and decline in widely separate areas. Frank thus based his proposal of a singular Bronze Age world system spanning much of Afro-Eurasia on what he and Gills perceived as largely calibrated cycles of expansion and contraction in different parts of the Old World between 1700 BCE and CE 1700 (cf. Frank & Gills 1993). Although the details of this argument have been contested, there appears to be some agreement that several early Old World civilizations were to some extent interconnected and their trajectories sometimes calibrated (cf. Chase-Dunn & Hall 1997; Hornborg & Crumley 2007).

Several archaeologists have proposed significant modifications of the Wallersteinian "world-system" concept in order to make it applicable to prehistoric societies. Most of the advantages and problems of applying world-system analysis to archaeology are addressed in a collection edited by Kardulias (1999). Particularly problematic are questions regarding how world-systems are to be delineated in geographical space and whether long-distance interdependencies also imply interregional inequalities, hegemony, and underdevelopment. The inclusion of prestige-goods exchange networks in the category "world-systems" suggests that, in these systems, interregional polarizations of power, while often manifest, are not immediately implied by the nature of the interaction itself. Other regularities, such as the tendency of new centers of

accumulation to develop on the frontiers or margins of earlier systems, contributing to their decline, appear to recur in both modern and premodern contexts. A fundamental constraint of most world-systems is the tendency of a core's capacity to control its hinterland to diminish with distance. Much as von Thünen showed already in 1826, for instance, the reason why prestige-goods exchange reaches farther than bulk-goods exchange in traditional societies is a matter of logistics and transport costs. Such dynamics have undoubtedly limited the interregional exercise of power, particularly in premodern settings (cf. Stein 1999). With various modifications and criticisms taken into account, the world-systems approach nevertheless continues to generate important transdisciplinary discussions on the prospects of writing world history over the very long term (cf. Denemark et al. 2000).

Current Debates

In recent years, the world-systems perspective has been criticized for reproducing a Eurocentric perception of people in the "periphery" as passive victims of expansion rather than as active agents negotiating their relation to the "core" in their own terms (cf. Stein 2002). While it is certainly justified to acknowledge the agency of the periphery in contributing to the particularities of core-periphery relations, it would be unfortunate if such a concession to "bottom-up" perspectives should obscure the historical incentives of colonial and imperial power centers. The world-system perspective is fundamentally materialist in that central concepts such as "unequal exchange" and "exploitation" are understood as objective, material phenomena. To be sure, cultural processes of ethnogenesis and identity formation in world-systems are as important and worthy of study as their material metabolism, but the inequalities which polarize "cores" and "peripheries" cannot be reduced entirely to cultural or ideological constructions. The world-system approach as developed by Frank and Wallerstein is ultimately concerned with the structures of long-distance exchange which contribute to capital accumulation in the core and impoverishment in the periphery. If this model is to maintain its relevance in both modern and premodern contexts, the sense in which exchange is "unequal," "asymmetric," and "exploitative" needs to be specified. Otherwise, the model will be reducible to a tautological definition of "core" as the locus of accumulation and "accumulation" as what occurs in the core. In the modern world economy, the exchange of manufactures from the core for raw materials from the periphery implies a recursive, net transfer of productive potential (negative entropy) from the periphery and a continuous gain in purchasing power in the core. Thus defined, unequal exchange is a process of social reproduction that systematically reinforces capital accumulation in the core and relative impoverishment in the periphery. Although similar structures of exchange may have characterized a number of premodern world-systems, this should be investigated empirically for each case. There are obviously many cases where no such systematic exchange of manufactures for raw materials can be identified.

Against this background, the most urgent challenge for world-systems research is to develop analytically rigorous definitions of the processes of "capital accumulation" and "unequal exchange," which are so frequently referred to but remain conspicuously undertheorized in the world-system literature. Wallerstein's explicit references to Arghiri Emmanuel's calculations of the unequal exchange of embodied labor time suggest that labor is the metric he would resort to in a definition, but this basically Marxian framework needs to be complemented with calculations of the unequal exchange of embodied natural space, i.e., land. Although generally more or less impossible to estimate in prehistoric contexts, the flows of labor time and natural space embodied in goods and services can occasionally be reconstructed from historical and archaeological data on the metabolism of empires such as

Rome or the Inca. In widening the concept of "world-system" to accommodate premodern societies, it will thus be necessary to also widen the concepts of "unequal exchange" and "capital accumulation." If the monumental architecture of imperial Rome and the agricultural terraces of the Inca can be recognized as "capital" that was as productive in their respective contexts as were textile factories in nineteenth-century Britain, it should be relevant to approximately estimate the net quantities of labor time and natural resources that were invested in their production. Such calculations would make it reasonable to posit the occurrence of "unequal exchange" and "capital accumulation" in ancient world-systems.

While perhaps feasible in the case of modern world economies and some premodern world empires, calculations of the unequal exchange of embodied labor and land would be unlikely to illuminate core-periphery asymmetries in prestige-good systems, where elites exchange exotic products that are strategically used to mobilize their local followers. An alternative approach would be to estimate discrepancies between the "catalytic" potential of different prestige goods circulated in such separate but interacting local economies, measured in terms of the labor time that they are able to mobilize, relative to the input of labor time invested in their production and transport. Such discrepancies, when related to the rates at which the different kinds of prestige goods are exchanged, should increase our understanding of the systemic logic of core-periphery asymmetries in premodern societies.

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Worsaae, Jens Jacob Asmussen

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Basic Biographical Information

Jens Jacob Asmussen Worsaae (1821–1885) (Fig. 1) was a Danish archaeologist and museum director, who created the basis for the development of prehistoric archaeology as a scientific discipline in the mid-nineteenth century. He was born in Vejle, Jutland, as son of the County Steward. In 1836 he came to Copenhagen and worked until 1843 as a volunteer at the Royal Museum for Nordic Antiquities under the leadership of Christian Jürgensen Thomsen. He studied law and theology at the University of Copenhagen but did not graduate. Instead he became occupied with archaeology and in 1843 came under the patronage of the Danish king Christian VIII, who urged him to write a survey of Danish prehistory. The King also contributed financially to Worsaae's travels and studies in Norway, Sweden, and Germany (1842–1845) and in the British Isles (1846–1847). In 1847 he was appointed Inspector for the Conservation of Antiquarian Monuments. He obtained the title of professor in 1855 and was the first to give lectures on prehistoric archaeology at the University of Copenhagen. In 1858 he became Inspector, from 1865 Director, of The Danish Royal Collections at Rosenborg Castle. Also in 1865, after the death of C.J. Thomsen, he became Director of the Royal Museum for Nordic Antiquities, and in 1866 Director of the Ethnographic Museum, while still being Inspector for the Conservation of Antiquarian Monuments. From 1874 to 1875, he was briefly Minister for Education and Ecclesiastical

Worsaae, Jens Jacob Asmussen, Fig. 1 J.J.A. Worsaae (1821–1885) (After a drawing by August Jerndorff)

Affairs. Worsaae became a member of the Royal Danish Academy of Sciences and Letters in 1852, and he was in 1865 elected vice-president of the Royal Society of Northern Antiquaries.

Major Accomplishments

Worsaae developed early an interest in archaeology and began collecting antiquities as a schoolboy. As a young student he undertook archaeological excavations and published the results in *Antikvariske Annaler* 1838–1839 and 1840–1841. Still during his early career, he was engaged in disputes with established scholars, opposing their misinterpretations of archaeological finds as evidence of historical myths. Worsaae based his research on the work by C.J. Thomsen, who introduced the Three-Age System, dividing the time before the beginning of history in a Stone Age, a Bronze Age, and an Iron Age. He dissociated himself from the traditional antiquarian practice of collecting, emphasizing the importance to document archaeological finds in their context as well as recording the association of archaeological finds, thus introducing modern archaeological methods. In 1843 he published a survey of Danish prehistory according to the Three-Age System and with explanation of archaeological practice: *The Primeval Antiquities of Denmark*. It attracted international attention, when translated into German (1846) and English (1849). After a journey to England, Scotland, and Ireland in 1846–1847 (Jensen 2007), Worsaae in 1851 issued a book on the remains of the Danes and Norwegians in England, Scotland, and Ireland (English edition: Worsaae 1852). He continued the work by Thomsen and succeeded in subdividing the three main periods of Danish prehistory. In 1848 he was attached to the "Lejre Commission" together with the botanist J. Steenstrup and the geologist J.G. Forchammer with the purpose of investigating the shell-mounds along the ancient coastlines. The Danish word for shell-mound, *kjøkkenmødding*, has since become a loanword in many languages. Inspecting the shell-mound at Mejlgaard in Jutland in 1851, Worsaae found simple stone artifacts different from those found in megalithic tombs. He concluded that they were older than the Neolithic and thus suggested a division of the Stone Age into an earlier and later period. Worsaae also divided the Bronze Age in an early period with inhumation and a late period with cremation burials, a division supported by stratigraphic observations during the excavations of grave mounds. His datings of the finds became known, when he published an illustrated catalogue of prehistoric artifacts in chronological order in 1854, with an updated edition in 1859 (English edition: Worsaae 1882). In 1865 he divided the Iron Age in three periods. The first one contained weapons found in bogs, like the finds from Torsbjerg in Schleswig, which he interpreted as weapon sacrifices. To the second period of the Iron Age, he referred the gold finds of the Migration Period and to the third objects from the Viking Age. He also interpreted male or female equipment from the Bronze Age such as weapons or ornaments found in bogs as votive depositions. The work by Worsaae was not only fundamental to Danish archaeology but had an impact on the development of archaeological method in general, especially in Scandinavia. Outside Scandinavia the Three-Age System became gradually accepted towards the end of the nineteenth century.

As Inspector for the Conservation of Antiquarian Monuments, Worsaae was assigned by the Danish King Frederik VII to conduct the excavations of the royal grave mounds at Jelling in 1861. His main accomplishment as responsible for the ancient monuments, however, was the implementation of a national survey. In 1873, on Worsaae's application, the Danish parliament gave an annual appropriation for a systematic inspection and documentation of prehistoric monuments in Denmark. It was carried on until 1932 by the National Museum, and the resulting register has formed the basis for later heritage administration as well as for research in ancient monuments in the country ever since.

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Wreck Site Formation Processes

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Introduction

All terrestrial archaeological sites are, by definition, places where human agency has modified a natural environment by rearrangement (digging, building, removing, or bringing in material) and by the processes of life and death (food production, processing, and consumption; waste disposal; making, using, and disposing of artifacts; acquiring goods from elsewhere; cultural and belief-related activities; and burial). These transforming inputs, which directly reflect human behavior and activity, are known as *cultural formation processes* or C-transforms. The environment is also constantly modified by *natural formation processes* or N-transforms. These may be cataclysmic and terminal, such as sudden burial in volcanic ash. More usually they are gradual and progressive and include the natural processes of decay and erosion, the

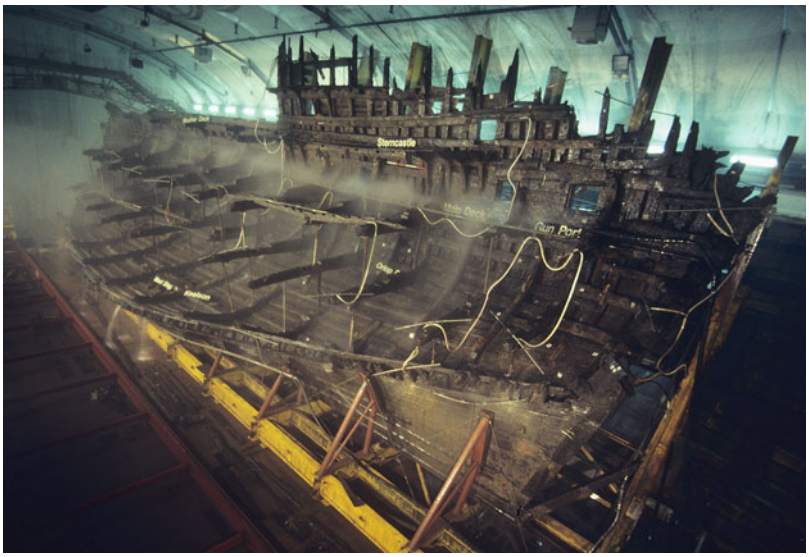

Wreck Site Formation Processes, Fig. 1 *Mary Rose* – a partially intact wreck (Colin Martin)

deposition or removal of soil, the buildup of vegetation, fire, and the activities of burrowing animals.

Definition

These transforms induce changes whereby a once-functioning focus of organized human activity metamorphoses into the archaeological signatures encountered today. If the processes which brought about the changes are understood, it is possible, in theory at least, to work backwards from the observed remains and their associations to establish an understanding of the site when it was a functioning entity. Although this ideal is rarely achieved in totality, the study of a site's formation processes – how it reached the state it is in today – is the key to interpreting archaeological features of every kind (Schiffer 1987; Renfrew & Bahn 1991: 44-47).

Key Issues/Current Debates/Future Directions/Examples

Shipwrecks

Cataclysmic events which bury a site quickly, such as the entombment of Pompeii or the engulfment by sand drifts of the Neolithic village at Skara Brae in Orkney, are often the easiest formation processes to interpret, since they seal the archaeology in a tight context at a single moment, and limit subsequent re-ordering and decay. A shipwreck too is a cataclysmic deposition, but the factors which affect its formation as an archaeological site differ in several important respects from a site created by a terrestrial disaster.

In the first place a ship is a highly organized and completely mobile entity, so the location of its wreck is usually fortuitous. From the time its keel is laid, and especially from the start of its final voyage, its ultimate fate is conditioned by C-transformation factors – how it was designed and built, how it was operated and managed, and particularly how attempts were made to avoid or mitigate the wrecking when the final disaster loomed. All these factors are the products of human input and behavior, but they are affected and modified by N-transforms, particularly the weather, currents, and the location of hazards such as lee shores or reefs.

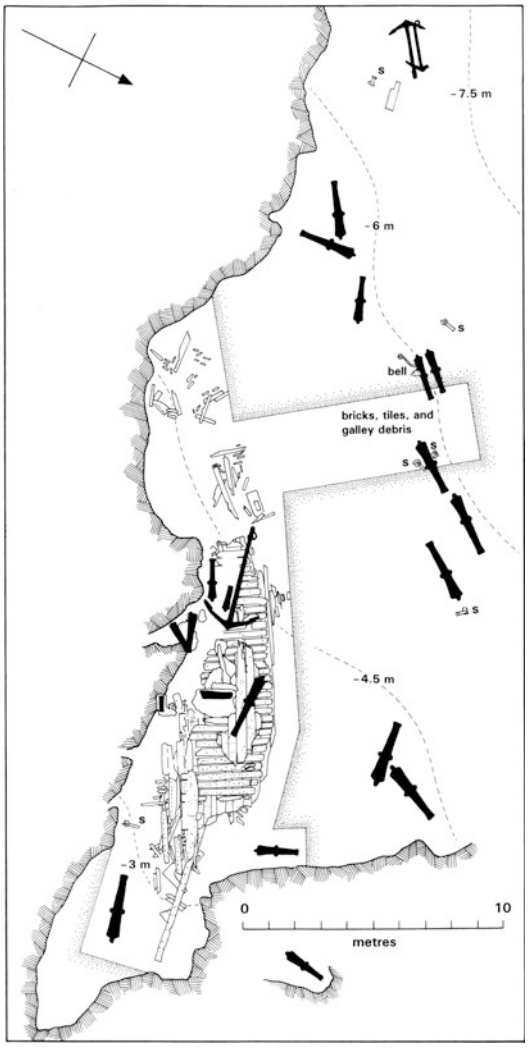

Wreck Site Formation Processes, Fig. 2 The *Dartmouth* (1690) – a continuous wreck site with discernible patterning (Colin Martin)

A wrecking event can be characterized as the moment at which the organized entity represented by a vessel's structure, contents, and crew, together with its systems of propulsion, control, and management, begins an irreversible process of change in which it leaves the world of

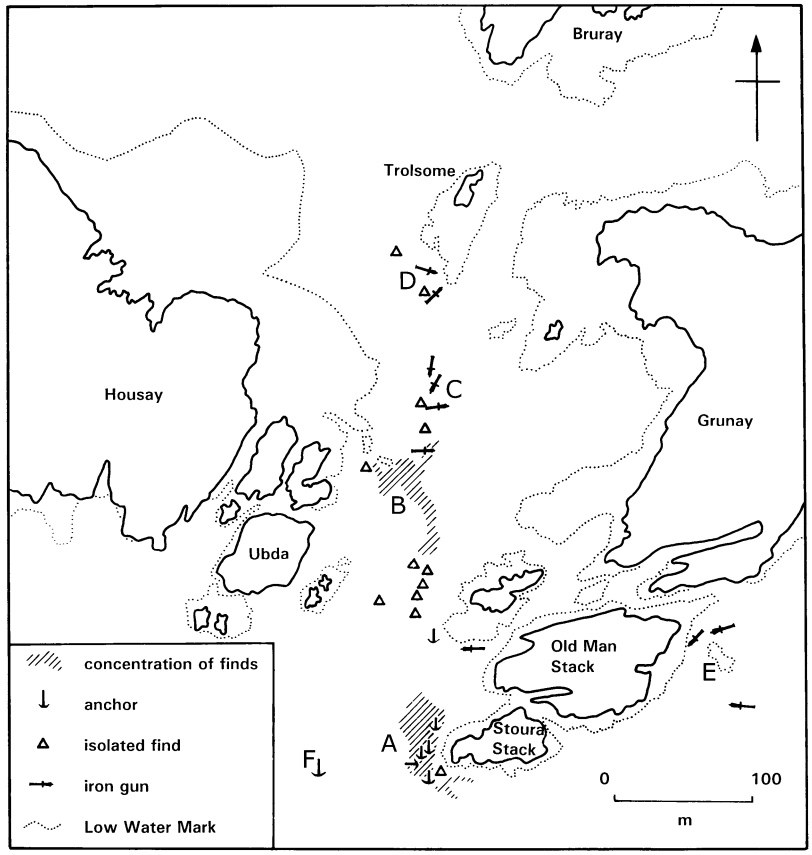

Wreck Site Formation Processes, Fig. 3 The *Kennemerland* (1664) – a discontinuous wreck with little discernible patterning (Colin Martin, adapted from Muckelroy 1978: 173)

human artifice (the C-world) and reverts to nature (the N-world). This transformation is often extremely dynamic, as when a ship strikes a reef in heavy seas and disintegrates in seconds. But it may, as in the case of a hull that settles into a benign environment of soft sediments, be a gentle and gradual process. In both cases, however, the wreck will represent a massive environmental anomaly which is unstable, lacks integration with its surroundings, and is prone to further disintegration, decay, and dispersal by N-transforms. These may extract some material. Buoyant items, unless trapped, will simply float away, while other losses will accrue more slowly to abrasion, corrosion, and biological attack. Much of the surviving material will be redistributed by tides, surges, currents, and wave action that may result in the breakup of structures and the transport elsewhere of their fabric and contents. These effects are influenced by the topography, geology, and sediment regimes of the sea bed on which the wreck lies.

Once the dynamic phase of a wreck's integration with the sea bed is complete, a static or stabilized state will normally follow as the remains settle into a state of balance with their environment. This can happen quickly and perhaps with little change to the ship's original form, as when a vessel sinks into and is encapsulated in semifluid mud. On the other hand, the dynamic phase may be short-lived but so violent that much of the vessel's substance and most of its coherence is lost by the time stability is achieved. Such a formation will almost invariably be fragmentary, jumbled, and perhaps spread over a wide area. The situation may be further complicated if the wrecked ship, or parts of it, is transported by wind or current while

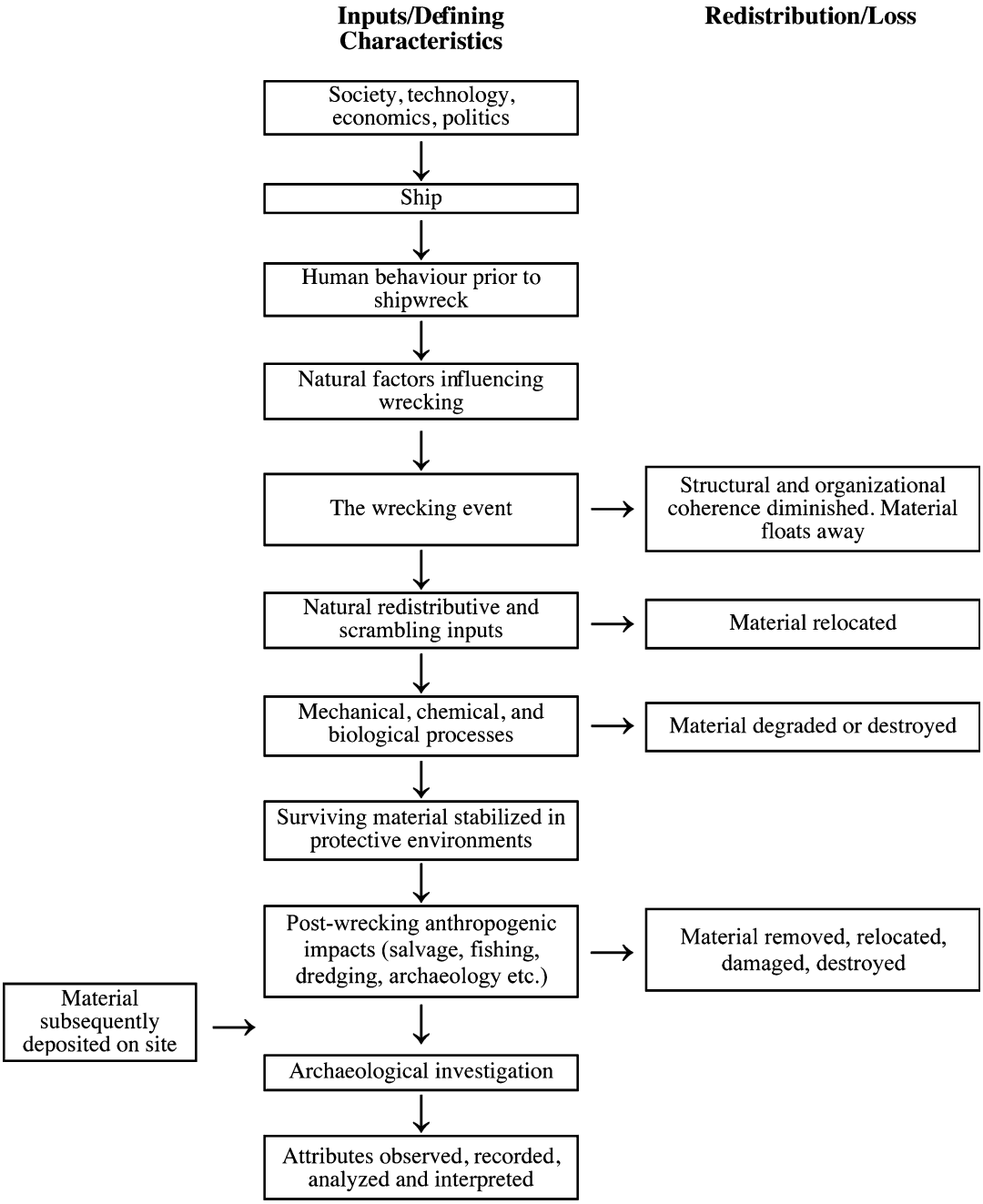

Wreck Site Formation Processes, Fig. 4 Flow diagram of wreck site formation processes (Colin Martin, adapted from Muckelroy 1978: 158)

breaking up. This can create a linear scatter of objects and sub-formations, each perhaps further dispersed by secondary actions, spread along the axis of the wreck's trail of destruction.

The circumstances of a shipwreck and the attendant environmental inputs determine its eventual characteristics as an archaeological site formation. At one end of the scale, a vessel may

survive almost intact, with its contents more or less complete and in situ, as, for example, the *Mary Rose*, which sank near Portsmouth, England, during an engagement with the French in 1545. At the other extreme a ship may be so broken up and dispersed, and its component parts so reduced by mechanical, chemical, and biological degradation, that it effectively ceases to exist (Figs. 1–4).

No two wreck formations are the same, since the complex and interacting variables that constitute the environmental setting, the nature of the ship, and the circumstances of its loss will combine to create a set of attributes unique to each site. Levels of archaeological survival can therefore range from almost intact to virtually extinct. Most wrecks, however, lie between these two extremes and may be categorized either as "continuous" (sufficiently coherent to allow a degree of reconstruction to be attempted) or "discontinuous" (too scrambled for meaningful conclusions to be drawn) (Muckelroy 1978: 182-214). But a fuller understanding of formation processes will reduce the size of the latter category, for there is an ultimate logic to the dispersal patterns of every wreck.

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Wu, Rukang

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Basic Biographical Information

Born in Wujin County, Changzhou Municipality, Jiangsu Province, eastern China, Rukang Wu (also known as Woo Ju-Kang before 1967) received a B.A. from the National Central University (then at Chongqing) in 1940. After graduation, he worked with Dingliang Wu (1894–1969) (also known as Woo Ting-Lian before 1967) in the section of Anthropology of the National Research Institute of History and Philology, Academia Sinica (then at Kunming, Yunnan Province), where they conducted studies on extant human skeleton and a number of field survey on different ethnic groups in Guizhou Province. In 1941, he published his first scientific article in a journal of Academia Sinica, the study of axes and the atlas of modern Chinese. Near the end of 1946, Rukang Wu left for the United States where he earned a doctoral degree under the supervision of Mildred Trotter at the Washington University Medical School in St. Louis, Missouri. He spent the summer of 1948 studying paleoanthropology under the direction of T. Dale Stewart at the National Museum of Natural History, Smithsonian Institution, Washington, DC. In the autumn of 1949, Wu returned to China and began to work at the Dalian Medical College as the head of the Department of Anatomy. In 1956, he moved to the Laboratory of Vertebrate Paleontology (now the Institute of Vertebrate Paleontology and Paleoanthropology), Chinese Academy of Sciences, where he has made the first study of nearly all human fossils found in China between 1949 and 1966.

Major Accomplishments

During Rukang Wu's tenure at the Institute of Vertebrate Paleontology and Paleoanthropology, he studied human fossils of Middle Pleistocene origin, including Zhoukoudian, Maba, Chenjiawo, Gongwangling, Yunxian, Xichuan, Hexian, and Jinniushan, and of Late Pleistocene origin, including Ziyang, Dingcun, Salawusu, Liujiang, and Jianping.

Rukang Wu also studied *Gigantopithecus* from Daxing and Liucheng in detail, as well as *Dryopithecus* teeth from Kaiyuan. In the late 1970s, he organized a comprehensive study of the Zhoukoudian site. The result of this work provided a series of chronometric data for the different strata of the deposits in the cave and showed that *Homo erectus* had probably occupied the site for at least 200 kiloyear.

During the 1980s, he and colleagues excavated at Shihuiba, Lufeng, Yunnan Province, and found a lot of hominoid fossils. Initially, they divided the assemblage into two genera: *Sivapithecus and Ramapithecus*. In 1987, he proposed a new genus, *Lufengpithecus*, to represent all hominoid fossils from this site. This new genus is generally accepted by the international community.

During the 1960s, Rukang Wu proposed that the unique characters of true humans are not formed altogether in a short period. Instead, these characters appeared at different times in a long transition period from ancient apes toward humans. Erect bipedal walking and the ability of manufacturing tools marked the beginning and termination of this transition period, respectively. The enlarging of the brain and the development of language and consciousness and society were forming gradually during this transition period. He introduced the term "neoanthropology" to embrace all of the subfields studying the variation and changes of physical characteristics of modern humans as a whole.

In 1982, he founded the journal, Acta Anthropologica Sinica, which is the only journal dealing with paleoanthropology and physical anthropology in China. He is a member of the Chinese Academy of Sciences and was the honorary president of the Chinese Association of Anatomical Sciences.

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Wylie, Alison

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Basic Biographical Information

Alison Wylie (Fig. 1) is an internationally known feminist philosopher of science and a leader in the philosophy of archaeology. A Canadian by birth, Wylie became acquainted with field archaeology during early childhood. Both of her parents were long-time avocational archaeologists who worked as volunteers for projects in England as well as in Canada.

Wylie received a B.A. Honours (with Distinction in Philosophy and Sociology) from Mount Allison College in 1976. As an undergraduate, she gained fieldwork experience at Fort Walsh, a nineteenth-century Northwest Mounted Police post, and the Fortress of Louisbourg. She

Wylie, Alison, Fig. 1 Alison Wylie

also took a history and philosophy of science course where she encountered the work of Merrilee Salmon and used it in a term paper on the possibility of a Kuhnian revolution in contemporary archaeology. In the fall of 1976, Wylie enrolled in the graduate program in the History and Philosophy of the Social and Behavioral Sciences at the State University of New York at Binghamton. She met and worked with several young archaeologists in the Department of Anthropology, notably Charles Redman, Margaret Conkey, and John Fritz, who were enthusiastic advocates of the New (or Processualist) Archaeology. She spent the summer of 1977 at Grasshopper, the University of Arizona's field school. Wylie completed her M. A. in Anthropology (1979) and a Ph.D. in Philosophy (1982). Her dissertation, focusing on positivism and the New Archaeology, was written under the direction of the realist philosopher Rom Haré and advised by Redman.

Wylie was hired as an Assistant Professor at the University of Western Ontario in 1985, where she was promoted to Associate Professor (1989–1993) and then Professor (1993–1998). In 1998, she moved to Washington University at St. Louis to take the position in Philosophy and the Program for Social Thought and Analysis. In 2003, she joined the faculties of the Department of Women's Studies at Columbia University and the Department of Philosophy at Barnard College. She is curre ntly Professor of Philosophy at the University of Washington in Seattle (2005–). She is the founder and coordinator of the Science Studies Network at the University of Washington and director of Biological Futures in a Globalized World, a project designed to foster the development of an integrated research ethics curriculum. She has held numerous visiting appointments including those at the Center for Advanced Study in the Behavioral Sciences (1995–1996) and the Clayman Institute for Gender Research (2005–2006) at Stanford; the University of Denver (1995); the University of California, Berkeley (1990–1992), Columbia University, and New York University (2001–2002); the École des hautes études en sciences sociales in Paris (2003), Reading University (2010), and Durham University (2012–2013).

Major Accomplishments

Wylie's primary research focus in archaeology is on archaeological inference; that is, how archaeologists derive interpretations of past times and places from limited knowledge of an intrinsically highly incomplete body of evidence – the archaeological record – and how they support their claims to knowledge of those times and places. One of Wylie's earliest contributions was her essay in Ian Hodder's book *Symbolic and Structural Archaeology* (Wylie 1982a), which provided epistemological support for structural archaeology. She showed that the most promising of the new structural perspectives exploited methodological approaches that were scientific and testable.

Wylie has made major contributions to the application of analogical reasoning in archaeology. She intervened in the debate between Patty Jo Watson and Richard Gould concluding that Gould's arguments against analogy were themselves analogical (Wylie 1982b). She reviewed the arguments against analogy offered by some New Archaeologists concluding that analogy is not categorically flawed, but it can be misused (Wylie 1985, 1988). The key is to work on both the source side and subject side of the

analogy in order to secure it more strongly. She has also proposed an influential model of interpretation that involves a dialectical tacking between experience-near concepts and experience-distant concepts (Wylie 1989). This latter model was inspired by Clifford Geertz and his interpretive anthropology.

Wylie was an early exponent of the archaeology of gender. She participated in the famous conference organized by Joan Gero and Margaret Conkey at the University of South Carolina's Wedge Plantation. Her contribution was to review the delay of an archaeology of gender (given its significance in the other social sciences) and evaluate its prospects for the future (Wylie 1991). She concluded that archaeology can benefit from the established traditions of gender research and that gender studies can benefit from archaeology because only archaeology can begin to answer questions about long-term evolution and diversity of the sex/gender system. She followed this with a series of influential publications arguing that feminist approaches, among other critical perspectives, may well enhance the conceptual integrity and empirical adequacy of archaeological knowledge claims (e.g., Wylie 1992).

Wylie has also interrogated the idea of objectivity in science and its implications for both feminism and feminist archaeology. She argues that the thesis that theories are culturally constructed does not necessarily entail epistemic relativism, where anything goes. Rather, she advocates a perspective she calls "mitigated objectivity." In this case, multiple lines of evidence drawn from the natural and social sciences are mutually constrained when they converge, or alternatively fail to converge, upon a particular interpretive account (Wylie 2000). This perspective is broadly consistent with standpoint theory in feminist science. Knowledge is understood to be situated with respect to particular experiences and social values. Wylie (2003: 40) explains that the question of what standpoints make a difference cannot be settled in the abstract, but instead requires an investigation of problem-specific practices of knowledge production.

She is equally concerned with the sociopolitical contexts of archaeology as a discipline and of individual archaeologists working in diverse economic, political, and social settings internationally. She is frequently consulted on ethical issues in contemporary archaeology (Lynott & Wylie 2000; Wylie 2003). Her recent book, *Thinking from Things* (Wylie 2002), is a set of essays describing and discussing her philosophical engagement with archaeological theory and practice from the 1970s to the 2000s, a period of great change for global archaeology. Hence, it is a significant contribution to the intellectual history of archaeology in the late twentieth century.

During the past 30 years, several philosophers of science have displayed passing interest in archaeology, but Alison Wylie is the only one with substantial experience not only in field archaeology but also in writing archaeological reports. She is familiar with documentation of archaeological finds during excavation and with the inferential processes employed by archaeologists as they describe, analyze, and interpret their finds. She is widely known because of her publications in archaeological journals and her vigorous participation in professional gatherings of archaeologists. Her publications provide well-informed analyses of archaeological procedures in the field, in the lab, and in the ensuing reports by a long-term participant observer who is a professional philosopher of science. She is often asked to serve as consultant to archaeological projects and to help form policy for archaeological groups in various parts of the world. For all these reasons, Wylie occupies a well-deserved position as intellectual guide and counselor to the global archaeological community.

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Xiaochangliang: Geography and Culture

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Introduction

The Nihewan Basin, located in the valley formed by Sanggan River and its tributary, the Huliu River, which covers an area of about 9,000 km^2 with an average elevation of 1,000 m, in northwest Hebei province and northern Shanxi province, 50 km west of Beijing, is a key region for studying Chinese or even global Quaternary geology, paleontology, and Paleolithic archaeology. Research in the Nihewan Basin can be traced back to the 1920s, when French scholars E. Licent and P. Teilhard de Chardin and others found and studied mammalian fossils contained in Late Cenozoic fluvio-lacustrine strata near Nihewan village, which eventually corresponded to the Villafranchian fauna in Europe (Barbour et al. 1927). The lacustrine sediments in the ancient Nihewan lake basin were called the "Nihewan Formation" (Barbour 1924). In 1960s (Gai & Wei, 1974) and 1970s (Jia & Wei 1976), the Hutouliang and Xujiayao sites were discovered. Paleolithic archaeology then became an important part of research here. In 1978, with the discovery of Xiaochanglaing (You et al. 1979), scholars began to study the Lower Paleolithic. This was the first time that Lower Paleolithic archaeology was studied systematically in the area, although the age of Xiaochangliang was controversial at that time. At present the Lower Paleolithic sites in the Nihewan Basin are known as one of the richest areas in North China, or even all of China. Over 20 Lower Paleolithic sites have been discovered, including 14 Early Pleistocene ones. They are located in the eastern part of the Nihewan Basin, around the Donggutuo Village and Cengjiawan Platform (Fig. 1).

Definition

The Xiaochangliang site (40°13′10″N, 114°3′944″E, altitude 916.52 m), whose name has been carved on the first bronze broad at China Millennium Monument's historical corridor in Beijing, is one of the most extensively excavated and prolific sites yet studied in the Nihewan Basin. It is located on the edge of

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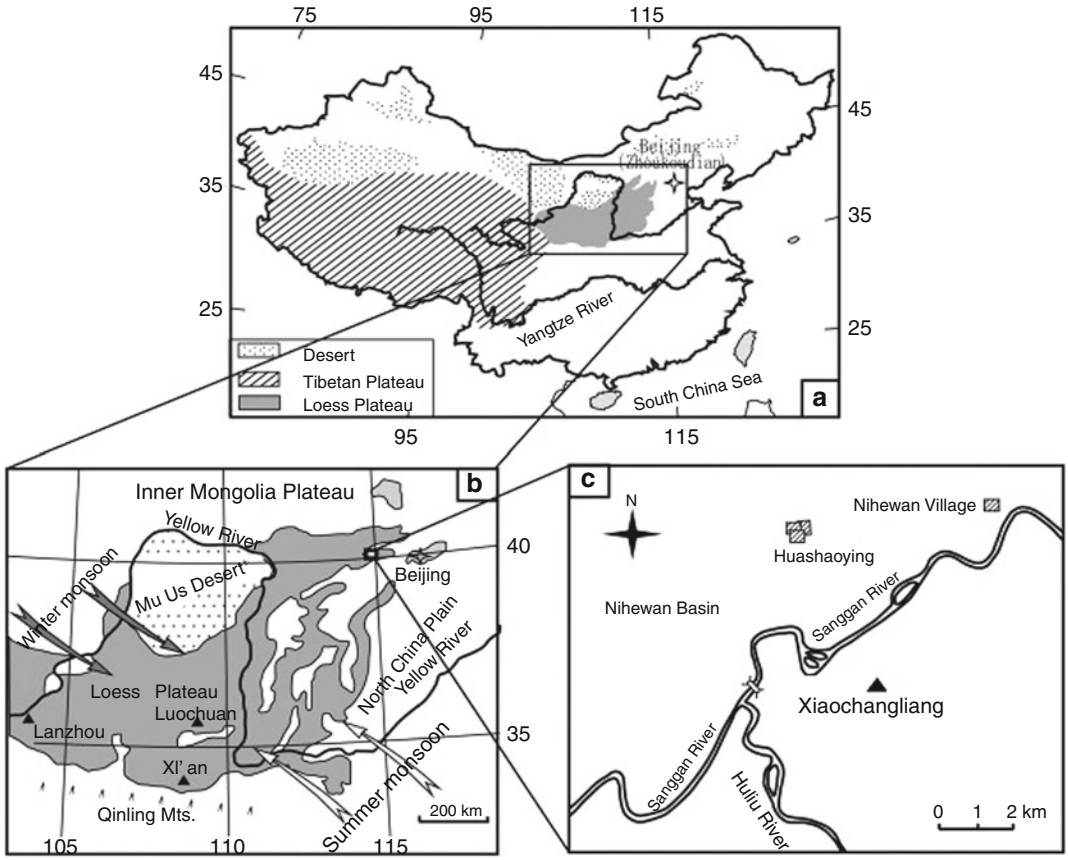

Xiaochangliang: Geography and Culture, Fig. 1 A map showing the position of the Xiaochangliang site (After Ao et al. 2010)

Cenjiawan platform of the Nihewan cliff, Yangyuan, Hebei province. It was found by You Yuzhu, Tang Yingjun, and Li Yi, members of the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) in 1978. By now the site has been excavated several times, and the area has been excavated about 200 m^2.

The Xiaochangliang strata, belonging to the Nihewan Formation, are normal faults located at the boot wall of a Brown fault. The section of the strata is as follows:

(1) Light-brown, silty, loosen loess. Thickness (Th.) 12.07 m
(2) Light-red, loess with calcium tuberculosis, gradual transition from the underlying strata. Th.1.83 m
(3) Gray-green, clayey silt with calcium TB. Th. 0.70 m
(4) Brown-yellow, slightly viscous, silty sand, with calcium tuberculosis, gradual transition from the underlying strata. Th.1.16 m
(5) Gray, viscous, clayey silt. Th. 0.92 m
(6) Gray, calcareous cement layer and with 8-cm-thick gray silt. Th. 0.21 m
(7) Gray, silt and clay. Th. 0.59 m
(8) Brown-yellow silt, with thin bedding. Th. 0.95 m
(9) Light-red, clayey silt. Th. 1.14 m
(10) Brown-yellow, silty sand. Th. 1.38 m
(11) Gray-green, sandy silt. Th. 1.01 m
(12) Sallow, silty sand. Th. 0.49 m

(13) Sienna brown, clayey silt, with calcium TB. Th.1.84 m
(14) Brown-yellow, fine sand. Th. 0.18 m
(15) Brown-red, clayey silt. Th. 0.21 m
(16) Brown-yellow, silt. Th. 0.40 m
(17) Brown-red, clayey silt. Th. 0.68 m
(18) Yellow-green, clayey silt. Th. 0.49 m
(19) Brown-red, silt, the bottom 30-cm-thick gravel layer. Th. 2.47 m
(20) Gray, silty sand, with small gravel and fine gravel. Th. 2.42 m
(21) Maliang (site name, about 0.78 Ma) layer, brown-yellow, fine sand, the lower part of the gray-green or light-gray silt layer of calcium TB. Th. 0.78 m
(22) (22)TBS layer, thick layer of brown sand. Th. 19.13 m
(23) Yellow-green, sandy silt. Th. 2.03 m
(24) Light-red, clayey silt. Th. 2.80 m
(25) Gray, clayey silt. Th. 0.50 m
(26) Light-red, sandy silt. Th. 0.40 m
(27) Yellow-green, silty sand. Th. 0.45 m
(28) Brown-yellow, silty sand, below the bottom of a small gravel. Th. 0.19 m
(29) Brown-yellow, sandy silt, the upper with a yellow-green clip gravel. Th. 0.66 m
(30) Light-red, sandy silt. Th. 0.92 m
(31) Gray-green, clayey silt, similar to Donggutuo (site name, about 1.1 Ma) layer A. Th. 0.13 m
(32) Light-red, sandy silt. Th. 2.05 m
(33) Gray-green, clayey silt, with bedding. Th. 2.20 m
(34) Light-red, silty sand. Th. 0.38 m
(35) Gray-green, silty sand. Th. 0.33 m
(36) Brown-yellow, medium and fine sand. Th. 0.22 m
(37) Light-red, sandy silt. Th. 1.32 m
(38) Brown-yellow, Shanshenmiaozui (site name, about 1.33 Ma) layer, fine sand. Th. 0.09 m
(39) Brown-yellow, sandy silt. Th. 0.99 m
(40) Gray-green, silty clay, with horizontal bedding. Th. 1.29–1.86 m
(41) Xiaochangliang layer: fine gray sandy silt. Th. 0.80 m
(42) Light-red, clayey silt. Th. 0.21 m
(43) Gray, silty clay, viscous. Th. 0.58 m
(44) Brown-yellow, silty sand, with small gravel. Th. 1.37 m
(45) Brick-red, silty sand. Th. 11.15 m
(46) Gravel layer especially boulders. Th. 0.31 m
(47) Purple, volcanic breccias, bared more than 10 m

The archaeological layer of Xiaochangliang site lies approximately 70 m below the Late Pleistocene Malan loess (e.g., You et al. 1978). Vertebrate fossils and artifacts were found associated within a fine gray sandy silt layer reaching 0.80-m thickness (You et al. 1978). A small investigation in 1990 found no discernible pattern of orientation of either artifacts or fossils, and the majority of artifacts appeared in fresh condition. That means it is an *in situ* buried site.

From the perspective of the 1816 stone artifacts assemblage (Fig. 2), the overwhelming majority of the artifact assemblage consists of flakes and flake fragments, along with some cores and clearly identifiable tools (You et al. 1980; You 1983; Chen et al. 1999). There are 96 cores, 342 flakes, 35 tools, and 1,343 blocks or debris. The stone artifacts are made predominantly of volcanic breccias, including cherts, chalcedonies, and agates, and cherts are the main raw material. An abundant source of raw materials can be found from the exposed bedrock, Jurassic volcanics, sediments, and Precambrian quartzite with cherty streaks which extremely fissured, at the vicinity of the Xiaochangliang site. Hard-hammer direct percussion is the main technology used to produce flakes. Most of the tools are semifinished products, and only few are refined products including various scrapers, points, borers, small chopping tools, and burins.

Except for the lithic products, there are also many mammal fossils, including *Allophaiomys cf. A. Pliocaenicus*, *Martes sp.*, *Hyaena licenti*, *Palaeoloxodon sp.*, *Hipparion sinense*, *Equus sanmeniensis*, *Coelodonta antiquitatis*, *Cervus sp.*, *Gazella sp.*, and *Bovids*.

The age of Xiaochangliang site, according to Zhu Rixiang and other studies, is 1.36 Ma (Zhu et al. 2001).

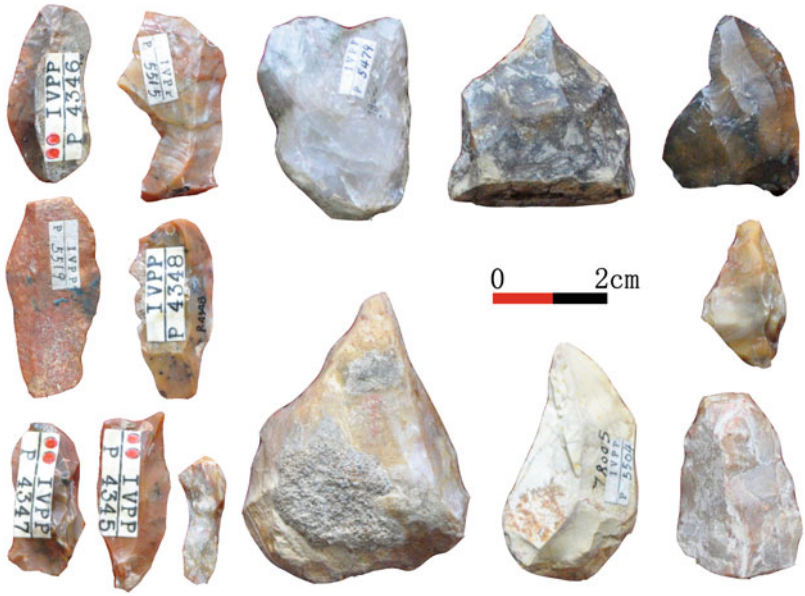

Xiaochangliang: Geography and Culture, Fig. 2 The stone artifacts from Xiaochangliang

Key Issues/Current Debates/Future Directions/Examples

The hot topics in research at the Xiaochangliang site are as follows.

First is the culture development: primitive or progressive. Some researchers consider that it is characterized by random flake knapping, lacking tool retouch, and instability of shape (Chen et al. 2002), meaning that the lithic technology is original (Schick et al. 1991), but for other researchers (Huang 1985), it has many advanced traits, for example, some smaller blades and flake fragment with faceted platform were observed, and the types of stone tools are diverse, including various scrapers, points, borers, small chopping tools, and burins.

Second is the age. Since its discovery in 1978, given its importance, the Xiaochangliang site has attracted the attention of geologists and chronologists. However, its age had long been debated because of the unavailability of an accurate chronostratigraphic framework. Age determinations by electron spin resonance, thermoluminescence, and radiometric isotopic methods could not be satisfactorily applied to these artifact-containing strata because of the absence of required materials. Paleomagnetic dating indicates that the site lies below the Jaramillo subchron (Schick & Dong 1993), placing them at or shortly before 1 Ma, while Zhu et al. (2001) report an age 1.36 Ma (between the Oldovai and Jaramillo events) for the artifact-bearing lacustrine deposits at Xiaochangliang. However, by stratigraphic correlation (Wei et al. 2011), the age of Xiaochangliang site is considered to be over 1.50 Ma.

Third is the paleoenvironment. At present, the climatic context of Xiaochangliang site is unclear, and it is not yet known whether the occupation occurred during an interglacial or glacial period. The faunal remains include *Cervus* and *Gazella*, which do not imply cold conditions. Given the evidence from Gongwangling as well as Central Asia (Wang et al. 1997), the occupation at Xiaochangliang 1.36 Ma ago was probably during a warm episode.

Cross-References

► Middle East, Central Asia, and the Indian Subcontinent: Lower Paleolithic

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X-Ray Diffraction (XRD): Applications in Archaeology

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Introduction and Definition

X-ray diffraction (XRD) is an analytical technique in which a prepared sample is bombarded with an X-ray beam at varying angles. The diffractometer measures the size of the "unit cell" – space between adjacent crystal planes – by virtue of the "d-spacing" (Fig. 1). Most archaeological samples are typically soil or sediments such as clays. Stoney materials can be analyzed and the only requirement of a material for XRD analysis is that it be crystalline. In the case of soil or sediments, the sample to be analyzed is in powder form. This allows the sample to present all of the possible crystal orientations in the minerals comprising the sample.

Key Issues/Current Debates/Future Directions/Examples

To prepare a sample, the material must be ground into a uniform consistency. This step randomizes the minerals in the sample. Samples are generally placed into an oven at a low temperature for 15–20 min to dry them out. The dry samples are then pounded with a mortar and pestle to a uniform powder. The powder is then pressed into a tablet using an aluminum disc frame, onto which 200 psi (pounds per square inch) is applied for 1 min. Pressing the powder prevents the incident X-rays from penetrating the sample too deeply, thereby creating some problems with the analysis, such as absorption, refraction, and reradiation of X-rays.

Then, samples are placed, one at a time, in the XRD diffractometer, and data are collected from 2 to 50 2θ at a step increment of 0.01 ° and scan

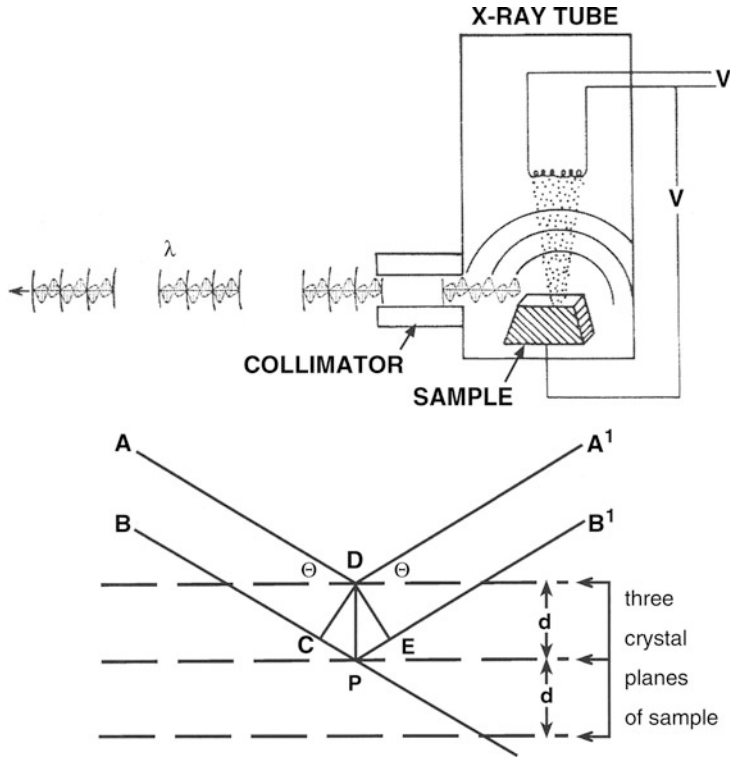

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 1 Schematic of X-ray diffraction. The diffractometer measures the "d-spacing" between the crystal planes following Bragg's Law ($n \cdot \lambda = 2 \cdot d \cdot \sin(\theta)$), where n is the integer representing the peak of interest, d is the lattice spacing of the specific crystallized mineral or element, θ is the angle between the scattered X-ray and the incident radiation, and λ is the wavelength of the incident light

speed of 0.1 s per stop. XRD data can be collected and saved using DIFFRACplus XRD Commander software by Bruker AXS, although other software is available.

Prior to interpretation, the raw diffractograms from the XRD machine have to be processed. Using the DIFFRAC*plus* EVA software by Bruker AXS, the Kα2 peaks and background noise are stripped, and the threshold sensitivity is adjusted prior to performing a peak search to identify the major peaks in the diffractogram. Any significant peaks missed by the automated peak search are manually selected and added to the diffractogram record. Finally, potential mineral matches for each peak are identified using the general search option within the EVA software. Suspected minerals not included by the automated search are checked by conducting manual EVA searches for individual minerals. Peak intensity, 2θ, and d-spacing are used to identify the most likely mineral(s) responsible for each peak. The 2θ and d-spacing of suspected mineral matches are then

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 2 Soil profiles at Whitehall Forest showing the profile of "horizon 3" paleosol as the deeper, darker brown horizon in contact with the mid-level orange-red horizon

ALLEGED PALEOSOL FINE FRACTION DATA					
Angle	d value	Intensity	Intensity %	Caption	Mineral(s)
2-Theta °	Angstrom	Count	%		
14.307	7.1829	136	100	d=7.1829	Kaolinite
10.254	10.0094	104	76.6	d=10.0094	Biotite & Muscovite
7.366	13.9248	102	74.9	d=13.9248	HIV
28.973	3.5758	90.3	66.3	d=3.5758	Kaolinite
31.061	3.3408	67.5	49.6	d=3.3408	

HORIZON 3 FINE FRACTION DATA					
Angle	d value	Intensity	Intensity %	Caption	Mineral(s)
2-Theta °	Angstrom	Count	%		
7.341	13.9727	202	100	d=13.9727	HIV
14.3	7.1865	166	81.8	d=7.1865	Kaolinite
10.262	10.0014	160	79	d=10.0014	Biotite & Muscovite
28.944	3.5793	109	53.8	d=3.5793	Kaolinite
31.174	3.329	90.3	44.6	d=3.3290	
20.714	4.9753	78.3	38.7	d=4.9753	
31.965	3.2486	77.7	38.4	d=3.2486	

ALLEGED PALEOSOL COARSE FRACTION DATA					
Angle	d value	Intensity	Intensity %	Caption	
2-Theta °	Angstrom	Count	%		
31.028	3.3442	5299	100	d=3.3442	Quartz
24.26	4.2568	996	18.8	d=4.2568	Potassium feldspar
42.695	2.4572	326	6.2	d=2.4572	
46.158	2.2818	270	5.1	d=2.2818	
49.708	2.1282	244	4.6	d=2.1282	
31.978	3.2473	223	4.2	d=3.2473	
47.145	2.2367	181	3.4	d=2.2367	
10.243	10.0204	118	2.2	d=10.0204	
32.563	3.1905	94.5	1.8	d=3.1905	
31.559	3.2893	58.3	1.1	d=3.2893	
29.754	3.484	56.8	1.1	d=3.4840	
41.031	2.5523	47	0.9	d=2.5523	
48.932	2.1598	37.4	0.7	d=2.1598	
20.632	4.995	37	0.7	d=4.9950	

HORIZON 3 COARSE FRACTION DATA					
Angle	d value	Intensity	Intensity %	Caption	
2-Theta °	Angstrom	Count	%		
31.014	3.3457	3756	100	d=3.3457	Quartz
24.245	4.2595	737	19.6	d=4.2595	Potassium feldspar
31.976	3.2476	309	8.2	d=3.2476	
42.684	2.4578	249	6.6	d=2.4578	
46.15	2.2822	215	5.7	d=2.2822	
49.71	2.1281	189	5	d=2.1281	
32.565	3.1903	150	4	d=3.1903	
10.266	9.9982	126	3.3	d=9.9982	
47.128	2.2375	116	3.1	d=2.2375	
12.184	8.4289	94.7	2.5	d=8.4289	
29.733	3.4863	56.6	1.5	d=3.4863	
33.293	3.1225	50.9	1.4	d=3.1225	
25.61	4.0358	48.9	1.3	d=4.0358	
27.456	3.7693	48.9	1.3	d=3.7693	
41.05	2.5512	47.2	1.3	d=2.5512	
48.933	2.1598	48.7	1.3	d=2.1598	

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 3 2-Theta, d-spacing, percent intensity peak data from XRD diffractograms and mineral interpretations for fine and coarse fractions of the alleged paleosol and horizon 3. Data are listed from greatest to least percent intensity and mineral interpretations are identified only for major components (>50 % intensity in the fine fraction and >10 % intensity in the coarse fraction)

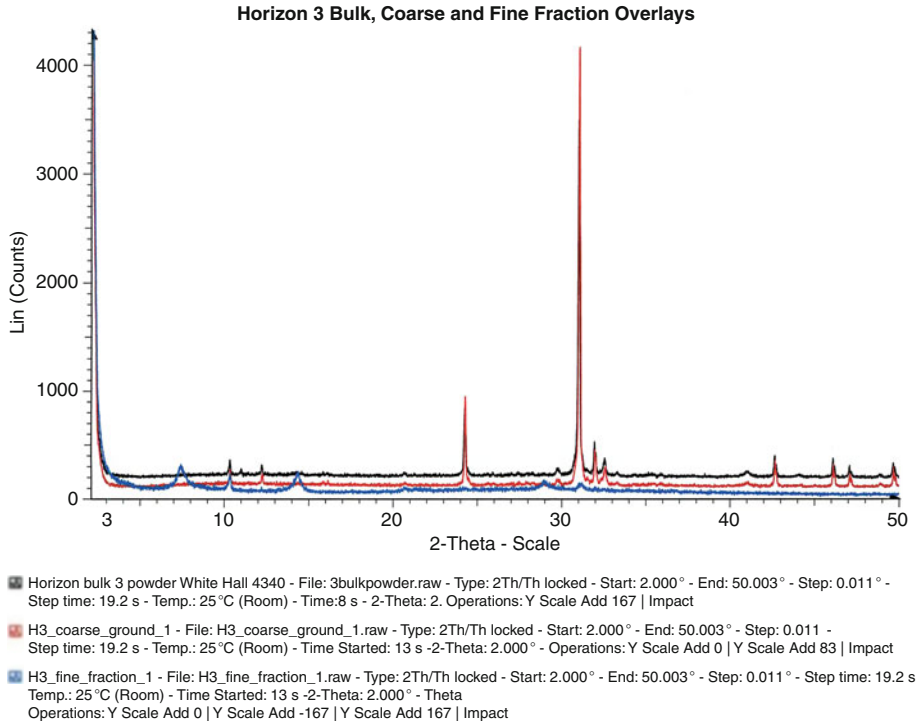

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 4 Diffractogram of the coarse, bulk, and fine fractions of a suspected paleosol sediment. The larger peak is that of the quartz soil fraction. The second peak located at 24° is identified as feldspar

compared to known index values and thereby verified or disqualified as a match using a Powder Diffraction Database Search software by Scintag, Inc.

An Example of XRD Identification of Paleosols

In the diffractograms shown below, one sees the mineralogic makeup of a puted paleosol collected within a soil profile exposed in a test pit located in the Georgia Piedmont near Athens, Georgia. The pit was located on a natural levee of the Middle Oconee River; thus, the parent material for the soils exposed in the walls of the pit is alluvial. One horizon is alleged to be a paleosol and is referred to hereafter as the "paleosol." The depth from which this horizon was originally sampled was not noted. The other horizon, referred to hereafter as "Horizon 3," was sampled from a depth of 134 cm. Figure 2 shows the soil profile in the field.

As expected, quartz created the most intense peak for the bulk and coarse fraction from both horizons. Figure 3 shows the tabulated XRD data shown graphically in the following diffractograms (Fig. 4). Potassium feldspar created the second most intense peak in the bulk and coarse fraction diffractograms for both horizons. Greater variability in terms of peak intensity was evident in the fine fraction diffractograms for the two horizons (Fig. 5), although both possessed the same major minerals. Kaolinite, hydroxy-interlayered vermiculite (HIV), biotite, and muscovite created the largest peaks in both horizons. However, kaolinite created the most intense peak in the alleged paleosol fine fraction, whereas HIV was responsible for the most intense peak in the

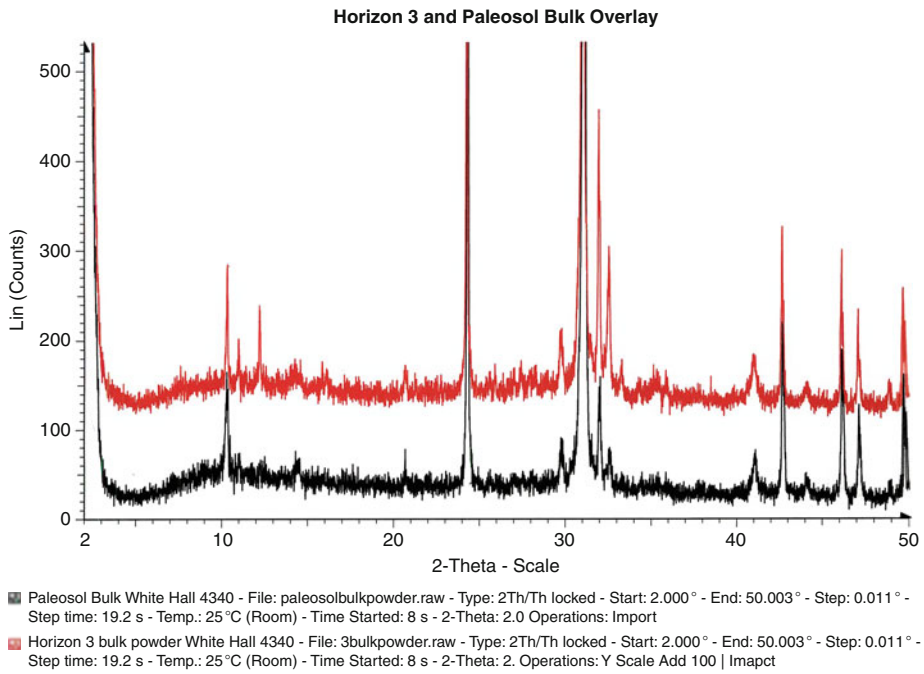

X-Ray Diffraction (XRD): Applications in Archaeology, Fig. 5 Diffractogram of the paleosol bulk fraction and Horizon 3 sediment

Horizon 3 fine fraction. Ultimately, XRD analysis successfully pinpointed differences between the fine fractions of the two horizons and confirmed their identities as Inceptisols.

Cross-References

- ▶ Archaeological Soil Micromorphology
- ▶ Archaeometry: Definition
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

Further Reading

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X-Ray Fluorescence (XRF): Applications in Archaeology

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Introduction

X-ray fluorescence is now a well-established method of analysis both in the laboratory and industry. The fact that the method is essentially nondestructive makes it particularly attractive for the analysis of archaeological and museum artifacts. Due to certain fundamental characteristics of the technique, it is not suitable for some projects which would seem at first sight to present no problems (Hall 1960).

Edward Hall's abstract for his 1960 paper entitled "X-ray fluorescent analysis applied to archaeology" in the journal *Archaeometry* is just as appropriate one-half century later. X-ray fluorescence spectrometry (XRF) may be more "well established" and is still "not suitable for some projects" even though they might seem so, and archaeologists might really, really want XRF to be so. This entry is dedicated to a brief discussion of the applicability of XRF analysis in archaeology.

How does XRF work and, more importantly, when and where is it appropriate? There are a number of recent published works on the subject that delve into the subject in great depth and are highly recommended for further edification (i.e., Beckhoff et al. 2006; Potts & West 2008; Shackley 2011a; and the seminal Jenkins 1999).

Today, the market is being flooded with, it seems, hundreds of portable X-ray fluorescent instruments (PXRF), but do they really do all that the marketing suggests (see Shackley 2011b)? The recent edited volume by Potts and West (2008) is devoted to the portable instrument for a variety of applications in science and engineering, including archaeological stone and museum works of art, and more recently, Ioannis Liritzis & Nikolaos Zacharias provides a critical evaluation of PXRF in obsidian studies and other archaeological materials (Liritzis & Zacharias 2011). Is there a need anymore for the desktop laboratory EDXRF? Can we as archaeologists get away with only a much less expensive PXRF? As an academic in a major university, I see the upcoming students increasing interest in PXRF as a solution to a problem – is it a solution looking for a problem or a very real need to be able to carry great analytical power into remote field conditions? It may, indeed, be too soon to definitively answer these questions, but very recent (summer 2011) newer versions of PXRF instruments and software may be resolving some of these issues.

The vast majority of archaeological XRF worldwide is applied to inorganic materials, mainly volcanic rocks, and there are very good technical reasons for that (Shackley 2011a). This does not mean, of course, that there are no perfectly good reasons for analyzing ceramics or organics. While pottery is "not a rock," it is composed of rocks and clay sediments that lend themselves to XRF analysis (Neff 1992). The very real difference is that unlike volcanic rocks as an example, they are not formed at very high temperatures in the mantle or crust but are not necessarily a reflection of human production.

What is very different from Edward Hall's XRF world is that archaeology as a discipline has changed markedly both theoretically and methodologically, due in large part to the tools and technology that are offered in the twenty-first century. Issues of social identity, equality, gender, national character, and native rights are all current and important issues in archaeology today and are being addressed with these new tools – XRF certainly among them (see Joyce 2011). Scholars have argued elsewhere that without our twenty-first-century archaeological tools, a twenty-first-century archaeology would be not much more than the New Archaeology of the 1960s or culture historical in nature (Joyce 2011). X-Ray fluorescence spectrometry will play an important role as a "well-established method" for illuminating our ever-changing problems in archaeology well into this century. What XRF will look like in another 50 years is impossible to imagine. The portables are probably a peep into that future.

Historical Background

History of XRF in Archaeology

X-rays were first discovered by the German physicist Wilhelm K. Röntgen (1845–1923) for which he won the Nobel Prize in 1901 (Röntgen 1898). Charles G. Barkla in 1909 found a connection between X-rays radiating from a sample and the atomic weight of the sample. In 1913, Henry G. J. Moseley helped number the elements with the use of X-rays by observing that the K line transitions in an X-ray spectrum moved the same amount each time the atomic number increased by one, a primary theoretical precept in XRF physics (see Fig. 1 here). He is credited with revising the periodic tables which were based on increasing atomic weight to periodic tables based on atomic

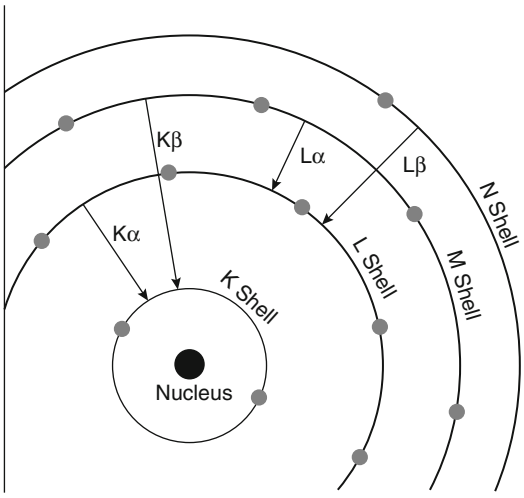

X-Ray Fluorescence (XRF): Applications in Archaeology, Fig. 1 Schematic view of orbital transitions due to X-ray fluorescence (From Shackley 2011b: Fig. 2-1)

number. He later laid the foundation for identifying elements in X-ray spectroscopy by establishing a relationship between frequency (energy) and the atomic number, a basis of X-ray spectrometry. The potential of the technique was quickly realized, with half of the Nobel Prizes in physics awarded to developments in X-rays from 1914 to 1924.

Key Issues

A Brief Discussion of the Principles of XRF

In EDXRF analysis, samples are irradiated with photons, usually from an X-ray tube or radioisotopic source. The primary X-ray beam excites electrons in the sample, causing it to emit secondary X-rays, i.e., to *fluoresce*. The emitted X-rays occur at energies specific to elements in the sample, appearing as peaks over a given energy spectrum (Fig. 1). The height or *intensity* of a given peak reflects, in part, the concentration of that element in the sample and may be converted to units of concentration, usually by comparison to a regression line based on well-characterized standards (Jenkins 1999).

Traditional destructive XRF analysis of geologic samples requires rigorous and time-consuming sample preparation. Samples are ground to a fine powder and pressed into briquettes, or for analysis of major elements, prepared as fused glass disks, particularly for wavelength XRF (WXRF) where the relationship between the angle of the instrument and the object analyzed is crucial. However, with energy-dispersive XRF (EDXRF), where the emitted energy is captured by the detector for all elements simultaneously, and through a detector and multichannel analyzer, which convert that energy to pulses and ultimately through software to elemental data, the surface of the object is not as critical (Davis et al. 2011: Fig. 2 here). While early EDXRF instruments did not yield the instrumental precision of WXRF, and certainly neutron activation analysis (NAA), advances in detector electronics and software have decreased the difference between these instruments and, with miniaturization, have heralded the portable XRF emerging technology (see Liritizis & Zacharias 2011). A number of experiments (summarized in Davis et al. 2011) have shown that EDXRF is the best technique in the analysis of volcanic rocks when sample destruction is not possible.

The overarching assumption seems to be that XRF, particularly energy-dispersive X-ray fluorescence spectrometry (EDXRF), solves so many of our problems in geoarchaeology. Glascock (2011) most recently addressed this issue by directly comparing the results of NAA versus EDXRF for obsidian sources of Mexico. I refer you to that study for an in-depth on this subject.

What Is Good About XRF?

The appeal of X-ray analysis of archaeological specimens lies in its remarkable combination of practical and economic advantages:

- Nondestructive: In the vast majority of cases, analyzed samples are not destroyed or changed by exposure to X-rays. They can thus be saved for future reference or used for other types of testing that may be destructive, such as obsidian hydration analysis.
- Minimal preparation: Many samples can be examined with little or no pretreatment, including almost all obsidian artifacts. While

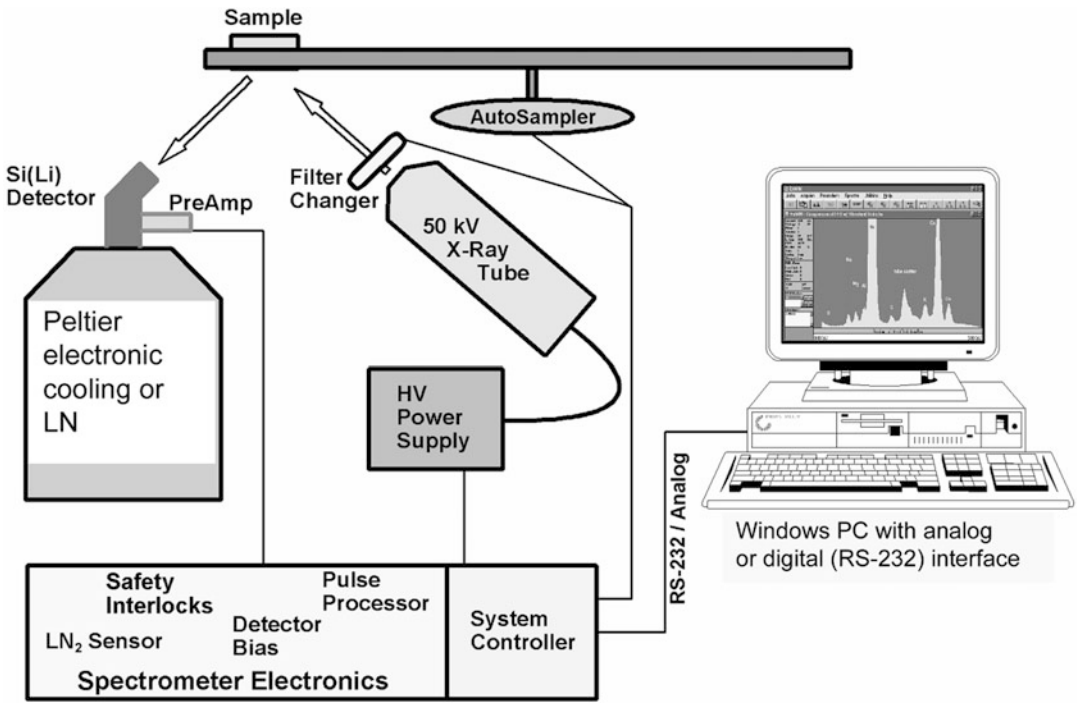

X-Ray Fluorescence (XRF): Applications in Archaeology, Fig. 2 Schematic drawing of a typical EDXRF instrument. Cooling can be either electronic Peltier or liquid nitrogen (*LN*) (From Shackley 2011b: Fig. 2-9)

it is best to wash any sediments off archaeological specimens, it has been shown that if the dirt is minimal and the artifact has not been subjected to heat so high as to melt some sediment matrix onto the sample, vigorous cleaning is not necessary (Shackley & Dillian 2002). This is mainly due to the penetration of X-rays in the mid-Z X-ray region beyond the surface, and while it does incorporate any contamination on the surface, it is generally not an issue if some soil remains in the flake scars. The analyzed volume is very large compared to any surface contamination. This is not the case with most metals, where patination and chemical weathering can radically change the composition at the surface and yield erroneous results (Hall 1960).

- Fast: X-ray spectrometry enables chemical compositions to be determined in seconds. For an analysis of the elements Ti-Nb on the Berkeley Spectrace and Thermo desktop instruments, at 200 live seconds per sample, it takes about 5–6 min per sample depending on mass.
- Easy to use: Modern instruments run under graphical interfacing software that easily handles measurement setup and results calculation. Tasks that once required the constant attention of a trained analyst can now be handled by skilled students and are fully automated.
- Cost effective: Without the more involved sample preparation necessary in most WXRF and all destructive analyses, the cost is significantly lowered per sample.

While this suggests that XRF will solve all our problems, it is not the all-knowing black box we would like it to be, however.

What Nondestructive EDXRF Will Not Do

- Sample size limits: Samples >10 mm in smallest dimension and >2 mm thick are optimal for EDXRF analyses (see Davis et al. 2011). Why is this important? Recently, Eerkens et al. (2007) noted that for hunter-gatherers in the North American West, high residential mobility often requires that stone sources, including obsidian, be conserved for

long periods of time. As an example, an Archaic hunter will attempt to rejuvenate a dart point rather than make a new one whenever possible as he or she moves through the landscape. The rejuvenation of that point creates debitage that is quite small, often smaller than 10 mm. With modern recovery techniques, these small debitage are recovered much more often than they were in the past, and to make a long story short, Eerkens et al. (2007) found that indeed these small obsidian flakes in Great Basin sites indicated not only a greater distance to the original tool raw material but also a greater diversity of sources than visible with an analysis of the larger flakes with EDXRF. So, while EDXRF can analyze much of the stone material left in prehistory, it may not solve all problems of interest to twenty-first-century archaeologists. To be fair, however, the procurement ranges that could be reconstructed were relatively accurate with samples above the 10 mm threshold in the Eerkens et al. (2007) study, and NAA had to be used on the smaller flakes, which is essentially a destructive technique. Recently, however, with the newer digital EDXRF instrumentation and tube collimation, we have been able to reach sizes down to 2 mm with the ThermoScientific Quant'X EDXRF at Berkeley.

- Restricted elemental acquisition: As discussed below, nondestructive XRF is restricted generally to a subset of the mid-Z X-ray region, the best portion including Ti-Nb, contains excellent incompatible elements for volcanic rocks (Shackley 2011b). While some rare-earth elements and those with low atomic numbers or with very low concentrations can be useful in discriminating sources, in most cases, XRF cannot solve that problem. This is discussed in detail in Glascock's comparison between XRF and NAA (2011).
- XRF cannot characterize small components: XRF like NAA is a mass analysis – every component in the irradiated substance is included in the analysis. It is possible to collimate the incoming X-rays from the tube and/or into the detector to focus on small components such as various minerals, but environmental scanning electron microscopy (ESEM), electron microprobe, or laser ablated-inductively coupled plasma-mass spectrometry (LA-ICP-MS) is much better suited to this kind of analysis. However, the bulk analysis of volcanic rocks has shown to be quite effective.

It is true that XRF will not solve all our problems in archaeological provenance studies; it is simply the best nondestructive analytical tool at our disposal at this time.

Is PXRF a Revolution or Just the Latest Development in XRF?

While portable XRF has both become very popular and highly criticized, this is expectable in a discipline that borrows much of its analytical technology (Liritzis & Zacharias 2011; Shackley 2011a, 2011b). What seems to be most problematic is that these portable instruments were originally designed for mining and industrial applications seeking only qualitative results. This is not necessary and sufficient to address archaeological problems where relatively precise quantitative data are required. Tied to this, most of the instruments, unlike lab/desktop EDXRF, did not allow the user to generate their own calibrations; indeed, most relied solely on fundamental parameter routines that are often standardless and could not be modified beyond factory settings. The criticisms have had their effect, and many of the manufacturers are generating software that allows the user to employ linear calibrations by rationing peaks/counts to the Compton scatter and thus eliminate the problem of differing sample sizes as earlier discussed by Davis et al. (2011) for lab EDXRF instruments. Given these important shifts in the ability of PXRF, it will be possible to take a sensitive instrument to the field or museum settings and nondestructively analyze at least volcanic rocks with similar instrumental precision and accuracy of lab XRF instruments. Most of the PXRF systems now available do not acquire the range of elements that laboratory systems do (i.e., Na through U), but the mid-Z (i.e., Z = 19–41) sensitivity seems to be very good. There may come a time in the near future when portable systems will acquire the typical sodium through uranium

elements that laboratory instruments can today, but it is not here yet. This is likely the future of XRF in archaeology. Hopefully, archaeologists will evaluate it with the same skepticism that is healthy for the discipline.

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- ▶ Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)
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Y

Yak: Domestication

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Basic Species Information

The domesticated yak (*Bos grunniens* Linnaeus, 1766) is a bovine species with unique long hairy skirts on its chest, flanks, and rump as well as a fully haired and horse-like tail. There are ~14 million domestic yak distributed at high altitudes from 2,000 to 5,000 m accompanied by hypoxia and low temperatures throughout the Qinghai-Tibetan Plateau, Himalayan and Altai regions in Asia. Yak is the most important livestock species for the nomads, mainly the Tibetans, in the region given their importance in producing meat, milk, fiber, hide, dung fuel as well as pack energy (Olsen 1990; Wiener et al. 2003; Leslie & Schaller 2009). The wild yak (*Bos mutus* Przewalski, 1883) survives in remote northern Qinghai-Tibetan Plateau at elevations from 3,000 to 5,500 m. The number of wild yak has shrunk from millions to less than 15,000 in the last century due to poaching and competition with livestock. This led to isolated and fragmented habitats with major populations present in northern Tibet and western Qinghai provinces, China. Yak are recognized as vulnerable among the IUCN Red List of Threatened Species (Olsen 1990; Wiener et al. 2003; Leslie & Schaller 2009).

The extant wild yak is thought to be the direct ancestor of the domestic yak. The domestication process may have begun ~10,000 years ago by the ancient nomadic Qiang people. The establishment of a primary yak industry and culture in China started at least 4,500 years ago. However, the taxonomic classifications and scientific names of both domestic and wild yak have gone through various changes under the genera of *Bos*, *Poephagus*, and *Bison*, mostly based on limited morphological and anatomical descriptions.

Apart from the hairy skirts, yak has 14 dorsal vertebrae and 14 pairs of ribs which are one and one pair more than other bovine species but five lumbar and 12-16 coccygeal vertebrae which are one and four to zero less than other bovids, respectively (Olsen 1990; Wiener et al. 2003; Leslie & Schaller 2009). Although the yak shares the basic vertebral column structure with American bison and European wisent following their probable common and recent past ancestry in central Asia (Leslie & Schaller 2009), Olsen (1990) found some anatomical difference in their skulls. There have been some reports on bovid fossil related to ancestral yak, but Olsen (1990) challenged their taxonomic assignments based on fragmented specimens excavated from Pleistocene locations in Alaska of USA, China, India, Nepal, and Russia. In the documentation of most

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but limited archaeological and recent historical evidence in China, Olsen (1990) concluded that the fundamentals of when and how yak domestication began remain obscure.

Guo et al. (2006) and Qi et al. (2008) investigated the genetic origin of domestic yak using variations in mitochondrial DNA (mtDNA). In two separate datasets, the former with only Chinese yak samples and the latter with a complete sampling across all eight yak keeping countries in Asia, two or three deeply divergent (>100,000 years before present) and diversified phylogenetic mtDNA lineages were observed. The major lineages were shared by domestic and wild yak while there was no clear geographic structure in terms of the distribution patterns of the major mtDNA lineages among domestic yak populations, supporting a single and recent origin of domestic yak from wild yak gene pool. Molecule dating of the major lineage (mt-I) from Qi et al. (2008) suggested an expansion of domestic yak population ~5000 years ago, which largely agrees with available archaeological evidence for yak domestication (Wiener et al. 2003). Different refuge wild yak populations harboring the mtDNA lineages were thought to have survived over the most recent glacial period when the Qinghai-Tibetan Plateau was not completely covered by ice. Such populations intermixed before domestication and thus contributed to the unique mtDNA diversity reservoir in today's domestic yak.

The highest mtDNA diversity and a significantly expanded major lineage (mt-I) identified in the eastern Qinghai-Tibetan Plateau area advocated it to be considered as the primary center for a single domestication event for yak. Two separate dispersal routes were testified following the significant but gradient reduction in mtDNA diversity in domestic yak populations distributed along a westward route via the "Pamir Knot" across the Himalayan and Kunlun mountains and a northward route across the South Gobi and Gobi Altai mountains (Qi et al. 2008). An extended Chinese yak mtDNA D-loop dataset and complete mtDNA sequences confirmed the previous findings and revealed a unique haplogroup present in wild yak (Wang et al. 2010).

The hybridization of female yak crossing with local male taurine (*B. taurus*) or indicine (*B. indicus*) cattle has been practiced since 1100 BCE and this practice intensified in the mid-1900s in order to explore the heterosis in milk and meat performance. The F1 yak-cattle hybrids are called Pien Niu by the Chinese, of which the females are fertile but males remain sterile until the third generation of backcrossing (Wiener et al. 2003; Qi et al. 2010). Molecular marker–based analyses revealed cattle introgression in most of domestic yak populations in Asia and a higher cattle admixture was detected among the Chinese and Mongolian yak populations than those kept in the Himalayan region and Pamir Plateau area (Qi et al. 2010). Wild and domestic yak can interbreed to produce fertile offspring of both sexes, and semen collected from the tamed wild yak bulls has been successfully applied to improve domestic yak genetics since 1990s in China (Wiener et al. 2003).

Recently, the draft genome assembly of a female domestic yak was published based on a whole-genome shotgun sequencing strategy at 65-fold coverage with a total length of 2,657 Mb base pairs. Comparative analyses between the yak and cattle genomes revealed that yak carried expanded gene families responsible for sensory perception and energy metabolism as well as enriched protein domains related to sensing extracellular environments and hypoxic stress, which were found to be under positive selection in evolution (Qiu et al. 2012). These findings are important to understand the unique adaptability of the yak to high altitudes. Such genome resources would certainly facilitate the identification of genes and alleles for genetic and genomic selection to improve the productivity of yak.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Cattle: Domestication
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- ▶ Water Buffalo: Domestication

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Yamanouchi, Sugao

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Basic Biographical Information

Sugao Yamanouchi (1902–1970) was a Japanese archaeologist, often called the "Father of Jomon studies". Jomon is the name of the Japanese hunter-gatherer period/culture with pottery. Yamanouchi was born in Tokyo in 1902, the son of the teacher of Japanese literature. In 1914, he entered Waseda Junior High School (in the old system of education, almost equal to the high school in the present educational system). During his school days, he was interested in evolution and Marxism/anarchism and read *On the Origin of Species* by Charles Darwin and *Das Kapital* by Karl Marx, in their original languages. He also had fun collecting artifacts on some archaeological sites, including Jomon shell middens, and sometimes had a chance to talk with the famous anthropologist, Ryuzo Torii in the University of Tokyo, who was a lecturer at that time.

In 1919, following Dr. Torii's advice, Sugao Yamanouchi chose to enter not high school but the college course of the Department of Anthropology at the University of Tokyo (in the old system of education, almost equal to the half stage of an undergraduate degree in the present educational system). As an undergraduate, he had a great interest in genetics, and his bachelor thesis was based on the subject. In 1922 he graduated from the college course. He worked at Tohoku University, located in the northeast part of Japan, as a junior assistant of the Department of Anatomy from 1924 to 1933. Over the period of a decade, he excavated a large number of shell middens – including those at Daigi-gakoi, Obora, and Satohama – in order to accumulate data for the sequential stratification of Jomon pottery. His ambition was to construct a chronological framework for Japanese prehistoric pottery, in order to establish the sequence of human skeletons of prehistoric Japan. However, Yamanouchi gradually came to dislike his job in the department because of its hierarchic nature, and because he held a sharply divided opinion on genetics, which was against that of the department professor, Kotondo Hasebe, he resigned his post in 1933. Yamanouchi decided to remain as an archaeologist with no formal institutional affiliation. After returning to Tokyo, he began to hold study meetings on prehistory, and these produced a journal, *Senshi Koko-gaku* (*Prehistoric Archaeology*), which continued for several years.

In 1946 Yamanouchi was appointed as a lecturer with the Department of Anthropology at the University of Tokyo, probably because of a collapse of imperialism due to the defeat of

World War II. Yamanouchi served as a member of a number of committees of the Japanese Archaeological Association, which was the first nationwide organization of archaeology, from the time of its inception in 1948. In 1962, he received a doctorate from Kyoto University, and on the very same day, he left the University of Tokyo upon reaching retirement age. After that, Yamanouchi joined the Department of Arts and Literature of Seijo University as a professor of culture history. In the summer of 1970, he died by pneumonia.

Major Accomplishments

Sugao Yamanouchi's major accomplishments include identification of the impression of cord mark – which is meant by the Japanese word, "*Jomon*" – on pottery in Japanese hunter-gatherer culture. Consistent with its literal sense, Jomon pottery mostly has cord impressions. The wide range of variation in cord impressions in Jomon pottery serves as a key to determine the local pottery type or to subdivide the chronological sequence of a local pottery tradition. Prior to Dr. Yamanouchi's work, this decorative technique had long been unsolved. Dr. Yamanouchi solved the riddle no later than 1929 (Saito & Sakadume 1998), by showing that, in most cases, the cord mark was produced not by the mere impression of cords but by rolling either a cord or a wound strand around a shaft.

Dr. Yamanouchi was the first scholar to attempt to construct the chronological chart of Jomon pottery sequences in type and to apply this throughout the Japanese mainlands. When he excavated the Ogawa shell midden in Fukushima in 1924, he fully recognized the importance in the stratigraphical evidence which he had already known from Dr. Matsumoto's work on typological sequence of Jomon pottery based on the stratigraphical data from the two shell middens – Satohama and Usozawa – excavated in late 1910s (Matsumoto 1919). Then, Yamanouchi gradually devoted himself to research in Jomon pottery sequence. It is true that he did not come back to anatomical analysis which would rely upon the time measure proposed by him of pottery sequences, while every scholar of Jomon culture has relied basically upon his framework of the sequence since his work. In 1930s, his chronological investigation clarified the almost simultaneous introduction of rice farming throughout the main parts of Japanese Archipelago. In Japanese prehistoric studies, since then, the argument for rivalry ceased to be operative between the western Japan as earlier rice cultivation areas and the eastern Japan as delayed cultivation areas deeply based on fishing, hunting, and gathering.

Dr. Yamanouchi's detailed research shed new light on the question of subsistence in Japanese prehistory. In 1925, he identified a rice impression on stone-age pottery (Yamanouchi 1925), which he typologically dated to the beginning of Yayoi period. His work demonstrated that rice cultivation was introduced in the Japanese Archipelago during the Yayoi period. This interpretation was put forward at a time when most archaeologists believed that rice cultivation did not start until the introduction of metal. Later, Dr. Yamanouchi hypothesized that salmon and nuts had served as staple food in the diet of the Jomon period in the eastern Japan and that this enabled people to achieve prosperity, in contrast to western Japan where salmon hardly existed. Dr. Yamanouchi's hypothesis derived from ethnographic analogies with salmon exploitation by Indigenous groups in California, USA. This is an example of his broad knowledge of world prehistory and ethnography. It is an irony, however, that his understanding of Russian prehistory prevented him from accepting radiocarbon dates for Jomon pottery. He had rejected the idea that the early Jomon pottery dated back to earlier than 5,000 BP, since this was not supported by his typological studies of stone implements in Japanese Archipelago and the Russian continent. He did not accept radiocarbon dating unless it was supported by comparison between artifacts themselves.

Dr. Yamanouchi placed much importance on academic freedom throughout his academic career and paid keen attention to the priority of scholars as to who proposed a new theory.

He often fiercely criticized other scholars who he thought encroached on his intellectual territory. His frankness led to a number of scholars having difficulties with him. However, there are many archaeologists who are proud to be known as his follower. Sugao Yamanouchi's eventful life with its outstanding and varied accomplishments in archaeology has become almost a legend within the history of prehistoric studies in Japan.

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- ▶ Japan: Indigenous Occupation
- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Torii, Ryūzō

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Yams: Origins and Development

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Basic Species Information

Yams are flowering plants of the family Dioscoreaceae, consisting of more than 800 species of climbing vines and woody shrubs. Many members of the yam family produce subterranean tubers or tuberous stems, and have heart-shaped leaves, small green or white flowers, and a fruit that is a winged capsule or berry. Yams are distributed widely throughout the tropical and warm temperate regions of the world, though current geographic distribution has almost certainly been influenced by human translocations. Today yams are widely used as an important food staple and as a fallback food in Africa, Asia, the Caribbean, Pacific islands, and South America.

In 2007, worldwide yam production totaled 52 million t, of which Africa produced 96 %, most of which derived from West Africa, with Nigeria alone producing 71 % of that total (IITA 2009). Yams are a good source of dietary fiber and are rich in carbohydrates, vitamin C, and essential minerals. Yams may be stored for up to six months after harvest, making them ideal for transport, and can be consumed by boiling, roasting, baking, frying, mashing, and even

processing into flour, which will keep for prolonged periods. Spanish and Portuguese mariners added Southeast Asian yams to their ship stores transporting several species of Dioscoreas to the New World. The word yam is thought to derive from West African languages, from the Mande, *niam* or the Temne, *enyame*, later adopted into Portuguese as *ynhame* and Spanish as ~ *tame*, French, *igname*, and English as, *yam* (Burkill 1938). While the term "yam" is now used loosely to refer to many different genera that produce edible roots, true yams are only those of the family Dioscoreaceae.

Harvesting wild yams is a relatively simple procedure; several groups employ the use of a digging stick, such as the Sakai of Malaysia, Baka of Cameroon, and the Aborigines of Australia. Collection of tubers from a wild plant will disturb the soil, aiding in the growth of new tubers and larger tubers, and as long as the growth head of some tubers is left behind, the plant will continue to produce fresh tubers, providing foragers with a perennial resource. The Baka also fill the hole left behind with organic matter to facilitate new yam growth. This simple vegetative mode of propagation also allows for in situ management of yam plants by foragers. Transport of yams from their place of collection to campsites, or settlements, will have inadvertently spread useful yams along with the dispersals of people. In some parts of the Pacific, deliberate translocations of yams to "seed" new islands may have been an important element of human colonization of these and other landscapes.

Human Evolution

Several hypotheses have been proposed where yams and other plants producing edible starchy roots (collectively described as Underground Storage Organs, USOs) are key to the spread of hominins outside Africa and of important changes in social organization. Wrangham et al. (1999) have suggested that access to USOs and cooking them, which dramatically increasing digestibility and energy returns, was a key evolutionary factor in the reduction of molar and gut size of *Homo erectus*, and helped facilitate dispersal of that species.

The "grandmother hypothesis" forwarded by O'Connell et al. (1999) suggests that instead of males provisioning the group with meat (a high-risk strategy of potentially high energetic returns, but with low rates of success), women and daughters supplied the group with USOs (a low-risk resource with high energetic returns). In doing so, this engendered mother-infant food sharing, combined with assistance from grandmothers, reinforcing co-residence among related females. As a result, it is suggested that matrilocality may have been the dominant model of hominid social organization throughout most of the Lower and early Middle Pleistocene (1.8– < 0.5 myr) (O'Connell et al. 1999).

The oldest remains of yam tissues in an archaeological context come from the West Mouth of Niah Cave in the lowland rainforests of Sarawak, Malaysia. From several deposits dating to 20,000 years ago, fragments of the yam *Dioscorea hispida*, and other unidentified tuberous remains were recovered by flotation (Barton & Paz 2007). *Dioscorea hispida* is still an important food source in Island Southeast Asia today among forager groups on the Malay Peninsula, and as a fallback food across island Southeast Asia. What is so interesting about this plant though is its toxicity. Without treatment, usually soaking, boiling, and/or roasting, the tubers are extremely toxic and cases of accidental death or hospitalization are known. Access to toxic yams could have provided important evolutionary advantages to humans, providing them with a relatively rewarding food source, isolated from other competitors, such as pigs and large ungulates.

Fire Management

Aboriginal Australians used fire as a tool to encourage the distribution of yams and manage productivity. The Kuku-Yalanji people of Cape York, Queensland, exploited two species of yam, *Dioscorea bulbifera*, and *Dioscorea transversa*, burning rainforest margins to encourage growth (Hill & Baird 2003). In Western Australia, *Dioscorea hastifolia*, was also managed by the use of fire, increasing the density of this plant in specific areas (Hallam 1989). In eastern Australia in 1841, Governor Sir George Grey noted large

tracts of land studded with holes where people had been extracting yams (possibly *Dioscorea transversa*). Continuous digging around some species acts to aerate the soil, thin and encourage better growth, and burning provides disturbed habitats that favor certain species (Gott 2005).

Domestication

Some groups of West African farmers engage in a process of yam management, rather loosely referred to as a process of "domestication" (Dumont & Vernier 2000; Scarcelli et al. 2006). Farmers select yam tubers from the forest that present desirable phenotypic attributes such as size, color, and taste and transplant the yam head, from which new tubers grow, into their cultivated plots. Over a period of 3–4 years, farmers can induce favorable change in the tubers (Hildebrandt 2003) by various methods including through applying stress by increasing the harvesting cycle; exposure of plants to sunshine, tillage, and mound heaping (Chikwendu & Okezie 1989; Scarcelli et al. 2006); and, also by the introduction of an obstacle, such as a stone or piece of pottery, that physically interfere with the orientation of tuber growth (Vernier et al. 2003: 39). Simply harvesting the plant repeatedly changes the soil conditions around newly forming tubers, allowing the growth of larger tubers in more loosely packed soils (Hildebrandt 2007: 290). If the phenotypic changes are of interest to the farmers, these plants are then introduced into the main crop, often alongside tubers with similar phenotypes (Scarcelli et al. 2006: 122).

The entire process is managed entirely via vegetative propagation though the exact biological process allowing this plasticity of tuber form is unknown (Scarcelli et al. 2006: 122). In order to better understand this process, Scarcelli et al. (2006) undertook a genetic analysis of "wild" (in their terms) "predomesticated" plants (*D. abyssinica* and *Dioscorea praehensilis*) that reproduced sexually from the forest with cultivated varieties (*D. cayenensis*, *D. rotundata*) that were vegetatively propagated. They found that nearly half the samples (47 %) considered to be "wild" contained genes from cultivated "domesticated" yams and that 14 samples could be considered genetically intermediate between the "wild" and "domesticated" plants. Sexual reproduction maintains genetic variation that is gradually incorporated into cultivated plots where propagation is continued via asexual methods. The mixture of genes from "wild" and "domesticated" varieties suggests ongoing hybridization, probably from feral plants abandoned in old fallows that have since returned to forest (Mignouna & Dansi 2003: 524). Farmers select from a mixture of heterogeneous genetic stock consisting of wild species, a diversity of hybrids, and feral landraces from old farms (Mignouna & Dansi 2003: 527).

Genetic studies of African yams show that there are no clear genetic and phenotypic correspondences between yams classified as "wild" and "domesticated." The processes employed by people in the selection and propagation of yams can lead to useful phenotypic change, but with little corresponding genetic change (Mignouna & Dansi 2003; Zohary 2004; Scarcelli et al. 2006).

Toxins and Medicinals

The active compounds within the family of Dioscorea yams fall into three main categories: the alkaloids, tannins, and saponins (Coursey 1967). The tannins and saponins are the least likely to present a problem for human consumption, though they do affect the taste of the tuber. Tannins are thought to give tubers an acrid taste (Coursey 1967: 208) and the saponins cause bitterness (Coursey 1967: 210). Saponins have also been identified as the active component in many fish poisons (acting to deoxygenate the water) and are readily detectable in tubers, characteristically forming a soapy lather when agitated in water (Coursey 1967: 209). At least one of the alkaloids, dioscorine, which has been identified in *Dioscorea hispida*, is extremely toxic and causes paralysis of the nervous system and – if taken in sufficient quantities – death (Burkill 1966: 833). While some of the chemicals and cellular crystals in tubers and rhizomes cause discomfort, the toxins and other physiological effects are usually destroyed or alleviated by heat, applied either through boiling or roasting.

Many groups exploit yams for their medicinal properties. In China's Yunan Province, the root of *Dioscorea althenoides* is taken orally as a cure for chronic rheumatism, indigestion, and for injuries from falls (Huang et al. 2004). Among the Lahu of Southwest China, the leaves of *Dioscorea bulbifera* are used as an antiseptic for puncture wounds and a decoction from the mature fruits to alleviate gastric bleeding (Huai & Pei 2004). In India, *Dioscorea bulbifera* is used as contraceptive by some tribal groups. *Dioscorea pentaphylla* is used as a medicine for ailments of the digestive tract and for problems with respiration. *Dioscorea prazeri* may be used as a soap and shampoo to kill lice. The pounded leaves of *Dioscorea hispida* may be used to treat skin conditions in Malaysia. Among the Sakai of Peninsular Malaysia, mucilage from the tubers of *Dioscorea laurifolia* and unidentified *Dioscorea* species is used to treat warts. The boiled tubers of *Dioscorea membranacea* are used to treat asthma and fever (Maneenoon et al. 2008).

Social Contexts of Yams

The Baka of Cameroon apply the metaphor of the human body to describe the anatomy of yams; it is the only plant treated in this way (Dounias 1996). The spiny roots at the head of the tuber are referred to as "hair," the oblong tuber as "body," and the terminal point as "bottom." Other tuberous forms are associated with male reproductive organs and leaf hairs are recognized as human "body hair" (Dounias 1996: 624). Ownership of newly discovered plants is marked by snapping vegetation surrounding the plant. Underground cavities left by the extraction of yams, which may last for years, are recognized by a name which translates as "edible yam ancestor" (Dounias 1996: 629).

Amongst the Avatime of Southeastern Ghana, yam rituals involve feeding the "forebears" before any living member of the clan may eat the yam flesh (Brydon 1981). These yam rituals are not held for the entire village but are reserved for kinship groups: "It is the elders of the clans who are the representatives of the living Avatime and who must make sure that the spirits of the clan forebears are well looked after before they eat yams themselves" (Brydon 1981: 666).

On the island of Pohnpei in Micronesia, yams are also revered and cultivated as a high prestige food. The islanders cultivate at least 133 varieties of *Dioscorea* species, though total agrodiversity is thought to have increased dramatically over the last 150 years with introductions by whalers, traders, missionaries, and colonial administrators, as well as Pohnpeians returning from overseas (Rayner et al. 1992). Traveling with your yam was clearly the thing to do. Consumption of yams on Pohnpei is a strongly ritualized activity where humans may not eat yams until they have been presented to the island chiefs, and through them, to the various traditional gods.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Niah Cave (The West Mouth)
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology
- ▶ Vegeculture: General Principles

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Yellowhorn, Eldon

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Basic Biographical Information

Eldon Yellowhorn is a past president of the Canadian Archaeological Association (2010–2012) and the first Aboriginal person to hold this title. It is the latest milestone he has reached during his career in archaeology.

Dr. Yellowhorn grew up on a farm on the Peigan Indian Reserve in southern Alberta, and his boyhood years were full of rural adventures. There is a direct path from the family farmstead to his interest in the earth sciences that inspired

his professional development. His undergraduate degrees in physical geography (1983) and archaeology (1986) from the University of Calgary brought him insights about the prairie landscape of his childhood that added more fuel to his curiosity. Gaining a better understanding of the ancient history of his Piikani ancestors compelled him to take on graduate studies in archaeology.

Dr. Yellowhorn discovered his enthusiasm for archaeological fieldwork through the surveys and excavations he conducted as part of his training. After several field seasons and a curator internship, he decided to pursue advanced degrees in archaeology. Attending graduate school at Simon Fraser University in Burnaby, British Columbia, in 1989, gave him the opportunity to mature as a researcher and to study the antiquity of his home community and the culture he inherited from his ancestors. His survey of the Piikani First Nation identified many new sites but more importantly opened up a discussion on a subject that had received no prior attention. His thesis explored the legal status of heritage protection on Indian reserve lands in Canada and interrogated existing legislation for this purpose.

After he completed his M.A. degree in archaeology (1993), Dr. Yellowhorn began working in the heritage consulting industry, conducting impact assessments in advance of terrain-altering activities. This experience brought him an insider's view of applied archaeology that differed from the research-oriented mode that was standard for graduate school. Although his clients included a variety of stakeholders, he had a special interest in first nations that needed his archaeological expertise.

By 1995 he had decided to pursue an academic career, so began his days as a student at McGill University. He specifically chose that school in order to work with Bruce Trigger. While studying archaeological theory was crucial for elucidating the archaeological record of the northern plains, Dr. Yellowhorn could not ignore the oral narratives that formed part of Piikani culture. His dissertation research directed him back to the old stories he heard in his youth to ascertain whether they could explain archaeological manifestations. One puzzle that caught his attention was the one that mystified researchers concerning the origins of large-scale communal hunting of bison using "buffalo jumps." Examining this question in light of Piikani mythology led him to construct his scheduling breakthrough hypothesis that accounted for the sudden appearance of this type of bison hunting strategy.

Major Accomplishments

Throughout his career, Dr. Yellowhorn has been an advocate of the right of Aboriginal people to be active participants in examining the past through their internal dialogue on the nature of antiquity. His internalist approach brings a self-reflexive quality to field research that enhances this perspective by appropriating the methods of archaeology to pursue internally defined objectives. Given his faculty appointment at Simon Fraser University, where he is an associate professor in Archaeology and Chair of the First Nations Studies Department, he welcomes the opportunity to train Aboriginal students to become competent researchers of their own antiquity and to be well-informed interpreters of archaeological discourse.

Cross-References

► Canadian Archaeological Association (CAA)
► Indigenous Archaeologies

York Archaeological Trust

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Basic Information

The York Archaeological Trust for Excavation and Research Ltd. is one of the largest

archaeological units in the UK, with 100 members, 12 trustees, and 198 staff. The Trust's headquarters is at 47 Aldwark, York, North Yorkshire YO1 7BX, UK.

The Trust was founded in 1972, in response to proposals to construct an inner ring road in York. The road was intended to remove through traffic from the ancient walled city in line with government advice on conservation in historic towns (Esher 1968). However, local archaeologists estimated that the road would have a devastating impact on below ground archaeology, cutting through six major Roman cemeteries, two Roman suburbs, areas of Anglo-Saxon and Viking occupation, three medieval suburbs, the site of a priory, and several churches, ancient hospitals, and almshouses (Addyman 1974: 156). The inner relief road was never built, but regeneration within the city in the Aldwark area, and elsewhere, did proceed. This prompted a series of major archaeological rescue excavations on Roman and later sites by the newly constituted York Archaeological Trust (Jones 1984: 132-143).

Major Impact

In the late 1970s the Trust gained international acclaim for its work on deeply stratified urban deposits. York's location between two rivers has led to the accumulation of moist anaerobic layers, which frequently contain well-preserved organic residues such as fragments of wood, thatch, coprolites, beetles, seeds, and pollen. The excavation of such richly organic deposits enabled the Trust to undertake pioneering research in environmental archaeology, analyzing the sediments from variety of sites, including a Roman sewer system, in partnership with the Department of the Environment-funded Environmental Archaeology Unit at the University of York (Buckland 1976).

The Trust is perhaps best known for its 5-year-long "Viking Dig" at Coppergate, which revealed tenth-century Viking houses and craft workshops (Hall 1984). The popularity of this dig led to the creation of the Jorvik Viking Centre, which opened in 1984, with its famous time-capsule ride through a reconstruction of the Viking town. In the last 5 years, the Trust has gained prominence by excavating the remains of nineteenth-century working-class terraced houses and shared toilet facilities in the former "slum" area of Hungate. In response to the growth of contract archaeology in Britain, the Trust now operates at a national level, with offices in Glasgow, Sheffield, and Nottingham. The educational activities of the Trust have also grown, and in addition to the Jorvik Viking Centre, the Trust now runs three other attractions in York: Jorvik DIG, an archaeological education and discovery center; Barley Hall, a reconstructed medieval town house; and Micklegate Bar, a medieval gateway containing exhibitions on the city walls (York Archaeological Trust website n.d.).

Cross-References

- ▶ Jorvik Viking Centre
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Urban Archaeology

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Yuanmou

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Introduction

Yuanmou is located in the northern Yunnan Province, near the southeastern margin of the Tibetan Plateau, 110 km away from Kunming, the capital of Yunnan Province, southwestern China. The Yuanmou Basin is a north–south elongated basin ~30 km in length and ~7 km wide on average. It is the lowest basin of the central Yunnan Plateau with an elevation of 1,050–1,150 m. The Longchuan River, the first tributary of the Jinsha River (upper reaches of Yangtze River), runs from south to north and joins the Jinsha River at Longjie town, in the northern part of Yuanmou. The Yuanmou Basin is a faulted basin. The western mountain is comprised of Precambrian metamorphic and granite rocks with an average elevation of 1,400 m, and the eastern mountain is composed of Jurassic and Cretaceous red layered sandstone rocks with an average elevation of 2,500 m; together they comprise the basement rocks of the Yuanmou Basin. The Plio-Pleistocene hominid-bearing fluviolacustrine deposits are best developed in the southern part of the basin and are ~850 m thick and date to between 4.9 and 1.4 Ma (Zhu et al. 2008a). The Late Miocene hominoid-bearing fluvial deposits can be found in the northwestern part of the basin, are ~70 m thick, and date to between 8.5 and 7.1 Ma (Zhang & Yue 2006). The discoveries of hominids and hominoids in the Yuanmou Basin caused great attention from the fields of paleoanthropology and paleontology since 1965.

Definition

In this entry, Yuanmou refers to the Early Pleistocene hominid and cultural remains in Yuanmou Basin, Yunnan Province, Southwestern China.

Key Issues/Current Debates/Future Directions/Examples

Two hominid upper medial incisors were discovered by geologists from the Chinese Academy of Geosciences in May 1965 at a location northwest of Shangnabang village, southeastern Yuanmou Basin. Here, the Plio-Pleistocene deposits are well developed and are designated to the Yuanmou formation geologically. The teeth were unearthed from layer 25, member 4 of the Yuanmou formation (there are 28 layers in total). After comparisons with the hominid material from Zhoukoudian, the original researcher found that the Yuanmou fossils were different from *Homo erectus pekinensis*, and gave it a new subspecies name *Homo erectus yuanmouensis*, represented by a young male individual (Hu 1973, Fig. 1). Subsequently, further study has been carried out and summarized the features as follows: The crown is robust and the outline is triangular fan-shaped, widely expanded to incisive margin; most of the labial side of crown is flat, except the basal part is more convex; and there are Tome's line, labial grooves, and shallow depressions. The basal tubercle and fingerlike projections were developed, the lingual surface shows a distinct shovel fossa which is divided by the median ridge into two halves, numerous enamel furrows are visible in the lingual fossa, and the transverse section at the neck art of the root is nearly elliptical, thinner in labiolingual diameter of root. Generally, it indicates more primitive features than *Homo erectus pekinensis* and shows transitional features between slender *Australopithecus* and *Homo erectus* (Zhou & Hu 1979; Zhou 1998).

A field team from the Beijing Natural History Museum surveyed at the southern slope of Guojiabao site, some 250 m away from the original place where the Yuanmou incisors were found. In December, 1984, a human left tibia shaft was unearthed from fluvial deposits that overlie layer 25, member 4, Yuanmou formation (Zhou et al. 1991; Fig. 2). The tibia should be from layers between 25 and 28, member 4. According to the latest paleomagnetic results (Zhu et al. 2008b), the age of the tibia should be

Yuanmou, Fig. 1 Upper medial incisors of *Homo erectus yuanmouensis* (From Zhou 2009 with permission)

Yuanmou, Fig. 2 Tibia of *Homo erectus yuanmouensis* (From Zhou 2009 with permission)

at least 1.4 Ma or between 1.7 Ma and 1.4 Ma. The features of the tibia were summarized by the original researcher as follows: The tibia probably represents a young female and belongs to the platycnemic type. The anterior border of the shaft is obviously round and obtuse, and the S-shape curve is weakly developed. There is a shallow interosseous crest. A marked flexor longus swells behind the shaft, a popliteal line shapes well, and a vertical ridge bulges, dividing the back of shaft into two halves. The wall of shaft is thick and the marrow cavity is relatively small. In general, although from younger layers, the tibia could still be attributed to *Homo erectus yuanmouensis*, the traits approximate *Homo habilis* (Zhou et al. 1991; Zhou 1998).

A formal excavation was launched by the Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, at a small hill where the human teeth were unearthed in October–December, 1973; no more hominid fossil have been discovered, but six artifacts were sorted from in situ strata and another ten artifacts were collected from the surface nearby (Yuan et al. 1984). The artifacts were made from quartz and quartzite cobbles and pebbles from rivers. The flaking technique and secondary work of the implements are nearly all undertaken by direct hammering. A few implements were made by bipolar technique, but there are no prepared platforms. All artifacts are small types, and core scrapers are common. In general, those artifacts show features of the early stage of the Early Paleolithic period (Wen 1978; Huang et al. 1985; Zhou 1998), matched with the primitive features of hominid fossil from the same site.

The features of the Yuanmou hominid have not been debated much; however, age determination has been controversial over the past decades.

The paleomagnetic dating for hominid incisor-bearing layer gave the following results: 1.7 Ma (Li et al. 1976), 0.7 Ma (Hyodo et al. 2002), and 1.7 Ma (Zhu et al. 2008); the ESR dating result is 1.1–1.6 Ma (Huang & Grün 1998); the analysis of comprehensive lithostratigraphy, biostratigraphy, magnetostratigraphy result and support age of middle Pleistocene is probably 0.5–0.6 Ma (Liu & Ding 1983). An early Pleistocene age (1.7 Ma) is widely accepted.

Homo erectus yuanmouensis is the earliest hominid fossil to date in China; however, the incisors and tibia could not provide much morphological traits for such species. Southern Yuanmou Basin has thick Plio-Pleistocene fluviolacustrine deposits, which have great potential for finding more hominid and culture remains. Unfortunately, just two excavations have been conducted in the past half century. Further field survey and excavation is necessary for future projects.

Cross-References

- ▶ Central Asia: Paleolithic
- ▶ Dmanisi Hominins and Archaeology
- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ *Homo erectus*
- ▶ *Homo habilis*
- ▶ Insular Southeast Asia in the Lower Paleolithic
- ▶ Java Man
- ▶ Movius Line
- ▶ Zhoukoudian, Archaeology of
- ▶ Zhoukoudian: Geography and Culture

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Z

Zbyszewski, Georges

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Basic Biographical Information

Georges Zbyszewski (1909–1999) (Fig. 1) was a Portuguese geologist, paleontologist, and archaeologist of Russian origin. During World War II, he went with his family to live in Paris, where he studied geology, graduating from the Sorbonne University. In 1935 he moved to Portugal, advised by Jacques Boucart, from whom he was an assistant, in order to study the Quaternary lands from the Portuguese coast, aiming to elaborate his Ph.D. dissertation. The aim of Zbyszewski's studies was to compare the Portuguese Quaternary formations with those from the north of Morocco, which had been studied before by Jacques Boucart. George Zbyszewski worked then with the Portuguese geographer António de Medeiros Gouveia, who was preparing his Ph.D. dissertation about the Algarve region. Zbyszewski finally established in Portugal in 1940, invited by António Viana, Chief of Serviços Geológicos de Portugal (Geological Services of Portugal) to work in that institution. He crossed the country, elaborating studies and making important discoveries regarding paleontology, geology, and archaeology, publishing several scientific articles regarding these disciplines. He also contributed to the elaboration of geological charts, working in Serviços Geológicos de Portugal till 1979, when he retired.

Major Accomplishments

Georges Zbyszewski was a great contributor to the advancement of Portuguese geology, paleontology, and archaeology. In terms of his scientific achievements, Georges Zbyszewski was the author of 281 publications, 54 of which were about paleontology. He published 105 studies on the Portuguese Quaternary (research about prehistoric fauna and lithic industries), covering the entire Portuguese territory. Concerning geology, he published 96 works and also 26 articles about other several subjects. He was the author or coauthor of 45 geological charts of Portugal, in the scale 1/50 000 and the respective explicative news.

Zbyszewski's studies about the Quaternary led him to publish, besides particular notes, valuable synthetic works on this subject, such as *Le Quaternaire du Portugal*, edited in 1957, and *A classificação do Paleolítico antigo e a cronologia do Quaternário de Portugal* (1942). The studies carried out in the region of Alpiarça (1946) were a decisive contribute for the knowledge of the Quaternary lands, in which he studied not only the characteristics of the terraces of the Tagus in

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Zbyszewski, Georges, Fig. 1 Georges Zbyszewski. Source: http://www.lneg.pt/CienciaParaTodos/edicoes_online/biografias/zbyszewski

this region but also the Paleolithic industries related with these deposits.

The presence of Henri Breuil in Portugal during World War II allowed a close collaboration with Zbyszewski. Several publications came out from this partnership such as "Contribuição para o estudo das indústrias paleolíticas de Portugal e sua relação com a Geologia do Quaternário" (1942), whose 1st volume constituted the *XXIII Comunicações dos Serviços Geológicos*, dedicated to the study of the main quarries from both sides of the ancient Tagus estuary, and the second volume, published on XXVI *Comunicações dos Serviços Geológicos*, dedicated to the quaternary beaches in the Estremadura coastline and the fluvial terraces of the Low Tagus Valley (1945).

Still regarding prehistoric archaeology, G. Zbyszewski studied the remains found in caves and rockshelters that he surveyed or in which survey he collaborated. It is the case of the Almonda's caves (1941 and 1947); Lapa da Bugalheira (1941); Lapa da Maceira, Vimeiro (1949); the caves of Ponte da Lage (Oeiras) (1957), of Salemas (Ponte de Lousa) (1962), of Columbeira (Bombarral) (1963), and of Alcobertas (1971); and Lapa do Bugio in the same year. He was dedicated also to the study of Late Prehistory in Portugal, conducting research about the hypogea of Casal do Pardo (Palmela), the Tholoi of Praia das Maçãs (1961) and of Calhariz (Sesimbra), and the dolmen of Casal do Penedo (1951), of Casainhos, and of Várzea de Sintra (1977).

Cross-References

- ► Europe: Middle to Upper Paleolithic Transition
- ► Europe: Prehistoric Rock Art
- ► Lithic Technology, Paleolithic

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Zeuner, Frederick Everard

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Basic Biographical Information

Frederick Zeuner (Fig. 1) was an intellectually brilliant and innovative natural scientist who founded the subdiscipline of environmental archaeology.

Born in Berlin in 1905, Zeuner was educated at the universities of Berlin, Tübingen, and Breslau (now Wroclaw in Poland) where he studied paleontology and geology with mineralogy, geography, zoology, and botany as minor subjects. At Breslau he studied under Walther Soergal, whose research on Quaternary glaciations and mammalian faunas influenced Zeuner and who supervised his Ph.D. (1927) on uplifted river terraces southwest of Breslau. At age 20, he was appointed *Assistent* and later *Privatdozent* in the Breslau Institute of Geology and Palaeontology. He qualified as a university teacher in 1931 with a thesis on Tertiary insects and was appointed to a lectureship at the University of Freiburg-im-Breisgau.

By 1934 Zeuner had already published over 30 scientific papers and monographs, but his career was then disrupted by the political turmoil in Germany where the Nazis had gained power in 1933. His Jewish wife was classified as a "non-Aryan" and Zeuner was dismissed from his university post. The couple left Germany for London in 1934 where, as an academic refugee, Zeuner was supported by the Academic Assistance Council (later the Council for Assisting Refugee Academics or CARA) which Sir William Beveridge, Director of the London School of Economics, and other prominent academics had established in May 1933. Already known for his many publications on fossil insects, Zeuner became a Research Associate in Palaeontology at the British Museum (Natural History) and in 1939 published a major monograph, *Fossil Orthoptera*

Zeuner, Frederick Everard, Fig. 1 Frederick Zeuner, *c.* 1955 (Reproduced by permission of the Institute of Archaeology, University College London)

Ensifera, for which he was awarded a London University D.Sc. degree. Although formally classified as an enemy alien, he succeeded in becoming a naturalized British citizen, and during the Second World War he joined the Anti-Locust Research Centre at the Museum. At this time he completed his first two books (see below) and began publishing papers on prehistoric archaeology and Pleistocene mammals.

Soon after his arrival in London, circumstances arose that changed the direction of Zeuner's scientific career. Through the determined efforts of Mortimer Wheeler, the then Director of the London Museum, and his wife Tessa, the Institute of Archaeology was founded, without premises in 1934 and formally in 1937 in a refurbished mansion, St. John's Lodge in Regent's Park (Evans 1987: 1-18). Wheeler's vision of archaeology included training in natural sciences, and, with further support from CARA, Zeuner joined the Institute as an Honorary Lecturer in Geochronology in 1936 – an event that

Zeuner, Frederick Everard, Fig. 2 Zeuner (*left*) with Professor Gordon Childe, date and location not recorded, possibly in Regent's Park (Reproduced by permission of the Institute of Archaeology, University College London)

marks the beginning of what was to become the subdiscipline of environmental archaeology. Teaching at the Institute was suspended during the Second World War, but although his fieldwork was curtailed, Zeuner continued to publish paleontological, geological, and archaeological papers. In 1944 the University of London agreed, in light of his exceptional qualifications, that he should be promoted to a (part-time) professorship, and in 1946, the same year that Gordon Childe became Director of the Institute (Fig. 2), he became the world's first Professor of Environmental Archaeology (Harris 2009: 130). His appointment later became full time and he continued to teach at the Institute and undertook fieldwork throughout the world until his premature death at the age of 58 in November 1963.

Major Accomplishments

The defining achievement of Zeuner's career was his ability to master evidence from across the natural sciences to examine, on a world scale, the sequence of environmental changes that occurred in the Quaternary and relate them to prehistoric archaeology and mammalian faunas. His talent for comparative field observation, his command of the multilingual European scientific literature, and his ability to synthesize a wide array of data were reflected in his first book, *The Pleistocene Period* (1945). In it he sought to establish an absolute chronology by relating changes in climate and sea level to evidence from fluctuations in solar radiation (following the Serbian mathematician Milutin Milankovitch's astronomical calculations, Gribbin 2002: 476-80), glacial moraines, loess (wind-blown silt from glacial sediments), river terraces, ancient shore lines, cave deposits, and changes in fauna. Then, in a companion volume *Dating the Past* (1946), which drew on lectures Zeuner gave at the Institute of Archaeology, he introduced the new subject of geochronology, described its techniques, comprehensively examined the relationship of Pleistocene (ice age) and Holocene (postglacial) environmental changes worldwide to archaeological periods, principally the Paleolithic, and concluded with a section on dating the prehuman past of the Earth.

These two publications established Zeuner's international reputation as a leading environmental scientist, but preceded the demonstration in 1950 by Willard Libby and his colleagues at Chicago that organic materials could be directly

dated by the radiocarbon technique. Zeuner responded to this breakthrough by immediately setting up his own radiocarbon dating project in London and produced a series of results, including dating the Neolithic occupation of Jericho excavated by Kathleen Kenyon (Harris 2009: 130-31, 139: Notes 5 and 6).

Through the 1950s and early 1960s, Zeuner undertook field projects in many parts of the world and published a multitude of archaeological, geological, and faunal papers. In his last decade he worked increasingly on animal domestication. This culminated, just before his premature death, in the publication of his magnum opus, *A History of Domesticated Animals* (1963), in which he presented domestication in its widest sense as more a biological than a cultural process. Zeuner was a lucid and fluent lecturer and at the Institute of Archaeology, he inspired and trained a succession of research students, many of whom went on to develop the subdiscipline of environmental archaeology that he created.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Childe, Vere Gordon (Theory)
- ▶ Radiocarbon Dating in Archaeology
- ▶ Wheeler, Mortimer

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Zhan, Guo

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Basic Biographical Information

Dr. Zhan received his M.A. in Mongolian History and Yuan Dynasty History from the Chinese Academy of Social Sciences and studied at the Archaeology Department of Peking University. Guo Zhan is the director of the World Heritage Expert Committee of China, a nongovernmental professional consultant institution designated by the State Administration of Cultural Heritage (SACH) as well as a senior researcher on history and archaeology and concurrent professor at the Chinese Academy of Governance. Dr. Zhan is the ICOMOS vice president and was first elected by the 15th General Assembly in 2005. He also is the vice-chairman and secretary-general of ICOMOS-China as well as director of IICC-Xi'an.

Major Accomplishments

Dr. Zhan took part in the deliberations and research with regard to the Nara Document on Authenticity in Nara, Japan, in 1994 and 2004.

He has worked within the State Administration of Cultural Heritage on the protection, management, and research of ancient architecture, historic cities, and archaeological sites, successively acting as project manager, deputy division chief, director of the General Office, director of the Cultural Relics Division, director of the Division of World Heritage, and commissioner of the Department of Cultural Heritage Protection until his retirement.

Most recently, Zhan has organized the ICOMOS Asia-Pacific Group meetings in China, worked with the international and national post-disaster heritage rescue and protection measures in the wake of Wenchuan earthquake in 2008, and presented at various symposia on the protection and management of cultural landscapes, industrial heritage, and the Grand Canal of China.

He is engaged in the conservation and monitoring of heritage sites in China and serves as chair of the International Symposium on the Concepts and Practices of Conservation and Restoration of Historic Buildings in East Asia. He participated in the revision of the *Principles for the Conservation of Heritage Sites in China* and organized the translation into Chinese of *History of Architectural Conservation* written by Jukka Jokilehto, the *ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites* (ICIP), *Preparing World Heritage Nominations* (World Heritage Centre, ICOMOS, IUCN), and of some interesting discussion papers of ICOMOS International Scientific Committee on the Theory and Philosophy of Conservation and Restoration.

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- ▶ China: Cultural Heritage Management
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- ▶ China: Managing Cultural Heritage and the World Heritage List

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Zhoukoudian, Archaeology of

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Introduction

Zhoukoudian is located in the Fangshan District, 55 km southwest of downtown Beijing. A hill called Longgushan "Dragon Bone Hill" was known by local farmers in the early twentieth century for Ordovician limestone quarrying. Zhoukoudian was first visited by the Swedish geologist Johan Gunnar Andersson as a potential location of quaternary mammalian fossils in 1918. The American paleontologist Walter Granger later identified fossils at the Dragon Bone Hill in 1921. Austrian paleontologist Otto Zdansky then discovered two *Homo erectus* teeth from the Locality 1 cave in 1926, the same year Canadian anthropologist Davidson Black named the hominid teeth as a new species *Sinanthropus pekinensis* (Black 1927). Black secured funding from the Rockefeller Foundation and started the official international collaboration with the Cenozoic Research Laboratory (today's Institute of Vertebrate Palaeontology and Palaeoanthropology, Chinese Academy of Sciences) in 1927. Both Davidson Black and Chinese paleontologist Yang Zhongjian led excavations at the site, where the first skull of Peking man was recovered by Chinese anthropologist Pei Wenzhong in 1929. Since 1930, Zhoukoudian has become one of the most important paleoanthropology sites for the study of human evolution in the world.

Definition

Zhoukoudian (aka Choukoutien in early publications) is a UNESCO world heritage site in China. It refers to a village whose landscape

Zhoukoudian, Archaeology of, Fig. 1 The only surviving Peking man skull, examined by one of the authors (Dr. Chen Shen) at the Institute of Vertebrate and Paleontology and Paleoanthropology in 2010 (Photo credit, author (ZXL))

includes 27 localities of hominids, fauna, and cultural remains. Four of these localities yielded significant hominid fossils of different species. Locality 1 cave (Peking man site) unearthed 203 *Homo* fossil fragments of *Homo erectus*, belonging to more than 40 individuals (Fig. 1). These included six nearly complete skulls, five of which were lost during WWII. The Peking man skulls are the most important study subjects for Asian *Homo erectus* and have been published extensively. A human premolar unearthed from Locality 4 in 1973 was unknown to the world, which probably belongs to Asian Archaic *Homo sapiens*. Locality 26 (aka the Upper Cave) yielded 10 individual fossil remains belonging to modern human *Homo sapiens sapiens*, which are also well-studied specimens in paleoanthropology. The latest discovery of human fossils at Zhoukoudian was from the Tianyuan Cave where 34 fragments were found, including a mandible, teeth, and postcranial bones, which present a nearly complete individual (Shang & Trinkaus 2010). Direct AMS 14 C dating from a limb fragment produced the most reliable and earliest date for China's Homo sapiens sapiens at Zhoukoudian, ranging from 42,000 to 38,500 years ago. In addition, six localities (Locality 1, 4, 13, 15, 22, and 26) yielded a large assemblage of lithic artifacts and other cultural relics such as fire remains and ornaments.

Key Issues/Current Debates/Future Directions/Examples

Locality 1 (Peking Man Site)

The most focused studies at Zhoukoudian have been dating, climatic context, lithic technology, and hominid and carnivore remains of the cave. Recent dating studies have changed the old perspectives about when Peking man lived, suggesting the hominid appeared at Zhoukoudian as early as 780,000 years ago (Shen et al. 2009), when the world was in extreme cold and dry climate. With cultural material deposits measuring 40 m deep, it is possible to show the occupation of early hominids may have lasted half a million years at Zhoukoudian. Lithic artifacts were recovered from deposits of three cultural phases (early layers 8–10, middle layers 6–7 and QII, and late layers 3–5), accounting for more than 17,000. These were catalogued into ten classes with 40 types of stone tools, which suggest a gradual transition from simple use to a more complicated tool manufacturing process at the site.

Locality 15

The lithic artifacts from Locality 15 (dated to the late Middle Pleistocene and early Late Pleistocene Periods) reveal evidence suggesting that lithic technology at the site was more

developed than that of their predecessors at the Locality 1 (Gao 2000). The Zhoukoudian Locality 15 hominid (most likely East Asian *Homo heidelbergensis* although no fossil found yet) effectively mastered sophisticated core reduction modes, represented by multi-directional flaking and alternate flaking, which were not evident at the Locality 1.

Fire Use

One of the issues debated about Zhoukoudian's cultural contents is the use of fire. Although there is no structurally defined hearth at the Locality 1 site, burnt ashes, charcoals, burnt bones, and even stone tools were often identified in situ. Whether or not these fire-related activities were the result of intentional human control and manipulation or of natural causes and hydratic force is the subject of further studies. Since 2009, full-scale excavations at the Locality 1 have been carried out by Chinese scientists and have revealed possible fire floors at the layer 4 (Fig. 2). An interdisciplinary research team is taking samples for all relevant scientific laboratory testings, and hopefully the results will advance our knowledge about the human use of fire in the Middle Pleistocene at Zhoukoudian.

Zhoukoudian, Archaeology of, Fig. 2 Ongoing excavation at Zhoukoudian Locality 1 by scientists from Chinese Academy of Sciences since 2009 (Photo credit: the author (SC))

Hunters or Hunted

Since 1980s, a number of studies related to Peking man behaviors have challenged old thoughts suggesting that Locality 1 was primarily a den of the giant hyena. Lewis Binford argued the deposition of fossil remains were likely the results of carnivores' activities (Binford & Ho 1985). Later Steve Weiner (Weiner et al. 1998) and Paul Goldberg (Goldberg et al. 2001) cautioned early reported evidences of fire use and proposed the fire-ash and burned bones at the cave probably were natural process of the formations. A study by Noel Boaz (Boaz et al. 2004) on spatial distribution of hominid fossils further dismissed the idea that the Zhoukoudian Locality 1 cave was a home base for Peking man. Instead, the cave was more likely used by carnivores scavenging the Peking man. The 20 years of studies in favor of carnivore activities over hominids were all based on analyses of limited samples of fauna and sediment.

Concerning all the discoveries and debates, new systematic excavations and multi-disciplinary research will bring the solutions. The comprehensive study of lithics including both technology and function will reveal the behavioral capability. Further taphonomic and zoo-archaeological research, physical anthropology, chronology dating, and paleoenvironmental study should be all involved.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Black, Davidson
- ▶ *Homo erectus*

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Zhoukoudian: Geography and Culture

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Introduction

The Zhoukoudian site (39°41′N, 115°51′E) is a series of cavities on the Dragon Hill, which is located at Zhoukoudian, Fangshan District, about 50 km southwest of Beijing at an elevation of about 128 m above sea level (Fig. 1). So far at least 27 fossil localities have been systematically studied and numbered. These are known not only for the discoveries of human remains but also for the long sequence of lithic and animal bone assemblages produced through several excavations in the various localities. Among all the localities, the Locality 1, situated on the northern slope of Dragon Bone Hill, including the "Peking Man Cave" and the Pigeon Hall, in which several human skeletal remains were first discovered in 1929 and named collectively as "Peking Man", is the most important one. At the time, the impact of finding the human fossils, originally called *Sinanthropus*, was immense. Continued excavations at Locality 1 uncovered an additional series of human fossils derived from a thick, well-stratified sequence.

Definition

The fossiliferous potential of the Zhoukoudian area was first investigated by geologist J. Gunnar Andersson in 1919 (Andersson 1919) at Chicken Bone Hill which now termed Zhoukoudian Locality 6. The main cave infilling, a hill of Ordovician limestone named Dragon Bone Hill, was discovered by J. Gunnar Andersson, Otto Zdansky, and Walter Granger in 1921(Andersson 1922). Long-term fieldwork was undertaken from 1921 to 1937, and many important discoveries were recovered in the Dragon Bone Hill, especially at Locality 1. The first excavation was undertaken by Zdansky in 1921 and 1923, and three isolated hominid teeth were recovered (Black 1926; Zdansky 1927; Weidenreich 1937). Five complete *Homo erectus* skulls and a number of mandibular and dental remains were discovered from 1929 to 1936. The first identified and also the well-preserved recovery skull (skulls E), discovered in 1929 by Pei Wenzhong (Pei 1930; Black 1931; Black et al. 1933), was a turning point in the investigation of the site and helped to ensure continued funding (Cormack 2000). Hominid discoveries were made each field season, but the excavation of skulls LI, LII, and LIII during 11 days in November 1936 by Jia Lanpo was particularly noteworthy (Jia 1999). The sixth complete skull was discovered during fieldwork from the 1950s to 1970s. The inventory

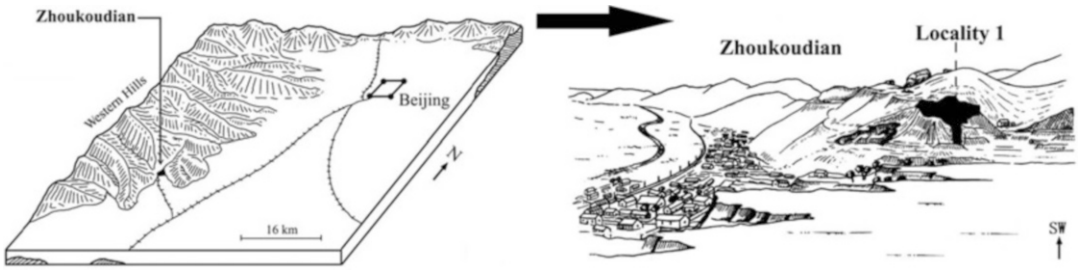

Zhoukoudian: Geography and Culture, Fig. 1 A map showing the position of the Zhoukoudian site (After Andersson 1943)

of all of the Peking Man fossils from Locality 1 is as follows: 6 complete or nearly complete skulls, 12 large skull fragments, 15 incomplete mandibles, 157 teeth, 3 humerus fragments, 1 clavicle, 7 femur fragments, 1 tibia fragment, and a lunate bone. The specimens represent materials from more than 40 male and female individuals of different ages. The Peking Man cave is the richest *Homo erectus* site in the world and marked a new era in our understanding of the history of human evolution.

Zhoukoudian is known not only for the discoveries of human remains but also for the long sequence of lithic and animal bone assemblages obtained at several excavations in the various localities (Jia & Huang 1990). Over 100,000 pieces of stone artifacts have been unearthed from Locality 1 alone (Fig. 2). The variety of raw materials used to make the stone artifacts include quartz, flint, sandstone, etc.; local quartz is dominant and outcrops exposed by weathering processes from such places as the riverbed and the hill slopes in the vicinity of the cave. The most striking feature of the Peking Man industry lies in use of the direct bipolar percussion technique, which was created by Peking Man himself principally because of the scarcity of better quality material in the region. The stone tools include scrapers, points, choppers, burins, borers, and so on, using different production techniques. Changes in tool size, raw materials used and the flake-producing techniques over time demonstrate that the lithic technology of Peking Man progressively evolved.

Nearly 100 species of mammalian fossils have been found in Locality 1, including thick-jaw deer (*Megaloceros pachyosteus*), sika deer (*Cervus grayi*), gazelle (*Gazella*), saber-toothed tiger (*Machairodus*), striped hyena (*Pachycrocuta sinensis*), and cave bear (*Ursus spelaeus*), among others. Some of these were clearly part of the diet of Peking Man.

Several ash layers are interspersed relatively widely within the 40 m of deposits. More strikingly, ash residue in the fourth layer was quite thick, and the thickest part is over 6 m. In these ash layers, there were large quantities of burnt stones, charred bones, and burnt seeds of hackberries. The analysis of black layer samples and associated charred bone fragments confirms the existence of remains of fire use by Peking Man.

The Peking Man cave sediments, more than 40 m thick, have been divided from bottom to top into 17 layers (Fig. 3). Human remains were found in nearly all layers (1–10) (Pei & Zhang 1985). The lithic assemblages were concentrated in several horizons (layers 1, 3, 4, top of 8 and 10), and some artifacts were found scattered throughout the thick brecciated layers (layers 5–9). The sediments also record much information regarding paleoclimatic change (Yang et al. 1985). They are characterized by breccias layers interbedded with non-breccia layers. The breccia layers imply a cold climate and the non-breccia layers imply a warm climate. There are many sedimentary cycles composed of subdivided beds in each layer, which may reflect paleoclimatic variations of different scales (Liu 1985).

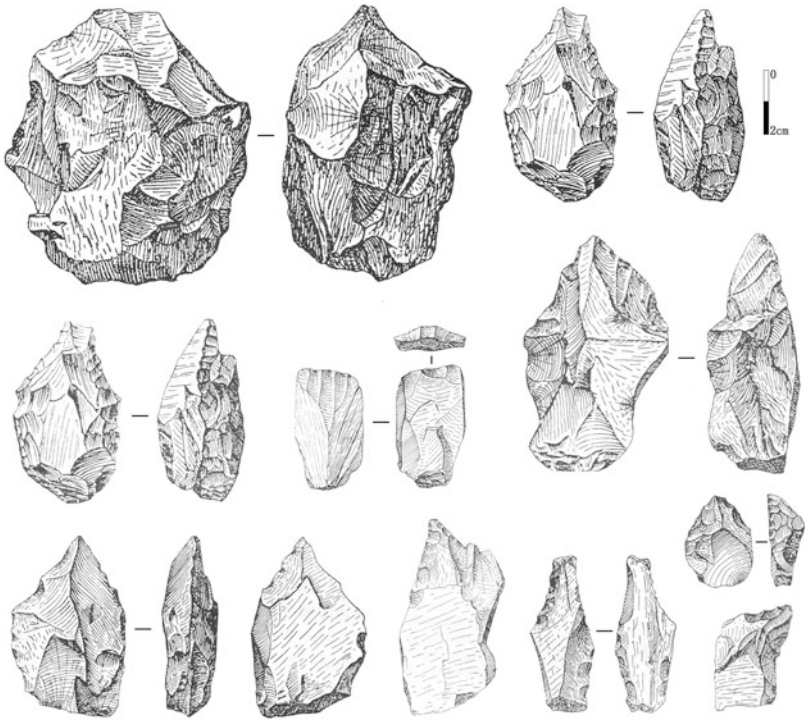

Zhoukoudian: Geography and Culture, Fig. 2 The stone artifacts from Zhoukoudian, Locality 1 (After Pei & Zhang 1985)

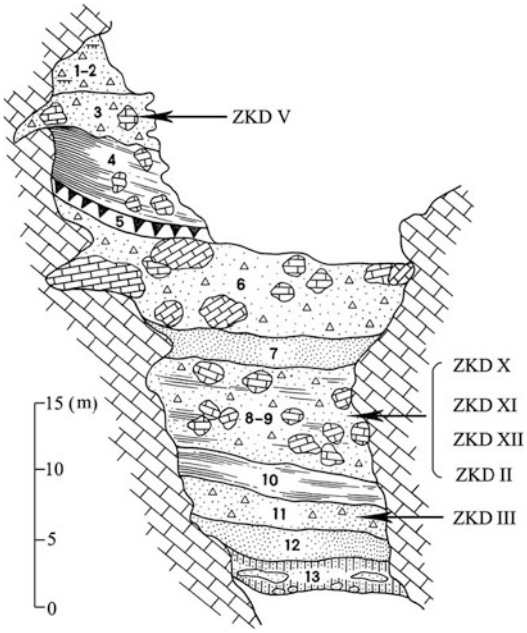

Zhoukoudian: Geography and Culture, Fig. 3 A sketch showing the deposits (West Profile) of ZKD Locality 1 and the stratigraphic positions of the cranial discoveries (From Wu et al. 2011)

The geological age of the deposits of Locality 1 is Middle Pleistocene based on the mammalian assemblages from the cave. A series of detailed geological, palynological, and paleontological studies, as well as dating, has contributed significantly to our understanding of the complex stratigraphy and the dates of the Peking Man site. Early attempts to date Locality 1 may be traced to 230Th/234U ages measured on two fossil bones by Cherdyntsev (1971). In the late 1970s, numerical dating was carried out at several Chinese institutions using different techniques, including U-series disequilibrium (Zhao et al. 1985a), fission track (Liu et al. 1985), paleomagnetism (Qian et al. 1985), thermoluminescence (Pei 1985), and amino acid racemization (Zhou 1989). As a result, the following chronological sequence has been proposed (Zhao et al. 1985b): c. 700 ka for the lowest fossiliferous horizon (layer 13), based mainly on paleomagnetic stratigraphy; c. 500 ka for the lowest stone artifact-containing layer (layer 10), based on fission track dating of sphene

grains extracted from ash deposits; and c. 230 ka for the uppermost strata (layers 1–3) based on 230Th/234U dating of fossils. Alongside technical advances in dating methods, chronological studies of Locality 1 have continued, but the newer age results do not significantly alter the generally accepted temporal framework, which places the age of the hominid remains in the range of about 230–500 ka. At present, a new result which was made by a new radiometric method indicates that the date of the oldest human fossils is about 770,000 years ago and that *H. erectus* at Zhoukoudian lived during a relatively mild glacial period (Shen et al. 2009).

Key Issues/Current Debates/Future Directions/Examples

There are some hot topics on which many subsequent studies have focused. The first is dating. Although many dating methods have been used to determine the age of Locality 1 and a general temporal framework has been obtained, the validity of the assumptions used in the dating and the accuracy of the derived ages remain problematic. Even the latest result which was made by Shen et al. (2009) has been subject to debate. The second is the use of fire. There is no doubt that the ash layers existed; even the ash residue in the fourth layer was quite thick. Furthermore, abundant burnt stones, charred bones, and burnt seeds of hackberries were found. Some of these samples have been analyzed and confirm the existence of remains of fire used by Peking Man (Wu 1999), but also there are some contradictions (Weiner et al., 1998). The third concerns the function of the cave: whether or not the cave was Peking Man's home. Because of the long sequence of the sediments, as well as other evidence, Peking Man was considered to have lived long term in the cave. But Binford (Binford & Ho 1985) thought the cave was a trap. The fourth focuses on the lithic industry. From the view of geology, the Zhoukoudian industry is old, but the small elongated flakes produced by the bipolar method are even Upper Paleolithic products in the West (Teilhard & Pei 1932). Finally, the issue of whether this hominid species was a direct ancestor of later eastern Asian populations or a side branch in human evolution impacts on the two principal current hypotheses about the origin of modern *H. sapiens* (e.g., Wolpoff et al. 1984).

Cross-References

- ▶ Andersson, Johan Gunnar
- ▶ *Homo erectus*
- ▶ Human Evolution: Use of Fire

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Zimbabwe: Cultural Heritage Management

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Introduction

Zimbabwe has a history of formal cultural heritage management which dates back to the colonial period. The country was a British colony from 1890 and named Rhodesia after Cecil John Rhodes. It won independence in 1980 after a war of liberation. The management of cultural heritage has remained conservative, lagging behind modern management practices. In Zimbabwe, cultural heritage is defined by law and includes some of the following: any historical building, ruin, statue, grave, cave, rockshelter, and area of archaeological or historical interest. This entry discusses the history of cultural heritage management in Zimbabwe and the challenges that have often been encountered when managing it. Finally, it looks at some of the concerns that have been raised about cultural heritage in Zimbabwe and how its management should be improved.

Historical Background

When the colonial government introduced formal cultural heritage management in Zimbabwe, it had assumed that there was no cultural heritage protection in the country. Prior to that time,

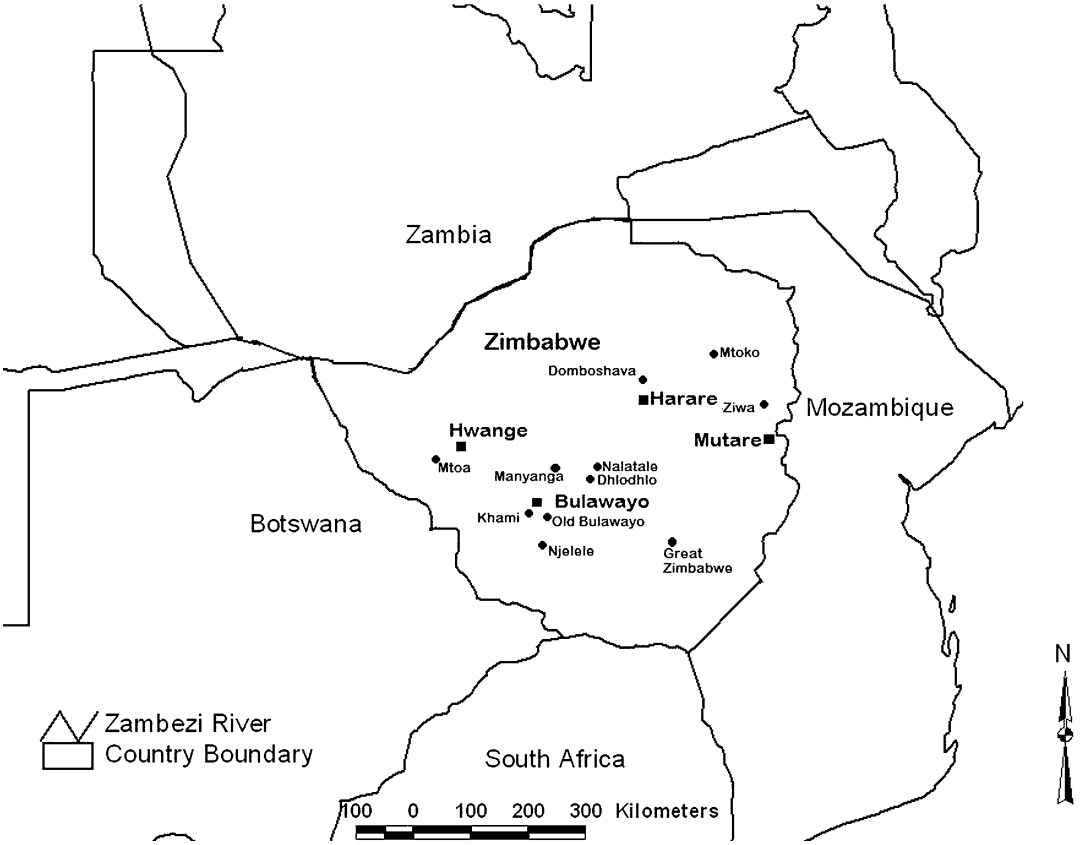

Zimbabwe: Cultural Heritage Management, Fig. 1 Part of Southern Africa showing some of the archaeological cultural heritage sites in Zimbabwe

however, cultural heritage was protected by traditional methods and laws, which were upheld by the local communities and enforced by traditional leaders. These traditional laws were not written down, and they constituted what is now known as customary laws (Chiwaura 2005). The introduction of formal laws to manage cultural heritage was part of efforts to protect the dry-stone ruins of Great Zimbabwe, Khami, Dhlodhlo (Danang'ombe), Zinjanja (Regina), Nalatale, and others (Fig. 1), which early European settlers had incorrectly believed were storage rooms for gold and other precious minerals for King Solomon and the Queen of Sheba (Mahachi & Ndoro 1997).

To protect these sites from pillaging and destruction, the Legislative Assembly enacted the Ancient Monuments Protection Ordinance in 1902. This was followed by the 1912 Bushman and Relics Ordinance aimed at protecting rock art. The promulgation of this ordinance emanated from the concern that the rampant pillaging of rock art by early European settlers in South Africa would spread into Rhodesia (Ndoro 2001). Both the 1902 and the 1912 ordinances were later repealed and replaced by the comprehensive Natural Historical Monuments and Relics Act of 1936. A wide range of cultural and natural heritage sites were for the first time protected and managed under this act. Following its enactment, the Commission for the Preservation of Natural and Historical Monuments and Relics, commonly known as the Commission, was established to implement the protective legislation. Its objective was to coordinate activities related to the preservation of ancient, historical, and natural monuments, relics, and other objects of aesthetic, historical, archaeological,

or scientific interest. The Act was later repealed and replaced with a new Act, CAP 313, after the Commission and the National Museums of Rhodesia were amalgamated in 1972 to establish the National Museums and Monuments of Rhodesia. Ndoro (2001) viewed this amalgamation as a positive development as it ensured that all cultural heritage property had to come under a single administration. However, Chipunza (2005) saw the merger differently, contending that the activities of the Commission to protect cultural heritage sites became limited as the inspection of monuments was no longer recognized as a profession. The new organization was divided into five administrative regions and headquartered first in Harare, then Salisbury, and placed under the ministry of Internal Affairs. Open-ended contracts for White regional and executive directors were established, probably to safeguard the interests of the White community. The problem of open-ended contracts is that cultural heritage continues to be administered with the same management style without any chance for change or improvement. At independence, the heritage agency's name was changed to the National Museums and Monuments of Zimbabwe (NMMZ) and administered under the ministry of Home Affairs. Although there are opposing views regarding the joining of the two organizations, the objective of the new body did not differ much from that of the Commission, except in few instances where it provides for the establishment of museums and the board of trustees. The protection of cultural heritage remained under this law and administration until independence, when it was adopted wholesale by the NMMZ.

Key Issues/Current Debates

Management Prior to Independence

Soon after its establishment, the Commission began to compile a list of rock paintings, ruins, and places of scenic beauty. A monuments register was created, with 2,400 sites initially entered. By 1954, the Commission had proclaimed 79 of these sites as national monuments (Summers & Cooke 1959). A number of sites declared as national monuments were related to colonialism, perhaps as part of legitimizing this cultural heritage in a country where Black people were the majority. Activities such as archaeological excavations, alteration, defacing or removal, and export of an ancient monument or relic were not permitted without the written consent of the Commission. Separate registers for historical buildings were also subsequently prepared in each of the country's major cities, and although they were protected by law, not many were declared as national monuments. Historical Buildings Advisory Committees were also established to provide advice on how they were to be protected and managed.

A major challenge during the formative years of the Commission was the lack of staff and equipment to carry out maintenance work on proclaimed monuments and other sites. Following an agreement with the National Parks Advisory Board in 1951, Victoria Falls and the Zimbabwe Ruins (Great Zimbabwe) were temporarily transferred to the Parks Board for management. Additional monuments were transferred to the Parks authorities after a further agreement was made in 1961. Table 1 shows a list of monuments that were transferred and were to be managed by the Parks Board, while Table 2 shows monuments that were to be co-managed by the two organizations.

The hope of the Commission was that these monuments were to be transferred back in future when adequate staff members were employed and equipment acquired. Only Great Zimbabwe and a few other sites were returned in 1975, but the rest including the Victoria Falls remained under the current Zimbabwe Parks and Wildlife Management Authority. Attempts to take over the management of Victoria Falls by the NMMZ in recent years from the Parks authorities have caused a considerable dispute between the two organizations (Makuvaza 2010).

Many sites that were proclaimed as national monuments were then fenced, and brass plaques were erected to advise the public that they were now government property and protected by law, and breaking the law was by order liable to

Zimbabwe: Cultural Heritage Management, Table 1 Monuments handed over to the Parks Board in 1951 for management

Registered number	Name of monument
1	Victoria Falls Reserve
4	World's View Hill-Matopos
9	Sinoa (Chinhoyi) Caves
10	Rhodes-Inyanga Estate
12	Pungwe Falls
29	World's View Farm-Nyanga
35	Chirinda Forest
42	Mtoa Ruins-Hwange
44	Mjelele Valley Road Cave
46	Ewanrigg Aloe Garden
51	Rupisi Hot Springs

Zimbabwe: Cultural Heritage Management, Table 2 Monuments that were to be co-managed by the Commission and the Parks Board

Registered number	Name of monument
2	Zimbabwe Ruins
7	Bambata Cave
8	Nswatugi Cave
19	Silozwane Cave
20	Gulubahwe Cave

Zimbabwe: Cultural Heritage Management, Fig. 2 Plaques erected at cultural heritage sites proclaimed as national monuments to warn the public that they were protected by law

Zimbabwe: Cultural Heritage Management, Fig. 3 Brass plaques erected at cultural heritage sites after the enactment of the Act, CAP 313

prosecution (Fig. 2). Proclamation of sites as national monuments, fencing and phraseology on the plaques instantaneously sidelined local communities from managing their cultural heritage in fear of being prosecuted.

Local communities had also begun to be isolated from managing cultural heritage as they were evicted from their original areas to create European settlements through the 1930 Land Apportionment Act and later by the 1949 Forestry Act, 1951 Land Husbandry Act, and the 1975 Parks and Wildlife Management Act. The result was that people were physically and spiritually separated and settled in new areas with cultural heritage sites they were not directly associated with (Pwiti & Ndoro 1999; Ndoro 2001). The problem of isolating people from their cultural heritage appears to have been realized and addressed when the old plaques were replaced with appropriately rephrased ones, showing the new Act, CAP 313 (Fig. 3).

These brass plaques are still erected at many cultural heritage sites proclaimed as national monuments in Zimbabwe today. The problem of isolating the local communities from their cultural heritage appears to have been in principal addressed but in practice remained, even well after the independence of the country.

During its early formation, the Commission had felt that the enactment of the legislation was not adequate for the full protection of sites in the country. Physical intervention was therefore required in cases where sites would collapse or vandalized. An inspection program was established, and the work included carrying out regular inspection of all monuments, which included maintenance and repair (Fothergill 1953). Inspection reports, which outlined the conservation requirements of cultural heritage sites, were also introduced as part of the program.

Zimbabwe: Cultural Heritage Management, Fig. 4 A museum at Khami developed as part of a visitor attraction at the site

However, much of the early conservation work was technical and unsystematic and involved seasonal clearing of vegetation, restoration, and provision of access to the visiting public (Pwiti 1997; Ndoro 2001). At some sites such as Khami and Nalatale, concrete or cement mixed with earth (dhaka) was applied to stabilize the collapsing walls. This approach, however, focused more on the protection of physical aspects of cultural heritage sites, while the protection of intangible elements was not of major concern. Also, regular conservation work was biased towards bigger and popular sites such as Great Zimbabwe, Khami, Dhlodhlo, Nalatale, Tsindi, and Mtoko ruins. Smaller, less popular, and other type of cultural heritage sites were managed through a monuments inspection program. Some sites located in private farms such as Manyanga (Ntaba zi ka mambo) located in the former Meikles farm in the Bubi district were in part administered by the farmers themselves. Although there were attempts to manage some of the religious sites such as Njelele in the Matobo hills and Tere ruins in Mtoko, these sites remained under the custodianship of traditional authorities and community protection (Pwiti & Ndoro 1999; Ranger 1999; Makuvaza 2008).

Archaeological research at some of the sites led to the realization that they could be developed as major tourist attractions in the country. Consequently, site museums were developed during the colonial period and others after independence at or near sites such as Great Zimbabwe, Khami, Dhlodhlo, Nalatale, Mtoko, and Ziwa in Nyanga and in Matopos (Fig. 4). Exhibitions in these site museums, however, were largely targeted at foreign tourists and less at domestic visitors.

Many of these sites were, however, later abandoned at the height of the liberation struggle during the latter half of the 1970s for security reasons (Ndoro 2001). During this period, no conservation work was carried out, and vegetation, which had previously been regularly cleared, grew back threatening their structural stability.

Post-Independence Period

After independence, the approach to the management of cultural heritage in the country did not, however, differ much from that which was established during the colonial period. The legislation was amended in 1984, in 1990, and in 2001 during which year it was renamed CAP 25/11. Regardless of these amendments, the legislation remained to a very large extend identical to the predecessor Acts, especially in sections and parts that relate to the definition and the actual protection and management of cultural heritage in the country. After independence, the management of cultural heritage continued under the same conservative management structures, established during the colonial era.

Although there was not a marked difference between the management of cultural heritage during the colonial and independence periods, the new Zimbabwean government began to support its management throughout the country. More attention, however, was given to Great Zimbabwe which was viewed as a source of national pride and from which a new identity could be advanced (Pwiti 1997). Several international consultants were sent to Great Zimbabwe and other sites by UNESCO, UNDP, and by other European countries such as United Kingdom, Sweden, and Norway to provide advice on how they should be managed (cf. Ndoro 1997, 2001). This eventually resulted in the acknowledgement by UNESCO of the significances and values of Great Zimbabwe and Khami as universally outstanding, leading to their proclamation in 1986 as World Heritage sites. This was followed later by the proclamation of Matobo Hills in 2003, while Ziwa has been under consideration for World Heritage listing since 1997. Other monuments and sites continued to be managed through a revived monuments inspection program as was the case before independence.

In 1991, the NMMZ developed a Master Plan for Cultural Resource Conservation and Development, which was aimed at providing a national conservation strategy and development of some of the monuments as tourist attractions so as to generate revenue for the organization (Collett 1991). The master plan was also aimed at changing museum displays and at addressing local communities concerns. After independence, presentations of major monuments had remained targeted at foreign tourists, and the local communities had also remained alienated from the management of these sites (Pwiti 1997). To address some of these concerns, a number of sites were selected for development, including Khami, Dhlodhlo, Domboshava – a rock art site situated 35 km north east of Harare and Old Bulawayo – a nineteenth-century Ndebele settlement located about 25 km south of Bulawayo.

While efforts were made to improve the management and development of important archaeological sites in the country, cultural heritage related to colonialism did not receive similar attention. Upon independence, the new government thought to be responsive to Black people's sensitivities could not allow cultural heritage related to colonialism to continue to survive (Turnbridge 1984). In Harare, this resulted in the removal of the statue of Cecil John Rhodes from Africa Unity Square and from the city center in Bulawayo (Fig. 5). The statue was viewed as symbolizing colonialism and oppression.

Keeping the statue in public places would have been interpreted as glorifying the colonial past and reminding Zimbabweans of the bitter colonial era under the British settler government rule. In Bulawayo, the statue was placed behind the premises of the Natural History Museum in the Centenary Park, away from public view. Plans are now at an advanced stage by the NMMZ to erect the statue of Joshua Nkomo at the position where Rhodes' statue once stood. Nkomo was one of the Zimbabwean nationalist who helped lead the war of independence against White minority rule in the country. About a decade ago, demands were also made by Sangano Munhumutapa, a pressure group, to exhume Cecil John Rhodes' grave in Matopos and repatriate the bones to Britain (cf. Muringaniza 2004). The NMMZ, however, intervened and saved the grave from this planned action, arguing that the monument is an integral part of the country's history.

On attainment of independence, many historical buildings have been threatened by modern development alleged to have been hindered by colonialism. Some of the buildings which had symbolized the settler government and oppression were owned by people of European origin, and Black Zimbabweans who could not own them did not have an interest in their protection. Instead, they were increasingly disturbed by the colonial repression the buildings symbolized and actively questioned the cultural heritage which was being protected in those structures (Turnbridge 1984). The interest in the protection of historical buildings appears to have been gradually lost due to the collapse of the Advisory Committees, as the few interested Whites left the country at the beginning of the land reform program in 2000. From 2000, the Zimbabwean

Zimbabwe: Cultural Heritage Management, Fig. 5 The statue of Cecil John Rhodes erected during the colonial period, between Main Street and 8th Avenue in Bulawayo

government embarked on a compulsory "fast track" acquisition of White-owned farms and redistributed them to "landless" Black Zimbabweans. The legislation has also remained passive on the protection of historic buildings as a result of the increased demand for modernization of old buildings to accommodate present economic and public needs.

Few cultural heritage sites were proclaimed as national monuments in the country after independence. In the recent past, Mataga and Chabata (2008) examined the current NMMZ monument register, and they found out that the majority of sites were declared before independence and the rate at which these sites were listed dramatically declined after 1980. They noted that by 2006, of the 171 sites on the list, only seven were declared after independence, a surprising development given the change from the minority to the majority government. This is also notwithstanding the fact that a lot of sites have been found through archaeological research following the introduction of the archaeology program at the University of Zimbabwe early after independence.

The acquisition of White farms resulted in unemployment, reduced gross domestic product, deteriorating race relations, political and economic instability, and skills emigration. Subsequently, European states and the USA imposed "targeted" or "smart" sanctions on the country as a punitive measure of forcing the government to impede what they regarded as unwarranted land reform program and human rights abuse during elections. The worsening economic situation resulted in the departure of experienced archaeologists and cultural heritage managers to work in neighboring countries. The official household redistribution of land and the informal resettlements must have seriously impacted negatively on the protection of cultural heritage in the country. The hustle with which the land acquisition program was carried out meant that there was no time to protect cultural heritage during the land reform program.

The high unemployment rate resulted in the widespread of illegal mining named *Chikorokoza* of diamond known locally as *Ngoda* and gold in previously protected farms and along the country's Great Dyke. Cultural heritage sites could be destroyed through this illegal mining, probably taking advantage of the fact that mining legislation overrides the protection of cultural heritage in Zimbabwe. The Great Dyke is a linear intrusion of mafic and ultramafic rocks which cut across the Archaean granites and greenstones of the Zimbabwe craton in a SW-NNE direction. It is between 520 and 550 km in length and 4–11 km wide and is rich in ore deposits, including gold, silver, chromium, platinum, nickel, and asbestos (Wilson & Prendergast 2001). The impact that the land redistribution program and these mining activities had on cultural heritage is at present unknown as no impact studies have been carried out.

Strained international relations also led to either the withdrawal, cancellation, or drying up

of donor funds for the management of cultural heritage in the country. Previously, cultural heritage management in Zimbabwe depended much on donor funding. The major problem of the withdrawal or cancellation of donor funding is that it placed the entire cultural heritage management into an uncertain future (Murimbika & Moyo 2008). The prevailing harsh economic environment also resulted in continued business depression leading to the withdrawal of local aid support for cultural heritage management. Consequently, cultural heritage management has been greatly underfunded in the country.

Future Directions

Way Forward and Conclusion

There have been expectations that cultural heritage management in Zimbabwe should be improved. These hopes have been based on the knowledge that cultural heritage has not been efficiently managed during both the colonial and postcolonial periods. The expectations have also been that the improvement should be in line with the shifting meaning of cultural heritage and the best international management practices. The failure to improve the management of cultural heritage in Zimbabwe has been regarded by Pwiti and Ndoro (1999) as the perpetuation of the colonial legacy.

To improve the management of cultural heritage, it has thus been argued that the legislation governing cultural heritage management should be revised. This would address the problem, according to Chipunza (2005) of its entrenchment in colonial principle, which considers that cultural heritage sites should be protected rather than used. This would also address the problem of the isolation of the local communities from managing their cultural heritage and the protection of its intangible aspects. The overlap of duties that were created between the NMMZ and the Park authorities since from the 1950s would as well be addressed through the revision of the legislation. The rampant destruction of cultural heritage through mining ventures could be avoided if reference is made to its protection under the mining legislation. Contracts for the NMMZ administrators require to be shortened to avoid the pursuance of self-interests and style of management, which can negatively affect the proper management of cultural heritage. This would end the current conservative approach to the management of cultural heritage in Zimbabwe.

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Zimbabwe's World Heritage Sites

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Introduction

Zimbabwe has five World Heritage sites, which are Great Zimbabwe, Khami, Matobo Hills, Victoria Falls, and Mana Pools. The Nyanga Terraces are on the Tentative List (Fig. 1). Great Zimbabwe, Khami, and the Nyanga Terraces are managed by the National Museums and Monuments of Zimbabwe (NMMZ), while the Victoria Falls and Mana Pools are run by the Zimbabwe Parks and Wildlife Management Authority (ZPWMA). The Matobo Hills are managed by both the NMMZ and the ZPWMA. These sites have a long history of research, conservation, and development well before they were accorded World Heritage status.

Key Issues/Current Debates/Future Directions/Examples

Great Zimbabwe

Declared the second national monument in 1937 after Victoria Falls, Great Zimbabwe (CE 1290–1450) is located near the city of Masvingo in south central Zimbabwe. It is one of the best-known archaeological sites in sub-Saharan Africa (Fig. 2). The site was established following the demise of Mapungubwe (CE 1220–1290), a precolonial site, situated at the confluence of Shashe and Limpopo rivers in the south. It consists of dry-stone walls and several Dhaka (earthen) structures of different sizes. Great Zimbabwe is divided into three main areas: the Hill Complex, the Valley Ruins, and the Great Enclosure. Two perimeter walls separate the inside and external confines of the settlement (Ndoro 2001).

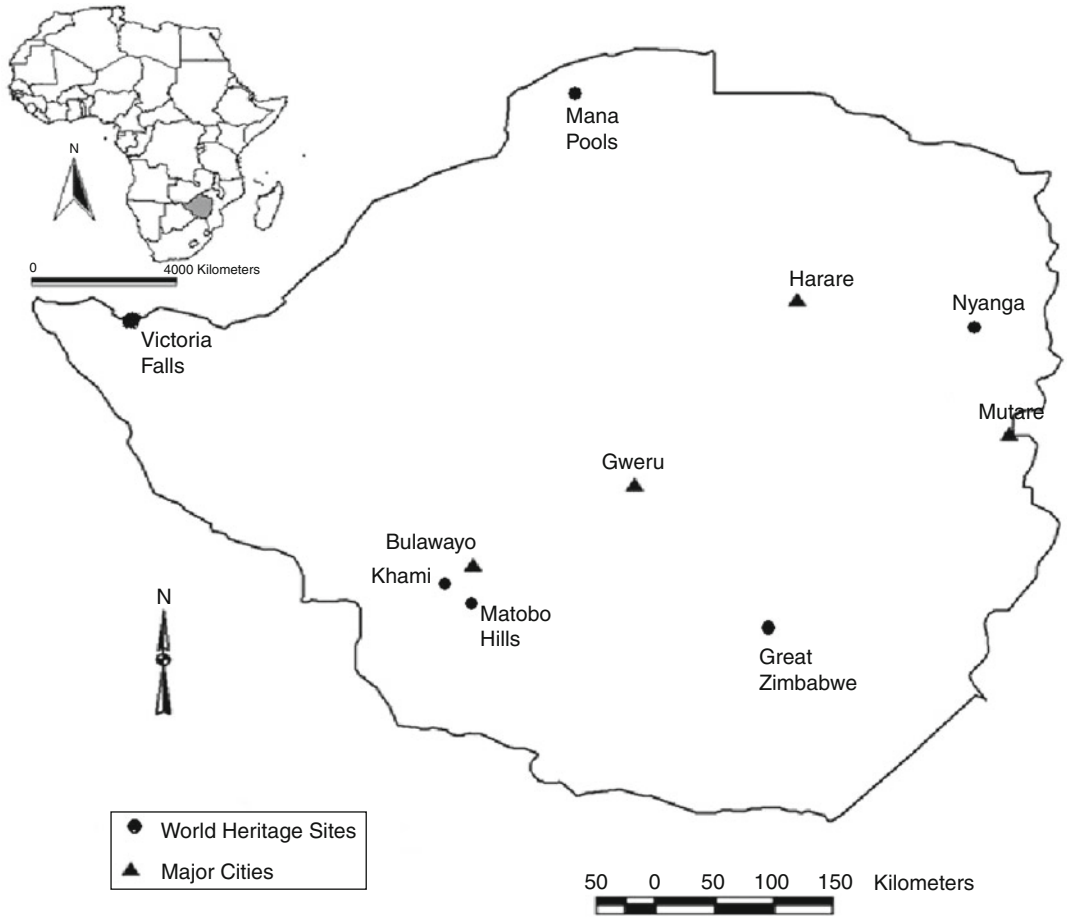

Zimbabwe's World Heritage Sites, Fig. 1 Map showing the location of world heritage sites in Zimbabwe

At its peak, between the fourth and fifteenth centuries, its population probably numbered 18,000 people, settled over an area of more than 720 ha (Huffman & Vogel 1991). The site was perhaps the largest settlement in sub-Saharan Africa before European colonization of the region (Ndoro 2001).

The decline of Great Zimbabwe as a center of a powerful prehistoric state between CE 1450 and 1550 remains an unresolved archaeological problem. According to Pikirayi (2001), this is largely due to unsystematic investigations of the late nineteenth century European antiquarians and prospectors, who destroyed its stratigraphy and looted the site in search of Near Eastern artifacts and gold. The site was abandoned by the middle of the fifteenth century. Causes for the abandonment have been suggested to be the decline of trade, which had shifted to the north of the country, political instability, famine, and water shortages caused by climatic change (Garlake 1982). However, the demise of Great Zimbabwe led to the rise of two major polities; the Mutapa state in the north and the Torwa state in the west.

During the late nineteenth and early twentieth centuries, Europeans who encountered Great Zimbabwe caused great controversy among the archaeological world. They contended that the site was not built by the indigenous people because of its advanced architecture. They thus attributed its construction to the Phoenicians, Arabians, or Egyptians (Mahachi & Ndoro 1997).

According to Huffman and Vogel (1991), this hypothesis was based on superficial similarity

Zimbabwe's World Heritage Sites, Fig. 2 Conical Tower in the Great Enclosure

between the site and the ruins in southern Arabia and false resemblance in names such as Ophir and Fura (also called Mount Darwin). The Rhodesian government also mounted political pressure on archaeologists to deny the authorship of the site by the indigenous people to justify its colonization of the country (cf. Mahachi & Ndoro 1997). This view, however, changed with the arrival of the first systematic archaeologists from the 1920s onwards. Evidence which demonstrated that the site was constructed by the indigenous people was largely based on the stratigraphical evidence at the site and comparative research carried out at Khami and Dhlodhlo (Danan'ombe) (cf. Caton-Thompson 1931; Robinson 1959). From this archaeological research, it was ultimately concluded that the indigenous people of Zimbabwe were responsible for the construction of the settlement.

Since from the late nineteenth century, archaeological research was carried out alongside conservation of the site, which began as far back as 1914 (Ndoro 1994). Much of it was, however, technical and unsystematic (Pwiti 1997; Ndoro 2001). Major restorations of collapsed stone walls were carried out on different parts of the site and approached from misinformed interpretation of the site. This is because the site was viewed as a product of exotic populations rather than of the indigenous people (Pwiti 1997). At independence from the British settler government in 1980, the country was named Zimbabwe after this archaeological site. Once the authorship of the site was resolved, not much archaeological research has been carried out at the site, and the focus shifted to its conservation and management. Accordingly, the government began to support the management of the site as it was viewed as a source of national pride and from which a new identity could be forged (Pwiti 1997). Several international consultants were sent to Great Zimbabwe by UNESCO and UNDP and by many European countries to provide advice on how it should be managed (cf. Ndoro 2001). This eventually resulted in the acknowledgement by UNESCO of its significance and values as universally outstanding leading to its proclamation in 1986 as a UNESCO cultural World Heritage site.

Khami

This archaeological site is a complex of dry-stone walls that cover approximately 35 ha of land and is located 22.5 km west of Bulawayo. Khami was established as a Torwa state in around 1640 after the collapse of Great Zimbabwe. The distinct development of Khami state was a modified style of dry-stone wall architecture, which was inherited from the Great Zimbabwe architecture. Its structures are terrace or retaining walls that are constructed around and over granite hill tops. The top surfaces of the hill tops were leveled to create platforms at which residential houses were built (Robinson 1959). The platforms are also decorated with check and cords patterns, and the general layout of Khami is a clear testimony of

Zimbabwe's World Heritage Sites, Fig. 3 The restored Hill Complex at Khami

the continuity from the preceding site of Great Zimbabwe (Fig. 3). The site has seven built-up areas believed to have been occupied by the royal family, with open areas in the valley occupied by the commoners.

The wealth of the Torwa state in cattle and involvement in long distance trade was envied by other ethnic groups. This eventually led to the invasion of the site in around 1683 by a powerful Rozvi people. This led to the burning and abandonment of the Torwa capital and the shift of the state to Dhlodhlo (Danan'ombe), located approximately 100 km in the east.

The archaeological footprint, which was protected as it was the royal reserve for Lobengula, the Ndebele King, was not badly disturbed by rampant prospecting by treasure hunters of the Rhodesia Ancient Ruins Company Limited. The site was examined by Randall-MacIver (1906), by Gertrude Caton-Thompson (1931), and by Robinson (1959), with the major aim of resolving the authorship of Great Zimbabwe. However, this work also provided comprehensive knowledge about the site's history. Since then, like at Great Zimbabwe, not much archaeological research has been carried out at the site as attention shifted to its conservation and protection. In 1937, Khami was proclaimed as a national monument in recognition of its importance in the prehistory of the country. Its significance was, however, eventually acknowledged as universally outstanding leading to its proclamation as a UNESCO cultural World Heritage site in 1986, the same year Great Zimbabwe was also accorded with the same status. Even though there are efforts which are being made to protect the property, the site is threatened by the constant flow of sewage into Khami River and dam due to the expansion of the Bulawayo high density suburbs towards this World Heritage site.

Matobo Hills

The Matobo Hills are located in Matabeleland South Province, about 35 km south of Bulawayo. They measure about 3,100 sq km, extending from almost to the Botswana border in the west, while to the east they merge with the Mbalambala granite pluton (Fig. 4). The local people also refer to this cultural landscape as Matonjeni.

The natural landscape comprises of scenic geological formations, which provides a wide range of niches that support a variety of flora and fauna. The geomorphology of the hills gives rise to microclimates and soil conditions which change markedly over short distances. The resultant landscape comprises of extensive open

Zimbabwe's World Heritage Sites, Fig. 4 The Matobo Hills cultural world heritage landscape

grasslands with groups of kopjes (rock outcrops) which are interspersed with wetlands (marshes and streams). The combination and diversity of flora and fauna and its long history of interaction with humankind has made this cultural landscape worthy of attention and preservation (Walker 1996).

Archaeological evidence has shown that the hills have been inhabited from the Stone Age period right up to the present times (Walker 1996). The hills have probably the highest concentration of rock art in southern Africa. This testimony, which when combined, contributes to the understanding of the precolonial history of the region. Matobo is the abode of the oracular cult of the High God (Mwari/Mwali) whose voice is believed to have been heard from the rocks (Ranger 1999). This oracle links the local communities with the hills. The hills also contain important historical sites from the colonial and postcolonial periods. Archaeological research in the Matobo has been more focused on the Stone Age period and the historical period as well as its biodiversity (see Grobler 1974; Walker 1996). However, not much research has been carried out on the Iron Age period of the hills. Although this is the case, the hills were accorded World Heritage status in 2003, making the area the first cultural landscape to be honored with this importance in the country.

The management of the hills has a long history, dating back to a period before the arrival of Europeans in the area in the late nineteenth century. Before this period, the hills have been managed by traditional methods and laws (cf. Ranger 1999). With the coming of Europeans, new laws based on European notions of management were introduced. Today, the management of this cultural landscape is based on the combination of traditional practices and modern legislations.

Victoria Falls

The Victoria Falls were inscribed on the World Heritage list in 1989 as a transboundary property shared between Zambia and Zimbabwe. This site is located in southwestern Zambia and northwestern Zimbabwe.

At Victoria Falls, the Zambezi River course is interrupted by the falls at approximately 1,300 km from the river's source in the northwest province of Zambia (Fig. 5). Below, the river traverses for another 1,500 km to its delta on the Indian Ocean in Mozambique. In 1855, the Victoria Falls was named by a Scottish missionary-explorer, David Livingstone, in honor of the British Queen Victoria. The falls are also known by their local

Zimbabwe's World Heritage Sites, Fig. 5 The Victoria Falls world heritage site main falls

Kololo name, Mosi-oa-Tunya, meaning the "smoke that thunders" because of the water's roar and clouds of rising mist.

The management and development of Victoria Falls as a tourist resort began from 1900 soon after the eviction of the local communities from the area (see McGregor 2003). On the Zambian side, the management of the Victoria Falls began in 1934 when an Executive Committee was set up under the Victoria Falls Reserve Preservation Ordinance. Its objectives were to promote tourism by managing visitor rondavels previously located at the now defunct Rainbow Lodge as well as managing the Zambia hydropower station and the customs post. Subsequently in 1948, the Preservation of Natural and Historical Monuments and Relics, which is now the National Heritage Conservation Commission, set up a Conservancy Committee. In the following year, the committee enacted bylaws and extended the protected area to the Songwe Gorge, which is just below the falls. On the Zimbabwean side, the Victoria Falls Reserve Preservation Act was enacted in 1928, specifically to protect the Victoria Falls Reserve, known as the Special Area (Fig. 6). A new legislation called the Monuments and Relics Act was enacted in 1936. This followed the establishment of the Commission for the Preservation of Natural and Historical Monuments and Relics, popularly known as the Commission, which is now the NMMZ. A year after, in 1937, the Victoria Falls Reserve was proclaimed the country's first national monument. In the same year, bylaws were put in place to protect the area (Joint Technical Committee 2007). At present, there are numerous related legislations being implemented at the site.

With the growth of heritage tourism, which is a special interest travel, which ranges from the examination of physical remains of the past and natural landscapes to the experiencing of local cultural traditions, the Victoria Falls have become a popular tourism area. Visitors to the site are motivated by unique experience, exclusivity, differentiation, personal experiences, and nostalgia for the past and the desire to experience diverse landscapes and forms. Until a few decades ago, the only important tourism activities at the site were to walk and view the falls and gorges from a few selected points. In recent years, however, a broad range of activities have been offered within the World Heritage area to cater for the different needs of visitors. In view of that, the site is currently being threatened by the expansion of tourism facilities (Joint Technical Committee 2007).

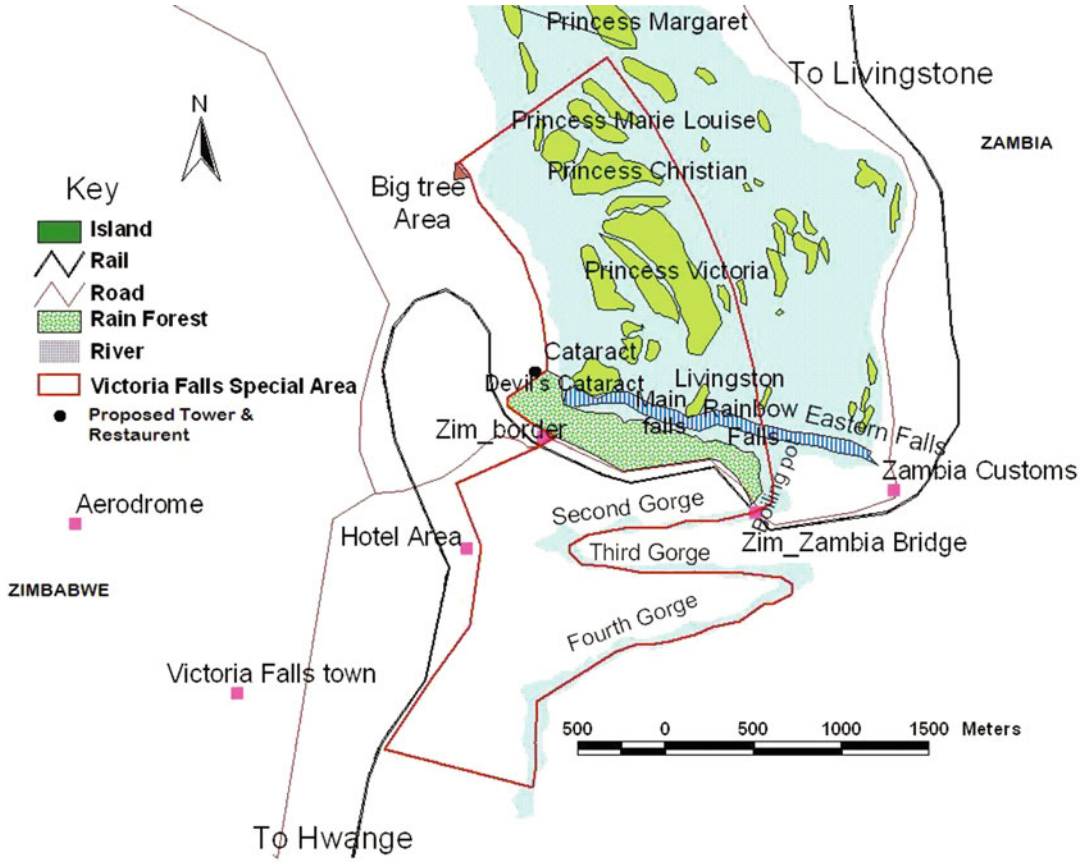

Zimbabwe's World Heritage Sites, Fig. 6 The Victoria Falls special area proclaimed as Zimbabwe's first national monument in 1937

Also in recent years, the NMMZ and the ZPWMA have been involved in an ownership dispute of the Special Area. The NMMZ argues that the Special Area is the country's first national monument under the then Commission and should be returned, while the ZPWMA counter argues that the area is now part of the Victoria Falls National Park, which was established in 1952 and it now falls under its administration. Although this conflict is yet to be resolved, it has caused considerable management problems of this celebrated World Heritage site (cf. Makuvaza 2010).

Mana Pools

The Mana Pools were the first to be proclaimed in 1984 as a UNESCO natural World Heritage site in Zimbabwe. The site is located in the Hurungwe district in Mashonaland Province. It is composed of three adjoining protected areas, namely, the Mana Pools National Park, Sapi, and Chewore Safari Areas.

This World Heritage site is part of the Miombo woodland/savannah biogeographic territory. The area includes large areas of the rugged Zambezi escarpment and also contains the last remaining natural stretch of the middle Zambezi River. Well-grassed Brachystegia communities dominate the mountainous escarpment and higher Chewore areas with small but significant riparian communities along the numerous streams. The valley is dominated by the mopane (*Colophospermum* spp.) woodlands. There is also a wide range of large mammals, over 350 bird species and aquatic wildlife in this World Heritage site.

The property has a well-defined and buffered boundary. Each of the three areas has functional

park management plans. However, the site does not have an integrated site management plan to ensure the effective management of the property.

Conservation problems affecting this World Heritage site, which are pollution and uncontrolled exploitation of its resources, have not been fully addressed since from early 1990s when an environmental impact study for the proposed Mupata hydroelectric power generation was carried out (see du Toit 1982). For engineering reasons, the Mupata project was shelved and a new feasibility study was carried out at Batoka Gorge. However, both projects appear to have been shelved as well given the economic and political problems experienced in the country in recent years. The site has also continued to be threatened by poaching, sport hunting, boating, and fishing. It is also regularly threatened by the regulating effect of the Kariba Dam and continued development of tourism facilities.

Nyanga Terraces

This cultural landscape, which is located in the Nyanga area in northeastern Zimbabwe, has been on the UNESCO World Heritage Tentative List since 1997. The cultural landscape has stone-faced terraces, which cover every hill and valley sides, while hundreds of hectares of soils have been worked into wide cultivation ridges. Associated with these are stone-built homesteads of the builders. Old water furrows reveal the exploitation of available water resources, and traces of iron-working show testimony of manufacturing activities. The cultural landscape covers a total of approximately 5,000 sq km. The whole complex represents an agricultural society of industrious farmers and livestock herders whose culture developed from about CE 1300 to sometime in the nineteenth century (Soper 2006). The terraces have evidence of human occupation for all the major archaeological periods identified in the country's archaeological sequence, beginning from the Stone Age to the historical period.

Since the placement of the terraces on the Tentative List, no effort has been made to ultimately inscribe them on the World Heritage List. Recently, however, the potential World Heritage status of the site has been noted (Willems & Comer 2011). If properly nominated, there is no doubt that the terraces can be Zimbabwe's next cultural World Heritage landscape.

Discussion and the Future

Although there is sufficient knowledge about sites such as Great Zimbabwe, Khami, and the Matobo Hills, a knowledge gap on how people moved from their old settlement to new established ones still exists. For instance, it is not clear if the movement of populations from Mapungubwe to Great Zimbabwe and from Great Zimbabwe to Mutapa in the north and to Khami in the west was rapid or gradual. If the movement was steady, settlements which are associated with this gradual process of movement require searching and further investigation. In Matobo, the transformation from the hunter-gatherer to the Iron Age period also requires further archaeological enquiry. Although a lot of archaeological research has been carried out on the Nyanga Terraces, there still exist areas that are not very apparent. The purpose for which the terraces have been constructed, and the recent discovery of gold mining by Kritzinger (2008) are still very highly controversial issues. At Victoria Falls, archaeological research was only active during the 1970s (see Phillipson 1975), while there is virtually no archaeological research carried out in the Mana Pools World Heritage area. As a result, not much is known about the prehistoric people who once settled in these natural World Heritage sites.

However, while this is the case, on the administrative side, there is also little or no effort made to fully involve the local communities in the management of these World Heritage sites. This explains why the integrity of some of them is constantly threatened. The friction between the NMMZ and the ZPWMA over the ownership of the Special Area needs to be resolved, while coordination with the Zambian authorities is vital to curb further development of tourist facilities in this World Heritage area. Lastly, efforts have to be made to nominate the Nyanga Terraces so that it can be added to Zimbabwe's rich and diverse natural and cultural World Heritage properties.

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- ▶ Chile's World Archaeological Heritage and its Management
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Basic Biographical Information

Larry J. Zimmerman is a North American archaeologist who is known for his work in social justice as it relates to the practice of archaeology. Zimmerman received a Ph.D. from the University of Kansas in 1976 and taught at the University of South Dakota from 1974 to 1996, where he was Distinguished Regents Professor. He was Chair of the American Indian and Native Studies at the University of Iowa from 1998 to 2001 and was Head of the Archaeology Department at the Minnesota Historical Society from 2002 to 2004.

Since 2004, he has served as Professor of Anthropology and Museum Studies and Public Scholar of Native American Representation at Indiana University-Purdue University, Indianapolis, and the Eiteljorg Museum of American Indians and Western Art in Indianapolis, Indiana.

Major Accomplishments

Zimmerman is highly regarded for his commitment to Native American and Indigenous issues as they relate to archaeology. In 1978, Zimmerman excavated the Crow Creek Massacre site in central South Dakota. His ability and willingness to listen to Lakota and Arikara Indian nations about their concerns over the project led him to insist on reburying the human remains that had been uncovered at the site. Three years of negotiations took place between the tribes, the Bureau of Indian Affairs, and the US Army Corps of Engineers before the remains were finally reburied. This project led to Zimmerman being trusted by many Native American activists but also put him in the middle of the controversy over whether repatriation and reburial could be a legitimate activity for a US archaeologist. Zimmerman's decision to speak with the descendants of the individuals buried at this archaeological site and ultimately to accede to their wishes with regard to treatment of the human remains resulted in hardships for him within the profession. Rather than hiding these challenges, he chose to publish accounts of them, such as the 1989 essay, "Made Radical by My Own," which were received as beacons by young Native scholars.

Zimmerman's publications revealed deficiencies in what was then standard American archaeology. The theoretical voids in American archaeology that Zimmerman highlighted are what many archaeologists now stand proudly behind: the need for archaeology to be socially relevant and respectful. By assigning his support to the "radical" side, Zimmerman exposed himself to the potential of ridicule and derision by his peers. Zimmerman (1989: 66) stated that, "I think being yelled at by colleagues and Indians is good for the soul," standing bravely behind his belief that being yelled at is a small price to pay for doing the right thing.

In 1988, Zimmerman served as Organizing Secretary of the World Archaeological Congress' First Inter-Congress in Vermillion, South Dakota. This meeting is important in that it resulted in one of the first archaeological codes of ethics to note the importance of treating human remains as inextricable from their cultural contexts, the Vermillion Accords. These set forth provisions for the ethical treatment of the dead by archaeologists and rest on the principle that human skeletons mean much more than archaeological objects. This was a watershed moment, representing the first time an international community of archaeologists listened to and reflected on the concerns of Indigenous peoples in an archaeological code of ethics. The fact that professional archaeologists from all over the world chose to travel to a remote area of South Dakota reflects the importance of the meeting. The Vermillion Accords have influenced generations of archaeologists and have meant that Native Americans have been able to see that a segment of the archaeological population really does understand deeply held tribal concerns about human remains and burial sites.

More recently, Zimmerman has been involved in a project of archaeology of the homeless, conducting research in downtown Indianapolis, Indiana, USA. The homeless archaeology project provides useful information for city governments and social workers who may have lacked an understanding of what life is really like for the homeless. Similar to Zimmerman's work with Native American communities, this research takes place alongside members of homeless communities. It is a collaborative research and also a form of social justice. These themes pervade most of Zimmerman's work.

Zimmerman's professional service includes work for the Society for American Archaeology, for which he served as a member of the Nominating Committee (1994) and as the chair of the Native American Scholarships Committee (1995–1997). He has also served the American Anthropological Association as elected Chair of

the Committee on Ethics (2002–2005). Much of Zimmerman's professional service has been for the World Archaeological Congress, for which he has served as Executive Secretary from 1990 to 1994 and as Vice President from 2005 to 2008.

In addition to the Vermillion Inter-Congress held in 1988, Zimmerman organized the World Archaeological Congress' 2009 Inter-Congress on Indigenous Peoples and Museums, held in Indianapolis, Indiana, USA. This conference provided space for ongoing dialogue about topics such as repatriation, the differing national ethics of museum exhibits, and ways that Indigenous knowledge can enhance archaeological research. It is certain that Zimmerman's reputation was one of the big draws for the meeting. In the 23 years since the Vermillion Inter-Congress, American archaeology has undergone a shift. Today, there are more than 17 Native Americans who hold doctorates in archaeology and many more with Master's degrees. In addition, the attitude and spirit of the Vermillion Inter-Congress is expressed in mainstream archaeology through the practice of what is called "Indigenous archaeology." If Zimmerman had not set the groundwork back in 1989, there certainly would never have been a 2009 conference of this nature. And, many of the subjects that were discussed might never have been raised.

Zimmerman has been honored by many organizations, including the Indiana University-Purdue University, Indianapolis, where he was named Outstanding Distinguished Resident Faculty, School of Liberal Arts in 2009. He was awarded the Mariko Mizuhara Award for Cross-Cultural Understanding in 2000 from the University of Iowa. Notably, in 2008, he received the inaugural Peter J. Ucko Memorial Award for Contributions to World Archaeology from the World Archaeological Congress at the sixth Congress in Dublin, Ireland. In a reflection of how his work has affected North American archaeology, Zimmerman was nominated for this award by four Native American archaeologists who hold doctorates. Each nominator was able to reflect on how Zimmerman's work had allowed them to progress within the discipline of archaeology.

Larry Zimmerman's commitment is not to archaeology of the dead, but to archaeology for the living. In his work with Native Americans, he sees us as inextricably linked to our ancestors and does not conduct work without acknowledging this bond. In his work with the homeless, he sees the path between the data he accumulates and the process of changing the lives of the people who live on the street. His archaeology is not conducted in an academic vacuum. He realizes that archaeology is a science that can be a powerful force for good.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Ethics in Archaeology
- ▶ Indigenous Archaeologies
- ▶ Indigenous Archaeologies: North American Perspective
- ▶ Indigenous Peoples, Working with and for
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA
- ▶ Repatriation Acts: Before NAGPRA
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation: Overview
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ World Archaeological Congress (WAC)

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Zoning: Boundary Areas and Buffer Zones

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Introduction

In the sense that time, as a quote widely attributed to Woody Allen would have it, is nature's way of keeping everything from happening at once, so zoning is a scheme devised by humans to prevent everything from happening at the same place. On any landscape, some areas are more amenable to particular uses than are others, and uses in some areas can be complementary or incompatible. When the landscape contains archaeological sites and materials that can be damaged by certain forms of human activities, preservation of them depends upon allocating, or zoning, uses appropriately. Effective conservation and preservation at archaeological sites must draw upon the knowledge of where vulnerable archaeological resources are located. Zones can then be delineated in ways that can be easily used by site managers.

Definition

Zoning is a basic land management tool, one commonly employed by local and regional governments in developed countries around the world. Zoning as practiced in settings from urban to rural addresses a variety of issues associated with use: activities (residential, commercial, industrial, agricultural), density of use or development, height of buildings, limitations on built space per unit of landscape, limitations on area of impervious surface, construction of roads and parking lots, preservation of green space, and rules governing both architectural and landscape design.

Key Issues/Current Debates/Future Directions/Examples

Many organizations that play a role in the conservation and preservation of archaeological sites have been slow to apply the concept and protocols of zoning. The idea of a buffer zone around World Heritage Sites was not introduced into the *Operational Guidelines for the Implementation of the World Heritage Convention* until 1977. In the 2005 version of these guidelines, a buffer zone was strongly recommended, but not mandatory. In 2008, an International Expert Meeting on World Heritage and Buffer Zones was held in Davos, Switzerland, which introduced less

equivocal language into the Operational Guidelines (UNESCO 2012: Paragraphs 103–107). It defined a buffer zone as an area surrounding a property necessary to the proper conservation (used in this sense to include preservation) that has been established by means of legal or customary restrictions. It should constitute an added layer of protection around the property. The buffer zone is described as (including), "the immediate setting of the nominated property, important views and other areas or attributes that are functionally important as a support to the property and its protection" (UNESCO 2012: Paragraph 104). Sites nominated to the World Heritage List, according to this version of the guidelines, must include a map of the buffer zone and a clear description of the size, characteristics, and uses authorized in the buffer zone. The guidelines also state that the buffer zone be determined through "appropriate mechanisms" and that the purposes served by the buffer zone be described.

In the publication resulting from the experts meeting (UNESCO 2009), it is emphasized that a buffer zone be defined in legal terms, "not just in the World Heritage nomination dossier" (UNESCO 2009: 29), thus emphasizing that such a zone should exist as more than a name alone. The document also suggests that the zone be devised in mind of all forms of intrusion to the site, including acoustic and visual, as well as those which arise from construction, roads, vibration, and natural disasters. It also notes that the buffer zone should be part of the management plan or system for the protected area, that is, the buffer zone itself must be managed and management should be integrated with that of the site itself.

The Xi'an Declaration (UNESCO 2005) also addresses the subject of buffer zones, here in the context of the preservation of setting. The need for monitoring change is expressly presented: "Monitoring should define approaches and actions to appreciate and measure as well as prevent or remedy decay, loss of significance or trivialization and propose improvement in conservation, management and interpretation Practices" (UNESCO 2005: 3). It sets out the need for the development of qualitative and quantitative indicators for this purpose. This is consistent with protocols for monitoring as they are used in many other fields, including ecology and medicine, which stipulate that instruments, indicators, and standards be identified in a monitoring plan (Comer 2006). Instruments are the means by which change is measured (e.g., a series of photographs or samples taken over time, periodic surveys of visitors to the site and residents of local communities). Indicators are things to be measured, which should be selected because they are most relevant to the condition of the system of which they are a part (e.g., indicator species in ecology, cholesterol or blood pressure in medicine). Finally, standards are thresholds that when crossed produce damage to the system in question.

Clearly, a buffer zone can be considered just the first step in establishing zoning adequate for effective management of an archaeological site or, indeed, any protected area. Other organizations with stewardship responsibilities for areas containing vulnerable natural and cultural resources have extended zoning in ways similar to those used by local governments in developed countries. For example, the Visitor Experience and Resource Protection Framework that has been used by the United States National Park Service since 1997 relies heavily on the concept of zoning (United States National Park Service 1997). Zones are determined by an analysis of the distribution of cultural and natural resources, the environmental context in which they are found, the degree to which they are sensitive to damage or destruction by human use, and existing infrastructure. This analysis is conducted after extensive research, which includes review of scientific literature and interviews with subject matter experts and all parties with a legitimate interest in the protected area. Of particular importance to achieving the goals of the framework is consultation with local communities and any indigenous peoples associated with the area in question. For each zone, the desired use and the desired

condition are established. These can vary widely. Areas that provide essential visitor amenities, for example, should not be located in zones that contain sensitive resources. Some sections of archaeological sites can best be appreciated and understood in relative solitude; others, for example, the bustling city centers of the ancient world, can be experienced best in the presence of others. The VERP approach also emphasizes the need to monitor both resource conditions and the satisfaction of visitors and residents alike.

The effective management of an archaeological site benefits greatly from zoning, and at large archaeological sites, it is likely that this cannot be achieved without zoning. As time goes one, zoning similar to that done by developed countries in urban and suburban environments should become standard practice.

Cross-References

- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Site Visitation and Interpretation: Management

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Zooarchaeology

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Introduction

Animals have played key roles in society, evolving alongside people from the Paleolithic right up until today. First they served as a source of food: animals were killed or scavenged for their meat, fat, and marrow as well as their skins and bones for manufacturing. Since domestication, secondary products such as milk, wool, or labor have also been provided by animals. Alongside practical innovation, perceptions of animals also evolved into a range of often subtle varieties. Human–animal interactions are therefore of utmost interest in reconstructing ancient cultures. Moreover, animals are often used as media-conveying messages that reflect relationships between people: they have formed an integral part of our mentality. Animal remains are usually brought to light in substantial quantities during archaeological excavations. As such, they potentially offer statistically reliable information on how humans interacted with their environments and with one another.

Definition

Zooarchaeology, originally called archaeozoology in the Old World, considers relationships between humans and animals using animal remains from archaeological sites. Although rooted in paleontology, the study of fossils from extinct natural fauna, zooarchaeological research deals exclusively with evidence from archaeological contexts. It is a multidisciplinary subject: it may involve the analysis of related objects (e.g., hunting gear or harnessing) and integrate the evaluation of excavated materials with pictorial and written records. Zooarchaeology thus

addresses diverse problems, from the biological and environmental aspects of past cultures to the social and cognitive side of human–animal relationships.

Historical Background

In his review of zooarchaeology in eastern North America, Neil D. Robison (1987) outlined three periods also applicable to Europe. Developments after the 1980s form the fourth, most recent phase.

The Formative Period (1850s–1951)

Archaeozoology emerged in mid-nineteenth-century Europe. It first developed in areas where spectacular architecture, hoards, and written sources did not distract attention from gathering complementary information in the form of biological remains. In 1851, Japetus Steenstrup began studying massive "shell banks" in coastal Denmark. Recovering archaeological artifacts and animal bones, he realized that these masses of shell were food refuse and coined the term "kitchen midden" (*køkkenmødding*; Forchhammer et al. 1851–1856). Soon similar formations were studied along the Atlantic coasts of Europe and America (Wyman 1868).

Archaeology in the nineteenth century was also inspired by romantic nationalism. Communal identities were asserted by claiming ancestral lineages. Celts, Etruscans, and other putative ancestors were studied across Europe. Help by Ludwig Rütimeyer was enlisted in a quest for Celtic Helvetii at Swiss lakeshore settlements. Although many of the pile dwellings turned out to have been much earlier (Neolithic and Early Bronze Age), Rütimeyer (1861) came up with a scholarly analysis of animal remains which, according to Darwin, represented "the most important contribution on domestic races ever published."

In 1865, Rudolf Carl Virchow, pathologist, politician, and polymath, had high hopes of having discovered yet another prehistoric pile dwelling in central Berlin which turned out to be an early-eighteenth-century urban deposit. Among others, he identified evidence for seafood consumption which predated the first-eighteenth-century Hamburg postal regulation concerning oyster barrels shipped to Berlin (Virchow 1872: 124). In this earliest example of postmedieval archaeozoology, Virchow struck the delicate balance between naturalists and culture historians, identifying lowly kitchen garbage of no interest to historians as "luxury artifacts" carrying historical meaning. In 1874, Virchow began working with Heinrich Schliemann at Troy.

Darwin's 1868 book on the variability of domesticates directed attention to an important point central to zooarchaeology. Domestic animals are material culture since they are shaped by human needs, beliefs, and aspirations. Human influence on their genetic makeup was not always conscious but is characteristic of the social niche the animals occupy – driven by cultural forces that can be detected in the shape and size of bones (Fig. 1). Ulrich Duerst (1926) adopted Rudolf Martin's standardized human bone measurements for a wide range of mammals.

Systematization Period (1951–1969)

Following World War II, the first generation of full-time zooarchaeologists emerged, including Jesús Altuna, Joachim Boessneck, Sándor Bökönyi, Vera Issacovna Gromova, John E. Guilday, Johannes Lepiksaar, Stanley J. Olsen, Elisabeth Schmid, and Rudolf Stampfli, to name just a few.

By this time, domestication was recognized by archaeologists as a benchmark in the development of civilization. The origins of most Old World domesticates have been traced back to the Neolithic of the "Fertile Crescent" (including the Levant as well as the Taurus and Zagros mountains ranging between Anatolia and Iran). The formation and distribution of domestic animals across Europe dominated the agenda, reinforcing the misconception that zooarchaeology was a "prehistoric" discipline. Under the influence of ethnographic research, the need to quantify animal remains arose. Theodore E. White (1953) came up with the concept of Minimum Number of Individuals (MNI). Much of the work at the time was aimed

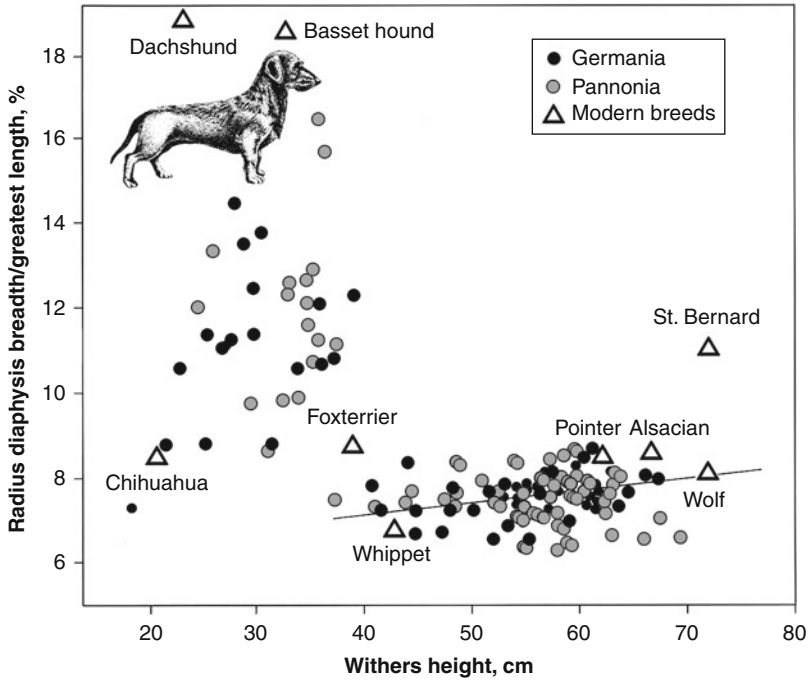

Zooarchaeology, Fig. 1 The distribution of first- to third-century Roman provincial dogs by estimated withers height and forearm shape (relative breadth of radius) from Pannonia and Germania in comparison with modern breeds. Propagating an inherited, nonpathological deformation through breeding created a range of short-legged forms toward the upper left corner of the graph (After Bökönyi 1984 and Peters 1997)

at reconstructing animal keeping rather than consumption. The mentality that focused on individuals and resulting herds populating catchment areas of sites leads to the development of a "herd management" jargon including harvest profiles and herding strategies. This language however, although pervasive, remained largely allegoric in the face of typically sporadic archaeological evidence. Little critical attention was paid to the impact of site formation processes on the reliability of data.

Integration Period (1969–1980s)

The invention of MNI already indicated the intellectual need to understand zooarchaeological data in more exact, economic terms, pushing interpretation beyond the physical descriptions of ancient animals. The archaeological aspects of animals began to be treated at a new scientific level (Brothwell & Higgs 1969).

Radiocarbon dating at stratified settlements helped to clarify the pace of domestication in the Near East (Braidwood 1967). Scientific expectations culminated in "New Archaeology" aimed at treating archaeology as a natural science. With their positivist agenda, archaeologists discovered the wealth of information represented by animal bones, treating them from a primarily archaeological point of view. Previously, archaeozoology was largely practiced by natural scientists; zooarchaeology represents the same discipline, but the emphasis is on archaeology.

Environmental thought on the rise during the 1960s soon inspired archaeological interpretation. Animal remains were tentatively included among ecofacts as materials not directly altered or modified by humans but associated with human exploitation (Schiffer 1987: 290–291). However, zooarchaeological finds by definition (i.e., in their connection to human cultural contexts) incorporate an artifactual dimension just like properly manufactured, even artistic bone objects or the genetic makeup of

Zooarchaeology, Fig. 2 Late-fifteenth-century Inka Period llama metapodium bone point from Paria, Oruro Province, Bolivia (*left*), and its modern counterpart (*right*) being used by a local villager. In the absence of direct cultural continuity, aside from morphological similarities, the raw material, use wear, and functional context need to be carefully considered

domesticates. Anthropogenic influences can create considerable bias in the environmental interpretation of animal remains from archaeological deposits.

New Archaeology (subsequently morphing into processual archaeology) set very high standards to present archaeology as a natural science. The processual paradigm includes the use of quantitative data in deductive models, the scientific method of observation, and hypothesis testing. Zooarchaeology has greatly benefited from this ambition: quantitative methods had long been around, but the novelty was that in addition to taxonomic composition or reconstruction of animal size, the degrees of fragmentation and dispersal were recognized as characteristic of ancient cultural behavior. Proponents of New Archaeology applied concepts from a variety of fields such as middle-range theory, adopted from sociology by Lewis Robert Binford. Middle-range theory proceeds from an empirical phenomenon toward general statements to be tested using data. Binford carried out ethnoarchaeological fieldwork among the Nunamiut and Navajo in North America, as well as in Australia, applying archaeological ideas and methodology to the analysis of contemporary animal bone refuse. By describing how modern people handle similar objects, he linked their use to archaeological interpretation (Binford 1981). In the case of direct ethnographic analogy, continuity in ancient practices can be documented. In the absence of cultural continuity, analogies remain indirect: in addition to morphological similarity between the archaeological and modern artifact, a reconstruction of technological/cultural contexts is necessary (Fig. 2).

Worked bones, traditionally treated as "real" artifacts, were studied by archaeologists from a purely stylistic point of view, rarely falling into the purview of zooarchaeologists. The 1957 book *Prehistoric Technology* by Sergei Aristarkhovich Semenov was translated into English in 1964 and became very influential during this period. Zooarchaeologists became more directly involved with analyzing worked osseous materials in the late 1970s, thanks to the application of new models, integrating archaeological, zoological, and technical information.

Opponents to the processual approach have emphasized that archaeological data are not reproducible and usually of too poor quality to meet the criteria set by the logical positivism of "hard" science. By the late 1980s, post-processual archaeology, a variegated rebound effect to failed scientific methodology,

was largely united only in its rejection of such methods. This trend took a toll on the demand for zooarchaeology that had been so appreciated by the processualist school. Animal bone reports became mere appendices to archaeological analyses (with little effort to integrate their conclusions) or published as case studies in specialist journals, separated from mainstream archaeological discourse. Rarely, zooarchaeological monographs were dedicated to the fauna of prominent archaeological sites, especially in the German language literature where the processualist/post-processualist divide was far less dramatic.

Diversification Period (1980s–Present)

A revival came through advances in both archaeology and natural sciences on the one hand and in the international spread of zooarchaeology on the other. Due to immense diversification, only brief summaries of this ongoing phase can be outlined here.

Groundbreaking research in stable isotopes (carbon, nitrogen, strontium, oxygen, sulfur, etc.) may be considered a spin-off from radiocarbon dating (van der Merwe 1982). Carbon and nitrogen isotopes became instrumental in assessing the type and proportion of plant to animal products in human and animal diets, refining reconstructions based on the traditional, morphological identification of animal remains. Radiogenic isotopes of strontium built into the mineral phase of the skeleton (Price et al. 2002) are of help in mapping regions where drinking water was consumed at various periods through an individual's life. Long-distance movements before or after death can thus be detected.

Complementary to the osteological evidence of meat consumption is the analysis of food residue preserved on ceramic sherds developed by Evershed et al. (1997).

The advent of ancient DNA studies has exposed the key relationship between heredity and environment, often treated superficially in conventional zooarchaeology. Wilhelm Johannsen introduced the term phenotype in 1911 to distinguish between an organism's inherited genotype and the effect of environment on its manifestation. In the absence of genetic information, however, zooarchaeologists attributed skeletal variability either to "superior breeding skills" (e.g., in Roman provinces) or to "environmental strain." While all experts *knew* that size and shape were a composite of heredity and environment, the emphasis shifted with the archaeological narrative. Ancient DNA was first recovered from a nineteenth-century museum specimen of the *quagga*, a South African wild horse extinct in 1883 (Higuchi et al. 1984). While DNA fragments are not always well preserved and expensive to extract, recently the analysis of mineralized residual collagen in archaeological bone using soft-ionization mass spectrometry (▶ Zooarchaeology by Mass Spectrometry (ZooMS)) has offered an affordable alternative in molecular species identification (Collins et al. 2010).

In response to post-processual criticism, traditional zooarchaeology also started addressing new, culturally informed questions. Previously neglected aspects of social identity, gender, and agency began to be studied. Focus from production shifted to the more tangible aspects of consumption (household archaeology and feasting). These approaches gave a special inspiration to studies of bone manufacturing. While in the 1980s bone tools and ornaments began to be integrated with ordinary animal remains within the framework of raw material studies, the focus did not extend much beyond technological reconstruction and function. Recent discussions, however, incorporate key theoretical issues, reconnecting the study of manufactured animal remains with archaeology.

Key Issues and Current Debates

Zooarchaeological Data and Interpretations

Traditionally, hand-collected bones of large mammals have been studied. However, dry or wet sieving is needed for the recovery of small vertebrates (e.g., rodents, birds, fish) and for unbiased anatomical recovery even of

larger species. Especially fine recovery is required in the study of minute insect and endoparasite remains.

The use of reference collections is advisable during identification. However, comparative materials are not always at hand in the case of extremely variable taxa (e.g., songbirds) or are unavailable on-site in countries where exporting archaeological finds is illegal. In such cases, osteological atlases (e.g., Schmid 1972) have been indispensable. Recently a number of online resources have significantly broadened the range of comparisons.

In addition to taxonomic information, the skeletal part and the age and sex of the animal need to be recorded whenever possible. Fragmentation and human modifications such as cut marks, traces of burning, or evidence of manufacturing should also be documented. All available standard measurements must be taken on each bone. Finally, precise stratigraphic information is required as no bone can be considered a "find" without proper archaeological context.

Once a database of individual finds is compiled, analysis begins with cross-tabulating the numbers of identifiable specimens (NISP) by animal species and skeletal part. These counts are, however, invariably biased by preservation. When bone weights are recorded, a similar summary will reveal the degree of fragmentation. In order to offset fragmentation bias, the minimum numbers of individuals may be estimated.

MNI is based on the most commonly found skeletal element of each species at a site. Simply put, finding three left boar tusks among ten pig bones would mean that at least three individuals were slaughtered. The use of MNI values has been hotly contested for decades as the way various authors calculate them strongly differ. Problems of interpretation also arise as minimum numbers vary depending on the way stratigraphic units are grouped for the calculation (aggregation effects; Grayson 1984). Moreover, MNI estimates are often taken at face value as "herds," forgetting that the calculation shows theoretical minima and some deposits characterized by these usually meager numbers had spanned centuries (NB the method developed by White in 1953 was aimed at calculating the dietary contribution of animals). Various refinements and redefinitions of MNI in zooarchaeology have not yet been successful in properly addressing these key problems.

Since the nineteenth-century biometry has been an essential tool used in taxonomic investigations in zoology. The comprehensive bone measurement manual of Jan Ulrich Duerst (1926) was simplified for zooarchaeological use by Angela von den Driesch (1976). Distinctions between the domestic form and its wild ancestor as well as secondary sexual dimorphism are often studied using measurements. A similar protocol for fish bones was published by Morales and Rosenlund (1979). Recently the development of geometric morphometrics (GMM; Bookstein 1991), a multivariate method of analyzing shape, has become important. This method can be profitably used in combination with ancient DNA information in appraising, the inherited component behind the external appearance of bones (phenotype).

Age and sex are recognizable in some bones such as horn cores, teeth (e.g., boar tusks), and cock spurs. Measurements can also be used in sexing animal remains. Age data are often scrutinized in the wider context of hunting strategies and exploitation for secondary products in domesticates. Secondary exploitation means the extended use of live animals for renewable resources such as milk, wool, labor, manure, companionship, and prestige. While meat can be acquired by hunting, secondary exploitation relies on animal keeping. Groundbreaking ethnographic observations by Sebastian Payne (1973) have been widely used in establishing demographic curves demonstrating longevity in herds, usually associated with secondary products such as wool. The effect of culling young animals is often interpreted as a sign of dairy exploitation.

In zooarchaeology, reconstructions of kill-off patterns and putative herd structures are implicitly based on precarious MNI estimations,

however, often disregarding distinctions between sheep and goat and the sex of the animal that cannot be recognized on the morphology of juvenile bone. This scarcity of detail, exacerbated by problems of bone preservation, makes the application of Payne's inventive method laden with cumulative bias beyond the control of zooarchaeologists. Spurious interpretations regarding "herd management strategies" abound when in fact one is dealing with humble food refuse reflecting the dietary contribution of animals in a certain time and place, and only indirectly related to herding. However, current discussion concerning the critical reevaluation of the method (Vigne & Helmer 2007; Brochier 2012) and its integration with independent evidence from, e.g., milk residue and dietary isotope analyses, has opened new perspectives.

Current Issues

Given its increasing diversity, zooarchaeology contributes to several strands of groundbreaking archaeological research. The following examples illustrate only some of the developments in zooarchaeology 160 years after the first archaeozoological treatise by Steenstrup.

Domestication

As detailed in numerous additional entries in this volume, problems of domestication have traditionally dominated debate as a technological development of utmost importance. The first ever international conference on archaeozoology was devoted to domestication research and the history of domestic animals (Matolcsi 1973). Questions concerning the places and times of first domestication remain to be resolved.

Just as large series of accelerator mass spectrometry (AMS) dating (frequently using animal remains) have become instrumental in fine-tuning conventional radiocarbon chronologies, studies of ancient DNA, food residue, and dietary stable isotopes have revolutionized domestication research. Put in a proper chronological framework, genetic studies began to offer reliable data for mapping domestication trends for the first time (Harris 1996). By the beginning of the new millennium, complex ancestral lineages have been outlined for most domesticates (e.g., Larson et al. 2007; Pedrosa et al. 2007).

Evidence of Early Neolithic dairy exploitation of Bovids in Europe was found through residue analyses (e.g., Craig et al. 2005). Remains of mare's milk at the Chalcolithic site of Botai in Kazakhstan furnished long-awaited key evidence that the numerous horses killed at the settlement were already domesticated, as milking wild horses would have been unlikely (Outram et al. 2009).

Fauna History

Although prone to increasing "noise" created by past human activity, zooarchaeological finds can contribute to studying fauna history and zoogeography. For example, a trend of the northwest to southeast extinction of European lions may be traced across the Balkans between the Early Neolithic (c. sixth millennium BCE) and the Early Iron Age (c. first millennium BCE) in the Pontic region. Considering that all lion remains marked in Fig. 3 were deposited by humans, the zoogeographical reliability of individual finds can be critically appraised on the basis of skeletal part distributions: teeth may have been widely circulated prestige goods/amulets, while bones of the feet could be left in high-status imported lion skins. However, numbers of ordinary bones representing lion carcasses rather than these prestigious parts were also recovered to substantiate the main zoogeographical tendency outlined in Fig. 3. A concentration of Early Iron Age finds from the Western Pontic Coast may represent live imports to Hellenistic colonies from outside Europe, although this hypothesis (based on subsequent Roman and Byzantine analogies) remains to be supported by DNA and/or strontium isotope analyses.

Events in fauna history are inseparable from environmental change. Bones of large game of diagnostic value, however, are found relatively rarely. Small organisms with faster reproduction rates have been particularly useful in reconstructing environmental history. Masses of marine fish remains from Danish coastal sites

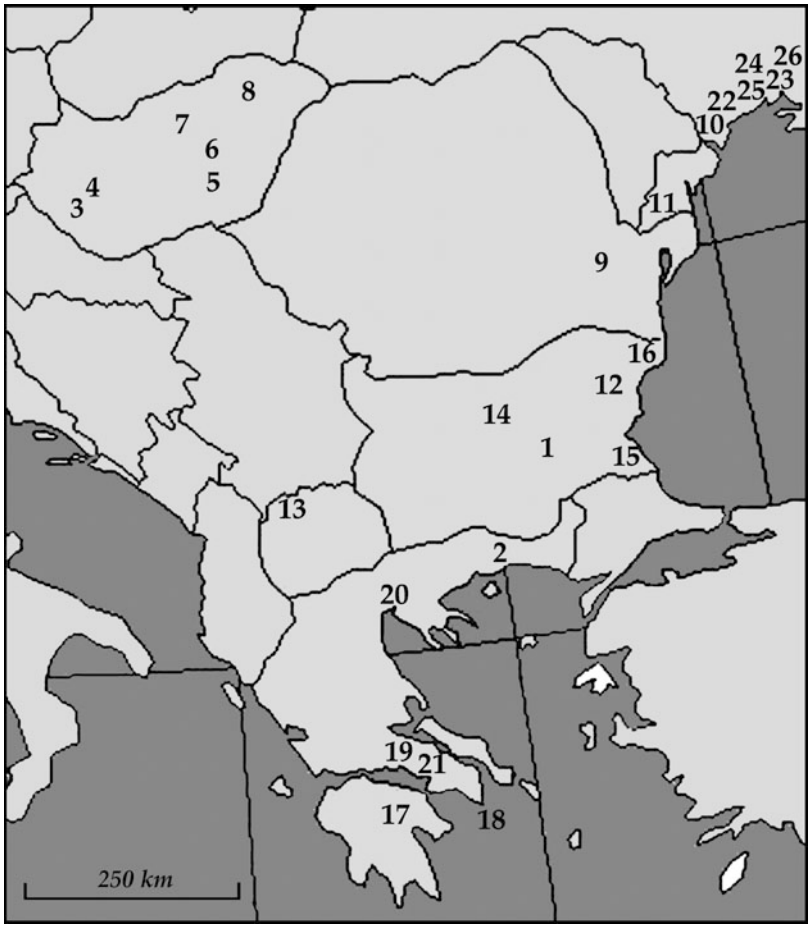

Zooarchaeology, Fig. 3 The extinction of European lions in the Balkans in estimated chronological order. Legend: *1* Karanovo II, Early Neolithic, Bulgaria, *2* Dikili Tash, Neolithic, Greece, *3* Zengővárkony, Late Neolithic, Hungary, *4* Tolna–Mözs, Copper Age/ Furchenstich culture, Hungary, *5* Hódmezővásárhely–Kopáncs-Olasz tanya I., *6* Tiszaföldvár–Téglagyár, Copper Age, Hungary, *7* Gyöngyöshalász–Encspuszta, Copper Age, Hungary, *8* Tiszalúc–Sarkad, Copper Age, Hungary, *9* Hârşova, Late Copper Age/Cernavoda level, Romania, *10* Mayaki, Copper Age, Ukraine, *11* Bolgrad, Copper Age, Ukraine, *12* Goljamo Delčevo, Copper Age, Bulgaria, *13* Slatino, Copper Age, Macedonia, *14* Devetashka Cave, Copper Age, Bulgaria, *15* Sozopol, Copper Age, Bulgaria, *16* Durankulak, Copper Age and Late Bronze Age, Bulgaria, *17* Tiryns, Late Bronze Age, Greece, *18* Keos, Late Bronze Age, Greece, *19* Delphi, Late Bronze Age–Iron Age, Greece, *20* Kastanas, Late Bronze Age–Iron Age, Greece, *21* Kalapodi, Iron Age, Greece, *22* Tira, Early Iron Age, Ukraine, *23* Ol'biya, Early Iron Age, Ukraine, *24* Berezan, Early Iron Age, Ukraine, *25* Chernomorka I, Early Iron Age, Ukraine, *26* Chernovaty, Early Iron Age, Ukraine

representing the warm Atlantic period (seventh to fourth millennium BCE) could be profitably used to model future changes in combination with modern fisheries records (Enghoff et al. 2007). The authors conclude that major changes to the fish stocks will be inevitable. Although economically important cod populations can potentially be maintained in waters near Denmark, the vulnerability to increasing water temperatures will increase fish mortalities.

Taphonomy

Taphonomy is the critical appraisal of *postmortem* processes that turn animal carcasses

into "finds." This important concept adopted by zooarchaeologists by some forty years ago had developed in paleontology (Efremov 1940). Until the 1960s, most archaeozoologists had typically explained assemblage variation by ancient human behavior, often disregarding effects of differential preservation and methods of recovery. From an archaeological point of view, pre-depositional (biostratinomic) modifications to animal remains are of special interest. In contrast to paleontology, ancient human activity had a key role to play in shaping zooarchaeological assemblages. Culturally characteristic ancient modes of butchering and cooking expose bones to further deterioration by natural agents in the deposit. Moreover, studies of animal pathology can be most reliably carried out on animals that were interred largely intact as unfit for human nutrition. Frequently buried alongside humans, horses and dogs may be viewed in a broader cultural context (e.g., in relation to the gender, age, and status of the deceased human) in addition to their anatomical integrity preserved under favorable taphonomic circumstances (Fig. 4).

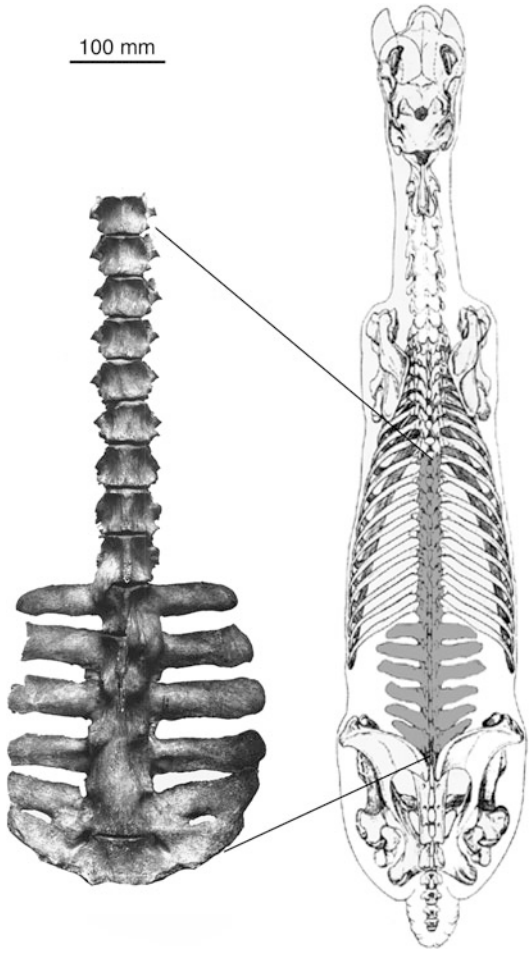

Zooarchaeology, Fig. 4 Fifteen pathologically fused thoracic and lumbar vertebrae from a c. 14-year-old stallion from the Late Avar Period (eighth to ninth century) cemetery of Tiszafüred–Majoros, Hungary. For years this animal must have been decapacitated and unfit for riding, but it had evidently been taken care of and was finally interred within a human cemetery

Complex Cultural Interpretations

It has been recognized that beyond food production, patterning in bone assemblages may be related to subtle aspects of animal use in social self-representation, exchange, and communal consumption (Marciniak 2005; Russell 2012). Taphonomically informed analyses of animal remains have gained new momentum within another trend of investigating the "biography" of artifacts in archaeology. High-prestige items in particular, such as the canine teeth preserved in the carefully sawn-off skull fragment of a medieval leopard found in Hungary (Fig. 5), embody inseparable overlaying aspects of zoological, taphonomic, technical, and culture historical information. Large predators especially can be exploited in a number of ways depending on their availability, perceived value, and symbolic meaning. Each of these forms is expressed in different degrees of skeletal representation ranging from complete through scattered to carefully selected, the latter cases usually standing for the complete beast symbolically. The biography of such objects parallels their taphonomic history, composed of decisions made from hunting through the degrees of carcass partitioning prior to selecting special parts depending on intended use. For high-status items, careful, decorative manufacturing adds to the value of the objects. Finally, such artifacts may be deposited under special circumstances,

Zooarchaeology, Fig. 5 Sawn-off muzzle region of a large leopard skull with upper canine teeth worked into a high-status decorative item from the fourteenth-century town of Segesd–Pékóföld, Hungary. It may have belonged to an exotic leopard skin such as those once worn by members of the Teutonic order

further improving their state of preservation and chances of recovery (Fig. 6). Prestige goods made from rare animals may end up in burials or in well-investigated high-status proveniences.

International Perspectives

Even though archaeological cultures crosscut national borders, their geographical and chronological extent is limited. Thanks to the universal use of animals and the fact that the animal skeleton is far more standardized than most archaeological objects, zooarchaeology is an emphatically international discipline. Its principles and main methods are globally applicable with little or no variation between archaeological periods. The "integration period" in zooarchaeology not only meant increasing integration with archaeology and other disciplines, it also brought about the recognition that zooarchaeologists worldwide had shared academic interests. In 1971, the International Council for Archaeozoology (ICAZ) was created in order to foster communication between practitioners in this narrow field. Europe was politically divided at the time, but this important channel of communication between East and West functioned very well, also involving scholars from North America. By the twenty-first century, ICAZ musters a global membership.

While developing countries served as areas to be explored by archaeological expeditions from the "Western World" for over a century, increasing numbers of local archaeozoologists began working in these areas on behalf of their own heritage management. Zooarchaeology has a long tradition in Russia and other republics of the former Soviet Union. The discipline is also important in China, but little has been known abroad about work in these countries, largely due the limited international dissemination of results rooted in linguistic isolation. From this point of view, Latin America has been in a more advantageous position as respectable research traditions in countries such as Argentina and Mexico have been more directly linked to both Europe and North America, providing channels of publicity beyond the region.

Future Directions

Since its rise in the mid-nineteenth century, zooarchaeology has reflected shifts in the broader ideological environment, largely mediated through developments in archaeology itself. The evolution of both political and scientific thought contributed to the diversification of this subject in its academic scope, geographical focus, and interdisciplinary integration. Traditional methods of identifying and inventorying animal remains from archaeozoological sites form a basic part of any respectable policy in heritage management. Additional locally available analytical methods and the redistribution of scientific capacity

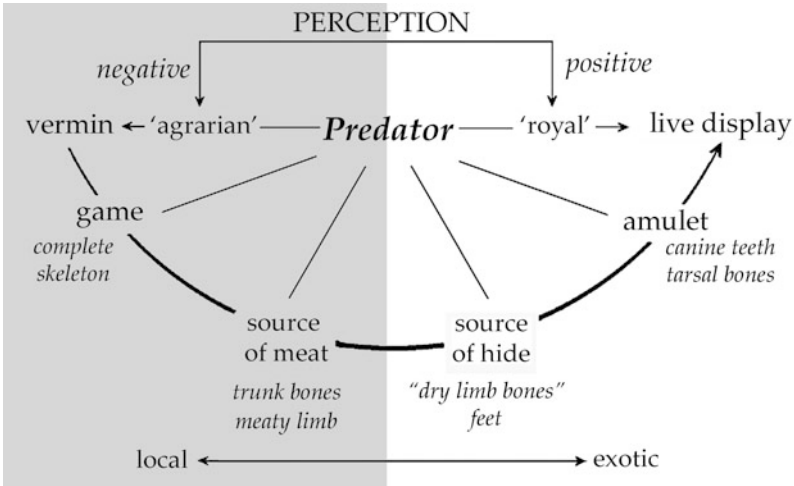

Zooarchaeology, Fig. 6 Taphonomic aspects determining the biography of large predator remains in archaeological contexts. Perceptions and values of animals vary depending on their availability and uses in various cultural settings as reflected in zooarchaeological finds

in leading research institutions through the international network of zooarchaeologists will determine the new directions and pace of development in our discipline. Targeted use of increasingly available chemical identification (such as ZooMS; Buckley et al. 2010), complementing traditional morphometric analysis, already began to have an impact on how zooarchaeology is done in the twenty-first century.

Cross-References

- ▶ Animal Paleopathology
- ▶ Biometry in Zooarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone Tools, Paleolithic
- ▶ Darwin, Charles R.
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Hunting and Hunting Landscapes
- ▶ Ichthyoarchaeology
- ▶ International Council for Archaeozoology (ICAZ)
- ▶ Isotopic Studies of Husbandry Practices
- ▶ North American Megafauna Extinction: Climate or Overhunting?
- ▶ North American Terminal Pleistocene Extinctions: Current Views
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Social Zooarchaeology
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology by Mass Spectrometry (ZooMS)
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Zooarchaeology by Mass Spectrometry (ZooMS)

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Brief Definition of the Topic

Zooarchaeology by mass spectrometry (usually abbreviated as ZooMS) is a minimally destructive method to determine animal origin by peptide fingerprinting for (mineralized) collagenous materials.

Mass spectrometry (MS) of proteins has been made possible due to the introduction of "soft" ionization methods, most notably MALDI (matrix-assisted laser desorption/ionization) and ESI (electrospray ionization) MS. MALDI achieves ionization of peptides through proton transfer via a solid matrix, where electrospray ionization can be attained directly from the liquid phase. These ionization methods allow molecules to not be degenerated during measurement. Where "harder" ionization would break down a protein in random fragments that are difficult to predict, proteins are instead digested by enzymes into peptides. Restrictive enzymes cut at specific sites (lysine and arginine for trypsin, the most common enzyme used for this purpose), creating consistent and predictable fragments. The resulting peptides can therefore be compared to theoretical fragments based on *in silico* digestions of known protein sequences.

ZooMS uses MALDI ionization to investigate materials such as bone extracts as these are relatively simple aqueous solutions, containing almost exclusively collagen type I. Collagen type I, the main organic constituent of bone, teeth, antler, and skin (leather and parchment), has a helical structure and consists of three fibrils: two α1 chains and one α2. Some fish collagens also contain a subunit α3 in lieu of one α1 chain. Although collagen is highly conserved through closely related taxa, especially within COLI-α1, there are minor – though significant – changes in primary sequence between genera and in some cases species. The changes in primary sequence cause differences in mass, ultimately producing a fingerprint of masses that may be (partially) characteristic for the animal of origin. Therefore, identification is dependent on the extent of evolutionary divergence (typically to the level of genera). For example, using ZooMS, sheep and goat can be distinguished primarily through a single peptide showing a mass difference between the two species (Buckley et al. 2010). Fingerprints are matched to either theoretical data based on *in silico* digestions of sequences obtained through cDNA libraries or comparison to practical data obtained through ZooMS analysis of known standards. In-house collagen databases are currently expanded to animal species other than mammals, including fish (Richter et al. 2011) and birds. Alternatively, indexed peptides of thoroughly investigated taxa can be used to determine animal origin.

Current generations of (MALDI) spectrometers can measure peptides at levels of a femtomole. Although this risks detecting contaminating substances (such as cellular keratins or autocleavage products of trypsin), the source material does not require amplification, and the extract is measured "as it is obtained." Common contaminants are well documented and do not necessarily interfere with a fingerprint obtained from collagen.

With this high sensitivity, a partial extraction in a mild buffer is often sufficient to obtain reliable and repeatable results, both for animal origin identification and thermal age estimations (see below), especially for samples that are well preserved and have been protected from water flux or modern material such as bone particles in meat and bone meal. In some situations, samples are decalcified prior to buffer extraction. This overall yields a higher concentration of collagen; however, it is permanently destructive to the sampled material. A buffer-only extraction will not significantly damage well-preserved mineralized artifacts.

Peptide fingerprinting (and by extension ZooMS) is a fast- and low-cost method: hundreds of samples can be processed in a day at a cost of <15€ per sample.

Deamidation (the loss of an amino group, e.g., glutamine, is transformed to glutamic acid) is a very common nonenzymatic posttranslational modification in proteins and is commonly associated with ageing of tissues. This process continues postmortem and can therefore indicate the amount of damage proteinaceous substances have been exposed to. Without altering the method as described above, the amount of overall deamidation between several glutamine sites in bone collagen can be estimated (Wilson et al. 2012), and this has been shown to correlate well with thermal age but poorly with common diagenetic parameters. ZooMS can therefore not only yield animal origin but also give an indication of (thermal) damage without necessarily damaging the originating material. A definite link between ZooMS success and degree of deamidation and DNA amplification has not been clearly established. However, a buffer-only extraction does not prevent successful DNA extraction from the exact same samples.

ZooMS is applicable to any venture that involves minimal sampling of collagen-containing material. Applications of ZooMS include investigation of animal feeds or detecting counterfeit leathers. In an archaeological context, advantages of ZooMS range from investigating rare or precious artifacts, morphologically indistinct bones, or very small (<250 μm) fragments that are otherwise problematic to identify. The high-throughput setup of ZooMS allows for cost-effective screening of samples prior to more expensive or destructive analyses, including aDNA. Buffer-only extraction only leaches partial collagen and has been shown to be nondestructive even to microscopic features, such as toolmarks, and allow for repeat or follow-up analyses on the same material. The estimation of thermal age through glutamine deamidation may aid discrimination of bone samples from multilayered sites.

New applications and optimization of both method and database are continuously in development, making ZooMS, along with its currently established advantages, an important tool for zooarchaeologists to consider more routinely in the future.

Cross-References

- ▶ Archaeology: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Dating Techniques in Archaeological Science
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Vertebrate Taphonomy in Archaeological Research
- ▶ Zooarchaeology

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Zooarchaeology: Methods of Collecting Age and Sex Data

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Introduction and Definition

Zooarchaeology has taken great strides since the early 1900s when a zoologist or veterinarian might occasionally have been consulted to examine animal bones recovered from archaeological excavations, if the context in question was believed to be especially important. Faunal reports from that era were often simply lists of species present: specific elements may or may not have been listed, and the age and sex of individuals represented were certainly not included. Having consulted the zoologist at all was a big enough step in archaeological scientific inquiry at the time. Most excavations before 1960 did not even bother collecting animal remains, and it was not until the 1970s when the processualist movement took hold in archaeology that excavators began consistently to consider bones a valuable source of environmental and anthropological information. However, in order to obtain that information, more data was needed from the animal remains themselves.

Understanding past lifeways through faunal remains is contingent on the amount of information one can extract from those remains. Determining the age and/or sex of animals slaughtered for daily food requirements or ritual purposes can aid in the reconstruction of herding strategies or ceremonial procedures, respectively. For example, identifying a predominantly older female population among sheep remains can suggest a secondary product strategy. In this instance, ageing and sexing information from animal remains is crucial to the interpretation of culturally deposited bone.

The evolution of the study of animal bones was facilitated by adopting methodologies pioneered originally for the study of human bones. Thus, systematic studies of dental eruption and attrition, and epiphyseal fusion of postcranial bones using modern specimens enabled the definition of stages of growth and development which could then be applied to archaeological specimens. These techniques were proven to be effective for the study of archaeological human remains and were then applied to common domesticates. As more techniques developed in the study of humans, so too did the application of similar methods to animal bones. Metrical and morphological studies proliferated, especially for dental analyses. More recently, technological innovations in morphometric and microscopic analyses have been used to age and sex animal bones, as have genetic and histological methods. These techniques are outlined below in simple terms, from the most basic to the most advanced available today. This entry is not meant to present a summary of every study produced on ageing and sexing – such a feat would require a volume unto itself. Rather, it describes many of the more common methods available for distinguishing age and sex.

To date, there are three major volumes that compile methods for ageing and sexing of archaeological animal bones. These are Ruscillo (2006a), Pike-Tay (2001), and Wilson, Grigson, and Payne (1982). Countless articles in journals and edited volumes have also been written, each presenting its own unique application of known methods of ageing and/or sexing or presenting new methods for applicability to animal bones.

Key Issues and Current Debates

Ageing Methods

Cortical Bone Texture

Perhaps the most basic method of determining age is to inspect the texture of cortical bone. Fetal and juvenile specimens exhibit rough developing cortex which becomes smoother with age. This texture difference is due to extracellular modifications of collagen as well as other developmental processes involving the mineralization of bone. Histological studies show microscopic differences in the structure of juvenile and adult bone tissue, but more useful to the bone analyst are the visual and tactile differences of the bone cortex which will immediately distinguish younger from older individuals. Although not always useful for suggesting precise ages, this method can be used in a bone assemblage to establish the presence of juvenile and immature specimens. Figure 1 shows the cortical differences between juvenile, immature, and adult long bones.

The juvenile bone (Fig. 1a) has a rough cortex, similar in texture to fine sandpaper. The younger the juvenile individual is, the finer the granularity. Fetal bones are smaller and less developed and have a very fine granular texture. Fetal specimens are often difficult to distinguish from neonatal individuals and can be described as "perinatal" i.e., having died close to the date of birth, either before (prenatal) or after (postnatal).

The immature specimen (Fig. 1b) has residual rough cortex around the epiphyseal joint, especially towards the ends of the bone diaphysis (shaft). This roughness decreases with age as the cartilage between the epiphysis and diaphysis ossifies. By maturity (Fig. 1c), the cortex is smooth with well-defined muscle attachments.

A good synopsis for identifying fetal bones in archaeological contexts is Prummel (1987). For a useful reference work on the ageing of fetal bones, see Habermahl (1975).

Epiphyseal Fusion

Analysis of epiphyseal fusion is the most common age determination technique used for postcranial bones. The fusion of bone epiphyses to the adjoining diaphysis occurs in regular stages during development and is fairly predictable with age, thus representing a good age indicator.

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 1 Differences in cortical bone texture in (**a**) juvenile bone, (**b**) immature bone, and (**c**) adult bone (Image by the author, with thanks to Lucretia Kelly for the specimens)

Silver's reference work *The Ageing of Domestic Animals* (1969) greatly aided faunal analysts when zooarchaeology was still in its infancy. Not only did Silver gather information from older veterinary and zoological studies on tooth eruption from nine major domesticates (horse, ass, cattle, sheep, goat, pig, dog, cat, and camel), but he also recorded the ages of epiphyseal fusion for almost all postcranial elements. Despite some problems, this work is still consulted for good estimates of age based on the state of epiphyseal fusion of specific bone ends and also for dental eruption timings (see below).

Many studies following Silver have attempted further to define ages from epiphyseal states while also considering influences such as castration, breeding, and environmental factors (e.g., see Davis 2000 for the delayed epiphyseal fusion of bones due to castration in a population of Shetland sheep). Problems with this method arise when trying to determine ages over four years for ungulates and over a year for smaller mammals such as canids and felids. After the complete fusion of long bones, ageing individuals is impossible without incorporating some

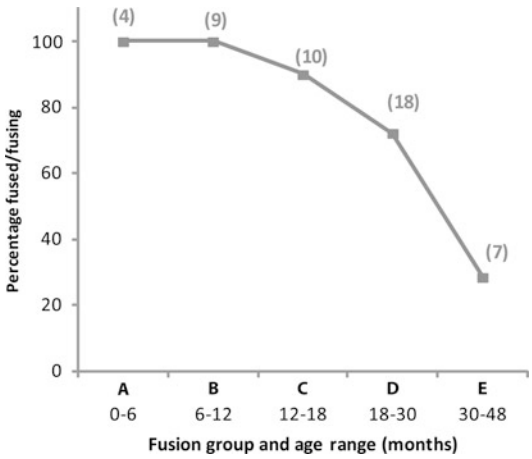

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 2 Epiphyseal fusion drop-off curve for sheep at Halaf period Fıstıklı Höyük, Turkey. Data points represent the percentage of specimens fused or fusing in each of five sequential fusion groups (as defined by Zeder 2006). Numbers in brackets are the sample sizes for each group (Image from David Orton, used with permission)

other method, such as dental attrition which continues throughout life.

Since the fusion states of individual specimens typically only provide age estimates of the form "younger than *x*" or "older than *y*," moving from this to an estimate of population structure or kill-off pattern is not straightforward. The usual approach is to combine elements into a number of groups, from the earliest-fusing to the latest-fusing (e.g., Zeder 2006), and to calculate the percent of specimens that are fused within each of these. One naturally expects to see a drop-off in "percentage fused" as one moves towards the later-fusing groups, but the rate and position of this drop-off can indicate kill-off structure (Fig. 2).

Tooth Eruption

The most commonly used age determination methods involve some form of dental analysis, partly due to the high preservation rate of teeth and mandibles. As with humans, other mammals have fairly predictable ages of tooth eruption and development. Mandible and maxilla fragments with teeth still intact can thus often offer fairly accurate estimates of age-at-death, especially for complete mandibles or maxillae and for individuals under 48 months of age, the time when most medium-large mammals have completed eruption of all teeth.

If the permanent dentition is fully erupted, other methods of ageing teeth can be adopted, such as measurements of dental attrition or cementum annuli counts (see below). Studies such as Deniz and Payne (1982) on goats and Jones (2006) on sheep have developed methods of ageing which consider both eruption stages and tooth wear to produce a complete mortality profile of a population. Zeder (2006) considered both tooth eruption and wear along with long bone fusion to further refine age determination accuracy in caprids. Similar work has been performed with wild and domesticated pigs by Bull and Payne (1982).

Tooth Wear and Dental Attrition

Much work has been performed on recording the rate at which dentition wears for different species. Theoretically, dental attrition progresses at a predictable rate so that wear can be measured within an accuracy of months to determine the age at death of an individual. Factors which affect the rate at which attrition occurs include feed, captivity, and environmental conditions for grazing. Sex and side of dentition do not generally seem to significantly affect attrition.

Methods usually involve observing and recording the wear on the occlusal surfaces of a row of teeth. Diagrams using standardized coding, such as those shown in Fig. 3, can be drawn to show patterns by indicating the level of wear of the occlusal enamel, cementum, and dentine of a specimen (after Grant 1982; see also Payne 1973). Theoretically, individual permanent teeth can be aged in this manner if given a dataset from known age/wear individuals, but usually this method is performed on complete or partially complete mandibles.

Tooth Crown Heights

Examining tooth crown heights is another method for gauging attrition. Typically, the distance between the occlusal surface and the

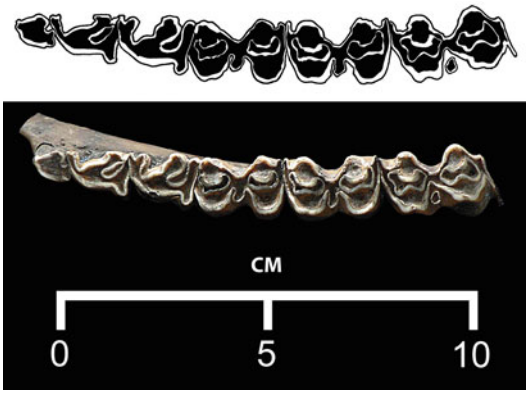

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 3 Dental attrition on a cattle mandible from Vindolanda (V07 69A 18174) with corresponding diagram of tooth wear patterns (Images by Deb Bennett, used with permission of the Vindolanda Trust)

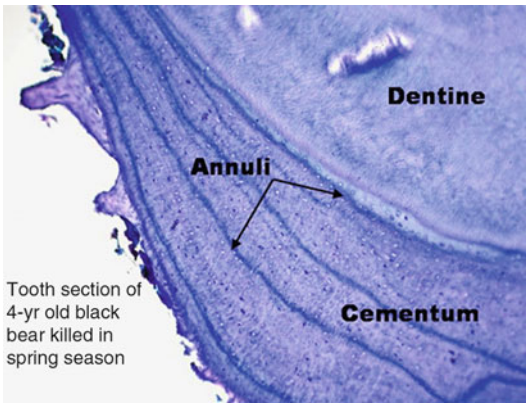

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 4 Cementum annuli as seen under a microscope with dye for contrast (Image copyright Gary Matson/Matson's Lab, used with permission)

line separating the enamel of the crown from the dentine of the root is measured for each relevant tooth on the buccal side (outlined in Klein & Cruz-Uribe 1984: 46-47). These measurements can then be analyzed in various ways, including Klein's and Cruz-Uribe's own Quadratic Crown Height Method (QCHM) which predicts age based on eruption age, unworn height, and an estimate of the age at which the crown would be completely worn down. Alternatively, linear and quadratic regressions have been performed using measurements on specimens of known age. This technique has been applied to cervids, bovids, and equids.

Cementum Annuli Counts

Tooth cementum is laid down continuously, but seasonal differences in deposition rate result in growth banding analogous to tree rings. When a tooth is thin-sectioned and stained for greater visibility, the rings (annuli) can be counted under a microscope and used to estimate age. Figure 4 shows dark annuli that have been deposited in the winter months, while the larger lighter-stained cementum represents the growth period in the spring and summer. Most wild animals can be aged this way, especially those from northerly latitudes where seasonal temperatures are more distinct. Domesticated animals and species in less seasonal climates may exhibit less characteristic seasonal growth patterns in dental cementum because there are less distinct differential feeding and growth periods.

Not only can this method be used to age animals at death, but the season in which the animal died can also be postulated.

Sexing Methods

The number of diagnostic features in a skeleton that indicate the sex of an individual differs from species to species. The predominant difference between male and female individuals is size dimorphism; males tend to be larger than females. Some species like pigs and deer are highly dimorphic, while many smaller species, such as hare, are less so. Thus, osteometric data can be used to estimate sex ratios for many species if the sample size is large enough. More reliable for identifying males from females, however, is the recognition of primary, secondary, and tertiary sexual characteristics. These are outlined below.

Primary Sexual Characteristics

Primary sexual characteristics are, of course, the reproductive organs. These features are useful for sexing individuals while they are alive, but after death reproductive organs generally do not survive in the archaeological record.

The baculum or penis bone, however, can preserve in certain conditions. Carnivores such as procyonids, mustelids, canids, felids, ursids, and pinnipeds have bacula. Occasionally, some of these species may have a female equivalent bone in their clitoris, the *os clitoridis* or baubellum, but this element is often absent or cartilaginous and cannot be predictably found in female individuals archaeologically.

The presence of a baculum in an archaeological sample or in a burial of a complete skeleton signifies a male individual, but not finding a baculum does not necessarily mean that males are absent. Some bacula are small and fragile and do not preserve well. Alternately, finding a baculum does not mean that females do not exist in a sample. The presence of a baculum is most useful for sexing when excavating whole skeletons. Canids, in particular, are sexed in this manner because many cultures bury companion animals purposefully.

Secondary Sexual Characteristics

Secondary sexual characteristics include features that males possess which females do not. These commonly include horns, antlers, tusks, large canines, and spurs. The identification of sex based on these secondary features is not a relative value like ageing data. Instead, it is based on a present or absent classification as with bacula. For example, if large canines from a wild boar are present, the identification of the individual as male is certain. A secondary trait that is relative is body size; mature males are larger than females in most mammals. A comparison of size data within a faunal sample can often distinguish size dimorphism.

Headgear Horns and especially antlers are good indicators of male individuals. If a frontal bone is found with pedicles from antlers, identifying the individual as male is certain (with the exception of caribou/reindeer). Caution must be used when interpreting sex based on pieces of antler – finding antler is not always evidence that male deer was hunted. Male deer molt their antlers after the annual rut in the late autumn or early winter, and these may be collected by humans. Both sexes of caribou produce antlers. The males, like most cervids, will shed their antlers after the rut, while females will shed theirs during the winter months unless they are pregnant, in which case they will retain their antlers until the spring.

Horns differ from antlers in that the horncores actually form part of the cranium; they are made of bone and are not shed. Many species exhibit horns on male individuals only, but some bovids have produced breeds where both males and females have horns. Work on distinguishing between the sexes by identifying horncore morphology has been performed so that the horns themselves can be sex indicators (Armitage & Clutton-Brock 1976, although see Sykes & Symmons 2007). Studies have shown that castrating male individuals early in life will affect the development of the horn cores. Thus, horncore morphology may also be useful in identifying castrates in a bone sample (Fig. 5).

Canine Morphology Another potentially diagnostic difference between male and female animals is canine size. This is true of many species, including suids, equids, moschids, hippopotamids, and elephantids, among others. With the exception of equids and moschids, male tusks grow perpetually throughout life; an old adult wild boar can have tusks of a considerable size. In equids and moschids, canine teeth are much more prominent in the male individuals. Only 25 % of female horses produce canines, and these are usually small in size. For felids and canids, canines seem to be proportionate with size. Females, being diminutive in stature, will naturally have smaller canines. It is difficult, however, with domesticated dogs and cats to use canines as sex indicators because manipulated breeding has produced great size variety which plays a large role in determining the overall stature of male and female individuals and their sexually dimorphic characters.

Size Dimorphism or Trimorphism Size dimorphism is the most inclusive of all the

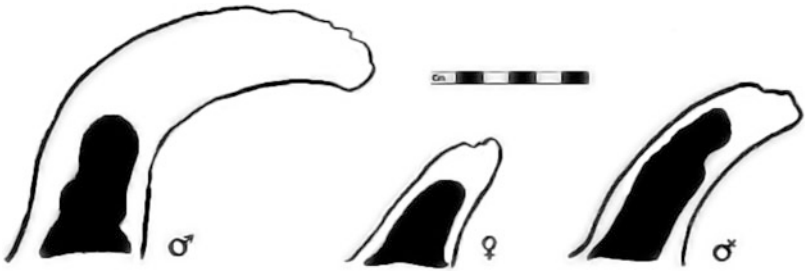

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 5 Horn-core differences in male, female, and wether sheep individuals as determined from radiographs (After Clutton-Brock et al. 1990)

sexually dimorphic differences in animals. Almost all mammals with the exception of the spotted hyena and the blue whale exhibit larger male stature and/or female gracility. This size dimorphism is measurable using standardized bone measurements, the collection and manipulation of which is known as biometry or more specifically *osteometrics*.

If the bone sample size is large enough, one can plot bone sizes (e.g., length versus width of any complete bone) to reveal size dimorphism in a population. Usually, there will be great overlap between the sexes, especially if there are wild and domestic populations or multiple domestic breeds present at the site but also because adult females and immature males are often similar in size. The challenge when interpreting osteometric data is that male animals are often culled from the population before maturity is reached, while females are often kept until they are too old to produce offspring or secondary products like milk. Males that are kept for meat, wool, or labor will often be castrated, further complicating the interpretation of the data. Castrated mature males are still larger than females, but their economic contribution to the herd has been altered: males can be used as studs or for sport (e.g., bullfighting), while castrates are kept either for meat (as in pigs and bovids), for wool (e.g., sheep), or for labor (as in cattle or equids). One cannot usually tell if the larger individuals in a site population are male or castrated individuals from size alone without also examining morphological differences using morphometrics, discussed below.

Bones that preserve well in the archaeological record and for which osteometrics have proven particularly useful for distinguishing between males/castrates and females include the metapodials, especially among bovids.

Birds Birds also exhibit secondary sexual characteristics in the form of spurs (males) and calcium deposits in the medullary cavity (females). Plumage is also a secondary trait, males often displaying more flamboyant colors and longer tail feathers, but these features rarely survive in the archaeological record.

Medullary bone is deposited commonly in the leg bones of female birds (femur, tibiotarsus, and/or tarsometatarsus) during egg production. Figure 6a shows a layer of mineral deposits in a tarsometatarsus of a hen. The medullary bone acts as a repository for the storage of calcium required for eggshell development. The medullary cavity can have a significant amount of mineral deposition, or the mineral stores can be represented by a fine bony web within the cavity. The extent to which the medullary bone is laid down is dependent on the species of bird, its age, its egg productivity, the mineral content in its diet, and other environmental factors. In order to examine this trait, however, one would need either to break the bones open or to use radiographs (O'Connor & O'Connor 2005). Medullary bone can also be considered a tertiary sexual character, for it arises after the sexual maturity of the animal and not during puberty.

Male spurs are more obvious on the tarsometatarsus on most adult galliform birds (Fig. 6b). This family includes turkeys, chickens, quails, pheasants, and peacocks. These spurs are used in mate and territory competitions and are useful indicators of sex.

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 6 Sexual dimorphic characters of *Gallus*, (**a**) medullary bone from a hen, and (**b**) a spur on a tarsometatarsus of a cock (Image copyright Lena Strid, used with permission)

Tertiary Sexual Characteristics

Tertiary sexual characters differ from secondary traits in that they arise during maturity and not as a direct result of sex hormones during puberty. Tertiary traits develop as a result of sex-specific behaviors (i.e., pelvic changes due to pregnancy and birth) or in support of secondary traits (i.e., atlas changes due to muscle development for headgear support). These affected bones are found in different places in the body but mainly involve the neck, the pelvis, and the lower extremities.

Pelvic Morphology The easiest and most common method for identifying sex through skeletal morphology is by examining the shape of the pubis. For ruminants, if the pubis is oval or round in section, it is a male individual. If the pubis is thin and slightly twisted, it is female (Fig. 7). Caution should be taken when examining female pubes – a male castrated within the first few days of life will develop a thinner pubis as well; the pubis of the castrated individual will resemble that of a female who has not yet reproduced. The absence of androgens during the early development of males will default the female morphology.

The shape of the obturator foramen, the space between the acetabulum, ischium, and ilium, can also be diagnostic of sex for ruminants. The female foramen is symmetrical and when traced resembles the shape of an avocado pit. The male foramen when traced is less symmetrical, bulging on one side compared to the other (see images in Ruscillo 2003). The foramen of a castrated individual interestingly resembles that of a male, probably due to its equitable size. Therefore, if one finds a complete innominate of a ruminant that has the pubis resembling that of a female and an obturator foramen of a male, then the identification of a castrated individual is likely.

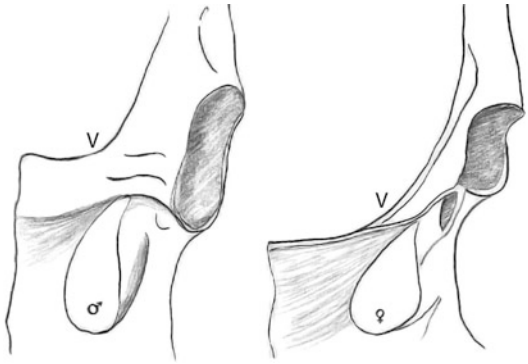

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 7 Bovid pubes of a male and female

A method for distinguishing sex in suids specifically is by measuring the height of the medial border of the acetabulum. Males have a higher medial wall than females – the female pubis is thin and the medial wall by association is also gracile (Greenfield 2006).

Mean Shape Method *Morphometrics* is a branch of mathematics which examines the metrical and statistical properties of shapes and shape changes of objects. Using techniques such as elliptic Fourier analysis (EFA) or eigenshape

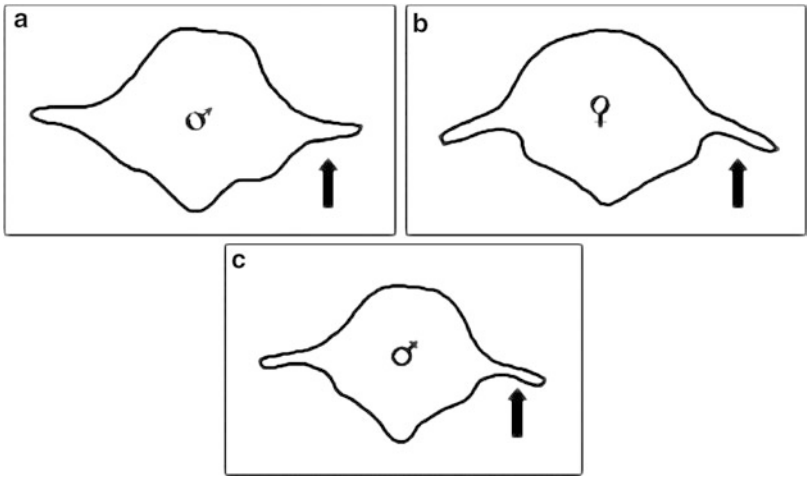

Zooarchaeology: Methods of Collecting Age and Sex Data, Fig. 8 Mean shapes of sheep atlases for (**a**) male, (**b**) female, and (**c**) wether (From Ruscillo 2003)

analysis, for example, bone morphology can be compared between the sexes in quantifiable terms. These techniques are particularly useful for examining tertiary sexual characteristics which are not immediately visible to the eye.

Ruscillo (2003) explores tertiary sexual characteristics using what she has called the "Mean Shape Method." By digitally outlining profiles of selected bone elements using a statistically sound number of specimens of known sex, eigenshape analysis can produce an average shape for each element by sex. Profiles were obtained by the use of profile gauges. These mean shapes can then be compared to the shapes of the archaeological specimens to determine the sex of the individual. The method was fruitful for cervids and bovids and indicated several bones that were sexually dimorphic. The transverse processes of the atlas were significantly dimorphic for both families of animals. Figure 8 shows the mean shapes of sheep atlases produced after scanning over 30 individuals of each sex including males, females, and wethers (castrated males).

Male and female bovids and cervids showed significant differences between shapes of the glenoid process (the articular part of the scapula) and the astragalus. For sheep, the transverse processes of the atlas, the astragalus, and the obturator foramen each showed a third shape corresponding to wethers. In general, the mean wether bone shapes are characterized as having the morphology of females with the size of males. Presumably, similar shapes would be expected of castrated goats, cattle, and cervids.

Table Test Sexing canid remains can be difficult unless a whole skeleton is present with a baculum. Isolated bones of canids can be problematical to sex because millennia of breeding the species have produced highly variable sizes and even bone shapes. However, a complete mature canid humerus can help suggest the sex of the animal with 85 % accuracy. The "Table Test" is described by Ruscillo (2006b) and is fairly simple. The complete humerus is placed on its anteroventral side on a level surface. If the humerus falls over to one side, then it is likely a male individual; if it rests stably on its anteroventral side, then it is more likely to be a female specimen, though several male humeri were stable as well in individuals which were lap animals and did not exercise "normal" male behaviors. These individuals may have been castrated as well. The morphological difference being measured by this simple test is the size of the deltoid tuberosity which is significantly more developed in most male individuals because of the more robust deltoid muscle.

Future Directions

Much work has been done in the past 60 years to identify useful methods of ageing and sexing

animal bones in the field and in the laboratory. There is still much to do, however. With advancements in technology, future work in ageing and sexing will no doubt involve more microscopic, chemical, and molecular analytical methods, as these become more accessible and affordable.

Osteohistology

Osteohistology is defined as the study of the microscopic structure, chemical composition, and function of bone. The stage of structural development of bone can be observed and recorded by viewing cross sections of bone under the microscope. The patterns of lamellar bone, osteons, resorption lacunae, and Haversian canals correspond to different ages. There are six primary stages of long bone structure in cross section (shown in Dammers 2006: 23; Fig. 8). With a detailed study of the bone structure of each taxon, age profiles can be recorded and used to age archaeological specimens. Many of these studies have yet to be done for specific taxa, but an overview of how this method can be applied to different species is explained in Dammers (2006). The development stages and patterns of bone structure are also distinctive of sex. Future work in this area is likely to prove invaluable.

Imaging

Medical imaging and 3D modeling technologies may be used to refine morphometric analysis for distinguishing between the sexes. Magnetic resonance imaging (MRI) technologies have, as yet, seen limited use with archaeological animal bone. Although radiography is currently preferred for inquiries related to bone, the image produced by MRI is superior for reproducing any object accurately in three dimensions, recording morphological and even histological information. With further refinement, minute histological details of bone structure may be more readily identified and accurate ageing assessed from bone samples.

There are many programs which have enabled the 3D imaging of objects. These programs replicate the specimen under examination by plotting coordinates on three planes. By comparing the location of a specific point or group of points plotted on the surfaces of an object, the principle components of shape can be measured and contrasted. Eigenshape analysis has already been used in comparing the eigensurface on paleontological species (MacLeod & Krieger 2007). This kind of technology will be especially useful for comparing sexual dimorphic differences in any species.

DNA and Molecular Studies

Every year strides in genetic technology are made, and improvements in cost and reliability are starting to make molecular sexing a viable option in archaeology. Genetic studies based on polymerase chain reaction (PCR) are already being implemented in projects involving various aspects of the origins of domesticated species.

In a study by Telldahl et al. (2012), for example, sex classifications based on measurements of cattle metapodia are corroborated by molecular studies. A sample of archaeological individuals was sexed using both conventional morphometric criteria and genetic analysis, and the results compared to establish the accuracy of the former. No doubt as DNA analysis becomes more mainstream and affordable, sex determination from bone remains will become easier and more accurate.

The future of ageing and sexing methods in zooarchaeology will likely be imaging and biomolecule based. New techniques will give rise to more accurate and more frequent identifications of age and sex, permitting creation of mortality profiles for animal populations from communities in the past. This should in turn give rise to a clearer picture of economics, trade, ritual, and daily lifeways of ancient peoples.

Cross-References

▶ Biometry in Zooarchaeology
▶ Geometric Morphometrics and Environmental Archaeology

▶ Secondary Products and the "Secondary Products Revolution"
▶ Zooarchaeology

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Zvelebil, Marek

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Basic Biographical Information

Marek Zvelebil (1952–2011) was born in Prague, capital of the then-communist country of Czechoslovakia. He relocated to the west in his teens with the rest of his family and studied at Sheffield and Cambridge. He spent 30 years as part of the faculty in Sheffield until his death in 2011.

Marek's interests were highly diverse. His mastery of eastern European languages enabled him to study shamanism among Siberian hunter-gatherers; he collaborated with his father, the eminent linguist Professor Kamil Zvelebil of Leiden University, in disputing the Early Neolithic origins of the Indo-European language group; he collaborated in fieldwork projects in Ireland and the Outer Hebrides; and after the fall of communism, he started to work in the Czech Republic. But Marek is mainly known for his work on the hunter-gatherers of the Baltic region and their part in the transition to agriculture. His Ph.D. was on this topic. His study visits to Finland were always via ferry and car – not by air – for fear that a flight approaching a fog-bound Helsinki might be diverted to nearby Leningrad (now St. Petersburg), potentially resulting in his enforced return to Communist Czechoslovakia.

Major Accomplishments

Marek was part of the small group of scholars who argued that hunter-gatherer lives did not have to be "nasty, brutish, and short," and that in favorable areas like the Baltic coasts, hunter-gatherer populations might be as dense and society as hierarchical as those of early farmers. The "availability model" for the origins of agriculture in the Baltic made the hunter-gatherers active players in the transition to agriculture by defining three phases in the process (Zvelebil & Rowley-Conwy 1984):

- The availability phase: hunter-gatherers are aware of agriculture practiced by neighboring farmers but adopt little or none of it; agriculture produces <5 % of food.
- The substitution phase: farming is being adopted and the two ways of life are in competition due to scheduling clashes between farming and foraging; agriculture produces 5–50 % of food.
- The consolidation phase: farming matures and spreads into suboptimal parts of the region; agriculture provides >50 % of food.

Marek further developed this model 2 years later, in a paper (Zvelebil 1986) from which Fig. 1 is taken. This model was in direct opposition to immigration or "wave of advance" models of the spread of agriculture into Europe, in which the hunter-gatherer population did not even feature. In immigration models, the first appearance of any domesticated species constituted the "Neolithic Revolution," but in the availability model, revolutionary change occurred only towards the end of the substitution phase and the transition to the consolidation phase.

The existence of lengthy availability phases of a millennium or more in various parts of the

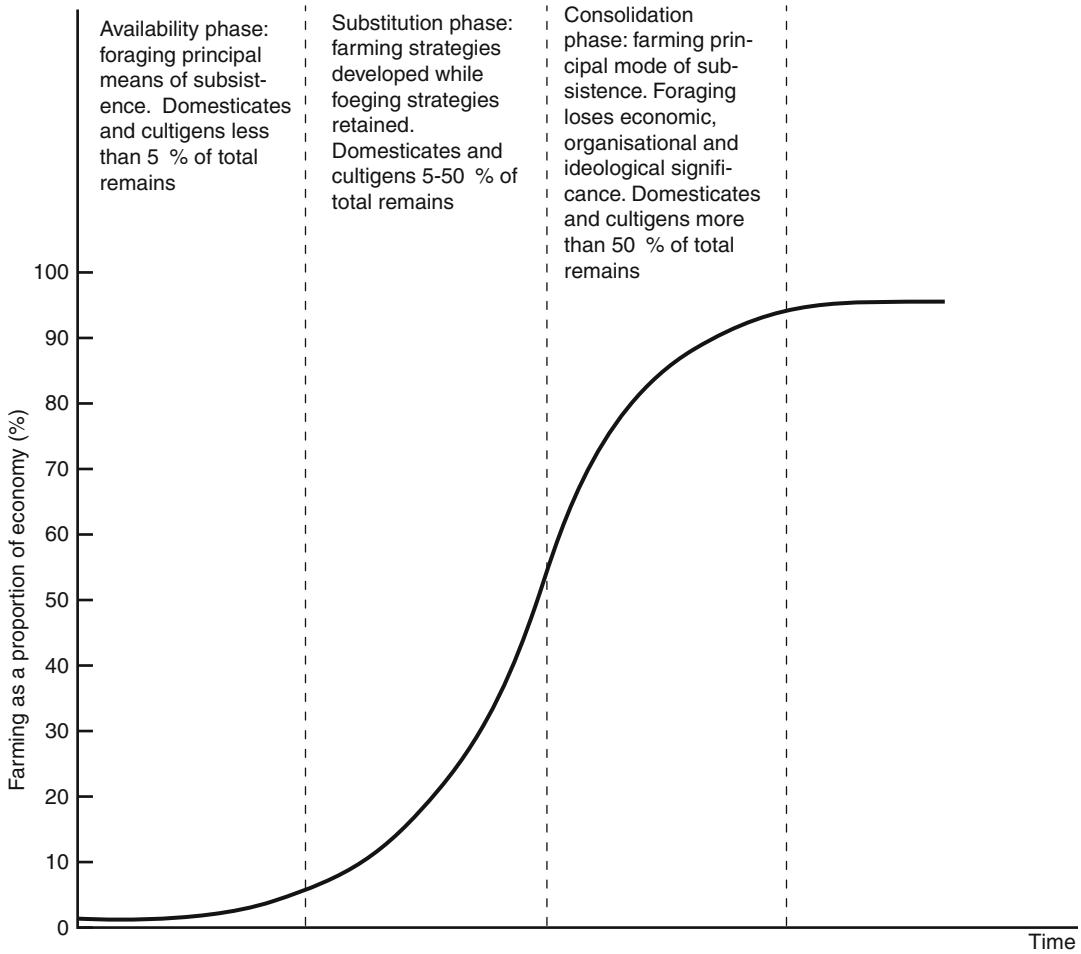

Zvelebil, Marek, Fig. 1 Chart showing the "availability model" (Reproduced from Zvelebil 1986, Fig. 3)

Baltic, when the agricultural spread halted, suggested that dense local populations of hunter-gatherers saw no reason to adopt farming. These dense populations were based on their sophisticated use of abundant but highly seasonal resources, which allowed long-term demographic expansion and economic intensification. The way Marek viewed this is shown in Fig. 2 (from Zvelebil 1995): population density (the dotted line) increases inexorably; each time it impacts the regional resource productivity ceiling (the solid line), a new solution is found (the practices on the vertical axis), allowing population density to increase once more. His major reviews of the exploitation of native plant and animal species suggested a degree of local domestication by hunter-gatherers before the advent of Neolithic farming (Zvelebil 1994, 1995).

Marek focused attention on the zone where hunter-gatherers and farmers met. He stressed the importance of connections across the boundary: ceramics, stone axes, and perhaps some agricultural items were documented moving north from the farmers to the hunter-gatherers. Commodities moving south were less easily visible in the archaeological record but might have

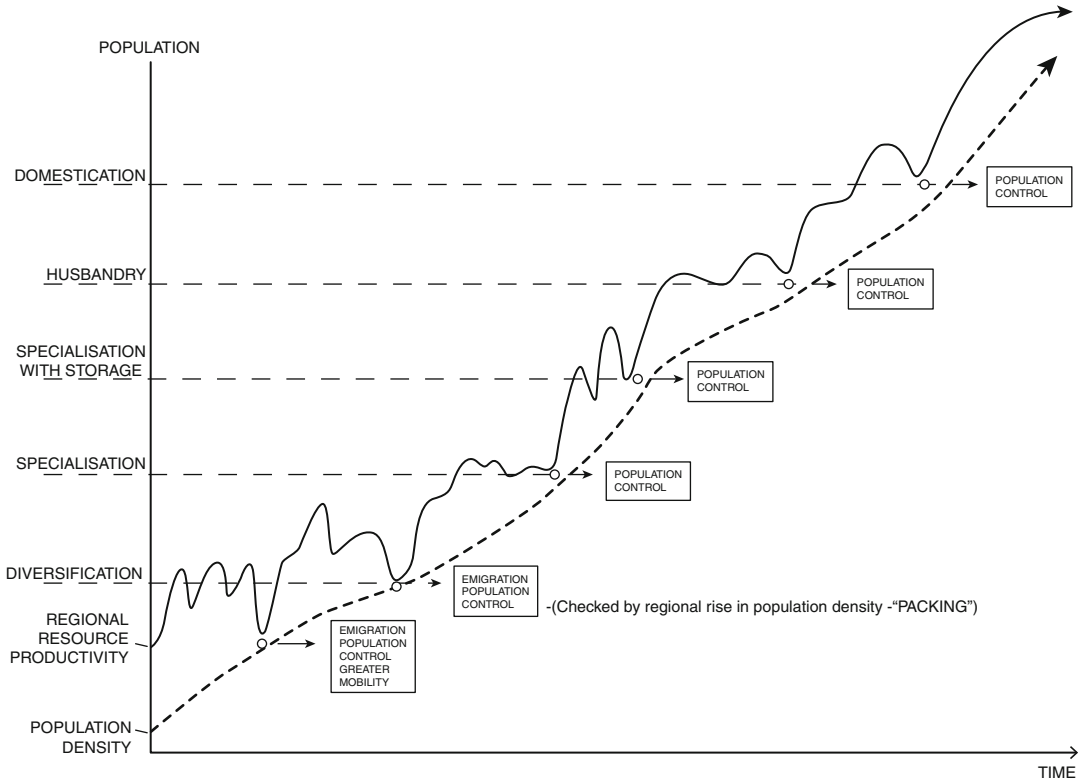

Zvelebil, Marek, Fig. 2 Chart of increasing hunter-gatherer population density and its economic outcomes (Reproduced from Zvelebil 1995, Fig. 2)

included forest products such as furs and honey, seal fat, and also amber from the Baltic (Zvelebil 1996, 2006). For a long period this interaction would have been stable and balanced, as shown in Fig. 3 (left). But the longer the frontier lasted, the more disruptive its effects would be on hunter-gatherer society. Prestige items imported from the farmers would lead to competition between hunter-gatherers, disrupting the social fabric. This would lead to the "commercialization" of some hunter-gatherer procurement activities, to obtain exportable commodities for exchange with the farmers. Hypergyny – the outmarriage of hunter-gatherer women to farmers and the consequent lack of mates for some male hunter-gatherers – would further destabilize things. Both competition and hypergyny would cause disruption to the hunter-gatherer society and might lead to farmers encroaching upon hunter-gatherer lands, initially to obtain their own forest products but subsequently to settle areas suitable for agriculture (Fig. 3 right).

This is probably the most in-depth consideration of any hunter-gatherer/farmer interaction in Europe. Needless to say, modifications have been suggested to some aspects of the intensification/population growth model (e.g., Rowley-Conwy 2004), but Marek's treatment remains the core study for the Baltic area, standing as something of a model of its kind. It should not be assumed that the Baltic pattern will be replicated everywhere: one attempt to apply it to the Adriatic (Zvelebil & Lillie 2000) has drawn criticism because of the lack of forager-farmer continuity in the region (Biagi & Spataro 2002). But the availability model can be employed as a useful search tool in any area.

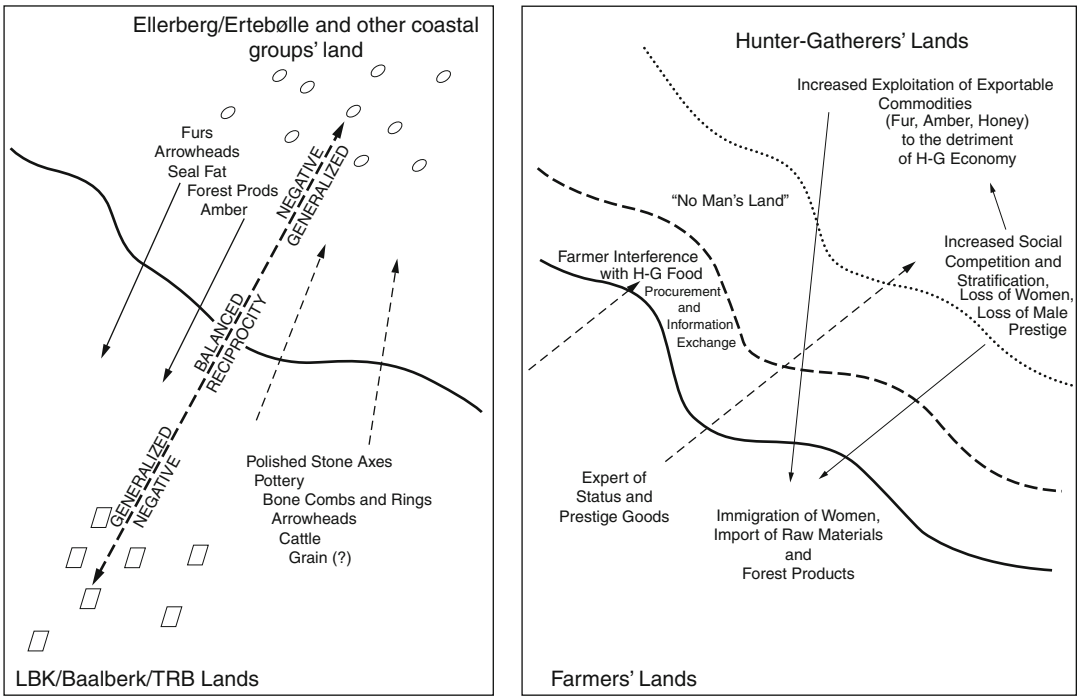

Zvelebil, Marek, Fig. 3 *Left*: model of balanced system of exchange between Ellerbek/Ertebølle hunter-gatherers and LBK/Baalberg/TRB farmers (Reproduced from Zvelebil 1996, Fig. 18.5. Marek's spellings of place-names were sometimes idiosyncratic!). *Right*: model of a destabilized hunter-gatherer/farmer frontier zone (Reproduced from Zvelebil 1996, Fig. 18.8)

Cross-References

- ▶ Complex Hunter-Gatherers
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunting and Hunting Landscapes
- ▶ Pig: Domestication

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Owing to a mistake on the part of Springer the name and address of Geoffrey Clark, was wrong in the initially published version.

The correct affiliation and address is:
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